

STORMWATER MANAGEMENT PLAN

Prepared for

**52 Upland Lane
Village of Croton-on-Hudson, NY
Town of Cortlandt, NY**

Prepared by:

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February 6, 2024

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- Town of Pound Ridge Building Permit - approval pending;

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1.0 Project Description

The subject property is located at 52 Upland Lane in the Village of Croton-on-Hudson, Westchester County, New York (see Figure 1.1 - Location Map and Figure 1-2 - Vicinity Map). As can be seen in the figures, the lot to be developed is located partially in the Town of Cortlandt as well. The parcels owned by the client are identified as tax lot 68.08-2-1 and 67.08-1-26 with an area of 7.06 acres and 0.75 acres respectively. The northern-northeastern portion of the site is located within the R-10 Single Family Residential zoning ordinance in the Town of Cortlandt. The southern-southwestern portion is located within the R-60 Single Family Residential zoning in the Village of Croton-on-Hudson. Topography varies greatly throughout the site with a total elevation difference of 156 feet. The highest contour elevation of 586 feet is located by the southeast corner section of the site and the lowest of 430 is located west of the site where a natural swale and intermittent watercourse can be found. Current coverage on lot 67.08-2-1 consists mostly of forested areas and grassed areas. Lot 67.08-1-26 is currently developed with a paved driveway from Upland Lane which provides access to the existing residence located in 47 Upland Lane. The rest of this parcel consists of forested areas. No wetlands are present on site.

The Proposed Project consists of building a 3-bedroom house with a well within the current R-60 zoning designation. An underground septic system is also proposed to service the house. It will be located within the R-10 designation in the Town of Cortlandt. The house will be 2 stories high and be accessed by extending the existing driveway located in lot 76.08-1-26 which connects to Upland Lane. Stormwater will be managed by subsurface chambers to accommodate the 100-year storm. The total disturbance expected for the project is 2.17 acres.

As required by the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-20-001, Part IIIA.8, an historic resource screening determination was conducted. This was done using the online tools at the NYS Office of Parks, Recreation and Historic Places (OPRHP) website. This screening determined that there is a small portion of the site within areas with historic or archeological sensitivity near the site. Figure 1.3 - NYS OPRHP Historic Resource Map was created from the website showing sensitive areas in Town of Cortlandt.

The following Report and Plans included in Appendix K describe, in detail, the design and implementation of the Stormwater Management Plan.

2.0 Stormwater Regulatory Requirements

2.1 Stormwater Impacts

Urban stormwater impacts relate to significant changes to stormwater quantity and quality as a result of land development. "Urban Development has a profound influence on the quality of New York's waters."¹ This proposed development will change the runoff characteristics of this site altering the quantity and quality of the surface stormwater. The impacts of this must be mitigated by managing the stormwater prior to discharge. This would be accomplished by the capture and treatment of surface runoff prior to discharge.

¹ New York State Stormwater Management Design Manual, January 2015.

Development of a site alters the hydrology therefore changing the characteristics of the surface and groundwater discharge of runoff. Changing the surface conditions alters a site's natural ability to store, treat, or infiltrate runoff. The change also allows for the discharge of potentially damaging pollutants and sediments to adjoining water bodies. This can occur during the construction phase, and long-term after development. During the construction phase, graded, destabilized, areas are subject to erosion which can cause the displacement of sediment. After development, changes in the surface conditions, such as impervious surfaces, roofs and pavement, or lawn surfaces can generate pollutants which would be collected and discharged through runoff. Some of the pollutants of concern are: Total Suspended Solids (TSS); Biological Oxygen Demand (BOD); Total Phosphorus (TP); and Total Nitrogen (TN), as well as oil or grease, and chloride.

The most common sources of these pollutants from developed sites are atmospheric deposition, fertilizers, pesticides, and leaked discharges from vehicles. These pollutants would collect on these impervious surfaces and quickly wash off during even the smallest storm event.

In the planning and design of the development, stormwater will be managed to minimize potential impacts. A Stormwater Management and Pollution Prevention Plan is going to be prepared. This Plan will deal with all aspects of the stormwater management programs such as identifying potential pollutant sources, design of temporary and permanent features, implementation, and maintenance.

2.2 Regulatory Obligation

2.2.1 USEPA/NYSDEC

The Federal Government's Clean Water Act (CWA), Section 402 states "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 State is a NPDES delegated State. The necessary permitting is administered through the State Pollutant Discharge Elimination System (SPDES) under the General Permit, GP-0-20-001, for Stormwater Discharges from Construction Activity. The Permit requires that any development meeting the disturbance thresholds listed in Tables 1 and 2 of Appendix B of the General Permit must prepare a SWPPP. Activities listed in Table 1 require preparation of only an Erosion and Sediment Control Plan. Those listed in Table 2 would additionally require post-construction stormwater management practices. This project does not meet the threshold requiring filing a notice of intent (NOI) with the NYS DEC.

The Plan identifies the potential sources of pollution, and a design prepared and implemented to reduce pollutant loadings. This project will be required to prepare the following to be in compliance:

- Prepare an Erosion and Sediment Control Plan;
- Design and implement a stormwater management system to capture and attenuate all storm events up to the 100-year storm.

2.2.2 Local Municipality

This project requires approval under Chapter 196, Stormwater, Drainage, Erosion and Water Pollution Control, of the Village of Croton on Hudson Code. The project also requires approval under Chapter 262, Stormwater Management and Erosion and Sediment Control, of the Town of Cortlandt. Furthermore, the Code requires compliance for projects with a land disturbance activity of 5,000 s.f. or more. Therefore, the project must provide management of the 100-year storm event.

The technical standards providing guidance in the preparation of the E&SC and SWPPP are the latest revisions of the following:

- “New York Standards & Specifications for Erosion and Sediment Control” (NYSSESC) published by the Empire State Chapter of the Soil and Water Conservation Society; and;
- “New York State Stormwater Management Design Manual” prepared by the Center of Watershed Protection, for the NYS DEC;
- Village of Croton-on-Hudson - Village Code Chapter 196 Stormwater, Drainage, Erosion and Water Pollution Control;
- Town of Cortlandt - Town Code Chapter 262 Stormwater Management and Erosion and Sediment Control;

2.2.3 NYC DEP

This site is not located within the limits of the New York City Watershed. This project is not required, therefore, to comply with Chapter 18 of the “Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources.”

3.0 Reducing Pollutant Impacts

3.1 Sources of Impact

For this project, the potential for contamination of stormwater occurs both during construction and after the completion of development. The goal to achieve reduced impacts involves containment and treatment of the various pollutants.

The proposed project will require temporary sediment and erosion control measures. The greatest source of pollutants during these phases is the potential of soil erosion. The nature of the construction plan is to have exposed soils which can erode and potentially discharge to sensitive areas. During construction, existing vegetation is removed exposing soils. Also, stockpiling of soils takes place. These conditions if not stabilized, are subject to erosion during rainfall events and wind conditions. Sediment discharged to a wetland can destroy vegetation and habitat affecting the function of the wetland. This degradation potential can be irreversible and eliminate its function in the ecosystem. Increases in turbidity to open water bodies such as streams, ponds, etc., are an additional environmental impact.

The implementation of proper erosion control measures and sediment containment along with a planned construction sequence can minimize or eliminate

these potential impacts. The selection and implementation of erosion and sediment practices are described in a later section of this Report.

3.2 Stormwater Management During Construction

The Erosion and Sediment Control plan will be implemented during all phases of construction until the completion of the project. This will minimize or eliminate the potential short-term adverse impacts which may occur during construction. After completion, the erosion and sediment control will become a maintenance plan to ensure that permanent erosion and sediment controls continue to function and prevent the transport of sediments.

The Erosion and Sediment Control plan includes the Sequence of Construction and designed measures to be installed, operated and maintained during all aspects of construction. The appropriate measures were selected and detailed in plan for implementation by the site contractor. The main objective of the plan is to prevent erosion from occurring by stabilization of the construction site where possible. Sediment controls are to be used as a containment system to allow the removal of sediment from runoff to the greatest extent possible before leaving the work site. Control methods and standards utilized are provided in the NYSSESC.

Potential sources of destabilization of the site have been determined so that proper measures will be used. The locations and methods designed for erosion and sediment control measures change as the construction sequence progresses. The priority is to stabilize disturbed areas subject to erosion and use containment and / or filtering practices where sediment may concentrate. Some of the practices and methods that will be used for this project are:

- Minimization of open disturbance by use of stabilizers such as seed, mulch, and erosion blankets, stone, etc. Areas not subject to construction traffic for extended periods will be temporarily stabilized.
- The work areas will be contained. Down grade perimeters will be lined with barriers such as silt fence, diversions, berms, etc.
- Where possible, clean stormwater will be diverted away or around the work site to reduce the amount of runoff requiring treatment.
- Sediment traps will be constructed where heavy concentrations of runoff may accumulate.
- Dust control measures will be maintained on-site such as water trucks.
- Runoff will be prevented from gaining erosive velocities on long slopes. This can be achieved with seed and mulch, erosion control blankets, curb dams and multiple rows of silt fence.
- Existing drainage structures will be protected from sediment-laden runoff.
- Regular weekly inspections and reports, if required, will be filed with the Operator by the Town.

Additional methods of practices may be employed dependent on the situation. The NYSSESC consists of NYS DEC accepted and recommended practices. The design requirements of temporary and permanent erosion and sediment control practices of this Manual have been followed.

Prior to completion of the project, all permanent structural features will be cleaned, restored, and re-vegetated as necessary. The erosion and sediment control phase of the project is complete when all work is finished, and all areas are stabilized. The post-construction Stormwater Management Inspection and Maintenance Agreement

(Schedule “B” in Appendix L) will describe the long term inspection schedule, periodic maintenance requirements, and the responsible party.

3.3 Stormwater Management Post-Construction

The post-construction design of the project must be included in the Stormwater Pollution Prevention and Stormwater Management Plans to minimize or eliminate potential long-term adverse impacts which might be caused by surface runoff from the site. This will deal with the management of the stormwater upon completion and operation of the site. The plan will be an analysis of all potential impacts due to stormwater and the means of protecting adjoining water bodies.

The management plan begins with conceptual designs of the collection and conveyance system and the proposed treatment practices. The treatment practices are subject to different parameters and must be designed to best fit the site including green infrastructure planning. Some of the limitations that may be encountered include soil types and properties, depth to groundwater or bedrock, distance to structures, and maintenance. A list of acceptable practices can be found in Chapters 3, 5, and 10 of the NYS Stormwater Design Manual (SMDM). Chapter 3 states “The Practices on this list are selected based on the following criteria:

1. Can capture and treat the full water quality volume (WQV)
2. Are capable of 80% TSS removal and 40% TP removal
3. Have acceptable longevity in the field
4. Have a pre-treatment mechanism.”

Green Infrastructure Practices include:

- I. Preservation of Natural Resources
- II. Reduction of Impervious Cover
- III. Runoff Reduction Techniques

The five broad groups of standard stormwater management practices are:

- I. Stormwater Ponds
- II. Stormwater Wetlands
- III. Infiltration Practices
- IV. Filtering Practices
- V. Open-channel Practices

These practices “are presumed to meet water quality requirements set forth in this manual if designed in accordance with the sizing criteria presented in Chapter 4 and constructed in accordance with the performance criteria in Chapter 6.”²

4.0 Site Characteristics

4.1 Soils

² Pg. 3-7 NYS Stormwater Management Design Manual, January 2015.

On-site soils were classified by using the USDA Natural Resources Conservation Service (NRCS) Websoil survey for Westchester County, NY, see Figure 4.1 - Soil Map.

The predominant soil type for this project is Chatfield-Charlton complex. This soil is somewhat well-drained and its slopes range from 15 to 35 percent. The Hydrologic classification of this soil is "B". The erosion hazard level for these soils is high as it contains very steep slopes. These soil properties are essential in the design and proper construction management of the site. Independent soil tests were performed, and the results are located in the Appendix E of this Report.

- Charlton, fine sandy loam - Typically found as hills, ridges, or ground moraines, 3 to 8 percent slopes, well-drained soils - slight to moderate erosion hazard;
- Charlton-Chatfield - Found as hills and ridges, 0 to 15 percent slopes, well-drained - slight to moderate erosion hazard.

Deep Test Soil Logs and soil percolation test data are included in Appendix E of this Report. The locations of these deep soil tests are indicated on the Construction Drawings. On-site soil investigation and knowledge of the soil groups facilitated the selection of coefficient values used for the pre- and post-development pollutant load scenarios. Additionally, curve numbers were determined for use in the analysis.

4.2 Hydrology

The proposed improvements will not significantly change the surface runoff patterns. Currently, the surface runoff pattern is in an east to west direction, toward an existing natural swale formed at the north-northwestern side of the property. The surface runoff pattern is a combination of sheet flow and concentrated flow. The majority of the site to be developed consists of forested area and shrub. Flow starts on the southeast section of the site by the existing stone walls delineating the property. The flow then travels slightly diagonal in a northwest direction towards the existing swale on the west, and then follows its course.

Under the proposed condition the general direction of the surface runoff will not be altered. Almost the entire amount of surface runoff from the impervious areas will be collected and attenuated. Since the land is currently vacant, the predeveloped condition is being analyzed before any development. Therefore, there will be an increase in the peak rate of runoff generated by the site for a given rainfall event. This will be mitigated with stormwater management practices.

In the planning, design and construction of the development, stormwater will be managed to minimize or eliminate potential off-site impacts. The proper implementation of temporary sediment and erosion control measures are used to achieve this goal. An Erosion and Sediment Control Plan has been established and will be implemented during construction until the completion of the project. The Erosion and Sediment Control Plan incorporates the sequence of construction and designed measures to be installed, operated and maintained during all aspects of each phase. The erosion and sediment controls are designed in accordance with the NYS Standards and Specifications for Erosion and Sediment Control.

5.0 Hydrologic Analysis

The method used to compute project runoff was the Soil Conservation Service TR-55. The basis for the analysis was the Type III, 24-hour storm, for the 1- year, 2- year, 5-year, 10-year, 25-year, 50-year, 100-year storm event. The rainfall depth for the respective storm events are 2.8, 3.4, 4.3, 5.1, 6.5, 7.8 and 9.28. The runoff coefficient "CN" and Time of Concentration for existing and post-development conditions were computed using Standard TR-55 criteria.

5.1 Pre-Development Condition

As stated, the proposed site consists of a new 3-bedroom house and a proposed driveway. Therefore, these will be the areas considered as impervious surface for the site. The remainder will continue to be forested and serve as a buffer. This project was analyzed in its pre-developed condition in order to understand current drainage patterns. The contributing watersheds are shown on Figure 5.1 - Pre-Development Watershed Map.

The Drainage Basin sizes, curve numbers and travel times used in the analysis are summarized in the Table below:

Pre-Development Conditions Watershed Analysis Variables

Drainage Basin	Area (acres)	Curve Number CN	Travel Time, Tc (hrs)
1	5.304	60	0.40

5.2 Post-Development Condition

A hydrologic analysis has been done for the site to determine the expected runoff depth for each storm event. The results of this analysis were used to calculate the subsurface stormwater detention chamber sizes required for this parcel. The chamber units were sized to accommodate the 100-year storm event. The contributing watersheds are shown on Figure 5.2 - Post-Development Watershed Map.

The hydrologic analysis assumes that full soil restoration as required in Chapter 5 (Table 5.3) of SMDM will be implemented. The areas of soil restoration will be shown on the E&SC Plan if required.

A portion of the volume of runoff generated from the watersheds analyzed is being infiltrated into the ground. Therefore, there is no increase in the peak rate of runoff discharge or volume up to the 100-year 24-hour rainfall for the project.

The Drainage Basin sizes, curve numbers and travel times used in the analysis are summarized in the Table below:

Post-Development Conditions Watershed Analysis Variables

Drainage Basin	Area (acres)	Curve Number CN	Travel Time, Tc (hrs)
DA-1	3.889	65	0.30
DA-2	1.415	60	0.12

6.0 Unified Stormwater Sizing Criteria

6.1 Flood Control Criteria

The purpose of the extreme flood analysis is to prevent flood damage from large storm events by maintaining predevelopment 100-year flood plain boundaries and protecting the integrity of stormwater management practices. The basis of the analysis, as per Town code, is to maintain pre-development peak rates of runoff for the 100-year, 24-hour storm event with proper stormwater management. Detailed criteria can be found in Chapter 196 of the Village code.

A summary of peak discharge rates at each design point for the pre and post-developed storm events analyzed for each drainage basin is summarized in the tables below:

Design Point 1:

Storm Event (year)	Pre-Developed Peak Flow (cfs)	Post-Developed Peak Flow (cfs)	Net Change of Peak Flow (cfs)	Percent Reduction
1	0.35	0.15	0.20	-57.1%
2	1.10	0.89	0.21	-19.1%
5	2.59	2.32	0.27	-10.4%
10	4.28	3.96	0.32	-7.5%
25	7.41	7.06	0.35	-4.7%
50	10.64	9.81	0.83	-7.8%
100	14.76	13.07	1.69	-11.4%

As can be seen by the results, peak discharge rates are decreased for the 100-year storm. Slight increases for some of the storm events are shown but they are relatively insignificant and can be attributed to rounding errors in the analysis and are well within acceptable ranges.

See Hydrologic Analysis (Appendix F) and Subsurface Detention Chamber Design for input values and results.

7.0 Stormwater Management Practices Selection, Justification and Design

The stormwater management practices selection process detailed in Chapters 3 and 7 of the NYS Stormwater Management Design Manual was followed to help select the practices chosen. These Chapters provide a series of matrices which allows logical selection of treatment practices based on several factors. The factors are as follows:

1. Land Use;
2. Physical Feasibility - location, slope, drainage area, groundwater table;
3. Watershed / Regional Factors;
4. Stormwater Management Capability
5. Community and Environmental Factors.

The matrices are provided in Appendix H of this Report. The matrices have been commented on or redacted to show elimination criteria through this stepped approach and eventual possible alternatives for treatment.

Infiltration - (I-3) NYS DEC SMDM:

Stormwater Infiltration Practices capture and temporarily store stormwater. The stormwater is then infiltrated into the existing soil strata over an extended period of time allowing recharge into the groundwater.

Required Elements:

Pre-Treatment Volume	
Required	Provided
If Fc for underlying soils is less than 2.0 in/hr minimum pre-treatment volume of 25% is required.	N/A
If Fc for underlying soil greater than 2.0 in/hour, minimum pretreatment volume of 50% is required	50%
If Fc for underlying soil greater than 5.0 in/hour, 100% of WQv must be pretreated	100%
Exit velocities from pretreatment volume shall be non-erosive (3.5 to 5.0 fps) during the 2-year storm event	Exit velocities are not a concern since there are no significant surface discharges.

Treatment Volume	
Required	Provided
Infiltration practice designed to exfiltrate entire WQv through floor of practice (side walls not included in sizing);	All criteria have been met. The subsurface infiltration system has been designed to exfiltrate the entire WQv and has been sized based solely on the surface area of the bottom.
Installation shall carefully follow the construction sequence.	All criteria have been met. The surface infiltration system has been designed to exfiltrate the entire WQv and has been sized based solely on the surface area of the bottom.
The surface area of the infiltration practice shall be sized based on	All criteria have been met. The surface infiltration system has been designed to exfiltrate the entire WQv and has been sized

$Ap = Vw / ndt$ Ap = surface area (SF) Vw = Water Quality Volume (cf) n = porosity (one used since open cavity) dt = depth of practice	based solely on the surface area of the bottom.
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Landscaping:

Does not apply.

Maintenance	
Required	Provided
Infiltration practice shall never serve as a temporary sediment trap during construction.	This Erosion and Sediment Control Plan includes separate locations for temporary sediment traps which do not coincide with the practice locations.
An observation well shall be installed in every practice and shall have lockable cap.	The subsurface stormwater management system will have access manholes.
Direct access shall be provided to the practice for maintenance and rehabilitation.	Direct access and observation will be served by a manhole cover.

See Routing Calculations in Appendix E and G for sizing calculations.

The selection of the treatment practice was based on evaluating the site to determine what would best fit the conditions providing maximum benefits. The goal was to select practices which would meet treatment and attenuation standards and minimize the disturbance footprint. The selection of Stormwater Practices was based on the surface and subsurface conditions of the site. In addition, the site design concept is to create a natural and environmentally sensitive setting

In General:

- Controls should be inspected periodically for the first few months after construction and on a semi-annual basis thereafter. They should also be inspected after major storm events (greater than 0.5 inches).
- All stormwater controls shall be inspected and cleaned of any debris or sediment.
- Any erosion shall be repaired and stabilized with seeding and mulch or stone.

Please note that additional notes regarding maintenance activities are contained on the project Construction Drawings and should be adhered to during and after construction.

The selection and justification of green practices can be found in Appendix H of this Report. The design of the practices can be found in Appendix I of this Report.

8.0 Erosion and Sediment Control

Erosion and sediment control practices were selected and designed in accordance with the NYSSESC. The practices proposed for this project are described below. Standard details and specifications are included in Appendix J as well as on the Construction Plans. Initial locations of each practice are shown on the Plans as construction progresses it may become necessary to repair, replace or relocate these practices as conditions warrant.

Stabilized Construction Entrance:

This has been specified for the entrance of the driveway. The installation will occur at the beginning of the project as described in the Suggested Construction Sequence. It will be maintained so as to prevent the tracking of sediment off-site.

Silt / Sediment Fence and Haybales:

Silt fence and haybales have been specified to control and contain sediment from leaving areas under disturbance to undisturbed areas. The fence shall be installed as best as possible following the contours and will be spaced in accordance with the NYSSESC. The fence will be inspected daily, repaired, and sediment removed as necessary.

Soil Stockpile:

Areas are provided for temporary stockpiling of delivered soil material for the construction. These areas will be contained with sediment fence to prevent the movement of sediment. The stockpiles, if not active for more than seven (7) days, will be seeded and mulched. The stockpile areas were placed to best suit the proposed construction activity. The stockpile will be installed as described in the Construction Sequence.

Storm Drain Inlet Protection:

The inlet protection is specified to provide a permeable barrier around drainage inlets to reduce sediment content in runoff before entering the storm drain system.

Temporary and Permanent Vegetative Cover:

This stabilization measure may be temporary and in other cases permanent vegetative cover is used. The vegetative cover specifications are based on the NYSSESC Manual. On the Construction Plans are notes, locations, and specifications as to the vegetative cover requirements. In the notes, there are specific situations and time constraints related to stabilization of disturbed areas. The specifications give seed and fertilizer mixes as well as placement. Any disturbed area

expected to remain exposed for more than seven (7) days shall receive temporary vegetative cover.

Soil Restoration:

Soil restoration is a required practice for construction projects where soil compaction occurs to soils which will be permanently vegetated. This compaction is typically a result of heavy vehicle traffic, cutting or filling, and areas which may receive heavy surcharges. This becomes more pronounced in soils with greater fines content specifically when wet. These actions can change soil properties which affect its ability to drain or absorb surface water and will also affect the survivability of vegetation. In order to maintain the integrity of the stormwater management plan these areas must receive soil restoration.

This project has soils which fall in the hydrologic soil group HSG "B." Therefore, for most instances, soil restorations are required for the development areas subject to permanent vegetation. Soil restoration can be done by tilling or aerating the soil to a depth of 12-inches. In heavy traffic areas, 3-inches of compost shall be placed over the compacted areas prior to the tilling. After the restoration, a 3/8" metal bar should be able to be hand pushed into the soil. Areas within the drip-line of trees should not be tilled.

Rock Outlet Protection:

Rock outlet protection is specified at discharge points of pipes and channels to reduce depth, velocity, and the energy of water to avoid downstream erosion. Specific usage for this project is discharge of the infiltration chambers. The sizing criteria used is from the NYSSESC Manual.

Level Spreader:

Level spreaders have been specified in two locations to convert concentrated flow into sheet flow. The level spreader uniformly discharges flow to prevent erosive conditions of stabilized areas. Both level spreaders are placed after a rock outlet protection leading to a swale. The flow spreaders will direct the flow to the southeastern section of the site towards Upper Shad Road. The proposed level spreaders will avoid concentrating the flow; therefore, mimicking the existing condition. The level spreader is designed based on the criteria presented in the NYSSESC Manual. In both cases, the level spreader is over-designed. The design flow for each falls within the 0-10 cfs range. Prior to entering the level spreader, rock outlet protection will be provided.

Other Controls:

Waste Disposal:

Solid, sanitary and toxic waste must be disposed of in a proper manner in accordance with applicable local, state and federal regulations. It is prohibited to burn, bury or pour out onto ground or into the storm sewers any solvents, paints, stains, gasoline, diesel fuel, used motor oil, hydraulic fluid, anti-freeze, cement curing compounds, or other toxic or hazardous wastes. The Contractor shall be responsible for disposal of all waste off site.

Concrete Truck Washout:

Wash out of cement trucks should occur in a designated diked area where the washings can be collected and disposed of properly when they harden.

Dust Control:

Generation of dust shall be minimized by limiting the extent of exposed soils and re-establishing vegetative cover in these areas as soon as possible. Additional and/or temporary methods to minimize dust may include wetting, mulching, spray adhesives, stone covering and wind barriers.

Stabilization:

The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased. This requirement does not apply in the following instance:

Where the initiation of stabilization measures by the 7th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

All areas not designated as buildings, roads, driveways, parking lots, walks, or aprons shall be established as lawn or vegetative areas. Permanent planting and vegetation shall be provided per approved the landscaping plan.

9.0 Construction Sequence

A key objective of the SWPPP is to reduce erosion and sedimentation potentials for the project. As a means to accomplish this, a suggested construction sequence was developed to assist the developer with incorporating, into the project, various controls designed to reduce such potentials. The sequence considers the performance of development activities in a phased approach, in conjunction with the installation, construction and monitoring of erosion and sedimentation control devices prior to and during construction.

Appendix D contains the project specific Suggested Construction Sequence. Essentially, the sequence has been broken down into various activities designed to ensure that certain erosion/sedimentation controls are in place, prior to and during construction, in recognition of site development.

Prior to any construction activities, the Owner, Engineer and any Contactors to perform land-disturbing activities shall meet to review this SWPPP to ensure a thorough understanding of its contents and overall intent. Certifications to this effect shall be signed by the Owner and Contractor. Certifications are provided on the Construction Plans and in Appendix C.

The Responsible Party during and after Construction is as follows:

Adee Dubray
WD Excavation & Contracting
411 Yorktown Road
Croton-on-Hudson, NY 10520
Phone: (914) 271-5726

10.0 Inspection and Reporting

Unless notified by the NYSDEC, the Owner or Operator shall have a qualified inspector conduct site inspections in accordance with the Permit requirements; for a site with on-going soil disturbance activities, a qualified inspector shall conduct a site inspection at least once every seven (7) calendar days. If a project has received prior written approval by the NYSDEC for the disturbance of greater than five (5) acres of soils at any one time, the inspection frequency shall be increased to a minimum of two (2) per seven (7) calendar day period separated by two (2) calendar days for as long as the five (5) acre threshold is exceeded. The qualified inspector, as defined in SPEDES General Permit guidelines, shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

1. Date and time of inspection.
2. Name and title of person(s) performing inspection.
3. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of inspection.
4. 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.
5. 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.
6. Identification of all erosion and sediment control practices that need repair or maintenance.
7. Identification of all erosion and sediment control practice that were not installed properly or are not functioning as designed and need to be reinstalled or replaced.
8. 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.

9. 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.
10. 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 practices.
11. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing correction actions. 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.

Within one business day of the completion of an inspection, the qualified inspector shall notify the Owner or Operator and appropriate Contractor (or Subcontractor) of any corrective actions that need to be taken. The Contractor (or Subcontractor) shall begin implementing the corrective action within one business day of this notification and shall complete the corrective actions in a reasonable time frame. All inspection reports shall be signed by the qualified inspector. A sample inspection report is included in Appendix K.

The Owner or Operator shall maintain a record of all inspection reports in a site log book until all disturbed areas have achieved final stabilization and the N.O.T. has been submitted to the DEC. The site log book shall be maintained on site and be made available to the permitting authority upon request.

Prior to filing of the Notice of Termination or the end of permit term, the Owner or Operator shall have the qualified professional perform a final site inspection. The qualified professional shall be provided with a certified final as-built survey. The survey shall locate and provide detailed information for the permanent stormwater facilities. The information provided shall include and not be limited to the following: rim and invert elevations of all structures, outlets, weirs, etc.; pipe material and sizes; basin dimensions, elevations and topography; and any other pertinent information specific to the stormwater practice constructed.

Upon final review of the as-built survey and completed site improvements, the qualified professional shall certify that the site has undergone final stabilization 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.

The qualified professional shall then complete the Notice of Termination (NOT) to be signed by the Owner. The NOT with the required supporting documentation shall be submitted to the MS4 for signature of approval which will then be forwarded to the NYS DEC.

11.0 Installation and Maintenance of Stormwater Management Practices

11.1 During Construction

The Contractor shall be responsible for the installation and maintenance of all temporary erosion control measures. The Contractor shall also be responsible for the installation of permanent control measures. The Operator shall be responsible for the maintenance of all permanent control measures.

All temporary erosion control measures installed on the project site shall be observed and maintained to ensure that they are operating as intended as follows:

1. Temporary measures will be inspected by the trained Contractor daily. Any necessary repairs, replacements, or upgrades will be made immediately.
2. Accumulated sediments will be removed as required to keep the measures functional. In the case of silt fencing and haybales (if applicable), remove deposits where accumulations reach half the height of the fence or bale. In the case of sediment basins, remove deposits whenever their capacity has been reduced by fifty percent (50%) from the design capacity.
3. All erosion of the silt fence will be repaired immediately with compacted backfill materials.
4. Disturbed areas, stockpile areas, areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system or downstream.
5. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
6. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.
7. The permanent storm drainage system shall be inspected and cleaned of all sediment prior to completion of project.

11.2 After Construction

The long-term operation and maintenance of the stormwater management system will be the responsibility of the Owner. The following is the proposed Inspection and Maintenance Schedule:

Control to be Inspected	Inspection Frequency	Maintenance Threshold Criteria	Maintenance Procedure
Drain Inlets	Quarterly	3"+ accumulated sediment	Remove debris and sediment annually.
Swales and Channels	Semi-Annually	Debris and leaves and Sediment at 5%	Remove debris and sediment semi-annually
Subsurface Infiltration	Bi-annually	Debris and leaves and Sediment at 5%	Remove debris and sediment

Recommended Maintenance Access:

Subsurface Infiltration Chamber

Access through manhole cover. Pump down permanent water volume. Vacuum sediment and debris.

Drain Inlets:

Access through grate structure and remove debris and sediment with hand tools or vacuum truck.

In General:

- Controls should be inspected periodically for the first few months after construction and on a semi-annual basis thereafter. They should also be inspected after major storm events (greater than 0.5 inches).
- All stormwater controls shall be inspected and cleaned of any debris or sediment.
- Any erosion shall be repaired and stabilized with seeding and mulch or stone.
- Maintenance and access shall comply with all local, State and Federal safety codes and guidelines.

Please note that additional notes regarding maintenance activities are contained on the project Construction Drawings and should be adhered to during and after construction.

12.0 Owner / Contractor Responsibilities

12.1 Owner / Operator Certification Statement

The _____ is the Owner/Operator of the project for the purpose of this Permit (see Appendix A). The Owner must sign a copy of the Owner's Certification Statement before construction commences (see Appendix C).

12.2 Contractor Certification Statement

The Owner is responsible for ensuring all Contractors and Subcontractors associated with site work construction activities identified within this SWPPP agree to implement applicable provisions of the SWPPP and sign a copy of the Contractor Certification Statement (see Appendix C) before construction commences.

In addition, the Owner/Operator is responsible to make sure that all Contractors and Subcontractors shall identify at least one person representing the Company at the site will be responsible for implementation of the SWPPP. This person will be known as the Trained Contractor and will have the required 4-hour Certification. This Certification is available through the NYS DEC. The listing of courses can be found at the NYS DEC Website.

12.3 Retention of Records

The Owner shall retain a copy of the most current SWPPP at the construction site from the date construction is initiated at the site until the date of construction at the site is completed and the N.O.T. has been filed.

Once work is completed, the Owner shall submit to the NYSDEC a Notice of Termination (see Appendix A).

The Owner shall retain copies of the N.O.I, N.O.T., Acknowledgement Letter, MS4 SWPPP Acceptance Form, SWPPP and all reports required by the General Permit for a period of five (5) years from the date that the site achieves final stabilization unless the NYSDEC specifies another time period in writing

13.0 Conclusion

The Stormwater Management Plan has been established for this project in accordance with the requirements of NYS DEC GP-0-20-001 and the Town Code of Pound Ridge. This plan will effectively control stormwater generated by this project during and after construction. The management of the stormwater is based on controlling increases in peak runoff. The design of the stormwater management system will accommodate storm flows up to the 100-year storm. Overall, it would improve even the existing conditions.

The final design of the project will detail the proposed practices and will establish the method with which they will be constructed. The detail will include layout, grading, plantings, outlet structures, and any other component as required for the design based on the Erosion and Sediment Control established in this Report. These will be part of the project Construction Drawings. The Sequence of Construction and required maintenance will also be set forth as part of the final construction plan. The full Construction Plan shall be considered part of the Stormwater Management Plan or Stormwater Pollution Prevention Plan.

The effectiveness of the stormwater practices selected in design will be insured by implementing a maintenance plan. The maintenance plan details specific activities, safeguards and provisions to be monitored and performed by specified frequencies. By adhering to the maintenance plan, optimum performance of the stormwater practices can be expected.

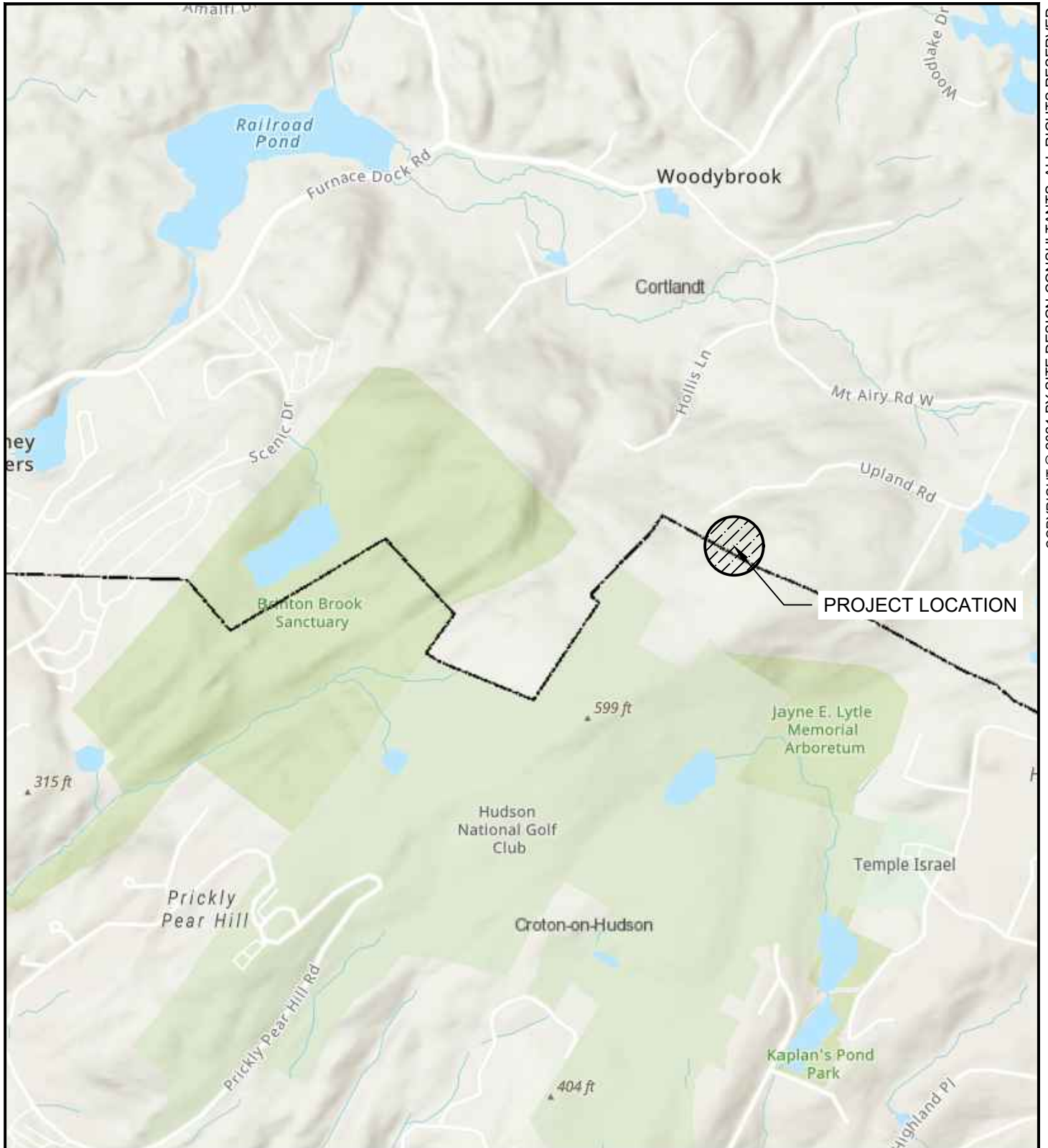
Based on the results of the analysis and recommended maintenance practices for the collection and treatment system, the proposed stormwater control designs will provide maximum control efficiency, high effectiveness for removal of pollutants of concern, and the best attainable post-development pollutant loading scenario.

In conclusion, the Stormwater Management Plan will not create negative downstream impacts as a result of this project.

Joseph C. Riina, P.E

April 7, 2022

FIGURES



NOTE:

1. Map Source: USGS 7.5 Minute Series Topographic Quadrangle Map(1:2,000 scale) for Cortlandt, Westchester County, New York

FIG 1.1 LOCATION MAP

THOMAS W. HANNIGAN

Town of Cortlandt

Westchester County, New York

Site Design Consultants

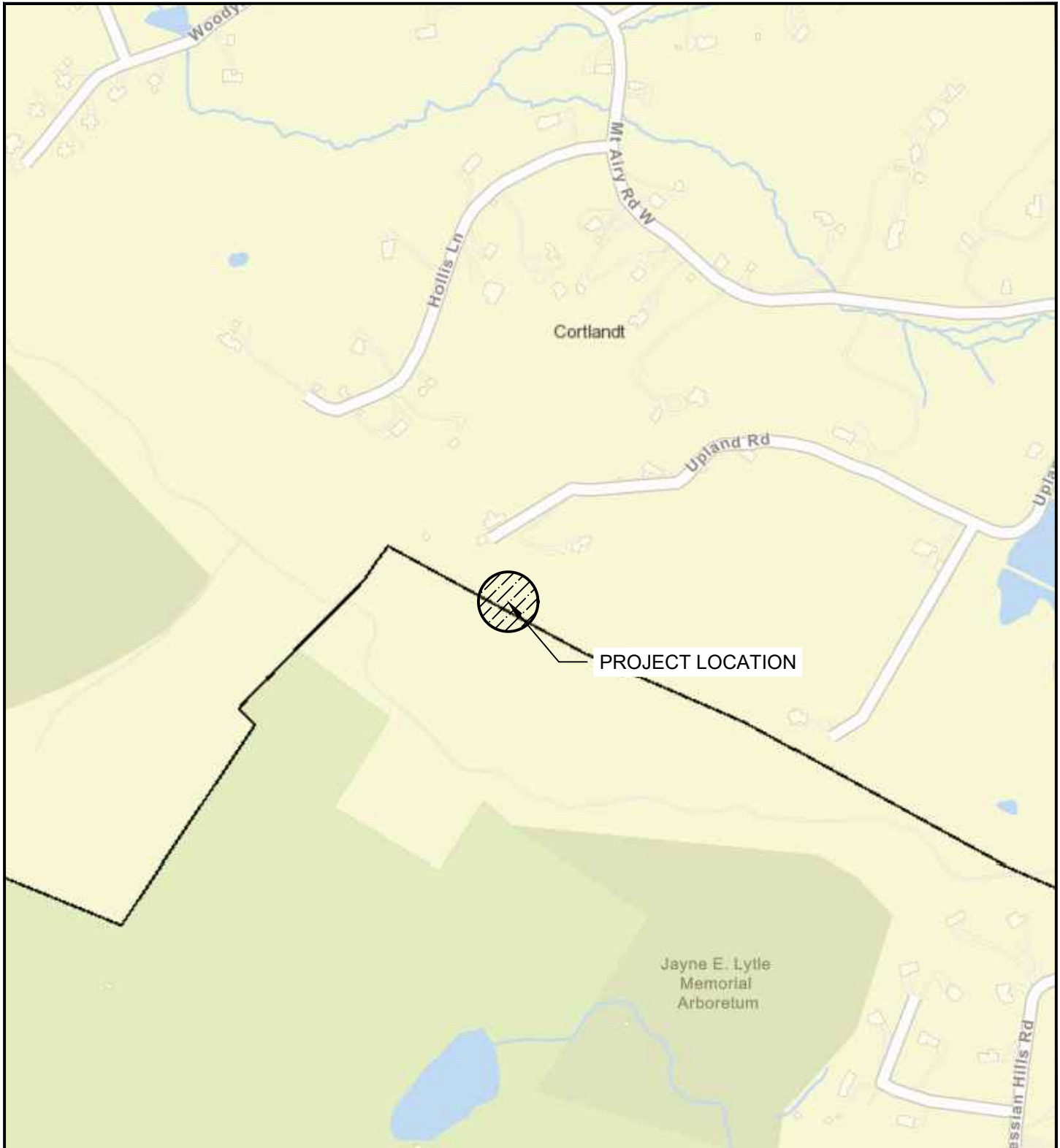
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(914) 962-4488 - Fax (914) 962-7386
www.sitedesignconsultants.com



NOT TO SCALE
DATE:11/1/2021

NOTE: UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NEW YORK STATE EDUCATION LAW.



NOTE:

1. Map Source: USGS 7.5 Minute Series Topographic Map(1:2,000 scale) for Cortlandt, Westchester County, New York

FIG 1.2 VICINITY MAP

THOMAS W. HANNIGAN

Town of Cortlandt

Westchester County, New York

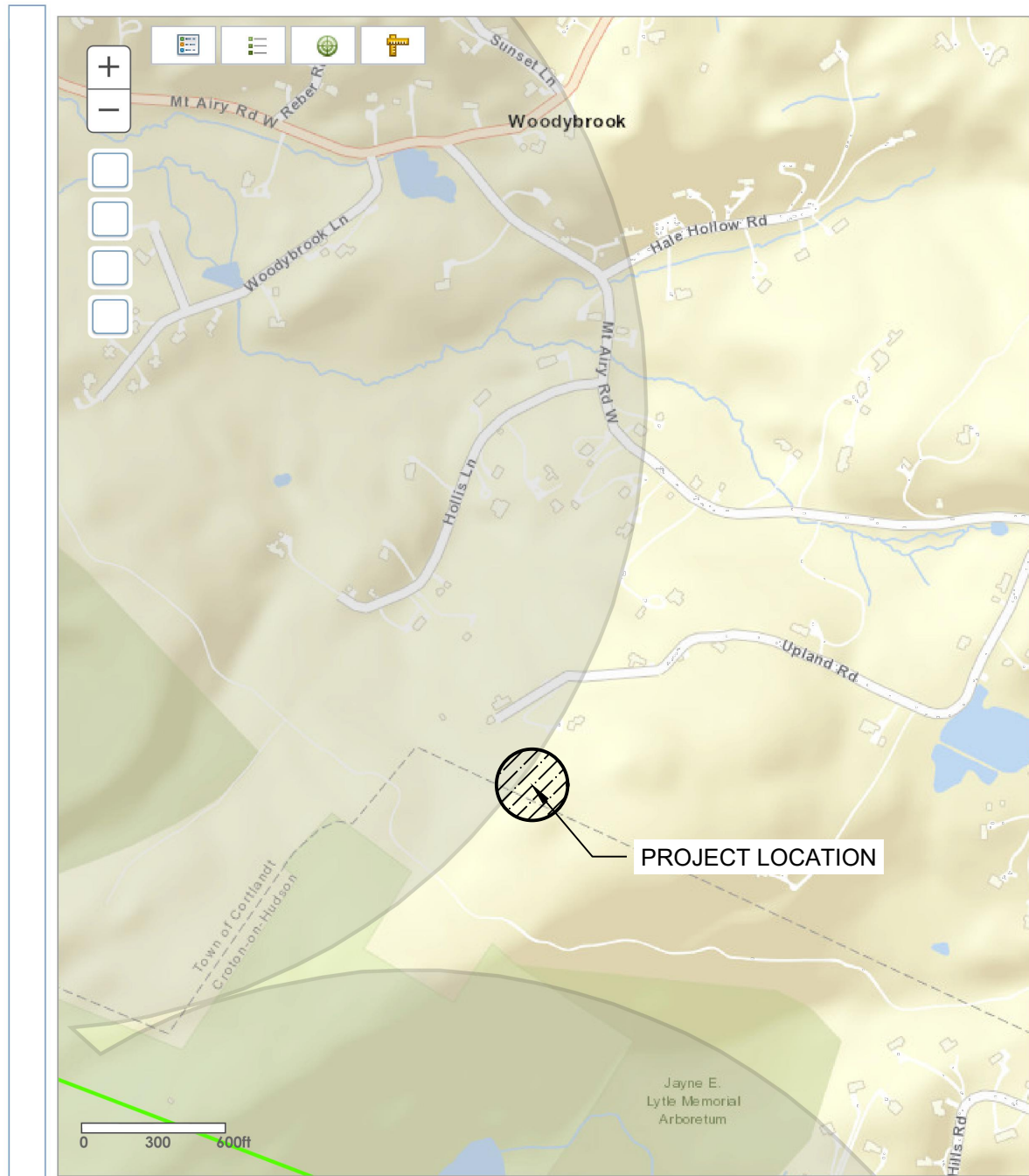
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NOTE: <https://cris.parks.ny.gov>

1/1

1. Map Source: Cultural Resource Information System (CRIS)

FIG 1.3 NYS OPRHP Historic Resource Map

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NOTE:

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIG 4.1 SOILS MAP

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MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

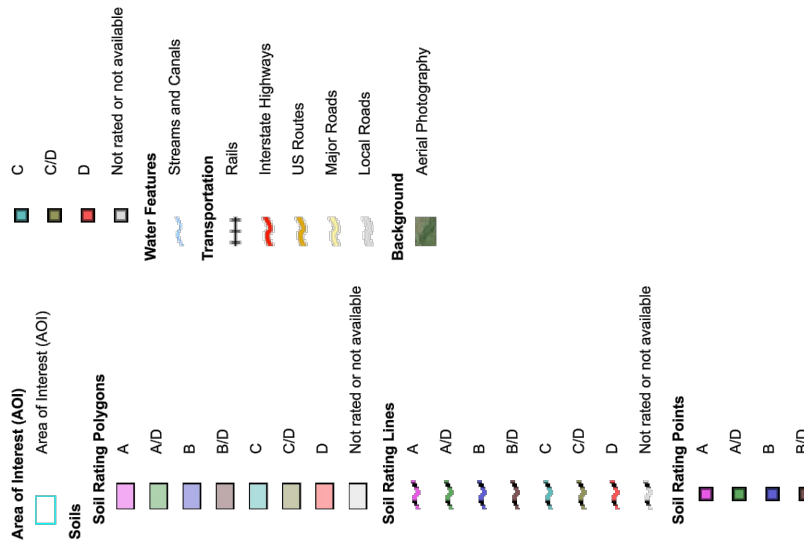
Soil Survey Area: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Jun 6, 2015—Oct 17, 2017

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

MAP LEGEND



NOTE:

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIG 4.1 SOILS MAP

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	B	0.9	12.7%
CrC	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	0.9	12.7%
CsD	Chatfield-Charlton complex, 15 to 35 percent slopes, very rocky	B	5.3	74.6%
Totals for Area of Interest			7.1	100.0%

NOTE:

**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

9/17/2021
Page 3 of 4

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIG 4.1 SOILS MAP

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Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

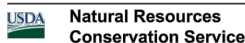
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Web Soil Survey
National Cooperative Soil Survey

9/17/2021
Page 4 of 4

NOTE:

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIG 4.1 SOILS MAP

THOMAS W. HANNIGAN

Town of Cortlandt

Westchester County, New York

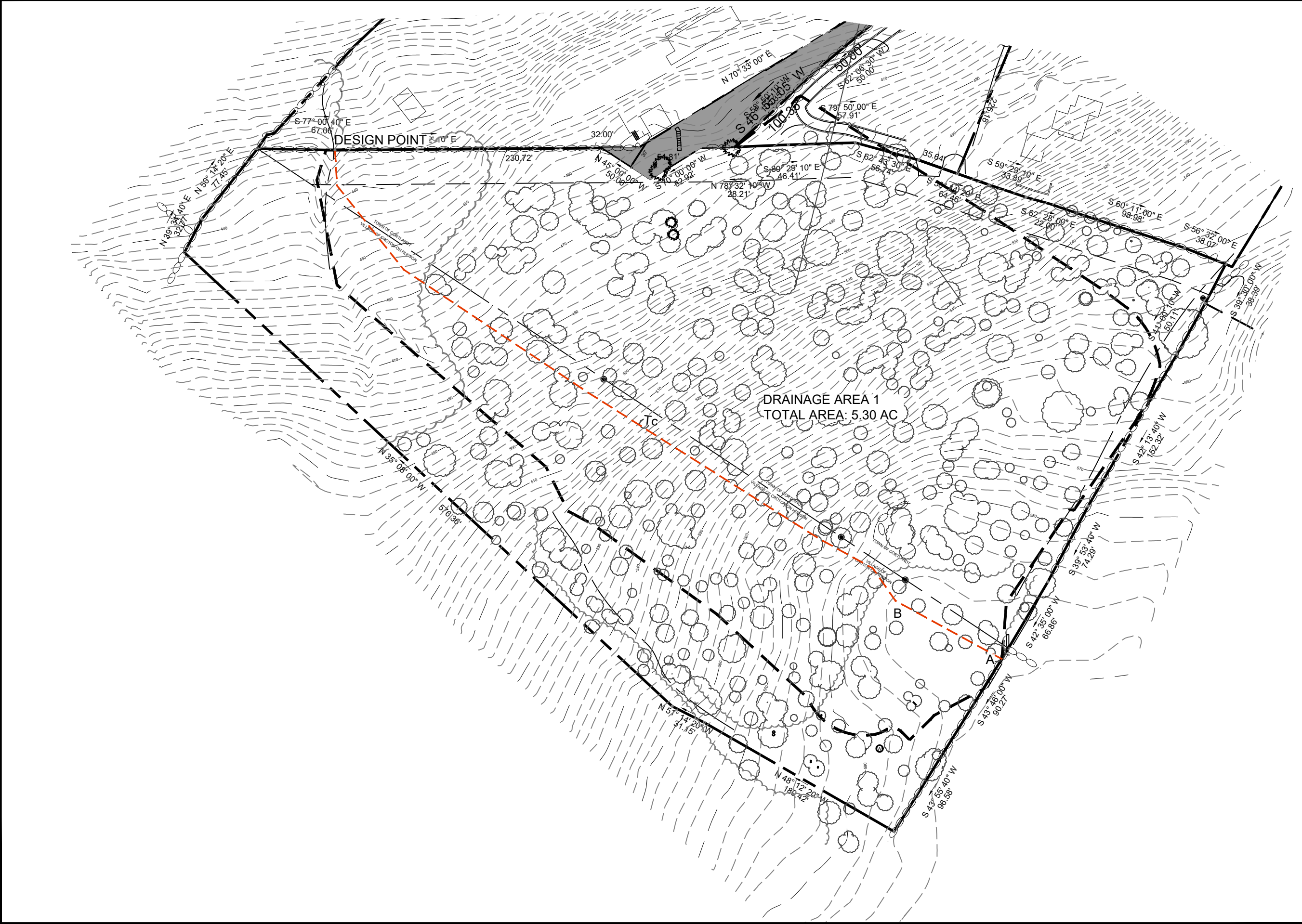
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FIG 5.1 PRE DEVELOPMENT CONDITION WATERSHED
PREPARED FOR

THOMAS W. HANNIGAN

Town of Cortlandt

Westchester County, New York

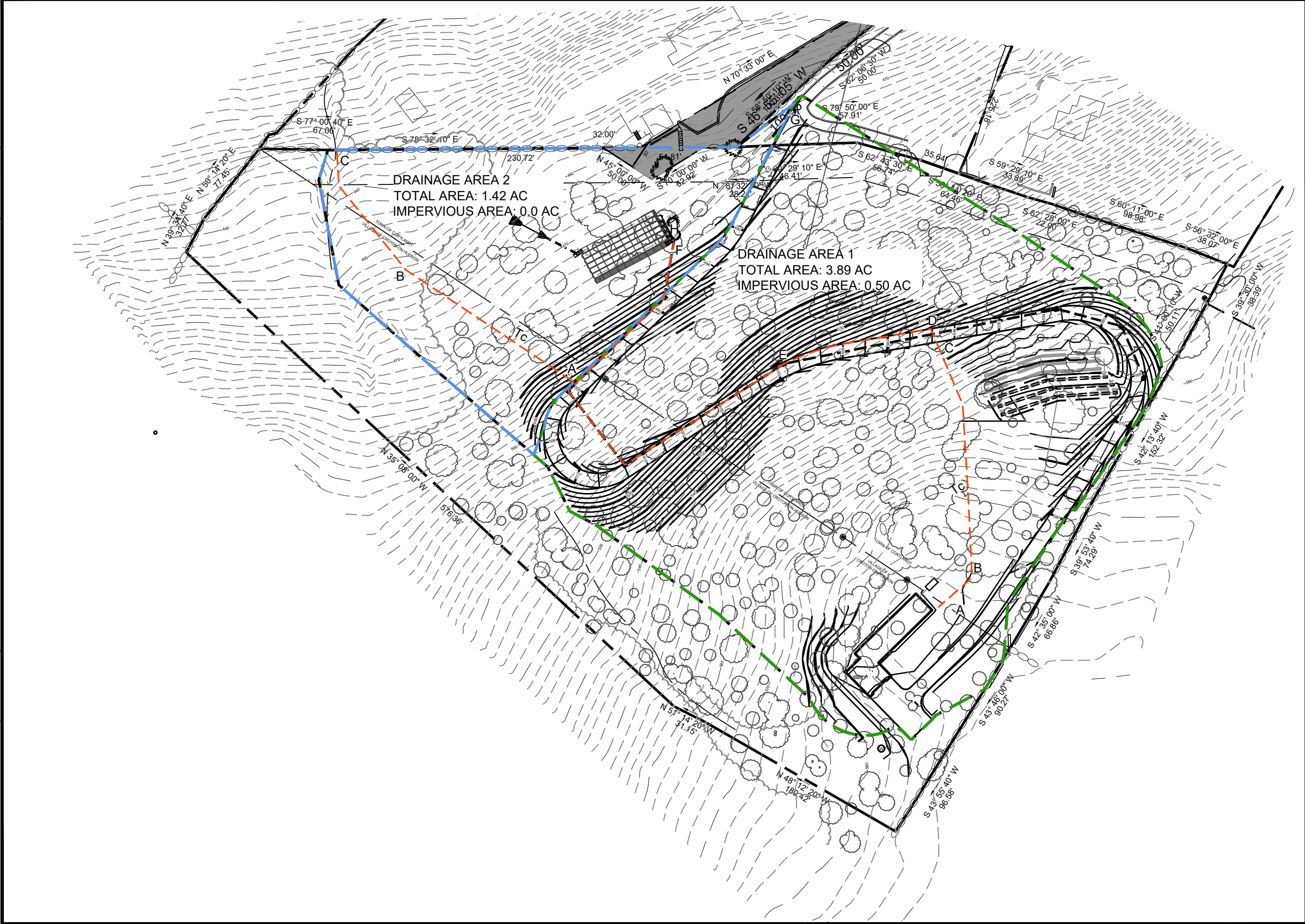
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FIG 5.1 PRE DEVELOPMENT CONDITION WATERSHED
PREPARED FOR

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DATE: 4/5/2022

APPENDIX A

List of Required Approvals and Applications:

Village of Croton-on-Hudson Approval - approval pending

Town of Cortlandt Approval - approval pending

Village of Croton-on-Hudson Building Permit - approval pending

Town of Cortlandt Building Permit - approval pending

APPENDIX B

Regulatory Ordinances:

NYS DEC General Permit No. GP-0-20-001

Local Ordinance

*Village of Croton-on-Hudson, NY
Friday, November 5, 2021*

Chapter 196. Stormwater, Drainage, Erosion and Water Pollution Control

[HISTORY: Adopted by the Board of Trustees of the Village of Croton-on-Hudson 7-16-2007 by L.L. No. 3-2007. Amendments noted where applicable.]

