STORMWATER MANAGEMENT AND POLLUTION PREVENTION PLAN

HILLSIDE COMMONS STUDENT HOUSING BLODGETT DRIVE

CITY OF ONEONTA
COUNTY OF OTSEGO
STATE OF NEW YORK

PREPARED FOR:
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I. BACKGROUND INFORMATION

A. Project Background

Keystone Associates Architects, Engineers, and Surveyors, LLC was retained by Newman Development Group of Vestal, New York to complete a Stormwater Management and Pollution Prevention Plan (SWPPP) to summarize the stormwater management and sediment and erosion control activities associated with site development for the proposed student housing development located on a 15.64-acre site on Blodgett Drive in the City of Oneonta, Otsego County, New York (see Figure 1 - Location Map, Figure 2 – USGS Vicinity Map, and Figure 3 – 2006 Aerial Photo).

B. Purpose of Stormwater Plan Report

The purpose of this Stormwater Management and Pollution Prevention Plan (SWPPP) is to identify pre-development and post-development hydrologic and hydraulic conditions, and to delineate the stormwater control practices required to prevent, minimize, or mitigate potential water quality and quantity impacts associated with stormwater disposal for the proposed facility.

In addition, this report identifies the submittals and signatures required to meet the regulatory requirements for a New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges for Construction Activities. (see Appendix A - Stormwater Discharge Permit Information). Appendix A contains a Notice of Intent Form (NOI), a sample Contractor Certification Statement Form, and permit signatory requirements. The NOI form should be finalized, executed, and submitted to NYSDEC as required. The contractor's and subcontractor's certification statements should be executed and submitted with any contract agreement.

C. Regulatory and Permit Requirements

The Federal Water Pollution Control Act of 1972 (with amendments), also referred to as the Clean Water Act (CWA), provides that stormwater discharges associated with industrial activity from a point source (including discharges through a municipal separate stormsewer system) to waters of the United States are unlawful, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In New York, which is a NPDES-delegated state, this is accomplished through the administration of the SPDES program administered by the NYSDEC.

A discharge that is subject to the NPDES regulations may be eligible to obtain coverage under a general permit by submitting an NOI to the administrator of the program, the NYSDEC. The NOI's are to be submitted to their Albany, New York office. Except when in compliance with the General Permit, or with a duly authorized permit from NYSDEC, discharge of stormwater associated with industrial activity by any person shall be unlawful.

The General Permit (Permit No. GP-0-10-001, effective January 29, 2010) (see Appendix A – Stormwater Discharge Permit Information) may authorize all discharges of stormwater associated with construction activity (those sites or common plans of development or sale that will result in the disturbance of one or more acres total land area) and where stormwater discharges from a point source to waters of the United States including wetlands.

The City of Oneonta is not currently listed as an MS4, therefore a signed MS4 acceptance form is not required for submittal with the NOI. However, the City will review and comment on the report.

D. Project and Site Description

This project involves the construction of a student housing development consisting of one 40,470 square foot 4-story residential building with associated access drives and parking areas are planned for construction. The entire 15.64-acre site is being modeled as part of this report. The drainage model also includes off-site areas for a total drainage area of 23.1 acres.

Offsite work associated with this project involves the replacement of approximately 1,700 lineal feet of existing water main in Blodgett Drive from Bugbee Drive to the proposed development with new 12 inch diameter water main.

Drainage, Stormwater Disposal and Natural Resources.

The 15.64-acre project site slopes steeply from northeast to southwest. Two single story houses currently occupy the property while the majority of the parcel is wooded. The surface runoff sheet flows across the property onto adjoining properties to the west owned by SUNY Oneonta. There is a small drainage area contributing to surface runoff that drains into an existing stormsewer system along Blodgett Drive that begins at its intersection with Farone Drive and continues southerly along the road until discharging into a drainage channel that continues

westerly downhill. The stormwater runoff from the site ultimately drains into the Susquehanna. The Susquehanna River is classified as an unprotected "Class C" stream. A review of available data indicates that mapped New York State protected waters were not identified in the vicinity of the project's drainage area. There are no New York State rare or protected plants or animals within the mapped radius of the site(see Figure 4 – NYSDEC Environmental Resource Map).

Historic Places. According to the New York State Historic Preservation Office, the site is located within mapped archeo sensitive areas (see Figure 6 – NYS Historic Preservation Office GIS Map). A Phase I Archaelogical Survey for this site was completed by Binghamton University. The results of the survey indicated there were no historically significant artifacts on the site. Based on this information, written permission to proceed from the New York State Office of Parks, Recreation and Historic Preservation Field Services Bureau has been requested.

According to the NYS Stormwater Interactive Mapper, the site is not located within a watershed improvement strategy area, or within an MS4 regulated area (see Figure 7 – NYS Stormwater Interactive Map).

Wetlands/Floodplains.
Based on the United States Fish & Wildlife Service National Wetland Inventory online wetland mapping resource, there are no known federally regulated wetlands identified within or near the site (see Figure 5 – National Wetland Inventory Map). State regulated wetlands have also not been identified in the vicinity of the site (see Figure 4 – NYSDEC Environmental Resource Map).

According to the Federal Emergency Management Agency (FEMA) Community Panel Number 360667 0005B, dated September 29, 1978, City of Oneonta, Otsego County, New York, there are no mapped flood hazard zones (100-yr. or 500-yr.) inside the project limits (see Figure 8 – Flood Zone Map). The nearest mapped flood zones are along Oneonta Creek with is located along and running parallel to East Street.

Soils. According to the United States Department of Agriculture Natural Resource Conservation Service's online web soil survey, the soils at the site are classified as Bath channery silt loam (BfD), Lordstown, Chadakoin, and Manlius soils (LrE), Mardin channery silt loam (MeC) and Oquaga-Arnot complex (OgC). Generally, the Mardin channery silt loam is found in the western portion of the site, and the Manlius soil is found on the eastern of the site. The remainder of the soil groups are along the eastern and southern edges of the subject property. (see Figure 9 – Soils Map). The Mardin series consists of deep, gently sloping to steep, well drained soils that have formed acid or low-lime glacial till. The Manlius series consists of deep, poorly drained, medium textured soils that formed in somewhat poorly drained loamy soils. Other properties of these soils are summarized in Table 1 - 1 Soil Types and are described and detailed in Appendix B – Soils Information.

Table 1-1 Soil Types

Symbol	Name	% Slopes	SG	Depth To: GW	Depth To: BR	Perm. In/hr
BfD	Bath channery silt loam	15-25	C	2.0-3.3	>60	0.6-2.0
LrE	Lordstown, Chadakoin, and Manlius	25-50	C	1.2-2.3'	20-40	0.6-2.0
MeC	Mardin channery silt loam	8-15	D	1.2-2.3'	NA	0.0-0.2
OgC	Oquaga-Arnot complex	8-15	C	NA	20-40	0.6-2.0

Legend/Definitions

BR = Bedrock

Channery = a soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis.

GW = Groundwater

NA = Not Available

Perm. = Permeability (based on upper soil horizons). Based on Otsego County soils data.

SG = Soil Group

E. Existing (Pre-Development) Conditions

The site is located at the north end cul-de-sac of Blodgett Road in the City of Oneonta. The City Limits compose the eastern, northern and western edges of the property. The site and modeled drainage areas are composed of undeveloped woodlands with two single family homes. There are no defined waterways on the site. Storm drainage generally sheet flows from the north east corner of the property to the southwest corner. The end of Blodgett Road terminates near the southwest corner of the property. The stormwater runoff eventually enters Oneonta Creek which is a tributary of the Susquehanna River. See Figure 10 – Pre Development Drainage Area Map.

F. Proposed Future (Post-Development) Conditions

This project involves the development of a 40,470-square foot 4-story residential building on the 15.64-acre site. A paved parking lot (238± stalls) is proposed on the north and west sides of the building. Blodgett Drive will serve as the entrance/exit at the southwest corner of the site. The layout of the building and parking is included in the stormwater plan as a basis for the preparation of the hydrologic, hydraulic, water quality and water quantity computations and control plan for the site. See Figure 11 – Post Development Drainage Area Map.

The off-site water main replacement will be in the paved roadway and will be repaved when complete. No computations were performed for this part of the project since there will be no changes to the land cover or drainage patterns. However, an erosion and sediment control plan has been prepared to accompany project plans for the water main replacement.

II. GREEN INFRASTRUCTURE PLANNING AND PRACTICES

A. Stormwater Management Planning

To mitigate the overall hydrological impact to the surrounding area due to the proposed development, a green infrastructure approach for stormwater management was taken through the implementation of site planning techniques and runoff reduction techniques. The goal of this approach is to maintain, as much as possible, the pre-development hydrological conditions such as pre-construction infiltration, peak runoff flow and discharge volume as well as minimizing the concentrated flow in order to address treatment in a distributed manner prior to reaching the collection system. In so doing, the overall runoff produced will be minimized as will the need for collection, storage and treatment. In order to address this approach the following five-step process that is presented in the New York State Stormwater Management Manual was utilized.

1. Site planning to preserve natural features and reduce impervious cover,
2. Calculation of the water quality volume for the site,
3. Incorporation of green infrastructure techniques and standard Stormwater Management Practices (SMPs) with Runoff Reduction Volume (RRv) capacity,
4. Use of standard SMPs, where applicable, to treat the portion of water quality volume not addressed by green infrastructure techniques and standard SMPs with RRv capacity, and
5. Design of volume and peak rate control practices where required.

A summary of the Green Infrastructure (GI) planning tools found in the Stormwater Management Manual and an explanation as to how each was either implemented or found to be non-applicable can be found in Table 2-1 – Green Infrastructure Planning and Practices as well as Table 2-2 – Green Infrastructure Techniques and Practices for Runoff Reduction. (NOTE: These tables provide only a general overview of each practice; reference the NYS Stormwater Management Design Manual for complete standards, details, specifications, and design variations).

B. Runoff Reduction Volume (RRv)

The Runoff Reduction Volume (RRv) is the reduction of the Water Quality Volume (WQv) on site through the implementation of a series of various green infrastructure techniques, standard stormwater management practices with runoff reduction capacity and good operation and maintenance. The Water Quality Volume is the runoff during the initial stage of a storm event that contains most runoff-related contaminants (salt, sand, etc.) transported from land (particularly impervious surfaces). If one hundred percent of the WQv cannot be treated, documentation must be provided justifying the evaluation of each of the green infrastructure planning and reduction techniques and identifying the specific limitations of the site and explaining why each of the techniques that are not used are technically infeasible. Projects that do not achieve one hundred percent runoff reduction must, at a minimum, reduce a percentage of the runoff from the proposed impervious areas on site specified by the Specific Reduction Factor which is based on the hydrologic soil group present on the site and treat the remaining WQv

using standard stormwater management practices.

For this project, newly constructed impervious areas which require Green Infrastructure practices to treat the required RRv includes the proposed residential building and pave parking lots. In Appendix C, both the total and minimum required WQv calculations are provided. See the Stormwater Management Plan Worksheets for New Projects in Non-Impaired Watersheds. Green Infrastructure Technique Worksheets are also provided to show the required RRv reductions. For this project, approximately 22% of the WQv (RRv) was reduced at each catchment area using the GI practices described below. In addition, a proposed stormwater pond will be implemented to provide additional water quality volume above permit requirements.

Soil test cuts were performed on the site to determine the viability for infiltration techniques to reduce stormwater runoff. The test cuts encountered solid hard pan at a depth of 4 feet precluding the use of any infiltration practices.

The impervious parking lot area will be treated using a dry swale with underdrain that will discharge into the proposed stormwater detention pond. The building roof top will drain to the surface across stormwater planters or dry swales with underdrains. The planters and dry swales. will also discharge into the stormwater detention pond. The design goal in reduction of WQv in soil group C and D soils is 30% and 20% reduction respectively and will be met. Drawings including location, size and details are provided in Appendix F – Stormwater Management Plans, Details, and Specifications.

C. Channel Protection Volume (CPv)

Channel protection volume protects stream channels from excessive erosion caused by the increase of flow at or near bankful levels attributed to urbanization. CPv is provided by 24 hour extended-detention of the post-developed one-year design storm.

The controlled outlet from the stormwater detention pond will provide for the channel protection volume below the preexisting conditions to mitigate and reduce the impact of stormwater runoff on the downstream stormwater facilities.

The computations for the required and provided water quality volume (WQv) and channel protection volume (CPv) for the proposed development are included in Appendix C and are summarized in Table 2-3 Runoff Reduction and Channel Protection Volume Control Summary.

Table 2-1 – Green Infrastructure Planning and Practices

Group/Practice	Description	Application
Preservation of Natural Resources		
Preservation of Undisturbed Areas	Delineate and place into permanent conservation easement undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Approximately 7.3 acres of the 15.64-acre site will be designated as a conservation easement by the owner through deed restriction. However, due to topology the area does not qualify as a NYSDEC conservation easement.
Preservation of Buffers	Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines, and wetlands.	There are no perennial streams, rivers, shorelines or wetlands in the vicinity of the project site, therefore the Preservation of Buffers was not applicable.
Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	Site planning techniques included placing the proposed facilities near existing grades and previously cleared areas to reduce the amount of clearing and grading required if the project was designed otherwise. The project has been designed to utilize the existing access and utilities and limit disturbance to natural areas. Stormwater management facilities were designed to mimic pre conditions as best possible.
Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests, and critical habitats by locating development to fit the terrain in areas that will create the least impact.	The Site is located within the radius of archeo sensitive areas. A Phase I survey has been completed and approval from SHPO has been requested to clear the area of any archeo impacts prior disturbing the area.

Open-Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	The site was strategically designed to to limit disturbance to sensitive areas, reduce clearing and grading requirements, and use existing impervious access routes in order to limit the need for new impervious surfaces.
Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of practices such as downspout disconnections, grass channels, filter strips, and tree clusters.	Only limited soil disturbance is proposed beyond the proposed impervious areas. There are no areas on the site to practice soil restoration other than placing topsoil, seeding and mulching all disturbed areas.

Table 2-1 – Green Infrastructure Planning and Practices (continued)

Group/Practice	Description	Application
Reduction of Impervious Cover		
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area.	The project has been designed to utilize the existing roadway infrastructure, eliminating increases in impervious area where possible.
Sidewalk Reduction	Minimize sidewalk widths and lengths to reduce site impervious area.	The use of proposed sidewalks has been reduced during design development to reduce site impervious areas. Planned sidewalk areas have been reduced to what is considered necessary for this project.
Driveway Reduction	Minimize driveway widths and lengths to reduce site impervious area.	The project has been designed to utilize the existing roadway infrastructure where possible, eliminating further increases in impervious area.
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious area.	There are no cul-de-sacs proposed for this project.
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	The building footprint has been reduced during design development to maximize the available building footprint.
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	The parking lot size was maximized using a narrow 9' wide parking space in lieu of the typical 10' wide space normally used for larger parking lots. All other parking spaces are at the minimum allowable under City of Oneonta zoning code.

Table 2-2 –Green Infrastructure Techniques and Practices for Runoff Reduction		
Group/Practice	**Description**	**Application**
Runoff Reduction Techniques (Area and Volume Reduction)		
Conservation of natural areas	Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers by restoring and/or permanently conserving these areas on a site.	Pre-development hydrologic and water quality characteristics of undisturbed natural areas will be retained by avoiding disturbance in these areas on-site. Stream and wetland buffers are not applicable at the Site. Building and parking lot elevations and stormwater runoff have been strategically designed to retain the pre-development hydrologic conditions as best possible. See Table 3-3 Summary of Stormwater Hydrology.
Sheetflow to vegetated buffers	Undisturbed natural areas such as forested conservation areas and stream buffers or vegetated filter strips and riparian buffers can be used to treat and control stormwater runoff from some areas of a development project.	The use of a vegetated buffer for the project is not applicable. There are no streams within or adjacent to the site.
Vegetated open swale	The natural drainage paths, or properly designed vegetated channels, can be used instead of constructing underground stormsewers or concrete open channels to increase time of concentration, reduce the peak discharge, and provide infiltration.	The project has been designed to utilize existing drainage patterns while avoiding underground stormwater retention to increase time of concentration and reduce peak discharge and provide infiltration where possible. See Appendix F.

Tree planting / tree box	Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees can be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.	Careful planning has been implemented to reduce necessary tree clearing activities on-site. Tree planting is encouraged wherever possible at the Site.
Disconnection of rooftop runoff	Direct runoff from residential rooftop areas and upland overland runoff flow to designated pervious areas to reduce runoff volumes and rates.	See Sheetflow to Vegetated Buffers above. Although the roof gutters will not be directly connect to a stormsewer, their discharge to stormwater planters negates the credit available for this practice.
Stream daylighting for redevelopment projects	Stream Daylight previously-culverted/piped streams to restore natural habitats, better attenuate runoff by increasing the storage size, promoting infiltration, and help reduce pollutant loads.	Stream daylighting is not applicable for this project.

Table 2-2 –Green Infrastructure Techniques and Practices for Runoff Reduction (continued)		
Group/Practice	**Description**	**Application**
Runoff Reduction Techniques		
Infiltration Trench	Infiltration trenches are shallow excavations that are lined with filter fabric and filled with stone to create underground reservoirs for stormwater runoff.	Infiltration practices are not applicable to this site due to limitations of existing soil conditions.
Rain garden	Manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression.	Stormwater planters were designed to accommodate the roof gutters. See Appendix F for details.
Green roof	Capture runoff by a layer of vegetation and soil installed on top of a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering conveyance system.	Based on the size of the building roof and required loading of 100 lbs/s.f., the use of a green roof was not technically feasible for this project. Instead, careful implementation of site planning technique, GI practices and standard stormwater management control measures were used to limit disturbance and treat water quality and quantity at the project site.
Stormwater planter	Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve water quality.	Stormwater planters are proposed for use along the building perimeter where roof gutters are located.
Rain tank/Cistern	Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities.	Although the use of rain tanks/cisterns has not been incorporated within this design, the use of such practices in encouraged where applicable at the Site.

Porous Pavement	Pervious types of pavements that provide an alternative to conventional paved surfaces, designed to infiltrate rainfall through the surface, thereby reducing stormwater runoff from a site and providing some pollutant uptake in the underlying soils.	The use of pervious pavements as alternatives to asphalt or concrete walks and driveways is encouraged in the future where applicable. See Appendix F for details.

Table 2-3 Runoff Reduction and Channel Protection Volume Control Summary

Description	Required	Provided	Meets Permit
Water Quality Volume (WQv) (90% Storm)	(ac-ft)	(ac-ft)	Requirements?
New Parking w/ D.S.	-	0.036	Yes
New Building w/S.P. & D,.S.	-	0.059	Yes
Pond 1	-	0.184	Yes
**Total WQv	0.279	0.279	Yes
Channel Protection Volume (CPv) (1-yr Storm)	(ac-ft)	(ac-ft)	
Pond 1	0.694	0.720	
Total CPv	0.694	0.720	Yes

*D.S is Dry Swale with underdrain

*S.P. is Stormwater Planter with underdrain

*See Appendix C for Stormwater Management Plan Worksheets and Associated GI Practice Worksheets.

** See Stormwater Management Plan Worksheets for WQv calculations.

Since the total RRv has been achieved by treating 100% of the WQv through implementation of GI practices and the detention pond, no additional water quality treatment is required. Therefore the requirements for application under the New York State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities (NYSDEC 2010 manual) will be met.

III. COMPARISON OF PRE-DEVELOPMENT TO POST-DEVELOPMENT RUNOFF

A. Methodologies

Stormwater runoff calculations were performed using the HydroCad software (SCS TR-55 method) for pre- and post-development peak flows and to design the detention systems (micropool extended detention pond, dry swales and stormwater planters). Under the SCS TR 55 method, 1, 2, 10, 25, 50, and 100-year storm events were modeled and compared for pre-development and post-development runoff.

Under predevelopment conditions, the drainage area was divided into two subbasins. Drainage Area 1 (11.10 acres) sheetflows into drainage swales and stormsewer systems along Blodgett Drive. The collection systems discharge eventually into Oneonta Creek.

Drainage Area 2 (11.30 acres) sheetflows overland downstream to the west across SUNY Oneonta athletic fields. A combination of existing drainage swales, culverts and stormsewers collect the runoff ultimately discharging into a branch of Oneonta Creek.

Under Post Development Conditions, in general, the existing drainage patterns will be maintained. The two discharge points used for pre-development conditions will be used for post-development conditions. A stormwater treatment system consisting of stormwater planters (with underdrains), a dry swale (with underdrain) and a stormwater detention basin are proposed to meet or exceed pre-development runoff conditions.

The drainage basins were divided into three sub areas. Drainage Area 1 (3.67 acres) contains an existing developed lot with an apartment housing complex. It sheet flows in a southwesterly direction into a stormsewer inlet located at the intersection of Blodgett Drive and Farone Ave. Drainage Area 2 was divided into Drainage Area 2A and Drainage Area 2B due to the proposed construction of a diversion swale to be used to divert undeveloped drainage runoff from the site to be developed.

Drainage Area 2A (8.09 acres) is primarily a wooded area to be diverted around the proposed construction. It sheetflows into the diversion swale where it will be collected in a proposed stormsewer that discharges into the proposed stormwater detention basin.

Drainage Area 2B (7.93 acres) consists of the proposed development. The parking lot area will sheet flow into a proposed dry swale. The runoff from the dryswale will be collected with a

proposed stormsewer that will also be connected to the proposed stormwater planters and dry swales which are around the building perimeter. All of the proposed development area will be collected and discharge into the proposed stormwater detention basin.

Drainage Area 3 (3.12 acres) consists of the existing off-site portion of the drainage area that enters Discharge Point #2. No work is proposed in the area. It consists of an undeveloped portion of the SUNY athletic fields that is defined by an existing drainage swale along its perimeter.

B. Calculations

For the hydrologic and hydraulic assumptions used and results calculated for pre- and post-development peak flows, see Appendix D - Hydrologic and Hydraulic Computations. Appendix D includes the input data, time of concentration (Tc), calculation of runoff curve number (CN), peak flows for each design storm event, pre-development and post-development hydrologic and hydraulic computations, and results for existing and proposed drainage areas for the proposed development for 1, 2, 10, 25, 50, and 100 year storm events. The pond detention system design parameters are summarized in Table 3-1 Pond 1 Summary and Table 3-2 Pond 2 Summary. The pre-development and post-development drainage flows for the project are summarized in Table 3-3 Summary of Stormwater Hydrology.

As stated above, there were no calculations performed for the off-site water main replacement work since it will be within the paved roadway and will be returned to paved roadway.

Table 3-1 Pond 1 Summary

Type of Pond – Micropool Extended Detention Pond (NYSDEC P-1)

Feature	Elev.	Remarks
Top of Bank/Berm	1544.00	Pond will be overtopped if this elevation is exceeded.
Auxiliary Spillway – 10' wide	1543.55	For major storms > 100 year and emergency conditions
100-yr Storm Event	1543.02	0.53 feet of freeboard.
1.5'x1.5' Outlet Structure Crest	1538.90	Elevation of top of concrete outlet structure.
10-yr Storm Event	1540.37	3.19 feet of freeboard.
Inlet Orifice (0.25'dia.)	1534.00	Elevation at which stormwater will begin discharging from pond into outlet structure. Outlet sized for stormwater quality control. Discharges through Outlet Structure to outlet pipe.
Outlet Pipe (18" dia.)	1526.00	Discharge from Outlet Structure to daylight.
Bottom of Main Pool	1530.00	Provides static main pool depth of 4.0 feet.
Top of Forebay Bank/Berm	1558.00	Channel provided into main pond.
Bottom of Forebay	1554.00	Provides static forebay pool depth of 4.0 feet.

Table 3-2 Summary of Stormwater Hydrology

Runoff to Blodgett Drive				Storm Event/Peak Flow (cfs)					
Description	Area	CN	Tc	1-Yr.	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Rainfall (inches)	NA	NA	NA	2.4	2.8	4	4.8	5	5.9
Pre 1	11.1	77	0.2933	8.28	11.81	23.73	32.25	34.56	44.66
Post 1	3.674	86	0.1317	7.02	8.98	15.07	19.19	20.22	24.86
Post 2A	8.377	71	0.4467	2.62	4.26	10.32	14.95	16.16	21.79
Post 2B	7.896	88	0.2717	12.63	15.97	26.21	33.09	34.82	42.55
Post 2A & 2B	16.273	na	na	14.21	18.82	34.01	44.75	47.49	59.96
Post 2A&2B w/ Pond	16.273	na	na	1.02	4.14	14.23	18.47	19.4	23.09
Total Post flow w/Pond	na	na	na	7.34	9.34	16.03	24.55	26.63	36.98
Difference: Post w/ Pond - Pre	5.173	na	na	-0.94	-2.47	-7.7	-7.7	-7.93	-7.68
Percent Difference	na	na	na	-11.35%	-20.91%	-32.45%	-23.88%	-22.95%	-17.20%
Is Post Peak Runoff </= Pre Peak Runoff?				Yes	Yes	Yes	Yes	Yes	Yes

Runoff to SUNY Oneonta				Storm Event/Peak Flow (cfs)					
Description	Area	CN	Tc	1-Yr.	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Pre 2	11.3	74	0.2933	4.76	7.21	15.86	22.33	24	31.77
Post 3	3.12	77	0.2417	2.58	3.67	7.35	10.01	10.68	13.79
Difference: Post-Pre	-8.18	na	-0.0516	-2.18	-3.54	-8.51	-12.32	-13.32	-17.98
Is Post Peak Runoff </= Pre Peak Runoff?				Yes	Yes	Yes	Yes	Yes	Yes

Legend:
cfs = Cubic Feet per Second
CN = Runoff Curve Number
Tc = Time of Concentration
Area measured in Acres

C. Evaluation

The assumptions used in assessing pre-development and post-development drainage conditions include:

- Pre-development runoff curve numbers were based on vegetative conditions prior to any development.
- Pre-development vegetative cover conditions were estimated based on a 2006 orthographic photograph downloaded from the New York State Geographic Information Clearinghouse website. These vegetative conditions were confirmed by subsequent site inspections by Keystone Associates.
- The woods and other vegetative cover curve numbers were based on "good" cover

conditions, as defined in the runoff curve tables.

- Cover conditions for post development were based on the areas of the proposed buildings, access drives and parking areas, sidewalks, and lawns and the wooded areas to remain.
- Impervious areas and cover conditions for post development were based on the area of the buildings, parking areas, drives and lawns.

Water quantity control from the area to be disturbed and developed is addressed by the reduction in peak flows utilizing development of a detention pond. Pond 1 is a Micropool Extended Detention Pond (NYSDEC designation: P-1). The ponds are designed to reduce post-development site peak flows to less than pre-development conditions for 1, 2, 10, 25, 50, and 100-year storm events for the area being discharged to it. In addition to the RRv provided by GI practices, water quality control will be provided by the ponds for the 90% water quality storm (0.9 inch storm) draining from the proposed impervious surfaces (buildings, parking lots, roads, and concrete sidewalks). Therefore, the requirements for application under the New York State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities will be met.

Water quality control will be provided by a dryswale located along the westerly edge of the proposed parking lot, and installation of stormwater planters along the building perimeter. The requirements for application under the New York State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities (NYSDEC 2003 manual) will be met for the combined drainage areas.

IV. STORMWATER MANAGEMENT

A. Stormwater Management Facilities

1. Plans and specifications for the Stormwater management and erosion and sediment control systems are included in Appendix F - Stormwater Management Plans, Details, and Specifications.

2. The stormwater management facilities are generally described as temporary erosion and sediment control facilities during construction (stabilized construction entrance, silt fences etc.), and permanent stormwater control facilities after construction (land grading, grassed swales, dry swales, stormwater planters, check dams, culverts, channels, and revegetation etc.).

V. EROSION AND SEDIMENT CONTROL

A. Temporary Erosion and Sediment Control Facilities

1. Temporary erosion and sediment control facilities to be used during construction by the construction contractor are provided in Appendix F – Stormwater Management Plans, Details, and Specifications. In general, the temporary erosion and sediment control facilities to be used at the site during construction may include, but are not necessarily limited to:
    - stabilized construction entrance(s),

- silt fences and/or hay bales,
- grading,
- inlet protection,
- check dams,
- sediment traps,
- dust control,
- mulching, and
- topsoil and seeding.

B. Permanent Erosion and Sediment Control Facilities

1. Permanent erosion and sediment control facilities are provided in Appendix F – Stormwater Management Plans, Details, and Specifications. In general, the permanent erosion and sediment control facilities to be constructed include, but are not necessarily limited to:
   - land grading,
   - grassed swales and channels,
   - dry swales with check dams,
   - catchbasins with sumps,
   - detention ponds,
   - revegetation of all disturbed areas,
   - Stormwater Planters.

VI. IMPLEMENTATION SCHEDULE AND MAINTENANCE

A. Implementation Schedule (Sequence of Operations)

1. Approximately 8.3 acres of the 15.64-acre site will be disturbed. A phasing plan to limit disturbance to less than 5 acres per phase has been developed for the project. (see Drawing C140 – Construction Staging Plan) The following schedule (sequence of operations) for erosion and sediment control facilities shall be implemented:

   a. Obtain plan approval and building permit from municipal and regulatory agencies.

   b. Submit Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity Under the SPDES General Permit.

   c. Hold Pre-construction Conference.

   d. Contractors shall sign Contractor's Certification Statement prepared for the project.

   e. Install on-site mail box (combination lock preferred) to hold NOI, Permit Notice, SWPPP, and Inspection Reports. A sign providing SWPPP contact names and phone numbers is preferred.

   f. Install temporary stabilized construction entrance/exits as required.

   The Phasing Sequence is defined as follows:

Phase 1:
1. Install silt fence (Phase 1 & Phase 2 areas)
2. Install temporary sediment trap
3. Install temporary cut-off ditch
4. Strip & stockpile topsoil
5. Begin building foundations
6. Install building fill material
7. Install building subbase material

Phase 2:
1. Strip topsoil
2. Construct sediment basin/stormwater facility
3. Topsoil & permanent seed all disturbed areas
4. Maintain ES&C measures

Phase 3:
1. Install silt fence
2. Strip and stockpile topsoil
3. Rough grade
4. Install temporary cut-off ditch, "Smartditch", and dry swale
5. Install stormwater systems
6. Install subbase material
7. Install concrete curbs
8. Install binder course
9. Topsoil & permanent seed all disturbed areas

Phase 4:
1. Install inlet protection
2. Saw cut pavement along water main route to limit area of disturbance
3. Stockpiles of material, either excavated or new material brought in, shall be kept to a minimum and not left uncovered for extended periods (seven days).
4. Excavate and install new water main in sections to limit disturbed area. Place gravel subbase as soon as possible after backfill is complete.
5. Sweep clean any pavement areas that have been tracked with sediments from the work area.
6. Install pavement
7. Topsoil & permanent seed all disturbed areas

Final Phase:
1. Topsoil & permanent seed any remaining disturbed areas
2. Install landscaping
3. Install asphalt top course

4. Install asphalt markings

NOTE: In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, *New York Standards and Specifications for Erosion and Sediment Control.*

g. Inspect all erosion and sediment controls weekly and after rainfall events; repair as required.

h. Water vegetation as required.

i. After the sites are stabilized and at least 80% vegetation has become established, remove all temporary erosion control measures.

j. Submit Notice of Termination (NOT) form for Stormwater Discharges Associated with Construction Activity Under the SPDES General Permit (by Lot Owner/Operator).

2. The site owner/operator(s), developer(s), and contractor(s) shall be responsible for development and implementation of appropriate temporary and permanent erosion and sediment control features on the parcel in compliance with all applicable rules, regulations, permits, project plans and specifications, and the Stormwater Management and Pollution Prevention Plan during construction. Following construction, the parcel owner/operator is responsible for permanent erosion and sediment control features. Documentation of installation of stormwater management and erosion and sediment control practices should be accordance with the Stormwater Construction Site Logbook (Appendix E) prepared for the project.

3. The Construction Site Logbook including signed NOI, NOI acknowledgement letter (permit notification), contractor's certification statements, Stormwater Management and Pollution Prevention Plan, and weekly SWPPP inspections shall be kept on site and up to date at all times during construction. The Stormwater Construction Site Logbook shall be placed in an onsite mailbox accessible to authorities at all times.

4. All litter shall be cleaned up by the end of each working day and properly disposed of. All debris shall be stored neatly until it can be removed and properly disposed of. All chemicals shall be properly applied according to directions and properly stored in appropriate containers when not in use.

B. Record Keeping During Construction

1. The stormwater record keeping requirements and report forms are included in Appendix E –

Stormwater Construction Site Logbook. According to the permit, the owner or operator shall retain a copy of the NOI, NOI acknowledgment letter, SWPPP, and any inspection reports that were prepared in conjunction with the permit for a period of five years from the date that the site achieves final stabilization. In addition, the logbook should be maintained to address record keeping such as contractor certification statements, contractor's "trained individual(s)" designations, final inspection reporting and notice of termination documentation. Properly completing the forms contained in the logbook will meet the inspection requirements for the NYSDEC SPDES General Permit for Construction Activities. The logbook and completed forms and this SWPPP shall be kept on site at all times during construction and made available to authorities upon request.

C. Construction and Waste Materials and Spill Controls

1. Construction materials expected to be temporarily stored on site while the site is under construction include concrete, wood, metal, and plastics, and other miscellaneous materials. They shall be covered by water resistant coverings to prevent contact with rainwater and they shall be stored off the ground (on pallets for example) to prevent contact with stormwater runoff. Soil materials such as fill and topsoil stockpiles shall be surrounded with silt fence for erosion control.

2. Waste materials expected to be temporarily stored on the site during the construction of the driveways may include wood and brush from clearing operations, soil from driveway grading operations, trimmings from geotextile soil stabilization materials, excess concrete and asphalt from curb and pavement construction, and other miscellaneous waste materials such as wood, metal and plastic trimmings, etc associated with construction.

3. Temporary excess soil material stockpiles shall have silt fence installed at the toe of slope for erosion control. Wood, stumps and brush shall be removed from the site and disposed of in a legal matter and must not be buried onsite unless approved by proper authority. Excess soils shall be removed from the site and disposed of in a legal matter unless fill location is provided by owner. Miscellaneous waste materials shall be stored in waste containers such as dumpsters or other appropriate containers which are periodically emptied by certified waste haulers or taken to an approved landfill or disposal site.

4. Excess concrete shall be dumped in a pre-determined location where materials are contained and cannot leach into waterways or stormsewer systems. Materials shall then be disposed in a legal matter unless approved fill location is provided by owner.

5. All petroleum spills that occur within New York State (NYS) must be reported to the NYS Spill Hotline (1-800-457-7362) within 2 hours of discovery, except spills which meet all of the following criteria:

1. The quantity is known to be less than 5 gallons; and

2. The spill is contained and under the control of the spiller; and

3. The spill has not and will not reach the State's water or any land; and

4. The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs and is contained on a paved surface such as asphalt or concrete. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

D. Short Term Maintenance

Short term maintenance shall occur during construction and for a post-construction period of one (1) year. Short term maintenance of any constructed cuts, fills, pavements, drainage features, dry swales, detention ponds and vegetation is the responsibility of the owner/operator identified within the filed Notice of Intent (see Appendix A – Stormwater Discharge Permit Information). Also, the contractor and subcontractors engaged in work affecting stormwater drainage at the site shall sign a contractor certification statement prior to undertaking any construction activity at the site, binding them to terms and conditions of the SWPPP. Blank copies of the contractor certification statements are provided in Appendix F – Stormwater Construction Site Logbook documentation. Signed copies should be retained onsite within a Stormwater Construction Site Logbook, provided separately. Maintenance scheduling is provided in Table 6-1.

1. Vegetated areas and drainage channels are to be maintained as follows:
   - Maintain a grass height of 4" to 6",
   - Maintain sideslopes, and
   - Repair erosion by regrading, fill, and/or reseeding as necessary.

2. Culverts are to be maintained as follows:
   - Culverts shall be inspected weekly and after rainfall events and shall be immediately cleaned of any silt build-up as required to provide for free flow of stormwater.

3. Grassed swales, Temporary Sediment Traps, Open Channels are to be maintained as follows:
   - Each stormwater control feature shall be inspected weekly and after rainfall events. The system shall be cleaned of any silt or grit build-up when 25 percent of the original volume has been exceeded. The stone check dams (if installed) shall be cleaned of any silt as required, providing for free flow of stormwater.

4. Dry swales are to be maintained as follows:
   - Dry swales should be inspected weekly and after rainfall events. All damage caused by soil erosion and construction equipment should be repaired immediately.

- Remove sediment from the dryswale when it reaches 25 percent of the original volume. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment, or adjacent to a stream or floodplain.

5. Stormwater Ponds (P-1 Micropool Extended Detention Pond) are to be maintained as follows:
   - Sediment removal in the forebay shall occur after 50% of total forebay capacity has been lost. Initial construction activities should provide a minimum forebay depth of 4 feet.
   - Sediments excavated from stormwater ponds that do not receive runoff from designated hotspots are generally not considered toxic or hazardous material, and can be safely disposed by either land application or land filling.

6. Catchbasins, dry wells, and stormsewers are to be maintained as follows:
   - Catchbasins, dry wells, and stormsewers shall be inspected weekly and after rainfall events and shall immediately be cleaned of any silt build-up or floatables as required to provide for free flow of stormwater.

7. Stormwater Planters are to be maintained as follows:
   - Stormwater Planters should be treated as a component of the landscaping, with routine maintenance provided by the homeowner including the occasional replacement of plants, mulching, weeding, and thinning to maintain the desired appearance and functionality of the garden (see Table 5-1).

E. Long-Term Maintenance

The owner/operator will be responsible for maintaining those facilities located within its property boundaries and designated easements, if any. The municipality shall be responsible for maintaining the stormwater systems within their existing highway right-of-ways and or designated easements, if any.

Maintenance activities for vegetation include mowing, fertilizing, watering, pruning, fire controls in dry weather, weed and pest control, reseeding, and repairs as necessary to maintain a vigorous, dense vegetative cover. Maintenance scheduling is provided in Table 6-1.

1. Vegetated areas of stormwater facilities (pond berms, slopes, swales, etc.) are to be maintained as follows:
   - Maintain a grass height of 4" to 6",
   - Maintain slopes, and
   - Repair erosion by regrading, fill, and/or reseeding as necessary.

2. Culverts are to be maintained as follows:

- Culverts shall be inspected monthly for the first year following construction then annually and cleaned of any silt build-up as required to provide for free flow of stormwater.

3. Grassed swales, Temporary Sediment Traps, Open Channels are to be maintained as follows:
   - Each stormwater control feature shall be inspected monthly for the first year following construction then annually. The swales/channels shall be cleaned of any silt or grit build-up when 25 percent of the original volume has been exceeded. The stone check dams (if installed) shall be cleaned of any silt as required, providing for free flow of stormwater.
   - Vegetation in dry swales is mowed as required during the growing season to maintain grass heights in the 4 to 6 inch range.

4. Dry swales are to be maintained as follows:
   - Dry swales should be inspected monthly for the first year following construction then annually. All damage caused by soil erosion should be repaired immediately.
   - Remove sediment from the dryswale when it reaches 25 percent of the original volume. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment, or adjacent to a stream or floodplain.

5. Stormwater Ponds (P-1 Micropool Extended Detention Pond) are to be maintained as follows:
   - Required Elements:
     - Maintenance responsibility for a pond and its buffer shall be vested with a responsible authority by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval.
     - The principal spillway shall be equipped with a removable trash rack, and generally accessible from dry land.
     - Sediment removal in the forebay shall occur every five to six years or after 50% of total forebay capacity has been lost.
     - If a minimum coverage of 50% is not achieved in the planted wetland zones after the second growing season, a reinforcement planting is required.
   - Design Guidance
     - Sediments excavated from stormwater ponds that do not receive runoff from designated hotspots are generally not considered toxic or hazardous material, and can be safely disposed by either land application or land filling. Sediment testing may be required prior to sediment disposal when a hotspot land use is present.
     - Sediment removed from stormwater ponds should be disposed of according to an approved comprehensive operation and maintenance plan.

- In areas where road sand is used, an inspection of the forebay and pond should be scheduled after the spring melt to determine if dredging is necessary. For forebays, dredging is needed if one half of the capacity of the forebay is full.

6. Catchbasins, dry wells, stormsewers are to be maintained as follows:
    - Catchbasins, dry wells, and stormsewers are to be inspected monthly following the first year of construction then annually, and shall immediately be cleaned of any silt build up or floatables as required to provide for free flow of stormwater.

8. Stormwater Planters are to be maintained as follows:
    - Stormwater Planters should be treated as a component of the landscaping, with routine maintenance provided by the owner including the occasional replacement of plants, mulching, weeding and thinning to maintain the desired appearance and functionality of the garden (see Table 6-1).

F. Maintenance Schedule

1. The schedule for maintaining the stormwater control facilities is summarized in Table 6-1 Maintenance Schedule:

Table 6-1 Maintenance Schedule

		Construction Period		Short Term (1-Year)		Long Term	
Symbol	Stormwater Practice	Inspect Sched.	Mow or Clean	Inspect Sched.	Mow or Clean	Inspect Sched.	Mow or Clean
V	Vegetated Areas (ponds, slopes, swales, etc.)		4" to 6"	Monthly	4" to 6"	Annually	4" to 6"
CV	Culverts	weekly	As Req.	Monthly	As Req.	Annually	As Req.
ST	Sediment traps	weekly	@25%	Monthly	@25%	Annually	@25%
DS	Dry Swales	weekly	@25%	Monthly	@25%	Annually	@25%
P-1	Detention Pond	weekly	@50%	Monthly	@50%	Annually	@50%
CB	Catch Basins	weekly	As Req.	Monthly	As Req.	Annually	As Req.
SP	Stormwater Planters	weekly	As Req.	Monthly	As Req.	Annually	As Req.

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New York State Department of Environmental Conservation. August 2010. New York State Stormwater Management Design Manual. Empire State Chapter, Soil and Water Conservation Society c/o Cayuga County SWCS, Auburn, New York.

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Federal Emergency Management Service (FEMA) online map service center. www.msc.fema.gov

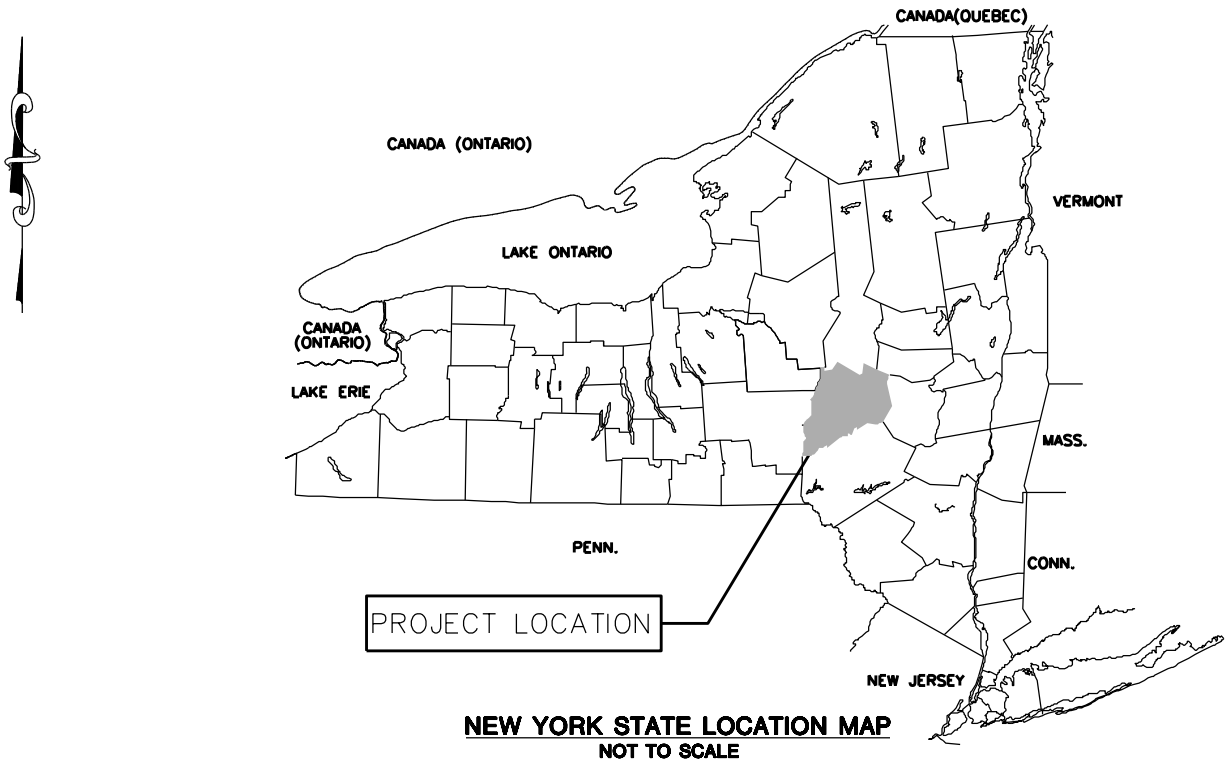
United States Fish and Wildlife Service (USF&W) National Wetlands Inventory (NWI) – Wetlands online mapper service: www.wetlandsfws.er.usgs.gov

United States Department of Agriculture Natural Resource Conservation Service Web Soil Survey online map service center: www.websoilsurvey.nrcs.usda.gov/app/

FIGURES

OTSEGO COUNTY LOCATION MAP

NOT TO SCALE



NEW YORK STATE LOCATION MAP

NOT TO SCALE

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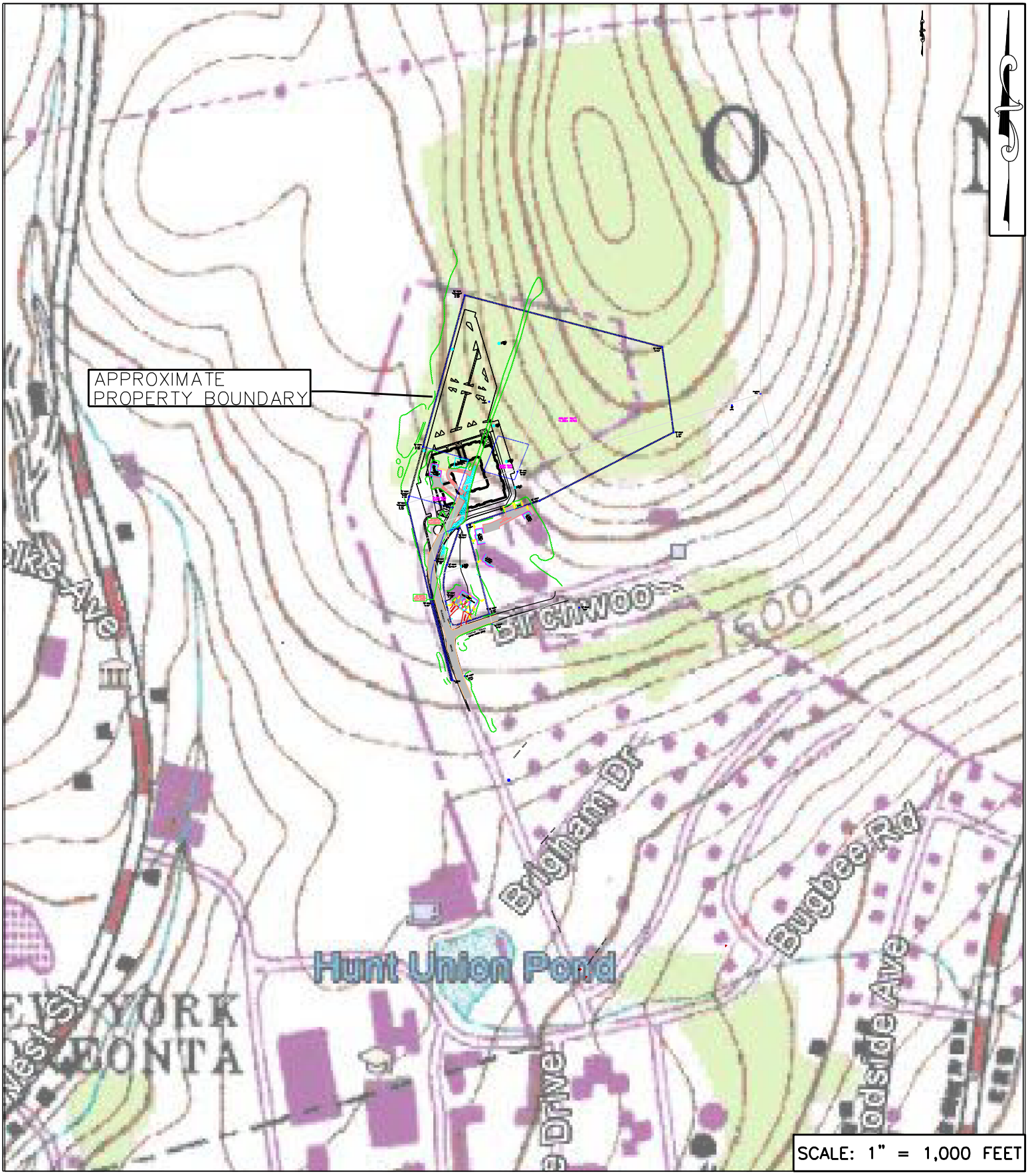
KEYSTONE PROJECT NO. 0200.26412

HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA
OTSEGO COUNTY NEW YORK STATE

FIGURE 1

LOCATION MAPS



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HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
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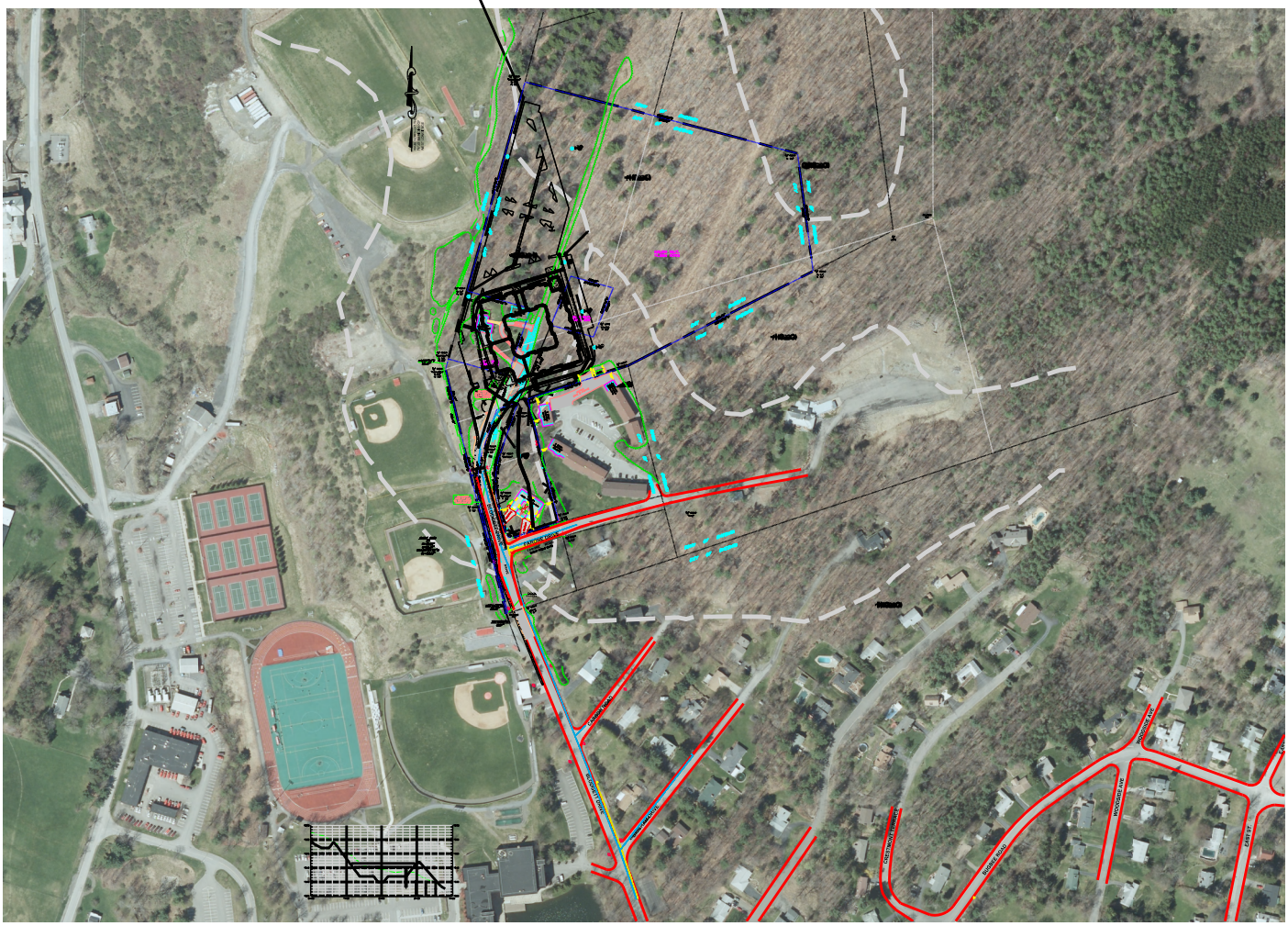
OTSEGO COUNTY NEW YORK STATE

FIGURE 2

USGS VICINITY MAP

APPROXIMATE PROPERTY BOUNDARY



SCALE: 1" = 500 FEET

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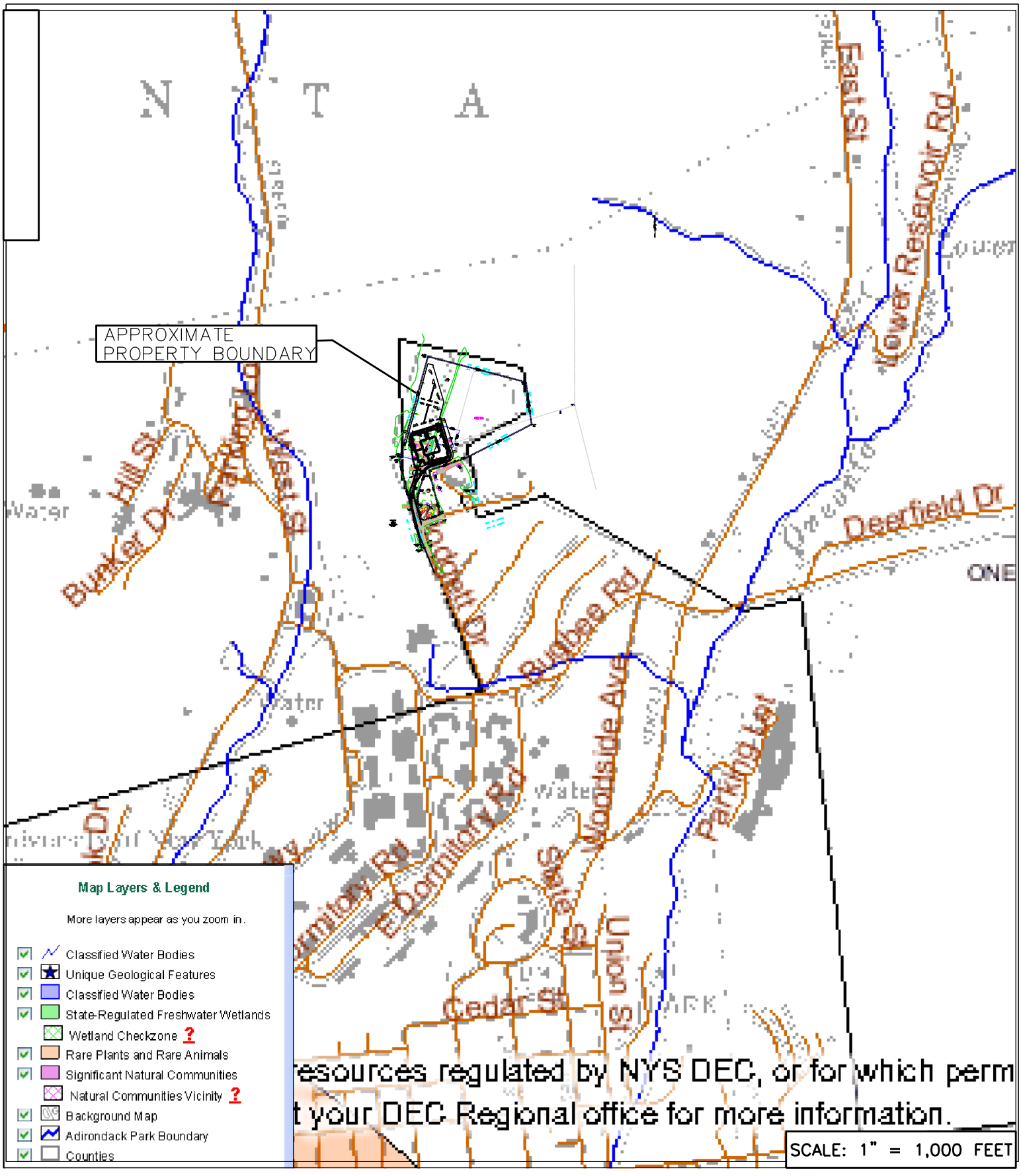
HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA
OTSEGO COUNTY NEW YORK STATE

