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PLANNING BOARD

TWENTY WAYLAND, LLC
c/o KGI Properties, LLC
4th Floor – 45 Broad Street
Boston, MA 02109

May 12, 2008

Wayland Planning Board
Wayland Town Building
41 Cochituate Road
Wayland, MA 01778-2614
Attention: Joseph Laydon, Town Planner

Re: Site Plan I
Phase I Permit Application
Town Center Project
400 Boston Post Road
Wayland, MA

Dear Mr. Laydon;

Pursuant to applicable provisions in the Mixed Use Overlay District zoning (§ 198-2300) and the Mixed Use Overlay District Rules and Regulations as amended through April 24, 2008, this document and twenty-five (25) copies of the design drawing are submitted for Phase I Site Plan Review. The drawings are titled: "Site Plan I Approval Submission, dated 2 May 2008, consisting of eleven drawings and prepared by Arrowstreet Architects. The cover sheet provides the drawing list. The application form is provided in Attachment A.

This submittal is the solely for the architectural design components of Building I-A, I-B, and I-C. The floor and roof plans in this application are provided as a convenience since the MUOD zoning and associated regulations do not regulate floor layouts. We respectfully request that the board's decision be based only on the elevations.

As we discussed with the Planning Board, subsequent Phase I Site Plan applications will provide additional building and site information for the board to review. This application provides waiver requests from the regulations primarily to addresses the phased submittal approach. The only deviation from that statement is the waiver request to depict the existing signage. That signage is going to be demolished and we believe it is not necessary to depict. Accordingly we believe it is in the public's interest to grant the waivers.

The following information is required by the board's rules and regulations.

1. **Checklist summary of required submittal information (§ 304-12 C(5)).**

   See Attachment B.

2. **Outline of Proposed Buildings. (§ 304-12 C(5)b [1]).**

   This information is provided on the design drawing but the following table summarizes the anticipated building program.

Use	Floor Area (SF)	Gross SF Per Zoning (1)
Residential	Not Designed	Will not exceed 165,000 sf
Office Use		Will not exceed 10,000 sf
Bldg 1- A (Second Floor)	8,000	7,500
Other Office	Not Designed	Up to 2,500
Retail/Restaurant Uses		Will not exceed 156,750 sf
Bldg 1- A (First Floor)	7,963	6,800
Bldg 1-B	7,769	6,635
Bldg 1-C	10,715	9,108
Other	Not Designed	Up to 134,207

(1) Gross Floor Area does not include mechanical rooms. Final summary of mechanical room area will be determined as each tenant designs their store and will be provided to the Building Inspector to ensure zoning compliance with each building permit application.

3. **Document How The Application Complies With The MSP Decision (§ 304-12 D (1)).**

Wayland Town Center is a mixed-use project designed to embody the most desirable characteristics of New England and the Town of Wayland as realized in the design of the retail buildings shown in this submittal.

The buildings have been designed to utilize the characteristics of a traditional New England village by using a variety of roof forms, articulated storefronts with awnings, pilasters and varying window types and sizes. We have also broken down the massing of the buildings to look as if they were built as a series of individual buildings and not one long continuous block.

Building 1-A is a two story, mixed-use structure. Through the use of gable ends, dormers and a tower element, this building conforms to the recommendations of the Master Special Permit. The first floor storefronts windows are designed to engage the public by allowing views into the store from the pedestrian way. On the second level traditional double hung windows are used along with strategically placed Juliet balconies.

Building 1-B is a one story retail structure located on the "Main Street". In this building we broke up the massing into 3 distinct "buildings' through the use of Hip and Gambrel roof forms, differing window types and trim details. The scale of the building relates well to the pedestrian and the traditional one storey retail streets found in many New England towns.

Building 1-C, also a one storey retail structure is located adjacent to building 1-B. Here we not only utilized differing roof forms to break up the massing, we varied the height of the tenant storefronts. This adds a sense of rhythm to the street edge that reinforces the recommendations of the Master Special Permit.

All three buildings being submitted use traditional clapboard as their main material enhanced with trim, panel, pilaster and rail details which are in keeping with the feel of a town center. They also are located within the proposed "building envelopes" as defined in the Master Special Permit, and are in compliance with the MSP decision regarding height limits.

The addition of historically styled light fixtures both on the streets and the facades, in conjunction with signage that is architecturally compatible with the retail buildings, helps articulate the streetscape serving to further reinforce the pedestrian-friendly scale.

4. Submit Information on the Application Phasing and Schedule (§ 304-12 D (2)).

It is important to understand the Phase I Site Plan submittal approach we have agreed with the Planning Board. A number of applications will be provided that relate to the residential, retail, and office components. Once each application is approved then no further planning board review is anticipated unless required pursuant to § 2304.4.5.

Based on the above, the current anticipated submittal schedule is as follows:

Submittal	General Description	Anticipated Submittal Date
Site Plan I	Architectural Design – Block I	May 12, 2008
Site Plan II	Site Development Plan	June 16, 2008
Site Plan III	Architectural Design – Block II	June 16, 2008
Site Plan IV	Architectural Design – Grocery Store	June 23, 2008
Site Plan V	Architectural Design – Block III	July 1, 2008

5. Submit Drainage Report (§ 304-12 D (3)).

This information is not applicable for this submittal. Therefore a waiver from this requirement for this application is requested.

6. Revisions to the MSP Approved Stormwater O&M Plan (§ 304-12 D (4)).

This information is not applicable for this submittal. Therefore a waiver from this requirement for this application is requested.

7. Explain compliance with MDEP Stormwater Regulations (§ 304-12 D (5)).

This information is not applicable for this submittal. Therefore a waiver from this requirement for this application is requested.

8. **Provide Landscaping and Maintenance Plan (§ 304-12 D (6)).**

   This information is not applicable for this submittal. Therefore a waiver from this requirement for this application is requested.

9. **Describe Proposed Signage (§ 304-12 D (7)).**

   The proposed signage is depicted on Drawing A4.1 and will comply with the MSP decision.

10. **Describe proposed lighting plan (§ 304-12 D (8)).**

    Compliance with the site lighting requirements is a function of the building exterior lights and the site lighting. Details on both of those components will be provided in subsequent Phase I Site Plan applications. Therefore such information is not provided herein and a waiver from this requirement for this application is requested.

11. **Describe the proposed waste management practices (§ 304-12 D (9)).**

    This information is not applicable for this submittal. Therefore a waiver from this requirement for this application is requested.

Thank you for your consideration. Please do not hesitate to contact me with any questions or concerns.

Sincerely,

TWENTY WAYLAND, LLC

By: Francis X Dougherty

Francis X. Dougherty, authorized representative

cc: D. Stratouly, CGI
G. Clagett, CGI
C. Irving, KGI
A. Deluca, KGI

ATTACHMENT A – APPLICATION FORM

TOWN OF WAYLAND
TOWN BUILDING
41 COCHITUATE ROAD
MASSACHUSETTS, 01778

PLANNING BOARD

MIXED-USE OVERLAY DISTRICT APPLICATION

Date of Application Submittal: *Site Plan I - May 12, 2007*

Application for:

☐ **Concept Plan** ☐ **Master Special Permit (MSP)** ☐ **MSP Modification**

☒ **Site Plan** ☐ **Site Plan Modification** ☐ **Other (see narrative)**

LOCATION OF SUBJECT PROPERTY

# and Street Name	Plate	Parcel	Year Built
400 Boston Post Road	023	5L-D,E,G,H,IJ,K,L, & M	

OWNER/ APPLICANT CONTACT INFORMATION

Name	Telephone Number	Fax
Frank Dougherty, Authorized Representative	(617) 357-9300	(617)357-9990

Address	Email
Twenty Wayland, LLC 45 Broad St. Boston MA02109	f.dougherty@kgiproperties.com

LEAD CONSULTANT CONTACT INFORMATION (if different from owner information)

Name | Telephone Number | Fax

Address | Email

ATTORNEY/AGENT INFORMATION (if applicable)

Adam Weisenberg | (617) 570-1473 | (617) 523-1231

Name | Telephone Number | Fax

Goodwin Procter LLP Exchange Place Boston, MA 02109
aweisenberg@goodwinprocter.com

Address | Email

NARRATIVE (describe proposal)

We request that the Planning Board find, as we believe will be apparent from our submission, that the proposed Project meets the applicable criteria for approval, including the requirements that the Project design, as depicted in the Phase I Site Plan Application, is in compliance with MUP Master Special Permit

I hereby request a meeting/hearing before the Planning Board with reference to the above application, with supporting documentation submitted, and certify that the proposed work is authorized by the Owner of Records and I have been authorized by the owner to make this application as the agent.

Francis X. Dougherty | 5/12/08

Authorized Agent/Owner | Date

Fee Paid: ____________________

____

Signature of Planning Board/ Agent

NO FEE REQUIRED
-FKD 5/12/08

ATTACHMENT B – COMPLIANCE CHECKLIST

ATTACHMENT B – SUBMITTAL CHECKLIST

PHASE I SITE PLAN SUBMITTAL CHECKLIST

MIXED USE OVERLAY DISTRICT (§ 304-12)

WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
C(1)a	Plan Sheets No Larger Than 24" x 36"	Y	
C(1)b	Plans to have cover sheet, title block, index of drawings, and legend of symbols.	Y	Legend of Symbols not required per architect for Site Plan I.
C(1)c	Each plan to have title block, North Arrow (civil drawings) and scale of measurement.	Y	
C(1)d	Each plan to be stamped and certified by appropriate professional	Y	
C(1)e	Plans to show existing and proposed site grading.	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(1)f	Base plans to have layers of information	Y	
C(2)	Plans to have suitable scale. A site plan shall be prepared for recording.	N	Need Planning Board agreement on what should be on the site plan.
C(3)	Submit multiple sheets with drawing index	Y	
C(4)	Cover sheet to have Planning Board endorsement provision	Y	
C(5)	Provide submittal checklist	Y	
C(5)a[1]	Plans to include locus map	Y	

PHASE I SITE PLAN SUBMITTAL CHECKLIST
MIXED USE OVERLAY DISTRICT (§ 304-12)
WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
C(5)a[2]	One Sheet to depict typical symbols	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[3]	Plans to have lot lines, abutters, and property lines	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[4]	Existing and proposed easements shall be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[5]	Existing and proposed private and public roads, pavement, and other features	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[6]	Zoning district should be shown on plans	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[7]	Existing and proposed topography with benchmarks to be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C5a[8]	Open space areas to be shown on one sheet	N	Waiver for this submittal requested. Information not required for architectural submittal
C(5)a[9]	Wetlands and Buffer Area shall be shown on one sheet	N	Waiver for this submittal requested. Information not required for architectural submittal
C(5)a[10]	Watercourses and water bodies shall be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)a[11]	Special site features shall be shown on at least one drawing	N	Waiver for this submittal requested. Information not required for architectural submittal.

PHASE I SITE PLAN SUBMITTAL CHECKLIST
MIXED USE OVERLAY DISTRICT (§ 304-12)
WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
C(5)b[1]	Show outline of existing and proposed structures	Y	Proposed footprints are shown, existing footprints are not shown for architectural submittal.
C(5)b[2]	Show building design, elevations, materials, and heights	Y	
C(5)b[3]	Table summarizing the gross floor area for retail, office, municipal, and residential uses	Y	See written submittal information.
C(5)b[4]	Show setbacks to MUOD zoning or MSP decision	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)b[5]	Existing and proposed signs	Y	Existing sign is to be demolished and not shown. Proposed signage is shown on Drawing A4.1 and described in the narrative for Section § 304-12D (7).
C(5)b[6]	Existing and proposed lighting to be shown	N	Existing lighting will not be show as it will be demolished. Proposed lighting will be shown in subsequent submittals. Waiver for this submittal is requested. Information not required for architectural submittal as described in the narrative for § 304-12 (D)8.
C(5)b[7]	Proposed landscaping, buffer area plantings, and other screening elements.	N	Waiver for this submittal requested. Information not required for architectural submittal.

PHASE I SITE PLAN SUBMITTAL CHECKLIST
MIXED USE OVERLAY DISTRICT (§ 304-12)
WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
C(5)b[8]	Outdoor storage area to be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)b[9]	Underground storage containers to be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)b[10]	Existing and proposed sidewalks, walkways, and driveways to be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)b[11]	Existing and proposed parking facilities including landscaped areas and related information to be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[1]	Stormwater design and detail information should be provided	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[2]	Erosion Control devices should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[3]	Water services should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[4]	Proposed hydrants should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[5]	Underground utilities with access covers should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)c[6]	Solid waste disposal facilities should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.

PHASE I SITE PLAN SUBMITTAL CHECKLIST
MIXED USE OVERLAY DISTRICT (§ 304-12)
WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
C(5)c[7]	Existing and Proposed on-site sewage disposal facilities should be shown	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)d[1]	Provide details of drainage and road construction materials	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)d[2]	Show details on tress and planting areas	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)d[3]	Show details on parking spaces	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)d[4]	Show outdoor structures and lighting	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)d[5]	Show erosion and sedimentation controls	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)e[1]	Show landscaping, plantings, buffers area plantings	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)e[2]	Show perimeter wooded areas	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)e[3]	Tabulate open space, building coverage, and upland areas	N	Waiver for this submittal requested. Information not required for architectural submittal.
C(5)e[4]	Show screening and buffers	N	Waiver for this submittal requested. Information not required for architectural submittal.
D (1)	Document how the application complies with the MSP decision	Y	See narrative.

PHASE I SITE PLAN SUBMITTAL CHECKLIST
MIXED USE OVERLAY DISTRICT (§ 304-12)
WAYLAND, MASSACHUSETTS

SITE PLAN I APPLICATION

REFERENCE	ITEM	SUBMITTED?	COMMENT
D(2)	Submit information on application phasing and how the final plans will be integrated	Y	See narrative.
D(3)	Drainage calculations should be provided	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(4)	Any revisions from the MSP stormwater O&M Plan should be provided	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(5)	Explanation on how the application complies with the DEP Stormwater regulations	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(6)	Description on the landscaping and maintenance plan.	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(7)	Description of the proposed signage	Y	See narrative.
D(8)	Proposed lighting plan descsription	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(9)	Description on the proposed waste disposal pratices	N	Waiver for this submittal requested. Information not required for architectural submittal.
D(10)	Applicant is encouraged to submit more information	N	None required.

Stormwater Management Study

Wayland Town Center
Wayland, MA

Applicant:
Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Prepared by:
R.J. O'Connell & Associates, Inc.
80 Montvale Avenue
Stoneham, MA 02180

Date: **June 2, 2008**

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I. STORMWATER MANAGEMENT NARRATIVE

1.0 Project Location and Description

The project site has an area of approximately 56.9 acres and is located at 400 Boston Post Road, in Wayland, MA (See Figure 1 - Locus Map). The site is bound by Route 20 (Boston Post Road) to the south, the Wayland Business Center property to the North, Sudbury River to the west and the Wayland meadows property and Route 27 (Old Sudbury Road) to the East. There are wetland areas on the site. The larger wetland is located at the western portion of the site adjacent to Sudbury River, two smaller wetland areas are at the north east portion of the site adjacent to the Wayland Business Center property, and on the south east portion of site adjacent to Route 20.

Approximately 25 acres of the site is currently developed. The existing development contains a building formerly occupied by Raytheon with a footprint area of ±272,700 square feet and a ±10,500 square foot building formerly utilized as a daycare center and associated parking. There is a Wastewater Treatment facility on site which is owned and operated by the Town of Wayland. The existing topography of the project site generally slopes east to west and ranges from elevation ±146 at the eastern property line adjacent to the Wayland Meadows Property to elevation ±116 at the western side of the site in the large wetland area adjacent to Sudbury River.

The proposed development program consists of demolishing the existing ±272,700 square foot building and constructing a mixed use development consisting of residential, municipal and retail use buildings, with associated parking facilities, utilities, and stormwater collection system (See Figure 2 - Site Plan). The stormwater management system for the proposed project has been designed in accordance with the MADEP's Stormwater Management Policy and Standards and the Town of Wayland's Wetlands and Water Resources Bylaw Chapter 194 Rules and Regulations.

Stormwater quality control will be achieved through a program of Best Management Practices (BMP's). The proposed stormwater management system will significantly improve the quality of the stormwater runoff. The existing pavement runoff drains to catch basins which direct runoff to wetland resource areas without additional water quality treatment. The proposed stormwater management system for the project will include new catch basins with deep sumps and hoods, and the use of innovative low impact development (LID) techniques.

Low Impact Development is a stormwater management approach with the goal to mimic the site's pre-development hydrology. This is done by using design techniques that infiltrate, filter, store, and detain water throughout the site using decentralized micro-scale controls. LID includes structural and non-structural strategies such as retention areas, reduction of impervious surfaces, lengthening of flow paths, and the preservation of existing vegetation and landscape features. Redevelopment and improving stormwater quality of existing sites, and energy and water conservation are also examples of LID techniques.

LID techniques proposed for the project include the use of water quality swales, rain gardens, and bio-retention basins to increase times of concentration, promote groundwater recharge, and enhance water quality. The water quality swales will be planted with grass on the bottom and sides to slow the runoff velocity and filter pollutants. The rain gardens and bio-retention basins will be planted with a combination of grasses, perennials, shrubs, and small trees. The clean stormwater runoff from the building rooftops will be directed to the water quality swales and bio-retention basins to provide additional groundwater recharge.

Based on a review of The National Flood Hazard Insurance Rate Map for the Town of Wayland, Massachusetts, Community Panel No 250224 0002 C, Dated (Revised) February 19,1986, the project site is located within the following zones:

Zone A - Area of 100 year flood
Zone B – Area between 100 year and 500 year floods
Zone C - Area of Minimal Flooding

2.0 Design Objectives and Methodologies

The stormwater management system was designed to control post-development peak runoff from the site by keeping it at or below the levels of pre-development. This was done by analyzing the 2-year, 10-year, and 100-year 24-hour storm events using the Hydraflow Hydrographs 2004 computer program. Hydraflow uses TR-20, the SCS Unit Hydrograph method (an industry accepted method) capable of developing runoff hydrographs for both simple and complex drainage basins. Hydraflow computes SCS Method Runoff Hydrographs by convoluting a rainfall hyetograph through a unit hydrograph.

Utilizing the TR-20 method in Hydraflow, the following data is necessary for input:

Watershed Area: Areas of each watershed are calculated and expressed in acres for these calculations.
SCS Curve Number (CN): Based on the cover type and hydrologic soil group, a weighted curve number (CN) was determined for each of the existing watersheds utilizing Table 2-2a- *Runoff Curve Numbers For Urban Areas* and *Worksheet 2, Runoff Curve Number and Runoff* from the Soil Conservation Service Technical Release 55 – Urban Hydrology for Small Watersheds
Time Interval (Minutes): For the most compatible results with the existing conditions, this value is defined at 2 minutes.
Time of Concentration, Tc (Minutes): The time of concentration for each watershed was determined by finding the time necessary for runoff to travel from the hydraulically most distant point in the watershed to the point of concentration. Time of concentrations were calculated using TR-55 worksheets with a minimum recommended time of concentration of 6 minutes.
SCS 24-Hour Storm Type: For the greater New England region, a Type III storm is recommended for drainage calculations.
Rainfall Precipitation: Rainfall precipitations for the 2, 10, and 25 year, 24-hour storm events were obtained using Figure B-1 from Technical Paper No. 40 (TP-40) Rainfall Frequency Atlas of the United States and are as follows for Wayland, MA:

2-year storm event: 3.1 inches
10-year storm event: 4.5 inches

As per Town of Wayland Wetland regulations, a 24 hour storm event with a depth of 1 inch will be required as part of the analysis. The minimum depth for a 24 hour 100 year storm depth will be 7 inches as per the Town of Wayland Wetland Regulations.

An on-site subsurface storm drainage collection system was designed to carry a minimum 25-year storm event through the site using the Hydraflow Storm Sewers Program. This program uses the Rational Method for estimating runoff and storm drainage pipes are sized based on calculated flows using Manning's Equation (See Appendix C for Pipe Sizing Calculations).

The site was divided into sub-areas, each contributing runoff to an individual catch basin inlet or roof drain. A value for area, time of concentration, and a runoff coefficient were calculated for each contributing sub-area. Rainfall intensities are calculated based on regional precipitation values provided in Technical Memorandum Hydro-35.

3.0 Existing Soils

The Soil Survey of Middlesex County, Massachusetts, completed by the National Resource Conservation Service (NRCS, formerly the Soil Conservation Service), was reviewed for general information on the soils within the site area (See Figure 3 - Soil Map). The mapped soils shown within the site limits are identified as follows:

Soil Number	Soil Type	Hydrologic Group
255A	Windsor Loamy Sand, 0 to 3 percent slopes	A
256A	Deerfield Loamy Sand, 0 to 3 percent slopes	B
602	Urban Land	Null
36A	Saco Mucky Silt Loam, 0 to 1 percent slopes	D

The soils surrounding the mapped urban land consists primarily of consist primarilyof Windsor Loamy Sand (hydrologic group A). Borings done on site in the areas mapped as urban land indicate that the soils consist of loamy sands which are consistent with hydrologic group A soils. For hydrology calculations, the soils mapped as urban land was assumed to be hydrologic group A soil.

4.0 Existing Conditions Runoff

The existing topography and land cover has been analyzed and 6 watershed areas were delineated with a combined area of ±43 acres for stormwater runoff. The watershed areas consist of the project site as well as any contributing off-site areas that direct runoff onto the project site. Six analysis points corresponding to the watersheds were used for determining the existing runoff leaving the site. The same points were used for the proposed runoff leaving the site to ensure that there will be no increase in peak runoff rates for the 2, 10, 25, and 100 year, 24 hour design storms (see Figure 4 – Pre-development watershed).

Watershed EW-1 is 17.05 acres and is predominantly impervious, consisting of the 6.26 acres of roof area of the existing Raytheon building, sidewalks and landscaped islands, a small area of runoff from offsite and a large portion of the existing parking lot. Runoff currently travels east to west and is captured by a number of catch basins and piped to a 36"combined sewer and storm pipe which discharges into the large wetland.

Watershed EW-2 has an area of 4.11 acres and consists mainly of paved areas with a small portion of a landscaped island and the roof runoff from the existing 10,500 square foot building. Runoff sheet flows northwest and is collected by catch basins and discharges directly into the wetland through an existing 18" storm pipe.

Watershed EW-3 is 12.31 acres in size and groundcover is predominantly previous consisting of grass, brush, woods and a small portion of the existing paved area. Runoff from this watershed is overland flow, which travels east to west directly into the existing wetland without any stormwater collection system capturing the runoff.

Watershed EW-4 has an area of 1.58 acres and is made up of the existing paved area and grass lawn area. Runoff currently sheet flows southwest into two ponds which are separated by the existing driveway entrance from Route 20 (Boston Post Road). These two ponds are connected by a culvert under the driveway and have no outlet, therefore during a large storm event, the ponds will overflow into Route 20.

Watershed EW-5 (EW-5A and EW-5B) is 8.08 acres in size and is consists of pavement, lawn, and brush areas. The existing Wayland Wastewater treatment plant is part of this watershed and a portion of runoff from off-site areas contributes to this watershed. Runoff from Watershed EW-5A is sheet flow which eventually flows north to the Wayland Commons property. Runoff from EW-5B consists of the Route 27 driveway and off-site areas. This runoff is collected in swales and a drainage culvert and flows to the wetland system north of the site.

Watershed EW-6 has an area of 2.83 acres, and is made up of the existing access driveway at the south east corner of the Raytheon Building and thick brush along the south east corner of the property. Runoff sheet flows south directly into the existing wetland located at the south-east corner of the property.

Table 4.1: The existing peak rates of stormwater runoff leaving the site are summarized as follows:

Analysis Point	Contributing Watersheds	1-inch (CFS)	2-YEAR (CFS	10-YEAR (CFS)	100-YEAR (CFS)	Receiving Watershed
Analysis Point 1 Existing 36" CMP combined storm/sewer culvert at Wetland	EW-1	3.3	31.7	53.1	91.5	Wetland system west of site
Analysis Point 2 Existing Culvert at Wetland	EW-2	<1.0	8.3	13.8	23.8	
Analysis Point 3	EW-1, EW2, EW-3	4.1	39.4	66.8	120.3	
Analysis Point 4 Overland flow southeast to Boston Post Road	EW-4	0	0	0	0	Boston Post Road
Analysis Point 5 Overland flow to wetland system north of site	EW-5	0	<1.0	1.4	8.6	Wetland system north of site
Analysis Point 6 Overland flow southeast to existing wetland	EW-6	0	1.1	4.0	10.7	Wetland system south of site

5.0 Proposed Conditions Runoff

The proposed site was also broken up into five watersheds with a combined area of ±43 acres (See Figure 5 – Proposed Watershed Plan). Proposed watershed 4 was removed as there is no proposed runoff to Route 20. Catch basins and water quality swales and rain gardens have been designed to collect runoff and discharge into bio-retention basins which will discharge the runoff at a controlled rate. Six analysis points corresponding to the watersheds were used for determining the proposed runoff that will leave the site. The same points were used for the existing runoff leaving the site to ensure that there will be no increase in runoff rates for the 2, 10, 25, and 100 year, 24 hour design storms. A curve number and time of concentration were calculated for each watershed using Soil Conservation Service TR-55 methods (See Appendix C for Proposed Conditions Hydrology Calculations). The recommended minimum time of concentration of 6 minutes was used for watersheds PW-1, PW-2B, PW-5B, and PW-6B.

Watershed PW-1 (PW-1A and PW-1B) is made up of the proposed paved areas, sidewalks, landscaped islands, roof areas and the proposed town green area. The runoff from this watershed is collected in catch basins rain gardens and water quality swales and directed to Basin 2. Runoff from Basin 2 is discharged into the large wetland located at the western portion of the site (Analysis Point 1).

Watershed PW-2 is made up of paved areas, sidewalks, one roof area and landscaped areas located at the southern portion of the site. The total area of the watershed is 1.31 acres. The majority of the runoff from PW-2 is collected in the existing basins located at the southern portion of the site adjacent to Rte 20. Runoff is discharged into an existing drain pipe which discharges into the large wetland located at the western portion of the site (Analysis Point 2).

Watershed PW-3 is made up of undisturbed area consisting of grass, brush, and woods. The total area of the watershed is 7.25 acres and is located in the western portion of the site. Runoff from this watershed will continue to runoff as it does presently, which is overland flow into the large wetland (Analysis Point 3).

Watershed PW-5 (PW-5A and 5B) is made up of paved areas and grass. The total area of all watersheds in PW-5 is 10.46 acres and is located at the north-eastern portion of the site. Runoff from PW-5A is predominately sheet flow into catch basins and a water quality swale which outlets into Bio-retention Basin 3.Infiltration is the primary outlet for both basins, however overflow from these basins is discharged into the large wetland area located at the western part of the site. Runoff from PW-5B is collected in swales and catch basins and is discharged to the wetland system via overland flow and a drainage culvert.

Watershed PW-6 (PW-6A and PW-6B) is made up of paved areas, landscaped islands, rooftop, sidewalks and a small undisturbed area consisting of grass, and brush. The total area of all watersheds in PW-6 is 1.95 acres and it is located at the south eastern portion of the site. Runoff from the developed area (PW-6A) is collected in roof drains and catch basins, which outlet into Bio-retention basin 4. Runoff from the undisturbed area (PW-6B) will continue to runoff as it does presently, which is overland flow into the small wetland located at the south eastern corner of the property.

Table 5.1: The peak rates of stormwater runoff leaving the site from the proposed development are summarized as follows:

Analysis Point	Contributing Watersheds	1 inch (CFS)	2-YEAR (CFS)	10-YEAR (CFS)	100-YEAR (CFS)	Receiving Watershed
Analysis Point 1 Existing CMP combined storm/sewer culvert at Wetland	PW-1	0	16.0	33.4	64.8	Wetland system west of site
Analysis Point 2 Existing Culvert at Wetland	PW-2	0	0	0	<1.0	
Analysis Point 3 Wetlands West of Site	PW-1, PW2, PW-3	0	16.6	39.3	80.6	
Analysis Point 4 Overland flow southeast to Boston Post Road	PW-4	0	0	0	0	Boston Post Road
Analysis Point 5 Overland flow north to Wayland Meadows	PW-5	0	<1.0	1.0	2.0	Wetland system north of site
Analysis Point 6 Overland flow southeast to existing wetland	PW-6	0	1.1	2.7	5.2	Wetland system south of site

6.0 Water Quality

Stormwater quality control will be achieved through a program of Best Management Practices (BMP's). The proposed development is designed to achieve a minimum 80% total suspended solids (TSS) removal in accordance with the MA DEP Stormwater Management Standards. The development includes high-intensity use parking lots, which classify the development as a land use with higher potential pollutant loads, and the water quality volume required to be treated is equal to 1-inch times the total impervious area. The total impervious area of the site is 22.2 acres, and the water quality volume is as follows:

$$WQV = (22.2\,acres)\left(\frac{43{,}560\,sf}{1\ acre}\right)(1\,inch)\left(\frac{1\,ft}{12\,inches}\right) = 80{,}586\,cf$$

The stormwater management system has been designed to treat the entire water quality volume. This is indicated in Table 5.1, which shows that the entire 1-inch storm is treated and there is no discharge to any of the analysis points for the 1-inch storm.

Effective stormwater management practices include the use of curbing along all pavement edges, catch basins with deep sumps and hoods, and detention/infiltration devices, which will treat stormwater runoff from the proposed development and minimize potential indirect, long term impacts to down gradient resources. In addition, a sediment and erosion control plan will be implemented to protect these areas during and after construction of the proposed development.

Catch Basins:

The proposed catch basins will be equipped with deep sumps and hoods. The sumps capture sediments and coarse particles, and the hoods prevent hydrocarbons and other floatable debris from entering the drainage system, which will improve the performance of subsequent BMP's. The sump will be no less than 4' in depth and a regular maintenance schedule will be followed. A regular inspection and cleaning will ensure optimal effectiveness.

Water Quality Swales:

Water quality swales are used to provide peak runoff control as well as enhanced water quality. The swales will be planted with grass on the bottom and sides to slow the runoff velocity and filter pollutants. Runoff volume is controlled by reducing runoff velocity and promoting infiltration. Pollutant removal is achieved through sedimentation, filtration, nutrient uptake, and infiltration.

Rain Gardens:

Rain gardens are low impact development techniques that serve to promote groundwater recharge and enhance water quality. The proposed rain gardens will be located within parking lot areas and will be planted with a combination of grasses, perennials, shrubs, and wetland plantings. Rain gardens are designed to maximize the removal of pollutants from stormwater runoff through vegetation uptake, retention, and settling.

Bioretention Basins:

Bioretention basins are low impact development techniques that serve to promote groundwater recharge and enhance water quality, but at a larger scale and are designed to handle larger runoff volumes than rain gardens. The proposed bioretention basins are essentially extended detention basins that are planted with a combination of grasses, perennials, shrubs, and wetland plantings, and are designed to maximize the removal of pollutants from stormwater runoff through vegetation uptake, retention, and settling.

TSS Removal:

There are three different treatment paths that stormwater runoff can take before being discharged off-site. The first two paths include runoff that is collected in water quality swales and rain gardens. All runoff collected in water quality swales and rain gardens will then be routed to a bioretention basin. The third path is runoff that is collected in catch basins. This runoff will then be routed to either a water quality swale or forebay for pretreatment and then to a bioretention basin. Parking lot sweeping will also be provided, but no credit for sweeping was included in TSS removal calculations.

The following tables provide the design TSS removal rates as set forth in the Massachusetts Stormwater Management Policy for the various BMP's utilized in this project:

Runoff collected in rain gardens:

BMP	Design Rate	Cumulative TSS Removal
Rain Garden	80%	80%
Bio-retention Basin	80%	96%

Runoff collected in water quality swales:

BMP	Design Rate	Cumulative TSS Removal
Water Quality Swale	70%	70%
Bio-retention Basin	80%	94%

Runoff collected in catch basins:

BMP	Design Rate	Cumulative TSS Removal
Catch Basin w/ Deep Sumps (off-line only)	25%	25%
Forebay (pretreatment calculation only)	25%	44%
Bio-retention Basin (including forebay)	80%	89%

As shown above, the proposed development will provide water quality treatment that exceeds 80% TSS removal required by the DEP Stormwater Management Standards. In addition, 44% TSS removal will be achieved prior to stormwater entering the bio-retention basins.

7.0 Groundwater Recharge

Groundwater recharge for the proposed development will be provided in accordance with the MA DEP Stormwater Management Standards. These standards require that the annual recharge from the post-development site shall approximate the annual recharge from pre-development site conditions based on soil types. For hydrologic group A soil types, the volume that is required to be recharged is equal to 0.60 inches multiplied by the increase in impervious area. The proposed development is located within hydrologic group A soils, therefore the volume required to be recharged is as follows:

Existing impervious area: ±21.8 acres
Proposed impervious area: ±22.2 acres
Increase in impervious area: ±0.4 acres

$$V = 0.4\ acres\ x\ 0.60\ inches\ x\ \frac{43{,}560\ s.f.}{1\ acre}\ x\ \frac{1\ ft.}{12\ inches} = 871\ cubic\ ft.$$

The stormwater management system will provide groundwater recharge through the use of water quality swales, rain gardens, and bio-retention basins. The static method was used to calculate recharge volumes for the bio-retention basins by determining the volume of water stored in each basin that is located below the system outlet. The recharge volumes provided in each BMP are as follows:

BMP	**Recharge Volume (cubic ft.)**
Basin 1	3,750
Basin 2	8,540
Basin 3	4,230
Basin 4	1,660
Total	18,180

As shown above, the proposed development provides a recharge volume of 18,180 cubic ft. which exceeds the 871 cubic feet required by DEP Stormwater Management Standards.

72-hour Drawdown Analysis:

As per the Massachusetts Stormwater Handbook, the recharge volume should infiltrate within 72 hours. The drawdown analysis for the static method is performed by selecting a Rawls infiltration rate (provided by the Handbook) for the existing site soils in the areas where recharge is proposed. Based on the site soils and review of the Rawls table, an infiltration rate of 2.41 inches per hour was used to determine the drawdown time for the infiltration BMP's. The drawdown time is calculated as follows:

$$DrawdownTime = \frac{Recharge\,Volume}{(Infiltration\ Rate)(1\ ft/12\,inches)(Bottom\ Area)}$$

The following table shows the calculated drawdown rate for the infiltration BMP's:

BMP	**Recharge Volume (c.f.)**	**Bottom Area (s.f.)**	**Drawdown Time (hrs)**
Basin 1	3,750	1,828	10.2
Basin 2	8,540	1,690	25.2
Basin 3	4,230	2,172	9.7
Basin 4	1,660	458	18.0

As indicated above, the recharge volume will infiltrate within 72 hours for the proposed infiltration BMP's.

8.0 Summary

The stormwater collection and management system for the proposed development will provide mitigation of post-development stormwater runoff conditions utilizing a combination of detention basins and Low Impact Development techniques and "Best Management Practices" to reduce pollutant loadings within the stormwater prior to discharging it off site.

As shown in the following summary, the proposed stormwater management system has been designed to match or reduce post development peak discharges to less than the existing rates for all modeled storms.

Analysis Point 1 - Existing 36" CMP

Summary Existing vs. Proposed Peak Discharge Rates

Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	3.3	0
2-year	31.7	16.0
10-year	53.1	33.4
100-year	91.5	64.8

Analysis Point 2 – Existing Culvert (Behind Daycare Building)

Summary Existing vs. Proposed Peak Discharge Rates

Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	<1.0	0
2-year	8.3	0
10-year	13.8	0
100-year	23.8	<1.0

Analysis Point 3 –Wetlands West of Site (Sudbury River)

Summary Existing vs. Proposed Peak Discharge Rates

Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	4.1	0
2-year	39.4	16.6
10-year	66.8	39.3
100-year	120.3	80.6

Analysis Point 4 - Boston Post Road		
Summary Existing vs. Proposed Peak Discharge Rates		
Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	0	0
2-year	0	0
10-year	0	0
100-year	0	0

Analysis Point 5 – Wetlands North of Site (Adjacent to Wayland Meadows)		
Summary Existing vs. Proposed Peak Discharge Rates		
Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	0	0
2-year	<1.0	<1.0
10-year	1.4	1.0
100-year	8.6	2.0

Analysis Point 6 – Wetlands South of Site		
Summary Existing vs. Proposed Peak Discharge Rates		
Storm Event:	Existing Flow (CFS)	Proposed Flow (CFS)
1-inch	0	0
2-year	1.1	1.1
10-year	4.0	2.7
100-year	10.7	5.2

9.0 Compliance with Stormwater Management Standards

Standard 1: *No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The stormwater management system has been designed such that no new stormwater conveyances will discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. Refer to section 6.0 Water Quality for more information about stormwater treatment.

Standard 2: *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The stormwater management system has been designed to mitigate peak rates of runoff for the 1-inch, 2-year, 10-year, 25-year, and 100-year 24 hour storm event. Please refer to the tables in Section 9 Summary and the Hydrology Calculations for more information.

Standard 3: *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance.*

Groundwater recharge will be provided through the use of low-impact development techniques such as rain gardens, water quality swales, and bioretention basins. Please refer to section 7.0 Groundwater Recharge for supporting calculations.

Standard 4: *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).*

The stormwater management system has been designed to remove 80% of the average annual post-construction load of TSS. BMP's have been sized to handle the water quality volume, and pretreatment is provided prior to infiltration in accordance with the Stormwater Management Handbook. Please refer to section 6.0 Water Quality for additional information and supporting calculations. A long term pollution prevention plan identifying suitable practices for source control and pollution prevention is included in Appendix E.

Standard 5: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.*

The project is considered a land use with higher potential pollutant loads due to the parking lots with high-intensity useand is subject to the requirement of Standard 5. BMP's selected for the project are consistent with the stormwater BMP's determined by DEP to be suitable for land uses with higher potential pollutant loads (i.e. deep sump catch basins, forebays, water quality swales, rain gardens, and bioretention areas).

Standard 6: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific* *source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.*

The project will be discharging treated stormwater to a Zone II and is subject to the requirements of Standard 6. BMP's selected for the project are consistent with the stormwater BMP's determined by DEP to be suitable for discharge to a Zone II (i.e. deep sump catch basins, forebays, water quality swales, rain gardens, and bioretention areas) and 44% TSS removal will be achieved prior to any infiltration BMP.

***Standard 7**: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

Although the project is a redevelopment and only required to meet the Stormwater Management Standards to the maximum extent practicable, the stormwater management system has been designed to meet all of the Stormwater Management Standards.

***Standard 8:** A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

A plan to control construction-related impacts including erosion, sedimentation, and other pollutant sources during construction has been included in Appendix F.

***Standard 9**: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A long term operation and maintenance plan is included in Appendix G.

***Standard 10:** All illicit discharges to the stormwater management system are prohibited.*

There will not be any illicit discharges to the stormwater management system.

II. FIGURES

Designed by:	
Drawn by:	LTT
Checked by:	
Scale:	1"=1,200'
Date:	5/08/2007

Prepared by:
RJ O'CONNELL & ASSOCIATES, INC.
Civil Engineers & Land Planners
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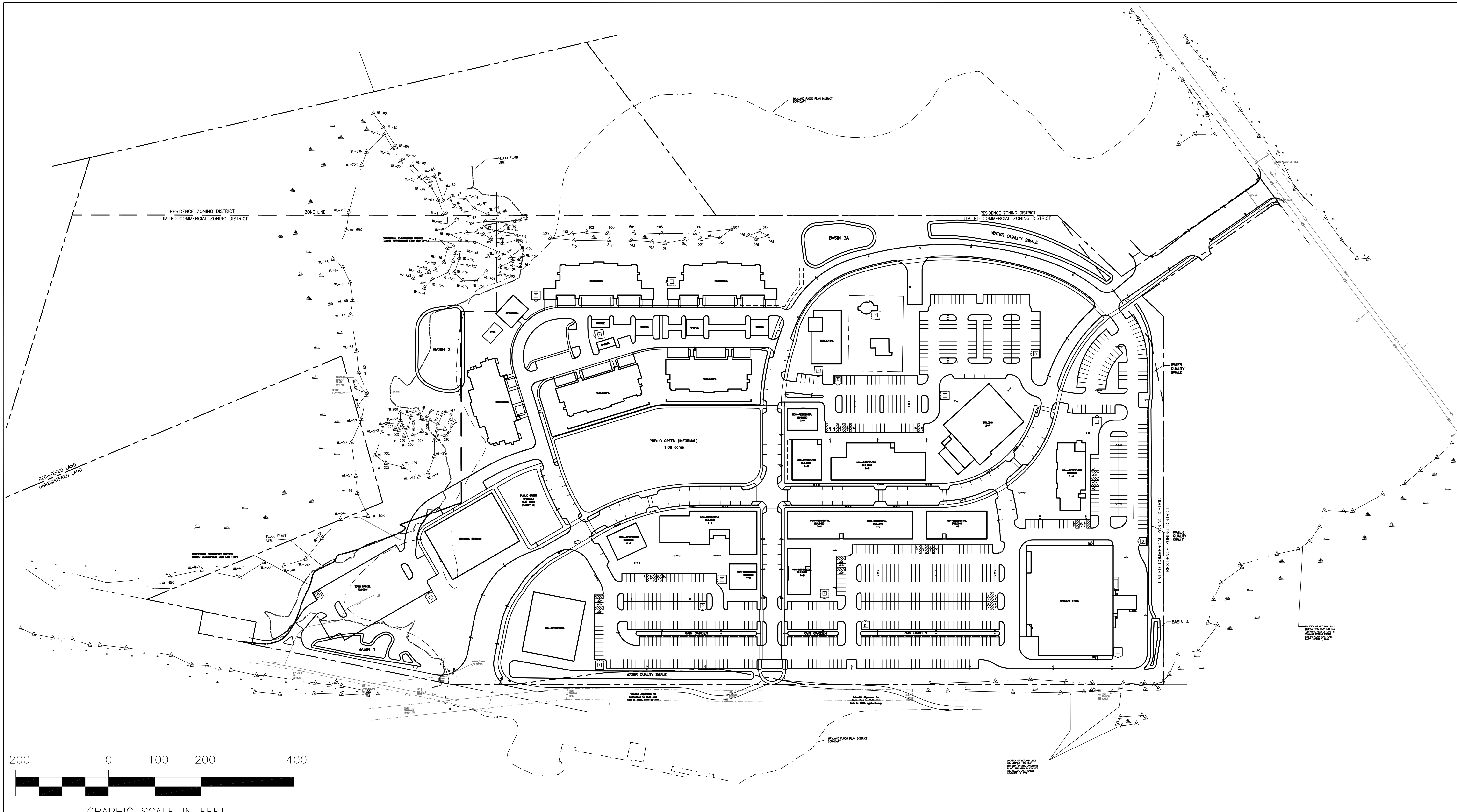
WOBURN, MA 01801
781-938-0570 / FAX: 781-938-0031

Project Name:
WAYLAND TOWN CENTER
WAYLAND, MA

Drawing Name:
SITE LOCUS MAP
WAYLAND, MA QUADRANGLE
MAP DATE: 1977

Drawing No.:
FIG. 1

Project No.: 06032



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May 27, 2008 - 14:02pm

No.	Revision	Date

Designed by:	SS
Drawn by:	LT/WJH
Checked by:	SS
Scale:	1"=200'
Date:	06/02/2008

Prepared for:

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45 BROAD STREET, 4TH FLOOR
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Project Name:

WAYLAND TOWN CENTER
WAYLAND, MA

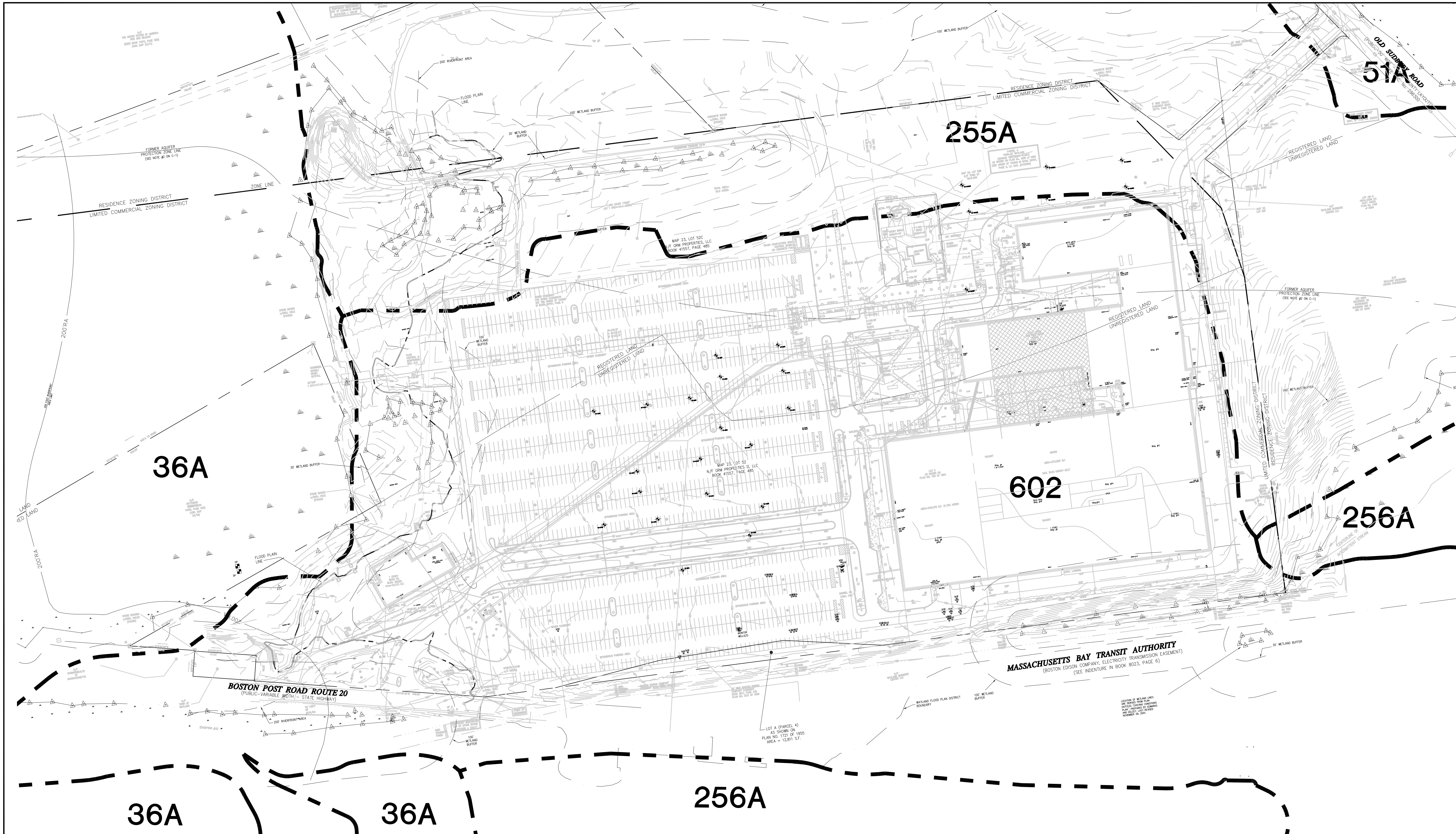
Drawing Name:

SITE PLAN

Drawing No.:

FIG.-2

Project No.: 06032



No.	Revision	Date	No.	Revision	Date

Seal:

Designed by:	SS
Drawn by:	RBM
Checked by:	SS
Scale:	NTS
Date:	06/02/2008

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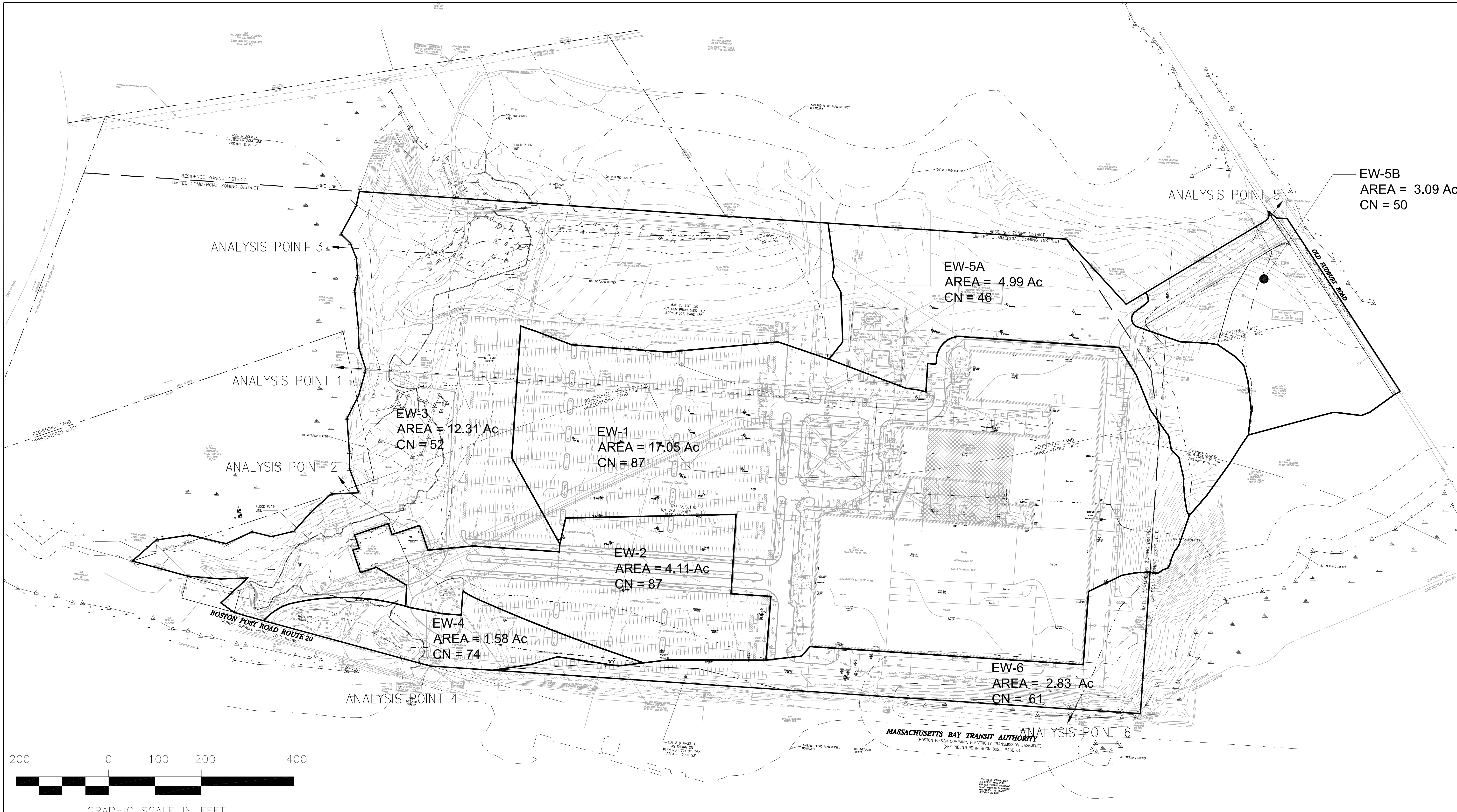
Project Name:
WAYLAND TOWN CENTER
WAYLAND, MA

Drawing Name:
SOIL MAP PLAN

Drawing No.:
FIG-3

Project No.: 06032



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Jun 03, 2008 – 18:10pm

No.	Revision	Date

Designed by:	SS
Drawn by:	LT/WJH
Checked by:	SS
Scale:	1"=200'
Date:	06/02/2008

Prepared for:

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Project Name:

WAYLAND TOWN CENTER
WAYLAND, MA

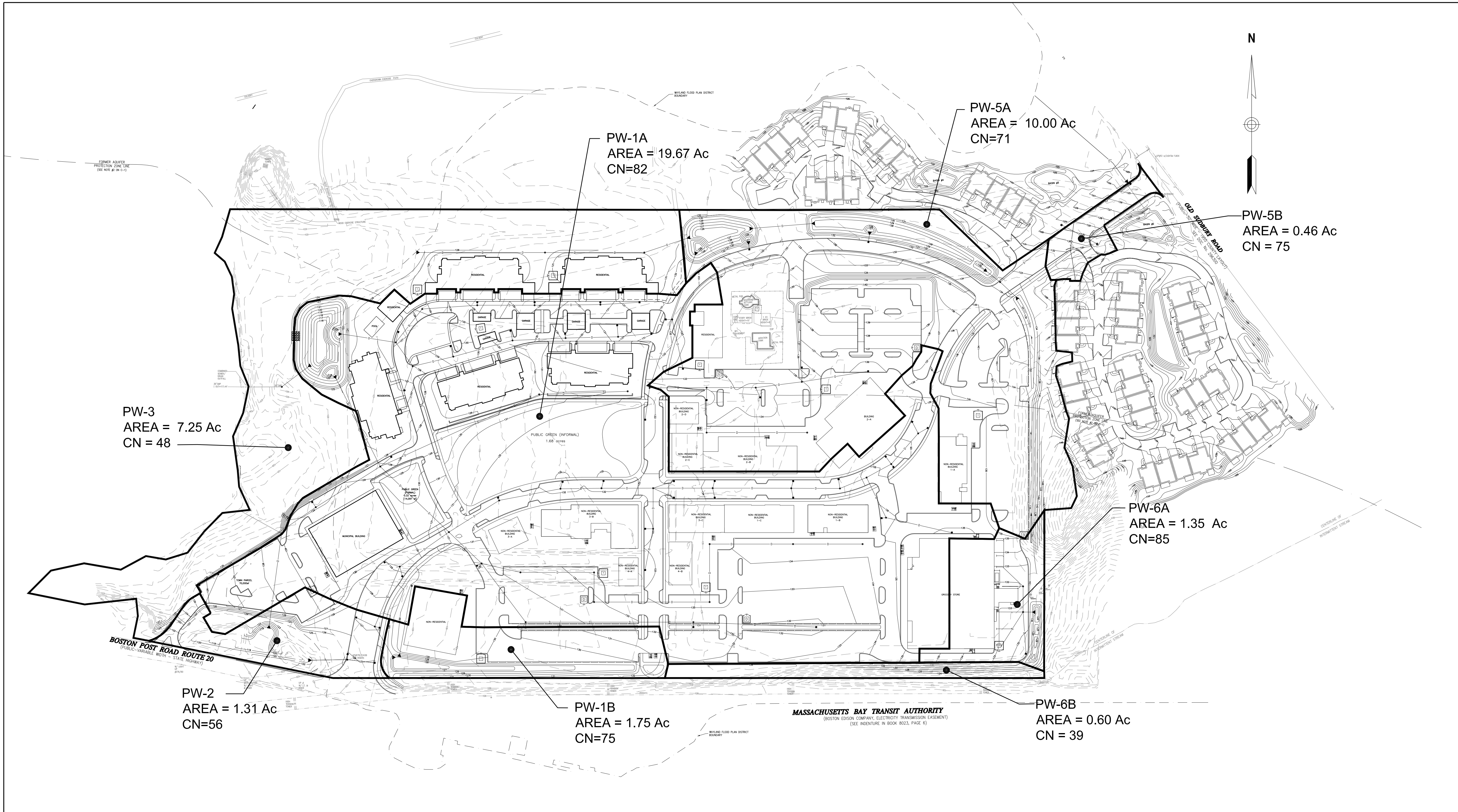
Drawing Name:

PRE-DEVELOPMENT WATERSHED PLAN

Drawing No.:

FIG.-4

Project No.: 06032



No.	Revision	Date

Designed by:	SS
Drawn by:	LT/WJH
Checked by:	SS
Scale:	N.T.S.
Date:	06/02/08

Prepared for:

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Project Name:
WAYLAND TOWN CENTER
WAYLAND, MA

Drawing Name:
POST-DEVELOPMENT WATERSHED PLAN

Drawing No.:
FIG.-5

Project No.: 06032

Drawing name: G:\MA\Wayland\Great Island\Town Center\Engineer\Stormwater\Site Plan Review 6-02-08\Fig-5 Post-Dev Watershed Plan.dwg
Jun 03, 2008 - 18:11pm

III. APPENDICES

APPENDIX A: CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

---

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
CHARLES A. DOHERTY
CIVIL
No. 45920
REGISTERED PROFESSIONAL ENGINEER

6/02/08
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☐ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☒ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☒ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): ______________________

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:
- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

  ☒ is within the Zone II or Interim Wellhead Protection Area

  ☐ is near or to other critical areas

  ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

  ☒ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☒ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX B: EXISTING CONDITIONS HYDROLOGY CALCULATIONS

Runoff Curve Numbers and Runoff
Time of Concentration
Pond Reports
Hydrograph Plots (2, 10, 25, 100 year storm events)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **Existing Watershed 1 (EW-1)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			3.24	126.36
A	Impervious (pavement, roof)	98			13.81	1353.38
A						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
				Totals =	**17.05**	**1479.74**

Use only one CN source per line.

CN (weighted) = total product / total area = **86.7883** Use CN= **87**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	2.00	3.29	5.38	

(Use P and CN with table 2-1, fig. 2-1,
or eqs. 2-3 and 2-4.)

Soil Conservation Service (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **Existing Watershed 2 (EW-2)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi² [ ] %	Product of CN x Area
A	Grass - good	39			0.80	31.20
A	Impervious (pavement, roof)	98			3.31	324.38
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**4.11**	**355.58**

CN (weighted) = total product / total area = **86.5158** Use CN= **87**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	2.00	3.29	5.38	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **Existing Watershed 3 (EW-3)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN: Table 2-2	CN: Figure 2-3	CN: Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			9.42	367.38
A	Impervious (pavement, roof)	98			2.32	227.36
A	Gravel	76			0.44	33.44
A	Wetland	83			0.13	10.79
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**12.31**	**638.97**

CN (weighted) = total product / total area = **51.9066** Use CN= **52**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.20	0.67	1.79	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project:	**Wayland Town Center**	By:	**CAD**	Date	**06/02/08**
Location:	**Wayland, MA**	Checked:		Date	
Check One:	**Present**	**Existing Watershed 4 (EW-4)**			

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN: Table 2-2	CN: Figure 2-3	CN: Figure 2-4	Area: [X] acres [ ] mi² [ ] %	Product of CN x Area
A	Grass - good	39			0.63	24.57
A	Impervious (pavement, roof)	98			0.95	93.10
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**1.58**	**117.67**

CN (weighted) = total product / total area = **74.4747** Use CN= **74**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	1.10	2.13	3.96	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project:	**Wayland Town Center**	By:	**CAD**	Date	**06/02/08**
Location:	**Wayland, MA**	Checked:		Date	
Check One:	**Present**	**Existing Watershed 5A (EW-5A)**			

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			4.43	172.77
A	Impervious (pavement, roof)	98			0.56	54.88
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
				Totals =	**4.99**	**227.65**

Use only one CN source per line.

CN (weighted) = total product / total area = **45.6212** Use CN= **46**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.07	0.39	1.27	

(Use P and CN with table 2-1, fig. 2-1,
or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **Existing Watershed 5B (EW-5B)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			2.53	98.67
A	Impervious (pavement, roof)	98			0.56	54.88
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**3.09**	**153.55**

CN (weighted) = total product / total area = **49.6926** Use CN= **50**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.15	0.57	1.61	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **Existing Watershed 6 (EW-6)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi^2 [ ] %	Product of CN x Area
A	Grass - good	39			1.79	69.81
A	Impervious (pavement, roof)	98			1.04	101.92
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**2.83**	**171.73**

CN (weighted) = total product / total area = **60.6820** Use CN= **61**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.49	1.19	2.63	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

TR55 Tc Worksheet

Hyd. No. 1

EW-1 (PT. 1)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	136.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	14.70		0.00		0.00		
Travel Time (min)	**=**	**7.22**	**+**	**0.00**	**+**	**0.00**	**=**	**7.22**
Shallow Concentrated Flow								
Flow length (ft)	=	60.00		0.00		0.00		
Watercourse slope (%)	=	0.50		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	1.44		0.00		0.00		
Travel Time (min)	**=**	**0.70**	**+**	**0.00**	**+**	**0.00**	**=**	**0.70**
Channel Flow								
X sectional flow area (sqft)	=	7.00		0.00		0.00		
Wetted perimeter (ft)	=	4.71		0.00		0.00		
Channel slope (%)	=	1.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	12.95		0.00		0.00		
Flow length (ft)	=	1800.0		0.0		0.0		
Travel Time (min)	**=**	**2.32**	**+**	**0.00**	**+**	**0.00**	**=**	**2.32**

Total Travel Time, Tc .... 10.23 min

TR55 Tc Worksheet

Hyd. No. 2

EW-2 (PT. 2)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.50		0.00		0.00		
Travel Time (min)	**=**	**2.14**	**+**	**0.00**	**+**	**0.00**	**=**	**2.14**
Shallow Concentrated Flow								
Flow length (ft)	=	673.00		0.00		0.00		
Watercourse slope (%)	=	1.20		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	2.23		0.00		0.00		
Travel Time (min)	**=**	**5.04**	**+**	**0.00**	**+**	**0.00**	**=**	**5.04**
Channel Flow								
X sectional flow area (sqft)	=	1.22		0.00		0.00		
Wetted perimeter (ft)	=	1.96		0.00		0.00		
Channel slope (%)	=	1.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	7.23		0.00		0.00		
Flow length (ft)	=	275.0		0.0		0.0		
Travel Time (min)	**=**	**0.63**	**+**	**0.00**	**+**	**0.00**	**=**	**0.63**

Total Travel Time, Tc .... **7.81 min**

TR55 Tc Worksheet

Hyd. No. 3

EW-3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.50		0.00		0.00		
Travel Time (min)	**=**	**21.82**	**+**	**0.00**	**+**	**0.00**	**=**	**21.82**
Shallow Concentrated Flow								
Flow length (ft)	=	972.00		148.00		0.00		
Watercourse slope (%)	=	1.30		2.70		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	1.84		2.65		0.00		
Travel Time (min)	**=**	**8.81**	**+**	**0.93**	**+**	**0.00**	**=**	**9.74**
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 .... 31.55 min

TR55 Tc Worksheet

Hyd. No. 5

EW-4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	2.50		0.00		0.00		
Travel Time (min)	**=**	**11.46**	**+**	**0.00**	**+**	**0.00**	**=**	**11.46**
Shallow Concentrated Flow								
Flow length (ft)	=	100.00		0.00		0.00		
Watercourse slope (%)	=	3.50		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	3.02		0.00		0.00		
Travel Time (min)	**=**	**0.55**	**+**	**0.00**	**+**	**0.00**	**=**	**0.55**
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 .... **12.01 min**

TR55 Tc Worksheet

Hyd. No. 7

EW-5A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.50		0.00		0.00		
Travel Time (min)	**=**	**14.06**	**+**	**0.00**	**+**	**0.00**	**=**	**14.06**
Shallow Concentrated Flow								
Flow length (ft)	=	130.00		0.00		0.00		
Watercourse slope (%)	=	2.50		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	2.55		0.00		0.00		
Travel Time (min)	**=**	**0.85**	**+**	**0.00**	**+**	**0.00**	**=**	**0.85**
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 .... 14.91 min

TR55 Tc Worksheet

Hyd. No. 8

E-5B

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	**=**	**16.53**	**+**	**0.00**	**+**	**0.00**	**=**	**16.53**
Shallow Concentrated Flow								
Flow length (ft)	=	370.00		0.00		0.00		
Watercourse slope (%)	=	5.40		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.75		0.00		0.00		
Travel Time (min)	**=**	**1.64**	**+**	**0.00**	**+**	**0.00**	**=**	**1.64**
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 .... 18.18 min

TR55 Tc Worksheet

Hyd. No. 10

EW-6 (PT. 6)

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)	=	3.10		0.00		0.00		
Land slope (%)	=	6.00		0.00		0.00		
Travel Time (min)	**=**	**9.34**	**+**	**0.00**	**+**	**0.00**	**=**	**9.34**
Shallow Concentrated Flow								
Flow length (ft)	=	240.00		0.00		0.00		
Watercourse slope (%)	=	0.85		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.49		0.00		0.00		
Travel Time (min)	**=**	**2.69**	**+**	**0.00**	**+**	**0.00**	**=**	**2.69**
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 .... 12.03 min

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Pond No. 7 - EX. BASIN

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 118.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	118.00	1,828	0	0
1.00	119.00	5,668	3,748	3,748
2.00	120.00	8,193	6,931	10,679
3.00	121.00	20,000	14,097	24,775

Culvert / Orifice Structures

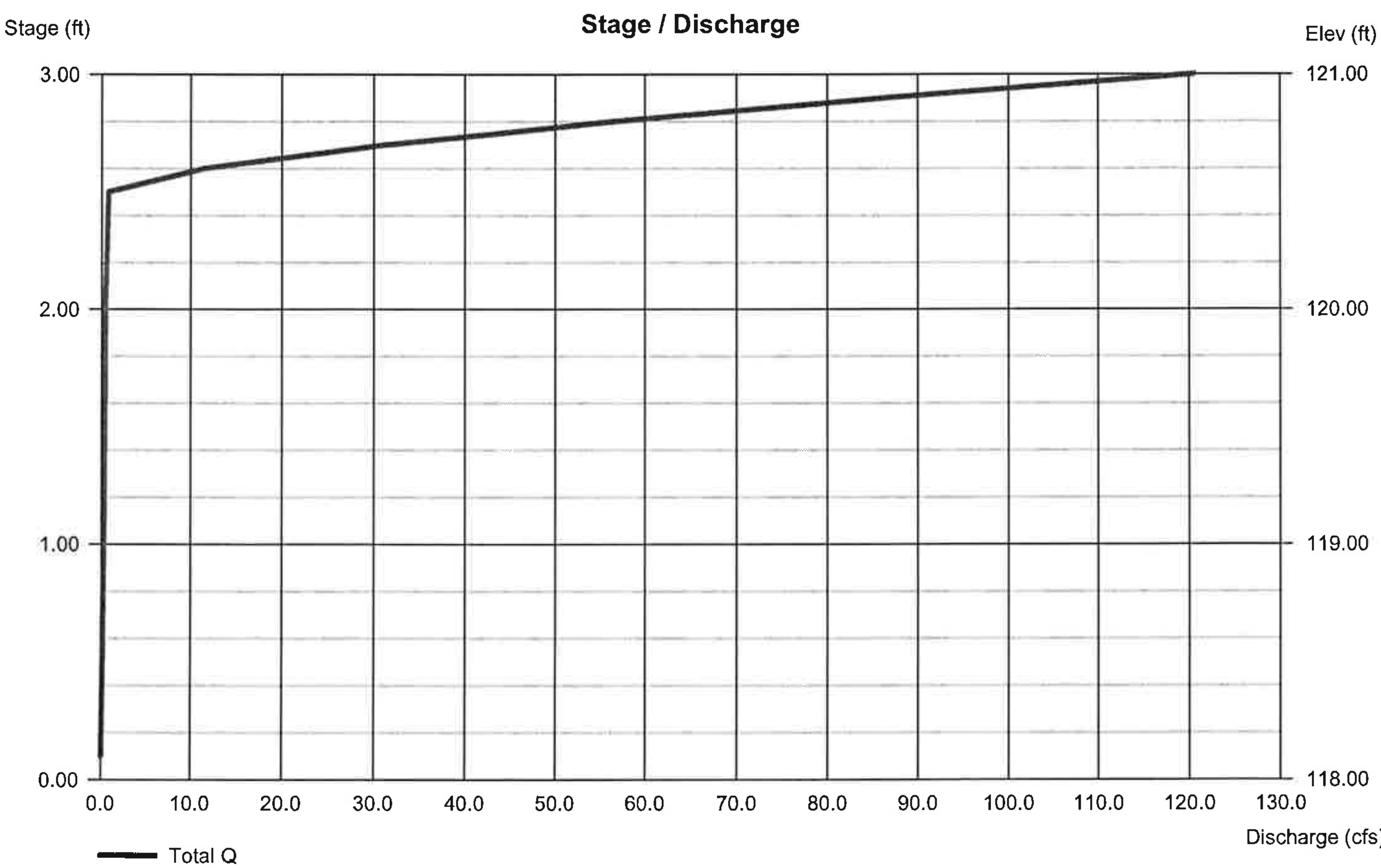
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 130.00	0.00	0.00	0.00
Crest El. (ft)	= 120.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



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	3.300	1	730	14,107	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	0.864	1	727	3,257	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-3
4	Combine	4.099	1	729	17,364	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	0.005	1	890	131	------	------	------	EW-4
6	Reservoir	0.000	1	960	0	5	118.01	37.2	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-5A
8	SCS Runoff	0.000	1	n/a	0	------	------	------	E-5B
9	Combine	0.000	1	n/a	0	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	1.436	1	741	9,324	------	------	------	PW-1A
12	SCS Runoff	0.007	1	825	199	------	------	------	PW-1B
13	Reservoir	0.000	1	893	0	12	126.02	61.1	WATER QUALITY SWALE
14	Combine	1.436	1	741	9,324	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	0.000	1	1477	0	14	117.41	3,803	BASIN 2
16	Diversion1	0.289	1	1477	1,526	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	0.000	1	n/a	-1,526	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-2
19	Reservoir	0.000	1	n/a	0	18	118.00	0.000	BASIN 1 (PT.2)
20	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-3
21	SCS Runoff	0.009	1	1337	283	------	------	------	PW-5A
22	Reservoir	0.000	1	1254	0	21	126.03	104	BASIN 3
23	Combine	0.000	1	1484	0	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.002	1	827	51	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	0.136	1	745	851	------	------	------	PW-6A
26	Reservoir	0.000	1	930	0	25	128.02	235	BASIN 4
27	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
28	Combine	0.000	1	930	0	26, 27	------	------	TOTAL TO PT. 6

Hydro_SPR_REV.gpw	Return Period: 1 Year	Tuesday, Jun 3, 2008

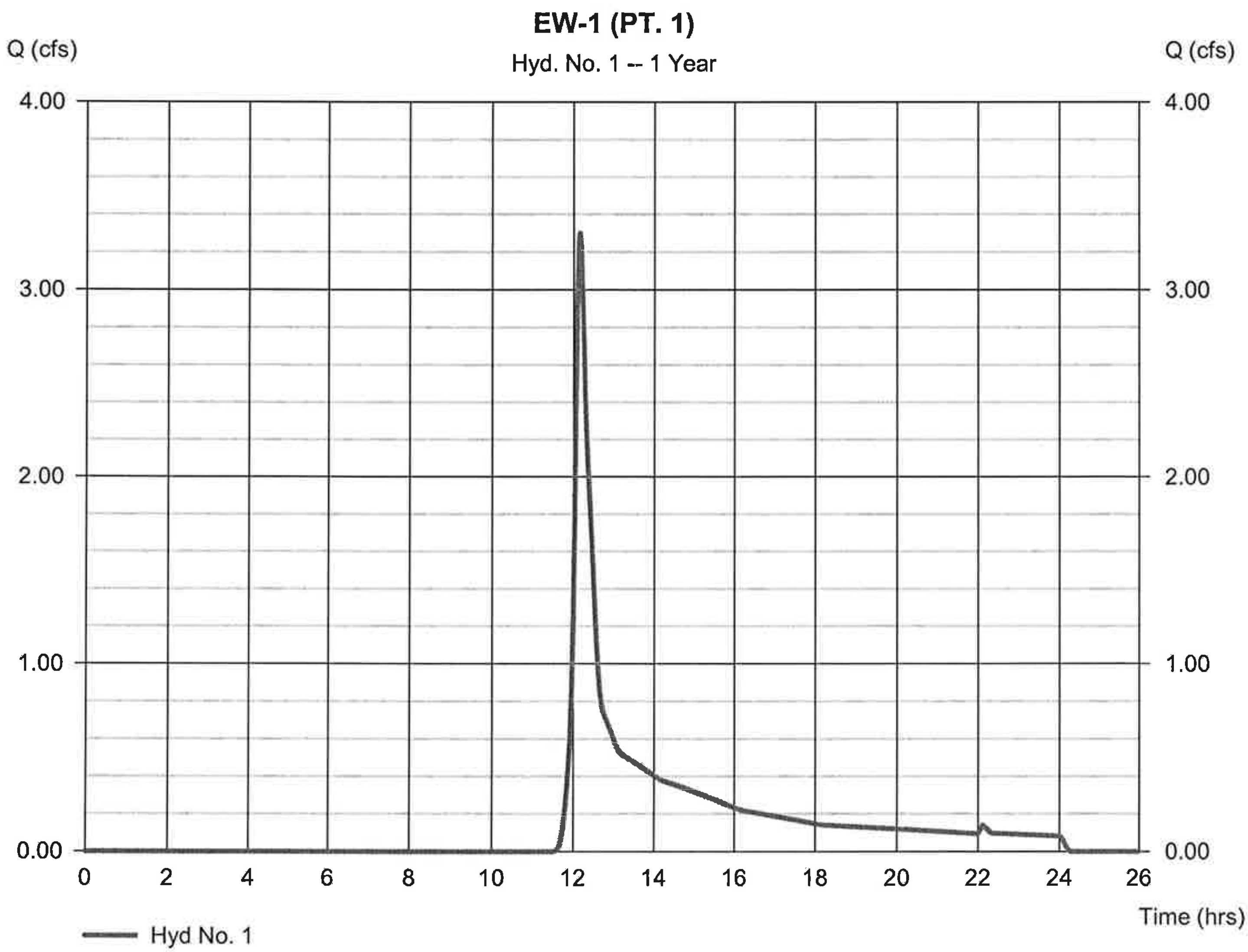
Hydrograph Report

Hyd. No. 1

EW-1 (PT. 1)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.300 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 14,107 cuft
Drainage area	= 17.050 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.23 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.240 x 39) + (14.180 x 98)] / 17.050



Hydrograph Report

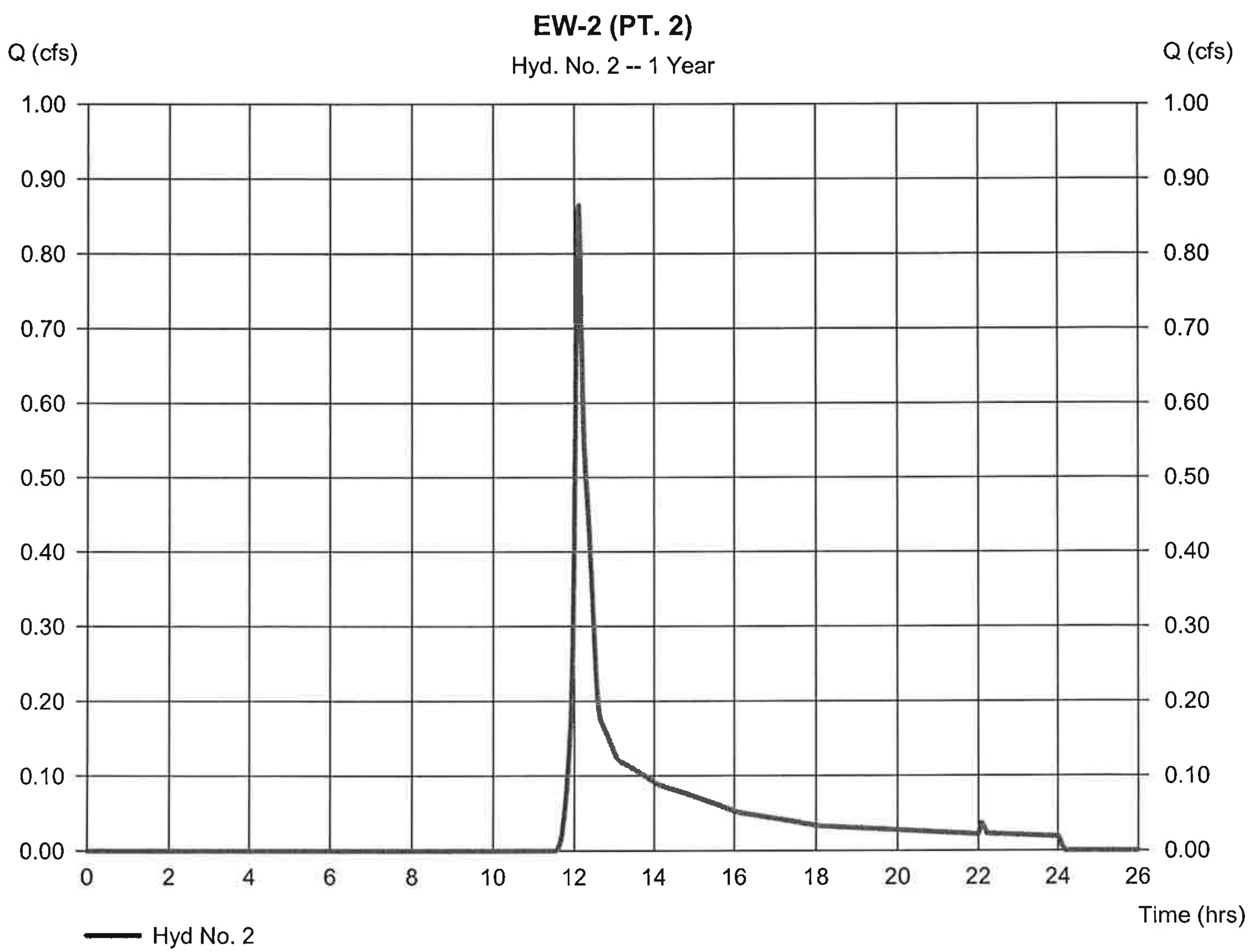
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 2

EW-2 (PT. 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.864 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 3,257 cuft
Drainage area	= 4.110 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.81 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.310 x 98) + (0.800 x 39)] / 4.110



Hydrograph Report

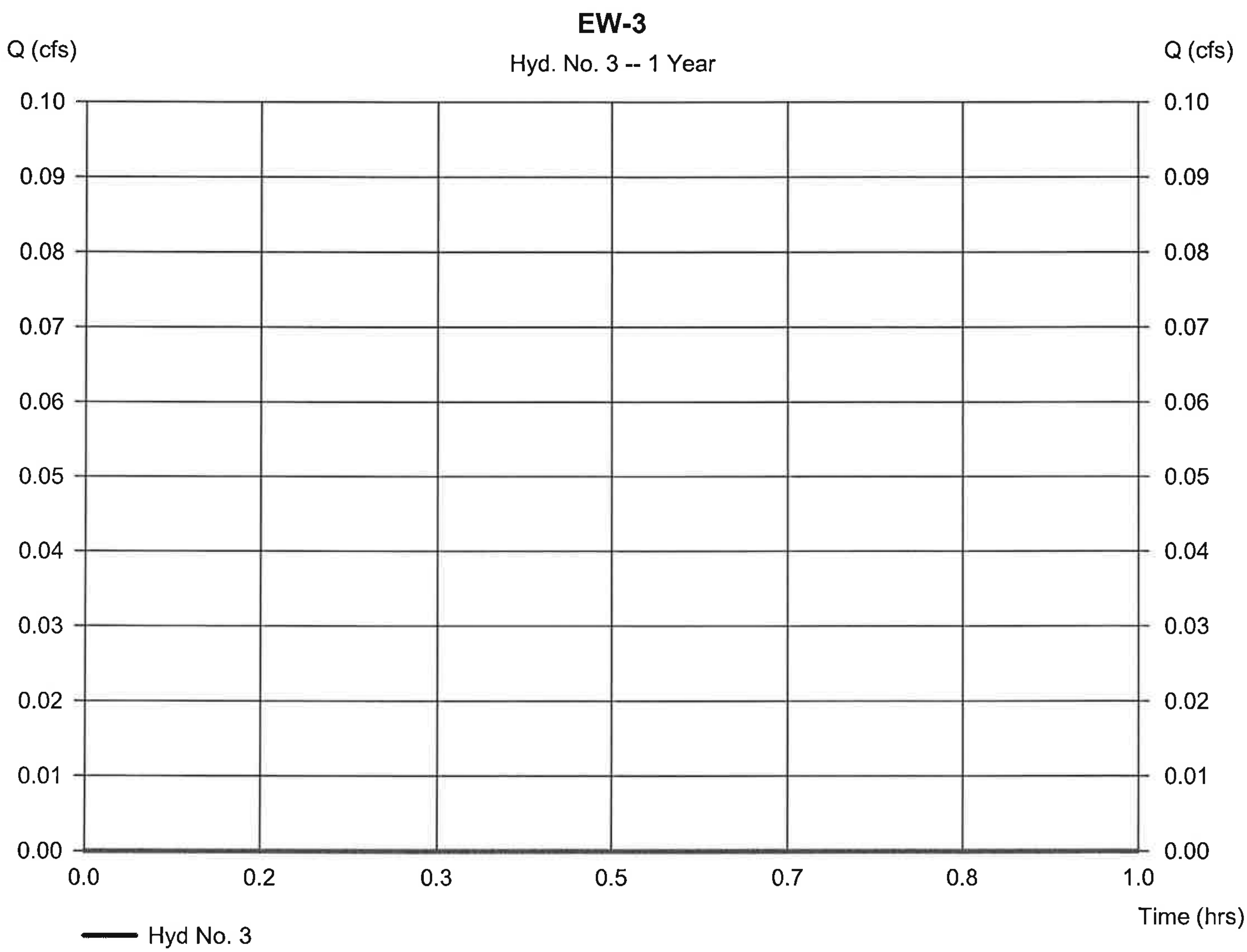
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 3

EW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 12.310 ac	Curve number	= 52*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.55 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.280 x 98) + (0.440 x 76) + (0.130 x 83) + (14.090 x 39)] / 12.310



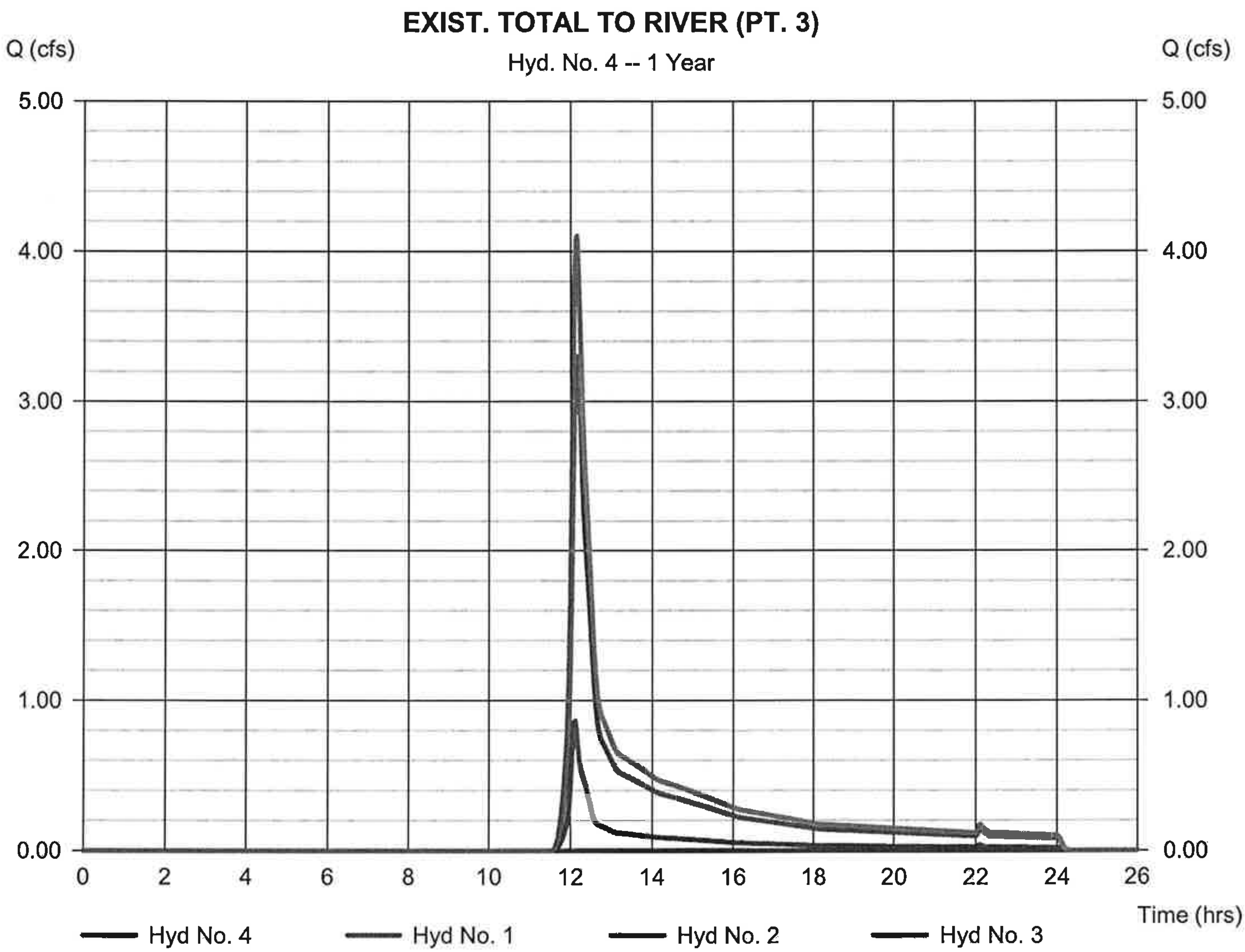
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 4

EXIST. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 4.099 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 17,364 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area=	33.470 ac



Hydrograph Report

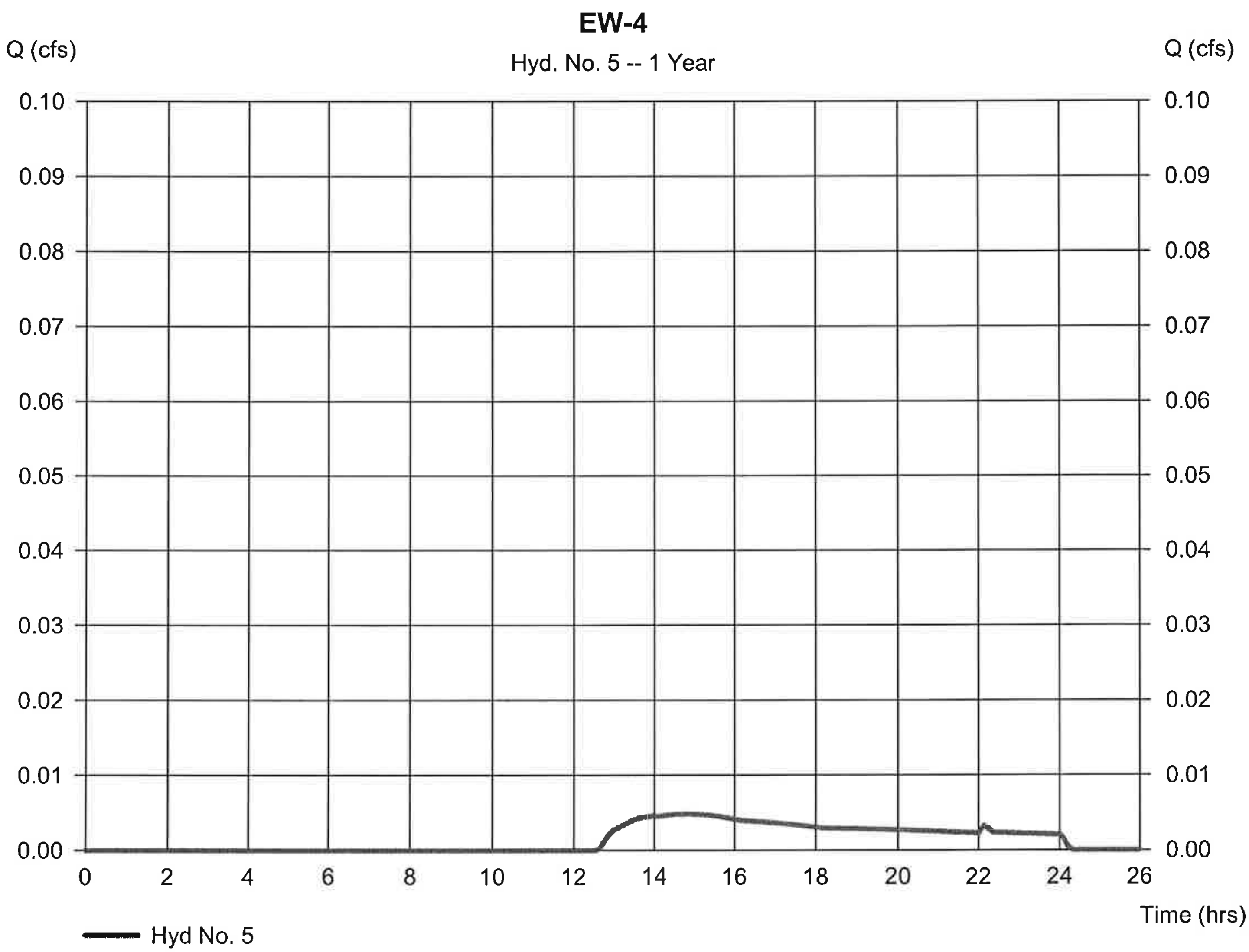
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 5