GENERAL REFERENCES

Environmental compliance — See Ch. **115**.
Environmental quality review — See Ch. **116**.
Excavation, filling and topsoil removal — See Ch. **120**.
Flood damage prevention — See Ch. **129**.
Professional fees — See Ch. **178**.
Steep slopes — See Ch. **195**.
Trees — See Ch. **208**.
Wetlands — See Ch. **227**.
Zoning — See Ch. **230**.

Article I. Stormwater Management and Erosion and Sediment Control

§ 196-1. Legislative findings.

It is hereby determined that:

- A. Land development activities and associated increases in site impervious cover often alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, or sediment transport and deposition.
- B. This stormwater runoff contributes to increased quantities of water-borne pollutants, including siltation of aquatic habitat for fish and other desirable species.
- C. Clearing, grading, excavating, soil disturbance or placement of fill during construction tends to increase soil erosion and add to the loss of native vegetation necessary for terrestrial and aquatic habitat.
- D. Improper design, maintenance and construction of stormwater management practices can increase the velocity of stormwater runoff, thereby increasing stream bank erosion and sedimentation.
- E. Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream baseflow.
- F. Substantial economic losses can result from these adverse impacts on the waters of the Village.
- G. Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from land development activities.
- H. The regulation of stormwater runoff discharges from land development activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel

erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will minimize threats to public health and safety.

- I. Regulation of land development activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the adverse effects of erosion and sedimentation from development.

§ 196-2. Purpose and objectives.

The purpose of this article is to establish minimum stormwater management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing within this jurisdiction and to address the legislative findings in § **196-1** hereof. This article seeks to meet those purposes by achieving the following objectives:

- A. Meet the requirements of minimum measures 4 and 5 of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4 SPDES No. NYR20A370), Permit No. GP-02-02 or as amended or revised.
- B. Require land development activities to conform to the substantive requirements of the NYS Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities GP-02-01 or as amended or revised.
- C. Minimize increases in the rate of stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels.
- D. Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality.
- E. Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable.
- F. Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and ensure that these management practices are properly maintained and eliminate threats to public safety.

§ 196-3. Applicability.

- A. All land development activities, including but not limited to land development activities subject to review and approval by the Village Board, Planning Board, Zoning Board of Appeals, or Village Engineer of the Village under subdivision, site plan, special permit, steep slope, wetland, tree removal permit and/or other land use or environmental permit regulations, shall be reviewed subject to the standards contained in this article.
- B. It shall be unlawful for any person to engage in a land development activity, other than an exempt activity as defined in § **196-4**, in the absence of a stormwater pollution prevention plan (SWPPP) approved by the Stormwater Management Officer or other approving authority as specified in § **196-3C**.
- C. The Stormwater Management Officer shall accept, review and be the approving authority for all stormwater pollution prevention plans, except as follows:
 - (1) The Board of Trustees shall be the approving authority for any application involving property that is also the subject of a pending special permit or other land use or environmental permit application before that Board in accordance with the provisions of the Village Code.

- (2) The Planning Board shall be the approving authority for any application involving property that is also the subject of a pending site plan, subdivision, special permit, steep slope, wetland, tree removal or other land use or environmental permit application before that Board in accordance with the provisions of the Village Code.
- (3) The Zoning Board of Appeals shall be the approving authority for any application involving property that is also the subject of a pending special permit or other land use or environmental permit application before that Board in accordance with the provisions of the Village Code.

D. The approving authority may:

- (1) Review the plans;
- (2) Upon approval by the Village Board, engage the services of a registered professional engineer to review the plans, specifications and related documents at a cost not to exceed a fee schedule established by said governing board; or
- (3) Accept the certification of a licensed professional that the plans conform to the requirements of this article.

§ 196-4. Exemptions.

The following activities shall be exempt from review under this article:

- A. Agricultural activity as defined in this article.
- B. Silvicultural activity, except that landing areas and log haul roads are subject to this article.
- C. Repairs and routine property maintenance activities that disturb less than 5,000 square feet and maintain the original line and grade.
- D. Repairs and routine maintenance to any stormwater management practice or facility deemed necessary by the Stormwater Management Officer.
- E. Land development activities for which a building permit has been approved and is still in effect on or before the effective date of this article.
- F. Cemetery graves.
- G. Installation of a fence, sign, telephone, and electric poles and other kinds of posts or poles.
- H. Emergency activity immediately necessary to protect life, property or natural resources.
- I. Activities of an individual engaging in home gardening by growing flowers, vegetables and other plants primarily for use by that person and his or her family.
- J. Landscaping and horticultural activities that disturb less than 5,000 square feet in connection with an existing noncommercial structure.

§ 196-5. Definitions.

Whenever used in this article, the following terms will have meanings set forth below:

AGRICULTURAL ACTIVITY

The activity of an active farm, including grazing and watering livestock, irrigating crops, harvesting crops, using land for growing agricultural products, and cutting timber for sale, but shall not include the operation of a dude ranch or similar operation, or the construction of new structures associated with agricultural activities.

APPLICANT

Any individual or individuals, firm, partnership, association, corporation, company, organization or other legal entity of any kind, including municipal corporations, governmental agencies or subdivisions thereof, filing an application for a land development activity or minor land disturbance activity subject to the provisions of this article.

BUILDING

The term "building" as defined in § 230-4 of the Village Code now or as hereafter amended.

CHANNEL

A natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

CLEARING

Any activity that removes the vegetative surface cover.

DEDICATION

The deliberate appropriation of property by its owner for general public use.

DEPARTMENT or NYSDEC

The New York State Department of Environmental Conservation.

DESIGN MANUAL

The New York State Stormwater Management Design Manual, most recent version, including applicable updates, that serves as the official guide for stormwater management principles, methods and practices.

DEVELOPER

A person who undertakes land development activities.

EROSION CONTROL MANUAL

The most recent version of the New York Standards and Specifications for Erosion and Sediment Control Manual, commonly known as the "Blue Book."

GRADING

Excavation or fill of material, including the resulting conditions therefrom.

IMPERVIOUS COVER

Those surfaces, improvements and structures that cannot effectively infiltrate rainfall, snow melt and water (e.g., building rooftops, pavement, sidewalks, driveways, etc.).

INDUSTRIAL STORMWATER PERMIT

A State Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

INFILTRATION

The process of percolating stormwater into the subsoil.

LAND DEVELOPMENT ACTIVITY

Any construction activity including clearing, grubbing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than 5,000 square feet in area.

LANDOWNER

The legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

MAINTENANCE AGREEMENT

A legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of stormwater management practices.

NONPOINT SOURCE POLLUTION

Pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

PERSON

Any individual or individuals, firm, partnership, association, corporation, company, organization or other legal entity of any kind, including municipal corporations, governmental agencies or subdivisions thereof.

PHASING

Clearing a parcel of land in distinct pieces or parts, with the stabilization of each piece completed before the clearing of the next.

POLLUTANT OF CONCERN

Sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

PROJECT

Land development activity or minor land disturbance activity as those terms are defined and/or used in this article.

RAINFALL DRAINAGE CHANNELS

Those existing interconnected networks of depressed contours and enlargements thereto which, by virtue of their location, convey surface water runoff from its source to its ultimate points of discharge.

RECHARGE

The replenishment of underground water reserves.

SEDIMENT CONTROL

Measures that prevent eroded sediment from leaving the site.

SILVICULTURAL

Of or relating to the management and care of forests.

SPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES GP-02-01

A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM MUNICIPAL SEPARATE STORMWATER SEWER SYSTEMS GP-02-02

A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA-established water quality standards and/or to specify stormwater control standards.

STABILIZATION

The use of practices that prevent exposed soil from eroding.

STOP-WORK ORDER

An order issued by the duly authorized municipal authority which requires that all land development activity and other construction activity on a site be stopped.

STORMWATER

Rainwater, surface runoff, snowmelt and drainage.

STORMWATER MANAGEMENT

The use of structural or nonstructural practices that are designed to reduce stormwater runoff and mitigate its adverse impacts on property, natural resources and the environment.

STORMWATER MANAGEMENT FACILITY

One or a series of stormwater management practices installed, stabilized and operating for the purpose of controlling stormwater runoff.

STORMWATER MANAGEMENT OFFICER (SMO)

The Village Engineer and his or her designees, and/or such other Village officers or employees as designated by the Village Manager.

STORMWATER MANAGEMENT PRACTICES (SMP)

Measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing flood damage and preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

STORMWATER RUNOFF

Flow on the surface of the ground, resulting from precipitation.

SURFACE WATERS OF THE STATE OF NEW YORK

Lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, 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. Storm sewers and waste treatment systems, including treatment ponds or lagoons which also meet the criteria of this definition, are not waters of the state. This exclusion applies only to man-made bodies of water which neither were originally created in waters of the state (such as a disposal area in wetlands) nor resulted from impoundment of waters of the state.

VILLAGE

The Village of Croton-on-Hudson, New York.

VILLAGE ENGINEER

The person employed as a Village Engineer of the Village of Croton-on-Hudson, or his or her designee.

WATERCOURSE

The term "watercourse" as defined in § 227-3 of the Village Code now or as hereafter amended.

WETLAND

The term "wetland" as defined in § 227-3 of the Village Code now or as hereafter amended.

§ 196-6. Stormwater pollution prevention plans.

- A. No application for approval of a land development activity shall be reviewed until the appropriate approving authority has received a stormwater pollution prevention plan (SWPPP) prepared in accordance with the requirements of this article.

B. All SWPPPs shall provide the following background information, erosion and sediment control, and stormwater management measures relating to stormwater quantity:

- (1) Background information about the scope of the project, including location, type and size of project.
- (2) 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 off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s). The site map shall be at a scale no smaller than one inch equals 50 feet.
- (3) Description of the soil(s) present at the site and soil test results, if requested.
- (4) Construction phasing plan describing the intended sequence 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. Not more than two acres shall be disturbed at any one time; provided, however, the approval authority may opt to increase the amount of land that may be exposed at any one time pursuant to an approved SWPPP.
- (5) Description of the pollution prevention measures that will be used to control construction materials, chemicals and debris from becoming a pollutant source in stormwater runoff.
- (6) Description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill-prevention and response.
- (7) Temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project close-out.
- (8) A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice.
- (9) Dimensions, material specifications and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins.
- (10) Temporary practices that will be converted to permanent control measures.
- (11) Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice will remain in place until the site is stabilized.
- (12) Maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practice.
- (13) Name(s) of the receiving water(s) and NYSDEC classification(s), if applicable.
- (14) Delineation of SWPPP implementation responsibilities for each part of the site.
- (15) Description of structural practices designed to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable.
- (16) Any existing data that describes the stormwater runoff at the site.
- (17) An acknowledgement by the landowner granting to the Village and other agencies having jurisdiction the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

- (18) Description of each postconstruction stormwater management practice, including but not limited to dimensions, material specifications, and installation details for each postconstruction stormwater management practice.
 - (19) Site map/construction drawing(s) showing the specific location(s) and size(s) of each postconstruction stormwater management practice.
 - (20) Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms, as per the manual specified in § **196-8A(1)** herein.
 - (21) Comparison of postdevelopment stormwater runoff conditions with pre-development conditions.
 - (22) Maintenance schedule to ensure continuous and effective operation of each postconstruction stormwater management practice.
- C. In addition to the information requirements of § **196-6B**, SWPPPs for land development activities disturbing one or more acres, whether or not these land development activities involve discharging a pollutant of concern to either an impaired water identified on the Department's 303(d) list of impaired waters or a total maximum daily load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment, must provide the following water quality controls (poststormwater construction controls):
- (1) Description of each postconstruction stormwater management quality practice.
 - (2) Site map/construction drawing(s) showing the specific location(s) and size(s) of each postconstruction stormwater management quality practice.
 - (3) Hydrologic and hydraulic analysis for all structural components of the stormwater management quality system for the applicable design storms, as per the manual specified in § **196-8A(1)** herein.
 - (4) Dimensions, material specifications and installation details for each postconstruction stormwater management quality practice.
 - (5) Maintenance schedule to ensure continuous and effective operation of each postconstruction stormwater management quality practice.
 - (6) Maintenance easement(s), where required, to ensure access to all stormwater management practices at the site for the purpose of inspection and repair. Easements shall be recorded and shall remain in effect with transfer of title to the property.
 - (7) Inspection and maintenance agreement recorded and binding on all subsequent landowners served by the on-site stormwater management measures in accordance with § **196-9** of this article.
- D. The SWPPP shall be prepared by a landscape architect, certified professional in erosion and sediment control, professional engineer, or other professional(s) deemed acceptable by the NYSDEC and must be signed by the professional preparing the plan, who shall certify that the design of all stormwater management practices meets the requirements in this article.
- E. The applicant shall assure that all other applicable environmental permits have been or will be acquired for the land development activity prior to approval of the final stormwater design plan.
- F. Each contractor and subcontractor identified in the SWPPP and/or any successor or substitute contractor or subcontractor who will be involved in soil disturbance and/or stormwater management practice installation shall sign and date a copy of the following certification statement before undertaking any land development activity: "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the stormwater pollution prevention plan. I also understand that it is unlawful for any person to cause or contribute to a violation of water quality standards." Copies of these statements shall be delivered to the SMO.

- (1) The certification must include the name and title of the person providing the signature, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.
 - (2) The certification statement(s) shall become part of the SWPPP for the land development activity.
 - (3) The certification shall contain proof that each contractor who will be involved in a land development activity has obtained training and/or certification in proper erosion and sedimentation control practices. Such certification shall become part of the SWPPP for the land development activity and shall be retained on-site.
- G. A copy of the SWPPP shall be retained at the site of the land development activity during construction from the date of initiation of construction activities to the date of final stabilization.

§ 196-7. Stormwater management and erosion and sediment control for minor land disturbance activities.

- A. All activities which require a building, land use or environmental permit and involve 400 square feet or more of land disturbance but which do not meet the defined size threshold in § 196-5, Definitions, for a land development activity, or any disturbance within 20 feet of a rainfall drainage channel, are subject to the review and approval of the Stormwater Management Officer.
- B. An application for approval of such a minor land disturbance activity, as specified in Subsection A above, shall include, except as may be waived by the SMO, the following background information, erosion and sediment controls, and stormwater management practices. Such activity is subject to the performance and design criteria in § 196-8A herein, and the application shall show that there will be no net increase in the rate of runoff resulting from the project for the ten-year storm event.
- (1) Background information about the scope of the project, including location, type and size of project.
 - (2) 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 off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s). The site map shall be at a scale no smaller than one inch equals 50 feet.
 - (3) Description of the soil(s) present at the site and soil test results, if requested.
 - (4) Construction phasing plan describing the intended sequence 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.
 - (5) Temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for the project from initial land clearing and grubbing to project close-out.
 - (6) A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice.
 - (7) Dimensions, material specifications and installation details for all erosion and sediment control practices.
 - (8) Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice will remain in place until the site is stabilized.

- (9) Maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practice.
- (10) Name(s) of the receiving water(s) and NYSDEC classification(s), if applicable.
- (11) Any existing data that describes the stormwater runoff at the site.
- (12) An acknowledgement by the landowner granting to the Village and other agencies having jurisdiction the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.
- (13) Description of each postconstruction stormwater management practice, including but not limited to dimensions, material specifications and installation details for each postconstruction stormwater management practice.
- (14) Site map/construction drawing(s) showing the specific location(s) and size(s) of each postconstruction stormwater management practice.
- (15) Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storm.
- (16) Comparison of post-development stormwater runoff conditions with predevelopment conditions.

§ 196-8. Performance and design criteria for stormwater management and erosion and sediment control.

All land development activities shall be subject to the following performance and design criteria:

- A. For the purpose of this article, the following documents shall serve as the official guides and specifications for stormwater management. Stormwater management practices that are designed and constructed in accordance with these technical documents shall be presumed to meet the standards imposed by this article chapter. Copies of the two manuals are on file in the office of the Stormwater Management Officer. (NOTE: The New York State technical guidance documents may be ordered from The Department. An order form as well as downloadable versions of the Manuals are available on the Internet at:
<http://www.dec.state.ny.us/website/dow/toolbox/escstandards/index.html> or
<http://www.dos.state.ny.us/lgss/stormwaterpub/index.html>.)
 - (1) The New York State Stormwater Management Design Manual (New York State Department of Environmental Conservation, most recent version including applicable updates or its successors, hereafter referred to as the "Design Manual").
 - (2) New York Standards and Specifications for Erosion and Sediment Control (Empire State Chapter of the Soil and Water Conservation Society, 2005, most recent version, including applicable updates, or its successors, hereafter referred to as the "Erosion Control Manual").
- B. Where stormwater management practices are not in accordance with technical standards, the owner, applicant or developer must demonstrate equivalence to the technical standards as set forth in § 196-8, and the SWPPP shall be prepared by a certified professional in erosion and sediment control, professional engineer or other professional(s) deemed acceptable by the NYSDEC.
- C. No land development activity shall cause an increase in turbidity that will result in substantial visible contrast to natural conditions in surface waters of the State of New York.

§ 196-9. Maintenance, inspection and repair of stormwater facilities.

- A. The owner, applicant or developer of the land development activity 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, applicant or developer to achieve compliance with the conditions of this article. Sediment shall be removed from sediment traps or sediment ponds whenever their design capacity has been reduced by 50%, and placed in an acceptable location and properly stabilized.
- B. The owner, applicant, developer or its representative shall be on site at all times when construction or grading activity takes place and shall maintain the effectiveness of all erosion and sediment control practices. Inspections shall be conducted and inspection reports shall be completed by a landscape architect, certified professional in erosion and sediment control, professional engineer or other professional(s) deemed acceptable by the NYSDEC every seven days and within 24 hours of any storm event producing 0.5 inch of precipitation or more. The reports shall be maintained in a site log book and transmitted to the SMO within two business days of the date of the inspection.
- C. Prior to the issuance of any approval that has a permanent stormwater management facility as one of the requirements, other than one serving an individual single-family residence, the owner, applicant or developer must execute an easement that shall be binding on all subsequent landowners served by the permanent stormwater management facility. The easement shall be in a form acceptable to the Village Attorney and shall provide for access to the facility at reasonable times for periodic inspection by the Village to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this article. The easement shall be recorded by the grantor in the office of the County Clerk after approval by the Village Attorney.
- D. The owner or operator of permanent stormwater management practices installed in accordance with this article shall operate and maintain the stormwater management practices to achieve the goals of this article. Proper operation and maintenance also includes, as a minimum, the following:
 - (1) A preventive/corrective maintenance program for all facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator to achieve the goals of this article.
 - (2) Written procedures for operation and maintenance and training new maintenance personnel.
 - (3) Discharges from the SMPs shall not exceed design criteria or cause or contribute to water quality standard violations in accordance with § 196-8C.
 - (4) If required by the SMO, an annual report shall be submitted to the SMO within 30 calendar days of the end of the calendar year.
- E. Prior to the issuance of any final plan approval, the owner, applicant or developer must execute a formal maintenance agreement for permanent stormwater management facilities, other than those serving an individual single-family residence, binding on all subsequent landowners. The maintenance agreement shall be in a form acceptable to the Village Attorney and shall be recorded in the office of the County Clerk as a deed restriction on the property. The Village of Croton-on-Hudson, in lieu of a maintenance agreement, at its sole discretion may accept dedication of any existing or future permanent stormwater management facility, provided such facility meets all the requirements of this article and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

§ 196-10. Construction inspection, administration and maintenance.

- A. The Stormwater Management Officer may require such inspections as are necessary to determine compliance with this article and may either approve that portion of the work completed or notify the

applicant wherein the work fails to comply with the requirements of this article and the stormwater pollution prevention plan (SWPPP) as approved.

- (1) To obtain inspections, the applicant shall notify Village enforcement officials at least 48 hours before any of the following as required by the Stormwater Management Officer:
 - (a) Start of construction;
 - (b) Installation of sediment and erosion control measures;
 - (c) Completion of site clearing;
 - (d) Completion of rough grading;
 - (e) Installation of constructed stormwater improvements;
 - (f) Completion of final grading;
 - (g) Close of the construction season;
 - (h) Completion of final landscaping; and
 - (i) Successful establishment of landscaping in public areas.
 - (2) If any violations are found, the owner, applicant and/or developer shall be notified in writing of the nature of the violation and the required corrective actions. No further work shall be conducted except for site stabilization until any violations are corrected and all work previously completed has received approval by the Stormwater Management Officer.
- B. It shall be the primary responsibility of the property owner(s) and the successor property owner(s) to perform all necessary inspections, maintenance, report submissions, adjustments, repair, replacement and reconstruction of the stormwater management facilities. Required inspections shall be conducted and reports prepared by a certified professional in erosion and sediment control, a professional engineer or other professional(s) deemed acceptable by the NYSDEC. If, at any time, the Stormwater Management Officer determines that necessary inspections, reports, maintenance, repairs, adjustments, replacements or reconstructions have not been properly performed, notice of such determination shall be given to the property owner(s) of the property or properties upon which the stormwater facility or facilities are situated and shall provide a reasonable period under the circumstances to cure such improper performance. If the property owner(s) fails to timely correct any and all deficiencies as provided in the notice, the Village may undertake to perform any such work or work that it finds, in its sole judgment, as necessary to preserve the stormwater management functions or stormwater management practices (SMPs), at the cost and expense of the property owner(s) and the successor property owner(s). Copies of all bills, statements and invoices substantiating such costs, including costs of consultants, shall be included with written notice of same. In the event that all such costs and expenses are not paid within 30 days of issuance of statements for this work, the total cost of such work shall constitute a lien against the property or properties upon which the stormwater management facilities are situated, which shall be levied and collected in the same manner as Village real estate taxes or in such manner otherwise provided by law. The property owner(s) and the successor property owner(s) shall be personally liable for the payment of all such costs, including costs of collection and reasonable attorney's fees. Where multiple lots are involved, each lot shall individually and separately bear its equal share of such costs.
- C. Except for activities regulated under § **196-7** herein, all applicants are required to submit "as built" plans for any stormwater management practices located on-site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a New York State licensed land surveyor or professional engineer.
- D. Inspection programs may be established on any reasonable basis, including, but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of

possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the SPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater management practices.

- E. The Stormwater Management Officer may require monitoring and reporting from entities subject to this article as are necessary to determine compliance with this article.
- F. When any new stormwater management facility is installed on private property or when any new connection is made between private property and the public stormwater system, the landowner shall grant to the Village and other agencies having jurisdiction the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

§ 196-11. Performance guarantee.

- A. In order to ensure the full and faithful completion of all land development activities related to compliance with all conditions set forth by the Village in its approval of the stormwater pollution prevention plan, the Village may require the owner, applicant or developer to provide, prior to construction, a performance bond, cash escrow, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the Village as the beneficiary. The security shall be in an amount to be determined by the Village based on submission of final design plans, with reference to actual construction and landscaping costs. The performance guarantee shall remain in force until the surety is released from liability by the Village, provided that such period shall not be less than one year from the date of final acceptance or such other certification that the facility(ies) has been constructed in accordance with the approved plans and specifications and that a one-year inspection has been conducted and the facilities have been found to be acceptable to the Village. Per-annum interest on cash escrow deposits shall be reinvested in the account until the surety is released from liability.
- B. Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or manages a commercial or industrial facility, the developer, prior to construction, may be required to provide the Village with an irrevocable letter of credit from an approved financial institution or surety to ensure proper operation and maintenance of all stormwater management and erosion control facilities both during and after construction based upon the advice of the SMO. If the developer or landowner fails to properly operate and maintain stormwater management and erosion and sediment control facilities, the Village may draw upon the account to cover the costs of proper operation and maintenance, including engineering and inspection costs.
- C. Entities subject to this article shall maintain records demonstrating compliance with this article.

§ 196-12. Enforcement; penalties for offenses.

- A. When the SMO determines that a land development activity is not being carried out in accordance with any requirement of this article, or that any provision of this article is not being complied with, the SMO may issue a written notice of violation to the landowner, applicant, contractor and/or developer. The notice of violation shall contain:
 - (1) The name and address of the landowner, contractor, developer or applicant;
 - (2) The address, when available, or a description of the building, structure or land upon which the violation is occurring;

- (3) A statement specifying the nature of the violation;
 - (4) A description of the remedial measures necessary to cure the violation and a time schedule for the completion of such remedial action; and
 - (5) A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed.
- B. If the notice of violation is not complied with within the time provided in the notice, the SMO may request the Village Attorney to institute the appropriate proceedings at law or in equity to prosecute, restrain, correct or abate such violation and for other attendant remedial measures.
- C. The SMO may issue a stop-work order for violations of this article. Persons receiving a stop-work order shall be required to halt all land development activities and other construction activities on the site, except those activities, approved by the SMO, that address the violations leading to the stop-work order. The stop-work order shall be in effect until the SMO confirms that the violation has been satisfactorily addressed. Failure to address a stop-work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this article.
- D. Issuance of a stop-work order by the SMO shall be as provided in Chapter **86** of the Village Code. A stop-work order may be appealed by filing a written notice of appeal with the Planning Board not later than 30 days after service of the stop-work order upon the applicant. A hearing shall be scheduled by the Planning Board within 20 days of receipt of request for a hearing. After the close of the hearing, the Planning Board may confirm, modify or cancel the stop-work order.
- E. Any violation of this article may be restrained by injunction or otherwise abated in a manner provided by this article.
- F. Any person who violates the provisions of this article shall be guilty of an offense punishable by a fine not less than \$500 nor more than \$1,000 or imprisonment for a period not to exceed six months, or both, for conviction of a first offense; for conviction of a second offense, both of which were committed within a period of five years, punishable by a fine not less than \$1,000 nor more than \$1,500 or imprisonment for a period not to exceed six months, or both; and upon conviction for a third or subsequent offense, all of which were committed within a period of five years, punishable by a fine not less than \$1,500 nor more than \$2,000 or imprisonment for a period not to exceed six months, or both. However, for the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this article shall be deemed misdemeanors, and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.
- G. In addition to any penalty provided herein or by law, any person in violation of this article may be required to restore land to its undisturbed condition and/or mitigate on-site and off-site damage from stormwater runoff, sediment or pollutants resulting from the violator's activities. In the event that restoration is not undertaken within a reasonable time after notice, the SMO may take necessary corrective action, the cost of which shall become a lien upon the property until paid.
- H. Under exigent circumstances, if any building or land development activity, minor land disturbance activity or permanent stormwater management facility is installed, conducted or operated in violation of this article, the Stormwater Management Officer may prevent the occupancy of said building or land, including the withholding of a certificate of occupancy. It shall be the obligation of the property owner to remediate the violation, at which time the Stormwater Management Officer shall further consider allowing occupancy of the building or land.

§ 196-13. Fees for services.

Application fees established by resolution of the Village Board of Trustees shall be submitted with the application. In addition, in accordance with the provisions of Chapter **178** of the Village Code, any person undertaking land development activities regulated by this article shall reimburse the Village for

the cost of professional services incurred by the Village for the review of SWPPPs and for the performance of inspections and/or maintenance activities as provided in this article. The Village may establish escrow accounts for these purposes as provided in Chapter **178** of the Village Code.

Article II. Illegal Discharges and Illicit Connections to Separate Storm Sewer System

§ 196-14. Purpose and objectives.

- A. The purpose of this article is to provide for the health, safety, and general welfare of the citizens of the Village of Croton-on-Hudson through the regulation of nonstormwater discharges to the municipal separate storm sewer system (MS4) to the maximum extent practicable as required by federal and state law. This article establishes methods for controlling the introduction of pollutants or excess flow into the MS4 in order to comply with requirements of the SPDES General Permit for Municipal Separate Storm Sewer Systems.
- B. The objectives of this article are:
- (1) To meet the requirements of the SPDES General Permit for Stormwater Discharges from MS4s, Permit No. GP-02-02 or as amended or revised;
 - (2) To regulate the contribution of pollutants to the MS4 since such systems are not designed to accept, process or discharge nonstormwater wastes;
 - (3) To prohibit illegal discharges and illicit connections to the MS4;
 - (4) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this article; and
 - (5) To promote public awareness of the adverse environmental impacts involved in the improper discharge of trash, yard waste, lawn chemicals, pet waste, wastewater, grease, oil, petroleum products, cleaning products, paint products, hazardous waste, sediment and other pollutants into the MS4.

§ 196-15. Definitions.

Whenever used in this article, the following terms will have meanings set forth below:

BEST MANAGEMENT PRACTICES (BMPs)

Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

CLEAN WATER ACT

The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

DESIGN PROFESSIONAL

A New York State licensed professional engineer or architect.

EPA

The United States Environmental Protection Agency.

HAZARDOUS MATERIALS

Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

ILLEGAL DISCHARGE

Any direct or indirect nonstormwater discharge to the MS4, except as exempted in § **196-18A** of this article.

ILLCIT CONNECTIONS

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the MS4, including, but not limited to:

- A. Any conveyances which allow any nonstormwater discharge, including but not limited to treated or untreated sewage, process wastewater, and wash water, to enter the MS4 and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted or approved by an authorized enforcement agency; or
- B. Any drain or conveyance connected from a commercial or industrial land use to the MS4 which has not been documented in plans, maps or equivalent records and approved by an authorized enforcement agency.

INDIVIDUAL SEWAGE TREATMENT SYSTEM

A facility serving one or more parcels of land or residential households, or a private, commercial or institutional facility, that treats sewage or other liquid wastes for discharge into the groundwaters of New York State, except where a permit for such a facility is required under the applicable provisions of Article 17 of the Environmental Conservation Law.

MS4

The Municipal separate storm sewer system.

MUNICIPAL SEPARATE STORM SEWER SYSTEM

A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- A. Owned or operated by the Village of Croton-on-Hudson;
- B. Designed or used for collecting or conveying stormwater;
- C. Which is not a combined sewer; and
- D. Which is not part of a publicly owned treatment works (POTW) as defined at 40 CFR 122.2.

NONSTORMWATER DISCHARGE

Any discharge to the MS4 that is not composed entirely of stormwater.

NYSDEC

The New York State Department of Environmental Conservation.

PERSON

Any individual or individuals, firm, partnership, association, corporation, company, organization or other legal entity of any kind, including municipal corporations, governmental agencies or subdivisions thereof.

POLLUTANT

Dredged spoil, filter backwash, solid waste, incinerator residue, treated or untreated 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.

POLLUTANT OF CONCERN

Sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

PREMISES

Any building, lot, parcel of land, or portion of land, whether improved or unimproved, including adjacent sidewalks and parking strips.

SPECIAL CONDITIONS

A. DISCHARGE COMPLIANCE WITH WATER QUALITY STANDARDS

The condition that applies where the Village has been notified by the NYSDEC that the discharge of stormwater authorized under its MS4 permit may have caused or has the reasonable potential to cause or contribute to the violation of an applicable water quality standard. Under this condition, the Village must take all necessary actions to ensure future discharges do not cause or contribute to a violation of water quality standards.

B. LISTED WATERS

TERS — The condition in the Village's MS4 permit that applies where the MS4 discharges to a 303(d) listed water. Under this condition, the stormwater management program must ensure no increase of the listed pollutant of concern to the 303(d) listed water.

C. TOTAL MAXIMUM DAILY LOAD (TMDL) STRATEGY

The condition in the Village's MS4 permit where a TMDL including requirements for control of stormwater discharges has been approved by the EPA for a water body or watershed into which the MS4 discharges. If the discharge from the MS4 did not meet the TMDL stormwater allocations prior to September 10, 2003, the Village was required to modify its stormwater management program to ensure that reduction of the pollutant of concern specified in the TMDL is achieved.

D. THE CONDITION IN THE VILLAGE'S MS4 PERMIT THAT APPLIES IF A TMDL IS APPROVED IN THE FUTURE BY THE EPA FOR ANY WATER BODY OR WATERSHED INTO WHICH AN MS4 DISCHARGES

Under this condition, the Village must review the applicable TMDL to see if it includes requirements for control of stormwater discharges. If an MS4 is not meeting the TMDL stormwater allocations, the Village must, within six months of the TMDL's approval, modify its stormwater management program to ensure that reduction of the pollutant of concern specified in the TMDL is achieved.

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) STORMWATER DISCHARGE PERMIT

A permit issued by the NYSDEC that authorizes the discharge of pollutants to waters of the state.

STORMWATER

Rainwater, surface runoff, snowmelt and drainage.

STORMWATER MANAGEMENT OFFICER (SMO)

The Village Engineer and his or her designees, and/or such other Village officers or employees as designated by the Village Manager. The Westchester County Department of Health presently is and shall continue to be the enforcement authority for the design, repair, replacement and operation of individual sewage treatment systems within the MS4.

303(d) LIST

A list of all surface waters in the state for which beneficial uses of the water (drinking, recreation, aquatic habitat, and industrial use) are impaired by pollutants, prepared periodically by the DEC as required by Section 303(d) of the Clean Water Act. 303(d) listed waters are estuaries, lakes and streams that fall short of state surface water quality standards and are not expected to improve within the next two years.

TOTAL MAXIMUM DAILY LOAD (TMDL)

The maximum amount of a pollutant to be allowed to be released into a water body so as not to impair uses of the water, allocated among the sources of that pollutant.

VILLAGE

The Village of Croton-on-Hudson, New York.

WASTEWATER

Water that is not stormwater, is contaminated with pollutants and is or will be discarded.

§ 196-16. Applicability.

This article shall apply to all water entering the MS4 generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

§ 196-17. Administration and enforcement.

The Stormwater Management Officer(s) shall administer, implement and enforce the provisions of this article. Such powers granted or duties imposed upon the SMO(s) may be delegated by the SMO(s) as may be authorized by the Village Manager.

§ 196-18. Prohibition of illegal discharges and illicit connections; exceptions.

A. Prohibition of illegal discharges. No person shall discharge or cause to be discharged into the MS4 any materials other than stormwater except as provided in § **196-18A**. The commencement, conduct or continuance of any illegal discharge to the MS4 is prohibited except as described as follows:

- (1) The following discharges are exempt from discharge prohibitions established by this article, unless the NYSDEC or the Village Board of Trustees by resolution has determined them to be substantial contributors of pollutants: water line flushing or other potable water sources, landscape irrigation or lawn watering, existing diverted stream flows, rising groundwater, uncontaminated groundwater infiltration to storm drains, uncontaminated pumped groundwater, foundation or footing drains, crawl space or basement sump pumps, air conditioning condensate, irrigation water, springs, water from individual residential car washing, natural riparian habitat or wetland flows, dechlorinated swimming pool discharges, residential street wash water, water from fire-fighting activities, and any other water source not containing pollutants.
- (2) Discharges approved in writing by the SMO to protect life or property from imminent harm or damage, provided that such approval shall not be construed to constitute compliance with other applicable laws and requirements, and further provided that such discharges may be permitted for a specified time period and under such conditions as the SMO may deem appropriate to protect such life and property while reasonably maintaining the purpose and intent of this article.

- (3) Dye testing in compliance with applicable state and local laws is a allowable discharge, but requires a verbal notification to the SMO at least 24 hours prior to the time of the test.
- (4) The prohibition shall not apply to any discharge permitted under a SPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the NYSDEC, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the MS4.

B. Prohibition of illicit connections.

- (1) The construction, use, maintenance or continued existence of illicit connections to the MS4 is prohibited.
- (2) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.
- (3) A person is considered to be in violation of this article if the person connects a line conveying sewage or any other wastewater discharge to the Village's MS4, or allows such a connection to continue.

§ 196-19. Prohibition against activities contaminating stormwater.

A. Activities that are subject to the requirements of this section include:

- (1) Activities that cause or contribute to a violation of the Village's MS4 SPDES permit.
- (2) Activities that cause or contribute to the Village being subject to the special conditions as defined in § **196-15**, Definitions, of this article.

B. Upon notification to a person that he or she is engaged in activities that cause or contribute to violations of the Village's MS4 SPDES permit authorization, that person shall take all reasonable actions to correct such activities such that he or she no longer causes or contributes to violations of the Village's MS4 SPDES permit authorization.

§ 196-20. Use of best management practices required.

A. Where the SMO has identified illegal discharges as defined in § **196-15** or activities contaminating stormwater as defined in § **196-19**, the Village may require implementation of best management practices (BMPs) to control those illegal discharges and activities.

- (1) The owner or operator of a commercial or industrial establishment shall provide, at its own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the MS4 through the use of structural and nonstructural BMPs.
- (2) Any person responsible for a property or premises, which is, or may be, the source of an illegal discharge as defined in § **196-15** or an activity contaminating stormwater as defined in § **196-19** may be required to implement, at said person's expense, additional structural and nonstructural BMPs to reduce or eliminate the source of pollutant(s) to the MS4.
- (3) Compliance with all terms and conditions of a valid SPDES permit authorizing the discharge of stormwater associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section.

B. Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris and other obstacles that would pollute, contaminate or significantly retard the flow of water through the

watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function or physical integrity of the watercourse.

§ 196-21. Suspension of access to MS4.

- A. The SMO may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, to the health or welfare of persons, or to the MS4. The SMO shall notify the person of such suspension within a reasonable time thereafter, in writing, including the reasons for the suspension. If the violator fails to comply with a suspension order issued in an emergency, the SMO may take such steps as deemed necessary to prevent or minimize damage to the MS4 or to minimize danger to persons.
- B. Suspension due to the detection of illegal discharge. Any person discharging to the Village's MS4 in violation of this article may have his or her MS4 access terminated if such termination would abate or reduce an illegal discharge. The SMO will notify a violator in writing of the proposed termination of its MS4 access and the reasons therefor. The violator may petition the SMO for a reconsideration. Access may be granted by the SMO, with or without conditions, if he/she finds that the illegal discharge has ceased and the discharger has taken steps to prevent its recurrence. Access may be denied if the SMO determines in writing that the illegal discharge has not ceased or is likely to recur. A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this section, without the prior approval of the SMO.

§ 196-22. Industrial or construction activity discharges.

Any person subject to an industrial or construction activity SPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Village prior to the allowing of discharges to the MS4. All reports submitted to the NYSDEC as required by the SPDES permit shall also be contemporaneously transmitted to the SMO.

§ 196-23. Access to property; inspection; monitoring of discharges.

- A. Applicability. This section applies to all facilities that the SMO must inspect to enforce any provision of this article, or whenever the authorized enforcement agency has cause to believe that there exists, or potentially exists, in or upon any premises any condition which constitutes a violation of this article.
- B. Access to facilities.
 - (1) The SMO shall be permitted to enter and inspect facilities subject to regulation under this article as often as may be necessary to determine compliance with this article. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to the SMO.
 - (2) Facility operators shall allow the SMO ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records as may be required to implement this article.
 - (3) The Village shall have the right to set up on any facility subject to this article such devices as are necessary in the opinion of the SMO to conduct monitoring and/or sampling of the facility's stormwater discharge or conduct other testing as deemed necessary by the SMO.

- (4) The Village has the right to require the facilities subject to this article to install monitoring equipment as is reasonably necessary to determine compliance with this article. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.
- (5) Unreasonable delays in allowing the Village access to a facility subject to this article is a violation of this article. A person who is the operator of a facility subject to this article commits an offense if the person denies the Village reasonable access to the facility for the purpose of conducting any activity authorized or required by this article.
- (6) If the SMO has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this article, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this article or any order issued hereunder, then the SMO may seek issuance of a search warrant from any court of competent jurisdiction.

§ 196-24. Notification of spills.

Notwithstanding other requirements of this article, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation, has information of any known or suspected release of materials which is resulting or may result in illegal discharges or pollutants discharging into the MS4, said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of nonhazardous materials, said person shall notify the Village in person or by telephone or facsimile no later than the next business day. Notifications in person or by telephone shall be confirmed by written notice addressed and mailed to the Village within three business days of the telephone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years. Appropriate state and federal agencies shall also be notified as per applicable regulations.

§ 196-25. Enforcement; penalties for offenses.

- A. Notice of violation. When the SMO finds that a person has violated a prohibition or failed to meet a requirement of this article, the SMO may order compliance by written notice of violation to the responsible person. Such notice may require, without limitation:
 - (1) The elimination of illicit connections or illegal discharges;
 - (2) That violating discharges, practices, or operations shall cease and desist;
 - (3) The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
 - (4) The performance of monitoring, analyses, and reporting; and
 - (5) The implementation of source control or treatment BMPs.
- B. If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by the Village or a contractor designated by the Village and the expense thereof shall be charged to the violator.

- C. If the violation has not been corrected pursuant to the requirements set forth in the notice of violation, then the SMO shall request the owner's permission for access to the subject private property to take any and all measures reasonably necessary to abate the violation and/or restore the property.
- D. If refused access to the subject private property, the SMO may seek a warrant in a court of competent jurisdiction to be authorized to enter upon the property to determine whether a violation has occurred and remains unabated. Upon determination that a violation has occurred and remains unabated, the SMO may seek a court order to take any and all measures reasonably necessary to abate the violation and/or restore the property. The cost of implementing and maintaining such measures shall be the sole responsibility of the discharger.
- E. Within 30 days after abatement of the violation by or under authorization of the SMO, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest with the Village Board of Trustees objecting to the amount of the assessment within 10 days of receipt of said notice. If the amount due is not paid within 30 days after the disposition of any protests or the expiration of the time to file an appeal, whichever is earlier, the charges shall become a lien on the property for the amount of the assessment to be collected in the same manner as real estate taxes.
- F. Any person who violates the provisions of this article shall be guilty of a offense punishable by a fine not less than \$500 nor more than \$1,000 or imprisonment for a period not to exceed six months, or both; for conviction of a second offense, both of which were committed within a period of five years, punishable by a fine not less than \$1,000 nor more than \$1,500 or imprisonment for a period not to exceed six months, or both; and upon conviction for a third or subsequent offense, all of which were committed within a period of five years, punishable by a fine not less than \$1,500 nor more than \$2,000 or imprisonment for a period not to exceed six months, or both. However, for the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this article shall be deemed misdemeanors, and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.

§ 196-26. Injunctive relief.

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this article. If a person has violated or continues to violate the provisions of this article, the SMO may request the Village Attorney to petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

§ 196-27. Violations deemed public nuisance.

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this article is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

§ 196-28. Remedies not exclusive.

The remedies listed in this article are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

§ 196-29. Severability.

If any provision of this chapter or of any article, section, subsection, paragraph, subdivision or clause of this chapter shall be judged invalid for any reason by a court of competent jurisdiction, such order or judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this chapter.

Select Language ▼

Chapter 262

STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL

GENERAL REFERENCES

Excavations and topsoil removal — See Ch. 157.

Steep slopes — See Ch. 259.

Flood damage prevention — See Ch. 175.

Storm sewers — See Ch. 263.

Freshwater wetlands, water bodies and watercourses — See Ch. 179.

Subdivision of land — See Ch. 265.

Sludge and hazardous materials — See Ch. 253.

Diversion of watercourses — See Ch. 301.

Zoning — See Ch. 307.

§ 262-1. Intent.

In accordance with the Municipal Home Rule Law of the State of New York, the Town of Cortlandt has the authority to enact local laws for the purpose of promoting the health, safety or general welfare of the Town and for the protection and enhancement of its physical environment. With this purpose in mind, these regulations are enacted with the intent of providing stormwater, erosion and sediment control practices within the Town of Cortlandt. It is also the intent of this chapter to promote the public purposes identified in this section by providing for the protection, preservation, and proper maintenance of stormwater facilities and preventing or minimizing erosion due to flooding and stormwater runoff.

§ 262-2. Definitions.

As used in this chapter, the following terms shall have the meanings indicated:

APPLICANT — A property owner or agent of a property owner who has filed an application for a land development activity.

APPROVING AUTHORITY — The Town Board, Zoning Board of Appeals, Planning Board or the Director of the Department of Technical Services or his designee.

BEST MANAGEMENT PRACTICES (BMPs) — A practice or combination of practices that is the most effective and practicable (including technological, economic and institutional considerations) means of controlling point or nonpoint source pollutants at levels compatible with environmental quality goals.

BUILDING — Any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.

CHANNEL — A natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

CLEARING — Any activity that removes the vegetative surface cover.

DEDICATION — The deliberate appropriation of property by its owner for general public use.

DEPARTMENT — The New York State Department of Environmental Conservation.

DESIGN MANUAL — The New York State Stormwater Design Manual, most recent version, including applicable updates that serves as the official guide for stormwater management principles, methods and practices.

DEVELOPER — A person who undertakes land development activities.

EROSION CONTROL MANUAL — The most recent version of the New York Standards and Specifications for Erosion and Sediment Control manual, commonly known as the "Blue Book."

GRADING — Excavation or fill of material, including the resulting conditions thereof.

IMPERVIOUS COVER — Those surfaces, improvements and structures that cannot effectively infiltrate rainfall, snowmelt and water (e.g., building rooftops, pavement, sidewalks, driveways, etc.).

INDUSTRIAL STORMWATER PERMIT — A State Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

INFILTRATION — The process of percolating stormwater into the subsoil.

LAND DEVELOPMENT ACTIVITY — Construction activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than one acre, or activities disturbing less than one acre of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land development activities may take place at different times on different schedules.

LANDOWNER — The legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

MAINTENANCE AGREEMENT — A legally recorded document or a municipally formed drainage district that acts as a property deed restriction, and which provides for long-term maintenance of stormwater management practices.

NONPOINT SOURCE POLLUTION — Pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

PHASING — Clearing a parcel of land in distinct pieces or parts, with the stabilization of each piece completed before the clearing of the next.

POLLUTANT OF CONCERN — Sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

PROJECT — Land development activity.

RECHARGE — The replenishment of underground water reserves.

SEDIMENT CONTROL — Measures that prevent eroded sediment from leaving the area of disturbance.

SENSITIVE AREAS — Cold-water fisheries, shellfish beds, swimming beaches, groundwater recharge areas, water supply reservoirs, habitats for threatened, endangered or special concern species.

SPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES GP-02-01 — A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM MUNICIPAL SEPARATE STORMWATER SEWER SYSTEMS GP-02-02 — A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA-established water quality standards and/or to specify stormwater control standards.

STABILIZATION — The use of practices that prevent exposed soil from eroding.

STOP-WORK ORDER — An order issued which requires that all construction activity on a site be stopped.

STORMWATER — Rainwater, surface runoff, snowmelt and drainage.

STORMWATER HOTSPOT — A land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies.

STORMWATER MANAGEMENT — The use of structural or nonstructural practices that are designed to reduce stormwater runoff and mitigate its adverse impacts on property, natural resources and the environment.

STORMWATER MANAGEMENT FACILITY — One or a series of stormwater management practices installed, stabilized and operating for the purpose of controlling stormwater runoff.

STORMWATER MANAGEMENT OFFICER (SMO) — The Director of the Department of Technical Services or his/her designee.

STORMWATER MANAGEMENT PRACTICES (SMPS) — Measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing flood damage and preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) — A plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

STORMWATER RUNOFF — Flow on the surface of the ground, resulting from precipitation.

SURFACE WATERS OF THE STATE OF NEW YORK — Lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, 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. Storm sewers and waste treatment systems, including treatment ponds or lagoons which also meet the criteria of this definition, are not waters of the state. This exclusion applies only to man-made bodies of water which neither were originally created in waters of the state (such as a disposal area in wetlands) nor resulted from impoundment of waters of the state.

WETLAND(S) — An area that is regulated by the Department or by other local laws and ordinances of the Town of Cortlandt. See also Chapter 179, Freshwater Wetlands, Water Bodies and Watercourses.

WATERCOURSE — A permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

WATERWAY — A channel that directs surface runoff to a watercourse or to the public storm drain.

§ 262-3. Findings of fact.

It is hereby determined that:

- A. Land development activities and associated increases in site impervious cover often alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, or sediment transport and deposition.
- B. This stormwater runoff contributes to increased quantities of water-borne pollutants, including siltation of aquatic habitat for fish and other desirable species.
- C. Clearing and grading during construction tends to increase soil erosion and add to the loss of native vegetation necessary for terrestrial and aquatic habitat.
- D. Improper design and construction of stormwater management practices can increase the velocity of stormwater runoff, thereby increasing stream bank erosion and sedimentation.
- E. Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream baseflow.
- F. Substantial economic losses can result from these adverse impacts on the waters of the municipality.
- G. Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from land development activities.
- H. The regulation of stormwater runoff discharges from land development activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will minimize threats to public health and safety.

- I. Regulation of land development activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the adverse effects of erosion and sedimentation from development.

§ 262-4. Purpose.

The purpose of this chapter is to establish minimum stormwater management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing within this jurisdiction and to address the findings of fact in § 262-3 hereof. This chapter seeks to meet those purposes by achieving the following objectives:

- A. Meet the requirements of minimum measures 4 and 5 of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s), Permit No. GP-02-02, when adopted or as amended or revised;
- B. Require land development activities to conform to the substantive requirements of the NYS Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities GP-02-01, or as amended or revised;
- C. Minimize increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and stream bank erosion and maintain the integrity of stream channels;
- D. Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality;
- E. Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable; and
- F. Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and ensure that these management practices are properly maintained and eliminate threats to public safety.

§ 262-5. Applicability.

- A. This chapter shall be applicable to all land development activities as defined in this chapter.
- B. The municipality shall designate the Director of the Department of Technical Services or his designee to act as Stormwater Management Officer. The Stormwater Management Officer shall accept and review all stormwater pollution prevention plans and forward such plans to the applicable municipal board. The Stormwater Management Officer may (1) review the plans, (2) or engage the services of a registered professional engineer to review the plans, specifications and related documents, to be paid for by the applicant.

- C. All land development activities subject to review and approval by an approving authority (Town Board, Planning Board, Zoning Board of Appeals, DOTs Director) in the Town of Cortlandt shall be reviewed subject to the standards contained in this chapter.

§ 262-6. Exemptions.

The following activities may be exempt from review under this chapter:

- A. Agricultural activity as defined in this chapter.
- B. Routine maintenance activities that disturb fewer than five acres and are performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility.
- C. Repairs to any stormwater management practice or facility deemed necessary by the Stormwater Management Officer.
- D. Any part of a subdivision if a plat for the subdivision has been approved by the approving authority on or before the effective date of this chapter.
- E. Land development activities for which a building permit has been approved on or before the effective date of this chapter.
- F. Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.
- G. Emergency activity immediately necessary to protect life, property or natural resources.
- H. Activities of an individual engaging in home gardening by growing flowers, vegetable and other plants primarily for use by that person and his or her family.
- I. Landscaping and horticultural activities in connection with an existing structure.

§ 262-7. Stormwater pollution prevention plans.

- A. Required. No application for approval of a land development activity shall be finalized until the approving authority has received a stormwater pollution prevention plan (SWPPP) when required, and prepared in accordance with the specifications in this chapter.
- B. Contents.
 - (1) All SWPPPs shall provide the following background information and erosion and sediment controls:
 - (a) Background information about the scope of the project, including location, type and size of project.
 - (b) Site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map should 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 off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s). The site map should be at a scale no smaller than one inch equals 100 feet.

- (c) Description of the soil(s) present at the site.
- (d) Construction phasing plan describing the intended sequence 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. Consistent with the New York Standards and Specifications for Erosion and Sediment Control (Erosion Control Manual), not more than five acres shall be disturbed at any one time unless pursuant to an approved SWPPP.
- (e) Description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in stormwater runoff.
- (f) Description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill prevention and response.
- (g) Temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project, from initial land clearing and grubbing to project close-out.
- (h) A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice.
- (i) Dimensions, material specifications and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins.
- (j) Temporary practices that will be converted to permanent control measures.
- (k) Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice should remain in place.
- (l) Maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practice.
- (m) Name(s) of the receiving water(s).
- (n) Delineation of SWPPP implementation responsibilities for each part of the site.
- (o) Description of structural practices designed to divert flows from exposed

soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable.

(p) Any existing data that describes the stormwater runoff at the site.

(2) Conditions A, B and C.

(a) Land development activities meeting Condition A, B or C below shall also include water quantity and water quality controls (postconstruction stormwater runoff controls) as set forth below as applicable:

[1] Condition A: stormwater runoff from land development activities discharging a pollutant of concern to either an impaired water identified on the Department's 303(d) list of impaired waters or a total maximum daily load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment.

[2] Condition B: stormwater runoff from land development activities disturbing five or more acres.

[3] Condition C: stormwater runoff from construction activity disturbing between one acre and five acres of land during the course of the project, exclusive of the construction of single-family residences and construction activities at agricultural properties.

(b) SWPPP requirements for Conditions A, B and C:

[1] All information in Subsection B(1).

[2] Description of each postconstruction stormwater management practice.

[3] Site map/construction drawing(s) showing the specific location(s) and size(s) of each postconstruction stormwater management practice.

[4] Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms.

[5] Comparison of postdevelopment stormwater runoff conditions with predevelopment conditions.

[6] Dimensions, material specifications and installation details for each postconstruction stormwater management practice.

[7] Maintenance schedule to ensure continuous and effective operation of each postconstruction stormwater management practice.

[8] Maintenance easements to ensure access to all stormwater management practices at the site for the purpose of inspection and repair. Easements shall be recorded on the plan and shall remain in effect with transfer of title to the property.

- [9] Inspection and maintenance agreement binding on all subsequent landowners served by the on-site stormwater management measures in accordance with § 262-9 of this chapter.
- C. Plan certification. The SWPPP shall be prepared by a landscape architect, certified professional or professional engineer and must be signed by the professional preparing the plan, who shall certify that the design of all stormwater management practices meets the requirements in this chapter.
- D. Other environmental permits. The applicant shall assure that all other applicable environmental permits have been or will be acquired for the land development activity prior to approval of the final stormwater design plan.
- E. Contractor certification.
- (1) Each contractor and subcontractor identified in the SWPPP who will be involved in soil disturbance and/or stormwater management practice installation shall sign and date a copy of the following certification statement before undertaking any land development activity: "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan. I also understand that it is unlawful for any person to cause or contribute to a violation of water quality standards."
 - (2) The certification must include the name and title of the person providing the signature; address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.
 - (3) The certification statement(s) shall become part of the SWPPP for the land development activity.
- F. A copy of the SWPPP shall be retained at the site of the land development activity during construction, from the date of initiation of construction activities to the date of final stabilization.

§ 262-8. Performance and design criteria.

All land development activities shall be subject to the following performance and design criteria:

- A. Technical standards. For the purpose of this chapter, the following documents shall serve as the official guides and specifications for stormwater management. Stormwater management practices that are designed and constructed in accordance with these technical documents shall be presumed to meet the standards imposed by this chapter:
- (1) The New York State Stormwater Management Design Manual (New York State Department of Environmental Conservation, most current version or its successor, hereafter referred to as the "Design Manual").
 - (2) New York Standards and Specifications for Erosion and Sediment Control (Empire State Chapter of the Soil and Water Conservation Society, 2004, most current version or its successor, hereafter referred to as the "Erosion Control

Manual").

- (3) Best management practices if established by resolution of the Town Board, which may be updated from time to time.
- B. Water quality standards. No land development activity shall cause an increase in turbidity that will result in visible contrast to natural conditions in surface waters of the State of New York.

§ 262-9. Maintenance and repair of stormwater facilities.

- A. Maintenance during construction.
- (1) The applicant or developer of the land development activity 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 applicant or developer to achieve compliance with the conditions of this chapter. Sediment shall be removed from sediment traps or sediment ponds whenever their design capacity has been reduced by 50%.
 - (2) The applicant or developer or their representative shall be on site at all times when construction or grading activity takes place and shall inspect and document the effectiveness of all erosion and sediment control practices. Inspection reports shall be completed every seven days and within 24 hours of any storm event producing 0.5 inch of precipitation or more. The reports shall be delivered to the Stormwater Management Officer and also copied to the site log book.
- B. Maintenance easement(s). Prior to the issuance of any approval that has a stormwater management facility as one of the requirements, the applicant or developer must execute a maintenance easement agreement or petition the Town Board for the establishment of a drainage district which shall be binding on all subsequent landowners served by the stormwater management facility. The easement or district shall provide for access to the facility at reasonable times for periodic inspection by the approving authority of the Town of Cortlandt to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this chapter. The easement shall be recorded in the office of the County Clerk after approval by the Town Attorney for the Town of Cortlandt.
- C. Maintenance after construction. The owner or operator of permanent stormwater management practices installed in accordance with this chapter shall be operated and maintained to achieve the goals of this chapter. Proper operation and maintenance also includes, as a minimum, the following:
- (1) A preventive/corrective maintenance program for all critical facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator to achieve the goals of this chapter.
 - (2) Written procedures for operation and maintenance and training new maintenance personnel.