FIGURE 3

2006 AERIAL PHOTO



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BLODGETT DRIVE
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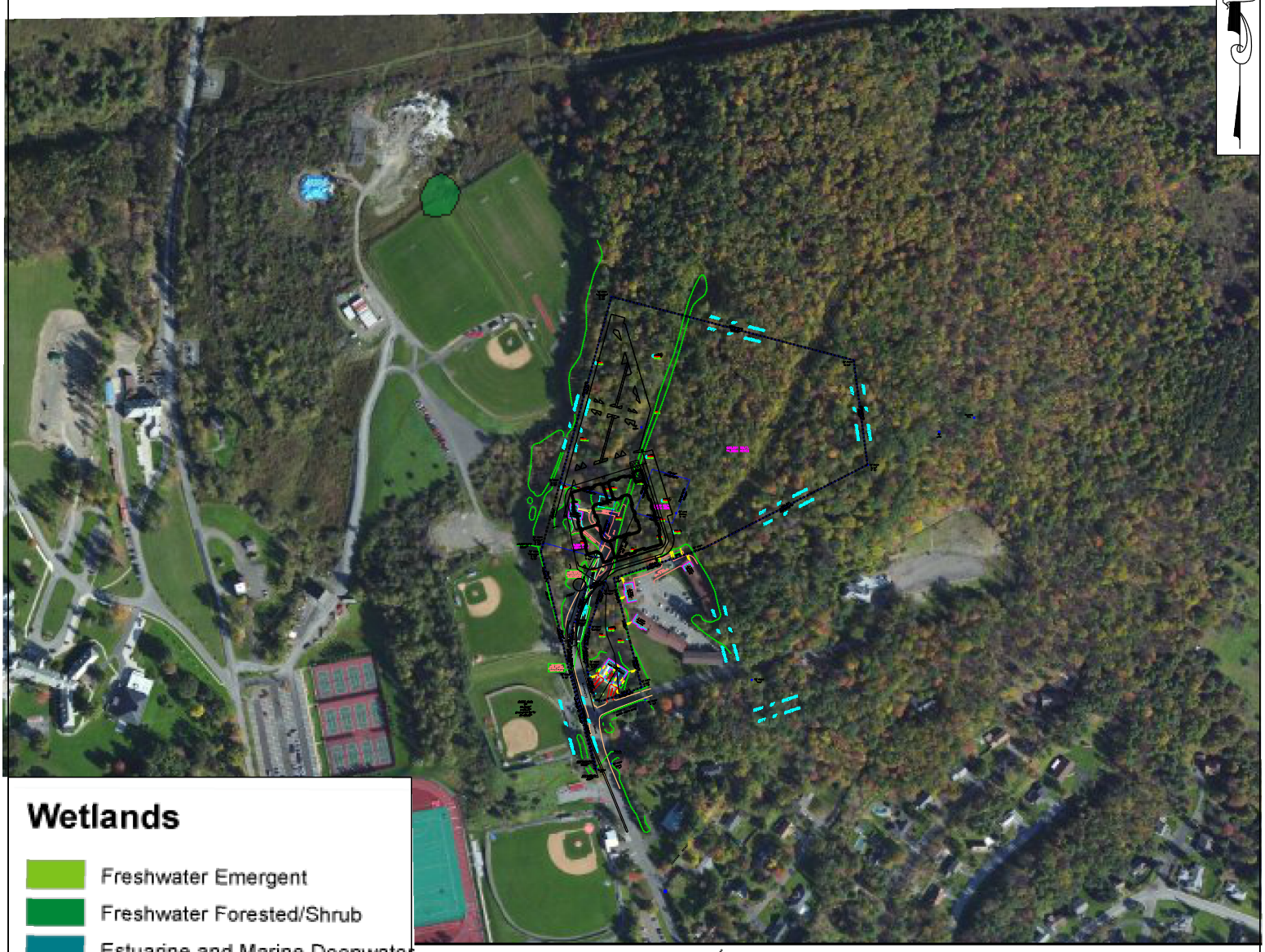
OTSEGO COUNTY NEW YORK STATE

FIGURE 4

NYSDEC ENVIRONMENTAL RESOURCE MAP



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

SCALE: 1" = 500 FEET

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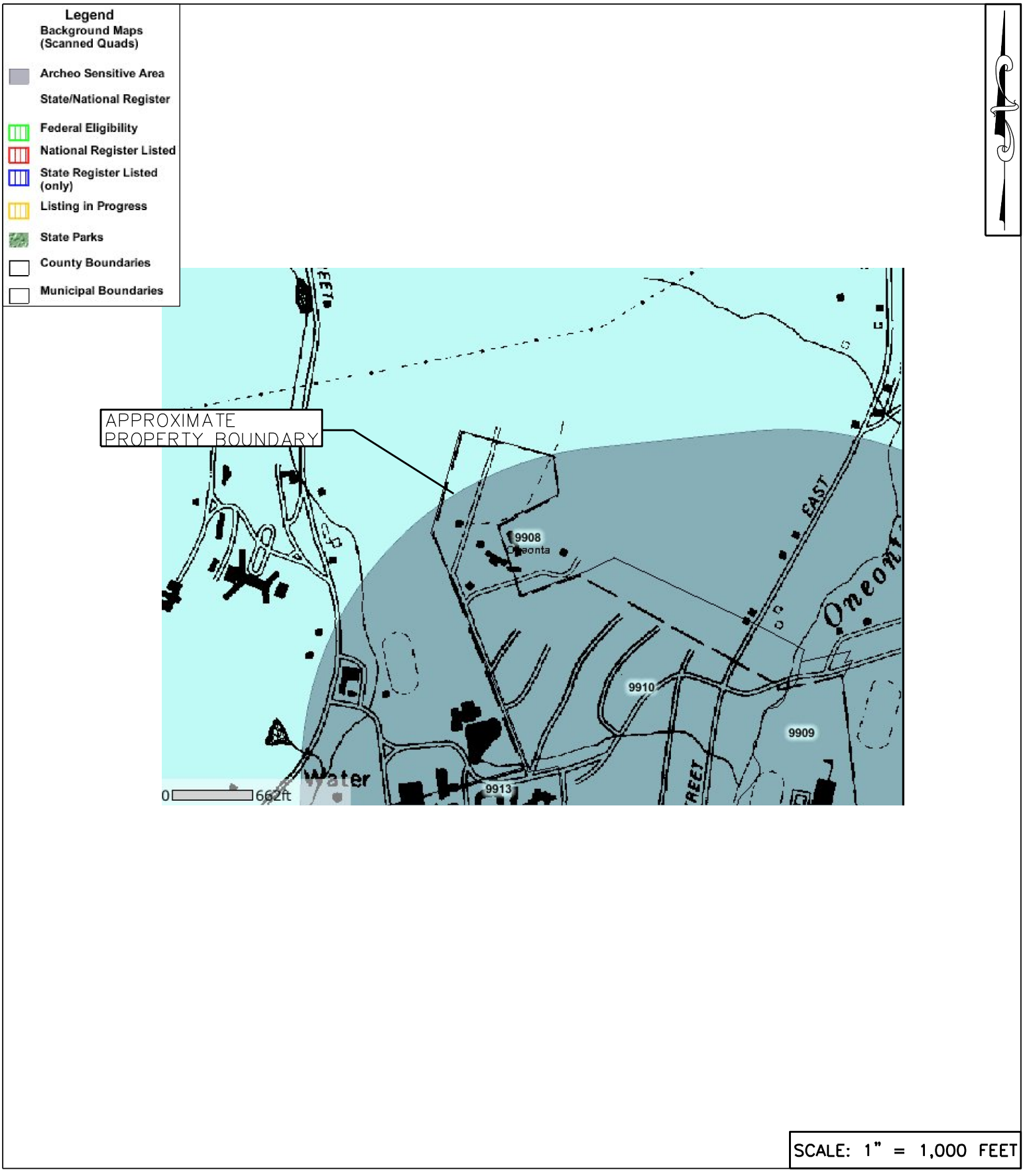
OTSEGO COUNTY NEW YORK STATE

FIGURE 5

NATIONAL WETLAND INVENTORY MAP



SCALE: 1" = 1,000 FEET

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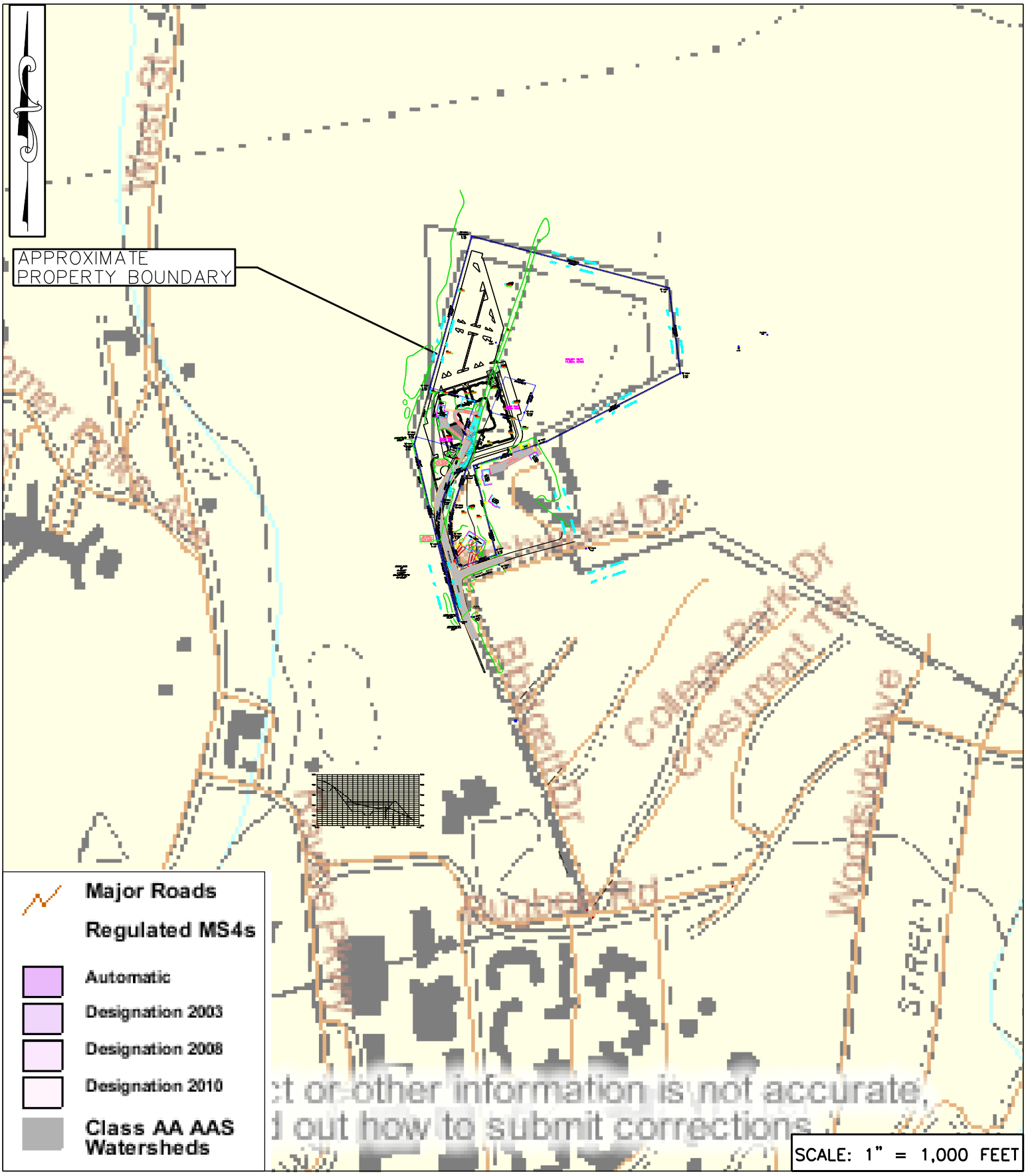
OTSEGO COUNTY NEW YORK STATE

FIGURE 6

NEW YORK STATE
HISTORIC PRESERVATION
OFFICE GIS MAP



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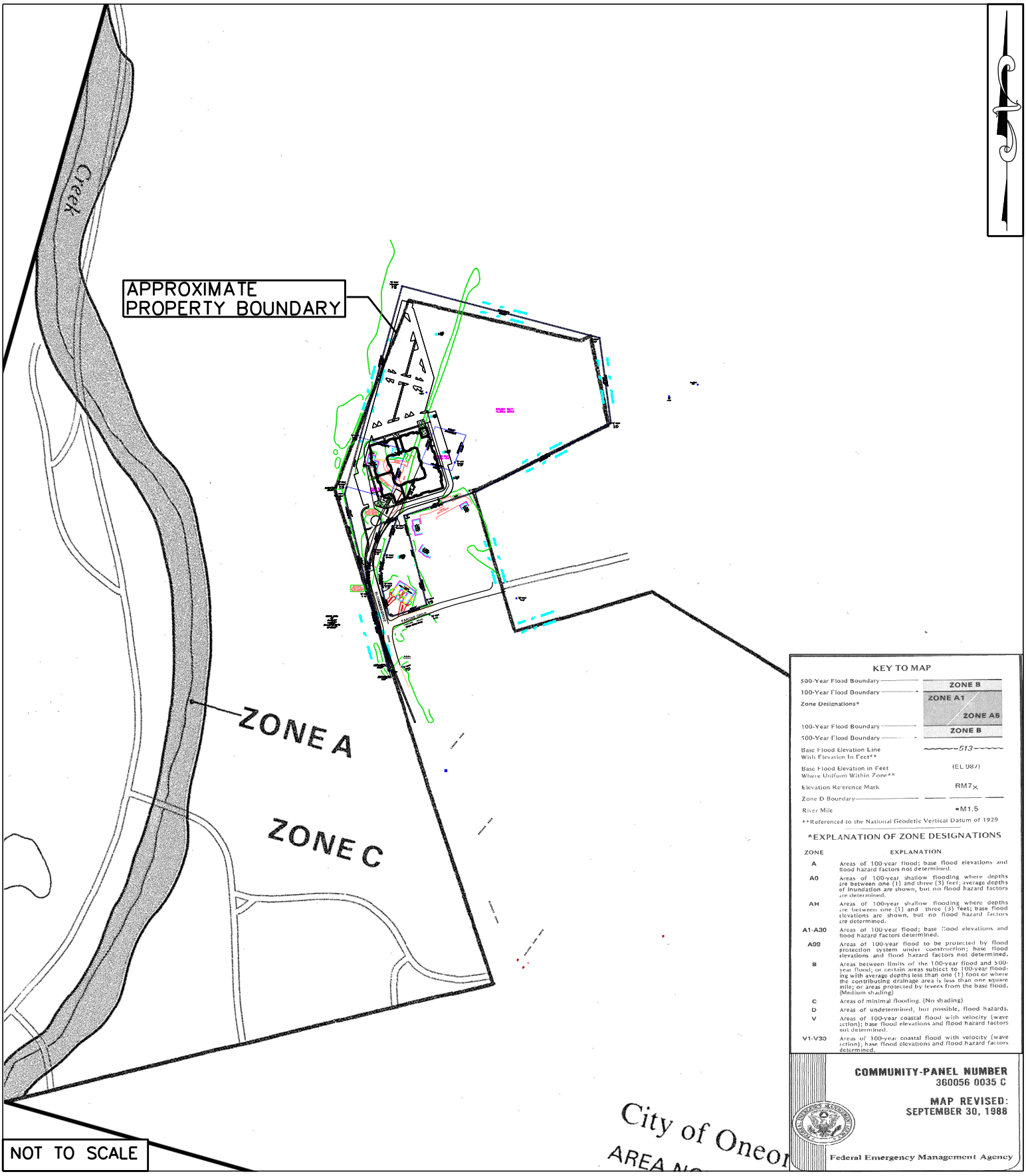
HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA
OTSEGO COUNTY NEW YORK STATE

FIGURE 7

NYSDEC STORMWATER
INTERACTIVE MAP



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1
Zone Designations*	ZONE A5
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

COMMUNITY-PANEL NUMBER
360056 0035 C

MAP REVISED:
SEPTEMBER 30, 1988

Federal Emergency Management Agency

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HILLSIDE COMMONS STUDENT HOUSING
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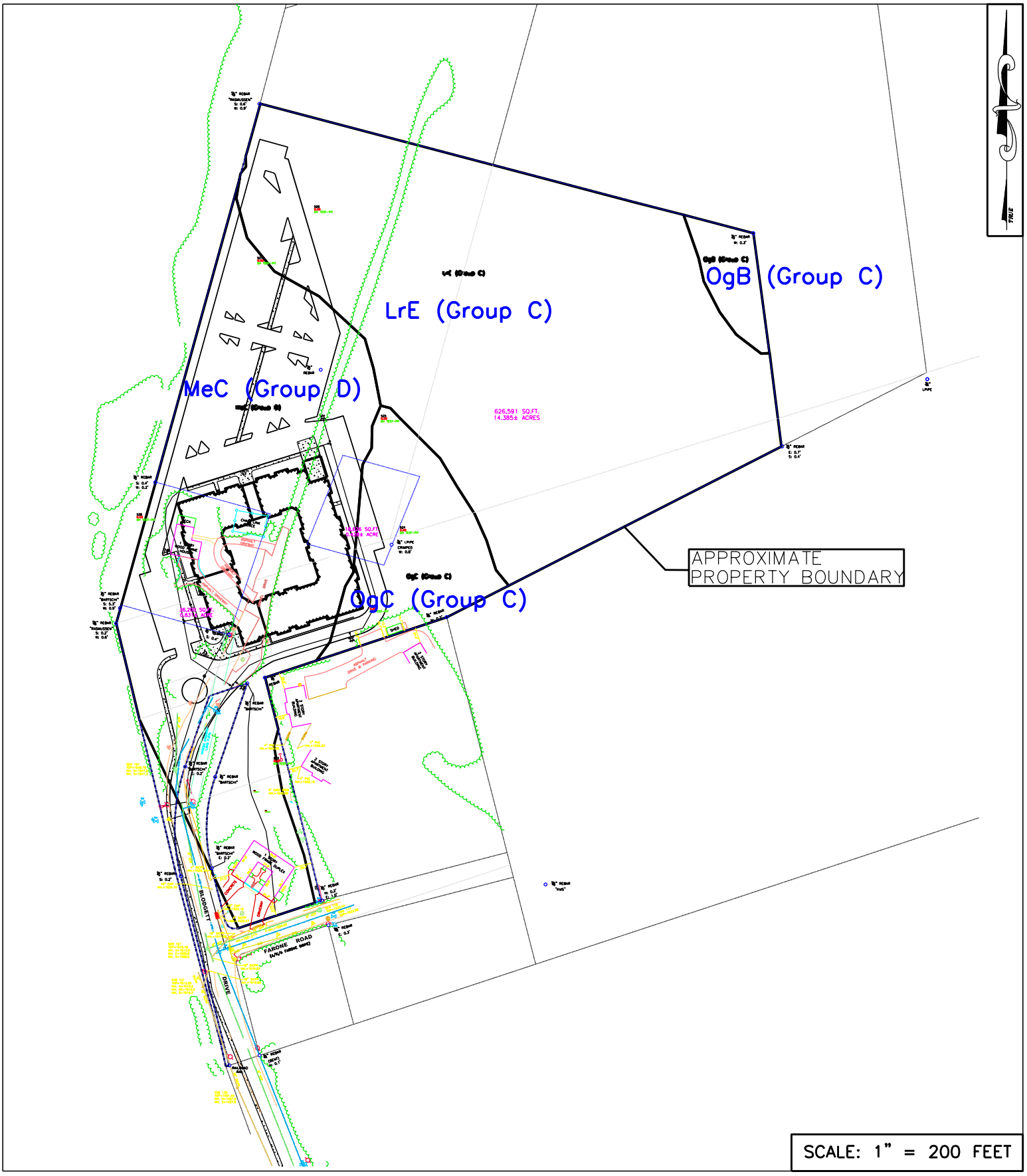
OTSEGO COUNTY NEW YORK STATE

FIGURE 8

FLOOD ZONE MAP



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KEYSTONE PROJECT NO. 0200.26412

HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA
OTSEGO COUNTY NEW YORK STATE

FIGURE 9

SOILS MAP

PRE #2 DRAINAGE AREA
TOTAL AREA = 11.30 ACRES
Tc pre = 0.4650 HRS.
CN pre = 74

PRE #1 DRAINAGE AREA
TOTAL AREA = 11.10 ACRES
Tc pre = 0.2933 HRS
CN pre = 77

Tc PATH

EXISTING SWALE

EXISTING SWALE

DISCHARGE POINT #1

DISCHARGE POINT #2

HYDROLOGY BOUNDARY, TYPICAL

LEGEND

PROPERTY BOUNDARY LINE

HYDROLOGY BOUNDARY LINE

TIME OF CONCENTRATION FLOW PATH

GRAPHIC SCALE

100 0 100 200 400

(IN FEET)
1 inch = 100 ft.

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KEYSTONE ASSOCIATES
ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

NO.	REVISION OR ISSUANCE DESCRIPTION	DATE
1	ISSUED FOR PRELIMINARY REVIEW	2/20/13

HILLSIDE COMMONS STUDENT HOUSING

CITY OF ONEONTA — OTSEGO COUNTY, NY

PRE DEVELOPMENT DRAINAGE AREA MAP

SHEET NO.
FIG 10

PROJECT NO.
200.26412

DATE: 02/20/13

CAD FILE NO.: 20026412_SITE.DGN

LEGEND

- PROPERTY BOUNDARY LINE
- HYDROLOGY BOUNDARY LINE
- TIME OF CONCENTRATION FLOW PATH

KEYSTONE ASSOCIATES
ARCHITECTS, ENGINEERS AND SURVEYORS, LLC
58 Exchange Street
Binghamton, New York 13901
Phone: 607.722.1100
Fax: 607.722.2515
Email: info@keyscomp.com
www.keyscomp.com

HILLSIDE COMMONS STUDENT HOUSING

CITY OF ONEONTA
OTSEGO COUNTY, NY

POST DEVELOPMENT DRAINAGE AREA MAP

SHEET NO. FIG 11

PROJECT NO. 200.26412

DATE: 02/20/13

CAD FILE NO. 20026412.SITE.DGN

APPENDIX A
STORMWATER DISCHARGE PERMIT INFORMATION

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)
NEWMAN DEVELOPMENT GROUP, LLC

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

Owner/Operator Contact Person First Name
JEFF

Owner/Operator Mailing Address
300 PLAZA DRIVE

City
VESTAL

State
NY

Zip
13851-

Phone (Owner/Operator)
607-770-1555

Fax (Owner/Operator)
607-770-4382

Email (Owner/Operator)
Jeff.Smetana@newmandevelopment.com

FED TAX ID
__-_____ (not required for individuals)

Project Site Information

Project/Site Name
HILLSIDE COMMONS STUDENT HOUSING

Street Address (NOT P.O. BOX)
BLODGETT DRIVE

Side of Street
○ **North** ○ **South** ● **East** ○ **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)
CITY OF ONEONTA

State NY | Zip | County OTSEGO | DEC Region 7

Name of Nearest Cross Street
FARONE DRIVE

Distance to Nearest Cross Street (Feet)
0

Project In Relation to Cross Street
● **North** ○ **South** ○ **East** ○ **West**

Tax Map Numbers
Section-Block-Parcel
288.6-1-62

Tax Map Numbers
288.6-1-63

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) 494897

Y Coordinates (Northing) 4770224433444

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

Number of Lots

*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
16.106.0	8.78.7	2.72.7	6.36.3

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
%	%	51%	49%

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

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

Start Date 07/01/2013 - End Date 06/30/2014

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

Name

Oneonta Creek

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 ONEONTA

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
KEYSTONE ASSOCIATES LLC

Contact Name (Last, Space, First)
COBB RONALD

Mailing Address
58 EXCHANGE STREET

City
BINGHAMTON

State
NY

Zip
13901-

Phone
6077221100

Fax
6077225515

Email
rcobb@keyscomp.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
Ronald

MI
P

Last Name
Cobb

Signature

Date
/ /

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

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)**

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

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

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)**

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

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.

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

NEWMAN DEVELOPMENT GROUP LLC

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

WQv Required .279279 **acre-feet**

WQv Provided .279279 **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 0.609494 **acre-feet**

CPv Provided 0.702020 **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 23.377 **CFS**

Post-development 16.600 **CFS**

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

Pre-Development 44.477 **CFS**

Post-development 33.700 **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. 10 %

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. 46 %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. 6

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) 2

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

DEC Permits

○ Air Pollution Control	○ Navigable Waters Protection / Article 15
○ Coastal Erosion	○ Water Quality Certificate
○ Hazardous Waste	○ Dam Safety
○ Long Island Wells	○ Water Supply
○ Mined Land Reclamation	○ Freshwater Wetlands/Article 24
○ Other SPDES	○ Tidal Wetlands
○ Solid Waste	○ Wild, Scenic and Recreational Rivers
● None	○ Stream Bed or Bank Protection / Article 15
○ Other	

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 Jeff **MI**

Print Last Name Smetana

Owner/Operator Signature

Date [ ][ ] / [ ][ ] / [ ][ ][ ][ ]

PAGE SEPARATION

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person: | 4a.Telephone:

5. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. ☐ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP.
***Date final stabilization completed** (month/year): _____

9b. ☐ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. ☐ Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? ☐ yes ☐ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? ☐ yes ☐ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

_____

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? ☐ yes ☐ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

☐ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

☐ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

☐ For post-construction stormwater management practices that are privately owned, the deed of record has been modified to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

☐ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? _____ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? ☐ yes ☐ no
(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:
(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:

Title/Position:

Signature:	Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):

I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

IX. Owner or Operator Certification

I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

(NYS DEC Notice of Termination - January 2010)

PAGE SEPARATION

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES 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

Effective Date: January 29, 2010 Expiration Date: January 28, 2015

William R. Adriance
Chief Permit Administrator

William R. Adriance — January 28, 2010
Authorized Signature — Date

Address: NYS DEC
Div. Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

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

This general permit ("permit") is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent ("NOI") to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation ("the Department") regional office (see Appendix G).They are also available on the Department's website at:

http://www.dec.ny.gov/

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a point source and therefore, pursuant to Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They cannot wait until there is an actual *discharge* from the construction site to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES

FROM CONSTRUCTION ACTIVITIES

TABLE OF CONTENTS

Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application - This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

B. Maintaining Water Quality - It shall be a violation of this permit and the *ECL* for any *discharge* to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

C. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph D. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater discharges from *construction activities*.

(Part I. C)

3. Notwithstanding paragraphs C.1 and C.2 above, the following non-stormwater *discharges* may be authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated groundwater or spring water; uncontaminated discharges from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who discharge as noted in this paragraph, and with the exception of flows from fire fighting activities, these discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with water quality standards in Part I.B.

D. <u>Activities Which Are Ineligible for Coverage Under This General Permit</u> - All of the following are **<u>not</u>** authorized by this permit:

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

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

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

4. *Discharges* from *construction activities* that adversely affect a listed, or proposed to be listed, endangered or threatened species, or its critical habitat;

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

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

    a. are tributary to waters of the state classified as AA or AA-s; and

(Part I. D. 6)

b. disturb one or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

7. *Construction activities* for linear transportation projects and linear utility projects that:
   a. are tributary to waters of the state classified as AA or AA-s; and

   b. disturb two or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

8. *Construction activities* that adversely affect a property that is listed or is eligible for listing on the State or National Register of Historic Places (Note: includes Archeological sites), unless there are written agreements in place with the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) or other governmental agencies to mitigate the effects, or there are local land use approvals evidencing the same.

Part II. OBTAINING PERMIT COVERAGE

A. Notice of Intent (NOI) Submittal

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the address below in order to be authorized to *discharge* under this permit. The NOI form shall be one which is associated with this permit, signed in accordance with Part VII.H. of this permit.

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

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the *MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the "MS4 SWPPP Acceptance" form signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4*, or by a duly authorized representative of that person, and then submit that form along with the NOI to the address referenced under "Notice of Intent (NOI) Submittal".

(Part II. A.2)

This requirement does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.E. (Change of Owner or Operator).

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

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

B. <u>Permit Authorization</u>

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

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

    a. project review pursuant to the State Environmental Quality Review Act (SEQRA) have been satisfied, when SEQRA is applicable,

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

    c. the final SWPPP has been prepared, and

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

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

(Part II. B. 3)

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

i. Five (5) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 and/or 3, or

ii. Sixty (60) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has <u>not</u> been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 or 3.

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

i. Five (5) business days from the date the Department receives a complete NOI and signed "MS4 SWPPP Acceptance" form,

4. The Department may suspend or deny an *owner's or operator's* coverage under this permit if the Department determines that the SWPPP does not meet the permit requirements.

5. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department.

C. <u>General Requirements For Owners or Operators With Permit Coverage</u>

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

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-10-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form and inspection reports at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department.

(Part II. C. 2)

The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

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

    b. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control.

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

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

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

4. The Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements.

(Part II. C)

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

D. Permit Coverage for Discharges Authorized Under GP-0-08-001

1. Upon renewal of SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001), a*n owner or operator* of *construction activity* with coverage under GP-0-08-001, as of the effective date of GP-0-10-001, shall be authorized to *discharge* in accordance with GP-0-10-001 unless otherwise notified by the Department.

E. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1.. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

   Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*.

(Part III. A)

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

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

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

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

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

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

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

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP.

(Part III. A. 6)

The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

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

> "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I 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. "

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

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

8. The SWPPP must include documentation supporting the determination of permit eligibility with regard to Part I.D.8. (Historic Places or Archeological Resource). At a minimum, the supporting documentation shall include the following:

(Part III. A. 8)

a. Information on whether the stormwater discharge or *construction activities* would have an effect on a property (historic or archeological resource) that is listed or eligible for listing on the State or National Register of Historic Places;

b. Results of historic resources screening determinations conducted. Information regarding the location of historic places listed, or eligible for listing, on the State or National Registers of Historic Places and areas of archeological sensitivity that may indicate the need for a survey can be obtained online by viewing the New York State Office of Parks, Recreation and Historic Places (OPRHP) online resources located on their web site at: http://nysparks.state.ny.us/shpo/online-tools/ (using The Geographic Information System for Archeology and National Register). OPRHP can also be contacted at: NYS OPRHP, State Historic Preservation Office, Peebles Island Resources Center, P.O. Box 189, Waterford, NY 12188-0189, phone: 518-237-8643;

c. A description of measures necessary to avoid or minimize adverse impacts on places listed, or eligible for listing, on the State or National Register of Historic Places. If the *owner or operator* fails to describe and implement such measures, the stormwater *discharge* is ineligible for coverage under this permit; and

d. Where adverse effects may occur, any written agreements in place with OPRHP or other governmental agency to mitigate those effects, or local land use approvals evidencing the same.

B. Required SWPPP Contents

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

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

(Part III. B. 1)

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

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

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

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

f. A temporary and permanent soil stabilization plan that meets the requirements of the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization;

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

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

(Part III. B. 1)

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

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

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

l. Identification of any elements of the design that are not in conformance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards.

2. Post-construction stormwater management practice component - All construction projects identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual"). If the Design Manual is revised during the term of this permit, an *owner or operator* must begin using the revised version of the Design Manual to prepare their SWPPP six (6) months from the final revision date of the Design Manual.

   Where post-construction stormwater management practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard.

   At a minimum, the post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project;

(Part III. B. 2)

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

c. The dimensions, material specifications and installation details for each post-construction stormwater management practice;

d. Identification of any elements of the design that are not in conformance with the Design Manual. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards;

e. A hydrologic and hydraulic analysis for all structural components of the stormwater management control system;

f. A detailed summary (including calculations) of the sizing criteria that was used to design all post-construction stormwater management practices. At a minimum, the summary shall address the required design criteria from the applicable chapter of the Design Manual; including the identification of and justification for any deviations from the Design Manual, and identification of any design criteria that are not required based on the design criteria or waiver criteria included in the Design Manual; and

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

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.g. above.

(Part III. C)

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

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices and all post-construction stormwater management practices identified in the SWPPP are maintained in effective operating condition at all times.

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

B. Owner or Operator Maintenance Inspection Requirements

1. The *owner or operator* shall inspect, in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, the erosion and sediment controls identified in the SWPPP to ensure that they are being maintained in effective operating condition at all times.

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

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

(Part IV. C)

C. <u>Qualified Inspector Inspection Requirements</u> - The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

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

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

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

    a. the construction of a single family residential subdivision with 25% or less impervious cover at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

    d. construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

    a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

(Part IV. C. 2)

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization*, and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1..

(Part IV. C. 3)

3. At a minimum, the *qualified inspector* shall inspect 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*, all points of discharge to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of discharge from the construction site.

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

    a. Date and time of inspection;

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

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

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

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

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

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

    h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;

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

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

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

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

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

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

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

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

(Part V. A. 2)

a. Total project completion - All construction activity identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT, certify that all disturbed areas have achieved *final stabilization;* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall also have the MS4 sign the "MS4 Acceptance" statement on the NOT. The *owner or operator* shall have the principal executive officer, ranking elected official, or duly authorized representative from the *regulated, traditional land use control MS4*, sign the "MS4 Acceptance" statement. The MS4 official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The MS4 can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector's* final site inspection certification(s) required in Part V.3.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

(Part V. A. 5)

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has modified their deed of record to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention - The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the site achieves *final stabilization*. This period may be extended by the Department, in its sole discretion, at any time upon written notification.

B. Addresses - With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate Department Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply - The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied.

(Part VII. A)

The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

B. <u>Continuation of the Expired General Permit</u> - This permit expires five (5) years from the effective date. However, coverage may be obtained under the expired general permit, which will continue in force and effect, until a new general permit is issued. Unless otherwise notified by the Department in writing, an *owner or operator* seeking authorization under the new general permit must submit a new NOI in accordance with the terms of such new general permit.

C. <u>Enforcement</u> - Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. <u>Need to Halt or Reduce Activity Not a Defense</u> - It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. <u>Duty to Mitigate</u> - The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to minimize or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. <u>Duty to Provide Information</u> - The *owner or operator* shall make available to the Department for review and copying or furnish to the Department within five (5) business days of receipt of a Department request for such information, any information requested for the purpose of determining compliance with this permit. This can include, but is not limited to, the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form, executed maintenance agreement, and inspection reports. Failure to provide information requested by the Department within the request timeframe shall be a violation of this permit.

The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review the NOI, SWPPP or inspection reports. Copying of documents will be done at the requester's expense.

G. <u>Other Information</u> - When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any other report, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s)

changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or impervious area), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. <u>Signatory Requirements</u>

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

        ii. the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

    b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

    c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

        i. the chief executive officer of the agency, or

(Part VII. H. 1. c)

ii. a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. or by a duly authorized representative of that person. A person is a duly authorized representative only if:

    a. The authorization is made in writing by a person described in Part VII.H.1.;

    b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

    c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

    It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. <u>Property Rights</u> - The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity.*

J. <u>Severability</u> - The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

(Part VII. K)
K. <u>Denial of Coverage Under This Permit</u>

1. At its sole discretion, the Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Regional Water Engineer, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. Any *owner or operator* authorized by this permit may request to be excluded from the coverage under this permit by applying for an individual permit or another general permit. In such cases, the *owner or operator* shall submit an individual application or an alternative general permit application in accordance with the requirements of this general permit, 40 CFR 122.26(c)(1)(ii) and 6 NYCRR Part 621, with reasons supporting the request, to the Department at the address for the appropriate Department Office (see addresses in Appendix F).The request may be granted by issuance of an individual permit or another general permit at the discretion of the Department.

3. When an individual SPDES permit is issued to a discharger authorized to discharge under a general SPDES permit for the same discharge(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. <u>Proper Operation and Maintenance</u> - The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. <u>Inspection and Entry</u> - The *owner or operator* shall allow the Department or an authorized representative of EPA, the State, or, in the case of a construction site which discharges through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

(Part VII. M)

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

N. Permit Actions - At the Department's sole discretion, this permit may, at any time, be modified, suspended, revoked, or renewed. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions - Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports – Article 17 of the ECL provides for a civil penalty of $37,500 per day per violation of this permit. Articles 175 and 210 of the New York State Penal Law provide for a criminal penalty of a fine and/or imprisonment for falsifying forms and reports required by this permit.

R. Other Permits – Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "Construction Activity(ies)" also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a construction site by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a construction site to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or point source.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 authorizing a category of discharges.

Groundwater - means waters in the saturated zone. The saturated zone is a subsurface zone in

which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct construction activities are occurring, or will occur, under one plan. The term "plan" in "larger common plan of development or sale" is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that construction activities may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
ii. Designed or used for collecting or conveying stormwater;
iii. Which is not a *combined sewer*; and
iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from construction activity.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the construction activity is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in Parts 700 et seq of this Title.

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics 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.

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

Routine Maintenance Activity - means construction activity that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Stream bank restoration projects (does not include the placement of spoil material),
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* will be responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B

Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other agricultural building, silo, stock yard or pen.

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Bike paths and trails
- Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

- All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover*, and constructed as part of an over-head electric transmission line project , wind-power project, cell tower project, oil or gas well drilling project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* and *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River - Figure 1
- Onondaga Lake Watershed - Figure 2
- Greenwood Lake Watershed -Figure 3
- Oscawana Lake Watershed – Figure 4

Figure 1 - New York City Watershed East of the Hudson

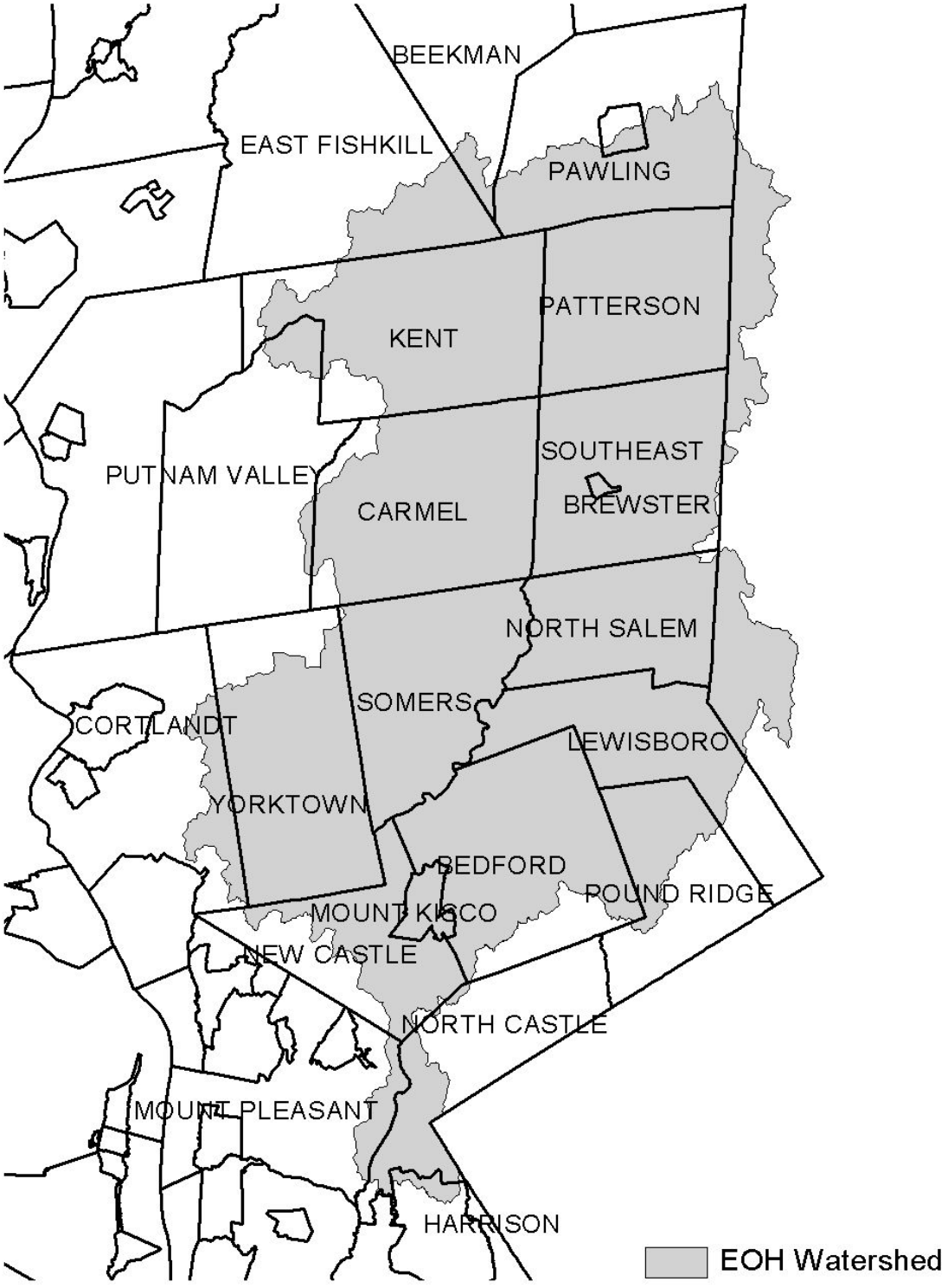
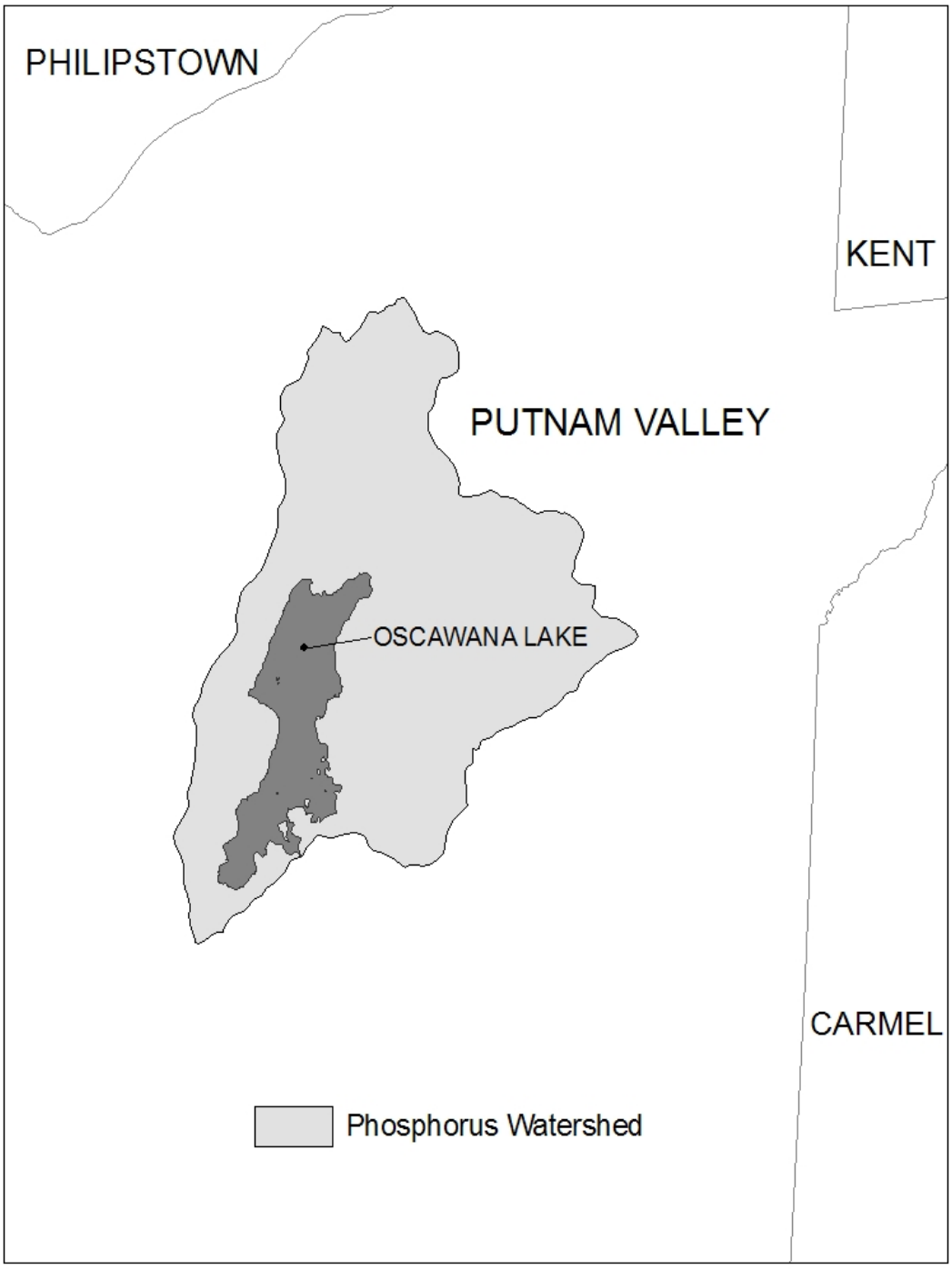


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

Figure 4 - Oscawana Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivision construction activities that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Beaver Lake
Broome	White Birch Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Dutchess	Rudd Pond
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county listed as Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Tonawanda Creek, Upper, and minor tribs
Genesee	Little Tonawanda Creek, Lower, and tribs
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Greene	Schoharie Reservoir
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs
Onondaga	Onondaga creek, Middle and tribs
Onondaga	Onondaga Creek, Upper, and minor tribs
Onondaga	Harbor Brook, Lower, and tribs
Onondaga	Ninemile Creek, Lower, and tribs
Onondaga	Minor tribs to Onondaga Lake
Ontario	Honeoye Lake
Ontario	Hemlock Lake Outlet and minor tribs
Ontario	Great Brook and minor tribs
Oswego	Lake Neatahwanta
Putnam	Oscawana Lake
Putnam	Lake Carmel
Queens	Jamaica Bay, Eastern, and tribs (Queens)
Queens	Bergen Basin
Queens	Shellbank Basin
Rensselaer	Snyders Lake
Richmond	Grasmere, Arbutus and Wolfes Lakes
Saratoga	Dwaas Kill and tribs
Saratoga	Tribs to Lake Lonely
Saratoga	Lake Lonely
Saratoga	Schuyler Creek and tribs
Schenectady	Collins Lake

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Schoharie	Engleville Pond		
Schoharie	Summit Lake		
St. Lawrence	Black Lake Outlet/Black Lake		
Steuben	Lake Salubria		
Steuben	Smith Pond		
Suffolk	Millers Pond		
Suffolk	Mattituck (Marratooka) Pond		
Suffolk	Tidal tribs to West Moriches Bay		
Suffolk	Canaan Lake		
Suffolk	Lake Ronkonkoma		
Tompkins	Cayuga Lake, Southern End		
Tompkins	Owasco Inlet, Upper, and tribs		
Ulster	Ashokan Reservoir		
Ulster	Esopus Creek, Upper, and minor tribs		
Warren	Lake George		
Warren	Tribs to L.George, Village of L George		
Warren	Huddle/Finkle Brooks and tribs		
Warren	Indian Brook and tribs		
Warren	Hague Brook and tribs		
Washington	Tribs to L.George, East Shore of Lake George		
Washington	Cossayuna Lake		
Wayne	Port Bay		
Wayne	Marbletown Creek and tribs		
Westchester	Peach Lake		
Westchester	Mamaroneck River, Lower		
Westchester	Mamaroneck River, Upper, and minor tribs		
Westchester	Sheldrake River and tribs		
Westchester	Blind Brook, Lower		
Westchester	Blind Brook, Upper, and tribs		
Westchester	Lake Lincolndale		
Westchester	Lake Meahaugh		
Wyoming	Java Lake		
Wyoming	Silver Lake		

Note: The list above identifies those waters from the final New York State "2008 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated May 26, 2008, that are impaired by silt, sediment or nutrients.

APPENDIX F

LIST OF NYS DEC REGIONAL OFFICES

Region	COVERING THE FOLLOWING COUNTIES:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS	DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, PO BOX 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD, PO BOX 220 WARRENSBURG, NY 12885-0220 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX B
SOILS INFORMATION


75° 3' 56"
75° 3' 18"
42° 28' 55"
42° 28' 17"
494700
494800
494900
495000
495100
495200
495300
495400
4703300
4703200
4703100
4703000
4702900
4702800
4702700
4702600
4702500
4702400
4702300
4702200
MeB
MeC
OgB
LrE
OgC
BfC
ChD
BfD
Farone Dr
Birchwood Dr
Carson Rd
Bloodgett Dr
Brigham Rd
College Park Dr
Crestmont Ter
Bugbee Rd
Woodside Ave
Map Scale: 1:5,510 if printed on A size (8.5" x 11") sheet.
N
Meters
0 50 100 200 300
Feet
0 200 400 800 1,200

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

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

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:5,510 if printed on A size (8.5" × 11") sheet.

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Otsego County, New York
Survey Area Data: Version 10, Dec 20, 2011

Date(s) aerial images were photographed: 11/25/2006; 8/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Otsego County, New York (NY077)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BfC	Bath channery silt loam, 8 to 15 percent slopes	2.5	1.9%
BfD	Bath channery silt loam, 15 to 25 percent slopes	17.9	13.8%
ChD	Chenango gravelly silt loam, 15 to 25 percent slopes	0.0	0.0%
LrE	Lordstown, Chadakoin, and Manlius soils, 25 to 50 percent slopes, very rocky	43.3	33.4%
MeB	Mardin channery silt loam, 3 to 8 percent slopes	0.0	0.0%
MeC	Mardin channery silt loam, 8 to 15 percent slopes	33.7	26.1%
OgB	Oquaga-Arnot complex, 1 to 8 percent slopes, rocky	10.2	7.9%
OgC	Oquaga-Arnot complex, 8 to 15 percent slopes, rocky	21.8	16.8%
Totals for Area of Interest		**129.3**	**100.0%**

APPENDIX C
RUNOFF REDUCTION, WATER QUALITY AND CHANNEL PROTECTION COMPUTATIONS

KEYSTONE ASSOCIATES
ARCHITECTS • ENGINEERS • SURVEYORS, LLC

Channel Protection Volume (CPv) Summary

Oneonta Student Housing
Blodgett Drive
City of Oneonta
Otsego County, New York

Job No:	200.26412
Date:	2/4/2013
Sheet:	1 of 1
Computed By:	RPC
Checked By:	

Channel Protection Volume (CPv) Summary

(See computations below)

	CPv Required (ac-ft)	CPv Provided (ac-ft)	Meets Req'd?
Drainage Area No. 2A	0.000	0.000	NA with 2B
Drainage Area No. 2B	0.694	0.72	Yes
NOI Cumulative Total	0.694	0.720	Yes

* Max Volume provided during 1 year storm event.

Pond #1 (Drainage Area 2)

Channel Protection Volume

$Vs/Vr = 0.682-1.43(q_o/q_i)+1.64(q_o/q_i)^2-0.804(q_o/q_i)^3$

$Vs = (Vs/Vr)(Qd)(A)/12$

Where: $CPv = Vs =$ Channel Protection Volume

Vr =	1.052	runoff volume (acre-feet)
qo =	0.520	peak outflow discharge (cfs)
qi =	14.200	peak inflow discharge (cfs)
A =	16.270	site area in acres (to pond)
Qd =	0.810	the post-developed runoff for the design storm (inches)

Calculation

qo/qi =	0.037	
Vs/Vr =	0.632	
Vs =	0.694	acre-feet

See attached HydroCad summaries for data values.

* Both drainage areas discharge to the same outlet point providing one total number for the NOI.

Chart : Forebay Storage Volume:

							A
Contour Elev. (ft)	Contour Area				Depth (ft)	Total Volume (ft^3)	Total Volume (ac-ft)
	Proposed (ft^2)	Average (ft^2)	Proposed (ac)	Average (ac)			
1554	142		0.0033				
		830		0.0190	4	3318	0.0762
1558	1517		0.0348				
						0	0.0000
			0.0000				
		0		0.0000	0	0	0.0000
			0.0000				
		0		0.0000	0	0	0.0000
			0.0000				

Chart : Permanent Pool Storage Volume (including Forebay Volumes)

Contour Elev. (ft)	Contour Area				Depth (ft)	Total Volume (ft^3)	Total Volume (ac-ft)
	Proposed (ft^2)	Average (ft^2)	Proposed (ac)	Average (ac)			
1530	100		0.0023				
		578		0.0133	4	2310	0.0530
1534	1055		0.0242				
						0	0.0000
			0.0000				
		0		0.0000	0	0	0.0000
			0.0000				
		0		0.0000	0	0	0.0000
			0.0000				
							0.0530

NOTE: Permanent pool to be 20% Min. of Total Water Quality volume. Extended detention to provide remainder.

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?	YES	NO

Manually enter P, Total Area and Impervious Cover.