EW-4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.83 hrs
Time interval	= 1 min	Hyd. volume	= 131 cuft
Drainage area	= 1.580 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.01 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (0.630 x 39)] / 1.580



Hydrograph Report

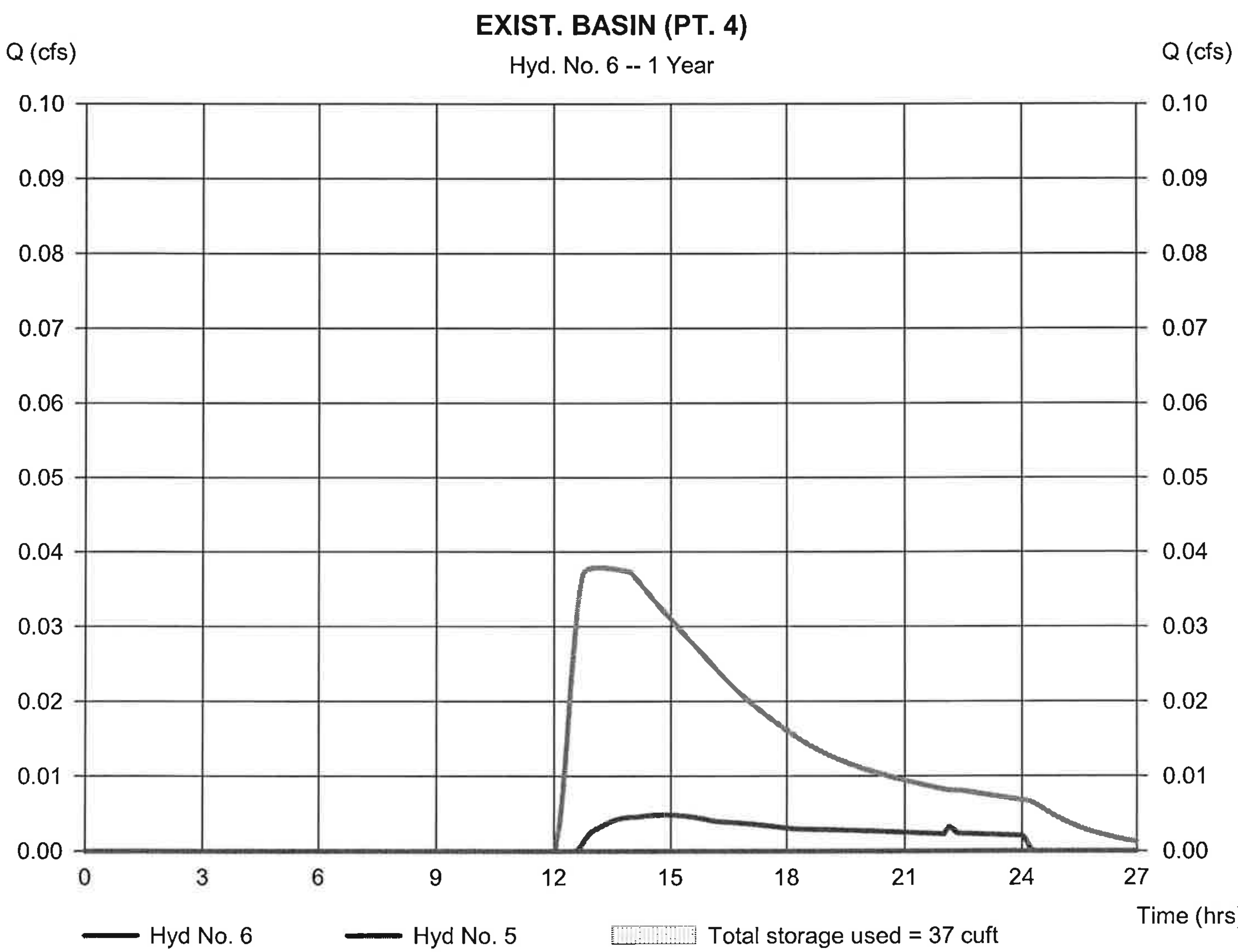
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 6

EXIST. BASIN (PT. 4)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.00 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - EW-4	Max. Elevation	= 118.01 ft
Reservoir name	= EX. BASIN	Max. Storage	= 37 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



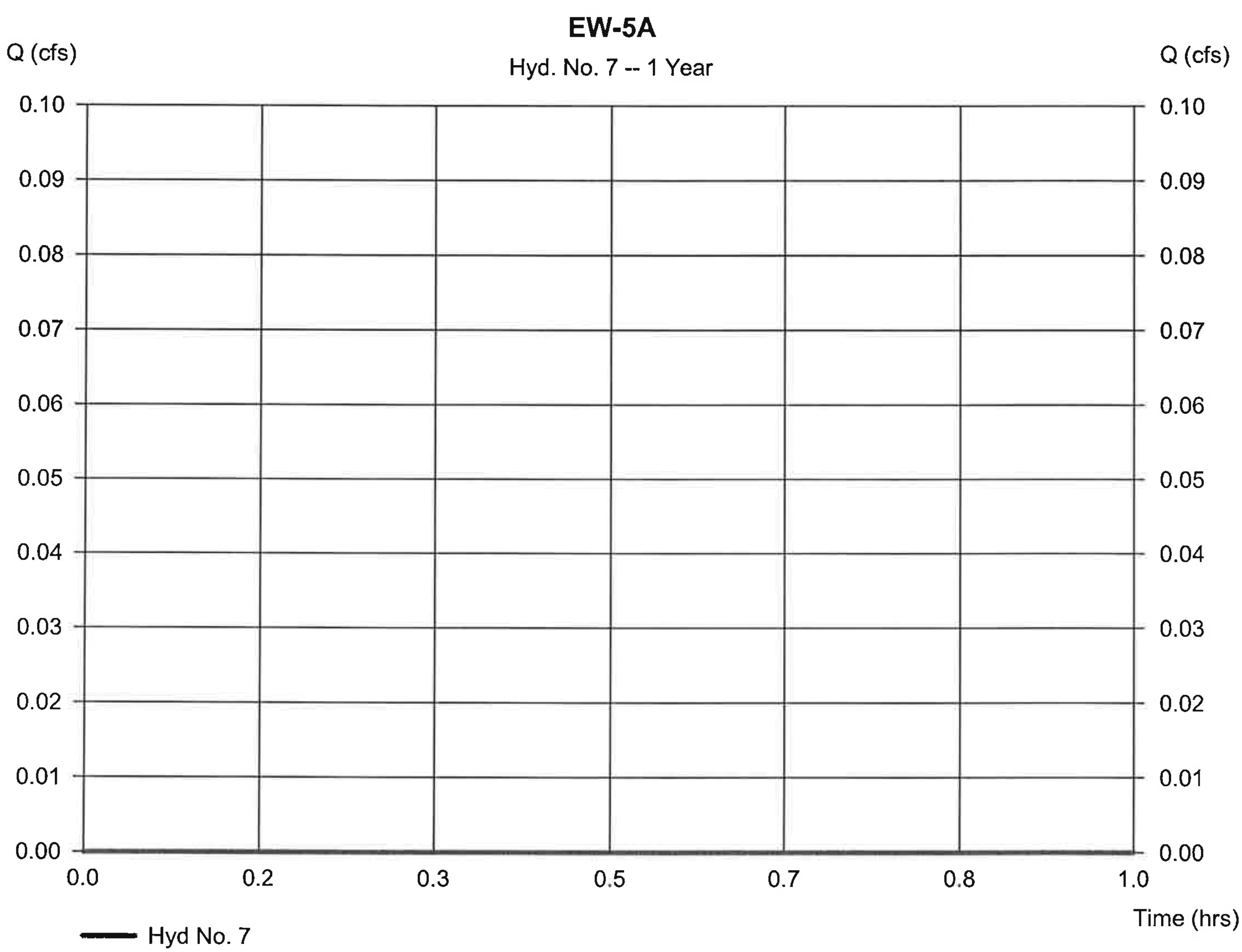
Hydrograph Report

Hyd. No. 7

EW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 4.990 ac	Curve number	= 46*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.91 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.400 x 98) + (4.750 x 39)] / 4.990



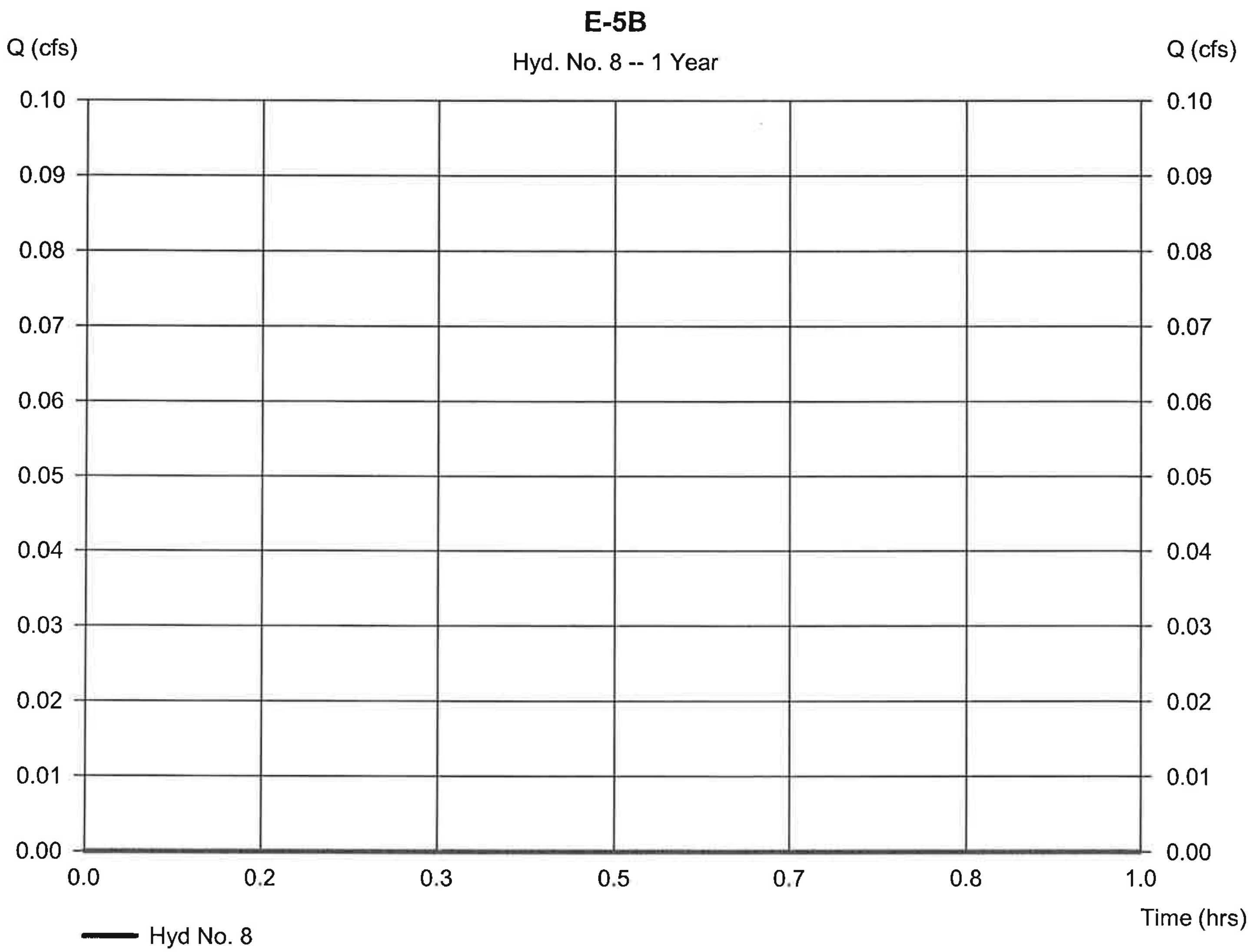
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 8

E-5B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 3.090 ac	Curve number	= 50
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.18 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



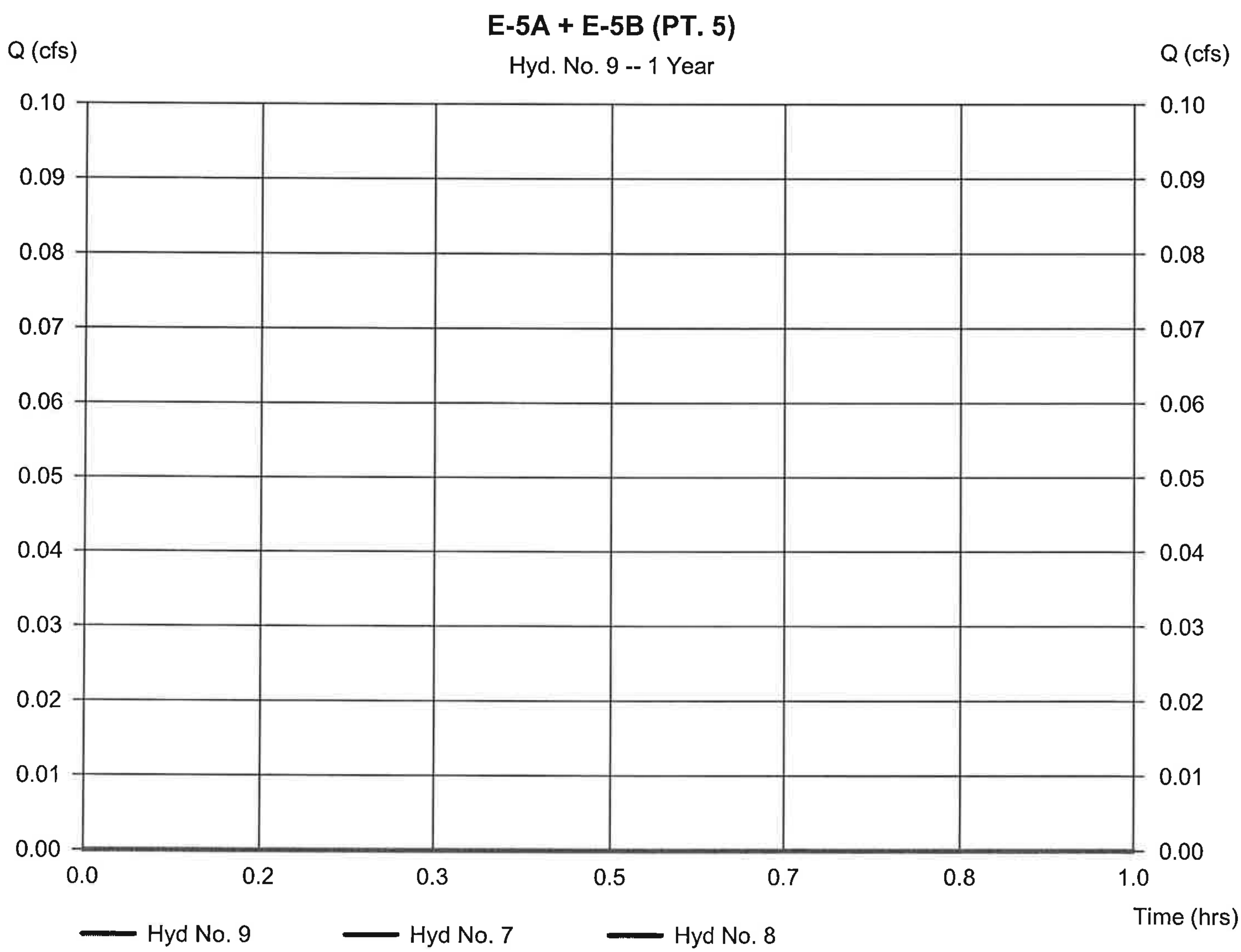
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 9

E-5A + E-5B (PT. 5)

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 8.080 ac



Hydrograph Report

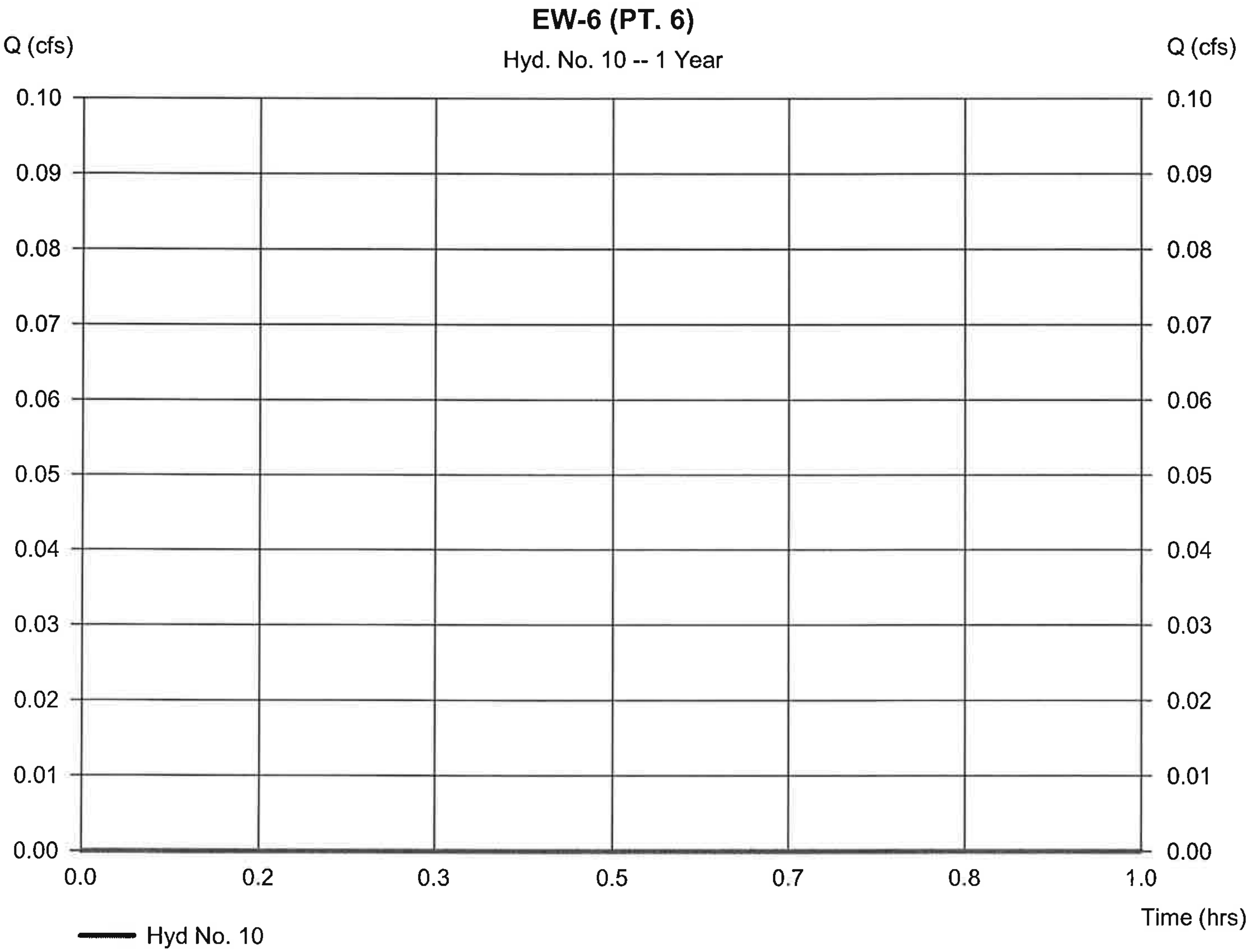
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 10

EW-6 (PT. 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 2.830 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.03 min
Total precip.	= 1.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.790 x 39)] / 2.830



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	31.68	1	728	115,076	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	8.251	1	726	26,572	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.352	1	773	6,744	------	------	------	EW-3
4	Combine	39.44	1	727	148,392	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	1.373	1	730	5,489	------	------	------	EW-4
6	Reservoir	0.000	1	785	0	5	118.60	2,248	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.029	1	922	820	------	------	------	EW-5A
8	SCS Runoff	0.047	1	825	1,209	------	------	------	E-5B
9	Combine	0.072	1	897	2,029	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	1.095	1	724	4,083	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	25.32	1	733	107,826	------	------	------	PW-1A
12	SCS Runoff	2.087	1	725	6,726	------	------	------	PW-1B
13	Reservoir	0.000	1	734	0	12	126.99	2,879	WATER QUALITY SWALE
14	Combine	25.32	1	733	107,826	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	16.64	1	745	82,763	14	120.76	25,670	BASIN 2
16	Diversion1	0.601	1	745	16,824	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	16.04	1	745	65,940	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.095	1	765	1,177	------	------	------	PW-2
19	Reservoir	0.000	1	798	0	18	118.10	368	BASIN 1 (PT.2)
20	SCS Runoff	0.072	1	893	1,948	------	------	------	PW-3
21	SCS Runoff	5.236	1	743	29,497	------	------	------	PW-5A
22	Reservoir	1.175	1	781	8,948	21	128.44	10,868	BASIN 3
23	Combine	16.64	1	745	91,712	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.476	1	727	1,715	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	1.697	1	737	8,197	------	------	------	PW-6A
26	Reservoir	1.083	1	752	2,070	25	129.94	2,955	BASIN 4
27	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
28	Combine	1.083	1	752	2,070	26, 27	------	------	TOTAL TO PT. 6

Hydrograph Report

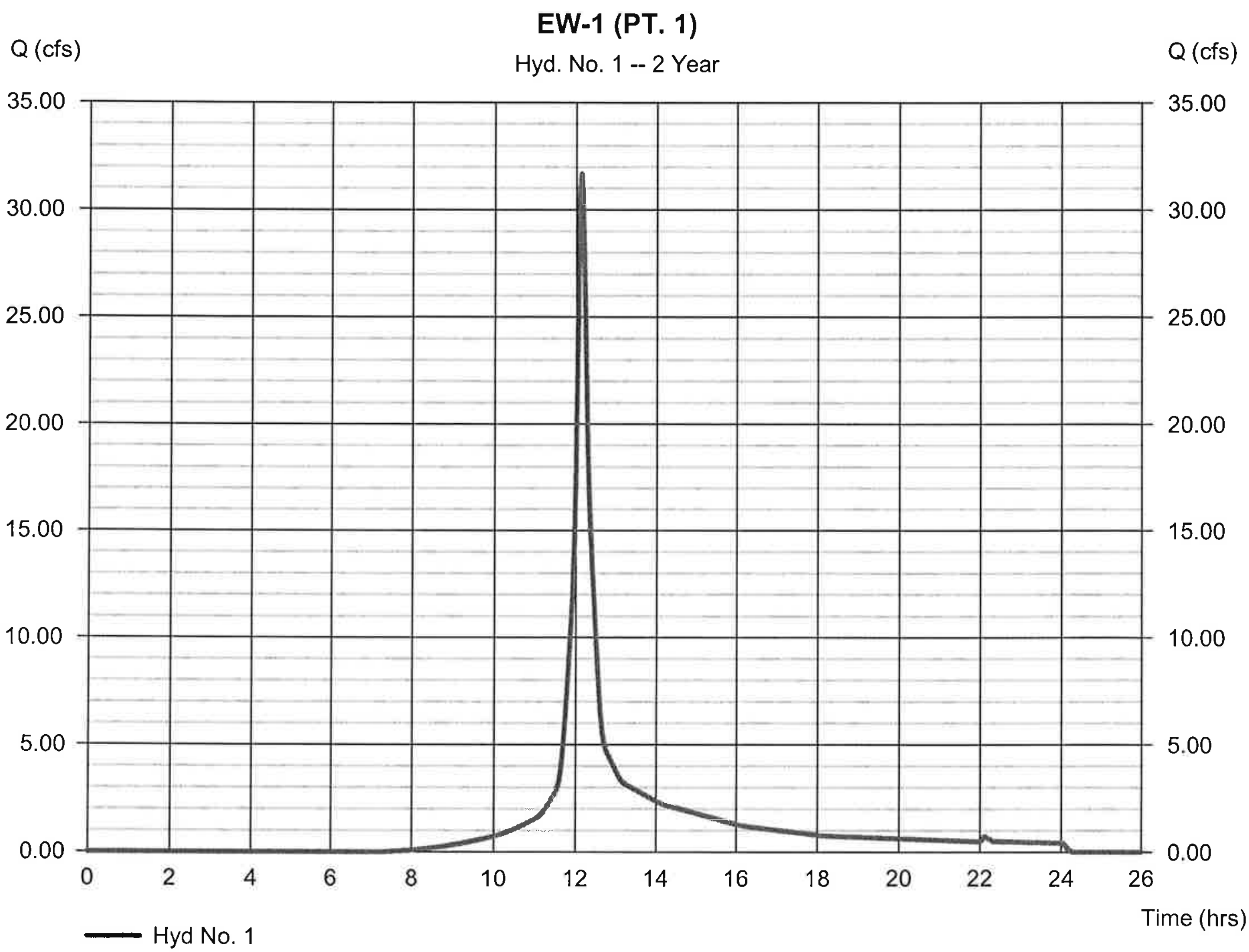
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 1

EW-1 (PT. 1)

Hydrograph type	= SCS Runoff	Peak discharge	= 31.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 115,076 cuft
Drainage area	= 17.050 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.23 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.240 x 39) + (14.180 x 98)] / 17.050



Hydrograph Report

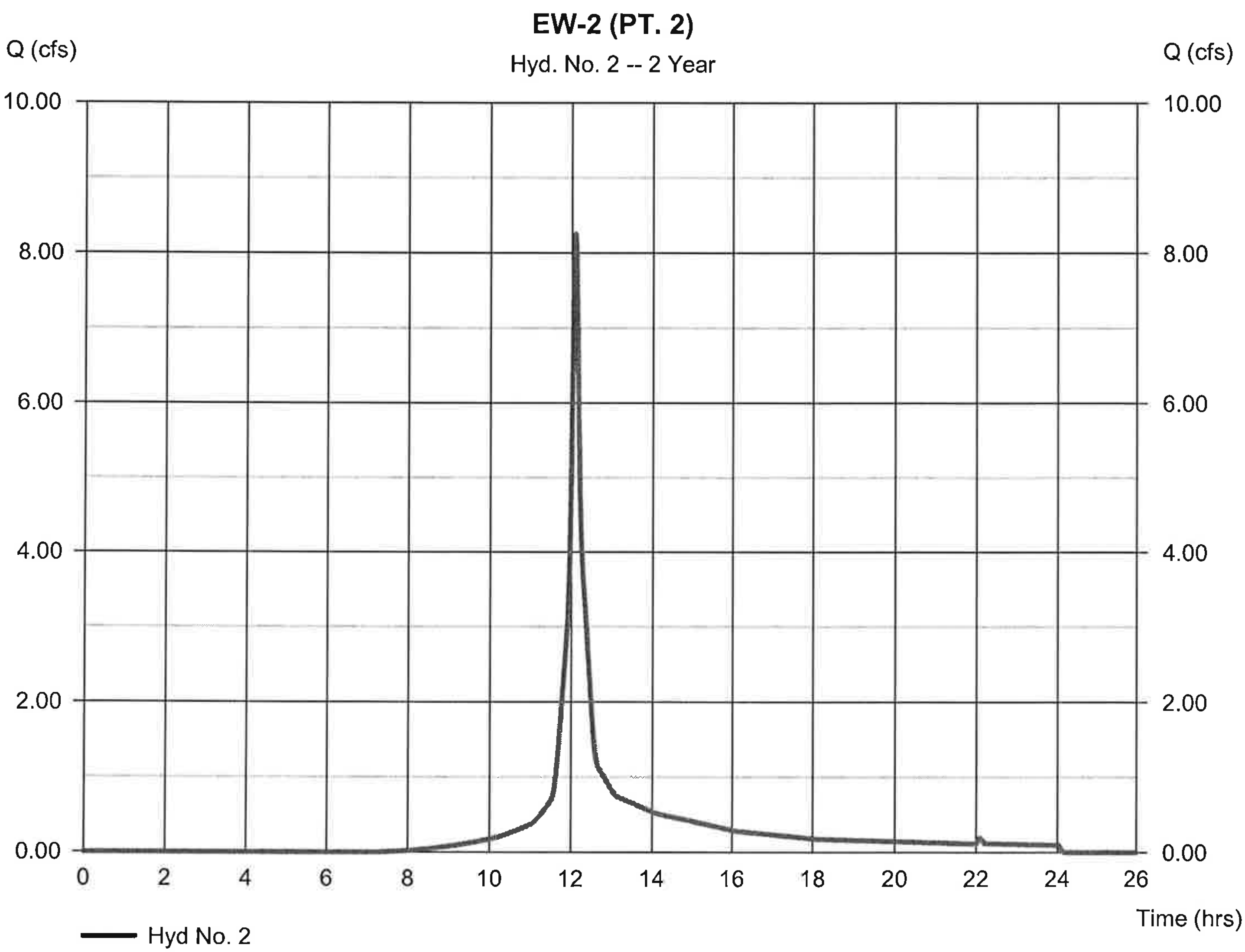
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 2

EW-2 (PT. 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 8.251 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 26,572 cuft
Drainage area	= 4.110 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.81 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.310 x 98) + (0.800 x 39)] / 4.110



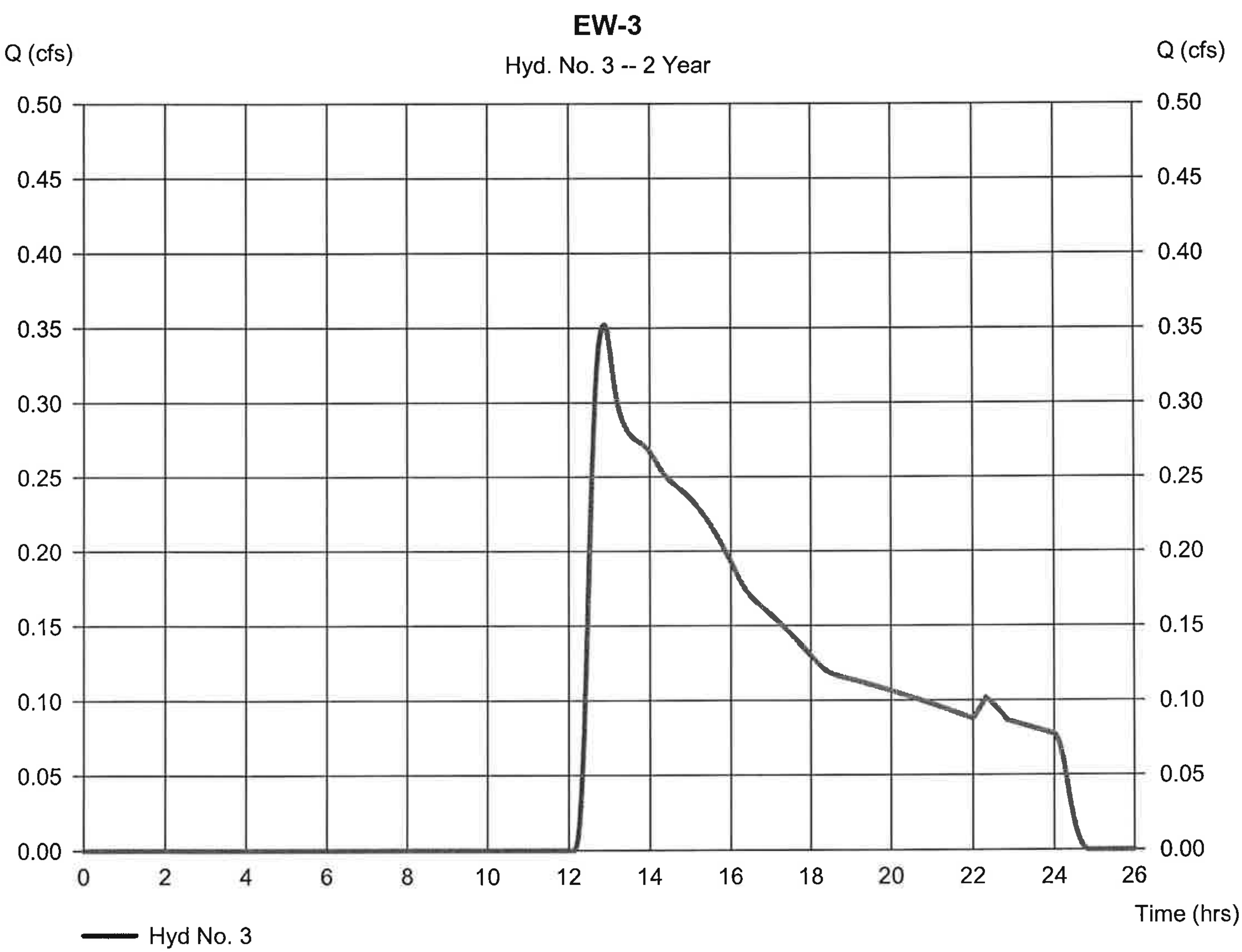
Hydrograph Report

Hyd. No. 3

EW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.352 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.88 hrs
Time interval	= 1 min	Hyd. volume	= 6,744 cuft
Drainage area	= 12.310 ac	Curve number	= 52*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.55 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.280 x 98) + (0.440 x 76) + (0.130 x 83) + (14.090 x 39)] / 12.310



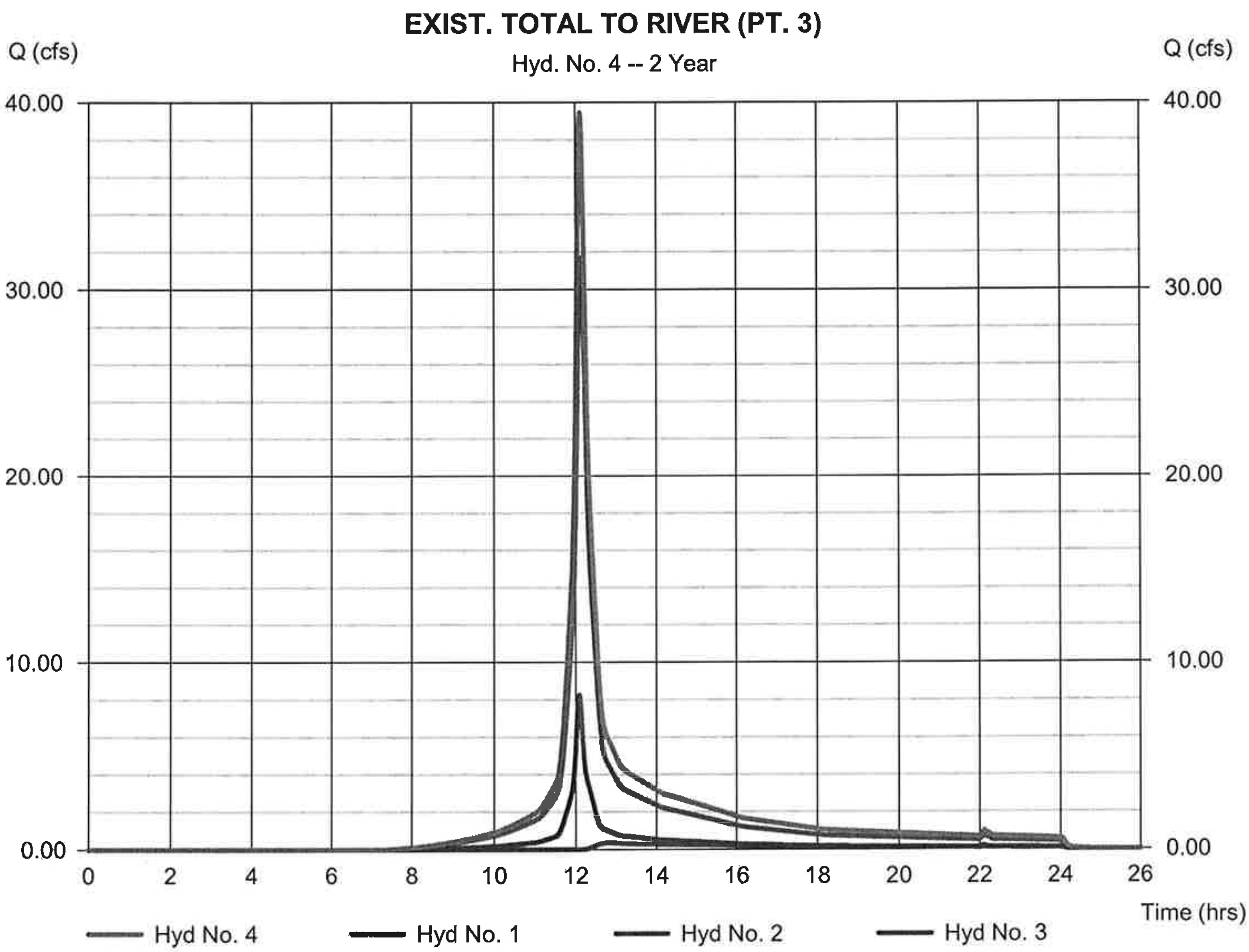
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 4

EXIST. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 39.44 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 148,392 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 33.470 ac



Hydrograph Report

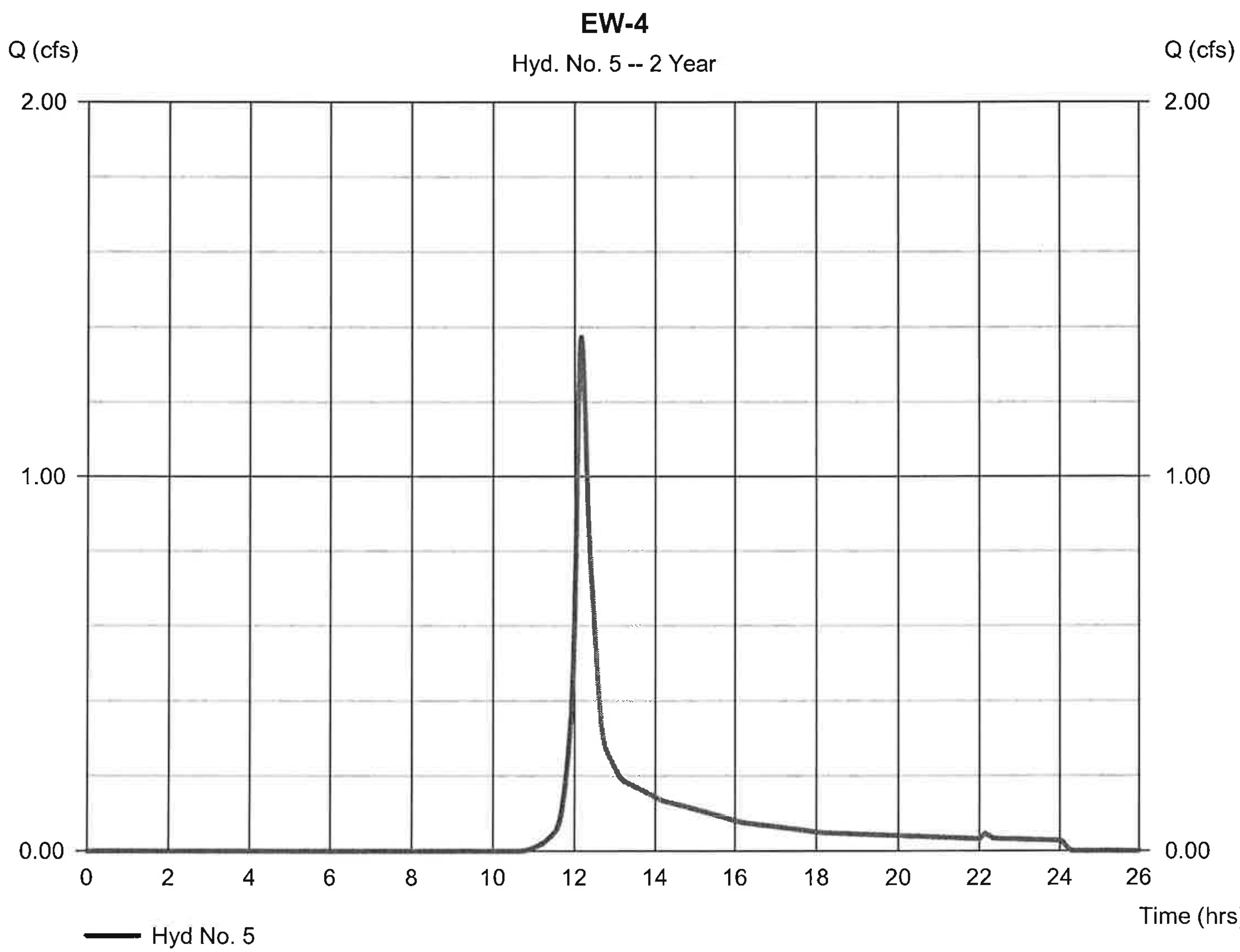
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 5

EW-4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.373 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 5,489 cuft
Drainage area	= 1.580 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.01 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (0.630 x 39)] / 1.580



Hydrograph Report

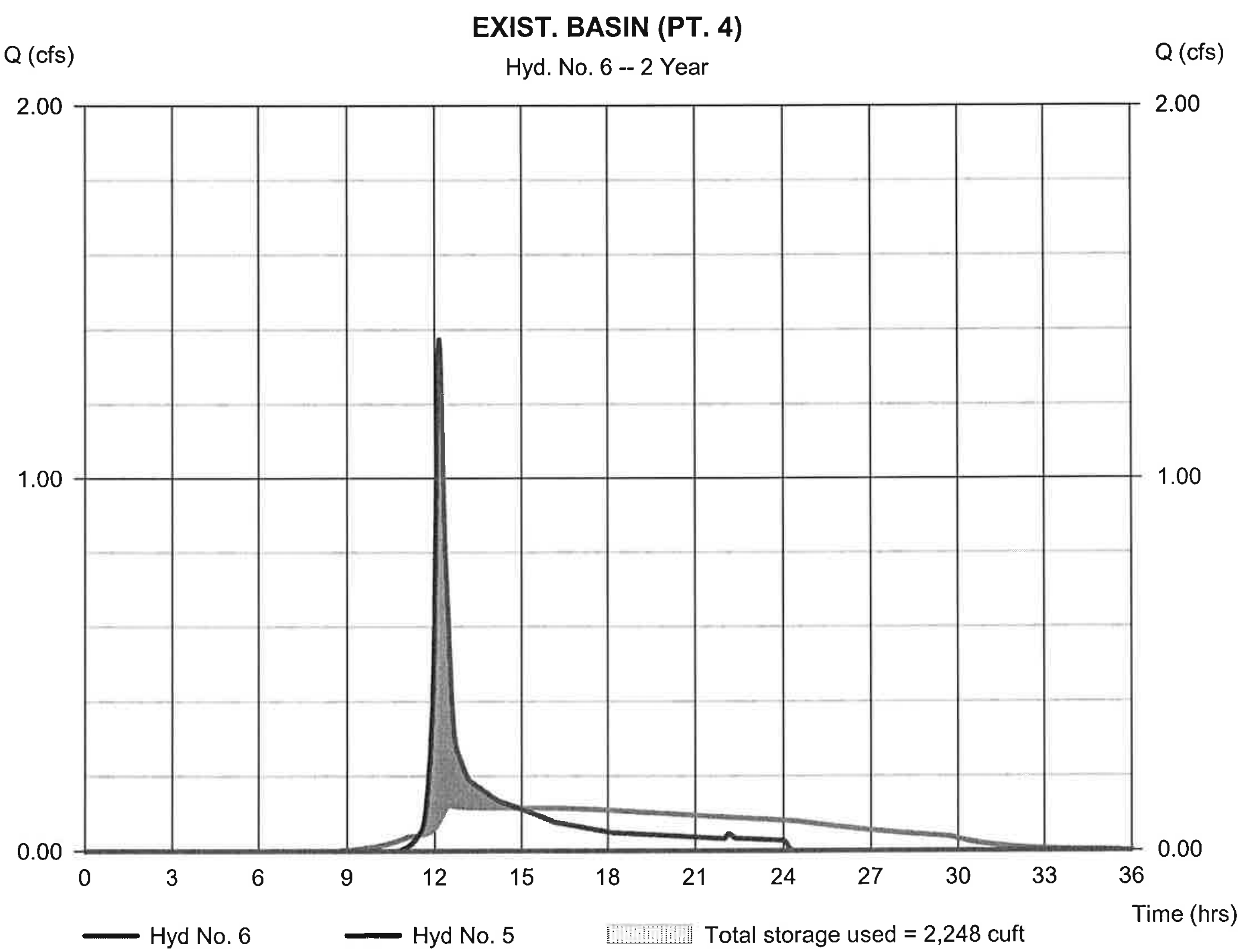
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 6

EXIST. BASIN (PT. 4)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.08 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - EW-4	Max. Elevation	= 118.60 ft
Reservoir name	= EX. BASIN	Max. Storage	= 2,248 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

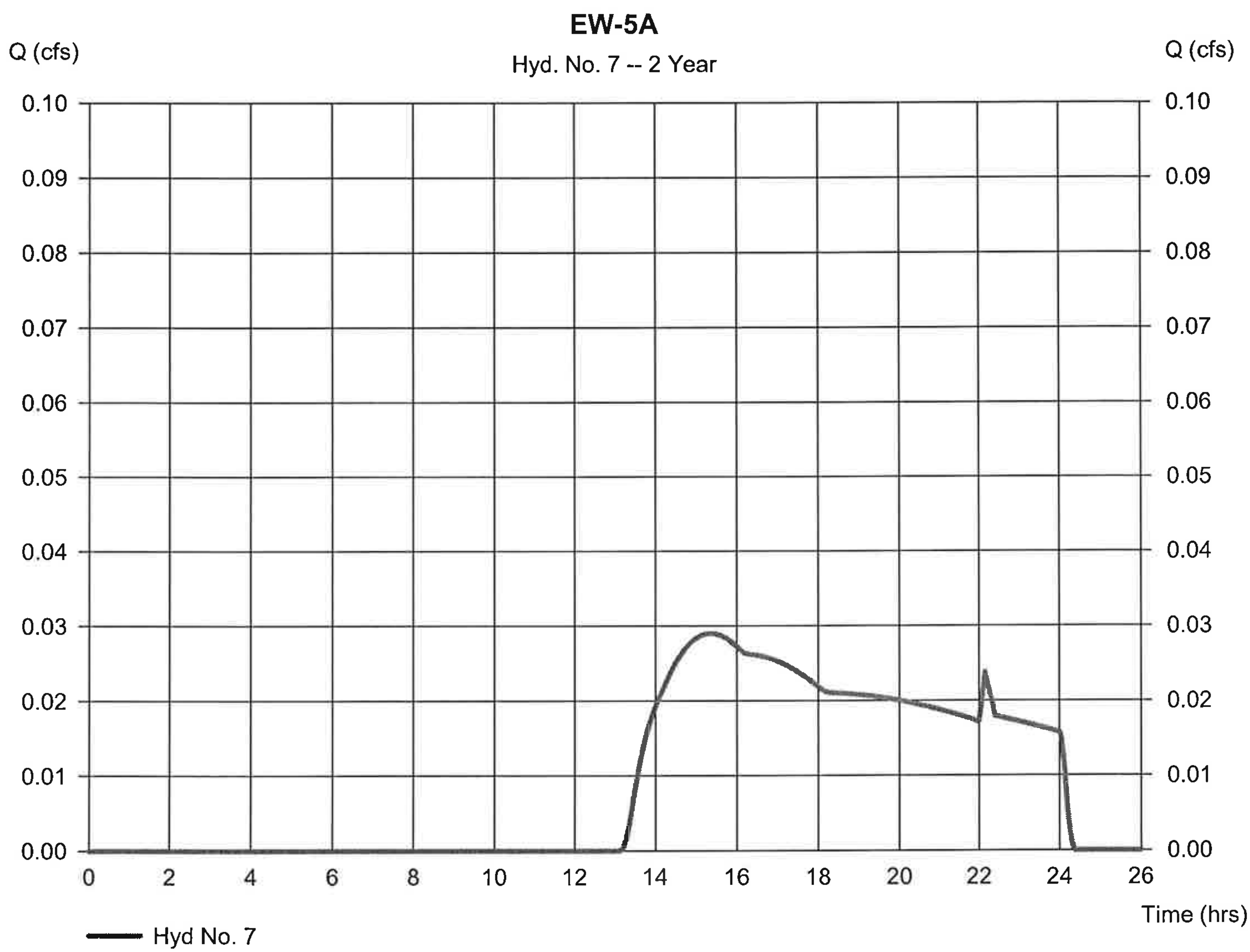
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 7

EW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.029 cfs
Storm frequency	= 2 yrs	Time to peak	= 15.37 hrs
Time interval	= 1 min	Hyd. volume	= 820 cuft
Drainage area	= 4.990 ac	Curve number	= 46*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.91 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.400 x 98) + (4.750 x 39)] / 4.990

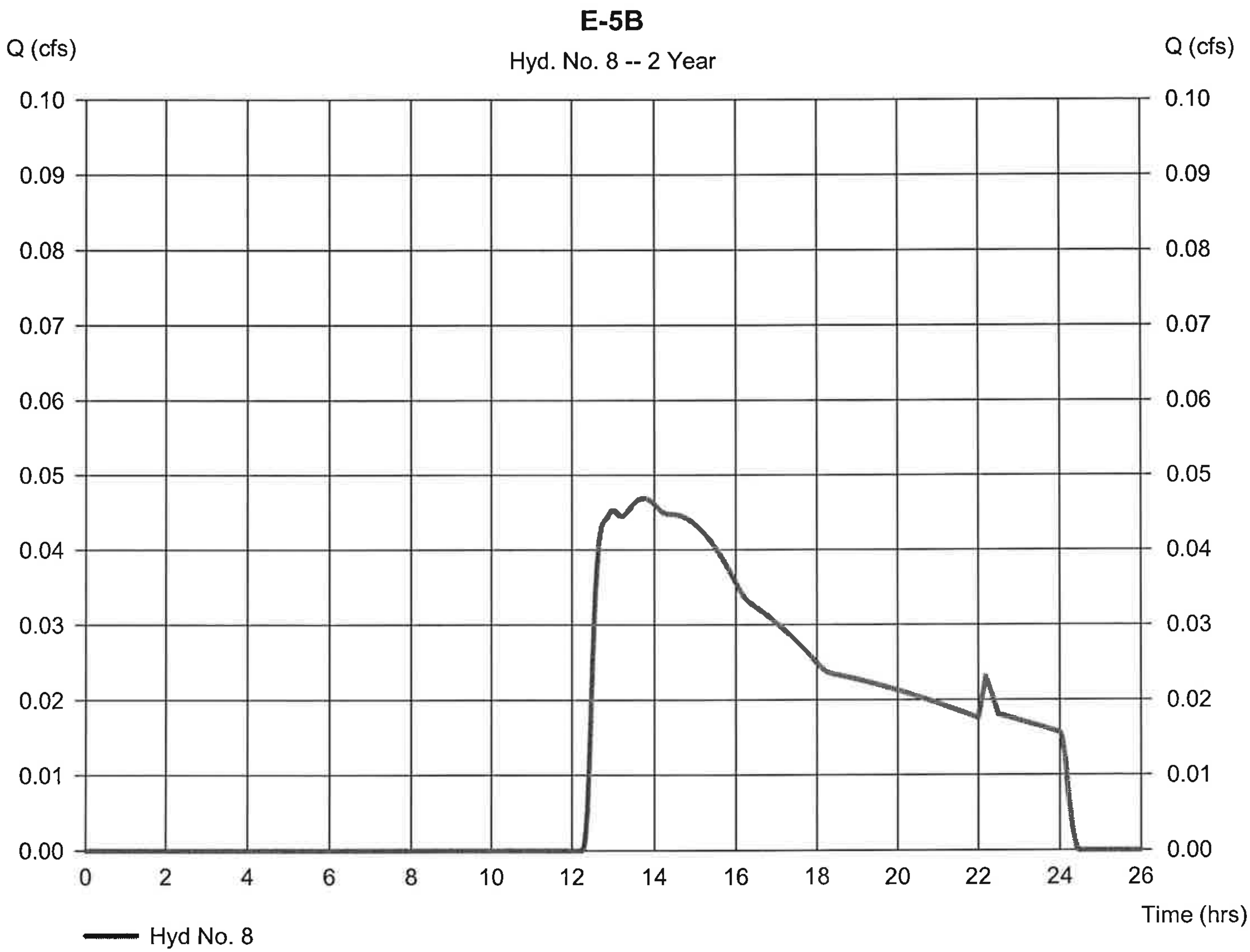


Hydrograph Report

Hyd. No. 8

E-5B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.047 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.75 hrs
Time interval	= 1 min	Hyd. volume	= 1,209 cuft
Drainage area	= 3.090 ac	Curve number	= 50
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.18 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

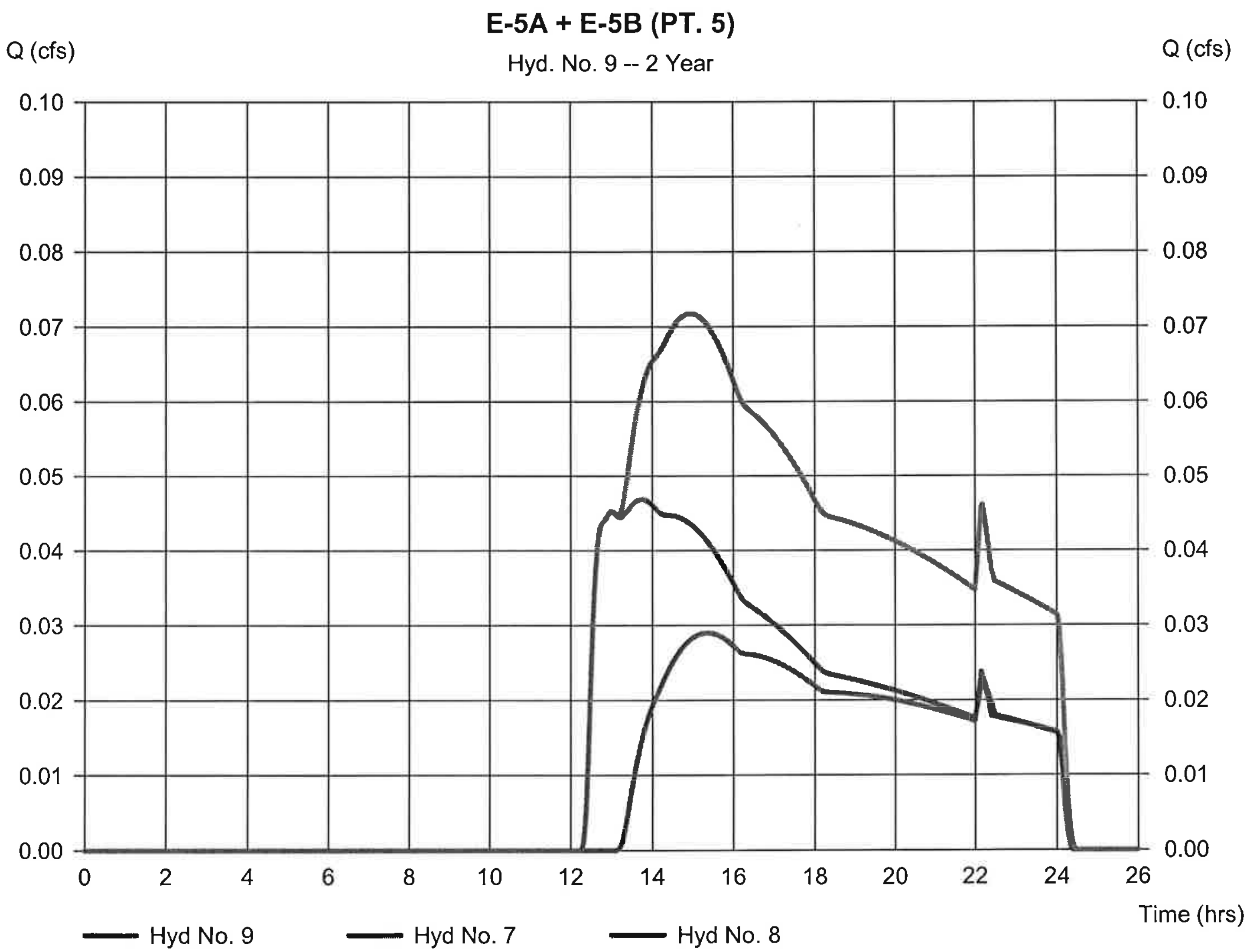


Hydrograph Report

Hyd. No. 9

E-5A + E-5B (PT. 5)

Hydrograph type	= Combine	Peak discharge	= 0.072 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.95 hrs
Time interval	= 1 min	Hyd. volume	= 2,029 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 8.080 ac



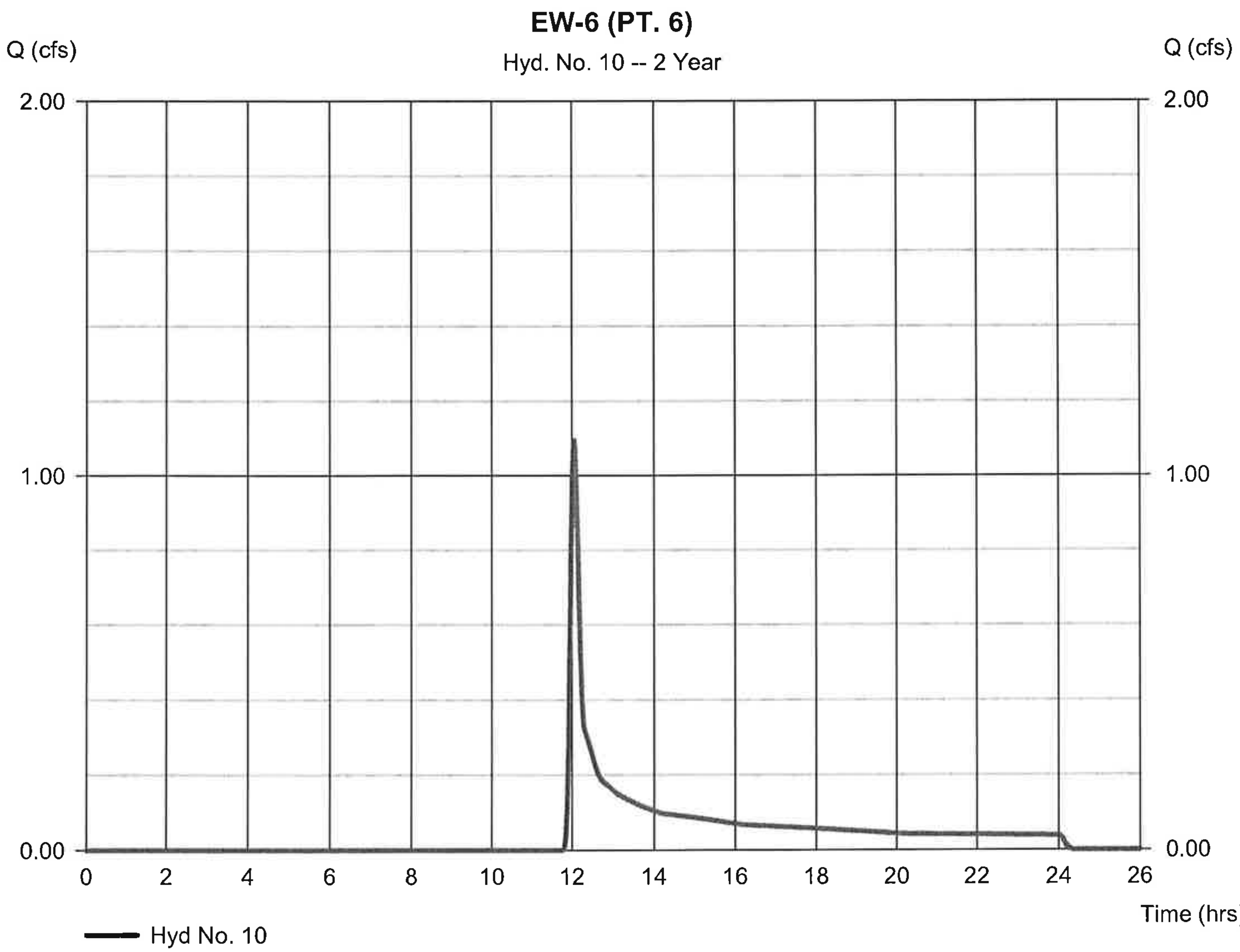
Hydrograph Report

Hyd. No. 10

EW-6 (PT. 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.095 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 4,083 cuft
Drainage area	= 2.830 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.03 min
Total precip.	= 3.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.790 x 39)] / 2.830



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	53.09	1	728	195,223	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	13.82	1	725	45,078	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	3.324	1	753	26,655	------	------	------	EW-3
4	Combine	66.75	1	727	266,955	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	2.927	1	729	11,135	------	------	------	EW-4
6	Reservoir	0.000	1	732	0	5	119.19	5,096	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.630	1	746	6,040	------	------	------	EW-5A
8	SCS Runoff	0.762	1	743	5,544	------	------	------	E-5B
9	Combine	1.385	1	745	11,584	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	3.951	1	722	10,914	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	45.30	1	732	192,400	------	------	------	PW-1A
12	SCS Runoff	4.338	1	725	13,432	------	------	------	PW-1B
13	Reservoir	0.842	1	748	3,749	12	127.41	5,189	WATER QUALITY SWALE
14	Combine	45.70	1	732	196,149	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	34.19	1	742	167,881	14	121.92	40,295	BASIN 2
16	Diversion1	0.820	1	742	19,625	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	33.37	1	742	148,255	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.499	1	755	3,761	------	------	------	PW-2
19	Reservoir	0.000	1	774	0	18	118.36	1,341	BASIN 1 (PT.2)
20	SCS Runoff	1.274	1	748	10,882	------	------	------	PW-3
21	SCS Runoff	12.06	1	741	62,928	------	------	------	PW-5A
22	Reservoir	7.915	1	757	38,755	21	129.25	17,002	BASIN 3
23	Combine	39.25	1	744	206,636	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.993	1	727	3,424	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	2.941	1	737	14,256	------	------	------	PW-6A
26	Reservoir	2.731	1	740	6,961	25	130.06	3,214	BASIN 4
27	SCS Runoff	0.009	1	881	248	------	------	------	PW-6B
28	Combine	2.731	1	740	7,210	26, 27	------	------	TOTAL TO PT. 6

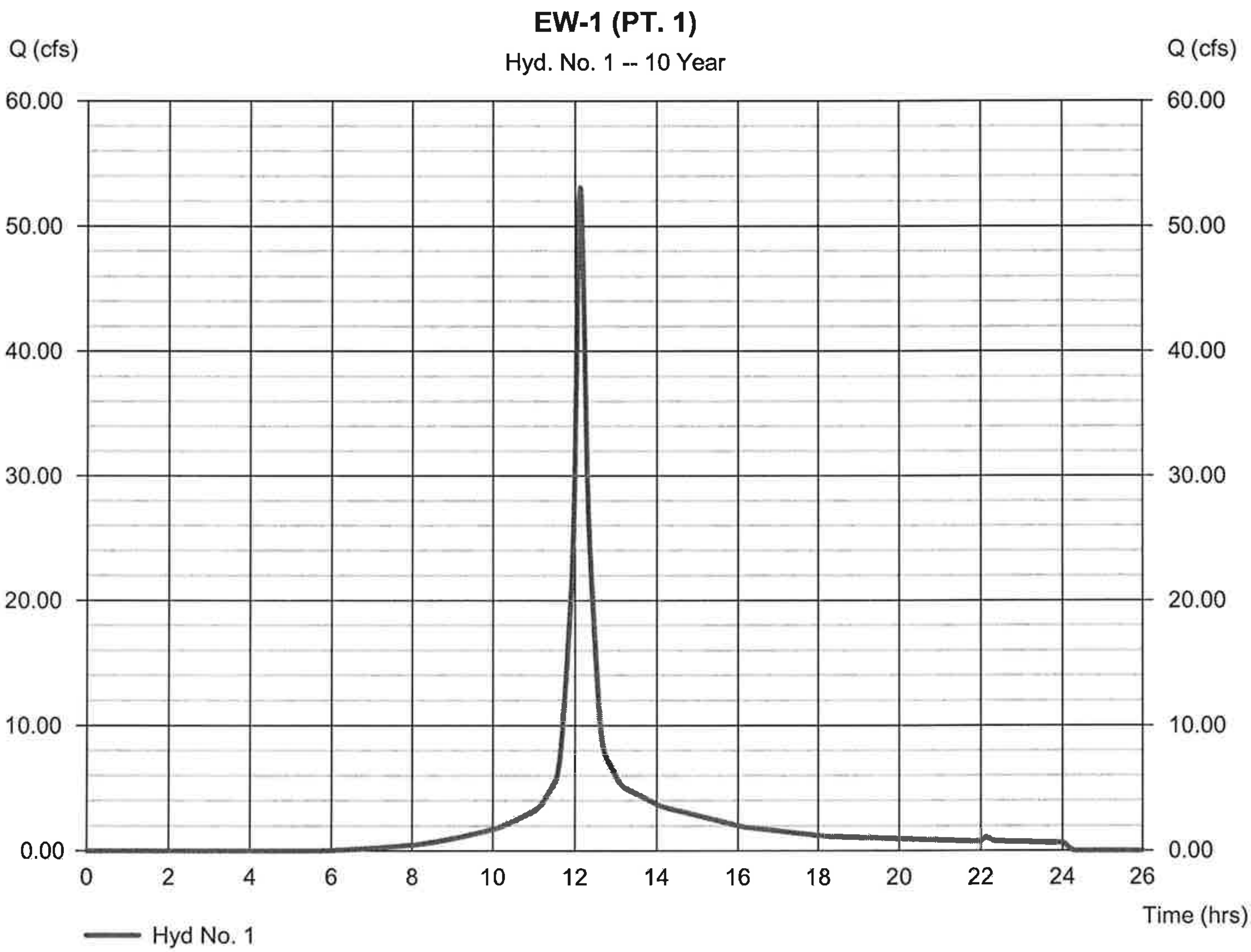
Hydrograph Report

Hyd. No. 1

EW-1 (PT. 1)

Hydrograph type	= SCS Runoff	Peak discharge	= 53.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 195,223 cuft
Drainage area	= 17.050 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.23 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.240 x 39) + (14.180 x 98)] / 17.050



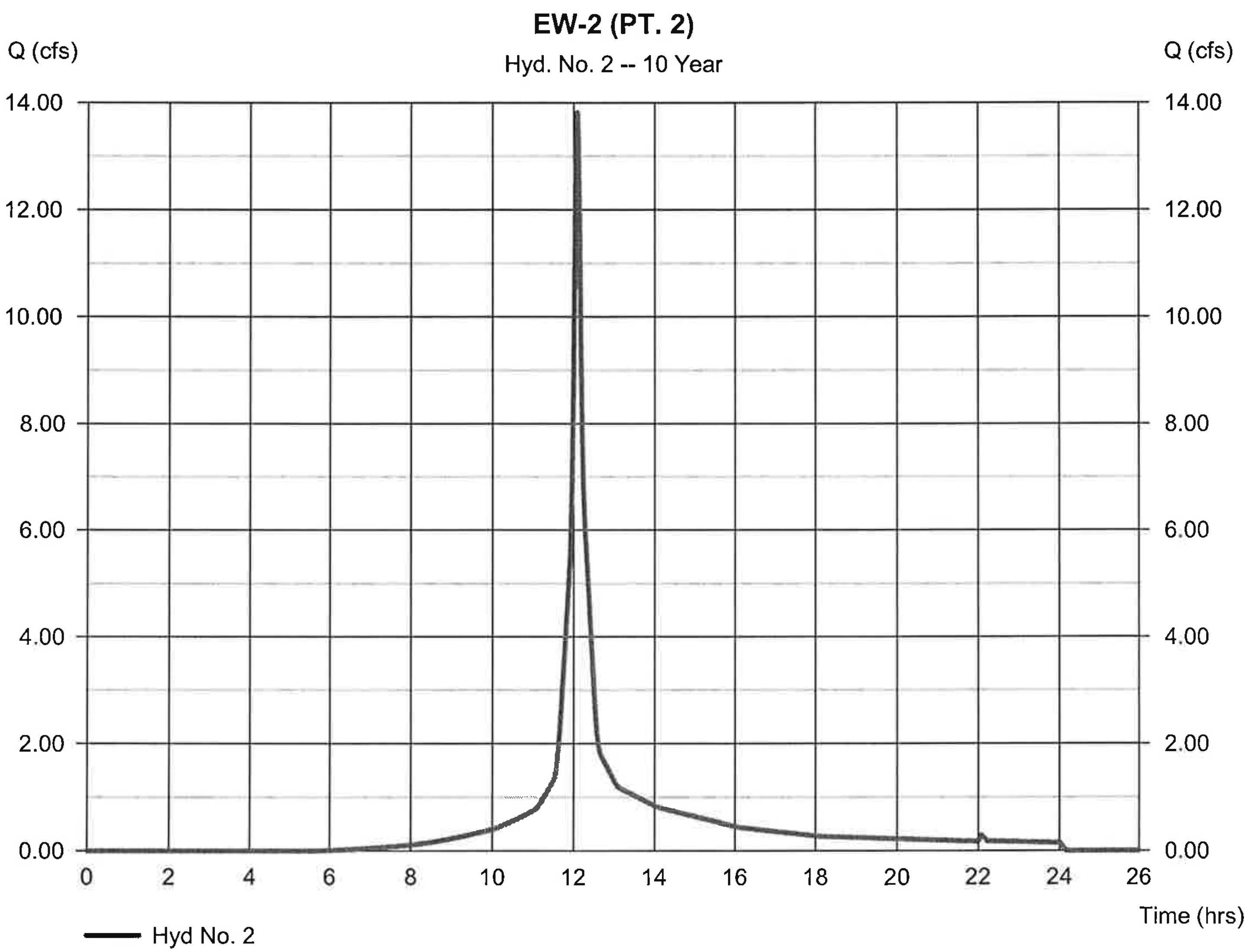
Hydrograph Report

Hyd. No. 2

EW-2 (PT. 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 13.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 45,078 cuft
Drainage area	= 4.110 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.81 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.310 x 98) + (0.800 x 39)] / 4.110



Hydrograph Report

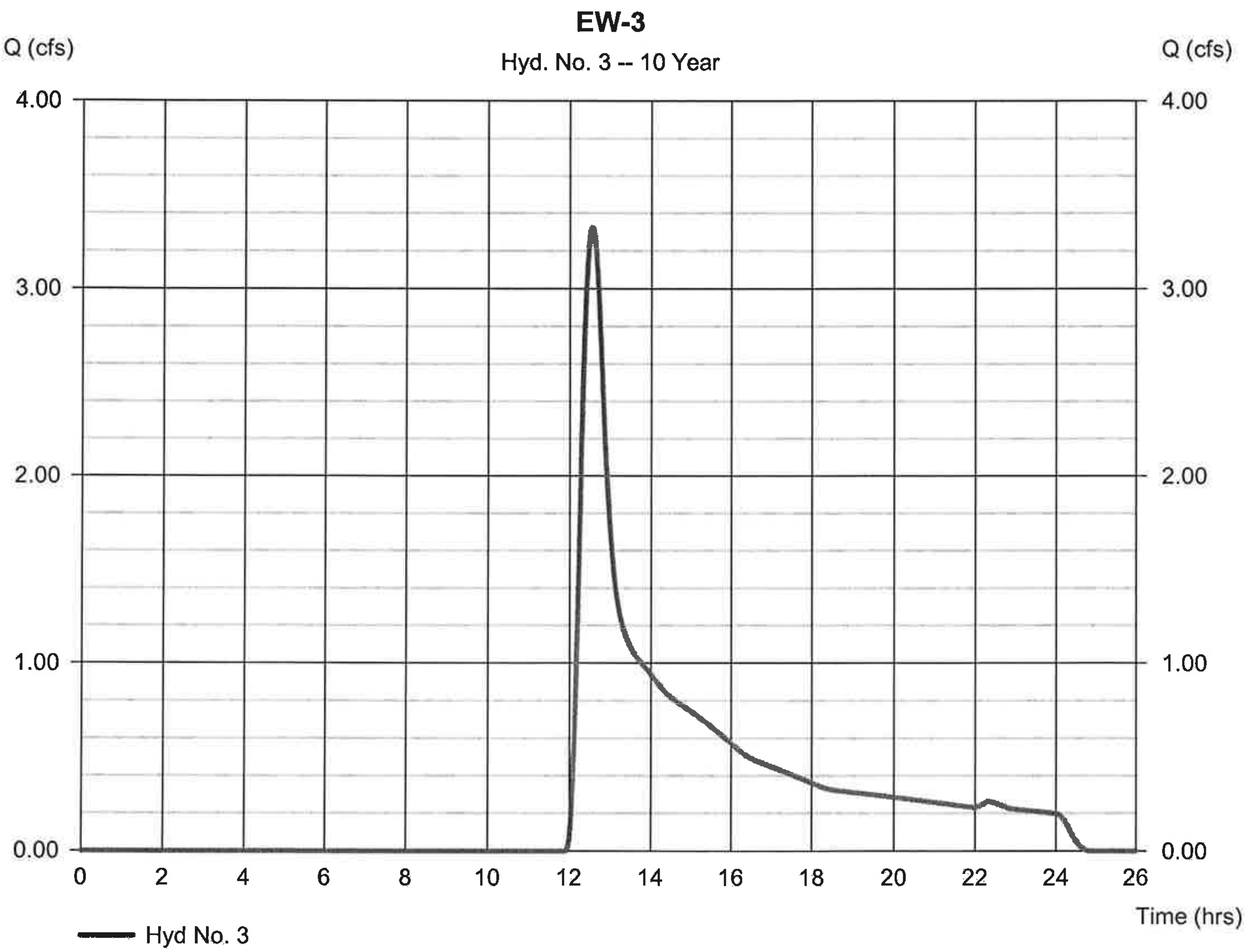
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 3

EW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.324 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.55 hrs
Time interval	= 1 min	Hyd. volume	= 26,655 cuft
Drainage area	= 12.310 ac	Curve number	= 52*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.55 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.280 x 98) + (0.440 x 76) + (0.130 x 83) + (14.090 x 39)] / 12.310



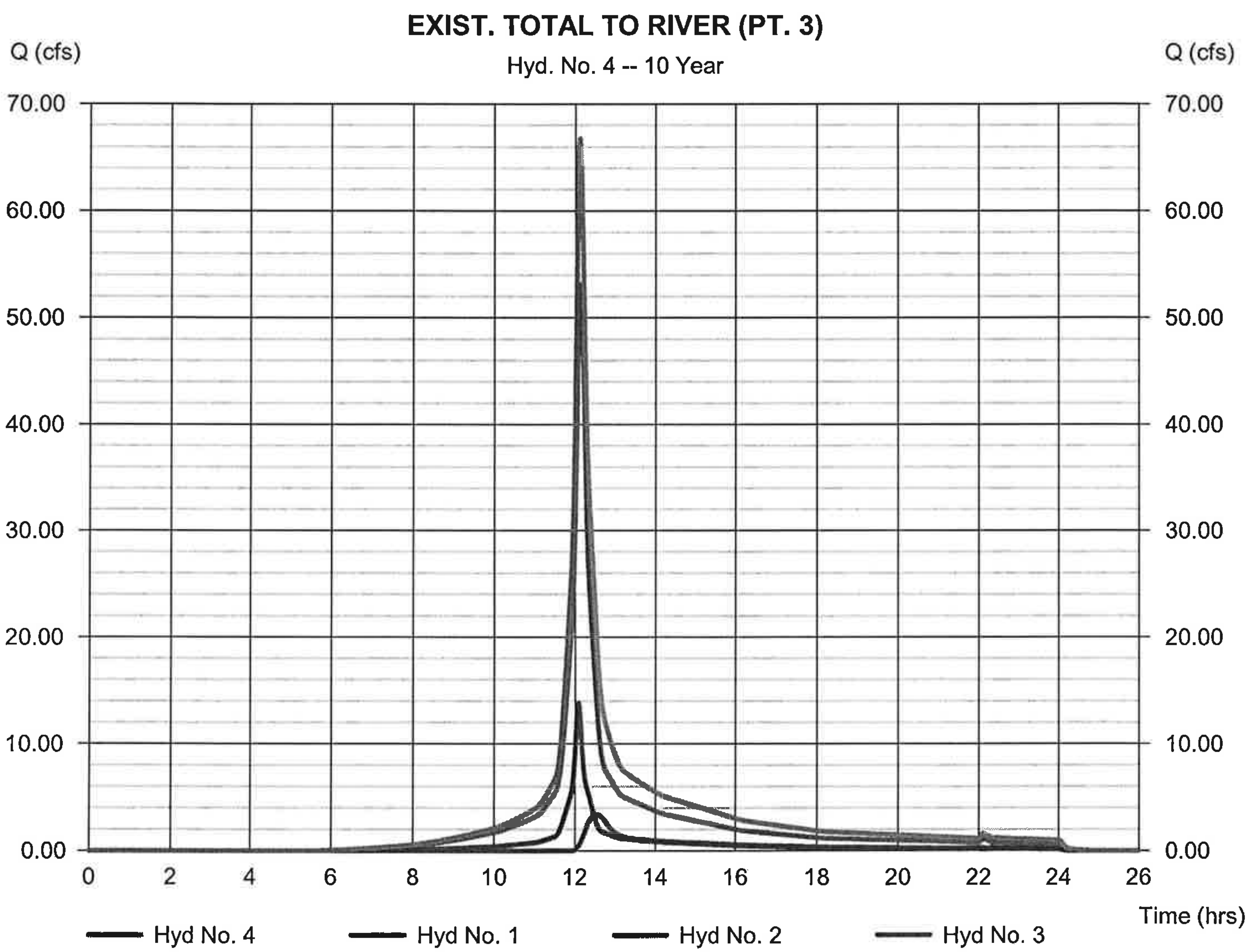
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 4

EXIST. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 66.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 266,955 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 33.470 ac



Hydrograph Report

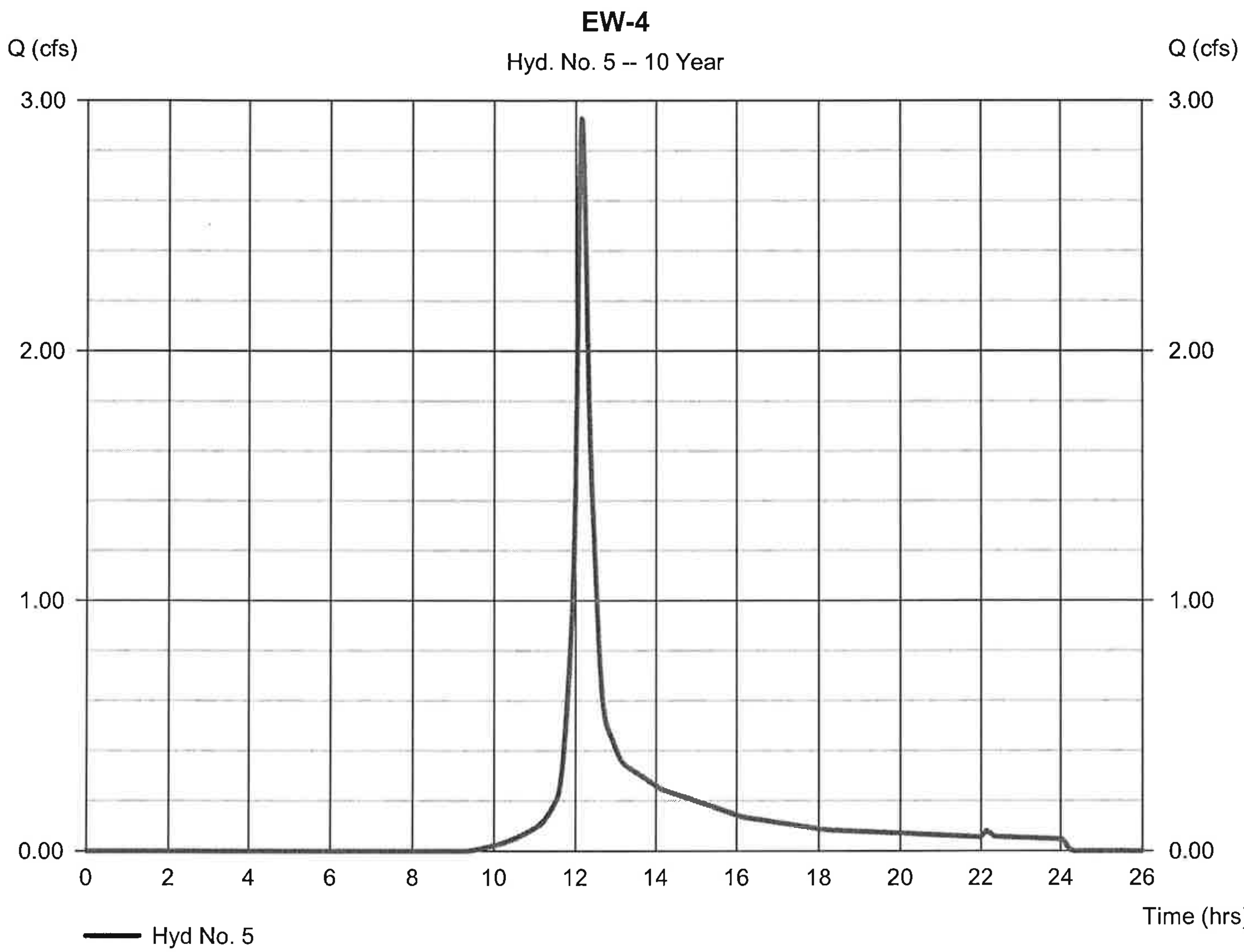
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 5

EW-4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.927 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 11,135 cuft
Drainage area	= 1.580 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.01 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (0.630 x 39)] / 1.580



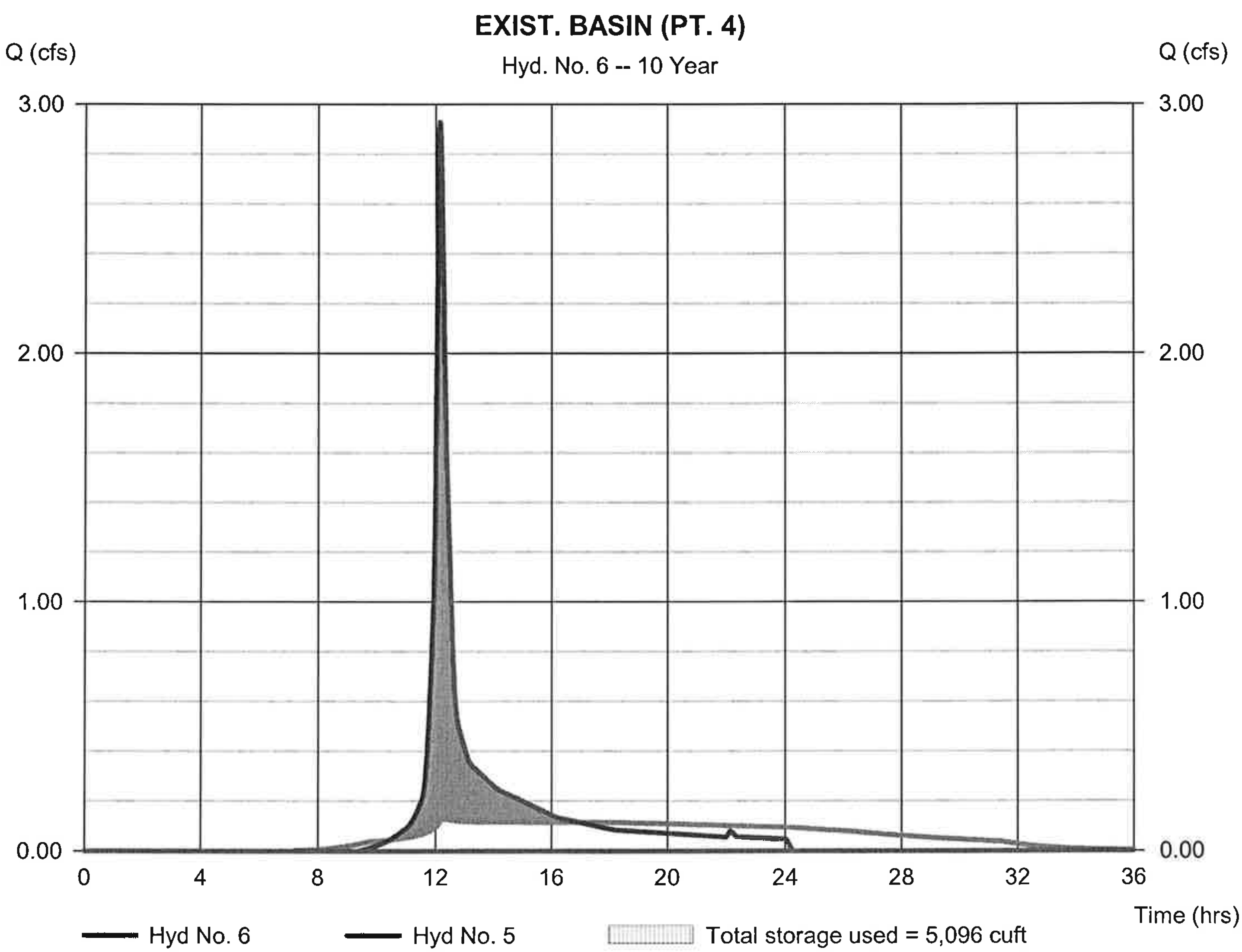
Hydrograph Report

Hyd. No. 6

EXIST. BASIN (PT. 4)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - EW-4	Max. Elevation	= 119.19 ft
Reservoir name	= EX. BASIN	Max. Storage	= 5,096 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

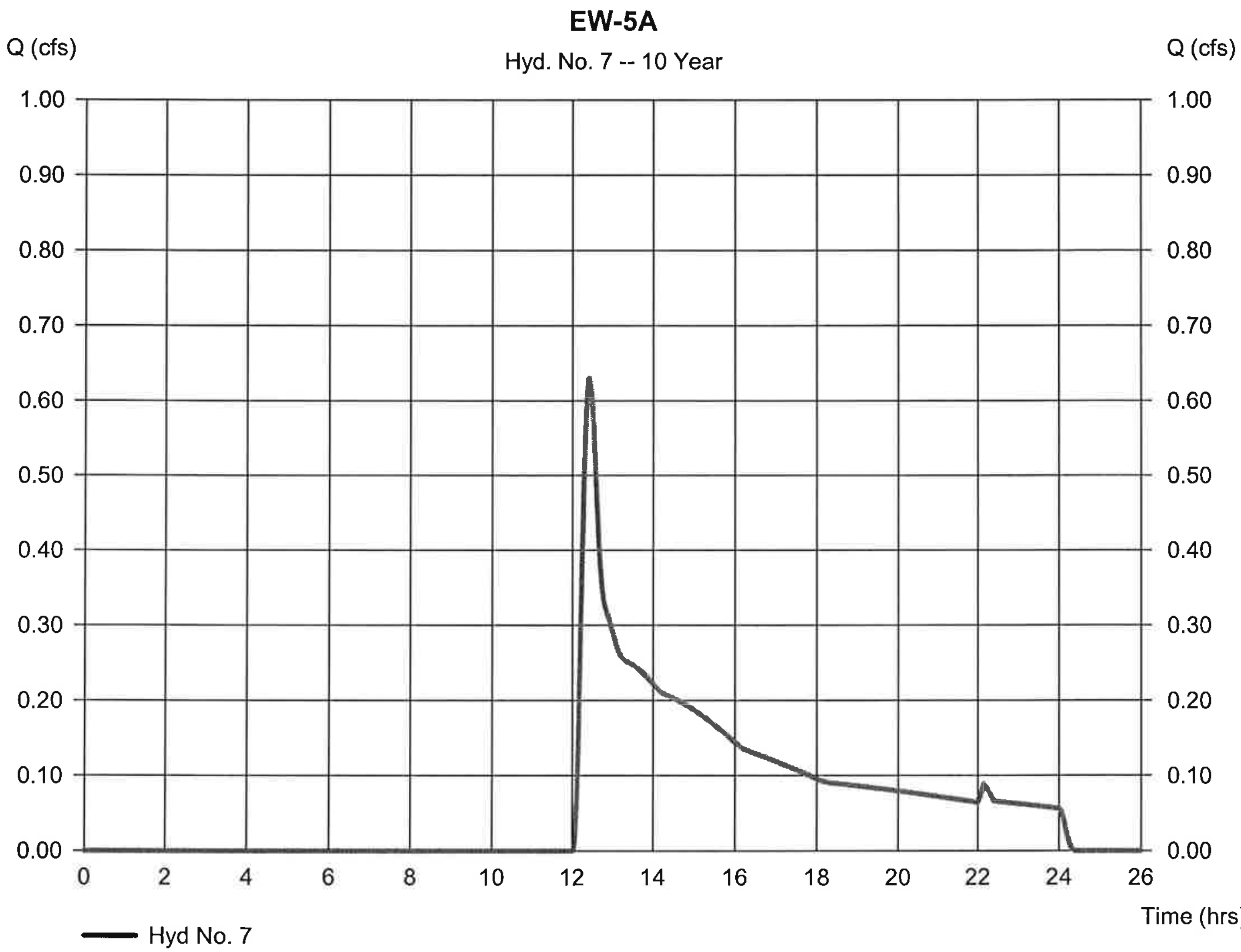
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 7