- (3) Discharges from the SMPs shall not exceed design criteria or cause or contribute to water quality standard violations in accordance with Subsection B.
- D. Maintenance agreements. The Town of Cortlandt shall approve a formal maintenance agreement for stormwater management facilities binding on all subsequent landowners and recorded in the office of the County Clerk as a deed restriction on the property prior to final plan approval. The maintenance agreement shall be consistent with the terms and conditions as set forth by the Town Attorney and the Director of Technical Services. The Town of Cortlandt, in lieu of a maintenance agreement, at its sole discretion may establish a drainage district to accept dedication of any existing or future stormwater management facility, provided such facility meets all the requirements of this chapter and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

§ 262-10. Erosion and sediment control.

Measures for the control of erosion and sedimentation shall be undertaken consistent with the most current version of the Westchester County Soil and Water Conservation District's Best Management Practices Manual for Erosion and Sediment Control and New York State Guidelines for Urban Erosion and Sediment Control, as amended, or their equivalents satisfactory to the approval authority.

§ 262-11. Construction inspections.

A. Erosion and sediment control inspection.

- (1) The Town of Cortlandt Stormwater Management Officer may require such inspections as necessary to determine compliance with this chapter and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of this chapter and the stormwater pollution prevention plan (SWPPP) as approved. To obtain inspections, the applicant shall notify Town of Cortlandt enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer:
 - (a) Start of construction.
 - (b) Installation of sediment and erosion control measures.
 - (c) Completion of site clearing.
 - (d) Completion of rough grading.
 - (e) Completion of final grading.
 - (f) Close of the construction season.
 - (g) Completion of final landscaping.
 - (h) Successful establishment of landscaping in public areas.

- (2) If any violations are found, the applicant and developer shall be notified in writing of the nature of the violation and the required corrective actions. No further work shall be conducted, except for site stabilization, until any violations are corrected and all work previously completed has received approval by the Stormwater Management Officer.
- B. Stormwater management practice inspections. The applicant is responsible for compliance. The SMO shall conduct periodic inspections of stormwater management practices (SMPs). All applicants are required to submit "as built" plans for any stormwater management practices located on-site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a professional engineer.
 - C. Inspection of stormwater facilities after project completion.
 - (1) Inspection programs shall be established on any reasonable basis, including, but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the SPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws.
 - (2) Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater management practices.
 - D. Submission of reports. The Town of Cortlandt Stormwater Management Officer may require monitoring and reporting from entities subject to this chapter as are necessary to determine compliance with this chapter.
 - E. Right-of-entry for inspection. When any new stormwater management facility is installed on private property or when any new connection is made between private property and the public stormwater system, the landowner shall grant to the Town of Cortlandt the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection as specified in Subsection C.

§ 262-12. Performance guarantees; recordkeeping.

- A. Construction completion guarantee. In order to ensure the full and faithful completion of all land development activities related to compliance with all conditions set forth by the Town of Cortlandt in its approval of the stormwater pollution prevention plan, the Town of Cortlandt may require the applicant or developer to provide, prior to construction, a performance bond, cash escrow, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the Town of Cortlandt as the beneficiary. The security shall be in an amount to be determined by the

approving authority based on submission of final design plans, with reference to actual construction and landscaping costs. The performance guarantee shall remain in force until the surety is released from liability by the Town of Cortlandt, provided that such period shall not be less than one year from the date of final acceptance or such other certification that the facility(ies) has been constructed in accordance with the approved plans and specifications and that a one-year inspection has been conducted and the facilities have been found to be acceptable to the Town of Cortlandt.

B. Maintenance guarantee.

- (1) Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or manages a commercial or industrial facility, the developer, prior to construction, may be required to provide the Town of Cortlandt with an irrevocable letter of credit from an approved financial institution or surety to ensure proper operation and maintenance of all stormwater management and erosion control facilities both during and after construction, and until the facilities are removed from operation. If the developer or landowner fails to properly operate and maintain stormwater management and erosion and sediment control facilities, the Town of Cortlandt may draw upon the account to cover the costs of proper operation and maintenance, including engineering and inspection costs.
- (2) Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the Town of Cortlandt after the Town has approved all construction, the developer shall provide the Town of Cortlandt with either cash, or an irrevocable letter of credit from an approved financial institution or surety to ensure proper operation of all stormwater management and erosion facilities for a period of not less than two years after the Town assumes ownership of the facilities.

C. Recordkeeping. The Town of Cortlandt may require entities subject to this chapter to maintain records demonstrating compliance with this chapter.

§ 262-13. Enforcement; penalties for offenses; fees.

A. Notice of violation. When the Town of Cortlandt determines that a land development activity is not being carried out in accordance with the requirements of this chapter, it may issue a written notice of violation to the landowner. The notice of violation shall contain:

- (1) The name and address of the landowner, developer or applicant;
- (2) The address, when available, or a description of the building, structure or land upon which the violation is occurring;
- (3) A statement specifying the nature of the violation;
- (4) A description of the remedial measures necessary to bring the land development activity into compliance with this chapter and a time schedule for the completion of such remedial action;

- (5) A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;
 - (6) A statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within 15 days of service of notice of violation.
- B. Stop-work orders. The Town of Cortlandt may issue a stop-work order for violations of this chapter. Persons receiving a stop-work order shall be required to halt all land development activities, except those activities that address the violations leading to the stop-work order. The stop-work order shall be in effect until the Town of Cortlandt confirms that the land development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a stop-work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this chapter.
- C. Violations. Any land development activity that is commenced or is conducted contrary to this chapter may be restrained by injunction or otherwise abated in a manner provided by law.
- D. Penalties.
 - (1) A violation of this chapter or a regulation made thereunder is hereby declared to be an offense, punishable by a fine not exceeding \$350 or by imprisonment for a period not to exceed six months, or both, for conviction of a first offense; for conviction of a second offense, both of which were committed within a period of five years, punishable by a fine of not less than \$350 nor more than \$700 or by imprisonment for a period not to exceed six months, or both; and upon a conviction for a third or subsequent offense, all of which were committed within a period of five years, punishable by a fine of not less than \$700 nor more than \$1,000 or by imprisonment for a period not to exceed six months, or both. However, for the purpose of conferring jurisdiction upon courts and judicial officers generally, violations of this chapter or regulation shall be deemed misdemeanors and, for such purpose only, all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation or a civil penalty of up to \$3,000 for each violation.
 - (2) In case any building or structure is erected, constructed, reconstructed, altered, converted or maintained or any building, structure or land is used in violation of this chapter, the proper local authorities of the Town, in addition to other remedies, may institute any appropriate action or proceedings to prevent such unlawful erection, construction, reconstruction, alteration, conversion, maintenance or use, to restrain, correct or abate such violations, to prevent occupancy of said building, structure or land or to prevent any illegal act, conduct, business or use in or about such building, structure or land, and upon the failure or refusal of the proper local officer, board or body of the Town to institute any such appropriate action or proceeding for a period of 10 days after written request by a resident taxpayer of the Town so to proceed, any three taxpayers of the Town residing in the district wherein such violation exists who are jointly or severally aggrieved by such violation may institute such

appropriate action or proceeding in like manner as such local office, board or body of the Town is authorized to do.

- (3) Upon his becoming aware of any violation of any of the provisions of this chapter, the Director of Code Administration and Enforcement shall serve notice of such violation on the person or corporation committing or permitting the same, and if such violation has not ceased within such reasonable time as the Director of Code Administration and Enforcement may specify, he shall institute such actions as may be authorized pursuant to this section and as may otherwise be provided under and pursuant to local laws and ordinances of the Town of Cortlandt and the laws of the State of New York.
- E. Withholding of certificate of occupancy. If any building or land development activity is installed or conducted in violation of this chapter, the Stormwater Management Officer may prevent the occupancy of said building or land.
- F. Restoration of lands. Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the Town of Cortlandt may take necessary corrective action, the cost of which shall become a lien upon the property until paid.
- G. Fees for services. The Town of Cortlandt may require any person undertaking land development activities regulated by this chapter to pay reasonable costs at prevailing rates for review of SWPPPs, inspections, or SMP maintenance performed by the Town of Cortlandt or performed by a third party for the Town of Cortlandt.

APPENDIX C

Owner/Operator Certification

Contractor Certification

OWNER/OPERATOR 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 _____

E-mail _____

Signature _____

Name of Trained Individual _____

CONTRACTOR CERTIFICATION

Contractor Certification Statement - All contractors and subcontractors identified in a SWPPP in accordance with Part III.E.1 (SPDES General Permit for Stormwater Runoff from Construction Activity, GP-0-20-001, January 2015) of this permit shall sign a copy of the following certification statement before undertaking any construction activity at the site identified in the SWPPP:

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *Owner or Operator* must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

Individual Contractor:

Name and Title (please print) _____

Signature of Contractor _____

Name of Trained Individual _____

Company / Contracting Firm:

Name of Company _____

Address of Company _____

Telephone Number / Cell Number _____

Site Information:

Address of Site _____

Today's Date:

APPENDIX D

Construction Sequence

Construction Sequence

Refer to the Plan Set for all plans and details which relate to Construction Sequence.

1. A licensed surveyor must define infrastructure locations, limits of disturbance, stormwater basin limits, and grades in the field prior to start of any construction. Limits of disturbance shall be marked with the installation of construction fence or approved equal.
2. Install all perimeter erosion control measures, construction entrance as shown on the Erosion and Sediment Control Plan and the associated Details.
3. Cut and clear trees within work area. Timbered trees, wood chips, and stumps shall be removed off-site. Strip site and place topsoil in stockpile locations shown on the plan.
4. Start construction of project access points, set-up staging areas as shown on Erosion and Sediment Control Plan.
6. Begin rough grading the site. Contractor to limit exposure of denuded soils by providing temporary stabilization for work areas that will remain undisturbed for over seven (7) days. Chipped rock that is not suitable to remain on site shall be hauled away and properly disposed of. An area has been provided for the stockpiling of removed soil and rock which is to be removed from the site.
7. Begin grading of driveway. The sections of driveway started at the beginning of the work day must be paved and completed by the end of the day.
8. Rough grade building.
9. Begin excavation of building foundations, and utilities. Protect open excavations. Where applicable, place fill on the up-slopes and side edges of fill area. Fill should be pushed in place and stabilized with tracking perpendicular to the slope. Place soil stockpiles in locations shown on the Erosion and Sediment Control Plans and associated Details.
10. Begin construction of house.
11. Upon completion of foundation, backfill to grade and immediately stabilize areas that will not receive traffic or disturbance within seven (7) days.
12. Begin the excavation and installation of utilities and drainage system. Protect trenches and open excavations from erosion. All drainage inlets shall be protected from sediment entering. There shall be no direct unfiltered discharge into the stormwater systems. The stormwater outlet shall be blocked until all upstream areas have been permanently stabilized.
13. During building and site construction maintain and re-establish as required erosion control and stabilization measures as required by the site plan and details.
14. Topsoil, rake, seed and mulch all disturbed areas. Once all proposed disturbances are completed, begin full stabilization of the site. Once the site has been stabilized, remove all temporary erosion control measures. This shall be done during optimum weather conditions to avoid sediment transport. A site shall be considered stabilized when it has a minimum uniform 80% perennial vegetation cover or other permanent non vegetative cover with a density sufficient to resist accelerated surface erosion. Once final stabilization has been achieved, unblock piping to infiltrators in order to allow flow to enter.

Winter Stabilization Notes:

1. If construction activities are expected to extend into or occur during the winter season the contractor shall anticipate proper stabilization and sequencing. Construction shall be sequenced such that wherever possible areas of disturbance that can be completed and permanently stabilized shall be done by

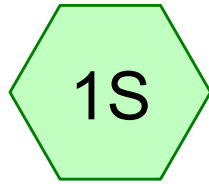
period of time shall be treated with temporary seed, mulch, and/or erosion blankets.

APPENDIX E

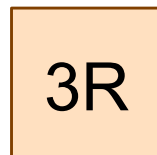
Soil Testing Data

APPENDIX F

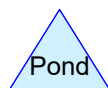
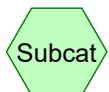
Hydrologic Analysis



DA-1 (Pre)



Design Point



21-22 Hannigan Residence 4-1-22

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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 7139 NY Westchester

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	NRCC 24-hr	D	Default	24.00	1	2.78	2
2	2-Year	NRCC 24-hr	D	Default	24.00	1	3.41	2
3	5-Year	NRCC 24-hr	D	Default	24.00	1	4.30	2
4	10-Year	NRCC 24-hr	D	Default	24.00	1	5.13	2
5	25-Year	NRCC 24-hr	D	Default	24.00	1	6.49	2
6	50-Year	NRCC 24-hr	D	Default	24.00	1	7.76	2
7	100-Year	NRCC 24-hr	D	Default	24.00	1	9.28	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.304	60	Woods, Fair, HSG B (1S)
5.304	60	TOTAL AREA

21-22 Hannigan Residence 4-1-22

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
5.304	HSG B	1S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.304		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	5.304	0.000	0.000	0.000	5.304	Woods, Fair	1S
0.000	5.304	0.000	0.000	0.000	5.304	TOTAL AREA	

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 1-Year Rainfall=2.78"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>0.20"
Flow Length=743' Tc=23.7 min CN=60 Runoff=0.35 cfs 0.087 af

Reach 3R: Design Point

Inflow=0.35 cfs 0.087 af
Outflow=0.35 cfs 0.087 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.087 af Average Runoff Depth = 0.20"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 1-Year Rainfall=2.78"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 0.35 cfs @ 12.50 hrs, Volume= 0.087 af, Depth> 0.20"

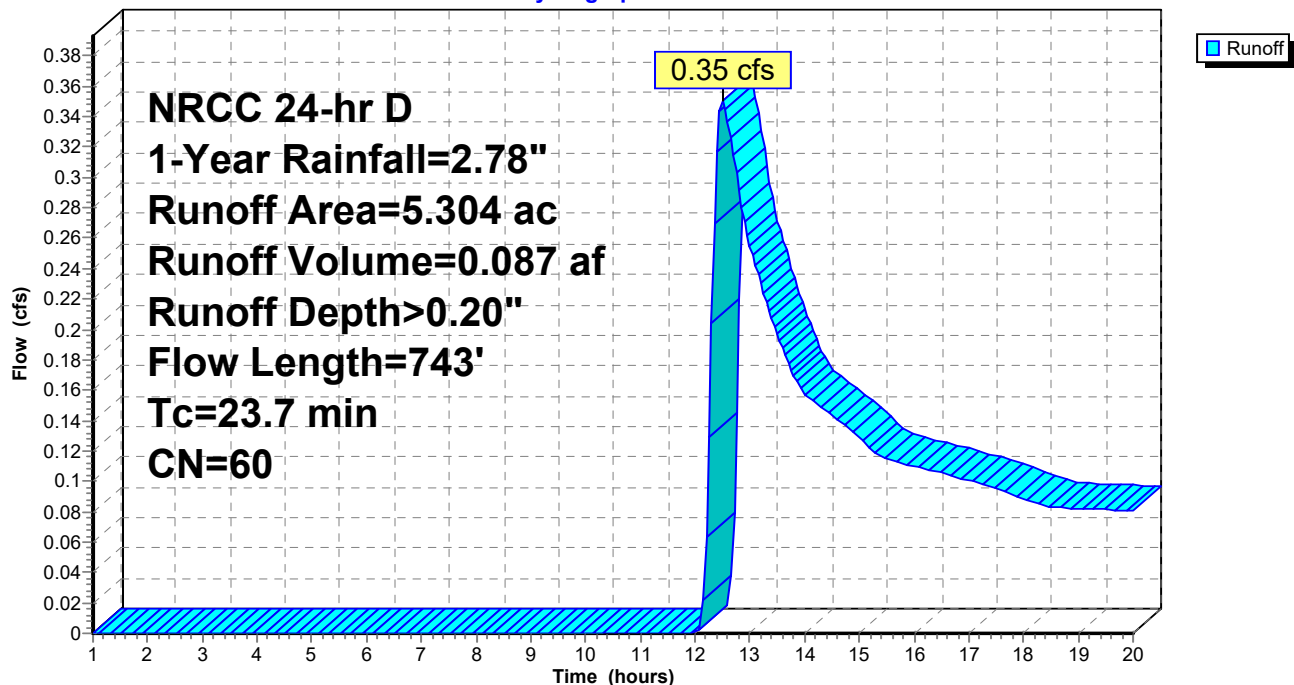
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 1-Year Rainfall=2.78"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

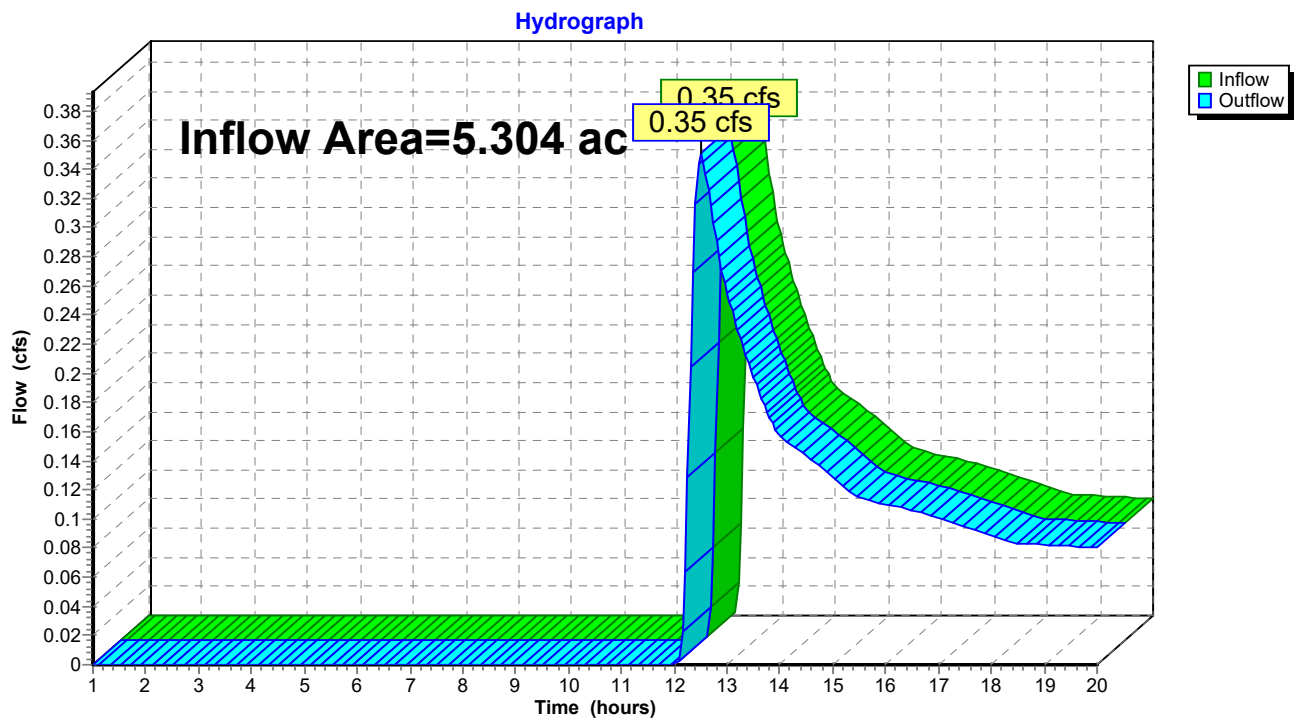
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 0.20" for 1-Year event
Inflow = 0.35 cfs @ 12.50 hrs, Volume= 0.087 af
Outflow = 0.35 cfs @ 12.50 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 2-Year Rainfall=3.41"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>0.40"
Flow Length=743' Tc=23.7 min CN=60 Runoff=1.10 cfs 0.175 af

Reach 3R: Design Point

Inflow=1.10 cfs 0.175 af
Outflow=1.10 cfs 0.175 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.175 af Average Runoff Depth = 0.40"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 2-Year Rainfall=3.41"

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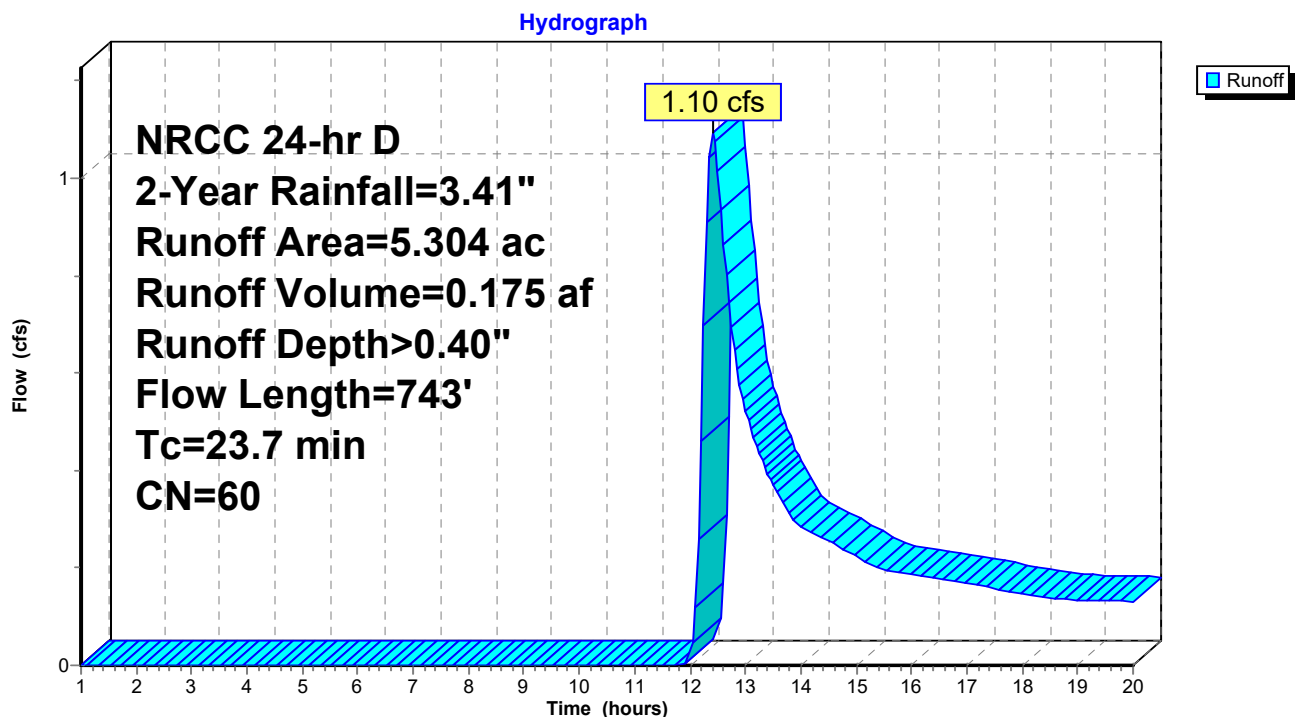
Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 1.10 cfs @ 12.41 hrs, Volume= 0.175 af, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.41"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

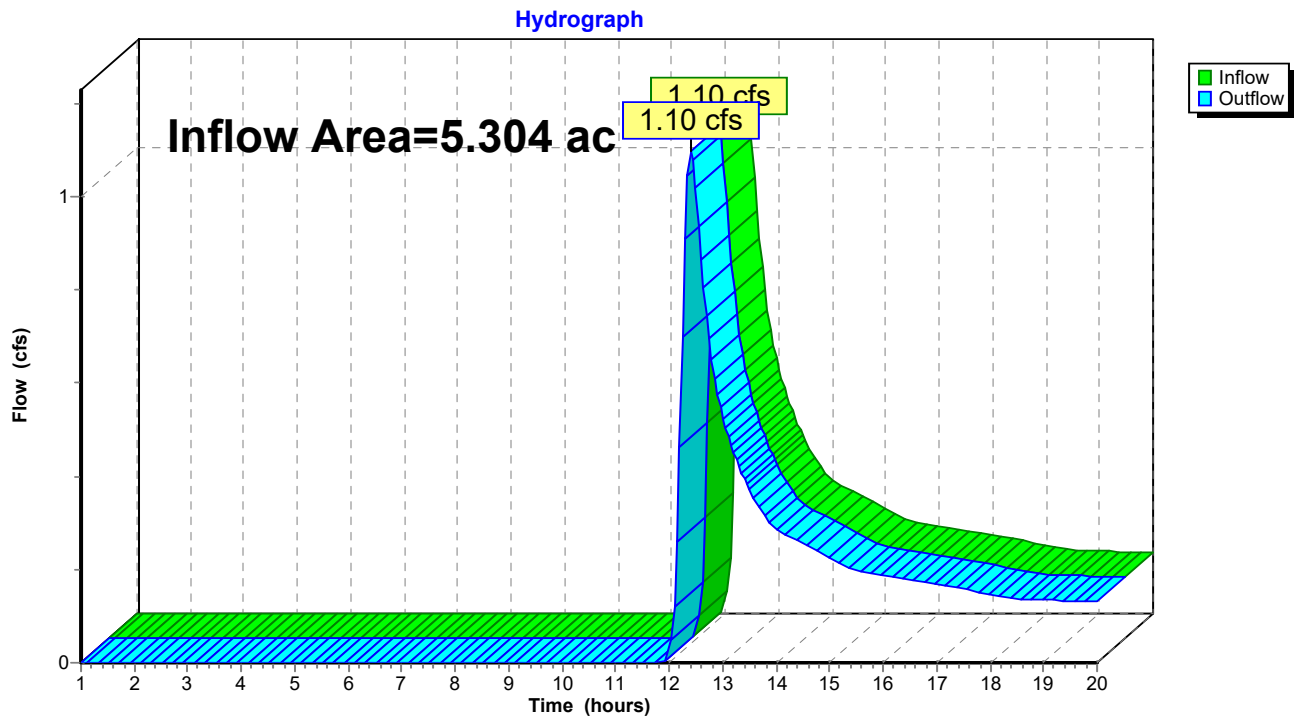
Subcatchment 1S: DA-1 (Pre)

Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 0.40" for 2-Year event
 Inflow = 1.10 cfs @ 12.41 hrs, Volume= 0.175 af
 Outflow = 1.10 cfs @ 12.41 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 5-Year Rainfall=4.30"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>0.76"
Flow Length=743' Tc=23.7 min CN=60 Runoff=2.59 cfs 0.336 af

Reach 3R: Design Point

Inflow=2.59 cfs 0.336 af
Outflow=2.59 cfs 0.336 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.336 af Average Runoff Depth = 0.76"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 5-Year Rainfall=4.30"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 2.59 cfs @ 12.38 hrs, Volume= 0.336 af, Depth> 0.76"

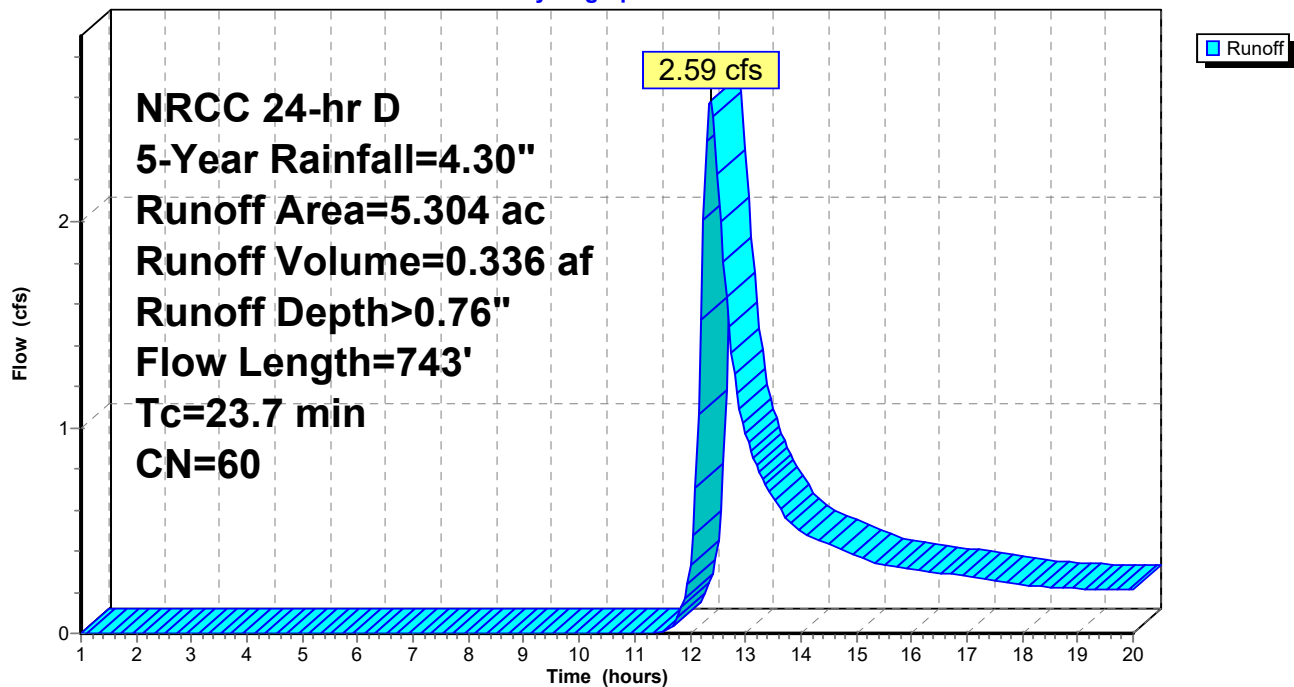
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 5-Year Rainfall=4.30"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

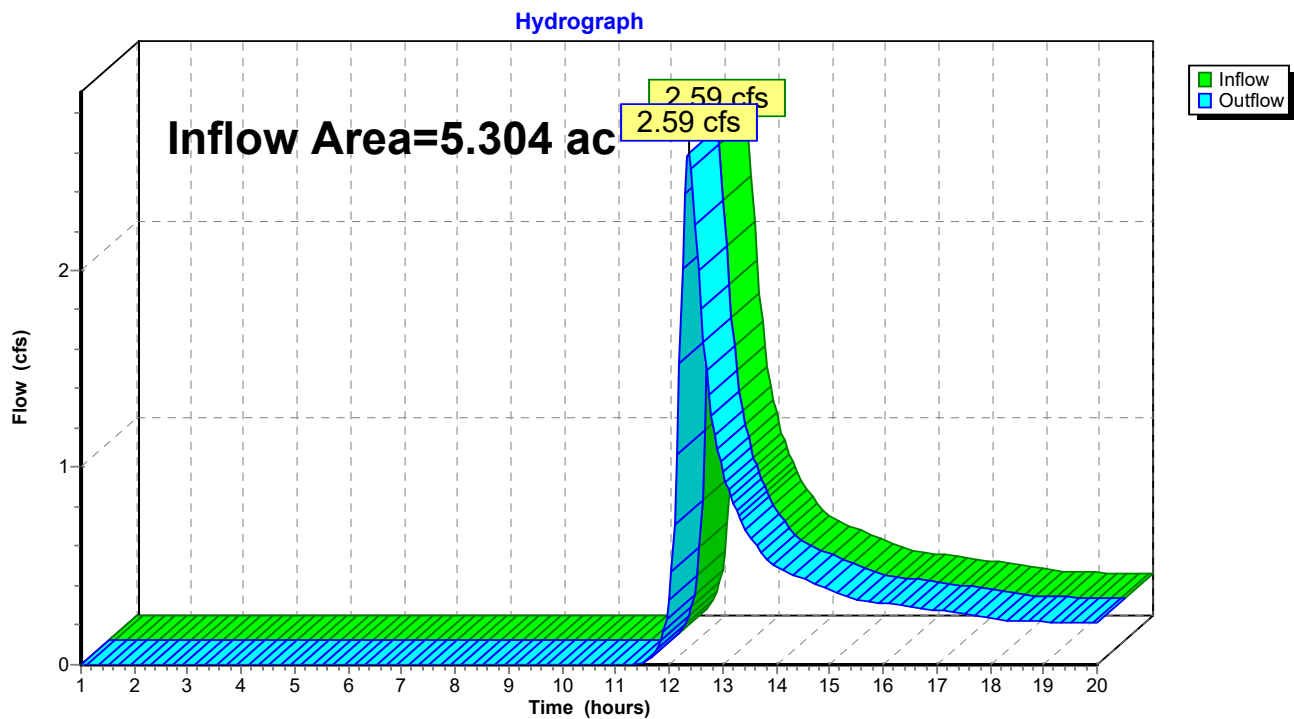
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 0.76" for 5-Year event
Inflow = 2.59 cfs @ 12.38 hrs, Volume= 0.336 af
Outflow = 2.59 cfs @ 12.38 hrs, Volume= 0.336 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 10-Year Rainfall=5.13"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>1.17"
Flow Length=743' Tc=23.7 min CN=60 Runoff=4.28 cfs 0.516 af

Reach 3R: Design Point

Inflow=4.28 cfs 0.516 af
Outflow=4.28 cfs 0.516 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.516 af Average Runoff Depth = 1.17"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 10-Year Rainfall=5.13"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 4.28 cfs @ 12.36 hrs, Volume= 0.516 af, Depth> 1.17"

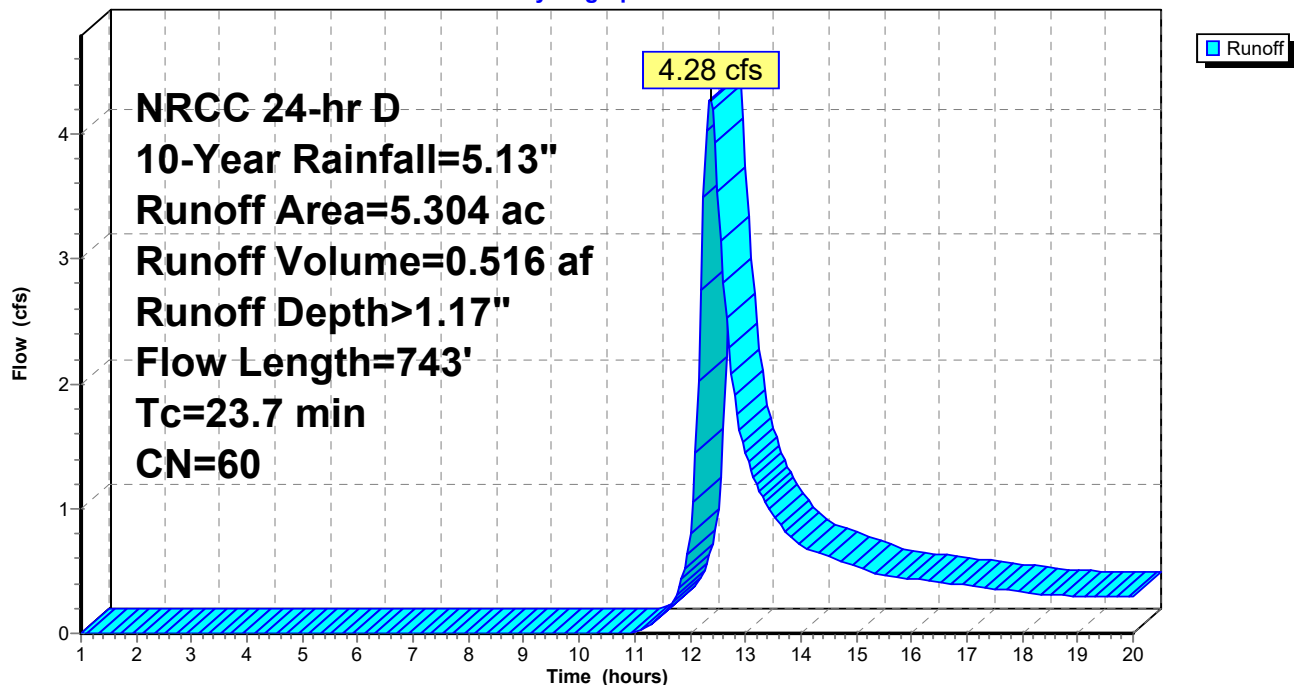
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.13"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

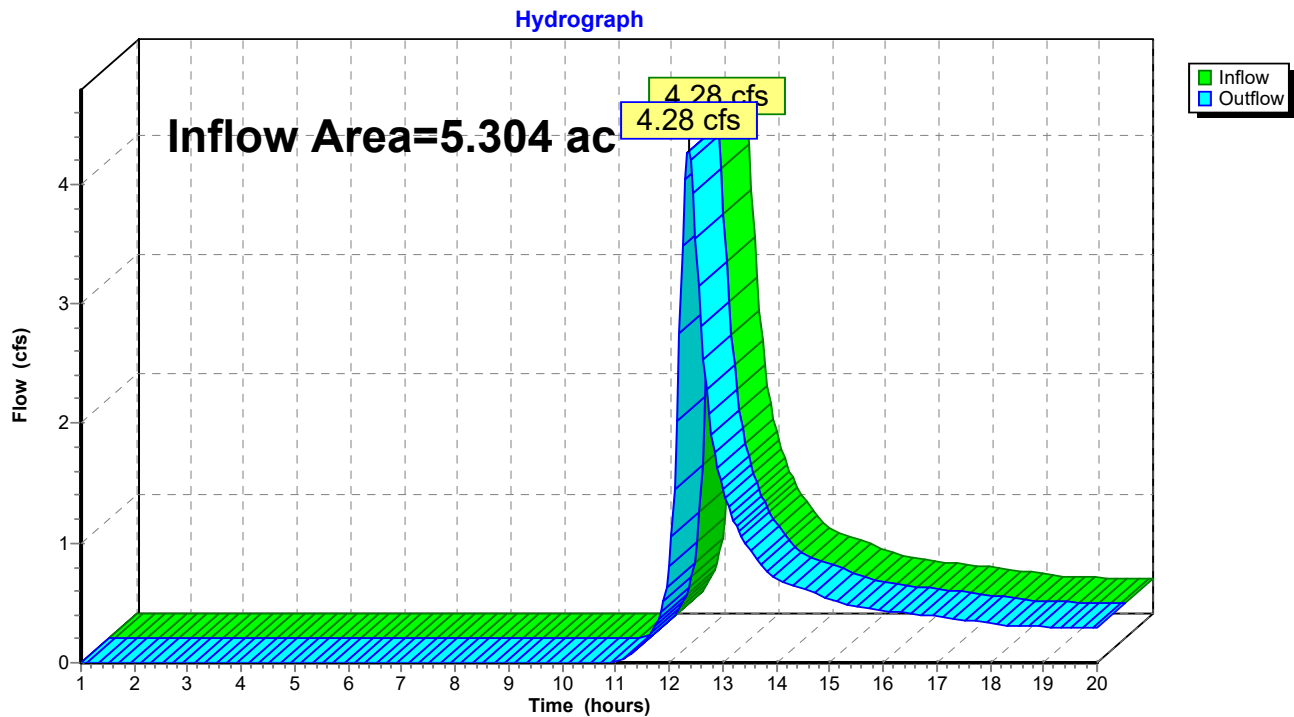
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 1.17" for 10-Year event
Inflow = 4.28 cfs @ 12.36 hrs, Volume= 0.516 af
Outflow = 4.28 cfs @ 12.36 hrs, Volume= 0.516 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 25-Year Rainfall=6.49"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>1.94"
Flow Length=743' Tc=23.7 min CN=60 Runoff=7.41 cfs 0.858 af

Reach 3R: Design Point

Inflow=7.41 cfs 0.858 af
Outflow=7.41 cfs 0.858 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.858 af Average Runoff Depth = 1.94"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 25-Year Rainfall=6.49"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 7.41 cfs @ 12.35 hrs, Volume= 0.858 af, Depth> 1.94"

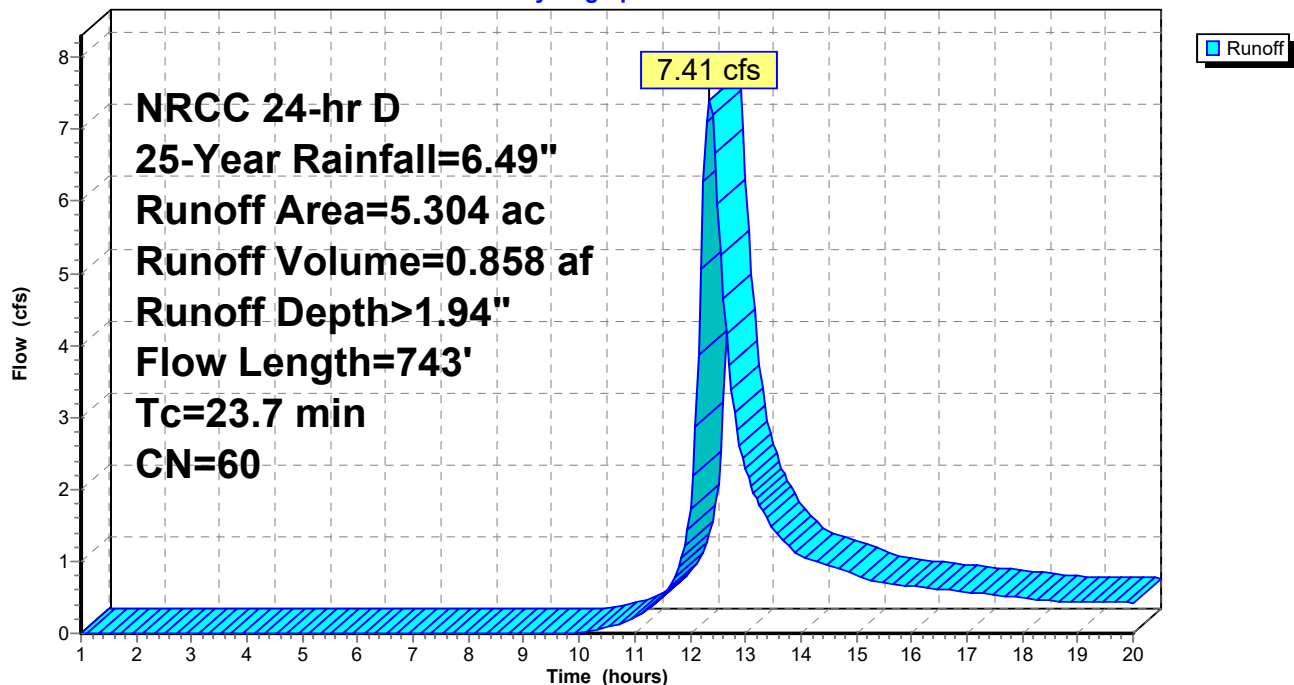
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.49"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

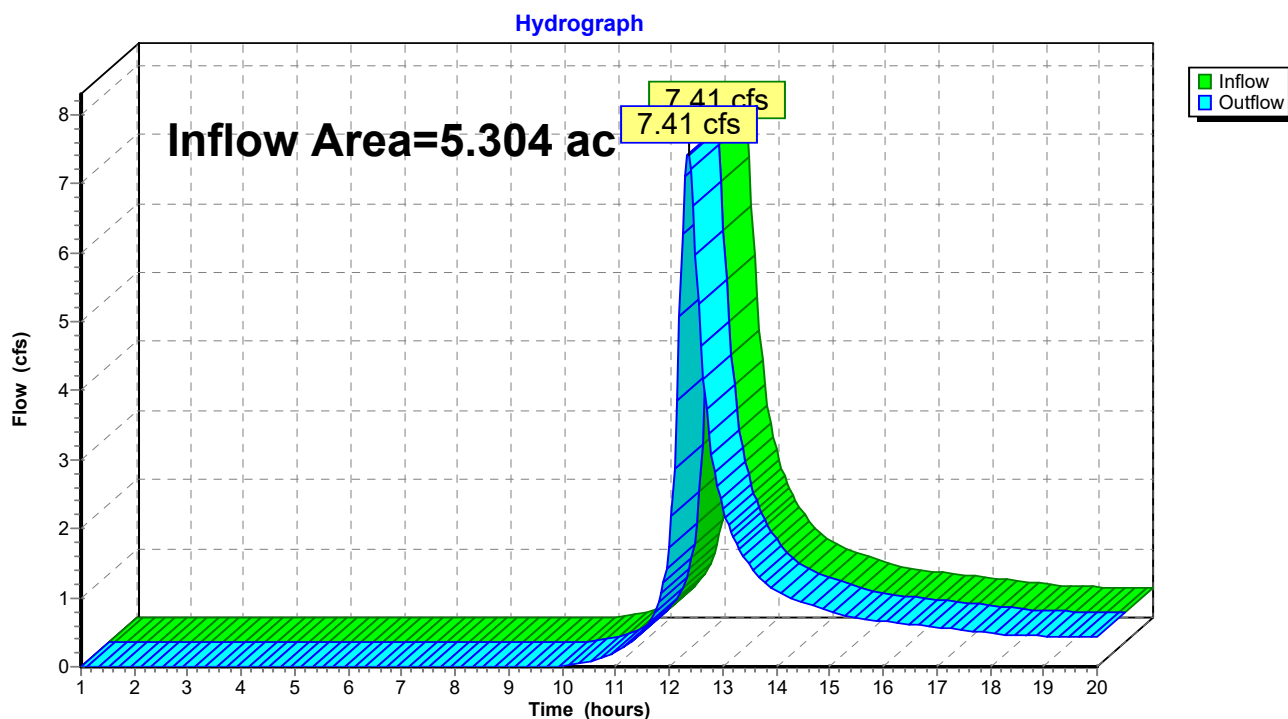
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 1.94" for 25-Year event
Inflow = 7.41 cfs @ 12.35 hrs, Volume= 0.858 af
Outflow = 7.41 cfs @ 12.35 hrs, Volume= 0.858 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 50-Year Rainfall=7.76"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth>2.75"

Flow Length=743' Tc=23.7 min CN=60 Runoff=10.64 cfs 1.217 af

Reach 3R: Design Point

Inflow=10.64 cfs 1.217 af

Outflow=10.64 cfs 1.217 af

Total Runoff Area = 5.304 ac Runoff Volume = 1.217 af Average Runoff Depth = 2.75"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 50-Year Rainfall=7.76"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 10.64 cfs @ 12.35 hrs, Volume= 1.217 af, Depth> 2.75"

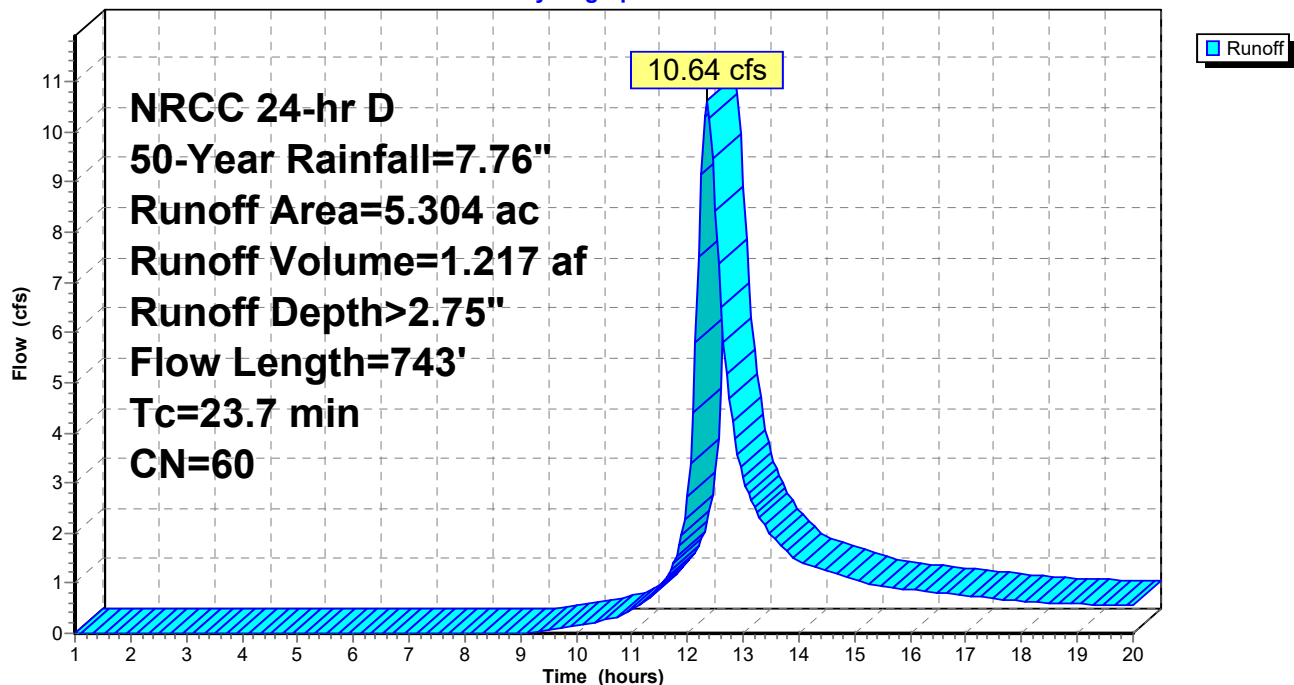
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 50-Year Rainfall=7.76"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

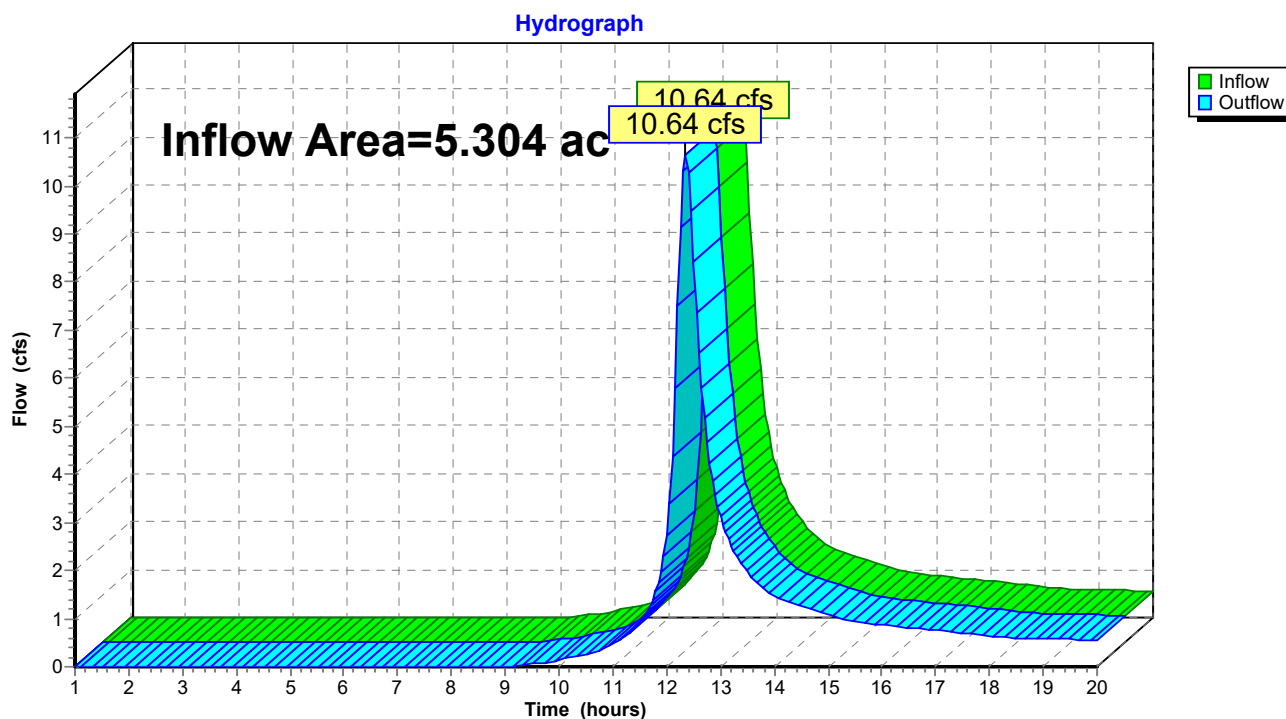
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 2.75" for 50-Year event
Inflow = 10.64 cfs @ 12.35 hrs, Volume= 1.217 af
Outflow = 10.64 cfs @ 12.35 hrs, Volume= 1.217 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 100-Year Rainfall=9.28"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 (Pre)

Runoff Area=5.304 ac 0.00% Impervious Runoff Depth=3.81"

Flow Length=743' Tc=23.7 min CN=60 Runoff=14.76 cfs 1.683 af

Reach 3R: Design Point

Inflow=14.76 cfs 1.683 af

Outflow=14.76 cfs 1.683 af

Total Runoff Area = 5.304 ac Runoff Volume = 1.683 af Average Runoff Depth = 3.81"
100.00% Pervious = 5.304 ac 0.00% Impervious = 0.000 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 100-Year Rainfall=9.28"

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Summary for Subcatchment 1S: DA-1 (Pre)

Runoff = 14.76 cfs @ 12.35 hrs, Volume= 1.683 af, Depth> 3.81"

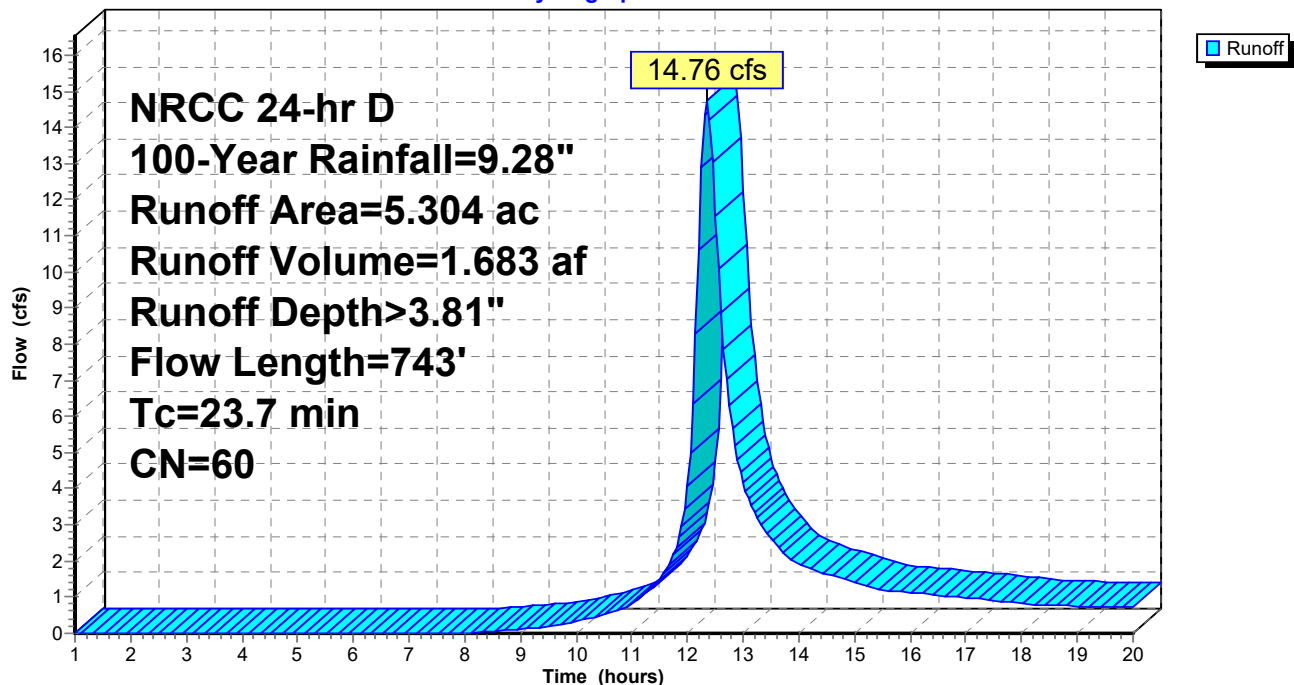
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=9.28"

Area (ac)	CN	Description
5.304	60	Woods, Fair, HSG B
5.304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0145	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
4.4	643	0.2400	2.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
23.7	743	Total			

Subcatchment 1S: DA-1 (Pre)