P=	0.90	*inch*

Breakdown of Subcatchments

Catchment	Total Area *(Acres)*	Impervious Cover *(Acres)*	Percent Impervious *%*	Runoff Coefficient *Rv*	WQv *(ft^3)*	Description
1	0.03	0.03	100%	0.95	100	Stormwater Planter
2	3.37	1.80	53%	0.53	5,843	Dry Swale
3	0.04	0.04	100%	0.95	120	Stormwater Planter
4	0.56	0.24	43%	0.44	797	Dry Swale
5	3.84	1.52	40%	0.41	5,097	
6	0.31	0.05	16%	0.20	198	Dry Swale
7						
8						
9						
10						
Total	8.15	3.68	45%	0.46	**12,154**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0	0	*minimum 10,000 sf*
Riparian Buffers	0	0	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0	0	
Tree Planting	0	0	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0**	**0**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Cover *(Acres)*	Percent Impervious *%*	Runoff Coefficient *Rv*	WQv *(ft^3)*
"<<Initial WQv"	8.15	3.68	0.45157546	0.46	12,154
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**8.15062**	**3.68062**	45%	0.46	12,154
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	8.15062	3.68	45%	0.46	**12,154**

Hillside Commons Student Housing
Oneonta, NY

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.07	0.07	66	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	4.24	2.09	2618	4220
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.07	0.07	66	
Totals by Standard SMP w/RRV		→	4.24	2.09	2618	4220
Totals by Standard SMP		→	0.00	0.00		0
Totals (Area + Volume + all SMPs)		→	4.31	2.16	2,684	4,220
	Impervious Cover √	error				

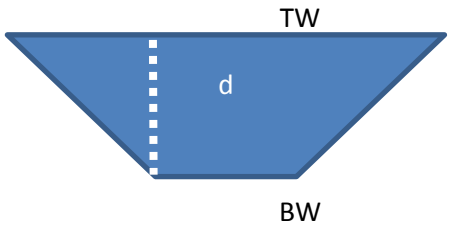
Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	2.77	30%
D	**5.38**	20%
Total Area	8.15	
Calculate the Minimum RRv		
S =	**0.23**	
Impervious =	3.68062	*acre*
Precipitation	0.9	*in*
Rv	0.95	
Minimum RRv	**2,673**	***ft3***
	0.06	af

Dry Swale Worksheet

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	3.37	1.80	53%	0.53	5,843	0.90	Dry Swale
Reduced by Disconnection of Rooftops			53%	0.53	5,843	<<WQv after adjusting for Disconnected Rooftops	

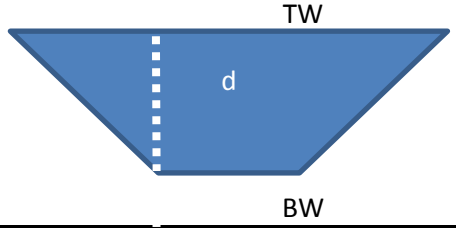
Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	584	ft^3	filter strip

Calculate Available Storage Capacity			
Bottom Width	2	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	2	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	4%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	2	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	10	*ft*	
Area	12.00	*sf*	
Minimum Length	438	*ft*	
Actual Length	600	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	7,784	ft^3	
Are you using an underdrain?		Yes	

Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	N/A
RRv	**1,557**	**ft^3**	**Runoff Reduction equals 20% with underdrains and 40% without**	
Volume Treated	4,286	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
4	0.56	0.24	43%	0.44	797	0.90	Dry Swale
Reduced by Disconnection of Rooftops			43%	0.44	797	<<WQv after adjusting for Disconnected Rooftops	
Pretreatment Provided					**Pretreatment Technique**		
Pretreatment (10% of WQv)			80	*ft^3*	filter strip		

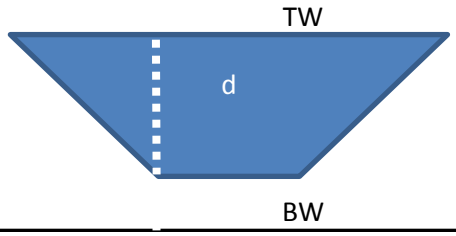
Calculate Available Storage Capacity			
Bottom Width	6	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	3	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	4%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	2	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for*
Top Width	18	*ft*	
Area	24.00	*sf*	
Minimum Length	30	*ft*	
Actual Length	145	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	3,560	*ft^3*	
Are you using an underdrain?		Yes	

Determine Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	N/A
RRv	**712**	***ft^3***	**Runoff Reduction equals 20% with underdrains and 40% without**	
Volume Treated	85	*ft^3*	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
6	0.31	0.05	16%	0.20	198	0.90	Dry Swale
Reduced by Disconnection of Rooftops			16%	0.20	198	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			**Pretreatment Technique**
Pretreatment (10% of WQv)	20	ft^3	filter strip

Calculate Available Storage Capacity			
Bottom Width	2	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	2	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	2%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.5	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for*
Top Width	8	*ft*	
Area	7.50	*sf*	
Minimum Length	24	*ft*	
Actual Length	230	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	1,745	ft^3	
Are you using an underdrain?		Yes	

Runoff Reduction					
Is the Dry Swale contributing flow to another practice?			No	Select Practice	N/A
RRv	**349**	***ft^3***	Runoff Reduction equals 20% with underdrains and 40% without		
Volume Treated	-151	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale		
Volume Directed	0	ft^3	This volume is directed another practice		
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv		
Volume √	*Error*		*Check to be sure that channel is long enough to store WQv*		

Stormwater Planter Worksheet

Af=WQv*(df)/[k*(hf+df)(tf)]

where

Af Required Surface Area (ft2)

WQv Water Quality Volume (ft^3)

df Depth of the Soil Medium (ft)

k The Hyrdaulic Conductivity (ft/day), usually set at 4 ft/day when soil is loosely placed in the planter, but can be varied depending on the properties of the soil media.

Sand - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil***

hf Average Height of Water above planter bed (ft)

tf The Design Time to Filter the Treatment Volume Through the Filter Media (days)

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.03	0.03	100%	0.95	100	0.90	Stormwater Planter

Calculate the Mimimum Filter Area			
	Value	Units	
WQv	100	*ft^3*	*WQv*
Depth of Soil Media	1.5	*ft*	*df*
Hydraulic Conductivity	4	*ft/d*	*k*
Average Height of Ponding	0.5	*ft*	*hf*
Filter Time	0.17	*d*	*tf*
Required Area of Filter	110	*ft^2*	*Af*

Area of Filter		
Width	10	*ft*
Length	169.5	*ft*
Area Provided	1695	*ft^2*
Volume Provided	1536.8	

Runoff Reduction		
Soil Type	D	
Through Planter?	*Yes*	

Determine the Runoff Reduction			
RRv	**100**	***ft^3***	
RRv Applied	**30**	***ft^3***	

Stormwater Planter Worksheet

Af=WQv*(df)/[k*(hf+df)(tf)]

where

Af Required Surface Area (ft2)

WQv Water Quality Volume (ft^3)

df Depth of the Soil Medium (ft)

k The Hyrdaulic Conductivity (ft/day), usually set at 4 ft/day when soil is loosely placed in the

Sand - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil***

hf Average Height of Water above planter bed (ft)

tf The Design Time to Filter the Treatment Volume Through the Filter Media (days)

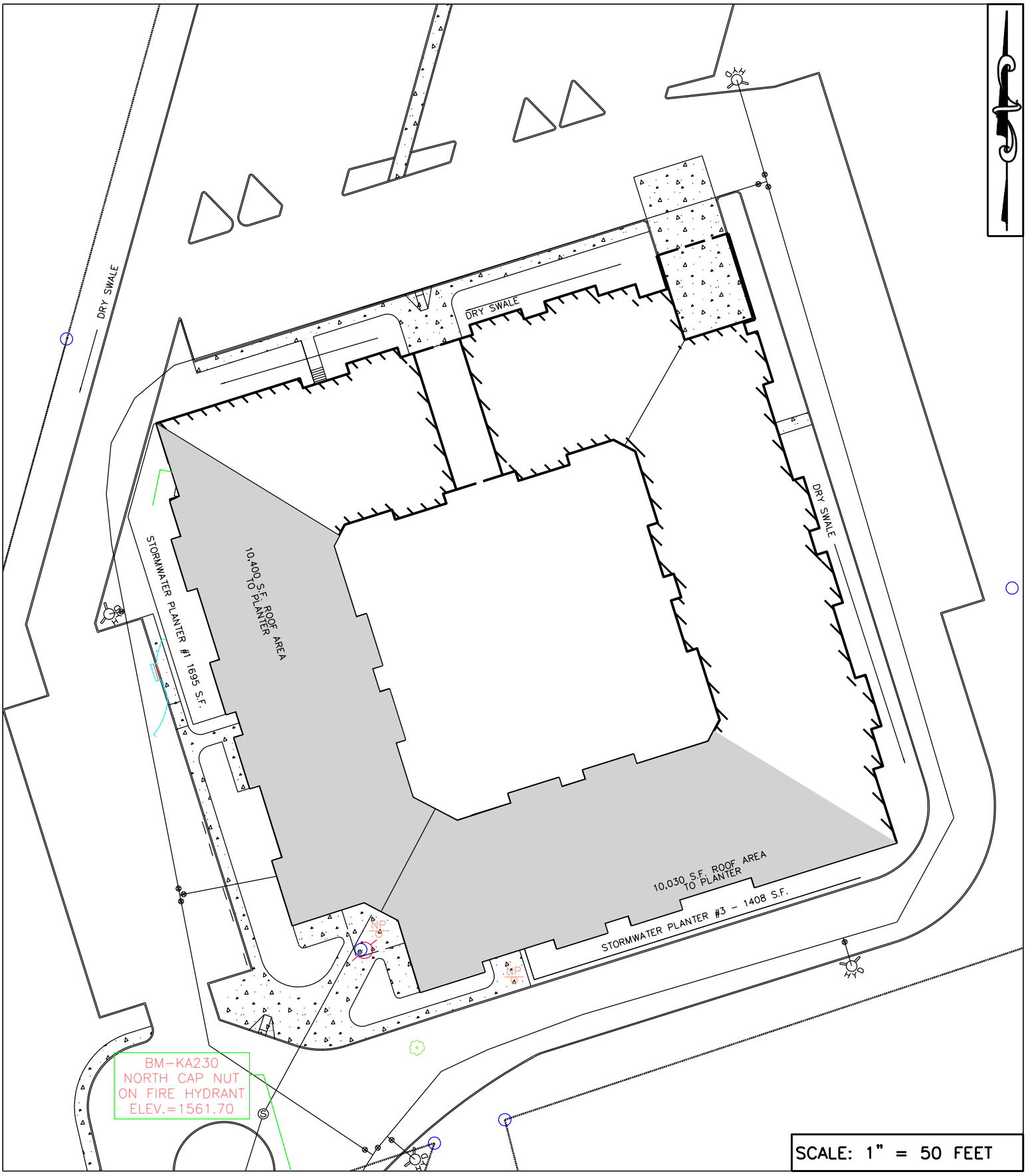
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.04	0.04	100%	0.95	120	0.90	Stormwater Planter

Calculate the Mimimum Filter Area			
	Value	Units	
WQv	120	*ft^3*	*WQv*
Depth of Soil Media	1.5	*ft*	*df*
Hydraulic Conductivity	4	*ft/d*	*k*
Average Height of Ponding	0.5	*ft*	*hf*
Filter Time	0.17	*d*	*tf*
Required Area of Filter	132	*ft^2*	*Af*

Area of Filter			
Width	10	*ft*	
Length	140.8	*ft*	
Area Provided	1408	*ft^2*	
Volume Provided	1276.58667		

Runoff Reduction			
Soil Type	D		
Through Planter?	*Yes*		

Determine the Runoff Reduction			
RRv	**120**	***ft^3***	
RRv Applied	**36**	***ft^3***	



KEYSTONE ASSOCIATES
ARCHITECTS • ENGINEERS • SURVEYORS, LLC

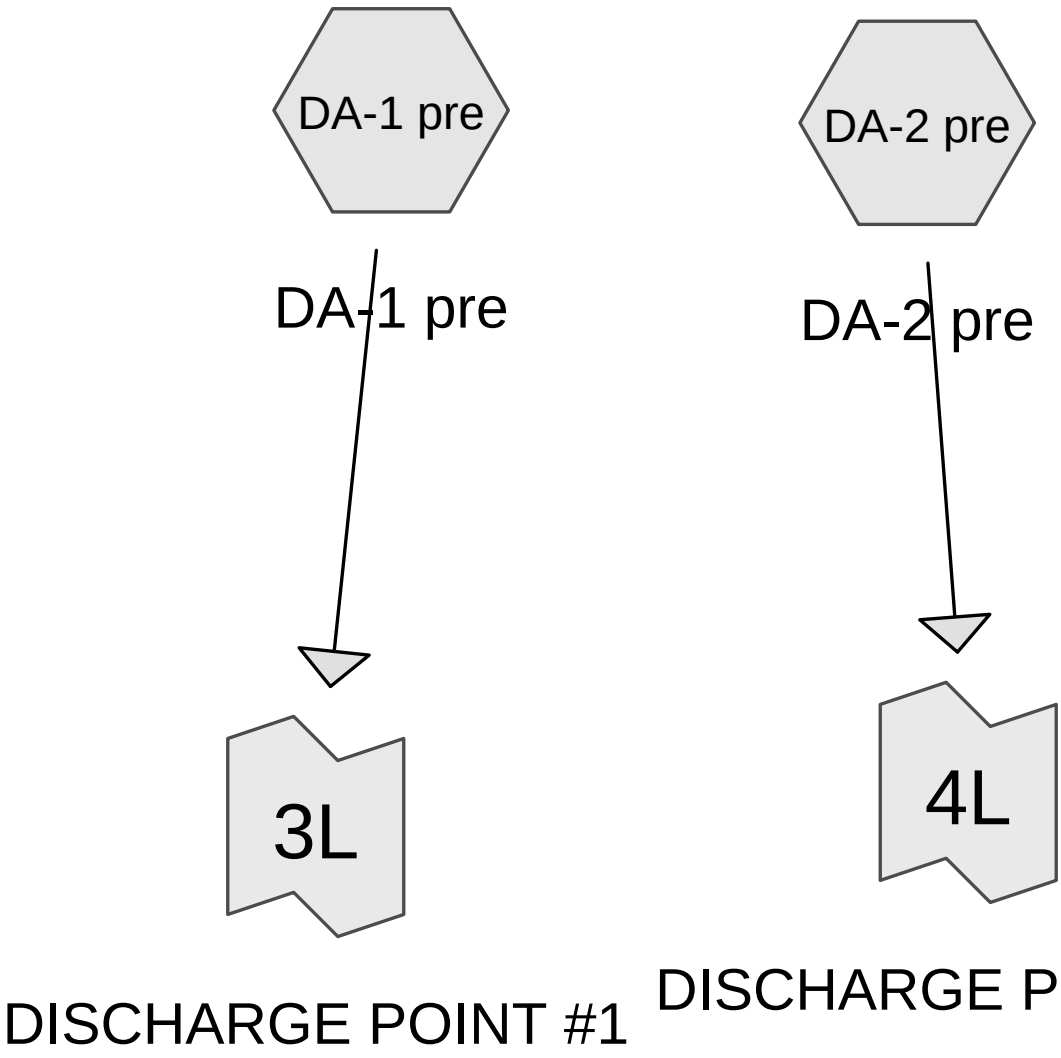
KEYSTONE PROJECT NO. 0200.26412

HILLSIDE COMMONS STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA
OTSEGO COUNTY NEW YORK STATE

STORMWATER PLANTER
DRAINAGE AREAS

APPENDIX D
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

PRE DEVELOPMENT



Subcat Reach Pond Link

Routing Diagram for oneonta housing existing

Prepared by Keystone Associates Engineers, Architects & Surveyors, LLC, Printed 3/6/2013

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.200	80	>75% Grass cover, Good, HSG D (DA-2 pre)
0.700	87	Dirt roads, HSG C (DA-1 pre)
1.300	98	Paved parking, HSG C (DA-1 pre)
1.000	98	Paved parking, HSG D (DA-1 pre, DA-2 pre)
11.100	70	Woods, Good, HSG C (DA-1 pre, DA-2 pre)
7.000	77	Woods, Good, HSG D (DA-1 pre, DA-2 pre)
0.800	72	Woods/grass comb., Good, HSG C (DA-1 pre)
0.300	79	Woods/grass comb., Good, HSG D (DA-1 pre)
22.400	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
13.900	HSG C	DA-1 pre, DA-2 pre
8.500	HSG D	DA-1 pre, DA-2 pre
0.000	Other	
22.400		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.200	0.000	0.200	>75% Grass cover, Good	DA-2 pre
0.000	0.000	0.700	0.000	0.000	0.700	Dirt roads	DA-1 pre
0.000	0.000	1.300	1.000	0.000	2.300	Paved parking	DA-1 pre, DA-2 pre
0.000	0.000	11.100	7.000	0.000	18.100	Woods, Good	DA-1 pre, DA-2 pre
0.000	0.000	0.800	0.300	0.000	1.100	Woods/grass comb., Good	DA-1 pre
0.000	**0.000**	**13.900**	**8.500**	**0.000**	**22.400**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>0.60"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=8.28 cfs 0.559 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>0.48"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=4.76 cfs 0.456 af

Link 3L: DISCHARGE POINT #1 Inflow=8.28 cfs 0.559 af
Primary=8.28 cfs 0.559 af

Link 4L: DISCHARGE POINT #2 Inflow=4.76 cfs 0.456 af
Primary=4.76 cfs 0.456 af

Total Runoff Area = 22.400 ac Runoff Volume = 1.015 af Average Runoff Depth = 0.54"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

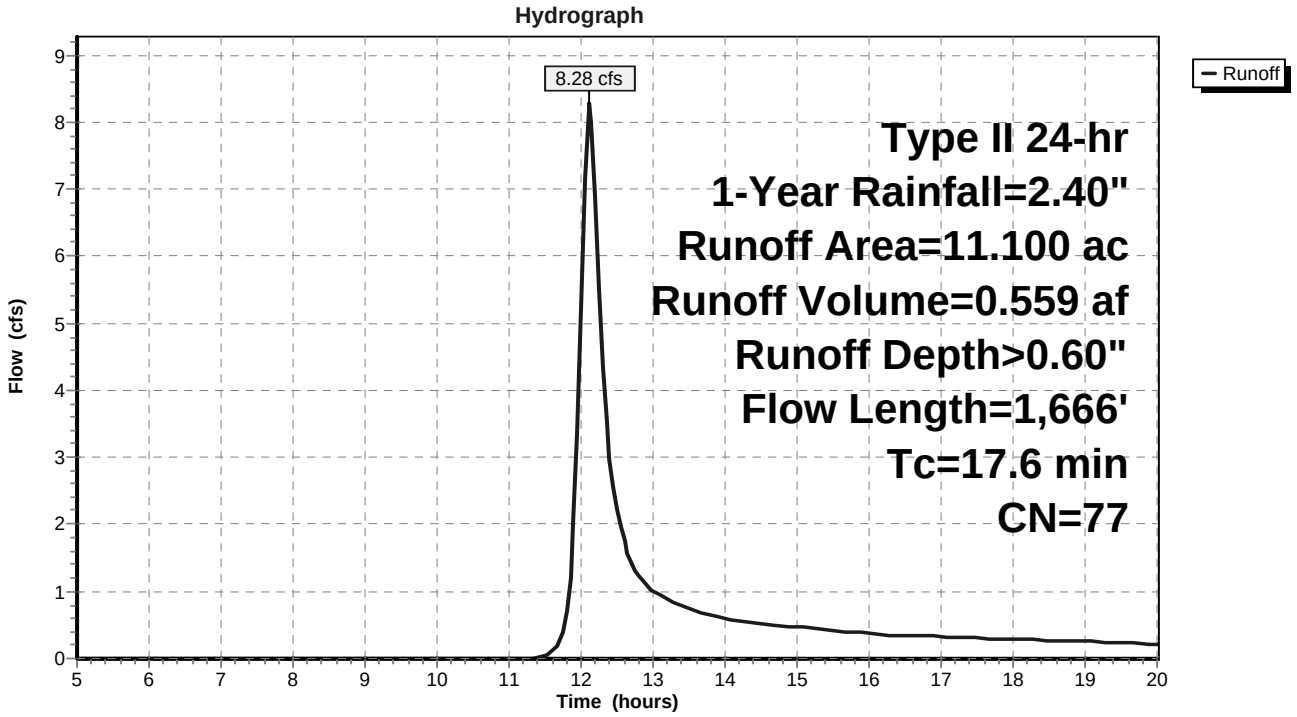
Runoff = 8.28 cfs @ 12.12 hrs, Volume= 0.559 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

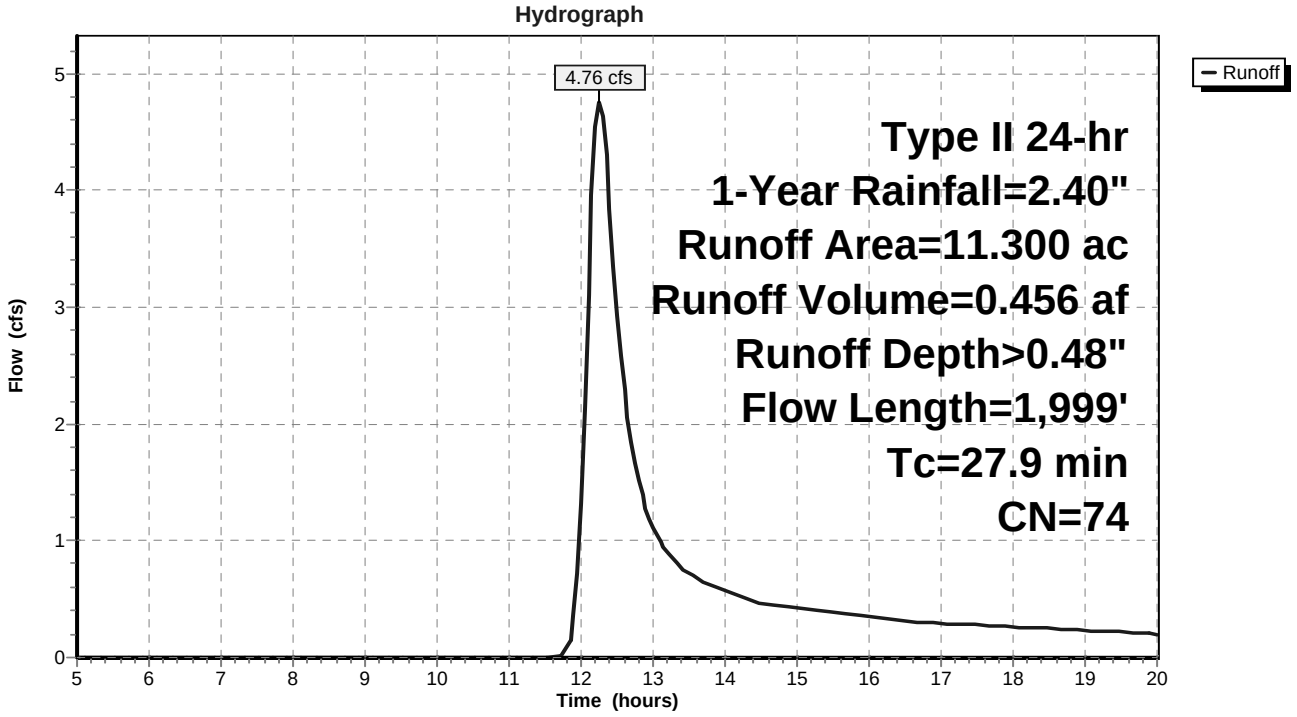
Runoff = 4.76 cfs @ 12.26 hrs, Volume= 0.456 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

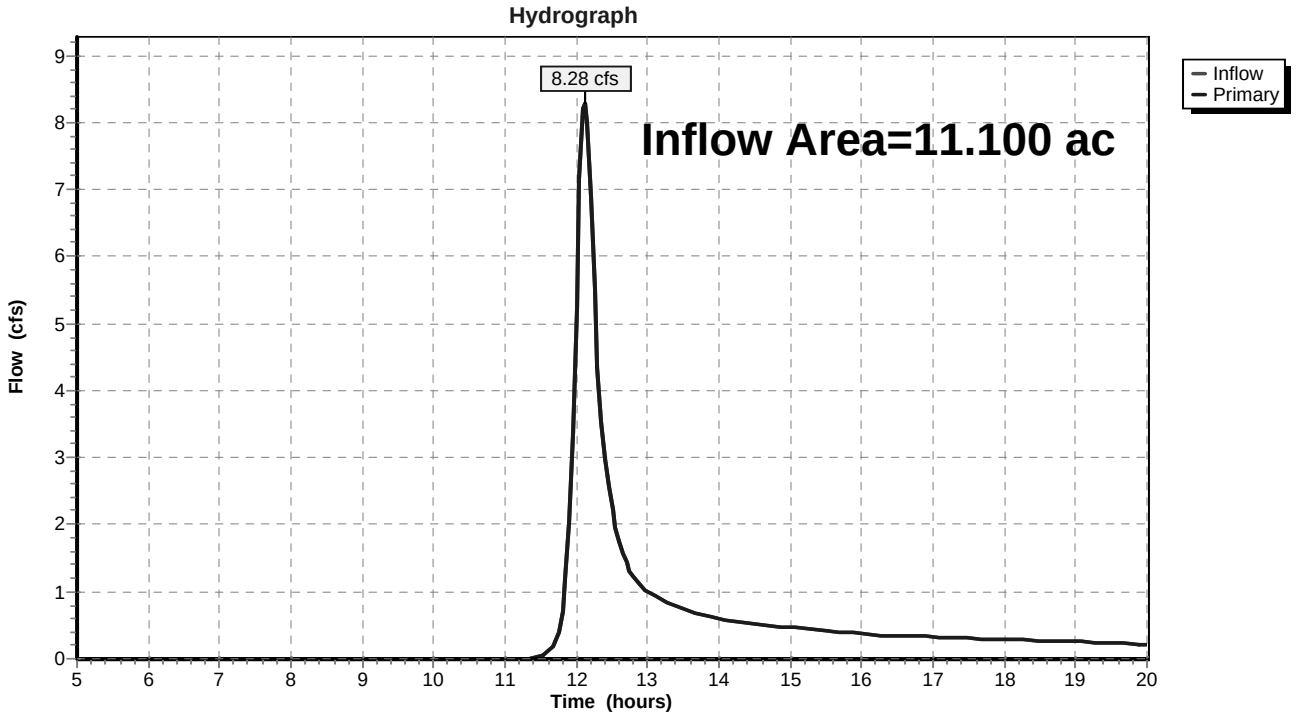


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 0.60" for 1-Year event
Inflow = 8.28 cfs @ 12.12 hrs, Volume= 0.559 af
Primary = 8.28 cfs @ 12.12 hrs, Volume= 0.559 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

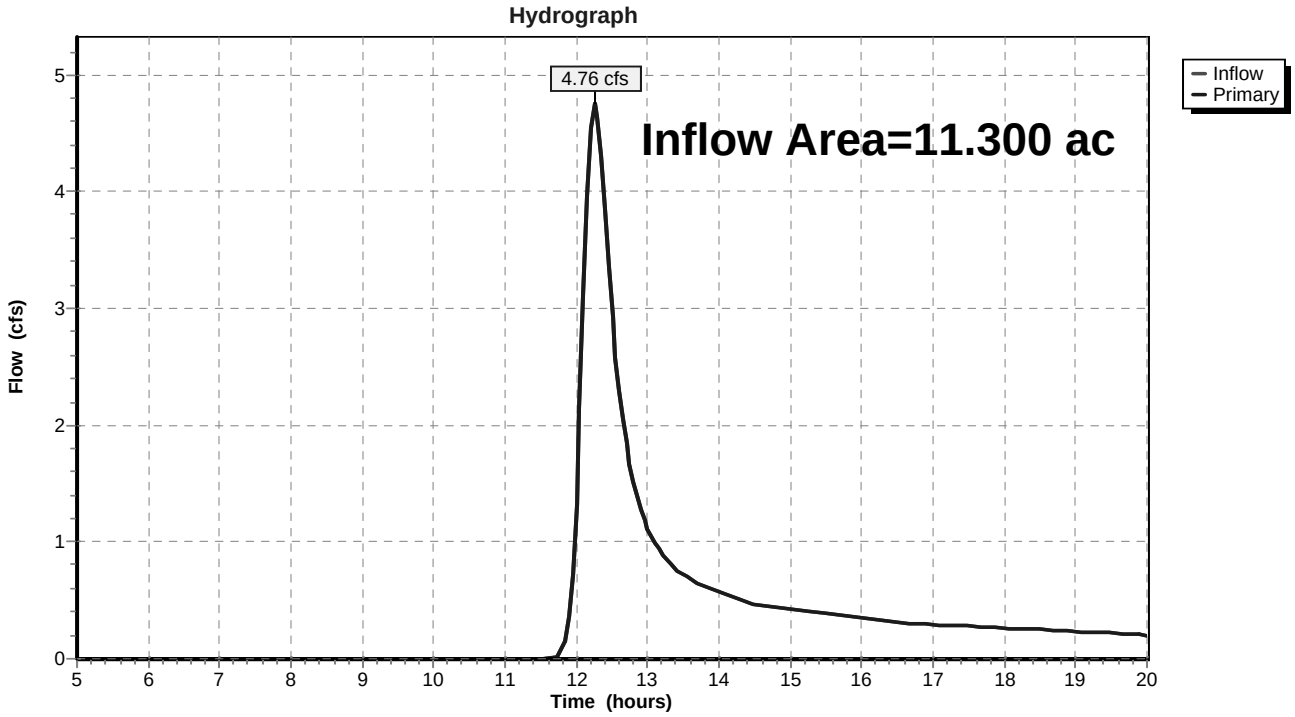


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 0.48" for 1-Year event
Inflow = 4.76 cfs @ 12.26 hrs, Volume= 0.456 af
Primary = 4.76 cfs @ 12.26 hrs, Volume= 0.456 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>0.84"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=11.81 cfs 0.777 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>0.69"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=7.21 cfs 0.654 af

Link 3L: DISCHARGE POINT #1 Inflow=11.81 cfs 0.777 af
Primary=11.81 cfs 0.777 af

Link 4L: DISCHARGE POINT #2 Inflow=7.21 cfs 0.654 af
Primary=7.21 cfs 0.654 af

Total Runoff Area = 22.400 ac Runoff Volume = 1.431 af Average Runoff Depth = 0.77"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

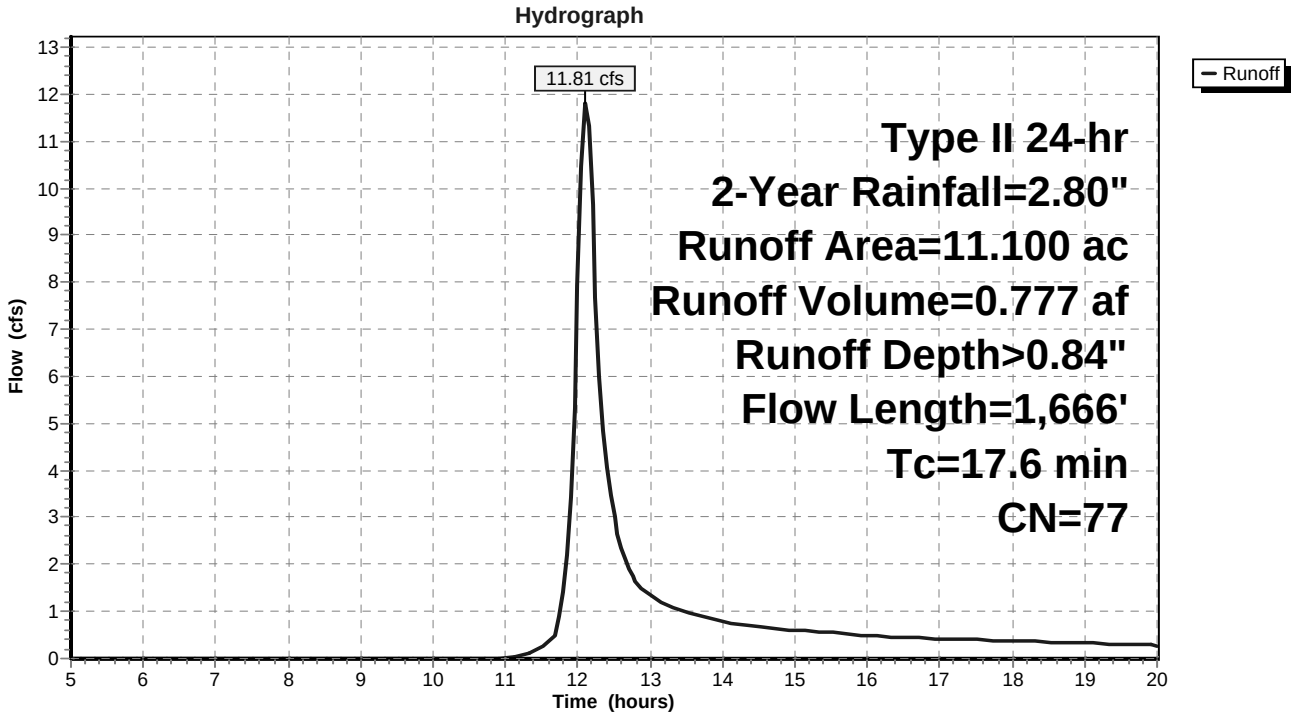
Runoff = 11.81 cfs @ 12.11 hrs, Volume= 0.777 af, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

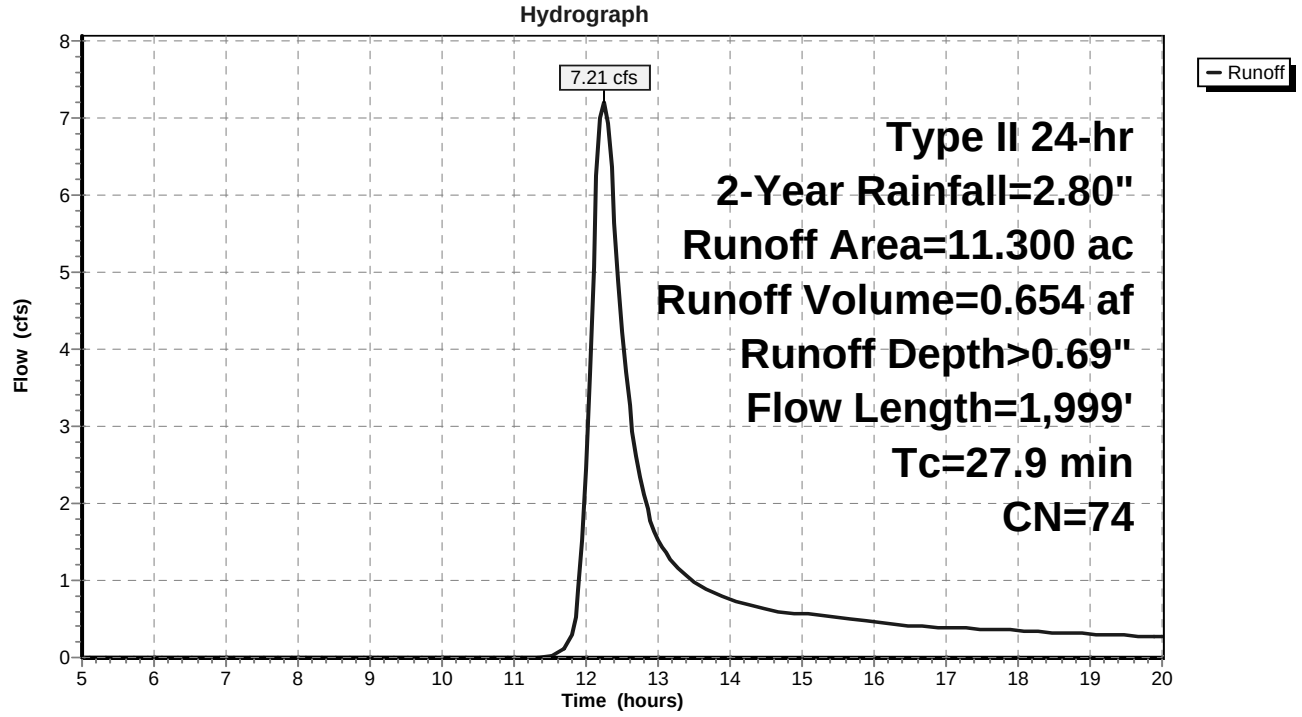
Runoff = 7.21 cfs @ 12.25 hrs, Volume= 0.654 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

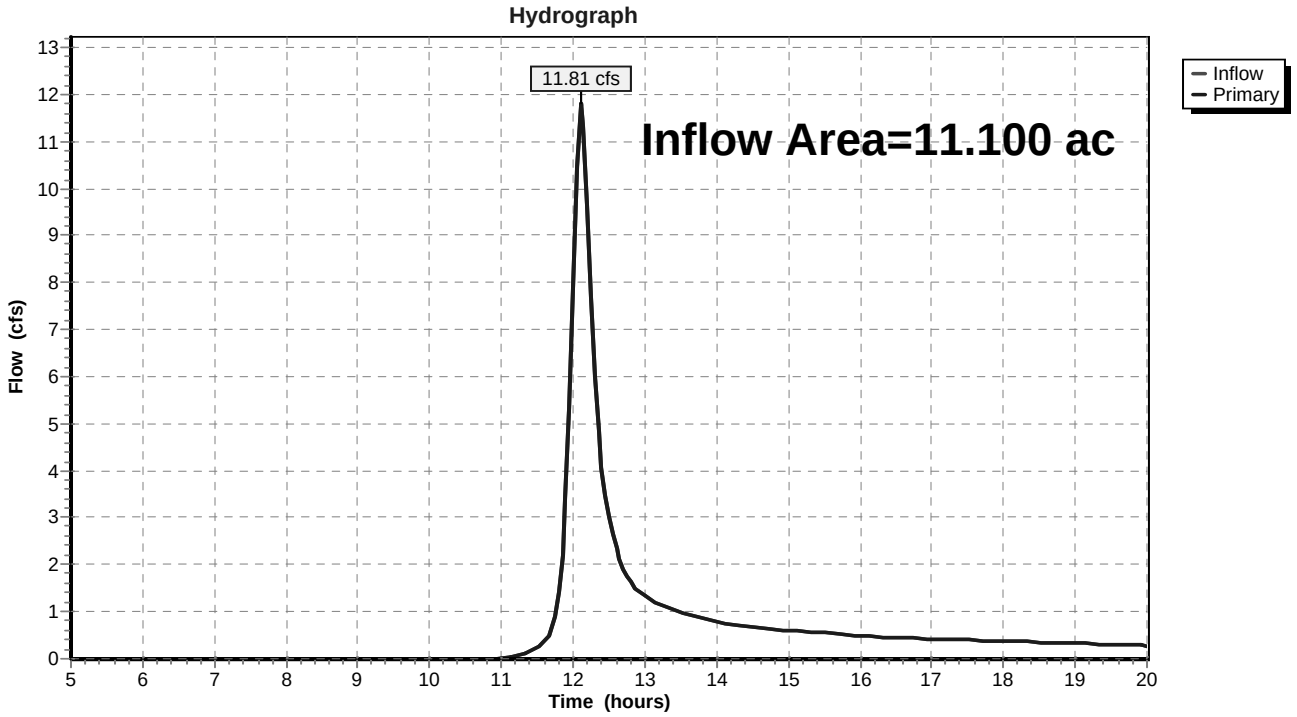


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 0.84" for 2-Year event
Inflow = 11.81 cfs @ 12.11 hrs, Volume= 0.777 af
Primary = 11.81 cfs @ 12.11 hrs, Volume= 0.777 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

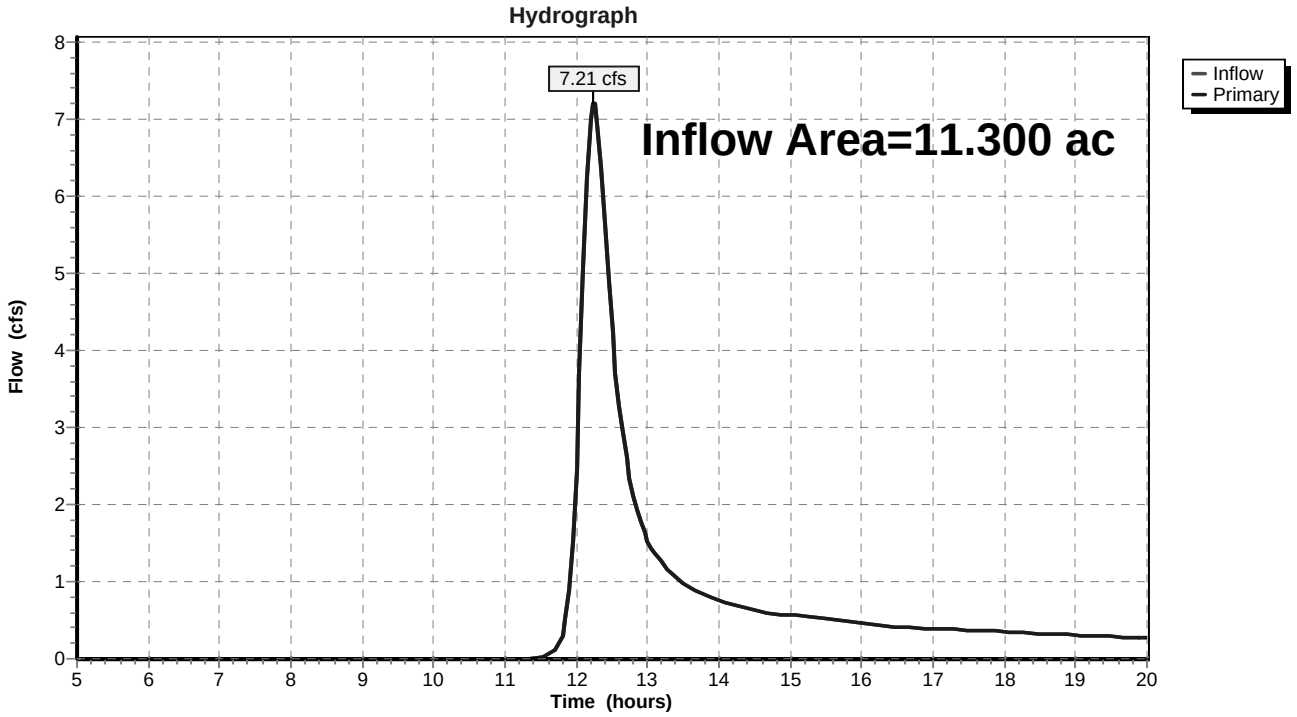


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 0.69" for 2-Year event
Inflow = 7.21 cfs @ 12.25 hrs, Volume= 0.654 af
Primary = 7.21 cfs @ 12.25 hrs, Volume= 0.654 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>1.65"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=23.73 cfs 1.529 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>1.44"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=15.86 cfs 1.357 af

Link 3L: DISCHARGE POINT #1 Inflow=23.73 cfs 1.529 af
Primary=23.73 cfs 1.529 af

Link 4L: DISCHARGE POINT #2 Inflow=15.86 cfs 1.357 af
Primary=15.86 cfs 1.357 af

Total Runoff Area = 22.400 ac Runoff Volume = 2.886 af Average Runoff Depth = 1.55"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

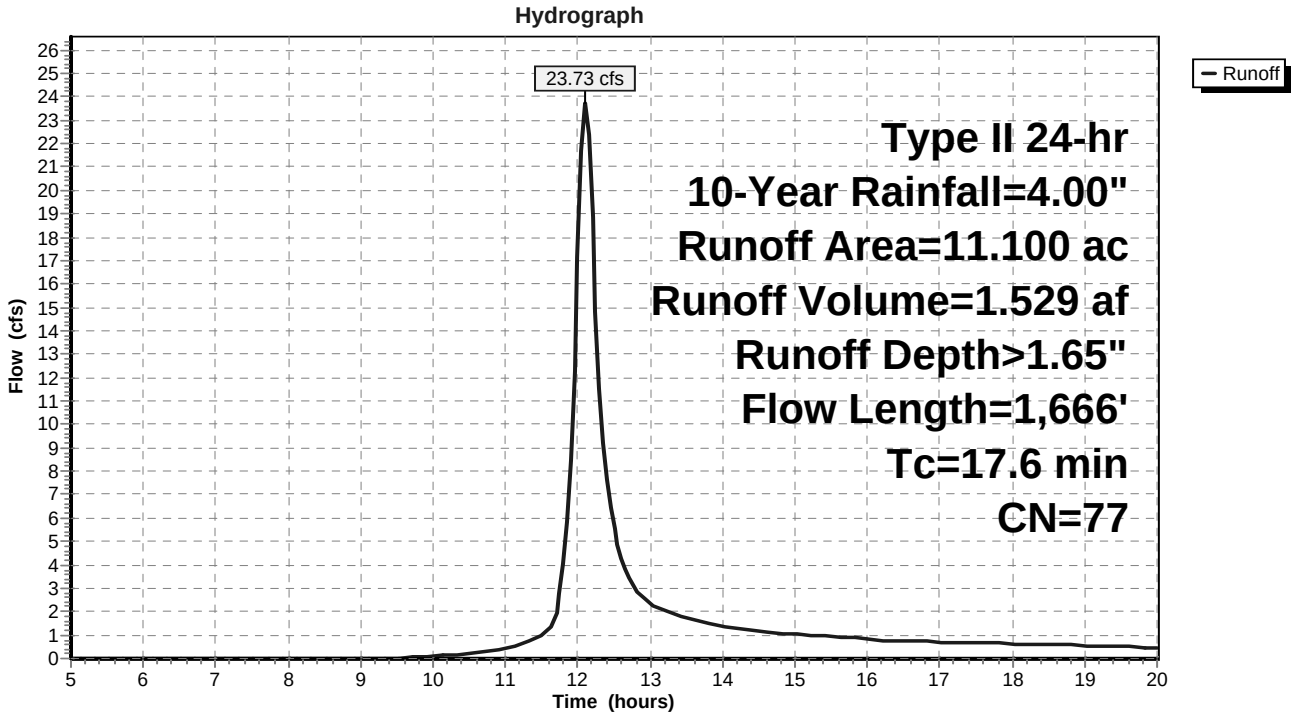
Runoff = 23.73 cfs @ 12.11 hrs, Volume= 1.529 af, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

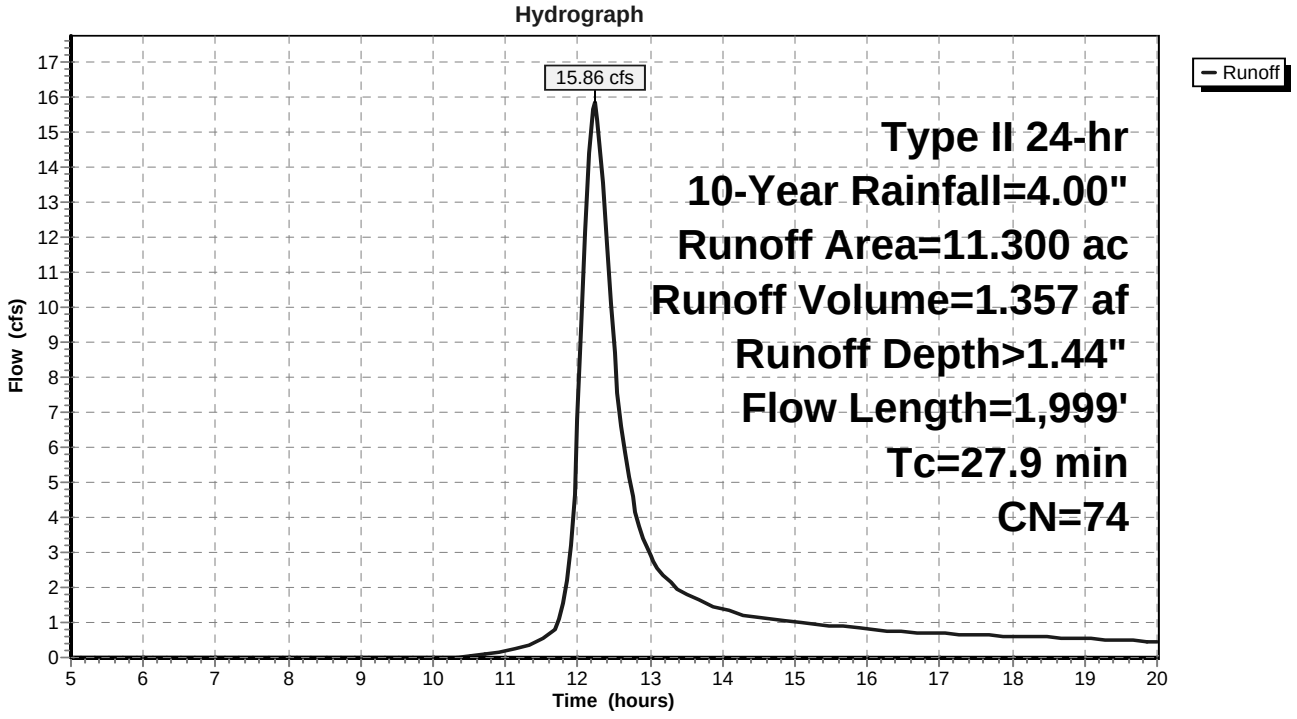
Runoff = 15.86 cfs @ 12.23 hrs, Volume= 1.357 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

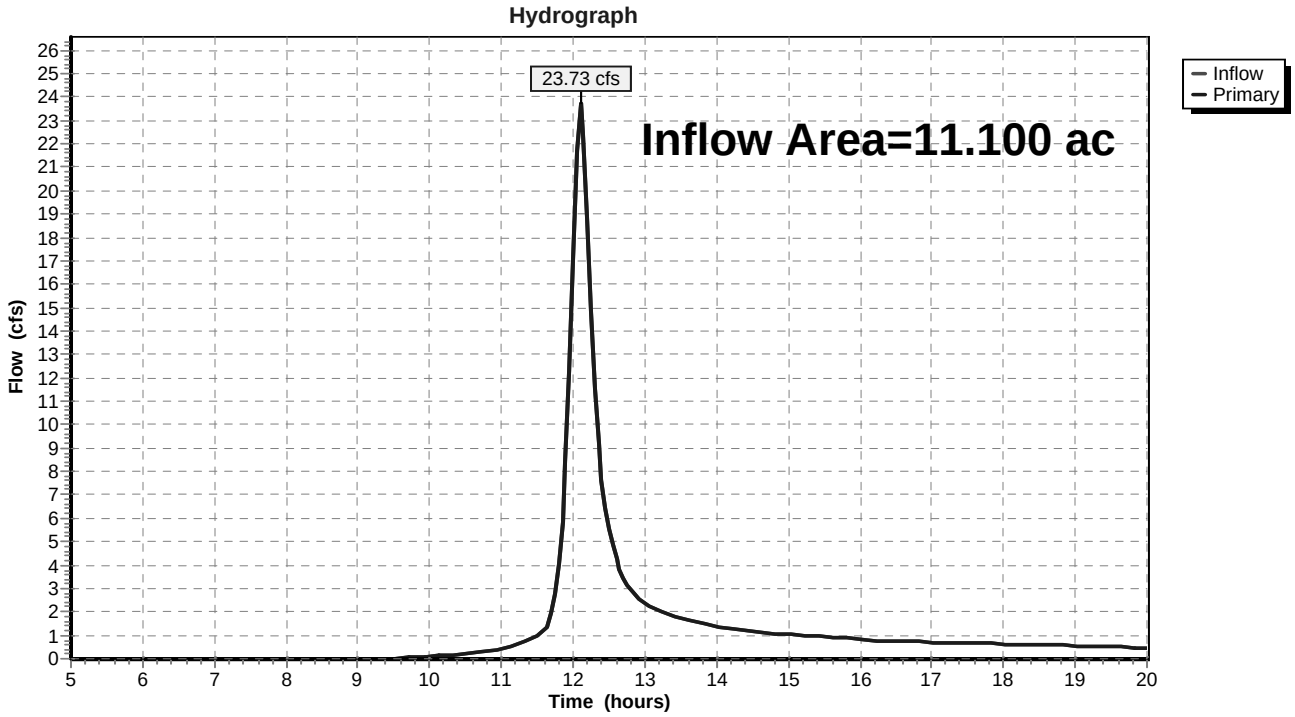


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 1.65" for 10-Year event
Inflow = 23.73 cfs @ 12.11 hrs, Volume= 1.529 af
Primary = 23.73 cfs @ 12.11 hrs, Volume= 1.529 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

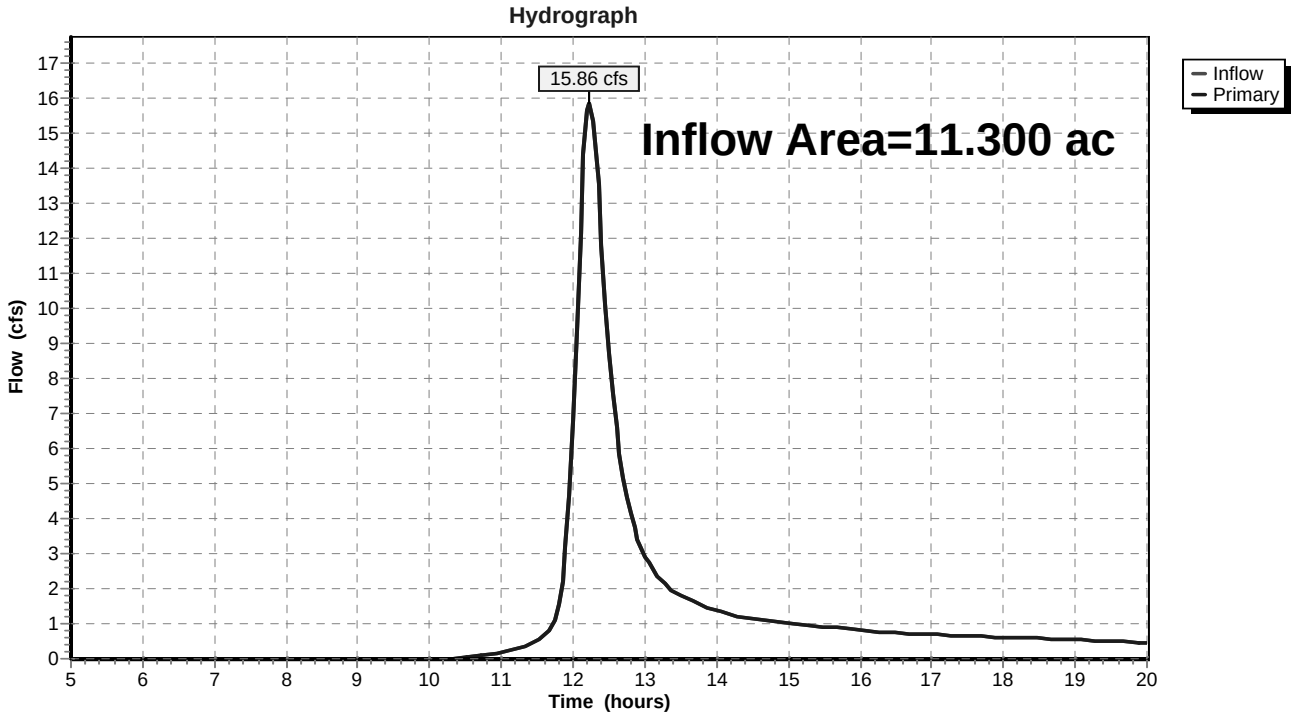


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 1.44" for 10-Year event
Inflow = 15.86 cfs @ 12.23 hrs, Volume= 1.357 af
Primary = 15.86 cfs @ 12.23 hrs, Volume= 1.357 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>2.25"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=32.35 cfs 2.085 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>2.01"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=22.33 cfs 1.888 af

Link 3L: DISCHARGE POINT #1 Inflow=32.35 cfs 2.085 af
Primary=32.35 cfs 2.085 af

Link 4L: DISCHARGE POINT #2 Inflow=22.33 cfs 1.888 af
Primary=22.33 cfs 1.888 af

Total Runoff Area = 22.400 ac Runoff Volume = 3.974 af Average Runoff Depth = 2.13"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

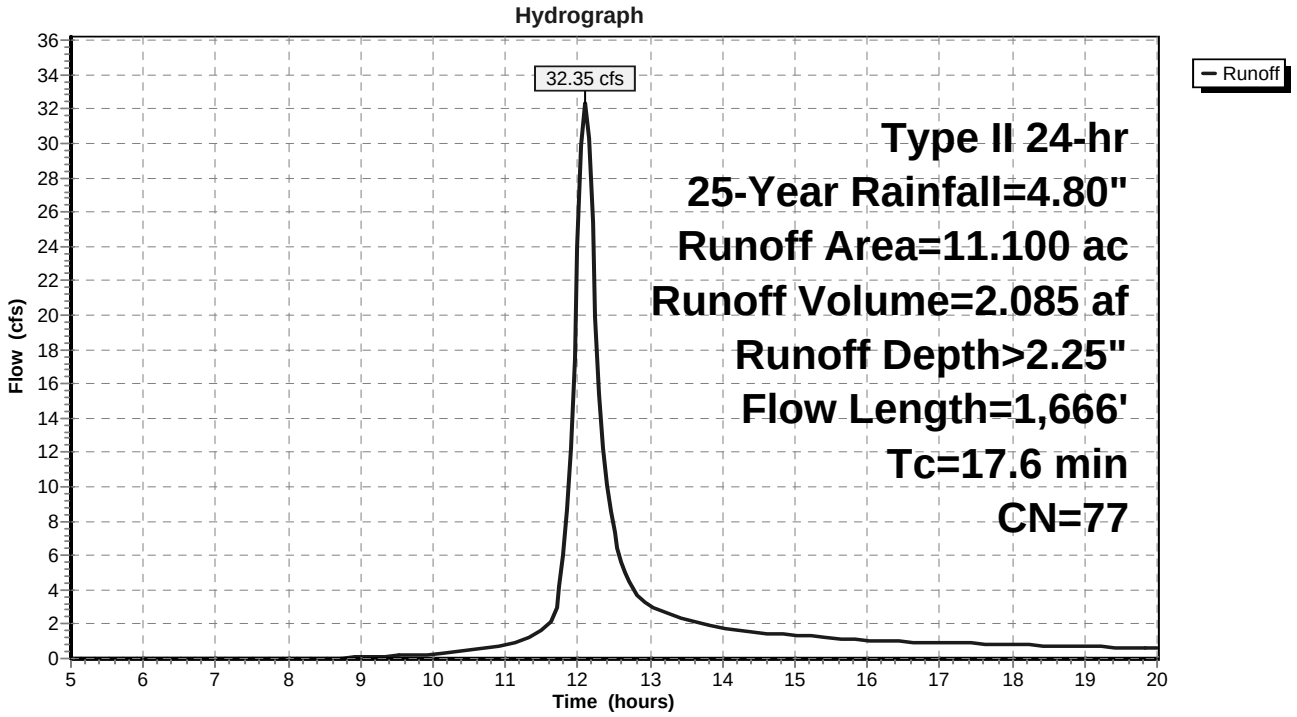
Runoff = 32.35 cfs @ 12.10 hrs, Volume= 2.085 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