EW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.630 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.43 hrs
Time interval	= 1 min	Hyd. volume	= 6,040 cuft
Drainage area	= 4.990 ac	Curve number	= 46*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.91 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.400 x 98) + (4.750 x 39)] / 4.990



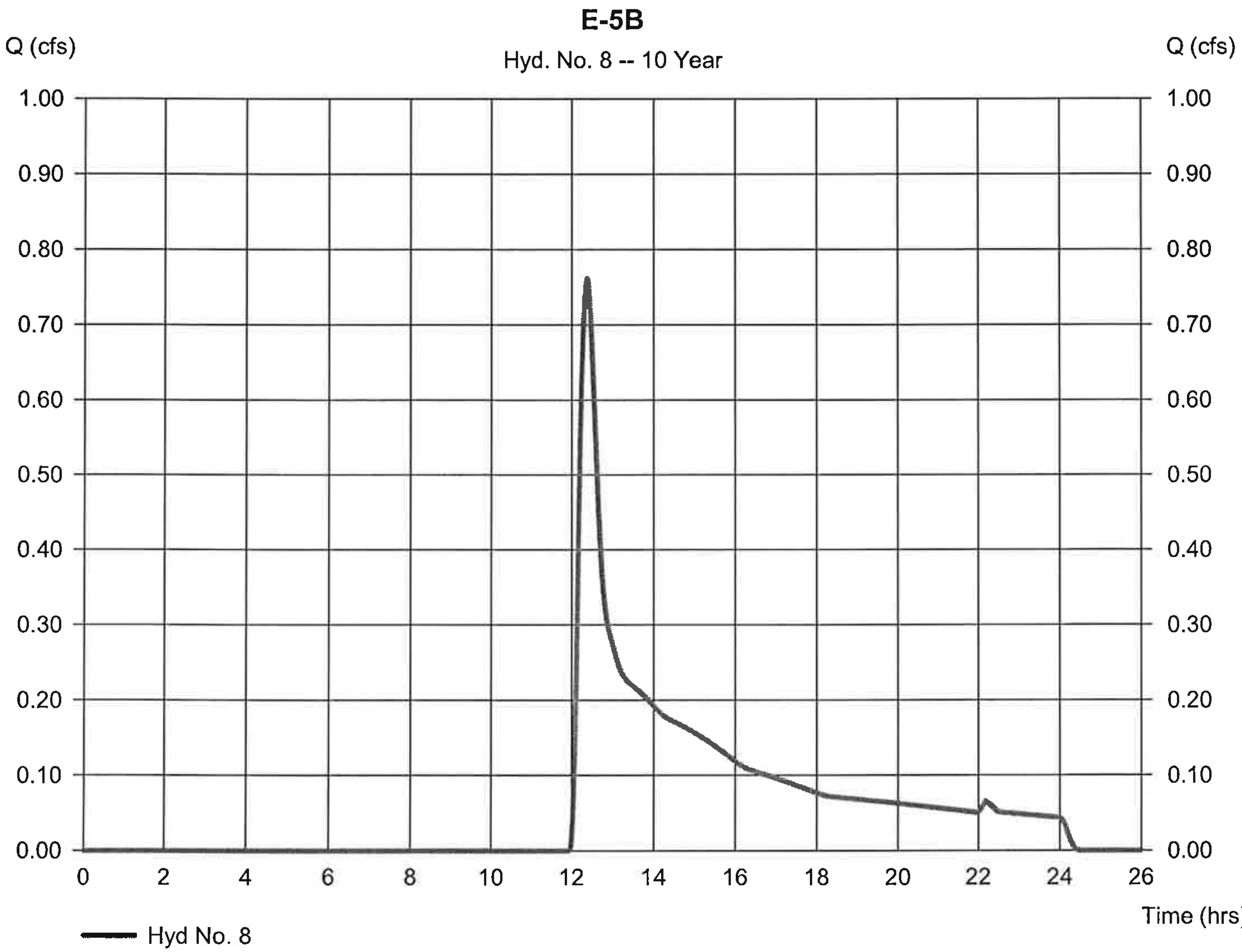
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 8

E-5B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.762 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 5,544 cuft
Drainage area	= 3.090 ac	Curve number	= 50
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.18 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



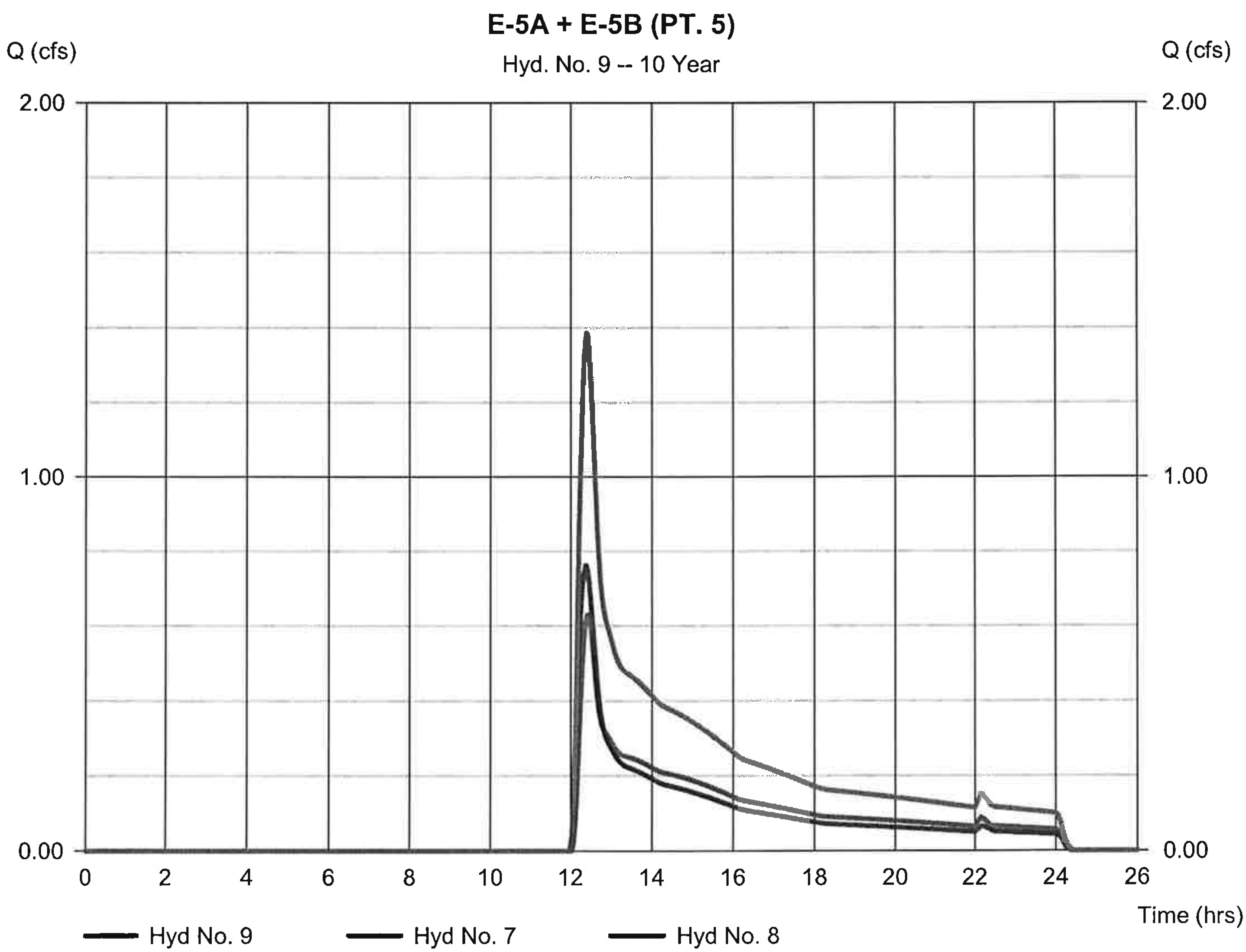
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 9

E-5A + E-5B (PT. 5)

Hydrograph type	= Combine	Peak discharge	= 1.385 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 11,584 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 8.080 ac



Hydrograph Report

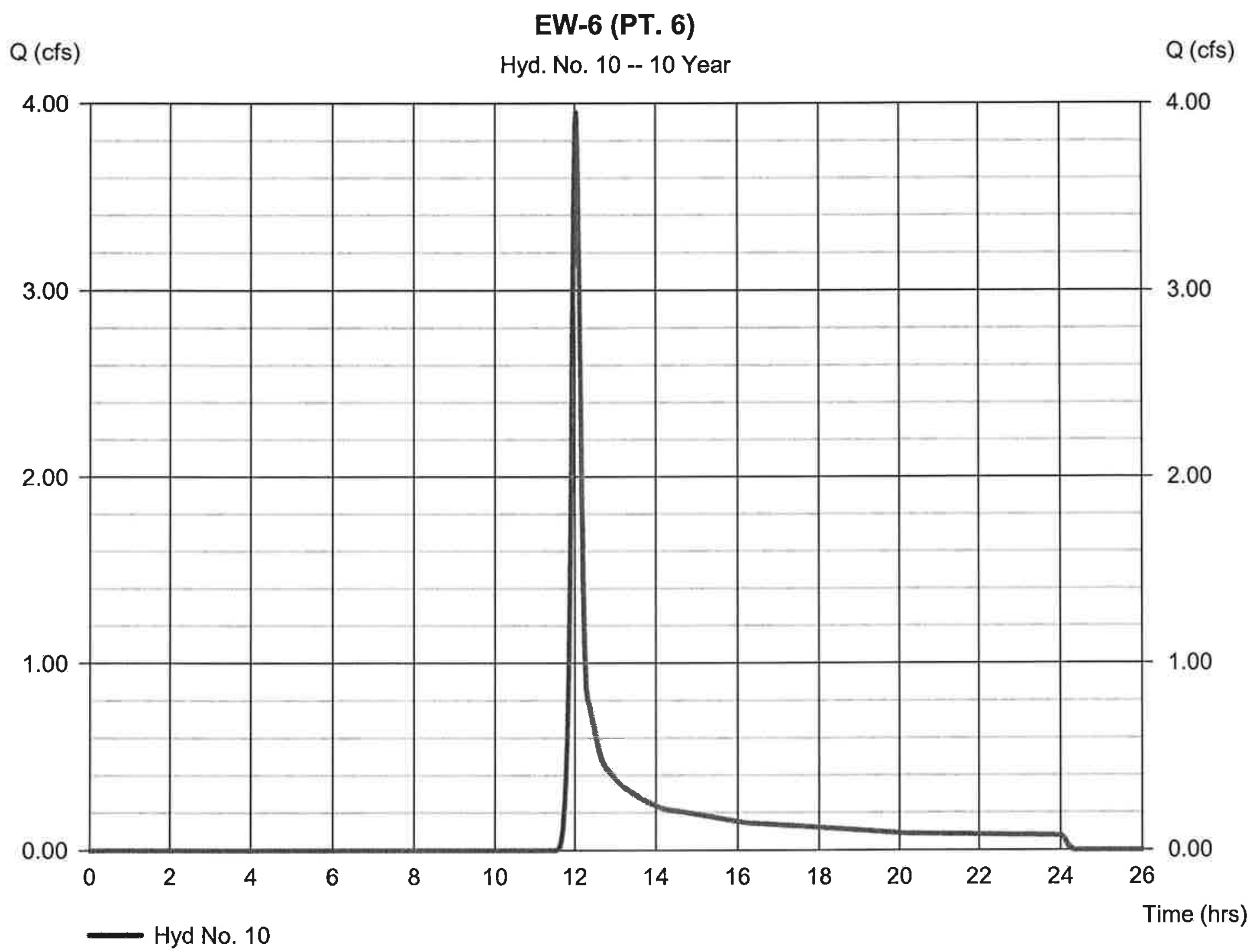
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 10

EW-6 (PT. 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.951 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 10,914 cuft
Drainage area	= 2.830 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.03 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.790 x 39)] / 2.830



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	91.48	1	728	345,180	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	23.83	1	725	79,704	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	13.92	1	746	83,057	------	------	------	EW-3
4	Combine	120.33	1	727	507,942	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	6.070	1	729	22,821	------	------	------	EW-4
6	Reservoir	0.000	1	768	0	5	120.10	12,018	EXIST. BASIN (PT. 4)
7	SCS Runoff	4.778	1	733	23,917	------	------	------	EW-5A
8	SCS Runoff	3.796	1	735	18,482	------	------	------	E-5B
9	Combine	8.554	1	734	42,399	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	10.68	1	721	27,323	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	82.29	1	732	354,916	------	------	------	PW-1A
12	SCS Runoff	8.803	1	725	27,183	------	------	------	PW-1B
13	Reservoir	4.011	1	733	14,267	12	127.96	8,308	WATER QUALITY SWALE
14	Combine	86.29	1	732	369,183	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	65.82	1	741	336,563	14	123.29	63,332	BASIN 2
16	Diversion1	1.025	1	741	23,696	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	64.79	1	741	312,865	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	1.683	1	749	10,491	------	------	------	PW-2
19	Reservoir	0.035	1	815	215	18	119.08	4,292	BASIN 1 (PT.2)
20	SCS Runoff	7.448	1	737	39,243	------	------	------	PW-3
21	SCS Runoff	26.40	1	740	134,167	------	------	------	PW-5A
22	Reservoir	17.27	1	757	106,346	21	130.69	31,280	BASIN 3
23	Combine	80.60	1	743	443,123	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	2.021	1	727	6,929	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	5.210	1	736	25,740	------	------	------	PW-6A
26	Reservoir	5.006	1	739	16,969	25	130.19	3,527	BASIN 4
27	SCS Runoff	0.275	1	728	1,726	------	------	------	PW-6B
28	Combine	5.237	1	739	18,695	26, 27	------	------	TOTAL TO PT. 6

Hydrograph Report

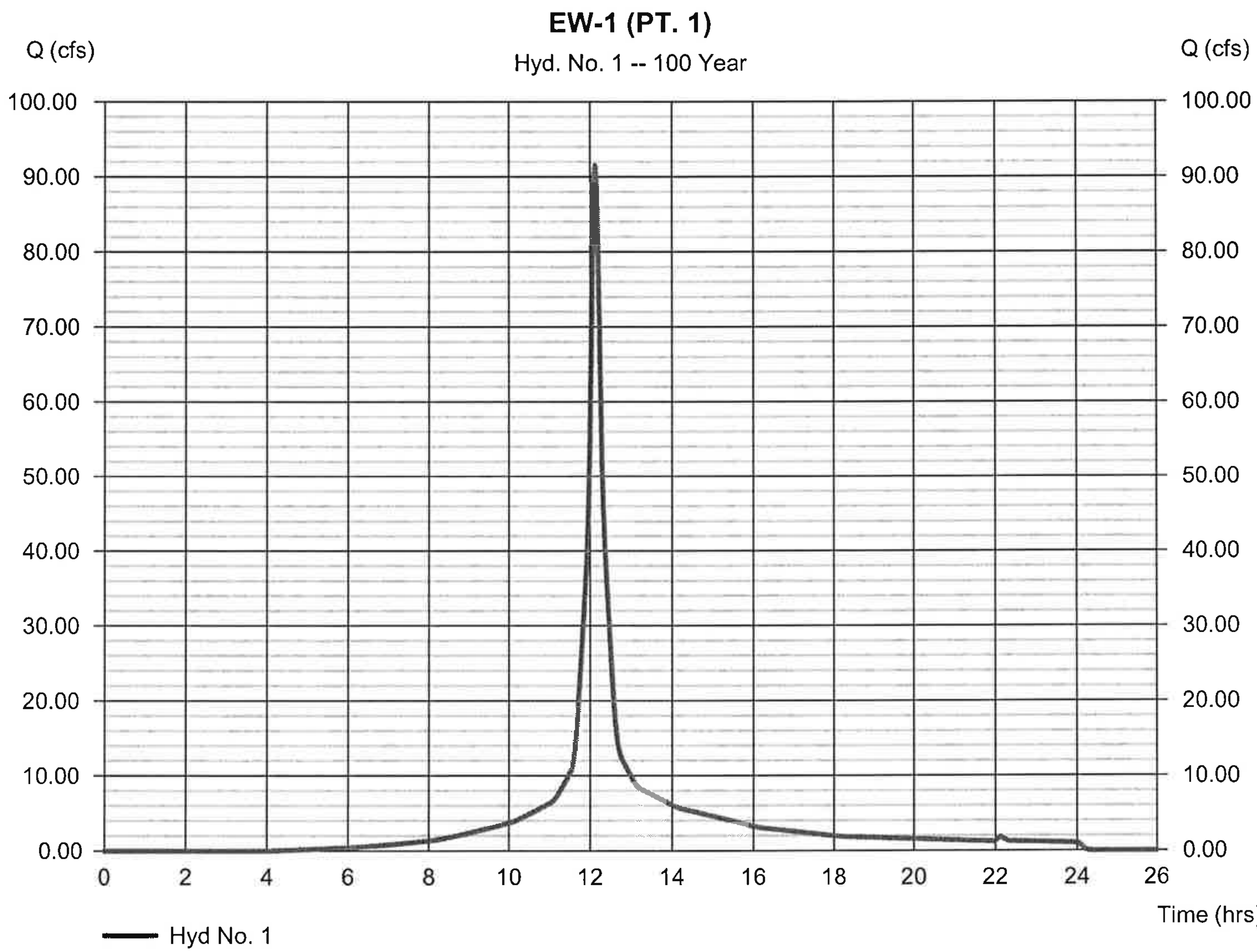
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 1

EW-1 (PT. 1)

Hydrograph type	= SCS Runoff	Peak discharge	= 91.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 345,180 cuft
Drainage area	= 17.050 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.23 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.240 x 39) + (14.180 x 98)] / 17.050



Hydrograph Report

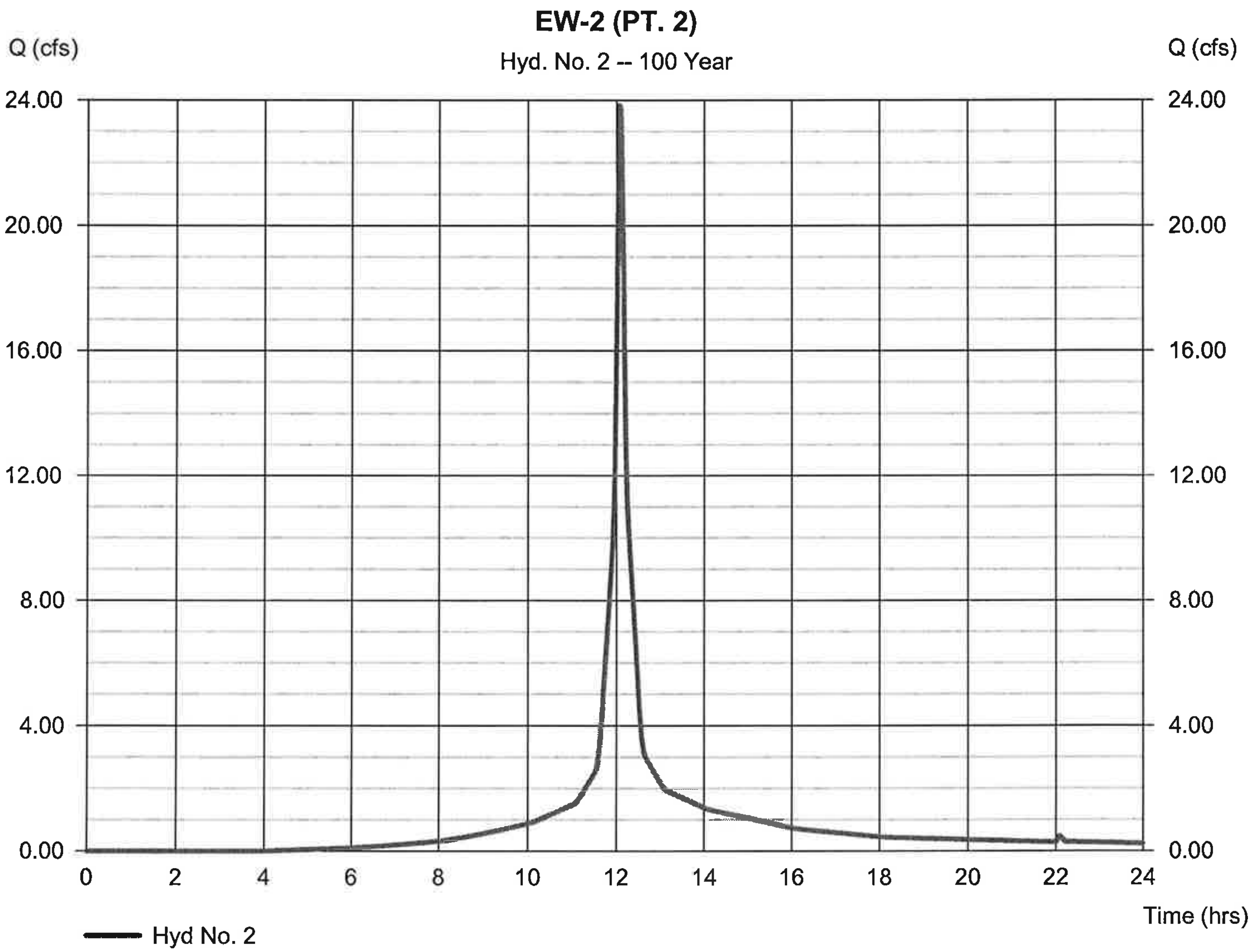
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 2

EW-2 (PT. 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 23.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 79,704 cuft
Drainage area	= 4.110 ac	Curve number	= 87*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.81 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.310 x 98) + (0.800 x 39)] / 4.110



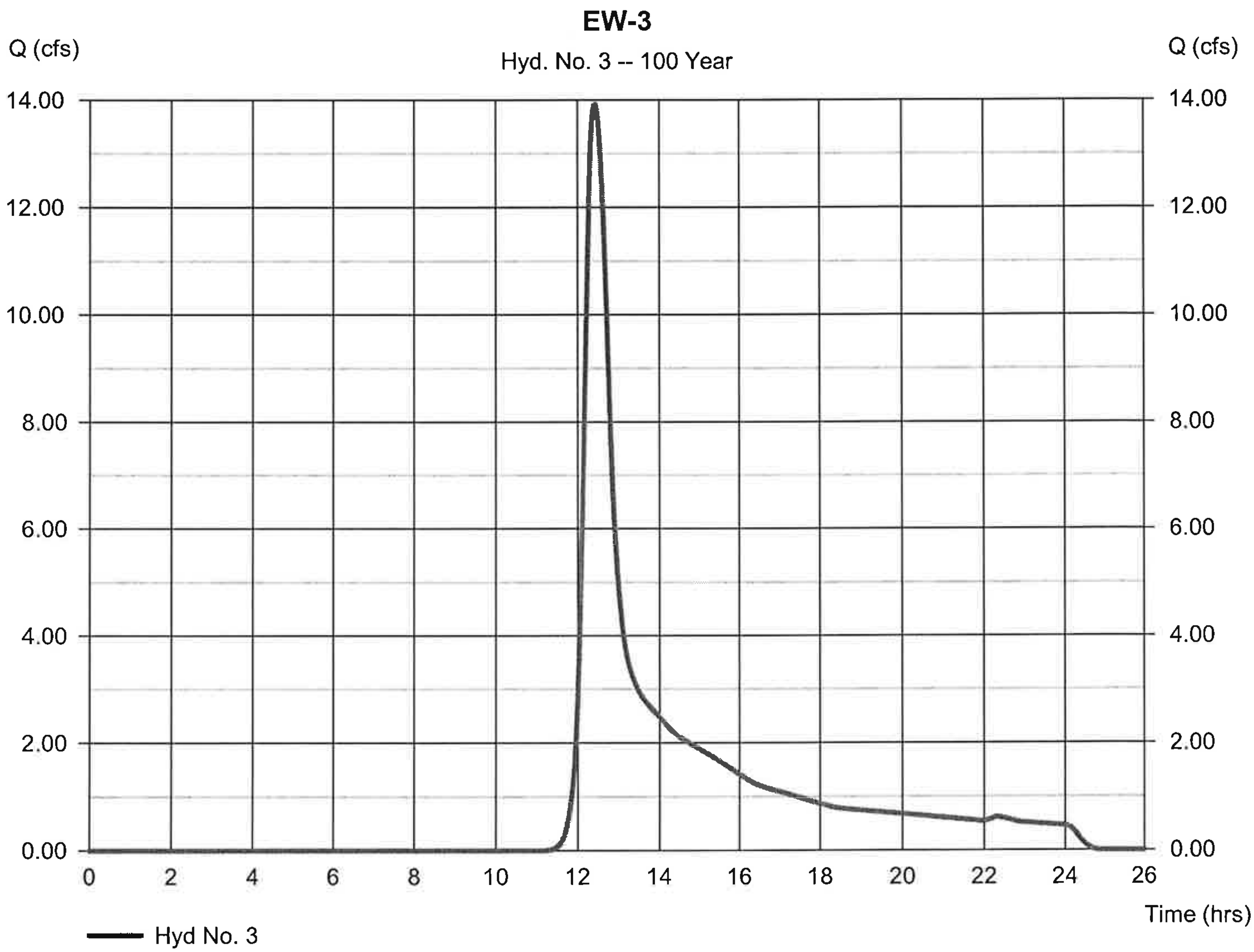
Hydrograph Report

Hyd. No. 3

EW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 13.92 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.43 hrs
Time interval	= 1 min	Hyd. volume	= 83,057 cuft
Drainage area	= 12.310 ac	Curve number	= 52*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.55 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.280 x 98) + (0.440 x 76) + (0.130 x 83) + (14.090 x 39)] / 12.310



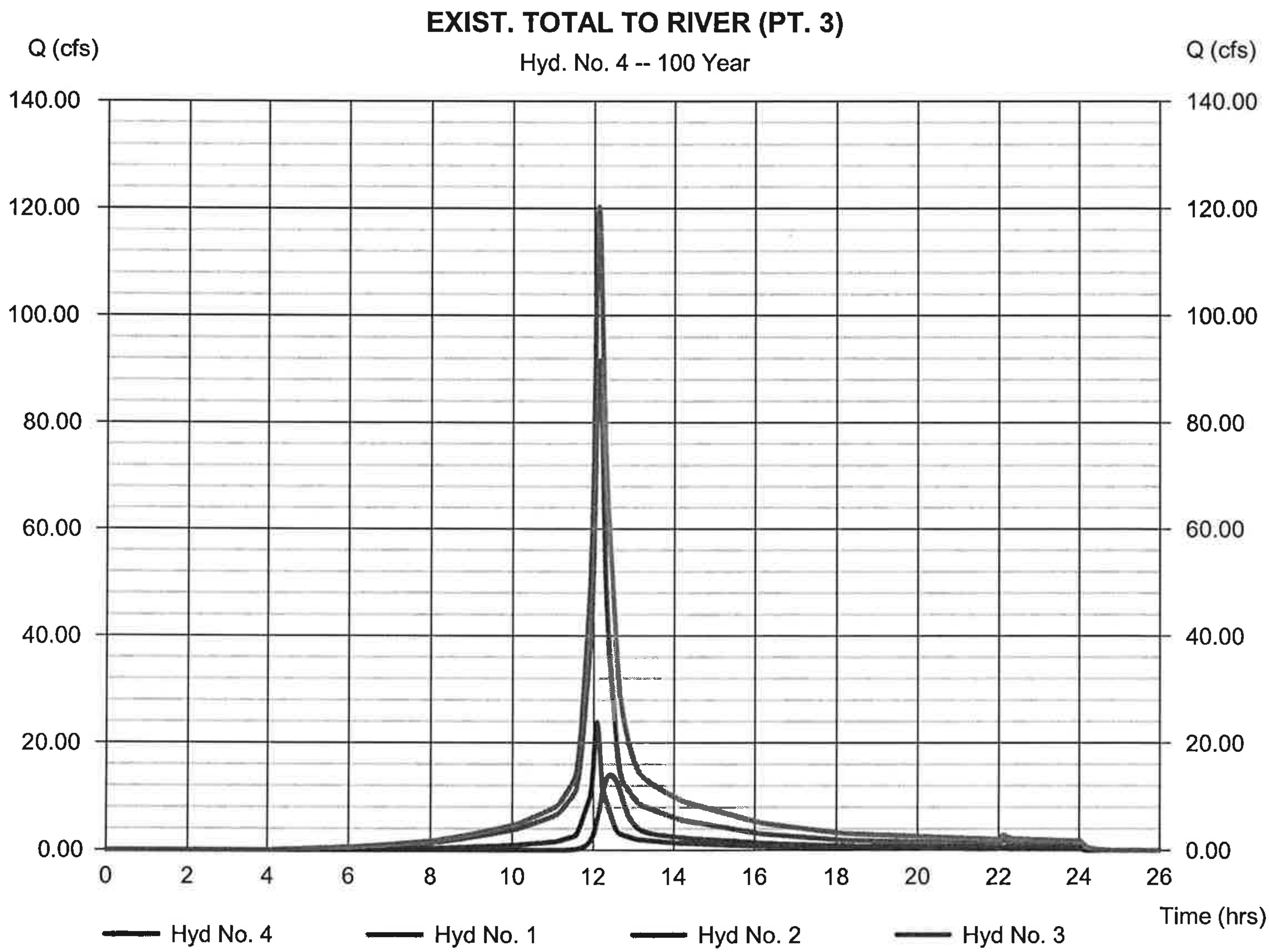
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 4

EXIST. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 120.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 507,942 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 33.470 ac



Hydrograph Report

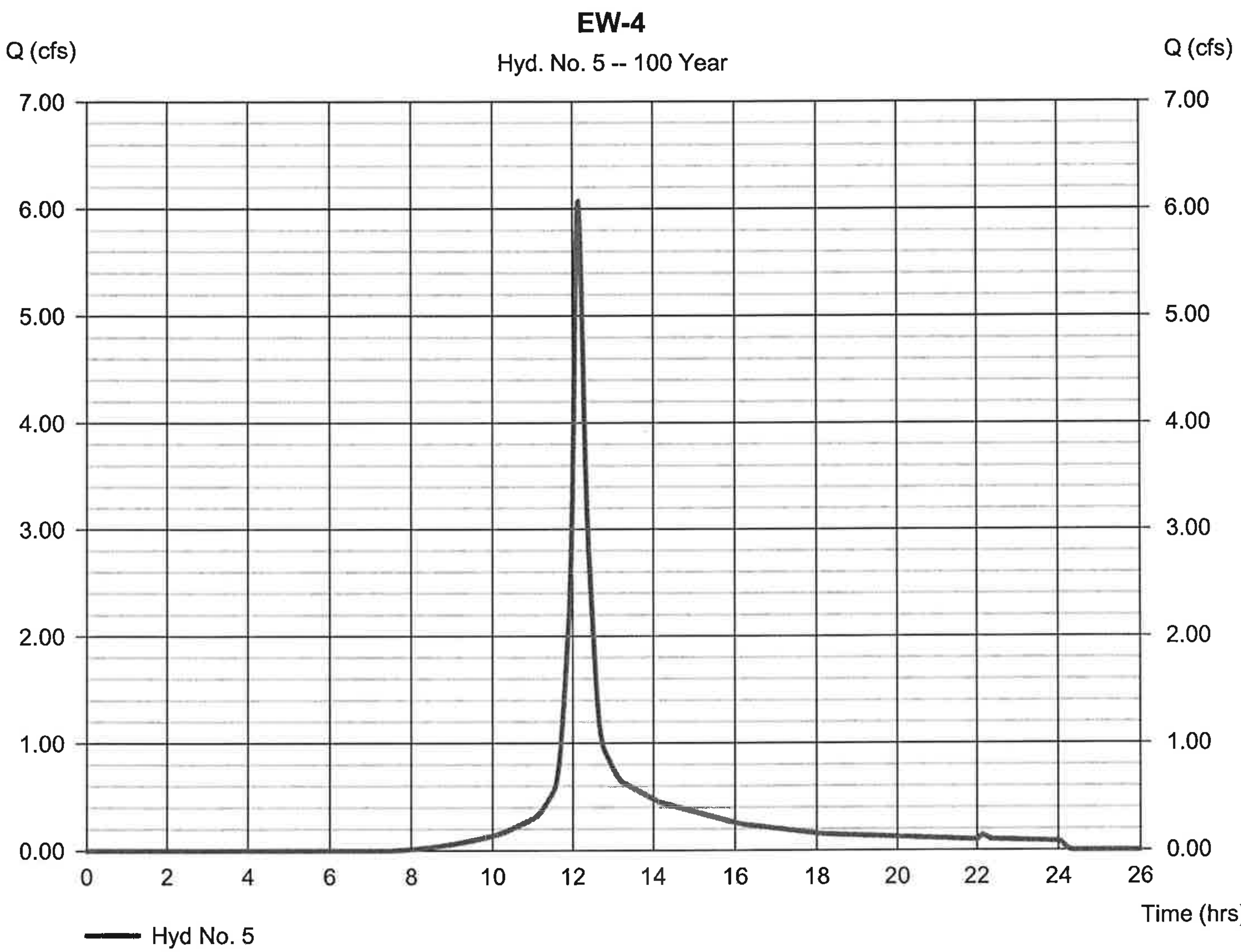
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 5

EW-4

Hydrograph type	= SCS Runoff	Peak discharge	= 6.070 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 22,821 cuft
Drainage area	= 1.580 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.01 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (0.630 x 39)] / 1.580



Hydrograph Report

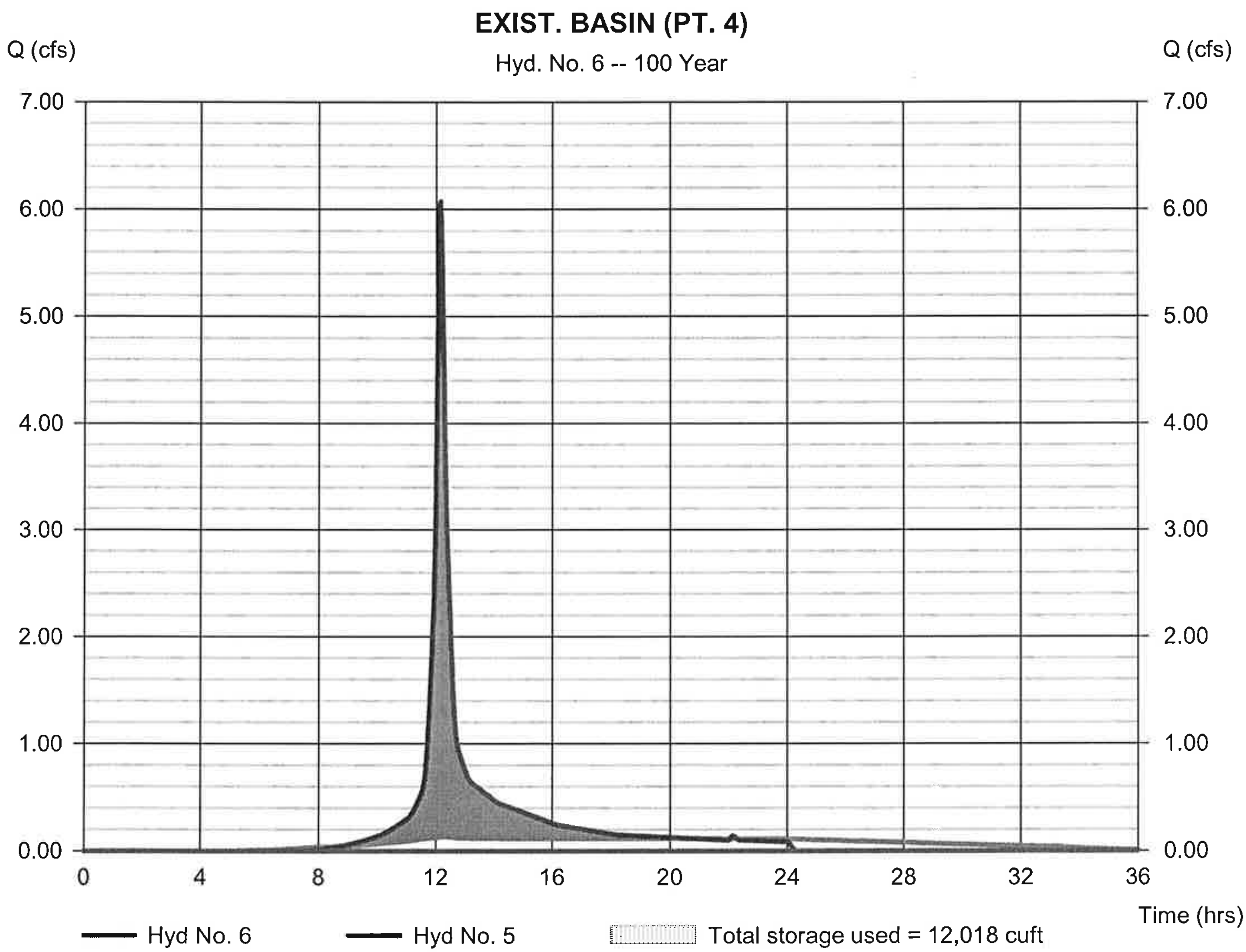
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 6

EXIST. BASIN (PT. 4)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.80 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - EW-4	Max. Elevation	= 120.10 ft
Reservoir name	= EX. BASIN	Max. Storage	= 12,018 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

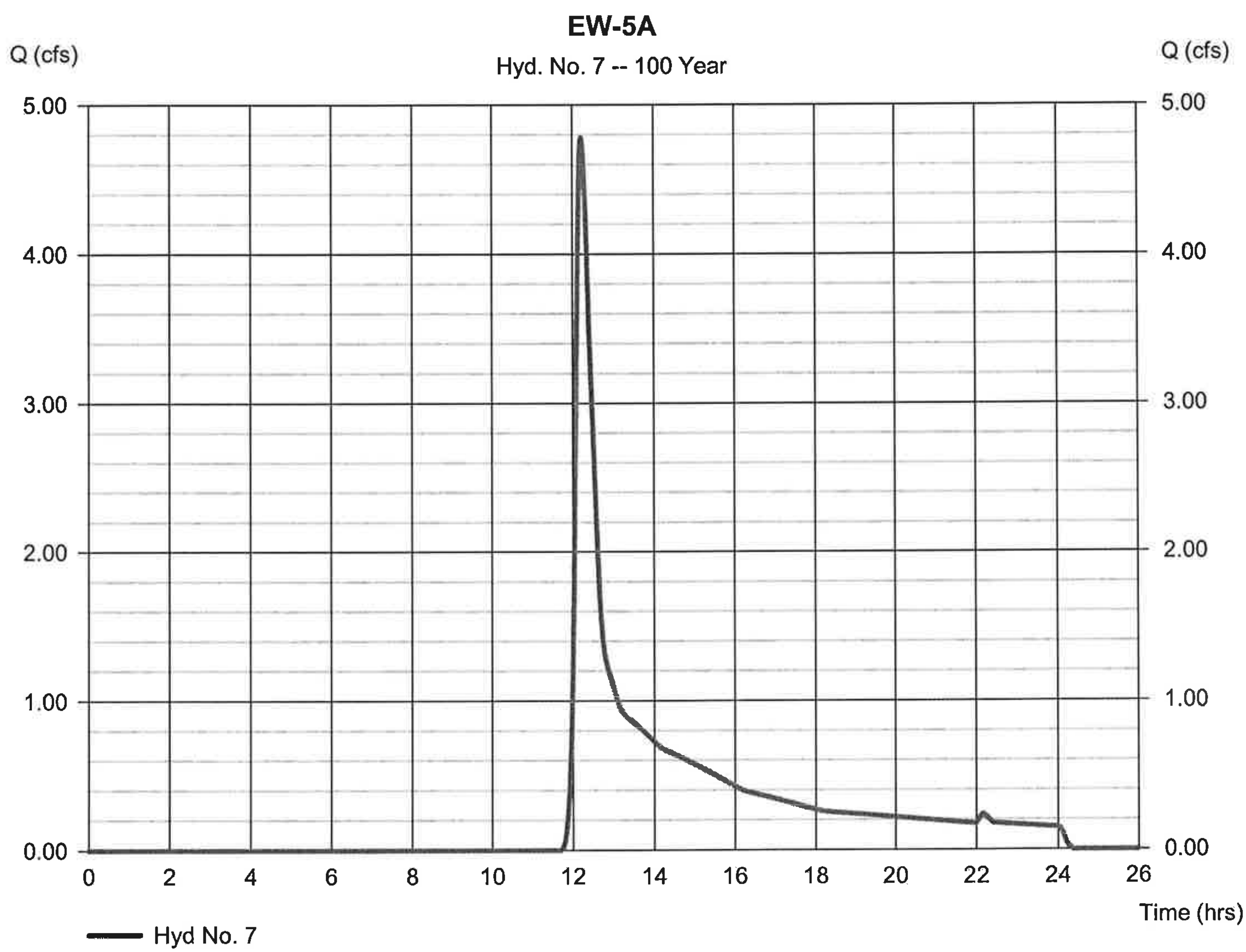
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 7

EW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.778 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 23,917 cuft
Drainage area	= 4.990 ac	Curve number	= 46*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.91 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.400 x 98) + (4.750 x 39)] / 4.990



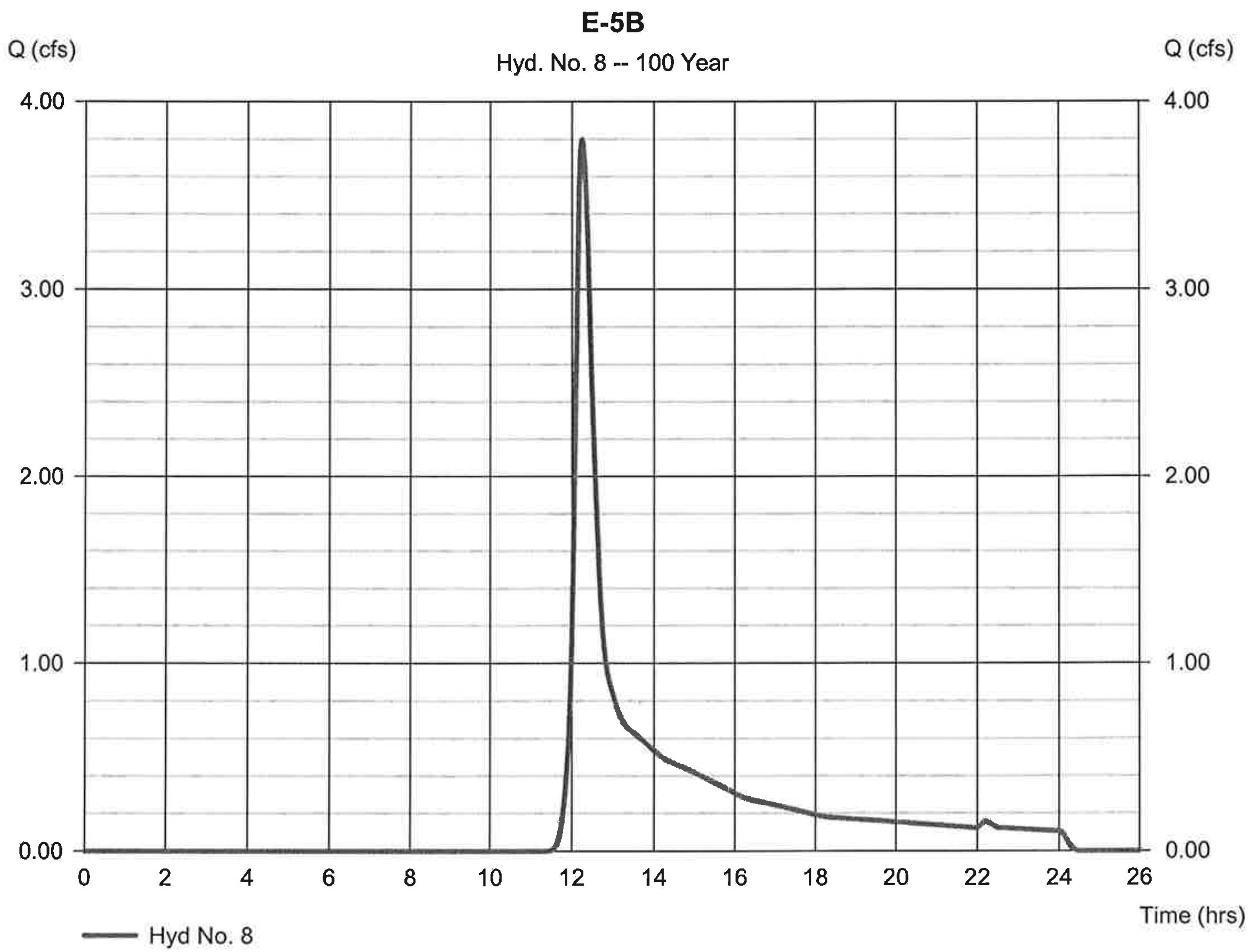
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 8

E-5B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.796 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 18,482 cuft
Drainage area	= 3.090 ac	Curve number	= 50
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.18 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



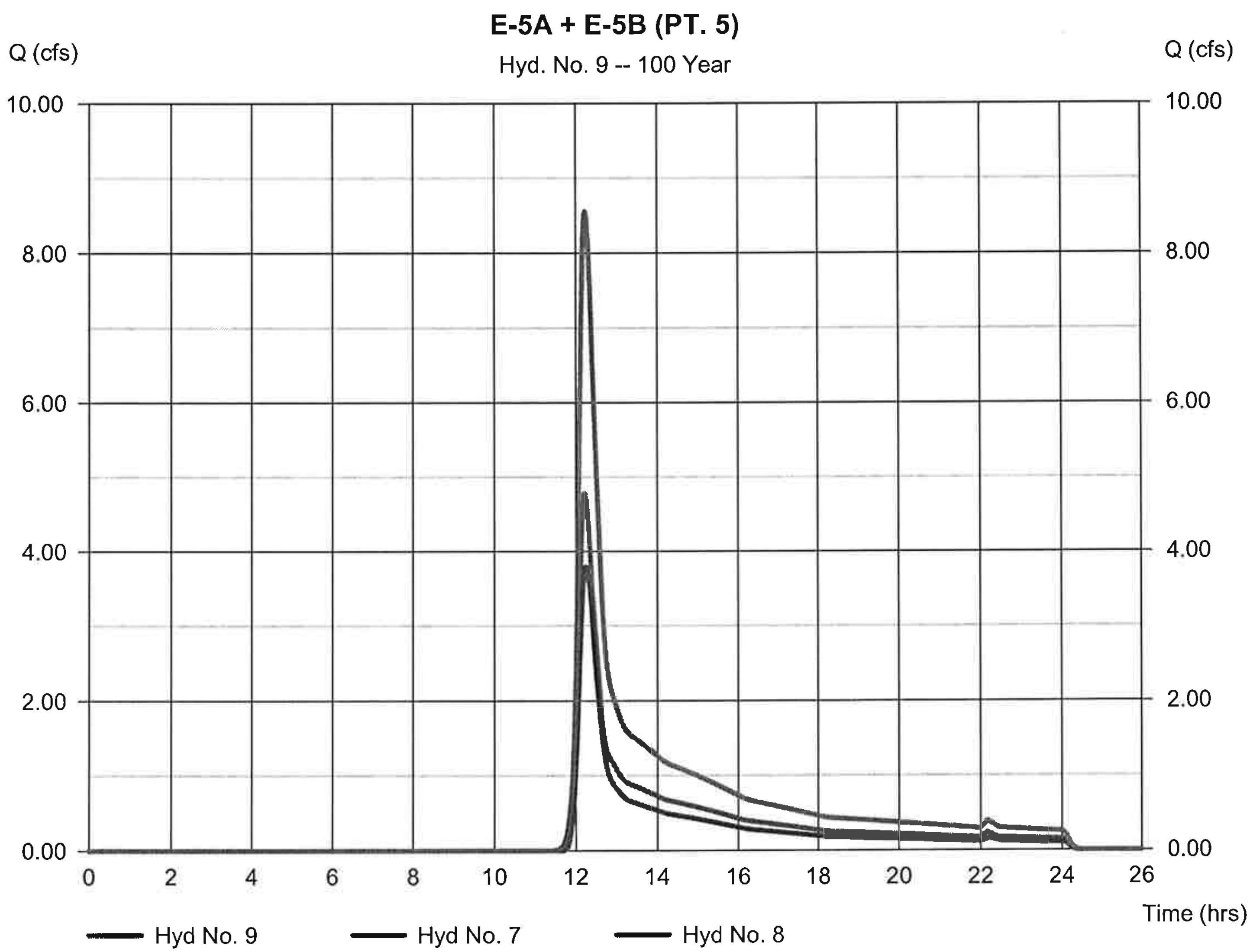
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 9

E-5A + E-5B (PT. 5)

Hydrograph type	= Combine	Peak discharge	= 8.554 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 42,399 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 8.080 ac



Hydrograph Report

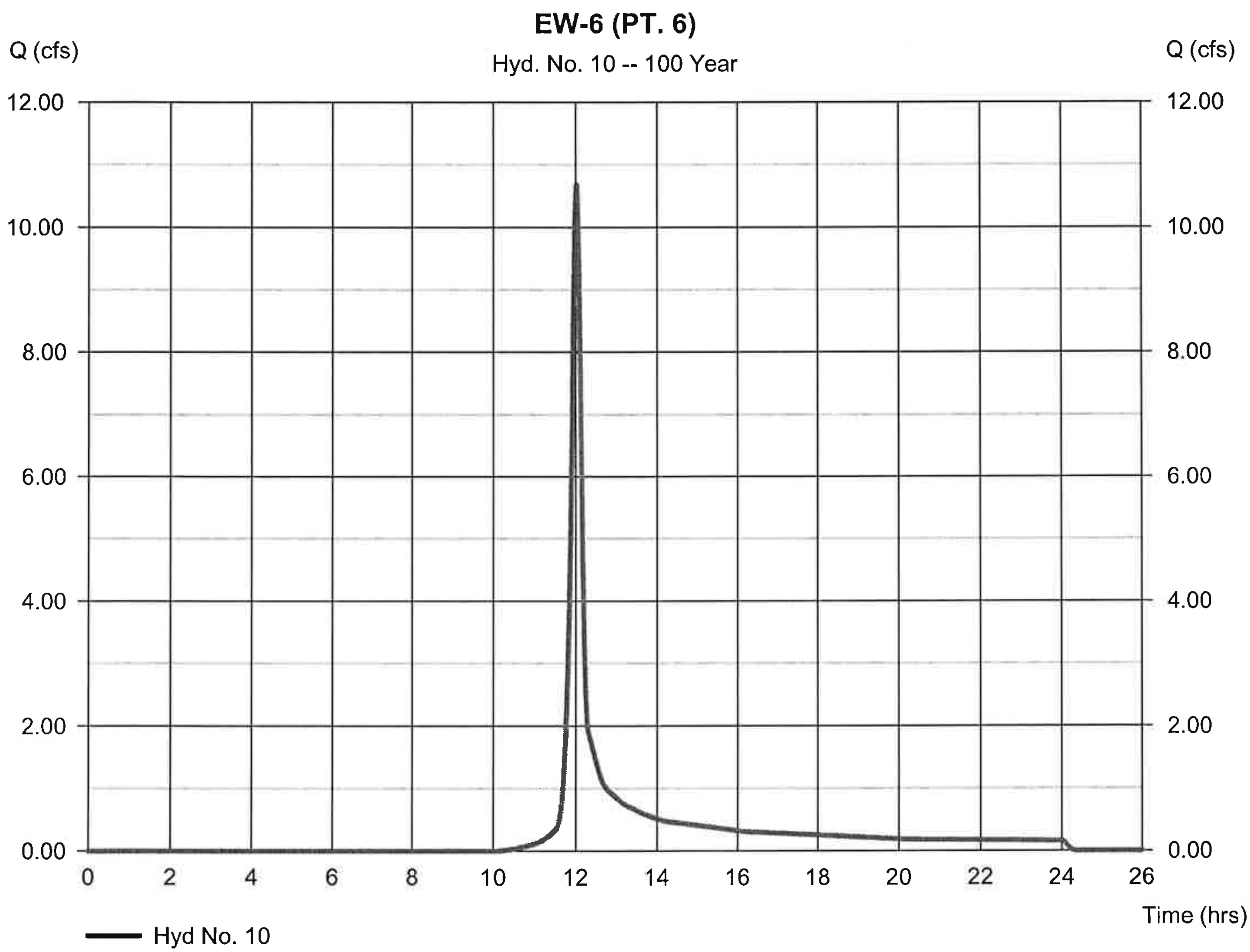
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 10

EW-6 (PT. 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.68 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 27,323 cuft
Drainage area	= 2.830 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.03 min
Total precip.	= 7.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.790 x 39)] / 2.830



APPENDIX C: PROPOSED CONDITIONS HYDROLOGY CALCULATIONS

Runoff Curve Numbers and Runoff
Time of Concentration
Pond Reports
Hydrograph Plots (2, 10, 25, 100 year storm events)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 1A (PW-1A)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			5.23	203.97
A	Impervious (pavement, roof)	98			14.44	1415.12
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**19.67**	**1619.09**

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = **82.3127** Use CN= **82**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	1.62	2.81	4.82	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 1B (PW-1B)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			0.68	26.52
A	Impervious (pavement, roof)	98			1.07	104.86
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**1.75**	**131.38**

CN (weighted) = total product / total area = **75.0743** Use CN= **75**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	1.16	2.21	4.06	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 2 (PW-2)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN: Table 2-2	CN: Figure 2-3	CN: Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			0.94	36.66
A	Impervious (pavement, roof)	98			0.37	36.26
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
		Totals =			**1.31**	**72.92**

Use only one CN source per line.

CN (weighted) = total product / total area = **55.6641** Use CN= **56**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.31	0.89	2.15	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** **PROPOSED WATERSHED 3 (PW-3)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN			Area	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4	X acres / mi² / %	
A	Grass - good	39			5.95	232.05
A	Wetland	83			0.63	52.29
A	Impervious (pavement, roof)	98			0.67	65.66
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**7.25**	**350**

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = **48.2759** Use CN= **48**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.11	0.48	1.44	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 5A (PW-5A)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area [X] acres [ ] mi² [ ] %	Product of CN x Area
A	Grass - good	39			4.65	181.35
A	Impervious (pavement, roof)	98			5.35	524.30
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**10**	**705.65**

CN (weighted) = total product / total area = **70.5650** Use CN= **71**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.94	1.89	3.64	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 5B (PW-5B)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area X acres / mi² / %	Product of CN x Area
A	Grass - good	39			0.18	7.02
A	Impervious (pavement, roof)	98			0.28	27.44
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**0.46**	**34.46**

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = **74.9130** Use CN= **75**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	1.16	2.21	4.06	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 6A (PW-6A)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN Table 2-2	CN Figure 2-3	CN Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			0.30	11.70
A	Impervious (pavement, roof)	98			1.06	103.88
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**1.36**	**115.58**

CN (weighted) = total product / total area = **84.9853** Use CN= **85**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	1.84	3.09	5.16	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff curve number and runoff

Project: **Wayland Town Center** By: **CAD** Date **06/02/08**

Location: **Wayland, MA** Checked: Date

Check One: **Present** Developed **PROPOSED WATERSHED 6B (PW-6B)**

1. Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic conditions percent impervious unconnected/connected impervious area ratio)	CN: Table 2-2	CN: Figure 2-3	CN: Figure 2-4	Area (X acres / mi² / %)	Product of CN x Area
A	Grass - good	39			0.60	23.40
A	Impervious (pavement, roof)	98			0.00	0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Use only one CN source per line.		Totals =			**0.6**	**23.4**

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = **39.0000** Use CN= **39**

2. Runoff

		Storm #1	Storm #2	Storm #3	
Frequency	yr.	2	10	100	
Rainfall, P (24 hour)	in.	3.30	4.70	6.90	
Runoff, Q	in.	0.00	0.14	0.73	

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

TR55 Tc Worksheet

Hyd. No. 11

PW-1A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	**=**	**16.53**	**+**	**0.00**	**+**	**0.00**	**=**	**16.53**
Shallow Concentrated Flow								
Flow length (ft)	=	70.00		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)	**=**	**0.72**	**+**	**0.00**	**+**	**0.00**	**=**	**0.72**
Channel Flow								
X sectional flow area (sqft)	=	1.77		0.00		0.00		
Wetted perimeter (ft)	=	2.36		0.00		0.00		
Channel slope (%)	=	0.50		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=	7.24		0.00		0.00		
Flow length (ft)	=	540.0		0.0		0.0		
Travel Time (min)	**=**	**1.24**	**+**	**0.00**	**+**	**0.00**	**=**	**1.24**

Total Travel Time, Tc .... 18.50 min

TR55 Tc Worksheet

Hyd. No. 18

PW-2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.25		0.00		0.00		
Travel Time (min)	**=**	**28.79**	**+**	**0.00**	**+**	**0.00**	**=**	**28.79**
Shallow Concentrated Flow								
Flow length (ft)	=	400.00		0.00		0.00		
Watercourse slope (%)	=	0.25		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	0.81		0.00		0.00		
Travel Time (min)	**=**	**8.26**	**+**	**0.00**	**+**	**0.00**	**=**	**8.26**
Channel Flow								
X sectional flow area (sqft)	=	1.76		0.00		0.00		
Wetted perimeter (ft)	=	2.35		0.00		0.00		
Channel slope (%)	=	0.50		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=	7.23		0.00		0.00		
Flow length (ft)	=	205.0		0.0		0.0		
Travel Time (min)	**=**	**0.47**	**+**	**0.00**	**+**	**0.00**	**=**	**0.47**

Total Travel Time, Tc .... **37.52 min**

TR55 Tc Worksheet

Hyd. No. 20

PW-3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**12.53**	**+**	**0.00**	**+**	**0.00**	**=**	**12.53**
Shallow Concentrated Flow								
Flow length (ft)	=	430.00		0.00		0.00		
Watercourse slope (%)	=	0.50		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=	1.14		0.00		0.00		
Travel Time (min)	**=**	**6.28**	**+**	**0.00**	**+**	**0.00**	**=**	**6.28**
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 .... 18.81 min

TR55 Tc Worksheet

Hyd. No. 21

PW-5A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.50		0.00		0.00		
Travel Time (min)	**=**	**21.82**	**+**	**0.00**	**+**	**0.00**	**=**	**21.82**
Shallow Concentrated Flow								
Flow length (ft)	=	360.00		0.00		0.00		
Watercourse slope (%)	=	0.50		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.14		0.00		0.00		
Travel Time (min)	**=**	**5.26**	**+**	**0.00**	**+**	**0.00**	**=**	**5.26**
Channel Flow								
X sectional flow area (sqft)	=	1.76		0.00		0.00		
Wetted perimeter (ft)	=	2.36		0.00		0.00		
Channel slope (%)	=	0.50		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=	7.21		0.00		0.00		
Flow length (ft)	=	80.0		0.0		0.0		
Travel Time (min)	**=**	**0.18**	**+**	**0.00**	**+**	**0.00**	**=**	**0.18**

Total Travel Time, Tc .... 27.26 min

TR55 Tc Worksheet

Hyd. No. 24

PW-5B (PT. 5)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	70.0		30.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		3.10		0.00		
Land slope (%)	=	7.00		5.00		0.00		
Travel Time (min)	**=**	**5.71**	**+**	**0.33**	**+**	**0.00**	**=**	**6.03**
Shallow Concentrated Flow								
Flow length (ft)	=	170.00		280.00		0.00		
Watercourse slope (%)	=	3.50		0.80		0.00		
Surface description	=	Paved		Unpaved		Paved		
Average velocity (ft/s)	=	3.80		1.44		0.00		
Travel Time (min)	**=**	**0.75**	**+**	**3.23**	**+**	**0.00**	**=**	**3.98**
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 .... **10.01 min**

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No. 25

PW-6A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.200		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.50		0.00		0.00		
Travel Time (min)	**=**	**21.82**	**+**	**0.00**	**+**	**0.00**	**=**	**21.82**
Shallow Concentrated Flow								
Flow length (ft)	=	200.00		0.00		0.00		
Watercourse slope (%)	=	0.50		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.14		0.00		0.00		
Travel Time (min)	**=**	**2.92**	**+**	**0.00**	**+**	**0.00**	**=**	**2.92**
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 .... **24.74 min**

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Pond No. 1 - BASIN 2

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 116.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	116.00	1,690	0	0
1.00	117.00	2,915	2,303	2,303
2.00	118.00	4,360	3,638	5,940
3.00	119.00	6,043	5,202	11,142
4.00	120.00	7,985	7,014	18,156
5.00	121.00	11,696	9,841	27,996
6.00	122.00	15,017	13,357	41,353
7.00	123.00	17,997	16,507	57,860
8.00	124.00	19,572	18,785	76,644

Culvert / Orifice Structures

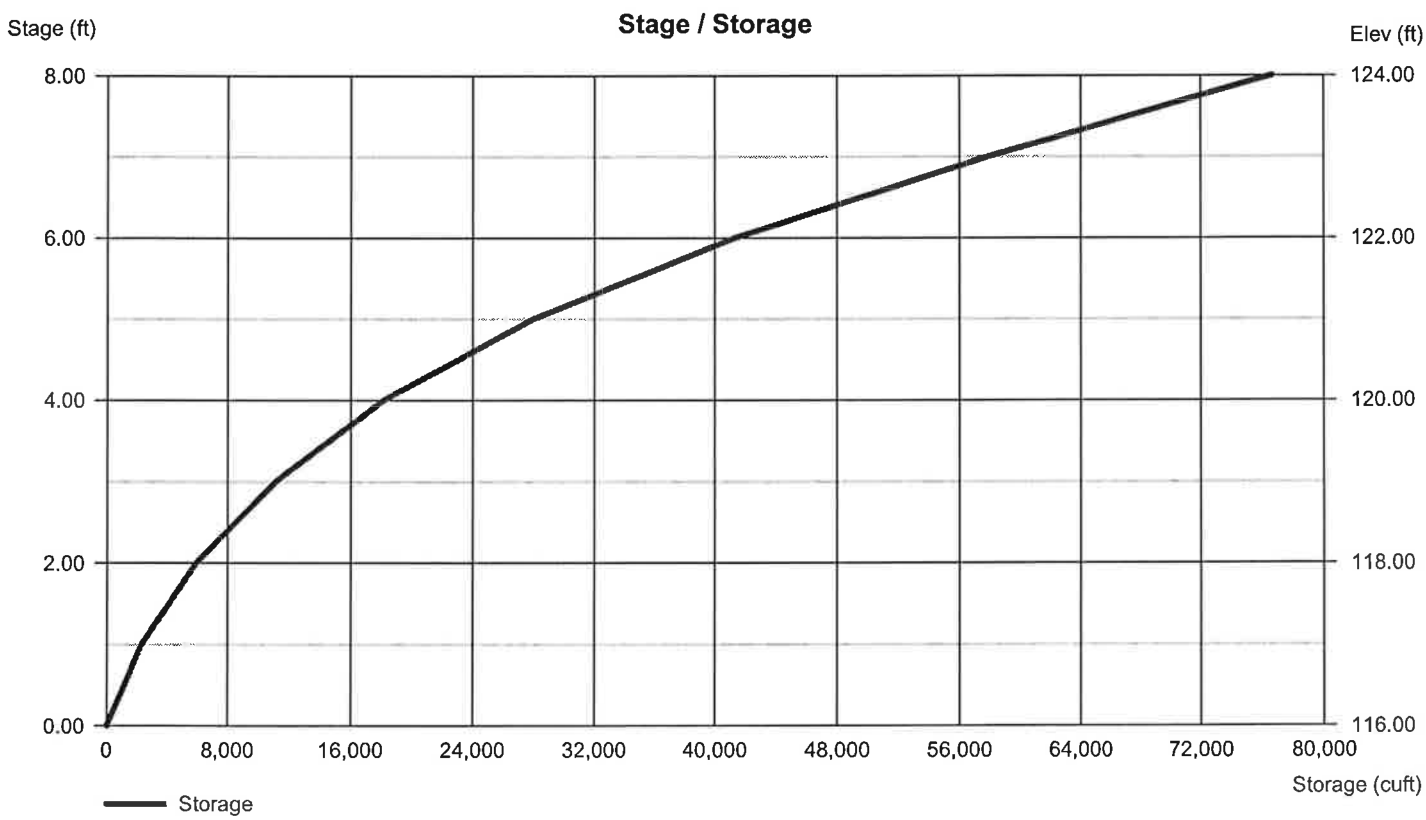
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 118.50	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 122.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Pond No. 2 - BASIN 3

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 126.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	126.00	2,172	0	0
1.00	127.00	3,880	3,026	3,026
2.00	128.00	5,778	4,829	7,855
3.00	129.00	7,901	6,840	14,695
4.00	130.00	10,251	9,076	23,771
5.00	131.00	11,511	10,881	34,652

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 128.00	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

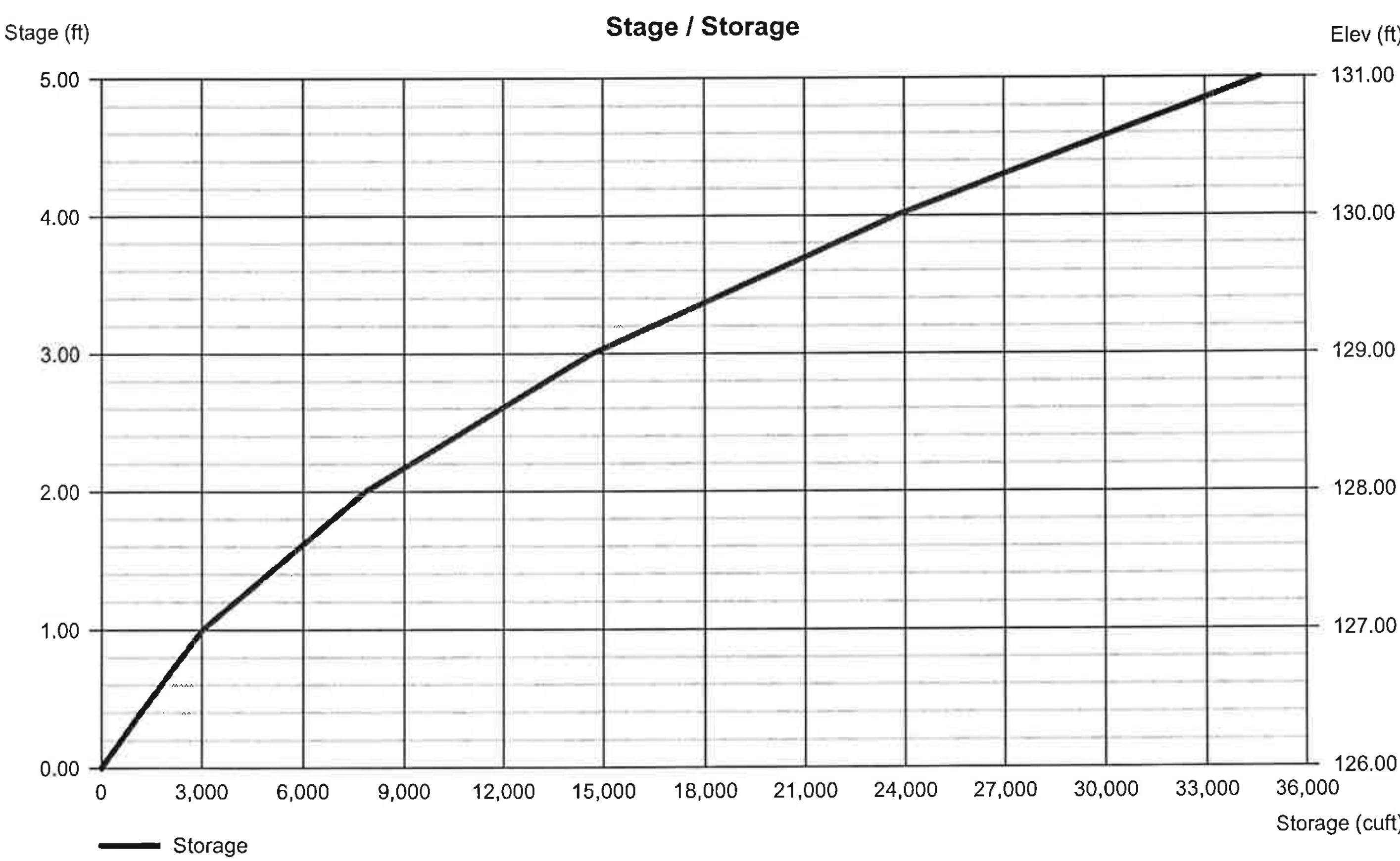
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Pond No. 4 - BASIN 4

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 127.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	127.50	200	0	0
0.50	128.00	670	218	218
1.50	129.00	1,407	1,039	1,256
2.50	130.00	2,225	1,816	3,072
3.00	130.50	2,657	1,221	4,293

Culvert / Orifice Structures

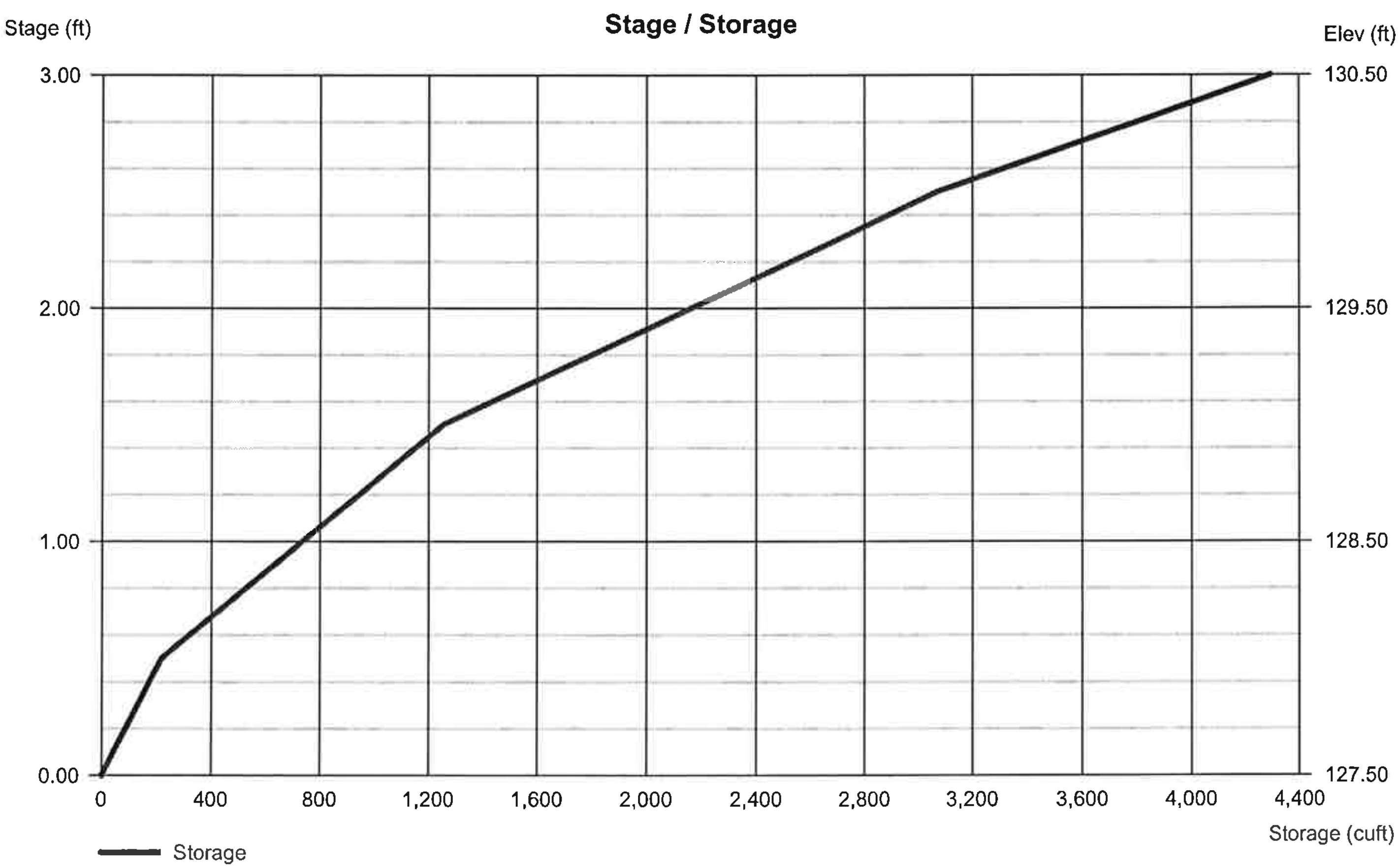
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 129.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Pond No. 5 - WATER QUALITY SWALE

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 126.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	126.00	1,916	0	0
1.00	127.00	3,905	2,911	2,911
2.00	128.00	7,305	5,605	8,516

Culvert / Orifice Structures

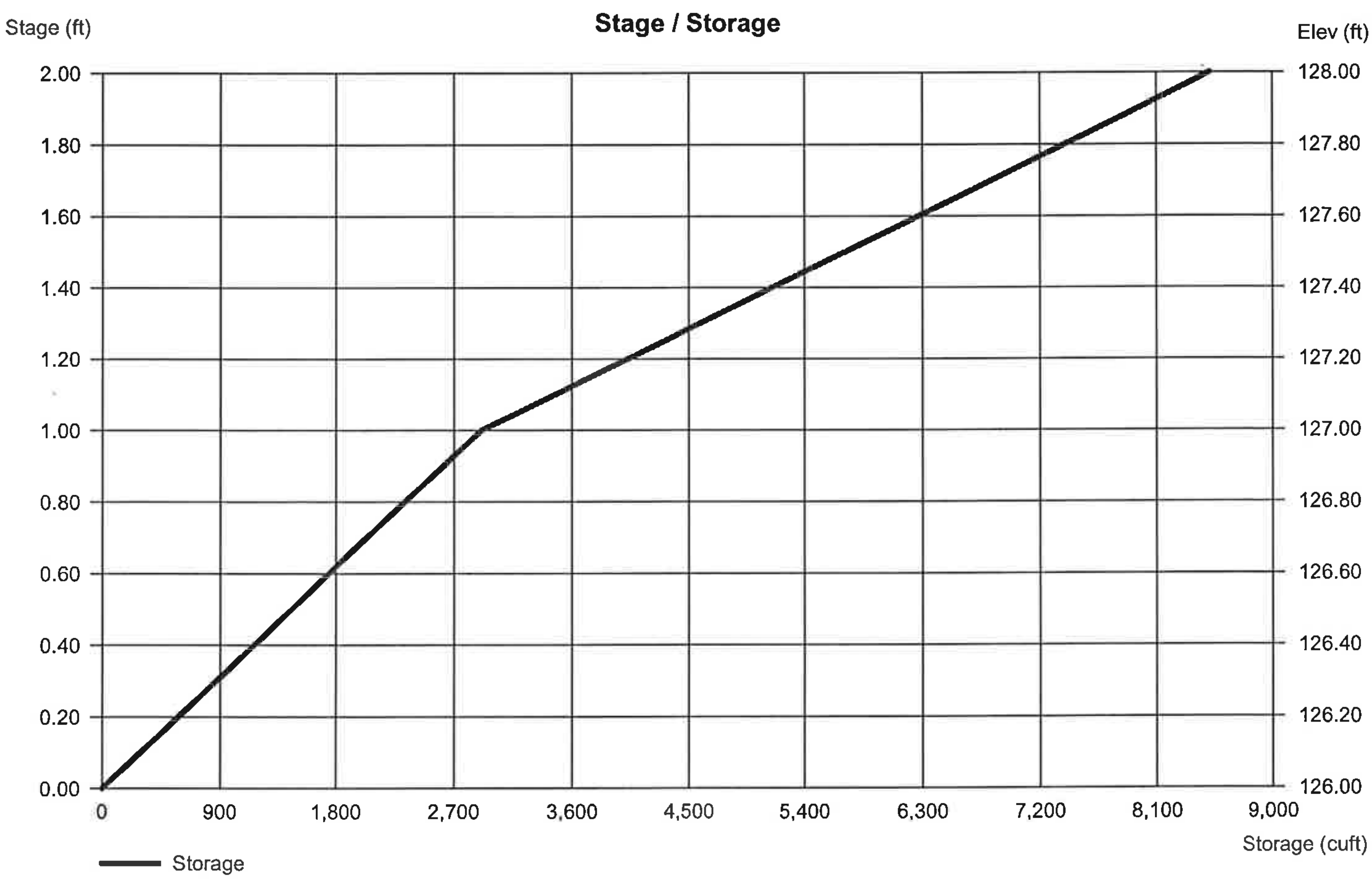
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 127.00	0.00	0.00	0.00
Length (ft)	= 140.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Pond No. 8 - UPGRADED BASIN

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 118.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	118.00	1,828	0	0
1.00	119.00	5,668	3,748	3,748
2.00	120.00	8,193	6,931	10,679
3.00	121.00	20,000	14,097	24,775

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 119.00	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.20	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

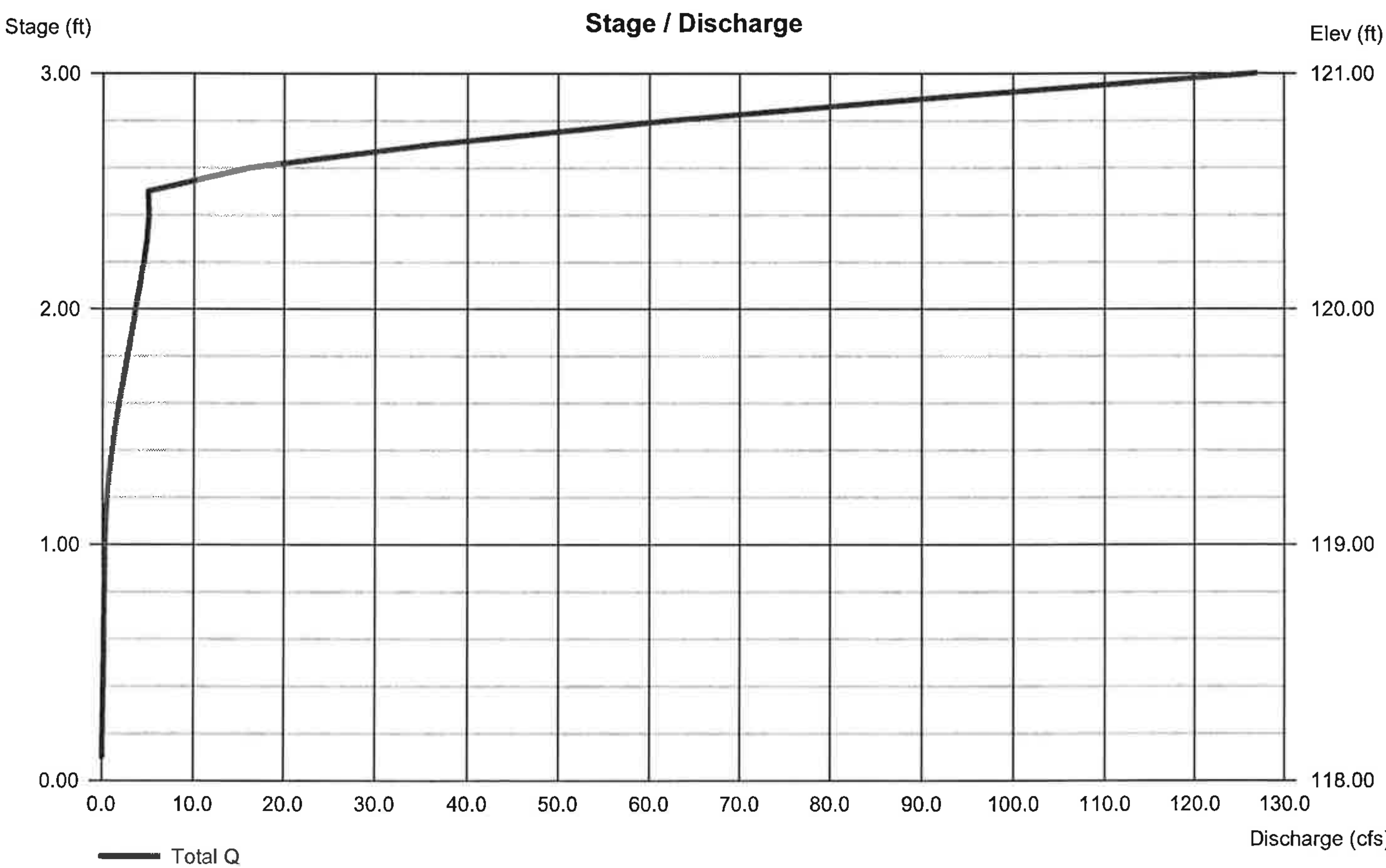
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 130.00	0.00	0.00	0.00
Crest El. (ft)	= 120.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.400 (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).