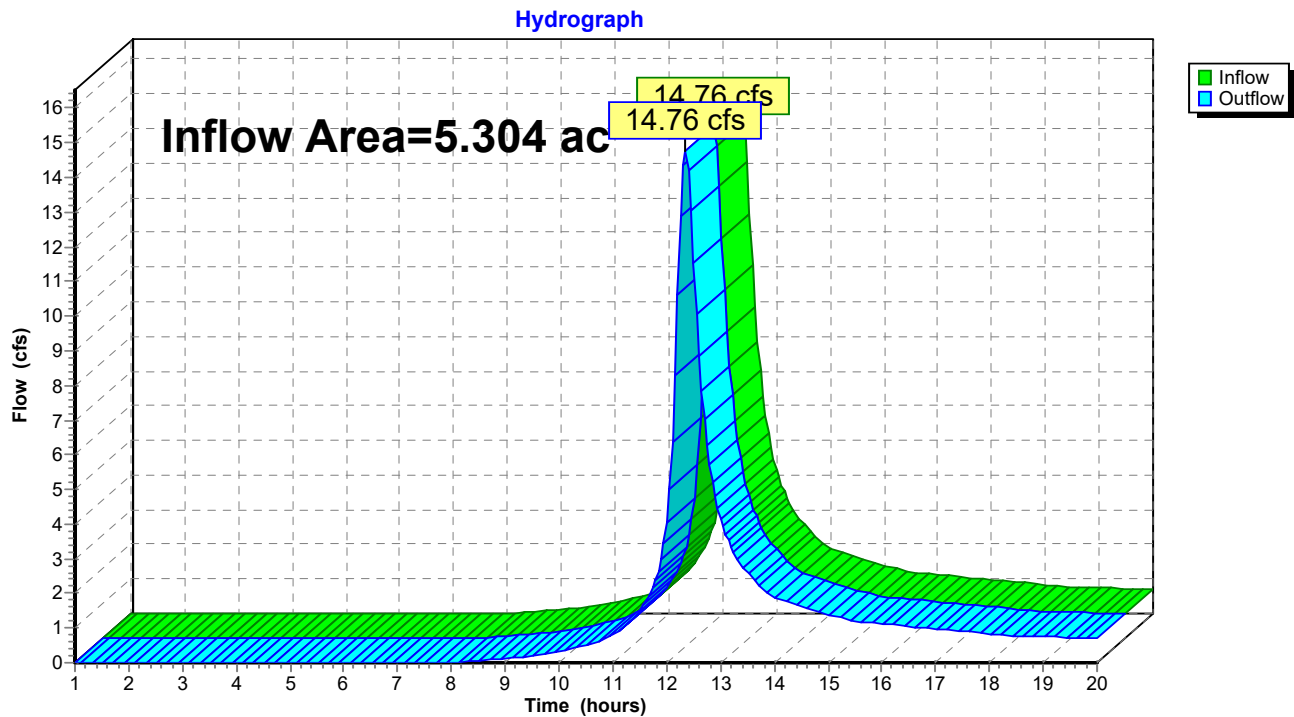
Hydrograph



Summary for Reach 3R: Design Point

Inflow Area = 5.304 ac, 0.00% Impervious, Inflow Depth > 3.81" for 100-Year event
Inflow = 14.76 cfs @ 12.35 hrs, Volume= 1.683 af
Outflow = 14.76 cfs @ 12.35 hrs, Volume= 1.683 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Design Point

21-22 Hannigan Residence 4-1-22

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Multi-Event Tables

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Events for Subcatchment 1S: DA-1 (Pre)

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.78	0.35	0.087	0.20
2-Year	3.41	1.10	0.175	0.40
5-Year	4.30	2.59	0.336	0.76
10-Year	5.13	4.28	0.516	1.17
25-Year	6.49	7.41	0.858	1.94
50-Year	7.76	10.64	1.217	2.75
100-Year	9.28	14.76	1.683	3.81

21-22 Hannigan Residence 4-1-22

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Multi-Event Tables

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Events for Reach 3R: Design Point

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	0.35	0.35	0.00	0
2-Year	1.10	1.10	0.00	0
5-Year	2.59	2.59	0.00	0
10-Year	4.28	4.28	0.00	0
25-Year	7.41	7.41	0.00	0
50-Year	10.64	10.64	0.00	0
100-Year	14.76	14.76	0.00	0

21-22 Hannigan Residence 4-1-22

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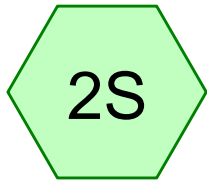
- 22 Node Listing
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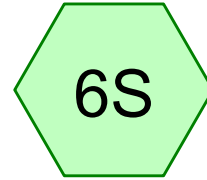
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Multi-Event Tables

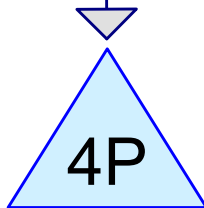
- 28 Subcat 1S: DA-1 (Pre)
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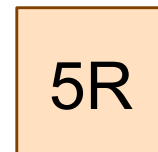
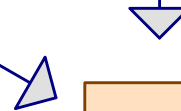
DA-1 (Post)



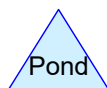
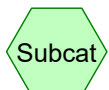
DA-2 (Post)



CHAMBERS



Design Point (Post)



Routing Diagram for 21-22 Hannigan Residence 4-1-22
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21-22 Hannigan Residence 4-1-22

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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 7139 NY Westchester

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	NRCC 24-hr	D	Default	24.00	1	2.78	2
2	2-Year	NRCC 24-hr	D	Default	24.00	1	3.41	2
3	5-Year	NRCC 24-hr	D	Default	24.00	1	4.30	2
4	10-Year	NRCC 24-hr	D	Default	24.00	1	5.13	2
5	25-Year	NRCC 24-hr	D	Default	24.00	1	6.49	2
6	50-Year	NRCC 24-hr	D	Default	24.00	1	7.76	2
7	100-Year	NRCC 24-hr	D	Default	24.00	1	9.28	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.671	61	>75% Grass cover, Good, HSG B (2S)
0.495	98	Paved parking, HSG B (2S)
4.138	60	Woods, Fair, HSG B (2S, 6S)
5.304	64	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
5.304	HSG B	2S, 6S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.304		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.671	0.000	0.000	0.000	0.671	>75% Grass cover, Good	2S
0.000	0.495	0.000	0.000	0.000	0.495	Paved parking	2S
0.000	4.138	0.000	0.000	0.000	4.138	Woods, Fair	2S, 6S
0.000	5.304	0.000	0.000	0.000	5.304	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	2S	0.00	0.00	791.0	0.1551	0.012	0.0	8.0	0.0
2	2S	0.00	0.00	151.0	0.0110	0.012	0.0	8.0	0.0
3	4P	467.22	466.97	30.0	0.0083	0.012	0.0	18.0	0.0

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NRCC 24-hr D 1-Year Rainfall=2.78"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>0.33"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=0.77 cfs 0.107 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>0.20"
Flow Length=298' Tc=7.1 min CN=60 Runoff=0.14 cfs 0.024 af**Reach 5R: Design Point (Post)**Inflow=0.15 cfs 0.025 af
Outflow=0.15 cfs 0.025 af**Pond 4P: CHAMBERS**Peak Elev=467.26' Storage=0.001 af Inflow=0.77 cfs 0.107 af
Discarded=0.72 cfs 0.106 af Primary=0.01 cfs 0.001 af Outflow=0.73 cfs 0.107 af**Total Runoff Area = 5.304 ac Runoff Volume = 0.131 af Average Runoff Depth = 0.30"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 1-Year Rainfall=2.78"

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Summary for Subcatchment 2S: DA-1 (Post)

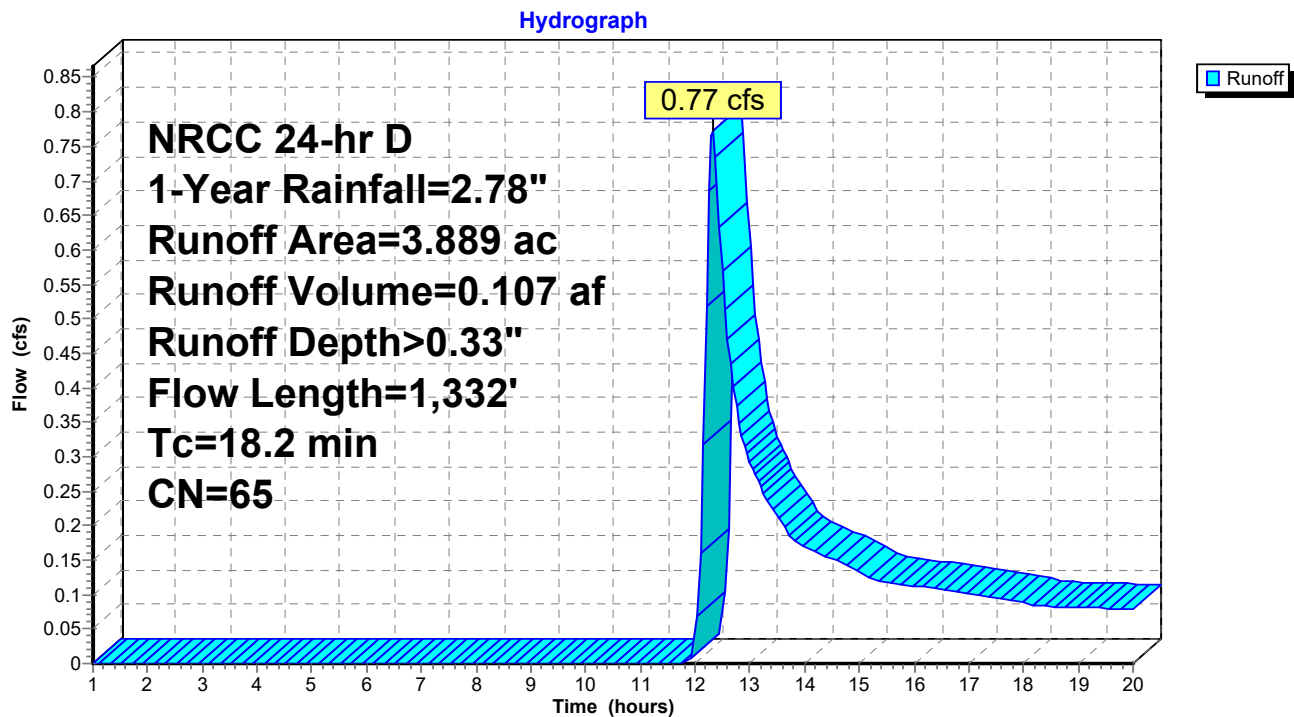
Runoff = 0.77 cfs @ 12.32 hrs, Volume= 0.107 af, Depth> 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 1-Year Rainfall=2.78"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 1-Year Rainfall=2.78"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 0.14 cfs @ 12.20 hrs, Volume= 0.024 af, Depth> 0.20"

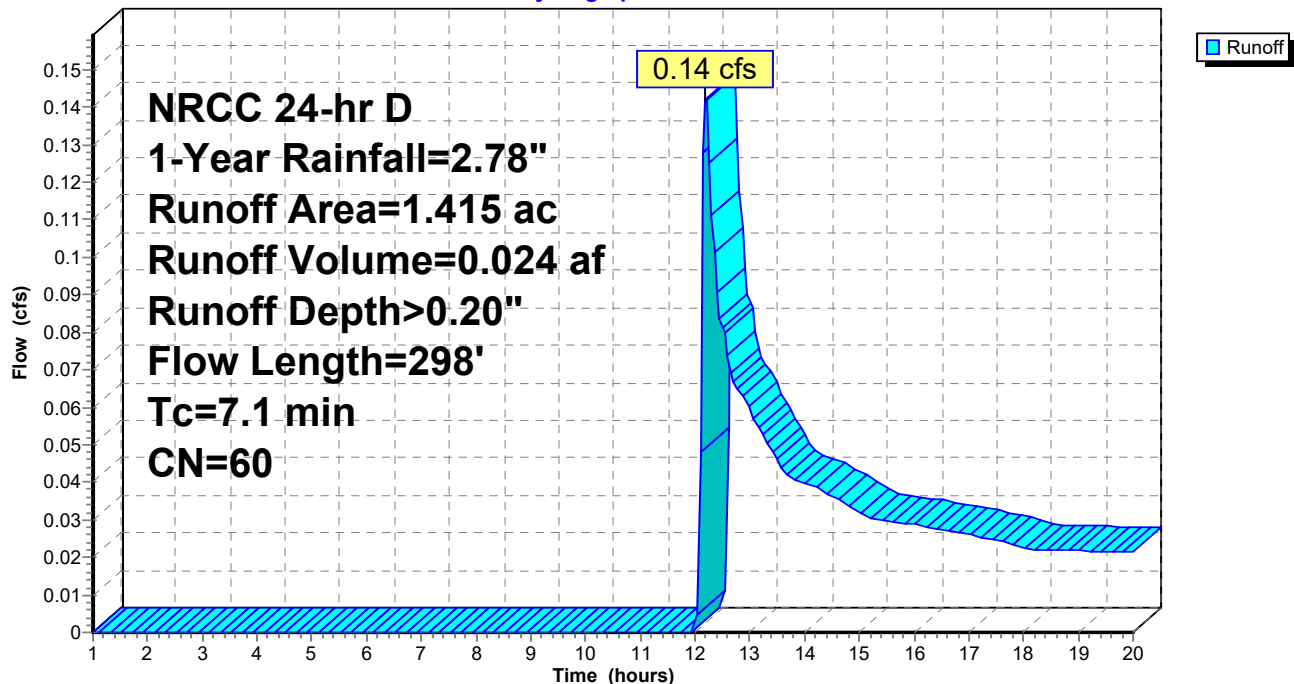
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 1-Year Rainfall=2.78"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow , Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow , Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow , Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

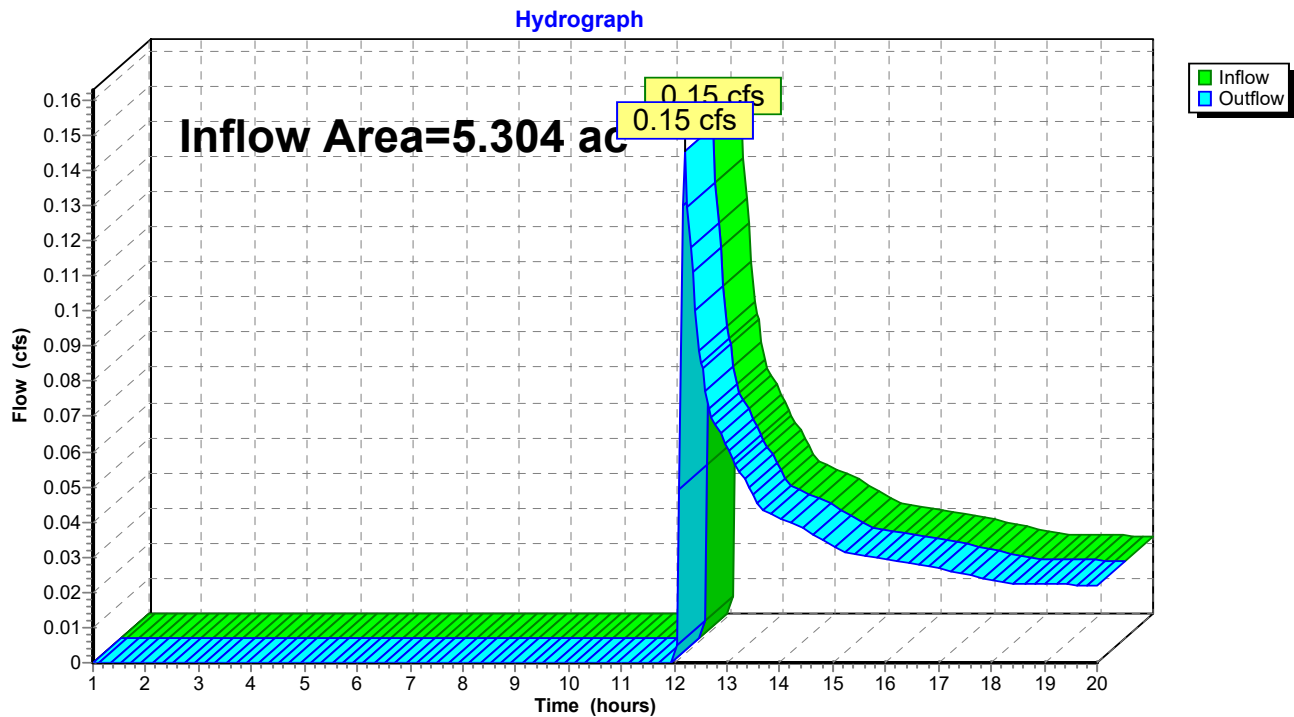
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 0.06" for 1-Year event
Inflow = 0.15 cfs @ 12.20 hrs, Volume= 0.025 af
Outflow = 0.15 cfs @ 12.20 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 0.33" for 1-Year event
 Inflow = 0.77 cfs @ 12.32 hrs, Volume= 0.107 af
 Outflow = 0.73 cfs @ 12.40 hrs, Volume= 0.107 af, Atten= 5%, Lag= 4.6 min
 Discarded = 0.72 cfs @ 12.30 hrs, Volume= 0.106 af
 Primary = 0.01 cfs @ 12.38 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 467.26' @ 12.38 hrs Surf.Area= 0.060 ac Storage= 0.001 af

Plug-Flow detention time= 0.8 min calculated for 0.107 af (100% of inflow)
 Center-of-Mass det. time= 0.6 min (881.5 - 880.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

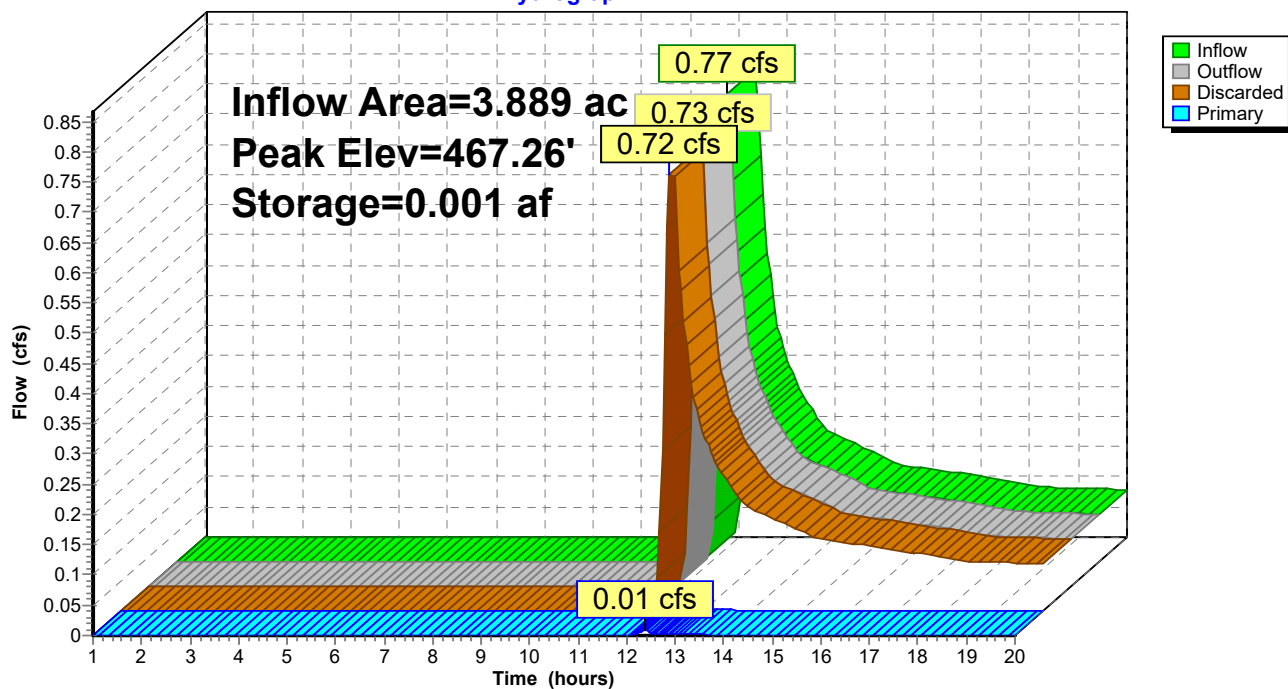
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' /' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 12.30 hrs HW=467.26' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.01 cfs @ 12.38 hrs HW=467.26' (Free Discharge)
 ↑ **2=Culvert** (Barrel Controls 0.01 cfs @ 0.86 fps)

Pond 4P: CHAMBERS

Hydrograph



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 2-Year Rainfall=3.41"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)

Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>0.59"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=1.66 cfs 0.191 af

Subcatchment6S: DA-2 (Post)

Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>0.40"
Flow Length=298' Tc=7.1 min CN=60 Runoff=0.51 cfs 0.047 af

Reach 5R: Design Point (Post)

Inflow=0.89 cfs 0.068 af
Outflow=0.89 cfs 0.068 af

Pond 4P: CHAMBERS

Peak Elev=467.62' Storage=0.009 af Inflow=1.66 cfs 0.191 af
Discarded=0.72 cfs 0.170 af Primary=0.69 cfs 0.021 af Outflow=1.41 cfs 0.190 af

Total Runoff Area = 5.304 ac Runoff Volume = 0.238 af Average Runoff Depth = 0.54"
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 2-Year Rainfall=3.41"

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Summary for Subcatchment 2S: DA-1 (Post)

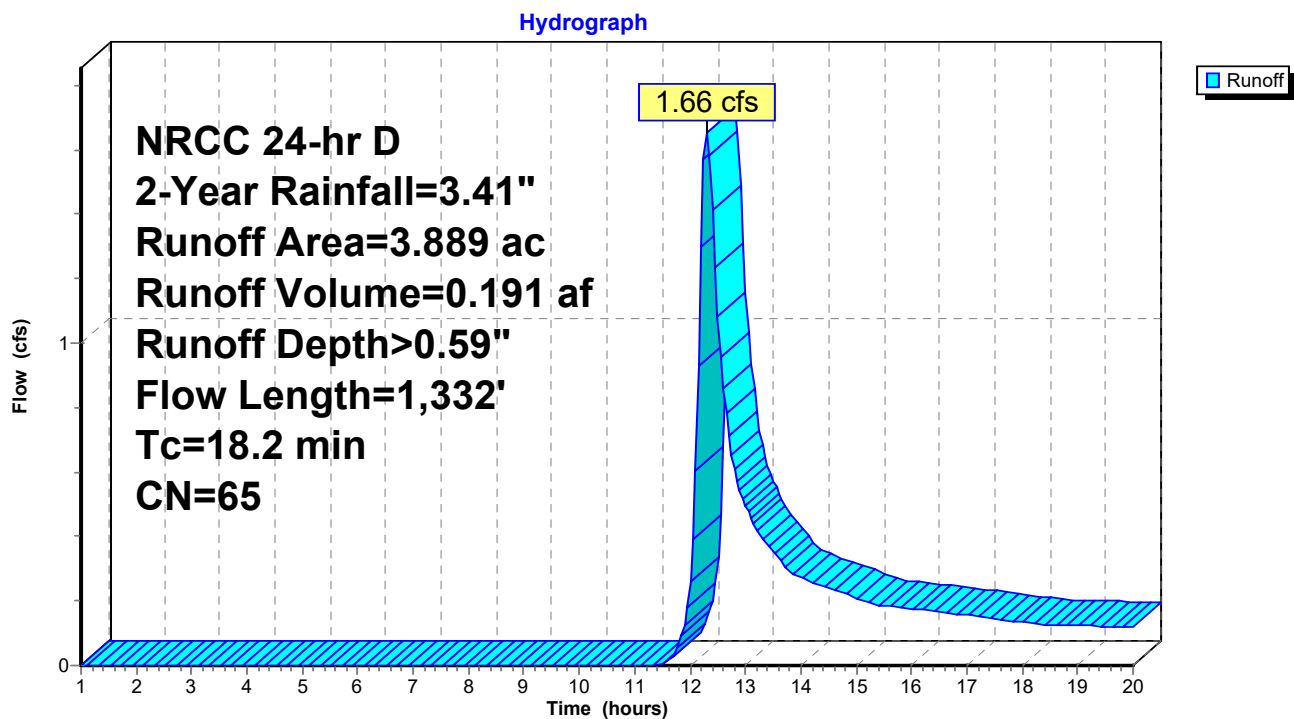
Runoff = 1.66 cfs @ 12.30 hrs, Volume= 0.191 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.41"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 2-Year Rainfall=3.41"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 0.51 cfs @ 12.16 hrs, Volume= 0.047 af, Depth> 0.40"

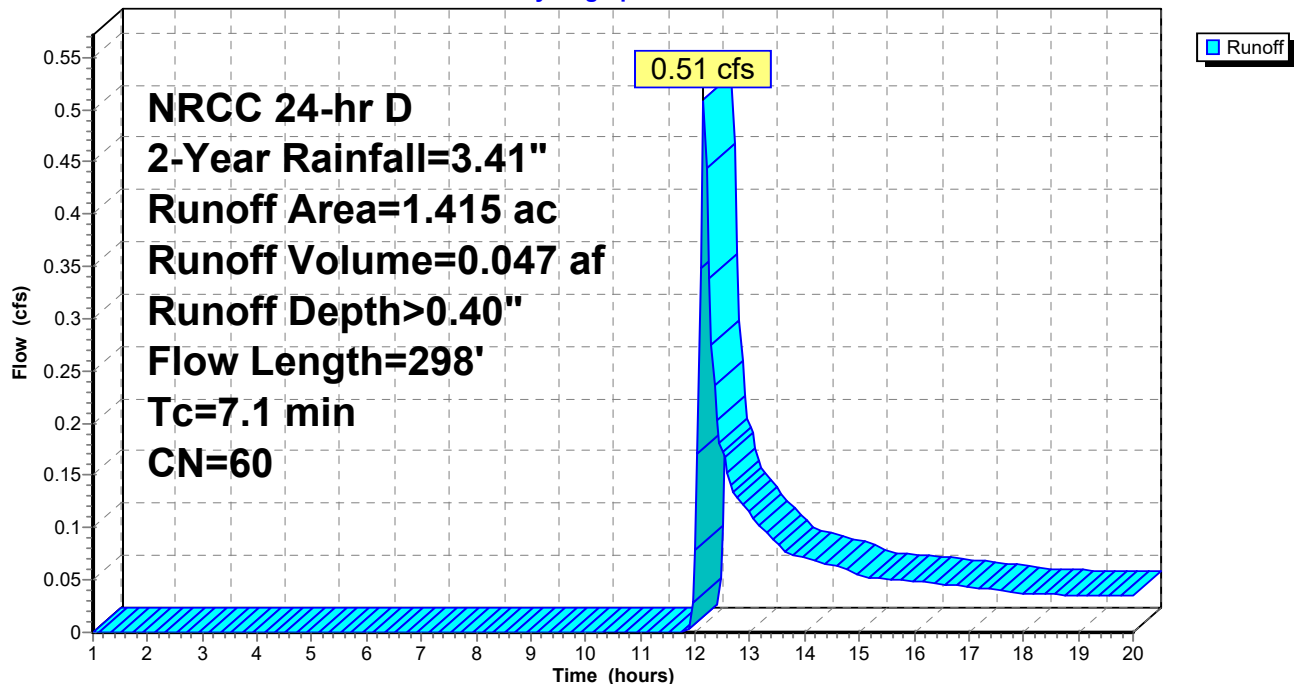
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.41"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

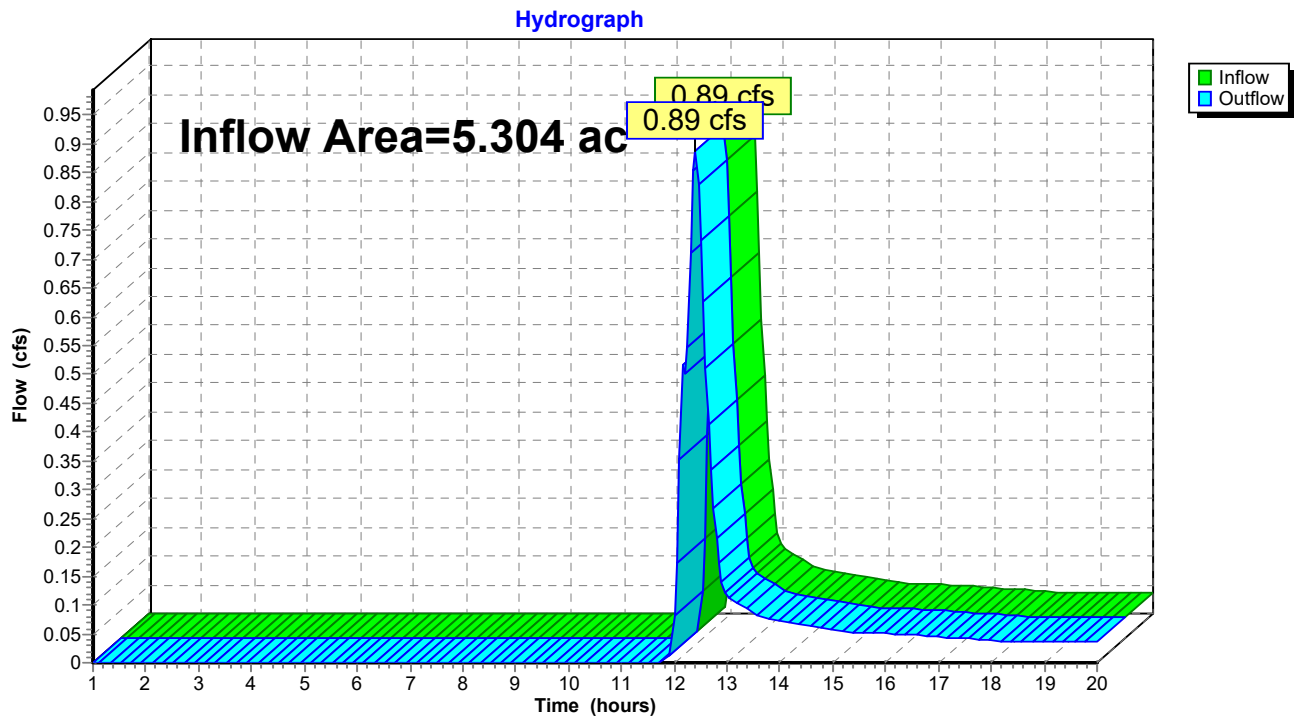
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.89 cfs @ 12.39 hrs, Volume= 0.068 af
Outflow = 0.89 cfs @ 12.39 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 0.59" for 2-Year event
 Inflow = 1.66 cfs @ 12.30 hrs, Volume= 0.191 af
 Outflow = 1.41 cfs @ 12.41 hrs, Volume= 0.190 af, Atten= 15%, Lag= 6.4 min
 Discarded = 0.72 cfs @ 12.15 hrs, Volume= 0.170 af
 Primary = 0.69 cfs @ 12.41 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 467.62' @ 12.41 hrs Surf.Area= 0.060 ac Storage= 0.009 af

Plug-Flow detention time= 1.9 min calculated for 0.190 af (100% of inflow)
 Center-of-Mass det. time= 1.7 min (864.6 - 862.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

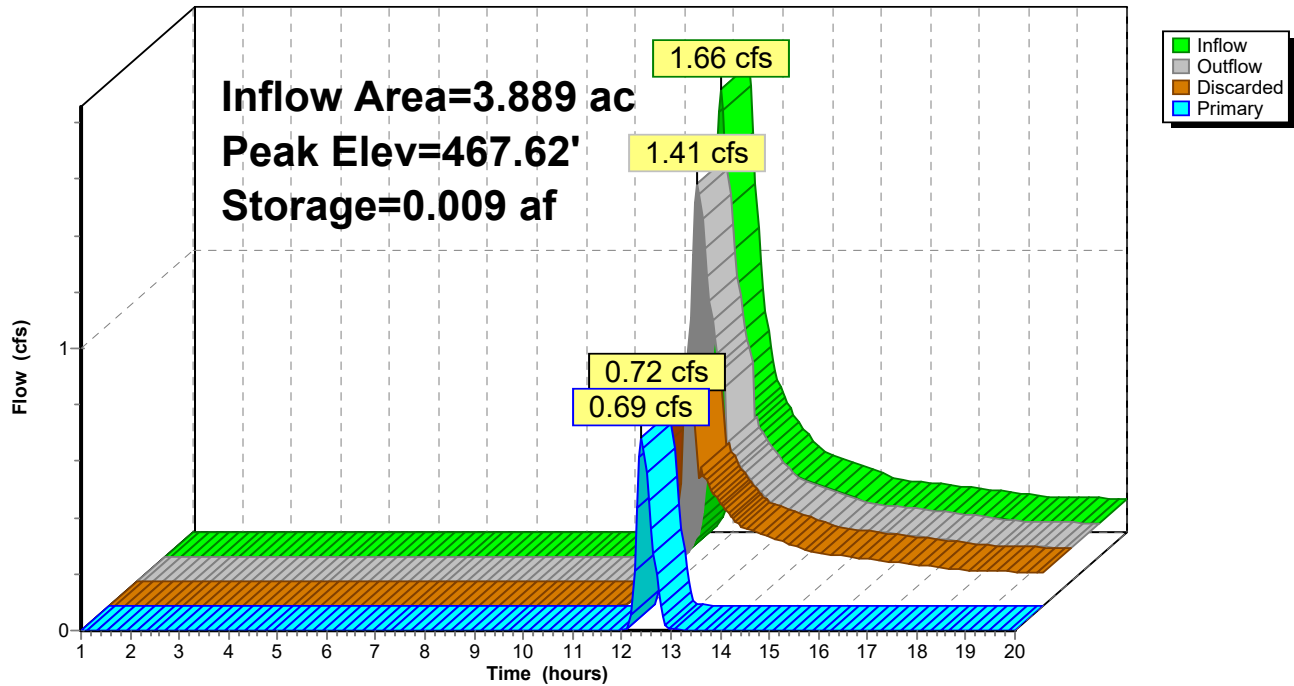
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' / Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 12.15 hrs HW=467.27' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=0.68 cfs @ 12.41 hrs HW=467.61' (Free Discharge)
 ↑ **2=Culvert** (Barrel Controls 0.68 cfs @ 2.75 fps)

Pond 4P: CHAMBERS

Hydrograph



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NRCC 24-hr D 5-Year Rainfall=4.30"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>1.03"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=3.16 cfs 0.334 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>0.77"
Flow Length=298' Tc=7.1 min CN=60 Runoff=1.18 cfs 0.091 af**Reach 5R: Design Point (Post)**Inflow=2.32 cfs 0.173 af
Outflow=2.32 cfs 0.173 af**Pond 4P: CHAMBERS**Peak Elev=467.93' Storage=0.022 af Inflow=3.16 cfs 0.334 af
Discarded=0.72 cfs 0.251 af Primary=1.90 cfs 0.082 af Outflow=2.63 cfs 0.334 af**Total Runoff Area = 5.304 ac Runoff Volume = 0.425 af Average Runoff Depth = 0.96"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 5-Year Rainfall=4.30"

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Summary for Subcatchment 2S: DA-1 (Post)

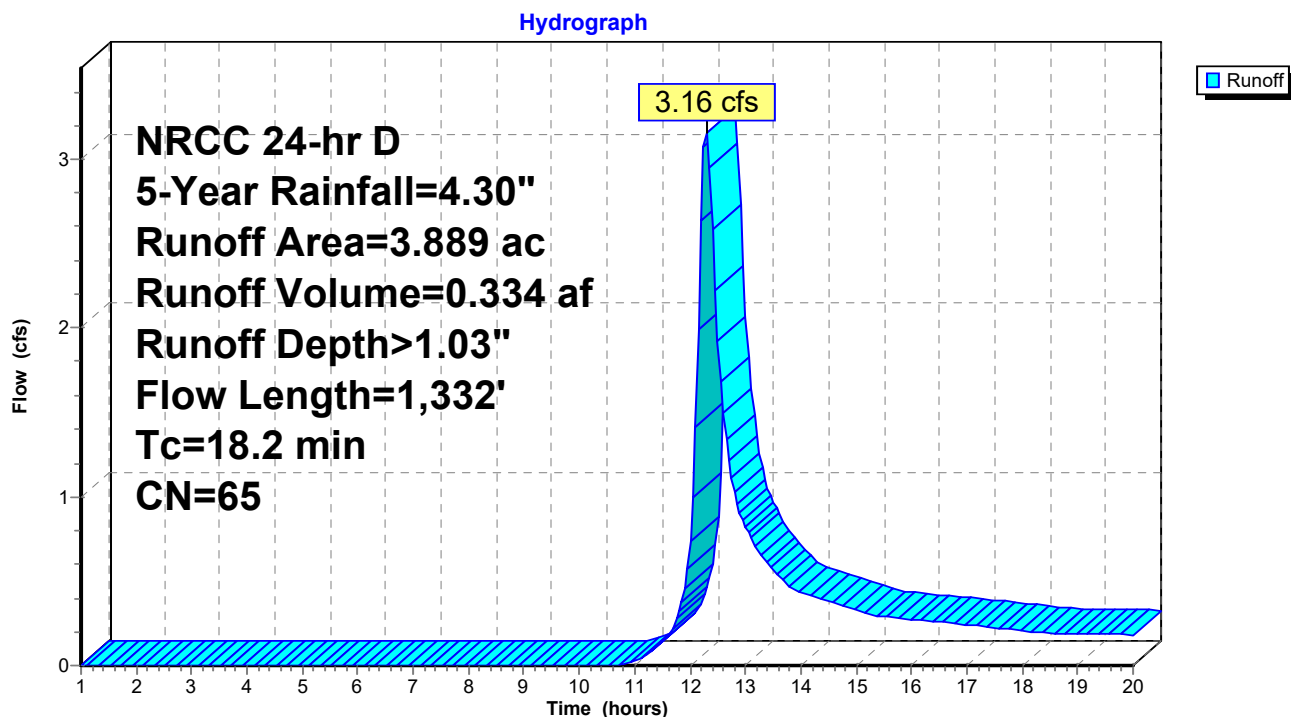
Runoff = 3.16 cfs @ 12.29 hrs, Volume= 0.334 af, Depth> 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 5-Year Rainfall=4.30"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 5-Year Rainfall=4.30"

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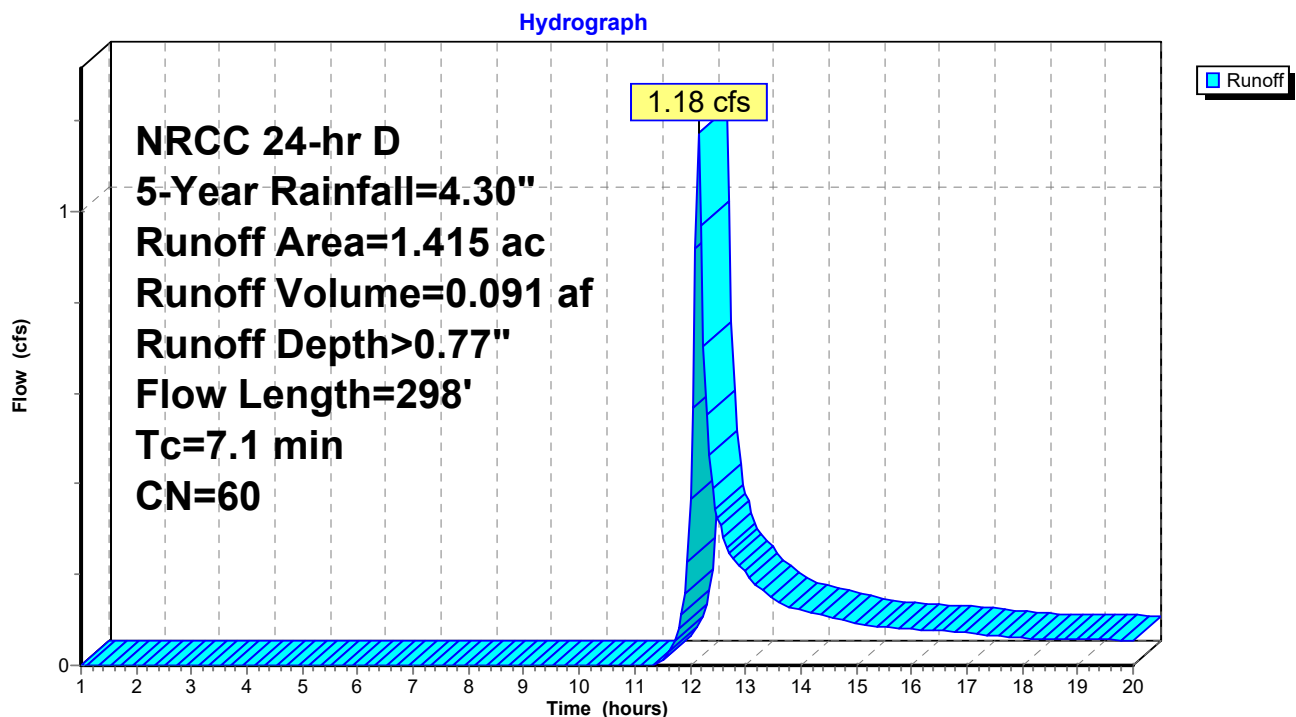
Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 1.18 cfs @ 12.15 hrs, Volume= 0.091 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 5-Year Rainfall=4.30"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow , Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow , Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow , Woodland Kv= 5.0 fps
7.1	298	Total			

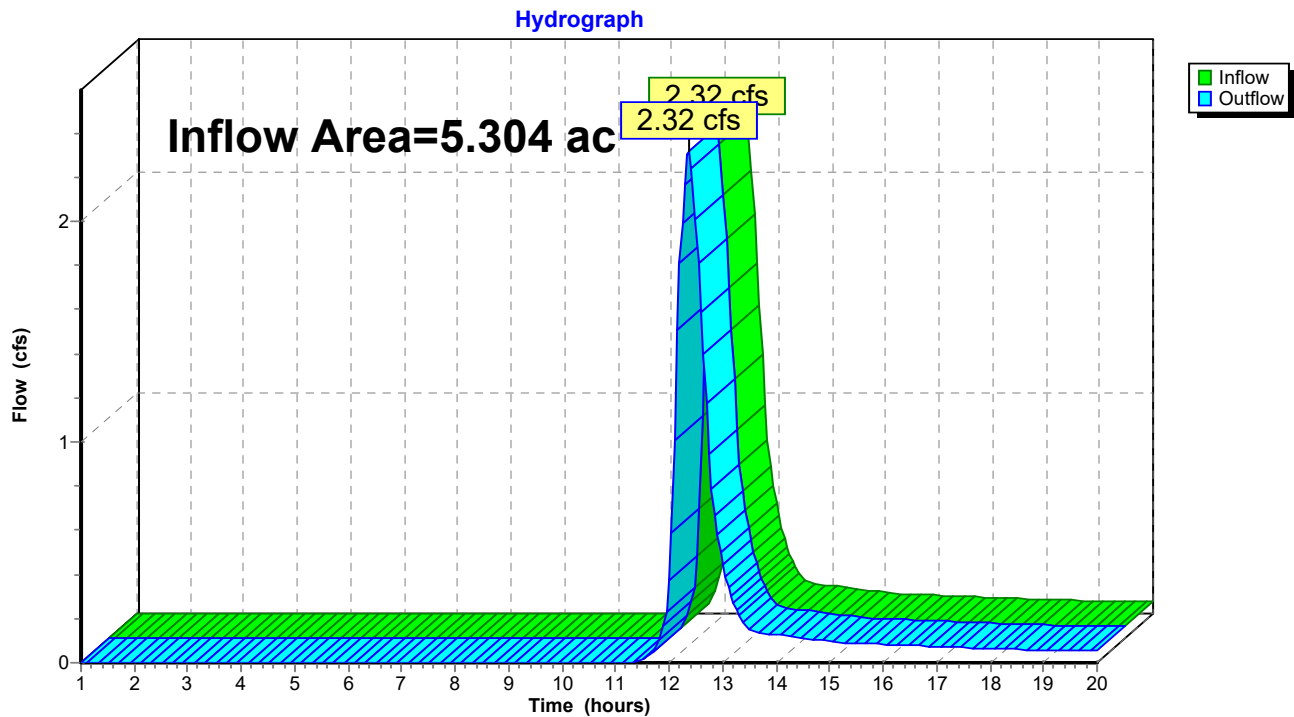
Subcatchment 6S: DA-2 (Post)

Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 0.39" for 5-Year event
 Inflow = 2.32 cfs @ 12.37 hrs, Volume= 0.173 af
 Outflow = 2.32 cfs @ 12.37 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)



Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 1.03" for 5-Year event
 Inflow = 3.16 cfs @ 12.29 hrs, Volume= 0.334 af
 Outflow = 2.63 cfs @ 12.40 hrs, Volume= 0.334 af, Atten= 17%, Lag= 6.6 min
 Discarded = 0.72 cfs @ 12.05 hrs, Volume= 0.251 af
 Primary = 1.90 cfs @ 12.40 hrs, Volume= 0.082 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 467.93' @ 12.40 hrs Surf.Area= 0.060 ac Storage= 0.022 af

Plug-Flow detention time= 2.8 min calculated for 0.333 af (100% of inflow)
 Center-of-Mass det. time= 2.6 min (849.7 - 847.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

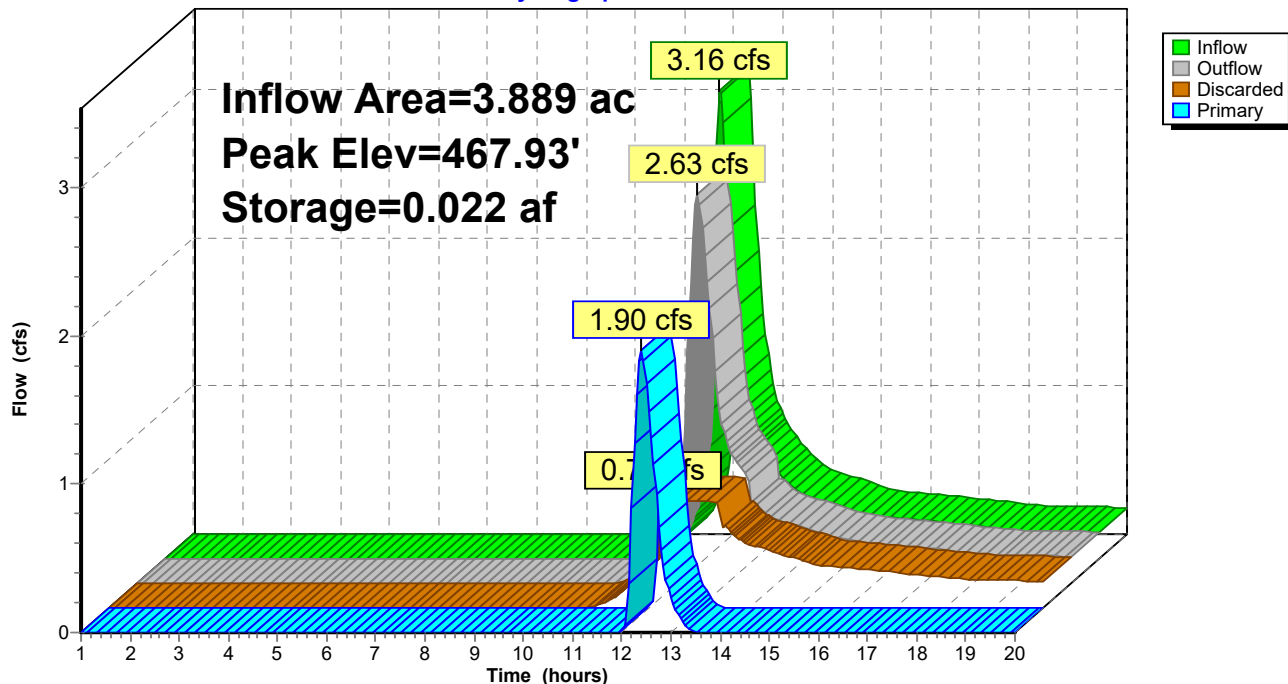
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' /' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 12.05 hrs HW=467.28' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=1.90 cfs @ 12.40 hrs HW=467.93' (Free Discharge)
 ↑ **2=Culvert** (Barrel Controls 1.90 cfs @ 3.42 fps)

Pond 4P: CHAMBERS

Hydrograph



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 10-Year Rainfall=5.13"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>1.51"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=4.75 cfs 0.488 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>1.18"
Flow Length=298' Tc=7.1 min CN=60 Runoff=1.91 cfs 0.139 af**Reach 5R: Design Point (Post)**Inflow=3.96 cfs 0.302 af
Outflow=3.96 cfs 0.302 af**Pond 4P: CHAMBERS**Peak Elev=468.20' Storage=0.036 af Inflow=4.75 cfs 0.488 af
Discarded=0.72 cfs 0.325 af Primary=3.31 cfs 0.163 af Outflow=4.03 cfs 0.488 af**Total Runoff Area = 5.304 ac Runoff Volume = 0.627 af Average Runoff Depth = 1.42"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 10-Year Rainfall=5.13"

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Summary for Subcatchment 2S: DA-1 (Post)

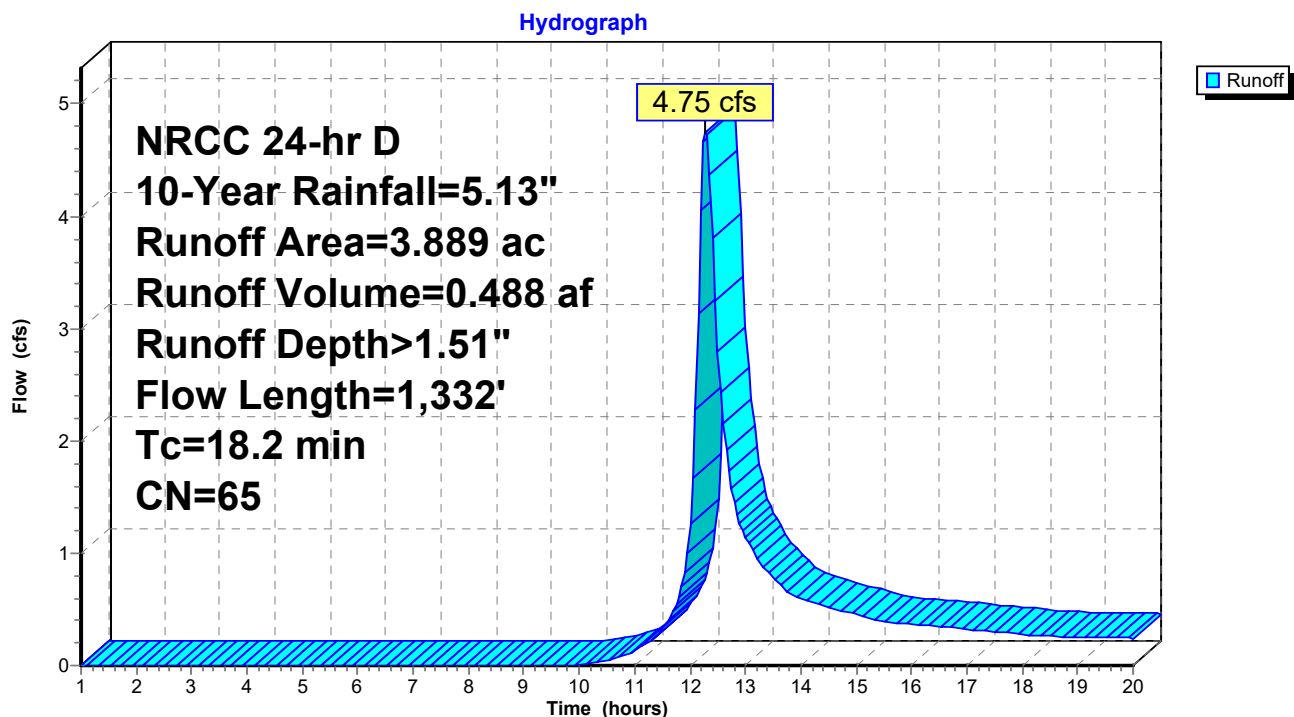
Runoff = 4.75 cfs @ 12.28 hrs, Volume= 0.488 af, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.13"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 10-Year Rainfall=5.13"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 1.91 cfs @ 12.15 hrs, Volume= 0.139 af, Depth> 1.18"

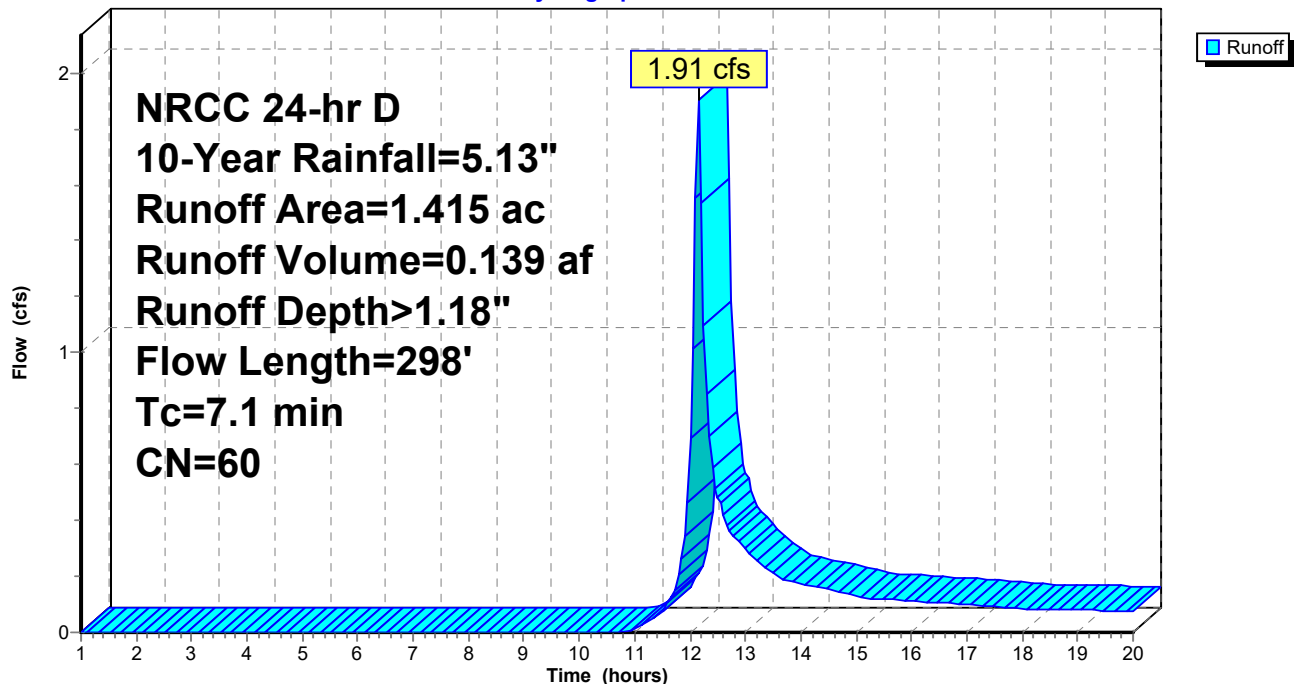
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.13"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow , Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow , Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow , Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

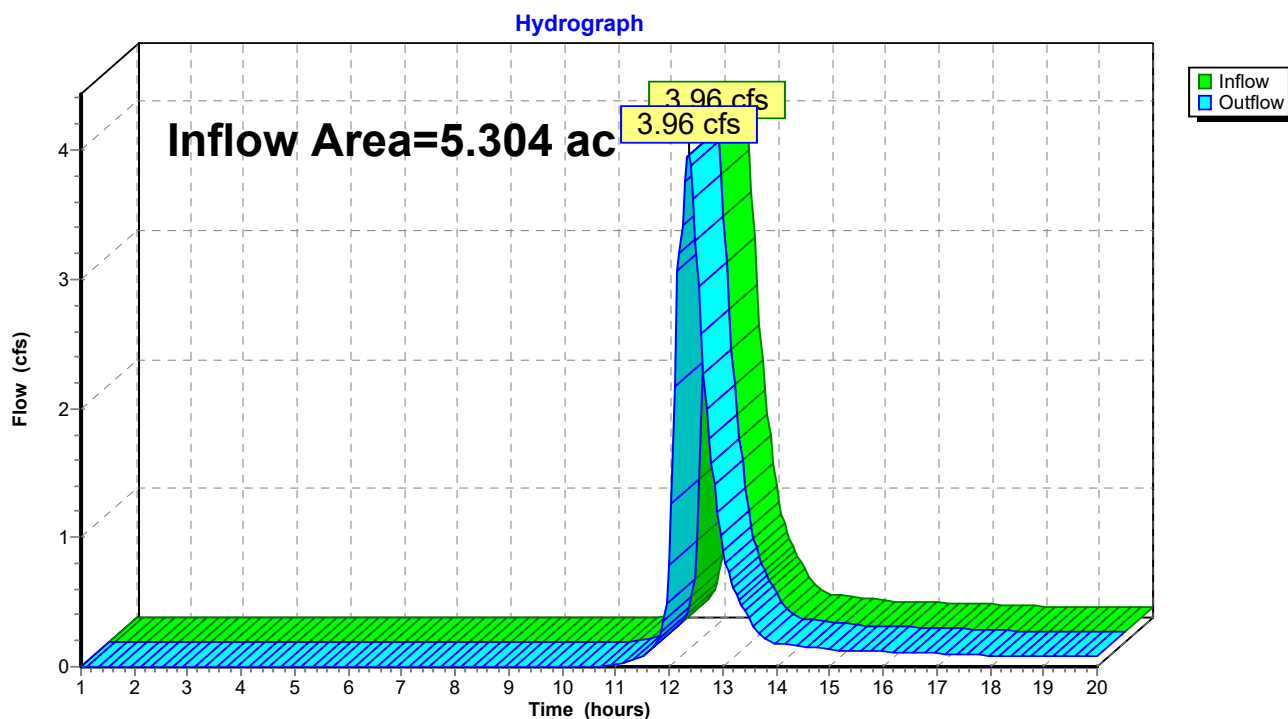
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 0.68" for 10-Year event
Inflow = 3.96 cfs @ 12.36 hrs, Volume= 0.302 af
Outflow = 3.96 cfs @ 12.36 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 1.51" for 10-Year event
 Inflow = 4.75 cfs @ 12.28 hrs, Volume= 0.488 af
 Outflow = 4.03 cfs @ 12.38 hrs, Volume= 0.488 af, Atten= 15%, Lag= 6.2 min
 Discarded = 0.72 cfs @ 11.90 hrs, Volume= 0.325 af
 Primary = 3.31 cfs @ 12.38 hrs, Volume= 0.163 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 468.20' @ 12.38 hrs Surf.Area= 0.060 ac Storage= 0.036 af