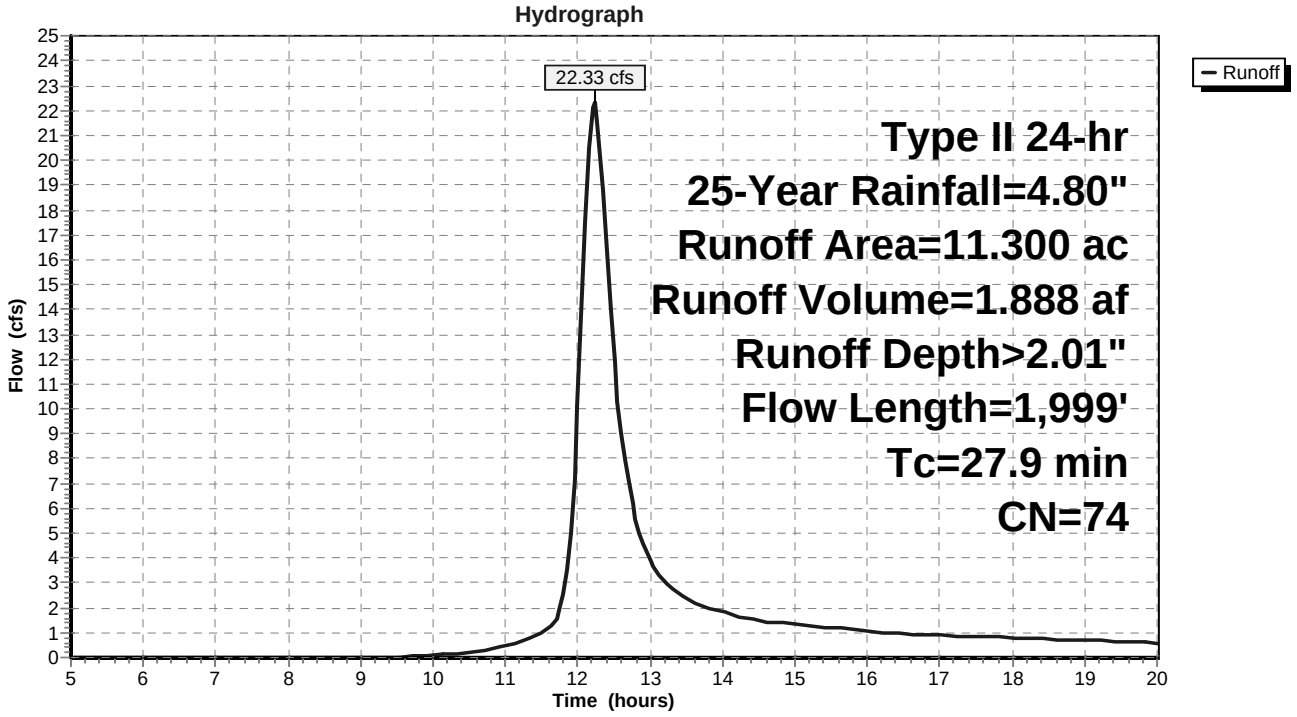
Runoff = 22.33 cfs @ 12.22 hrs, Volume= 1.888 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

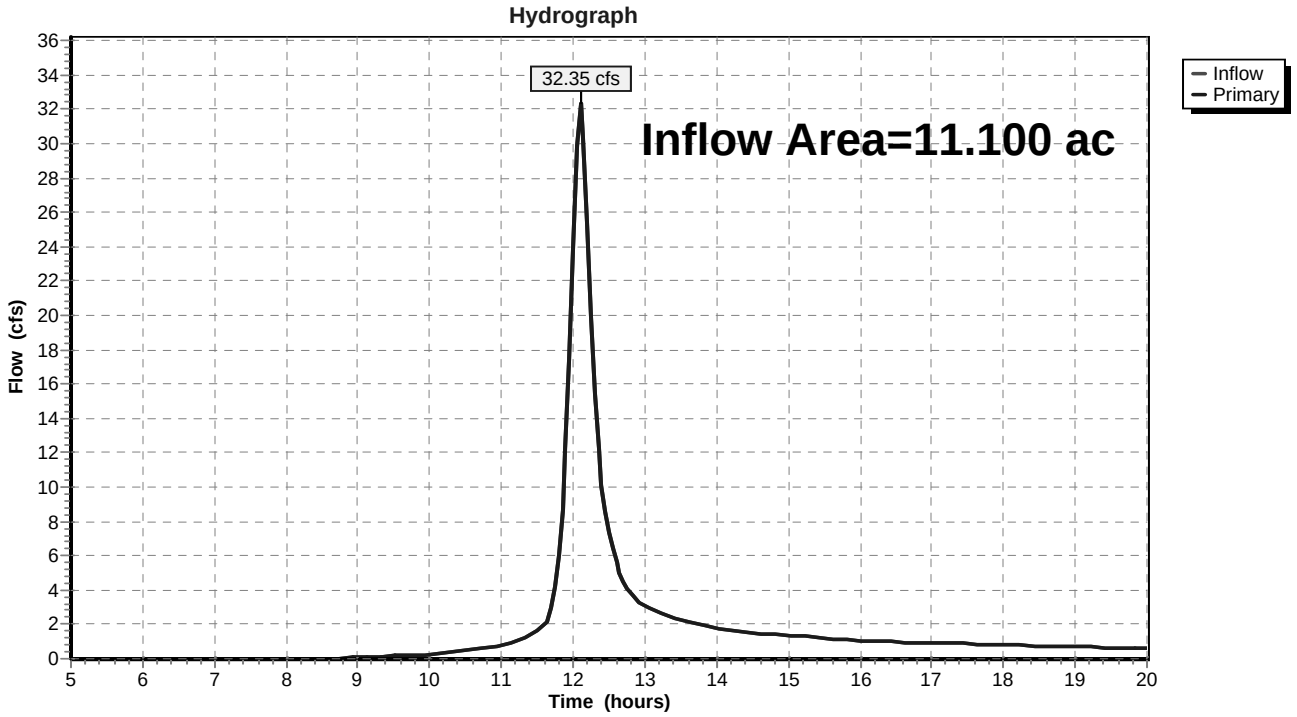


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 2.25" for 25-Year event
Inflow = 32.35 cfs @ 12.10 hrs, Volume= 2.085 af
Primary = 32.35 cfs @ 12.10 hrs, Volume= 2.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

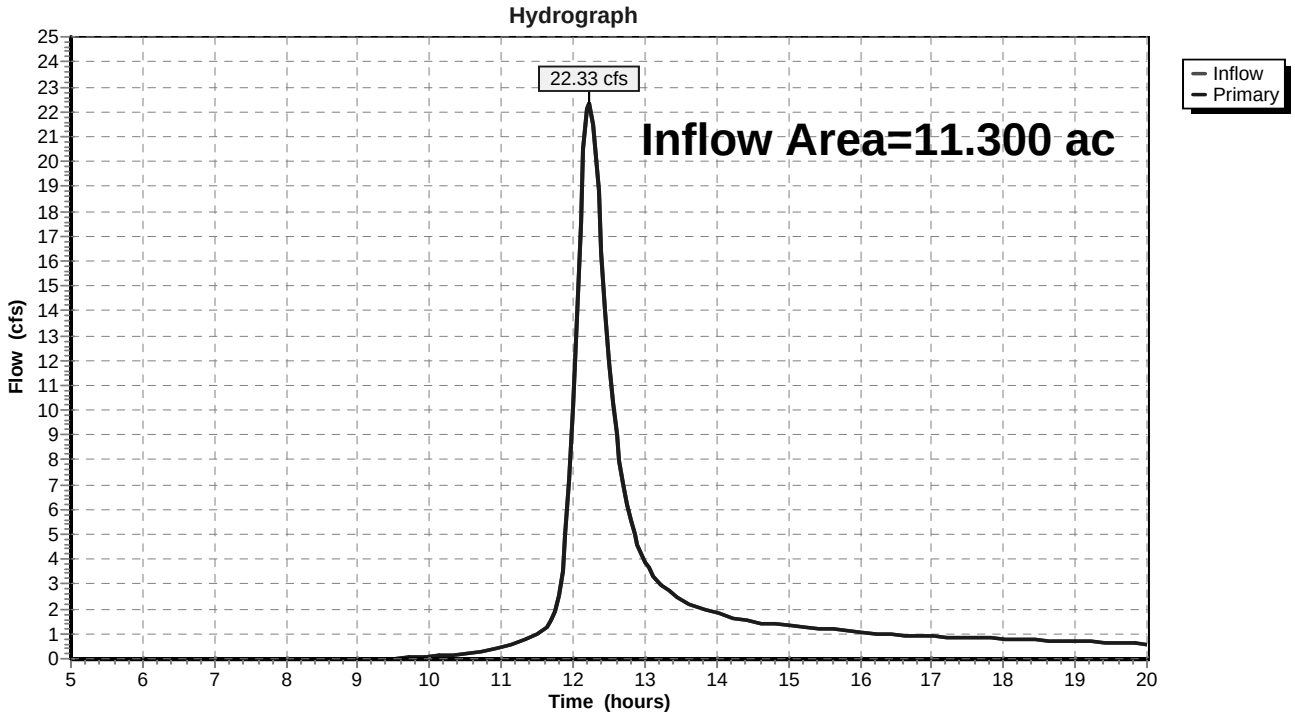


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 2.01" for 25-Year event
Inflow = 22.33 cfs @ 12.22 hrs, Volume= 1.888 af
Primary = 22.33 cfs @ 12.22 hrs, Volume= 1.888 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>2.41"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=34.56 cfs 2.229 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>2.15"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=24.00 cfs 2.027 af

Link 3L: DISCHARGE POINT #1 Inflow=34.56 cfs 2.229 af
Primary=34.56 cfs 2.229 af

Link 4L: DISCHARGE POINT #2 Inflow=24.00 cfs 2.027 af
Primary=24.00 cfs 2.027 af

Total Runoff Area = 22.400 ac Runoff Volume = 4.256 af Average Runoff Depth = 2.28"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

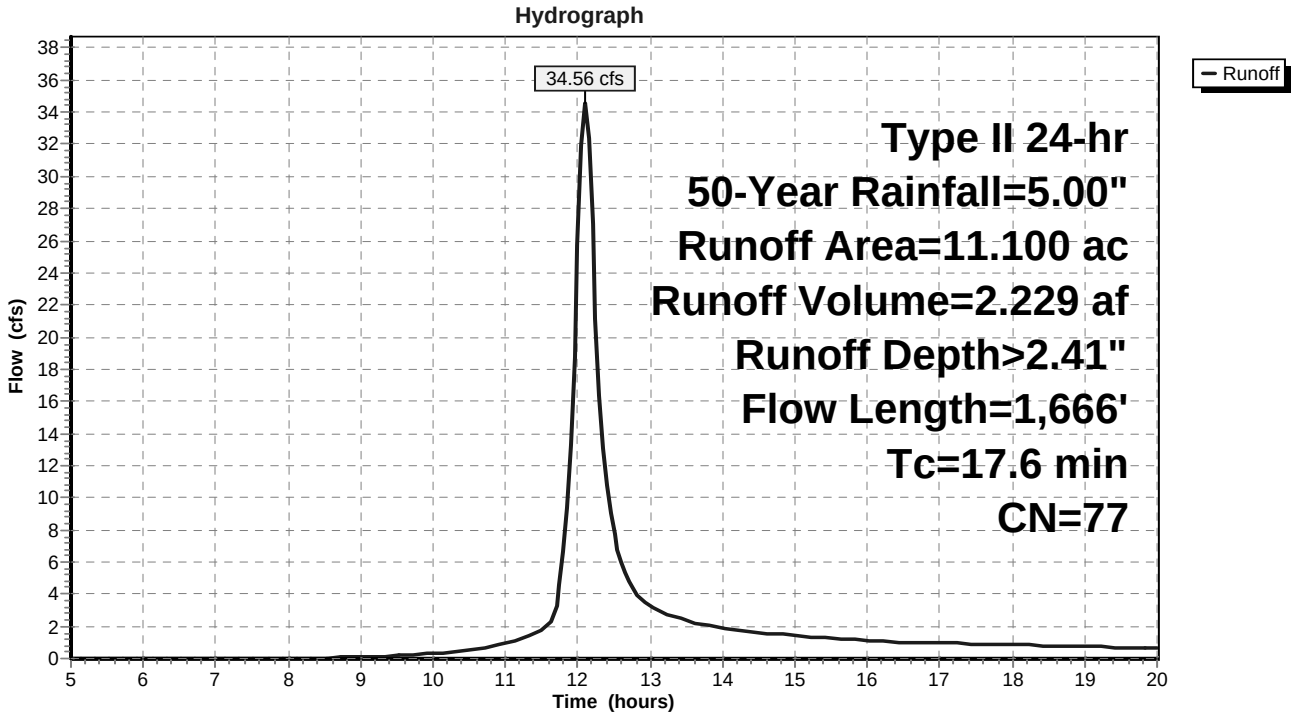
Runoff = 34.56 cfs @ 12.10 hrs, Volume= 2.229 af, Depth> 2.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

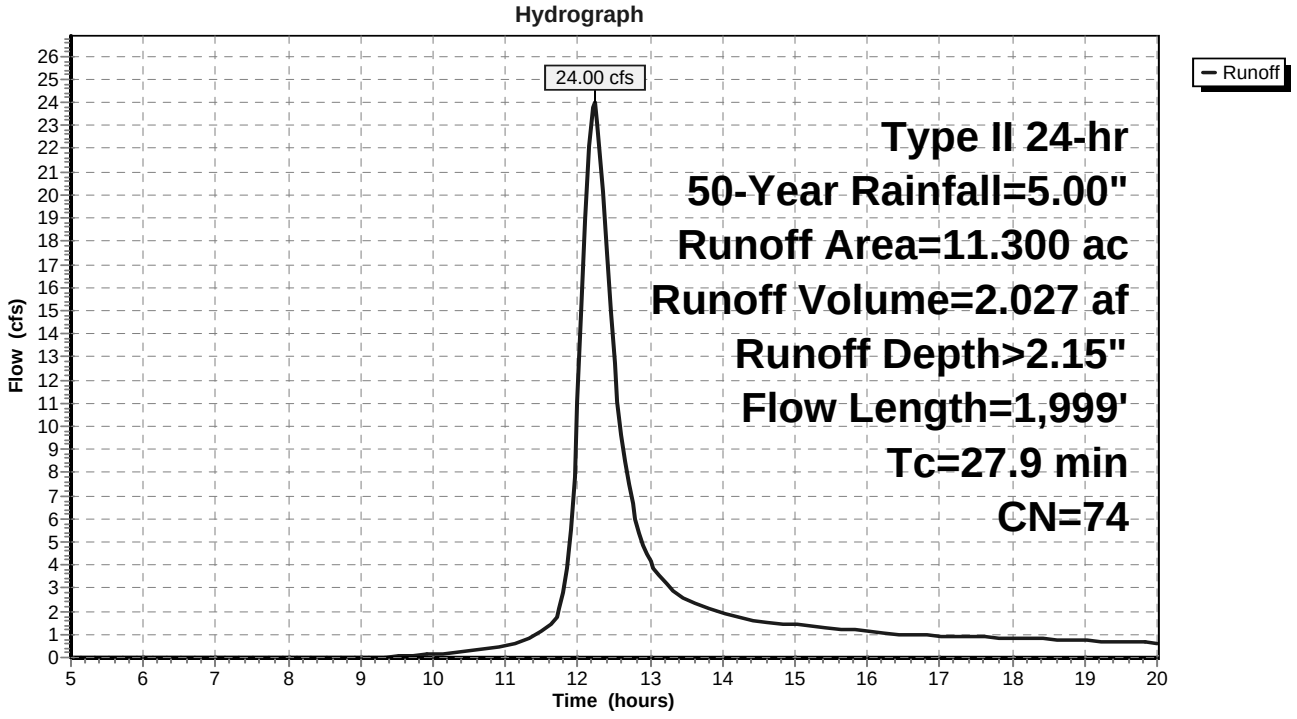
Runoff = 24.00 cfs @ 12.22 hrs, Volume= 2.027 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

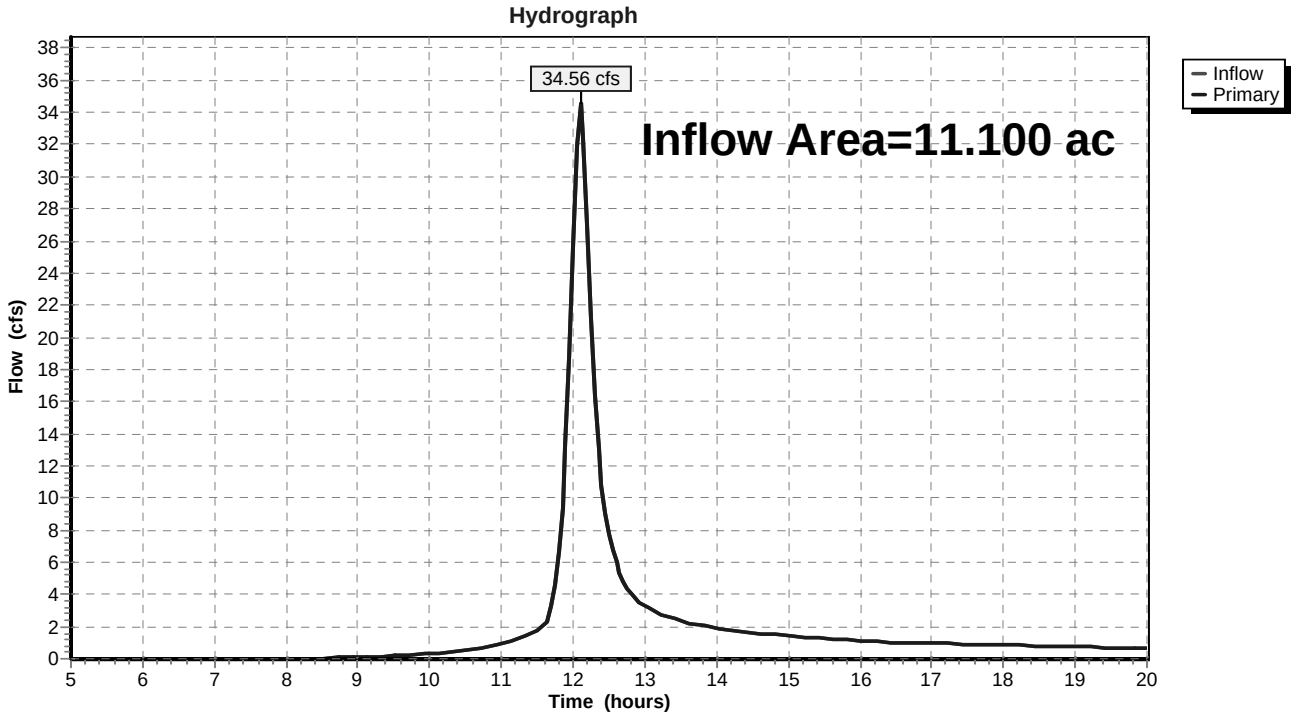


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 2.41" for 50-Year event
Inflow = 34.56 cfs @ 12.10 hrs, Volume= 2.229 af
Primary = 34.56 cfs @ 12.10 hrs, Volume= 2.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

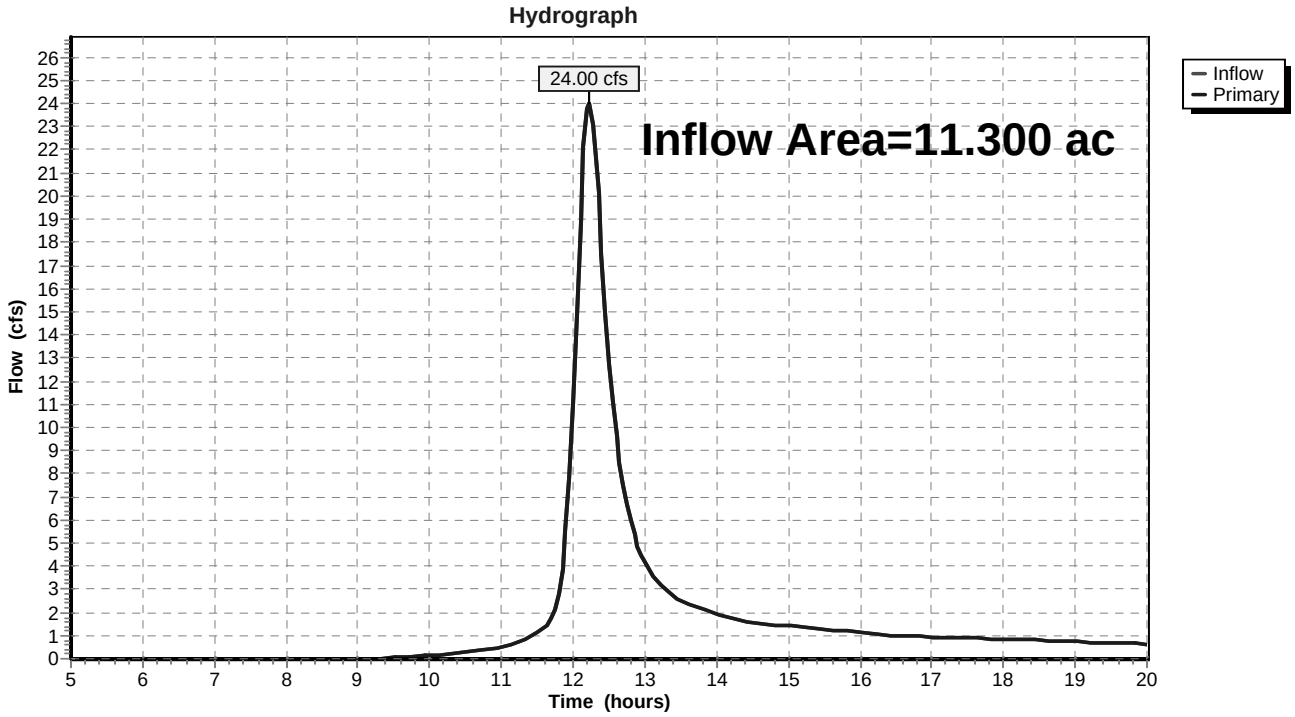


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 2.15" for 50-Year event
Inflow = 24.00 cfs @ 12.22 hrs, Volume= 2.027 af
Primary = 24.00 cfs @ 12.22 hrs, Volume= 2.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 pre: DA-1 pre Runoff Area=11.100 ac 17.12% Impervious Runoff Depth>3.13"
Flow Length=1,666' Tc=17.6 min CN=77 Runoff=44.66 cfs 2.895 af

Subcatchment DA-2 pre: DA-2 pre Runoff Area=11.300 ac 3.54% Impervious Runoff Depth>2.84"
Flow Length=1,999' Tc=27.9 min CN=74 Runoff=31.71 cfs 2.673 af

Link 3L: DISCHARGE POINT #1 Inflow=44.66 cfs 2.895 af
Primary=44.66 cfs 2.895 af

Link 4L: DISCHARGE POINT #2 Inflow=31.71 cfs 2.673 af
Primary=31.71 cfs 2.673 af

Total Runoff Area = 22.400 ac Runoff Volume = 5.568 af Average Runoff Depth = 2.98"
89.73% Pervious = 20.100 ac 10.27% Impervious = 2.300 ac

Summary for Subcatchment DA-1 pre: DA-1 pre

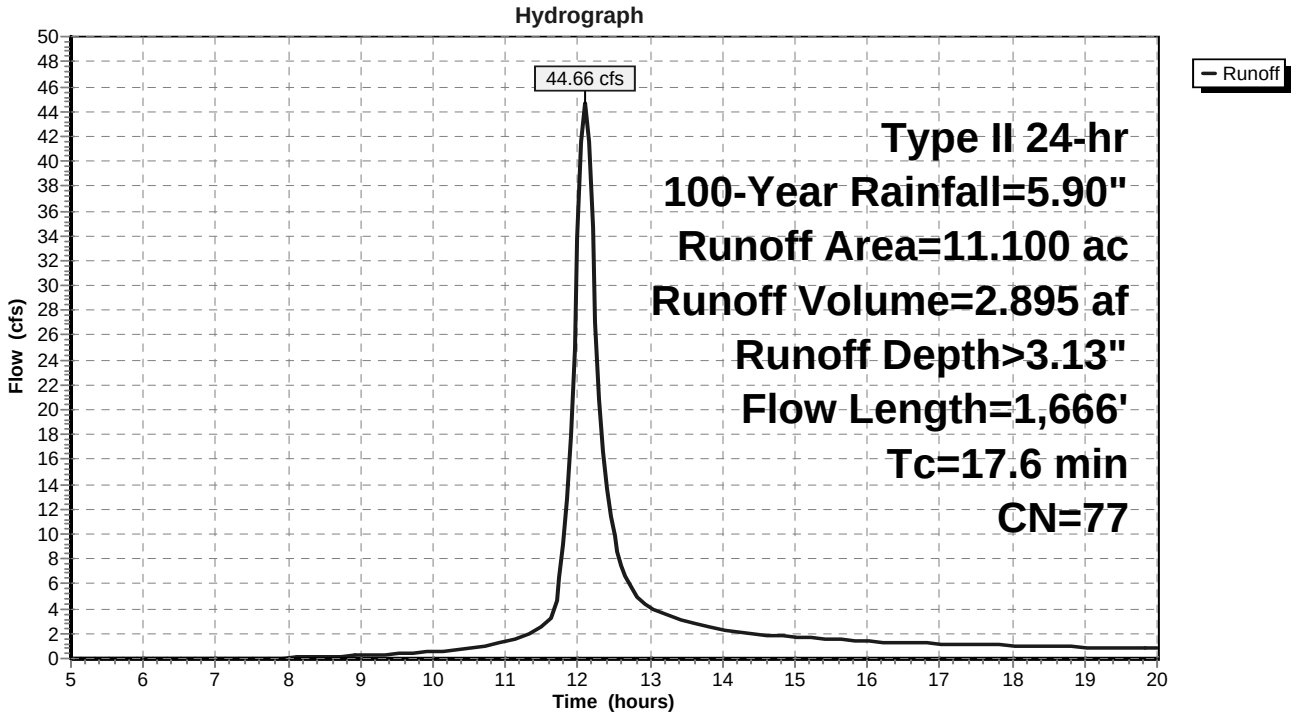
Runoff = 44.66 cfs @ 12.10 hrs, Volume= 2.895 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
5.500	70	Woods, Good, HSG C
0.700	87	Dirt roads, HSG C
1.300	98	Paved parking, HSG C
0.800	72	Woods/grass comb., Good, HSG C
1.900	77	Woods, Good, HSG D
0.300	79	Woods/grass comb., Good, HSG D
0.600	98	Paved parking, HSG D
11.100	77	Weighted Average
9.200		82.88% Pervious Area
1.900		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.1470	0.14		**Sheet Flow, shallow sheet flow** Woods: Light underbrush n= 0.400 P2= 2.08"
4.1	616	0.2560	2.53		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.5	950	0.0480	10.74	42.95	**Trap/Vee/Rect Channel Flow, along drainage swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
17.6	1,666	Total			

Subcatchment DA-1 pre: DA-1 pre



Summary for Subcatchment DA-2 pre: DA-2 pre

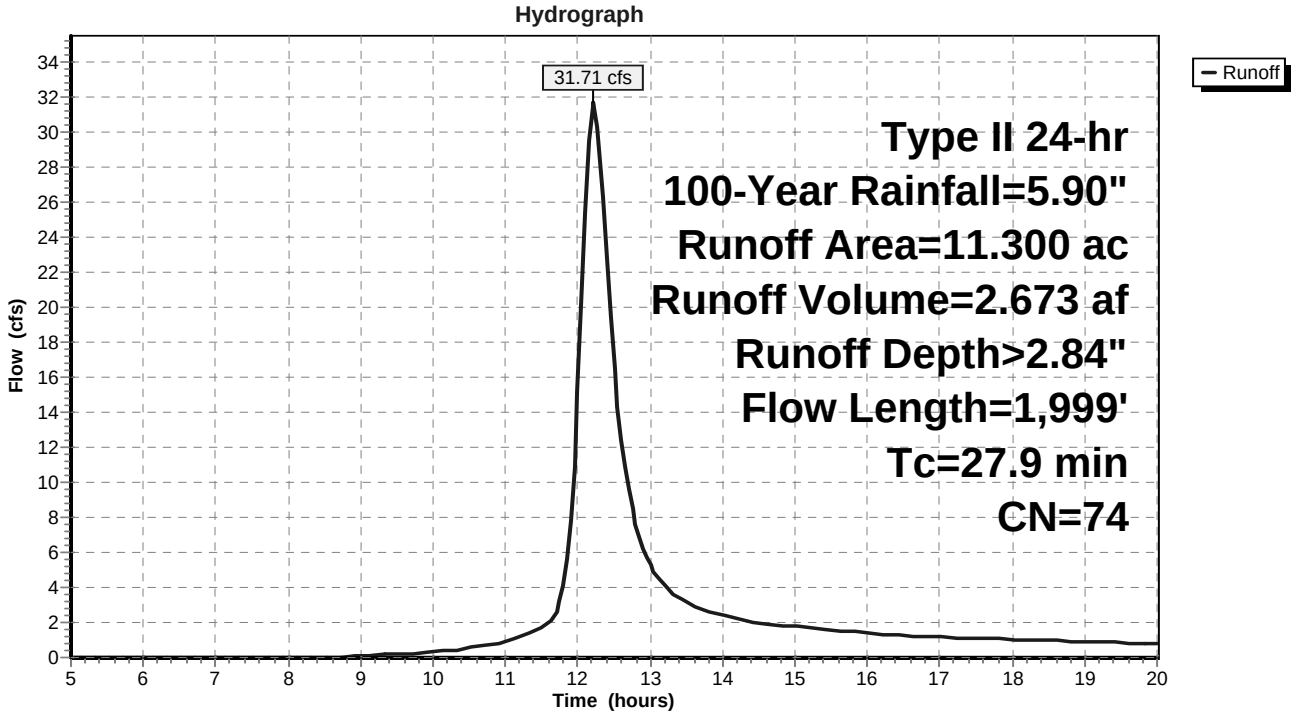
Runoff = 31.71 cfs @ 12.22 hrs, Volume= 2.673 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG D
5.600	70	Woods, Good, HSG C
5.100	77	Woods, Good, HSG D
0.200	80	>75% Grass cover, Good, HSG D
11.300	74	Weighted Average
10.900		96.46% Pervious Area
0.400		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0526	0.09		**Sheet Flow, through woods** Woods: Light underbrush n= 0.400 P2= 2.08"
8.8	1,002	0.1440	1.90		**Shallow Concentrated Flow, through woods** Woodland Kv= 5.0 fps
1.0	897	0.0980	15.34	61.37	**Trap/Vee/Rect Channel Flow, roadside swale** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
27.9	1,999	Total			

Subcatchment DA-2 pre: DA-2 pre

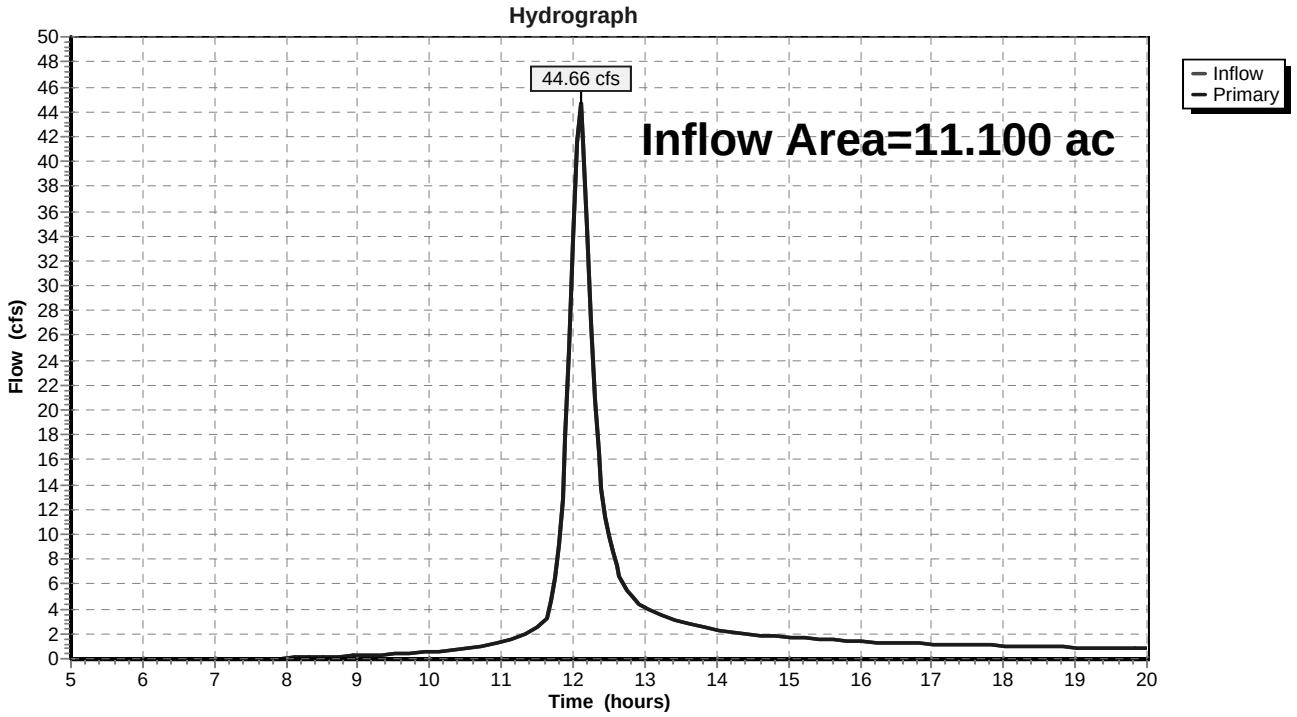


Summary for Link 3L: DISCHARGE POINT #1

Inflow Area = 11.100 ac, 17.12% Impervious, Inflow Depth > 3.13" for 100-Year event
Inflow = 44.66 cfs @ 12.10 hrs, Volume= 2.895 af
Primary = 44.66 cfs @ 12.10 hrs, Volume= 2.895 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DISCHARGE POINT #1

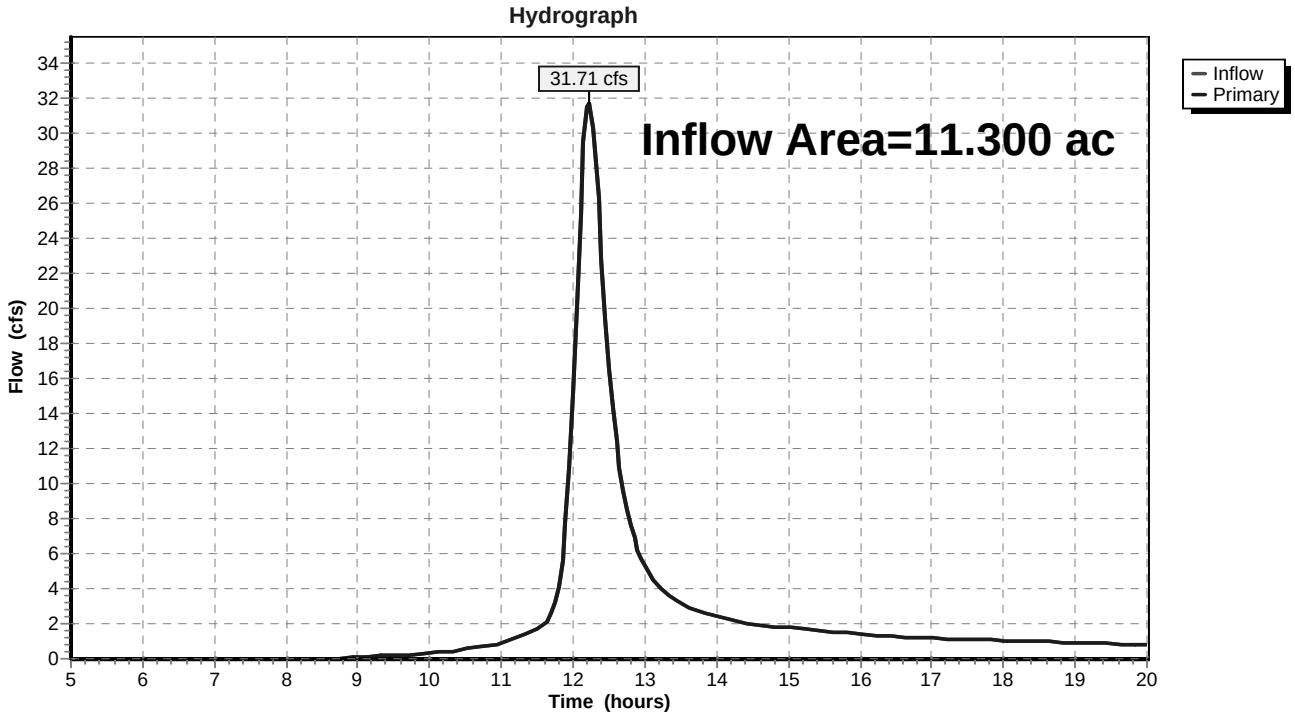


Summary for Link 4L: DISCHARGE POINT #2

Inflow Area = 11.300 ac, 3.54% Impervious, Inflow Depth > 2.84" for 100-Year event
Inflow = 31.71 cfs @ 12.22 hrs, Volume= 2.673 af
Primary = 31.71 cfs @ 12.22 hrs, Volume= 2.673 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: DISCHARGE POINT #2



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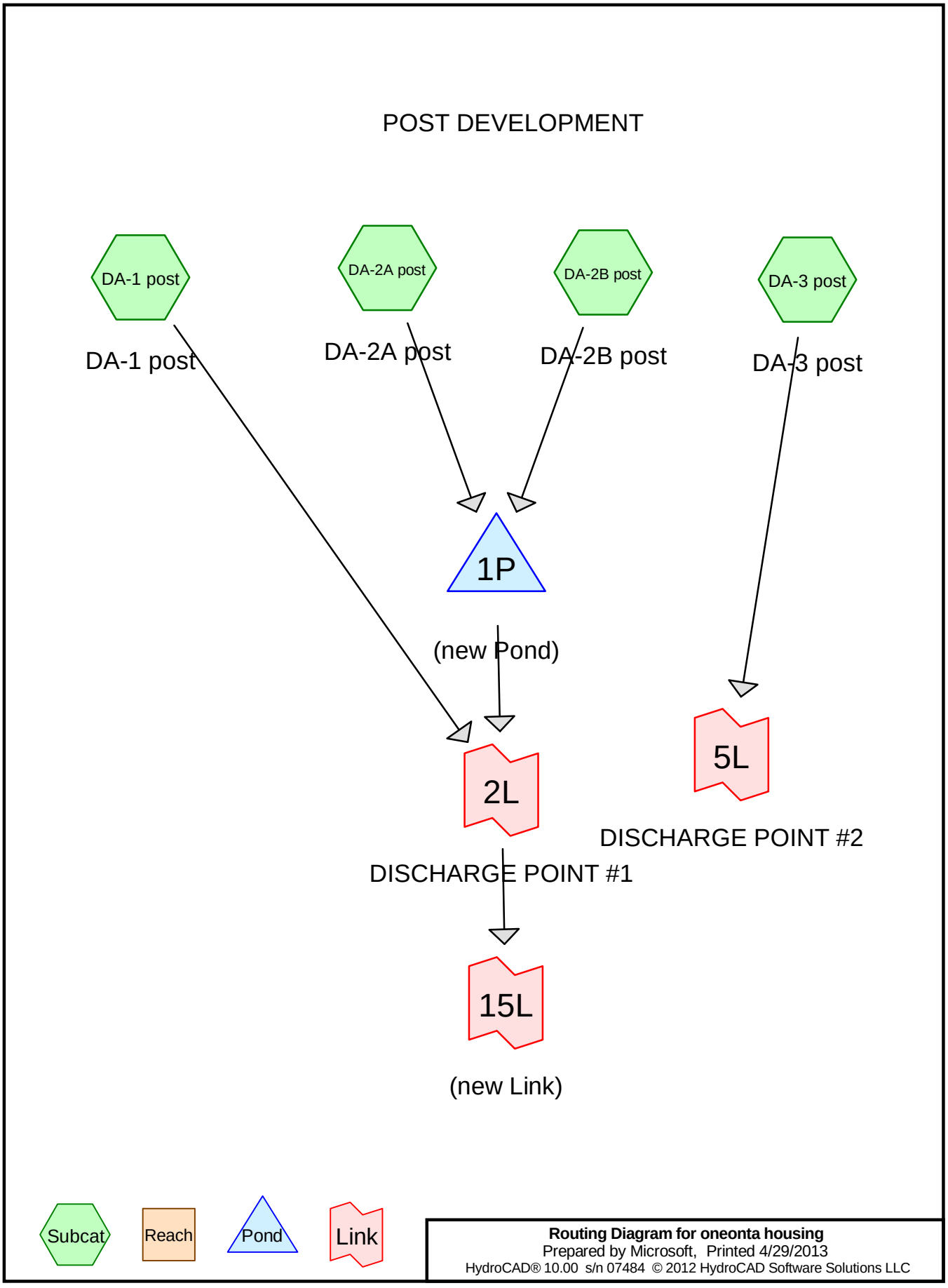


Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.901	74	>75% Grass cover, Good, HSG C (DA-1 post, DA-2B post)
1.988	80	>75% Grass cover, Good, HSG D (DA-1 post, DA-2B post)
0.612	87	Dirt roads, HSG C (DA-2A post)
0.918	98	Paved parking, HSG C (DA-1 post, DA-2B post)
4.360	98	Paved parking, HSG D (DA-1 post, DA-2B post)
0.349	98	Water Surface, HSG D (DA-2B post)
8.579	70	Woods, Good, HSG C (DA-2A post, DA-2B post)
4.104	77	Woods, Good, HSG D (DA-1 post, DA-2B post, DA-3 post)
22.811	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
12.010	HSG C	DA-1 post, DA-2A post, DA-2B post
10.801	HSG D	DA-1 post, DA-2B post, DA-3 post
0.000	Other	
22.811		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.901	1.988	0.000	3.889	>75% Grass cover, Good	DA-1 post, DA-2B post
0.000	0.000	0.612	0.000	0.000	0.612	Dirt roads	DA-2A post
0.000	0.000	0.918	4.360	0.000	5.278	Paved parking	DA-1 post, DA-2B post
0.000	0.000	0.000	0.349	0.000	0.349	Water Surface	DA-2B post
0.000	0.000	8.579	4.104	0.000	12.683	Woods, Good	DA-1 post, DA-2A post, DA-2B post, DA-3 post
0.000	**0.000**	**12.010**	**10.801**	**0.000**	**22.811**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DA-1 post	0.00	0.00	40.0	0.0480	0.010	10.0	0.0	0.0
2	1P	1,526.00	1,524.00	115.0	0.0174	0.013	18.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>1.07"
Flow Length=245' Tc=7.9 min CN=86 Runoff=7.02 cfs 0.327 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=2.53 cfs 0.258 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>1.13"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=12.01 cfs 0.745 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>0.61"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=2.58 cfs 0.157 af

Pond 1P: (new Pond) Peak Elev=1,538.94' Storage=0.634 af Inflow=13.54 cfs 1.002 af
Outflow=0.79 cfs 0.400 af

Link 2L: DISCHARGE POINT #1 Inflow=7.33 cfs 0.727 af
Primary=7.33 cfs 0.727 af

Link 5L: DISCHARGE POINT #2 Inflow=2.58 cfs 0.157 af
Primary=2.58 cfs 0.157 af

Link 15L: (new Link) Inflow=7.33 cfs 0.727 af
Primary=7.33 cfs 0.727 af

Total Runoff Area = 22.811 ac Runoff Volume = 1.487 af Average Runoff Depth = 0.78"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

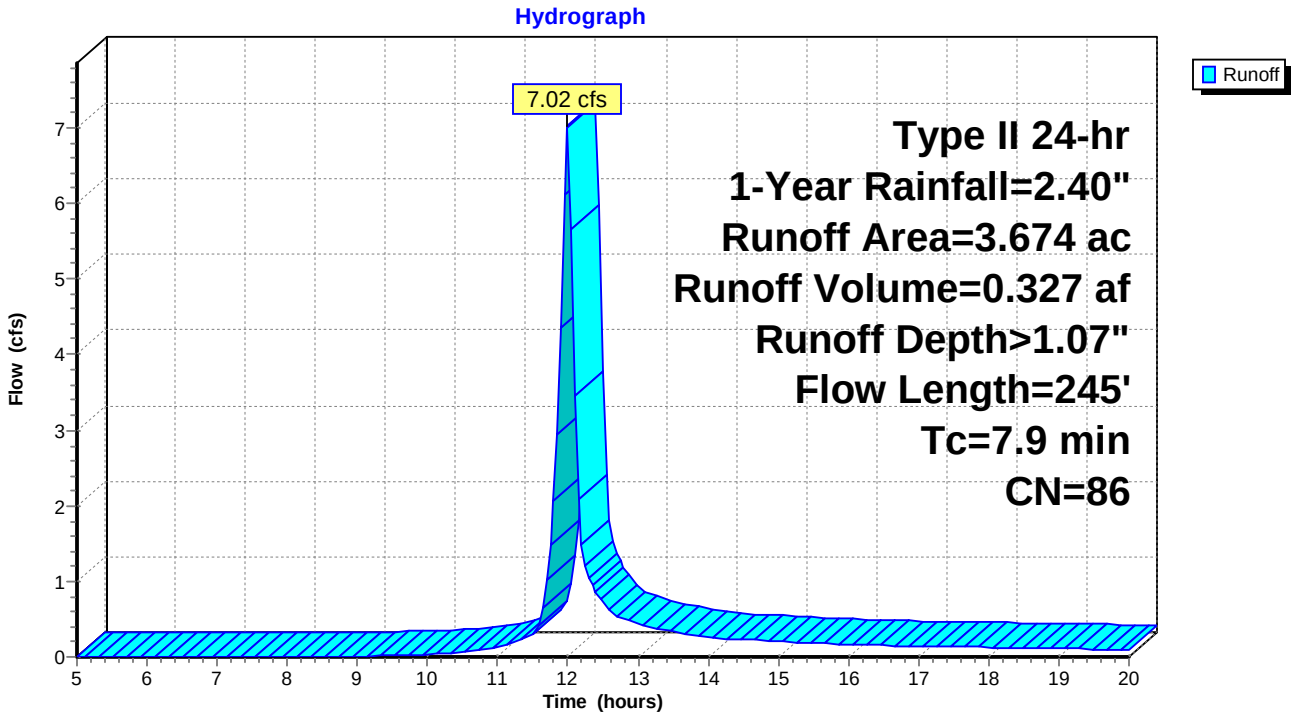
Runoff = 7.02 cfs @ 11.99 hrs, Volume= 0.327 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

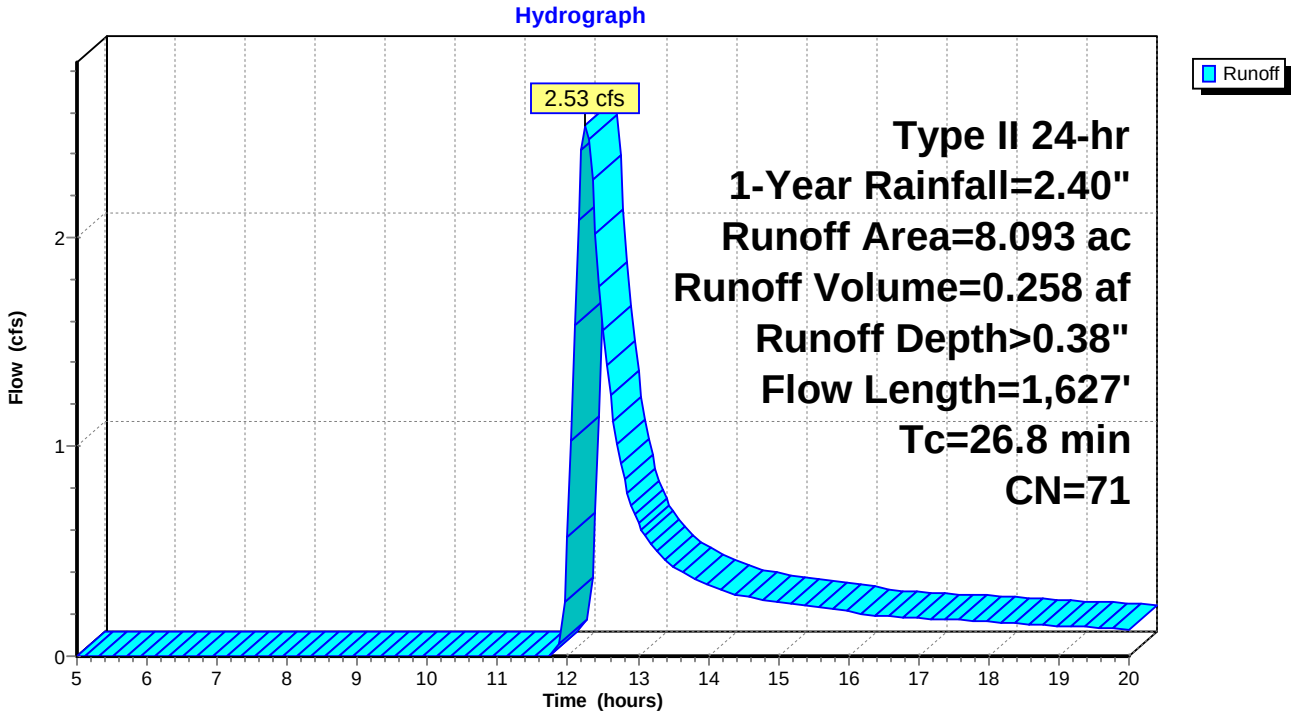
Runoff = 2.53 cfs @ 12.26 hrs, Volume= 0.258 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

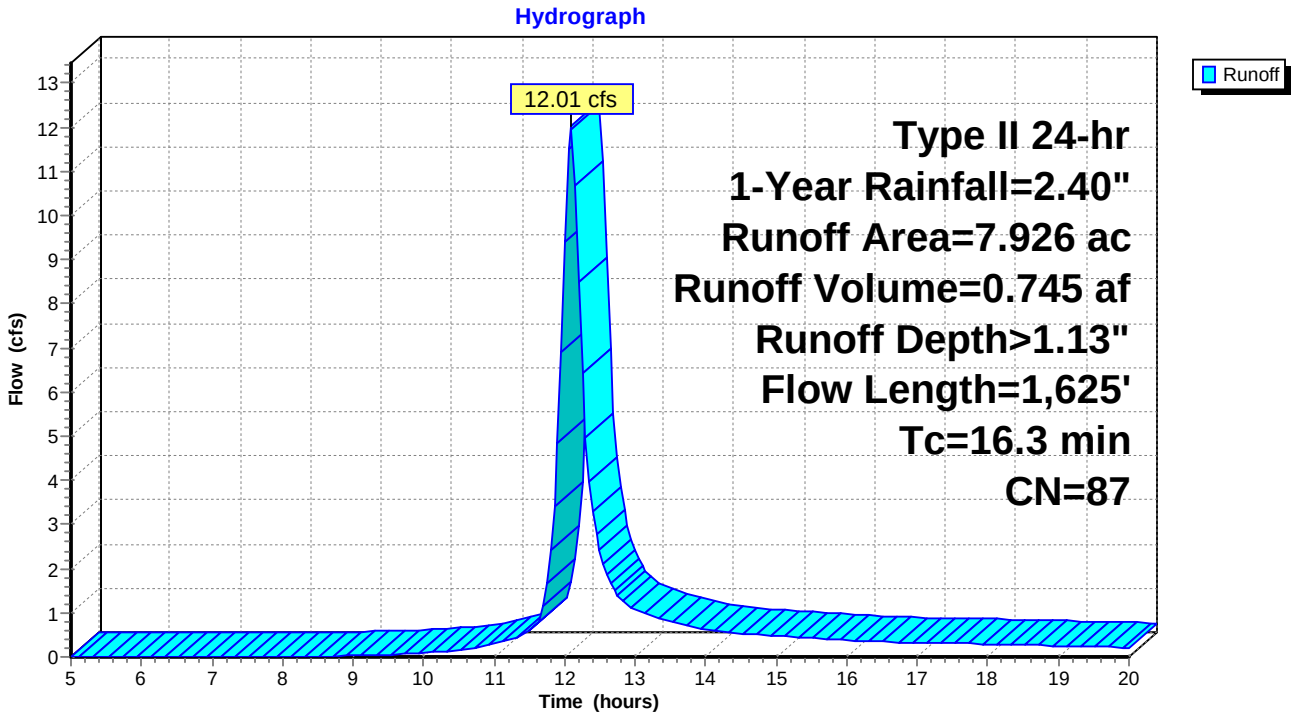
Runoff = 12.01 cfs @ 12.09 hrs, Volume= 0.745 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

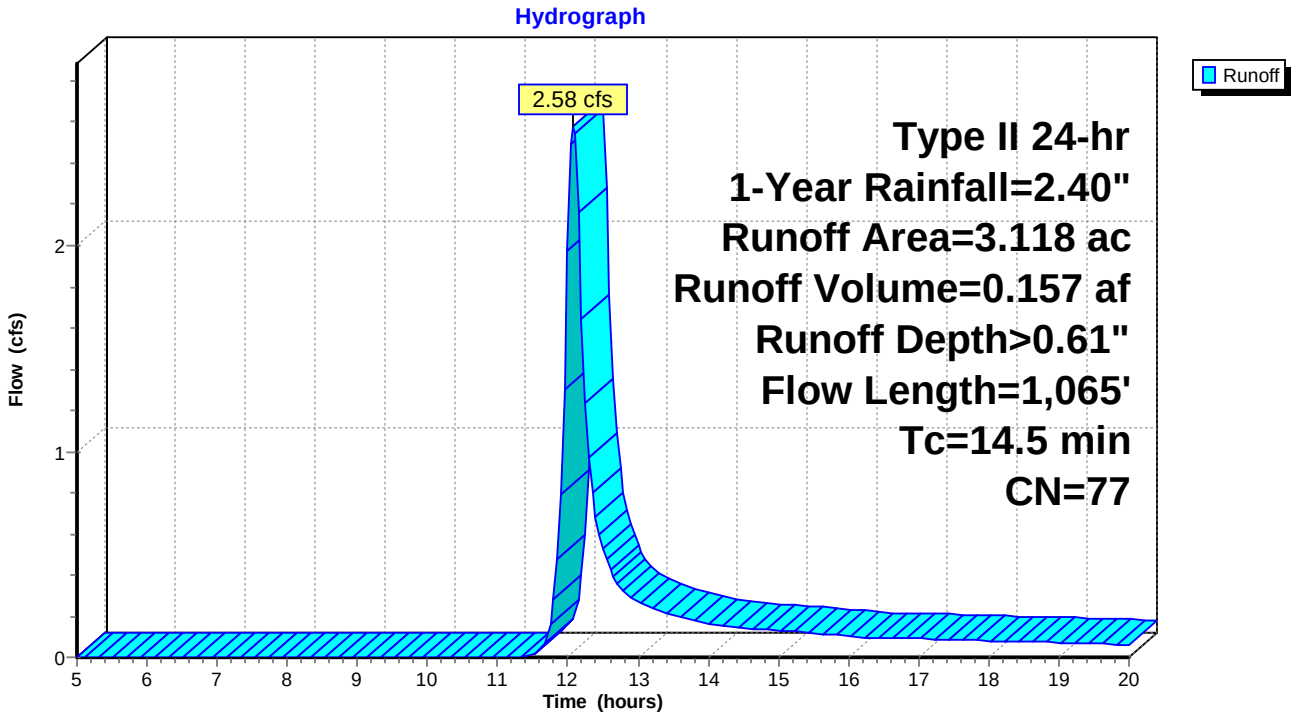
Runoff = 2.58 cfs @ 12.08 hrs, Volume= 0.157 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 0.75" for 1-Year event
Inflow = 13.54 cfs @ 12.10 hrs, Volume= 1.002 af
Outflow = 0.79 cfs @ 14.66 hrs, Volume= 0.400 af, Atten= 94%, Lag= 153.5 min
Primary = 0.79 cfs @ 14.66 hrs, Volume= 0.400 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,538.94' @ 14.66 hrs Surf.Area= 0.206 ac Storage= 0.634 af

