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Storm Water Pollution Prevention Plan (SWPPP)

FOR

Warwick Commons

Village of Warwick, Orange County, NY

September 2020
Revised February 2021

Prepared For

Warwick Commons Stage 5, LLC
321 Route 59, #338
Tallman, NY 10982

Prepared By

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I. EXECUTIVE SUMMARY

Project Name:	**Operator Name and Address:**
Warwick Commons Stage 5 Village of Warwick Orange County New York	Warwick Commons Stage 5, LLC 321 Route 59 #338 Tallman, NY 10982
Project Engineer and Firm:	**Contractor Name and Address:**
Andrew B. Fetherston, P.E. Maser Consulting 555 Hudson Valley Avenue, Ste 101 New Windsor, NY 12553 (845) 564-4495	**TBD**
Project Location:	**MS4 Contact:**
Tax lot: 218-1-91, 92,93, 94, &96; 219-1-2.2 Sheffield Drive Village of Warwick Orange County, NY	**N/A**

Figure 1: Project Location Arial

INTRODUCTION

The proposed development, Warwick Common Stage 5, also known as Tax Lots 218-1-91, 92, 93, 94 & 96, and 219-1-2.2 is a +/- 15.3-acre site located on Sheffield Drive in the Village of Warwick. The project site has frontage on Brady Road to the west and is bisected by Sheffield Drive in a west to east direction. Currently, the site is partially developed with the, unmaintained & unopened to traffic, 30' wide Sheffield Drive, parking areas, drainage structures, and other utilities. The remainder of the site is a mixture of dense woodland, meadow areas that have been previously disturbed and re-vegetated, and wetlands. The site is also bisected by a stream flowing from south to north towards the previously constructed Warwick Commons. The site is not located within the 100-year floodplain, per the latest FEMA FRIM mapping.

The proposed project will consist of 14 residential condominium buildings totaling 90 units. Other improvements include a clubhouse, swimming pool, roads, driveways, parking, sidewalks, and associated utilities to service the residences. The project will also involve the re-alignment and width reduction of Sheffield Road to create an improved and safer 4-way intersection with Brady Road and Country Lane.

The project is continuation of the overall Warwick Commons development located north of the project site. The overall development was first approved in the 1980's and has since gone through several alterations and modifications. The site was most recently approved for a development similar in scope, in 2013. In the previously approved designs, the stormwater peak detention was attenuated for the entire development at the Class 'B' Dam known as Warwick Meadows Dam (NYS# 180-4895). The dam is located north of the project, with Laudaten Way, running over its crest. The prior design relied on modification to the dam to provided peak mitigation for larger storm events and to address NYS DEC dam safety violations. The updated project has been designed to mitigate the increase in stormwater runoff on-site, within the need to modify the dam.

To meet the stormwater requirements, a total of ten (10) stormwater management practices have been proposed on site including infiltration and bioretention surface basins and subsurface infiltration basins. These standard mitigation practices proposed are consistent with the previous approvals. These stormwater features have been designed in accordance with the 2015 New York State Stormwater Management Design Manual and local requirements.

Due to the size of the project, coverage under the State Pollutant Discharge Elimination System Permit (SPDES GP 0-20-001) administered by New York State Department of Environmental Conservation (NYSDEC) is required.

II. STORMWATER MANAGEMENT GOALS

GOALS

The Stormwater Pollution Prevention Plan (SWPPP) has been prepared in compliance with the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-20-001 (See ***Appendix 4***). The SWPPP is a plan for controlling runoff and pollutants from a site during and after construction activities. The principle objective of this document is to comply with the SPDES Permit for construction activities by planning and implementing the following practices:

- Reduction or elimination of erosion and sediment loading to water bodies during and after construction.
- Control of the impact of stormwater runoff on the water quality of the receiving waters.
- Control of the peak rate of runoff during and after construction.
- Maintenance of stormwater controls during and after completion of construction.

CLASSIFICATION & STANDARDS

The activities associated with this project are eligible for coverage under this permit. Using the General Permit guidelines for coverage, a summary of classification and requirements is provided below:

Project Type:
- *Multi-Family residential developments: including duplexes, townhomes, condominiums, senior housing complexes, apartment complexes and mobile home parks.*

Classification: Appendix B, Table 2, of the GP-0-20-001 “Construction activities that require the preparation of a SWPPP that includes Post Construction Stormwater Practices”.

The following guidance documents, in addition to various resources located on the NYS Department of Environmental Conservation website, were used in preparation of this SWPPP.

The New York State Stormwater Management Design Manual, by New York State Department of Environmental Conservation, August 2015.

New York Standard Specifications for Erosion and Sediment Control, by New York State Department of Environmental Conservation, November 2016.

The SWPPP is intended to be a *‘living’* document and should be revised and updated whenever site conditions dictate. Any proposed modifications shall be reviewed by the owner/operator prior to incorporation in the SWPPP and implementation at the project site. The certifying engineer of this SWPPP document shall be notified of any proposed modifications to this document. Modifications shall be in accordance with the NYSDEC technical standards.

III. METHODOLOGY

1. The watersheds are divided into subareas, by topography, soils, and land use. A summary of the watershed areas, composite curve numbers, and travel times are shown in Table 1.
2. Rainfall depths used for this analysis are those published by the Northeast Regional Climate Center for the project location for the 100, 10, and 1-year frequency storms as directed in the NYSSMDM.

3. Topographical mapping is taken from a survey title' "Survey of Property for Warwick Commons Stage 5, LLC Village of Warwick, Orange County New York, prepared by Schmick Surveying, INC, Dated August 29, 2019 and supplemented with best available mapping.
4. The required water quality volume (WQv) was calculated in accordance with the Section 4.2 and chapter 9 of the NYSSMDM. This is also the required RRv as per Section 4.3 of the NYSSMDM.
5. The provided RRv was calculated through the use of the Green Infrastructure (GI) Worksheets, Version 1.6, provided by NYSDEC. The worksheets are included in *Appendix 3.*
6. As this project is defined as redevelopment with an increase in impervious area, the study shows mitigation of the proposed impervious areas as required per the NYSSMDM.
7. The peak flows from the watersheds in the existing condition are computed using the runoff curve numbers taken from TR-55 to determine undeveloped peak runoff and runoff hydrographs at the design points. The existing peak flows are presented in the report.
8. In the post-development condition, the peak flows from the proposed development are computed using the runoff curve numbers taken from TR-55. The watersheds are adjusted for the proposed improvements and grading of the site. The runoff flows are hydraulically routed for updated travel times, diversions, and new storage structures, as necessary. The resulting proposed peak flows at the design point are presented in the report.
9. Erosion and sediment control plans and details have been included with the site plans. A full Erosion & Sediment Control Plan (plans and construction sequencing) designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (aka the "bluebook") has been included in *Appendix 16* of this document.
10. Maps indicating the various drainage conditions are enclosed in this report. Schematic diagrams of the flow models in the existing and proposed conditions are included in the HydroCAD output within the *Appendix 2*.
11. A "Draft" Notice of Intent (NOI) for GP-0-20-001 and "Draft" MS4 SWPPP Acceptance form have been included within the Appendix.

IV. DISCUSSION

DISCUSSION OF DESIGN POINTS

The Project has only one design point, this design point was studied to mitigate for stormwater quality only as previously discussed. The Design point and drainage areas were limited, wherever possible to the area of proposed project site.

The design points evaluated in this report is described as follows:

Design Point 1 is located at the northern property line in the stream the bisects the site. This stream is the low point or valley of the site and receives sheet flow from both the eastern and western side of the site. The stream conveys runoff from the site and upstream tributary areas north under Sheffield Road via a 60" culvert, towards the offsite Dam previously discussed.

The Design Point locations, the pre- and post-development land use, travel times flow paths, and watersheds are clearly identified on the watershed maps found in the Appendix of this report. The pre-development (hereafter "existing") and post-development (hereafter "proposed") watershed characteristics can be found in Table 1 below.

TABLE 1: WATERSHED CHARACTERISTICS

Existing Conditions		
	Area	CN
WS E1	15.26	83
Total	15.26	83
Proposed Conditions		
	Total Area	**CN**
WS 1	0.55	88.00
WS 2	2.50	93.00
WS 3	1.10	85.00
WS 4	0.44	90.00
WS 5	0.75	91.00
WS 6	0.27	96.00
WS 7	1.02	88.00
WS 8	0.55	88.00
WS 9	0.59	94.00
WS 10	0.97	95.00
WS A	2.71	86.00
WS B	3.50	81.00
WS C	0.25	79.00
Totals	15.21	88.00

SOIL TYPES

Soil data for this project was obtained from the NRCS Web Soil Survey (WSS) as operated by the USDA Natural Resources Conservation Service (NRCS) (See ***Appendix 8***)

Five (5) soil designations are identified within the project site. The project site soils include Alden silt loam (Ab), Mardin gravely silt loam, 8 to 15 percent slopes (MdC), Rock outcrop-Hollis Complex, 15 to 35 precent slopes, Swartswood and Mardin soils, sloping very stony (SXC) and, Swartswood and Mardin soils, moderately steep, very stony (SXD). A further detailed description of the soil characteristics and properties can be found in ***Appendix 8*** of this report.

HYDROLOGIC SOIL GROUP (HSG)

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). Conservatively dual class soil groups are considered "D" soils.

TABLE 2: HYDROLOGIC SOIL GROUPS

HSG	Soil (abbreviation)
D	Ab
D	MdC
D	ROD
C	SXC
C	SXD

4.3.3 SOIL BORING AND INFILTRATION TESTING

Preliminary project specific soil testing was conducted on the on site within the location of proposed stormwater mitigation practices. Stabilized soil infiltration rates from this testing ranged between 24 and 18 inches per hour. For design purposes, the proposed stormwater infiltration basins utilized an infiltration rate of 12 inches per hour to maintain a factor of safety in the design. Additional soil information and testing location is included within the full Geotechnical report (*see Appendix 15*). Additional testing may need to be conducted prior to construction.

REDEVELOPMENT

As defined in Chapter 9 of the NYSSMDM, redevelopment activity is disturbance and reconstruction of existing impervious surfaces. This includes impervious surfaces removed within the last five (5) years. Redevelopment is distinguished from new development in that new development refers to construction on land where there had not been previous construction. Redevelopment specifically applies to constructed areas with impervious surface.

According to the Design Manual, redevelopment of previously developed sites is encouraged from a watershed protection standpoint because it often provides an opportunity to conserve natural resources in less impacted areas by targeting development to areas with existing services and infrastructure. At the same time, redevelopment provides an opportunity to correct existing problems and reduce pollutant discharges from older developed areas that were constructed without effective stormwater pollution controls.

Site constraints associated with pre-developed project sites are another factor that makes it more difficult to provide standard stormwater practices (SMPs). The biggest constraints encountered on this site are primarily the presence of highly compacted and poorly drained soils. Chapter 9 of the NYSSMDM sets forth alternative design criteria for certain redevelopment projects because the technical standards contained elsewhere in the Manual were primarily intended for new development projects and compliance with those standards may present a challenge to some redevelopment projects.

The existing site has a total of 0.98 Acres of impervious area. the proposed development will cause a net increase of 4.75 acres of impervious area. While the vast majority of the proposed development's impervious area will be treated in stormwater mitigation practices, portions of the site were not able to be treated due to being located in an area downstream of any treatment practice and/or the need to maintain the already construed Sheffield Road. These areas are being considered the redevelopment portion of the project.

ZERO-NET INCREASE:

The proposed storm water improvements for the site provide the required channel protection (CPv), overbank flood protection (Qp), and extreme flood protection (Qf). Peak flows have been reduced at the selected design point in the proposed condition for the 100, 10, and 1-year storms. the stormwater has also been desiged to accommodate the towns 10% reduction requirement for all storm events. These peak flow reductions can also be found in Table 3 below.

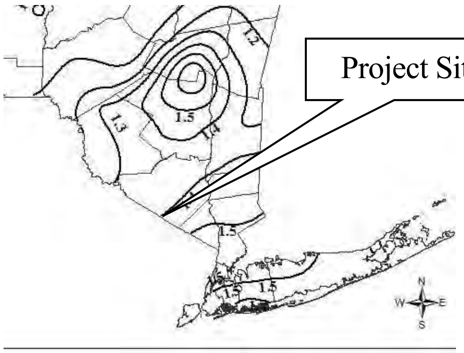
TABLE 3: EXISTING AND PROPOSED PEAK FLOW SUMMARY

Design Point	Storm Events	Existing	Proposed	Diff.	Percent
DP 1	1	15.12	7.18	-7.94	-52.5%
	10	38.08	26.88	-11.20	-29.4%
	100	80.10	70.40	-9.70	-12.1%

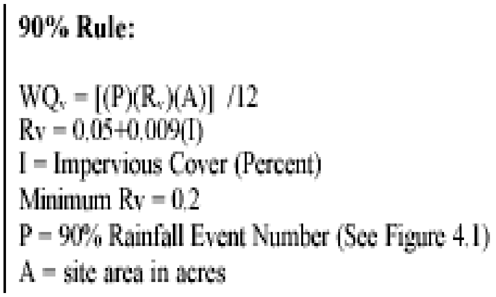
As stated in the introduction, the previously approved design utilized the off-site dam to provide peak mitigation for the proposed development. The current design has addressed the peak mitigation requirements onsite, without the need to modify the dam. Supplemental project history and explanation of the change in design has been included in Appendix 17, “Warwick Meadows, Phase IV – Dam Modification Memo” prepared by Maser Consulting revised January 6th , 2021. Please note, the previous memo did not account for the roadway width reduction of Sheffield, therefore the peak flows from the proposed development have only decreased.

WATER QUALITY VOLUME (WQV):

The Water Quality Volume (WQv) is designed to improve water quality. The design captures and treats 90% of the average annual stormwater runoff volume. The WQv is directly related to the impervious cover created at a site. The 90% rainfall event value (P) used in the calculations (1.40”) is shown below in the portion of Figure 4.1 from Section 4.2, page 4-3 in the NYSSMDM.



Project Site



90% Rule:

$WQ_v = [(P)(R_v)(A)]\ /12$
$Rv = 0.05+0.009(I)$
I = Impervious Cover (Percent)
Minimum Rv = 0.2
P = 90% Rainfall Event Number (See Figure 4.1)
A = site area in acres

Maser Consulting determined the impervious area for each watershed in the proposed condition. The Runoff Coefficient “Rv” in the computation of Water Quality Volume WQv is dependent on the percent impervious cover. As per Section 4.2 of the NYSSMDM, 100% of the water quality volume shall be treated.

TABLE 4: REQUIRED WATER QUALITY CALCULATION

Watershed	Area (A) Acres	90% Rainfall Event Number (P) Inches	Impervious Area treated Acres	Percent Impervious (I) %	Runoff Coefficient Rv	Required WQv Cf	Provided WQv Cf
WS 1	0.53	1.40	0.23	43%	0.43	1,173	1,173
WS 2	2.50	1.40	1.77	71%	0.69	8,723	8,723
WS 3	0.84	1.40	0.19	22%	0.25	1,068	1,068
WS 4	0.45	1.40	0.25	56%	0.55	1,257	1,257
WS 5	0.73	1.40	0.42	58%	0.57	2,096	2,096
WS 6	0.37	1.40	0.34	93%	0.88	1,658	1,658
WS 7	0.45	1.40	0.45	100%	0.95	2,177	2,177
WS 8	0.54	1.40	0.22	41%	0.42	1,128	1,128
WS 9	0.51	1.40	0.38	75%	0.72	1,882	1,882
WS 10	0.97	1.40	0.79	82%	0.78	3,860	3,860

The total required water quality volume per NYSDEC standards, for the new construction portion of the development, based on the proposed impervious area of 5.04 acres, is 25,022 CF or 0574 Ac-ft. The total impervious area that is being treated (5.04 acres) is beyond the net increase in impervious area (4.75 acres). As shown in table 3 above, the current design provides the required Water quality volume. The above table has also not accounted for the water quality volume provided by the pretreatment practices upstream of the SMPs. Therefore, the proposed design exceeds the water quality requirements.

RUNOFF REDUCTION VOLUME

The runoff reduction volume (RRv) is designed to reduce the stormwater volume leaving the site by capturing an amount equal to the computed water quality volume and infiltrating it onsite. However, for sites that cannot reduce runoff in the amount equal to the water quality volume, a minimum RRv is allowed if the project demonstrates acceptable limitations. The minimum RRv requirement (in acre-feet) was calculated as follows:

$RRv_{min} = [(P)(\overline{R}v)(S)(Aic)]/12$ where,
I = Percent Impervious Cover (must be 100%)
P = 90% rainfall event = 1.4
$\overline{R}v = 0.05 + [(0.009)(I)] = 0.95$
S = Hydrologic Soil Group Reduction Factor = 0.22 (20% HSG C, 80% HSG D)
Aic = Total Area of new impervious cover (acres) = 5.04

$$RRv_{min} = \frac{[(P)(\overline{R}v)(S)(Aic)]}{12} = \frac{[(1.4)(0.95)(0.22)(5.04)]}{12} = 0.122 \text{ Acre-ft} = 5{,}353 \text{ ft}^3$$

Runoff from the impervious area has been treated by bioretention and infiltration basins. Within these proposed practices the entire WQv has not been reduced through the use of standard SMPs with RRv capacity. The RRv and for each proposed practice is included in Table 4 below. Calculations are provided in ***Appendix 3***.

TABLE 5 –RRV VOLUMES PROVIDED

Watershed	Treatment Practice	RRv Provided (CF.)
WS 1	Infiltration Basin (I-2)	1,139
WS 2	Infiltration Basin (I-2)*	7,916
WS 3	Infiltration Basin (I-2)*	1,068
WS 4	Infiltration Basin (I-2)*	1,247
WS 5	Infiltration Basin (I-2)*	1,925
WS 6	Infiltration Basin (I-2)*	1,573
WS 7	Infiltration Basin (I-2)	2,035
WS 8	Infiltration Basin (I-2)	1,046
WS 9	Bioretention Basin (F-5)	864
WS 10	Infiltration Basin (I-2)*	3,860

**Indicated that the proposed Stormtech subsurface infiltration basin.*

The proposed development requires a minimum runoff reduction of 5,353 cf (0.122 Ac-Ft) be reduced and total water quality be treated for the proposed improvements. The proposed design exceeds the minimum requirement, provided an RRv of 22,672 (0.52047 Ac-ft) and provides in excess of 100% of the water quality volume set forth by the NYSDEC requirements. This aspect of the design has been met.

RUNOFF REDUCTION VOLUME (RRV) THROUGH SITE PLANNING:

The application of site planning and green infrastructure to reduce water quality volume with runoff reduction practices can either reduce the required water quality volume to be treated or can completely account for the required water quality volume, which is recommended; the summary of this analysis can be found below. The combination of practices provided on site exceeds the minimum required water quality and runoff reduction for the proposed development.

The basic premise of runoff reduction is to recognize the water quality benefits of certain practices by allowing for a reduction in the water quality treatment volume. Runoff reduction is first achieved through better site design during the planning stages and has been implemented in the planning and design of this project as described in this report.

In accordance with Section 5.2 "Planning for Green Infrastructure: Reduction of Impervious Cover" of the NYSDEC Stormwater Management Design Manual, the proposed site plan has been designed to meet the planning techniques as follows:

TABLE 6: GREEN INFRASTRUCTURE SITE PLANNING

Preservation of undisturbed Areas	
Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	The extent of the clearing was limited to meet the user's needs. There is no proposed disturbance of the wetland areas.
Preservations of Buffers	
Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	The project was designed to not impact the existing wetlands and buffers on site to wherever possible.
Reduction of Clearing & Grading	
Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	The clearing limit was minimized using maximum slopes and retaining walls to meet grade where applicable.
Locating Development in Less Sensitive Areas	
Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	The project was designed to avoid the most sensitive areas on site such as the steep slopes and wetlands to the west. Additionally, this site has been previously disturbed for the construction of Sheffield Drive and the associated utilities.
Open Space Design	
Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Larger "green spaces" have been proposed on site including the center of the south western "loop road"
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 post construction practices.	Compacted soils located in open areas without shallow existing utilities will be tilled in order to restore the original properties of the soil prior to seeding. (*see Appendix 12*)
Roadway Reduction	
Minimize roadway widths and lengths to reduce site impervious area.	Roadway widths were reduced wherever possible while still maintaining town standards and access for emergency vehicle access. The existing 30' wide Sheffield Drive has been reduced 4' in width.
Sidewalk Reduction	
Minimize sidewalk lengths and widths to reduce site impervious area.	Sidewalks added where needed to adequately and safely serve the pedestrian needs of the facility.
Driveway Reduction	
Minimize driveway lengths and widths to reduce site impervious area.	The proposed driveways have been minimized wherever possible.
Cul-de-Sac Reduction	
Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	The cul-de-sac proposed on the north east side of the site was reduced to the minimum Village design requirements.
Building Footprint Reduction	
Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	The building were designed to meet the potential end user's needs.

Parking Reduction	
Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	The parking spaces were limited to what is required by local municipal code and the previous approvals.

Green Infrastructure Techniques (GITs):

After taking into account the reductions through Site Planning mentioned above, RRv remains to be treated through GITs and/or Standard SMPs. Chapter 5 of the NYSSMDM outlines the various Green Infrastructure Techniques which can be implemented on-site to achieve runoff reduction. The GI Worksheets included in the Appendix of this report provide the calculations for the green infrastructure techniques chosen to treat the Runoff Reduction Volume for this project. Below is a brief description of each Green Infrastructure Technique along with a discussion regarding the feasibility of each technique with respect to this project.

TABLE 7: GREEN INFRASTRUCTURE FEASIBILITY

Conservation of Natural Areas	
Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers by restoring and/or permanently conserving these areas on a site.	The project was designed to avoid the most sensitive areas on site such as the steep slopes and wetlands.
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.	The wetland and heavily vegetated areas onsite are located downhill of the proposed development and will act as a buffer although the Water quality benefits have not been quantified.
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 peak discharge, and provide infiltration.	Vegetated swales have been used on site to convey runoff to stormwater mitigation practices without the use of storm structures. The water quality benefits of these swales have not been quantified.
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.	Tree planting has been proposed through the site but has not been quantified as a stormwater mitigation.

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.	This practice has been utilized and 3 of the proposed 14 buildings.
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.	This strategy is not applicable to the project as the onsite stream splits the site, utilizing this practice would not allow the deployment of the eastern half of the site due to the dead end of Sheffield road, as required by the town.
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.	There are a few green locations proposed throughout the development, but rain gardens have not been proposed on site.
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.	The structural design of the proposed buildings does not allow for this technique.
Stormwater Planter	
Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve quality.	Landscaping in green areas and planted beds are proposed throughout the development, but planters have not been proposed for treatment. No credit has been taken in the SWPPP.
Rain Tank or Cistern	
Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities.	This practice has not been used for the proposed development.
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.	Porous pavement has been proposed within some parking areas. The WQv benefits of these practices have not been quantified within the SWPPP.

The bioretention basins and infiltration basins account for the runoff reduction as required. **The site has been designed to meet the required water quality requirements without accounting for the pretreatment volume tributary to the proposed basins.**

Soil restoration efforts, including mechanical decompaction and compost amendment in accordance with Section 5.1.6 and Table 5.3 of the NYSSMDM, are proposed for areas to be disturbed for improvements that will not be impervious at final buildout.

Refer to Tables 6 and 7 above for the decision-making matrices utilized herein. The design for the project utilized a standard SMPs with RRV capacity to attain the required minimum runoff reduction volume and water quality for new construction and redevelopment respectively. NYSDEC Green Infrastructure (GI) worksheets can be found in the Appendix 3 summarizing calculations.

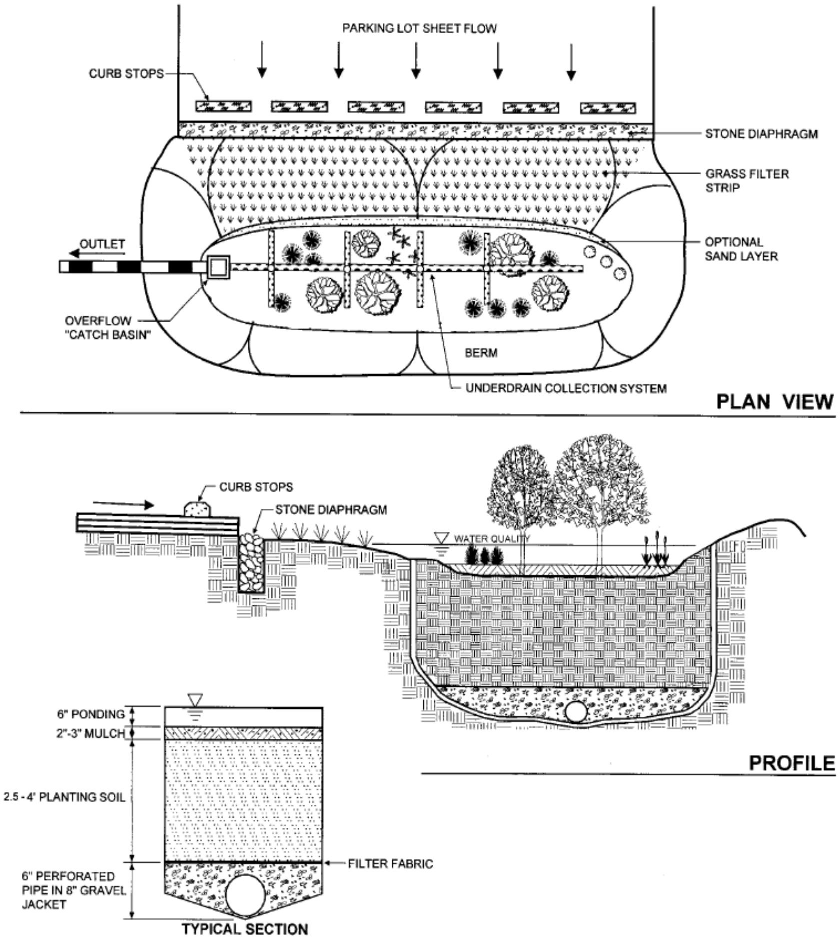
BIORETENTION BASINS WITH UNDERDRAIN (NO INFILTRATION):

The proposed development causes an increase in impervious cover. As such the runnoff must be mitigated for water quality. One of the SMP utilized for the proposed development is the use of bioretention with a proposed underdrain (F-5). Runoff from the development is proposed to be routed to a bioretention basin to provide runoff reduction capacity as well as water quality treatment volume. The basins are proposed with a 3" mulch layer, 2.5 feet of soil media, and an 8-inch drainage layer with a 6-inch underdrain which ultimately connects to an outlet control structure and discharges downstream to provide WQv. Bioretention soils shall meet the design criteria outlined in Appendix H of the NYSSMDM; soil deep ripping and de-compaction shall be in accordance with the NYSDEC guidelines found in the Appendix.

The sizing calculation for the bioretention system was completed in accordance with design requirements set forth in Section 6.4.4 of the NYSSMDM. An exception to the design is that grass filter strips have not been provided in all locations for pre-treatment of the sheet flow from the paved areas. Frequent observance of scour and destruction of existing bioretention areas have led the design to include properly sized riprap inlet protection at all curb cuts and proper scour protection for discharging pipes. Although the intent of the design requires grass filter strips, Maser Consulting believes longevity of the system design and maintenance of the mulch layer and vegetation will adequately treat the runoff from the proposed development and this design alteration will meet the long-term goals of the permit.

The stage/storage information of the bioretention areas can be found in the HydroCAD output within the Appendix of this report. The NYSDEC GI worksheet for runoff reduction and water quality treatment can be found in the Appendix for RRv capacity calculations (See NYSDEC GI worksheet). A summary of the water quality provided in these facilities can be found in Table 4.

Figure 6.19 Bioretention (F-5)

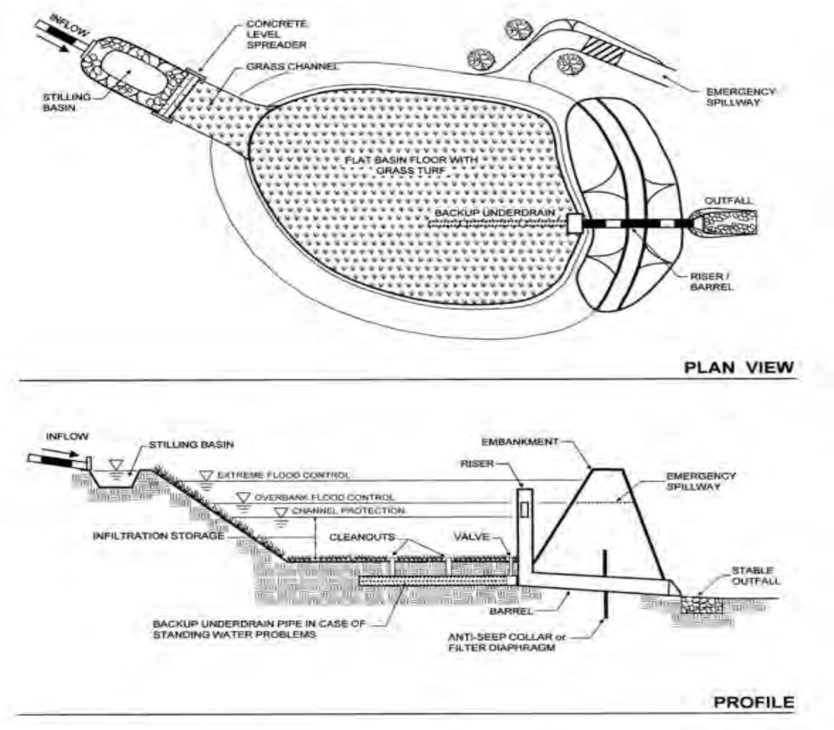


INFILTRATION BASIN:

The proposed design utilizes an infiltration basin for RRv/Wqv on the new construction. The basin was designed to meet the requirements of the NYSSWDM. The design infiltration date of 12 in/hr is more conservative than the 24 -18 in/hr observed during geotechnical testing. The basin has proposed side slopes of 3 on 1.

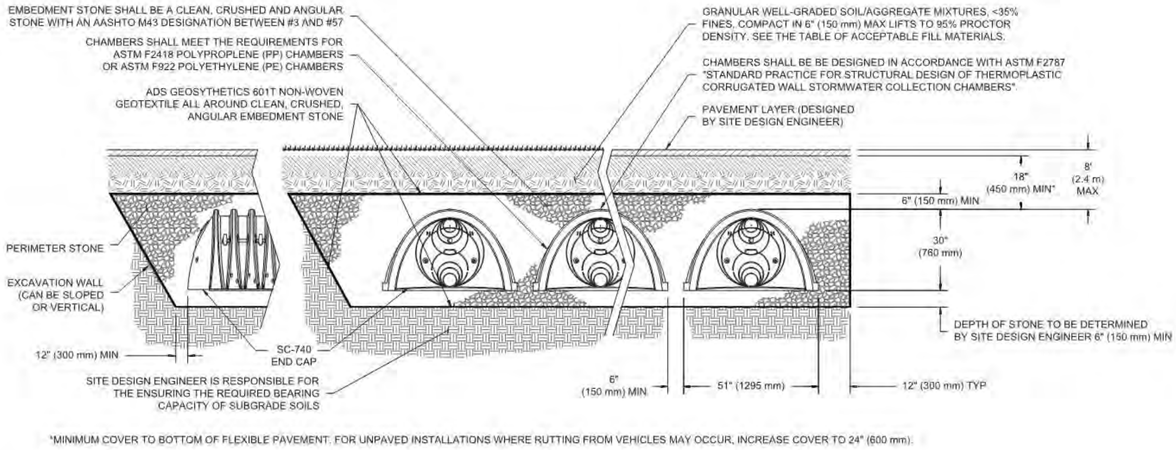
The stage/storage information of the infiltration basin can be found in the HydroCAD output within the Appendix of this report. The NYSDEC GI worksheet for runoff reduction and water quality treatment can be found in the Appendix for RRv capacity calculations (See NYSDEC GI worksheet). A summary of the water quality provided in these facilities can be found in Table 4.

Figure 6.12 Infiltration Basin (I-2)



STORMTECH INFILTRATION CHAMBERS:

The StormTech SC-740 is a subsurface resin chamber that allows the storage of large volumes at reasonable depths. Maser Consulting has designed six (6) underground systems throughout the site. Sizing for these systems include the standard 6-12” stone base to increase storage capacity for the given footprint for the water quality storm to infiltrate and can be found in the HydroCAD output. The chambers are shown in the Green Infrastructure worksheet outputs as equivalent areas that include the correct quantity of chambers. The HydroCAD Appendix includes volume calculations to support the WQv volume shown in the GI worksheets and Table 4 above for each system. The calculations shown include the volume within the chambers and stone voids (StormTech assumes a porosity of 40%). The systems were designed to treat the increase impervious associated with the development. Support for the sizing of the systems can be found in the Appendix of this report.



To provide pretreatment, the runoff will enter the systems isolator row to provided pretreatment. The design infiltration date of 12 in/hr is more conservative than the 24-18 in/hr observed during geotechnical testing. These infiltration rates were used in the design of the runoff reduction volume found within the NYSDEC GI worksheets and for peak attenuation found in the HydroCAD output.

V. EROSION & SEDIMENT CONTROL

FIVE (5) ACRES OR GREATER OF DISTURBANCE

The proposed development will be staged as to not cause greater than 5 acres of disturbance at one time. If the proposed phasing cannot be achieved due to unforeseen site conditions, the applicant will seek a 5 acre waiver from the MS4 municipality and the NYSDEC. After these agencies authorize the disturbance the project must comply with the following requirements:

A. The owner or operator shall have a qualified inspector conduct at least two (2) site inspections in accordance with Part IV.C of the GP-0-020-001 every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

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

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

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

GENERAL EROSION CONTROL PLAN:

Construction operations shall be carried out in such a manner that erosion will be controlled and sediment migration minimized. Federal, State, and Local laws concerning pollution reduction will be followed. The control practices indicated on attached Erosion & Sediment Control Plans shall be installed and used on this project.

In the event control practices not contained within the attached Erosion & Sediment Control Plans are required due to unforeseen/unknown existing conditions this SWPPP document contains applicable Erosion and Sediment Control details in ***Appendix 16*** as a reference. Details in ***Appendix 16*** are considered as needed and are not part of the construction documents for bidding purposes.

The list of measures and practices below are contained on the attached Erosion and Sediment Control Plans and shall be installed and maintained per the most current edition of the New York Standard Specifications for Erosion and Sediment Control Handbook. All erosion control measures implemented shall be in accordance with the construction sequence schedule as described in Section VIII of this narrative.

TEMPORARY MEASURES

- *Silt Fence* – Silt fence shall be placed along the toe of all fill areas or any location where surface sheet flow could be expected in accordance with temporary soil erosion and sediment control plans serving to reduce runoff velocity and effect deposition of transported sediment load. Where silt fence ends, the end shall turn and run perpendicular to contours for a length of ten (10) feet, or for a difference in elevation of two (2) feet, whichever comes first.

- *Mulching* – Mulching of all disturbed surfaces will be mandatory. Hydroseeding with mulch only mixes will be the preferred method.

- *Stabilized Construction Access* - 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.

  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.

- *Concrete Washout Station* - A temporary concrete washout station is to be used near the entrance to the site. The station will have a depth of 24 inches and shall be a minimum of 10 feet by 10 feet. Station shall be lined with a 10mil waterproof plastic membrane. Any tools or equipment that were used for concrete work will be cleaned here before leaving the site.

PERMANENT MEASURES

- *Topsoil, Seed & Mulch* – Final vegetative stabilization shall be used at all locations where the ground has been disturbed and impervious covers are not specified. Mulch shall be applied with, or immediately after seeding.

- *Rock outlet protection*- Stone riprap is to be placed at the outlet end of the culverts beneath the flared end section to slow down the flow of the runoff and reduce erosion.

MAINTENANCE AND INSPECTION OF MEASURES

All temporary and permanent soil erosion and sediment measures shall be maintained by the contractor during the life of the project. The contractor shall have a *trained contractor,* as defined in the GP-0-20-001 (See ***Appendix 4***) on site at all times. The *trained contractor* shall be responsible for the day to day construction and maintenance of all erosion and sediment control measures.

All temporary measures (silt fence, inlet protection, etc.) and permanent measures (landscaping) shall be inspected by the *Qualified Inspector* every seven calendar days. The *Qualified Inspector* role and inspection requirements are outlined in Part IV.C of the GP-0-20-001 (See ***Appendix 4***). All inspections are required to be completed within one calendar day. Any comments, suggestions or corrective actions the *Qualified Inspector* notes shall be addressed by the contractor within 24 hours of the inspection.

CONSTRUCTION SEQUENCE:

The construction sequence for the proposed development will be as follows:

- Install construction entrance.
- Stake limits of disturbance and orange construction fence for wetland protection.
- Install perimeter silt fencing on downhill areas as shown on plan.
- Install sediment ponds. Install temporary swales to direct all open soil area disturbance to sediment ponds as necessary. Locations and size of the erosions and sediment control practices are noted on the plan. these may vary depending on the contractor's schedule and approach but 3,600 cf of storage must be provided at a minimum per acre of upstream disturbance. Sediment traps shall be installed in accordance with the plans and details. sediment traps and basins shall be sized in accordance with the New York standards and specifications for erosion and sediment control manual.
- Rough grade proposed driveway/road.
- Disturbed soils shall be temporarily stabilized as soon as practical. materials stored in stock piles shall be cordoned off with silt fence per the appropriate specifications and details. the

operator shall initiate stabilization measures as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than (14) days after the construction activity in that portion of the site has temporarily or permanently ceased.

- Construct roads, drives, buildings, and parking area install drainage system.
- Topsoil/hay/seed lawn areas.
- The project site must meet final stabilization criteria prior to removing all erosion and sediment control devices and closing out the project. litter and construction debris shall be removed as practical throughout the life of the project.

    - *Final Stabilization* means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement
- Upon final stabilization being met, Contractor shall clear drainage pipes and structures of any sediment which may have accumulated. Additional erosion control measures shall be installed, as may be necessary, required and/or requested by authorities, to prevent the incidental discharge of silt laden runoff from entering a water course or a drainage system. The general permit for stormwater discharges from construction activities states that it is unlawful for any person to cause or contribute to a violation of water quality standards.

- Additional erosion control measures shall be installed, as may be necessary, required and/or requested by authorities, to prevent the incidental discharge of silt laden runoff from entering a water course or a drainage system. the general permit for stormwater discharges from construction activities states that it is unlawful for any person to cause or contribute to a violation of water quality standards.

The applicant and the applicant's contractor are required to attend a preconstruction meeting with
For additional, general Erosion and Sediment Control notes including seeding, please refer to the Erosion and Sediment Control Plans.

VI. Good Housekeeping

Good housekeeping practices are inexpensive, relatively easy to implement and are often effective in preventing stormwater contamination. Specific activities that should be completed by the contractor are listed below:

SPILL INVENTORY
The materials or substances listed below are expected to be present on-site during construction:

- Concrete
- Fertilizers

- Piping
- Paints (enamel & latex)
- Treated and non-treated wood
- Seed
- Tar
- Petroleum-based products
- Reinforcing steel
- Cleaning solvents
- Masonry block
- Paving materials

MATERIAL MANAGEMENT PRACTICES

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff:

- Products shall be kept in original containers unless they are not resealable.
- Original labels and material safety data sheets (MSDS) shall be retained; they contain important product information.
- An effort shall be made to store only enough products required to do the job.
- All materials stored onsite shall be stored in a neat, orderly manner in their appropriate containers, and if possible, under a roof or other enclosure and/or on non-porous blacktop.
- Products shall be kept in their original containers with the original manufacturer's label.
- Substances shall not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product shall be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal shall be followed.
- The contractor's site superintendent shall inspect daily to ensure proper use and disposal of materials on site.

SPILL CONTROL PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup.

- Spills, of any size, of toxic or hazardous material and/or petroleum products shall be reported to the NYSDEC and Central Hudson's Environmental Affairs division.
- Manufacturer's recommended methods for spill cleanup shall be clearly posted and site personnel shall be made aware of the procedures and the locations of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup shall be kept in the material storage area onsite. Equipment and materials shall include but not be limited to brooms, dust pans, mops, rags, gloves, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills shall be cleaned up immediately after discovery.

- The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- The spill prevention plan shall be adjusted to include measures to prevent toxic or hazardous material of spills from recurring and how to clean up the spill. A description of the spill, what caused it, and the cleanup measures shall also be included.

The contractor's site superintendent is responsible for the day-to-day site operations and shall be the spill prevention and cleanup coordinator.

PRODUCT SPECIFIC PRACTICES

The following product specific practices shall be followed onsite.

- Petroleum Products – All onsite vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used on site shall be applied according to manufacturer's recommendations.

- Fertilizers- Fertilizers shall be applied only in the minimum amounts recommended by the manufacturer. Use only fertilizers that have 5 or less parts phosphorous. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic bin to avoid spills.

- Paints – All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to the manufacturer's instructions or state and local regulations.

- Concrete Trucks – Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on the site, unless in approved clean-out areas.

- Waste Disposal – All waste materials shall be collected and stored in a securely lidded metal dumpster rented from a licensed solid waste management company. The dumpster shall meet all local and any State solid waste management regulations. All trash and construction debris from the site shall be deposited in the dumpster. The dumpster shall be emptied as necessary, and the trash shall be hauled to a NYSDEC permitted landfill. No construction waste materials shall be buried onsite. All personnel shall be instructed regarding the correct procedure for waste disposal.

- Hazardous Waste – All hazardous waste materials shall be disposed of in a manner specified by local or State regulations or the manufacturer. Site personnel shall be instructed in these practices.

- Sanitary Waste – All sanitary waste shall be collected from the portable units by a licensed sanitary waste management contractor, as required by local regulation and as required to protect public health and safety.

- Recyclable Waste – All recyclable waste (cardboard, wood, etc.) shall be collected and recycled on a weekly schedule.

VII. Responsible Parties

IMPLEMENTATION OF SWPPP

The owner/operator is responsible for implementing the provisions of the SWPPP and ensuring that the appropriate contractors and subcontractors on the site provide certification in accordance with the provisions of the GP-0-20-001.

The owner/operator is also responsible to have a *trained contractor* and *Qualified Inspector* inspect the active construction site in accordance with section 6.3 of this report and all provisions for inspections defined in the GP-0-20-001, (See ***Appendix 9***) A *trained contractor* cannot conduct *Qualified Inspector* site inspections unless they meet the *Qualified Inspector* qualifications listed in appendices of the GP-0-20-001.

INSPECTION REQUIREMENTS

The owner/operator is responsible for implementing inspections of all erosion and sediment control measures. To do so, the owner/operator shall have a *Qualified Inspector* inspect the site in accordance with the guidelines of Part IV of the GP-0-20-001. A sample inspection template is provided in this document (See ***Appendix 10***).

The owner/operator shall maintain a record of all inspection reports in a site logbook. The site logbook shall be kept on site and be made available to the permitting authority upon request. The owner/operator shall also retain a copy of this SWPPP document at the construction site during the life of the project.

VIII. End of Project – Termination of Permit

FINAL INSPECTION

Prior to filing the Notice of Termination (NOT), or at the end of permit term, the owner/operator shall have a *Qualified Inspector* perform a final site inspection. The inspector shall certify that the site has undergone final stabilization using either vegetative or structural stabilization methods. Final stabilization means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of 80% has been established on all unpaved areas and areas not covered by permanent structures.

NOTICE OF TERMINATION

When the site has been finally stabilized, the owner/operator must submit a Notice of Termination (NOT) form to terminate coverage under SPDES General Permit GP-0-20-001. The permittee must identify all of the permanent stormwater management structures that have been constructed. In addition, a manual describing the operation and maintenance practices that will be necessary for the structures(s) to function as designed after the site is stabilized must be developed and in place. The permittee must also certify that the permanent structure(s) have been constructed in conformance with this document. A copy of the Notice of Termination (NOT) is provided in this document (See ***Appendix 6***). The submission of the N.O.T. will require the sign off from the MS4 regulated municipality (Town of Wawayanda), a copy of the MS4 Acceptance Form has been included in this document (See ***Appendix7***).

RECORD KEEPING

The owner/operator shall retain copies of SWPPP, any reports submitted in conjunction with this permit, and records of all data used to complete the NOI & NOT for a period of at least five (5) years from the date that the site is finally stabilized.

IX. SUMMARY OF PROPOSED STORMWATER IMPROVEMENTS

The proposed project falls under the New York State definition of redevelopment with an increase in impervious area. The site runoff has been attenuated for peak flows in the peak design storms. The proposed development has been design to treat the required water quality through SMP's with RRv capacity. The design utilizes DEC approved practices that help maintain the existing hydrology.

X. CONCLUSION

As the storm water pollution prevention plan meets the water quality requirements for a redevelopment projects with an increase in impervious cover and meets peak flow mitigation to the applicable standards, there should be no adverse impacts due to storm water, on-site or off-site, as a result of the proposed site improvements.

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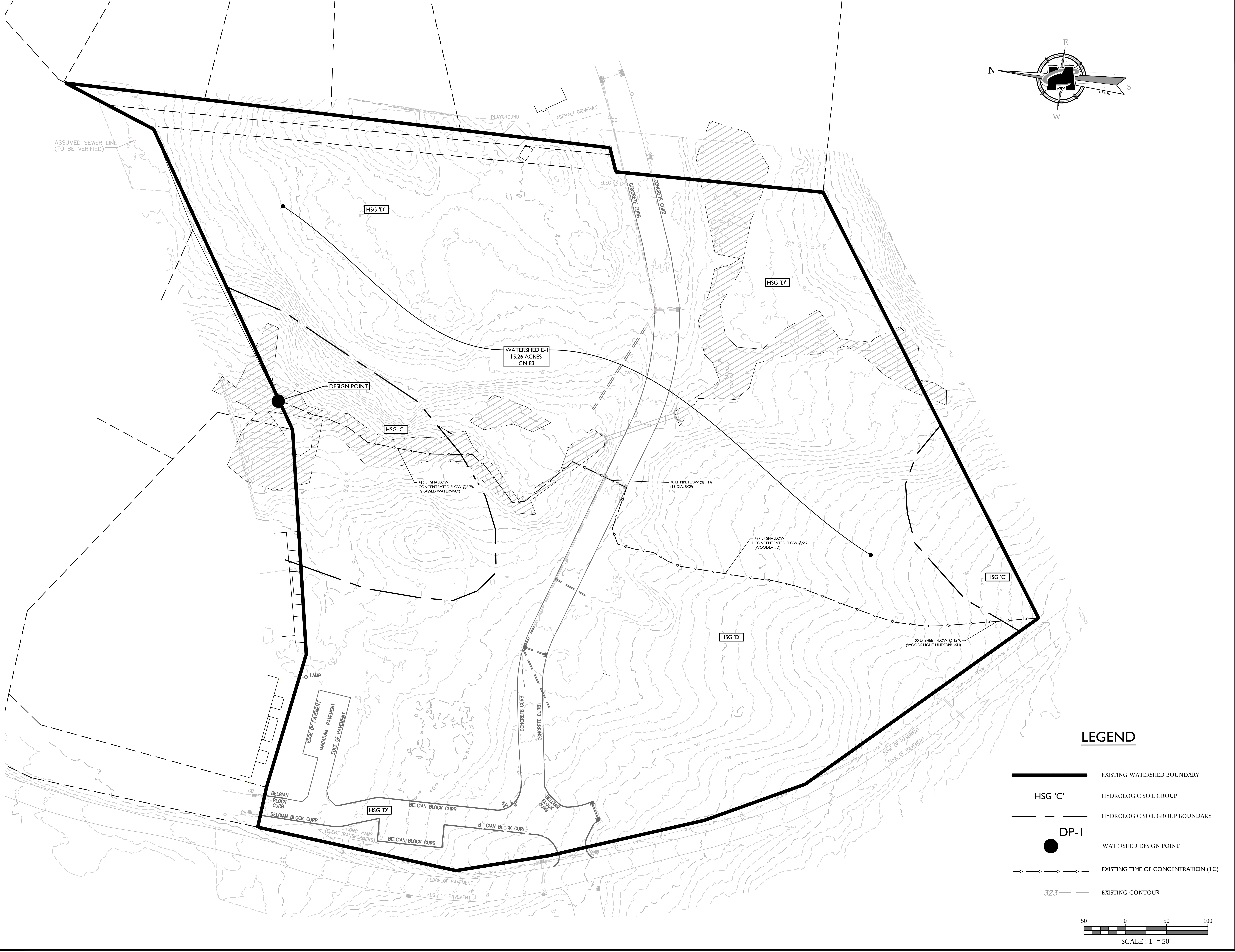
APPENDIX 1

WATERSHED MAPS



2015\15002429D\Engineering\Drainage Maps\C-DRNG.dwg\C-01-EXIST. DRAINAGE MAP By: CMCCORMACK

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FOR STATE SPECIFIC DIRECT PHONE NUMBERS
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REV	DATE	DRAWN BY	DESCRIPTION
1	1/6/2021	CPM	REVISED PER PLANNING BOARD COMMENT.
2	2/23/2021	CPM	REVISED PER PLANNING BOARD COMMENTS.
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WATERSHED MAPS

FOR

WARWICK
COMMONS STAGE 5,
LLC

TAX LOTS
218-1-91,92,93,94 & 96,
219-1-2.2

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

NEW WINDSOR OFFICE
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553

Phone: 845.564.4495
Fax: 845.567.1025

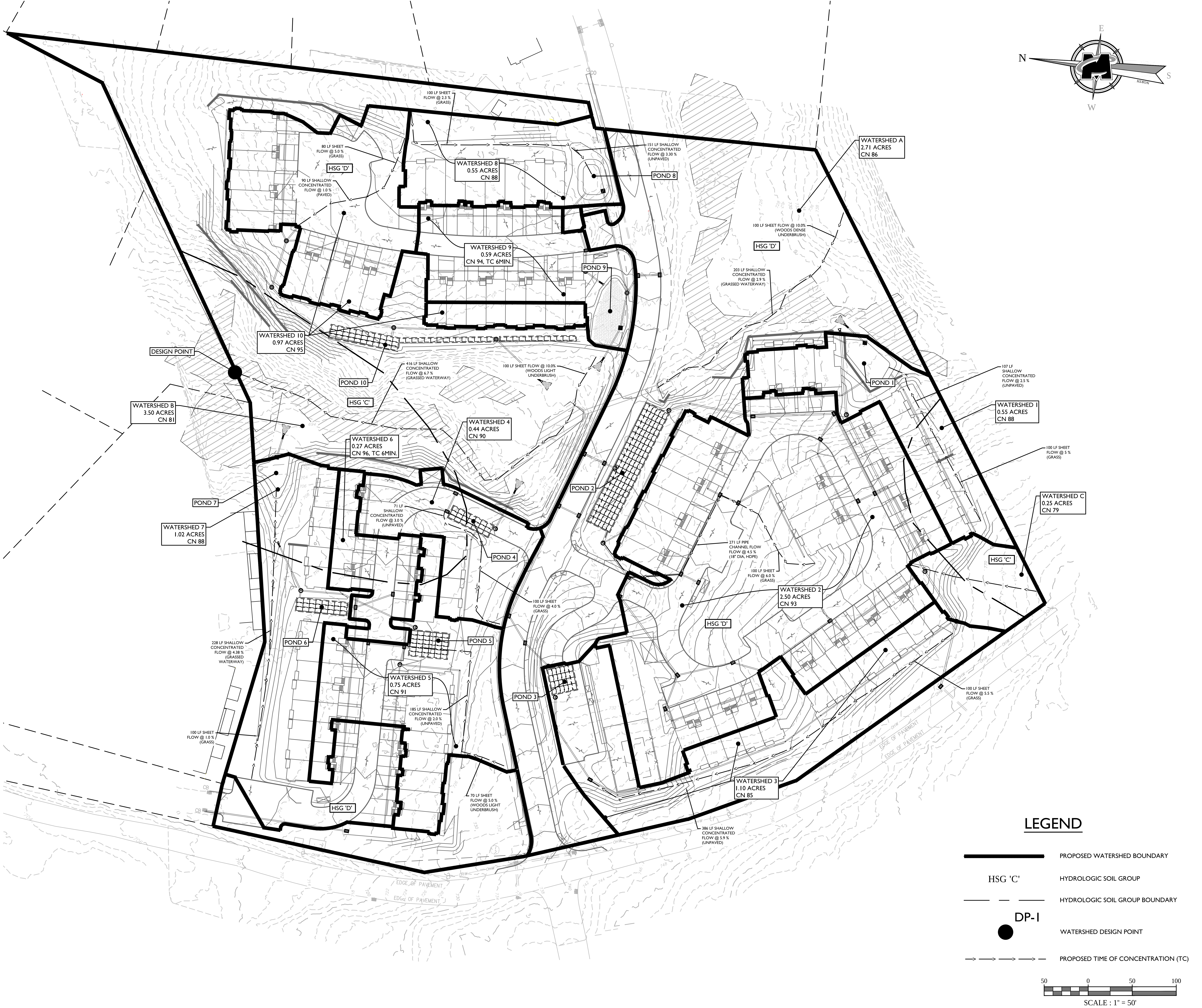
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	9/25/2020	CPM	ABF

PROJECT NUMBER: 15002429D
DRAWING NAME: C-DRNG

SHEET TITLE:
EXISTING
DRAINAGE MAP

SHEET NUMBER:
01 of 02

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



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1	1/6/2021	CPM	REVISED PER PLANNING BOARD COMMENT.
2	2/23/2021	CPM	REVISED PER PLANNING BOARD COMMENTS.

WATERSHED MAPS

FOR

WARWICK
COMMONS STAGE 5,
LLC

TAX LOTS
218-1-91,92,93,94 & 96,
219-1-2.2

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NEW YORK

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Phone: 845.564.4495
Fax: 845.567.1025

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	9/25/2020	CPM	ABF

PROJECT NUMBER: 15002429D
DRAWING NAME: C-DRNG

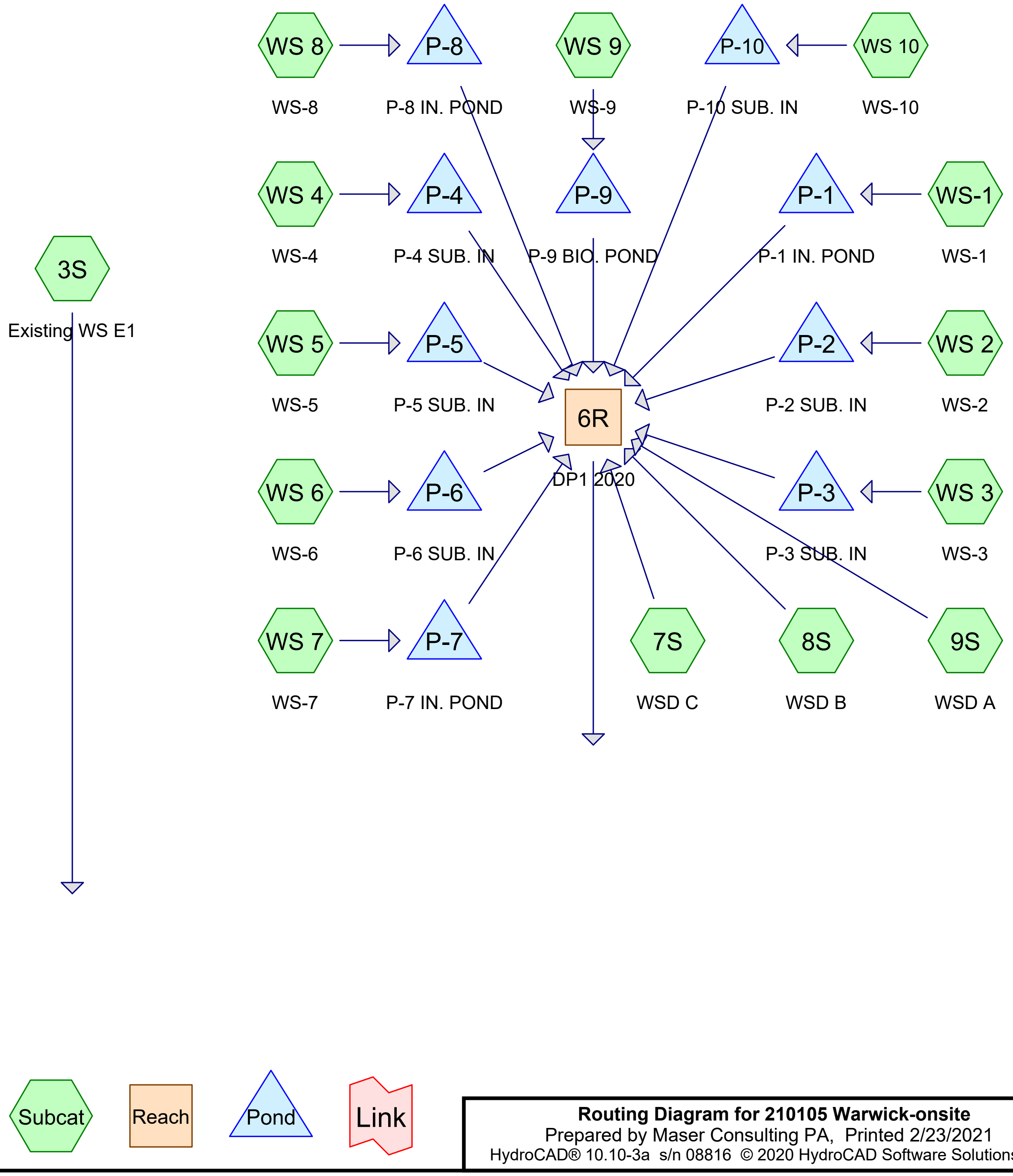
SHEET TITLE:
PROPOSED WATERSHED MAPS

SHEET NUMBER:
02 of 02

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

APPENDIX 2

HYDROCAD MODEL OUTPUT



Routing Diagram for 210105 Warwick-onsite
Prepared by Maser Consulting PA, Printed 2/23/2021
HydroCAD® 10.10-3a s/n 08816 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 3S: Existing WS E1

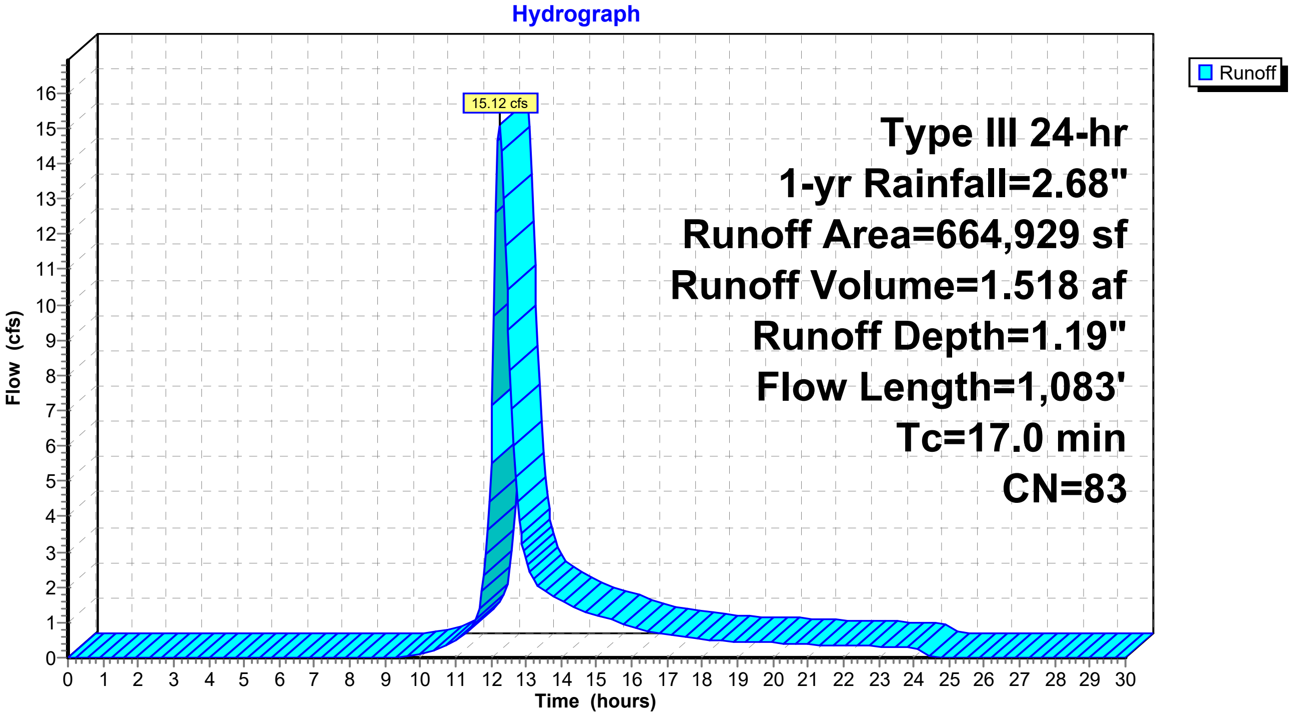
Runoff = 15.12 cfs @ 12.24 hrs, Volume= 1.518 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
42,999	98	Paved parking, HSG D
24,491	89	<50% Grass cover, Poor, HSG D
96,069	78	Meadow, non-grazed, HSG D
24,245	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
397,885	83	Woods, Poor, HSG D
69,348	77	Woods, Poor, HSG C
664,929	83	Weighted Average
621,930		93.53% Pervious Area
42,999		6.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
5.5	497	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	70	0.0620	15.49	19.01	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
17.0	1,083	Total			

Subcatchment 3S: Existing WS E1



Summary for Subcatchment 7S: WSD C

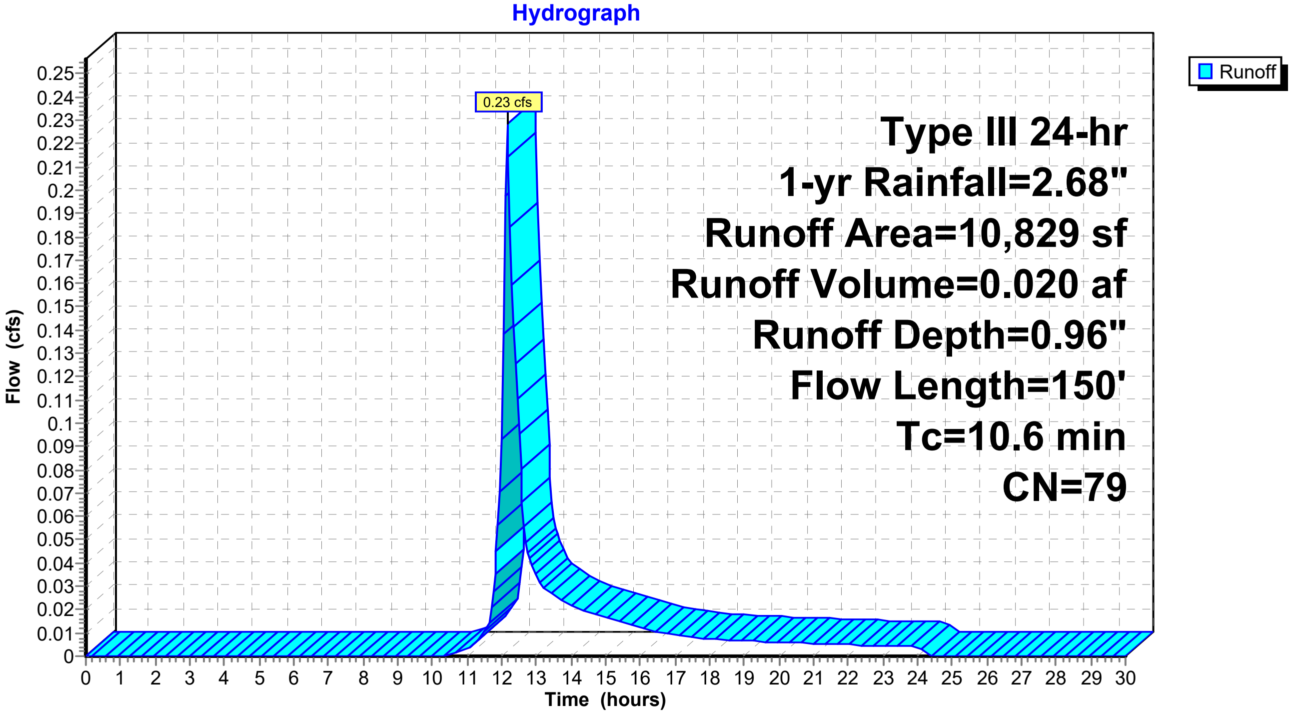
Runoff = 0.23 cfs @ 12.16 hrs, Volume= 0.020 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
2,167	83	Woods, Poor, HSG D
4,412	77	Woods, Poor, HSG C
2,847	80	>75% Grass cover, Good, HSG D
1,403	74	>75% Grass cover, Good, HSG C
10,829	79	Weighted Average
10,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.1200	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
0.1	50	0.3330	9.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.6	150	Total			

Subcatchment 7S: WSD C



Summary for Subcatchment 8S: WSD B

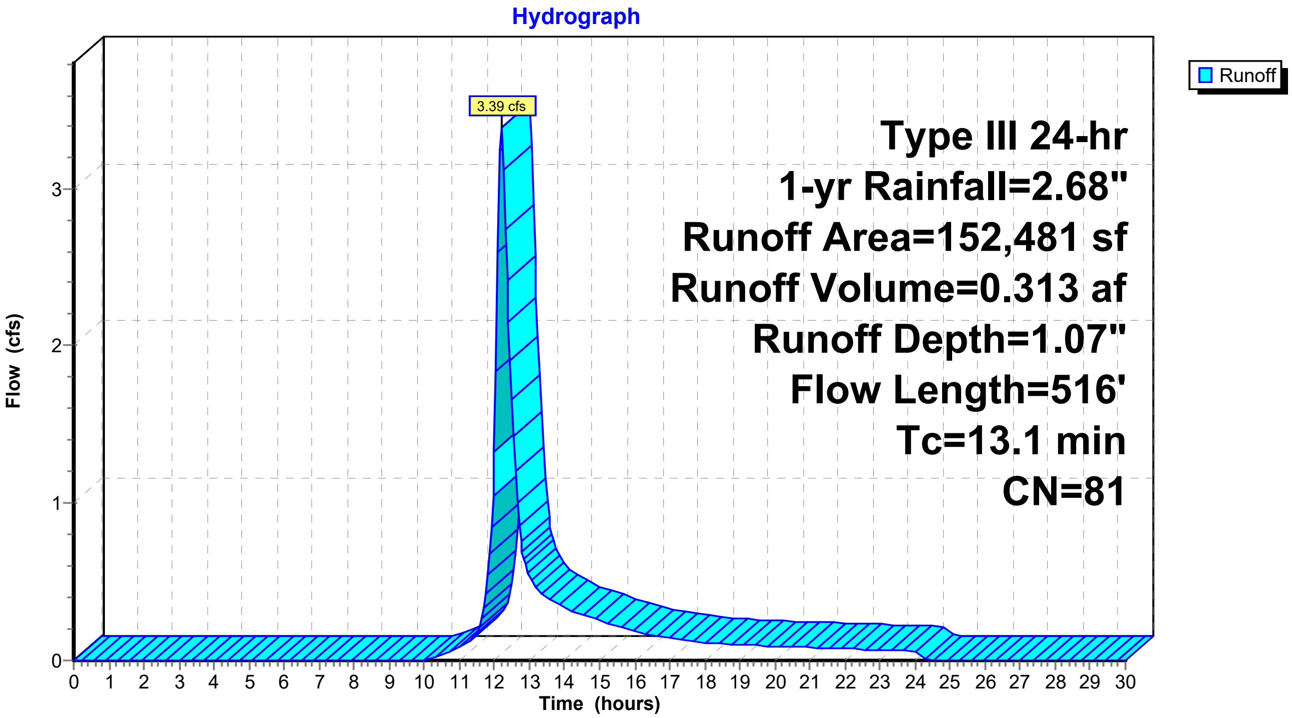
Runoff = 3.39 cfs @ 12.19 hrs, Volume= 0.313 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
1,974	98	Paved parking, HSG D
51,706	80	>75% Grass cover, Good, HSG D
6,862	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
61,255	83	Woods, Poor, HSG D
20,792	77	Woods, Poor, HSG C
152,481	81	Weighted Average
150,507		98.71% Pervious Area
1,974		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.1000	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.1	516	Total			

Subcatchment 8S: WSD B



Summary for Subcatchment 9S: WSD A

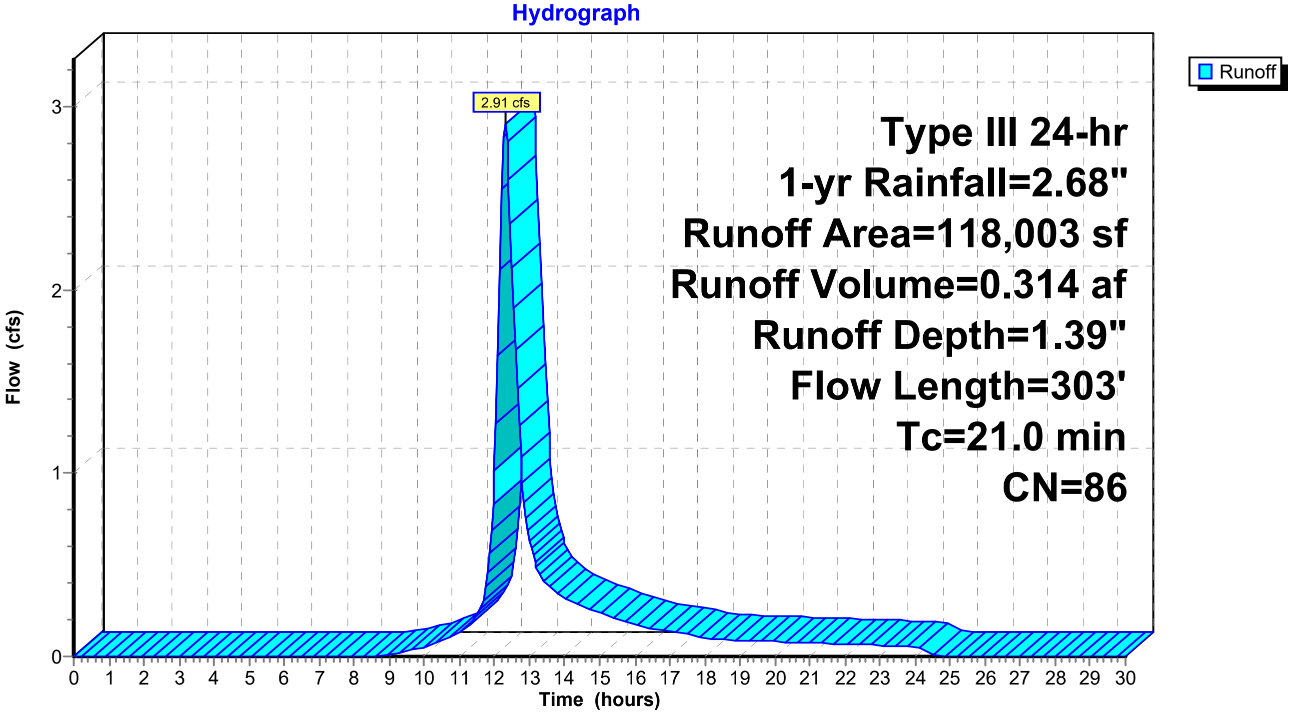
Runoff = 2.91 cfs @ 12.30 hrs, Volume= 0.314 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
29,011	98	Paved parking, HSG D
46,783	83	Woods, Poor, HSG D
17,380	83	Brush, Poor, HSG D
24,829	80	>75% Grass cover, Good, HSG D
118,003	86	Weighted Average
88,992		75.42% Pervious Area
29,011		24.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.1000	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.17"
1.3	203	0.0290	2.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
21.0	303	Total			

Subcatchment 9S: WSD A



Summary for Subcatchment WS 10: WS-10

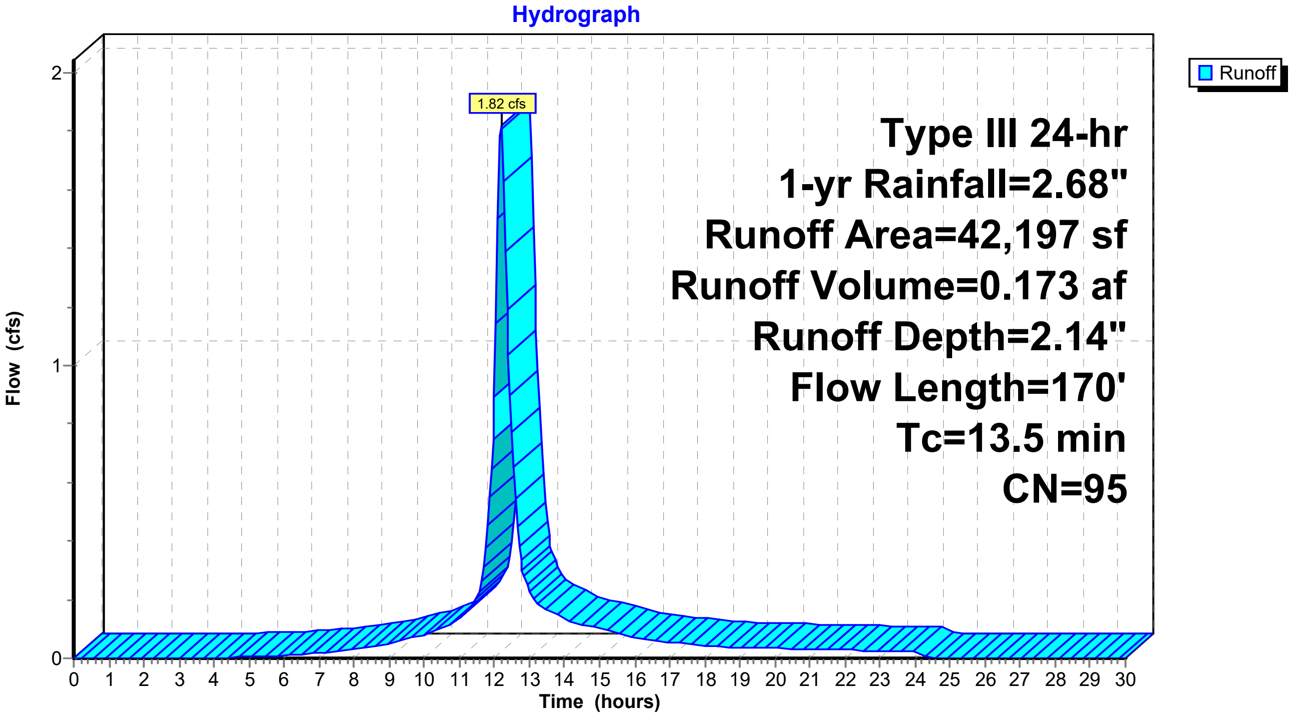
Runoff = 1.82 cfs @ 12.18 hrs, Volume= 0.173 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
34,390	98	Paved parking, HSG D
7,807	80	>75% Grass cover, Good, HSG D
42,197	95	Weighted Average
7,807		18.50% Pervious Area
34,390		81.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	80	0.0500	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	90	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.5	170	Total			

Subcatchment WS 10: WS-10



Summary for Subcatchment WS 2: WS-2

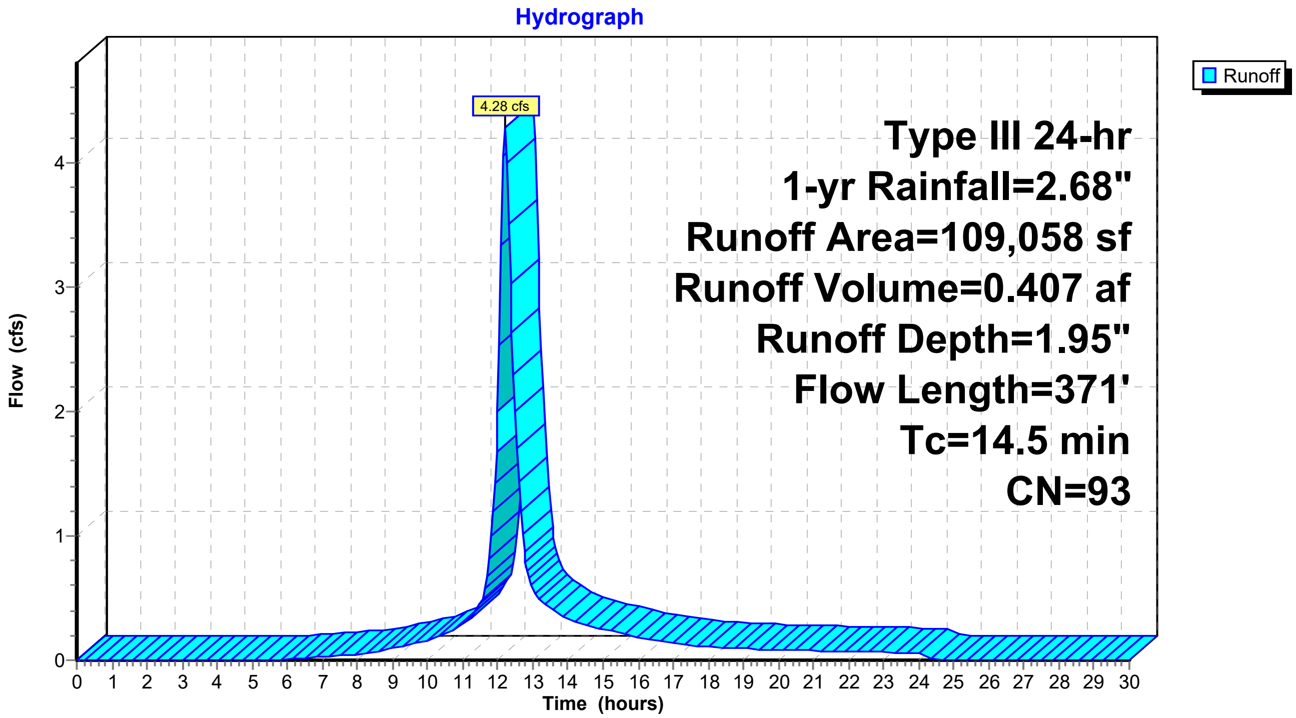
Runoff = 4.28 cfs @ 12.20 hrs, Volume= 0.407 af, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
77,027	98	Paved parking, HSG D
32,031	80	>75% Grass cover, Good, HSG D
109,058	93	Weighted Average
32,031		29.37% Pervious Area
77,027		70.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0600	0.12		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.3	271	0.0450	16.39	28.97	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010
14.5	371	Total			

Subcatchment WS 2: WS-2



Summary for Subcatchment WS 3: WS-3

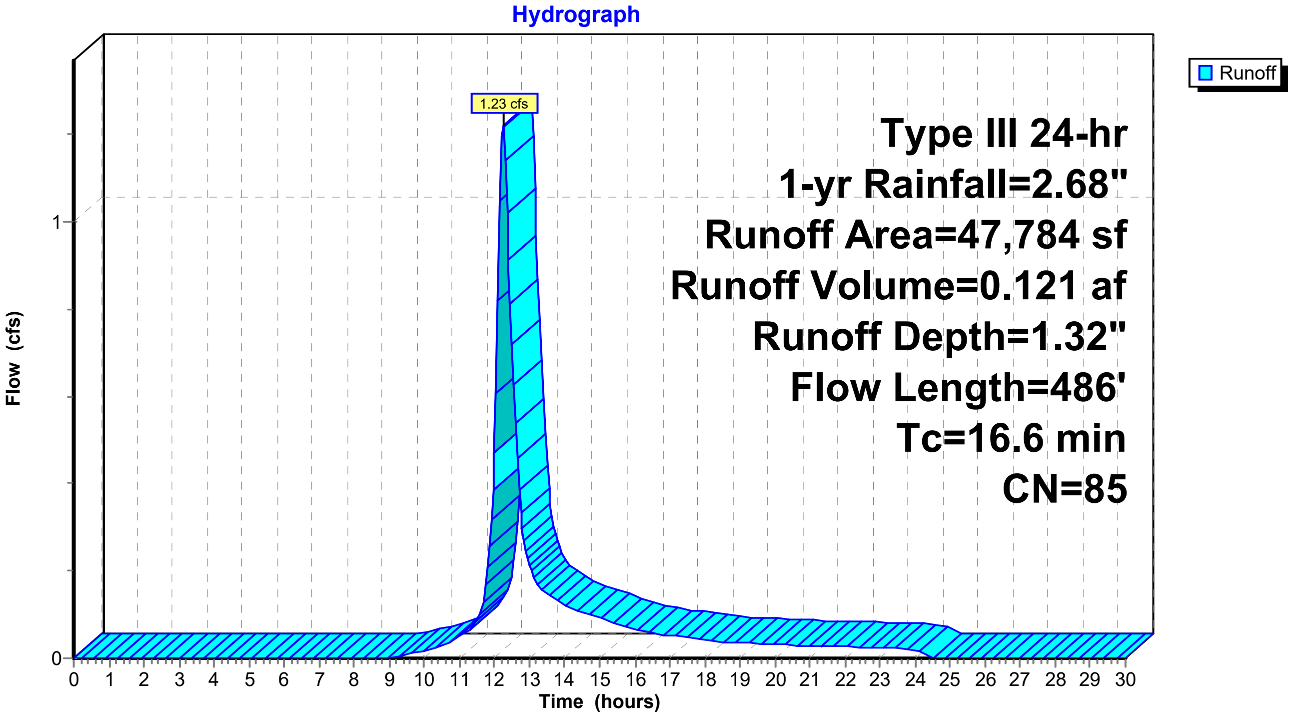
Runoff = 1.23 cfs @ 12.24 hrs, Volume= 0.121 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
13,095	98	Paved parking, HSG D
34,689	80	>75% Grass cover, Good, HSG D
47,784	85	Weighted Average
34,689		72.60% Pervious Area
13,095		27.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0520	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
1.6	386	0.0590	3.91		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	486	Total			

Subcatchment WS 3: WS-3



Summary for Subcatchment WS 4: WS-4

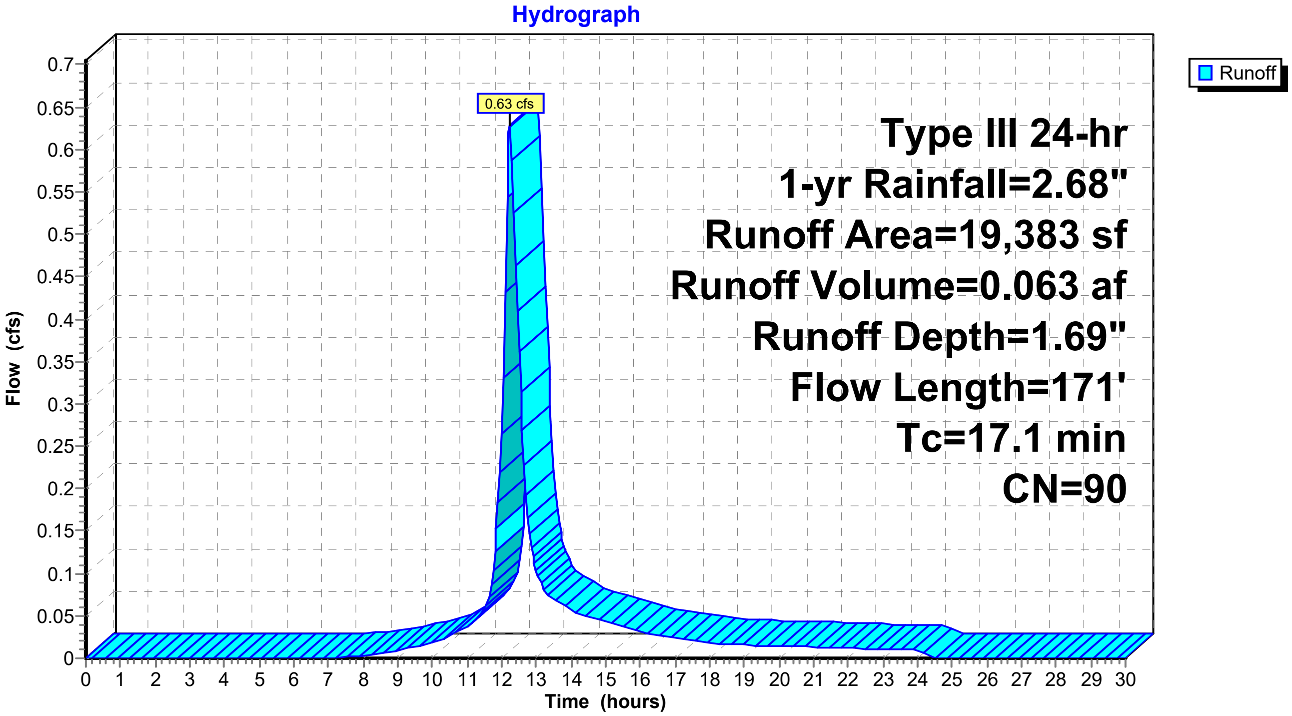
Runoff = 0.63 cfs @ 12.23 hrs, Volume= 0.063 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
10,863	98	Paved parking, HSG D
8,520	80	>75% Grass cover, Good, HSG D
19,383	90	Weighted Average
8,520		43.96% Pervious Area
10,863		56.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	100	0.0400	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.4	71	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.1	171	Total			

Subcatchment WS 4: WS-4



Summary for Subcatchment WS 5: WS-5

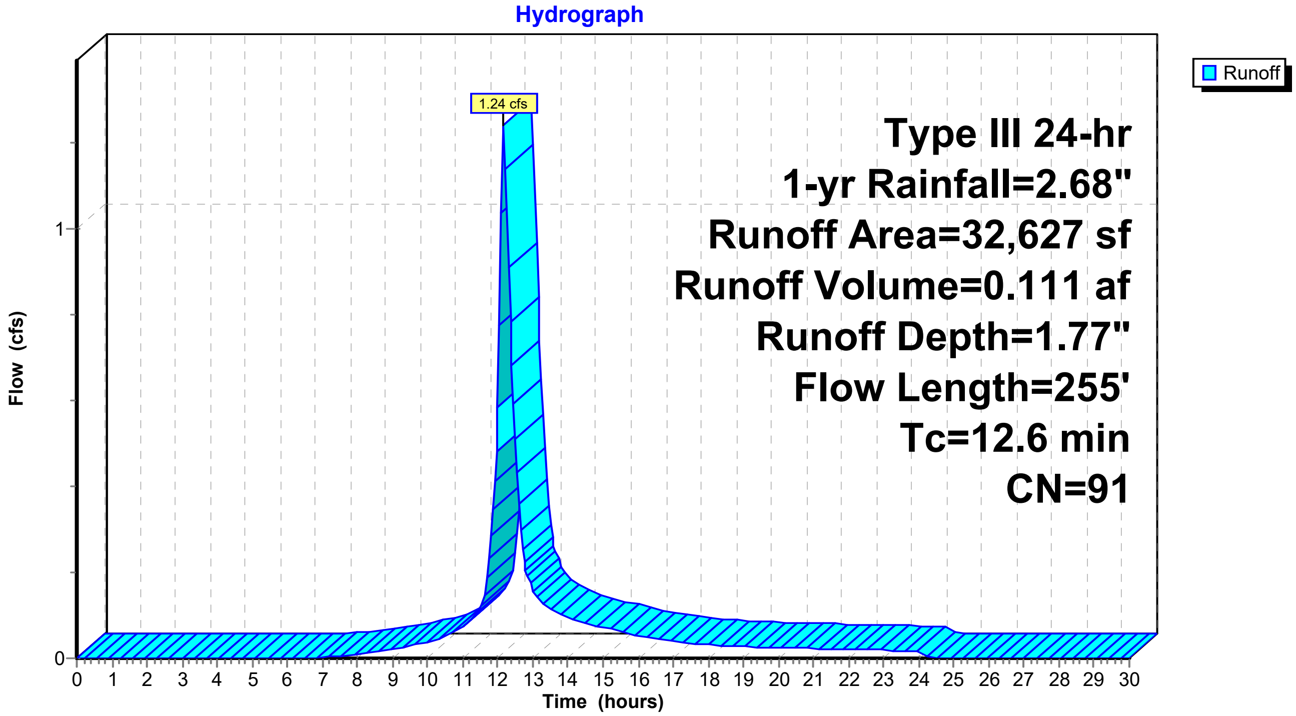
Runoff = 1.24 cfs @ 12.17 hrs, Volume= 0.111 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
19,247	98	Paved parking, HSG D
13,380	80	>75% Grass cover, Good, HSG D
32,627	91	Weighted Average
13,380		41.01% Pervious Area
19,247		58.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	70	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.6	255	Total			

Subcatchment WS 5: WS-5



Summary for Subcatchment WS 6: WS-6

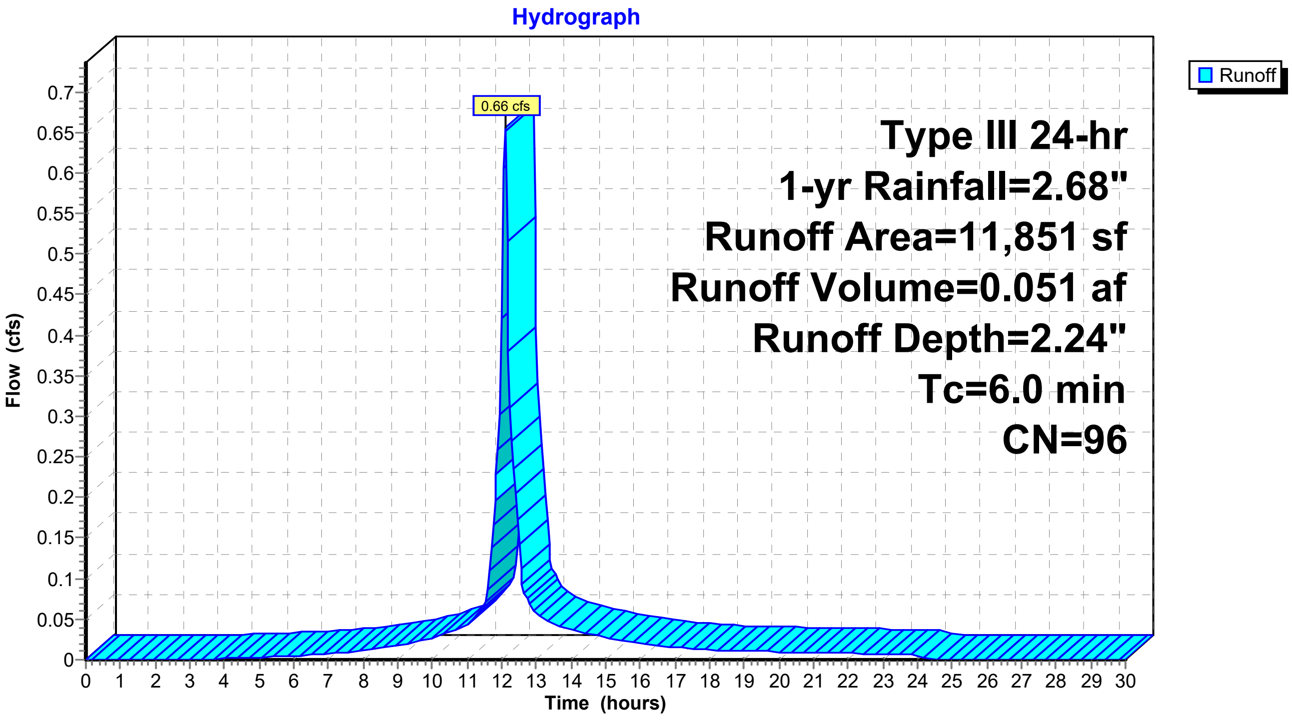
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
10,691	98	Paved parking, HSG D
1,160	80	>75% Grass cover, Good, HSG D
11,851	96	Weighted Average
1,160		9.79% Pervious Area
10,691		90.21% Impervious Area

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

Subcatchment WS 6: WS-6



Summary for Subcatchment WS 7: WS-7

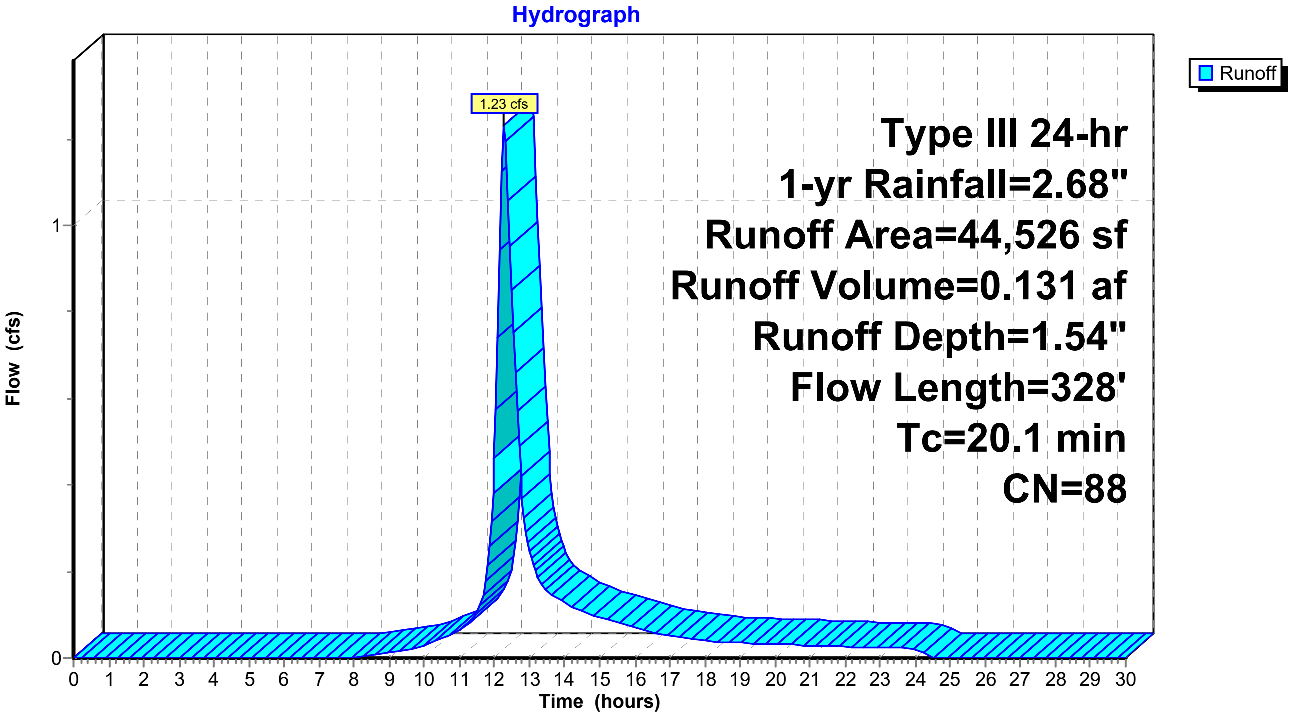
Runoff = 1.23 cfs @ 12.28 hrs, Volume= 0.131 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
19,660	98	Paved parking, HSG D
24,866	80	>75% Grass cover, Good, HSG D
44,526	88	Weighted Average
24,866		55.85% Pervious Area
19,660		44.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
1.2	228	0.0438	3.14		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
20.1	328	Total			

Subcatchment WS 7: WS-7



Summary for Subcatchment WS 8: WS-8

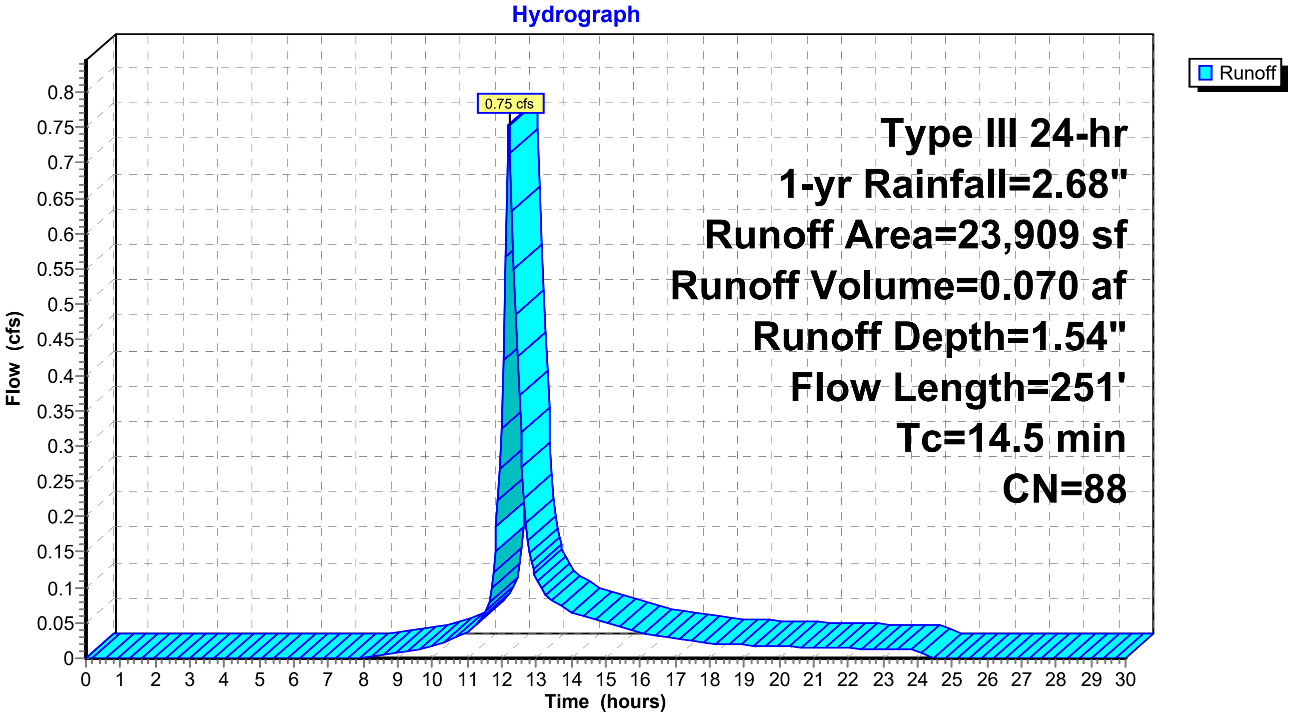
Runoff = 0.75 cfs @ 12.20 hrs, Volume= 0.070 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
10,069	98	Paved parking, HSG D
13,840	80	>75% Grass cover, Good, HSG D
23,909	88	Weighted Average
13,840		57.89% Pervious Area
10,069		42.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0230	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
0.9	151	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.5	251	Total			

Subcatchment WS 8: WS-8



Summary for Subcatchment WS 9: WS-9

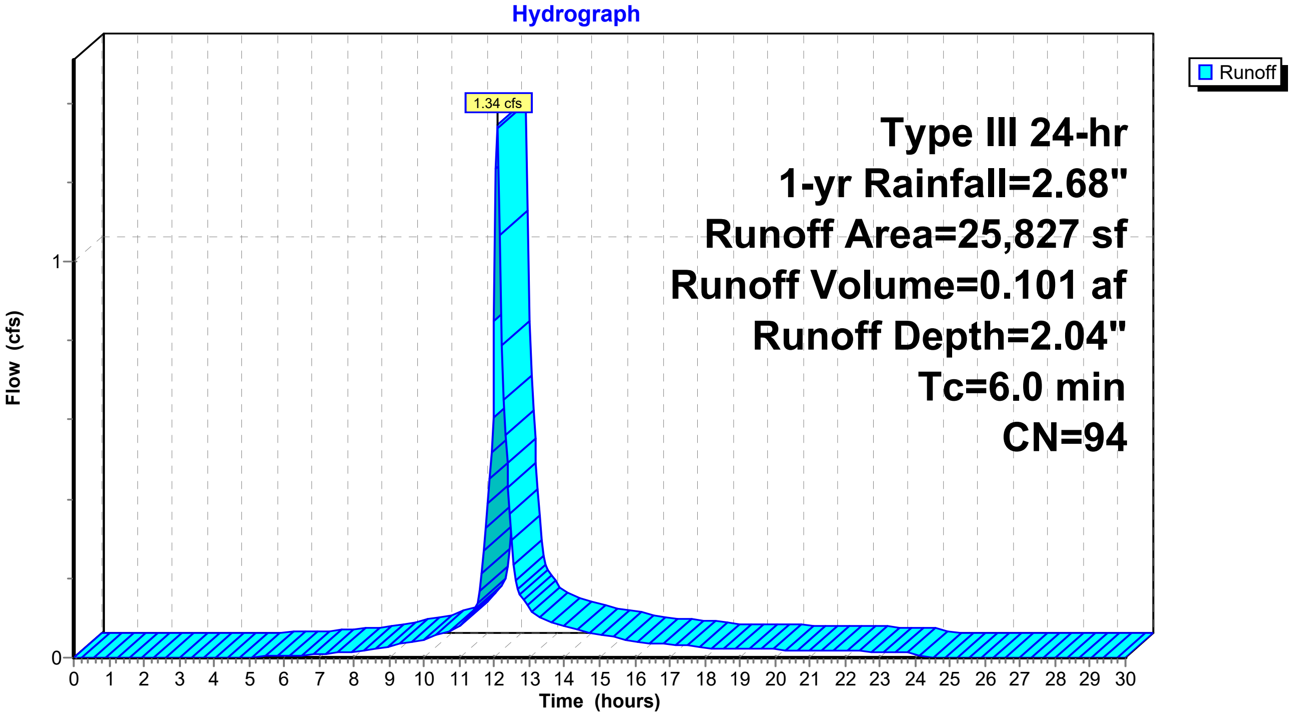
Runoff = 1.34 cfs @ 12.09 hrs, Volume= 0.101 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
20,174	98	Paved parking, HSG D
5,653	80	>75% Grass cover, Good, HSG D
25,827	94	Weighted Average
5,653		21.89% Pervious Area
20,174		78.11% Impervious Area

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

Subcatchment WS 9: WS-9



Summary for Subcatchment WS-1: WS-1

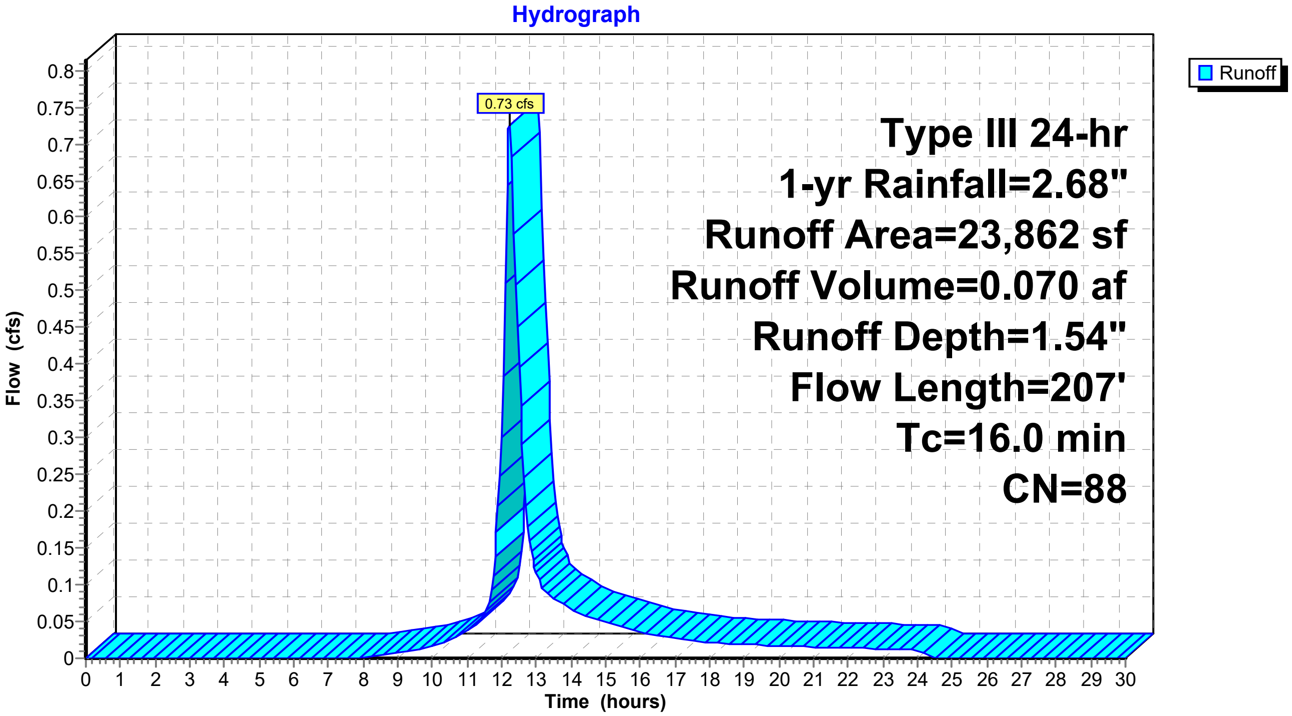
Runoff = 0.73 cfs @ 12.22 hrs, Volume= 0.070 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.68"

Area (sf)	CN	Description
10,610	98	Paved parking, HSG D
13,252	80	>75% Grass cover, Good, HSG D
23,862	88	Weighted Average
13,252		55.54% Pervious Area
10,610		44.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0500	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	107	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	207	Total			

Subcatchment WS-1: WS-1

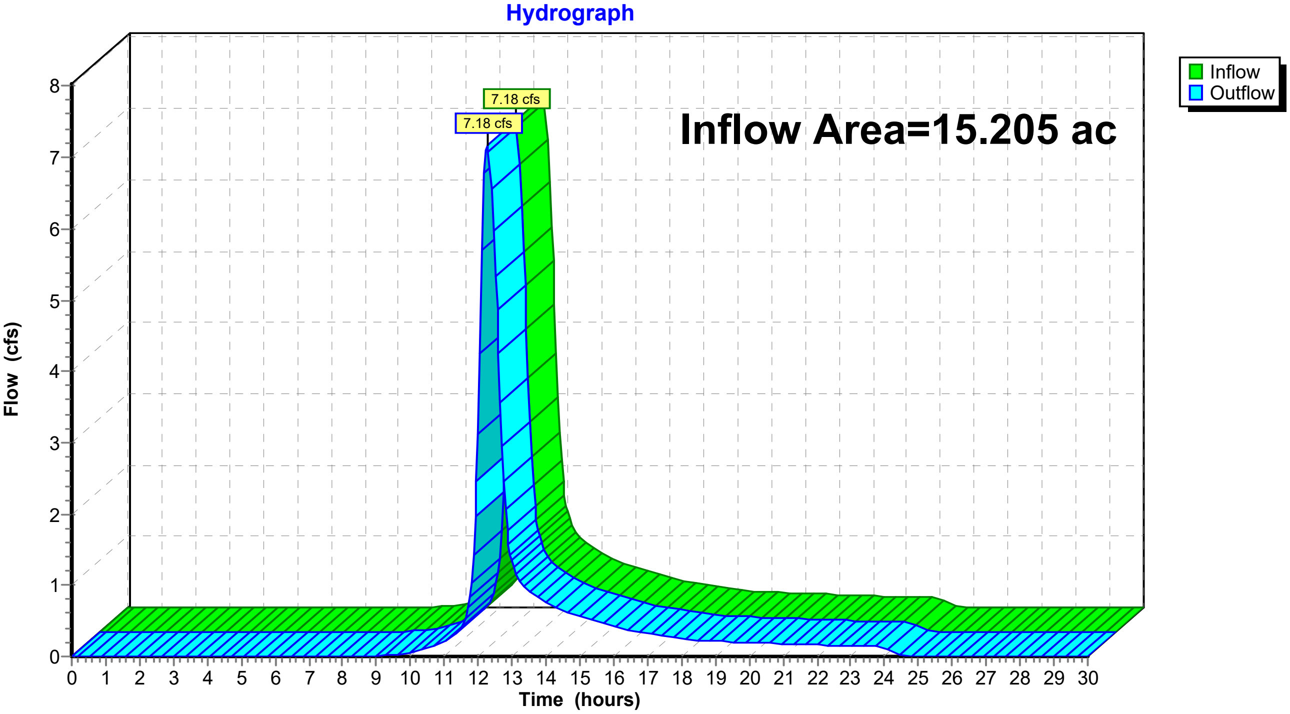


Summary for Reach 6R: DP1 2020

Inflow Area =	15.205 ac, 38.77% Impervious, Inflow Depth = 0.61" for 1-yr event			
Inflow =	7.18 cfs @	12.28 hrs, Volume=	0.767 af	
Outflow =	7.18 cfs @	12.28 hrs, Volume=	0.767 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach 6R: DP1 2020



Summary for Pond P-1: P-1 IN. POND

```
Inflow Area =      0.548 ac, 44.46% Impervious, Inflow Depth =  1.54"   for 1-yr event
Inflow     =      0.73 cfs @  12.22 hrs, Volume=         0.070 af
Outflow    =      0.31 cfs @  12.58 hrs, Volume=         0.070 af, Atten= 57%, Lag= 21.6 min
Discarded  =      0.31 cfs @  12.58 hrs, Volume=         0.070 af
Primary    =      0.00 cfs @   0.00 hrs, Volume=         0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 730.54' @ 12.58 hrs   Surf.Area= 1,123 sf   Storage= 536 cf

Plug-Flow detention time= 10.3 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 10.3 min ( 842.1 - 831.8 )
```

Volume	Invert	Avail.Storage	Storage Description
#1	730.00'	4,836 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

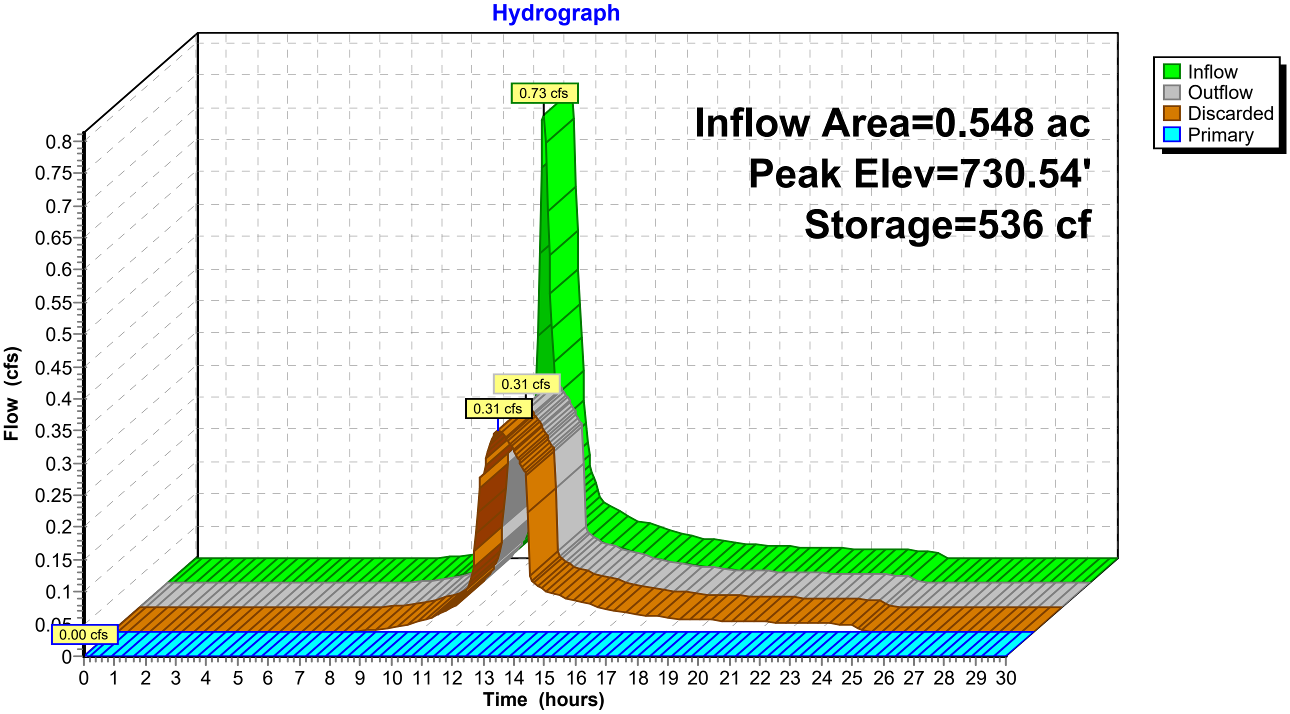
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
730.00	844	0	0
733.00	2,380	4,836	4,836

Device	Routing	Invert	Outlet Devices
#1	Primary	731.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	730.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.31 cfs @ 12.58 hrs HW=730.54' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=730.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond P-1: P-1 IN. POND



Summary for Pond P-10: P-10 SUB. IN

```
Inflow Area =      0.969 ac, 81.50% Impervious, Inflow Depth =  2.14"   for 1-yr event
Inflow     =     1.82 cfs @  12.18 hrs, Volume=         0.173 af
Outflow    =     0.66 cfs @  11.95 hrs, Volume=         0.173 af, Atten= 64%, Lag= 0.0 min
Discarded  =     0.66 cfs @  11.95 hrs, Volume=         0.173 af
Primary    =     0.00 cfs @   0.00 hrs, Volume=         0.000 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 719.66' @ 12.55 hrs Surf.Area= 2,389 sf Storage= 1,265 cf

Plug-Flow detention time= 9.3 min calculated for 0.172 af (100% of inflow)
Center-of-Mass det. time= 9.3 min (802.8 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	2,720 cf	**11.00'W x 217.22'L x 4.00'H Field A** 9,558 cf Overall - 2,756 cf Embedded = 6,801 cf x 40.0% Voids
#2A	719.50'	2,756 cf	**ADS_StormTech SC-740 +Cap** x 60 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 60 Chambers in 2 Rows
		5,477 cf	Total Available Storage

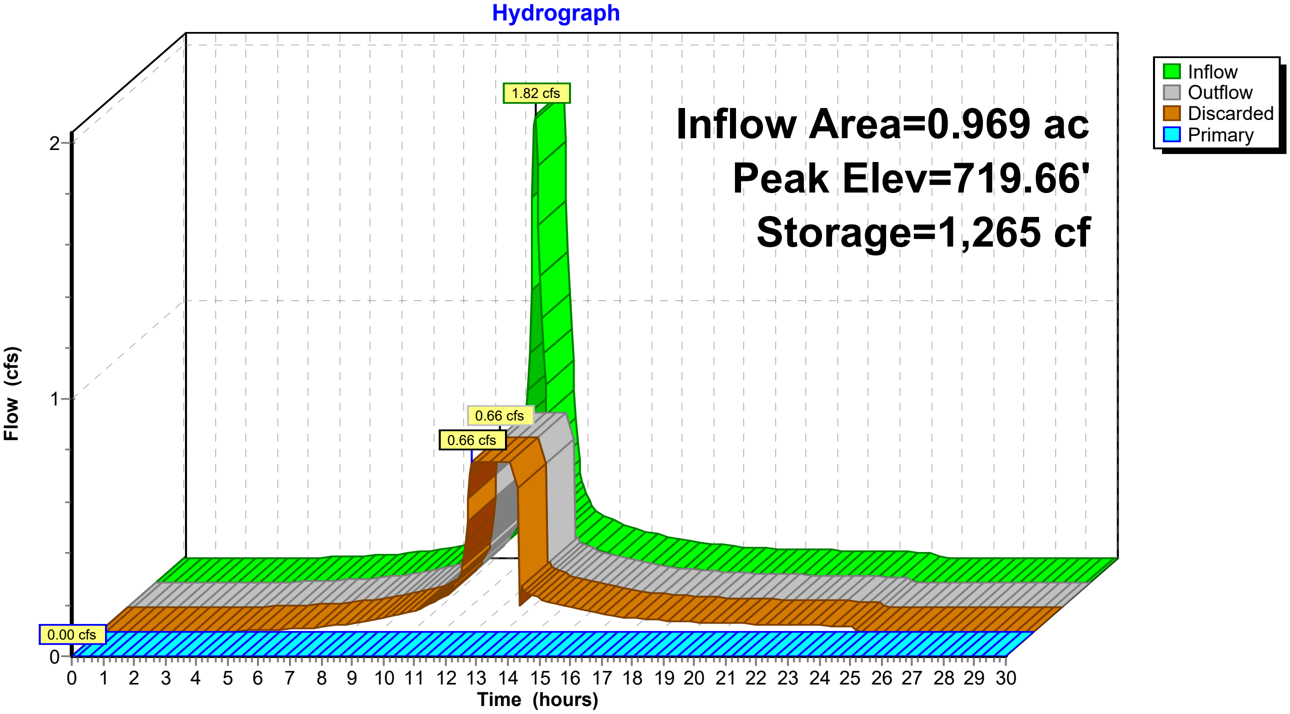
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.75'	**20.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

```
Discarded OutFlow Max=0.66 cfs @ 11.95 hrs HW=718.55'  (Free Discharge)
└─3=Exfiltration (Exfiltration Controls 0.66 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=718.50'  (Free Discharge)
├─1=Broad-Crested Rectangular Weir( Controls 0.00 cfs)
└─2=Orifice/Grate ( Controls 0.00 cfs)
```

Pond P-10: P-10 SUB. IN



Summary for Pond P-2: P-2 SUB. IN

Inflow Area = 2.504 ac, 70.63% Impervious, Inflow Depth = 1.95" for 1-yr event
Inflow = 4.28 cfs @ 12.20 hrs, Volume= 0.407 af
Outflow = 2.50 cfs @ 12.42 hrs, Volume= 0.407 af, Atten= 42%, Lag= 13.6 min
Discarded = 1.28 cfs @ 11.90 hrs, Volume= 0.370 af
Primary = 1.22 cfs @ 12.42 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 719.75' @ 12.42 hrs Surf.Area= 4,594 sf Storage= 2,803 cf

Plug-Flow detention time= 8.9 min calculated for 0.406 af (100% of inflow)
Center-of-Mass det. time= 8.9 min (815.8 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	5,035 cf	**30.00'W x 153.14'L x 4.00'H Field A** 18,376 cf Overall - 5,788 cf Embedded = 12,588 cf x 40.0% Voids
#2A	719.50'	5,788 cf	**ADS_StormTech SC-740 +Cap** x 126 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 126 Chambers in 6 Rows
		10,824 cf	Total Available Storage

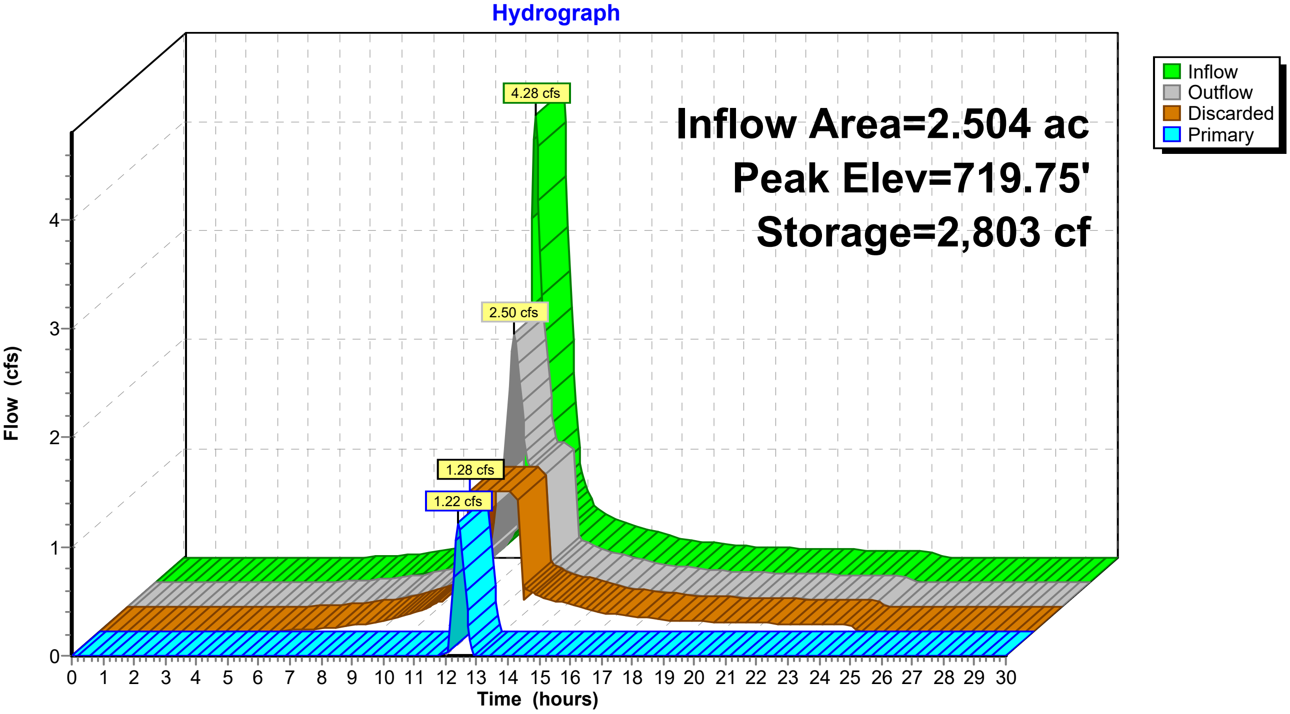
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.50'	**36.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.90 hrs HW=718.55' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.28 cfs)

Primary OutFlow Max=1.20 cfs @ 12.42 hrs HW=719.75' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 1.20 cfs @ 1.60 fps)

Pond P-2: P-2 SUB. IN



Summary for Pond P-3: P-3 SUB. IN

```
Inflow Area =      1.097 ac,  27.40% Impervious,  Inflow Depth =   1.32"    for  1-yr event
Inflow      =     1.23 cfs @  12.24 hrs,  Volume=          0.121 af
Outflow     =     0.56 cfs @  12.61 hrs,  Volume=          0.121 af,  Atten= 54%,  Lag= 22.2 min
Discarded   =     0.27 cfs @  11.90 hrs,  Volume=          0.116 af
Primary     =     0.29 cfs @  12.61 hrs,  Volume=          0.005 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.09' @ 12.61 hrs Surf.Area= 963 sf Storage= 1,335 cf

Plug-Flow detention time= 31.0 min calculated for 0.121 af (100% of inflow)
Center-of-Mass det. time= 31.0 min (875.1 - 844.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	724.00'	907 cf	**30.00'W x 32.10'L x 3.50'H Field A** 3,370 cf Overall - 1,103 cf Embedded = 2,268 cf x 40.0% Voids
#2A	724.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 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 24 Chambers in 6 Rows
		2,010 cf	Total Available Storage

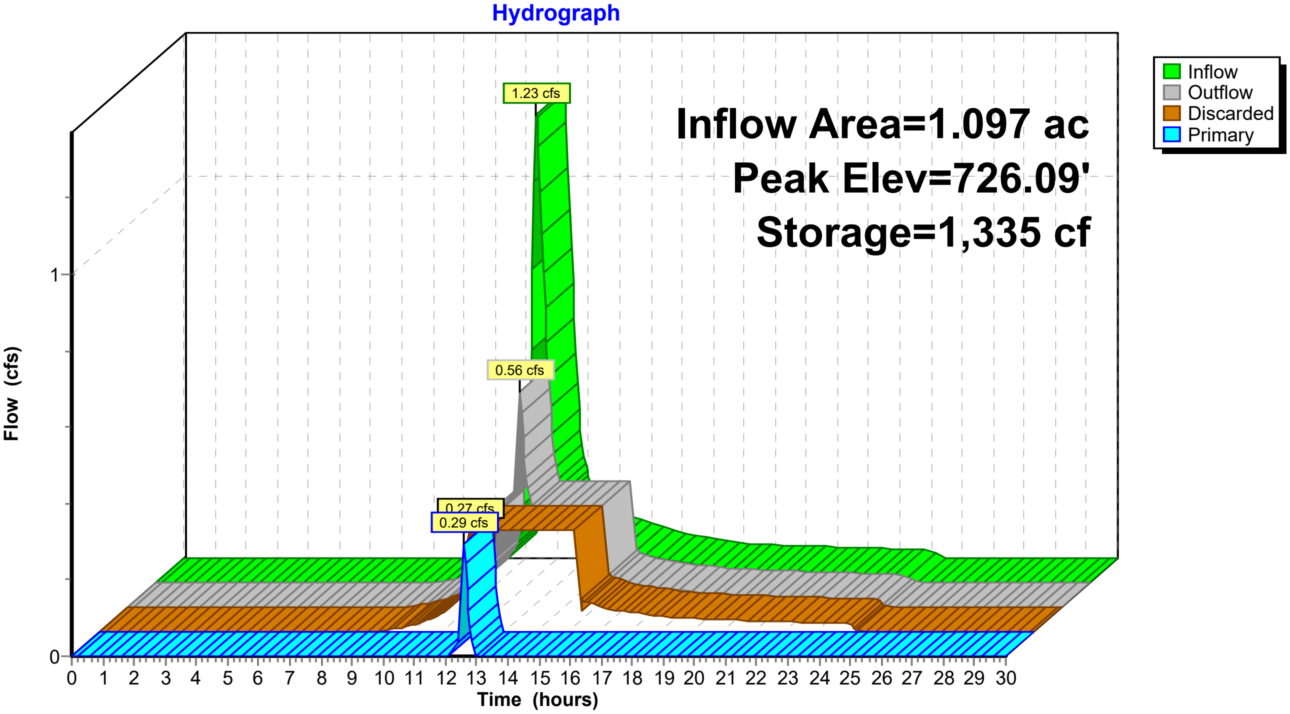
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	726.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	724.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.90 hrs HW=724.05' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.29 cfs @ 12.61 hrs HW=726.09' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.29 cfs @ 0.83 fps)

Pond P-3: P-3 SUB. IN



Summary for Pond P-4: P-4 SUB. IN

Inflow Area = 0.445 ac, 56.04% Impervious, Inflow Depth = 1.69" for 1-yr event
Inflow = 0.63 cfs @ 12.23 hrs, Volume= 0.063 af
Outflow = 0.23 cfs @ 12.00 hrs, Volume= 0.063 af, Atten= 63%, Lag= 0.0 min
Discarded = 0.23 cfs @ 12.00 hrs, Volume= 0.063 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 711.50' @ 12.64 hrs Surf.Area= 842 sf Storage= 498 cf

Plug-Flow detention time= 11.1 min calculated for 0.063 af (100% of inflow)
Center-of-Mass det. time= 11.1 min (835.3 - 824.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.50'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	711.00'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 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 21 Chambers in 3 Rows
		1,758 cf	Total Available Storage

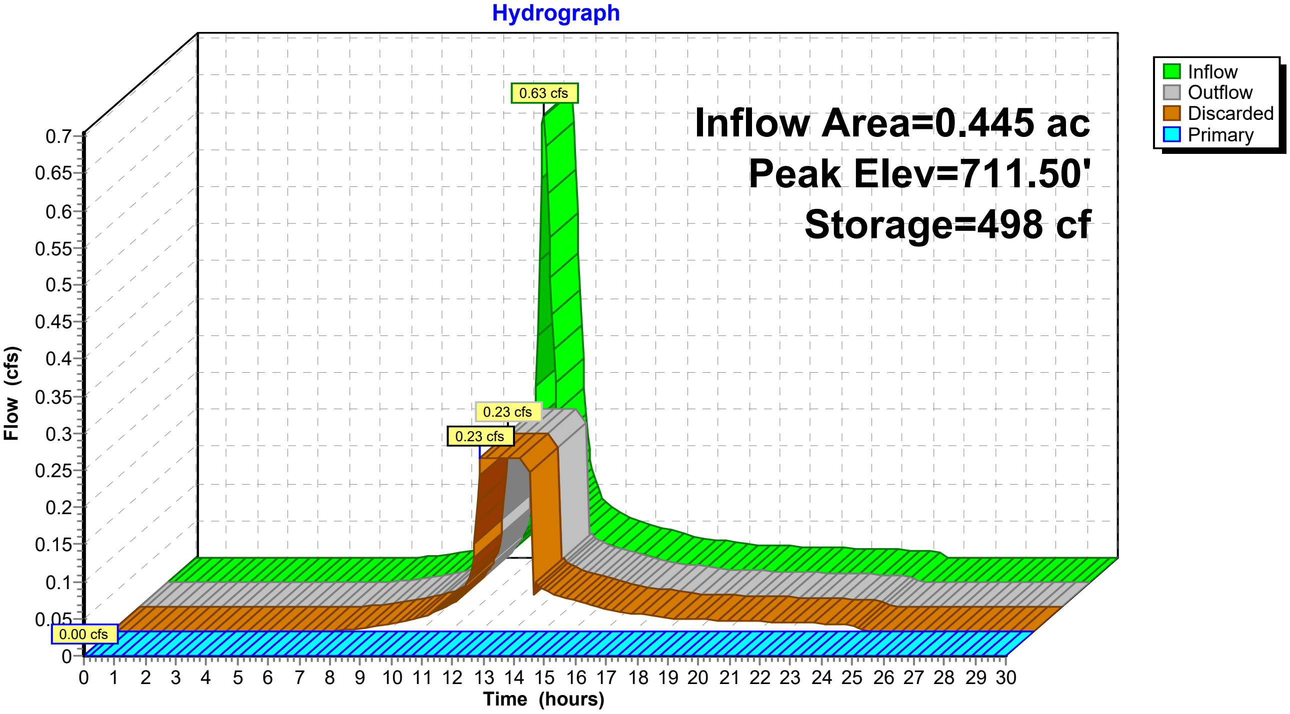
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	710.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.23 cfs @ 12.00 hrs HW=710.54' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=710.50' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-4: P-4 SUB. IN



Summary for Pond P-5: P-5 SUB. IN

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Inflow Area =         0.749 ac,  58.99% Impervious,  Inflow Depth =   1.77"    for  1-yr event
Inflow       =       1.24 cfs @   12.17 hrs,  Volume=           0.111 af
Outflow      =       0.39 cfs @   11.90 hrs,  Volume=           0.111 af,  Atten= 69%,  Lag= 0.0 min
Discarded  =         0.39 cfs @   11.90 hrs,  Volume=           0.111 af
Primary      =       0.00 cfs @    0.00 hrs,  Volume=           0.000 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 711.37' @ 12.58 hrs   Surf.Area= 1,390 sf   Storage= 974 cf

Plug-Flow detention time= 13.3 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 13.3 min (828.7 - 815.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.00'	1,563 cf	**30.00'W x 46.34'L x 4.00'H Field A** 5,560 cf Overall - 1,654 cf Embedded = 3,907 cf x 40.0% Voids
#2A	711.00'	1,654 cf	**ADS_StormTech SC-740 +Cap** x 36 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 36 Chambers in 6 Rows
		3,216 cf	Total Available Storage

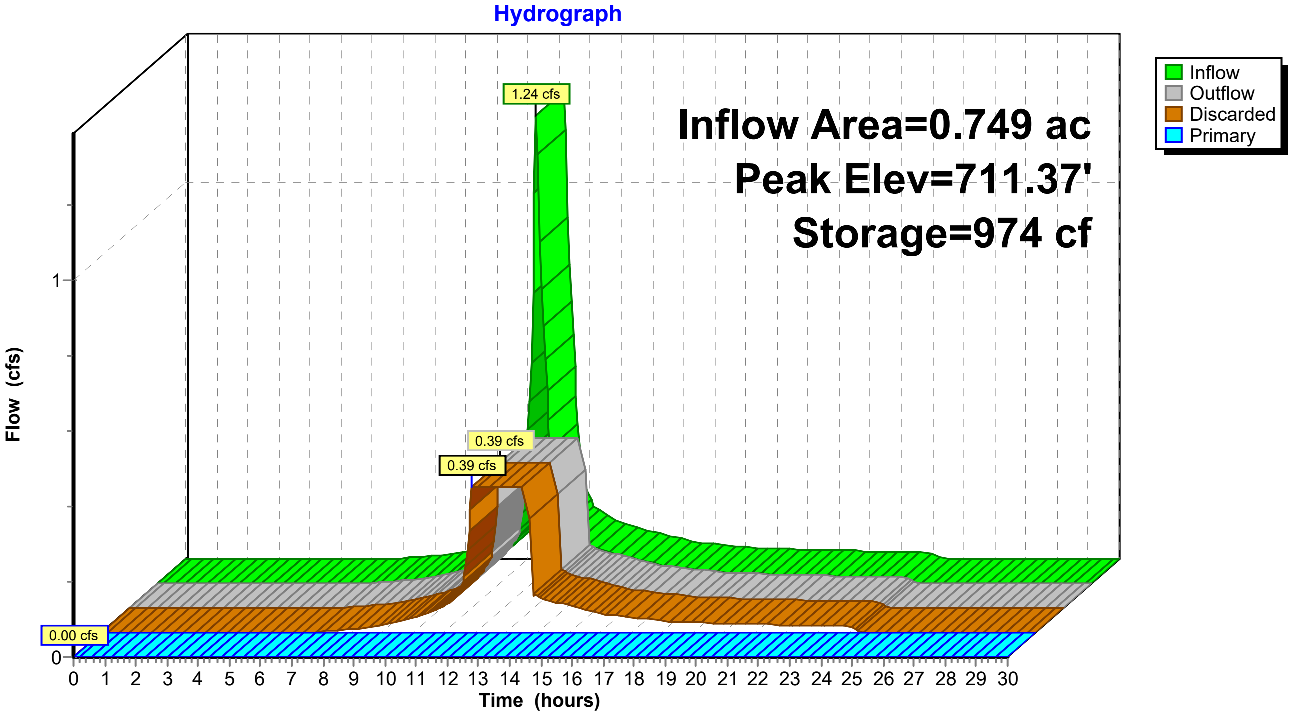
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	711.75'	**18.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	710.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.39 cfs @ 11.90 hrs HW=710.04' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=710.00' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond P-5: P-5 SUB. IN



Summary for Pond P-6: P-6 SUB. IN

Inflow Area = 0.272 ac, 90.21% Impervious, Inflow Depth = 2.24" for 1-yr event
Inflow = 0.66 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.27 cfs @ 11.95 hrs, Volume= 0.051 af, Atten= 60%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.95 hrs, Volume= 0.051 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 709.08' @ 12.31 hrs Surf.Area= 954 sf Storage= 254 cf

Plug-Flow detention time= 4.3 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (783.5 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	708.50'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A**
			3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	709.00'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 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
			24 Chambers in 3 Rows
		1,997 cf	Total Available Storage

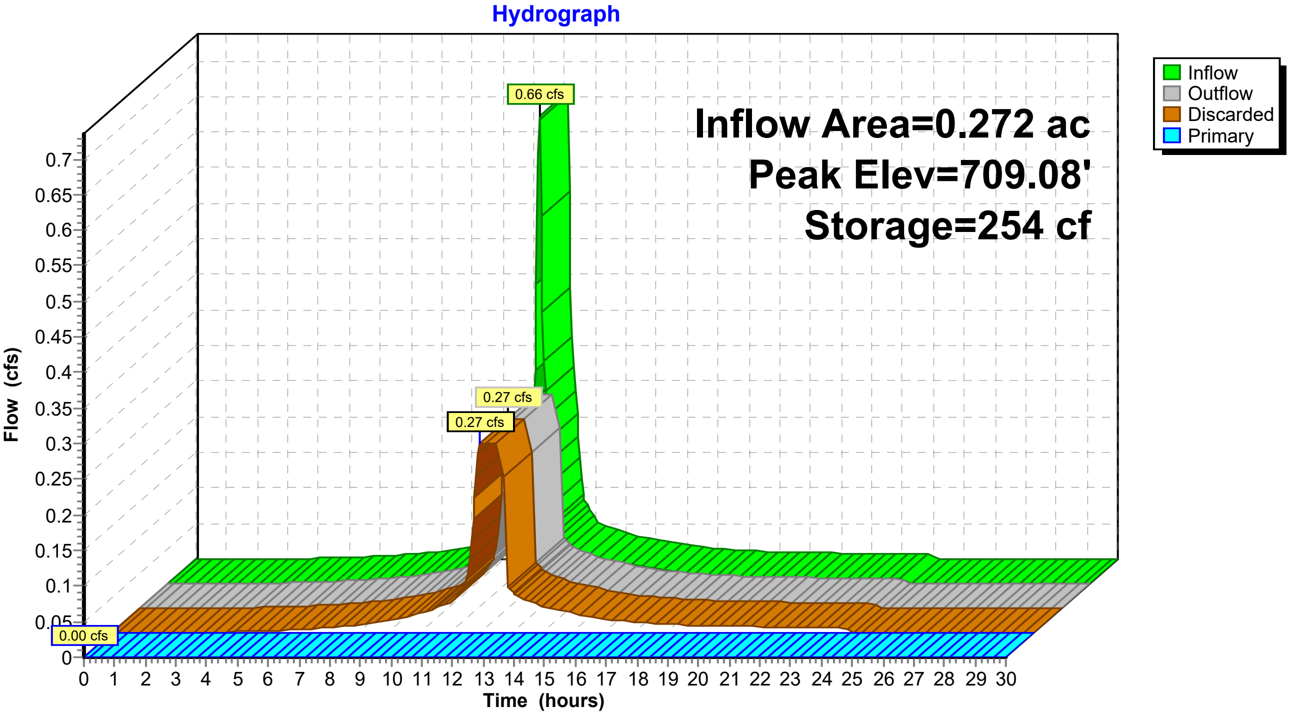
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	711.30'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	708.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.95 hrs HW=708.54' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=708.50' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-6: P-6 SUB. IN



Summary for Pond P-7: P-7 IN. POND

Inflow Area = 1.022 ac, 44.15% Impervious, Inflow Depth = 1.54" for 1-yr event
Inflow = 1.23 cfs @ 12.28 hrs, Volume= 0.131 af
Outflow = 0.35 cfs @ 12.82 hrs, Volume= 0.131 af, Atten= 71%, Lag= 32.4 min
Discarded = 0.35 cfs @ 12.82 hrs, Volume= 0.131 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 701.48' @ 12.82 hrs Surf.Area= 1,274 sf Storage= 1,568 cf

Plug-Flow detention time= 32.3 min calculated for 0.131 af (100% of inflow)
Center-of-Mass det. time= 32.3 min (867.9 - 835.6)

Volume	Invert	Avail.Storage	Storage Description
#1	700.00'	5,700 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

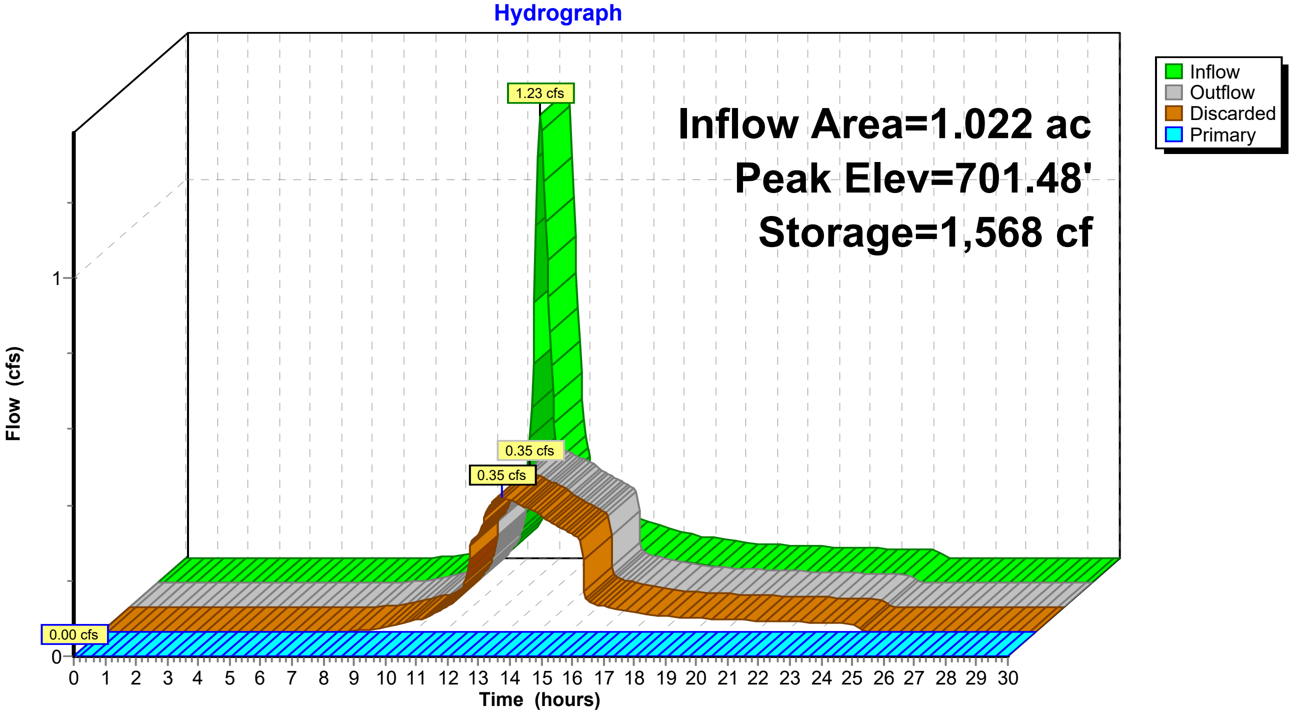
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
700.00	850	0	0
704.00	2,000	5,700	5,700

Device	Routing	Invert	Outlet Devices
#1	Primary	702.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	700.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.35 cfs @ 12.82 hrs HW=701.48' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=700.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-7: P-7 IN. POND



Summary for Pond P-8: P-8 IN. POND

Inflow Area = 0.549 ac, 42.11% Impervious, Inflow Depth = 1.54" for 1-yr event
Inflow = 0.75 cfs @ 12.20 hrs, Volume= 0.070 af
Outflow = 0.28 cfs @ 12.59 hrs, Volume= 0.070 af, Atten= 62%, Lag= 23.0 min
Discarded = 0.28 cfs @ 12.59 hrs, Volume= 0.070 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 730.76' @ 12.59 hrs Surf.Area= 1,019 sf Storage= 639 cf

Plug-Flow detention time= 14.7 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 14.6 min (845.1 - 830.4)

Volume	Invert	Avail.Storage	Storage Description
#1	730.00'	6,864 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

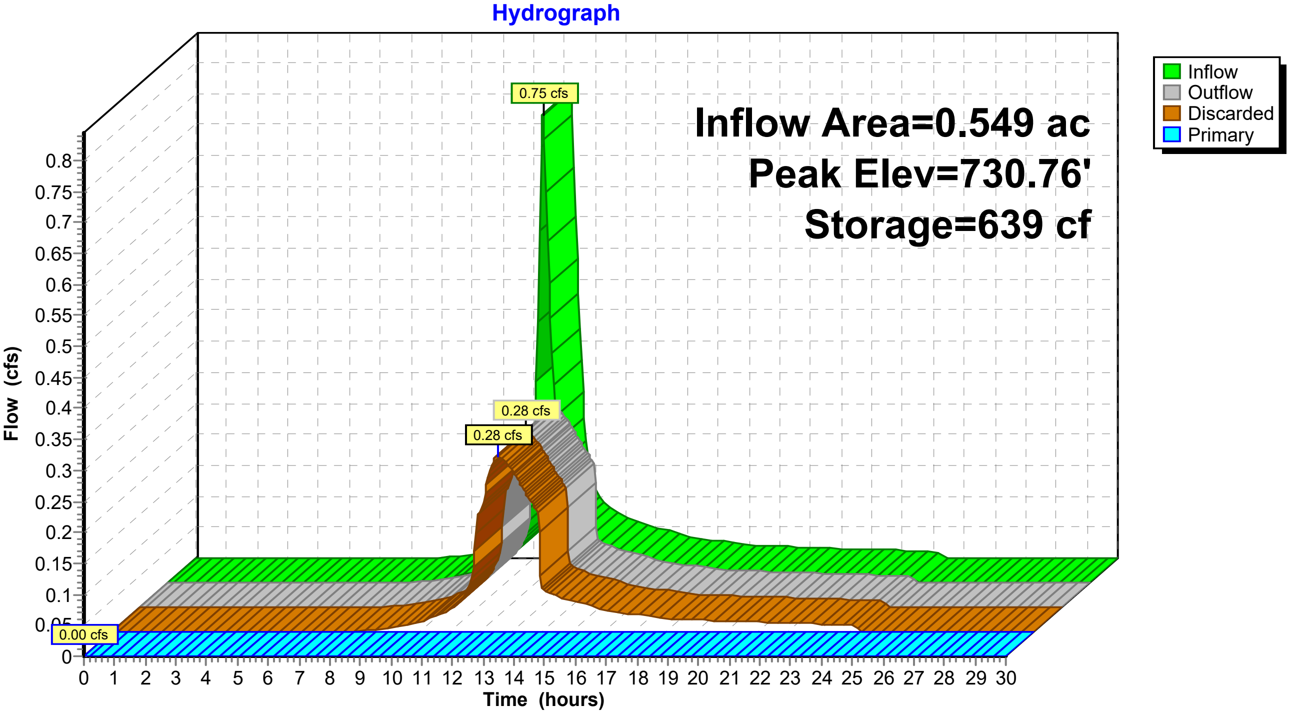
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
730.00	664	0	0
732.00	1,600	2,264	2,264
734.00	3,000	4,600	6,864

Device	Routing	Invert	Outlet Devices
#1	Primary	731.75'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	730.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.28 cfs @ 12.59 hrs HW=730.76' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=730.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond P-8: P-8 IN. POND



Summary for Pond P-9: P-9 BIO. POND

Inflow Area = 0.593 ac, 78.11% Impervious, Inflow Depth = 2.04" for 1-yr event
Inflow = 1.34 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 1.28 cfs @ 12.12 hrs, Volume= 0.079 af, Atten= 5%, Lag= 1.6 min
Primary = 1.28 cfs @ 12.12 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.59' @ 12.12 hrs Surf.Area= 2,097 sf Storage= 1,156 cf

Plug-Flow detention time= 130.5 min calculated for 0.079 af (78% of inflow)
Center-of-Mass det. time= 51.4 min (844.5 - 793.1)

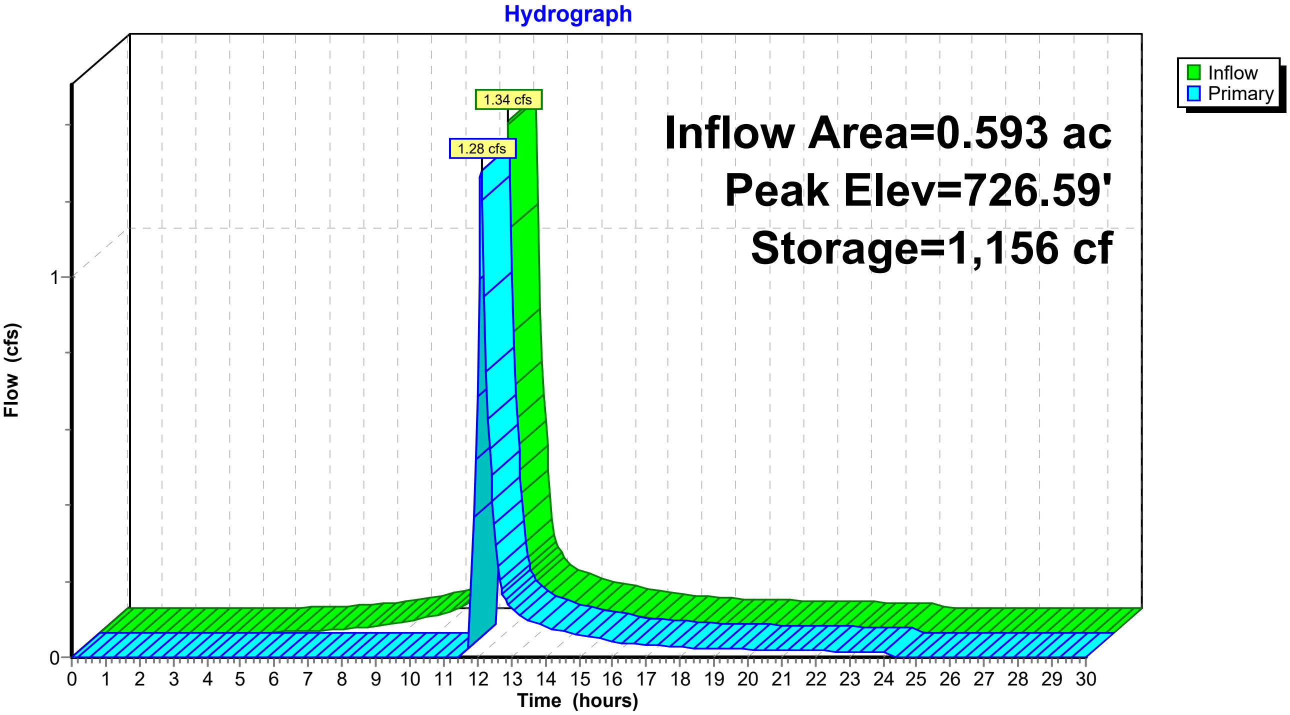
Volume	Invert	Avail.Storage	Storage Description
#1	726.00'	4,600 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
726.00	1,800	0	0
728.00	2,800	4,600	4,600

Device	Routing	Invert	Outlet Devices
#1	Primary	726.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.24 cfs @ 12.12 hrs HW=726.59' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.24 cfs @ 0.85 fps)

Pond P-9: P-9 BIO. POND



Summary for Subcatchment 3S: Existing WS E1

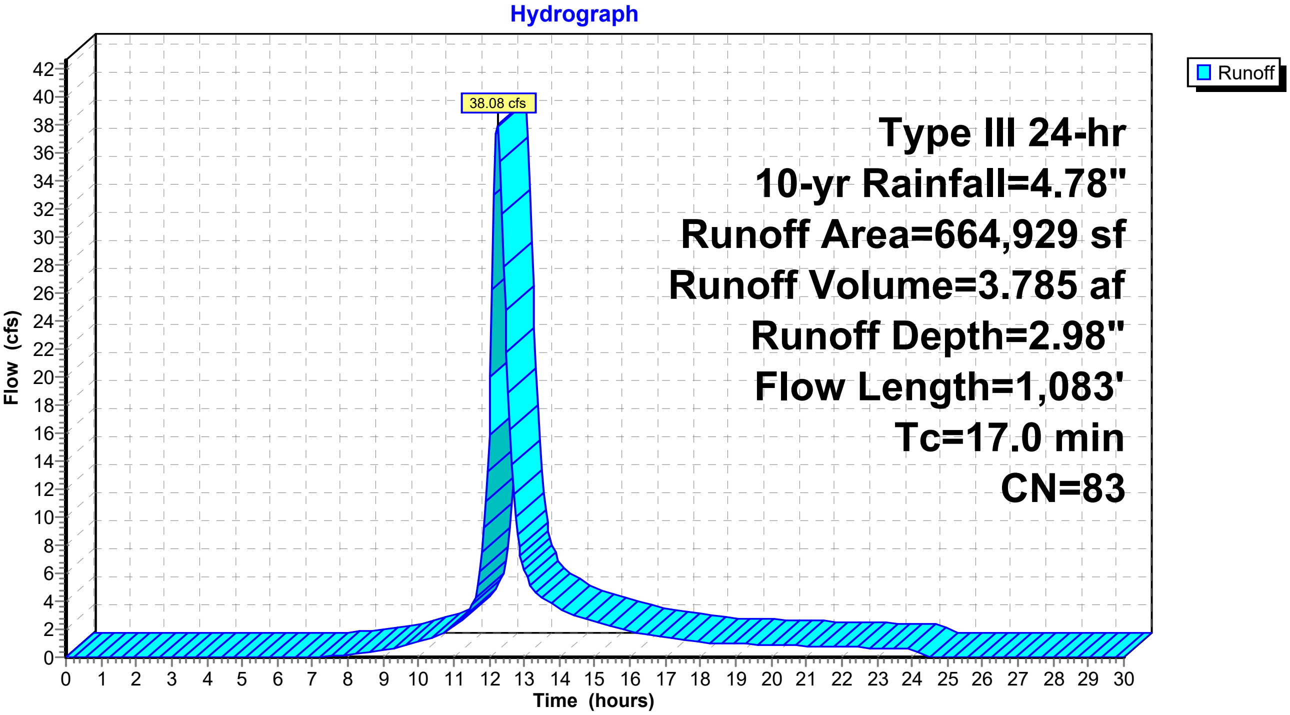
Runoff = 38.08 cfs @ 12.23 hrs, Volume= 3.785 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
42,999	98	Paved parking, HSG D
24,491	89	<50% Grass cover, Poor, HSG D
96,069	78	Meadow, non-grazed, HSG D
24,245	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
397,885	83	Woods, Poor, HSG D
69,348	77	Woods, Poor, HSG C
664,929	83	Weighted Average
621,930		93.53% Pervious Area
42,999		6.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
5.5	497	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	70	0.0620	15.49	19.01	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
17.0	1,083	Total			

Subcatchment 3S: Existing WS E1



Summary for Subcatchment 7S: WSD C

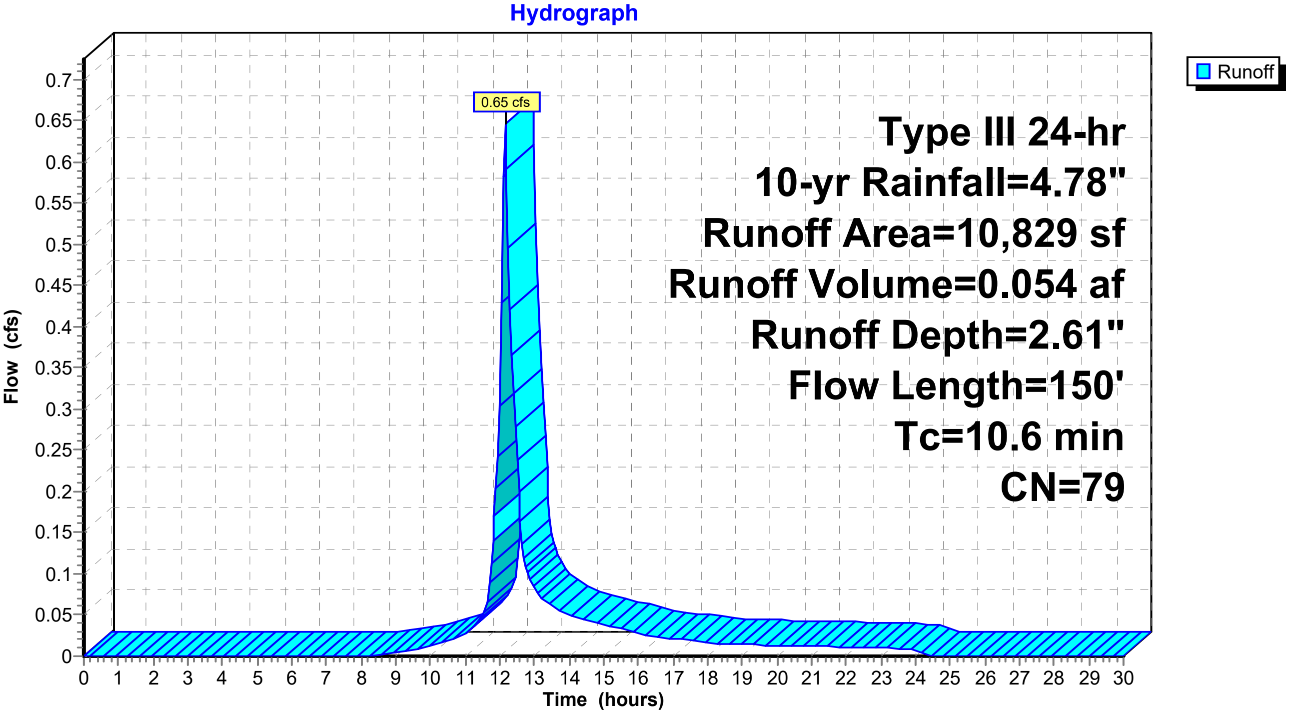
Runoff = 0.65 cfs @ 12.15 hrs, Volume= 0.054 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
2,167	83	Woods, Poor, HSG D
4,412	77	Woods, Poor, HSG C
2,847	80	>75% Grass cover, Good, HSG D
1,403	74	>75% Grass cover, Good, HSG C
10,829	79	Weighted Average
10,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.1200	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
0.1	50	0.3330	9.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.6	150	Total			

Subcatchment 7S: WSD C



Summary for Subcatchment 8S: WSD B

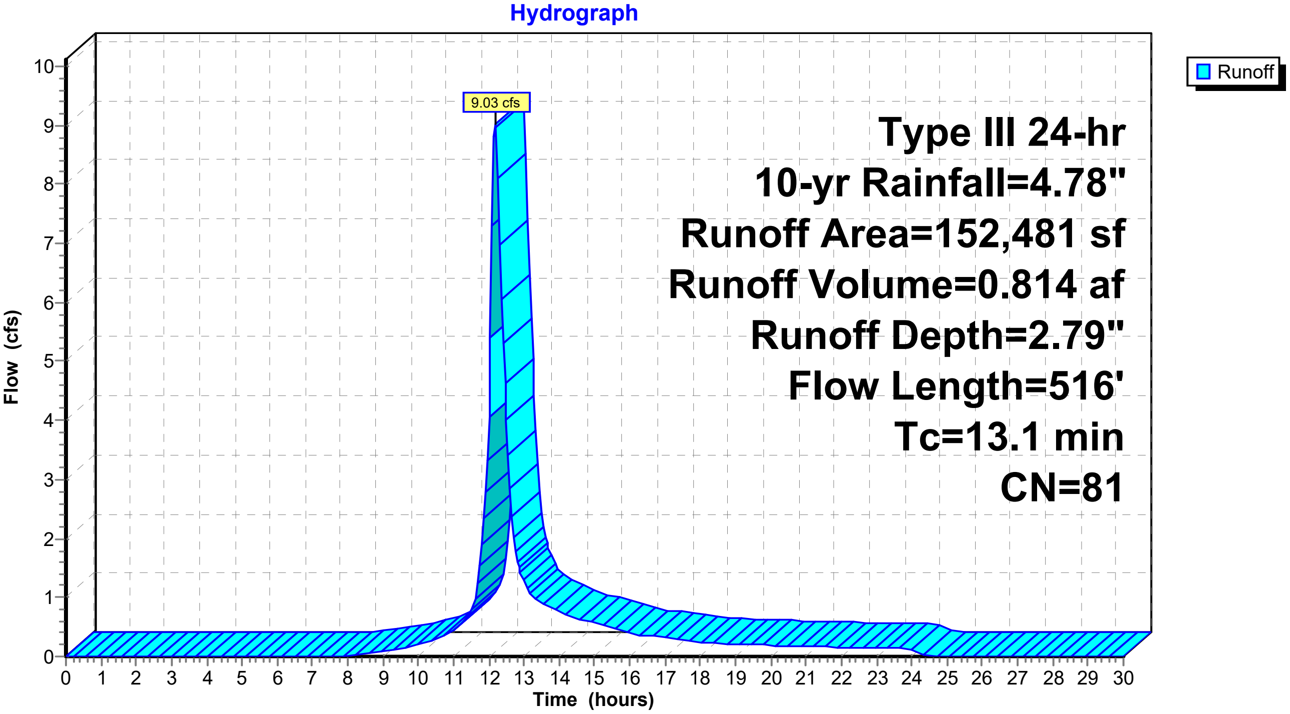
Runoff = 9.03 cfs @ 12.18 hrs, Volume= 0.814 af, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
1,974	98	Paved parking, HSG D
51,706	80	>75% Grass cover, Good, HSG D
6,862	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
61,255	83	Woods, Poor, HSG D
20,792	77	Woods, Poor, HSG C
152,481	81	Weighted Average
150,507		98.71% Pervious Area
1,974		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.1000	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.1	516	Total			

Subcatchment 8S: WSD B



Summary for Subcatchment 9S: WSD A

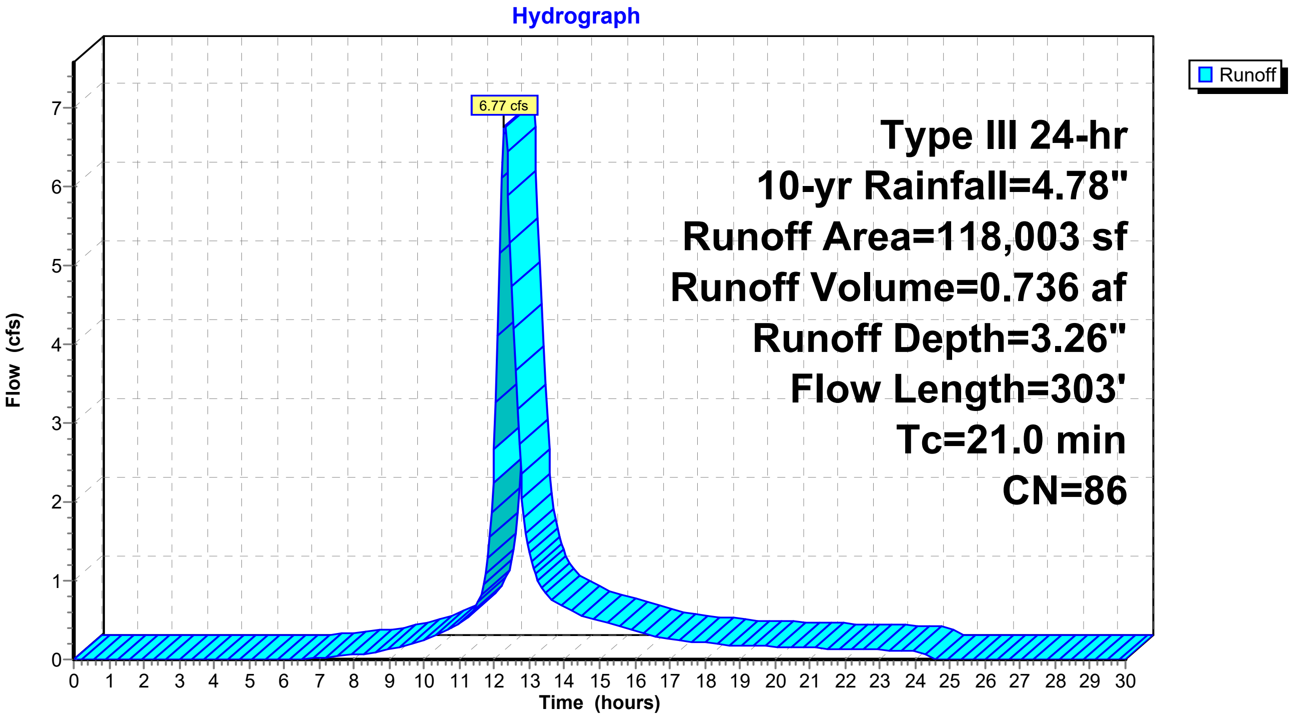
Runoff = 6.77 cfs @ 12.28 hrs, Volume= 0.736 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
29,011	98	Paved parking, HSG D
46,783	83	Woods, Poor, HSG D
17,380	83	Brush, Poor, HSG D
24,829	80	>75% Grass cover, Good, HSG D
118,003	86	Weighted Average
88,992		75.42% Pervious Area
29,011		24.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.1000	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.17"
1.3	203	0.0290	2.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
21.0	303	Total			

Subcatchment 9S: WSD A



Summary for Subcatchment WS 10: WS-10

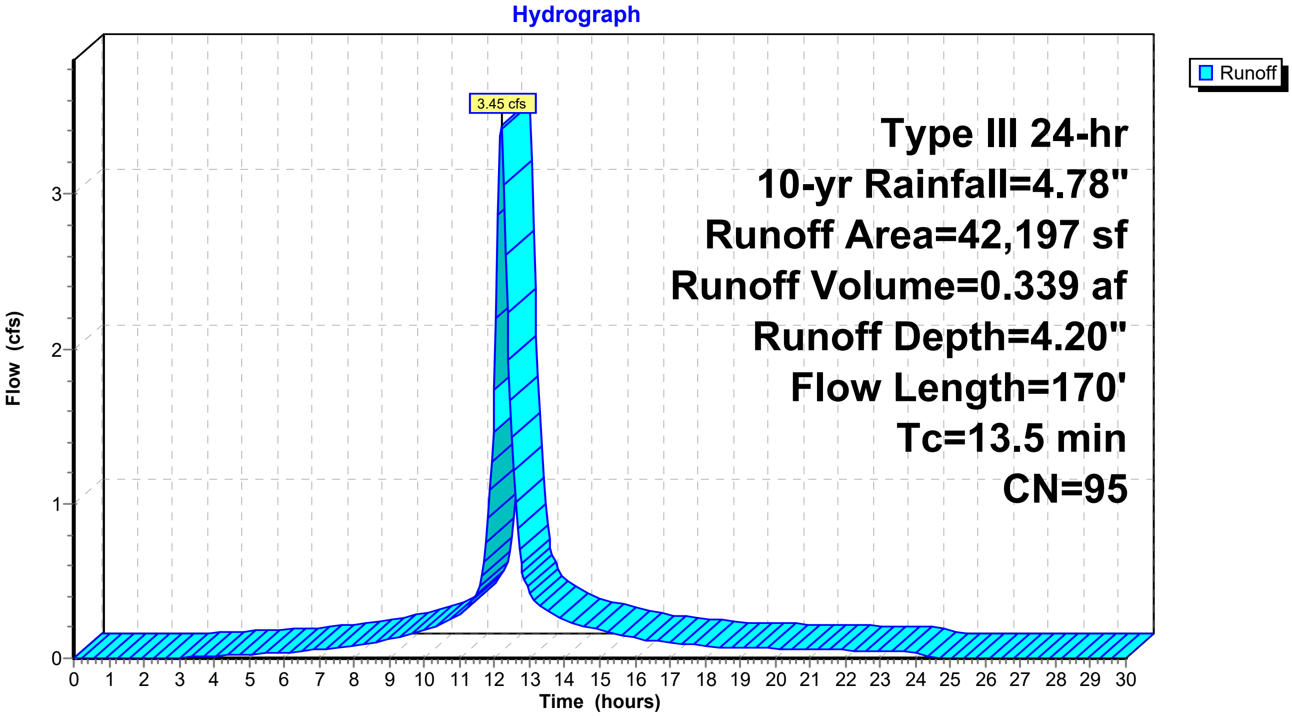
Runoff = 3.45 cfs @ 12.18 hrs, Volume= 0.339 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
34,390	98	Paved parking, HSG D
7,807	80	>75% Grass cover, Good, HSG D
42,197	95	Weighted Average
7,807		18.50% Pervious Area
34,390		81.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	80	0.0500	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	90	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.5	170	Total			

Subcatchment WS 10: WS-10



Summary for Subcatchment WS 2: WS-2

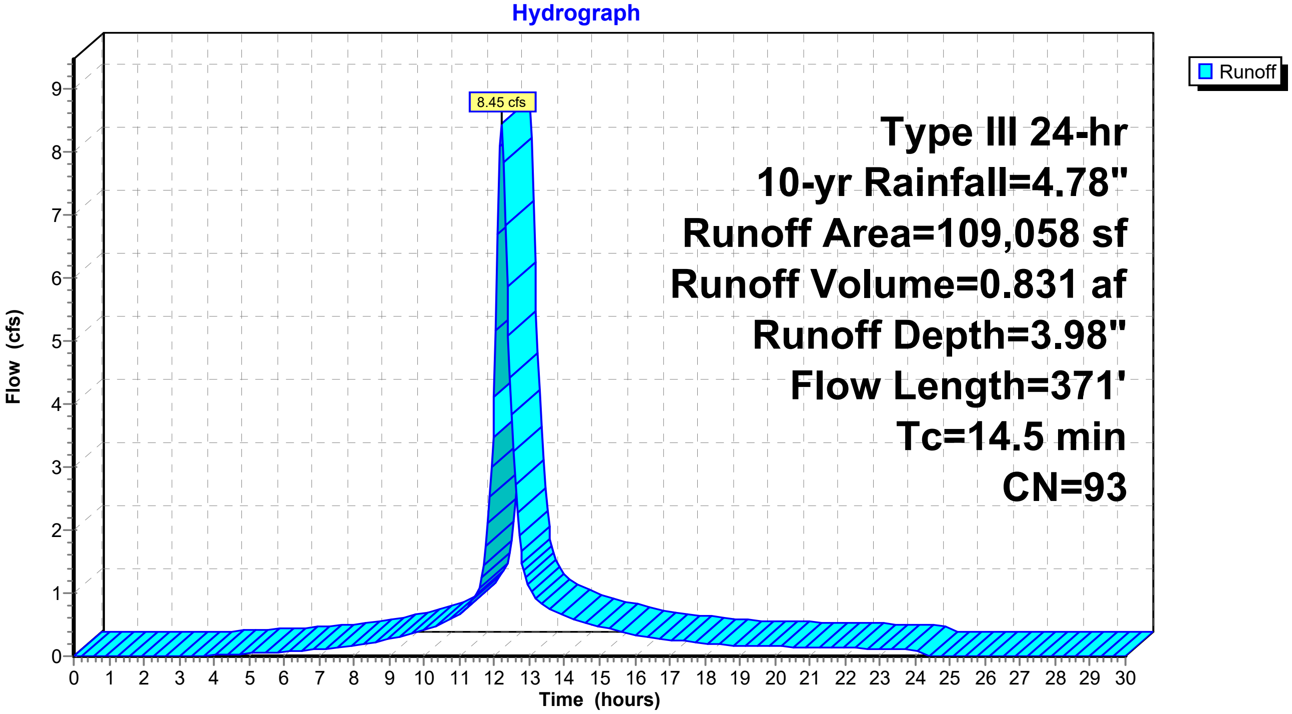
Runoff = 8.45 cfs @ 12.19 hrs, Volume= 0.831 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
77,027	98	Paved parking, HSG D
32,031	80	>75% Grass cover, Good, HSG D
109,058	93	Weighted Average
32,031		29.37% Pervious Area
77,027		70.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0600	0.12		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.3	271	0.0450	16.39	28.97	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010
14.5	371	Total			

Subcatchment WS 2: WS-2



Summary for Subcatchment WS 3: WS-3

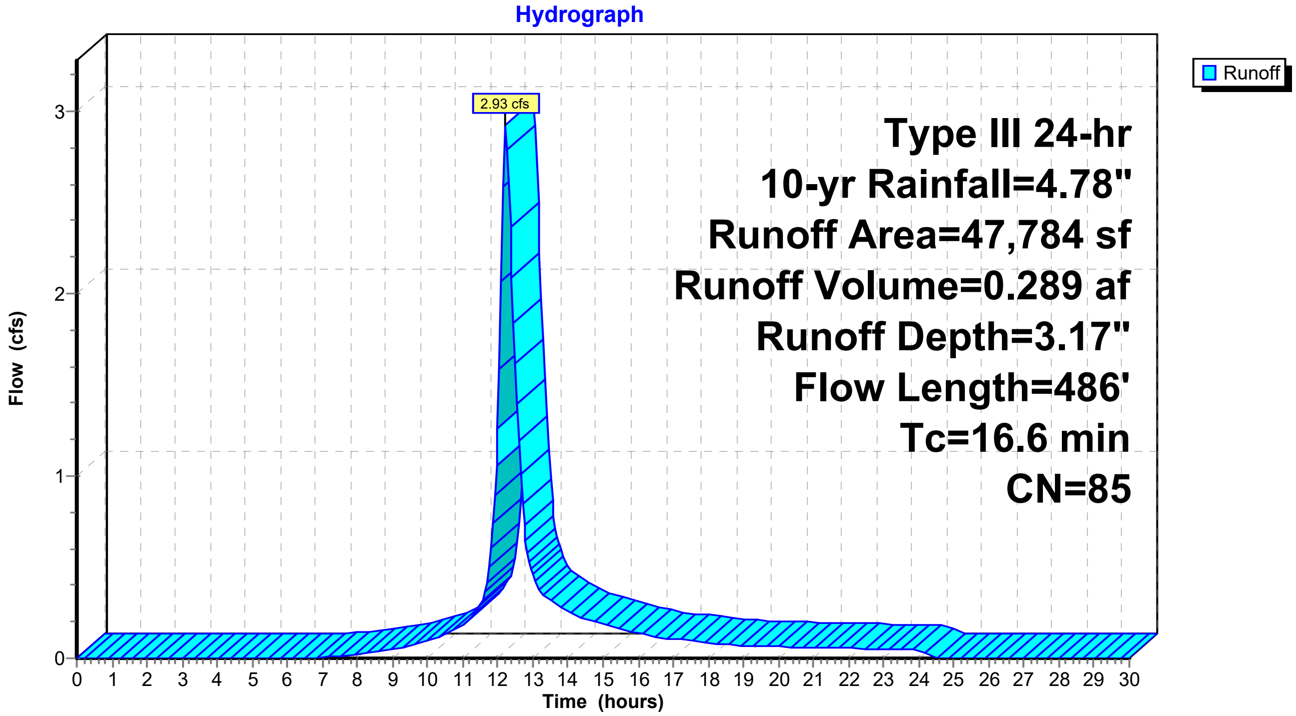
Runoff = 2.93 cfs @ 12.23 hrs, Volume= 0.289 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
13,095	98	Paved parking, HSG D
34,689	80	>75% Grass cover, Good, HSG D
47,784	85	Weighted Average
34,689		72.60% Pervious Area
13,095		27.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0520	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
1.6	386	0.0590	3.91		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	486	Total			

Subcatchment WS 3: WS-3



Summary for Subcatchment WS 4: WS-4

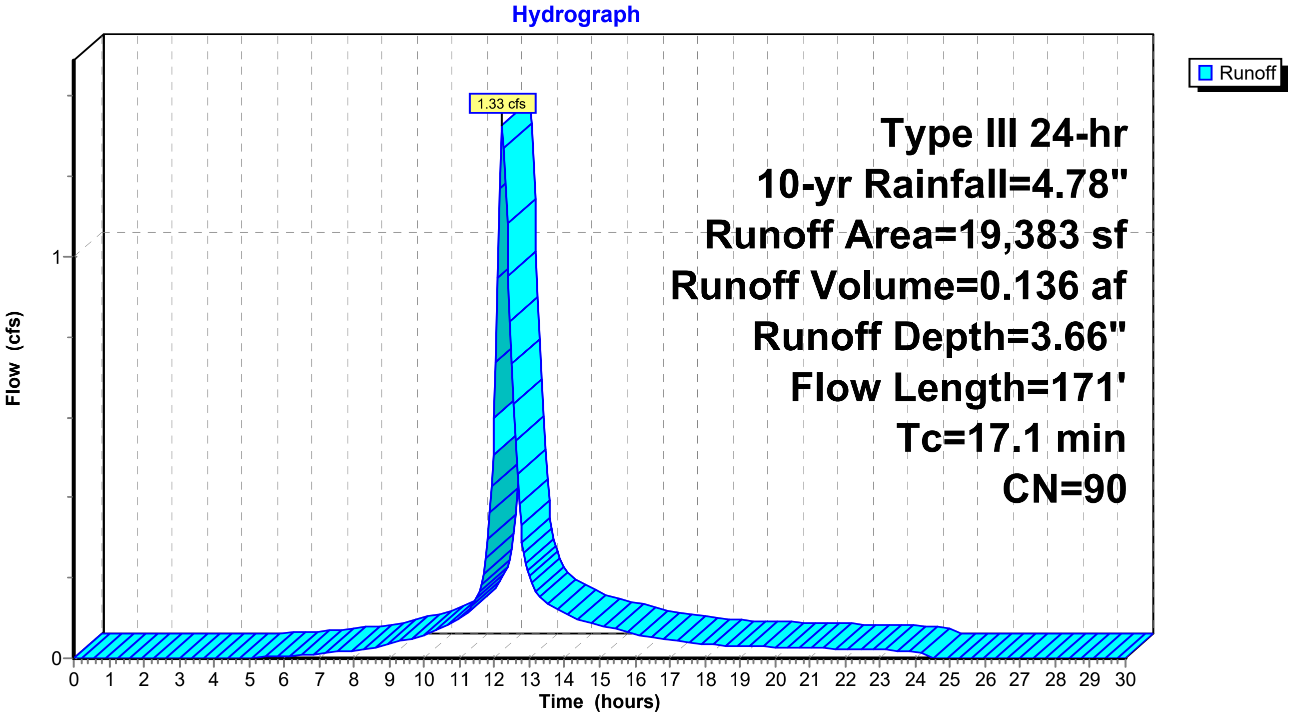
Runoff = 1.33 cfs @ 12.23 hrs, Volume= 0.136 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
10,863	98	Paved parking, HSG D
8,520	80	>75% Grass cover, Good, HSG D
19,383	90	Weighted Average
8,520		43.96% Pervious Area
10,863		56.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	100	0.0400	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.4	71	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.1	171	Total			

Subcatchment WS 4: WS-4



Summary for Subcatchment WS 5: WS-5

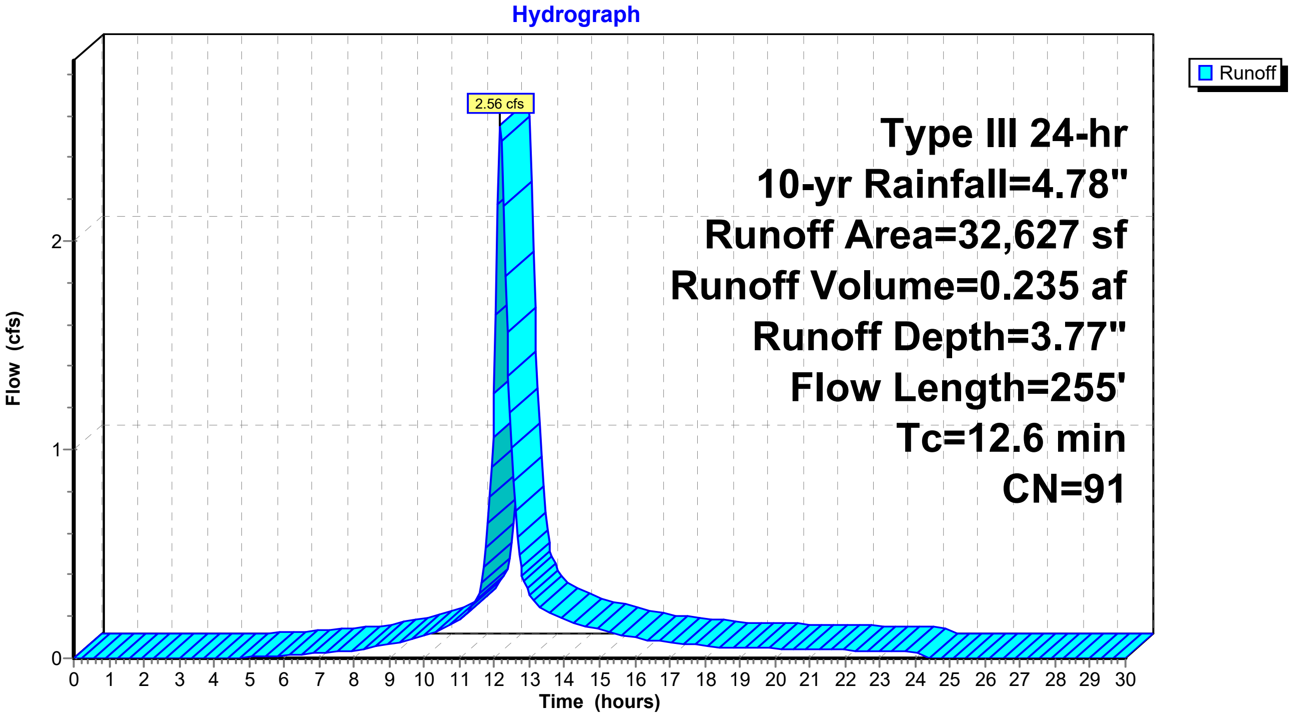
Runoff = 2.56 cfs @ 12.17 hrs, Volume= 0.235 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
19,247	98	Paved parking, HSG D
13,380	80	>75% Grass cover, Good, HSG D
32,627	91	Weighted Average
13,380		41.01% Pervious Area
19,247		58.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	70	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.6	255	Total			

Subcatchment WS 5: WS-5



Summary for Subcatchment WS 6: WS-6

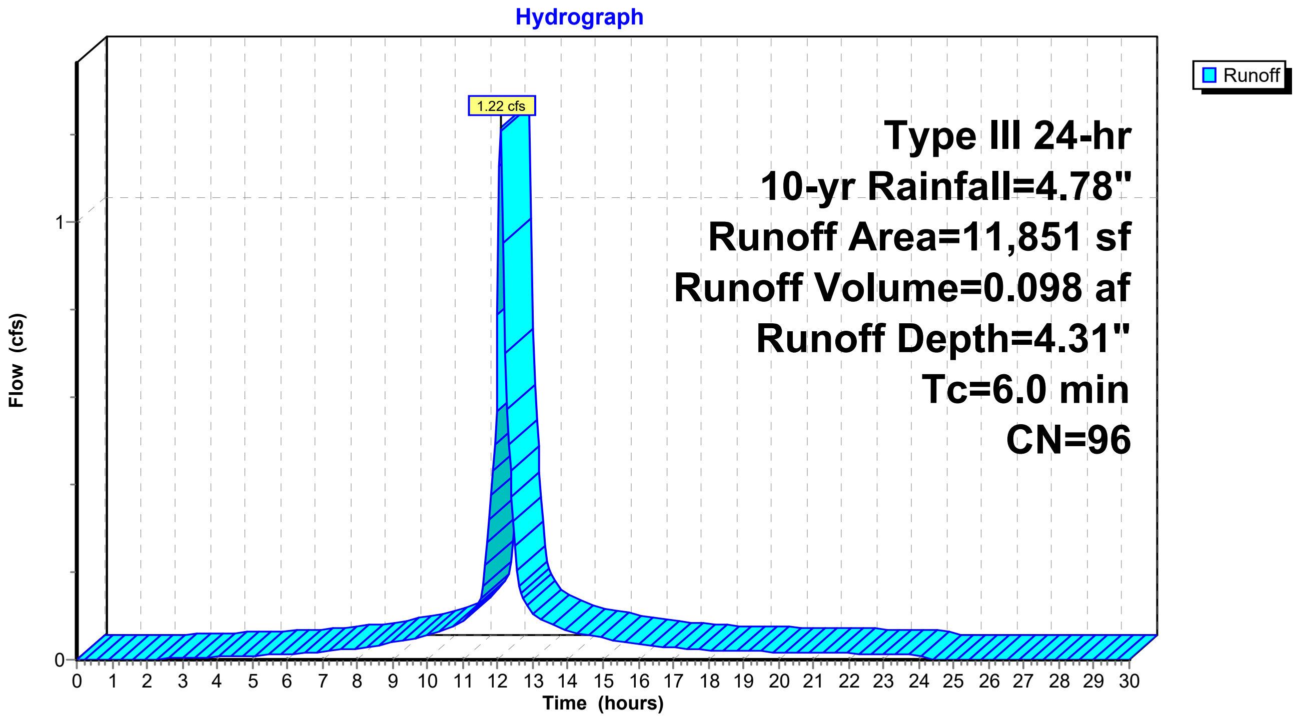
Runoff = 1.22 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
10,691	98	Paved parking, HSG D
1,160	80	>75% Grass cover, Good, HSG D
11,851	96	Weighted Average
1,160		9.79% Pervious Area
10,691		90.21% Impervious Area

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

Subcatchment WS 6: WS-6



Summary for Subcatchment WS 7: WS-7

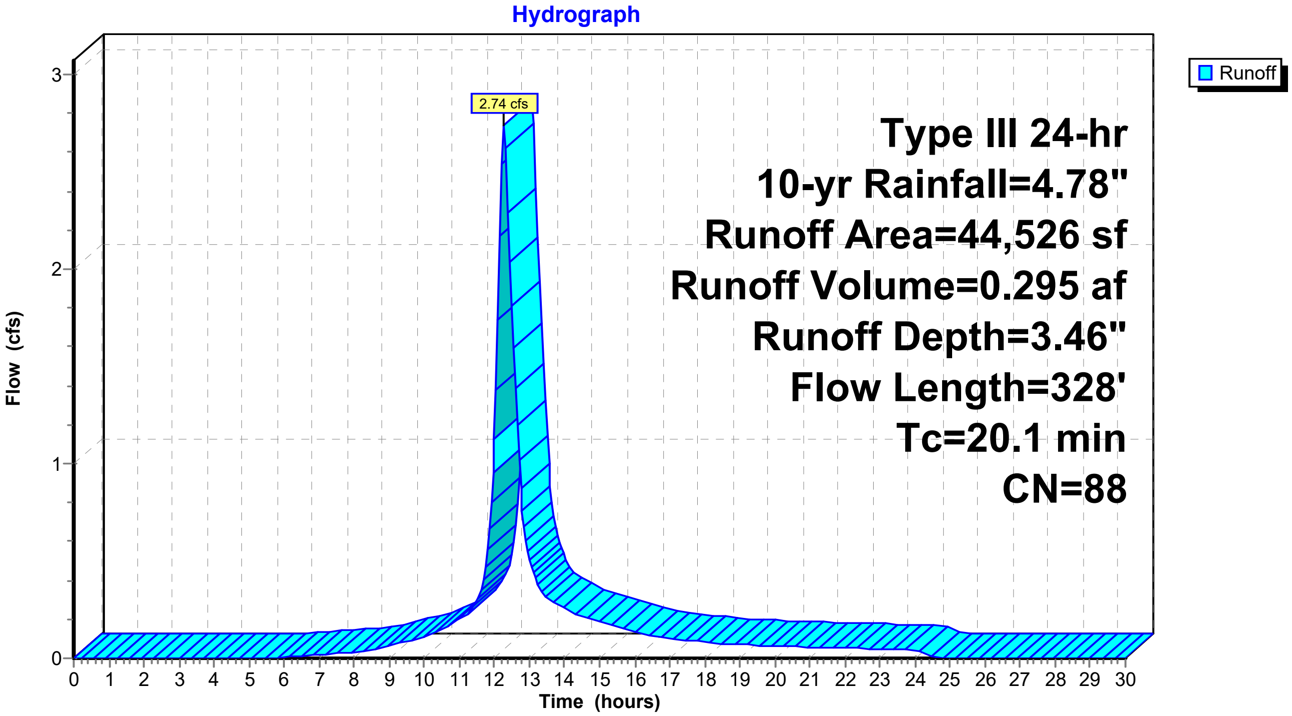
Runoff = 2.74 cfs @ 12.27 hrs, Volume= 0.295 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
19,660	98	Paved parking, HSG D
24,866	80	>75% Grass cover, Good, HSG D
44,526	88	Weighted Average
24,866		55.85% Pervious Area
19,660		44.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
1.2	228	0.0438	3.14		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
20.1	328	Total			

Subcatchment WS 7: WS-7



Summary for Subcatchment WS 8: WS-8

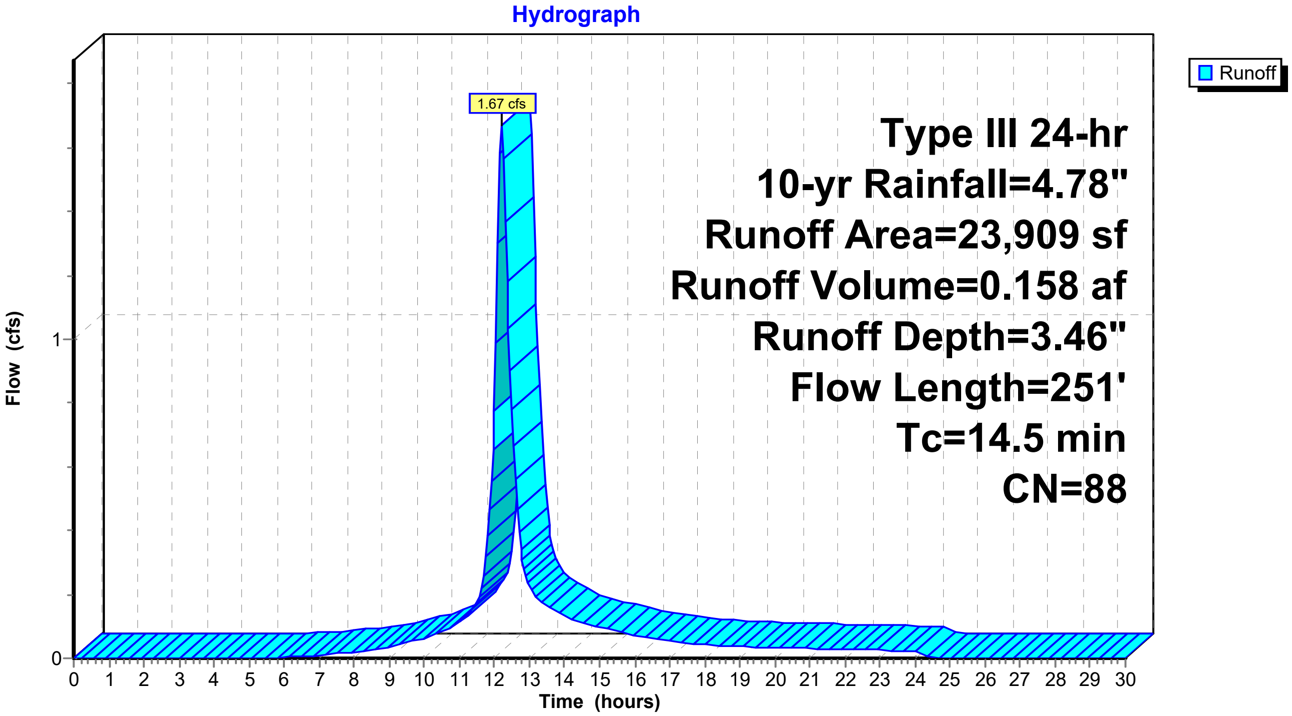
Runoff = 1.67 cfs @ 12.20 hrs, Volume= 0.158 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
10,069	98	Paved parking, HSG D
13,840	80	>75% Grass cover, Good, HSG D
23,909	88	Weighted Average
13,840		57.89% Pervious Area
10,069		42.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0230	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
0.9	151	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.5	251	Total			