Plug-Flow detention time= 3.4 min calculated for 0.486 af (100% of inflow)
 Center-of-Mass det. time= 3.2 min (840.1 - 836.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

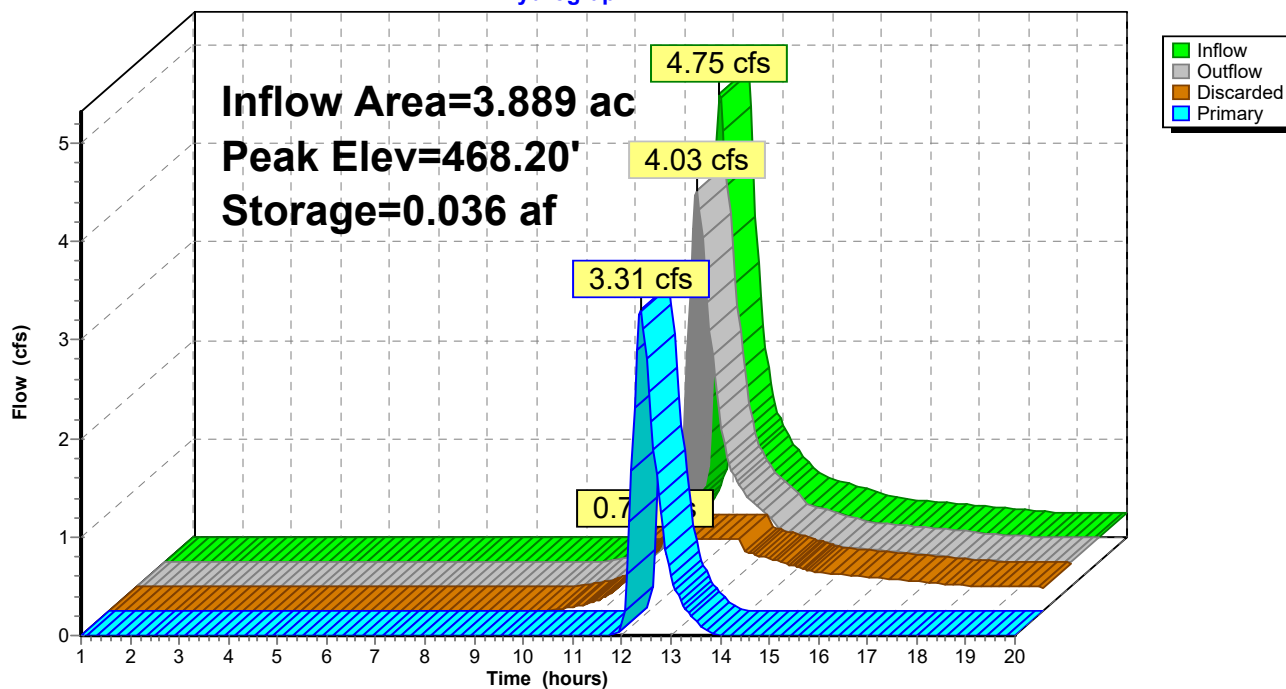
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' / Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 11.90 hrs HW=467.26' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=3.28 cfs @ 12.38 hrs HW=468.20' (Free Discharge)
 ↑**2=Culvert** (Barrel Controls 3.28 cfs @ 3.82 fps)

Pond 4P: CHAMBERS

Hydrograph



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 25-Year Rainfall=6.49"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>2.38"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=7.62 cfs 0.772 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>1.96"
Flow Length=298' Tc=7.1 min CN=60 Runoff=3.26 cfs 0.231 af**Reach 5R: Design Point (Post)**Inflow=7.06 cfs 0.569 af
Outflow=7.06 cfs 0.569 af**Pond 4P: CHAMBERS**Peak Elev=468.66' Storage=0.057 af Inflow=7.62 cfs 0.772 af
Discarded=0.72 cfs 0.434 af Primary=5.95 cfs 0.337 af Outflow=6.67 cfs 0.771 af**Total Runoff Area = 5.304 ac Runoff Volume = 1.003 af Average Runoff Depth = 2.27"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 25-Year Rainfall=6.49"

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Summary for Subcatchment 2S: DA-1 (Post)

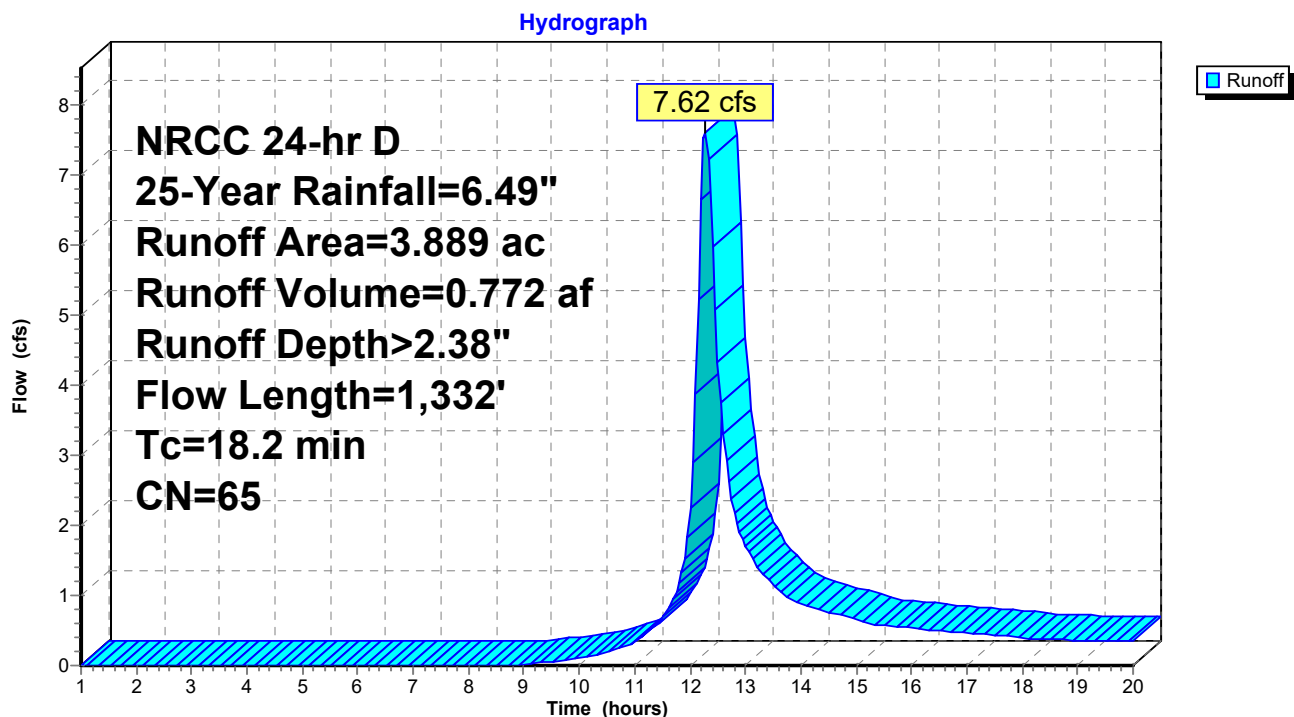
Runoff = 7.62 cfs @ 12.28 hrs, Volume= 0.772 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.49"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 25-Year Rainfall=6.49"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 3.26 cfs @ 12.15 hrs, Volume= 0.231 af, Depth> 1.96"

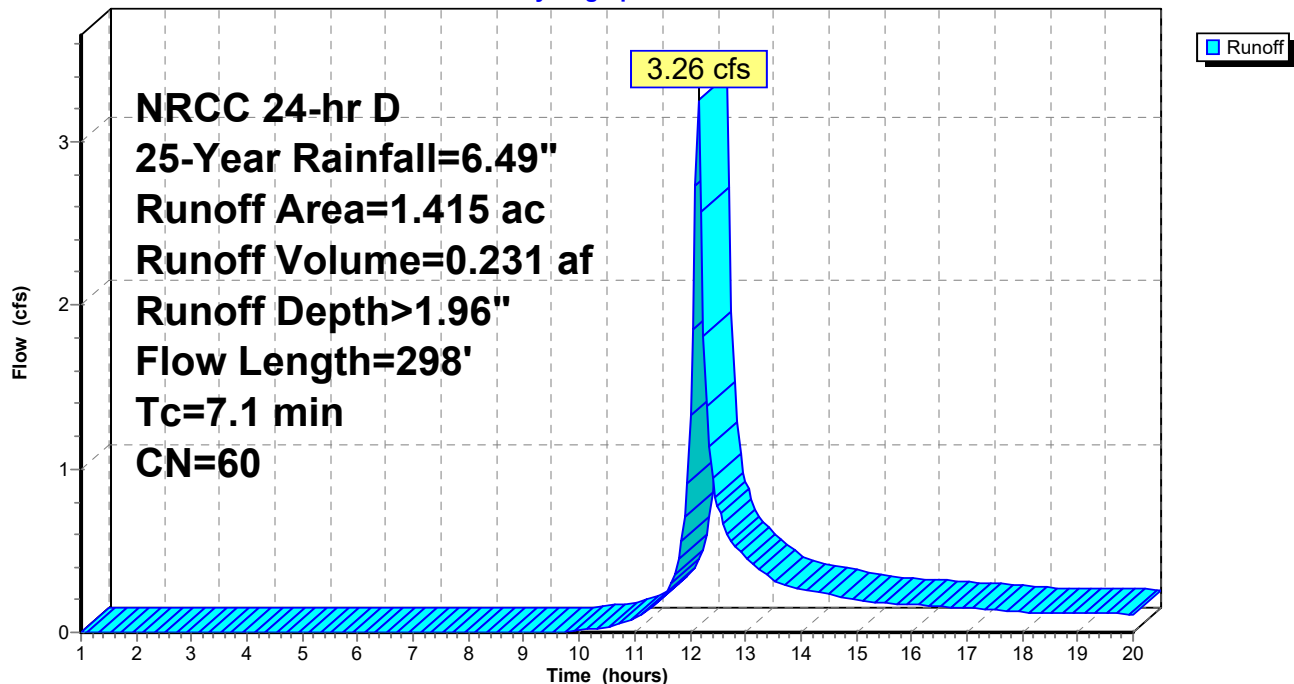
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.49"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow , Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow , Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow , Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

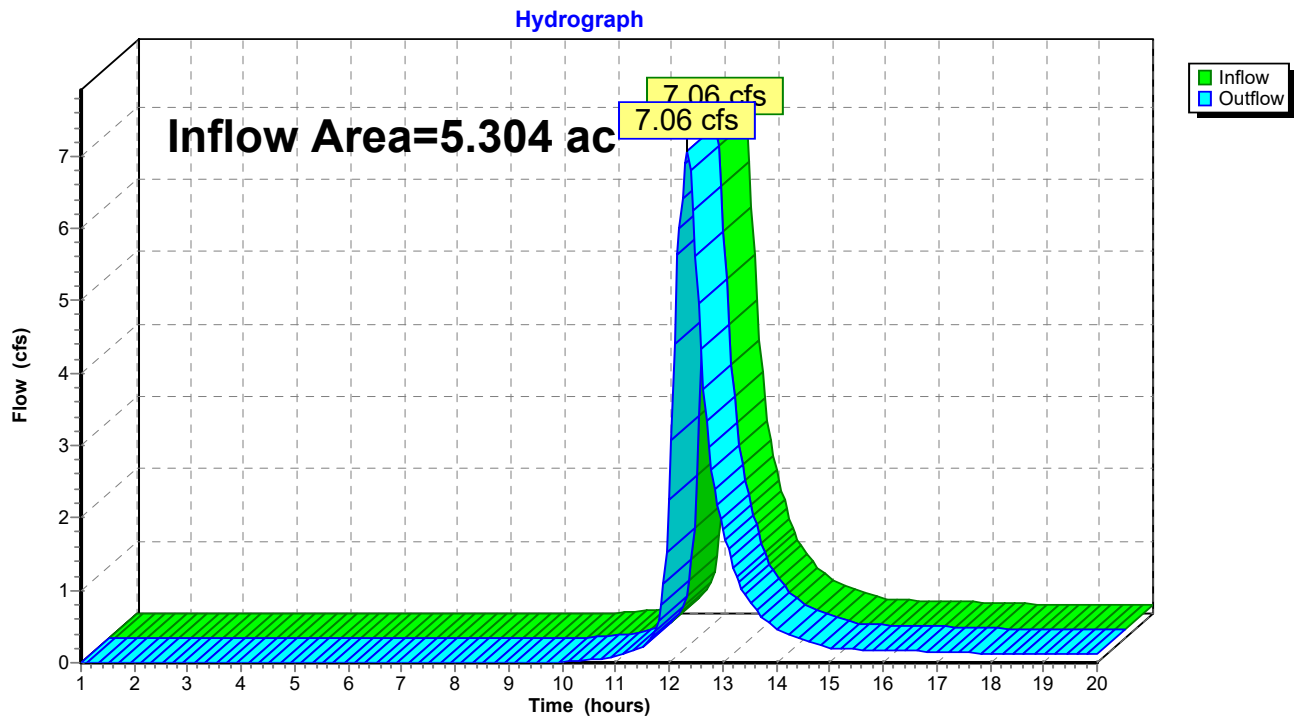
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 1.29" for 25-Year event
Inflow = 7.06 cfs @ 12.34 hrs, Volume= 0.569 af
Outflow = 7.06 cfs @ 12.34 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 2.38" for 25-Year event
 Inflow = 7.62 cfs @ 12.28 hrs, Volume= 0.772 af
 Outflow = 6.67 cfs @ 12.37 hrs, Volume= 0.771 af, Atten= 12%, Lag= 5.5 min
 Discarded = 0.72 cfs @ 11.60 hrs, Volume= 0.434 af
 Primary = 5.95 cfs @ 12.37 hrs, Volume= 0.337 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 468.66' @ 12.37 hrs Surf.Area= 0.060 ac Storage= 0.057 af

Plug-Flow detention time= 4.0 min calculated for 0.771 af (100% of inflow)
 Center-of-Mass det. time= 3.8 min (828.4 - 824.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

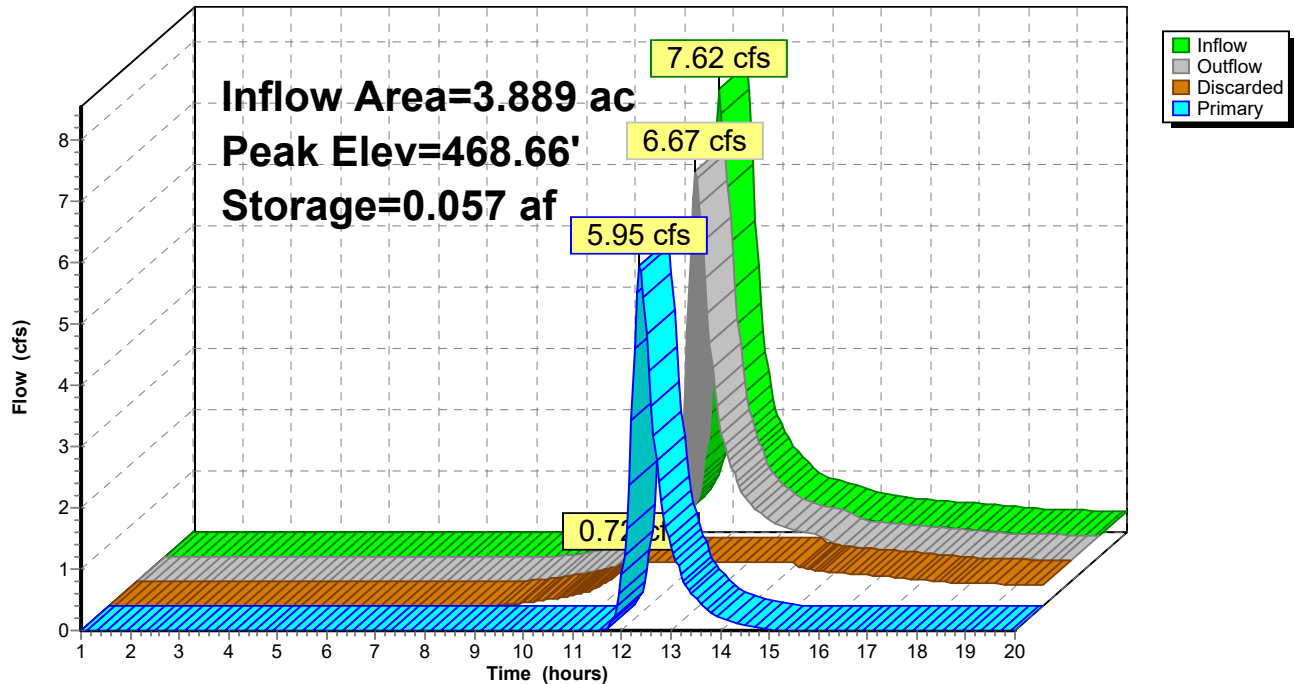
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' /' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 11.60 hrs HW=467.26' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=5.89 cfs @ 12.37 hrs HW=468.65' (Free Discharge)
 ↑ **2=Culvert** (Barrel Controls 5.89 cfs @ 4.35 fps)

Pond 4P: CHAMBERS

Hydrograph



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 50-Year Rainfall=7.76"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>3.28"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=10.54 cfs 1.062 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>2.78"
Flow Length=298' Tc=7.1 min CN=60 Runoff=4.64 cfs 0.328 af**Reach 5R: Design Point (Post)**Inflow=9.81 cfs 0.869 af
Outflow=9.81 cfs 0.869 af**Pond 4P: CHAMBERS**Peak Elev=469.18' Storage=0.080 af Inflow=10.54 cfs 1.062 af
Discarded=0.72 cfs 0.520 af Primary=8.25 cfs 0.541 af Outflow=8.97 cfs 1.061 af**Total Runoff Area = 5.304 ac Runoff Volume = 1.390 af Average Runoff Depth = 3.14"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 50-Year Rainfall=7.76"

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Summary for Subcatchment 2S: DA-1 (Post)

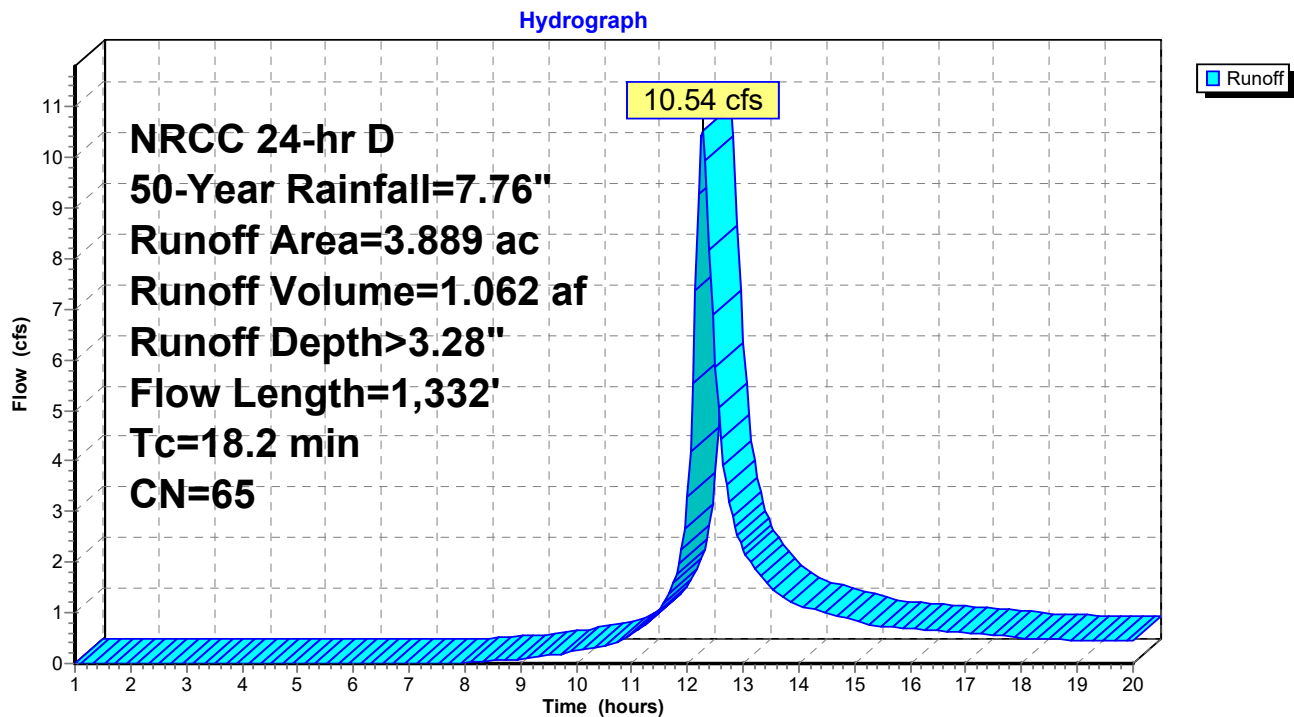
Runoff = 10.54 cfs @ 12.27 hrs, Volume= 1.062 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 50-Year Rainfall=7.76"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 50-Year Rainfall=7.76"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 4.64 cfs @ 12.15 hrs, Volume= 0.328 af, Depth> 2.78"

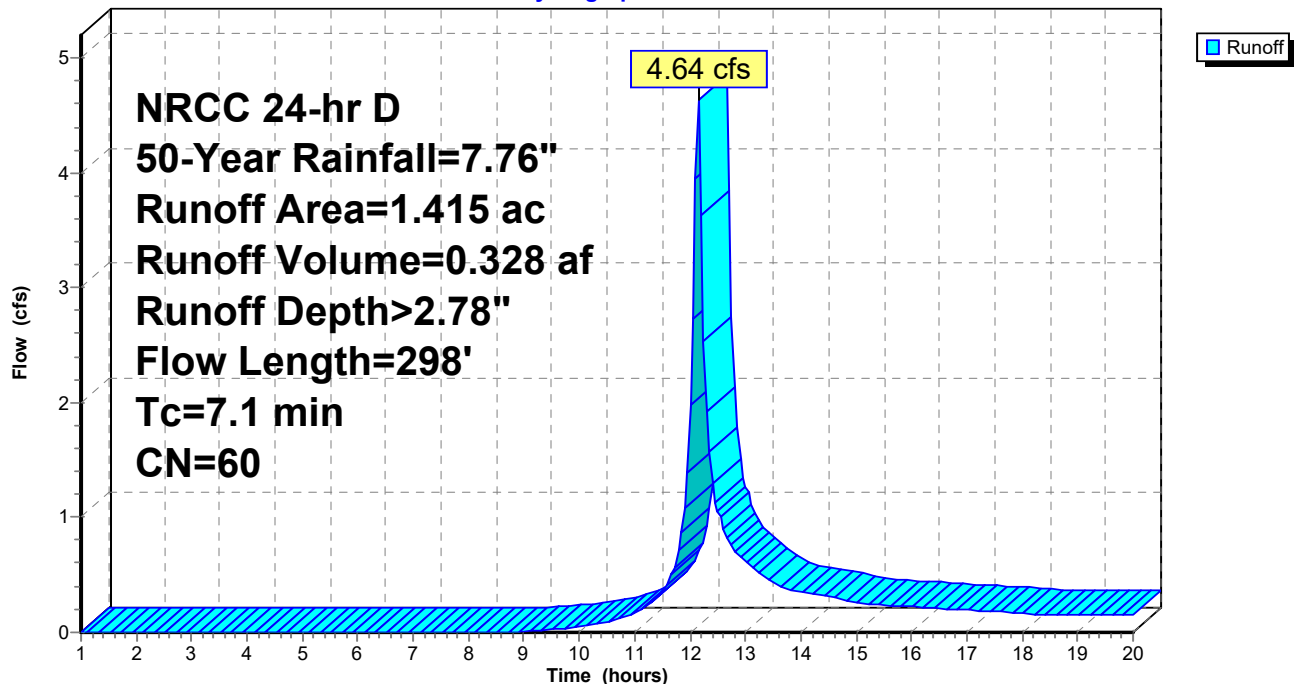
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 50-Year Rainfall=7.76"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow , Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow , Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow , Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

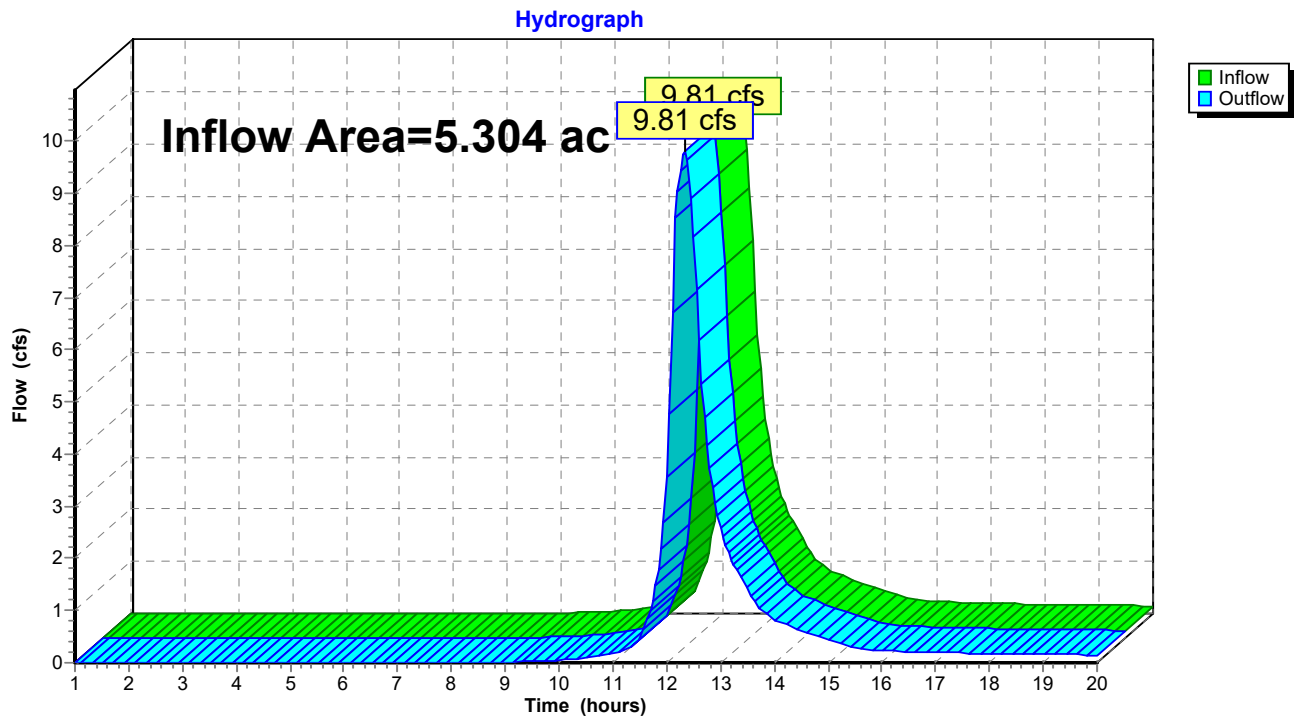
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 1.97" for 50-Year event
Inflow = 9.81 cfs @ 12.33 hrs, Volume= 0.869 af
Outflow = 9.81 cfs @ 12.33 hrs, Volume= 0.869 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 3.28" for 50-Year event
 Inflow = 10.54 cfs @ 12.27 hrs, Volume= 1.062 af
 Outflow = 8.97 cfs @ 12.37 hrs, Volume= 1.061 af, Atten= 15%, Lag= 5.9 min
 Discarded = 0.72 cfs @ 11.25 hrs, Volume= 0.520 af
 Primary = 8.25 cfs @ 12.37 hrs, Volume= 0.541 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 469.18' @ 12.37 hrs Surf.Area= 0.060 ac Storage= 0.080 af

Plug-Flow detention time= 4.4 min calculated for 1.058 af (100% of inflow)
 Center-of-Mass det. time= 4.2 min (820.1 - 815.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

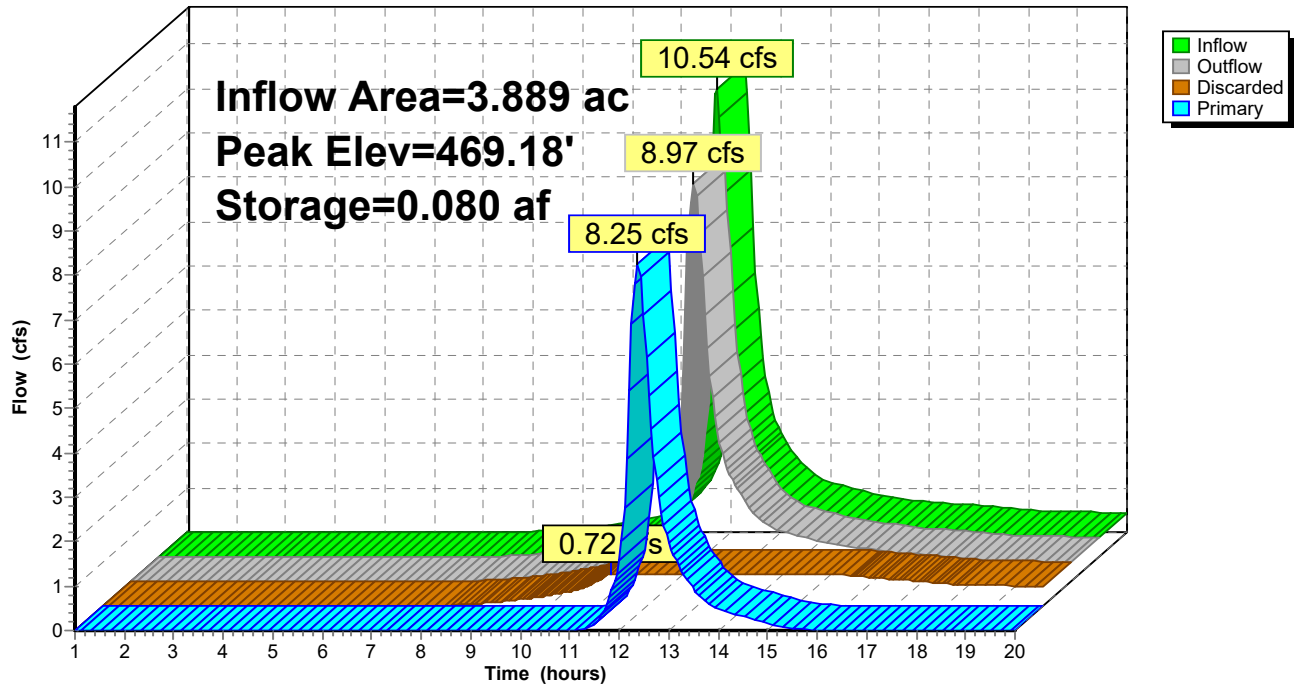
Device	Routing	Invert	Outlet Devices
#1	Discarded	467.22'	12.000 in/hr Exfiltration over Surface area
#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' /' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 11.25 hrs HW=467.26' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=8.20 cfs @ 12.37 hrs HW=469.16' (Free Discharge)
 ↑**2=Culvert** (Inlet Controls 8.20 cfs @ 4.64 fps)

Pond 4P: CHAMBERS

Hydrograph



21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 100-Year Rainfall=9.28"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: DA-1 (Post)Runoff Area=3.889 ac 12.73% Impervious Runoff Depth>4.42"
Flow Length=1,332' Tc=18.2 min CN=65 Runoff=14.16 cfs 1.431 af**Subcatchment6S: DA-2 (Post)**Runoff Area=1.415 ac 0.00% Impervious Runoff Depth>3.84"
Flow Length=298' Tc=7.1 min CN=60 Runoff=6.40 cfs 0.453 af**Reach 5R: Design Point (Post)**Inflow=13.07 cfs 1.282 af
Outflow=13.07 cfs 1.282 af**Pond 4P: CHAMBERS**Peak Elev=470.13' Storage=0.114 af Inflow=14.16 cfs 1.431 af
Discarded=0.72 cfs 0.602 af Primary=11.04 cfs 0.829 af Outflow=11.76 cfs 1.431 af**Total Runoff Area = 5.304 ac Runoff Volume = 1.884 af Average Runoff Depth = 4.26"**
90.67% Pervious = 4.809 ac 9.33% Impervious = 0.495 ac

21-22 Hannigan Residence 4-1-22

NRCC 24-hr D 100-Year Rainfall=9.28"

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Summary for Subcatchment 2S: DA-1 (Post)

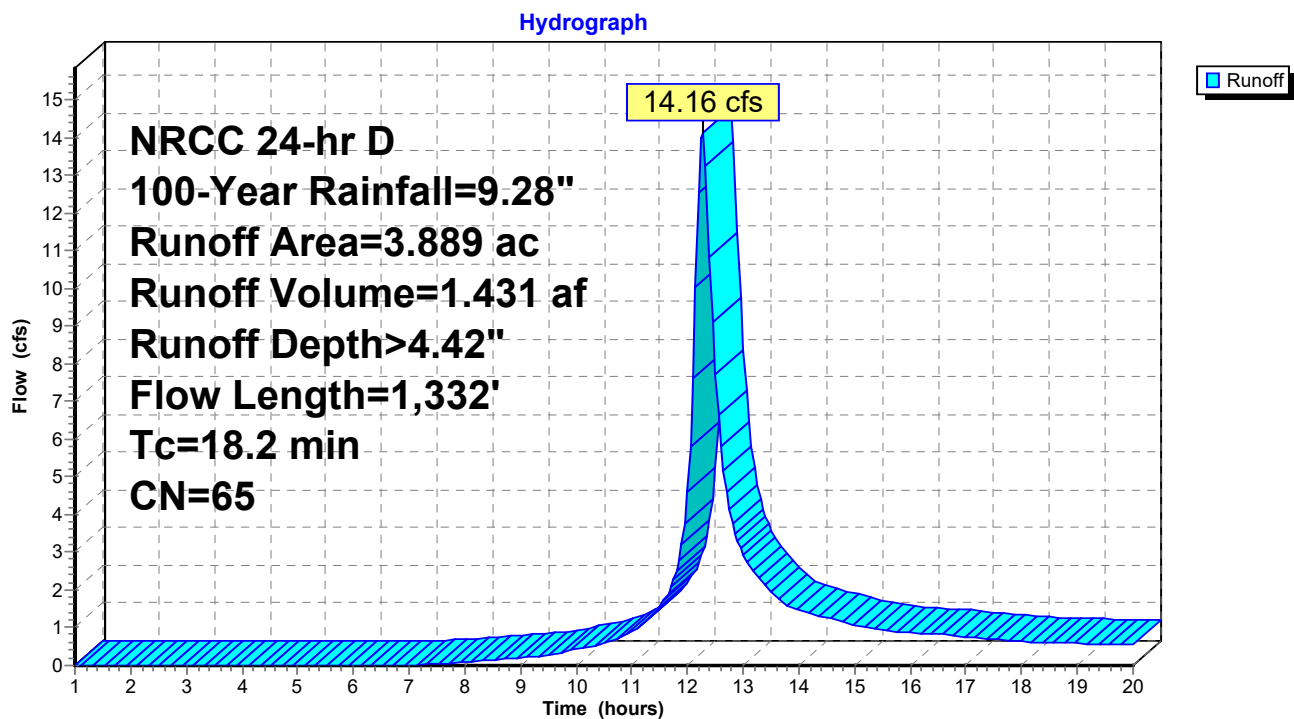
Runoff = 14.16 cfs @ 12.27 hrs, Volume= 1.431 af, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=9.28"

Area (ac)	CN	Description
0.495	98	Paved parking, HSG B
0.671	61	>75% Grass cover, Good, HSG B
2.723	60	Woods, Fair, HSG B
3.889	65	Weighted Average
3.394		87.27% Pervious Area
0.495		12.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	45	0.0150	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
10.7	55	0.0762	0.09		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 5.13"
1.0	147	0.2462	2.48		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	143	0.0968	6.32		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.9	791	0.1551	14.77	5.16	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
0.6	151	0.0110	3.93	1.37	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
18.2	1,332	Total			

Subcatchment 2S: DA-1 (Post)



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NRCC 24-hr D 100-Year Rainfall=9.28"

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Summary for Subcatchment 6S: DA-2 (Post)

Runoff = 6.40 cfs @ 12.14 hrs, Volume= 0.453 af, Depth> 3.84"

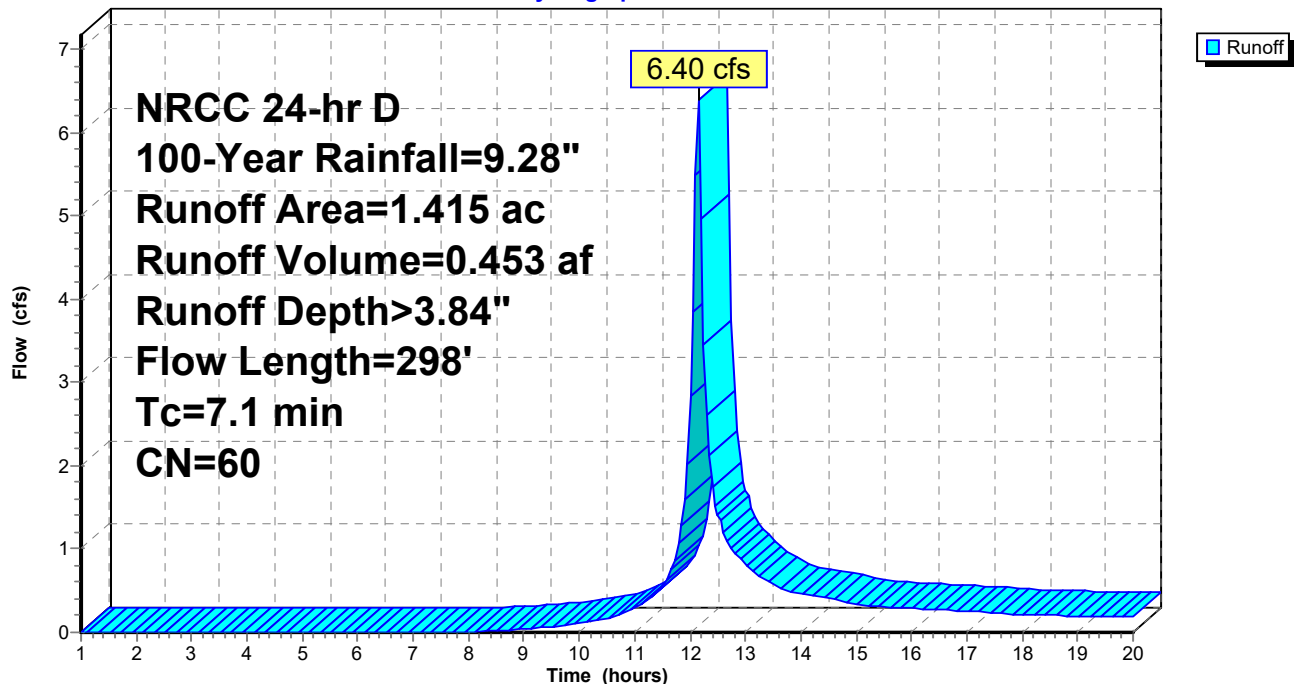
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=9.28"

Area (ac)	CN	Description
1.415	60	Woods, Fair, HSG B
1.415		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	26	0.4700	0.58		Sheet Flow, Grass: Short n= 0.150 P2= 5.13"
4.9	74	0.2466	0.25		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 5.13"
1.5	198	0.2069	2.27		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	298	Total			

Subcatchment 6S: DA-2 (Post)

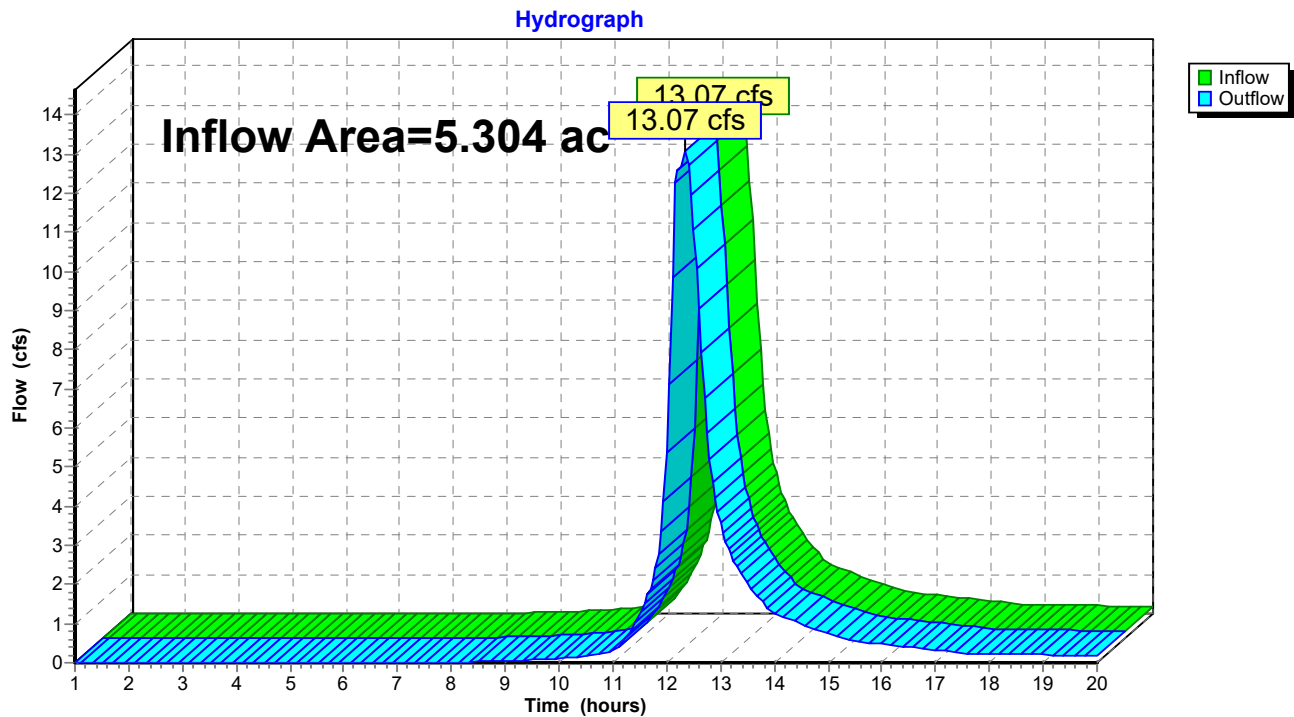
Hydrograph



Summary for Reach 5R: Design Point (Post)

Inflow Area = 5.304 ac, 9.33% Impervious, Inflow Depth > 2.90" for 100-Year event
Inflow = 13.07 cfs @ 12.35 hrs, Volume= 1.282 af
Outflow = 13.07 cfs @ 12.35 hrs, Volume= 1.282 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs

Reach 5R: Design Point (Post)

Summary for Pond 4P: CHAMBERS

Inflow Area = 3.889 ac, 12.73% Impervious, Inflow Depth > 4.42" for 100-Year event
 Inflow = 14.16 cfs @ 12.27 hrs, Volume= 1.431 af
 Outflow = 11.76 cfs @ 12.38 hrs, Volume= 1.431 af, Atten= 17%, Lag= 6.3 min
 Discarded = 0.72 cfs @ 10.85 hrs, Volume= 0.602 af
 Primary = 11.04 cfs @ 12.38 hrs, Volume= 0.829 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 470.13' @ 12.38 hrs Surf.Area= 0.060 ac Storage= 0.114 af

Plug-Flow detention time= 4.9 min calculated for 1.431 af (100% of inflow)
 Center-of-Mass det. time= 4.8 min (812.3 - 807.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	467.22'	0.054 af	34.75'W x 74.82'L x 3.50'H Field A 0.209 af Overall - 0.074 af Embedded = 0.135 af x 40.0% Voids
#2A	467.72'	0.074 af	ADS_StormTech SC-740 +Cap x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 7 Rows
		0.128 af	Total Available Storage

Storage Group A created with Chamber Wizard

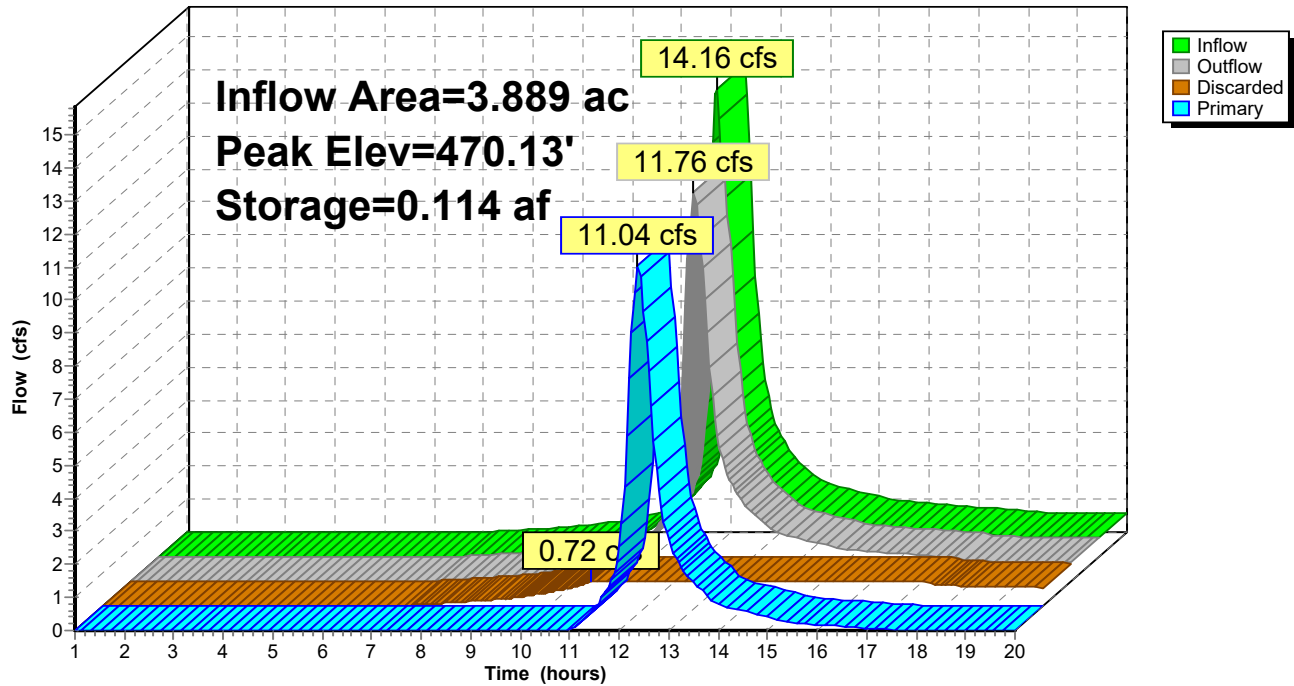
Device	Routing	Invert	Outlet Devices
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#2	Primary	467.22'	18.0" Round Culvert L= 30.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 467.22' / 466.97' S= 0.0083 ' / Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.72 cfs @ 10.85 hrs HW=467.26' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.72 cfs)

Primary OutFlow Max=10.96 cfs @ 12.38 hrs HW=470.10' (Free Discharge)
 ↑**2=Culvert** (Inlet Controls 10.96 cfs @ 6.20 fps)

Pond 4P: CHAMBERS

Hydrograph



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Multi-Event Tables

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Events for Subcatchment 2S: DA-1 (Post)

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.78	0.77	0.107	0.33
2-Year	3.41	1.66	0.191	0.59
5-Year	4.30	3.16	0.334	1.03
10-Year	5.13	4.75	0.488	1.51
25-Year	6.49	7.62	0.772	2.38
50-Year	7.76	10.54	1.062	3.28
100-Year	9.28	14.16	1.431	4.42

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Multi-Event Tables

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Events for Subcatchment 6S: DA-2 (Post)

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.78	0.14	0.024	0.20
2-Year	3.41	0.51	0.047	0.40
5-Year	4.30	1.18	0.091	0.77
10-Year	5.13	1.91	0.139	1.18
25-Year	6.49	3.26	0.231	1.96
50-Year	7.76	4.64	0.328	2.78
100-Year	9.28	6.40	0.453	3.84

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Multi-Event Tables

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Events for Reach 5R: Design Point (Post)

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	0.15	0.15	0.00	0
2-Year	0.89	0.89	0.00	0
5-Year	2.32	2.32	0.00	0
10-Year	3.96	3.96	0.00	0
25-Year	7.06	7.06	0.00	0
50-Year	9.81	9.81	0.00	0
100-Year	13.07	13.07	0.00	0

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Multi-Event Tables

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Events for Pond 4P: CHAMBERS

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-Year	0.77	0.73	0.72	0.01	467.26	0.001
2-Year	1.66	1.41	0.72	0.69	467.62	0.009
5-Year	3.16	2.63	0.72	1.90	467.93	0.022
10-Year	4.75	4.03	0.72	3.31	468.20	0.036
25-Year	7.62	6.67	0.72	5.95	468.66	0.057
50-Year	10.54	8.97	0.72	8.25	469.18	0.080
100-Year	14.16	11.76	0.72	11.04	470.13	0.114

21-22 Hannigan Residence 4-1-22

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- 4 Area Listing (selected nodes)
- 5 Soil Listing (selected nodes)
- 6 Ground Covers (selected nodes)
- 7 Pipe Listing (selected nodes)

1-Year Event

- 8 Node Listing
- 9 Subcat 2S: DA-1 (Post)
- 11 Subcat 6S: DA-2 (Post)
- 12 Reach 5R: Design Point (Post)
- 13 Pond 4P: CHAMBERS

2-Year Event

- 15 Node Listing
- 16 Subcat 2S: DA-1 (Post)
- 18 Subcat 6S: DA-2 (Post)
- 19 Reach 5R: Design Point (Post)
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5-Year Event

- 22 Node Listing
- 23 Subcat 2S: DA-1 (Post)
- 25 Subcat 6S: DA-2 (Post)
- 26 Reach 5R: Design Point (Post)
- 27 Pond 4P: CHAMBERS

10-Year Event

- 29 Node Listing
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25-Year Event

- 36 Node Listing
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21-22 Hannigan Residence 4-1-22

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Multi-Event Tables

- 57 Subcat 2S: DA-1 (Post)
- 58 Subcat 6S: DA-2 (Post)
- 59 Reach 5R: Design Point (Post)
- 60 Pond 4P: CHAMBERS

APPENDIX G

Hydraulic Storm Sewer Capacity Analysis

Channel Report

21-22 Hannigan Residence

Circular

Diameter (ft) = 1.50

Invert Elev (ft) = 467.72

Slope (%) = 2.50

N-Value = 0.012

Calculations

Compute by: Known Q

Known Q (cfs) = 3.96

Highlighted

Depth (ft) = 0.48

Q (cfs) = 3.960

Area (sqft) = 0.49

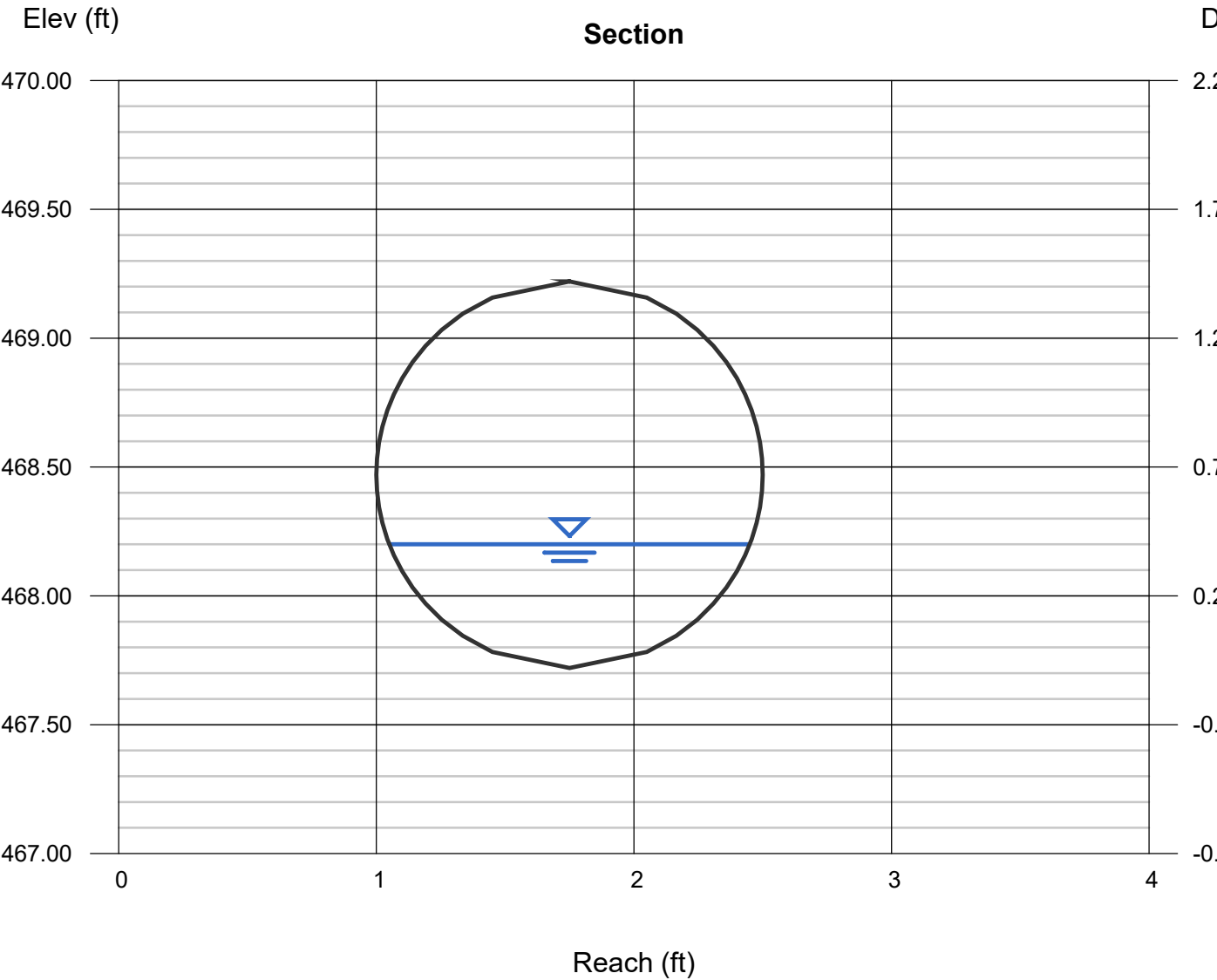
Velocity (ft/s) = 8.08

Wetted Perim (ft) = 1.81

Crit Depth, Yc (ft) = 0.77

Top Width (ft) = 1.40

EGL (ft) = 1.50



APPENDIX H

SMP Selection

Green Infrastructure Planning Evaluation

Group	Practice	Description	Comments
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.	Undisturbed portions of the site will be protected and remain in natural state.
	Preservation of Buffers	Define, delineate and place in permanent conservation easement naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	5
	Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	The project disturbance has been minimized to the greatest extent 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.	All sensitive areas have been avoided. Improvements within floodway either provide enhancement or will have no increased impacts.
	Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	5
	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.	Soil restoration proposed.
Reduction of Impervious Cover	Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area.	1
	Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site	1

		impervious area.	
	Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area.	3
	Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	1
	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.	3
	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.	1
Runoff Reduction Techniques	Conservation of natural areas	Retain the pre-development hydrologic and water quality Conservation of characteristics of undisturbed natural areas, stream and wetland natural areas buffers by restoring and/or permanently conserving these areas on a site.	2
	Sheetflow to riparian buffers or filter strips	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.	2
	Vegetated open swale	The natural drainage paths, or properly designed vegetated channels, can be used instead of constructing underground storm sewers or concrete open channels to increase time of concentration, reduce the	2

		peak discharge, and provide infiltration.	
	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.	2
	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	2
	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.	Infiltration used for this project.
	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.	2
	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.	2
	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	2

		quantity and improve water quality.	
	Rain tank/Cistern	Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities.	2
	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.	2
Pond	Micropool Extended Detention Pool (P-1)	Pond that treats the majority of the water quality volume through extended detention, and incorporates a micropool at the outlet of the pond to prevent sediment resuspension.	1
	Wet Pond (P-2)	Pond that provides storage for the entire water quality volume in the permanent pool.	1
	Wet Extended Detention (P-3)	Pond that treats a portion of the water quality volume by detaining storm flows above a permanent pool for a specified minimum detention time.	1
	Multiple Pond System (P-4) Pocket Pond (P-5)	A group of ponds that collectively treat the water quality volume. A stormwater wetland design adapted for the treatment of runoff from small drainage areas that has little or no baseflow available to maintain water elevations and relies on ground water to maintain a permanent pool.	1
Wetland	Shallow Wetland (W-1)	A wetland that provides water quality treatment entirely in a wet shallow marsh.	1
	Extended Detention Wetland (W-2)	A wetland system that provides some fraction of the water quality volume by	1

		detaining storm flows above the marsh surface.	
	Pond/ Wetland System (W-3)	A wetland system that provides a portion of the water quality volume in the permanent pool of a wet pond that precedes the marsh for a specified minimum detention time.	1
	Pocket Wetland (W-4)	A shallow wetland design adapted for the treatment of runoff from small drainage areas that has variable water levels and relies on groundwater for its permanent pool.	1
Infiltration	Infiltration Trench (I-1)	An infiltration practice that stores the water quality volume in the void spaces of a gravel trench before it is infiltrated into the ground.	1
	Infiltration Basin (I-2)	An infiltration practice that stores the water quality volume in a shallow depression, before it is infiltrated it into the ground.	1
	Dry Well (I-3)	An infiltration practice similar in design to the infiltration trench, and best suited for treatment of rooftop runoff.	Proposed for this project.
Filtering Practices	Surface Sand Filter (F-1)	A filtering practice that treats stormwater by settling out larger particles in a sediment chamber, and then filtering stormwater through a sand matrix.	1
	Underground Sand Filter (F2)	A filtering practice that treats stormwater as it flows through underground settling and filtering chambers.	1
	Perimeter Sand Filter (F-3)	A filter that incorporates a sediment chamber and filter bed as parallel vaults adjacent to a parking lot.	1
	Organic Filter (F-4)	A filtering practice that uses an organic medium such as compost in the filter, in the place of sand.	1
	Bioretention (F-5)	A shallow depression that treats stormwater as it flows through a soil matrix,	1

		and is returned to the storm drain system.	
Open Channels	Dry Swale (O-1)	An open drainage channel or depression explicitly designed to detain and promote the filtration of stormwater runoff into the soil media.	1
	Wet Swale (O-2)	An open drainage channel or depression designed to retain water or intercept groundwater for water quality treatment.	1

Comment Notes:

1. This improvement is not proposed for the project and does not apply.
2. This practice cannot be applied to this project. It is either deemed (a) inappropriate by the NYS DEC; (b) does not fit the type of project; or (c) cannot be engineered because of practical difficulties such as constructability, maintenance issues, durability, stability or other cause.
3. Minimized to the greatest extent possible within applicable codes.
4. Similar type of practice used.
5. Not applicable.