Plug-Flow detention time= 226.7 min calculated for 0.400 af (40% of inflow)
Center-of-Mass det. time= 133.8 min (942.2 - 808.3)

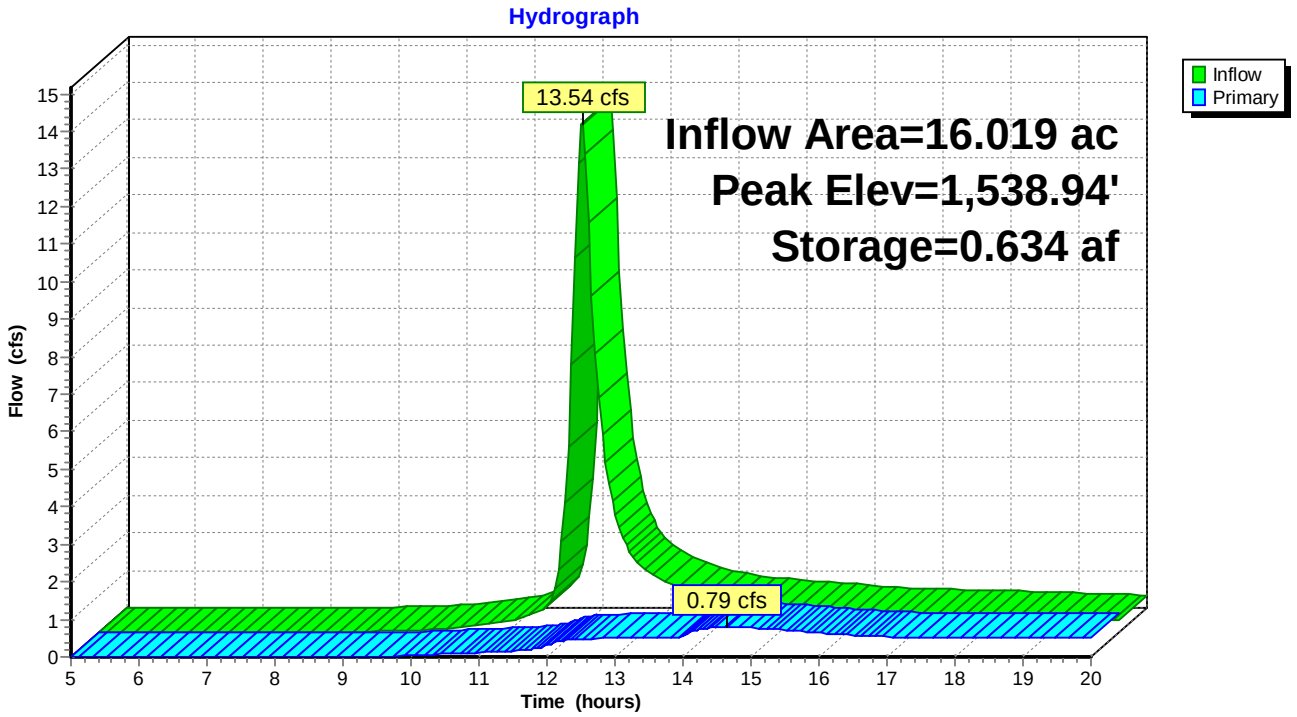
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.70 cfs @ 14.66 hrs HW=1,538.94' (Free Discharge)
└**1=Culvert** (Passes 0.70 cfs of 27.39 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.52 cfs @ 10.57 fps)
  └**3=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.68 fps)

Pond 1P: (new Pond)

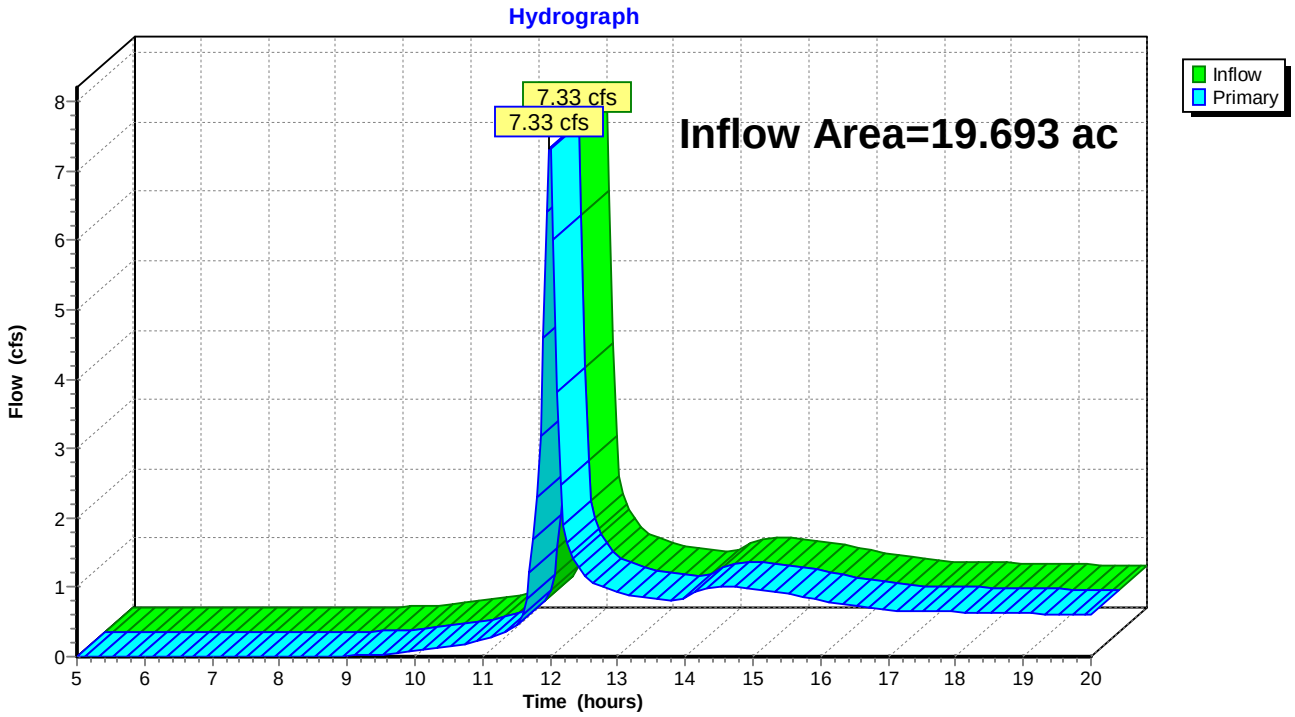


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 0.44" for 1-Year event
Inflow = 7.33 cfs @ 12.00 hrs, Volume= 0.727 af
Primary = 7.33 cfs @ 12.00 hrs, Volume= 0.727 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

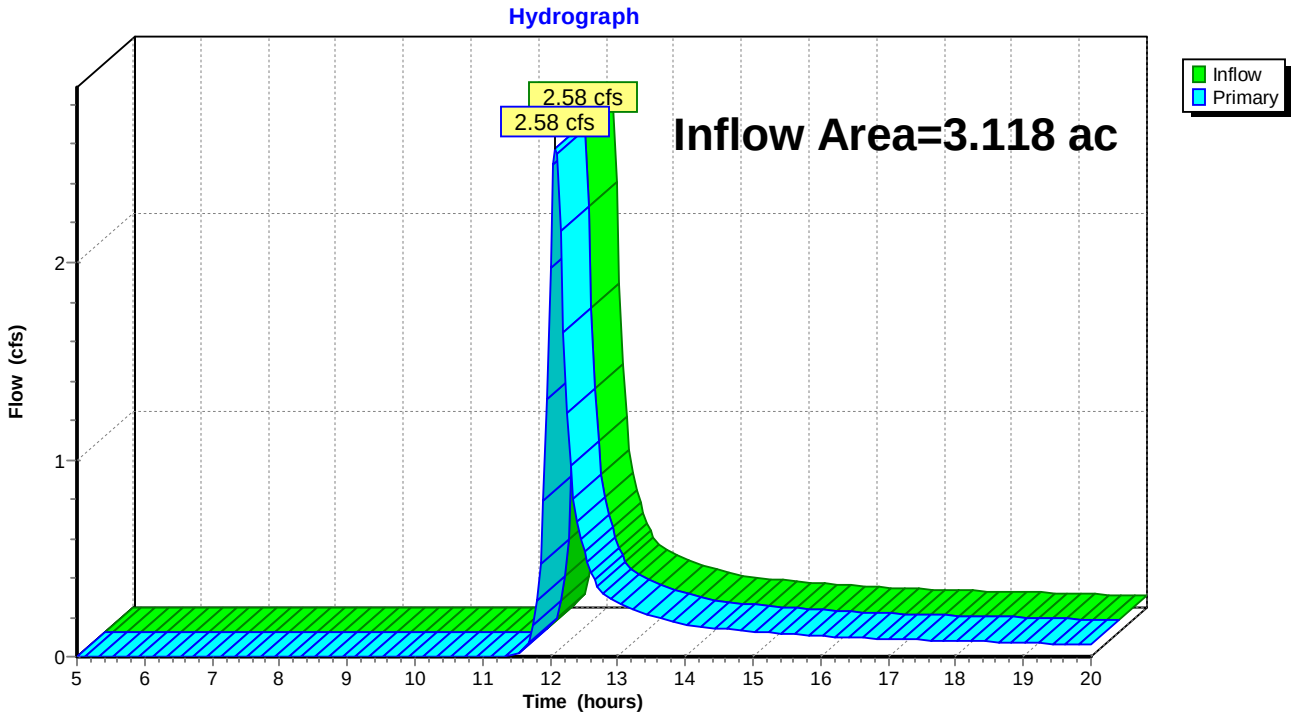


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 0.61" for 1-Year event
Inflow = 2.58 cfs @ 12.08 hrs, Volume= 0.157 af
Primary = 2.58 cfs @ 12.08 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

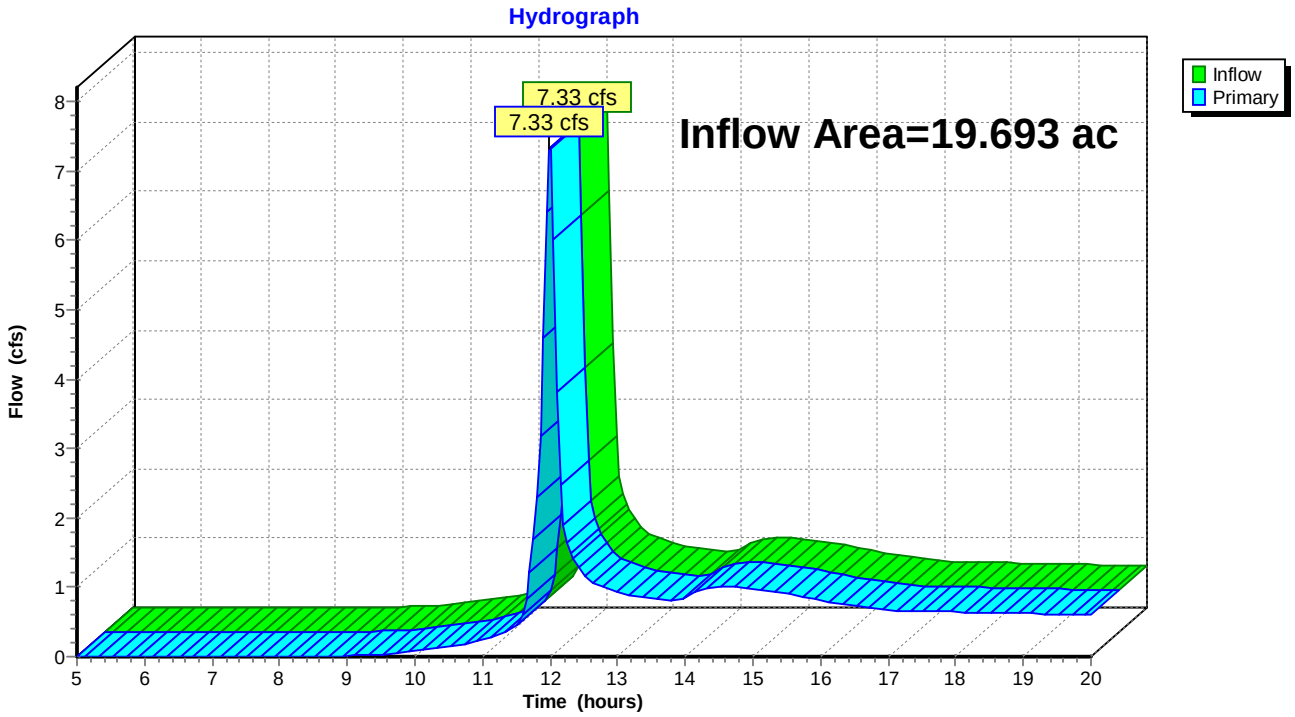


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 0.44" for 1-Year event
Inflow = 7.33 cfs @ 12.00 hrs, Volume= 0.727 af
Primary = 7.33 cfs @ 12.00 hrs, Volume= 0.727 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>1.38"
Flow Length=245' Tc=7.9 min CN=86 Runoff=8.98 cfs 0.422 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>0.57"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=4.11 cfs 0.383 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>1.44"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=15.31 cfs 0.953 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>0.84"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=3.67 cfs 0.219 af

Pond 1P: (new Pond) Peak Elev=1,539.18' Storage=0.682 af Inflow=18.08 cfs 1.337 af
Outflow=3.39 cfs 0.716 af

Link 2L: DISCHARGE POINT #1 Inflow=9.33 cfs 1.138 af
Primary=9.33 cfs 1.138 af

Link 5L: DISCHARGE POINT #2 Inflow=3.67 cfs 0.219 af
Primary=3.67 cfs 0.219 af

Link 15L: (new Link) Inflow=9.33 cfs 1.138 af
Primary=9.33 cfs 1.138 af

Total Runoff Area = 22.811 ac Runoff Volume = 1.977 af Average Runoff Depth = 1.04"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

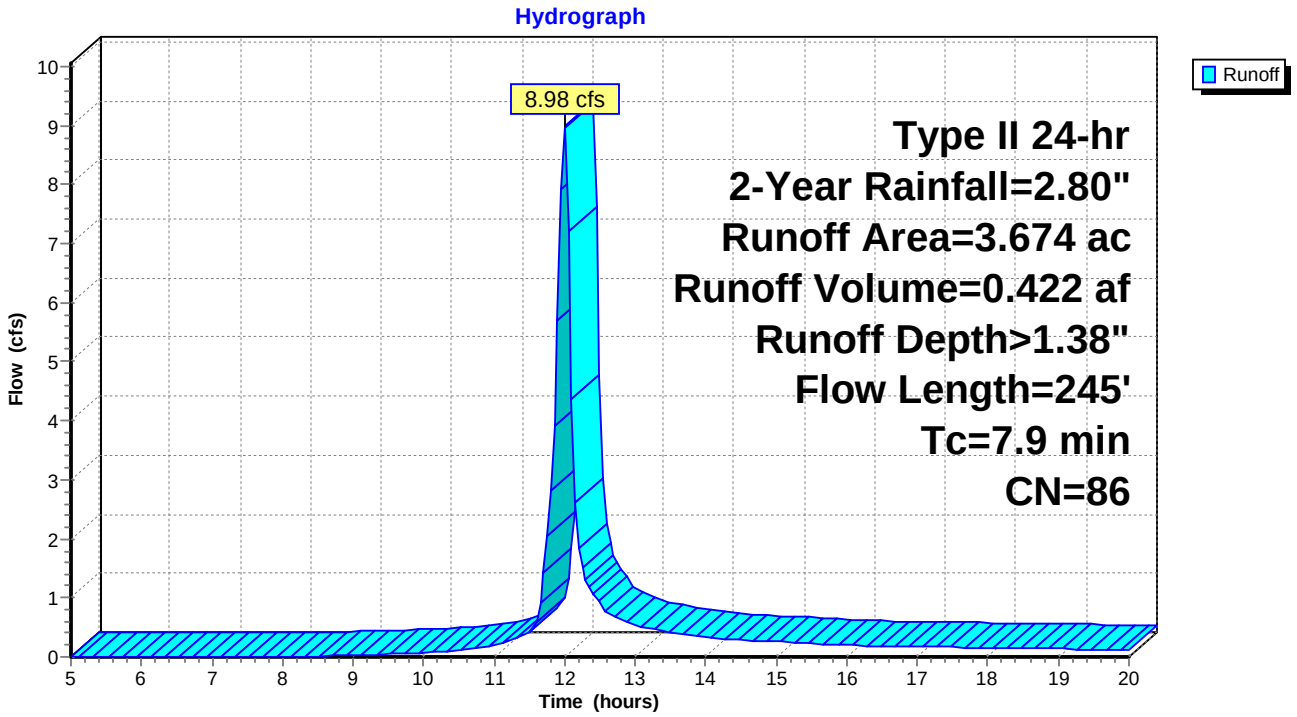
Runoff = 8.98 cfs @ 11.99 hrs, Volume= 0.422 af, Depth> 1.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

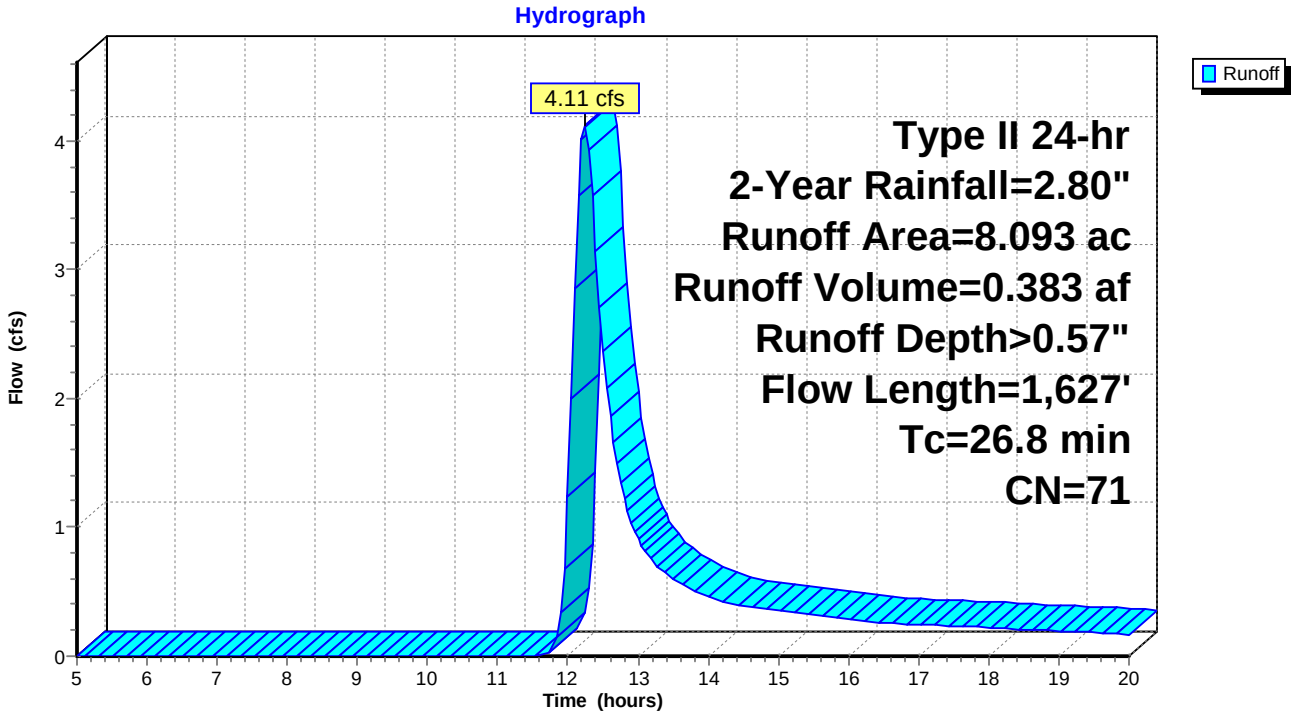
Runoff = 4.11 cfs @ 12.24 hrs, Volume= 0.383 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

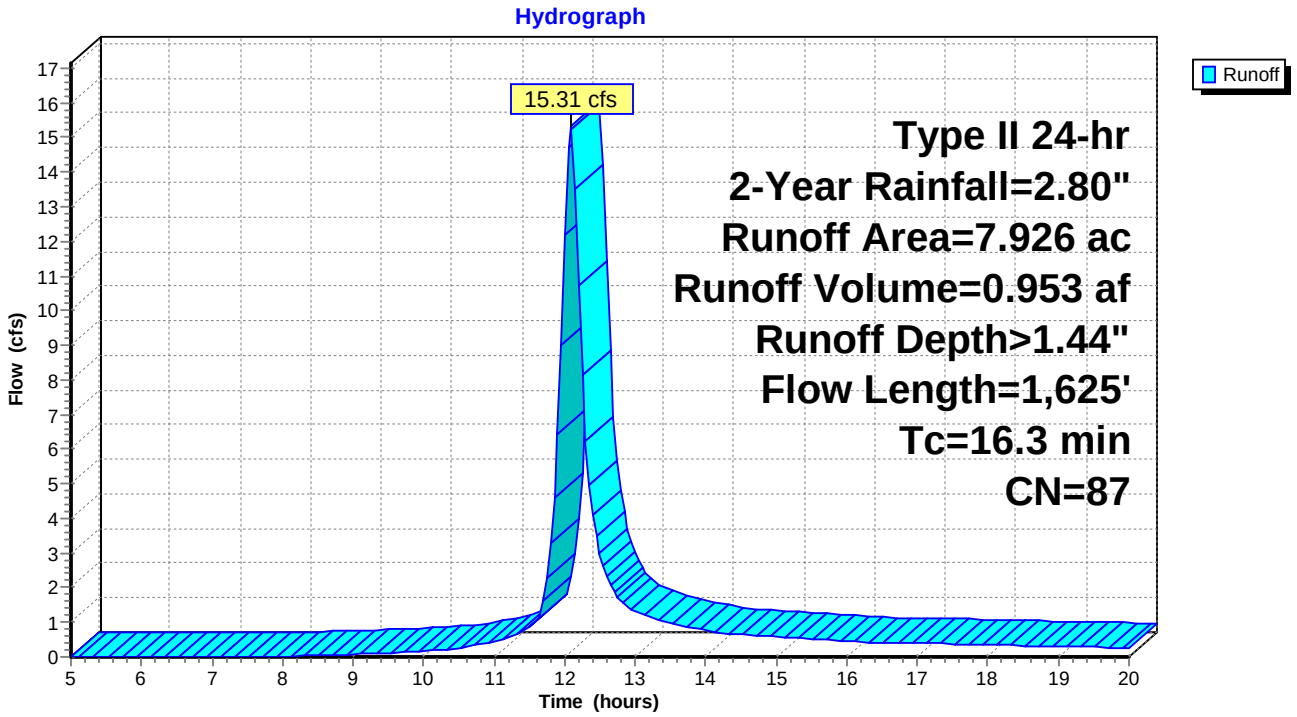
Runoff = 15.31 cfs @ 12.09 hrs, Volume= 0.953 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

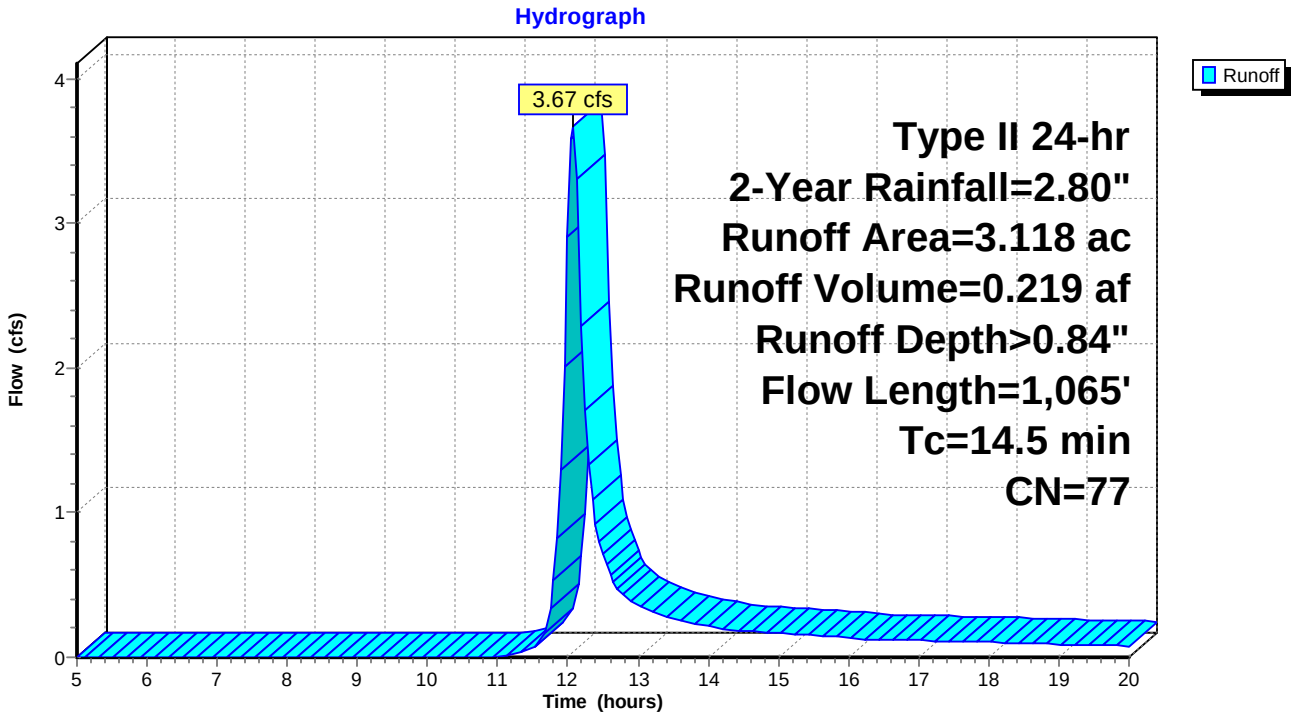
Runoff = 3.67 cfs @ 12.08 hrs, Volume= 0.219 af, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.80"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 1.00" for 2-Year event
Inflow = 18.08 cfs @ 12.10 hrs, Volume= 1.337 af
Outflow = 3.39 cfs @ 12.70 hrs, Volume= 0.716 af, Atten= 81%, Lag= 35.9 min
Primary = 3.39 cfs @ 12.70 hrs, Volume= 0.716 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,539.18' @ 12.70 hrs Surf.Area= 0.213 ac Storage= 0.682 af

Plug-Flow detention time= 166.6 min calculated for 0.714 af (53% of inflow)
Center-of-Mass det. time= 83.6 min (887.0 - 803.3)

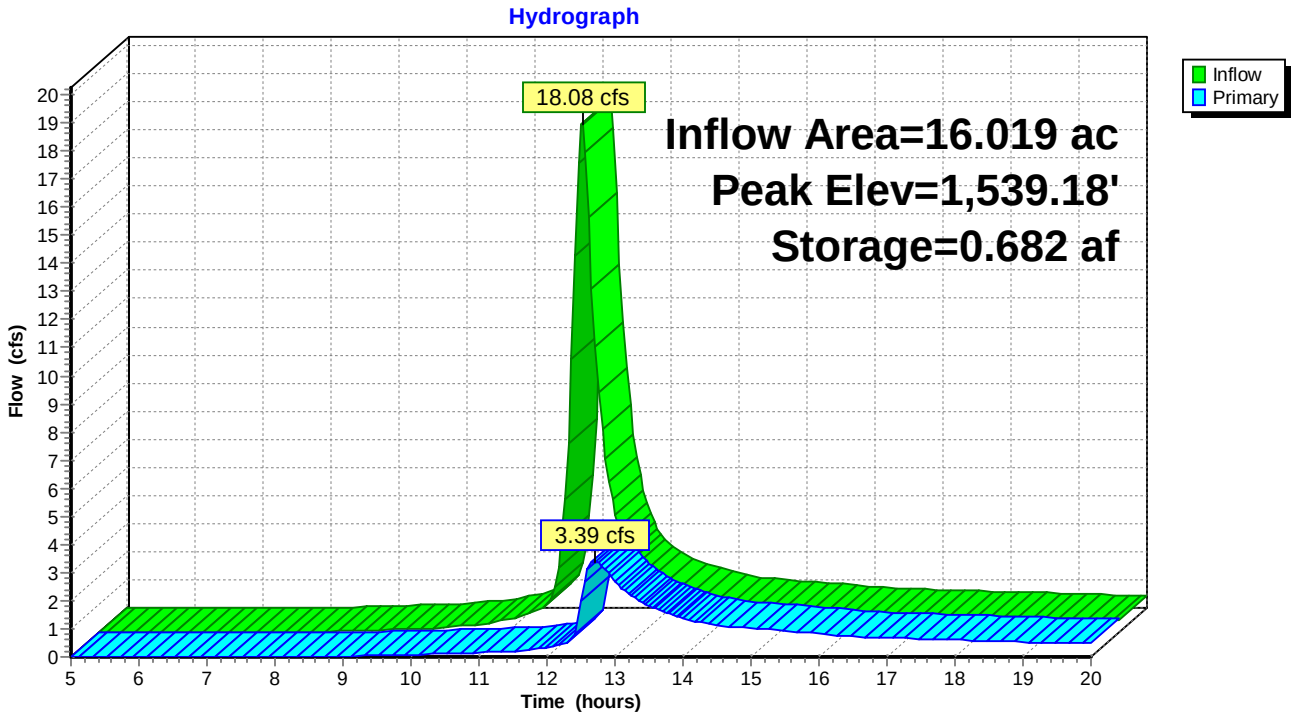
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=3.36 cfs @ 12.70 hrs HW=1,539.18' (Free Discharge)
↑**1=Culvert** (Passes 3.36 cfs of 27.63 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 10.82 fps)
3=Orifice/Grate (Weir Controls 2.83 cfs @ 1.72 fps)

Pond 1P: (new Pond)

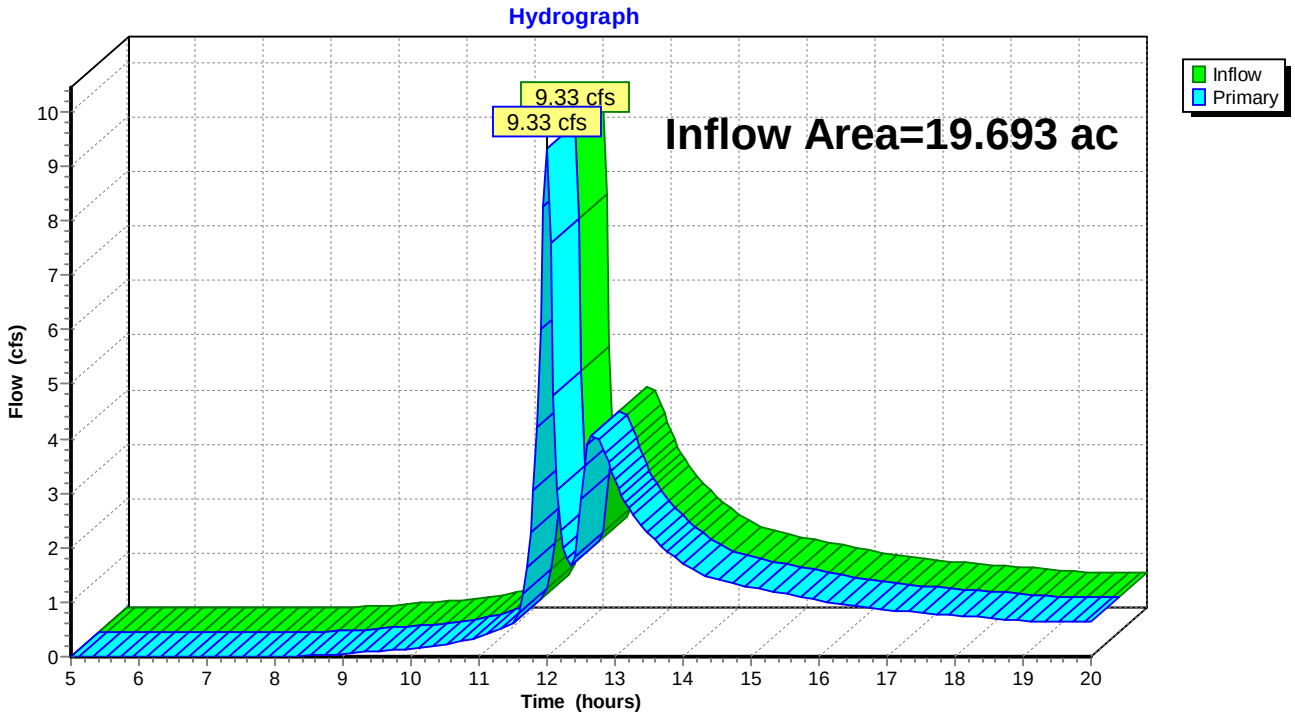


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 0.69" for 2-Year event
Inflow = 9.33 cfs @ 11.99 hrs, Volume= 1.138 af
Primary = 9.33 cfs @ 11.99 hrs, Volume= 1.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

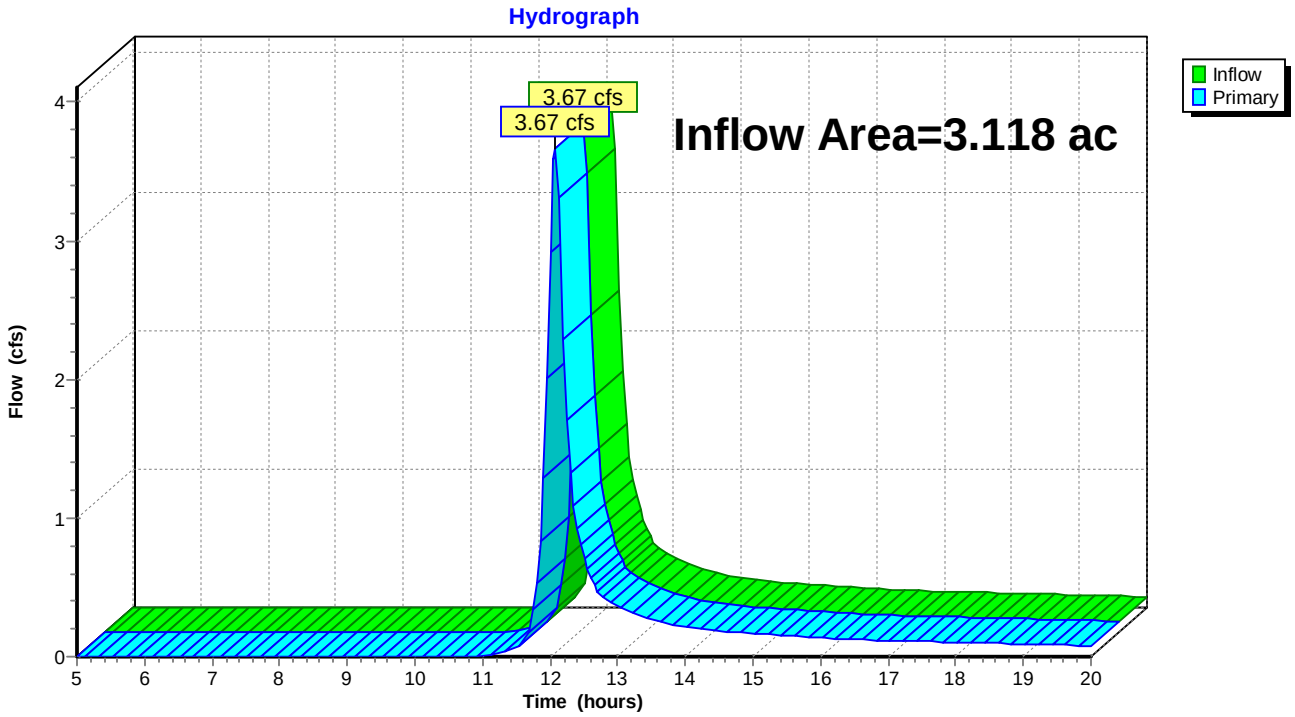


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 0.84" for 2-Year event
Inflow = 3.67 cfs @ 12.08 hrs, Volume= 0.219 af
Primary = 3.67 cfs @ 12.08 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

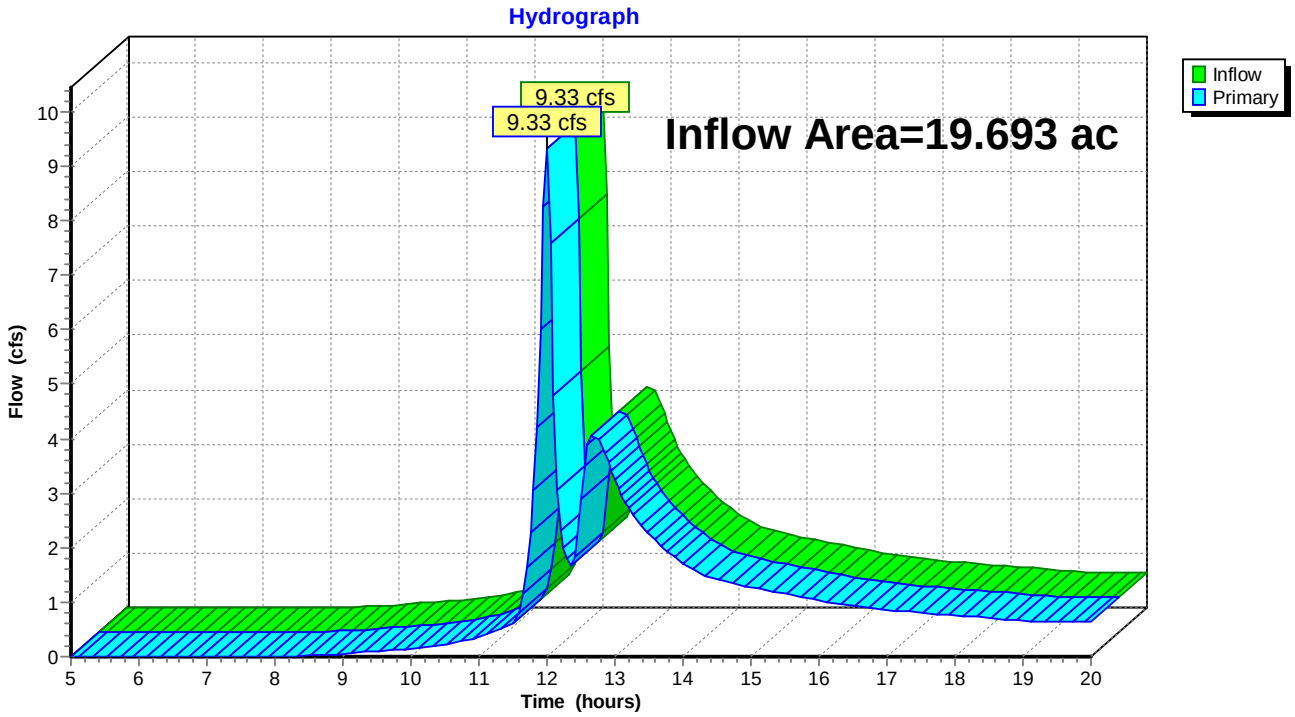


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 0.69" for 2-Year event
Inflow = 9.33 cfs @ 11.99 hrs, Volume= 1.138 af
Primary = 9.33 cfs @ 11.99 hrs, Volume= 1.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>2.37"
Flow Length=245' Tc=7.9 min CN=86 Runoff=15.07 cfs 0.725 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>1.25"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=9.97 cfs 0.843 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>2.45"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=25.52 cfs 1.618 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>1.66"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=7.35 cfs 0.430 af

Pond 1P: (new Pond) Peak Elev=1,540.37' Storage=0.956 af Inflow=33.08 cfs 2.462 af
Outflow=13.73 cfs 1.829 af

Link 2L: DISCHARGE POINT #1 Inflow=15.52 cfs 2.554 af
Primary=15.52 cfs 2.554 af

Link 5L: DISCHARGE POINT #2 Inflow=7.35 cfs 0.430 af
Primary=7.35 cfs 0.430 af

Link 15L: (new Link) Inflow=15.52 cfs 2.554 af
Primary=15.52 cfs 2.554 af

Total Runoff Area = 22.811 ac Runoff Volume = 3.617 af Average Runoff Depth = 1.90"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

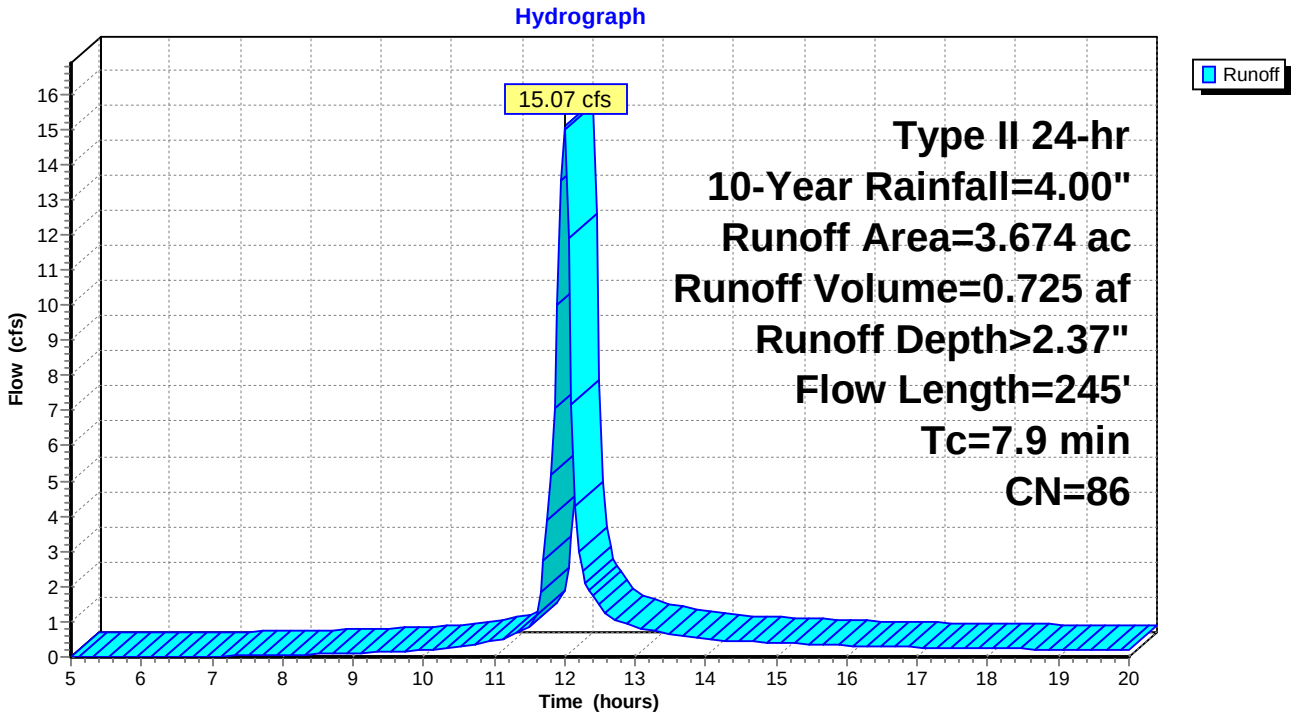
Runoff = 15.07 cfs @ 11.99 hrs, Volume= 0.725 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

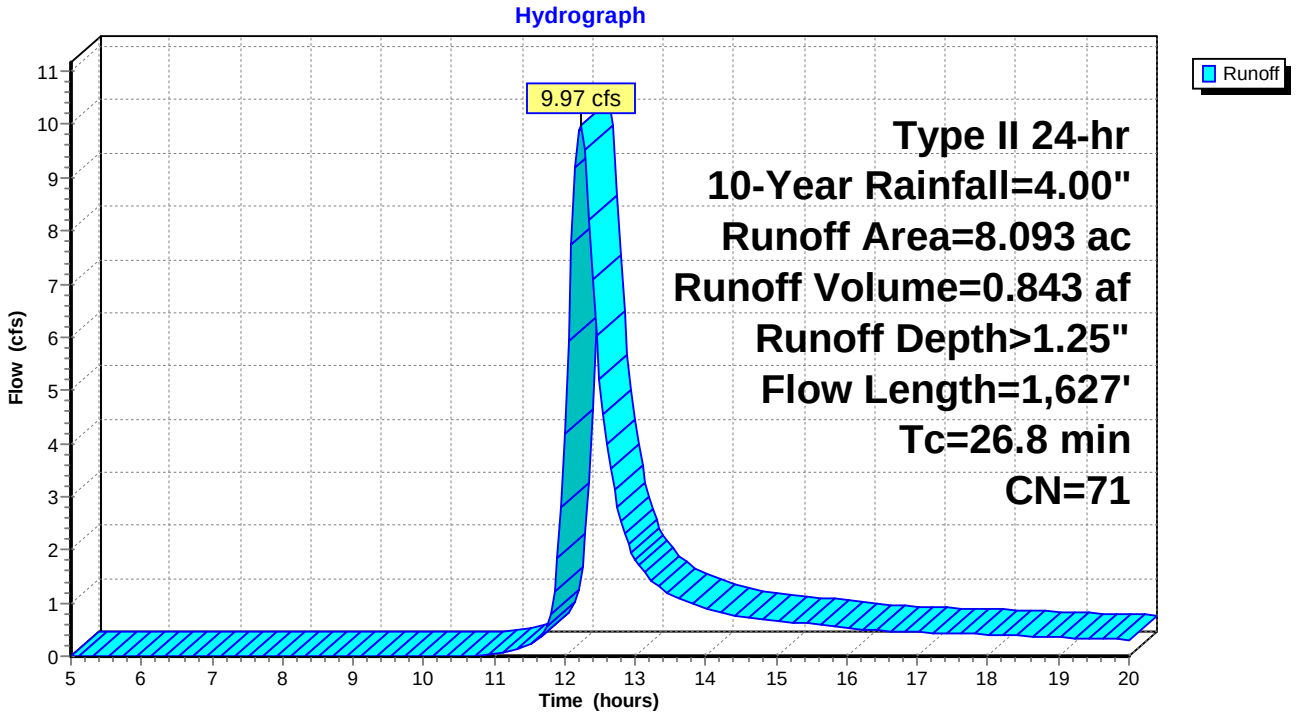
Runoff = 9.97 cfs @ 12.22 hrs, Volume= 0.843 af, Depth> 1.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

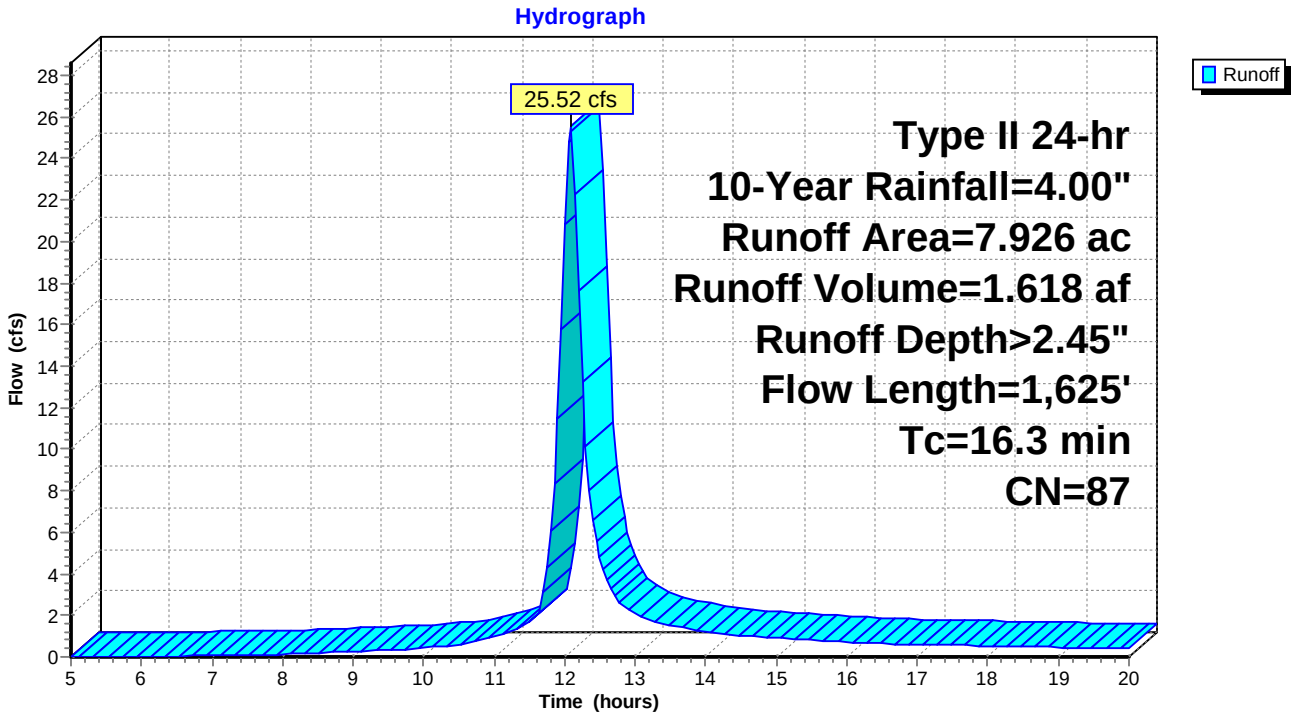
Runoff = 25.52 cfs @ 12.08 hrs, Volume= 1.618 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

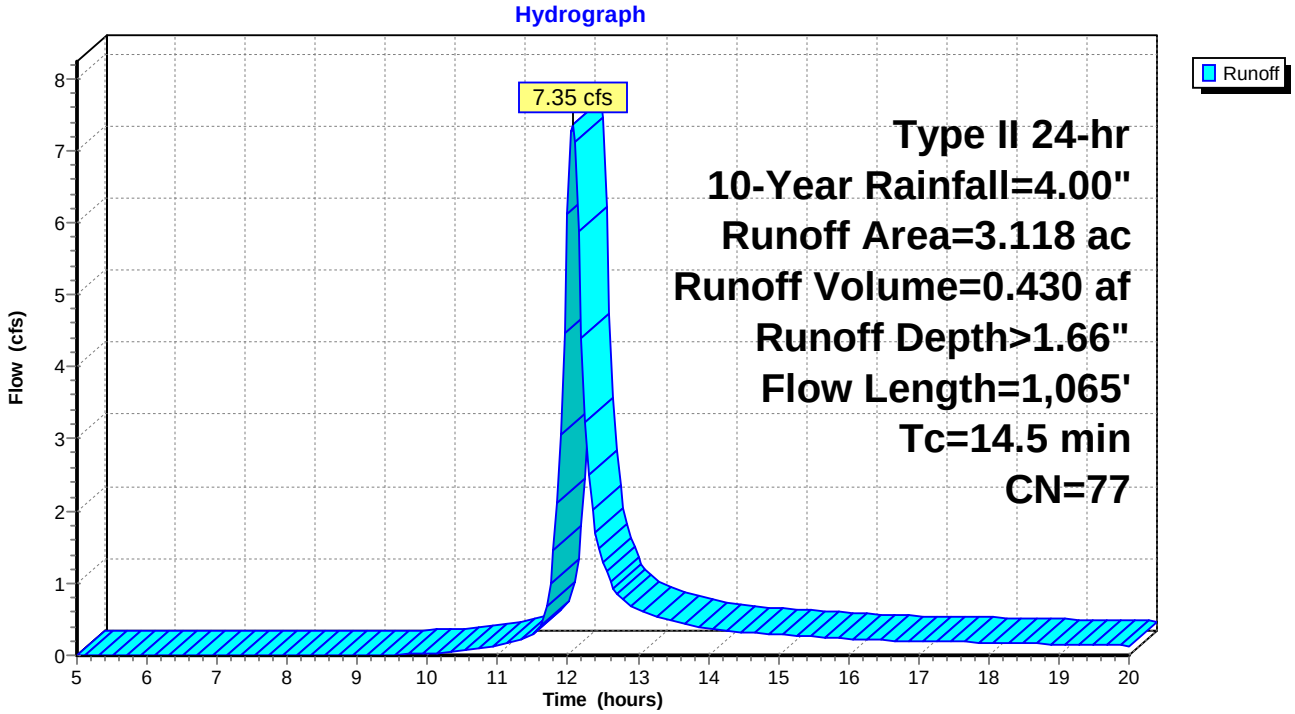
Runoff = 7.35 cfs @ 12.07 hrs, Volume= 0.430 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 1.84" for 10-Year event
Inflow = 33.08 cfs @ 12.10 hrs, Volume= 2.462 af
Outflow = 13.73 cfs @ 12.40 hrs, Volume= 1.829 af, Atten= 59%, Lag= 17.9 min
Primary = 13.73 cfs @ 12.40 hrs, Volume= 1.829 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,540.37' @ 12.40 hrs Surf.Area= 0.246 ac Storage= 0.956 af

Plug-Flow detention time= 105.4 min calculated for 1.823 af (74% of inflow)
Center-of-Mass det. time= 42.7 min (835.2 - 792.4)

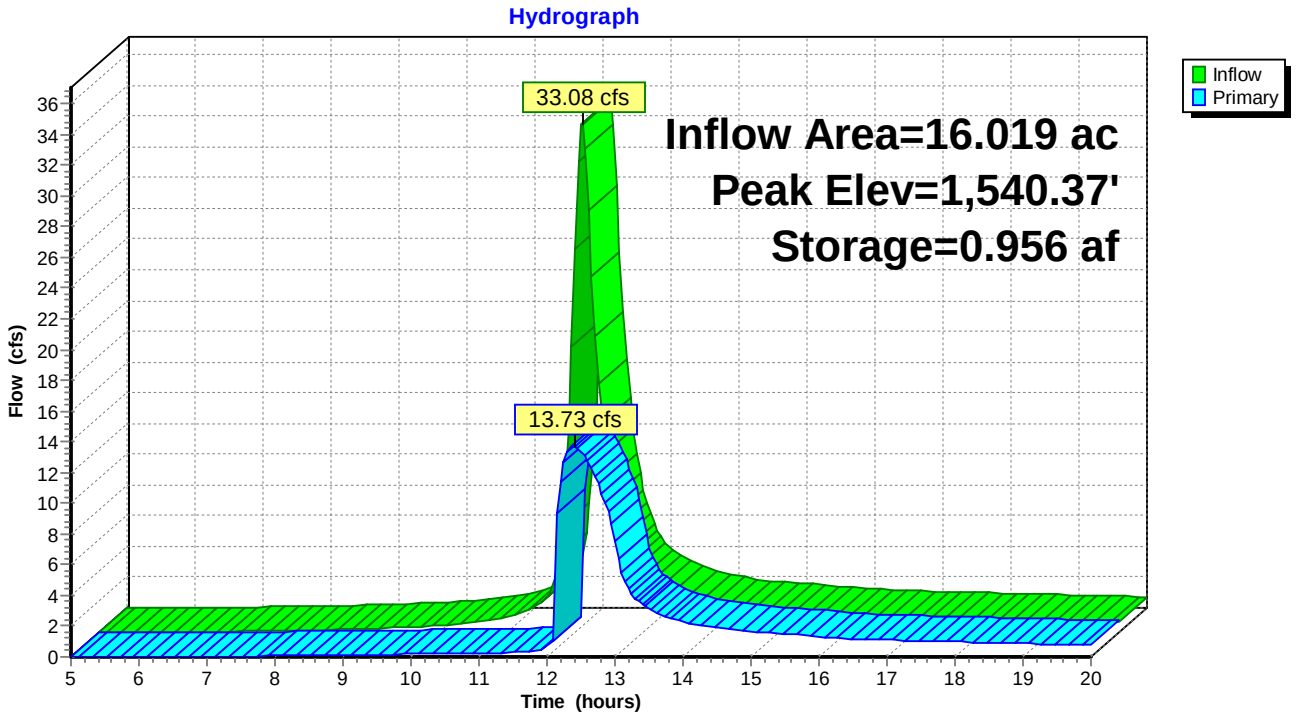
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=13.72 cfs @ 12.40 hrs HW=1,540.37' (Free Discharge)
└**1=Culvert** (Passes 13.72 cfs of 28.81 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.59 cfs @ 12.03 fps)
  └**3=Orifice/Grate** (Orifice Controls 13.13 cfs @ 5.84 fps)