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	3.300	1	730	14,107	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	0.864	1	727	3,257	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-3
4	Combine	4.099	1	729	17,364	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	0.005	1	890	131	------	------	------	EW-4
6	Reservoir	0.000	1	960	0	5	118.01	37.2	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-5A
8	SCS Runoff	0.000	1	n/a	0	------	------	------	E-5B
9	Combine	0.000	1	n/a	0	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	1.436	1	741	9,324	------	------	------	PW-1A
12	SCS Runoff	0.007	1	825	199	------	------	------	PW-1B
13	Reservoir	0.000	1	893	0	12	126.02	61.1	WATER QUALITY SWALE
14	Combine	1.436	1	741	9,324	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	0.000	1	1477	0	14	117.41	3,803	BASIN 2
16	Diversion1	0.289	1	1477	1,526	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	0.000	1	n/a	-1,526	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-2
19	Reservoir	0.000	1	n/a	0	18	118.00	0.000	BASIN 1 (PT.2)
20	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-3
21	SCS Runoff	0.009	1	1337	283	------	------	------	PW-5A
22	Reservoir	0.000	1	1254	0	21	126.03	104	BASIN 3
23	Combine	0.000	1	1484	0	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.002	1	827	51	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	0.136	1	745	851	------	------	------	PW-6A
26	Reservoir	0.000	1	930	0	25	128.02	235	BASIN 4
27	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
28	Combine	0.000	1	930	0	26, 27	------	------	TOTAL TO PT. 6

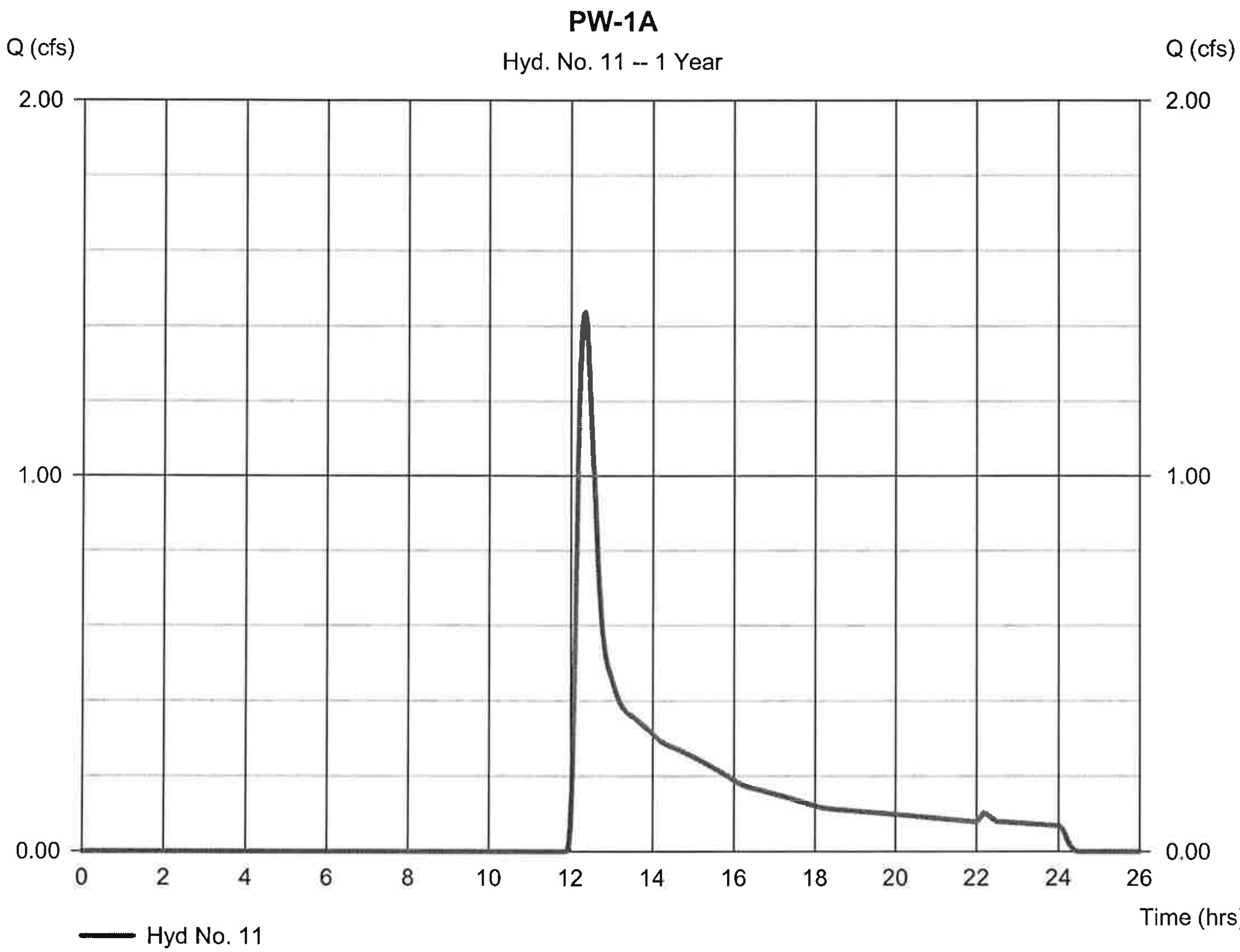
Hydrograph Report

Hyd. No. 11

PW-1A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.436 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 9,324 cuft
Drainage area	= 19.670 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.50 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.300 x 98) + (5.150 x 39)] / 19.670

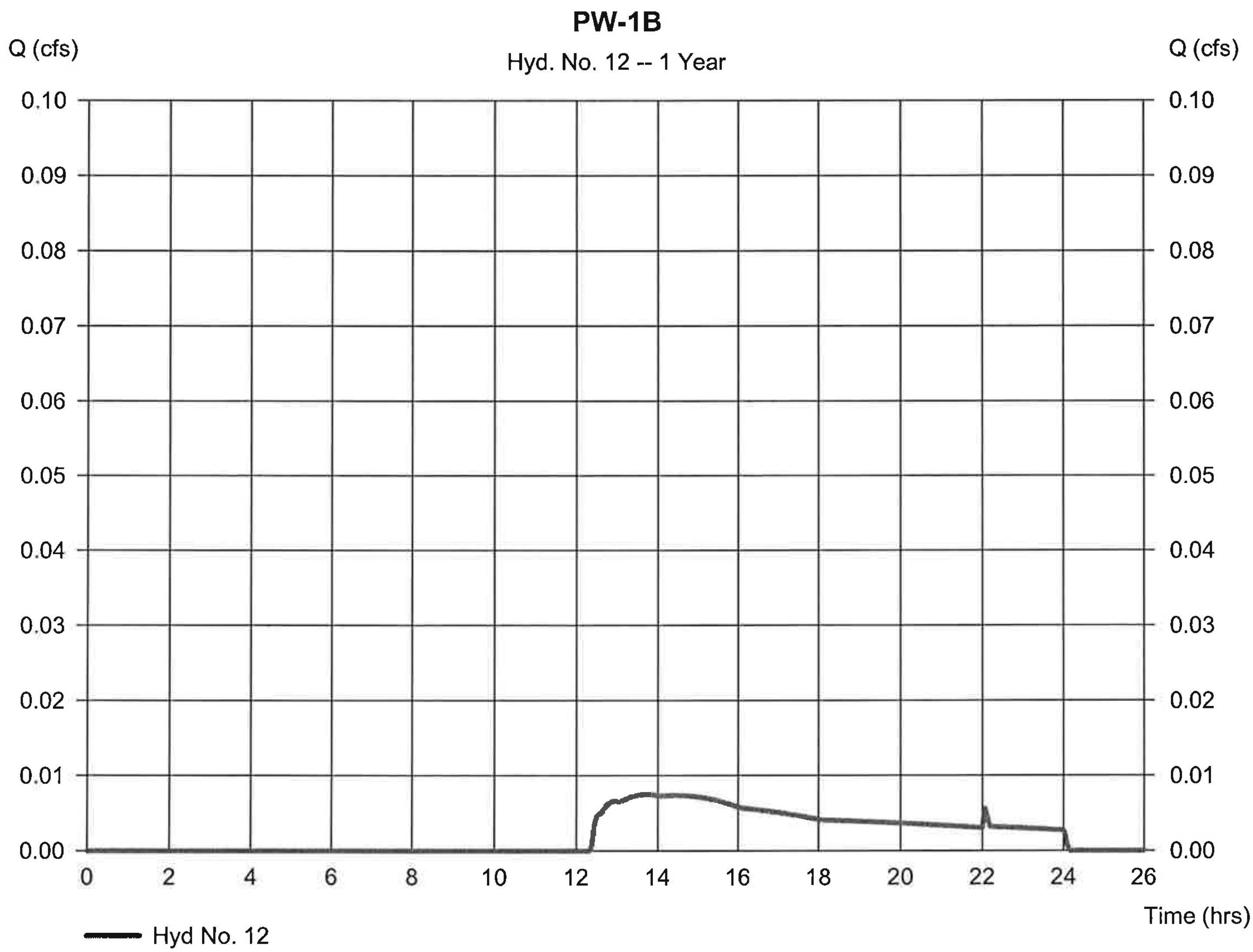


Hydrograph Report

Hyd. No. 12

PW-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.75 hrs
Time interval	= 1 min	Hyd. volume	= 199 cuft
Drainage area	= 1.750 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

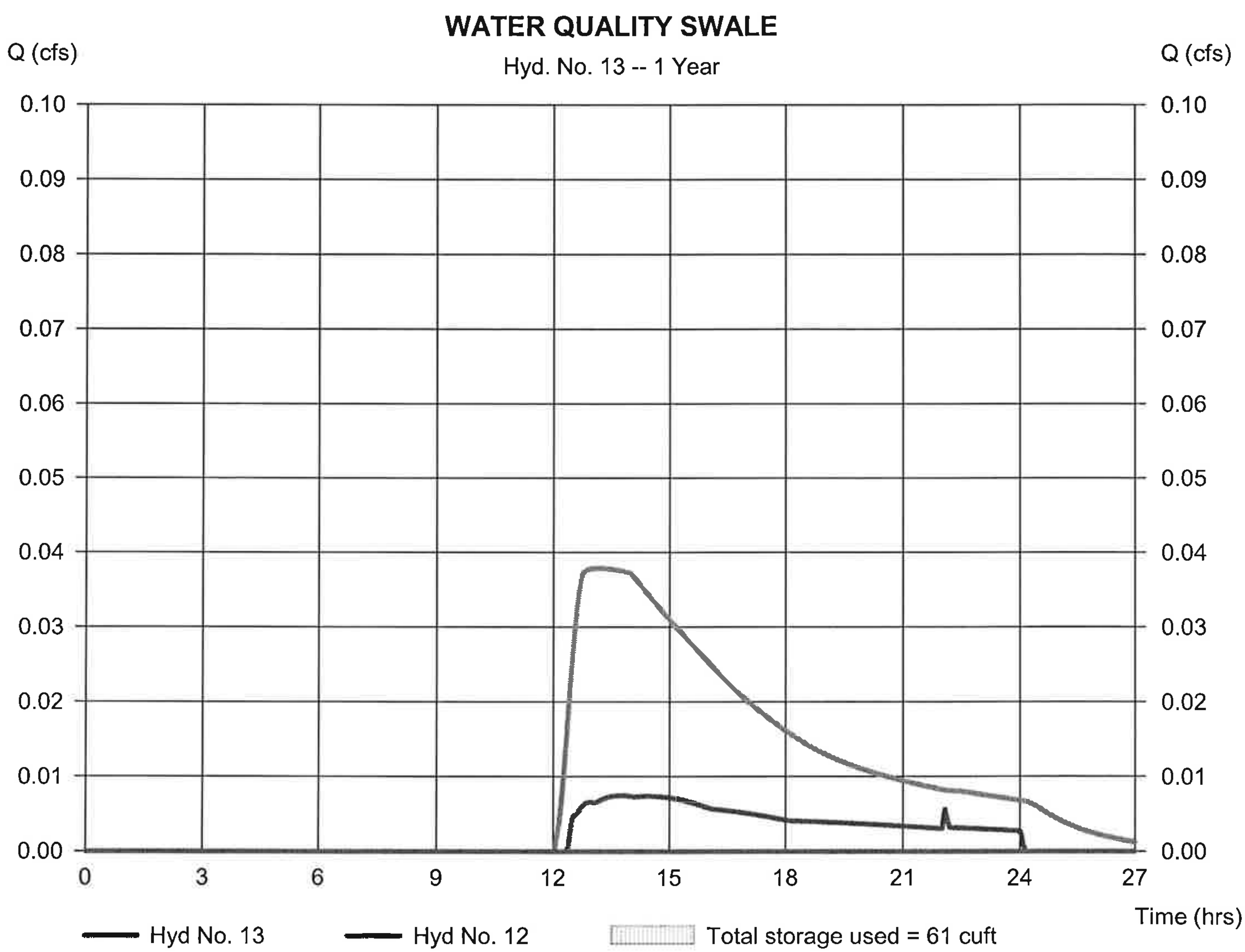
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 13

WATER QUALITY SWALE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.88 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 12 - PW-1B	Max. Elevation	= 126.02 ft
Reservoir name	= WATER QUALITY SWALE	Max. Storage	= 61 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

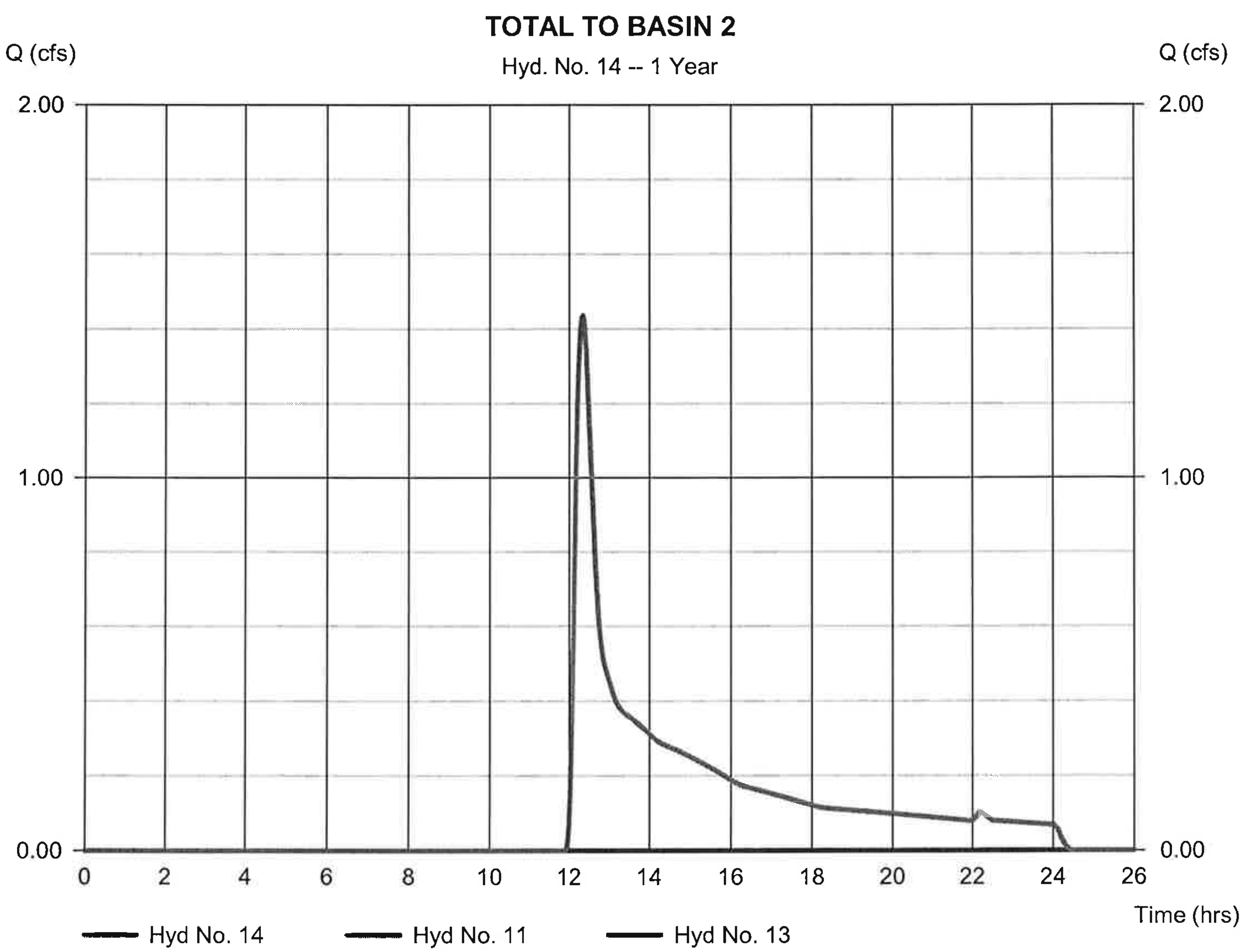


Hydrograph Report

Hyd. No. 14

TOTAL TO BASIN 2

Hydrograph type	= Combine	Peak discharge	= 1.436 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 9,324 cuft
Inflow hyds.	= 11, 13	Contrib. drain. area	= 19.670 ac



Hydrograph Report

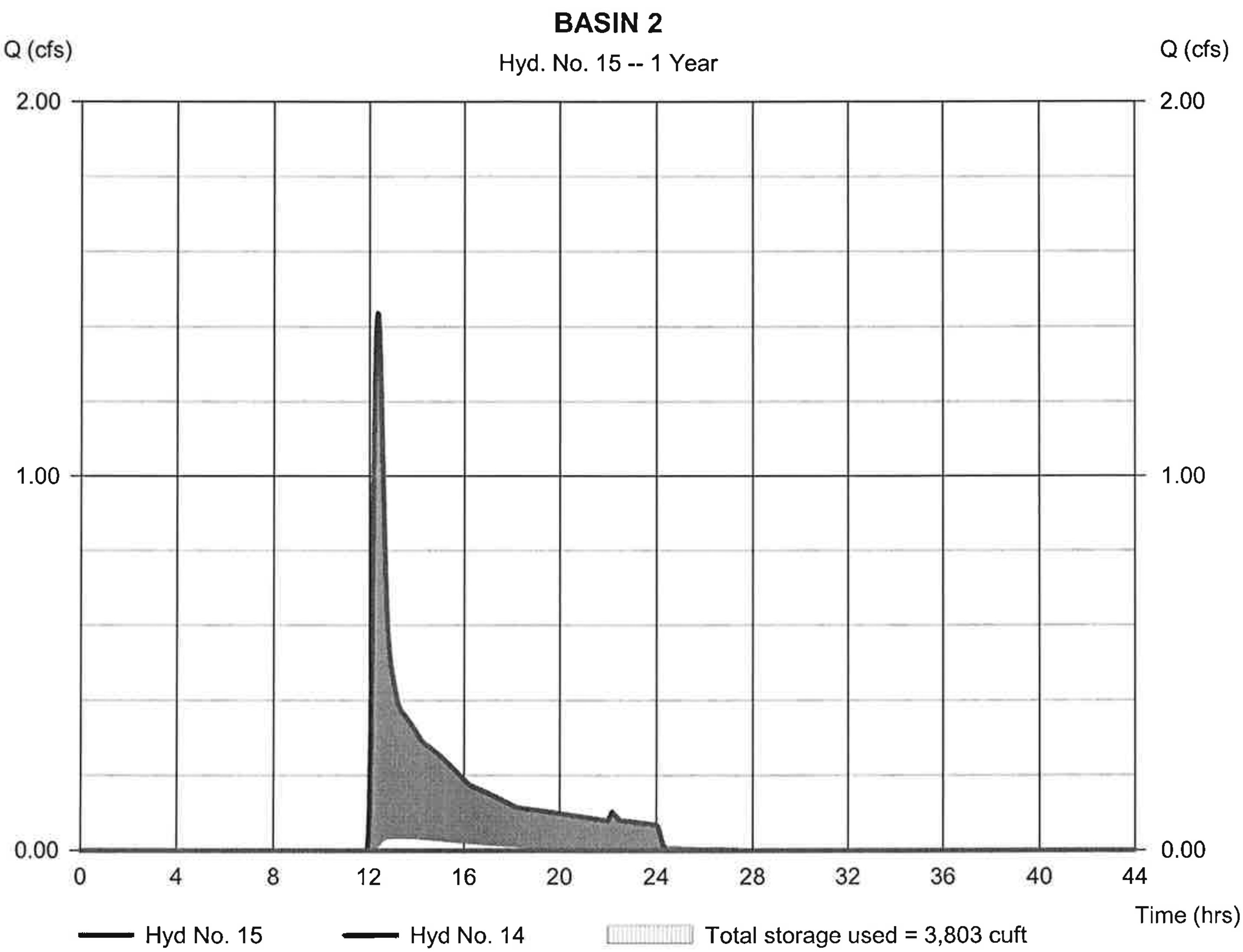
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 15

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.62 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - TOTAL TO BASIN 2	Max. Elevation	= 117.41 ft
Reservoir name	= BASIN 2	Max. Storage	= 3,803 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

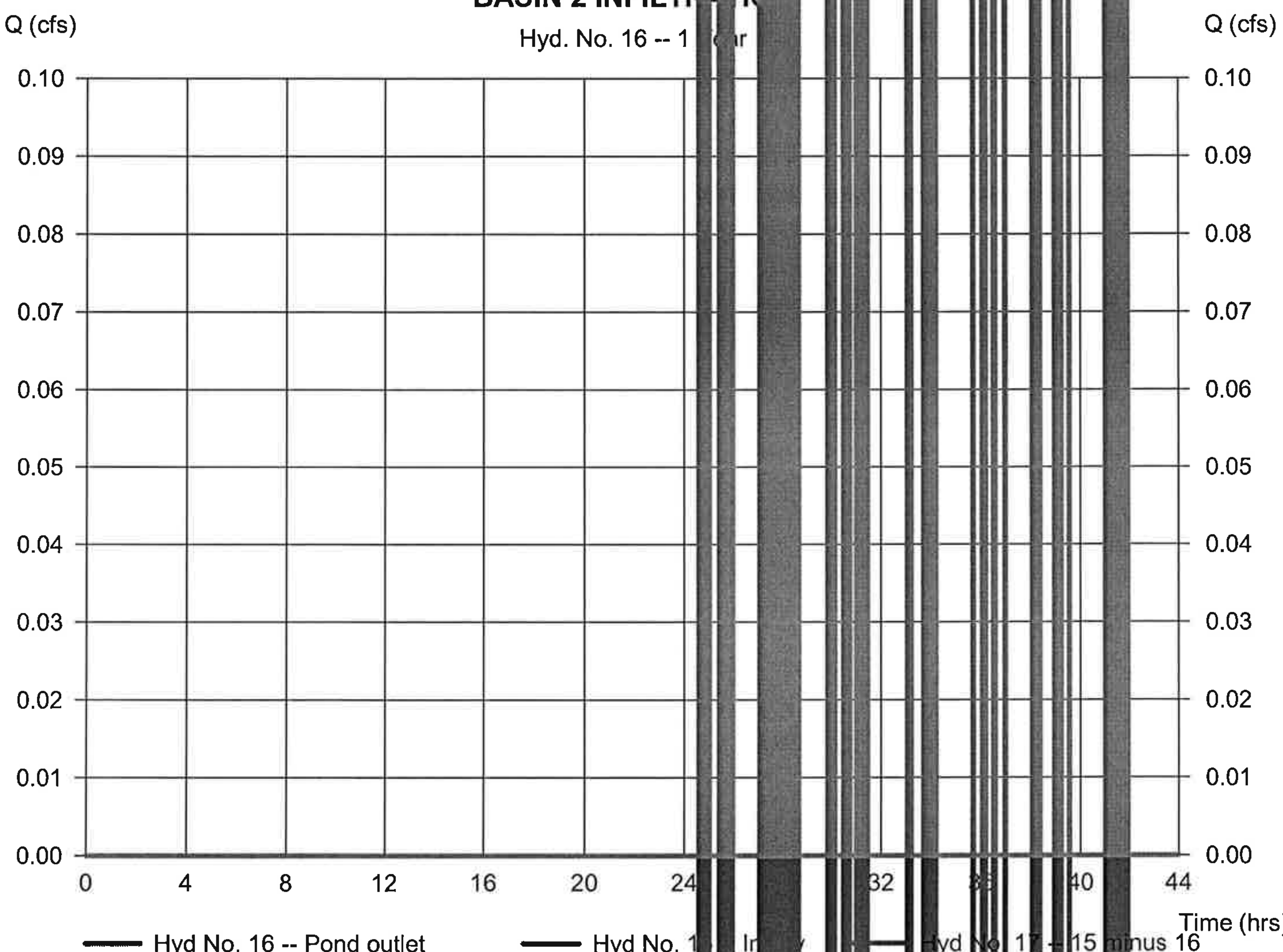
Hyd. No. 16

BASIN 2 INFILTRATION

Hydrograph type	= Diversion1	Pe[illegible] disc[illegible]arg[illegible]	= 0.[illegible]9 cfs
Storm frequency	= 1 yrs	Ti[illegible] to p[illegible]ak	= 24[illegible]2 hrs
Time interval	= 1 min	Hy[illegible] volu[illegible]e	= 1,[illegible]6 cuft
Inflow hydrograph	= 15 - BASIN 2	2n[illegible] dive[illegible]d h[illegible]d.	= 17
Diversion method	= Pond - BASIN 2	Po[illegible] stru[illegible]tur[illegible]	= Ex[illegible]tration

BASIN 2 INFILTR[illegible]TI[illegible]

Hyd. No. 16 -- 1 [illegible]ar



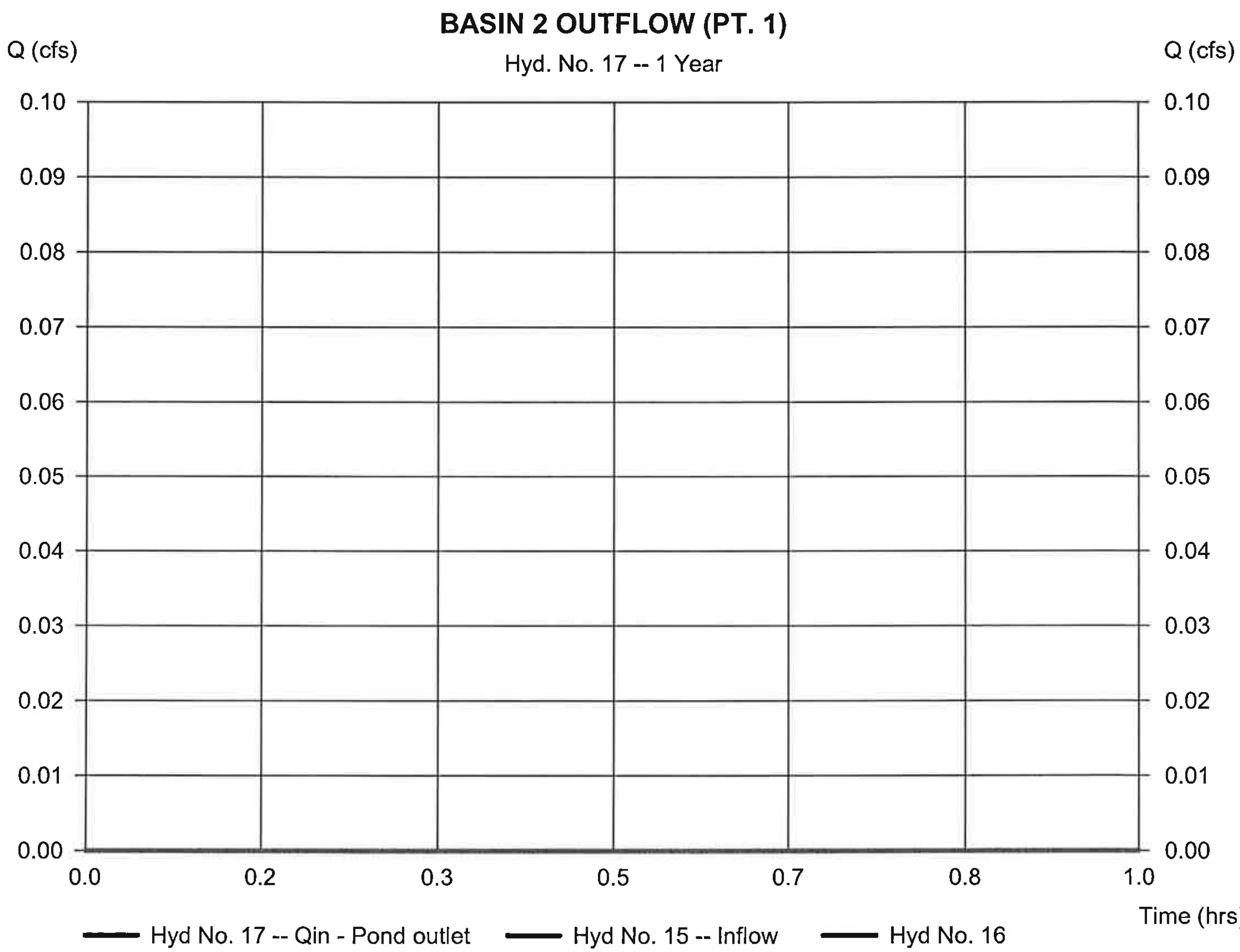
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 17

BASIN 2 OUTFLOW (PT. 1)

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= -1,526 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 16
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



Hydrograph Report

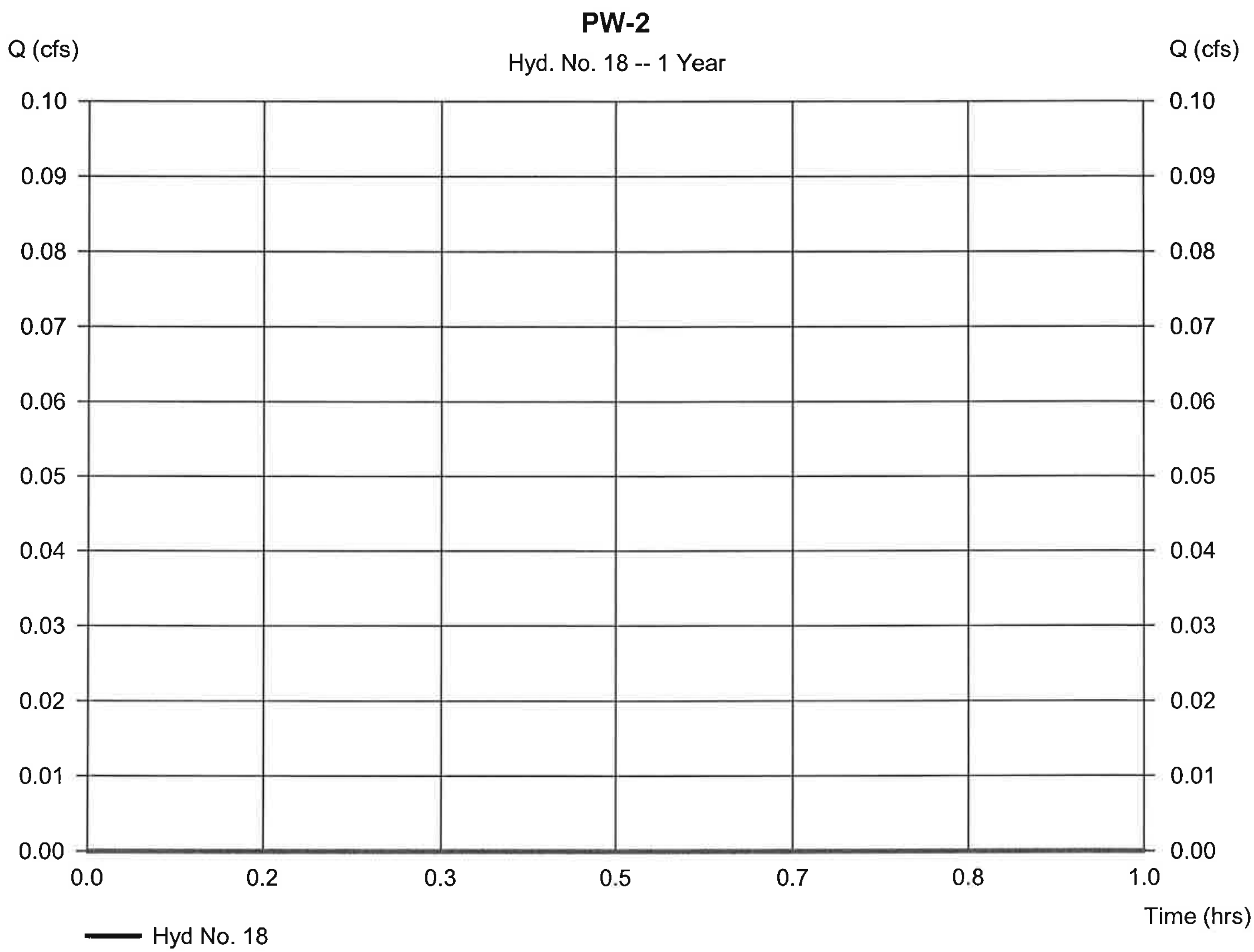
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 18

PW-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 1.310 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.52 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.230 x 98) + (0.300 x 39)] / 1.310



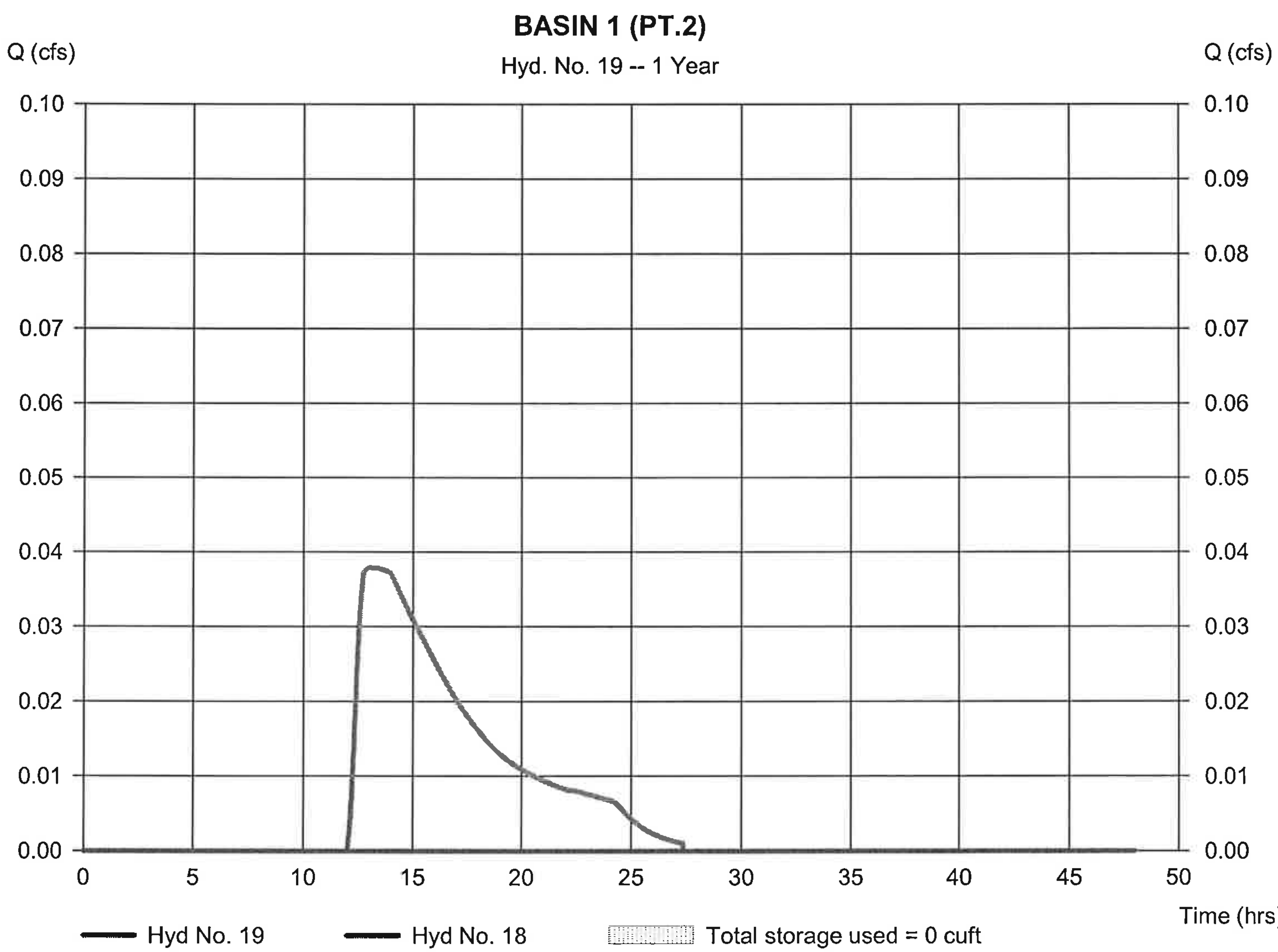
Hydrograph Report

Hyd. No. 19

BASIN 1 (PT.2)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - PW-2	Max. Elevation	= 118.00 ft
Reservoir name	= UPGRADED BASIN	Max. Storage	= 0 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

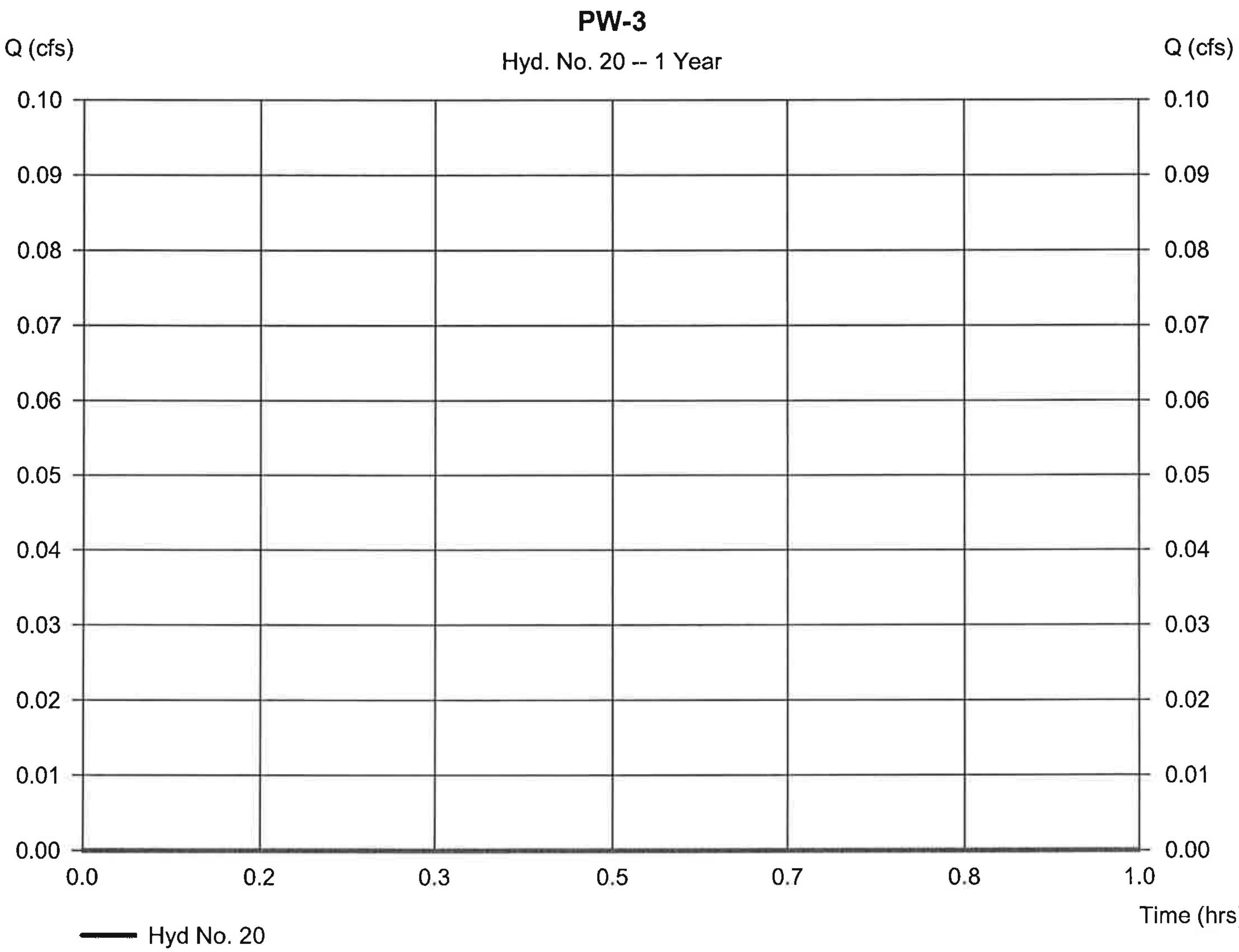
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 20

PW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 7.250 ac	Curve number	= 48*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.81 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.240 x 39)] / 7.250



Hydrograph Report

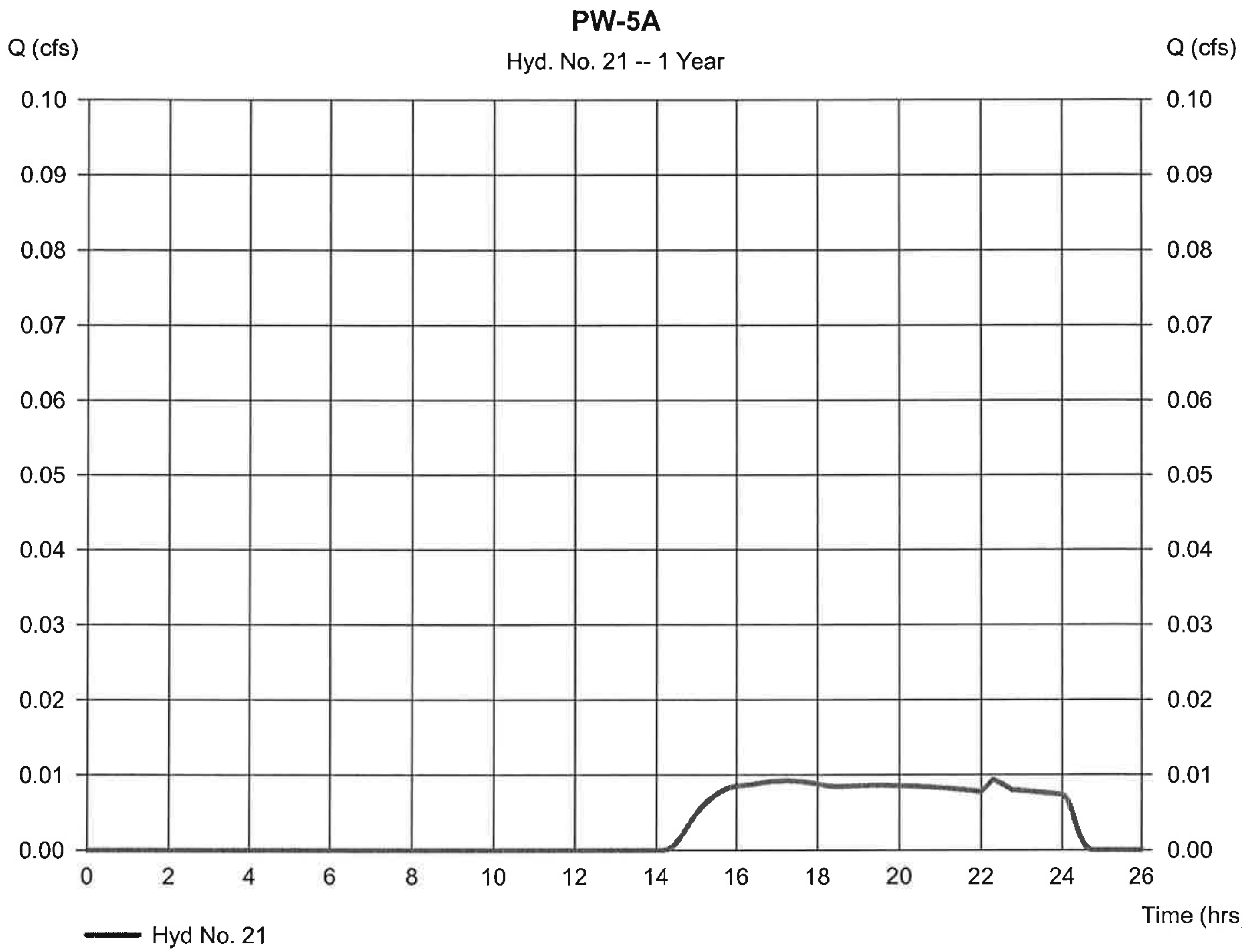
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 21

PW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 22.28 hrs
Time interval	= 1 min	Hyd. volume	= 283 cuft
Drainage area	= 10.000 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.26 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (3.950 x 39)] / 10.000



Hydrograph Report

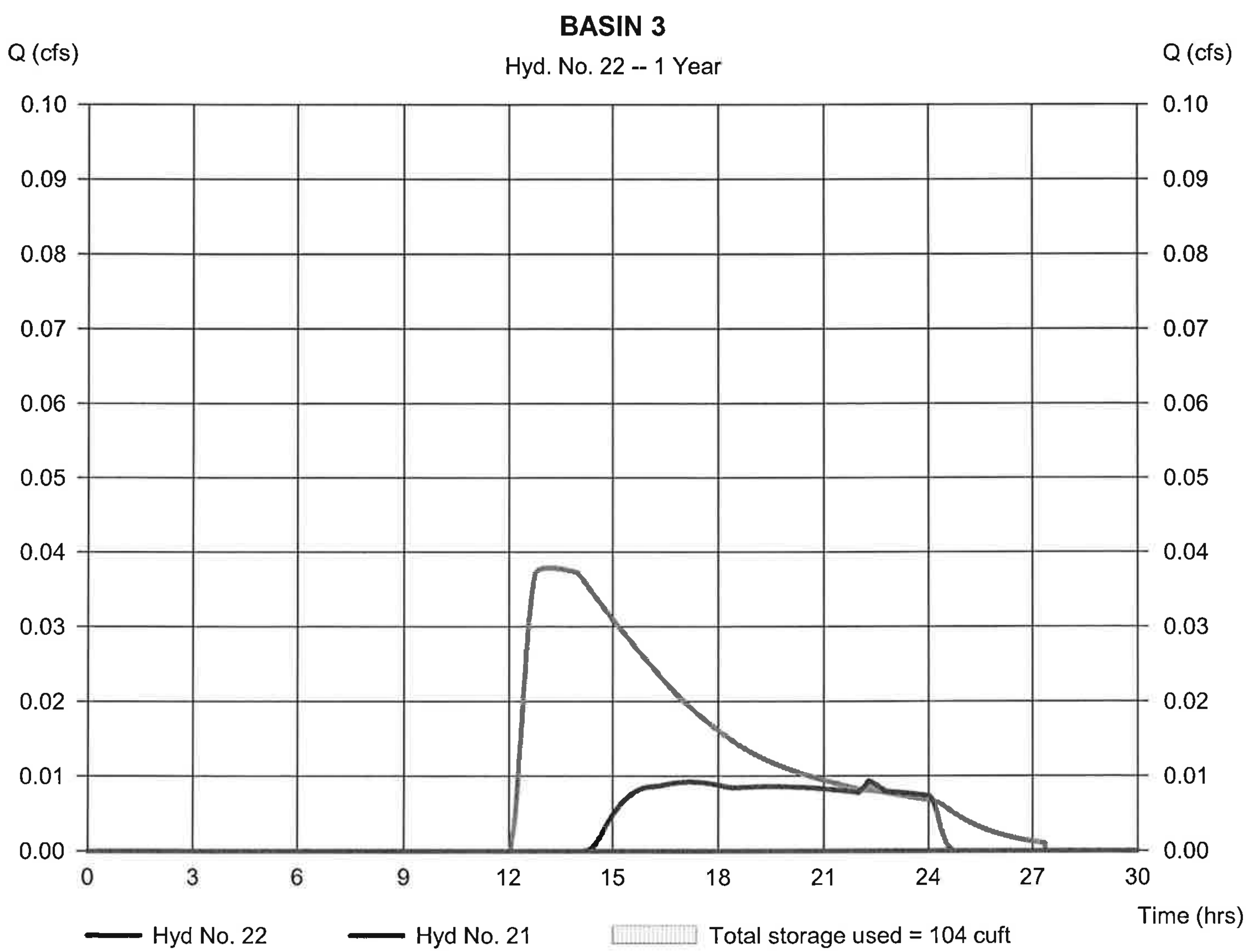
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 22

BASIN 3

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 20.90 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 21 - PW-5A	Max. Elevation	= 126.03 ft
Reservoir name	= BASIN 3	Max. Storage	= 104 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

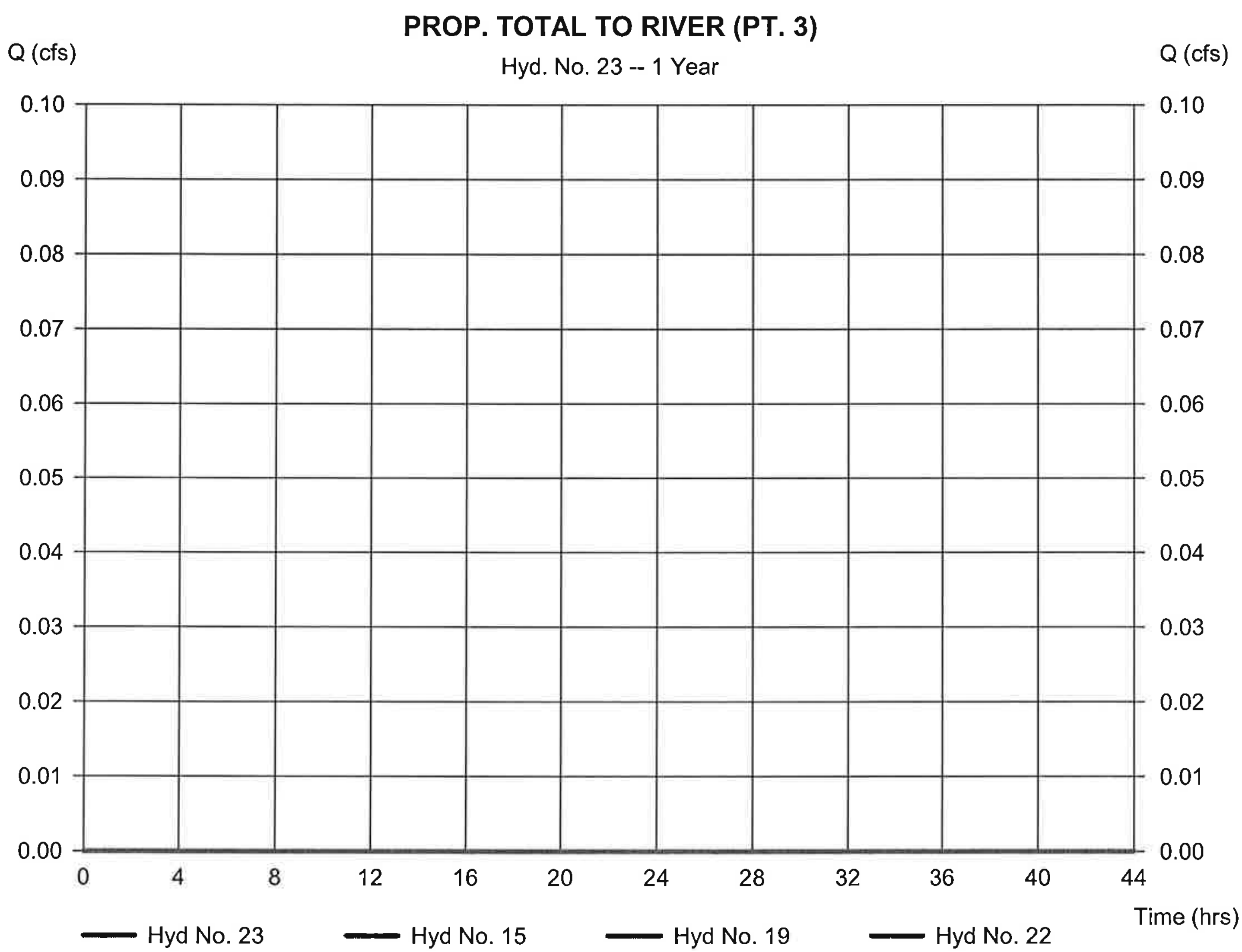


Hydrograph Report

Hyd. No. 23

PROP. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.73 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 15, 19, 22	Contrib. drain. area	= 0.000 ac

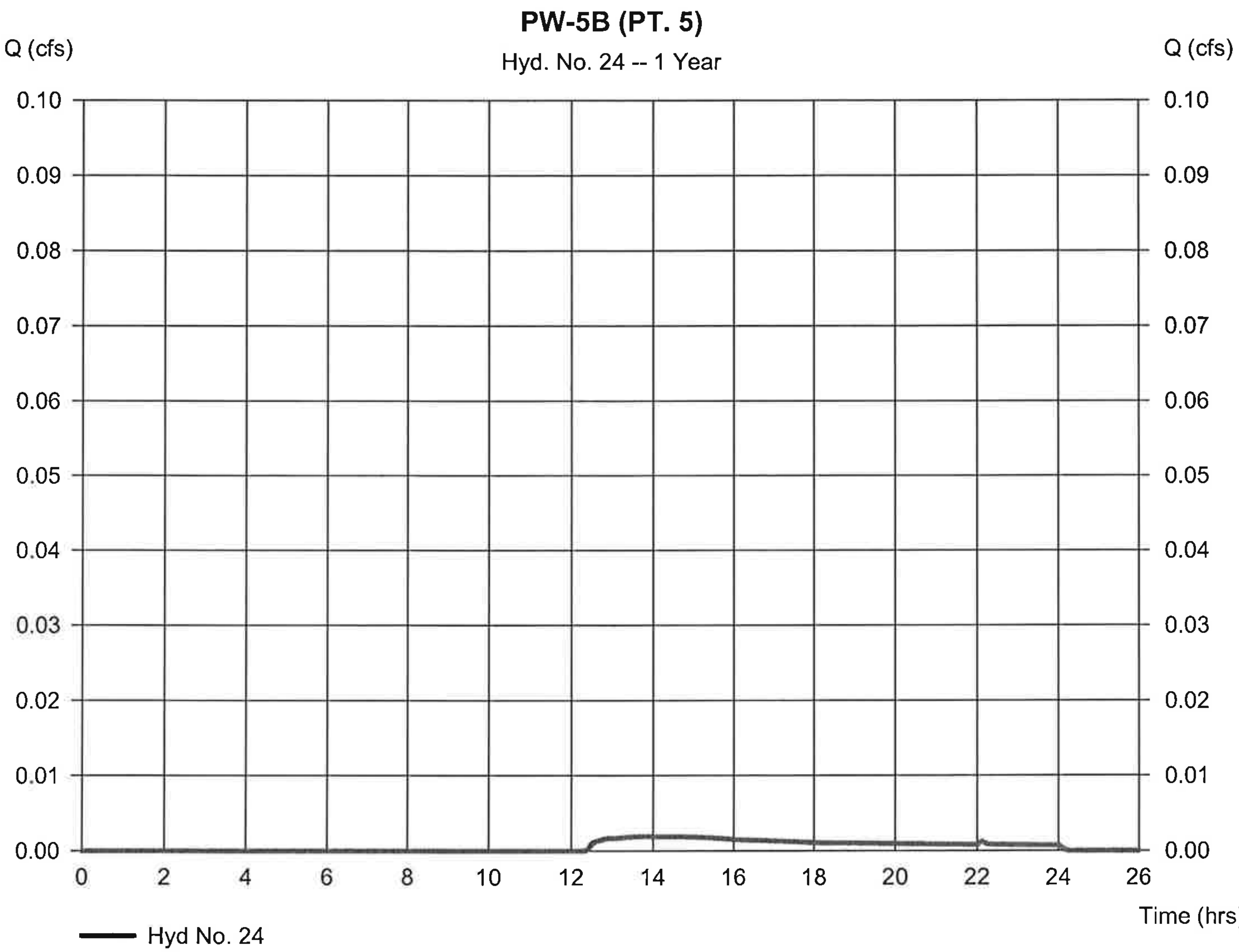


Hydrograph Report

Hyd. No. 24

PW-5B (PT. 5)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.78 hrs
Time interval	= 1 min	Hyd. volume	= 51 cuft
Drainage area	= 0.460 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.01 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

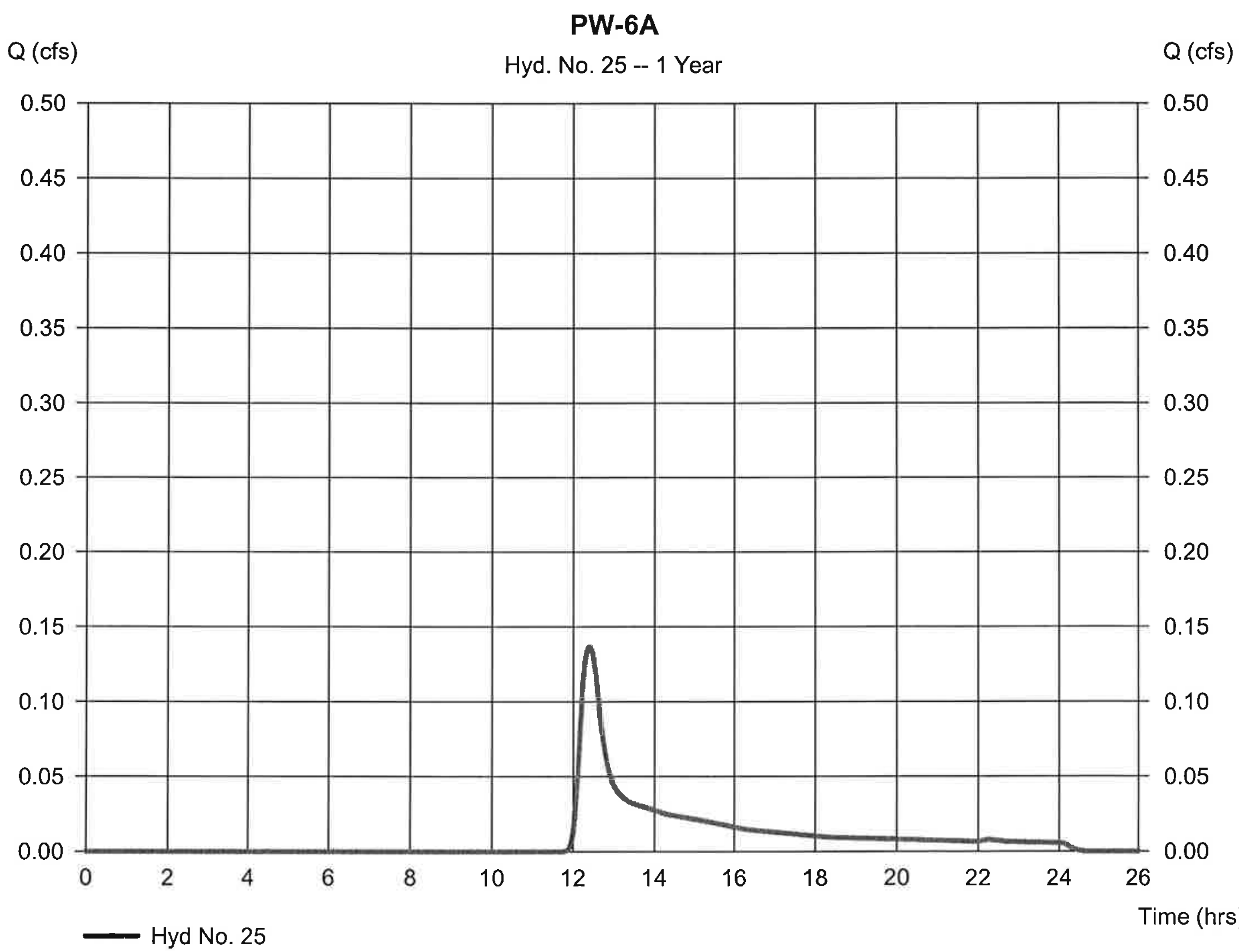
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 25

PW-6A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.136 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 851 cuft
Drainage area	= 1.350 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.74 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 39) + (0.650 x 98)] / 1.350



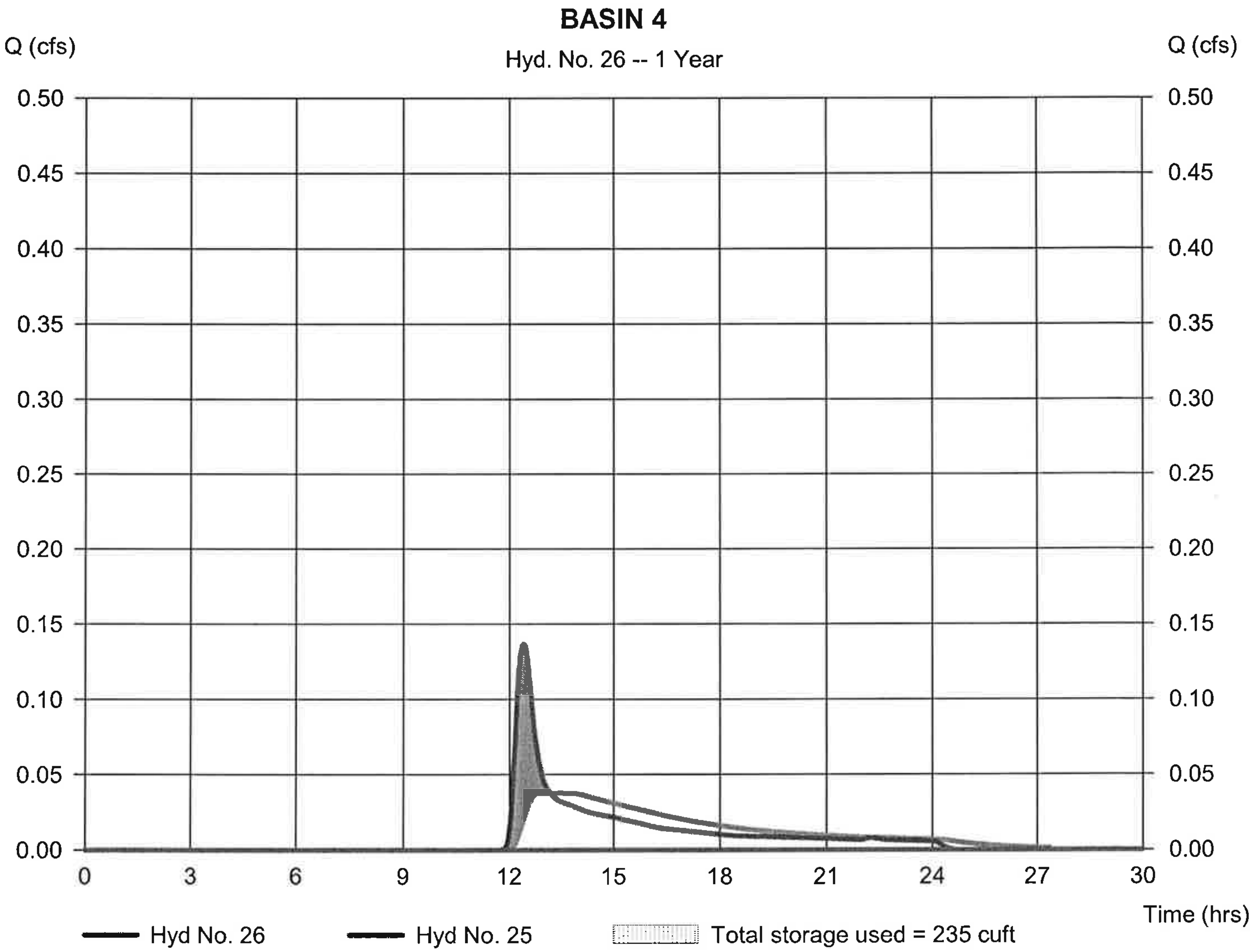
Hydrograph Report

Hyd. No. 26

BASIN 4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.50 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 25 - PW-6A	Max. Elevation	= 128.02 ft
Reservoir name	= BASIN 4	Max. Storage	= 235 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

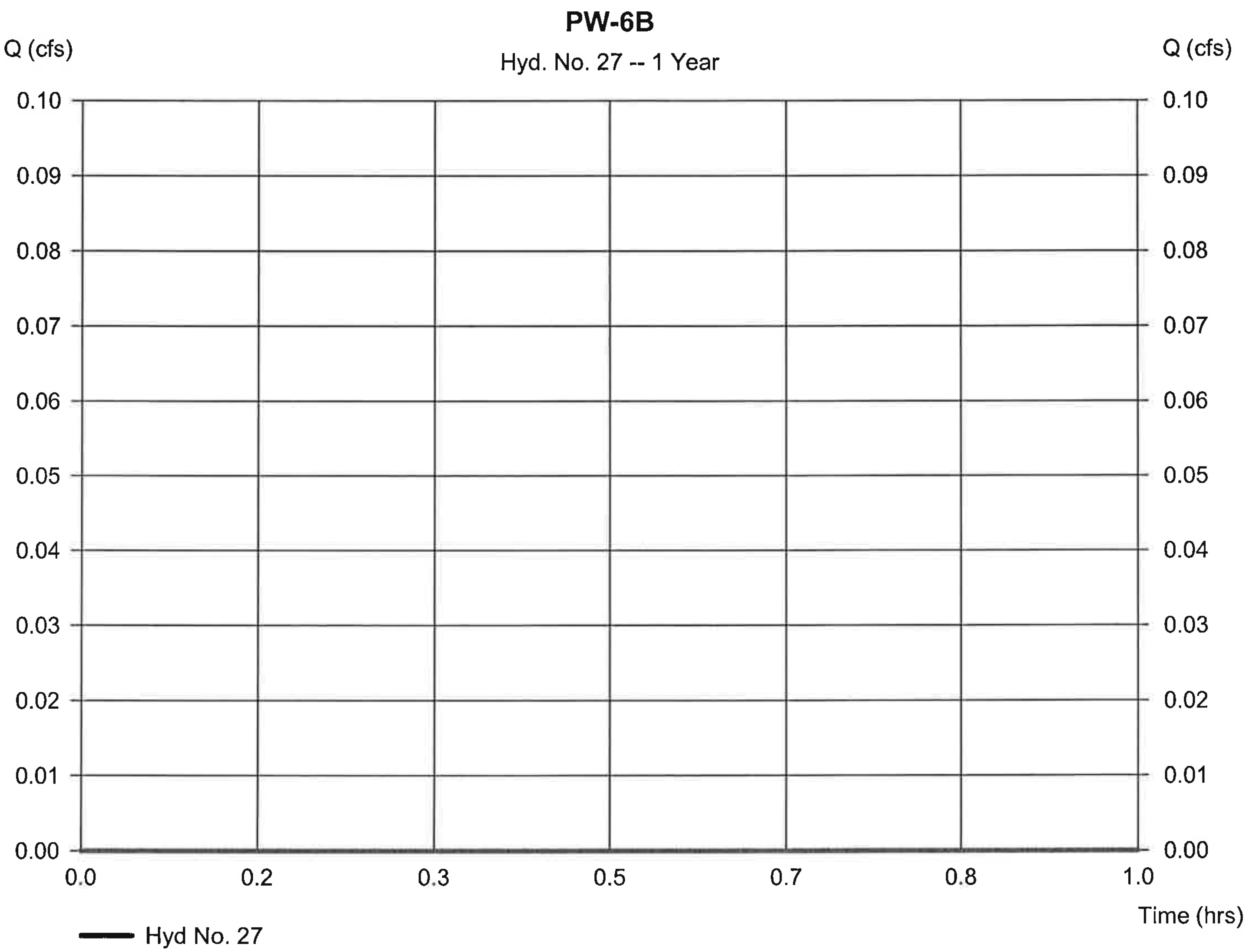
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 27

PW-6B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.600 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.610 x 39)] / 0.600



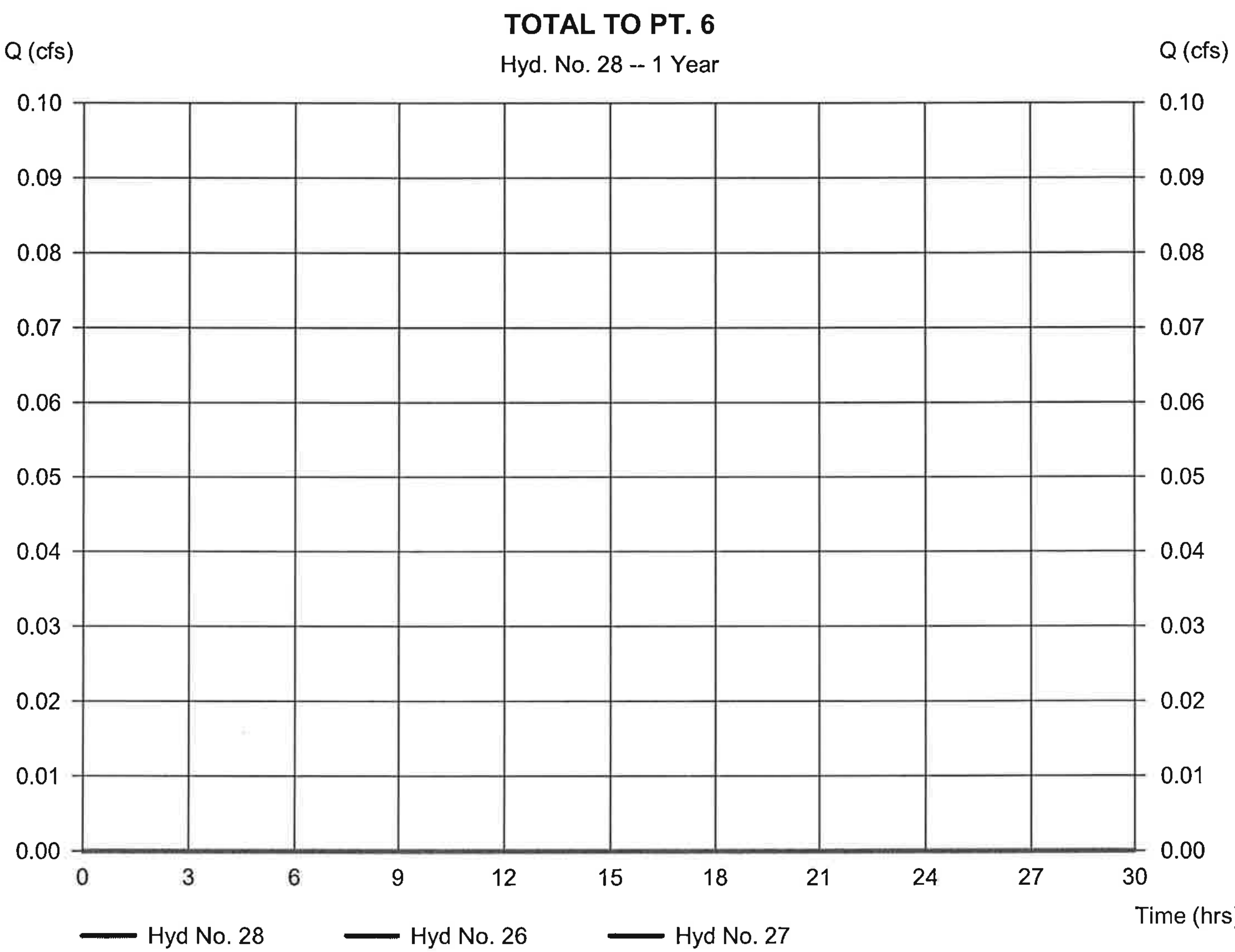
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 28

TOTAL TO PT. 6

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.50 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.600 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	31.68	1	728	115,076	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	8.251	1	726	26,572	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.352	1	773	6,744	------	------	------	EW-3
4	Combine	39.44	1	727	148,392	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	1.373	1	730	5,489	------	------	------	EW-4
6	Reservoir	0.000	1	785	0	5	118.60	2,248	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.029	1	922	820	------	------	------	EW-5A
8	SCS Runoff	0.047	1	825	1,209	------	------	------	E-5B
9	Combine	0.072	1	897	2,029	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	1.095	1	724	4,083	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	25.32	1	733	107,826	------	------	------	PW-1A
12	SCS Runoff	2.087	1	725	6,726	------	------	------	PW-1B
13	Reservoir	0.000	1	734	0	12	126.99	2,879	WATER QUALITY SWALE
14	Combine	25.32	1	733	107,826	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	16.64	1	745	82,763	14	120.76	25,670	BASIN 2
16	Diversion1	0.601	1	745	16,824	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	16.04	1	745	65,940	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.095	1	765	1,177	------	------	------	PW-2
19	Reservoir	0.000	1	798	0	18	118.10	368	BASIN 1 (PT.2)
20	SCS Runoff	0.072	1	893	1,948	------	------	------	PW-3
21	SCS Runoff	5.236	1	743	29,497	------	------	------	PW-5A
22	Reservoir	1.175	1	781	8,948	21	128.44	10,868	BASIN 3
23	Combine	16.64	1	745	91,712	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.476	1	727	1,715	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	1.697	1	737	8,197	------	------	------	PW-6A
26	Reservoir	1.083	1	752	2,070	25	129.94	2,955	BASIN 4
27	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
28	Combine	1.083	1	752	2,070	26, 27	------	------	TOTAL TO PT. 6

Hydro_SPR_REV.gpw	Return Period: 2 Year	Tuesday, Jun 3, 2008

Hydrograph Report

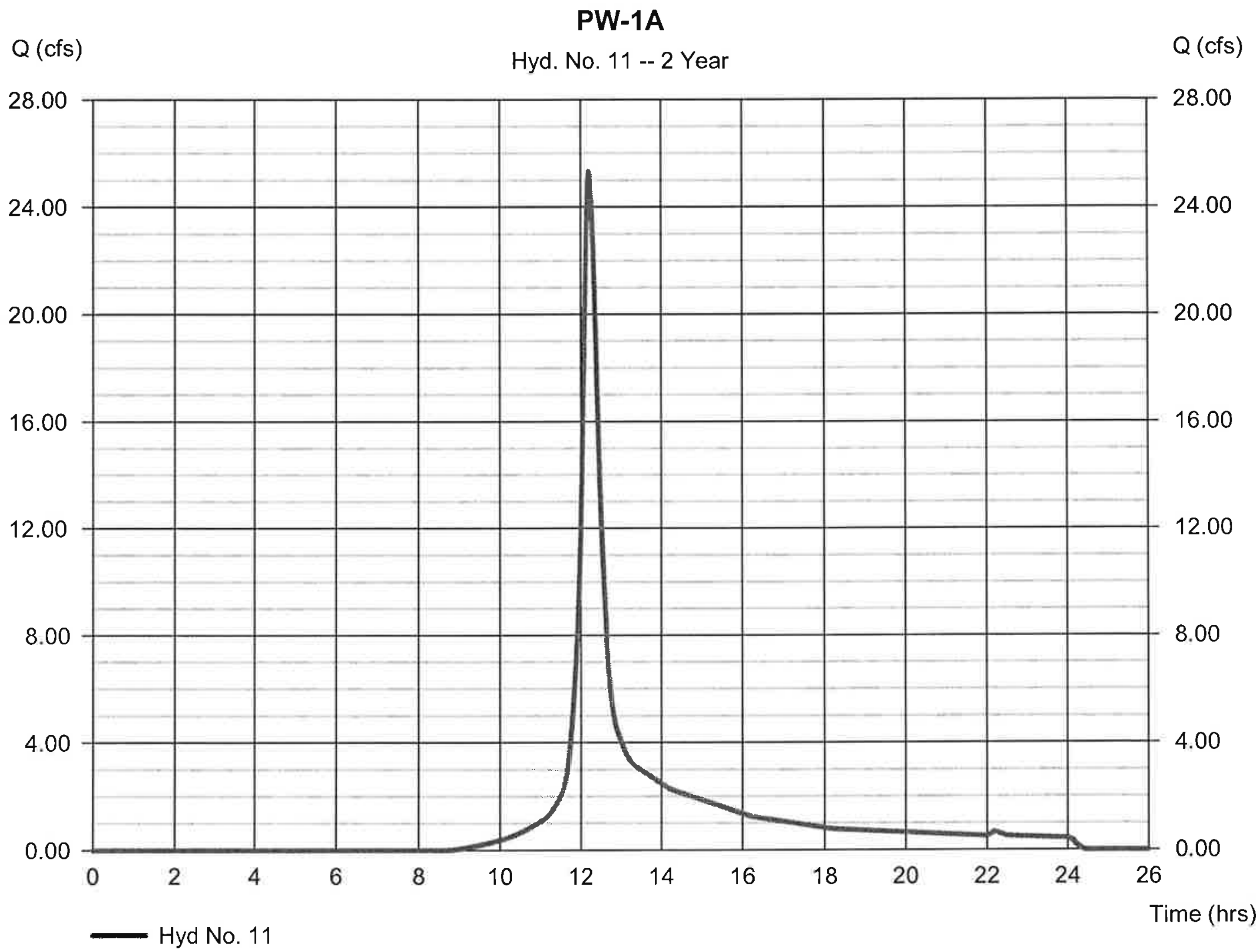
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 11

PW-1A

Hydrograph type	= SCS Runoff	Peak discharge	= 25.32 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 107,826 cuft
Drainage area	= 19.670 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.50 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.300 x 98) + (5.150 x 39)] / 19.670



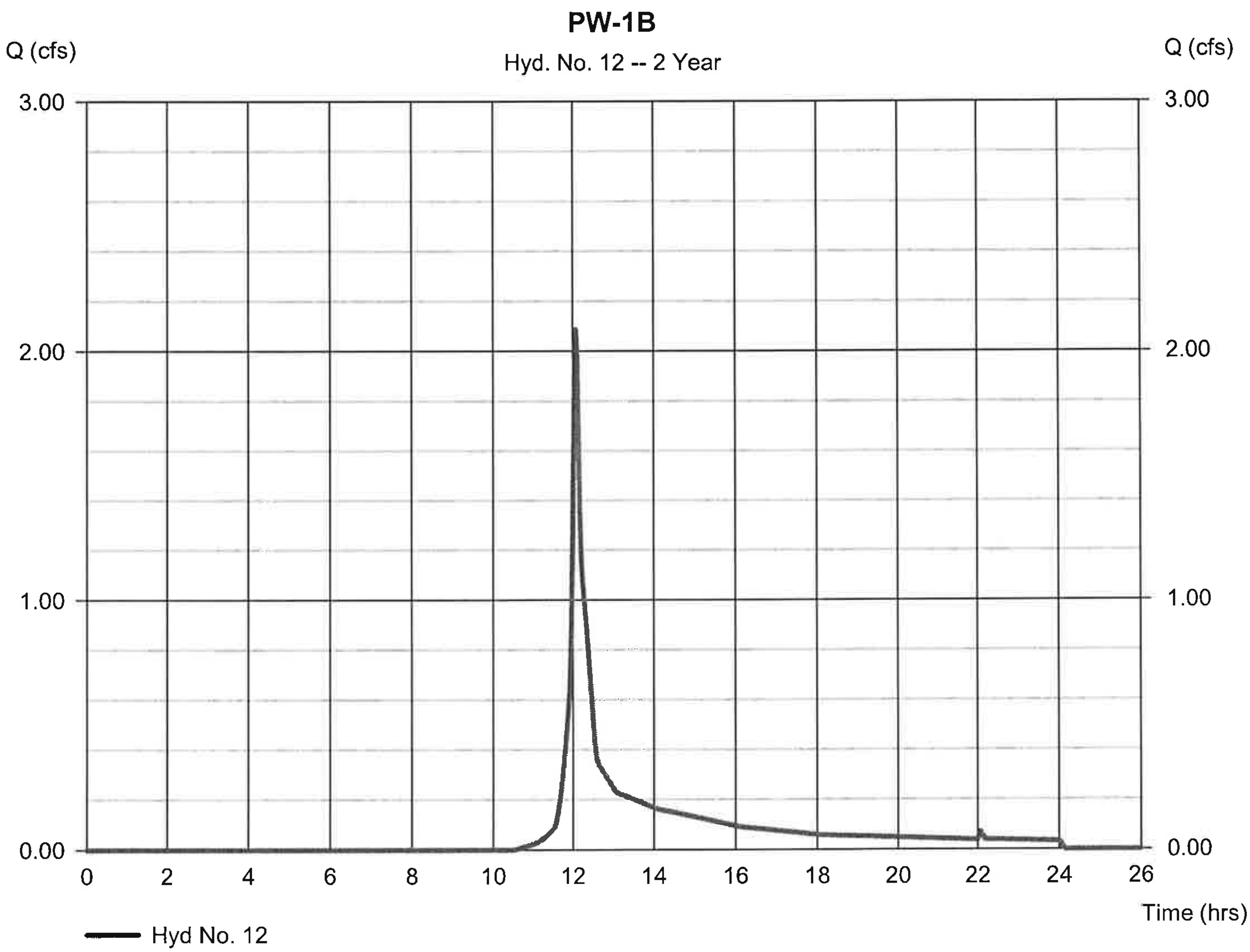
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 12

PW-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.087 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 6,726 cuft
Drainage area	= 1.750 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



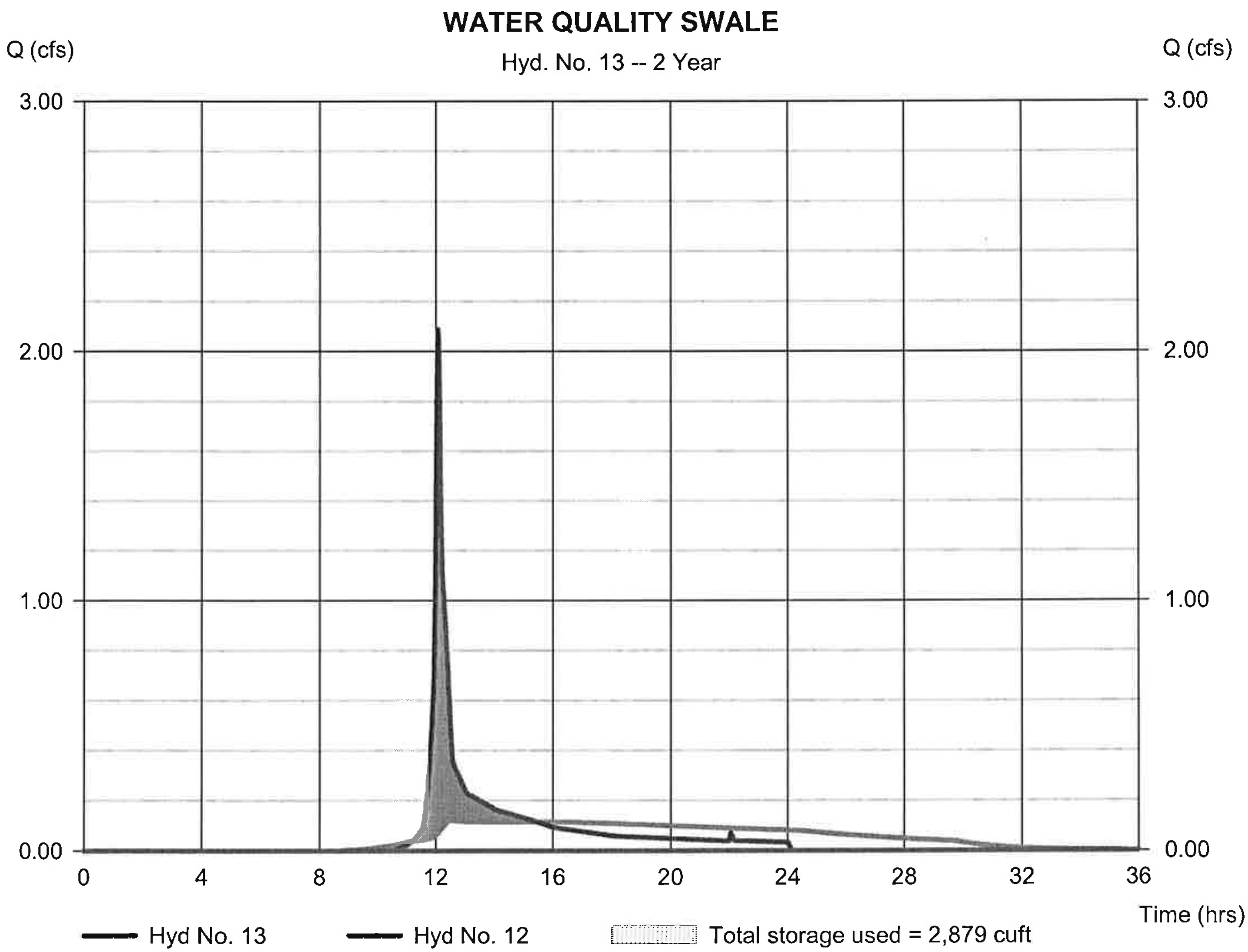
Hydrograph Report

Hyd. No. 13

WATER QUALITY SWALE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 12 - PW-1B	Max. Elevation	= 126.99 ft
Reservoir name	= WATER QUALITY SWALE	Max. Storage	= 2,879 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

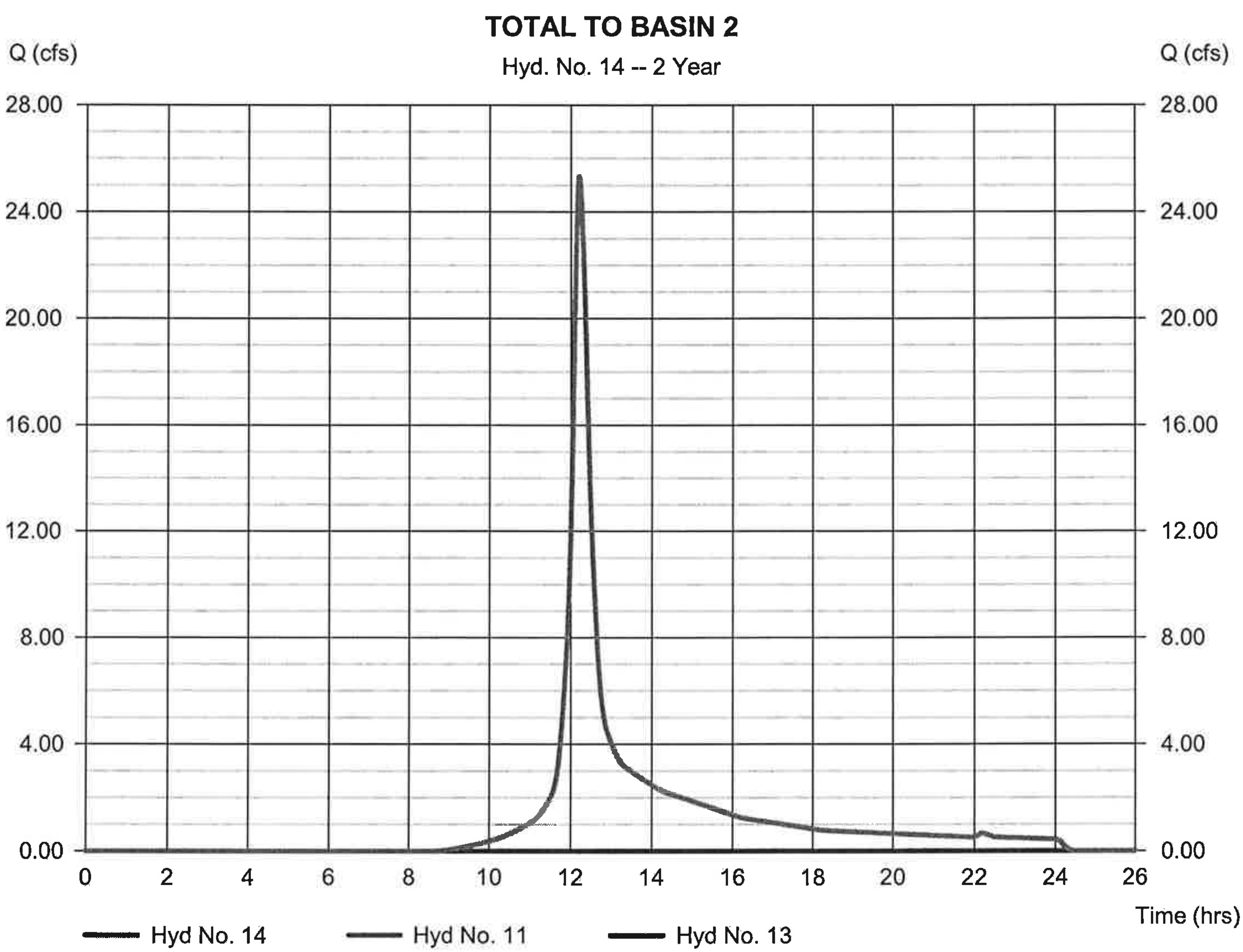


Hydrograph Report

Hyd. No. 14

TOTAL TO BASIN 2

Hydrograph type	= Combine	Peak discharge	= 25.32 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 107,826 cuft
Inflow hyds.	= 11, 13	Contrib. drain. area	= 19.670 ac



Hydrograph Report

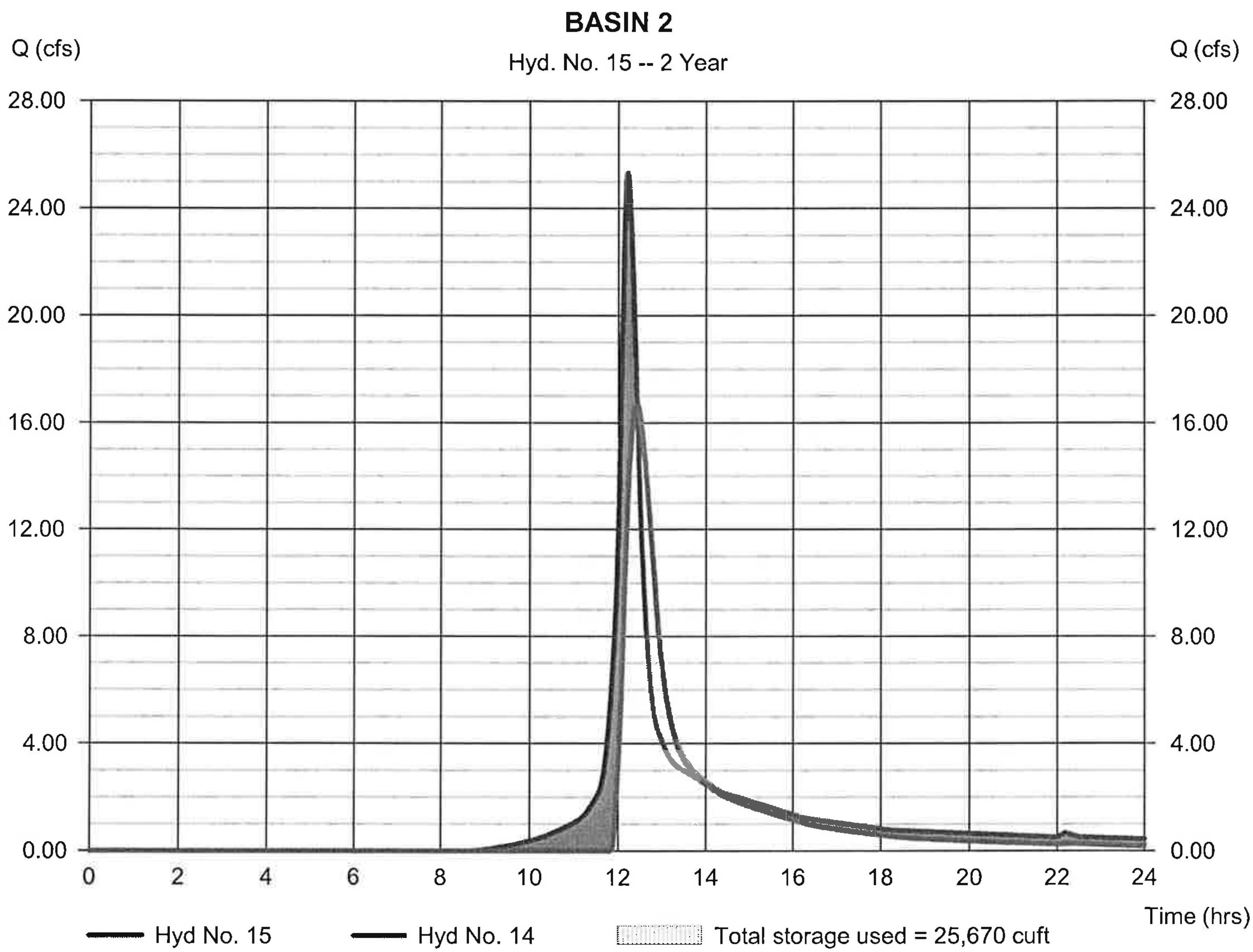
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 15

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 16.64 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 82,763 cuft
Inflow hyd. No.	= 14 - TOTAL TO BASIN 2	Max. Elevation	= 120.76 ft
Reservoir name	= BASIN 2	Max. Storage	= 25,670 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



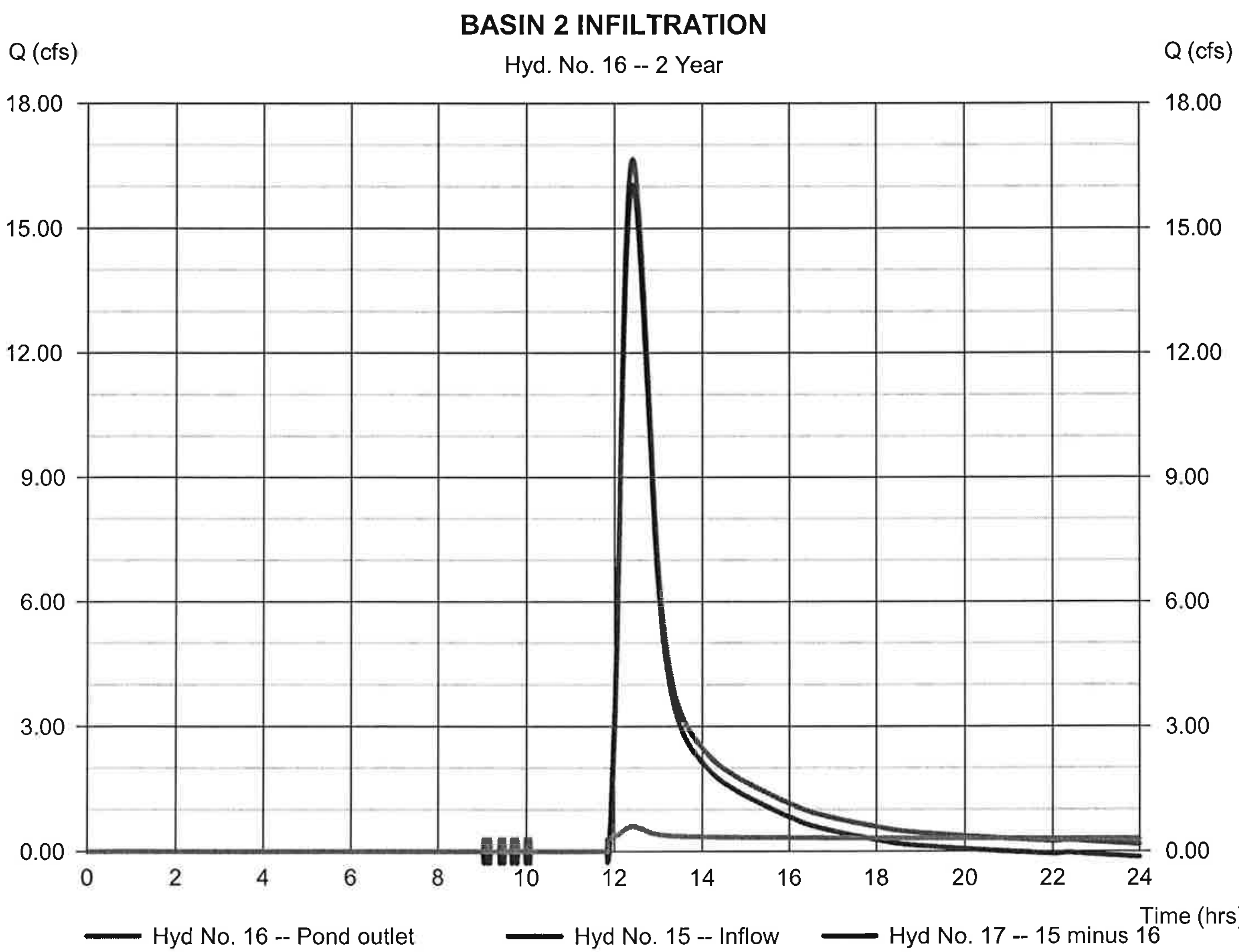
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 16

BASIN 2 INFILTRATION

Hydrograph type	= Diversion1	Peak discharge	= 0.601 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 16,824 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 17
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