Subcatchment WS 8: WS-8



Summary for Subcatchment WS 9: WS-9

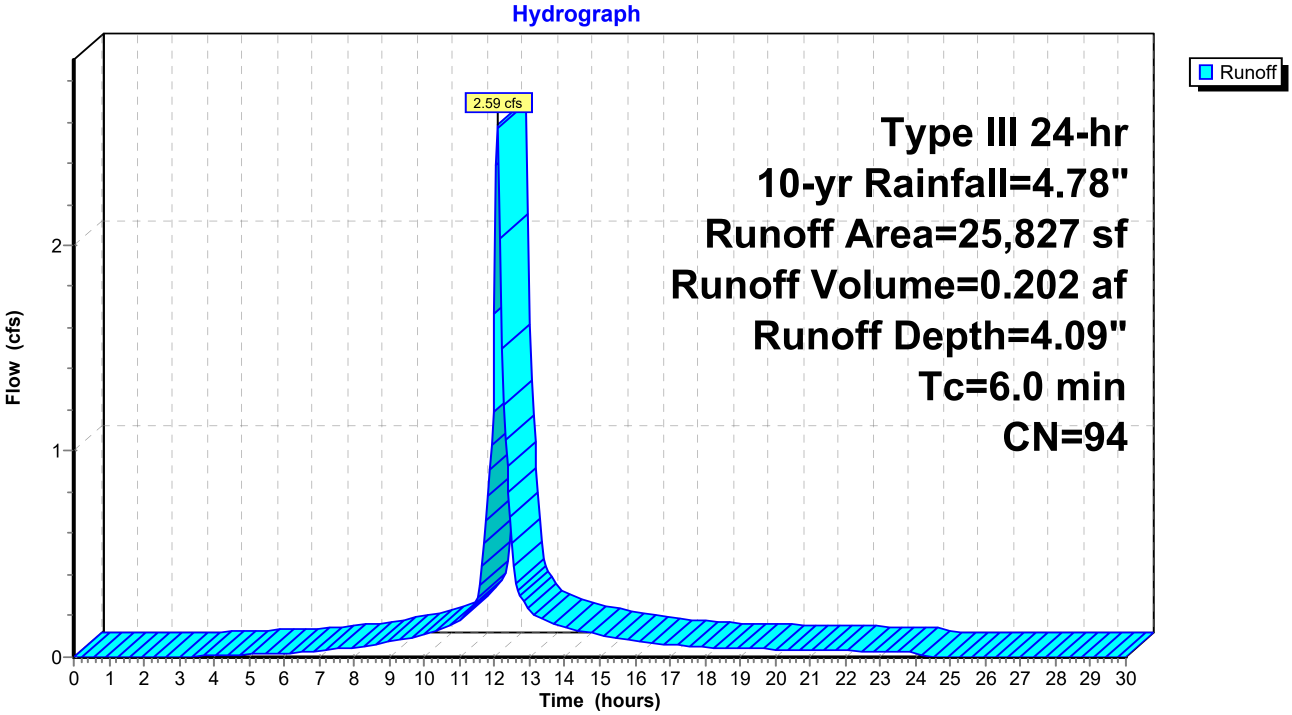
Runoff = 2.59 cfs @ 12.09 hrs, Volume= 0.202 af, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
20,174	98	Paved parking, HSG D
5,653	80	>75% Grass cover, Good, HSG D
25,827	94	Weighted Average
5,653		21.89% Pervious Area
20,174		78.11% Impervious Area

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

Subcatchment WS 9: WS-9



Summary for Subcatchment WS-1: WS-1

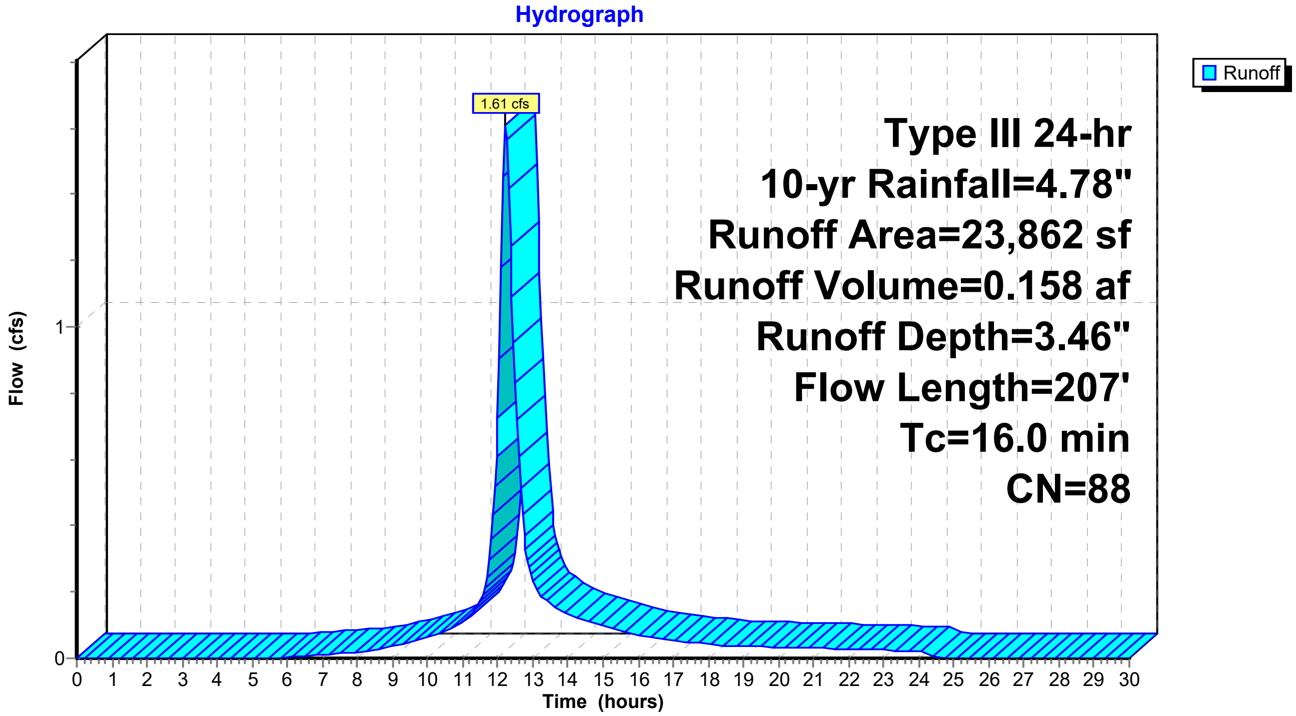
Runoff = 1.61 cfs @ 12.22 hrs, Volume= 0.158 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.78"

Area (sf)	CN	Description
10,610	98	Paved parking, HSG D
13,252	80	>75% Grass cover, Good, HSG D
23,862	88	Weighted Average
13,252		55.54% Pervious Area
10,610		44.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0500	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	107	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	207	Total			

Subcatchment WS-1: WS-1

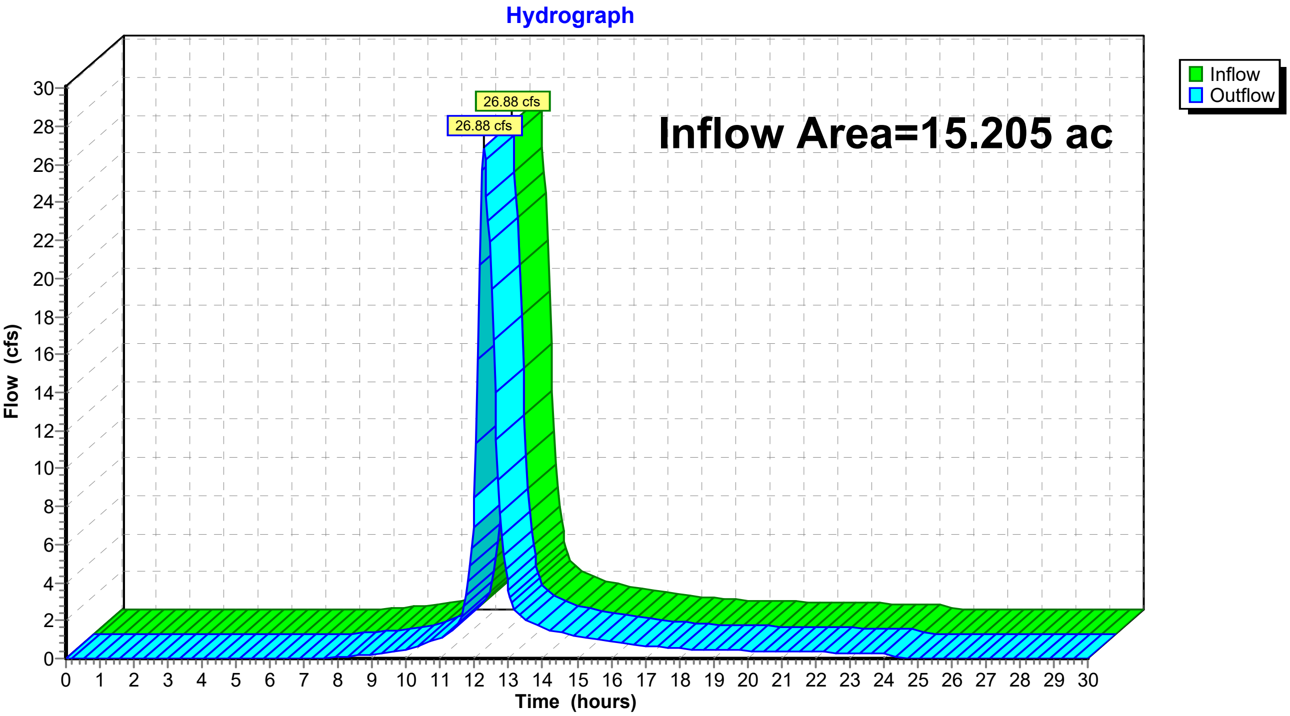


Summary for Reach 6R: DP1 2020

Inflow Area =	15.205 ac, 38.77% Impervious,	Inflow Depth = 1.78"	for 10-yr event	
Inflow =	26.88 cfs @	12.26 hrs, Volume=	2.255 af	
Outflow =	26.88 cfs @	12.26 hrs, Volume=	2.255 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach 6R: DP1 2020



Summary for Pond P-1: P-1 IN. POND

Inflow Area = 0.548 ac, 44.46% Impervious, Inflow Depth = 3.46" for 10-yr event
Inflow = 1.61 cfs @ 12.22 hrs, Volume= 0.158 af
Outflow = 0.56 cfs @ 12.63 hrs, Volume= 0.158 af, Atten= 65%, Lag= 25.0 min
Discarded = 0.45 cfs @ 12.63 hrs, Volume= 0.157 af
Primary = 0.11 cfs @ 12.63 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 731.51' @ 12.63 hrs Surf.Area= 1,619 sf Storage= 1,864 cf

Plug-Flow detention time= 29.4 min calculated for 0.158 af (100% of inflow)
Center-of-Mass det. time= 29.4 min (838.2 - 808.8)

Volume	Invert	Avail.Storage	Storage Description
#1	730.00'	4,836 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

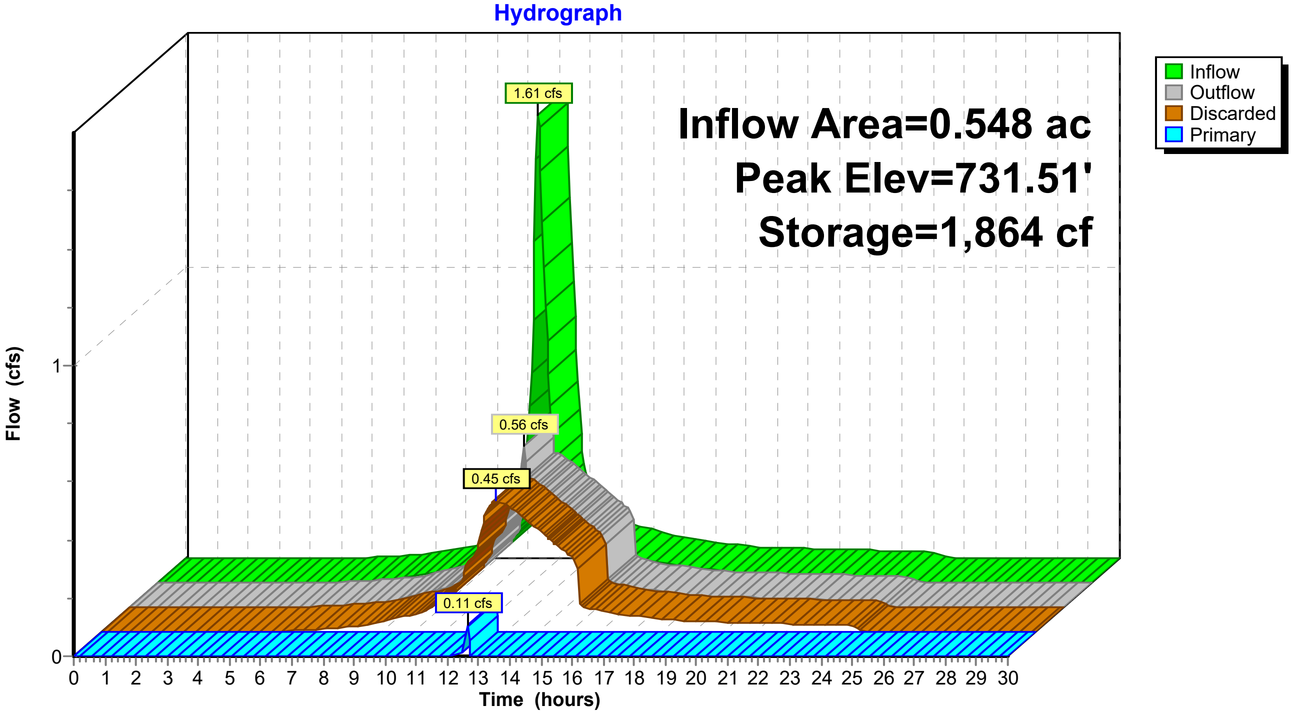
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
730.00	844	0	0
733.00	2,380	4,836	4,836

Device	Routing	Invert	Outlet Devices
#1	Primary	731.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	730.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.45 cfs @ 12.63 hrs HW=731.51' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.07 cfs @ 12.63 hrs HW=731.51' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.32 fps)

Pond P-1: P-1 IN. POND



Summary for Pond P-10: P-10 SUB. IN

Inflow Area = 0.969 ac, 81.50% Impervious, Inflow Depth = 4.20" for 10-yr event
Inflow = 3.45 cfs @ 12.18 hrs, Volume= 0.339 af
Outflow = 2.44 cfs @ 12.33 hrs, Volume= 0.339 af, Atten= 29%, Lag= 8.8 min
Discarded = 0.66 cfs @ 11.75 hrs, Volume= 0.282 af
Primary = 1.77 cfs @ 12.33 hrs, Volume= 0.057 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 720.23' @ 12.33 hrs Surf.Area= 2,389 sf Storage= 2,321 cf

Plug-Flow detention time= 11.5 min calculated for 0.339 af (100% of inflow)
Center-of-Mass det. time= 11.4 min (787.8 - 776.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	2,720 cf	**11.00'W x 217.22'L x 4.00'H Field A** 9,558 cf Overall - 2,756 cf Embedded = 6,801 cf x 40.0% Voids
#2A	719.50'	2,756 cf	**ADS_StormTech SC-740 +Cap** x 60 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 60 Chambers in 2 Rows
		5,477 cf	Total Available Storage

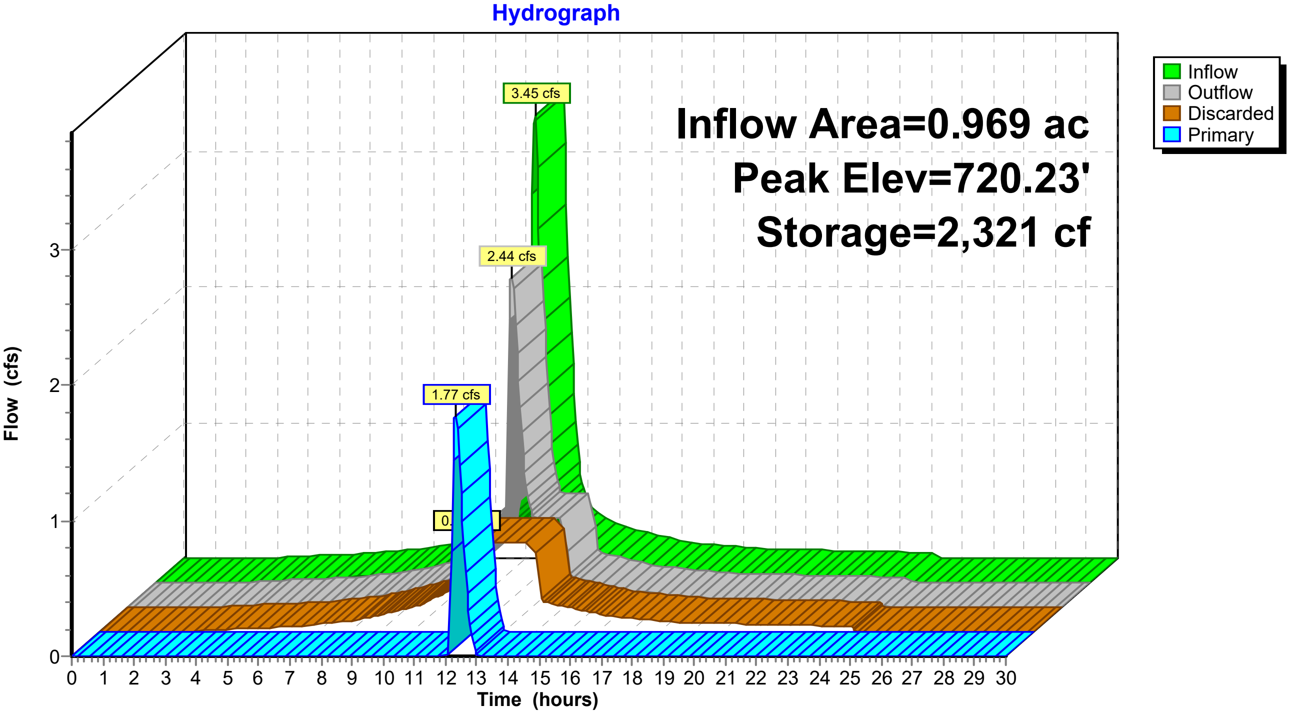
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.75'	**20.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.66 cfs @ 11.75 hrs HW=718.55' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.66 cfs)

Primary OutFlow Max=1.75 cfs @ 12.33 hrs HW=720.23' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 1.75 cfs @ 2.21 fps)

Pond P-10: P-10 SUB. IN



Summary for Pond P-2: P-2 SUB. IN

Inflow Area = 2.504 ac, 70.63% Impervious, Inflow Depth = 3.98" for 10-yr event
Inflow = 8.45 cfs @ 12.19 hrs, Volume= 0.831 af
Outflow = 6.48 cfs @ 12.32 hrs, Volume= 0.831 af, Atten= 23%, Lag= 7.6 min
Discarded = 1.28 cfs @ 11.70 hrs, Volume= 0.612 af
Primary = 5.20 cfs @ 12.32 hrs, Volume= 0.219 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 720.28' @ 12.32 hrs Surf.Area= 4,594 sf Storage= 4,766 cf

Plug-Flow detention time= 8.7 min calculated for 0.829 af (100% of inflow)
Center-of-Mass det. time= 8.7 min (796.2 - 787.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	5,035 cf	**30.00'W x 153.14'L x 4.00'H Field A** 18,376 cf Overall - 5,788 cf Embedded = 12,588 cf x 40.0% Voids
#2A	719.50'	5,788 cf	**ADS_StormTech SC-740 +Cap** x 126 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 126 Chambers in 6 Rows
		10,824 cf	Total Available Storage

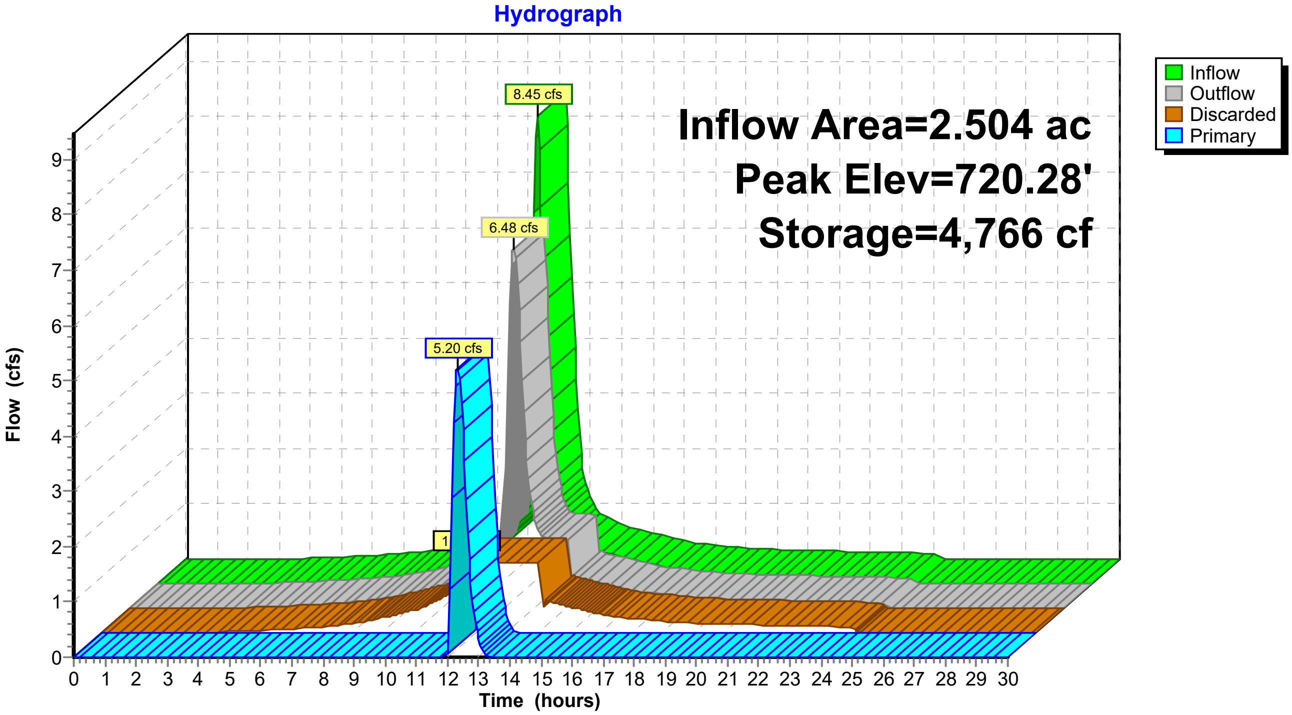
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.50'	**36.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.70 hrs HW=718.55' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.28 cfs)

Primary OutFlow Max=5.17 cfs @ 12.32 hrs HW=720.27' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 5.17 cfs @ 3.45 fps)

Pond P-2: P-2 SUB. IN



Summary for Pond P-3: P-3 SUB. IN

```
Inflow Area =       1.097 ac,  27.40% Impervious,  Inflow Depth =   3.17"    for  10-yr event
Inflow      =       2.93 cfs @  12.23 hrs,  Volume=          0.289 af
Outflow     =       3.19 cfs @  12.22 hrs,  Volume=          0.289 af,  Atten= 0%,  Lag= 0.0 min
Discarded   =       0.27 cfs @  11.45 hrs,  Volume=          0.194 af
Primary     =       2.92 cfs @  12.22 hrs,  Volume=          0.095 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.38' @ 12.20 hrs   Surf.Area= 963 sf   Storage= 1,515 cf

Plug-Flow detention time= 25.9 min calculated for 0.289 af (100% of inflow)
Center-of-Mass det. time= 25.9 min ( 845.0 - 819.1 )

Volume       Invert    Avail.Storage   Storage Description
  #1A       724.00'           907 cf   30.00'W x 32.10'L x 3.50'H Field A
                                       3,370 cf Overall - 1,103 cf Embedded = 2,268 cf  x 40.0% Voids
  #2A       724.50'         1,103 cf   ADS_StormTech SC-740 +Cap x 24  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
                                       24 Chambers in 6 Rows
                            2,010 cf   Total Available Storage

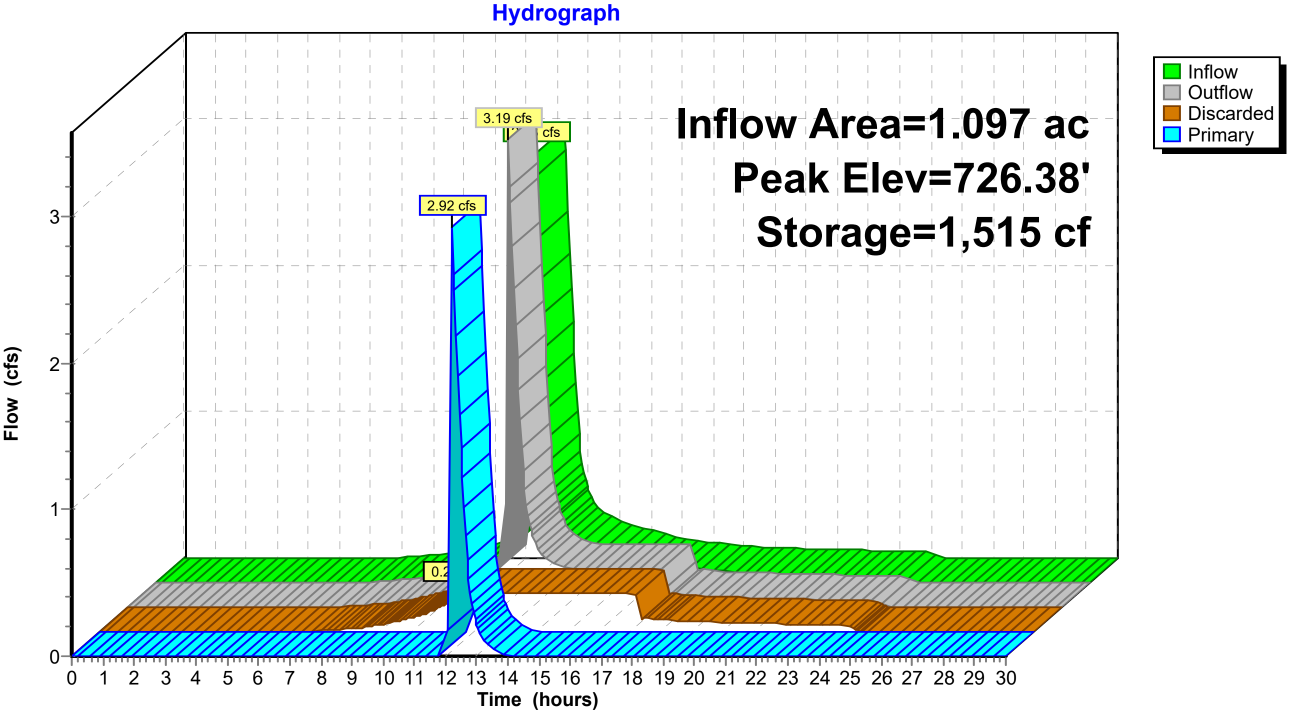
   Storage Group A created with Chamber Wizard

Device   Routing          Invert   Outlet Devices
  #1     Primary         726.00'   4.0' long  x 0.5' breadth Broad-Crested Rectangular Weir
                                   Head (feet)  0.20  0.40  0.60  0.80  1.00
                                   Coef. (English)  2.80  2.92  3.08  3.30  3.32
  #2     Discarded       724.00'   12.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.27 cfs @ 11.45 hrs  HW=724.04'   (Free Discharge)
└─2=Exfiltration  (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=2.68 cfs @ 12.22 hrs  HW=726.38'   (Free Discharge)
└─1=Broad-Crested Rectangular Weir (Weir Controls 2.68 cfs @ 1.78 fps)
```

Pond P-3: P-3 SUB. IN



Summary for Pond P-4: P-4 SUB. IN

Inflow Area = 0.445 ac, 56.04% Impervious, Inflow Depth = 3.66" for 10-yr event
Inflow = 1.33 cfs @ 12.23 hrs, Volume= 0.136 af
Outflow = 0.79 cfs @ 12.49 hrs, Volume= 0.136 af, Atten= 40%, Lag= 15.8 min
Discarded = 0.23 cfs @ 11.75 hrs, Volume= 0.125 af
Primary = 0.56 cfs @ 12.49 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 713.14' @ 12.49 hrs Surf.Area= 842 sf Storage= 1,449 cf

Plug-Flow detention time= 35.6 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 35.5 min (838.0 - 802.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.50'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	711.00'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 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 21 Chambers in 3 Rows
		1,758 cf	Total Available Storage

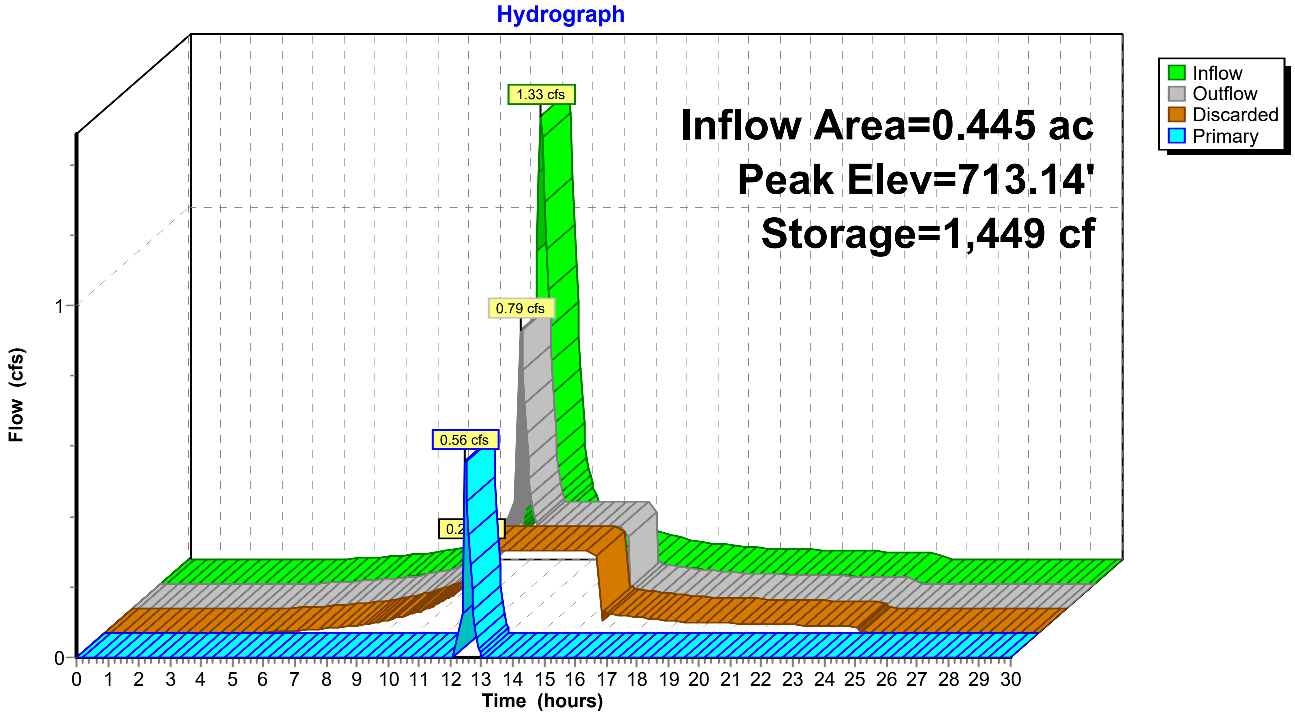
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	710.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.23 cfs @ 11.75 hrs HW=710.54' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.54 cfs @ 12.49 hrs HW=713.13' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 1.02 fps)

Pond P-4: P-4 SUB. IN



Summary for Pond P-5: P-5 SUB. IN

```
Inflow Area =       0.749 ac,  58.99% Impervious,  Inflow Depth =   3.77"    for  10-yr event
Inflow      =      2.56 cfs @  12.17 hrs,  Volume=          0.235 af
Outflow     =      1.87 cfs @  12.31 hrs,  Volume=          0.235 af,  Atten= 27%,  Lag= 8.4 min
Discarded   =      0.39 cfs @  11.70 hrs,  Volume=          0.193 af
Primary     =      1.48 cfs @  12.31 hrs,  Volume=          0.043 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 712.21' @ 12.31 hrs   Surf.Area= 1,390 sf   Storage= 1,861 cf

Plug-Flow detention time= 19.0 min calculated for 0.235 af (100% of inflow)
Center-of-Mass det. time= 18.9 min (813.4 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.00'	1,563 cf	**30.00'W x 46.34'L x 4.00'H Field A** 5,560 cf Overall - 1,654 cf Embedded = 3,907 cf x 40.0% Voids
#2A	711.00'	1,654 cf	**ADS_StormTech SC-740 +Cap** x 36 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 36 Chambers in 6 Rows
		3,216 cf	Total Available Storage

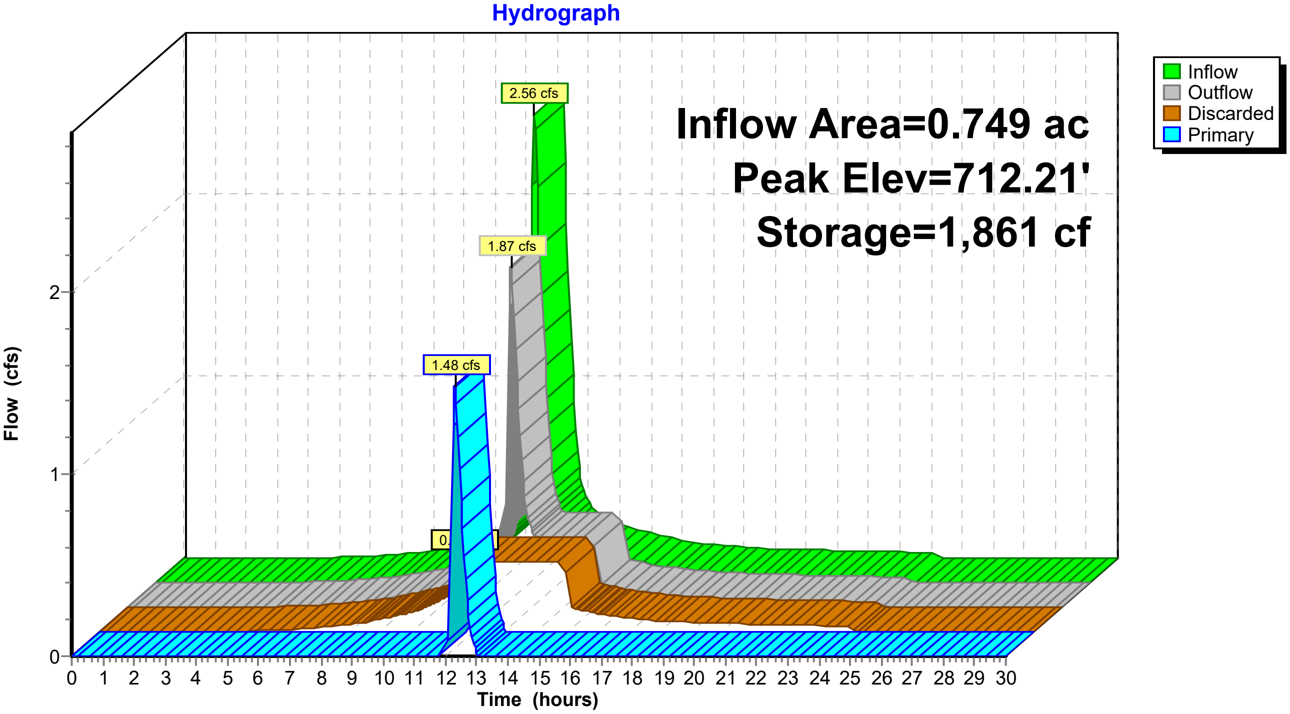
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	711.75'	**18.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	710.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.39 cfs @ 11.70 hrs HW=710.05' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=1.46 cfs @ 12.31 hrs HW=712.20' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 1.46 cfs @ 2.16 fps)

Pond P-5: P-5 SUB. IN



Summary for Pond P-6: P-6 SUB. IN

```
Inflow Area =      0.272 ac, 90.21% Impervious, Inflow Depth =  4.31"   for 10-yr event
Inflow      =     1.22 cfs @  12.09 hrs, Volume=        0.098 af
Outflow     =     0.27 cfs @  11.75 hrs, Volume=        0.098 af, Atten= 78%, Lag= 0.0 min
Discarded   =     0.27 cfs @  11.75 hrs, Volume=        0.098 af
Primary     =     0.00 cfs @   0.00 hrs, Volume=        0.000 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 710.02' @ 12.50 hrs Surf.Area= 954 sf Storage= 948 cf

Plug-Flow detention time= 17.9 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 17.8 min (781.3 - 763.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	708.50'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	709.00'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 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 24 Chambers in 3 Rows
		1,997 cf	Total Available Storage

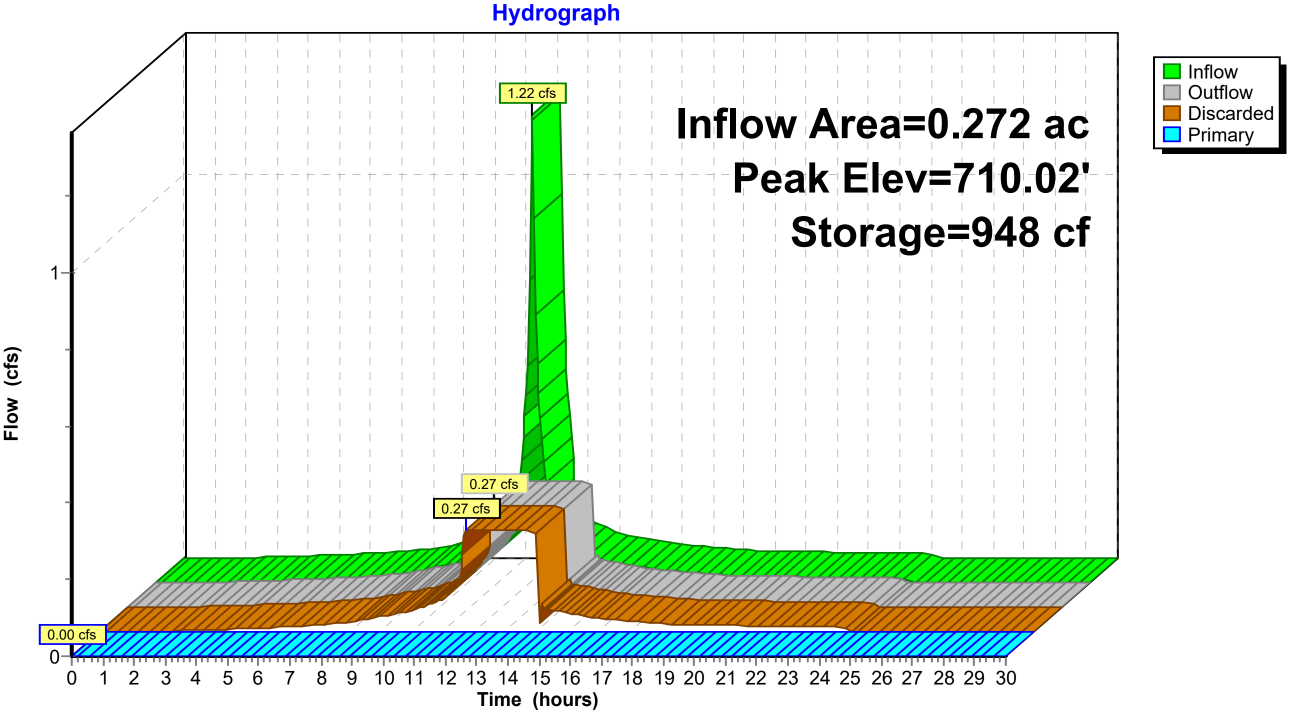
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	711.30'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	708.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.75 hrs HW=708.55' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=708.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-6: P-6 SUB. IN



Summary for Pond P-7: P-7 IN. POND

```
Inflow Area =       1.022 ac,  44.15% Impervious,  Inflow Depth =   3.46"    for  10-yr event
Inflow      =      2.74 cfs @   12.27 hrs,  Volume=          0.295 af
Outflow     =      2.25 cfs @   12.46 hrs,  Volume=          0.295 af,  Atten= 18%,  Lag= 11.4 min
Discarded   =      0.45 cfs @   12.46 hrs,  Volume=          0.254 af
Primary     =      1.80 cfs @   12.46 hrs,  Volume=          0.040 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 702.62' @ 12.46 hrs   Surf.Area= 1,602 sf   Storage= 3,209 cf

Plug-Flow detention time= 51.2 min calculated for 0.294 af (100% of inflow)
Center-of-Mass det. time= 51.1 min ( 863.7 - 812.6 )

Volume       Invert    Avail.Storage   Storage Description
   #1       700.00'         5,700 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

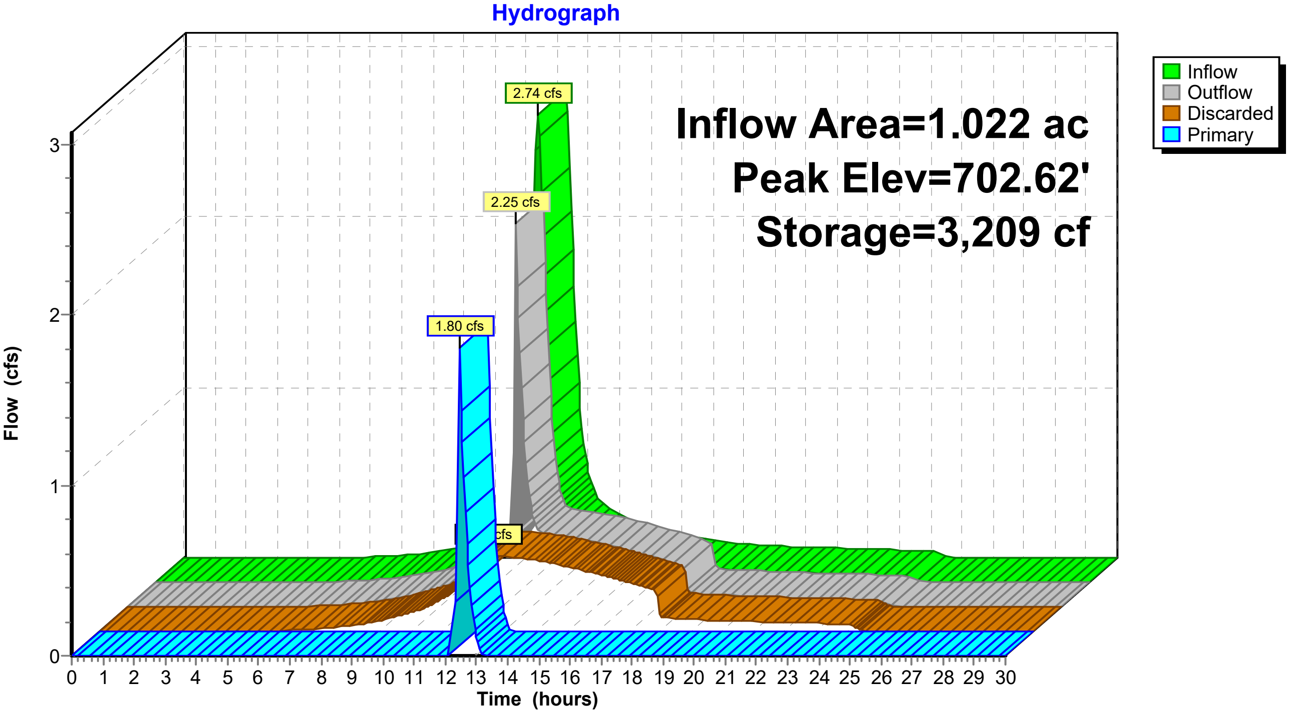
 Elevation        Surf.Area        Inc.Store       Cum.Store
    (feet)          (sq-ft)     (cubic-feet)    (cubic-feet)
    700.00              850                0               0
    704.00            2,000            5,700           5,700

Device   Routing          Invert   Outlet Devices
   #1    Primary          702.50'  16.0' long  x 0.5' breadth Broad-Crested Rectangular Weir
                                   Head (feet)  0.20  0.40  0.60  0.80  1.00
                                   Coef. (English)  2.80  2.92  3.08  3.30  3.32
   #2    Discarded        700.00'  12.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.44 cfs @ 12.46 hrs  HW=702.61'   (Free Discharge)
└─2=Exfiltration  (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=1.69 cfs @ 12.46 hrs  HW=702.61'   (Free Discharge)
└─1=Broad-Crested Rectangular Weir(Weir Controls 1.69 cfs @ 0.94 fps)
```

Pond P-7: P-7 IN. POND



Summary for Pond P-8: P-8 IN. POND

Inflow Area = 0.549 ac, 42.11% Impervious, Inflow Depth = 3.46" for 10-yr event
Inflow = 1.67 cfs @ 12.20 hrs, Volume= 0.158 af
Outflow = 0.71 cfs @ 12.55 hrs, Volume= 0.158 af, Atten= 58%, Lag= 21.1 min
Discarded = 0.42 cfs @ 12.55 hrs, Volume= 0.155 af
Primary = 0.29 cfs @ 12.55 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 731.78' @ 12.55 hrs Surf.Area= 1,498 sf Storage= 1,925 cf

Plug-Flow detention time= 34.2 min calculated for 0.158 af (100% of inflow)
Center-of-Mass det. time= 34.2 min (841.6 - 807.4)

Volume	Invert	Avail.Storage	Storage Description
#1	730.00'	6,864 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

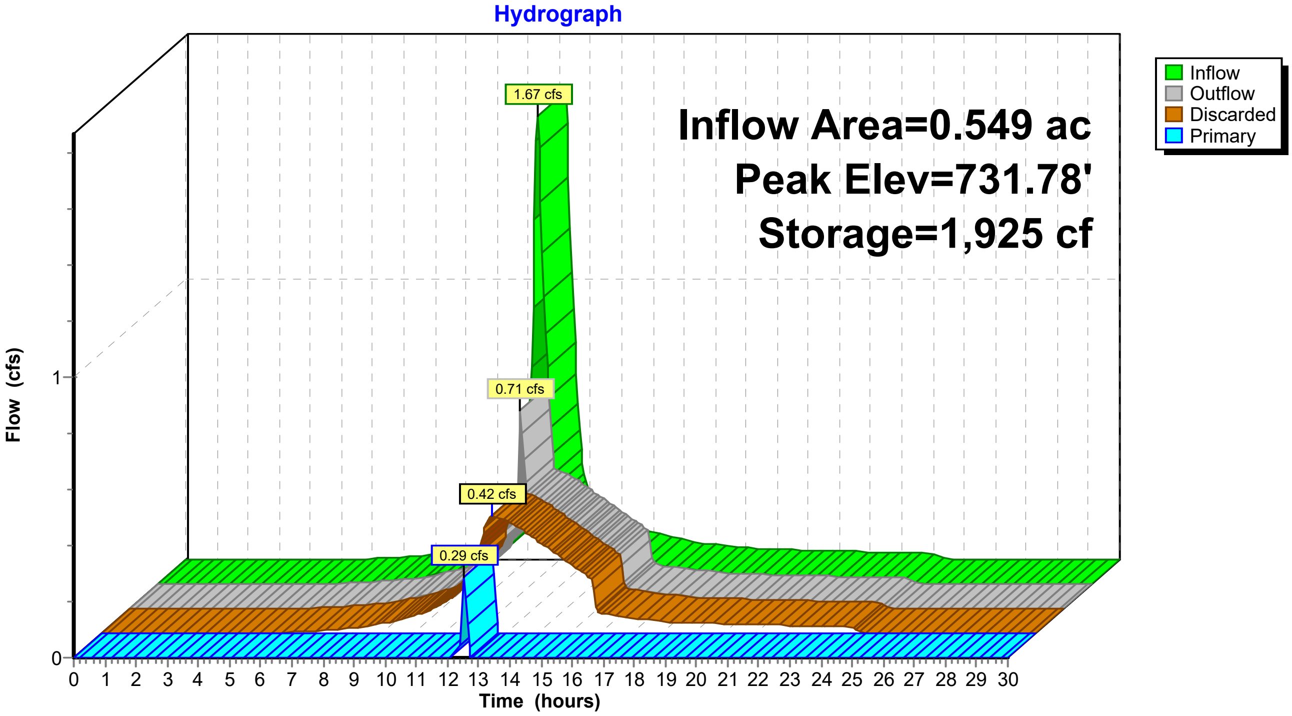
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
730.00	664	0	0
732.00	1,600	2,264	2,264
734.00	3,000	4,600	6,864

Device	Routing	Invert	Outlet Devices
#1	Primary	731.75'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	730.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.42 cfs @ 12.55 hrs HW=731.78' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=0.25 cfs @ 12.55 hrs HW=731.78' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.25 cfs @ 0.50 fps)

Pond P-8: P-8 IN. POND



Summary for Pond P-9: P-9 BIO. POND

Inflow Area = 0.593 ac, 78.11% Impervious, Inflow Depth = 4.09" for 10-yr event
Inflow = 2.59 cfs @ 12.09 hrs, Volume= 0.202 af
Outflow = 2.50 cfs @ 12.11 hrs, Volume= 0.180 af, Atten= 3%, Lag= 1.4 min
Primary = 2.50 cfs @ 12.11 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.65' @ 12.11 hrs Surf.Area= 2,123 sf Storage= 1,267 cf

Plug-Flow detention time= 89.8 min calculated for 0.180 af (89% of inflow)
Center-of-Mass det. time= 38.0 min (812.8 - 774.8)

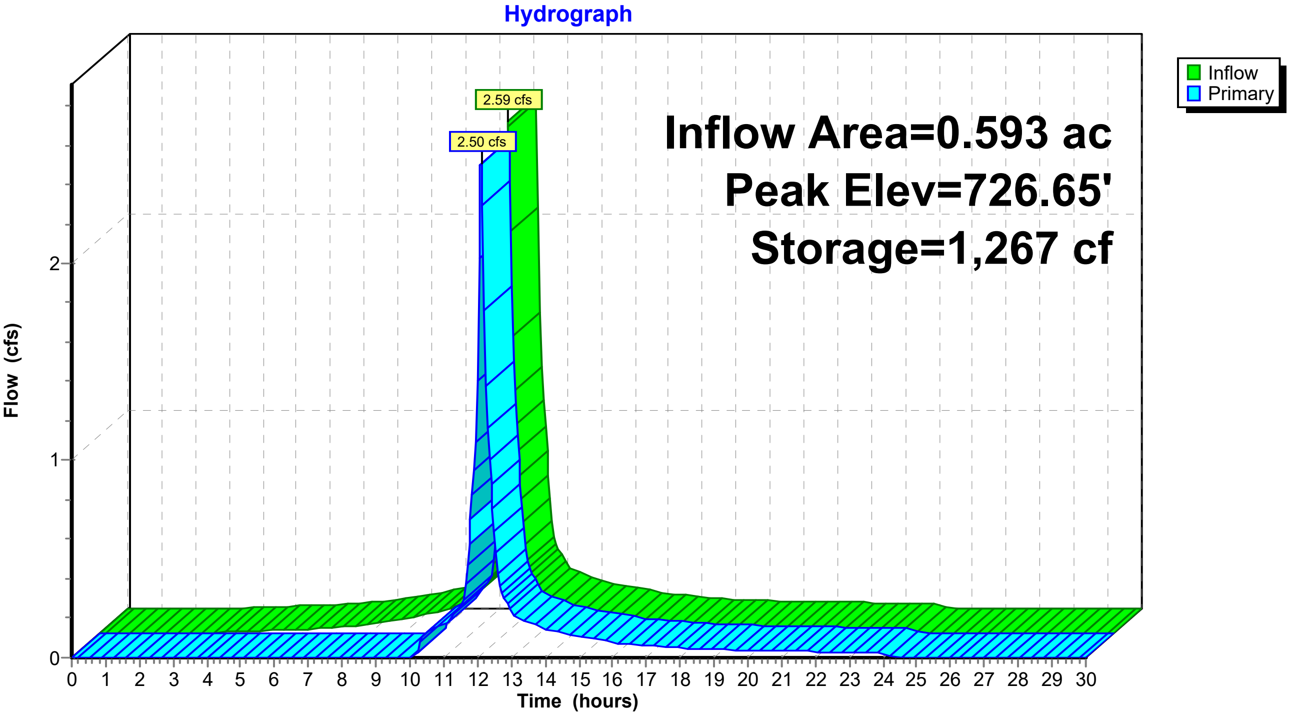
Volume	Invert	Avail.Storage	Storage Description
#1	726.00'	4,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
726.00	1,800	0	0
728.00	2,800	4,600	4,600

Device	Routing	Invert	Outlet Devices
#1	Primary	726.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.45 cfs @ 12.11 hrs HW=726.64' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.45 cfs @ 1.06 fps)

Pond P-9: P-9 BIO. POND



Summary for Subcatchment 3S: Existing WS E1

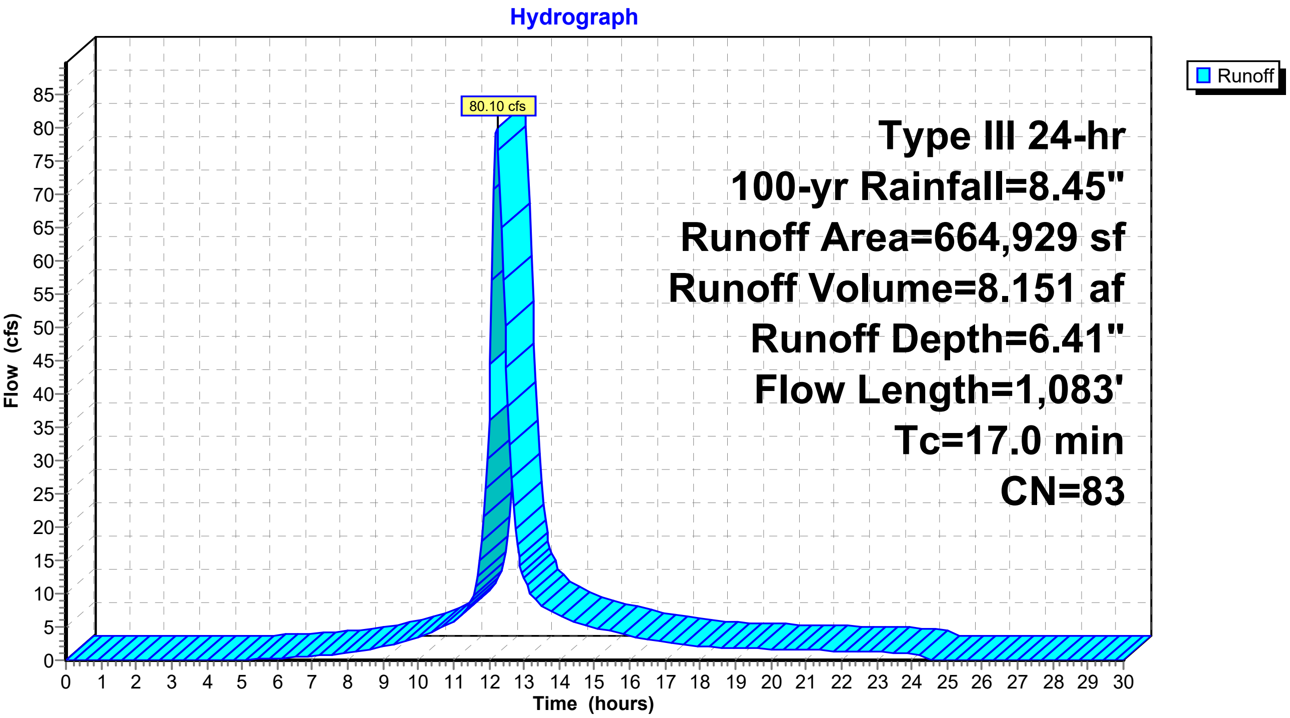
Runoff = 80.10 cfs @ 12.23 hrs, Volume= 8.151 af, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
42,999	98	Paved parking, HSG D
24,491	89	<50% Grass cover, Poor, HSG D
96,069	78	Meadow, non-grazed, HSG D
24,245	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
397,885	83	Woods, Poor, HSG D
69,348	77	Woods, Poor, HSG C
664,929	83	Weighted Average
621,930		93.53% Pervious Area
42,999		6.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.1500	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
5.5	497	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	70	0.0620	15.49	19.01	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
17.0	1,083	Total			

Subcatchment 3S: Existing WS E1



Summary for Subcatchment 7S: WSD C

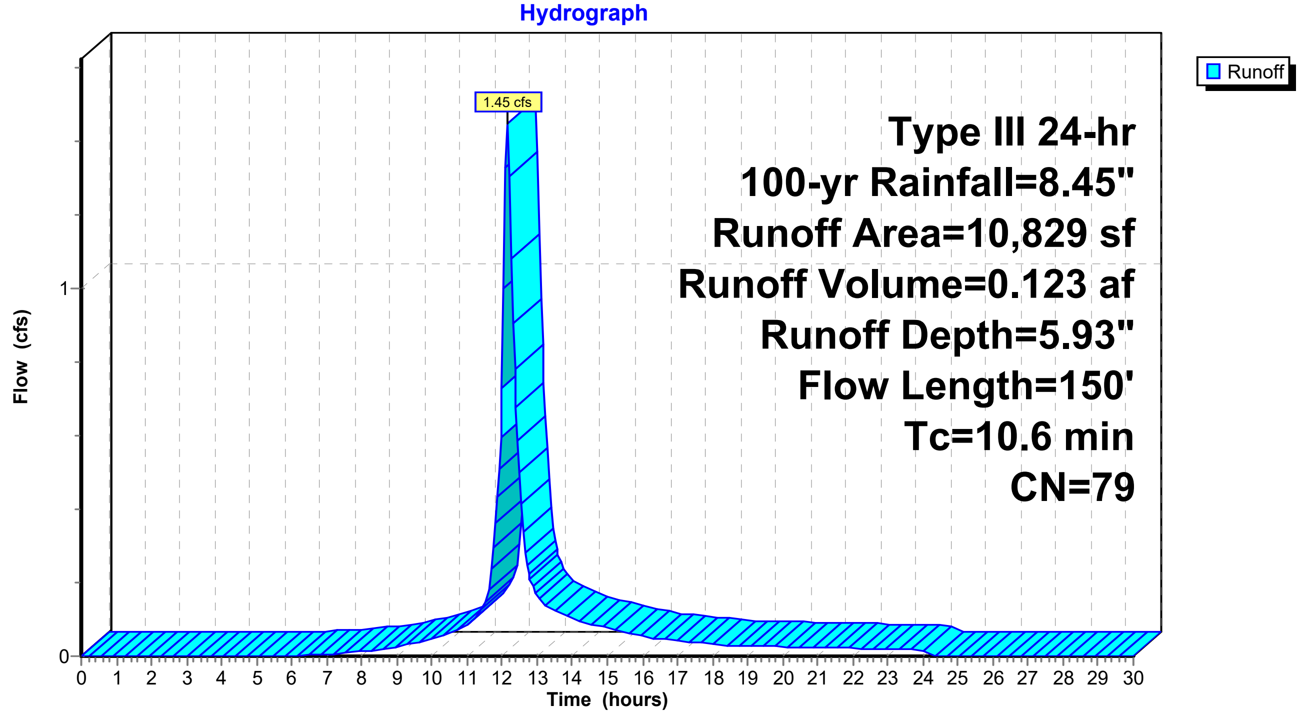
Runoff = 1.45 cfs @ 12.15 hrs, Volume= 0.123 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
2,167	83	Woods, Poor, HSG D
4,412	77	Woods, Poor, HSG C
2,847	80	>75% Grass cover, Good, HSG D
1,403	74	>75% Grass cover, Good, HSG C
10,829	79	Weighted Average
10,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.1200	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
0.1	50	0.3330	9.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.6	150	Total			

Subcatchment 7S: WSD C



Summary for Subcatchment 8S: WSD B

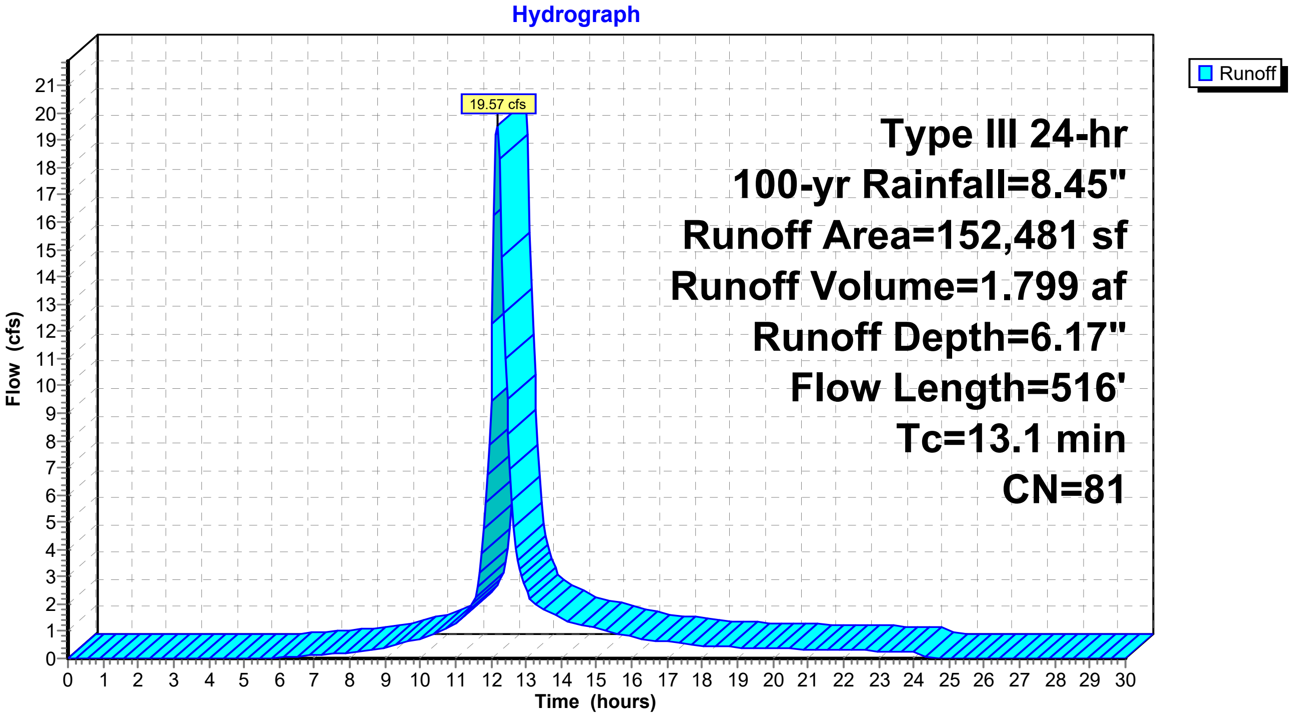
Runoff = 19.57 cfs @ 12.18 hrs, Volume= 1.799 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
1,974	98	Paved parking, HSG D
51,706	80	>75% Grass cover, Good, HSG D
6,862	83	Brush, Poor, HSG D
9,892	77	Brush, Poor, HSG C
61,255	83	Woods, Poor, HSG D
20,792	77	Woods, Poor, HSG C
152,481	81	Weighted Average
150,507		98.71% Pervious Area
1,974		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.1000	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.8	416	0.0670	3.88		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.1	516	Total			

Subcatchment 8S: WSD B



Summary for Subcatchment 9S: WSD A

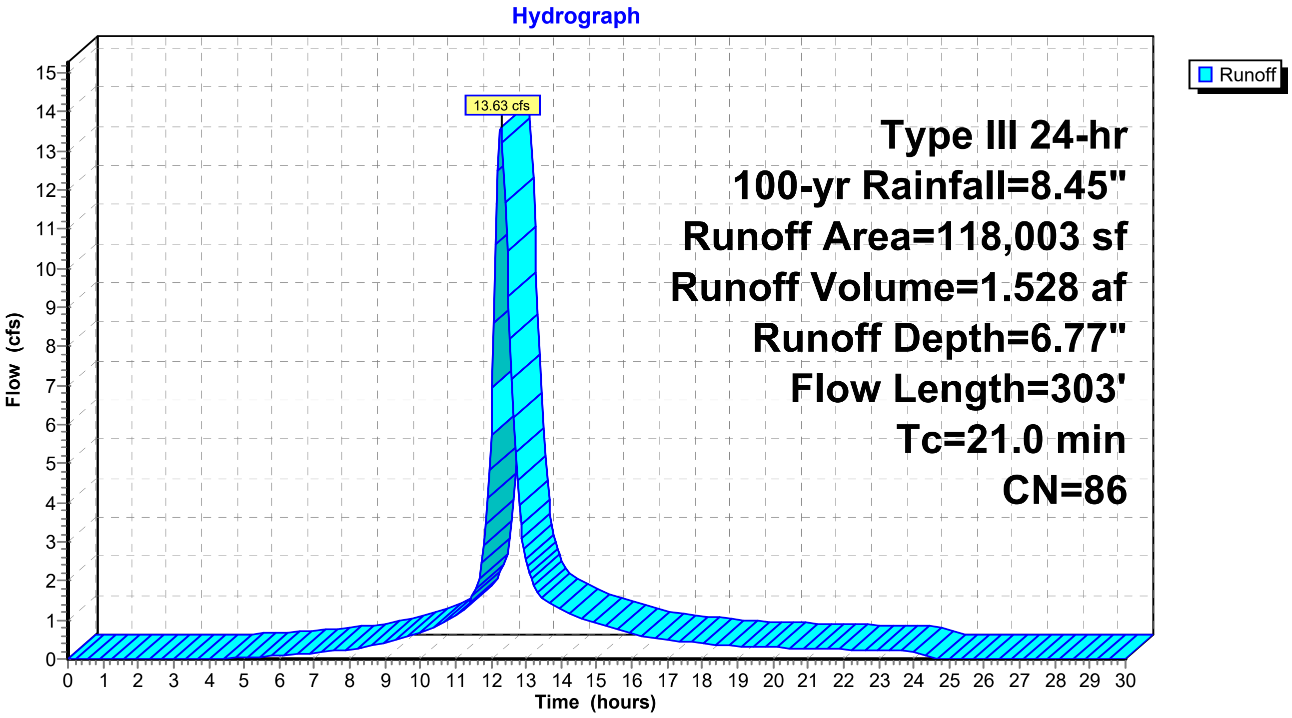
Runoff = 13.63 cfs @ 12.28 hrs, Volume= 1.528 af, Depth= 6.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
29,011	98	Paved parking, HSG D
46,783	83	Woods, Poor, HSG D
17,380	83	Brush, Poor, HSG D
24,829	80	>75% Grass cover, Good, HSG D
118,003	86	Weighted Average
88,992		75.42% Pervious Area
29,011		24.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.1000	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.17"
1.3	203	0.0290	2.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
21.0	303	Total			

Subcatchment 9S: WSD A



Summary for Subcatchment WS 10: WS-10

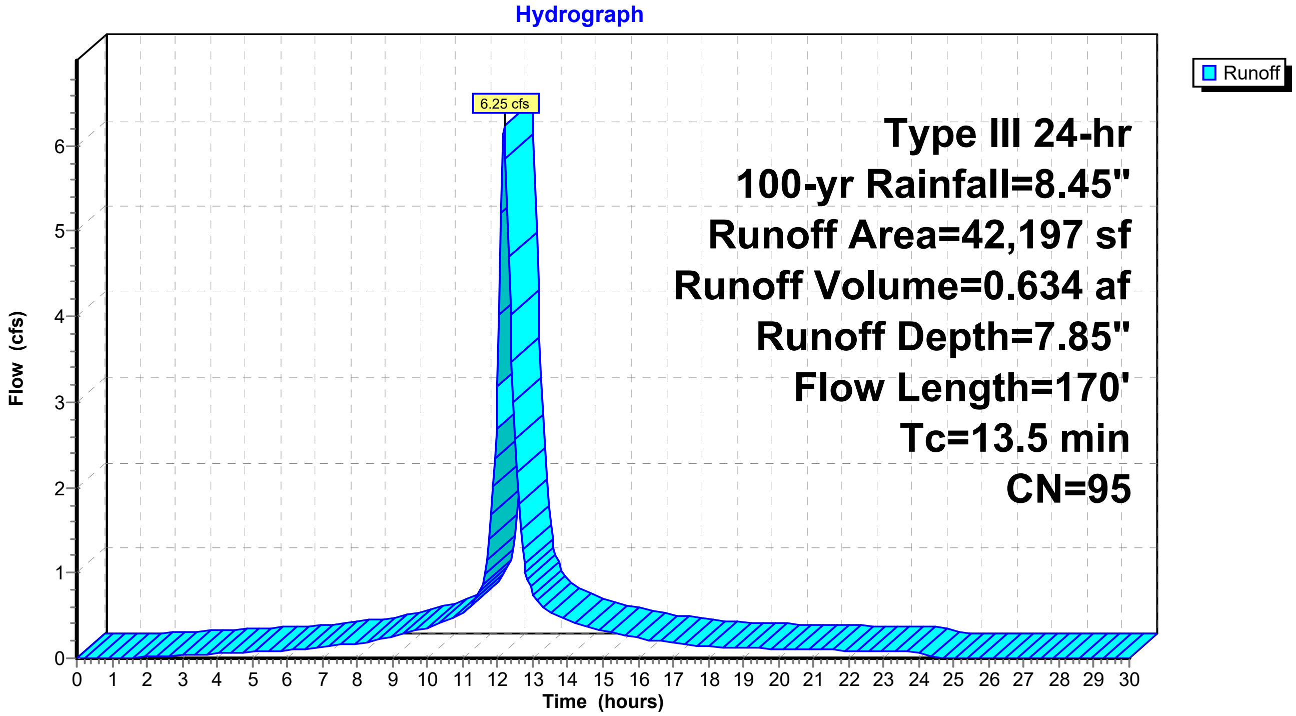
Runoff = 6.25 cfs @ 12.18 hrs, Volume= 0.634 af, Depth= 7.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
34,390	98	Paved parking, HSG D
7,807	80	>75% Grass cover, Good, HSG D
42,197	95	Weighted Average
7,807		18.50% Pervious Area
34,390		81.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	80	0.0500	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	90	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.5	170	Total			

Subcatchment WS 10: WS-10



Summary for Subcatchment WS 2: WS-2

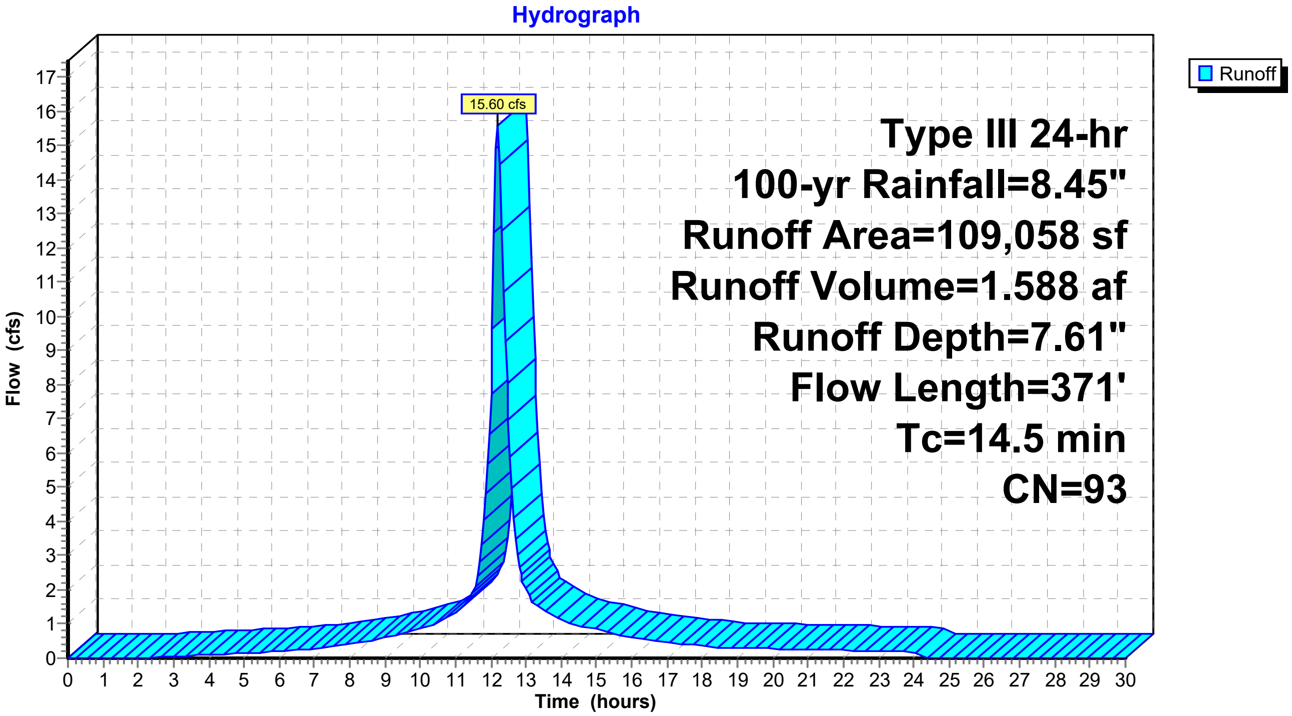
Runoff = 15.60 cfs @ 12.19 hrs, Volume= 1.588 af, Depth= 7.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
77,027	98	Paved parking, HSG D
32,031	80	>75% Grass cover, Good, HSG D
109,058	93	Weighted Average
32,031		29.37% Pervious Area
77,027		70.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0600	0.12		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.3	271	0.0450	16.39	28.97	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010
14.5	371	Total			

Subcatchment WS 2: WS-2



Summary for Subcatchment WS 3: WS-3

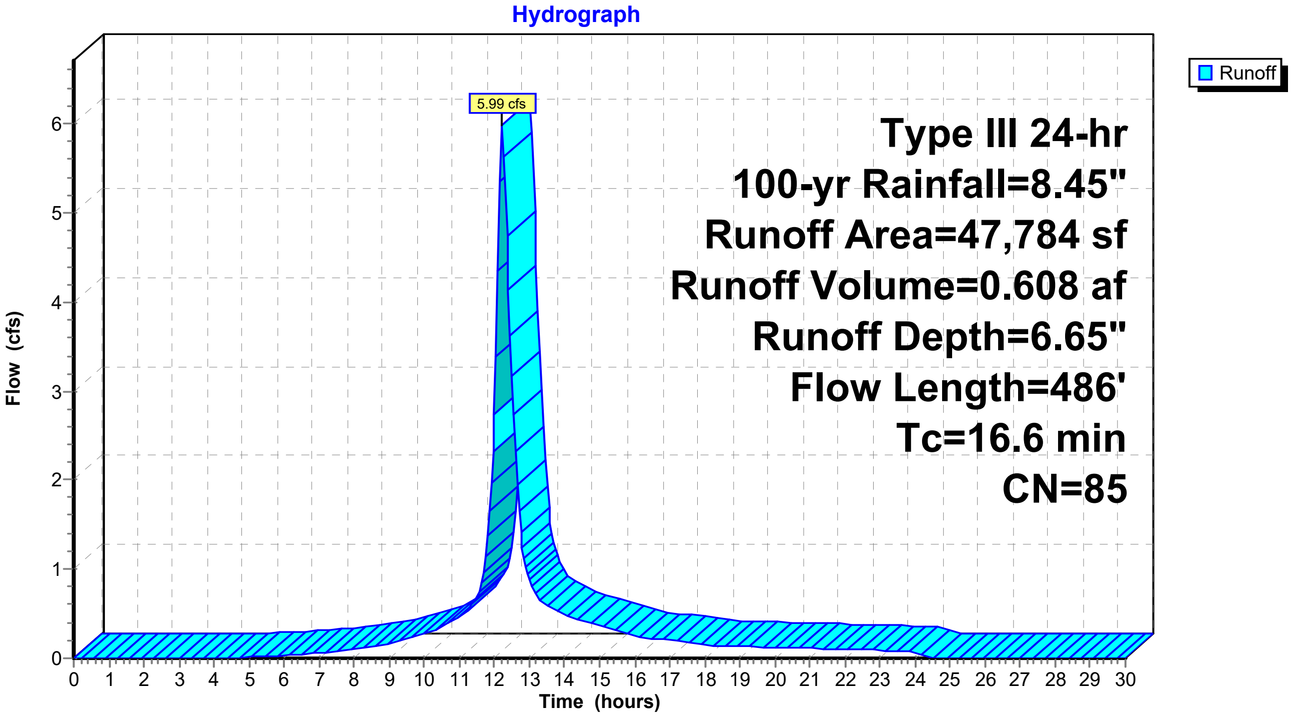
Runoff = 5.99 cfs @ 12.22 hrs, Volume= 0.608 af, Depth= 6.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
13,095	98	Paved parking, HSG D
34,689	80	>75% Grass cover, Good, HSG D
47,784	85	Weighted Average
34,689		72.60% Pervious Area
13,095		27.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0520	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
1.6	386	0.0590	3.91		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	486	Total			

Subcatchment WS 3: WS-3



Summary for Subcatchment WS 4: WS-4

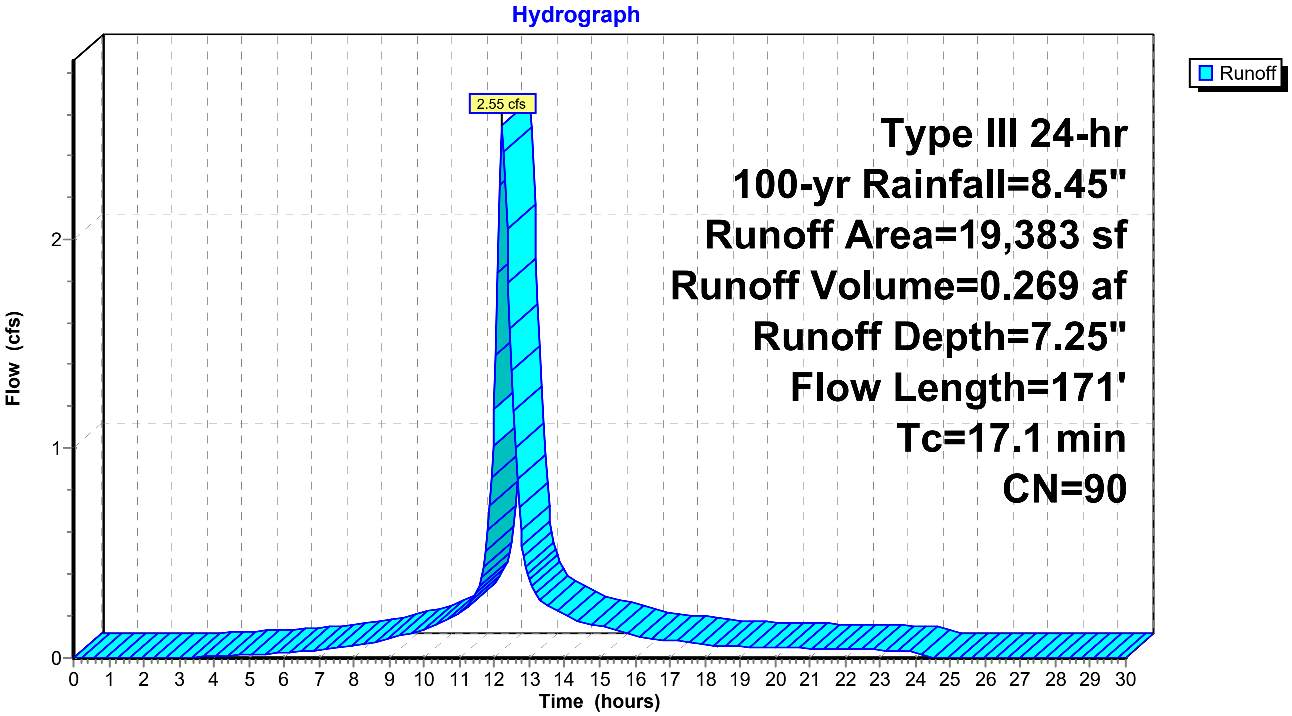
Runoff = 2.55 cfs @ 12.22 hrs, Volume= 0.269 af, Depth= 7.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
10,863	98	Paved parking, HSG D
8,520	80	>75% Grass cover, Good, HSG D
19,383	90	Weighted Average
8,520		43.96% Pervious Area
10,863		56.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	100	0.0400	0.10		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.4	71	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.1	171	Total			

Subcatchment WS 4: WS-4



Summary for Subcatchment WS 5: WS-5

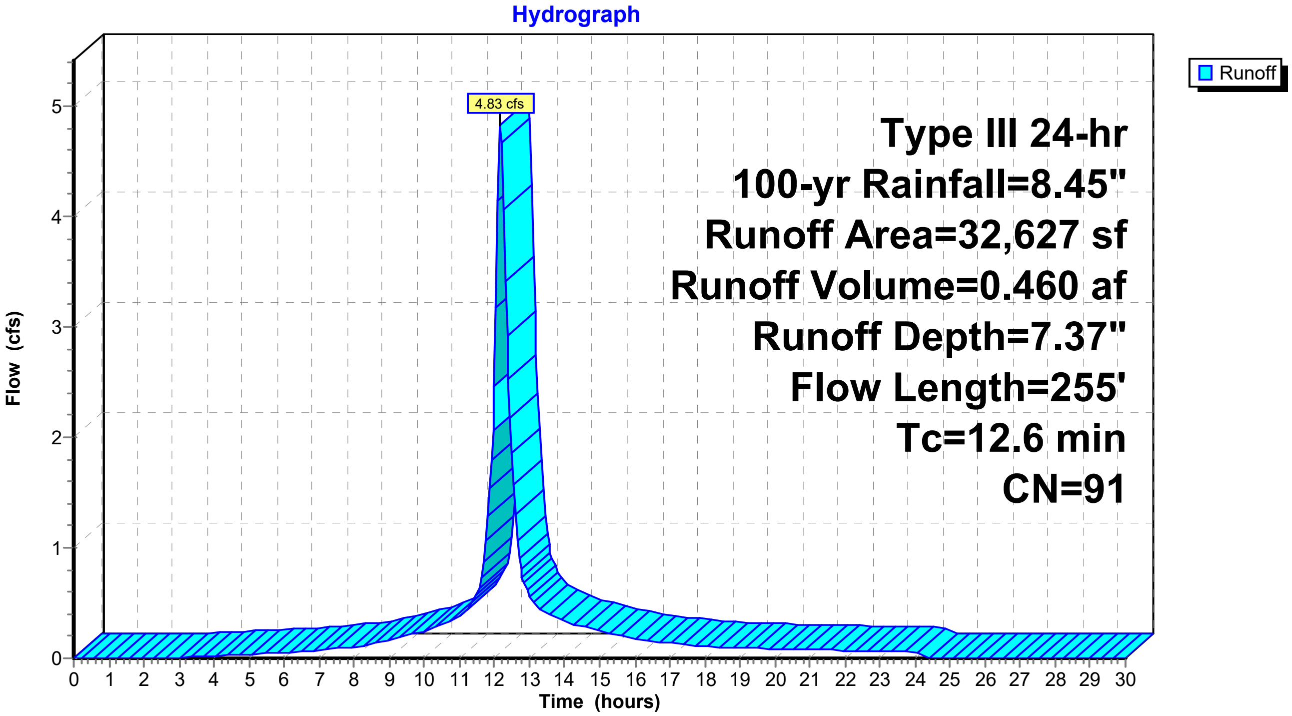
Runoff = 4.83 cfs @ 12.17 hrs, Volume= 0.460 af, Depth= 7.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
19,247	98	Paved parking, HSG D
13,380	80	>75% Grass cover, Good, HSG D
32,627	91	Weighted Average
13,380		41.01% Pervious Area
19,247		58.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	70	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.6	255	Total			

Subcatchment WS 5: WS-5



Summary for Subcatchment WS 6: WS-6

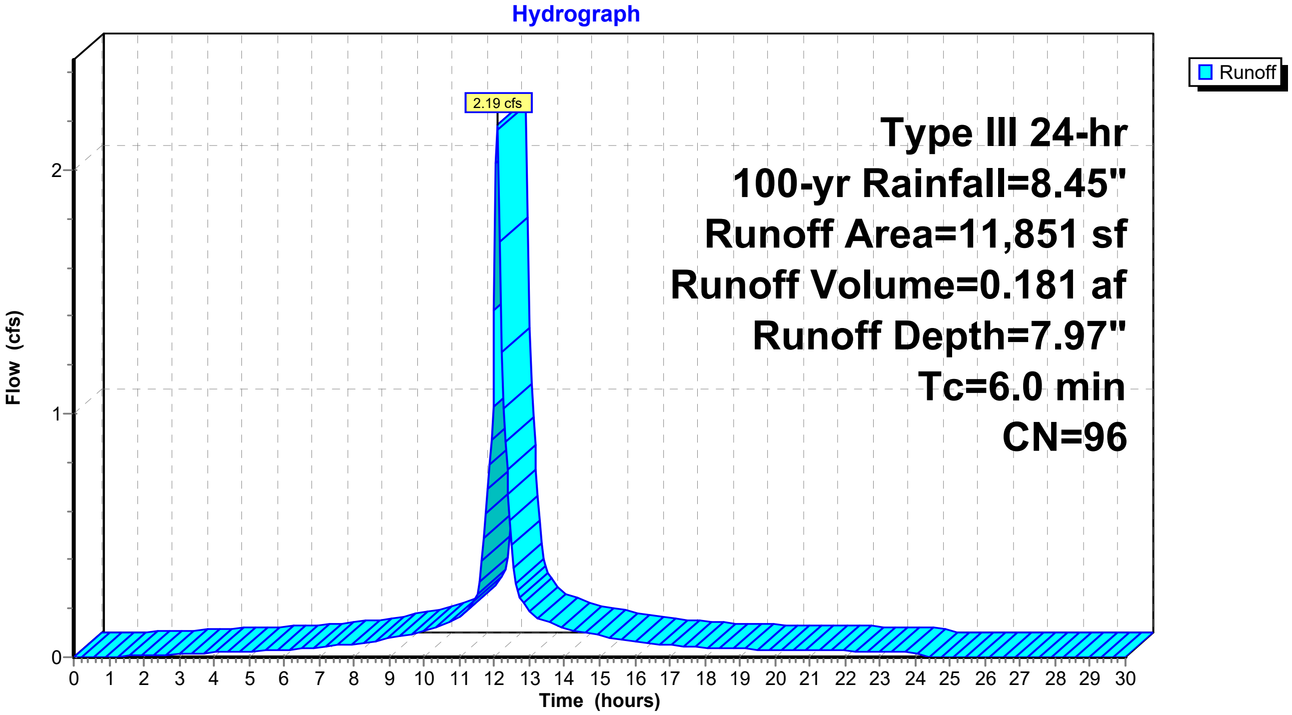
Runoff = 2.19 cfs @ 12.09 hrs, Volume= 0.181 af, Depth= 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
10,691	98	Paved parking, HSG D
1,160	80	>75% Grass cover, Good, HSG D
11,851	96	Weighted Average
1,160		9.79% Pervious Area
10,691		90.21% Impervious Area

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

Subcatchment WS 6: WS-6



Summary for Subcatchment WS 7: WS-7

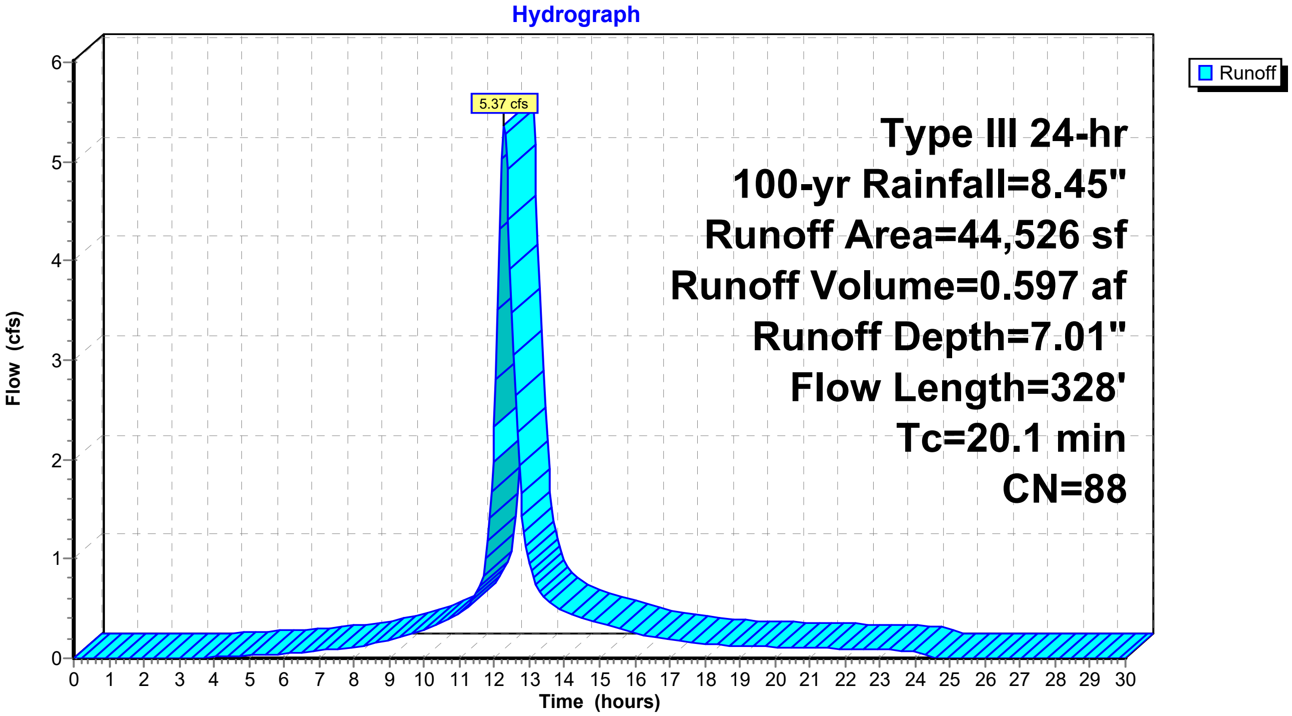
Runoff = 5.37 cfs @ 12.27 hrs, Volume= 0.597 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
19,660	98	Paved parking, HSG D
24,866	80	>75% Grass cover, Good, HSG D
44,526	88	Weighted Average
24,866		55.85% Pervious Area
19,660		44.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	100	0.0100	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
1.2	228	0.0438	3.14		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
20.1	328	Total			

Subcatchment WS 7: WS-7



Summary for Subcatchment WS 8: WS-8

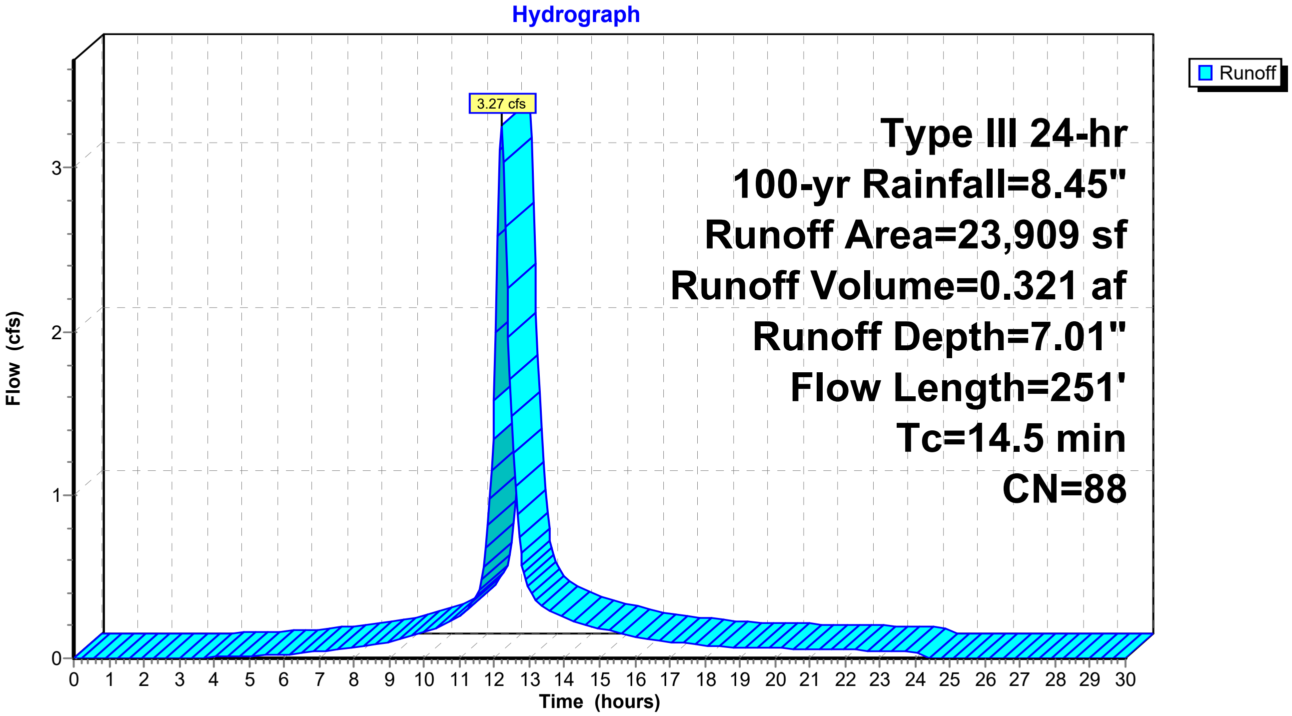
Runoff = 3.27 cfs @ 12.19 hrs, Volume= 0.321 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
10,069	98	Paved parking, HSG D
13,840	80	>75% Grass cover, Good, HSG D
23,909	88	Weighted Average
13,840		57.89% Pervious Area
10,069		42.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0230	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"
0.9	151	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.5	251	Total			

Subcatchment WS 8: WS-8



Summary for Subcatchment WS 9: WS-9

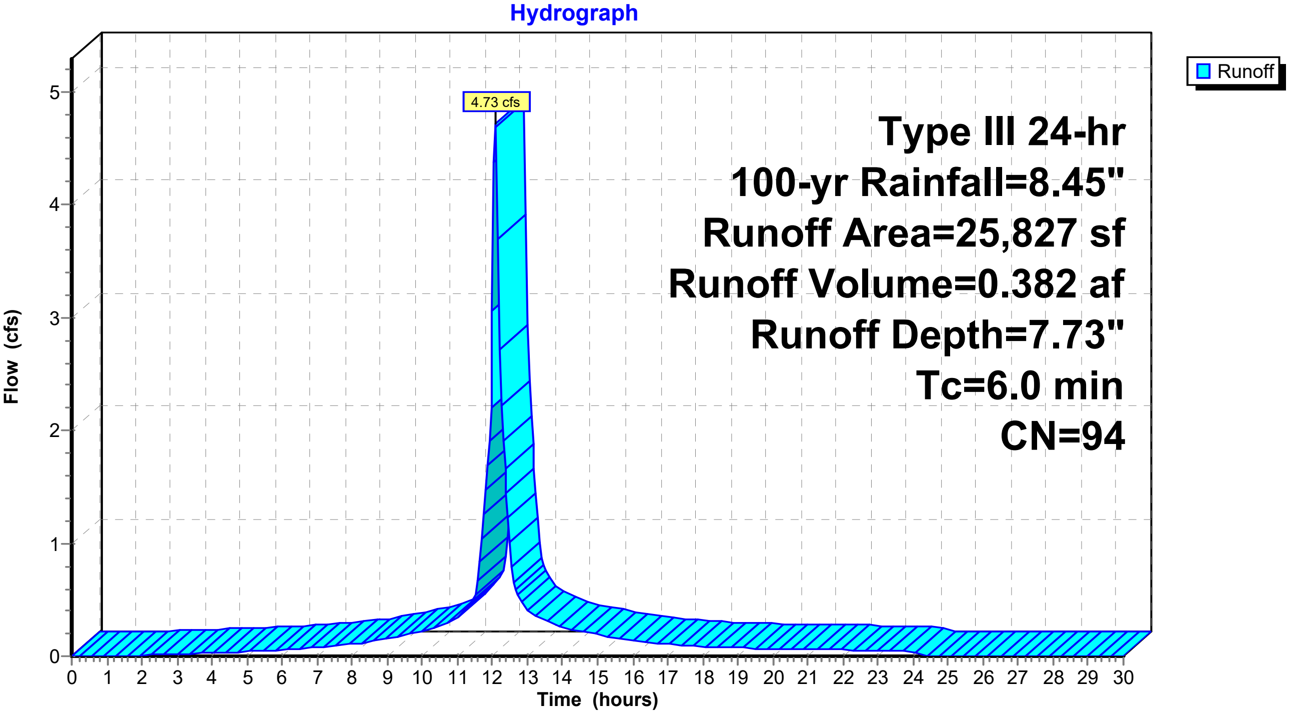
Runoff = 4.73 cfs @ 12.09 hrs, Volume= 0.382 af, Depth= 7.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
20,174	98	Paved parking, HSG D
5,653	80	>75% Grass cover, Good, HSG D
25,827	94	Weighted Average
5,653		21.89% Pervious Area
20,174		78.11% Impervious Area

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

Subcatchment WS 9: WS-9



Summary for Subcatchment WS-1: WS-1

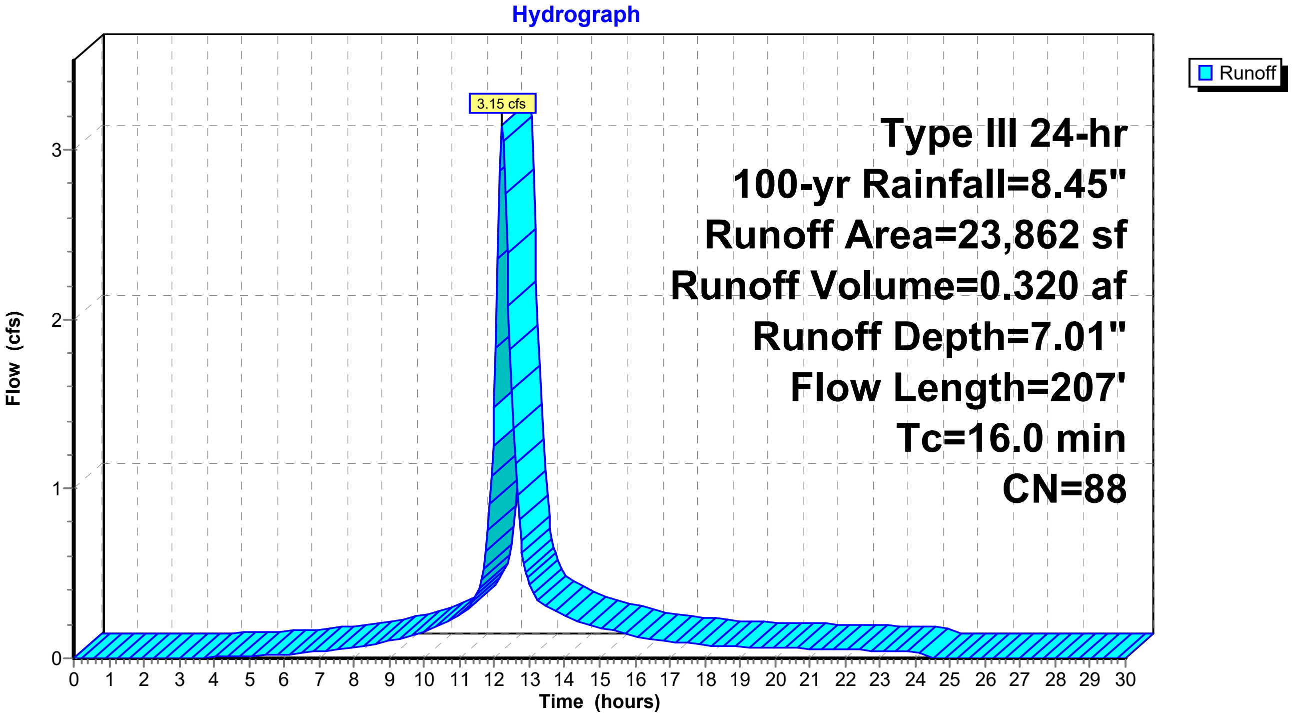
Runoff = 3.15 cfs @ 12.21 hrs, Volume= 0.320 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.45"

Area (sf)	CN	Description
10,610	98	Paved parking, HSG D
13,252	80	>75% Grass cover, Good, HSG D
23,862	88	Weighted Average
13,252		55.54% Pervious Area
10,610		44.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0500	0.11		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 3.17"
0.7	107	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	207	Total			

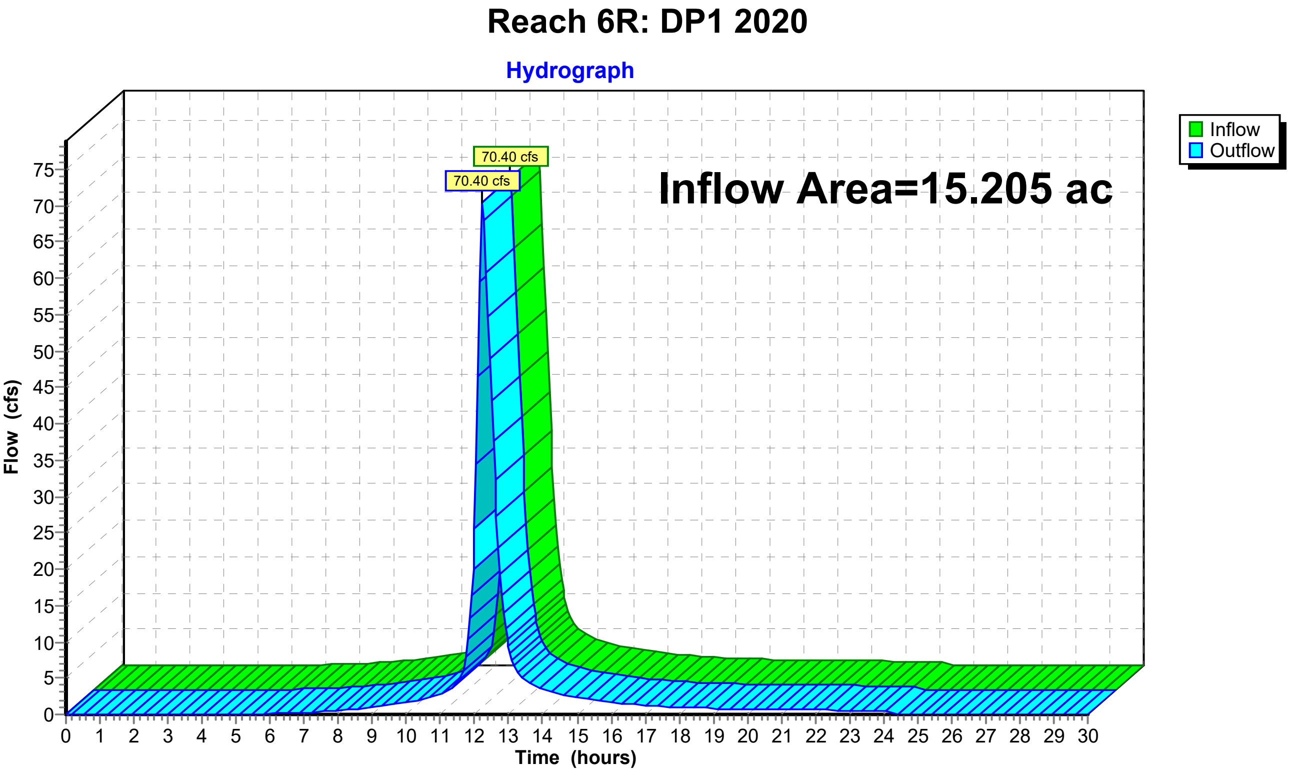
Subcatchment WS-1: WS-1



Summary for Reach 6R: DP1 2020

Inflow Area =	15.205 ac,	38.77% Impervious,	Inflow Depth = 4.38"	for 100-yr event
Inflow =	70.40 cfs @	12.23 hrs, Volume=	5.545 af	
Outflow =	70.40 cfs @	12.23 hrs, Volume=	5.545 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Pond P-1: P-1 IN. POND

```
Inflow Area =       0.548 ac, 44.46% Impervious, Inflow Depth =  7.01"   for 100-yr event
Inflow      =      3.15 cfs @  12.21 hrs, Volume=          0.320 af
Outflow     =      3.12 cfs @  12.24 hrs, Volume=          0.320 af, Atten= 1%, Lag= 1.8 min
Discarded   =      0.47 cfs @  12.24 hrs, Volume=          0.246 af
Primary     =      2.65 cfs @  12.24 hrs, Volume=          0.074 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 731.65' @ 12.24 hrs   Surf.Area= 1,690 sf   Storage= 2,092 cf

Plug-Flow detention time= 24.1 min calculated for 0.319 af (100% of inflow)
Center-of-Mass det. time= 24.1 min ( 813.8 - 789.7 )

Volume      Invert    Avail.Storage   Storage Description
   #1       730.00'        4,836 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

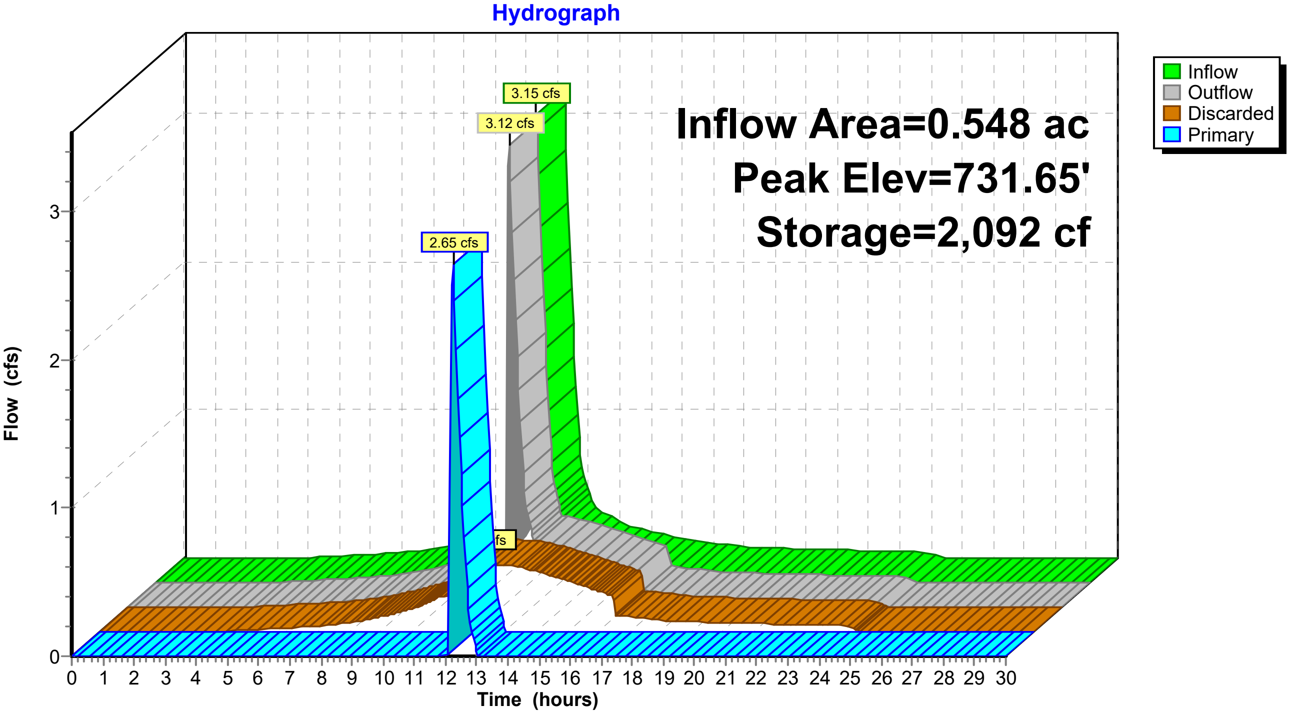
 Elevation         Surf.Area          Inc.Store         Cum.Store
    (feet)           (sq-ft)       (cubic-feet)      (cubic-feet)
    730.00               844                  0                 0
    733.00             2,380              4,836             4,836

Device   Routing          Invert   Outlet Devices
   #1    Primary         731.50'   16.0' long  x 0.5' breadth Broad-Crested Rectangular Weir
                                   Head (feet)  0.20  0.40  0.60  0.80  1.00
                                   Coef. (English)  2.80  2.92  3.08  3.30  3.32
   #2    Discarded       730.00'   12.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.47 cfs @ 12.24 hrs  HW=731.65'   (Free Discharge)
⬑2=Exfiltration  (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=2.62 cfs @ 12.24 hrs  HW=731.65'   (Free Discharge)
⬑1=Broad-Crested Rectangular Weir (Weir Controls 2.62 cfs @ 1.09 fps)
```

Pond P-1: P-1 IN. POND



Summary for Pond P-10: P-10 SUB. IN

Inflow Area = 0.969 ac, 81.50% Impervious, Inflow Depth = 7.85" for 100-yr event
Inflow = 6.25 cfs @ 12.18 hrs, Volume= 0.634 af
Outflow = 4.72 cfs @ 12.30 hrs, Volume= 0.634 af, Atten= 25%, Lag= 7.5 min
Discarded = 0.66 cfs @ 11.35 hrs, Volume= 0.442 af
Primary = 4.05 cfs @ 12.30 hrs, Volume= 0.192 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 721.01' @ 12.30 hrs Surf.Area= 2,389 sf Storage= 3,682 cf

Plug-Flow detention time= 11.3 min calculated for 0.633 af (100% of inflow)
Center-of-Mass det. time= 11.3 min (774.1 - 762.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	2,720 cf	**11.00'W x 217.22'L x 4.00'H Field A** 9,558 cf Overall - 2,756 cf Embedded = 6,801 cf x 40.0% Voids
#2A	719.50'	2,756 cf	**ADS_StormTech SC-740 +Cap** x 60 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 60 Chambers in 2 Rows
		5,477 cf	Total Available Storage

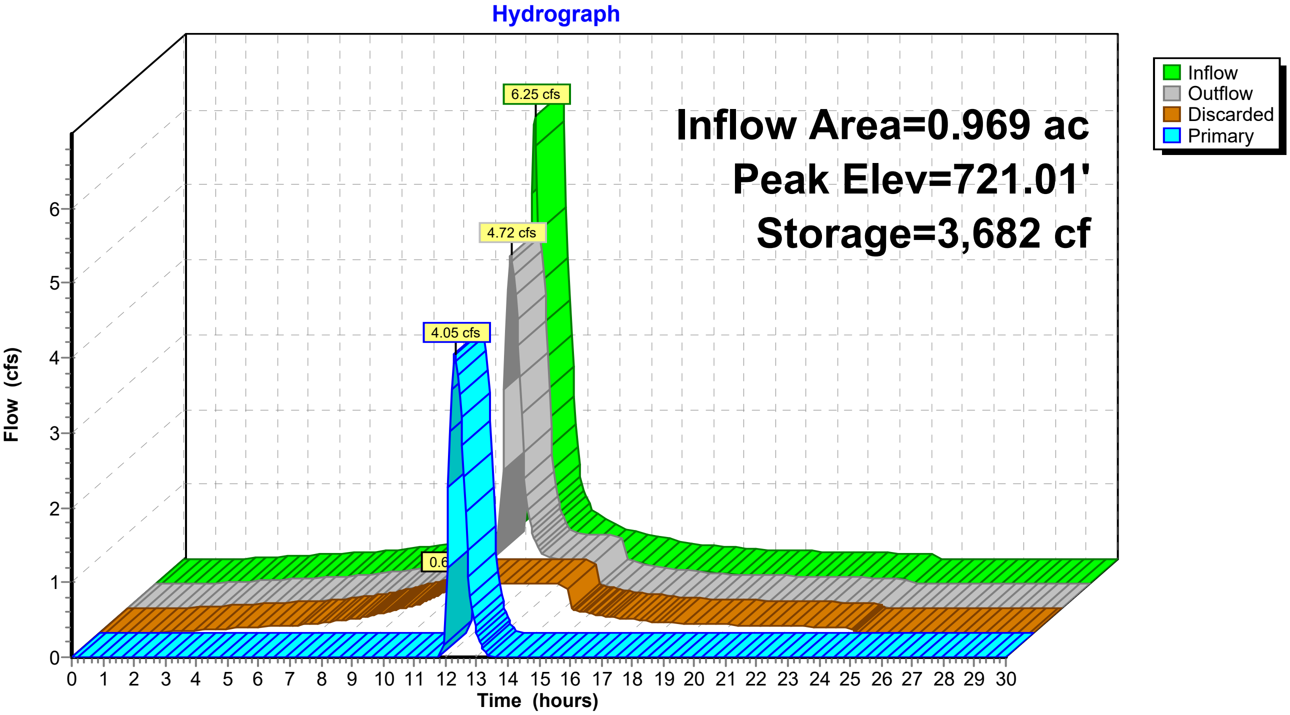
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.75'	**20.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.66 cfs @ 11.35 hrs HW=718.54' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.66 cfs)

Primary OutFlow Max=4.04 cfs @ 12.30 hrs HW=721.01' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.30 fps)
└─**2=Orifice/Grate** (Orifice Controls 4.03 cfs @ 4.83 fps)

Pond P-10: P-10 SUB. IN



Summary for Pond P-2: P-2 SUB. IN

Inflow Area = 2.504 ac, 70.63% Impervious, Inflow Depth = 7.61" for 100-yr event
Inflow = 15.60 cfs @ 12.19 hrs, Volume= 1.588 af
Outflow = 11.25 cfs @ 12.34 hrs, Volume= 1.588 af, Atten= 28%, Lag= 9.0 min
Discarded = 1.28 cfs @ 10.95 hrs, Volume= 0.980 af
Primary = 9.98 cfs @ 12.34 hrs, Volume= 0.607 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 721.57' @ 12.34 hrs Surf.Area= 4,594 sf Storage= 8,971 cf

Plug-Flow detention time= 10.0 min calculated for 1.585 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (781.9 - 771.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	718.50'	5,035 cf	**30.00'W x 153.14'L x 4.00'H Field A** 18,376 cf Overall - 5,788 cf Embedded = 12,588 cf x 40.0% Voids
#2A	719.50'	5,788 cf	**ADS_StormTech SC-740 +Cap** x 126 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 126 Chambers in 6 Rows
		10,824 cf	Total Available Storage

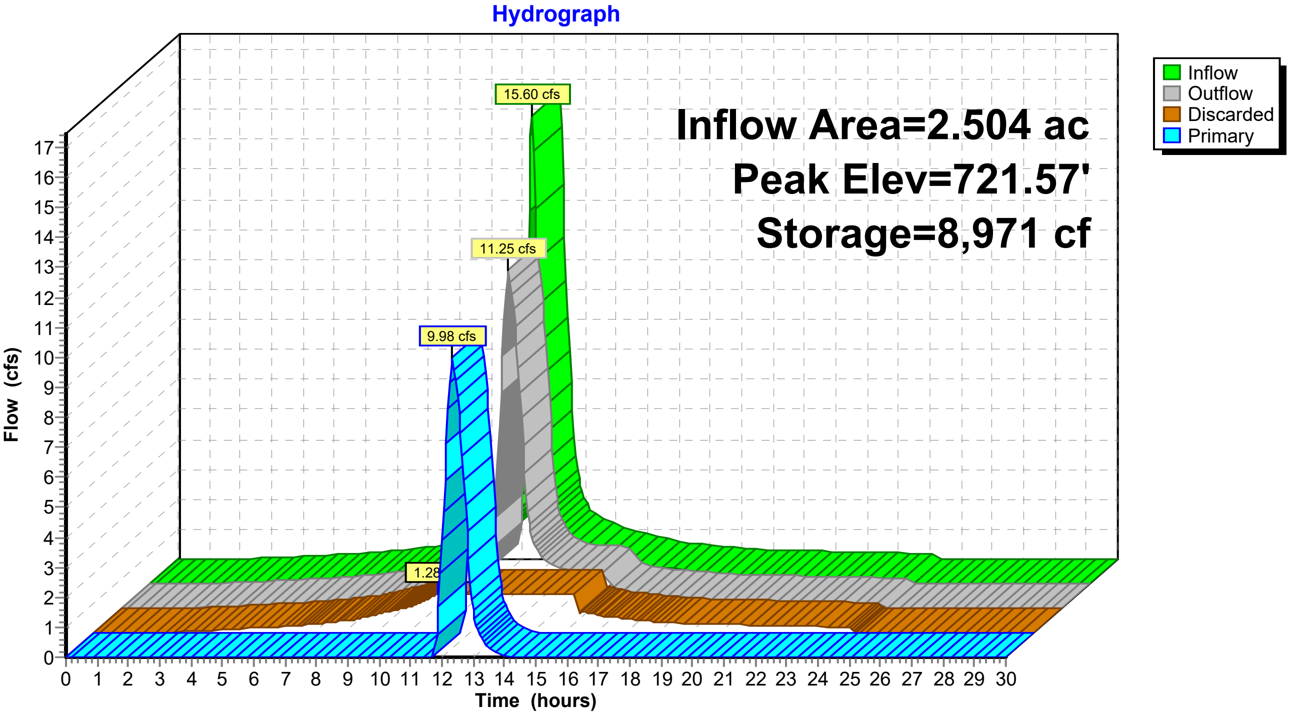
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	721.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	719.50'	**36.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	718.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 10.95 hrs HW=718.54' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.28 cfs)

Primary OutFlow Max=9.93 cfs @ 12.34 hrs HW=721.57' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.20 cfs @ 0.73 fps)
└─**2=Orifice/Grate** (Orifice Controls 9.73 cfs @ 6.49 fps)

Pond P-2: P-2 SUB. IN



Summary for Pond P-3: P-3 SUB. IN

```
Inflow Area =       1.097 ac, 27.40% Impervious, Inflow Depth =  6.65"   for 100-yr event
Inflow     =       5.99 cfs @  12.22 hrs, Volume=          0.608 af
Outflow    =       5.97 cfs @  12.23 hrs, Volume=          0.608 af, Atten= 0%, Lag= 0.7 min
Discarded  =       0.27 cfs @  10.00 hrs, Volume=          0.293 af
Primary    =       5.70 cfs @  12.23 hrs, Volume=          0.315 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.60' @ 12.23 hrs Surf.Area= 963 sf Storage= 1,637 cf

Plug-Flow detention time= 21.4 min calculated for 0.607 af (100% of inflow)
Center-of-Mass det. time= 21.3 min (819.8 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	724.00'	907 cf	**30.00'W x 32.10'L x 3.50'H Field A** 3,370 cf Overall - 1,103 cf Embedded = 2,268 cf x 40.0% Voids
#2A	724.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 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 24 Chambers in 6 Rows
		2,010 cf	Total Available Storage

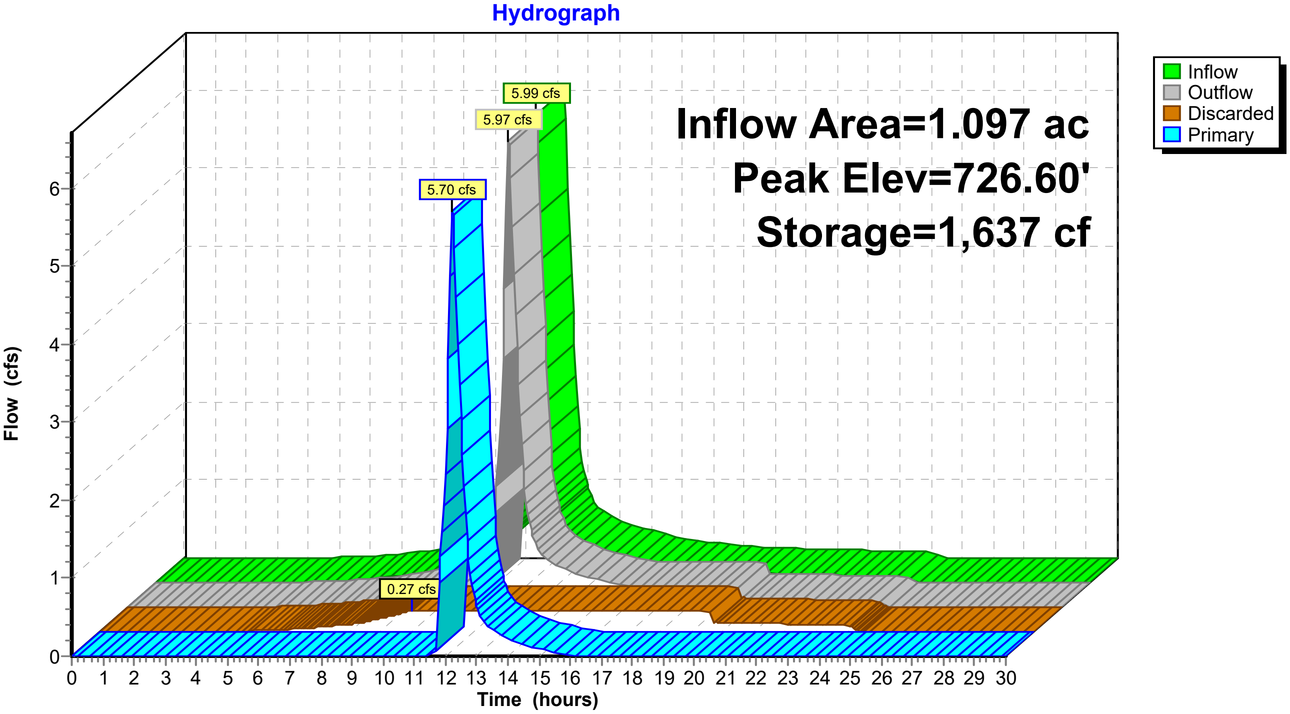
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	726.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	724.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 10.00 hrs HW=724.04' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=5.64 cfs @ 12.23 hrs HW=726.59' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.64 cfs @ 2.37 fps)

Pond P-3: P-3 SUB. IN



Summary for Pond P-4: P-4 SUB. IN

```
Inflow Area =        0.445 ac, 56.04% Impervious, Inflow Depth =  7.25"   for 100-yr event
Inflow      =        2.55 cfs @  12.22 hrs, Volume=          0.269 af
Outflow     =        3.03 cfs @  12.21 hrs, Volume=          0.269 af, Atten= 0%, Lag= 0.0 min
Discarded   =        0.23 cfs @  11.20 hrs, Volume=          0.191 af
Primary     =        2.80 cfs @  12.21 hrs, Volume=          0.078 af
```

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 713.39' @ 12.22 hrs Surf.Area= 842 sf Storage= 1,552 cf

Plug-Flow detention time= 29.9 min calculated for 0.268 af (100% of inflow)
Center-of-Mass det. time= 29.9 min (814.5 - 784.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.50'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	711.00'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 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 21 Chambers in 3 Rows
		1,758 cf	Total Available Storage

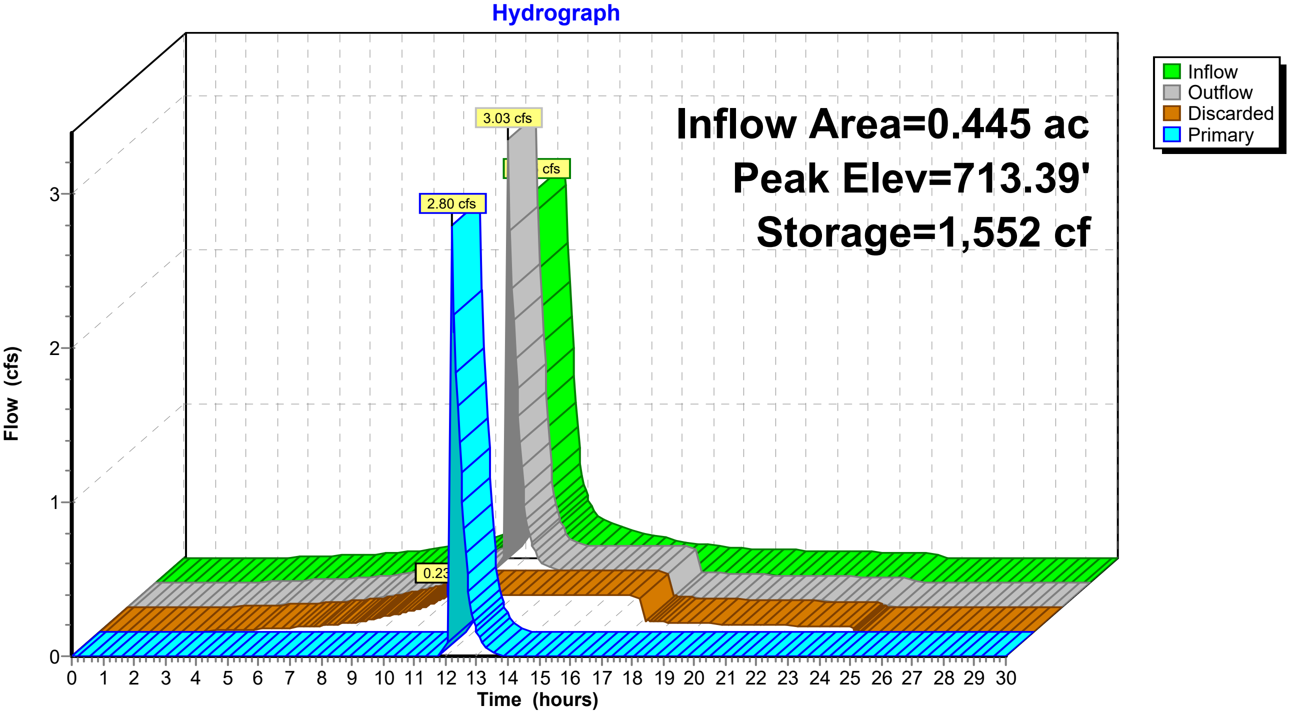
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	710.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.23 cfs @ 11.20 hrs HW=710.54' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=2.50 cfs @ 12.21 hrs HW=713.36' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.50 cfs @ 1.74 fps)

Pond P-4: P-4 SUB. IN



Summary for Pond P-5: P-5 SUB. IN

Inflow Area = 0.749 ac, 58.99% Impervious, Inflow Depth = 7.37" for 100-yr event
Inflow = 4.83 cfs @ 12.17 hrs, Volume= 0.460 af
Outflow = 4.08 cfs @ 12.25 hrs, Volume= 0.460 af, Atten= 16%, Lag= 5.2 min
Discarded = 0.39 cfs @ 11.05 hrs, Volume= 0.303 af
Primary = 3.69 cfs @ 12.25 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 713.02' @ 12.26 hrs Surf.Area= 1,390 sf Storage= 2,617 cf

Plug-Flow detention time= 17.8 min calculated for 0.459 af (100% of inflow)
Center-of-Mass det. time= 17.7 min (794.9 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	710.00'	1,563 cf	**30.00'W x 46.34'L x 4.00'H Field A** 5,560 cf Overall - 1,654 cf Embedded = 3,907 cf x 40.0% Voids
#2A	711.00'	1,654 cf	**ADS_StormTech SC-740 +Cap** x 36 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 36 Chambers in 6 Rows
		3,216 cf	Total Available Storage

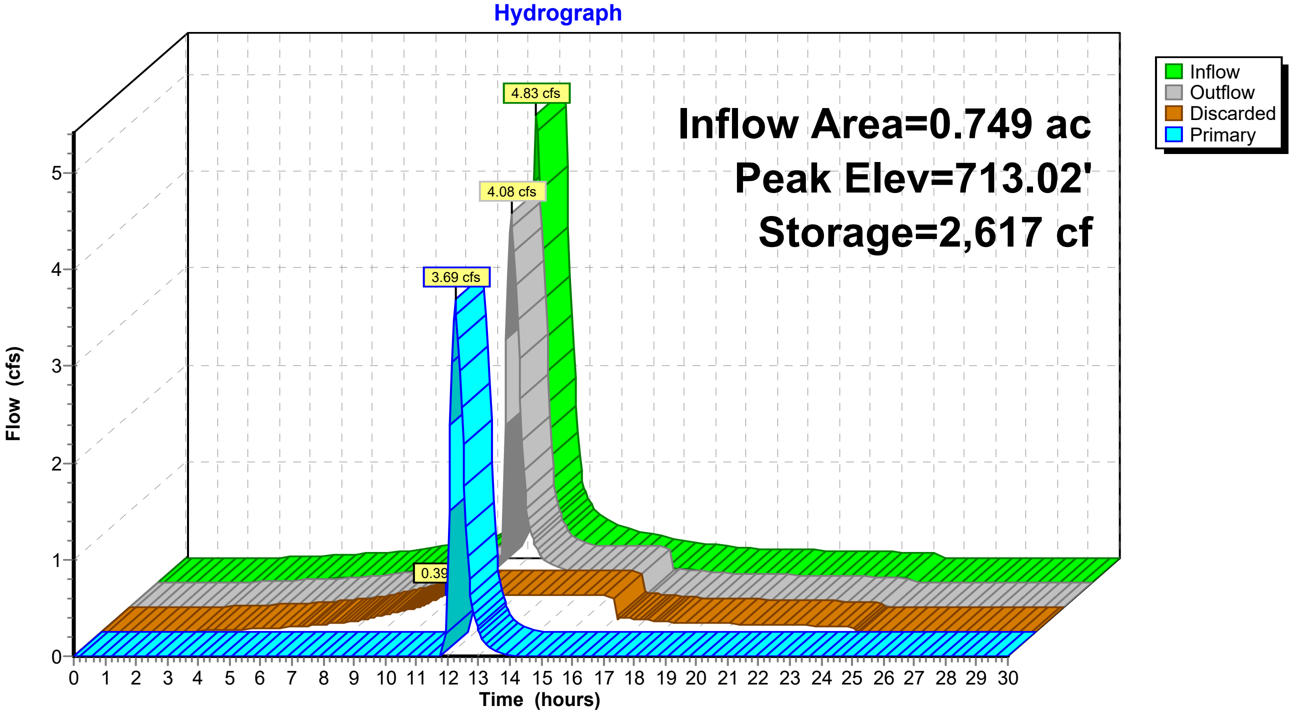
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	711.75'	**18.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	710.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.39 cfs @ 11.05 hrs HW=710.04' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=3.66 cfs @ 12.25 hrs HW=713.02' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.37 fps)
└─**2=Orifice/Grate** (Orifice Controls 3.63 cfs @ 4.84 fps)

Pond P-5: P-5 SUB. IN



Summary for Pond P-6: P-6 SUB. IN

Inflow Area = 0.272 ac, 90.21% Impervious, Inflow Depth = 7.97" for 100-yr event
Inflow = 2.19 cfs @ 12.09 hrs, Volume= 0.181 af
Outflow = 1.26 cfs @ 12.26 hrs, Volume= 0.181 af, Atten= 42%, Lag= 10.3 min
Discarded = 0.27 cfs @ 11.60 hrs, Volume= 0.165 af
Primary = 0.99 cfs @ 12.26 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 711.50' @ 12.26 hrs Surf.Area= 954 sf Storage= 1,806 cf

Plug-Flow detention time= 34.9 min calculated for 0.180 af (100% of inflow)
Center-of-Mass det. time= 34.8 min (786.2 - 751.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	708.50'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	709.00'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 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 24 Chambers in 3 Rows
		1,997 cf	Total Available Storage

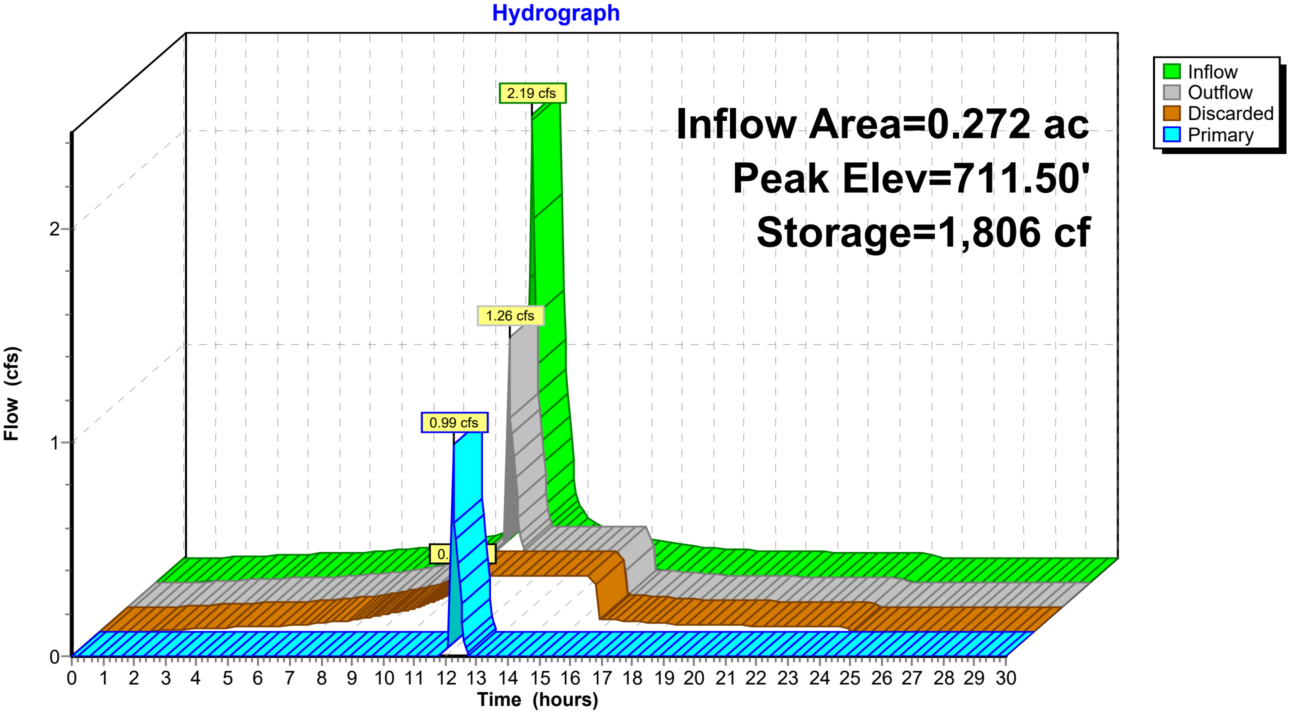
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	711.30'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	708.50'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.60 hrs HW=708.55' (Free Discharge)
⮤**2=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.91 cfs @ 12.26 hrs HW=711.49' (Free Discharge)
⮤**1=Broad-Crested Rectangular Weir** (Weir Controls 0.91 cfs @ 1.21 fps)

Pond P-6: P-6 SUB. IN



Summary for Pond P-7: P-7 IN. POND

```
Inflow Area =     1.022 ac,  44.15% Impervious,  Inflow Depth =  7.01"   for  100-yr event
Inflow      =     5.37 cfs @  12.27 hrs,  Volume=         0.597 af
Outflow     =     5.35 cfs @  12.28 hrs,  Volume=         0.597 af,  Atten= 0%,  Lag= 0.7 min
Discarded   =     0.45 cfs @  12.28 hrs,  Volume=         0.380 af
Primary     =     4.89 cfs @  12.28 hrs,  Volume=         0.217 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 702.73' @ 12.28 hrs   Surf.Area= 1,634 sf   Storage= 3,388 cf

Plug-Flow detention time= 42.1 min calculated for 0.596 af (100% of inflow)
Center-of-Mass det. time= 42.0 min ( 835.5 - 793.5 )

Volume      Invert    Avail.Storage   Storage Description
   #1       700.00'        5,700 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

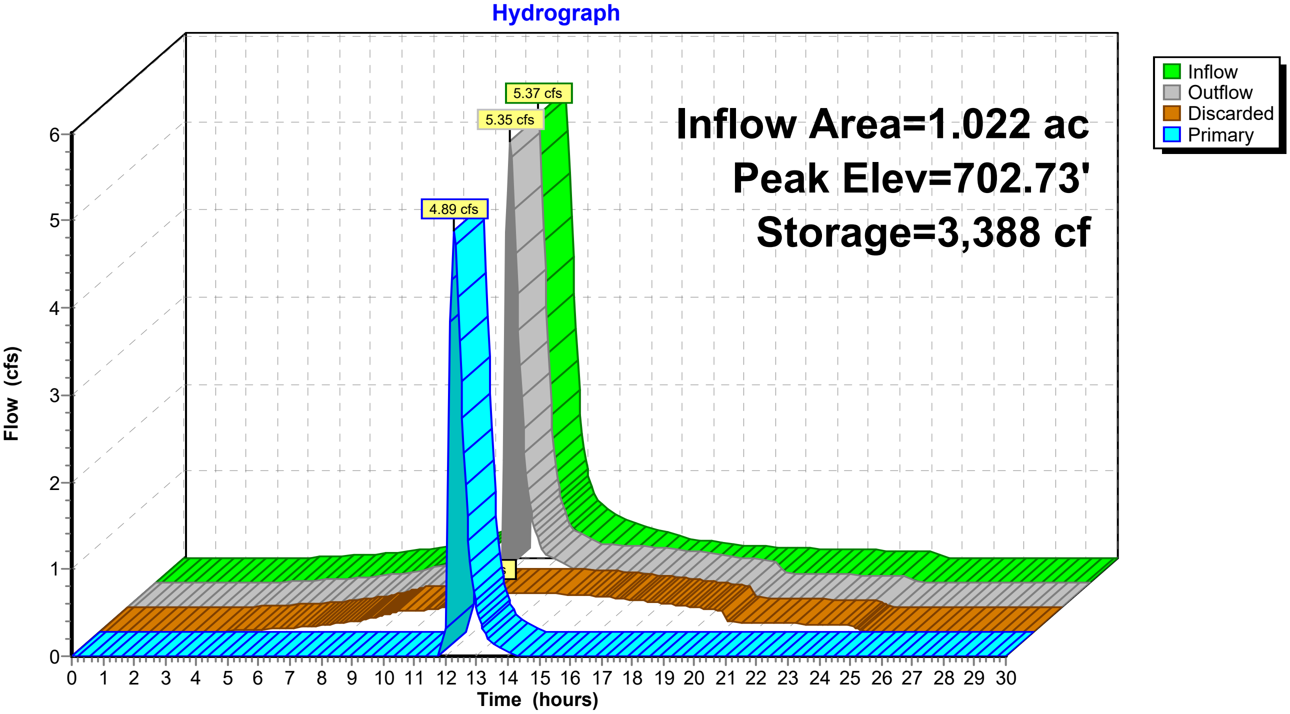
 Elevation        Surf.Area        Inc.Store       Cum.Store
    (feet)          (sq-ft)      (cubic-feet)    (cubic-feet)
    700.00              850                0               0
    704.00            2,000            5,700           5,700