Pond 1P: (new Pond)

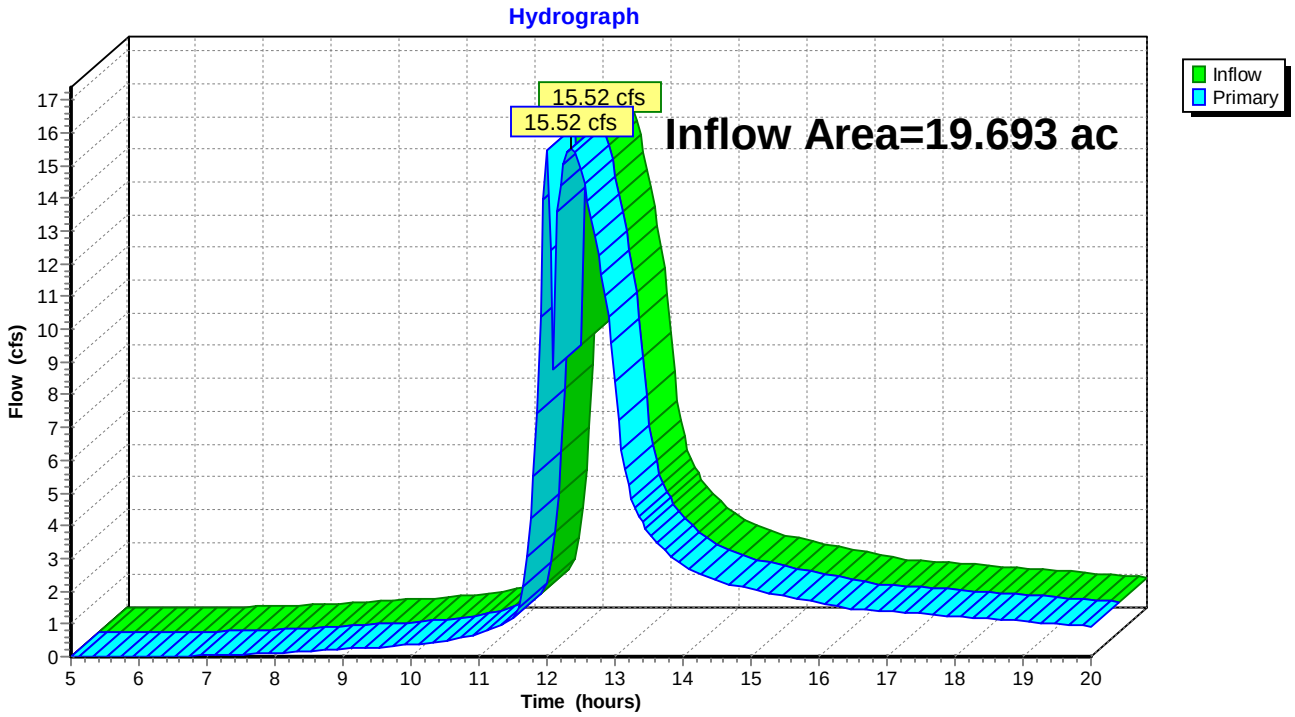


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 15.52 cfs @ 12.36 hrs, Volume= 2.554 af
Primary = 15.52 cfs @ 12.36 hrs, Volume= 2.554 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

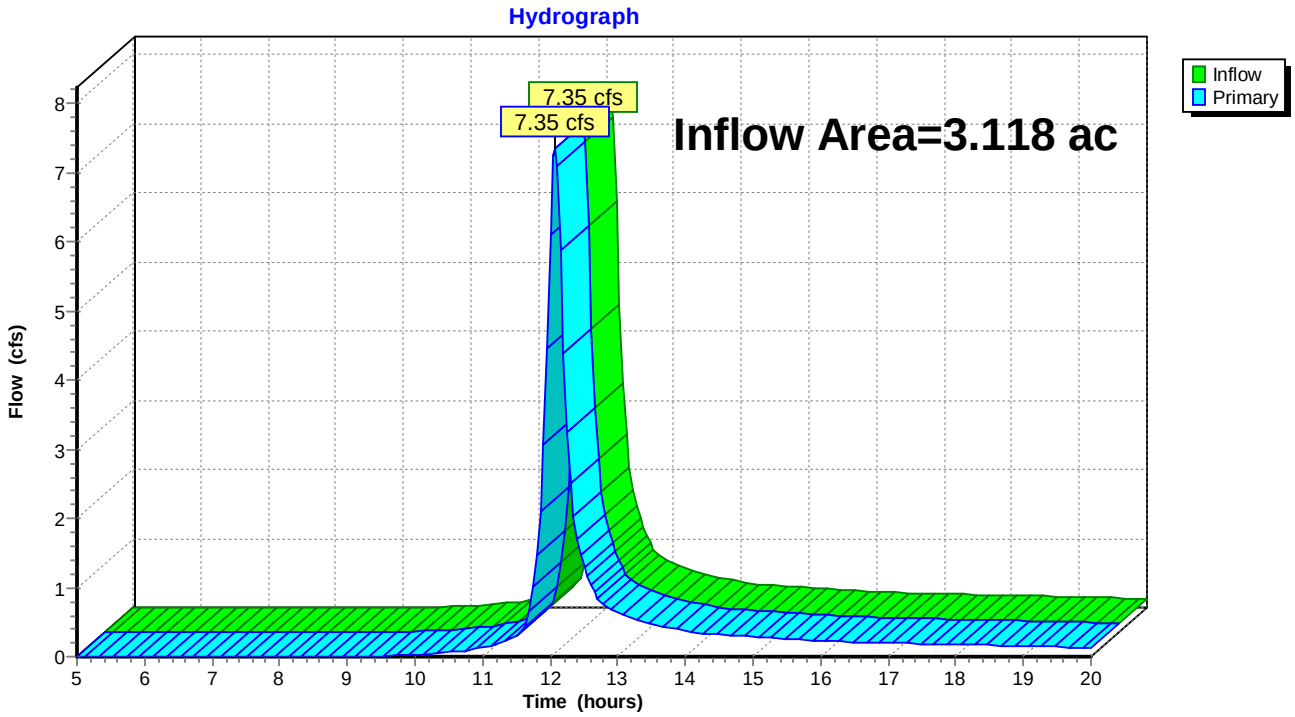


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 1.66" for 10-Year event
Inflow = 7.35 cfs @ 12.07 hrs, Volume= 0.430 af
Primary = 7.35 cfs @ 12.07 hrs, Volume= 0.430 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

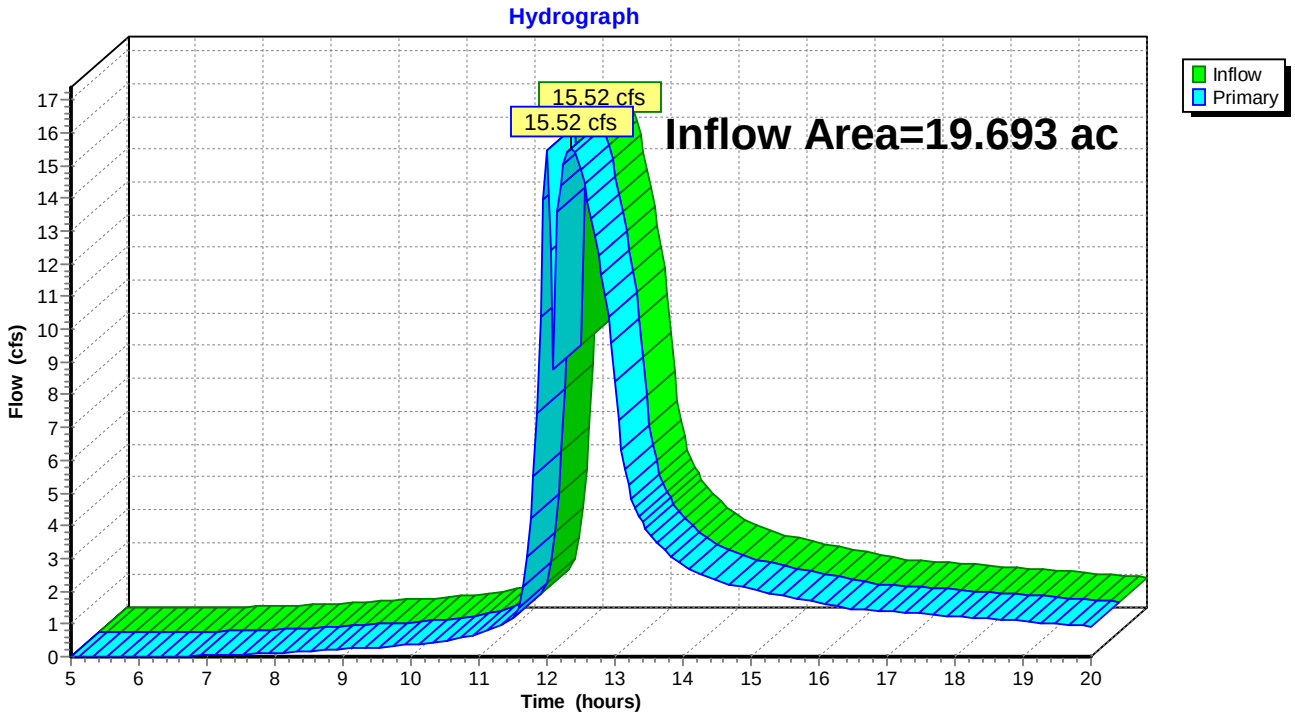


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 15.52 cfs @ 12.36 hrs, Volume= 2.554 af
Primary = 15.52 cfs @ 12.36 hrs, Volume= 2.554 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>3.06"
Flow Length=245' Tc=7.9 min CN=86 Runoff=19.19 cfs 0.937 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>1.78"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=14.44 cfs 1.199 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>3.15"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=32.43 cfs 2.081 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>2.26"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=10.01 cfs 0.586 af

Pond 1P: (new Pond) Peak Elev=1,541.47' Storage=1.243 af Inflow=43.71 cfs 3.280 af
Outflow=18.01 cfs 2.641 af

Link 2L: DISCHARGE POINT #1 Inflow=23.06 cfs 3.579 af
Primary=23.06 cfs 3.579 af

Link 5L: DISCHARGE POINT #2 Inflow=10.01 cfs 0.586 af
Primary=10.01 cfs 0.586 af

Link 15L: (new Link) Inflow=23.06 cfs 3.579 af
Primary=23.06 cfs 3.579 af

Total Runoff Area = 22.811 ac Runoff Volume = 4.804 af Average Runoff Depth = 2.53"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

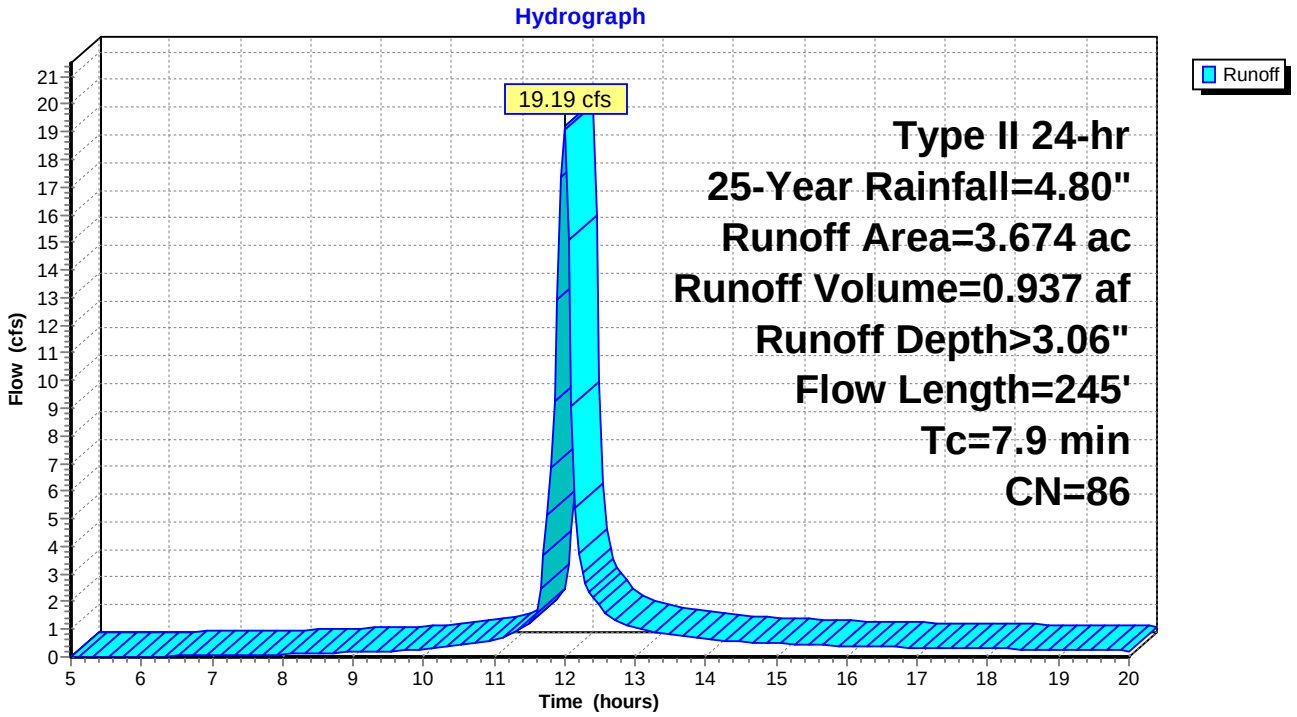
Runoff = 19.19 cfs @ 11.99 hrs, Volume= 0.937 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

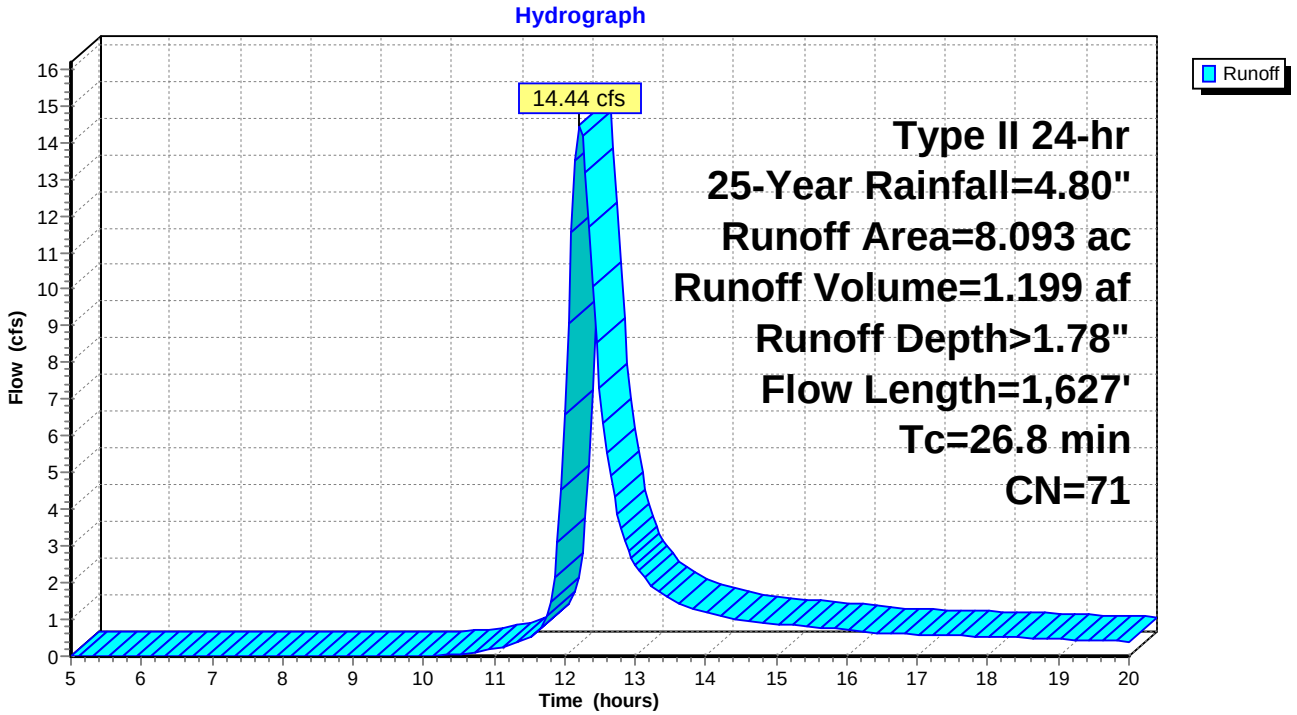
Runoff = 14.44 cfs @ 12.22 hrs, Volume= 1.199 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

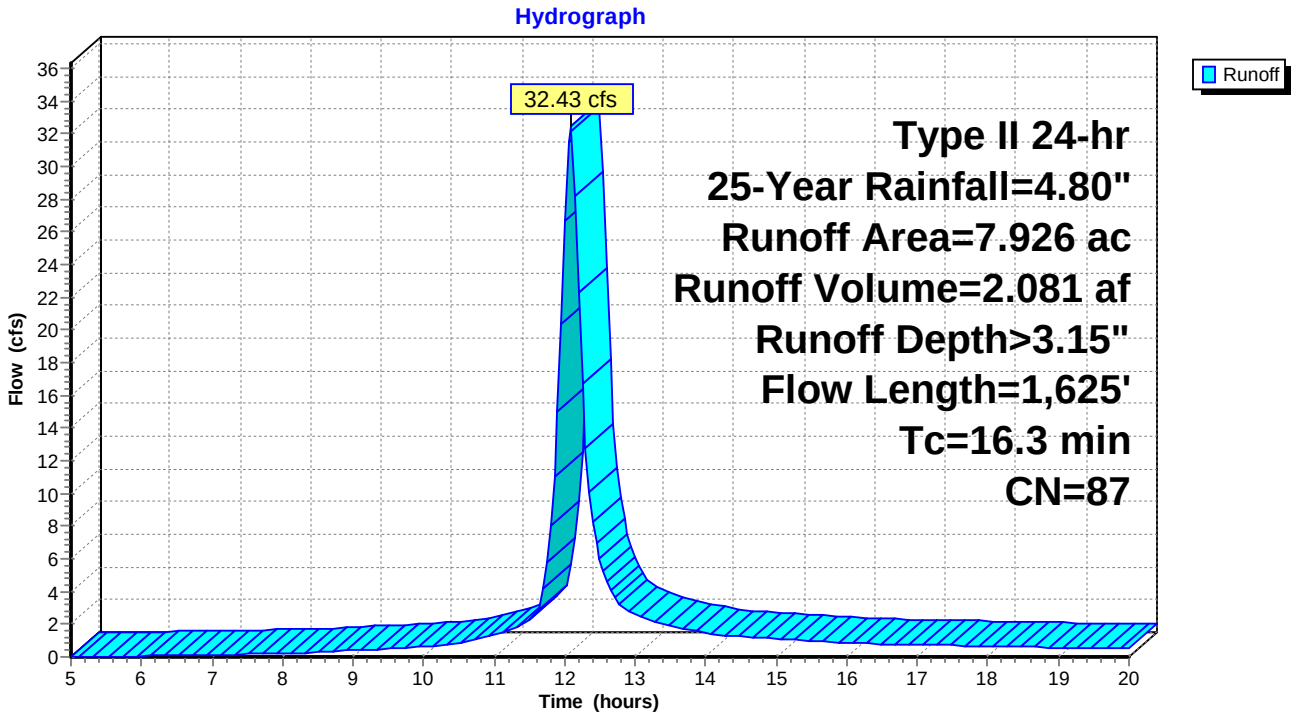
Runoff = 32.43 cfs @ 12.08 hrs, Volume= 2.081 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

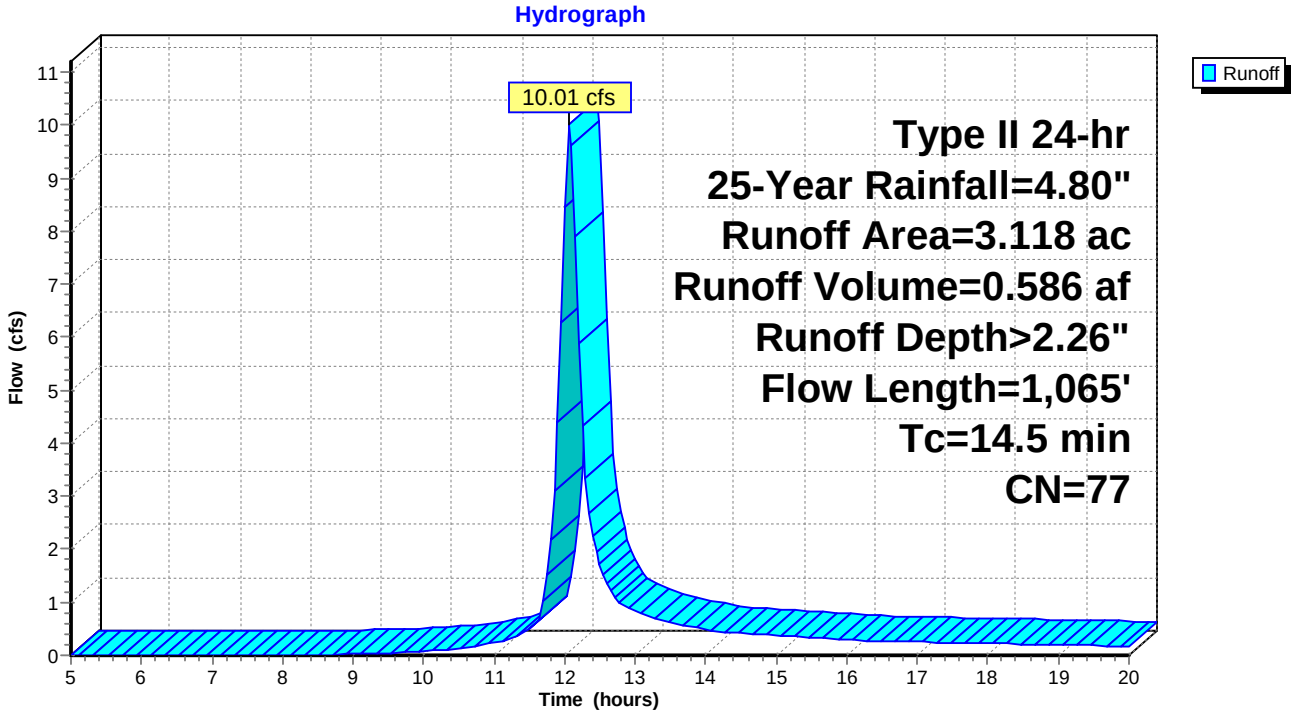
Runoff = 10.01 cfs @ 12.07 hrs, Volume= 0.586 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.80"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 2.46" for 25-Year event
Inflow = 43.71 cfs @ 12.11 hrs, Volume= 3.280 af
Outflow = 18.01 cfs @ 12.41 hrs, Volume= 2.641 af, Atten= 59%, Lag= 18.2 min
Primary = 18.01 cfs @ 12.41 hrs, Volume= 2.641 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,541.47' @ 12.41 hrs Surf.Area= 0.276 ac Storage= 1.243 af

Plug-Flow detention time= 92.3 min calculated for 2.641 af (81% of inflow)
Center-of-Mass det. time= 38.4 min (825.5 - 787.1)

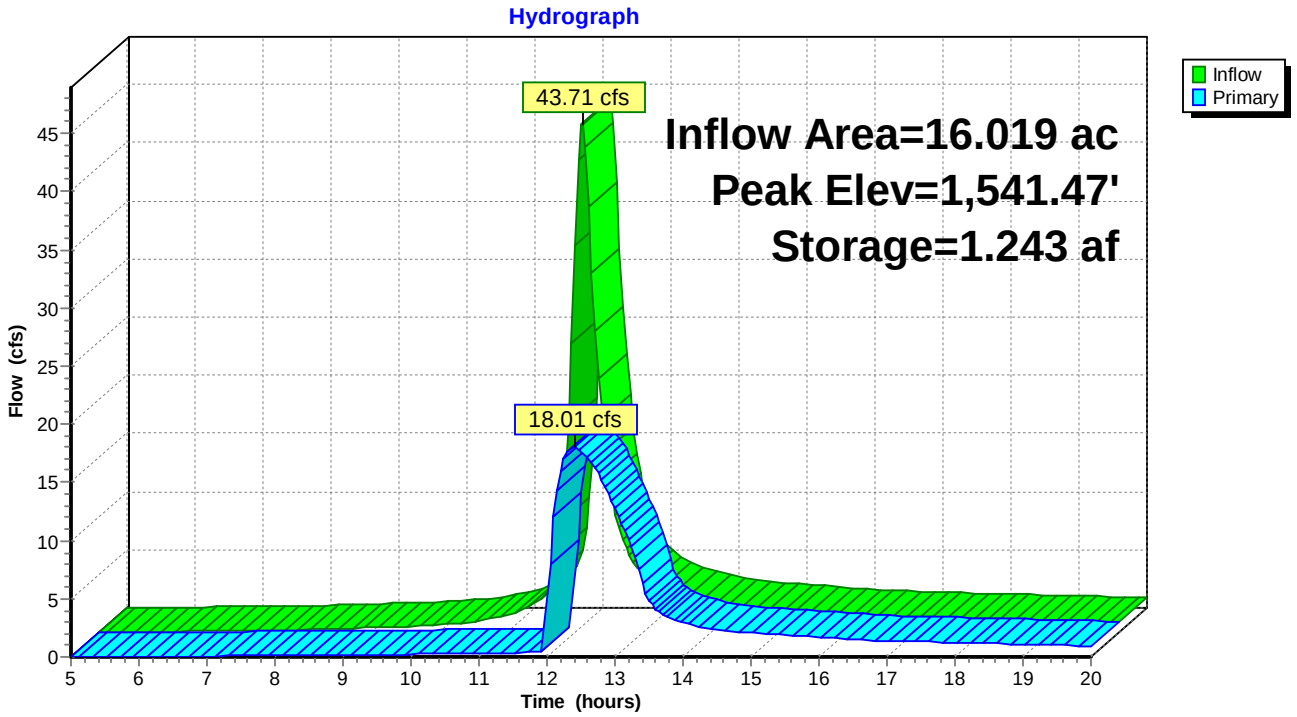
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=17.99 cfs @ 12.41 hrs HW=1,541.47' (Free Discharge)
↑**1=Culvert** (Passes 17.99 cfs of 29.85 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 13.05 fps)
3=Orifice/Grate (Orifice Controls 17.35 cfs @ 7.71 fps)

Pond 1P: (new Pond)

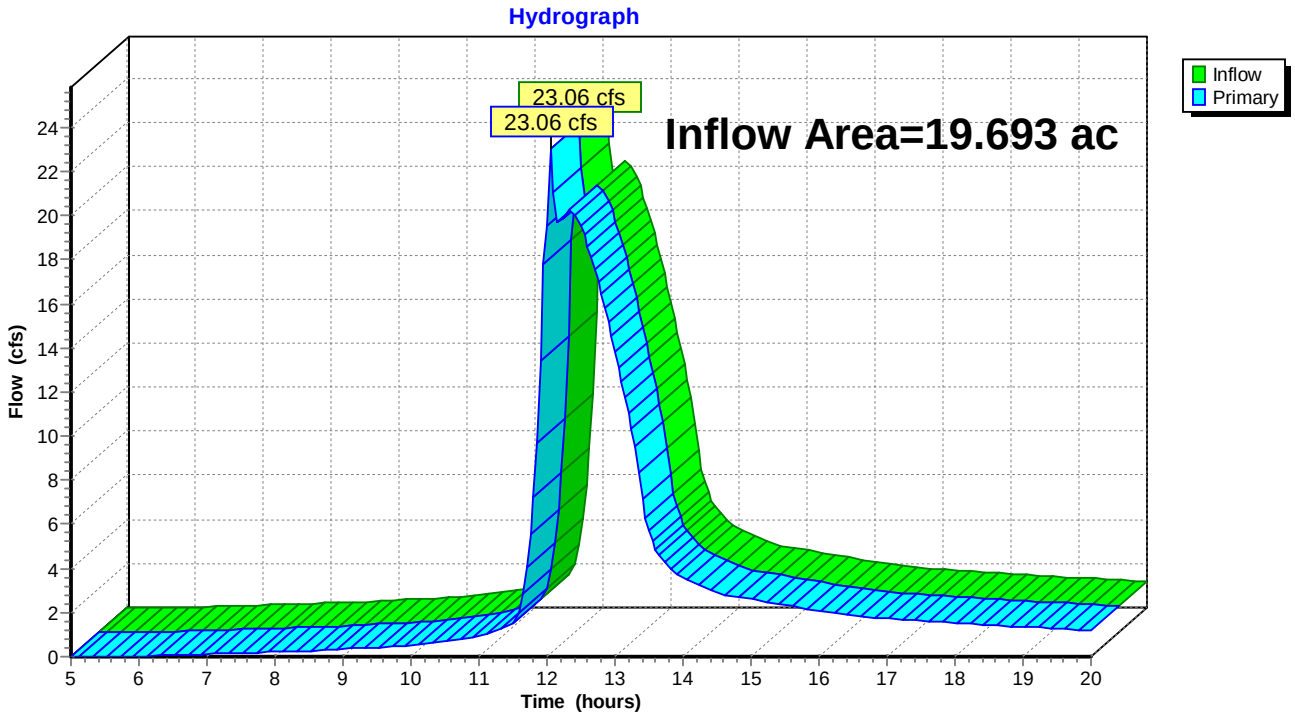


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 2.18" for 25-Year event
Inflow = 23.06 cfs @ 12.06 hrs, Volume= 3.579 af
Primary = 23.06 cfs @ 12.06 hrs, Volume= 3.579 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

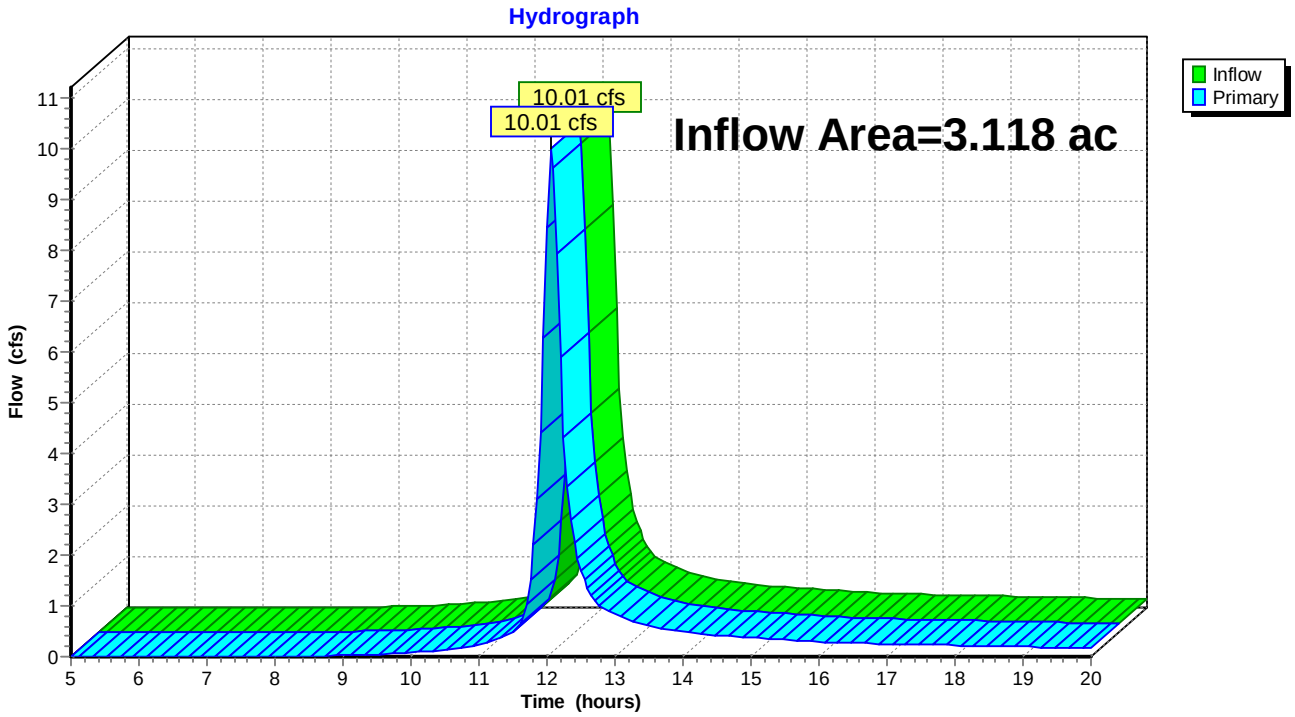


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 2.26" for 25-Year event
Inflow = 10.01 cfs @ 12.07 hrs, Volume= 0.586 af
Primary = 10.01 cfs @ 12.07 hrs, Volume= 0.586 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

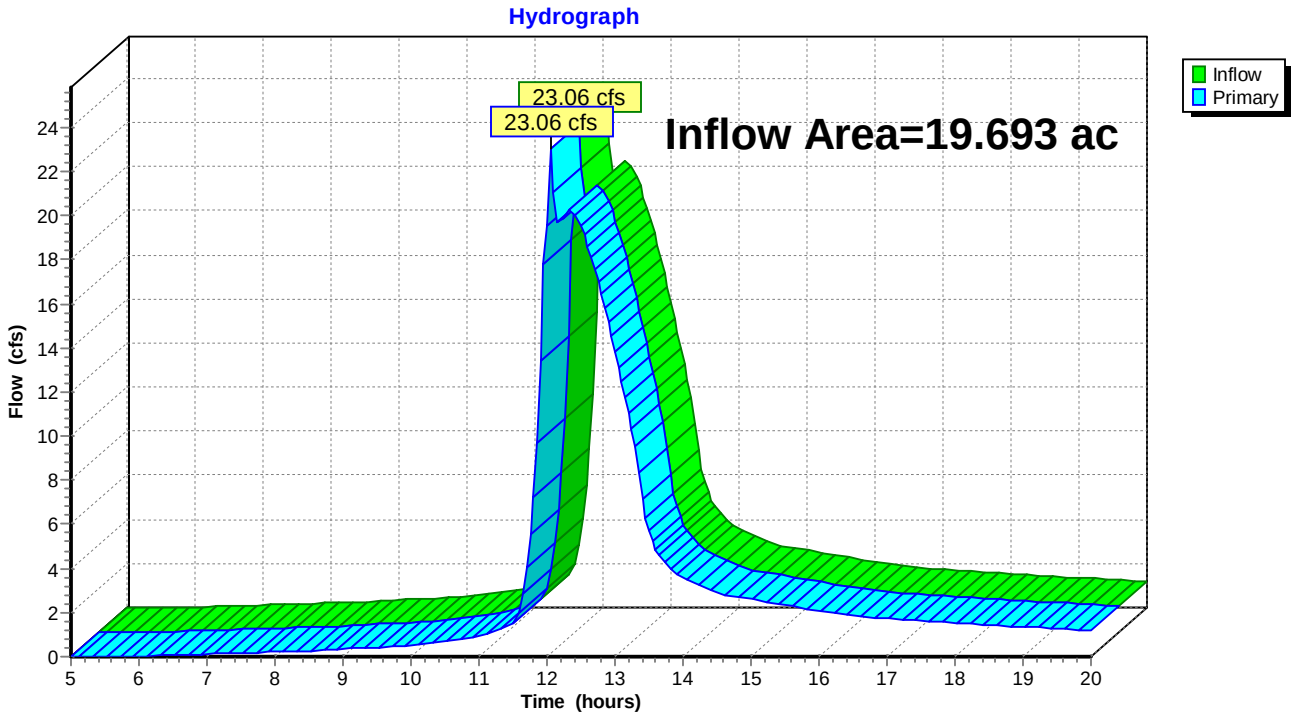


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 2.18" for 25-Year event
Inflow = 23.06 cfs @ 12.06 hrs, Volume= 3.579 af
Primary = 23.06 cfs @ 12.06 hrs, Volume= 3.579 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>3.24"
Flow Length=245' Tc=7.9 min CN=86 Runoff=20.22 cfs 0.991 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>1.92"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=15.61 cfs 1.293 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>3.33"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=34.16 cfs 2.198 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>2.41"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=10.68 cfs 0.627 af

Pond 1P: (new Pond) Peak Elev=1,541.76' Storage=1.325 af Inflow=46.41 cfs 3.491 af
Outflow=18.97 cfs 2.850 af

Link 2L: DISCHARGE POINT #1 Inflow=25.91 cfs 3.842 af
Primary=25.91 cfs 3.842 af

Link 5L: DISCHARGE POINT #2 Inflow=10.68 cfs 0.627 af
Primary=10.68 cfs 0.627 af

Link 15L: (new Link) Inflow=25.91 cfs 3.842 af
Primary=25.91 cfs 3.842 af

Total Runoff Area = 22.811 ac Runoff Volume = 5.109 af Average Runoff Depth = 2.69"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

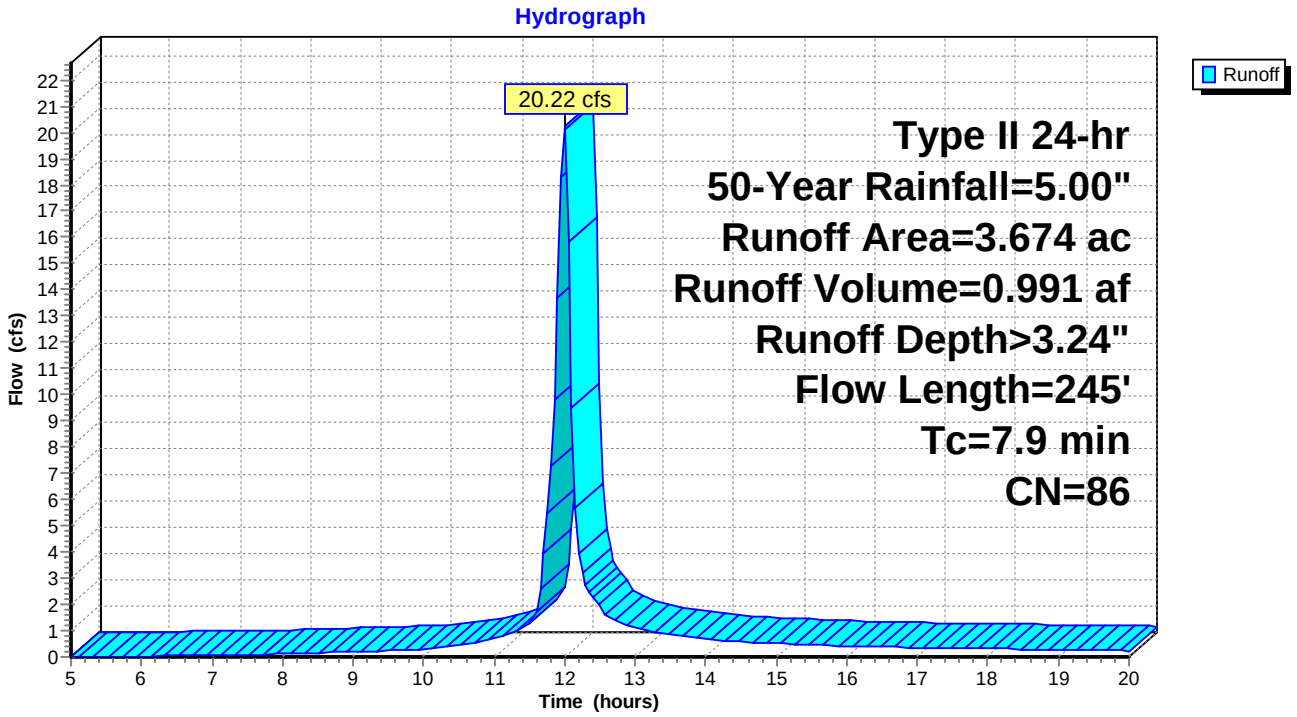
Runoff = 20.22 cfs @ 11.99 hrs, Volume= 0.991 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

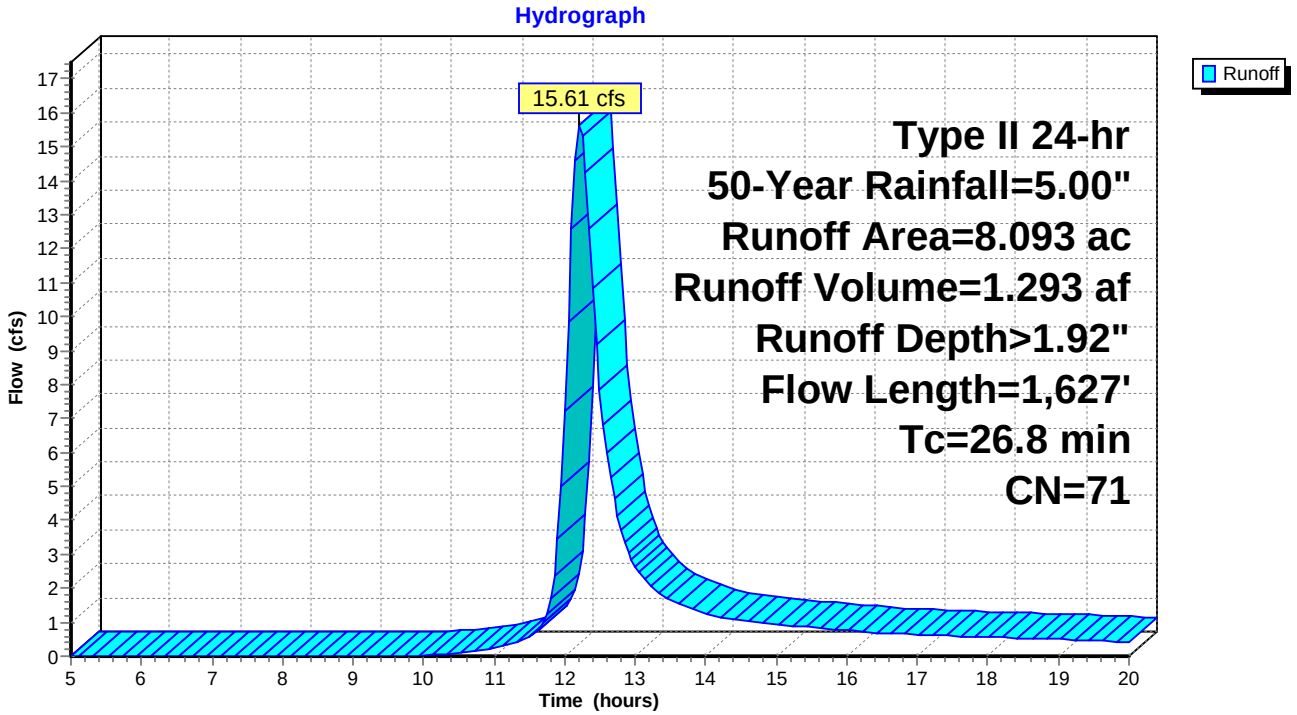
Runoff = 15.61 cfs @ 12.22 hrs, Volume= 1.293 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

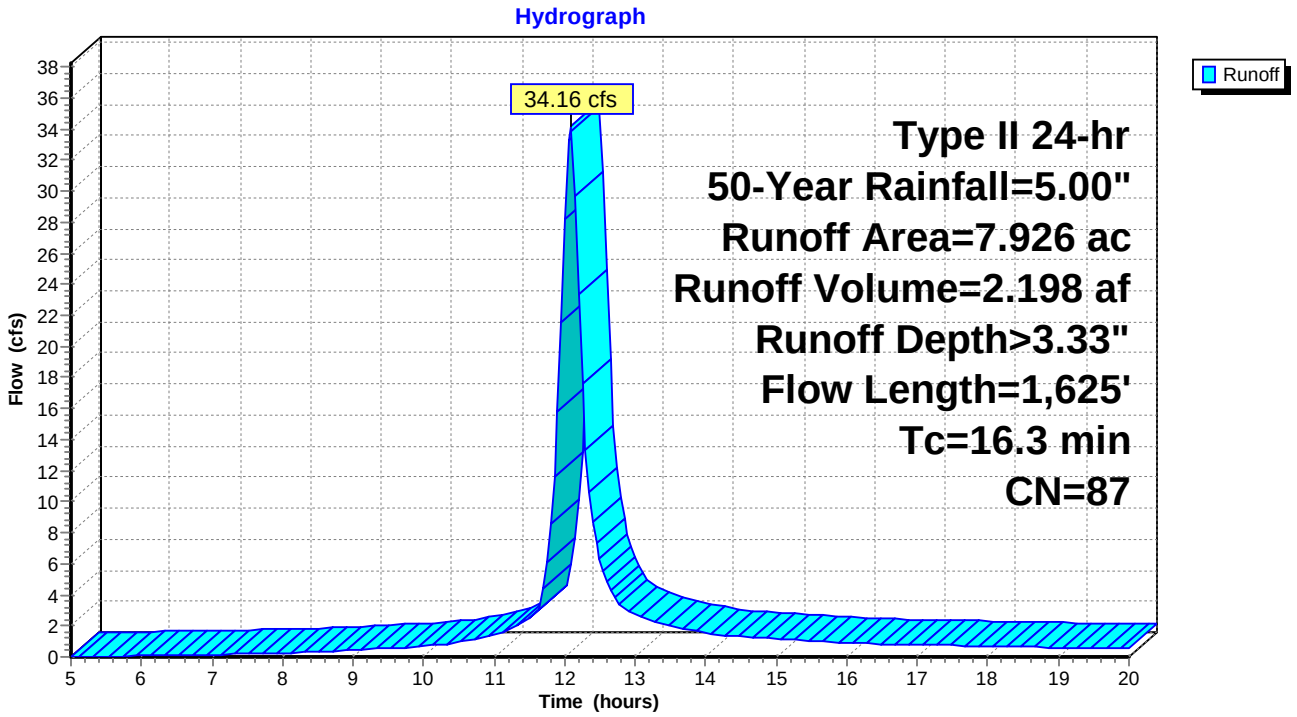
Runoff = 34.16 cfs @ 12.08 hrs, Volume= 2.198 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

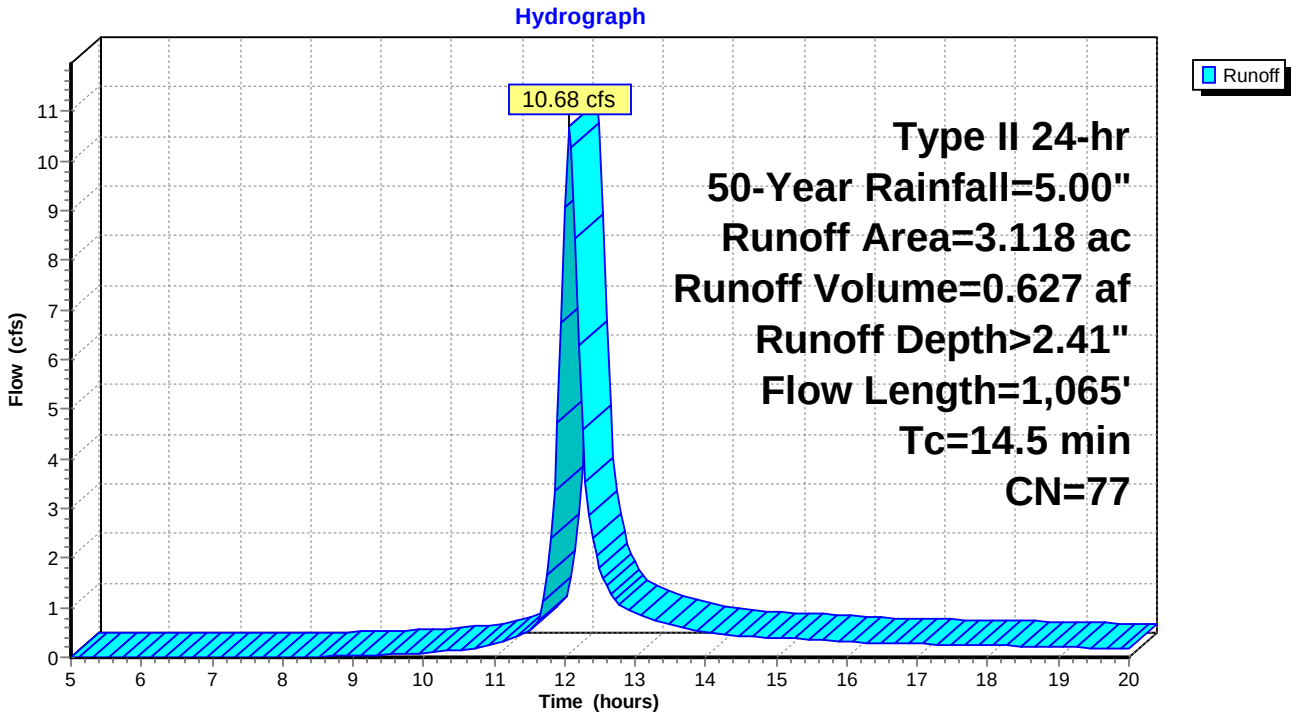
Runoff = 10.68 cfs @ 12.07 hrs, Volume= 0.627 af, Depth> 2.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=5.00"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 2.62" for 50-Year event
Inflow = 46.41 cfs @ 12.11 hrs, Volume= 3.491 af
Outflow = 18.97 cfs @ 12.41 hrs, Volume= 2.850 af, Atten= 59%, Lag= 18.3 min
Primary = 18.97 cfs @ 12.41 hrs, Volume= 2.850 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,541.76' @ 12.41 hrs Surf.Area= 0.285 ac Storage= 1.325 af

Plug-Flow detention time= 89.3 min calculated for 2.841 af (81% of inflow)
Center-of-Mass det. time= 38.2 min (824.1 - 786.0)

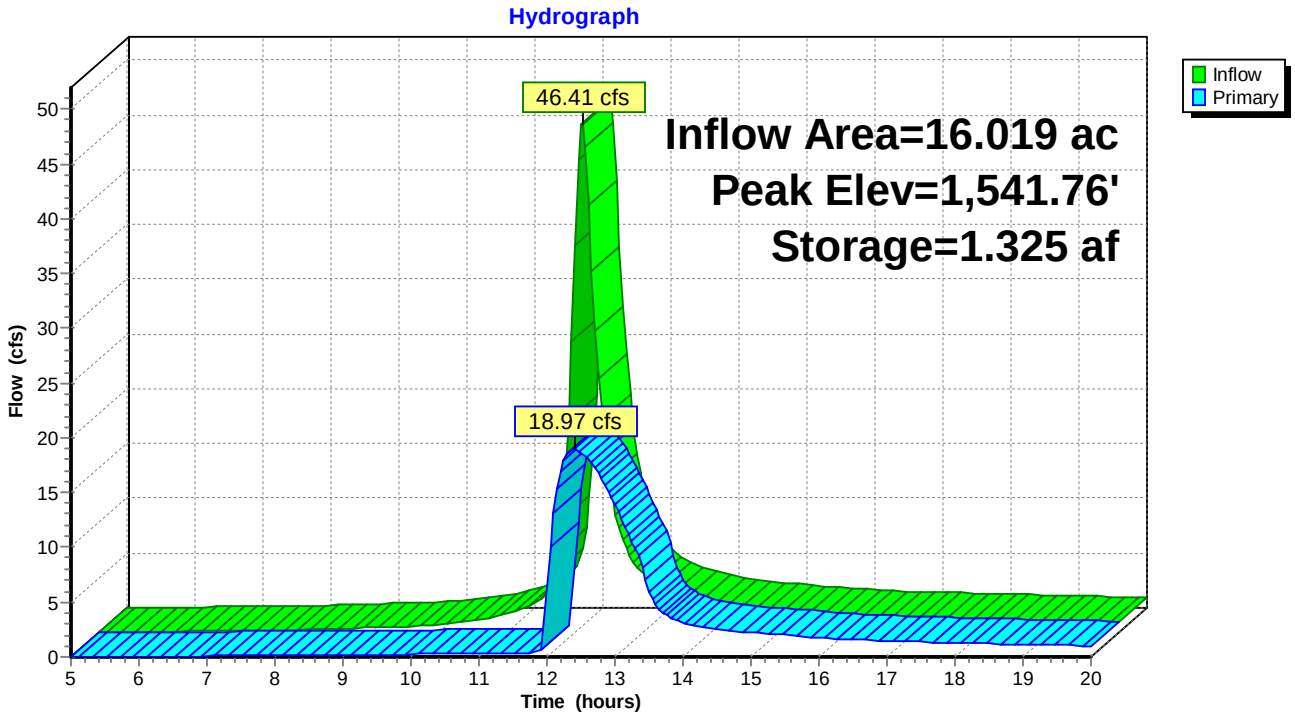
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=18.96 cfs @ 12.41 hrs HW=1,541.76' (Free Discharge)
↑**1=Culvert** (Passes 18.96 cfs of 30.12 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.65 cfs @ 13.30 fps)
3=Orifice/Grate (Orifice Controls 18.31 cfs @ 8.14 fps)

Pond 1P: (new Pond)

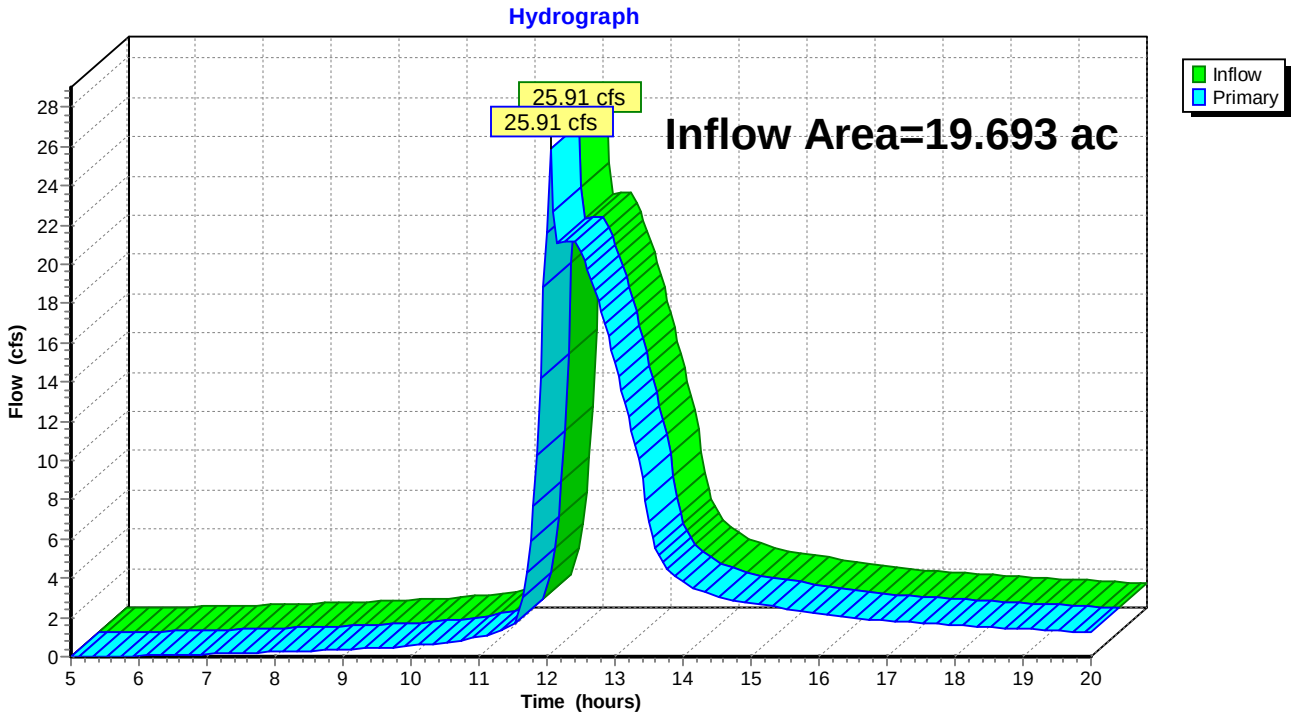


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 2.34" for 50-Year event
Inflow = 25.91 cfs @ 12.05 hrs, Volume= 3.842 af
Primary = 25.91 cfs @ 12.05 hrs, Volume= 3.842 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