APPENDIX I

Stormwater Management Practices Design:

Subsurface Stormwater Management System Volume Calculations

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



21-22 HANNIGAN

CORTLANDT, NY

SC-740 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH SC-740.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

- STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

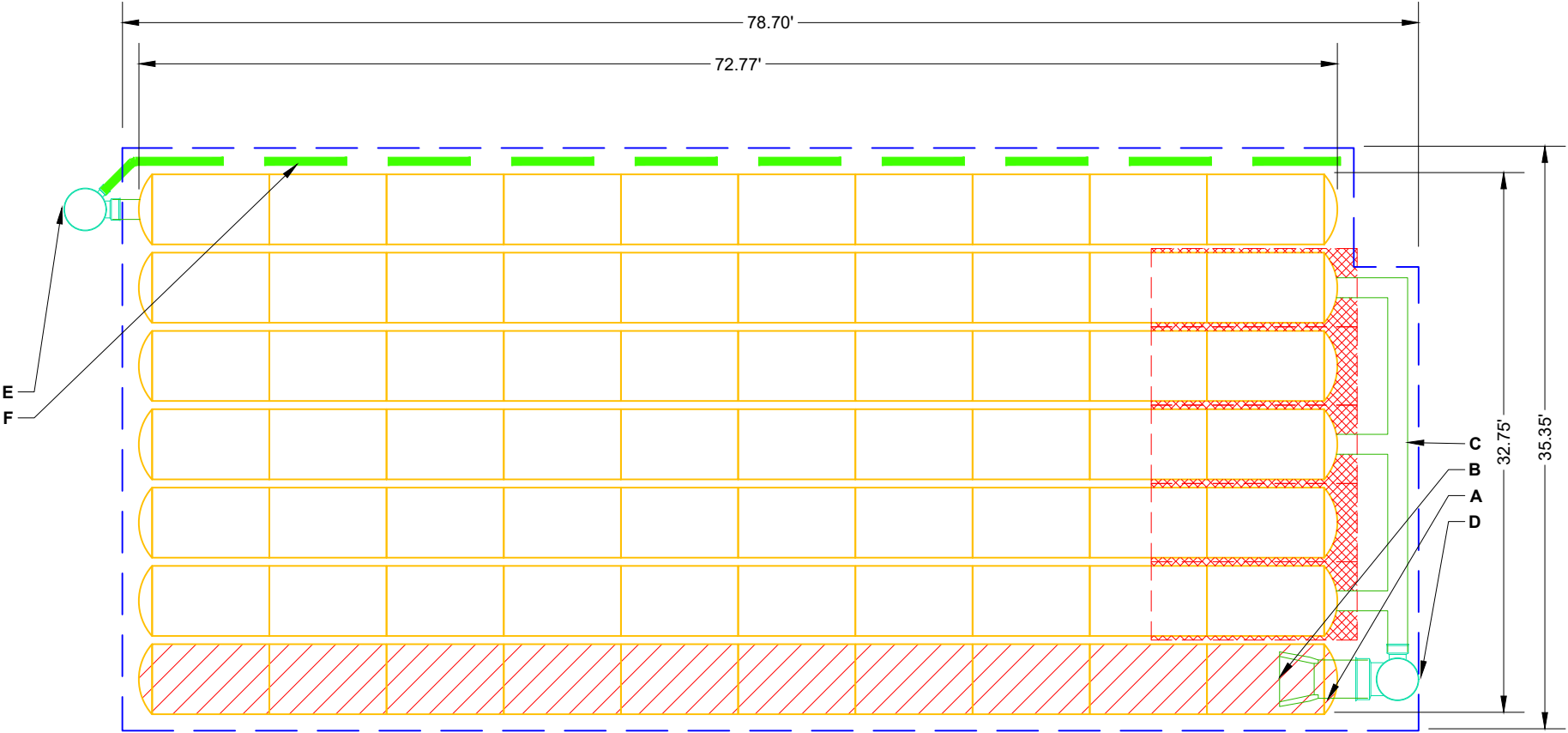
NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS		*INVERT ABOVE BASE OF CHAMBER				
				PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
70	STORMTECH SC-740 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	11.00					
14	STORMTECH SC-740 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	5.00					
6	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	4.50	PREFABRICATED EZ END CAP	A	24" BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.10"	
6	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	4.50	FLAMP	B	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: SC74024RAMP		
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	4.50	MANIFOLD	C	12" x 12" TOP MANIFOLD, ADS N-12	12.50"	
5785	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	3.50	NYLOPLAST (INLET W/ ISO PLUS ROW)	D	30" DIAMETER (24.00" SUMP MIN)		5.7 CFS IN
		TOP OF SC-740 CHAMBER:	3.00	NYLOPLAST (OUTLET)	E	30" DIAMETER (DESIGN BY ENGINEER)		2.0 CFS OUT
		12" x 12" TOP MANIFOLD INVERT:	1.54					
		12" BOTTOM CONNECTION INVERT:	0.60					
2754	SYSTEM AREA (SF)	24" ISOLATOR ROW PLUS INVERT:	0.51	UNDERDRAIN	F	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
228.1	SYSTEM PERIMETER (ft)	BOTTOM OF SC-740 CHAMBER:	0.50					
		UNDERDRAIN INVERT:	0.00					
		BOTTOM OF STONE:	0.00					



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 12.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

21-22 HANNIGAN

CORTLANDT, NY

DATE:

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PROJECT #:

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Chamber System

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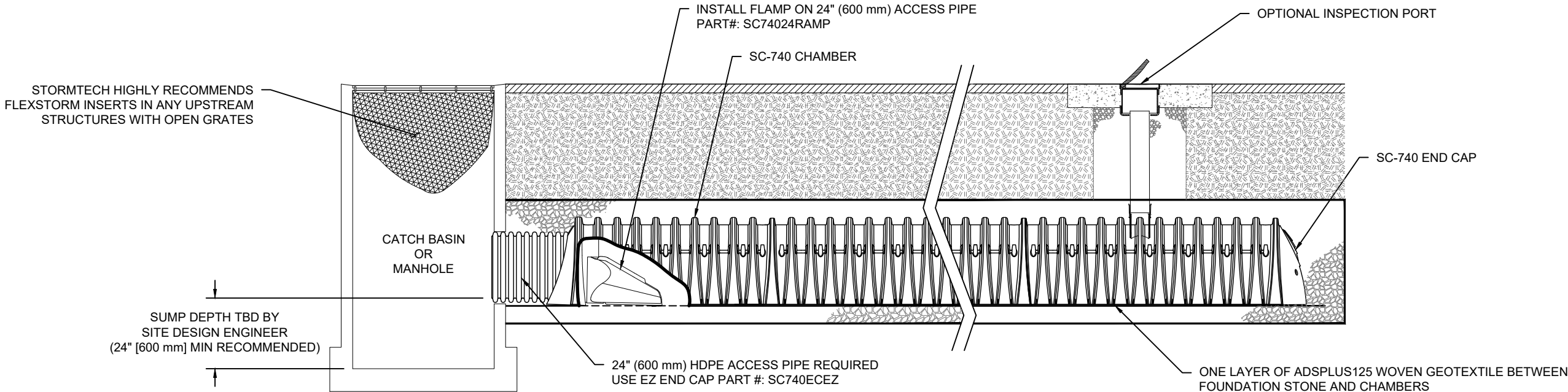
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HILLIARD, OH 43026
1-800-733-7473

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2 OF 6

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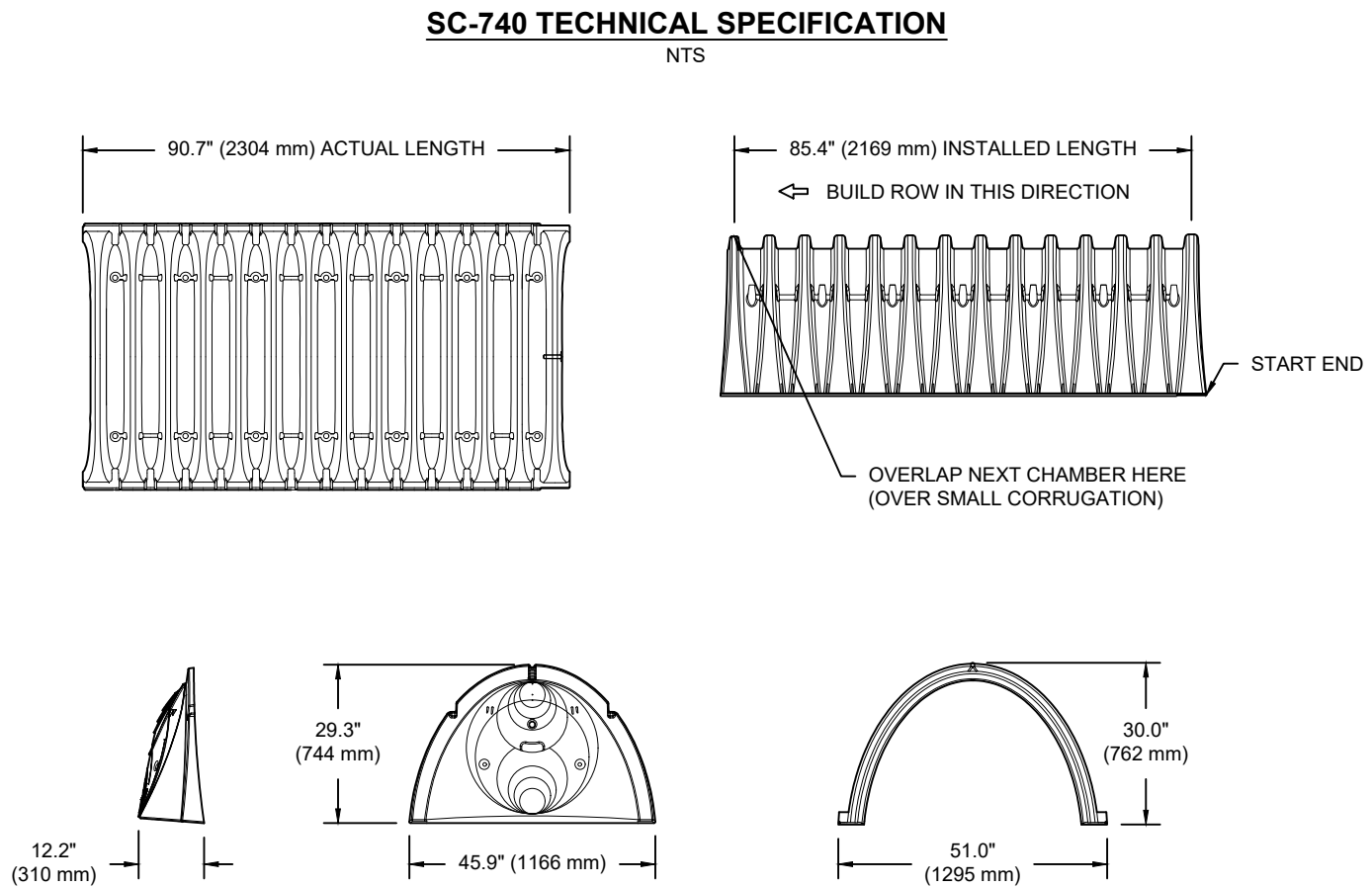
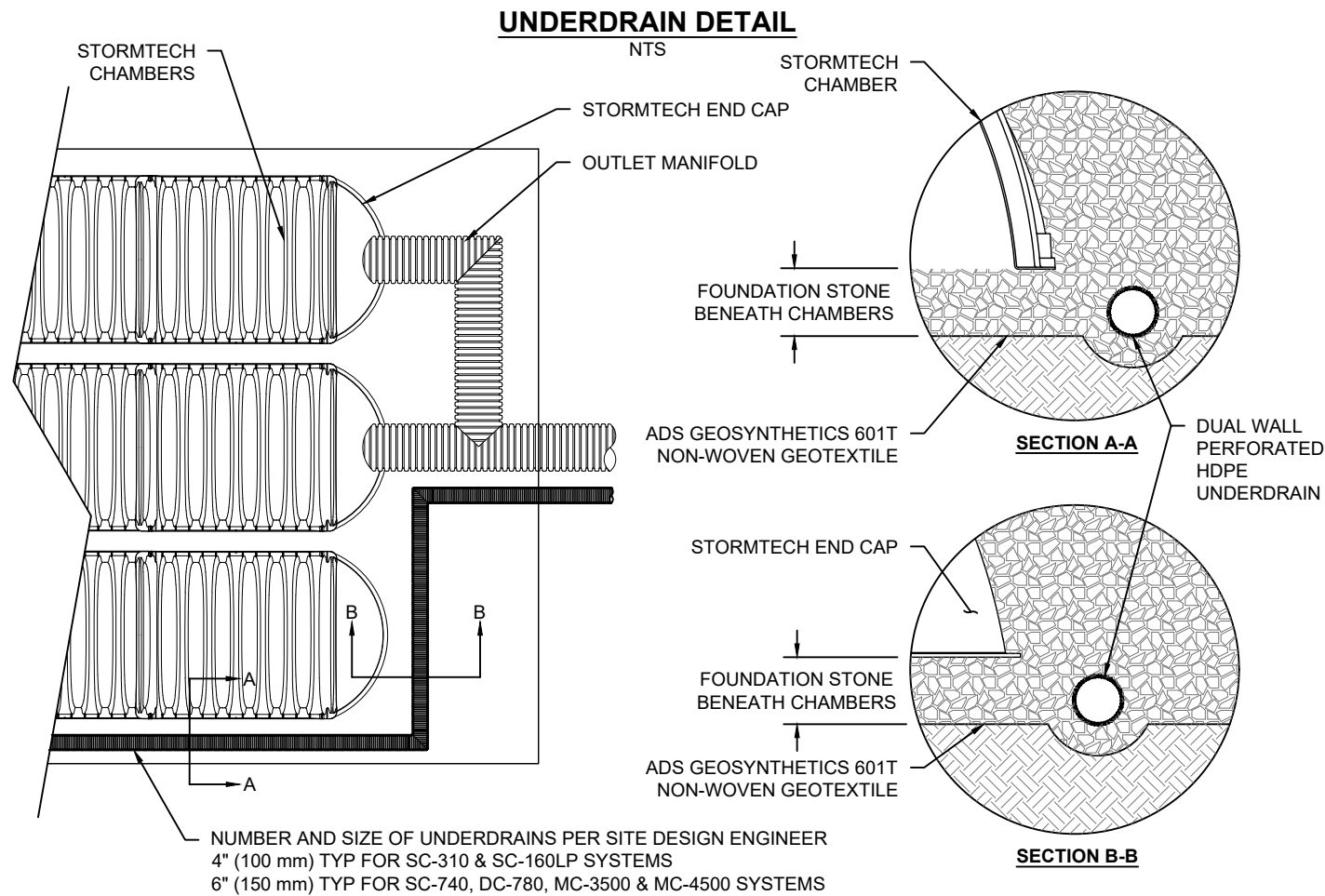
SC-740 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
- A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
- A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
- A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
- A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
- A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
- B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
- B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
- i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
- ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
- B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOMINAL CHAMBER SPECIFICATIONS		
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

21-22 HANNIGAN

CORTLANDT, NY

DRAWN: CS

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DATE:

PROJECT #:

DESCRIPTION

CHK

DRW

DATE

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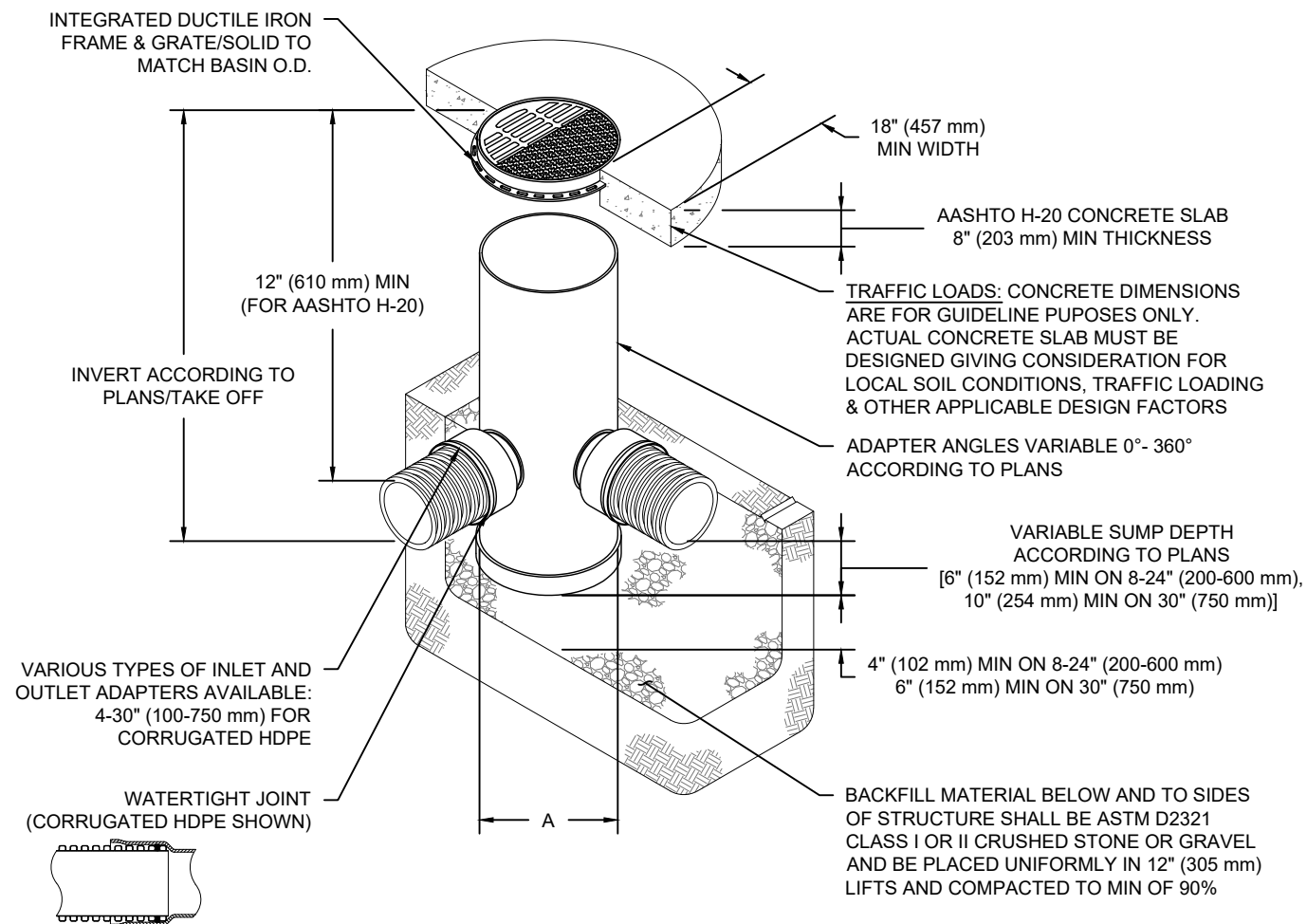
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NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

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770-932-2443 WWW.NYLOPLAST-US.COM		DATE	DRW	CHK	DESCRIPTION
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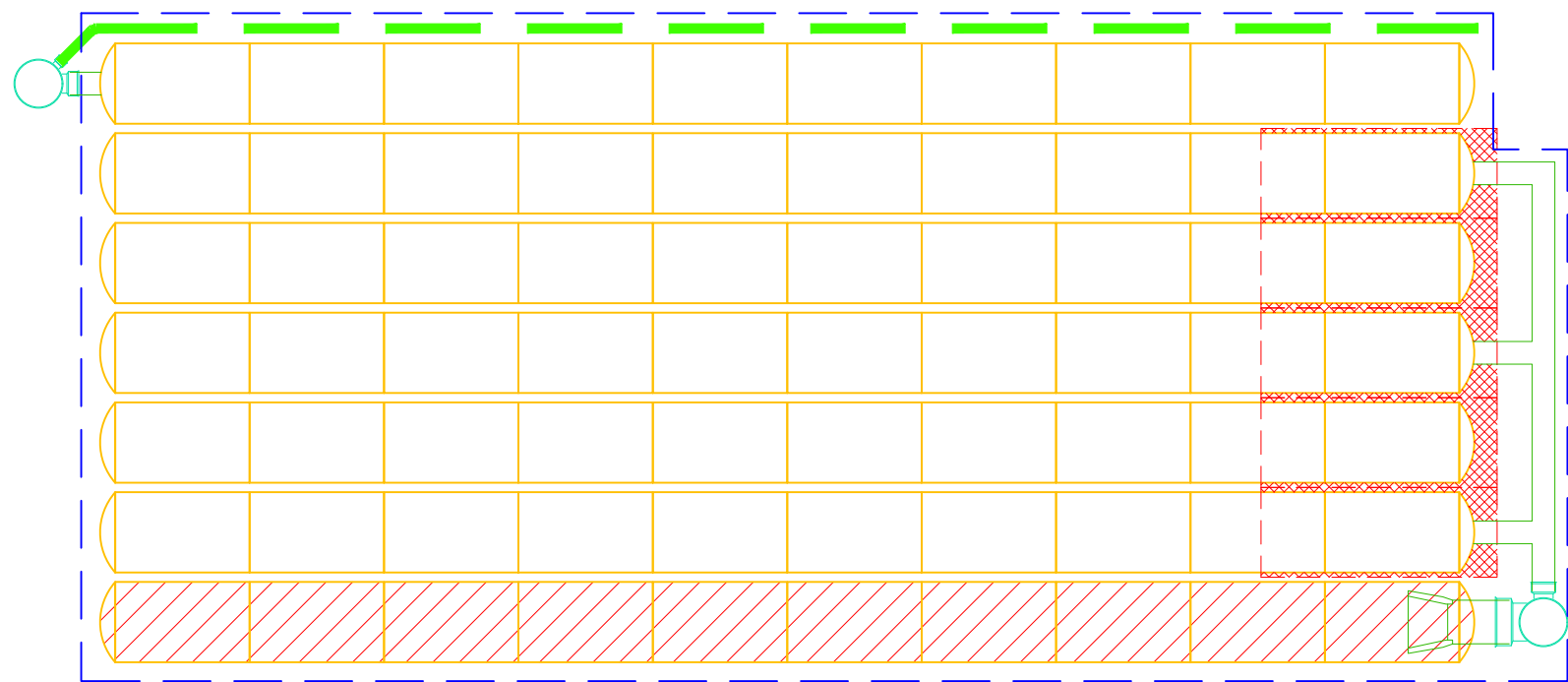


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APPENDIX J

Standard and Specifications for Erosion and Sediment Control Measures

STANDARD AND SPECIFICATIONS FOR CONSTRUCTION ROAD STABILIZATION



Definition & Scope

The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas to control erosion on temporary construction routes and parking areas.

Conditions Where Practice Applies

All traffic routes and parking areas for temporary use by construction traffic.

Design Criteria

Construction roads should be located to reduce erosion potential, minimize impact on existing site resources, and maintain operations in a safe manner. Highly erosive soils, wet or rocky areas, and steep slopes should be avoided. Roads should be routed where seasonal water tables are deeper than 18 inches. Surface runoff and control should be in accordance with other standards.

Road Grade – A maximum grade of 12% is recommended, although grades up to 15% are possible for short distances.

Road Width – 12 foot minimum for one-way traffic or 24 foot minimum for two-way traffic.

Side Slope of Road Embankment – 2:1 or flatter.

Ditch Capacity – On-site roadside ditch and culvert capacities shall be the 10 yr. peak runoff.

Composition – Use a 6-inch layer of NYS DOT sub-base Types 1,2,3, 4 or equivalent as specified in NYSDOT Standard Specifications.

Construction Specifications

1. Clear and strip roadbed and parking areas of all vegetation, roots, and other objectionable material.
2. Locate parking areas on naturally flat areas as available. Keep grades sufficient for drainage, but not more than 2 to 3 percent.
3. Provide surface drainage and divert excess runoff to stabilized areas.
4. Maintain cut and fill slopes to 2:1 or flatter and stabilized with vegetation as soon as grading is accomplished.
5. Spread 6-inch layer of sub-base material evenly over the full width of the road and smooth to avoid depressions.
6. Provide appropriate sediment control measures to prevent offsite sedimentation.

Maintenance

Inspect construction roads and parking areas periodically for condition of surface. Top dress with new gravel as needed. Check ditches for erosion and sedimentation after rainfall events. Maintain vegetation in a healthy, vigorous condition. Areas producing sediment should be treated immediately.

STANDARD AND SPECIFICATIONS FOR CONCRETE TRUCK WASHOUT



Definition & Scope

A temporary excavated or above ground lined constructed pit where concrete truck mixers and equipment can be washed after their loads have been discharged, to prevent highly alkaline runoff from entering storm drainage systems or leaching into soil.

Conditions Where Practice Applies

Washout facilities shall be provided for every project where concrete will be poured or otherwise formed on the site. This facility will receive highly alkaline wash water from the cleaning of chutes, mixers, hoppers, vibrators, placing equipment, trowels, and screeds. Under no circumstances will wash water from these operations be allowed to infiltrate into the soil or enter surface waters.

Design Criteria

Capacity: The washout facility should be sized to contain solids, wash water, and rainfall and sized to allow for the evaporation of the wash water and rainfall. Wash water shall be estimated at 7 gallons per chute and 50 gallons per hopper of the concrete pump truck and/or discharging drum. The minimum size shall be 8 feet by 8 feet at the bottom and 2 feet deep. If excavated, the side slopes shall be 2 horizontal to 1 vertical.

Location: Locate the facility a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams and other surface waters. Prevent surface water from entering the structure except for the access road. Provide appropriate access with a gravel access road sloped down to the structure. Signs shall be placed to direct drivers to the facility after their load is discharged.

Liner: All washout facilities will be lined to prevent

leaching of liquids into the ground. The liner shall be plastic sheeting with a minimum thickness of 10 mils with no holes or tears, and anchored beyond the top of the pit with an earthen berm, sand bags, stone, or other structural appurtenance except at the access point.

If pre-fabricated washouts are used they must ensure the capture and containment of the concrete wash and be sized based on the expected frequency of concrete pours. They shall be sited as noted in the location criteria.

Maintenance

- All concrete washout facilities shall be inspected daily. Damaged or leaking facilities shall be deactivated and repaired or replaced immediately. Excess rainwater that has accumulated over hardened concrete should be pumped to a stabilized area, such as a grass filter strip.
- Accumulated hardened material shall be removed when 75% of the storage capacity of the structure is filled. Any excess wash water shall be pumped into a containment vessel and properly disposed of off site.
- Dispose of the hardened material off-site in a construction/demolition landfill. On-site disposal may be allowed if this has been approved and accepted as part of the projects SWPPP. In that case, the material should be recycled as specified, or buried and covered with a minimum of 2 feet of clean compacted earthfill that is permanently stabilized to prevent erosion.
- The plastic liner shall be replaced with each cleaning of the washout facility.
- Inspect the project site frequently to ensure that no concrete discharges are taking place in non-designated areas.

STANDARD AND SPECIFICATIONS FOR DUST CONTROL



dust control (see Section 3).

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

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

Definition & Scope

The control of dust resulting from land-disturbing activities, to prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

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

Design Criteria

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

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

No polymer application shall take place without written approval from the NYSDEC.

Construction Specifications

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

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of

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

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access route to provide short term limited dust control.

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

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

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

Maintenance

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

STANDARD AND SPECIFICATIONS FOR PROTECTING VEGETATION DURING CONSTRUCTION



Definition & Scope

The protection of trees, shrubs, ground cover and other vegetation from damage by construction equipment. In order to preserve existing vegetation determined to be important for soil erosion control, water quality protection, shade, screening, buffers, wildlife habitat, wetland protection, and other values.

Conditions Where Practices Applies

On planned construction sites where valued vegetation exists and needs to be preserved.

Design Criteria

1. Planning Considerations

A. Inventory:

1) Property boundaries, topography, vegetation and soils information should be gathered. Identify potentially high erosion areas, areas with tree windthrow potential, etc. A vegetative cover type map should be made on a copy of a topographic map which shows other natural and manmade features. Vegetation that is desirable to preserve because of its value for screening, shade, critical erosion control, endangered species, aesthetics, etc., should be identified and marked on the map.

2) Based upon this data, general statements should be prepared about the present condition, potential problem areas, and unique features of the property.

B. Planning:

1) After engineering plans (plot maps) are prepared, another field review should take place and

recommendations made for the vegetation to be saved. Minor adjustments in location of roads, dwellings, and utilities may be needed. Construction on steep slopes, erodible soils, wetlands, and streams should be avoided. Clearing limits should be delineated (See "Determine Limits of Clearing and Grading" on page 2.2).

2) Areas to be seeded and planted should be identified. Remaining vegetation should blend with their surroundings and/or provide special function such as a filter strip, buffer zone, or screen.

3) Trees and shrubs of special seasonal interest, such as flowering dogwood, red maple, striped maple, serviceberry, or shadbush, and valuable potential shade trees should be identified and marked for special protective treatment as appropriate.

4) Trees to be cut should be marked on the plans. If timber can be removed for salable products, a forester should be consulted for marketing advice.

5) Trees that may become a hazard to people, personal property, or utilities should be removed. These include trees that are weak-wooded, disease-prone, subject to windthrow, or those that have severely damaged root systems.

6) The vigor of remaining trees may be improved by a selective thinning. A forester should be consulted for implementing this practice.

2. Measures to Protect Vegetation

A. Limit soil placement over existing tree and shrub roots to a maximum of 3 inches. Soils with loamy texture and good structure should be used.

B. Use retaining walls and terraces to protect roots of trees and shrubs when grades are lowered. Lowered grades should start no closer than the dripline of the tree. For narrow-canopied trees and shrubs, the stem diameter in inches is converted to feet and doubled, such that a 10 inch tree should be protected to 20 feet.

C. Trenching across tree root systems should be the same minimum distance from the trunk, as in "B". Tunnels under root systems for underground utilities should start 18 inches or deeper below the normal ground surface. Tree roots which must be severed should be cut clean. Backfill material that will be in contact with the roots should be topsoil or a prepared planting soil mixture.

D. Construct sturdy fences, or barriers, of wood, steel, or other protective material around valuable

vegetation for protection from construction equipment. Place barriers far enough away from trees, but not less than the specifications in "B", so that tall equipment such as backhoes and dump trucks do not contact tree branches.

E. Construction limits should be identified and clearly marked to exclude equipment.

F. Avoid spills of oil/gas and other contaminants.

G. Obstructive and broken branches should be pruned properly. The branch collar on all branches whether living or dead should not be damaged. The 3 or 4 cut method should be used on all branches larger than two inches at the cut. First cut about one-third the way through the underside of the limb (about 6-12 inches from the tree trunk). Then (approximately an inch further out) make a second cut through the limb from the upper side. When the branch is removed, there is no splintering of the main tree trunk. Remove the stub. If the branch is larger than 5-6 inches in diameter, use the four cut system. Cuts 1 and 2 remain the same and cut 3 should be from the underside of the limb, on the outside of the branch collar. Cut 4 should be from the top and in alignment with the 3rd cut. Cut 3 should be 1/4 to 1/3 the way through the limb. This will prevent the bark from peeling down the trunk. Do not paint the cut surface.

H. Penalties for damage to valuable trees, shrubs, and herbaceous plants should be clearly spelled out in the contract.

PROTECTING TREES IN HEAVY USE AREAS

The compaction of soil over the roots of trees and shrubs by the trampling of recreationists, vehicular traffic, etc., reduces oxygen, water, and nutrient uptake by feeder roots. This weakens and may eventually kill the plants. Table 2.6 rates the "Susceptibility of Tree Species to Compaction."

Where heavy compaction is anticipated, apply and maintain a 3 to 4 inch layer of undecayed wood chips or 2 inches of No. 2 washed, crushed gravel. In addition, use of a wooden or plastic mat may be used to lessen compaction, if applicable.

Table 2.6
Susceptibility of Tree Species to Compaction¹

Resistant:

Box elder.....	<i>Acer negundo</i>	Willows.....	<i>Salix spp.</i>
Green ash.....	<i>Fraxinus pennsylvanica</i>	Honey locust.....	<i>Gleditsia triacanthos</i>
Red elm.....	<i>Ulmus rubra</i>	Eastern cottonwood.....	<i>Populus deltoides</i>
Hawthornes.....	<i>Crataegus spp.</i>	Swamp white oak.....	<i>Quercus bicolor</i>
Bur oak.....	<i>Quercus macrocarpa</i>	Hophornbeam.....	<i>Ostrya virginiana</i>
Northern white cedar....	<i>Thuja occidentalis</i>		

Intermediate:

Red maple.....	<i>Acer rubrum</i>	Sweetgum.....	<i>Liquidambar styraciflua</i>
Silver maple.....	<i>Acer saccharinum</i>	Norway maple.....	<i>Acer platanoides</i>
Hackberry.....	<i>Celtis occidentalis</i>	Shagbark hickory.....	<i>Carya ovata</i>
Black gum.....	<i>Nyssa sylvatica</i>	London plane.....	<i>Platanus x hybrida</i>
Red oak.....	<i>Quercus rubra</i>	Pin oak.....	<i>Quercus palustris</i>
Basswood.....	<i>Tilia americana</i>		

Susceptible:

Sugar maple.....	<i>Acer saccharum</i>	Austrian Pine.....	<i>Pinus nigra</i>
White pine.....	<i>Pinus strobus</i>	White ash.....	<i>Fraxinus americana</i>
Blue spruce.....	<i>Picea pungens</i>	Paper birch.....	<i>Betula papyrifera</i>
White oak.....	<i>Quercus alba</i>	Mountain ash.....	<i>Sorbus aucuparia</i>
Red pine.....	<i>Pinus resinosa</i>	Japanese maple.....	<i>Acer palmatum</i>

¹ If a tree species does not appear on the list, insufficient information is available to rate it for this purpose.

STANDARD AND SPECIFICATIONS FOR SITE POLLUTION PREVENTION



Definition & Scope

A collection of management practices intended to control non-sediment pollutants associated with construction activities to prevent the generation of pollutants due to improper handling, storage, and spills and prevent the movement of toxic substances from the site into surface waters.

Conditions Where Practice Applies

On all construction sites where the earth disturbance exceeds 5,000 square feet, and involves the use of fertilizers, pesticides, petroleum based chemicals, fuels and lubricants, as well as sealers, paints, cleared woody vegetation, garbage, and sanitary wastes.

Design Criteria

The variety of pollutants on a particular site and the severity of their impacts depend on factors such as the nature of the construction activity, the physical characteristics of the construction site, and the proximity of water bodies and conveyances to the pollutant source.

1. All state and federal regulations shall be followed for the storage, handling, application, usage, and disposal of pesticides, fertilizers, and petroleum products.
2. Vehicle and construction equipment staging and maintenance areas will be located away from all drainage ways with their parking areas graded so the runoff from these areas is collected, contained and treated prior to discharge from the site.
3. Provide sanitary facilities for on-site personnel.
4. Store, cover, and isolate construction materials including topsoil, and chemicals, to prevent runoff of



pollutants and contamination of groundwater and surface waters.

5. Develop and implement a spill prevention and control plan. The plan should include NYSDEC's spill reporting and initial notification requirements.
6. Provide adequate disposal for solid waste including woody debris, stumps, and other construction waste and include these methods and directions in the construction details on the site construction drawings. Fill, woody debris, stumps and construction waste shall not be placed in regulated wetlands, streams or other surface waters.
7. Distribute or post informational material regarding proper handling, spill response, spill kit location, and emergency actions to be taken, to all construction personnel.
8. Refueling equipment shall be located at least 100 feet from all wetlands, streams and other surface waters.



STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ACCESS



Definition & Scope

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

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

Design Criteria

See Figure 2.1 on page 2.31 for details.

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

Thickness: Not less than six (6) inches.

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

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

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

Criteria for Geotextile: The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be

inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

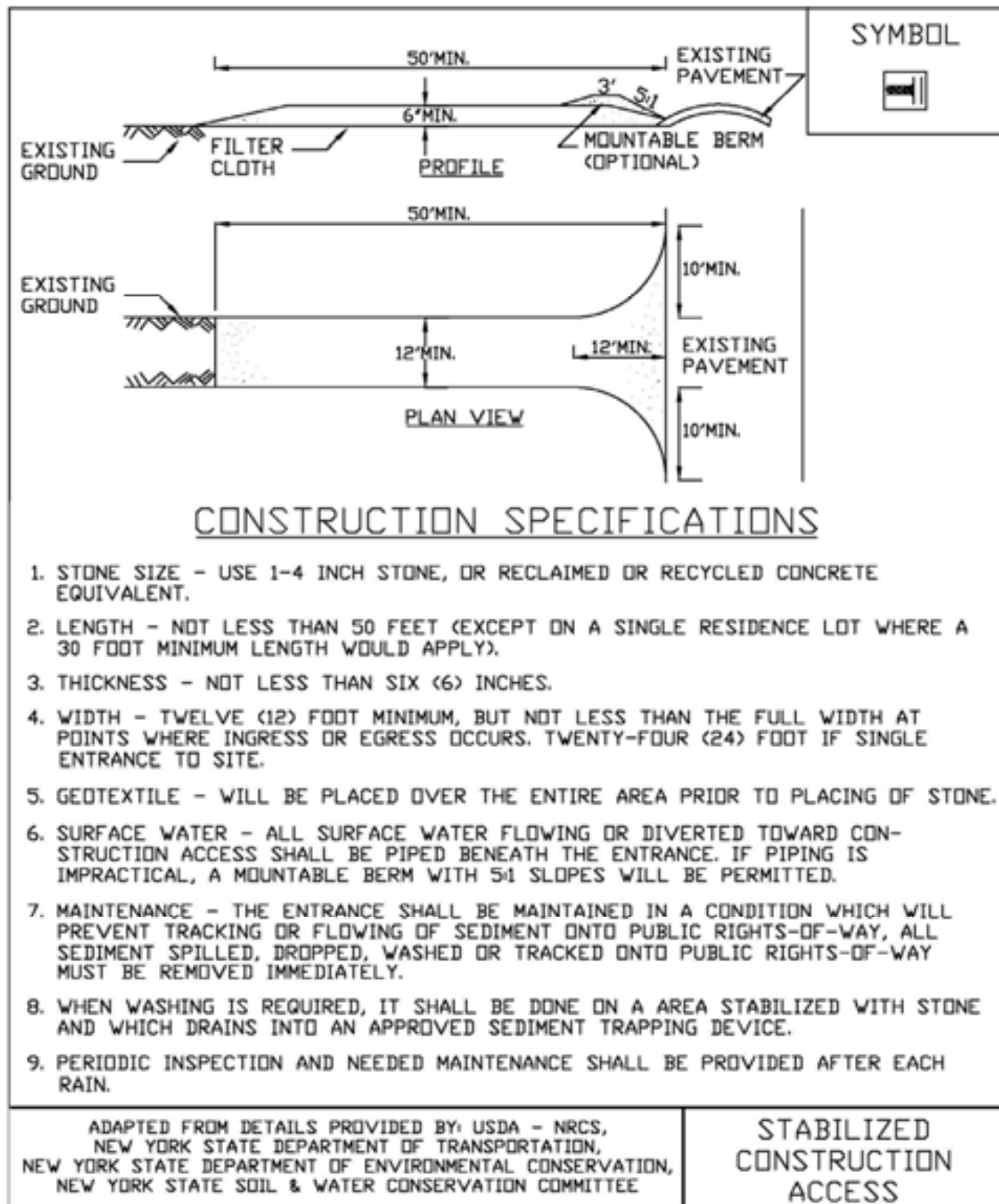
Fabric Properties ³	Light Duty ¹ Roads Grade Sub-grade	Heavy Duty ² Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Burst Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 Modified
Equivalent	40-80	40-80	US Std Sieve
Opening Size			CW-02215
Aggregate Depth	6	10	-
¹ Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.			
² Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.			
³ Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.			

Maintenance

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

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

Figure 2.1
Stabilized Construction Access



STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION



Definition & Scope

A temporary site specific, enhanced erosion and sediment control plan to manage runoff and sediment at the site during construction activities in the winter months to protect off-site water resources.

Conditions Where Practice Applies

This standard applies to all construction activities involved with ongoing land disturbance and exposure between November 15th to the following April 1st.

Design Criteria

1. Prepare a snow management plan with adequate storage for snow and control of melt water, requiring cleared snow to be stored in a manner not affecting ongoing construction activities.
2. Enlarge and stabilize access points to provide for snow management and stockpiling. Snow management activities must not destroy or degrade installed erosion and sediment control practices.
3. A minimum 25 foot buffer shall be maintained from all perimeter controls such as silt fence. Mark silt fence with tall stakes that are visible above the snow pack.
4. Edges of disturbed areas that drain to a waterbody within 100 feet will have 2 rows of silt fence, 5 feet apart, installed on the contour.
5. Drainage structures must be kept open and free of snow and ice dams. All debris, ice dams, or debris from plowing operations, that restrict the flow of runoff and meltwater, shall be removed.
6. Sediment barriers must be installed at all appropriate

perimeter and sensitive locations. Silt fence and other practices requiring earth disturbance must be installed before the ground freezes.

7. Soil stockpiles must be protected by the use of established vegetation, anchored straw mulch, rolled stabilization matting, or other durable covering. A barrier must be installed at least 15 feet from the toe of the stockpile to prevent soil migration and to capture loose soil.
8. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures should be initiated by the end of the next business day and completed within three (3) days. Rolled erosion control blankets must be used on all slopes 3 horizontal to 1 vertical or steeper.
9. If straw mulch alone is used for temporary stabilization, it shall be applied at double the standard rate of 2 tons per acre, making the application rate 4 tons per acre. Other manufactured mulches should be applied at double the manufacturer's recommended rate.
10. To ensure adequate stabilization of disturbed soil in advance of a melt event, areas of disturbed soil should be stabilized at the end of each work day unless:
 - a. work will resume within 24 hours in the same area and no precipitation is forecast or;
 - b. the work is in disturbed areas that collect and retain runoff, such as open utility trenches, foundation excavations, or water management areas.
11. Use stone paths to stabilize access perimeters of buildings under construction and areas where construction vehicle traffic is anticipated. Stone paths should be a minimum 10 feet in width but wider as necessary to accommodate equipment.

Maintenance

The site shall be inspected frequently to ensure that the erosion and sediment control plan is performing its winter stabilization function. If the site will not have earth disturbing activities ongoing during the "winter season", **all** bare exposed soil must be stabilized by established vegetation, straw or other acceptable mulch, matting, rock, or other approved material such as rolled erosion control products. Seeding of areas with mulch cover is preferred but seeding alone is not acceptable for proper stabilization.

Compliance inspections must be performed and reports filed properly in accordance with the SWPPP for all sites under a winter shutdown.

References

1. Northeastern Illinois Soil and Sedimentation Control Steering Committee. October 1981. Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois.
2. J.F. Rushing, V.M. Moore, J.S. Tingle, Q. Mason, and T. McCaffery, 2005. Dust Abatement Methods for Lines of Communication and Base Camps in Temperate Climates. ERDC/GSL TR-05-23, October 2005.

STANDARD AND SPECIFICATIONS FOR EARTH DIKE



Definition & Scope

A **temporary** berm or ridge of compacted soil, located in such a manner as to channel water to a desired location. Its purpose is to direct runoff to a sediment trapping device, thereby reducing the potential for erosion and off site sedimentation. Earth dikes can also be used for diverting clean water away from disturbed areas.

Conditions Where Practice Applies

Earth dikes are often constructed across disturbed areas and around construction sites such as graded parking lots and subdivisions. The dikes shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 3.5 on page 3.15 for details.

General

	Dike A	Dike B
Drainage Area	<5 Ac	5-10 Ac
Dike Height	18 in.	36 in.
Dike Width	24 in.	36 in.
Flow Width	4 ft.	6 ft.
Flow Depth in Channel	8 in.	15 in.
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 10% Max.	0.5% Min. 10% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specifications for Diversion on page 3.9.

Stabilization

Stabilization of the dike shall be completed within 2 days of installation in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in seeding season. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade ¹	Flow Channel	
		A (<5 Ac.)	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" 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. rip-rap or, geotextile
4	8.1-10%	Line with 4-8 in. rip-rap or geotextile	Site Specific Design
¹ In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.			

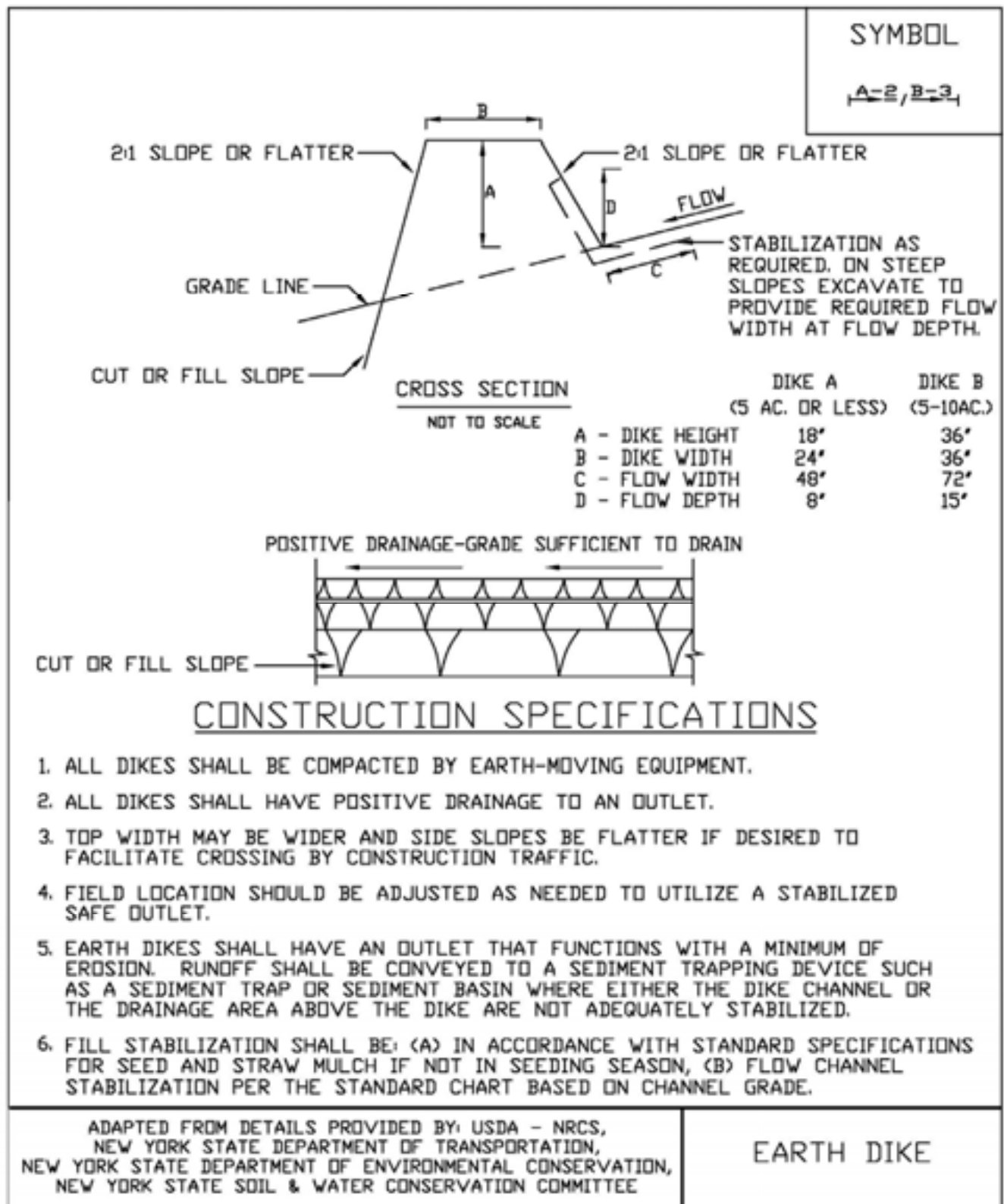
Outlet

Earth dikes shall have an outlet that functions with a minimum of erosion.

Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 3.5
Earth Dike Detail



STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION



Definition & Scope

A **permanent** section of rock protection placed at the outlet end of the culverts, conduits, or channels to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.
2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.
3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet

must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 3.17 on page 3.43 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 3.16 on page 3.42

Maximum Tailwater – Use Figure 3.17 on page 3.43

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions. Outlets constructed on the bank of a stream or wetland shall not use grouted rip-rap, gabions or concrete.

Riprap shall be composed of a well-graded mixture of rock size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A

well-graded mixture, as used herein, is defined as a mixture composed primarily of larger rock sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the rocks. The diameter of the largest rock size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum rock diameter for d_{50} of 15 inches or less; and 1.2 times the maximum rock size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thick- ness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Rock Quality

Rock for riprap shall consist of field rock or rough unhewn quarry rock. The rock shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual rocks shall be at least 2.5.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Anchored Slope and Channel Stabilization on page 4.7.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturer's recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged rocks. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.
2. Determine the tailwater condition at the outlet to establish which curve to use.
3. Use the appropriate chart with the design discharge to determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.
4. Calculate apron width at the downstream end if a flare section is to be employed.

Design Examples are demonstrated in Appendix B.

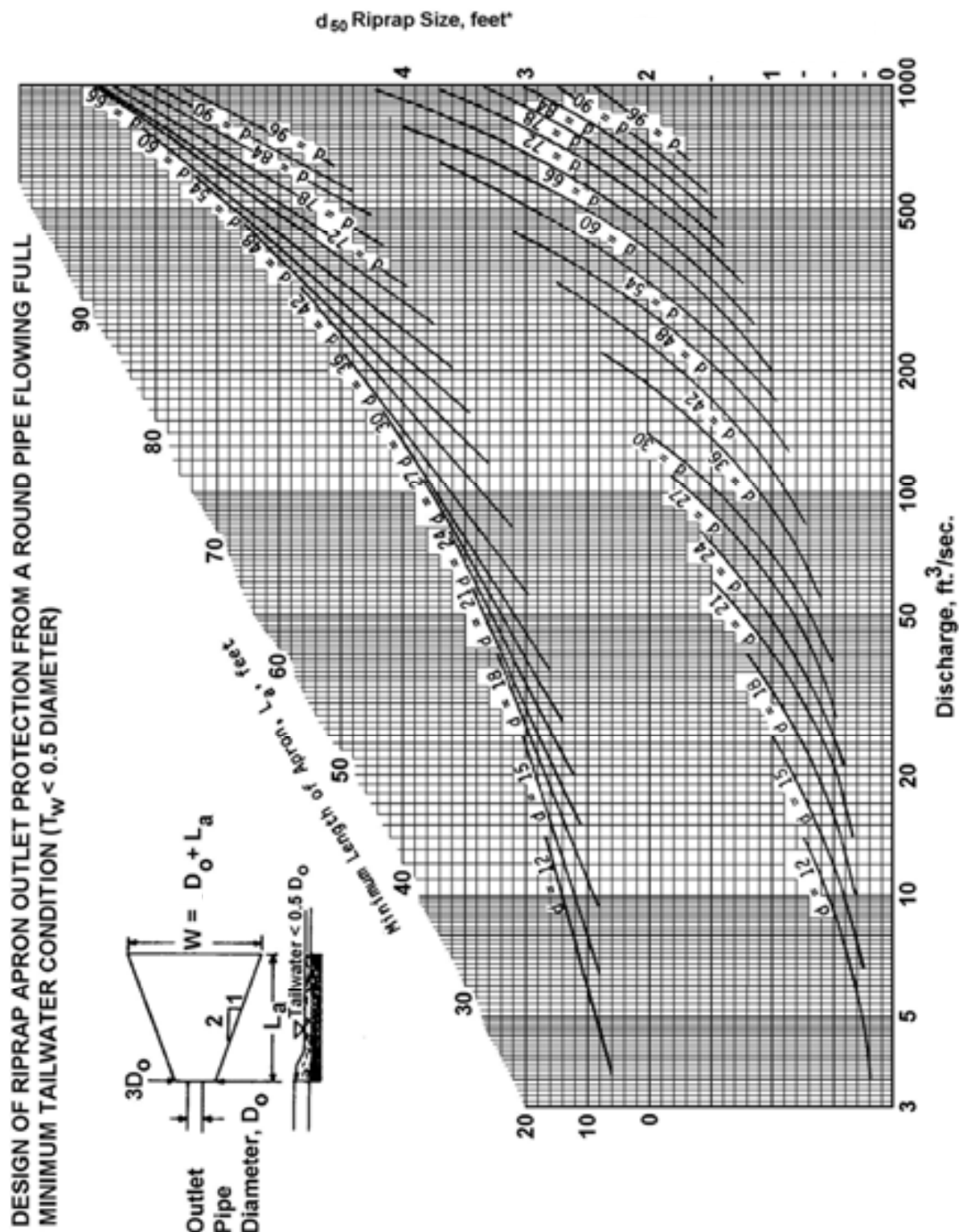
Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
2. The rock or gravel shall conform to the specified grad-

ing limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.
4. Rock for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The rock for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller rocks and spalls filling the voids between the larger rocks. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure 3.16
Outlet Protection Design—Minimum Tailwater Condition Chart
(Design of Outlet Protection from a Round Pipe Flowing Full,
Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)



* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase d_{50} stone size and/or provide velocity reduction device.