Device   Routing           Invert   Outlet Devices
   #1    Primary          702.50'   16.0' long  x 0.5' breadth Broad-Crested Rectangular Weir
                                    Head (feet)  0.20  0.40  0.60  0.80  1.00
                                    Coef. (English)  2.80  2.92  3.08  3.30  3.32
   #2    Discarded        700.00'   12.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.45 cfs @ 12.28 hrs  HW=702.73'   (Free Discharge)
└─2=Exfiltration  (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=4.85 cfs @ 12.28 hrs  HW=702.73'   (Free Discharge)
└─1=Broad-Crested Rectangular Weir(Weir Controls 4.85 cfs @ 1.34 fps)
```

Pond P-7: P-7 IN. POND



Summary for Pond P-8: P-8 IN. POND

Inflow Area = 0.549 ac, 42.11% Impervious, Inflow Depth = 7.01" for 100-yr event
Inflow = 3.27 cfs @ 12.19 hrs, Volume= 0.321 af
Outflow = 3.44 cfs @ 12.22 hrs, Volume= 0.321 af, Atten= 0%, Lag= 1.3 min
Discarded = 0.43 cfs @ 12.22 hrs, Volume= 0.240 af
Primary = 3.01 cfs @ 12.22 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 731.92' @ 12.22 hrs Surf.Area= 1,560 sf Storage= 2,130 cf

Plug-Flow detention time= 28.2 min calculated for 0.320 af (100% of inflow)
Center-of-Mass det. time= 28.1 min (816.4 - 788.3)

Volume	Invert	Avail.Storage	Storage Description
#1	730.00'	6,864 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

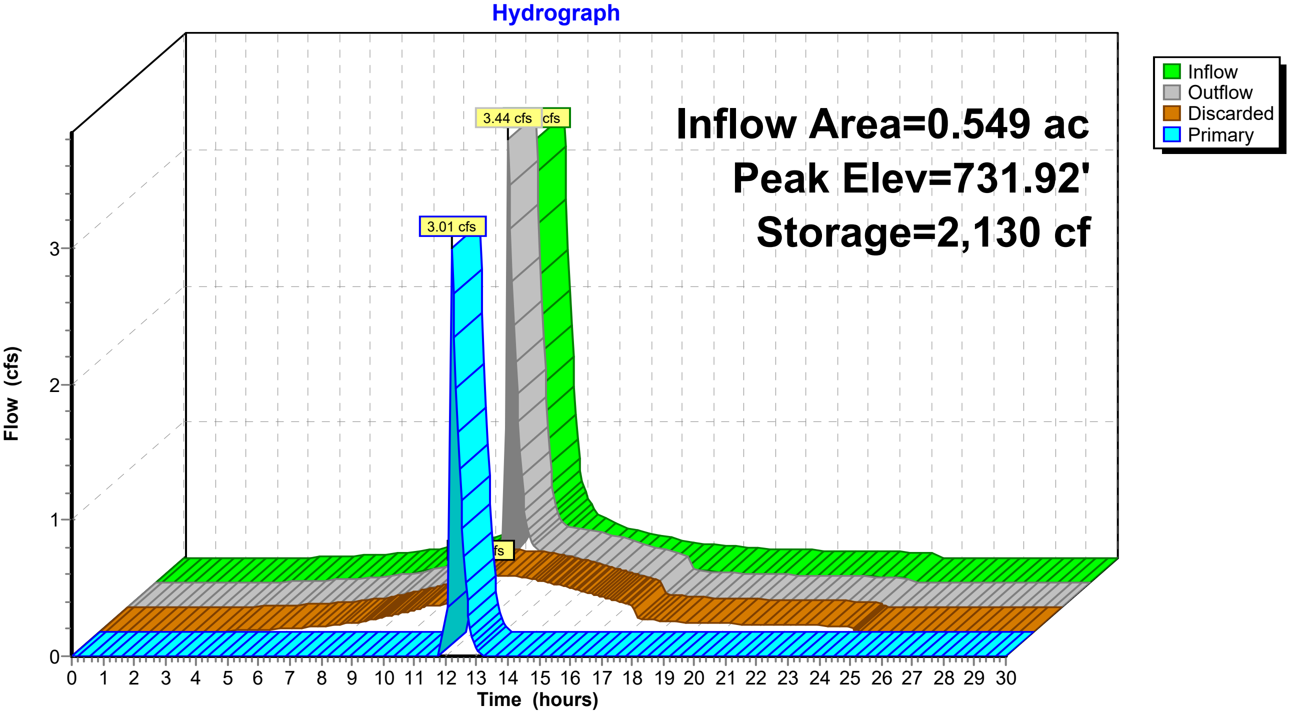
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
730.00	664	0	0
732.00	1,600	2,264	2,264
734.00	3,000	4,600	6,864

Device	Routing	Invert	Outlet Devices
#1	Primary	731.75'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	730.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.43 cfs @ 12.22 hrs HW=731.91' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=2.84 cfs @ 12.22 hrs HW=731.91' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir**(Weir Controls 2.84 cfs @ 1.12 fps)

Pond P-8: P-8 IN. POND



Summary for Pond P-9: P-9 BIO. POND

Inflow Area = 0.593 ac, 78.11% Impervious, Inflow Depth = 7.73" for 100-yr event
Inflow = 4.73 cfs @ 12.09 hrs, Volume= 0.382 af
Outflow = 4.63 cfs @ 12.11 hrs, Volume= 0.360 af, Atten= 2%, Lag= 1.2 min
Primary = 4.63 cfs @ 12.11 hrs, Volume= 0.360 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 726.72' @ 12.11 hrs Surf.Area= 2,160 sf Storage= 1,425 cf

Plug-Flow detention time= 60.1 min calculated for 0.359 af (94% of inflow)
Center-of-Mass det. time= 28.1 min (788.2 - 760.1)

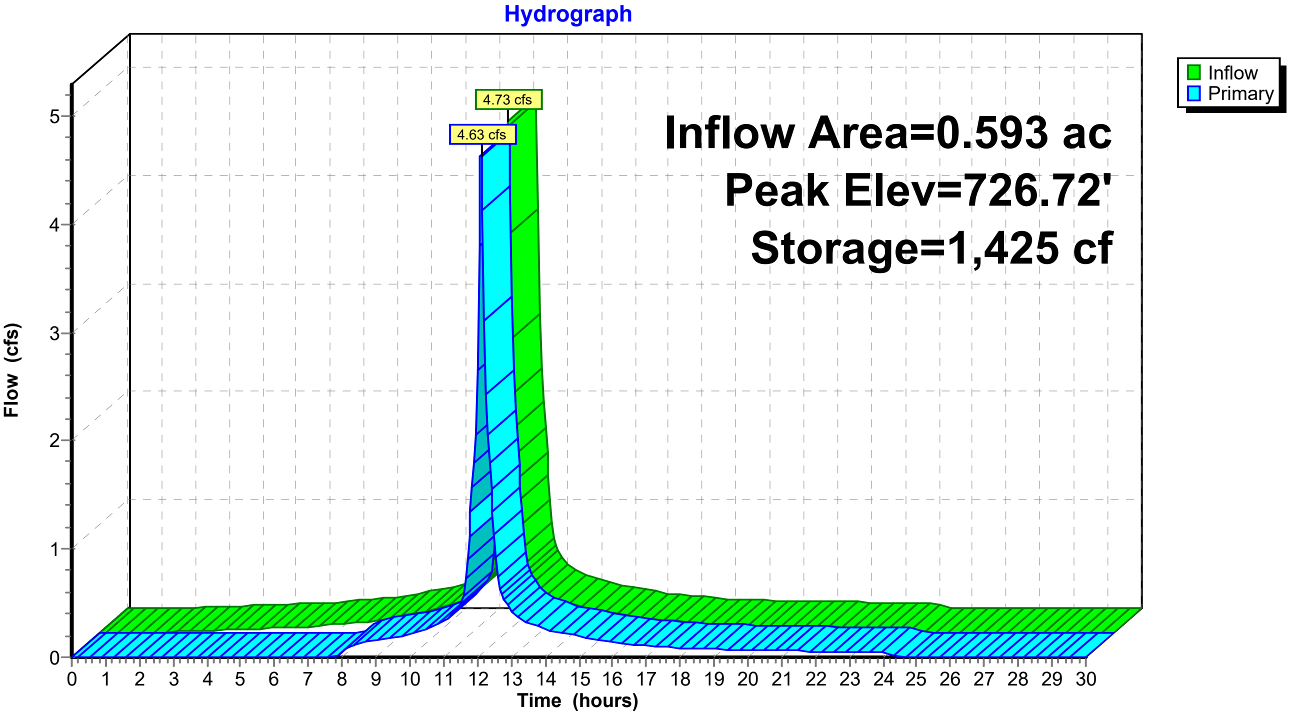
Volume	Invert	Avail.Storage	Storage Description
#1	726.00'	4,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
726.00	1,800	0	0
728.00	2,800	4,600	4,600

Device	Routing	Invert	Outlet Devices
#1	Primary	726.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.56 cfs @ 12.11 hrs HW=726.72' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 4.56 cfs @ 1.31 fps)

Pond P-9: P-9 BIO. POND



APPENDIX 3

NYSDEC GREEN INFRASTRUCTURE WORKSHEETS

Version 1.6
Last Updated: 10/27/2017

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

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

Design Point:	South West	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description		
1	0.53	0.23	43%	0.43	1,173	Infiltration Basin		
2	2.50	1.77	71%	0.69	8,723	Infiltration Basin		
3	0.84	0.19	22%	0.25	1,068	Infiltration Basin		
4								
5								
6								
7								
8								
9								
10								
Subtotal (1-30)	3.87	2.18	56%	0.56	**10,964**	**Subtotal 1**		
Total	3.87	2.18	56%	0.56	**10,964**	**Initial WQv**	**0.25**	**af**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*		
"<<Initial WQv"	3.87	2.18	56%	0.56	10,964		
Subtract Area	0.00	0.00					
WQv adjusted after Area Reductions	**3.87**	**2.18**	56%	0.56	10,964		
Disconnection of Rooftops		0.00					
Adjusted WQv after Area Reduction and Rooftop Disconnect	3.87	2.18	56%	0.56	**10,964**	**0.25**	**af**
WQv reduced by Area Reduction techniques					0	**0.00**	**af**

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

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	0.53	0.23	0.43	0.43	1173.43	Infiltration
2	2.50	1.77	0.71	0.69	8,723	Infiltration
3	0.84	0.19	0.22	0.25	1067.98	Infiltration
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Runoff Reduction Volume and Treated volumes

	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	3.87	2.18	10124	841
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
	Totals by Area Reduction	→	0.00	0.00	0	
	Totals by Volume Reduction	→	0.00	0.00	0	
	Totals by Standard SMP w/RRV	→	3.87	2.18	10124	841
	Totals by Standard SMP	→	0.00	0.00		0
	Totals (Area + Volume + all SMPs)	→	3.87	2.18	10,124	841
	Impervious Cover √	okay				
	Total Area √	okay				

Minimum RRv

Enter the Soils Data for the site

Soil Group	Acres	S
A		55%
B		40%
C	0.77	30%
D	**3.10**	20%
Total Area	3.87	

Calculate the Minimum RRv

S =	**0.22**	
Impervious =	2.18	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**2,318**	***ft3***
	0.05	af

NOI QUESTIONS

#	**NOI Question**	**Reported Value**	
		cf	af
28	Total Water Quality Volume (WQv) Required	10964	*0.252*
30	Total RRV Provided	10124	*0.232*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	2318	*0.053*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	841	*0.019*
34	Sum of Volume Reduced & Treated	10964	*0.252*
34	Sum of Volume Reduced and Treated	10964	*0.252*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Infiltration Basin Worksheet

Design Point:	South West Loop

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.53	0.23	0.43	0.43	1173.43	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	43%	0.43	1,173	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	1,173	*ft^3*	
Pretreatment Provided	1,200	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	1,173	*ft^3*	WQv
Basal Area Required	782	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	844	*ft^2*	
Design Depth	1.50	*ft*	
Volume Provided	1,266	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,139**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	34	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	**South West loop**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	2.50	1.77	0.71	0.69	8722.74	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	71%	0.69	8,723	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	8,723	*ft^3*	
Pretreatment Provided	8,800	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	8,723	*ft^3*	WQv
Basal Area Required	3,008	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	3,033	*ft^2*	
Design Depth	2.90	*ft*	
Volume Provided	8,796	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**7,916**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	807	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	**South West loop**

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.84	0.19	0.22	0.25	1067.98	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	22%	0.25	1,068	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging			
Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	1,068	*ft^3*	
Pretreatment Provided	1,100	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin			
Design Volume	1,068	*ft^3*	WQv
Basal Area Required	534	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	640	*ft^2*	
Design Depth	2.00	*ft*	
Volume Provided	1,280	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*
Determine Runoff Reduction			
RRv	**1,068**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Version 1.6
Last Updated: 10/27/2017

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

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

Design Point:	North West	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**		
1	0.45	0.25	56%	0.55	1,257	Infiltration Basin		
2	0.73	0.42	58%	0.57	2,096	Infiltration Basin		
3	0.37	0.34	93%	0.88	1,658	Infiltration Basin		
4	0.45	0.45	100%	0.95	2,177	Infiltration Basin		
5								
6								
7								
8								
9								
10								
Subtotal (1-30)	1.99	1.46	73%	0.71	**7,188**	**Subtotal 1**		
Total	1.99	1.46	73%	0.71	**7,188**	**Initial WQv**	**0.17**	**af**

Identify Runoff Reduction Techniques By Area

Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*		
"<<Initial WQv"	1.99	1.46	73%	0.71	7,188		
Subtract Area	0.00	0.00					
WQv adjusted after Area Reductions	**1.99**	**1.46**	73%	0.71	7,188		
Disconnection of Rooftops		0.00					
Adjusted WQv after Area Reduction and Rooftop Disconnect	1.99	1.46	73%	0.71	**7,188**	**0.17**	**af**
WQv reduced by Area Reduction techniques					0	**0.00**	**af**

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	0.45	0.25	0.56	0.55	1256.78	Infiltration
2	0.73	0.42	0.58	0.57	2,096	Infiltration
3	0.37	0.34	0.93	0.88	1658.00	Infiltration
4	0.45	0.45	1.00	0.95	2177.13	Infiltration
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Runoff Reduction Volume and Treated volumes

	Runoff Reduction Techiques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.45	0.45	2177	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	1.99	1.46	6780	408
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
	Totals by Area Reduction	→	0.00	0.00	0	
	Totals by Volume Reduction	→	0.45	0.45	2177	
	Totals by Standard SMP w/RRV	→	1.99	1.46	6780	408
	Totals by Standard SMP	→	0.00	0.00		0
	Totals (Area + Volume + all SMPs)	→	2.44	1.91	8,957	408
	Impervious Cover √	error				
	Total Area √	error				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	0.40	30%
D	**1.59**	20%
Total Area	1.99	
Calculate the Minimum RRv		
S =	**0.22**	
Impervious =	1.46	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**1,552**	***ft3***
	0.04	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	7188	*0.165*
30	Total RRV Provided	8957	*0.206*
31	Is RRv Provided ≥WQv Required?	Yes	
32	Minimum RRv	1552	*0.036*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	408	*0.009*
34	Sum of Volume Reduced & Treated	9365	*0.215*
34	Sum of Volume Reduced and Treated	9365	*0.215*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Infiltration Basin Worksheet

Design Point: North West road

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.45	0.25	0.56	0.55	1256.78	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	56%	0.55	1,257	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	1,257	*ft^3*	
Pretreatment Provided	1,300	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	1,257	*ft^3*	WQv
Basal Area Required	503	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	554	*ft^2*	
Design Depth	2.50	*ft*	
Volume Provided	1,385	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,247**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	10	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	**North West road**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.73	0.42	0.58	0.57	2096.07	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	58%	0.57	2,096	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	2,096	*ft^3*	
Pretreatment Provided	2,100	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	2,096	*ft^3*	WQv
Basal Area Required	911	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	930	*ft^2*	
Design Depth	2.30	*ft*	
Volume Provided	2,139	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,925**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	171	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	**North West road**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.37	0.34	0.93	0.88	1658.00	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	93%	0.88	1,658	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	1,658	*ft^3*	
Pretreatment Provided	1,700	*ft^3*	
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	1,658	*ft^3*	WQv
Basal Area Required	721	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	760	*ft^2*	
Design Depth	2.30	*ft*	
Volume Provided	1,748	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,573**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	85	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Design Point:	**North West road**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
4	0.45	0.45	1.00	0.95	2177.13	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	100%	0.95	2,177	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	10.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	2,177	*ft^3*	
Pretreatment Provided	2,200	*ft^3*	
Pretreatment Techniques utilized	*Grass Channel*		

Size An Infiltration Basin

Design Volume	2,177	*ft^3*	WQv
Basal Area Required	818	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	850	*ft^2*	
Design Depth	2.66	*ft*	
Volume Provided	2,261	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**2,035**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	142	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Version 1.6
Last Updated: 10/27/2017

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

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...		No
Design Point:	North East	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**		
1	0.54	0.22	41%	0.42	1,128	Infiltration Basin		
2	0.51	0.38	75%	0.72	1,882	Bioretention		
3	0.97	0.79	82%	0.78	3,860	Infiltration Basin		
4								
5								
6								
7								
8								
9								
10								
Subtotal (1-30)	2.02	1.39	69%	0.67	**6,870**	**Subtotal 1**		
Total	2.02	1.39	69%	0.67	**6,870**	**Initial WQv**	**0.16**	**af**

Identify Runoff Reduction Techniques By Area

Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*		
"<<Initial WQv"	2.02	1.39	69%	0.67	6,870		
Subtract Area	0.00	0.00					
WQv adjusted after Area Reductions	**2.02**	**1.39**	69%	0.67	6,870		
Disconnection of Rooftops		0.00					
Adjusted WQv after Area Reduction and Rooftop Disconnect	2.02	1.39	69%	0.67	**6,870**	**0.16**	**af**
WQv reduced by Area Reduction techniques					0	**0.00**	**af**

Total Water Quality Volume Calculation

$WQv(acre\text{-}feet) = [(P)(Rv)(A)] /12$

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft ^{3})*	**Description**
1	0.54	0.22	0.41	0.42	1128.46	Infiltration
2	0.51	0.38	0.75	0.72	1,882	Bioretention
3	0.97	0.79	0.82	0.78	3859.52	Infiltration
4						
5						
6						
7						
8						
9						
10						
11						
12						
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23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes

	Runoff Reduction Techiques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	1.50	1.01	4905	83
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.51	0.38	864	1018
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	2.02	1.39	5769	1101
Totals by Standard SMP		→	0.00	0.00		0
Totals (Area + Volume + all SMPs)		→	2.02	1.39	5,769	1,101
	Impervious Cover √	okay				
	Total Area √	okay				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	0.40	30%
D	**1.62**	20%
Total Area	2.02	
Calculate the Minimum RRv		
S =	**0.22**	
Impervious =	1.39	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**1,476**	***ft3***
	0.03	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	6870	*0.158*
30	Total RRV Provided	5769	*0.132*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	1476	*0.034*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	1101	*0.025*
34	Sum of Volume Reduced & Treated	6870	*0.158*
34	Sum of Volume Reduced and Treated	6870	*0.158*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Infiltration Basin Worksheet

Design Point:	**North East**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.54	0.22	0.41	0.42	1128.46	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	41%	0.42	1,128	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	2.00	*in/hour*	*Okay*
Pretreatment Sizing	25	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	282	*ft^3*	
Pretreatment Provided	300	*ft^3*	
Pretreatment Techniques utilized	*Grass Channel*		

Size An Infiltration Basin

Design Volume	1,128	*ft^3*	WQv
Basal Area Required	645	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	664	*ft^2*	
Design Depth	1.75	*ft*	
Volume Provided	1,162	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,046**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	83	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

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

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**North East**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.51	0.38	0.75	0.72	1881.86	1.40	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	75%	0.72	1,882	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	
Soil Information							
Soil Group		D					
Soil Infiltration Rate		0.00	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				1,882		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**1568**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		18	*ft*				
Filter Length		100	*ft*				
Filter Area		1800	*ft^2*				
Actual Volume Provided		2160	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?			No	Select Practice			
RRv		864					
RRv applied		**864**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		1,018	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Infiltration Basin Worksheet

Design Point:	**North East**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft*^{3}*)*	**Precipitation** *(in)*	**Description**
3	0.97	0.79	0.82	0.78	3859.52	1.40	Infiltration Basin
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	82%	0.78	3,860	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft*^{3}	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	2.00	*in/hour*	*Okay*
Pretreatment Sizing	25	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	965	*ft*^{3}	
Pretreatment Provided	500	*ft*^{3}	*Inadequate Pretreatment Provided*
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	3,860	*ft*^{3}	WQv
Basal Area Required	1,544	*ft*^{2}	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	3,925	*ft*^{2}	
Design Depth	2.50	*ft*	
Volume Provided	9,813	*ft*^{3}	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**3,860**	***ft***^{3}	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	0	*ft*^{3}	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

APPENDIX 4

SPDES GENERAL PERMIT GP 0-20-001

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020 Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

1-23-20

Authorized Signature Date

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

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

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

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

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Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

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

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

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

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

B. Effluent Limitations Applicable to Discharges from Construction Activities

*Discharge*s authorized by this permit must achieve, at a minimum, the effluent limitations in Part I.B.1. (a) – (f) of this permit. These limitations represent the degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the *Stormwater Pollution Prevention Plan* ("SWPPP") the reason(s) for the

deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

   (i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;

   (ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

   (iii) *Minimize* the amount of soil exposed during *construction activity*;

   (iv) *Minimize* the disturbance of *steep slopes*;

   (v) *Minimize* sediment *discharge*s from the site;

   (vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

   (vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted;

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

   (ix) *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged from the site.

b. **Soil Stabilization**. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures**. Design, install, implement, and maintain effective pollution prevention measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be designed, installed, implemented and maintained to:

  (i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

  (ii) *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

  (iii) Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited *Discharges*.** The following *discharge*s are prohibited:

  (i) Wastewater from washout of concrete;

  (ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

f. Surface Outlets. When discharging from basins and impoundments, the outlets shall be designed, constructed and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion at or below the outlet does not occur.

C. Post-construction Stormwater Management Practice Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices ("SMPs") are not designed in conformance with the *performance criteria* in the Design Manual, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall direct runoff from all newly constructed impervious areas to a RR technique or standard SMP with RRv capacity unless infeasible. The specific site limitations that prevent the reduction of 100% of the WQv shall be documented in the SWPPP.

For each impervious area that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered infeasible.

In no case shall the runoff reduction achieved from the newly constructed impervious areas be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (“Cpv”): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (“Qp”): Requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (“Qf”): Requires storage to attenuate the post-development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

b. *Sizing Criteria* for *New Development* in Enhanced Phosphorus Removal Watershed

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 10.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:

(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or

(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:

(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or

(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:

(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or

(2) A downstream analysis reveals that *overbank* control is not required.

c. Sizing Criteria for Redevelopment Activity

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 – 4 above.

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iii) *Overbank* Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site

d. Sizing Criteria for Combination of Redevelopment Activity and New Development

Construction projects that include both New Development and Redevelopment Activity shall provide post-construction stormwater management controls that meet the sizing criteria calculated as an aggregate of the Sizing Criteria in Part I.C.2.a. or b. of this permit for the New Development portion of the project and Part I.C.2.c of this permit for Redevelopment Activity portion of the project.

D. Maintaining Water Quality

The Department expects that compliance with the conditions of this permit will control *discharge*s necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any discharge to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

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

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

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

If there is evidence indicating that the stormwater *discharge*s authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

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

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "Discharges from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **not** authorized by this permit:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

d. Documentation that:

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

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

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

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

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

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

B. Notice of Intent (NOI) Submittal

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

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

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

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

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

C. Permit Authorization

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

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

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

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

c. the final SWPPP has been prepared, and

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

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

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

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

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

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

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

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

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

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

D. General Requirements For Owners or Operators With Permit Coverage

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

F. Change of Owner or Operator

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

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

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

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

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

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

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

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

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

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

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

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

d. to document the final construction conditions.

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

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

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

   > "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with

the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

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

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

B. Required SWPPP Contents

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

e. Infiltration test results, when required; and

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

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

C. Required SWPPP Components by Project Type

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

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

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

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

B. Contractor Maintenance Inspection Requirements

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

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

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

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

C. Qualified Inspector Inspection Requirements

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

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

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

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

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

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

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

d. *construction activities* located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

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

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

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

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

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

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

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

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

a. Date and time of inspection;

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

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

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

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

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

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

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

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

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

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

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

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

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

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

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

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

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

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

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

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

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

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

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

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

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

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

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

Part VI. REPORTING AND RETENTION RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

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

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

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

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

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

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

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

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

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

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

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

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

(i) the chief executive officer of the agency, or

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

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

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

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

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

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

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

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

I. Property Rights

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

J. Severability

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

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

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

L. Proper Operation and Maintenance

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

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a *construction site* which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

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

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

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

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

P. Re-Opener Clause

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

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

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

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

APPENDIX A – Acronyms and Definitions

Acronyms

APO – Agency Preservation Officer
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
Cpv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - Environmental Conservation Law
EPA – U. S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

Definitions

All definitions in this section are solely for the purposes of this permit.

Agricultural Building – a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

Agricultural Property –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

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

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

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

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

Construction Site – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

Dewatering – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

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

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

Embankment –means an earthen or rock slope that supports a road/highway.

Endangered or Threatened Species – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

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

Equivalent (Equivalence) – means that the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

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

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

Groundwater(s) - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Historic Property – means any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

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

Infeasible – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

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

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

Minimize – means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

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

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

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

Natural Buffer –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

New Development – means any land disturbance that does not meet the definition of Redevelopment Activity included in this appendix.

New York State Erosion and Sediment Control Certificate Program – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

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

Nonpoint Source - means any source of water pollution or pollutants which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

Overbank –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Performance Criteria – means the design criteria listed under the "Required Elements" sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf) in Part I.C.2. of the permit.

Point Source - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be discharged.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq .

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

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

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

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

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Redevelopment Activity(ies) – means the disturbance and reconstruction of existing impervious area, including impervious areas that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is authorized to discharge under New York State DEC's

SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

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

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

Site limitations – means site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical site limitations include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of site limitations shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

Sizing Criteria – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

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

Steep Slope – means land area designated on the current United States Department of Agriculture (“USDA”) Soil Survey as Soil Slope Phase “D”, (provided the map unit name is inclusive of slopes greater than 25%) , or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

Streambank – as used in this permit, means the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

Stormwater Pollution Prevention Plan (SWPPP) – means a project specific report, including construction drawings, that among other things: describes the construction activity(ies), identifies the potential sources of pollution at the *construction site*; describes and shows the stormwater controls that will be used to control the pollutants (i.e. erosion and sediment controls; for many projects, includes post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions of the permit. See Part III of the permit for a complete description of the information that must be included in the SWPPP.

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

Temporarily Ceased – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

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

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

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

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

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

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

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

APPENDIX B – Required SWPPP Components by Project Type

Table 1
Construction Activities that Require the Preparation of a SWPPP That Only Includes Erosion and Sediment Controls

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

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

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

All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

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

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Pond construction
- Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
- Cross-country ski trails and walking/hiking trails
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics

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

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

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State”, excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

Table 2

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

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

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family home that disturbs five (5) or more acres of land
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) and structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State” that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW’s, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

Table 2 (Continued)

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

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

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

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

- Entire New York City Watershed located east of the Hudson River **-** Figure 1
- Onondaga Lake Watershed **-** Figure 2
- Greenwood Lake Watershed **-**Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

Figure 1 - New York City Watershed East of the Hudson

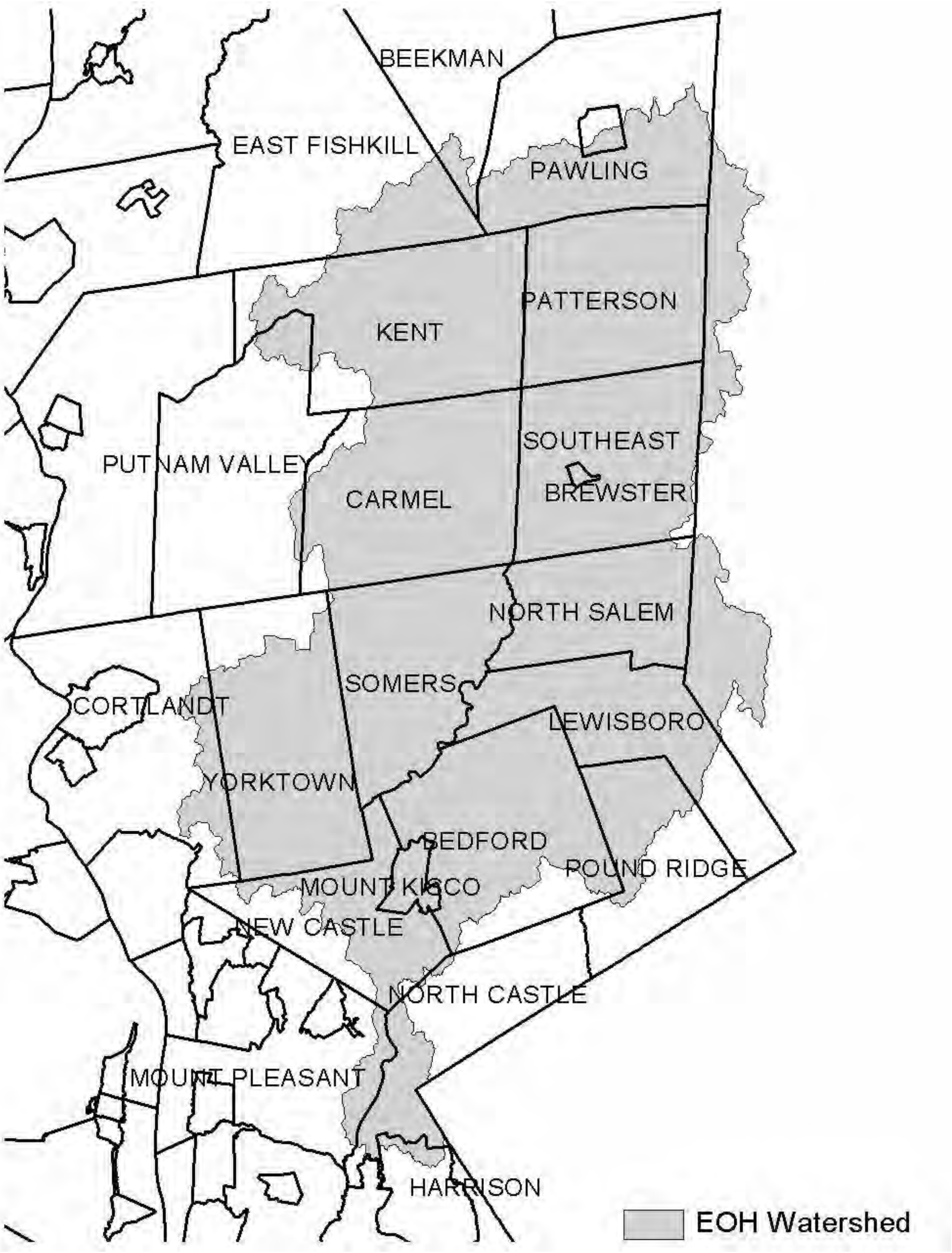


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

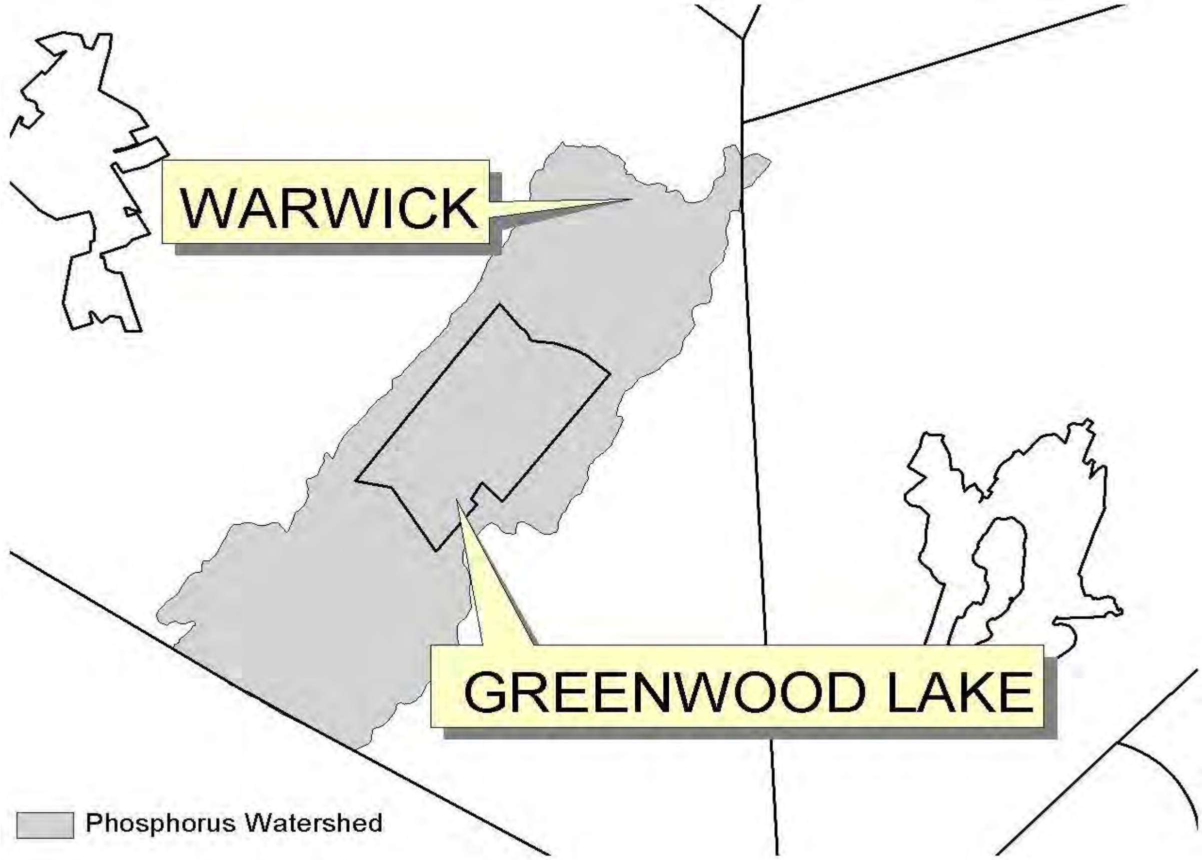


Figure 4 - Oscawana Lake Watershed

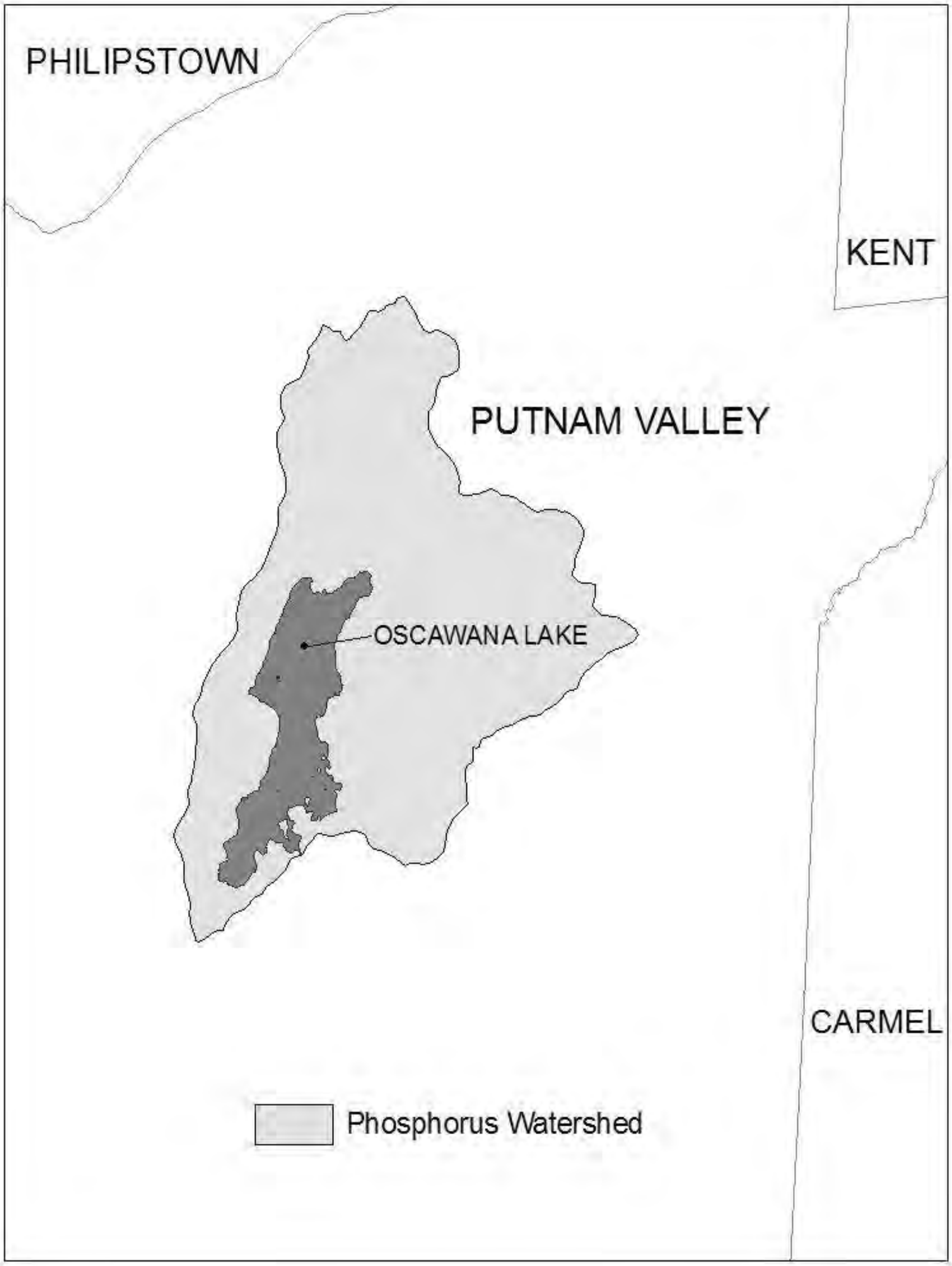
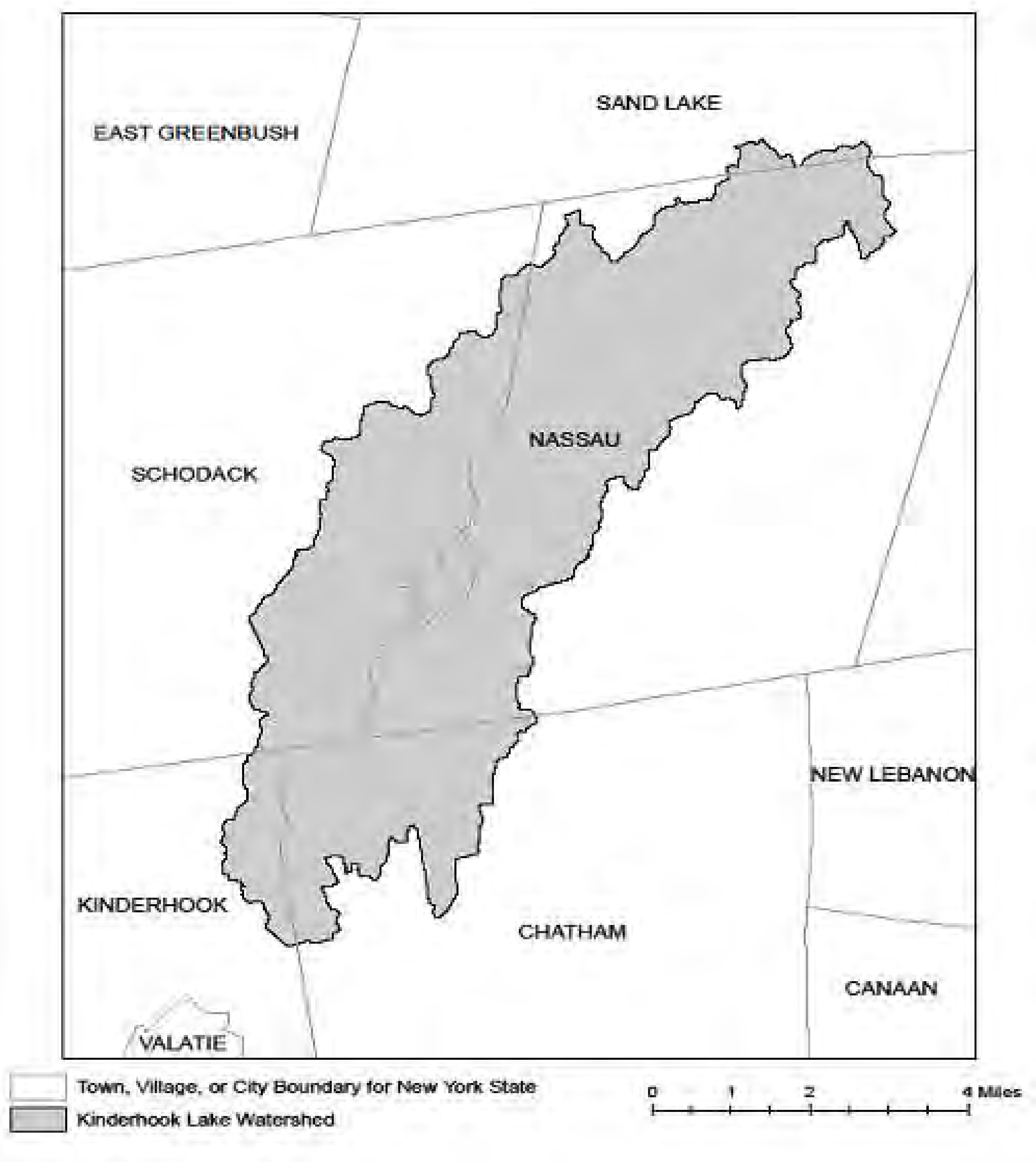


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Watersheds with Lower Disturbance Threshold

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

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

APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using ”The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy” dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual (“Design Manual”), dated January 2015.

COUNTY	WATERBODY	POLLUTANT
Albany	Ann Lee (Shakers) Pond, Stump Pond	Nutrients
Albany	Basic Creek Reservoir	Nutrients
Allegany	Amity Lake, Saunders Pond	Nutrients
Bronx	Long Island Sound, Bronx	Nutrients
Bronx	Van Cortlandt Lake	Nutrients
Broome	Fly Pond, Deer Lake, Sky Lake	Nutrients
Broome	Minor Tribs to Lower Susquehanna (north)	Nutrients
Broome	Whitney Point Lake/Reservoir	Nutrients
Cattaraugus	Allegheny River/Reservoir	Nutrients
Cattaraugus	Beaver (Alma) Lake	Nutrients
Cattaraugus	Case Lake	Nutrients
Cattaraugus	Linlyco/Club Pond	Nutrients
Cayuga	Duck Lake	Nutrients
Cayuga	Little Sodus Bay	Nutrients
Chautauqua	Bear Lake	Nutrients
Chautauqua	Chadakoin River and tribs	Nutrients
Chautauqua	Chautauqua Lake, North	Nutrients
Chautauqua	Chautauqua Lake, South	Nutrients
Chautauqua	Findley Lake	Nutrients
Chautauqua	Hulburt/Clymer Pond	Nutrients
Clinton	Great Chazy River, Lower, Main Stem	Silt/Sediment
Clinton	Lake Champlain, Main Lake, Middle	Nutrients
Clinton	Lake Champlain, Main Lake, North	Nutrients
Columbia	Kinderhook Lake	Nutrients
Columbia	Robinson Pond	Nutrients
Cortland	Dean Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Dutchess	Fall Kill and tribs	Nutrients
Dutchess	Hillside Lake	Nutrients
Dutchess	Wappingers Lake	Nutrients
Dutchess	Wappingers Lake	Silt/Sediment
Erie	Beeman Creek and tribs	Nutrients
Erie	Ellicott Creek, Lower, and tribs	Silt/Sediment
Erie	Ellicott Creek, Lower, and tribs	Nutrients
Erie	Green Lake	Nutrients
Erie	Little Sister Creek, Lower, and tribs	Nutrients
Erie	Murder Creek, Lower, and tribs	Nutrients
Erie	Rush Creek and tribs	Nutrients
Erie	Scajaquada Creek, Lower, and tribs	Nutrients
Erie	Scajaquada Creek, Middle, and tribs	Nutrients
Erie	Scajaquada Creek, Upper, and tribs	Nutrients
Erie	South Branch Smoke Cr, Lower, and tribs	Silt/Sediment
Erie	South Branch Smoke Cr, Lower, and tribs	Nutrients
Essex	Lake Champlain, Main Lake, South	Nutrients
Essex	Lake Champlain, South Lake	Nutrients
Essex	Willsboro Bay	Nutrients
Genesee	Bigelow Creek and tribs	Nutrients
Genesee	Black Creek, Middle, and minor tribs	Nutrients
Genesee	Black Creek, Upper, and minor tribs	Nutrients
Genesee	Bowen Brook and tribs	Nutrients
Genesee	LeRoy Reservoir	Nutrients
Genesee	Oak Orchard Cr, Upper, and tribs	Nutrients
Genesee	Tonawanda Creek, Middle, Main Stem	Nutrients
Greene	Schoharie Reservoir	Silt/Sediment
Greene	Sleepy Hollow Lake	Silt/Sediment
Herkimer	Steele Creek tribs	Silt/Sediment
Herkimer	Steele Creek tribs	Nutrients
Jefferson	Moon Lake	Nutrients
Kings	Hendrix Creek	Nutrients
Kings	Prospect Park Lake	Nutrients
Lewis	Mill Creek/South Branch, and tribs	Nutrients
Livingston	Christie Creek and tribs	Nutrients
Livingston	Conesus Lake	Nutrients
Livingston	Mill Creek and minor tribs	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs	Nutrients
Monroe	Buck Pond	Nutrients
Monroe	Cranberry Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Monroe	Lake Ontario Shoreline, Western	Nutrients
Monroe	Long Pond	Nutrients
Monroe	Mill Creek and tribs	Nutrients
Monroe	Mill Creek/Blue Pond Outlet and tribs	Nutrients
Monroe	Minor Tribs to Irondequoit Bay	Nutrients
Monroe	Rochester Embayment - East	Nutrients
Monroe	Rochester Embayment - West	Nutrients
Monroe	Shipbuilders Creek and tribs	Nutrients
Monroe	Thomas Creek/White Brook and tribs	Nutrients
Nassau	Beaver Lake	Nutrients
Nassau	Camaans Pond	Nutrients
Nassau	East Meadow Brook, Upper, and tribs	Silt/Sediment
Nassau	East Rockaway Channel	Nutrients
Nassau	Grant Park Pond	Nutrients
Nassau	Hempstead Bay	Nutrients
Nassau	Hempstead Lake	Nutrients
Nassau	Hewlett Bay	Nutrients
Nassau	Hog Island Channel	Nutrients
Nassau	Long Island Sound, Nassau County Waters	Nutrients
Nassau	Massapequa Creek and tribs	Nutrients
Nassau	Milburn/Parsonage Creeks, Upp, and tribs	Nutrients
Nassau	Reynolds Channel, west	Nutrients
Nassau	Tidal Tribs to Hempstead Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Silt/Sediment
Nassau	Tribs to Smith/Halls Ponds	Nutrients
Nassau	Woodmere Channel	Nutrients
New York	Harlem Meer	Nutrients
New York	The Lake in Central Park	Nutrients
Niagara	Bergholtz Creek and tribs	Nutrients
Niagara	Hyde Park Lake	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Oneida	Ballou, Nail Creeks and tribs	Nutrients
Onondaga	Harbor Brook, Lower, and tribs	Nutrients
Onondaga	Ley Creek and tribs	Nutrients
Onondaga	Minor Tribs to Onondaga Lake	Nutrients
Onondaga	Ninemile Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Middle, and tribs	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Onondaga	Onondaga Lake, northern end	Nutrients
Onondaga	Onondaga Lake, southern end	Nutrients
Ontario	Great Brook and minor tribs	Silt/Sediment
Ontario	Great Brook and minor tribs	Nutrients
Ontario	Hemlock Lake Outlet and minor tribs	Nutrients
Ontario	Honeoye Lake	Nutrients
Orange	Greenwood Lake	Nutrients
Orange	Monhagen Brook and tribs	Nutrients
Orange	Orange Lake	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Oswego	Lake Neatahwanta	Nutrients
Oswego	Pleasant Lake	Nutrients
Putnam	Bog Brook Reservoir	Nutrients
Putnam	Boyd Corners Reservoir	Nutrients
Putnam	Croton Falls Reservoir	Nutrients
Putnam	Diverting Reservoir	Nutrients
Putnam	East Branch Reservoir	Nutrients
Putnam	Lake Carmel	Nutrients
Putnam	Middle Branch Reservoir	Nutrients
Putnam	Oscawana Lake	Nutrients
Putnam	Palmer Lake	Nutrients
Putnam	West Branch Reservoir	Nutrients
Queens	Bergen Basin	Nutrients
Queens	Flushing Creek/Bay	Nutrients
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Nutrients
Queens	Kissena Lake	Nutrients
Queens	Meadow Lake	Nutrients
Queens	Willow Lake	Nutrients
Rensselaer	Nassau Lake	Nutrients
Rensselaer	Snyders Lake	Nutrients
Richmond	Grasmere Lake/Bradys Pond	Nutrients
Rockland	Congers Lake, Swartout Lake	Nutrients
Rockland	Rockland Lake	Nutrients
Saratoga	Ballston Lake	Nutrients
Saratoga	Dwaas Kill and tribs	Silt/Sediment
Saratoga	Dwaas Kill and tribs	Nutrients
Saratoga	Lake Lonely	Nutrients
Saratoga	Round Lake	Nutrients
Saratoga	Tribs to Lake Lonely	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Schenectady	Collins Lake	Nutrients
Schenectady	Duane Lake	Nutrients
Schenectady	Mariaville Lake	Nutrients
Schoharie	Engleville Pond	Nutrients
Schoharie	Summit Lake	Nutrients
Seneca	Reeder Creek and tribs	Nutrients
St.Lawrence	Black Lake Outlet/Black Lake	Nutrients
St.Lawrence	Fish Creek and minor tribs	Nutrients
Steuben	Smith Pond	Nutrients
Suffolk	Agawam Lake	Nutrients
Suffolk	Big/Little Fresh Ponds	Nutrients
Suffolk	Canaan Lake	Silt/Sediment
Suffolk	Canaan Lake	Nutrients
Suffolk	Flanders Bay, West/Lower Sawmill Creek	Nutrients
Suffolk	Fresh Pond	Nutrients
Suffolk	Great South Bay, East	Nutrients
Suffolk	Great South Bay, Middle	Nutrients
Suffolk	Great South Bay, West	Nutrients
Suffolk	Lake Ronkonkoma	Nutrients
Suffolk	Long Island Sound, Suffolk County, West	Nutrients
Suffolk	Mattituck (Marratooka) Pond	Nutrients
Suffolk	Meetinghouse/Terrys Creeks and tribs	Nutrients
Suffolk	Mill and Seven Ponds	Nutrients
Suffolk	Millers Pond	Nutrients
Suffolk	Moriches Bay, East	Nutrients
Suffolk	Moriches Bay, West	Nutrients
Suffolk	Peconic River, Lower, and tidal tribs	Nutrients
Suffolk	Quantuck Bay	Nutrients
Suffolk	Shinnecock Bay and Inlet	Nutrients
Suffolk	Tidal tribs to West Moriches Bay	Nutrients
Sullivan	Bodine, Montgomery Lakes	Nutrients
Sullivan	Davies Lake	Nutrients
Sullivan	Evens Lake	Nutrients
Sullivan	Pleasure Lake	Nutrients
Tompkins	Cayuga Lake, Southern End	Nutrients
Tompkins	Cayuga Lake, Southern End	Silt/Sediment
Tompkins	Owasco Inlet, Upper, and tribs	Nutrients
Ulster	Ashokan Reservoir	Silt/Sediment
Ulster	Esopus Creek, Upper, and minor tribs	Silt/Sediment
Warren	Hague Brook and tribs	Silt/Sediment

303(d) Segments Impaired by Construction Related Pollutant(s)

Warren	Huddle/Finkle Brooks and tribs	Silt/Sediment
Warren	Indian Brook and tribs	Silt/Sediment
Warren	Lake George	Silt/Sediment
Warren	Tribs to L.George, Village of L George	Silt/Sediment
Washington	Cossayuna Lake	Nutrients
Washington	Lake Champlain, South Bay	Nutrients
Washington	Tribs to L.George, East Shore	Silt/Sediment
Washington	Wood Cr/Champlain Canal and minor tribs	Nutrients
Wayne	Port Bay	Nutrients
Westchester	Amawalk Reservoir	Nutrients
Westchester	Blind Brook, Upper, and tribs	Silt/Sediment
Westchester	Cross River Reservoir	Nutrients
Westchester	Lake Katonah	Nutrients
Westchester	Lake Lincolndale	Nutrients
Westchester	Lake Meahagh	Nutrients
Westchester	Lake Mohegan	Nutrients
Westchester	Lake Shenorock	Nutrients
Westchester	Long Island Sound, Westchester (East)	Nutrients
Westchester	Mamaroneck River, Lower	Silt/Sediment
Westchester	Mamaroneck River, Upper, and minor tribs	Silt/Sediment
Westchester	Muscoot/Upper New Croton Reservoir	Nutrients
Westchester	New Croton Reservoir	Nutrients
Westchester	Peach Lake	Nutrients
Westchester	Reservoir No.1 (Lake Isle)	Nutrients
Westchester	Saw Mill River, Lower, and tribs	Nutrients
Westchester	Saw Mill River, Middle, and tribs	Nutrients
Westchester	Sheldrake River and tribs	Silt/Sediment
Westchester	Sheldrake River and tribs	Nutrients
Westchester	Silver Lake	Nutrients
Westchester	Teatown Lake	Nutrients
Westchester	Titicus Reservoir	Nutrients
Westchester	Truesdale Lake	Nutrients
Westchester	Wallace Pond	Nutrients
Wyoming	Java Lake	Nutrients
Wyoming	Silver Lake	Nutrients

APPENDIX F – List of NYS DEC Regional Offices

Region	COVERING THE FOLLOWING COUNTIES:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS	DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, PO BOX 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD WARRENSBURG, NY 12885-1172 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROADAVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX 5

DRAFT NOTICE OF INTENT (NOI)

0644089821

NOTICE OF INTENT

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

NYR ☐☐☐☐☐☐
(for DEC use only)

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

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

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address

City

State

Zip -

Phone (Owner/Operator) - -

Fax (Owner/Operator) - -

Email (Owner/Operator)

FED TAX ID - (not required for individuals)

Project Site Information

Project/Site Name

Street Address (NOT P.O. BOX)

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

City/Town/Village (THAT ISSUES BUILDING PERMIT)

State: N Y

Zip: -

County

DEC Region

Name of Nearest Cross Street

Distance to Nearest Cross Street (Feet)

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

Tax Map Numbers
Section-Block-Parcel

Tax Map Numbers

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

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

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

X Coordinates (Easting)
-7
Ex. -73.749

Y Coordinates (Northing)
4
Ex. 42.652

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in impervious area**

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

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

Pre-Development Existing Land Use

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

Post-Development Future Land Use

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

Number of Lots

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

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

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
.	.	.	.

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

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

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

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

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

Start Date / / - **End Date** / /

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

Name

9a. Type of waterbody identified in Question 9?

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

9b. How was the wetland identified?

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

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

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

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

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

.

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

15.	Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?	○ **Yes** ○ **No** ○ **Unknown**
16.	What is the name of the municipality/entity that owns the separate storm sewer system?	
17.	Does any runoff from the site enter a sewer classified as a Combined Sewer?	○ **Yes** ○ **No** ○ **Unknown**
18.	Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?	○ **Yes** ○ **No**
19.	Is this property owned by a state authority, state agency, federal government or local government?	○ **Yes** ○ **No**
20.	Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)	○ **Yes** ○ **No**
21.	Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?	○ **Yes** ○ **No**
22.	Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? **If No, skip questions 23 and 27-39.**	○ **Yes** ○ **No**
23.	Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?	○ **Yes** ○ **No**

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

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

SWPPP Preparer

Contact Name (Last, Space, First)

Mailing Address

City

State Zip -

Phone - -

Fax - -

Email

SWPPP Preparer Certification

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

First Name **MI**

Last Name

Signature

Date / /

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

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

Temporary Structural

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

Biotechnical

- ○ **Brush Matting**
- ○ **Wattling**

Vegetative Measures

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

Permanent Structural

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

Other

Post-construction Stormwater Management Practice (SMP) Requirements

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

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

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

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

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

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

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

Total WQv Required
☐☐☐.☐☐☐ **acre-feet**

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

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

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

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

RR Techniques (Area Reduction)	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
○ Conservation of Natural Areas (RR-1) ...	.	and/or	.
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	.	and/or	.
○ Tree Planting/Tree Pit (RR-3)	.	and/or	.
○ Disconnection of Rooftop Runoff (RR-4)..	.	and/or	.

RR Techniques (Volume Reduction)	
○ Vegetated Swale (RR-5)	.
○ Rain Garden (RR-6)	.
○ Stormwater Planter (RR-7)	.
○ Rain Barrel/Cistern (RR-8)	.
○ Porous Pavement (RR-9)	.
○ Green Roof (RR-10)	.

Standard SMPs with RRv Capacity	
○ Infiltration Trench (I-1)	.
○ Infiltration Basin (I-2)	.
○ Dry Well (I-3)	.
○ Underground Infiltration System (I-4)	.
○ Bioretention (F-5)	.
○ Dry Swale (O-1)	.

Standard SMPs	
○ Micropool Extended Detention (P-1)	.
○ Wet Pond (P-2)	.
○ Wet Extended Detention (P-3)	.
○ Multiple Pond System (P-4)	.
○ Pocket Pond (P-5)	.
○ Surface Sand Filter (F-1)	.
○ Underground Sand Filter (F-2)	.
○ Perimeter Sand Filter (F-3)	.
○ Organic Filter (F-4)	.
○ Shallow Wetland (W-1)	.
○ Extended Detention Wetland (W-2)	.
○ Pond/Wetland System (W-3)	.
○ Pocket Wetland (W-4)	.
○ Wet Swale (O-2)	.

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

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

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

Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Manufacturer ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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

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

Total RRv provided

☐☐☐.☐☐☐ **acre-feet**

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

○ **Yes** ○ **No**

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

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

Minimum RRv Required

☐☐☐.☐☐☐ **acre-feet**

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

○ **Yes** ○ **No**

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

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

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

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

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

WQv Provided

☐☐☐.☐☐☐ **acre-feet**

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

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

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

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

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

CPv Required	**CPv Provided**
☐☐☐.☐☐☐ **acre-feet**	☐☐☐.☐☐☐ **acre-feet**

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

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

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

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

Total Overbank Flood Control Criteria (Qp)

Pre-Development	**Post-development**
☐☐☐.☐☐☐ **CFS**	☐☐☐.☐☐☐ **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development	**Post-development**
☐☐☐.☐☐☐ **CFS**	☐☐☐.☐☐☐ **CFS**

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

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

○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ○ Yes ○ No

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

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

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

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

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

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

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

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

Owner/Operator Certification

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

Print First Name **MI**

Print Last Name

Owner/Operator Signature

Date

/ /

APPENDIX 6

DRAFT NOTICE OF TERMINATION (NOT)

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

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

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

I. Owner or Operator Information

1. Owner/Operator Name: WESCORP

2. Street Address: 2 Dearfield Drive, Site#3

3. City/State/Zip: Greenwich, CT 06831

4. Contact Person: TONY MARTINEZ

4a. Telephone: 203-422-6700

4b. Contact Person E-Mail: TMartinez@wescorpbuilders.com

II. Project Site Information

5. Project/Site Name: Goshen Plaza

6. Street Address: 84-120 Clowes Avenue

7. City/Zip: Village of Goshen

8. County: Orange County

III. Reason for Termination

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

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

9c. ☐ Other (Explain on Page 2)

IV. Final Site Information:

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

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

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

____

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

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

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

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

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

☐ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator’s deed of record.

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

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

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? ☐ yes ☐ no

(If Yes, complete section VI - “MS4 Acceptance” statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

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

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

Printed Name:

Title/Position:

Signature:

Date:

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

VII. Qualified Inspector Certification - Final Stabilization:

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

Printed Name:

Title/Position:

Signature: Date:

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

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

Printed Name:

Title/Position:

Signature: Date:

IX. Owner or Operator Certification

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

Printed Name:

Title/Position:

Signature: Date:

(NYS DEC Notice of Termination - January 2015)

APPENDIX 7

DRAFT MS4 ACCEPTANCE FORM

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

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

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

I. Project Owner/Operator Information

1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:

II. Project Site Information

5. Project/Site Name:
6. Street Address:
7. City/State/Zip:

III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information

8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:

IV. Regulated MS4 Information

11. Name of MS4:
12. MS4 SPDES Permit Identification Number: NYR20A
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

MS4 SWPPP Acceptance Form - continued

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

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

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

APPENDIX 8

NRCS HYDROLOGIC SOIL MAPPING

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Orange County, New York

September 18, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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      MdC—Mardin gravelly silt loam, 8 to 15 percent slopes.......................... 11
      ROD—Rock outcrop-Hollis complex, 15 to 35 percent slopes.................... 12
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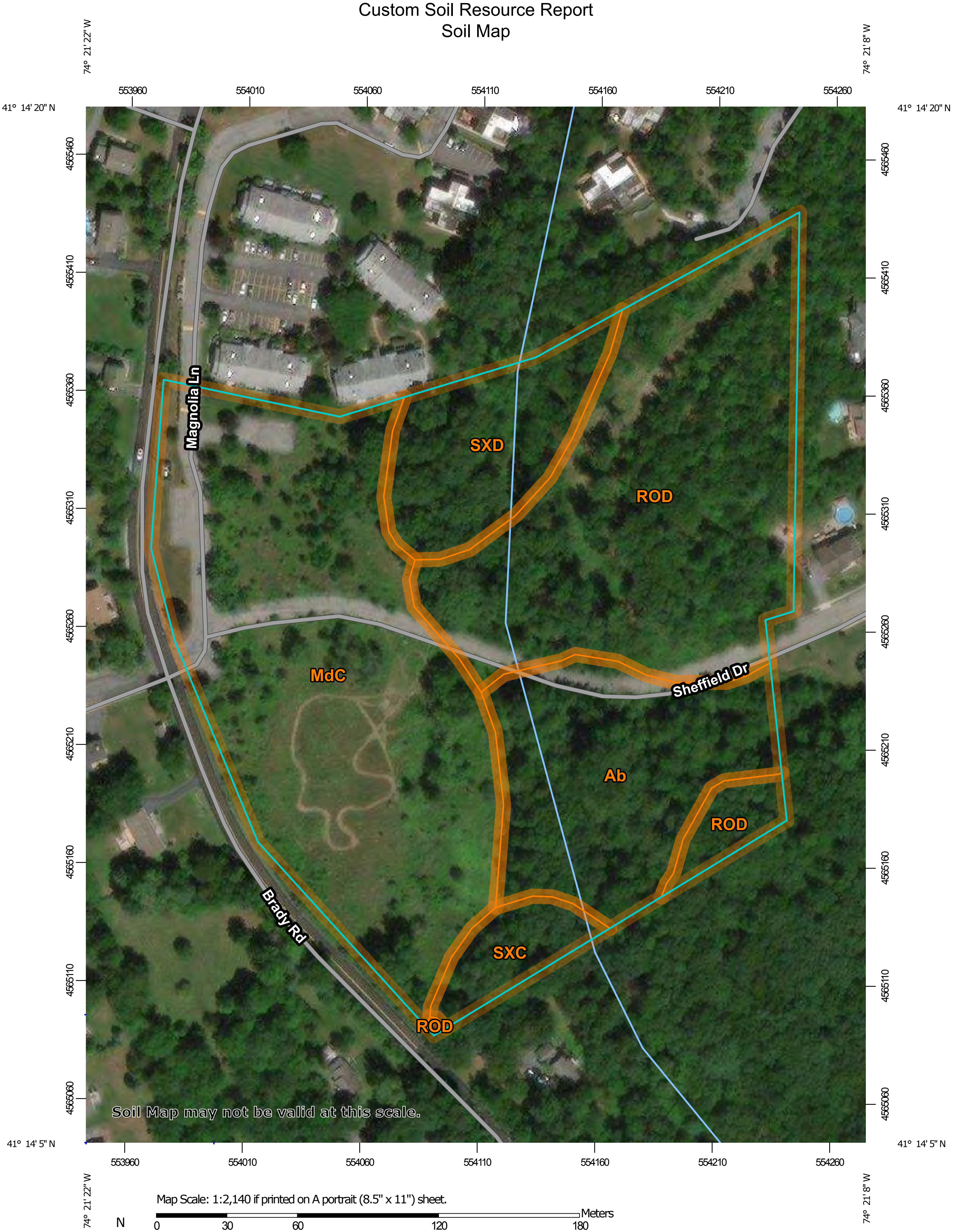
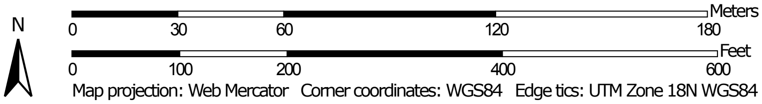
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:2,140 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

Soils
Soil Map Unit Polygons
Soil Map Unit Lines
Soil Map Unit Points

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

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

Date(s) aerial images were photographed: Oct 7, 2013—Feb 26, 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 Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ab	Alden silt loam	2.4	15.7%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	6.1	39.4%
ROD	Rock outcrop-Hollis complex, 15 to 35 percent slopes	5.1	32.8%
SXC	Swartswood and Mardin soils, sloping, very stony	0.5	3.2%
SXD	Swartswood and Mardin soils, moderately steep, very stony	1.4	8.9%
Totals for Area of Interest		**15.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, New York

Ab—Alden silt loam

Map Unit Setting

National map unit symbol: 9vtc
Elevation: 300 to 1,500 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Alden and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alden

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: A silty mantle of local deposition overlying loamy till

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 36 inches: silt loam
H3 - 36 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Available water capacity: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY040NY - Semi-Rich Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Carlisle

Percent of map unit: 5 percent
Landform: Swamps, marshes

Hydric soil rating: Yes

Erie

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: No

Wayland

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

MdC—Mardin gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v30l
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mardin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan

Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope, nose slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ROD—Rock outcrop-Hollis complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2w69n
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 50 percent
Hollis, very stony, and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Charlton, very stony

Percent of map unit: 4 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, very stony

Percent of map unit: 4 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Paxton, very stony

Percent of map unit: 2 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

SXC—Swartswood and Mardin soils, sloping, very stony

Map Unit Setting

National map unit symbol: 2v30r
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Swartswood, very stony, and similar soils: 41 percent
Mardin, very stony, and similar soils: 39 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swartswood, Very Stony

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from quartzite, conglomerate, and sandstone

Typical profile

H1 - 0 to 3 inches: gravelly loam
H2 - 3 to 31 inches: gravelly fine sandy loam
H3 - 31 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 23 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F140XY030NY - Well Drained Dense Till
Hydric soil rating: No

Description of Mardin, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: gravelly silt loam
Bw - 4 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Bath, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Wurtsboro, very stony

Percent of map unit: 5 percent
Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

SXD—Swartswood and Mardin soils, moderately steep, very stony

Map Unit Setting

National map unit symbol: 2v30s
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Swartswood, very stony, and similar soils: 41 percent
Mardin, very stony, and similar soils: 39 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swartswood, Very Stony

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from quartzite, conglomerate, and sandstone

Typical profile

H1 - 0 to 2 inches: gravelly loam
H2 - 2 to 28 inches: gravelly fine sandy loam
H3 - 28 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 23 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F140XY030NY - Well Drained Dense Till

Hydric soil rating: No

Description of Mardin, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: gravelly silt loam
Bw - 4 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Wurtsboro, very stony

Percent of map unit: 5 percent
Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope, nose slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Volusia, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Bath, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

APPENDIX 9

APPENDIX H – CONSTRUCTION SITE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

I. Pre-Construction Meeting Documents
  a. Preamble to Site Assessment and Inspections
  b. Operator's Certification
  c. Qualified Professional's Credentials & Certification
  d. Pre-Construction Site Assessment Checklist

II. Construction Duration Inspections
  a. Directions
  b. Modification to the SWPPP

III. Monthly Summary Reports

IV. Monitoring, Reporting, and Three-Month Status Reports
  a. Operator's Compliance Response Form

Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ______________________________ **Date of Authorization** ____________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

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[1] "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

[2] "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

[3] "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

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

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

c. Qualified Professional's Credentials & Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

d. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

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

Yes No NA
☑ ☐ ☐ Has a Notice of Intent been filed with the NYS Department of Conservation?
☐ ☐ ☐ Is the SWPPP on-site? Where?________________________________
☐ ☐ ☐ Is the Plan current? What is the latest revision date?_______________
☐ ☐ ☐ Is a copy of the NOI (with brief description) onsite? Where?_______________
☐ ☐ ☐ Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA
☐ ☐ ☐ Are construction limits clearly flagged or fenced?
☐ ☐ ☐ Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
☐ ☐ ☐ Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA
☐ ☐ ☐ Clean stormwater runoff has been diverted from areas to be disturbed.
☐ ☐ ☐ Bodies of water located either on site or in the vicinity of the site have been identified and protected.
☐ ☐ ☐ Appropriate practices to protect on-site or downstream surface water are installed.
☐ ☐ ☐ Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA
☐ ☐ ☐ A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
☐ ☐ ☐ Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
☐ ☐ ☐ Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA
☐ ☐ ☐ Silt fence material and installation comply with the standard drawing and specifications.
☐ ☐ ☐ Silt fences are installed at appropriate spacing intervals
☐ ☐ ☐ Sediment/detention basin was installed as first land disturbing activity.
☐ ☐ ☐ Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA
☐ ☐ ☐ The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
☐ ☐ ☐ The plan is contained in the SWPPP on page ______
☐ ☐ ☐ Appropriate materials to control spills are onsite. Where? __________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

Inspector (print name) **Date of Inspection**

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

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

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions
Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering
Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).

[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).

[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.

[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.

[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.

[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.

[ ] [ ] [ ] Installed per standards and specifications?

[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?

[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).

[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.

[ ] [ ] [ ] Fabric buried 6 inches minimum.

[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

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

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

b. Modifications to the SWPPP (To be completed as described below)

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

Modification & Reason:

APPENDIX 10

NYSDEC CONSTRUCTION STORMWATER INSPECTION MANUAL

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

Construction Stormwater Inspection Manual

Primarily for Government Inspectors Evaluating Compliance with Construction Stormwater Control Requirements

New York State
Department of Environmental Conservation

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Version 1.05 (8/27/07)

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1.0 INTRODUCTION AND PURPOSE

The New York State Department of Environmental Conservation Division of Water (DOW) considers there to be two types of inspections germane to construction stormwater; compliance inspections and self-inspections.

This manual is for use by DOW and other regulatory oversight construction stormwater inspectors in performing compliance inspections, as well as for site operators in performing self inspections. The manual should be used in conjunction with the *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005.

1.1 Compliance Inspections

Regulatory compliance inspections are performed by regulatory oversight authorities such as DOW staff, or representatives of DOW and local municipal construction stormwater inspectors. These inspections are intended to determine compliance with the state or local requirements for control of construction stormwater through erosion and sediment control and post construction practices. Compliance inspections focus on determinations of compliance with legal and water quality standards. Typically, compliance inspections can be further sub-categorized to include comprehensive inspections, and follow-up or reconnaissance inspections.

Compliance inspectors will focus on determining whether:

- the project is causing water quality standard violations;
- the required Stormwater Pollution Prevention Plan (SWPPP) includes appropriate erosion and sediment controls and, to some extent, post construction controls;
- the owner/operator is complying with the SWPPP;
- where required, self-inspections are being properly performed; and
- where self-inspections are required, the owner/operator responds appropriately to the self-inspector's reports.

1.1.1 Comprehensive Inspection

Comprehensive inspections are designed to verify permittee compliance with all applicable regulatory requirements, effluent controls, and compliance schedules. This inspection involves records reviews, visual observations, and evaluations of management practices, effluents, and receiving waters.

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities. A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting prioritiesto ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

A neutral inspection scheme should set the criteria the inspector uses to choose which facilities to inspect, but the schedule for the actual inspection should remain confidential, and may be kept separate from the neutral plan.

A routine comprehensive compliance inspection is most effective when it is unannounced or conducted with very little advance warning.

1.1.2 Reconnaissance Inspection

A reconnaissance inspection is performed in lieu of, or following a comprehensive inspection to obtain a preliminary overview of an owner/operator's compliance program, to respond to a citizen complaint, or to assess a non-permitted site. The inspector performs a brief (generally about an hour) visual inspection of the site, discharges and receiving waters. A reconnaissance inspection uses the inspector's experience and judgement to summarize potential compliance problems, without conducting a full comprehensive inspection. The objective of a reconnaissance inspection is to expand inspection coverage without increasing inspection resource expenditures. The reconnaissance inspection is the shortest and least resource intensive of all inspections.

Reconnaissance inspections may be initiated in response to known or suspected violations, a public complaint, a violation of regulatory requirements, or as follow-up to verify that necessary actions were taken in response to a previous inspection.

1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional[1] perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

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[1] A "Qualified professional" is a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed landscape architect or soil scientist.

2.0 PRE-INSPECTION ACTIVITIES

2.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf, such as county Soil and Water Conservation District staff. Examples of other regulatory oversight authorities include: the United States Environmental Protection Agency (EPA); New York City Department of Environmental Protection (DEP), Adirondack Park Agency (APA); the Lake George Park Commission (LGPC), and the Skaneateles Lake Watershed Authority (SLWA). Before arriving on-site to conduct the inspection, considerations concerning communication, documentation and equipment must be made.

Regulatory oversight authority is granted by state or local law to government agencies or, depending upon the particular law, an authorized representative of state or local government. SPDES rules 6 NYCRR 750-2.3 and Environmental Conservation Law 17-0303(6) and 17-0829(a) all allow for authorized representatives of the (NYSDEC) commissioner to perform all the duties of an inspector.

2.1.1 Communication

Coordination with Other Entities

Where appropriate, prior to selecting sites for inspection, compliance inspectors should communicate with other regulatory oversight authorities to avoid unnecessary duplication or to coordinate follow-up to inspections performed by other regulatory oversight authorities.

Announced vs. Unannounced Inspection

Inspections may be announced or unannounced. Each method has its own advantages and disadvantages. Unannounced inspections are preferred, however many job sites are not continuously manned, or not always staffed by someone who is familiar with the SWPPP, thus necessitating an announced inspection. As an alternative, when an announced inspection is necessary, inspectors should try to give as little advanced warning as possible (24 hours is suggested).

Itinerary

For obvious safety reasons, inspectors should be sure to inform someone in their office which site or sites they will be visiting prior to leaving the to perform inspections.

2.1.2 Documentation

Data Review

The inspector should review any available information such as:

- Notice of Intent
- Stormwater Pollution Prevention Plan
- Past inspection records
- Phasing plan

- Construction sequence
- Inspection and Maintenance schedules
- Site specific issues
- Consent Orders
- Access agreements

Inspection Form
The inspector should have copies of, and be familiar with, the inspection form used by their regulatory oversight authority (example in Attachment 1) before leaving the office. Static information such as name, location and permit number can be entered onto the inspection form prior to arriving at the inspection site.

Credentials
Inspectors should always carry proper identification to prove that they are employed by an entity with jurisdictional authority. Failure to display proper credentials may be legal grounds for denial of entry to a site.

2.1.3 Equipment

Personal Protective Equipment
DOW employees must conform to the DOW Health and Safety policy as it relates to personal protective equipment. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at: www.osha.gov/dep/etools/ehasp/ to develop a health and safety plan.

The following is a list of some of the most common health and safety gear that may be needed:

- Hard hat (Class G, Type1 or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

If the construction is on an industrial site or a hazardous waste site, special training may be required prior to entering the site. The inspector should consult with OSHA or NYSDEC prior to entering such a site.

Monitoring Equipment
The following is a list of some equipment that may be helpful to document facts and verify compliance:

- Digital Camera
- Measuring tape or wheel
- Hand level or clinometer
- Turbidity meter (in limited circumstances)

2.2 Permittee's Self-inspection

This section is intended for qualified professionals who conduct site self-inspections on behalf of owner/operators. Self-inspectors are responsible for performing inspections in accordance with permit requirements and reporting to site owners and operators the results and any recommendations resulting from the inspection.

Prior to conducting inspections, qualified professionals should ensure familiarity with the Stormwater Pollution Prevention Plan and previous inspection reports.

3.0 ON-SITE INSPECTION PROCESS

3.1 Compliance Inspections

3.1.1 Professionalism

Don't Pretend to Possess Knowledge

Unless the inspector has experience with a particular management practice, do not pretend to possess knowledge. Inspectors cannot be expert in all areas; their job is to collect information, not to demonstrate superior wisdom. Site operators are often willing to talk to someone who is inquisitive and interested. Within reason, asking questions to obtain new information about a management practice, construction technique or piece of equipment is one of the inspector's main roles in an inspection.

Don't Recommend Solutions

The inspector should not recommend solutions or endorse products. The solution to a compliance problem may appear obvious based on the inspector's experience. However, the responsibility should be placed on the site owner to implement a workable solution to a compliance problem that meets NYSDEC standards. The inspector should refer the site operator to the New York Standards and Specifications for Erosion and Sediment Control (the Blue Book) or the New York State Stormwater Management Design Manual (the Design Manual).

Key advice must be offered carefully. One experienced stormwater inspector suggests saying: "I can't direct you or make recommendations, but what we've seen work in other situations is ..."

The way inspectors present themselves is important to the effectiveness of the inspection. An inspector cannot be overly familiar, but will be more effective if able to establish a minimum level of communication.

3.1.2 Safety

DOW employees must conform to Division health and safety policies when on a construction site. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at:

www.osha.gov/dep/etools/ehasp to develop a health and safety plan.

Some general protections for construction sites are:

- Beware of heavy equipment, avoid operator blind spots and make sure of operator eye contact around heavy equipment.
- Avoid walking on rock rip-rap if possible. Loose rock presents a slip hazard.
- Stay out of confined spaces like tanks, trenches and foundation holes.
- Avoid lightning danger. Monitor weather conditions, get out of water, avoid open areas and high points, do not huddle in groups or near trees.
- Protect yourself from sun and heat exposure. Use sun screen or shading clothing. Remain hydrated by drinking water, watching for signs of heat cramps, exhaustion (fatigue, nausea, dizziness, headache, cool or moist skin), or stroke (high body temperature; red, hot and dry skin)
- Protect yourself from cold weather. Wear multiple layers of thin clothing. Wear a warm hat. Drink warm fluids or eat hot foods, and keep dry.
- Avoid scaffolding in excess of 4 feet above grade.
- Beware of ticks, stinging insects, snakes and poison ivy or sumac.

3.1.3 Legal access

DOW has general powers, set forth under ECL 17-0303, subparagraph 6, to enter premises for inspections. In addition, ECL 3-0301.2 conveys general statutory authority granting the DOW the power to access private property to fulfill DOW obligations under the law.

ECL 15-0305 gives the DOW the authority to enter at all times in or upon any property, public or private, for the purpose of inspecting or investigating conditions affecting the construction of improvements to or developments of water resources for the public health, safety or welfare.

ECL 17-0829 allows an authorized DOW representative, upon presentation of their credentials, to enter upon any premises where any effluent source is located, or in which records are required to be maintained. The representative may at reasonable times have access to, and sample discharges/pollutants to the waters or to publicly owned treatment plants where the effluent source is located. This subparagraph provides DOW representatives performing their duties authority to enter a site to pursue administrative violations. Pursuing criminal violations may require a warrant or the owner's permission to enter the site.

For sites that are permitted, DOW has authority under the permit to enter the site.

If the owner/operator's representatives onsite deny access, the inspector *should not* physically force entry. Under these circumstances the attorney representing the inspector should be immediately notified and consideration should be given to soliciting the aid of a law officer to obtain entry.

DOW staff have the right to enter at any reasonable time. If no one is available, and the site is fenced or posted, DOW staff should make all reasonable efforts to identify, contact and notify the owner that the DOW is entering the site. If the inspector has made all reasonable efforts to contact site owners, but was unable to do so, the site can then be accessed. All efforts should be taken not to cause any damage to the facility.

Other regulatory oversight authorities should seek advice on their legal authorities to enter a job site. Municipalities that have adopted Article 6 of the New York State Sample Local Law for Stormwater Management and Erosion and Sediment Control (NYSDEC, 2004, updated 2006) will have legal authority to enter sites in accordance with that chapter and any other existing municipal authority .

Agents of DOW have authority similar DOW staff authority to enter sites. However, DOW staff enjoy significant personal liability protections as state employees. That liability protection may not be the same for authorized representatives of DOW. For authorized representatives of DOW (or other regulatory oversight authorities), it is prudent to obtain permission to enter the site. If such permission is denied, the authorized representatives should inform the appropriate DOW contact, usually the regional water manager.

3.1.4 Find the Legally Responsible Party (Construction Manager, Self-inspector)

The first action a compliance inspector should take upon entering a construction site is to find the construction trailer or the construction or project manager if they are available. The inspector should present appropriate identification to the site's responsible party and state the reason for the inspection; construction stormwater complaint response or neutral construction stormwater inspection. If the inspection is initiated as a response to a complaint, frequently the responsible party will ask who made the complaint. DOW keeps private individual complainants confidential. If the complainant is another regulatory oversight authority, DOW tends to make that known to the site's responsible party.

3.1.5 On-site records review (NOI, SWPPP, Self-inspection Reports, Permit)

Generally, the compliance inspector should next review the on-site records. Verify that a copy of the construction stormwater permit and NOI are on-site. Verify that the acreage, site conditions, and receiving water listed on the NOI are accurate. Compare the on-site documentation with documentation already submitted to, or obtained by the compliance inspector.

If the SWPPP has not been reviewed in the office, verify that it exists and contains the minimum required components (16 for a basic plan and 22 for a full plan). On-site review of the SWPPP should determine if: there is an appropriate phasing plan; the acreage disturbed in each phase, construction sequence for each phase; proposed implementation of erosion and sediment control measures; and, where required, post construction controls. For each of the erosion and sediment control practices, the SWPPP must show design details in accordance with the NYS Standards for Erosion and Sediment Controls. The SWPPP must also include provisions for maintenance of practices during construction. On-site review of post construction controls is generally limited to verification that the proposed stormwater management practices are shown on the site plan.

Where self-inspections are required, self-inspection reports are a significant tool for the compliance inspector to determine the performance history of the site. The self-inspection reports should be done with the required frequency . Self-inspection reports must include all the details required by the permit. Generally, it is desirable for permit information to be shown on a site plan. The compliance inspector should become familiar with the report and use that familiarity to judge whether the self-inspections are being performed correctly and that the site operator is correcting deficiencies noted in the report.

3.1.6 Walk the Site

During wet weather conditions, it may be advantageous to observe the receiving waters prior to walking the rest of the site. At some point during the inspection, the receiving water conditions must be observed and noted. It is critical to note if there is a substantial visible contrast to natural conditions, or evidence of deposition, streambank erosion, construction debris or waste materials (e.g. concrete washdown) in the receiving stream.

Each inspector should evaluate actual implementation and maintenance of practices on-site compared to how implementation and maintenance is detailed in the SWPPP. At a minimum, the compliance inspector should observe all areas of active construction. Observing equipment or materials storage, recently stabilized areas, or stockpile areas is also appropriate to evaluate the effectiveness of management practices.

3.1.7 Taking Photographs

Evidence of poor receiving water conditions and poor or ineffective practices should be documented with digital photographs. Those photographs should be logged date stamped and stored on media that cannot be edited (e.g. write only CDs). Photos should also be appended to the site inspector's report.

It is also beneficial to take photographs of good practices for educational and technology transfer reasons.

3.1.8 Exit Interview

Clearly communicate expectations and consequences. If it is clear from the inspection that the owner/operator must modify the SWPPP, or modify management practices within an assigned period (e.g. 24 hours, 48 hours, one week, two weeks), then that finding should be communicated at the time of the exit interview. The inspector should assign the period based on factors such as how long it would reasonably take to complete such modifications and the level of risk to water quality associated with failure to make such modifications.

The inspector should make clear that NYSDEC reserves rights to future enforcement actions. If the inspector's supervisor or enforcement coordinator determines additional enforcement actions are necessary, the inspector *should not* reassure the owner/operator that the current situation is acceptable.

3.2 Non-permitted Site Inspections

For sites not authorized in accordance with state or local laws, the process will be abbreviated. First verify the need for authorization and observe receiving waters to detect water quality standard violations. If there is a violation, notify the owner of the violation or other compliance actions in response to their illicit activity. For DOW staff, Attachment 2 or a similar notice can be used to notify the site owner/operator that stormwater authorization is required.

3.3 Self-inspections

The role of the self-inspector is to verify that the site is complying with stormwater requirements. In particular, the self-inspector verifies that the SWPPP is being properly implemented. The self-inspector also documents SWPPP implementation so regulatory agencies can review implementation activities.

It is <u>not</u> the role of the self-inspector to report directly to regulatory authorities.

Appendix H of *The New York Standards and Specifications for Erosion and Sediment Control* - August 2005 (the Blue Book) includes a Construction Duration Inspection checklist that can be used by the owner/operators qualified professional for self-inspections. The Blue Book is available on the NYSDEC website.

3.3.1 Purpose

The self inspector should ensure that the project's SWPPP is being properly implemented. This includes ensuring that the erosion and sediment control practices are properly installed and being maintained in accordance with the SWPPP/Blue Book.

The project must be properly phased to limit the disturbance to less than five acres, and the construction sequence for each phase must be followed. The SWPPP must also be modified to address evolving circumstances. Finally, and most importantly, receiving waters must be protected.

If a soil disturbance will be greater than five acres at any given time, the site operator must obtain written permission from the DOW regional office.

3.3.2 Pre-construction Conference

The parties responsible for various aspects of stormwater compliance should be identified at the pre-construction conference. Responsible parties may include, but are not limited to, owner's engineer, owner/operator/permittee, contractors, and subcontractors.

Typical responsibilities include: installation of erosion and sediment control (E & SC) practices; maintenance of E & SC practices, inspection of E&SC practices, installation of post construction stormwater management practices (SMPs), inspection of post construction SMPs, SWPPP revisions, and contractor direction.

All parties should clearly know what is expected of them. Responsible parties should complete the Pre-construction Site Assessment Checklist provided in Appendix H of the Blue Book.

3.3.3 Inspection Preparation

The inspector should review the project's SWPPP (including the phasing plan, construction sequence and site specific issues) and the last few inspection reports (if the inspector has them available).

3.3.4 Self-inspection Components

Inspect installation, performance and maintenance of all E&SC practices

The self inspector should inspect all areas that are under active construction or disturbance and areas that are vulnerable to erosion. The self-inspector should also inspect areas that will be disturbed prior to the next inspection for measures required prior to construction (e.g. silt barriers, stabilized construction entrance, diversions). Finally, self-inspectors should inspect post-construction controls during and after installation.

Identify site deficiencies and corrective measures

The self-inspector's reports must be maintained in a log book on site and the log book must be made available to the regulatory authorities. Although the legal responsibility for filing a Notice of Termination lies with the owner/operator, the self-inspector may also be called upon to perform a final site inspection, including post construction SMPs, prior to filing the Notice of Termination.

4.0 POST-INSPECTION ACTIVITIES

4.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf (such as County Soil and Water Conservation District staff.) Upon completion of an inspection, inspection results should be documented for the record.

4.1.1 Written Notification

The inspector should inform the permittee or the on-site representative of their inspection results in writing by sending the permittee a complete, signed copy of the inspection report. The inspection report should be transmitted under a cover letter which elaborates on any deficiencies noted in the inspection report. It is not a good idea to commend exceptional efforts by the owner/operator in a letter, because such letters tend to undermine enforcement efforts when compliance status at a site degrades.

The inspector should consider providing a copy of the cover letter and inspection report to other parties with including:

- Permittee
- Contractor(s)
- Other regulatory oversight authorities
- Other parties present during the inspection (e.g. SWPPP preparer, permittee's self-inspector, etc.)

For DOW staff, an example of the inspection cover letter is included as Attachment 3.

4.1.2 Inspection Tracking

DOW staff must enter their inspection results into the electronic *Water Compliance System*.

Local municipalities and other regulatory oversight authorities are encouraged to develop an electronic tracking system in which to record their inspections.

4.2 Permittee's Self-inspections

This section is intended for qualified professionals who conduct site inspections for permittees in accordance with a SPDES permit or local requirements.

4.2.1 Written Records

Inspection Reports
The inspector shall prepare a written report summarizing inspection results. The inspection report is then provided to the permittee, or the permittee's duly authorized representative, and to the contractor responsible for implementing stormwater controls on-site in order to correct deficiencies noted in the inspection report. Finally, the inspection report must be added to the site log book that is required to be maintained on-site, and be available to regulatory oversight authorities for review.

4.2.2 Stormwater Pollution Prevention Plan Revisions

The inspector must inform the permittee of his/her duty to amend the Stormwater Pollution Prevention Plan (SWPPP) whenever an inspection proves the SWPPP to be ineffective in:

- Eliminating or significantly minimizing pollutants from on-site sources
- Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity
- Eliminating discharges that cause a substantial visible contrast to natural conditions

ATTACHMENT 1

Construction Stormwater Compliance Inspection Report

Project Name and Location: Municipality: County:	Date:	Page 1 of 2
	Permit # (if any): **NYR**	
	Entry Time:	Exit Time:
On-site Representative(s) and contact information:	Weather Conditions:	
Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted: Yes ☐ No ☐		

INSPECTION CHECKLIST

SPDES Authority

	Yes	No	N/A		Law, rule or permit citation
1.	☐	☐	☐	Is a copy of the NOI posted at the construction site for public viewing?	
2.	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?	
3.	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?	

SWPPP Content

	Yes	No	N/A		Law, rule or permit citation
4.	☐	☐	☐	Does the SWPPP describe and identify the erosion & sediment control measures to be employed?	
5.	☐	☐	☐	Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures?	
6.	☐	☐	☐	Does the SWPPP describe and identify the post-construction SW control measures to be employed?	
7.	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?	
8.	☐	☐	☐	Does the SWPPP include all the necessary 'CONTRACTOR CERTIFICATION' statements?	
9.	☐	☐	☐	Is the SWPPP signed/certified by the permittee?	

Recordkeeping

	Yes	No	N/A		Law, rule or permit citation
10.	☐	☐	☐	Are inspections performed as required by the permit (every 7 days and after ½" rain event)?	
11.	☐	☐	☐	Are the site inspections performed by a qualified professional?	
12.	☐	☐	☐	Are all required reports properly signed/certified?	
13.	☐	☐	☐	Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status?	

Visual Observations

	Yes	No	N/A		Law, rule or permit citation
14.	☐	☐	☐	Are all erosion and sediment control measures installed/constructed?	
15.	☐	☐	☐	Are all erosion and sediment control measures maintained properly?	
16.	☐	☐	☐	Have all disturbances of 5 acres or more been approved prior to the disturbance?	
17.	☐	☐	☐	Are stabilization measures initiated in inactive areas?	
18.	☐	☐	☐	Are permanent stormwater control measures implemented?	
19.	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?	
20.	☐	☐	☐	Are receiving waters free of there evidence of turbidity, sedimentation, or oil ? (If no , complete Page 2)	

Overall Inspection Rating: ☐ Satisfactory ☐ Marginal ☐ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

Water Quality Observations

Describe the discharge(s) [source(s), impact on receiving water(s), etc.] ______________________________

____

____

____

____

Describe the quality of the receiving water(s) both upstream and downstream of the discharge______________________________

____

____

____

____

Describe any other water quality standards or permit violations ______________________________

____

____

Additional Comments:______________________________

____

____

____

____

____

____

____

____

____

____

____

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____

____

____

☐ Photographs attached

ATTACHMENT 2

**** NOTICE ****

On March 10, 2003, provisions of the Federal Clean Water Act went into effect that apply to many construction operations.

If your construction operations result in the disturbance of one acre or greater and stormwater runoff from your site reaches surface waters (i.e., lake, stream, road side ditch, swale, storm sewer system, etc.), the stormwater runoff from your site must be covered by a State Pollutant Discharge Elimination System (SPDES) Permit issued by the New York State Department of Environmental Conservation (NYSDEC).

To facilitate your compliance with the law, NYSDEC has issued a General Permit which may be applicable to your project. To obtain coverage under this General Permit, you need to prepare a Stormwater Pollution Prevention Plan (SWPPP) and then file a Notice of Intent (NOI) to the NYSDEC headquarters in Albany. The NOI form is available on the DEC website. You may also obtain a copy of the NOI form at the nearest NYSDEC regional offices.

When you file your NOI you are certifying that you have developed a SWPPP and that it will be implemented prior to commencing construction. When you submit the NOI you need to indicate if your SWPPP is in conformance with published NYSDEC technical standards; if it is, your SPDES permit coverage will be effective in as few as five business days. If your SWPPP does not conform to the DEC technical standards, coverage will not be available for at least 60 business days.

Failure to have the required permit can result in legal actions which include Stop Work Orders and/or monetary penalties of up to $37,500/day

If your construction operations are already in progress and you are not covered by an appropriate NYSDEC permit contact the NYSDEC Regional Water Engineer as soon as possible. If your construction field operations have not yet commenced, review the NOI and the General Permit on the DEC's website or at the DEC regional office for your area. When you are comfortable that you understand and comply with the requirements, file your NOI.

The requirement to file an NOI does not replace any local requirements. Developers/Contractors are directed to contact the Local Code Enforcement Officer or Stormwater Management Officer for local requirements.

ATTACHMENT 3

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

Re: Stormwater Inspection
SPDES Permit Identification No. NYR10Z000 (through SPDES No. GP-02-01)
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

Dear Mr. Smith:

On the afternoon of << date >> I conducted an inspection of the construction activities associated with the Blowing Leaves Subdivision located on County Route 1 in the town of Gasper, Eaton County. The inspection was conducted in the presence of you and Mr. Samuel Siltfence of Acme Excavating Co., Inc. The purpose of the inspection was to verify compliance with the *State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity* ("the general permit").

The overall rating for the project at the time of the inspection was ***unsatisfactory***. A copy of my inspection report is attached for your information. In addition to the report, I would like to elaborate on the following:

SPDES Authority

- In accordance with subdivision 750-2.1 (a) of Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR), a copy of your permit must be retained at the construction site. You did not have a copy of the general permit at the site. **Your failure to retain a copy of the general permit at the construction site is a violation of 6 NYCRR Part 750-2.1 (a).** Please retain a copy of the general permit at the site from this point forward.

SWPPP Content

- In accordance with Part III.E.2. of the general permit, contractors and subcontractors must certify that they understand the terms and conditions of the general permit and the SWPPP before undertaking any construction activity at the site. Your SWPPP does not include a certification statement from Acme Excavating Co., Inc. **The failure of your contractor to sign this certification before undertaking construction activity at the site is a violation of Part III.E.2. of the general permit.** Please obtain copies of all necessary certifications and provide copies of them to each party who holds a copy of your SWPPP.

- In accordance with Part V.H.2. of the general permit, SWPPP’s must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

violation of Part V.H.2. of the general permit. Please certify your SWPPP.

Recordkeeping

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.

- Although the frequency of self-inspections does not meet rquirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.

- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

Visual Observations

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.

- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.

- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is “no increase that will cause a substantial visible contrast to natural conditions.” I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.

APPENDIX 11

CONTRACTOR CERTIFICATION FORM

MASER
CONSULTING

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12553-4749
T: 845.564.4495
F: 845.567.1025
www.maserconsulting.com

CONTRACTOR'S CERTIFICATION
Pursuant to
NYS DEC GENERAL PERMIT GP-0-20-001

Pursuant to the SPDES General Permit for Stormwater Discharges from Construction Activity (Permit GP-0-20-001) Part III.a.6, all contractors and subcontractors implementing all, or a portion of the Stormwater Pollution Prevention Plan (SWPPP) shall sign a copy of the following certification statement before undertaking any construction activity at the site identification in the SWPPP:

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

____________________________	____________________________	_____________
Signature	Print Name	Date

Contracting Firm Information:

Contracting Firm Name:

Address:

Telephone Number:

Address of Site:
____

Name of trained individual responsible for SWPPP implementation, and who shall be on site on a daily basis when soil disturbance activities are being performed:

Name: ____________________________ Title: ______________________________

r:\reference\design references\ny stormwater\swppp report template\gp-0-20-001 contractor certification.docx

APPENDIX 12

NYSDEC DEEP-RIPPING & DECOMPACTION MANUAL

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

New York State
Department of Environmental Conservation

Document Prepared by:

John E. Lacey,
Land Resource Consultant and Environmental Compliance Monitor
(Formerly with the Division of Agricultural Protection and Development Services,
NYS Dept. of Agriculture & Markets)

Alternative Stormwater Management
Deep-Ripping and Decompaction

Description

The two-phase practice of 1) “Deep Ripping;” and 2) “Decompaction” (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil’s water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.

Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper “rips” through severely compressed subsoil.

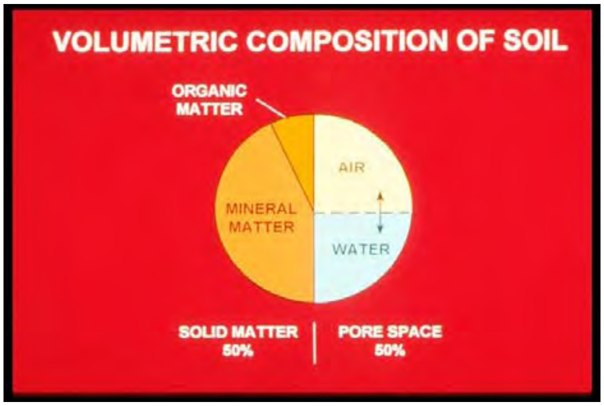

Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

Recommended Application of Practice

Fig. 3. Construction site with significant compaction of the deep basal till subsoil extends 24 inches below this exposed cut-and-fill work surface.

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterallly) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the "two-phase" practice of Deep Ripping and Decompaction first became established as a "best management practice" through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).

Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

Benefits

Aggressive "deep ripping" through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by "decompaction," i.e.: "sub-soiling," through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area's direct surface infiltration of rainfall by providing the open site's mitigated soil condition and lowers the demand on concentrated runoff control structures
- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures
- Decreases runoff volume generated and provides hydrologic source control
- May be planned for application in feasible open locations either alone or in

conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

Feasibility / Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

Soil

In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

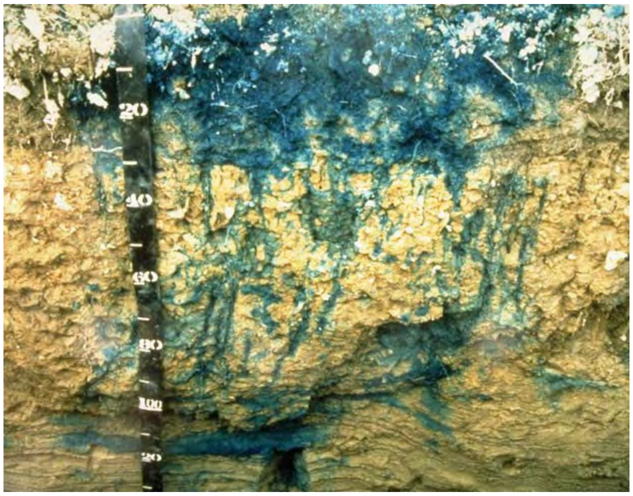

Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompation (subsoiling); and other measures may be more practical.

Slope

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

Local Weather/Timing/Soil Moisture

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a “plastic” or “liquid” state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the “slicing and smearing” of the material or added “squeezing and compression” instead of the necessary fracturing. Ample drying time is needed for a “rippable” soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

The “poor man’s Atterberg field test” for soil plasticity is a simple “hand-roll” method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a “plastic” state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.

Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and

2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, “decompaction,” mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area’s soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

Implements

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only "scarify" the uppermost surface portion of the mass of compacted subsoil material. The term "chisel plow" is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).

Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.

Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a "heavy duty" agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) of Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like "lifting and shattering" action up through the soil layers as it is pulled.

Pulling-Power of Equipment

Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are "chained up" so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.

Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.

Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or "teeth" of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.

Depth and Patterns of Movement

As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decompaction (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a ¾ inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decompation (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.

Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.

Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decompaction on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decompation (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

Large, Unobstructed Areas

For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.

- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.

- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a ¾-inch cone penetrometer.)

Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.

Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

Corridors

In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

- A second series of passes makes a broad "S" shaped pattern of rips, continually and gradually alternating the "S" curves between opposite edges inside the compacted corridor.

- The third and final series again uses the broad, alternating S pattern, but it is "flip-flopped" to continually cross the previous S pattern along the corridor's centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompation is completed, two items are essential for maintaining a site's soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.

Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.

Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland.The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at $1800 per day, the net cost is $900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs $675 per acre for a combined total of $1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

Resources

Publications:

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- Baver, L.D. 1948. *Soil Physics.* John Wiley & Sons.

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- Ellis, B. (Editor). 1997. Safe & Easy Lawn Care: The Complete Guide to Organic Low Maintenance Lawn. Houghton Mifflin.

- Harpstead, M.I., T.J. Sauer, and W.F. Bennett. 2001. *Soil Science Simplified. 4th ed.* Iowa State University Press.

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- McCarthy, D.F. 1993. *Essentials of Soil Mechanics and Foundations, Basic Geotechnics 4th ed.* Regents/Prentice Hall.

- Plaster, E.J. 1992. *Soil Science & Management. 3rd ed.* Delmar Publishers.

- Union Gas Limited, Ontario, Canada. 1984. *Rehabilitation of Agricultural Lands, Dawn-Kerwood Loop Pipeline; Technical Report*. Ecological Services for Planning, Ltd.; Robinson, Merritt & Devries, Ltd. and Smith, Hoffman Associates, Ltd.

- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York.* USDA.

Internet Access:

- Examples of implements:

V-Rippers. Access by internet search of *John Deere Ag -New Equipment for 915* (larger-frame model) *V-Rippe*; and, *for 913* (smaller-frame model) *V-Ripper*. Deep, angled-leg subsoiler. Access by internet search of: B*igham Brothers Shear Bolt Paratill-Subsoiler.* http://salesmanual.deere.com/sales/salesmanual/en_NA/primary_tillage/2008/feature/rippers/915v_pattern_frame.html?sbu=ag&link=prodcat Last visited March 08.

- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*

- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07

APPENDIX 13

NRCC PRECIPITATION TABLES

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	74.354 degrees West
Latitude	41.237 degrees North
Elevation	0 feet
Date/Time	Thu, 10 Sep 2020 09:14:35 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.04	1.29	**1yr**	0.90	1.21	1.47	1.81	2.20	2.68	3.08	**1yr**	2.37	2.96	3.40	4.14	4.77	**1yr**
2yr	0.40	0.61	0.76	1.00	1.26	1.56	**2yr**	1.08	1.46	1.79	2.19	2.66	3.22	3.69	**2yr**	2.85	3.54	4.07	4.80	5.46	**2yr**
5yr	0.46	0.72	0.90	1.21	1.55	1.94	**5yr**	1.33	1.80	2.23	2.74	3.33	4.03	4.64	**5yr**	3.57	4.46	5.11	5.92	6.69	**5yr**
10yr	0.52	0.81	1.03	1.39	1.81	2.30	**10yr**	1.56	2.11	2.65	3.26	3.96	4.78	5.53	**10yr**	4.23	5.32	6.06	6.95	7.81	**10yr**
25yr	0.60	0.95	1.21	1.68	2.24	2.86	**25yr**	1.93	2.61	3.32	4.10	4.98	5.99	6.98	**25yr**	5.30	6.71	7.61	8.58	9.59	**25yr**
50yr	0.68	1.09	1.39	1.95	2.62	3.39	**50yr**	2.26	3.06	3.94	4.86	5.92	7.11	8.33	**50yr**	6.29	8.01	9.05	10.07	11.20	**50yr**
100yr	0.76	1.24	1.59	2.26	3.08	4.01	**100yr**	2.66	3.60	4.67	5.79	7.04	8.45	9.94	**100yr**	7.48	9.56	10.76	11.82	13.09	**100yr**
200yr	0.86	1.41	1.83	2.62	3.63	4.75	**200yr**	3.13	4.24	5.55	6.88	8.37	10.04	11.87	**200yr**	8.88	11.42	12.81	13.88	15.31	**200yr**
500yr	1.03	1.69	2.21	3.21	4.50	5.93	**500yr**	3.88	5.26	6.95	8.65	10.53	12.62	15.02	**500yr**	11.17	14.45	16.13	17.18	18.85	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.46	0.56	0.76	0.93	1.13	**1yr**	0.80	1.10	1.24	1.57	2.04	2.37	2.60	**1yr**	2.10	2.50	2.91	3.74	4.48	**1yr**
2yr	0.38	0.59	0.72	0.98	1.21	1.46	**2yr**	1.04	1.42	1.65	2.12	2.63	3.12	3.57	**2yr**	2.76	3.44	3.97	4.67	5.31	**2yr**
5yr	0.43	0.66	0.82	1.12	1.43	1.69	**5yr**	1.23	1.65	1.93	2.48	3.09	3.72	4.30	**5yr**	3.29	4.13	4.78	5.54	6.30	**5yr**
10yr	0.47	0.72	0.89	1.25	1.61	1.90	**10yr**	1.39	1.85	2.17	2.76	3.50	4.23	4.97	**10yr**	3.74	4.78	5.52	6.25	7.05	**10yr**
25yr	0.53	0.81	1.01	1.44	1.90	2.19	**25yr**	1.64	2.14	2.54	3.26	4.10	4.98	5.99	**25yr**	4.41	5.76	6.64	7.33	8.16	**25yr**
50yr	0.59	0.89	1.11	1.59	2.15	2.47	**50yr**	1.85	2.41	2.87	3.70	4.64	5.58	6.92	**50yr**	4.94	6.65	7.66	8.28	9.14	**50yr**
100yr	0.65	0.98	1.23	1.78	2.44	2.76	**100yr**	2.10	2.70	3.24	4.19	5.27	6.25	8.00	**100yr**	5.53	7.69	8.82	9.34	10.20	**100yr**
200yr	0.72	1.09	1.38	2.00	2.79	3.10	**200yr**	2.40	3.03	3.67	4.78	6.00	7.02	9.27	**200yr**	6.21	8.92	10.19	10.56	11.38	**200yr**
500yr	0.84	1.25	1.61	2.33	3.32	3.62	**500yr**	2.87	3.54	4.34	5.70	7.15	8.14	11.29	**500yr**	7.20	10.86	12.35	12.47	13.18	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.56	0.68	0.92	1.13	1.36	**1yr**	0.97	1.33	1.56	1.99	2.42	2.88	3.30	**1yr**	2.55	3.17	3.65	4.39	5.06	**1yr**
2yr	0.41	0.63	0.78	1.06	1.30	1.55	**2yr**	1.12	1.52	1.77	2.26	2.81	3.36	3.82	**2yr**	2.97	3.68	4.23	4.99	5.71	**2yr**
5yr	0.50	0.78	0.96	1.32	1.68	1.99	**5yr**	1.45	1.95	2.27	2.91	3.63	4.35	4.95	**5yr**	3.85	4.76	5.43	6.31	7.09	**5yr**
10yr	0.60	0.92	1.13	1.58	2.05	2.44	**10yr**	1.77	2.39	2.76	3.55	4.43	5.35	6.08	**10yr**	4.73	5.84	6.63	7.59	8.54	**10yr**
25yr	0.75	1.14	1.42	2.02	2.66	3.20	**25yr**	2.29	3.13	3.61	4.60	5.76	7.04	7.92	**25yr**	6.23	7.62	8.61	9.70	10.88	**25yr**
50yr	0.89	1.35	1.68	2.41	3.25	3.79	**50yr**	2.80	3.71	4.40	5.59	7.01	8.68	9.67	**50yr**	7.68	9.30	10.49	11.67	13.10	**50yr**
100yr	1.05	1.59	1.99	2.88	3.95	4.61	**100yr**	3.41	4.51	5.36	6.79	8.54	10.73	11.83	**100yr**	9.50	11.38	12.78	14.06	15.77	**100yr**
200yr	1.25	1.88	2.39	3.45	4.82	5.61	**200yr**	4.16	5.49	6.52	8.26	10.39	13.30	14.46	**200yr**	11.77	13.91	15.59	16.91	19.00	**200yr**
500yr	1.58	2.35	3.03	4.40	6.25	7.27	**500yr**	5.40	7.11	8.47	10.69	13.46	17.66	18.83	**500yr**	15.63	18.10	20.25	21.62	24.33	**500yr**

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APPENDIX 14

OPERATION & MAINTENANCE PLAN

MASER
CONSULTING P.A.

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

STORMWATER OPERATION & MAINTENANCE PLAN

WARWICK COMMONS STAGE 5, LLC

Tax lots: 218-1-91, 92, 93, 94 & 96; 219-1-2.2
Village of Warwick, Orange County, NY

Prepared For

Warwick Commons Stage 5, LLC
321 Route 59 # 338
Tallman, NY 10982

Prepared By

Maser Consulting P.A.
555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12550
845.564.4495

SEPTEMBER 2020

MC PROJECT NO. 15002429D

Project Description

The proposed development, Warwick Common Stage 5, also known as Tax Lots 218-1-91, 92, 93, 94 & 96, and 219-1-2.2 is a +/- 15.3-acre site located on Sheffield Drive in the Village of Warwick. The project site has frontage on Brady Road to the west and is bisected by Sheffield Drive in a west to east direction. The proposed project will consist of 14 residential condominium buildings totaling 90 units. Other improvements include a clubhouse, swimming pool, roads, driveways, parking, sidewalks, and associated utilities to service the residences. The project will also involve the re-alignment of the western side of Sheffield Road to create an improved and safer 4-way intersection with Brady Road and Country Lane.

Site Drainage

A State Pollutant Discharge Elimination System Permit (SPDES GP 0-20-001) is required from the New York State Department of Environmental Conservation (NYSDEC) and a Storm Water Pollution Prevention Plan (SWPPP) has been prepared for review/approval by the Village of Warwick (an MS4 community). The site improvements made to the parcel required this study of impacts on watercourses in and around the site. The study provides reviews the existing drainage conditions as well as the proposed improvements to provide measures that will be used to control potential impacts due to storm water runoff.

Constructed Stormwater Control Practices

Catch Basins:

Catch basins on-site are utilized to collect stormwater run-off and melting snow from the paved parking areas, driveway and sidewalks. These are located along the centerline of roadside swales.

Drain/Yard Inlets:

Drain/yard inlets are located within the landscaped areas and are utilized to collect overland stormwater run-off and snow melt.

Roof leaders:

Roof leaders are utilized to collect stormwater run-off from the roof and discharge it into the subsurface chamber system.

Subsurface StormTech Infiltration Chamber System:

A subsurface chamber system is proposed to provide water quality and quantity mitigation in keeping with the requirements in the New York State Storm Water Management Design Manual

(NYSSMDM). The system also has an outlet control structure which regulates the discharge of stormwater.

Bio-retention Areas:

These are shallow stormwater depressions which capture run-off from a surrounding drainage area (six inch deep surface ponding area) and then utilize an engineered soil strata and vegetation for treatment.

See Design Plans and Details for these improvements.

Typical Maintenance for Stormwater Practices

As a consequence of its function, the stormwater conveyance system collects and transports runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and the basins on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly to avoid flooding.

Catch Basins:

Catch basins should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of catch basins includes removal of debris from the grate and sump. This can be done manually or using a vehicle equipped with a vacuum pump. Catch basins should be cleaned out at least one (1) time per year. A good time to clean out catch basins is in the spring to remove the build-up of leaves, sand used for traction, dirt, and other debris that accumulates during winter months.

Drain/Yard Inlets:

Drain/yard inlets, similar to the catch basins, require typical maintenance which includes removal of debris from the grate and sump manually. For this site, use of a vac truck may cause damage to the lawn areas around these structures. Inspections of the structures should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

Roof leaders:

Roof leaders, similar to the catch basins, require typical maintenance which includes removal of debris manually. Inspections of the leaders should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

Subsurface StormTech Infiltration Chamber System:

The Subsurface Arch Chamber System should be inspected monthly (pipes, outlet control structure, etc.) and after heavy rain fall to ensure proper functionality. Refer to Appendix for Manufacturers recommended Operation & Maintenance of the Stormtech Chambers.

Bio-retention Areas:

These areas should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of the bio-retention areas include removal of debris, weeding (especially in the first couple of years while the plants are establishing their root systems) and mulching. Any areas devoid of mulch shall be re-mulched on an annual basis. Dead or diseased plant material shall be replaced immediately.

Silt/Sediment removal from the filter bed shall be conducted when the accumulation exceeds one inch or every five to six years. If the filter bed ponds water at the surface for more than 48 hours, the top 4-6 inches (below the mulch) of material shall be removed and replaced with fresh material. Any plant material removed during clean-out shall be replaced in-kind.

See Design Plans and Details for the components of the soil mixture for the filter bed.

Stormwater Basins:

These basins should be inspected monthly (this includes the inlets pipes, rip-rap, embankments, outlet control structure, emergency spillway and fencing) and after heavy rain fall to ensure proper functionality.

Long-term Stormwater Basin maintenance requires the following:

- Mowing grass, at least twice yearly. Grass clippings and other debris must be removed from the basin area after each cutting. Removal of woody brush and trees. Reestablish good grass cover in areas where woody material has been removed.
- Leaves shall be removed as needed from the basin and outlet control structure.
- Restore and reseed eroded any areas and gullies along embankment areas. Reoccurring erosion should be inspected by a licensed professional engineer to determine probable cause and remedial action that may be necessary.
- General maintenance and repairs of the stormwater outlet and inlet structures.
- Sediment removal from forebay and micropool every five to six years or when 50% full.
- The emergency spillway must remain free of debris and maintain the design elevation in order to convey stormwater during a catastrophic storm event.

In general, any deficiencies identified during the regular inspections or otherwise for all the stormwater management facilities should be corrected immediately. See appendices for forms to record inspection and maintenance work for the stormwater facilities.

APPENDIX A

GENERAL INSPECTION FORMS

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ______________________________
Location: ______________________________
Site Status: ______________________________

Date: ______________________________
Time: ______________________________

Inspector: ______________________________

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	**Satisfactory/ Unsatisfactory**	**Comments**
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete ______ Corrugated pipe _______ Masonry _______ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	**Satisfactory/ Unsatisfactory**	**Comments**
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

_______________ Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

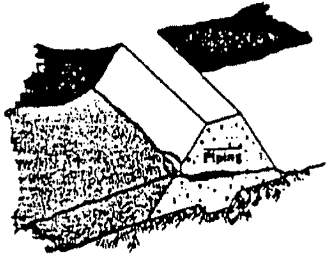
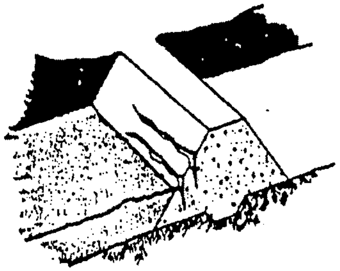
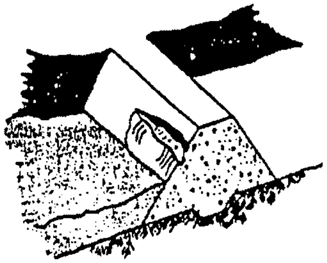
MAINTENANCE ITEM	**SATISFACTORY/ UNSATISFACTORY**	**COMMENTS**
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

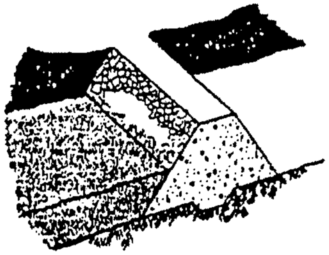
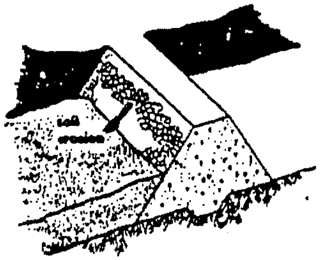
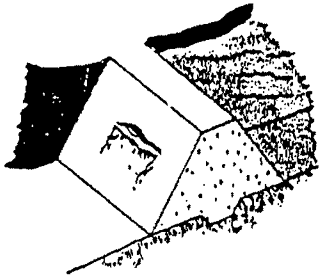
MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

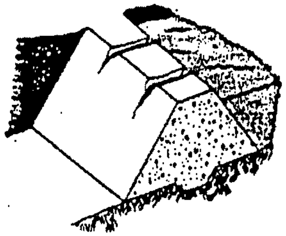
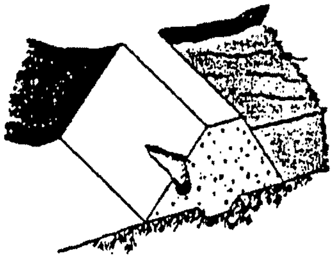
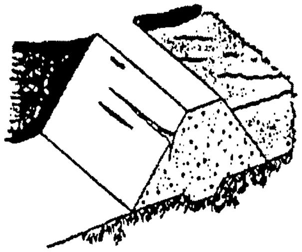
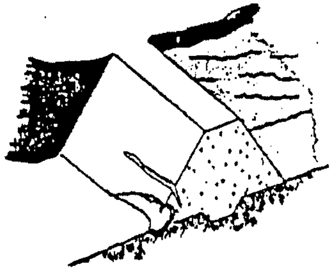
Actions to be Taken:

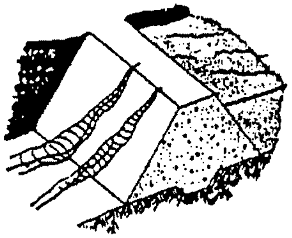
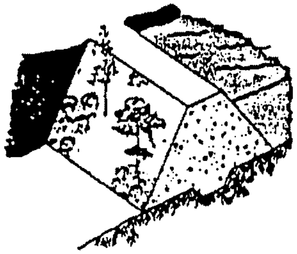
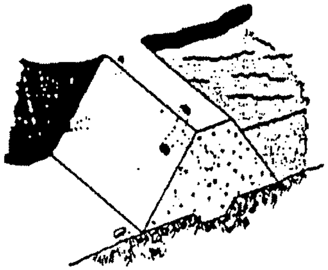
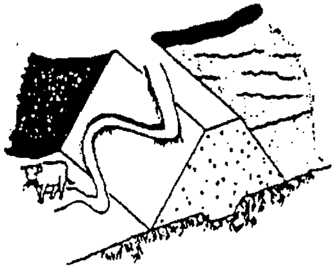
FIGURES 5.3.1
INSPECTION GUIDELINES - EMBANKMENT UPSTREAM SLOPE

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
SINKHOLE  	Piping or internal erosion of embankment materials or foundation causes a sinkhole. The cave-in of an eroded cavern can result in a sink hole. A small hole in the wall of an outlet pipe can develop a sink hole. Dirty water at the exit indicates erosion of the dam.	HAZARDOUS Piping can empty a reservoir through a small hole in the wall or can lead to failure of a dam as soil pipes erode through the foundation or a pervious part of the dam.	Inspect other parts of the dam for seepage or more sink holes. Identify exact cause of sink holes. Check seepage and leakage outflows for dirty water. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
LARGE CRACKS 	A portion of the embankment has moved because of loss of strength, or the foundation may have moved, causing embankment movement.	HAZARDOUS Indicates onset of massive slide or settlement caused by foundation failure.	Depending on embankment involved, draw reservoir level down. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SLIDE, SLUMP OR SLIP 	Earth or rocks move down the slope along a slippage surface because of too steep a slope, or the foundation moves. Also, look for slides movement in reservoir basin.	HAZARDOUS A series of slides can lead to obstruction of the outlet or failure of the dam.	Evaluate extent of the slide. Monitor slide. (See Chapter 6.) Draw the reservoir level down if safety of dam is threatened. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SCARPS, BENCHES, OVERSTEEP AREAS	Wave action, local settlement, or ice action cause soil and rock to erode and slide to the lower part of the slope forming a bench.	Erosion lessens the width and possible height of the embankment and could lead to increased seepage or overtopping of the dam.	Determine exact cause of scarps. Do necessary earthwork, restore embankment to original slope and provide adequate protection (bedding and riprap). See Chapter 7.

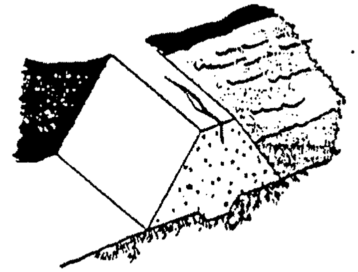
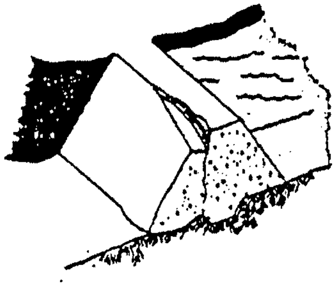
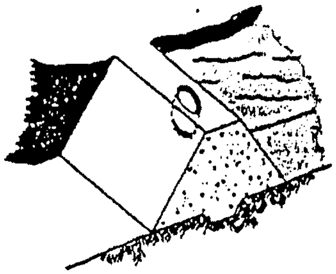
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMEND ACTIONS
BROKEN DOWN MISSING RIPRAP 	Poor quality riprap has deteriorated. Wave action or ice action has displaced riprap. Round and similar-sized rocks have rolled downhill.	Wave action against these unprotected areas decreases embankment width.	Re-establish normal slope. Place bedding and competent riprap. (See Chapter 7.)
EROSION BEHIND POORLY GRADED RIPRAP 	Similar-sized rocks allow waves to pass between them and erode small gravel particles and soil.	Soil is eroded away from behind the riprap. This allows riprap to settle, providing less protection and decreased embankment width.	Re-establish effective slope protection. Place bedding material. ENGINEER REQUIRED for design for gradation and size for rock for bedding and riprap. A qualified engineer should inspect the conditions and recommend further actions to be taken.
SLIDE/SLOUGH 	1. Lack of or loss of strength of embankment material. 2. Loss of strength can be attributed to infiltration of water into the embankment or loss of support by the foundation.	HAZARDOUS Massive slide cuts through crest or upstream slope reducing freeboard and cross section. Structural collapse or overtopping can result.	1. Measure extent and displacement of slide. 2. If continued movement is seen, begin lowering water level until movement stops. 3. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED

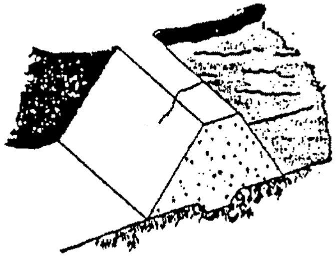
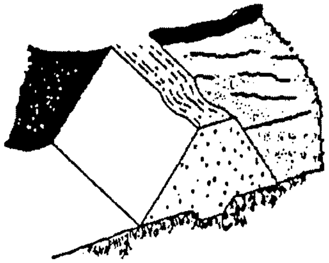
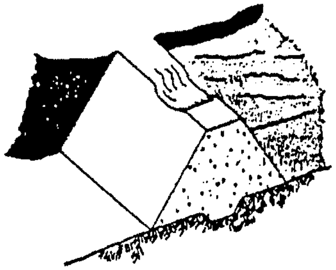
Figures 5.3.2
Inspection Guidelines - Downstream Slope

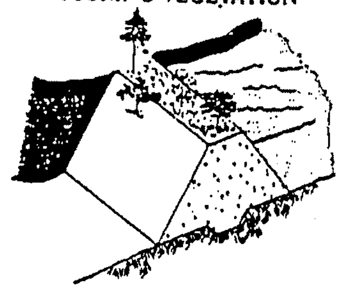
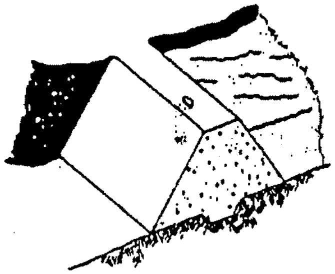
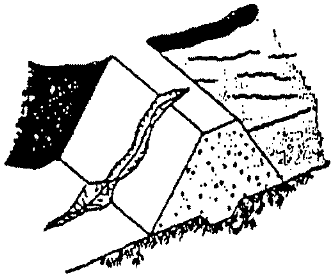
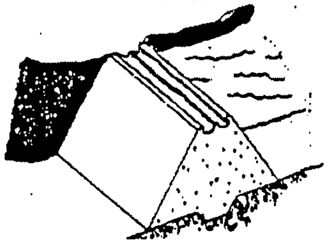
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRANSVERSE CRACKING 	Differential settlement of the embankment also leads to tranverse cracking (e.g., center settles more than abutments).	HAZARDOUS Settlement or shrinkage cracks can lead to seepage of reservoir water through the dam. Shrinkage cracks allow water to enter the embankment. This promotes saturation and increases freeze-thaw action.	1. If necessary, plug upstream end of crack to prevent flows from the reservoir. 2. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
CAVE IN/COLLAPSE 	1. Lack of adequate compaction. 2. Rodent hole below. 3. Piping through embankment or foundation.	HAZARDOUS Indicates possible wash out of embankment.	1. Inspect for and immediately repair rodent holes. Control rodents to prevent future damage. 2. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED
LONGITUDINAL CRACKING 	1. Drying and shrinkage of surface material. 2. Downstream movement of settlement of embankment.	1. Can be an early warning of a potential slide. 2. Shrinkage cracks allow water to enter the embankment and freezing will further crack the embankment. 3. Settlement or slide showing loss of strength in embankment can lead to failure.	1. If cracks are from drying, dress area with well-compacted material to keep surface water out and natural moisture in. 2. If cracks are extensive, a qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SLUMP (LOCALIZED CONDITION) 	Preceded by erosion undercutting a portion of the slope. Can also be found on steep slopes.	Can expose impervious zone to erosion and lead to further slumps.	1. Inspect area for seepage. 2. Monitor for progressive failure. 3. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED

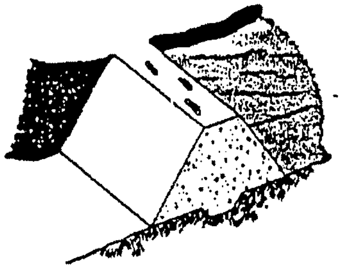
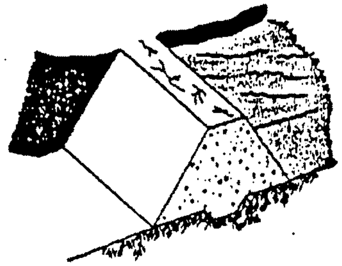
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
EROSION 	Water from intense rainstorms or snow-melt carries surface material down the slope, resulting in continuous troughs.	Can be hazardous if allowed to continue. Erosion can lead to eventual deterioration of the downstream slope and failure of the structure.	1. The preferred method to protect eroded areas is rock or riprap. 2. Re-establishing protective grasses can be adequate if the problem is detected early.
TREES/OBSCURING BRUSH 	Natural vegetation in area.	Large tree roots can create seepage paths. Bushes can obscure visual inspection and harbor rodents.	1. Remove all large, deep-rooted trees and shrubs on or near the embankment. Properly backfill void. (See Chapter 7.) 2. Control vegetation on the embankment that obscures visual inspection. (See Chapter 7.)
RODENT ACTIVITY 	Over-abundance of rodents. Holes, tunnels and caverns are caused by animal burrowings. Certain habitats like cattail type plants and trees close to the reservoir encourage these animals.	Can reduce length of seepage path, and lead to piping failure. If tunnel exists through most of the dam, it can lead to failure of the dam.	1. Control rodents to prevent more damage. 2. Backfill existing rodent holes. 3. Remove rodents. Determine exact location of digging and extent of tunneling. Remove habitat and repair damages. (See Chapter 7.)
LIVESTOCK/CATTLE TRAFFIC 	Excessive travel by livestock especially harmful to slope when wet.	Creates areas bare of erosion protection and causes erosion channels. Allows water to stand. Area susceptible to drying cracks.	1. Fence livestock outside embankment area. 2. Repair erosion protection, i.e., riprap, grass.

Figures 5.3.3 Inspection Guidelines - Embankment Crest

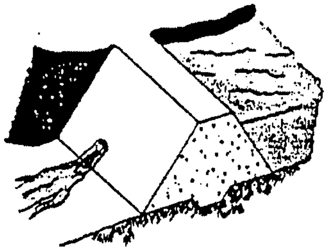
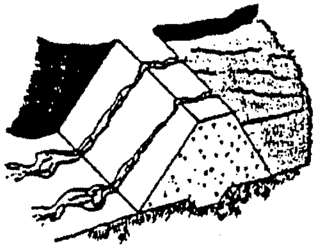
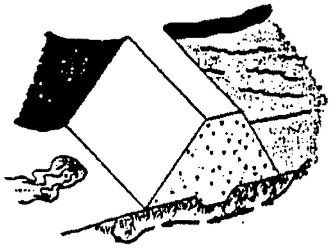
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
LONGITUDINAL CRACK 	1. Uneven settlement between adjacent sections or zones within the embankment. 2. Foundation failure causing loss of support to embankment. 3. Initial stages of embankment slide.	HAZARDOUS 1. Creates local area of low strength within embankment. Could be the point of initiation of future structural movement, deformation, or failure. 2. Provides entrance point for surface run-off into embankment, allowing saturation of adjacent embankment area, and possible lubrication which could lead to localized failure.	1. Inspect crack and carefully record location, length, depth, width, alignment, and other pertinent physical features. Immediately stake out limits of cracking. Monitor frequently. 2. Engineer should determine cause of cracking and supervise steps necessary to reduce danger to dam and correct condition. 3. Effectively seal the cracks at the crest's surface to prevent infiltration by surface water. 4. Continue to routinely monitor crest for evidence of further cracking. ENGINEER REQUIRED
VERTICAL DISPLACEMENT 	1. Vertical movement between adjacent sections of the embankment. 2. Structural deformation or failure caused by structural stress or instability, or by failure of the foundation.	HAZARDOUS 1. Provides local area of low strength within embankment which could cause future movement. 2. Leads to structural instability or failure. 3. Provides entrance point for surface water that could further lubricate failure plane. 4. Reduces available embankment cross section.	1. Carefully inspect displacement and record its location, vertical and horizontal displacement, length, and other physical features. Immediately stake out limits of cracking. 2. Engineer should determine cause of displacement and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate area to the bottom of the displacement. Backfill excavation using competent material and correct construction techniques, and under supervision of engineer. 4. Continue to monitor areas routinely for evidence of future cracking or movement. (See Chapter 6.) ENGINEER REQUIRED
CAVE-IN ON CREST 	1. Rodent activity. 2. Hole in outlet conduit is causing erosion of embankment material. 3. Internal erosion or piping of embankment material by seepage. 4. Breakdown of dispersive clays within embankment by seepage waters.	HAZARDOUS 1. Void within dam could cause localized caving, sloughing, instability, or reduced embankment cross section. 2. Entrance point for surface water.	1. Carefully inspect and record location and physical characteristics (depth, width, length) of cave in. 2. Engineer should determine cause of cave in and supervise all steps necessary to reduce threat to dam and correct condition. 3. Excavate cave in, slope sides of excavation, and backfill hole with competent material using proper construction techniques. (See Chapter 7.) This should be supervised by engineer. ENGINEER REQUIRED

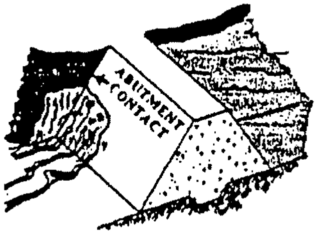
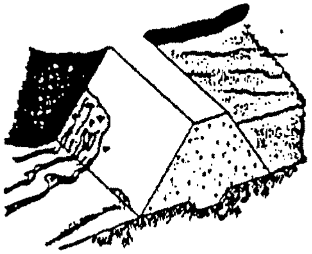
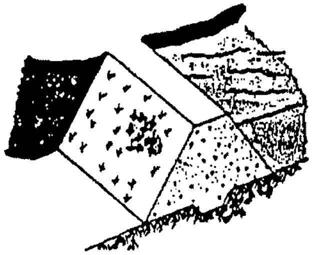
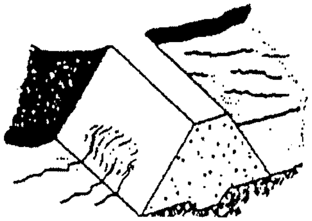
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRANSVERSE CRACKING 	1. Uneven movement between adjacent segments of the embankment. 2. Deformation caused by structural stress or instability.	HAZARDOUS 1. Can provide a path for seepage through the embankment cross section. 2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin. 3. Provides entrance point for surface runoff to enter embankment.	1. Inspect crack and carefully record crack location, length, depth, width, and other pertinent physical features. Stake out limits of cracking. 2. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate crest along crack to a point below the bottom of the crack. Then backfilling excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. (See Chapter 7.) This should be supervised by engineer. 4. Continue to monitor crest routinely for evidence of future cracking. (See Chapter 6.) ENGINEER REQUIRED
CREST MISALIGNMENT 	1. Movement between adjacent parts of the structure. 2. Uneven deflection of dam under loading by reservoir. 3. Structural deformation or failure near area of misalignment.	1. Area of misalignment is usually accompanied by low area in crest which reduces freeboard. 2. Can produce local areas of low embankment strength which may lead to failure.	1. Establish monuments across crest to determine exact amount, location, and extent of misalignment. 2. Engineer should determine cause of misalignment and supervise all steps necessary to reduce threat to dam and correct condition. 3. Monitor crest monuments on a scheduled basis following remedial action to detect possible future movement. (See Chapter 6.) ENGINEER REQUIRED
LOW AREA IN CREST OF DAM 	1. Excessive settlement in the embankment or foundation directly beneath the low area in the crest. 2. Internal erosion of embankment material. 3. Foundation spreading to upstream and/or downstream direction. 4. Prolonged wind erosion of crest area. 5. Improper final grading following construction.	Reduces freeboard available to pass flood flows safely through spillway.	1. Establish monuments along length of crest to determine exact amount, location, and extent of settlement in crest. 2. Engineer should determine cause of low area and supervise all steps necessary to reduce possible threat of the dam and correct condition. 3. Re-establish uniform crest elevation over crest length by placing fill in low area using proper construction techniques. This should be supervised by engineer. 4. Re-establish monuments across crest of dam and monitor monuments on a routine basis to detect possible future settlement. ENGINEER REQUIRED

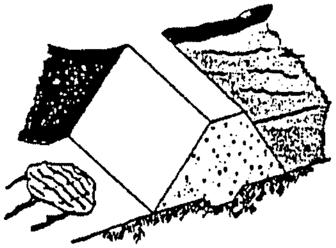
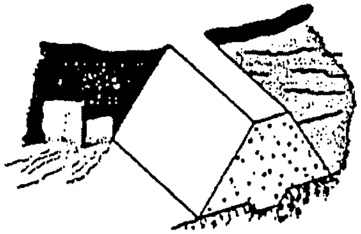
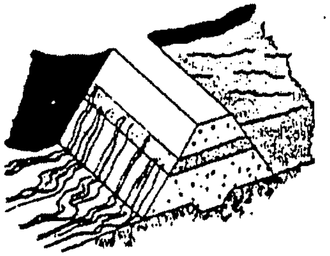
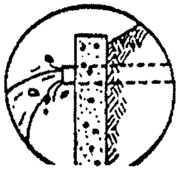
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
OBSCURING VEGETATION 	Neglect of dam and lack of proper maintenance procedures.	1. Obscures large parts of the dam, preventing adequate, accurate visual inspection of all parts of the dam. Problems which threaten the integrity of the dam can develop and remain undetected until they progress to a point that threatens the dam's safety. 2. Associated root systems develop and penetrate into the dam's cross section. When the vegetation dies, the decaying root systems can provide paths for seepage. This reduces the effective seepage path through the embankment and could lead to possible piping situations. 3. Prevents easy access to all parts of the dam for operation, maintenance, and inspection. 4. Provides habitat for rodents.	1. Remove all damaging growth from the dam. This would include removal of trees, bushes, brush, conifers, and growth other than grass. Grass should be encouraged on all segments of the dam to prevent erosion by surface runoff. Root systems should also be removed to the maximum practical extent. The void which results from removing the root system should be backfilled with wellcompetent, well-compacted material. 2. Future undesirable growth should be removed by cutting or spraying, as part of an annual maintenance program. (See Chapter 7.) 3. All cutting or debris resulting from the vegetative removal should be immediately taken from the dam and properly disposed of outside the reservoir basin.
RODENT ACTIVITY 	Burrowing animals.	1. Entrance point for surface runoff to enter dam. Could saturate adjacent portions of the dam. 2. Especially dangerous if hole penetrates dam below phreatic line. During periods of high storage, seepage path through the dam would be greatly reduced and a piping situation could develop.	1. Completely backfill the hole with competent, well-compacted material. 2. Initiate a rodent control program to reduce the burrowing animal population and to prevent future damage to the dam. (See Chapter 7.)
GULLY ON CREST 	1. Poor grading Xand improper drainage of crest. Improper drainage causes surface runoff to collect and drain of crest at low point in upstream or downstream shoulder. 2. Inadequate spillway capacity which has caused dam to overtop.	1. Can reduce available freeboard. 2. Reduces cross-sectional area of dam. 3. Inhibits access to all parts of the crest and dam. 4. Can result in a hazardous condition if due to overtopping.	1. Restore freeboard to dam by adding fill material in low area, using proper construction techniques. (See Chapter 7.) 2. Regrading crest to provide proper drainage of surface runoff. 3. If gully was caused by overtopping, provide adequate spillway which meets current design standards. This should be done by engineer. 4. Re-establish protective cover.
RUTS ALONG CREST 	Heavy vehicle traffic without adequate or proper maintenance or proper crest surfacing.	1. Inhibits easy access to all parts of crest. 2. Allows continued development of rutting. 3. Allows standing water to collect and saturate crest of dam. 4. Operating and maintenance vehicles can get stuck.	1. Drain standing water from ruts. 2. Regrade and recompact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Do periodic maintenance and regrading to prevent reformation of ruts.

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
PUDDLING ON CREST-POOR DRAINAGE 	1. Poor grading and improper drainage of crest. 2. Localized consolidation or settlement on crest allows puddles to develop.	1. Cause localized saturation of the crest. 2. Inhibits access to all parts of the dam and crest. 3. Becomes progressively worse if not corrected.	1. Drain standing water from puddles. 2. Regrade and recompact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Do periodic maintenance and regrading to prevent reformation of low areas.
DRYING CRACKS 	Material on the crest of dam expands and contracts with alternate wetting and drying of weather cycles. Drying cracks are usually short, shallow, narrow, and many.	Provides point of entrance for surface runoff and surface moisture, causing staturation of adjacent embankment areas. This staturation, and later drying of the dam, could cause further cracking.	1. Seal surface of cracks with a tight, impervious material. (See Chapter 7.) 2. Routinely grade crest to provide proper drainage and fill cracks. -OR 3. Cover crest with non-plastic (not clay) material to prevent large moisture content variations.

Figures 5.3.4
Inspection Guidelines - Embankment Seepage Areas

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
EXCESSIVE QUANTITY AND/OR MUDDY WATER EXITING FROM A POINT 	1. Water has created an open pathway, channel, or pipe through the dam. The water is eroding and carrying embankment material. 2. Large amounts of water have accumulated in the downstream slope. Water and embankment materials are exiting at one point. Surface agitation may be causing the muddy water. 3. Rodents, frost action or poor construction have allowed water to create an open pathway or pipe through the embankment.	HAZARDOUS 1. Continued flows can saturate parts of the embankment and lead to slides in the area. 2. Continued flows can further erode embankment materials and lead to failure of the dam.	1. Begin measuring outflow quantity and establishing whether water is getting muddier, staying the same, or clearing up. 2. If quantity of flow is increasing the water level in the reservoir should be lowered until the flow stabilizes or stops. 3. Search for opening on upstream side and plug if possible. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
STREAM OF WATER EXITING THROUGH CRACKS NEAR THE CREST 	1. Severe drying has caused shrinkage of embankment material. 2. Settlement in the embankment or foundation is causing the transverse cracks.	HAZARDOUS Flow through the crack can cause failure of the dam.	1. Plug the upstream side of the crack to stop the flow. 2. The water level in he reservoir should be lowered until it is below the level of the cracks. 3. A qualified engineer should inspect the condition and recommend further actions to be taken.
SEEPAGE WATER EXITING AS A BOIL IN THE FOUNDATION 	Some part of the foundation material is supplying a flow path. This could be caused by a sand or gravel layer in the foundation.	HAZARDOUS Increased flows can lead to erosion of the foundation and failure of the dam.	1. Examine the boil for transportation of foundation materials. 2. If soil particles are moving downstream, sandbags or earth should be used to create a dike around the boil. The pressures created by the water level within the dike may control flow velocities and temporarily prevent further erosion. 3. If erosion is becoming greater, the reservoir level should be lowered. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
SEEPAGE EXITING AT ABUTMENT CONTACT  	1. Water flowing through pathways in the abutment. 2. Water flowing through the embankment.	HAZARDOUS Can lead to erosion of embankment materials and failure of the dam.	1. Study leakage area to determine quantity of flow and extent of saturation. 2. Inspect daily for developing slides. 3. Water level in reservoir may need to be lowered to assure the safety of the embankment. 4. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
LARGE AREA WET OR PRODUCING FLOW 	A seepage path has developed through the abutment or embankment materials and failure of the dam can occur.	HAZARDOUS 1. Increased flows could lead to erosion of embankment material and failure of the dam. 2. Saturation of the embankment can lead to local slides which could cause failure of the dam.	1. Stake out the saturated area and monitor for growth or shrinking. 2. Measure any outflows as accurately as possible. 3. Reservoir level may need to be lowered if saturated areas increase in size at a fixed storage level or if flow increases. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
MARKED CHANGE IN VEGETATION 	1. Embankment material are supplying flows paths. 2. Natural seeding by wind. 3. Change in seed type during early post construction seeding.	Can show a saturated area.	1. Use probe and shovel to establish if the materials in this area are wetter than surrounding areas. 2. If areas shows wetness, when surrounding areas do not, a qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
BULGE IN LARGE WET AREA 	Downstream embankment materials have begun to move.	HAZARDOUS Failure of the embankment result from massive sliding can follow these early movements.	1. Compare embankment cross section to the end of construction condition to see if observed condition may reflect end of construction. 2. Stake out affected area and accurately measure outflow. 3. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRAMPOLINE EFFECT IN LARGE SOGGY AREA 	1. Water moving rapidly through the embankment or foundation is being controlled or contained by a well-established turf root system.	Condition shows excessive seepage in the area. If control layer of turf is destroyed, rapid erosion of foundation materials could result in failure of the dam.	1. Carefully inspect the area for outflow quantity and any transported material. 2. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
LEAKAGE FROM ABUTMENTS BEYOND THE DAM 	Water moving through cracks and fissures in the abutment materials.	Can lead to rapid erosion of abutment and evacuation of the reservoir. Can lead to massive slides near or downstream from the dam.	1. Carefully inspect the area to determine quantity of flow and amount of transported material. 2. A qualified engineer or geologist should inspect the condition and recommend further actions to be taken.
WET AREA IN HORIZONTAL BAND 	Frost layer or layer of sandy material in original construction.	HAZARDOUS 1. Wetting of areas below the area of excessive seepage can lead to localized instability of the embankment. (SLIDES) 2. Excessive flows can lead to accelerated erosion of embankment materials and failure of the dam.	1. Determine as closely as possible the flow being produced. 2. If flow increases, reservoir level should be reduced until flow stabilizes or stops. 3. Stake out the exact area involved. 4. Using hand tools, try to identify the material allowing the flow. 5. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
LARGE INCREASE IN FLOW OR SEDIMENT IN DRAIN OUTFALL 	A shortened seepage path or increased storage levels.	HAZARDOUS 1. Higher velocity flows can cause erosion of drain then embankment materials. 2. Can lead to piping failure.	1. Accurately measures outflow quantity and determine amount of increase over previous flow. 2. Collect jar samples to compare turbidity. 3. If either quantity or turbidity has increased by 25%, a qualified engineer should evaluate the condition and recommend further actions. ENGINEER REQUIRED

APPENDIX B

STORMTECH INSPECTION & MAINTENANCE FORMS

Save Valuable Land and Protect Water Resources

StormTech®

Detention • Retention • Water Quality

Subsurface Stormwater Management℠

Isolator™ Row O&M Manual

StormTech® Chamber System for Stormwater Management

U.S. GREEN BUILDING COUNCIL MEMBER

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patented technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-310, SC-740, DC-780 or MC-3500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

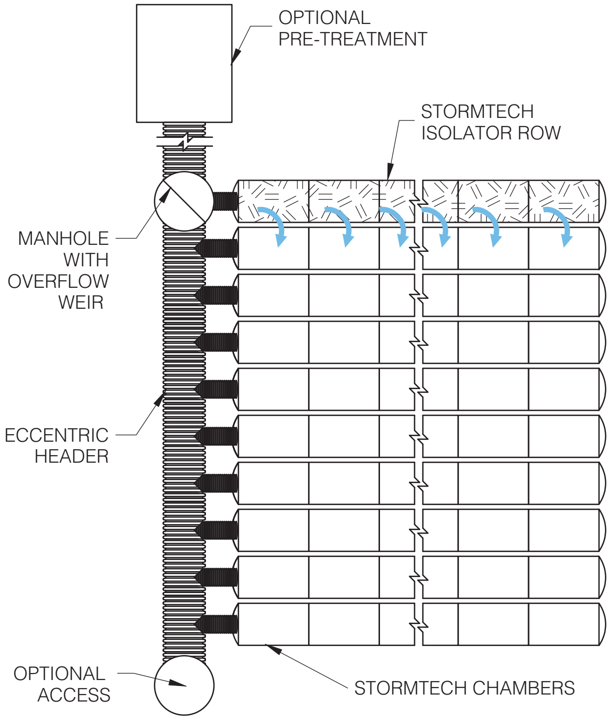
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

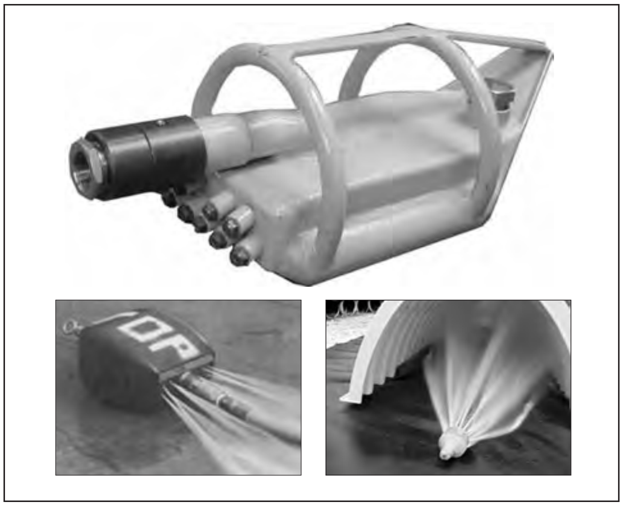
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

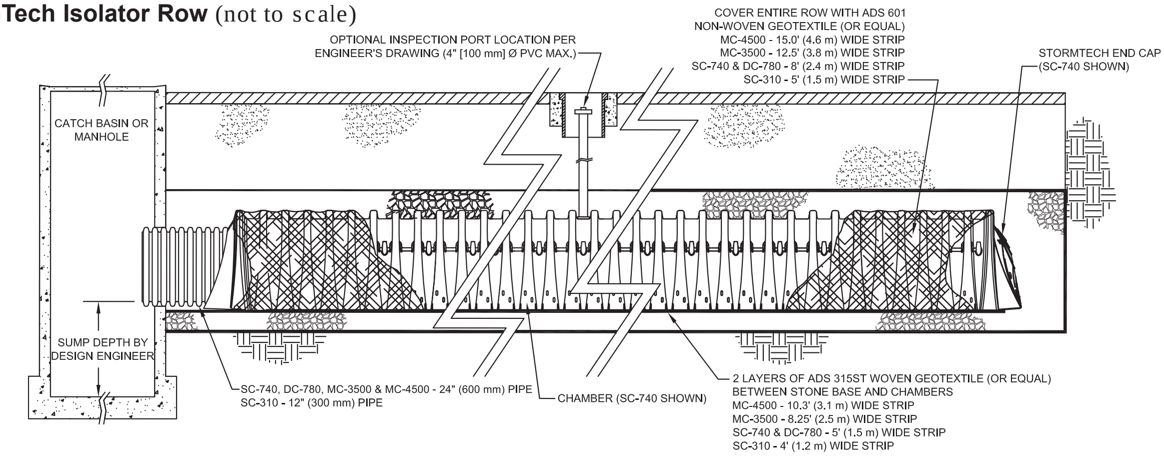
The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

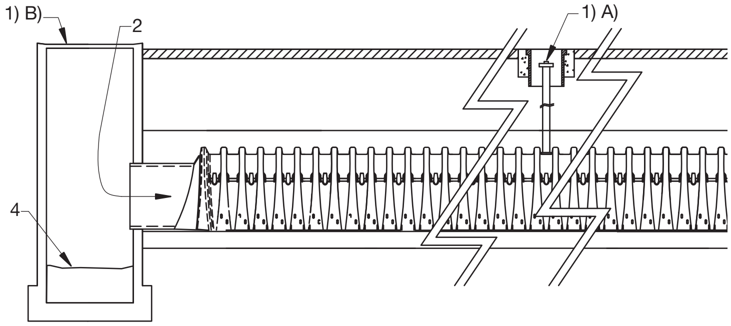
StormTech Isolator Row (not to scale)



Note: For many applications, the non-woven geotextile over the DC-780, MC-3500 and MC-4500 Isolator Row chambers can be eliminated or substituted with the AASHTO Class 1 woven geotextile. Contact your StormTech representative for assistance.

3.0 Isolator Row Step By Step Maintenance Procedures

StormTech Isolator Row (not to scale)



Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)
- i. Remove lid from floor box frame
- ii. Remove cap from inspection riser
- iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
- iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows
- i. Remove cover from manhole at upstream end of Isolator Row
- ii. Using a flashlight, inspect down Isolator Row through outlet pipe
  1. Mirrors on poles or cameras may be used to avoid a confined space entry
  2. Follow OSHA regulations for confined space entry if entering manhole
- iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

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Subsurface Stormwater Management℠

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StormTech products are covered by one or more of the following patents: U.S. Patents: 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844; Canadian Patents: 2,158,418 Other U.S. and Foreign Patents Pending Printed in U.S.A.

12.0 Inspection & Maintenance

STORMTECH ISOLATOR™ ROW - STEP-BY-STEP MAINTENANCE PROCEDURES

Step 1) Inspect Isolator Row for sediment

- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod, measure depth of sediment
  - iv. If sediment is at, or above, 3" (76 mm) depth proceed to Step 2. If not proceed to Step 3.
- B) All Isolator Rows
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Follow OSHA regulations for confined space entry if entering manhole
    2. Mirrors on poles or cameras may be used to avoid a confined space entry
  - iii. If sediment is at or above the lower row of sidewall holes [approximately 3" (76 mm)] proceed to Step 2. If not proceed to Step 3.

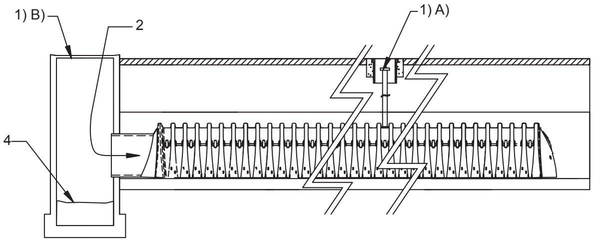
Step 2) Clean out Isolator Row using the JetVac process

- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45" (1143 mm) or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required during jetting

Step 3) Replace all caps, lids and covers

Step 4) Inspect and clean catch basins and manholes upstream of the StormTech system following local guidelines.

Figure 20 – StormTech Isolator Row (not to scale)



12.3 ECCENTRIC PIPE HEADER INSPECTION

Theses guidelines do not supercede a pipe manufacturer's recommended I&M procedures. Consult with the manufacturer of the pipe header system for specific I&M procedures. Inspection of the header system should be carried out quarterly. On sites which generate higher levels of sediment more frequent inspections may be necessary. Headers may be accessed through risers, access ports or manholes. Measurement of sediment may be taken with a stadia rod or similar device. Cleanout of sediment should occur when the sediment volume has reduced the storage area by 25% or the depth of sediment has reached approximately 25% of the diameter of the structure.

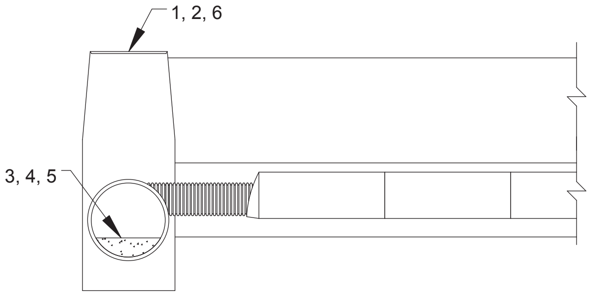
12.4 ECCENTRIC PIPE MANIFOLD MAINTENANCE

Cleanout of accumulated material should be accomplished by vacuum pumping the material from the header. Cleanout should be accomplished during dry weather. Care should be taken to avoid flushing sediments out through the outlet pipes and into the chamber rows.

Eccentric Header Step-by-Step Maintenance Procedures

1. Locate manholes connected to the manifold system
2. Remove grates or covers
3. Using a stadia rod, measure the depth of sediment
4. If sediment is at a depth of about 25% pipe volume or 25% pipe diameter proceed to step 5. If not proceed to step 6.
5. Vacuum pump the sediment. Do not flush sediment out inlet pipes.
6. Replace grates and covers
7. Record depth and date and schedule next inspection

Figure 21 – Eccentric Manifold Maintenance



Please contact StormTech's Technical Services Department at 888-892-2894 for a spreadsheet to estimate cleaning intervals.

SC-310/SC-740/DC-780

StormTech®
Detention • Retention • Water Quality
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StormTech Construction Guide

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable fill materials per **Table 1**
- Woven and non-woven geotextiles
- StormTech solid end caps and pre-cored end caps
- StormTech chambers
- StormTech manifolds and fittings

IMPORTANT NOTES:

A. This installation guide provides the minimum requirements for proper installation of chambers. Non-adherence to this guide may result in damage to chambers during installation. Replacement of damaged chambers during or after backfilling is costly and very time consuming. It is recommended that all installers are familiar with this guide, and that the contractor inspects the chambers for distortion, damage and joint integrity as work progresses.

B. Use of a dozer to push embedment stone between the rows of chambers may cause damage to chambers and is not an acceptable backfill method. Any chambers damaged by using the "dump and push" method are not covered under the StormTech standard warranty.

C. Care should be taken in the handling of chambers and end caps. Avoid dropping, prying or excessive force on chambers during removal from pallet and initial placement.

Requirements for System Installation

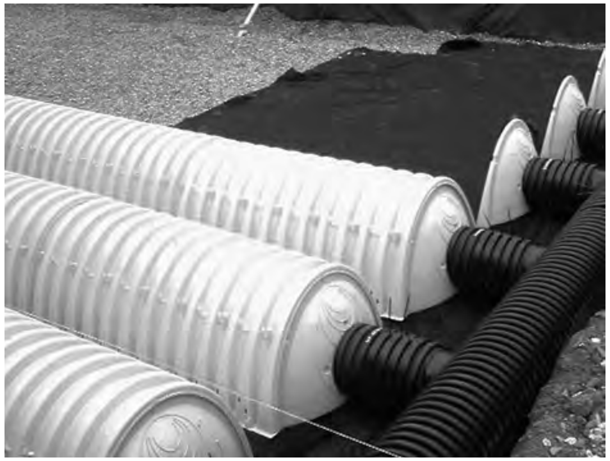
Excavate bed and prepare subgrade per engineer's plans.

Place non-woven geotextile over prepared soils and up excavation walls.

Place clean, crushed, angular stone foundation 6" (150 mm) min. Install underdrains if required. Compact to achieve a flat surface.

Manifold, Scour Fabric and Chamber Assembly

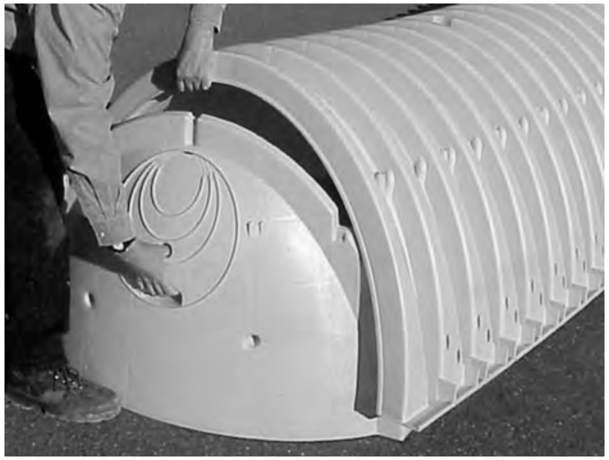
Install manifolds and lay out woven scour geotextile at inlet rows [min. 12.5 ft (3.8 m)] at each inlet end cap. Place a continuous piece (no seams, double layer) along entire length of Isolator® Row(s).



Align the first chamber and end cap of each row with inlet pipes. Contractor may choose to postpone stone placement around end chambers and leave ends of rows open for easy inspection of chambers during the backfill process.

Construct the chamber bed by overlapping the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber on to the end corrugation of the last chamber in the row. Be sure that the chamber placement does not exceed the reach of the construction equipment used to place the stone.

Attaching the End Caps



Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber's end corrugation.

Prefabricated End Caps

24" (600 mm) inlets are the maximum size that can fit into a SC-740/DC-780 end cap and must be prefabricated with a 24" (600 mm) pipe stub. SC-310 chambers with a 12" (300 mm) inlet pipe must use a prefabricated end cap with a 12" (300 mm) pipe stub.

Isolator Row

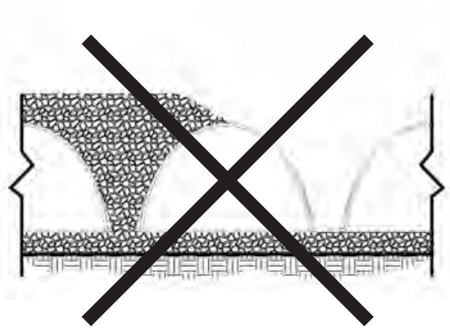
Drape a strip of ADS non-woven geotextile over the row of chambers (not required over DC-780). This is the same type of non-woven geotextile used as a separation layer around the angular stone of the StormTech system.

Initial Anchoring of Chambers – Embedment Stone

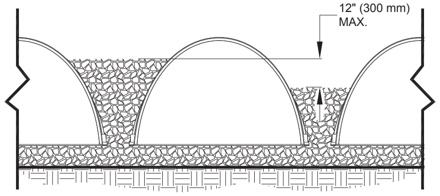
Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. This is best accomplished with a stone conveyor or excavator reaching along the row.

No equipment shall be operated on the bed at this stage of the installation. Excavators must be located off the bed. Dump trucks shall not dump stone directly on to the bed. Dozers or loaders are not allowed on the bed at this time.

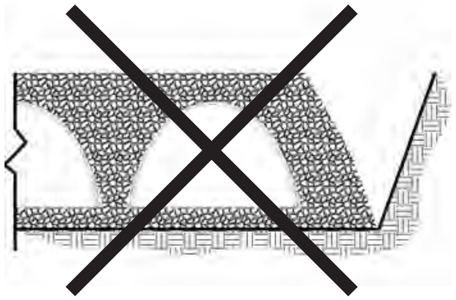
Backfill of Chambers – Embedment Stone



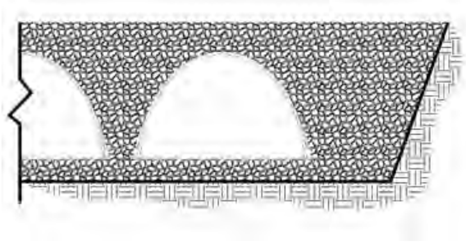
UNEVEN BACKFILL



EVEN BACKFILL



PERIMETER NOT BACKFILLED



PERIMETER FULLY BACKFILLED

Backfill chambers evenly. Stone column height should never differ by more than 12” (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

Perimeter stone must be brought up evenly with chamber rows. Perimeter must be fully backfilled, with stone extended horizontally to the excavation wall.

Backfill of Chambers – Embedment Stone and Cover Stone

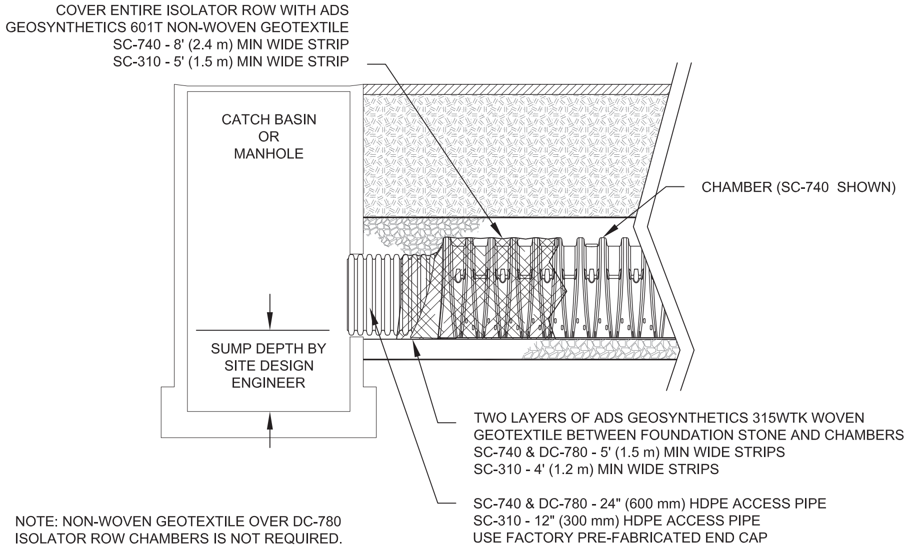
Continue evenly backfilling between rows and around perimeter until embedment stone reaches tops of chambers. Perimeter stone must extend horizontally to the excavation wall for both straight or sloped sidewalls. **Only after chambers have been backfilled to top of chamber and with a minimum 6" (150 mm) of cover stone on top of chambers can small dozers be used over the chambers for backfilling remaining cover stone.**

Small dozers and skid loaders may be used to finish grading stone backfill in accordance with ground pressure limits in Table 2. They must push material parallel to rows only. Never push perpendicular to rows. StormTech recommends that the contractor inspect chambers before placing final backfill. Any chambers damaged by construction shall be removed & replaced.

Final Backfill of Chambers – Fill Material

Install non-woven geotextile over stone. Geotextile must overlap 24" (600 mm) min. where edges meet. Compact each lift of backfill as specified in the site design engineer's drawings. Roller travel parallel with rows.

StormTech Isolator Row Detail



NOTE: NON-WOVEN GEOTEXTILE OVER DC-780 ISOLATOR ROW CHAMBERS IS NOT REQUIRED.

Table 1 – Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ **Final Fill:** Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per site design engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ **Initial Fill:** Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (450 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines or processed aggregate. Most pavement subbase materials can be used in lieu of this layer.	AASHTO M45 A-1, A-2-4, A-3 or AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (300 mm) of material over the chambers is reached. Compact additional layers in 6" (150 mm) max. lifts to a min. 95% Proctor density for well-graded material and 95% relative density for processed aggregate materials. Roller gross vehicle weight not to exceed 12,000 lbs (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN).
Ⓑ **Embedment Stone:** Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone nominal size distribution 3/4 - 2" (20 mm - 50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	No compaction required.
Ⓐ **Foundation Stone:** Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone, nominal size distribution 3/4 - 2" (20 mm - 50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	Place and compact in 6" (150 mm) lifts using two full coverages with a vibratory compactor.[2, 3]

PLEASE NOTE:

1. ***The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone".***
2. ***StormTech compaction requirements are met for 'A' location materials when placed and compacted in 6" (150 mm) (max) lifts using two full coverages with a vibratory compactor.***
3. ***Where infiltration surfaces may be comprised by compaction, for standard installations and standard design load conditions, a flat surface may be achieved by raking or dragging without compaction equipment. For special load designs, contact StormTech for compaction requirements.***

Figure 1 – Inspection Port Detail

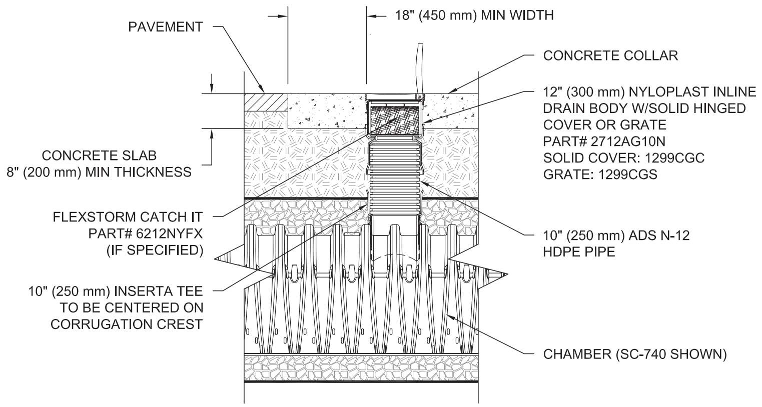
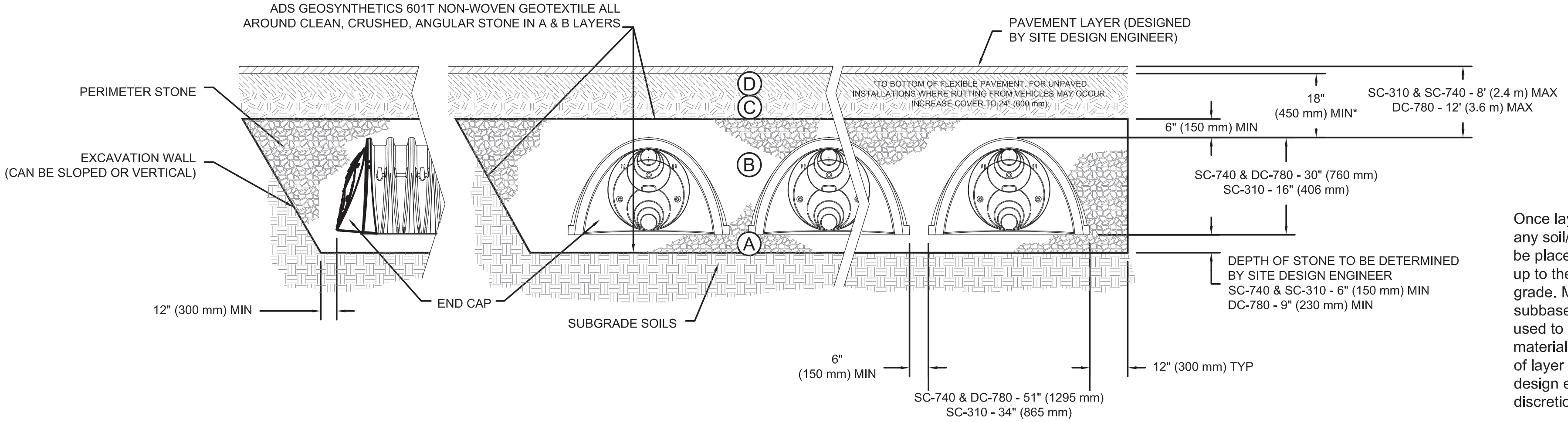


Figure 2 – Fill Material Locations



Once layer 'C' is placed any soil/material can be placed in layer 'D' up to the finished grade. Most pavement subbase soils can be used to replace the materials requirements of layer 'C' or 'D' at the design engineer's discretion.

NOTES:

1. *36" (900 mm) of stabilized cover materials over the chambers is required for full dump truck travel and dumping.*

2. *During paving operations, dump truck axle loads on 18" (450 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18" (450 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.*

3. *Ground pressure for track dozers is the vehicle operating weight divided by total ground contact area for both tracks. Excavators will exert higher ground pressures based on loaded bucket weight and boom extension.*

4. *Mini-excavators (< 8,000lbs/3,628 kg) can be used with at least 12" (300 mm) of stone over the chambers and are limited by the maximum ground pressures in Table 2 based on a full bucket at maximum boom extension.*

5. *Storage of materials such as construction materials, equipment, spoils, etc. should not be located over the StormTech system. The use of equipment over the StormTech system not covered in Table 2 (ex. soil mixing equipment, cranes, etc) is limited. Please contact StormTech for more information.*

6. *Allowable track loads based on vehicle travel only. Excavators shall not operate on chamber beds until the total backfill reaches 3 feet (900 mm) over the entire bed.*

ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com.

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Table 2 – Maximum Allowable Construction Vehicle Loads[5]

Material Location	Fill Depth over Chambers in. [mm]	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads[6]		Maximum Allowable Roller Loads
		Max Axle Load for Trucks lbs [kN]	Max Wheel Load for Loaders lbs [kN]	Track Width in. [mm]	Max Ground Pressure psf [kPa]	Max Drum Weight or Dynamic Force lbs [kN]
Ⓓ Final Fill Material	36" [900] Compacted	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	3420 [164] 2350 [113] 1850 [89] 1510 [72] 1310 [63]	38,000 [169]
Ⓒ Initial Fill Material	24" [600] Compacted	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	2480 [119] 1770 [85] 1430 [68] 1210 [58] 1070 [51]	20,000 [89]
	24" [600] Loose/Dumped	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	2245 [107] 1625 [78] 1325 [63] 1135 [54] 1010 [48]	20,000 [89] Roller gross vehicle weight not to exceed 12,000 lbs. [53 kN]
	18" [450]	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	2010 [96] 1480 [71] 1220 [58] 1060 [51] 950 [45]	20,000 [89] Roller gross vehicle weight not to exceed 12,000 lbs. [53 kN]
Ⓑ Embedment Stone	12" [300]	16,000 [71]	NOT ALLOWED	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	1540 [74] 1190 [57] 1010 [48] 910 [43] 840 [40]	20,000 [89] Roller gross vehicle weight not to exceed 12,000 lbs. [53 kN]
	6" [150]	8,000 [35]	NOT ALLOWED	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	1070 [51] 900 [43] 800 [38] 760 [36] 720 [34]	NOT ALLOWED

Table 3 – Placement Methods and Descriptions

Material Location	Placement Methods/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Roller Load Restrictions
		See Table 2 for Maximum Construction Loads		
Ⓓ Final Fill Material	A variety of placement methods may be used. All construction loads must not exceed the maximum limits in Table 2.	36" (900 mm) minimum cover required for dump trucks to dump over chambers.	Dozers to push parallel to rows until 36" (900mm) compaced cover is reached.[4]	Roller travel parallel to rows only until 36" (900 mm) compacted cover is reached.
Ⓒ Initial Fill Material	Excavator positioned off bed recommended. Small excavator allowed over chambers. Small dozer allowed.	Asphalt can be dumped into paver when compacted pavement subbase reaches 18" (450 mm) above top of chambers.	Small LGP track dozers & skid loaders allowed to grade cover stone with at least 6" (150 mm) stone under tracks at all times. Equipment must push parallel to rows at all times.	Use dynamic force of roller only after compacted fill depth reaches 12" (300 mm) over chambers. Roller travel parallel to chamber rows only.
Ⓑ Embedment Stone	No equipment allowed on bare chambers. Use excavator or stone conveyor positioned off bed or on foundation stone to evenly fill around all chambers to at least the top of chambers.	No wheel loads allowed. Material must be placed outside the limits of the chamber bed.	No tracked equipment is allowed on chambers until a min. 6" (150 mm) cover stone is in place.	No rollers allowed.
Ⓐ Foundation Stone	No StormTech restrictions. Contractor responsible for any conditions or requirements by others relative to subgrade bearing capacity, dewatering or protection of subgrade.			

APPENDIX 15

GEOTECHNICAL REPORT

MASER
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Geotechnical Data Report

(In-situ Infiltration Testing)

FOR

Warwick Meadows

Sheffield Drive
Tax Lots 218-1-91, 92, 93, 94, & 96, 219-1-2.2
Village of Warwick, Orange County, NY

September 11, 2020

Prepared For

Warwick Commons Stage 5, LLC
321 Route 59, #338
Tallman, NY 10982

Prepared By

Maser Consulting
555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12553
845.564.4495

Ahmed Elmekati, PE
License No. 094599

MC Project No. 15002429D

Engineers Planners Surveyors Landscape Architects Environmental Scientists

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2. SITE AND PROJECT DESCRIPTION 1
3. SUBSURFACE EXPLORATION 1
4. INFILTRATION TESTING 2
5. CLOSING 3
6. LIMITATIONS 3

FIGURES

Figure 1 .... Site Location Plan

DRAWINGS

B-01-ELP .... Exploration Location Plan

APPENDICES

APPENDIX A .... Test Pit Logs
APPENDIX B .... Infiltration Test Results

1. INTRODUCTION

In accordance with our proposal dated January 24, 2020, Maser Consulting has performed in-situ infiltration testing for the proposed stormwater management facilities at the proposed development located at Sheffield Drive, Village of Warwick, New York.

This report presents the summary of the data collected using the conducted tests.

2. SITE AND PROJECT DESCRIPTION

The project site is located at Sheffield Drive, in the village of Warwick, Orange County, New York (Figure 1). The site is bounded by Brady Road towards west, a residential subdivision east, a condominium development north, and a single family home south. Magnolia Lane passes through the site dividing it into northern and southern areas and transitions into Sheffield Drive near its eastern side.

The proposed development comprises the construction of 14 new residential structures, with a new clubhouse and pool area and new stormwater management facilities, along with typical appurtenant site improvements including parking lots, landscaping, and lighting.

3. SUBSURFACE EXPLORATION

Exploration Program

Maser Consulting performed a geotechnical exploration program originally consisting of fifteen Test Pits, TP-01 through TP-15. The test pits extended up to 9 ft below existing grade. Note that Test Pits TP-06 and TP-14 were not performed due to existing site conditions. The test pit logs are presented in Appendix A.

The test pits were excavated during the period from August 18, 2020 through August 20, 2020 by SoilTesting, Inc. of Oxford, CT, using a CAT 308 excavator, under the continuous observation of Maser Consulting field representative, Mr. Nicholas Ohrynowicz. The test pits were backfilled on August 21, 2020 at the conclusion of the infiltration testing. Our field representative located the test pits in the field using existing site features and conventional taping methods. Locations of the test pits are presented in the Exploration Location Plan, Drawing B-01-ELP.

4. INFILTRATION TESTING

Procedure

In-situ Infiltration testing was performed within Test Pits TP-01, TP-03 through TP-05, TP-07 through TP-13, and TP-15. The test pits were initially advanced to depths varying between 1.5 ft and 6 ft below the corresponding ground surface. Thereafter, infiltration testing was performed to measure the infiltration rates of the underlying soils.

The infiltration tests were conducted in accordance with Appendix D of New York State Stormwater Design Manual. The tests were conducted after an initial presoaking period of 24 hours. Thereafter, a total of three trials were performed at each location. During each trial, our field representative obtained readings at 60-minute intervals for a total duration of one hour (per trial).

Measured Infiltration Rates

Appendix B presents details of the infiltration tests performed and the corresponding results. Table 1 presents a summary of these results.

Table 1. Summary of Infiltration Test Results

Location ID	Test Depth (ft)	Soil Description (Below Test Depth)	Measured Infiltration Rate (in/hr)*			
			Trial 1	Trial 2	Trial 3	Average
TP-01	6	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-03	1.5	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-04	3	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-05	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	22.0	23.3
TP-07	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	18.0	24.0	24.0	22.0
TP-08	5	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-09	6	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-10	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-11	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	21.0	23.0
TP-12	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-13	4	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-15	4	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0

*The infiltration rates indicated in Table 1 represent the rate measured at the conclusion of each trial. No correction factors applied.

5. CLOSING

The data presented in this report is based, on field observations and measured test results. The number, location, and depth of the explorations were completed as requested by the project Site Civil Engineer.

6. LIMITATIONS

This geotechnical exploration has been performed in accordance with generally accepted engineering practice and any applicable design standards as referenced herein. This data report and all supporting documentation have been prepared exclusively for the use of **Warwick Commons Stage 5, LLC.** pursuant to the Agreement between Maser Consulting (Maser) and **Warwick Commons Stage 5, LLC**. All provisions set forth in the Agreement and the General Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The field observations, and data contained in this report are based on limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations, depths, and times explored.

This report is intended to serve as a data report. Maser is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Maser.

This data report and related documentation are instruments of service. The subject matter of this data report is limited to the facts and matters stated herein.

The scope of this geotechnical exploration did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for information only.

\\maserconsulting.com\qmv\alloffices\newburgh\projects\2015\15002429d - warwick meadows\reports\geotechnical\2020 infiltration\2020 data report\text\200911_nco_ahe_geotechnical data report.docx

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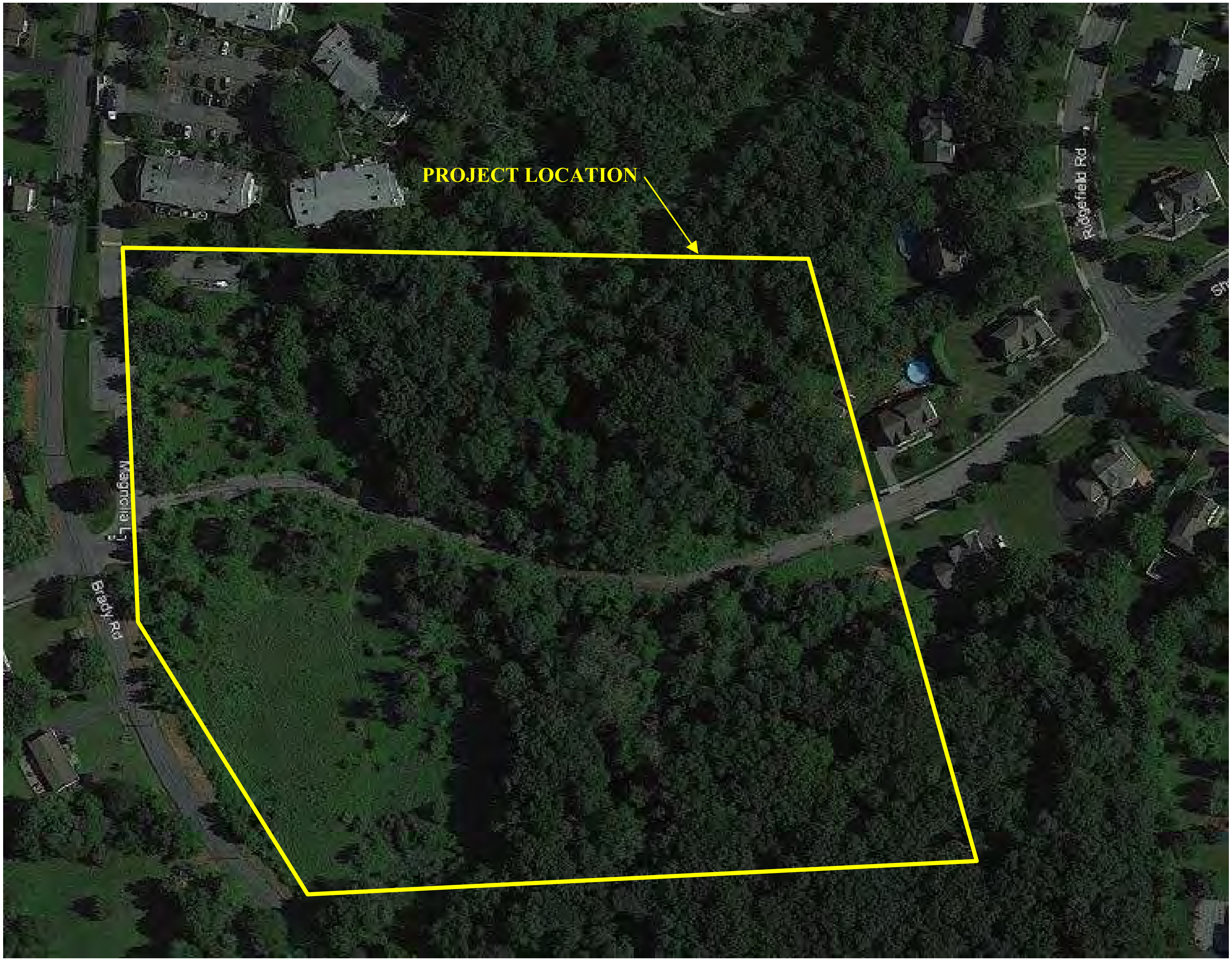
Figures



Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

50 Chestnut Ridge Road, Suite 101
Montvale, New Jersey 07645
Phone: 845.352.0411
Fax: 845.352.2611

FIGURE 1

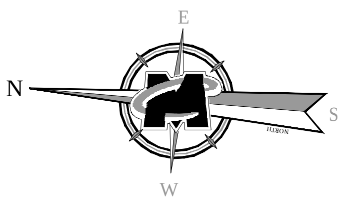
SITE LOCATION PLAN

PROJECT:
Warwick Meadows
Village of Warwick, Orange County, NY

MC File No: 15002429D

MASER CONSULTING

Drawings

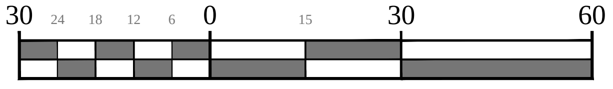


GENERAL NOTES:

1. LOCATION PLAN BASED ON DRAWING TITLED "GRADING AND DRAINAGE PLAN" BY MASER CONSULTING, DATED JUNE 6, 2020.
2. THIS DRAWING IS PART OF MASER CONSULTING'S REPORT (PROJECT NO. (15002429D) DATED SEPTEMBER, 2020 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
3. SOIL EXPLORATION LOCATIONS ARE APPROXIMATE BASED ON EXISTING SITE FEATURES AND INFORMATION AVAILABLE AT THE TIME OF OUR FIELD EXPLORATION.
4. TEST PIT SERIES TP-XX PERFORMED BY SOILTESTING, INC. DURING THE PERIOD FROM AUGUST 18, 2020 THROUGH AUGUST 20, 2020 UNDER THE CONTINUOUS OBSERVATION OF MASER CONSULTING.
5. ALL EXPLORATIONS BACKFILLED UPON COMPLETION.

LEGEND:

◪ TP-XX	TEST PIT LOCATION (AUGUST, 2020)



SCALE : 1" = 30'

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State of N.Y. Cert. of Authorization: 0008671/0008821
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EXPLORATION LOCATION PLAN
FOR
WARWICK
MEADOWS

TAX LOTS 218-1-91, 92, 93, 94, & 96, 219-1-2.2
VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

MONTVALE OFFICE
50 Chestnut Ridge Road
Suite 101
Montvale, NJ 07645

Phone: 845.352.0411
Fax: 845.352.2611

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	09/10/2020	N.O.	A.E.

PROJECT NUMBER:	DRAWING NAME:
15002429D	B-01-ELP

SHEET TITLE:
EXPLORATION LOCATION PLAN

SHEET NUMBER:
B-01-ELP

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Appendix A

Test Pit Logs

Burmister Soil Classification System

I - Soil and Fraction Definitions

Material	Symbol	Fraction	Sieve Size	Definition
Boulders	Bldr	-----	9" +	Material retained on 9" sieve.
Cobbles	Cbl	-----	3" to 9"	Material passing 9" sieve and retained on the 3" sieve.
Gravel	G	Coarse (c) Medium (m) Fine (f)	1" to 3" 3/8" to 1" No. to 3/8"	Material passing the 3" sieve and retained on the No. 10 sieve.
Sand	S	Coarse (c) Medium (m) Fine (f)	No. 30 to No. 10 No. 60 to No. 30 No. 200 to No. 60	Material passing No. 10 sieve and retained on the No. 200 sieve.
Silt	$	-----	Passing No. 200 (0.075 mm)	Material passing the No. 200 sieve that is non-plastic in character and exhibits little or no strength when air-dried.
Clayey Silt	c$	Slight (SL)	1 to 5	Clay – Soil. Material passing the No. 200 sieve which can be made to exhibit plasticity and clay qualities within a certain range of moisture content, and which exhibits considerable strength when air-dried.
Silt & Clay	$ & C	Low (L)	5 to 10	
Clay & Silt	C & $	Medium (M)	10 to 20	
Silty Clay	$C	High (H)	20 to 40	
Clay	C	Very High (VH)	40 Plus	
Organic Silt	(O$)	-----	-----	Material passing the No. 200 sieve which exhibits plastic properties within a certain range of moisture content, and exhibits fine granular and organic characteristics.

II - Proportion Definitions

Component	Written	Proportions	Symbol	Percentage Range by Weight*
Principal	CAPITALS	---	---	50 or more
Minor	Lower Case	And	a.	35 to 50
		Some	s.	20 to 35
		Little	l.	10 to 20
		Trace	t.	0 to 10

* Minus sign (-) lower limit, plus sign (+) upper limit, no sign middle range.

III - Strength Term Definitions

Relative Density of Coarse-Grained Soils		**Consistency of Fine-Grained Soils**		
Density	**N-Value (bpf)**	**Consistency**	**Unconfined Compressive Strength (tsf)**	**N-Value (bpf)**
Very Loose	0 to 3	Very Soft	Less than 0.25	0 to 1
Loose	4 to 9	Soft	0.25 to 0.50	2 to 4
Medium Dense	10 to 29	Medium Stiff	0.50 to 1.00	4 to 8
Dense	30 to 50	Stiff	1.00 to 2.00	8 to 15
Very Dense	More than 50	Very Stiff	2.00 to 4.00	15 to 30
		Hard	More than 4.00	More than 30

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Soil Classification Standard

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-01

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 736.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0		Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24	Lt. Brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 72" BGS.
	108	**END OF TEST PIT AT 108 INCHES**	

NOTES:
* Excavation expanded for shallower infiltration test at 72" BGS.

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/18/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-02

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 725.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	**REFUSAL ENCOUNTERED AT 18 INCHES**	
5	60 72 84 96 108		
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES:	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	∇	N.E.	08/18/20
At Completion (0 hrs.)	∇		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: TP-02
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-03**

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 736.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24		Infiltration test casing installed at 18” BGS.
	36	Lt. Brown mf SAND, some Silt, little mf Gravel. (Dry)	
	48		
5	60		
	72	**REFUSAL ENCOUNTERED AT 60 INCHES**	
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 18” BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/18/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-03**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-04

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 713.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 36" BGS.
5	60 72		
	84 96 108	**END OF TEST PIT AT 72 INCHES**	
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 36" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: TP-04
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-05

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 716.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	0–24	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24–60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60	**END OF TEST PIT AT 60 INCHES**	
10	120		
15	180		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 24" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-07**

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 719.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24		Infiltration test casing installed at 24" BGS.
	36	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	48		
5	60	**REFUSAL ENCOUNTERED AT 60 INCHES**	
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216	NOTES: * Excavation expanded for shallower infiltration test at 24" BGS.	
	228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/19/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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50 Chestnut Ridge Road, Suite 101 Montvale, NJ 07645

PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-08

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 718.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48		
5	60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 60” BGS.
	72 84 96		
	108	**END OF TEST PIT AT 96 INCHES**	
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 60” BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-09**
PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 741.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	0–24	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24–108	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 72" BGS.
	108	**END OF TEST PIT AT 108 INCHES**	

Depth scale (ft): 0, 5, 10, 15, 20
Depth scale (in): 3, 6, 9, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 240

NOTES:
* Excavation expanded for shallower infiltration test at 72" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-09**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-10**
PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 734.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60	**END OF TEST PIT AT 60 INCHES**	
	72 84 96 108		
10	120		
	132 144 156 168		
15	180		
	192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 24" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-10**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-11

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 720.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
	36		
	48		
5	60	**END OF TEST PIT AT 60 INCHES**	
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 24" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-11**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-12**
PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 722.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24		Infiltration test casing installed at 24" BGS.
	36	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	48		
5	60	**END OF TEST PIT AT 60 INCHES**	
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 24" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-13**

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 724.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0			
	3	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	6		
	9		
	12		
	24		
	36		
	48		Infiltration test casing installed at 48" BGS.
5	60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	72		
	84		
	96	**END OF TEST PIT AT 84 INCHES**	
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228	NOTES: * Excavation expanded for shallower infiltration test at 48" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	∇	N.E.	08/19/20
At Completion (0 hrs.)	∇		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-13**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-15**

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 746.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24		
	36		
	48		
5	60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	72		Infiltration test casing installed at 48" BGS.
	84	**END OF TEST PIT AT 84 INCHES**	
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 48" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	∇	N.E.	08/20/20
At Completion (0 hrs.)	∇		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

Appendix B

Infiltration Test Results

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50 Chestnut Ridge Road, Suite 101
Montvale, New Jersey 07645
Phone: 845.352.0411
Fax: 845.352.2611

Falling Head Infiltration Test

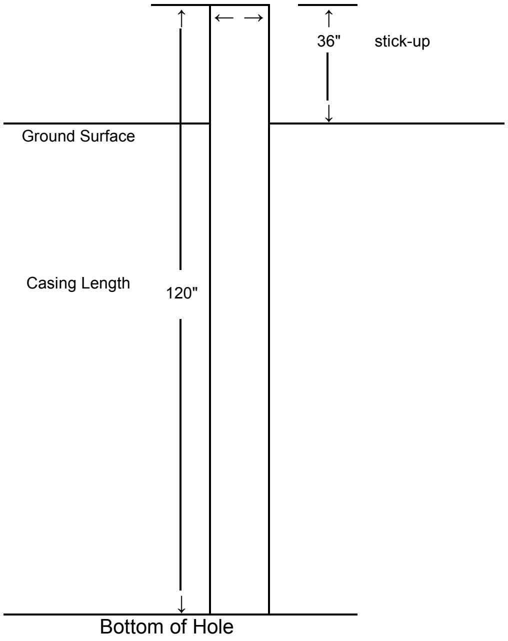
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/19/2020
Exploration No: TP-01

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Phone: 845.352.0411
Fax: 845.352.2611

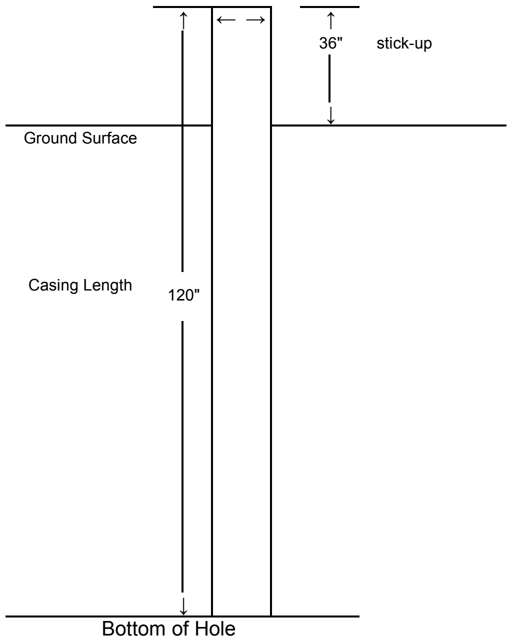
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/19/2020
Exploration No: TP-01

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Phone: 845.352.0411
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Falling Head Infiltration Test

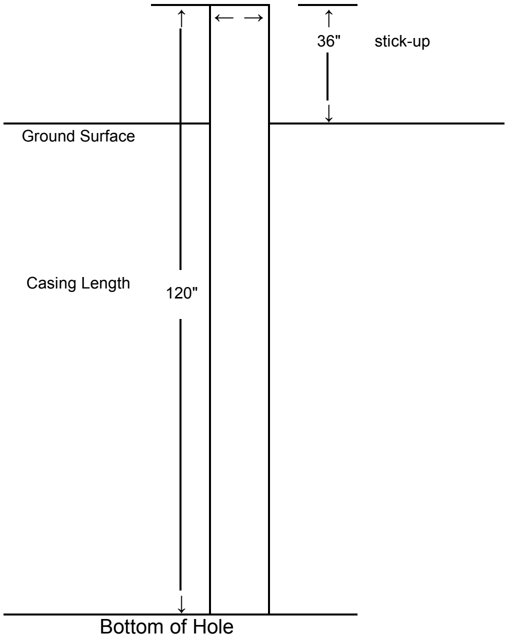
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/19/2020
Exploration No: TP-01

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Phone: 845.352.0411
Fax: 845.352.2611

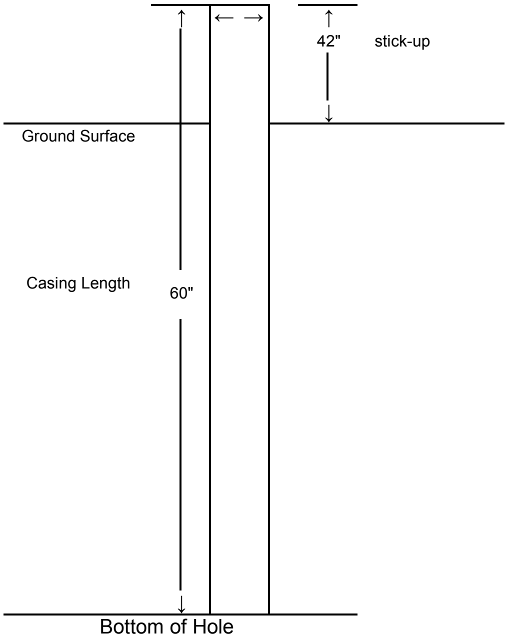
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-03

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Phone: 845.352.0411
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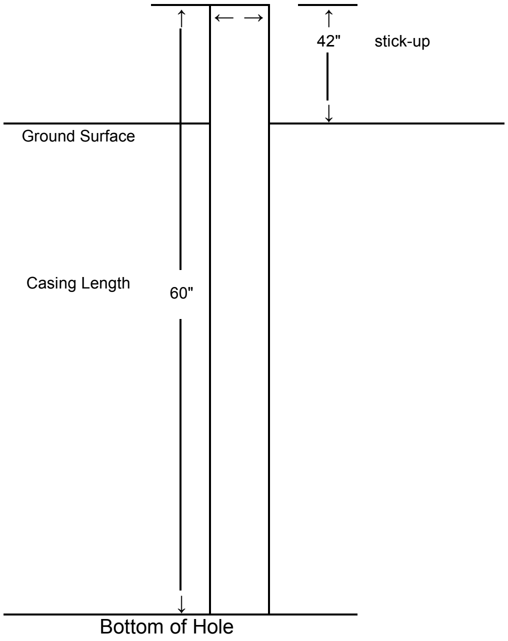
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-03
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

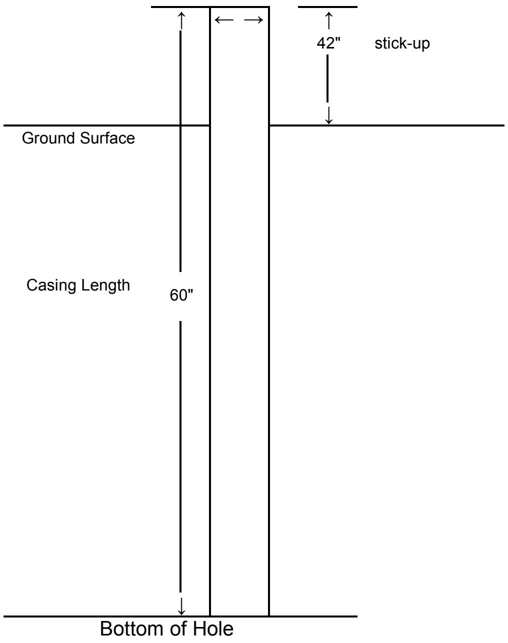
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-03

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Phone: 845.352.0411
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Falling Head Infiltration Test

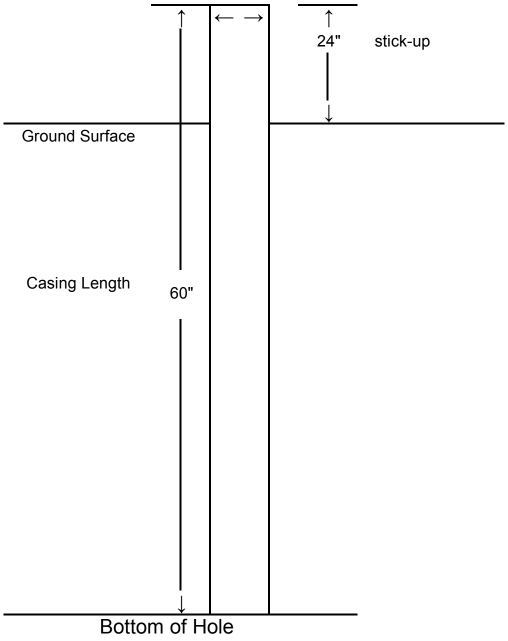
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-04

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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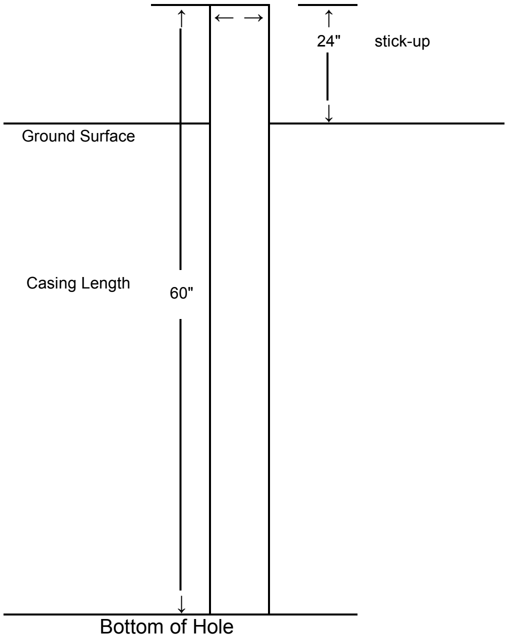
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-04

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

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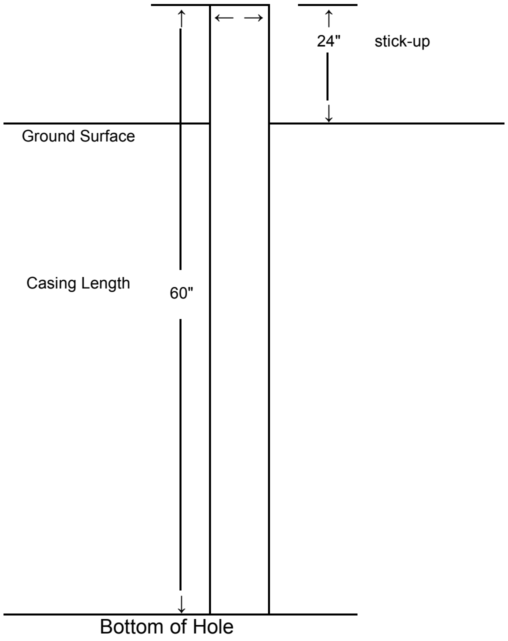
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-04
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

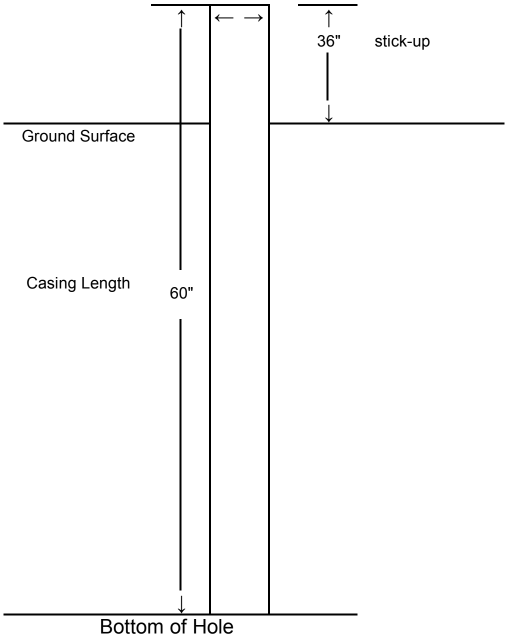
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-05

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

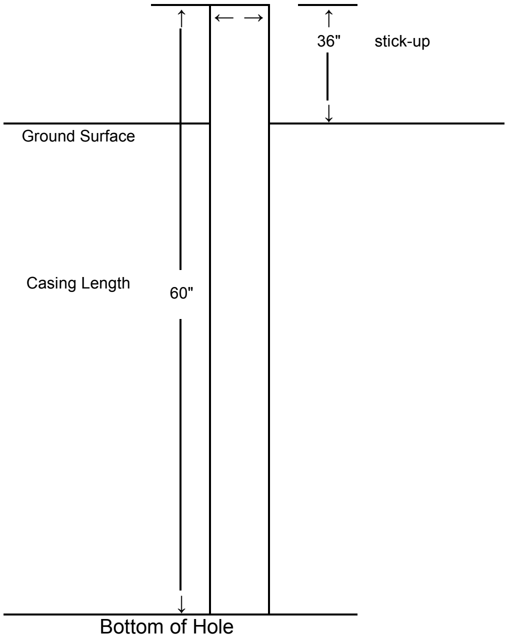
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-05

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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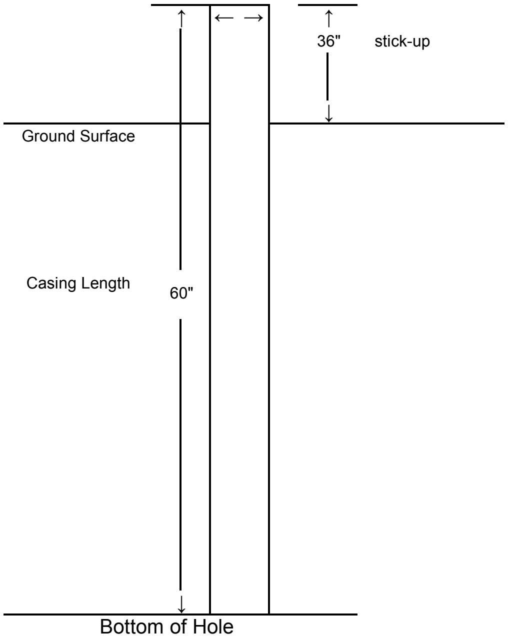
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-05
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	10.00	(in)	22.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 22.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

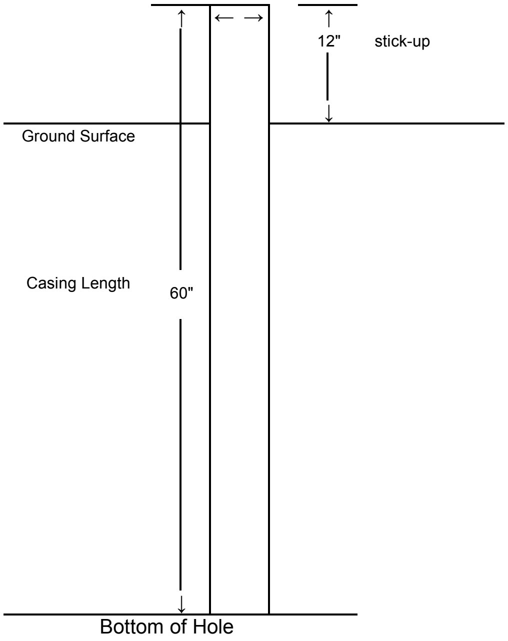
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-07

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	6.00	(in)	18.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 18.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

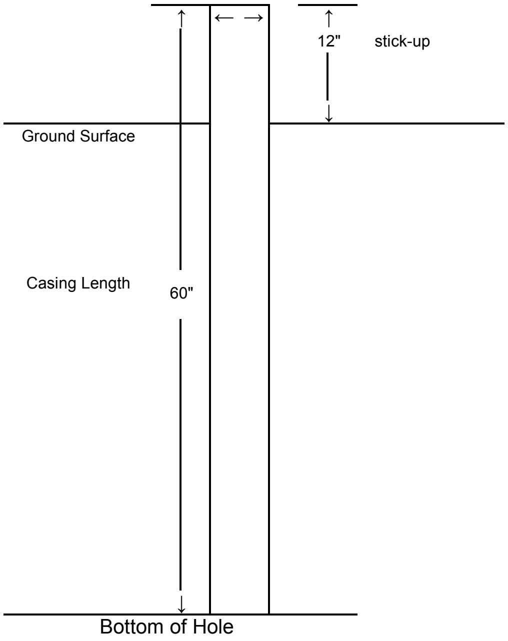
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-07

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

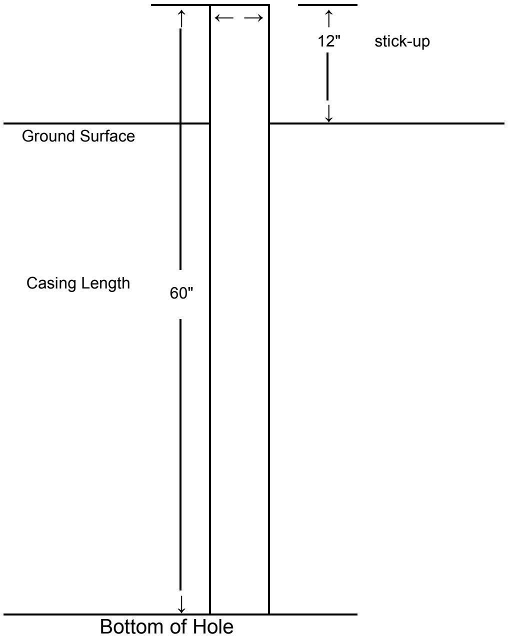
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-07

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

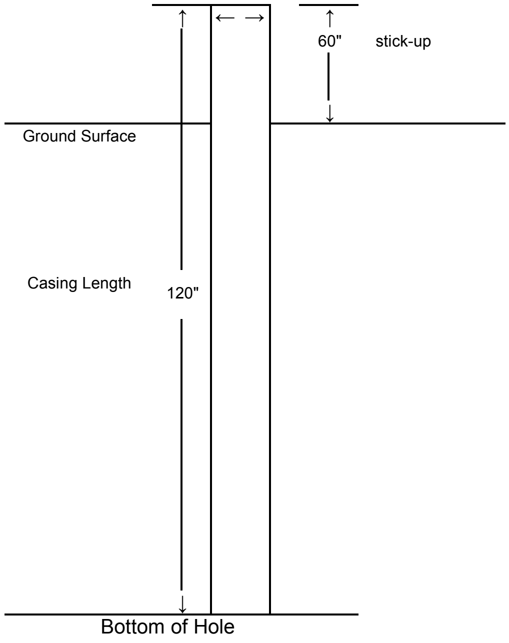
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-08

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Fax: 845.352.2611

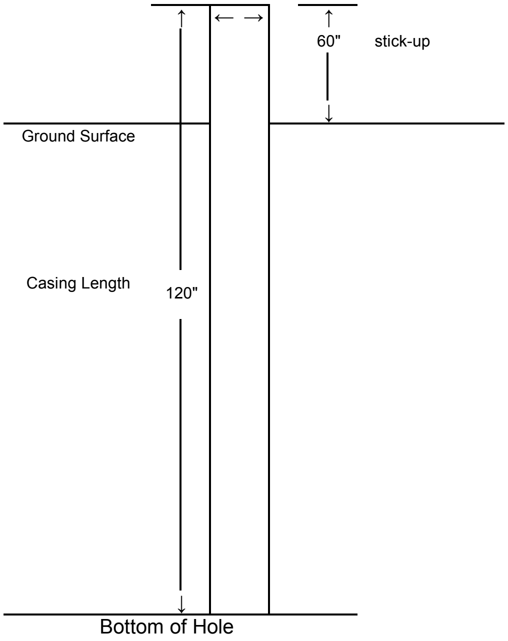
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-08

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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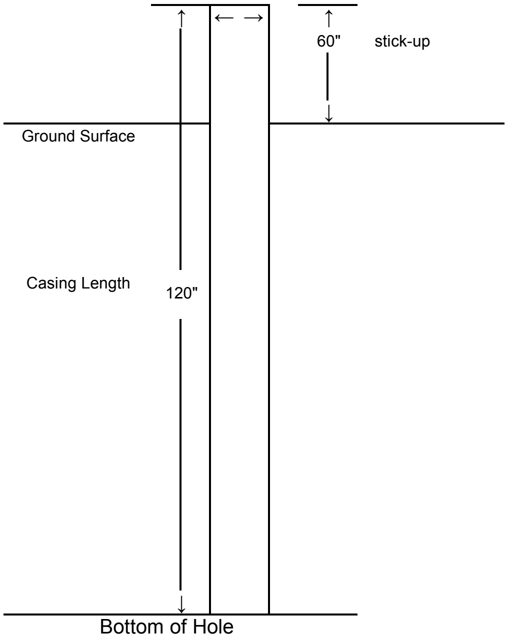
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-08
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

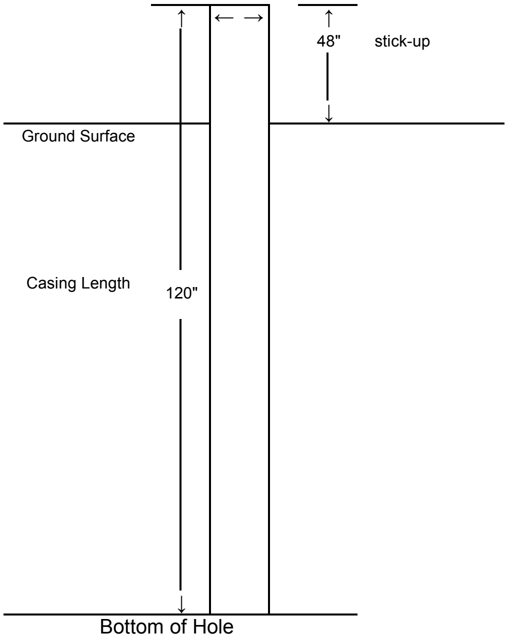
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-09

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

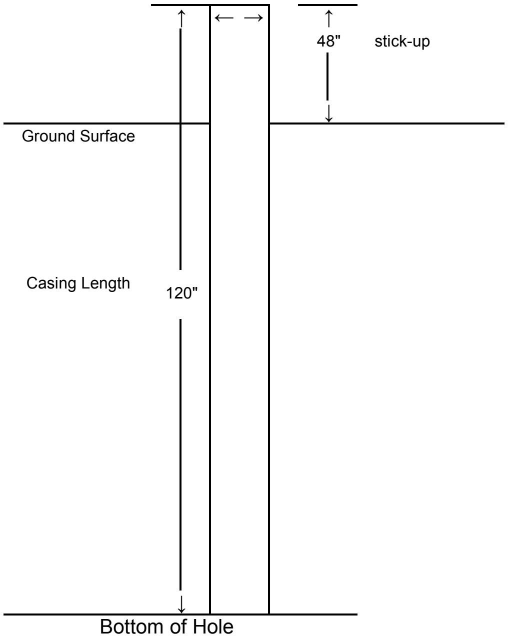
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-09

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

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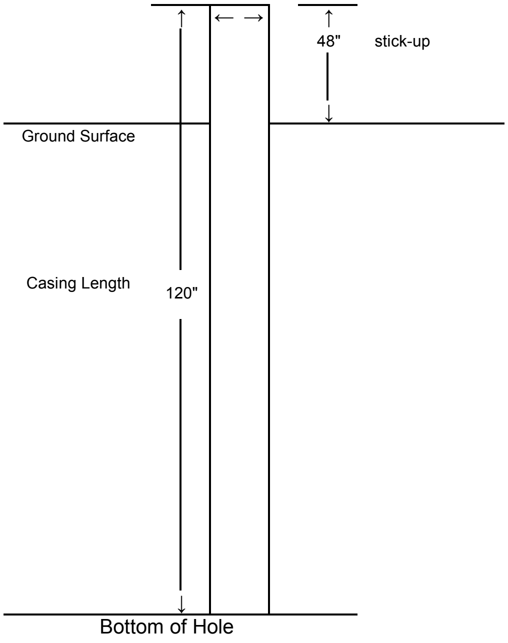
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-09

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

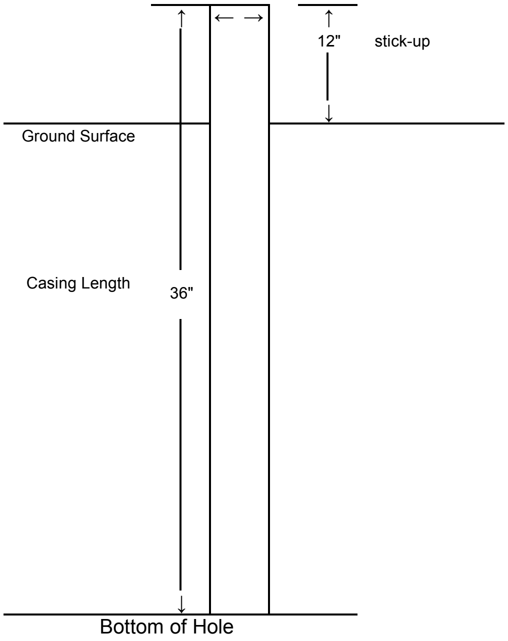
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-10

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

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Falling Head Infiltration Test

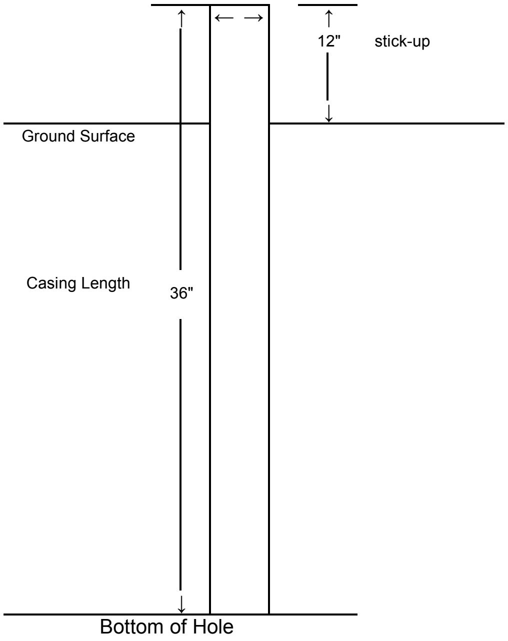
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-10

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

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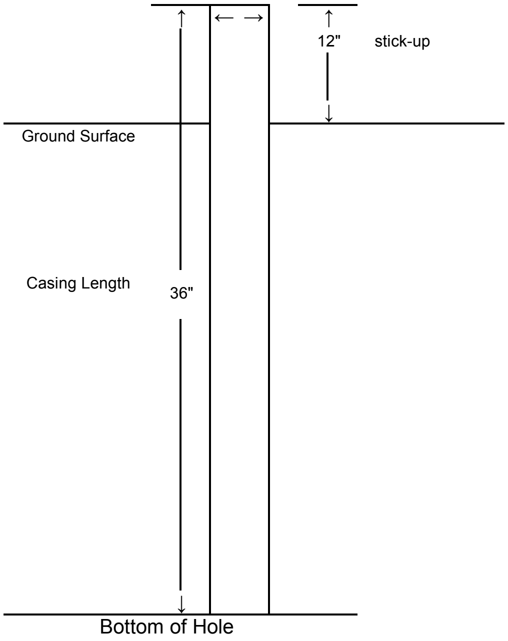
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-10

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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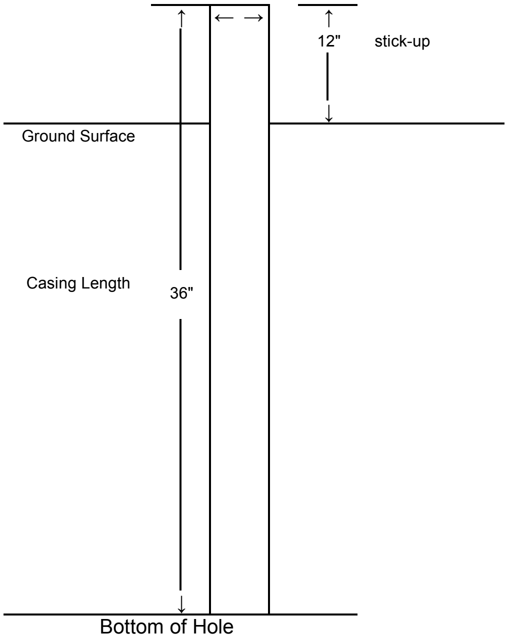
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-11

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

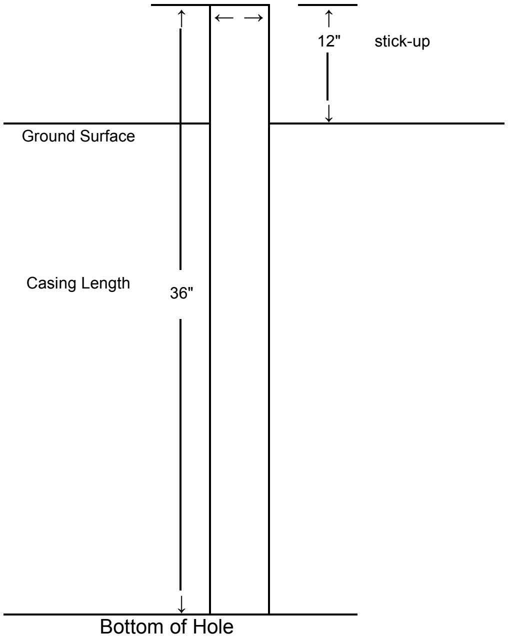
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-11

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

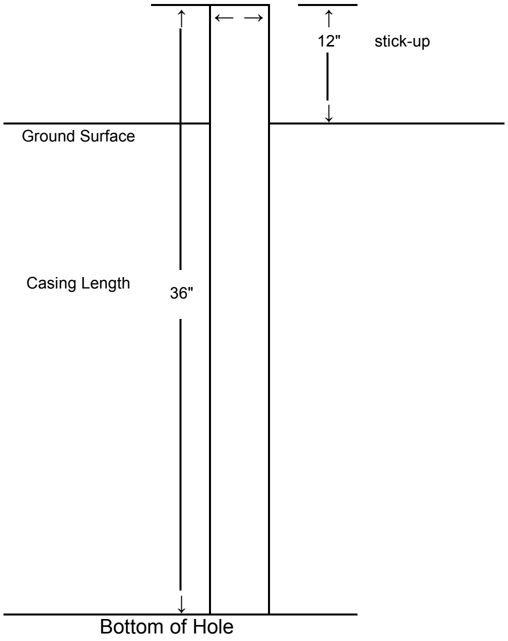
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-11

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	9.00	(in)	21.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 21.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

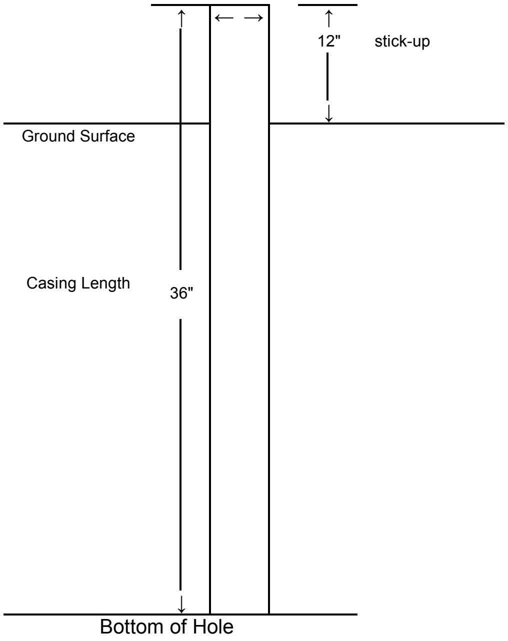
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

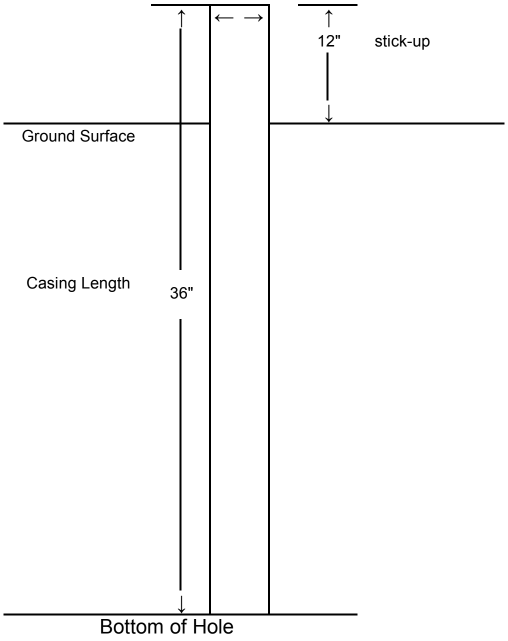
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

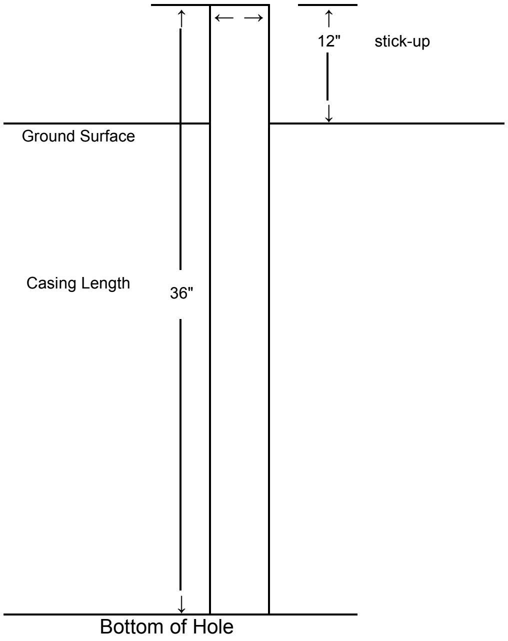
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

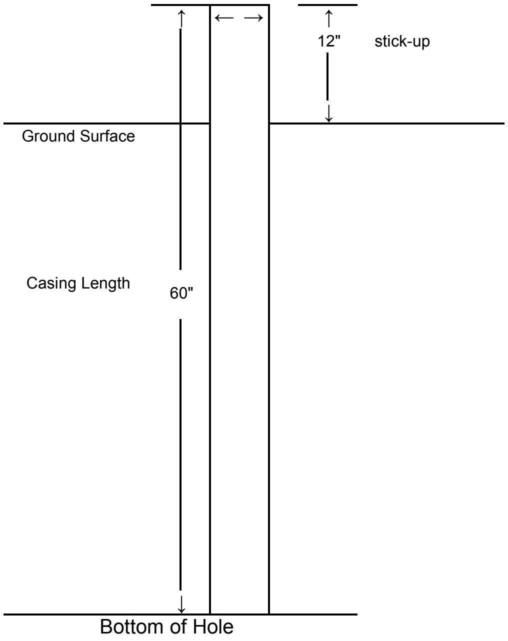
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-13

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

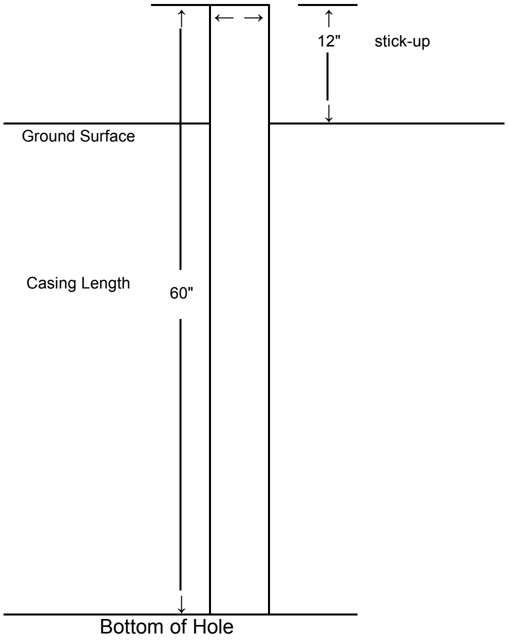
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-13

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

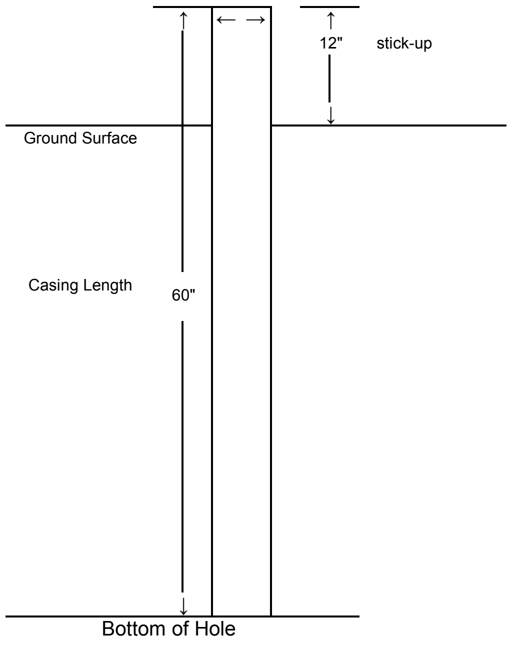
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-13

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

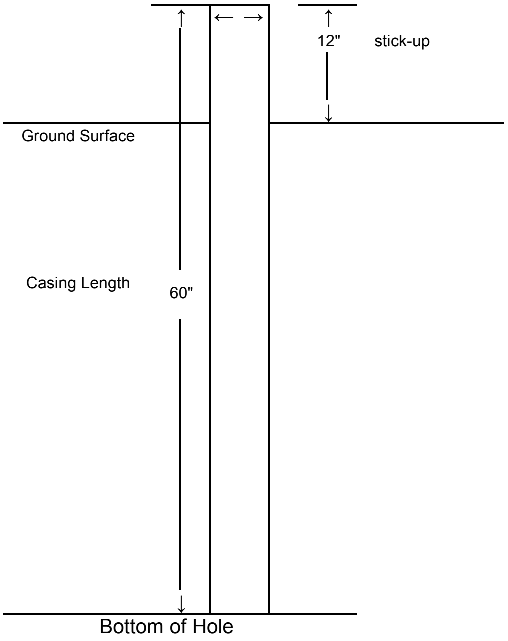
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-15

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

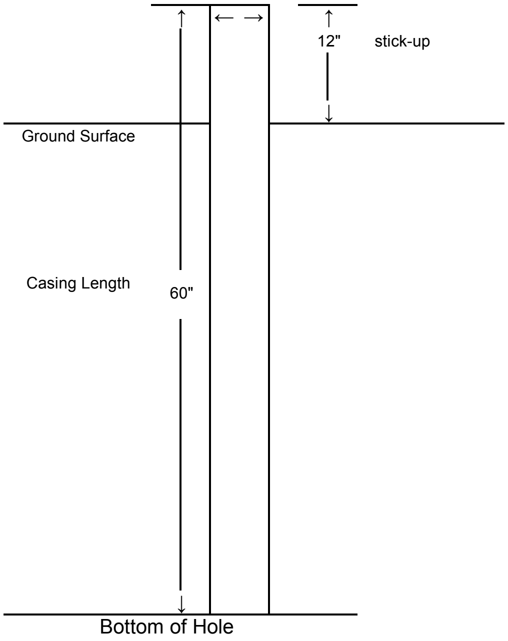
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-15

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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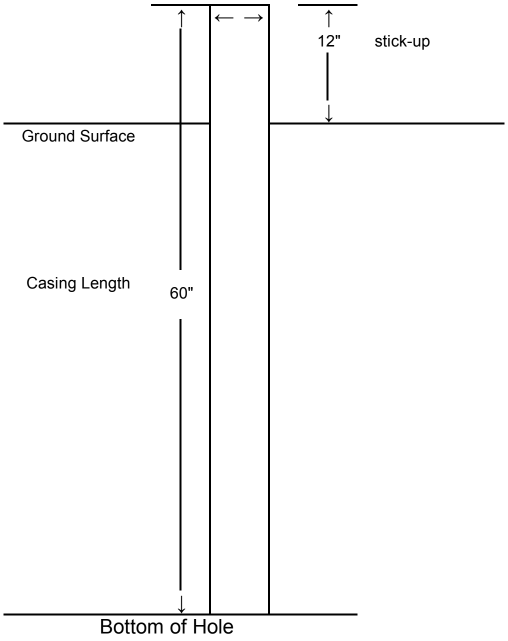
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-15

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Engineers Planners Surveyors Landscape Architects Environmental Scientists

Geotechnical Data Report

(In-situ Infiltration Testing)

FOR

Warwick Meadows

Sheffield Drive
Tax Lots 218-1-91, 92, 93, 94, & 96, 219-1-2.2
Village of Warwick, Orange County, NY

September 11, 2020

Prepared For

Warwick Commons Stage 5, LLC
321 Route 59, #338
Tallman, NY 10982

Prepared By

Maser Consulting
555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12553
845.564.4495

Ahmed Elmekati, PE
License No. 094599

MC Project No. 15002429D

www.maserconsulting.com

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GEOTECHNICAL DATA REPORT – INFILTRATION TESTING
WARWICK MEADOWS
VILLAGE OF WARWICK, ORANGE COUNTY, NEW YORK
MC PROJECT NO. 15002429D

TABLE OF CONTENTS

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3. SUBSURFACE EXPLORATION 1
4. INFILTRATION TESTING 2
5. CLOSING 3
6. LIMITATIONS.. 3

FIGURES

Figure 1 .... Site Location Plan

DRAWINGS

B-01-ELP .... Exploration Location Plan

APPENDICES

APPENDIX A .... Test Pit Logs
APPENDIX B ....Infiltration Test Results

1. INTRODUCTION

In accordance with our proposal dated January 24, 2020, Maser Consulting has performed in-situ infiltration testing for the proposed stormwater management facilities at the proposed development located at Sheffield Drive, Village of Warwick, New York.

This report presents the summary of the data collected using the conducted tests.

2. SITE AND PROJECT DESCRIPTION

The project site is located at Sheffield Drive, in the village of Warwick, Orange County, New York (Figure 1). The site is bounded by Brady Road towards west, a residential subdivision east, a condominium development north, and a single family home south. Magnolia Lane passes through the site dividing it into northern and southern areas and transitions into Sheffield Drive near its eastern side.

The proposed development comprises the construction of 14 new residential structures, with a new clubhouse and pool area and new stormwater management facilities, along with typical appurtenant site improvements including parking lots, landscaping, and lighting.

3. SUBSURFACE EXPLORATION

Exploration Program

Maser Consulting performed a geotechnical exploration program originally consisting of fifteen Test Pits, TP-01 through TP-15. The test pits extended up to 9 ft below existing grade. Note that Test Pits TP-06 and TP-14 were not performed due to existing site conditions. The test pit logs are presented in Appendix A.

The test pits were excavated during the period from August 18, 2020 through August 20, 2020 by SoilTesting, Inc. of Oxford, CT, using a CAT 308 excavator, under the continuous observation of Maser Consulting field representative, Mr. Nicholas Ohrynowicz. The test pits were backfilled on August 21, 2020 at the conclusion of the infiltration testing. Our field representative located the test pits in the field using existing site features and conventional taping methods. Locations of the test pits are presented in the Exploration Location Plan, Drawing B-01-ELP.

4. INFILTRATION TESTING

Procedure

In-situ Infiltration testing was performed within Test Pits TP-01, TP-03 through TP-05, TP-07 through TP-13, and TP-15. The test pits were initially advanced to depths varying between 1.5 ft and 6 ft below the corresponding ground surface. Thereafter, infiltration testing was performed to measure the infiltration rates of the underlying soils.

The infiltration tests were conducted in accordance with Appendix D of New York State Stormwater Design Manual. The tests were conducted after an initial presoaking period of 24 hours. Thereafter, a total of three trials were performed at each location. During each trial, our field representative obtained readings at 60-minute intervals for a total duration of one hour (per trial).

Measured Infiltration Rates

Appendix B presents details of the infiltration tests performed and the corresponding results. Table 1 presents a summary of these results.

Table 1. Summary of Infiltration Test Results

Location ID	Test Depth (ft)	Soil Description (Below Test Depth)	Measured Infiltration Rate (in/hr)*			
			Trial 1	Trial 2	Trial 3	Average
TP-01	6	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-03	1.5	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-04	3	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-05	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	22.0	23.3
TP-07	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	18.0	24.0	24.0	22.0
TP-08	5	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-09	6	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-10	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-11	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	21.0	23.0
TP-12	2	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-13	4	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0
TP-15	4	Lt. brown mf Sand some Clayey Silt, little mf Gravel.	24.0	24.0	24.0	24.0

*The infiltration rates indicated in Table 1 represent the rate measured at the conclusion of each trial. No correction factors applied.

5. CLOSING

The data presented in this report is based, on field observations and measured test results. The number, location, and depth of the explorations were completed as requested by the project Site Civil Engineer.

6. LIMITATIONS

This geotechnical exploration has been performed in accordance with generally accepted engineering practice and any applicable design standards as referenced herein. This data report and all supporting documentation have been prepared exclusively for the use of **Warwick Commons Stage 5, LLC.** pursuant to the Agreement between Maser Consulting (Maser) and **Warwick Commons Stage 5, LLC**. All provisions set forth in the Agreement and the General Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The field observations, and data contained in this report are based on limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations, depths, and times explored.

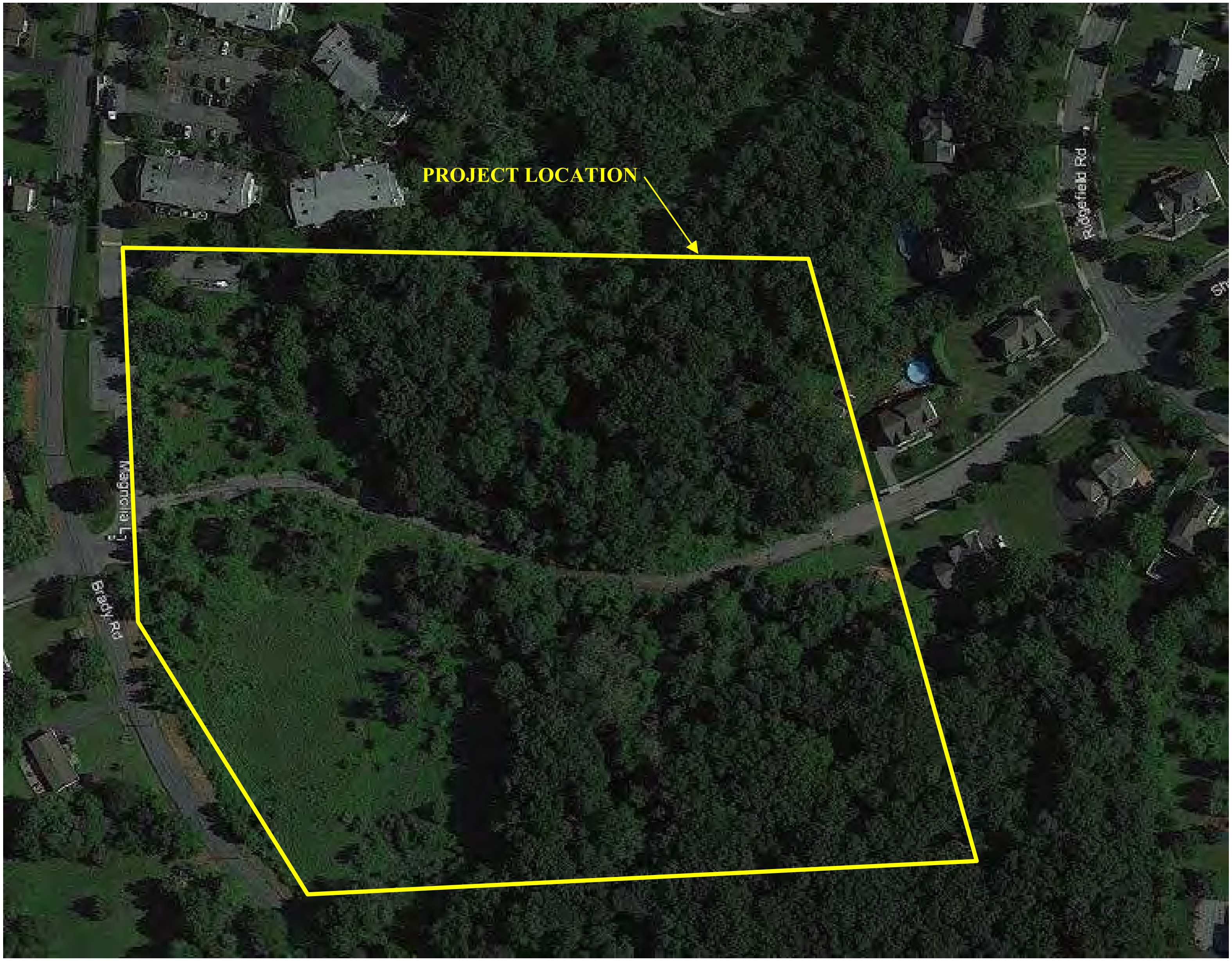
This report is intended to serve as a data report. Maser is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Maser.

This data report and related documentation are instruments of service. The subject matter of this data report is limited to the facts and matters stated herein.

The scope of this geotechnical exploration did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for information only.

\\maserconsulting.com\qmv\alloffices\newburgh\projects\2015\15002429d - warwick meadows\reports\geotechnical\2020 infiltration\2020 data report\text\200911_nco_ahe_geotechnical data report.docx

Figures



Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

50 Chestnut Ridge Road, Suite 101
Montvale, New Jersey 07645
Phone: 845.352.0411
Fax: 845.352.2611

FIGURE 1

SITE LOCATION PLAN

PROJECT:
Warwick Meadows
Village of Warwick, Orange County, NY

MC File No: 15002429D

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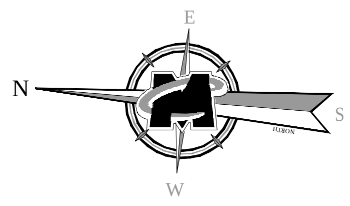
Drawings



GENERAL NOTES:

1. LOCATION PLAN BASED ON DRAWING TITLED "GRADING AND DRAINAGE PLAN" BY MASER CONSULTING, DATED JUNE 6, 2020.
2. THIS DRAWING IS PART OF MASER CONSULTING'S REPORT (PROJECT NO. (15002429D) DATED SEPTEMBER, 2020 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
3. SOIL EXPLORATION LOCATIONS ARE APPROXIMATE BASED ON EXISTING SITE FEATURES AND INFORMATION AVAILABLE AT THE TIME OF OUR FIELD EXPLORATION.
4. TEST PIT SERIES TP-XX PERFORMED BY SOILTESTING, INC. DURING THE PERIOD FROM AUGUST 18, 2020 THROUGH AUGUST 20, 2020 UNDER THE CONTINUOUS OBSERVATION OF MASER CONSULTING.
5. ALL EXPLORATIONS BACKFILLED UPON COMPLETION.

LEGEND:

◩ TP-XX — TEST PIT LOCATION (AUGUST, 2020)

30 24 18 12 6 0 15 30 60

SCALE : 1" = 30'

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State of N.J. Cert. of Authorization: 24GA27986500

REV	DATE	DRAWN BY	DESCRIPTION
.	.	.	.
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.	.	.	.
.	.	.	.
.	.	.	.

EXPLORATION LOCATION PLAN
FOR
WARWICK MEADOWS

TAX LOTS 218-1-91, 92, 93, 94, & 96, 219-1-2.2
VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

MONTVALE OFFICE
50 Chestnut Ridge Road
Suite 101
Montvale, NJ 07645

Phone: 845.352.0411
Fax: 845.352.2611

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	09/10/2020	N.O.	A.E.

PROJECT NUMBER: 15002429D
DRAWING NAME: B-01-ELP

SHEET TITLE: EXPLORATION LOCATION PLAN

SHEET NUMBER: B-01-ELP

h\Projects\2015\15002429D - Warwick Meadows\Reports\Geotechnical\CAD\B-01-ELP.dwg\Layout1 By: NOHRYNOWICZ

Appendix A

Test Pit Logs

Burmister Soil Classification System

I - Soil and Fraction Definitions

Material	Symbol	Fraction	Sieve Size	Definition
Boulders	Bldr	-----	9” +	Material retained on 9” sieve.
Cobbles	Cbl	-----	3” to 9”	Material passing 9” sieve and retained on the 3” sieve.
Gravel	G	Coarse (c) Medium (m) Fine (f)	1” to 3” 3/8” to 1” No. to 3/8”	Material passing the 3” sieve and retained on the No. 10 sieve.
Sand	S	Coarse (c) Medium (m) Fine (f)	No. 30 to No. 10 No. 60 to No. 30 No. 200 to No. 60	Material passing No. 10 sieve and retained on the No. 200 sieve.
Silt	$	-----	Passing No. 200 (0.075 mm)	Material passing the No. 200 sieve that is non-plastic in character and exhibits little or no strength when air-dried.
Clayey Silt	c$	Slight (SL)	1 to 5	Clay – Soil. Material passing the No. 200 sieve which can be made to exhibit plasticity and clay qualities within a certain range of moisture content, and which exhibits considerable strength when air-dried.
Silt & Clay	$ & C	Low (L)	5 to 10	
Clay & Silt	C & $	Medium (M)	10 to 20	
Silty Clay	$C	High (H)	20 to 40	
Clay	C	Very High (VH)	40 Plus	
Organic Silt	(O$)	-----	-----	Material passing the No. 200 sieve which exhibits plastic properties within a certain range of moisture content, and exhibits fine granular and organic characteristics.

II - Proportion Definitions

Component	Written	Proportions	Symbol	Percentage Range by Weight*
Principal	CAPITALS	---	---	50 or more
Minor	Lower Case	And	a.	35 to 50
		Some	s.	20 to 35
		Little	l.	10 to 20
		Trace	t.	0 to 10

* Minus sign (-) lower limit, plus sign (+) upper limit, no sign middle range.

III - Strength Term Definitions

Relative Density of Coarse-Grained Soils		**Consistency of Fine-Grained Soils**		
Density	**N-Value (bpf)**	**Consistency**	**Unconfined Compressive Strength (tsf)**	**N-Value (bpf)**
Very Loose	0 to 3	Very Soft	Less than 0.25	0 to 1
Loose	4 to 9	Soft	0.25 to 0.50	2 to 4
Medium Dense	10 to 29	Medium Stiff	0.50 to 1.00	4 to 8
Dense	30 to 50	Stiff	1.00 to 2.00	8 to 15
Very Dense	More than 50	Very Stiff	2.00 to 4.00	15 to 30
		Hard	More than 4.00	More than 30

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Soil Classification Standard

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-01

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 736.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24		
	36		
	48		
5	60	Lt. Brown mf SAND, some Silt, little mf Gravel. (Dry)	
	72		Infiltration test casing installed at 72" BGS.
	84		
	96		
	108	**END OF TEST PIT AT 108 INCHES**	
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 72" BGS.

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/18/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-01**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-02**
PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 725.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24	**REFUSAL ENCOUNTERED AT 18 INCHES**	
	36		
	48		
5	60		
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216	NOTES:	
	228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/18/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-02**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-03
PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 736.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/18/20
DATE FINISHED: 08/18/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24		Infiltration test casing installed at 18" BGS.
	36	Lt. Brown mf SAND, some Silt, little mf Gravel. (Dry)	
	48		
5	60	**REFUSAL ENCOUNTERED AT 60 INCHES**	
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228	NOTES: * Excavation expanded for shallower infiltration test at 18" BGS.	
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/18/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-04**
PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 713.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 36" BGS.
5	60		
	72	**END OF TEST PIT AT 72 INCHES**	
	84 96 108		
10	120		
	132 144 156 168		
15	180		
	192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 36" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-04**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS
LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY
PROJECT NO. 15002429D

TEST PIT: TP-05

PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 716.0 +/−
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60	**END OF TEST PIT AT 60 INCHES**	
	72 84 96 108		
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 24" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-05**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-07

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 719.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60	**REFUSAL ENCOUNTERED AT 60 INCHES**	
	72 84 96 108		
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 24" BGS.	
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/19/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-08**
PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 718.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	0–24	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
5	24–96	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 60” BGS.
	96	**END OF TEST PIT AT 96 INCHES**	

Depth scale: 0, 5, 10, 15, 20 ft; 3, 6, 9, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 240 in

NOTES:
* Excavation expanded for shallower infiltration test at 60” BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-08**
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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-09**
PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 741.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24		
	36		
	48		
5	60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	72		Infiltration test casing installed at 72" BGS.
	84		
	96		
	108	**END OF TEST PIT AT 108 INCHES**	
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228	NOTES: * Excavation expanded for shallower infiltration test at 72" BGS.	
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	N.E.	08/19/20
At Completion (0 hrs.) ▽		
Perched Groundwater ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-09**
PAGE 1 OF 1

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-10**

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 734.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60 72 84 96 108	**END OF TEST PIT AT 60 INCHES**	
10	120 132 144 156 168		
15	180 192 204 216 228	NOTES: * Excavation expanded for shallower infiltration test at 24" BGS.	
20	240		

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-11

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 720.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	12		
	24	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
	36		
	48		
5	60	**END OF TEST PIT AT 60 INCHES**	
	72		
	84		
	96		
	108		
10	120		
	132		
	144		
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 24" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

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877.627.3772 / maserconsulting.com
50 Chestnut Ridge Road, Suite 101 Montvale, NJ 07645

PROJECT: WARWICK MEADOWS
LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY
PROJECT NO. 15002429D

TEST PIT: **TP-12**
PAGE 1 OF 1
LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 722.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	0–24	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24–60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 24" BGS.
5	60	**END OF TEST PIT AT 60 INCHES**	

Depth scale: 0, 5, 10, 15, 20 (ft); 3, 6, 9, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168, 180, 192, 204, 216, 228, 240 (in)

NOTES:
* Excavation expanded for shallower infiltration test at 24" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-12**
PAGE 1 OF 1

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50 Chestnut Ridge Road, Suite 101 Montvale, NJ 07645

PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: **TP-13**
PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 724.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/19/20
DATE FINISHED: 08/19/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
5	24 36 48 60 72 84	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	Infiltration test casing installed at 48" BGS.
10 15 20	96 108 120 132 144 156 168 180 192 204 216 228 240	**END OF TEST PIT AT 84 INCHES** NOTES: * Excavation expanded for shallower infiltration test at 48" BGS.	

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/19/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-13**
PAGE 1 OF 1

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50 Chestnut Ridge Road, Suite 101 Montvale, NJ 07645

PROJECT: WARWICK MEADOWS

LOCATION: SHEFFIELD DRIVE
WARWICK, ORANGE COUNTY, NY

PROJECT NO. 15002429D

TEST PIT: TP-15

PAGE 1 OF 1

LOCATION: **SEE PLAN**
GROUND ELEVATION (ft): 746.0 +/-
ELEV. FROM: INTERPOLATED
GROUND WATER ELEV. (ft): N/A

CONTRACTOR: SOILTESTING, INC.
EQUIPMENT: CAT 308 EXCAVATOR

FIELD OBSERVER: NICHOLAS OHRYNOWICZ
CHECKED BY: AHMED ELMEKATI

DATE STARTED: 08/20/20
DATE FINISHED: 08/20/20

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3 6 9 12	Lt. Brown cmf SAND, little to some Clayey Silt, trace mf Gravel. (Topsoil) (Dry)	
	24 36 48		
5	60	Lt. brown mf SAND, some Silt, little mf Gravel. (Dry)	
	72 84		Infiltration test casing installed at 48" BGS.
	96	**END OF TEST PIT AT 84 INCHES**	
	108		
10	120 132 144 156 168		
15	180 192 204 216 228		
20	240		

NOTES:
* Excavation expanded for shallower infiltration test at 48" BGS.

GROUNDWATER:		DEPTH (ft.)	DATE
First Encountered	▽	N.E.	08/20/20
At Completion (0 hrs.)	▽		
Perched Groundwater	▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: N.E.
PERCHED CONDITIONS ENCOUNTERED AT: N.E.

TEST PIT: **TP-15**
PAGE 1 OF 1

Appendix B

Infiltration Test Results

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50 Chestnut Ridge Road, Suite 101
Montvale, New Jersey 07645
Phone: 845.352.0411
Fax: 845.352.2611

Falling Head Infiltration Test

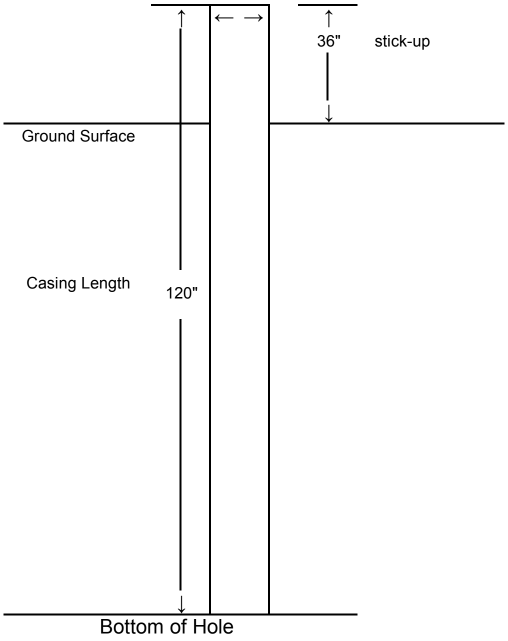
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/19/2020
Exploration No: TP-01

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Fax: 845.352.2611

Falling Head Infiltration Test

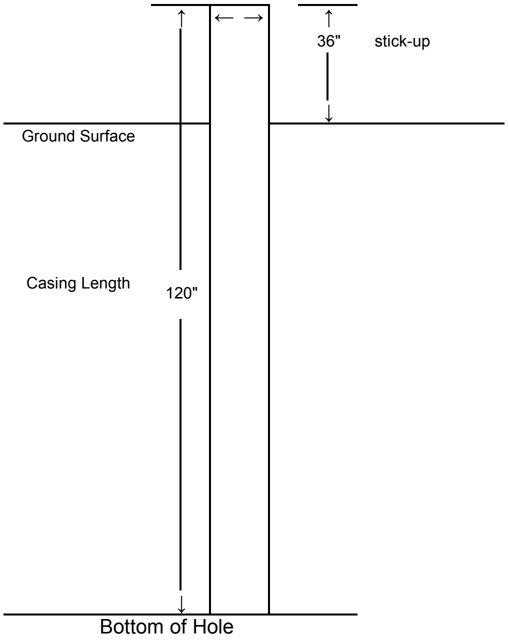
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/19/2020
Exploration No: TP-01

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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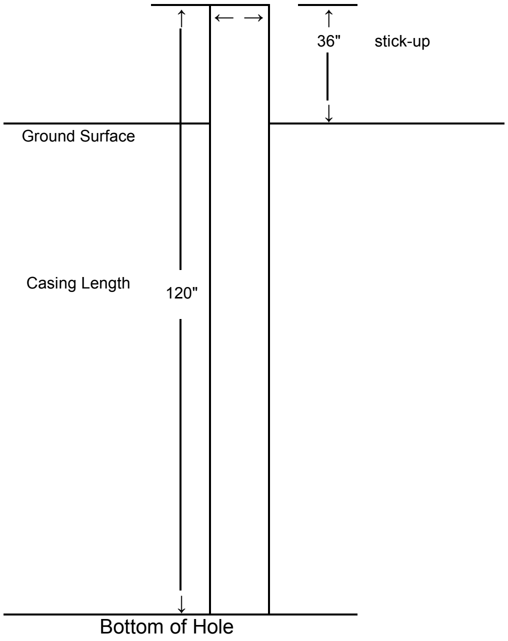
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/19/2020
Exploration No: TP-01
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

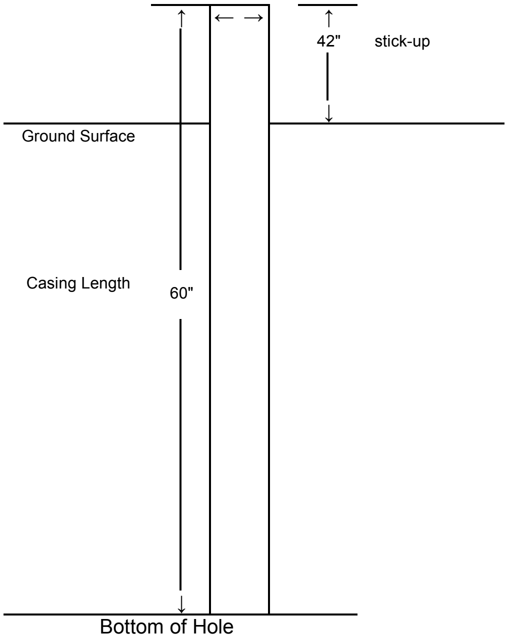
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-03

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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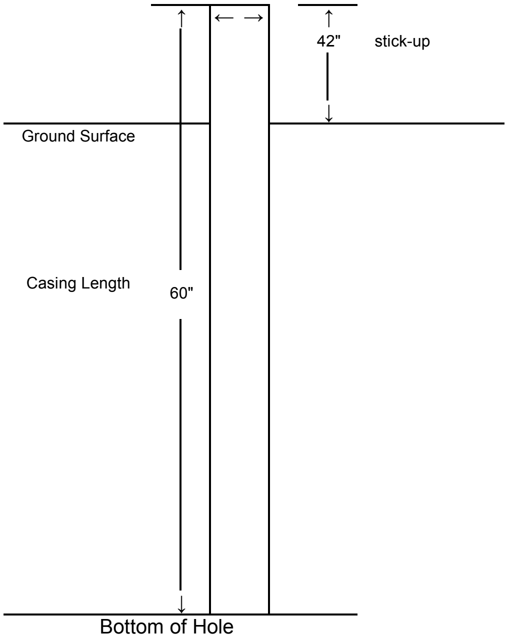
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-03

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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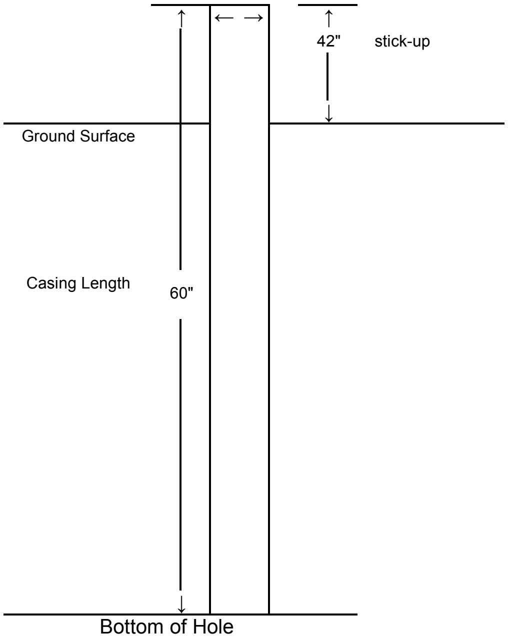
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-03

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	42	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

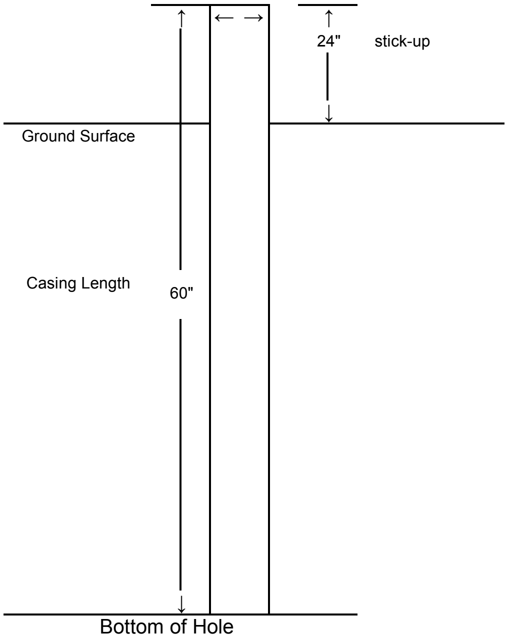
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-04

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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50 Chestnut Ridge Road, Suite 101
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Phone: 845.352.0411
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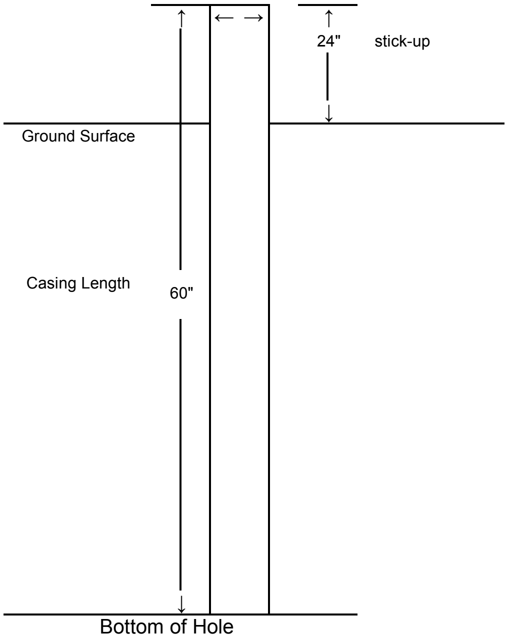
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-04
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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50 Chestnut Ridge Road, Suite 101
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Phone: 845.352.0411
Fax: 845.352.2611

Falling Head Infiltration Test

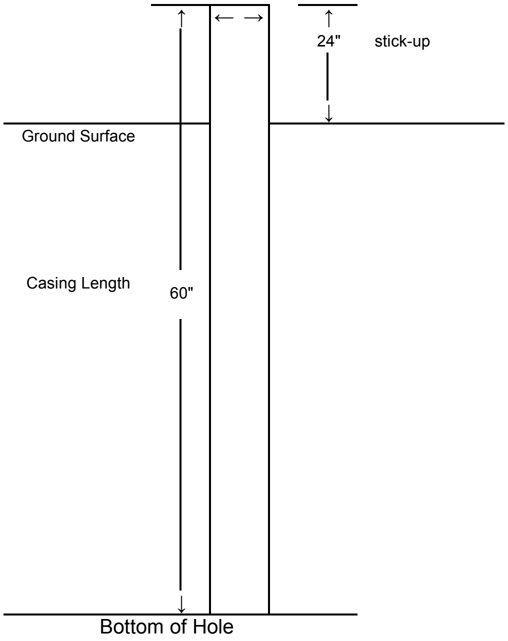
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-04

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	24	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Fax: 845.352.2611

Falling Head Infiltration Test

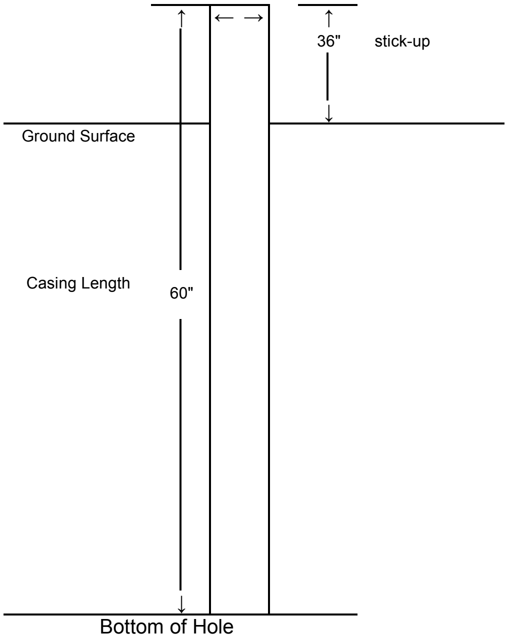
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-05

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

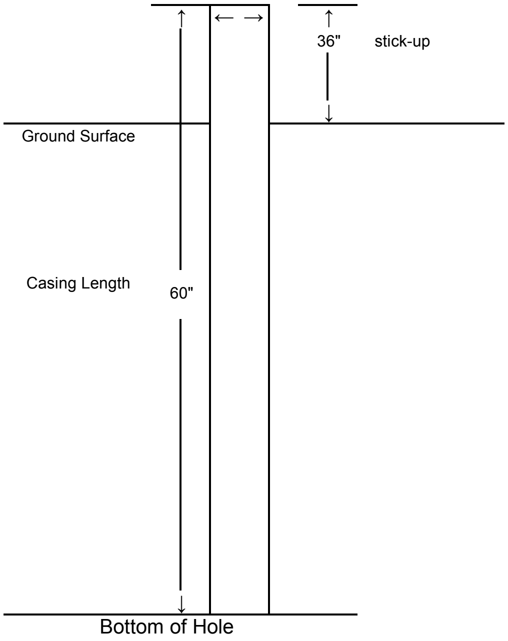
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-05

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

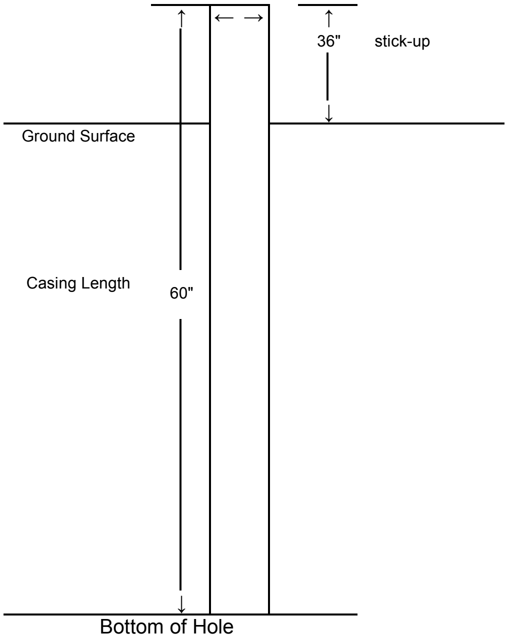
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-05

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	36	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	10.00	(in)	22.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 22.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

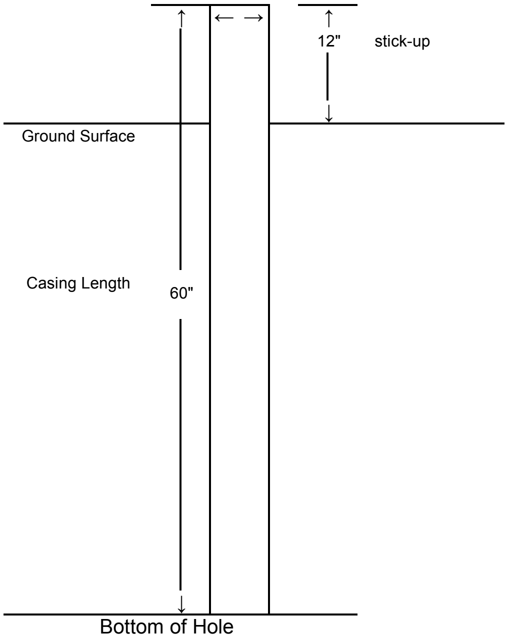
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-07

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	6.00	(in)	18.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 18.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

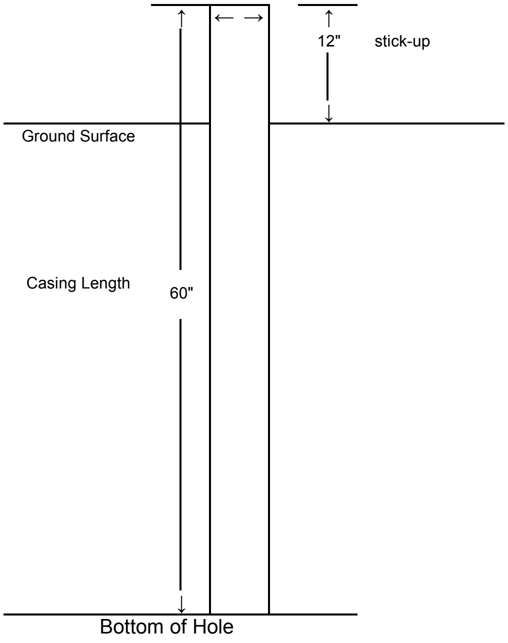
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-07

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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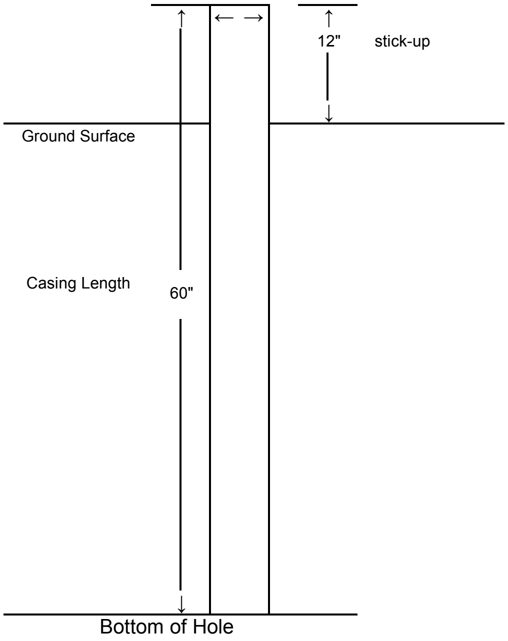
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-07
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

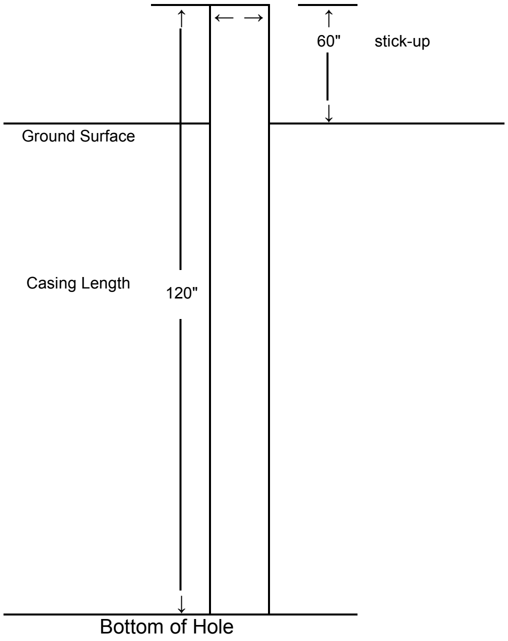
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-08

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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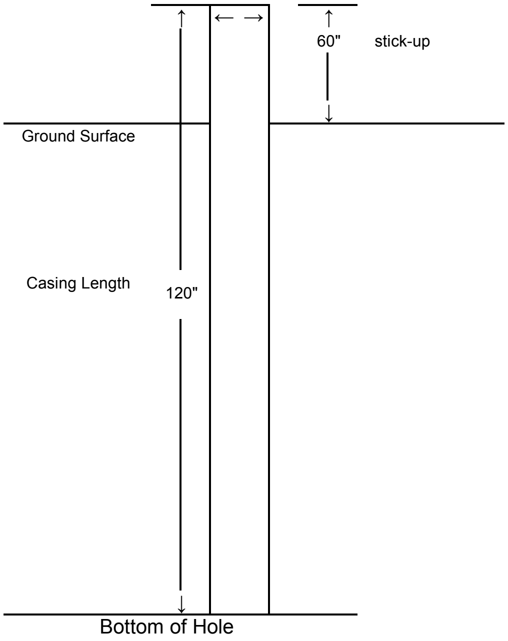
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-08
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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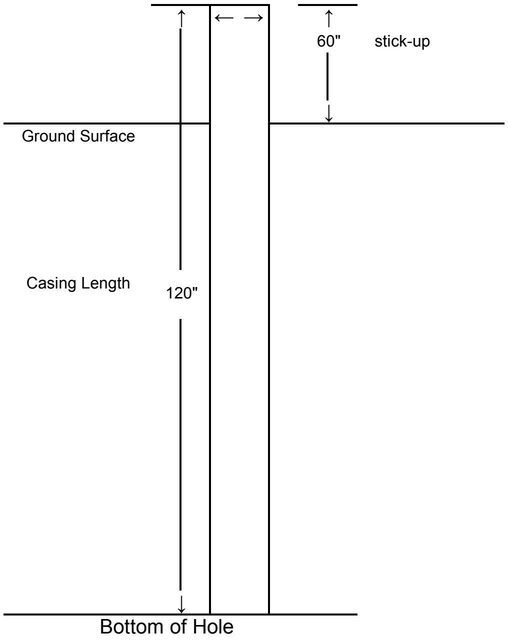
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-08
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	60	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

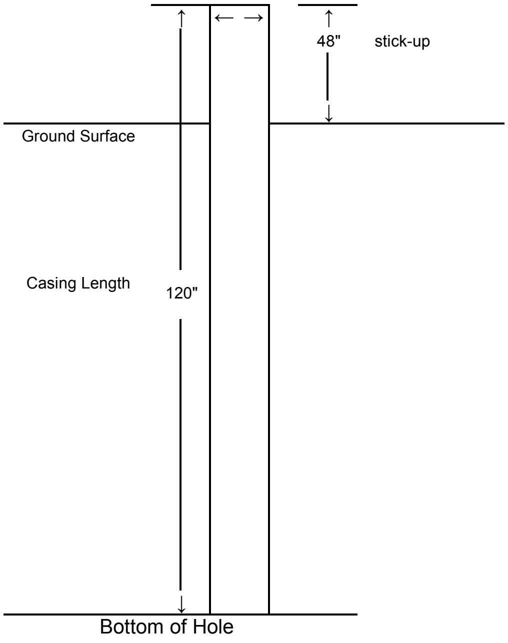
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-09

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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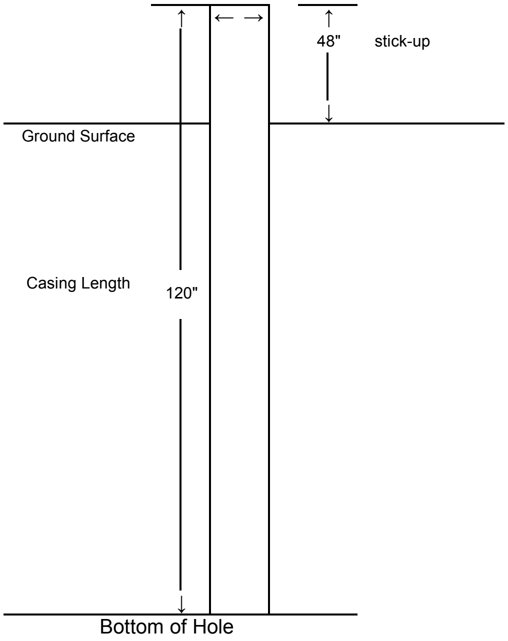
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/20/2020
Exploration No: TP-09
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

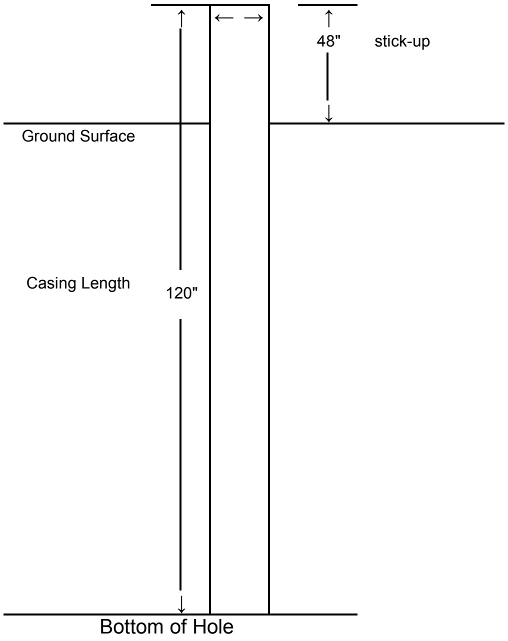
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-09

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	120	in
Stick-Up	48	in
Depth from Bottom of Hole to Top of Casing	120	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

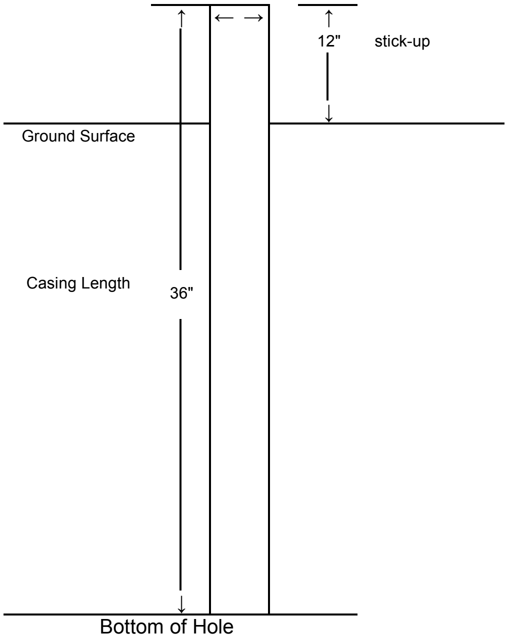
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-10

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

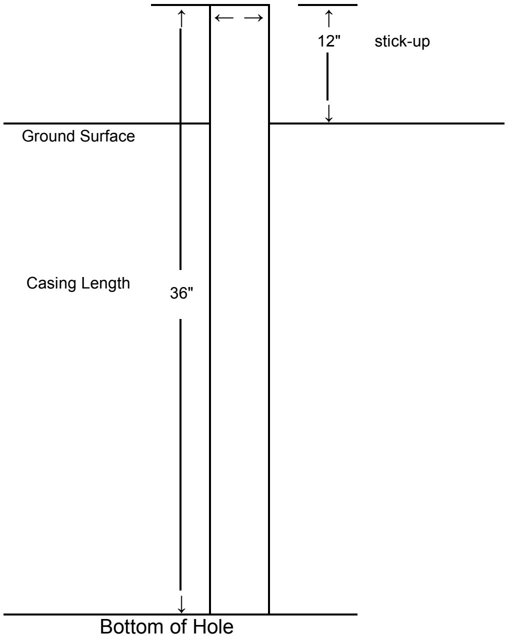
1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-10
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

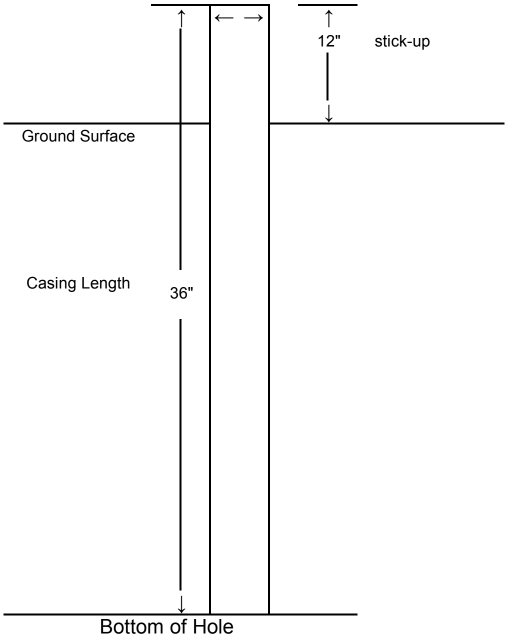
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-10

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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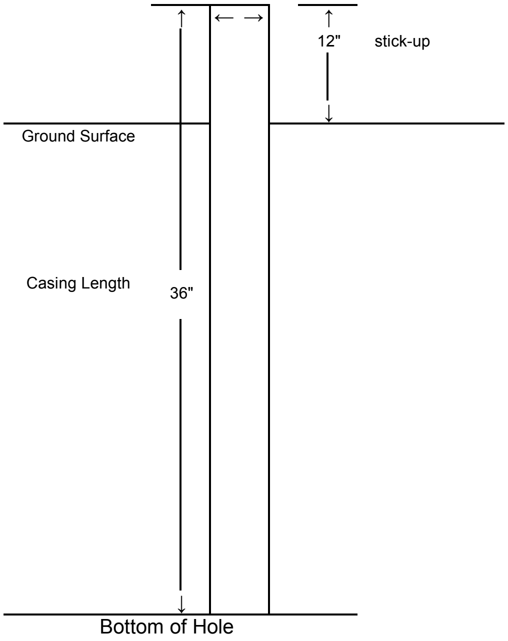
Falling Head Infiltration Test

Project: Warwick Meadows
Job Number: 15002429D
Date: 8/21/2020
Exploration No: TP-11

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

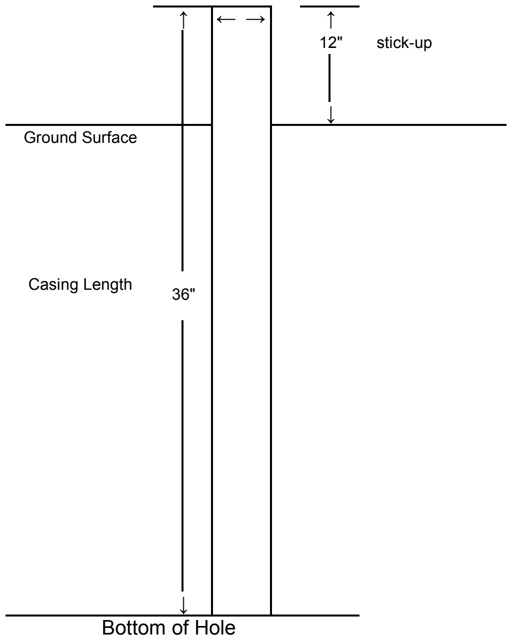
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-11

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

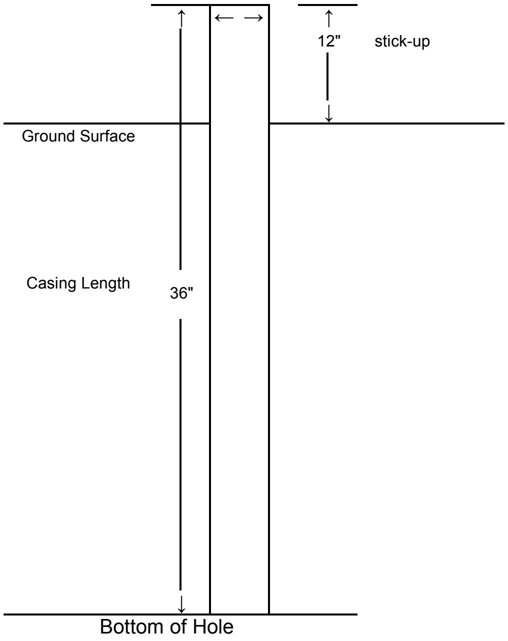
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-11

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	1	(ft)	9.00	(in)	21.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 21.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

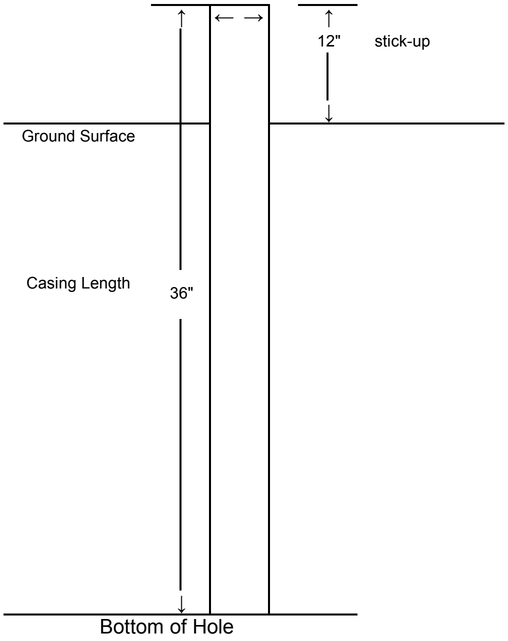
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

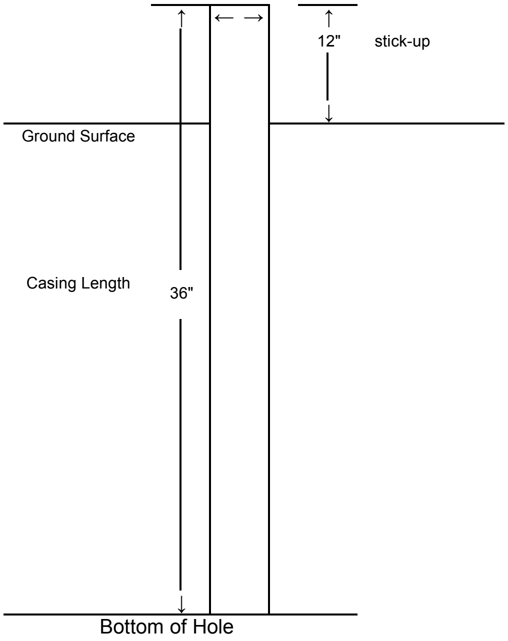
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

Falling Head Infiltration Test

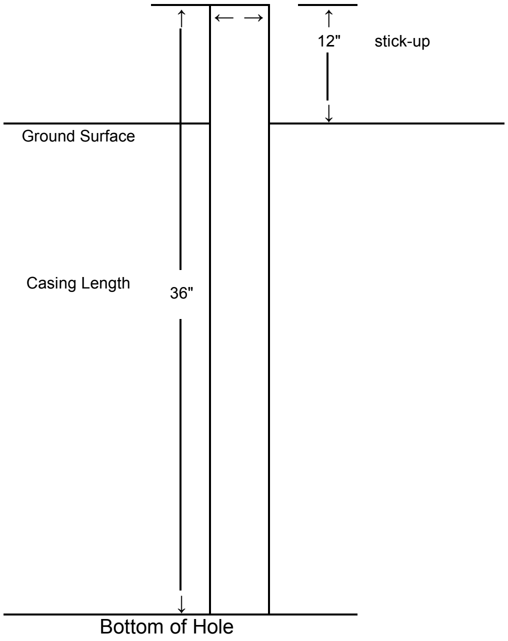
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-12

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	36	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	36	in
Water Level from Top of Casing	N/A	in

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

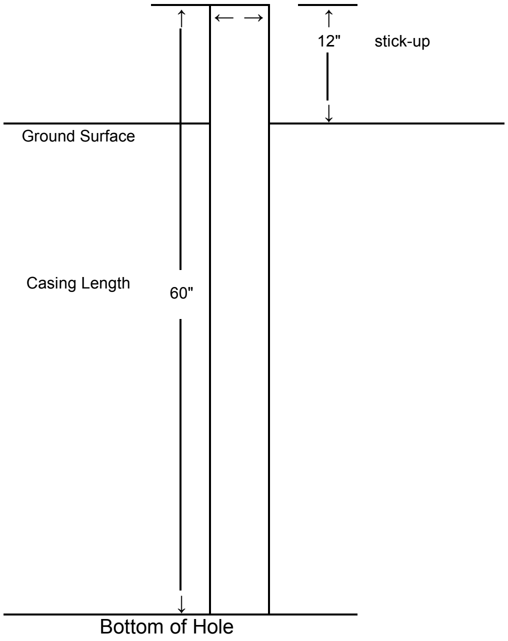
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-13

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

50 Chestnut Ridge Road, Suite 101
Montvale, New Jersey 07645
Phone: 845.352.0411
Fax: 845.352.2611

Falling Head Infiltration Test

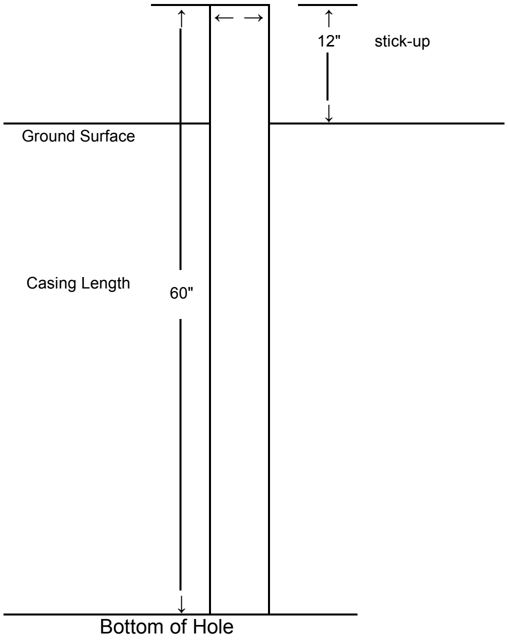
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/20/2020
Exploration No: TP-13

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
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3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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Measurements:

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Notes:

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Project: Warwick Meadows
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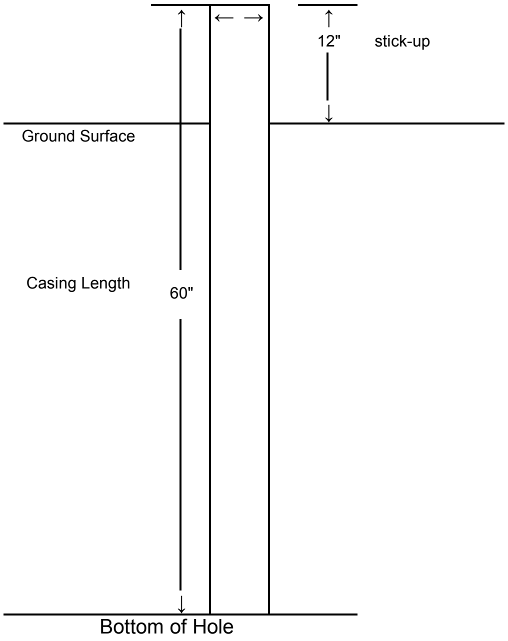
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Fax: 845.352.2611

Falling Head Infiltration Test

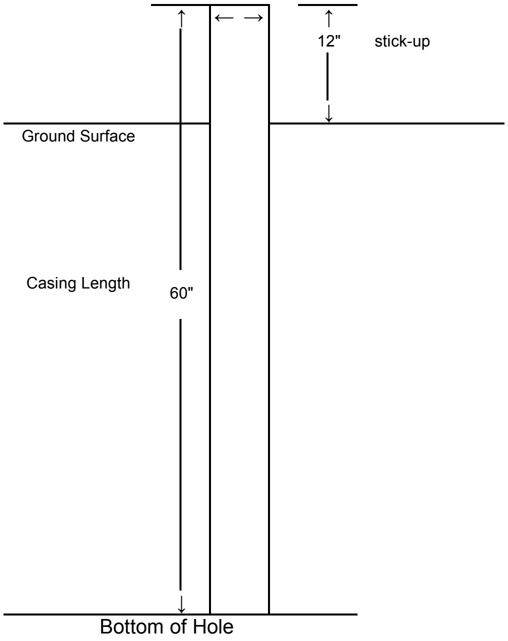
Project: Warwick Meadows
Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-15

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
Depth from Bottom of Hole to Top of Casing	60	in
Water Level from Top of Casing	N/A	in

Well Diagram



Test Data

Time (sec)	Water Level Reading		Water Level Reading		ΔH
0		(ft)	0.00	(in)	-
3600	2	(ft)	0.00	(in)	24.00
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	
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		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

1. **Infiltration rates shown are a direct measurement from conducted field test. No correction factors are applied.**

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Falling Head Infiltration Test

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Job Number: 15002429D

Date: 8/21/2020
Exploration No: TP-15

Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Information		
Standing Groundwater	NA	in
Casing Diameter	5	in
Casing Length	60	in
Stick-Up	12	in
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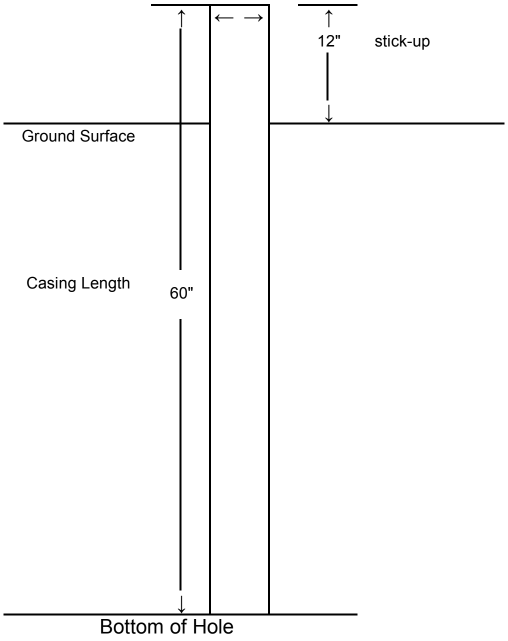
Well Diagram



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Measurements:

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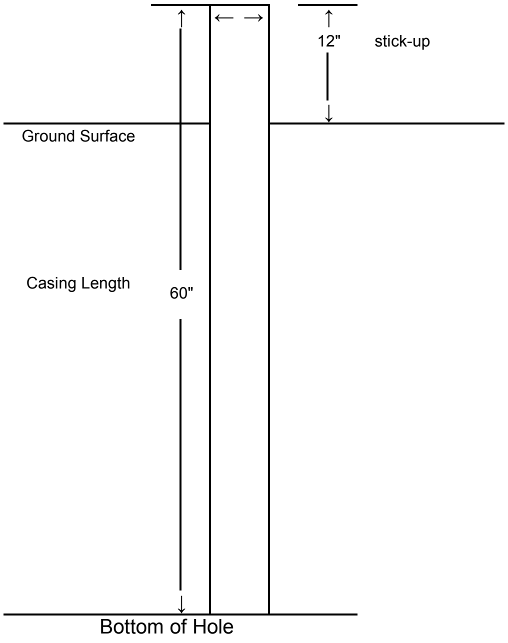
Inspector: Nicholas Ohrynowicz
Operator: SoilTesting, Inc.
Rig/Crew Time:

Well Diagram



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		(ft)		(in)	
		(ft)		(in)	
		(ft)		(in)	

Measurements:

Measured Infiltration Rate:
= 24.00 (in/hr)

Notes:

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APPENDIX 16

EROSION & SEDIMENT CONTROL PLANS

GENERAL CONSTRUCTION SEQUENCE OF RESIDENTIAL DEVELOPMENT PROJECT

MOD: 09/24/20
MCNY-SOIL-NOTE-1500 07/01/19

1. CLEARING OF ENTRANCES, AND LIMIT OF DISTURBANCE FOR INSTALLATION OF SILT FENCE AND CONSTRUCTION ENTRANCE PAD. INSTALL TRACKING PADS AND INLET PROTECTION ON EXISTING DRAIN INLETS.
2. CONSTRUCT AND STABILIZE SEDIMENT RETENTION BASINS. THE RETENTION BASIN HAS BEEN DESIGNED TO TEMPORARILY STORE THE SEDIMENT GENERATED BY THE SITE. IF THE SEDIMENT EXCEEDS THE BOTTOM OF THE PERMANENT RETENTION BASIN, THE SEDIMENT SHALL BE REMOVED.
3. CLEARING AND ROUGH GRADING AS NECESSARY TO CONSTRUCT ROADWAYS. ALL EXPOSED SURFACES SHALL BE STABILIZED AS DEFINED IN SOIL EROSION AND SEDIMENT CONTROL NOTES.
4. INSTALL STORM DRAINAGE SYSTEM, CONDUIT OUTLET PROTECTION AND ALL OTHER UTILITIES. INSTALL INLET PROTECTION.
5. CONSTRUCT CURBS AND PLACE ROADWAY SUBBASE.
6. CLEAR AND GRADE BUILDING AREAS AND CONSTRUCT UNITS. ALL DISTURBED AREAS SHALL BE STABILIZED AS DEFINED IN SOIL EROSION AND SEDIMENT CONTROL NOTES.
7. ESTABLISH FINISH GRADES. CONDUCT SOIL COMPACTION TESTING AS REQUIRED, OR SCARIFY/TILL 6" MINIMUM DEPTH OF SUBSOIL IN THE LANDSCAPED AND LAWN AREA.
8. ALL SURFACES HAVING LAWN OR LANDSCAPING AS FINAL COVER ARE TO BE PROVIDED 5" OF TOPSOIL, FIRM IN PLACE, PRIOR TO SEEDING, SODDING OR PLANTING. PLACE PERMANENT VEGETATIVE COVER.
9. REMOVE TEMPORARY ACCESS PROTECTION, SILT FENCE, AND INLET PROTECTION AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED.
10. PAVE ROADWAY AND COMPLETE FINAL LANDSCAPING.

INFILTRATION AREA PROTECTION DURING CONSTRUCTION

THE INFILTRATION CHAMBER FOOTPRINT AREAS MUST BE PROTECTED FROM RUNOFF AND SURCHARGE LOADING AT ALL TIMES DURING CONSTRUCTION UNTIL THE CHAMBER SYSTEM HAS BEEN FULLY INSTALLED WITH ADEQUATE COVER. ALL UPSTREAM STRUCTURES TRIBUTARY TO THE SUBSURFACE SYSTEM MUST HAVE ADEQUATE INLET PROTECTION INSTALLED PRIOR TO THE SYSTEM BEING PLACE ON-LINE. INFILTRATION PONDS MUST BE PROTECTED FROM SURCHARGE LOADING AT ALL TIMES AND PROTECTED FROM RUNOFF UNTIL ALL TRIBUTARY AREAS HAVE BEEN FULLY STABILIZED. WRITTEN APPROVAL FROM THE ENGINEER IS REQUIRED PRIOR TO PLACING SUBSURFACE CHAMBER AREAS ON-LINE AND PRIOR TO REMOVING SEDIMENT PROTECTION FROM INFILTRATION POND AREAS.

LEGEND FOR EROSION CONTROL DURING CONSTRUCTION

▬ ▬ ▬	CONSTRUCTION LIMIT LINE
—x—	SILT FENCE
—○—	SILT SOCK
—□—	TEMPORARY CONSTRUCTION FENCE
—x—	ORANGE CONSTRUCTION FENCE
▩	STORM INLET SEDIMENT TRAP
▩	STABILIZED CONSTRUCTION ENTRANCE
◠	STONE OUTLET SEDIMENT TRAP
▬▷ ▬▷ ▬	TEMPORARY SWALE
▭	TEMPORARY SEDIMENT BASIN
S.P	MATERIAL STOCKPILE
▩	CHECK DAM

40 0 40 80
SCALE : 1" = 40'

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FOR STATE SPECIFIC DIRECT PHONE NUMBERS
VISIT: WWW.CALL811.COM

REV	DATE	DRAWN BY	DESCRIPTION
1	10/27/2020	SMB	PLAN REVISIONS PER PLANNING BOARD COMMENTS.
2	11/09/2020	CPM	BULK TABLE REVISIONS PER PLANNING BOARD COMMENTS.
3	12/29/2020	SMB	PER PLANNING BOARD COMMENTS.
4	2/23/2021	CPM	PER PLANNING BOARD COMMENTS.

ANDREW B. FETHERSTON
NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 073555-1

AMENDED SITE PLANS
FOR
WARWICK COMMONS STAGE 5, LLC

TAX LOTS 218-1-91,92,93,94 & 96, 219-1-2.2

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

NEW WINDSOR OFFICE
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553

Phone: 845.564.4495
Fax: 845.567.1025

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	9/25/2020	SMB	JED

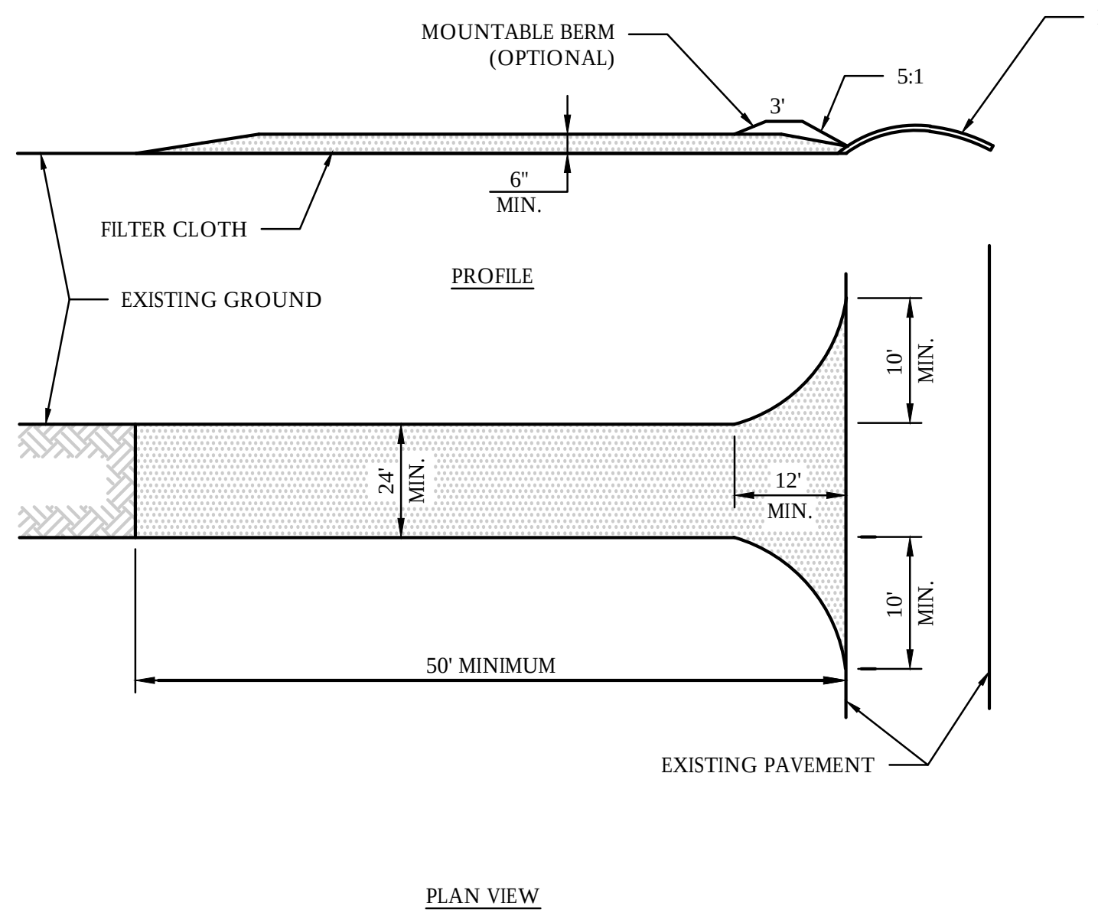
PROJECT NUMBER: 15002429D
DRAWING NAME: C-SESC

SHEET TITLE:
SOIL EROSION & SEDIMENT CONTROL PLAN

SHEET NUMBER:
12 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

2015\15002429D\Engineering\Site Plans\C-SESC.dwg\C-12-SOIL EROSION By: SBRADY

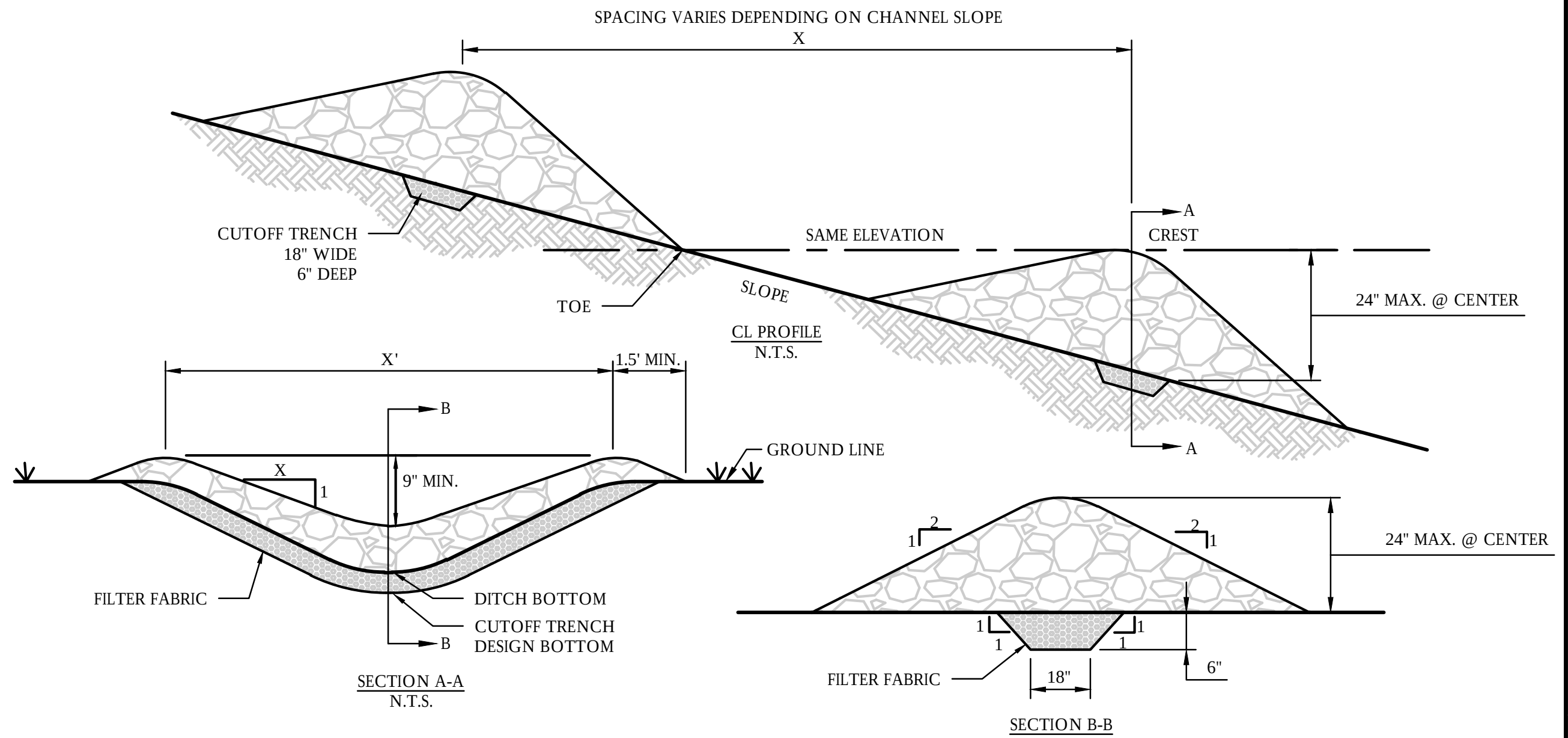


NOTES:

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT. LENGTH: NOT LESS THAN 50 FEET. THICKNESS: NOT LESS THAN (6) INCHES.
2. WIDTH - 24'
3. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
4. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTING BERM WITH 5:1 SLOPES WILL BE PERMITTED.
5. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
6. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED BY THE CONTRACTOR AS REQUIRED.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1000 07/01/19



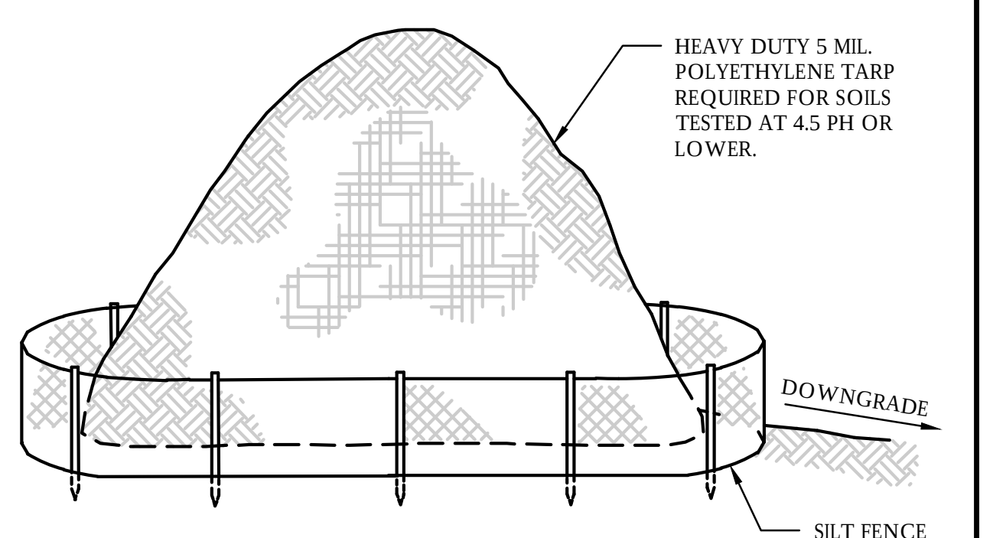
CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN ON THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA: 2 ACRES

STONE CHECK DAM DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2301 07/01/19

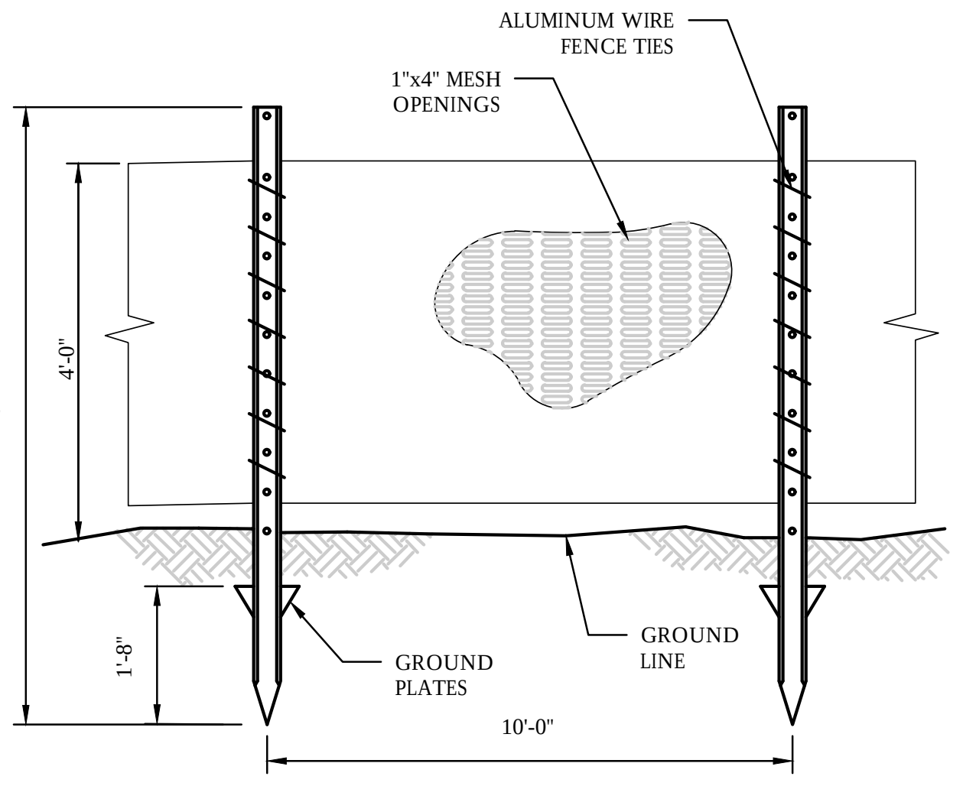


NOTES:

1. ALL STOCKPILES SHALL NOT TO BE LOCATED WITHIN 50 FEET OF A FLOODPLAIN, SLOPE, ROADWAY OR DRAINAGE FACILITY.

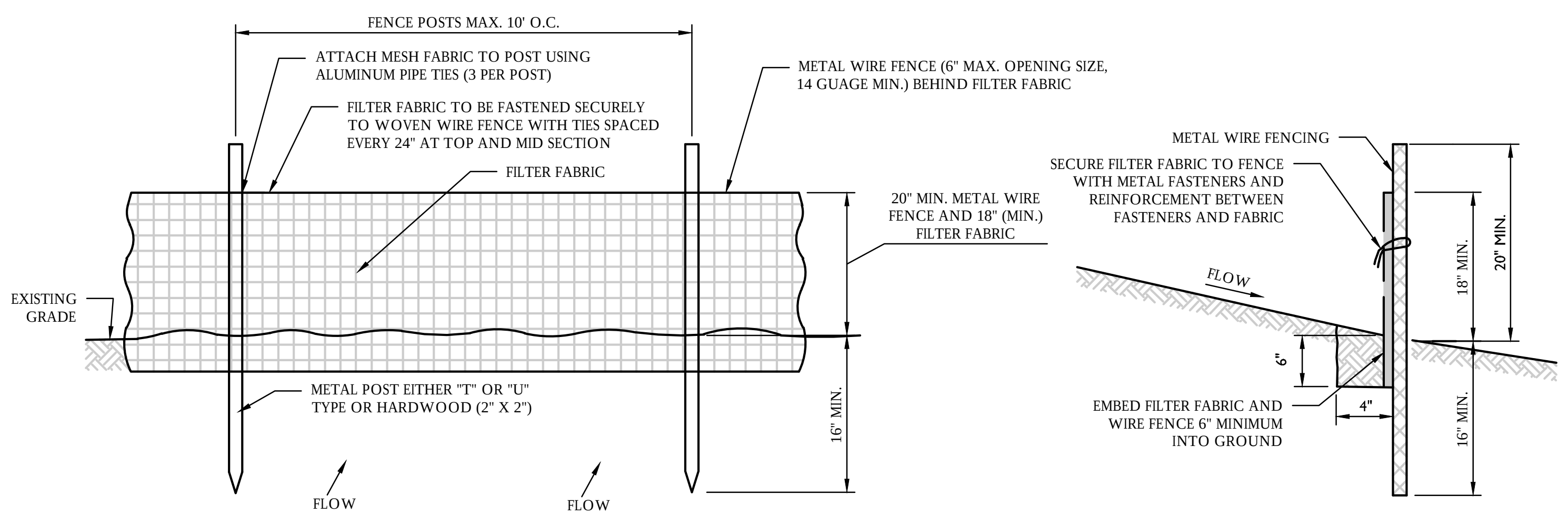
TOPSOIL STOCKPILE DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2500 07/01/19



ORANGE CONSTRUCTION FENCE DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1400 07/01/19

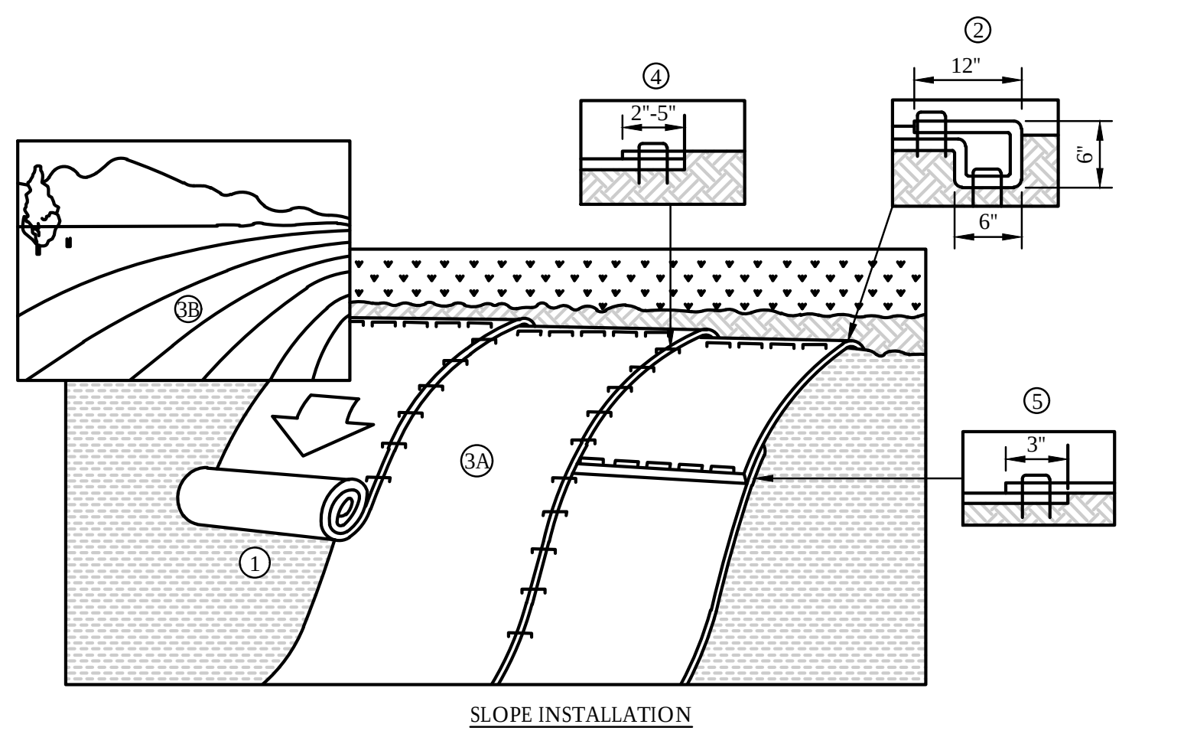


NOTES:

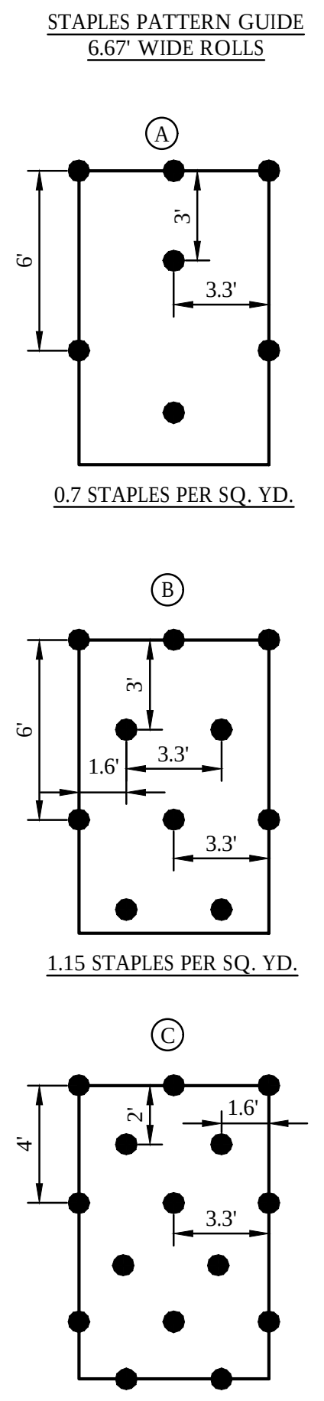
1. GEOTEXTILE TO BE FASTENED SECURELY TO FENCE POST BY USING WIRE TIES OR HOG RINGS. USE 3 FASTENERS PER POST.
2. SPLICING OF INDIVIDUAL ROLLS SHALL NOT OCCUR AT LOW POINTS.
3. ALL SILT FENCE TO BE INSPECTED AND REMEDIAL MAINTENANCE PERFORMED BY THE CONTRACTOR AS REQUIRED. MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
4. WHEN TWO SECTIONS OF FILTER FABRIC ARE JOINED, THEY SHALL BE OVER-WRAPPED BY SIX INCHES AND FOLDED.
5. FILTER FABRIC TO BE EITHER FILTER X, MIRAFI 100X, STABILINKA T14ON, OR APPROVED EQUIVALENT.
6. PREFABRICATED UNITS SHALL MEET THE MINIMUM REQUIREMENTS SHOWN.
7. IF SPACE PERMITTED, LOCATE SILT FENCE 10' AWAY FROM TOE OF SLOPE IF THE SLOPE IS STEEPER THAN 1:1.

REINFORCED SILT FENCE (WITH WIRE FENCE) DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1101 07/01/19



SLOPE INSTALLATION

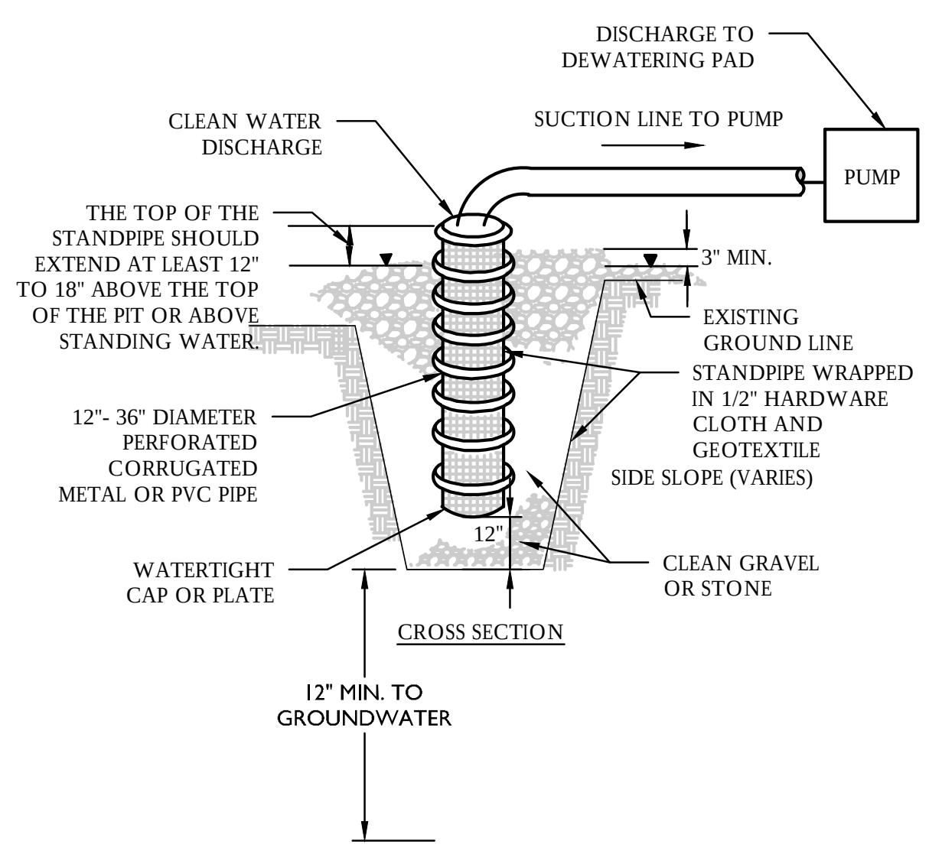


NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
   - * WHEN USING MATTING WITH SEED, DO NOT SEED THE AREA. FOLLOW MANUFACTURER'S RECOMMENDATIONS.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP'S IN A 6" DEEP x 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP'S EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE RECP'S.
3. ROLL THE RECP'S (A.) DOWN OR (B.) HORIZONTALLY STEP BY STEP ACROSS THE SLOPE TAMPERING IT DOWN ALONG THE WAY. RECP'S SHALL UNROLL WITH APPROPRIATE SIDE TIGHTLY AGAINST THE SOIL SURFACE. RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKESSHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP'S MUST BE STAKED WITH APPROXIMATELY 2" TO 5" OVERLAP DEPENDING ON RECP'S TYPE.
5. CONSECUTIVE RECP'S SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE RECP'S WIDTH.
   - * IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE RECP'S.

EROSION MATTING (CURLEX ENFORCER I) DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2200 07/01/19

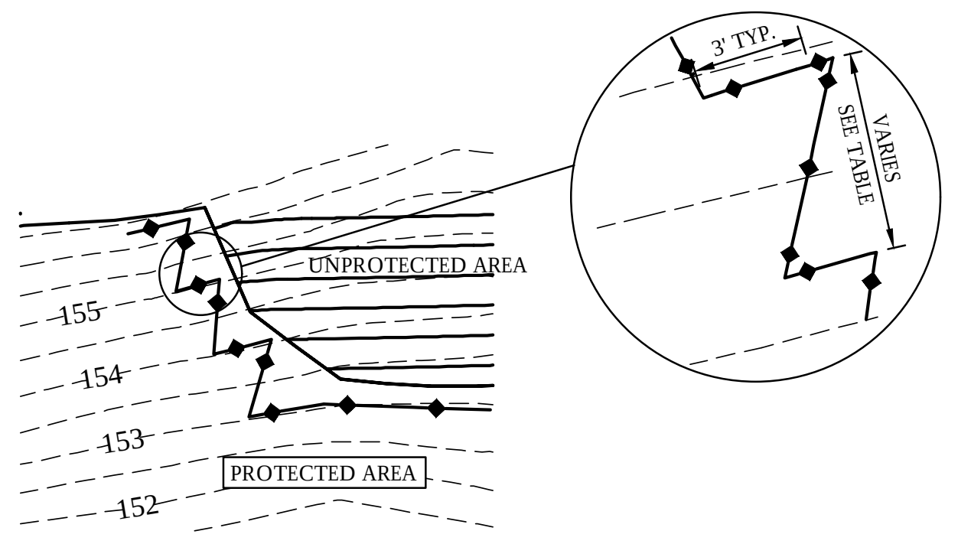


NOTES:

1. PIT DIMENSIONS ARE VARIABLE, WITH THE MINIMUM DIAMETER BEING 2 TIMES THE STANDPIPE DIAMETER.
2. THE STANDPIPE SHOULD BE CONSTRUCTED BY PERFORATING A 12" TO 24" DIAMETER DIAMETER CORRUGATED OR PVC PIPE. THEN WRAPPING WITH 1/2" HARDWARE CLOTH AND GEOTEXTILE FABRIC. THE PERFORATIONS SHALL BE 1/2" X 6" SLITS OR 1" DIAMETER HOLES.
3. A BASE OF FILTER MATERIAL CONSISTING OF CLEAN 2" STONE SHOULD BE PLACED IN THE PIT TO A DEPTH OF 12". AFTER INSTALLING THE STANDPIPE, THE PIT SURROUNDING THE STANDPIPE SHOULD THEN BE BACKFILLED WITH THE SAME FILTER MATERIAL.
4. THE STANDPIPE SHOULD EXTEND 12" TO 18" ABOVE THE LIP OF THE PIT OR THE RISER CREST ELEVATION (BASIN DEWATERING ONLY) AND THE FILTER MATERIAL SHOULD EXTEND 3" MINIMUM ABOVE THE ANTICIPATED STANDING WATER ELEVATION.

SUMP PIT DETAIL

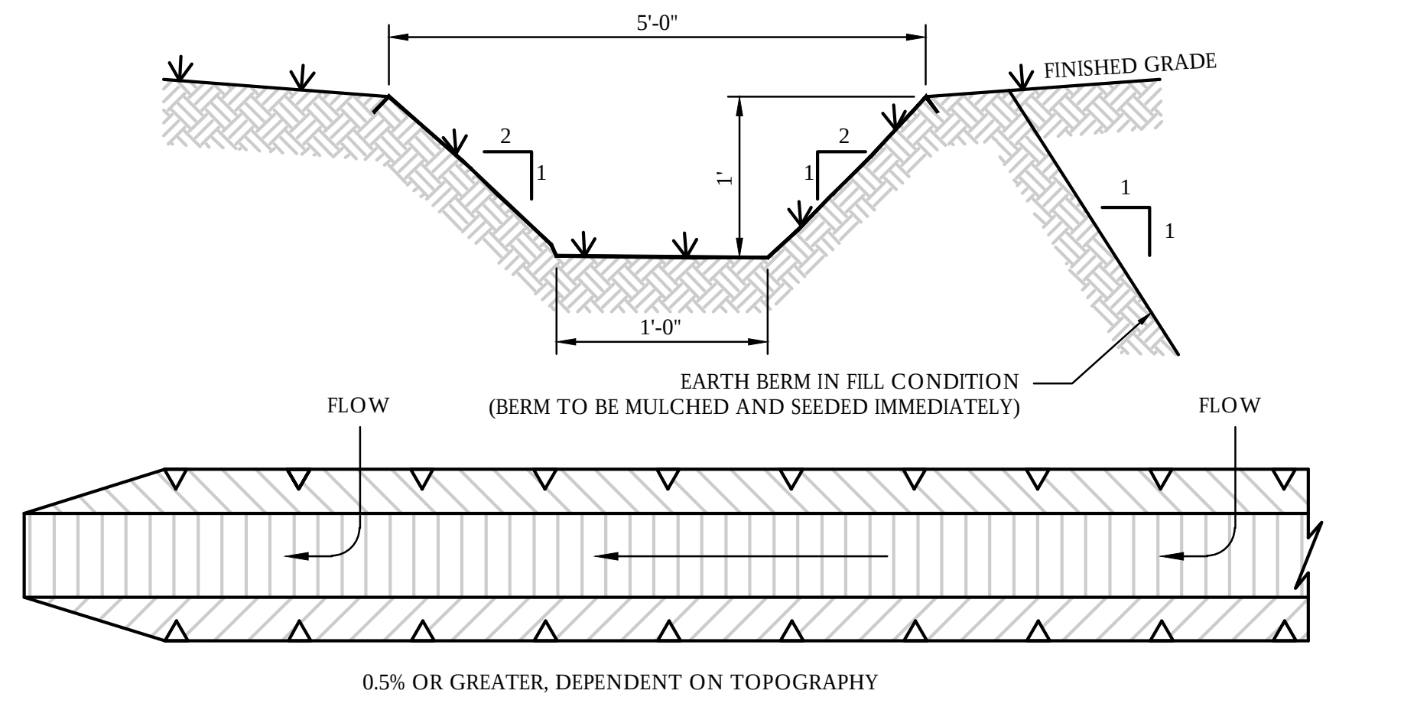
NOT TO SCALE MCNY-SOIL-EROS-1900 07/01/19



SLOPE	DISTANCE
1:2	15 FT
1:3	30 FT
1:4	50 FT
1:5	65 FT
FLATTER THAN 1:5	80 FT

SILT FENCE INSTALLATION DETAIL (WHEN NOT PARALLEL TO CONTOURS)

NOT TO SCALE MCNY-SOIL-EROS-1103 07/01/19



TO BE INSTALLED ABOVE DISTURBED AREAS, TO DIVERT RUNOFF OFF-SITE WITHOUT INCREASING EROSION; INTERMITTENTLY ACROSS DISTURBED AREAS, TO SHORTEN OVERLAND FLOW DISTANCES; BELOW DISTURBED AREAS, TO DIVERT SEDIMENT-LADEN WATER TO A SEDIMENT TRAPPING DEVICE; AND TO SAFELY TRANSPORT RUNOFF ALONG ROADWAYS.