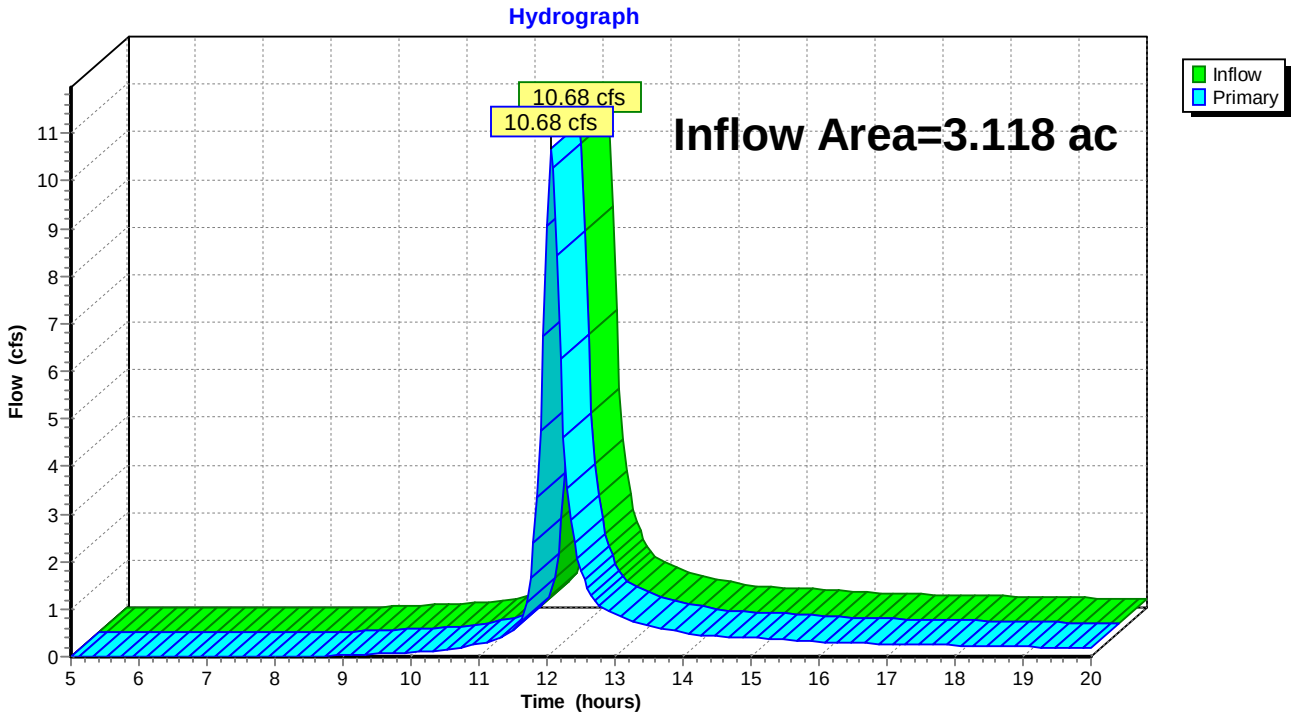


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 2.41" for 50-Year event
Inflow = 10.68 cfs @ 12.07 hrs, Volume= 0.627 af
Primary = 10.68 cfs @ 12.07 hrs, Volume= 0.627 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

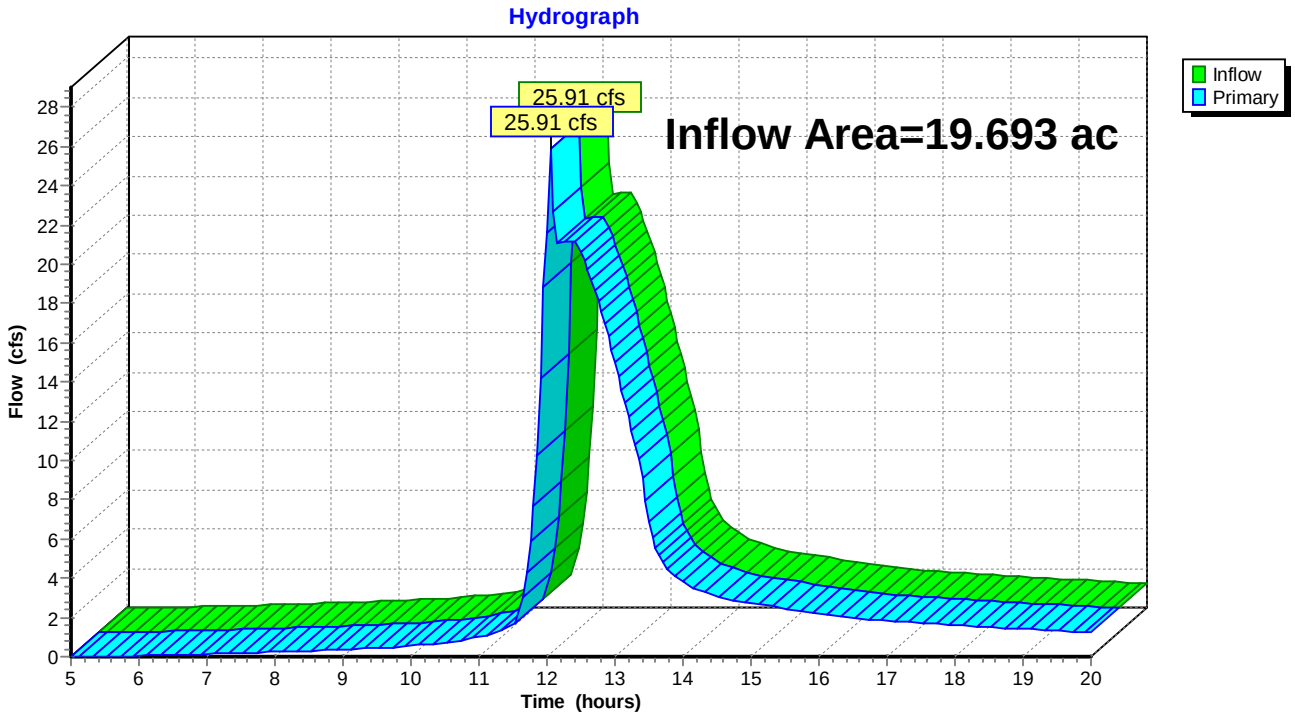


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 2.34" for 50-Year event
Inflow = 25.91 cfs @ 12.05 hrs, Volume= 3.842 af
Primary = 25.91 cfs @ 12.05 hrs, Volume= 3.842 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-1 post: DA-1 post Runoff Area=3.674 ac 43.49% Impervious Runoff Depth>4.04"
Flow Length=245' Tc=7.9 min CN=86 Runoff=24.86 cfs 1.236 af

Subcatchment DA-2A post: DA-2A post Runoff Area=8.093 ac 0.00% Impervious Runoff Depth>2.57"
Flow Length=1,627' Tc=26.8 min CN=71 Runoff=21.05 cfs 1.732 af

Subcatchment DA-2B post: DA-2B post Runoff Area=7.926 ac 50.83% Impervious Runoff Depth>4.13"
Flow Length=1,625' Tc=16.3 min CN=87 Runoff=41.93 cfs 2.730 af

Subcatchment DA-3 post: DA-3 post Runoff Area=3.118 ac 0.00% Impervious Runoff Depth>3.13"
Flow Length=1,065' Tc=14.5 min CN=77 Runoff=13.79 cfs 0.814 af

Pond 1P: (new Pond) Peak Elev=1,543.02' Storage=1.707 af Inflow=58.77 cfs 4.462 af
Outflow=22.71 cfs 3.816 af

Link 2L: DISCHARGE POINT #1 Inflow=36.51 cfs 5.052 af
Primary=36.51 cfs 5.052 af

Link 5L: DISCHARGE POINT #2 Inflow=13.79 cfs 0.814 af
Primary=13.79 cfs 0.814 af

Link 15L: (new Link) Inflow=36.51 cfs 5.052 af
Primary=36.51 cfs 5.052 af

Total Runoff Area = 22.811 ac Runoff Volume = 6.513 af Average Runoff Depth = 3.43"
75.33% Pervious = 17.184 ac 24.67% Impervious = 5.627 ac

Summary for Subcatchment DA-1 post: DA-1 post

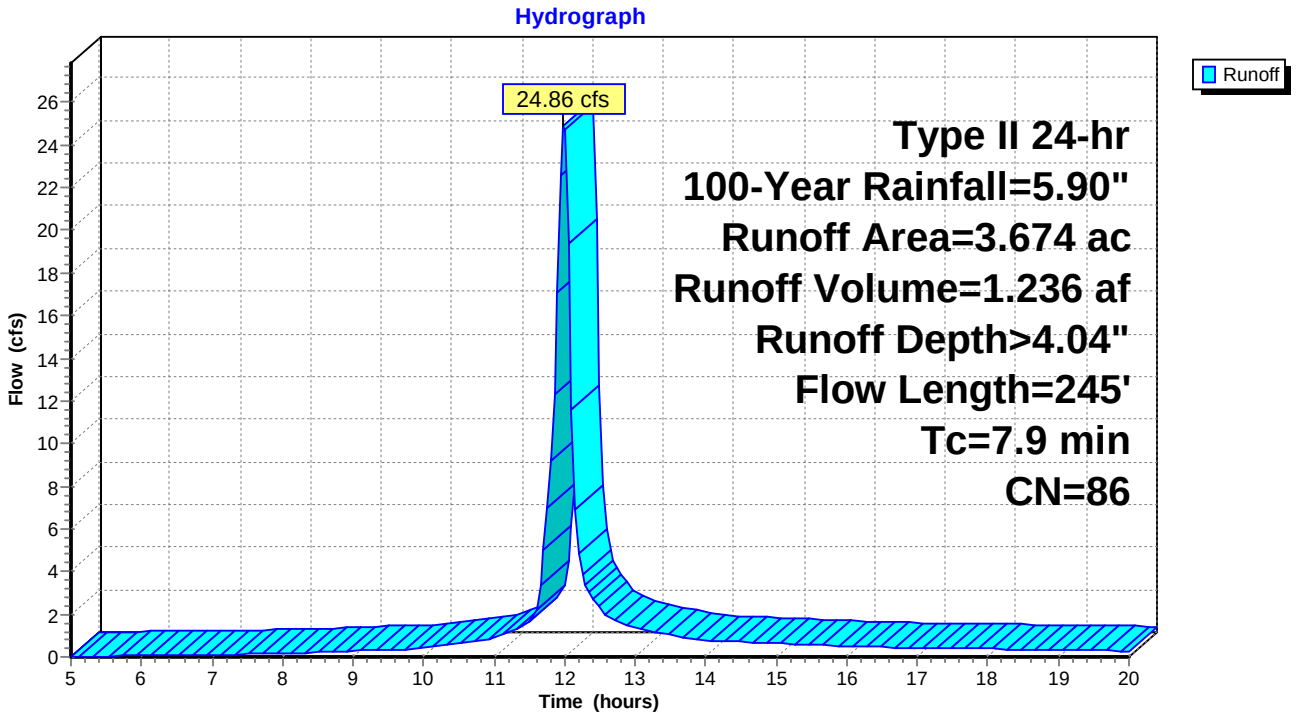
Runoff = 24.86 cfs @ 11.99 hrs, Volume= 1.236 af, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
0.264	98	Paved parking, HSG C
1.334	98	Paved parking, HSG D
0.574	74	>75% Grass cover, Good, HSG C
0.888	80	>75% Grass cover, Good, HSG D
0.614	77	Woods, Good, HSG D
3.674	86	Weighted Average
2.076		56.51% Pervious Area
1.598		43.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0645	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.08"
0.2	105	0.3800	9.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0480	11.44	6.24	**Pipe Channel, ROAD CROSSING** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.010 PVC, smooth interior
7.9	245	Total			

Subcatchment DA-1 post: DA-1 post



Summary for Subcatchment DA-2A post: DA-2A post

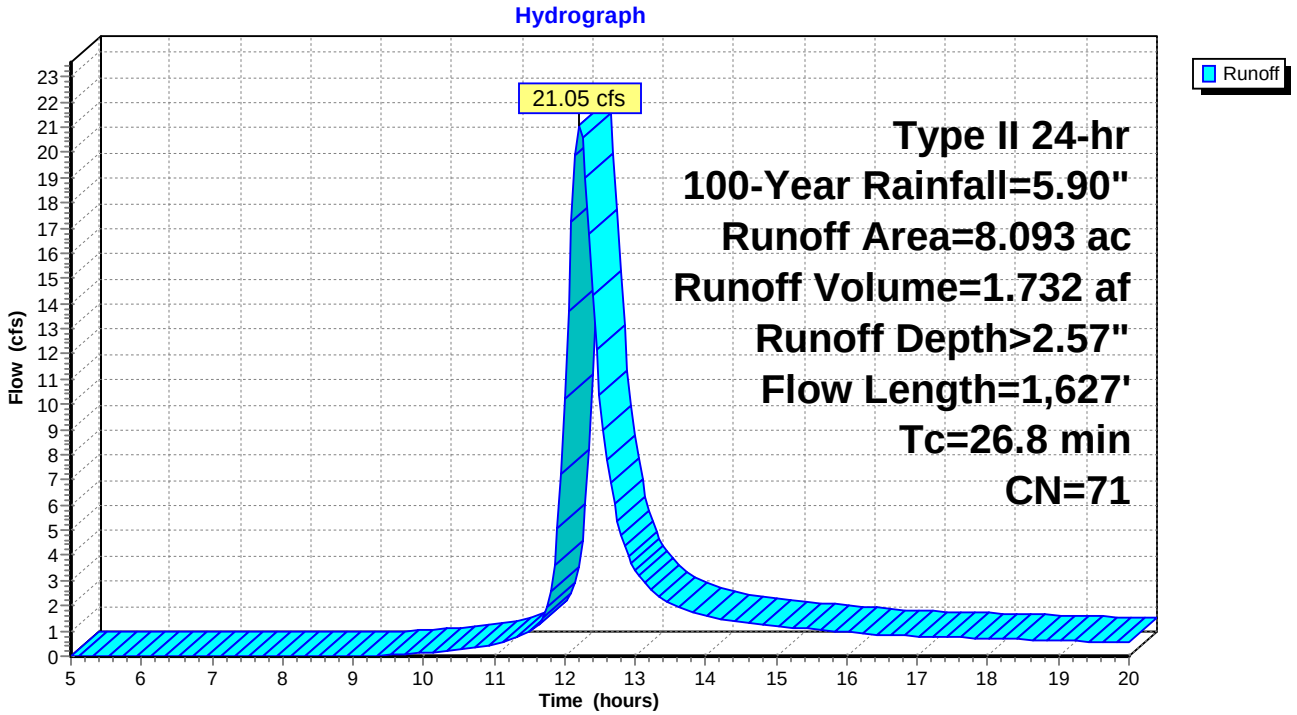
Runoff = 21.05 cfs @ 12.21 hrs, Volume= 1.732 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
7.481	70	Woods, Good, HSG C
0.612	87	Dirt roads, HSG C
8.093	71	Weighted Average
8.093		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0610	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
9.1	1,062	0.1506	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
26.8	1,627	Total			

Subcatchment DA-2A post: DA-2A post



Summary for Subcatchment DA-2B post: DA-2B post

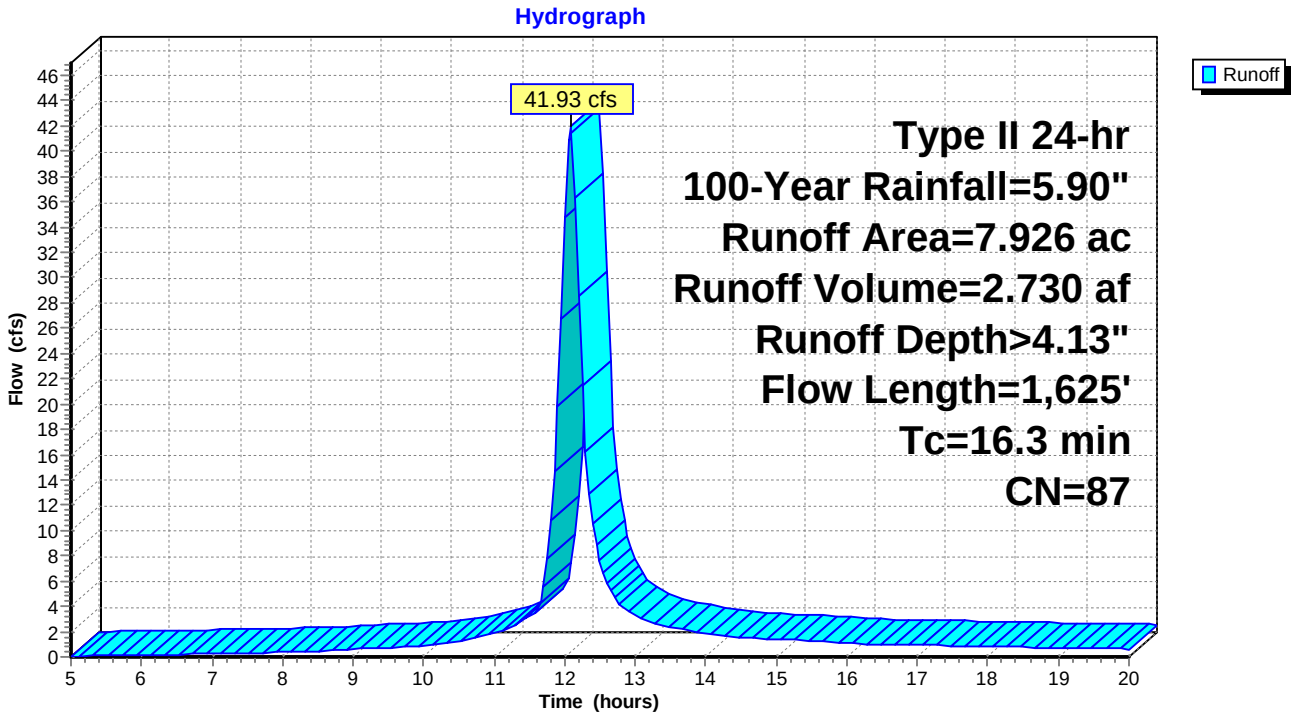
Runoff = 41.93 cfs @ 12.08 hrs, Volume= 2.730 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
3.026	98	Paved parking, HSG D
0.654	98	Paved parking, HSG C
1.100	80	>75% Grass cover, Good, HSG D
1.327	74	>75% Grass cover, Good, HSG C
0.372	77	Woods, Good, HSG D
1.098	70	Woods, Good, HSG C
0.349	98	Water Surface, HSG D
7.926	87	Weighted Average
3.897		49.17% Pervious Area
4.029		50.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.1389	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
2.2	350	0.2914	2.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	710	0.0400	9.80	39.21	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
0.6	465	0.0774	13.63	54.54	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 2.0 '/' Top.W=6.00' n= 0.022 Earth, clean & straight
16.3	1,625	Total			

Subcatchment DA-2B post: DA-2B post



Summary for Subcatchment DA-3 post: DA-3 post

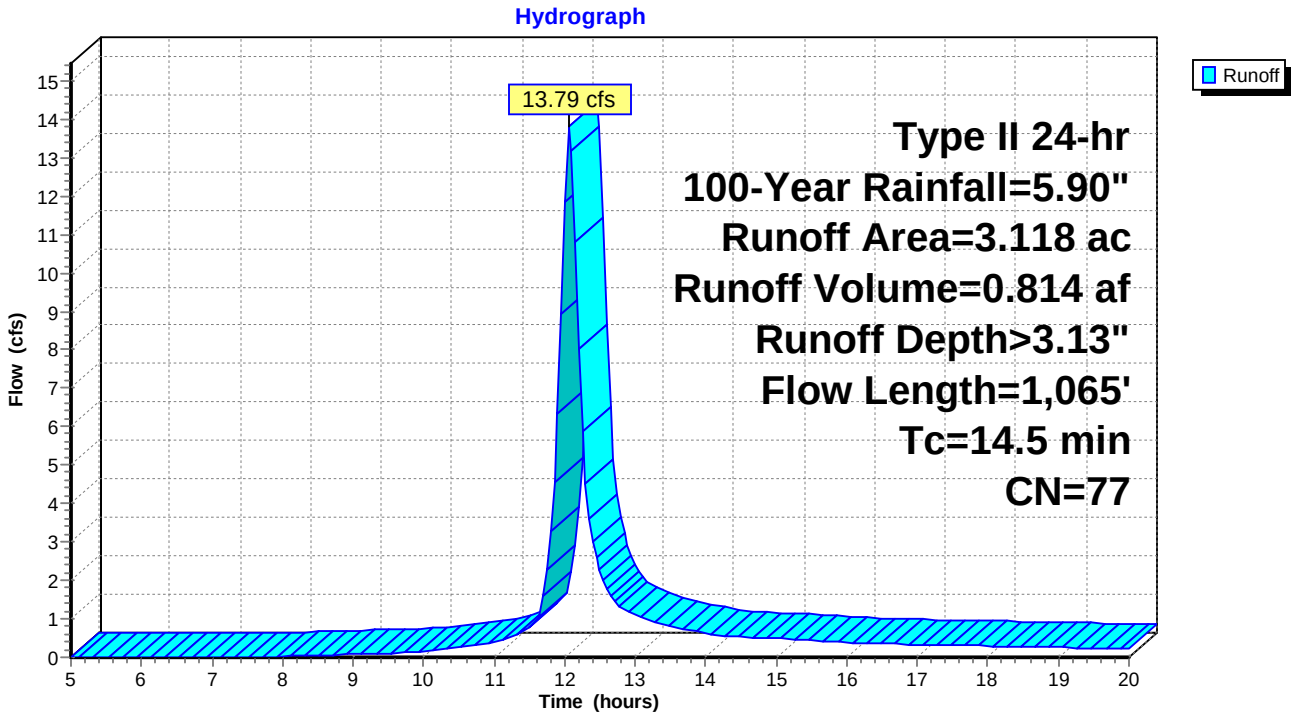
Runoff = 13.79 cfs @ 12.06 hrs, Volume= 0.814 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.90"

Area (ac)	CN	Description
3.118	77	Woods, Good, HSG D
3.118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	85	0.0890	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.08"
1.6	980	0.0480	9.91	29.74	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.022 Earth, clean & straight
14.5	1,065	Total			

Subcatchment DA-3 post: DA-3 post



Summary for Pond 1P: (new Pond)

Inflow Area = 16.019 ac, 25.15% Impervious, Inflow Depth > 3.34" for 100-Year event
Inflow = 58.77 cfs @ 12.11 hrs, Volume= 4.462 af
Outflow = 22.71 cfs @ 12.43 hrs, Volume= 3.816 af, Atten= 61%, Lag= 19.4 min
Primary = 22.71 cfs @ 12.43 hrs, Volume= 3.816 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,543.02' @ 12.43 hrs Surf.Area= 0.320 ac Storage= 1.707 af

Plug-Flow detention time= 82.7 min calculated for 3.803 af (85% of inflow)
Center-of-Mass det. time= 39.1 min (820.4 - 781.4)

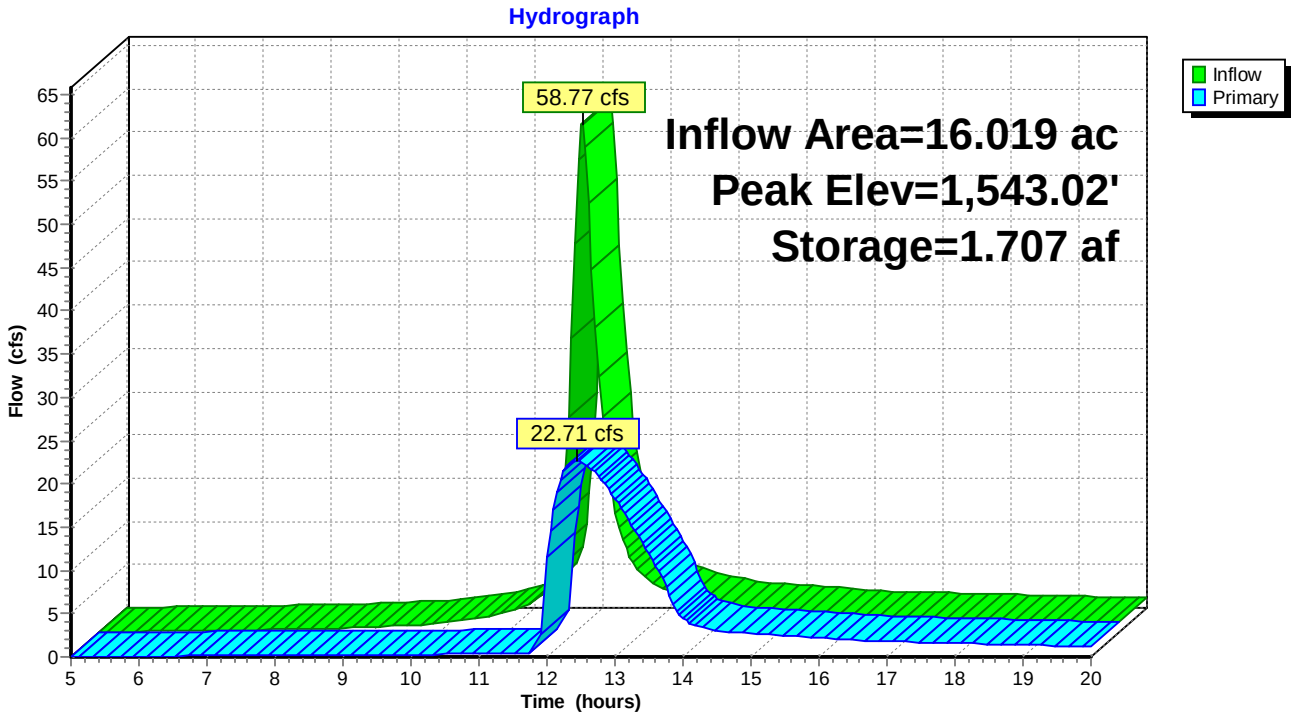
Volume	Invert	Avail.Storage	Storage Description
#1	1,534.00'	2.032 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,534.00	0.024	0.000	0.000
1,536.00	0.124	0.148	0.148
1,544.00	0.347	1.884	2.032

Device	Routing	Invert	Outlet Devices
#1	Primary	1,526.00'	**18.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,526.00' / 1,524.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,534.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	1,538.90'	**18.0" x 18.0" Horiz. Orifice/Grate** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=22.69 cfs @ 12.43 hrs HW=1,543.02' (Free Discharge)
↑**1=Culvert** (Passes 22.69 cfs of 31.27 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.70 cfs @ 14.36 fps)
3=Orifice/Grate (Orifice Controls 21.99 cfs @ 9.77 fps)

Pond 1P: (new Pond)

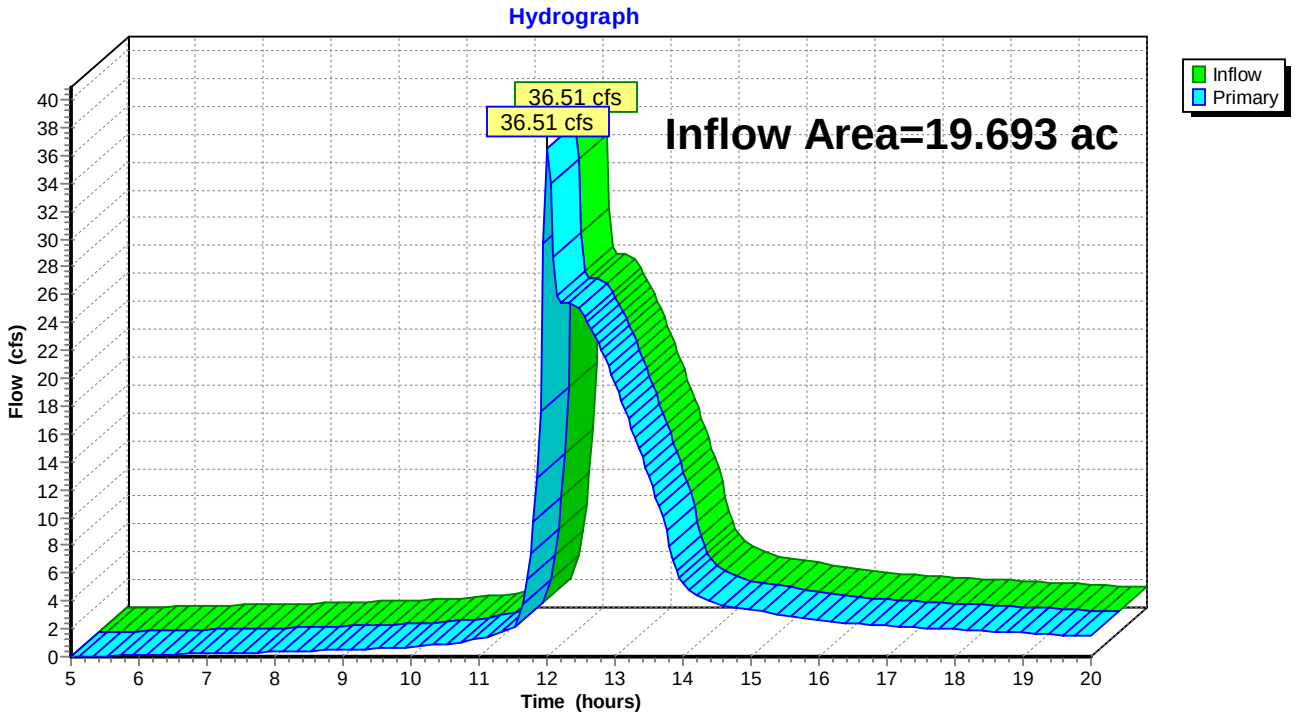


Summary for Link 2L: DISCHARGE POINT #1

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 3.08" for 100-Year event
Inflow = 36.51 cfs @ 12.01 hrs, Volume= 5.052 af
Primary = 36.51 cfs @ 12.01 hrs, Volume= 5.052 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DISCHARGE POINT #1

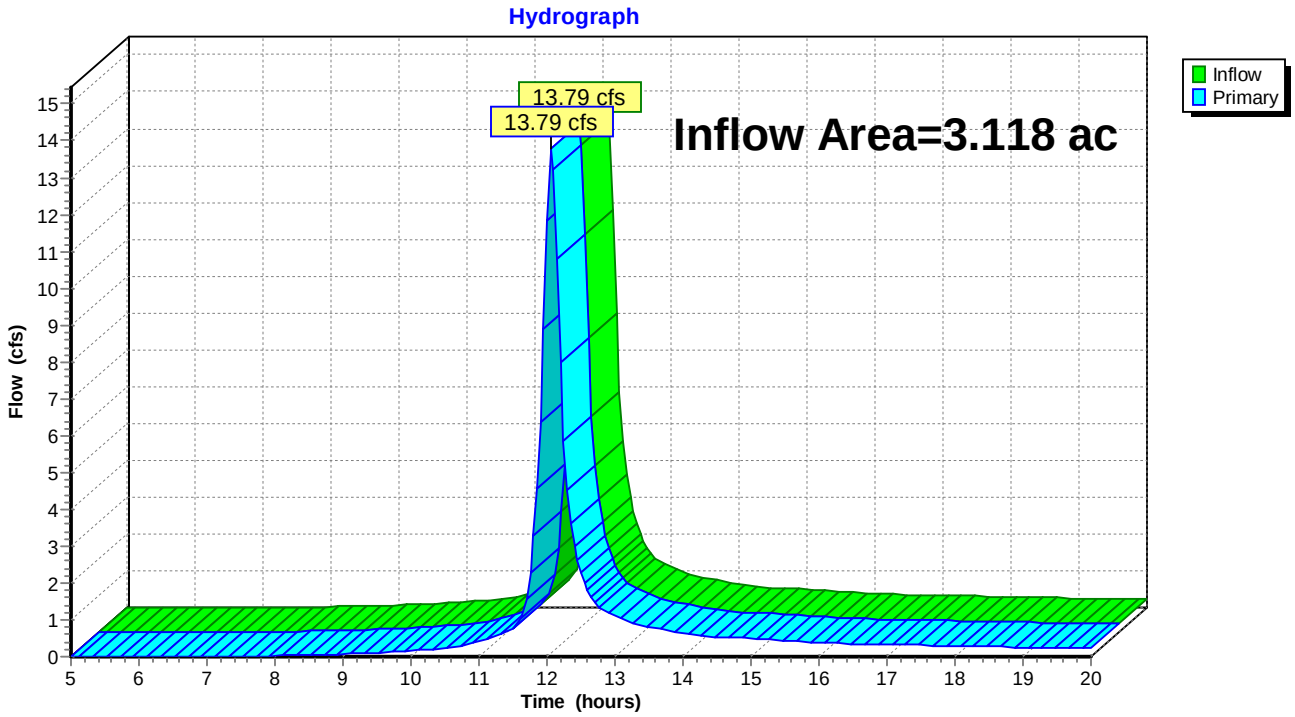


Summary for Link 5L: DISCHARGE POINT #2

Inflow Area = 3.118 ac, 0.00% Impervious, Inflow Depth > 3.13" for 100-Year event
Inflow = 13.79 cfs @ 12.06 hrs, Volume= 0.814 af
Primary = 13.79 cfs @ 12.06 hrs, Volume= 0.814 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: DISCHARGE POINT #2

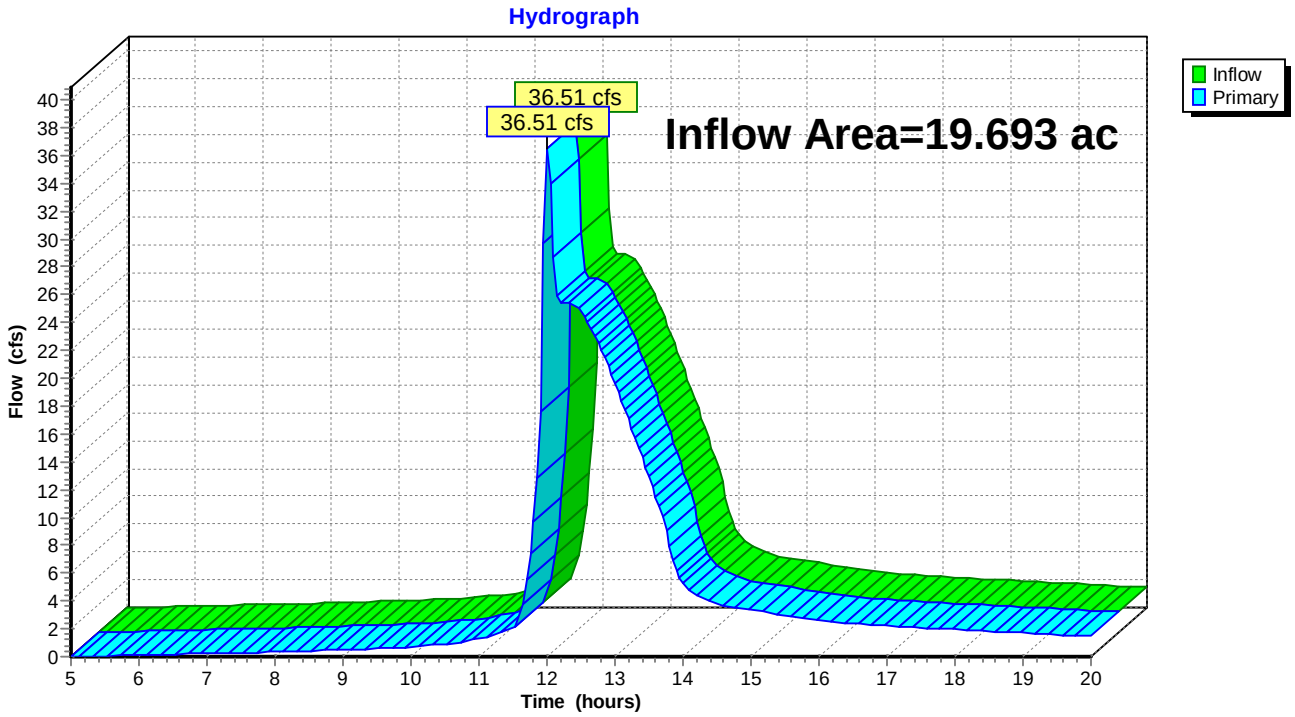


Summary for Link 15L: (new Link)

Inflow Area = 19.693 ac, 28.57% Impervious, Inflow Depth > 3.08" for 100-Year event
Inflow = 36.51 cfs @ 12.01 hrs, Volume= 5.052 af
Primary = 36.51 cfs @ 12.01 hrs, Volume= 5.052 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 15L: (new Link)



APPENDIX E
STORMWATER CONSTRUCTION SITE LOGBOOK

Stormwater Construction Site Logbook

Hillside Commons Student Housing
Blodgett Drive
City of Oneonta
Otsego County, New York

Prepared For:
Newman Development Group, LLC
300 Plaza Drive
Vestal, New York 13850

KEYSTONE ASSOCIATES
ARCHITECTS • ENGINEERS • SURVEYORS, LLC
58 Exchange Street • Binghamton, NY 13901 • Phone: 607.722.1100 • Fax: 607.722.2515 •www.keyscomp.com

Project No. 0200.26412 February 2013

APPENDIX H

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS
Project Name _____
Permit No. _____ Date of Authorization _____
Name of Operator _____
Prime Contractor _____

a. Preamble to Site Assessment and Inspections
The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

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

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

c. Qualified Professional's Credentials & Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

d. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

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

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass
water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

_____ _____

Inspector (print name) **Date of Inspection**

_____ _____

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

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

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions
Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering
Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam
Yes No NA
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles
Yes No NA
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation
Yes No NA
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance
Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence
Yes No NA
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

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

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

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

Modification & Reason:

CONSTRUCTION DURATION INSPECTION

SWPPP CONSTRUCTION DURATION INSPECTION #

HILLSIDE COMMONES STUDENT HOUSING
BLODGETT DRIVE
CITY OF ONEONTA, OTSEGO COUNTY, NY
KA PROJECT NO. 0200.26412

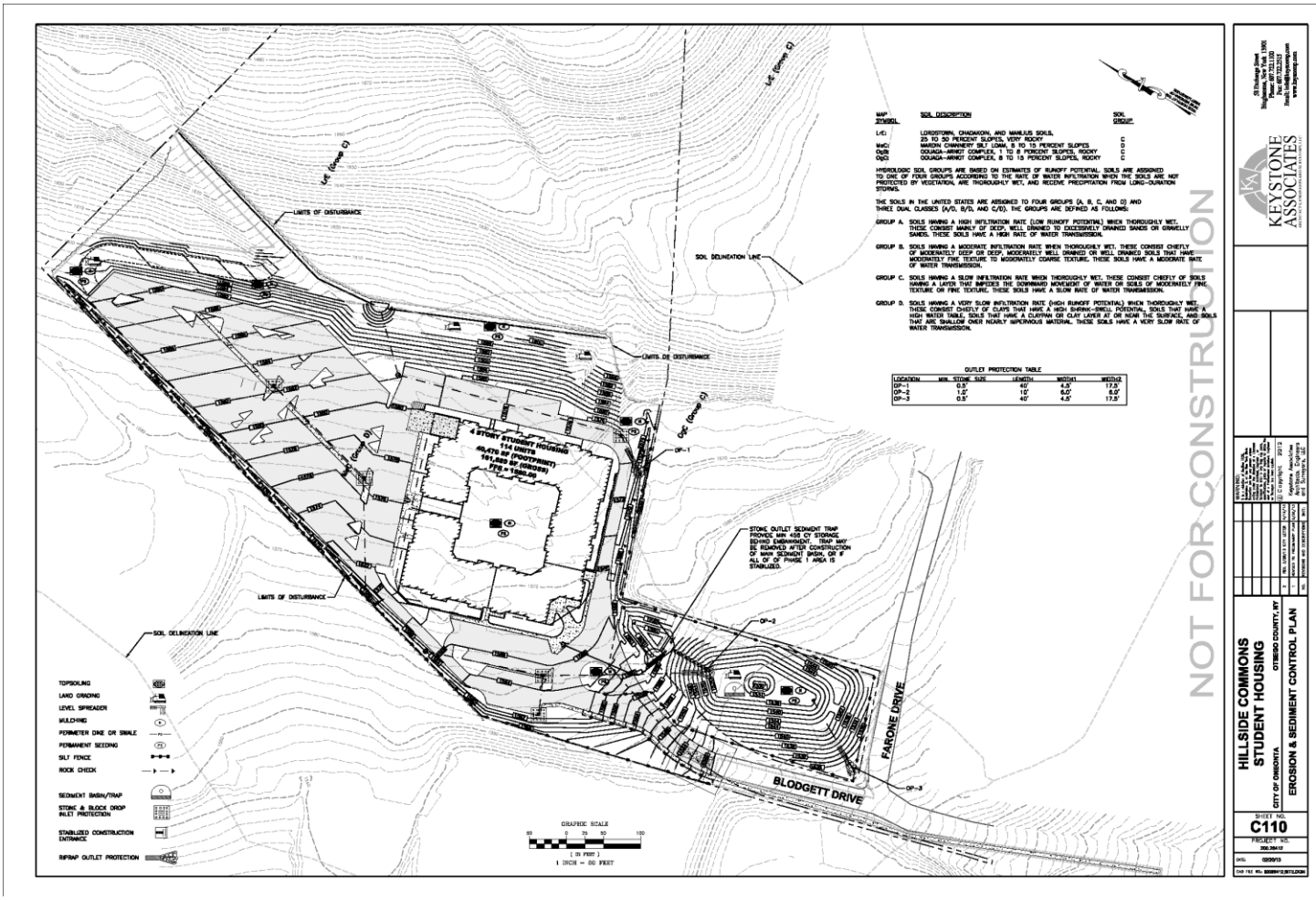


IMAGE IS NOT TO SCALE AND IS FOR REFERENCE PURPOSES ONLY

SITE PLAN/SKETCH

KEYSTONE ASSOCIATES, LLC

Qualified Inspector (Name & Sign) **Date of Inspection & Start Time**

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

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

CONSTRUCTION DURATION INSPECTION

ACTION ITEMS: *The contractor or subcontractor should begin implementing the following corrective actions within one business day of notification and should complete the corrective actions in a reasonable time frame in accordance with applicable SPDES regulations (GP-0-10-001 General Permit):*

1.

Recent Activities:

Qualified Inspector:

Weather & Soil Conditions:

Description of runoff at all points of discharge from the Site:

1. **List Discharge Point(s):**

Description of natural surface water bodies within or adjacent to the Site:

1. **List Surface Water Bodies:**

***Site Photographs are attached with this report.**

CONSTRUCTION DURATION INSPECTION

Maintaining Water Quality

Yes No NA

[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Keystone Notes:

Housekeeping

1. General Site Conditions

Yes No NA

[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

Keystone Notes:

2. Temporary Stream Crossing

Yes No NA

[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Keystone Notes:

Runoff Control Practices

1. Excavation Dewatering

Yes No NA

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

Keystone Notes:

2. Level Spreader

Yes No NA

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

Keystone Notes:

CONSTRUCTION DURATION INSPECTION

Runoff Control Practices (continued)

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Keystone Notes:

4. Stone Check Dam

Yes No NA

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

Keystone Notes:

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Keystone Notes:

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

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

Keystone Notes:

2. Revegetation

Yes No NA

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

Keystone Notes:

Sediment Control

1. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Keystone Notes:

Sediment Control (continued)

CONSTRUCTION DURATION INSPECTION

2. Silt Fence

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation is ___% of design capacity.

Keystone Notes:

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

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

Keystone Notes:

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

Keystone Notes:

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Keystone Notes:

Modifications to the SWPPP (To be completed as described below)

CONSTRUCTION DURATION INSPECTION

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

Cumulative List of SWPPP Modifications: (Provided Sequentially)

1.

APPENDIX F
STORMWATER MANAGEMENT PLANS, DETAILS AND SPECIFICATIONS

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.

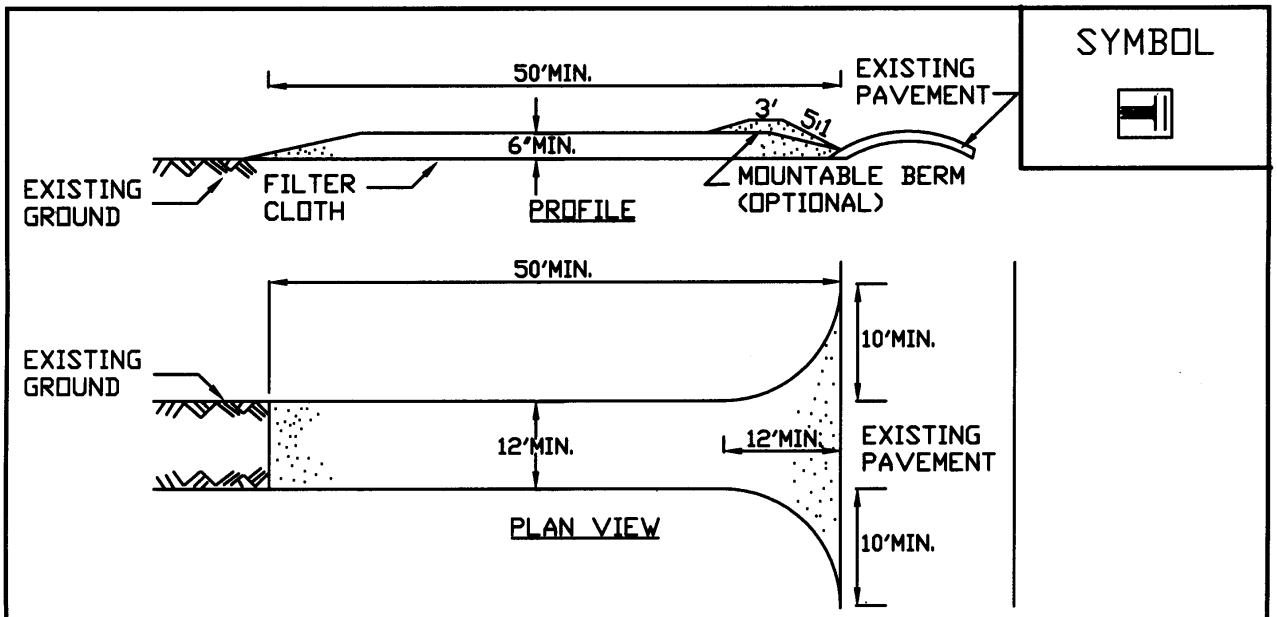
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

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

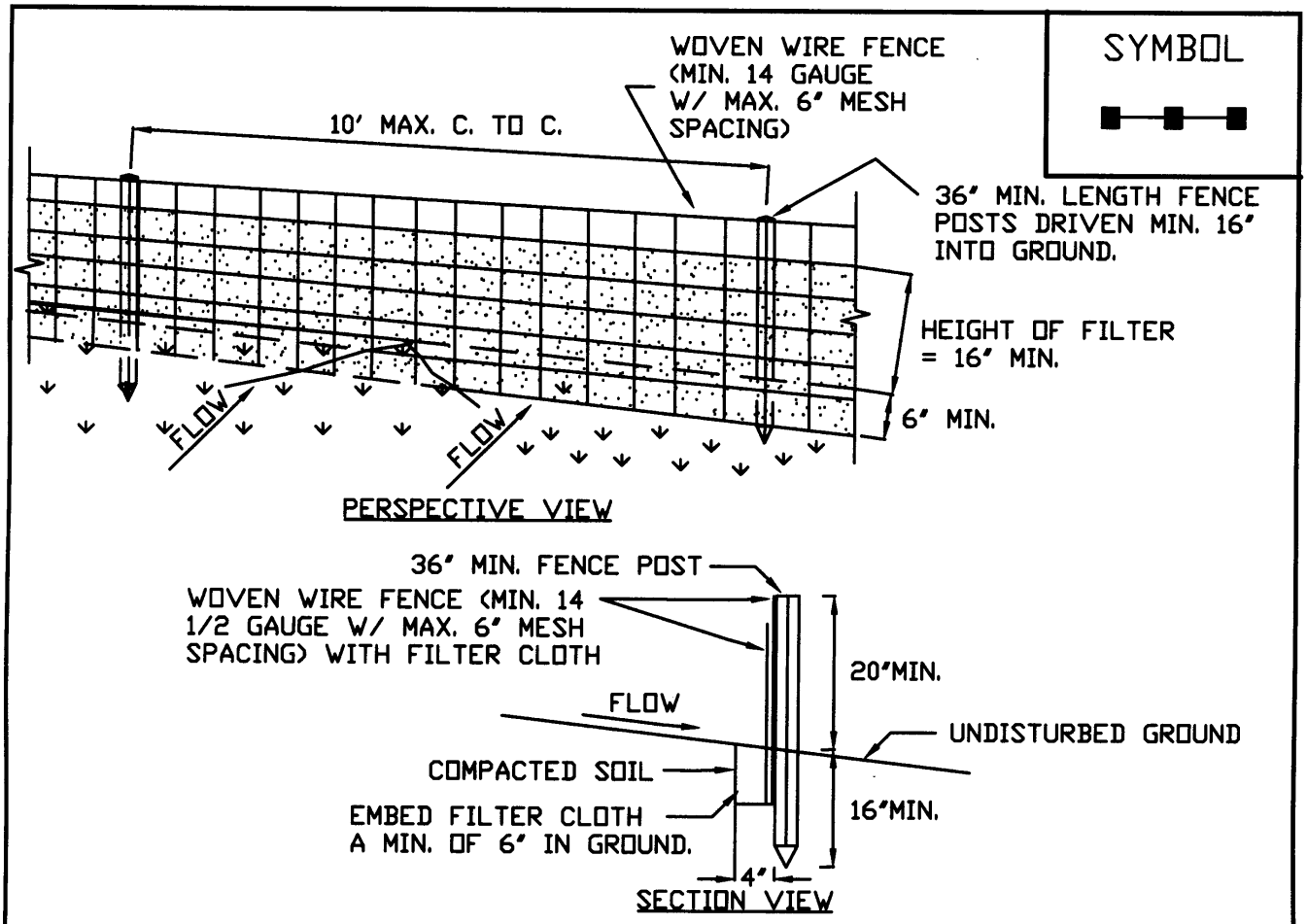
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

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.

Figure 5A.8
Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

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

STANDARD AND SPECIFICATIONS FOR TEMPORARY SWALE

Definition

A temporary excavated drainage way.

Purpose

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary swales are constructed:

1. to divert flows from entering a disturbed area.

2. intermittently across disturbed areas to shorten overland flow distances.

3. to direct sediment laden water along the base of slopes to a trapping device.

4. to transport offsite flows across disturbed areas such as rights-of-way.

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

Design Criteria

See Figure 5A.2 on page 5A.5 for details.

	Swale A	Swale B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specification for Waterways on page 5B.11.

Stabilization

Stabilization of the swale shall be completed within 7 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade[1]	Flow Channel A (<5 Ac.)	Flow Channel B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, Sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. or stone or Recycled Concrete Equivalent[2] or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[2] or geotextile	Site Specific Engineering Design

[1] In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.
[2] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

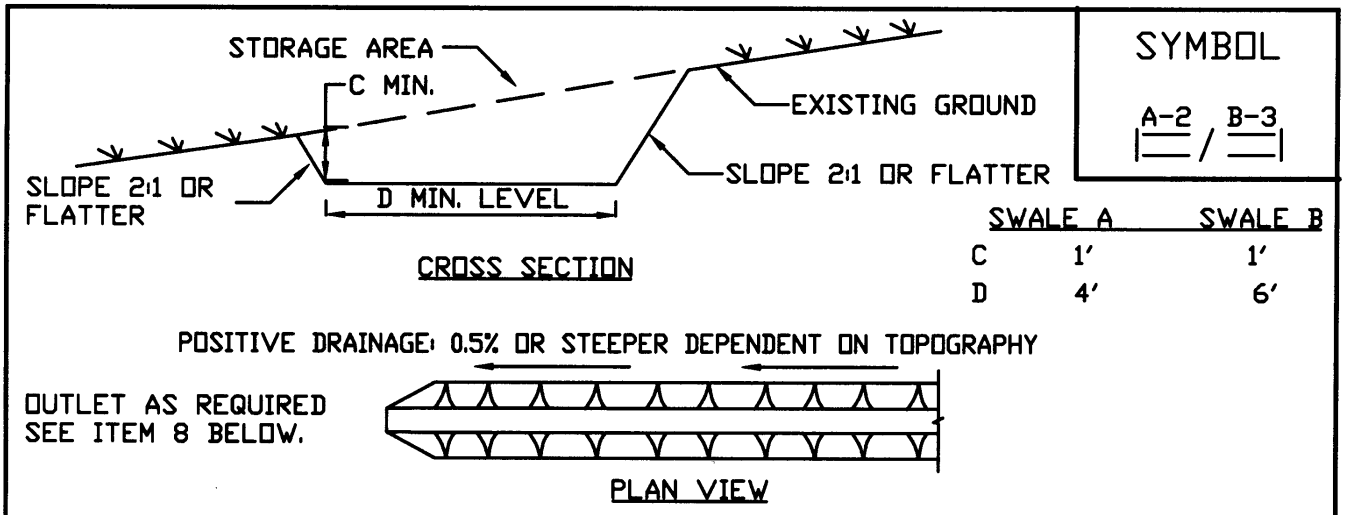
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

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

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

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

Figure 5A.2
Temporary Swale



CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE FLOW CHANNEL STABILIZATION CHART BELOW:

TYPE OF TREATMENT	CHANNEL GRADE	A(5 AC. OR LESS)	B(5 AC -10AC)
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED AND COVER USING RECP
3	5.1-8.0%	SEED AND COVER WITH RECP	LINED WITH 4-8" RIP-RAP OR GEOTEXTILE
4	8.1-20.%	LINED WITH 4-8" RIP-RAP OR GEOTEXTILE	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

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

TEMPORARY SWALE

STANDARD AND SPECIFICATIONS
FOR
CHECK DAM

Definition

Small barriers or dams constructed of stone, bagged sand or gravel, or other durable material across a drainage way.

Purpose

To reduce erosion in a drainage channel by restricting the velocity of flow in the channel.

Condition Where Practice Applies

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

Design Criteria

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

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

Side Slopes: Shall be 2:1 or flatter.

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

Therefore:

$$S = h/s$$

Where:

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

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows:

$$S = \frac{2 \text{ ft.}}{.04 \text{ ft/ft.}} = 50 \text{ ft.}$$

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

The overflow of the check dams will be stabilized to resist erosion that might be caused by the check dam. See Figure 5A.9 on page 5A.24 for details.

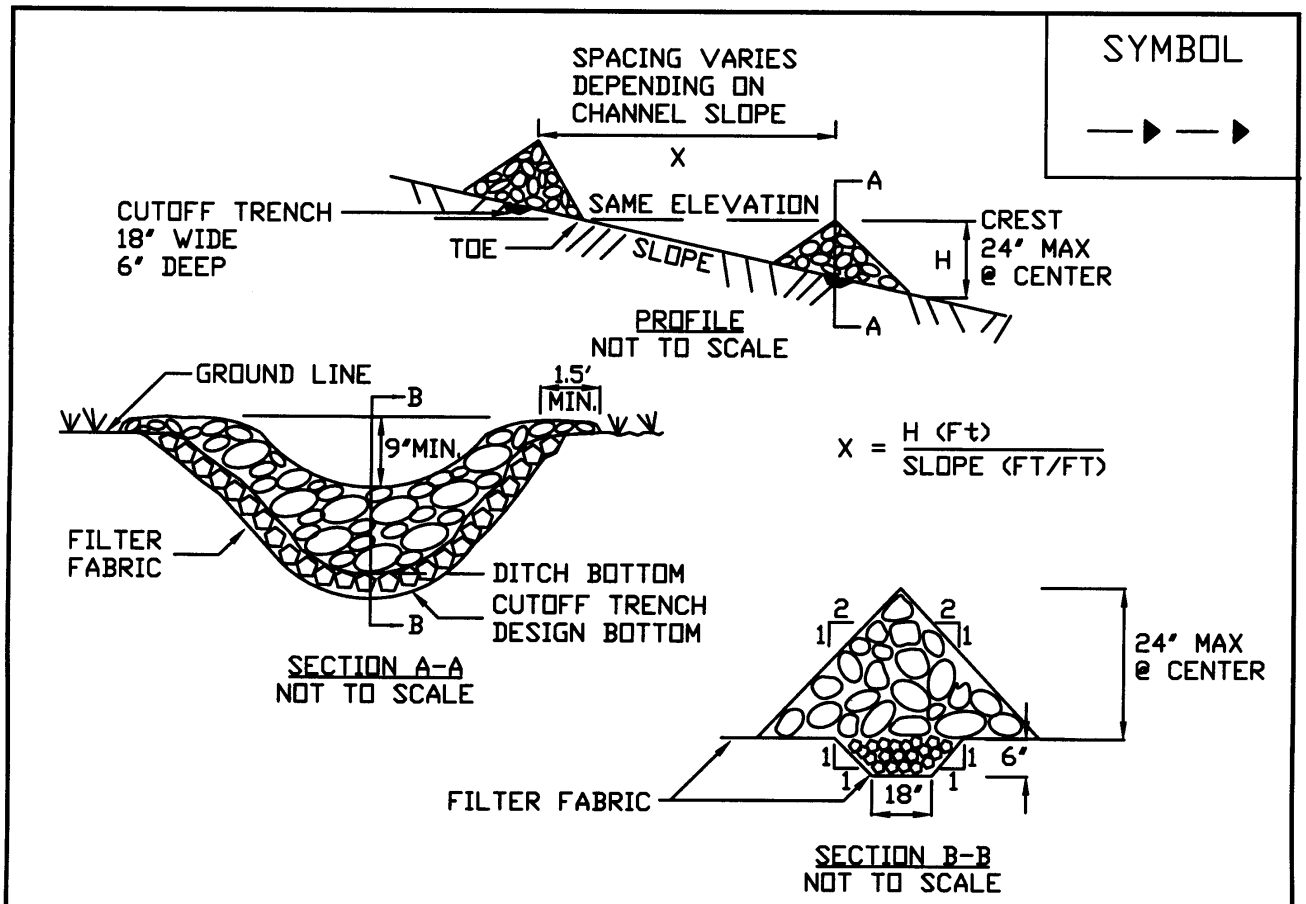
Check dams should be anchored in the channel by a cutoff trench 1.5 ft. wide and 0.5 ft. deep and lined with filter fabric to prevent soil migration.