Figure 3.17
Outlet Protection Design—Maximum Tailwater Condition Chart
(Design of Outlet Protection from a Round Pipe Flowing Full,
Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

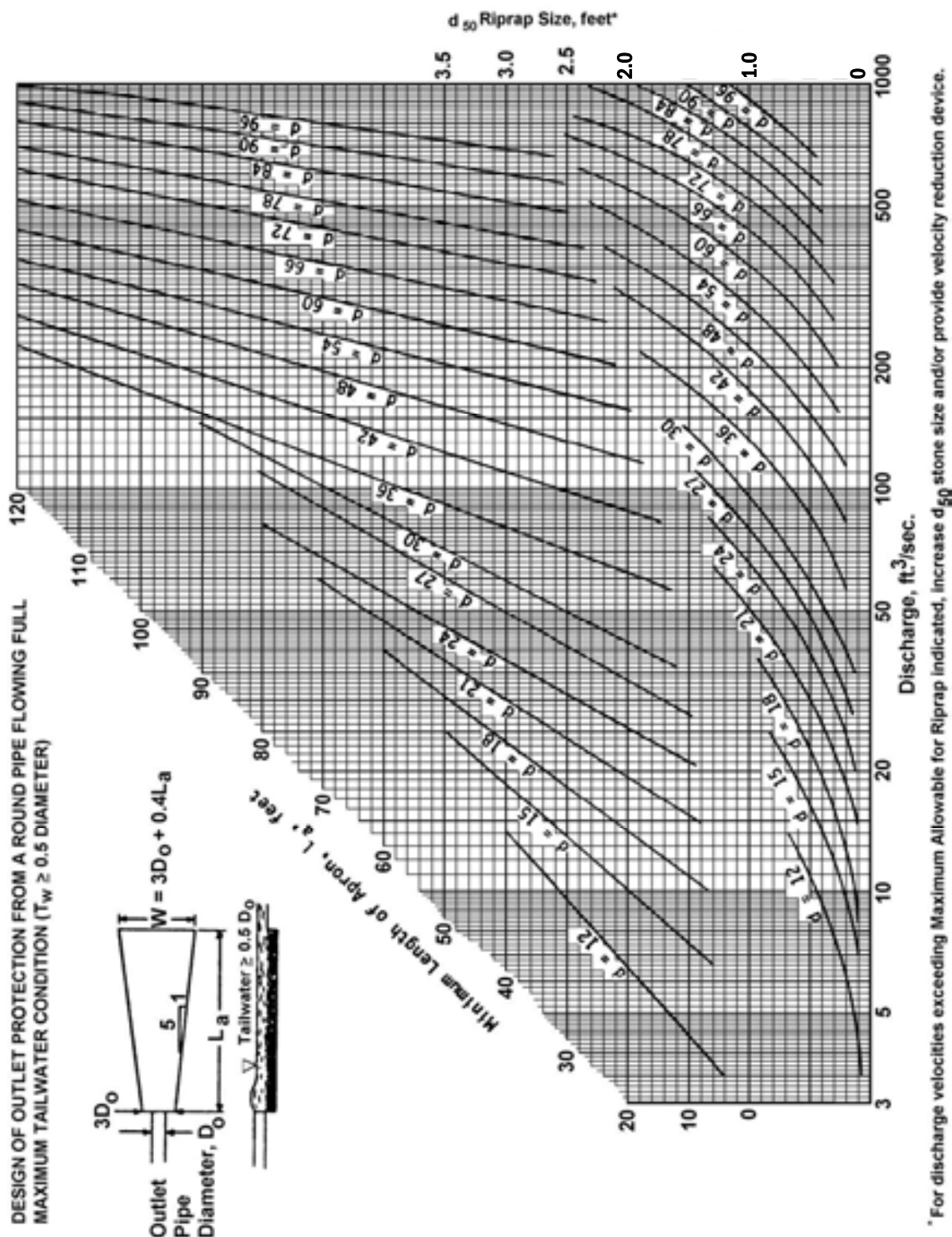


Figure 3.18
Riprap Outlet Protection Detail (1)

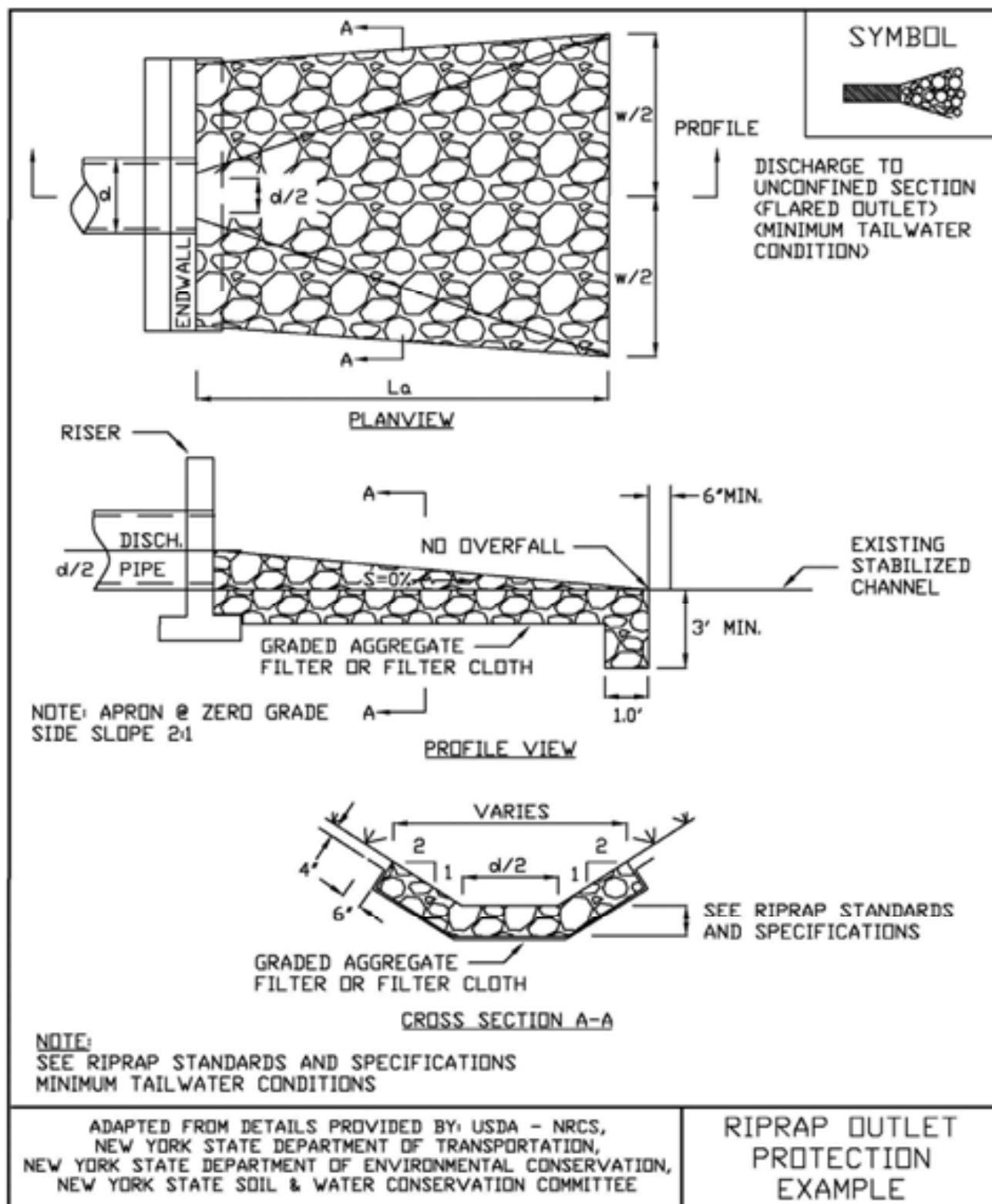


Figure 3.19
Riprap Outlet Protection Detail (2)

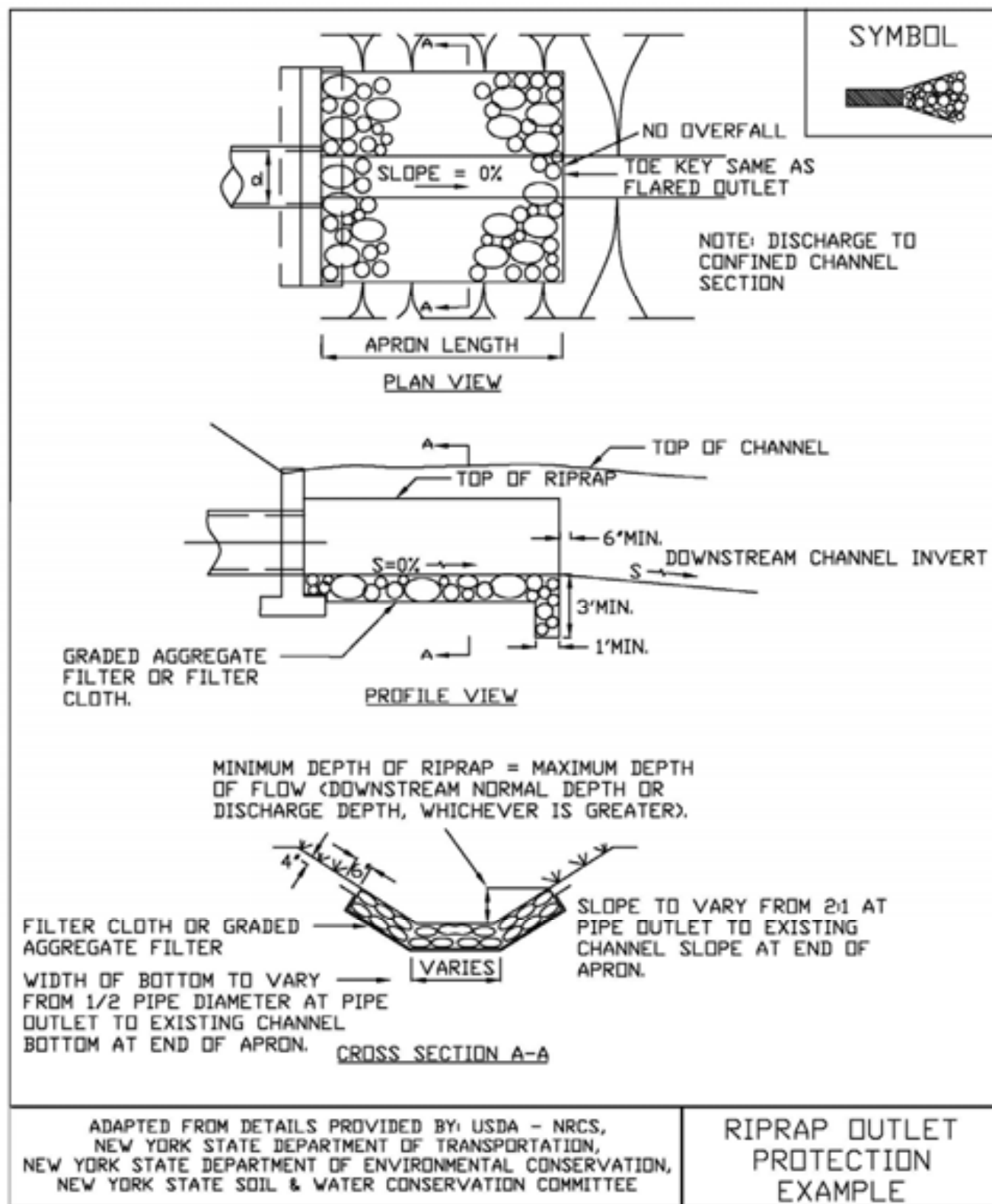
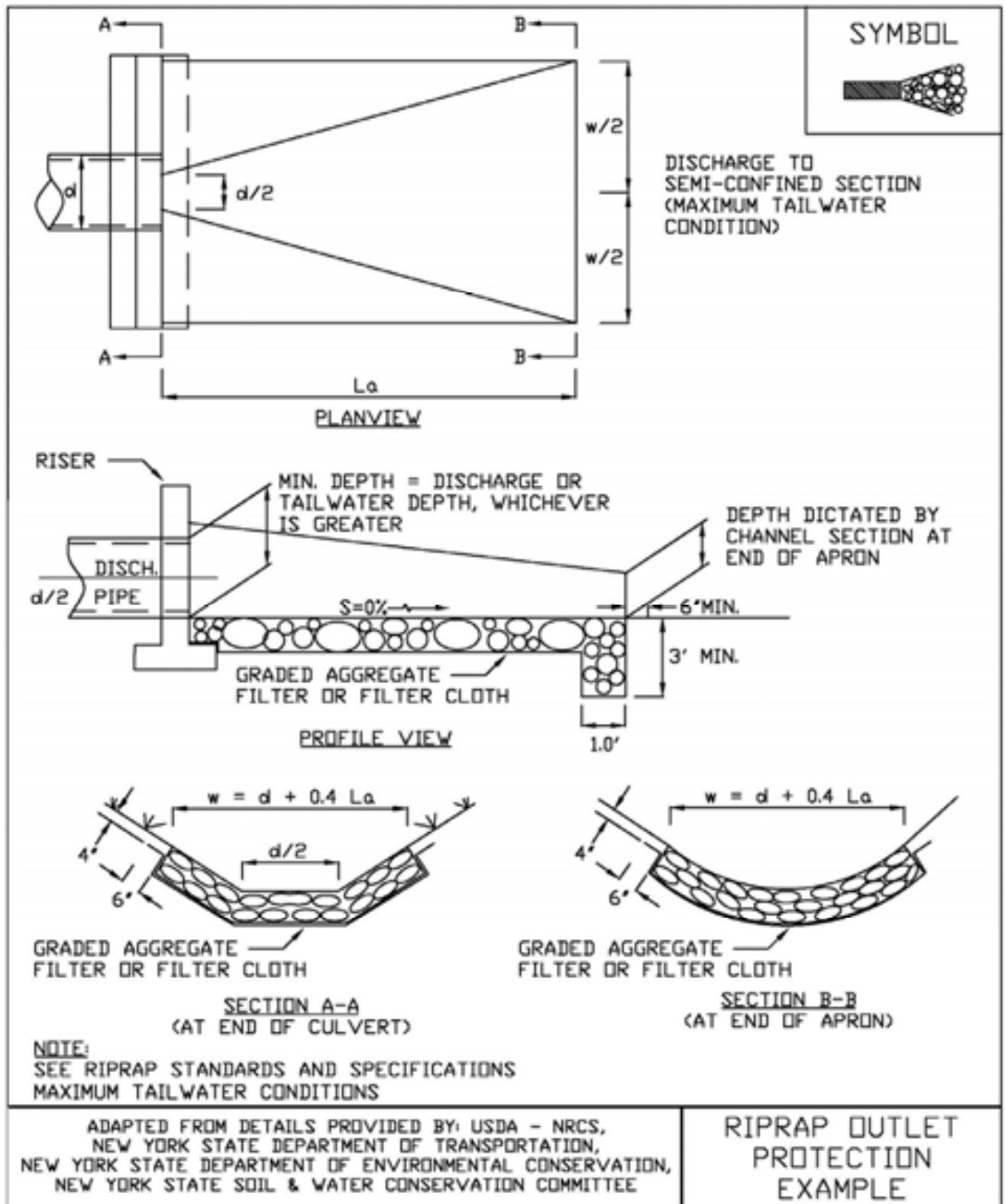


Figure 3.20
Riprap Outlet Protection Detail (3)



STANDARD AND SPECIFICATIONS FOR FLOW SPREADER



Definition & Scope

A **permanent or temporary**, non-erosive outlet for concentrated runoff, constructed to disperse concentrated flow uniformly over a hardened weir into a stabilized area as shallow, low velocity, sheet flow.

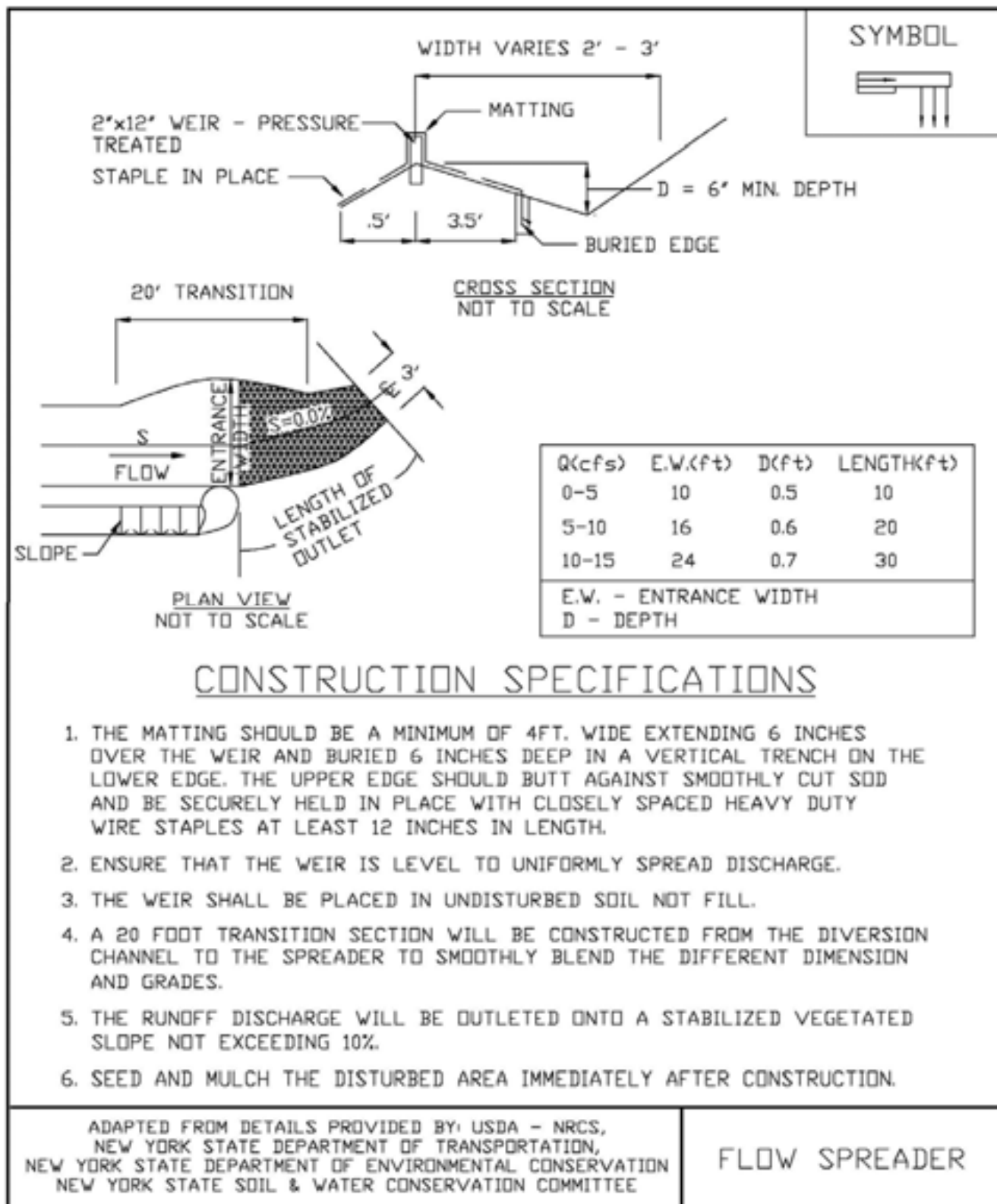
Conditions Where Practice Applies

Where sediment-free storm runoff can be released in sheet flow down a stabilized slope without causing erosion; where a hardened level weir can be constructed without filling; where the area below the weir is uniform with a slope of 10% or less and the runoff will not re-concentrate after release; and where no traffic will disturb the flow spreader.

Design Criteria

1. **Drainage area:** The maximum drainage area to the spreader may not exceed 5 acres.
2. **Discharge to a flow spreader:** The peak stormwater flow rate to a flow spreader due to runoff from a 10-year 24-hour storm must be less than 0.5 cubic feet per second (0.5 cfs) per foot length of flow spreader lip.
3. **Length of flow spreader:** The flow spreader length may not be more than 30 feet if flow is entering from one end of the spreader. Longer lengths require flow to split evenly from the center of the spreader.
4. **Receiving area of buffer:** Each flow spreader shall have a vegetated receiving area with the capacity to pass the flow without erosion. The receiving area shall be stable prior to the construction of the flow spreader. The receiving area shall have topography regular enough to prevent undue flow concentration before entering a stable watercourse but it shall have a slope that is less than 10%. If the receiving area is not presently stable, then the receiving area shall be stabilized prior to construction of the flow spreader. The receiving area below the flow spreader shall be protected from harm during construction. Sodding and/or turf reinforced mat in combination with vegetative measures shall stabilize disturbed areas. The receiving area shall not be used by the flow spreader until stabilization has been accomplished. A temporary diversion may be necessary in this case.
5. **Weir:** The weir of the flow spreader should consist of a pressure treated 2"x12" timber plank laid on edge and set at level elevation perpendicular to flow. Alternate hardened weir structures may be used as long as a hard, durable, continuous weir is maintained.
6. **Channel:** The flow spreader entrance channel shall be a minimum of 1 foot deep with a minimum 2 foot bottom width to trap sediment and reduce lateral flow velocities. Side slopes shall be 2:1 or flatter. The channel shall be constructed with a 0% grade to ensure uniform flow distribution. Velocity entering the channel shall be reduced to ensure non-erosive low approach velocity in the weir.
7. **Maintenance:** Long term maintenance of the flow spreader is essential to ensure its continued effectiveness. The following provisions should be followed. In the first year the flow spreader should be inspected semi annually and following major storm events for any signs of channelization and should be immediately repaired. After the first year, annual inspection should be sufficient. Spreaders constructed of wood, asphalt, stone or concrete curbing require periodic inspection to check for damage and to be repaired as needed.
 - A. **Inspections:** At least once a year, the spreader pool should be inspected for sand accumulation and debris that may reduce capacity.
 - B. **Maintenance Access:** Flow spreaders should be sited to provide easy access for removal of accumulated sediment and rehabilitation of the berm.
 - C. **Debris Removal:** Debris buildup within the channel should be removed when it has accumulated to approximately 10 to 20% of design volume or channel capacity. Remove debris such as leaf litter, branches, tree growth and any sediment build-up from the spreader and dispose of appropriately.
 - D. **Mowing:** Vegetated spreaders may require mowing.

Figure 3.7
Flow Spreader Detail



STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE



Definition & Scope

A **temporary** ridge of soil formed by excavating an adjoining swale located along the perimeter of the site or disturbed area. Its purpose is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 3.14 on page 3.36 for details.

The perimeter dike/swale shall not be constructed outside property lines or setbacks without obtaining legal easements from affected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area – Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres, see earth dike or construction ditch; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height – 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike – 2 feet minimum.

Width of swale – 2 feet minimum.

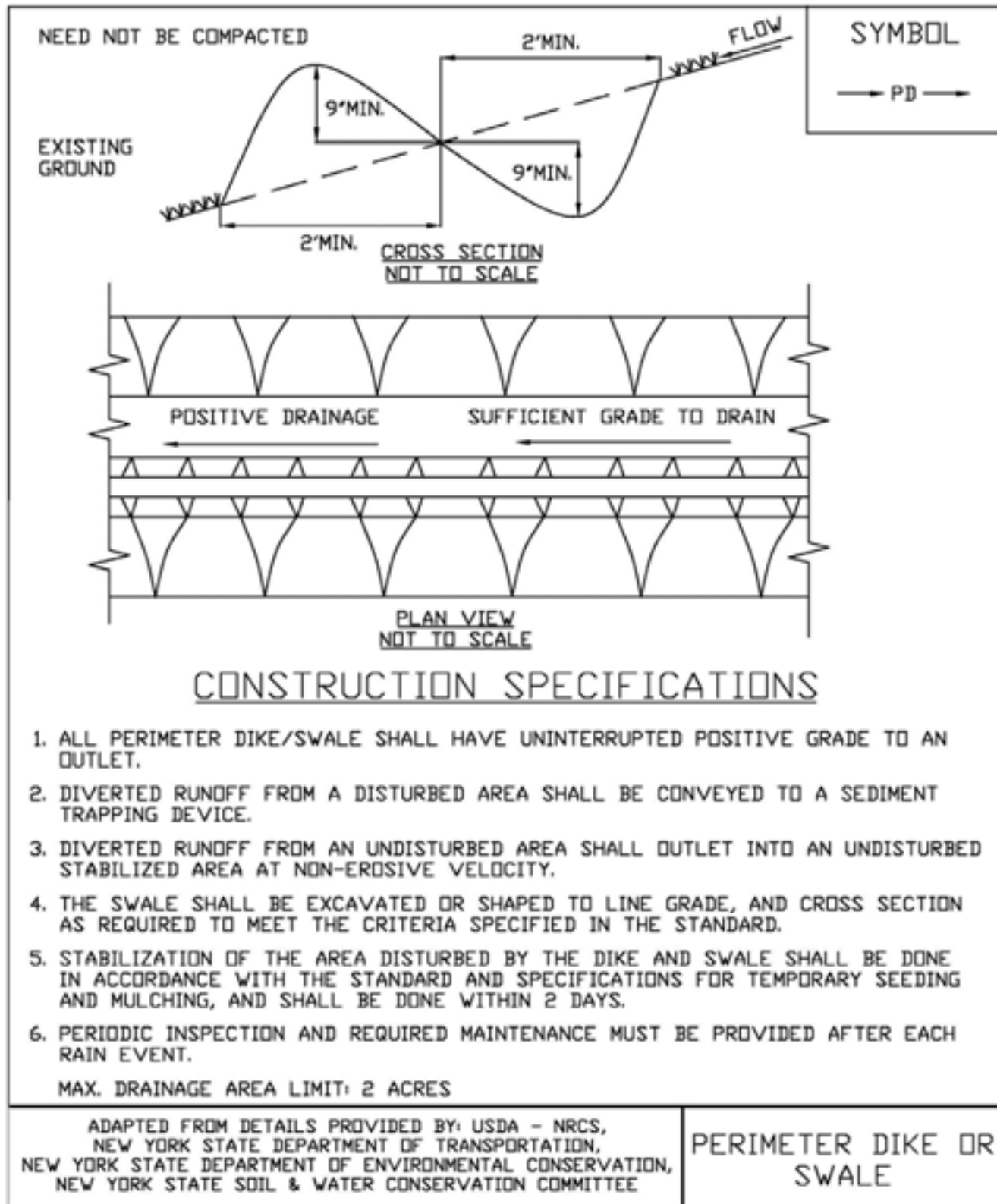
Grade – Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 8 percent.

Stabilization – The disturbed area of the dike and swale shall be stabilized within 2 days of installation, in accordance with the standard and specifications for construction ditch (page 3.4).

Outlet

1. Perimeter dike/swale shall have a stabilized outlet.
2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.
4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 3.14
Perimeter Dike/Swale Detail



STANDARD AND SPECIFICATIONS FOR SUBSURFACE DRAIN



Definition & Scope

A **permanent** conduit, such as tile, pipe, or tubing, installed beneath the ground surface, which intercepts, collects, and/or conveys drainage water to serve one or more of the following purposes:

1. Improve the environment for vegetative growth by regulating the water table and groundwater flow.
2. Intercept and prevent water movement into a wet area.
3. Relieve artesian pressures.
4. Remove surface runoff.
5. Provide internal drainage of slopes to improve their stability and reduce erosion.
6. Provide internal drainage behind bulkheads, retaining walls, etc.
7. Replace existing subsurface drains that are interrupted or destroyed by construction operations.
8. Provide subsurface drainage for dry storm water management structures.
9. Improve dewatering of sediment in sediment basins. (See Standard and Specification for Sediment Basins in Section 5).

Conditions Where Practice Applies

Subsurface drains are used in areas having a high water table or where subsurface drainage is required. The soil shall have enough depth and permeability to permit installation of an effective system. This standard does not apply to

storm drainage systems or foundation drains. Regulatory restrictions may apply if wetlands are present.

An outlet for the drainage system shall be available, either by gravity flow or by pumping. The outlet shall be adequate for the quantity of water to be discharged without causing damage above or below the point of discharge and shall comply with all state and local laws.

Design Criteria

The design and installation shall be based on adequate surveys and on-site soils investigations.

Required Capacity of Drains

The required capacity shall be determined by one or more of the following:

1. Where sub-surface drainage is to be uniform over an area through a systematic pattern of drains, a drainage coefficient of 1 inch to be removed in 24 hours shall be used; see Drain Chart, Figure 3.21 on page 3.51.
2. Where sub-surface drainage is to be by a random interceptor system, a minimum inflow rate of 0.5 cfs per 1,000 feet of line shall be used to determine the required capacity. If actual field tests and measurements of flow amounts are available, they may be used for determining capacity.

For interceptor subsurface drains on sloping land, increase the inflow rate as follows:

Land Slope	Increase Inflow Rate By
2-5 percent	10 percent
5-12 percent	20 percent
Over 12 percent	30 percent

3. Additional design capacity must be provided if surface water is allowed to enter the system.

Size of Subsurface Drain

The size of subsurface drains shall be determined from the drain chart found on Figures 3.21 on page 3.51. All subsurface drains shall have a nominal diameter, which equals or exceeds four (4) inches.

Depth and Spacing

The minimum depth of cover of subsurface drains shall be 24 inches where possible. The minimum depth of cover may be reduced to 15 inches where it is not possible to attain the 24 inch depth and where the drain is not subject to equipment loading or frost action. Roots from some types of vegetation can plug drains, as the drains get closer to the surface.

The spacing of drain laterals will be dependent on the permeability of the soil, the depth of installation of the drains and degree of drainage required. Generally, drains installed 36 inches deep and spaced 50 feet center-to-center will be adequate. For more specific information, see the [New York Drainage Guide \(USDA-NRCS\)](#).

Minimum Velocity and Grade

The minimum grade for subsurface drains shall be 0.10 percent. Where surface water enters the system a velocity of not less than 2 feet per second shall be used to establish the minimum grades. Provisions shall be made for preventing debris or sediment from entering the system by means of filters or collection and periodic removal of sediment from installed traps.

Materials for Subsurface Drains

Acceptable subsurface drain materials include perforated, continuous closed joint conduits of polyethylene plastic, concrete, corrugated metal, polyvinyl chloride, and clay tile.

The conduit shall meet strength and durability requirements of the site.

Loading

The allowable loads on subsurface drain conduits shall be based on the trench and bedding conditions specified for the job. A factor of safety of not less than 1.5 shall be used in computing the maximum allowable depth of cover for a particular type of conduit.

Envelopes and Envelope Materials

Envelopes shall be used around subsurface drains for proper bedding and to provide better flow into the conduit. Not less than three inches of envelope material shall be used for sand/gravel envelopes. Where necessary to improve the characteristics of flow of groundwater into the conduit, more envelope material may be required.

Where county regulations do not allow sand/gravel envelopes, but require a special type and size of envelope material, they shall be followed. Envelope material shall be placed to the height of the upper-

most seepage strata. Behind bulkheads and retaining walls, it shall go to within twelve inches of the top of the structure. This standard does not cover the design of filter materials where needed.

Materials used for envelopes shall not contain materials which will cause an accumulation of sediment in the conduit or render the envelope unsuitable for bedding of the conduit. Envelope materials shall consist of either filter cloth or sand/gravel material, which shall pass a 1 ½ inch sieve, 90 to 100 percent shall pass a ¾ inch sieve, and not more than 10 percent shall pass a No. 60 sieve.

Filter cloth envelope can be either woven or non-woven monofilament yarns and shall have a sieve opening ranging from 40 to 80. The envelope shall be placed in such a manner that once the conduit is installed, it shall completely encase the conduit.

The conduit shall be placed and bedded in a sand/gravel envelope. A minimum of three inches depth of envelope materials shall be placed on the bottom of a conventional trench. The conduit shall be placed on this and the trench completely filled with envelope material to minimum depth of 3 inches above the conduit.

Soft or yielding soils under the drain shall be stabilized where required and lines protected from settlement by adding gravel or other suitable material to the trench, by placing the conduit on plank or other rigid support, or by using long sections of perforated or watertight pipe with adequate strength to ensure satisfactory subsurface drain performance.

Use of Heavy Duty Corrugated Plastic Drainage Tubing

Heavy duty corrugated drainage tubing shall be specified where rocky or gravelly soils are expected to be encountered during installation operations. The quality of tubing will also be specified when cover over this tubing is expected to exceed 24 inches for 4, 5, 6, or 8 inch tubing. Larger size tubing designs will be handled on an individual job basis.

Auxiliary Structure and Subsurface Drain Protection

The outlet shall be protected against erosion and undermining of the conduit, against damaging periods of submergence, and against entry of rodents or other animals into the subsurface drain. An animal guard shall be installed on the outlet end of the pipe. A swinging animal guard shall be used if surface water enters the pipe.

A continuous 10-foot section of corrugated metal, cast iron, polyvinyl chloride, or steel pipe without perforations shall be used at the outlet end of the line and shall outlet 1.0 foot above the normal elevation of low flow in the outlet ditch or

above mean high tide in tidal areas. No envelope material shall be used around the 10-foot section of pipe. Two-thirds of the pipe shall be buried in the ditch bank and the cantilevered section shall extend to a point above the toe of the ditch side slope. If not possible, the side slope shall be protected from erosion.

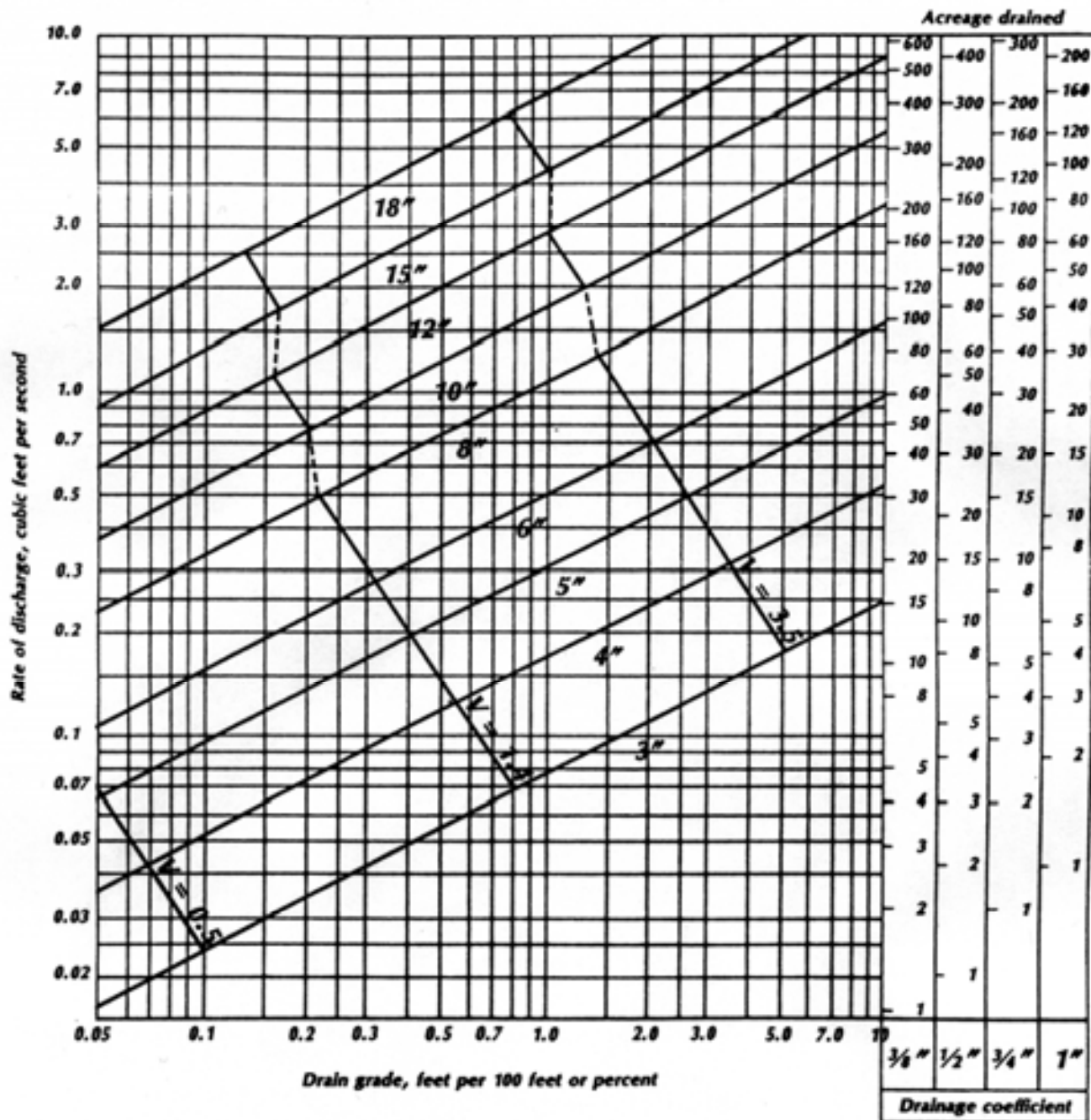
Conduits under roadways and embankments shall be water-tight and designed to exclude debris and prevent sediment from entering the conduit. Lines flowing under pressure shall be designed to withstand the resulting pressures and velocity of flow. Surface waterways shall be used where feasible.

The upper end of each subsurface drain line shall be capped with a tight fitting cap of the same material as the conduit or other durable material unless connected to a structure.

Construction Specifications

1. Deformed, warped, or otherwise damaged pipe or tubing shall not be used.
2. All subsurface drains shall be laid to a uniform line and covered with envelope material. The pipe or tubing shall be laid with the perforations down and oriented symmetrically about the vertical centerline. Connections will be made with manufactured appurtenances comparable in strength with the specified pipe or tubing unless otherwise specified. The method of placement and bedding shall be as specified on the drawing.
3. Envelope material shall consist of filter cloth or a sand/gravel (which shall pass the 1 ½ inch sieve, 90 to 100 percent shall pass ¾ inch sieve, and not more than 10 percent shall pass the No. 60 sieve).
4. The upper end of each subsurface drain line shall be capped with a tight fittings cap of the same material as the conduit or other durable material unless connected to a structure.
5. A continuous 10-foot section of corrugated metal, cast iron, polyvinyl chloride, or steel pipe without perforations shall be used at the outlet end of the line. No envelope material shall be used around the 10-foot section of the pipe. An animal guard shall be installed on the outlet end of the pipe.
6. Earth backfill material shall be placed in the trench in such a manner that displacement of the drain will not occur.
7. Where surface water is entering the system, the pipe outlet section of the system shall contain a swing type trash and animal guard.

Figure 3.21
Drain Chart - Corrugated Plastic Drain Tubing (USDA-NRCS)



STANDARD AND SPECIFICATIONS FOR BRUSH LAYER



Definition & Scope

A brush layer is a horizontal row of live branch cuttings placed in soil with other similar rows, spaced a specific vertical distance apart to stabilize cut and fill slope areas by reinforcing the soil with uprooted branch stems, trapping debris on slope, drying excessively wet sites, and redirecting adverse slope seepage by acting as horizontal drains.

Conditions Where Practice Applies

Generally applicable to stabilize slope areas above the flow line of streambanks as well as cut and fill slopes. Brush layers can be used on slopes up to 2:1 in steepness and 20 feet in height.

Design Criteria

The spacing requirements for brush layer rows is dependent on the slope steepness and moisture content. Spacing shall conform with the following table.

Slope Distance Between Layers (feet)			
Slope H : V	Wet Slope	Dry Slope	Max Slope Length
2 to 2.5:1	3'	3'	15'
2.5 to 3.5:1	3'	4'	15'
3.5 to 4.0:1	4'	5'	25'

Brush layer cuttings shall be 1/2 to 2 inches in diameter and be from dormant plants. No leaf buds shall have initiated growth beyond 1/4" and the cambium layer shall be moist, green, and healthy. The cuttings shall be long

enough to contact the back of the bench with the growing tips protruding out of the slope face.

Care shall be taken not to severely damage the live branch cuttings during installation. Damaged cuttings will be replaced prior to backfilling.

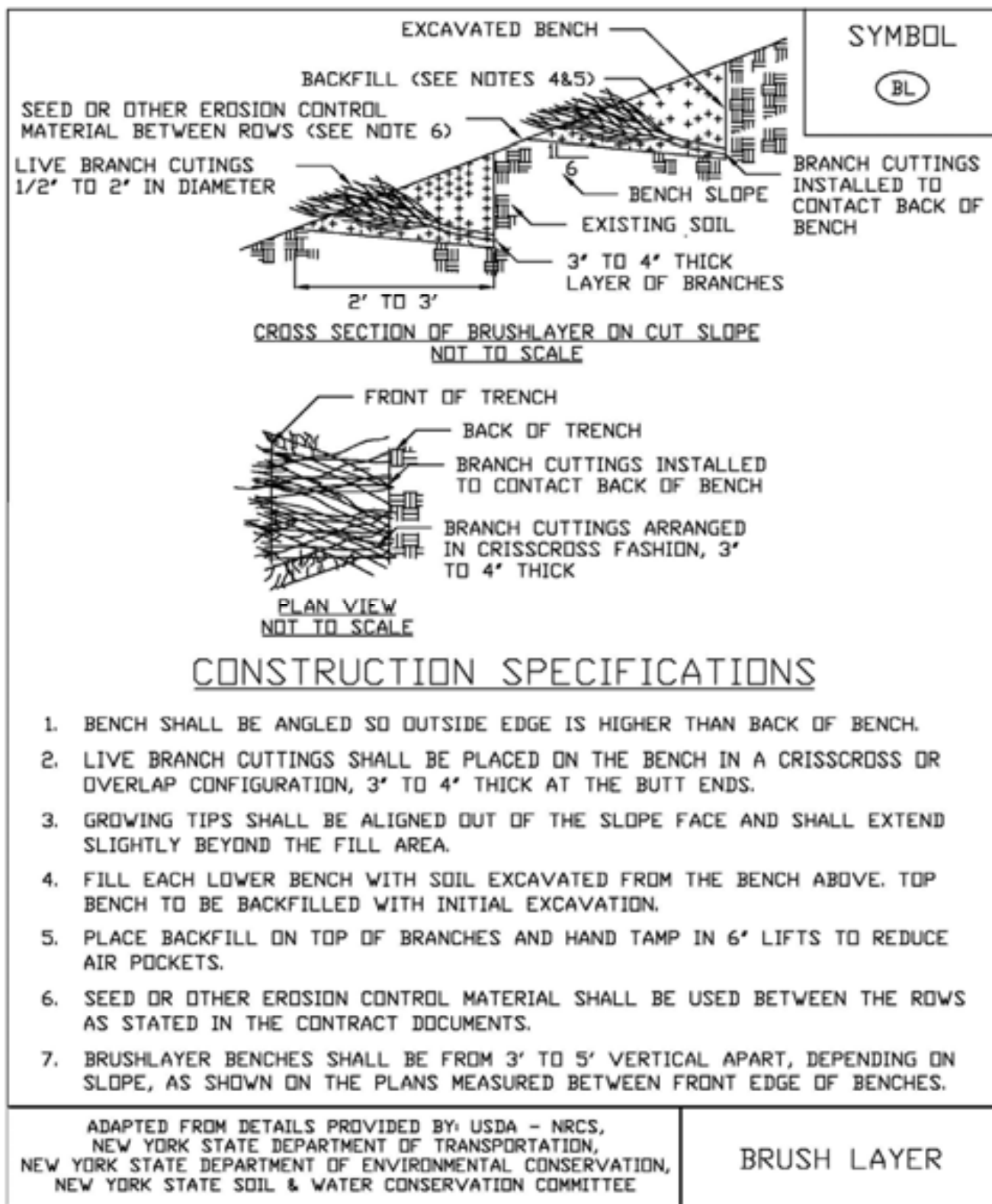
Starting at the toe of the slope, excavate benches along the contour of the slope. The benches shall range from 2 to 3 feet wide and the surface of the bench shall be angled so the front edge is higher than the back of the bench (See Figure 4.6). The benches shall be spaced according to the previous table, Slope Distance Between Layers (ft).

Live branch cuttings shall be placed on the bench in a crisscross or overlapping configuration in layers 3 - 4 inches thick at the butt ends. Backfill shall be placed on top of the live branch cuttings and tamped in 6 inch lifts. Small plate compactors may be used to settle the soil. Areas between the rows of brush layers shall be stabilized by seeding or other appropriate erosion control method.

Maintenance

Due to the susceptibility of plant materials to the physical constraints of the site, climate conditions, and animal populations, it is necessary to inspect installations frequently. This is especially important during the first year or two of establishment. Plant materials missing or damaged should be replaced as soon as possible. Sloughs or breaks in drainage pattern should be reestablished for the site as quickly as possible to maintain stability. The brush layer may need to be watered periodically during the first year if installation is done during the summer months.

Figure 4.6
Brush Layer



STANDARD AND SPECIFICATIONS FOR LANDGRADING



Definition & Scope

Permanent reshaping of the existing land surface by grading in accordance with an engineering topographic plan and specification to provide for erosion control and vegetative establishment on disturbed, reshaped areas.

Design Criteria

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

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

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

1. Provisions shall be made to safely convey surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not

damage slopes or other graded areas; see standards and specifications for Grassed Waterway, Diversion, or Grade Stabilization Structure.

2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. When slopes exceed 2:1, special design and stabilization consideration are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper than 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.)
3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.
 - A. Benches shall be a minimum of six feet wide to provide for ease of maintenance.
 - B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.
 - C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations; see Standard and Specifications for Diversion on page 3.9
4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:
 - A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.
 - B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded ditches, downspouts, etc.
 - C. The face of the slope will be protected by anchored stabilization matting, sod, gravel, riprap, or other stabilization method.

5. Cut slopes occurring in ripable rock shall be serrated as shown in Figure 4.9 on page 4.26. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1 ½: 1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.
6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.
7. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.
8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.
9. Stockpiles, borrow areas, and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.
10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Permanent Construction Area Planting Standard on page 4.42.
4. Areas to be filled shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.
5. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.
6. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems. Fill intended to support buildings, structures, and conduits, etc., shall be compacted in accordance with local requirements or codes.
7. All fill shall be placed and compacted in layers not to exceed 9 inches in thickness.
8. Except for approved landfills or nonstructural fills, fill material shall be free of frozen particles, brush, roots, sod, or other foreign objectionable materials that would interfere with, or prevent, construction of satisfactory fills.
9. Frozen material or soft, mucky or highly compressible materials shall not be incorporated into fill slopes or structural fills.
10. Fill shall not be placed on saturated or frozen surfaces.
11. All benches shall be kept free of sediment during all phases of development.
12. Seeps or springs encountered during construction shall be handled in accordance with the Standard and Specification for Subsurface Drain on page 3.48 or other approved methods.
13. All graded areas shall be permanently stabilized immediately following finished grading.
14. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

Construction Specifications

See Figures 4.9 and 4.10 for details.

1. All graded or disturbed areas, including slopes, shall be protected during clearing and construction in accordance with the erosion and sediment control plan until they are adequately stabilized.
2. All erosion and sediment control practices and measures shall be constructed, applied and maintained in accordance with the erosion and sediment control plan and these standards.
3. Topsoil required for the establishment of vegetation shall be stockpiled in amount necessary to complete finished grading of all exposed areas.



Figure 4.9
Typical Section of Serrated Cut Slope

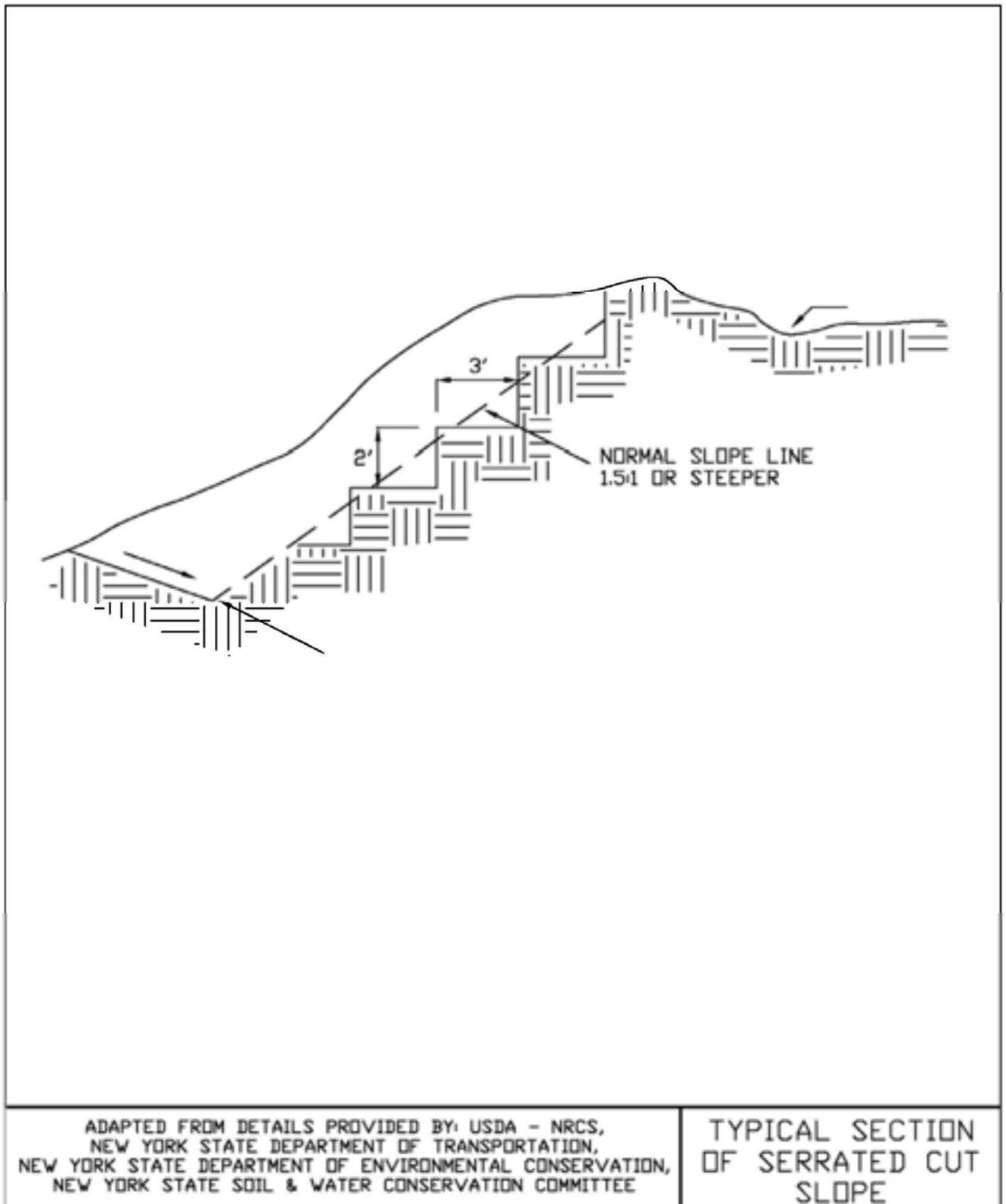


Figure 4.10
Landgrading

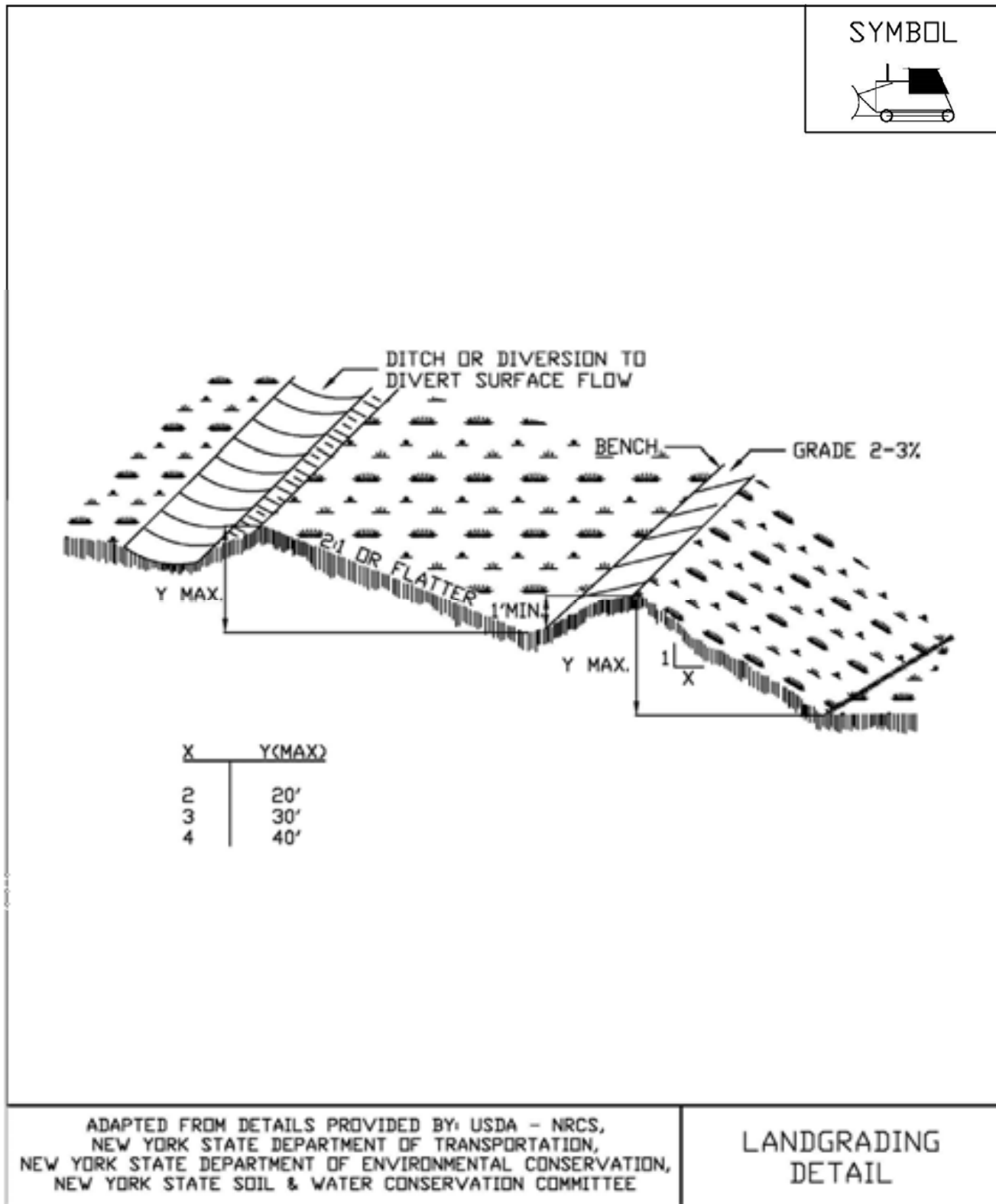


Figure 4.11
Landgrading - Construction Specifications

<u>CONSTRUCTION SPECIFICATIONS</u>	
1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED. 2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN. 3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS. 4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL. 5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL. 6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES. 7. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS. 8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS. 9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS. 10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES. 11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT. 12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD. 13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING. 14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.	
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

STANDARD AND SPECIFICATIONS FOR MULCHING



Definition and Scope

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch can also be used alone for temporary stabilization in non-growing months. Use of stone as a mulch could be more permanent and should not be limited to non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedlings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Hay mulch shall not be used in wetlands or in areas of permanent seeding. Clean straw mulch is preferred alternative in wetland application. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.



Table 4.2
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7"	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2"	9 cu. yds.	405 cu. yds.	3"	Excellent mulch for short slopes and around plants and ornaments. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll	48" x 50 yds. or 48" x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	4' x 112.5' or 8' x 112.5'.	—	—	Use without additional mulch. Excellent for seeding establishment. Anchor as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 4.3
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45 ⁰ Fahrenheit are required.

STANDARD AND SPECIFICATIONS FOR PERMANENT CONSTRUCTION AREA PLANTING



Definition & Scope

Establishing **permanent** grasses with other forbs and/or shrubs to provide a minimum 80% perennial vegetative cover on areas disturbed by construction and critical areas to reduce erosion and sediment transport. Critical areas may include but are not limited to steep excavated cut or fill slopes as well as eroding or denuded natural slopes and areas subject to erosion.