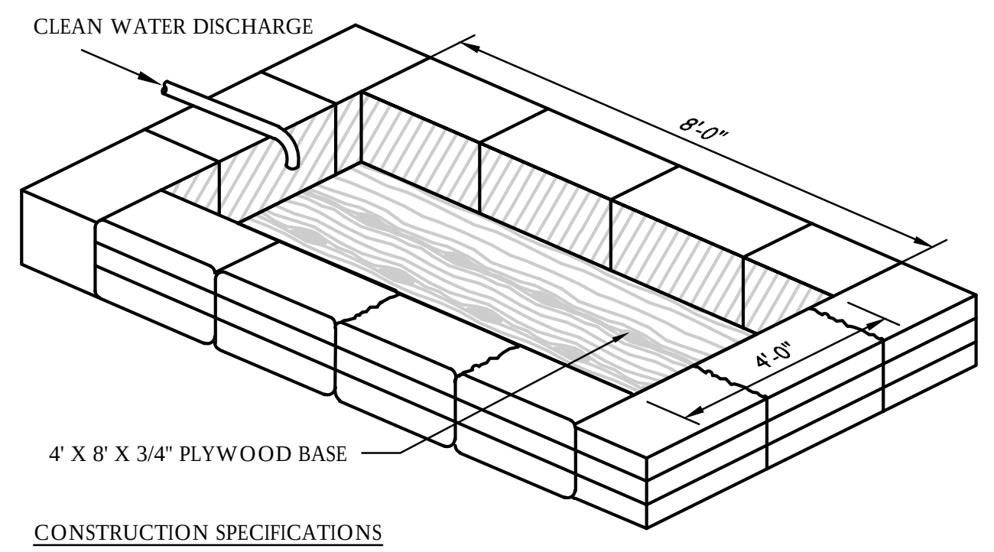
* WHERE SWALE TRAVERSES CONSTRUCTION VEHICLE PATH, DEPTH TO BE 6". SEE PLAN FOR LOCATION

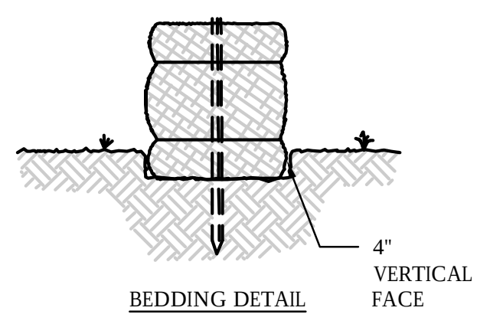
INSTALLATION NOTES:

1. ALL SWALES SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO AS NOT TO INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. INSPECTION AND MAINTENANCE MUST BE PROVIDED BY THE CONTRACTOR AS REQUIRED
9. STABILIZATION SHALL BE SEED AND STRAW MULCH.

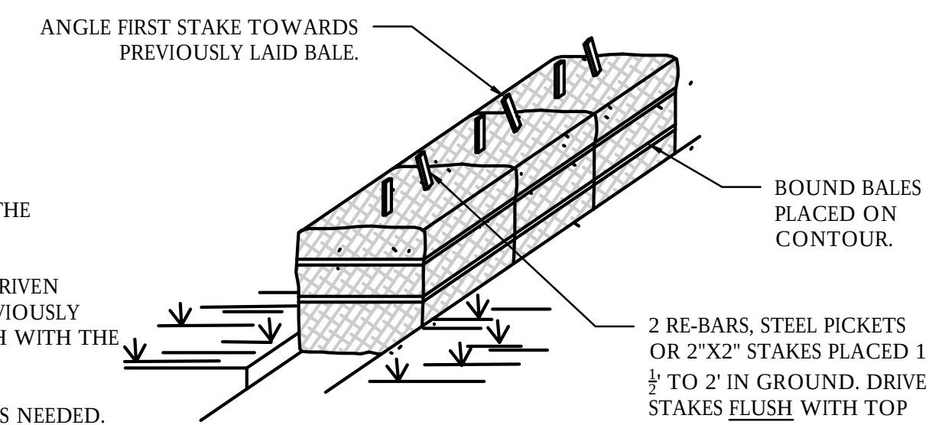
TEMPORARY SWALE & EARTH BERM DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2302 07/01/19





BEDDING DETAIL



ANCHORING DETAIL

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL..
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO (2) STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

DEWATERING PAD DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1801 07/01/19

GENERAL SEEDING NOTES

MCNY-SOIL-NOTE-1100 07/01/19

1. TEMPORARY SEEDING SHALL CONSIST OF PERENNIAL RYEGRASS APPLIED AT A RATE OF 1.0 LBS. PER 1000 SF OR SPRING OATS APPLIED AT A RATE OF 2.0 LBS. PER 1000 SF. TEMPORARY SEEDING SHALL BE MULCHED AND MAINTAINED UNTIL DISTURBED AREAS ARE PERMANENTLY STABILIZED WITH PERMANENT SEEDING.
2. PERMANENT SEEDING SHALL CONSIST OF THE FOLLOWING MIXTURE OR APPROVED EQUAL - OPTIMUM SEEDING DATES ARE BETWEEN APRIL 1 AND MAY 31: AND AUGUST 16 AND OCTOBER 15.

MIXTURE -	HARD FESCUE	120 LBS/ACRE
	PERENNIAL RYE GRASS	30 LBS/ACRE
	KENTUCKY BLUE GRASS (BLEND)	40 LBS/ACRE

3. PERMANENT SEEDING TO BE APPLIED BY RAKING OR DRILLING INTO THE SOILS AT A RATE OF 150# PER ACRE, SLOPED AREA TO BE COVERED WITH MULCH AS INDICATED IN NOTE 5.
4. FERTILIZER FOR THE ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER SHALL BE IN COMPLIANCE WITH THE LATEST NYSDEC REGULATIONS. A SOIL TEST PRIOR TO FERTILIZER APPLICATION IS RECOMMENDED.
5. IF SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY OR PERMANENT SEEDING, EXPOSED AREA TO BE STABILIZED WITH MULCH AS INDICATED IN NOTE 6.
6. MULCH TO CONSIST OF SMALL GRAIN STRAW OR SALT HAY ANCHORED WITH A WOOD AND FIBER MULCH BINDER OR AN APPROVED EQUAL. MULCH WILL BE SPREAD AT RATES OF 90 TO 115 LBS. PER 1000 SF AND ANCHORED WITH A MULCH ANCHORING TOOL OR LIQUID MULCH BINDER, AND SHALL BE PROVIDED ON ALL SEEDINGS. HYDROMULCH SHALL ONLY BE USED DURING OPTIMUM GROWING SEASONS.
7. WORK LIME AND FERTILIZER INTO SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM, FINE SEEDBED IS PREPARED. ALL BUT CLAY OR SILTY SOILS AND COARSE SANDS SHOULD BE ROLLED TO FIRM THE SEEDBED WHEREVER FEASIBLE.
8. REMOVE FROM THE SURFACE ALL STONES TWO INCHES OR LARGER IN ANY DIMENSION. REMOVE ALL OTHER DEBRIS, SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, LUMPS, OR OTHER UNSUITABLE MATERIAL.
9. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE RETILLED AND FIRMED AS ABOVE.

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State of N.Y. C.O.A: 0008671 / 0008821

REV	DATE	DRAWN BY	DESCRIPTION
1	10/27/2020	SMB	PLAN REVISIONS PER PLANNING BOARD COMMENTS.
2	11/09/2020	CPM	BULK TABLE REVISIONS PER PLANNING BOARD COMMENTS.
3	12/29/2020	SMB	PER PLANNING BOARD COMMENTS.
4	2/23/2021	CPM	PER PLANNING BOARD COMMENTS.

ANDREW B. FETHERSTON
NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 073555-1

AMENDED SITE PLANS

FOR

WARWICK
COMMONS STAGE 5,
LLC

TAX LOTS 218-1-91,92,93,94
& 96, 219-1-2.2

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

NEW WINDSOR OFFICE
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553

Phone: 845.564.4495
Fax: 845.567.1025

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	9/25/2020	SMB	JED
PROJECT NUMBER: 15002429D	DRAWING NAME: C-SESC		

SHEET TITLE:
SOIL EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
13 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

APPENDIX 17

DAM MODIFICATION MEMO

MASER
CONSULTING

Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12553-4749
T: 845.564.4495
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www.maserconsulting.com

MEMORANDUM

To: Chairman James Patterson

From: Andrew Fetherston, P.E.

Date: December 29, 2020
Revised January 6, 2021

Re: Warwick Meadows, Phase IV – Dam Modifications
Tax Lots 218-1-91, 92, 93, 94 & 96 and 219-1-2.2
Warwick, Orange County, New York
MC Project No. 15002429D

Introduction:

As stated in previous reports, the existing Warwick Meadows dam was originally intended to provide peak mitigation for the overall Warwick Commons development. Additionally, Warwick Meadows dam is a Class B NYSDEC regulated Dam. with outstanding violations. As part of the current site plan approval, the previous Engineer Vanderbeek, prepared a plan to raise the crest of the dam and provide additional spillway capacity for the dam.

As part of the amended site plans application, Maser has prepared a hydraulic model of two (2) dam modification scenarios, the previously approved Vanderbeek Dam improvements and a dam decommissioning alternative. The supporting documentation and figures below show, that in both dam modification scenarios, the peak flows for the overall development have been mitigated and the NYSDEC Violations have been addressed.

Existing Conditions:

As part of rebuilding the hydraulic model of the existing dam and watersheds, the previous reports were reviewed and incorporated into our model. In previous reports, a single 244-acre watershed with a curve number (CN) of 74 and a time of concentration (TC) of 73.9 minutes was used as the existing condition. To provide a comparison to previous reports, this singular watershed was routed to the existing dam with current rainfall depths and included in our analysis. This watershed will be referred to as “Existing total” In the tables below.

Additionally, a second existing condition scenario was analyzed. The watershed was split into two separate watersheds. The first watershed was the existing conditions of the project site only. This watershed had an area of 15.2 acres, a CN of 83 and a TC 17 minutes. The second watershed was the remaining 228.8 acres tributary to the dam. The second watershed utilized the same curve number and TC and the "Existing total" watershed. This analysis provides an accurate way to gauge the impacts of the proposed project site development. The two separate watersheds were combined and routed to the dam. These watersheds will be referred to as "Existing split" in the tables below

Project Site Development Impacts :

As noted above, the updated "Existing split" watershed analysis breaks out the project site from the overall tributary area to the dam. The table below shows that the proposed development will cause an increase in the curve number of the proposed watersheds, producing greater runoff then the existing conditions. This increase in runoff was originally intended to be mitigated at the dam as described in previously approved drainage reports.

Existing Conditions		
	Area	**CN**
WS E1	15.26	83
Total	15.26	83
Proposed Conditions		
	Total Area	**CN**
WS 1	0.55	88.00
WS 2	2.50	93.00
WS 3	1.10	85.00
WS 4	0.44	90.00
WS 5	0.75	91.00
WS 6	0.27	96.00
WS 7	1.02	88.00
WS 8	0.55	88.00
WS 9	0.59	94.00
WS 10	0.97	95.00
WS A	2.71	87.00
WS B	3.50	81.00
WS C	0.25	79.00
Totals	15.26	88.00

In addition to the proposed site improvements, stormwater mitigation practices have been proposed on site. In the September 2020 SWPPP submitted by our office, these stormwater practices were only analyses for their water quality and runoff reduction benefits. However, due to the high infiltration rates found during on-site soil testing, the stormwater mitigation practices also provide peak reduction benefits (see Appendix 15 of the September 2020 SWPPP for soil testing results). As shown in the chart below, the proposed stormwater mitigation practices provide peak detention below that of the undeveloped condition.

Design Point	Storm Events	Existing	Proposed	Diff.	Percent
DP 1	1	15.12	7.33	-7.79	-51.5%
	10	38.08	27.07	-11.01	-28.9%
	100	80.10	70.57	-9.53	-11.9%

In summation while the dam was originally intended to provide peak mitigation for the proposed development, this requirement has been met through the use of on-site stormwater mitigation practices. With this in mind, an analysis of the flows from the dam was still performed.

Proposed Conditions:

To provide a comparison to the existing split condition noted above, the proposed onsite watersheds were routed through their respective mitigation practices and combined with the remaining offsite area tributary to the dam (similar to the “Existing split”). As noted in the table above the flows from this watershed to the dam have already been reduced by the onsite mitigation practices. This watershed routing scenario will be referred to as “Proposed split” in the tables below.

The watersheds in the “Proposed split” scenario were routed to the existing dam as it is today, in addition to the two possible dam modification scenarios. A summary of each analysis scenario has been included in the table below.

Watershed	Structure	Storm Events	Peak flow	Peak Elevation
Existing - total	Existing dam	1	62.41	641.18
		10	213.29	642.16
		100	525.79	649.45
		150% 100	789.06	650.30
Existing split	Existing dam	1	61.07	641.17
		10	206.09	642.12
		100	506.46	649.37
		150% 100	758.36	650.21
Proposed split	Existing dam	1	59.75	641.16
		10	203.48	642.11
		100	504.39	649.37
		150% 100	756.25	650.20
Proposed split	Vanderbeek - Modification	1	59.75	641.16
		10	203.48	642.11
		100	489.42	647.74
		150% 100	753.89	650.22
Proposed split	Dam Decommission	1	60.03	634.33
		10	203.98	636.20
		100	501.61	641.11
		150% 100	754.79	642.60

As shown in the table, both dam modification scenarios provide reduction in the peak flows at the dam during the 1, 10 and 100 year flows. This reduction, along with the water quality and runoff reduction addressed in the previous SWPPP prepared by Maser, meet the requirements the stormwater pollution prevention plan for the proposed development.

Finally, the dam modifications were reviewed for compliance with New York State dam safety standards. The proposed Vanderbeek modification will raise the road provide adequate freeboard and spillway capacity. The proposed dam decommissioning will reduce the peak impoundment height and volumes below the thresholds to be considered a regulated dam by NYSDEC, Because it is no longer considered a dam, the NYSDEC Dam safety violations have been addressed.

ABF/cpm
cc: Leiby Katz
Nathan Ungar
Dave Everett

R:\Projects\2015\15002429D\Reports\Drainage\20 December\Report\210106 Warwick Commons Dam Memo .docx

WARWICK COMMONS, LLC

VILLAGE OF WARWICK, ORANGE COUNTY
NEW YORK

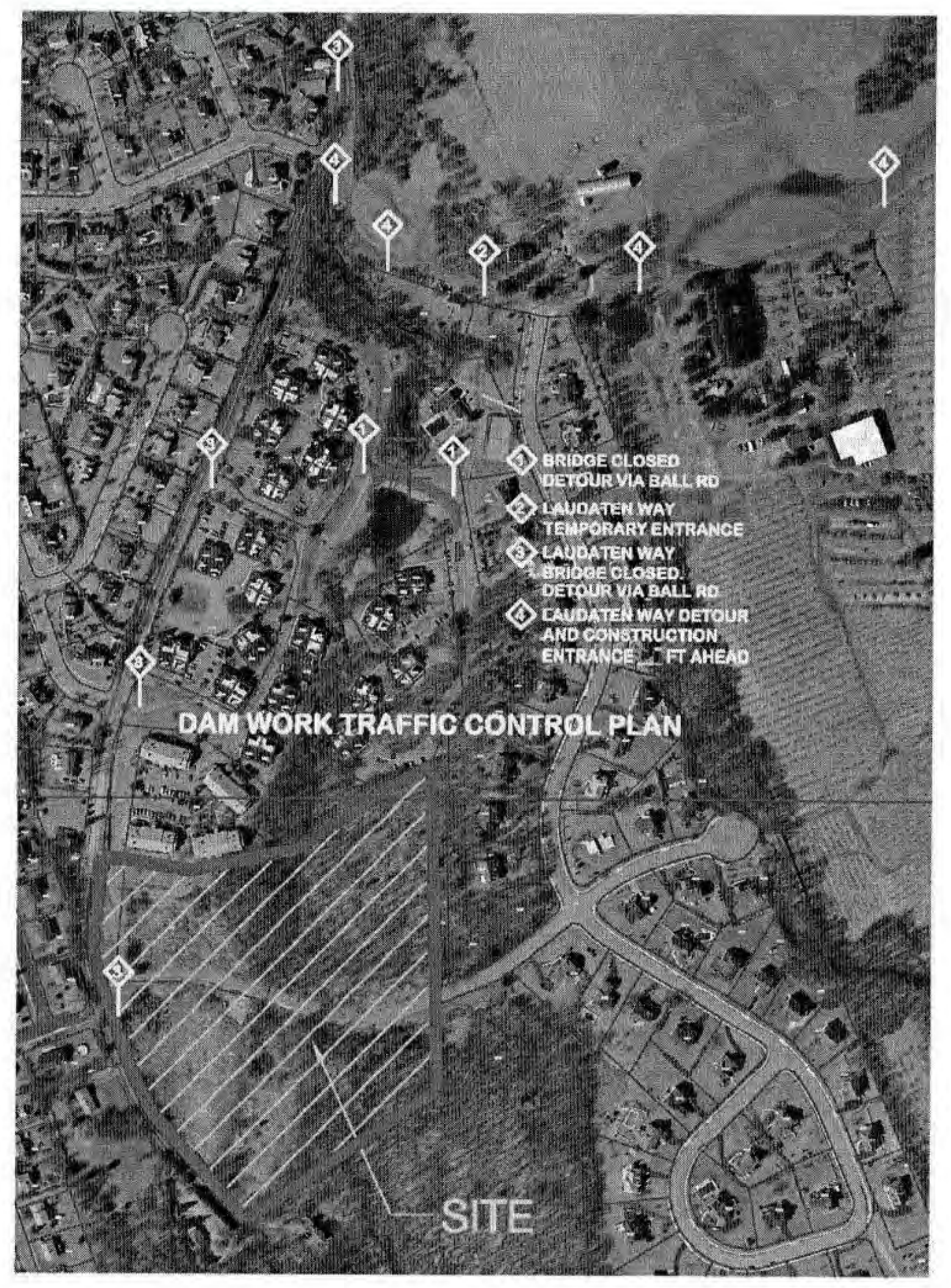
SCALE 1"=1000'

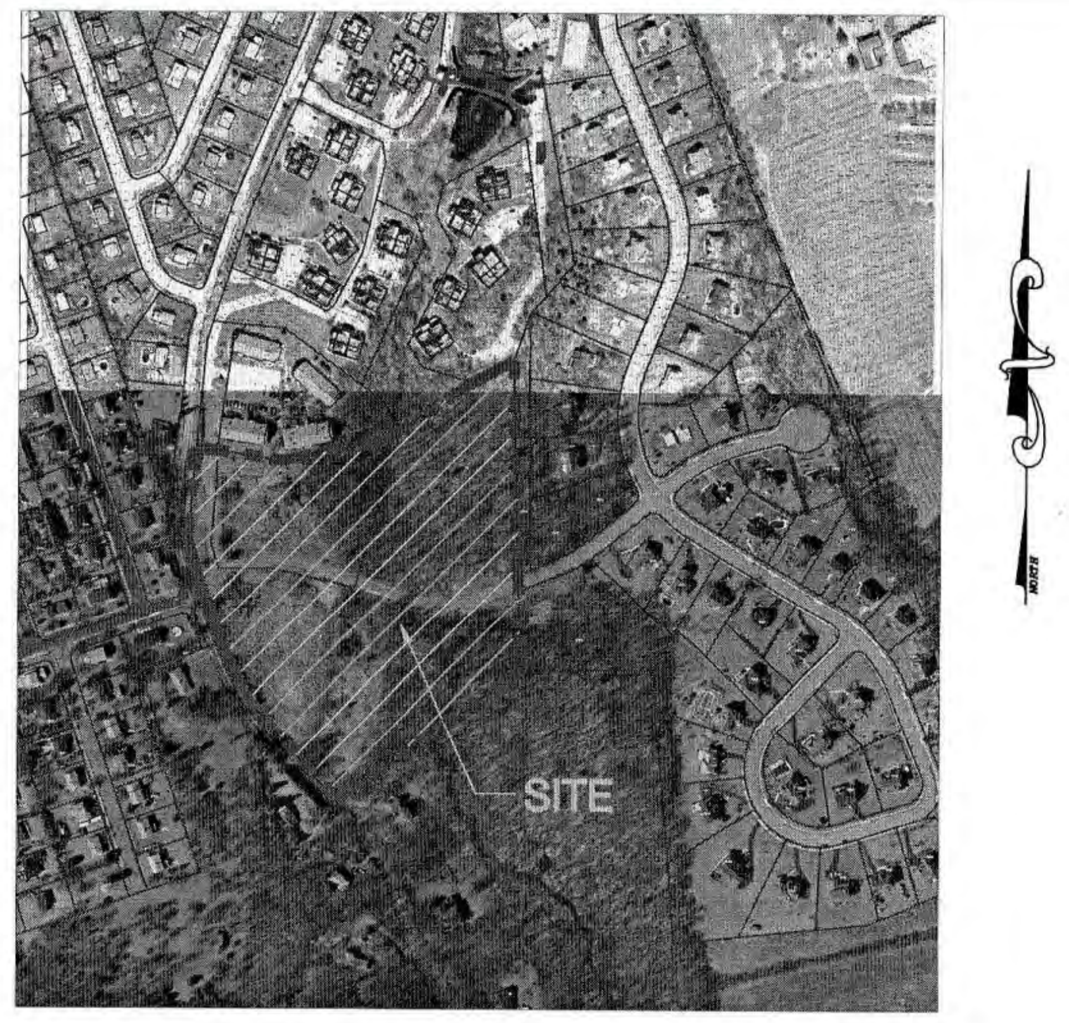
SEE APPROVED "WARWICK COMMONS" PLANSET FOR DETAILS
- EROSION CONTROL – SHEETS 8 & 9
- PAVING – SHEET 8 DETAIL 8, MEDIUM PAVEMENT
- MATTING – SHEET 8 DETAIL 5
- SEEDING – SHEET 6
- WATER MAIN DETAILS – SHEET 11

CONTRACTOR TO CALL FOR MARKOUT AND SITE MEETING W/VILLAGE ENGINEER & WATER DEPARTMENT BEFORE PROCEEDING. WATER SUPPLY TO REMAIN IN SERVICE TO THE EXTENT PRACTICABLE, AND NOT BE OUT OF SERVICE FOR MORE THAN 4 HOURS A DAY.

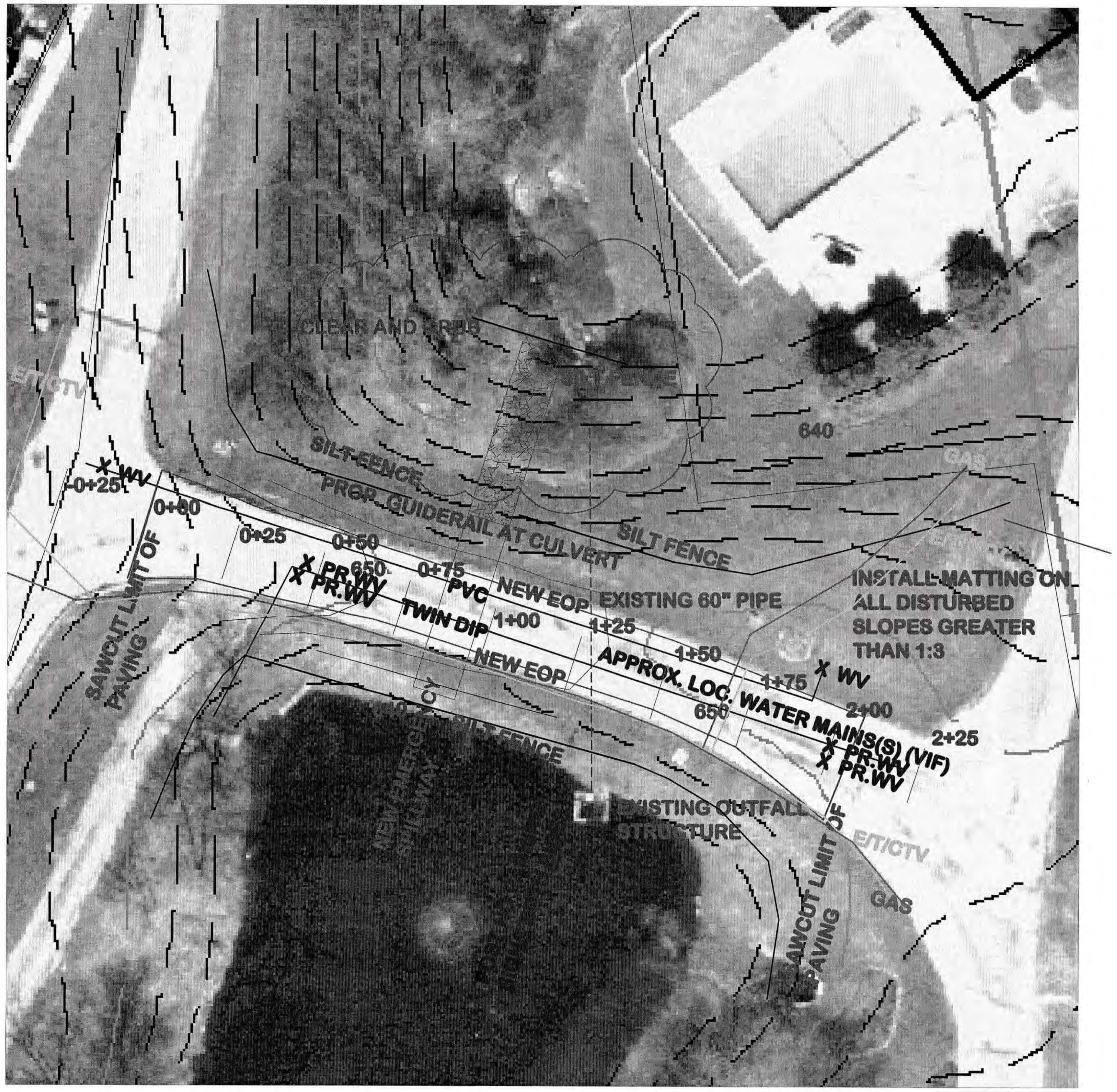
SCALE 1"=20'

IMPORTANT NOTE – THERE IS AN APPROVED SCHEDULE OF WORK AND TRAFFIC CONTROL PLAN. THE TRAFFIC CONTROL PLAN CALLS FOR AN ENTRANCE OFF BALL ROAD. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING CONCRETE HEADWALLS AT THE UPSTREAM AND DOWNSTREAM OF THE TWIN CULVERTS ON THE ACCESS ROAD, WIDENING THE ACCESS ROAD TO A MINIMUM OF 20 FT, AND PROTECTING THE CULVERTS FROM CONSTRUCTION TRAFFIC BY USE OF PLATES.

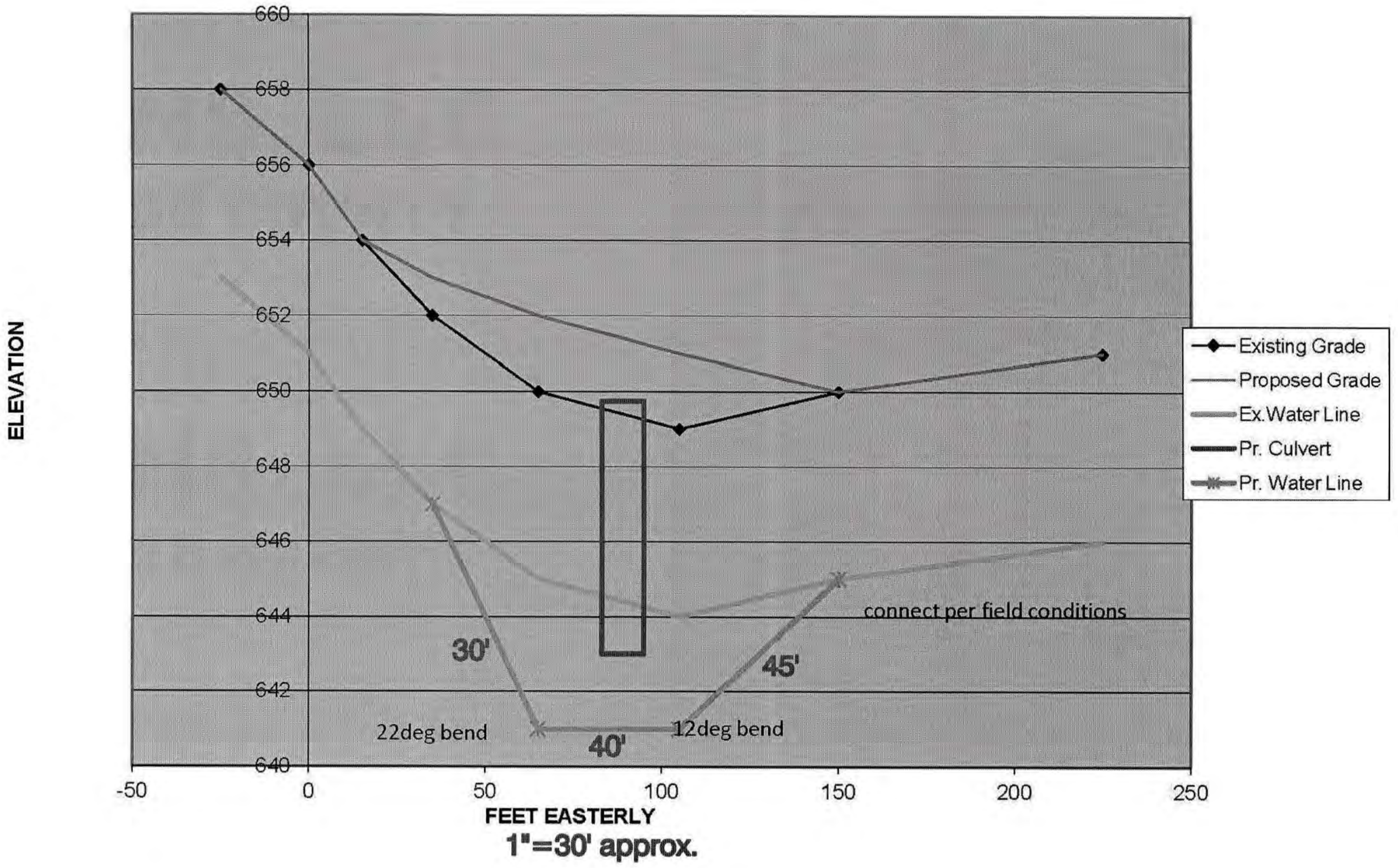




SCALE 1"=500'



PROFILE - ROAD OVER DAM
NTS



EXISTING CULVERT BELOW EL640

THOMAS B. VANDERBEEK
LICENSED PROFESSIONAL ENGINEER
061448-1
STATE OF NEW YORK

02/15/2012

26	03/19/2012 PER FINAL REVIEW COMMENTS	
25	02/15/2012 PER DAM REVIEW COMMENTS	10/11/11 per village comments
24	01/05/2012 PER REVIEW COMMENTS	
23	10/31/2011 PER REVIEW COMMENTS	
22	08/25/2011 PER REVIEW COMMENTS	
21	05/09/2011 PER PERMIT AND REVIEW COMMENTS	
20	04/01/2011 PER PERMIT AND REVIEW COMMENTS	

REVISION	DESCRIPTION
19 02/10/2011	PER DEC COMMENTS
18 11/1/2010	FOR DEC DAM PERMIT
17 6-1-2010	PER REVIEW MEETING
16 5-5-2010	PER PUBLIC COMMENTS

DESIGNED:	TBV	DRAWN:	TBV
CHECKED:	TBV	APPROVED:	TBV
DATE:	6/15/2007	SCALE:	AS SHOWN
VE JOB No.:	KBE-002	CLIENT JOB No.:	XXXX

OWNER: **WARWICK COMMONS, LLC**

PROJECT: **AMENDED SITE PLAN**

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

TITLE:

WARWICK MEADOWS
DAM IMPROVEMENTS

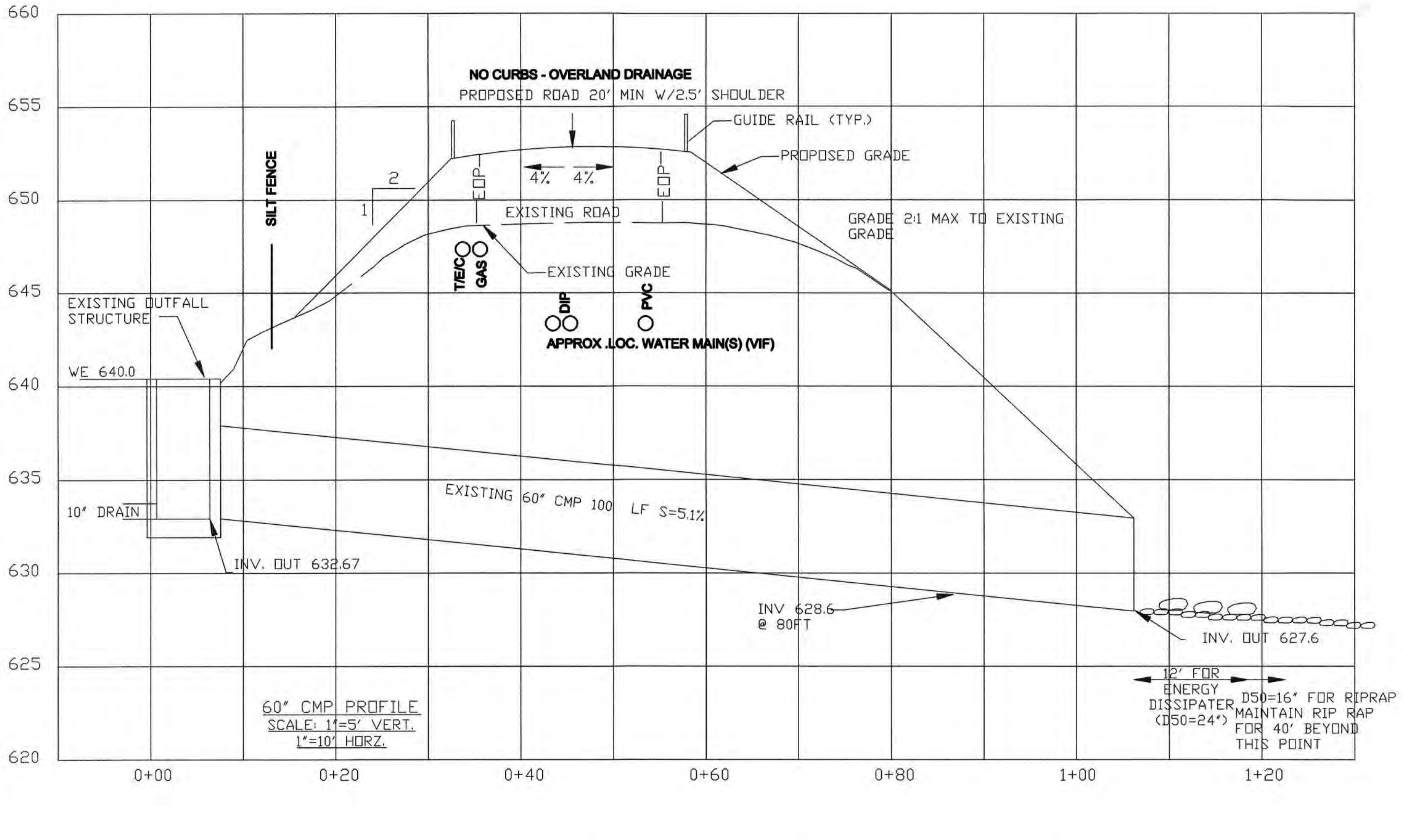
VANDERBEEK ENGINEERING P.C.
LAND PLANNING • MUNICIPAL SERVICES
P.O. Box 874, SUFFERN NY 10901
PHONE: 845-304-9667

03/19/2012

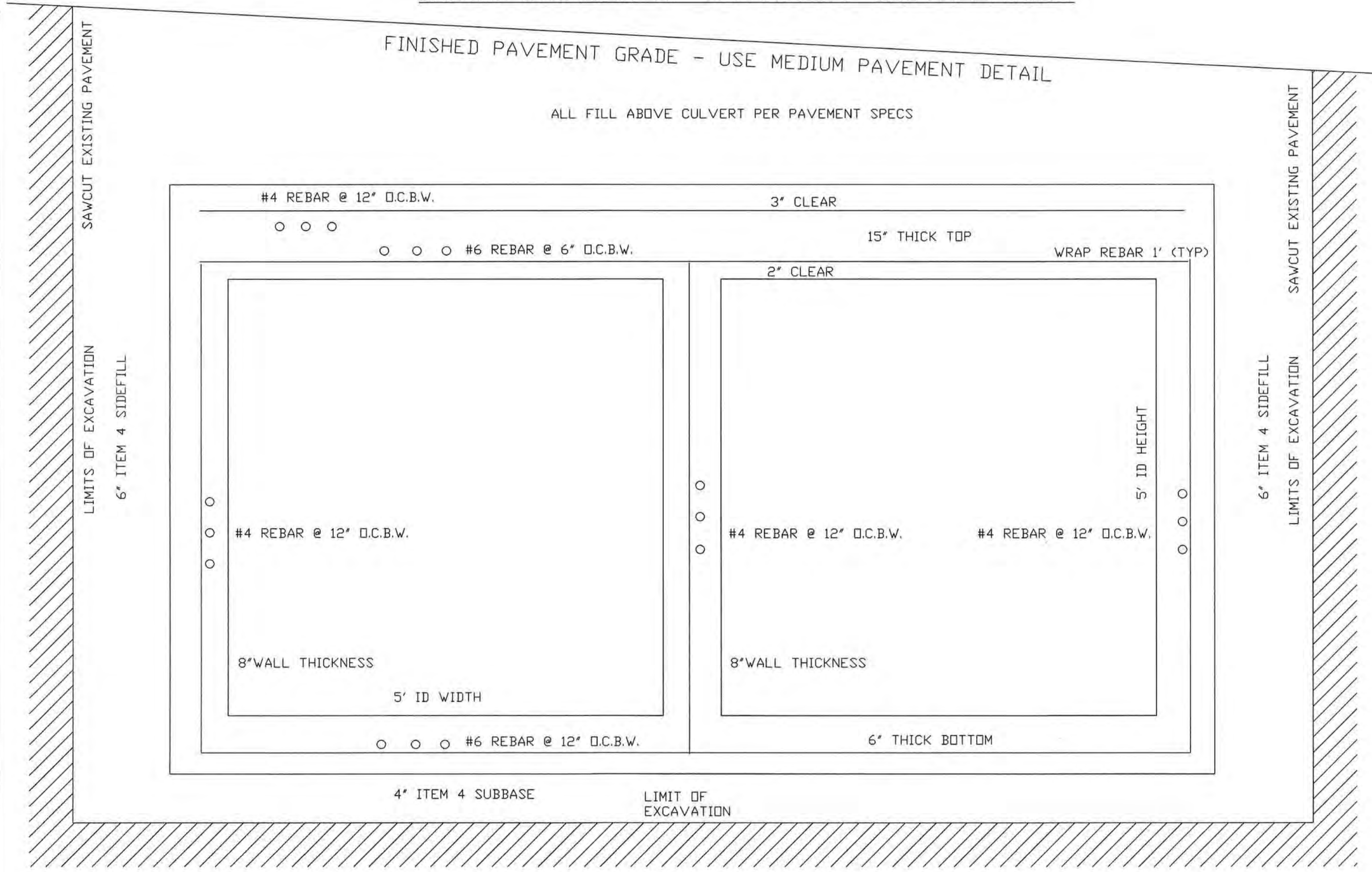
THOMAS B. VANDERBEEK, P.E. DATE:
NEW YORK PROFESSIONAL ENGINEER No. 061448

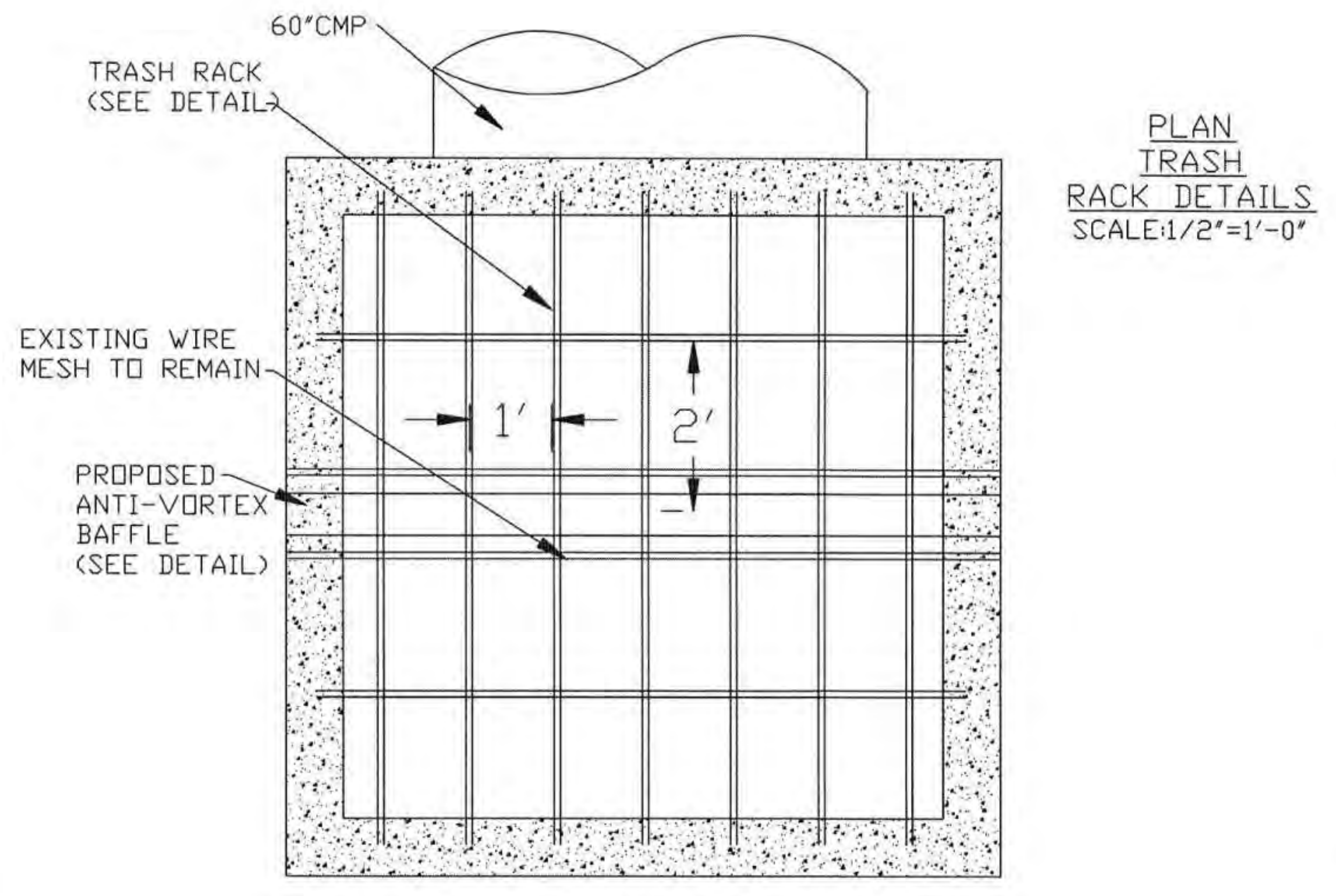
SHEET No. 1 OF 16

DWG: 1

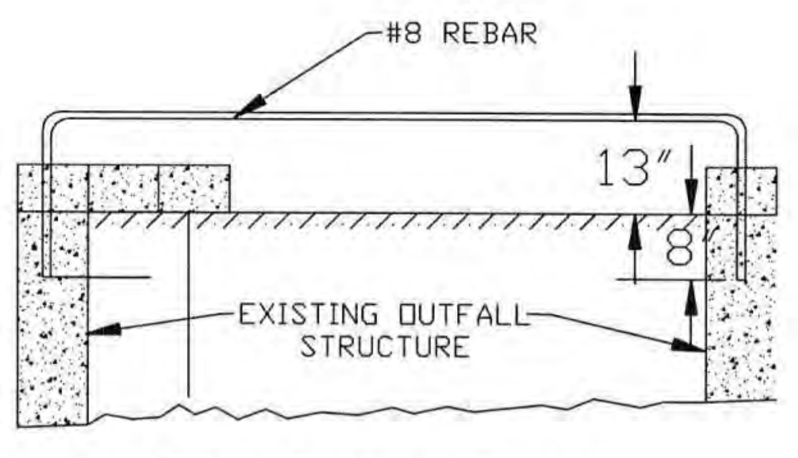


CROSS-SECTION OF OVERFLOW INSTALLATION

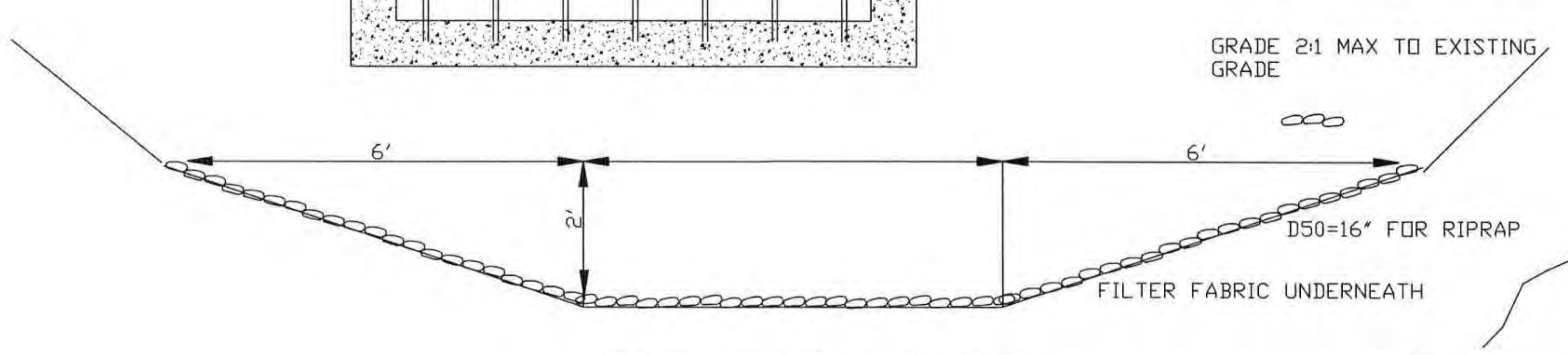




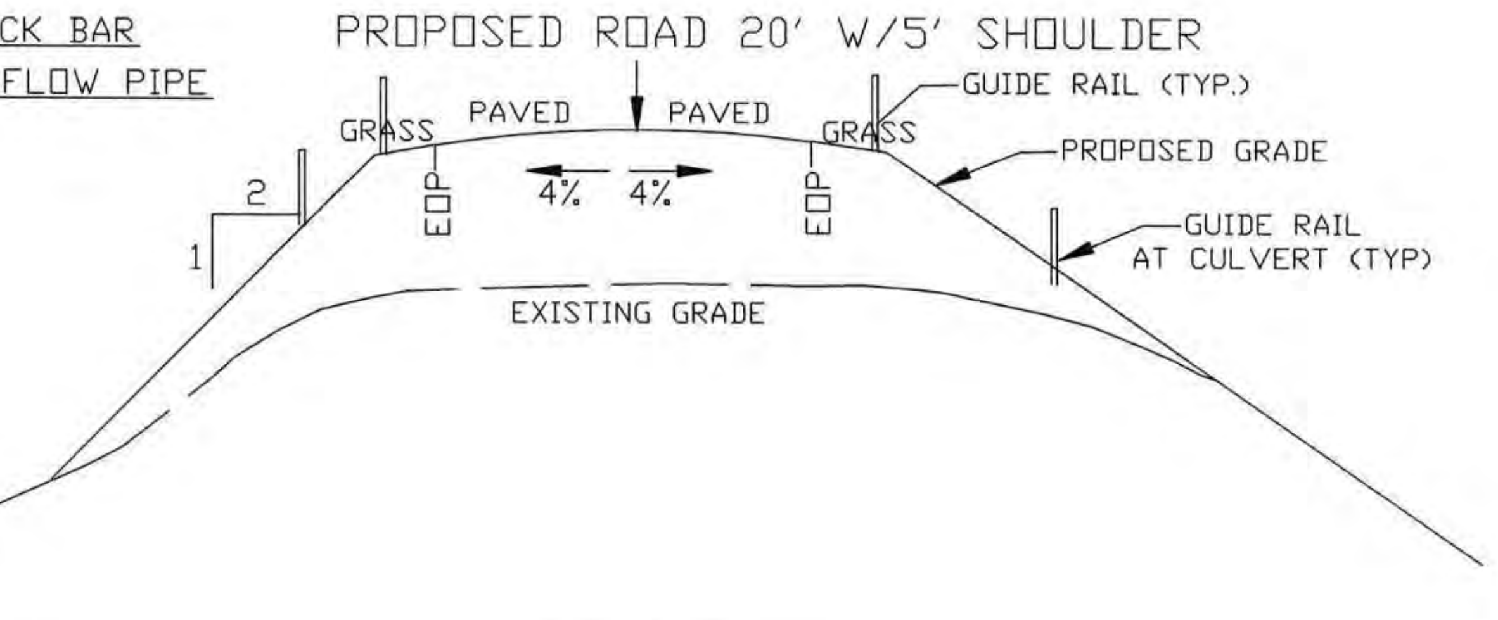
PLAN
TRASH RACK DETAILS
SCALE:1/2"=1'-0"

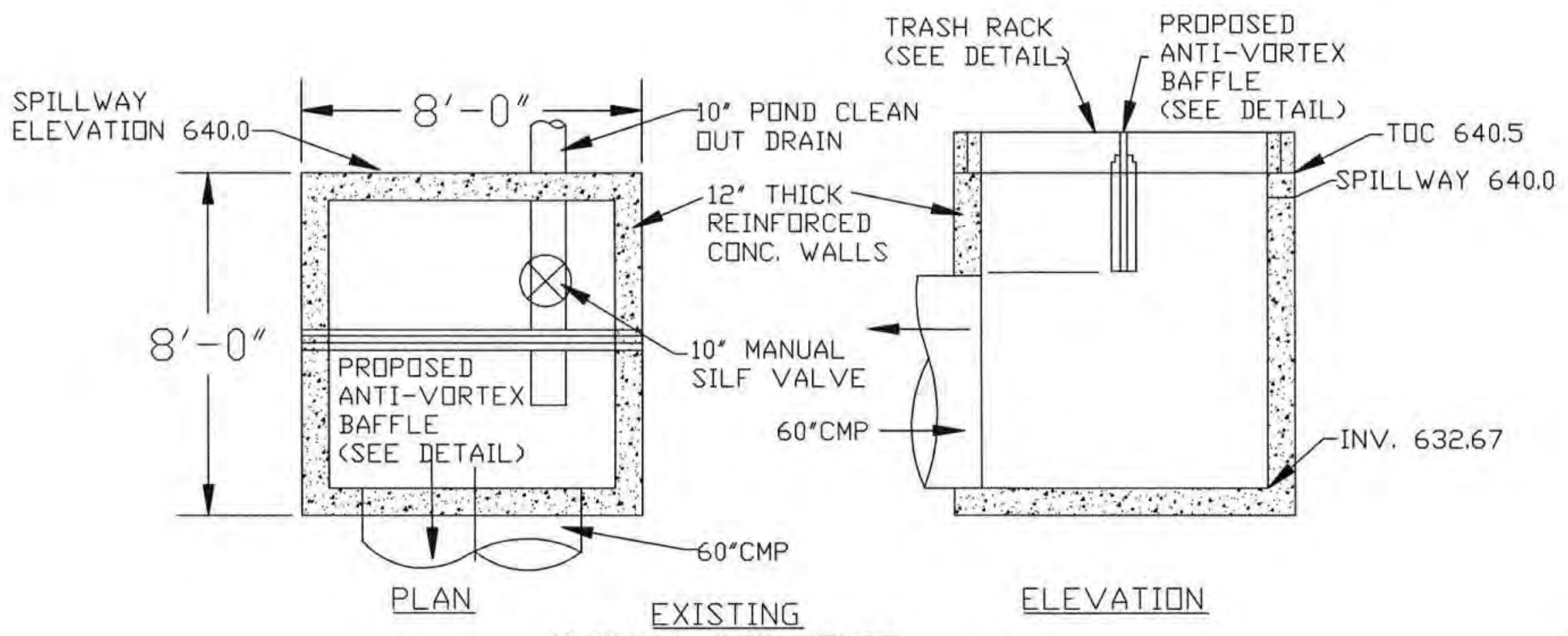


TYPICAL TRASH RACK BAR LOOKING TOWARDS OUTFALL PIPE

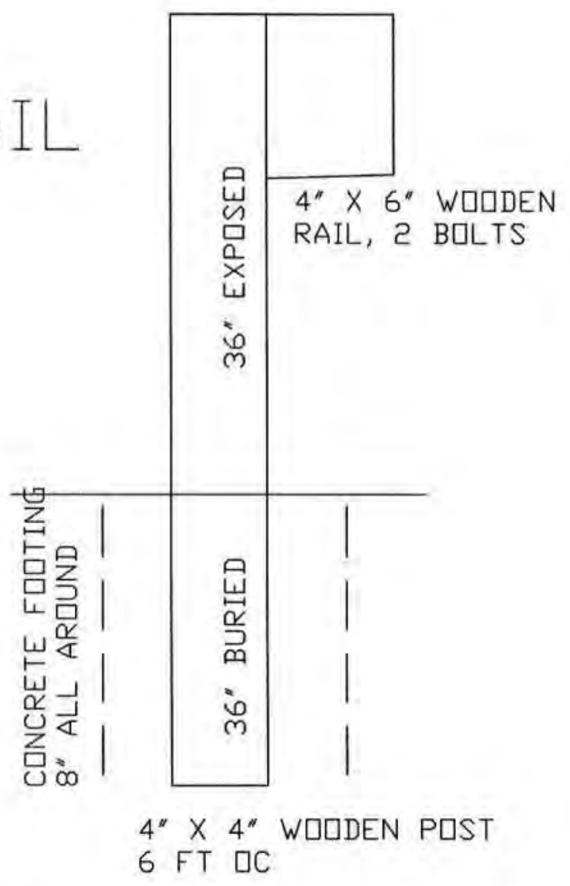


RIP-RAP LINED EMERGENCY SPILLWAY SWALE DETAIL

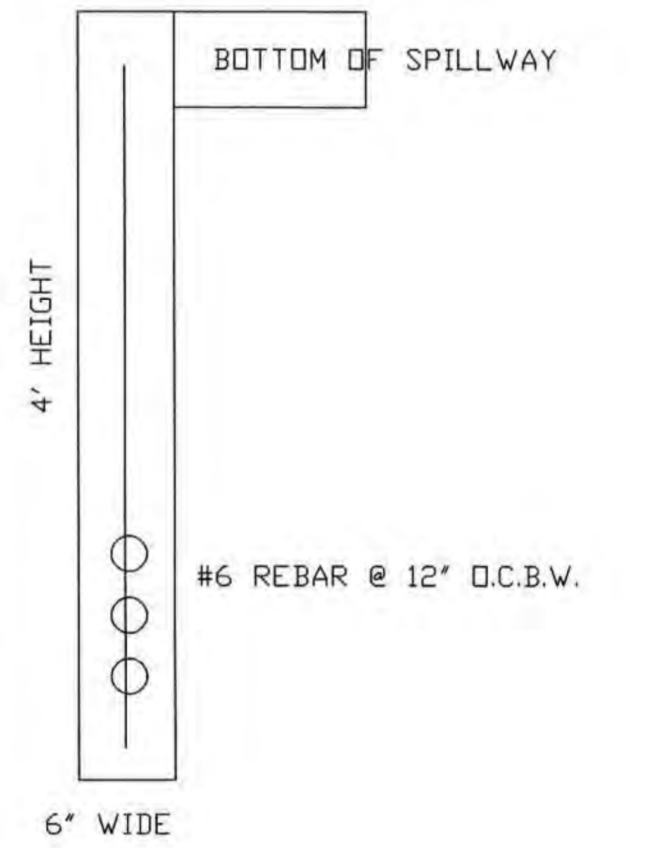




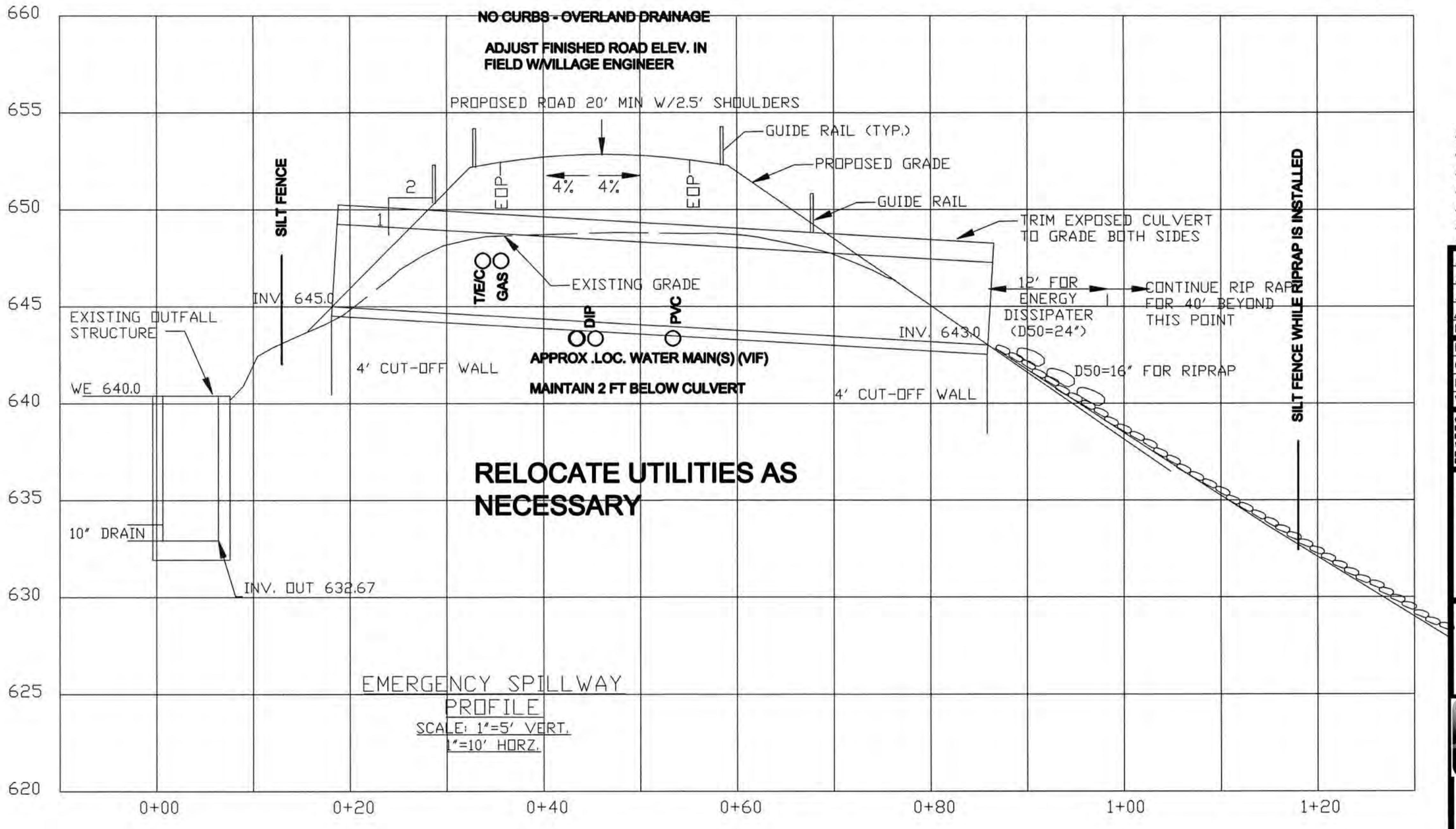
EXISTING OUTFALL STRUCTURE
SCALE:1/4"=1'-0"



GUIDERAIL DETAIL (NTS)



CUTOFF WALL DET (NTS)



061448-1
03/19/2012

10/11/11 per village comments

REVISION	DESCRIPTION
26 03/19/2012	PER FINAL REVIEW COMMENTS
25 02/15/2012	PER DAM REVIEW COMMENTS
24 01/05/2012	PER REVIEW COMMENTS
23 10/31/2011	PER REVIEW COMMENTS
22 08/25/2011	PER REVIEW COMMENTS
21 05/09/2011	PER PERMIT AND REVIEW COMMENTS
20 04/01/2011	PER PERMIT AND REVIEW COMMENTS
19 02/10/2011	PER DEC COMMENTS
18 11/1/2010	FOR DEC DAM PERMIT
17 6-1-2010	PER REVIEW MEETING
16 5-5-2010	PER PUBLIC COMMENTS

DESIGNED:	TBV	DRAWN:	TBV
CHECKED:	TBV	APPROVED:	TBV
DATE:	6/15/2007	SCALE:	AS SHOWN
VE JOB No.:	KBE-002	CLIENT JOB No.:	XXXX

OWNER: WARWICK COMMONS, LLC
PROJECT: AMENDED SITE PLAN

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

TITLE:
WARWICK MEADOWS
DAM IMPROVEMENTS

VANDERBEEK ENGINEERING P.C.
LAND PLANNING • MUNICIPAL SERVICES
P.O. Box 874, SUFFERN NY 10901
PHONE: 845-304-9667

03/19/2012
THOMAS B. VANDERBEEK, P.E. DATE:
NEW YORK PROFESSIONAL ENGINEER No. 061448

SHEET No. 2 OF 2
DWG: 2

Engineering Assessment Report
Warwick Meadows Farm Pond Dam
Village of Warwick, Orange County, NY Dam Id #180-4895

for
Warwick Commons, LLC
475 South Main Street
New City, NY 10956

October 2010 revised February 2011

In support of DEC Application ID#3-3354-00393-00003

Report written by

Vanderbeek Engineering, P.C.
233 Lafayette Avenue, Suite M-2
Suffern, NY 10901
845-357-9000
845-357-9005 fax

Thomas B. Vanderbeek, P.E.
NY License #61448

BUREAU OF
MAR - 1 2011
FLOOD PROTECTION
AND DAM SAFETY

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A - NYSDEC Inspection Correspondence
B - Revised Form D-1
C - Emergency Action Plan (EAP) Template
D - Inspection and Maintenance (I&M) Plan Template
E - Hydraflow Model Runs

UPDATED TECHNICAL SPECIFICATIONS
02210 and 02630

061445

INTRODUCTION

This report will serve as a revision to the original Engineering Reports dated 6-5-86, revised through 11-3-86, and re-issued on 6-3-1996 by the office of John Lehman, P.E., for the Warwick Meadows Farm Pond Dam.

On April 15, 1987, a permit was issued by the New York State Department of Environmental Conservation as Permit #3354-99-1 for the repair and upgrade of an existing dam located on Subtributary 20-1 of Wawayanda Creek. Although the work was started on this repair, it was never completed. The permit was reissued several times by the DEC, through 12/31/1998. However, recent correspondence indicated that the DEC is requiring a new permit application for completion of the dam.

The dam and farm pond is presently owned by the Warwick Meadows Homeowners Association, 2 Laudaten Way, Village of Warwick, New York 10990. They are the owners of the pond and dam area as well as the common lands of the existing condominiums in the immediate area.

Prior to the original developer (LTL) purchasing the property, this farm pond existed for many years with a single 24" RCP pipe as the outfall structure. LTL increased the height of the dam and changed the outfall pipe to a 60" CMP in 1984 or 1985 without a permit from the DEC. Since a permit was required for this work, an application was submitted in 1986 by LTL and approved in 1987 by the DEC.

This report will consist of five sections:

1. Existing conditions of the dam along with an update of the downstream conditions and the classification of the dam.

2. Drainage report to determine the 25 year and 100 year runoff using full development of the project and anticipated upstream buildout.

3. Hydraulic calculations for the outflow from the dam and its ability to pass the 25 year storm with the service spillway and 150% of the 100 year storm with the combined capacity of service and emergency spillways.

4. Required construction.

5. Supplemental reporting requirements, including responses to DEC questions.

EXISTING CONDITIONS AND DAM CLASSIFICATION

Existing Conditions of Dam

Since the permit was issued in 1987, the following work has been done on the dam:

1. The 60" CMP has been extended as called for, and is shown on the plans.

2. Additional fill has been placed on the upstream and downstream face of the dam. The top elevation has been brought up to el. 648 and a roadway constructed and paved over the top of the dam.

3. A trash rack has been installed in the drop inlet.

There is additional work which is required on the dam to bring it into conformance with NYDEC regulations. This will be covered in the last section of this report.

Dam Classification

In April 1986 detailed inspections were carried out on-site to determine the downstream conditions. These were done by both the original design engineer and the NYDEC Dam Safety Division. The basic findings of these 1986 inspections which classified the dam as Class B were still true in 1996 and continued to be true for 2010, based on current on-site inspections.

Homes continue to be located downstream of the dam; these are shown in Aerial #1. These houses are located on the west side of Brady Road. The first house has a first floor approximately 5 feet above the road. The stream is still on the east side of Brady Road at this point, and the house would not be impacted by a breech of the dam except for water which would sheet-flow down the Brady Road right-of-way. This could potentially occur as the culvert under Brady Road would not be adequate to handle 150% of the 100 year storm plus a dam breach. However, the level of water which would sheet flow down Brady Road would not reach this house. (See page 4 of the 1986

Engineering Report for further discussion.)

The second house is also shown in Aerial #1. This house is also located on the west side of Brady Road; however the stream has now crossed Brady Road and flows in the back yard of this home. The first floor of this house is set approximately four feet above the top of the streambed. Again due to the inability of both the Ball Road culvert and the 8 foot by 3 foot box culvert on Brady Road to pass 150% of the 100 year storm plus the additional flow from the Maskers Orchard property (drainage area over 300 acres), the excess water from a dam breach would flow down Brady Road and outside the stream banks. It is highly unlikely that this house would be flooded; if any water were to reach this house, it would pool in the basement.

Aerial #1 also shows an additional old home located between the two homes discussed above. As previously stated in the 1986 Engineering Report, this home would have its basement flooded.

As demonstrated by the above information, the Warwick Meadows Farm Pond Dam should remain as a Class B structure since no changes have occurred downstream since the 1986 report requiring dam re-classification.

The DEC inspection in June 2009 confirmed that the dam as it exists now is in relatively good shape (letter attached). It should be noted that said inspection does not substitute for an engineering investigation and report.

DRAINAGE CALCULATIONS FOR WATER SHED:

This section is taken from the 1996 Engineering Report. The existing conditions have not changed and as such the calculations remain valid. *Revised calculations based on updated rainfall numbers are described in subsequent sections.*

> "The drainage calculation for the 244 acres which are tributary to the dam have been analyzed using TR-55 methodology. There are five distinct areas which make up the drainage area and are shown on the overlay of the drainage area in Appendix B
>
> "These areas were previously analyzed using TR-55 with a Type II storm in the 1986 Engineering Report. At that time there'were to be 309·single family and multi-resident homes in the Warwick Meadows Development. Due to change in zoning from 15,000 square

feet to 20,000 square feet per lot, the number of single family homes has been reduced by 25. The total number of units for the development will be a maximum of 284. In addition, the area above Warwick Meadows in the Town of Warwick has been rezoned from 2 acre lots to 3 and 4 acre lots in the Mountain Residential and Conservation Districts. A copy of the relevant section of the Town of Warwick Zoning Map is included in Appendix B.

"As a result of these changes in the zoning, the CN value for the drainage area was reduced from a CN of 75 in the 1986 report to a CN of 74 at the present time. TR-55 calculations were run for the 25 and 100 year storms using a Type III storm. The computer runs are included in Appendix B. and summarized below:

? "OLD REPORT"

Storm Event	CN	Tc	Peak Q
25	74	1.23 hr	272 cfs
100	74	1.23 hr	407 cfs

The DEC review letter of 20 September 2010 made reference to reducing the sheet flow lengths. In that regard, reducing the length of 300 ft in the original analysis to 150 ft has very little effect on the Times-of-Concentration, as this is a large (244 acre) watershed. *This is further analyzed in the following section with new computer simulations.*

The DEC review letter of 20 September 2010 made reference to the rainfall used. In that regard, the 24-hr runoff used was 2.7 inches and 6.0 inches for the 25 and 100 year return periods, respectively. The highest rainfall values for the 24-hr storms are 6.1 and 8.4 inches for the 25 and 100 year return periods, respectively; these are from NRCC. *These higher numbers were used in the new calculations.*

FLOOD ROUTING THROUGH FARM POND

This section reviews the previous work and then presents updates based on current conditions.

1996 Engineering Report

This section is taken from the 1996 Engineering Report. The existing conditions have not changed and as such the calculations remain valid, *with the exception of the revised rainfall numbers.*.

> "The basin elevation, discharge and storage information was calculated. The discharge from the farm pond is broken down into the Service Spillway and the Emergency Spillway.
>
> "The Service Spillway is a drop box with a lip elevation of 640 which discharges through a 60" CMP. The flow into the drop box was calculated using a standard sharp crested weir formula with a coefficient of 3.2:
>
> "Q (cfs) = Height^1.5 X Length X Coefficient
>
> "However the capacity of the 60" CMP to handle the discharge is the limiting factor after elevation 643. The capacity of the pipe is based on an inlet controlled structure using Figure 4-18 of the Handbook of Steel Drainage & Highway Construction Projects for corrugated steel pipe culverts. The printout of the Service Spillway depth versus discharge is given in Appendix C.
>
> "The 25 year Type III storm was then flood routed through the farm pond. The 25 year storm will have a maximum discharge of 261 cfs at elevation 643.22 feet. The invert of the Emergency Spillway will therefore be set at 643.50 so that the Service Spillway handles the 25 year storm. The flood routing calculations for the 25 year storm are included in Appendix C.
>
> "*Emergency Spillway*
>
> now 645.0
>
> "The inflow hydrograph was taken from the 100 year storm computed in the prior section of this report. The table which gives 150% of the 100 year storm is included in Appendix D.
>
> "The capacity of the Emergency Spillway was calculated as a broad crested weir with a coefficient of 2.64. The weir table in Appendix D shows the calculations of the Emergency Spillway with an invert elevation of 643.5. This table also shows the combined capacity of the Service Spillway and the Emergency Spillway from elevation 640 to 649 . This is the discharge curve for the flood routing calculations.
>
> "One hundred fifty percent (150%) of the 100 year Type III Storm was then routed through the farm pond. The maximum water level through the Service Spillway and the 12 foot wide Emergency Spillway is 647.63 feet which requires. a 12 foot wide by 4.13 high box culvert.

It is proposed to use one 12 foot wide or two 6 foot wide box culverts each 4.25 feet clear inside height. The top of the dam which is also the top of the road will be established at 649.0 which will allow for a depth of 15 inches for the top section of the box culvert and the pavement combined. The calculations for the flood routing are included in Appendix D.

Road 647.5

2010 Conditions and Analyses

The drainage basin, pond, and structure information were input into a computer modeling program, Hydraflow Hydrographs 2007. Output is presented in Appendix E.

The rainfall used was the NRCC values for the 24-hr storms of 6.1 and 8.4 inches for the 25 and 100 year return periods, respectively. To emulate 150% of the 100 yr flow, a rainfall value of 11.4 inches was used. The following presents a comparison of the runoff values into the pond:

Return Period (yr)	*Rainfall (inches)*	*Runoff (mcf/inches)*	*Peak Flow (cfs)*	*1996 Peak Flow (cfs)*
25	*6.1*	*2.9mcf/3.3"*	*338*	*272*
100	*8.4*	*4.7mcf/5.3"*	*548*	*407*
*150% of 100**	*11.4*	*7.2mcf/8.1"*	*829*	*610*

** Labeled in model runs as 50-yr storm*

The elevation of the 25-yr storm as routed through the overflow structure and pipe was 643.0. Therefore, the auxiliary structure was set an an elevation of 645.0.

Model runs for the 150% condition had a maximum elevation of 649.44, just below a full culvert at el 650.

The 2 February 2011 review letter from DEC inquired as to the effect on reduced Times of concentrations on the modeling results. A test run was done reducing the Tc from 74 minutes to 60 minutes as an extreme case. Although the peak flows increased (as expected), there was minimal effect on the results of pond operations, and no adjustments were necessary in the control structures.

REQUIRED WORK TO COMPLETE DAM:

The following work is required to complete the dam:

1. Install Emergency Spillway and outfall swale leading back to stream.

2. Install anti-vortex baffle

3. Install rip-rap and energy dissipation at outlet of Service Spillway

4. Regrade top of dam to elevation 652.5. (present top of dam 648 +/-)

The Applicant would like to commence work April 18, 2011.

The following additional work was referenced in the prior Engineering Report, was not completed by the prior developer, and based upon engineering observation is not required.

a. Toe drains were to be installed. At the present time there is no seepage at the base of the dam. Toe drains are therefore unnecessary.

b. The stream channel was to be straightened at the outfall of the Service Spillway. Since there is no visible evidence of erosion in the stream at the outfall, the present configuration is working satisfactorily. With the addition of rip-rap and energy dissipation at the downstream of the spillway, stream re-alignment is not necessary. If the stream were to be realigned, it would come close to the existing swimming pool and deck area constructed by the Homeowners Association.

SUPPLEMENTAL REGULATORY REQUIREMENTS

With regards to the NYSDEC review letter dated 20 September 2010:

Comment 1 - Form D-1 has been revised (attached)

Comment 2 has 5 items:

2.a Provide a schedule of construction inspection. The construction is expected to take four weeks, with a proposed start date of Monday, 18th April 2011. Details are as follows:

Pre-Construction

Notify residents, Town, and Village of proposed construction schedule 2 weeks prior to start. The road over the dam will be closed for approximately 2 to 3 weeks. The emergency entrance off Ball Road will be the primary access for certain residents, as well as being the primary vehicular access for the clubhouse.

Construction inspection will be on a continuous basis by a qualified inspector acting under the direction of a licensed professional engineer.

Start - Week 1

Place construction and detour signs along Ball and Brady Roads.
Excavate and pour cut-off walls for overflow culvert (dam road remains open).

Week 2

Close dam road, divert traffic to Ball Road entrance. Excavate and install culvert. Affected residents are 98 Laudaten Way and higher.
Pedestrians will not be permitted to cross the dam while the road is closed. A temporary walking bridge will be placed across the stream above the pond so residents can walk around the pond to the clubhouse.

Week 3

Finish dam road grading and repave.

Week 4

Reopen dam road, finish spillway riprap and grading.

2.b Provide a current assessment of downstream hazards - provided herein, Page 3, Dam Classification.

2.c Provide a current assessment of hydrology and hydraulics.

As discussed herein, there have been little changes in the watershed due to the zoning. The proposal to construct the last Phase of Warwick Commons includes finalizing the dam remediation, and this proposal was included in the original analyses.

Sheet flow lengths and rainfall used have been discussed previously herein (Page 5).

2.d Provide an assessment of the outlet works.

Provided herein. With respect to the condition of the service spillway and operability of the low level outlet (Guidelines 7.0), recent inspections have shown that they are in good condition.

(7.1) Can the low level outlet drain 90% of the volume below the service spillway crest in 14 days? *Yes. The volume below the service spillway crest is 1.3 acre-feet at a depth of 8 ft. The outlet control is a valved 10" pipe; the rating curve is presented in the I&M report. Using an average depth of 4 ft results in 5 cfs average, or 189 minutes to drain.*

(6.5.6) Can the service spillway drain 75% of the volume between the service spillway and the auxiliary spillway in 7 days? *Yes. The volume is 1.8 acre feet. The rating curve is presented in the I&M report, with a flow of 217 cfs at an average stage of elevation 642. Therefore, the time to drain the entire volume is 6 minutes.*

(6.5.5) Can the service/auxiliary spillway drain the volume between maximum high water and the auxiliary spillway in 12 hrs?. *Yes. The volume is 2.4 acre feet. The rating curve is* *presented in the I&M report, with a flow of 570 cfs at an average stage of elevation 647. Therefore, the time to drain the entire volume is 3 minutes.*

2.e ***Integrated evaluation*** of structure (Guidelines 11) and embankment geometry (Guidelines 9):

The slopes and width comply with the Guidelines. Chapter 9.

With regard to rehabilitation (Guidelines Chapter 11), the facility is in excellent shape. The existing stable embankment will not be modified with the construction of the new spillway, merely raised slightly. The only excavation that will occur is where the box culverts and cut-off walls are being installed. Upon construction of the auxiliary spillway, brush within 20 feet of the toe of the dam shall be removed and the area seeded and stabilized.

Comment 3. provided technical specifications - attached.

Comment 4. provide an Inspection and Maintenance Plan (I&M Plan) and an Emergency Action Plan (EAP) - information attached.

APPENDIX A

NYSDEC Inspection Correspondence

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, New York 12561-1620
Phone: (845) 256-3054 **FAX:** (845) 255-4659
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

June 24, 2009

Thomas B. Vanderbeek
Greater Hudson Valley Engineering & Land Surveying, PC
233 Lafayette Avenue, Suite M-1
Suffern, NY 10901

Re: Warwick Meadows Dam
DEC Tracking ID#3-3354-00393/00003
V. Warwick, Orange County

Notice of Permit Jurisdiction

Dear Mr. Vanderbeek,

The New York State Department of Environmental Conservation (DEC or Department) has reviewed the information received May 15, 2009 requesting a determination whether this impoundment meets the thresholds for regulation under Article 15, Title 5, Protection of Waters. The DEC Dam Safety Unit has determined that this dam, NYS ID 180-4895, **is** subject to regulation under 6 NYCRR Part 608.3, Dams and impoundment structures. In addition, based on this review, the Dam Safety Unit continues to have concerns that this dam does not meet NYS Dam safety criteria per 6 NYCRR Part 673, Dam Safety Regulations. By copy of this letter, the Department requests that any further approvals by the Village of Warwick be withheld until the Department is satisfied that the dam meets all safety criteria.

Your letter of May 11th indicated the dam impoundment retains approximately 400,000 gallons, which is below the regulatory threshold of 1 million gallons. However, the review by Dam Safety staff found this calculation was based on the normal pool elevation, not the maximum impoundment capacity as required by the Environmental Conservation Law (ECL 15-0503). The maximum impoundment capacity given in the original application is approximately 1.63 million gallons and, according to the 1996 "as built" plans, the existing maximum elevation is even higher than originally proposed, indicating an even greater capacity. Combined with a dam height well over the 15-foot threshold, this data indicates this dam is subject to regulation.

You must submit plans and an engineering report that either demonstrate that the dam meets Dam safety requirements per Part 673 or includes an application for permit to allow revisions which will address all concerns. Please incorporate the follow dam safety comments from Scott Braymer, DEC Dam Safety Unit, into your response:

1. The "Maximum Outflow Capacity" discussion provided is not sufficiently detailed to complete a review however it appears that the assumed n-value is too low for a CMP outlet.
2. The Guidelines for Design of Dams (Guidelines), Section 6.3.4, states that a single drop inlet spillway is only acceptable for a Class A dam with a drainage area less than 50-acres. Warwick Meadows Dam is class B and the drainage area listed in the 1996 D-1 form and engineer's report is 244-acres. If you wish to propose that the current spillway configuration is adequate, then

sufficient justification must be provided for deviation from the Guidelines, along with complete calculations demonstrating the spillway capacity. The Guidelines can be accessed online at http://www.dec.ny.gov/docs/water_pdf/damguideli.pdf

Please note that Department is currently working on revisions to Part 673 which will increase the requirements for the owners of Class B dams. It is anticipated that these requirements will include the development of an Emergency Action Plan (EAP) and an Inspection and Maintenance (I&M) Plan.

In addition to the above Dam Safety requirements, please address the following concerns regarding the proposed final stage of development:

3. Clarify ownership. Your letter indicates that Warwick Commons LLC is your client, however Department records indicate that the Warwick Meadows Master Homeowners Association is the owner of the dam. If the applicant for any permits is not the owner, a letter of permission signed by the owner must be included in the application.
4. If an application is needed, you must submit the Joint Application for Permit and the Joint Application Supplement D-1 for Construction, Reconstruction or Repair of a Dam or Other Impoundment Structure. Please note that the Joint Application for Permit was modified in 2008. Please use the new form when applying and include the "Permission of Inspect Property" form. All these forms are available from the DEC website at http://www.dec.ny.gov/permits/6222.html.
5. When submitting the requested dam information, include plans and a project description of the final phase of the development referenced in your letter. Include a Stormwater Pollution Prevention Plan (SWPPP) for review by the Department which includes any potential impacts the final phase may have on this dam. These plans will be reviewed to determine if any additional permits will be required. Please note that the stream which the dam impounds is a Class C(t), protected tributary of Wawayanda Creek; the nearby sub-tributary is also Class C(t) and protected. Any disturbances proposed to the bed or banks of these streams will also require a permit pursuant to 6 NYCRR Part 608.2, Disturbance of protected streams.

When submitting materials, please direct them to my attention at the Region 3New Paltz office and reference the DEC Tracking ID listed above. Dam safety questions can be directed to Scott Braymer at (518) 402-8145. If you have additional comments or questions, please contact me at (845) 256-3014 or the above listed address.

Sincerely,

Rebecca Crist
Environmental Analyst

Cc: Village of Warwick Planning Board

Ecc: Scott Braymer, DEC Dam Safety Unit, Albany
Berhanu Gonfa, DEC Division of Water, White Plains

New York State Department of Environmental Conservation
Division of Water
Bureau of Flood Protection and Dam Safety, 4th Floor
625 Broadway, Albany, New York 12233-3504
Phone: (518) 402-8185 · FAX: (518) 402-9029
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

July 30, 2009

Warwick Meadows Master Homeowners Association Ltd.
1 Laudaten Way
Warwick, New York 10990

Re: Warwick Meadows Dam
DEC Dam ID#: 180-4895
Village of Warwick, Orange County

Dear Dam Owner:

I conducted a routine visual inspection at the above referenced dam on July 27, 2009 as part of the Department of Environmental Conservation's (Department) ongoing Dam Safety Program. I am writing to you because it is my understanding that you are, or represent, the owner of this structure. A copy of my Visual Observations is enclosed for your information. The inspection revealed that the dam is generally well maintained. However, the trees and brush around the spillway outlet and downstream toe should be cleared, stumps removed and the area put to grass. Also, review of our file indicates that this dam may have inadequate spillway capacity.

This dam is currently considered to be a "Class B - Intermediate Hazard" dam. This means that failure of the dam could damage isolated homes, main highways, minor railroads, interrupt the use of relatively important public utilities, and/or cause significant economic loss or serious environmental damage. The revised Dam Safety Regulations are expected to become effective in August, and the owners of Class B - Intermediate Hazard dams will be required to:

1. Operate and maintain the dam and all appurtenant structures in a safe condition at all times;
2. Maintain in good order all available records regarding the dam, and provide those records to any new owner;
3. Develop and implement an Inspection and Maintenance (I&M) Plan for each structure;
4. Develop and submit an Emergency Action Plan (EAP) for each structure;
5. Submit annual certification of ownership, that the I&M Plans are current and being implemented and that the EAPs are current, for each structure;

6. Conduct a Safety Inspection by a Professional Engineer on a regular schedule as defined in the Inspection and Maintenance Plan;

7. Conduct a full engineering assessment every 10-years; and

8. Report flows in erodible auxiliary spillways.

The 2009 draft of these regulations can be downloaded from the following website: http://www.dec.ny.gov/regulations/39559.html.

Please note that we do not "certify" dams, or give them a "pass/fail" rating although this data is sometimes requested. The Department's visual observation of the facilities is not a substitute for a thorough engineering evaluation of the facility by a licensed professional engineer. The Department's inspection observations and notes are not intended for, and should not be relied on for "risk management/assessment" or other financially based determinations.

Please keep in mind that any repair or construction activities related to the dam may require permits from Department. Well before beginning work on the dam, please check with the Regional Permit Administrator at the Department's Region 3 - New Paltz office at (845) 256-3059 to see if any permits are required.

If you have any questions regarding the above, or the Dam Safety Program in general, please contact me at (518) 402-8145.

Sincerely,

Scott M. Braymer, P.E.
Environmental Engineer 2
Dam Safety Section

cc w/ enc: Mayor, Village of Warwick
cc w/o enc: Seamus Leary, Deputy Commissioner, Orange Co. Dept. of Emergency Services
cc w/ enc: Berhanu Gonfa, NYSDEC, Region 3, Dam Safety Representative

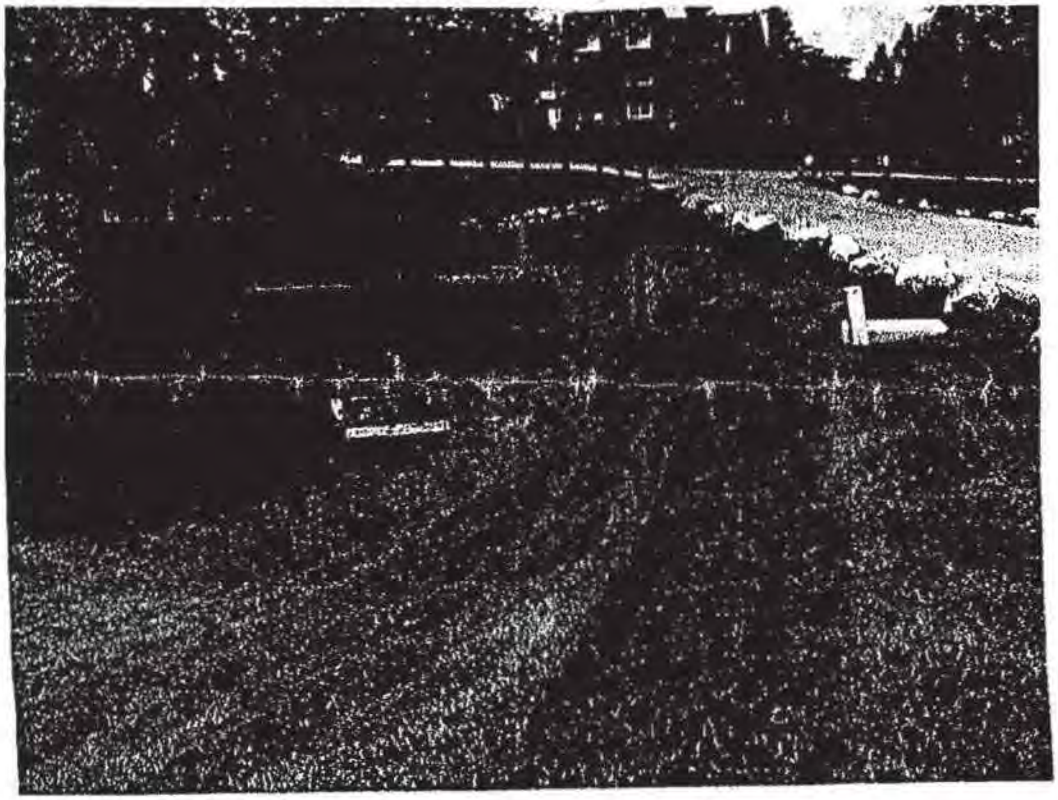
New York State Department of Environmental Conservation
Division of Water
Bureau of Flood Protection and Dam Safety, 4th Floor
625 Broadway, Albany, New York 12233-3504
Phone: (518) 402-8185 • FAX: (518) 402-8082
Website: www.dec.state.ny.us

Alexander B. Grannis
Commissioner

Visual Observations

Dam Name:	Warwick Meadows Dam	*State ID:*	180-4895
Hazard Class:	Class B – Intermediate Hazard	*Section:*	B
County:	Orange	*Nearest City/Town:*	V. Warwick
Owner:	Warwick Meadows Master Homeowners Association		
Inspectors:	SMB/BG	*Date of Inspection:*	7/27/09

Drop inlet spillway in same general condition as observed in 2005. Water level just spilling. Drain operation not observed, valve located in drop box. No auxiliary spillway. Upstream face well mowed, minor scarping at waters edge, healed over with vegetation; utility box and dry hydrant. Aerator in pond. Storm drain on right side with scour hole at culvert outlet. Top of dam wide, two lane paved road with large stones on shoulders. Upper slope of downstream face well mowed. Toe around outlet pipe overgrown with brush, brambles and small trees.



New York State Department of Environmental Conservation
Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, New York 12561-1620
Phone: (845) 256-3054 **FAX:** (845) 255-4659
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

September 20, 2010

Thomas B. Vanderbeek
Vanderbeek Engineering P.C.
233 Lafayette Avenue, Suite M-2
Suffern, NY 10901

Re: Warwick Meadows Dam
DEC Application ID#3-3354-00393/00003
V. Warwick, Orange County
Notice of Incomplete Application

Dear Mr. Vanderbeek,

The New York State Department of Environmental Conservation (DEC) has reviewed the application which you submitted on behalf of Warwick Meadows Master HOA Ltd for the remediation of the stormwater detention basin dam at the Warwick Commons subdivision. This proposal includes installation of the auxiliary spillway, as required in the original dam construction permit 3-3351-00393/00002. The application is incomplete.

Department staff have reviewed the following:

- Cover letter from T. Vanderbeek, dated June 11, 2010.
- Joint Application for permit signed by Nancy Bouden
- Supplement D-1 form
- Attachment 1 -- Summary Updated Engineering Report.
- Previously Approved Plans, sheets 1 through 7.

Dam Safety

The Summary Updated Engineering Report is not sufficiently detailed for Department evaluation of the safety aspects of the dam. While many of the concepts included in the Lehman Engineering Report (dated 6/3/96), and the associated previously-approved plans, may still be valid, the proposed work must be based on a complete evaluation of the current conditions at the dam. Too much time has elapsed to rely solely on the 1996 Lehman Report, which was in turn an update of an earlier 1986 report. A new engineering report, new plans, and new specifications are required; see the Department's Guidelines for Design of Dams (Guidelines) for applicable safety criteria. The Guidelines are available at http://www.dec.ny.gov/docs/water_pdf/damguideli.pdf. The report, plans, and specifications must be signed and sealed by the current Design Engineer listed on the D-1 form. The Design Engineer is the individual P.E., registered in NYS and familiar with dam safety, responsible for oversight of the design. Please address the following:

1. Revise the D-1 form, Item 20, to include the name and information for the individual P.E., registered in NYS and familiar with dam safety, who will oversee the construction work and provide the engineers certification that the work was completed in accordance with the approved plans, and who will sign and seal the as-built record drawings.

2. Provide a revised engineering report to include, but not be limited too, the following:
    - A schedule of construction inspection, see Guidelines, Section 4.4.
    - A current assessment of downstream hazards. Simple adoption of the Department's currently assigned hazard class is not sufficient. The Design engineer's opinion of the current downstream hazard must be provided, see Guidelines, Section 3.
    - A current assessment of Hydrology and Hydraulics for the proposed dam. Both TP-40 and NRCC rainfall values must be evaluated and the more conservative values should be used, along with an appropriate storm-duration. Assess any changes within the watershed that may have occurred since 1996 and which may impact the curve numbers (CN), also consider any upstream development currently being proposed. The sheet flow length of 300 feet used in the 1996 analysis is not longer acceptable. Maximum sheet flow lengths are 150 feet for an undeveloped condition and 100 feet for a developed condition.
    - An assessment of the outlet works. The condition of the service spillway and operability of the low level outlet must be evaluated, in comparison to the Guidelines, Section 7.0. Defects, if identified, must be addressed. Provide calculations demonstrating that the low level outlet can drain 90% of the volume below the service spillway crest in 14 days (see Guidelines Section 7.1), that the service spillway can drain 75% of the volume between the service spillway and the auxiliary spillway in 7 days (see Guidelines Section 6.5.6), and that the service/auxiliary spillway can drain the volume between maximum high water and the auxiliary spillway in 12 hours (see Guidelines Section 6.5.5).
    - The proposed work would appear to represent at least the 3rd generation of construction on this dam (original, 1986, proposed). As such, the entire structure should be evaluated to ensure that it will act in an integrated manner to safely impound water, see Guidelines, Section 11. Evaluate embankment geometry in comparison to Guidelines, Section 9, and justify any deviations. How will the surface of the existing embankment be prepared prior to placement of the new fill required to raise the embankment? Trees and brush should be cleared, and stumps removed, for at least 10 feet downstream of the toe.

3. Provide technical specifications for items such as: embankment material, compaction, concrete and rip rap.

4. Provide an Inspection and Maintenance (I&M) Plan and an Emergency Action Plan (EAP). An I&M Plan template can be found at: http://www.dec.ny.gov/lands/4991.html. The Department's "Guidance for Developing an Emergency Action Plan," TOGS 3.1.3, including EAP Templates, can be found at: http://www.dec.ny.gov/lands/4991.html. An EAP is not considered complete until it has been fully coordinated with local emergency responders.

Stream Protection
No specific issues have been identified. Any permit issued will require standard pollution prevention condition. These include prohibition on contact of fresh concrete with the waters of the stream and pond and the use of standard erosion and sedimentation controls.

When resubmitting, please provide two paper copies of all materials and one digital copy in pdf format. Technical questions can be directed to Scott Braymer in the Dam Safety Unit at (518)402-8145. For questions regarding the application process, please contact me at (845) 256-3014 or the above listed address.

Sincerely,

Rebecca Crist
Environmental Analyst

Cc: Warwick Meadows Master HOA Ltd.
Village of Warwick Planning Board

Ecc: Scott Braymer, DEC Dam Safety Unit, Albany
Doug Gaugler, DEC Bureau of Habitat

New York State Department of Environmental Conservation
Notice of Incomplete Application - This is NOT a Permit

Application ID: 3-3354-00393/00003 *Batch Number*: 615210

Facility: WARWICK MEADOWS CONDOMINIMUMS AND DAM
BALL & BRADY RDS
WARWICK, NY 10990

Contact: VANDERBEEK ENGINEERING PC *Owner ID*: 1556347
233 LAFAYETTE AVE STE M-2
SUFFERN, NY 10901

Permit(s) Applied for: 1 - Article 15 Title 5 Dam

Project Location: in WARWICK in ORANGE COUNTY

Your application for Permit is incomplete. The following items are required:

DEC's Dam Safety Section has completed review of the latest re-submission for the above-referenced application, which included the following:

1. Engineering Assessment Report, Warwick Meadows Farm Pond Dam, dated October 2010.
2. Plan entitled "Warwick Meadows Dam Improvements," dated 11/1/2010.

The application is Incomplete at this time. The following are DEC's comments:

The design intent is not clearly depicted, and many inconsistencies have been noted between the Report and the Plan provided. These documents should clearly and consistently depict the current configuration of the dam, and the proposed work required to bring the dam into conformance. The Report still appears to overly rely on past analyses. Repackaging of previous analyses is not sufficient. Please provide an updated Hydrology and Hydraulics (H&H) analysis, including computer models and all supporting calculations, both on hard copy and on disk.

Engineering Assessment Report

Page 3. Item 1 states that the 60" CMP has already been extended as shown on the plans. Has all necessary embankment material also been placed to achieve the proposed grade shown on the plan? Other than re-grading the top of the dam, no additional fill is called for on page 7, item 4, but significant additional fill is shown on the plan.

Page 5. The computer runs referenced in the 2nd paragraph have not been provided. 3rd paragraph, what is the effect of the shorter sheet flow on time of concentration (Tc)? The precipitation values used appear to be significantly less than those provided by the NRCC, and as such do not appear to be conservative. Being based on a longer period of record, and being more conservative, the NRCC values should be used in the H&H analysis.

Page 6, the 5th paragraph and the last paragraph list the invert of auxiliary spillway as 643.5, but the plan shows an inlet invert of 645, please clarify.

Page 7, 1st paragraph, lists top of dam at 649, but the plan shows the road (i.e. top of dam) at about 652.5. The D-1 form, Item 15 lists top of dam as 652. Please clarify.

Page 8. When do you propose to conduct the work?

Page 9, Item 2.d, 2nd paragraph, low level drain capacity. Why are you using Mannings equation for open channel flow to estimate the capacity of a pipe flowing full?

Appendix B, D-1 form

Items 9.a. and 9.b. It appears that you have listed the precipitation, and not the runoff volume.

Item 15, spillway crest, volume stored appears to be in error.

Appendix C

Fly sheet is labeled as I&M Plan, but the draft EAP is included.

It appears that the EAP has not yet been distributed to and coordinated with local emergency responders. It will be considered draft until that step has been completed and a "Promulgation & Concurrence" form has been submitted to Dam Safety.

Page 3. The 24-hr Phone number for Dam safety is currently: (518) 852-0415.

Page 7. In the absence of a more rigorous analysis, the inundation area should be extended downstream to the confluence with the outlet stream from the Warwick Reservoirs.

Appendix D

Fly sheet is labeled as EAP, but the I&M plan is included.

Page 3, towards the bottom of page. Maximum impoundment volume is listed as 1.4 Mgal. Please note that maximum impoundment volume is measured to the top of dam, not to design high water, 5 acre feet is listed on the D-1 form. Auxiliary spillway elevation is listed as 643.5, but is shown as 645 on the plan. Please clarify.

Page 4, inspection frequency table, engineering assessment frequency left blank. Please note that 6 NYCRR Part 673.13 requires a full engineering assessment for a Class B dam every 10 years, with the first no later than 2015. Once accepted this report could be counted as the first engineering assessment, and the next assessment would be due 10 years later.

Page 5, Part V, Appendices have not yet been provided.

Technical Specifications, Section 02210

3.04.A. Existing embankment should be benched prior to placement of new embankment material (see Guidelines, Section 11.0.c)

Drawing 1 (Sheet 1 of 16, other sheets not provided)

This drawing should clearly depict the current configuration of the dam, and the proposed work required to bring the dam into conformance.

Location of underground utilities and test borings are not shown on plan, as called for in Spec Section 02210.

The only specification found for Rip Rap was the NYSDOT Item No. 620.03, Stone Filling (Light), referenced in Spec Section 02630, which does not appear consistent with the D50 = 16" called for on the drawings along the outlet channels. What stone size is intended for the energy dissipaters, a larger size than D50 = 16" is implied?

Page 3, Item 3 states that the trash rack has been placed (this is confirmed by photos taken during site inspections), but the drawing shows the rack as "proposed." The drawing does call for an anti-vortex plate, which does not yet appear to have been installed.

Two versions of the "existing outfall structure" are shown in the lower left corner, the upper version with a 36" CMP riser, and the lower version without. The upper version does not appear to depict either existing or proposed conditions. What is the intended purpose of the additional 36" riser? There are notches cut into the top of the existing outfall structure that are not depicted on the drawing, also the configuration of the trash rack bars does not appear to be accurate as depicted. The existing wire mesh spanning the bars is not depicted, is it to remain, or be removed?

60" CMP profile. Please verify if the horizontal scale is correct as shown, or revise as appropriate. Show the 10" low level drain into the existing outfall structure. The service spillway and the auxiliary spillway are shown along the same section, which appears inconsistent with the plan view. The CMP extension is shown as proposed, but page 3 of the report lists it as already extended, please clarify. Existing grade and proposed grade are shown, but page 3 of the report seems to imply has this work already been completed?

Plan view. What is the scale and contour interval on this figure? The proposed alignment of the auxiliary spillway appears to discharge above the service spillway outlet, is that the design intent? Clearing limits should be shown, as described on page 9.

No section through the cast-in-place auxiliary spillway has been provided, no wall thickness or rebar have been shown, as called for in Specification Section 03300.

For technical questions on these comments, please contact Scott Braymer in DEC's Dam Safety Section at 518-402-8145. For administrative questions on the processing of this application, I can be reached at axsheera@gw.dec.state.ny.us.

---

cc: Warwick Meadows Condo Association
Warwick Planning Board
File
ECC ONLY:
Berhanu Gonfa, R3 DSS
Scott Braymer, CO DSS
Doug Gaulgler, R3 BOH
Chron

Please submit requested information by ______________
No further action can be taken until all of these materials are received.

Contact Person:
ANDREA SHEERAN
NYSDEC
625 BROADWAY
ALBANY, NY 12233

Signature: ____________________

Date: February 02, 2011

Telephone Number: (518) 402-9167

APPENDIX B

Revised Form D-1

Supplement D-1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK 12233

FOR DEPARTMENT USE ONLY
APPLICATION NO.
DAM NO.
WATERSHED

APPLICATION FOR PERMIT

FOR THE CONSTRUCTION, RECONSTRUCTION OR REPAIR OF A DAM OR OTHER IMPOUNDMENT STRUCTURE

Read instructions on reverse side of last sheet before completing this application. PLEASE TYPE OR PRINT CLEARLY IN INK

PROJECT DESCRIPTION

1. LOCATION On U.S. GEOLOGICAL SURVEY MAP

Name of Map	Latitude	Longitude
Greenwood	41.2416	74.3546

2. PROPOSED USE FOR IMPOUNDED WATER: stormwater detention

3. STATE THE HEIGHT ABOVE SPILLCREST OF THE LOWEST PART OF THE IMMEDIATE UPSTREAM ADJOINING PROPERTY OR PROPERTIES: 10 Feet

4. IS THIS PROPOSED POND OR LAKE PART OF A PUBLIC WATER SUPPLY ☐ Yes ☑ No
If not, where is nearest downstream public water supply intake?

5. SIZE OF AREA DRAINING INTO POND OR LAKE (Acres or Square Miles): 244 acres

HEIGHT OF DAM ABOVE STREAM BED? 22 Feet

6. THE DRAINAGE AREA IS COMPOSED OF: (Total = 100%)

50 % Forest ____ % Cropland ____ % Pasture ____ % Other ____ % Swamp 50 % Suburban Lands ____ % Urban Lands

7. TYPE OF SPILLWAY

☑ Service Spillway - Auxiliary Spillway Combination ☐ Pip Riser ONLY
☐ Single Spillway ☐ Other ____

8. DESIGNER'S ESTIMATE OF CLASS OF HAZARD (As described in 6NYCRR Part 673)

☐ Class "A" ☑ Class "B" ☐ Class "C"

NOTE: Provide descriptive information on character of downstream area.

9a. SPILLWAY INFLOW DESIGN FLOOD

Frequency 1.5x100 Flood Peak 829 cfs Runoff Volume 8.1 in.

9b. SERVICE SPILLWAY INFLOW DESIGN FLOOD

Frequency 25 Flood Peak 338 cfs Runoff Volume 3.3 in.

10. THE SINGLE SPILLWAY OR AUXILIARY SPILLWAY IS COMPOSED OF:

☐ Vegetated Earth ☑ Concrete ☐ Timber ☐ Rock-filled Crib ☐ Masonry ☑ Other

11. MAXIMUM VELOCITY WITHIN THE SINGLE OR AUXILIARY SPILLWAY 5.5 fps

12. SINGLE OR AUXILIARY SPILLWAY DISCHARGE AT DESIGN HIGH WATER 874 cfs

13. TYPE OF ENERGY DISSIPATER PROVIDED ON SINGLE SPILLWAY

☐ Hydraulic Jump Basin ☐ Drop Structure ☐ Other ____

14. POND OR LAKE WILL BE DRAINED BY MEANS OF
valve

WATER WILL BE SUPPLIED TO RIPARIAN OWNERS DOWNSTREMA BY MEANS OF
bypass flow

15. AREA CAPACITY DATA
Answer 1, 2 and 3, OR 1, 2, 4, 5

	ELEVATION, Referred to Assumed Benchmark	SURFACE AREA	VOLUME STORED
1. Top of Dam	652.5 Feet	.50 Acres	6.7 Acre-Feet
2. Design High Water	650.0 Feet	.47 Acres	5.5 Acre-Feet
3. Single Spillway Crest	Feet	Acres	Acre-Feet
4. Auxiliary Spillway Crest	645 Feet	.37 Acres	3.1 Acre-Feet
5. Service Spillway Crest	640 Feet	.33 Acres	1.3 Acre-Feet

16. TYPE OF ENERGY DISSIPATER AT OUTLET OF CONDUIT:

☐ Impact Basin ☐ Hydraulic Jump Basin
☐ Plunge Pool ☑ Other rip-rap

IS RISER PROVIDED WITH AN ANTI-VORTEX DEVICE? ☑ Yes ☐ No

17. DRAWDOWN TIMES: Answer 1 and 2, OR 1, 3, and 4

	Yes	No
1. Has provision been made to evacuate 90% of the storage below the lowest spillway crest within fourteen days?	☑	☐
2. Can the single spillway evacuate 75% of the storage between the maximum design high water and the spillway crest within 48 hours?	☐	☐
3. Can the Service Spillway evauate 75% of the storage between the auxiliary spillway and the Service Spillway crest within seven days?	☑	☐
4. Can the Service Spillway and the Auxiliary Spillway in combination evacuate the storage between the design high water and the auxiliary spillway crest within 12 hours?	☑	☐

18. SOIL DATA - State the character of the bed and banks in respect to natural types of soil materials, hardness, perviousness, water bearing, effect of exposure to air and water, uniformity, etc.

Mardin gravelly silt loam

If an earth dam, describe the material to be used in the embankment.

dam is existing, constructed in the 80s

What is the source of embankment fill material?

61448

Are there porous seams or fissures beneath the foundation of the proposed dam? ☐ Yes ☑ No

Method used to obtain the above soil data ☐ Soil Bearing ☑ Test Pits

19. DESIGN ENGINEER Name of agency or individual	P.E. License No. of Individual	20. CONSTRUCTION ENGINEER Name of agency or individual	P.E. License No. of Individual
Thomas Vanderbeek	61448	Thomas Vanderbeek	61448
Address 233 Lafayette Avenue, Suite M-2, 10901		Address 233 Lafayette Avenue, Suite M-2, 10901	
Title President	Telephone No. 845-357-9000	Title President	Telephone No. 845-357-9000

APPENDIX C

Emergency Action Plan (EAP) Template

FILED w/
EAPS

EMERGENCY ACTION PLAN

(Class B – Intermediate Hazard Dams)

APPENDIX D

Inspection and Maintenance (I&M) Plan Template

New York State Department of Environmental Conservation

Division of Water

Bureau of Flood Protection and Dam Safety, 4th Floor

625 Broadway, Albany, New York 12233-3504

Phone: (518) 402-8185 • FAX: (518) 402-9029

Website: www.dec.ny.gov

A Template for an Inspection
And Maintenance Plan for Dams

Purpose:

Pursuant to New York State Environmental Conservation Law Article 15-0507: Dam owners shall at all times operate and maintain the dam and all appurtenant works in a safe condition. The purpose of this document is to assist dam owners in developing a Dam Safety Inspection and Maintenance Plan (I&M Plan) as required by NYCRR Part 673.6. The I&M Plan should be used by the owner and kept on file, but does not need to be submitted to the Department unless requested.

This template reflects the general components of an I&M plan for the average dam. Use of this format does not guarantee acceptance of the Inspection and Maintenance Plan by the Department. Dam owners may use other guidance and formats so long as the plan complies with 6 NYCRR Part 673.6.

INSPECTION AND MAINTENANCE PLAN

WARWICK MEADOWS FARM POND DAM

DEC DAM No. 180-4895

1 LAUDATEN WAY, WARWICK, NY

Prepared by

Thomas B. Vanderbeek, P.E
President
Vanderbeek Engineering, P.C.

Preparation Date: 11/5/2010

Revision Dates:
1) 2/11/11
2)
3)
4)

Location of Dam Inspection and Maintenance Plan
Copies on File with the Village of Warwick Clerk, Orange County Office of Emergency Management

THOMAS B VANDE
061448

Part 1: Dam Data

Dam Name: Warwick Meadows Farm Pond Dam

Dam State Identification Number: 180-4895

Federal Energy Regulatory Commission Identification Number, if applicable: N/A

Dam Hazard Classification: B - Intermediate Hazard

(C-High Hazard, B-Intermediate Hazard, A-Low Hazard)

Date of last Hazard Class Verification: 2010

Dam Location:
Orange County, Village of Warwick

Latitude: 41.2416 Longitude: 74.3546

Dam Type: Embankment

Year of original construction: Pre 1986 Year of last construction activity: 1996

Name of last Engineer and Builder: N/A

Dam Use(s): Flood Control, Recreation

Dam Owner(s) Name: Warwick Meadows Home Owners Association

Dam Owner(s) Mailing Address: 1 Laudatan Way, Warwick, NY 10990

Dam Owner(s) Telephone Number: 845-986-9410

Dam Owner(s) Facsimile Number: N/A

Dam Owner(s) E-Mail: N/A

Reservoir and stream (inflow and outflow) name and class (and/or navigability?):
Subtributary 20-1 of Wawayanda Creek; Class C(T)

Associated wetlands and other natural resources of special concern: None

Dam height: 22 feet (as measured from downstream toe at lowest point to top of dam)

Dam Crest length: 200 feet

Dam Crest Width: 15 feet

Maximum Impoundment Volume: 6.7 million gallons

H&H SAYS 2.094 MGAL?

All Counties/Towns/Cities/Villages within downstream inundation zone: Warwick (V)

(B and C Hazard Class dam owners should refer to their Emergency Action Plans)

Normal Pool Elevation: 640 NGVD29 (set by crest of service spillway)

Auxiliary/Emergency Spillway Elevation: 645.0 NGVD29

Maximum Design Water Surface Elevation: 650.0 NGVD29

(specify vertical datum used: local, barge canal, NGVD 29, NAVD 88, IGLD)

Part II: Dam Inspection and Maintenance

Primary person responsible for Dam Operations: HOA PRESIDENT, 845-986-9410

INSPECTION - This section of ther I&M Plan indicates who, how frequent, and what is involved in an inspection.

INSPECTION TYPE	FREQUENCY	LOOK FOR	STAFF
Informal	after heavy rains	erosion, both banks	Owner
General	Monthly	Seepage; wet areas; pond level; debris	Owner
General	Quarterly	Cracks; rodent activity; vandalism; vegetation	Owner
Annual	Yearly	Slope Protection; Riprap Erosion; Condition of Vegetative Cover; Spillway and embankment condition; Lake Drain Conditions	Owner
Safety Inspection	every 4 years	see Part 673.12	Engineer
Engineering Assessment	by 2015, then every 10 yrs	see Part 673.13	Engineer

MAINTENANCE – These items will require periodic maintenance. Particular attention should be given to conditions noted on past inspection reports.

ITEM	FREQUENCY
Mow embankment and emergency spillway	Annually
Lubricate and repair as needed lake drain valve mechanism	As needed
Re-establish proper vegetative cover	As needed
Address erosion	As needed
Address rodent damage	As needed
Clean trash rack	As needed
Concrete Maintenance	As needed
Replace/ replenish riprap	Annually

OPERATIONS -The following are operation procedures for the dam. Emergency operation is covered in the Emergency Action Plan (EAP).

ITEM	FREQUENCY	WHO
Pool drawdown	not necessary	
Exercise drain valve	Annually	Owner
Recordkeeping	Quarterly	HOA (Owner)

SAFE RATE DRAWDOWN PLAN - This section includes the method to be used for drawing the impoundment down under emergency and non-emergency conditions.

NON-EMERGENCY - Open drain valve
EMERGENCY - Open drain valve; bypass pumping to downstream riprap.
SEE ALSO THE EMERGENCY ACTION PLAN

Part III: Training

The OWNER (HOA) shall hold an annual refresher course on dam procedures, to review the various documents and procedures. In attendance shall be two representatives of the HOA (at a minimum), the Engineer, and the maintenance personnel or company. Contacts listed in the EAP shall be invited.

Please note that any work in the overflow structure or the auxiliary spillway box culvert is governed, at a minimum, by OSHA Confined Space Entry procedures.

Part IV: Notifications

This is a list of Items Requiring Notification and Notification Procedures pursuant to NYS ECL Part 673. This should consist of at a minimum the following:

FORM	SUBMITTAL DATE
Annual Certification	By January 31st
Incident Report	within 5 days
Notification of Property Transfer	within 30 days

Part V: Appendices

1. Inspection Forms	attached
2. Past Inspection Reports	none
3. Reduced Size As-Built Drawings	to be provided upon completion of work
4. Spillway Rating Curve	attached
5. Drain Rating Curve	attached
6. Pictures	attached

Part VI: Available References

1. An Owners Guidance Manual for the Inspection and Maintenance of Dams in New York State, DEC June 1987.

http://www.dec.ny.gov/docs/water_pdf/damguideman.pdf

2. Guidelines for Design of Dams, DEC Revised January 1989.

http://www.dec.ny.gov/docs/water_pdf/damguideli.pdf

Warwick Commons Farm Pond Dam Inspection Checklist

Date of Inspection:
Weather:
Person Inspecting Dam:

Dam Componant	**Action Required**	**Observations**
Crest	Walk across the crest from abutment to abutment	
Upstream/Downstream Slope	Walk across the slope in an up and down or zigzag pattern from abutment to abutment	
Embankment-Abutment Contacts	Walk the entire length of the embankment-abutment contacts (groin)	
Outlet Conduit	Observe all accessible features of the outlet conduit	
Spillway	Visually observe the entire length of the spillway or spillways, and all other visible features	
Downstream Channel	Travel the route of the stream below the dam to maintain familiarity with locations of residences and property that can be affected by dam failure. Dam Owners should be aware of new downstream development(s) and how those development(s) may impact the hazard class of their dam. Go far enough downstream to cover the area that could be affected by a dam failure	
Downstream Toe	Walk the entire length of the downstream toe. Reservoir Slopes: Scout the reservoir perimeter in an effort to develop an overall familiarity with its conditions	

Additional Observations For Dam:	**Action Required**	**Observations**
settlement		
turbid discharge		
structural cracking		
foundation movement		
erosion		
sinkholes		
vandalism		
animal burrows		
boils		
depressions		
voids		

Additional Observations For Dam:	**Action Required**	**Observations**
debris in gates and spillways		
wave erosion		
excessive vegetation		
seeps		
soil displacement on slopes (sloughing)		

Inspection of Concrete Structures at Dams for:	**Action Required**	**Observations**
Concrete structures cracking.		
Structural cracking of concrete		
Inspection of intake structures, trashracks, upstream conduits, and stilling basin concrete surfaces below the water surface.		

Inspection of Low Level Drains for:	**Action Required**	**Observations**
deteriorated and bent control stems and stem guides		
deteriorated and separated conduit joints		
leaky and rusted control valves and sluice gates		
deteriorated ladders and platforms in control structures		
deteriorated control structures		
clogging of the drain conduit inlet with sediment and debris		
inaccessibility of the control mechanism to operate the drain		
seepage along the drain conduit		
erosion and undermining of the conduit discharge area		

Inspection of Low Level Drains for:	**Action Required**	**Observations**
vandalism		
development of instability of earthen sections resulting in slides along the upstream slope of the dam and the shoreline caused by lowering the lake level too quickly		

Pond Report

Pond No. 1 - Farm Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 632.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	632.00	1,200	0	0
8.00	640.00	14,400	52,680	52,680
18.00	650.00	20,000	171,218	223,898
20.50	652.50	25,000	56,128	280,026 = 2.094 MGAL. ?

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 60.00	60.00	Inactive	0.00
Span (in)	= 60.00	120.00	10.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 632.00	645.00	632.00	0.00
Length (ft)	= 100.00	50.00	5.00	0.00
Slope (%)	= 5.00	3.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.80	0.80	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 24.00	0.00	0.00	0.00
Crest El. (ft)	= 640.00	0.00	0.00	0.00
Weir Coeff.	= 3.20	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	632.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.80	5,268	632.80	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.60	10,536	633.60	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
2.40	15,804	634.40	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
3.20	21,072	635.20	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
4.00	26,340	636.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
4.80	31,608	636.80	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
5.60	36,876	637.60	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
6.40	42,144	638.40	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
7.20	47,412	639.20	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
8.00	52,680	640.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
9.00	69,802	641.00	77.87 ic	0.00	0.00	---	76.80	---	---	---	---	---	76.80
10.00	86,923	642.00	217.22 ic	0.00	0.00	---	217.22	---	---	---	---	---	217.22
11.00	104,045	643.00	334.44 ic	0.00	0.00	---	334.43 s	---	---	---	---	---	334.43
12.00	121,167	644.00	372.52 ic	0.00	0.00	---	372.51 s	---	---	---	---	---	372.51
13.00	138,289	645.00	399.23 ic	0.00	0.00	---	399.23 s	---	---	---	---	---	399.23
14.00	155,411	646.00	421.55 ic	45.40 ic	0.00	---	421.52 s	---	---	---	---	---	466.92
15.00	172,533	647.00	441.58 ic	128.40 ic	0.00	---	441.58 s	---	---	---	---	---	569.98
16.00	189,654	648.00	459.11 oc	232.65 oc	0.00	---	459.02 s	---	---	---	---	---	691.68
17.00	206,776	649.00	473.93 oc	312.30 oc	0.00	---	473.84 s	---	---	---	---	---	786.14
18.00	223,898	650.00	488.14 oc	385.60 oc	0.00	---	487.96 s	---	---	---	---	---	873.56
18.25	229,511	650.25	491.61 oc	416.49 oc	0.00	---	491.55 s	---	---	---	---	---	908.05
18.50	235,124	650.50	495.05 oc	445.25 oc	0.00	---	494.90 s	---	---	---	---	---	940.15
18.75	240,736	650.75	498.46 oc	472.26 oc	0.00	---	498.26 s	---	---	---	---	---	970.52
19.00	246,349	651.00	501.85 oc	497.81 oc	0.00	---	501.69 s	---	---	---	---	---	999.49
19.25	251,962	651.25	505.20 oc	522.10 oc	0.00	---	505.08 s	---	---	---	---	---	1027.18
19.50	257,575	651.50	508.54 oc	545.32 oc	0.00	---	508.50 s	---	---	---	---	---	1053.82
19.75	263,188	651.75	511.84 oc	567.59 oc	0.00	---	511.62 s	---	---	---	---	---	1079.20
20.00	268,801	652.00	515.13 oc	589.01 oc	0.00	---	514.88 s	---	---	---	---	---	1103.90
20.25	274,413	652.25	518.38 oc	609.69 oc	0.00	---	518.10 s	---	---	---	---	---	1127.79
20.50	280,026	652.50	521.62 oc	629.68 oc	0.00	---	521.32 s	---	---	---	---	---	1151.00

Pond Report

Pond No. 1 - Farm Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 632.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	632.00	1,200	0	0
8.00	640.00	14,400	52,680	52,680
18.00	650.00	20,000	171,218	223,898
20.50	652.50	25,000	56,128	280,026

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 60.00	60.00	10.00	0.00
Span (in)	= 60.00	120.00	10.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 632.00	645.00	632.00	0.00
Length (ft)	= 100.00	50.00	5.00	0.00
Slope (%)	= 5.00	3.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.80	0.80	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 24.00	0.00	0.00	0.00
Crest El. (ft)	= 640.00	0.00	0.00	0.00
Weir Coeff.	= 3.20	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	632.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.80	5,268	632.80	0.00	0.00	1.64 ic	---	0.00	---	---	---	---	---	1.639
1.60	10,536	633.60	0.00	0.00	2.86 ic	---	0.00	---	---	---	---	---	2.856
2.40	15,804	634.40	0.00	0.00	3.70 ic	---	0.00	---	---	---	---	---	3.698
3.20	21,072	635.20	0.00	0.00	4.38 ic	---	0.00	---	---	---	---	---	4.381
4.00	26,340	636.00	0.00	0.00	4.97 ic	---	0.00	---	---	---	---	---	4.971
4.80	31,608	636.80	0.00	0.00	5.50 ic	---	0.00	---	---	---	---	---	5.498
5.60	36,876	637.60	0.00	0.00	5.98 ic	---	0.00	---	---	---	---	---	5.978
6.40	42,144	638.40	0.00	0.00	6.42 ic	---	0.00	---	---	---	---	---	6.423
7.20	47,412	639.20	0.00	0.00	6.84 ic	---	0.00	---	---	---	---	---	6.839
8.00	52,680	640.00	0.00	0.00	7.23 ic	---	0.00	---	---	---	---	---	7.231
9.00	69,802	641.00	77.87 ic	0.00	7.69 ic	---	76.80	---	---	---	---	---	84.49
10.00	86,923	642.00	217.22 ic	0.00	8.13 ic	---	217.22	---	---	---	---	---	225.35
11.00	104,045	643.00	334.44 ic	0.00	8.54 ic	---	334.43 s	---	---	---	---	---	342.98
12.00	121,167	644.00	372.52 ic	0.00	8.94 ic	---	372.51 s	---	---	---	---	---	381.45
13.00	138,289	645.00	399.23 ic	0.00	9.31 ic	---	399.23 s	---	---	---	---	---	403.54
14.00	155,411	646.00	421.55 ic	45.40 ic	9.68 ic	---	421.52 s	---	---	---	---	---	476.60
15.00	172,533	647.00	441.58 ic	128.40 ic	10.03 ic	---	441.58 s	---	---	---	---	---	580.00
16.00	189,654	648.00	459.11 oc	232.65 oc	10.37 ic	---	459.02 s	---	---	---	---	---	702.04
17.00	206,776	649.00	473.93 oc	312.30 oc	10.69 ic	---	473.84 s	---	---	---	---	---	796.83
18.00	223,898	650.00	488.14 oc	385.60 oc	11.01 ic	---	487.96 s	---	---	---	---	---	884.57
18.25	229,511	650.25	491.61 oc	415.49 oc	11.09 ic	---	491.55 s	---	---	---	---	---	919.14
18.50	235,124	650.50	495.05 oc	445.25 oc	11.17 ic	---	494.90 s	---	---	---	---	---	951.32
18.75	240,736	650.75	498.46 oc	472.26 oc	11.24 ic	---	498.26 s	---	---	---	---	---	981.77
19.00	246,349	651.00	501.85 oc	497.31 oc	11.32 ic	---	501.69 s	---	---	---	---	---	1010.81
19.25	251,962	651.25	505.20 oc	522.10 oc	11.40 ic	---	505.08 s	---	---	---	---	---	1038.58
19.50	257,575	651.50	508.54 oc	545.32 oc	11.47 ic	---	508.50 s	---	---	---	---	---	1065.30
19.75	263,188	651.75	511.84 oc	567.59 oc	11.55 ic	---	511.62 s	---	---	---	---	---	1090.75
20.00	268,801	652.00	515.13 oc	589.01 oc	11.62 ic	---	514.88 s	---	---	---	---	---	1115.52
20.25	274,413	652.25	518.38 oc	609.69 oc	11.69 ic	---	518.10 s	---	---	---	---	---	1139.48
20.50	280,026	652.50	521.62 oc	629.68 oc	11.77 ic	---	521.32 s	---	---	---	---	---	1162.77

C is 10" pond drain pipe

02.15.2011

02.15.2011

02.15.2011

02.15.2011

15.2011

02.15.2011

02.15.2011

APPENDIX E

Hydraflow Model Runs

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	-------	-------	-------	-------	338.20	829.28	548.21	Incoming Drainage
2	Reservoir	1	-------	-------	-------	-------	-------	336.03	823.99	545.48	leaving farm pond

Proj. file: WarwickMeadowsFarmPond2011.gpw

Monday, Feb 14, 2011

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	338.20	2	770	2,912,007	----	------	------	Incoming Drainage
2	Reservoir	336.03	2	774	2,912,007	1	643.04	104,762	leaving farm pond

WarwickMeadowsFarmPond2011.gpw | Return Period: 25 Year | Monday, Feb 14, 2011

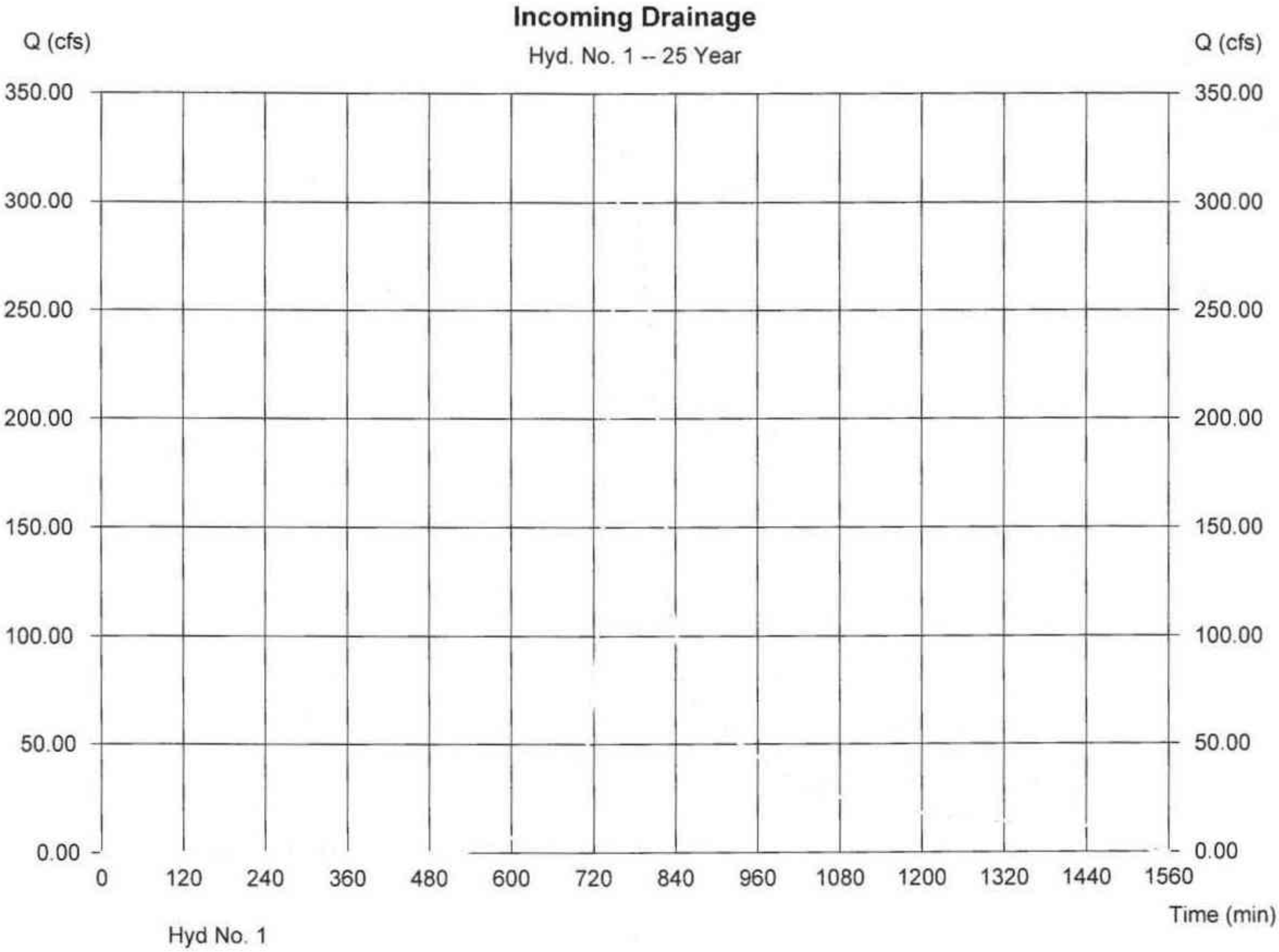
Hydrograph Report

Hyd. No. 1

Incoming Drainage

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 244.000 ac
Basin Slope = 10.0 %
Tc method = USER
Total precip. = 6.10 in
Storm duration = 24 hrs

Peak discharge = 338.20 cfs
Time to peak = 770 min
Hyd. volume = 2,912,007 cuft
Curve number = 74
Hydraulic length = 500 ft
Time of conc. (Tc) = 74.00 min
Distribution = Type III
Shape factor = 484



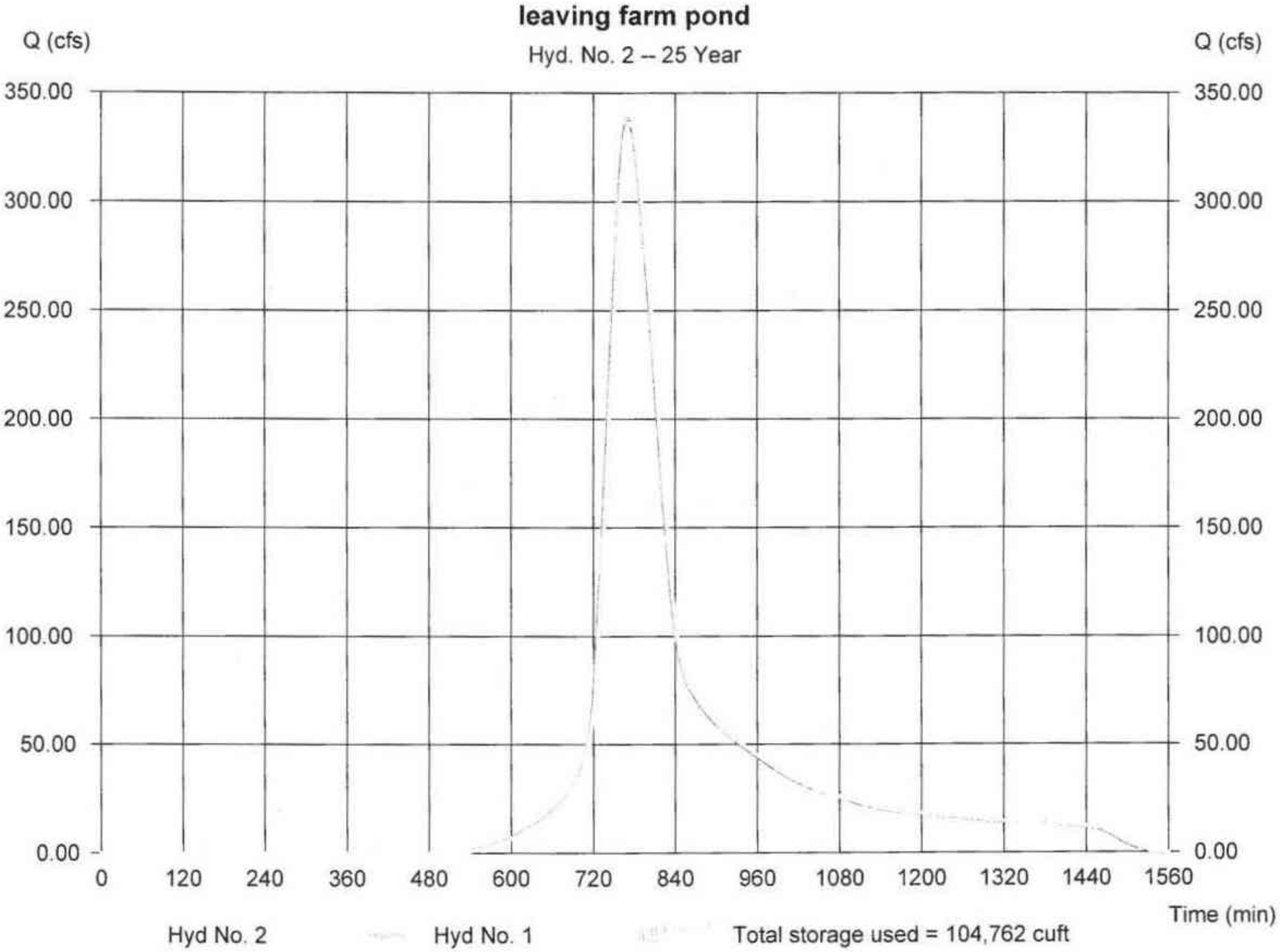
Hydrograph Report

Hyd. No. 2

leaving farm pond

Hydrograph type	= Reservoir	Peak discharge	= 336.03 cfs
Storm frequency	= 25 yrs	Time to peak	= 774 min
Time interval	= 2 min	Hyd. volume	= 2,912,007 cuft
Inflow hyd. No.	= 1 - Incoming Drainage	Max. Elevation	= 643.04 ft
Reservoir name	= Farm Pond	Max. Storage	= 104,762 cuft

Storage Indication method used. Wet pond routing start elevation = 640.00 ft.



Pond Report

Pond No. 1 - Farm Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 632.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	632.00	1,200	0	0
8.00	640.00	14,400	52,680	52,680
18.00	650.00	20,000	171,218	223,898
20.50	652.50	25,000	56,128	280,026

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 60.00	60.00	0.00	0.00
Span (in)	= 60.00	120.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 632.00	645.00	0.00	0.00
Length (ft)	= 100.00	50.00	0.00	0.00
Slope (%)	= 5.00	3.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.80	0.80	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 24.00	0.00	0.00	0.00
Crest El. (ft)	= 640.00	0.00	0.00	0.00
Weir Coeff.	= 3.20	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	632.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
8.00	52,680	640.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
18.00	223,898	650.00	488.14 oc	385.60 oc	---	---	487.96 s	---	---	---	---	---	873.56
20.50	280,026	652.50	521.62 oc	629.68 oc	---	---	521.32 s	---	---	---	---	---	1151.00

SDF 150% OF 100 YR

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	829.28	2	768	7,172,758	----	------	------	Incoming Drainage
2	Reservoir	823.99	2	770	7,172,759	1	649.44	214,189	leaving farm pond

WarwickMeadowsFarmPond2011.gpw	Return Period: 50 Year	Monday, Feb 14, 2011

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

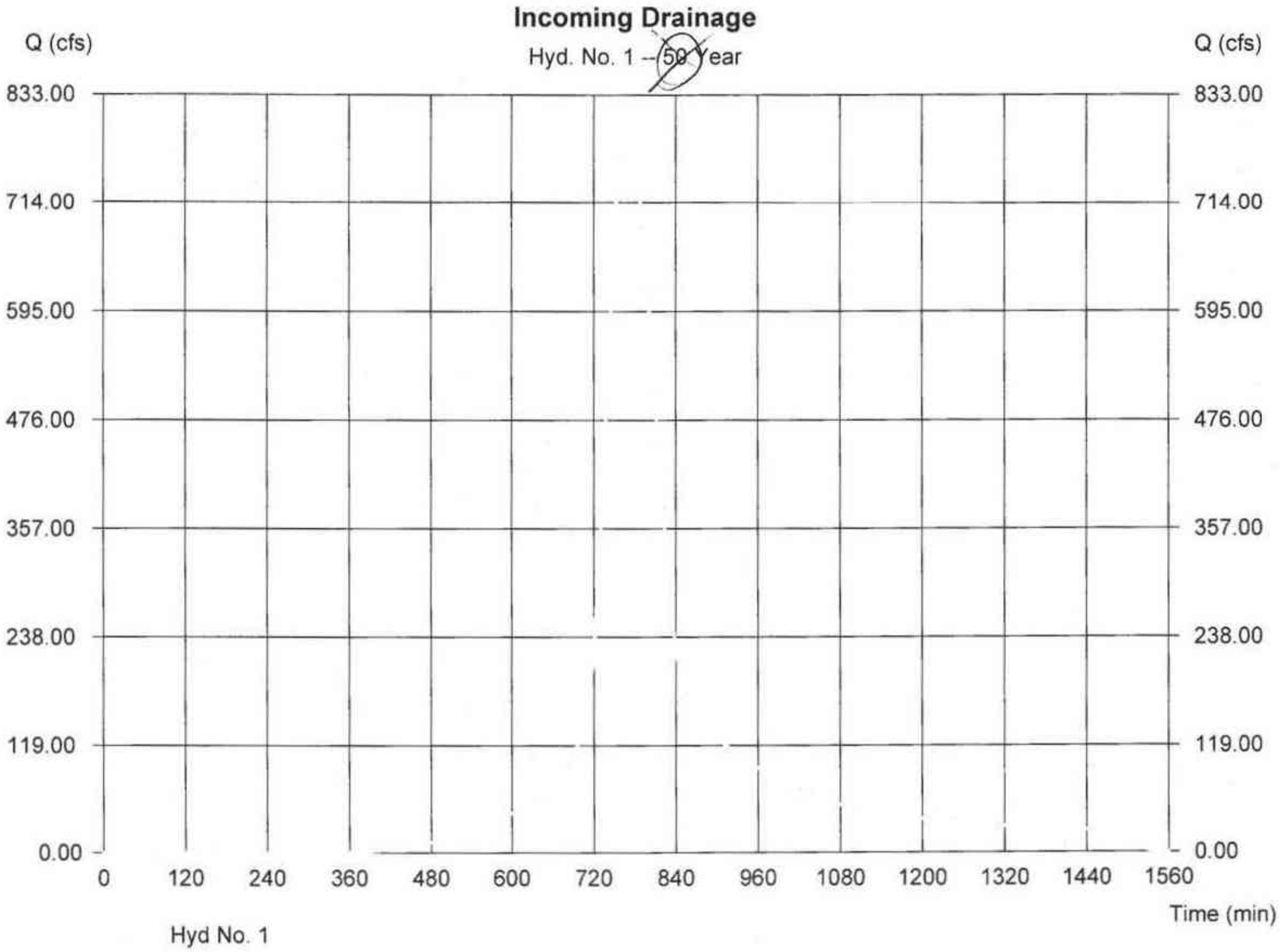
Monday, Feb 14, 2011

Hyd. No. 1

Incoming Drainage

Hydrograph type = SCS Runoff
Storm frequency = ~~50 yrs~~ SDF 150% of 100yr
Time interval = 2 min
Drainage area = 244.000 ac
Basin Slope = 10.0 %
Tc method = USER
Total precip. = 11.40 in
Storm duration = 24 hrs

Peak discharge = 829.28 cfs
Time to peak = 768 min
Hyd. volume = 7,172,758 cuft
Curve number = 74
Hydraulic length = 500 ft
Time of conc. (Tc) = 74.00 min
Distribution = Type III
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 Monday, Feb 14, 2011

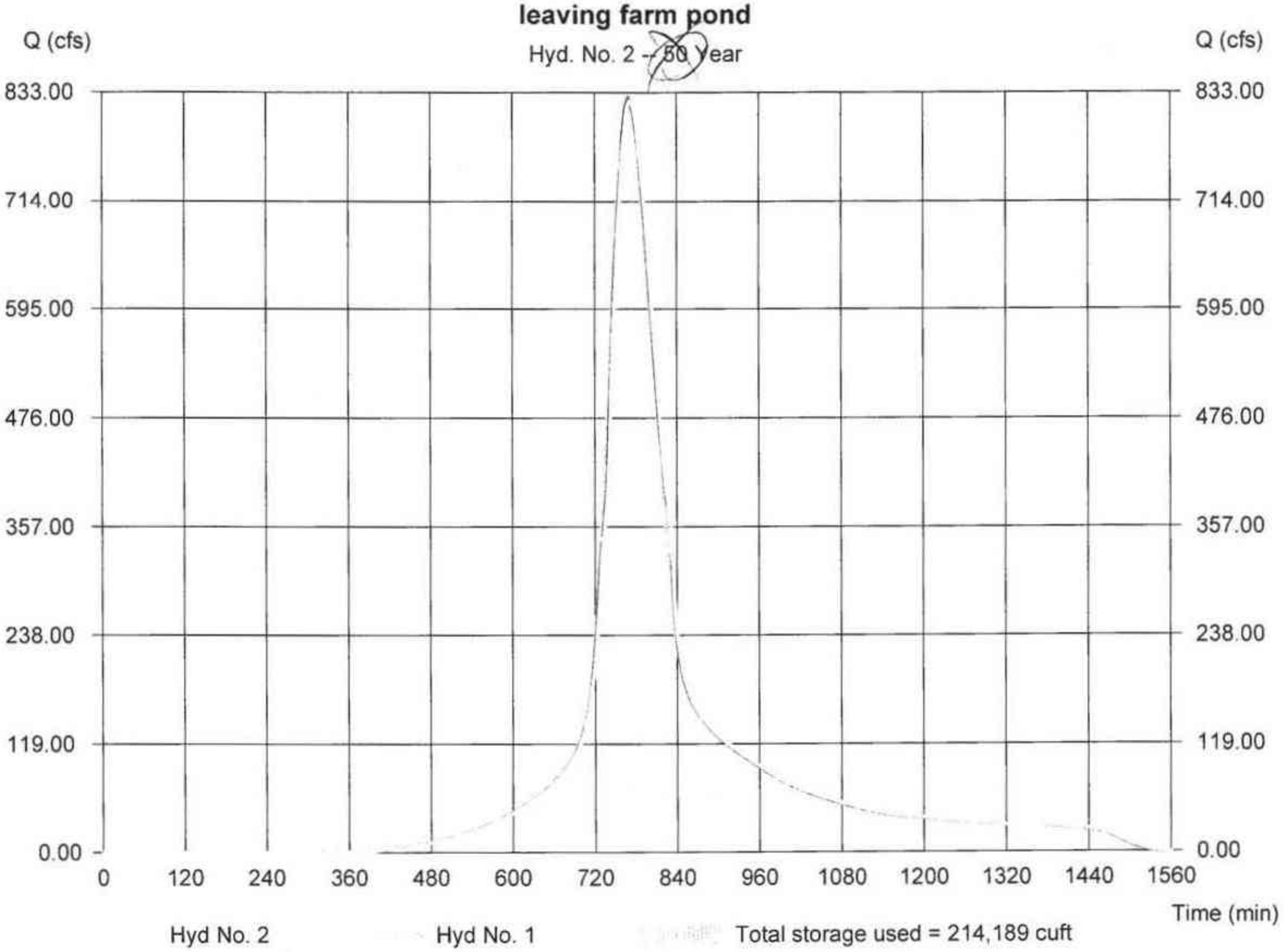
Hyd. No. 2

leaving farm pond

Hydrograph type = Reservoir
Storm frequency = 50 yrs SDF 150% of 100 yr
Time interval = 2 min
Inflow hyd. No. = 1 - Incoming Drainage
Reservoir name = Farm Pond

Peak discharge = 823.99 cfs
Time to peak = 770 min
Hyd. volume = 7,172,759 cuft
Max. Elevation = 649.44 ft
Max. Storage = 214,189 cuft

Storage Indication method used. Wet pond routing start elevation = 640.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	548.21	2	768	4,707,570	----	------	------	Incoming Drainage
2	Reservoir	545.48	2	772	4,707,570	1	646.77	168,463	leaving farm pond

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

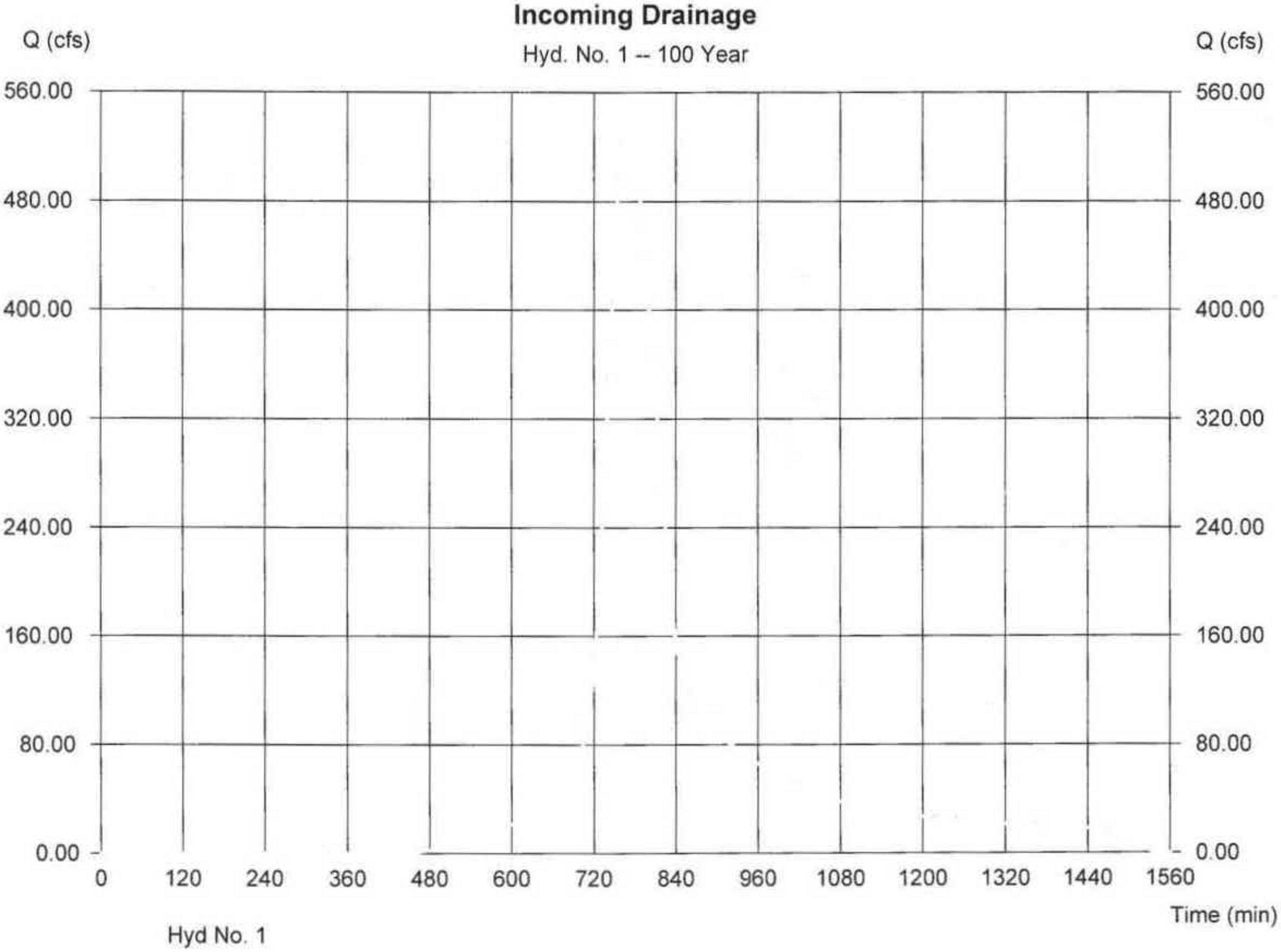
Monday, Feb 14, 2011

Hyd. No. 1

Incoming Drainage

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 244.000 ac
Basin Slope = 10.0 %
Tc method = USER
Total precip. = 8.40 in
Storm duration = 24 hrs

Peak discharge = 548.21 cfs
Time to peak = 768 min
Hyd. volume = 4,707,570 cuft
Curve number = 74
Hydraulic length = 500 ft
Time of conc. (Tc) = 74.00 min
Distribution = Type III
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Feb 14, 2011

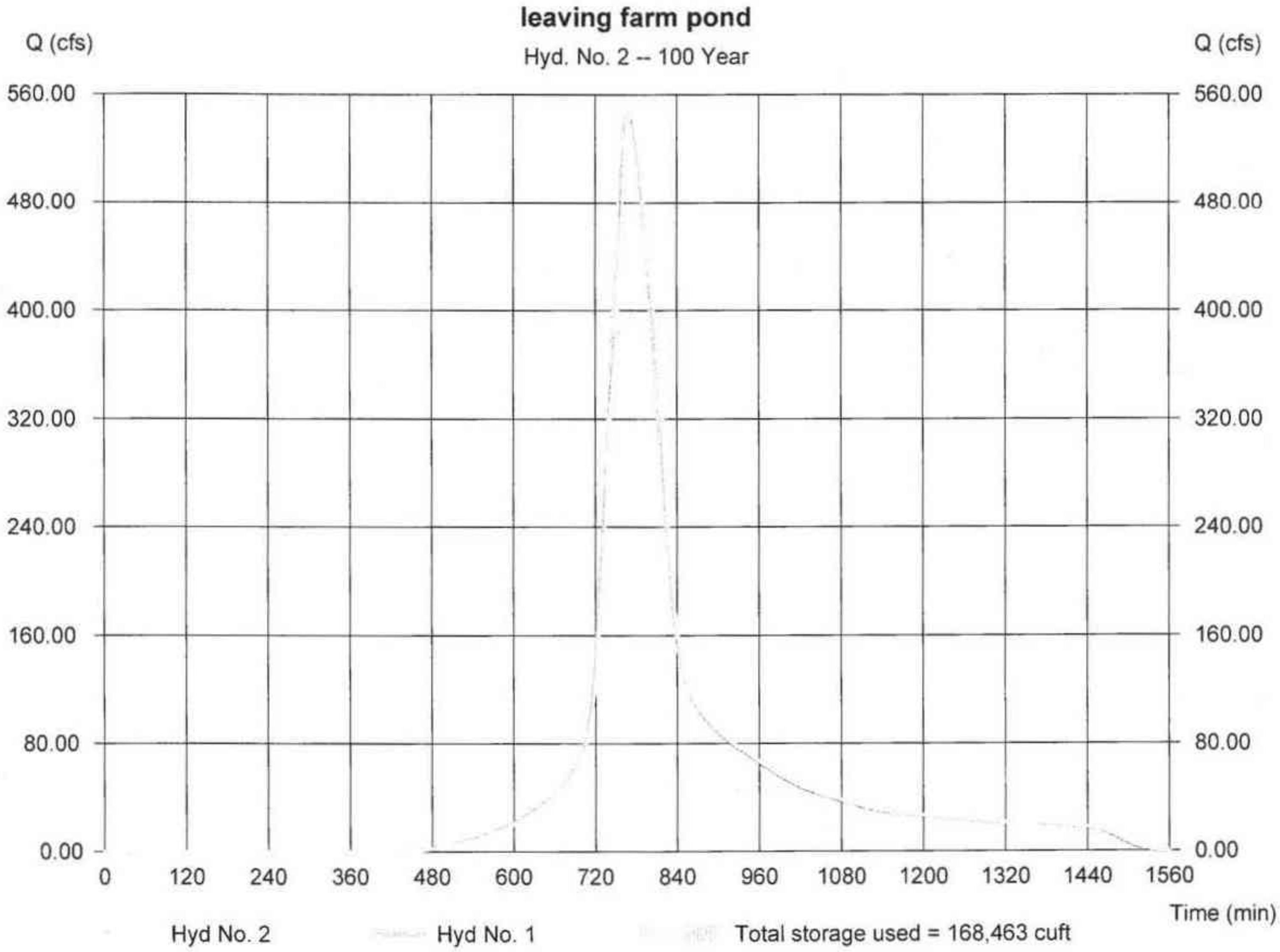
Hyd. No. 2

leaving farm pond

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 1 - Incoming Drainage
Reservoir name = Farm Pond

Peak discharge = 545.48 cfs
Time to peak = 772 min
Hyd. volume = 4,707,570 cuft
Max. Elevation = 646.77 ft
Max. Storage = 168,463 cuft

Storage Indication method used. Wet pond routing start elevation = 640.00 ft.



Hydraflow Rainfall Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Feb 14, 2011

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	0.0000	0.0000	0.0000	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	0.0000	0.0000	0.0000	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	0.0000	0.0000	0.0000	--------

File name: SAMPLE.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

Precip. file name: farmpond.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.50	3.50	0.00	3.30	5.50	6.10	11.40	8.40
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	0.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	6.50	6.00	8.00

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SEE OCT 2010
EDITION FOR
SPEC'S THAT WERE
NOT SUPERSEDED

UPDATED TECHNICAL SPECIFICATIONS

02210 and 02630

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NYS Cert. of Authorization #0006974

SECTION 02210 - EARTHWORK

PART I - GENERAL

1.01 DESCRIPTION

A. The General Contractor shall furnish all labor, materials, tools, and equipment necessary to perform all excavating, backfilling and disposing of surplus and unacceptable materials as required for constructing structures, pipelines, roads, grading and other facilities, except that the Electrical Contractor shall perform all excavating, backfilling and disposing of surplus and unacceptable materials as required for the installation of underground duct banks, and handholes and the Plumbing Contractor shall perform all excavating, backfilling and disposing of surplus and unacceptable materials as required for the installation of underground sewer and water lines as shown on the Contract Drawings.

1.02 RELATED SECTIONS

A. Section 01350: Environmental Protection and Erosion Control

B. Section 02110: Clearing and Grubbing

1.03 EXISTING CONDITIONS

A. The locations of existing underground utilities shown on the Contract Drawings are approximate. The Contractor shall determine the exact location of all existing utilities before commencing the Work. The Contractor shall contact the utility companies for locations of their respective lines. The Contractor is responsible to verify the locations of all utilities and for any damage, which occurs to any underground utilities.

none shown

B. A subsurface soil investigation program has been conducted to establish a basis for the design of the new structures. The locations of the test borings are shown on the Contract Drawings and copies of the test boring logs are appended to the end of this Section. The logs are not intended to constitute any explicit or implicit representation as to the nature of the subsurface conditions, which may be encountered at the Site. Before submitting a Bid, the bidder may, at its own expense, conduct such investigations and test, as the bidder may deem necessary.

B. The Contractor shall do such additional investigations of the surface and subsurface soils as it deems necessary to satisfy itself as to the conditions existing throughout the extent of the work, including but not limited to the type of equipment required to perform the work and the character, quality and quantity of subsurface materials to be encountered. Failure of the Contractor to do all additional investigations necessary and/or to acquaint itself with the available information will not relieve it from the responsibility for properly judging and estimating the difficulty and cost of successfully performing the work.

1.04 QUALITY ASSURANCE

A. Reference Standards

The latest edition of the following standards, as referenced herein, shall be applicable:

1. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering".
2. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of Highway and Transportation Officials (AASHTO)".

B. Requirements of Regulatory Agencies

The Contractor shall comply with all Federal, State, and Local governmental authorities.

C. Testing Agency

The Contractor shall provide and pay for all costs in connection with a qualified independent testing laboratory to determine the acceptability of materials and compaction requirements as noted in this Section.

The Contractor's laboratory shall perform gradation tests on proposed materials for compliance with the specification and perform field moisture content and density tests to assure that the specified compaction of fill has been obtained.

1.05 REQUIRED SUBMITTALS

A. The Contractor shall submit to the Engineer the identification of the source of all fill and backfill materials. Copies of gradation analysis for each material and field moisture content and density test results shall be submitted. The Contractor shall also submit detailed drawings and design computations for all sheeting and bracing prepared by a registered professional engineer. In addition the Contractor shall submit details for the dewatering systems it intends to use. Approval of such materials and drawings shall not relieve the Contractor from the requirement that all materials and the dewatering system meet the specifications described in this Section.

1.06 PROJECT REQUIREMENTS

A. The Contractor shall be wholly responsible for designing, installing, maintaining and operating all temporary systems to accomplish lateral earth support and dewatering.

B. Protect excavations by shoring, bracing, sheet piling, and underpinning or by other methods as required to ensure the stability of the excavation.

C. Underpin or otherwise support structures and other facilities and utility lines adjacent to the excavation, which may be damaged by the excavation. Immediately notify the Engineer of any unexpected subsurface conditions.

D. Locate existing underground utilities in the area of the work. Provide adequate means of support and protection of underground utilities that are to remain during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer and utility owner immediately for directions. The Contractor shall cooperate with the Owner and utility companies to keep services and facilities in operation. Damaged utilities must be repaired to the satisfaction of the Owner and utility companies, at no cost to the Owner.

E. The Contractor shall provide barricades and warning lights on all open excavations. Protection of structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by the trenching operation must be maintained. Excavations within the drip-line of large trees must be done by hand. Protect the root system from damage or dry-out to the greatest extent possible. Paint root cuts of 1" diameter and larger with an approved emulsified asphalt tree paint.

F. The Contractor shall control dust by sweeping and sprinkling of roadways to minimize the creation and dispersion of dust

PART 2 - PRODUCTS

2.01 GENERAL

A. Excavated material may be used for backfill unless directed otherwise by the Engineer. Excess material shall be disposed of off-site or as ordered by the Owner. It is the responsibility of the Contractor to provide material within the specified gradation limits that can be properly placed and compacted.

2.02 SELECT GRANULAR FILL

A. Material for select fill shall be sandy gravel, or clean fine gravel free of organic material, loam, wood, trash, snow, ice, frozen soil and other material which, in the opinion of the Engineer is objectionable, and shall be well-graded within the following limits:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
4 in.	100
No. 4	30-95
No. 40	5-50
No. 200	0-8

2.03 COMMON FILL

A. Common fill shall be material whose gradation shall be not more than 35 percent (35%) passing the No.200 sieve. All common fill shall be inorganic soil free of clay, deleterious material and rocks larger than 6 inches and organic material such as leaves, grass, roots, brush and rubbish. Common fill shall be used beneath pavement areas, as general site fill and as backfill at other areas where permitted and indicated on the Contract Drawings or directed by the Engineer.

2.04 PAVEMENT SUBBASE

A. The subbase for pavements shall be a graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand, or NYSDOT "Item 4".

2.05 UNSUITABLE MATERIAL

A. Shall include all material excavated from the site which does not meet the requirements of this Section. Unsuitable material shall be removed from the Site and disposed of by the Contractor at no additional cost to the Owner.

2.06 STRUCTURAL FILL

A. Structural fill shall be a graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand, as approved solely by the Engineer and Architect.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall establish the extent of the excavations by area and elevation as indicated on the Contract Drawings; accurately determine all existing utility line elevations and locations prior to beginning any excavation; and maintain benchmarks and other elevation control points, at no additional cost to the Owner. The excavations shall include pavement, fill, natural sand, glacial till, boulders not requiring drilling and blasting to remove and decomposed rock, except bedrock.

B. All excavation shall be open-cut type. The Contractor shall excavate all earth and other materials regardless of the types of materials encountered down to the depths required. All excavations for structures and pipelines shall be sloped or temporarily supported in accordance with the applicable OSHA regulations contained in 29 CFR Part 1926 Subpart P. New or used materials may be used for temporary supports. Used material shall be in good condition. All steel used for temporary support systems shall be designed in accordance with AISC "Specifications for Structural Steel Buildings"except that field welding will be permitted. Steel sheet piling shall be manufactured from steel conforming to ASTM A328. Steel for wales and braces shall conform to ASTM A36. The Contractor shall maintain all temporary supports for the full time that excavations are open. All timber used for sheeting and bracing shall be sound and free from defects that may impair its strength. Timber shall be rough sawn, and any grade of spruce, Douglas fur, white or yellow Lodgepole or Ponderosa pine or Western Hemlock plank. Deformed or split timber shall not be used.

C. The Contractor shall leave in place all sheeting and bracing as may be indicated on the Contract Drawings to be left in place or only when ordered by the Engineer in writing to be left in place for the purpose of preventing damage to structures, utilities or property. Payment for sheeting ordered left in place will only be made for the length and amount of sheeting left in place. No reimbursement will be made for sheeting indicated on the Contract Drawings. Sheeting and shoring to be withdrawn shall be carefully removed so as not to endanger the safety of personnel, other structures, utilities, pipelines or property. All voids left or caused by the withdrawal of sheeting shall be immediately filled with sand and compacted.

D. The elevation of the bottom of footings shown on the Contract Drawings shall be considered as approximate. The Engineer may order changes in dimensions and elevations as required to establish a satisfactory footing. All structure excavations shall be hand trimmed to permit the placing of full widths and lengths of footings on horizontal beds. When excavations are made below required grades, they shall be backfilled with compacted select fill or concrete as directed by the Engineer at no additional cost to the Owner.

E. The excavations shall be extended on each side of structures, footings, etc., to permit the setting of forms, installation of temporary supports or the safe sloping of the sides.

F. The subgrades for pavement and structures shall be firm and dense, free of mud, muck, frozen soil or other unstable materials. Subgrades, which become soft or mucky on top due to construction activities, shall be reinforced with crushed stone.

G. All damage to pipes or structures occurring through settlements, heaving, water or earth pressures, slides, caving, or other causes shall be repaired by the Contractor at its own expense. The Contractor has the option of using shoring or sheeting. All shoring or sheeting shall be properly braced to maintain safe-working conditions at all times.

3.02 TRENCH EXCAVATION

A. Trenches shall be excavated to a width which will provide adequate working space and pipe clearances for proper pipe installation and shall not exceed the width shown on the Contract Drawings. The slope of the sides of the excavation shall be kept as nearly vertical as possible, consistent with the types of materials encountered. Except as otherwise noted, pipe trenches shall be excavated to a depth of six (6) inches below the bottom of the pipe. Overexcavation shall be backfilled with compacted select fill.

B. Where trenches would become unreasonably large due to a deep excavation or an extremely wet condition, the Contractor shall slope or bench the trench walls or use sheeting to maintain safe working conditions. A clear area shall be maintained a sufficient distance back from the top edge of the excavation to avoid overloading which may cause slides, cave-ins, or shifting of the pipe.

C. The Contractor shall excavate the trenches to the proper depths required by the profile shown on the Contract Drawings avoiding overexcavation and providing a uniformly graded bottom surface. After approval of the trench bottom has been obtained from the Engineer, the pipe bedding material shall be installed on the trench bottom from wall to wall to the thickness shown on the Contract Drawings and shall be evenly graded to the proper grade to assure full bearing of the pipe throughout its entire length.

D. Stones larger than 3/4 in. in size shall be removed from the immediate area around the pipe to avoid point bearing. Bell holes and depressions for the joints of the pipes shall be dug after the bedding material has been properly graded.

E. Whenever wet or otherwise unstable material is encountered that is incapable of properly supporting the pipe in the bottom of the trench, such material shall be over-excavated to a depth and extent as ordered by the Engineer and replaced with suitable material to allow for the construction of a stable pipe bed. The trench shall be open only so far in advance of the pipe or utility installation, as the Engineer shall permit.

3.03 BACKFILLING

A. All backfill for structures and trenches and as required to provide the finished grades shown on the Contract Drawings shall be furnished, placed and compacted by the Contractor.

B. No backfilling of trenches will be allowed until all specified tests have been performed and the Engineer has approved the installed piping.

C. The excavations shall be backfilled as soon as possible, but not until the Engineer has accepted the construction below grade including waterproofing and insulation, removal of all formwork, removal of temporary supports and removal of trash and debris.

D. The line, grade, and joints of all pipelines will be inspected by the Engineer before backfilling the trench is commenced. Some backfill may be placed to hold the pipe true to grade and alignment during the line testing. Care shall be exercised in backfilling trenches to protect the pipe from falling rocks, direct impact of compaction equipment or other sources of potential damage.

E.. The backfill material around structures and piping shall be placed in-the-dry and brought up in layers, evenly on all sides. A variation of two (2) feet in elevation will be the maximum allowed. Where topsoil is called for, the final top of fill shall be the required topsoil thickness below the finish grade. Each layer shall be thoroughly compacted by rolling or with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached final elevation. Other methods of achieving the compaction requirements may be used with the written approval of the Engineer.

F. Backfill shall be compacted as specified in this Section. Backfill not compacted to the required density shall be removed, refilled, recompacted, and retested at the Contractor's expense until the requirements are met. Excess material may be disposed of at a location ordered by the Owner and/or Engineer at no additional cost to the Owner. Backfill shall be maintained in a satisfactory condition in accordance with the requirements of these specifications.

3.04 COMPACTION

A. Fill shall be placed only on surfaces approved by the Engineer. The existing embankment shall be benched prior to the placement of new embankment materials. Each layer of fill placed shall be compacted to a density of not less than 95% of the maximum laboratory dry density as determined by ASTM Test D1557, Method D. Field density tests to insure that the specified density is obtained will be performed by the Contractors testing laboratory during each day of compaction work. Compaction of each layer shall be accomplished by hand-guided mechanical equipment such as a small vibratory roller, approved by the Engineer and capable of achieving the specified densities. Each layer shall be compacted by at least four (4) coverages of the surface of each lift using approved compaction equipment.

B. The following additional requirements shall apply to all fill materials in freezing weather:

1. A layer of fill shall not be left in an uncompacted state at the close of a day's operations. Prior to terminating work for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by the trucks used for compaction.

2. The Contractor shall not place a layer of compacted fill on snow, ice, or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required prior to fill placement as directed by the Engineer.

C. Where fill or backfill must be moisture conditioned before compaction, the Contractor shall uniformly apply water to the surface of each layer. The Contractor shall prevent ponding of water on the surface during compaction operations.

E. The Contractor shall remove and replace, or scarify and air dry, soil that is too wet to permit compaction to the specified density. Soil that has been removed because it is too wet may be stockpiled or spread and allowed to dry. Drying may be assisted by harrowing or pulverizing until the moisture content is reduced.

3.05 **DEWATERING**

A. Where necessary, the Contractor shall furnish, install, maintain, operate, and remove temporary dewatering systems as required to lower and control the groundwater level in order to maintain the undisturbed state of foundation soils below structures and piping, to permit placement of compacted granular fill, pipe bedding and drainage materials, construction of structures and piping in-the-dry, and/or to remove, intercept or divert all water which enters excavations and work areas. The Contractor shall submit drawings showing details of the dewatering systems for approval by the Engineer. The approval of the Contractor's drawings by the Engineer shall not relieve the Contractor of its responsibility to provide an adequate dewatering system.

B. As part of its request for approval of a particular dewatering system the Contractor shall demonstrate the adequacy of the proposed system by means of a test installation. Discharge water shall be clear, with no visible soil particles in a 1-qt sample. If the discharge water does not meet this qualification, the Contractor shall install a sediment basin (or comparable structure) in accordance with New York State Guidelines on Sediment and Erosion Control. The Contractor shall, at its own expense, correct all damage resulting from inadequacy of the dewatering system or from flooding of the construction site from other causes. The Contractor shall comply with all special conditions attached to the State and Federal permits associated with the portions of the work within and adjacent to waterbodies (see Appendices).

C. The dewatering systems shall be adequate to drain all excavations, to maintain the water at such a level as to permit construction in the dry, and to maintain the lowered water table until the construction has been completed to the required stages. Dewatering of trenches shall commence when ground water is first encountered, and shall be continuous until such time as submergence in water will not damage the pipeline or structure.

D. The Contractor shall maintain the water level below the specified elevations for the various phases of the work continuously and shall make such provisions as may be necessary to avoid interruptions due to weather, labor strikes, power failures, or other delays. The Contractor shall provide and have ready for immediate use at all times diesel or gasoline powered standby pumping units to adequately serve the system in case of failure of the normal pumping units.

E. A failure in the dewatering system will not be tolerated when soil conditions are such that a rising water level in the excavated area may make the foundation material unstable and therefore unfit for the placement of structures, or pipes.

F. Boiling, or any form of uncontrolled seepage, in the bottom or sides of the excavation shall be prevented at all times. If for any reason the dewatering system is found to be inadequate to meet the requirements of this Section, the Contractor shall at its own expense make such additions, changes and/or replacements as necessary to provide, in the judgment of the Engineer, a satisfactory dewatering system.

G. In trenches the Contractor shall maintain the groundwater level at or below subgrade of pipes until the pipes are placed and backfilled sufficiently to prevent flotation.

H. The Contractor shall prevent flotation by maintaining a continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages, which may result from failure of this system.

I. Drainage water shall be disposed of in such a manner so that flow or seepage back into the excavated area will be prevented. The water shall be conveyed from the site in a closed conduit. Trench excavations shall not be used as temporary drainage ditches. There shall be no discharge of silty, muddy or otherwise polluted water from any dewatering operation to any natural watercourse.

J. The Contractor shall remove the dewatering system, materials, and associated appurtenances when no longer required or when ordered by the Engineer.

END OF SECTION

SECTION 02630 – STORMWATER DRAINAGE

PART 1 – GENERAL

1.01 DESCRIPTION

A. The General Contractor shall provide all labor, materials, and equipment necessary to install, test and place into service a stormwater drainage system to the lines, grades, elevations and limits shown on the Contract Drawings. The Work shall include but not necessarily be limited to, sump, catch basins, inlets, headwalls, piping, valves and other structures as required.

1.02 RELATED SECTIONS

A. Section 02310 - Earthwork

1.03 SUBMITTALS

A. The General Contractor shall submit shop drawings, catalog data, and manufacturer's technical data showing complete information on gaskets, fittings, frames and covers and the material composition, physical properties, and dimensions of the pipe. The submittal shall also include the manufacturers recommendations for the handling, storage and repair of damaged pipe as well as installation instructions.

1.04 DELIVERY, STORAGE AND HANDLING

A. The General Contractor shall transport, unload, and stockpile the pipe and other materials as recommended by the manufacturer. The pipe shall be stored to prevent warping and covered to protect it against the sun's rays.

PART 2 - PRODUCTS

2.01 PIPE

A. The stormwater drainage pipe shall be high-density polyethylene (HDPE) corrugated pipe with an integrally formed smooth waterway.

B. The pipe and fitting material shall be made from virgin PE compounds, which conform, with the applicable current addition of AASHTO Material Specifications for cell classification as defined in ASTM D3350.

C. The HDPE pipe and fittings shall be supplied by the same manufacturer.

D. The "Silt Tight Joints" shall have a bell and spigot design with arubber gasket meeting the requirements of ASTM F477.

E. The HDPE pipe shall be N-12 as manufactured by Advanced Drainage Systems, Inc., 4640 Trueman Blvd., Hillard OH 43026, 800-821-6710, http://www.ads-pipe.com, or an approved equal.

2.02 PIPE BEDDING, HAUNCHING AND INITIAL BACKFILL

A. The pipe bedding, haunching and initial backfill shall be compacted granular fill.

B. Material for compacted granular fill shall be sandy gravel, or clean fine gravel free of organic material, loam, wood, trash, snow, ice, frozen soil and other material which, in the opinion of the Engineer is objectionable, and shall be well-graded within the following limits:

ASTM D448 No. 6

SIEVE SIZE	PERCENT PASSING BY WEIGHT
1 in.	100
3/4 in.	90-100
1/2 in.	20-55
3/8 in.	0-15
No. 4	0-5

2.03 METALLIC WARNING TAPE

A. The metallic warning tape shall be a continuous foil core bonded between two layers of bright green polyethylene film. The tape shall be two (2) inches wide and printed with "Buried Storm Sewer Below" in prominent black lettering that is repeated along the length of the tape. The tape shall be as manufactured by Lineguard Inc., 70-T Monaco, Wheaton, IL 60189, 630-653-0271 or an approved equal.

2.04 DRAINAGE STRUCTURES

A. Precast catch basins and the sump shall be designed and manufactured in accordance with the requirements of ASTM C913. The catch basins and sumps shall be constructed of concrete having a minimum compressive strength of 4000 psi after 28 days. Reinforcing shall be the manufacturers standard of ASTM A497 welded wire fabric.

2.05 FRAMES AND COVERS

A. The catch basin curb inlet frames and grates shall be Campbell "bike safe" pattern number 2617.

B. The catch basin inlet (flat) frames and grates shall be Campbell "bike safe" pattern number 3407.

C. The standard catch basin traps shall be cast iron with stainless steel hanger hooks Campbell pattern number 2560.

D. The light duty trench frames and grates shall be Campbell pattern number 4576.

E. The cleanout frames and covers shall be Campbell pattern number 4153.

A. The above items shall be as manufactured by Campbell Foundry Co., 800 Bergen Street, Harrison, NJ 07029, 973-483-5480 or an approved equal.

2.06 RIP – RAP

A. Rip-Rap shall conform to NYSDOT Standard Specifications, Section 620, as amended 6 January 2011. D50 (50% diameter) stone sizes shall be 16" for the stream rip-rap, and 24" for the energy dissipaters.

2.07 FILTER FABRIC

A. The filter fabric installed on the construction entrances shall be 600 x as manufactured by Mirafi, Inc. or an approved equal. The filter fabric shall be a woven or nonwoven fabric that complies with the following requirements:

   1. Grab tensile strength of 220 lbs.
   2. Elongation at failure of 60%.
   3. Mullen burst strength of 430 psi.
   4. Puncture strength of 125 lbs.
   5. Equivalent opening size of 40-80 (US Std. Sieve)

2.08 CRUSHED STONE

A. The crushed stone used for the fill around the perforated pipe and under drainage structures shall be 3/4 inch (2 inch maximum) in size. The crushed stone shall consist of clean, durable, sharp-angled fragments of rock of uniform quality. Reclaimed or recycled concrete may be substituted provided it meets the two-inch size requirement.

PART 3 – EXECUTION

3.01 PIPE LAYING

A. In general the installation of the HDPE stormwater drainage piping shall be in accordance with ASTM D2321-Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

B. The General Contractor shall inspect all HDPE pipe for soundness and damage due to handling immediately before being placed in the trench. Any pipe that is damaged or unsound shall be removed from the Site and replaced by the General Contractor at no additional cost to the Owner. The outside of the spigots and the inside of bells shall be clean, dry, and free from oil and grease before the pipe is laid. All pipe and accessories shall be carefully lowered into the trench by suitable equipment as to prevent damage to the pipes. Pipe materials shall not be dropped or dumped into the trench.

C. The trench bottom shall be smooth and free from debris, stones larger than 1 ½-in., large dirt clods, and any frozen material. Excavation for bells (bell holes) shall be performed in advance of pipe laying so the pipe is uniformly supported along its entire length.

D. Pipe laying shall proceed upgrade, beginning at the lower end of the line. Bell and spigot pipe shall be laid with the bell end upgrade. The General Contractor shall provide assurance to the Engineer that the pipelines are laid to the required lines and grades as shown on the Contract Drawings. The Contractor shall use a laser beam instrument to lay and check the alignment and grade between manholes.

E. Prior to pipe installation, carefully bring the bedding material to grade. The haunching material (the bedding material from the bedding to the pipe springline) and initial backfill (the bedding material from the pipe springline to a level 6-in. above the crown of the pipe), shall be hand placed and compacted. The pipe installation and joint assembly shall be made in strict accordance with the manufacturer's recommendations.

F. Each length of pipe shall be pushed "home" against the section previously laid and held in place until the trench and bedding are prepared for the next pipe section. Pushing the pipe home shall be done by means of a block and push bar. The use of excavating equipment to push or move the pipe will not be permitted. At the end of each days work, the open end of all pipes shall be protected against the entrance of animals, earth, or debris by bulkheads or stoppers. The bulkheads or stoppers shall be perforated to allow for the passage of water into the installed pipe to prevent flotation. The Contractor at no additional cost to the Owner shall remove any earth or other material found in the pipe as a result of an open or unplugged pipe.

3.02 TESTING

A. The General Contractor shall provide all labor, materials, and equipment to check the integrity of the installed pipe as well as verify that the pipe was not damaged during installation. For "Silt Tight Joints" a visual inspection will be required to insure that the pipe has been installed to the correct lines and grades.

3.03 METALLIC WARNING TAPE

A. The General Contractor shall place a metallic warning tape over the stormwater drainage lines.

END OF SECTION

STORMWATER POLLUTION PREVENTION PLAN
Warwick Commons

Village of Warwick, OrangeCounty, New York

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EXECUTIVE SUMMARY

Warwick Commons is located on Sheffield Drive between Brady Road and Ridgefield Drive in the Village of Warwick (See Figure A-1 Location Map). The lots involved are Section 218, Block 1, Lots 91, 92, 93, 94, and 96 and total 15.3 acres. It consists of the construction of the last condominium section (C-5 to C-19) of the previously approved Warwick Meadows project. The overall planned development (PUD) site plan was approved from 1985 to 1987 with townhouses, single family houses, and condominiums. The majority of the sections have been constructed, along with the water, sewer, and road infrastructure, leaving only the last condominium section to be built.