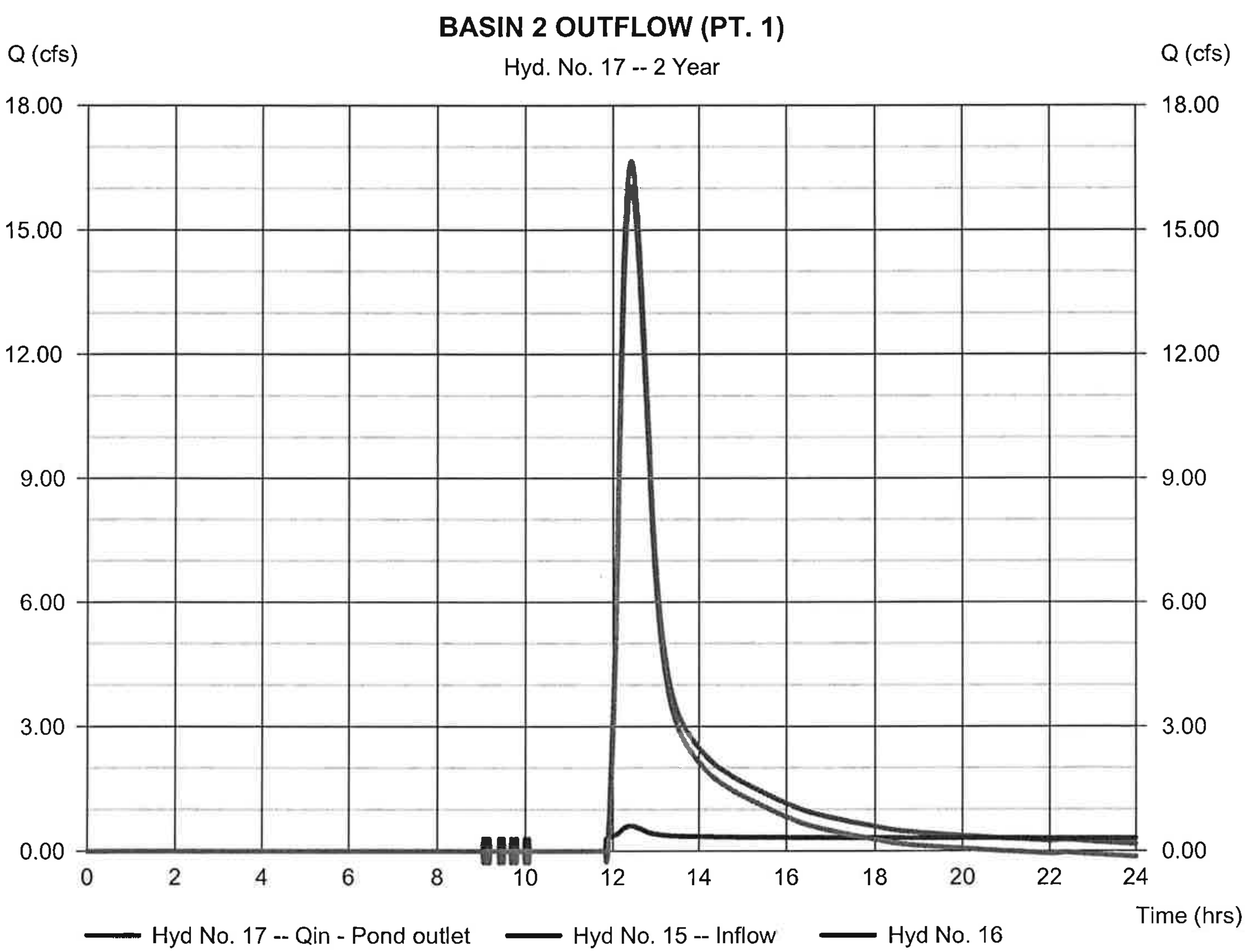
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 17

BASIN 2 OUTFLOW (PT. 1)

Hydrograph type	= Diversion2	Peak discharge	= 16.04 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 65,940 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 16
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



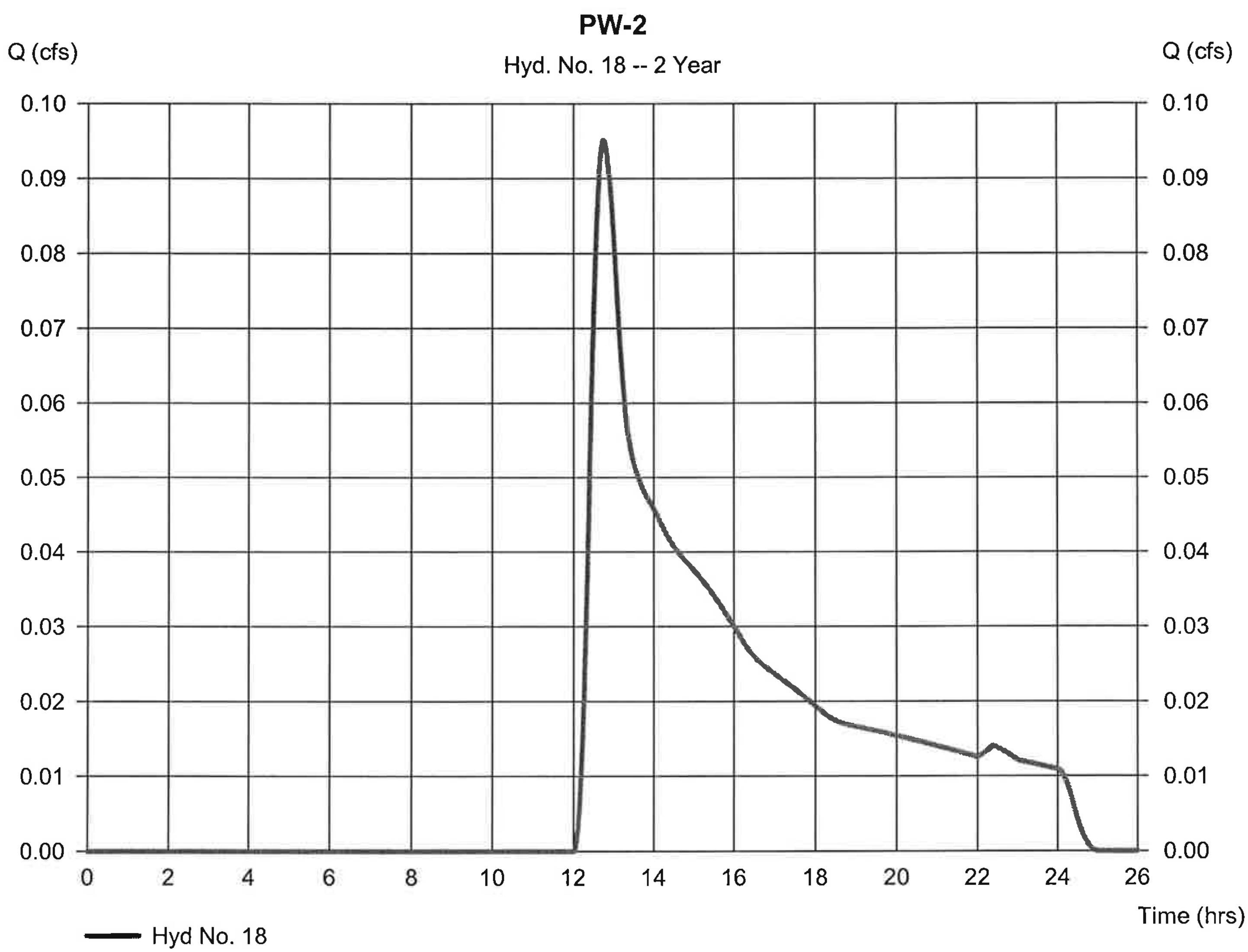
Hydrograph Report

Hyd. No. 18

PW-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.095 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.75 hrs
Time interval	= 1 min	Hyd. volume	= 1,177 cuft
Drainage area	= 1.310 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.52 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.230 x 98) + (0.300 x 39)] / 1.310



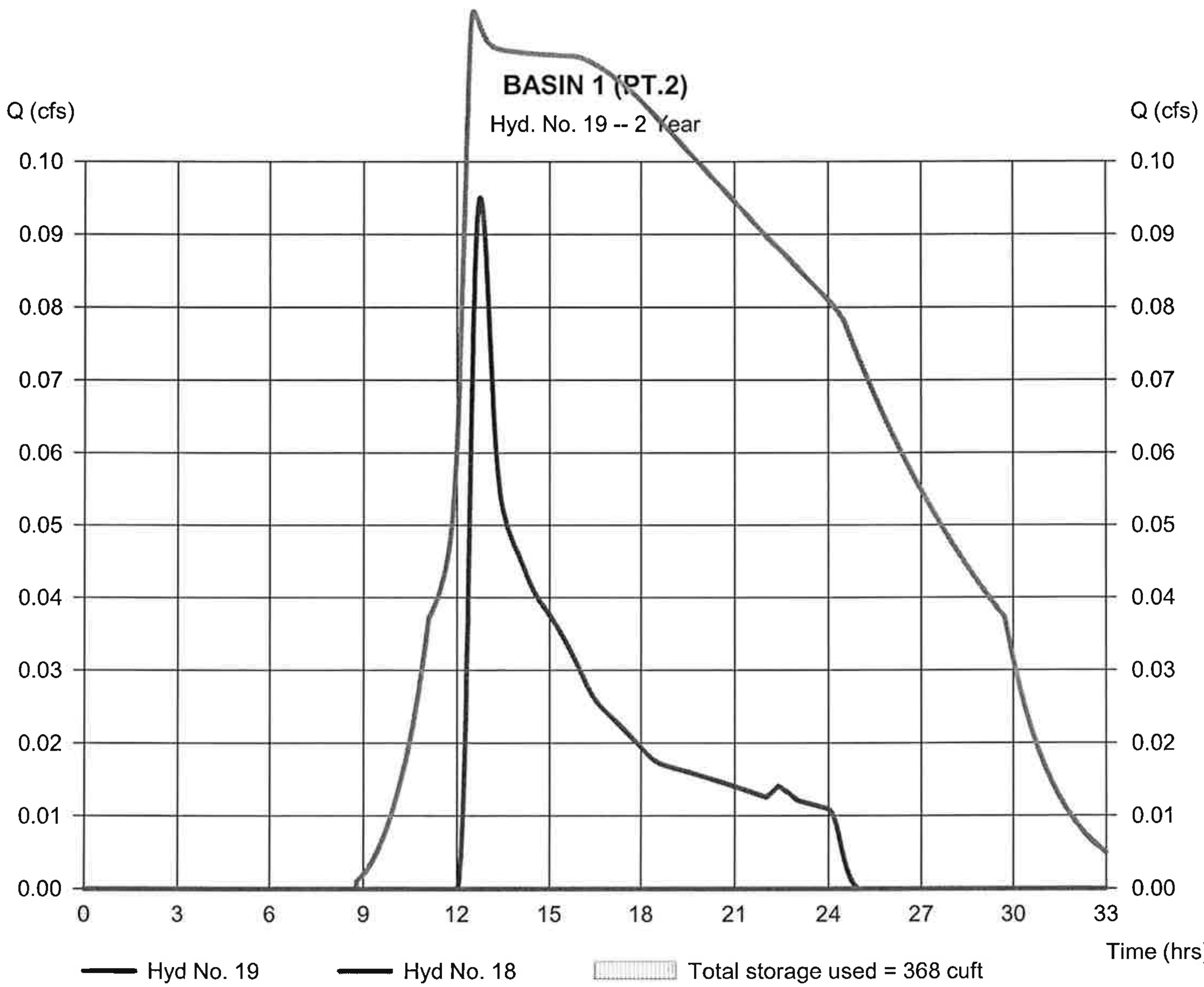
Hydrograph Report

Hyd. No. 19

BASIN 1 (PT.2)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.30 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - PW-2	Max. Elevation	= 118.10 ft
Reservoir name	= UPGRADED BASIN	Max. Storage	= 368 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

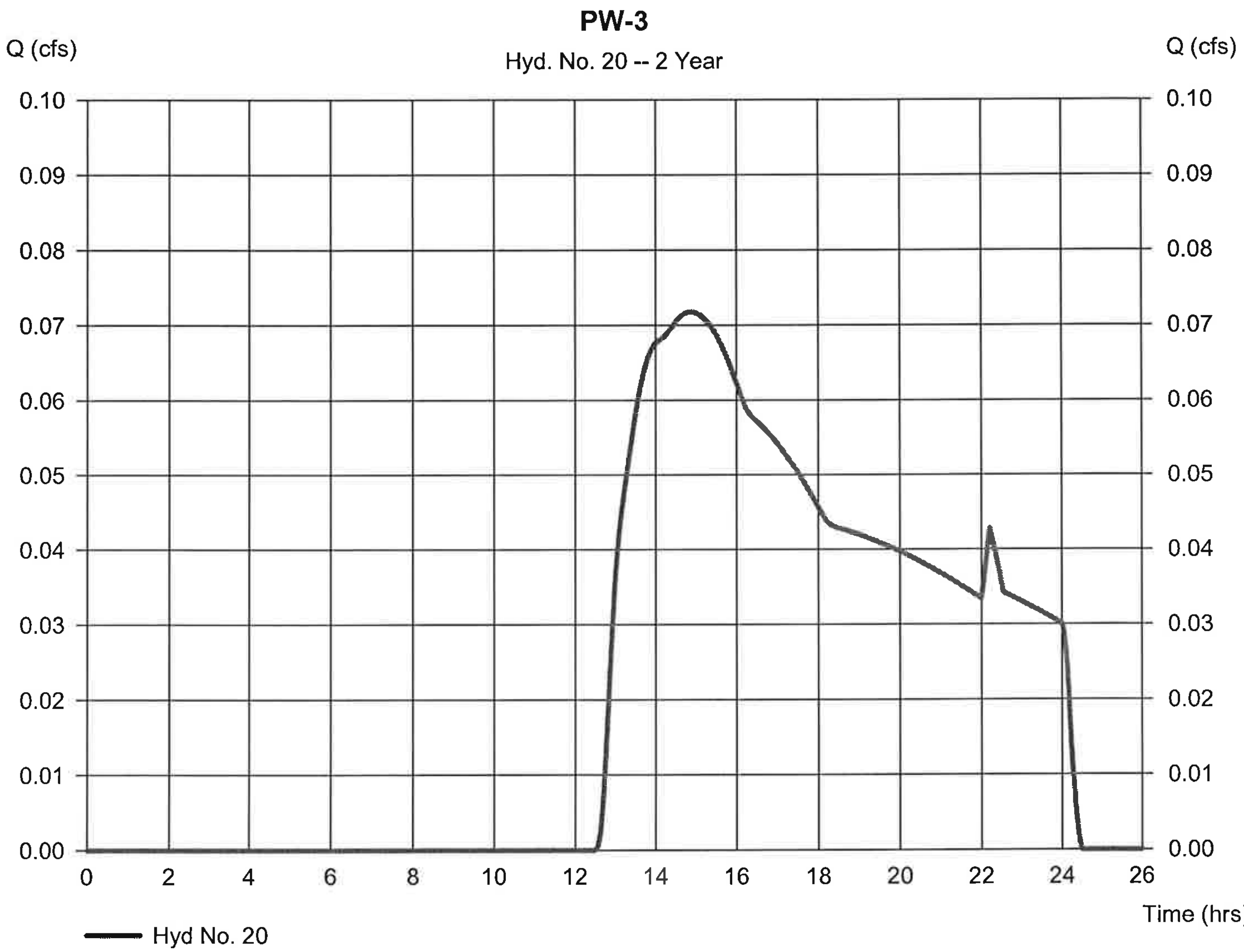
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 20

PW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.072 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.88 hrs
Time interval	= 1 min	Hyd. volume	= 1,948 cuft
Drainage area	= 7.250 ac	Curve number	= 48*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.81 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.240 x 39)] / 7.250



Hydrograph Report

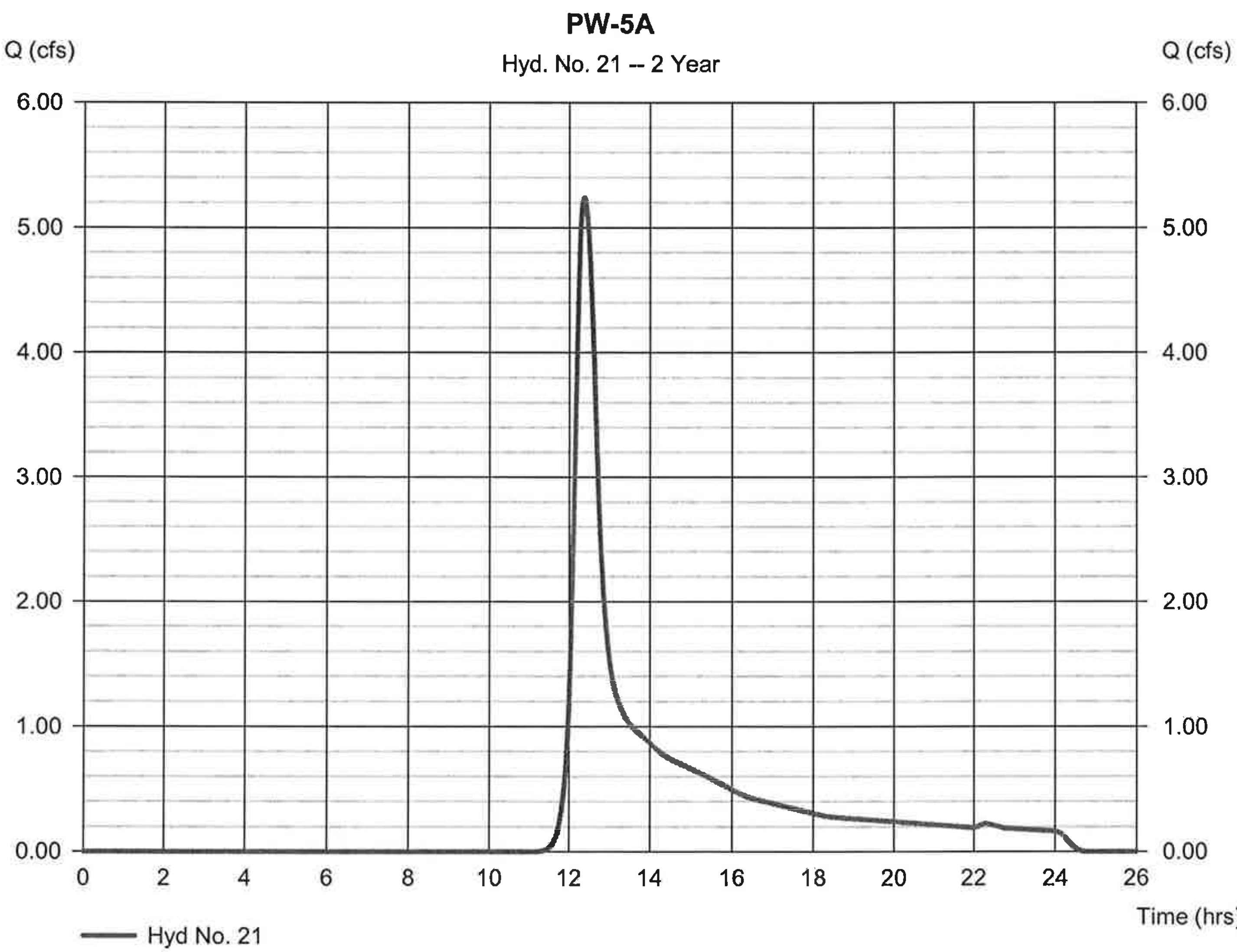
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 21

PW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.236 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 29,497 cuft
Drainage area	= 10.000 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.26 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (3.950 x 39)] / 10.000



Hydrograph Report

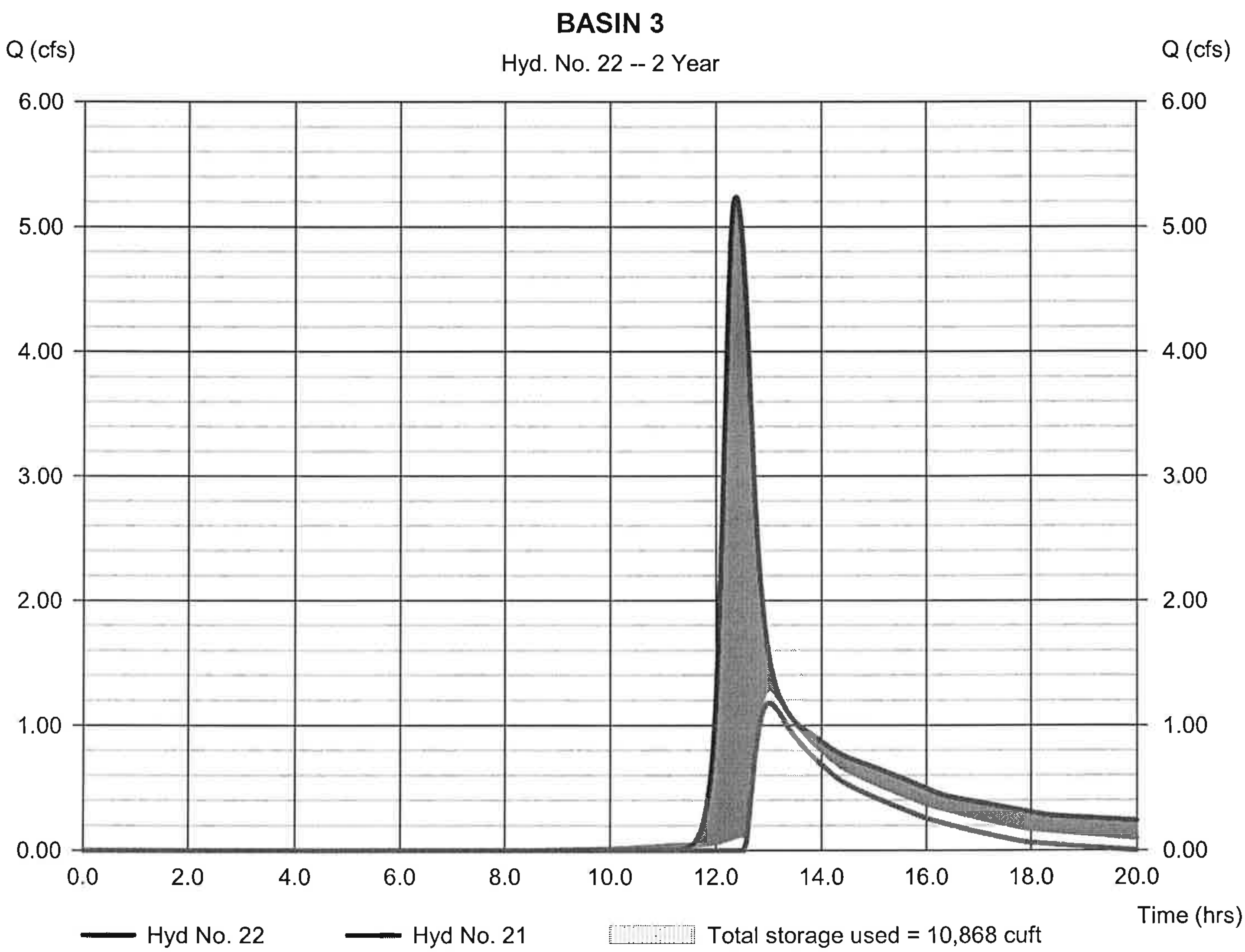
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 22

BASIN 3

Hydrograph type	= Reservoir	Peak discharge	= 1.175 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.02 hrs
Time interval	= 1 min	Hyd. volume	= 8,948 cuft
Inflow hyd. No.	= 21 - PW-5A	Max. Elevation	= 128.44 ft
Reservoir name	= BASIN 3	Max. Storage	= 10,868 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



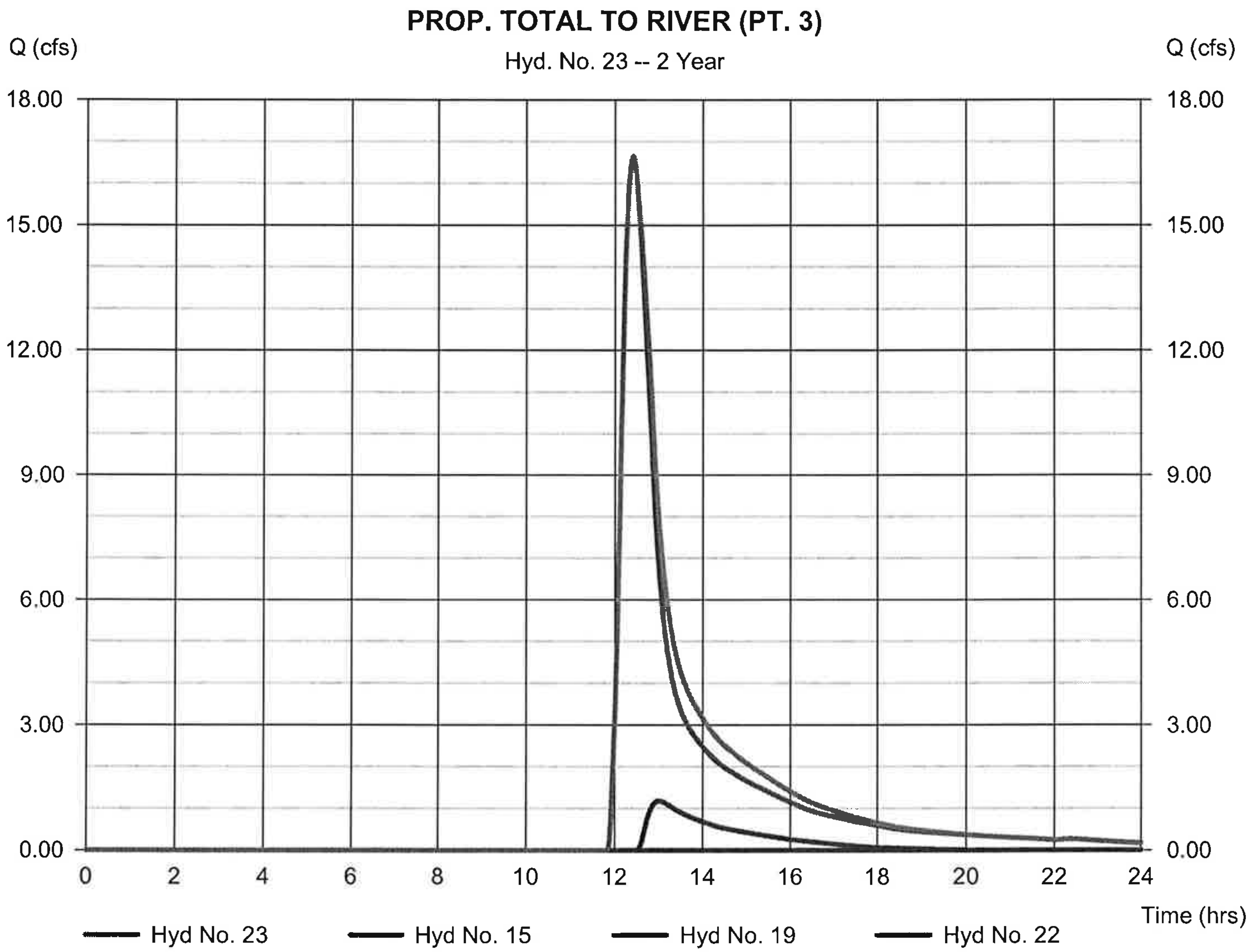
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 23

PROP. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 16.64 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 91,712 cuft
Inflow hyds.	= 15, 19, 22	Contrib. drain. area	= 0.000 ac

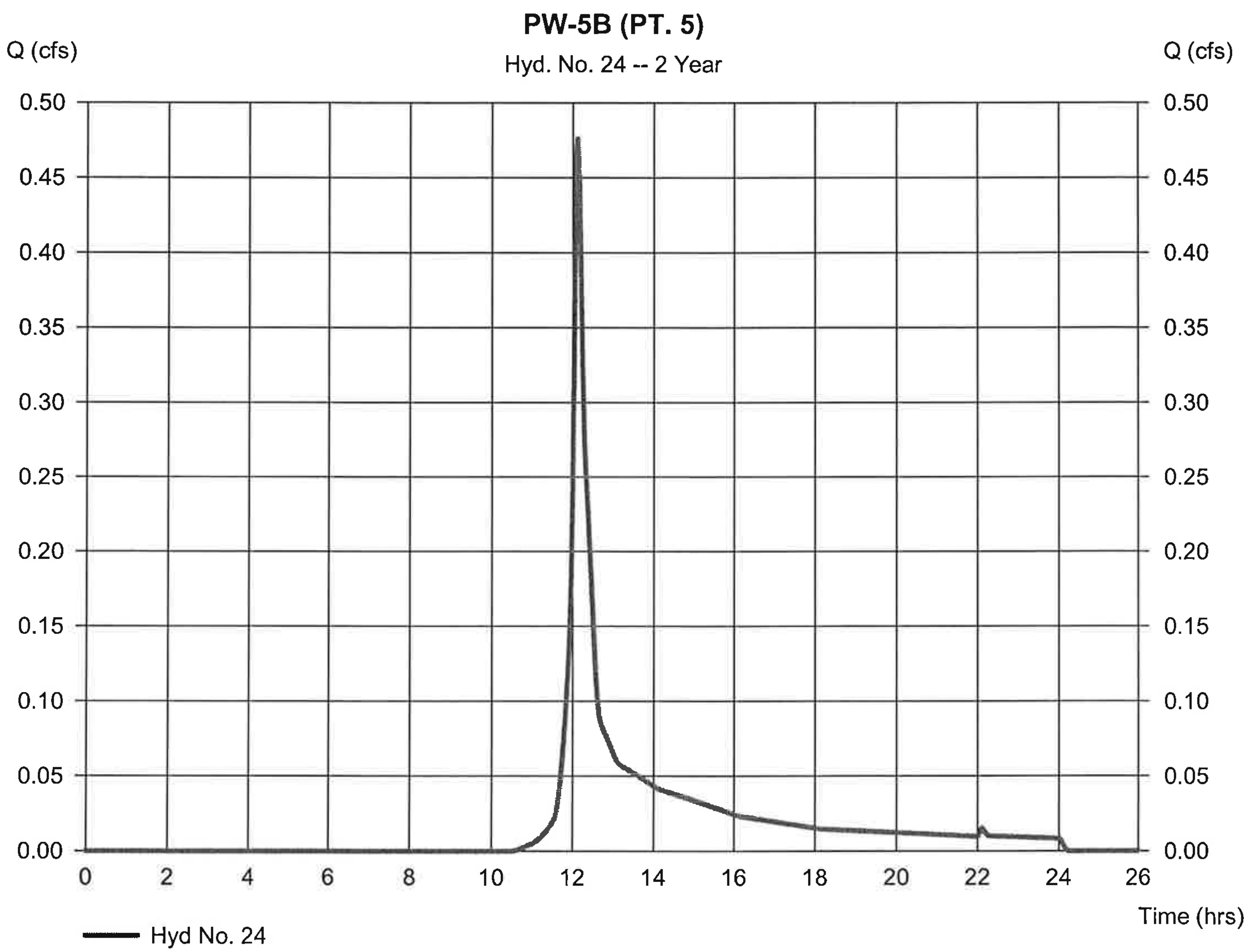


Hydrograph Report

Hyd. No. 24

PW-5B (PT. 5)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.476 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 1,715 cuft
Drainage area	= 0.460 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.01 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

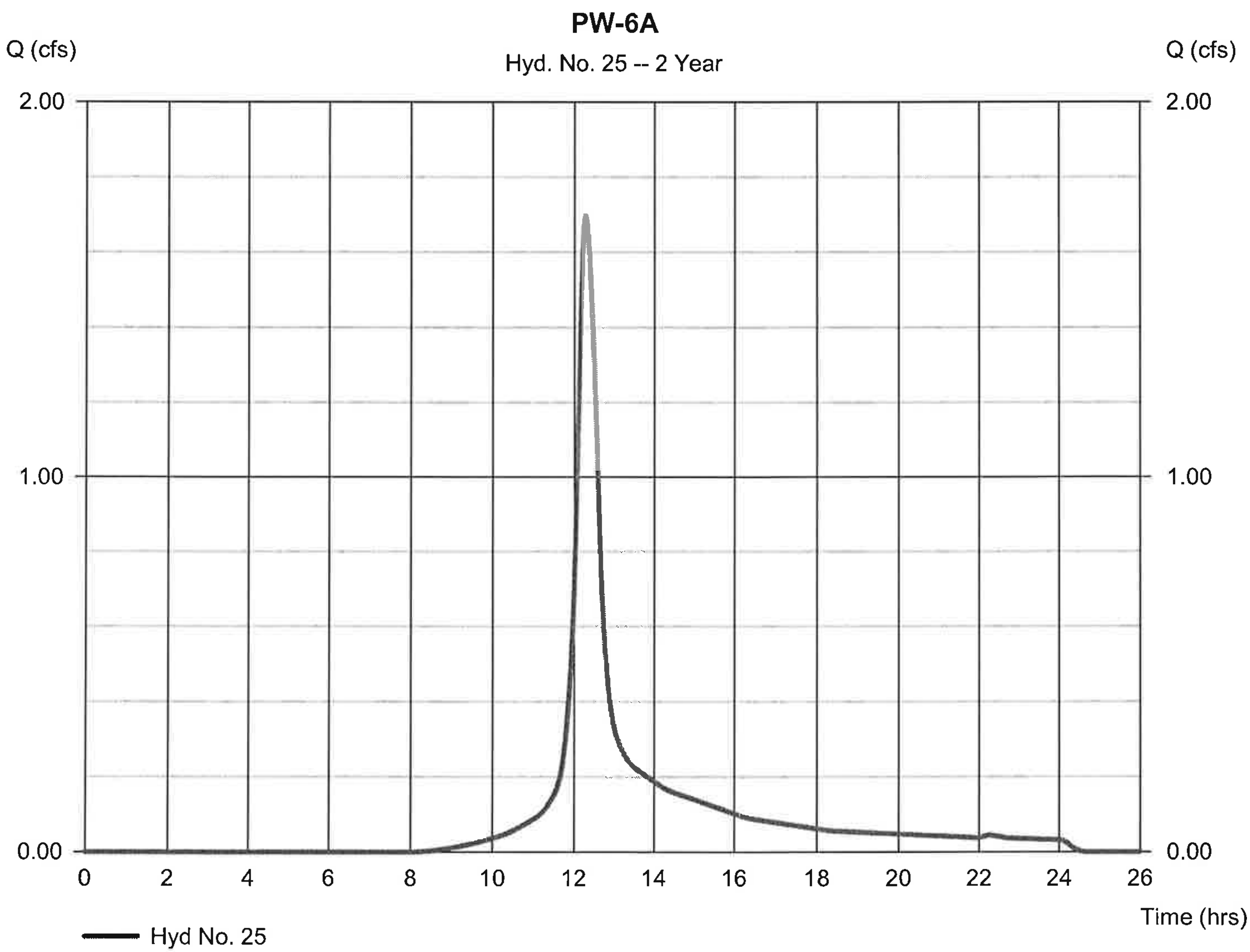
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 25

PW-6A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.697 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 8,197 cuft
Drainage area	= 1.350 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.74 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 39) + (0.650 x 98)] / 1.350



Hydrograph Report

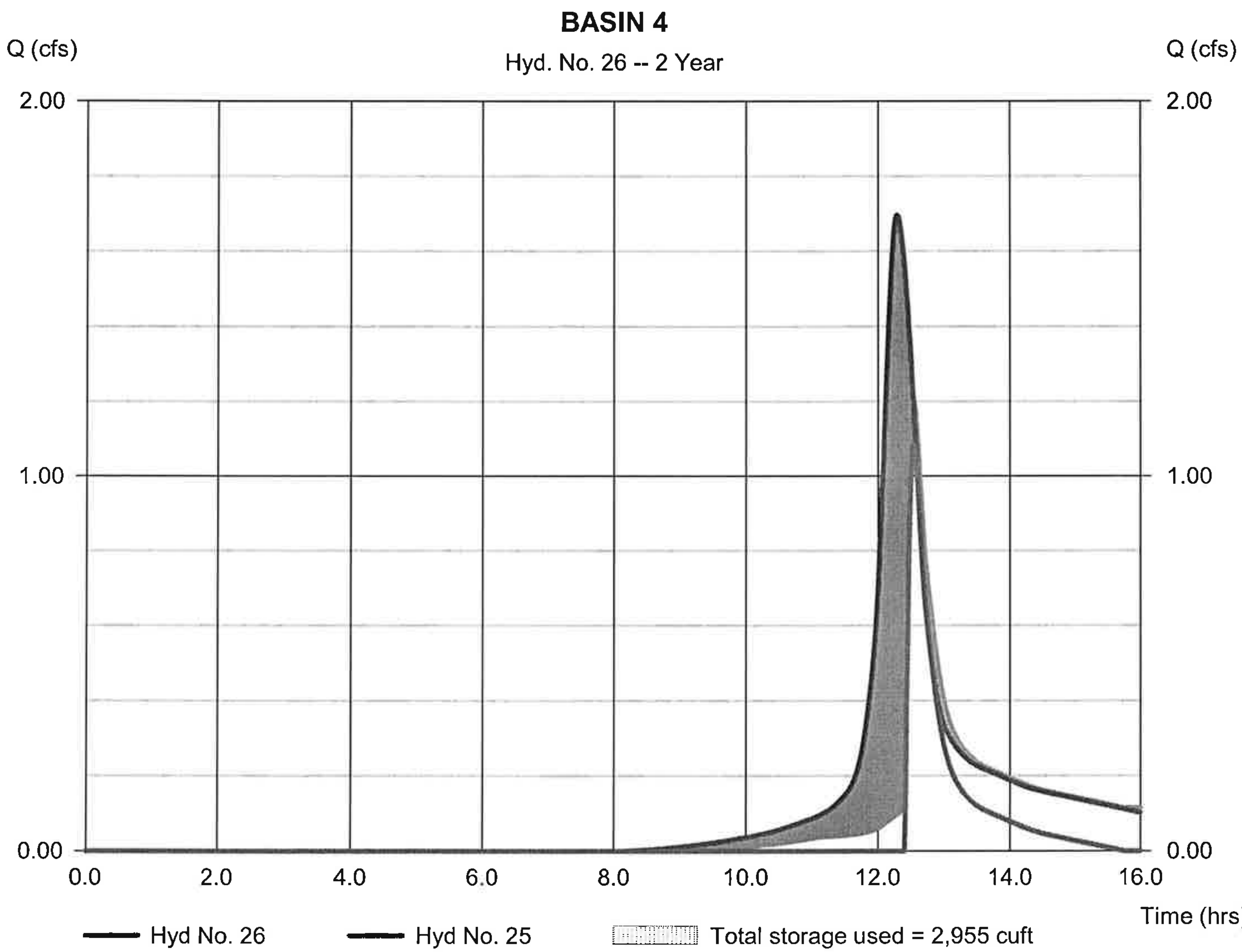
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 26

BASIN 4

Hydrograph type	= Reservoir	Peak discharge	= 1.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.53 hrs
Time interval	= 1 min	Hyd. volume	= 2,070 cuft
Inflow hyd. No.	= 25 - PW-6A	Max. Elevation	= 129.94 ft
Reservoir name	= BASIN 4	Max. Storage	= 2,955 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

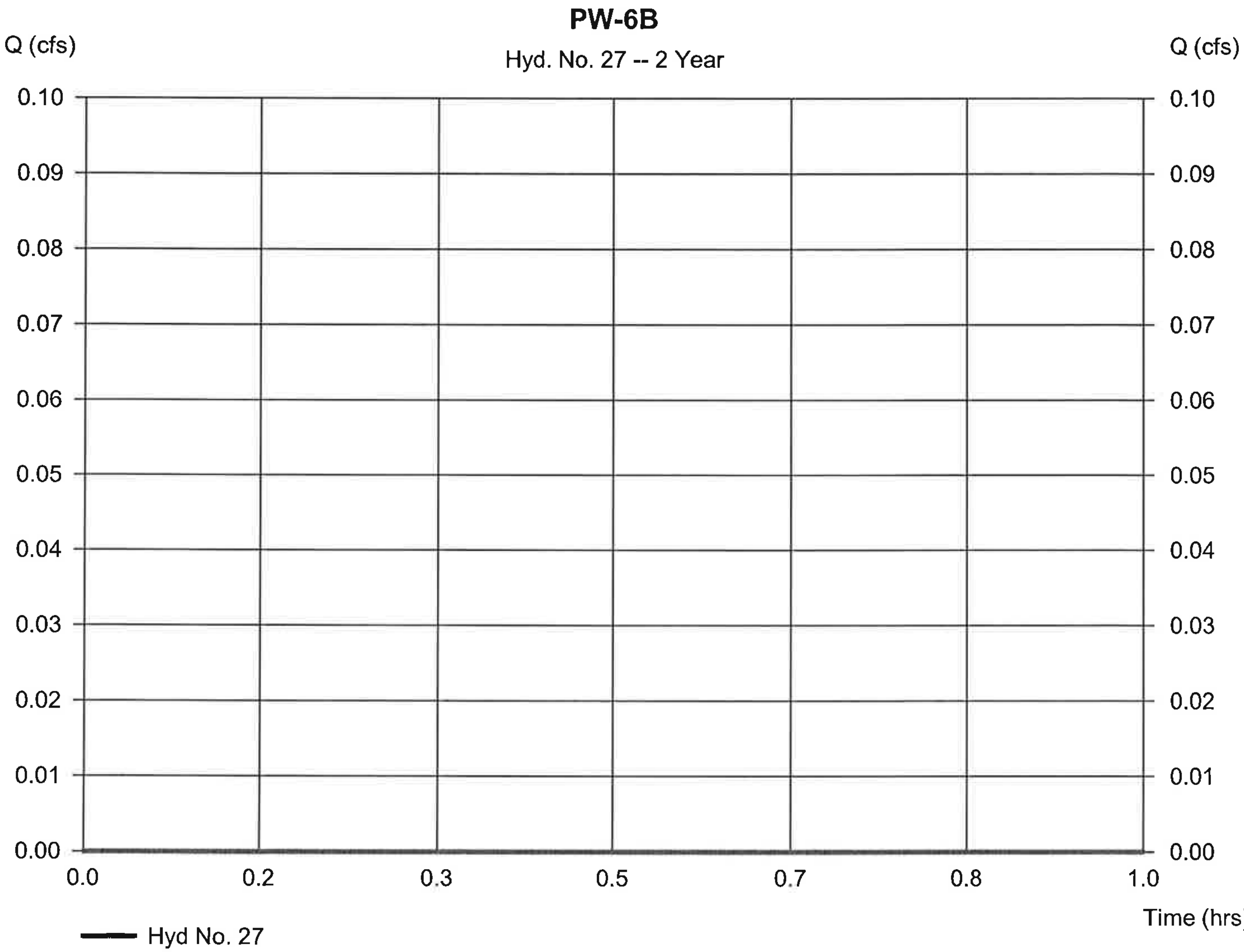
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 27

PW-6B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.600 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.610 x 39)] / 0.600



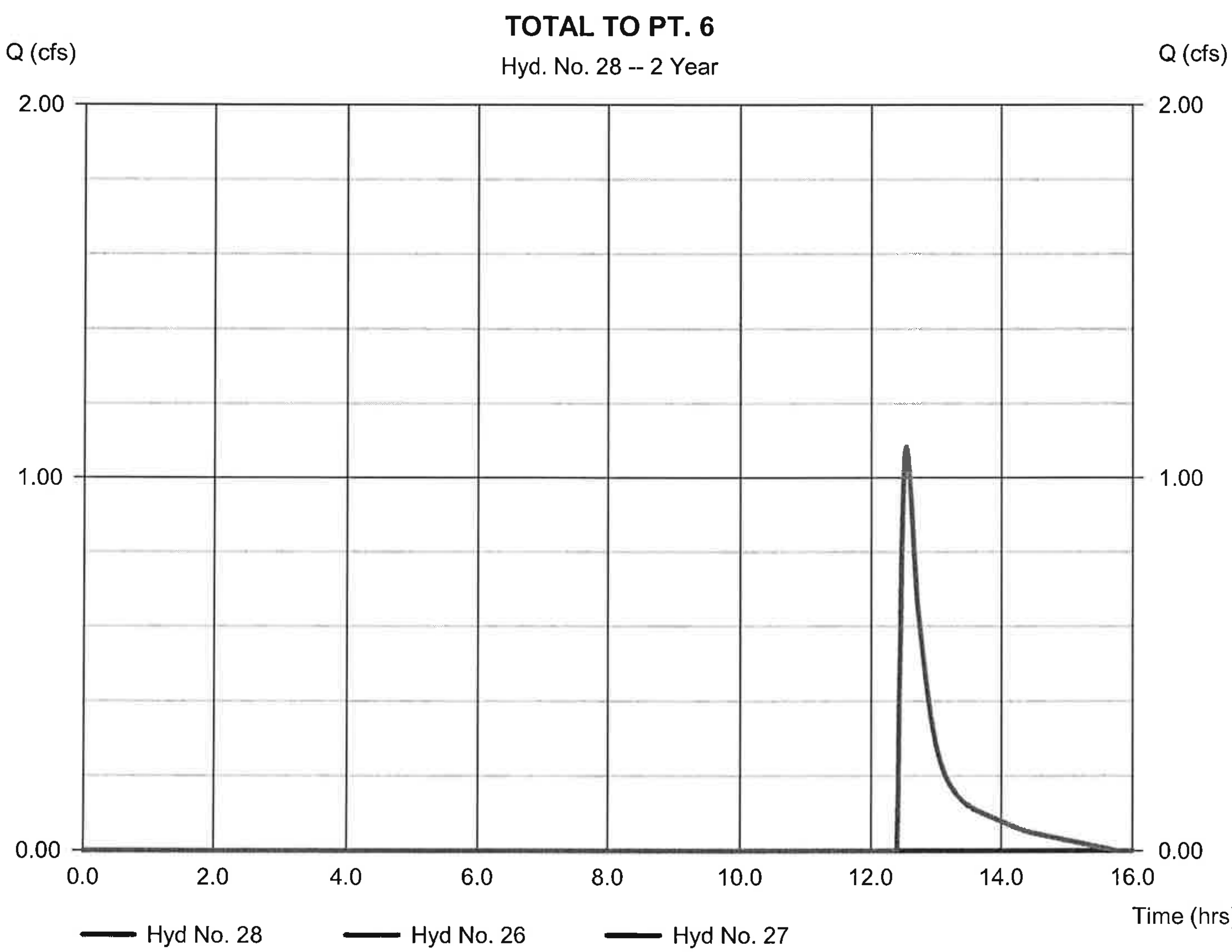
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 28

TOTAL TO PT. 6

Hydrograph type	= Combine	Peak discharge	= 1.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.53 hrs
Time interval	= 1 min	Hyd. volume	= 2,070 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.600 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	53.09	1	728	195,223	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	13.82	1	725	45,078	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	3.324	1	753	26,655	------	------	------	EW-3
4	Combine	66.75	1	727	266,955	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	2.927	1	729	11,135	------	------	------	EW-4
6	Reservoir	0.000	1	732	0	5	119.19	5,096	EXIST. BASIN (PT. 4)
7	SCS Runoff	0.630	1	746	6,040	------	------	------	EW-5A
8	SCS Runoff	0.762	1	743	5,544	------	------	------	E-5B
9	Combine	1.385	1	745	11,584	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	3.951	1	722	10,914	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	45.30	1	732	192,400	------	------	------	PW-1A
12	SCS Runoff	4.338	1	725	13,432	------	------	------	PW-1B
13	Reservoir	0.842	1	748	3,749	12	127.41	5,189	WATER QUALITY SWALE
14	Combine	45.70	1	732	196,149	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	34.19	1	742	167,881	14	121.92	40,295	BASIN 2
16	Diversion1	0.820	1	742	19,625	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	33.37	1	742	148,255	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	0.499	1	755	3,761	------	------	------	PW-2
19	Reservoir	0.000	1	774	0	18	118.36	1,341	BASIN 1 (PT.2)
20	SCS Runoff	1.274	1	748	10,882	------	------	------	PW-3
21	SCS Runoff	12.06	1	741	62,928	------	------	------	PW-5A
22	Reservoir	7.915	1	757	38,755	21	129.25	17,002	BASIN 3
23	Combine	39.25	1	744	206,636	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	0.993	1	727	3,424	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	2.941	1	737	14,256	------	------	------	PW-6A
26	Reservoir	2.731	1	740	6,961	25	130.06	3,214	BASIN 4
27	SCS Runoff	0.009	1	881	248	------	------	------	PW-6B
28	Combine	2.731	1	740	7,210	26, 27	------	------	TOTAL TO PT. 6

Hydro_SPR_REV.gpw	Return Period: 10 Year	Tuesday, Jun 3, 2008

Hydrograph Report

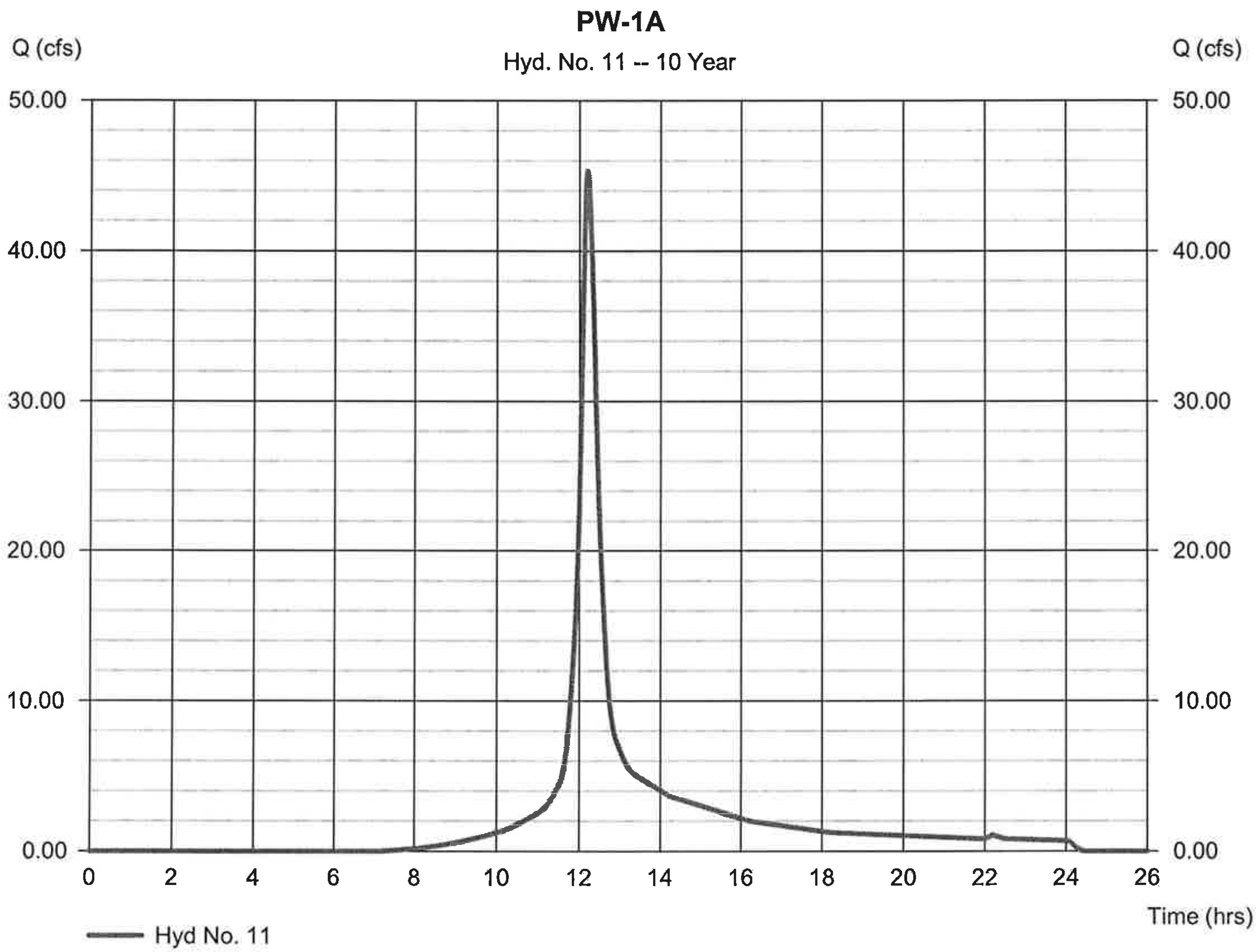
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 11

PW-1A

Hydrograph type	= SCS Runoff	Peak discharge	= 45.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 192,400 cuft
Drainage area	= 19.670 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.50 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.300 x 98) + (5.150 x 39)] / 19.670



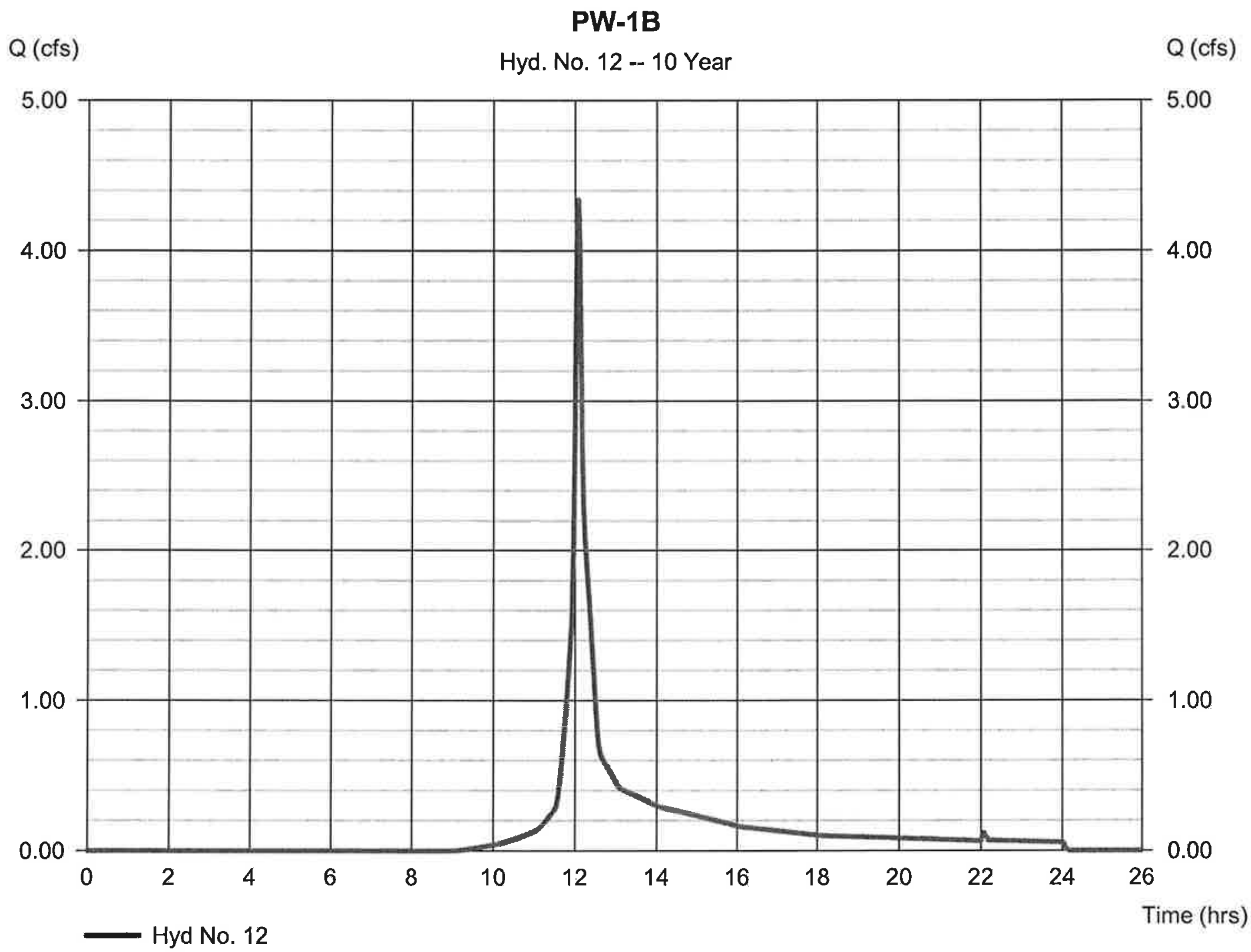
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 12

PW-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 4.338 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 13,432 cuft
Drainage area	= 1.750 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

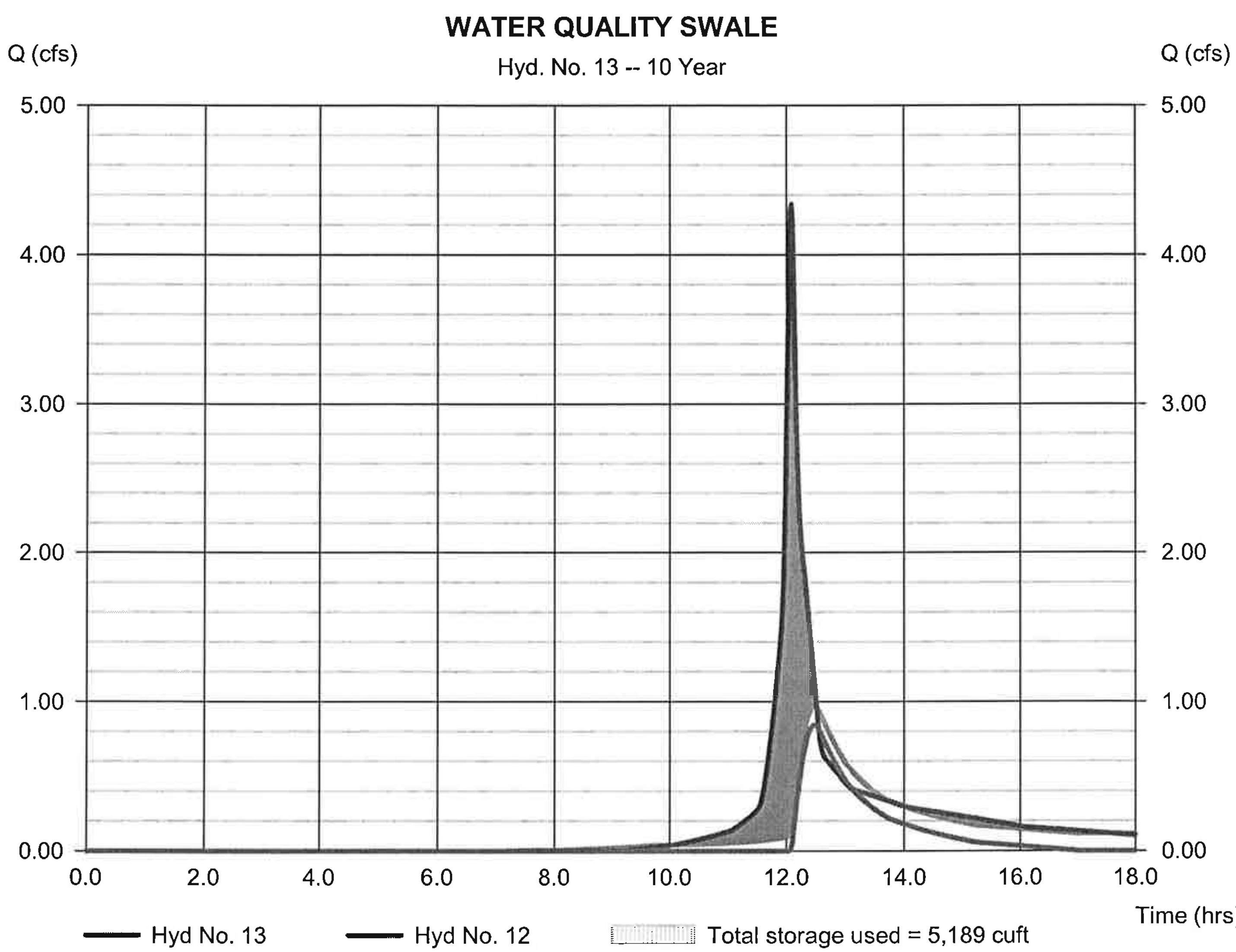
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 13

WATER QUALITY SWALE

Hydrograph type	= Reservoir	Peak discharge	= 0.842 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.47 hrs
Time interval	= 1 min	Hyd. volume	= 3,749 cuft
Inflow hyd. No.	= 12 - PW-1B	Max. Elevation	= 127.41 ft
Reservoir name	= WATER QUALITY SWALE	Max. Storage	= 5,189 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

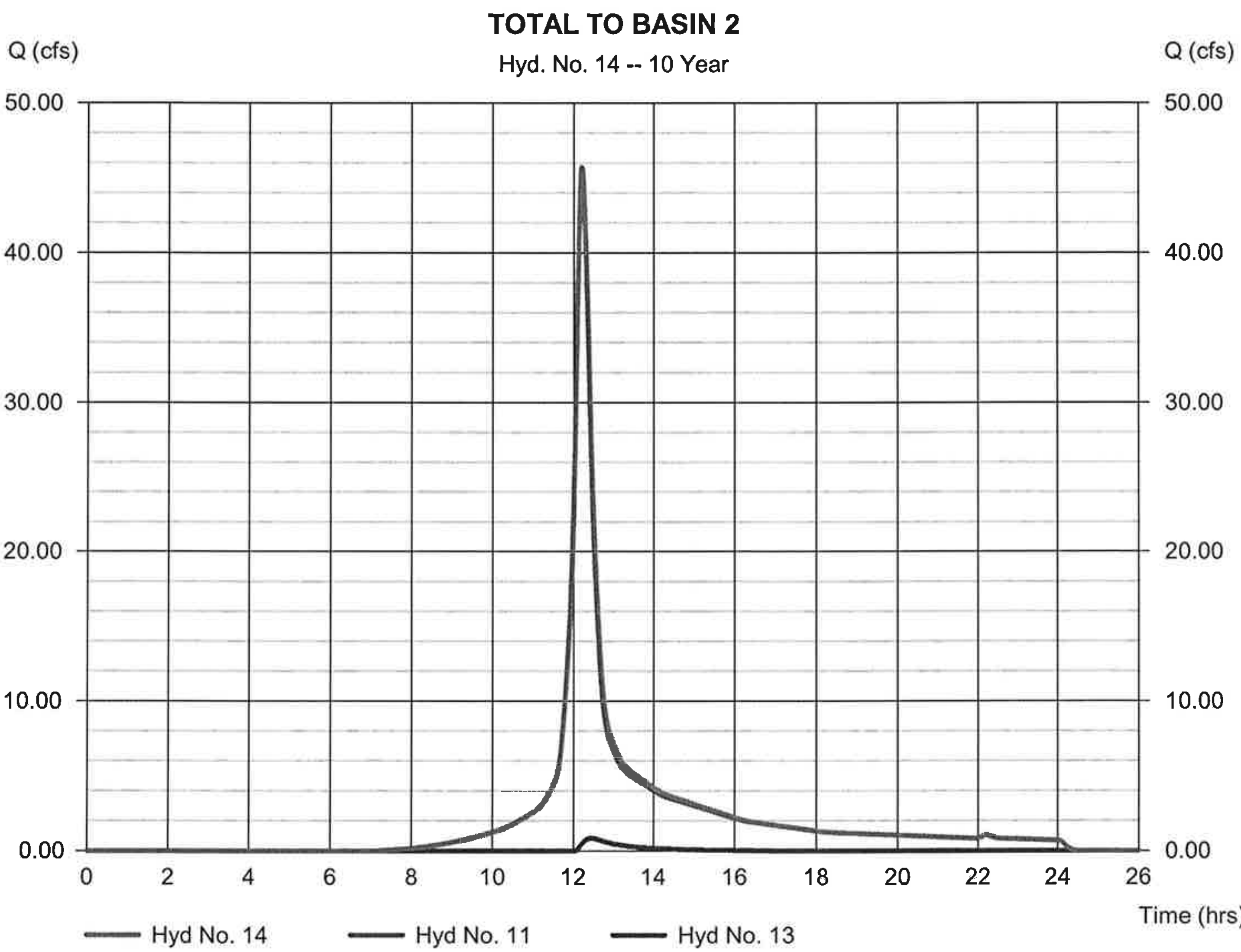


Hydrograph Report

Hyd. No. 14

TOTAL TO BASIN 2

Hydrograph type	= Combine	Peak discharge	= 45.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 196,149 cuft
Inflow hyds.	= 11, 13	Contrib. drain. area	= 19.670 ac



Hydrograph Report

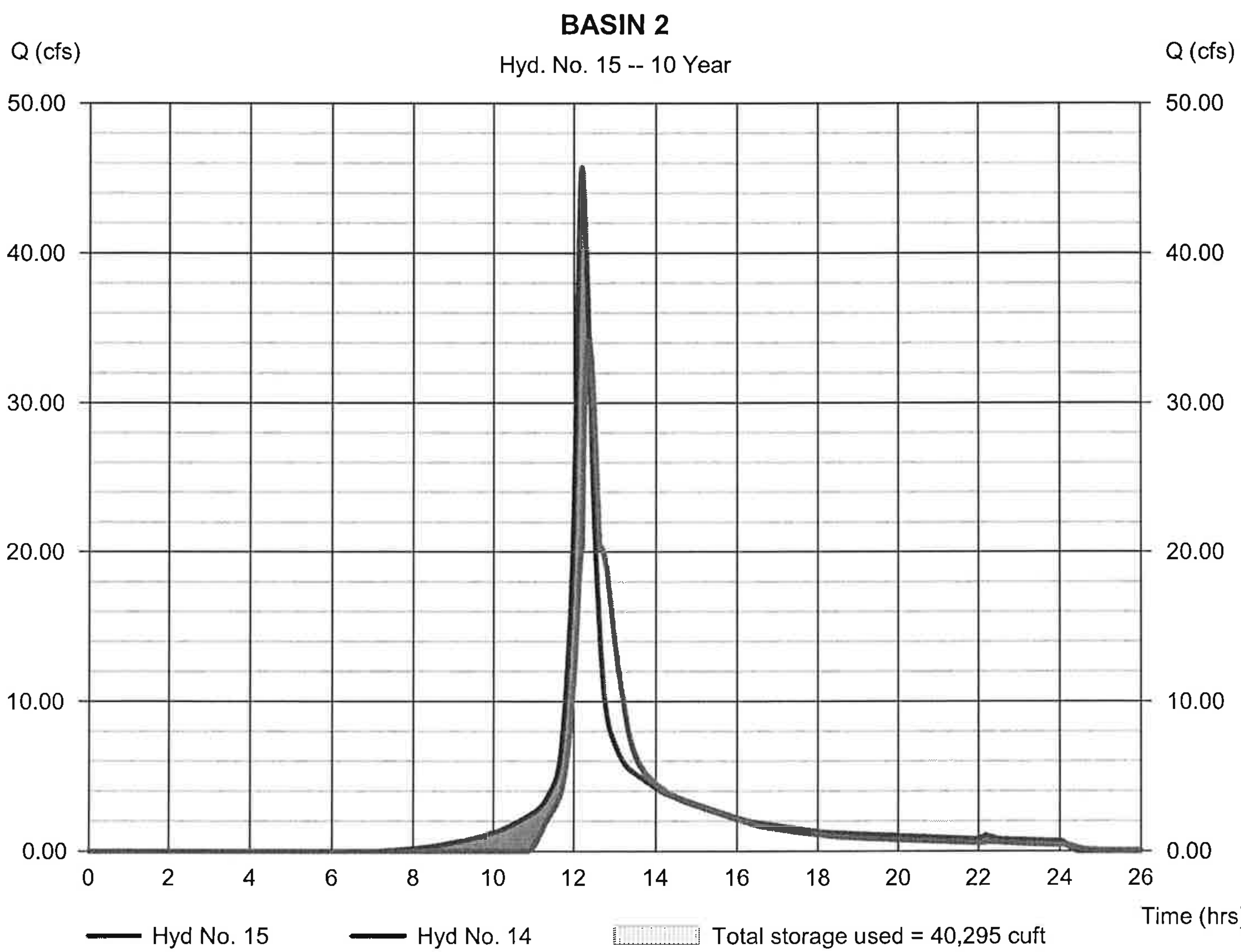
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 15

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 34.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.37 hrs
Time interval	= 1 min	Hyd. volume	= 167,881 cuft
Inflow hyd. No.	= 14 - TOTAL TO BASIN 2	Max. Elevation	= 121.92 ft
Reservoir name	= BASIN 2	Max. Storage	= 40,295 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



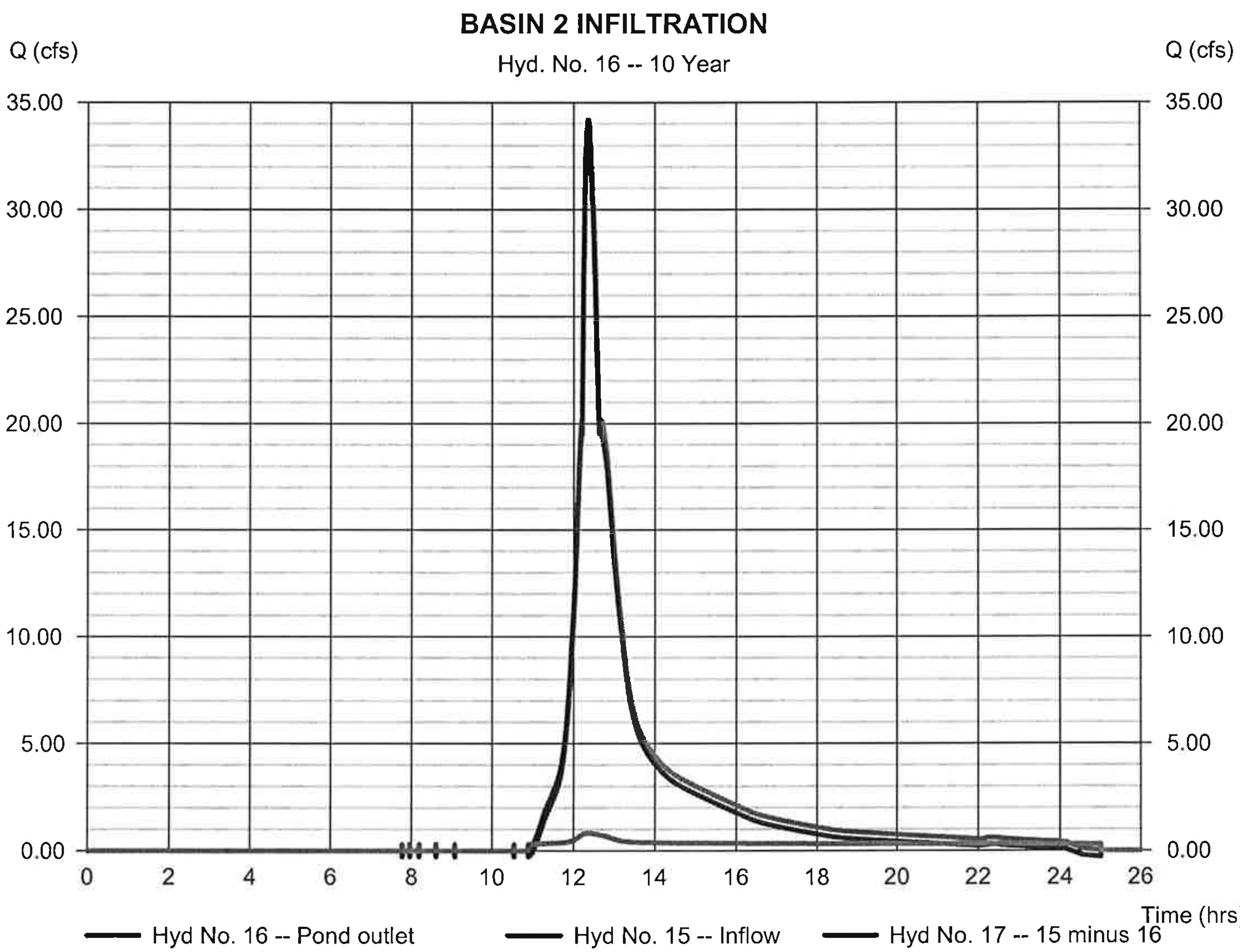
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 16

BASIN 2 INFILTRATION

Hydrograph type	= Diversion1	Peak discharge	= 0.820 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.37 hrs
Time interval	= 1 min	Hyd. volume	= 19,625 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 17
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



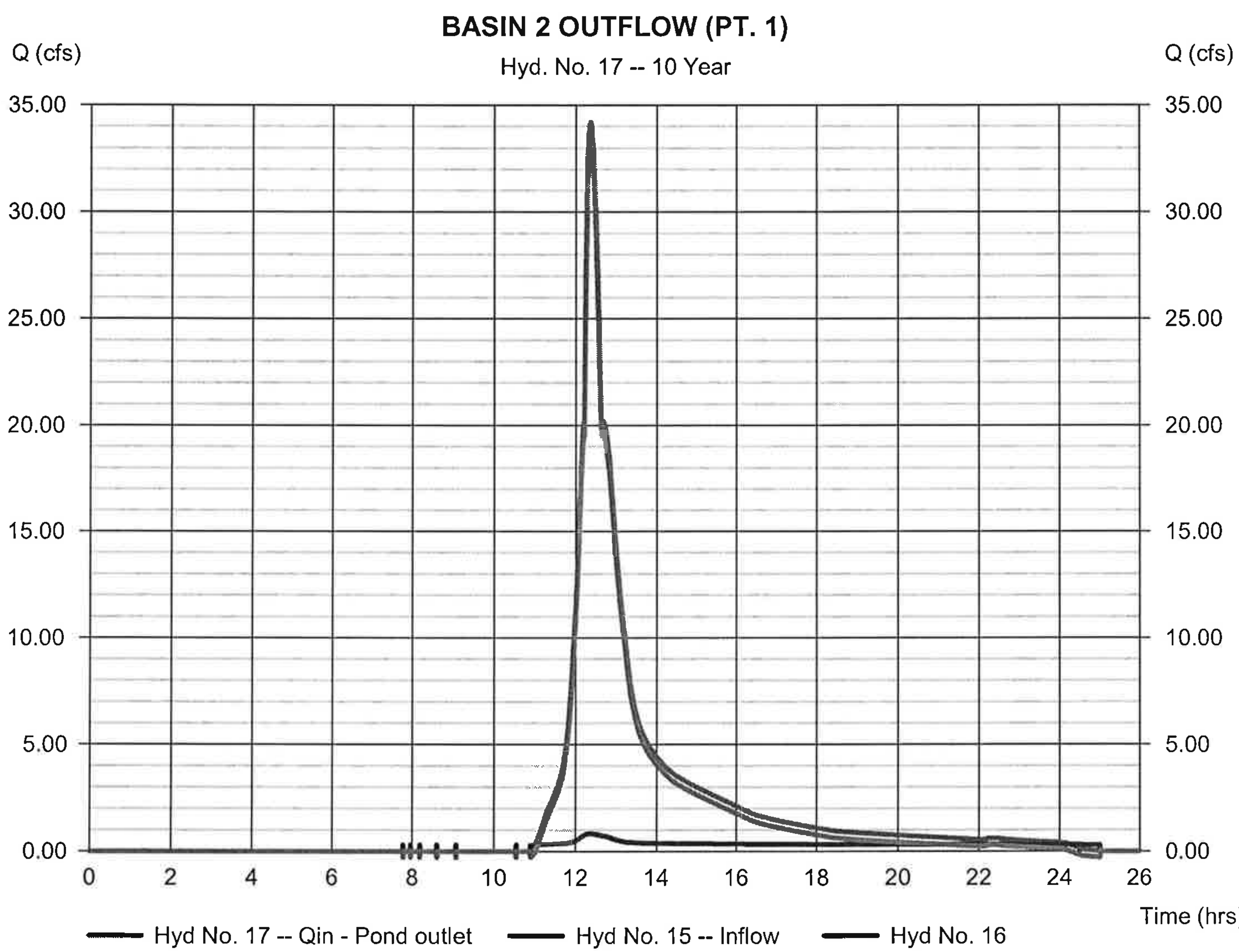
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 17

BASIN 2 OUTFLOW (PT. 1)

Hydrograph type	= Diversion2	Peak discharge	= 33.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.37 hrs
Time interval	= 1 min	Hyd. volume	= 148,255 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 16
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



Hydrograph Report

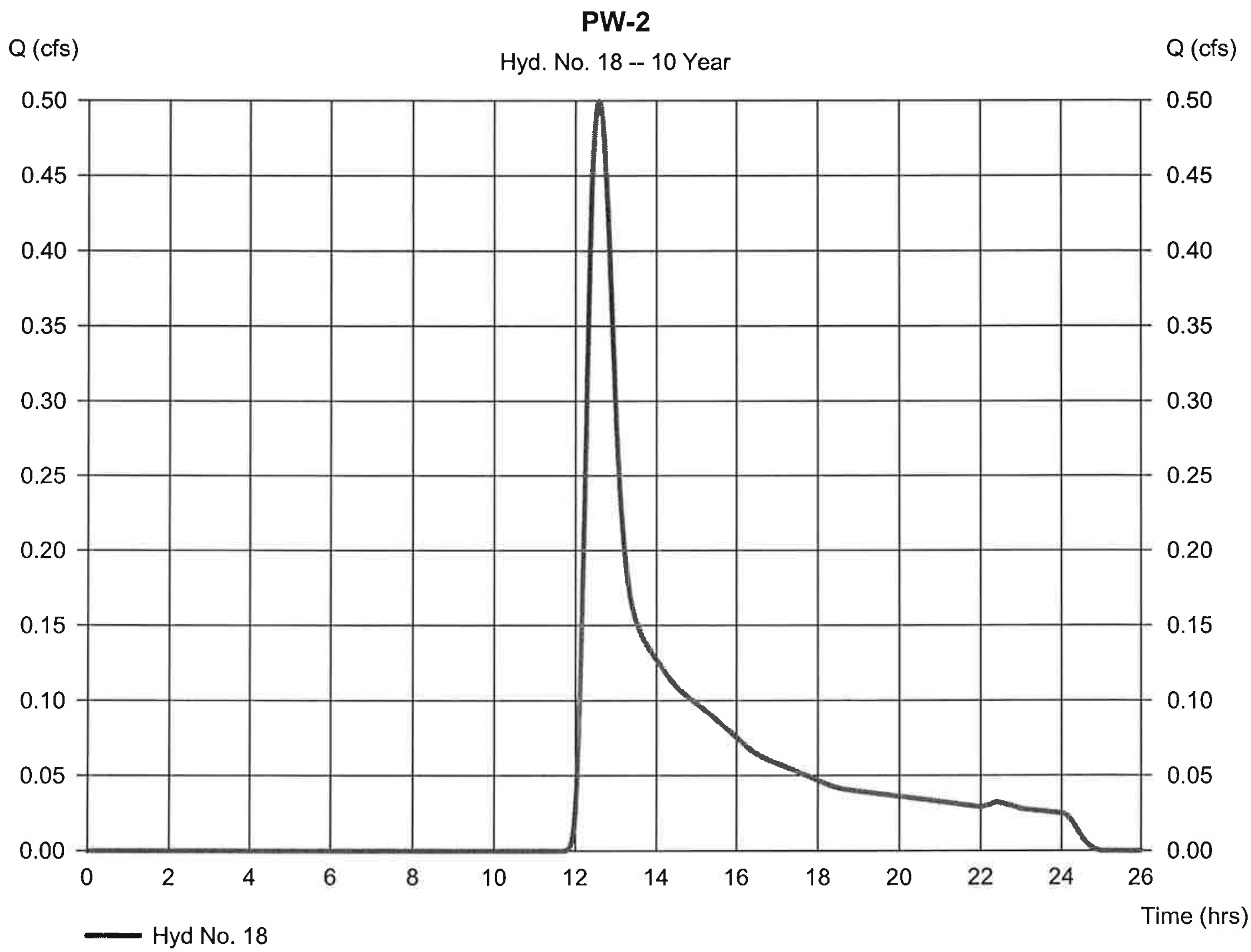
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 18

PW-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.499 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.58 hrs
Time interval	= 1 min	Hyd. volume	= 3,761 cuft
Drainage area	= 1.310 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.52 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.230 x 98) + (0.300 x 39)] / 1.310



Hydrograph Report

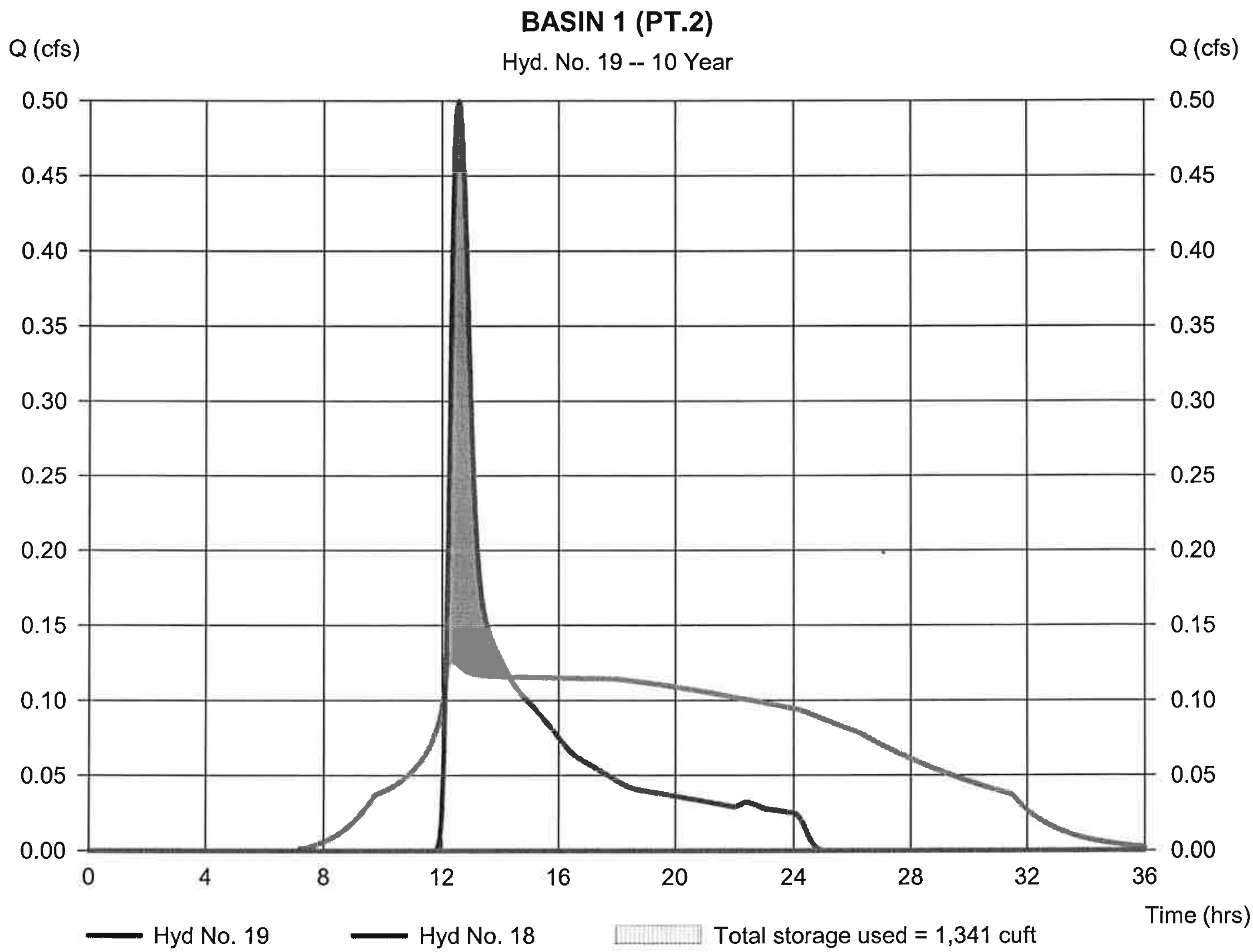
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 19

BASIN 1 (PT.2)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.90 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - PW-2	Max. Elevation	= 118.36 ft
Reservoir name	= UPGRADED BASIN	Max. Storage	= 1,341 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



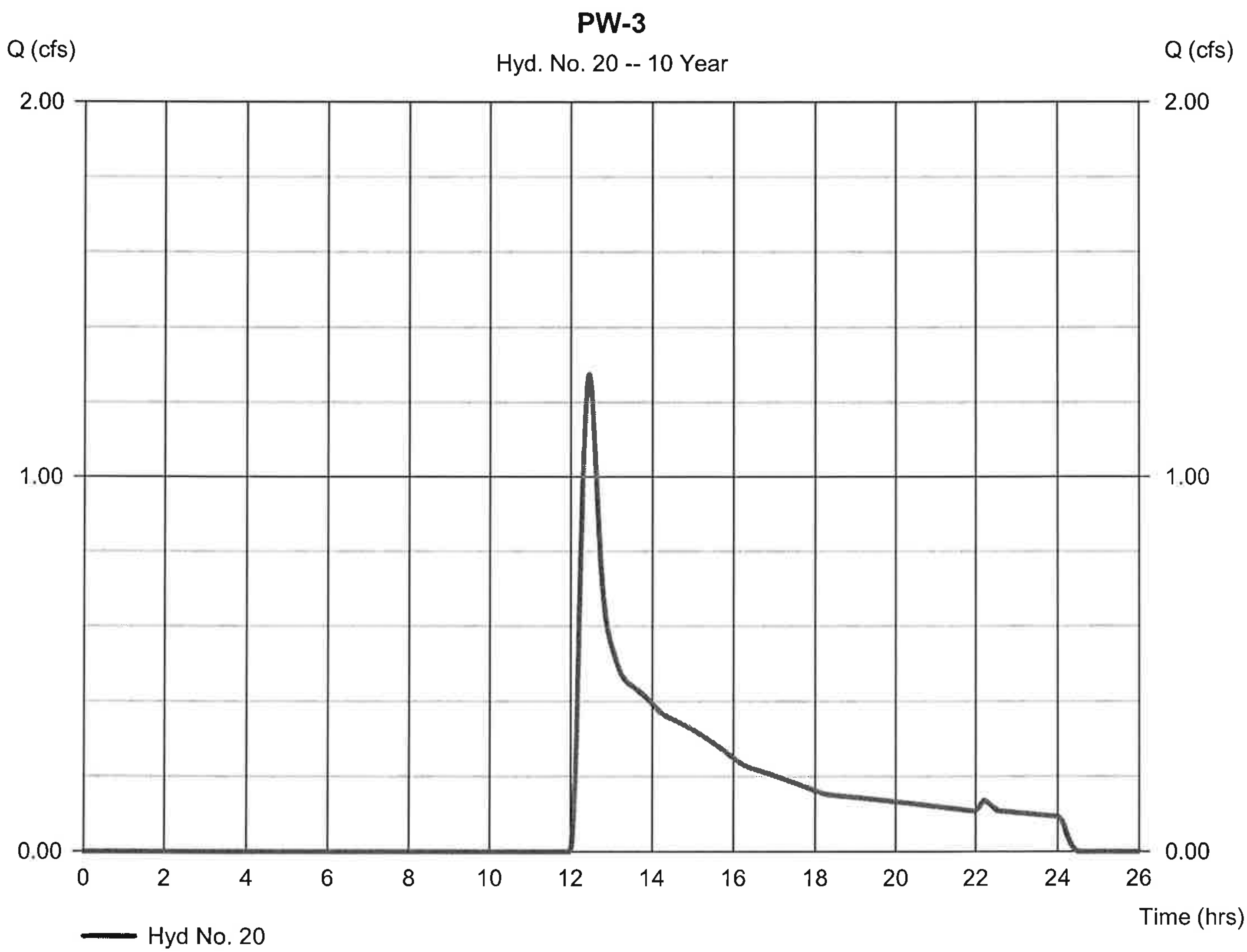
Hydrograph Report

Hyd. No. 20

PW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.274 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.47 hrs
Time interval	= 1 min	Hyd. volume	= 10,882 cuft
Drainage area	= 7.250 ac	Curve number	= 48*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.81 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.240 x 39)] / 7.250