Conditions Where Practice Applies

This practice applies to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport. See additional standards for special situations such as sand dunes and sand and gravel pits.

Criteria

All water control measures will be installed as needed prior to final grading and seedbed preparation. Any severely compacted sections will require chiseling or disking to provide an adequate rooting zone, to a minimum depth of 12", see Soil Restoration Standard. The seedbed must be prepared to allow good soil to seed contact, with the soil not too soft and not too compact. Adequate soil moisture must be present to accomplish this. If surface is powder dry or sticky wet, postpone operations until moisture changes to a favorable condition. If seeding is accomplished within 24 hours of final grading, additional scarification is generally not needed, especially on ditch or stream banks. Remove all stones and other debris from the surface that are greater than 4 inches, or that will interfere with future mowing or maintenance.

Soil amendments should be incorporated into the upper 2 inches of soil when feasible. **The soil should be tested to determine the amounts of amendments needed.** Apply

ground agricultural limestone to attain a pH of 6.0 in the upper 2 inches of soil. If soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 600 lbs. per acre of 5-5-10 or equivalent. If manure is used, apply a quantity to meet the nutrients of the above fertilizer. This requires an appropriate manure analysis prior to applying to the site. Do not use manure on sites to be planted with birdsfoot trefoil or in the path of concentrated water flow.

Seed mixtures may vary depending on location within the state and time of seeding. Generally, warm season grasses should only be seeded during early spring, April to May. These grasses are primarily used for vegetating excessively drained sands and gravels. See Standard and Specification for Sand and Gravel Mine Reclamation. Other grasses may be seeded any time of the year when the soil is not frozen and is workable. When legumes such as birdsfoot trefoil are included, spring seeding is preferred. See Table 4.4, "Permanent Construction Area Planting Mixture Recommendations" for additional seed mixtures.

General Seed Mix:	Variety	lbs./acre	lbs/1000 sq. ft.
Red Clover ¹ <u>OR</u>	Acclaim, Rally, Red Head II, Renegade	8 ²	0.20
Common white clover ¹	Common	8	0.20
<u>PLUS</u>			
Creeping Red Fescue	Common	20	0.45
<u>PLUS</u>			
Smooth Bromegrass <u>OR</u>	Common	2	0.05
Ryegrass (perennial)	Pennfine/Linn	5	0.10
¹ add inoculant immediately prior to seeding ² Mix 4 lbs each of Empire and Pardee OR 4 lbs of Birdsfoot and 4 lbs white clover per acre. All seeding rates are given for Pure Live Seed (PLS)			

Pure Live Seed, or (PLS) refers to the amount of live seed in a lot of bulk seed. Information on the seed bag label includes the type of seed, supplier, test date, source of seed, purity, and germination. Purity is the percentage of pure seed. Germination is the percentage of pure seed that will produce normal plants when planted under favorable conditions.

To compute Pure Live Seed multiply the “germination percent” times the “purity” and divide that by 100 to get Pure Live Seed.

$$\text{Pure Live Seed (PLS)} = \frac{\% \text{ Germination} \times \% \text{ Purity}}{100}$$

For example, the PLS for a lot of Kentucky Blue grass with 75% purity and 96% germination would be calculated as follows:

$$\frac{(96) \times (75)}{100} = 72\% \text{ Pure Live Seed}$$

For 10lbs of PLS from this lot =

$$\frac{10}{0.72} = 13.9 \text{ lbs}$$

Therefore, 13.9 lbs of seed is the actual weight needed to meet 10lbs PSL from this specific seed lot.

Time of Seeding: The optimum timing for the general seed mixture is early spring. Permanent seedings may be made any time of year if properly mulched and adequate moisture is provided. Late June through early August is not a good time to seed, but may facilitate covering the land without additional disturbance if construction is completed. Portions of the seeding may fail due to drought and heat. These areas may need reseeding in late summer/fall or the following spring.

Method of seeding: Broadcasting, drilling, cultipack type seeding, or hydroseeding are acceptable methods. Proper soil to seed contact is key to successful seedings.

Mulching: Mulching is essential to obtain a uniform stand of seeded plants. Optimum benefits of mulching new seedings are obtained with the use of small grain straw applied at a rate of 2 tons per acre, and anchored with a netting or tackifier. See the Standard and Specifications for Mulching for choices and requirements.

Irrigation: Watering may be essential to establish a new seeding when a drought condition occurs shortly after a new seeding emerges. Irrigation is a specialized practice and care must be taken not to exceed the application rate for the soil or subsoil. When disconnecting irrigation pipe, be sure pipes are drained in a safe manor, not creating an erosion concern.



80% Perennial Vegetative Cover



50% Perennial Vegetative Cover

Table 4.4
Permanent Construction Area Planting Mixture Recommendations

Seed Mixture	Variety	Rate in lbs./acre (PLS)	Rate in lbs./ 1, 000 ft ²
Mix #1			
Creeping red fescue	Ensylva, Pennlawn, Boreal	10	.25
Perennial ryegrass	Pennfine, Linn	10	.25
*This mix is used extensively for shaded areas.			
Mix #2			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	20	.50
*This rate is in pure live seed, this would be an excellent choice along the upland edge of a wetland to filter runoff and provide wildlife benefits. In areas where erosion may be a problem, a companion seeding of sand lovegrass should be added to provide quick cover at a rate of 2 lbs. per acre (0.05 lbs. per 1000 sq. ft.).			
Mix #3			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	4	.10
Big bluestem	Niagara	4	.10
Little bluestem	Aldous or Camper	2	.05
Indiangrass	Rumsey	4	.10
Coastal panicgrass	Atlantic	2	.05
Sideoats grama	El Reno or Trailway	2	.05
Wildflower mix		.50	.01
*This mix has been successful on sand and gravel plantings. It is very difficult to seed without a warm season grass seeder such as a Truax seed drill. Broadcasting this seed is very difficult due to the fluffy nature of some of the seed, such as bluestems and indiangrass.			
Mix #4			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	10	.25
Coastal panicgrass	Atlantic	10	.25
*This mix is salt tolerant, a good choice along the upland edge of tidal areas and roadsides.			
Mix #5			
Saltmeadow cordgrass (<i>Spartina patens</i>)—This grass is used for tidal shoreline protection and tidal marsh restoration. It is planted by vegetative stem divisions.			
'Cape' American beachgrass can be planted for sand dune stabilization above the saltmeadow cordgrass zone.			
Mix #6			
Creeping red fescue	Ensylva, Pennlawn, Boreal	20	.45
Chewings Fescue	Common	20	.45
Perennial ryegrass	Pennfine, Linn	5	.10
Red Clover	Common	10	.45
*General purpose erosion control mix. Not to be used for a turf planting or play grounds.			

STANDARD AND SPECIFICATIONS FOR SOIL RESTORATION



Definition & Scope

The decompaction of areas of a development site or construction project where soils have been disturbed to recover the original properties and porosity of the soil; thus providing a sustainable growth medium for vegetation, reduction of runoff and filtering of pollutants from stormwater runoff.

Conditions Where Practice Applies

Soil restoration is to be applied to areas whose heavy construction traffic is done and final stabilization is to begin. This is generally applied in the cleanup, site restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate ground cover to maintain the soil structure. Soil restoration measures should be applied over and adjacent to any runoff reduction practices to achieve design performance.



Design Criteria

1. Soil restoration areas will be designated on the plan views of areas to be disturbed.

2. Soil restoration will be completed in accordance with Table 4.6 on page 4.53.

Specification for Full Soil Restoration

During periods of relatively low to moderate subsoil moisture, the disturbed subsoils are returned to rough grade and the following Soil Restoration steps applied:

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table, except for "Particle Size" 100% will pass the 1/2" sieve. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**



2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
3. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site.
4. Apply topsoil to a depth of 6 inches.
5. Vegetate as required by the seeding plan. Use appropriate ground cover with deep roots to maintain the soil structure.
6. Topsoil may be manufactured as a mixture or a mineral component and organic material such as compost.

At the end of the project an inspector should be able to push a 3/8" metal bar 12 inches into the soil just with body weight. This should not be performed within the drip line of any existing trees or over utility installations that are within 24 inches of the surface.

Maintenance

Keep the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths.

Table 4.6
Soil Restoration Requirements

Type of Soil Disturbance	Soil Restoration Requirement		Comments/Examples
No soil disturbance	Restoration not permitted		Preservation of Natural Features
Minimal soil disturbance	Restoration not required		Clearing and grubbing
Areas where topsoil is stripped only - no change in grade	HSG A&B	HSG C&D	Protect area from any ongoing construction activities.
	Apply 6 inches of topsoil	Aerate* and apply 6 inches of topsoil	
Areas of cut or fill	HSG A&B	HSG C&D	
	Aerate* and apply 6 inches of topsoil	Apply full Soil Restoration**	
Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)	Apply full Soil Restoration (decompaction and compost enhancement)		
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.		
* Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler. ** Per “Deep Ripping and De-compaction, DEC 2008”.			

STANDARD AND SPECIFICATIONS FOR TOPSOILING



Definition & Scope

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

Conditions Where Practice Applies

Topsoil is applied to subsoils that are droughty (low available moisture for plants), stony, slowly permeable, salty or extremely acid. It is also used to backfill around shrub and tree transplants. This standard does not apply to wetland soils.

Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.
2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.
3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

Site Preparation

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.
2. Complete rough grading and final grade, allowing for depth of topsoil to be added.
3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.
4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

Topsoil Materials

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.
2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.
3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.
4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.
5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.
6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

Application and Grading

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.
2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by "tracking" with suitable equipment.
3. Apply topsoil in the amounts shown in Table 4.7 below:

Table 4.7 - Topsoil Application Depth		
Site Conditions	Intended Use	Minimum Topsoil Depth
1. Deep sand or loamy sand	Mowed lawn	6 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	1 in.
2. Deep sandy loam	Mowed lawn	5 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	none
3. Six inches or more: silt loam, clay loam, loam, or silt	Mowed lawn	4 in.
	Tall legumes, unmowed	1 in.
	Tall grass, unmowed	1 in.

STANDARD AND SPECIFICATIONS FOR TREES, SHRUBS, AND VINES



Definition & Scope

Establishing trees, shrubs, and vines or selectively reducing stand density and trimming woody plants to protect the soil and plant resources, improve an area for recreation and increase the attractiveness and usefulness of areas.

Conditions Where Practice Applies

On any area planned for recreation or landscape use such as yard areas, leisure areas, picnic areas, and park lands providing outdoor recreational opportunities.

Criteria and Specifications

1. Planting nursery stock

A. Select species to serve the intended purpose. See Appendix G, Table G.1, "Trees Suitable for Landscape and Conservation Plantings in New York." Where planting of trees is to be done in recreation areas, use those species resistant to compaction listed in Table G.2, "Susceptibility of Tree Species to Compaction" whenever possible.

B. Plant Materials

1) Plants shall conform to the species, variety, size, number, and conditions as stated in a conservation plan or on a plant list shown on landscape drawings. "American Standard for Nursery Stock," by American Association of Nurserymen, shall be used to develop the plant list for landscape drawings and to check quality of plant materials.

2) Durable, legible labels with the scientific and common name and cultivar shall be securely

attached to plants, bundles of seedlings, containers, and/or flats.

C. Plant Protection

Prior to delivery, the trunk, branches, and foliage of the plants shall be sprayed with non-toxic antidesiccant, applied according to the manufacturer's recommendations. This does not apply to state nursery seedlings.

D. Planting Time

Deciduous trees and shrubs: April 1 to June 1 and October 15 to December 15. Evergreen trees and shrubs: April 1 to June 1 and September 1 to November 15.

E. Spacing

Plant all trees and shrubs well back from buildings to allow for mature crown size. The following are guides for planning:

Large Trees	50-60 feet apart
Small Trees	20-30 feet apart
Columnar Species	6-8 feet apart
Hedges	1-4 feet apart
Shrubs	For clumps, plan spacing so mature shrubs will be touching or overlapping by only 1 or 2 feet

F. Site Preparation

1) Individual sites for planting seedlings can be prepared by scalping the sod away from a four foot square area where the seedling is to be planted.

2) All planting beds shall be cultivated to a depth of 8 inches, or chemically treated for weed control. Remove objectionable objects that will interfere with maintenance of site.

G. Planting

1) Plants shall be located as shown on plans and/or drawings and, where necessary, located on the site by stakes, flags or other means.

2) Prior to planting, remove galvanized wire basket securing root ball, untie and roll down burlap covering from around the stem.

3) The plants shall be set upright in holes as illustrated in Figure G.1 in Appendix G.

4) All plants shall be thoroughly watered on the same day of planting. Plants that have settled shall be reset to grade.

H. Wrapping

Immediately after planting, wrap deciduous tree trunks from the bottom to the first limb with a 4 inch wide bituminous impregnated, insect resistant tape or paper manufactured for that purpose. Tie with jute (bag strings) at top and bottom. The wrap should be removed per nursery recommendations.

I. Mulching

Mulch the disturbed area around individual trees and shrubs with a 2-3" layer of wood chips. Pull wood chips 1 inch away from the base of shrubs to avoid fungus development.

J. Pruning

After planting, prune to remove injured twigs and branches. The natural shape of the plant should not be changed.

K. Cleanup and Maintenance

1) After all work is complete, all excess soil, peat moss, debris, etc., shall be removed from the site.

2) Water plants two weeks after planting. For two years, water plants every two weeks during dry periods, which exceed three weeks without a good soaking rain, or water as needed in accordance with local conditions. Shrubs may require 5 to 10 gallons and trees, 20 to 30 gallons for each watering.

3) Remove trunk wrap per nursery recommendation.

2. Transplanting "Wild" Stock

Successful transplanting of wild stock will require heavy equipment and considerable labor as a large weight of soil must be moved with the roots.

A. Select trees and shrubs with good form and full crowns.

B. Transplant only when plants are dormant and soil is moist. Wrap soil ball with burlap to prevent soil from separating from roots.

C. Table 4.8 shows minimum diameter and

approximate weight of soil ball that must be moved with each size plant.

D. Plant and maintain as described above for nursery stock.

PRUNING AND THINNING

Use	Cleared Width Each Side of Trail Tread (ft.)	Cleared Height (ft.)
<u>TRAILS</u>		
Hiking	1	8
Bicycle	2	10
Motorbike	2	10
Horse	2	12
X-Country Ski	Total: 3-12	12 ¹
Snowmobile	Total: 6-12	12 ¹
<u>PICNIC & CAMPING AREAS</u>		
Campfire/Grill	10 ft. diam.	15
¹ Includes allowance for snow depth and snow load on branches		

1. Pruning

A. Remove trees, limbs, and limb stubs to the above widths and heights specified for the intended use.

B. Remove dead, diseased, or dying limbs that may fall.

C. Do not remove more than one-third of the live crown of a tree in a year.

D. Cut limbs flush to the branch bark ridge.

E. Use the 3 or 4 cut pruning method on all branches over 2 inches in diameter: First cut about one-third the way through the underside of the limb (about 6-12 inches from the tree trunk). Then (approximately an inch further out) make a second cut through the limb from the upper side. When the branch is removed, there is no splintering of the main tree trunk. Remove the stub. If the branch is larger than 5-6 inches in diameter, use the four cut system. Cuts 1 and 2 remain the same and cut 3 should be from the underside of the limb, on the outside of the branch collar. Cut 4 should be from the top and in alignment with the 3rd cut. Cut 3 should be 1/4 to 1/3 the way through the limb. This will prevent the bark from peeling down the trunk. Do not paint the cut surface.

2. Thinning

- A. Remove dead, diseased, dying, poorly anchored, or ice damaged trees that pose a hazard to recreationists or that interfere with intended use.
- B. To maintain grass cover in a wooded area, thin according to formula $D \times 3$ (average diameter of the trunk of overstory trees, in inches, times three—the answer is the spacing between trees to be left, in feet). For example, for trees with average diameter of 6 inches, spacing after thinning should leave trees 18 feet apart on average. Crown cover after thinning should be about 50 percent.
- C. Selectively thin as needed to favor those trees that are most “resistant” to compaction around their roots. See Table G.2, “Susceptibility of Tree Species to Compaction” in Appendix G. If the soil on the site is naturally well drained, those species in the “intermediate” group may also be favored.

Table 4.8
Size and Weight of Earth Ball Required to Transplant Wild Stock

Caliper ¹ (Inches)	Shade Trees (Maple, Ash, Oak, Birch, etc.)		Small Trees & Shrubs (Crabapple, Thornapple, Viburnum, Dogwood, etc.)		
	Minimum Diameter Ball (Inches)	Weight of Ball (lbs.)	Up to 6 ft. Height — 6 ft. and Caliper ¹	Minimum Diameter Ball (Inches)	Weight of Ball (lbs.)
1/2	14	88	2	12	55
3/4	16	130	3	14	88
1	18	186	4	16	130
1-1/4	20	227	5	18	186
1-1/2	22	302	3/4	18	186
1-3/4	24	390	1	20	227
2	28	621	1-1/2	22	302
3	32	836	1-3/4	24	390
3-1/2	38	1,400	2	28	621
4	42	1,887	2-1/2	32	836
			3	38	1,400

¹Caliper is a diameter measurement of trees at a height of 6 inches above the ground.

STANDARD AND SPECIFICATIONS FOR SILT FENCE



Definition & Scope

A **temporary** barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil by temporarily ponding the sediment laden runoff allowing settling to occur. The maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year).

Conditions Where Practice Applies

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

1. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used ; and
2. Maximum ponding depth of 1.5 feet behind the fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

Design Criteria

1. Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff.
2. All silt fences shall be placed as close to the disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V, to allow for maintenance and

roll down. The area beyond the fence must be undisturbed or stabilized.

3. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

		Slope Length/Fence Length (ft.)		
Slope	Steepness	Standard	Reinforced	Super
<2%	< 50:1	300/1500	N/A	N/A
2-10%	50:1 to 10:1	125/1000	250/2000	300/2500
10-20%	10:1 to 5:1	100/750	150/1000	200/1000
20-33%	5:1 to 3:1	60/500	80/750	100/1000
33-50%	3:1 to 2:1	40/250	70/350	100/500
>50%	> 2:1	20/125	30/175	50/250

Standard Silt Fence (SF) is fabric rolls stapled to wooden stakes driven 16 inches in the ground.

Reinforced Silt Fence (RSF) is fabric placed against welded wire fabric with anchored steel posts driven 16 inches in the ground.

Super Silt Fence (SSF) is fabric placed against chain link fence as support backing with posts driven 3 feet in the ground.

4. Silt fence shall be removed as soon as the disturbed area has achieved final stabilization.

The silt fence shall be installed in accordance with the appropriate details. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Butt joints are not acceptable. A detail of the silt fence shall be shown on the plan. See Figure 5.30 on page 5.56 for Reinforced Silt Fence as an example of details to be provided.

Criteria for Silt Fence Materials

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

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	110	ASTM D 4632
Elongation at Failure (%)	20	ASTM D 4632
Mullen Burst Strength (PSI)	300	ASTM D 3786
Puncture Strength (lbs)	60	ASTM D 4833
Minimum Trapezoidal Tear Strength (lbs)	50	ASTM D 4533
Flow Through Rate (gal/min/sf)	25	ASTM D 4491
Equivalent Opening Size	40-80	US Std Sieve ASTM D 4751
Minimum UV Residual (%)	70	ASTM D 4355

Super Silt Fence

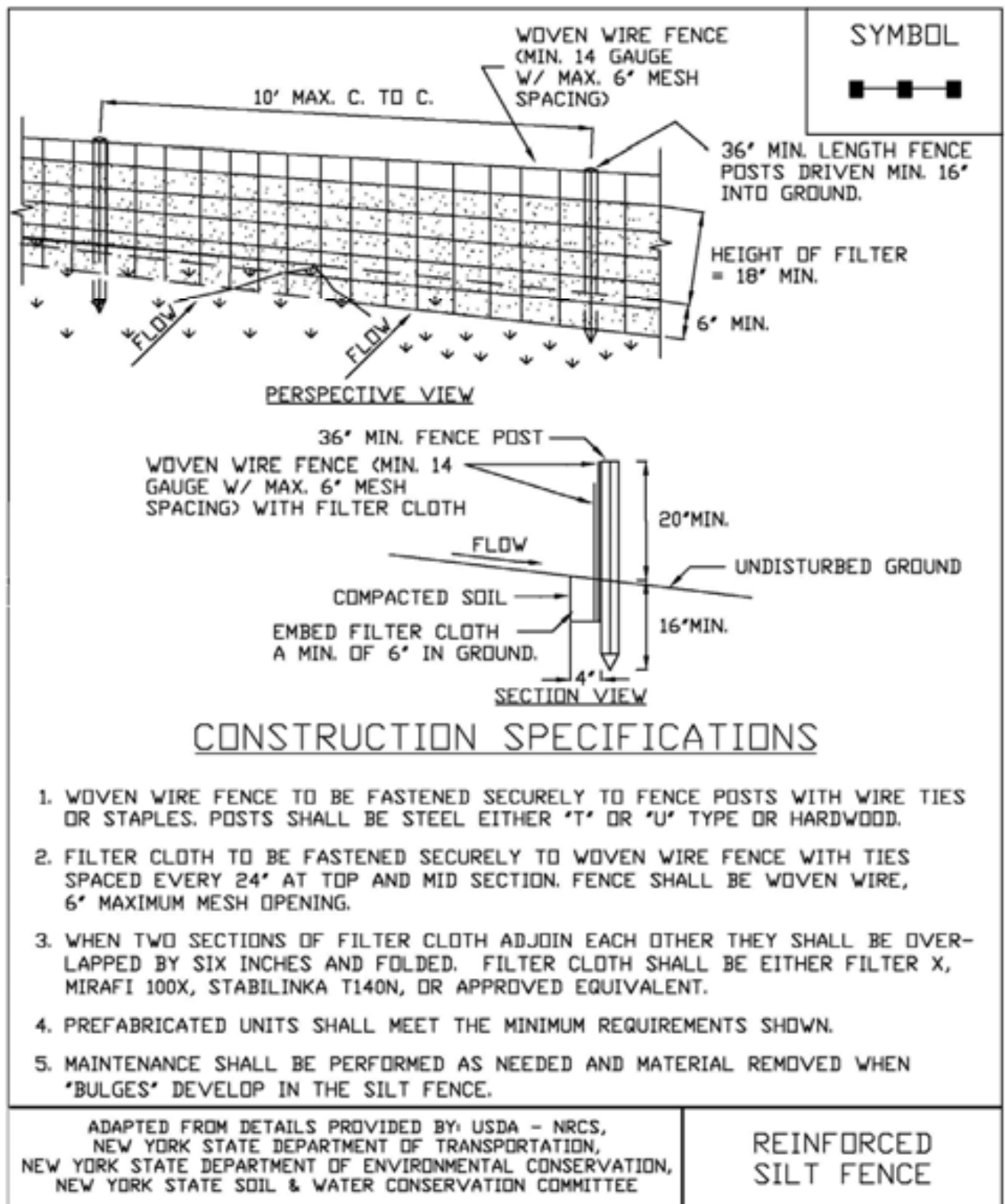


2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot. Posts for super silt fence shall be standard chain link fence posts.
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.
4. Prefabricated silt fence is acceptable as long as all material specifications are met.

Reinforced Silt Fence



**Figure 5.30
Reinforced Silt Fence**



STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION



Definition & Scope

A **temporary** barrier with low permeability, installed around inlets in the form of a fence, berm or excavation around an opening, detaining water and thereby reducing the sediment content of sediment laden water by settling thus preventing heavily sediment laden water from entering a storm drain system.

Conditions Where Practice Applies

This practice shall be used where the drainage area to an inlet is disturbed, it is not possible to temporarily divert the storm drain outfall into a trapping device, and watertight blocking of inlets is not advisable. **It is not to be used in place of sediment trapping devices.** This practice shall be used with an upstream buffer strip if placed at a storm drain inlet on a paved surface. It may be used in conjunction with storm drain diversion to help prevent siltation of pipes installed with low slope angle.

Types of Storm Drain Inlet Practices

There are five (5) specific types of storm drain inlet protection practices that vary according to their function, location, drainage area, and availability of materials:

- I. Excavated Drop Inlet Protection
- II. Fabric Drop Inlet Protection
- III. Stone & Block Drop Inlet Protection
- IV. Paved Surface Inlet Protection
- V. Manufactured Insert Inlet Protection

Design Criteria

Drainage Area – The drainage area for storm drain inlets shall not exceed one acre. Erosion control/temporary stabilization measures must be implemented on the disturbed

drainage area tributary to the inlet. The crest elevations of these practices shall provide storage and minimize bypass flow.

Type I – Excavated Drop Inlet Protection

This practice is generally used during initial overlot grading after the storm drain trunk line is installed.

Limit the drainage area to the inlet device to 1 acre. Excavated side slopes shall be no steeper than 2:1. The minimum depth shall be 1 foot and the maximum depth 2 feet as measured from the crest of the inlet structure. Shape the excavated basin to fit conditions with the longest dimension oriented toward the longest inflow area to provide maximum trap efficiency. The capacity of the excavated basin should be established to contain 900 cubic feet per acre of disturbed area. Weep holes, protected by fabric and stone, should be provided for draining the temporary pool.

Inspect and clean the excavated basin after every storm. Sediment should be removed when 50 percent of the storage volume is achieved. This material should be incorporated into the site in a stabilized manner.

Type II – Fabric Drop Inlet Protection



This practice is generally used during final elevation grading phases after the storm drain system is completed.

Limit the drainage area to 1 acre per inlet device. Land area slope immediately surrounding this device should not exceed 1 percent. The maximum height of the fabric above the inlet crest shall not exceed 1.5 feet unless reinforced.

The top of the barrier should be maintained to allow overflow to drop into the drop inlet and not bypass the inlet to

unprotected lower areas. Support stakes for fabric shall be a minimum of 3 feet long, spaced a maximum 3 feet apart. They should be driven close to the inlet so any overflow drops into the inlet and not on the unprotected soil. Improved performance and sediment storage volume can be obtained by excavating the area.

Inspect the fabric barrier after each rain event and make repairs as needed. Remove sediment from the pool area as necessary with care not to undercut or damage the filter fabric. Upon stabilization of the drainage area, remove all materials and unstable sediment and dispose of properly. Bring the adjacent area of the drop inlet to grade, smooth and compact and stabilize in the appropriate manner to the site.

Type III – Stone and Block Drop Inlet Protection

This practice is generally used during the initial and intermediate overlot grading of a construction site.

Limit the drainage area to 1 acre at the drop inlet. The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow.

Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area.

The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet (“doughnut”). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet. A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure. Temporary diking should be used as necessary to prevent bypass flow.

The barrier should be inspected after each rain event and repairs made where needed. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage area, remove all

materials and any unstable soil and dispose of properly.

Bring the disturbed area to proper grade, smooth, compact and stabilize in a manner appropriate to the site.

Type IV – Paved Surface Inlet Protection



This practice is generally used after pavement construction has been done while final grading and soil stabilization is occurring. These practices should be used with upstream buffer strips in linear construction applications, and with temporary surface stabilization for overlot areas, to reduce the sediment load at the practice. This practice includes sand bags, compost filter socks, geo-tubes filled with ballast, and manufactured surface barriers. Pea gravel can also be used in conjunction with these practices to improve performance. When the inlet is not at a low point, and is offset from the pavement or gutter line, protection should be selected and installed so that flows are not diverted around the inlet.



The drainage area should be limited to 1 acre at the drain inlet. All practices will be placed at the inlet perimeter or beyond to maximize the flow capacity of the inlet. Practices shall be weighted, braced, tied, or otherwise anchored to prevent movement or shifting of location on paved surfaces. Traffic safety shall be integrated with the use of this practice. All practices should be marked with traffic safety cones as appropriate. Structure height shall not cause flooding or by-pass flow that would cause additional erosion.

The structure should be inspected after every storm event. Any sediment should be removed and disposed of on the site. Any broken or damaged components should be replaced. Check all materials for proper anchorage and secure as necessary.

Type V - Manufactured Insert Inlet Protection



The drainage area shall be limited to 1 acre at the drain inlet. All inserts will be installed and anchored in accordance with the manufacturers recommendations and design details. The fabric portion of the structure will equal or exceed the performance standard for the silt fence fabric. The inserts will be installed to preserve a minimum of 50 percent of the open, unobstructed design flow area of the storm drain inlet opening to maintain capacity for storm events.

Figure 5.31
Excavated Drop Inlet Protection

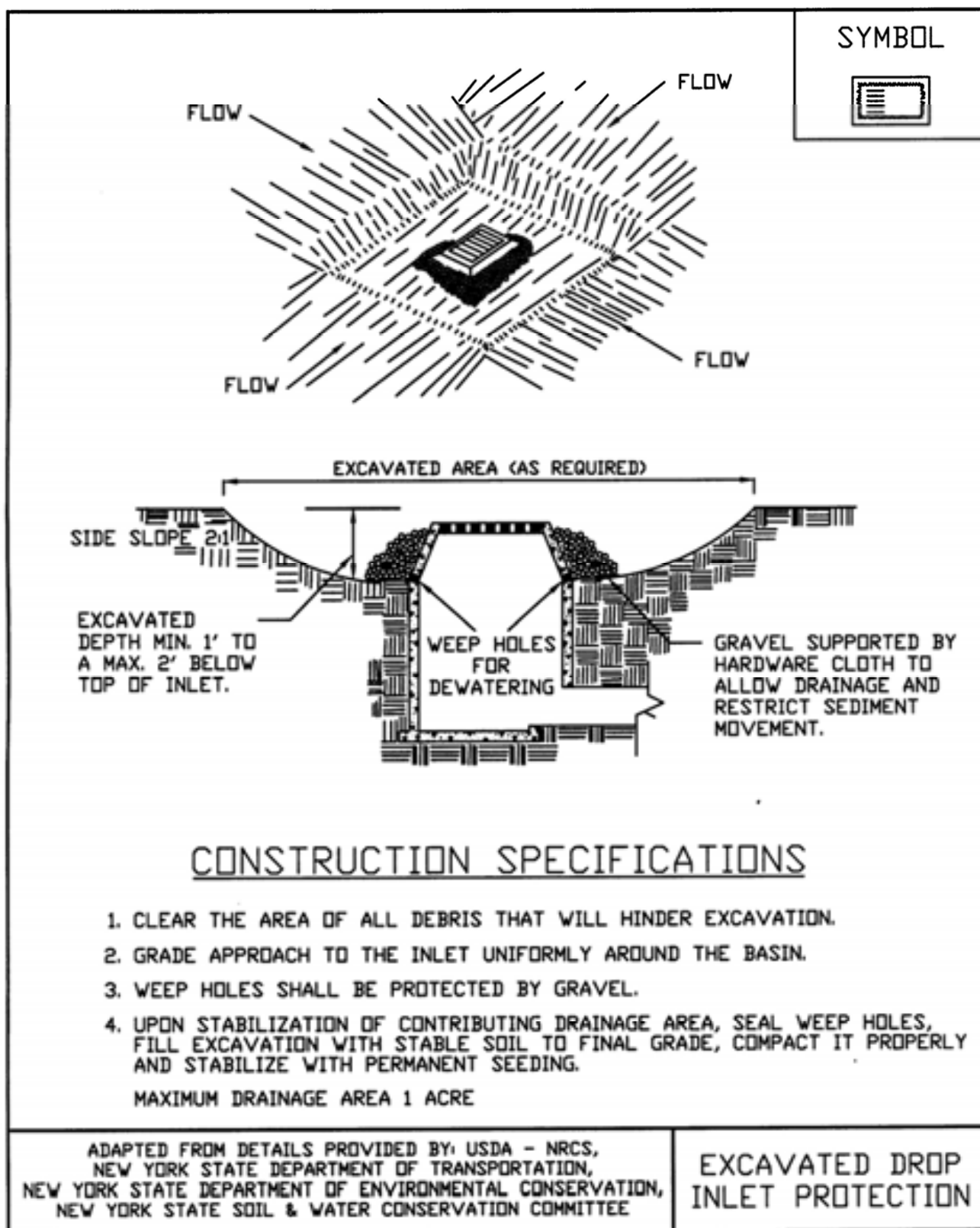


Figure 5.32
Fabric Drop Inlet Protection

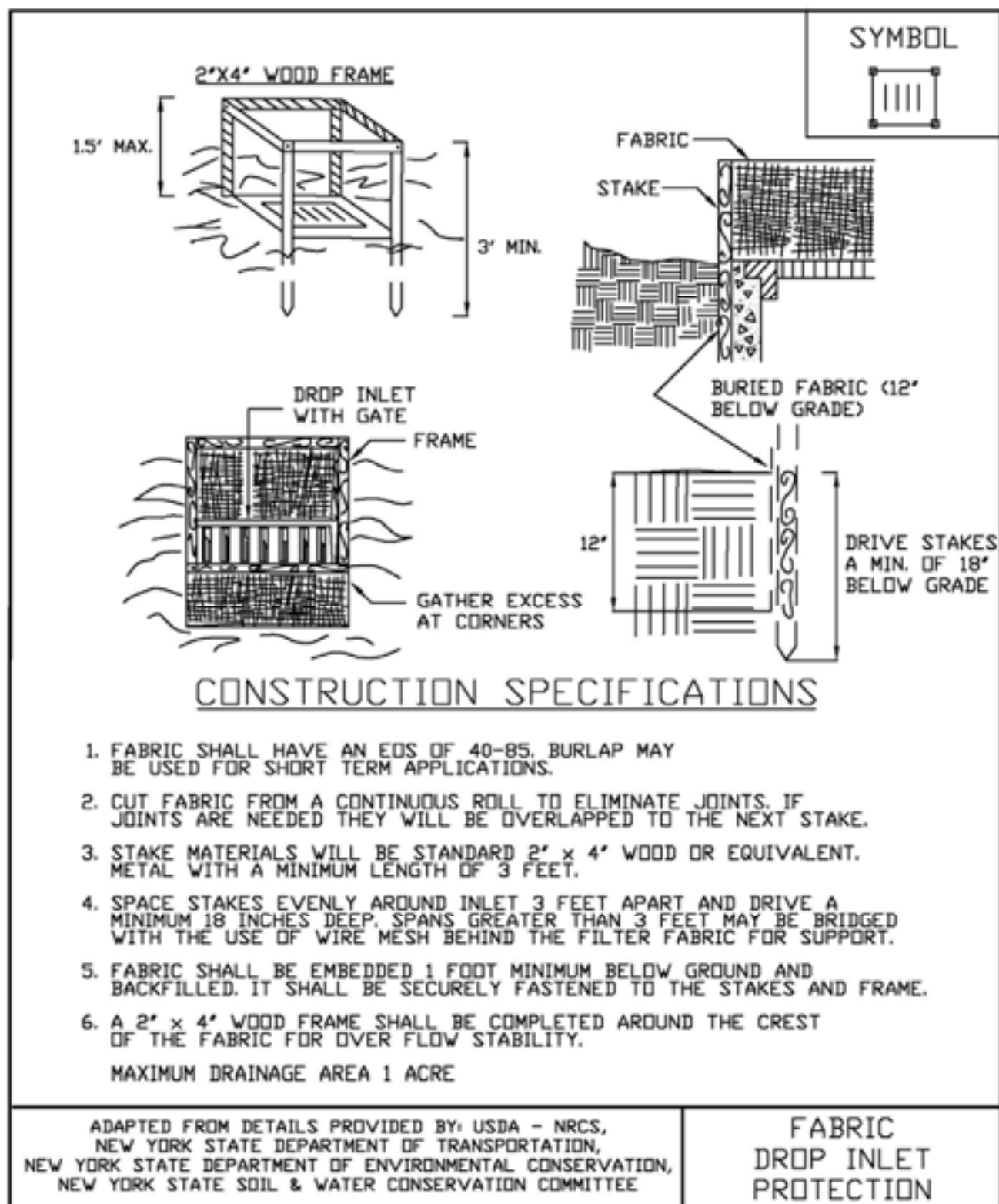


Figure 5.33
Stone & Block Drop Inlet Protection

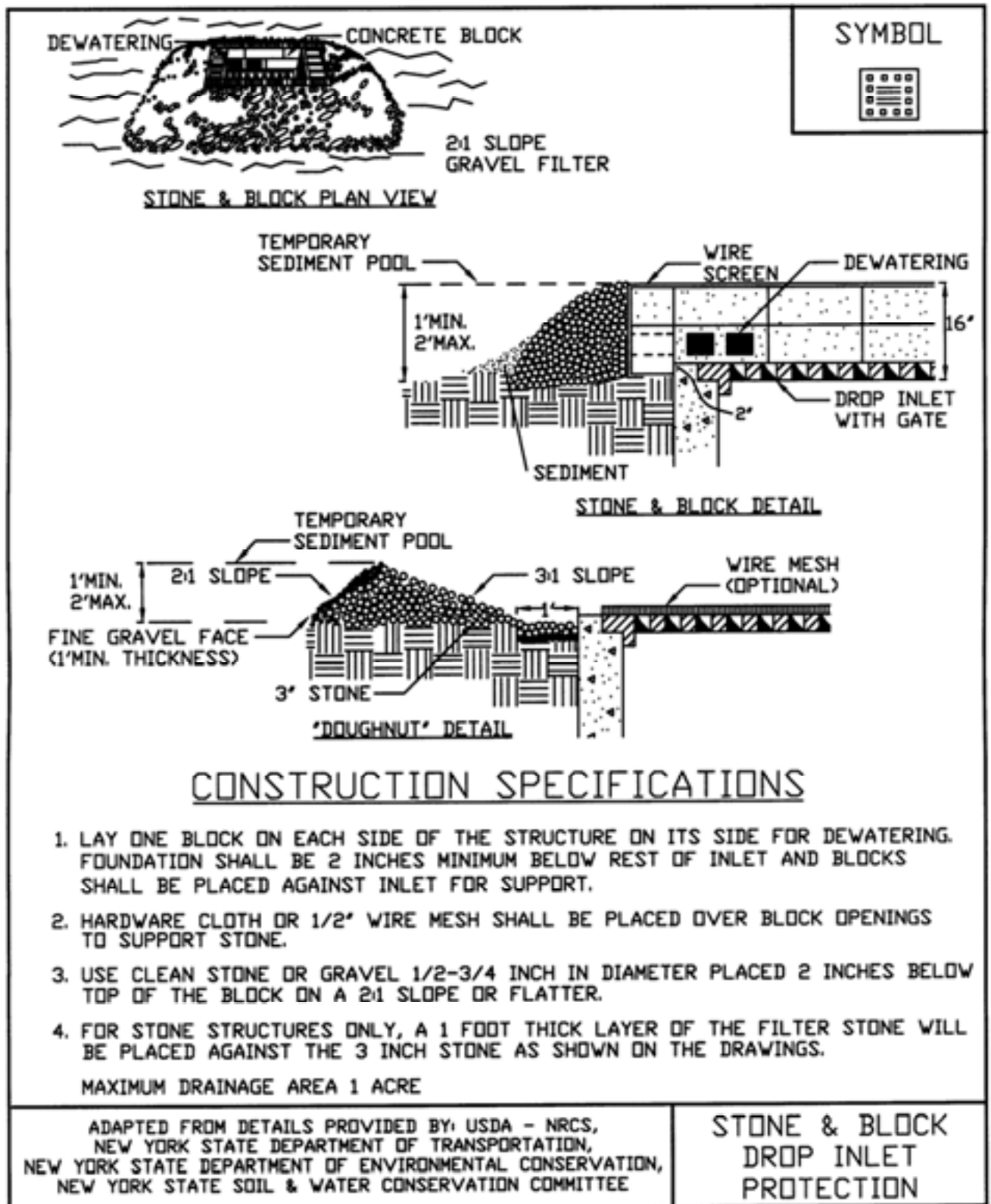
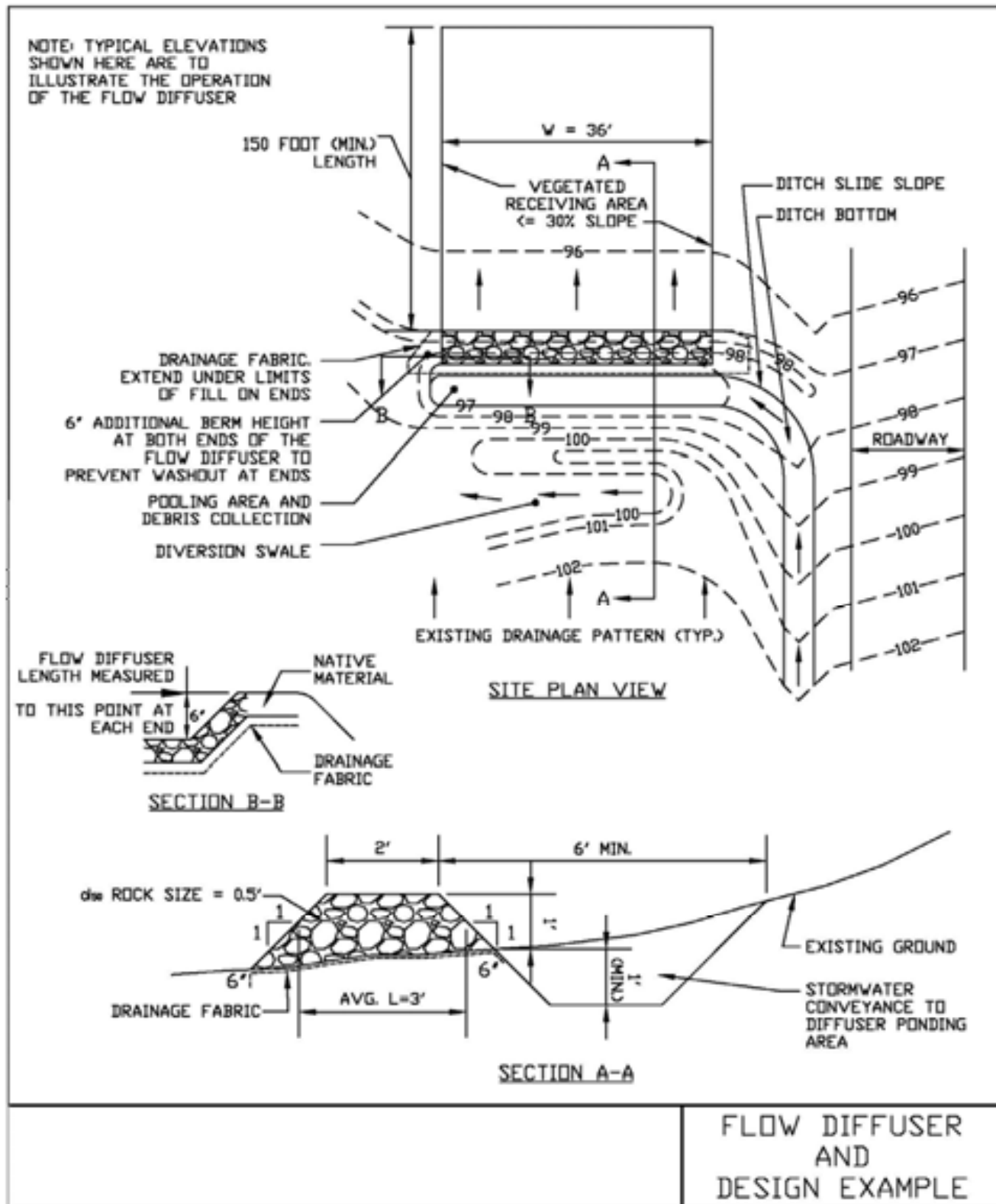


Figure B.1
Flow Diffuser Design Example



APPENDIX K

Sample Inspection Reports

Pre-Construction Site Assessment Checklist Page 1 of 2

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

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

Yes	No	NA	Observations
			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) on-site? Where?
			Have all contractors involved with stormwater-related activities signed a contractor's certification?

2. Resource Protection:

Yes	No	NA	Observations
			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	Observations
			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 or protected.
			Appropriate practices to protect on-site or downstream surface water are installed.
			Are clearing and grading operations divided into areas < 5 acres?

Pre-Construction Site Assessment Checklist Page 2 of 2

4. Stabilized Construction Entrance:

Yes	No	NA	Observations
			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	Observations
			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 hand disturbing activity.
			Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials:

Yes	No	NA	Observations
			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 on-site. Where? _____.

Note: Provide comments below as necessary:

Construction Duration Inspections: Page 1 of 6

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

Permit Reference: Part IV.C.2.a (page 17):

"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."

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

Immediate report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

Construction Duration Inspections: Page 2 of 6

Identify location, nature of work, by contractor and subcontractors for each operation:

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.

Construction Duration Inspections: Page 3 of 6**Maintaining Water Quality**

Yes	No	NA	Observations
			Is there an increase in turbidity causing a substantial contrast to natural conditions?
			Is there residue from oil and floating substances, visible oil film, or globules or grease?
			All disturbances are 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	Observations
			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	Observations
			Maximum diameter pipe necessary to span creek without dredging are installed.
			Installed non-woven geotextile fabric beneath approaches.
			Is fill composed of aggregate (no earth or soil)?
			Rock on approaches is clean enough to remove mud from vehicles and prevent sediment from entering stream during high flow.

Runoff Control Practices**1. Excavation Dewatering**

Yes	No	NA	Observations
			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	Observations
			Installed per plan.
			Constructed on undisturbed soil, not on fill, receiving only clean, non-sediment laden flow.
			Flow sheets out of level spreader without erosion on downstream edge.

Construction Duration Inspections: Page 4 of 6

3. Interceptor Dikes and Swales

Yes	No	NA	Observations
			Installed per plan with minimum side slopes 2H:1V or flatter.
			Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
			Sediment-laden runoff directed to sediment trapping structure.

4. Stone Check Dam

Yes	No	NA	Observations
			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	Observations
			Installed as per Plan
			Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes	No	NA	Observations
			Stockpiles are stabilized with vegetation and/or mulch.
			Sediment control is installed at the toe of the slope.

2. Revegetation

Yes	No	NA	Observations
			Temporary seedings and mulch have been applied to idle areas.
			Four inches minimum of topsoil has been applied under permanent seedings.

Sediment Control Practices

1. Stabilized Construction Entrance

Yes	No	NA	Observations
			Stone is clean enough to effectively remove mud from vehicles.
			Installed per standards and specifications?
			Does all traffic use the stabilized entrance to enter and leave site?
			Is adequate drainage provided to prevent ponding at entrance?

Construction Duration Inspections: Page 5 of 6

2. Silt Fence - Sediment accumulation is _____ % of design capacity.

Yes	No	NA	Observations
			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.

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices) - Sediment accumulation _____ % of design capacity.

Yes	No	NA	Observations
			Installed concrete blocks lengthwise so open ends face outward, not upward.
			Placed wire screen between No. 3 crushed stone and concrete blocks.
			Drainage area is 1 acre or less.
			Excavated area is 900 cubic feet.
			Excavated side slopes should be 2:1.
			2" x 4" frame is constructed and structurally sound.
			Posts 3-foot maximum spacing between posts.
			Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
			Posts are stable, fabric is tight and without rips or frayed areas.

4. Temporary Sediment Trap - Sediment accumulation is _____ % of design capacity.

Yes	No	NA	Observations
			Outlet structure is constructed per the approved plan or drawing.
			Geotextile fabric has been placed beneath rock fill.

5. Temporary Sediment Trap - Sediment accumulation is _____ % of design capacity.

Yes	No	NA	Observations
			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.

Recommended maintenance or additional measures:

Notes or Comments:

Construction Duration Inspections: Page 6 of 6

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 and Reason:

[illegible]

Stormwater Management Pond/Wetland
Construction Inspection Checklist
Page 1 of 8

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

Permit Reference: Part IV.C.2.a (page 17):

"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."

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
1. Pre-Construction / Materials and Equipment		
Pre-Construction Meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked.		
1. Material (including protective coating, if specified).		
2. Diameter.		
3. Dimensions of metal riser or pre-cast concrete outlet structure.		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans.		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 2 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
6. Number and dimensions of prefabricated anti-seep collars.		
7. Watertight connectors and gaskets.		
8. Outlet drain valve.		
Project benchmark near pond site.		
Equipment for temporary de-watering.		
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil and organic matter.		
3. Pipe Spillway Installation		
Method of installation details on plans.		
A. Bed Preparation		
Installation trench excavated with specified side slopes.		
Stable, uniform, dry subgrade of relatively impervious material. (If subgrade is wet, contractor shall have defined steps before proceeding with installation.)		
Invert at proper elevation and grade.		
B. Pipe Placement - Metal / Plastic		
1. Watertight connectors and gaskets properly installed.		
2. Anti-seep collars properly spaced and having watertight connections to pipe.		
3. Backfill placed and tamped by hand under "haunches" of pipe.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 3 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2-feet of cover over pipe is reached.		
Pipe Placement - Concrete Pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle.		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area.		
3. Excavation for lower half of anti-seep collars(s) with reinforcing steel set.		
4. Entire area where anti-seep collars(s) will come in contact with pipe coated with mastic or other approved waterproof sealant.		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix.		
6. Upper half of anti-seep collars(s) formed with reinforcing steel set.		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary).		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Purge if necessary.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 4 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
C. Backfilling		
Fill placed in maximum 8-inch lifts.		
Backfill taken minimum 2-feet above top of anti-seep collar elevation before traversing with heavy equipment.		
4. Riser / Outlet /Structure Installation		
Riser located within embankment.		
A. Metal riser		
1. Riser base excavated or formed on stable subgrade to design dimensions.		
2. Set on blocks to design elevations and plumbed.		
3. Reinforcing bars placed at right angles and projecting into sides of riser.		
4. Concrete poured as to fill inside of riser to invert of barrel.		
B. Pre-Cast Concrete Structure		
1. Dry and stable elevation.		
2. Riser base set to design elevation.		
3. If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely.		
4. Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 5 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
C. Poured Concrete Structure		
Footings excavated or formed on stable subgrade, to design dimensions with reinforcing steel set.		
Structure formed to design dimensions, with reinforcing steel set as per Plan.		
Concrete of an approved mix and vibrated into place (protect from freezing while curing, if necessary).		
Forms stripped and inspected for "honeycomb" prior to backfilling; pare if necessary.		
5. Embankment Construction		
Fill Material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment.		
2. Constructed to design cross-section, side slopes and top width.		
3. Constructed to design elevation plus allowance for settlement.		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes.		
Inlet pipes have adequate outfall protection.		
Forebay(s).		
Pond benches.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 6 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
7. Earth Emergency Spillway Construction		
Spillway located in cur or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width.		
Entrance channel, crest, and exit channel constructed to design grades and elevations.		
8. Outlet Protection		
A. End Section		
Securely in place and properly backfilled.		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified.		
Endwall formed to design dimensions with reinforcing steel set as per Plan.		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary).		
Forms stripped and structure inspected for "honeycomb" prior to backfilling; parge if necessary.		
C. Riprap Apron / Channel		
Apron / Channel excavated to design cross-section with proper transition to existing ground.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 7 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
Filter fabric in place.		
Stone sized as per Plan and uniformly placed at the thickness specified.		
9. Vegetative Stabilization		
Approved seed mixture or sod.		
Proper surface preparation and required soil amendments.		
Excelsior mat or other stabilization, as per Plan.		
10. Miscellaneous		
Drain for ponds having a permanent pool.		
Trash rack / anti-vortex device secured to outlet structure.		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required).		
Access road.		
Set aside for clean-out maintenance.		
11. Stormwater Wetlands		
Adequate water balance.		
Variety of depth zones present.		
Approved pondscaping plan in place. Reinforcement budget for additional plantings.		
Plants and materials ordered 6 months prior to construction.		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window).		
Wetland buffer area preserved to maximum extent possible.		

Post-Development Stormwater Management Practice
Construction Inspection Checklist
Page 8 of 8

Comments:

Actions to be Taken:

APPENDIX L

Schedule "B"

DECLARATION OF COVENANTS, CONDITIONS, AND RESTRICTIONS FOR

Thomas W. Hannigan Jr

DECLARATION made as of the [] day of [], 2021, by Thomas W. Hannigan Jr, located at 52 Upland Road, Croton-on-Hudson, NY (hereinafter referred to as the “Declarant”).

WITNESSETH:

WHEREAS, Declarant is the owner of all that certain lot, piece or parcel of land situate, lying and being in the Town of Yorktown Heights, County of Westchester and State of New York, being designated as Section 68.08, Block 2 and Lot 1 as shown on that certain map entitled “[filed map name]” which was filed in the Office of the County Clerk of Westchester County on [] as Filed Map No. [] and which is more accurately bounded and described in the deed attached hereto as Exhibit 1 (the “Property”); and

WHEREAS, Declarant plans to undertake or is undertaking plans for the development or sale of land that will result in construction of an impervious surface as referenced in the *Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and Its Sources*, Title 10 New York Codes, Rules and Regulations Part 128-3.9(b)(3)(x); Title 15 Rules of the City of New York Chapter 18-39(b)(3)(x) (“Watershed Regulations”); and

WHEREAS, the Watershed Regulations require Declarant to prepare a Stormwater Pollution Prevention Plan (“SWPPP”) and submit the SWPPP to the New York City Department of Environmental Protection (“DEP”) for its review and approval so that stormwater generated by precipitation during and after soil disturbing activities and runoff from newly created impervious surfaces is captured and treated, thus reducing or eliminating a pollution discharge; and

WHEREAS, Declarant has submitted a SWPPP application to DEP for the Property described above, Correia Enterprises LLC (number TBD), and received an approval from DEP for such SWPPP, dated [], such SWPPP approval and the maintenance obligations being attached hereto as Exhibit 2; and

WHEREAS, Declarant desires to declare the following covenants, conditions and restrictions to govern the future development, use and maintenance of any lots that are part of the Property that may be conveyed to future owners, including the Declarant’s respective heirs, successors, and assigns, and to subject any deed of conveyance of any such lots to this Declaration, by reference thereto, to the covenants, conditions and restrictions described herein,

NOW, THEREFORE, Declarant hereby declares that the Property shall be held, sold, conveyed, transferred and occupied subject to the following covenants, conditions, and restrictions which are for the benefit of the City of New York as well as for the owners of the Property and which shall be perpetual so long as the provisions of the SWPPP continue to be required by the Watershed Regulations, shall run with the Property and be binding on the Declarant, its heirs, successors and assigns and be binding upon each successive owner of any Property parcel or lot described in the subdivision plan and the heirs, successors and assigns of

each subsequent party having or acquiring any right, title or interest in the Property or any part thereof.

1. Declarant hereby acknowledges, covenants, warrants, and represents that it shall install and maintain any and all erosion and sediment controls and stormwater management practices on the Property in accordance with the SWPPP approved by DEP, dated [], and any and all amendments to the SWPPP that may be required and that DEP may approve.
2. Declarant's installation and maintenance of the erosion and sediment controls and stormwater management practices shall be for the benefit of the City of New York as well as for the owners of the Property.
3. Declarant's obligation to install and maintain any and all erosion and sediment controls and stormwater management practices on the Property in accordance with the DEP-approved SWPPP and any and all amendments to the SWPPP that DEP may approve shall be perpetual so long as the provisions of the SWPPP continue to be required by the Watershed Regulations.
4. Declarant hereby acknowledges, covenants and warrants that this Property shall be subject to the maintenance obligations set forth and described in the SWPPP, with respect to any stormwater management practices or treatment of runoff located on areas commonly owned by multiple property owners or a homeowners' association in the subdivision.
5. Declarant hereby covenants, warrants, and represents that any lease, mortgage, subdivision, or other transfer of the Property, or any interest therein, shall be subject to the restrictive covenants contained herein pertaining to the installation and maintenance of erosion and sediment control and stormwater management practices, and any deed, mortgage, or other instrument of conveyance shall be subject to and, specifically refer to, the attached SWPPP approval and shall specifically state that the interest thereby conveyed is subject to the covenants and restrictions contained herein and therein.
6. These covenants, conditions and restrictions shall be recorded at the Office of the County Clerk, shall run with the land and shall apply to, inure to the benefit of, and bind the Declarant and all subsequent heirs, executors, administrators, successors and assigns.

52 Upland Lane

IN WITNESS WHEREOF, Declarant has executed this document on the date first above written.

Signature

STATE OF NEW YORK)

)

COUNTY OF _____)

On _____, 20__, before me, the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his/her capacity, and that by his/her capacity, and that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public

52 Upland Lane

Exhibit 1

Exhibit 2

The following is the proposed Inspection and Maintenance Schedule:

Control to be Inspected	Inspection Frequency	Maintenance Threshold Criteria	Maintenance Procedure
Drain Inlets/Filter Insert	Quarterly	3" accumulated sediment	Remove debris and sediment annually.
DC-740 Chambers	Bi-Annually	3" accumulated sediment	Remove debris and sediment.

APPENDIX M

Project Plans