This last section consists of 15 buildings with 116 units, with a maximum of 180 bedrooms. The builder has not changed the footprint nor the bedroom distribution of this phase from its original approval. The builder will be constructing the remaining buildings, parking, and garages. In addition, he will be constructing the additional infrastructure which is required and shown on the approved plan. Work not shown on the approved plans which needs to be constructed consists of stormwater controls associated with the DEC regulations and General Permit GP-0-08-001 for stormwater runoff. These new stormwater controls are a result of the more stringent requirements that have been established by the DEC since the original site plan was approved.

Since the initial approval, US Army Corps of Engineers (ACOE) wetlands have been delineated, and two of the buildings within the PUD have been moved slightly to avoid encroachment. All stormwater controls have been designed to avoid the wetlands as well. ACOE will not be involved as there is no wetland disturbance involved with the project.

Construction of the new buildings and paved parking areas will cause an increase in impervious surface. Proposed drainage improvements include a series of smaller water quality basins in addition to dry wells. Each building will have its stormwater collected and deposited into a dry well for treatment. Stormwater from parking lots and other areas will be collected via traditional catch basins and piped to one of six water quality basins onsite. As part of the previous construction, large detention ponds were provided downstream to treat volume but not quality. These water quality basins will aid in the quality treatment.

1 Introduction and Site Description

Warwick Commons consists of the construction of the last condominium section (C-5 to C-19) of the previously approved Warwick Meadows project. The overall planned development (PUD) site plan was approved from 1985 to 1987 with townhouses, single family houses, and condominiums. The majority of the sections have been constructed, along with the water, sewer, and road infrastructure, leaving only the last condominium section to be built.

The 15.3 acre project site (tax lots 218-1-91, 92, 93, 94 & 96) is located on Sheffield Drive between Brady Road and Ridgefield Drive in the Village of Warwick. The project consists of the construction of 15 condominium buildings each with a footprint of approximately 6,765 square feet and totaling 116 units with a maximum of 180 bedrooms. The plan is consistent with the originally approved plan and has only been improved to avoid the wetland areas. The site already has Sheffield Drive crossing through it and many of the utilities have previously been installed with earlier construction projects. Excluding these improvements, the site remains wooded with some open meadows. A stream crosses the site entering in the south and exiting in the north.

2 Site Drainage and Drainage Basin Description

The site has been divided into 3 drainage subbasins which all exit the site through the stream that divides the site in half. The watershed boundaries can be found in Figure A-2 Existing Conditions Map. They have been labeled as Existing Drainage Area A, B, and C.

Under the proposed development (See Map A-3), the site is divided into 9 subbasins. Existing Drainage Area A becomes 6 subbasins, Existing Drainage Area B remains unchanged, and Existing Drainage Area C becomes 2 subbasins.

The water quality ponds have been designed to provide the required water quality treatment. Each pond has an 18" outlet pipe with a 3" orifice in a 3'x3' riser. There is also a 5' wide emergency spillway for overflow. The orifice has been placed so that the pond can fit the required water quality volume below the orifice. A 3" orifice is being used as it is the smallest permissible orifice suggested by the NYSDEC that will allow discharge without clogging. Through the use of the orifice, the peak flows have been contained so the combined peak discharge is less than existing conditions irregardless of downstream detention. These peak flows do not take into account the stormwater from the buildings which will be directed to the dry wells as that stormwater will be infiltrated back into the ground and will not leave the site as runoff.

As stormwater runoff from the site discharges and is detained downstream, attenuation of the 1-year storm (Stream Channel Protection Volume Requirement, Cp_v), 10-year storm (Overbank Flood Control Criteria, Q_p) and 100-year storm (Extreme Flood Control Criteria, Q_f) are not applicable. The attenuation has been incorporated into the downstream detention ponds previously constructed in earlier phases of the Warwick Meadows development. However, the water quality ponds have been designed such that, in addition to providing the required Water Quality Volume (WQv), they can safely pass the post developed peak flows from the 1, 10 and 100 year storm events. A summary is provided in Section 4 of this report and details can be found in Appendix B.

All drainage components are designed in accordance with the NYSDEC Phase II stormwater regulations, which require a net decrease in the rate of runoff from existing (predevelopment) conditions, and treatment of the runoff to improve water quality. However, as noted above, the net decrease requirement is not required in this case, since on-site runoff discharge is detained downstream in previously constructed detention ponds.

According to the National Cooperative Soil Survey, the site contains a variety of soils of the hydrologic groups C and D. This is to be expected, especially in the vicinity of the wetlands where poor soils are generally found. The soils include Alden silt loam (Ab), Mardin gravelly silt loam, 8-15% slopes (MdC), rock outcrip-Hollis complex, moderately steep (ROD), Swartswood and Martin very stony soils, sloping (SXC), and Swartswood and Martin very stony soils, moderately steep (SXD). All of these soils excluding the Alden silt loam are of the C hydrologic group. Alden silt loam is a D hydrologic soil.

3 General Study Methodology

In the existing condition, stormwater runoff flows generally from towards the stream from both the east and the west. Under the proposed, developed condition, runoff is collected via a system of catch basins and pipes and redirected to the proposed water quality ponds where it is treated, and then allowed to flow into either the stream or the existing system of catch basins within Sheffield Drive.

As noted in Section 2 above, providing Cp_v, Q_p, Q_f, is not required. It is the intent of the design, therefore, to provide water quality treatment only. However, the watershed was modeled to demonstrate that the proposed ponds have the capacity to safely pass the post-developed peak flow from the 1-year, 10-year and 100-year storm events without exceeding the emergency spillway elevation.

WQv calculations were performed in accordance with the NYSDEC Stormwater Management Design Manual (SMDM) and can be found in Section 6 of this report. Routing calculations were made using the Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2008 computer modeling program. This program uses standard SCS methods of overall hydrograph calculations (TR-20 and TR-55), and allows, for example, direct entry of sub-watershed characteristics to calculate Times of Concentration (TCs). The model description and calculation methodology is presented in Appendix C.

As previously mentioned, soils on the site are classified as a mix of Hydrologic Soil Group C and D. Composite Curve Number (CN) values are weighted averages of the site soil CN's of 74 for C lawn (good condition), 80 for D lawn (good condition), 71 for C meadow, 78 for D meadow, 76 for C woods (good condition), 82 for D woods (good condition), 82 for C woods (poor condition, used for wetlands), 86 for D woods (poor condition, used for wetlands), and 98 for impervious surfaces, i.e. pavement and rooftops. Curve Number calculations can be found within the model output on each Hydrograph Report page, located in Appendix C.

Table 1 – Summary of Drainage Basin Characteristics

Site Basin	Total Area (Acres)	Impervious Area (Acres)	CN	TC (minutes)
Existing				
Drainage Area A	10.08	1.05	76	12.7
Drainage Area B	1.24	0.08	82	17.1
Drainage Area C	4.81	0.11	77	19.4
Proposed				
Drainage Area A-1	0.75	0.48	87	7.8
Drainage Area A-2	0.90	0.58	88	9.5
Drainage Area A-3	0.95	0.53	86	6.2
Drainage Area A-4	0.45	0.14	81	8.0
Drainage Area A-5	1.50	0.87	83	6.0
Drainage Area A-6	5.53	1.81	90	11.2
Drainage Area B	1.24	0.08	82	17.1

Drainage Area C-1	3.80	0.68	77	9.8
Drainage Area C-2	1.01	0.64	88	17.0

TR-55 Methods were used for calculating Times of Concentration (TC), and are presented in the model output. The TC paths are also shown on the Existing Conditions Map and the Proposed Conditions Map. The above areas are the total areas and impervious areas of each drainage area, including the buildings which direct their stormwater into dry wells. The areas used to model the proposed conditions are slightly different because they do not include the areas being directed to the dry wells.

4 Model Results

The following table presents the overall model results; details are presented in Appendix D. Refer to Figures A-2 and A-3 for the existing and proposed site, respectively. A schematic of the model routing can be found in Appendix C, Hydrology Model Results.

Table 2 – Summary of Model Results

Basin	Peak Flow, CFS		
(Hydr. #)	1-YR	10-YR	100-YR
Existing			
Drainage Area A	7.52	24.85	46.19
Drainage Area B	1.15	3.13	5.41
Drainage Area C	3.24	10.36	18.96
Combined	11.61	37.62	69.12
Proposed			
Drainage Area A-1	0.25	2.15	3.53
Drainage Area A-2	0.24	2.80	4.60
Drainage Area A-3	0.15	0.31	1.51
Drainage Area A-4	0.14	0.32	2.09
Drainage Area A-5	0.20	3.52	6.20
Drainage Area A-6	4.64	13.42	23.70
Drainage Area B	1.15	3.13	5.41
Drainage Area C-1	2.88	9.28	16.97
Drainage Area C-2	0.25	2.48	4.11
Combined	9.21	34.07	62.11
Difference	-2.40	-3.55	-7.01

For each storm event, there is a net decrease in peak flow even though it is not required. The downstream ponds which were constructed during earlier phases of the

Warwick Meadows development were designed to detain the flow from this portion of the project as well. Only quality treatment is required for this portion of the project but the ponds will pass all storms without exceeding the emergency spillway. The proposed flows do not include the runoff from any building attached to a dry well however. As designed, all condominium buildings and two of the garages are attached to dry wells so those areas have been subtracted from the proposed drainage areas. The dry wells will permit the stormwater to infiltrate into the ground rather than runoff which is why it is not included in the peak runoff values. All dry well calculations can be found in Appendix B.

5 Basin Design

The water quality basins were sized to safely pass the 100-year storm event without exceeding the emergency spillway. Each basin has a smaller forebay to provide a form of pretreatment and then a larger pool area. For discharge, the basins have an 18" outlet pipe exiting a riser. The risers are 6 inches below the emergency spillways and are 3'x3' square. Each basin has a 3" orifice located at an elevation which will allow the water quality volume to be stored in the pond before discharging. A 3" orifice is used as it is the smallest permissible orifice suggested by the NYSDEC to allow for discharge without clogging. 24 hour detention is not required if the minimum size orifice is utilized. The orifice also helps detain the water in larger storm events by controlling the discharge rate.

Each dry well is designed to be 8 feet deep and have a diameter of 8 feet. There will be two feet of stone (n value of 0.4) surrounding the dry well structure. Each dry well is designed to filter the required water quality volume as shown in the calculations provided in Appendix B.

6 Quality Controls

NYSDEC Phase II regulations call for treatment of the water quality volume (WQv), which is assumed to control 90% of the storms and is defined as

WQv= P*Rv*A/12

P= Runoff Coefficient (1.2 for Warwick)

A= Area in acres

Rv= 0.05+0.009(I),

Where I= percent Impervious Cover

Calculations can be found in Appendix B.

The required water quality volumes (WQv) for the proposed areas are shown in Table 4 below. Each basin holds the required WQv below the first orifice to allow the greatest detention possible. 24 hour detention is not possible even with the 3" orifice, the smallest permissible, that is incorporated into the design of each outlet structure. Utilizing the smallest orifice permitted allows for detention of the 1 year event for less than 24 hours.

Table 4 presents the required and provided volumes for the water quality ponds.

Table 3 – Required Volumes

	Required WQv (cf)	Orifice Elevation (ft)	WQv Provided (cf)
Proposed Drainage Area A-1	523	707.50	541
Proposed Drainage Area A-2	653	699.75	727
Proposed Drainage Area A-3	610	726.50	788
Proposed Drainage Area A-4	392	716.75	423
Proposed Drainage Area A-5	897	717.75	988
Proposed Drainage Area C-2	749	727.25	868

Each dry well has been designed to detain the water quality volume of the building discharging to it. Calculations can be found in Appendix B. For each building, there is approximately 0.155 acres of impervious surface. Therefore, the WQv to be treated for each building is 0.015 acre-ft, or 643 cubic feet (a value of 676.5 cubic feet is used in calculations). For each building an 8' deep, 8' diameter dry well is proposed. It will be surrounded by 2' of stone. Assuming an exfiltration rate of 1" in 30 minutes, the volume released over 24 hours through only the sides combined with the volume of the dry well and the volume of the void spaces in the stone is 858 cubic feet. Some buildings are proposed to have two dry wells even though one dry well is sufficient.

7 Sediment and Erosion Controls

The implementation of erosion control measures remains the responsibility of the Contractor to be hired by the Applicant and shall be in accordance with the most recent NYSDEC and local regulations at the time of construction.

Because the disturbance is more than one acre, a SPDES permit for stormwater discharges from construction activities (GP-0-08-001) will be required. Along with the submission of a notice of intent (NOI) form to the NYSDEC. The primary components of this plan are the control of incidental releases during construction. There will be a substantial amount of disturbance which must be managed.

The Erosion Control plan can be found in Figure A-4 Erosion Control Plan. A recommended sequence of construction appears on this plan. The intent of this recommended sequence of construction is to ensure that all sediments are maintained on-site. Should it be found that sediments have left the site; the contractor must take immediate measures to rectify the situation.

The Erosion Control Plan also shows the limits of each phase. Phase 1 will be approximately 3.05 acres, Phase 2 will be approximately 4.49 acres, and Phase 3 will be approximately 3.07 acres. All phases comply with the 5 acre maximum permitted by NYSDEC.

7.1 Temporary Erosion and Sediment Control Features

Table 5 presents a narrative of the general construction sequence and erosion control plan. Refer to the Erosion Control Plan for a recommended sequence of construction. The significant components of this plan are as follows. At no time is any of the site to be left unprotected.

Phasing – the project is phased in order to minimize the disturbed areas at any given time, and to maximize the control of erosion.

Inlet Protection – Once installed and building work begins, every catch basin in a paved area where construction traffic will travel is to have a protection of block and gravel, silt fence (in accordance with NYSDEC details) or Silt Sacks®. Sumps will also be provided around newly installed inlets.

Wheel Pad – Trucks must pass through a stone wheel pad prior to leaving the immediate construction area.

Silt Fences – Silt fences are proposed downhill of any soil disturbance and around all soil stockpile areas.

Haybales – Haybales are installed downstream of small catchment areas.

Dirtbag – Construction which must be dewatered must be pumped through a Dirtbag© system. This is a filter bag which connects to the discharge side of a pump, and is generally mounted on hay bales for further removals. It can be trailer mounted.

Potential impacts from Sediment and erosion during construction would be mitigated by implementation of a detailed Soil Erosion and Sediment Control Plan prepared in accordance with "Guidelines for Urban Erosion and Sediment Control in New York", latest edition. The objectives of the plan would be to:

Control erosion at its source with temporary control devices.

Minimize the runoff from areas of disturbance.

Remove sediments from stormwater runoff before discharging to the drainage systems.

These objectives would be achieved by implementing the following general soil erosion and control measures during grading and earthwork operations:

Minimize land disturbance.

Minimize the extent of cleared soil at any particular time.

Retain existing vegetation wherever feasible.

Stabilize disturbed areas that would not require further earthwork operations within 48 hours after the land has been cleared.

Minimize the extent of disturbed slopes.

Trap sediment on-site prior to discharge.

Soil erosion and sediment control during construction would be accomplished through a variety of measures, including silt fences, straw haybale dikes, stabilized construction entrances, sediment basins, temporary diversion swales, storm drain inlet protection, and dust control. Additionally, the earthwork contractors would be required to follow the following control procedures:

Have an independent inspection of the effectiveness and condition of erosion control devices at a minimum, every 7 days.

Repair or replace damaged erosion control devices immediately or in no case more than 4 hours after observing such deficiencies.

Be prepared to implement interim drainage controls and erosion control measures as may be necessary during the course of the construction.

Make available on-site all equipment, materials, and labor necessary to effect emergency erosion control and drainage improvement within 4 hours of any impending emergency situation.

Make a final inspection, clean all cross culverts, and sweep roadways.

Have on call at all times a responsible representative who, when authorized, would mobilize the necessary personnel, materials, and equipment and otherwise provide the required action when notified of any impending emergency situation.

Supply a telephone number to the Town Engineer so that the contractor may be contacted during the evenings and on weekends, if necessary.

Maintain a site log and certification of the practices and inspections.

The control measures for this site have been designed to minimize the impact of construction. Phasing has been designed to take into account the need to balance cuts and fills. The majority of the site work will be complete as quickly as possible, so that the building can then be constructed with minimal disturbance.

7.2 Permanent Erosion and Sediment Control Features

All catch basins have some ability to store the first flush of sediment. Water quality controls will have pretreatment as required by NYSDEC regulations.

8 Implementation Schedule and Maintenance

8.1 During Construction

Table 5 presents the general schedule and sequence of sedimentation and erosion control features during construction. This is a suggested schedule and is subject to the Contractor's actual schedule, means, and methods.

8.2 After Construction

Table 5 presents the schedule and sequence of sediment and erosion control features after construction. The Owner is committed to maintaining its site facilities.

Table 4 - Stormwater Pollution Control Operations

Prior to Construction	
1.	Notify Town and NYSDEC. Develop list of contacts.
2.	Install Stabilized Construction Entrances, silt fences and hay bales
3.	Set up temporary sediment basins at permanent locations and others. Install diversion swales where necessary.
During Construction	
4.	Maintain and supplement erosion control measures as necessary. At a minimum, inspect all measures weekly and after storm events or incidents.
5.	Check filter fences weekly, and after rainfall events; clean and replace as necessary.
6.	Clean out sediment basins when sediment reaches a depth of 12 inches.
7.	Public streets to remain broom clean at the end of each day.
8.	Soil Stockpile areas to be maintained and not to exceed 2:1 slopes. Stockpiles not in use to be seeded and mulched.
After Construction	
9.	Remove erosion control measures and install landscaping as required by Village approvals.
10.	Remove temporary sediment basins.
11.	Monitor landscape restoration growth and dress up as necessary.
12.	Owner to check stormwater basins and controls monthly and after significant rainfall. Basins and controls to be cleaned and kept free of unwanted vegetation and litter.

13.	Check header pipes quarterly and clean as necessary when clogging is observed.

Long term maintenance will be required as well. At a minimum, quarterly inspections of the forebay and outlet structures for each water quality basin, catch basins, and dry wells will be needed. Cleaning will be required on an annual basis or as determined by the quarterly inspections. All long term maintenance will be the responsibility of the Home Owner's Associaition.

9 CERTIFICATIONS

9.1 OWNER 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. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law.

Signature:

Kenneth Bergstol

Bergstol Enterprises

9.2 CONTRACTOR CERTIFICATION

I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the New York State Pollution 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.

Construction site: Warwick Commons (Sheffield Drive), aka Tax Lots 218-1-91, 92, 93, 94 & 96.

Signature: ______________________________ Date: ____________

Street address

Town, ST Zip Code

Phone number

APPENDIX A - FIGURES

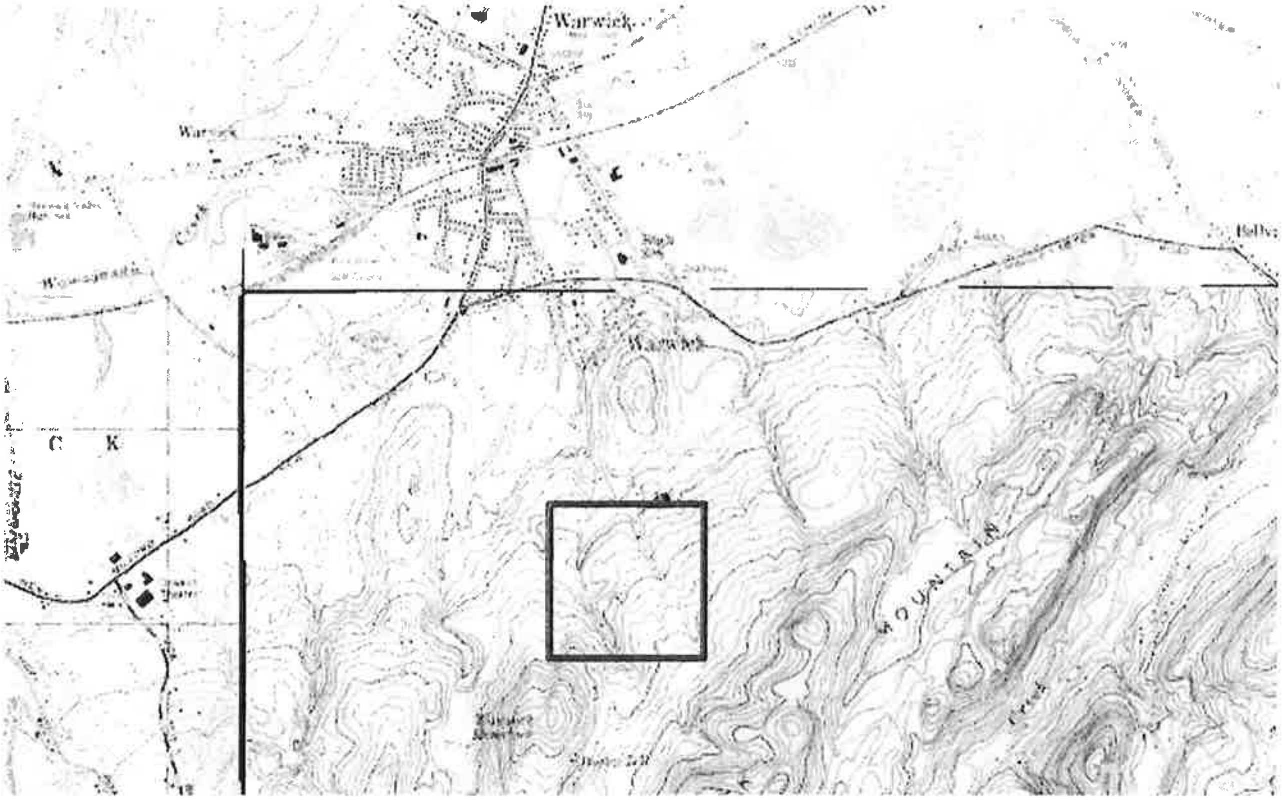


Figure 1 – Site Location Map

APPENDIX B - CALCULATIONS

CURVE NUMBER CALCULATIONS - EXISTING WATERSHEDS

DRAINAGE AREA	HYDROL. GROUP	COVER TYPE	HYDROL. COND.	TOTAL	IMPERVIOUS AREA			PERVIOUS AREA			WEIGHT-ED CN
				AREA(AC)	AREA(AC)	CN	A * CN	AREA(AC)	CN	A * CN	
Existing Drainage Area A											
	C	Wetlands-Woods	Poor	0.15				0.15	82	12.30	82
	C	Woods	Good	2.39				2.39	76	181.64	76
	C	Meadow	Good	5.22				5.22	71	370.62	71
	D	Wetlands-Woods	Poor	0.14				0.14	86	12.04	86
	D	Woods	Good	0.80				0.80	82	65.60	82
	D	Meadow	Good	0.32				0.32	78	24.96	78
		Impervious	Fair	1.05	1.05	98	102.9				98
TOTAL:				10.07	1.05		102.9	9.02		667.16	76
Existing Drainage Area B											
	C	Wetlands-Woods	Poor	0.04				0.04	82	3.28	82
	C	Woods	Good	0.41				0.41	76	31.16	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	D	Wetlands-Woods	Poor	0.31				0.31	86	26.66	86
	D	Woods	Good	0.40				0.40	82	32.80	82
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.08	0.08	98	7.84				98
TOTAL:				1.24	0.08		7.84	1.16		93.90	82
Existing Drainage Area C											
	C	Wetlands-Woods	Poor	0.29				0.29	82	23.78	82
	C	Woods	Good	4.01				4.01	76	304.76	76
	C	Meadow	Good	0.33				0.33	71	23.43	71
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.01				0.01	82	0.82	82
	D	Meadow	Good	0.06				0.06	78	4.68	78
		Impervious	Fair	0.11	0.11	98	10.78				98
TOTAL:				4.81	0.11		10.78	4.70		357.47	77

CURVE NUMBER CALCULATIONS - PROPOSED WATERSHEDS*

*Areas directed to dry wells not included

DRAINAGE AREA	HYDROL. GROUP	COVER TYPE	HYDROL. COND.	TOTAL AREA(AC)	ERVIOUS AREA			PERVIOUS AREA			WEIGHT-ED CN
					AREA(AC)	CN	A * CN	AREA(AC)	CN	A * CN	
Proposed Drainage Area A-1											
	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.27				0.27	74	20.28	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.32	0.324	98	31.752				98
TOTAL:				0.60	0.324		31.752	0.27		20.28	87
Proposed Drainage Area A-2											
	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.32				0.32	74	23.68	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.43	0.43	98	42.14				98
TOTAL:				0.75	0.43		42.14	0.32		23.68	88
Proposed Drainage Area A-3											
	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.14				0.14	74	10.36	74

	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.28				0.28	80	22.40	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.28	0.28	98	27.44				98
TOTAL:				0.70	0.28		27.44	0.42		32.76	86
Proposed Drainage Area A-4											
	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.31				0.31	74	22.94	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.14	0.14	98	13.72				98
TOTAL:				0.45	0.14		13.72	0.31		22.94	81
Proposed Drainage Area A-5											
	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.63				0.63	74	46.62	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.40	0.4	98	39.2				98
TOTAL:				1.03	0.4		39.2	0.63		46.62	83
Proposed Drainage Area A-6											
	C	Wetlands-Woods	Poor	0.15				0.15	82	12.30	82

	C	Woods	Good	0.69				0.69	76	52.44	76
	C	Meadow	Good	0.93				0.93	71	66.03	71
	C	Lawn	Good	1.56				1.56	74	115.44	74
	D	Wetlands-Woods	Poor	0.14				0.14	86	12.04	86
	D	Woods	Good	0.08				0.08	82	6.56	82
	D	Lawn	Good	0.18				0.18	80	14.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	1.03	1.025	98	100.45				98
TOTAL:				4.75	1.025		100.45	3.73		278.81	80
Proposed Drainage Area B											
	C	Wetlands-Woods	Poor	0.04				0.04	82	3.28	82
	C	Woods	Good	0.41				0.41	76	31.16	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.00				0.00	74	0.00	74
	D	Wetlands-Woods	Poor	0.31				0.31	86	26.66	86
	D	Woods	Good	0.40				0.40	82	32.80	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.08	0.08	98	7.84				98
TOTAL:				1.24	0.08		7.84	1.16		93.90	82
Proposed Drainage Area C-1											
	C	Wetlands-Woods	Poor	0.29				0.29	82	23.78	82
	C	Woods	Good	1.20				1.20	76	91.20	76
	C	Meadow	Good	0.25				0.25	71	17.75	71
	C	Lawn	Good	1.32				1.32	74	97.68	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.01				0.01	82	0.82	82
	D	Lawn	Good	0.05				0.05	80	4.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.21	0.21	98	20.58				98
TOTAL:				3.33	0.21		20.58	3.12		235.23	77

Proposed Drainage Area C-2

	C	Wetlands-Woods	Poor	0.00				0.00	82	0.00	82
	C	Woods	Good	0.00				0.00	76	0.00	76
	C	Meadow	Good	0.00				0.00	71	0.00	71
	C	Lawn	Good	0.37				0.37	74	27.38	74
	D	Wetlands-Woods	Poor	0.00				0.00	86	0.00	86
	D	Woods	Good	0.00				0.00	82	0.00	82
	D	Lawn	Good	0.00				0.00	80	0.00	80
	D	Meadow	Good	0.00				0.00	78	0.00	78
		Impervious	Fair	0.49	0.49	98	48.02				98
TOTAL:				0.86	0.49		48.02	0.37		27.38	88

Water Quality Volume Calculations

WQv = (P*Rv*A)/12
Rv = 0.05+0.009(I)
Where
I = Impervious Cover (percent)
Min Rv = 0.2
P = 90% Rainfall Event Number
A = Site Area in Acres

From Figure 4.1 NYSDEC SWM Design Manual
P = 1.2

Proposed Drainage Area A-1

A = 0.6 Acres
I = 0.32 Acres
I = 53.33%

Rv = 0.055 < 0.2 so use 0.2
WQv = 0.012 Ac-ft
= 522.72 cf

Proposed Drainage Area A-2

A = 0.75 Acres
I = 0.43 Acres
I = 57.33%

Rv = 0.055 < 0.2 so use 0.2
WQv = 0.015 Ac-ft
= 653.4 cf

Proposed Drainage Area A-3

A = 0.7 Acres
I = 0.28 Acres
I = 40.00%

Rv = 0.054 < 0.2 so use 0.2
WQv = 0.014 Ac-ft
= 609.84 cf

Proposed Drainage Area A-4

A = 0.45 Acres
I = 0.14 Acres
I = 31.11%

Rv = 0.053 < 0.2 so use 0.2
WQv = 0.009 Ac-ft
= 392.04 cf

Proposed Drainage Area A-5

A = 1.03 Acres
I = 0.4 Acres
I = 38.83%

Rv = 0.053 < 0.2 so use 0.2
WQv = 0.0206 Ac-ft
= 897.336 cf

Proposed Drainage Area A-6

A = 4.75 Acres
I = 1.03 Acres
I = 21.68%

Rv = 0.052 < 0.2 so use 0.2
WQv = 0.095 Ac-ft
= 4138.2 cf

Proposed Drainage Area B

A = 1.24 Acres
I = 0.08 Acres
I = 6.45%

Rv = 0.051 < 0.2 so use 0.2
WQv = 0.0248 Ac-ft
= 1080.29 cf

Proposed Drainage Area C-1

A = 3.33 Acres
I = 0.21 Acres
I = 6.31%

Rv = 0.051 < 0.2 so use 0.2
WQv = 0.0666 Ac-ft
= 2901.1 cf

Proposed Drainage Area C-2

A = 0.86 Acres
I = 0.49 Acres
I = 56.98%

Rv = 0.055 < 0.2 so use 0.2
WQv = 0.0172 Ac-ft
= 749.232 cf

Drywell

Date 3/26/2009

Warwick Commons **File #** 1016B

PERCOLATION TEST DATA

diameter of percolation hole(ft)	1.00
start depth of percolation test(in)	6.00
end depth of percolation test(in)	5.00
time for percolation test(min)	30.00
safety factor for clogging	1.33

DESIGN RAINFALL DATA

return period(yrs)	100
duration(hrs)	24
rainfall(in)	7.2

DRYWELL SIZE DATA

drywell I.D.(ft)	7.33
drywell O.D.(ft)	8.00
drywell depth(ft)	8.00
thickness of gravel(ft)	2.00
porosity of gravel	0.40

DRAINAGE AREA DATA

lot area(sf)	roof	6765	"C"
existing CN		76	0.00
proposed CN		98	0.17

PERCOLATION RATE CALCULATIONS

area of sides of perc hole(sf)	1.44
area of bottom of perc hole(sf)	0.79
total area of percolation hole(sf)	2.23
volume of percolation test(cf)	0.07
actual percolation rate(cf/sf/day)	1.41
design percolation rate(cf/sf/day)	1.06

RUNOFF CALCULATIONS

existing runoff(in)	0.00
proposed runoff(in)	1.20
req'd storage volume per lot(cf)	676.50

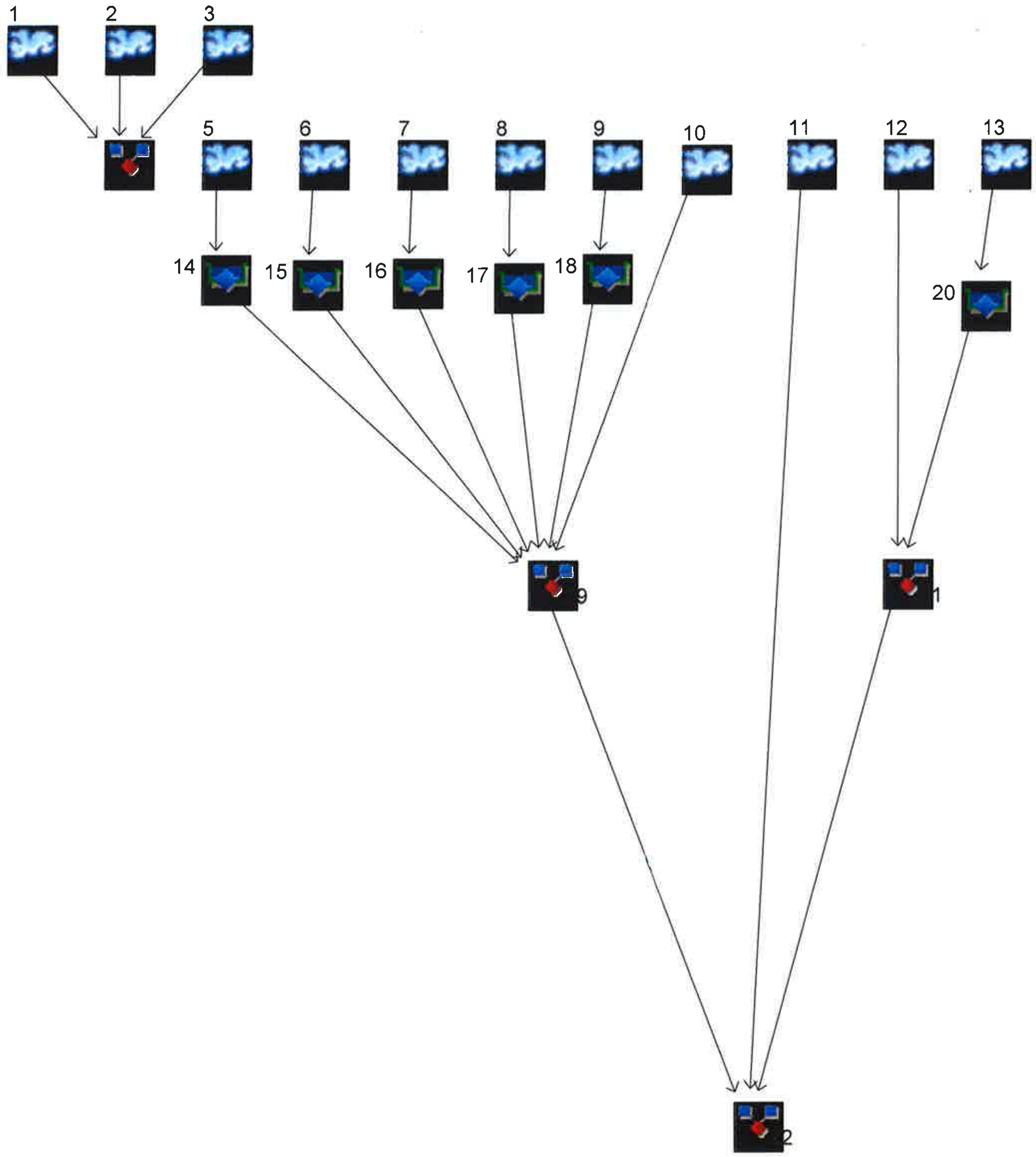
DRYWELL CALCULATIONS

drywell inside pit volume(cf)	337.59
drywell gravel void volume(cf)	201.06
total drywell volume(cf)	538.65
24 hr perc vol per drywell(cf)	320.13
total 24 hr retention vol per drywell	858.78
no. of drywells req'd	0.79

APPENDIX C – HYDROLOGY MODEL RESULTS

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052



Project: 1016 Stormwater 3 inch orifice.gpw	Monday, Mar 30, 2009

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	7.521	-------	-------	-------	24.85	-------	-------	46.19	Existing A
2	SCS Runoff	------	1.154	-------	-------	-------	3.130	-------	-------	5.408	Existing B
3	SCS Runoff	------	3.244	-------	-------	-------	10.36	-------	-------	18.96	Existing C
4	Combine	1, 2, 3	11.61	-------	-------	-------	37.62	-------	-------	69.12	Existing Combined
5	SCS Runoff	------	0.928	-------	-------	-------	2.199	-------	-------	3.587	Proposed A-1
6	SCS Runoff	------	1.239	-------	-------	-------	2.860	-------	-------	4.620	Proposed A-2
7	SCS Runoff	------	1.123	-------	-------	-------	2.717	-------	-------	4.468	Proposed A-3
8	SCS Runoff	------	0.508	-------	-------	-------	1.427	-------	-------	2.484	Proposed A-4
9	SCS Runoff	------	1.408	-------	-------	-------	3.699	-------	-------	6.279	Proposed A-5
10	SCS Runoff	------	4.642	-------	-------	-------	13.42	-------	-------	23.70	Proposed A-6
11	SCS Runoff	------	1.154	-------	-------	-------	3.130	-------	-------	5.408	Proposed B
12	SCS Runoff	------	2.883	-------	-------	-------	9.277	-------	-------	16.97	Proposed C-1
13	SCS Runoff	------	1.098	-------	-------	-------	2.546	-------	-------	4.123	Proposed C-2
14	Reservoir	5	0.245	-------	-------	-------	2.154	-------	-------	3.531	Pond A-1
15	Reservoir	6	0.240	-------	-------	-------	2.797	-------	-------	4.600	Pond A-2
16	Reservoir	7	0.149	-------	-------	-------	0.311	-------	-------	1.508	Pond A-3
17	Reservoir	8	0.140	-------	-------	-------	0.317	-------	-------	2.093	Pond A-4
18	Reservoir	9	0.200	-------	-------	-------	3.519	-------	-------	6.196	Pond A-5
19	Combine	10, 14, 15, 16, 17, 18	5.319	-------	-------	-------	21.98	-------	-------	37.40	Proposed A Combined
20	Reservoir	13	0.254	-------	-------	-------	2.482	-------	-------	4.107	Pond C-2
21	Combine	12, 20	2.993	-------	-------	-------	9.550	-------	-------	20.08	Proposed C Combined
22	Combine	11, 19, 21	9.206	-------	-------	-------	34.07	-------	-------	62.11	Proposed Combined

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	7.521	2	730	30,859	------	------	------	Existing A
2	SCS Runoff	1.154	2	734	5,164	------	------	------	Existing B
3	SCS Runoff	3.244	2	734	15,166	------	------	------	Existing C
4	Combine	11.61	2	732	51,189	1, 2, 3	------	------	Existing Combined
5	SCS Runoff	0.928	2	726	3,170	------	------	------	Proposed A-1
6	SCS Runoff	1.239	2	726	4,231	------	------	------	Proposed A-2
7	SCS Runoff	1.123	2	724	3,356	------	------	------	Proposed A-3
8	SCS Runoff	0.508	2	726	1,776	------	------	------	Proposed A-4
9	SCS Runoff	1.408	2	724	4,238	------	------	------	Proposed A-5
10	SCS Runoff	4.642	2	730	18,311	------	------	------	Proposed A-6
11	SCS Runoff	1.154	2	734	5,164	------	------	------	Proposed B
12	SCS Runoff	2.883	2	726	10,500	------	------	------	Proposed C-1
13	SCS Runoff	1.098	2	734	4,852	------	------	------	Proposed C-2
14	Reservoir	0.245	2	750	2,661	5	708.70	1,301	Pond A-1
15	Reservoir	0.240	2	756	3,551	6	700.91	1,936	Pond A-2
16	Reservoir	0.149	2	758	2,709	7	727.03	1,620	Pond A-3
17	Reservoir	0.140	2	752	1,417	8	717.23	692	Pond A-4
18	Reservoir	0.200	2	758	3,313	9	718.59	1,891	Pond A-5
19	Combine	5.319	2	730	31,963	10, 14, 15, 16, 17, 18	------	------	Proposed A Combined
20	Reservoir	0.254	2	766	4,014	13	728.53	2,237	Pond C-2
21	Combine	2.993	2	728	14,514	12, 20	------	------	Proposed C Combined
22	Combine	9.206	2	730	51,641	11, 19, 21	------	------	Proposed Combined

1016 Stormwater 3 inch orifice.gpw | Return Period: 1 Year | Monday, Mar 30, 2009

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

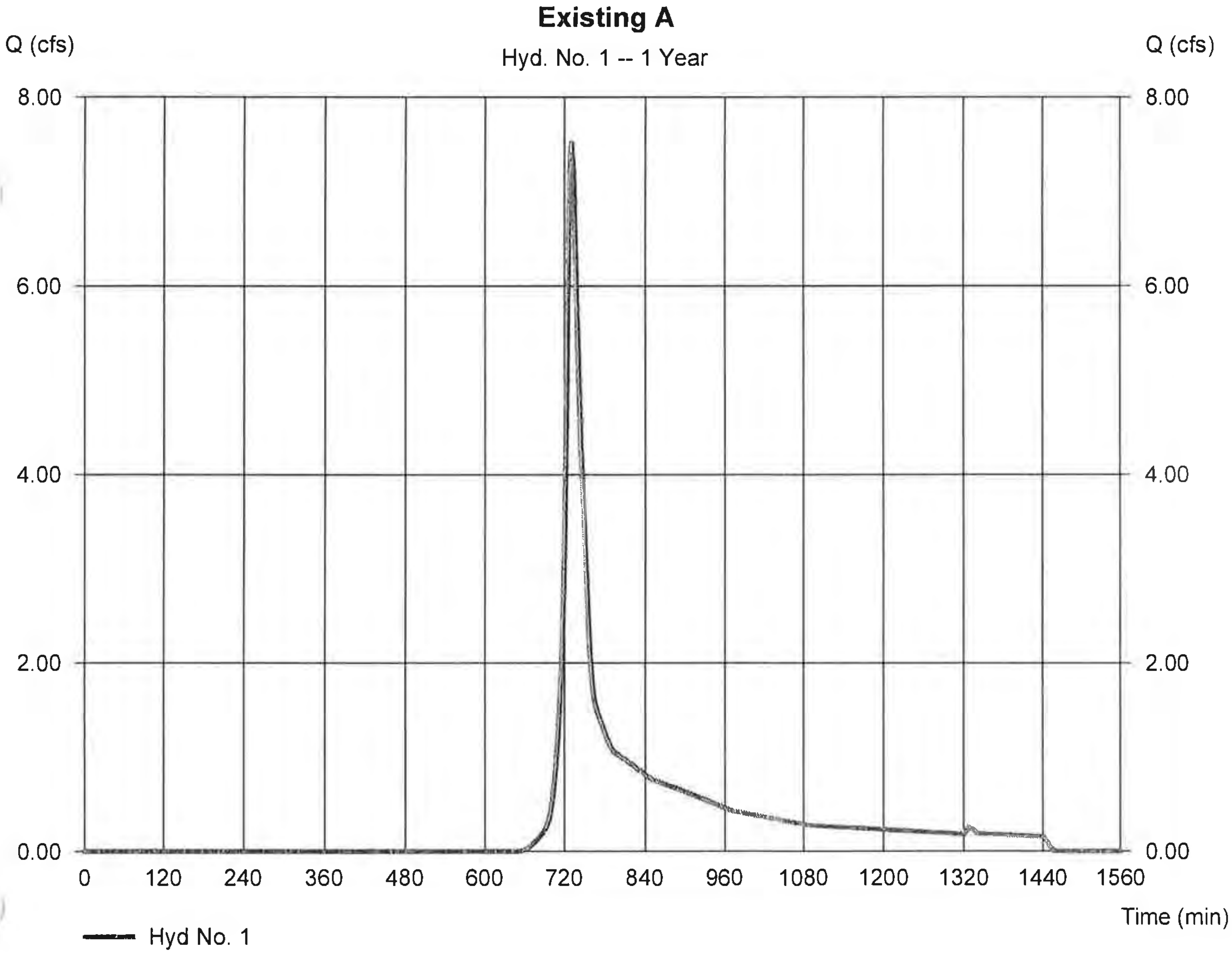
Hyd. No. 1

Existing A

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 10.070 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 7.521 cfs
Time to peak = 730 min
Hyd. volume = 30,859 cuft
Curve number = 76*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.70 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(1.050 x 98) + (0.290 x 84) + (5.220 x 71) + (2.390 x 76) + (0.800 x 82) + (0.320 x 78)] / 10.070



TR55 Tc Worksheet

Hyd. No. 1

Existing A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	10.00		0.00		0.00		
Travel Time (min)	**=**	**10.79**	**+**	**0.00**	**+**	**0.00**	**=**	**10.79**
Shallow Concentrated Flow								
Flow length (ft)	=	404.00		0.00		0.00		
Watercourse slope (%)	=	12.80		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	5.77		0.00		0.00		
Travel Time (min)	**=**	**1.17**	**+**	**0.00**	**+**	**0.00**	**=**	**1.17**
Channel Flow								
X sectional flow area (sqft)	=	5.00		0.00		0.00		
Wetted perimeter (ft)	=	7.00		0.00		0.00		
Channel slope (%)	=	5.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	17.73		0.00		0.00		
Flow length (ft)	=	796.0		0.0		0.0		
Travel Time (min)	**=**	**0.75**	**+**	**0.00**	**+**	**0.00**	**=**	**0.75**

Total Travel Time, Tc .... 12.70 min

Hydrograph Report

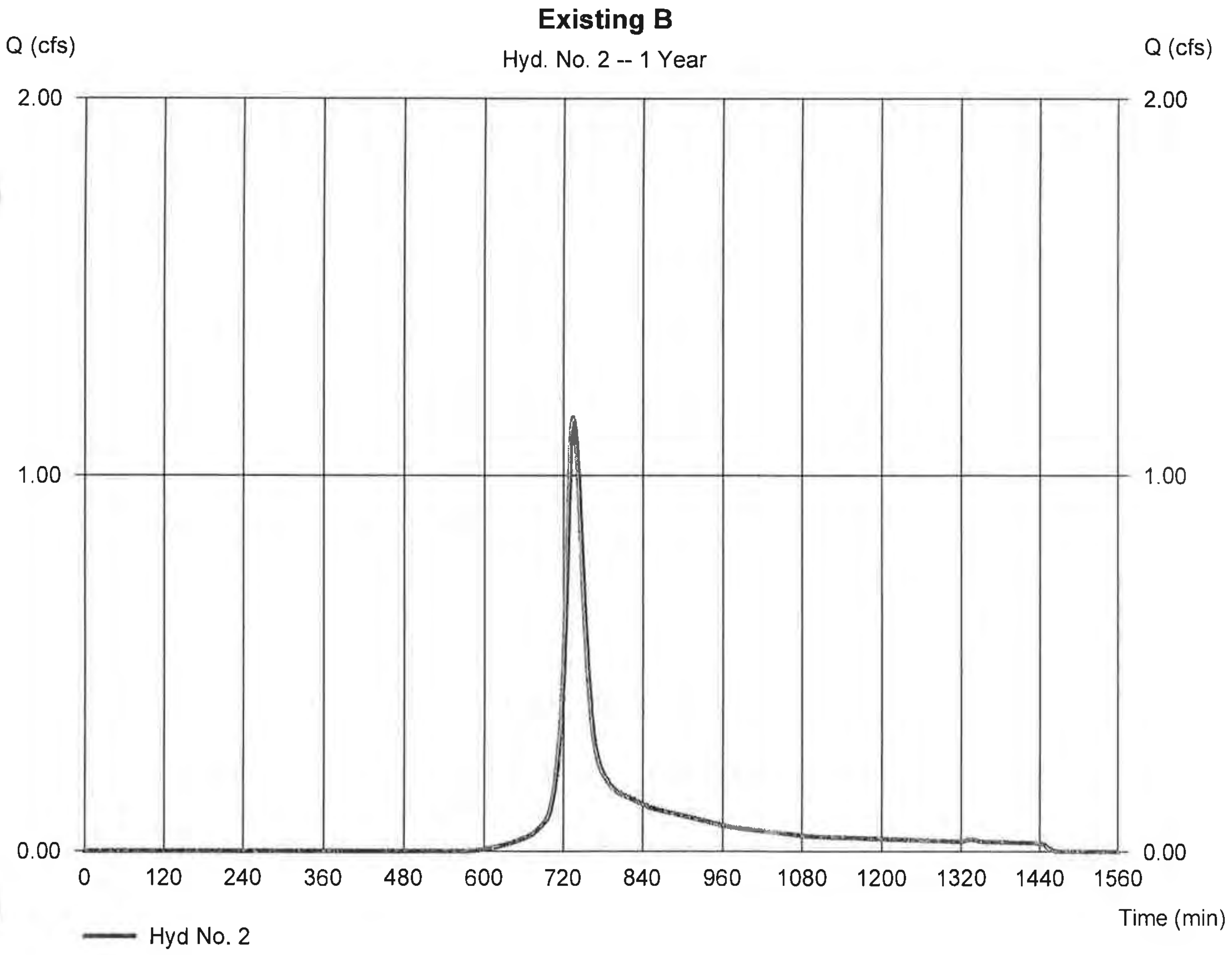
Hyd. No. 2

Existing B

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 1.240 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 1.154 cfs
Time to peak = 734 min
Hyd. volume = 5,164 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.10 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



TR55 Tc Worksheet

Hyd. No. 2

Existing B

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.400	0.130	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.50	0.00	0.00	
Land slope (%)	= 4.00	0.00	0.00	
Travel Time (min)	**= 15.56**	**+ 0.00**	**+ 0.00**	**= 15.56**
Shallow Concentrated Flow				
Flow length (ft)	= 72.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	**= 0.74**	**+ 0.00**	**+ 0.00**	**= 0.74**
Channel Flow				
X sectional flow area (sqft)	= 5.00	0.00	0.00	
Wetted perimeter (ft)	= 7.00	0.00	0.00	
Channel slope (%)	= 5.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 17.73	0.00	0.00	
Flow length (ft)	= 838.0	0.0	0.0	
Travel Time (min)	**= 0.79**	**+ 0.00**	**+ 0.00**	**= 0.79**

Total Travel Time, Tc .... 17.10 min

Hydrograph Report

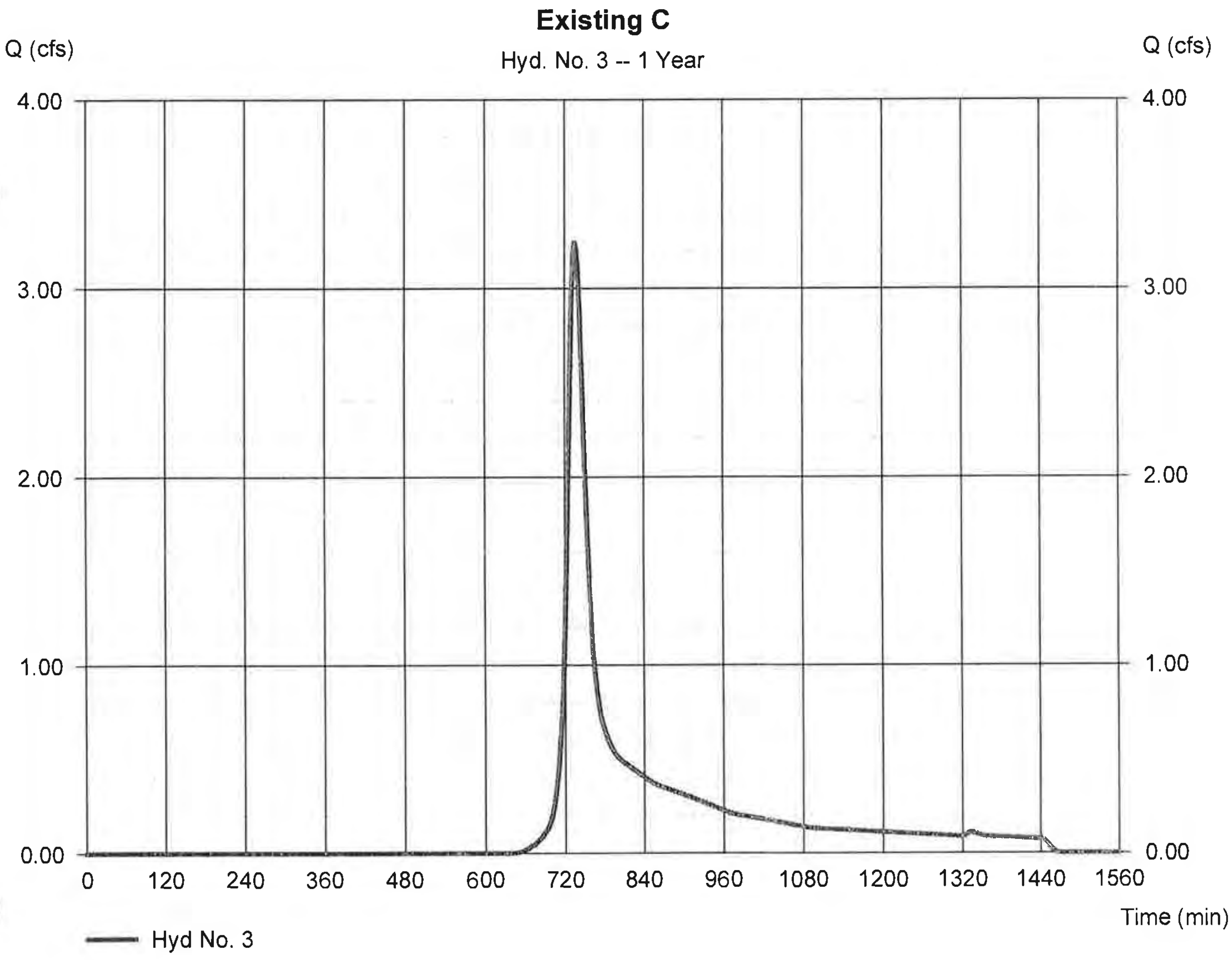
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 3

Existing C

Hydrograph type	= SCS Runoff	Peak discharge	= 3.244 cfs
Storm frequency	= 1 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 15,166 cuft
Drainage area	= 4.810 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.40 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.110 x 98) + (0.290 x 82) + (4.010 x 76) + (0.330 x 71) + (0.010 x 82) + (0.060 x 78)] / 4.810



TR55 Tc Worksheet

Hyd. No. 3

Existing C

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	**=**	**18.00**	**+**	**0.00**	**+**	**0.00**	**=**	**18.00**
Shallow Concentrated Flow								
Flow length (ft)	=	93.00		181.00		0.00		
Watercourse slope (%)	=	4.00		14.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	3.23		6.04		0.00		
Travel Time (min)	**=**	**0.48**	**+**	**0.50**	**+**	**0.00**	**=**	**0.98**
Channel Flow								
X sectional flow area (sqft)	=	5.00		0.00		0.00		
Wetted perimeter (ft)	=	7.00		0.00		0.00		
Channel slope (%)	=	5.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	17.73		0.00		0.00		
Flow length (ft)	=	394.0		0.0		0.0		
Travel Time (min)	**=**	**0.37**	**+**	**0.00**	**+**	**0.00**	**=**	**0.37**

Total Travel Time, Tc .... 19.40 min

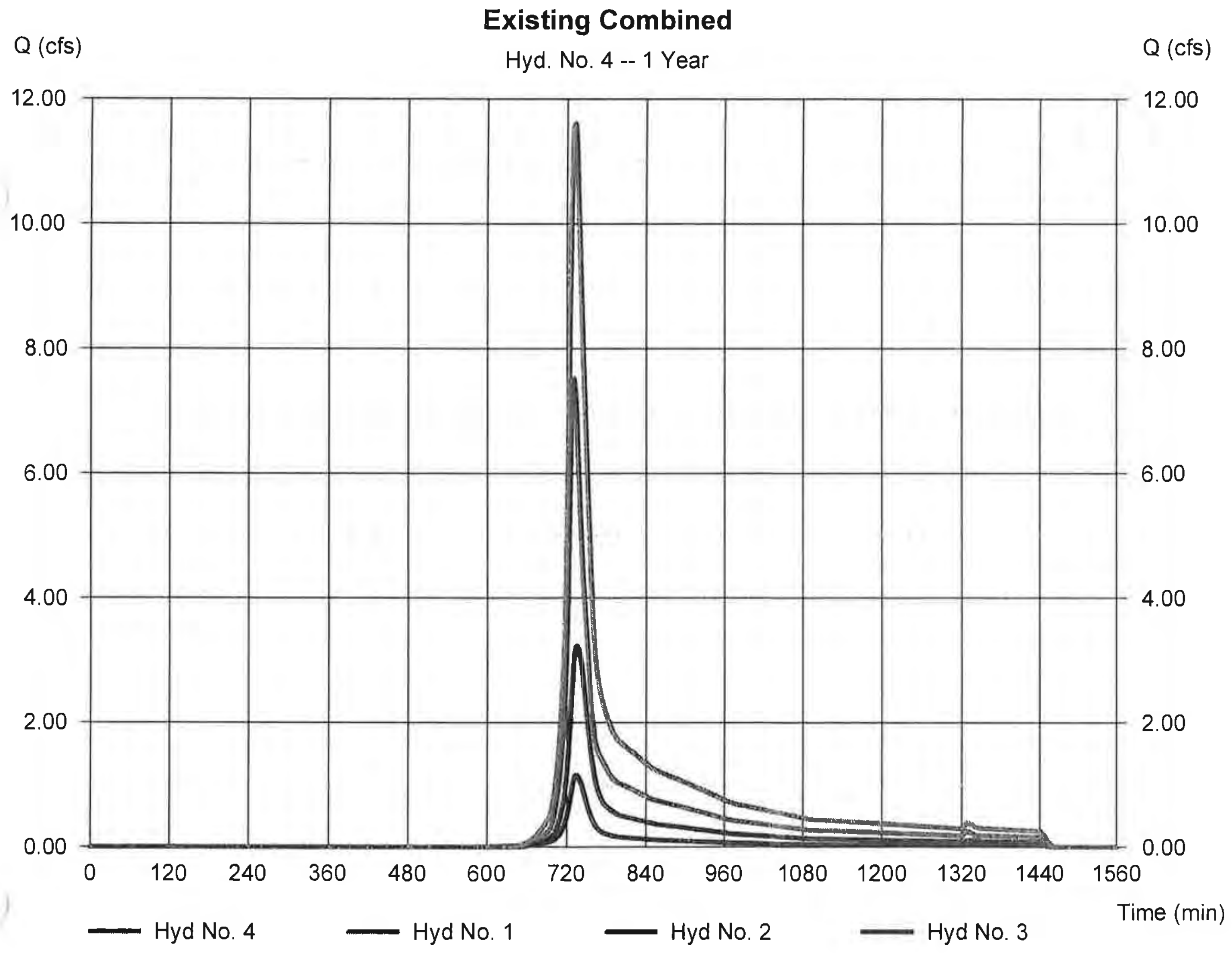
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 4

Existing Combined

Hydrograph type	= Combine	Peak discharge	= 11.61 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 51,189 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 16.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

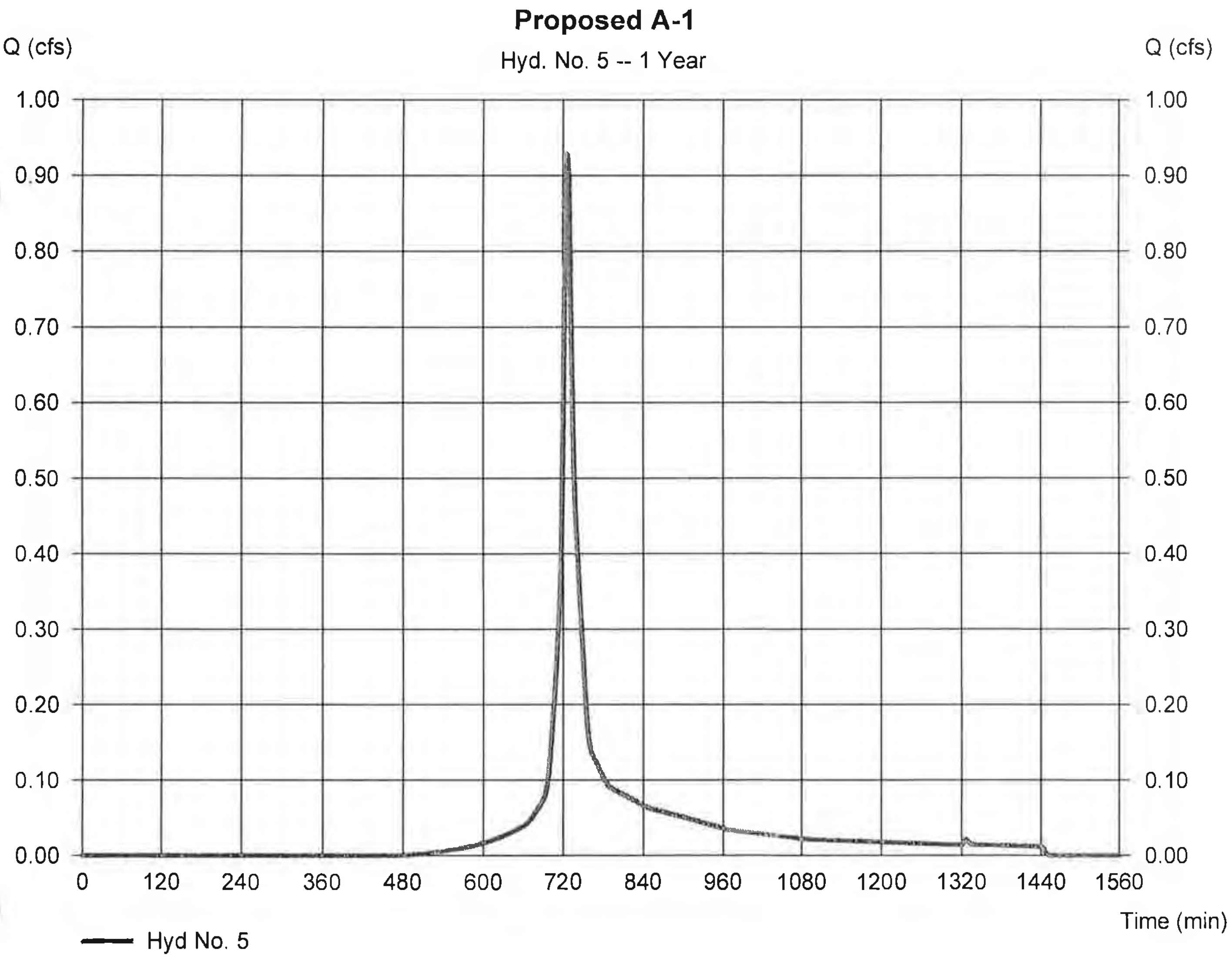
Hyd. No. 5

Proposed A-1

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 0.590 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 0.928 cfs
Time to peak = 726 min
Hyd. volume = 3,170 cuft
Curve number = 87*
Hydraulic length = 0 ft
Time of conc. (Tc) = 7.80 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.320 x 98) + (0.270 x 74)] / 0.590



TR55 Tc Worksheet

Hyd. No. 5

Proposed A-1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	72.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	9.00		0.00		0.00		
Travel Time (min)	**=**	**5.75**	**+**	**0.00**	**+**	**0.00**	**=**	**5.75**
Shallow Concentrated Flow								
Flow length (ft)	=	203.00		95.00		0.00		
Watercourse slope (%)	=	1.00		7.50		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	2.03		5.57		0.00		
Travel Time (min)	**=**	**1.66**	**+**	**0.28**	**+**	**0.00**	**=**	**1.95**
Channel Flow								
X sectional flow area (sqft)	=	2.00		0.00		0.00		
Wetted perimeter (ft)	=	4.70		0.00		0.00		
Channel slope (%)	=	2.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	7.92		0.00		0.00		
Flow length (ft)	=	30.0		0.0		0.0		
Travel Time (min)	**=**	**0.06**	**+**	**0.00**	**+**	**0.00**	**=**	**0.06**

Total Travel Time, Tc .... 7.80 min

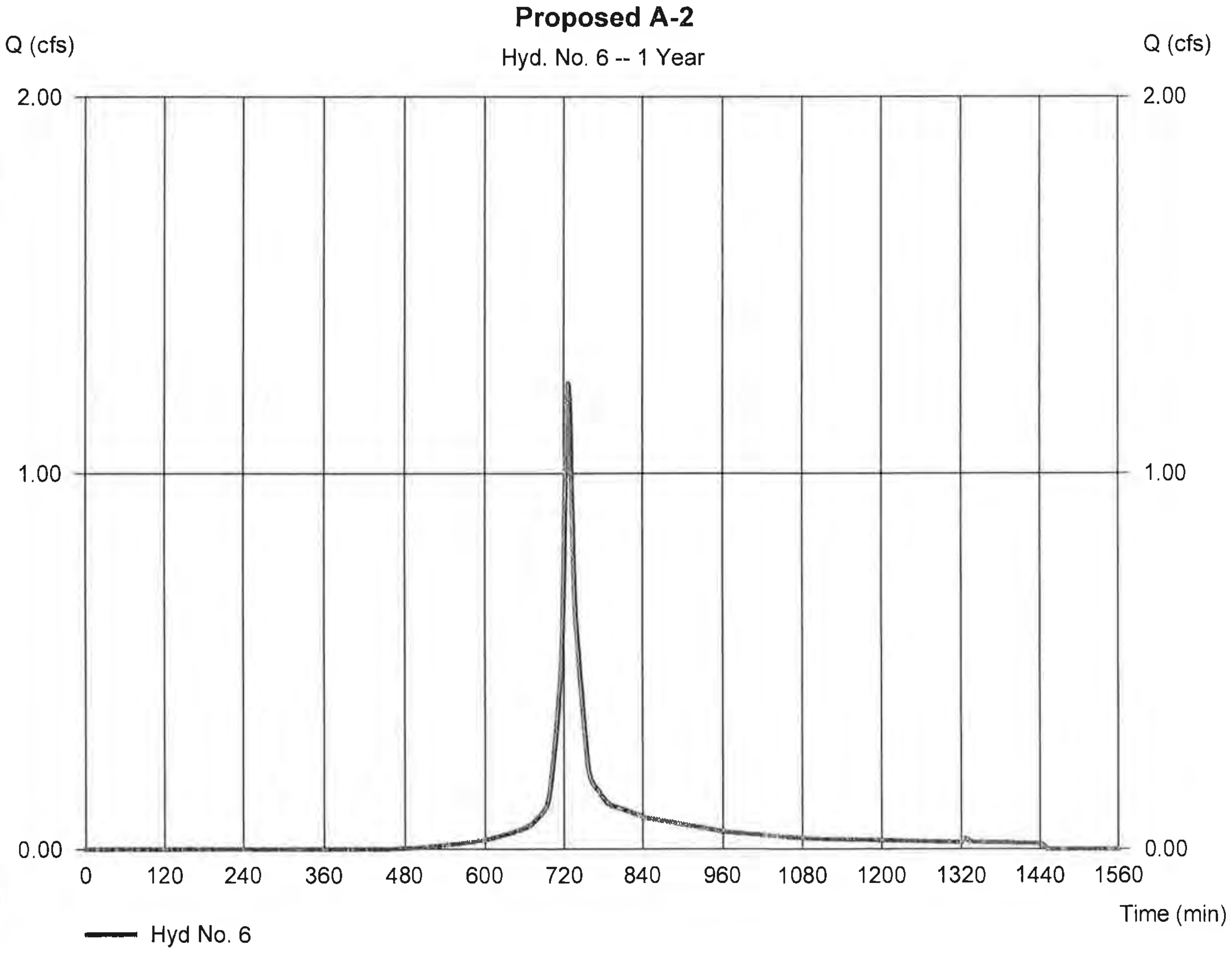
Hydrograph Report

Hyd. No. 6

Proposed A-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.239 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	4,231 cuft
Drainage area	=	0.750 ac	Curve number	=	88*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.50 min
Total precip.	=	2.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.430 x 98) + (0.320 x 74)] / 0.750



TR55 Tc Worksheet

Hyd. No. 6

Proposed A-2

Description		**A**		**B**		**C**		**Totals**
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	44.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	**=**	**9.34**	**+**	**0.00**	**+**	**0.00**	**=**	**9.34**
Shallow Concentrated Flow								
Flow length (ft)	=	52.00		28.00		0.00		
Watercourse slope (%)	=	19.00		20.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	7.03		7.22		0.00		
Travel Time (min)	**=**	**0.12**	**+**	**0.06**	**+**	**0.00**	**=**	**0.19**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 9.50 min

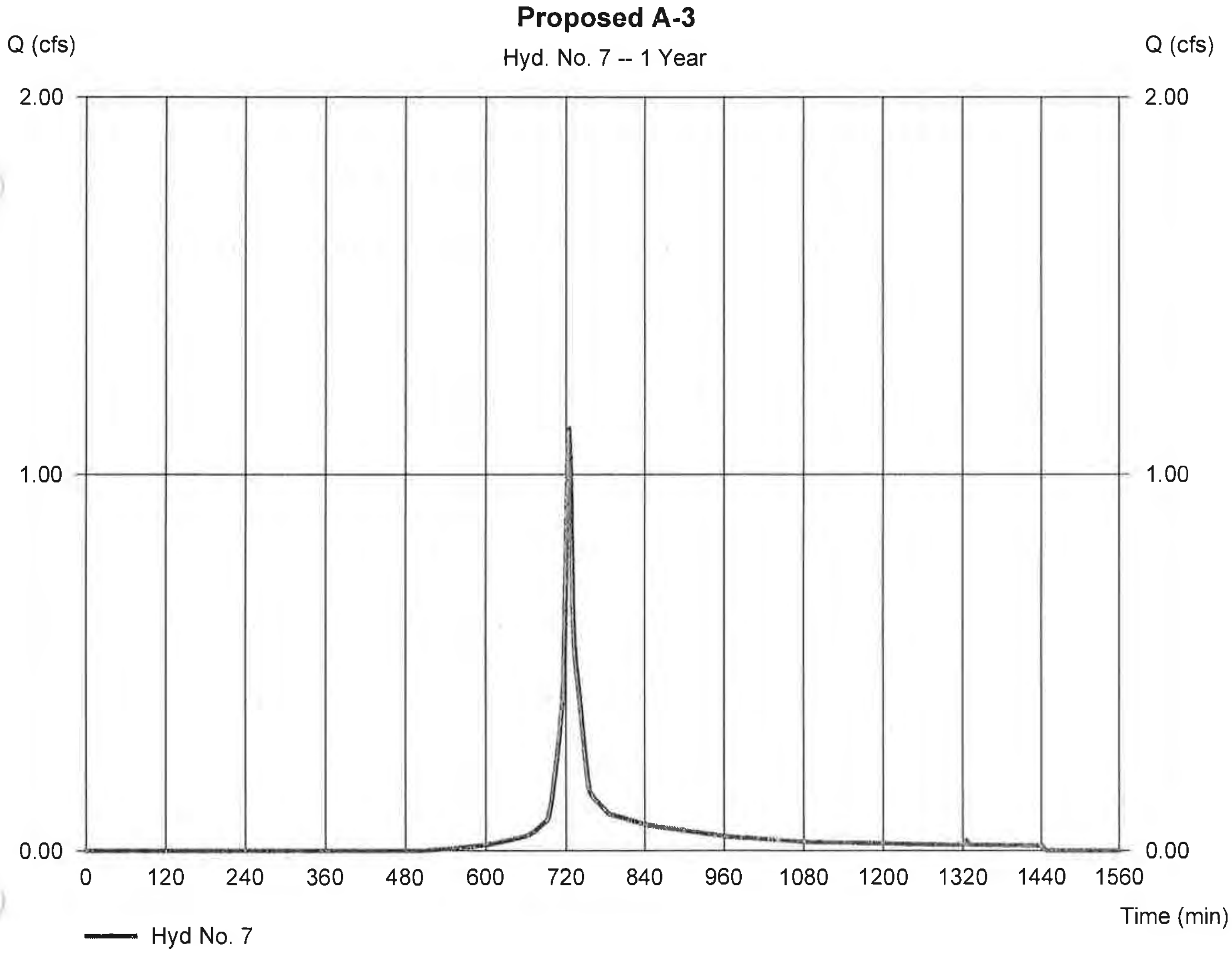
Hydrograph Report

Hyd. No. 7

Proposed A-3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.123 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 3,356 cuft
Drainage area	= 0.700 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.20 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.280 x 98) + (0.280 x 80) + (0.140 x 74)] / 0.700



TR55 Tc Worksheet

Hyd. No. 7

Proposed A-3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	69.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	9.00		0.00		0.00		
Travel Time (min)	=	**5.56**	+	**0.00**	+	**0.00**	=	**5.56**
Shallow Concentrated Flow								
Flow length (ft)	=	86.00		58.00		27.00		
Watercourse slope (%)	=	2.00		24.00		22.00		
Surface description	=	Paved		Unpaved		Unpaved		
Average velocity (ft/s)	=	2.87		7.90		7.57		
Travel Time (min)	=	**0.50**	+	**0.12**	+	**0.06**	=	**0.68**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc .... **6.20 min**

Hydrograph Report

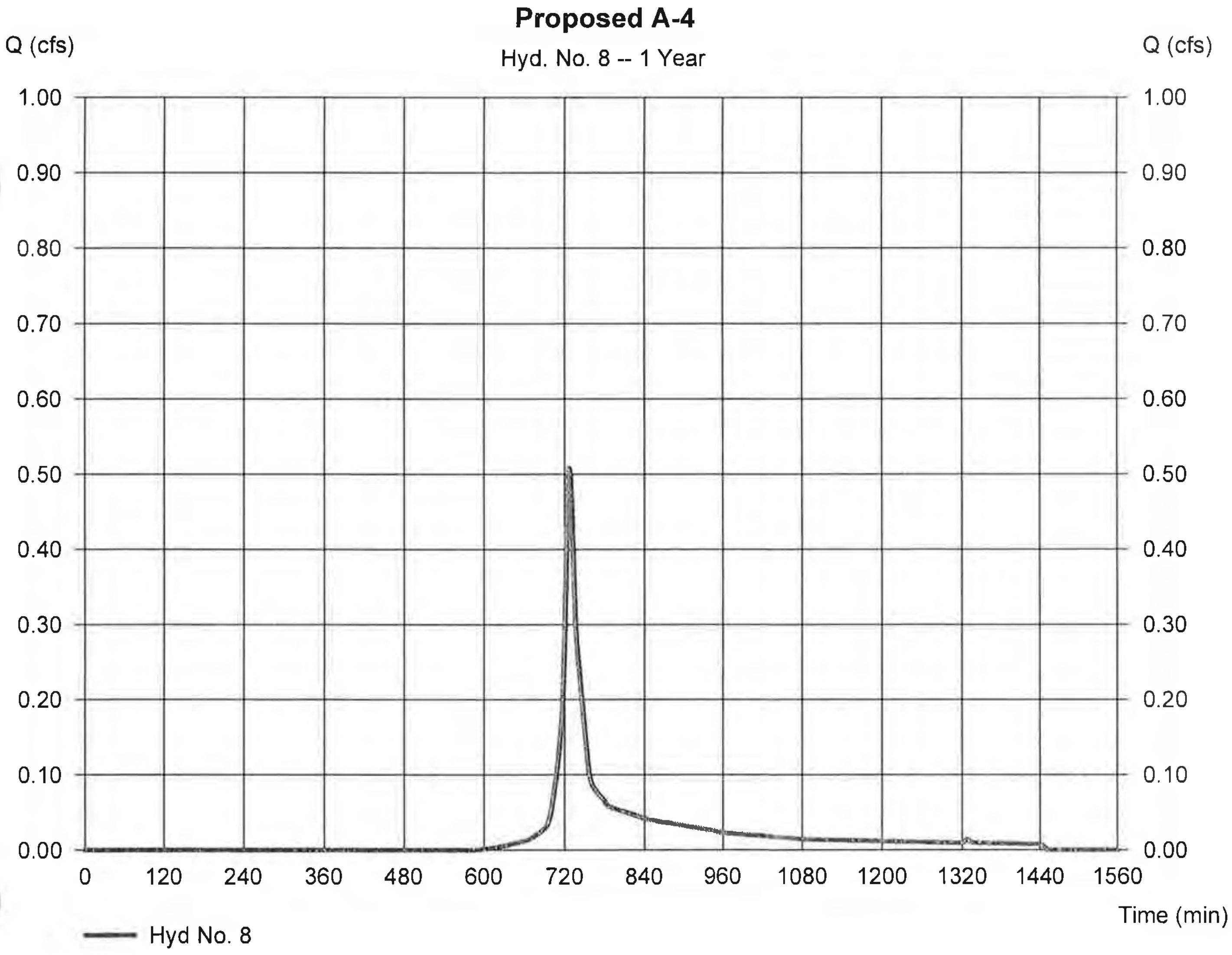
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 8

Proposed A-4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.508 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,776 cuft
Drainage area	= 0.450 ac	Curve number	= 81*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.140 x 98) + (0.310 x 74)] / 0.450



TR55 Tc Worksheet

Hyd. No. 8

Proposed A-4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	117.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	11.00		0.00		0.00		
Travel Time (min)	=	**7.82**	+	**0.00**	+	**0.00**	=	7.82
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	0.00
Channel Flow								
X sectional flow area (sqft)	=	1.77		0.00		0.00		
Wetted perimeter (ft)	=	4.70		0.00		0.00		
Channel slope (%)	=	10.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	16.33		0.00		0.00		
Flow length (ft)	=	199.0		0.0		0.0		
Travel Time (min)	=	**0.20**	+	**0.00**	+	**0.00**	=	0.20

Total Travel Time, Tc .... **8.00 min**

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

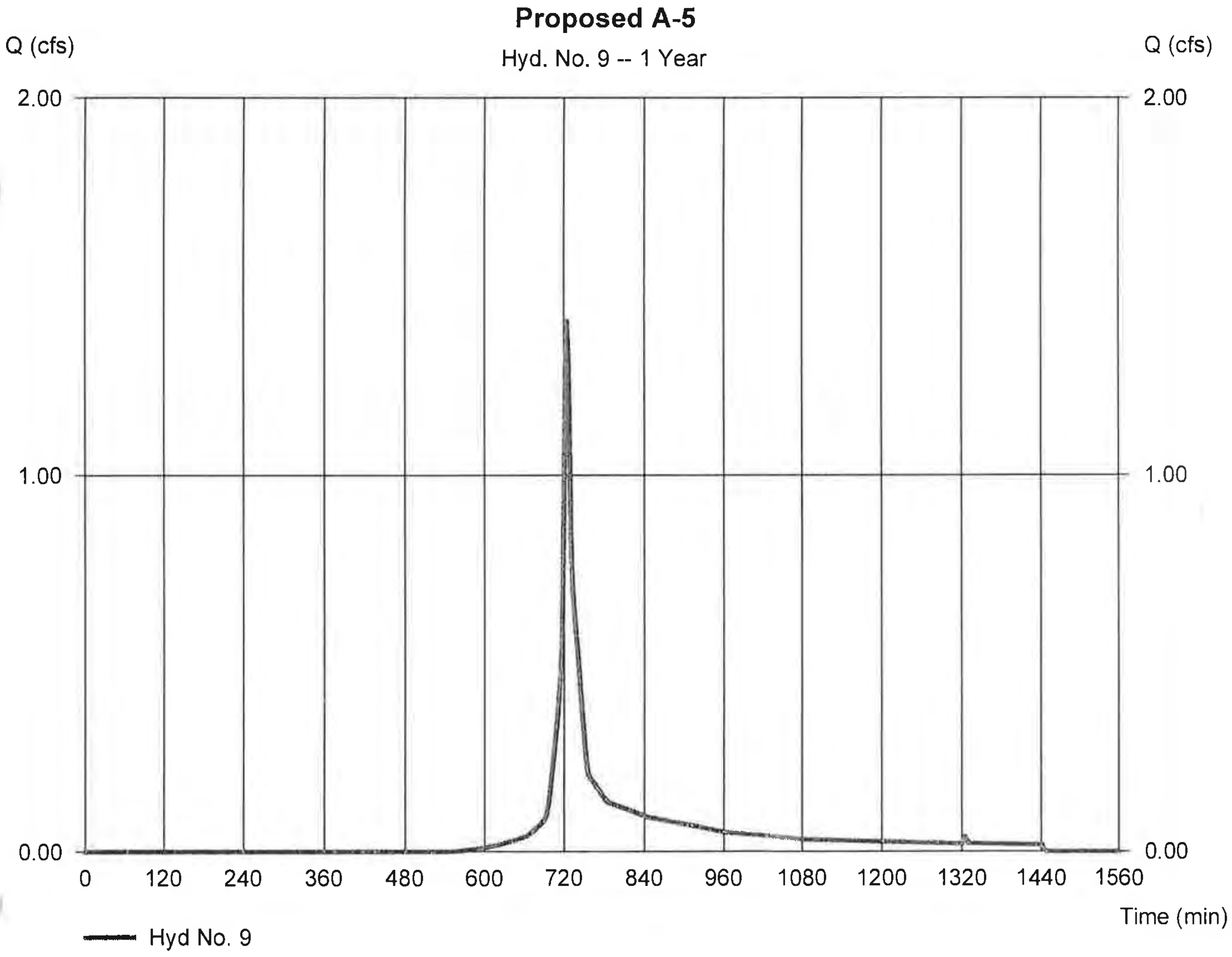
Hyd. No. 9

Proposed A-5

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 1.030 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 1.408 cfs
Time to peak = 724 min
Hyd. volume = 4,238 cuft
Curve number = 83*
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.400 x 98) + (0.630 x 74)] / 1.030


Proposed A-5

Hyd. No. 9 -- 1 Year

TR55 Tc Worksheet

Hyd. No. 9

Proposed A-5

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	67.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	9.00		0.00		0.00		
Travel Time (min)	**=**	**5.43**	**+**	**0.00**	**+**	**0.00**	**=**	**5.43**
Shallow Concentrated Flow								
Flow length (ft)	=	125.00		0.00		0.00		
Watercourse slope (%)	=	4.80		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	4.45		0.00		0.00		
Travel Time (min)	**=**	**0.47**	**+**	**0.00**	**+**	**0.00**	**=**	**0.47**
Channel Flow								
X sectional flow area (sqft)	=	1.77		0.00		0.00		
Wetted perimeter (ft)	=	4.70		0.00		0.00		
Channel slope (%)	=	10.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	16.33		0.00		0.00		
Flow length (ft)	=	117.0		0.0		0.0		
Travel Time (min)	**=**	**0.12**	**+**	**0.00**	**+**	**0.00**	**=**	**0.12**

Total Travel Time, Tc .... **6.00 min**

Hydrograph Report

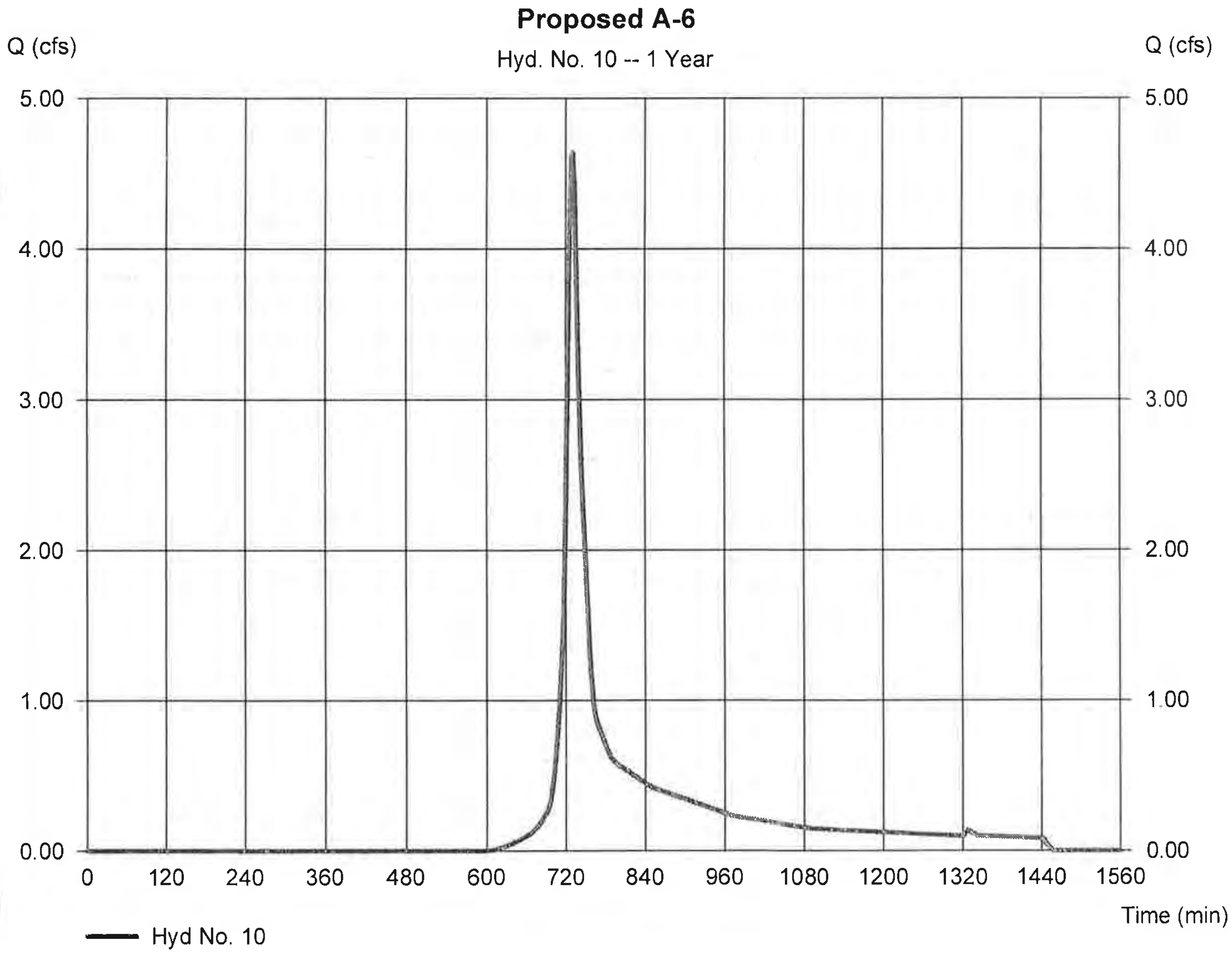
Hyd. No. 10

Proposed A-6

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 4.750 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 4.642 cfs
Time to peak = 730 min
Hyd. volume = 18,311 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.20 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(1.030 x 98) + (0.290 x 84) + (0.250 x 81) + (0.690 x 76) + (1.560 x 74) + (0.930 x 71)] / 4.750



TR55 Tc Worksheet

Hyd. No. 10

Proposed A-6

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	13.00		0.00		0.00		
Travel Time (min)	**=**	**9.71**	**+**	**0.00**	**+**	**0.00**	**=**	**9.71**
Shallow Concentrated Flow								
Flow length (ft)	=	172.00		0.00		0.00		
Watercourse slope (%)	=	17.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	6.65		0.00		0.00		
Travel Time (min)	**=**	**0.43**	**+**	**0.00**	**+**	**0.00**	**=**	**0.43**
Channel Flow								
X sectional flow area (sqft)	=	5.00		0.00		0.00		
Wetted perimeter (ft)	=	7.00		0.00		0.00		
Channel slope (%)	=	5.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	17.73		0.00		0.00		
Flow length (ft)	=	1089.0		0.0		0.0		
Travel Time (min)	**=**	**1.02**	**+**	**0.00**	**+**	**0.00**	**=**	**1.02**

Total Travel Time, Tc .... 11.20 min

Hydrograph Report

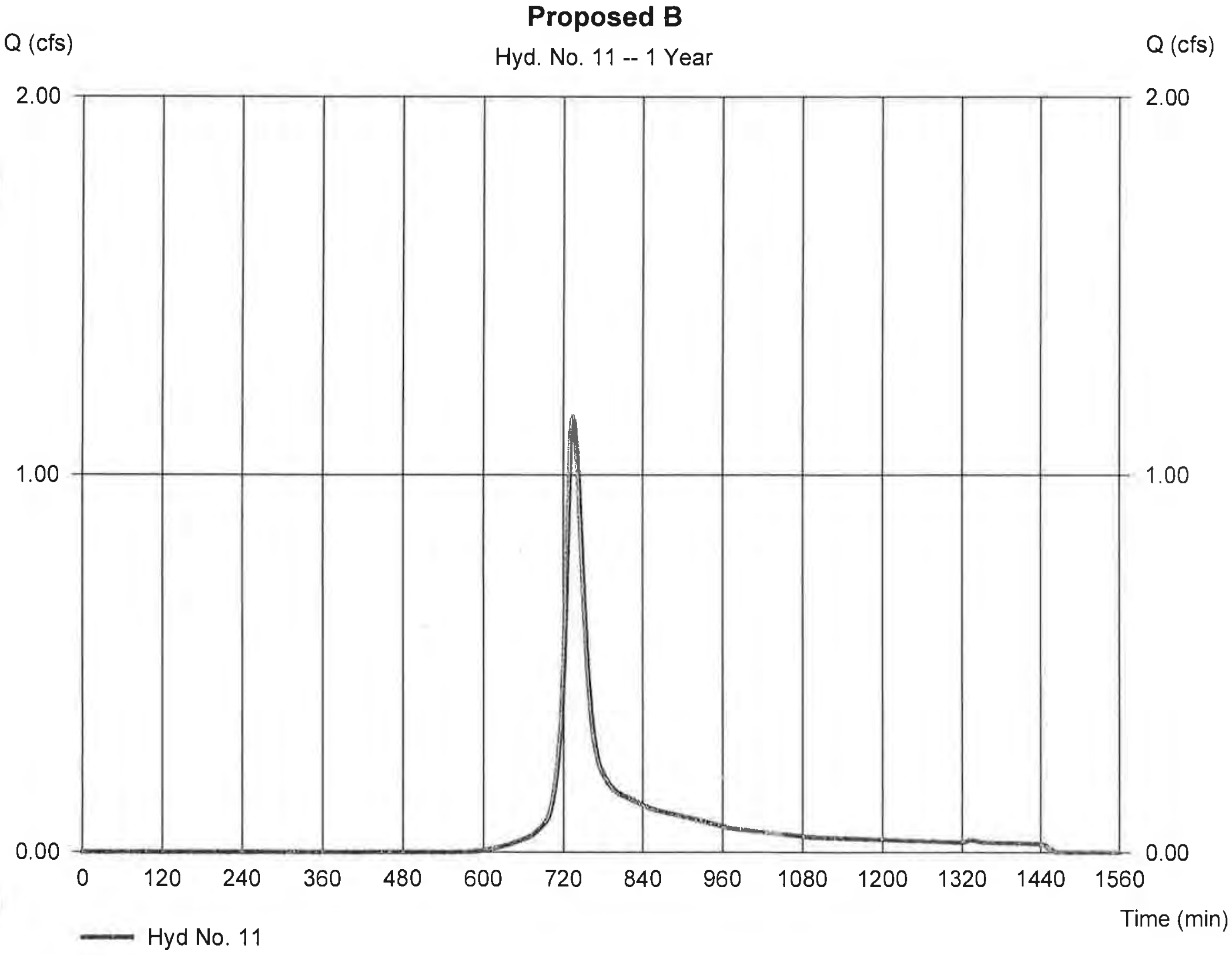
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 11

Proposed B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.154 cfs
Storm frequency	= 1 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 5,164 cuft
Drainage area	= 1.240 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.10 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



TR55 Tc Worksheet

Hyd. No. 11

Proposed B

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	4.00		0.00		0.00		
Travel Time (min)	**=**	**15.56**	**+**	**0.00**	**+**	**0.00**	**=**	**15.56**
Shallow Concentrated Flow								
Flow length (ft)	=	72.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.61		0.00		0.00		
Travel Time (min)	**=**	**0.74**	**+**	**0.00**	**+**	**0.00**	**=**	**0.74**
Channel Flow								
X sectional flow area (sqft)	=	5.00		0.00		0.00		
Wetted perimeter (ft)	=	7.00		0.00		0.00		
Channel slope (%)	=	5.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	17.73		0.00		0.00		
Flow length (ft)	=	838.0		0.0		0.0		
Travel Time (min)	**=**	**0.79**	**+**	**0.00**	**+**	**0.00**	**=**	**0.79**

Total Travel Time, Tc .... 17.10 min

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

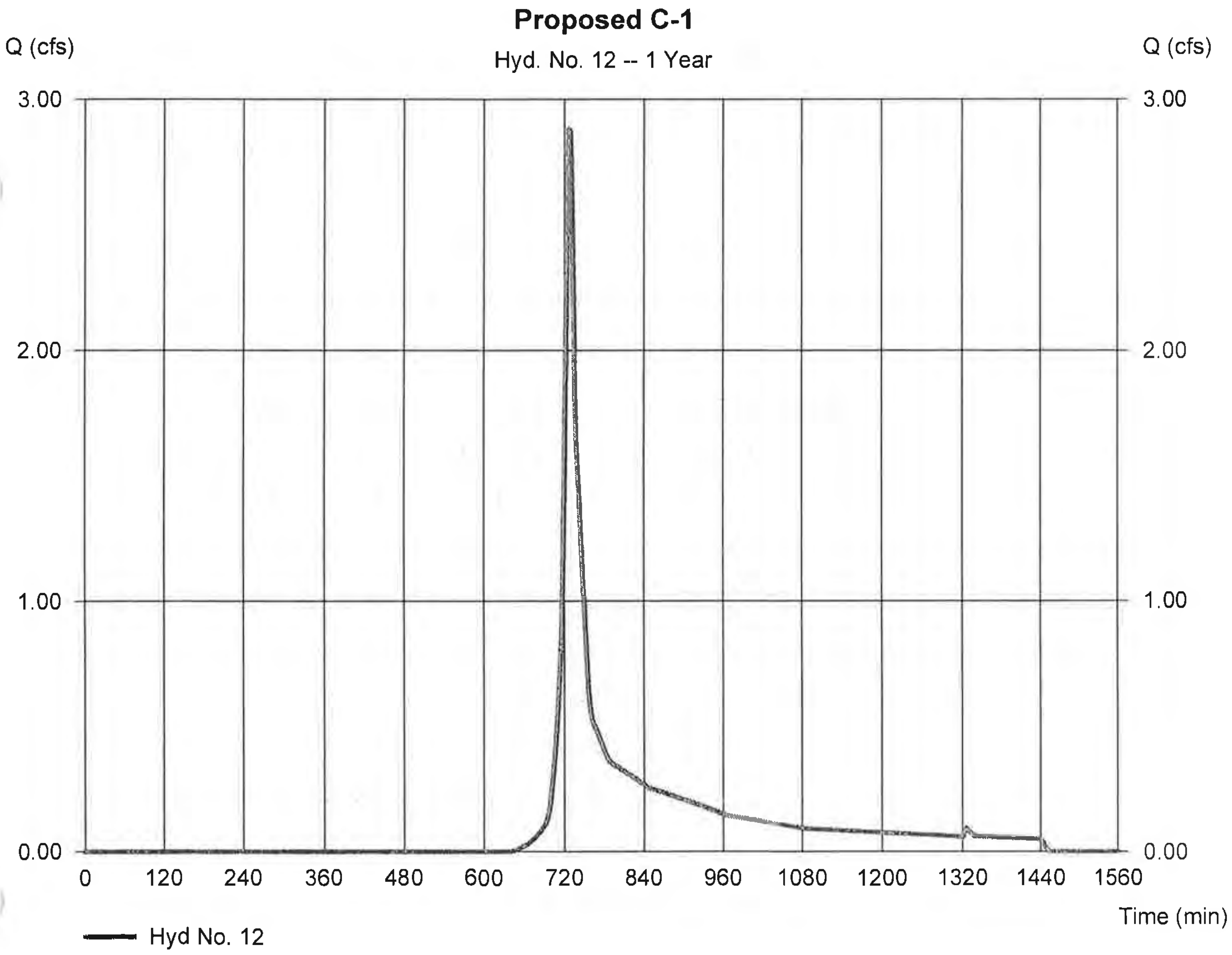
Hyd. No. 12

Proposed C-1

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 3.330 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.70 in
Storm duration = 24 hrs

Peak discharge = 2.883 cfs
Time to peak = 726 min
Hyd. volume = 10,500 cuft
Curve number = 77*
Hydraulic length = 0 ft
Time of conc. (Tc) = 9.80 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.210 x 98) + (0.300 x 82) + (1.200 x 76) + (0.050 x 80) + (0.250 x 71) + (1.320 x 74)] / 3.330



TR55 Tc Worksheet

Hyd. No. 12

Proposed C-1

Description		**A**		**B**		**C**		**Totals**
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		0.00		0.00		
Land slope (%)	=	14.00		0.00		0.00		
Travel Time (min)	=	**9.43**	+	**0.00**	+	**0.00**	=	**9.43**
Shallow Concentrated Flow								
Flow length (ft)	=	141.00		0.00		0.00		
Watercourse slope (%)	=	18.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	6.85		0.00		0.00		
Travel Time (min)	=	**0.34**	+	**0.00**	+	**0.00**	=	**0.34**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc .... **9.80 min**

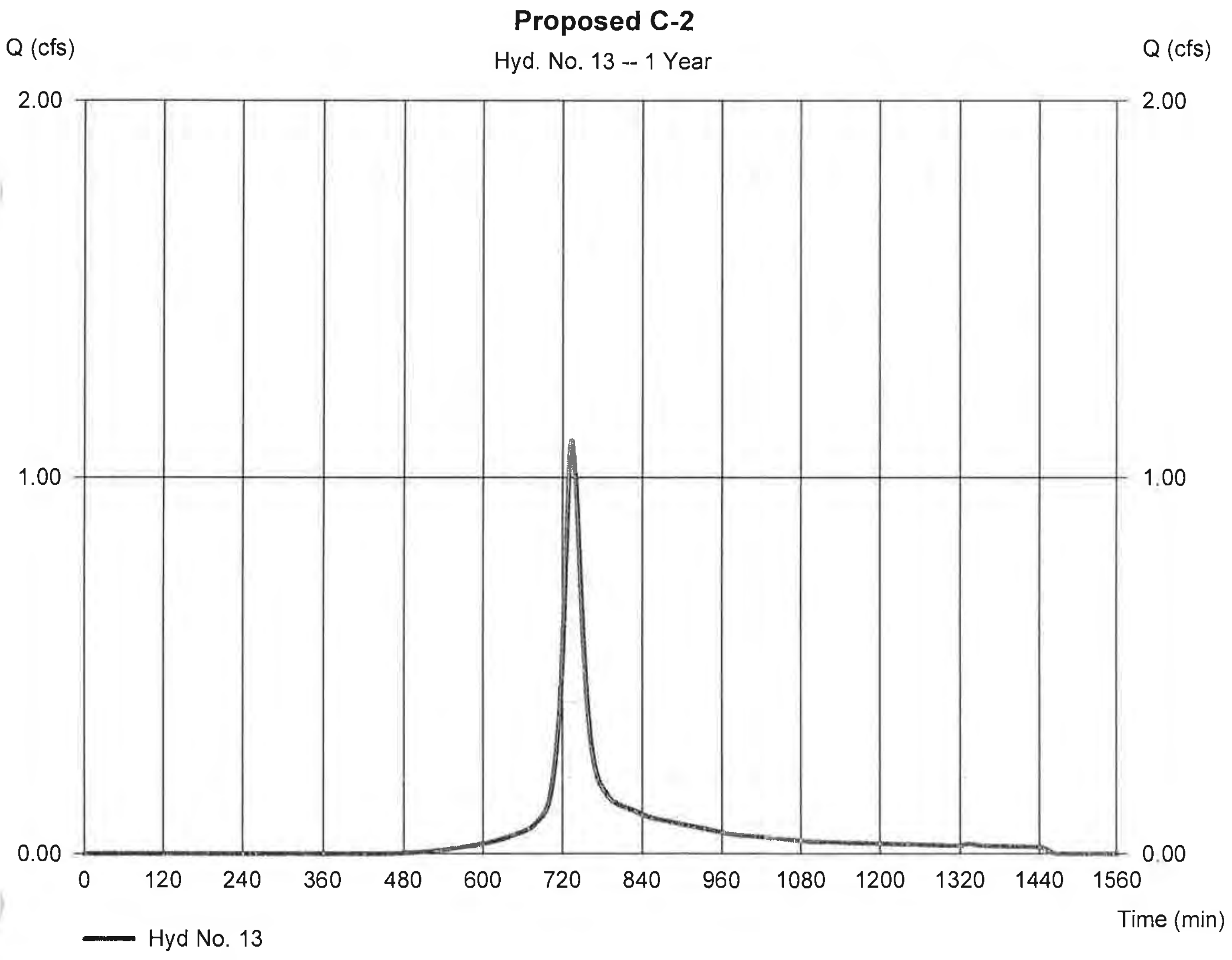
Hydrograph Report

Hyd. No. 13

Proposed C-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.098 cfs
Storm frequency	= 1 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 4,852 cuft
Drainage area	= 0.860 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.490 x 98) + (0.370 x 74)] / 0.860



TR55 Tc Worksheet

Hyd. No. 13

Proposed C-2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.240		0.011		
Flow length (ft)	=	40.0		60.0		0.0		
Two-year 24-hr precip. (in)	=	3.50		3.50		0.00		
Land slope (%)	=	0.50		17.00		0.00		
Travel Time (min)	=	**11.41**	+	**3.85**	+	**0.00**	=	**15.27**
Shallow Concentrated Flow								
Flow length (ft)	=	61.00		130.00		0.00		
Watercourse slope (%)	=	1.00		1.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.61		2.03		0.00		
Travel Time (min)	=	**0.63**	+	**1.07**	+	**0.00**	=	**1.70**
Channel Flow								
X sectional flow area (sqft)	=	1.77		0.00		0.00		
Wetted perimeter (ft)	=	4.70		0.00		0.00		
Channel slope (%)	=	2.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	7.30		0.00		0.00		
Flow length (ft)	=	26.0		0.0		0.0		
Travel Time (min)	=	**0.06**	+	**0.00**	+	**0.00**	=	**0.06**
Total Travel Time, Tc								**17.00 min**

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

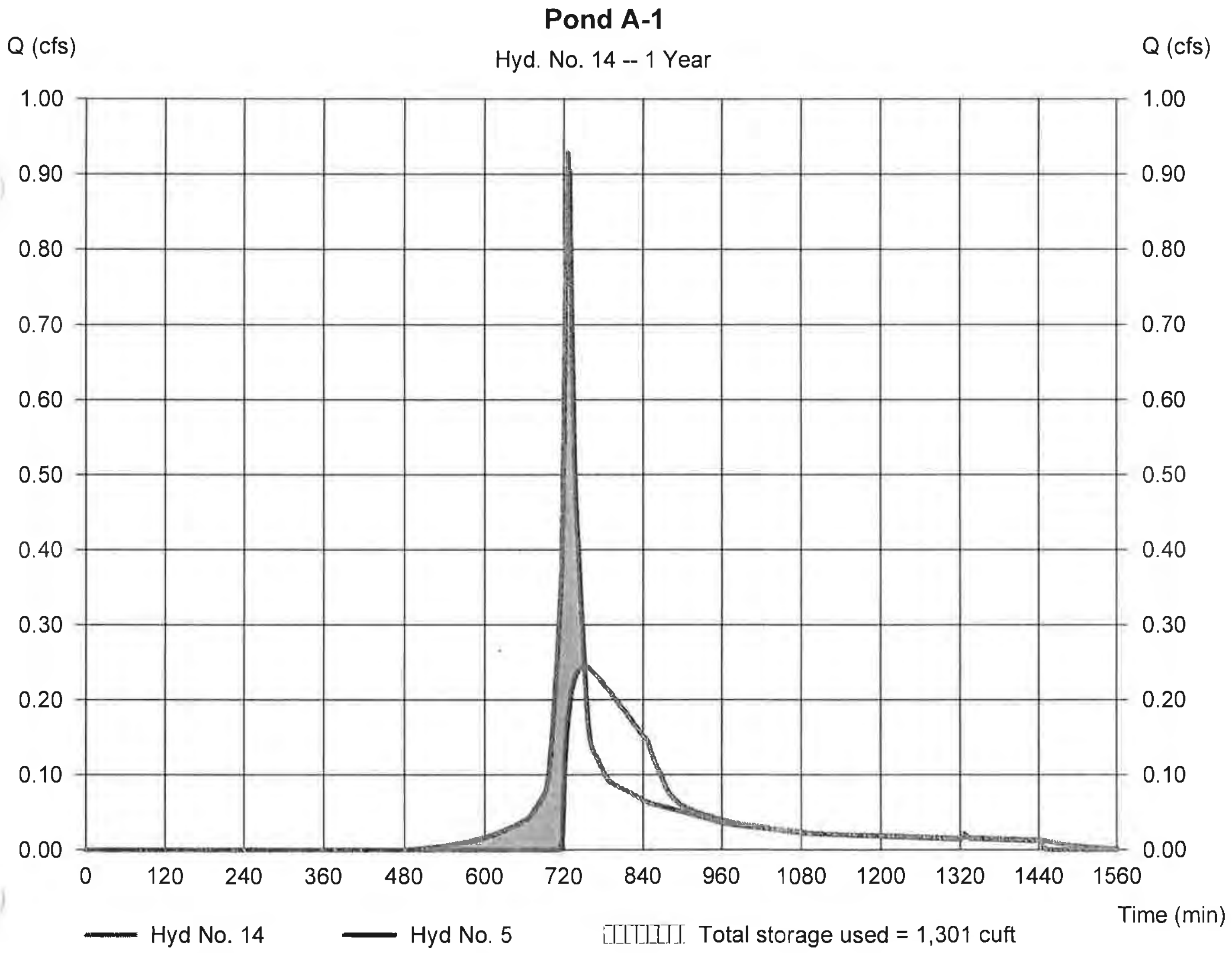
Hyd. No. 14

Pond A-1

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 5 - Proposed A-1
Reservoir name = A-1

Peak discharge = 0.245 cfs
Time to peak = 750 min
Hyd. volume = 2,661 cuft
Max. Elevation = 708.70 ft
Max. Storage = 1,301 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 1 - A-1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 706.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	706.00	176	0	0
2.00	708.00	587	722	722
4.00	710.00	1,090	1,651	2,373

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	706.00	707.50	0.00	0.00
Length (ft)	=	16.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

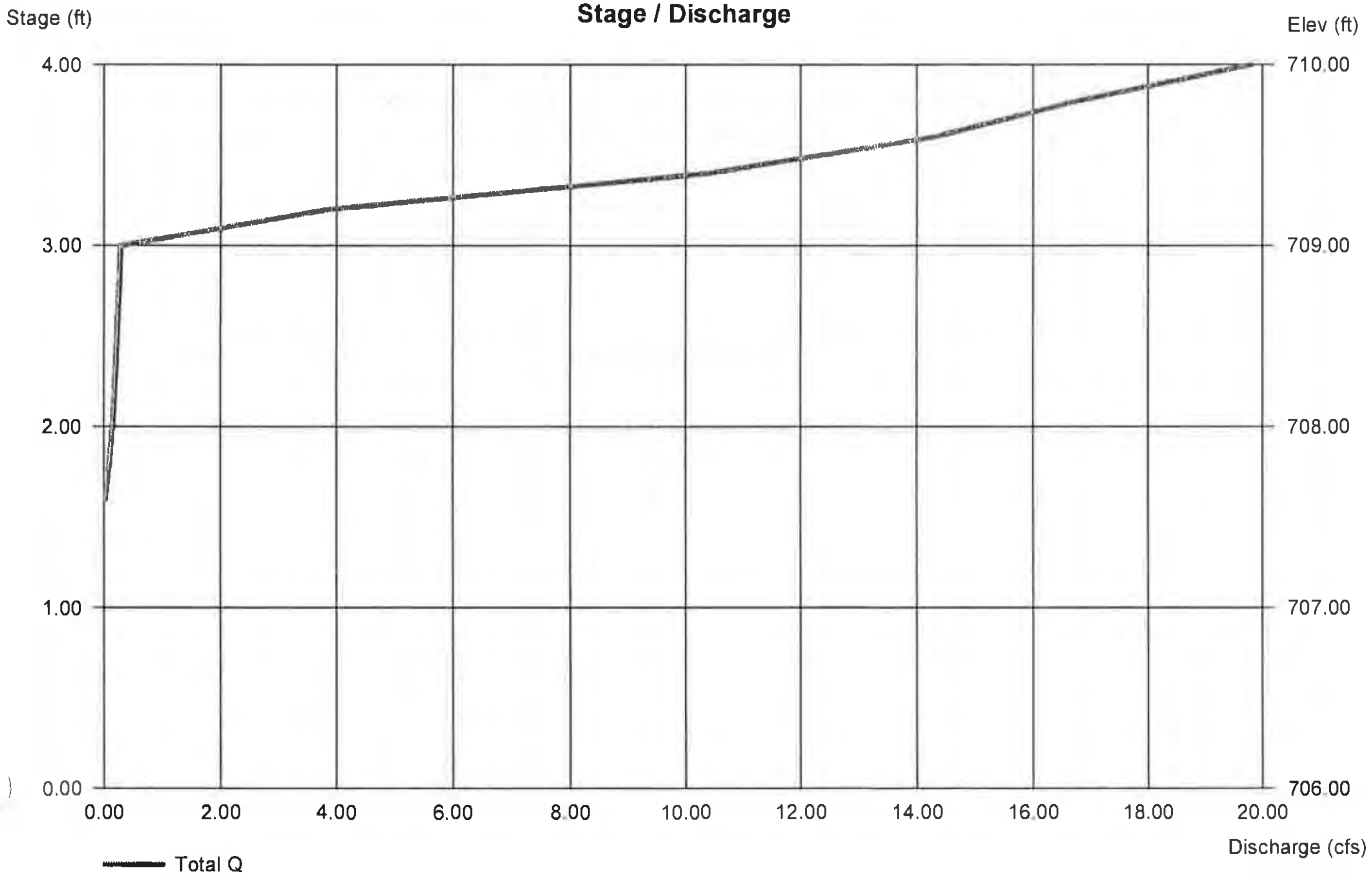
Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	709.00	709.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Discharge



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

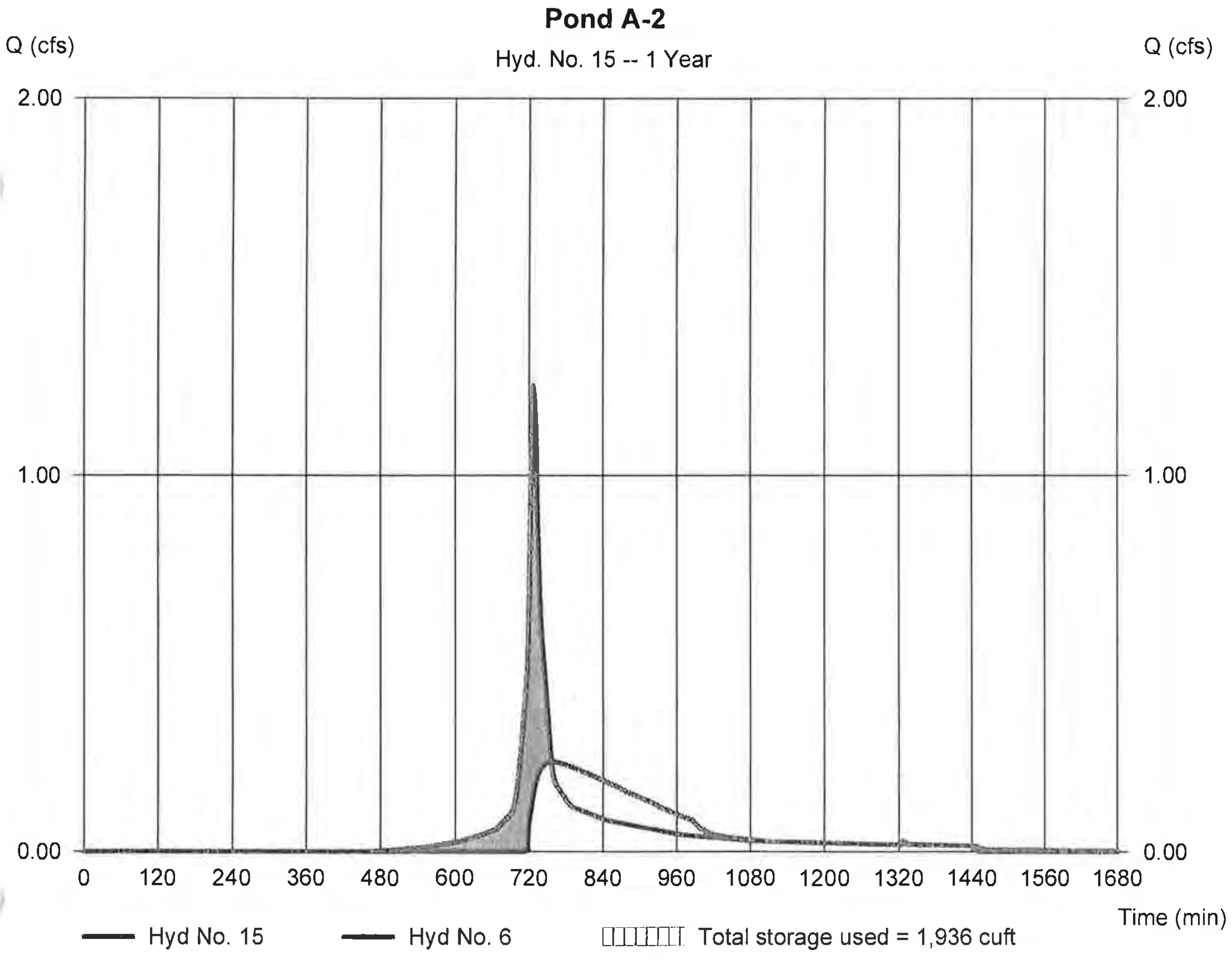
Hyd. No. 15

Pond A-2

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 6 - Proposed A-2
Reservoir name = A-2

Peak discharge = 0.240 cfs
Time to peak = 756 min
Hyd. volume = 3,551 cuft
Max. Elevation = 700.91 ft
Max. Storage = 1,936 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - A-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 698.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	698.00	152	0	0
2.00	700.00	757	831	831
4.00	702.00	1,750	2,438	3,270

Culvert / Orifice Structures

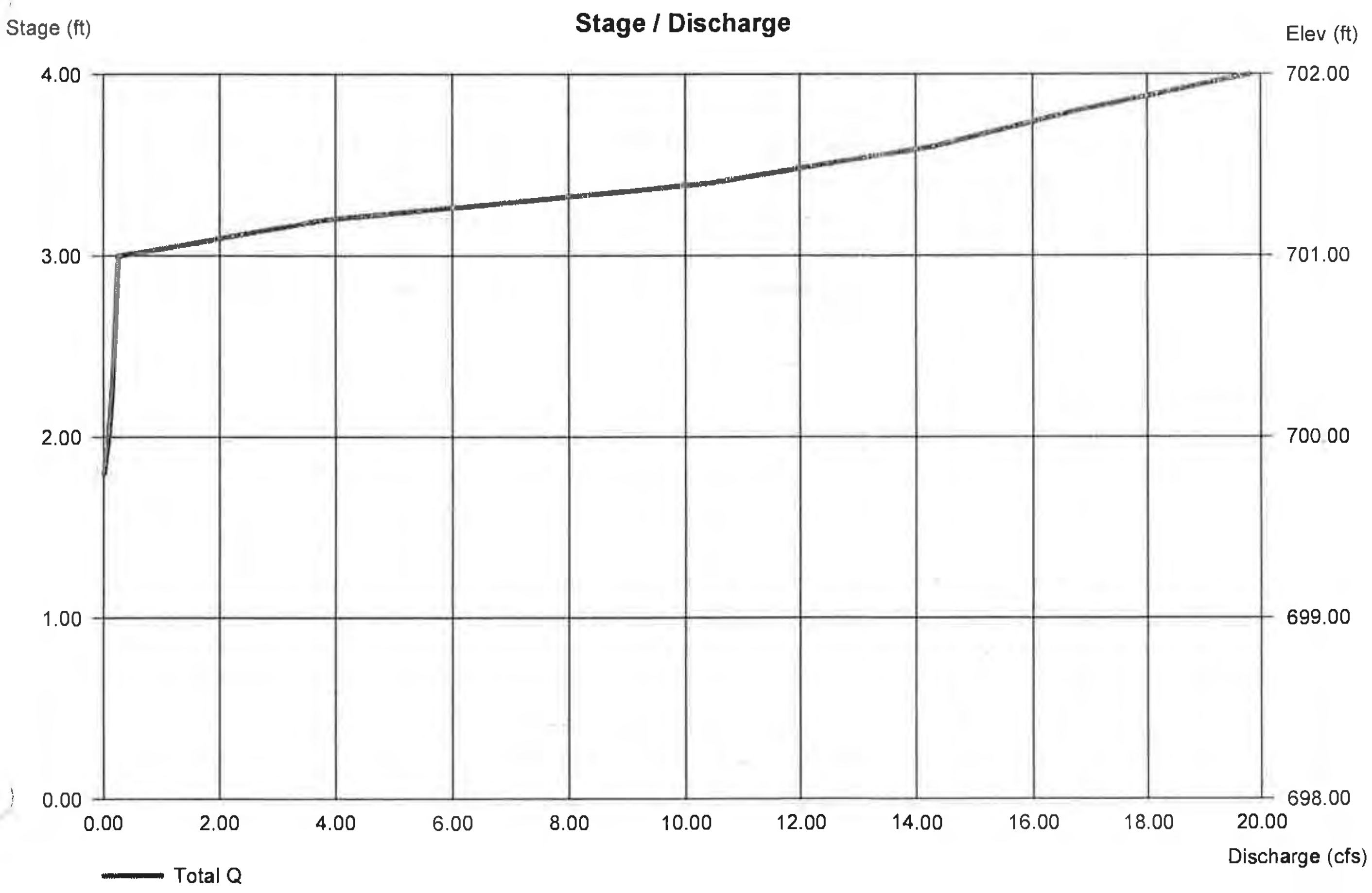
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	698.00	699.75	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	701.00	701.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

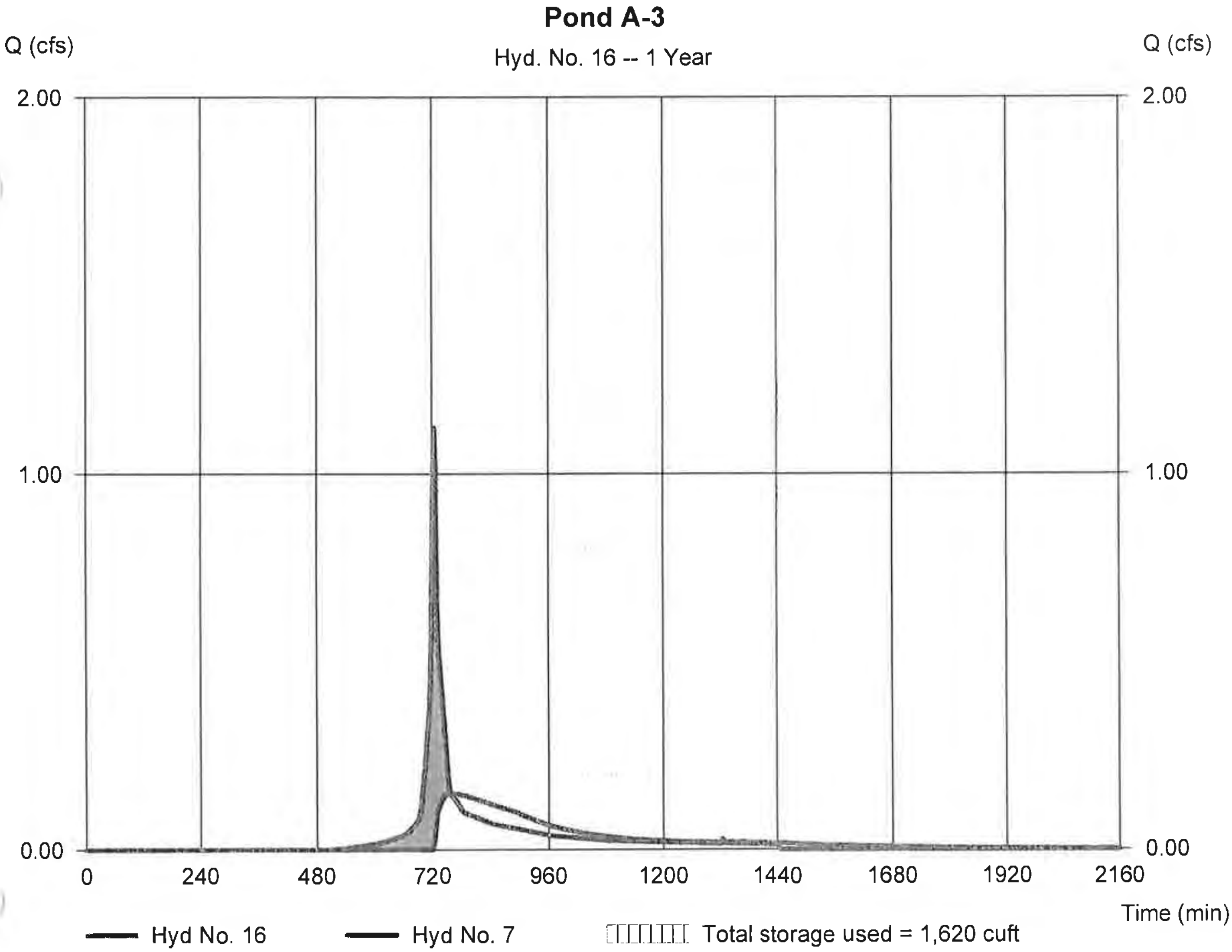
Hyd. No. 16

Pond A-3

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 7 - Proposed A-3
Reservoir name = A-3

Peak discharge = 0.149 cfs
Time to peak = 758 min
Hyd. volume = 2,709 cuft
Max. Elevation = 727.03 ft
Max. Storage = 1,620 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - A-3

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	946	0	0
2.00	728.00	2,308	3,154	3,154
4.00	730.00	3,632	5,889	9,043

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 726.00	726.50	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

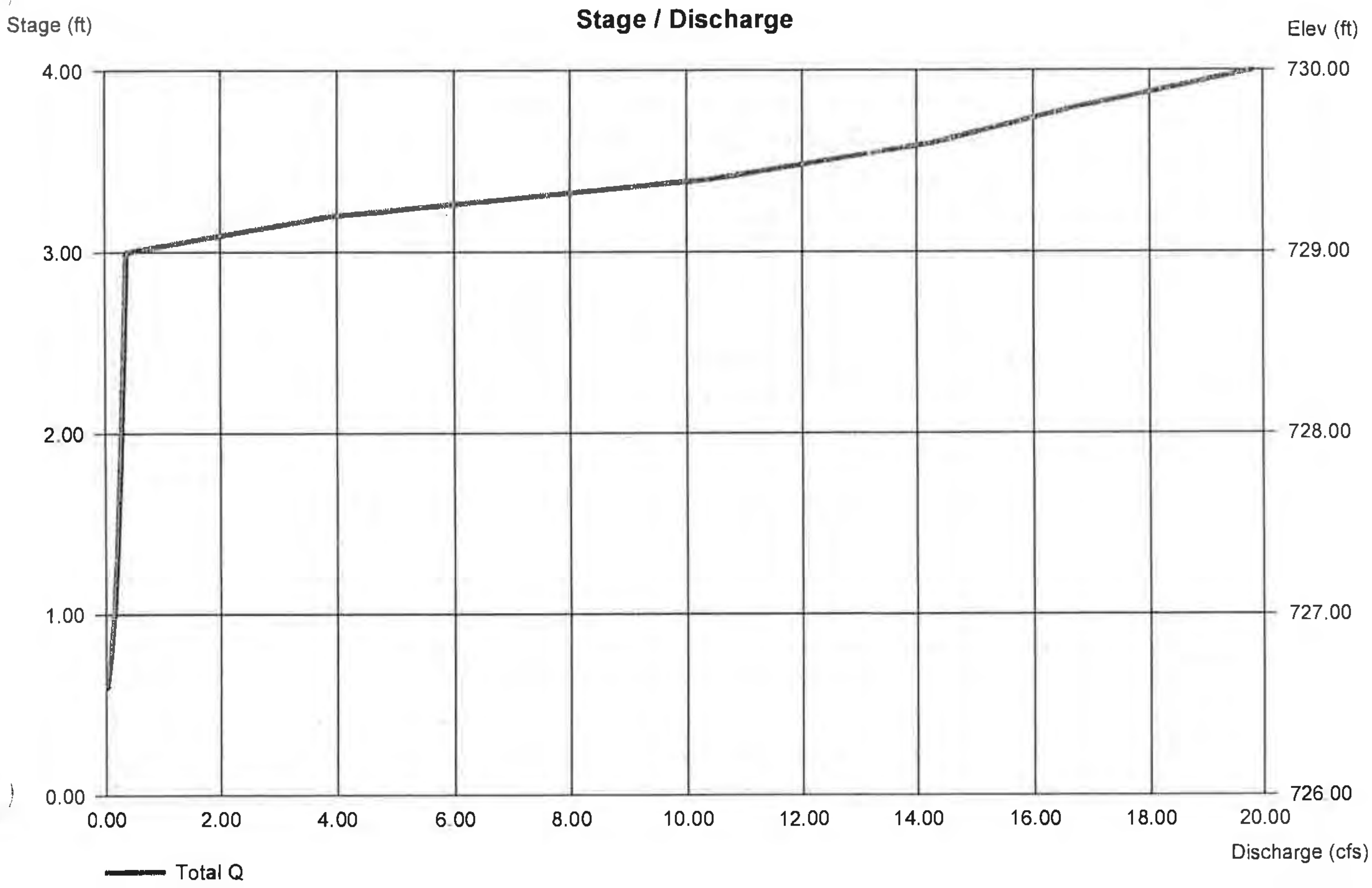
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 729.00	729.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



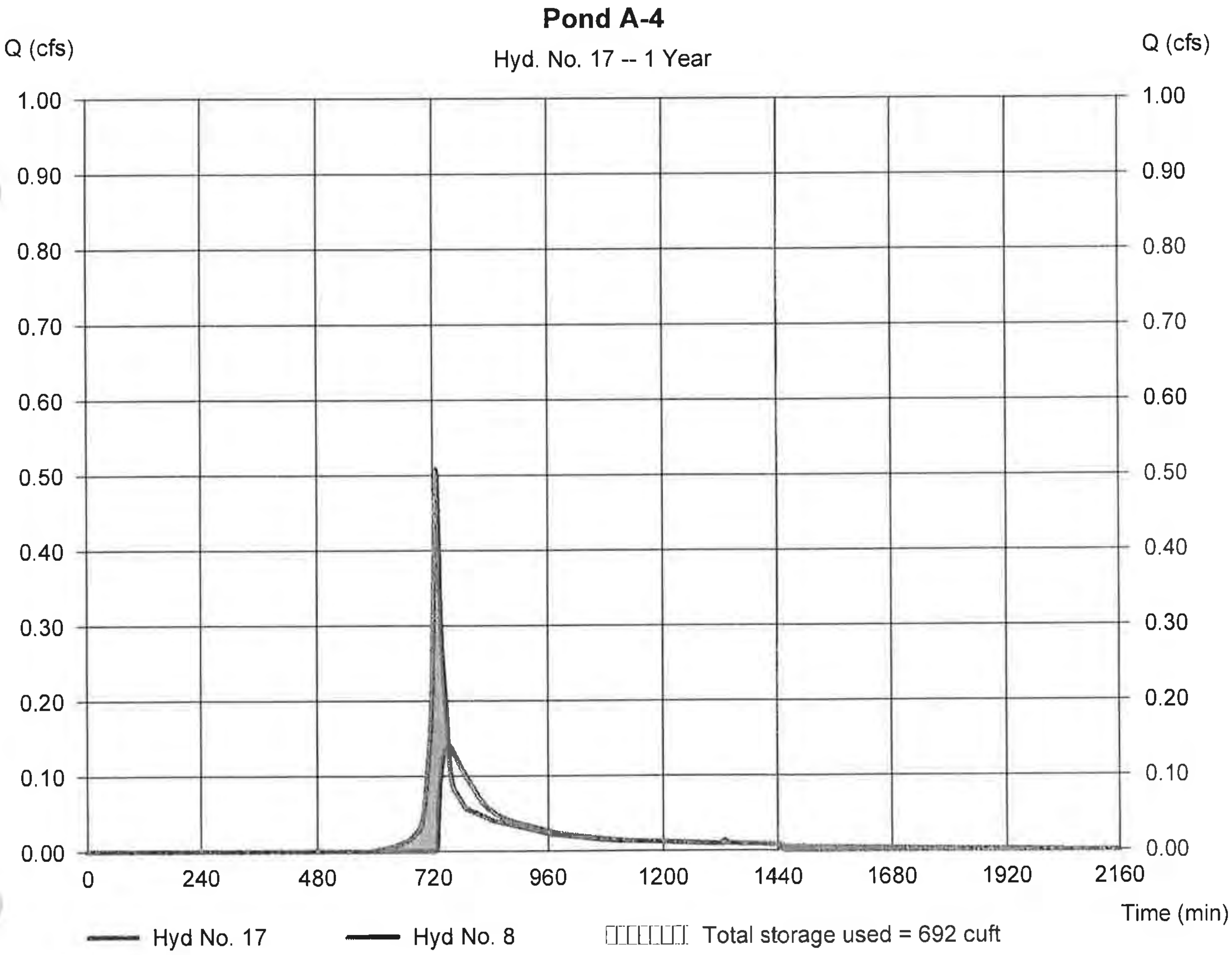
Hydrograph Report

Hyd. No. 17

Pond A-4

Hydrograph type	= Reservoir	Peak discharge	= 0.140 cfs
Storm frequency	= 1 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,417 cuft
Inflow hyd. No.	= 8 - Proposed A-4	Max. Elevation	= 717.23 ft
Reservoir name	= A-4	Max. Storage	= 692 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 4 - A-4

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	918	1,129	1,129
4.00	720.00	1,703	2,581	3,710

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 716.00	716.75	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

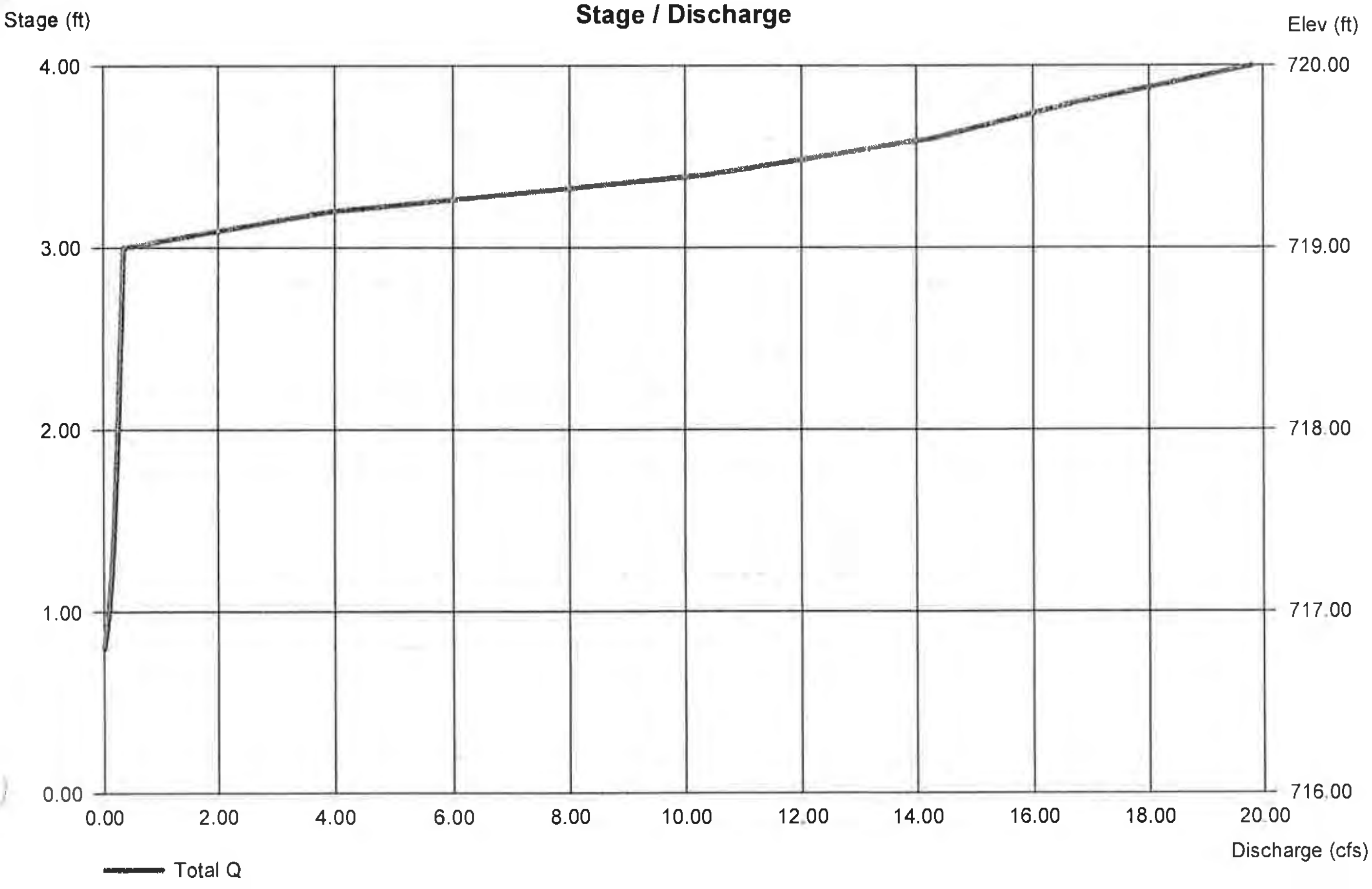
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 719.00	719.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control Weir risers checked for orifice conditions (ic) and submergence (s)

Stage / Discharge



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

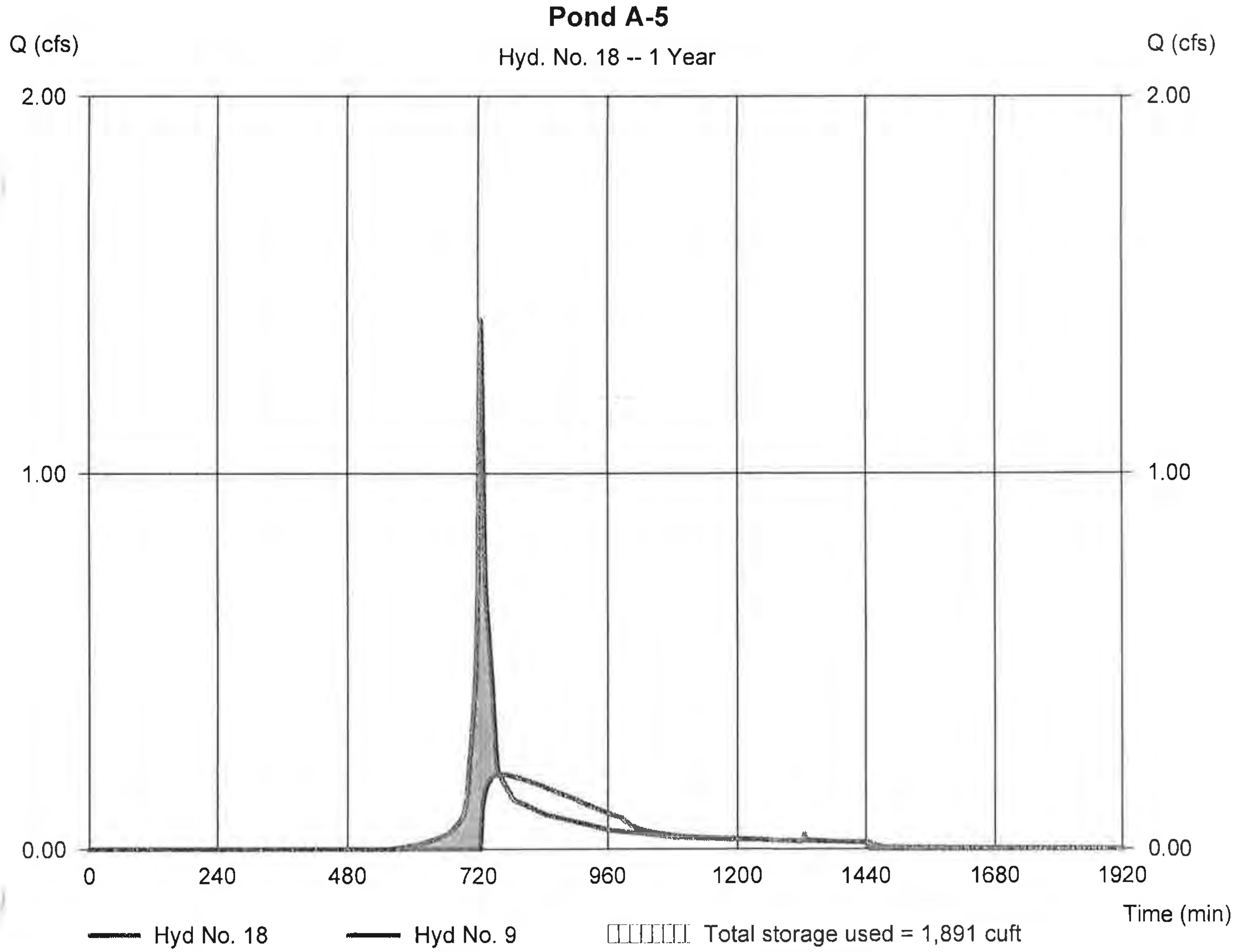
Hyd. No. 18

Pond A-5

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 9 - Proposed A-5
Reservoir name = A-5

Peak discharge = 0.200 cfs
Time to peak = 758 min
Hyd. volume = 3,313 cuft
Max. Elevation = 718.59 ft
Max. Storage = 1,891 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 5 - A-5

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	920	1,130	1,130
4.00	720.00	1,703	2,583	3,714

Culvert / Orifice Structures

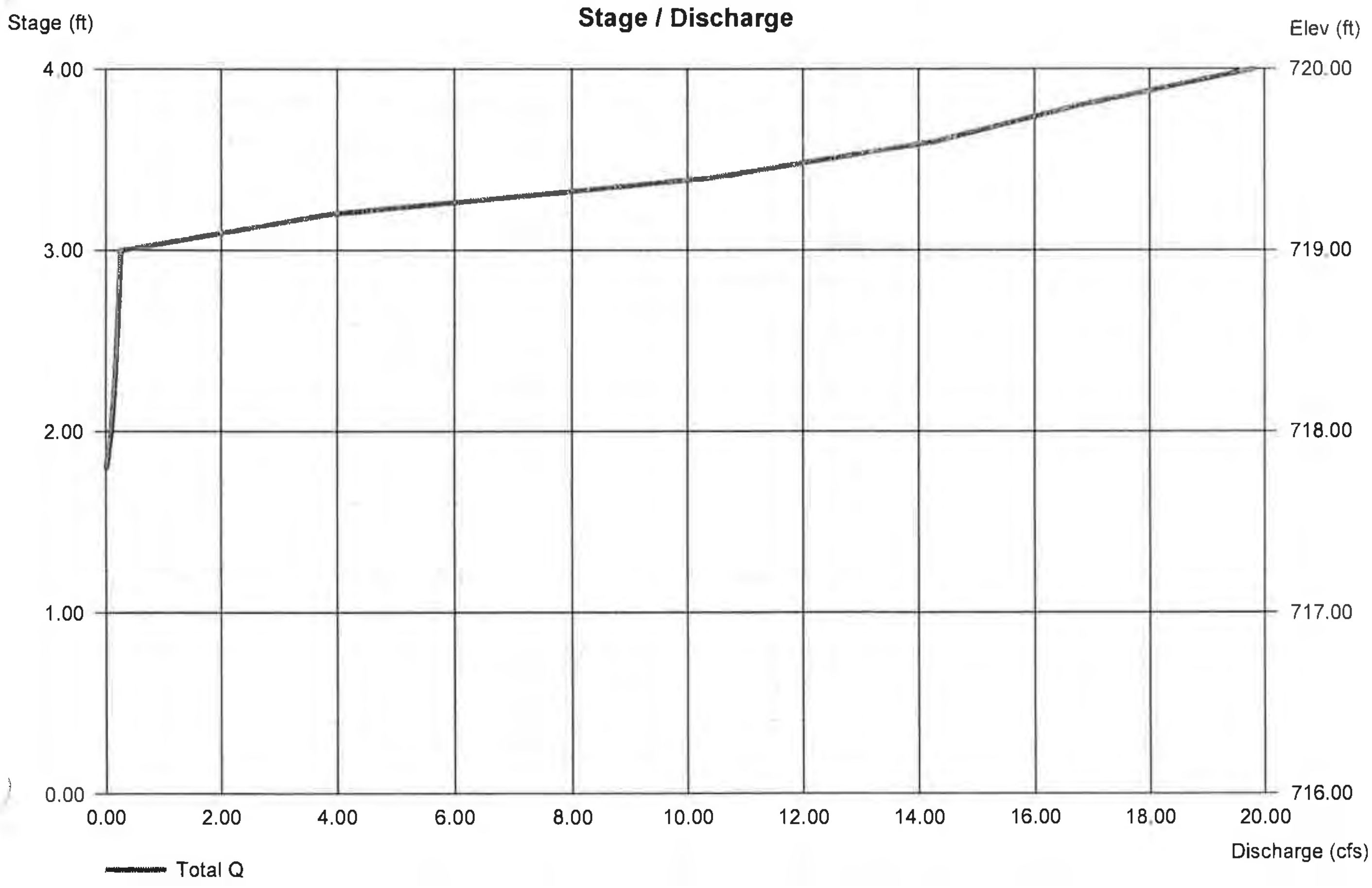
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	716.00	717.75	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	719.00	719.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

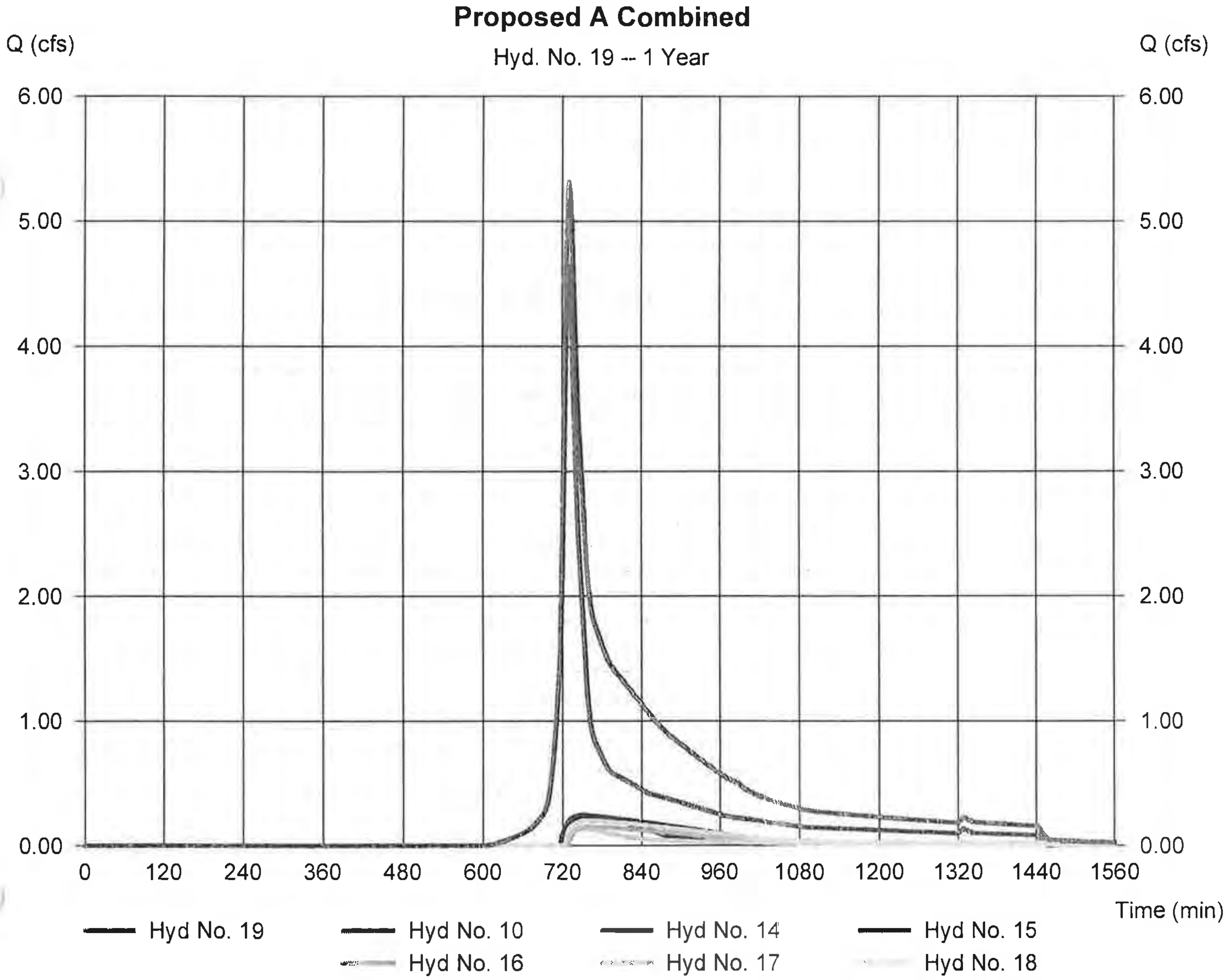
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 19

Proposed A Combined

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 10, 14, 15, 16, 17, 18

Peak discharge = 5.319 cfs
Time to peak = 730 min
Hyd. volume = 31,963 cuft
Contrib. drain. area= 4.750 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

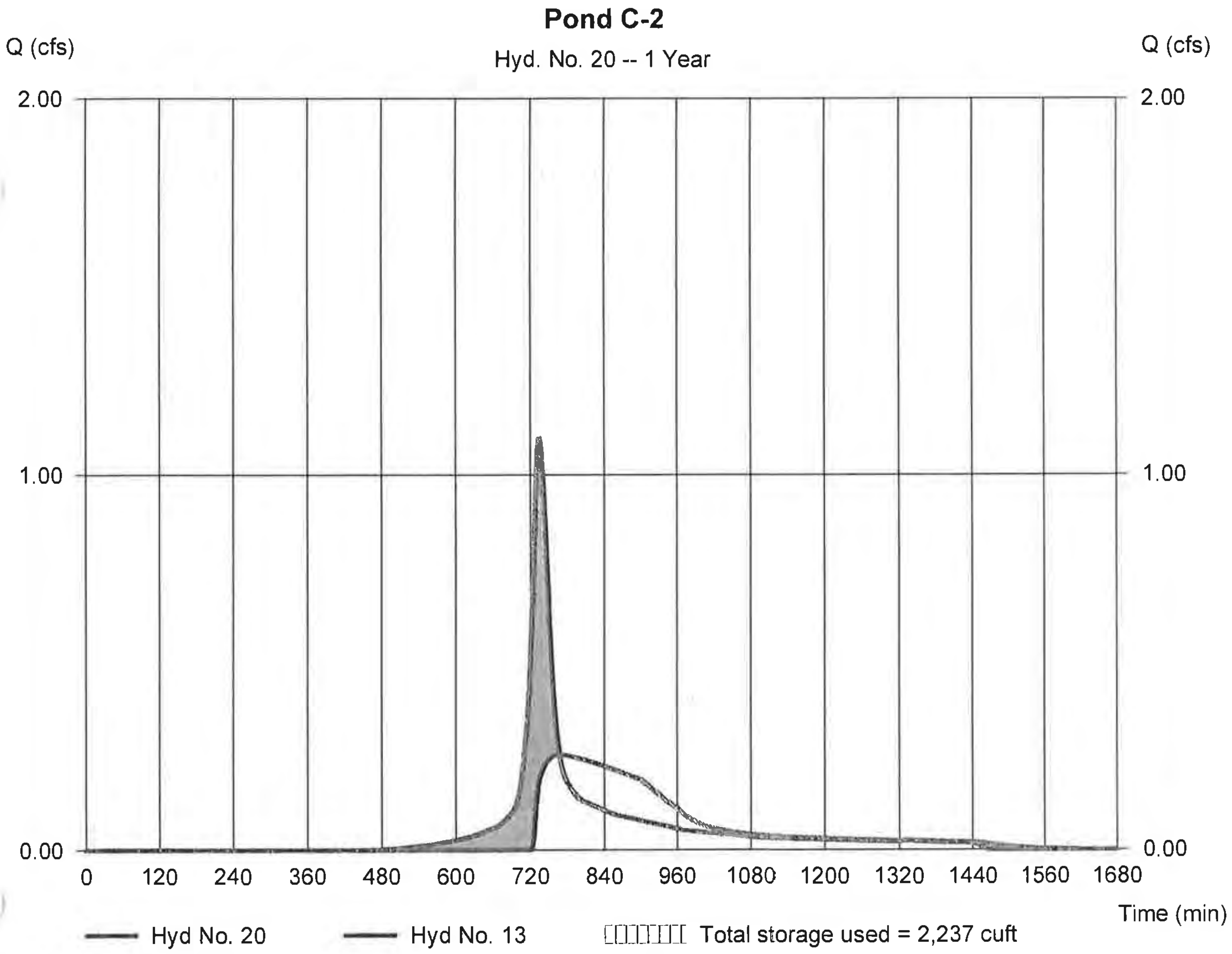
Hyd. No. 20

Pond C-2

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 13 - Proposed C-2
Reservoir name = C-2

Peak discharge = 0.254 cfs
Time to peak = 766 min
Hyd. volume = 4,014 cuft
Max. Elevation = 728.53 ft
Max. Storage = 2,237 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

Pond No. 6 - C-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	337	0	0
2.00	728.00	1,131	1,390	1,390
4.00	730.00	2,120	3,199	4,589

Culvert / Orifice Structures

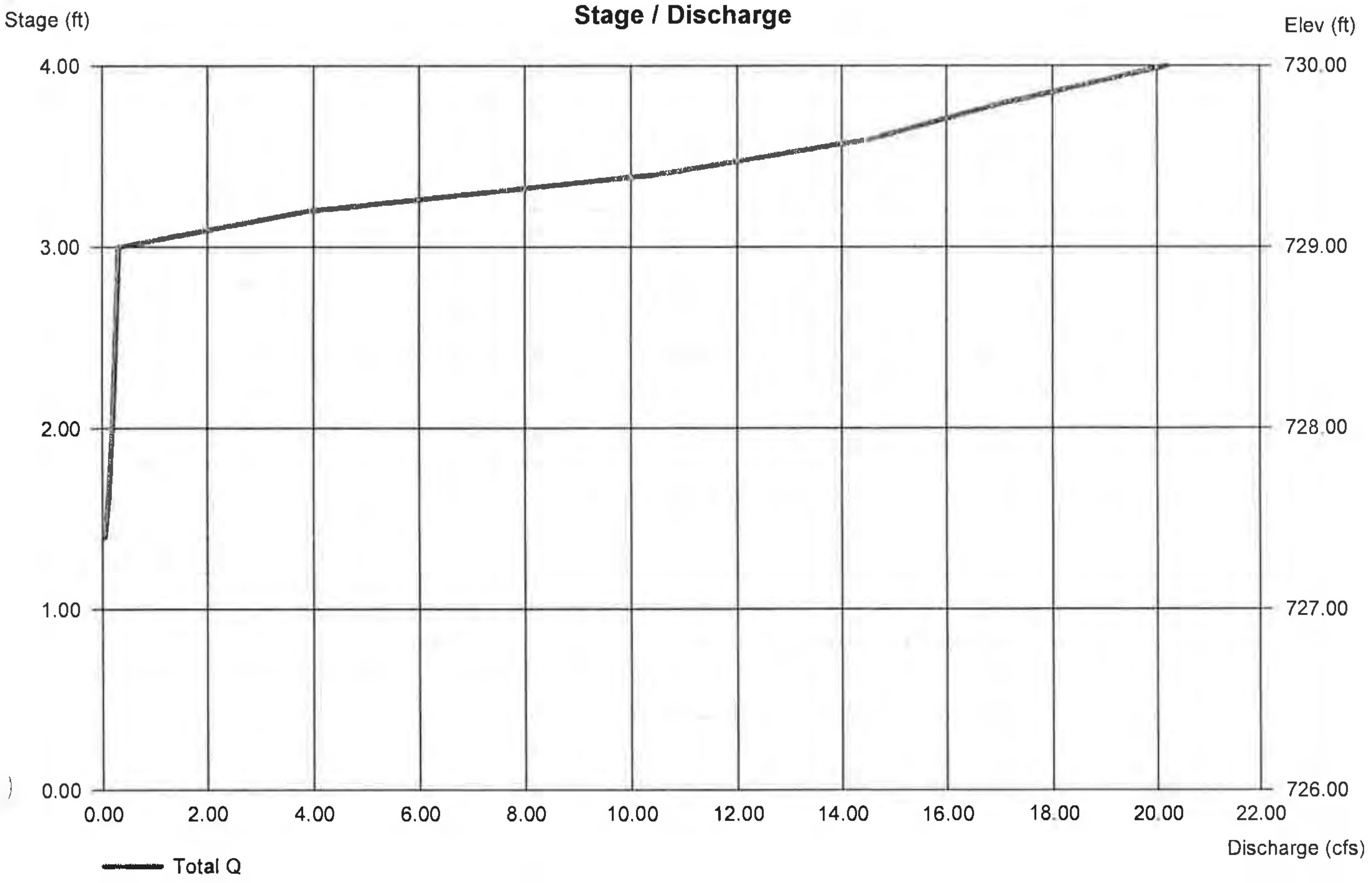
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	726.00	727.25	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	729.00	729.50	0.00	0.00
Weir Coeff.	=	3 33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

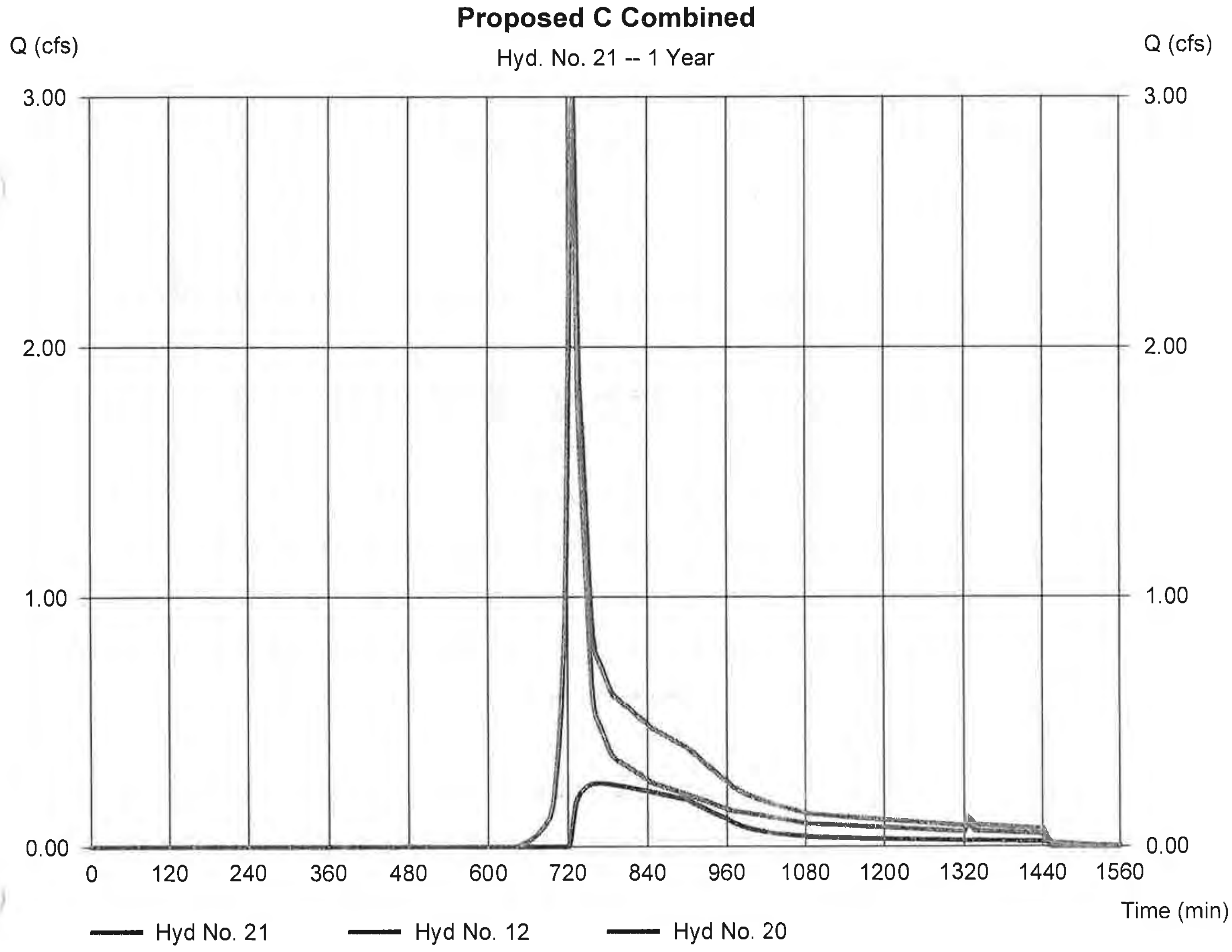


Hydrograph Report

Hyd. No. 21

Proposed C Combined

Hydrograph type	= Combine	Peak discharge	= 2.993 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 14,514 cuft
Inflow hyds.	= 12, 20	Contrib. drain. area=	3.330 ac



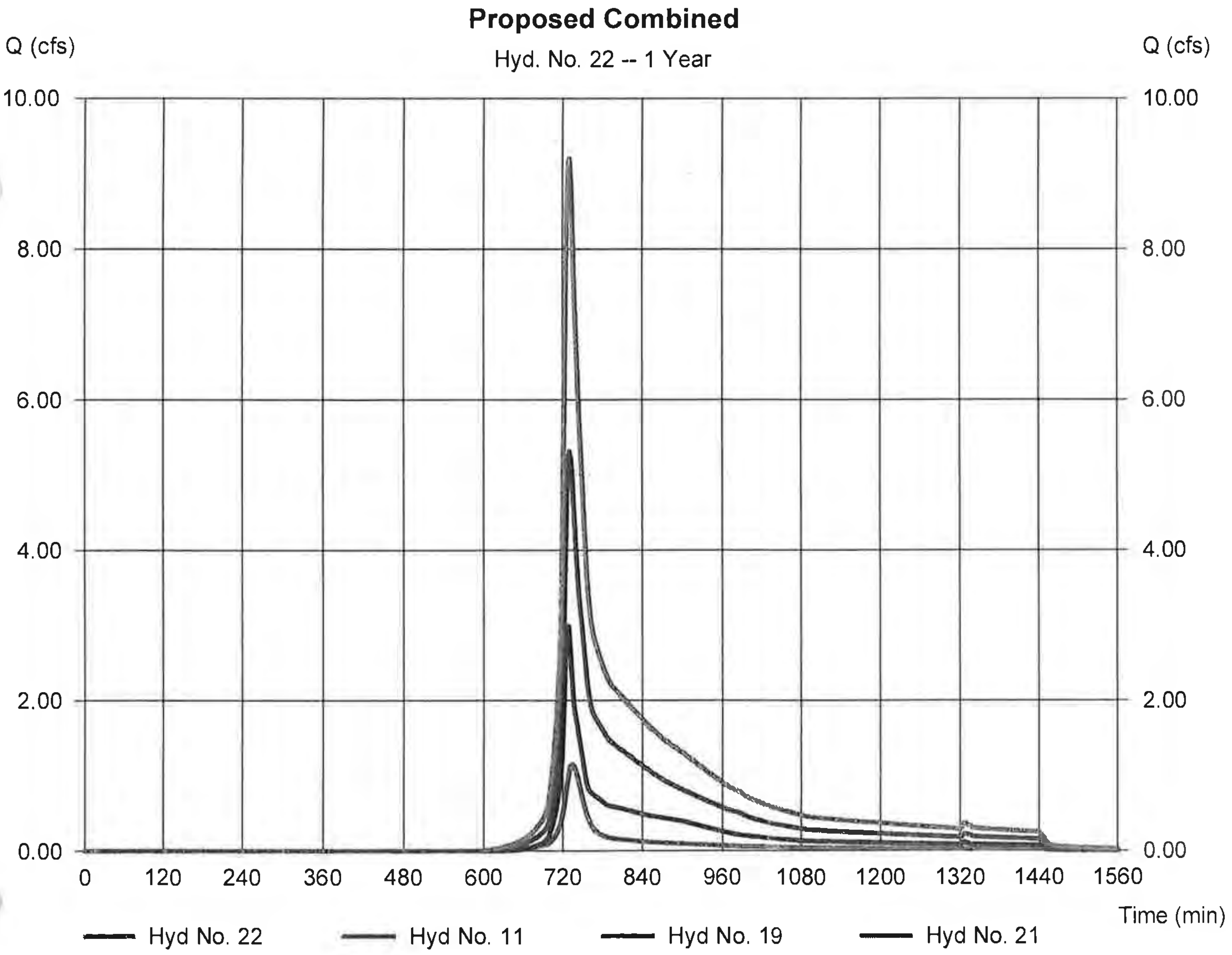
Hydrograph Report

Hyd. No. 22

Proposed Combined

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 11, 19, 21

Peak discharge = 9.206 cfs
Time to peak = 730 min
Hyd. volume = 51,641 cuft
Contrib. drain. area= 1.240 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	24.85	2	728	95,580	------	------	------	Existing A
2	SCS Runoff	3.130	2	732	13,860	------	------	------	Existing B
3	SCS Runoff	10.36	2	734	45,798	------	------	------	Existing C
4	Combine	37.62	2	730	155,238	1, 2, 3	------	------	Existing Combined
5	SCS Runoff	2.199	2	726	7,640	------	------	------	Proposed A-1
6	SCS Runoff	2.860	2	726	9,989	------	------	------	Proposed A-2
7	SCS Runoff	2.717	2	724	8,259	------	------	------	Proposed A-3
8	SCS Runoff	1.427	2	726	4,877	------	------	------	Proposed A-4
9	SCS Runoff	3.699	2	724	11,126	------	------	------	Proposed A-5
10	SCS Runoff	13.42	2	728	51,439	------	------	------	Proposed A-6
11	SCS Runoff	3.130	2	732	13,860	------	------	------	Proposed B
12	SCS Runoff	9.277	2	726	31,706	------	------	------	Proposed C-1
13	SCS Runoff	2.546	2	732	11,454	------	------	------	Proposed C-2
14	Reservoir	2.154	2	728	7,131	5	709.11	1,634	Pond A-1
15	Reservoir	2.797	2	728	9,309	6	701.14	2,223	Pond A-2
16	Reservoir	0.311	2	762	7,613	7	728.35	4,197	Pond A-3
17	Reservoir	0.317	2	752	4,517	8	718.67	1,994	Pond A-4
18	Reservoir	3.519	2	726	10,201	9	719.19	2,657	Pond A-5
19	Combine	21.98	2	728	90,210	10, 14, 15, 16, 17, 18	------	------	Proposed A Combined
20	Reservoir	2.482	2	736	10,616	13	729.12	3,184	Pond C-2
21	Combine	9.550	2	726	42,323	12, 20	------	------	Proposed C Combined
22	Combine	34.07	2	728	146,392	11, 19, 21	------	------	Proposed Combined

1016 Stormwater 3 inch orifice.gpw | Return Period: 10 Year | Monday, Mar 30, 2009

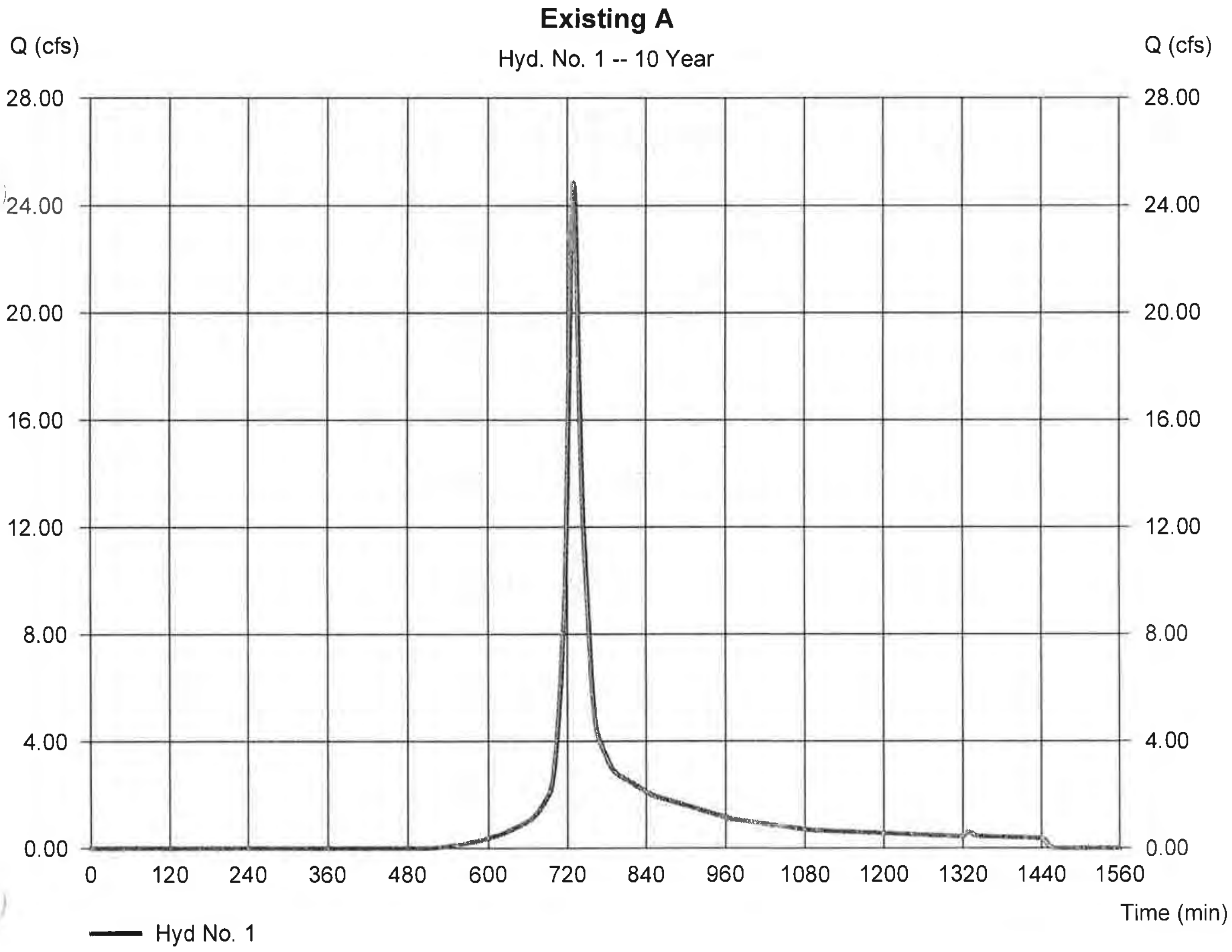
Hydrograph Report

Hyd. No. 1

Existing A

Hydrograph type	= SCS Runoff	Peak discharge	= 24.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 95,580 cuft
Drainage area	= 10.070 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 5.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.050 x 98) + (0.290 x 84) + (5.220 x 71) + (2.390 x 76) + (0.800 x 82) + (0.320 x 78)] / 10.070



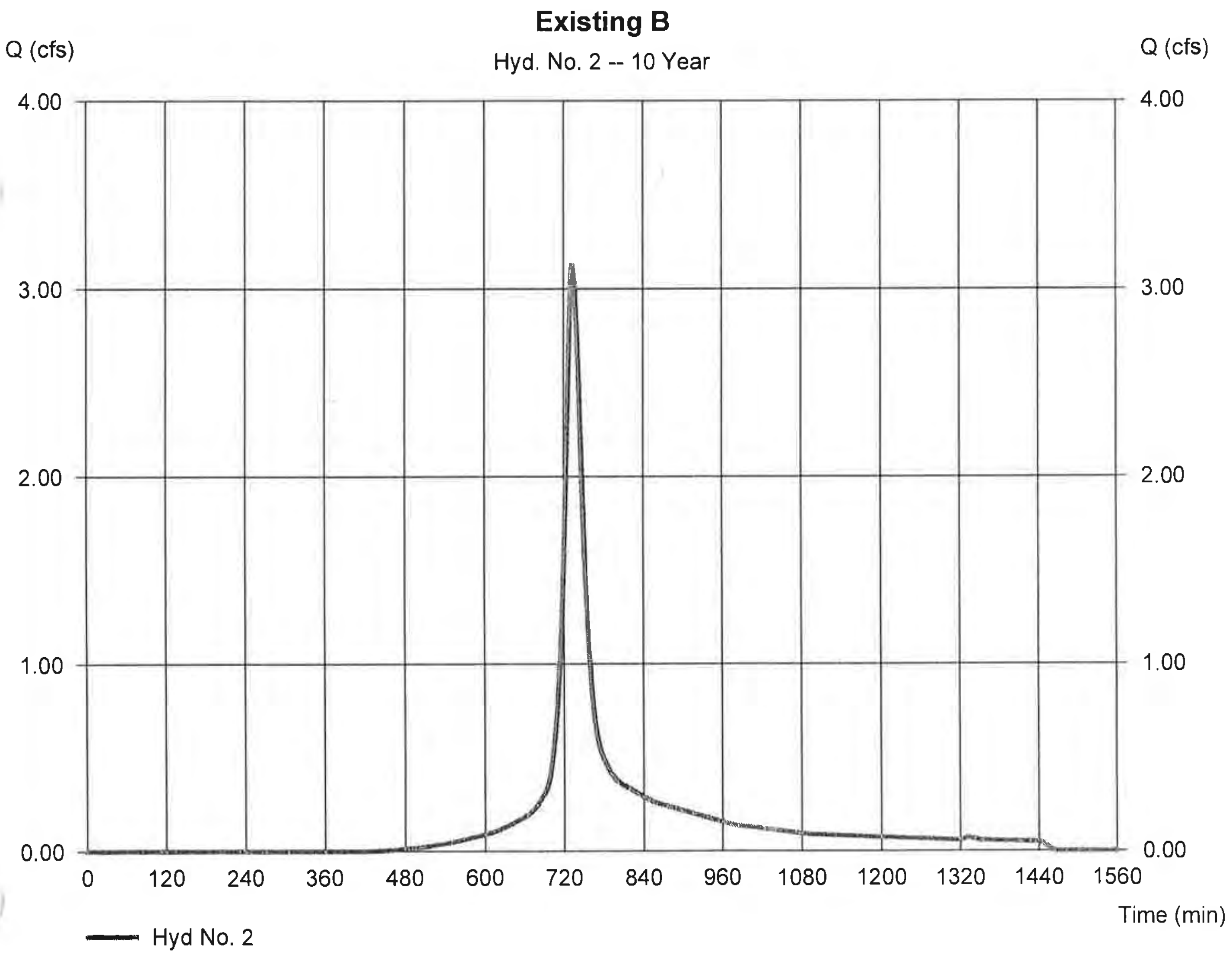
Hydrograph Report

Hyd. No. 2

Existing B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.130 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 13,860 cuft
Drainage area	= 1.240 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.10 min
Total precip.	= 5.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



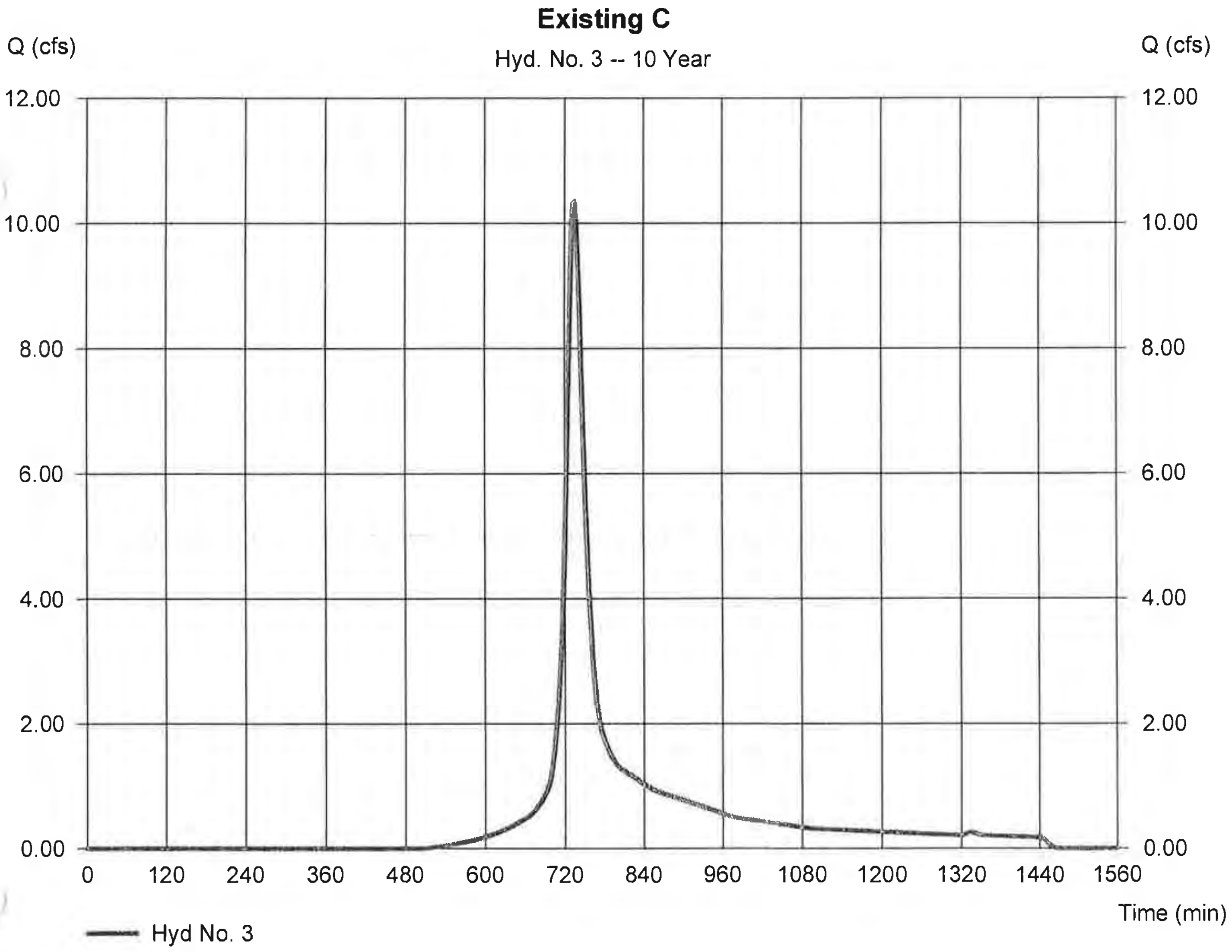
Hydrograph Report

Hyd. No. 3

Existing C

Hydrograph type = SCS Runoff		Peak discharge = 10.36 cfs	
Storm frequency = 10 yrs		Time to peak = 734 min	
Time interval = 2 min		Hyd. volume = 45,798 cuft	
Drainage area = 4.810 ac		Curve number = 77*	
Basin Slope = 0.0 %		Hydraulic length = 0 ft	
Tc method = TR55		Time of conc. (Tc) = 19.40 min	
Total precip. = 5.00 in		Distribution = Type III	
Storm duration = 24 hrs		Shape factor = 484	

* Composite (Area/CN) = [(0.110 x 98) + (0.290 x 82) + (4.010 x 76) + (0.330 x 71) + (0.010 x 82) + (0.060 x 78)] / 4.810



Hydrograph Report

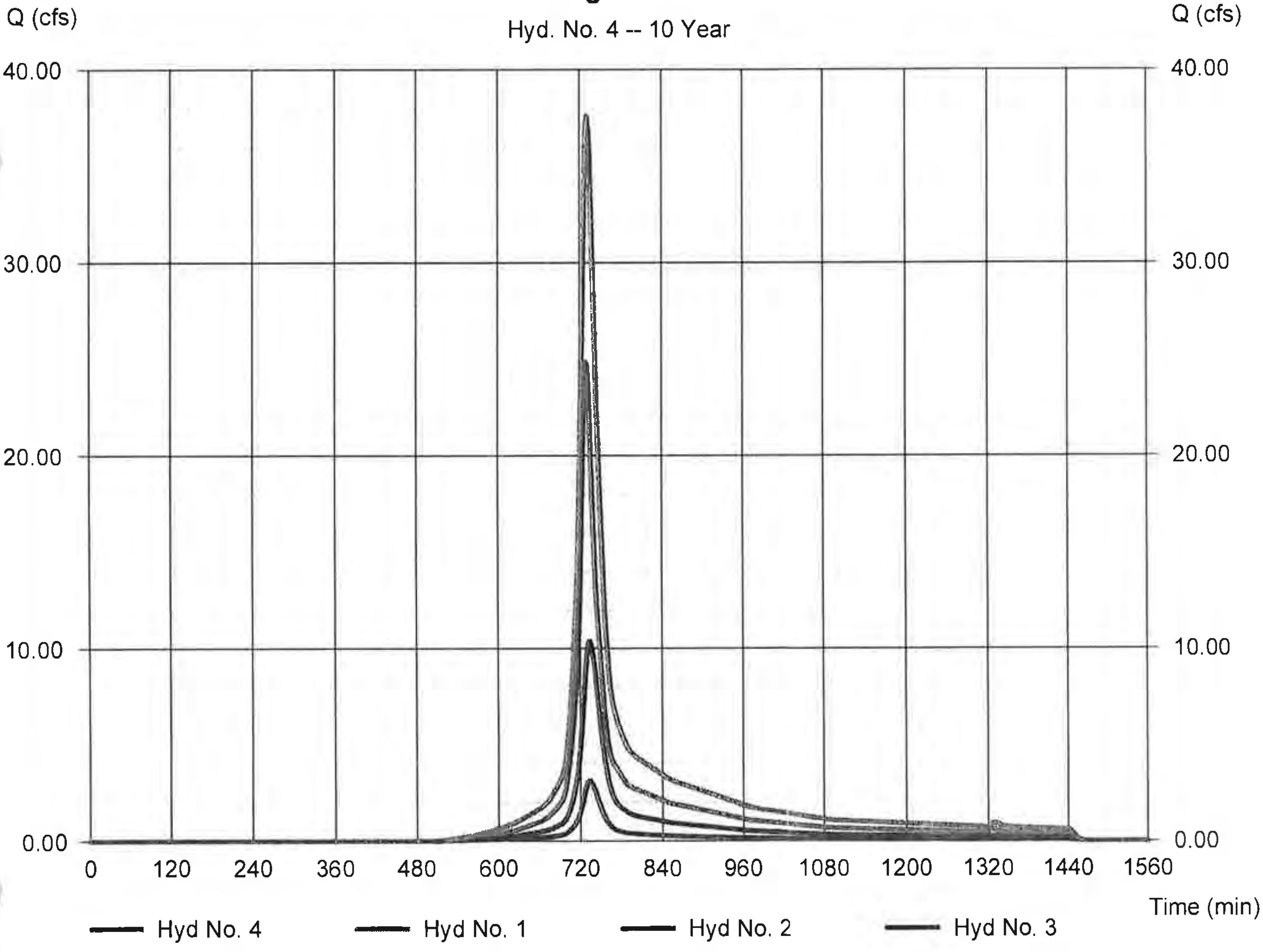
Hyd. No. 4

Existing Combined

Hydrograph type	= Combine	Peak discharge	= 37.62 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 155,238 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 16.120 ac

Existing Combined

Hyd. No. 4 -- 10 Year



Hydrograph Report

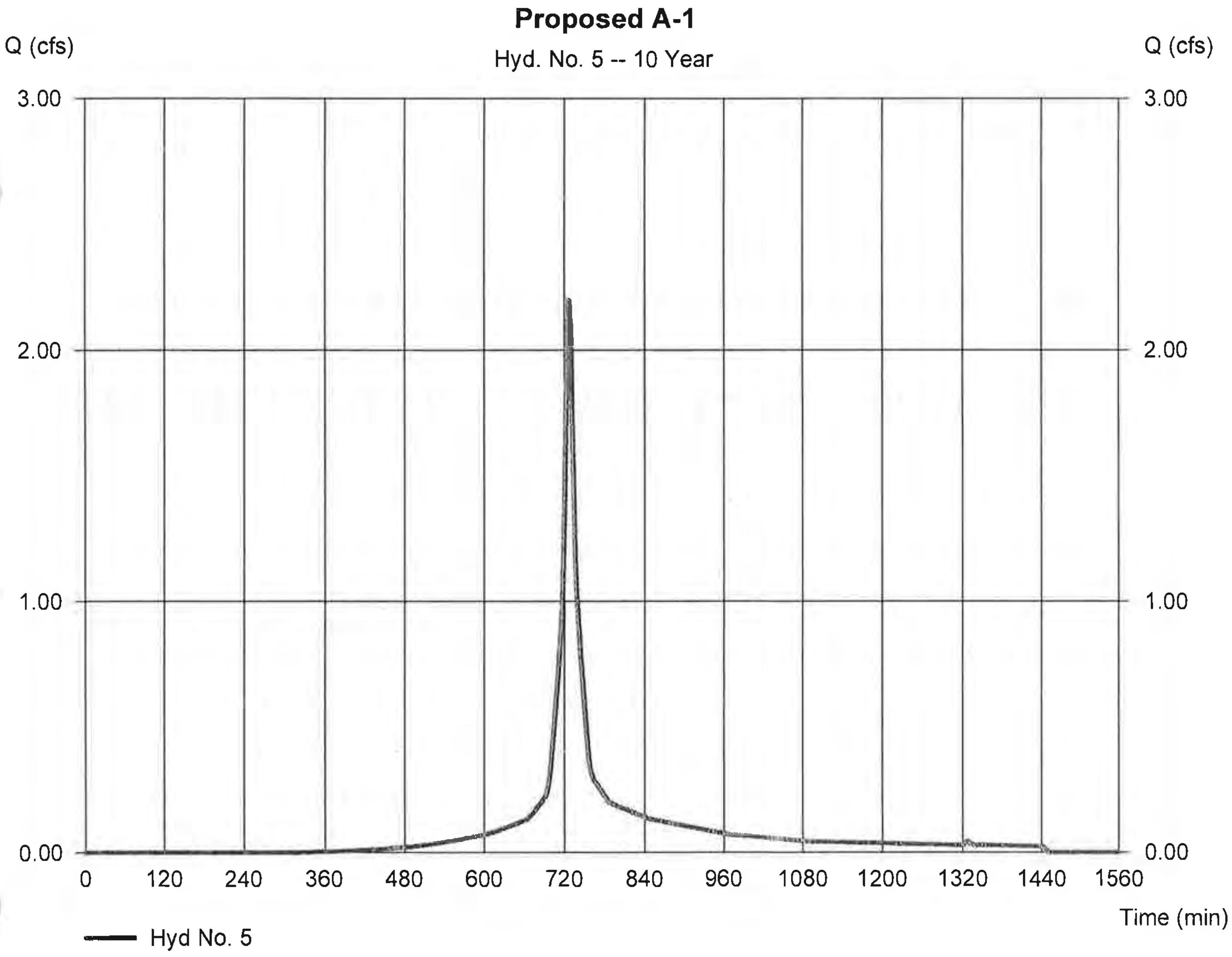
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 5

Proposed A-1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.199 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 7,640 cuft
Drainage area	= 0.590 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.80 min
Total precip.	= 5.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 98) + (0.270 x 74)] / 0.590



Hydrograph Report

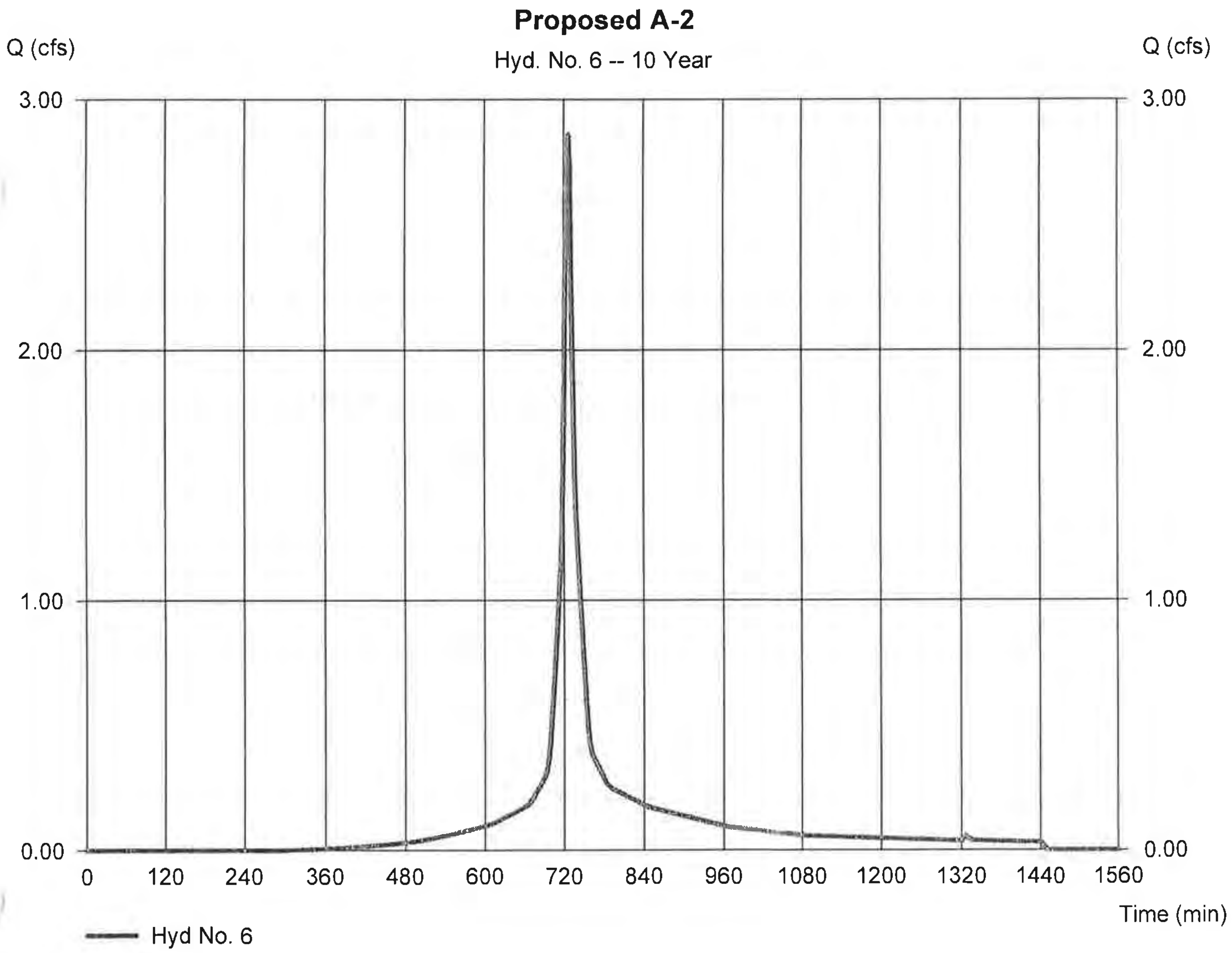
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 6

Proposed A-2

Hydrograph type = SCS Runoff		Peak discharge = 2.860 cfs	
Storm frequency = 10 yrs		Time to peak = 726 min	
Time interval = 2 min		Hyd. volume = 9,989 cuft	
Drainage area = 0.750 ac		Curve number = 88*	
Basin Slope = 0.0 %		Hydraulic length = 0 ft	
Tc method = TR55		Time of conc. (Tc) = 9.50 min	
Total precip. = 5.00 in		Distribution = Type III	
Storm duration = 24 hrs		Shape factor = 484	

* Composite (Area/CN) = [(0.430 x 98) + (0.320 x 74)] / 0.750



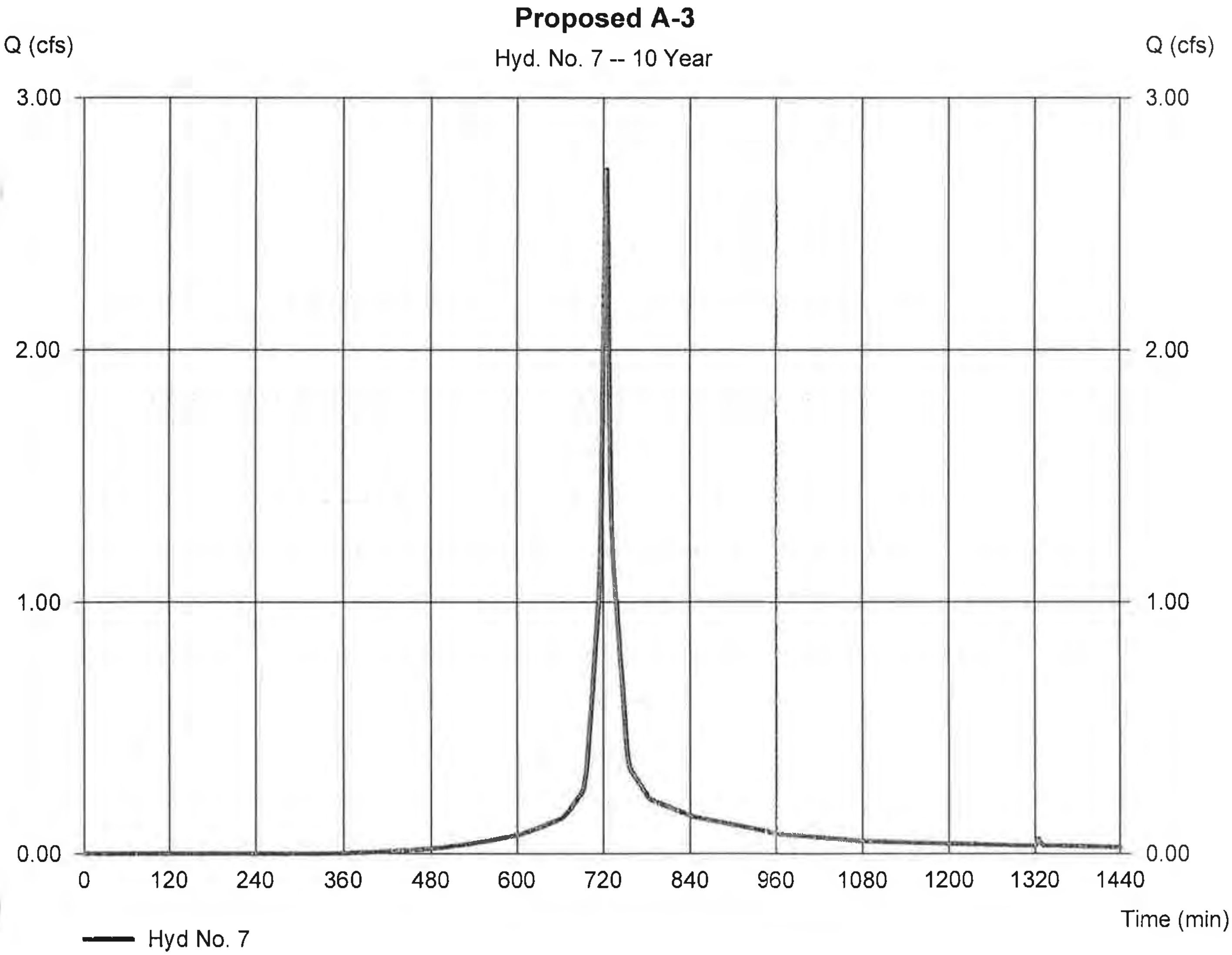
Hydrograph Report

Hyd. No. 7

Proposed A-3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.717 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 8,259 cuft
Drainage area	= 0.700 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.20 min
Total precip.	= 5.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.280 x 98) + (0.280 x 80) + (0.140 x 74)] / 0.700



Hydrograph Report

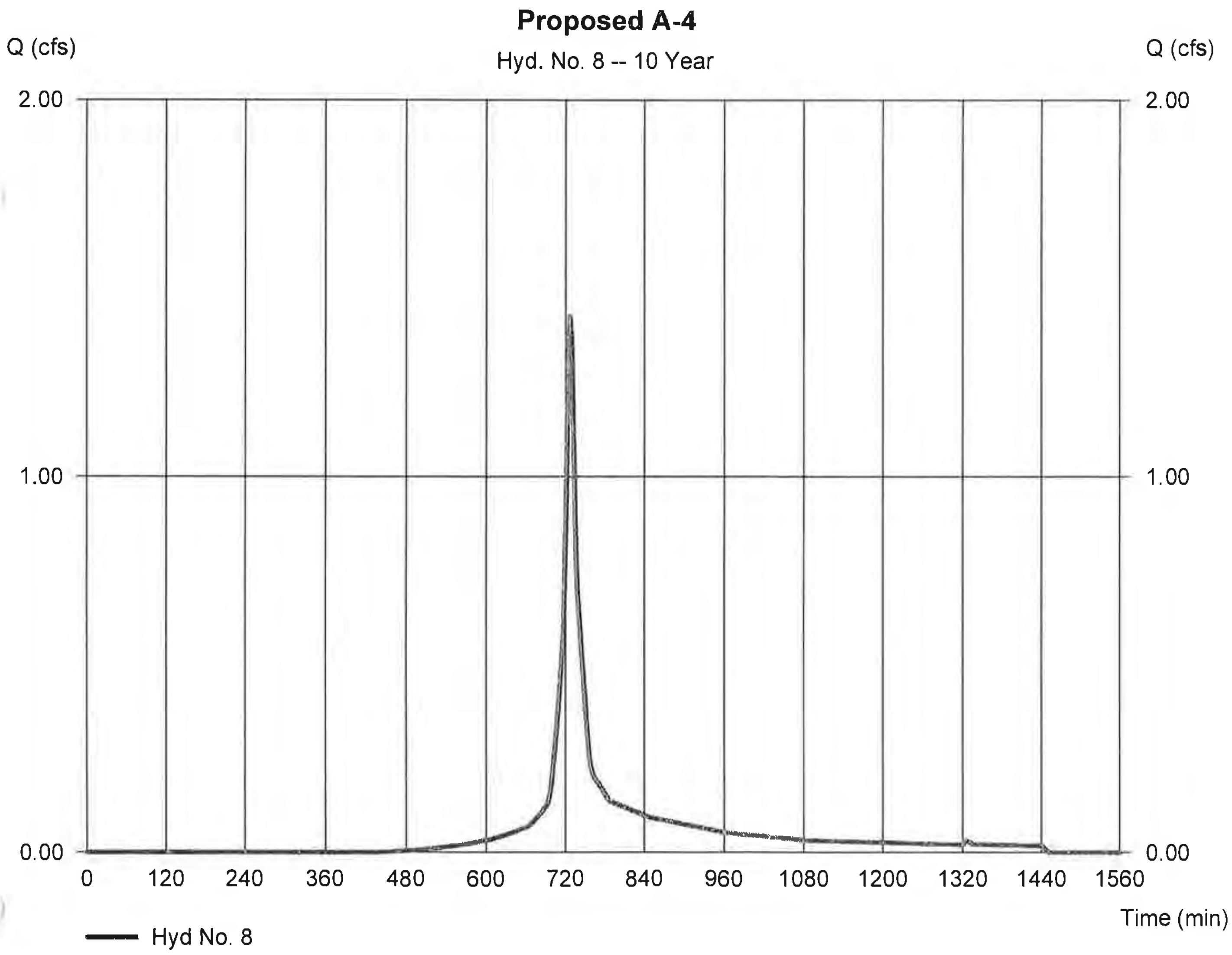
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 8

Proposed A-4

Hydrograph type = SCS Runoff		Peak discharge = 1.427 cfs	
Storm frequency = 10 yrs		Time to peak = 726 min	
Time interval = 2 min		Hyd. volume = 4,877 cuft	
Drainage area = 0.450 ac		Curve number = 81*	
Basin Slope = 0.0 %		Hydraulic length = 0 ft	
Tc method = TR55		Time of conc. (Tc) = 8.00 min	
Total precip. = 5.00 in		Distribution = Type III	
Storm duration = 24 hrs		Shape factor = 484	

* Composite (Area/CN) = [(0.140 x 98) + (0.310 x 74)] / 0.450



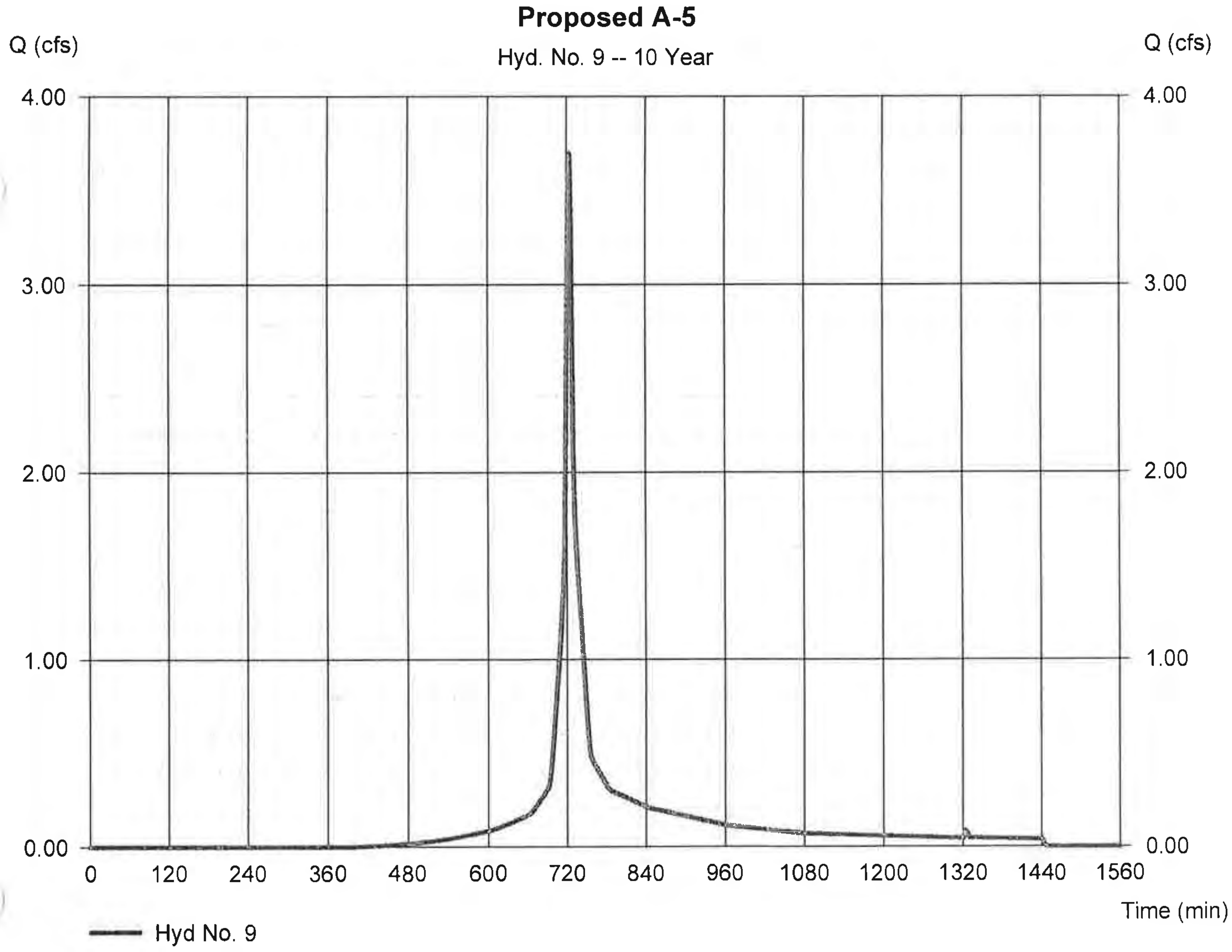
Hydrograph Report

Hyd. No. 9

Proposed A-5

Hydrograph type	= SCS Runoff	Peak discharge	= 3.699 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 11,126 cuft
Drainage area	= 1.030 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.400 x 98) + (0.630 x 74)] / 1.030



Hydrograph Report

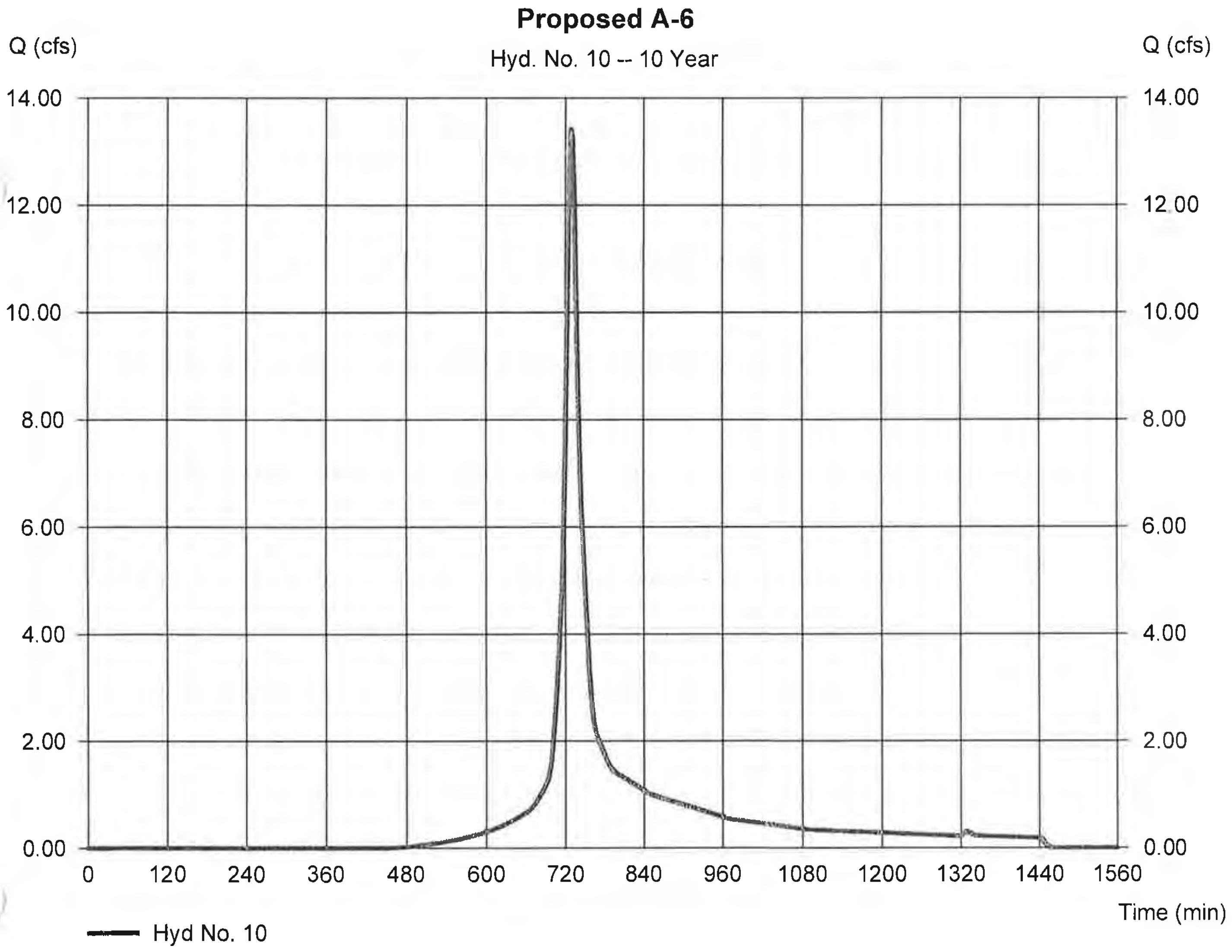
Hyd. No. 10

Proposed A-6

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 4.750 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 5.00 in
Storm duration = 24 hrs

Peak discharge = 13.42 cfs
Time to peak = 728 min
Hyd. volume = 51,439 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.20 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(1.030 x 98) + (0.290 x 84) + (0.250 x 81) + (0.690 x 76) + (1.560 x 74) + (0.930 x 71)] / 4.750



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

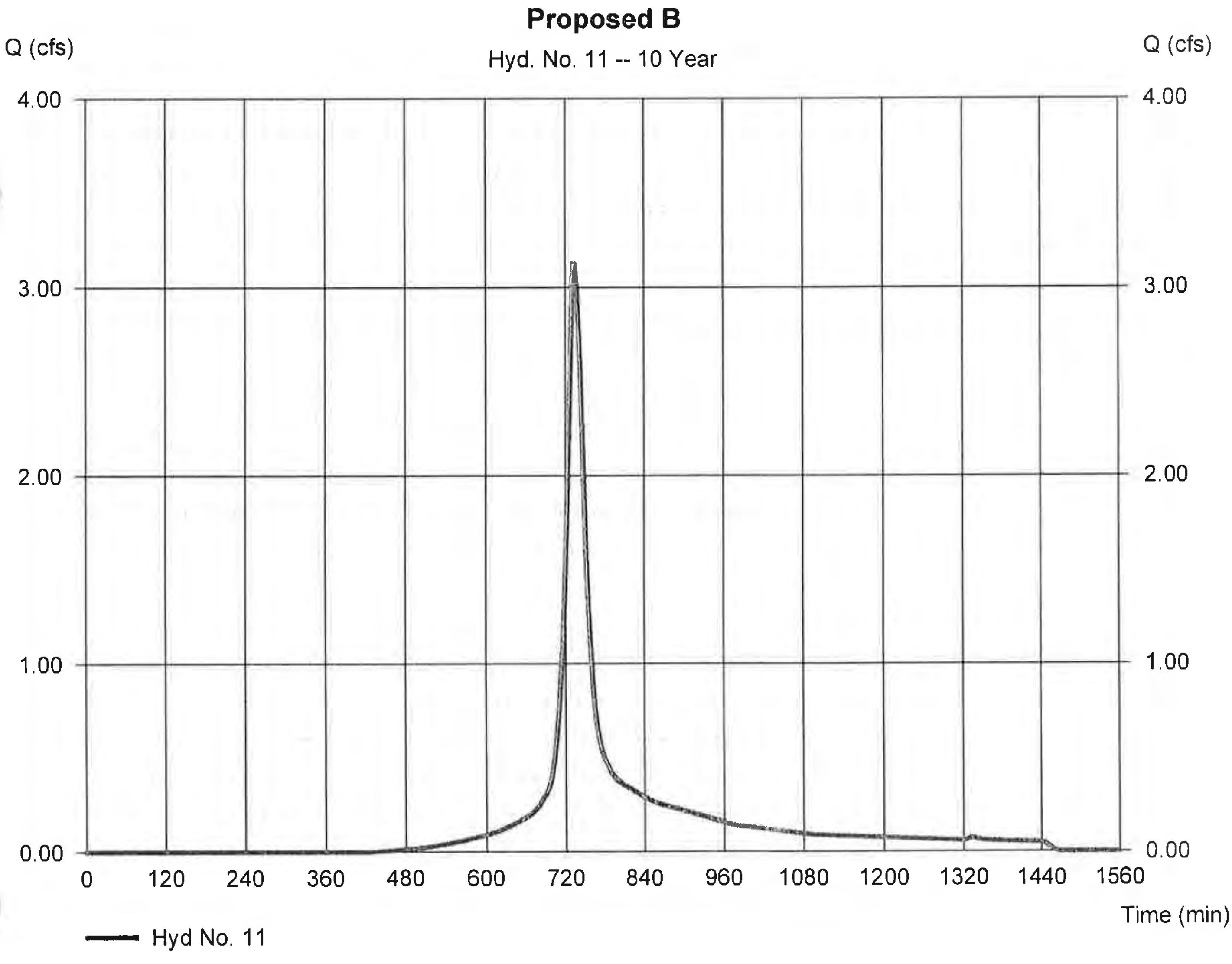
Hyd. No. 11

Proposed B

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 1.240 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 5.00 in
Storm duration = 24 hrs

Peak discharge = 3.130 cfs
Time to peak = 732 min
Hyd. volume = 13,860 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.10 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

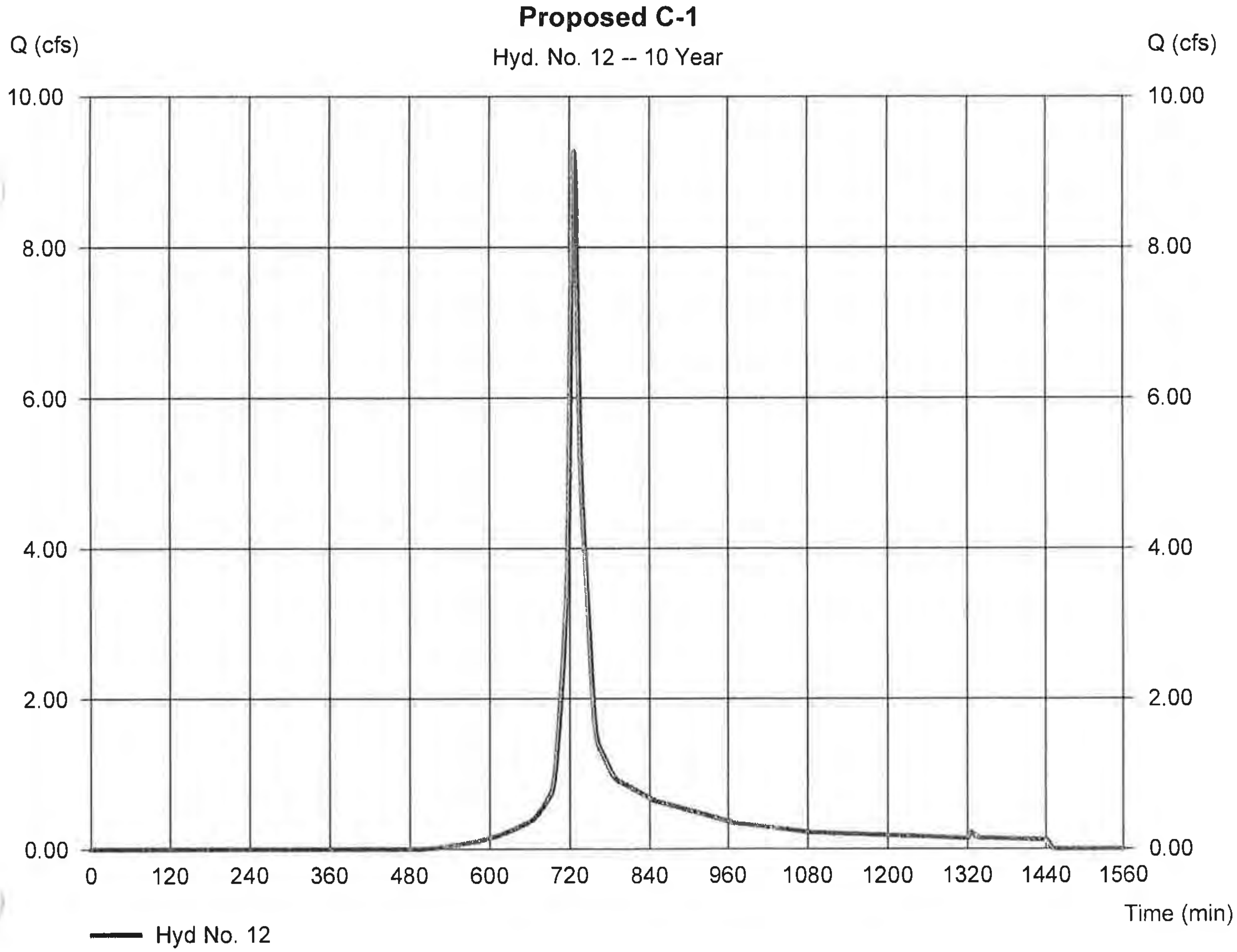
Hyd. No. 12

Proposed C-1

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 3.330 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 5.00 in
Storm duration = 24 hrs

Peak discharge = 9.277 cfs
Time to peak = 726 min
Hyd. volume = 31,706 cuft
Curve number = 77*
Hydraulic length = 0 ft
Time of conc. (Tc) = 9.80 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.210 x 98) + (0.300 x 82) + (1.200 x 76) + (0.050 x 80) + (0.250 x 71) + (1.320 x 74)] / 3.330



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

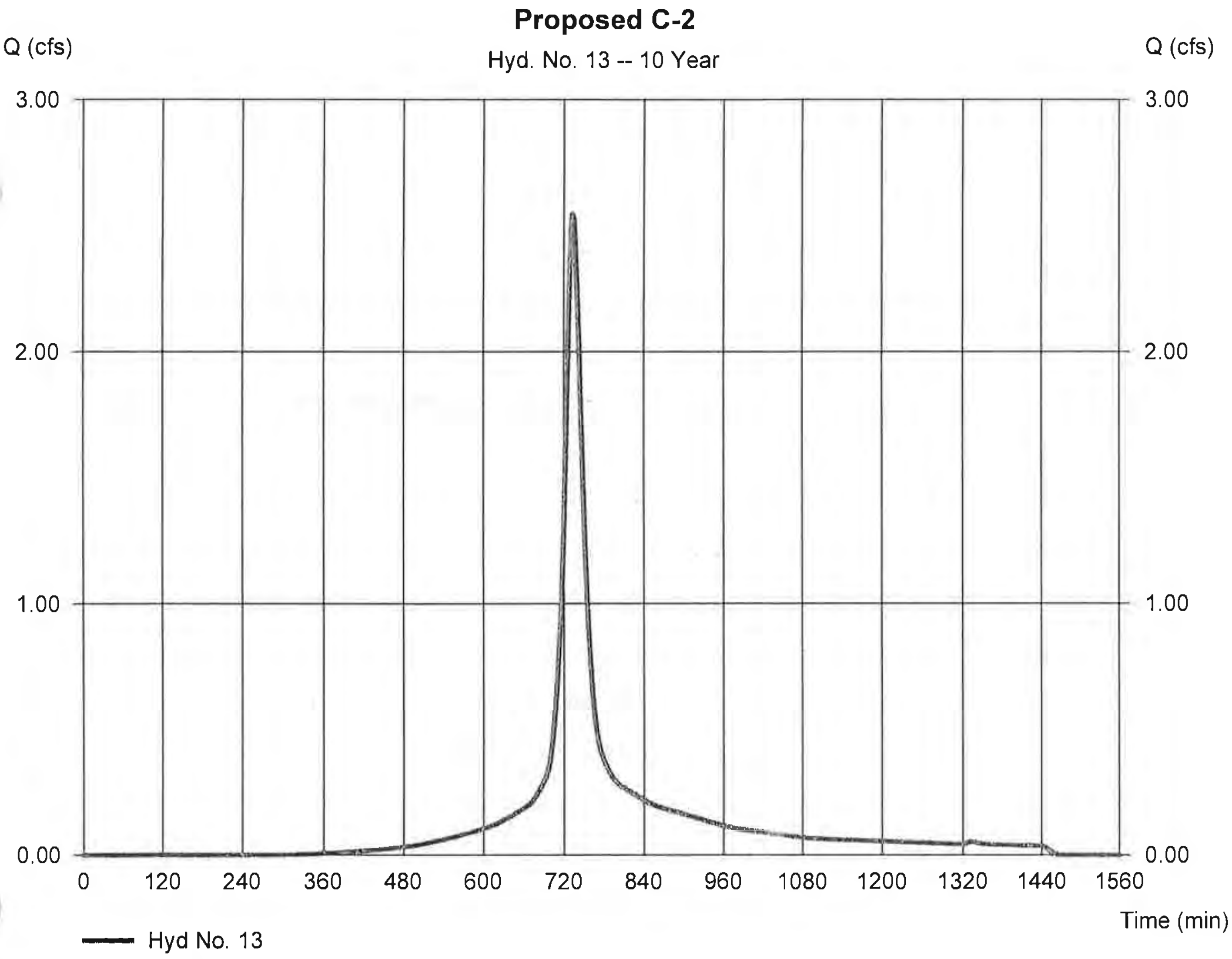
Hyd. No. 13

Proposed C-2

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 0.860 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 5.00 in
Storm duration = 24 hrs

Peak discharge = 2.546 cfs
Time to peak = 732 min
Hyd. volume = 11,454 cuft
Curve number = 88*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.490 x 98) + (0.370 x 74)] / 0.860



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

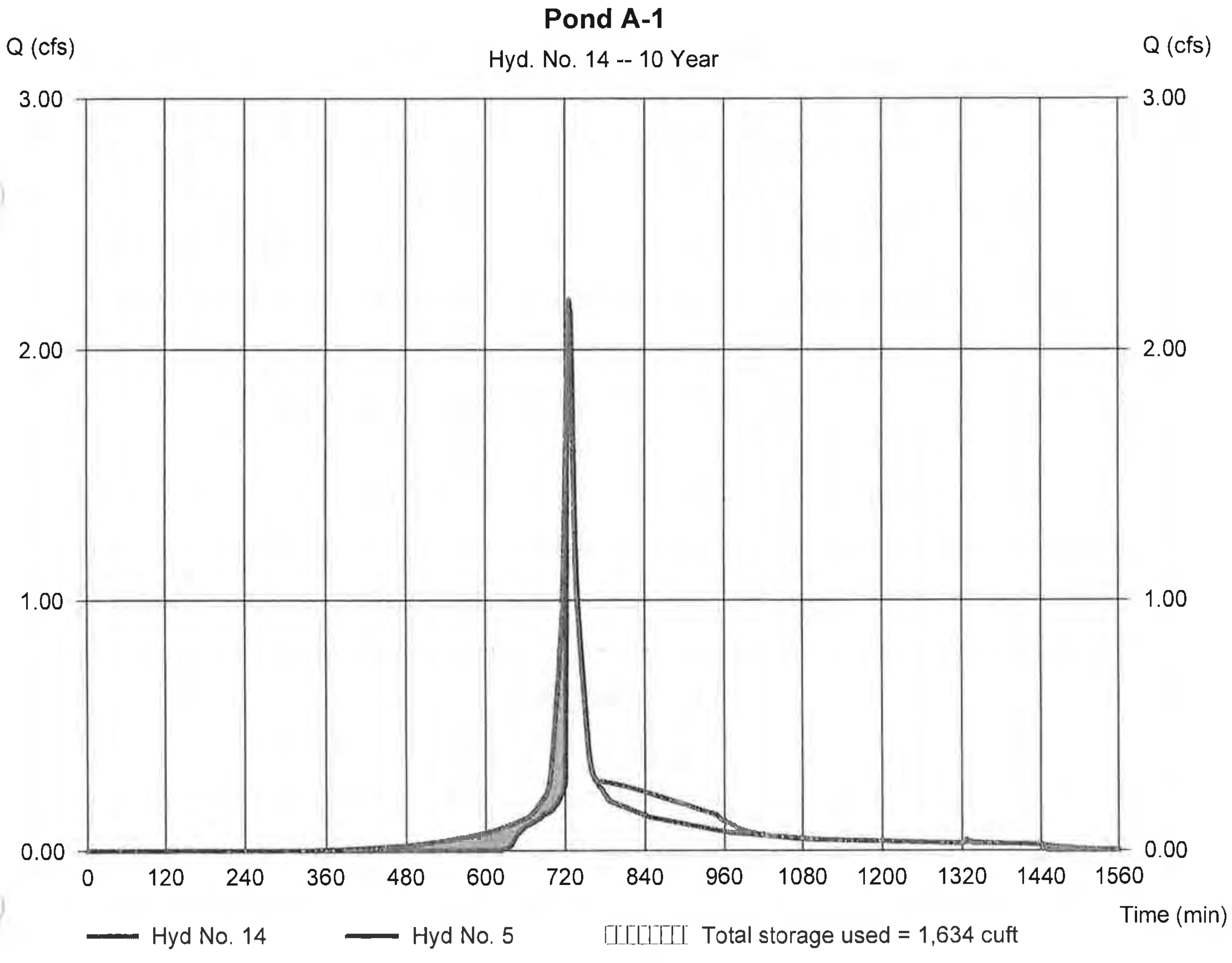
Hyd. No. 14

Pond A-1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 5 - Proposed A-1
Reservoir name = A-1

Peak discharge = 2.154 cfs
Time to peak = 728 min
Hyd. volume = 7,131 cuft
Max. Elevation = 709.11 ft
Max. Storage = 1,634 cuft

Storage Indication method used



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 1 - A-1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 706.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	706.00	176	0	0
2.00	708.00	587	722	722
4.00	710.00	1,090	1,651	2,373

Culvert / Orifice Structures

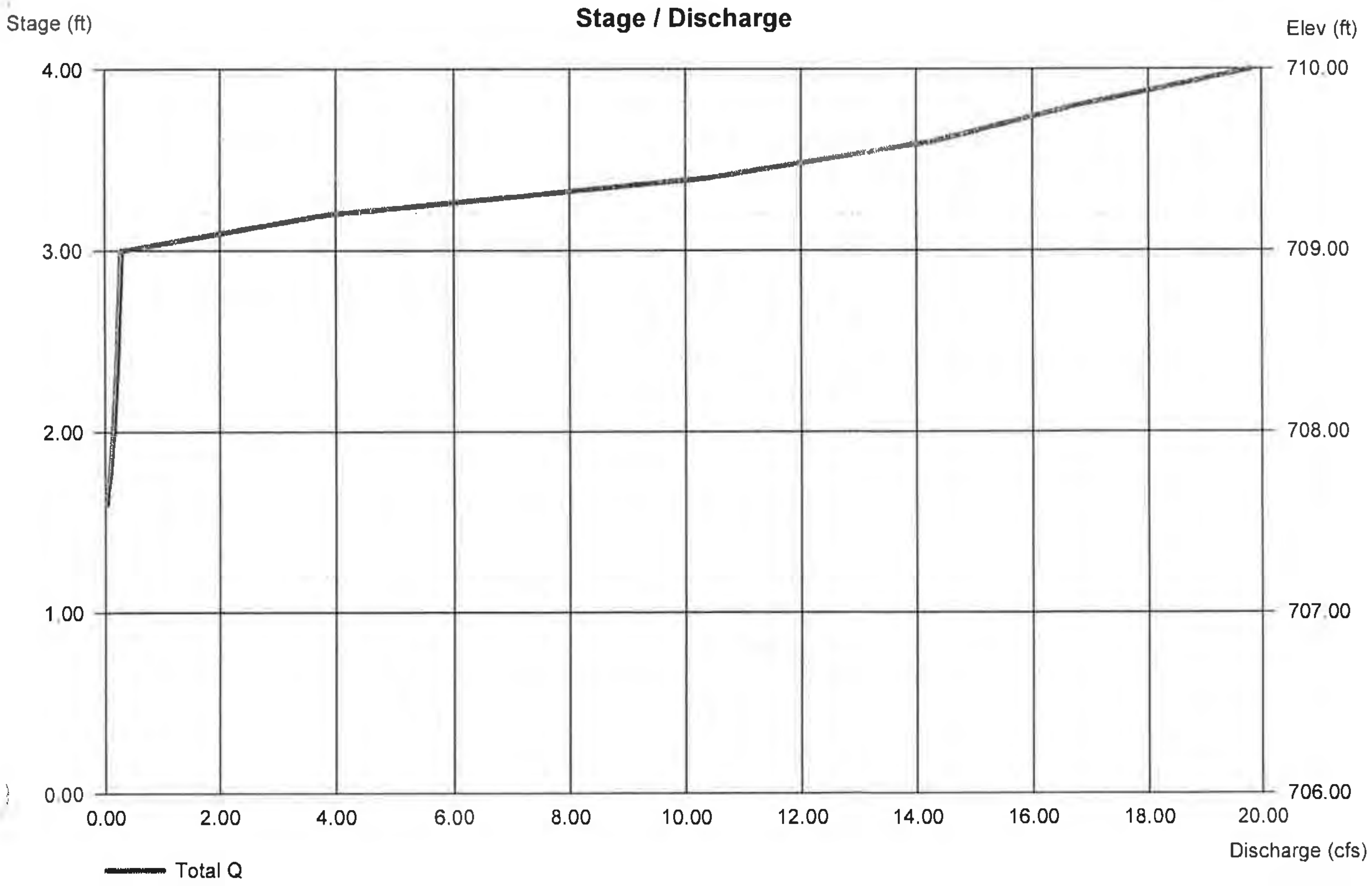
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 706.00	707.50	0.00	0.00
Length (ft)	= 16.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 709.00	709.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

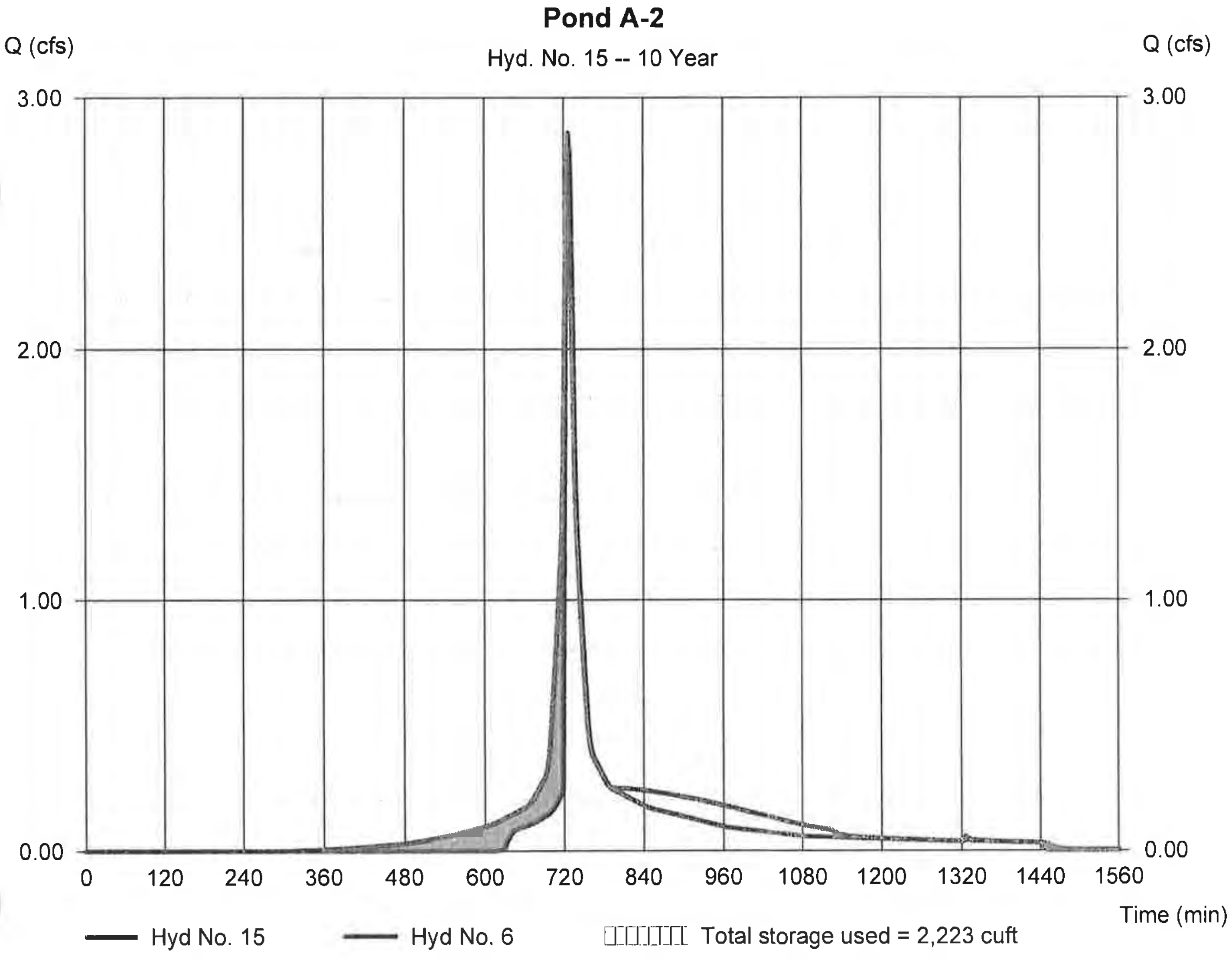
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 15

Pond A-2

Hydrograph type	=	Reservoir	Peak discharge	=	2.797 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	9,309 cuft
Inflow hyd. No.	=	6 - Proposed A-2	Max. Elevation	=	701.14 ft
Reservoir name	=	A-2	Max. Storage	=	2,223 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

Pond No. 2 - A-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining **Elevation** = 698.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	698.00	152	0	0
2.00	700.00	757	831	831
4.00	702.00	1,750	2,438	3,270

Culvert / Orifice Structures

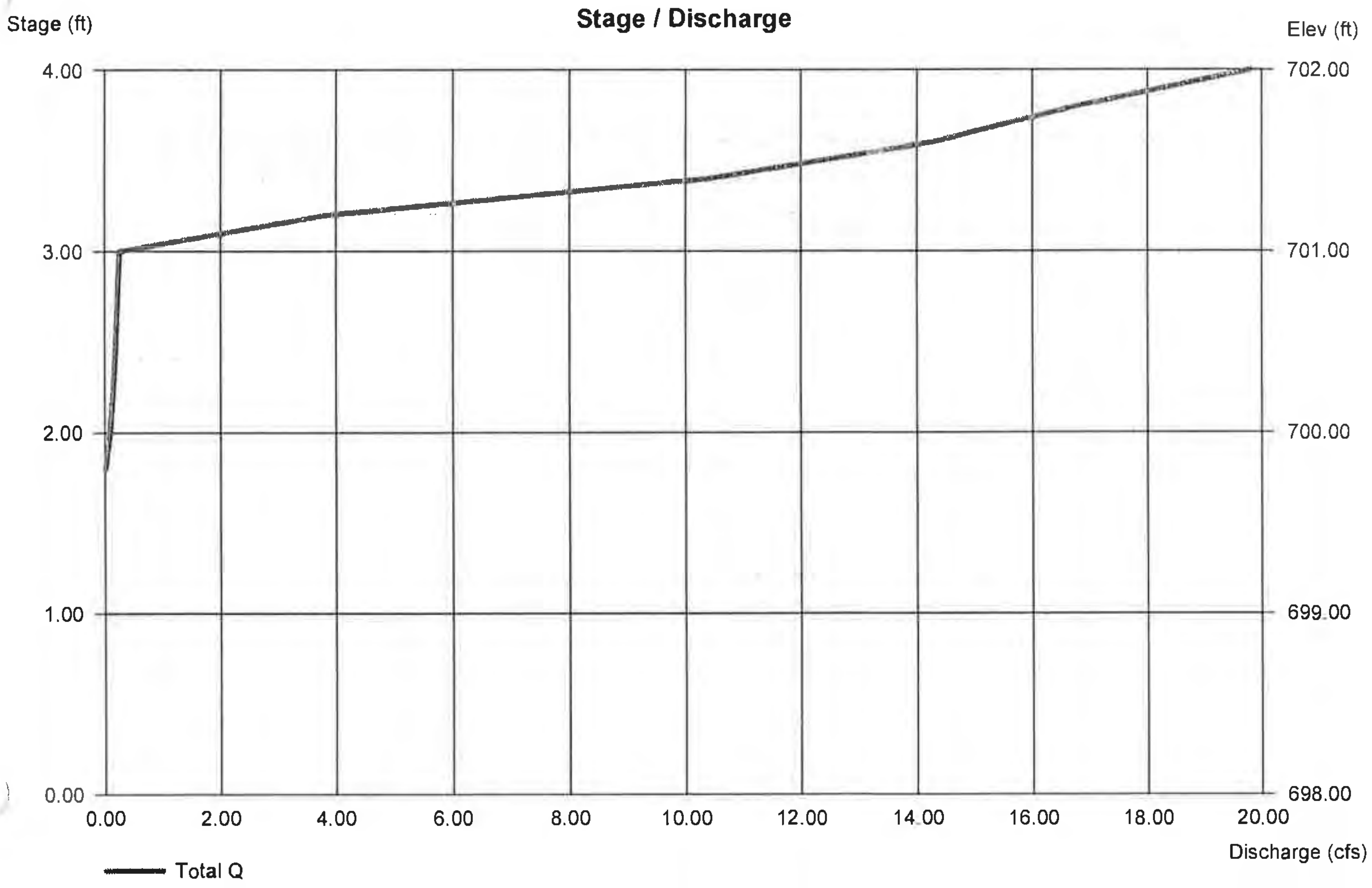
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	698.00	699.75	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	701.00	701.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

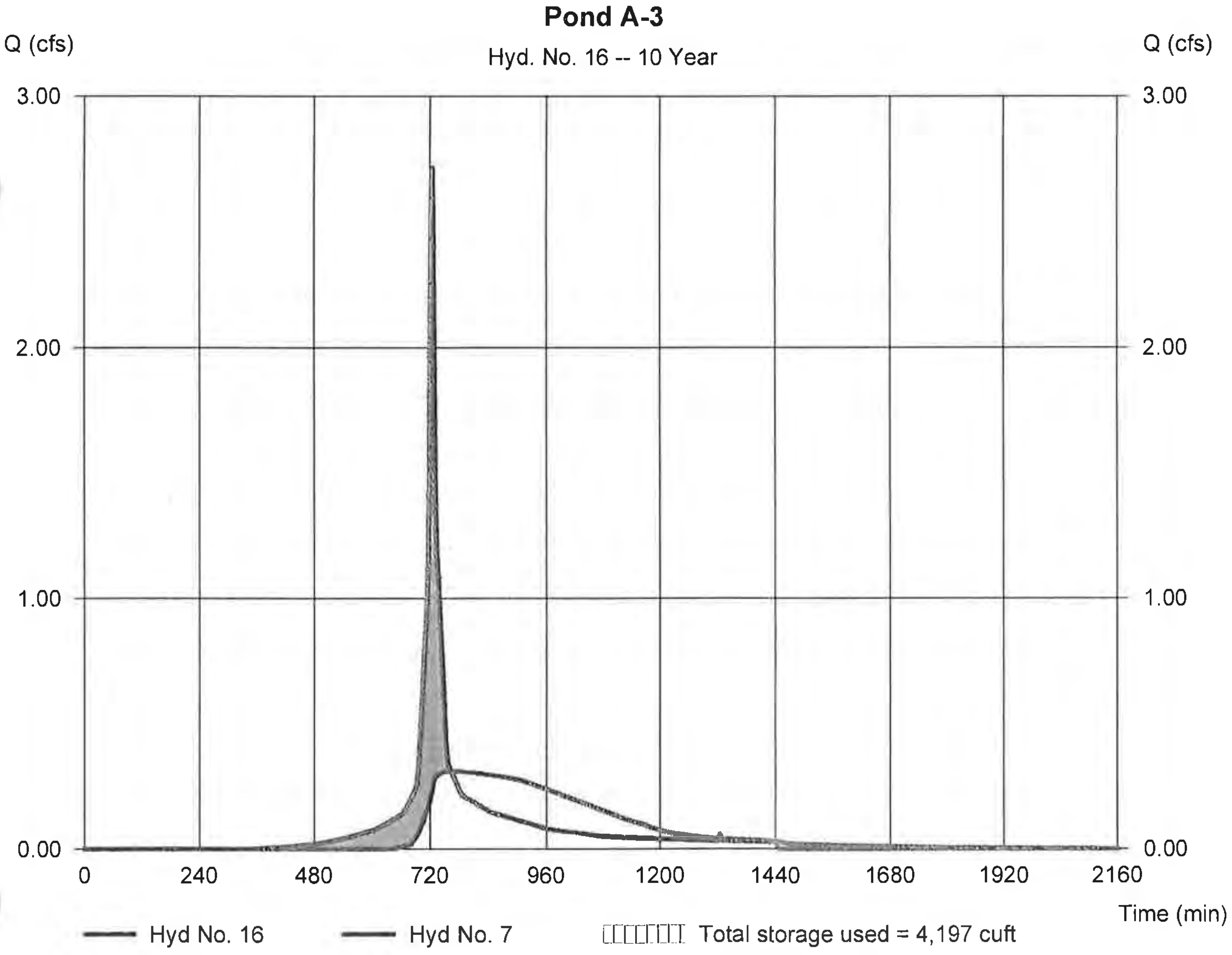
Hyd. No. 16

Pond A-3

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 7 - Proposed A-3
Reservoir name = A-3

Peak discharge = 0.311 cfs
Time to peak = 762 min
Hyd. volume = 7,613 cuft
Max. Elevation = 728.35 ft
Max. Storage = 4,197 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 3 - A-3

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	946	0	0
2.00	728.00	2,308	3,154	3,154
4.00	730.00	3,632	5,889	9,043

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	726.00	726.50	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

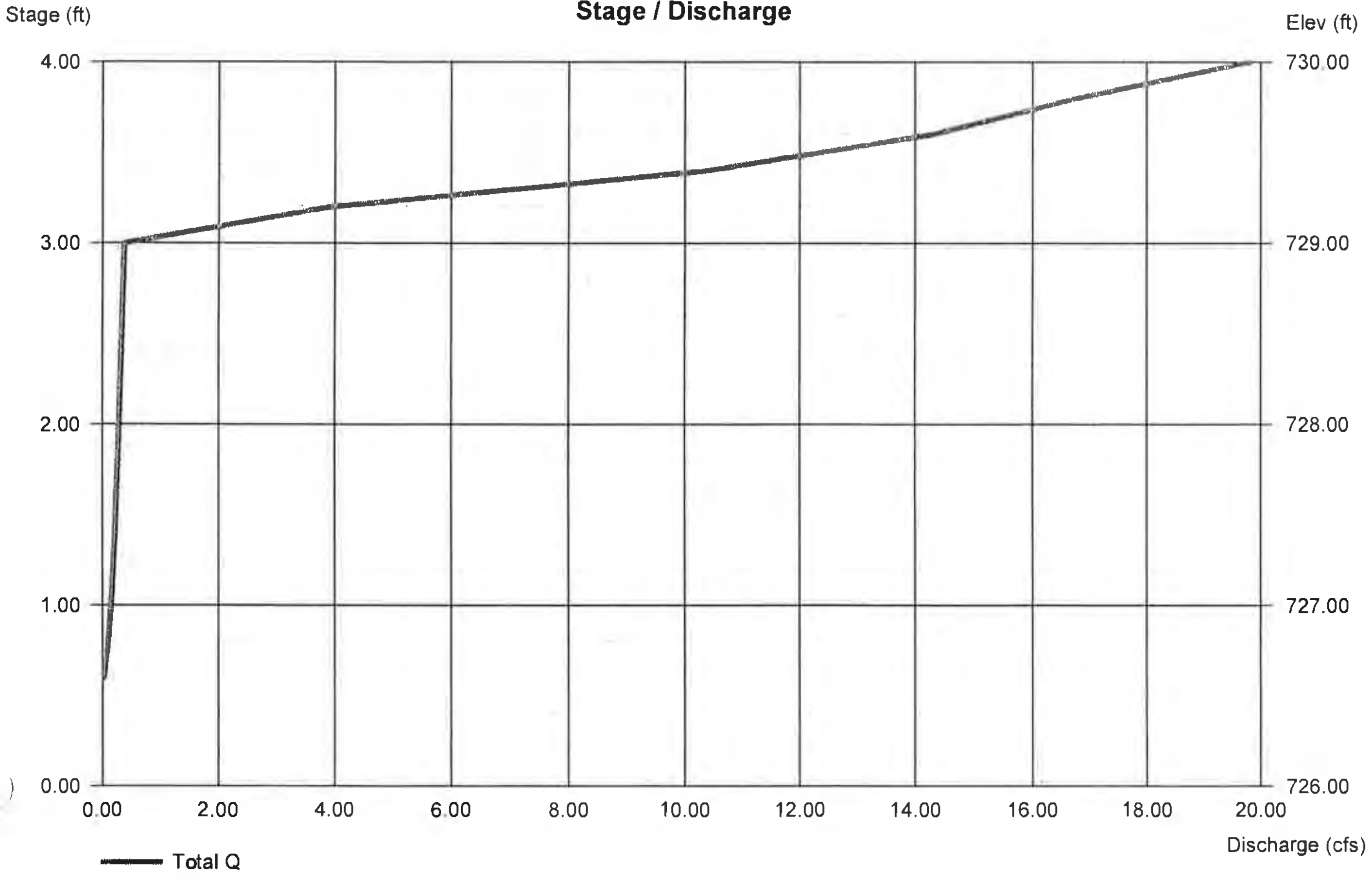
Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	729.00	729.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)

Stage / Discharge



Hydrograph Report

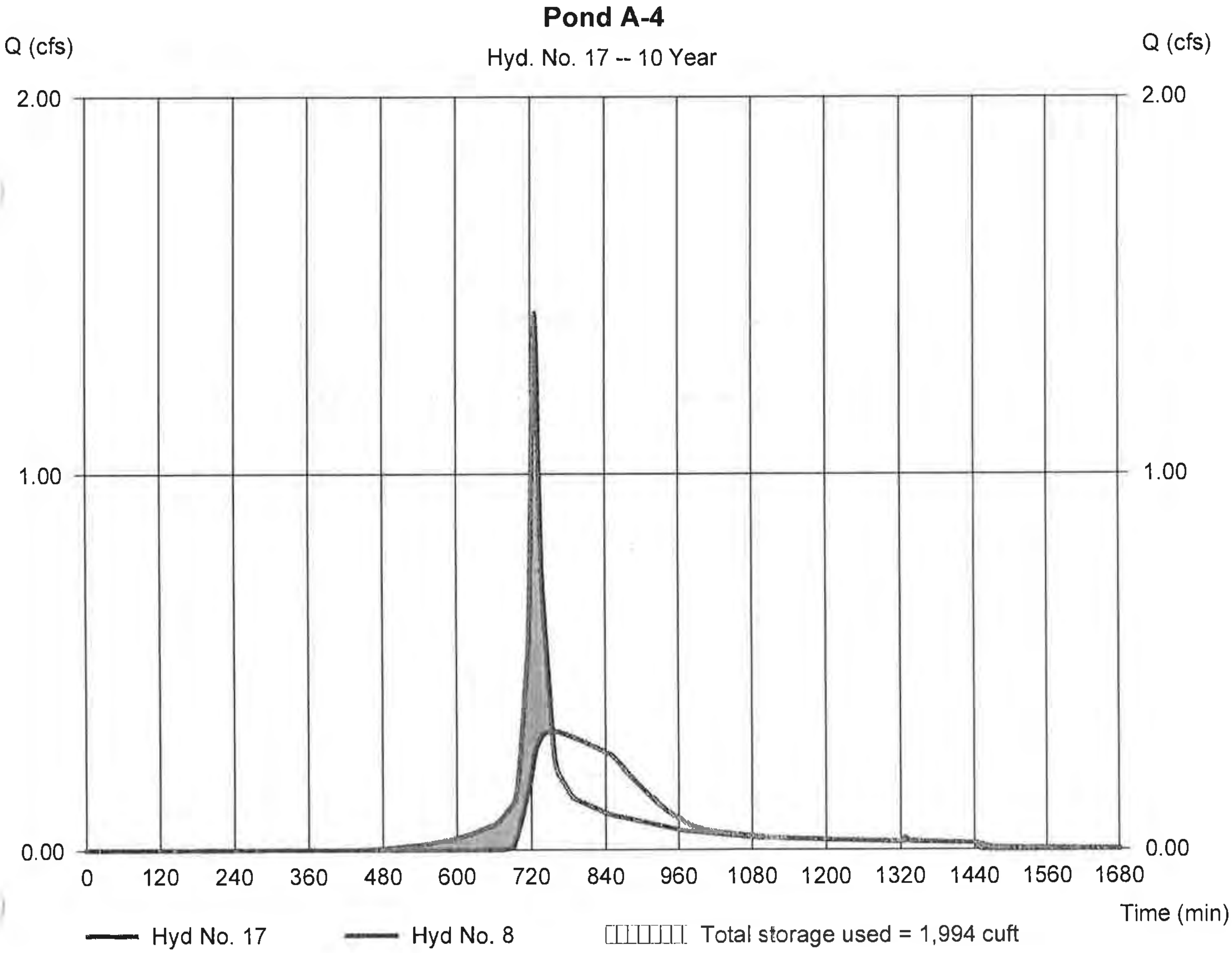
Hyd. No. 17

Pond A-4

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 8 - Proposed A-4
Reservoir name = A-4

Peak discharge = 0.317 cfs
Time to peak = 752 min
Hyd. volume = 4,517 cuft
Max. Elevation = 718.67 ft
Max. Storage = 1,994 cuft

Storage Indication method used.



Pond Report

Pond No. 4 - A-4

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	918	1,129	1,129
4.00	720.00	1,703	2,581	3,710

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	716.00	716.75	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

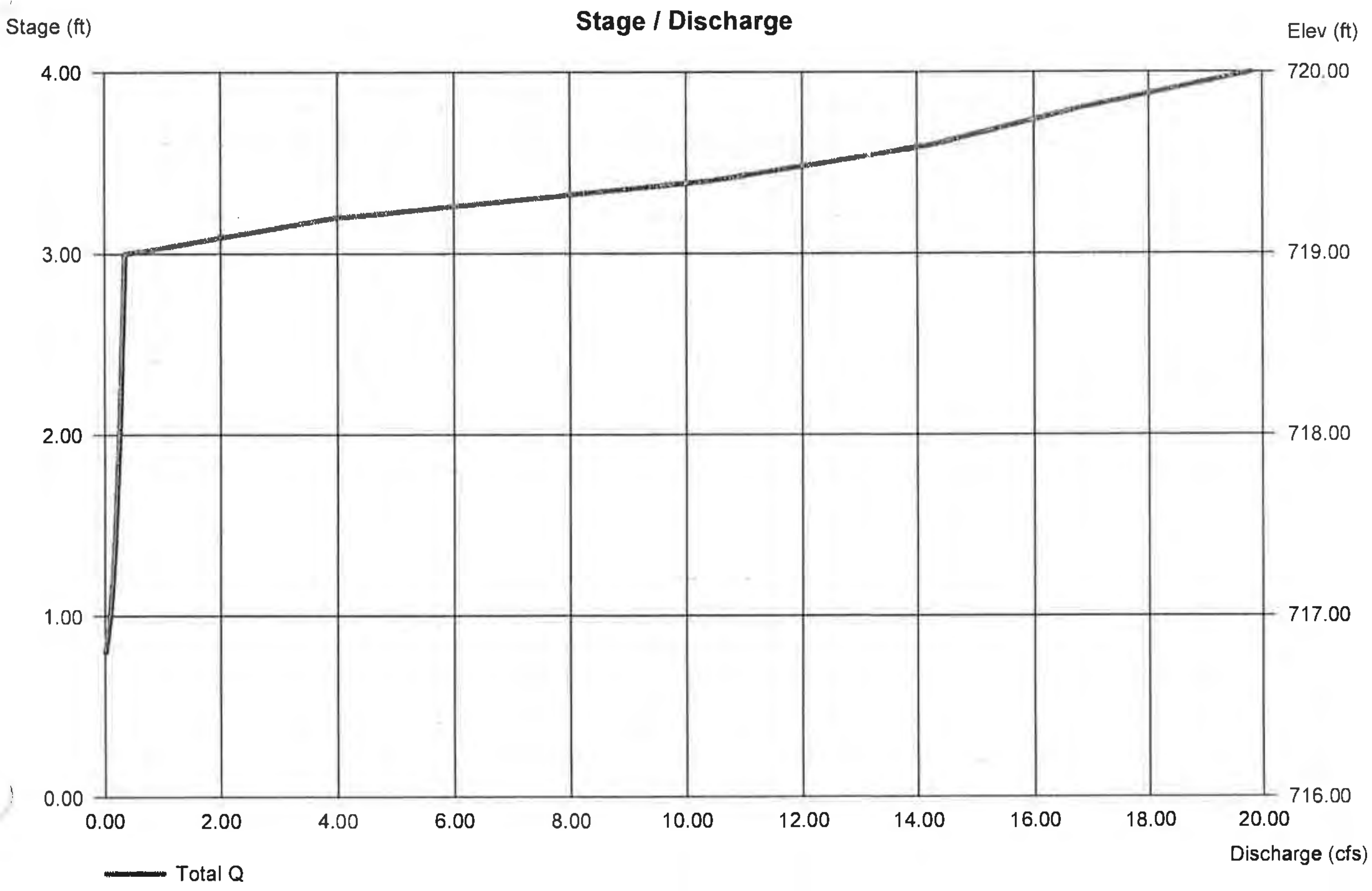
Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	719.00	719.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

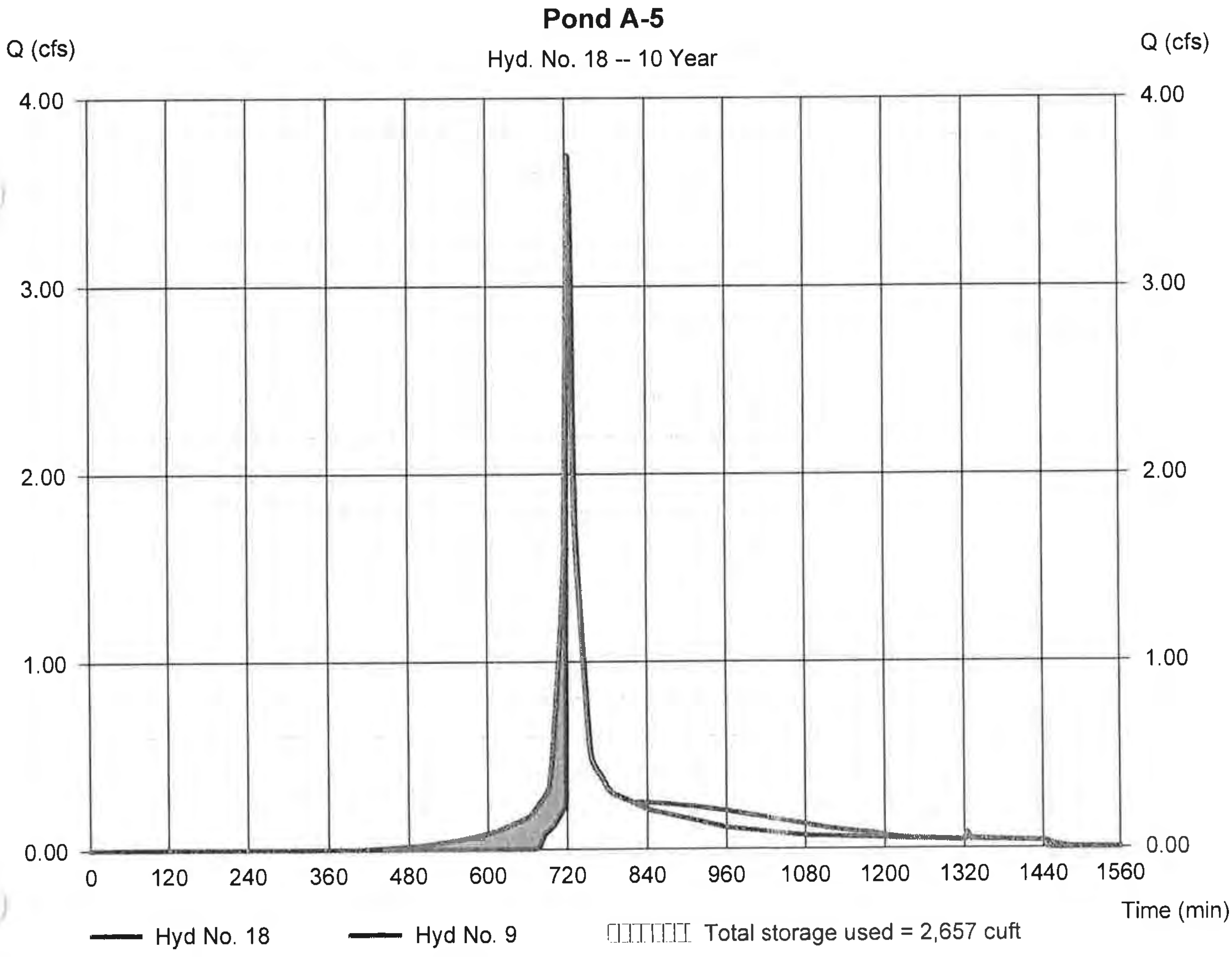
Hyd. No. 18

Pond A-5

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 9 - Proposed A-5
Reservoir name = A-5

Peak discharge = 3.519 cfs
Time to peak = 726 min
Hyd. volume = 10,201 cuft
Max. Elevation = 719.19 ft
Max. Storage = 2,657 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 5 - A-5

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	920	1,130	1,130
4.00	720.00	1,703	2,583	3,714

Culvert / Orifice Structures

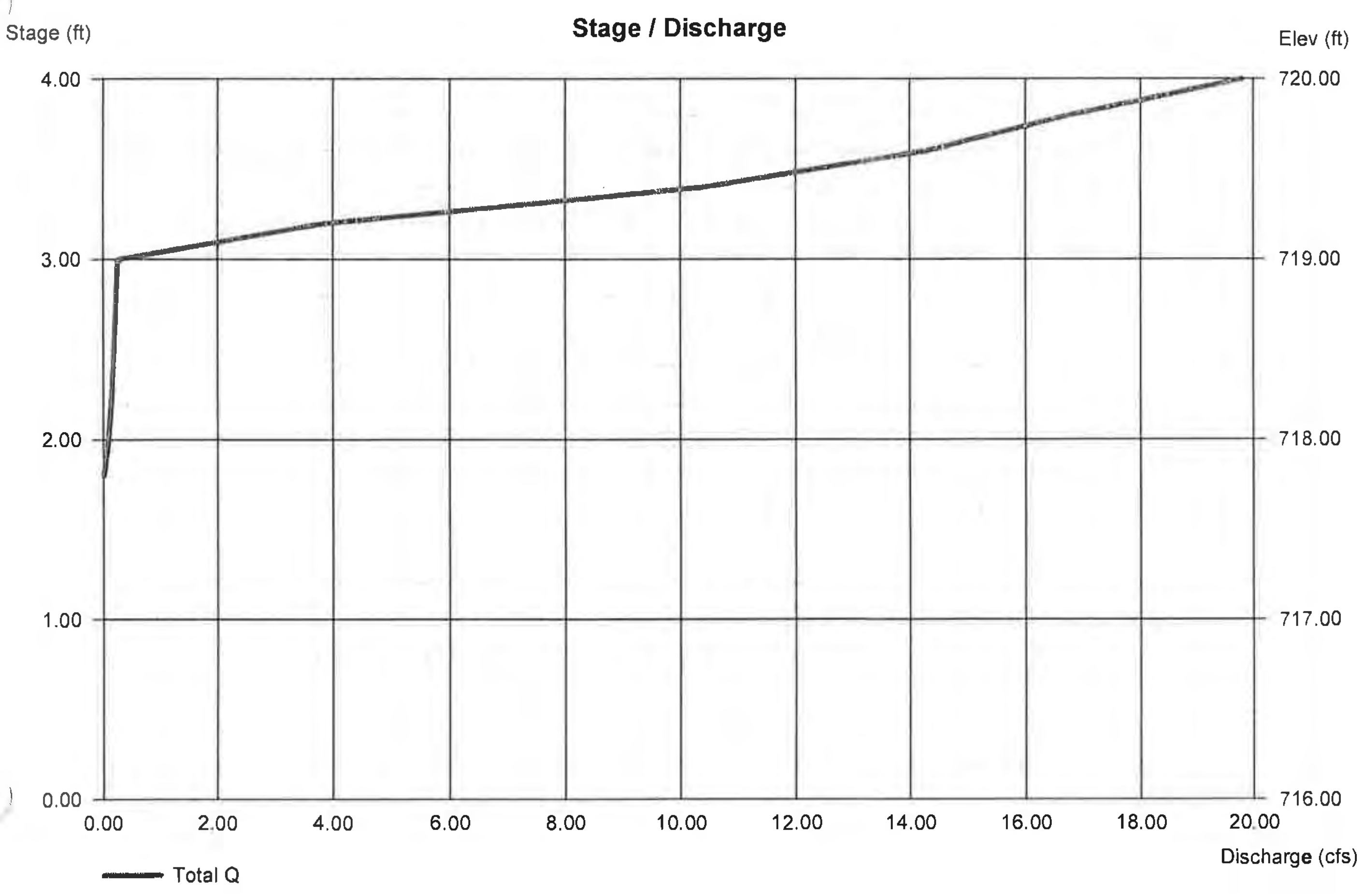
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	716.00	717.75	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	719.00	719.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)

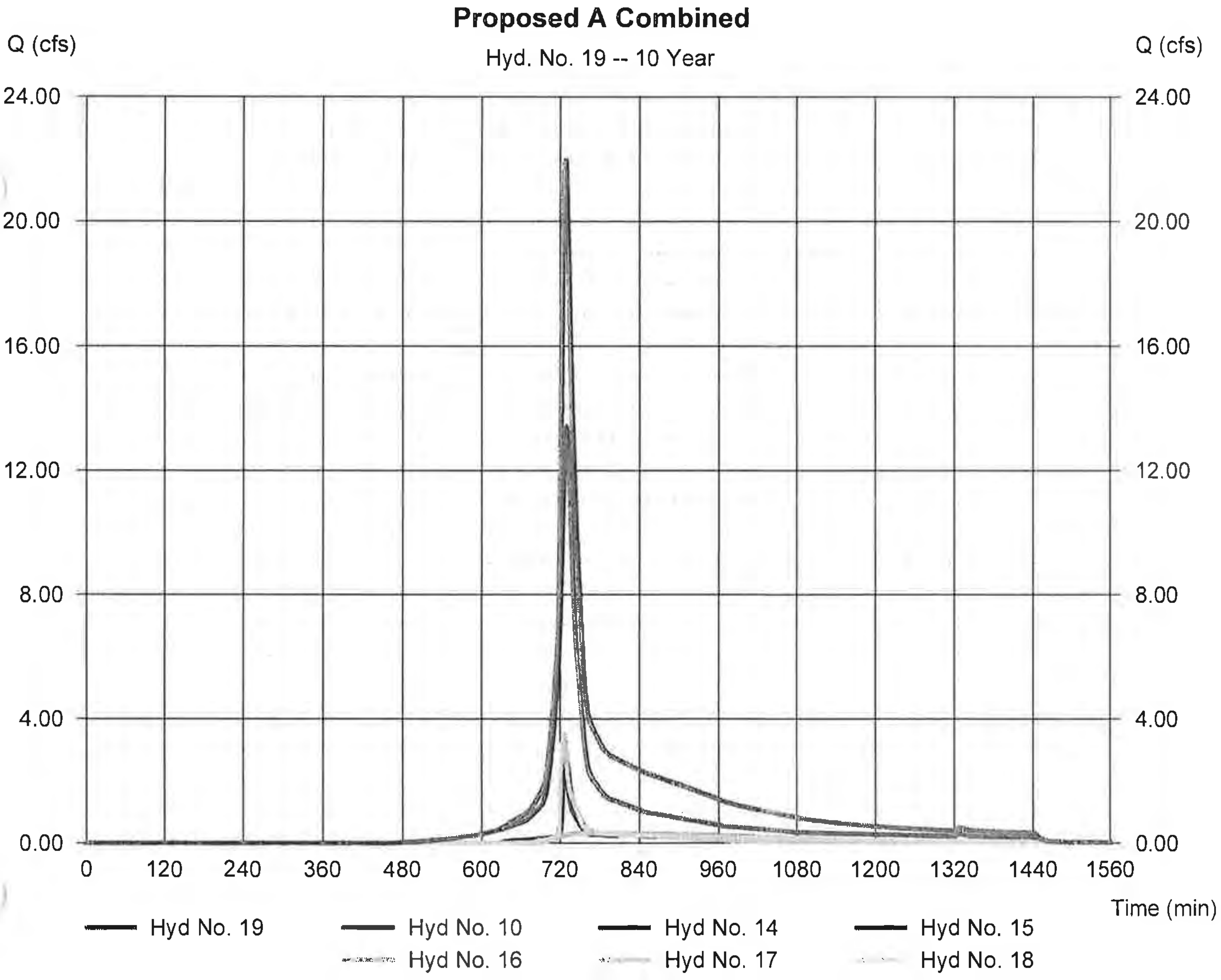


Hydrograph Report

Hyd. No. 19

Proposed A Combined

Hydrograph type	= Combine	Peak discharge	= 21.98 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 90,210 cuft
Inflow hyds.	= 10, 14, 15, 16, 17, 18	Contrib. drain. area=	4.750 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

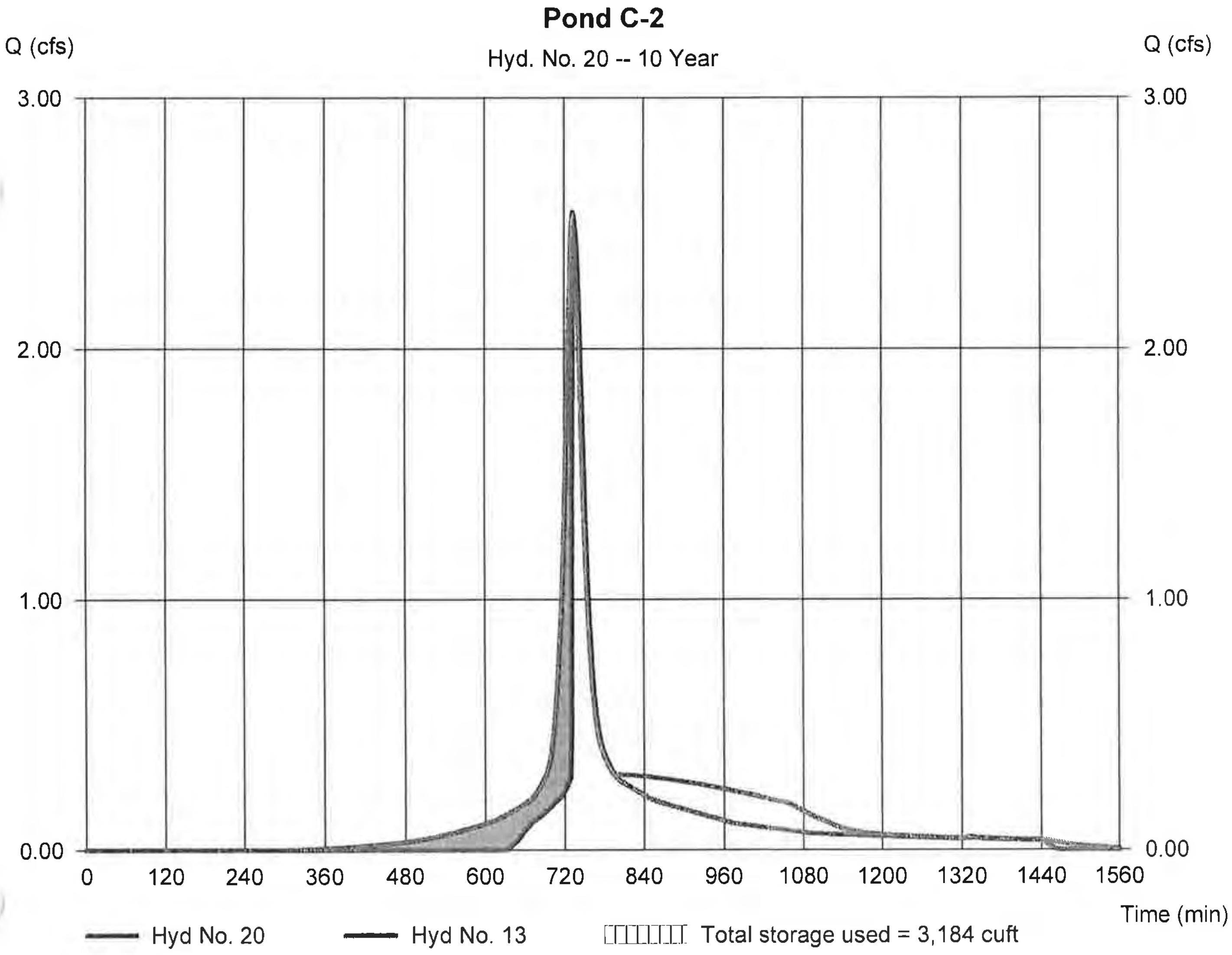
Hyd. No. 20

Pond C-2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 13 - Proposed C-2
Reservoir name = C-2

Peak discharge = 2.482 cfs
Time to peak = 736 min
Hyd. volume = 10,616 cuft
Max. Elevation = 729.12 ft
Max. Storage = 3,184 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

Pond No. 6 - C-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	337	0	0
2.00	728.00	1,131	1,390	1,390
4.00	730.00	2,120	3,199	4,589

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	726.00	727.25	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

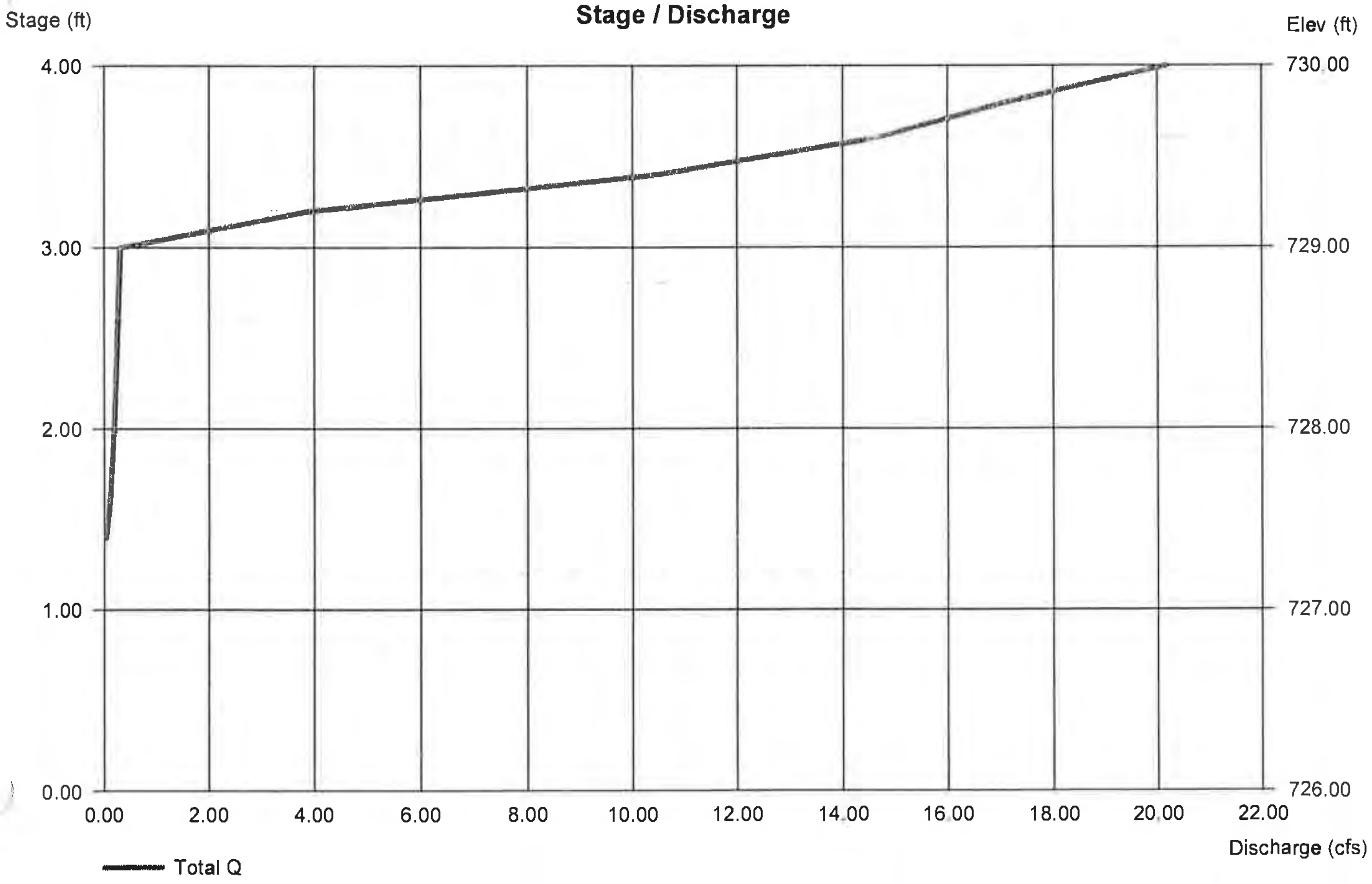
Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	729.00	729.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Discharge



Hydrograph Report

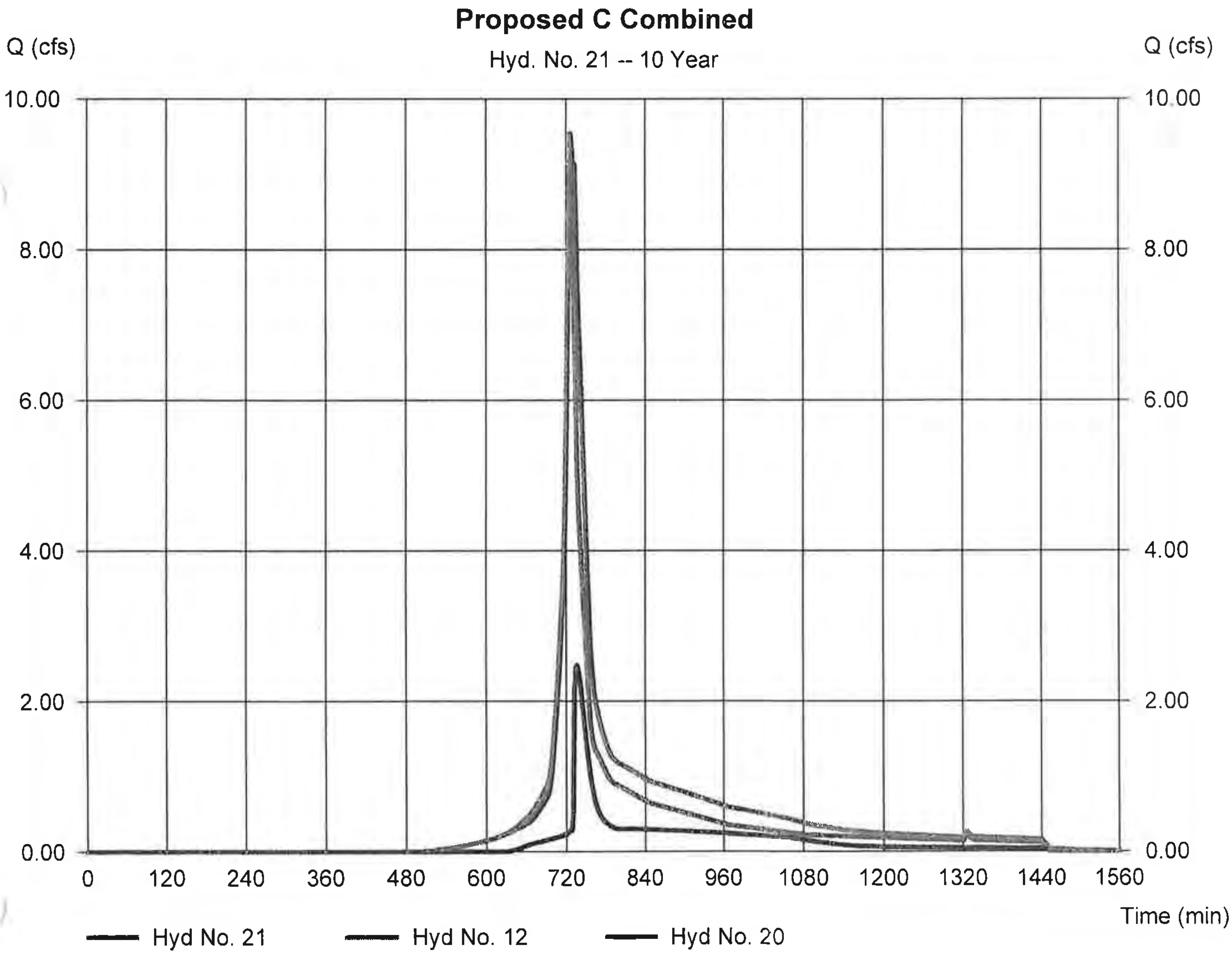
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 21

Proposed C Combined

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 12, 20

Peak discharge = 9.550 cfs
Time to peak = 726 min
Hyd. volume = 42,323 cuft
Contrib. drain. area= 3.330 ac

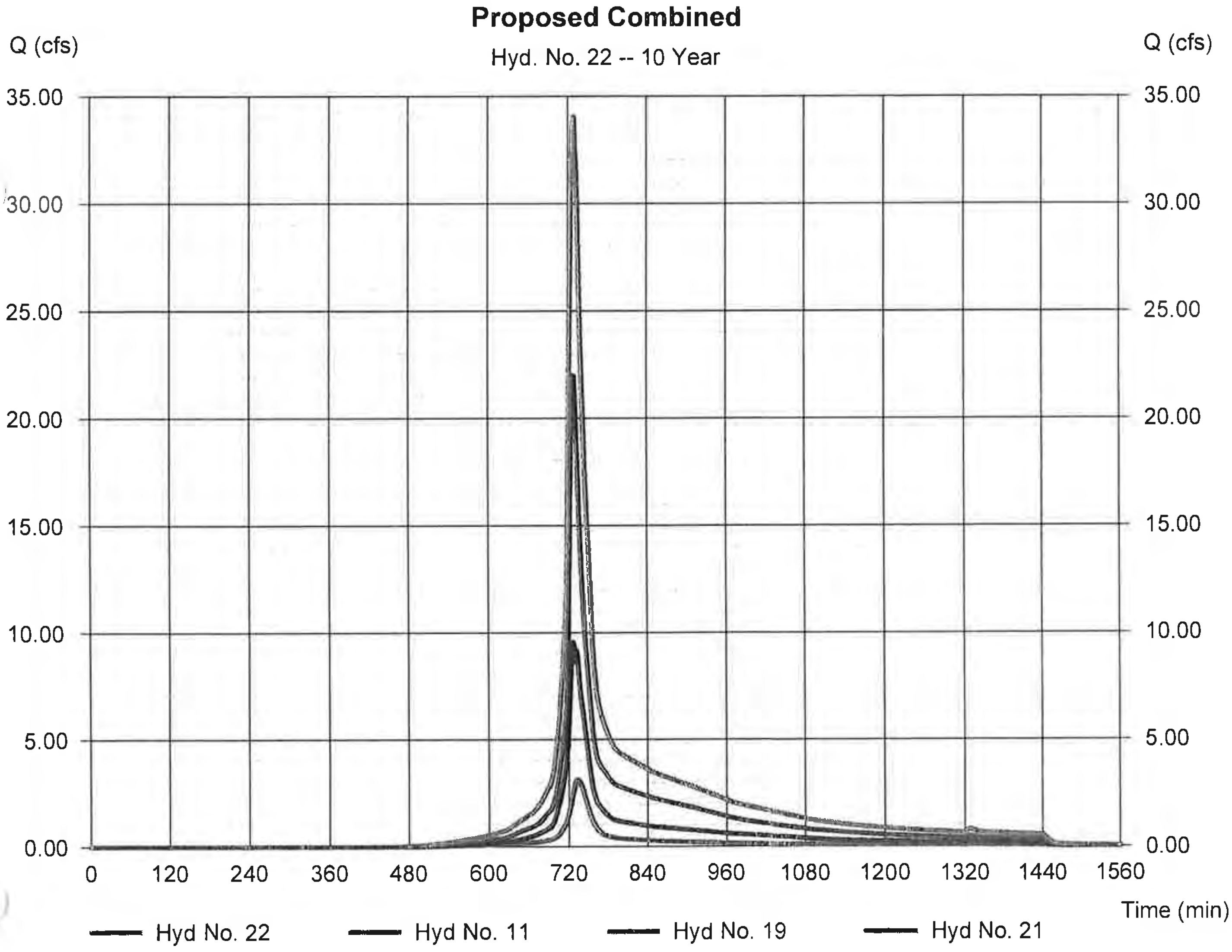


Hydrograph Report

Hyd. No. 22

Proposed Combined

Hydrograph type	= Combine	Peak discharge	= 34.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 146,392 cuft
Inflow hyds.	= 11, 19, 21	Contrib. drain. area	= 1.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	46.19	2	728	177,367	------	------	------	Existing A
2	SCS Runoff	5.408	2	732	24,245	------	------	------	Existing B
3	SCS Runoff	18.96	2	732	84,120	------	------	------	Existing C
4	Combine	69.12	2	730	285,732	1, 2, 3	------	------	Existing Combined
5	SCS Runoff	3.587	2	726	12,772	------	------	------	Proposed A-1
6	SCS Runoff	4.620	2	726	16,553	------	------	------	Proposed A-2
7	SCS Runoff	4.468	2	724	13,930	------	------	------	Proposed A-3
8	SCS Runoff	2.484	2	726	8,612	------	------	------	Proposed A-4
9	SCS Runoff	6.279	2	724	19,283	------	------	------	Proposed A-5
10	SCS Runoff	23.70	2	728	91,714	------	------	------	Proposed A-6
11	SCS Runoff	5.408	2	732	24,245	------	------	------	Proposed B
12	SCS Runoff	16.97	2	726	58,237	------	------	------	Proposed C-1
13	SCS Runoff	4.123	2	732	18,981	------	------	------	Proposed C-2
14	Reservoir	3.531	2	726	12,263	5	709.19	1,697	Pond A-1
15	Reservoir	4.600	2	726	15,873	6	701.22	2,322	Pond A-2
16	Reservoir	1.508	2	740	13,284	7	729.06	6,287	Pond A-3
17	Reservoir	2.093	2	730	8,253	8	719.10	2,545	Pond A-4
18	Reservoir	6.196	2	724	18,358	9	719.28	2,773	Pond A-5
19	Combine	37.40	2	728	159,745	10, 14, 15, 16, 17, 18	------	------	Proposed A Combined
20	Reservoir	4.107	2	734	18,143	13	729.21	3,320	Pond C-2
21	Combine	20.08	2	726	76,380	12, 20	------	------	Proposed C Combined
22	Combine	62.11	2	728	260,371	11, 19, 21	------	------	Proposed Combined

1016 Stormwater 3 inch orifice.gpw	Return Period: 100 Year	Monday, Mar 30, 2009

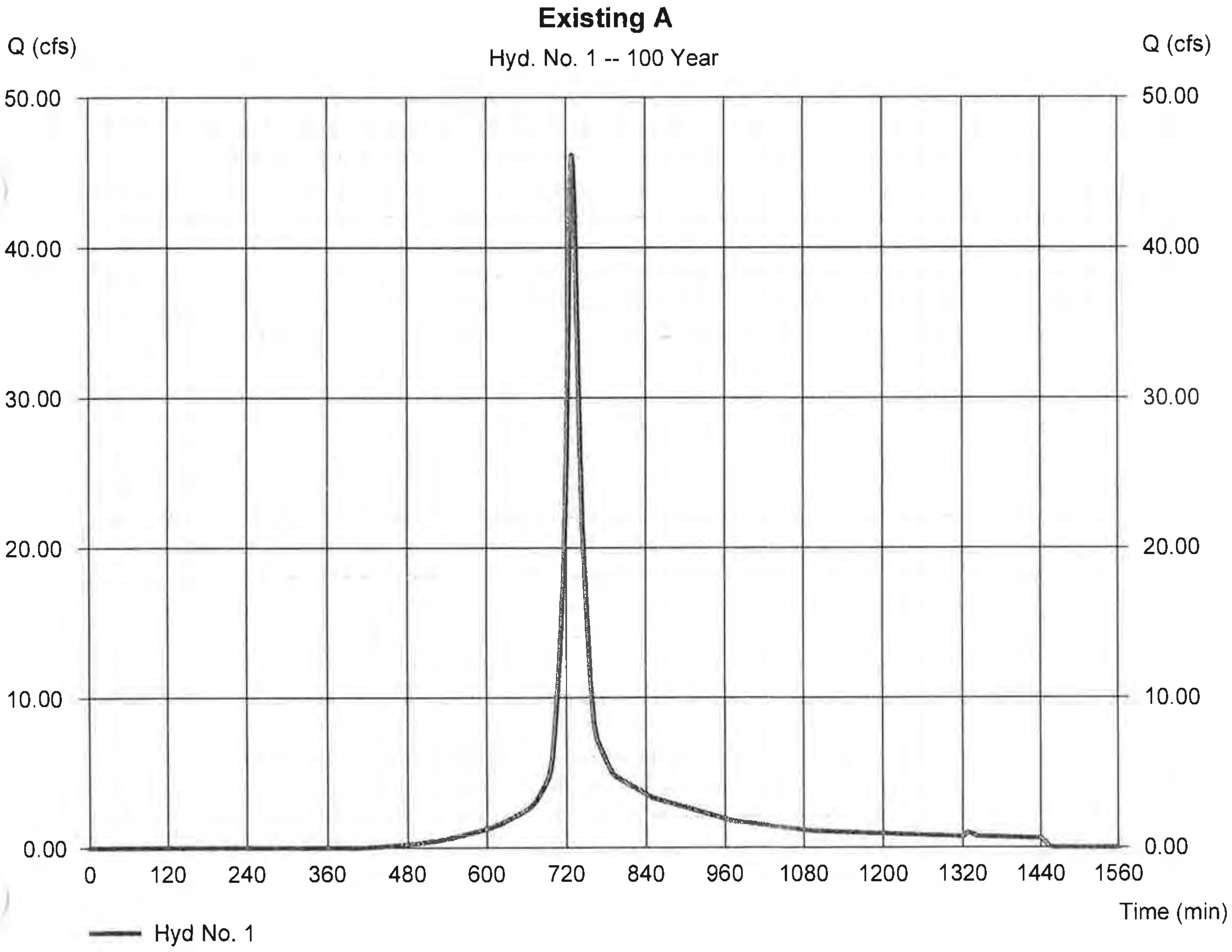
Hydrograph Report

Hyd. No. 1

Existing A

Hydrograph type	= SCS Runoff	Peak discharge	= 46.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 177,367 cuft
Drainage area	= 10.070 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.050 x 98) + (0.290 x 84) + (5.220 x 71) + (2.390 x 76) + (0.800 x 82) + (0.320 x 78)] / 10.070



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

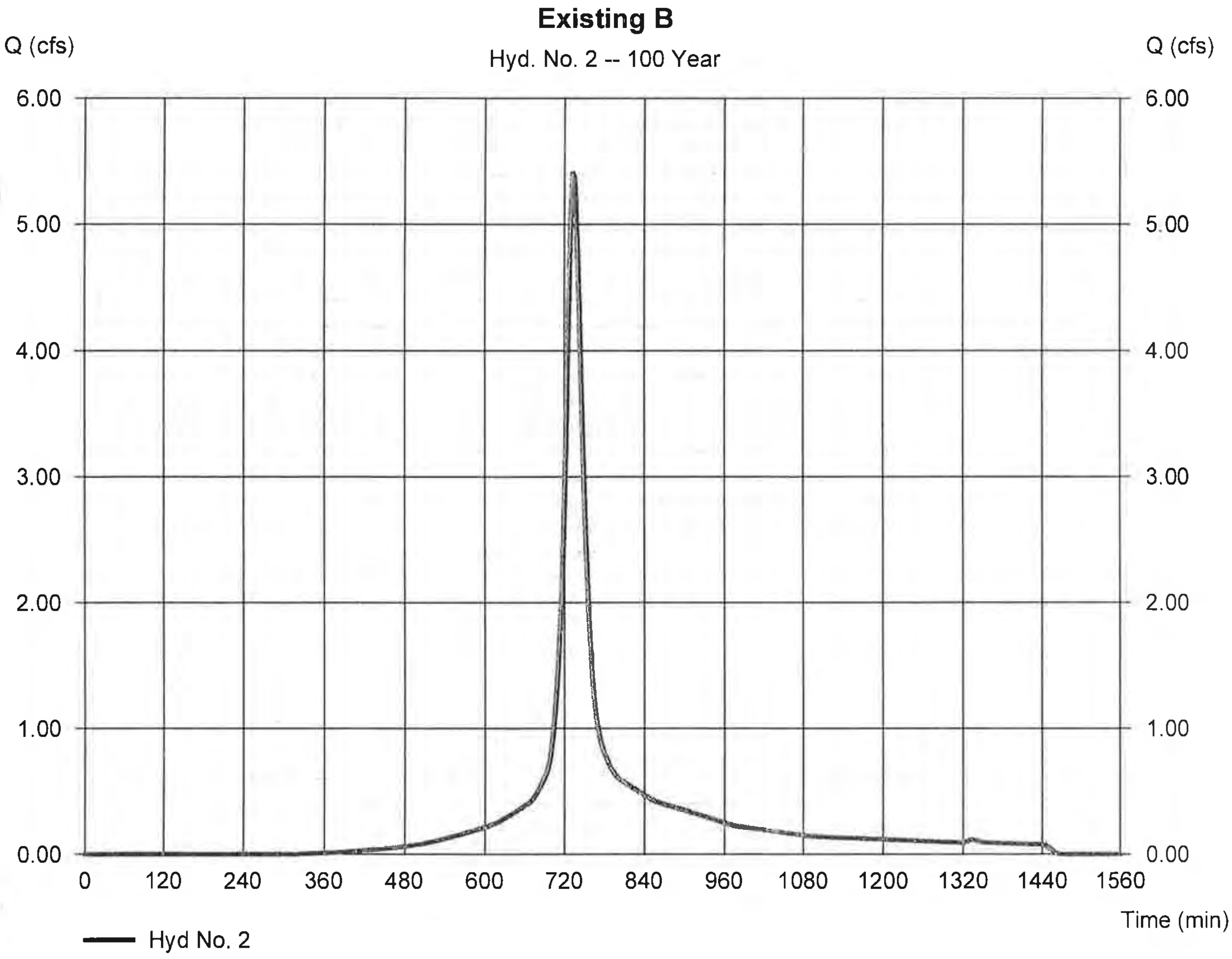
Hyd. No. 2

Existing B

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 1.240 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 5.408 cfs
Time to peak = 732 min
Hyd. volume = 24,245 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.10 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

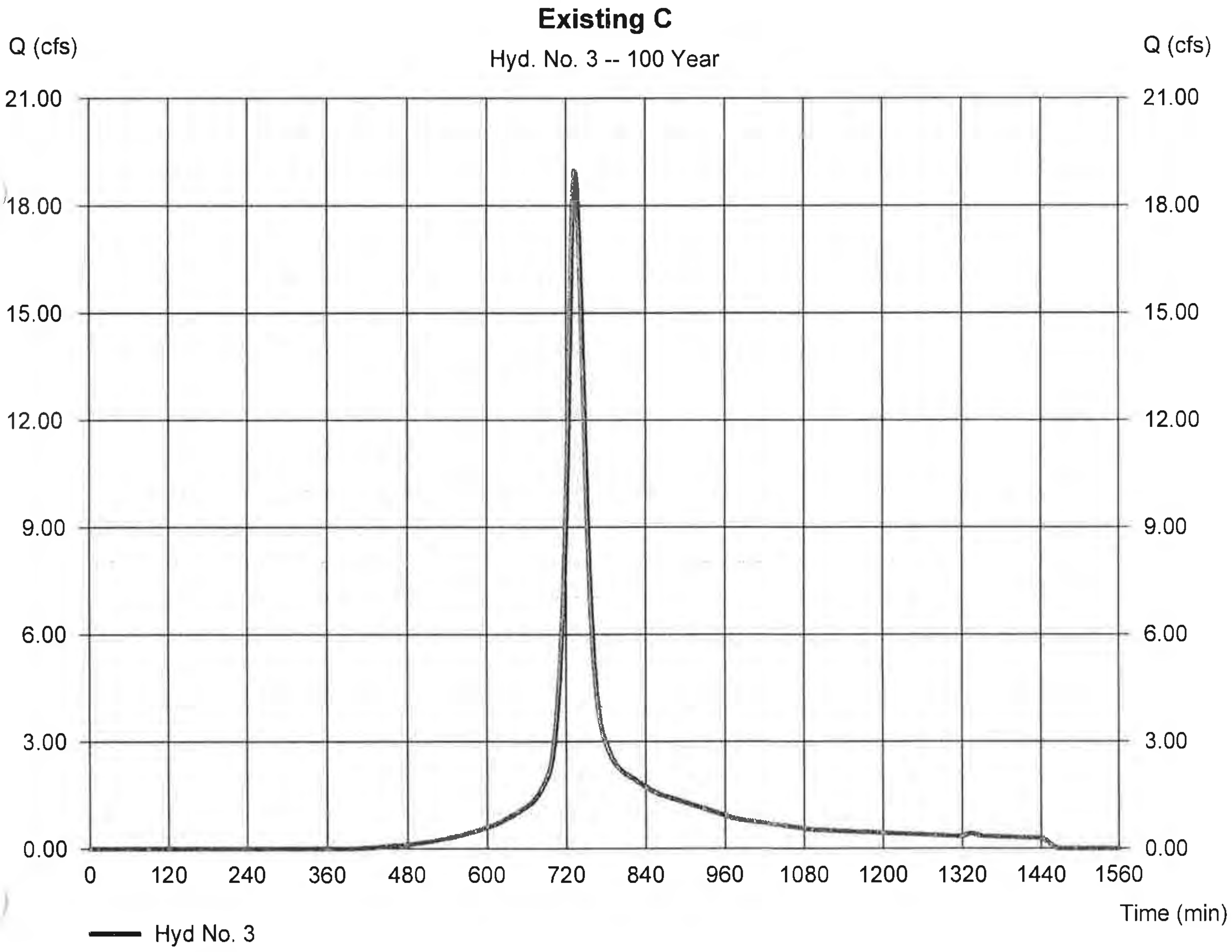
Hyd. No. 3

Existing C

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 4.810 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 18.96 cfs
Time to peak = 732 min
Hyd. volume = 84,120 cuft
Curve number = 77*
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.40 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.110 x 98) + (0.290 x 82) + (4.010 x 76) + (0.330 x 71) + (0.010 x 82) + (0.060 x 78)] / 4.810



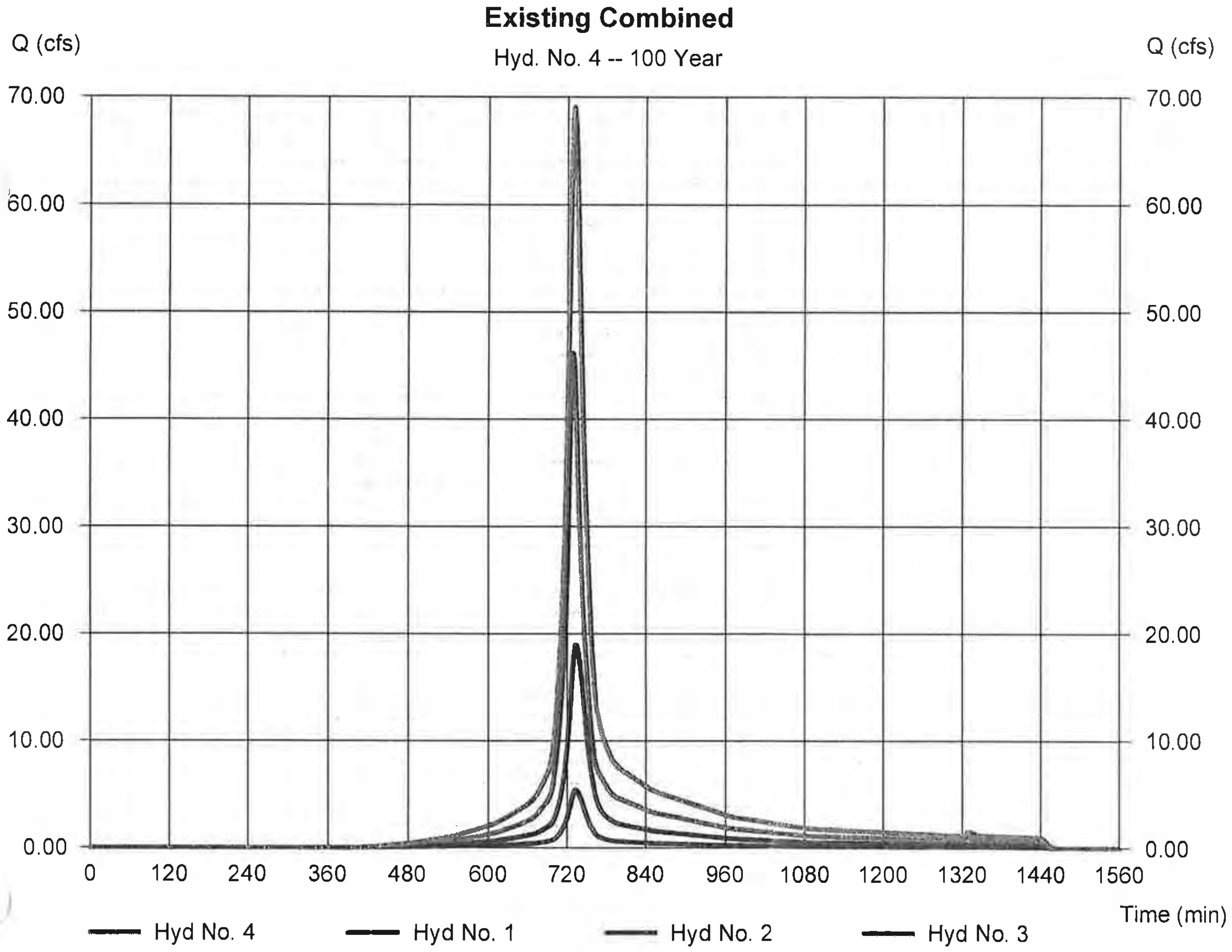
Hydrograph Report

Hyd. No. 4

Existing Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 1, 2, 3

Peak discharge = 69.12 cfs
Time to peak = 730 min
Hyd. volume = 285,732 cuft
Contrib. drain. area= 16.120 ac



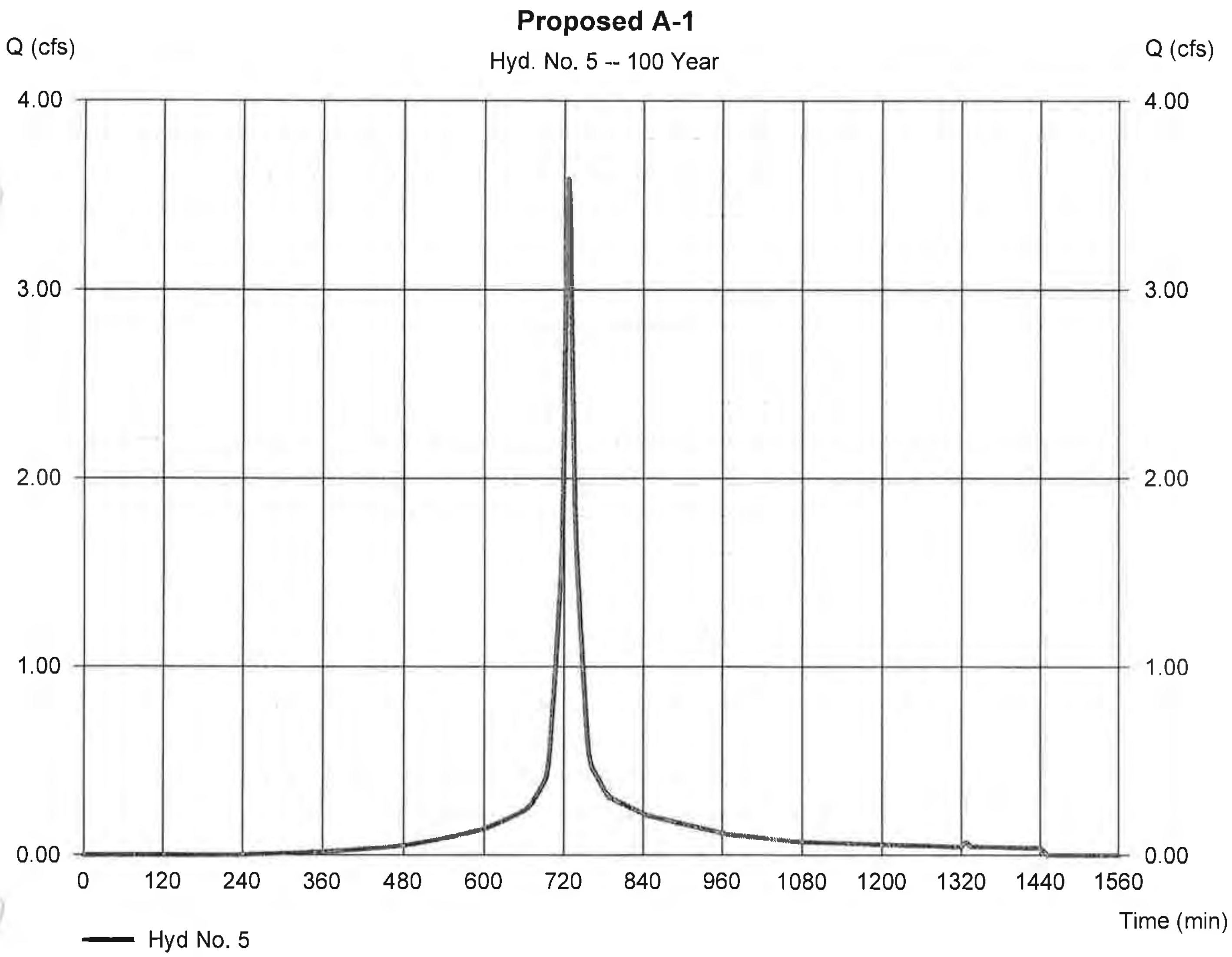
Hydrograph Report

Hyd. No. 5

Proposed A-1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.587 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 12,772 cuft
Drainage area	= 0.590 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.80 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 98) + (0.270 x 74)] / 0.590



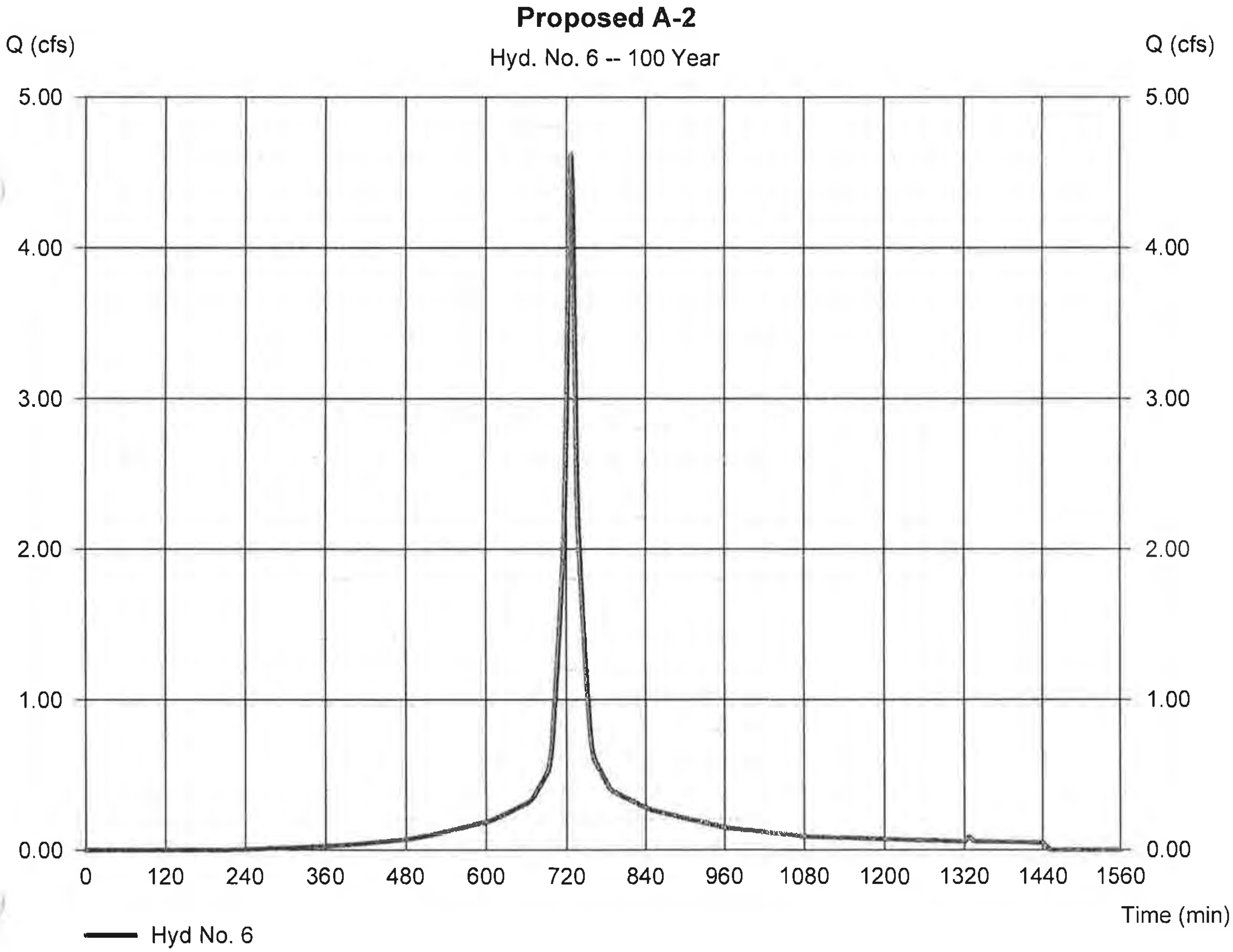
Hydrograph Report

Hyd. No. 6

Proposed A-2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.620 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 16,553 cuft
Drainage area	= 0.750 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.50 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.430 x 98) + (0.320 x 74)] / 0.750



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

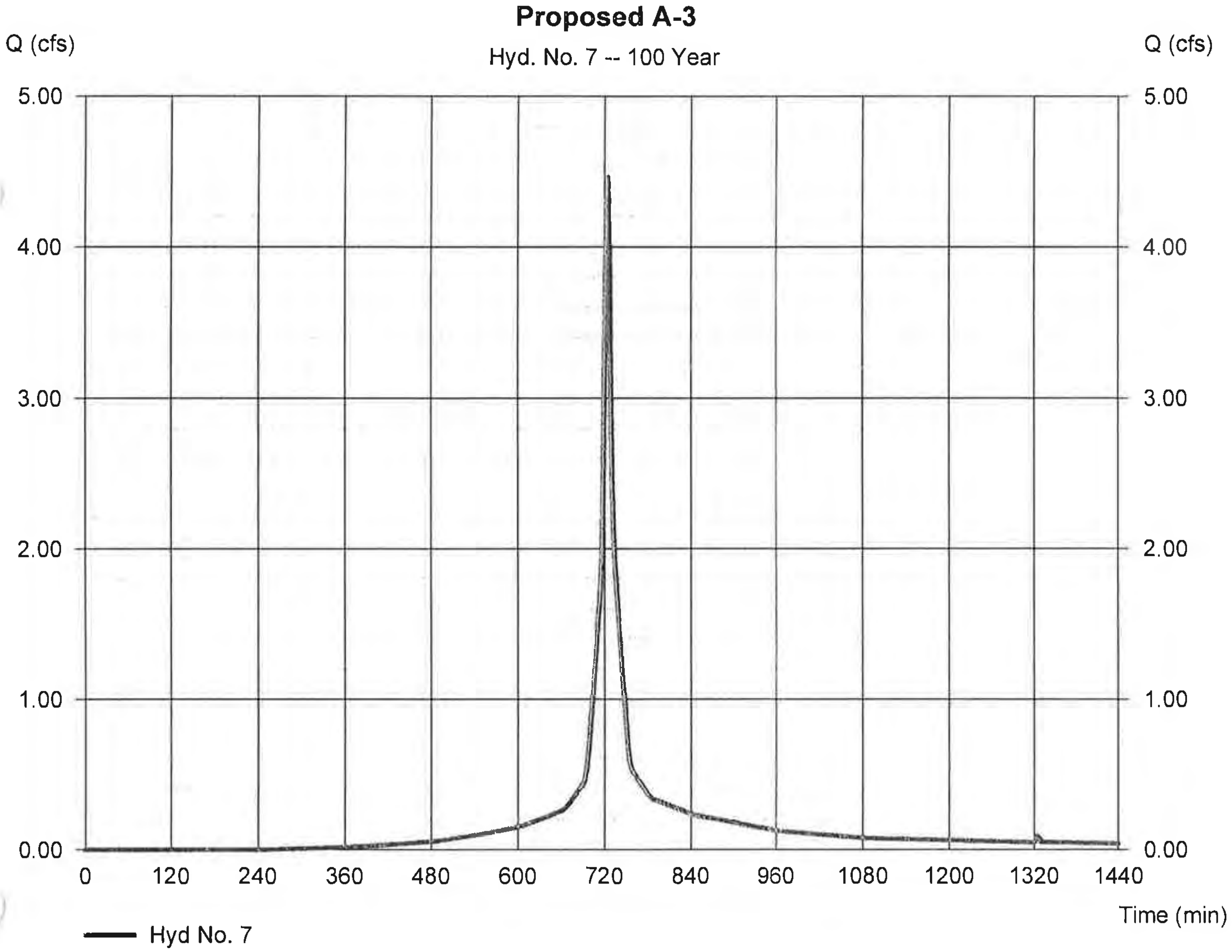
Hyd. No. 7

Proposed A-3

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 0.700 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 4.468 cfs
Time to peak = 724 min
Hyd. volume = 13,930 cuft
Curve number = 86*
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.20 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.280 x 98) + (0.280 x 80) + (0.140 x 74)] / 0.700



Hydrograph Report

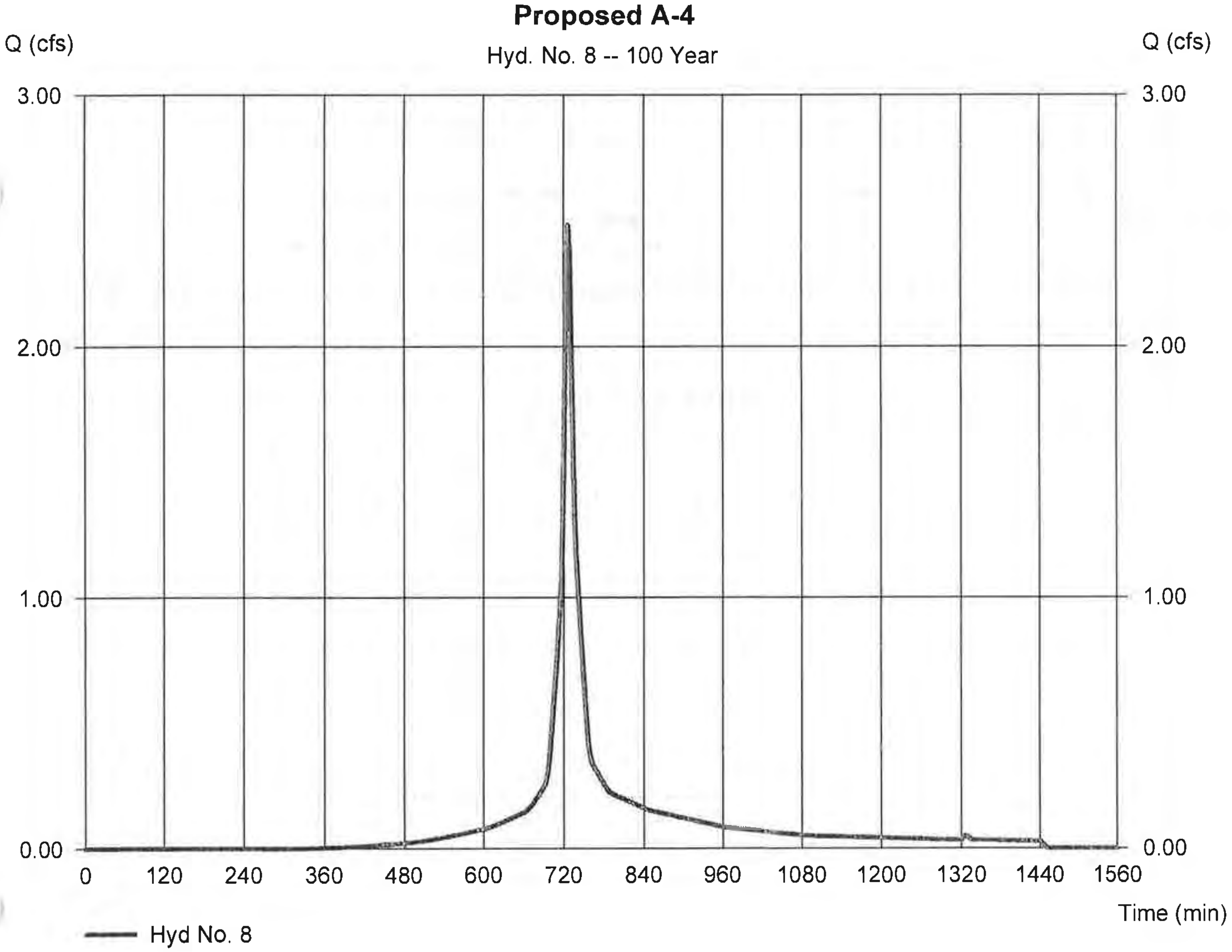
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 8

Proposed A-4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.484 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 8,612 cuft
Drainage area	= 0.450 ac	Curve number	= 81*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.140 x 98) + (0.310 x 74)] / 0.450



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

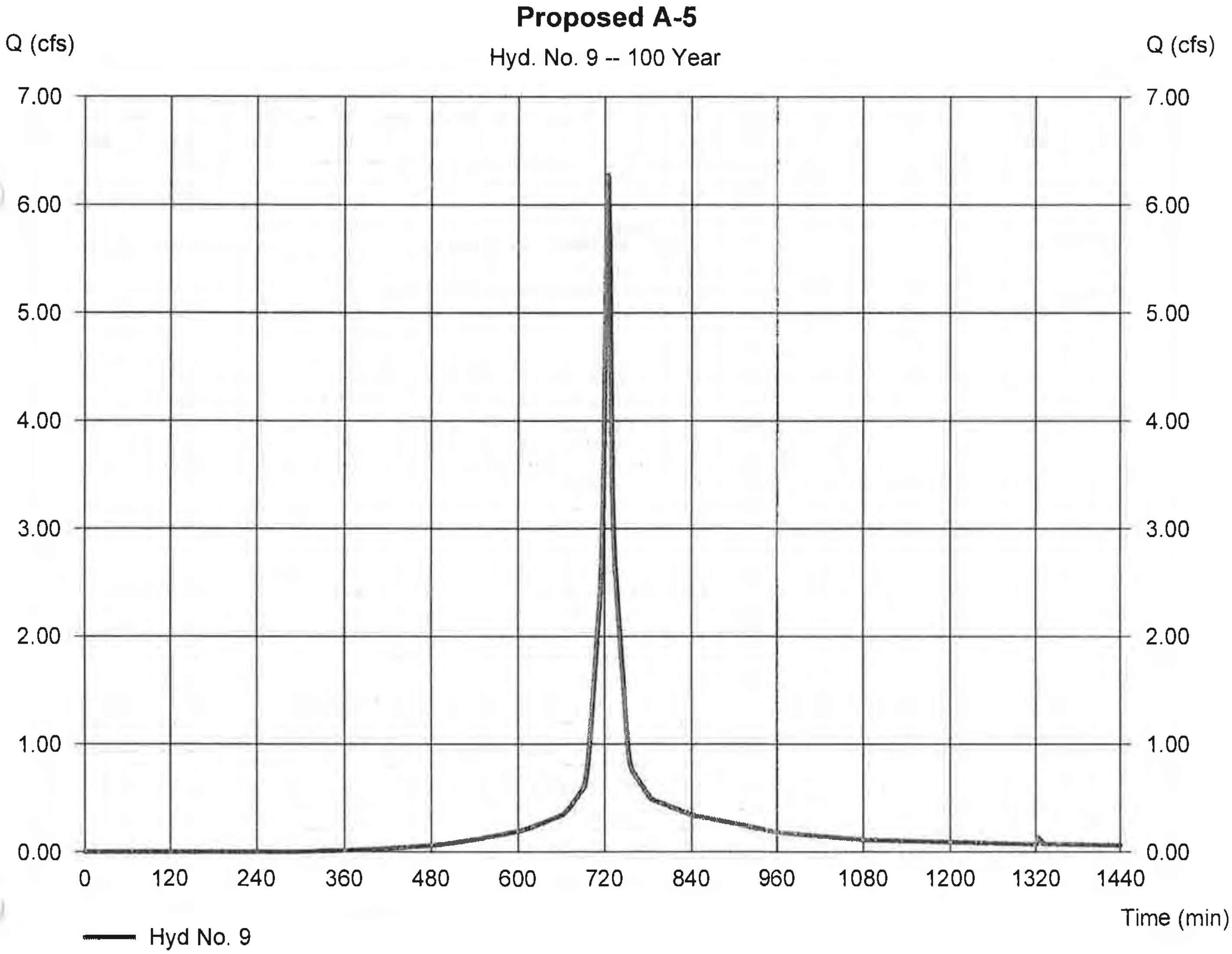
Hyd. No. 9

Proposed A-5

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 1.030 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 6.279 cfs
Time to peak = 724 min
Hyd. volume = 19,283 cuft
Curve number = 83*
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = [(0.400 x 98) + (0.630 x 74)] / 1.030



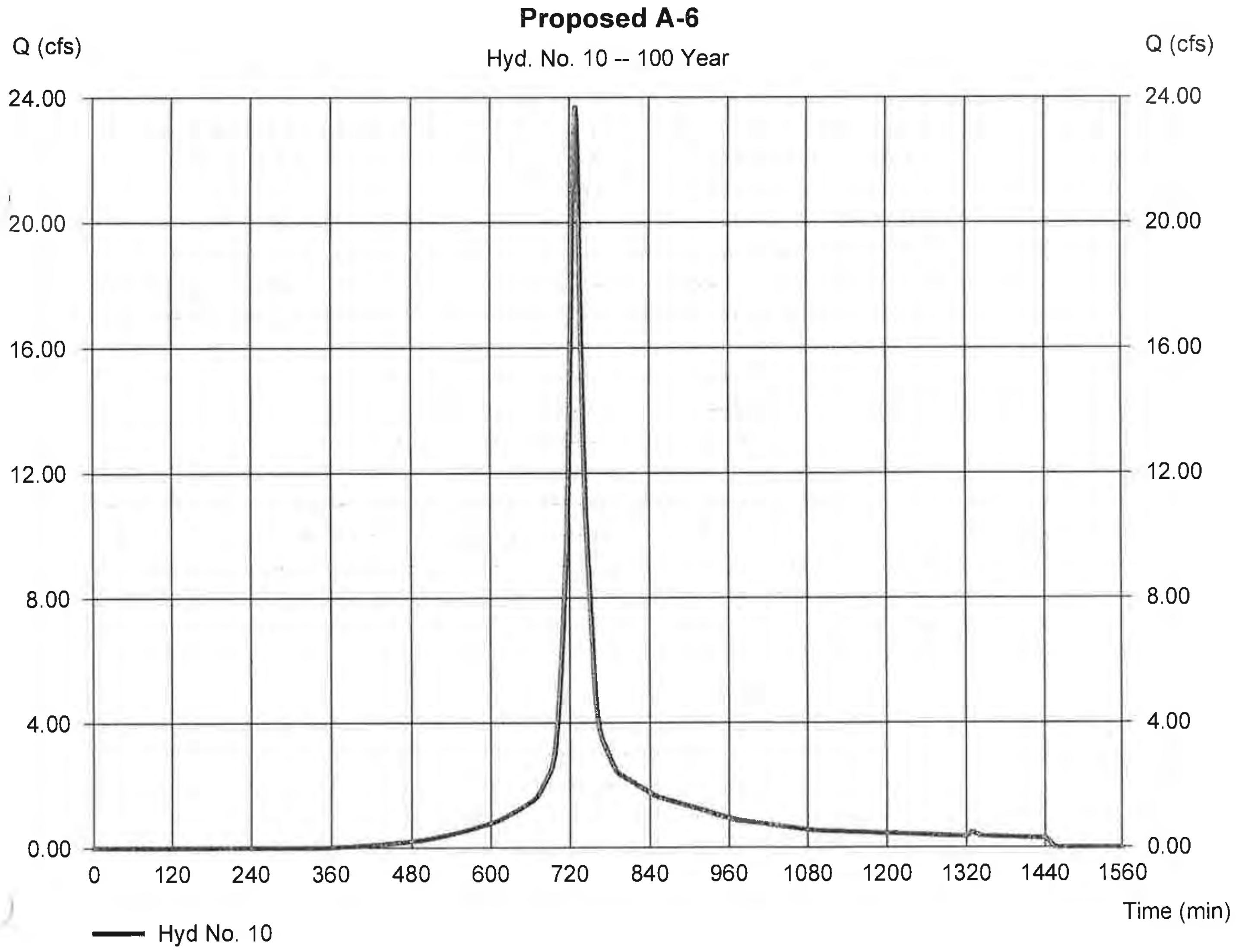
Hydrograph Report

Hyd. No. 10

Proposed A-6

Hydrograph type	= SCS Runoff	Peak discharge	= 23.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 91,714 cuft
Drainage area	= 4.750 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.030 x 98) + (0.290 x 84) + (0.250 x 81) + (0.690 x 76) + (1.560 x 74) + (0.930 x 71)] / 4.750



Hydrograph Report

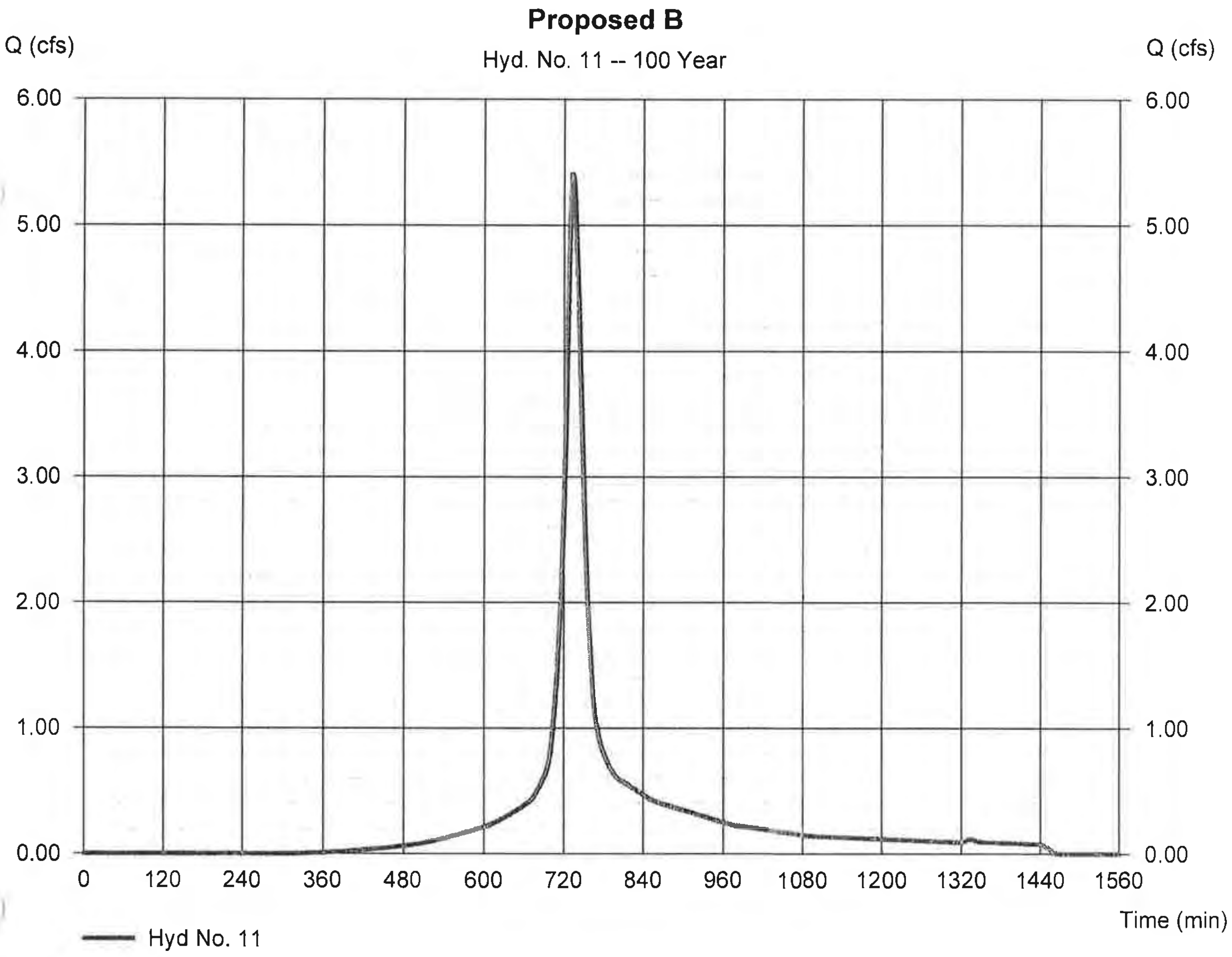
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 11

Proposed B

Hydrograph type	= SCS Runoff	Peak discharge	= 5.408 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 24,245 cuft
Drainage area	= 1.240 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.10 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (0.040 x 82) + (0.310 x 86) + (0.410 x 76) + (0.400 x 82)] / 1.240



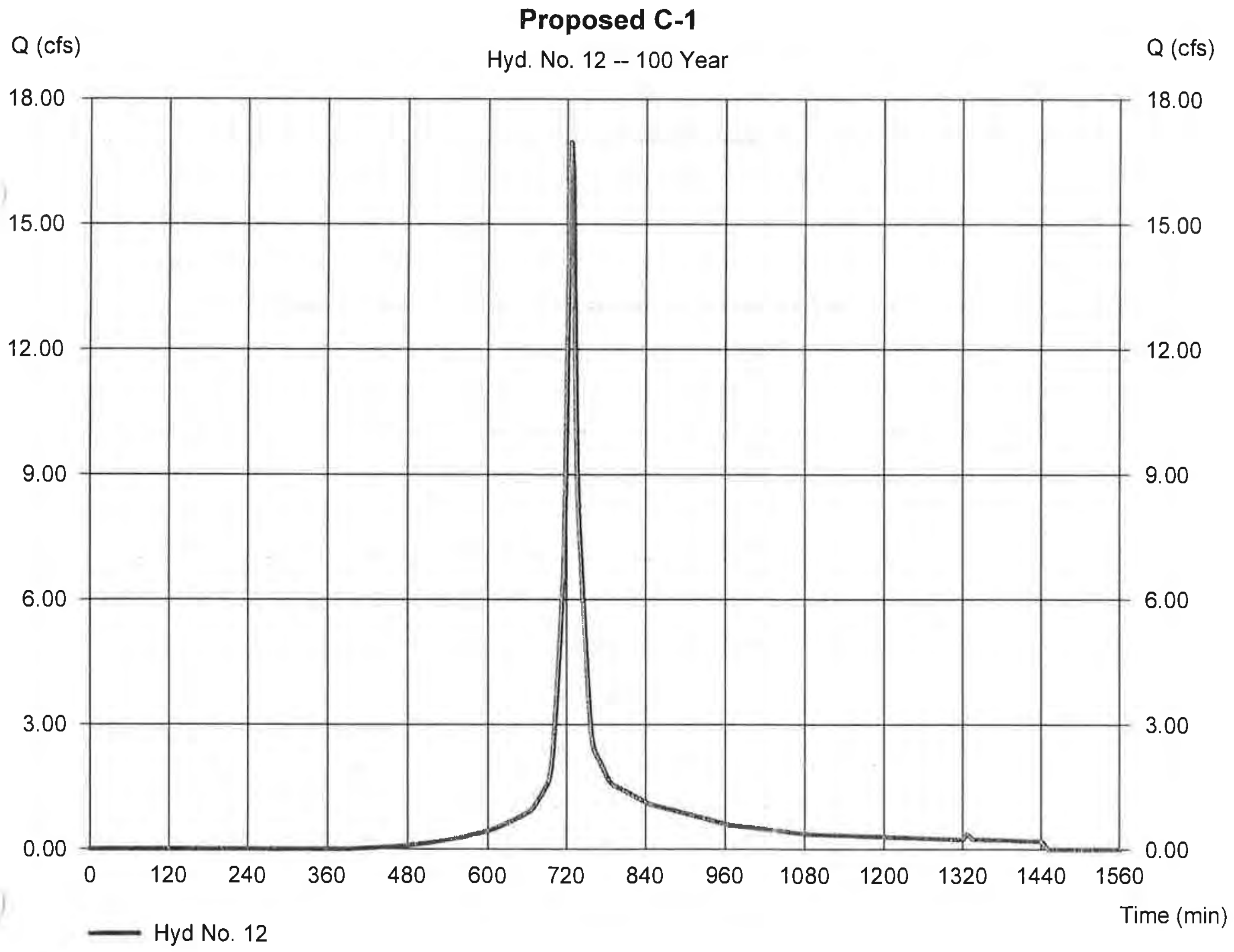
Hydrograph Report

Hyd. No. 12

Proposed C-1

Hydrograph type	= SCS Runoff	Peak discharge	= 16.97 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 58,237 cuft
Drainage area	= 3.330 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.80 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98) + (0.300 x 82) + (1.200 x 76) + (0.050 x 80) + (0.250 x 71) + (1.320 x 74)] / 3 330



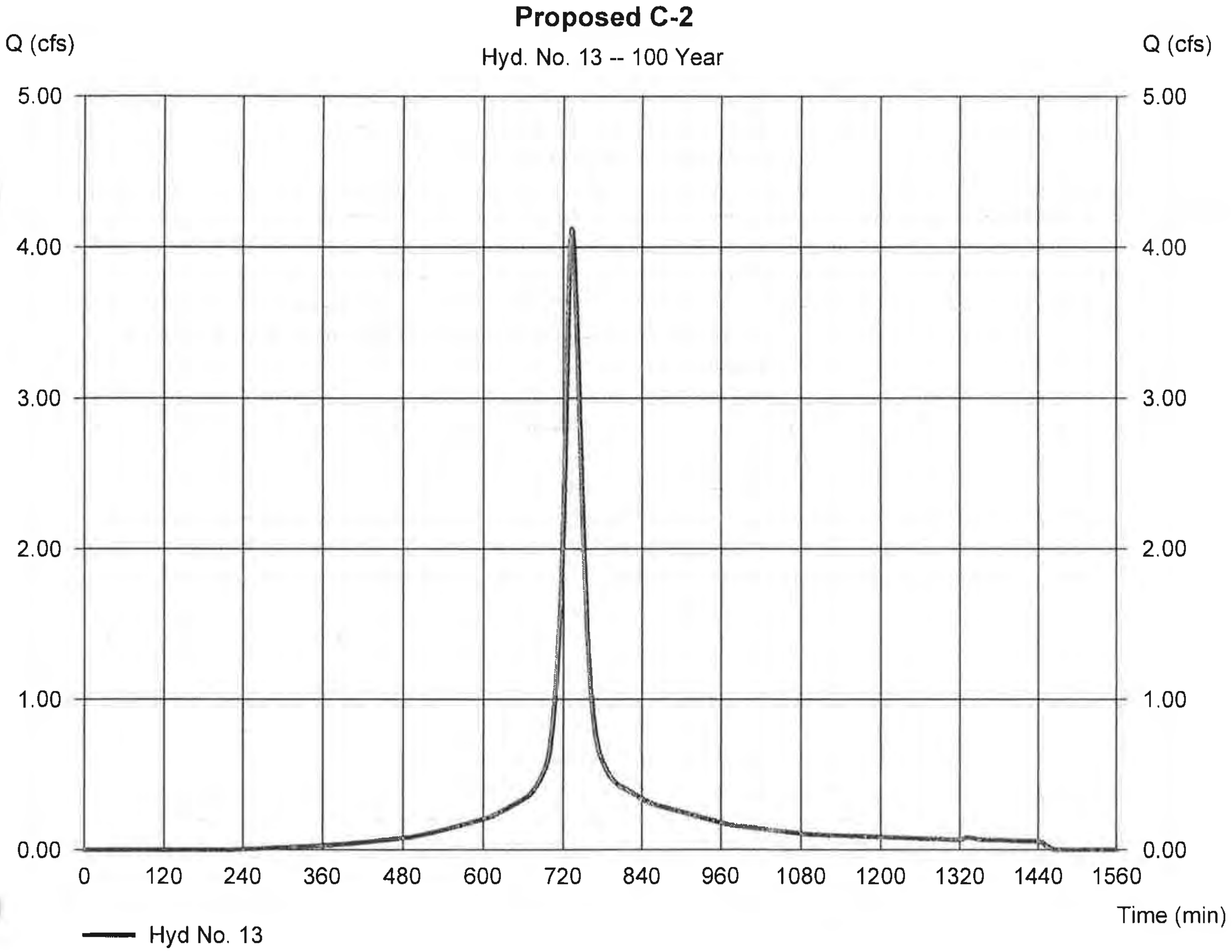
Hydrograph Report

Hyd. No. 13

Proposed C-2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.123 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 18,981 cuft
Drainage area	= 0.860 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.490 x 98) + (0.370 x 74)] / 0.860



Hydrograph Report

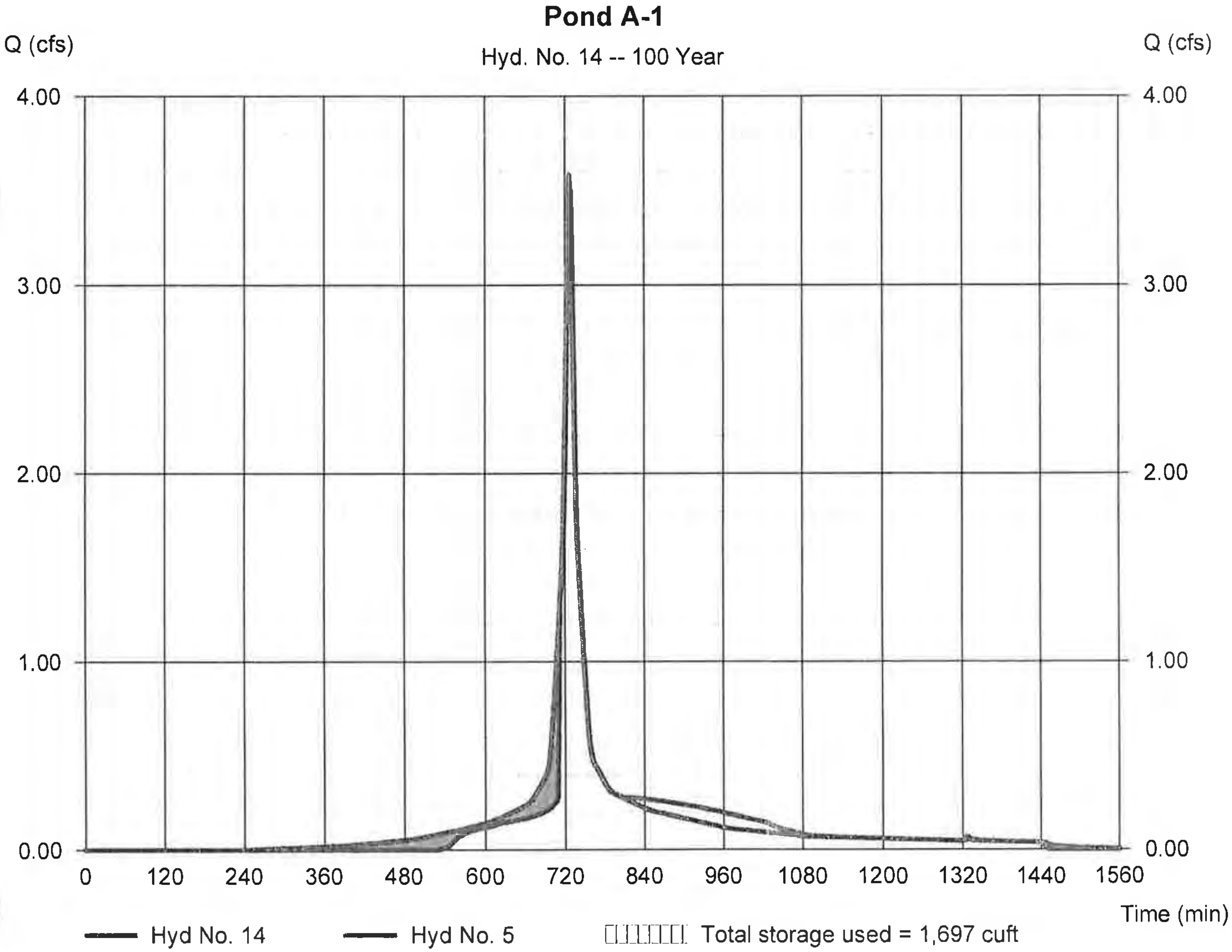
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 14

Pond A-1

Hydrograph type	= Reservoir	Peak discharge	= 3.531 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 12,263 cuft
Inflow hyd. No.	= 5 - Proposed A-1	Max. Elevation	= 709.19 ft
Reservoir name	= A-1	Max. Storage	= 1,697 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - A-1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 706.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	706.00	176	0	0
2.00	708.00	587	722	722
4.00	710.00	1,090	1,651	2,373

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 706.00	707.50	0.00	0.00
Length (ft)	= 16.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

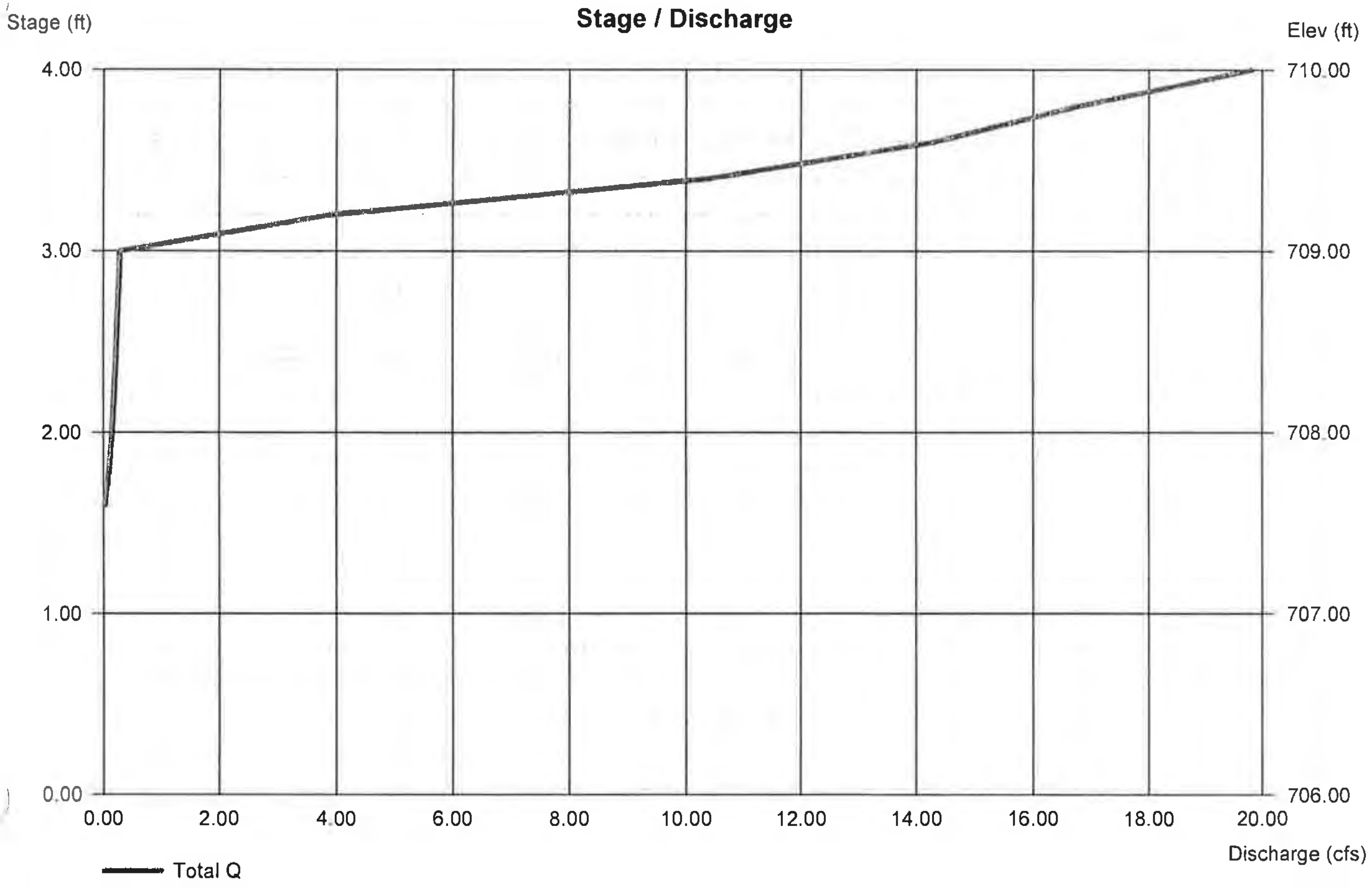
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 709.00	709.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

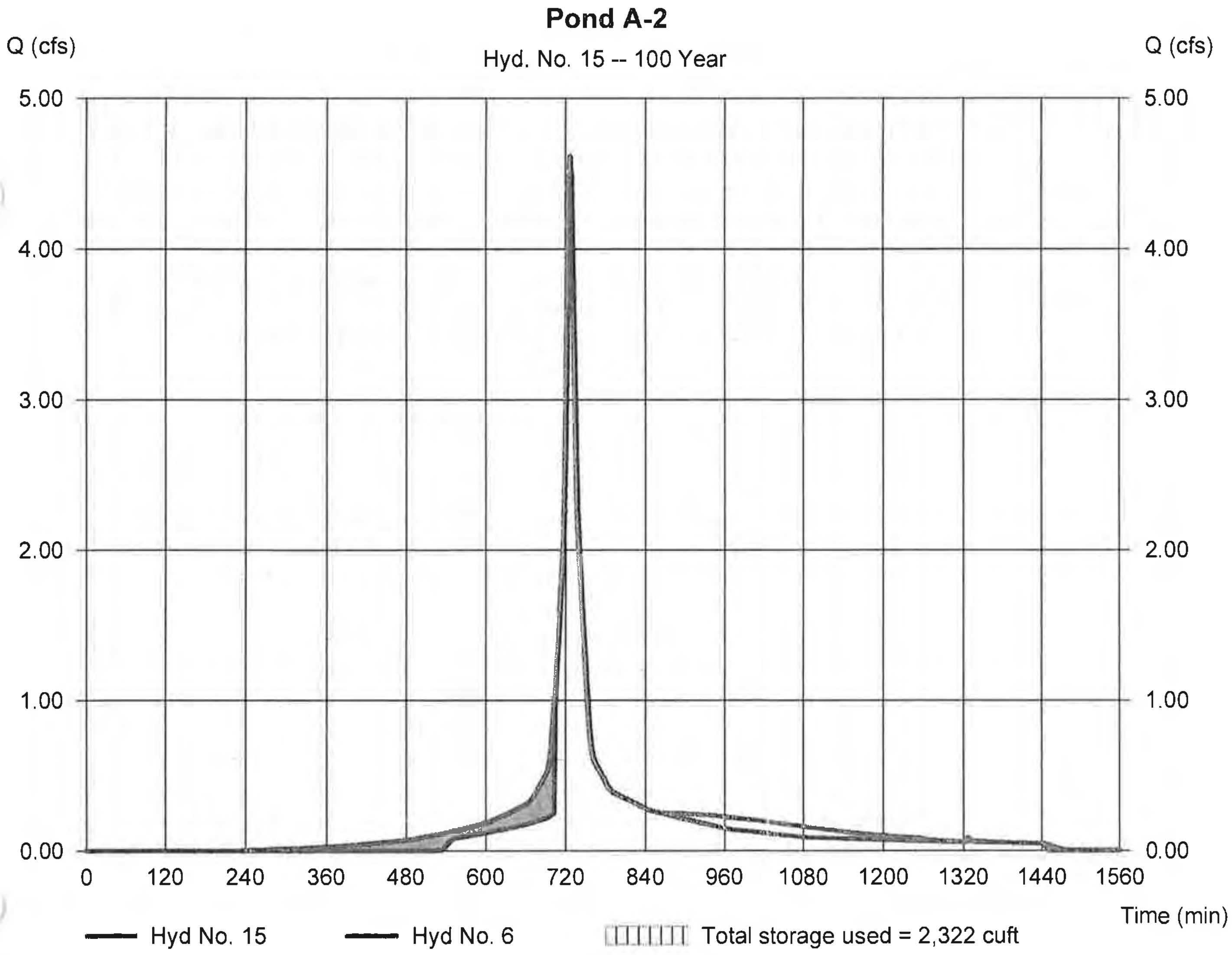
Hyd. No. 15

Pond A-2

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 6 - Proposed A-2
Reservoir name = A-2

Peak discharge = 4.600 cfs
Time to peak = 726 min
Hyd. volume = 15,873 cuft
Max. Elevation = 701.22 ft
Max. Storage = 2,322 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

Pond No. 2 - A-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 698.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	698.00	152	0	0
2.00	700.00	757	831	831
4.00	702.00	1,750	2,438	3,270

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 698.00	699.75	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

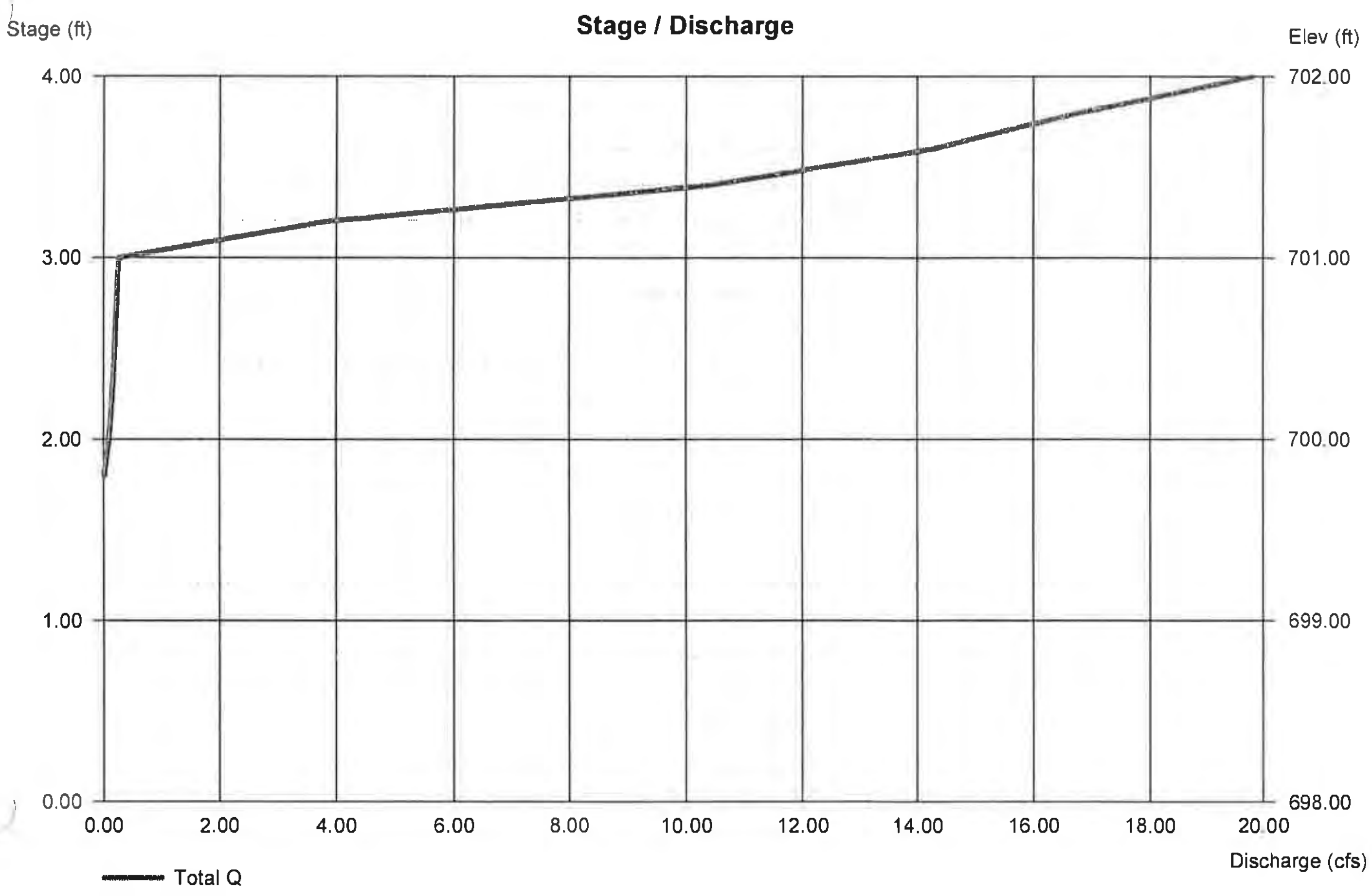
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 701.00	701.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



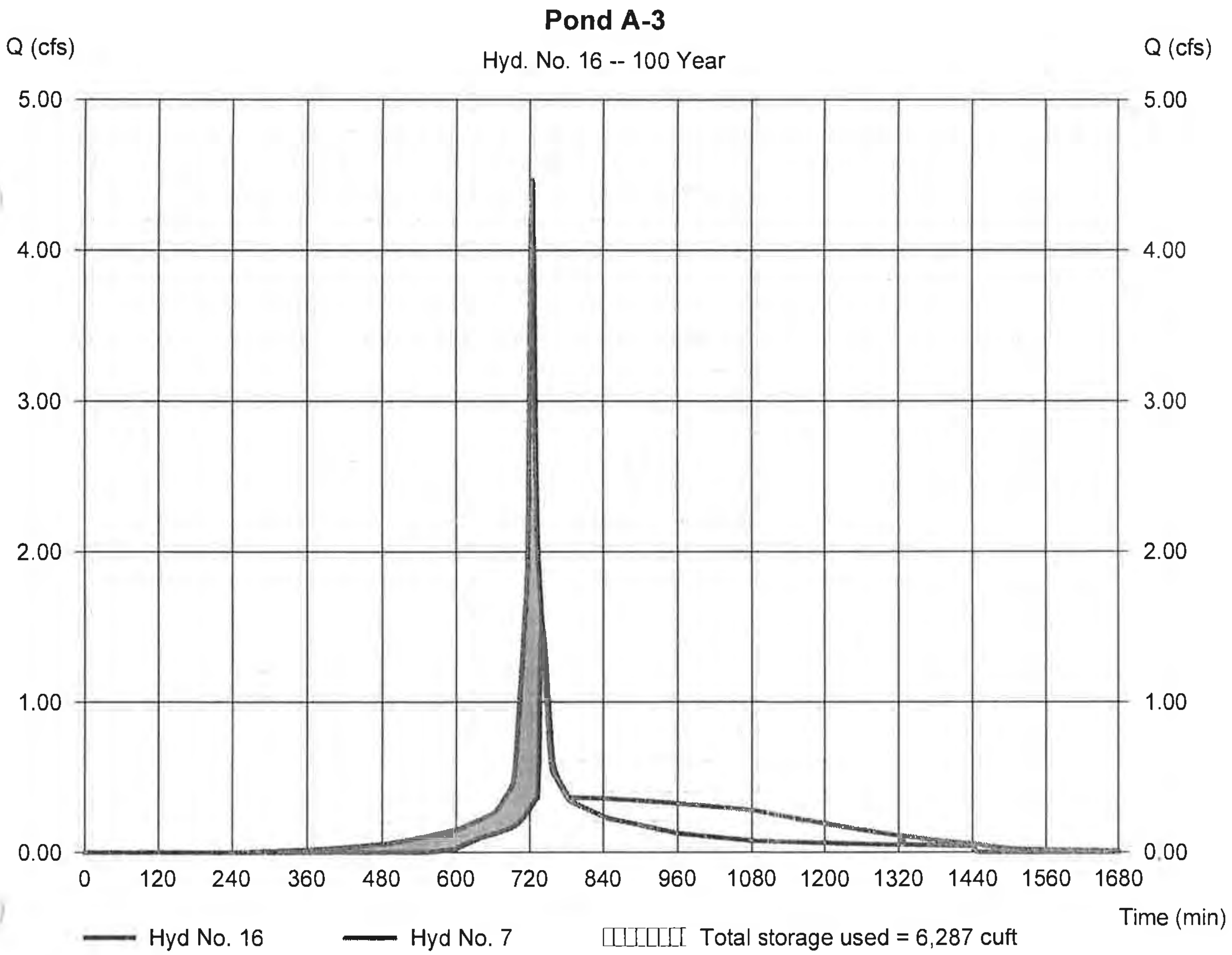
Hydrograph Report

Hyd. No. 16

Pond A-3

Hydrograph type	= Reservoir	Peak discharge	= 1.508 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 13,284 cuft
Inflow hyd. No.	= 7 - Proposed A-3	Max. Elevation	= 729.06 ft
Reservoir name	= A-3	Max. Storage	= 6,287 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Monday, Mar 30, 2009

Pond No. 3 - A-3

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	946	0	0
2.00	728.00	2,308	3,154	3,154
4.00	730.00	3,632	5,889	9,043

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 726.00	726.50	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

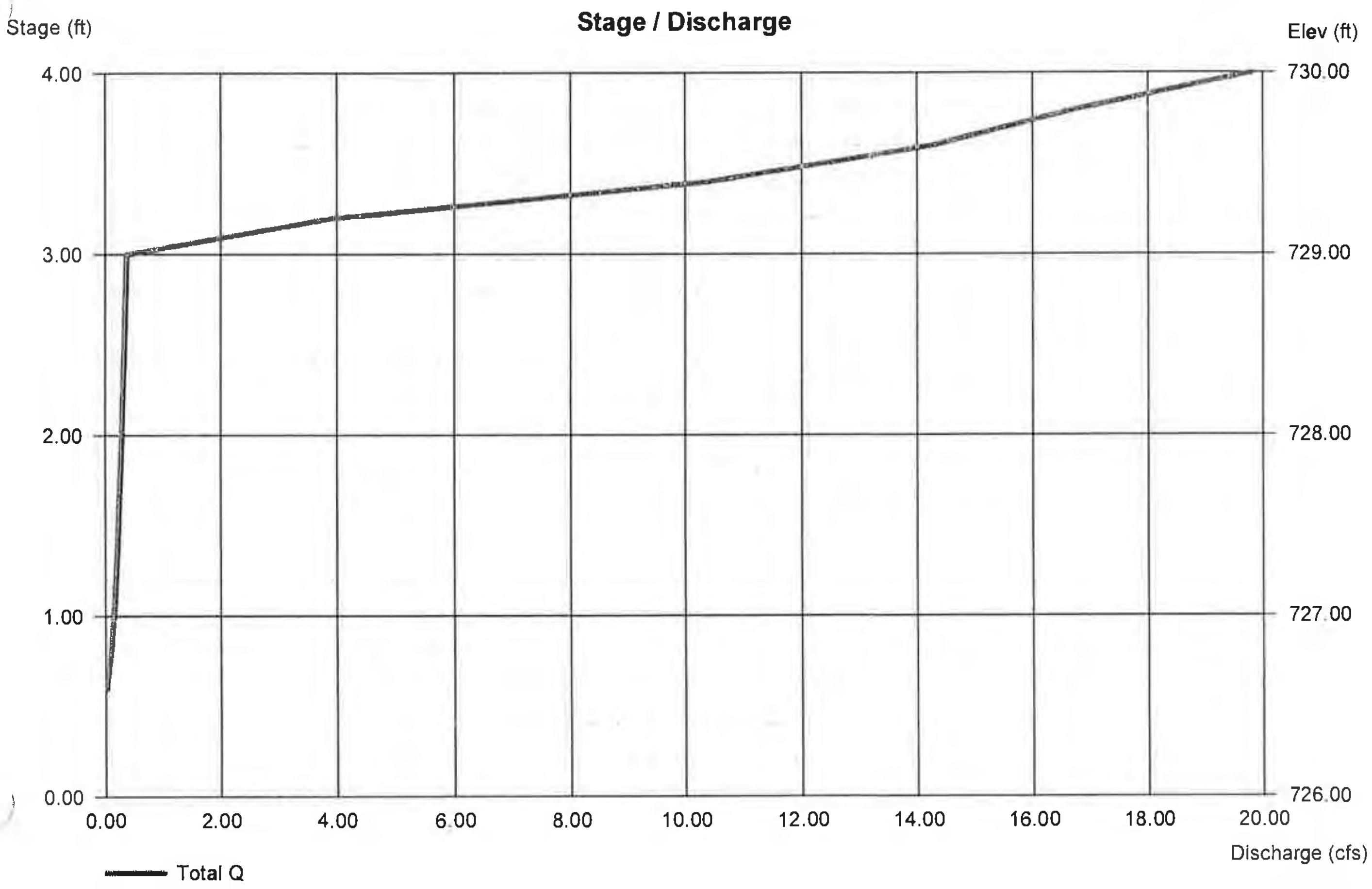
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 729.00	729.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

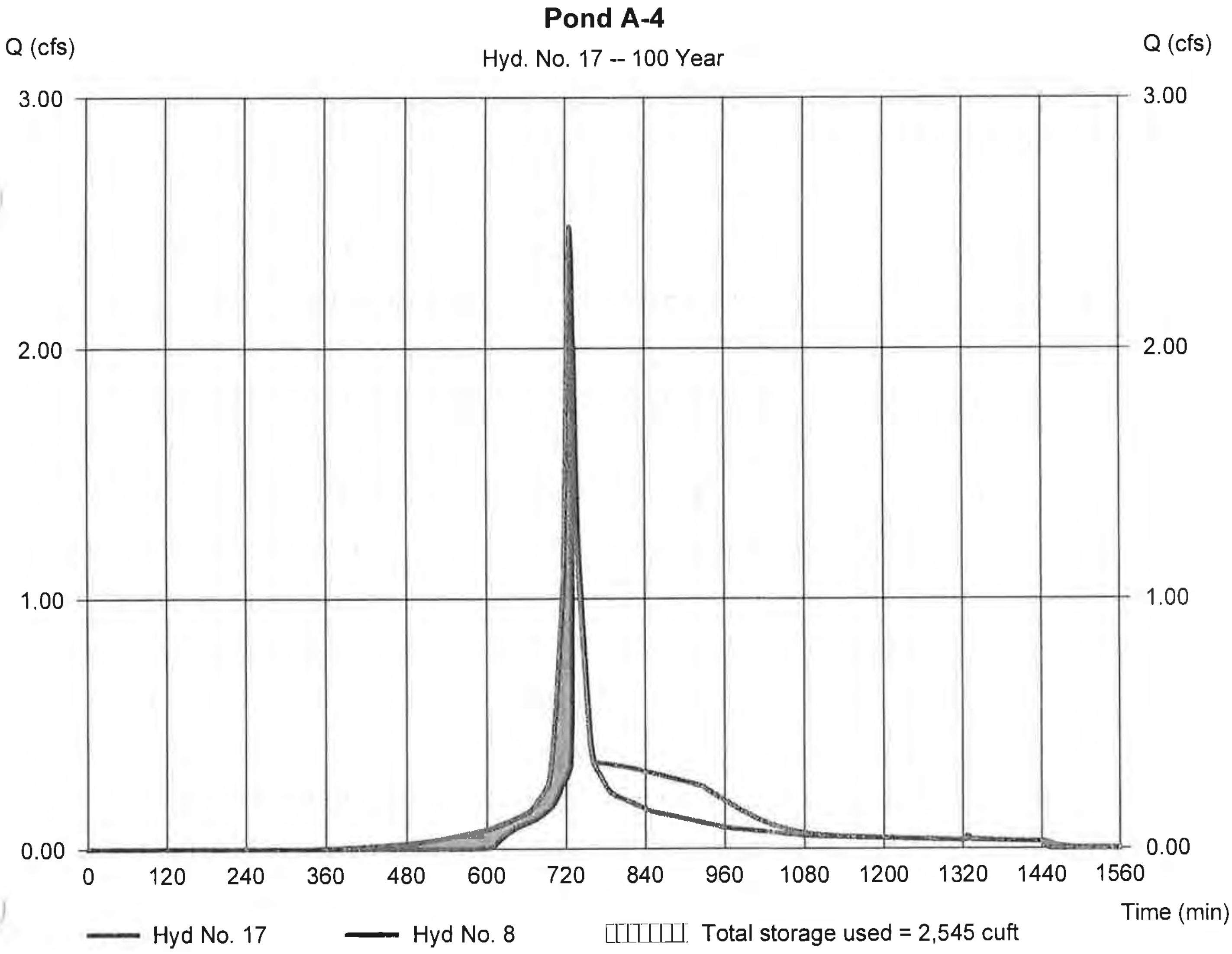
Hyd. No. 17

Pond A-4

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 8 - Proposed A-4
Reservoir name = A-4

Peak discharge = 2.093 cfs
Time to peak = 730 min
Hyd. volume = 8,253 cuft
Max. Elevation = 719.10 ft
Max. Storage = 2,545 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 4 - A-4

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	918	1,129	1,129
4.00	720.00	1,703	2,581	3,710

Culvert / Orifice Structures

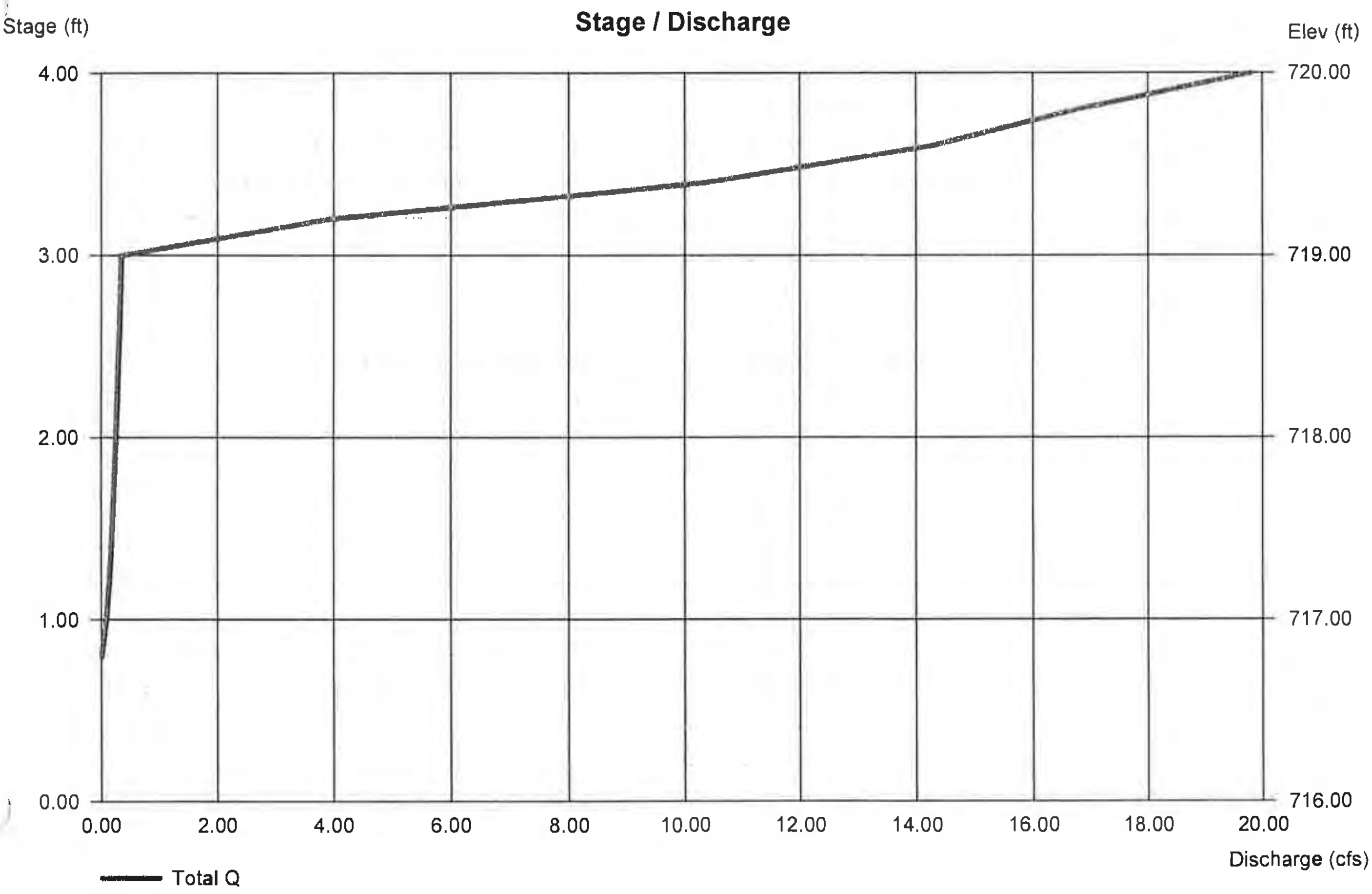
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 716.00	716.75	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 719.00	719.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

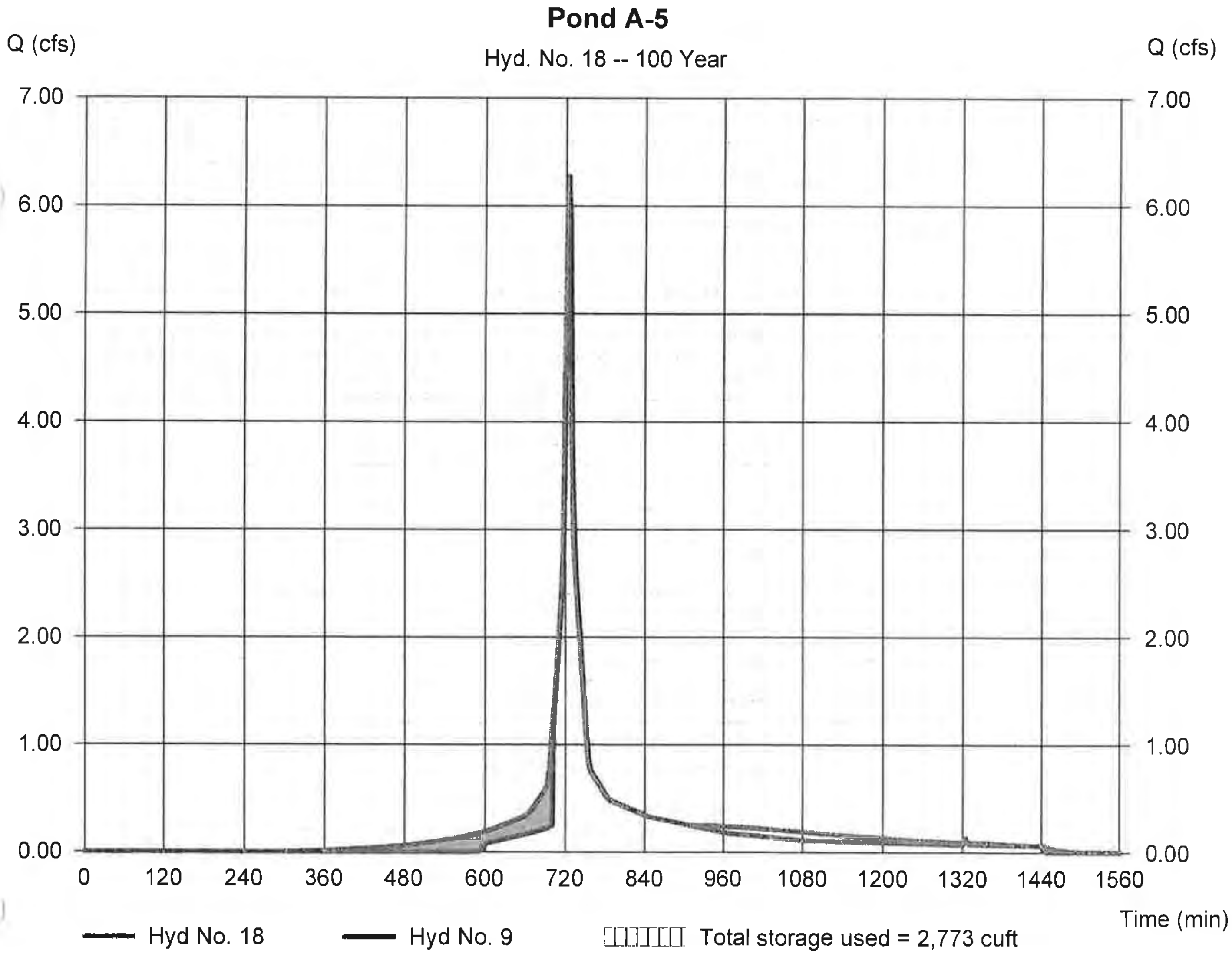
Hyd. No. 18

Pond A-5

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 9 - Proposed A-5
Reservoir name = A-5

Peak discharge = 6.196 cfs
Time to peak = 724 min
Hyd. volume = 18,358 cuft
Max. Elevation = 719.28 ft
Max. Storage = 2,773 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - A-5

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 716.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	716.00	274	0	0
2.00	718.00	920	1,130	1,130
4.00	720.00	1,703	2,583	3,714

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 716.00	717.75	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

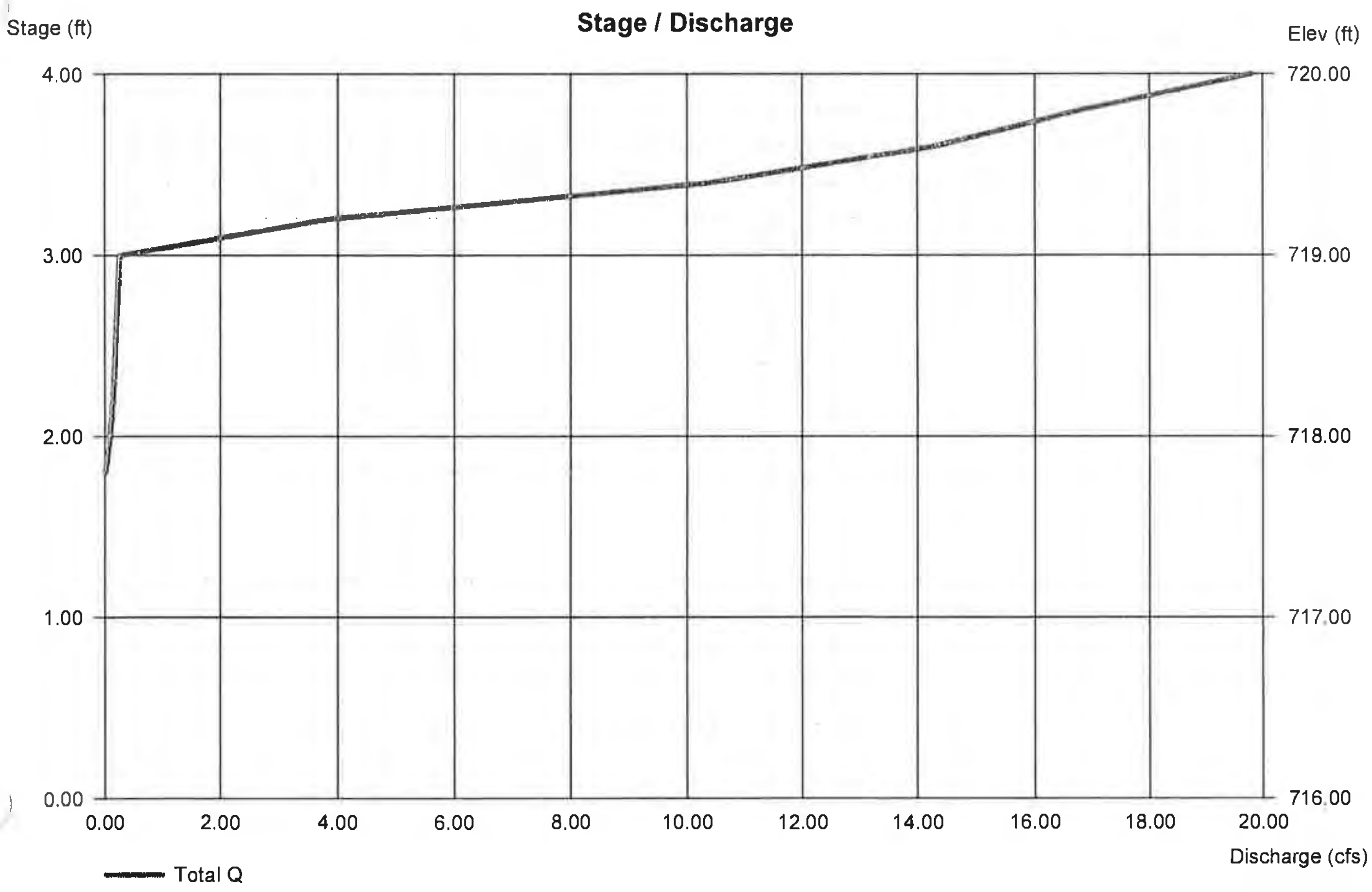
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	5.00	0.00	0.00
Crest El. (ft)	= 719.00	719.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

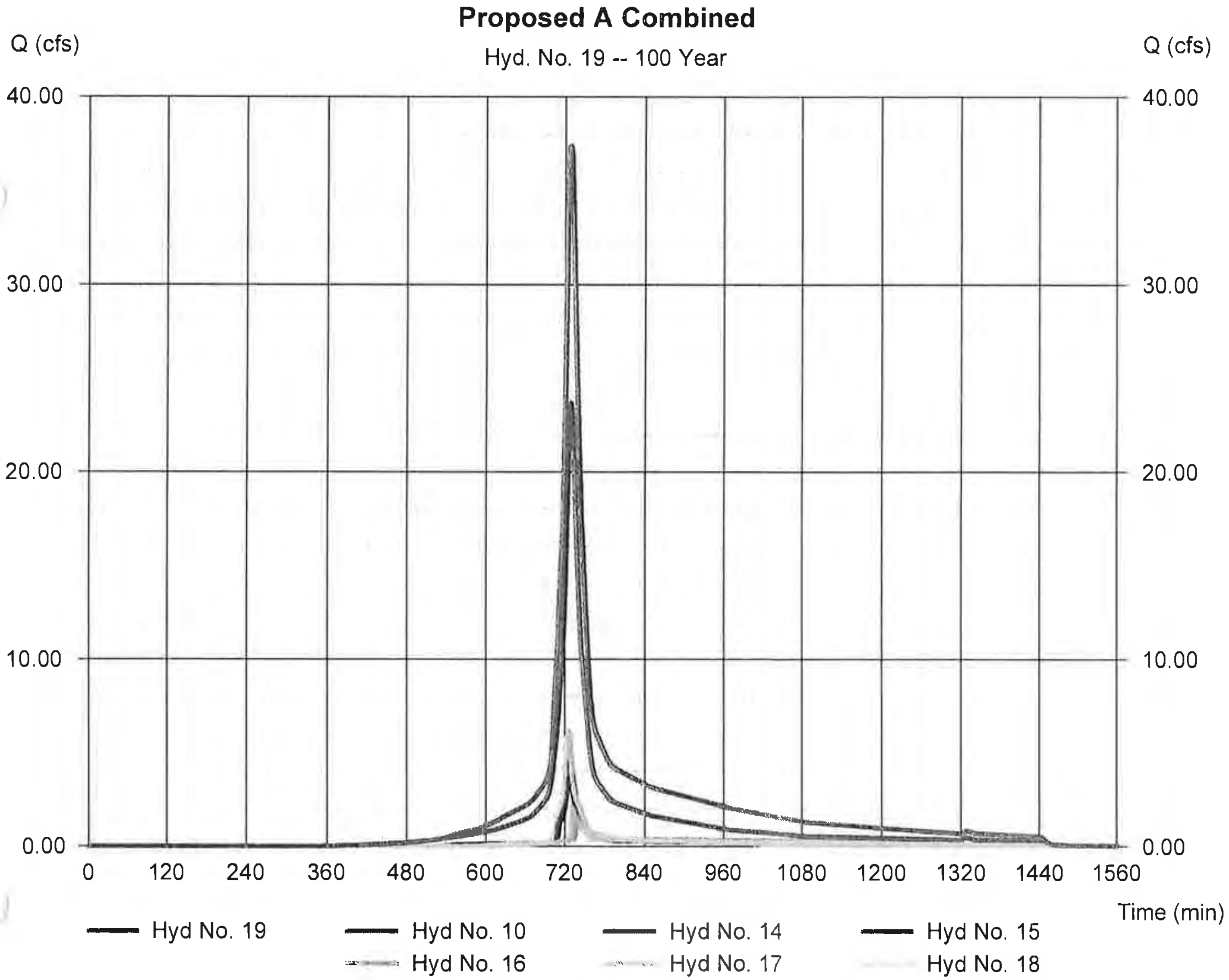
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 19

Proposed A Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 10, 14, 15, 16, 17, 18

Peak discharge = 37.40 cfs
Time to peak = 728 min
Hyd. volume = 159,745 cuft
Contrib. drain. area= 4.750 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

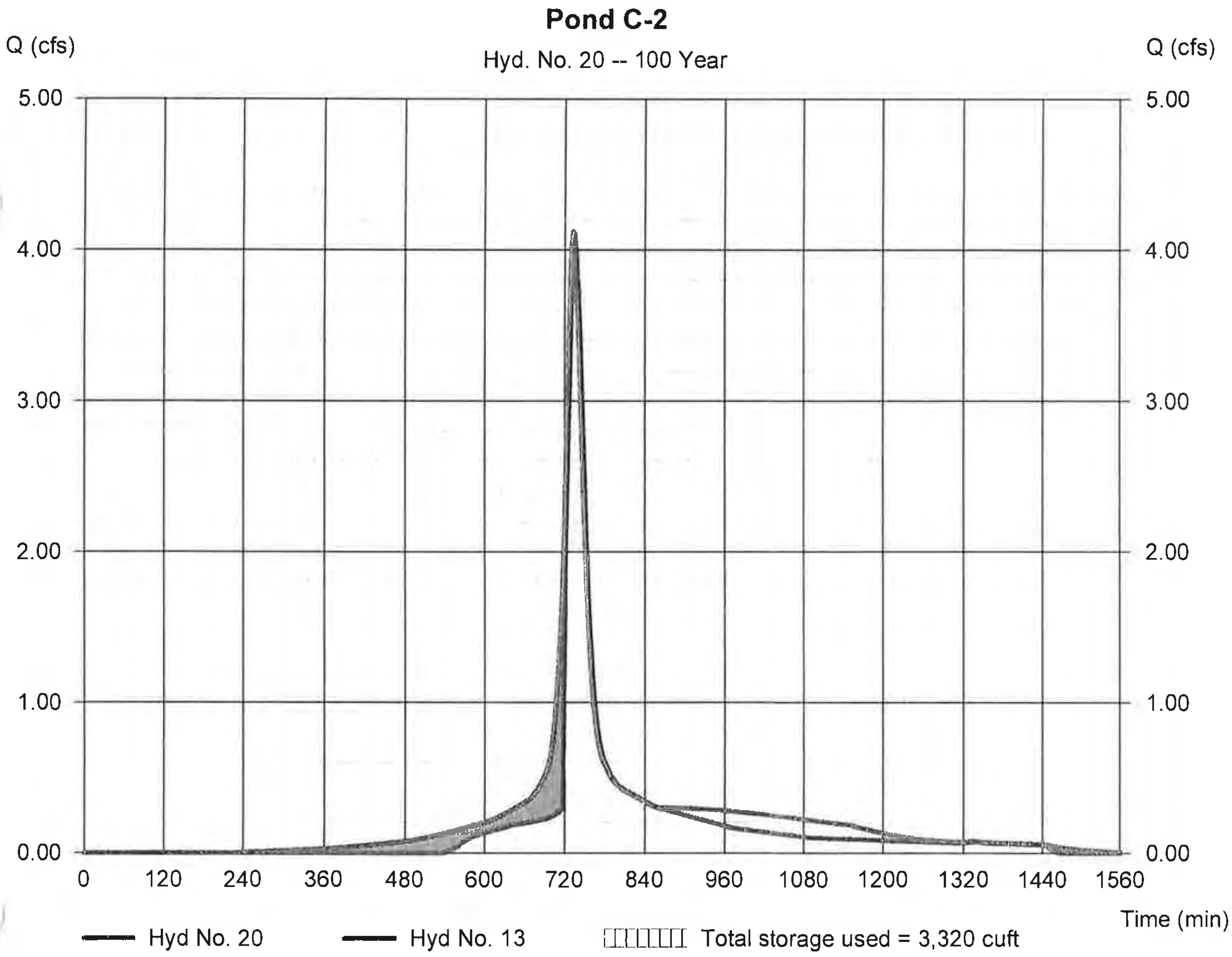
Hyd. No. 20

Pond C-2

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 13 - Proposed C-2
Reservoir name = C-2

Peak discharge = 4.107 cfs
Time to peak = 734 min
Hyd. volume = 18,143 cuft
Max. Elevation = 729.21 ft
Max. Storage = 3,320 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Pond No. 6 - C-2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 726.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	726.00	337	0	0
2.00	728.00	1,131	1,390	1,390
4.00	730.00	2,120	3,199	4,589

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	3.00	0.00	0.00
Span (in)	=	18.00	3.00	0.00	0.00
No. Barrels	=	1	1	0	0
Invert El. (ft)	=	726.00	727.25	0.00	0.00
Length (ft)	=	19.00	0.00	0.00	0.00
Slope (%)	=	2.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

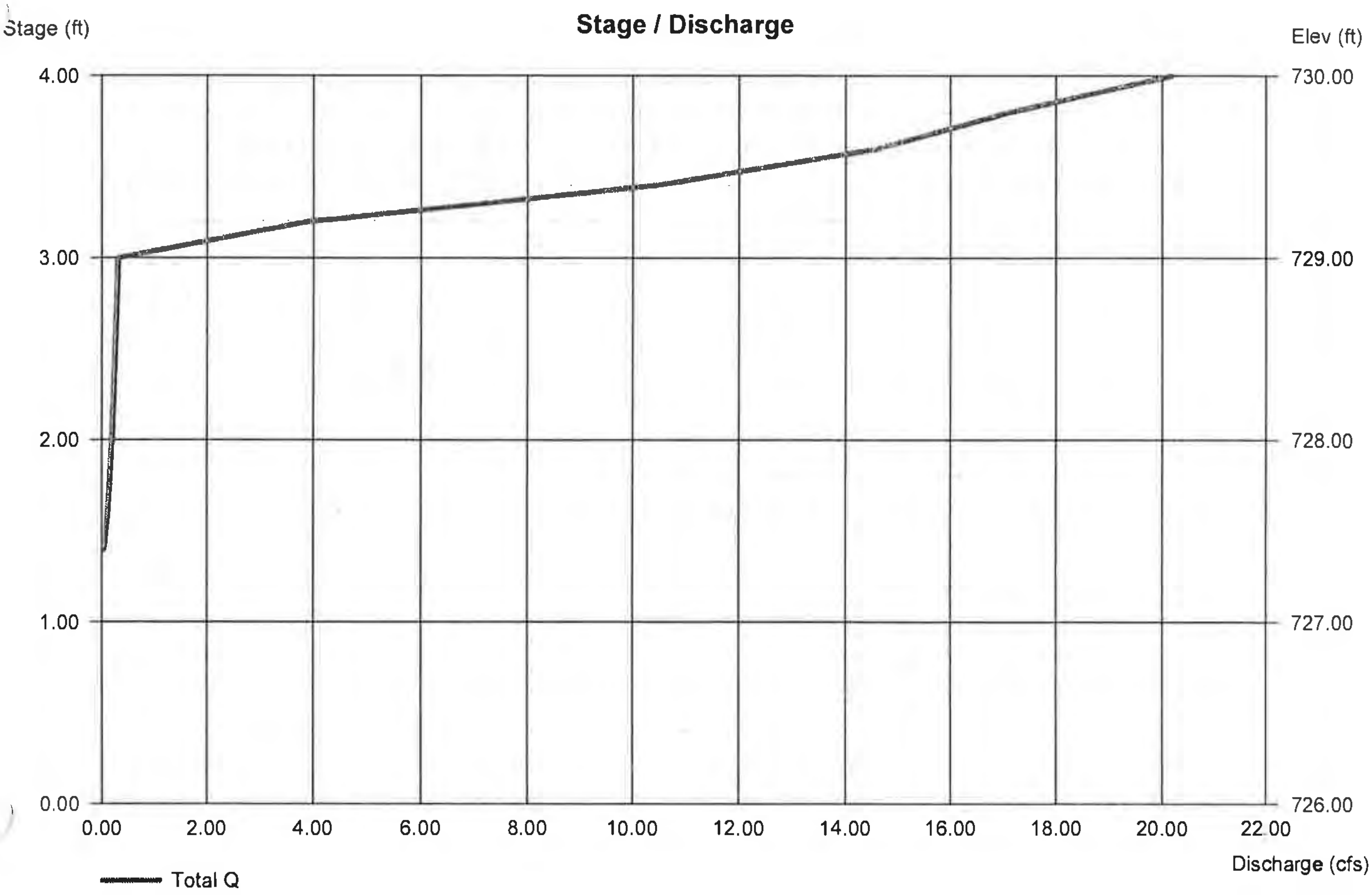
Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	5.00	0.00	0.00
Crest El. (ft)	=	729.00	729.50	0.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	Riser	Broad	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)

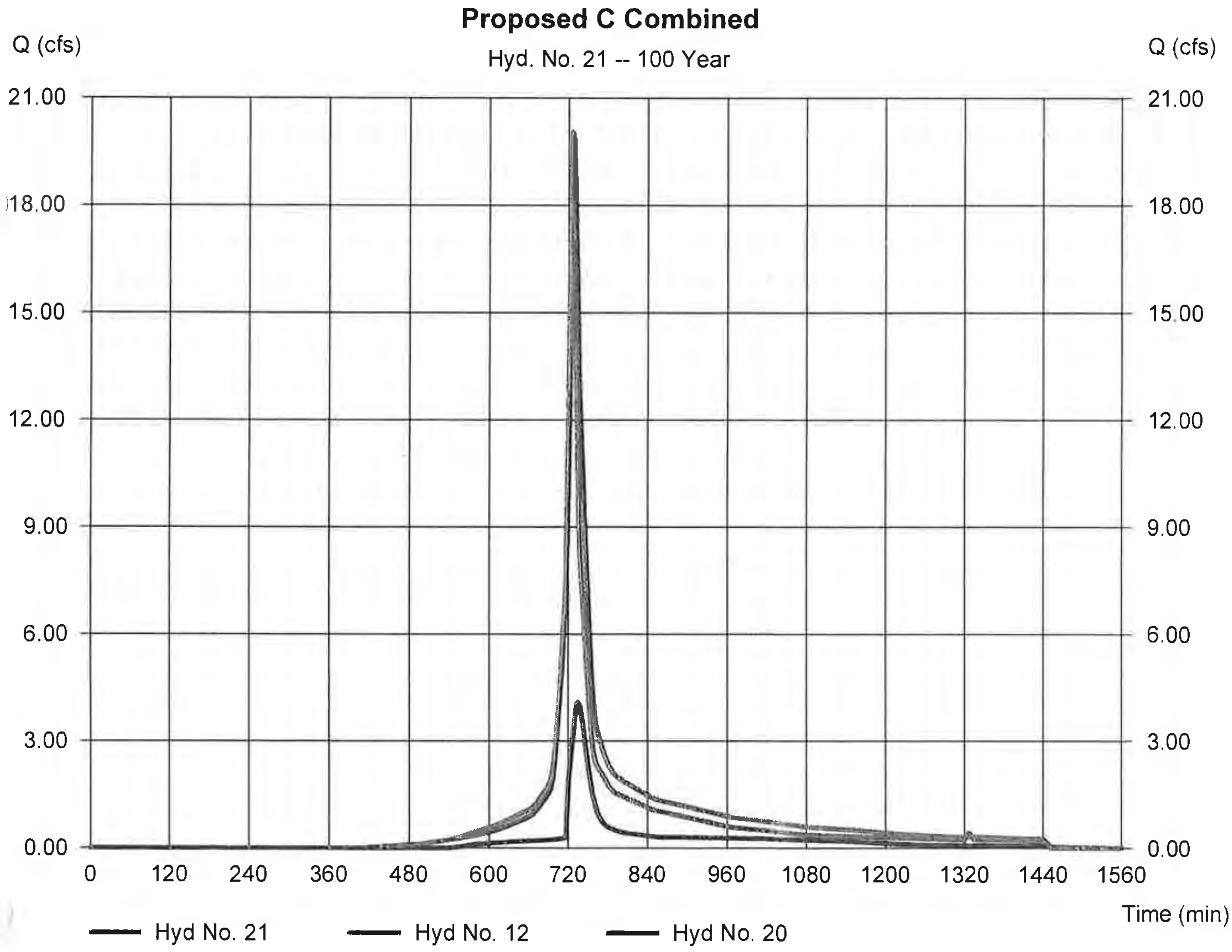


Hydrograph Report

Hyd. No. 21

Proposed C Combined

Hydrograph type	= Combine	Peak discharge	= 20.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 76,380 cuft
Inflow hyds.	= 12, 20	Contrib. drain. areε	= 3.330 ac



Hydrograph Report

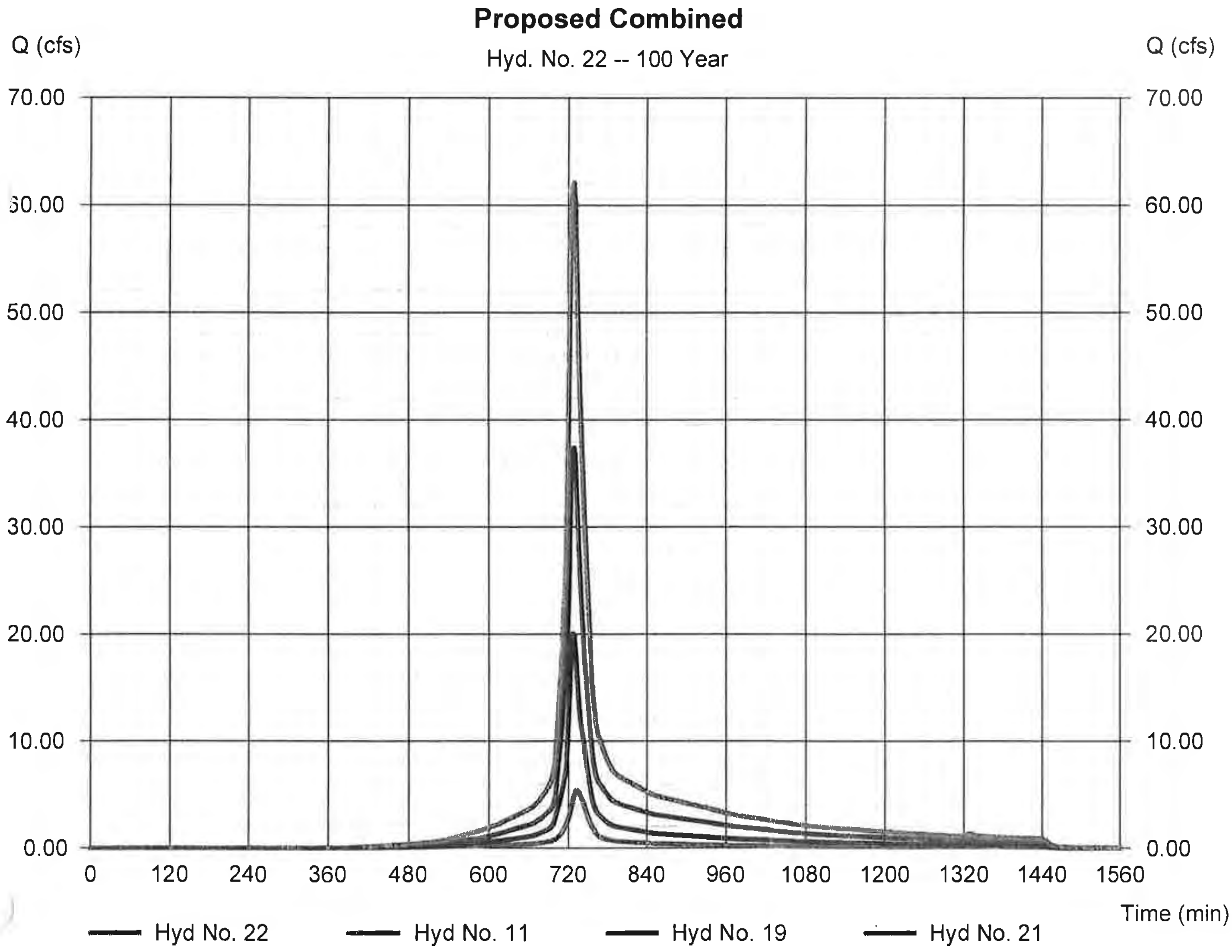
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Monday, Mar 30, 2009

Hyd. No. 22

Proposed Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 11, 19, 21

Peak discharge = 62.11 cfs
Time to peak = 728 min
Hyd. volume = 260,371 cuft
Contrib. drain. area= 1.240 ac



APPENDIX D – NOTICE OF INTENT

3358554733

NOTICE OF INTENT

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

NYR ☐☐☐☐☐☐
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-08-001

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

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
WARWICK COMMONS LLC

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

Owner/Operator Contact Person First Name
KENNETH

Owner/Operator Mailing Address
475 SOUTH MAIN STREET

City
NEW CITY

State
NY

Zip
10956 -

Phone (Owner/Operator)
845-638-4545

Fax (Owner/Operator)
845-638-4606

Email (Owner/Operator)
KBERGSTOL@BERGSTOL.COM

FED TAX ID
 - (not required for individuals)

Project Site Information

Project/Site Name
WARWICK COMMONS LLC

Street Address (NOT P.O. BOX)
SHEFFIELD ROAD

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

City/Town/Village (THAT ISSUES BUILDING PERMIT)
WARWICK VILLAGE

State	Zip	County	DEC Region
NY	10990 -	ORANGE	3

Name of Nearest Cross Street
BRADY LANE

Distance to Nearest Cross Street (Feet)
0

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

Tax Map Numbers
Section-Block-Parcel
218-1-91

Tax Map Numbers
218-1-94

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

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

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site go to the dropdown menu on the left and choose "Get Coordinates". Click on the center of your site and a small window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)	Y Coordinates (Northing)
554055	4565256

2. What is the nature of this construction project?

● **New Construction**

○ **Redevelopment with increase in imperviousness**

○ **Redevelopment with no increase in imperviousness**

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

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

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

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

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

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

Total Site Acreage	**Acreage To Be Disturbed**	**Existing Impervious Area Within Disturbed**	**Future Impervious Area Within Disturbed**
15.3	10.6	1.2	5.8

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

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

A	B	C	D
0 %	0 %	87 %	13 %

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

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

Start Date 05/15/2009 - **End Date** 12/31/2010

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

Name

TRIBUTARY OF THE WAWAYANDA CREEK

12a. Type of waterbody identified in Question 12?

○ Wetland / State Jurisdiction On Site (Answer 12b)
○ Wetland / State Jurisdiction Off Site
● Wetland / Federal Jurisdiction On Site (Answer 12b)
○ Wetland / Federal Jurisdiction Off Site
○ Stream / Creek On Site
○ Stream / Creek Off Site
○ River On Site
○ River Off Site
○ Lake On Site
○ Lake Off Site
○ Other Type On Site
○ Other Type Off Site

12b. How was the wetland identified?

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

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-08-001? ○ Yes ● No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-08-001? ○ Yes ● No

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

16. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ Yes ● No

If Yes, what is the acreage to be disturbed?

☐☐☐☐.☐

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

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

(If No, skip question 19)

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

VILLAGE OF WARWICK

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

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

22. Does this construction activity require the development of a SWPPP that includes Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) ● Yes ○ No

(If No, skip questions 23 and 27-35)

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Dcsign Manual ? ● Yes ○ No

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

● **Professional Engineer (P.E.)**

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

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

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

○ **Owner/Operator**

○ **Other**

SWPPP Preparer: GREATER HUDSON VALLEY ENGINEERING ...

Contact Name (Last, Space, First): VANDERBEEK THOMAS

Mailing Address: 233 LAFAYETTE AVE SUITE M-1

City: SUFFERN

State: NY

Zip: 10901-

Phone: 845-357-7450

Fax: 845-357-7460

Email: TVANDERBEEK@GHVE.COM

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-08-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name: THOMAS

MI: B

Last Name: VANDERBEEK

Signature:

Date: / /

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

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

Temporary Structural

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

Biotechnical

○ Brush Matting
○ Wattling

Vegetative Measures

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

Permanent Structural

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

Other

Water Quality and Quantity Control

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

Post-Construction Stormwater Management Practices

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

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

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

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

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

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

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

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

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

There is no deviation from the technical standards. Previous phases have constructed the quantity control measures.

29. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● **Yes** ○ **No**

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

WARWICK COMMONS LLC HOA

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

WQv Required 0.323 acre-feet

WQv Provided 0.671 acre-feet

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

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

CPv Required 0.323 acre-feet

CPv Provided 0.671 acre-feet

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

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

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

Pre-Development 37.26 **CFS**

Post-development 34.07 **CFS**

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

Pre-Development 68.69 **CFS**

Post-development 62.11 **CFS**

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

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

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

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

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. 8 %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. 36 %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. 35

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

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

DEC Permits

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

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

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

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

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

Owner/Operator Certification

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

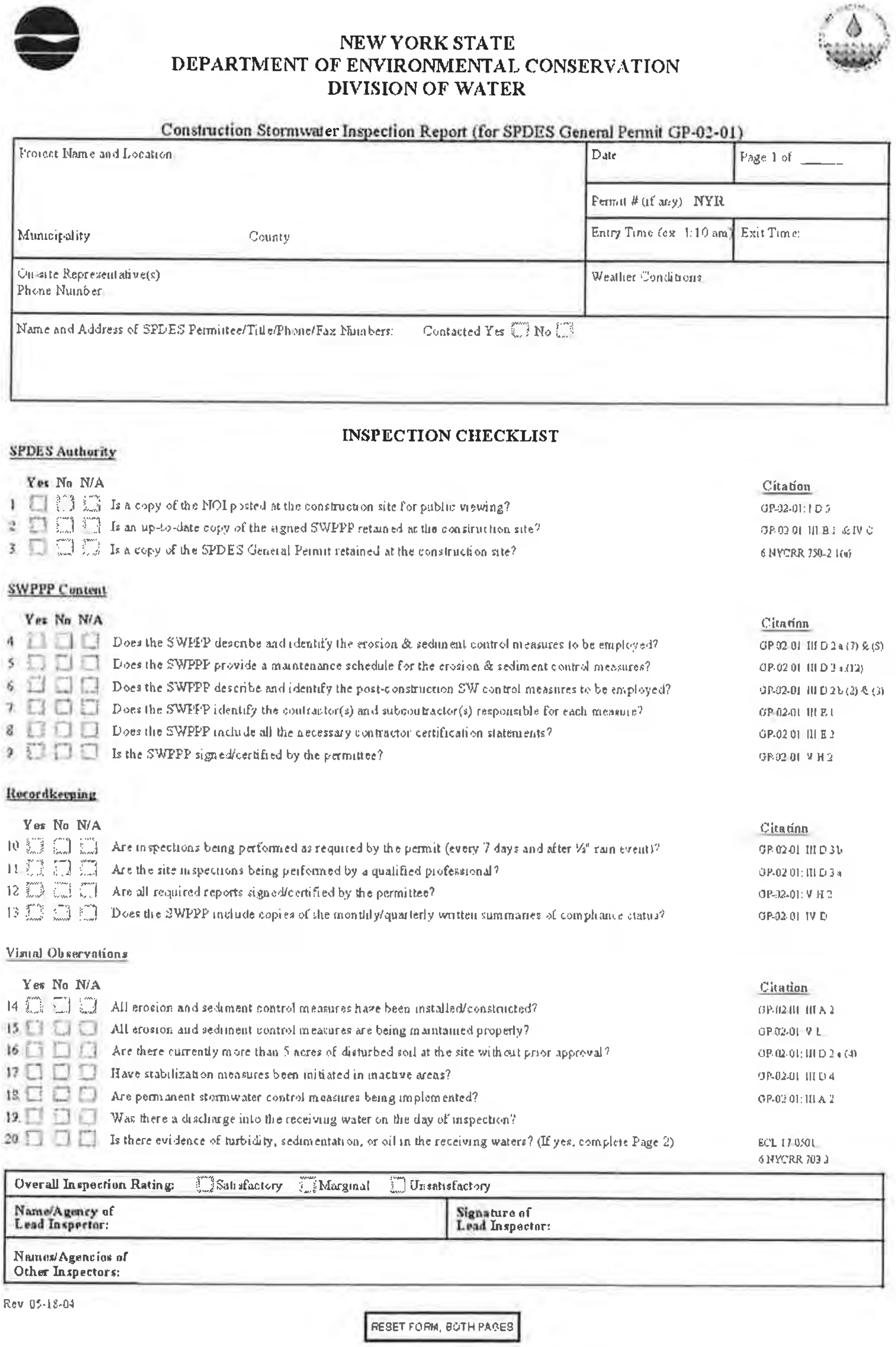
Print First Name KENNETH **MI** A

Print Last Name BERGSTOL

Owner/Operator Signature

Date / /

APPENDIX E – INSPECTION FORMS



NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER

Construction Stormwater Inspection Report (for SPDES General Permit GP-02-01)

Project Name and Location Municipality County	Date	Page 1 of ______	
	Permit # (if any) NYR		
	Entry Time (ex 1:10 am)	Exit Time:	
On-site Representative(s) Phone Number	Weather Conditions		
Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted Yes ☐ No ☐			

INSPECTION CHECKLIST

SPDES Authority

	Yes	No	N/A		Citation
1	☐	☐	☐	Is a copy of the NOI posted at the construction site for public viewing?	GP-02-01: I D 5
2	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?	GP-02-01 III B 1 & IV C
3	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?	6 NYCRR 750-2 1(e)

SWPPP Content

	Yes	No	N/A		Citation
4	☐	☐	☐	Does the SWPPP describe and identify the erosion & sediment control measures to be employed?	GP-02-01 III D 2 a (7) & (8)
5	☐	☐	☐	Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures?	GP-02-01 III D 2 a (12)
6	☐	☐	☐	Does the SWPPP describe and identify the post-construction SW control measures to be employed?	GP-02-01 III D 2 b (2) & (3)
7	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?	GP-02-01 III E 1
8	☐	☐	☐	Does the SWPPP include all the necessary contractor certification statements?	GP-02-01 III E 2
9	☐	☐	☐	Is the SWPPP signed/certified by the permittee?	GP-02-01 V H 2

Recordkeeping

	Yes	No	N/A		Citation
10	☐	☐	☐	Are inspections being performed as required by the permit (every 7 days and after ½" rain event)?	GP-02-01 III D 3 b
11	☐	☐	☐	Are the site inspections being performed by a qualified professional?	GP-02-01: III D 3 a
12	☐	☐	☐	Are all required reports signed/certified by the permittee?	GP-02-01: V H 2
13	☐	☐	☐	Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status?	GP-02-01 IV D

Visual Observations

	Yes	No	N/A		Citation
14	☐	☐	☐	All erosion and sediment control measures have been installed/constructed?	GP-02-01 III A 3
15	☐	☐	☐	All erosion and sediment control measures are being maintained properly?	GP-02-01 V L
16	☐	☐	☐	Are there currently more than 5 acres of disturbed soil at the site without prior approval?	GP-02-01: III D 2 a (4)
17	☐	☐	☐	Have stabilization measures been initiated in inactive areas?	GP-02-01 III D 4
18	☐	☐	☐	Are permanent stormwater control measures being implemented?	GP-02-01: III A 2
19	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?	
20	☐	☐	☐	Is there evidence of turbidity, sedimentation, or oil in the receiving waters? (If yes, complete Page 2)	ECL 17-0501 6 NYCRR 703.3

Overall Inspection Rating: ☐ Satisfactory ☐ Marginal ☐ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

Rev 05-18-04

RESET FORM, BOTH PAGES

Page 2 of 2

Water Quality Observations

Describe the discharge(s) [source(s), impact on receiving water(s), etc.]

Describe the quality of the receiving water(s) both upstream and downstream of the discharge

Describe any other water quality standards or permit violations

……

Additional Comments:

☐ Photographs attached

RESET FORM BOTH PAGES

NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity

Permit Number GP-02-01

Monthly Summary of Site Inspection Activities

Name of Permitted Facility:

Permit Identification #:

Location:

Today's Date:

Reporting Month:

Name and Telephone Number of Site Inspector:

Name and Telephone Number of Site Inspector:

Permit Reference; Part III.D.3.b (page 15):

"The operator shall post at the site, in a publicly-accessible location, a summary of the site inspection activities on a monthly basis."

Date of Inspection	Type of Inspection and 24 hr Rainfall	Name of Qualified Professional conducting Site Inspections	Major items of concern related to compliance of the SWPPP with all conditions of the general permit	Date Corrected

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. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative

Date

Duly authorized representatives of the Permittee (Owner/Operator) must have written authorization, submitted to DEC, to sign any permit documents.

NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity

Permit Number GP-02-01

Quarterly Summary of SWPPP Status with Permit Compliance

Name of Permitted Facility:	**Permit Identification #:**		**Today's Date:**
Location (Town and County):	**Reporting Period:**	**Acres Disturbed:**	**Acres Stabilized:**

Permit Reference; Part IV.D (page 18):

"The operator shall also prepare a written summary of its status with respect to compliance with this general permit at a minimum frequency of every three months during which coverage under this permit exists. The summary should address the status of achieving each component of the SWPPP. This summary shall be handled in the same manner as prescribed for SWPPPs under Part III. subsection B (see Page 9)."

Component of SWPPP (All SWM and E&SC Practices)	**Compliant** (Yes / No)	**Comments on achieving each component of the SWPPP** (Issues related to installation, maintenance, or use of practices)
Permanent EC Measures		*EXAMPLE*
Exposed Slope Stabilization:	Yes	As construction is completed in area 2, slopes have been stabilized with mulch and seed. Grass germination is at 60%. This work has been detailed in the regular inspection reports as to the extent and schedule of completion.

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. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative

Date

of pages

Duly authorized representatives of the Permittee must have written authorization, submitted to DEC, to sign any permit documents

FINAL
ENVIRONMENTAL IMPACT
STATEMENT

WARWICK MEADOWS

BRADY ROAD

VILLAGE OF WARWICK

ORANGE COUNTY

PREPARED BY

ROBERT DRESNACK, Ph.D., P.E.

NOVEMBER 7, 1985

REVISED DECEMBER 12, 1985

APPENDIX "L"

Thonet Associates
Environmental Consultants

Harding Drive
uth Orange, New Jersey 07079
(201) 761-1162

October 8, 1984

Mr. William L. Wissing
Wissing Engineering Associates
P.O. Box 103
Franklin Lakes, NJ 07417

Re: Warwick Meadows - Stage I

Dear Bill:

Enclosed is a signed and sealed (NJPE) copy of my August 31st report regarding the detention basin analysis for the above project. Please note that it is unlikely that a "New York" PE is required for this report, as the report does not provide an engineering design for the stormwater detention system, nor was it the basis for the proposed design.

The report presents a hydrologic analysis and routing which demonstrates the functional adequacy of the proposed system with certain conditions specified.

Very truly yours,

THONET ASSOCIATES

John A. Thonet, PE, PP

JAT:kbt
Enc.

Thonet Associates
Environmental Consultants

18 Harding Drive
South Orange, New Jersey 07079
(201) 761-1162

August 31, 1984

Mr. William L. Wissing
Wissing Engineering Associates
P.O. Box 103
Franklin Lakes, NJ 07417

Re: Detention Basin Analysis
Warwick Meadows - Stage I

Dear Mr. Wissing:

As per your request, I have prepared the following detention basin analysis for the above project. This report, together with some minor changes to your present plans, should satisfy the municipal engineer's requirements with respect to detention analysis.

Location and Description of Project

The project lies in a tributary basin to Wawayanda Creek in the Village of Warwick, New York (see Figure I, Vicinity Map). Enclosure I, Storm Drain Design, illustrates the Stage I development proposed and the proposed stormwater drainage and detention facilities. The total area of the tract to be developed is approximately ten acres. The stormwater system, however, proposes to intercept and control runoff from an additional 1.4 acres of undeveloped land off the Stage I site, as part of its overall stormwater management plan. The total drainage area of the tributary stream along which the project is located is 238 acres and is illustrated in Figure I. Accordingly, this project's 11.4 acres represents about five percent of the total drainage area above the site.

Investigations and Findings

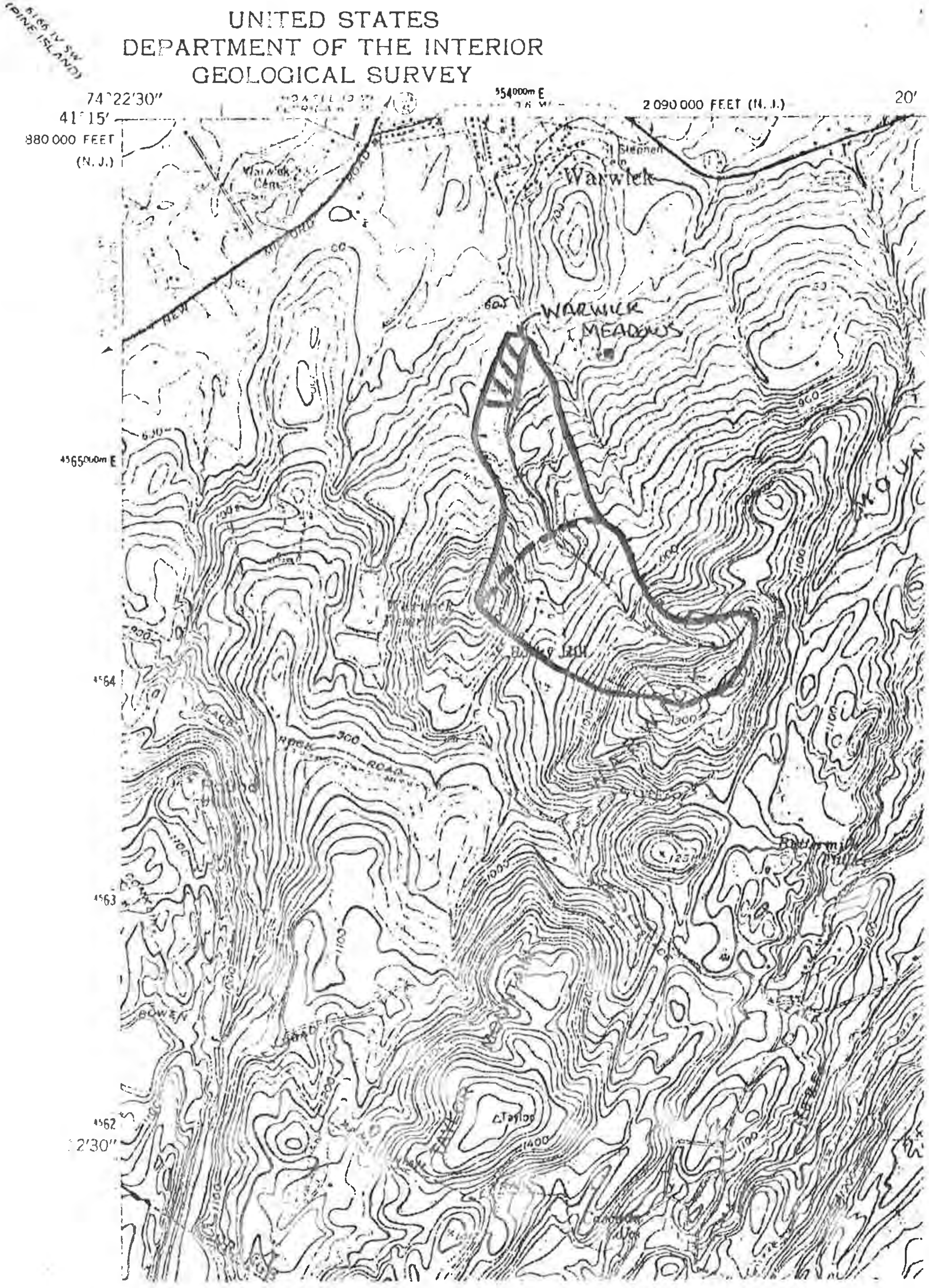
Our investigations included the following:

1. Basin scale analysis of the hydrologic response of the entire tributary basin under existing and proposed conditions (assuming no stormwater controls) to demonstrate the potential impact of the proposed project even in the absence of controls.

2. Site specific analysis of the hydrologic response of the 11.4 acre tract for existing and proposed conditions and determination of overall storage requirements.

FIGURE I

VICINITY MAP



3. Evaluation of the proposed stormwater management plan and recommendation for one minor change.

Appendix A presents the basin scale analysis. This analysis illustrates that the impact of the proposed project by itself on the peak 100-year flood flow in the tributary, in the absence of any stormwater management controls, would be an increase of about one percent. With stormwater management controls, no increase will result.

Appendix B presents the site specific analysis of the hydrologic response of the 11.4 acre tract for existing and proposed conditions and quantifies the necessary stormwater detention storage requirements. This analysis defines the peak 100-year flows of the site for before and after development as 54 and 81 cfs respectively. Using the SCS TR-55 methodology, the required detention storage is approximately 45,000 cubic feet. Approximately 67,000 cubic feet is presently proposed.

The present stormwater management plan calls for intercepting and storing most of the runoff from approximately three of the ten acres proposed for development, as well as most of the runoff from 1.4 acres of presently undeveloped land. The remaining seven acres proposed for development are proposed to run off uncontrolled into the on-site stream. By catching and storing the majority of the runoff from 4.4 acres, it is proposed that the remaining acreage can run off without detention measures without increasing peak rates of runoff from the site.

Appendix C presents an evaluation of the feasibility of this stormwater management approach. The analysis demonstrates the feasibility of the approach provided that the proposed 8-inch diameter outlet pipe from the basin is reduced to a 6-inch pipe.

Conclusions and Recommendations

Based on the enclosed analysis, I conclude that the proposed stormwater management system can guarantee no increase in peak rates of runoff from the site assuming the following:

1. The proposed 8-inch outlet pipe is replaced by a 6-inch pipe.

2. At least three acres of the proposed ten acre development and 1.4 acres of undeveloped uplands can be directed to the 67,000 cubic foot detention basin.

I hope this report will assist you in completing your plans for the project. If I can be of further assistance to you, please let me know.

Very truly yours,

THONET ASSOCIATES

John A. Thonet, PE, PP
PE LIC. #26216

JAT:kbt
Enc.

APPE

I. BASIN STATISTICS

A. TOTAL DRAINAGE AREA: 238 ACRES

1. UPPER PORTION OF DA: OVERLAND FLOW
    - a. 147 ACRES (62% OF BASIN)
    - b. 60% WOODS, 40% MEADOW
    - c. AV. SLOPE: 16% (STEEP)
2. LOWER PORTION OF BASIN: WELL DEFINED CHANNEL
    - a. 91 ACRES (38% OF BASIN)
    - b. 50% WOODS, 50% MEADOW
    - c. AV. SLOPE: 10%
3. HYDROLOGIC SOIL CLASS: "C"
4. HYDRAULIC LENGTH, l, IN UPPER BASIN: 3800'
5. STREAM LENGTH & SLOPE IN LOWER BASIN: 3000'; S = 6%

B. TIME OF CONCENTRATION:

1. UPPER BASIN: OVERLAND FLOW:

$$T_c = L/0.6 \text{ WHERE } L = \frac{l^{.8}(S+1)^{.7}}{1900\, Y^{.5}}$$

$$l = 3800', \; Y = 16\%, \; S = \frac{1000}{CN} - 10 = \frac{1000}{75} - 10 = 3.33$$

$T_c \approx 0.5$ HOURS

2. LOWER BASIN: STREAM TRAVEL TIME = 0.25 HR. = T_t

II PEAK FLOWS (SCS - TR 55 - TABLE 5-3) (100-YEAR)

A. EXISTING CONDITIONS, CN = 75

$T_c = .5$ hr, $T_t = .25$ hr

$q_u = 425$ CFS $A = 0.37$ mi^2

H_i = In. In. OF RUNOFF = 4.6 in for $P_{24} = 7.5''$

$Q_{100} = 425(.37)(4.6) = 723$ cfs (EXISTING COND.)

B. PROPOSED CONDITIONS CN = 75.5

$T_c = .5$ hr, $T_t = .25$ hr, In. of RUNOFF = 4.65

$Q_{100} = 425(.37)(4.65) = 731$ cfs (1% increase)

DIX A

BASIN SCALE ANALYSIS

STAGE I - WARWICK MEADOWS

APPENDIX B

SITE SPECIFIC ANALYSIS - WARWICK MEADOWS I

I. DRAINAGE AREA STATISTICS

A. TOTAL D.A. = 11.4 ACRES

B. CN (EXISTING) = 75

CN (PROPOSED) = 85

C. LAG = $L = \frac{l^{.8}(S+1)^{.7}}{1900\,Y^{1/2}}$ WHERE $l = 1450'$

$Y = 8\%$

$S = \frac{1000}{CN} - 10$

∴ LAG (EXISTING) = [redacted] .1756 HRS

TC (EXISTING) = $\frac{L}{.6}$ = 0.3 HRS

LAG (PROPOSED) = .1282 HRS

TC (PROPOSED) = .2 HRS

II. PEAK FLOWS (100-YR EVENT)

FROM SCS-TR-55, TABLE 5-3

A. FOR EXISTING CONDITIONS

CN = 75, 100-YR P_{24} = 7.5"

Inches of RUNOFF = 4.6", TC = .3 HRS

DA = .0178 sq. mi

$Q_{100} = 658 \frac{cfs}{mi^2\text{-}in}(.0178\,mi^2)(4.6) = \underline{54\,cfs}$

B. FOR FUTURE CONDITIONS

CN = 85, TC = .2 HRS, INCHES OF RUNOFF = 5.74"

$q_{100} = 796(.0178)(5.74) = \underline{81\,cfs}$ (50% INCREASE)

$Q_{INFLOW} = Q_i = 81\,cfs$ $\frac{Q_o}{Q_i} = \frac{54}{81} = 0.67$

$Q_{OUTFLOW} = Q_o = 54\,cfs$

III. REQUIRED DETENTION STORAGE

FROM FIG. 7-2, SCS, TR-55

FOR $\frac{Q_o}{Q_i} = 0.67$, $\frac{V_s}{V_r} = \frac{\text{Vol. Storage}}{\text{Vol. runoff}} = 0.215$

$V_s = V_r(.215) = 5.74(.215) = 1.234$ INCHES ≈ $\underline{45,000\,FT^3}$

APPENDIX C

EVALUATION OF PROPOSED STORMWATER MANAGEMENT PLAN FOR WARWICK MEADOWS - STAGE I.

I. UNCONTROLLED RUNOFF FROM 7 ACRES (100-YR EVENT)

$Q_{100} = \frac{7}{11.4}(81) = \underline{50 \text{ CFS}}$ $\left[\frac{7 \text{ ACRES}}{11.4 \text{ ACRES}}(81 \text{ CFS})\right]$

II. MAX. RELEASE PERMITTED FROM CONTROLLED 4.4 ACRES.

54 CFS − 50 CFS = 4 CFS

III. DETENTION BASIN OUTLET DESIGN

DESIGN FOR PRESSURE FLOW WITH MAX DISCHARGE NOT TO EXCEED 4 CFS.

- TRY 8" ϕ PIPE, MAX HEAD = 8', K = 1.5 (AS PROPOSED)

$Q_P = A\sqrt{2gH/K} = .349\sqrt{2g(8)/1.5} = 6.5 \text{ CFS}$ (Too High)

- TRY 6" ϕ PIPE

$Q_P = .1963\sqrt{2g(8)/1.6} = 3.6 \text{ CFS}$ OK - USE 6" ϕ PIPE.

∴ MAX PEAK $Q_{100} = 53.6 \text{ CFS} < 54 \text{ CFS}$ (OK)

IV. CHECK ADEQUACY OF STORAGE:

$L = \frac{l^{.8}(S+1)^{.7}}{1900\,Y^{.5}}$ WHERE $l = 500$, $Y = 8\%$, $S = \frac{1000}{CN} - 10 = 2.195$

$CN = \left(\frac{3}{4.4}\right)85 + \frac{1.4}{4.4}(75) = 82$

L = .0606 HRS

$T_c = \frac{L}{.6} = \underline{0.1 \text{ HRS}}$

INCHES OF RUNOFF = 5.4" FOR CN = 82 (T[illegible] S.C.S, TR-55)

APPENDIX C (CONT)

IV. CHECK ADEQUACY OF STORAGE (CONT.)
FROM TABLE 5-3, SCS-TR-55. Tc = .1 HR

TIME (HRS)	CSM/IN	INFLOW HYDROGRAPH (CFS)	AV. FLOW FOR TIME PERIOD	APPROX. OUTFLOW	ΔSTORAGE FOR TIME PERIOD (CFS)	TIME PERIOD (HR)	Δ STORAGE (FT³)	ACC. STORAGE (FT³)
11	24	1						
			1.5	0.4	1.1	0.5	1980	1980
11.5	51	2						
			6.5	0.4	6.1	0.2	4392	6,372
11.7	299	11						
			24	1.5	22.5	0.1	8100	14,472
11.8	991	37						
			32.5	2	30.5	0.1	10,980	25,452
11.9	746	28						
			23	2	21	0.1	7560	33,012
12.0	477	18						
			13.5	2.5	11	0.1	3960	36,972
12.1	233	9						
			7.5	2.5	5	0.1	1800	38,772
12.2	152	6						
			5.5	2.5	3	0.1	1080	39,852
12.3	132	5						
			4.5	3	1.5	0.1	540	40,392
12.4	121	4						
			4	3	1	0.1	360	40,752
12.5	111	4						
			3.5	3.5	0	0.1	0	40,752 MAX STORAGE
12.6	85	3						

40,752 FT³ < 67,000 FT³ ACTUALLY PROVIDED — OK

DRAINAGE REPORT

WARWICK MEADOWS DEVELOPMENT WITH EXISTING FARM POND & DAM STRUCTURE

VILLAGE OF WARWICK
ORANGE COUNTY
NEW YORK

John Lehman, PE

N J. Lic. #26030
NY. Lic. #056653
Date: 12-05-2004

LEHMAN & GETZ, P.C.

CONSULTING ENGINEER
17 River Street, Warwick, NY 10990
(845) 986-7737 / (845) 986-0245 fax
lehman@lehmangetz.com

INTRODUCTION

This report will cover existing conditions at the Warwick Meadows Development and the impacts of the construction of 116 additional condominium units on Section 218, Block 1, Lot 5. At the present time, all of the construction for the Warwick Meadows Development has been completed with the exception of these 116 units and five single family homes. The basic road network to serve the condominiums and the single family homes has been completed.

The report will analyze the existing Farm Pond and the dam which creates this pond. This pond serves as the primary detention facility for the existing developed areas, and will also handle the stormwater flows from the 116 new condominium units.

BACKGROUND

The Farm Pond itself was constructed many years prior to the start of the Warwick Development. However, during the initial phase of the construction by James Lynch, the original developer, the dam for the Farm Pond was modified. This modification was not done under a permit from the NYDEC Division of Dam Safety, who have jurisdiction over this structure.

Plans and an engineering report were done for the Warwick Meadows Farm Pond Dam to bring this structure into compliance with New York State Department of Environmental Conservation requirements. A prior report dated 06-05-86, revised through 11-03-86 and a report dated 06-03-1996, are referenced for additional background on the project.

On April 15, 1987, a permit was issued by the New York State Department of Environmental Conservation as Permit #3354-99-1 for the repair and upgrade of the existing dam located on sub-tributary 20-1 of the Wawayanda Creek. This permit was extended until December 31, 1988 in a letter from the NYDEC dated December 15, 1997, a copy of which is included in Appendix A. Although the work under this permit was started, it was never completed and the dam remains out of compliance with Dam Safety Standards. Based on the hazard classification of the dam, the spillway is required to pass 150% of the 100 year storm event with no impact to the dam.

STORMWATER RUNOFF AND REQUIRED DETENTION

EXISTING CONDITIONS

The TR-55 methodology has been used to analyze the drainage calculations for the 240.5 acres that are tributary to the dam. There are five distinct areas which make up the drainage area and these are shown on the overlay of the drainage area in Appendix B, along with the location and soils mapping of the project area.

The areas upstream of Warwick Meadows were analyzed based on the development allowed in the Town of Warwick Zoning with the current zoning using a Type III storm.

A description of each drainage area is given below

Drainage Area #	Acres	Description
I	28.5	Originally undeveloped farm fields and woods. The majority of this area has been converted to the multi-residence section of the Warwick Meadows. The balance of the area, Section 218, Block 1, Lot 5 will be used for the 116 new units.
II	24.4	Originally farm lands, which have now been converted to single family homes on ½ acre lots.
III	25.0	Presently undeveloped woods with moderately steep slopes. This will be analyzed as 5-acre single family home lots, in conformance with Town of Warwick Zoning.
IV	99.2	Ball Road runs through the center of this drainage area which presently consists of undeveloped woods with scattered homes along Ball Road. This area will be analyzed as 5-acre single family home lots, which represent the maximum development potential.
V	63.4	This area is undeveloped with steep slopes for the majority of the area. This area will be analyzed as 6-acre single family home lots, which represents the maximum development potential.

The table below gives the inputs to TR-55 for the calculations of the Weighted CN Value for the 240.5 acres in the existing conditions with the majority of the construction completed. All of the soils are Hydrologic Group C with the exception of 1.7 acres in Drainage Areas #I and II, which are Hydrologic Group D. These "D" soils are presently woods and will remain in this condition after development.

INPUTS FOR CALCULATION OF WEIGHTED CN VALUE
PRESENT CONDITIONS

Drainage Area #	Area	Present Use
I	14.5	1/8 acre townhouses
I	14.04	Meadow/Brush - good
II	24.4	1/2 acre lots
III	10.0	2 acre lots **
III	15.0	Woods - good
IV	39.68	2 acre lots **
IV	59.52	Woods - good
V	21.23	2 acre lots ***
V	42.17	Woods - good
	240.54	

** Since there is no imput in TR-55 for 5 acre lots, this area was analyzed with 2/5 of the area as 2 acre lots and 3/5 of the area as woods.

*** Since there is no imput in TR-55 for 6 acre lots, this area was analyzed with 2/6 of the area as 2 acre lots and 4/6 of the area as woods.

The TR-55 calculations of the 1, 2, 10 and 100 year storms are included in Appendix C and summarized below using the maximum length of 150 feet for sheet flow in the Time of Concentration calculations and the following storm events:

Storm Events	Intensity in/hr
1 Year	3.0
2 Year	3.5
10 Year	5.5
100 Year	7.5

The peak storm and runoff hydrographs were calculated using Hydroflow 2004 computer software.

Drainage Area	240.5 acres
Weighted CN Value	74
Time of Concentration	0.68 hrs
Peak Flow 1 Year Storm	107.6 cfs
Peak Flow 2 Year Storm	151.1 cfs
Peak Flow 10 Year Storm	352.1 cfs
Peak Flow 100 Year Storm	573.3 cfs

DEVELOPED CONDITIONS

In the developed conditions, 14.04 acres of Meadow and Brush will be converted to condominiums with a 1/8 acre density. The TR-55 Calculations of the Weighted CN are contained in Appendix D. Since the Time of Concentration is controlled by the farthest upstream conditions and the stream flow through the development, it did not change due to this limited development at the lower end of the study area.

The table below gives the inputs to TR-55 for the calculations of the Weighted CN Value for the 240.5 acres in the developed conditions, with the 116 condominium units.

INPUTS FOR CALCULATION OF WEIGHTED CN VALUE
DEVELOPED CONDITIONS

Drainage Area #	Area	Present Use
I	28.5	1/8 acre townhouses
I	0	Meadow/Brush - good
II	24.4	1/2 acre lots
III	10.0	2 acre lots **
III	15.0	Woods - good
IV	39.68	2 acre lots **
IV	59.52	Woods - good
V	21.23	2 acre lots ***
V	42.17	Woods - good
	240.50	

The TR-55 calculations for the 1, 2, 10 and 100 year storms are included in Appendix D and summarized below:

Drainage Area	240.5 acres
Weighted CN Value	75
Time of Concentration	0.68 hrs
Peak Flow 1 Year Storm	115.1 cfs
Peak Flow 2 Year Storm	159.7 cfs
Peak Flow 10 Year Storm	364.5 cfs
Peak Flow 100 Year Storm	587.5 cfs

FLOOD ROUTING THROUGH FARM POND FOR REQUIRED DAM FLOW AND DEVELOPED CONDITIONS

The Dam Safety Regulations require that the primary spillway be capable of passing the 25 year storm event, and that the combination of the primary and emergency spillway be capable of passing 150% of the 100 year storm event.

The existing spillway consists of a drop box with a low flow weir 6 feet long set at elevation 640.7 and the top lip of the drop box set at elevation 641.2 with a net weir length of 26 feet. The drop box outlet consists of a 60" diameter CMP with an invert elevation of 632.6. This spillway is not adequate to handle either the 100 year storm event or required dam flow of 150% of the 100 year storm.

A modification to the primary spillway has been designed that will handle the 1, 2, 10 and 100 year storm events. We have added an emergency spillway designed to handle the additional flow from the 150% of the 100 year storm.

The new spillway will utilize a new 72" RCP with a modified drop inlet and the addition of an emergency spillway. The invert of the new 72" RCP has been kept at elevation 632.62 feet. The drop box will consist of a similar structure with a low flow rectangular weir set at elevation 640.0, with a width of 4.7 feet. The primary weir will be set at elevation 648.2, with a net width of 26 feet. The emergency spillway will be 53 .3 feet wide, set at elevation 649.5.

The results of the flood routing calculations for the 1, 2, 10 and 100 year storms are given in Appendix E.

The dam and spillway were then checked for conformance with dam flow being 150% of the 100 year storm. The results of the flood routing calculations for this flow are contained in Appendix F.

The table below compares the Existing Conditions versus the Developed Conditions flood routed through the Farm Pond and outlet structures:

ANALYSIS OF 1, 2, 10 & 100 YEAR STORM EVENTS

Description	Inflow 1 Year	Outflow 1 Year	Inflow 2 Year	Outflow 2 Year	Inflow 10 Year	Outflow 10 Year	Inflow 100 Yr.	Outflow 100 Yr.
Existing - 40 minute T/C	107.60		151.13		352.12		573.32	
Developed - 40 minute T/C - Pond Modified for Dam Flow	115.14	107.18	159.75	149.59	364.52	331.99	587.48	574.58
Increase	7.54	-0.42	8.62	-1.54	12.40	-20.13	14.16	1.26

The detention facilities have, therefore, reduced the 1, 2 and 10 year storms to below their existing conditions and held the 100 year storm within 1.26 cfs or 0.2% of existing conditions.

The results of the flood routing of the required dam flow show that the proposed structure is capable of passing the peak flow of 881 cfs without overtopping the dam.

APPENDIX A

Permit Extension for Dam Repairs by NYDEC
December 15, 1997

~~385~~
399

New York State Department of Environmental Conservation
21 South Putt Corners Road, New Paltz, NY 12561-1696
(914) 256-3000 - Division of Environmental Permits

John P. Cahill
Commissioner

December 15, 1997

ATTN: MARIE LAVIN
WARWICK MEADOWS HOMEOWNERS ASSN
2 LAUDATEN WAY
WARWICK NY 10990

RE: DEC #3-3354-00393/00001
WARWICK MEADOWS FARM POND DAM
TOWN OF WARWICK, ORANGE COUNTY
Resource: Index #H139-13-6-9-20-1, Class C(t)
DAM #180B-4895

Dear Ms. Lavin:

PERMIT MODIFICATION

In accordance with your written request from Mr. John Lehman, P.E., dated December 8, 1997, the expiration date of the above permit is hereby extended to December 31, 1998.

All other terms and conditions remain as written in the original permit. Please attach this modification to the front of your permit. If you have any questions, please contact Ruth Bean of my staff at (914) 256-3040.

Very truly yours,

Alexander F. Ciesluk, Jr.

Alexander F. Ciesluk, Jr.
Deputy Regional Permit Administrator
Region 3

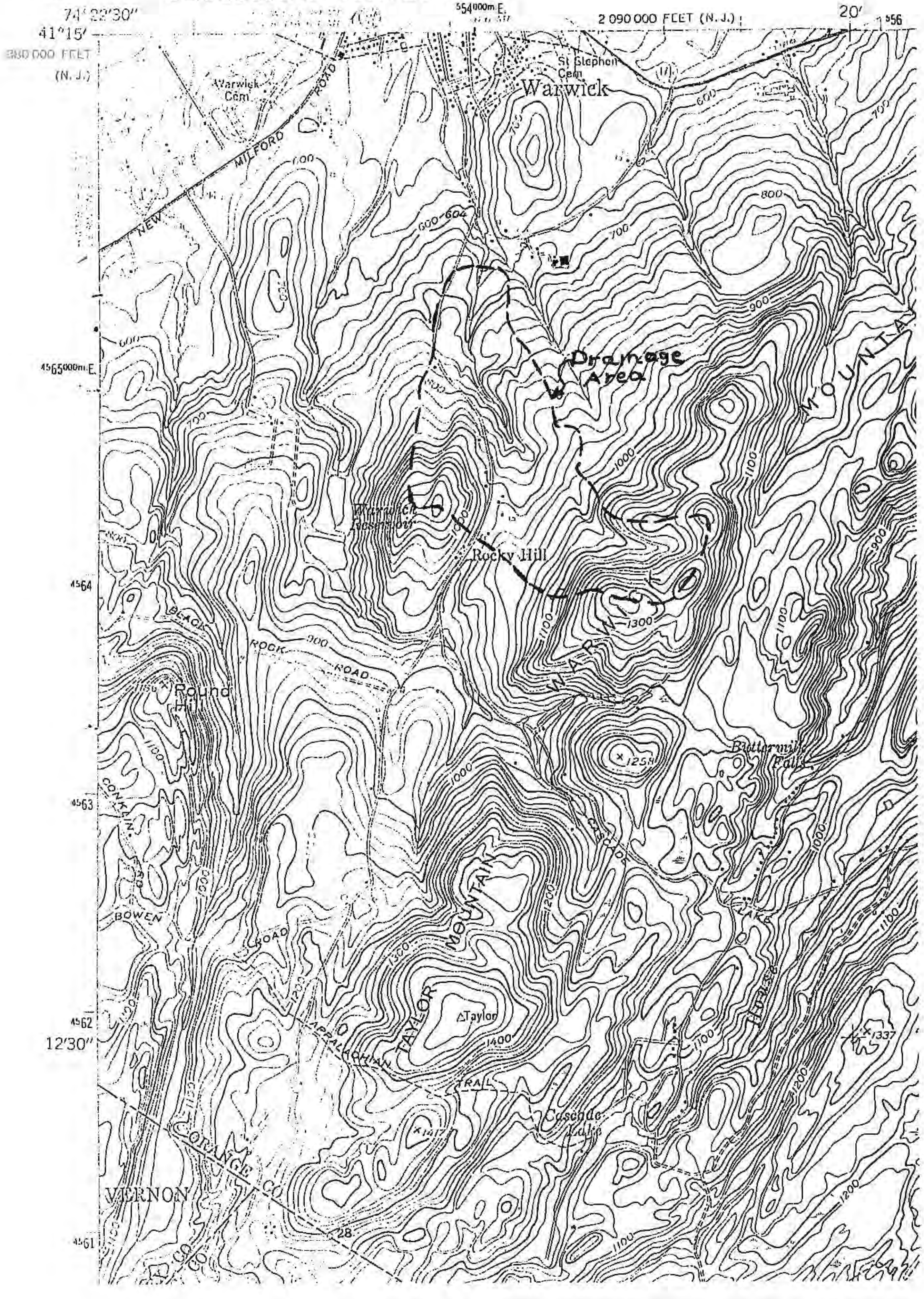
RDB/Warwick.ext
cc: Law Enforcement
R. Wood
J. Isaacs
S. Len, Dam Safety Unit (3507)
F. Lacalamita, Mayor, Village of Warwick
J. Lehman, P. E.

APPENDIX B

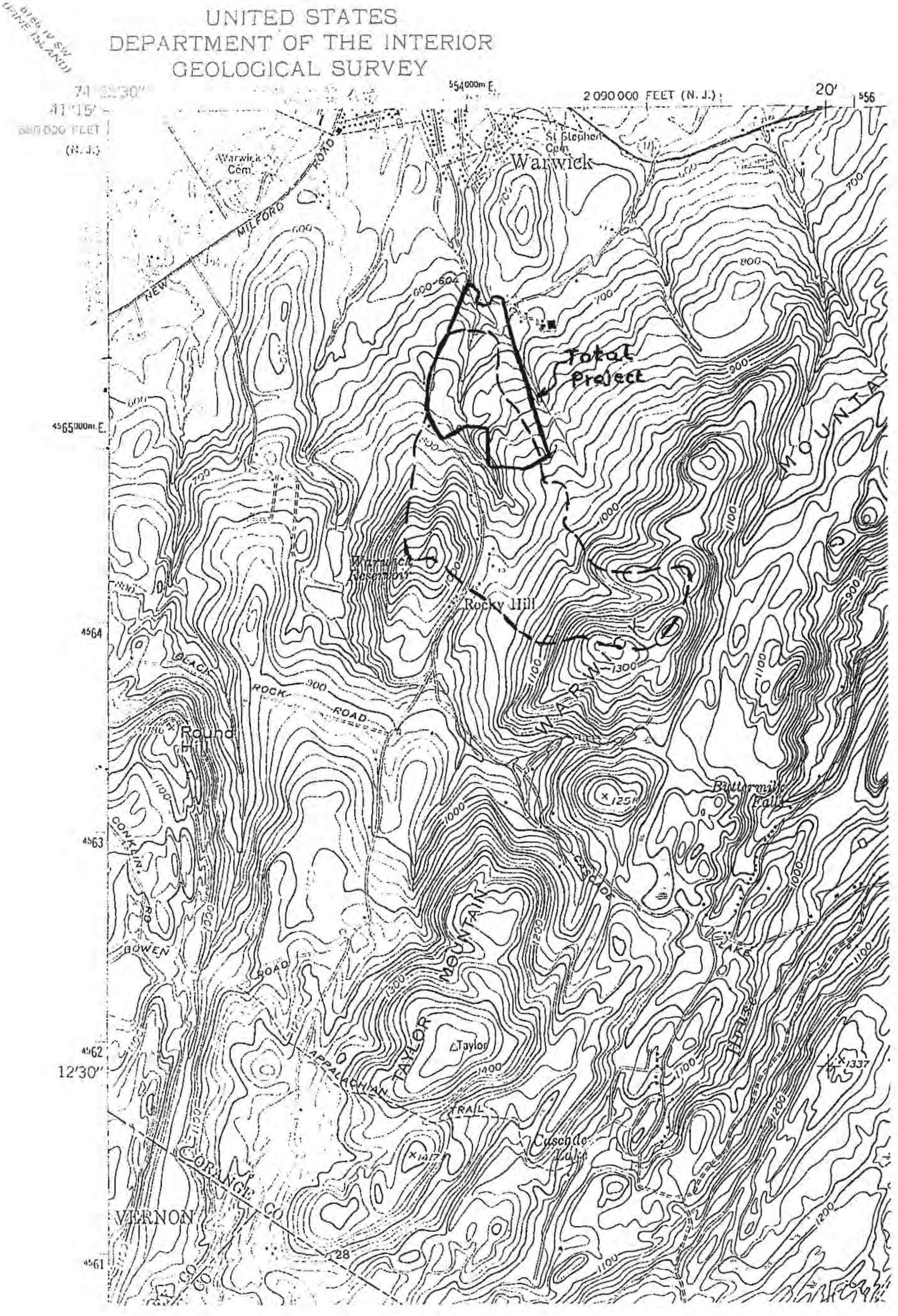
Location, Drainage Areas & Soils Mapping

5766 IV SW
(PINE ISLAND)

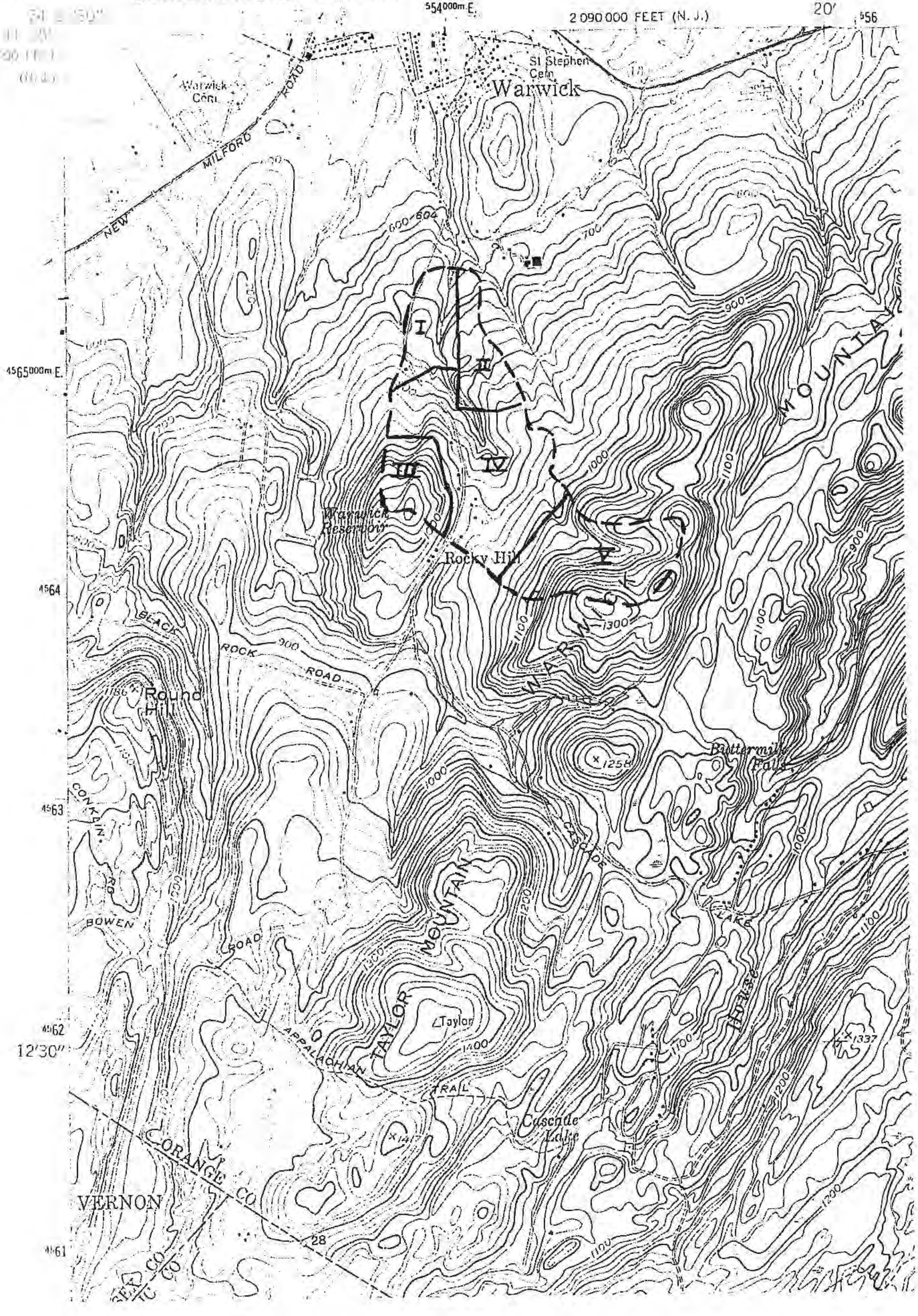
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



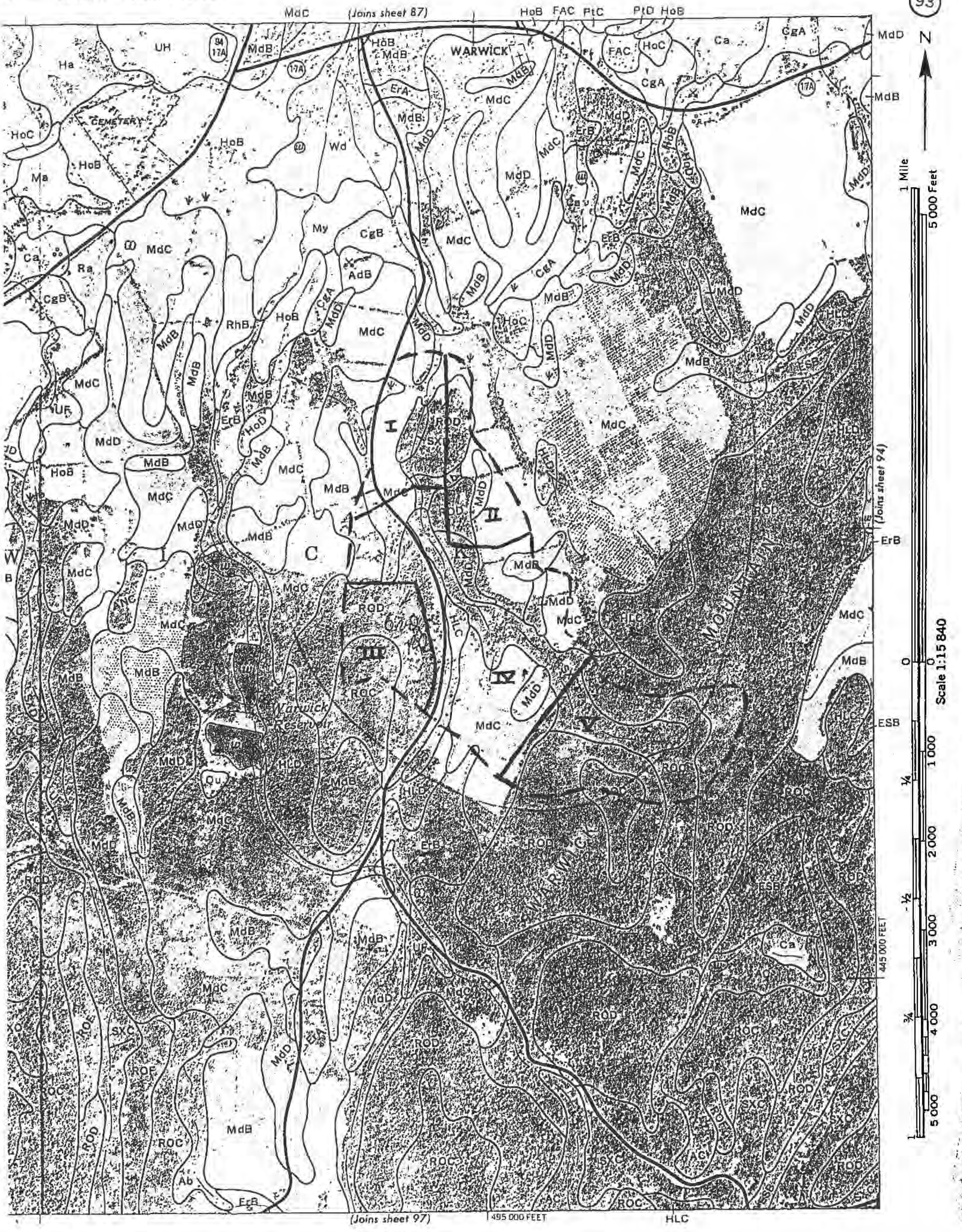
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



SHEET NUMBER 93



APPENDIX C

Existing Conditions with 40 Minute T/C