Hydrograph Report

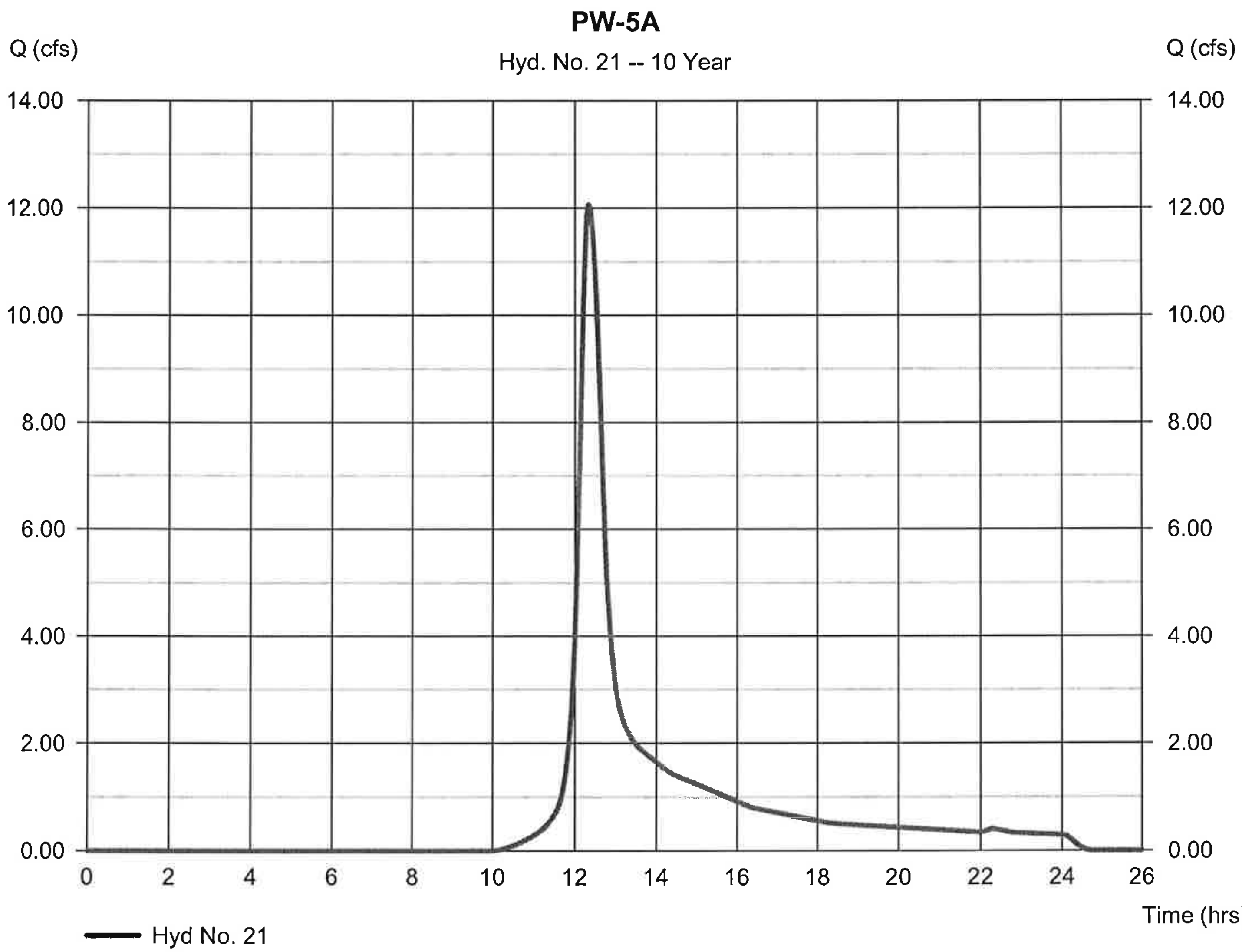
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 21

PW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 12.06 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 62,928 cuft
Drainage area	= 10.000 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.26 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (3.950 x 39)] / 10.000



Hydrograph Report

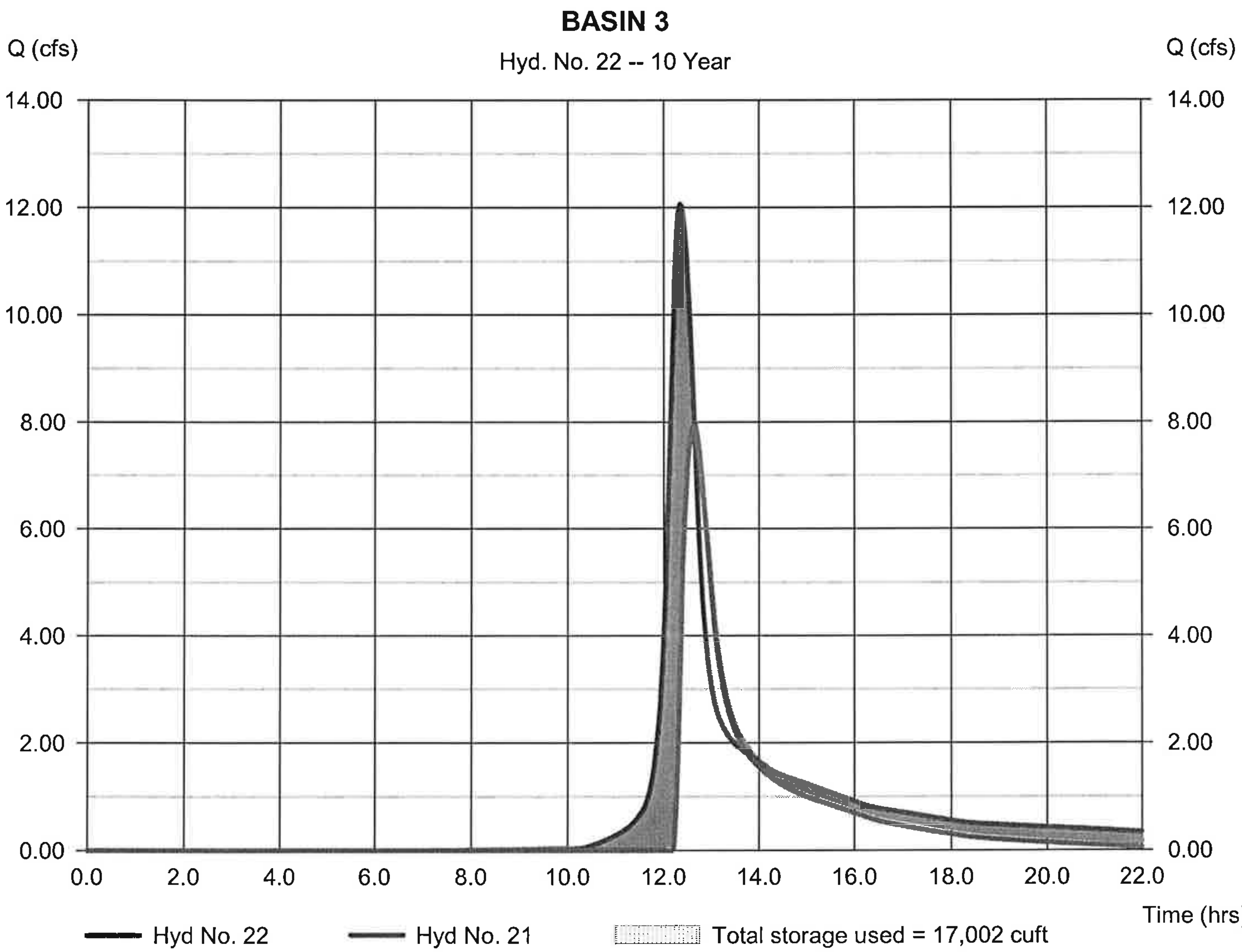
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 22

BASIN 3

Hydrograph type	= Reservoir	Peak discharge	= 7.915 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.62 hrs
Time interval	= 1 min	Hyd. volume	= 38,755 cuft
Inflow hyd. No.	= 21 - PW-5A	Max. Elevation	= 129.25 ft
Reservoir name	= BASIN 3	Max. Storage	= 17,002 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



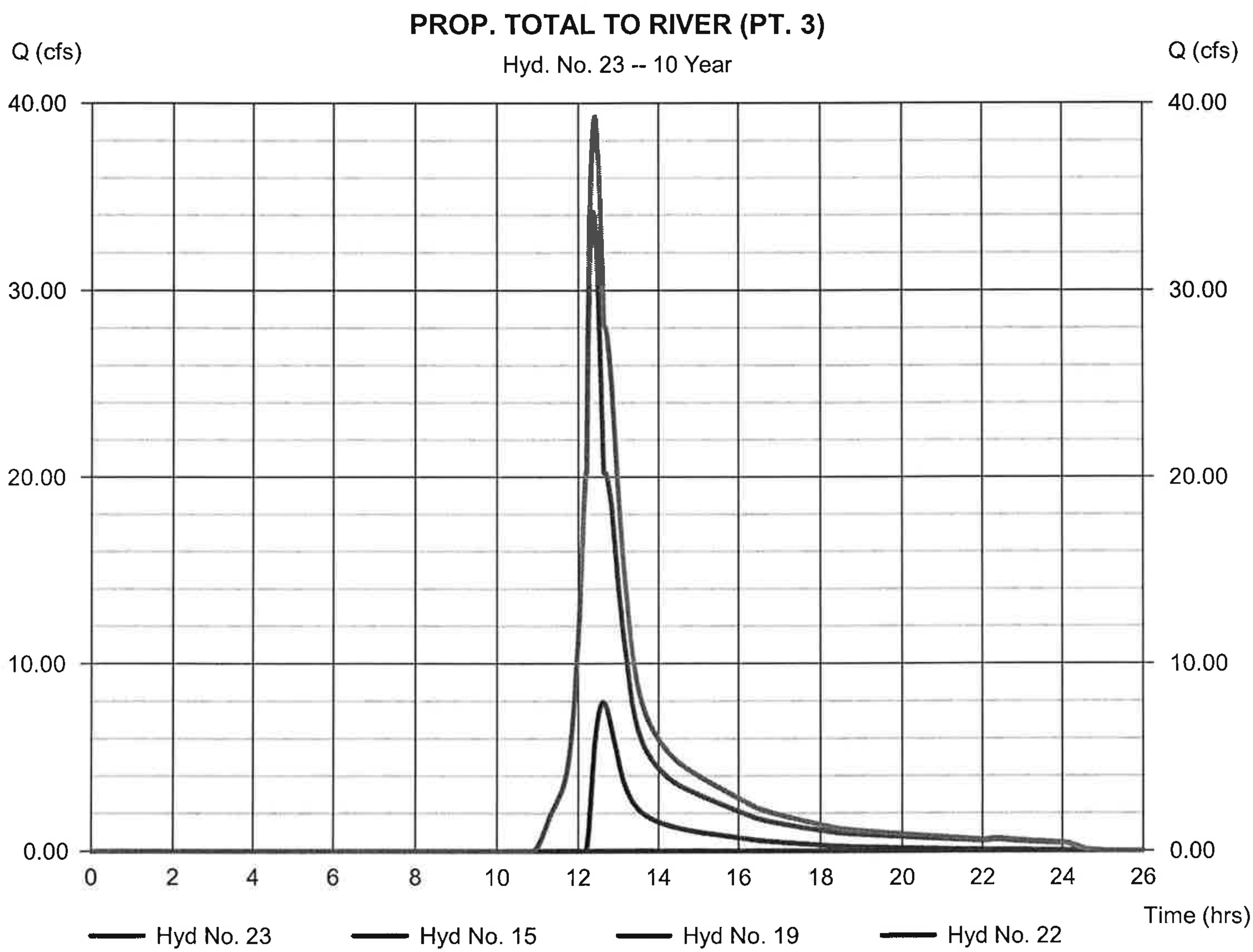
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 23

PROP. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 39.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.40 hrs
Time interval	= 1 min	Hyd. volume	= 206,636 cuft
Inflow hyds.	= 15, 19, 22	Contrib. drain. area	= 0.000 ac



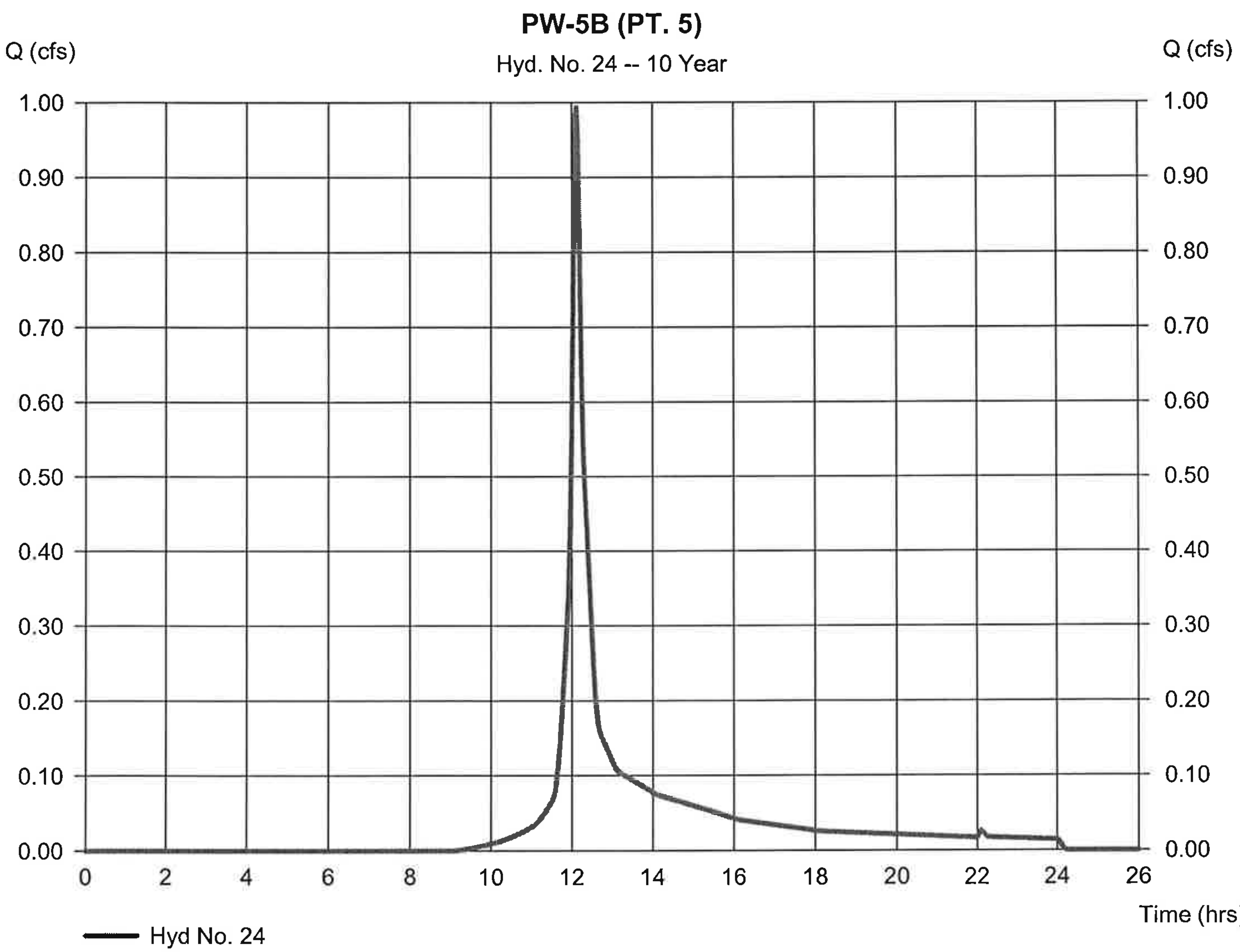
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 24

PW-5B (PT. 5)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.993 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 3,424 cuft
Drainage area	= 0.460 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.01 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

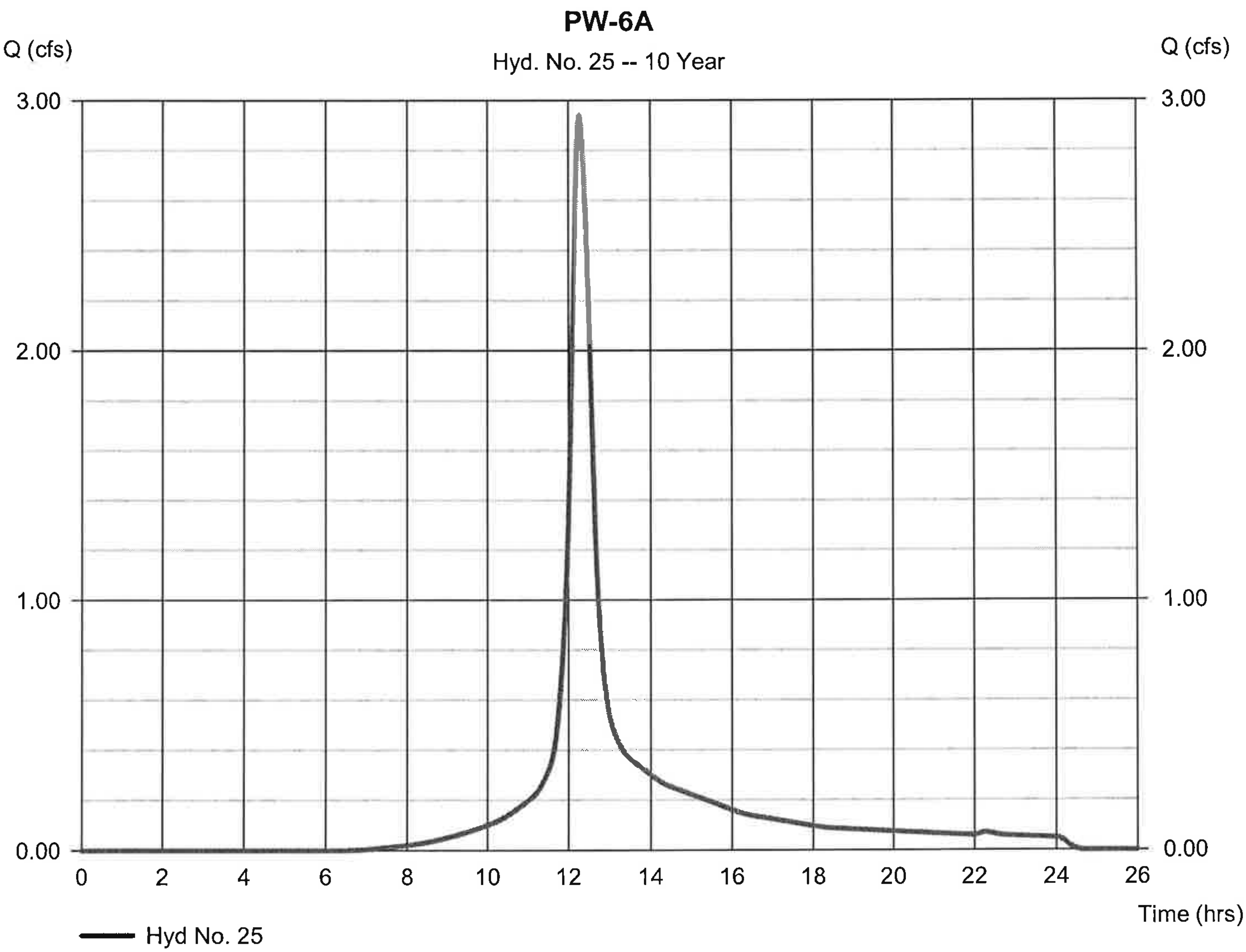
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 25

PW-6A

Hydrograph type	= SCS Runoff	Peak discharge	= 2.941 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 14,256 cuft
Drainage area	= 1.350 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.74 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 39) + (0.650 x 98)] / 1.350



Hydrograph Report

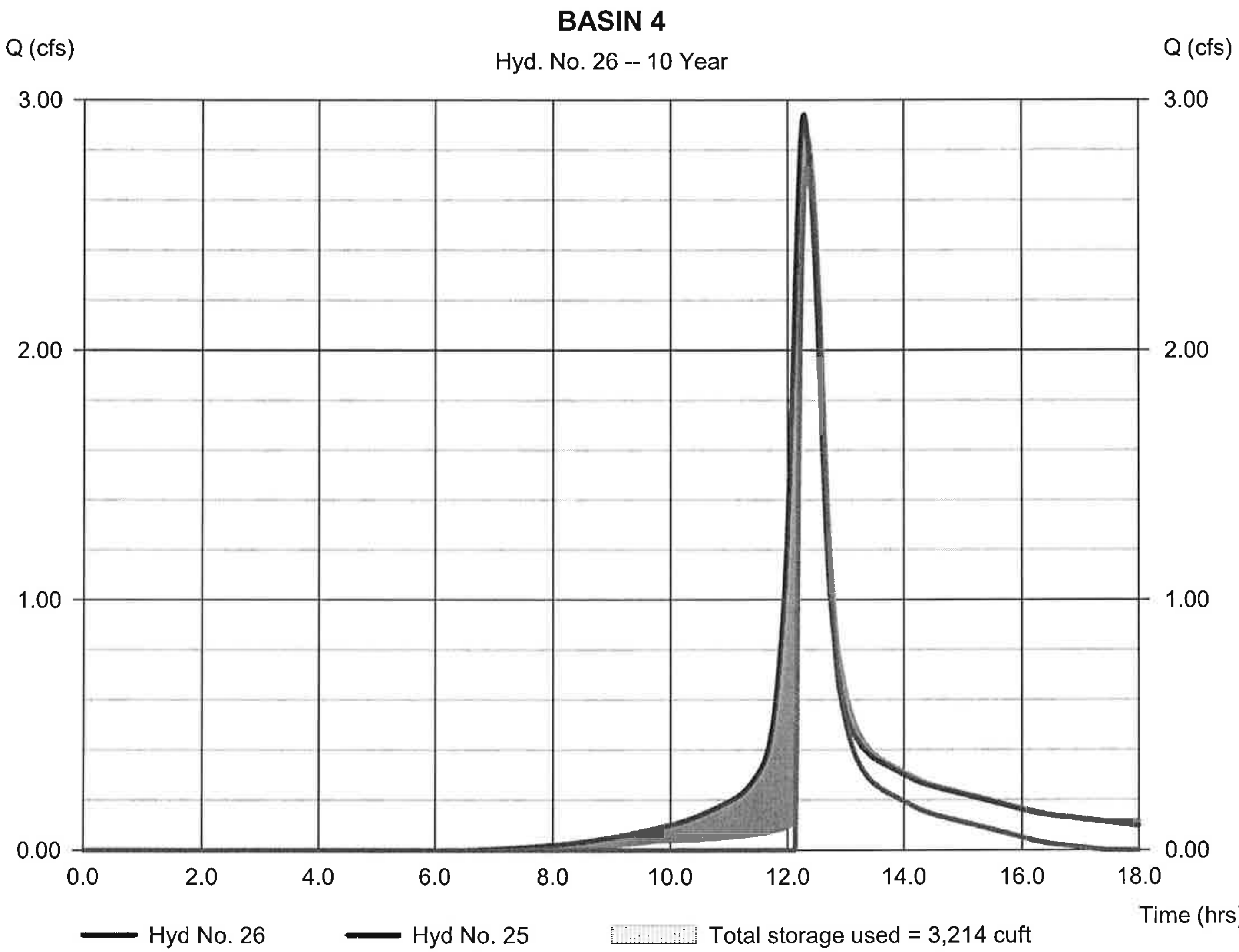
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 26

BASIN 4

Hydrograph type	= Reservoir	Peak discharge	= 2.731 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 6,961 cuft
Inflow hyd. No.	= 25 - PW-6A	Max. Elevation	= 130.06 ft
Reservoir name	= BASIN 4	Max. Storage	= 3,214 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

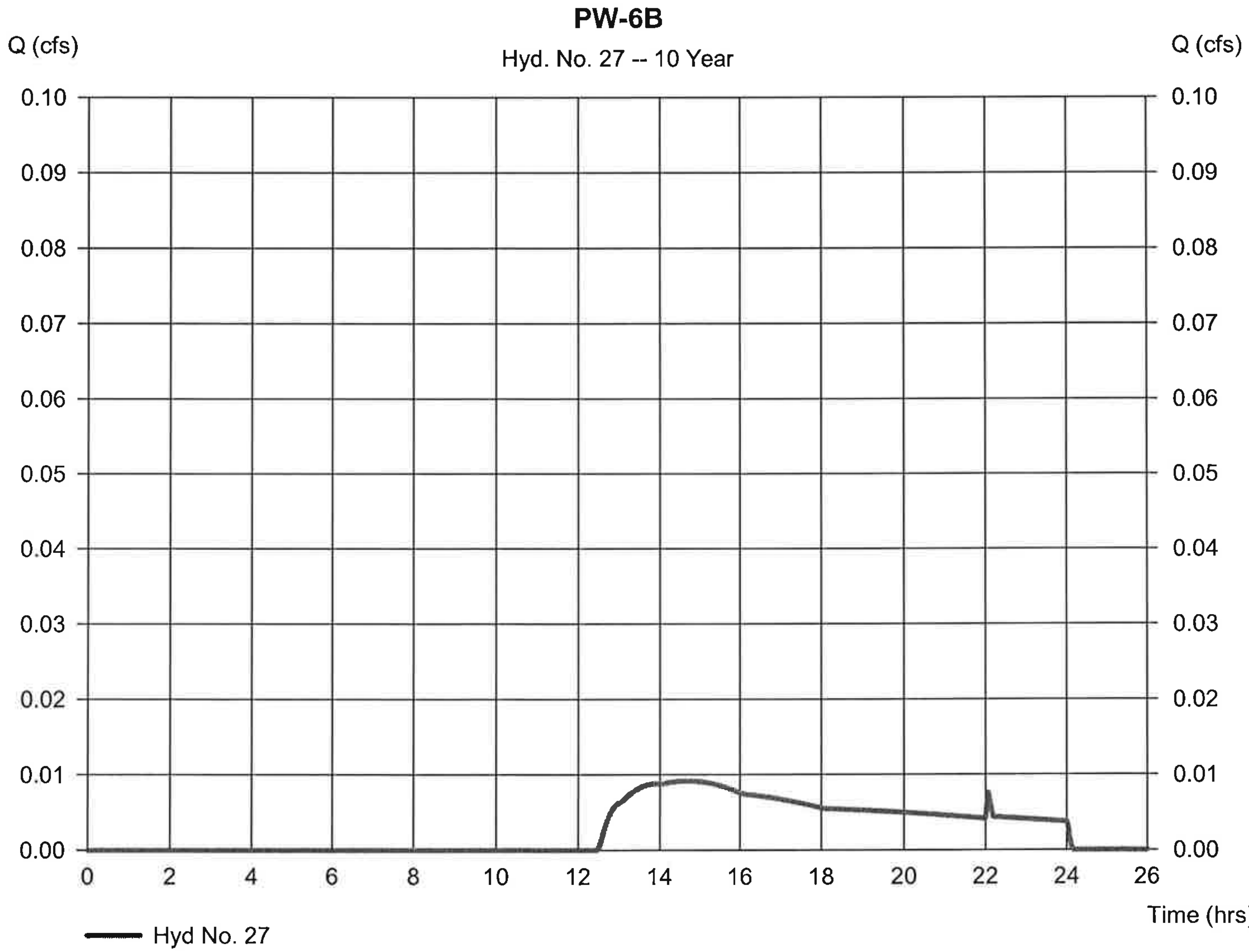
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 27

PW-6B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.68 hrs
Time interval	= 1 min	Hyd. volume	= 248 cuft
Drainage area	= 0.600 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.610 x 39)] / 0.600

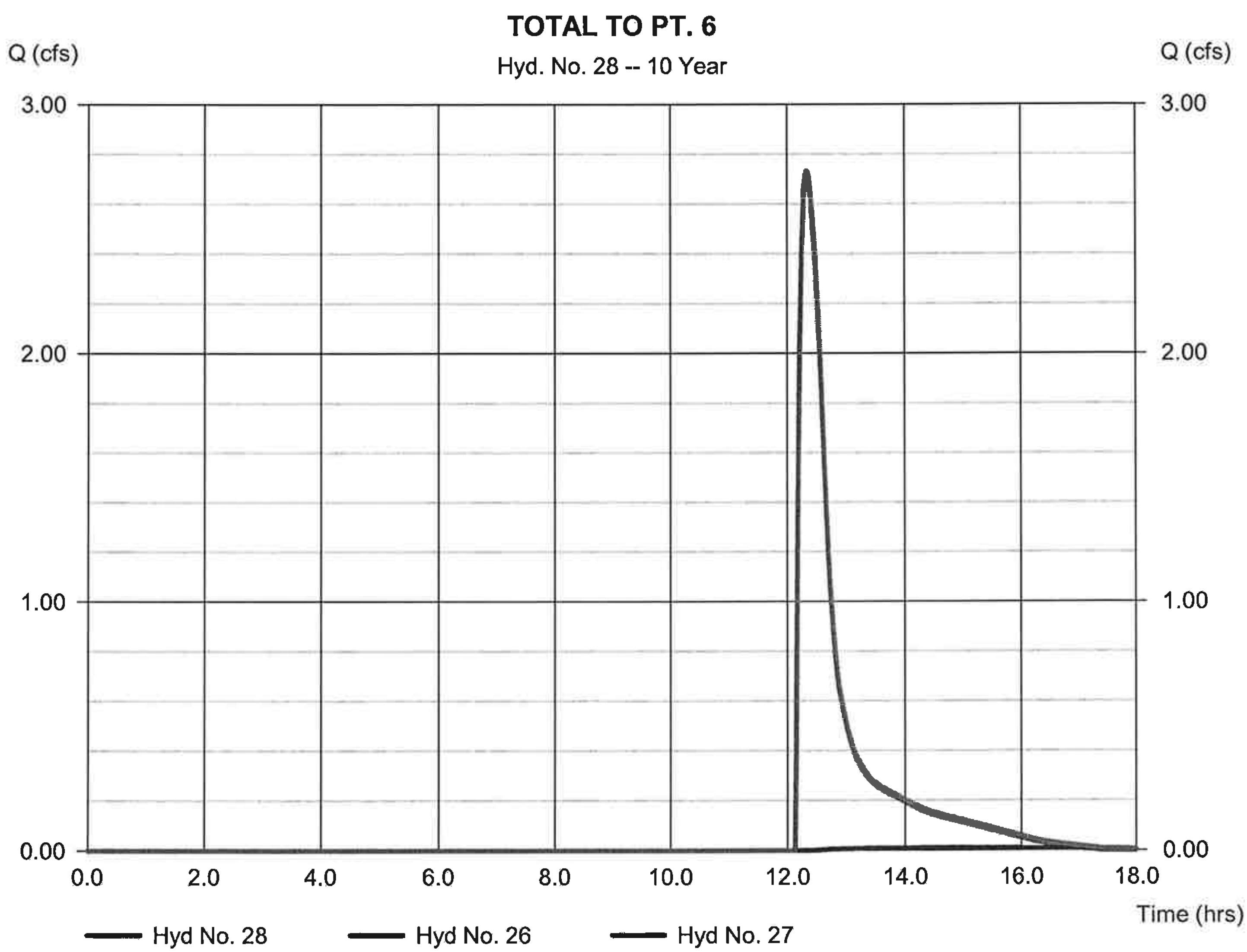


Hydrograph Report

Hyd. No. 28

TOTAL TO PT. 6

Hydrograph type	= Combine	Peak discharge	= 2.731 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 7,210 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.600 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	91.48	1	728	345,180	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	23.83	1	725	79,704	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	13.92	1	746	83,057	------	------	------	EW-3
4	Combine	120.33	1	727	507,942	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	6.070	1	729	22,821	------	------	------	EW-4
6	Reservoir	0.000	1	768	0	5	120.10	12,018	EXIST. BASIN (PT. 4)
7	SCS Runoff	4.778	1	733	23,917	------	------	------	EW-5A
8	SCS Runoff	3.796	1	735	18,482	------	------	------	E-5B
9	Combine	8.554	1	734	42,399	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	10.68	1	721	27,323	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	82.29	1	732	354,916	------	------	------	PW-1A
12	SCS Runoff	8.803	1	725	27,183	------	------	------	PW-1B
13	Reservoir	4.011	1	733	14,267	12	127.96	8,308	WATER QUALITY SWALE
14	Combine	86.29	1	732	369,183	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	65.82	1	741	336,563	14	123.29	63,332	BASIN 2
16	Diversion1	1.025	1	741	23,696	15	------	------	BASIN 2 INFILTRATION
17	Diversion2	64.79	1	741	312,865	15	------	------	BASIN 2 OUTFLOW (PT. 1)
18	SCS Runoff	1.683	1	749	10,491	------	------	------	PW-2
19	Reservoir	0.035	1	815	215	18	119.08	4,292	BASIN 1 (PT.2)
20	SCS Runoff	7.448	1	737	39,243	------	------	------	PW-3
21	SCS Runoff	26.40	1	740	134,167	------	------	------	PW-5A
22	Reservoir	17.27	1	757	106,346	21	130.69	31,280	BASIN 3
23	Combine	80.60	1	743	443,123	15, 19, 22	------	------	PROP. TOTAL TO RIVER (PT. 3)
24	SCS Runoff	2.021	1	727	6,929	------	------	------	PW-5B (PT. 5)
25	SCS Runoff	5.210	1	736	25,740	------	------	------	PW-6A
26	Reservoir	5.006	1	739	16,969	25	130.19	3,527	BASIN 4
27	SCS Runoff	0.275	1	728	1,726	------	------	------	PW-6B
28	Combine	5.237	1	739	18,695	26, 27	------	------	TOTAL TO PT. 6

Hydro_SPR_REV.gpw	Return Period: 100 Year	Tuesday, Jun 3, 2008

Hydrograph Report

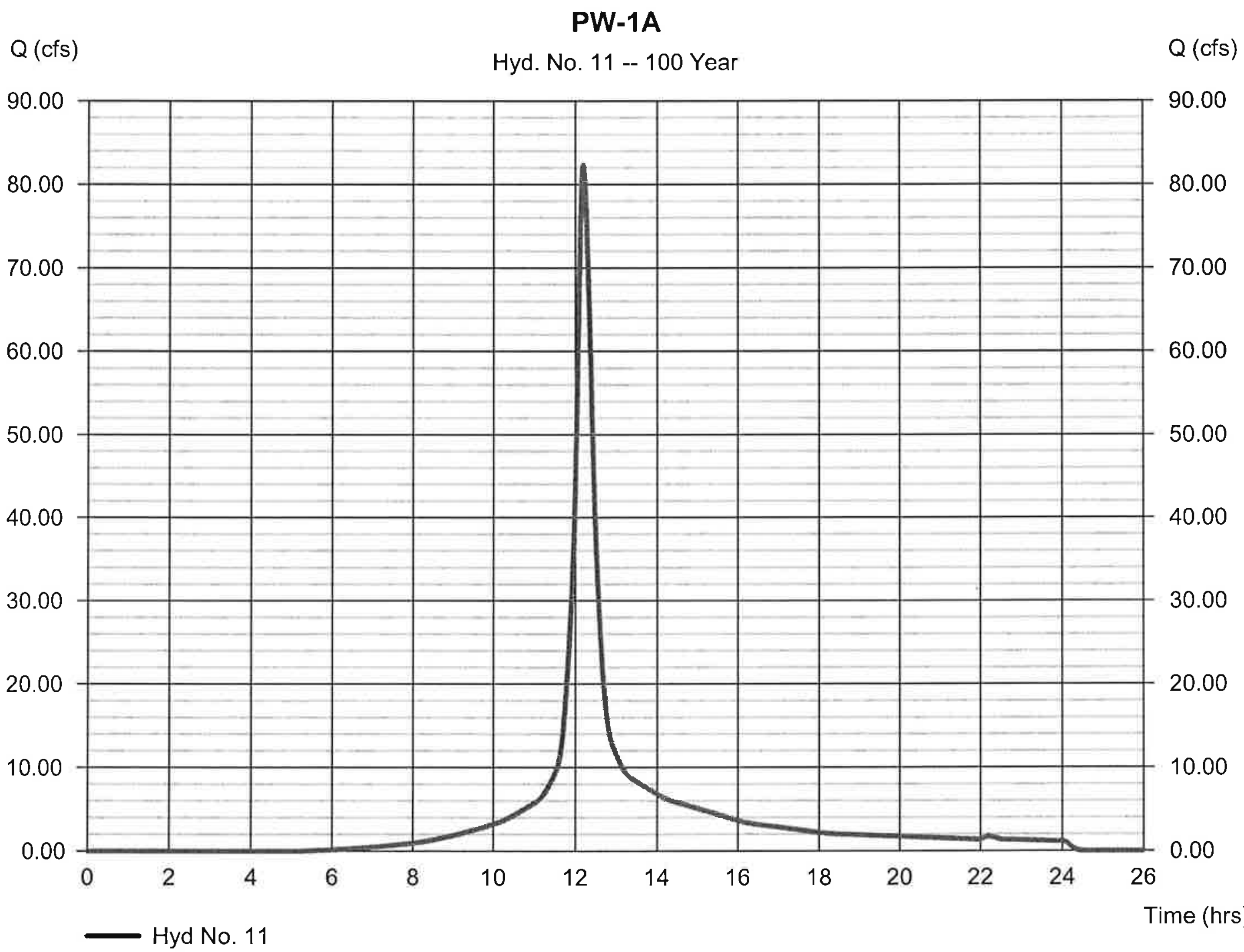
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 11

PW-1A

Hydrograph type	= SCS Runoff	Peak discharge	= 82.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 354,916 cuft
Drainage area	= 19.670 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.50 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.300 x 98) + (5.150 x 39)] / 19.670



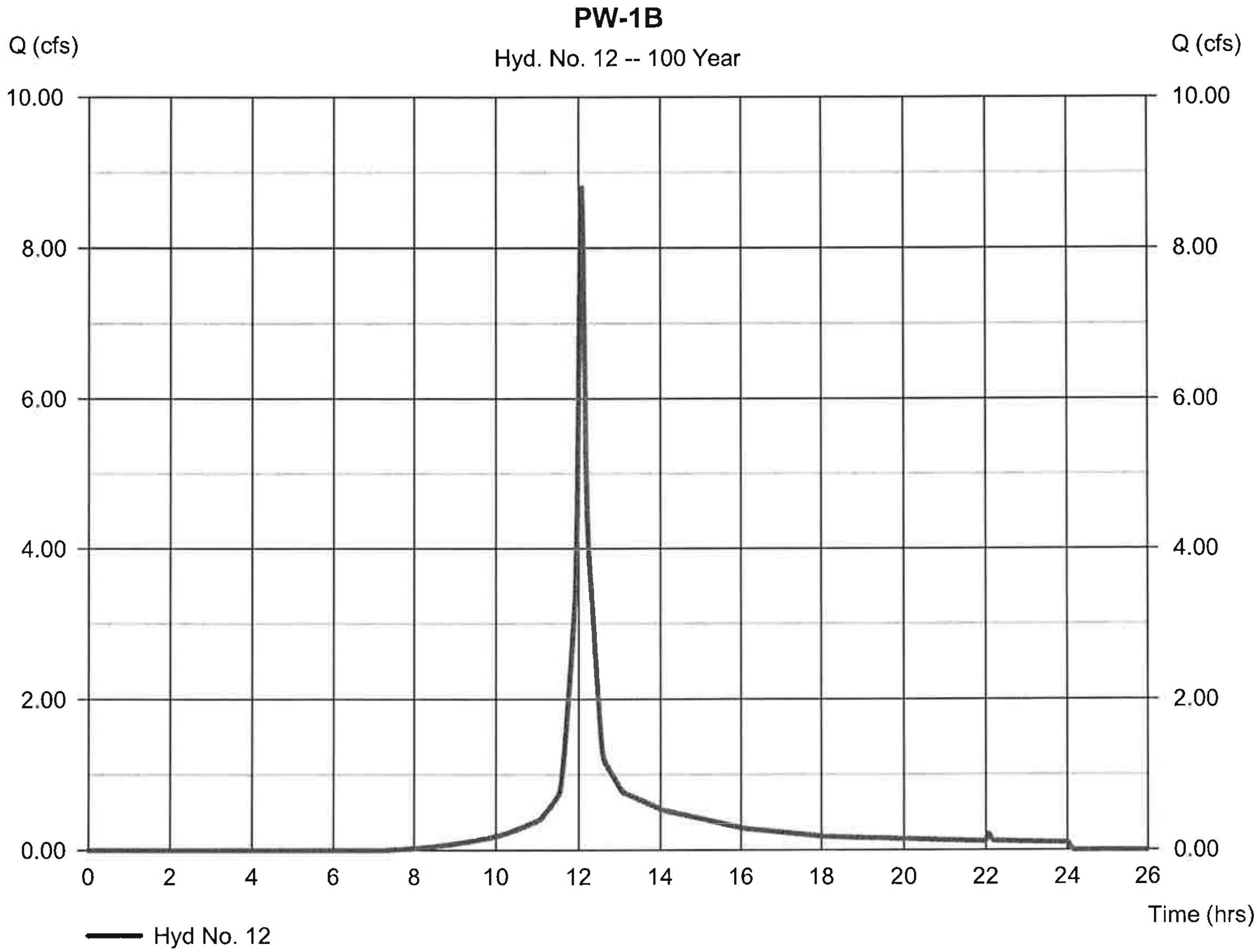
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 12

PW-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 8.803 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 27,183 cuft
Drainage area	= 1.750 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

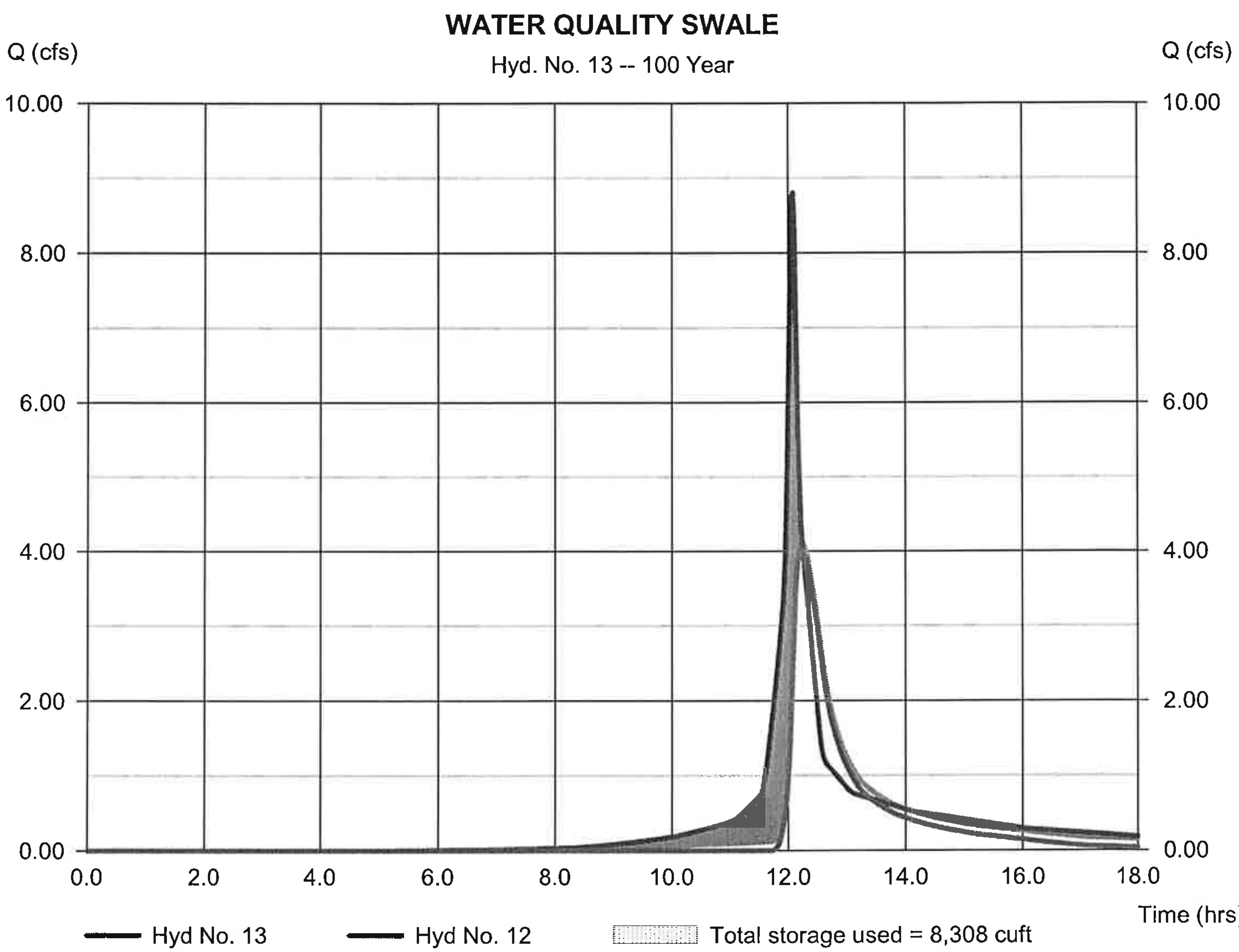
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 13

WATER QUALITY SWALE

Hydrograph type	= Reservoir	Peak discharge	= 4.011 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 14,267 cuft
Inflow hyd. No.	= 12 - PW-1B	Max. Elevation	= 127.96 ft
Reservoir name	= WATER QUALITY SWALE	Max. Storage	= 8,308 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



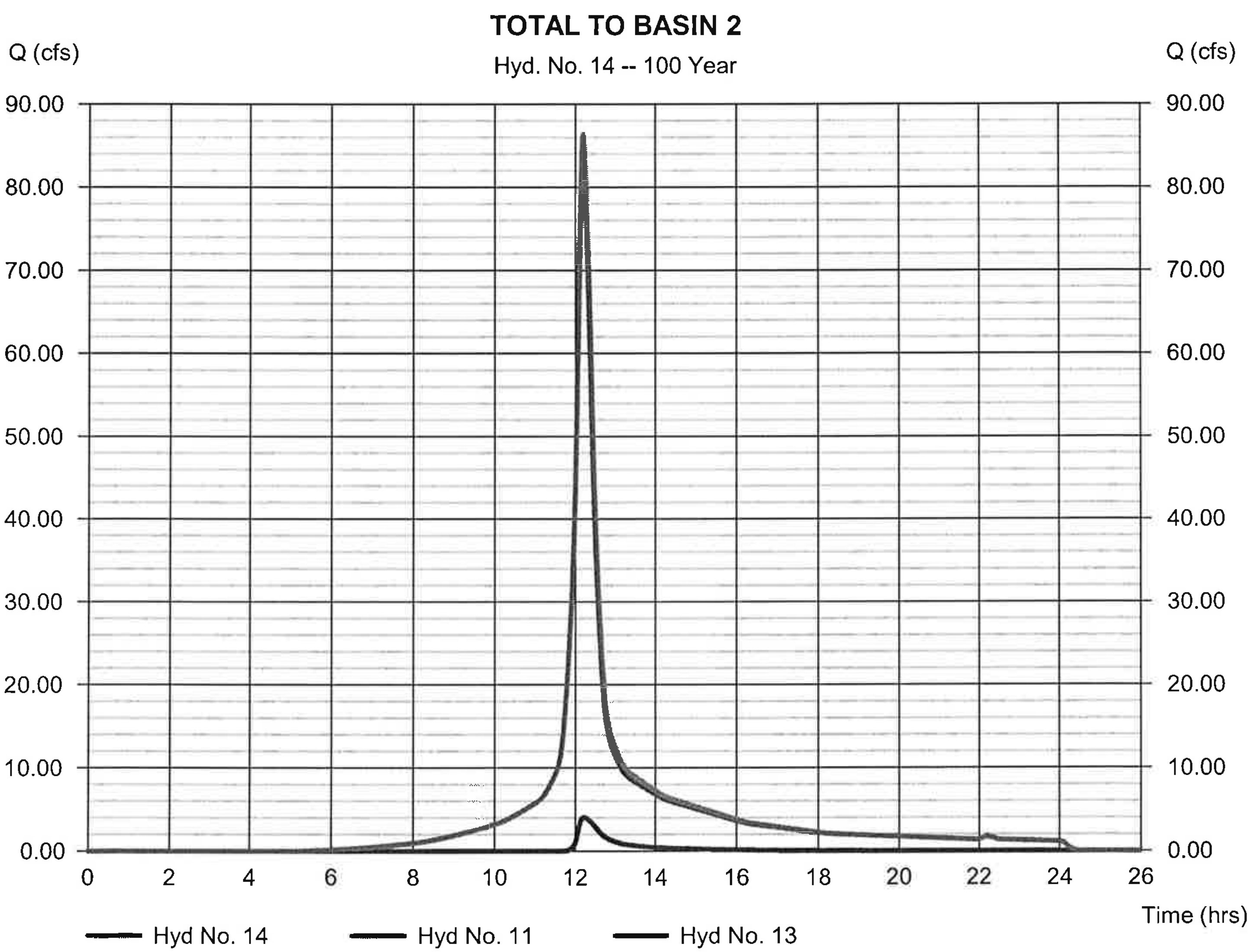
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 14

TOTAL TO BASIN 2

Hydrograph type	= Combine	Peak discharge	= 86.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 369,183 cuft
Inflow hyds.	= 11, 13	Contrib. drain. area	= 19.670 ac



Hydrograph Report

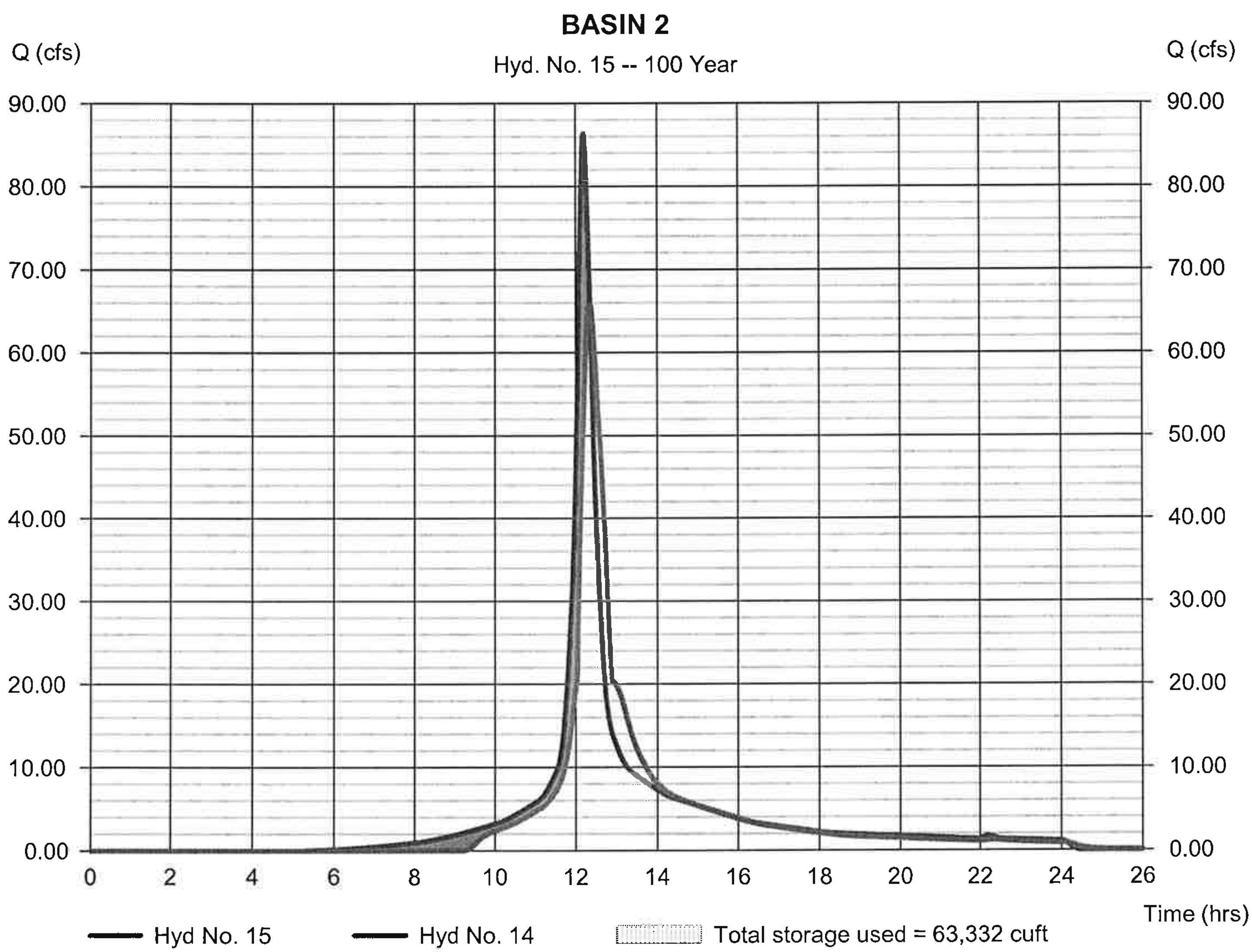
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 15

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 65.82 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 336,563 cuft
Inflow hyd. No.	= 14 - TOTAL TO BASIN 2	Max. Elevation	= 123.29 ft
Reservoir name	= BASIN 2	Max. Storage	= 63,332 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



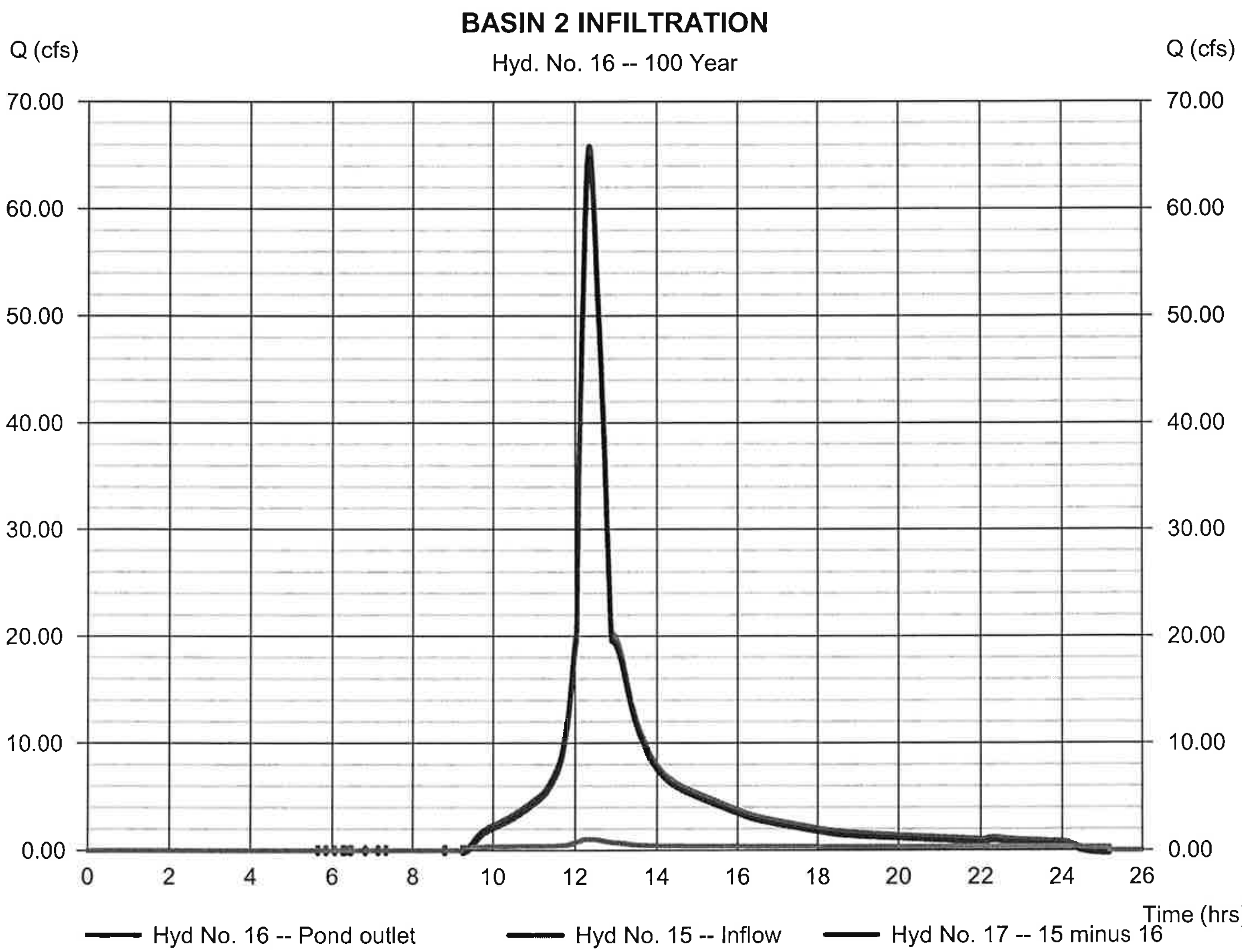
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 16

BASIN 2 INFILTRATION

Hydrograph type	= Diversion1	Peak discharge	= 1.025 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 23,696 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 17
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration

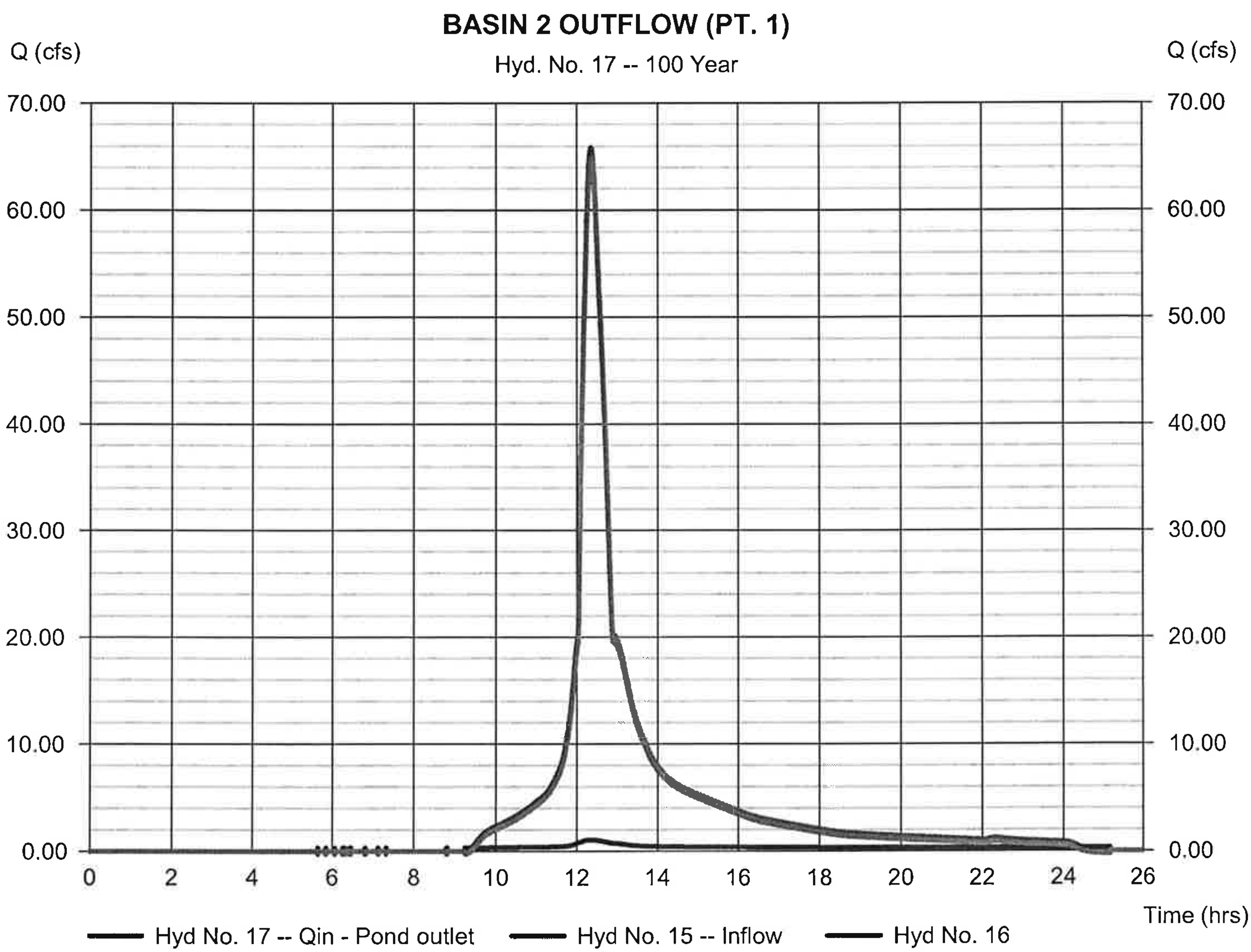


Hydrograph Report

Hyd. No. 17

BASIN 2 OUTFLOW (PT. 1)

Hydrograph type	= Diversion2	Peak discharge	= 64.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 312,865 cuft
Inflow hydrograph	= 15 - BASIN 2	2nd diverted hyd.	= 16
Diversion method	= Pond - BASIN 2	Pond structure	= Exfiltration



Hydrograph Report

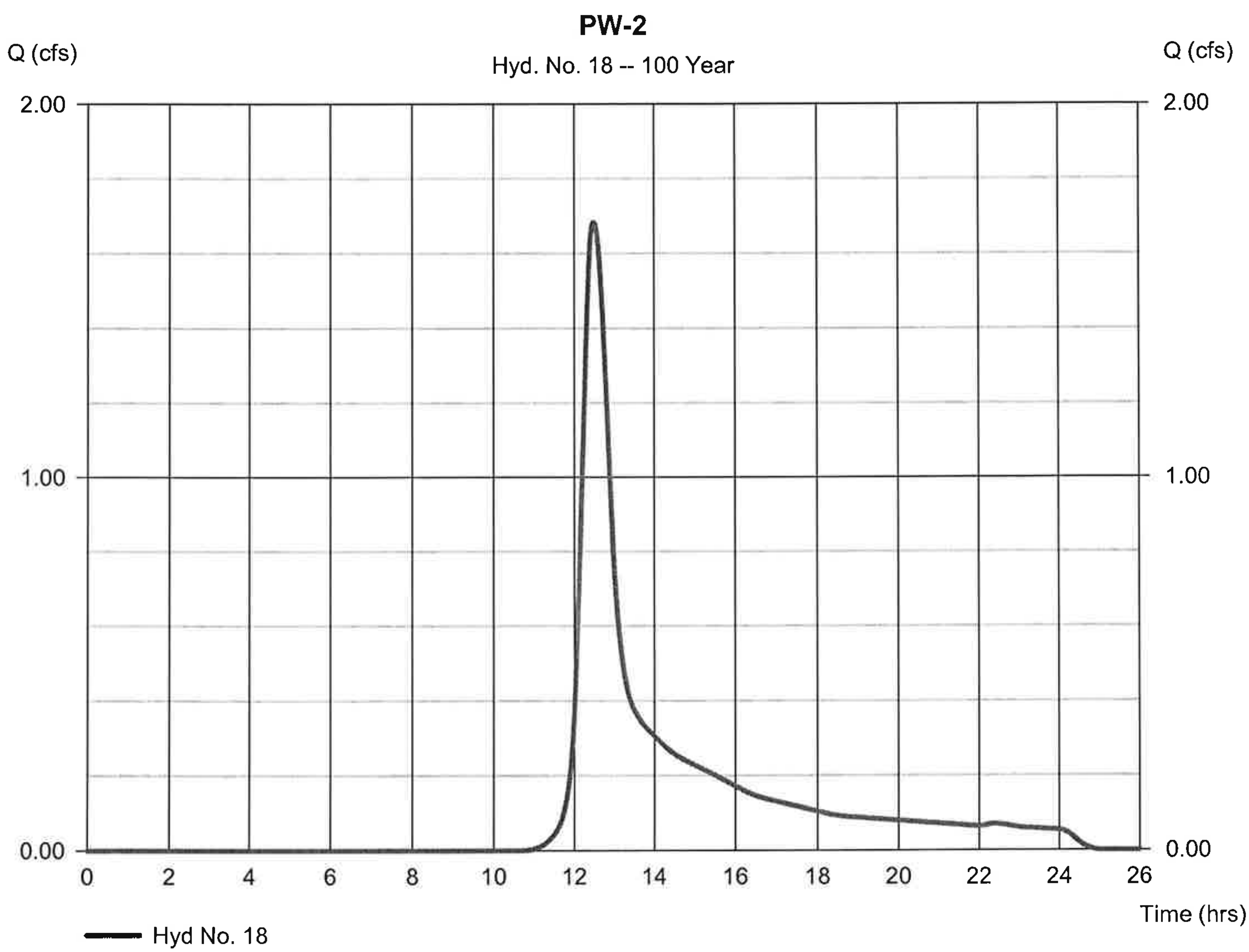
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 18

PW-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.683 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.48 hrs
Time interval	= 1 min	Hyd. volume	= 10,491 cuft
Drainage area	= 1.310 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.52 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.230 x 98) + (0.300 x 39)] / 1.310



Hydrograph Report

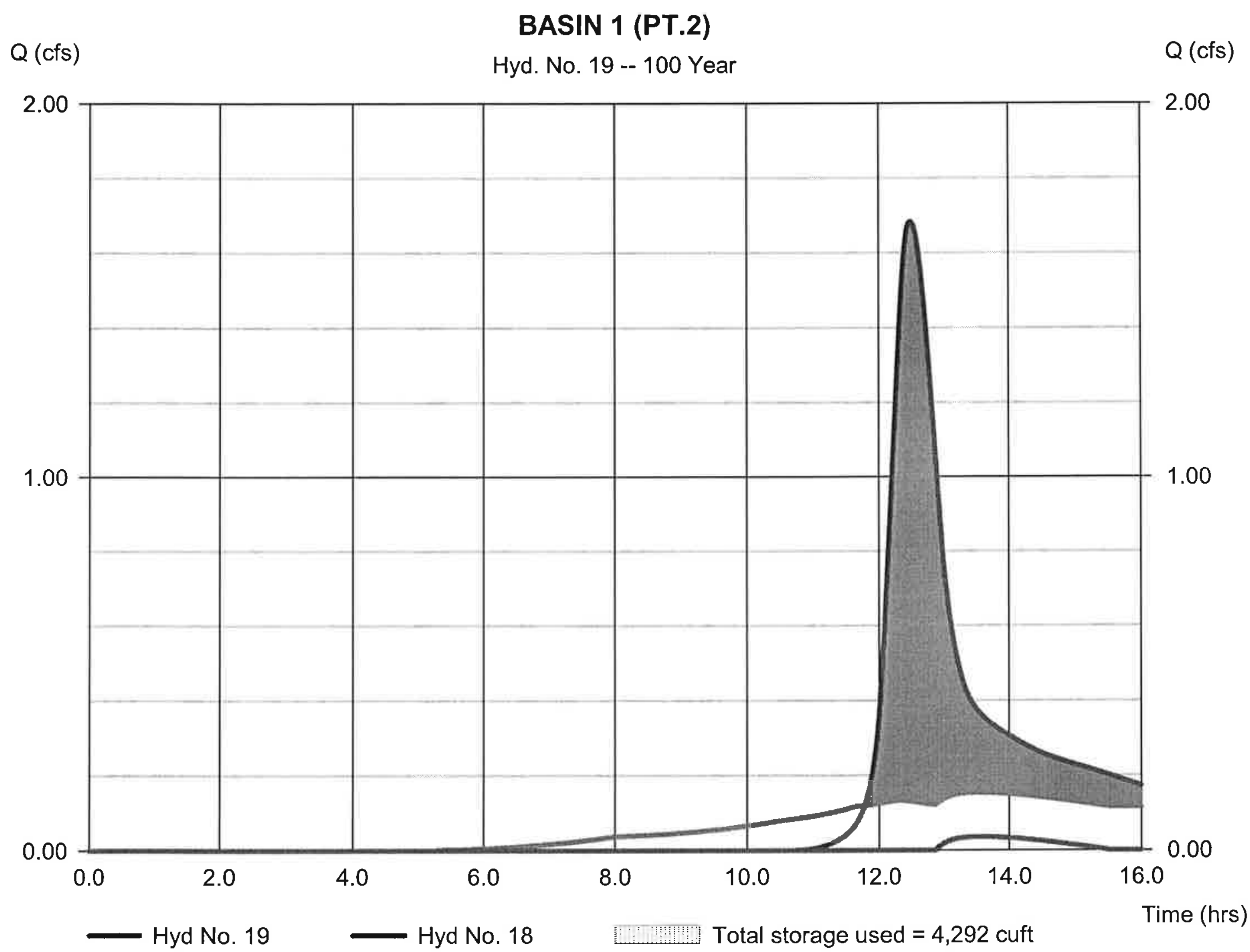
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 19

BASIN 1 (PT.2)

Hydrograph type	= Reservoir	Peak discharge	= 0.035 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.58 hrs
Time interval	= 1 min	Hyd. volume	= 215 cuft
Inflow hyd. No.	= 18 - PW-2	Max. Elevation	= 119.08 ft
Reservoir name	= UPGRADED BASIN	Max. Storage	= 4,292 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



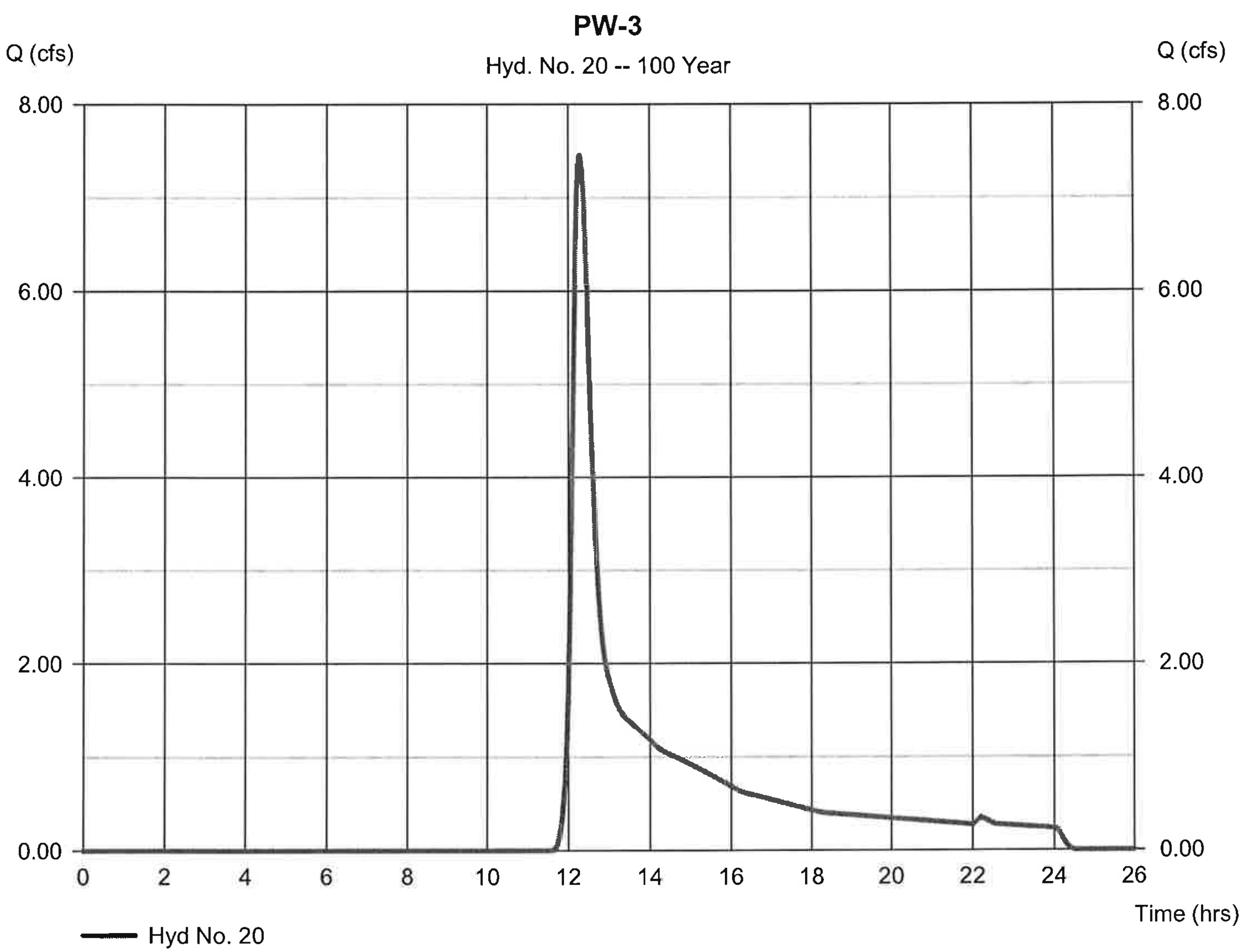
Hydrograph Report

Hyd. No. 20

PW-3

Hydrograph type	= SCS Runoff	Peak discharge	= 7.448 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 39,243 cuft
Drainage area	= 7.250 ac	Curve number	= 48*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.81 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.240 x 39)] / 7.250



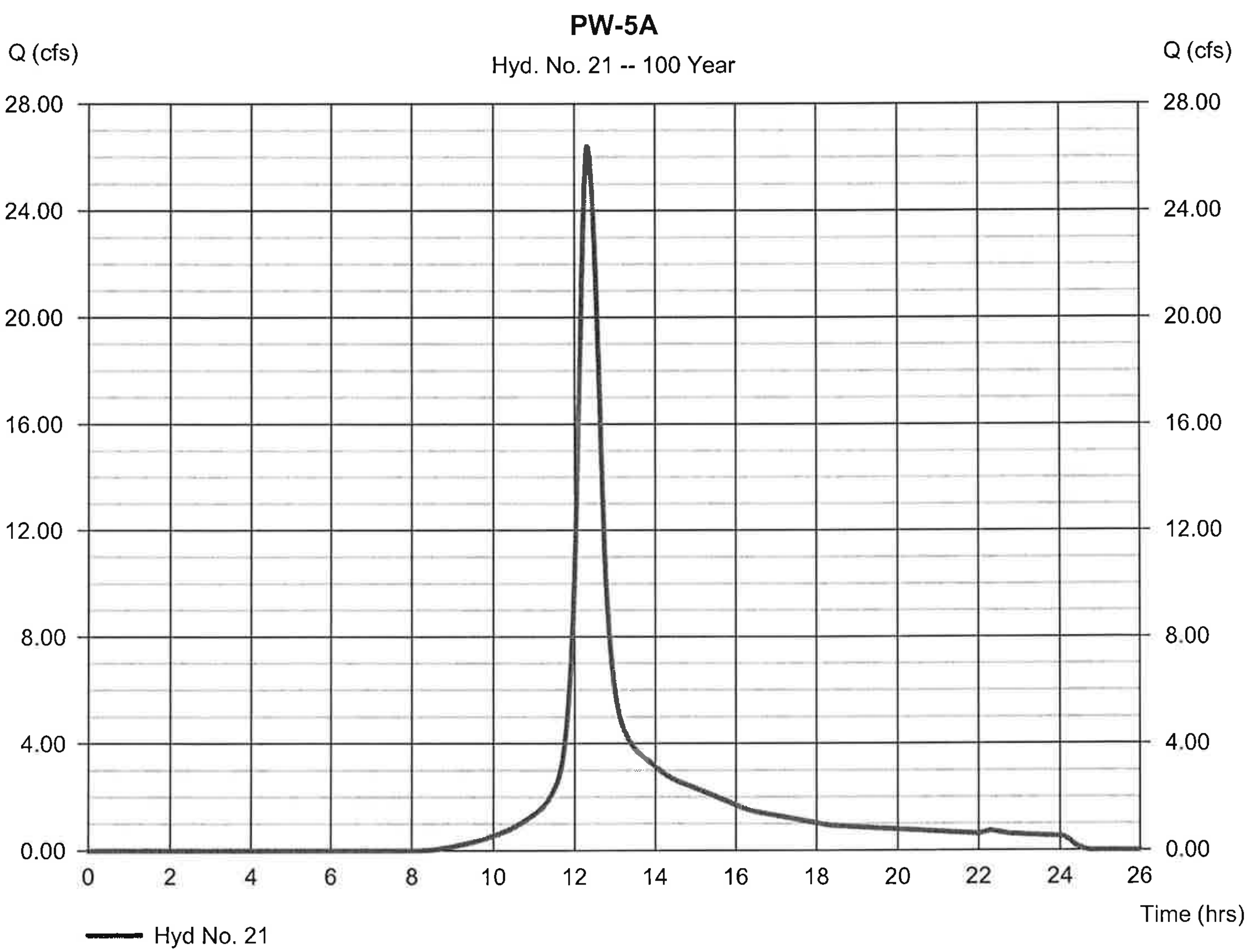
Hydrograph Report

Hyd. No. 21

PW-5A

Hydrograph type	= SCS Runoff	Peak discharge	= 26.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 134,167 cuft
Drainage area	= 10.000 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.26 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (3.950 x 39)] / 10.000



Hydrograph Report

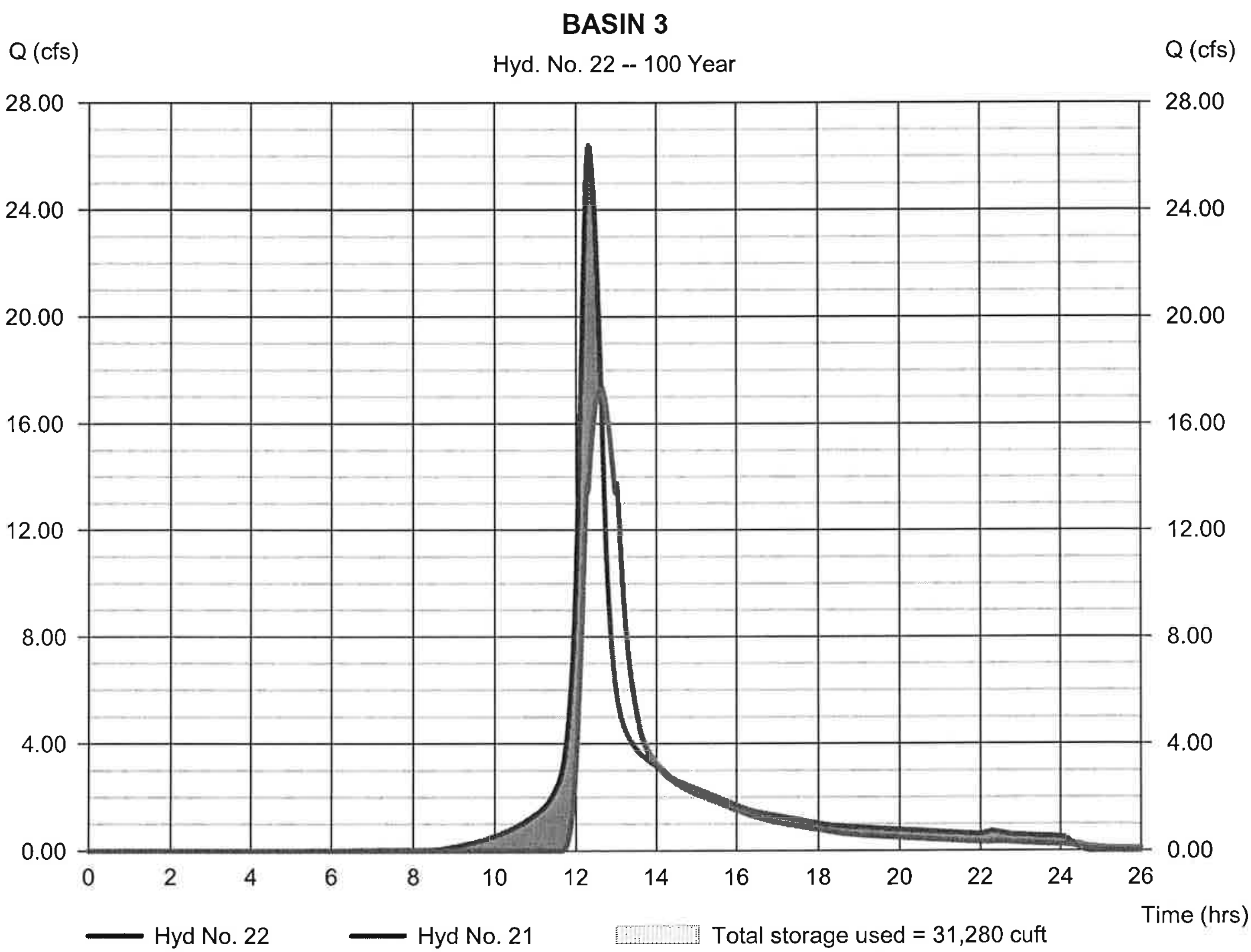
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 22

BASIN 3

Hydrograph type	= Reservoir	Peak discharge	= 17.27 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.62 hrs
Time interval	= 1 min	Hyd. volume	= 106,346 cuft
Inflow hyd. No.	= 21 - PW-5A	Max. Elevation	= 130.69 ft
Reservoir name	= BASIN 3	Max. Storage	= 31,280 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



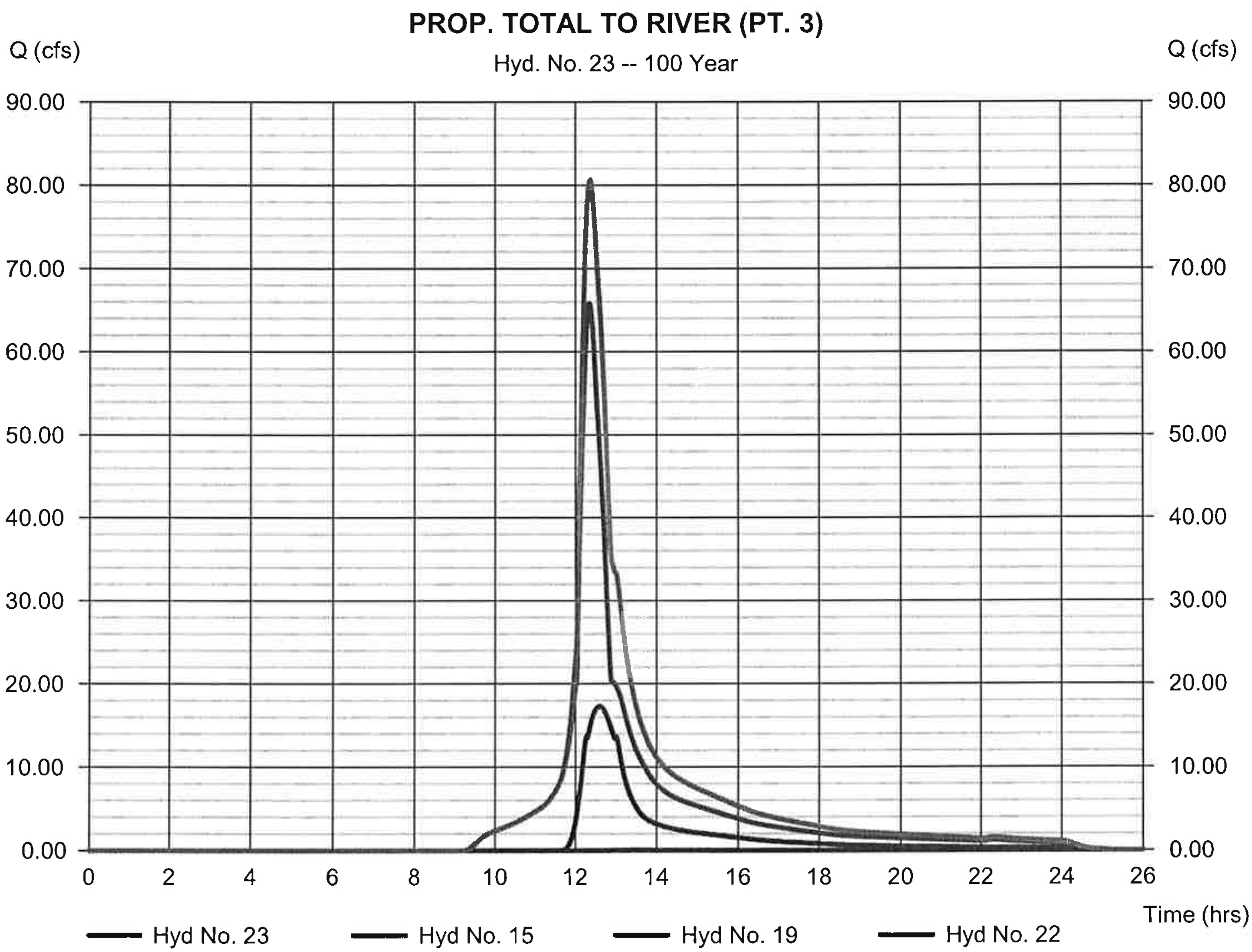
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 23

PROP. TOTAL TO RIVER (PT. 3)

Hydrograph type	= Combine	Peak discharge	= 80.60 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 443,123 cuft
Inflow hyds.	= 15, 19, 22	Contrib. drain. area	= 0.000 ac



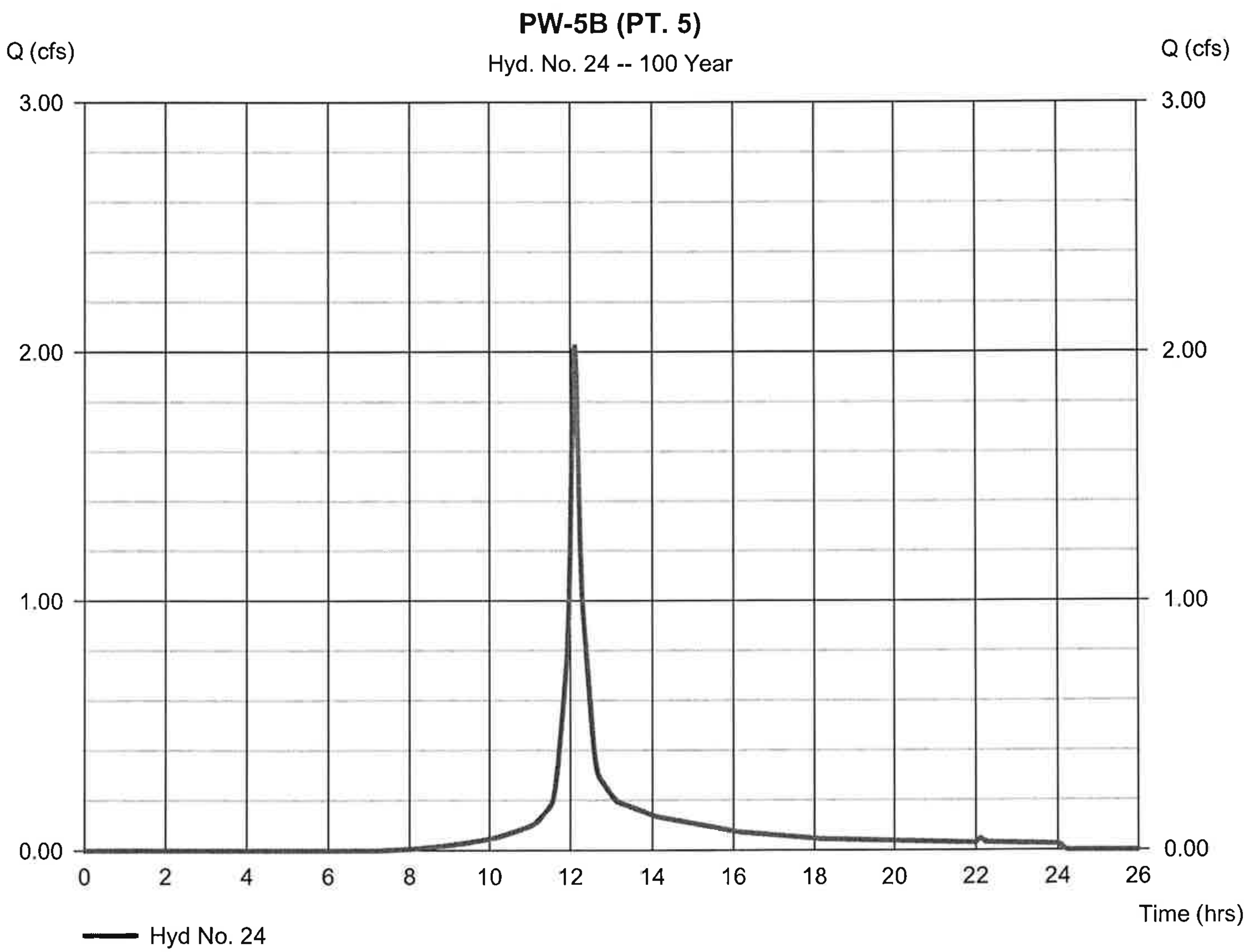
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Jun 3, 2008

Hyd. No. 24

PW-5B (PT. 5)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.021 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 6,929 cuft
Drainage area	= 0.460 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.01 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