Maintenance

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

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam. Replace stones as needed to maintain the design cross section of the structures.

Figure 5A.9
Check Dam



CONSTRUCTION SPECIFICATIONS

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

MAXIMUM DRAINAGE AREA 2 ACRES.

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	CHECK DAM

STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

Definition

A section of rock protection placed at the outlet end of the culverts, conduits, or channels.

Purpose

The purpose of the rock outlet protection is to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Scope

This standard applies to the planning, design, and construction of rock riprap and gabions for protection of downstream areas. It does not apply to rock lining of channels or streams.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.

2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.

3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 5B.13 on page 5B.26 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 5B.12 on page 5B.25
Maximum Tailwater – Use Figure 5B.13 on page 5B.26

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions.

Riprap shall be composed of a well-graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger stone sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum stone diameter for d_{50} of 15 inches or less; and 1.2 times the maximum stone size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thickness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Stone Quality

Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5.

Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have any exposed steel or reinforcing bars.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Riprap Slope Protection on page 5B.57.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturers recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged stones. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.
3. Enter the appropriate chart with the design discharge to

determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed.

Examples

Example 1: Pipe Flow (full) with discharge to unconfined section.

Given: A circular conduit flowing full.

Q = 280 cfs, diam. = 66 in., tailwater (surface) is 2 ft. above pipe invert (minimum tailwater condition).

Find: Read d_{50} = 1.2 and apron length (L_a) = 38 ft.

Apron width = diam. + L_a = 5.5 + 38 = 43.5 ft.

Use: d_{50} = 15", d_{max} = 22", blanket thickness = 32"

Example 2: Box Flow (partial) with high tailwater

Given: A box conduit discharging under partial flow conditions. A concrete box 5.5 ft. x 10 ft. flowing 5.0 ft. deep,

Q = 600 cfs and tailwater surface is 5 ft. above invert (max. tailwater condition).

Since this is not full pipe and does not directly fit the nomograph assumptions of Figure 7B.13 substitute depth as the diameter, to find a discharge equal to full pipe flow for that diameter, in this case 60 inches.

Since, $Q = AV$ and $A = \frac{\pi D^2}{4}$

First, compute velocity:

V = (Q/A) = (600/(5) (10)) = 12 fps

Then substituting:

$$Q = \frac{\pi D^2}{4} \times V = \frac{3.14\ (5\ ft)^2}{4} \times 12\ fps = 236\ cfs$$

At the intersection of the curve d = 60 in. and Q = 236 cfs, read d_{50} = 0.4 ft.

Then reading the d = 60 in. curve, read apron length (L_a) = 40 ft.

Apron width, W = conduit width + (6.4)(L_a) = 10 + (0.4) (40) = 26 ft.

Example 3: Open Channel Flow with Discharge to Unconfined Section

Given: A trapezoidal concrete channel 5 ft. wide with 2:1 side slopes is flowing 2 ft. deep, Q = 180 cfs (velocity = 10 fps) and the tailwater surface downstream is 0.8 ft. (minimum tailwater condition).

Find: Using similar principles as Example 2, compute equivalent discharge for a 2 foot, using depth as a diameter, circular pipe flowing full at 10 feet per second.

Velocity:

$$Q = \frac{\pi\ (2ft)^2}{4} \times 10\ fps = 31.4\ cfs$$

At intersection of the curve, d = 24 in. and Q = 32 cfs, read d_{50} = 0.6 ft.

Then reading the d = 24 in. curve, read apron length (L_a) = 20 ft.

Apron width, W = bottom width of channel + L_a = 5 + 20 = 25 ft.

Example 4: Pipe flow (partial) with discharge to a confined section

Given: A 48 in. pipe is discharging with a depth of 3 ft. Q = 100 cfs, and discharge velocity of 10 fps (established from partial flow analysis) to a confined trapezoidal channel with a 2 ft. bottom, 2:1 side slopes, n = .04, and grade of 0.6%.

Calculation of the downstream channel (by Manning's Equation) indicates a normal depth of 3.1 ft. and normal velocity of 3.9 fps.

Since the receiving channel is confined, the maximum tailwater condition controls.

Find: discharge using previous principles:

$$Q = \frac{\pi\ (3ft)^2}{4} \times 10\ fps = 71\ cfs$$

At the intersection of d = 36 in. and Q = 71 cfs, read d_{50} = 0.3 ft.

Reading the d = 36" curve, read apron length (L_a) = 30 ft.

Since the maximum flow depth in this reach is 3.1 ft., that is the minimum depth of riprap to be maintained for the entire length.

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grading limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Stone for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure 5B.12
Outlet Protection Design—Minimum Tailwater Condition
(Design of Outlet Protection from a Round Pipe Flowing Full, Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)

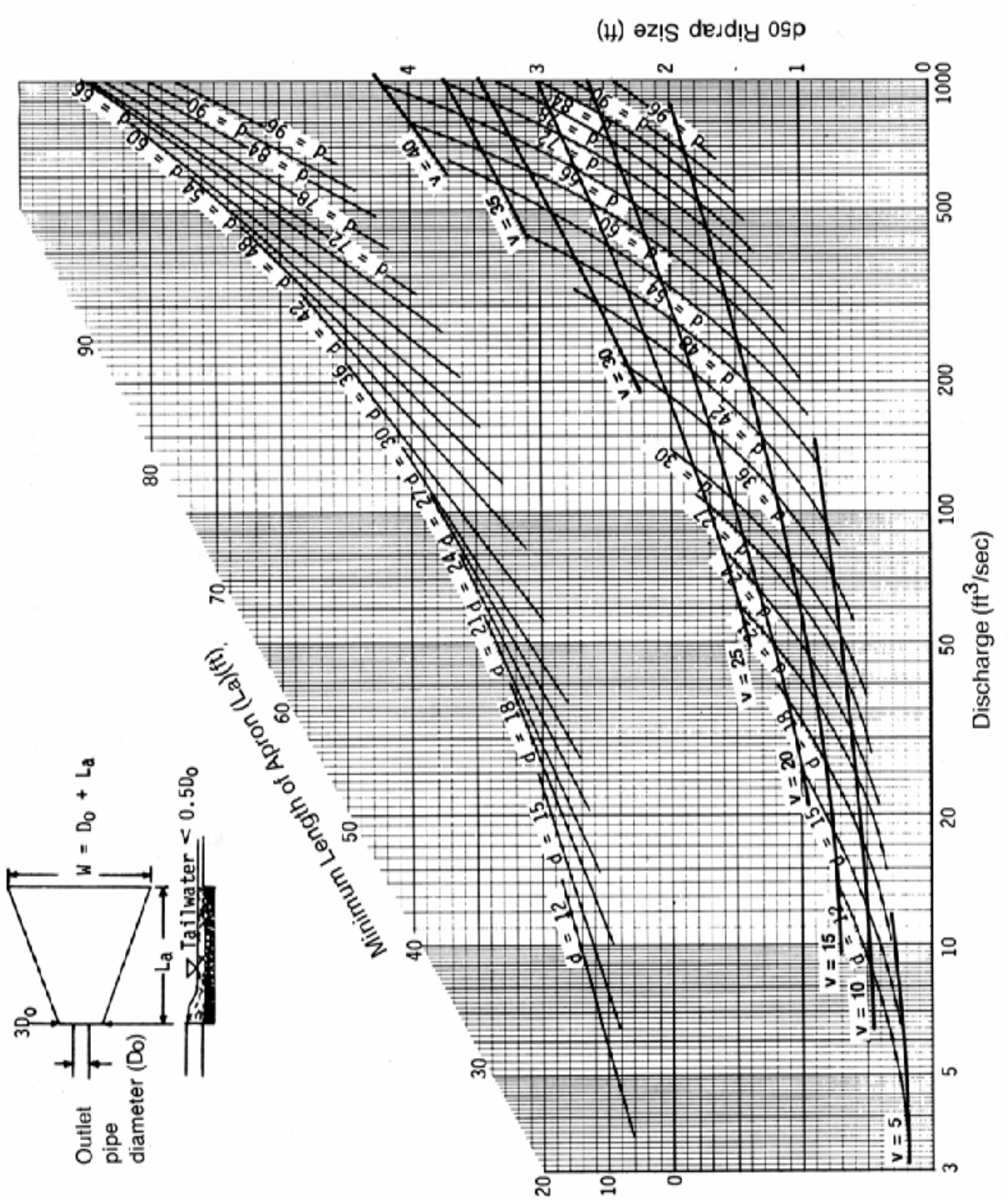


Figure 5B.13
Outlet Protection Design—Maximum Tailwater Condition
(Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

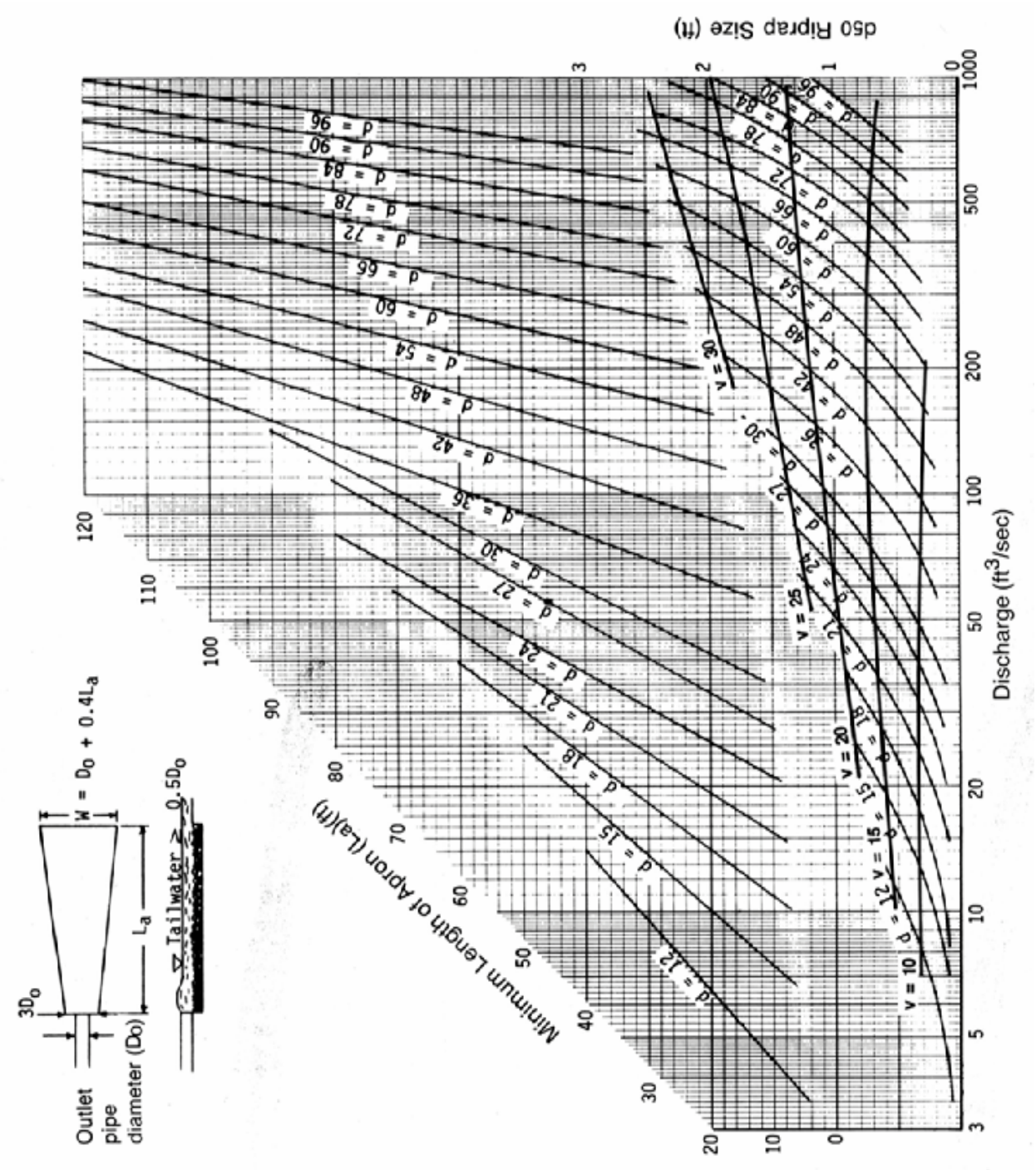


Figure 5B.14
Riprap Outlet Protection Detail (1)

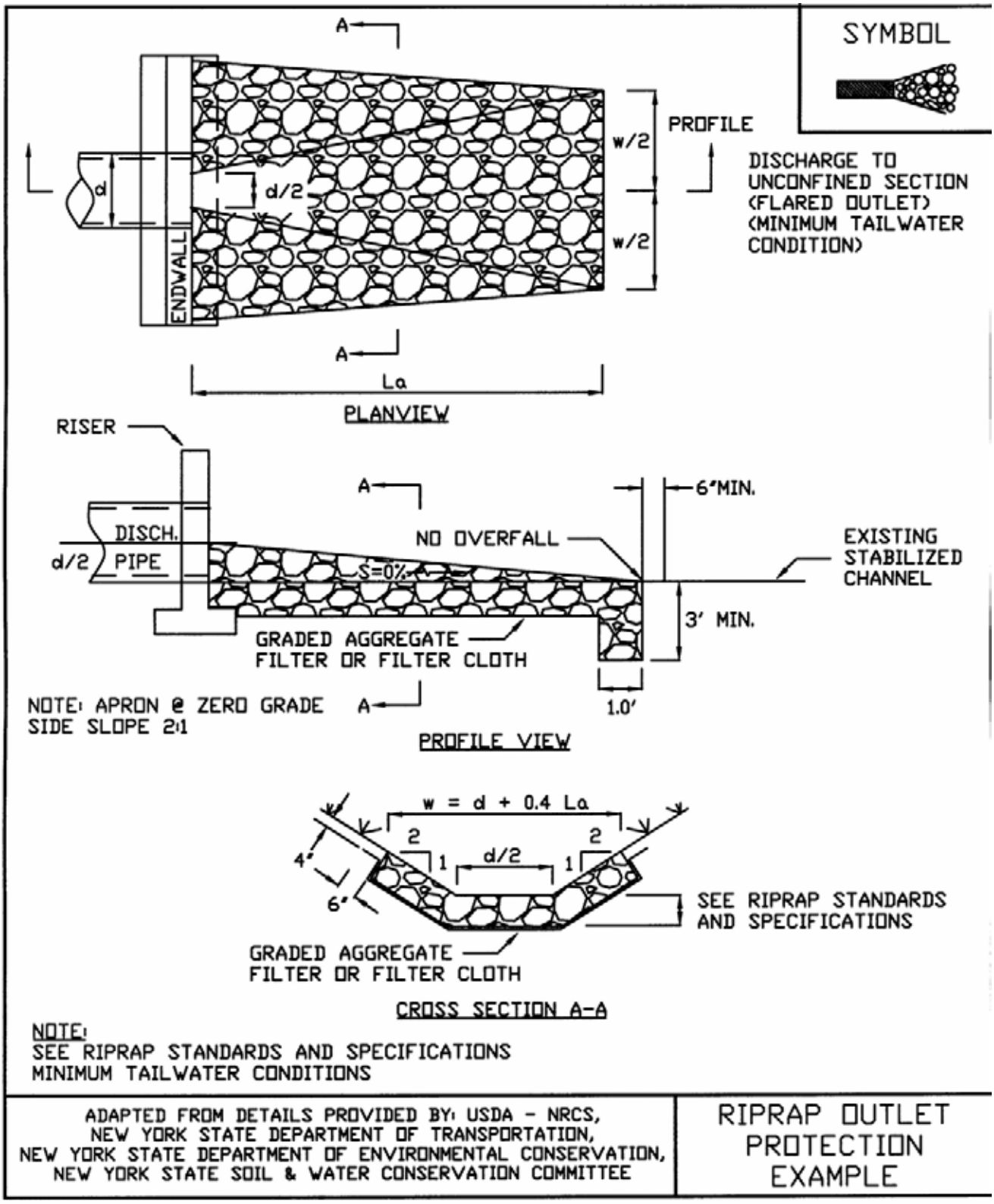


Figure 5B.15
Riprap Outlet Protection Detail (2)

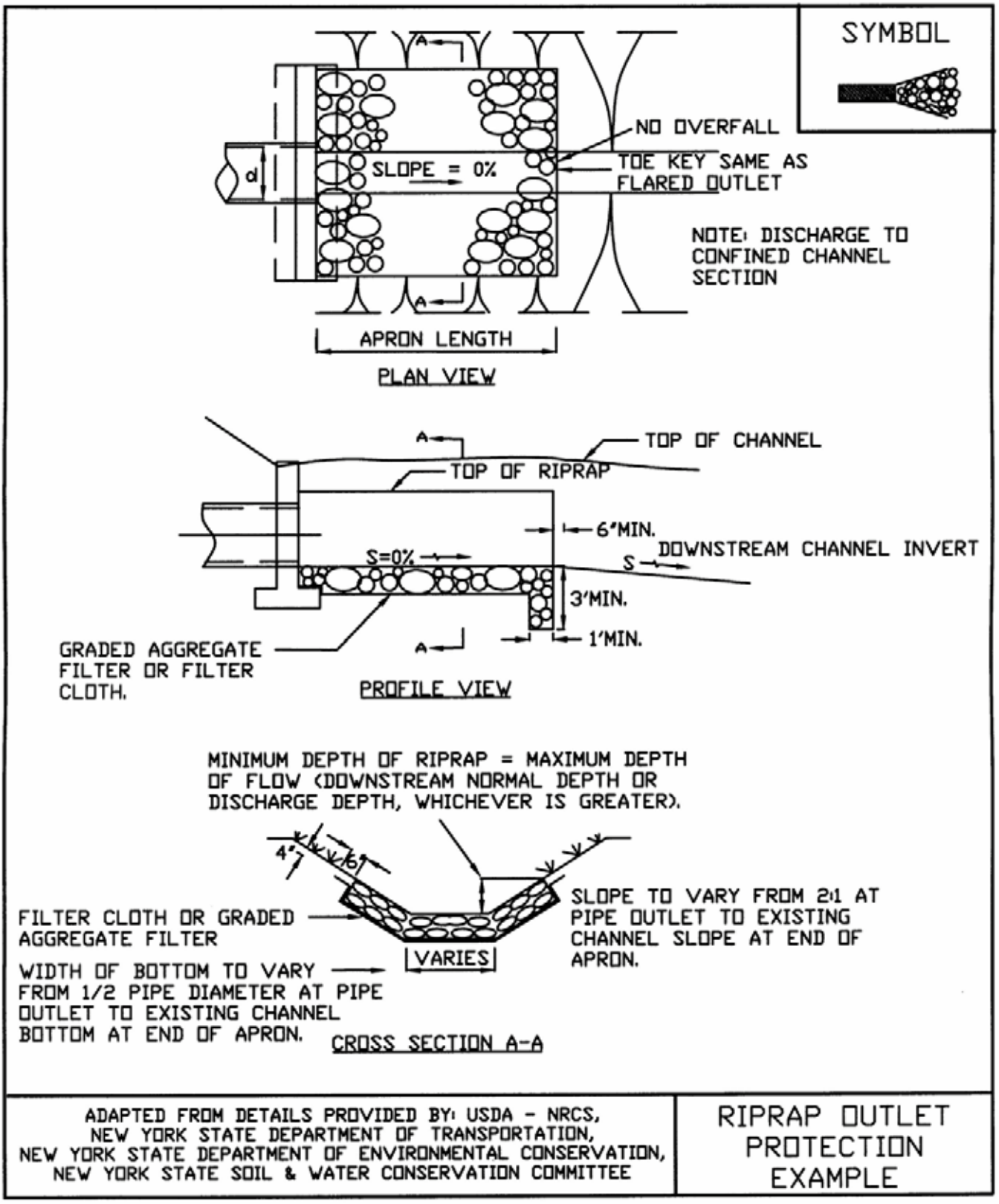
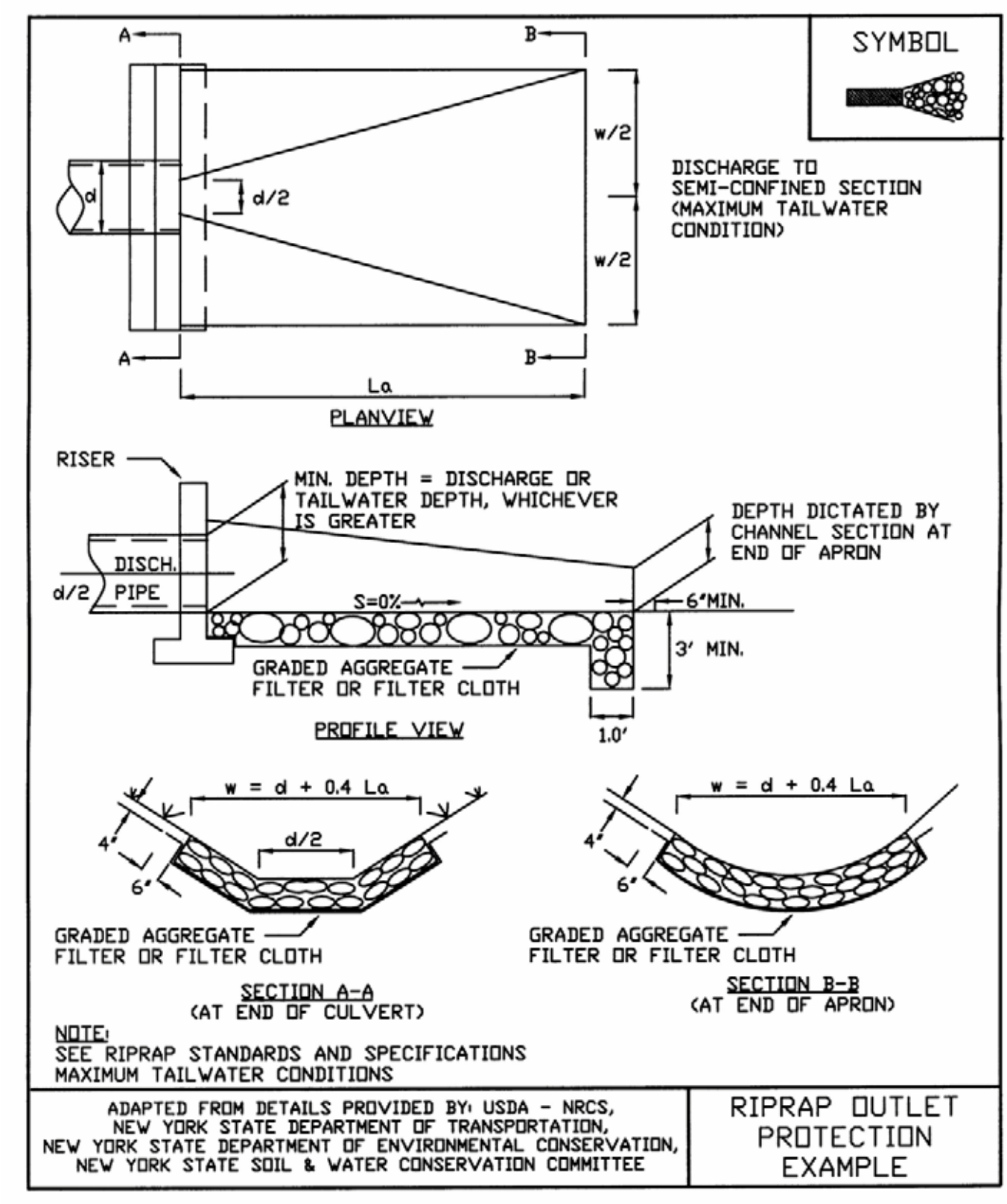


Figure 5B.16
Riprap Outlet Protection Detail (3)



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STANDARD AND SPECIFICATIONS FOR SEDIMENT TRAP

Definition

A temporary sediment control device formed by excavation and/or embankment to intercept sediment laden runoff and retain the sediment.

Purpose

The purpose of the structure is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties, and rights-of-way below the sediment trap from sedimentation.

Conditions Where Practice Applies

A sediment trap is usually installed in a drainage way, at a storm drain inlet, or other points of collection from a disturbed area.

Sediment traps should be used to artificially break up the natural drainage area into smaller sections where a larger device (sediment basin) would be less effective.

Design Criteria

If any of the design criteria presented here cannot be met, see Standard and Specification for Sediment Basin on page 5A.49.

Drainage Area

The drainage area for sediment traps shall be in accordance with the specific type of sediment trap used (Type I through V).

Location

Sediment traps shall be located so that they can be installed prior to grading or filling in the drainage area they are to protect. Traps must not be located any closer than 20 feet from a proposed building foundation if the trap is to function during building construction. Locate traps to obtain maximum storage benefit from the terrain and for ease of cleanout and disposal of the trapped sediment.

Trap Size

The volume of a sediment trap as measured at the elevation of the crest of the outlet shall be at least 3,600 cubic feet per acre of drainage area. The volume of a constructed trap shall be calculated using standard mathematical procedures. The volume of a natural sediment trap may be approximated by the equation: Volume (cu.ft.) = 0.4 x surface area (sq.ft.) x maximum depth (ft.).

Trap Cleanout

Sediment shall be removed and the trap restored to the original dimensions when the sediment has accumulated to ½ of the design depth of the trap. Sediment removed from the trap shall be deposited in a protected area and in such a manner that it will not erode.

Embankment

All embankments for sediment traps shall not exceed five (5) feet in height as measured at the low point of the original ground along the centerline of the embankment. Embankments shall have a minimum four (4) foot wide top and side slopes of 2:1 or flatter. The embankment shall be compacted by traversing with equipment while it is being constructed. The embankment shall be stabilized with seed and mulch as soon as it is completed

The elevation of the top of any dike directing water to any sediment trap will equal or exceed the maximum height of the outlet structure along the entire length of the trap.

Excavation

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Excavated portions of sediment traps shall have 1:1 or flatter slopes.

Outlet

The outlet shall be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.

Sediment traps must outlet onto stabilized (preferable undisturbed) ground, into a watercourse, stabilized channel, or into a storm drain system. Distance between inlet and outlet should be maximized to the longest length practicable.

Trap Details Needed on Erosion and Sediment Control Plans

Each trap shall be delineated on the plans in such a manner that it will not be confused with any other features. Each trap on a plan shall indicate all the information necessary to properly construct and maintain the structure. If the drawings are such that this information cannot be delineated on the drawings, then a table shall be developed. If a table is developed, then each trap on a plan shall have a number and the numbers shall be consecutive.

The following information shall be shown for each trap in a summary table format on the plans.

1. Trap number
2. Type of trap
3. Drainage area
4. Storage required
5. Storage provided (if applicable)
6. Outlet length or pipe sizes
7. Storage depth below outlet or cleanout elevation
8. Embankment height and elevation (if applicable)

Type of Sediment Traps

There are five (5) specific types of sediment traps which vary according to their function, location, or drainage area.

I. Pipe Outlet Sediment Trap
II. Grass Outlet Sediment Trap
III. Catch Basin Sediment Trap
IV. Stone Outlet Sediment Trap
V. Riprap Outlet Sediment Trap

I. Pipe Outlet Sediment Trap

A Pipe Outlet Sediment Trap consists of a trap formed by embankment or excavation. The outlet for the trap is through a perforated riser and a pipe through the embankment. The outlet pipe and riser shall be made of steel, corrugated metal or other suitable material. The top of the embankment shall be at least 1 ½ feet above the crest of the riser. The top 2/3 of the riser shall be perforated with one (1) inch nominal diameter holes or slits spaced six (6) inches vertically and horizontally placed in the concave portion of the corrugated pipe.

No holes or slits will be allowed within six (6) inches of the top of the horizontal barrel. All pipe connections shall be watertight. The riser shall be wrapped with ½ to ¼ inch hardware cloth wire then wrapped with filter cloth with a sieve size between #40-80 and secured with strapping or connecting band at the top and bottom of the cloth. The cloth shall cover an area at least six (6) inches above the highest hole and six (6) inches below the lowest hole. The top of the riser pipe shall not be covered with filter cloth. The riser shall have a base with sufficient weight to prevent flotation of the riser. Two approved bases are:

1. A concrete base 12 in. thick with the riser embedded 9 in. into the concrete base, or

2. One quarter inch, minimum, thick steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate shall have 2.5 feet of stone, gravel, or earth placed on it to prevent flotation. In either case, each side of the square base measurement shall be the riser diameter plus 24 inches.

Pipe outlet sediment traps shall be limited to a five (5) acre maximum drainage area. Pipe outlet sediment traps may be interchangeable in the field with stone outlet or riprap sediment traps provided that these sediment traps are constructed in accordance with the detail and specifications for that trap.

Select pipe diameter from the following table:

Minimum Sizes

Barrel Diameter[1] (in.)	Riser Diameter[1] (in.)	Maximum Drainage Area (ac.)
12	15	1
15	18	2
18	21	3
21	24	4
21	27	5

[1] Barrel diameter may be same size as riser diameter.

See details for Pipe Outlet Sediment Trap ST-I in Figure 5A.16 (1) and 5A.16 (2) on pages 5A.38 and 5A.39.

II. Grass Outlet Sediment Trap

A Grass Outlet Sediment Trap consists of a trap formed by excavating the earth to create a holding area. The trap has a discharge point over natural existing grass. The outlet crest width (feet) shall be equal to four (4) times the drainage area (acres) with a minimum width of four (4) feet. The outlet shall be free of any restrictions to flow. The outlet lip must remain undisturbed and level. The volume of this trap shall be computed at the elevation of the crest of the outlet. Grass outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Grass Outlet Sediment Trap ST-II in Figure 5A.17 on page 5A.40.

III. Catch Basin Sediment Trap

A Catch Basin Sediment Trap consists of a basin formed by excavation on natural ground that discharges through an opening in a storm drain inlet structure. This opening can either be the inlet opening or a temporary opening made by omitting bricks or blocks in the inlet.

A yard drain inlet or an inlet in the median strip of a dual highway could use the inlet opening for the type outlet. The trap should be out of the roadway so as not to interfere with future compaction or construction. Placing the trap on the opposite side of the opening and diverting water from the roadway to the trap is one means of doing this. Catch basin sediment traps shall be limited to a three (3) acre maximum drainage area. The volume of this trap is measured at the elevation of the crest of the outlet (invert of the inlet opening).

See details for Catch Basin Sediment Trap ST-III in Figure 5A.18 on page 5A.41.

IV. Stone Outlet Sediment Trap

A Stone Outlet Sediment Trap consists of a trap formed by an embankment or excavation. The outlet of this trap is over a stone section placed on level ground. The minimum length (feet) of the outlet shall be equal to four (4) times the drainage area (acres).

Required storage shall be 3,600 cubic feet per acre of drainage area.

The outlet crest (top of stone in weir section) shall be level, at least one (1) foot below top of embankment and no more than one (1) foot above ground beneath the outlet. Stone used in the outlet shall be small riprap (4 in. x 8 in.). To provide more efficient trapping effect, a layer of filter cloth should be embedded one (1) foot back into the upstream face of the outlet stone or a one (1) foot thick layer of two (2) inch or finer aggregate shall be placed on the upstream face of the outlet.

Stone Outlet Sediment Traps may be interchangeable in the field with pipe or riprap outlet sediment traps provided they are constructed in accordance with the detail and specifications for those traps. Stone outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Stone Outlet Sediment Trap ST-IV in Figure 5A.19 on page 5A.42.

V. Riprap Outlet Sediment Trap

A Riprap Outlet Sediment Trap consists of a trap formed by an excavation and embankment. The outlet for this trap shall be through a partially excavated channel lined with riprap. This outlet channel shall discharge onto a stabilized area or to a stable watercourse. The riprap outlet sediment trap may be used for drainage areas of up to a maximum of 15 acres.

Design Criteria for Riprap Outlet Sediment Trap

1. The total contributing drainage area (disturbed or undisturbed either on or off the developing property) shall not exceed 15 acres.
2. The storage needs for this trap shall be computed using 3600 cubic feet of required storage for each acre of drainage area. The storage volume provided can be figured by computing the volume of storage area available behind the outlet structure up to an elevation of one (1) foot below the level weir crest.
3. The maximum height of embankment shall not exceed five (5) feet.
4. The elevation of the top of any dike directing water to a riprap outlet sediment trap will equal or exceed the minimum elevation of the embankment along the entire length of this trap.

Riprap Outlet Sediment Trap ST-V
(for Stone Lined Channel)

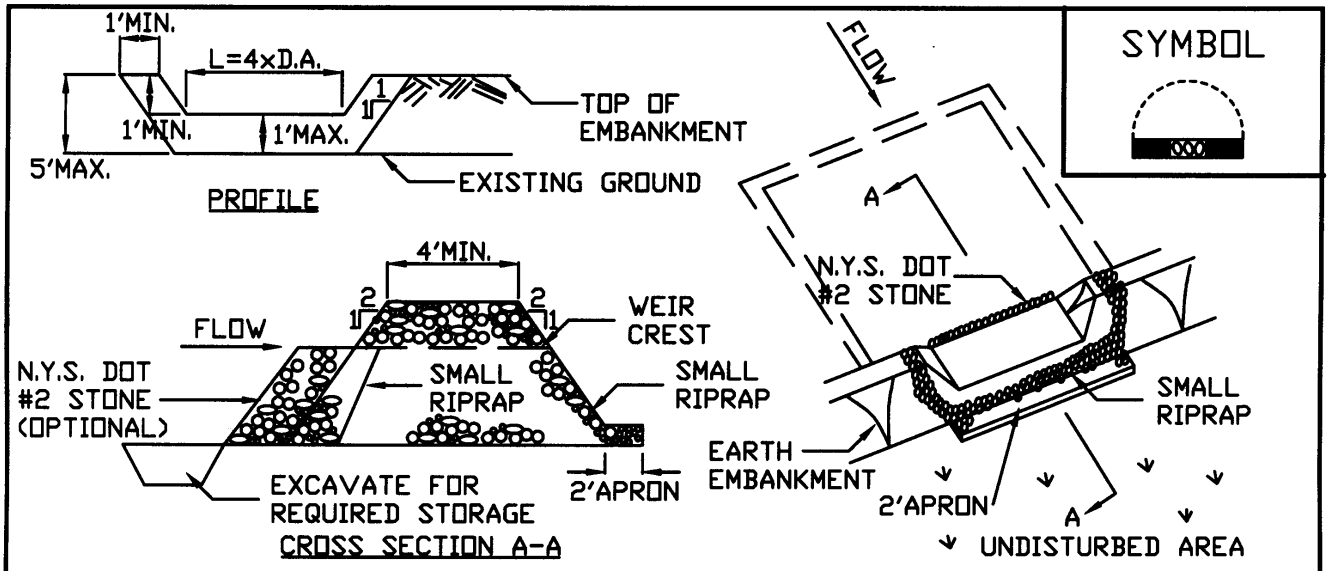
Contributing Drainage Area (ac.)	Depth of Channel (a) (ft.)	Length of Weir (b) (ft.)
1	1.5	4.0
2	1.5	5.0
3	1.5	6.0
4	1.5	10.0
5	1.5	12.0
6	1.5	14.0
7	1.5	16.0
8	2.0	10.0
9	2.0	10.0
10	2.0	12.0
11	2.0	14.0
12	2.0	14.0
13	2.0	16.0
14	2.0	16.0
15	2.0	18.0

See details for Riprap Outlet Sediment Trap ST-V on Figures 5A.20(1) and 5A.20(2) on pages 5A.43 and 5A.44.

Optional Dewatering Methods

Optional dewatering devices may be designed for use with sediment traps. Included are two methods, which may be used. See Figure 5A.21 on page 5A.45 for details.

Figure 5A.19
Stone Outlet Sediment Trap: ST-IV



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

CONSTRUCTION SPECIFICATIONS

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

MAXIMUM DRAINAGE AREA 5 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STONE OUTLET SEDIMENT TRAP ST-IV

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.

Figure 5B.23
Typical Section of Serrated Cut Slope

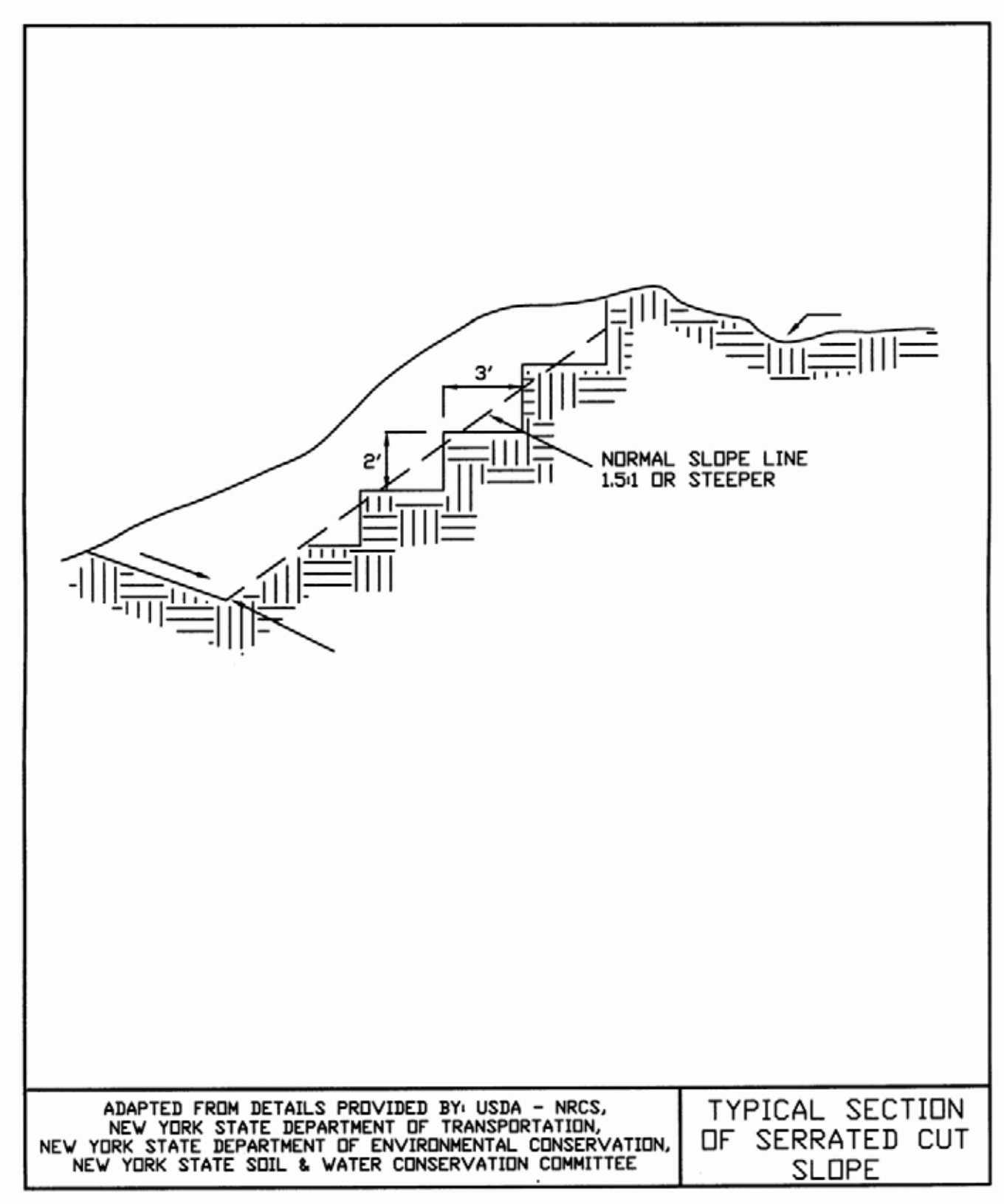


Figure 5B.24 (1)
Landgrading

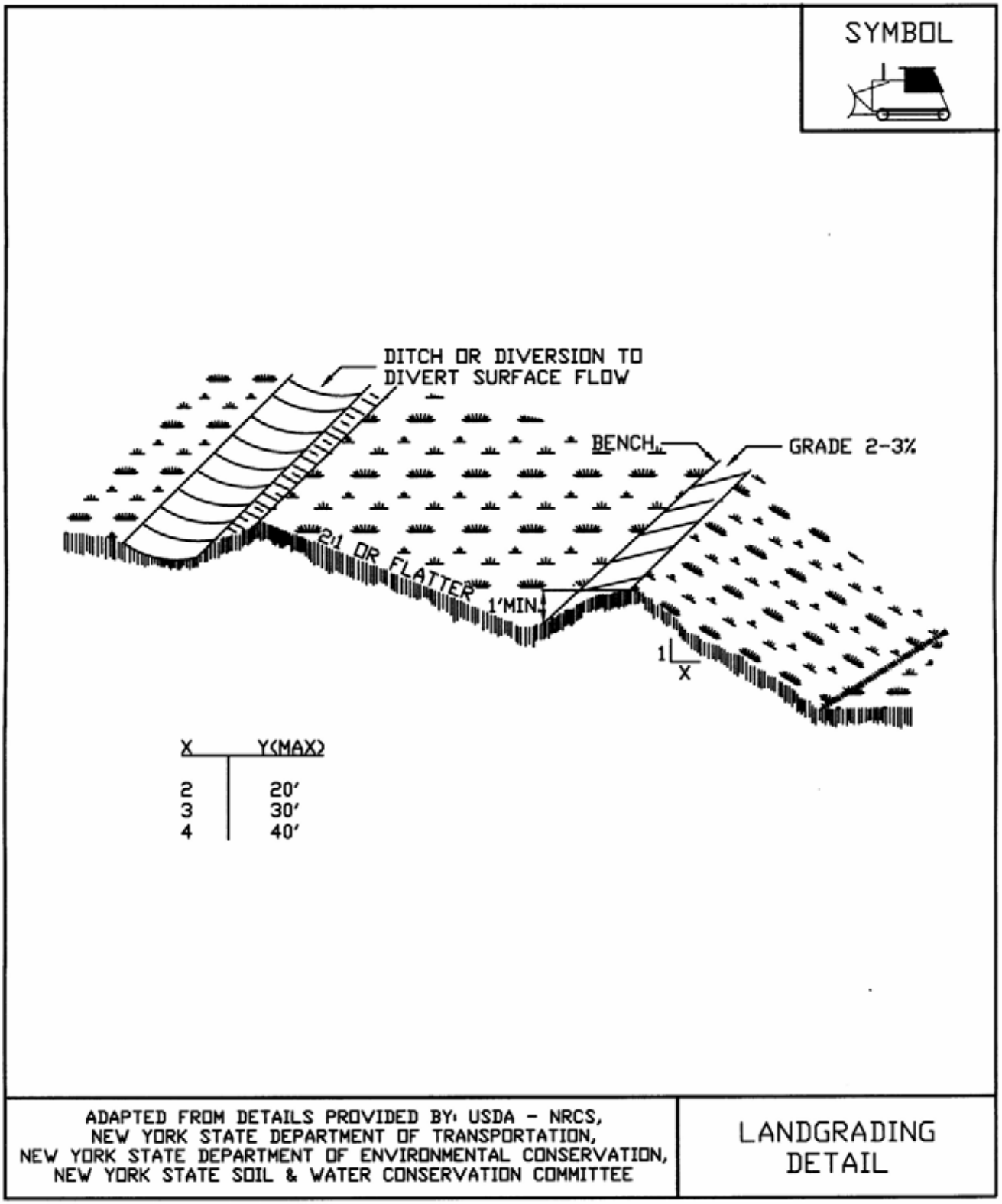
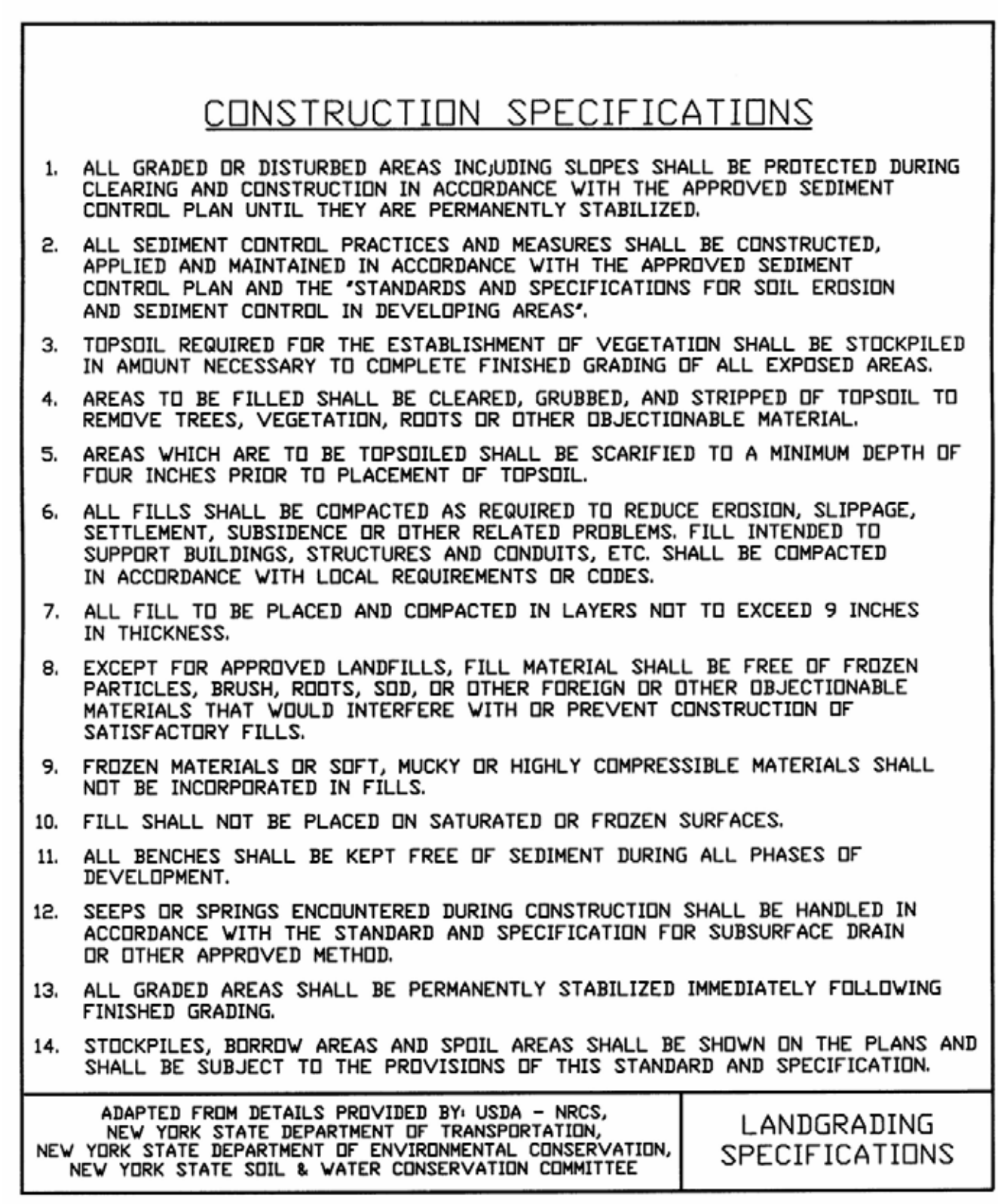


Figure 5B.24 (2)
Landgrading —Construction Specifications



CONSTRUCTION SPECIFICATIONS

1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED SEDIMENT CONTROL PLAN AND THE "STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL IN DEVELOPING AREAS".
3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
7. ALL FILL TO BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

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

LANDGRADING SPECIFICATIONS

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STANDARD AND SPECIFICATIONS FOR SURFACE ROUGHENING

Definition

Roughening a bare soil surface whether through creating horizontal grooves across a slope, stair-stepping, or tracking with construction equipment.

Purpose

To aid the establishment of vegetative cover from seed, to reduce runoff velocity and increase infiltration, and to reduce erosion and provide for trapping of sediment.

Conditions Where Practice Applies

All construction slopes require surface roughening to facilitate stabilization with vegetation, particularly slopes steeper than 3:1.

Design Criteria

There are many different methods to achieve a roughened soil surface on a slope. No specific design criteria is required. However, the selection of the appropriate method depends on the type of slope. Methods include tracking, grooving, and stair-stepping. Steepness, mowing requirements, and/or a cut or fill slope operation are all factors considered in choosing a roughening method.

Construction Specifications

A. Cut Slope, No mowing.

1. Stair-step grade or groove cut slopes with a gradient steeper than 3:1 (Figure 5B.25).

2. Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes of soft rock with some soil are particularly suited to stair-step grading.

3. Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" to the vertical wall.

4. Do not make vertical cuts more than 2 feet in soft materials or 3 feet in rocky materials.

Grooving uses machinery to create a series of ridges and depressions that run perpendicular to the slope following the contour. Groove using any appropriate implement that can be safely operated on the slope, such as disks, tillers, spring harrows, or the teeth of a front-end loader bucket. Do not make the grooves less than 3 inches deep or more than 15 inches apart.

B. Fill Slope, No mowing

1. Place fill to create slopes with a gradient steeper than 3:1 in lifts 9 inches or less and properly compacted. Ensure the face of the slope consists of loose, uncompacted fill 4 to 6 inches deep. Use grooving as described above to roughen the slope, if necessary.

2. Do not blade or scrape the final slope face.

C. Cuts/Fills, Mowed Maintenance

1. Make mowed slopes no steeper than 3:1.

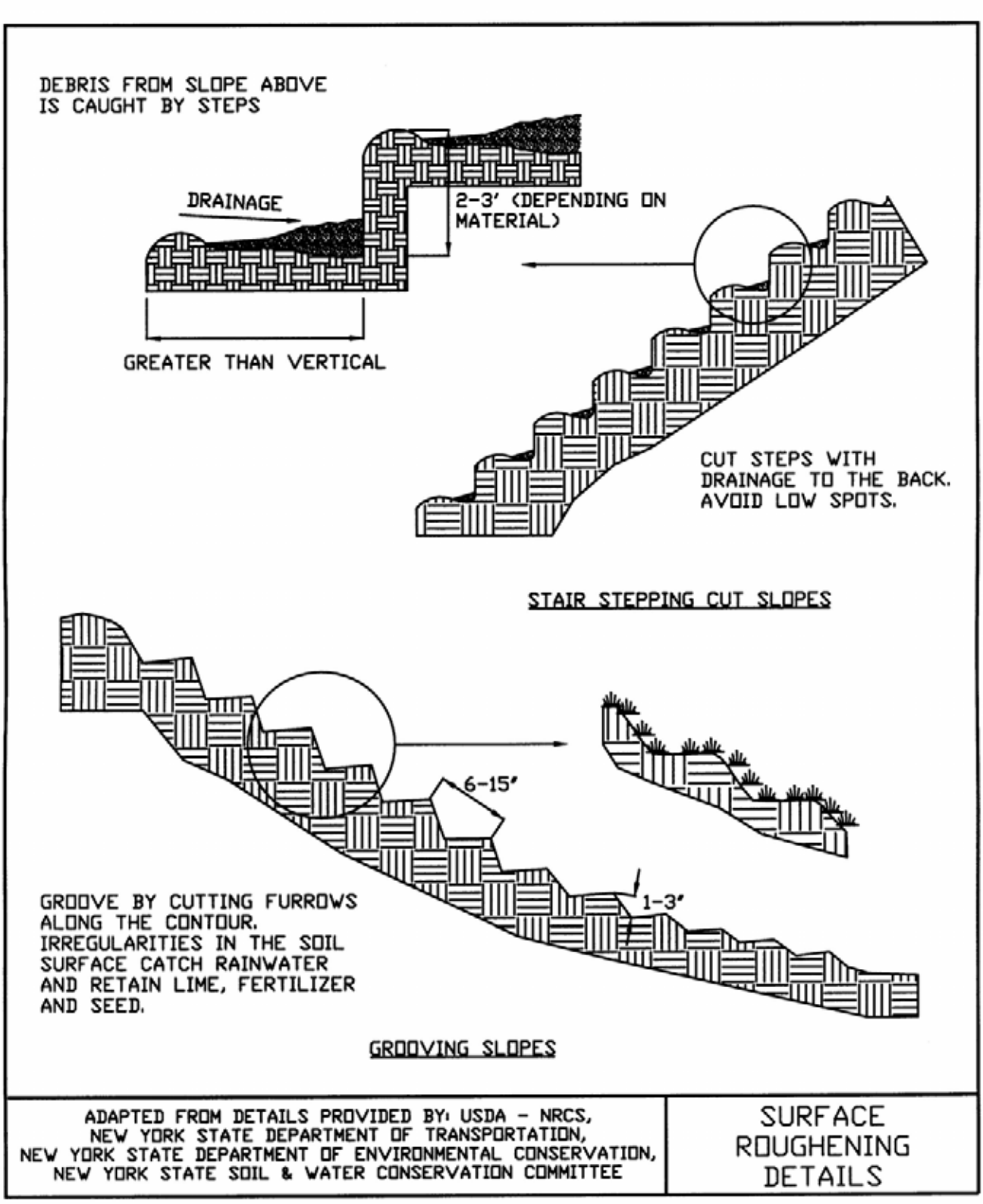
2. Roughen these areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of such tillage equipment on the contour.

3. Make grooves at least 1 inch deep and a maximum of 10 inches apart.

4. Excessive roughness is undesirable where mowing is planned.

Tracking should be used primarily in sandy soils to avoid undue compaction of the soil surface. Tracking is generally not as effective as the other roughening methods described. (It has been used as a method to track down mulch.) Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

Figure 5B.25
Surface Roughening



STANDARD AND SPECIFICATIONS FOR TOPSOILING

Definition

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas.

Purpose

To provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

Conditions Where Practice Applies

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

Design Criteria

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

2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established.

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

Site Preparation

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

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

3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted to a minimum depth of 12 inches with a deep ripper or chisel plow prior to topsoiling.

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

Topsoil Materials

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

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

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

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

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

Application and Grading

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

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

3. Apply topsoil in the following amounts:

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

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

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

Criteria

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

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

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

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

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

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

Table 3.7
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7”	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2”	9 cu. yds.	405 cu. yds.	3”	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll	48” x 50 yds. or 48” x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	8” x 100” 2-sided plastic, 48” x 180” 1-sided plastic	—	—	Use without additional mulch. Excellent for seeding establishment. Tie down as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Compost	Up to 3” pieces, moderately to highly stable	3-9 cu. yds.	134-402 cu. yds.	1-3”	Coarser textured mulches may be more effective in reducing weed growth and wind erosion.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 3.8
Mulch Anchoring Guide

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