```
                     RUNOFF CURVE NUMBER COMPUTATION              Version 2.10
 Project : Warwick Meadows Farm Pond                  User: JL      Date: 12-05-2004
County  : Orange              State: NY          Checked: ____     Date: ________
Subtitle: Existing Conditions
Subarea : Main
-------------------------------------------------------------------------------
                                                        Hydrologic Soil Group
       COVER DESCRIPTION                          A         B         C        D
                                                             Acres (CN)
-------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Residential districts      Avg % imperv
  (by average lot size)
  1/8 acre (town houses)        65                -         -   14.5(90)      -
  1/2 acre                      25                -         -   24.4(80)      -
    2 acre                      12                -         -   70.9(77)      -


OTHER AGRICULTURAL LANDS
Brush - brush, weed, grass mix    good            -         -   14.0(65)      -

Woods                             good            -         -    115(70)  1.7(77)


Total Area (by Hydrologic Soil Group)                           238.       1.7
                                                                ====       ====

-------------------------------------------------------------------------------
SUBAREA: Main   TOTAL DRAINAGE AREA: 240.5 Acres     WEIGHTED CURVE NUMBER: 74
-------------------------------------------------------------------------------
```

```
                        TIME OF CONCENTRATION AND TRAVEL TIME          Version 2.10
 Project : Warwick Meadows Farm Pond                     User: JL       Date: 12-04-
2004
County  : Orange                   State: NY      Checked: ____      Date: ________
Subtitle: Existing Conditions

------------------------------ Subarea #1 - Main
------------------------------
Flow Type   2 year   Length   Slope   Surface   n   Area     Wp   Velocity
Time
             rain     (ft)   (ft/ft)   code        (sq/ft)  (ft)  (ft/sec)
(hr)
--------------------------------------------------------------------------------
-
Sheet        3.5      150      .1       I
0.433
Shallow Concent'd     1500     .095     u
0.084
Open Channel          2500                                          4.3
0.161
                                                Time of Concentration = 0.68*
                                                                          =====

        --- Sheet Flow Surface Codes ---
    A Smooth Surface            F Grass, Dense      --- Shallow Concentrated ---
    B Fallow (No Res.)          G Grass, Burmuda    ---      Surface Codes     ---
    C Cultivated < 20 % Res.    H Woods, Light                 P Paved
    D Cultivated > 20 % Res.    I Woods, Dense                 U Unpaved
    E Grass-Range, Short        J Range, Natural
```

Hydrograph Plot

Monday, Nov 29 2004, 9:27 AM

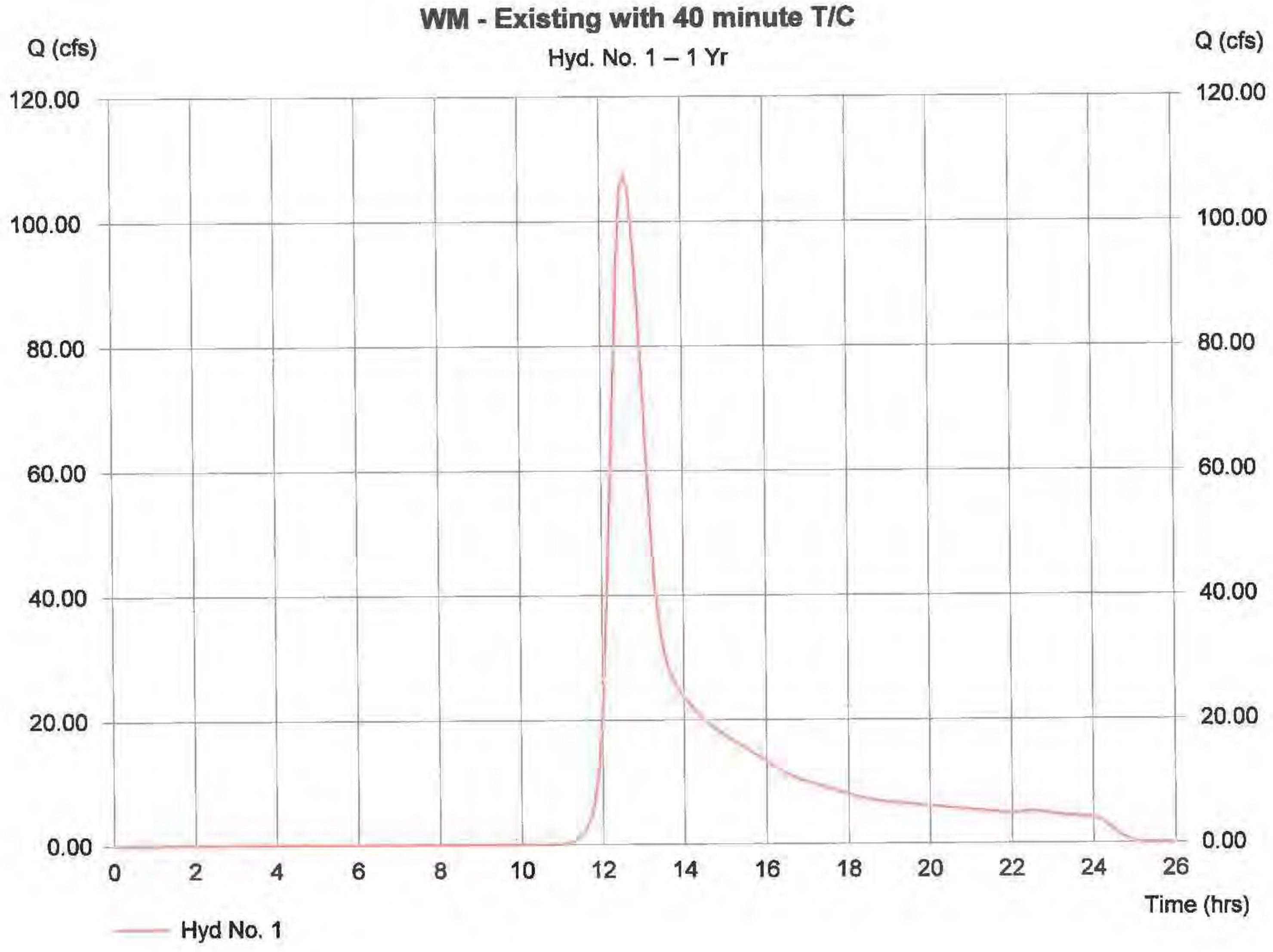
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.00 in
Storm duration = 24 hrs

Peak discharge = 107.60 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 773,073 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:32 AM

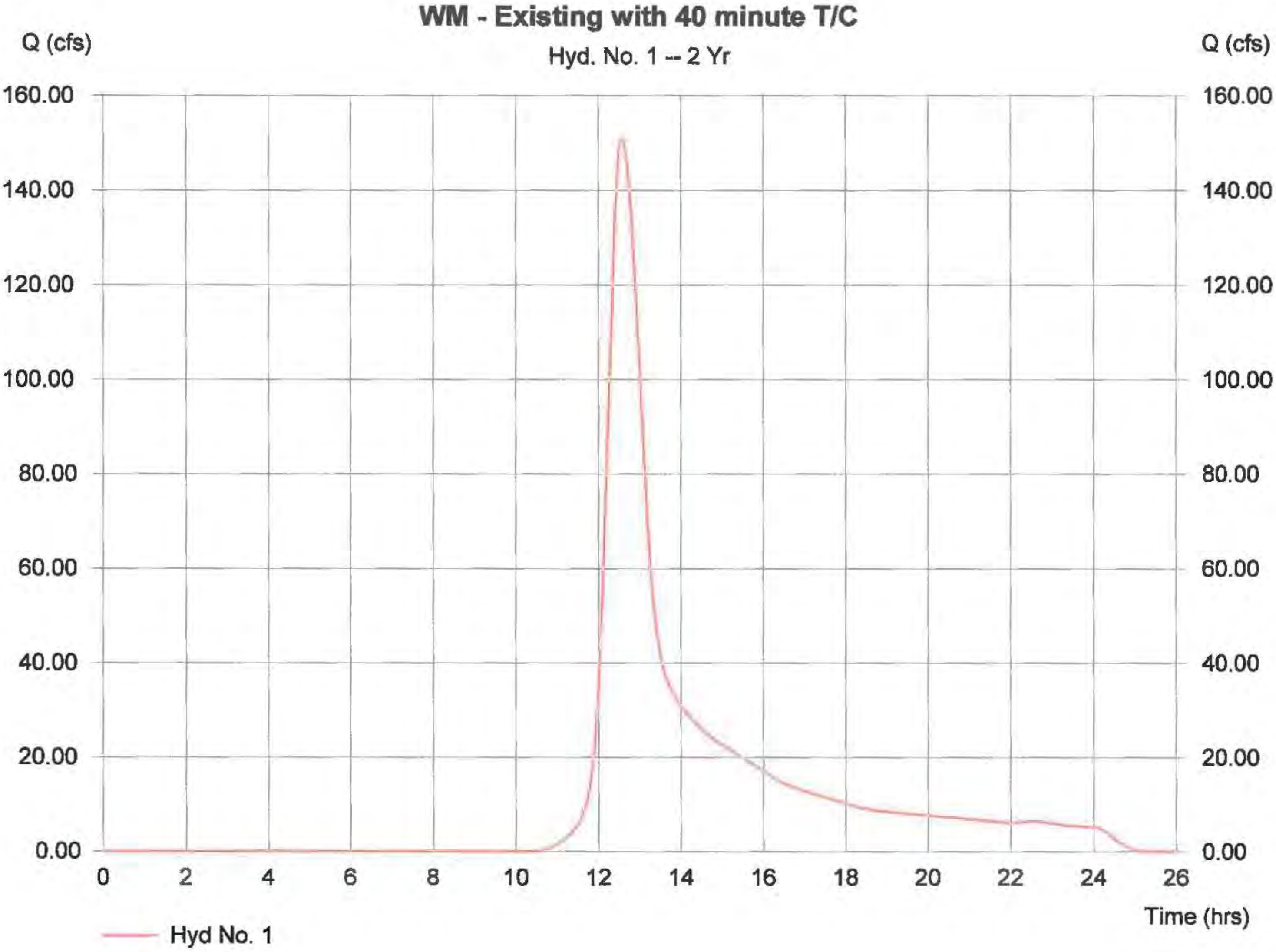
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 151.13 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 1,055,397 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:32 AM

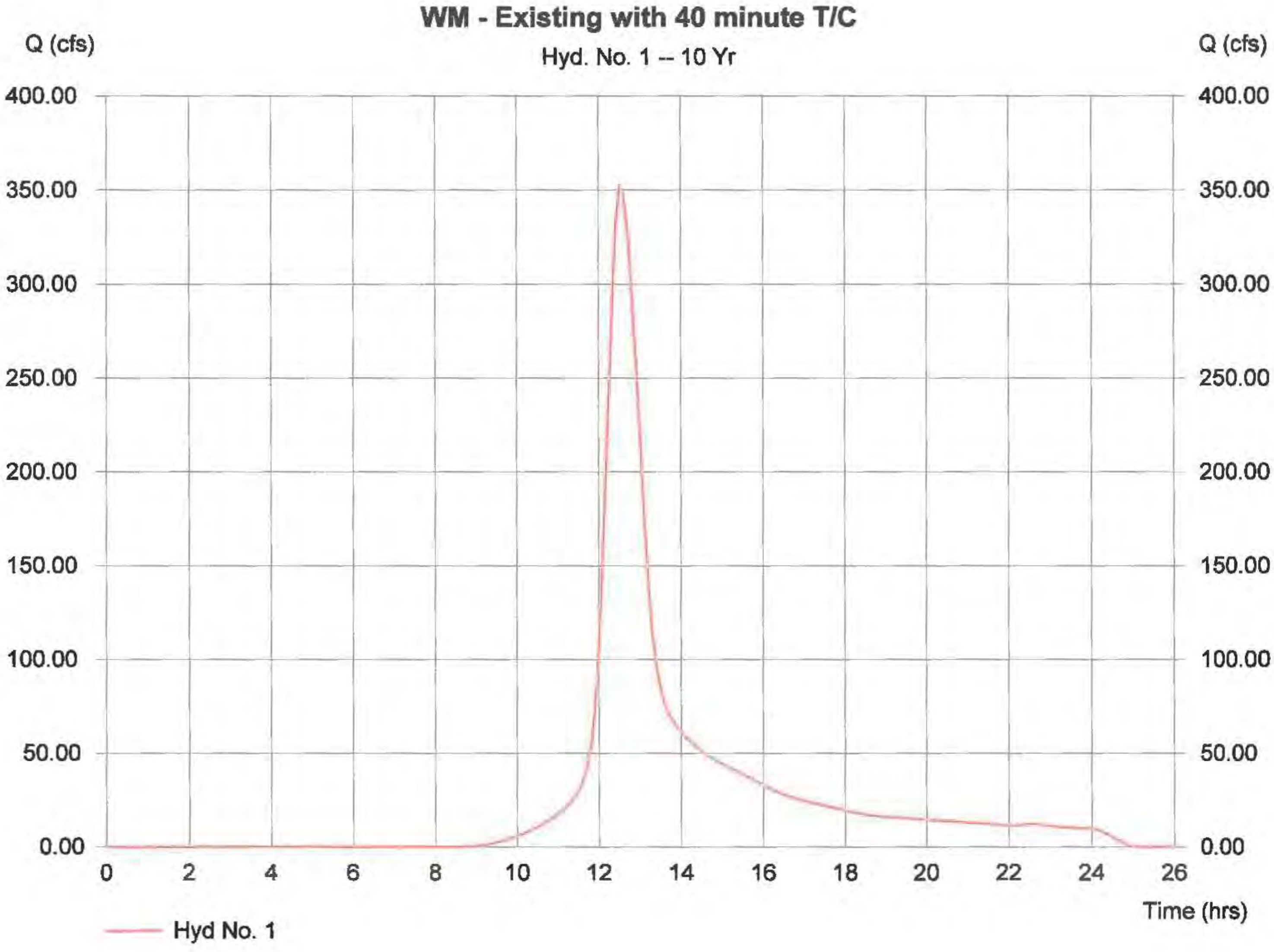
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 352.12 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,357,088 cuft



Hydrograph Plot

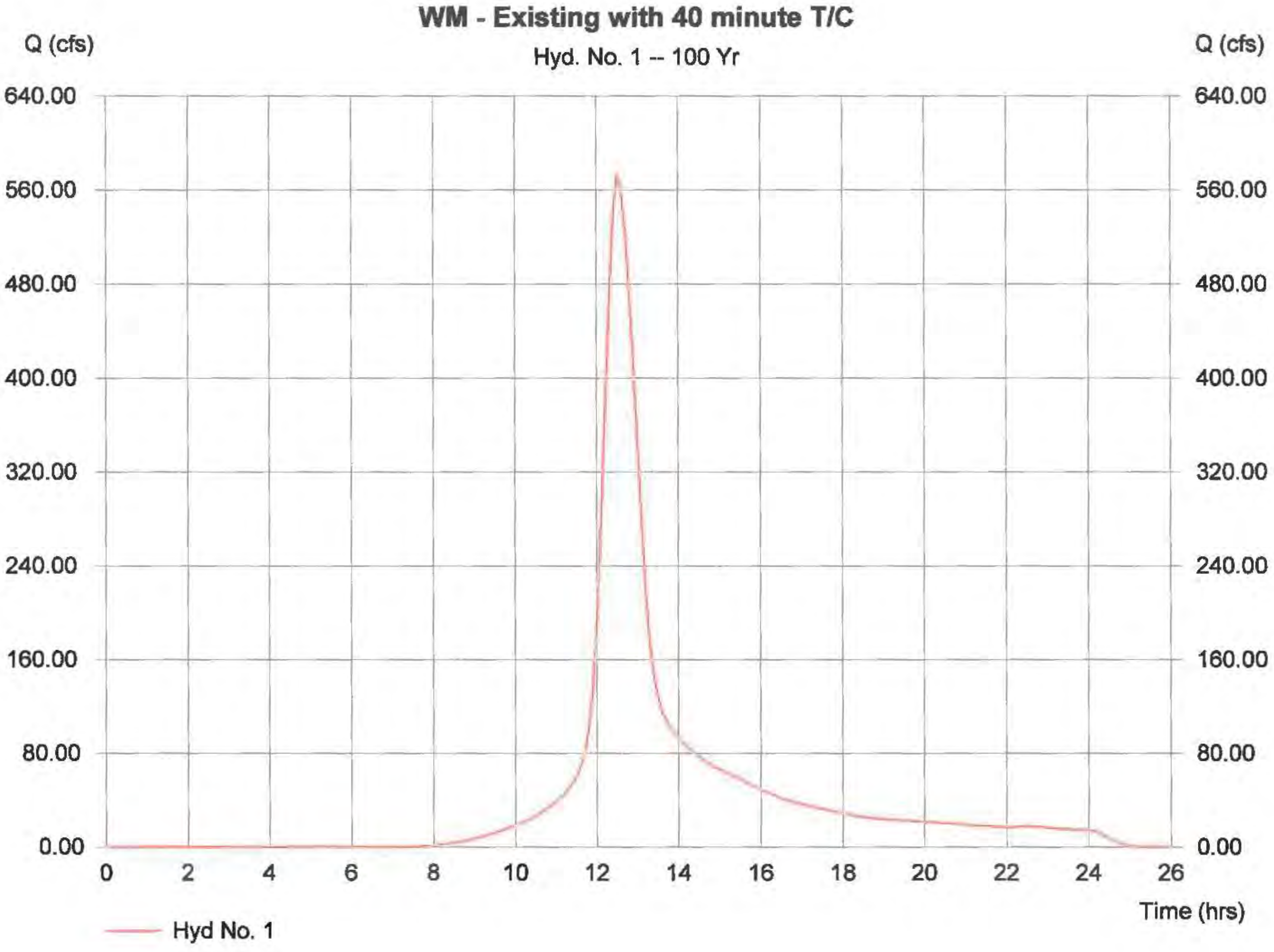
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 573.32 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 3,814,209 cuft



APPENDIX D

Developed Conditions with 40 Minute T/C

```
                      RUNOFF CURVE NUMBER COMPUTATION            Version 2.10
 Project : Warwick Meadows Farm Pond             User: JL       Date: 12-05-2004
County  : Orange               State: NY      Checked: ____     Date: ________
Subtitle: Developed Conditions
Subarea : Main
--------------------------------------------------------------------------------
                                                       Hydrologic Soil Group
         COVER DESCRIPTION                           A        B        C        D
                                                              Acres (CN)
--------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Residential districts      Avg % imperv
  (by average lot size)
  1/8 acre (town houses)       65                    -        -  28.5(90)     -
  1/2 acre                     25                    -        -  24.4(80)     -
    2 acre                     12                    -        -  70.9(77)     -


OTHER AGRICULTURAL LANDS
Woods                            good                -        -   115(70)  1.7(77)


Total Area (by Hydrologic Soil Group)                            238.      1.7
                                                                 ====      ====