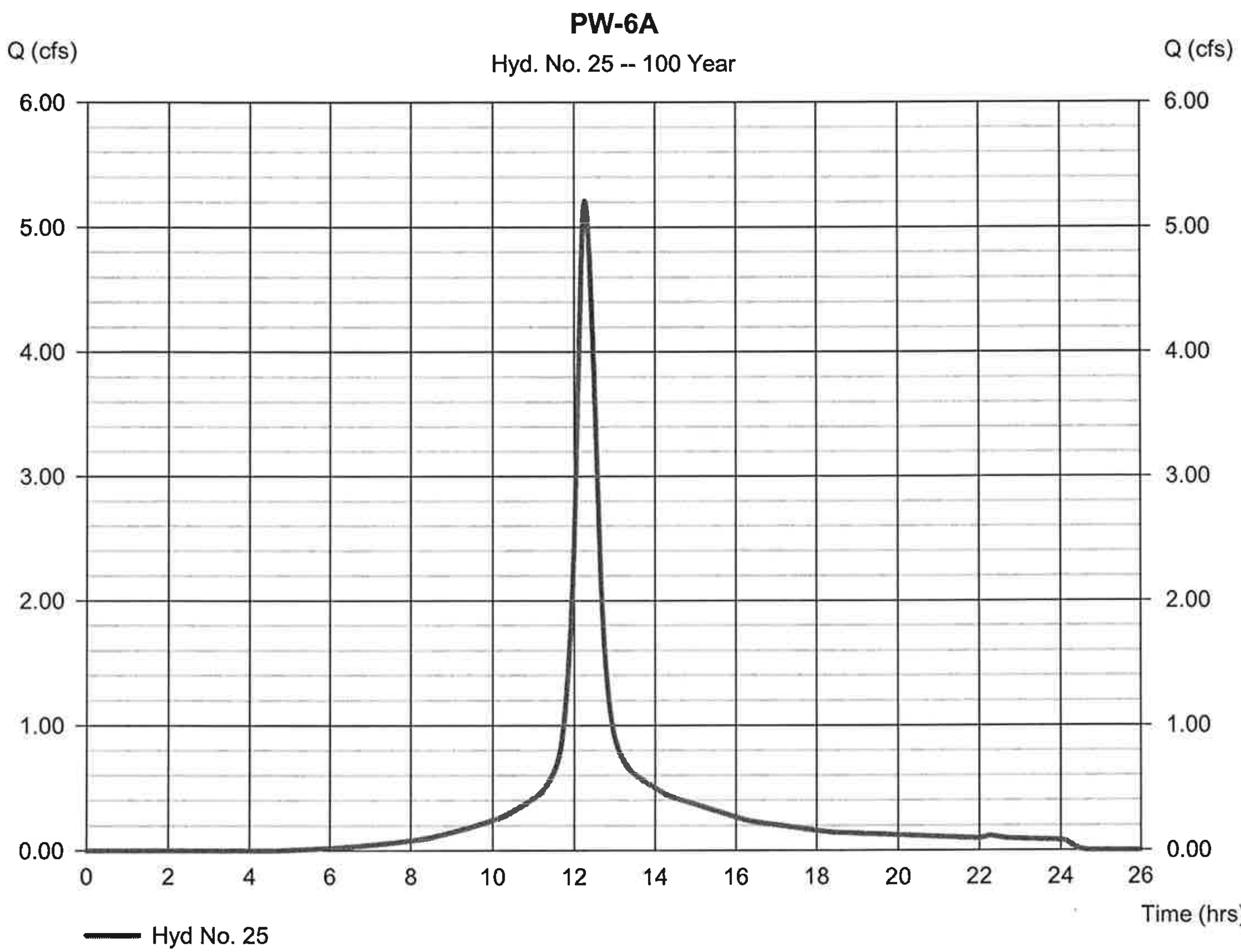
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 | Tuesday, Jun 3, 2008

Hyd. No. 25

PW-6A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.210 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 25,740 cuft
Drainage area	= 1.350 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.74 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 39) + (0.650 x 98)] / 1.350



Hydrograph Report

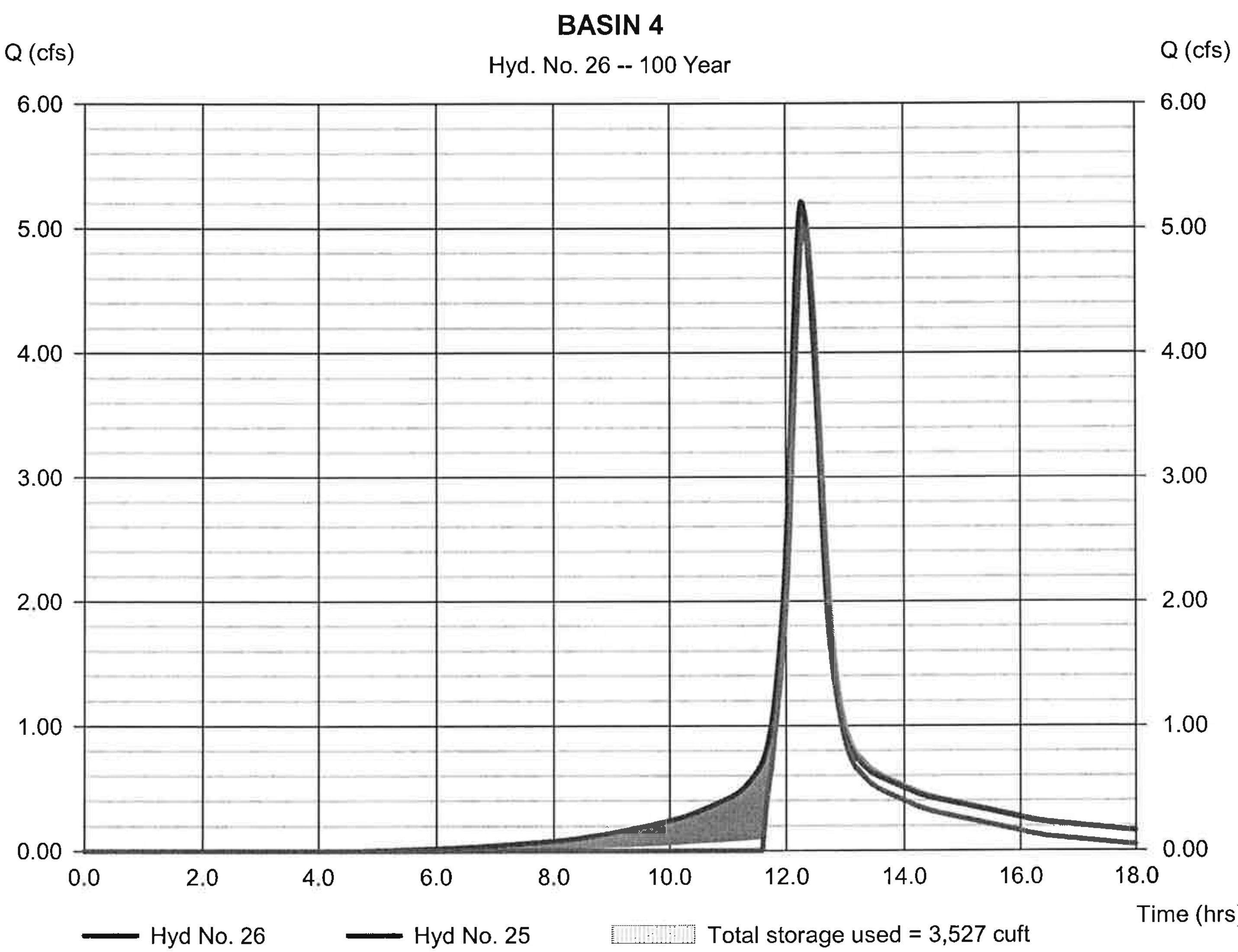
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Tuesday, Jun 3, 2008

Hyd. No. 26

BASIN 4

Hydrograph type	= Reservoir	Peak discharge	= 5.006 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.32 hrs
Time interval	= 1 min	Hyd. volume	= 16,969 cuft
Inflow hyd. No.	= 25 - PW-6A	Max. Elevation	= 130.19 ft
Reservoir name	= BASIN 4	Max. Storage	= 3,527 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



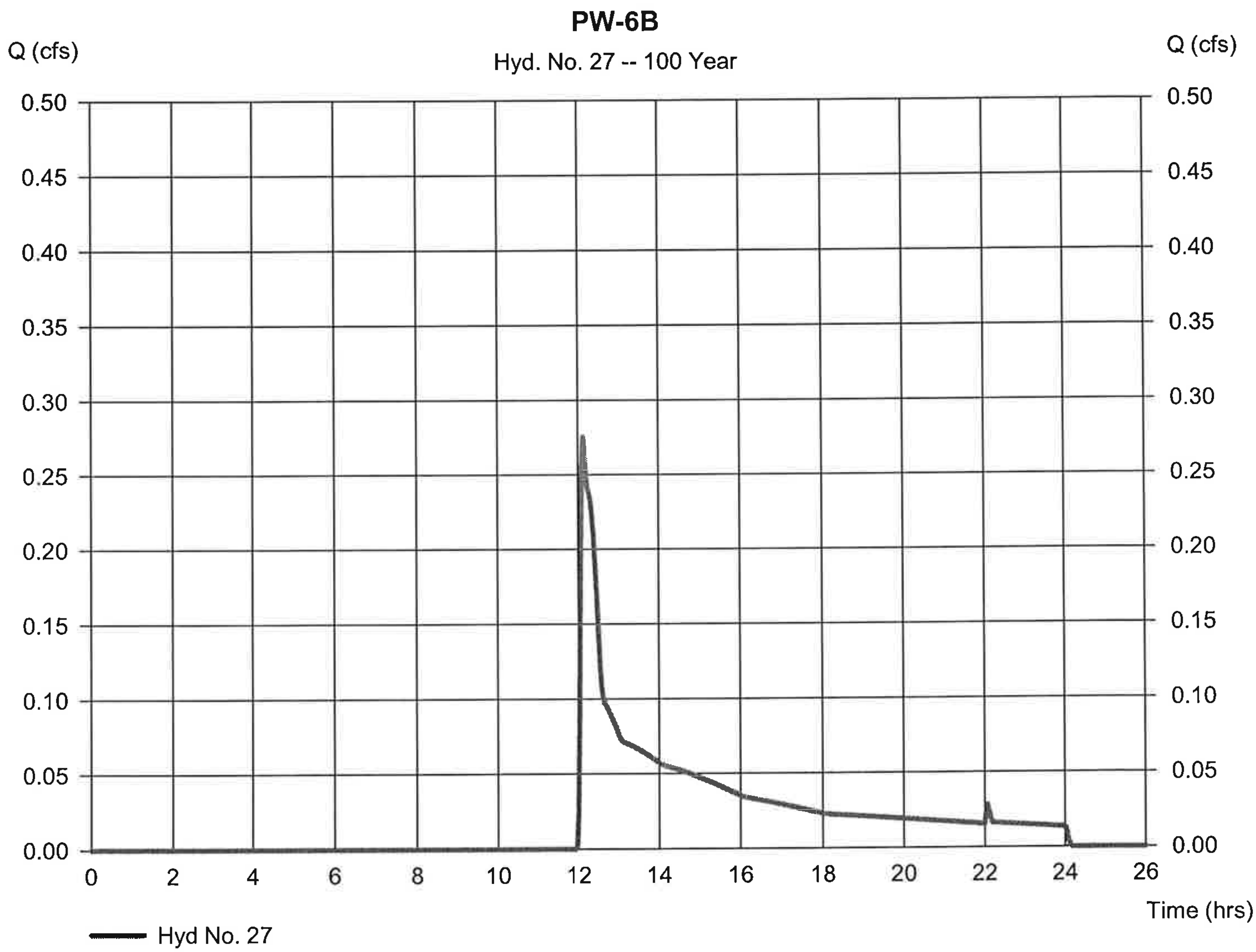
Hydrograph Report

Hyd. No. 27

PW-6B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.275 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 1,726 cuft
Drainage area	= 0.600 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.610 x 39)] / 0.600

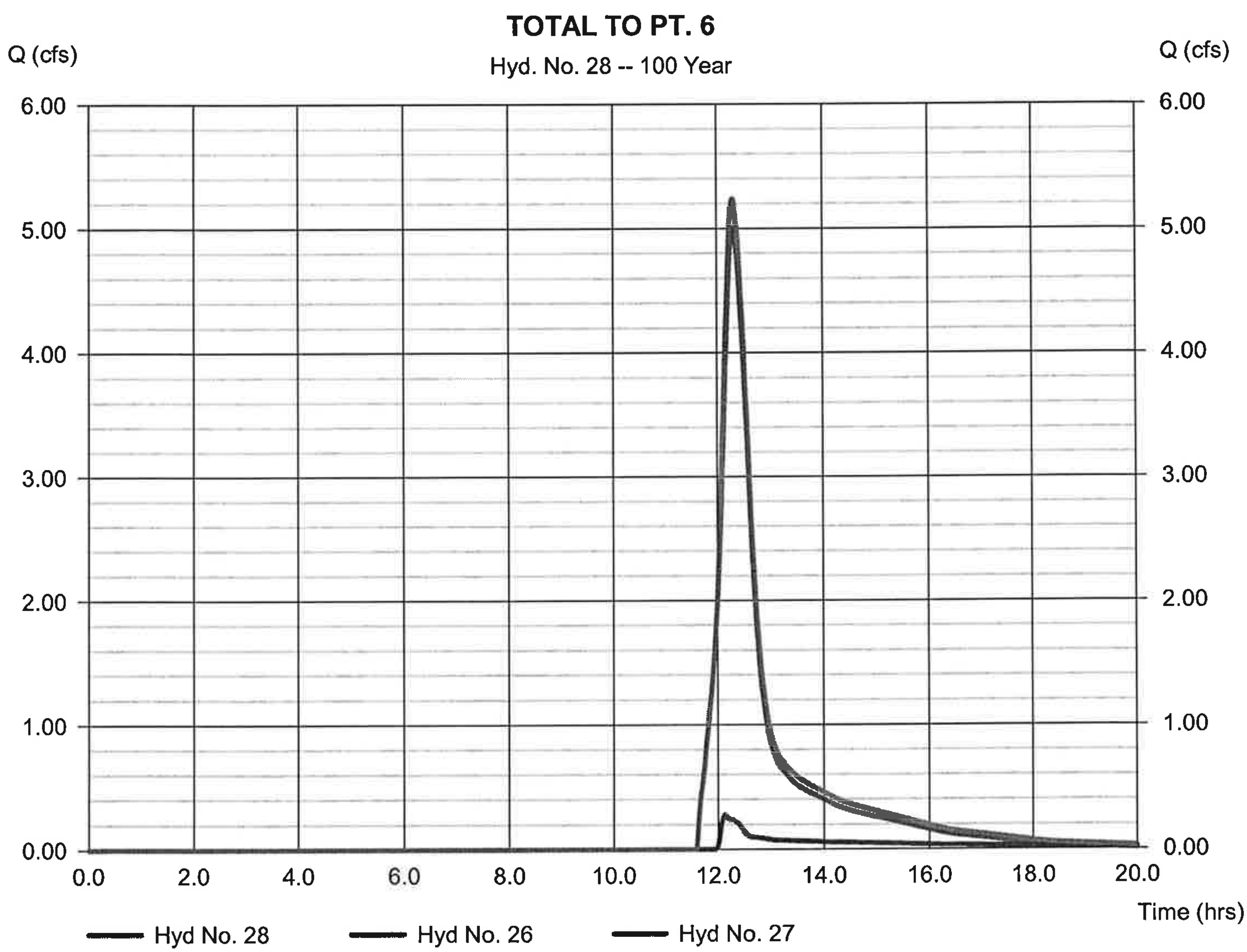


Hydrograph Report

Hyd. No. 28

TOTAL TO PT. 6

Hydrograph type	= Combine	Peak discharge	= 5.237 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.32 hrs
Time interval	= 1 min	Hyd. volume	= 18,695 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.600 ac



APPENDIX D: HYDRAULIC CALCULATIONS

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
1	DMH-12	Outfall	195.900	0.00	16.59	0.00	0.00	12.16	0.0	23.8	42.41	51.62	7.86	36	0.51	121.00	120.00	127.15	123.08	121.50	122.21
2	DMH-25	1	157.480	0.00	0.93	0.00	0.00	0.80	0.0	7.6	4.49	7.85	2.54	18	0.48	121.25	120.50	128.30	123.32	127.15	123.08
3	DMH-23	2	298.520	0.00	0.68	0.00	0.00	0.58	0.0	5.6	3.57	4.88	2.91	15	0.49	122.70	121.25	125.30	124.20	128.30	123.42
4	CB-28	3	92.140	0.34	0.34	0.86	0.29	0.29	5.0	5.0	1.84	2.84	2.34	12	0.54	123.20	122.70	125.70	124.52	125.30	124.31
5	CB-27	1	12.690	0.30	0.30	0.58	0.17	0.17	5.0	5.0	1.09	5.42	3.92	12	1.97	123.75	123.50	127.00	124.30	127.15	123.80
6	CB-30	2	7.210	0.25	0.25	0.86	0.22	0.22	5.0	5.0	1.35	7.18	4.42	12	3.47	124.25	124.00	128.25	125.13	128.30	124.29
7	CB-29	3	8.280	0.34	0.34	0.86	0.29	0.29	5.0	5.0	1.84	4.24	2.34	12	1.21	122.80	122.70	125.60	124.33	125.30	124.31
8	DMH-28	1	124.580	0.00	2.06	0.00	0.00	1.25	0.0	15.1	5.42	5.18	6.90	12	1.81	122.75	120.50	127.25	125.53	127.15	123.08
9	DMH-27	8	254.990	0.27	0.54	0.90	0.24	0.49	5.0	6.3	2.88	4.71	3.69	12	1.49	126.55	122.75	130.50	127.52	127.25	126.21
10	DMH-26	9	190.960	0.27	0.27	0.90	0.24	0.24	5.0	5.0	1.53	2.72	2.70	12	0.50	127.50	126.55	130.50	128.05	130.50	127.59
11	DMH-11	1	218.000	0.00	12.84	0.00	0.00	9.53	0.0	22.3	34.34	31.56	7.00	30	0.50	121.60	120.50	131.05	124.38	127.15	123.08
12	CB-31	8	16.960	1.52	1.52	0.50	0.76	0.76	15.0	15.0	3.31	4.68	4.22	12	1.47	123.00	122.75	127.00	126.34	127.25	126.21
13	DMH-22	11	129.520	0.00	2.83	0.00	0.00	1.83	0.0	21.5	6.74	8.06	3.81	18	0.50	122.25	121.60	129.20	125.59	131.05	125.14
14	DMH-21	13	140.160	0.00	2.23	0.00	0.00	1.45	0.0	20.5	5.46	8.04	3.09	18	0.50	122.95	122.25	127.10	126.13	129.20	125.81
15	CB-23	14	44.000	0.43	0.43	0.55	0.24	0.24	5.0	5.0	1.49	3.68	1.89	12	0.91	123.35	122.95	127.05	126.35	127.10	126.28
16	DMH-20	11	97.680	0.10	6.20	0.90	0.09	4.96	5.0	20.2	18.79	39.20	6.62	24	2.56	124.10	121.60	130.00	125.64	131.05	125.14
17	CB-25	13	35.580	0.40	0.40	0.56	0.22	0.22	5.0	5.0	1.41	4.09	1.81	12	1.12	124.90	124.50	128.90	125.85	129.20	125.81
18	CB-24	14	10.470	0.31	0.31	0.56	0.17	0.17	5.0	5.0	1.09	3.77	1.39	12	0.96	123.05	122.95	127.05	126.29	127.10	126.28
19	DMH-19	16	84.710	0.00	1.04	0.00	0.00	0.94	0.0	11.1	4.62	4.09	5.88	12	1.12	125.05	124.10	131.20	126.85	130.00	125.64
20	DMH-18	19	158.000	0.35	1.04	0.90	0.32	0.94	5.0	10.1	4.79	4.98	3.90	15	0.51	125.85	125.05	132.60	127.69	131.20	126.95
21	DMH-17	20	73.640	0.05	0.69	0.90	0.05	0.62	5.0	9.6	3.23	2.66	4.12	12	0.48	126.20	125.85	132.10	128.43	132.60	127.92
22	DMH-16	21	230.000	0.16	0.64	0.90	0.14	0.58	5.0	8.0	3.18	2.79	4.05	12	0.52	127.40	126.20	133.20	130.25	132.10	128.69

Project File: Wayland TC.stm | Number of lines: 112 | Date: 05-27-2008

NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
23	DMH-15	22	125.000	0.11	0.48	0.90	0.10	0.43	5.0	7.2	2.47	2.78	3.14	12	0.52	128.05	127.40	133.90	131.02	133.20	130.51
24	DMH-14	23	180.000	0.22	0.37	0.90	0.20	0.33	5.0	6.0	2.00	2.73	2.55	12	0.50	128.95	128.05	134.60	131.66	133.90	131.17
25	DMH-13	24	150.000	0.15	0.15	0.90	0.14	0.14	5.0	5.0	0.85	3.98	1.08	12	1.07	130.55	128.95	134.55	131.74	134.60	131.67
26	DMH-10	11	129.460	0.00	3.81	0.00	0.00	2.74	0.0	11.9	13.14	39.71	5.18	24	2.63	125.00	121.60	131.05	126.28 j	131.05	125.14
27	CB-26	13	25.640	0.20	0.20	0.78	0.16	0.16	5.0	5.0	0.98	6.81	1.25	12	3.12	124.80	124.00	128.80	125.83	129.20	125.81
28	DMH-54	16	158.350	0.00	4.70	0.00	0.00	3.69	0.0	19.2	14.35	17.42	5.96	24	0.51	124.90	124.10	130.00	126.25 j	130.00	125.64
29	DMH-9	26	134.970	0.00	3.30	0.00	0.00	2.44	0.0	11.0	12.08	17.65	5.81	24	0.52	125.70	125.00	131.80	126.93 j	131.05	126.28
30	DMH-53	28	361.870	0.00	3.20	0.00	0.00	2.59	0.0	16.8	10.75	17.28	4.60	24	0.50	126.70	124.90	132.00	127.86 j	130.00	126.77
31	DMH-8	29	88.540	0.00	2.96	0.00	0.00	2.26	0.0	10.4	11.39	17.47	5.70	24	0.51	126.15	125.70	131.80	127.35	131.80	126.93
32	CB-19	30	265.180	2.64	2.64	0.81	2.14	2.14	15.0	15.0	9.33	7.97	5.28	18	0.49	128.00	126.70	131.00	129.98	132.00	128.20
33	DMH-7	31	109.350	0.00	2.50	0.00	0.00	2.00	0.0	9.7	10.36	17.38	4.32	24	0.50	126.70	126.15	133.50	127.95	131.80	127.86
34	DMH-7A	33	87.500	0.00	0.33	0.00	0.00	0.29	0.0	5.6	1.78	3.45	4.16	12	0.80	128.70	128.00	132.20	129.27	133.50	128.51
35	CB-18	34	89.670	0.15	0.15	0.90	0.14	0.14	5.0	5.0	0.85	2.88	2.42	12	0.56	129.20	128.70	132.20	129.59 j	132.20	129.27
36	CB-22	16	10.190	0.36	0.36	0.68	0.24	0.24	5.0	5.0	1.54	7.64	4.80	12	3.93	126.90	126.50	129.90	127.85	130.00	126.80
37	CB-14	26	6.640	0.51	0.51	0.58	0.30	0.30	10.0	10.0	1.52	10.59	5.75	12	7.53	127.50	127.00	131.00	128.88	131.05	127.26
38	CB-21	28	11.260	1.50	1.50	0.73	1.10	1.10	15.0	15.0	4.78	8.13	6.08	12	4.44	125.50	125.00	129.50	126.94	130.00	126.77
39	CB-13	29	20.310	0.34	0.34	0.55	0.19	0.19	10.0	10.0	0.96	7.66	3.03	12	3.94	127.30	126.50	131.30	127.72 j	131.80	126.93
40	CB-20	30	10.610	0.56	0.56	0.81	0.45	0.45	15.0	15.0	1.98	8.38	5.23	12	4.71	128.00	127.50	131.00	128.87	132.00	127.86
41	CB-12	31	21.440	0.46	0.46	0.56	0.26	0.26	10.0	10.0	1.32	4.56	2.65	12	1.40	127.30	127.00	131.30	127.79	131.80	127.86
42	DMH-6	33	130.560	0.00	1.96	0.00	0.00	1.53	0.0	8.8	8.18	10.91	5.80	18	0.92	128.40	127.20	134.50	129.49 j	133.50	128.34
43	CB-15	34	8.280	0.18	0.18	0.87	0.16	0.16	5.0	5.0	0.98	4.24	2.63	12	1.21	128.80	128.70	132.20	129.22 j	132.20	129.27
44	DMH-5	42	169.460	0.00	1.76	0.00	0.00	1.36	0.0	7.7	7.59	8.29	5.32	18	0.53	129.30	128.40	134.60	130.43	134.50	129.53

Project File: Wayland TC.stm | Number of lines: 112 | Date: 05-27-2008

NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
45	DMH-4	44	84.140	0.00	1.43	0.00	0.00	1.07	0.0	7.2	6.14	7.84	3.55	18	0.48	129.70	129.30	134.80	131.07	134.60	130.86
46	DMH-3	45	81.710	0.00	1.27	0.00	0.00	0.95	0.0	6.6	5.54	4.89	4.51	15	0.49	130.10	129.70	135.20	131.79	134.80	131.28
47	DMH-2	46	60.670	0.00	0.69	0.00	0.00	0.49	0.0	5.7	2.98	2.71	3.80	12	0.49	130.40	130.10	134.80	132.46	135.20	132.10
48	DMH-1	47	60.000	0.00	0.38	0.00	0.00	0.27	0.0	5.3	1.64	3.52	2.09	12	0.83	130.90	130.40	135.05	132.80	134.80	132.69
49	CB-2	48	50.700	0.16	0.16	0.79	0.13	0.13	5.0	5.0	0.79	3.43	1.01	12	0.79	131.30	130.90	134.30	132.86	135.05	132.84
50	CB-10	33	51.140	0.11	0.11	0.85	0.09	0.09	5.0	5.0	0.59	2.95	2.78	12	0.59	129.00	128.70	133.00	129.33	133.50	129.00
51	CB-8	42	20.790	0.10	0.10	0.85	0.09	0.09	5.0	5.0	0.53	3.78	2.98	12	0.96	130.00	129.80	134.00	130.31	134.50	130.05
52	CB-6	44	21.040	0.13	0.13	0.90	0.12	0.12	5.0	5.0	0.73	7.04	0.98	12	3.33	130.00	129.30	134.30	130.87	134.60	130.86
53	CB-5	45	22.340	0.16	0.16	0.79	0.13	0.13	5.0	5.0	0.79	4.47	1.01	12	1.34	130.00	129.70	134.00	131.29	134.80	131.28
54	DMH-52	46	96.280	0.00	0.58	0.00	0.00	0.46	0.0	6.0	2.74	3.05	3.49	12	0.62	130.70	130.10	135.90	132.59	135.20	132.10
55	CB-3	47	27.340	0.10	0.10	0.85	0.09	0.09	5.0	5.0	0.53	4.04	0.68	12	1.10	130.70	130.40	134.50	132.69	134.80	132.69
56	CB-1	48	47.960	0.22	0.22	0.63	0.14	0.14	5.0	5.0	0.87	3.52	1.11	12	0.83	131.30	130.90	134.30	132.87	135.05	132.84
57	CB-17	54	145.680	0.32	0.32	0.71	0.23	0.23	5.0	5.0	1.43	2.67	1.82	12	0.48	131.40	130.70	134.70	132.98	135.90	132.78
58	CB-11	33	51.140	0.10	0.10	0.85	0.09	0.09	5.0	5.0	0.53	2.95	2.70	12	0.59	129.00	128.70	133.00	129.31	133.50	128.99
59	CB-9	42	20.560	0.10	0.10	0.86	0.09	0.09	5.0	5.0	0.54	3.81	2.99	12	0.97	130.00	129.80	134.00	130.31	134.50	130.05
60	CB-7	44	20.820	0.20	0.20	0.84	0.17	0.17	5.0	5.0	1.06	7.07	1.40	12	3.36	130.00	129.30	134.30	130.87	134.60	130.86
61	CB-4	47	7.620	0.21	0.21	0.67	0.14	0.14	5.0	5.0	0.88	6.25	1.13	12	2.62	130.60	130.40	134.50	132.69	134.80	132.69
62	CB-16	54	9.770	0.26	0.26	0.88	0.23	0.23	5.0	5.0	1.44	6.76	1.83	12	3.07	131.00	130.70	134.50	132.79	135.90	132.78
63	FES-16	14	82.240	1.49	1.49	0.70	1.04	1.04	20.0	20.0	3.98	7.43	5.06	12	3.71	126.00	122.95	0.00	127.16	127.10	126.28
64	DMH-55	1	76.133	0.46	0.46	0.90	0.41	0.41	5.0	5.0	2.60	5.14	5.55	12	1.77	124.50	123.15	130.50	125.18	127.15	123.65
65	DMH-34	Outfall	123.910	0.00	2.91	0.00	0.00	1.89	0.0	9.0	10.02	9.70	6.29	18	0.73	122.40	121.50	126.90	123.74	0.00	122.71
66	DMH-33	65	80.790	0.00	1.45	0.00	0.00	0.98	0.0	8.5	5.32	5.50	4.33	15	0.62	122.90	122.40	127.50	124.76	126.90	124.29

Project File: Wayland TC.stm | Number of lines: 112 | Date: 05-27-2008

NOTES: ** Critical depth

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
67	DMH-32	66	128.490	0.00	1.07	0.00	0.00	0.73	0.0	7.7	4.12	7.17	3.37	15	1.05	124.25	122.90	129.05	125.47	127.50	125.05
68	DMH-31	67	116.930	0.00	0.89	0.00	0.00	0.62	0.0	6.9	3.59	4.80	3.01	15	0.47	124.80	124.25	129.05	125.92	129.05	125.64
69	DMH-30	68	100.600	0.00	0.66	0.00	0.00	0.43	0.0	6.2	2.53	2.85	3.22	12	0.55	125.35	124.80	130.05	126.50	129.05	126.07
70	DMH-29	69	103.790	0.00	0.50	0.00	0.00	0.32	0.0	5.5	1.94	2.81	2.47	12	0.53	125.90	125.35	130.05	126.90	130.05	126.66
71	CB-32	70	76.360	0.37	0.37	0.62	0.23	0.23	5.0	5.0	1.44	3.42	2.43	12	0.79	126.50	125.90	130.50	127.08	130.05	126.99
72	CB-42	65	27.220	0.35	0.35	0.61	0.21	0.21	5.0	5.0	1.34	5.73	1.71	12	2.20	123.00	122.40	126.50	124.32	126.90	124.29
73	CB-37	66	13.920	0.38	0.38	0.65	0.25	0.25	5.0	5.0	1.55	3.27	1.98	12	0.72	123.00	122.90	126.50	125.07	127.50	125.05
74	CB-36	67	7.110	0.18	0.18	0.63	0.11	0.11	5.0	5.0	0.71	10.23	4.28	12	7.03	126.00	125.50	129.00	126.78	129.05	125.68
75	CB-35	68	6.070	0.23	0.23	0.85	0.20	0.20	5.0	5.0	1.23	7.00	1.56	12	3.29	125.00	124.80	129.00	126.07	129.05	126.07
76	CB-34	69	5.850	0.16	0.16	0.68	0.11	0.11	5.0	5.0	0.68	7.13	1.10	12	3.42	126.00	125.80	130.00	126.66	130.05	126.66
77	CB-33	70	6.770	0.13	0.13	0.67	0.09	0.09	5.0	5.0	0.55	4.69	0.70	12	1.48	126.00	125.90	130.00	126.99	130.05	126.99
78	DMH-38	65	61.040	0.00	1.11	0.00	0.00	0.69	0.0	8.5	3.76	5.95	4.80	12	2.38	123.85	122.40	127.50	124.84	126.90	124.29
79	DMH-37	78	124.040	0.00	1.11	0.00	0.00	0.69	0.0	7.6	3.89	5.06	3.57	15	0.52	124.50	123.85	129.05	125.43	127.50	125.10
80	DMH-36	79	138.400	0.00	0.82	0.00	0.00	0.50	0.0	6.7	2.94	2.74	3.74	12	0.51	125.20	124.50	129.55	126.48	129.05	125.68
81	DMH-35	80	127.250	0.00	0.60	0.00	0.00	0.36	0.0	5.9	2.18	2.76	2.78	12	0.51	125.85	125.20	130.05	127.10	129.55	126.70
82	CB-38	81	130.000	0.39	0.39	0.55	0.21	0.21	5.0	5.0	1.35	2.73	1.79	12	0.50	126.50	125.85	130.50	127.37	130.05	127.22
83	CB-41	79	6.460	0.29	0.29	0.65	0.19	0.19	5.0	5.0	1.18	10.73	1.87	12	7.74	125.00	124.50	129.00	125.64	129.05	125.68
84	CB-40	80	6.460	0.22	0.22	0.65	0.14	0.14	5.0	5.0	0.90	8.31	1.14	12	4.64	125.50	125.20	129.50	126.70	129.55	126.70
85	CB-39	81	5.350	0.21	0.21	0.70	0.15	0.15	5.0	5.0	0.92	6.46	1.18	12	2.80	126.00	125.85	130.00	127.23	130.05	127.22
86	DMH-50	Outfall	67.160	0.00	0.75	0.00	0.00	0.43	0.0	5.4	2.64	3.80	4.58	12	0.97	121.65	121.00	125.75	122.34	123.50	121.69
87	CB-53	86	11.130	0.43	0.43	0.55	0.24	0.24	5.0	5.0	1.49	6.33	3.10	12	2.70	121.95	121.65	125.95	122.47 j	125.75	122.34
88	CB-52	86	57.410	0.32	0.32	0.60	0.19	0.19	5.0	5.0	1.21	2.79	2.71	12	0.52	121.95	121.65	125.95	122.42	125.75	122.34

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NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
89	DMH-45	Outfall	137.320	0.00	3.34	0.00	0.00	2.65	0.0	9.3	13.92	17.49	6.18	24	0.51	127.60	126.90	131.25	128.98	128.90	128.22
90	DMH-44	89	155.480	0.00	3.22	0.00	0.00	2.57	0.0	8.3	14.05	17.58	5.64	24	0.51	128.40	127.60	133.50	129.73 j	131.25	129.29
91	DMH-43	90	96.530	0.00	2.77	0.00	0.00	2.28	0.0	7.6	12.77	10.36	7.23	18	0.83	129.20	128.40	133.40	131.57	133.50	130.35
92	DMH-43A	91	142.390	0.00	1.94	0.00	0.00	1.53	0.0	6.7	8.92	15.91	2.84	24	0.42	129.80	129.20	133.80	132.57	133.40	132.38
93	CB-43	92	108.000	0.00	1.07	0.00	0.00	0.90	0.0	6.0	5.38	11.99	3.05	18	1.11	131.00	129.80	134.50	132.93	133.80	132.69
94	CB-44A	93	145.150	0.95	0.95	0.86	0.82	0.82	5.0	5.0	5.13	11.37	3.25	18	1.00	132.20	130.75	134.50	133.33	134.50	133.08
95	CB-54	89	108.680	0.12	0.12	0.65	0.08	0.08	5.0	5.0	0.49	2.98	0.62	12	0.60	128.25	127.60	132.25	129.31	131.25	129.29
96	CB-46	90	69.590	0.45	0.45	0.65	0.29	0.29	5.0	5.0	1.84	2.74	2.34	12	0.50	128.75	128.40	132.25	130.51	133.50	130.35
97	CB-43	92	21.710	0.87	0.87	0.73	0.64	0.64	5.0	5.0	3.99	4.75	3.25	15	0.46	129.90	129.80	133.40	132.76	133.80	132.69
98	CB-45	91	35.992	0.20	0.83	0.90	0.18	0.75	5.0	7.3	4.25	7.34	2.41	18	0.42	129.35	129.20	133.55	132.43	133.40	132.38
99	DMH-42	98	61.058	0.19	0.63	0.90	0.17	0.57	5.0	6.9	3.28	8.61	1.86	18	0.57	129.70	129.35	133.80	132.53	133.55	132.48
100	DMH-41	99	278.000	0.44	0.44	0.90	0.40	0.40	5.0	5.0	2.49	5.63	2.03	15	0.65	131.50	129.70	135.50	132.93	133.80	132.58
101	CB-44	93	30.312	0.12	0.12	0.65	0.08	0.08	5.0	5.0	0.49	13.02	0.40	15	3.46	131.80	130.75	0.00	133.08	134.50	133.08
102	DMH-47	Outfall	29.170	0.00	3.00	0.00	0.00	1.80	0.0	20.3	6.82	11.54	3.86	18	1.03	128.50	128.20	133.55	130.34	130.20	130.23
103	DMH-46	102	112.150	0.00	0.59	0.00	0.00	0.45	0.0	5.3	2.82	2.82	3.59	12	0.54	129.10	128.50	132.05	131.15	133.55	130.56
104	CB-50	103	6.890	0.27	0.27	0.90	0.24	0.24	5.0	5.0	1.53	4.65	1.94	12	1.45	129.20	129.10	132.00	131.36	132.05	131.34
105	FES-13	102	46.210	2.41	2.41	0.56	1.35	1.35	20.0	20.0	5.14	7.28	4.19	15	1.08	129.00	128.50	131.00	130.81	133.55	130.56
106	CB-49	103	42.330	0.32	0.32	0.66	0.21	0.21	5.0	5.0	1.33	2.65	1.69	12	0.47	129.30	129.10	132.00	131.40	132.05	131.34
107	CB-47	Outfall	18.000	0.53	0.53	0.13	0.07	0.07	10.0	10.0	0.35	7.04	0.45	12	3.33	127.60	127.00	130.60	128.84	129.00	128.84
108	FES-12	Outfall	54.680	1.58	1.58	0.64	1.01	1.01	15.0	15.0	4.41	4.67	6.01	12	1.46	129.00	128.20	131.00	129.88	130.50	129.08
109	CB-48	Outfall	6.000	0.62	0.62	0.58	0.36	0.36	5.0	5.0	2.26	4.98	4.27	12	1.67	128.30	128.20	131.30	128.94	130.50	128.84
110	DMH-49	Outfall	17.390	0.00	0.49	0.00	0.00	0.42	0.0	5.4	2.59	5.07	3.92	12	1.73	127.70	127.40	132.25	128.38 j	129.00	128.38

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NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
111	CB-51	110	61.500	0.34	0.34	0.86	0.29	0.29	5.0	5.0	1.84	2.69	3.52	12	0.49	128.00	127.70	131.20	128.59	132.25	128.38
112	TR-DR	110	15.000	0.15	0.15	0.85	0.13	0.13	5.0	5.0	0.80	5.46	2.17	12	2.00	128.00	127.70	131.90	128.38 j	132.25	128.38

Project File: Wayland TC.stm | Number of lines: 112 | Date: 05-27-2008

NOTES: ** Critical depth

APPENDIX E: LONG TERM POLLUTION PREVENTION PLAN

LONG TERM POLLUTION PREVENTION PLAN (LTPPP)
MATERIALS MANAGEMENT PLAN

Applicant: Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Prepared by: R.J. O'Connell & Associates, Inc.
80 Montvale Avenue
Stoneham, MA

A. PROGRESS DRAWING

The Civil Construction plan set includes an Erosion and Sediment Control Plans which shall be posted inside the job trailer wall. This plan will be used to record the locations of the Job Trailer, Sanitary Waste Facilities, Solid Waste Facilities, Fuel Storage Area, Equipment Service Area, and Concrete Washout Pit. Any time any of these facilities are relocated on the site, a new location will be noted on the drawing.

B. MATERIALS COVERED

The following materials or substances are expected to be present onsite during construction:

Concrete/Additives/Wastes	Cleaning solvents
Detergents	Petroleum based products
Paints/Solvents	Pesticides
Acids	Fertilizers
Solid and construction wastes	Sanitary wastes
Soil stabilization additives	

C. MATERIALS MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The Contractor's Superintendent will be responsible for ensuring that these procedures are followed:

1. Good Housekeeping
   The following good housekeeping practices will be followed onsite during construction:
   a) An effort will be made to store only enough products required to do the job.
   b) All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
   c) Products will be kept in their original containers with the original manufacturer's label in legible condition.
   d) Substances will not be mixed with one another unless recommended by the manufacturer.
   e) Whenever possible, all of a product will be used up before disposing of the container.
   f) Manufacturer's recommendations for proper use and disposal will be followed.

g) The Contractor’s Superintendent will be responsible for daily inspections to ensure proper use and disposal of materials.

2. Hazardous Substances

These practices will be used to reduce the risks associated with Hazardous Substances. Material Safety Data Sheets (MSDS's) for each product with hazardous properties that is used at the Project will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the job trailer at the Project. Each employee who must handle a Hazardous Substance will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

a) Products will be kept in original containers with the original labels in legible condition.
b) Original labels and MSDS's will be procured and used for each product.
c) If surplus product must be disposed manufacturer's and local/state/federal required methods for proper disposal must be followed.

3. Hazardous Waste

It is imperative that all Hazardous Waste be properly identified and handled in accordance with all applicable Hazardous Waste Standards, including the storage, transport and disposal of the Hazardous Wastes. There are significant penalties for the improper handling of Hazardous Wastes. It is important that the Site Superintendent seeks appropriate assistance in making the determination of whether a substance or material is a Hazardous Waste. For example, Hazardous Waste may include certain Hazardous Substances, as well as pesticides, paints, paint solvents, cleaning solvents, pesticides, contaminated soils, and other materials, substances or chemicals that have been discarded (or are to be discarded) as being out-of-date, contaminated, or otherwise unusable, and can include the containers for those substances; other materials and substances can also be or become Hazardous Wastes, however. The Contractor's Superintendent is also responsible for ensuring that all site personnel are instructed as to these Hazardous Waste requirements and also that the requirements are being followed.

4. Product Specific Practices

The following product specific practices will be followed on the job site:

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Petroleum storage tanks shall be located at minimum 100 linear feet from drainage ways, inlets and surface waters. Any petroleum storage tanks stored onsite will be located within a containment area that is designed with an impervious surface between the tank and the ground. The secondary containment must be designed to provide a containment volume that is equal to 110% of the volume of the largest tank. Any mobile petroleum tank shall be parked in a vehicular service area surrounded by a berm that provides a containment volume that is equal to 110% of the volume of the largest tank. Containment must provide sufficient volume to contain expected precipitation and 110% volume of the largest tank.

Accumulated rainwater or spills from containment areas are to be promptly pumped into a containment device and disposed of properly by a licensed Hazardous Waste transporter. Drip pans shall be provided for all dispensers. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations. The location of any fuel tanks and/or equipment storage areas must be identified on the Erosion Control Plan by the Contractor once the locations have been determined.

Fertilizers

Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked in the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints, Paint Solvents, and Cleaning Solvents

All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or state and federal regulations.

Concrete Wastes

Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water on the site, but only in specifically designated diked and impervious washouts which have been prepared to prevent contact between the concrete wash and storm water. Waste generated from concrete wash water shall not be allowed to flow into drainage ways, inlets, receiving waters or highway right of ways, or any location other than the designated concrete washout. Waste concrete may be poured into forms to make riprap or other useful concrete products. Proper signage designating the “Concrete Washout” shall be placed near the facility. Concrete Washouts shall be located at minimum 100 linear feet from drainage ways, inlets and surface waters.

The hardened residue from the concrete wash out diked areas will be disposed of in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor. Maintenance of the washout is to include removal of hardened concrete. Facility shall have sufficient volume to contain all the concrete waste resulting from washout and a minimum freeboard of 12 inches. Facility shall not be filled beyond 95% capacity and shall be cleaned out once 75% full unless a new facility is constructed. The Contractor’s Superintendent will be responsible for seeing that these procedures are followed.

Saw-cut Portland Cement Concrete (PCC) slurry shall not be allowed to enter storm drains or Watercourses. Saw-cut residue should not be left on the surface of pavement or be allowed to flow over and off pavement. Residue from saw-cutting and grinding shall be collected by vacuum and disposed of in the concrete washout facility.

The Project may require the use of multiple concrete wash out areas. These concrete wash out areas are to be made available to all trades and subcontractors working on the Project. The Contractor may designate certain wash out areas for particular trades or subcontractors, but the Contractor is responsible for the management of all concrete washout areas on the Project. All concrete wash out areas will be located in an area where the likelihood of the area contributing to storm water discharges is negligible. If required, additional BMPs must be implemented to prevent concrete wastes from contributing to storm water discharges. The location of concrete wash out area(s) must be identified on the Civil plans by the Contractor once the locations have been determined. In addition, a standard detail on the construction of the concrete wash out is included in the Civil detail sheets.

5. Solid and Construction Wastes

All waste materials will be collected and stored in an appropriately covered container and/or securely contained metal dumpster rented from a local waste management company which must be a licensed solid waste management company. The dumpster will comply with all local and state solid waste management regulations.

All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of once per week or more often if necessary. Once building construction has commenced, the dumpster will be emptied a minimum of once per week or when 95% full, or more often if necessary to prevent over-flow and the trash will be hauled to a landfill. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal.

All waste dumpsters and roll-off containers will be located in an area where the likelihood of the containers contributing to storm water discharges is negligible. Solid waste containers shall be located no less than 50 feet from any storm inlet, drainage way, or surface water. If required, additional BMPs must be implemented, such as gravel bags, wattles, Dikes, berms, and fences around the base, to prevent wastes from contributing to storm water discharges. The location of waste dumpsters and roll-off containers must be identified on the Civil plans by the Contractor once the locations have been determined.

6. Sanitary Wastes

A minimum of one portable sanitary unit will be provided for every ten (10) workers on the site. All sanitary waste will be collected from the portable units a minimum of one time per week by a licensed portable facility provider in complete compliance with local and state regulations.

All sanitary waste units will be located in an area where the likelihood of the unit contributing to storm water discharges is negligible. Additional containment BMPs must be implemented, such as gravel bags or specially designed plastic skid containers around the base, to prevent wastes from contributing to storm water discharges. The location of sanitary waste units must be identified on the Civil plans by the contractor once the locations have been determined

7. Contaminated Soils

Any contaminated soils (resulting from spills of Hazardous Substances or Oil or discovered during the course of construction) which may result from Construction Activities will be contained and cleaned up immediately in accordance with the procedures given in the Materials Management Plan and in accordance with applicable state and federal regulations. Contaminated soils not resulting from Construction Activities, or which pre-existed Construction Activities, but which are discovered by virtue of Construction Activities, should be reported in the same manner as spills, but with sufficient information to indicate that the discovery of an existing condition is being reported. If there is a release that occurs by virtue of the discovery of existing contamination, this should be reported as a spill, if it otherwise meets the requirements for a reportable spill.

D. SPILL PREVENTION AND RESPONSE PROCEEDURES

The Contractor will train all personnel in the proper handling and cleanup of spilled Hazardous Substances or Oil. No spilled Hazardous Substances or Oil will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the Contractor's Superintendent to be properly trained, and to train all personnel in spill prevention and clean up procedures.

1. In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil to come into contact with storm water, the following steps will be implemented:

   a) All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
   b) The minimum practical quantity of all such materials will be kept at the Project.
   c) A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
   d) Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.
   e) It is the Contractors responsibility to ensure that all Hazardous Waste discovered or generated at the Project site is disposed of properly by a licensed hazardous material disposal company. The Contractor is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authority.

2. In the event of a spill of Hazardous Substances or Oil, the following procedures must be followed:

   a) All measures must be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to storm water or off-site. (The spill area must be kept well ventilated and personnel must wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)
   b) For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.
   c) For spills greater than five (5) gallons of material immediately contact the MA DEP Hazardous Waste Incident Response Group at (617) 792-7653 and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired.
   d) If there is a Reportable Quantity (RQ) release during the construction period, then the National Response Center will be notified immediately at (800) 424-8802; within 14 days a report will be submitted to the EPA regional office describing the release, the date and circumstances of the

release and the steps taken to prevent another release. This Stormwater Pollution Prevention Plan must be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

3. The Contractor's Superintendent will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the office trailer onsite.

E. ILLICIT DISCHARGE STATEMENT- CONTROL OF NON-STORMWATER DISCHARGES

Certain types of discharges are allowable under the U.S. Environmental Protection Agency Construction General Permit, and it is the intent of this LTPPP to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place.

APPENDIX F: CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION PLAN

CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION PLAN

CONTACT INFORMATION/ RESPONSABLE PARTIES

Operators:

Owner
Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Contractor
Not selected at this time

Plan Prepared by
R.J. O'Connell & Associates, Inc.
80 Montvale Avenue
Stoneham, MA 02180

I. PROJECT DESCRIPTION

The project site has an area of approximately 56.9 acres and is located at 400 Boston Post Road, in Wayland, MA (See Figure 1 - Locus Map). The site is bound by Route 20 (Boston Post Road) to the south, the Wayland Business Center property to the North, Sudbury River to the west and the Wayland meadows property and Route 27 (Old Sudbury Road) to the East. There are wetland areas on the site. The larger wetland is located at the western portion of the site adjacent to Sudbury River, two smaller wetland areas are at the north east portion of the site adjacent to the Wayland Business Center property, and on the south east portion of site adjacent to Route 20.

Approximately 25 acres of the site is currently developed. The existing development contains a building formerly occupied by Raytheon with a footprint area of ±272,700 square feet and a ±10,500 square foot building formerly utilized as a daycare center and associated parking. There is a Wastewater Treatment facility on site which is owned and operated by the Town of Wayland. The existing topography of the project site generally slopes east to west and ranges from elevation ±146 at the eastern property line adjacent to the Wayland Meadows Property to elevation ±116 at the western side of the site in the large wetland area adjacent to Sudbury River.

The proposed development program consists of demolishing the existing ±272,700 square foot building and constructing a mixed use development consisting of residential, municipal and retail use buildings, with associated parking facilities, utilities, and stormwater collection system (See Figure 2 - Site Plan). The stormwater management system for the proposed project has been designed in accordance with the MADEP's Stormwater Management Policy and Standards and the Town of Wayland's Wetlands and Water Resources Bylaw Chapter 194 Rules and Regulations.

Stormwater quality control will be achieved through a program of Best Management Practices (BMP's). The proposed stormwater management system will significantly improve the quality of the stormwater runoff. The existing pavement runoff drains to catch basins which direct runoff to wetland resource areas without additional water quality treatment. The proposed stormwater management system for the project will include new catch basins with deep sumps and hoods, and the use of innovative low impact development (LID) techniques.

Low Impact Development is a stormwater management approach with the goal to mimic the site's pre-development hydrology. This is done by using design techniques that infiltrate, filter, store, and detain water throughout the site using decentralized micro-scale controls. LID includes structural and non-structural strategies such as retention areas, reduction of impervious surfaces, lengthening of flow paths, and the preservation of existing vegetation and landscape features. Redevelopment and improving stormwater quality of existing sites, and energy and water conservation are also examples of LID techniques.

LID techniques proposed for the project include the use of water quality swales, rain gardens, and bio-retention basins to increase times of concentration, promote groundwater recharge, and enhance water quality. The water quality swales will be planted with grass on the bottom and sides to slow the runoff velocity and filter pollutants. The rain gardens and bio-retention basins will be planted with a combination of grasses, perennials, shrubs, and small trees. The clean stormwater runoff from the building rooftops will be directed to the water quality swales and bio-retention basins to provide additional groundwater recharge.

II. EROSION AND SEDIMENT CONTROL BMPS

A. MINIMIZE DISTURBED AREA AND PROTECT NATURAL FEATURES AND SOIL

Prior to any construction activity, silt fence shall installed at the limits of the work area and filter bags installed in existing catch basins within the construction site area as shown on the plans. All construction activities shall occur within the limits of the silt fence as shown on the attached Erosion Control Plans. See Appendix B Drawings C-2A and C-2B for Erosion Control Plans.

B. PHASE CONSTRUCTION ACTIVITY

The following phasing is one possible sequence of construction. The contractor, upon approval from the owner's on-site erosion control monitor, may divert from this sequence in order to accommodate specific situations that may occur once construction has commenced. Any changes shall be approved by the owner's on site erosion control monitor and conform to the DEQE's (D.E.P.) Erosion and Sedimentation Control Guidelines, August 1983 and USDA S.C.S. Erosion and Sediment Control in Site Development, Massachusetts Conservation Guide, September 1983 and all local municipal regulations.

Phase I

Phase 1 erosion controls will be installed prior to initiating the major earthwork activity at the site. The following measures will be installed and maintained:

- Prior to any construction activity, silt fencing shall be installed at the limits of the work area as shown on the plans. The silt fence may be installed in stages, but must be in place prior to disturbance of soils within the area draining to the silt fence.

- Stabilized construction entrances shall be installed at the pavement limits as shown on the drawings. The construction entrance locations shall be adjusted as necessary as construction proceeds.

- Install filter bags on all existing catch basins within the construction area until the site is stabilzed.

- Phase 1 erosion controls must remain in place during clearing and grubbing activities and the preliminary cut and fill operation. Cuts and fills shall be performed in a manner such that runoff will continue to be directed toward erosion and sediment controls. Fill shall be placed in lifts sloping towards the control measures until it becomes practical and necessary to relocate them. As the excavated and filled surfaces reach subgrade, Phase 2 erosion control measures will be installed.

Phase II

Phase 2 erosion controls shall consist of similar controls to Phase 1, but with new locations. The following measures shall be applied:

- All silt fence shall remain in place until the final stabilization of the site.

- As side slopes reach final subgrade, and where these slopes are outside the limits of paving or other structural surfacing, the slopes shall be topsoiled, seeded for permanent vegetative cover and mulched. All proposed slopes steeper than 3:1 shall be stabilized with erosion control matting and protected from erosion. Topsoil placement and seeding shall take place within 30 days of completion of subgrade at these locations, unless the time of year prevents application of permanent seed. In that case, the exposed slopes shall be mulched for winter protection, and if seasonal conditions permit, a temporary seed mix applied.

Phase III

Phase 3 erosion controls comprise measures required to control erosion from surfaces that are near to final grade and are waiting final stabilization by pavement, permanent landscaping, or other surfacing. These measures shall include the following:

- Silt fence shall remain until the tributary drainage areas are stabilized.

General Measures During All Phases:

In addition to the erosion controls listed for in Phases 1, 2, and 3, the following measures shall be employed throughout all phases:

- The contractor shall minimize the area of disturbed soil and efforts shall be made to limit the time of exposure of disturbed areas.

- Erosion control measures shall be routinely inspected and cleaned, repaired or replaced as necessary. The proponent will monitor the measures for proper maintenance and operation throughout the construction period will retain a professional environmental scientist or other qualified professional.

- Where construction activities have permanently ceased or have temporarily been suspended for more than seven days, or when final grades are reached in any portion of the site, stabilization practices shall be implemented within three days. Areas which remain disturbed but inactive for at least thirty days shall receive temporary seeding in accordance with the DEP Erosion and Sedimentation Control Guidelines, August 1983 and USDA S.C.S. Erosion and Sediment Control in Site Development, Massachusetts Conservation Guide, September 1983 and all local municipal regulations.

- Stockpiled soil materials shall be contained within staked haybales and/or silt fence.

- Any dewatering activities in which water will be released to a resource area or to a storm drain shall use a settling pond or similar device to remove sediment before water is released.

Structural Practices:

Structural practices which will be used on this site to divert stormwater flows away from exposed soils, store stormwater runoff, and discharge stormwater from the site include but are not limited to; silt fences, stacked haybales, drainage swales, sediment traps, check dams, catch basins, drainage pipe, manholes, temporary sediment basins, outlet control structure, permanent seeding and landscaping treatments (including permanent mulches, as applicable), and structural surfaces such as pavements. The site work drawings detail and show locations of these structural practices.

C. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT

BMP Description: Sedimentation filter bag	
Installation Schedule:	At commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

D. ESTABLISH PERIMETER CONTROLS AND SEDIMENT BARRIERS

BMP Description: Silt fence	
Installation Schedule:	Prior to any construction activity
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

E. STABILIZE SOILS

BMP Description: Mulch, hay or seeding for temporary vegetation of disturbed or exposed areas	
☐ ***Permanent***	☒ ***Temporary***
Installation Schedule:	As needed. No areas shall be left disturbed for longer than necessary to complete the work associated with that area.
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

F. PROTECT SLOPES

BMP Description: Erosion control matting for slopes steeper than 3:1	
Installation Schedule:	During construction activities associated with the slope
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

G. PROTECT STORM DRAIN INLETS

BMP Description: Sedimentation filter bag	
Installation Schedule:	At commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

H. RETAIN SEDIMENT ON-SITE

BMP Description: Sedimentation filter bag	
Installation Schedule:	At commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

I. ESTABLISH STABILIZED CONSTRUCTION EXITS

BMP Description: Construction entrance vehicle tracking pads	
Installation Schedule:	Prior to the commencement of any earthwork operations
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

III. GOOD HOUSEKEEPING BMPS

A. MATERIAL HANDLING AND WASTE MANAGEMENT

BMP Description: Solid waste containers / dumpsters	
Installation Schedule:	At commencement of construction activities
Maintenance and Inspection:	As required

B. ESTABLISH PROPER BUILDING MATERIAL STAGING AREAS

BMP Description: Silt fences and haybales at all stockpile areas of construction and excavated material	
Installation Schedule:	At the commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

C. DESIGNATE WASHOUT AREAS

***BMP Description:** Equipment washing shall occur only within drainage areas with temporary sedimentation basins.*	
Installation Schedule:	At the commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

D. ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES

***BMP Description:** Fueling operations, including the service and storage of equipment associated with fueling, shall occur a minimum of 100 feet from the edge of a resource area and within a drainage areas with temporary sedimentation basins.*	
Installation Schedule:	At the commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

E. CONTROL EQUIPMENT/VEHICLE WASHING

***BMP Description:** Vehicle washing shall occur only within drainage areas with temporary sedimentation basins.*	
Installation Schedule:	At the commencement of construction activities
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

F. SPILL PREVENTION AND CONTROL PLAN

A spill contingency plan will be implemented during construction, including the following provisions:

- Equipment necessary to quickly attend to inadvertent spills or will be stored on-site in a secure but accessible location. Such equipment will include:

  1. safety goggles
  2. chemically resistant gloves and overshoe boots
  3. water and chemical fire extinguishers
  4. sand and shovels
  5. suitable absorbent materials
  6. storage containers
  7. first aid equipment

- Spills or leaks will be treated properly in accordance with material type, volume of spillage and location of the spill. Mitigation will include:

  1. preventing further spillage

2. containing the spilled material in the smallest practical area
3. removing spilled material immediately in a safe and environmentally sound manner
4. mitigating any damage to the environment

- For spills of less than 5 gallons of material, proceed with source control and containment and clean up with absorbent materials or other applicable means, unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional response contractor.

- Spills of toxic or hazardous materials will be reported to the appropriate federal, state and/or local government agency, regardless of the size of the spill. Spills of amounts that exceed reportable quantities of certain substances specifically mentioned in federal regulations 40 CFR 110, 40 CFR 117 and 40 CFR 302 must be immediately reported to the EPA National Response Center, telephone 1-800-424-8802.

G. ANY ADDITIONAL BMPS

BMP Description: Adequate sanitation facilities for on-site construction crews	
Installation Schedule:	At the commencement of construction activities
Maintenance and Inspection:	As required

BMP Description: Dust control through watering	
Installation Schedule:	As required throughout earthwork operations
Maintenance and Inspection:	As required

H. ALLOWABLE NON-STORMWATER DISCHARGE MANAGEMENT

BMP Description: All measures used to mitigate sedimentation shall be used to control water associated with dust control activities	
Installation Schedule:	As outlined in above measures
Maintenance and Inspection:	Once weekly and within 24 hours of the end of a rainfall event that is 0.5 inches or greater

APPENDIX G: STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN

STORMWATER MANAGEMENT SYSTEM (SMS)
OPERATION AND MAINTENANCE PLAN

Applicant: Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Prepared by: R.J. O'Connell & Associates
80 Montvale Avenue
Stoneham, MA

A. SMS DESCRIPTION

The on-site drainage system, which collects and conveys storm water runoff from the parking lot consists of deep sump catch basins with oil/grease hoods on the outlets, drain manholes, closed drainage piping, water quality swales, rain gardens, bioretention basins and curbing along pavement edges.

B. OPERATION AND MAINTENANCE RESPONSIBILITY

During construction:
Site Contractor (Not Selected at this time)

Post construction**:**
Twenty Wayland, LLC

C. INSPECTION AND MAINTENANCE SCHEDULE

Schedule During Construction:

See Erosion Control Notes (below). These notes are also included on the site design plans. The NPDES general permit which is prepared prior to construction will also include schedule information for the inspection and maintenance of erosion controls during and immediately following construction.

EROSION CONTROL NOTES:

1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH D.E.Q.E.'S (DEP) EROSION AND SEDIMENTATION CONTROL GUIDELINES, AUGUST 1983, THE U.S.D.A. S.C.S. EROSION AND SEDIMENT CONTROL IN SITE DEVELOPMENT, MASSACHUSETTS CONSERVATION GUIDE, SEPTEMBER 1983 AND ALL LOCAL MUNICIPAL REGULATIONS.

2. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE COMMENCEMENT OF ANY SITE WORK OR EARTHWORK OPERATIONS,

SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITE WORK IS COMPLETE AND GROUND COVER IS ESTABLISHED.

3. STOCKPILES SHALL BE SURROUNDED ON THEIR PERIMETERS WITH STAKED HAY BALES AND/OR SILTATION FENCES TO PREVENT AND/OR CONTROL SILTATION AND EROSION.

4. TOPS OF STOCKPILES SHALL BE COVERED IN SUCH A MANNER THAT STORMWATER DOES NOT INFILTRATE THE MATERIALS AND THEREBY RENDER THE SAME UNSUITABLE FOR FILL USE.

5. ALL DISTURBED OR EXPOSED AREAS SUBJECT TO EROSION SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER. WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED OR HAVE TEMPORARILY BEEN SUSPENDED FOR MORE THAN FOURTEEN DAYS, OR WHEN FINAL GRADES ARE REACHED IN ANY PORTION OF THE SITE, STABILIZATION PRACTICES SHALL BE IMPLEMENTED WITHIN THREE DAYS. AREAS WHICH REMAIN DISTURBED BUT INACTIVE FOR AT LEAST FOURTEEN DAYS SHALL RECEIVE TEMPORARILY SEEDING IN ACCORDANCE WITH MASSACHUSETTS DEP EROSION AND SEDIMENT CONTROL GUIDELINES. IN ALL CASES, STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE.

6. EARTHWORK ACTIVITY ON THE SITE SHALL BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO THE TEMPORARY DRAINAGE SWALES & SEDIMENT BASINS.

7. THE LOCATION OF TEMPORARY DRAINAGE SWALES AND SEDIMENTATION TRAPS SHALL BE REVISED AS REQUIRED AS CONSTRUCTION PROGRESSES

8. HAYBALES AND/OR FILTER BAGS SHALL BE PLACED AROUND CATCH BASINS AS REQUIRED DURING CONSTRUCTION.

9. ALL EROSION CONTROL MEASURES SHALL BE ROUTINELY INSPECTED OR A WEEKLY BASIS (ONCE EVERY SEVEN DAYS), CLEANED AND REPAIRED OR REPLACED AS NECESSARY THROUGHOUT ALL PHASES OF CONSTRUCTION. IN ADDITION, INSPECTION SHALL TAKE PLACE AFTER EACH RAINFALL EVENT. THE CONTRACTOR SHALL STRICTLY ADHERE TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) DURING CONSTRUCTION OPERATIONS.

10. ALL PROPOSED SLOPES (EXCLUDING RIP RAP SLOPES) STEEPER THAN 3H:1V SHALL BE STABILIZED WITH A CURLEX EROSION CONTROL MATTING BY AMERICAN EXCELSIOR COMPANY (OR EGINEER APPROVED EQUAL) PRIOR TO HYDROSEEDING AND PROTECTED FROM EROSION.

11. THE CONTRACTOR SHALL KEEP ON SITE AT ALL TIMES ADDITIONAL HAYBALES AND EXTRA SILTATION FENCING FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER AND/OR CONSERVATION COMMISSION AGENT TO MITIGATE ANY EMERGENCY CONDITION.

12. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ANY PERMITS AND/OR CONNECTION FEES REQUIRED TO CARRY OUT THE WORK INCLUDING BUT NOT LIMITED TO DEMOLITION.

13. THE LIMIT OF WORK LINE FOR THE AREA TO BE CLEARED AND GRUBBED SHALL BE THE SAME AS THE LIMIT OF WORK LINE NECESSARY FOR GRADING PURPOSES, (I.E.., THE GRADING LIMITS AROUND THE PERIMETER OF THE PROJECT AREA).

14. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AS DETERMINED BY THE ENGINEER OR OWNER'S REPRESENTATIVE.

15. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY.

16. CATCH BASINS WHICH SERVE AS TEMPORARY SEDIMENT TRAPS MUST BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT. SEDIMENT WILL BE REMOVED FROM EACH BASIN WHEN SEDIMENT HAS ACCUMULATED TO WITHIN 1' BELOW THE INVERT ELEVATION OF THE OUTFALL PIPE.

17. UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

18. ALL CONSTRUCTION SHALL MEET OR EXCEED THE TOWN OF WAYLAND'S ENGINEERING DEPARTMENT SPECIFICATIONS.

19. ALL SLOPES EXCEEDING FIFTEEN (15) PERCENT RESULTING FROM THE SITE GRADING SHALL BE EITHER COVERED WITH SIX (6) INCHES OF TOPSOIL AND PLANTED WITH A VEGETATIVE COVER SUFFICIENT TO PREVENT EROSION OR BE STABILIZED BY A RETAINING WALL.

20. DUST CONTROL SHALL BE USED DURING GRADING OPERATIONS. DUST CONTROL METHODS SHALL CONSIST OF DAMPENING THE GROUND WITH WATER. IF WATER DOES NOT PROVIDE ADEQUATE DUST CONTROL, AN EMULSION SOIL STABLIZER SHALL BE APPLIED TO SUSCEPTIBLE SOILS.

21. THE CONTRACTOR SHALL BE AWARE THAT SOIL, GRADES AND WETLANDS PROXIMITY AT THIS SITE MAKE IT PARTICULARLY SUSCEPTIBLE TO SOIL EROSION AND SENSITIVE TO IT'S CONSEQUENCES. IT SHOULD BE NOTED THAT THE EROSION CONTROL MEASURES AS SHOWN ON THE DRAWINGS DEPICT THE MINIMUM REQUIRED CONTROL AND ARE REPRESENTATIVE OF A SINGLE STAGE OF CONSTRUCTION FOR EACH PHASE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITING, RELOCATION AND AUGMENTATION OF EROSION CONTROL DEVICES AS THE PROJECT PROGRESSES AND SITE DRAINAGE CONDITIONS CHANGE.

22. THE CONTRACTOR SHALL ANTICIPATE AND MODIFY EROSION CONTROL MEASURES BASED ON PAST AND CURRENT WEATHER CONDITIONS, SEASON AND EXPECTED FUTURE CONSTRUCTION ACTIVITIES.

23. THE CONTRACTOR SHALL MINIMIZE THE AREA OF DISTURBED SOIL. EFFORTS SHALL BE MADE TO LIMIT THE TIME OF EXPOSURE OF DISTURBED AREAS.

24. THE CONTRACTOR SHALL AT HIS EXPENSE SURVEY AND MARK OUT IN THE FIELD THE LIMITS OF CLEARING (I.E. HAYBALE/SILTFENCE LINE) AND THE WETLAND BUFFER BOUNDARY FOR APPROVAL BY THE TOWN PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING ACTIVITIES.

25. THE CONTRACTOR SHALL NOTIFY THE TOWN'S PLANNING STAFF AND CONSERVATION AGENT AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF SITEWORK.

26. PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AT THE SITE, THE CONTRACTOR SHALL ENGAGE AN INDIVIDUAL WITH SPECIFIC PROFESSIONAL TRAINING AND EXPERTISE IN EROSION AND SEDIMENT CONTROL. THE EROSION CONTROL MONITOR SHALL PREPARE A WEEKLY REPORT WHICH SHALL BE KEPT ON SITE AT ALL TIMES AND SHALL BE SHOWN TO LOCAL, STATE AND FEDERAL AGENTS UPON REQUEST. THIS REPORT SHALL INDICATE THE STATUS OF THE EROSION CONTROLS AND ANY MAINTENANCE REQUIRED AND PERFORMED. THIS REPORT SHALL CONFORM TO THE REQUIREMENTS OF THE EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT.

27. HAYBALE DIKES SHALL BE CONSTRUCTED AT ALL EXISTING & PROPOSED CATCH BASINS LOCATED IN FILL AREAS & SUBJECT TO STORMWATER RUN-OFF FROM PROPOSED FILL AREAS DURING CONSTRUCTION, OR AS DIRECTED BY THE OWNER/ENGINEER. NO SEDIMENTS SHALL ENTER THE ON-SITE DRAINAGE SYSTEM AT ANY TIME.

28. THE FOREBAY BASINS SHALL BE USED AS SEDIMENTATION BASINS THROUGHOUT CONSTRUCTION AND SHALL BE PERIODICALLY CLEANED DURING CONSTRUCTION, AND AT THE COMPLETION OF CONSTRUCTION. ALL TEMPORARY SWALES SHALL BE DIRECTED TO THE FOREBAY LOCATION WHEN POSSIBLE.

29. THE LOCATION OF HAYBALE CHECK DAMS SHALL BE FIELD VERIFIED DURING SITE PREPARATION OPERATIONS BY THE CONTRACTOR.

30. UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

Post Construction Schedule

1. A checklist of all maintenance items will be developed and used for each stormwater treatment component. Each time an inspection is completed or a maintenance procedure is performed, it will be documented on the checklist. The checklist will be kept on the project site.

2. The property owner will be financially responsible for the implementation of this plan and for future system repairs as needed.

3. Sweep parking lot and driveway areas to remove sediments before they can enter the stormwater management system, twice annually, in the early spring and late fall, and on an as needed basis at other times.

4. Inspect and clean deep sump catch basins including the oil/grease traps to prevent blockage and to remove accumulated sediments on an annual basis in the spring and in general if the depth of accumulated sediment is greater than one-half the depth of the sump.

5. Inspect and clean water quality swales and rain gardens an annual basis in the spring and on an as needed basis at other times.

6. Inspect and clean bioretention basins an annual basis in the spring and on an as needed basis at other times.

7. Inspect dumpster and compactor areas for spillage and clean as necessary.

8. Inspect landscape areas and edges of paved areas for any signs of erosion. Perform any necessary curb replacement, earth repair, reseeding or mulching upon identification.

9. Routinely pick up and remove litter from the parking areas and perimeter landscape areas. Clean leaves or trash from catch basin grates when observed.

RJ O'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND PLANNERS
80 Montvale Ave., Suite 201 Stoneham, MA 02180
phone 781-279-0180 fax 781-279-0173

September 30, 2008

Mr. John Barrows
Marchionda Associates
62 Montvale Ave
Suite I
Stoneham, MA 02180

Via Hand Delivery

RE: Phase I Site Plan II Engineering Review
Marchionda Comment Letter dated August 21, 2008
Wayland Town Center
400 Boston Post Road
06032.00

Dear Mr. Barrows:

R J O'Connell & Associates, Inc. (RJOC) is in receipt of your comment letter of August 21, 2008 regarding your review of RJOC's revised site/civil documents associated with the Wayland Town Center project situated at 400 Boston Post Rd which was resubmitted to the Planning Board on July 31, 2008.

To assist you with your review I have provided below a follow-up response to your comments on our responses to your original letter of July 25, 2008.

Site Design and Layout

1. *Typical details and specifications for both the standard duty and the heavy-duty pavements should be provided.*

   Applicant's Response: Such details are typically provided after Site Plan Approval during the Contract Document design phase.

   ***M&A**: We are unable to comment on the proposed pavement specification at this time.*

   RJOC Response: Heavy duty and standard duty pavement sections have been added to Dwg No C-12 titled "Layout & Materials Details I".

2. *Construction details indicate that two types curbing will be utilized throughout the project. The site plans should indicate locations in which the different curbing types will be installed*

   Applicant's Response: We anticipate designing Street "A" for acceptance as a public way and need to discuss with the Planning Board what the appropriate curbing types on-site should be. Once those discussions are completed the limits and types of curbing can be identified.

M&A: The type and location of curbing should be added to the site plans once determined by Planning Board.

RJOC Response:Curb types have been added to site/civil Dwg. Nos. C-5A – C-5D titled "Parking & Traffic Control Plan and detailed on Dwg. No C-12.

3. *The grading plans appear to depict retaining walls in an area that has been graded as swale. These walls are located in the rear yards of the residential buildings north of the "informal" public green.*

   Applicant's Response: These walls are an architectural design feature and are not retaining walls. The grades in these areas have been revised so that the swale is on the Town Green side of the walls, and an area drain has been added to capture drainage.

   M&A: The "architectural" walls should not create an issue as long as they do not impound or redirect stormwater on to the adjacent sidewalks. The grading in the vicinity of the area drains should be revised to insure that stormwater will be directed to the drains.

   RJOC Response: RJOC has revised Dwg No C-3A to provide a swale behind the residential units to ensure positive flow of stormwater runoff to DMH-27 & DMH-27A.

4. *The design and layout of the proposed access driveway connections to Boston Post Road have changed from the MSP plans. The access driveway layouts do not appear to match the information shown on the Boston Post Road improvement plans prepared by Vanasse & Associates. The existing conditions information provided for Boston Post Road in the areas of these driveways is limited to contour lines. Additional existing features such as the edge of pavement, utilities, and easements should be added to the grading plans.*

   Applicant's Response: The driveways have been updated so that they match the Boston Post Road improvement plans prepared by Vanasse and Associates. Existing conditions information in Boston Post Road is shown on the survey plans.

   M&A: The plans have been updated with the latest driveway pavement layout proposed at Boston Post Road. The drainage proposed in Boston Post Road has not been added to the plan set. It appears that the grading of the fore-bay east of Basin #1 is incomplete.

   The Boston Post improvements include a FES outlet terminating at the fore-bay east of Basin 1. This should be added to the plans to insure that the fore-bay will be design to accommodate this structure.

   RJOC Response: RJOC Dwg No C-3C has been revised to complete the grading of the forebay located east of Basin No. 1. In addition the FES from RT 27 which discharges into said forebay has been added to the plans.

Engineering

1. *Based on Figure 5 in the stormwater report it appears that the post-development analysis has not been updated to reflect the changes made to the municipal parking area. Drainage improvements to Boston Post Road have not been considered in the drainage calculations.*

Applicant's Response: Figure 5 has been updated to reflect the changes made to the municipal parking area. Drainage improvements to Boston Post Road have also been added to the drainage calculations.

***M&A**: The Stormwater Report and calculations have been revised as requested. The fore-bay east of Basin #1 will be receiving additional stormwater from the Boston Post Road drainage. It is recommended that the swale which will convey stormwater into Basin 1 is lined with rip-rap to prevent erosion.*

RJOC Response: RJOC Dwg No. C-3 has been revised to depict a rip-rap swale from Forebay to Basin No. 1.

2. *The watershed considered in the post development analysis of peak flows to the wetland north of the access drive to Old Sudbury Road (point #5) is inconsistent with that used in the pre-development analysis. To determine the net affects of the construction proposed in this area, both analysis should use either a build-out condition of the Wayland Commons site or an undeveloped condition. Using the build-out condition is recommended if run off from the Wayland Commons project will ultimately affect the performance and sizing of the stormwater structures in the Town Center site.*

   Applicant's Response: The stormwater management study has been revised to use the full-build out condition of the Wayland Commons site for both pre-development and post-development analysis.

   ***M&A**: The Stormwater Report and calculations have been revised as requested.*

   RJOC Response: No further action performed.

3. *The stormwater detention/infiltration structures (BMP's) have been modeled considering exfiltration through the bottom of the structures. Additional details and specifications of the design of these structures should be provided to insure proper interface with the underlying soils and long-term performance. The proper basin surface is also important to achieve the recommended draw down times.*

   Applicant's Response: Additional details of the rain gardens, bioretention areas, and water quality swales have been added to the plan set.

   ***M&A**: Typical construction details of the Rain Gardens and Bio-filter Swales have been added to the plan set. Since the watershed to the Rain Gardens is considered to be an area with higher pollutant loads and pretreatment is not proposed, the filter fabric specified should be changed to an impermeable liner.*

   Basins 2 and 3 have been changed from infiltration basins to wet basins. The wet basins will maintain standing water to elevations of the pond outlet inverts. The storage volumes below these elevations should not be considered in the modeling of these basins. The Stormwater Report and calculations should be revised accordingly.

   Construction details and specifications for the sediment traps and basins should be added to the plans.

RJOC Response: RJOC has revised the Stormwater Management calculations to confirm that the volume within basins 2 & 3 do not include the volume of standing water planned within each basin (a copy of the revised calculations are included herein). In addition details associated with the infiltration basin, wet basin, biofilter swale bmp's have been added to Dwg No C-7.

4. *Soil testing in the locations of the proposed detention/infiltration structures should be provided to show the affects of seasonal high groundwater and that the underlying soils will provide the infiltration rates assumed. It is recommended that the soil testing meets the criteria used in the DEP Stormwater Handbook.*

   Applicant's Response: Groundwater levels were determined based on monitoring wells located on the site. The monitoring well locations and groundwater levels have been added to the plan set and stormwater report. Soil infiltration rates were determined based on soil types and the Rawl's table in accordance with the DEP Stormwater Handbook.

   ***M&A**: The soil assessment logs provided are not located in many of the proposed stormwater BMP's locations. The results of the soil assessment show that the site has varying soil types and seasonal water table depths. Additional soil observation holes should be performed in the locations of the Basins, Rain Gardens, Bio-Filter Swales.*

   RJOC Response: Additional test pits were dug within the infiltration Basin Nos 4 & 5 as well as within the primary and reserve septic field areas (for location of test pits see RJOC Dwg Nos C-3A – C-3D). Copies of the test pit logs and soil permeability rates are enclosed herein.

5. *Information should be provided on the sizing and the construction specifications of the proposed forebay/sediment traps. It is recommended that the plan set include construction details of these structures.*

   Applicant's Response: Forebay sizing calculations have been added to the stormwater management study. The proposed grading in the forebay areas are indicated on the grading and drainage plans.

   ***M&A**: Fore-bay specifications and sizing calculations do not appear to have been added to the Stormwater Report or site plans.*

   RJOC Response: Forebay sizing calculations have been performed and are enclosed herein.

6. *Emergency spillways should be provided for Basins 3 & 4.*

   Applicant's Response: Emergency spillways have been added to basins 3 and 4.

   ***M&A**: The spillway size and specifications should be added to the typical construction detail for the basins.*

   RJOC Response: RJOC has added to site/civil Dwg No. C-7 a typical spillway detail.

7. *Basins 1 and 2 outfalls utilize existing drain lines. It is recommended that these lines be inspected to insure they are in satisfactory condition.*

Applicant's Response: Notes have been added to grading and drainage plans requiring site contractor to inspect and jet wash the existing drainage pipes at the outfalls to Basins 1 and 2.

***M&A**: The performance of Basin 2 is dependent on full flows through the existing 36" CMP. This drain line should be replaced if the inspection reveals that the capacity of the pipe has been compromised.*

RJOC Response: RJOC concurs with Marchionda's recommendation that upon inspection of the existing 36"drainline if it is determined that the drain line needs to be replaced, the applicant will replace said line.

8. *Pipe size and slope information for the existing and proposed pipes draining Basin 1 should be added to the drainage plans.*

Applicant's Response: Pipe size and slope has been added to the proposed drainage pipe that serves as an emergency outfall to Basin 1. It should be noted that the existing basin in this area does not have an outlet, and overflows into Old Sudbury Road.

***M&A**: A general note should be added to the plans instructing contractors to reference the Stormwater Report for drain pipe lengths and slopes.*

RJOC Response: A note has been added to RJOC Dwg No C-0 requiring the Contractor to reference the Stormwater report for drain pipe lengths and slopes. Note was added under the sub title of Grading & Drainage Notes and is number 15.

9. *The information provided for the outlet pipe to Basin 3 from the water quality swale conflicts between the plan set and the Stormwater Report.*

Applicant's Response: The drainage swale located east of Basin 3 was not modeled in the stormwater management study, which provides a conservative analysis of peak runoff. The water quality swale modeled in the stormwater management report is located south of Building 3-A, near the Boston Post Road driveway. The swales have been labeled with numbers on the plans and stormwater report for clarification.

***M&A**: The down stream end of Water Quality Swale has been revised to an Infiltration Basin (Basin #5). The Pond Report in the Stormwater Report for Basin 5 uses an 18" outlet culvert in the calculations. The plans reference a 12" CPP.*

RJOC Response: RJOC has revised Dwg. No C-3 to reflect an 18" CPP discharge pipe from Basin No. 5.

10. *The information provided for the outlet pipe of Basin 2 conflicts between the plan set and the Stormwater Report.*

Applicant's Response: The outlet pipe provided for Basin 2 has been updated in the stormwater report so that it matches the site plan.

***M&A**: The outlet invert elevation for Basin 2 still conflicts between the report and the plans. The report elevation is 118.75 and the plan set elevation is 118.50.*

RJOC Response: RJOC has revised Dwg. No. C-3 to reflect the outlet invert of the 36" drain pipe discharging from Basin No.2 to be at elevation 118.75.

11. *The outfall pipes of Basins 1 & 2 fall well below the flood elevation of the Sudbury River. The affects of tail water at the basin outlets should be considered. The results of any affects of tail water to the performance of the basins should also be considered in the analysis of the performance of the street drainage design.*

Applicant's Response: Basin No. 1 is located in an existing depression which is located below the FEMA Flood Elevation along with the portion of RT 20 which is located adjacent to Basin No 1. Under the existing condition this portion of RT 20 is subject to periodic flooding. The projects stormwater management design allows storm water from this portion of RT 20 to outlet into Basin No 1. Route 20 has a direct surface hydraulic connection to the Sudbury River flood plain on its south side which will control the street water elevation during flood events. A tail water effect at the outfall pipe which is below the street flood elevation will cause a slight reduction in discharge rates on stormwater and increase the water impoundment in Basin No. 1. and as a result this tail water effect will not increase off-site discharge rates or create additional flooding impacts to RT 20.

A tailwater effect at the discharge pipe from Basin No. 2 will result in a slightly reduced off-site discharge rate for the design storms and an increase in the impoundment of water in the basin. All catch basin rims and the finish floor elevations of planned buildings are significantly above the basin spillway elevation of 122.8 and as a result during a 100yr flood water will rise to elevation 124.0 (town of Wayland Flood Plain Elevation) which will be contained in Basin No 2 and any tailwater action that may occur at the discharge pipe will not cause on-site flooding or increased off-site discharge rates.

M&A: It appears the software used to model the performance of the drainage system has the option to consider tailwater and starting hydraulic elevations. The calculations should be updated to determine the actual affects of the flood elevations of the Sudbury River.

RJOC Response: RJOC has incorporated into the post development hydrology analysis for detention basin Nos 1 & 2 the tailwater effects from the 25yr storm event. The 25yr flood elevation was obtained by interpolating from the FIRM maps the flood elevation of the 10yr and 50yr storm events. The 25yr flood elevation was estimated to be at elevation 119.4 (NAVD 88 Base). Incorporating this tailwater elevation into the hydrology analysis resulted in the water elevation within Basin No 1 to increase from elevation 119.94 to 119.99. The drain inlet to Basin 1 has an invert elevation of 120. There was no change in the water elevation for Basin No 2. Based on the above, it is RJOC's opinion that the tailwater effect within Basin No.s 1 & 2 will have no effect on the performance of the proposed drainage system. Copies of the tailwater calculations are enclosed herein.

12. *Since the site is located within a Zone II to a water supply and is considered to be a development with the potential of higher pollutant loads, at least 44% total suspended soil (TSS) removal treatment is required prior to entering an infiltration BMP. Any pretreatment BMP which infiltrates stormwater should be lined. Construction details of these BMP's should include specifications of the required liners. Exfiltration rates of the lined BMP's should not be used in the sizing calculations of the stormwater detention structures.*

Applicant's Response: Basin 4 and Basin 5 were used to satisfy the projects infiltration requirements as required by Standard No 3 within the Stormwater Management Policy. The remaining BMP's (ie: swales, rain gardens wet basins, etc) have been designed to promote groundwater infiltration but were not included in the minimum infiltration requirements to satisfy Standard No 3. Liners were not proposed in these devices in order to accommodate the Town of Wayland's desire to maximize infiltration of storm water to the maximum extent practical. Approximately 70% of the storm water entering Basin 4 is clean roof water. The remaining water is treated in three lightly loaded (10,000sf ea) catch basins and forebays. Prior to entering the basin the combination of the basin treatment and roof water dilution results in water meeting the pretreatment requirement prior to entering the BMP.

Basin 5 receives stormwater runoff from both pavement and rooftop areas. Rainfall runoff from pavement areas run off via overland flow through a grassed biofilter swale with stone check dams installed every one hundred feet. Prior to storm water entering Basin No 5 this grassed lined biofilter swale with stone check dams serves as storm water pretreatment.

***M&A**: The rain gardens have no pre-treatment component and therefore it is recommended that they are constructed with an impermeable liner.*

RJOC Response: Impermeable liners are not being proposed within the design of the rain gardens in order to accommodate the Town of Wayland's requirement during the Master Special Permit (MSP) phase of the project that the design of the projects stormwater management system must maximize to the extent practical stormwater recharge.

13. *Additional inlet capacity and 100 year storm event hydraulic calculations should be provided for the street drainage design to help identify any by-pass or surcharging that will cause changes to the drainage patterns assumed in the hydrology calculations.*

Applicant's Response: The hydraulic calculations have been designed for the 25-year storm event, which meets the requirements set forth in the Wayland Subdivision Rules and Regulations. This was discussed and agreed upon between the project proponent, Marchionda and Associates, and the Town of Wayland during the Master Special Permit process.

***M&A**: No additional comments.*

RJOC Response: No further action required

14. *The pipe sizing hydraulic calculations do not include supporting information on characteristics and locations of the catch basin subcatchments. This information should be added to the stormwater report.*

Applicant's Response: A subcatchment plan has been added to the stormwater report to show the areas and C values of catch basin drainage areas.

***M&A**: The Stormwater Report and calculations have been revised to include the information requested.*

RJOC Response: No Further action required

15. *Additional information is required for catch basin #55. As shown there appears to be insufficient separation between the rim elevation and the invert. The invert elevation also appears to be lower than the existing grades in that area.*

Applicant's Response: The road has been regraded and the rim elevation of CB-55 has been raised to elevation 125.8 which provides approximately 1.5 ft. of cover over the top of its discharge pipe. Eighteen (18") of cover is adequate to accommodate a concrete flat top and catch basin frame and grate.

***M&A**: The plans have been changed as described. Based on the invert of the adjacent 15" CMP shown on the Wayland Commons site plans it appears that proposed FES will be at the existing grade in this area. Pipe and FES information should be added to the plan set.*

RJOC Response: RJOC has revised Dwg. No. C-3B to include the pipe size and invert elevation of the flared end section which discharges from CB-55. In addition rip rap stone has been added to the end of FES-20.

16. *The limits of the proposed rip-rap apron at the flared end structures should be included on the drainage plans.*

Applicant's Response: The limits of proposed rip-rap aprons at flared end sections have been added to the drainage plans.

***M&A**: Rip-rap has not been added to FES 19 and the FES at CB 55.*

RJOC Response: RJOC has revised Dwg. Nos. C-3A & C-3B to indicate rip rap stone at the outfall pipes of FES-19 & FES-20.

17. *Construction details of the proposed water quality swales, rain gardens and bioretention areas should be added to the plans. These BMP's require specific design features to receive the treatment efficiencies assumed in the calculations submitted.*

Applicant's Response: Details of the rain gardens, bioretention areas, and water quality swales have been added to the plan set.

***M&A**: As stated in comment 3 above, general construction details and specifications for the infiltration and wet basins should be added to the plan set.*

RJOC Response: RJOC has added to Dwg No C-7 details for wet ponds, bioretention swales, and water quality swales.

18. *The swale proposed north of the "informal" town green will cause concentrate stormwater flow to run over a proposed sidewalk and across Road "C" prior to entering a catch basin. A yard drain is recommended to capture stormwater prior to passing over the sidewalk.*

Applicant's Response: The area adjacent to both sides of the sidewalk has been regraded to create shallow swales which direct storm water to one of two yard drains

(DMH-27A & 27B) and thus minimizing the amount of surface water that would sheet flow over the sidewalk area in question.

***M&A**: Grading in the area of DMH 27 should be revised to direct stormwater to the inlet.*

RJOC Response: RJOC has revised Dwg No C-3A to provide a swale behind the residential units to ensure positive flow of stormwater runoff to DMH-27.

19. *A more specific demolition and construction sequence narrative should be integrated into the erosion control plans. Other than the installation of erosion control barriers at the limit of work it is unclear when the other erosion control devices called out on plans will be installed and removed. It is understood that a sequence will be a guideline for contractors and that flexibility will be necessary depending on how the construction progresses.*

Applicant's Response: Additional construction sequencing notes will be implemented in the Stormwater Pollution Prevention Plan (SWPPP), which will be prepared prior to construction, and the sitework contractor will be required to comply with the SWPPP. The town's consultants will have the ability to review the SWPPP to ensure that the town's interests are protected.

***M&A:** No additional comments at this time.*

RJOC Response: No further action required.