--------------------------------------------------------------------------------
SUBAREA: Main   TOTAL DRAINAGE AREA: 240.5 Acres     WEIGHTED CURVE NUMBER: 75
--------------------------------------------------------------------------------
```

Hydrograph Plot

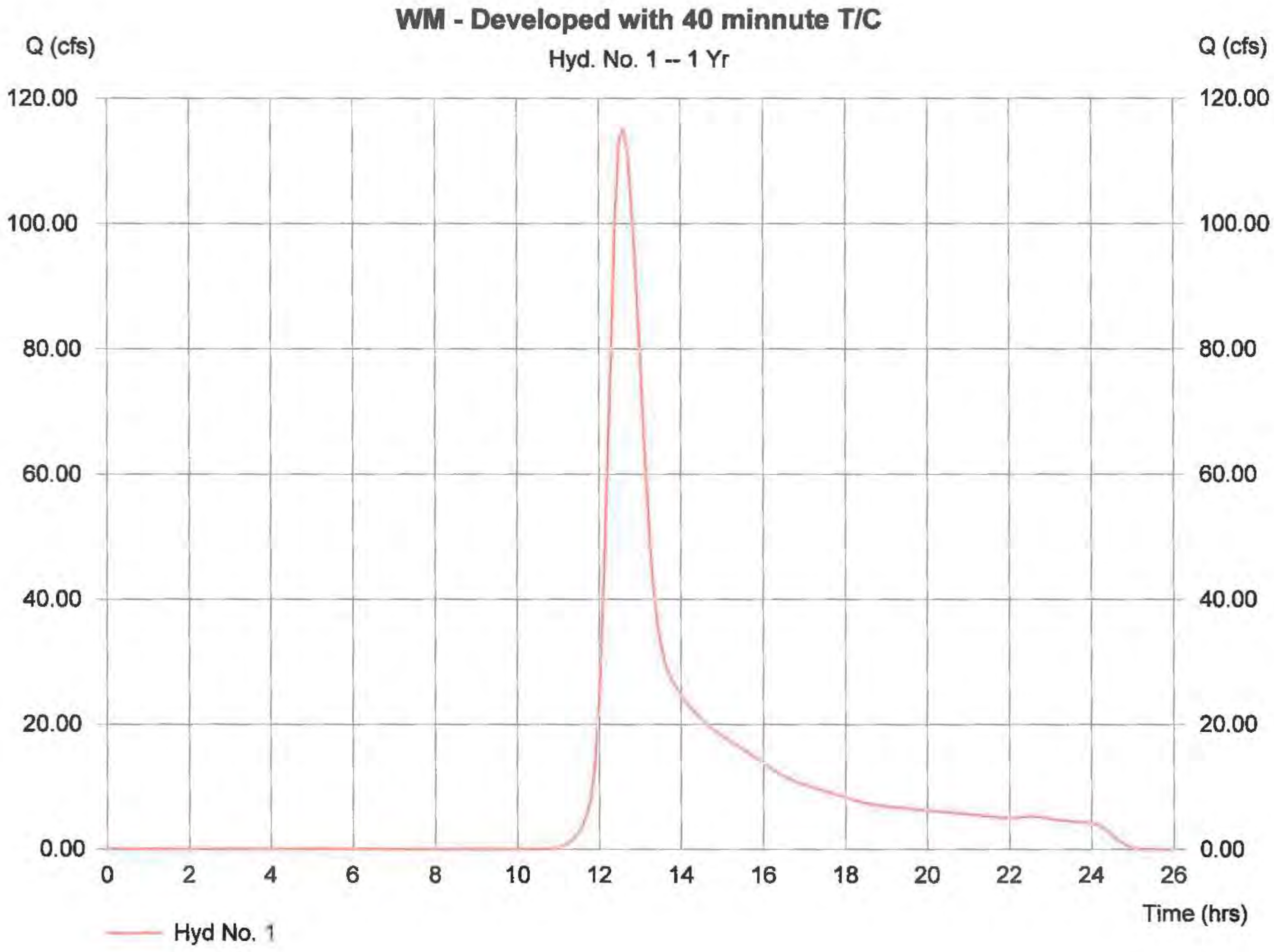
Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.00 in
Storm duration = 24 hrs

Peak discharge = 115.14 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 817,809 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

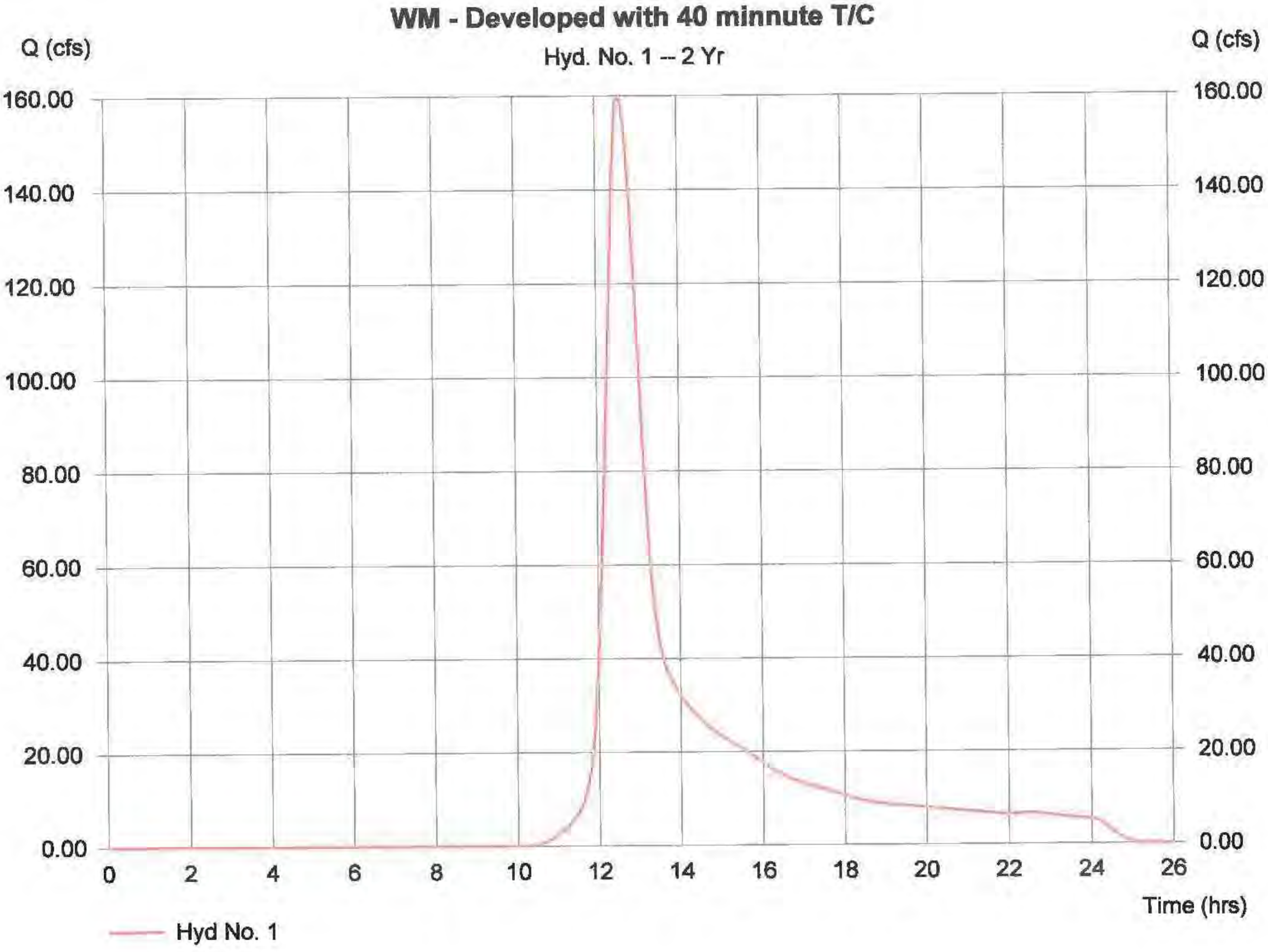
Monday, Nov 29 2004, 9:8 AM

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 159.75 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 3.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,108,073 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:8 AM

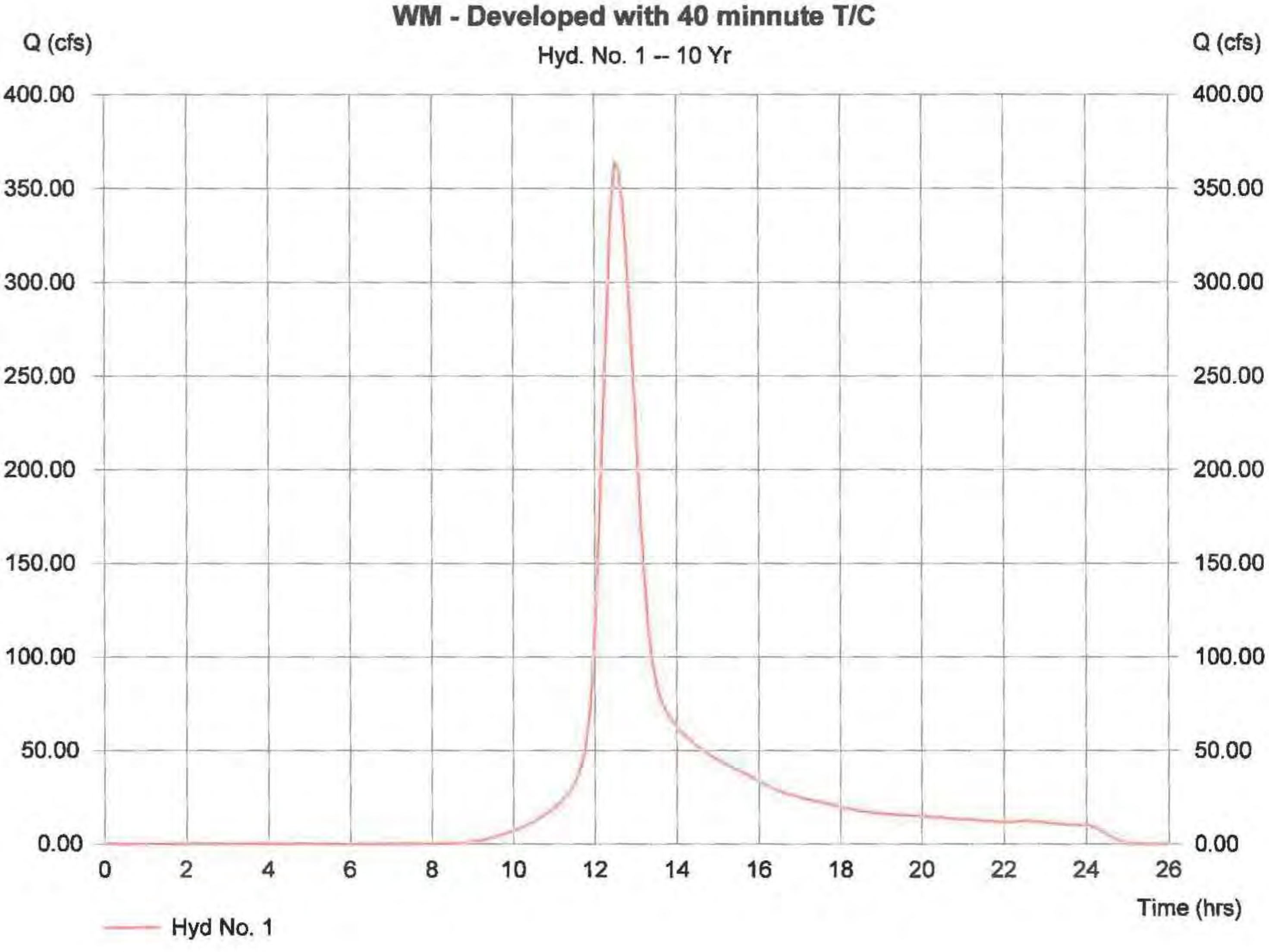
Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 364.52 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,434,857 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

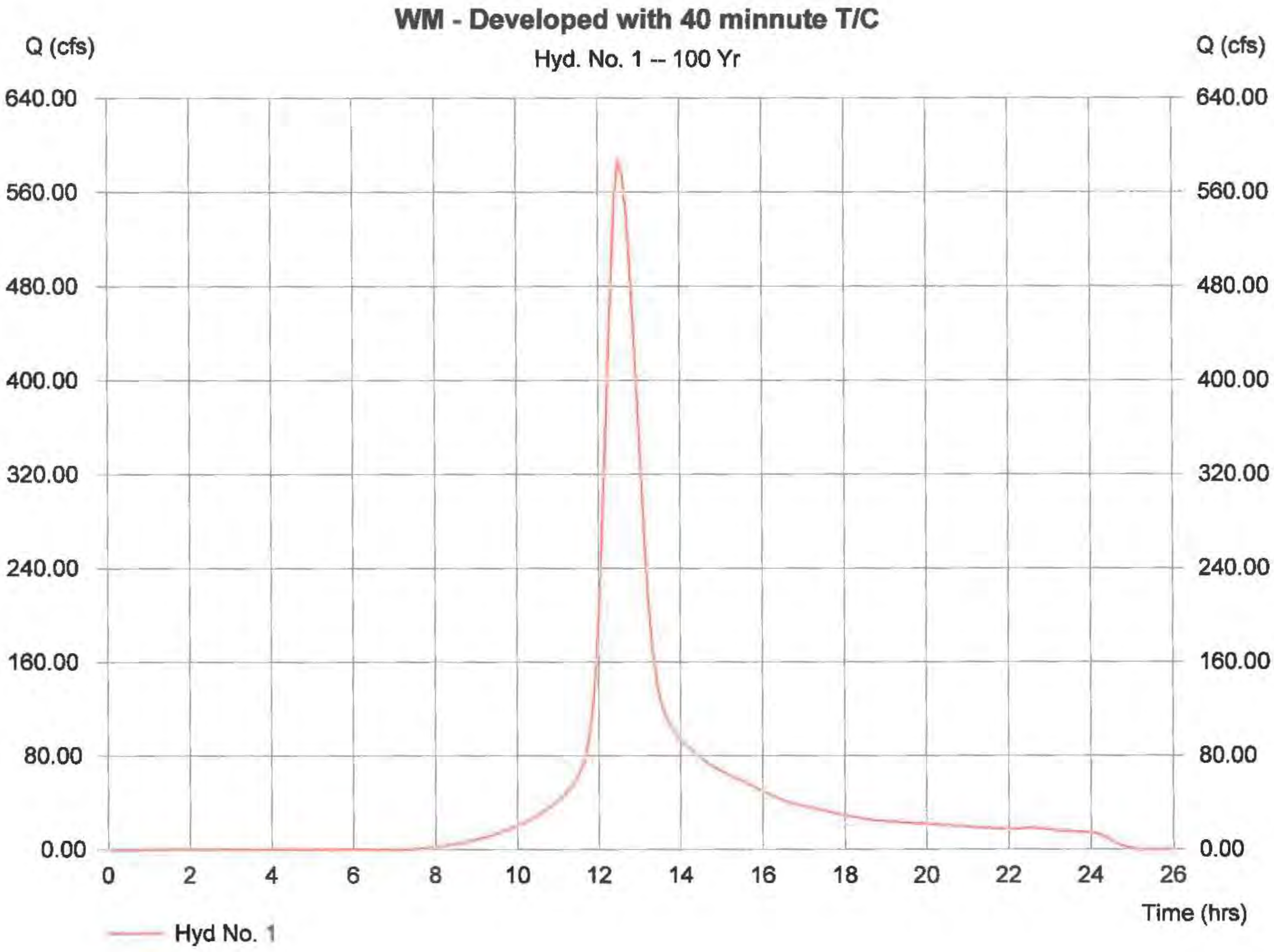
Monday, Nov 29 2004, 9:8 AM

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 587.48 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,909,422 cuft



APPENDIX E

Flood Routing of Developed Conditions Through Modified Detention Pond

Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 12:59 PM

Pond No. 1 - WM Farm Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871
11.00	651.00	55,000	52,818	357,688
12.00	652.00	60,000	57,500	415,188

Culvert / Orifice Structures

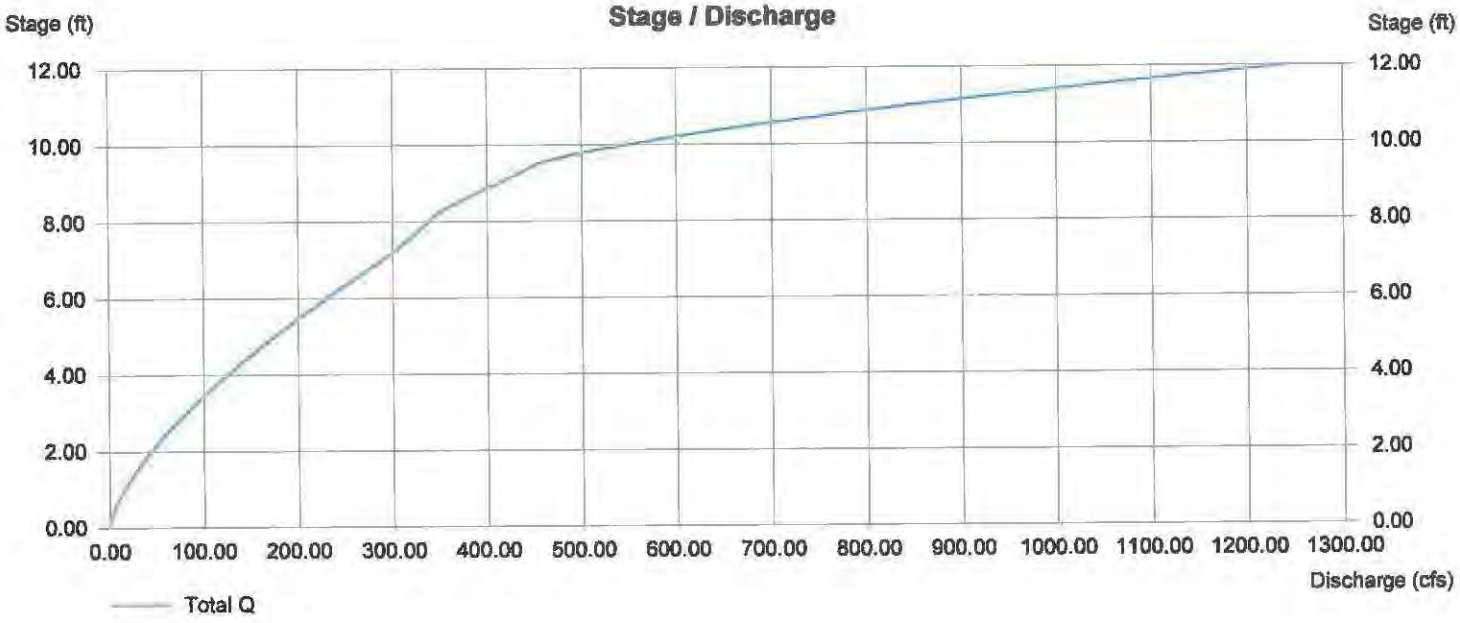
	[A]	[B]	[C]	[D]
Rise (In)	= 72.00	0.00	0.00	0.00
Span (in)	= 72.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	4.70	53.30	0.00
Crest El. (ft)	= 648.20	640.00	649.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	Rect	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 12:59 PM

Hyd. No. 2

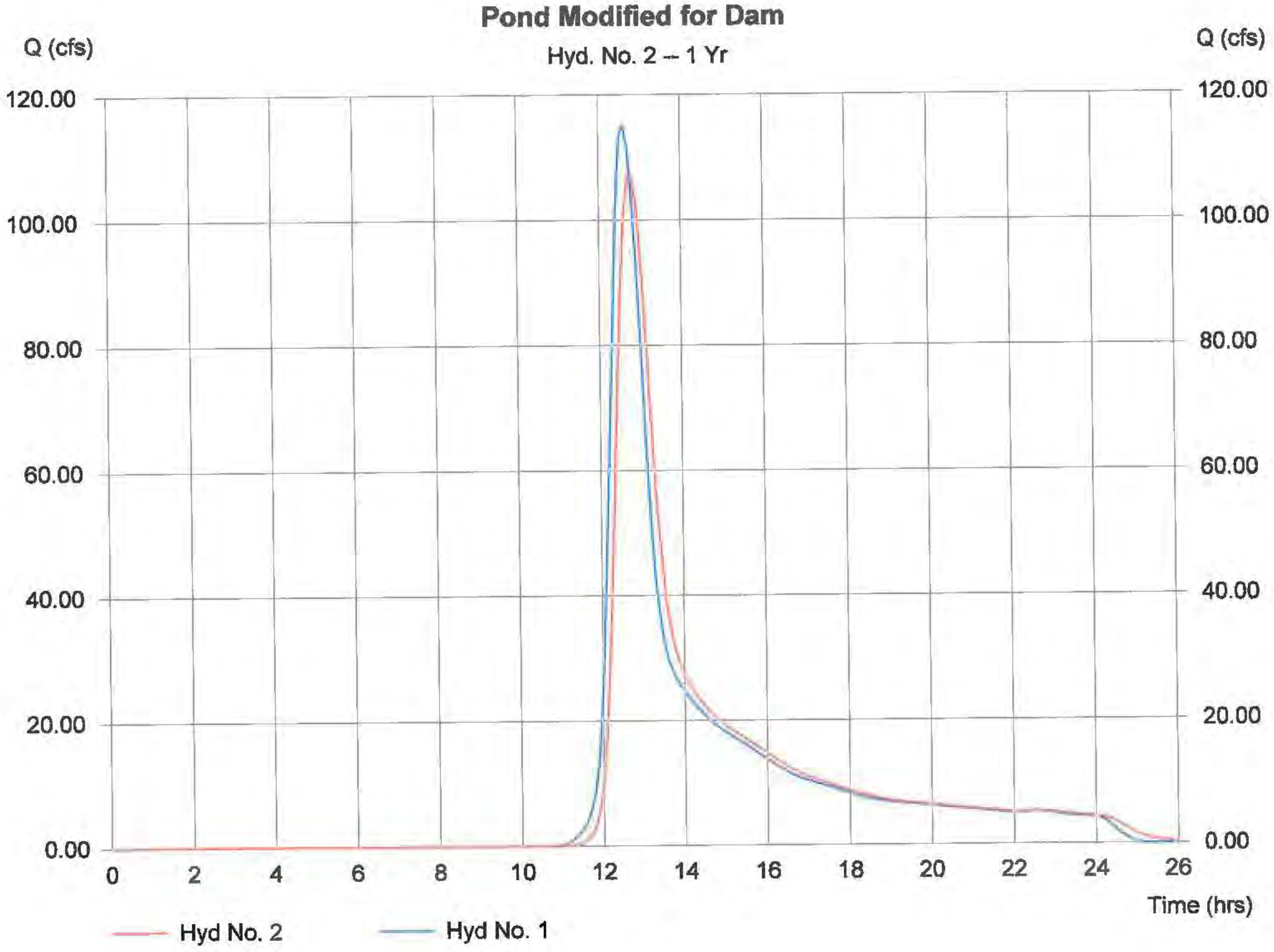
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 107.18 cfs
Time interval = 6 min
Max. Elevation = 643.61 ft
Max. Storage = 71,459 cuft

Storage Indication method used.

Hydrograph Volume = 817,806 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 1:3 PM

Hyd. No. 2

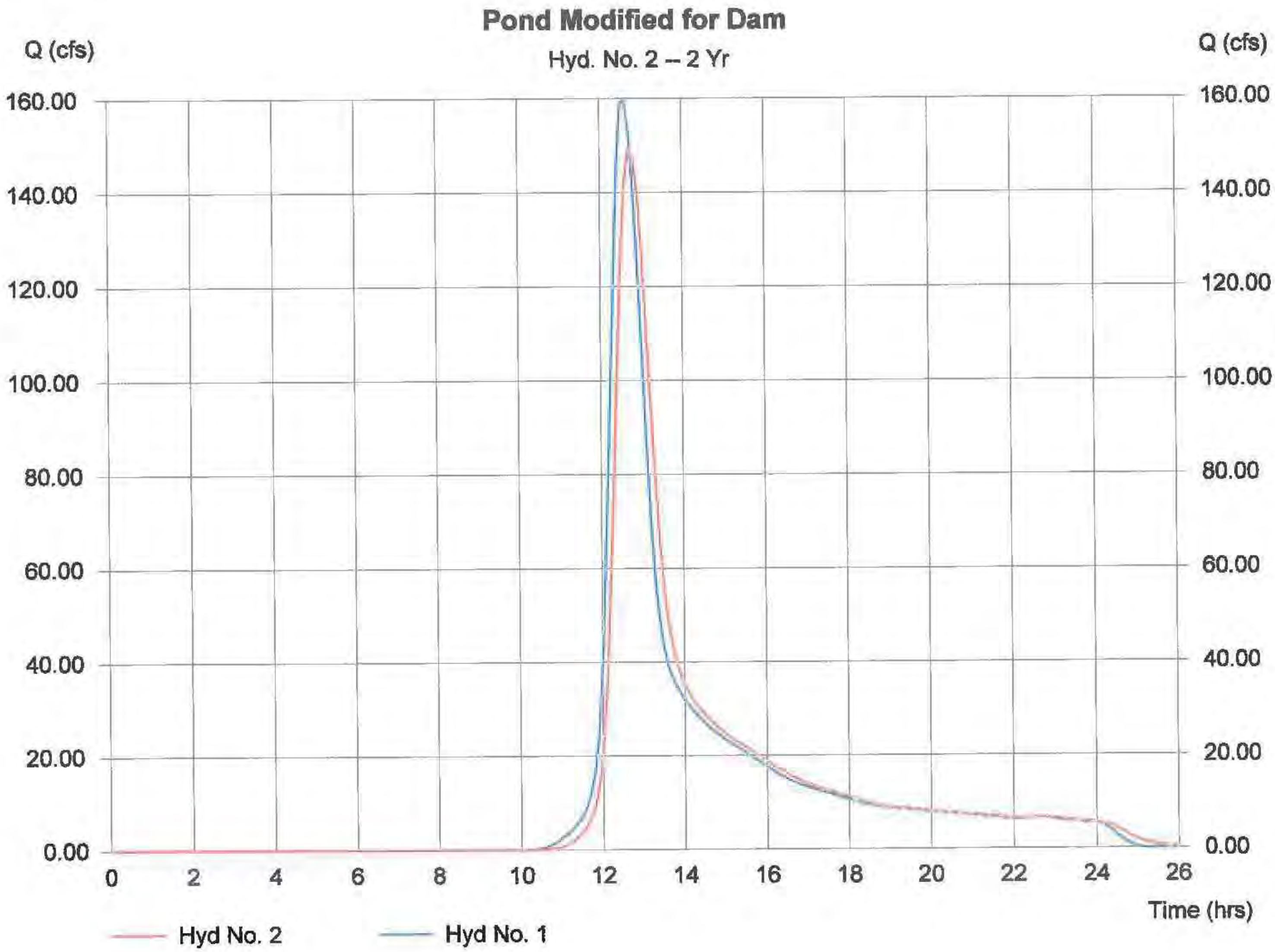
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 149.59 cfs
Time interval = 6 min
Max. Elevation = 644.50 ft
Max. Storage = 94,794 cuft

Storage Indication method used.

Hydrograph Volume = 1,108,070 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 1:3 PM

Hyd. No. 2

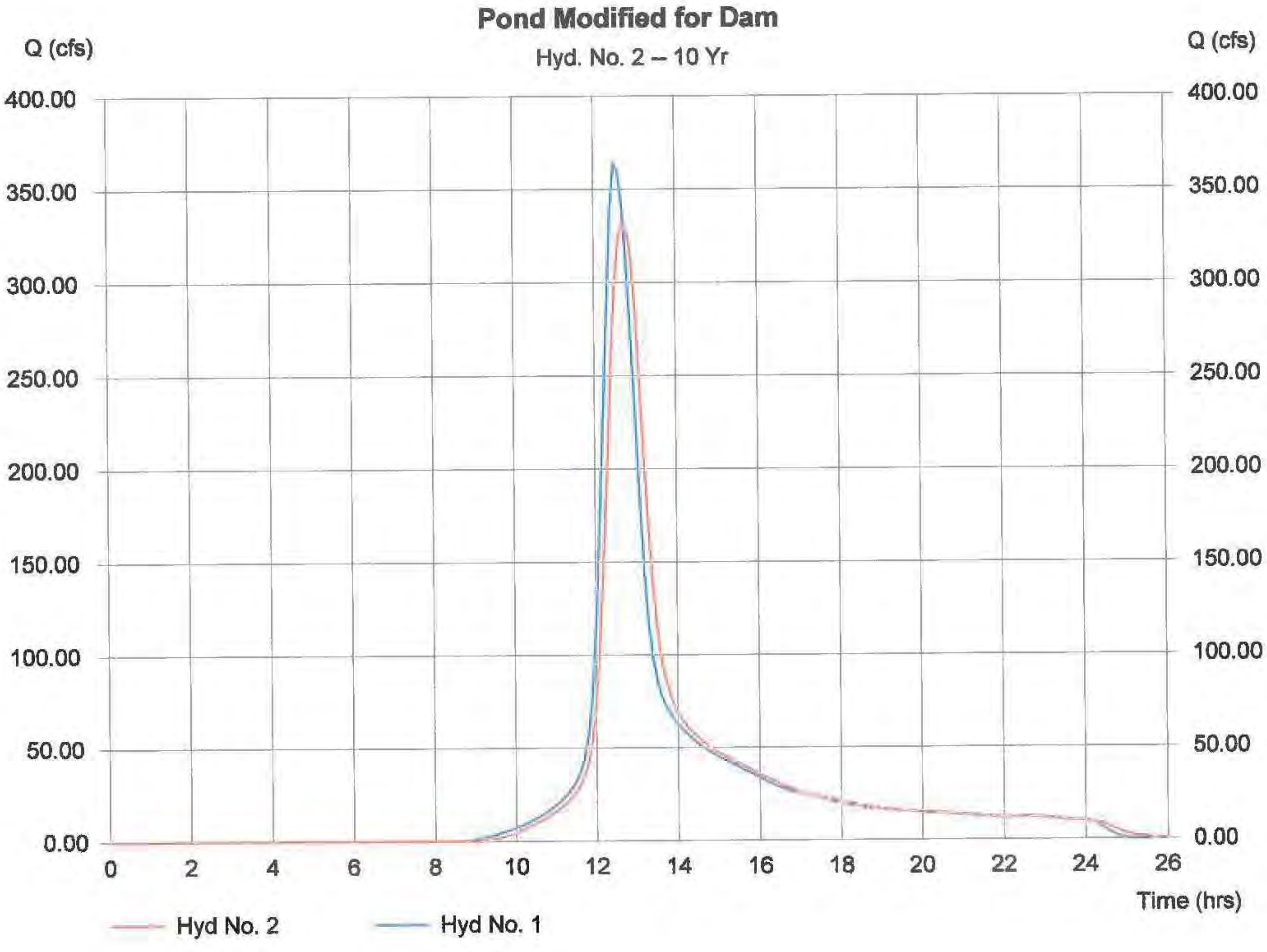
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 331.99 cfs
Time interval = 6 min
Max. Elevation = 647.85 ft
Max. Storage = 207,434 cuft

Storage Indication method used.

Hydrograph Volume = 2,434,854 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 1:3 PM

Hyd. No. 2

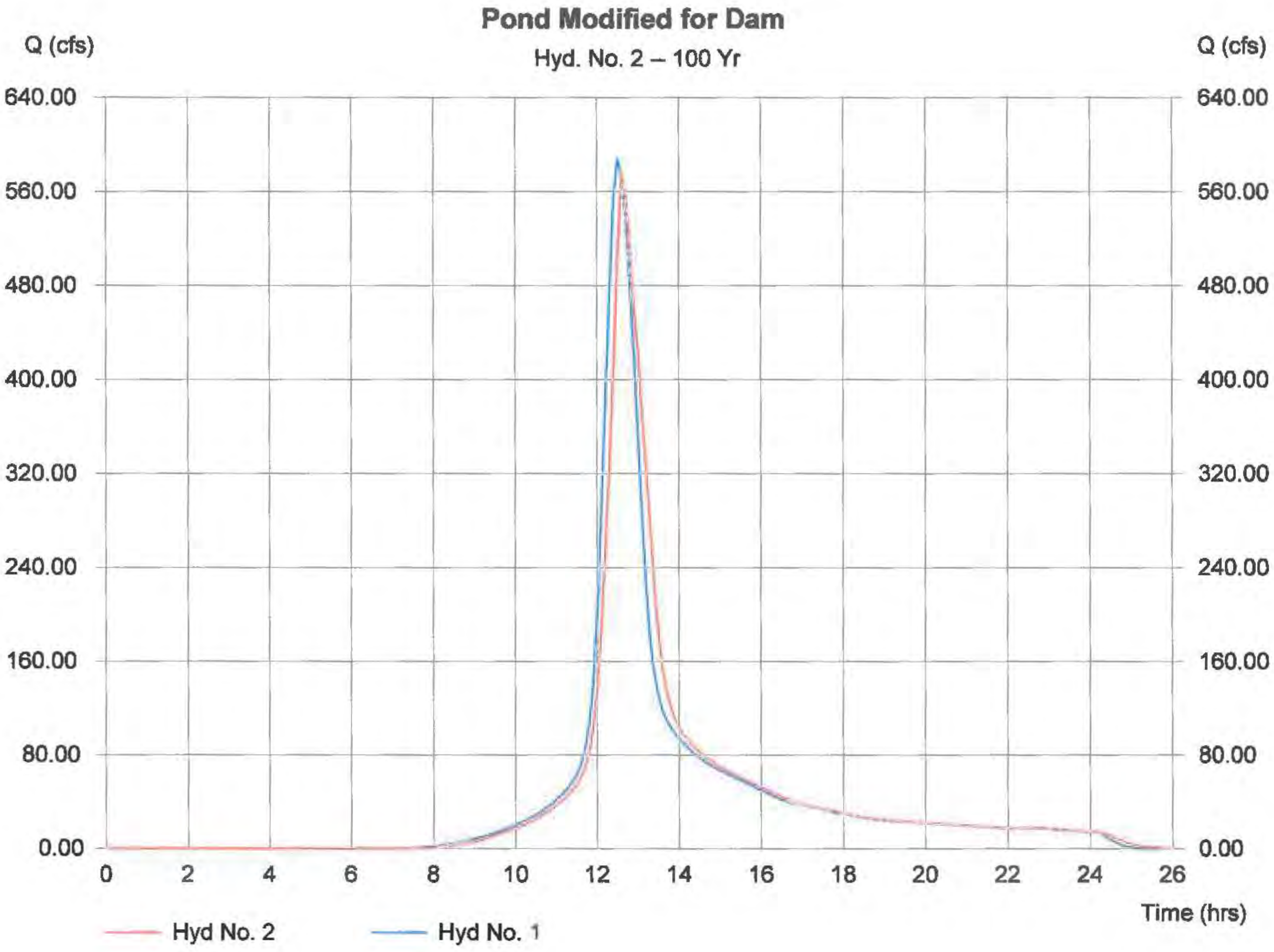
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 574.48 cfs
Time interval = 6 min
Max. Elevation = 650.10 ft
Max. Storage = 310,313 cuft

Storage Indication method used.

Hydrograph Volume = 3,909,419 cuft



APPENDIX F

Flood Flow of Required Dam Flow
150% of 100 Year Storm

Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 1:15 PM

Pond No. 1 - 640

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871
11.00	651.00	55,000	52,818	357,688
12.00	652.00	60,000	57,500	415,188

Culvert / Orifice Structures

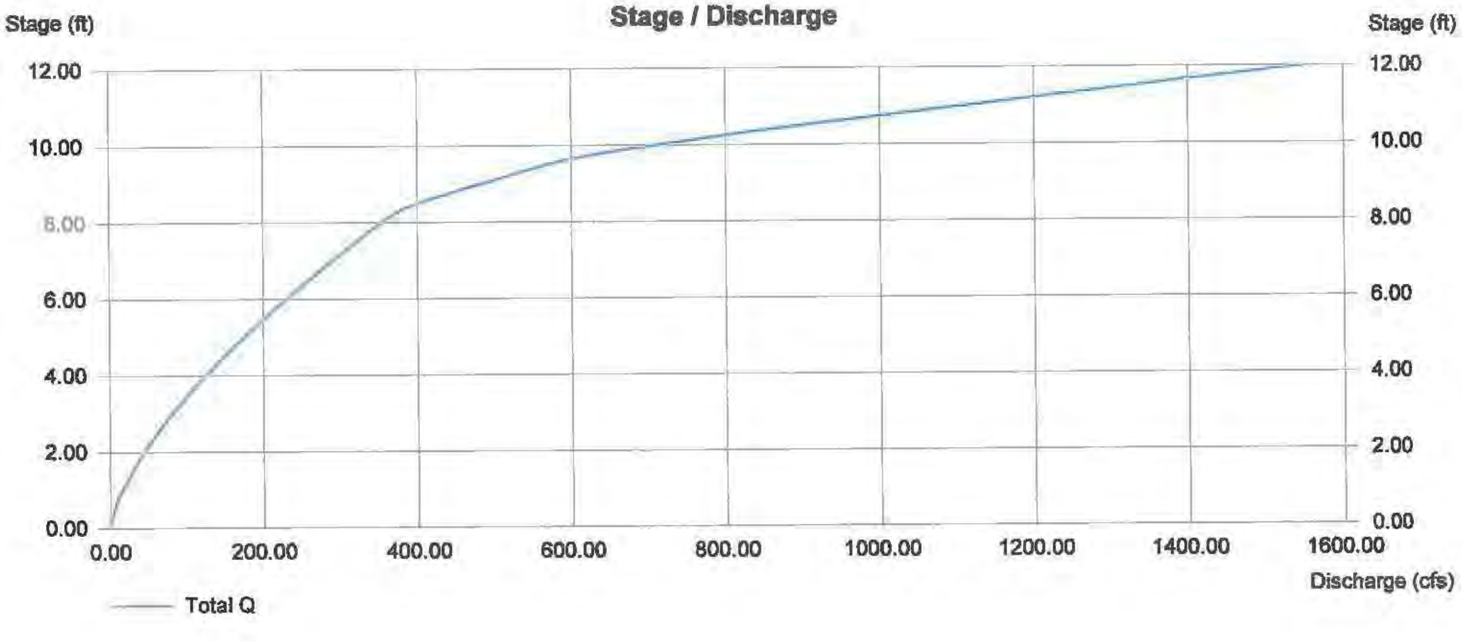
	[A]	[B]	[C]	[D]
Rise (in)	= 72.00	0.00	0.00	0.00
Span (in)	= 92.30	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	4.70	53.30	0.00
Crest El. (ft)	= 648.20	640.00	649.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	Rect	—
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Dec 7 2004, 1:15 PM

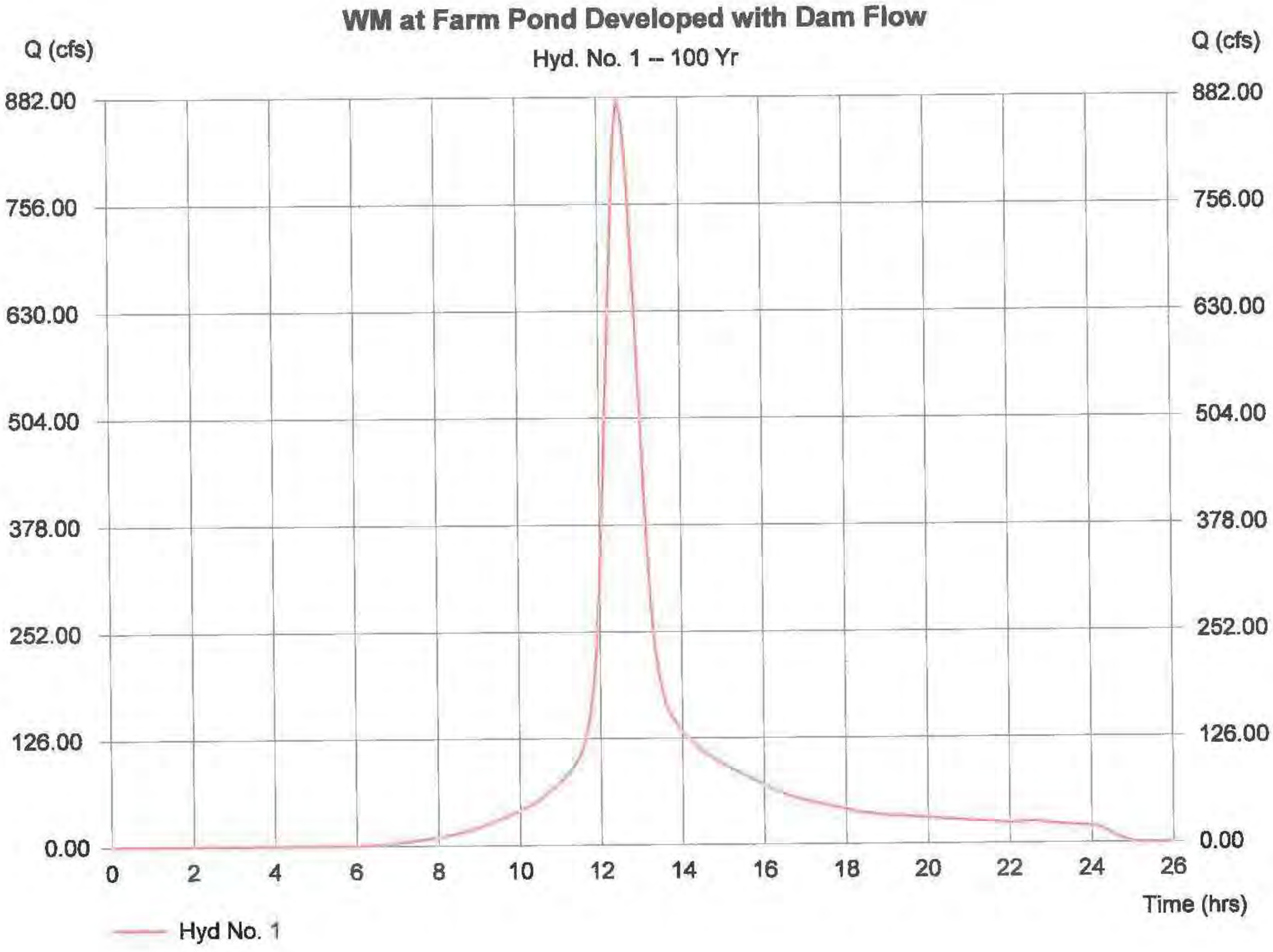
Hyd. No. 1

WM at Farm Pond Developed with Dam Flow

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 10.06 in
Storm duration = 24 hrs

Peak discharge = 881.40 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 5,903,721 cuft



Hydrograph Plot

Hyd. No. 2

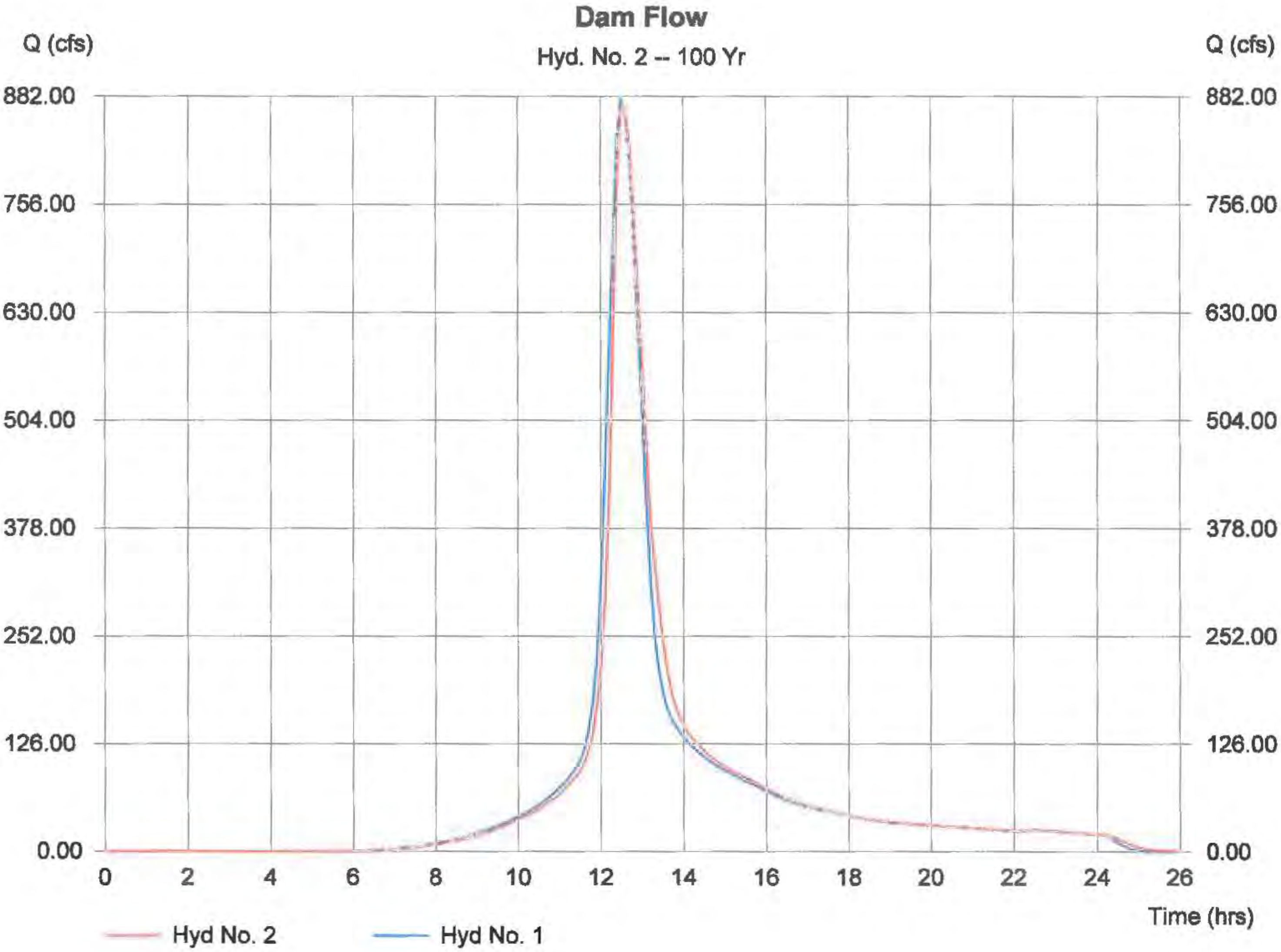
Dam Flow

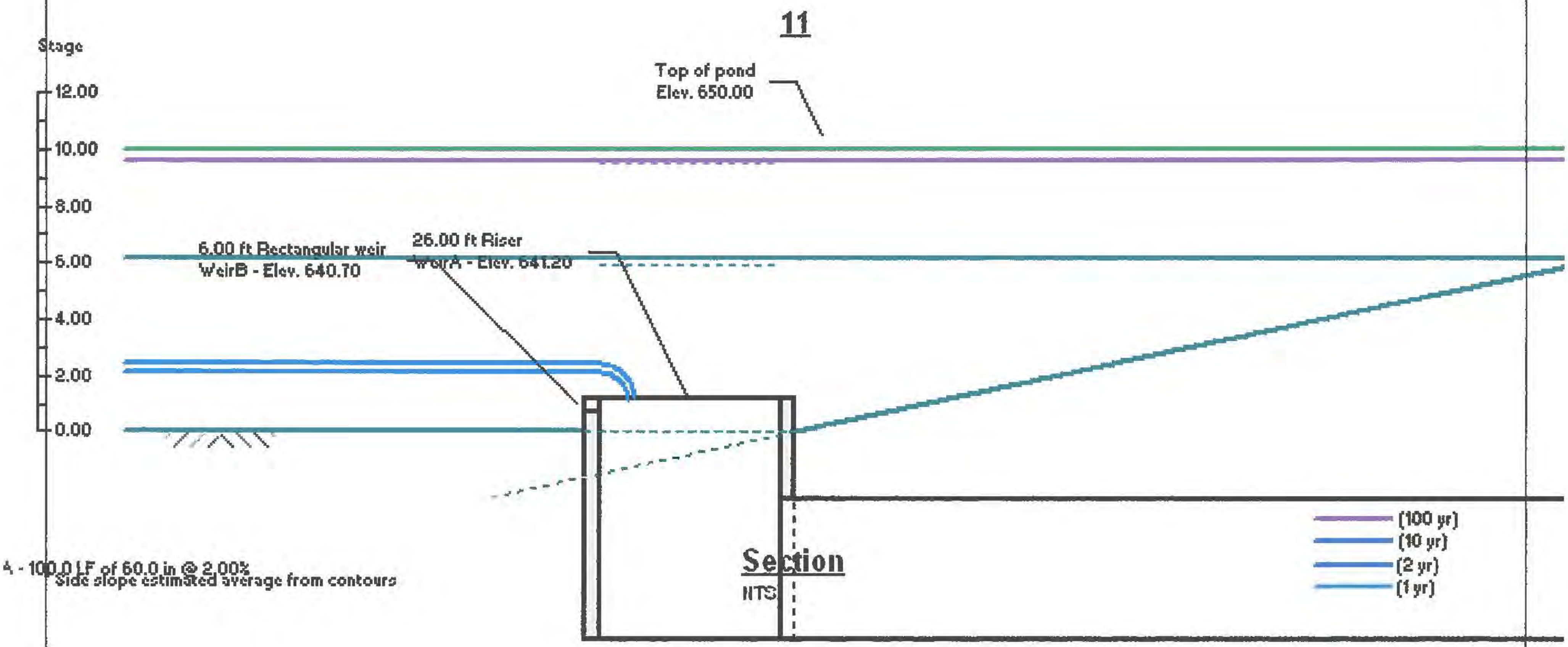
Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Reservoir name = 640

Peak discharge = 869.27 cfs
Time interval = 6 min
Max. Elevation = 650.42 ft
Max. Storage = 327,141 cuft

Storage Indication method used.

Hydrograph Volume = 5,903,719 cuft





Schematic only. Not for construction.

Hydraflow Hydrographs Pond Draw	Project: WM- Developed - 100 yr with 40 min T-C.gpw	Monday, Nov 29 2004, 8:42 AM

APPENDIX A

Location Maps

APPENDIX B

Existing Conditions with 80 Minute T/C

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:34 AM

Pond No. 1 - WM Farm Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871

Culvert / Orifice Structures

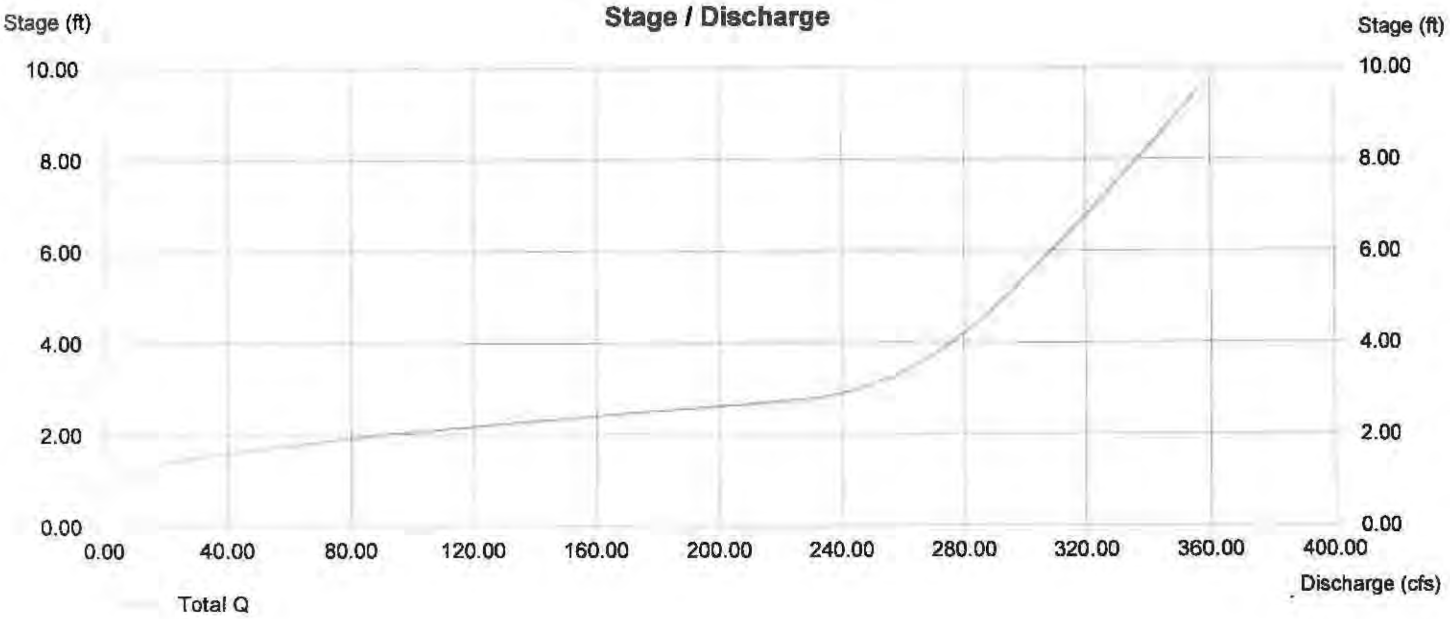
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	6.00	0.00	0.00
Crest El. (ft)	= 641.20	640.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



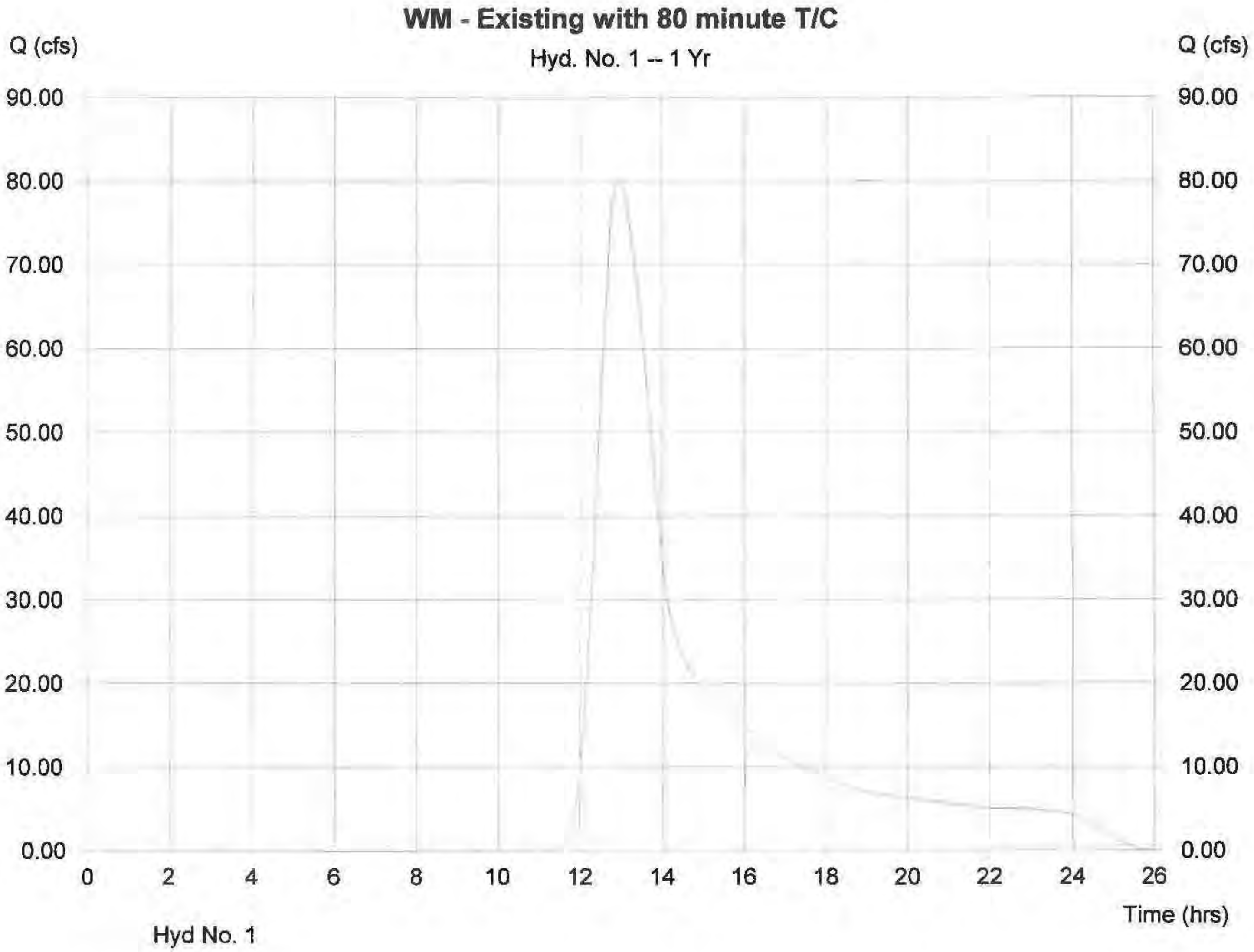
Hydrograph Plot

Hyd. No. 1

WM - Existing with 80 minute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 80.17 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 80.00 min
Total precip.	= 3.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 780,507 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:34 AM

Hyd. No. 2

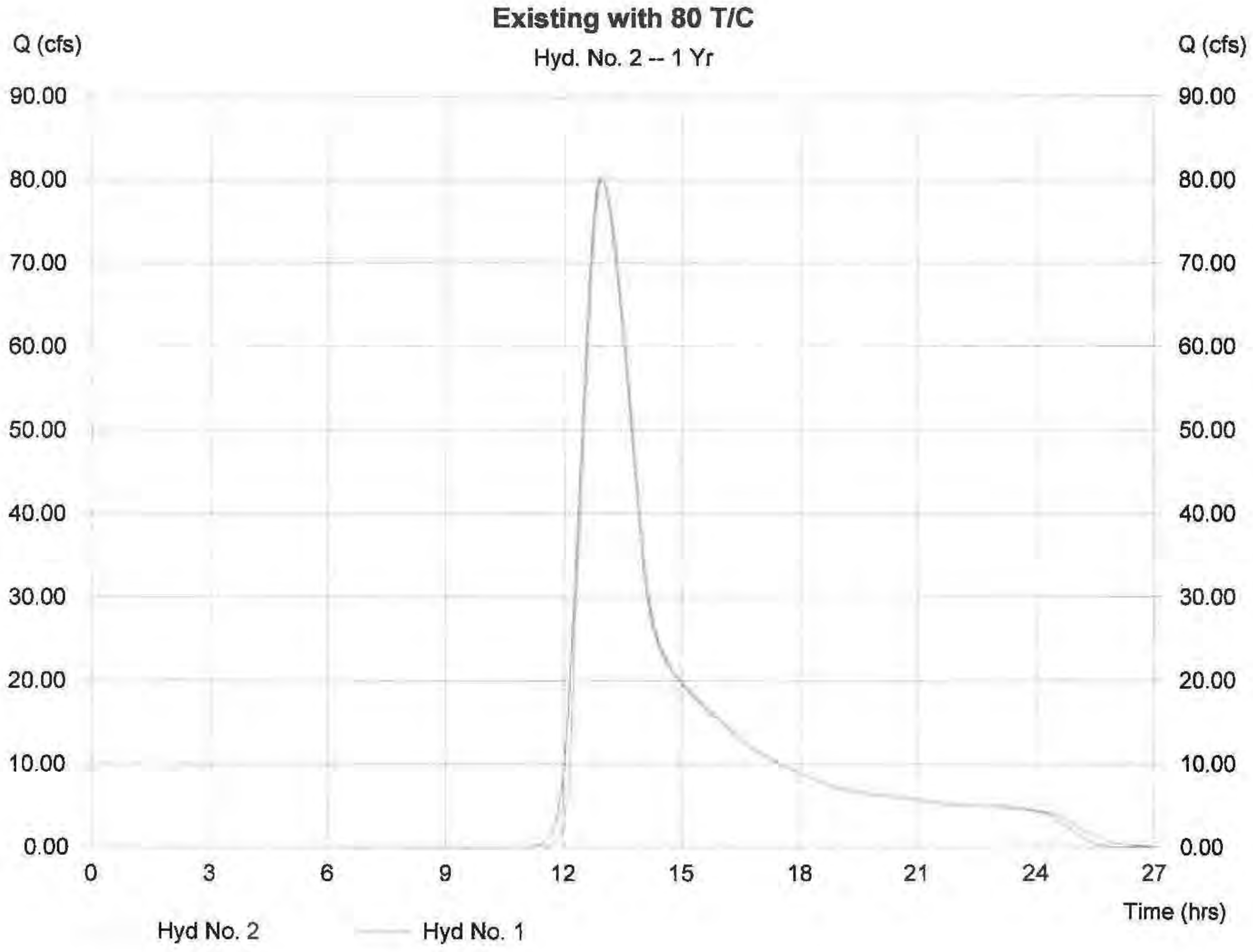
Existing with 80 T/C

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 80.18 cfs
Time interval = 6 min
Max. Elevation = 641.92 ft
Max. Storage = 34,434 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 780,504 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:39 AM

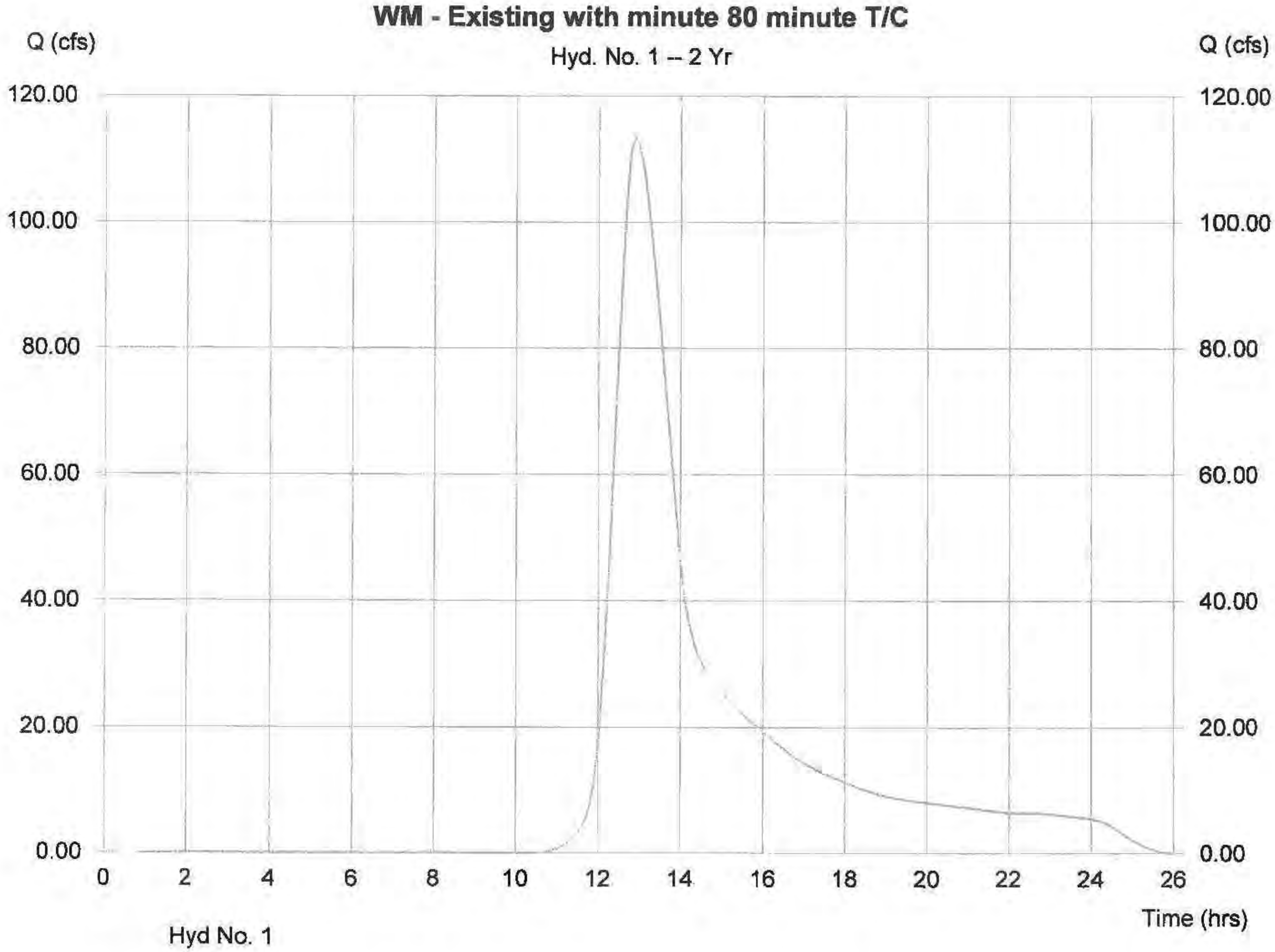
Hyd. No. 1

WM - Existing with minute 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 113.38 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 1,065,545 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:39 AM

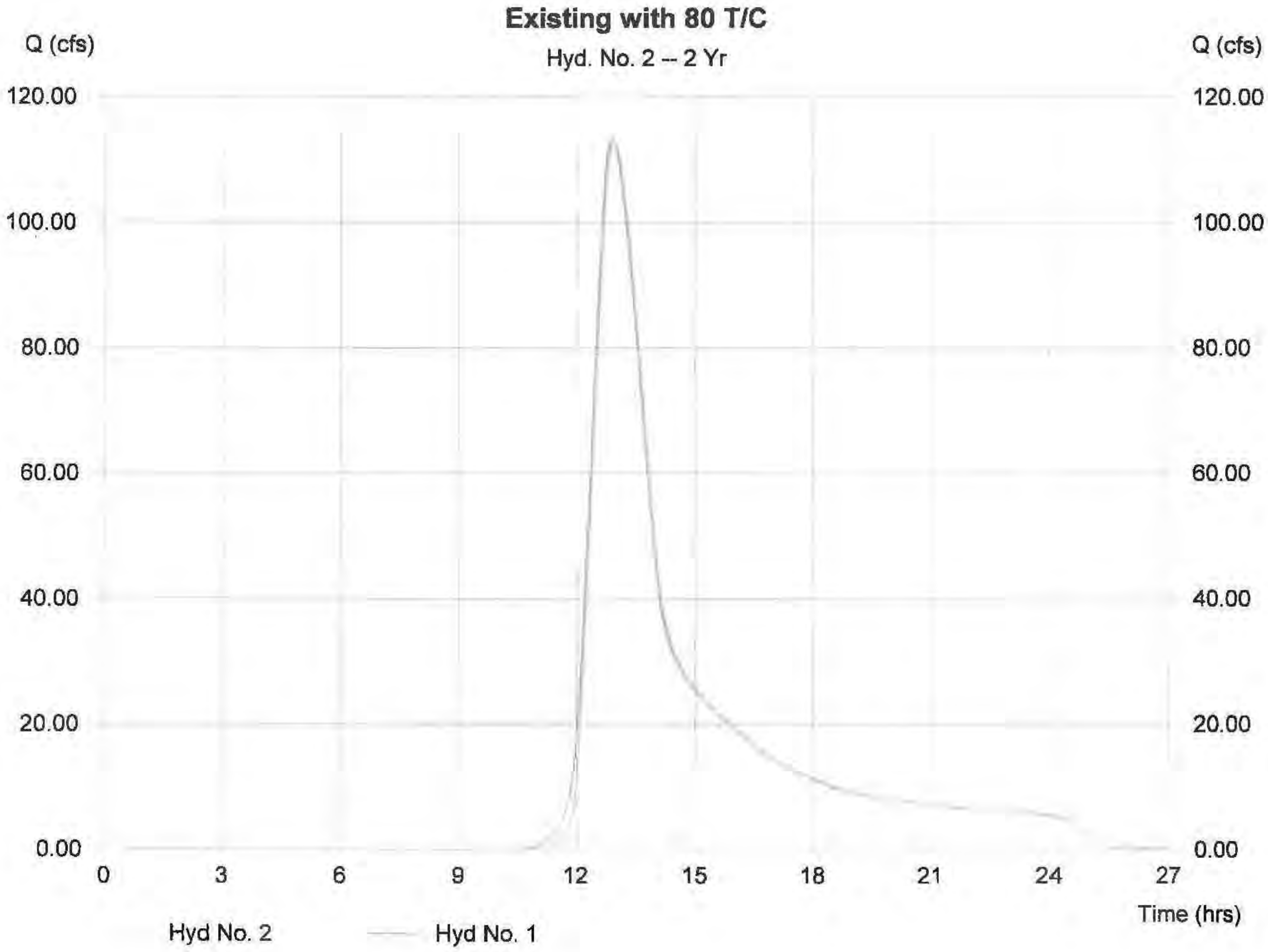
Hyd. No. 2

Existing with 80 T/C

Hydrograph type	= Reservoir	Peak discharge	= 112.99 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 642.14 ft
Reservoir name	= WM Farm Pond	Max. Storage	= 38,752 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 1,065,542 cuft



Hydrograph Plot

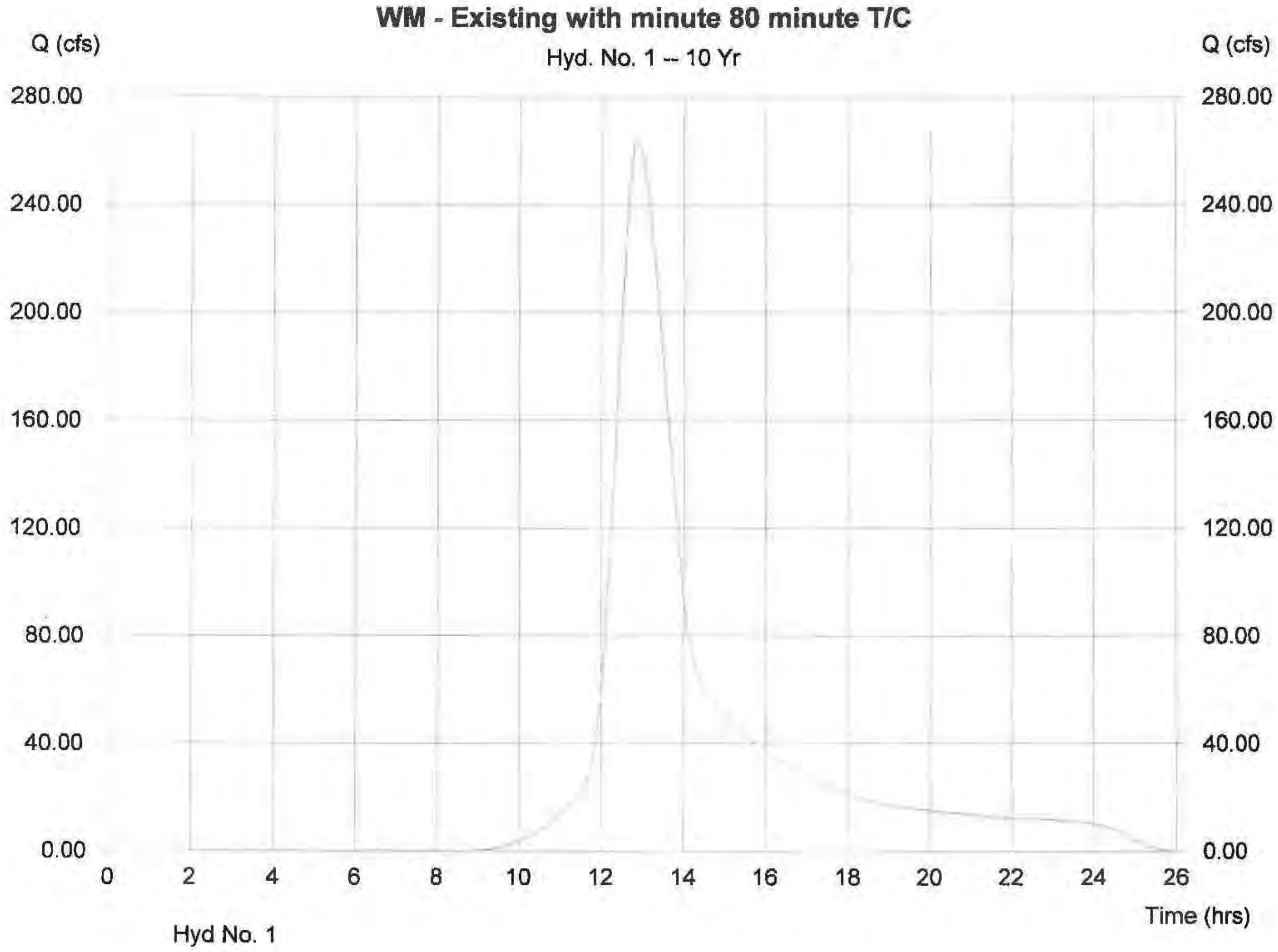
Hyd. No. 1

WM - Existing with minute 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 264.16 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,379,752 cuft



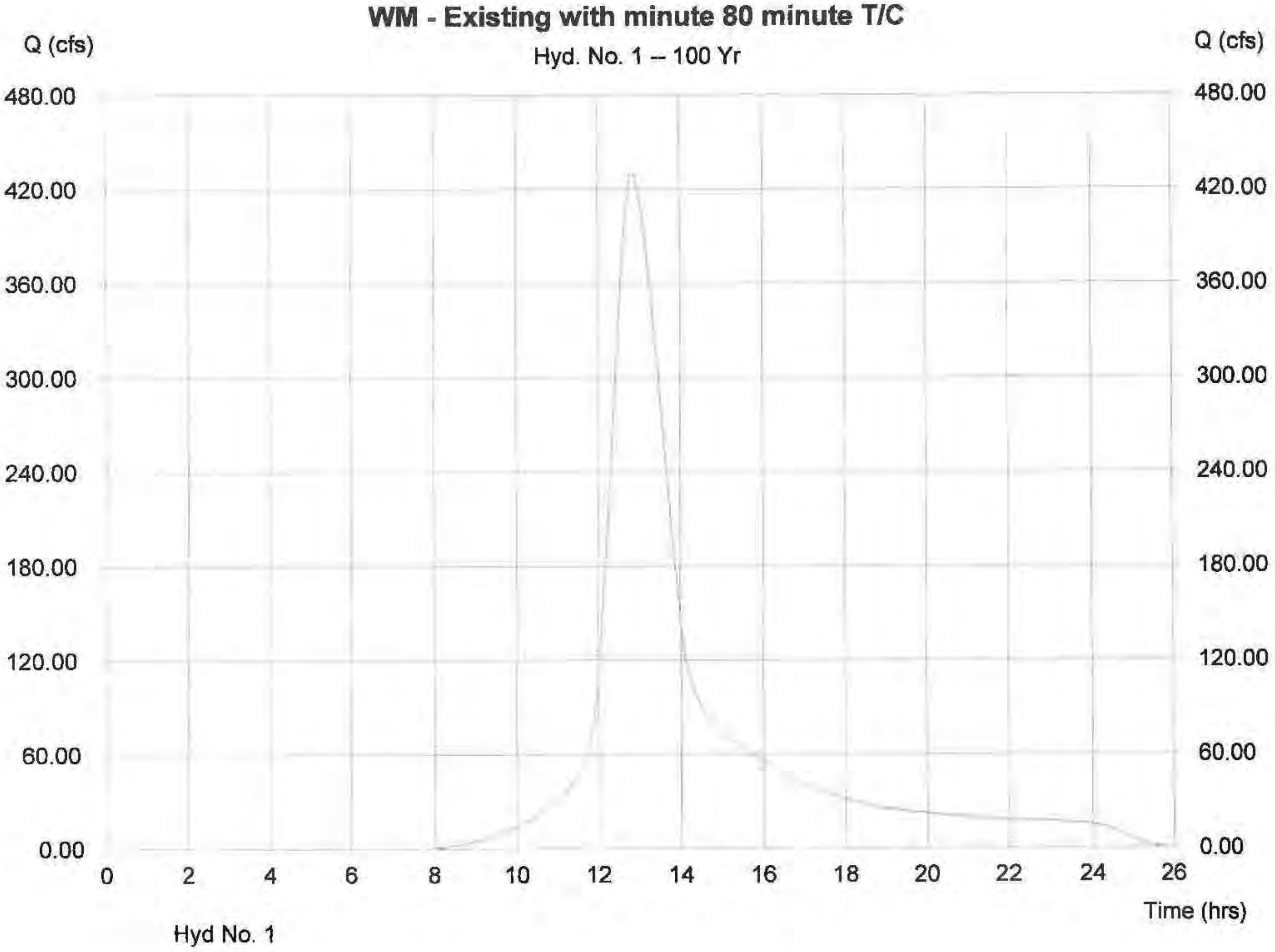
Hydrograph Plot

Hyd. No. 1

WM - Existing with minute 80 minute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 430.63 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 80.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,850,883 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:39 AM

Hyd. No. 2

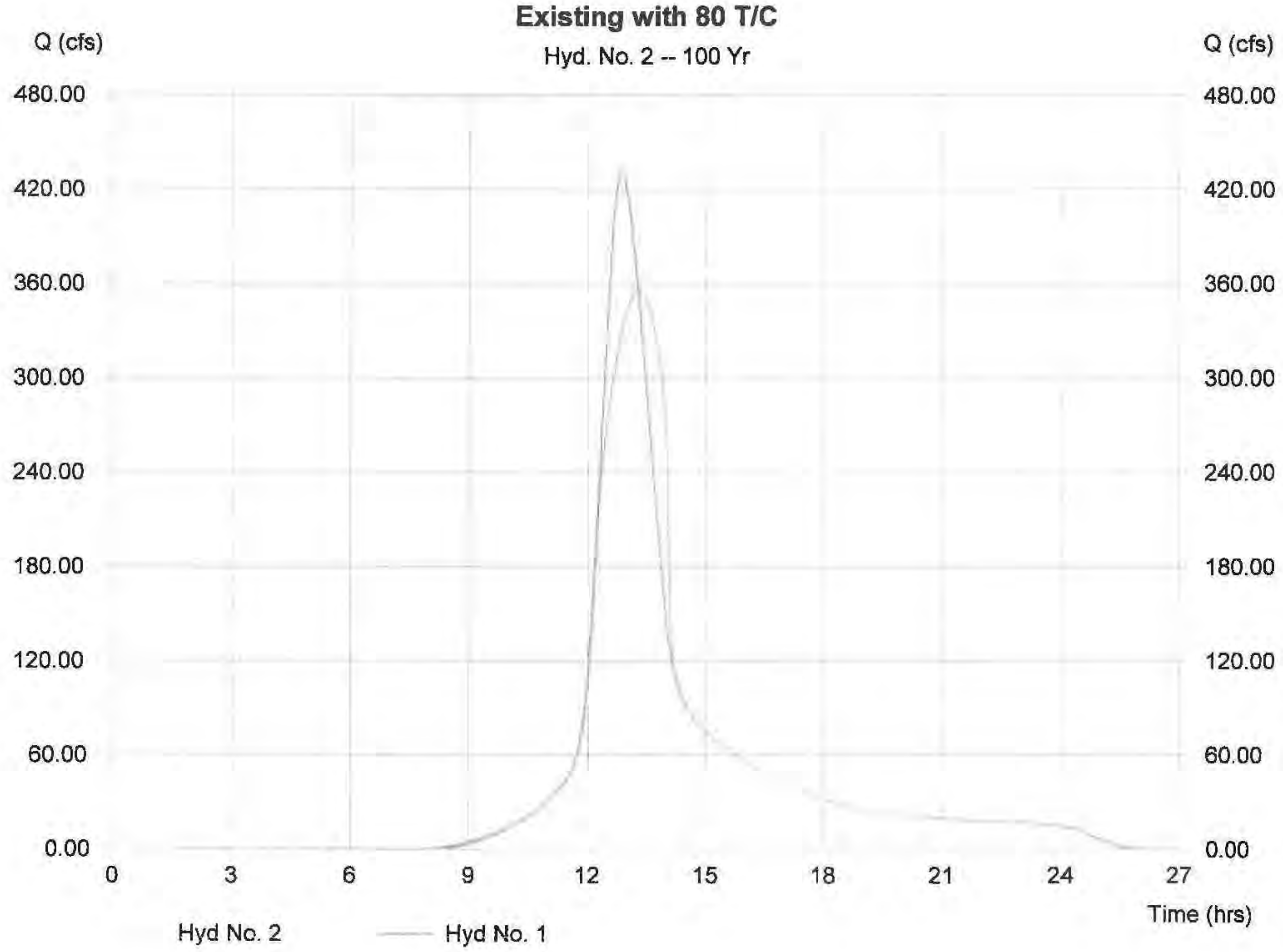
Existing with 80 T/C

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 355.46 cfs
Time interval = 6 min
Max. Elevation = 649.44 ft
Max. Storage = 277,986 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 3,850,879 cuft



APPENDIX C

Developed Conditions with 80 Minute T/C

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:19 AM

Pond No. 1 - WM Farm Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871

Culvert / Orifice Structures

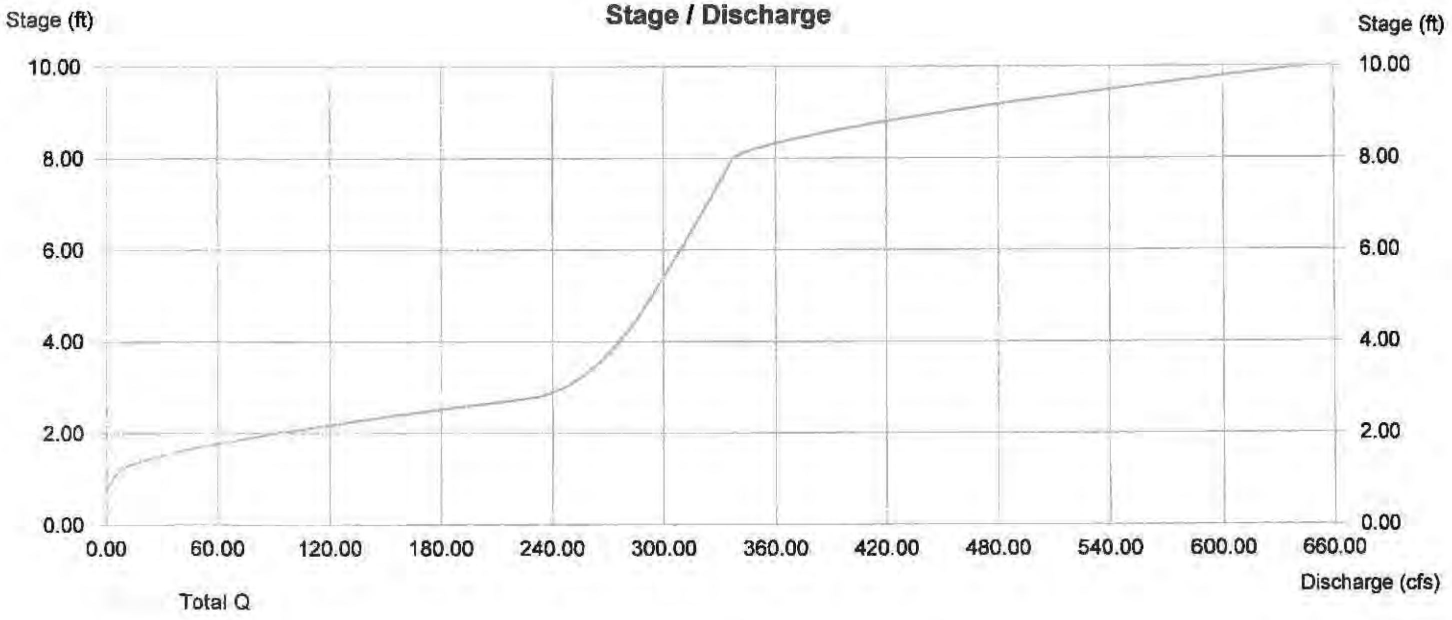
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.60	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	6.00	30.00	0.00
Crest El. (ft)	= 641.20	640.70	648.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	Rect	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

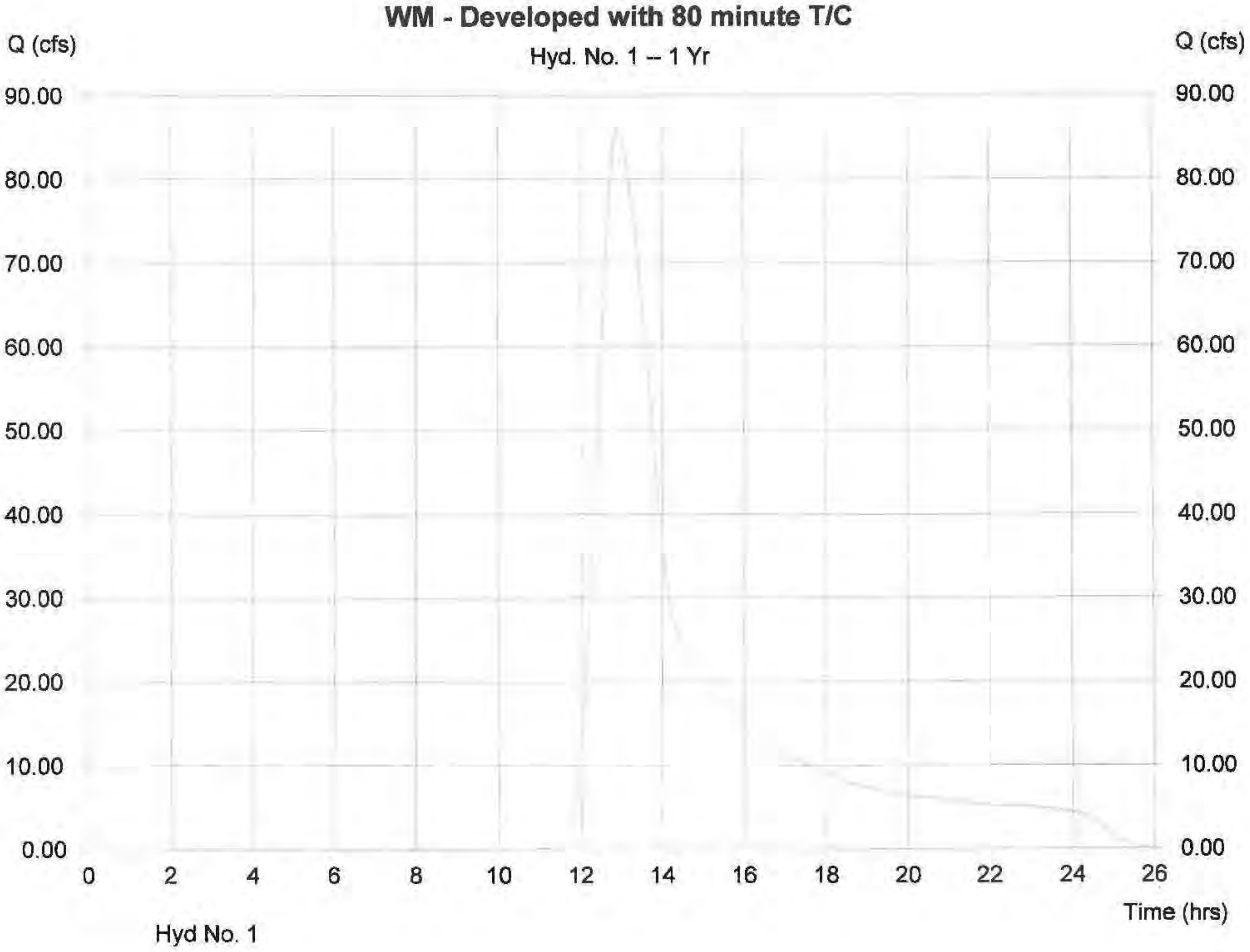
Hyd. No. 1

WM - Developed with 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.00 in
Storm duration = 24 hrs

Peak discharge = 86.00 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 825,673 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

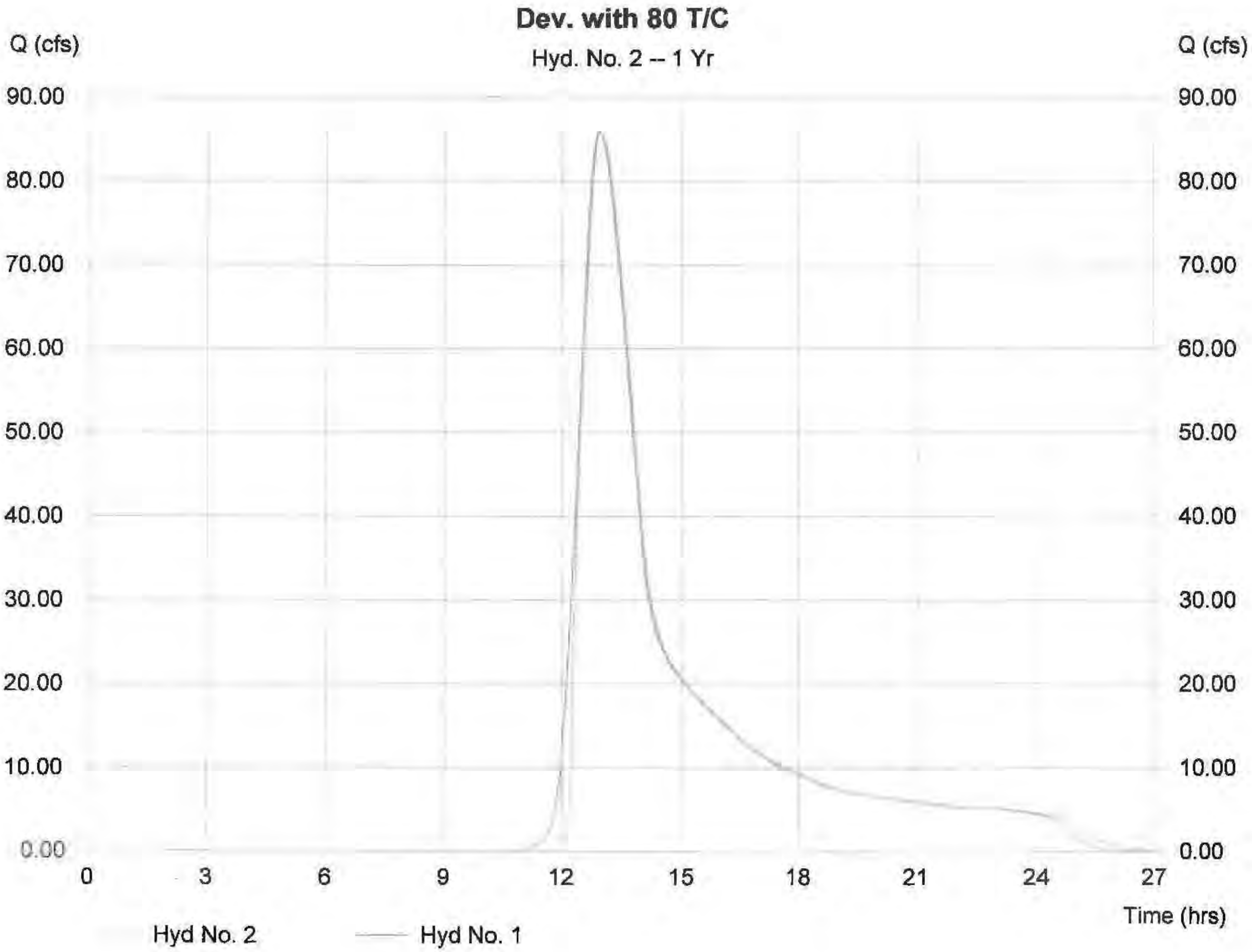
Hyd. No. 2

Dev. with 80 T/C

Hydrograph type	= Reservoir	Peak discharge	= 85.87 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 641.96 ft
Reservoir name	= WM Farm Pond	Max. Storage	= 35,159 cuft

Storage Indication method used.

Hydrograph Volume = 813,615 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

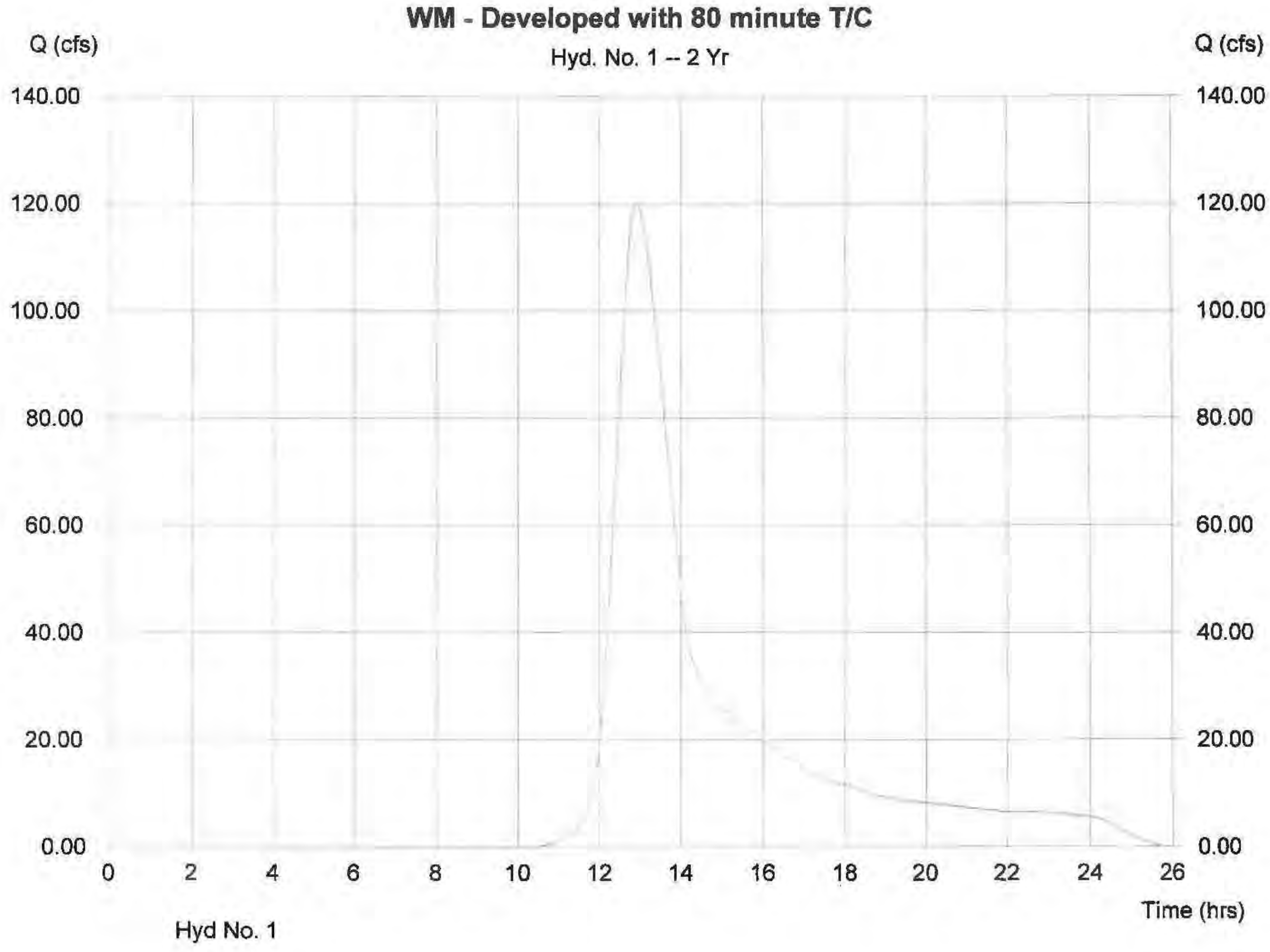
Hyd. No. 1

WM - Developed with 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 120.08 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 1,118,728 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

Hyd. No. 2

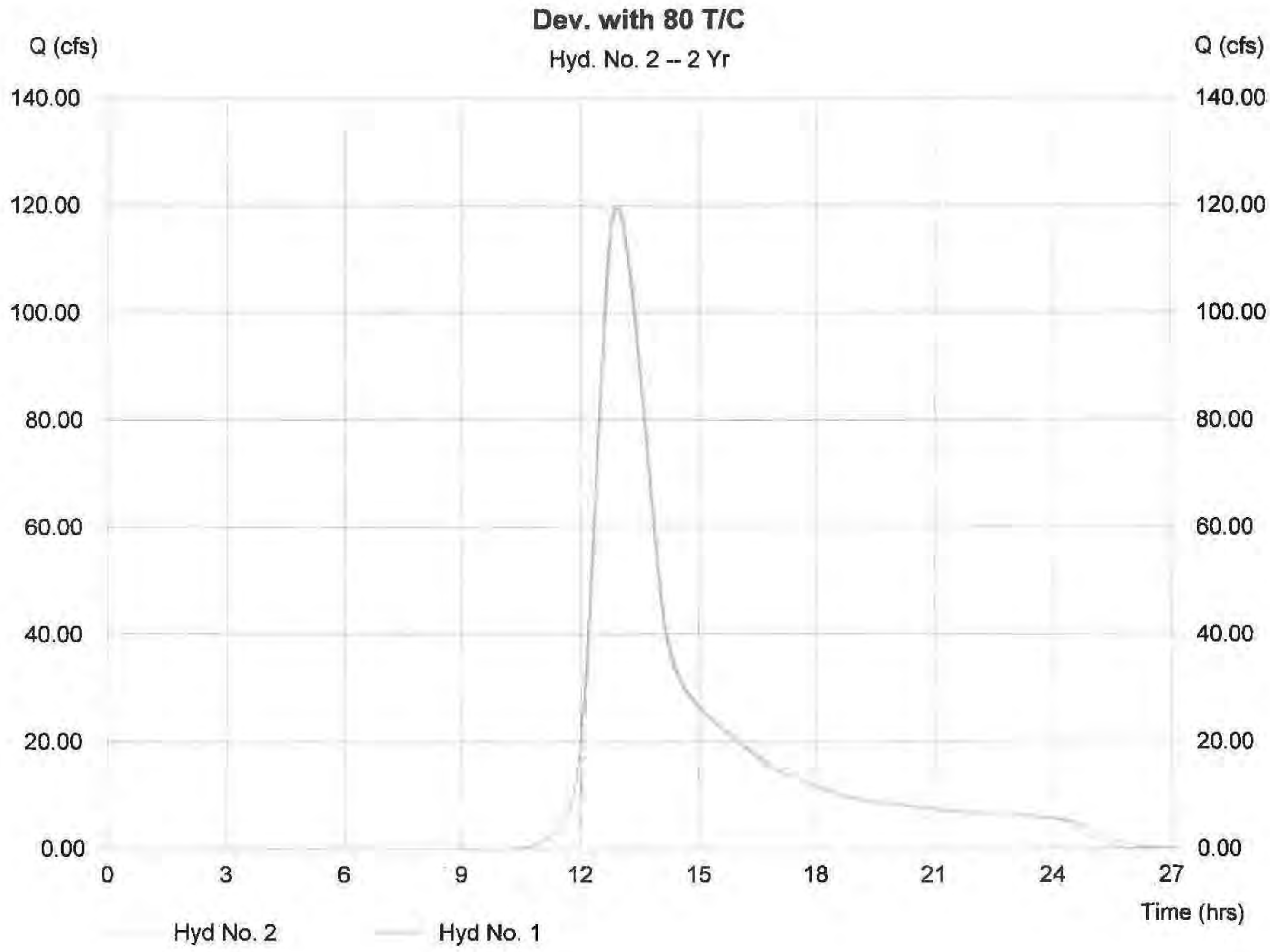
Dev. with 80 T/C

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 119.74 cfs
Time interval = 6 min
Max. Elevation = 642.18 ft
Max. Storage = 39,622 cuft

Storage Indication method used.

Hydrograph Volume = 1,106,670 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

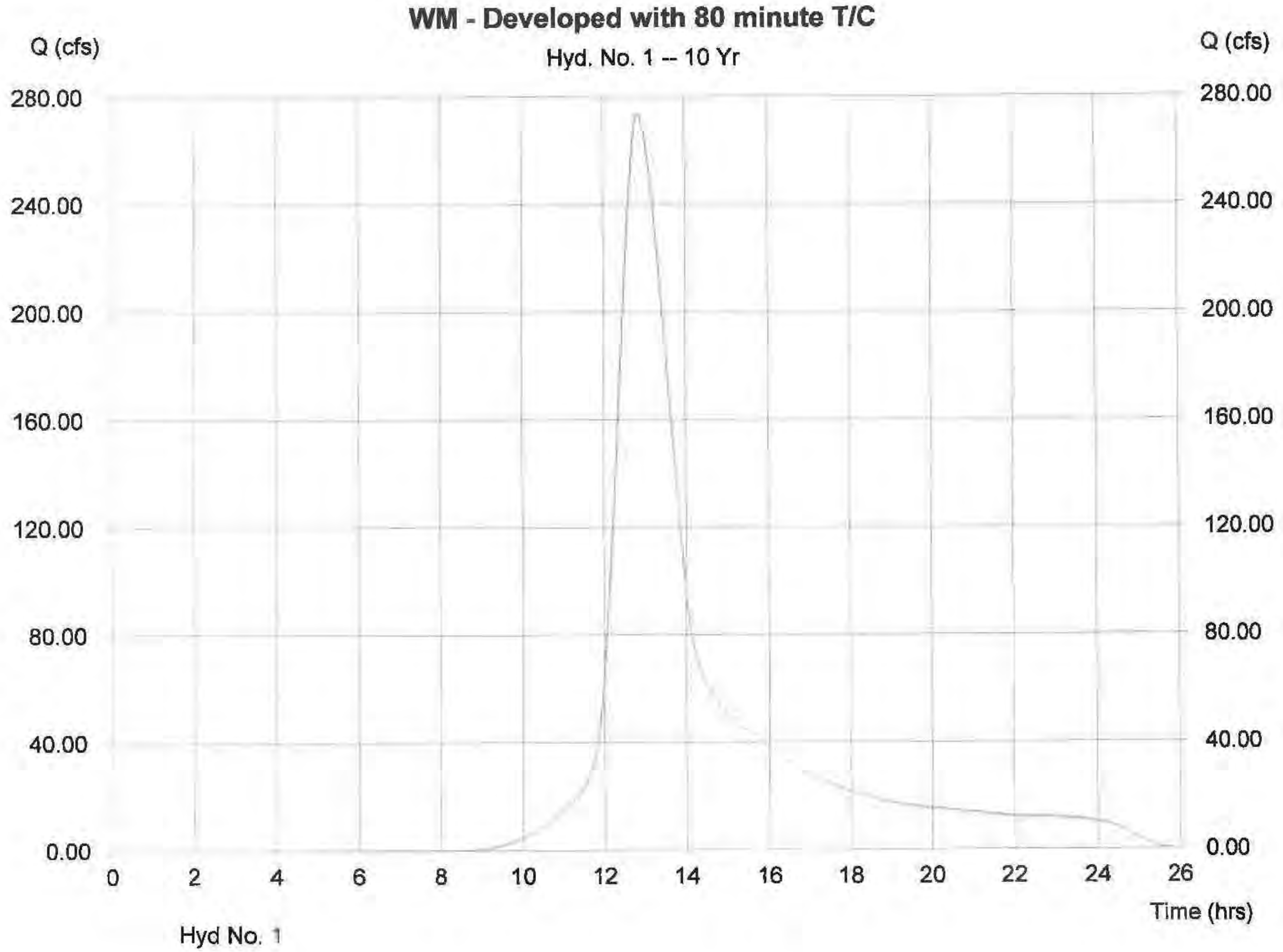
Hyd. No. 1

WM - Developed with 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 273.31 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,458,269 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

Hyd. No. 2

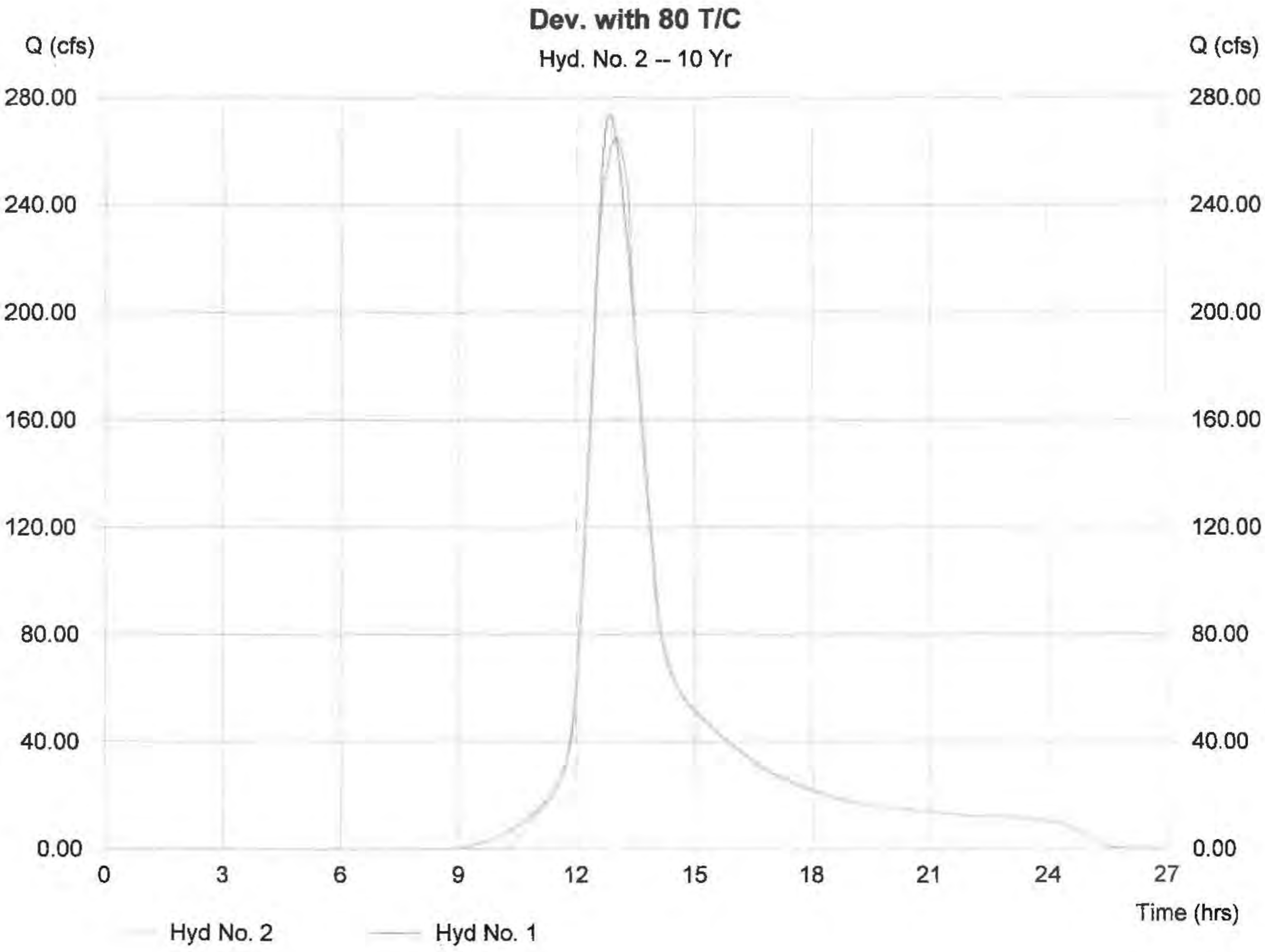
Dev. with 80 T/C

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 264.97 cfs
Time interval = 6 min
Max. Elevation = 643.54 ft
Max. Storage = 69,781 cuft

Storage Indication method used.

Hydrograph Volume = 2,446,212 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

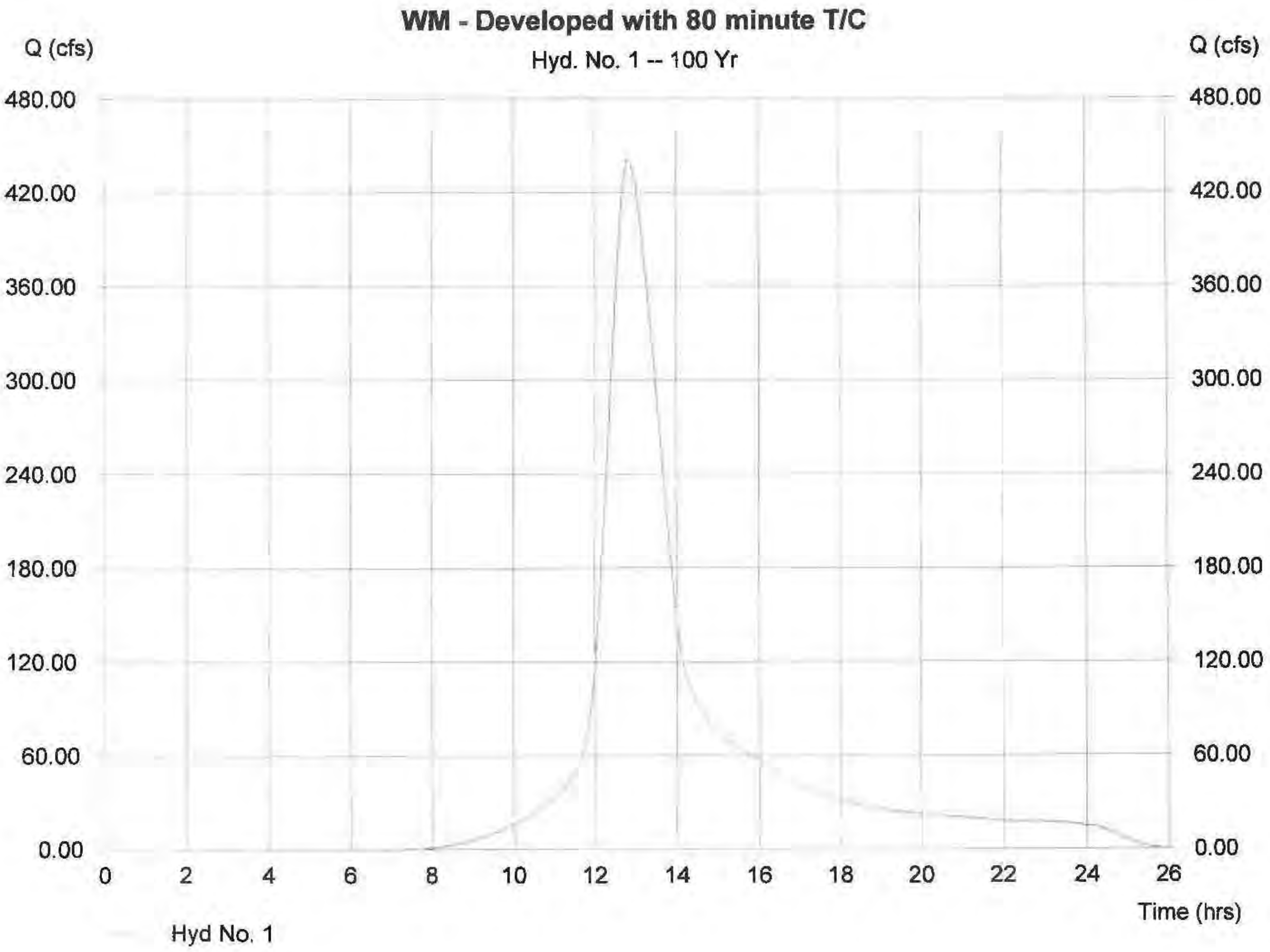
Hyd. No. 1

WM - Developed with 80 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 441.50 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 80.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 3,947,013 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:17 AM

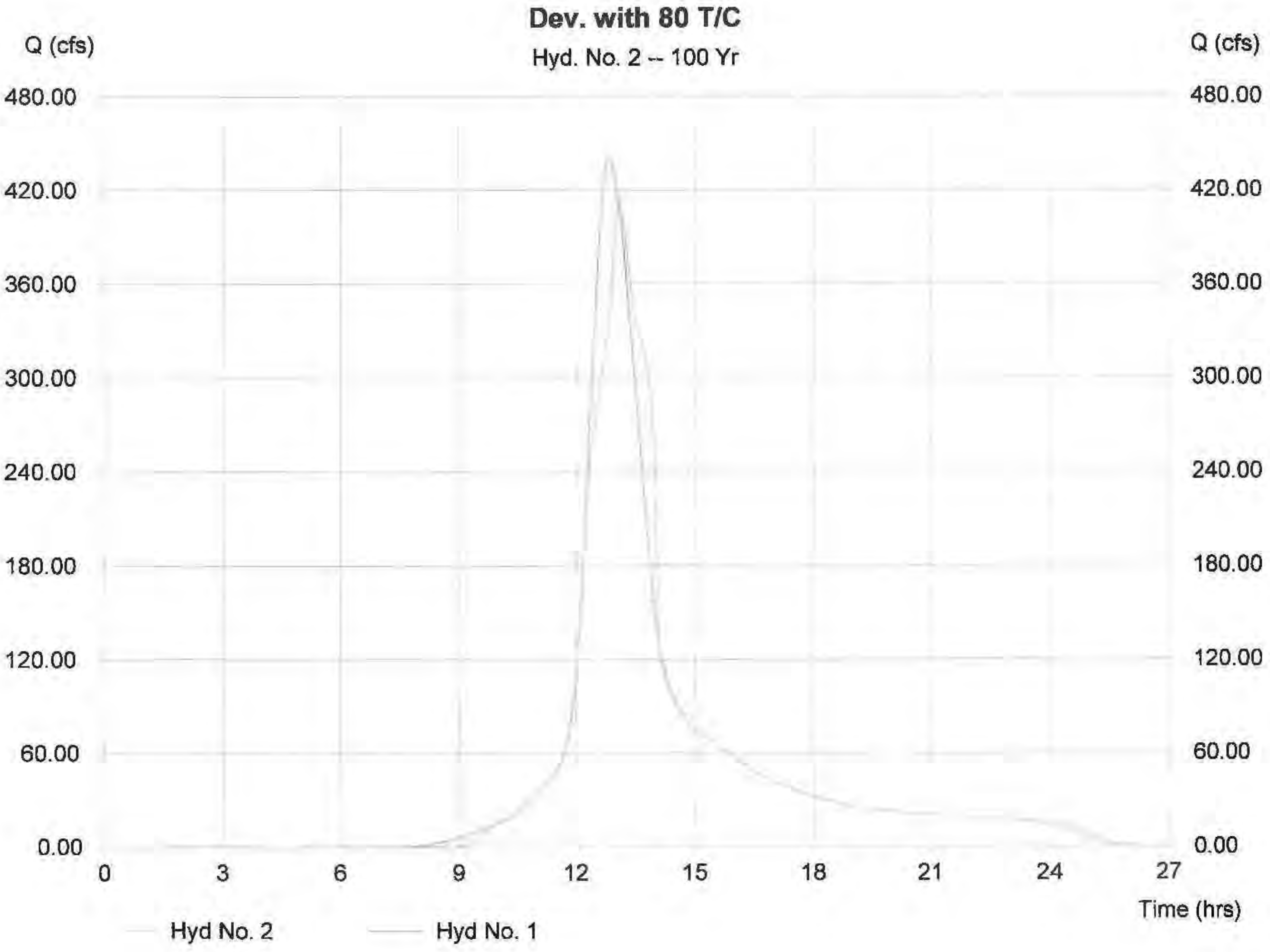
Hyd. No. 2

Dev. with 80 T/C

Hydrograph type = Reservoir		Peak discharge	= 414.37 cfs
Storm frequency = 100 yrs		Time interval	= 6 min
Inflow hyd. No. = 1		Max. Elevation	= 648.77 ft
Reservoir name = WM Farm Pond		Max. Storage	= 246,589 cuft

Storage Indication method used.

Hydrograph Volume = 3,934,956 cuft



APPENDIX D

Existing Conditions with 40 Minute T/C

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:27 AM

Pond No. 1 - WM Farm Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	24,677	23,605	80,450
5.00	645.00	29,269	26,973	107,423
6.00	646.00	32,860	31,065	138,487
7.00	647.00	36,902	34,881	173,368
8.00	648.00	40,944	38,923	212,291
9.00	649.00	45,790	43,367	255,658
10.00	650.00	50,635	48,213	303,871

Culvert / Orifice Structures

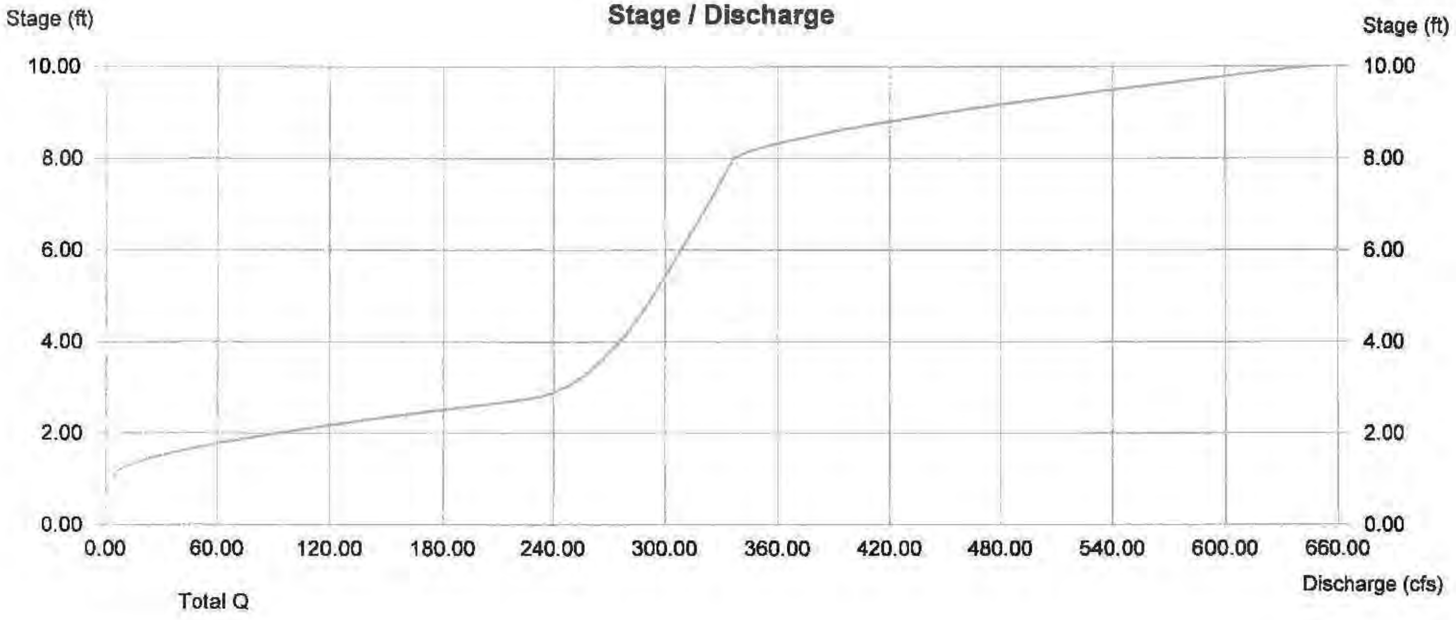
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	6.00	30.00	0.00
Crest El. (ft)	= 641.20	640.70	648.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	Rect	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Stage / Discharge

Hydrograph Plot

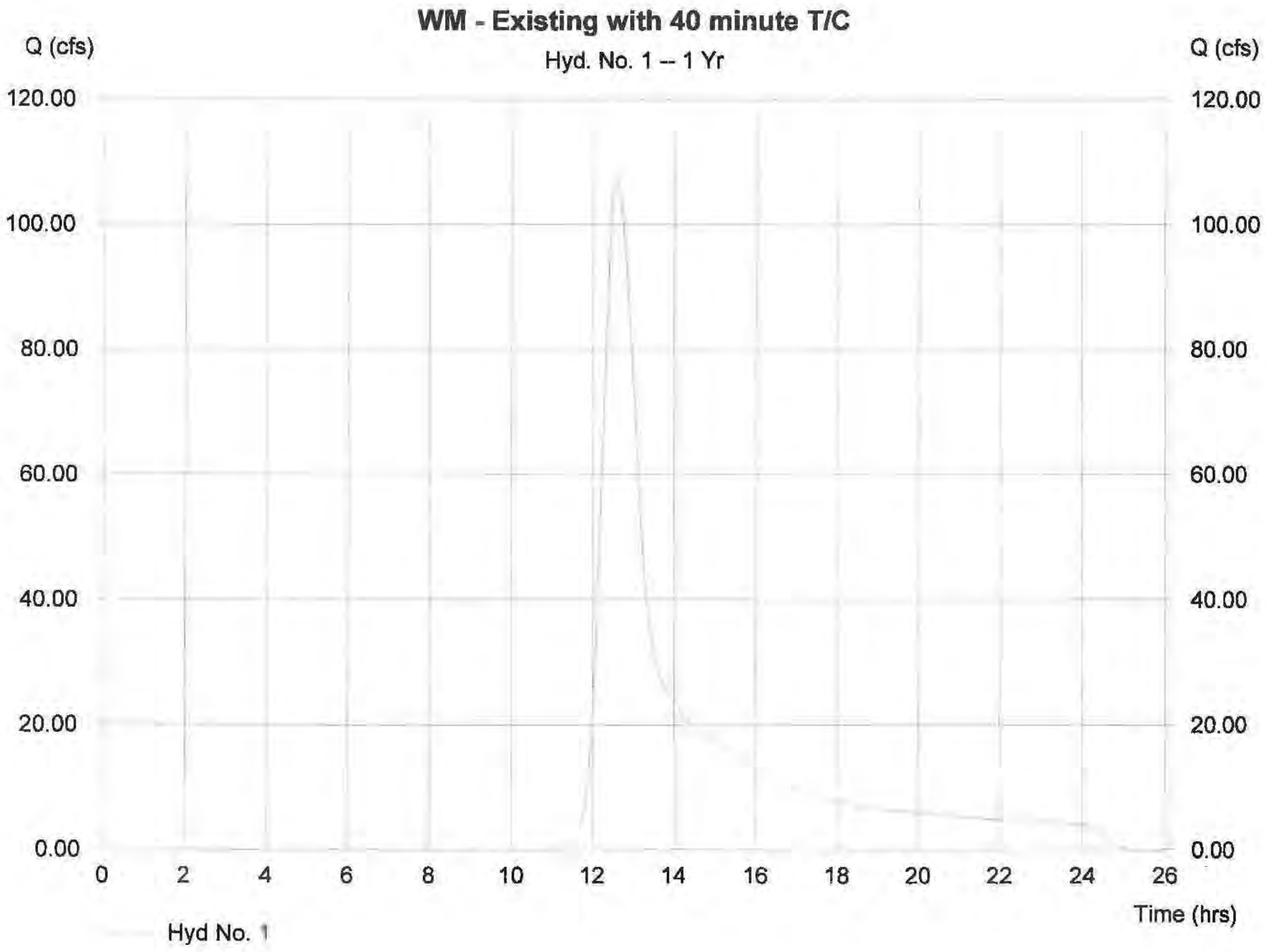
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.00 in
Storm duration = 24 hrs

Peak discharge = 107.60 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 773,073 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:27 AM

Hyd. No. 2

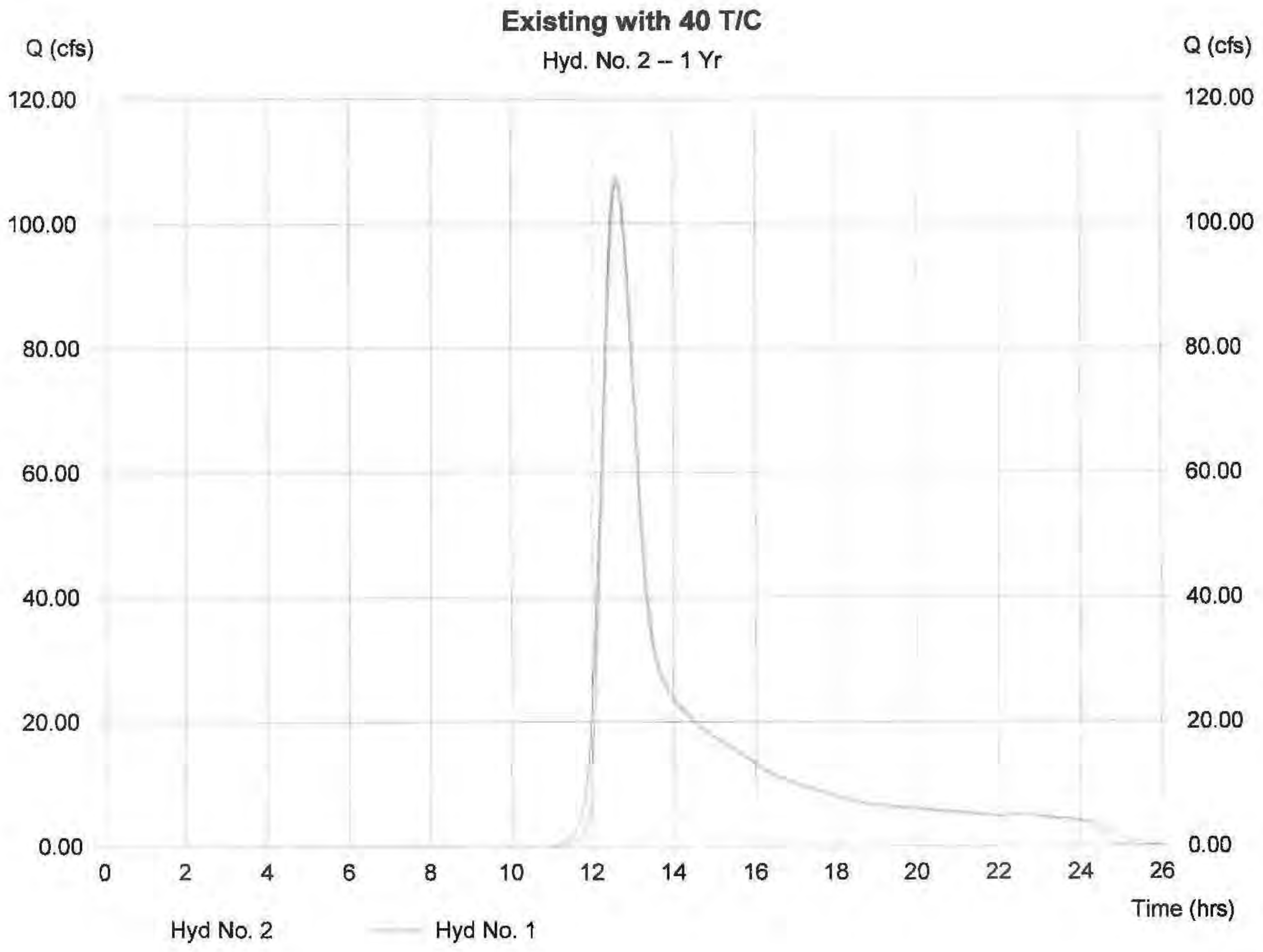
Existing with 40 T/C

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 107.30 cfs
Time interval = 6 min
Max. Elevation = 642.10 ft
Max. Storage = 38,018 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 773,070 cuft



Hydrograph Plot

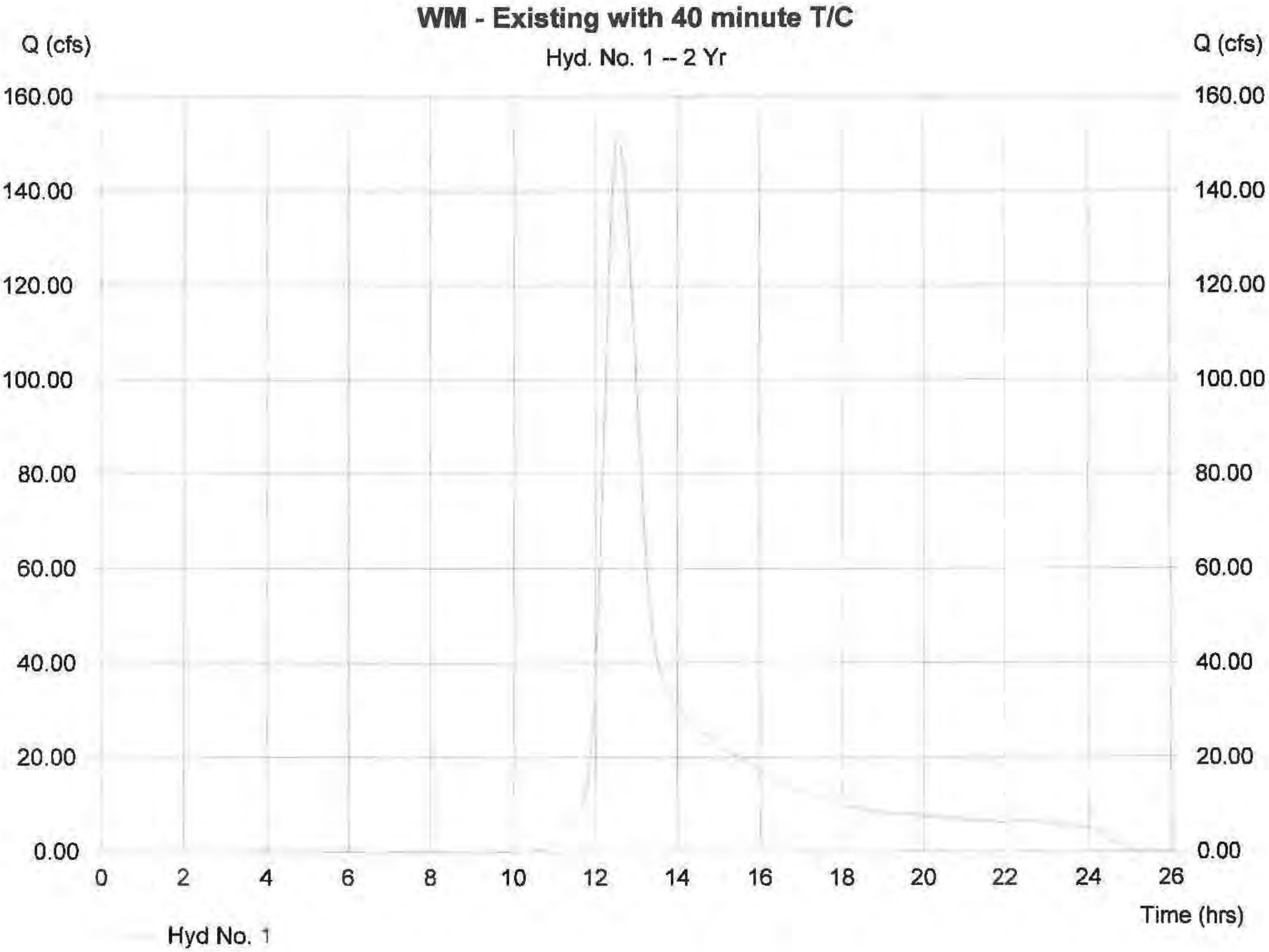
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 151.13 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 1,055,397 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:32 AM

Hyd. No. 2

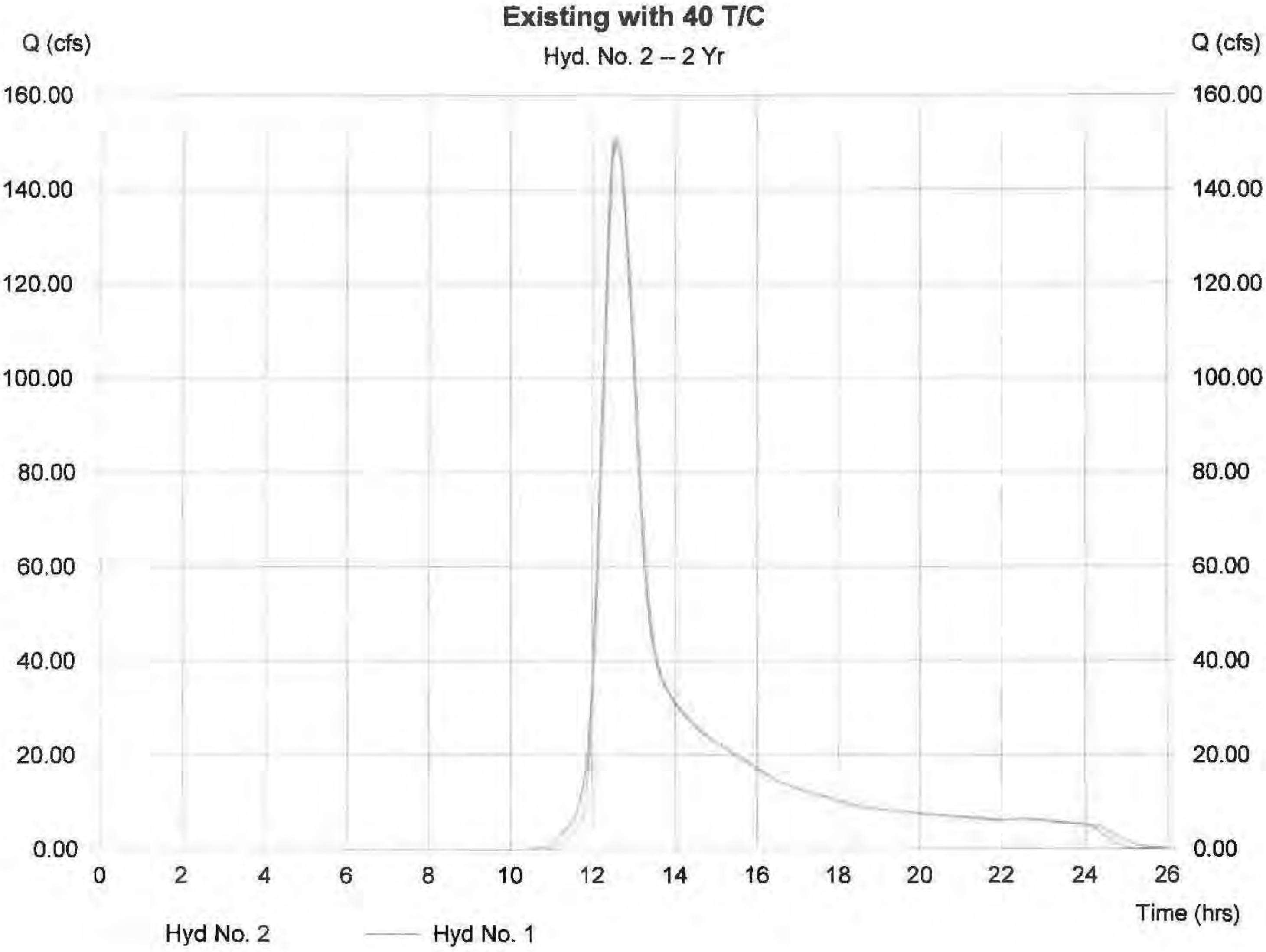
Existing with 40 T/C

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 151.55 cfs
Time interval = 6 min
Max. Elevation = 642.36 ft
Max. Storage = 43,500 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 1,055,394 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

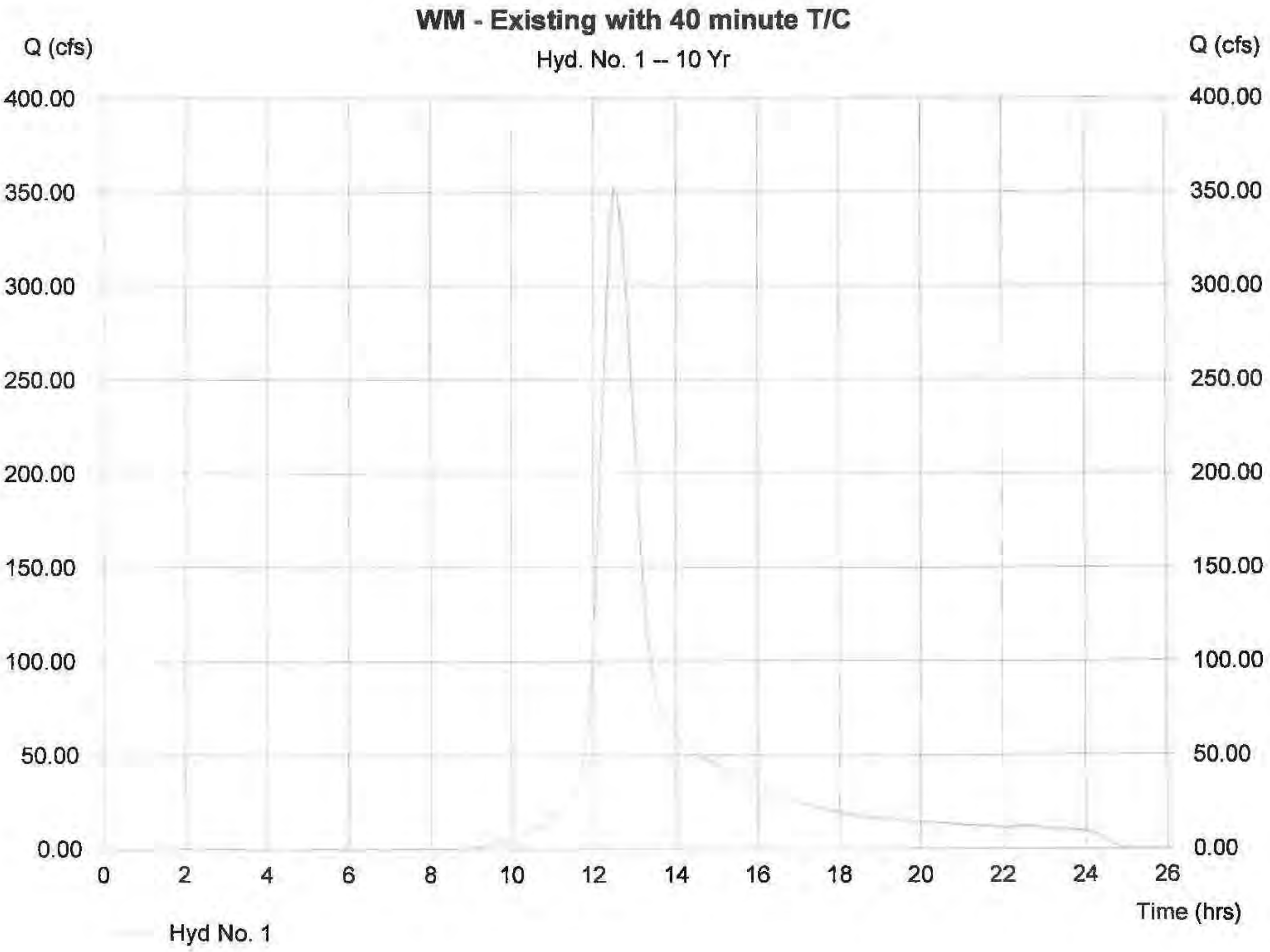
Monday, Nov 29 2004, 9:32 AM

Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 352.12 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 5.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,357,088 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:32 AM

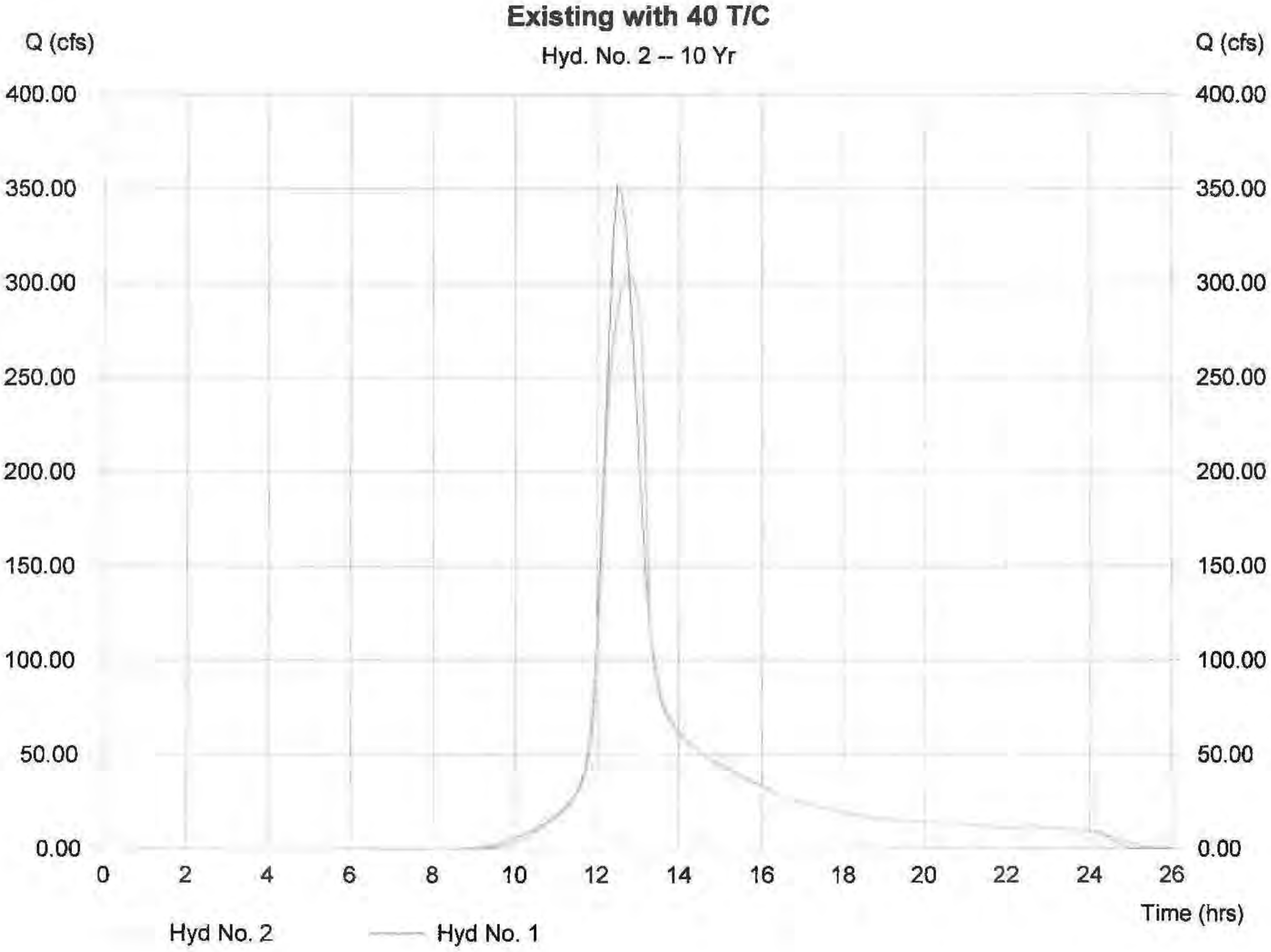
Hyd. No. 2

Existing with 40 T/C

Hydrograph type	= Reservoir	Peak discharge	= 305.58 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 645.80 ft
Reservoir name	= WM Farm Pond	Max. Storage	= 132,184 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 2,357,083 cuft



Hydrograph Plot

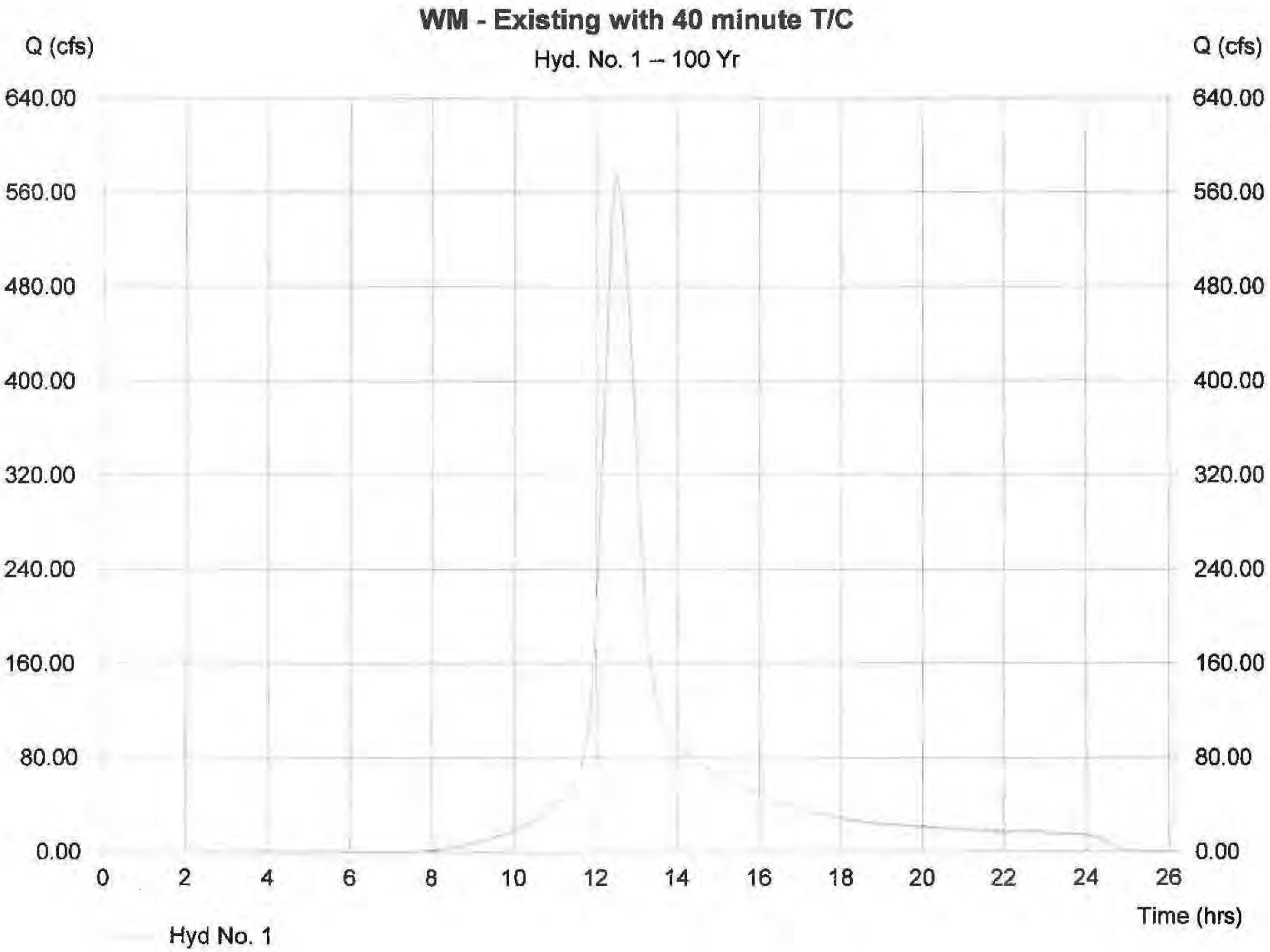
Hyd. No. 1

WM - Existing with 40 minute T/C

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.50 in
Storm duration = 24 hrs

Peak discharge = 573.32 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 3,814,209 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:32 AM

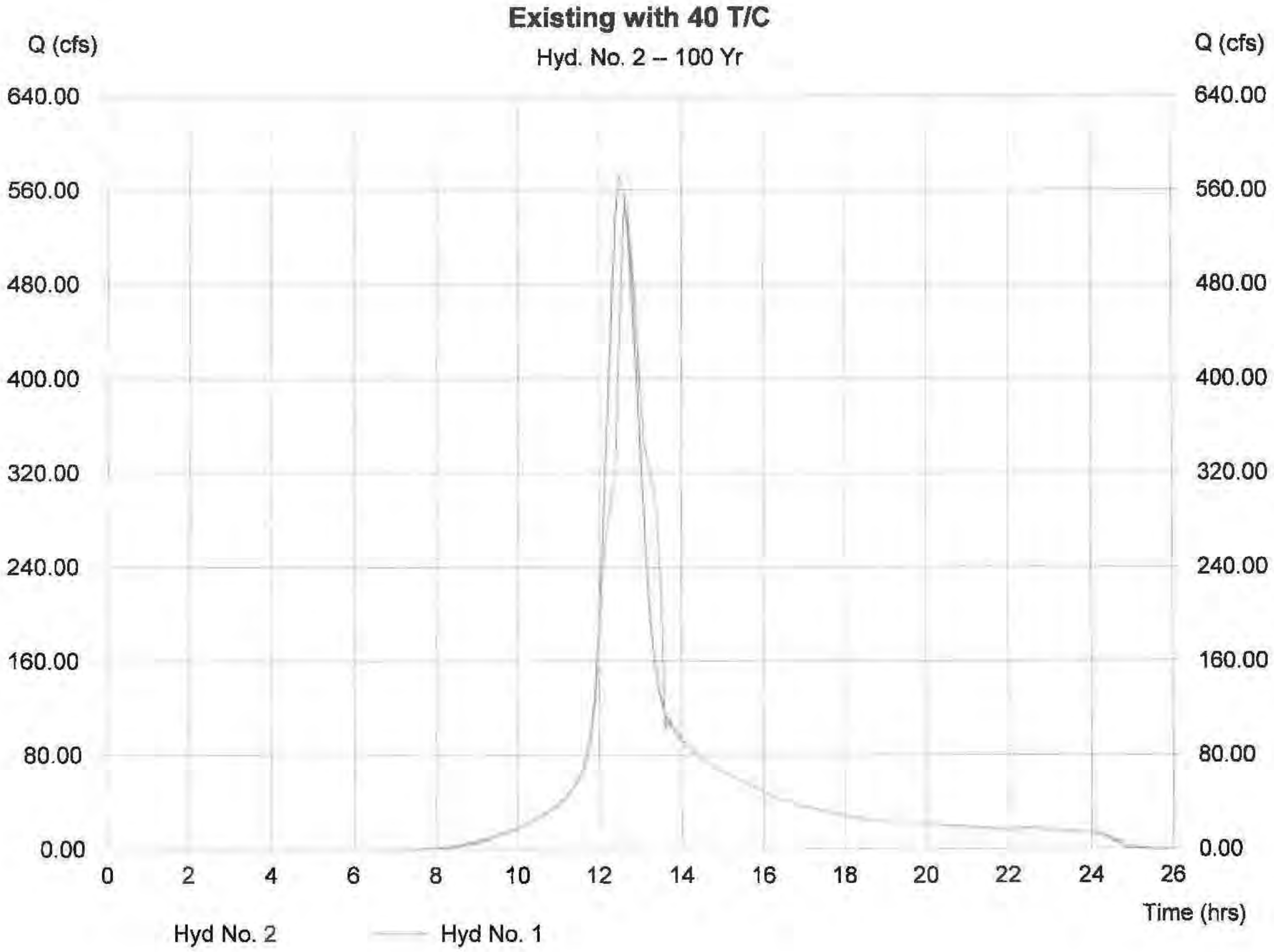
Hyd. No. 2

Existing with 40 T/C

Hydrograph type	= Reservoir	Peak discharge	= 543.20 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 649.52 ft
Reservoir name	= WM Farm Pond	Max. Storage	= 280,611 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 3,814,204 cuft



APPENDIX E

Developed Conditions with 40 Minute T/C

Pond Report

Hydraflow Hydrographs by Intelisolve — Monday, Nov 29 2004, 8:44 AM

Pond No. 1 - 11

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,486	18,715	35,936
3.00	643.00	22,532	21,009	56,945
4.00	644.00	25,677	24,105	81,050
5.00	645.00	29,269	27,473	108,523
6.00	646.00	32,860	31,065	139,587
7.00	647.00	36,902	34,881	174,468
8.00	648.00	40,944	38,923	213,391
9.00	649.00	45,790	43,367	256,758
10.00	650.00	50,635	48,213	304,971

Culvert / Orifice Structures

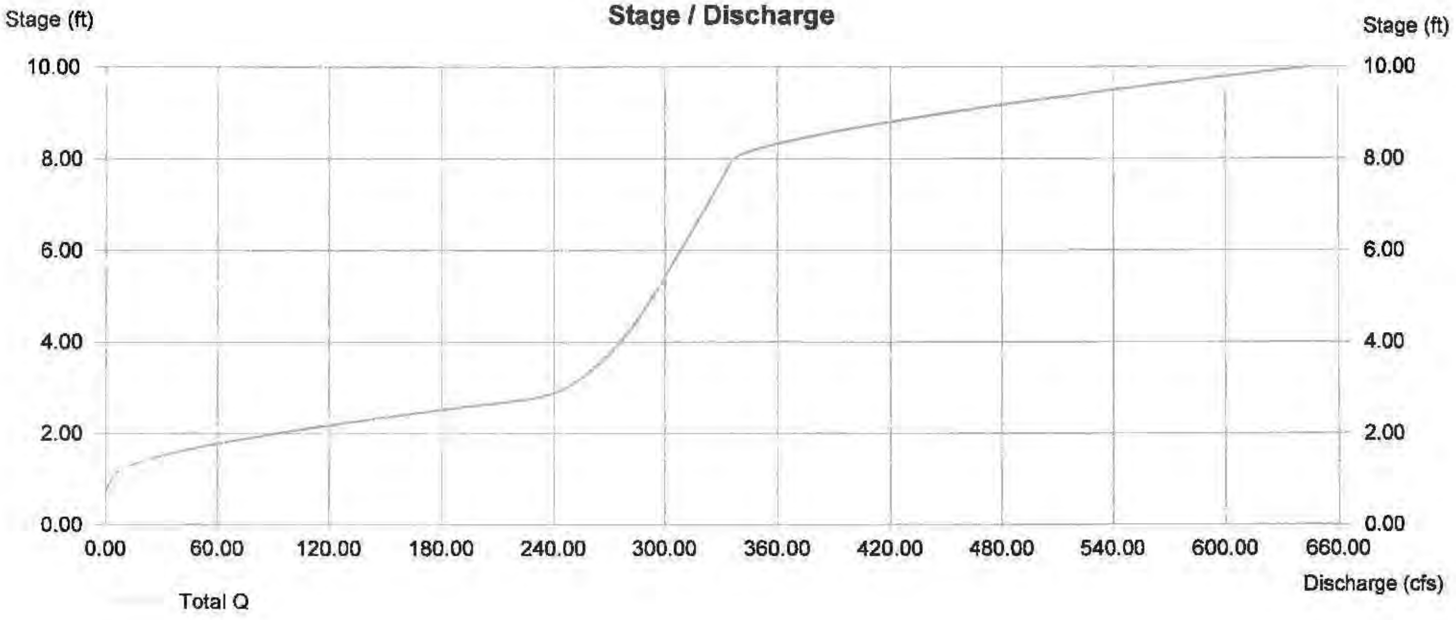
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	6.00	30.00	0.00
Crest El. (ft)	= 641.20	640.70	648.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	Rect	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



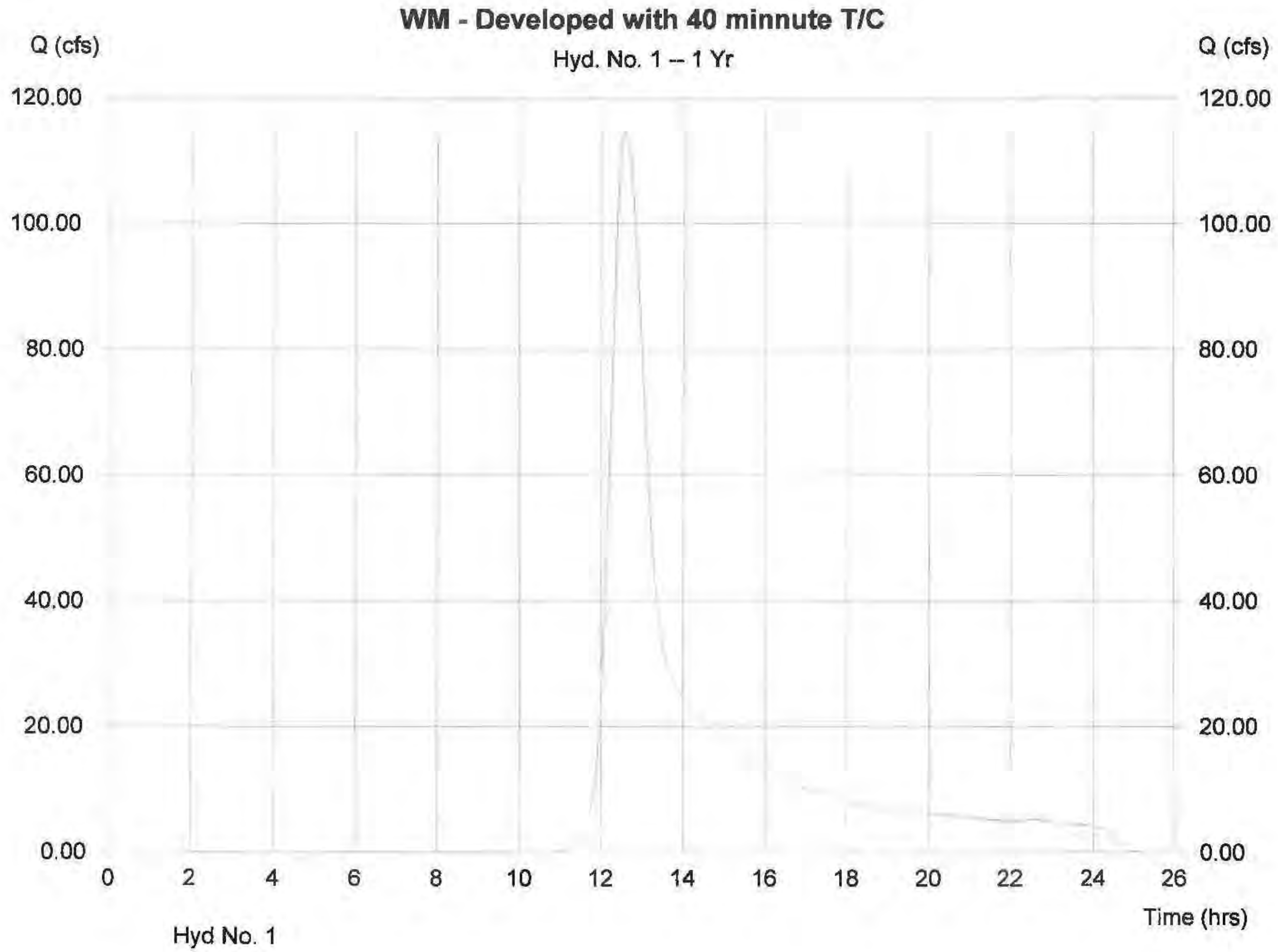
Hydrograph Plot

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 115.14 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 3.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 817,809 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:15 AM

Hyd. No. 2

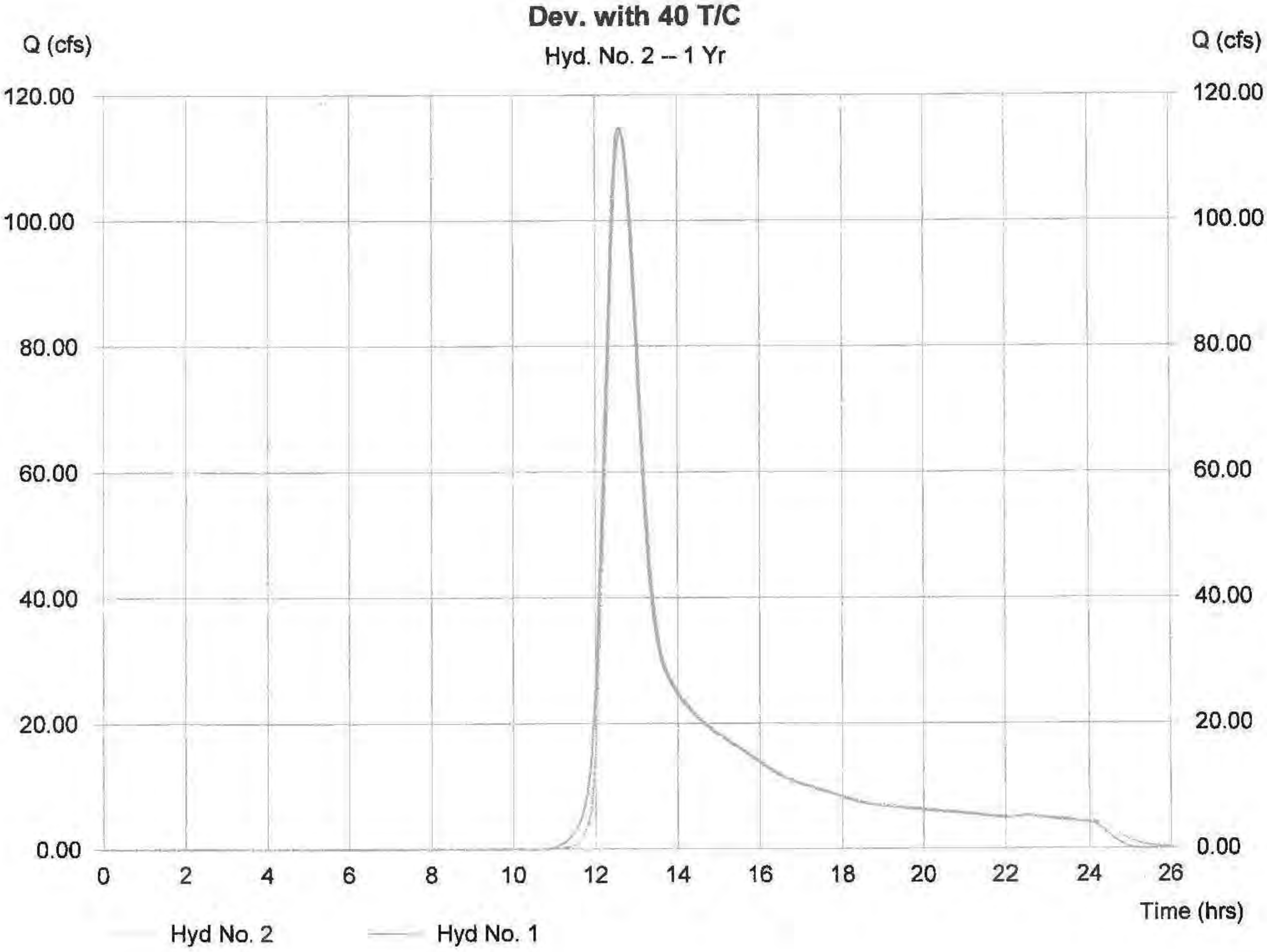
Dev. with 40 T/C

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = 11

Peak discharge = 115.12 cfs
Time interval = 6 min
Max. Elevation = 642.15 ft
Max. Storage = 39,083 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 817,806 cuft



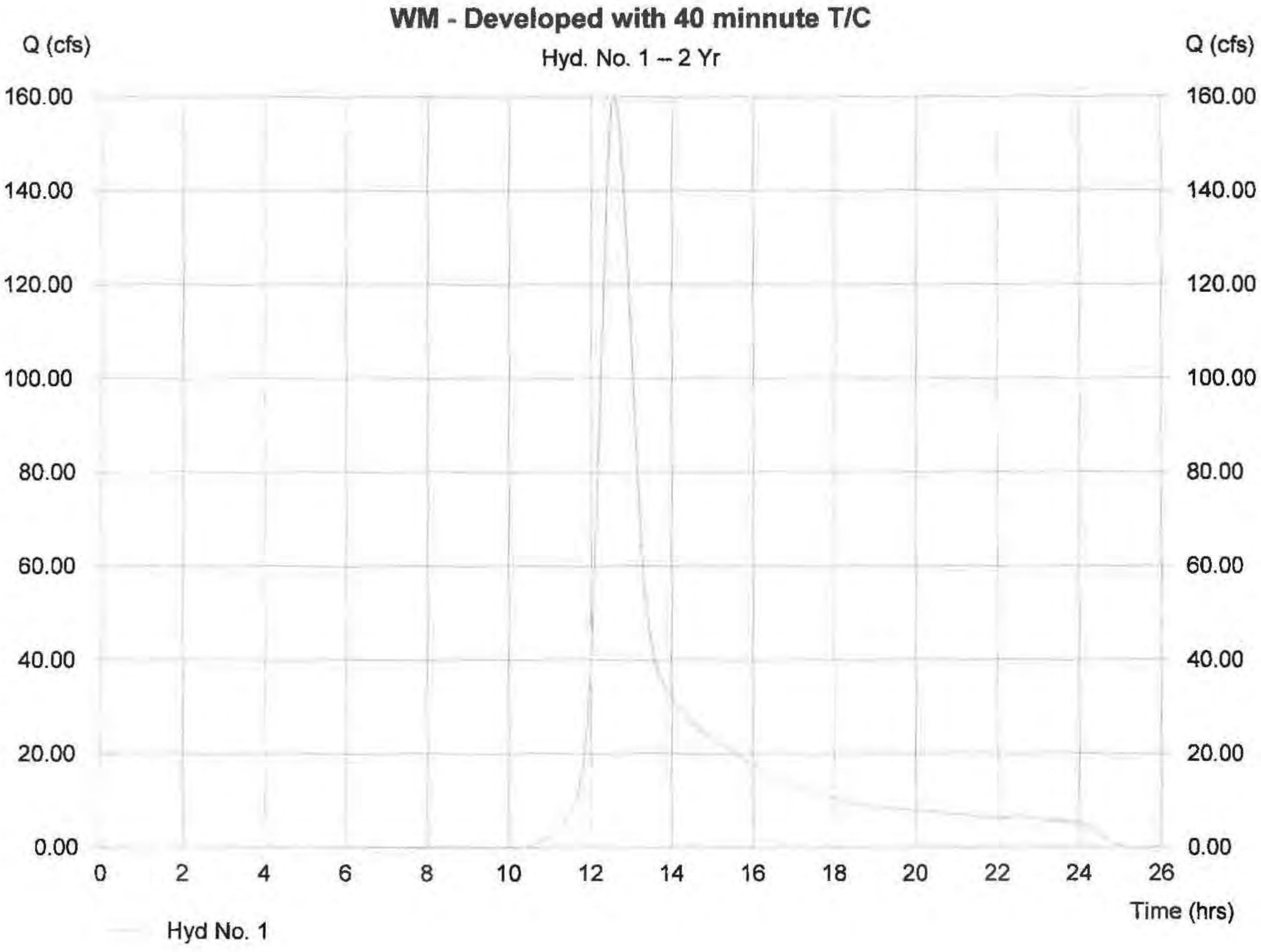
Hydrograph Plot

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 159.75 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 3.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,108,073 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:8 AM

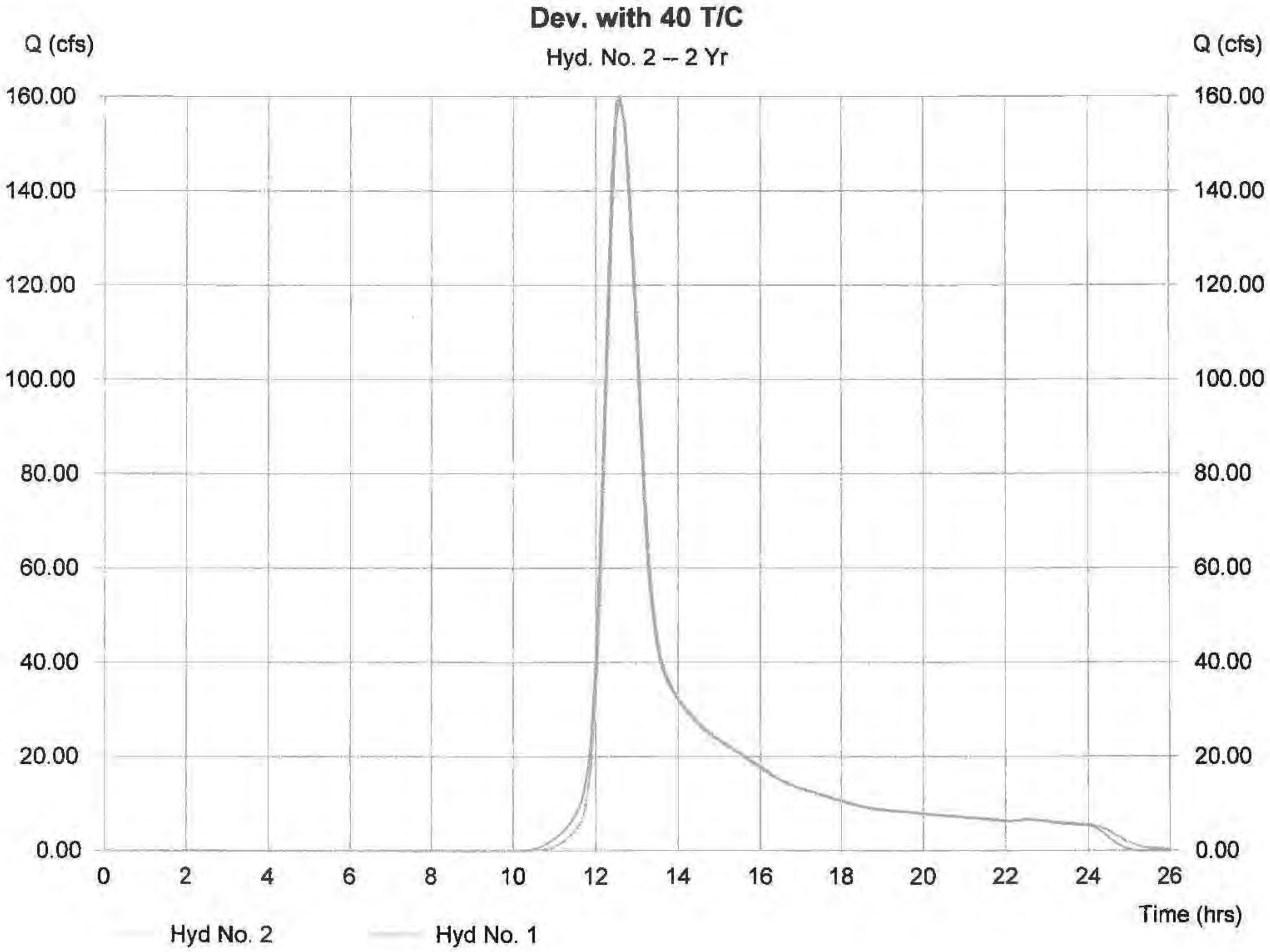
Hyd. No. 2

Dev. with 40 T/C

Hydrograph type	= Reservoir	Peak discharge	= 160.37 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 642.41 ft
Reservoir name	= 11	Max. Storage	= 44,600 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 1,108,070 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

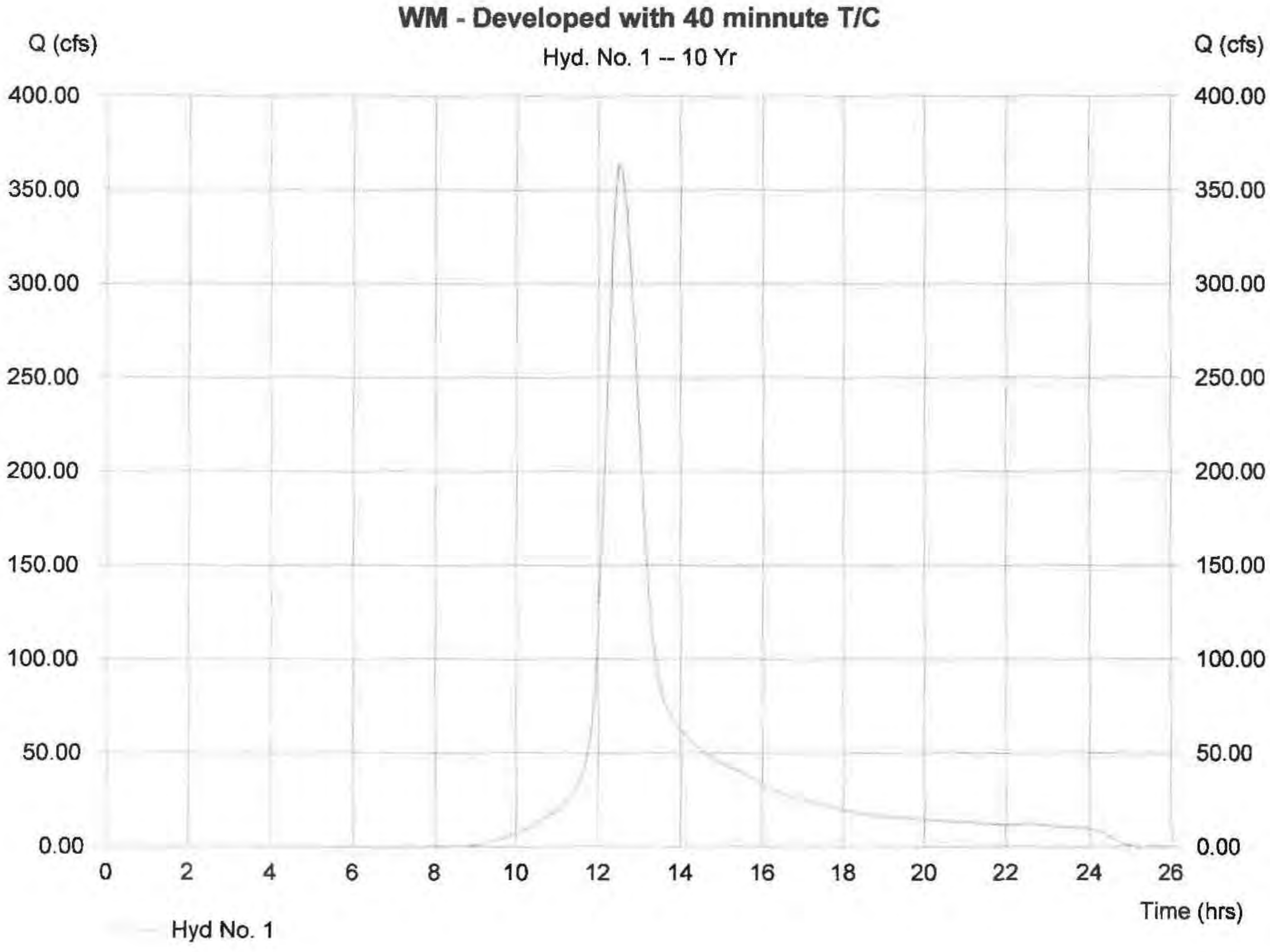
Monday, Nov 29 2004, 9:8 AM

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 364.52 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 5.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,434,857 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:8 AM

Hyd. No. 2

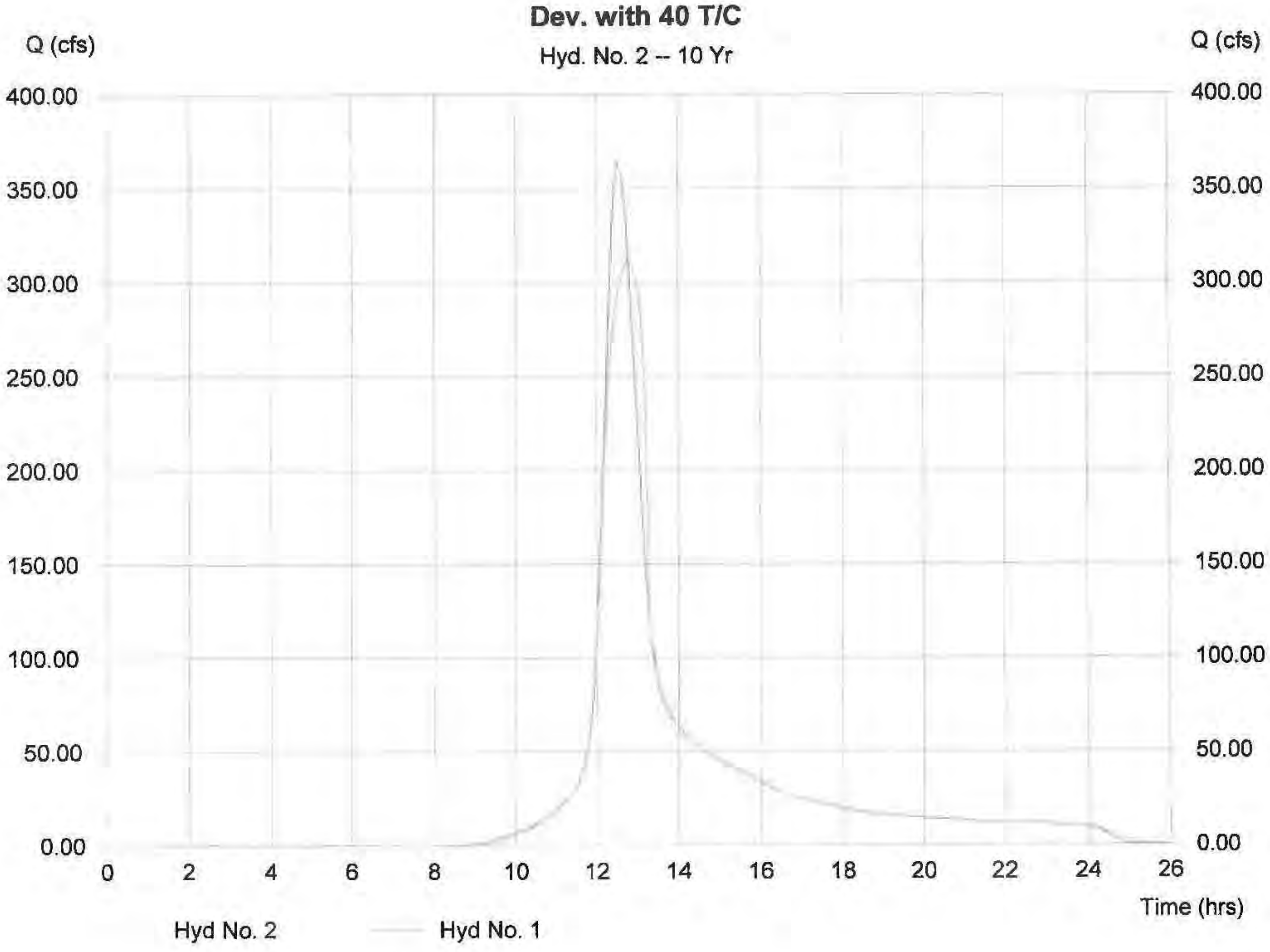
Dev. with 40 T/C

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = 11

Peak discharge = 311.51 cfs
Time interval = 6 min
Max. Elevation = 646.20 ft
Max. Storage = 146,462 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 2,434,855 cuft



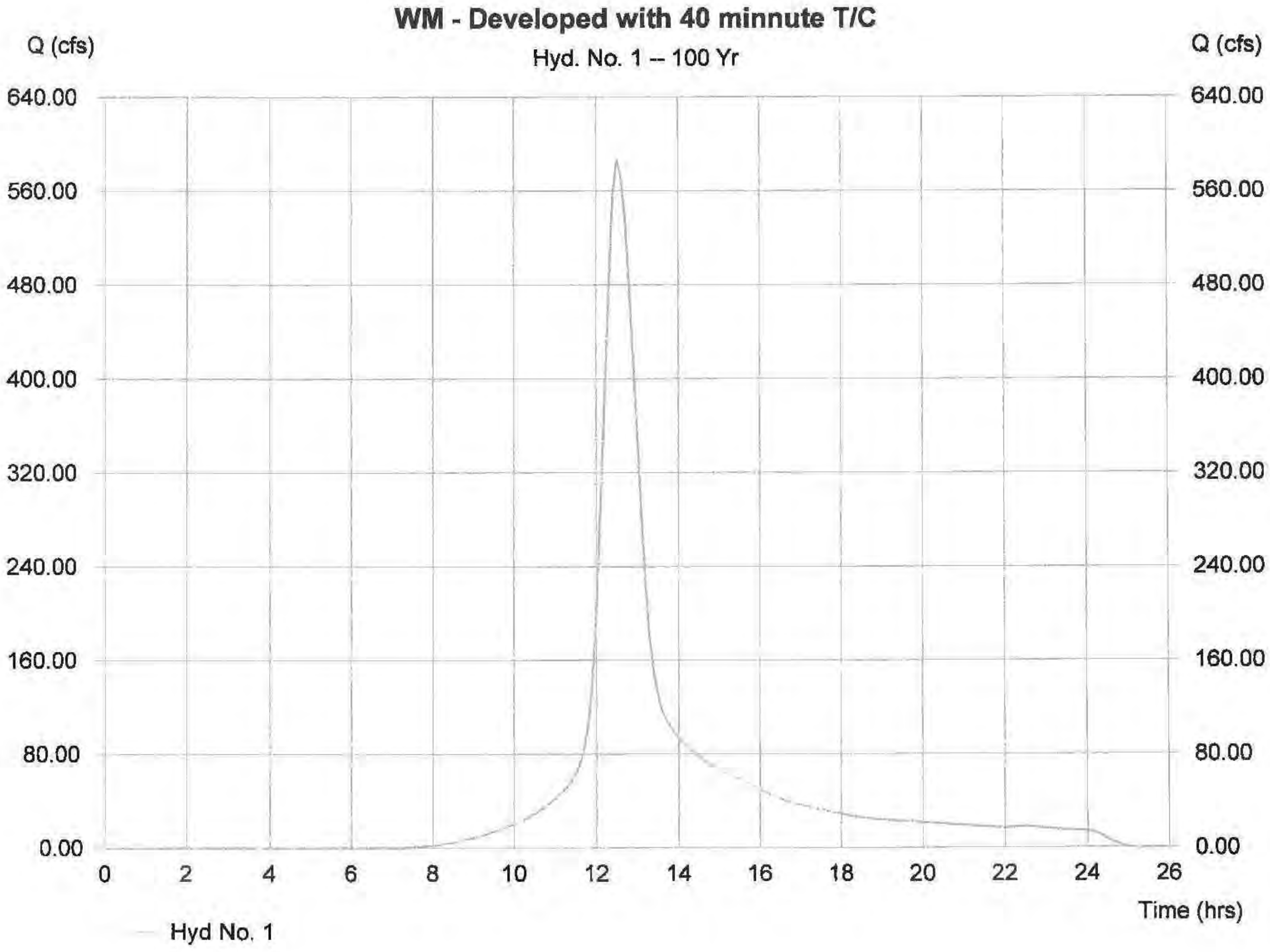
Hydrograph Plot

Hyd. No. 1

WM - Developed with 40 minnute T/C

Hydrograph type	= SCS Runoff	Peak discharge	= 587.48 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,909,422 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:8 AM

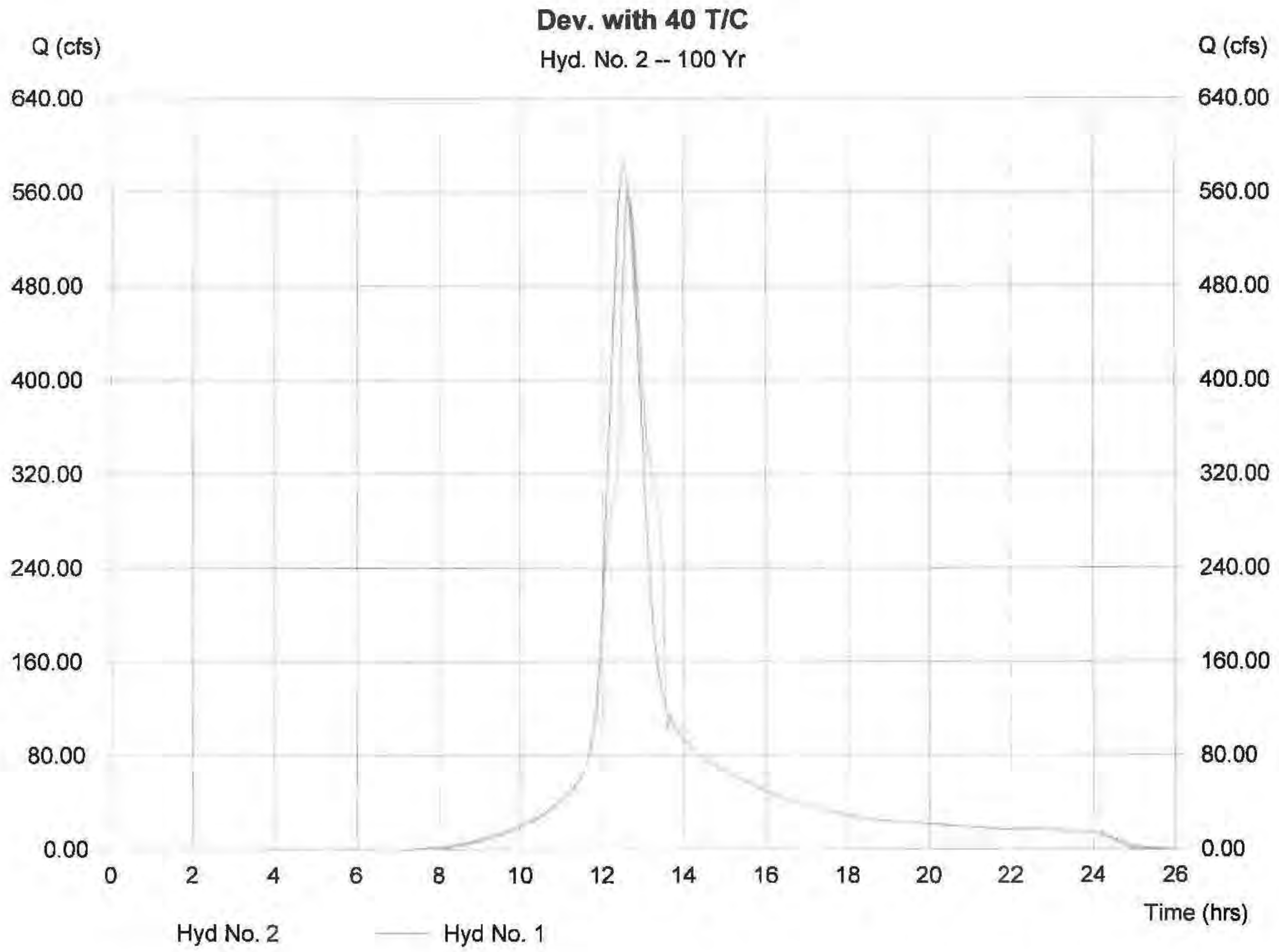
Hyd. No. 2

Dev. with 40 T/C

Hydrograph type	= Reservoir	Peak discharge	= 560.77 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 1	Max. Elevation	= 649.61 ft
Reservoir name	= 11	Max. Storage	= 285,944 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 3,909,420 cuft



APPENDIX F

Flood Flow – 150% of 100 Year Storm

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:44 AM

Pond No. 1 - 640

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871

Culvert / Orifice Structures

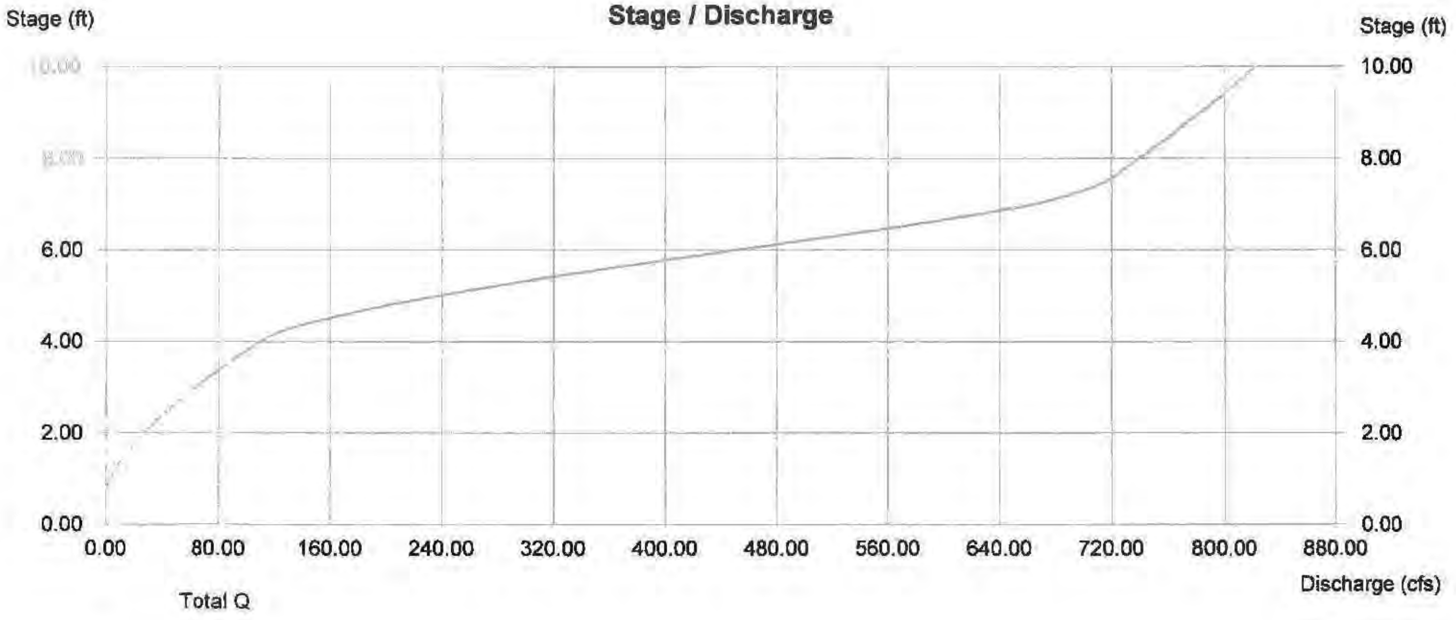
	[A]	[B]	[C]	[D]
Rise (in)	= 96.00	0.00	0.00	0.00
Span (in)	= 96.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	5.50	0.00	0.00
Crest El. (ft)	= 644.10	640.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:44 AM

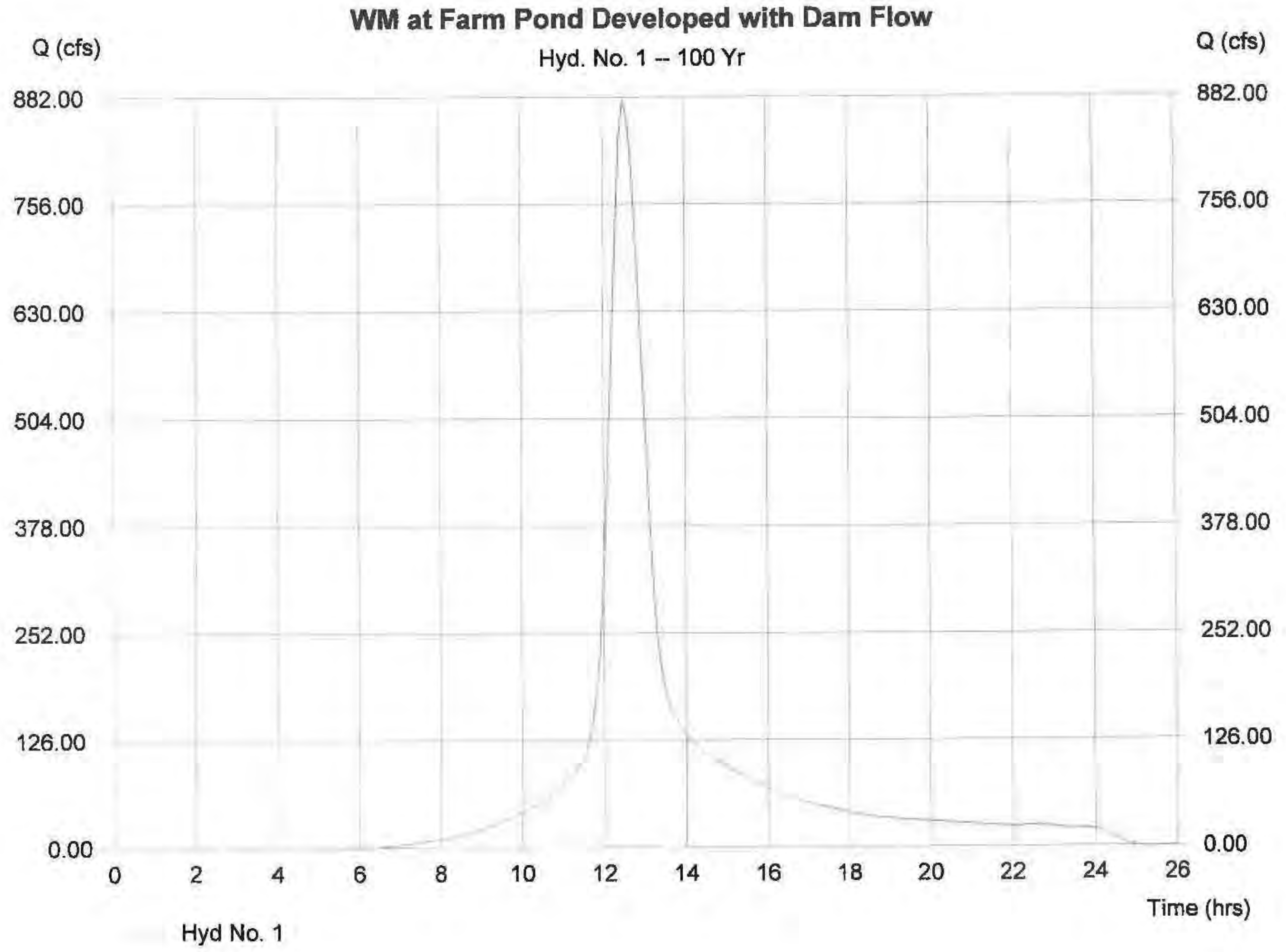
Hyd. No. 1

WM at Farm Pond Developed with Dam Flow

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 10.06 in
Storm duration = 24 hrs

Peak discharge = 881.40 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 5,903,721 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:44 AM

Hyd. No. 2

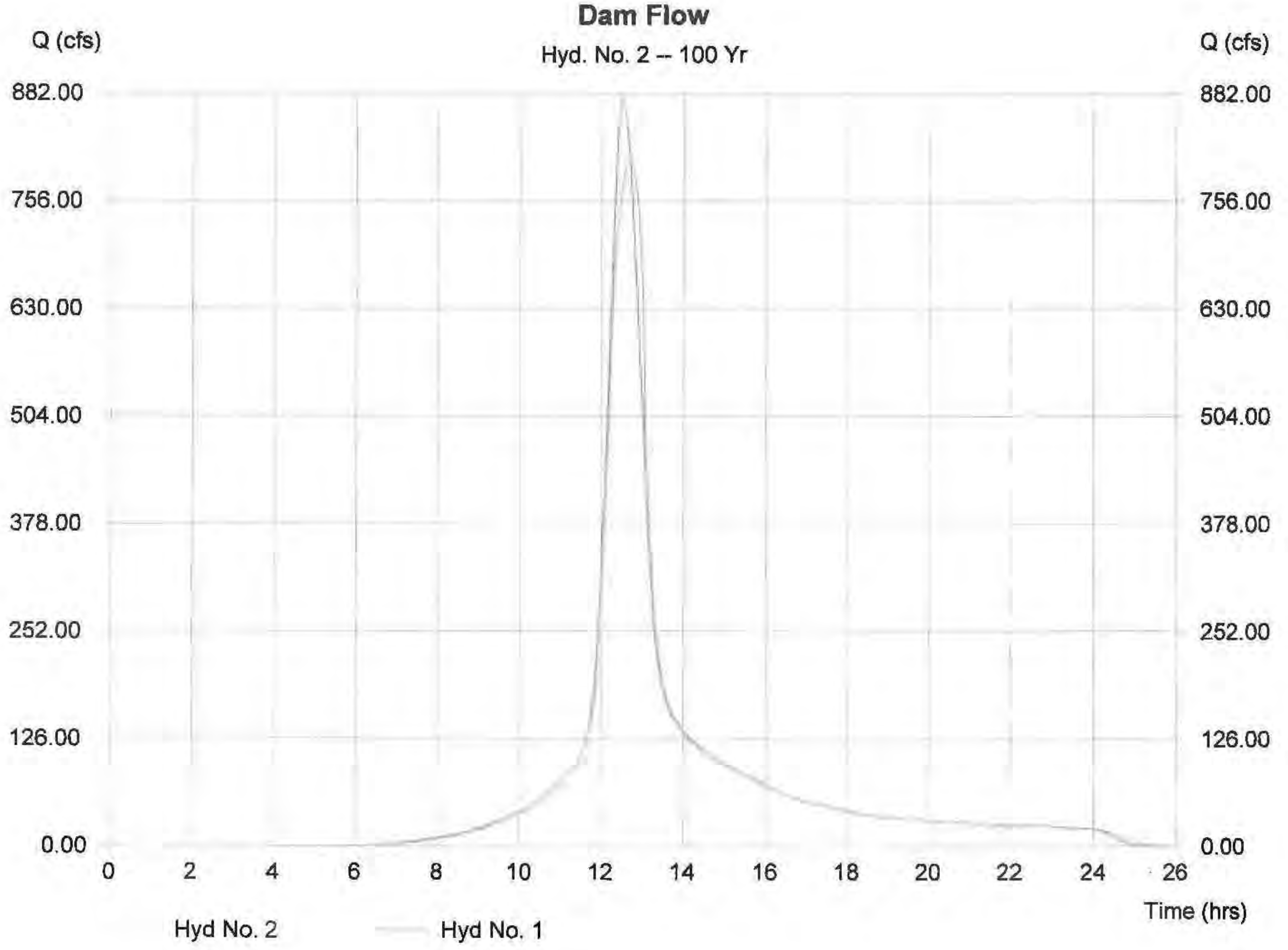
Dam Flow

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Reservoir name = 640

Peak discharge = 804.86 cfs
Time interval = 6 min
Max. Elevation = 649.54 ft
Max. Storage = 282,725 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 5,903,714 cuft



APPENDIX G

Developed Conditions with 40 Minute T/C Pond Modified for Flood Flow

Pond Report

Pond No. 1 - WM Farm Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	640.00	16,500	0	0
1.00	641.00	17,943	17,222	17,222
2.00	642.00	19,386	18,665	35,886
3.00	643.00	22,532	20,959	56,845
4.00	644.00	25,677	24,105	80,950
5.00	645.00	29,269	27,473	108,423
6.00	646.00	32,860	31,065	139,487
7.00	647.00	36,902	34,881	174,368
8.00	648.00	40,944	38,923	213,291
9.00	649.00	45,790	43,367	256,658
10.00	650.00	50,635	48,213	304,871

Culvert / Orifice Structures

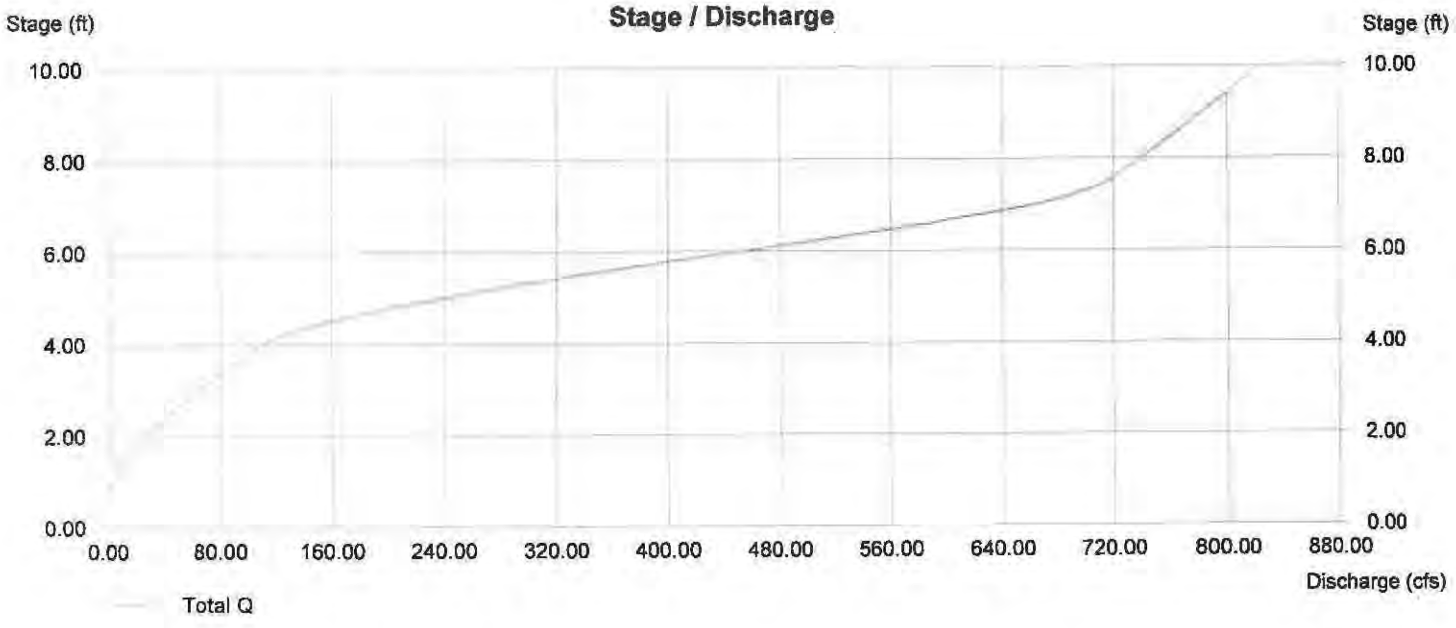
	[A]	[B]	[C]	[D]
Rise (in)	= 96.00	0.00	0.00	0.00
Span (in)	= 96.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 632.62	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 26.00	5.50	0.00	0.00
Crest El. (ft)	= 644.10	640.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:47 AM

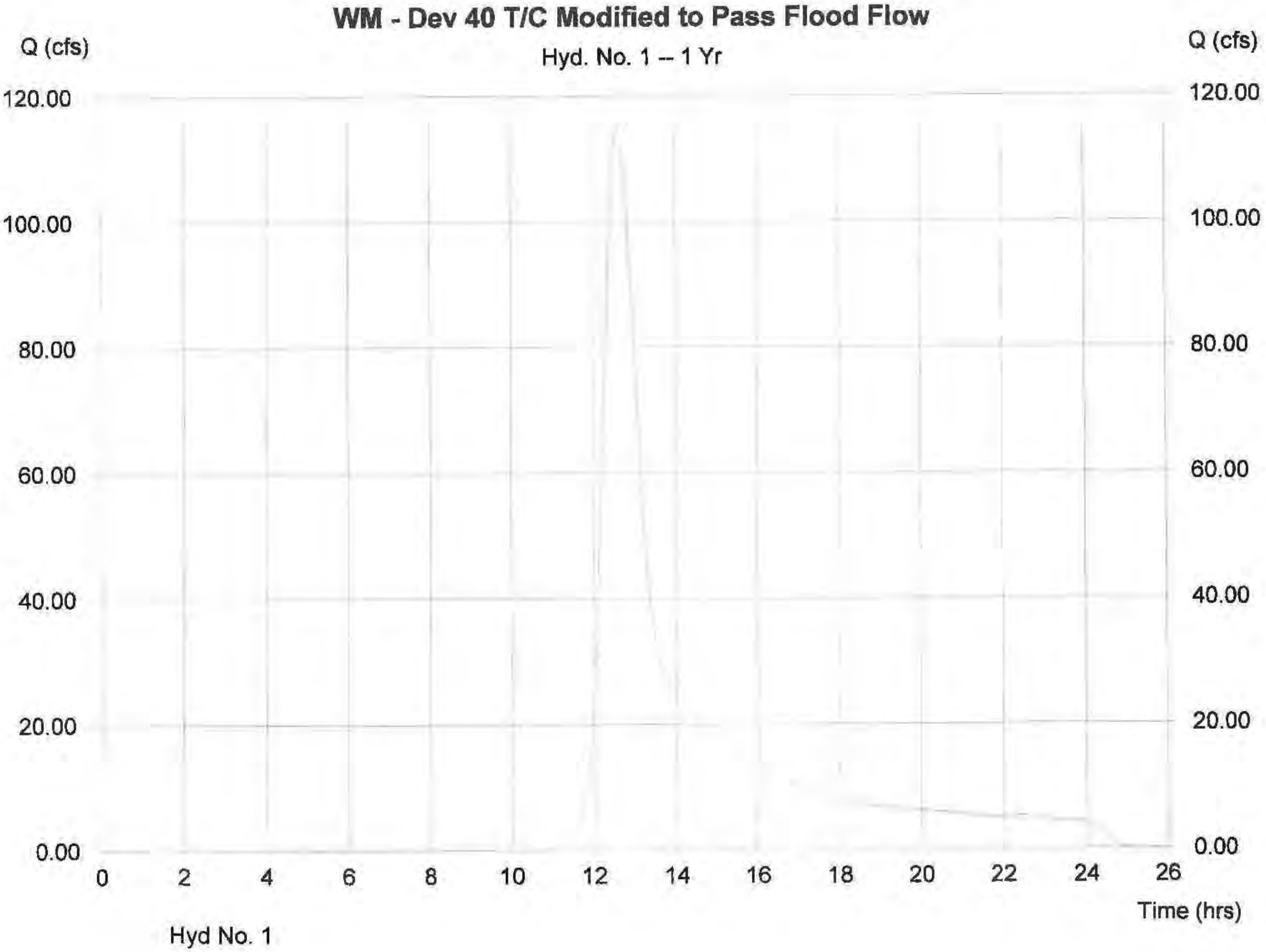
Hyd. No. 1

WM - Dev 40 T/C Modified to Pass Flood Flow

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.00 in
Storm duration = 24 hrs

Peak discharge = 115.14 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 817,809 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 9:47 AM

Hyd. No. 2

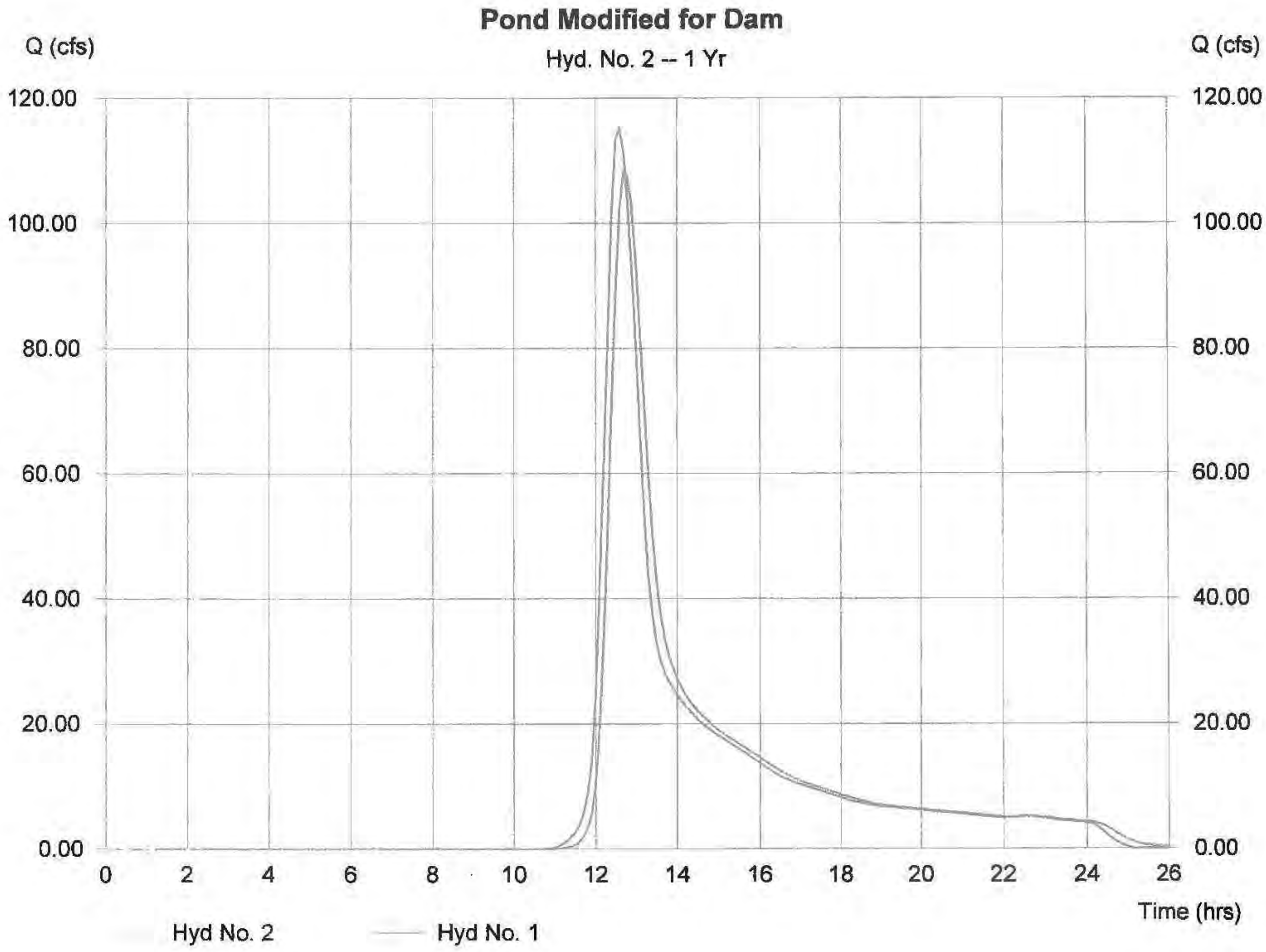
Pond Modified for Dam

Hydrograph type	= Reservoir
Storm frequency	= 1 yrs
Inflow hyd. No.	= 1
Reservoir name	= WM Farm Pond

Peak discharge	= 108.29 cfs
Time interval	= 6 min
Max. Elevation	= 643.97 ft
Max. Storage	= 80,221 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 817,806 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

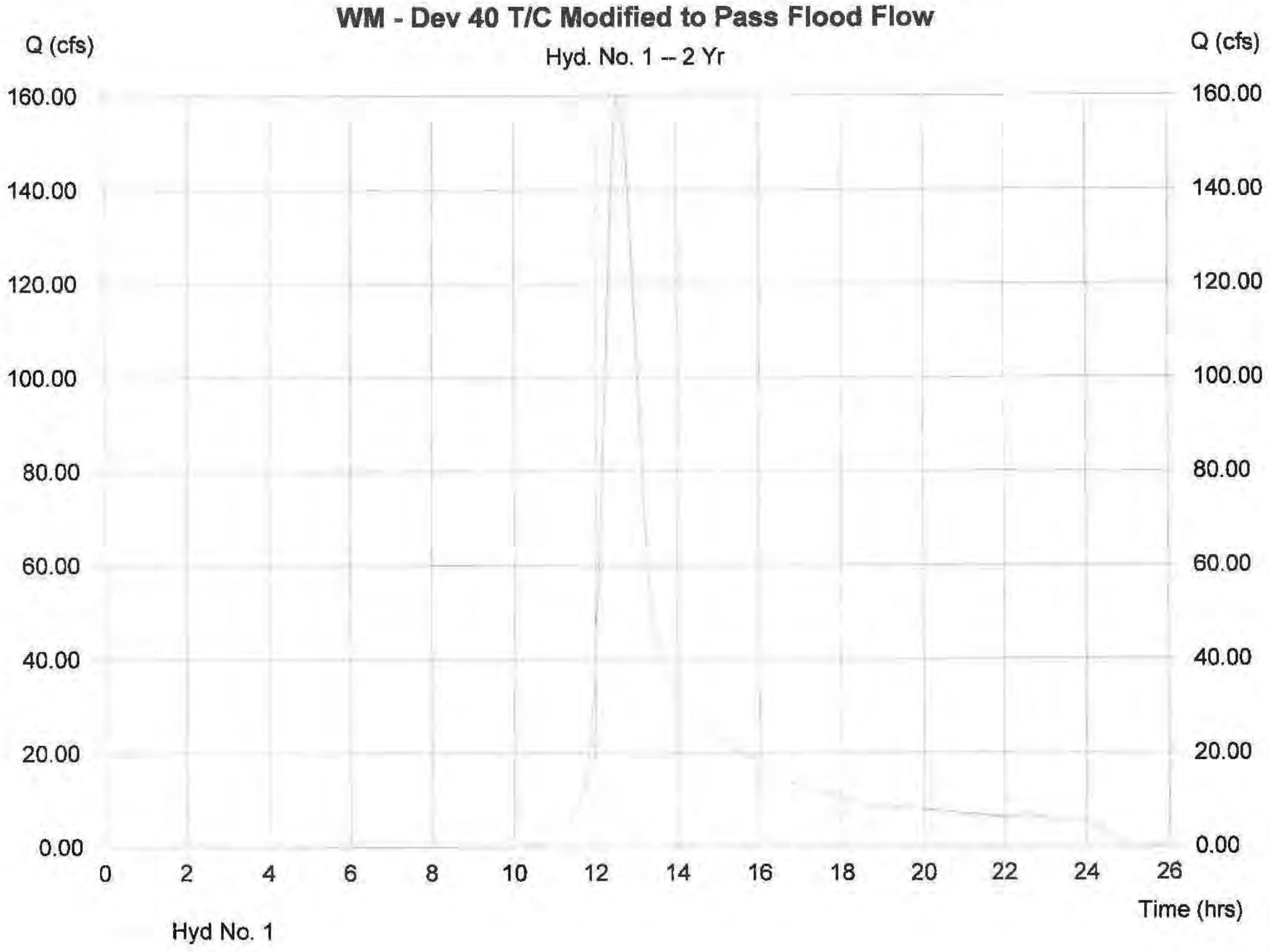
Monday, Nov 29 2004, 10:2 AM

Hyd. No. 1

WM - Dev 40 T/C Modified to Pass Flood Flow

Hydrograph type	= SCS Runoff	Peak discharge	= 159.75 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 3.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,108,073 cuft



Hydrograph Plot

Hyd. No. 2

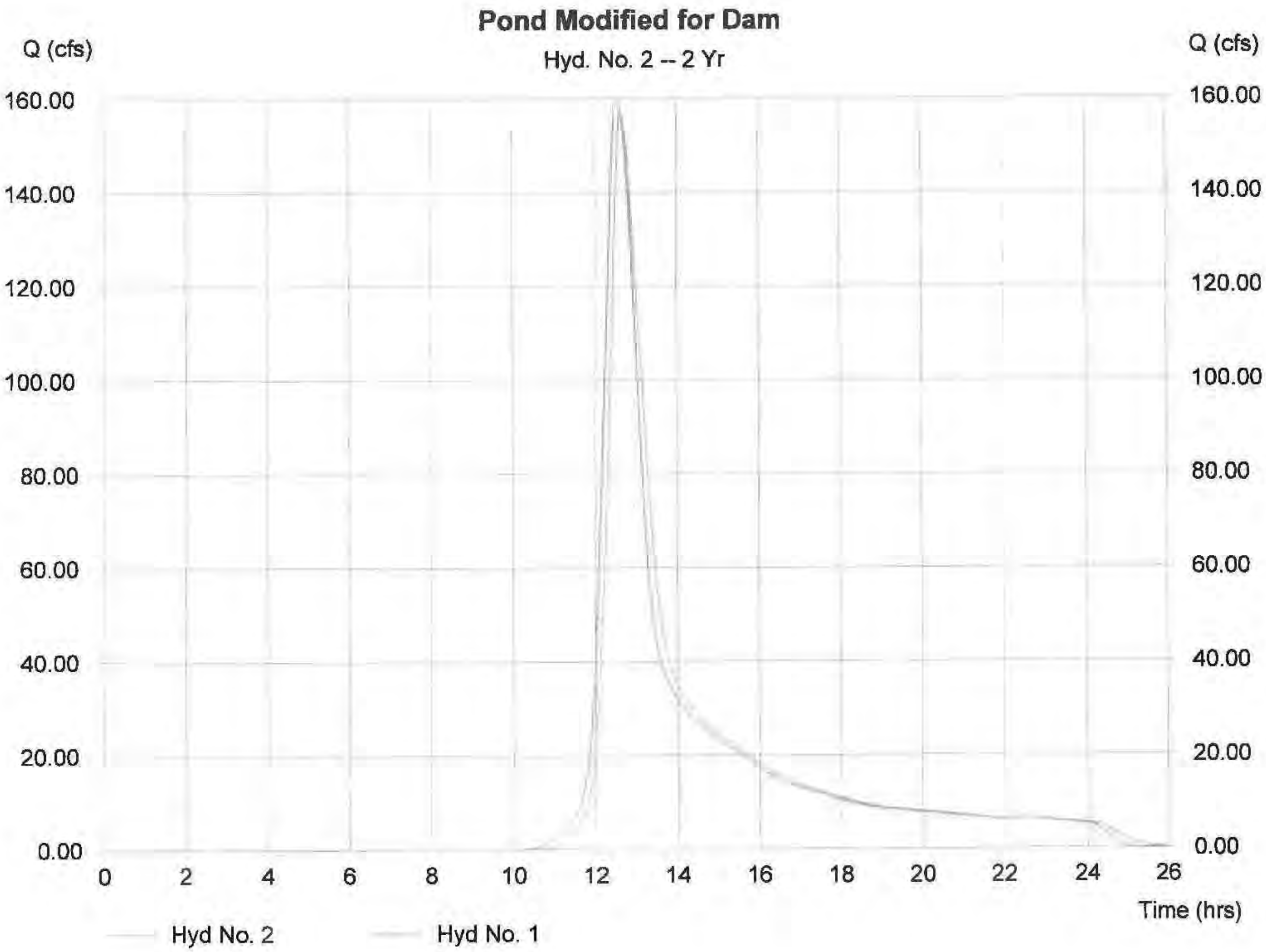
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 157.10 cfs
Time interval = 6 min
Max. Elevation = 644.50 ft
Max. Storage = 94,589 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 1,108,070 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 10:2 AM

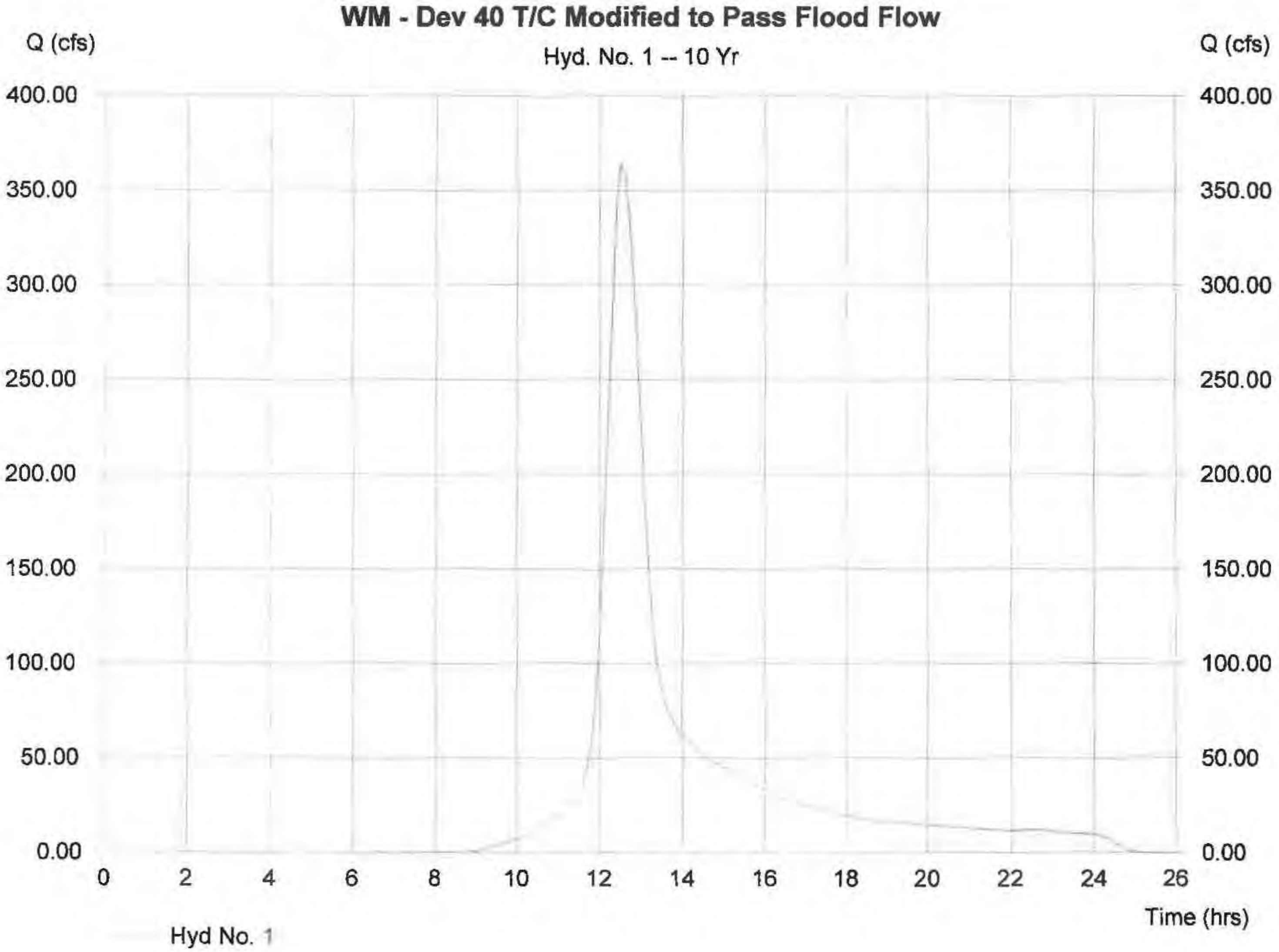
Hyd. No. 1

WM - Dev 40 T/C Modified to Pass Flood Flow

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 240.500 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 364.52 cfs
Time interval = 6 min
Curve number = 75
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,434,857 cuft



Hydrograph Plot

Hyd. No. 2

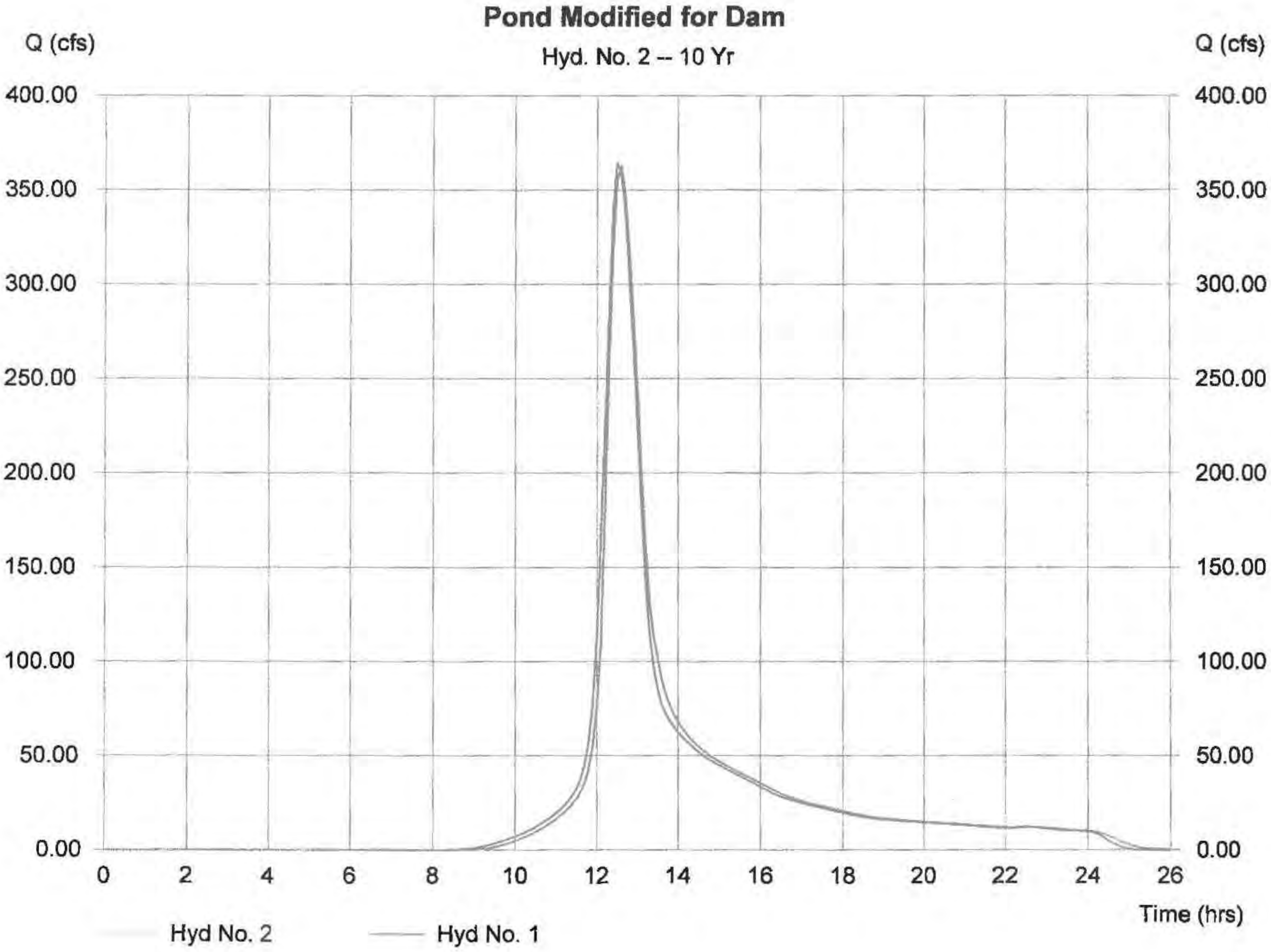
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 362.69 cfs
Time interval = 6 min
Max. Elevation = 645.62 ft
Max. Storage = 127,759 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 2,434,853 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

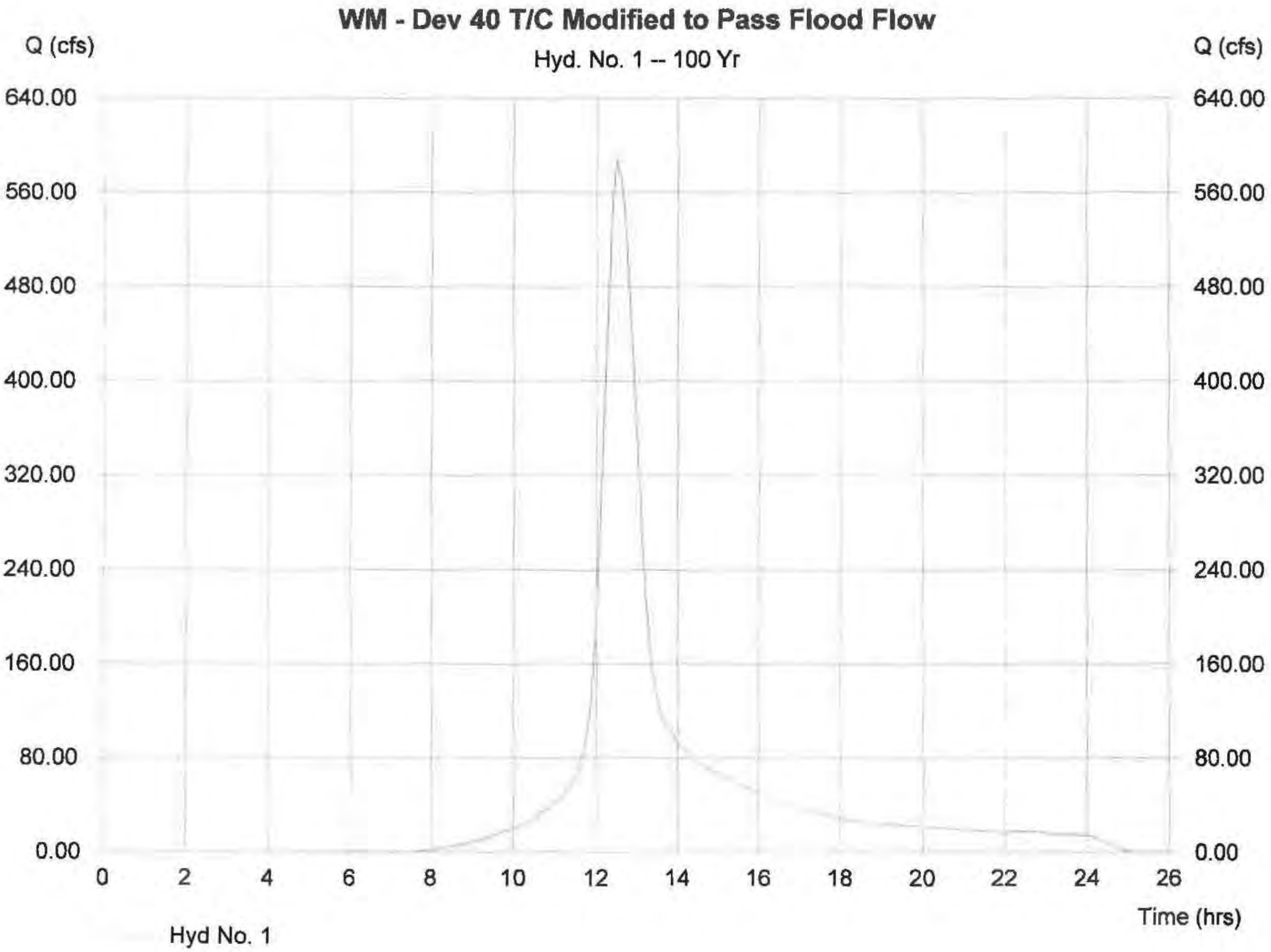
Monday, Nov 29 2004, 10:2 AM

Hyd. No. 1

WM - Dev 40 T/C Modified to Pass Flood Flow

Hydrograph type	= SCS Runoff	Peak discharge	= 587.48 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 240.500 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,909,422 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 29 2004, 10:2 AM

Hyd. No. 2

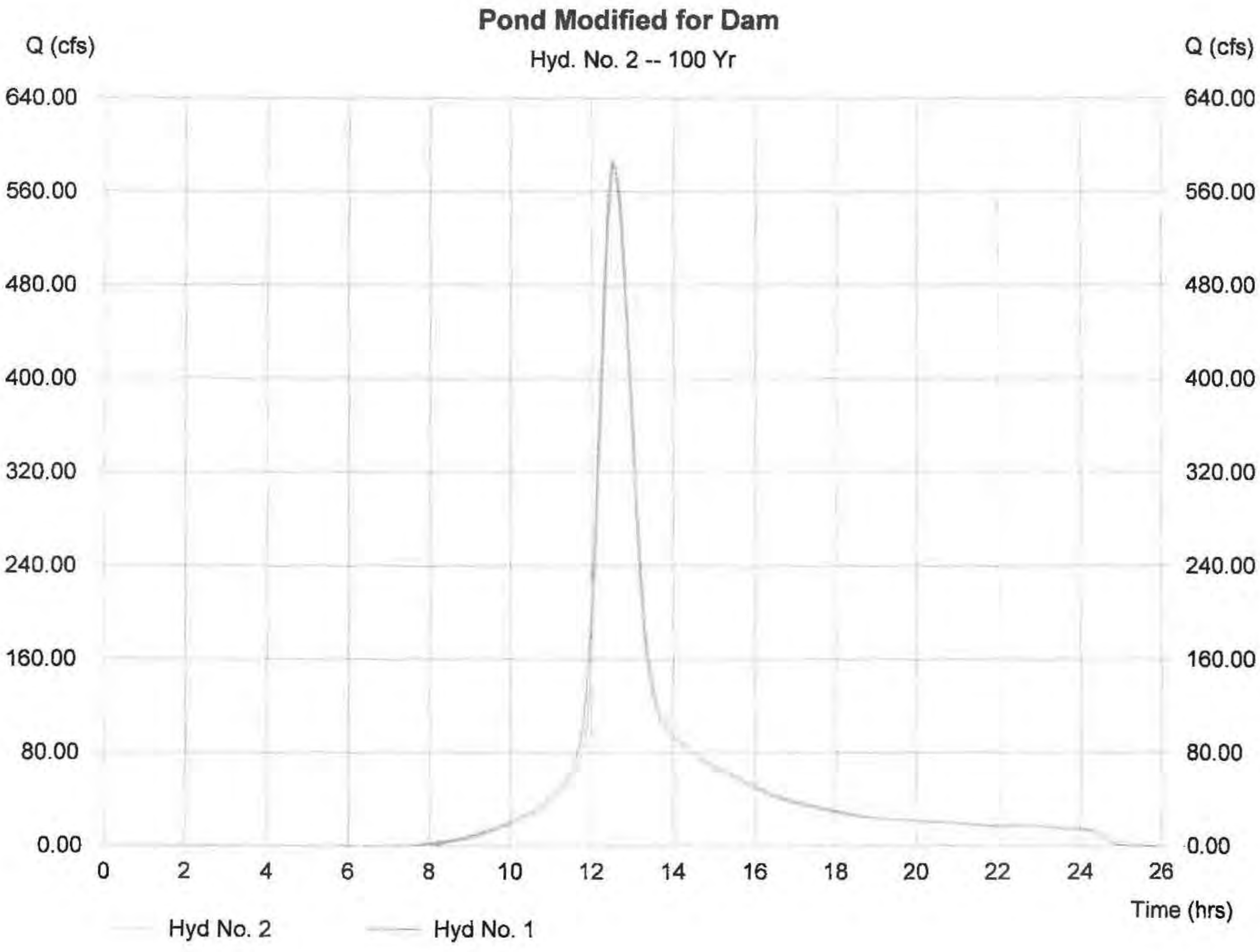
Pond Modified for Dam

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 1
Reservoir name = WM Farm Pond

Peak discharge = 581.12 cfs
Time interval = 6 min
Max. Elevation = 646.57 ft
Max. Storage = 159,486 cuft

Storage Indication method used. Wet pond routing start elevation = 640.70 ft.

Hydrograph Volume = 3,909,421 cuft



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	74.354 degrees West
Latitude	41.237 degrees North
Elevation	0 feet
Date/Time	Thu, 10 Sep 2020 09:14:35 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.04	1.29	**1yr**	0.90	1.21	1.47	1.81	2.20	2.68	3.08	**1yr**	2.37	2.96	3.40	4.14	4.77	**1yr**
2yr	0.40	0.61	0.76	1.00	1.26	1.56	**2yr**	1.08	1.46	1.79	2.19	2.66	3.22	3.69	**2yr**	2.85	3.54	4.07	4.80	5.46	**2yr**
5yr	0.46	0.72	0.90	1.21	1.55	1.94	**5yr**	1.33	1.80	2.23	2.74	3.33	4.03	4.64	**5yr**	3.57	4.46	5.11	5.92	6.69	**5yr**
10yr	0.52	0.81	1.03	1.39	1.81	2.30	**10yr**	1.56	2.11	2.65	3.26	3.96	4.78	5.53	**10yr**	4.23	5.32	6.06	6.95	7.81	**10yr**
25yr	0.60	0.95	1.21	1.68	2.24	2.86	**25yr**	1.93	2.61	3.32	4.10	4.98	5.99	6.98	**25yr**	5.30	6.71	7.61	8.58	9.59	**25yr**
50yr	0.68	1.09	1.39	1.95	2.62	3.39	**50yr**	2.26	3.06	3.94	4.86	5.92	7.11	8.33	**50yr**	6.29	8.01	9.05	10.07	11.20	**50yr**
100yr	0.76	1.24	1.59	2.26	3.08	4.01	**100yr**	2.66	3.60	4.67	5.79	7.04	8.45	9.94	**100yr**	7.48	9.56	10.76	11.82	13.09	**100yr**
200yr	0.86	1.41	1.83	2.62	3.63	4.75	**200yr**	3.13	4.24	5.55	6.88	8.37	10.04	11.87	**200yr**	8.88	11.42	12.81	13.88	15.31	**200yr**
500yr	1.03	1.69	2.21	3.21	4.50	5.93	**500yr**	3.88	5.26	6.95	8.65	10.53	12.62	15.02	**500yr**	11.17	14.45	16.13	17.18	18.85	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.46	0.56	0.76	0.93	1.13	**1yr**	0.80	1.10	1.24	1.57	2.04	2.37	2.60	**1yr**	2.10	2.50	2.91	3.74	4.48	**1yr**
2yr	0.38	0.59	0.72	0.98	1.21	1.46	**2yr**	1.04	1.42	1.65	2.12	2.63	3.12	3.57	**2yr**	2.76	3.44	3.97	4.67	5.31	**2yr**
5yr	0.43	0.66	0.82	1.12	1.43	1.69	**5yr**	1.23	1.65	1.93	2.48	3.09	3.72	4.30	**5yr**	3.29	4.13	4.78	5.54	6.30	**5yr**
10yr	0.47	0.72	0.89	1.25	1.61	1.90	**10yr**	1.39	1.85	2.17	2.76	3.50	4.23	4.97	**10yr**	3.74	4.78	5.52	6.25	7.05	**10yr**
25yr	0.53	0.81	1.01	1.44	1.90	2.19	**25yr**	1.64	2.14	2.54	3.26	4.10	4.98	5.99	**25yr**	4.41	5.76	6.64	7.33	8.16	**25yr**
50yr	0.59	0.89	1.11	1.59	2.15	2.47	**50yr**	1.85	2.41	2.87	3.70	4.64	5.58	6.92	**50yr**	4.94	6.65	7.66	8.28	9.14	**50yr**
100yr	0.65	0.98	1.23	1.78	2.44	2.76	**100yr**	2.10	2.70	3.24	4.19	5.27	6.25	8.00	**100yr**	5.53	7.69	8.82	9.34	10.20	**100yr**
200yr	0.72	1.09	1.38	2.00	2.79	3.10	**200yr**	2.40	3.03	3.67	4.78	6.00	7.02	9.27	**200yr**	6.21	8.92	10.19	10.56	11.38	**200yr**
500yr	0.84	1.25	1.61	2.33	3.32	3.62	**500yr**	2.87	3.54	4.34	5.70	7.15	8.14	11.29	**500yr**	7.20	10.86	12.35	12.47	13.18	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.56	0.68	0.92	1.13	1.36	**1yr**	0.97	1.33	1.56	1.99	2.42	2.88	3.30	**1yr**	2.55	3.17	3.65	4.39	5.06	**1yr**
2yr	0.41	0.63	0.78	1.06	1.30	1.55	**2yr**	1.12	1.52	1.77	2.26	2.81	3.36	3.82	**2yr**	2.97	3.68	4.23	4.99	5.71	**2yr**
5yr	0.50	0.78	0.96	1.32	1.68	1.99	**5yr**	1.45	1.95	2.27	2.91	3.63	4.35	4.95	**5yr**	3.85	4.76	5.43	6.31	7.09	**5yr**
10yr	0.60	0.92	1.13	1.58	2.05	2.44	**10yr**	1.77	2.39	2.76	3.55	4.43	5.35	6.08	**10yr**	4.73	5.84	6.63	7.59	8.54	**10yr**
25yr	0.75	1.14	1.42	2.02	2.66	3.20	**25yr**	2.29	3.13	3.61	4.60	5.76	7.04	7.92	**25yr**	6.23	7.62	8.61	9.70	10.88	**25yr**
50yr	0.89	1.35	1.68	2.41	3.25	3.79	**50yr**	2.80	3.71	4.40	5.59	7.01	8.68	9.67	**50yr**	7.68	9.30	10.49	11.67	13.10	**50yr**
100yr	1.05	1.59	1.99	2.88	3.95	4.61	**100yr**	3.41	4.51	5.36	6.79	8.54	10.73	11.83	**100yr**	9.50	11.38	12.78	14.06	15.77	**100yr**
200yr	1.25	1.88	2.39	3.45	4.82	5.61	**200yr**	4.16	5.49	6.52	8.26	10.39	13.30	14.46	**200yr**	11.77	13.91	15.59	16.91	19.00	**200yr**
500yr	1.58	2.35	3.03	4.40	6.25	7.27	**500yr**	5.40	7.11	8.47	10.69	13.46	17.66	18.83	**500yr**	15.63	18.10	20.25	21.62	24.33	**500yr**

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