20. *The location of the erosion control barriers and the temporary sediment swale along the eastern and northern sides of the site is questionable. The sediment swale is shown passing directly through an isolated wetland and the 30 foot no disturb zones well beyond the proposed limit of work.*

Applicant's Response: The limits of erosion control barriers have been revised so that they are located at the limits of grading on the revised site plans. The sediment swale in question has also been relocated so that it is located entirely within the proposed limits of grading, and will not impact the wetland area.

***M&A**: The plans have been revised as described.*

RJOC Response: No further action required.

21. *The erosion control barrier locations should be added to the grading plan to insure the barriers will be positioned to encompass the limits of proposed grading.*

Applicant's Response: The perimeter erosion controls have been added to the grading plan.

***M&A**: In a number of locations the Grading Plans show grading taking place beyond the edge of the proposed haybales. The erosion controls should be relocated to accommodate the proposed grading.*

RJOC Response: RJOC has revised the Erosion Control Plans (Dwg No. C-1A – C-1D) to alleviate conflicts with the haybale locations as it relates to proposed grades.

22. *A 60 foot long stabilized construction entrance is called out on the erosion control plan. A 100 foot length is recommended. If at any time construction vehicles begin to access the site through the Old Sudbury Road driveway a stabilized entrance should be installed.*

Applicant's Response: The length of the stabilized construction entrance had been increased to 100 ft. and a second stabilized construction entrance has been added to the Old Sudbury Road driveway.

***M&A**: The plans have been revised as described.*

RJOC Response: No further action required.

23. *Limited information has been provided on the existing conditions of Old Sudbury in the area of the intersection with the site access drive (Street "A"). Additional information should be provided to the plans to help assess the grading and drainage proposed at this intersection.*

Applicant's Response: Existing conditions information is provided on the survey plans and grading and drainage plan within the limits of the project site and the intersection at Old Sudbury Road adjacent to the project site. For additional existing conditions information of Old Sudbury Road adjacent to abutting properties, please refer to off-site roadway plans prepared by Vanasse and Associates, or Wayland Commons site plans prepared by VHB.

***M&A**: In order to properly review the proposed driveway intersection with Old Sudbury Road a comprehensive plan of this area showing existing and proposed features should be compiled as part of the submission.*

RJOC Response: RJOC has added to Dwg. No. C-3B the proposed grades as design by Vanasse & Associates for the roadway improvements to Old Sudbury Rd. In addition at the end of the plan set the grading plan for the limits of roadway improvements planned for Old Sudbury Rd are included herein.

24. *The Long Tern Pollution Prevention and Stormwater Management Operation and Maintenance Plans should include additional maintenance requirements for the proposed BMP's. The DEP Stormwater Handbook should be used as a guideline.*

Applicant's Response: Maintenance of stormwater BMP's are addressed in the Stormwater Management System Operation and Maintenance Plan. This plan has been revised to include additional information on maintenance of the stormwater BMP's.

M&A: The Stormwater O &M Plan provided includes very minimal maintance requirements for the project's BMP's. The DEP Stormwater Handbook includes specific maintenance requirements for each of the BMP's proposed. This language should be added to the O&M Plan.

RJOC Response: RJOC has updated the Operations and Maintenance plan to outline in greater detail the maintenance requirements for the BMP's proposed for this project. A copy of the updated Operations and Maintenance plan is included herein.

25. *The site plans include portions of the proposed subsurface disposal system design plans. The review of this design has been limited to horizontal and vertical layout of the system's components on the site. It has been assumed that the system will be approved by the Board of Health as shown on the submitted plans.*

Applicant's Response: The subsurface disposal system has been submitted to the Board of Health for review and approval.

***M&A**: Not additional comments necessary.*

RJOC Response: No further action required

26. *A sewer lift station is proposed in SMH 2. This SMH is located within a parking area access aisle. No information has been provided on the location of pump controls or alarms. It is recommended that this station is moved north to the area where the other components of the system will be located.*

Applicant's Response: This sewer lift station has been relocated to an area outside of the parking area access aisle, and details have been added to the plan set specifying pump controls, alarms, and appurtenances.

***M&A**: The plans have been revised as described.*

RJOC Response: No further action required.

27. *A sewer pump station is proposed to be located within the "formal" public green. A "hard" accessible surface should be provided to the station. Additional details on the station controls and appurtenances should be provided.*

Applicant's Response: This sewer lift station has been relocated to an area outside of the public green, and details have been added to the plan set specifying pump controls, alarms, and appurtenances.

***M&A**: The plans have been revised as described.*

RJOC Response: No further action required

Also enclosed for your review are revised hydraulic calculations for pipe sizing utilizing the Hydroflow storm sewers software.

I trust the responses provided above to your comments meet with your approval such that a letter from your office could be provided to the Planning Board which confirms the applicant's engineer has adequately address all engineering related comments associated with the development of Wayland Town Center. Should you have any questions and/or comments regarding RJOC's responses above please do not hesitate to contact me.

Very Truly yours,
R J O'Connell & Associates, Inc

Brian Dundon, PE
Vice President

Cc: Frank Dougherty w/enc, Mark Macrae w/enc

SUPPLEMENTAL RESPONSE TO ENGINEERING COMMENT #3:

REVISED POND REPORTS AND HYDROGRAPH SUMMARY REPORTS CALCULATED WITH WET VOLUME REMOVED FROM BASINS 1, 2, AND 3.

1. Basin #1 Pond Report
2. Basin #2 Pond Report
3. Basin #3 Pond Report
4. Hydrograph Summary Report: 1-inch storm event
5. Hydrograph Summary Report: 2-year storm event
6. Hydrograph Summary Report: 10-year storm event
7. Hydrograph Summary Report: 100-year storm event

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Sep 30, 2008

Pond No. 8 - PROPOSED BASIN 1

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 119.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	119.00	5,668	0	0
1.00	120.00	8,193	6,931	6,931
2.00	121.00	20,000	14,097	21,027

Culvert / Orifice Structures

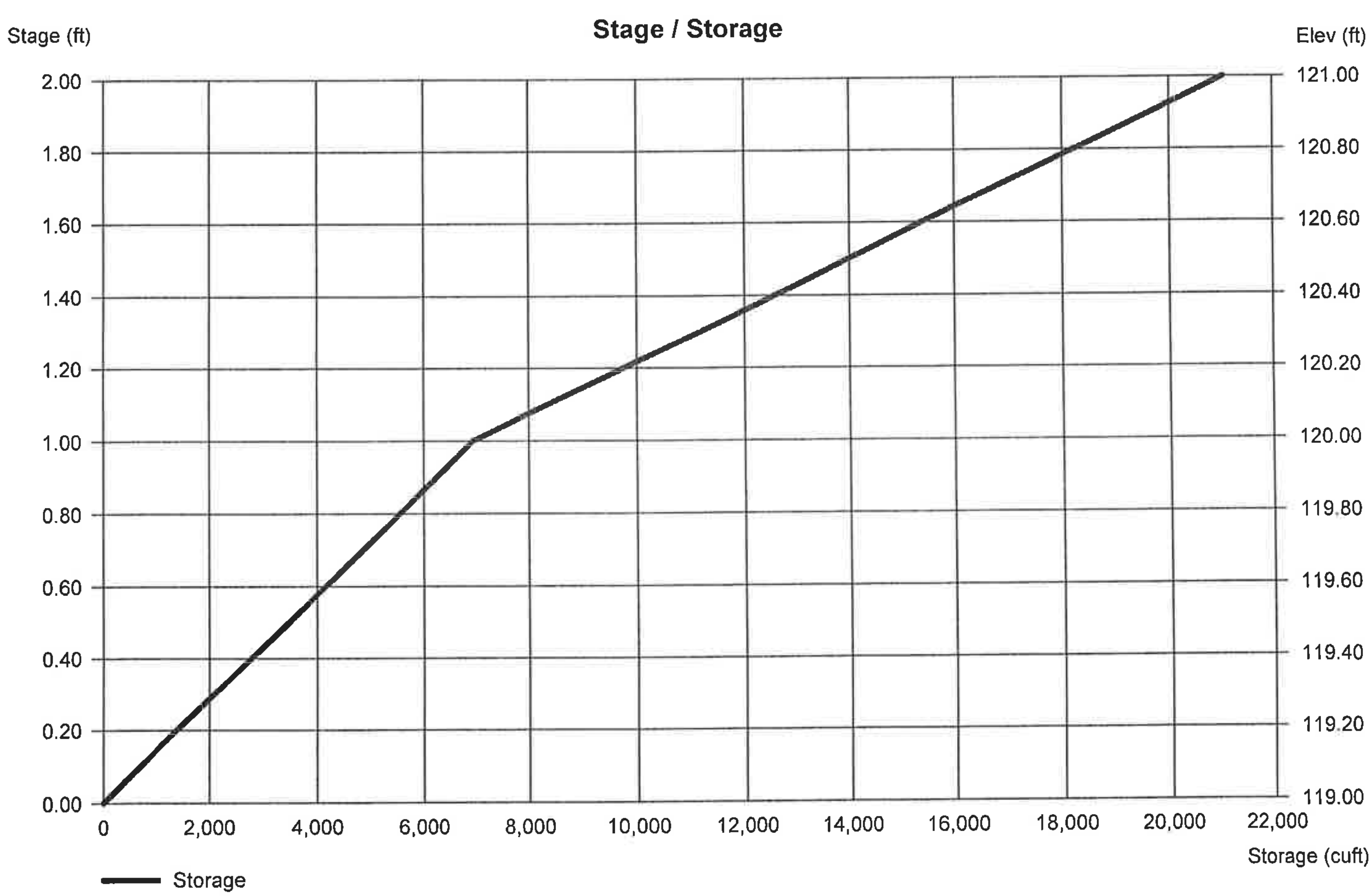
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 119.00	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.20	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 130.00	0.00	0.00	0.00
Crest El. (ft)	= 120.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Sep 30, 2008

Pond No. 1 - BASIN 2

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 118.75 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	118.75	5,622	0	0
0.25	119.00	6,043	1,458	1,458
1.25	120.00	7,985	7,014	8,472
2.25	121.00	11,696	9,841	18,313
3.25	122.00	15,017	13,357	31,669
4.25	123.00	17,997	16,507	48,176
5.25	124.00	19,572	18,785	66,961

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 118.75	0.00	0.00	0.00
Length (ft)	= 75.00	0.00	0.00	0.00
Slope (%)	= 0.60	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

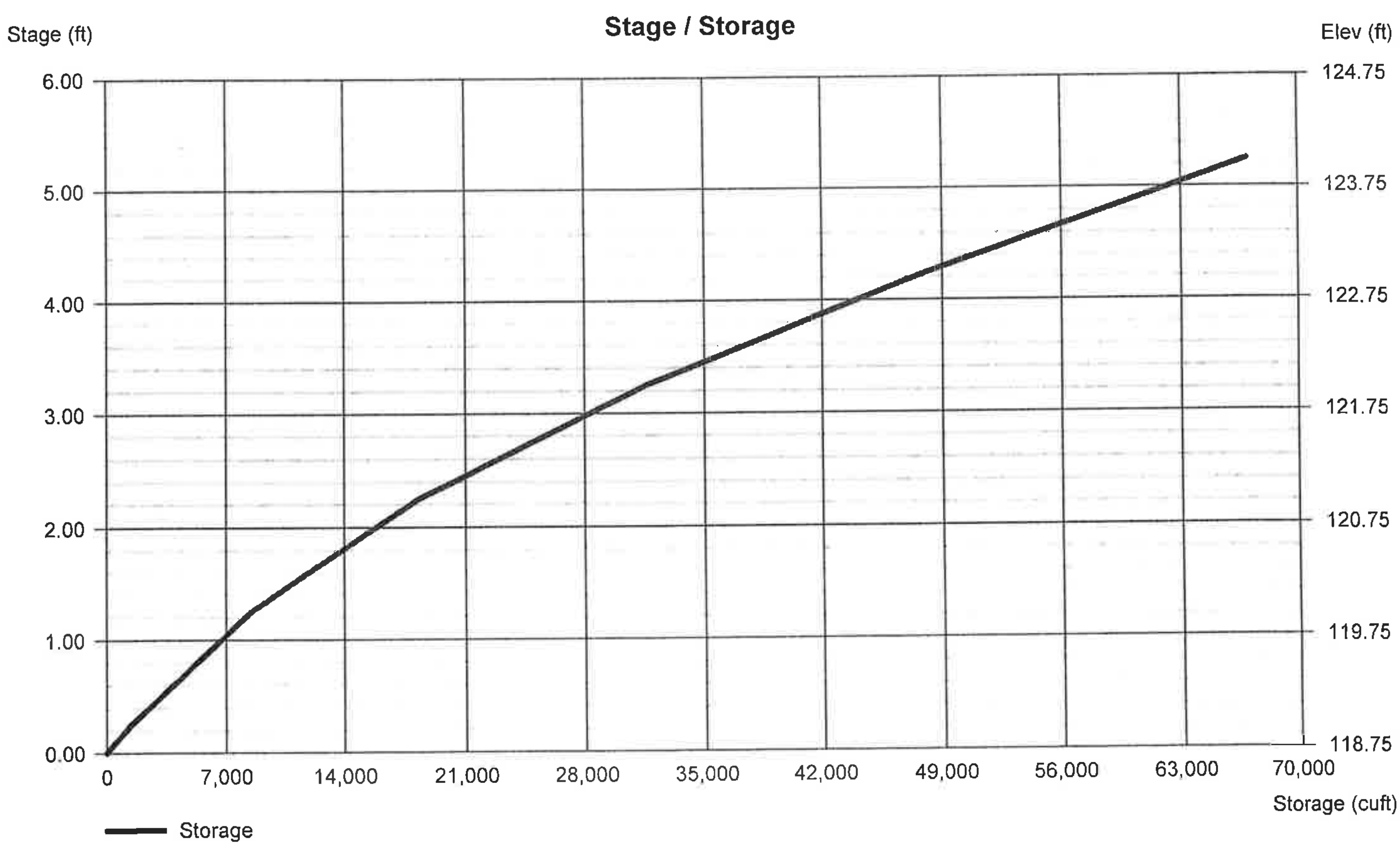
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 122.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Sep 30, 2008

Pond No. 2 - BASIN 3

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 128.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	128.00	5,778	0	0
1.00	129.00	7,901	6,840	6,840
2.00	130.00	10,251	9,076	15,916
3.00	131.00	11,511	10,881	26,797

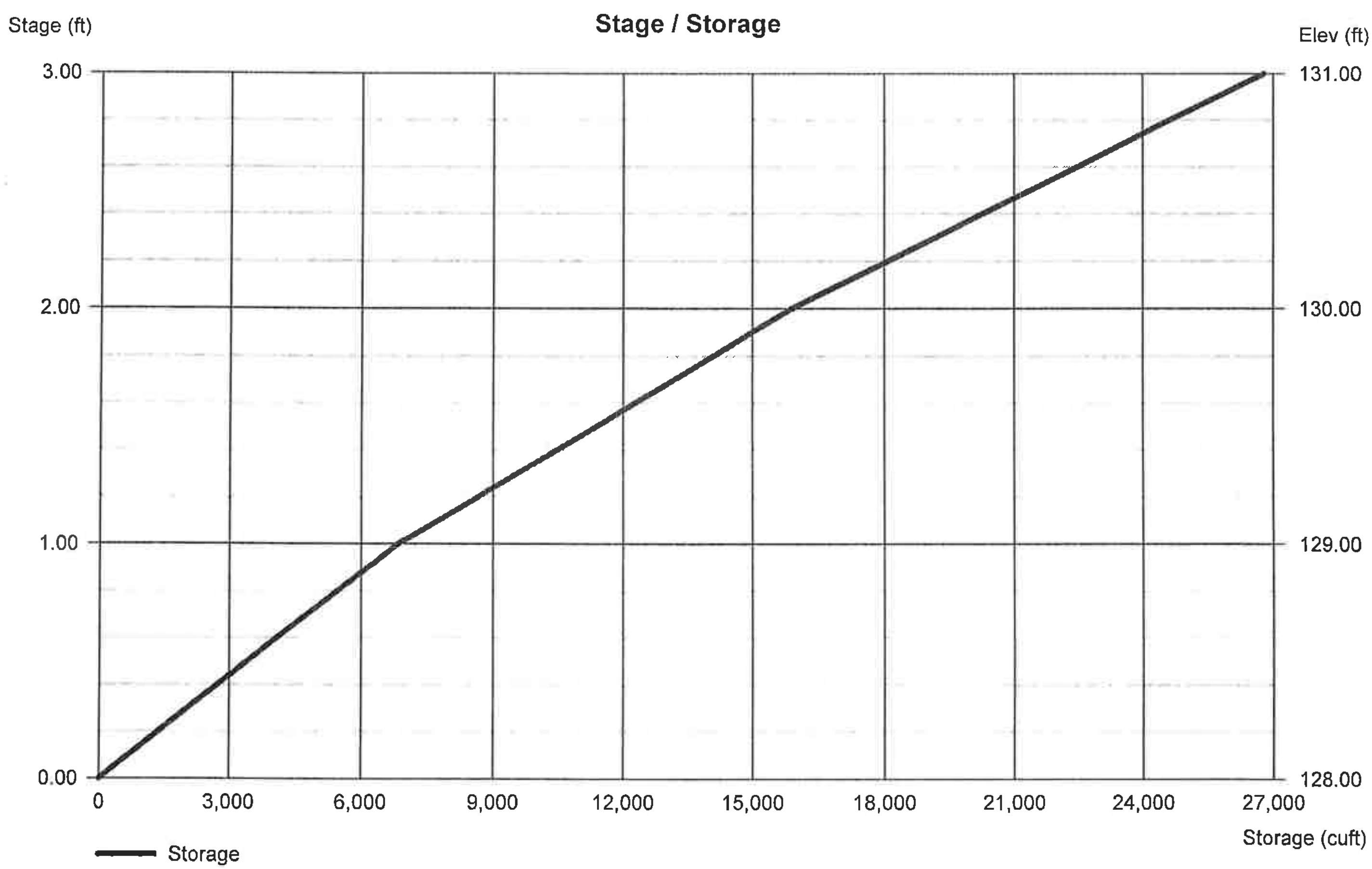
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 128.00	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.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	0.00	0.00	0.00
Crest El. (ft)	= 130.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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).



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	3.290	1	730	14,065	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	0.864	1	727	3,257	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-3
4	Combine	4.089	1	729	17,323	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	0.039	1	748	455	------	------	------	EW-4
6	Reservoir	0.000	1	n/a	0	5	118.12	455	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-5A
8	SCS Runoff	0.000	1	n/a	0	------	------	------	E-5B
9	Combine	0.000	1	n/a	0	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	0.000	1	n/a	0	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	1.114	1	743	7,957	------	------	------	PW-1A
12	SCS Runoff	0.008	1	825	203	------	------	------	PW-1B
13	Reservoir	0.000	1	890	0	12	126.02	62.5	BASIN 5
14	Combine	1.114	1	743	7,957	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	0.486	1	768	7,928	14	119.00	1,469	BASIN 2 (PT. 1)
16	SCS Runoff	0.003	1	1327	71	------	------	------	PW-2
17	Reservoir	0.002	1	1440	54	16	119.00	31.0	BASIN 1 (PT.2)
18	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-3
19	SCS Runoff	0.009	1	1337	287	------	------	------	PW-5A
20	Reservoir	0.008	1	1383	277	19	128.01	85.4	BASIN 3
21	Combine	0.486	1	768	8,259	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	0.002	1	827	51	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	0.136	1	745	851	------	------	------	PW-6A
24	Reservoir	0.000	1	930	0	23	128.02	235	BASIN 4
25	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
26	Combine	0.000	1	930	0	24, 25	------	------	TOTAL TO PT. 6

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	31.58	1	728	114,739	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	8.251	1	726	26,572	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	0.352	1	773	6,744	------	------	------	EW-3
4	Combine	39.34	1	727	148,055	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	2.422	1	730	9,352	------	------	------	EW-4
6	Reservoir	0.000	1	n/a	0	5	119.81	9,352	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	0.031	1	905	857	------	------	------	EW-5A
8	SCS Runoff	0.121	1	742	837	------	------	------	E-5B
9	Combine	0.121	1	742	1,693	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	1.068	1	724	3,982	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	23.80	1	733	101,622	------	------	------	PW-1A
12	SCS Runoff	2.135	1	725	6,880	------	------	------	PW-1B
13	Reservoir	0.461	1	748	1,813	12	126.80	2,318	BASIN 5
14	Combine	23.98	1	733	103,435	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	18.55	1	743	103,406	14	120.65	14,910	BASIN 2 (PT. 1)
16	SCS Runoff	1.836	1	729	7,410	------	------	------	PW-2
17	Reservoir	0.483	1	758	7,393	16	119.35	2,391	BASIN 1 (PT.2)
18	SCS Runoff	0.072	1	893	1,948	------	------	------	PW-3
19	SCS Runoff	5.315	1	743	29,939	------	------	------	PW-5A
20	Reservoir	3.905	1	758	29,929	19	128.84	5,734	BASIN 3
21	Combine	21.62	1	746	140,727	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	0.476	1	727	1,715	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	1.697	1	737	8,197	------	------	------	PW-6A
24	Reservoir	1.118	1	751	2,072	23	129.92	2,926	BASIN 4
25	SCS Runoff	0.000	1	n/a	0	------	------	------	PW-6B
26	Combine	1.118	1	751	2,072	24, 25	------	------	TOTAL TO PT. 6

Hydro_SPR3.gpw	Return Period: 2 Year	Tuesday, Sep 30, 2008

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	52.93	1	728	194,650	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	13.82	1	725	45,078	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	3.324	1	753	26,655	------	------	------	EW-3
4	Combine	66.60	1	727	266,383	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	4.744	1	729	17,861	------	------	------	EW-4
6	Reservoir	0.070	1	1440	134	5	120.50	17,747	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	0.620	1	744	5,424	------	------	------	EW-5A
8	SCS Runoff	0.465	1	735	2,306	------	------	------	E-5B
9	Combine	1.032	1	742	7,730	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	3.854	1	722	10,644	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	43.28	1	732	183,717	------	------	------	PW-1A
12	SCS Runoff	4.437	1	725	13,739	------	------	------	PW-1B
13	Reservoir	1.957	1	734	7,012	12	127.14	3,685	BASIN 5
14	Combine	45.22	1	732	190,729	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	31.54	1	744	190,700	14	121.91	30,416	BASIN 2 (PT. 1)
16	SCS Runoff	4.240	1	728	15,809	------	------	------	PW-2
17	Reservoir	1.624	1	749	15,792	16	119.71	4,916	BASIN 1 (PT.2)
18	SCS Runoff	1.274	1	748	10,882	------	------	------	PW-3
19	SCS Runoff	12.24	1	741	63,871	------	------	------	PW-5A
20	Reservoir	9.788	1	754	63,861	19	129.43	10,742	BASIN 3
21	Combine	41.91	1	745	270,352	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	0.993	1	727	3,424	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	2.941	1	737	14,256	------	------	------	PW-6A
24	Reservoir	2.761	1	740	6,968	23	130.02	3,129	BASIN 4
25	SCS Runoff	0.009	1	881	248	------	------	------	PW-6B
26	Combine	2.761	1	740	7,216	24, 25	------	------	TOTAL TO PT. 6

Hydro_SPR3.gpw	Return Period: 10 Year	Tuesday, Sep 30, 2008

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	91.22	1	728	344,168	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	23.83	1	725	79,704	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	13.92	1	746	83,057	------	------	------	EW-3
4	Combine	120.06	1	727	506,929	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	9.228	1	729	34,858	------	------	------	EW-4
6	Reservoir	2.791	1	752	17,131	5	120.56	18,524	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	4.209	1	733	20,454	------	------	------	EW-5A
8	SCS Runoff	1.343	1	733	5,887	------	------	------	E-5B
9	Combine	5.553	1	733	26,340	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	10.41	1	721	26,647	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	79.71	1	732	342,625	------	------	------	PW-1A
12	SCS Runoff	9.004	1	725	27,804	------	------	------	PW-1B
13	Reservoir	4.958	1	731	18,956	12	127.60	6,269	BASIN 5
14	Combine	84.65	1	732	361,581	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	69.55	1	740	361,551	14	123.21	52,084	BASIN 2 (PT. 1)
16	SCS Runoff	9.282	1	728	33,706	------	------	------	PW-2
17	Reservoir	2.835	1	751	33,689	16	120.30	11,107	BASIN 1 (PT.2)
18	SCS Runoff	7.448	1	737	39,243	------	------	------	PW-3
19	SCS Runoff	26.80	1	740	136,179	------	------	------	PW-5A
20	Reservoir	23.59	1	749	136,169	19	130.40	20,260	BASIN 3
21	Combine	91.44	1	742	531,408	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	2.021	1	727	6,929	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	5.210	1	736	25,740	------	------	------	PW-6A
24	Reservoir	5.026	1	738	16,983	23	130.13	3,399	BASIN 4
25	SCS Runoff	0.275	1	728	1,726	------	------	------	PW-6B
26	Combine	5.260	1	738	18,709	24, 25	------	------	TOTAL TO PT. 6

Hydro_SPR3.gpw	Return Period: 100 Year	Tuesday, Sep 30, 2008

<u>SUPPLEMENTAL RESPONSE TO ENGINEERING COMMENT #5:</u>

FOREBAY SIZING CALCULATIONS

RJ O'CONNELL & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND PLANNERS

Memorandum

Date: October 1, 2008

To: John Barrows

From: Brian Dundon

Regarding: Wayland Town Center – Forebay sizing calculations

The forebays for the Wayland Town Center project are required per the Massachusetts Stormwater Handbook to be sized for a storage volume of 0.1 inch times the contributing impervious area. In accordance with the handbook, the forebay sizing calculations for the Wayland Town Center project are summarized below:

FOREBAY	CONTRIBUTING IMPERVIOUS AREA	REQUIRED FOREBAY VOLUME	PROVIDED FOREBAY VOLUME
BASIN-1	1.33 Ac	483 Cubic Feet	672 Cubic Feet
BASIN-2			
FOREBAY (36" INLET)	2.93 Ac	1,064 Cubic feet	1,116 Cubic feet
FOREBAY (18" INLET)	2.25 Ac	816 Cubic Feet	922 Cubic feet
BASIN-3	2.10 Ac	761 Cubic Feet	956 Cubic Feet

SUPPLEMENTAL RESPONSE TO ENGINEERING COMMENT #11

POND REPORTS AND HYDROGRAPH SUMMARY REPORTS WITH 25-YEAR FLOOD TAILWATER ELEVATION of 119.40

1. Basin #1 Pond Report with tailwater elevation of 119.40
2. Basin #2 Pond Report with tailwater elevation of 119.40
3. Hydrograph Summary Report for 25-year storm event. Hydrology calculations were done using tailwater elevation of 119.40 for Basin #1 and Basin #2.
4. Hydrograph Summary Report for 25-year storm event for comparison purposes. Hydrology calculations did not use tailwater elevations for Basin #1 and Basin #2

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Sep 30, 2008

Pond No. 8 - PROPOSED BASIN 1

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 119.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	119.00	5,668	0	0
1.00	120.00	8,193	6,931	6,931
2.00	121.00	20,000	14,097	21,027

Culvert / Orifice Structures

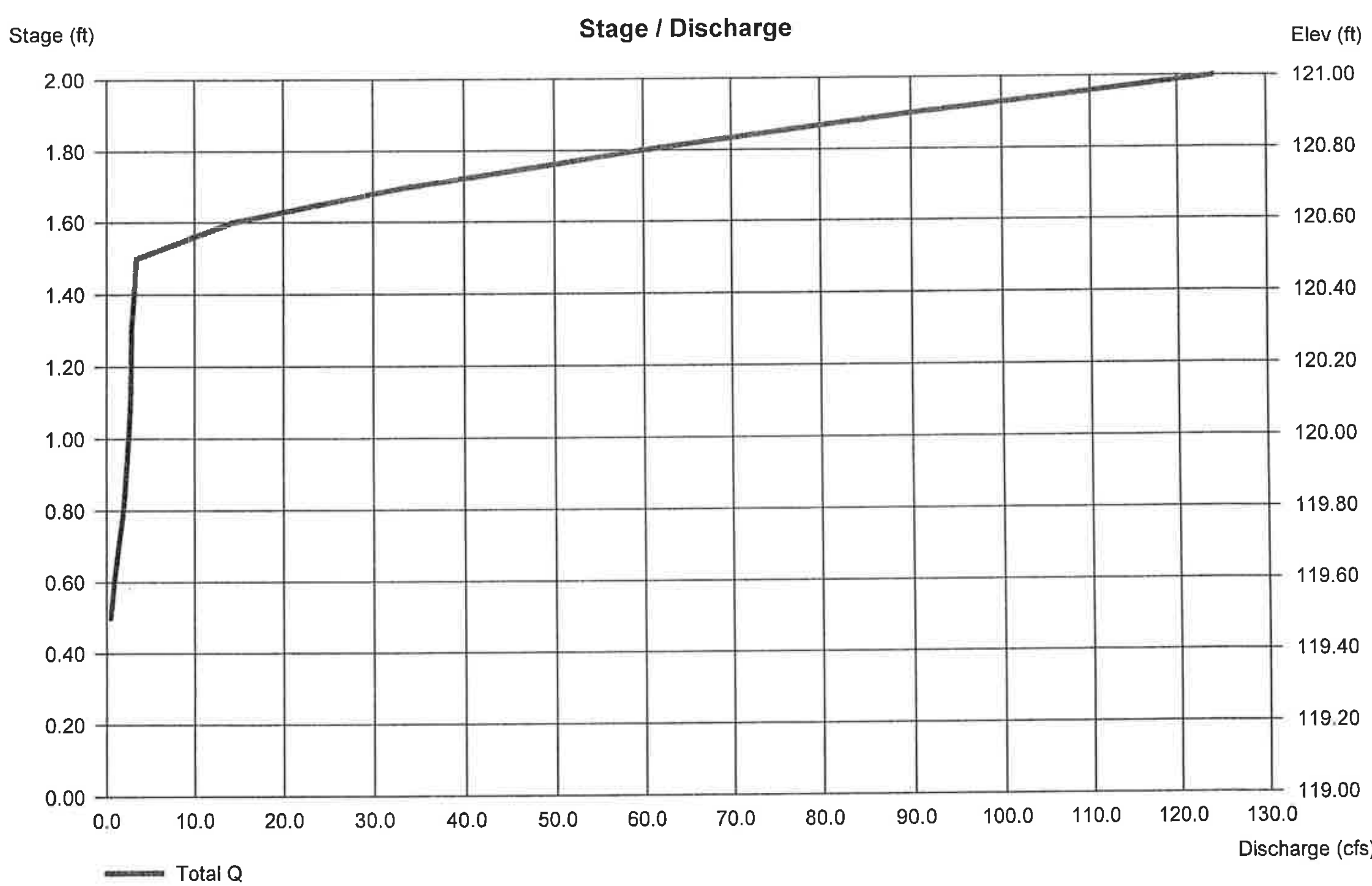
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 119.00	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.20	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 130.00	0.00	0.00	0.00
Crest El. (ft)	= 120.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 119.40

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control Weir risers checked for orifice conditions (ic) and submergence (s)



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Tuesday, Sep 30, 2008

Pond No. 1 - BASIN 2

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 118.75 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	118.75	5,622	0	0
0.25	119.00	6,043	1,458	1,458
1.25	120.00	7,985	7,014	8,472
2.25	121.00	11,696	9,841	18,313
3.25	122.00	15,017	13,357	31,669
4.25	123.00	17,997	16,507	48,176
5.25	124.00	19,572	18,785	66,961

Culvert / Orifice Structures

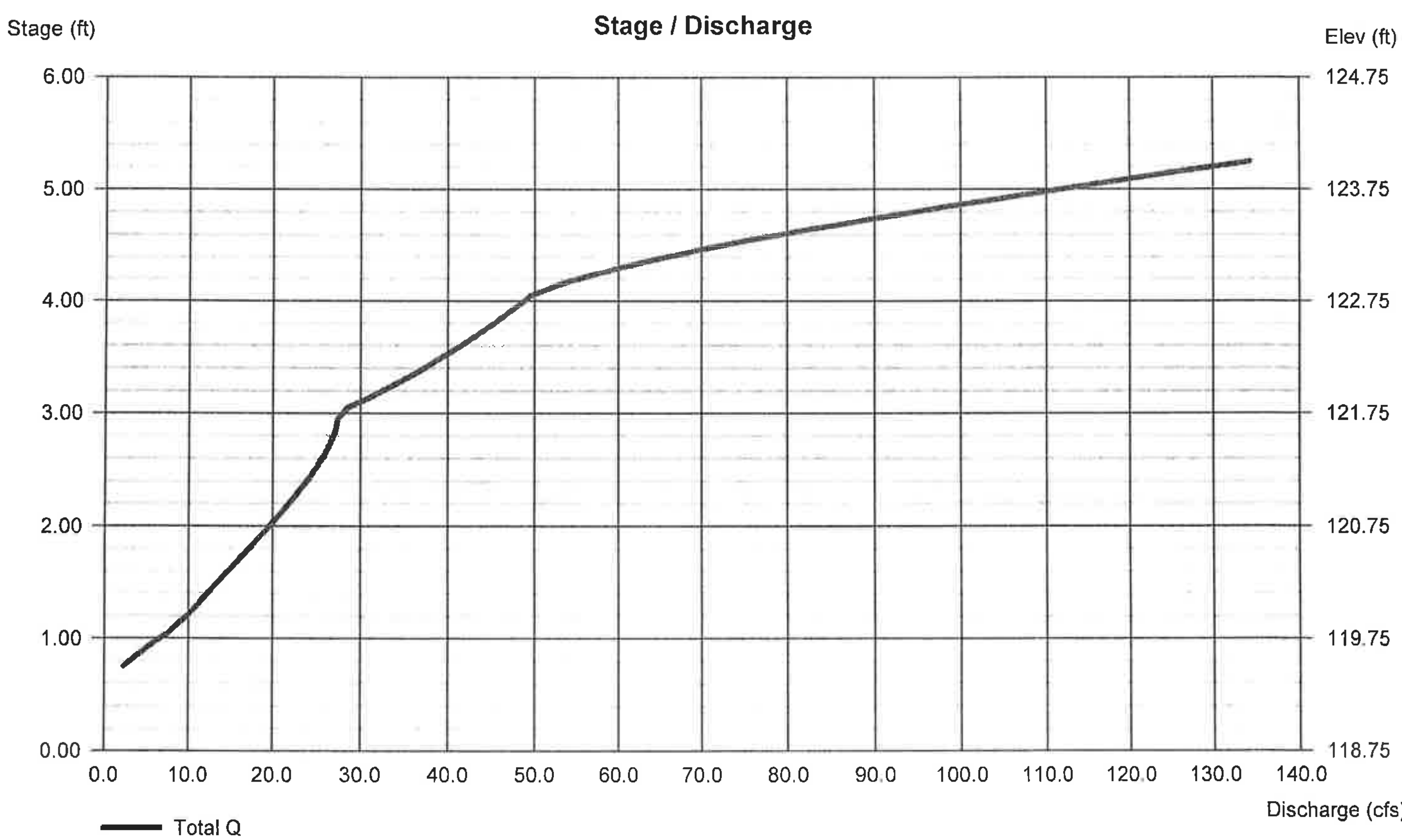
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 118.75	0.00	0.00	0.00
Length (ft)	= 75.00	0.00	0.00	0.00
Slope (%)	= 0.60	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 122.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 119.40

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



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	65.21	1	728	241,867	------	------	------	EW-1 (PT. 1)
2	SCS Runoff	17.03	1	725	56,013	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	6.164	1	750	42,300	------	------	------	EW-3
4	Combine	83.12	1	727	340,179	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	6.152	1	729	23,121	------	------	------	EW-4
6	Reservoir	0.348	1	913	5,394	5	120.51	17,826	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	1.436	1	738	9,422	------	------	------	EW-5A
8	SCS Runoff	0.721	1	734	3,346	------	------	------	E-5B
9	Combine	2.132	1	737	12,768	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	5.792	1	722	15,313	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	54.85	1	732	233,386	------	------	------	PW-1A
12	SCS Runoff	5.859	1	725	18,057	------	------	------	PW-1B
13	Reservoir	2.891	1	732	10,546	12	127.30	4,564	BASIN 5
14	Combine	57.74	1	732	243,932	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	42.19	1	743	239,668	14	122.38	38,011	BASIN 2 (PT. 1)
16	SCS Runoff	5.785	1	728	21,235	------	------	------	PW-2
17	Reservoir	2.474	1	746	18,462	16	119.99	6,831	BASIN 1 (PT.2)
18	SCS Runoff	2.777	1	743	18,500	------	------	------	PW-3
19	SCS Runoff	16.69	1	740	85,796	------	------	------	PW-5A
20	Reservoir	13.28	1	753	85,785	19	129.78	13,918	BASIN 3
21	Combine	56.78	1	745	343,914	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	1.313	1	727	4,500	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	3.665	1	737	17,869	------	------	------	PW-6A
24	Reservoir	3.493	1	739	10,037	23	130.06	3,223	BASIN 4
25	SCS Runoff	0.044	1	744	595	------	------	------	PW-6B
26	Combine	3.531	1	739	10,632	24, 25	------	------	TOTAL TO PT. 6

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
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2	SCS Runoff	17.03	1	725	56,013	------	------	------	EW-2 (PT. 2)
3	SCS Runoff	6.164	1	750	42,300	------	------	------	EW-3
4	Combine	83.12	1	727	340,179	1, 2, 3	------	------	EXIST. TOTAL TO RIVER (PT. 3)
5	SCS Runoff	6.152	1	729	23,121	------	------	------	EW-4
6	Reservoir	0.348	1	913	5,394	5	120.51	17,826	EXIST. BASIN 1 (PT. 4)
7	SCS Runoff	1.436	1	738	9,422	------	------	------	EW-5A
8	SCS Runoff	0.721	1	734	3,346	------	------	------	E-5B
9	Combine	2.132	1	737	12,768	7, 8	------	------	E-5A + E-5B (PT. 5)
10	SCS Runoff	5.792	1	722	15,313	------	------	------	EW-6 (PT. 6)
11	SCS Runoff	54.85	1	732	233,386	------	------	------	PW-1A
12	SCS Runoff	5.859	1	725	18,057	------	------	------	PW-1B
13	Reservoir	2.891	1	732	10,546	12	127.30	4,564	BASIN 5
14	Combine	57.74	1	732	243,932	11, 13	------	------	TOTAL TO BASIN 2
15	Reservoir	42.16	1	743	243,903	14	122.38	37,990	BASIN 2 (PT. 1)
16	SCS Runoff	5.785	1	728	21,235	------	------	------	PW-2
17	Reservoir	2.344	1	747	21,218	16	119.94	6,498	BASIN 1 (PT.2)
18	SCS Runoff	2.777	1	743	18,500	------	------	------	PW-3
19	SCS Runoff	16.69	1	740	85,796	------	------	------	PW-5A
20	Reservoir	13.28	1	753	85,785	19	129.78	13,918	BASIN 3
21	Combine	56.62	1	745	350,905	15, 17, 20	------	------	PROP. TOTAL TO RIVER (PT. 3)
22	SCS Runoff	1.313	1	727	4,500	------	------	------	PW-5B (PT. 5)
23	SCS Runoff	3.665	1	737	17,869	------	------	------	PW-6A
24	Reservoir	3.493	1	739	10,037	23	130.06	3,223	BASIN 4
25	SCS Runoff	0.044	1	744	595	------	------	------	PW-6B
26	Combine	3.531	1	739	10,632	24, 25	------	------	TOTAL TO PT. 6

Hydro_SPR3.gpw	Return Period: 25 Year	Tuesday, Sep 30, 2008

SUPPLEMENTAL RESPONSE TO ENGINEERING COMMENT #24

STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN

STORMWATER MANAGEMENT SYSTEM (SMS) OPERATION AND MAINTENANCE PLAN

Applicant: Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Prepared by: R.J. O'Connell & Associates
80 Montvale Avenue
Stoneham, MA

A. SMS DESCRIPTION

The on-site drainage system, which collects and conveys storm water runoff from the parking lot consists of deep sump catch basins with oil/grease hoods on the outlets, drain manholes, closed drainage piping, biofilter swales, rain gardens, and curbing along pavement edges.

B. OPERATION AND MAINTENANCE RESPONSIBILITY

During construction:
Site Contractor (Not Selected at this time)

Post construction:
Twenty Wayland, LLC

C. INSPECTION AND MAINTENANCE SCHEDULE

Schedule During Construction:

See Erosion Control Notes (below). These notes are also included on the site design plans. The NPDES general permit which is prepared prior to construction will also include schedule information for the inspection and maintenance of erosion controls during and immediately following construction.

EROSION CONTROL NOTES:

1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH D.E.Q.E.'S (DEP) EROSION AND SEDIMENTATION CONTROL GUIDELINES, AUGUST 1983, THE U.S.D.A. S.C.S. EROSION AND SEDIMENT CONTROL IN SITE DEVELOPMENT, MASSACHUSETTS CONSERVATION GUIDE, SEPTEMBER 1983 AND ALL LOCAL MUNICIPAL REGULATIONS.
2. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE COMMENCEMENT OF ANY SITE WORK OR EARTHWORK OPERATIONS,

SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITE WORK IS COMPLETE AND GROUND COVER IS ESTABLISHED.

3. STOCKPILES SHALL BE SURROUNDED ON THEIR PERIMETERS WITH STAKED HAY BALES AND/OR SILTATION FENCES TO PREVENT AND/OR CONTROL SILTATION AND EROSION.

4. TOPS OF STOCKPILES SHALL BE COVERED IN SUCH A MANNER THAT STORMWATER DOES NOT INFILTRATE THE MATERIALS AND THEREBY RENDER THE SAME UNSUITABLE FOR FILL USE.

5. ALL DISTURBED OR EXPOSED AREAS SUBJECT TO EROSION SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER. WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED OR HAVE TEMPORARILY BEEN SUSPENDED FOR MORE THAN FOURTEEN DAYS, OR WHEN FINAL GRADES ARE REACHED IN ANY PORTION OF THE SITE, STABILIZATION PRACTICES SHALL BE IMPLEMENTED WITHIN THREE DAYS. AREAS WHICH REMAIN DISTURBED BUT INACTIVE FOR AT LEAST FOURTEEN DAYS SHALL RECEIVE TEMPORARILY SEEDING IN ACCORDANCE WITH MASSACHUSETTS DEP EROSION AND SEDIMENT CONTROL GUIDELINES. IN ALL CASES, STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE.

6. EARTHWORK ACTIVITY ON THE SITE SHALL BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO THE TEMPORARY DRAINAGE SWALES & SEDIMENT BASINS.

7. THE LOCATION OF TEMPORARY DRAINAGE SWALES AND SEDIMENTATION TRAPS SHALL BE REVISED AS REQUIRED AS CONSTRUCTION PROGRESSES

8. HAYBALES AND/OR FILTER BAGS SHALL BE PLACED AROUND CATCH BASINS AS REQUIRED DURING CONSTRUCTION.

9. ALL EROSION CONTROL MEASURES SHALL BE ROUTINELY INSPECTED OR A WEEKLY BASIS (ONCE EVERY SEVEN DAYS), CLEANED AND REPAIRED OR REPLACED AS NECESSARY THROUGHOUT ALL PHASES OF CONSTRUCTION. IN ADDITION, INSPECTION SHALL TAKE PLACE AFTER EACH RAINFALL EVENT. THE CONTRACTOR SHALL STRICTLY ADHERE TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) DURING CONSTRUCTION OPERATIONS.

10. ALL PROPOSED SLOPES (EXCLUDING RIP RAP SLOPES) STEEPER THAN 3H:1V SHALL BE STABILIZED WITH A CURLEX EROSION CONTROL MATTING BY AMERICAN EXCELSIOR COMPANY (OR EGINEER APPROVED EQUAL) PRIOR TO HYDROSEEDING AND PROTECTED FROM EROSION.

11. THE CONTRACTOR SHALL KEEP ON SITE AT ALL TIMES ADDITIONAL HAYBALES AND EXTRA SILTATION FENCING FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER AND/OR CONSERVATION COMMISSION AGENT TO MITIGATE ANY EMERGENCY CONDITION.

12. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ANY PERMITS AND/OR CONNECTION FEES REQUIRED TO CARRY OUT THE WORK INCLUDING BUT NOT LIMITED TO DEMOLITION.

13. THE LIMIT OF WORK LINE FOR THE AREA TO BE CLEARED AND GRUBBED SHALL BE THE SAME AS THE LIMIT OF WORK LINE NECESSARY FOR GRADING PURPOSES, (I.E.., THE GRADING LIMITS AROUND THE PERIMETER OF THE PROJECT AREA).

14. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AS DETERMINED BY THE ENGINEER OR OWNER'S REPRESENTATIVE.

15. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY.

16. CATCH BASINS WHICH SERVE AS TEMPORARY SEDIMENT TRAPS MUST BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT. SEDIMENT WILL BE REMOVED FROM EACH BASIN WHEN SEDIMENT HAS ACCUMULATED TO WITHIN 1' BELOW THE INVERT ELEVATION OF THE OUTFALL PIPE.

17. UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

18. ALL CONSTRUCTION SHALL MEET OR EXCEED THE TOWN OF WAYLAND'S ENGINEERING DEPARTMENT SPECIFICATIONS.

19. ALL SLOPES EXCEEDING FIFTEEN (15) PERCENT RESULTING FROM THE SITE GRADING SHALL BE EITHER COVERED WITH SIX (6) INCHES OF TOPSOIL AND PLANTED WITH A VEGETATIVE COVER SUFFICIENT TO PREVENT EROSION OR BE STABILIZED BY A RETAINING WALL.

20. DUST CONTROL SHALL BE USED DURING GRADING OPERATIONS. DUST CONTROL METHODS SHALL CONSIST OF DAMPENING THE GROUND WITH WATER. IF WATER DOES NOT PROVIDE ADEQUATE DUST CONTROL, AN EMULSION SOIL STABLIZER SHALL BE APPLIED TO SUSCEPTIBLE SOILS.

21. THE CONTRACTOR SHALL BE AWARE THAT SOIL, GRADES AND WETLANDS PROXIMITY AT THIS SITE MAKE IT PARTICULARLY SUSCEPTIBLE TO SOIL EROSION AND SENSITIVE TO IT'S CONSEQUENCES. IT SHOULD BE NOTED THAT THE EROSION CONTROL MEASURES AS SHOWN ON THE DRAWINGS DEPICT THE MINIMUM REQUIRED CONTROL AND ARE REPRESENTATIVE OF A SINGLE STAGE OF CONSTRUCTION FOR EACH PHASE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITING, RELOCATION AND AUGMENTATION OF EROSION CONTROL DEVICES AS THE PROJECT PROGRESSES AND SITE DRAINAGE CONDITIONS CHANGE.

22. THE CONTRACTOR SHALL ANTICIPATE AND MODIFY EROSION CONTROL MEASURES BASED ON PAST AND CURRENT WEATHER CONDITIONS, SEASON AND EXPECTED FUTURE CONSTRUCTION ACTIVITIES.

23. THE CONTRACTOR SHALL MINIMIZE THE AREA OF DISTURBED SOIL. EFFORTS SHALL BE MADE TO LIMIT THE TIME OF EXPOSURE OF DISTURBED AREAS.

24. THE CONTRACTOR SHALL AT HIS EXPENSE SURVEY AND MARK OUT IN THE FIELD THE LIMITS OF CLEARING (I.E. HAYBALE/SILTFENCE LINE) AND THE WETLAND BUFFER BOUNDARY FOR APPROVAL BY THE TOWN PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING ACTIVITIES.

25. THE CONTRACTOR SHALL NOTIFY THE TOWN'S PLANNING STAFF AND CONSERVATION AGENT AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF SITEWORK.

26. PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AT THE SITE, THE CONTRACTOR SHALL ENGAGE AN INDIVIDUAL WITH SPECIFIC PROFESSIONAL TRAINING AND EXPERTISE IN EROSION AND SEDIMENT CONTROL. THE EROSION CONTROL MONITOR SHALL PREPARE A WEEKLY REPORT WHICH SHALL BE KEPT ON SITE AT ALL TIMES AND SHALL BE SHOWN TO LOCAL, STATE AND FEDERAL AGENTS UPON REQUEST. THIS REPORT SHALL INDICATE THE STATUS OF THE EROSION CONTROLS AND ANY MAINTENANCE REQUIRED AND PERFORMED. THIS REPORT SHALL CONFORM TO THE REQUIREMENTS OF THE EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT.

27. HAYBALE DIKES SHALL BE CONSTRUCTED AT ALL EXISTING & PROPOSED CATCH BASINS LOCATED IN FILL AREAS & SUBJECT TO STORMWATER RUN-OFF FROM PROPOSED FILL AREAS DURING CONSTRUCTION, OR AS DIRECTED BY THE OWNER/ENGINEER. NO SEDIMENTS SHALL ENTER THE ON-SITE DRAINAGE SYSTEM AT ANY TIME.

28. THE FOREBAY BASINS SHALL BE USED AS SEDIMENTATION BASINS THROUGHOUT CONSTRUCTION AND SHALL BE PERIODICALLY CLEANED DURING CONSTRUCTION, AND AT THE COMPLETION OF CONSTRUCTION. ALL TEMPORARY SWALES SHALL BE DIRECTED TO THE FOREBAY LOCATION WHEN POSSIBLE.

29. THE LOCATION OF HAYBALE CHECK DAMS SHALL BE FIELD VERIFIED DURING SITE PREPARATION OPERATIONS BY THE CONTRACTOR.

30. UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

Post Construction Schedule

A checklist of all maintenance items will be developed and used for each stormwater treatment component. Each time an inspection is completed or a maintenance procedure is performed, it will be documented on the checklist. The checklist will be kept on the project site. The property owner will be financially responsible for the implementation of this plan and for future system repairs as needed.

General Site Inspections and Maintenance:

1. Sweep parking lot and driveway areas to remove sediments before they can enter the stormwater management system, twice annually, in the early spring and late fall, and on an as needed basis at other times.

2. Inspect dumpster and compactor areas for spillage and clean as necessary.

3. Inspect landscape areas and edges of paved areas for any signs of erosion. Perform any necessary curb replacement, earth repair, reseeding or mulching upon identification.

4. Routinely pick up and remove litter from the parking areas and perimeter landscape areas. Clean leaves or trash from catch basin grates when observed.

Stormwater Management System Inspections and Maintenance:

1. Deep Sump Catch Basins:

Activity	Frequency
Inspect units	Four times per year
Clean units	Whenever the depth of sediment is greater than two feet.

2. Sediment Forebays:

Activity	Frequency
Inspect sediment forebays	Monthly
Clean sediment forebays	Whenever the depth of sediment is greater than two feet.

3. Rain Gardens (Bioretention Areas):

Activity	Frequency
Inspect and remove trash	Monthly
Mow	2 to 12 times per year
Mulch	Annually
Fertilize	Annually
Remove dead vegetation	Annually
Prune	Annually

4. Biofilter Swales (Grassed Channel):

Activity	**Frequency**
Remove sediment from grass channel	Annually
Mow	Once a month during growing season
Repair areas of erosion and revegetate	As needed, but no less than once per year

5. Wet Basins:

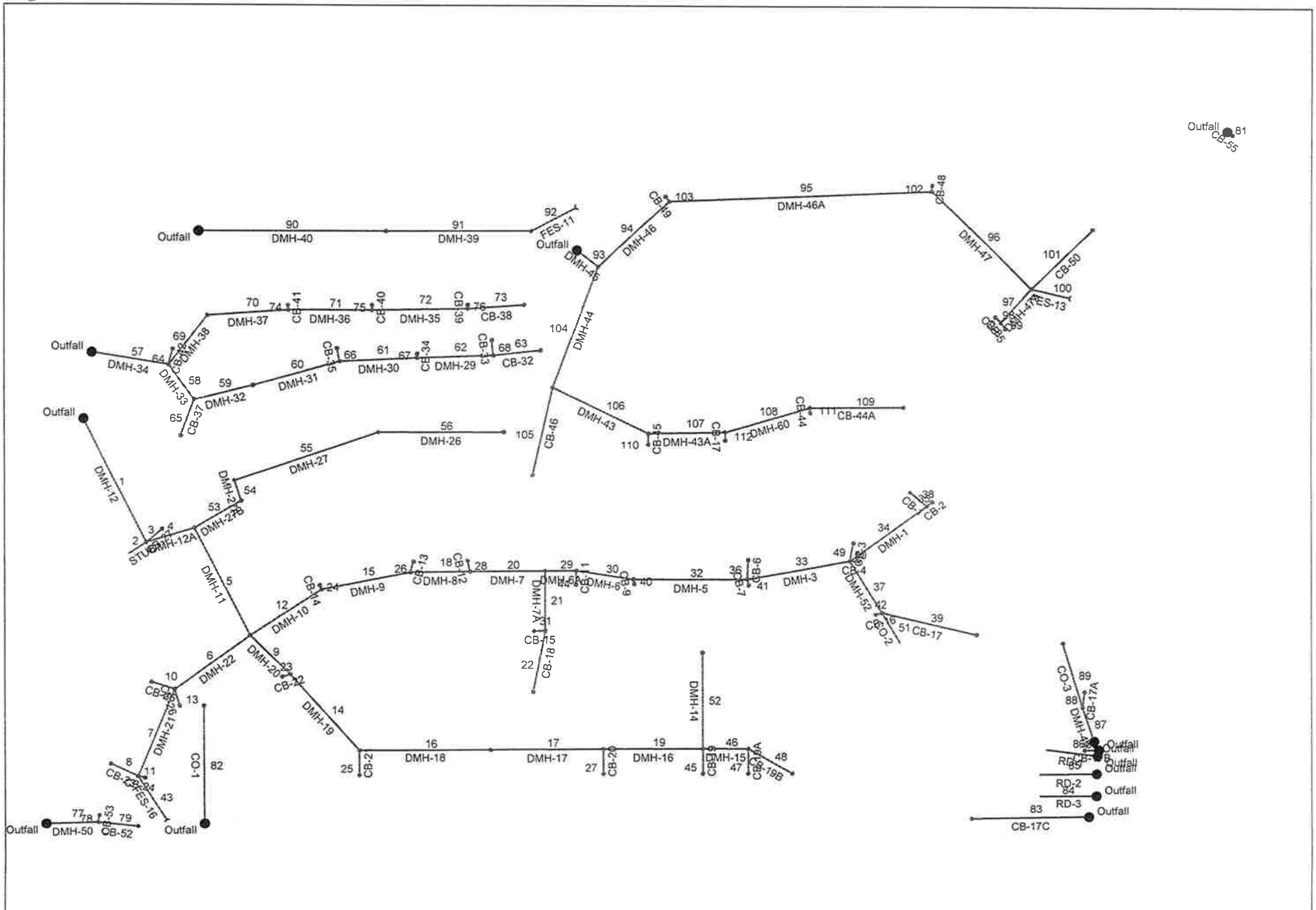
Activity	**Frequency**
Inspect wet basins to ensure they are operation as designed	At least once per year
Mow the side slopes and embankments	At least twice per year
Check the sediment forebays for accumulated sediment, trash, and debris and remove it	At least twice per year
Remove sediment from basin	As necessary, and at least once every 10 years.

6. Infiltration Basins:

Activity	**Frequency**
Preventative maintenance	Twice per year
Inspect to ensure proper functioning	After every major storm during the first 3 months of operation and twice per year thereafter
Mow the bottom and side slopes; remove trash and debris; remove grass clippings and accumulated organic matter	Twice per year
Inspect and clean pretreatment devices	At least twice per year, and after every major storm event.

REVISED HYDRAULIC CALCULATIONS

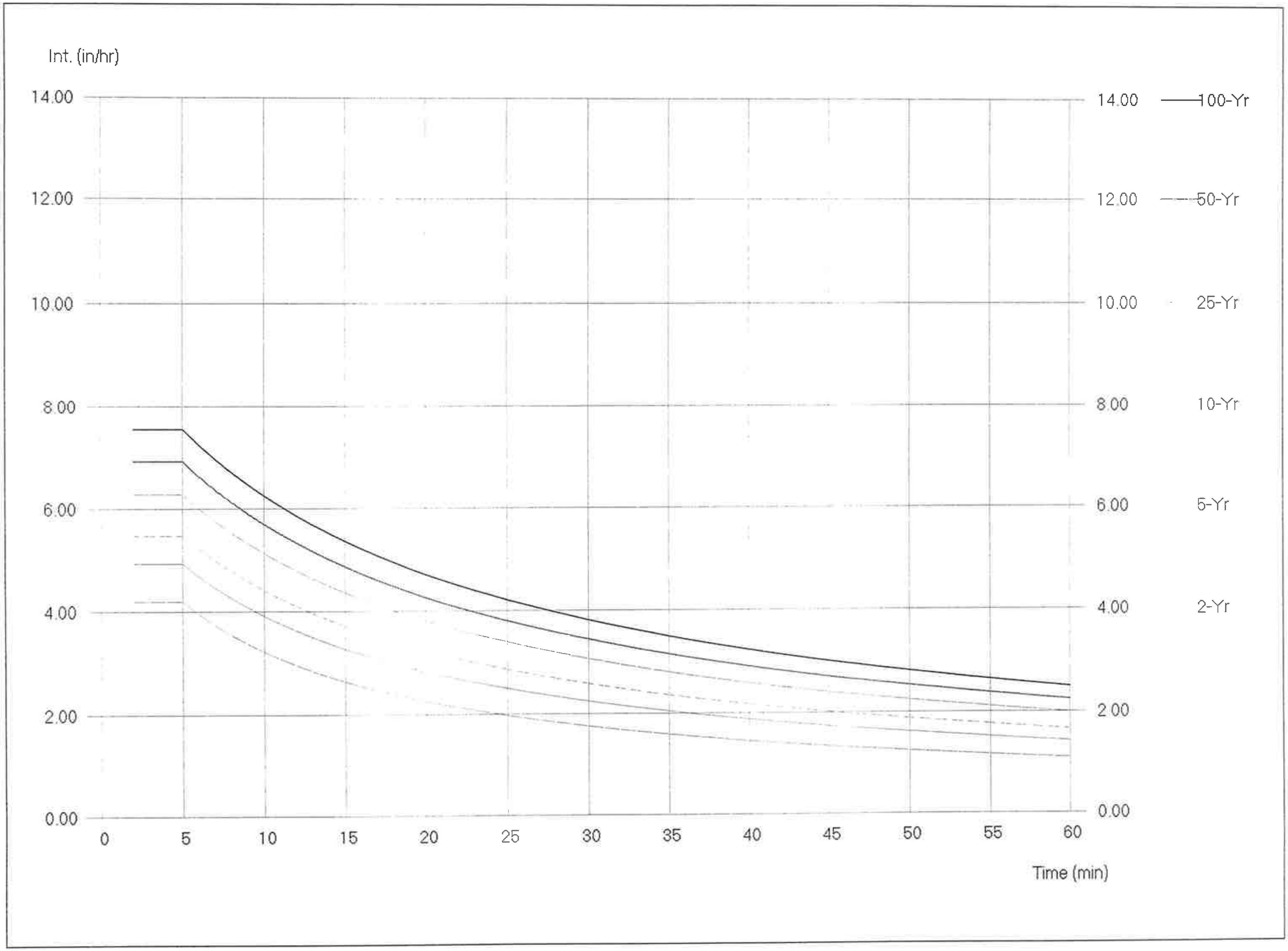
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: SS_9-30-08.stm	Number of lines: 112	Date: 10-01-2008

Storm Sewer IDF Curves

IDF file: Wayland.IDF



Hydraflow Storm Sewers Extension

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
1	DMH-12	Outfall	210.0	0.30	14.90	0.90	0.27	10.08	5.0	24.1	37.75	49.86	6.03	36	0.48	120.50	119.50	128.25	122.75	121.50	122.38
2	STUB	1	30.0	1.24	1.24	0.88	1.09	1.09	5.0	5.0	6.85	9.29	3.88	18	0.67	120.70	120.50	128.40	123.54	128.25	123.43
3	CB-27	1	31.1	0.54	0.54	0.58	0.31	0.31	5.0	5.0	1.97	4.89	4.95	12	1.61	123.50	123.00	127.50	124.10	128.25	123.44
4	DMH-12A	1	74.0	0.00	12.82	0.00	0.00	8.41	0.0	23.6	32.27	32.66	6.57	30	0.54	120.90	120.50	128.40	123.82	128.25	123.43
5	DMH-11	4	179.0	0.00	10.54	0.00	0.00	7.37	0.0	22.4	29.33	31.50	5.98	30	0.50	121.80	120.90	131.55	125.27	128.40	124.49
6	DMH-22	5	136.2	0.00	0.87	0.00	0.00	0.48	0.0	21.5	4.57	7.86	2.58	18	0.48	122.25	121.60	129.20	126.05	131.55	125.83
7	DMH-21	6	140.2	0.00	0.51	0.00	0.00	0.28	0.0	20.5	3.85	8.04	2.18	18	0.50	122.95	122.25	126.35	126.31	129.20	126.14
8	CB-23	7	44.0	0.20	0.20	0.53	0.11	0.11	5.0	5.0	0.67	3.68	0.85	12	0.91	123.35	122.95	126.50	126.39	126.35	126.38
9	DMH-20	5	82.2	0.31	6.21	0.90	0.28	4.66	5.0	21.3	17.21	20.93	5.48	24	0.73	122.40	121.80	130.90	126.23	131.55	125.83
10	CB-25	6	35.6	0.12	0.12	0.65	0.08	0.08	5.0	5.0	0.49	4.09	0.62	12	1.12	124.90	124.50	128.90	126.15	129.20	126.14
11	CB-24	7	10.5	0.31	0.31	0.56	0.17	0.17	5.0	5.0	1.09	3.77	1.39	12	0.95	123.05	122.95	126.30	126.39	126.35	126.38
12	DMH-10	5	124.5	0.00	3.46	0.00	0.00	2.23	0.0	11.9	10.74	25.98	3.42	24	1.12	123.00	121.60	131.05	126.07	131.55	125.83
13	CB-26	6	25.6	0.24	0.24	0.51	0.12	0.12	5.0	5.0	0.77	4.18	0.98	12	1.17	124.80	124.50	128.80	126.16	129.20	126.14
14	DMH-19	9	152.3	0.00	5.55	0.00	0.00	4.17	0.0	20.2	15.79	17.76	5.03	24	0.53	123.20	122.40	130.40	127.33	130.90	126.70
15	DMH-9	12	134.4	0.00	3.38	0.00	0.00	2.18	0.0	11.0	10.80	17.68	5.48	24	0.52	125.70	125.00	131.80	126.86 j	131.05	126.24
16	DMH-18	14	194.6	0.18	4.05	0.90	0.16	3.21	5.0	18.1	12.85	17.56	4.09	24	0.51	124.20	123.20	132.10	128.17	130.40	127.64
17	DMH-17	16	167.2	0.27	3.87	0.90	0.24	3.05	5.0	16.9	12.57	17.98	4.00	24	0.54	125.10	124.20	133.00	128.65	132.10	128.21
18	DMH-8	15	88.2	0.00	3.02	0.00	0.00	1.99	0.0	10.4	10.06	17.50	5.42	24	0.51	126.15	125.70	131.80	127.27 j	131.80	126.86
19	DMH-16	17	148.0	0.00	3.08	0.00	0.00	2.40	15.0	16.0	10.19	21.12	3.24	24	0.74	126.20	125.10	132.50	129.16	133.00	128.90
20	DMH-7	18	111.3	0.00	2.55	0.00	0.00	1.72	0.0	9.6	8.96	17.22	5.12	24	0.49	126.70	126.15	134.80	127.76 j	131.80	127.27
21	DMH-7A	20	87.3	0.00	0.34	0.00	0.00	0.25	0.0	5.6	1.55	3.45	3.98	12	0.80	128.70	128.00	132.20	129.23	134.80	128.47
22	CB-18	21	91.3	0.16	0.16	0.74	0.12	0.12	5.0	5.0	0.74	2.86	2.31	12	0.55	129.20	128.70	132.20	129.57 j	132.20	129.23

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NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
23	CB-22	9	11.9	0.35	0.35	0.60	0.21	0.21	5.0	5.0	1.32	4.99	4.01	12	1.68	126.60	126.40	130.60	127.20	130.90	126.75
24	CB-14	12	6.6	0.08	0.08	0.68	0.05	0.05	10.0	10.0	0.28	6.72	2.86	12	3.03	127.00	126.80	131.00	127.28	131.05	126.94
25	CB-21	14	37.3	1.50	1.50	0.64	0.96	0.96	20.0	20.0	3.66	4.00	4.66	12	1.07	125.50	125.10	129.50	127.97	130.40	127.64
26	CB-13	15	16.4	0.36	0.36	0.53	0.19	0.19	10.0	10.0	0.98	7.07	4.31	12	3.35	127.30	126.75	131.30	127.83	131.80	127.00
27	CB-20	17	37.4	0.52	0.52	0.77	0.40	0.40	15.0	15.0	1.75	4.46	2.22	12	1.34	126.50	126.00	130.50	128.98	133.00	128.90
28	CB-12	18	16.4	0.47	0.47	0.56	0.26	0.26	10.0	10.0	1.35	5.22	4.23	12	1.83	127.30	127.00	131.30	127.88	131.80	127.35
29	DMH-6A	20	46.0	0.00	2.21	0.00	0.00	1.47	0.0	9.3	7.73	10.61	6.16	18	0.87	127.60	127.20	134.10	128.66	134.80	128.15
30	DMH-6	29	86.7	0.00	2.08	0.00	0.00	1.37	0.0	8.7	7.37	10.93	4.91	18	0.92	128.40	127.60	134.35	129.44 j	134.10	129.18
31	CB-15	21	16.9	0.18	0.18	0.75	0.14	0.14	5.0	5.0	0.85	2.97	2.36	12	0.59	128.80	128.70	132.20	129.22	132.20	129.23
32	DMH-5	30	169.4	0.00	1.88	0.00	0.00	1.22	0.0	7.6	6.85	8.29	4.27	18	0.53	129.30	128.40	134.35	130.46	134.35	129.91
33	DMH-3	32	155.8	0.00	1.59	0.00	0.00	1.03	0.0	6.6	6.06	8.15	3.93	18	0.51	130.10	129.30	134.50	131.18	134.35	130.80
34	DMH-1	33	142.7	0.00	0.29	0.00	0.00	0.18	0.0	5.2	1.12	5.56	1.54	15	0.63	131.00	130.10	134.70	131.55	134.50	131.47
35	CB-2	34	10.8	0.19	0.19	0.61	0.12	0.12	5.0	5.0	0.73	3.71	1.60	12	0.93	131.10	131.00	134.60	131.62	134.70	131.62
36	CB-6	32	28.8	0.15	0.15	0.59	0.09	0.09	5.0	5.0	0.56	6.01	0.77	12	2.43	130.00	129.30	134.30	130.80	134.35	130.80
37	DMH-52	33	90.2	0.00	0.79	0.00	0.00	0.58	0.0	6.0	3.51	3.15	4.47	12	0.67	130.70	130.10	134.70	132.22	134.50	131.47
38	CB-1	34	33.4	0.10	0.10	0.65	0.07	0.07	5.0	5.0	0.41	3.66	1.34	12	0.90	131.30	131.00	134.60	131.62	134.70	131.62
39	CB-17	37	146.0	0.50	0.50	0.72	0.36	0.36	5.0	5.0	2.26	2.67	2.88	12	0.48	131.40	130.70	134.40	133.03	134.70	132.53
40	CB-9	30	6.7	0.20	0.20	0.76	0.15	0.15	5.0	5.0	0.95	6.67	3.85	12	2.99	130.00	129.80	134.00	130.68	134.35	130.06
41	CB-7	32	8.6	0.14	0.14	0.70	0.10	0.10	5.0	5.0	0.62	11.01	0.85	12	8.14	130.00	129.30	134.30	130.80	134.35	130.80
42	CB-16	37	9.8	0.14	0.14	0.63	0.09	0.09	5.0	5.0	0.55	6.75	0.71	12	3.06	131.00	130.70	134.50	132.53	134.70	132.53
43	FES-16	7	79.5	0.00	0.00	0.00	0.00	0.00	20.0	20.0	2.80	24.04	2.74	18	4.47	126.50	122.95	0.00	127.14 j	126.35	126.38
44	CB-11	29	20.4	0.13	0.13	0.76	0.10	0.10	5.0	5.0	0.62	6.04	1.89	12	2.45	129.00	128.50	133.80	129.33 j	134.10	129.18

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NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
45	CB-19	19	37.5	0.90	0.90	0.70	0.63	0.63	15.0	15.0	2.75	3.45	3.50	12	0.80	126.50	126.20	130.50	129.51	132.50	129.32
46	DMH-15	19	67.9	0.00	1.79	0.00	0.00	1.42	0.0	15.5	6.11	7.56	3.46	18	0.44	126.50	126.20	132.50	129.52	132.50	129.32
47	CB-19A	46	37.6	1.23	1.23	0.80	0.98	0.98	15.0	15.0	4.29	4.45	5.46	12	1.33	127.00	126.50	130.50	130.17	132.50	129.70
48	CB-19B	46	75.8	0.56	0.56	0.78	0.44	0.44	15.0	15.0	1.91	3.13	2.43	12	0.66	127.50	127.00	131.50	129.89	132.50	129.70
49	CB-3	33	27.5	0.16	0.16	0.59	0.09	0.09	5.0	5.0	0.59	5.70	0.83	12	2.18	130.70	130.10	134.30	131.48	134.50	131.47
50	CB-4	33	13.1	0.35	0.35	0.50	0.18	0.18	5.0	5.0	1.10	7.54	1.45	12	3.82	130.60	130.10	134.20	131.48	134.50	131.47
51	CO-2	37	51.5	0.15	0.15	0.90	0.14	0.14	5.0	5.0	0.85	4.81	1.08	12	1.55	131.50	130.70	134.70	132.55	134.70	132.53
52	DMH-14	19	142.0	0.39	0.39	0.90	0.35	0.35	5.0	5.0	2.20	3.97	3.12	12	1.06	129.00	127.50	134.60	129.76	132.50	129.32
53	DMH-27B	4	80.7	1.21	2.28	0.32	0.39	1.04	10.0	10.0	5.34	3.04	6.80	12	0.62	123.50	123.00	128.30	126.04	128.40	124.49
54	DMH-27A	53	33.0	0.18	1.07	0.32	0.06	0.65	5.0	7.7	3.65	7.36	4.65	12	3.64	124.70	123.50	128.30	127.04	128.30	126.74
55	DMH-27	54	224.1	0.62	0.89	0.57	0.35	0.60	5.0	6.2	3.54	3.69	4.51	12	0.91	126.75	124.70	129.60	129.27	128.30	127.37
56	DMH-26	55	186.4	0.27	0.27	0.90	0.24	0.24	5.0	5.0	1.53	2.68	1.94	12	0.48	127.65	126.75	130.90	129.68	129.60	129.39
57	DMH-34	Outfall	114.3	0.06	3.04	0.90	0.05	2.21	0.0	8.9	11.82	10.09	6.95	18	0.79	122.40	121.50	126.90	124.10	123.00	122.81
58	DMH-33	57	63.6	0.00	1.68	0.00	0.00	1.25	0.0	8.5	6.78	5.55	5.53	15	0.63	122.80	122.40	128.00	125.40	126.90	124.80
59	DMH-32	58	89.3	0.00	0.86	0.00	0.00	0.59	0.0	7.9	3.25	8.76	2.65	15	1.57	124.20	122.80	129.30	126.04	128.00	125.84
60	DMH-31	59	132.5	0.00	0.86	0.00	0.00	0.59	0.0	7.0	3.37	4.71	2.75	15	0.45	124.80	124.20	129.30	126.36	129.30	126.05
61	DMH-30	60	114.9	0.00	0.63	0.00	0.00	0.44	0.0	6.2	2.62	2.67	3.33	12	0.48	125.35	124.80	129.10	127.01	129.30	126.48
62	DMH-29	61	113.2	0.00	0.49	0.00	0.00	0.33	0.0	5.5	2.05	2.69	2.61	12	0.49	125.90	125.35	130.90	127.50	129.10	127.18
63	CB-32	62	70.6	0.28	0.28	0.66	0.18	0.18	5.0	5.0	1.16	3.56	1.48	12	0.85	126.50	125.90	130.50	127.67	130.90	127.61
64	CB-42	57	23.5	0.30	0.30	0.59	0.18	0.18	5.0	5.0	1.11	6.16	1.42	12	2.55	123.00	122.40	126.50	124.82	126.90	124.80
65	CB-37	58	57.0	0.82	0.82	0.81	0.66	0.66	5.0	5.0	4.17	4.14	3.40	15	0.35	123.00	122.80	127.00	126.04	128.00	125.84
66	CB-35	60	19.5	0.23	0.23	0.63	0.14	0.14	5.0	5.0	0.91	3.91	1.16	12	1.03	125.00	124.80	129.00	126.49	129.30	126.48

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RJO_HGL

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67	CB-34	61	5.9	0.14	0.14	0.76	0.11	0.11	5.0	5.0	0.67	6.15	0.85	12	2.54	125.50	125.35	129.50	127.18	129.10	127.18
68	CB-33	62	22.8	0.21	0.21	0.71	0.15	0.15	5.0	5.0	0.94	2.56	1.19	12	0.44	126.00	125.90	130.00	127.62	130.90	127.61
69	DMH-38	57	92.1	0.00	1.00	0.00	0.00	0.73	0.0	8.1	4.03	4.84	5.13	12	1.57	123.85	122.40	127.50	125.80	126.90	124.80
70	DMH-37	69	119.4	0.02	1.00	0.90	0.02	0.73	5.0	7.3	4.16	5.16	3.39	15	0.54	124.50	123.85	129.05	126.55	127.50	126.12
71	DMH-36	70	124.0	0.03	0.75	0.90	0.03	0.54	5.0	6.5	3.19	2.90	4.06	12	0.56	125.20	124.50	129.60	127.57	129.05	126.73
72	DMH-35	71	141.8	0.03	0.54	0.90	0.03	0.38	5.0	5.6	2.35	2.61	2.99	12	0.46	125.85	125.20	130.05	128.36	129.60	127.83
73	CB-38	72	84.0	0.37	0.37	0.67	0.25	0.25	5.0	5.0	1.56	5.41	1.98	12	1.96	127.50	125.85	130.00	128.63	130.05	128.50
74	CB-41	70	6.5	0.23	0.23	0.75	0.17	0.17	5.0	5.0	1.08	10.70	1.38	12	7.69	125.00	124.50	128.50	126.73	129.05	126.73
75	CB-40	71	6.5	0.18	0.18	0.73	0.13	0.13	5.0	5.0	0.83	8.29	1.05	12	4.62	125.50	125.20	129.50	127.83	129.60	127.83
76	CB-39	72	5.4	0.14	0.14	0.78	0.11	0.11	5.0	5.0	0.69	6.43	0.87	12	2.78	126.00	125.85	130.00	128.50	130.05	128.50
77	DMH-50	Outfall	76.7	0.00	0.29	0.00	0.00	0.18	0.0	5.4	1.09	3.11	3.25	12	0.65	120.50	120.00	124.75	120.94	123.50	120.44
78	CB-53	77	11.1	0.15	0.15	0.57	0.09	0.09	5.0	5.0	0.54	7.77	2.09	12	4.05	120.95	120.50	124.95	121.26 j	124.75	120.94
79	CB-52	77	59.2	0.14	0.14	0.65	0.09	0.09	5.0	5.0	0.57	2.75	2.17	12	0.51	120.80	120.50	124.80	121.12 j	124.75	120.94
80	CB-17B	Outfall	20.9	0.27	0.27	0.88	0.24	0.24	5.0	5.0	1.49	2.67	1.90	12	0.48	128.60	128.50	131.40	130.09	129.50	130.06
81	CB-55	Outfall	10.0	0.23	0.23	0.90	0.21	0.21	5.0	5.0	1.30	3.86	3.44	12	1.00	123.10	123.00	125.80	123.59	125.00	123.48
82	CO-1	Outfall	178.6	0.34	0.34	0.90	0.31	0.31	5.0	5.0	1.92	4.56	3.43	12	1.40	129.00	126.50	130.50	129.59 j	129.00	127.30
83	CB-17C	Outfall	175.4	0.11	0.11	0.70	0.08	0.08	5.0	5.0	0.48	4.51	1.56	12	1.37	131.40	129.00	134.90	131.69 j	130.50	130.06
84	RD-3	Outfall	83.6	0.16	0.16	0.90	0.14	0.14	5.0	5.0	0.90	5.17	2.10	12	1.79	130.00	128.50	133.50	130.40 j	129.50	130.06
85	RD-2	Outfall	84.4	0.16	0.16	0.90	0.14	0.14	5.0	5.0	0.90	4.20	1.49	12	1.18	129.50	128.50	132.20	130.10	129.50	130.06
86	RD-1	Outfall	76.8	0.16	0.16	0.90	0.14	0.14	5.0	5.0	0.90	3.11	1.15	12	0.65	129.00	128.50	132.20	130.10	129.50	130.06
87	DMH-49	Outfall	53.5	0.00	0.82	0.00	0.00	0.73	0.0	5.7	4.47	2.18	5.69	12	0.37	128.30	128.10	131.90	130.90	129.50	130.06
88	CB-17A	87	22.7	0.27	0.27	0.88	0.24	0.24	5.0	5.0	1.49	2.56	1.90	12	0.44	128.40	128.30	131.20	131.18	131.90	131.15

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89	CO-3	87	99.3	0.55	0.55	0.90	0.50	0.50	5.0	5.0	3.11	4.74	3.96	12	1.51	129.80	128.30	133.80	131.79	131.90	131.15
90	DMH-40	Outfall	277.0	0.30	0.60	0.90	0.27	0.54	5.0	6.4	16.18	17.11	6.19	24	0.49	126.35	125.00	130.60	127.90	128.60	126.55
91	DMH-39	90	215.1	0.30	0.30	0.90	0.27	0.27	5.0	5.0	14.70	17.52	5.89	24	0.51	127.45	126.35	131.00	128.81 j	130.60	127.99
92	FES-11	91	74.6	0.00	0.00	0.00	0.00	0.00	0.0	0.0	13.00	21.04	5.35	24	0.74	128.00	127.45	130.50	129.28 j	131.00	129.15
93	DMH-45	Outfall	39.3	0.17	9.39	0.90	0.15	5.76	5.0	25.4	19.41	31.68	3.96	30	0.51	127.40	127.20	133.00	129.85	129.50	129.78
94	DMH-46	93	143.5	0.00	5.77	0.00	0.00	2.96	0.0	24.4	10.18	12.94	3.24	24	0.28	127.80	127.40	131.70	130.34	133.00	130.09
95	DMH-46A	94	393.7	0.00	4.82	0.00	0.00	2.54	0.0	21.8	9.28	9.57	2.96	24	0.15	128.40	127.80	131.80	131.07	131.70	130.50
96	DMH-47	95	208.4	0.00	3.62	0.00	0.00	2.03	0.0	20.4	7.65	13.15	2.44	24	0.29	129.00	128.40	133.55	131.40	131.80	131.20
97	DMH-47A	96	66.9	0.00	0.06	0.00	0.00	0.05	0.0	5.1	0.34	2.11	0.43	12	0.30	129.20	129.00	134.90	131.50	133.55	131.50
98	CB-8	97	11.5	0.03	0.03	0.90	0.03	0.03	5.0	5.0	0.17	3.60	0.22	12	0.87	129.80	129.70	134.90	131.51	134.90	131.50
99	CB-5	97	11.3	0.03	0.03	0.90	0.03	0.03	5.0	5.0	0.17	3.64	0.22	12	0.89	129.80	129.70	134.90	131.51	134.90	131.50
100	FES-13	96	59.0	3.42	3.42	0.54	1.85	1.85	20.0	20.0	7.04	8.11	3.98	18	0.51	129.30	129.00	131.00	131.72	133.55	131.50
101	CB-50	96	127.0	0.14	0.14	0.90	0.13	0.13	5.0	5.0	0.79	2.17	1.01	12	0.31	129.40	129.00	132.10	131.55	133.55	131.50
102	CB-48	95	9.5	1.20	1.20	0.43	0.52	0.52	8.0	8.0	2.85	7.17	2.32	15	1.05	129.20	129.10	131.70	131.22	131.80	131.20
103	CB-49	94	9.3	0.95	0.95	0.44	0.42	0.42	8.0	8.0	2.31	7.27	1.88	15	1.08	128.60	128.50	131.60	130.51	131.70	130.50
104	DMH-44	93	189.0	0.07	3.45	0.90	0.06	2.65	5.0	8.6	14.28	19.52	4.55	24	0.63	128.60	127.40	132.00	130.73	133.00	130.09
105	CB-46	104	135.1	0.24	0.24	0.74	0.18	0.18	5.0	5.0	1.12	2.78	1.42	12	0.52	129.30	128.60	132.50	131.17	132.00	131.06
106	DMH-43	104	158.1	0.46	3.14	0.90	0.41	2.41	5.0	7.6	13.53	17.43	4.31	24	0.51	129.40	128.60	133.20	131.54	132.00	131.06
107	DMH-43A	106	114.1	0.00	2.31	0.00	0.00	1.76	0.0	6.8	10.22	8.25	5.79	18	0.53	130.00	129.40	133.30	132.72	133.20	131.80
108	DMH-60	107	131.7	0.43	1.25	0.90	0.39	1.01	5.0	5.9	6.08	5.10	4.96	15	0.53	131.00	130.30	135.00	134.24	133.30	133.25
109	CB-44A	108	140.6	0.52	0.52	0.76	0.40	0.40	5.0	5.0	2.48	4.94	2.02	15	0.50	132.00	131.30	135.00	134.80	135.00	134.62
110	CB-45	106	16.2	0.37	0.37	0.62	0.23	0.23	5.0	5.0	1.44	8.01	1.83	12	4.31	130.10	129.40	133.10	131.83	133.20	131.80

Project File: SS_9-30-08.stm | Number of lines: 112 | Date: 10-01-2008

NOTES: ** Critical depth

RJO_HGL

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	HGL Up (ft)	Gnd/Rim El Dn (ft)	HGL Dn (ft)
111	CB-44	108	7.6	0.30	0.30	0.76	0.23	0.23	5.0	5.0	1.43	4.43	1.82	12	1.32	131.40	131.30	134.80	134.63	135.00	134.62
112	CB-17	107	12.4	1.06	1.06	0.71	0.75	0.75	5.0	5.0	4.73	6.28	3.85	15	0.81	130.70	130.60	133.20	133.30	133.30	133.25

Project File: SS_9-30-08.stm | Number of lines: 112 | Date: 10-01-2008

NOTES: ** Critical depth

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Estimated Depth to High Groundwater: 120” inches 133 +/- elevation

Deep Observation Hole Number: TP-HA401 Basin #4 Title 5 Inspector: Mark D. Kelley

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 – 22	A/FILL	Dk Brn 10 YR 3/3	NE			Loam	0%	--	Very friable	moist	
22 – 32	B/ Rework ed	Yellowish brown 10 YR 5/6	NE			Loamy sand	5%	--	friable	moist	
32 – 78	C1	Yellowish brown 10 YR 5/8	NE			Loamy Sand	10%	--	massive	moist	
78 – 102	A (buried)	Dark Brn 10 YR 3/3	NE			Loam	NE	--	friable	moist	
102 – 126	B	Brownish yellow 10 YR 6/8	120”	Gray 5 YR 5/1 and Red 10 R 4/8	10%	Sandy Loam	NE	--	friable	moist	
126 – 173	C	Yellowish brown 10 yr 5/8	126-173	Gray 5 Y 5/1	40%	Loamy Sand	NE	--	friable	wet	

Additional Notes ESHWT @ 120”
Seepage 14 ft +/-
No Refusal

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Estimated Depth to High Groundwater: 120" (inches) 131 +/- (elevation)

Deep Observation Hole Number: TP-HA402 Basin #4 Title 5 Inspector Mark D. Kelley

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 – 8	A/FILL								friable	moist	
8 – 18	B	Yellowish Brown 10 YR 5/6				Loamy Sand	5%		friable	moist	
18 – 84	C1	Yellowish Brown 10 YR 5/8				Loamy Sand	5%	NE	massive	moist	
84 – 132	C2	Black 5 Y 2.5/2	120"	Gray 5 Y 6/1	10%	Sandy Clay Loam	NE	--	organic odor	moist	
132 - 156	Cg	Gray 1 Gray 5/				Fine Sand	NE		platy/ laminated	moist	

Additional Notes ESHWT @ 10 ft (120")
No water encountered
No Refusal

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Estimated Depth to High Groundwater: NE (inches) 130 +/- (elevation)

Deep Observation Hole Number: TP-HA403 Basin #5 Title 5 Inspector Mark D. Kelley

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 – 3	Pavement		NE	--	--						
3 – 15	FILL	Brown 10 YR 5/3	NE	--	--	Sand and Gravel	20%	5%	N/A	dry	
15 – 30	B	Yellowish brown 10 YR 5/6	NE	--	--	Med to fine Sand and Gravel	25%		single grain	moist	
30 – 132	C	Yellowish brown 10 YR 5/4	NE	--	--	Coarse to med Sand w/ stratification at 8 ft with med to fine sand lenses	10%	5%	single grain	moist	

Additional Notes No Refusal
No water encountered

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Estimated Depth to High Groundwater: NE (inches) 130 +/- (elevation)

Deep Observation Hole Number: TP-HA404 Basin #5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 – 2.5	Pave-ment						--	--		--	
2.5 – 16	FILL	Brown 10 YR 5/3				Medium Sand and gravel	15%	5%		dry	
16 – 32	B	Yellowish brown 10 YR 5/6				Loamy Sand	10%	<5%	single grain	moist	
32 – 132	C	Yellowish brown 10 YR 5/4	NE	--	--	Coarse to med Sand and gravel, lt yellowish brn stratification of med to fine Sand at 7 to 8 ft	25%	10%	single grain	moist	

Additional Notes No Refusal
No water encountered
J. Marchese & Sons

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

tab

return

A. Site Information

KGI Properties – Twenty Wayland LLC
Owner Name

400 Boston Post Road
Street Address or Lot #

City/Town	State	Zip Code
Wayland	MA	01718

Contact Person (if different from Owner)	Telephone Number
Mark MacRae	617-620-1668

B. Test Results

	Date	Time	Date	Time
	9/17/2008	0946		
Observation Hole #	TP-HA501			
Depth of Perc	108"		Sandy Loam	
Start Pre-Soak	09:46			
End Pre-Soak	11:28:00			
Time at 12"	11:29:00			
Time at 9"	11:42:30			
Time at 6"	12:27:30			
Time (9"-6")	45 min			
Rate (Min./Inch)	15 min./in.			
	Test Passed:	☑	Test Passed:	☐
	Test Failed:	☐	Test Failed:	☐

Mark D. Kelley, P.E.
Test Performed By:

Steven Calichman, Wayland Board of Health
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

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tab

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A. Site Information

KGI Properties – Twenty Wayland LLC
Owner Name

400 Boston Post Road
Street Address or Lot #

City/Town	State	Zip Code
Wayland	MA	01718

Contact Person (if different from Owner)	Telephone Number
Mark MacRae	617-620-1668

B. Test Results

	Date	Time	Date	Time
	9/17/2008	0946		
Observation Hole #	TP-HA502			
Depth of Perc	90”		Loamy Sand	
Start Pre-Soak	10:30			
End Pre-Soak	11:52:00			
Time at 12”	11:53:00			
Time at 9”	11:59:30			
Time at 6”	12:06:30			
Time (9”-6”)	9.0			
Rate (Min./Inch)	2.33 min./in.			
	Test Passed: ☑		Test Passed: ☐	
	Test Failed: ☐		Test Failed: ☐	

Mark D. Kelley, P.E.
Test Performed By:

Steven Calichman, Wayland Board of Health
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

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A. Site Information

KGI Properties – Twenty Wayland LLC
Owner Name

400 Boston Post Road
Street Address or Lot #

Wayland	MA	01718
City/Town	State	Zip Code
Mark MacRae	617-620-1668	
Contact Person (if different from Owner)	Telephone Number	

B. Test Results

	Date	Time	Date	Time
	9/17/2008			
Observation Hole #	TP-HA504			
Depth of Perc	64"		Sand and Gravel	
Start Pre-Soak	13:26:00			
End Pre-Soak	13:54:00			
Time at 12"	13:55:00			
Time at 9"	13:56:30			
Time at 6"	13:58:00			
Time (9"-6")	1.5			
Rate (Min./Inch)	0.5 min./in.			
	Test Passed: ☑		Test Passed: ☐	
	Test Failed: ☐		Test Failed: ☐	

Mark D. Kelley, P.E.
Test Performed By:

Steven Calichman, Wayland Board of Health
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

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tab

return

A. Site Information

KGI Properties – Twenty Wayland LLC
Owner Name

400 Boston Post Road
Street Address or Lot #

Wayland	MA	01718
City/Town	State	Zip Code
Mark MacRae	617-620-1668	
Contact Person (if different from Owner)	Telephone Number	

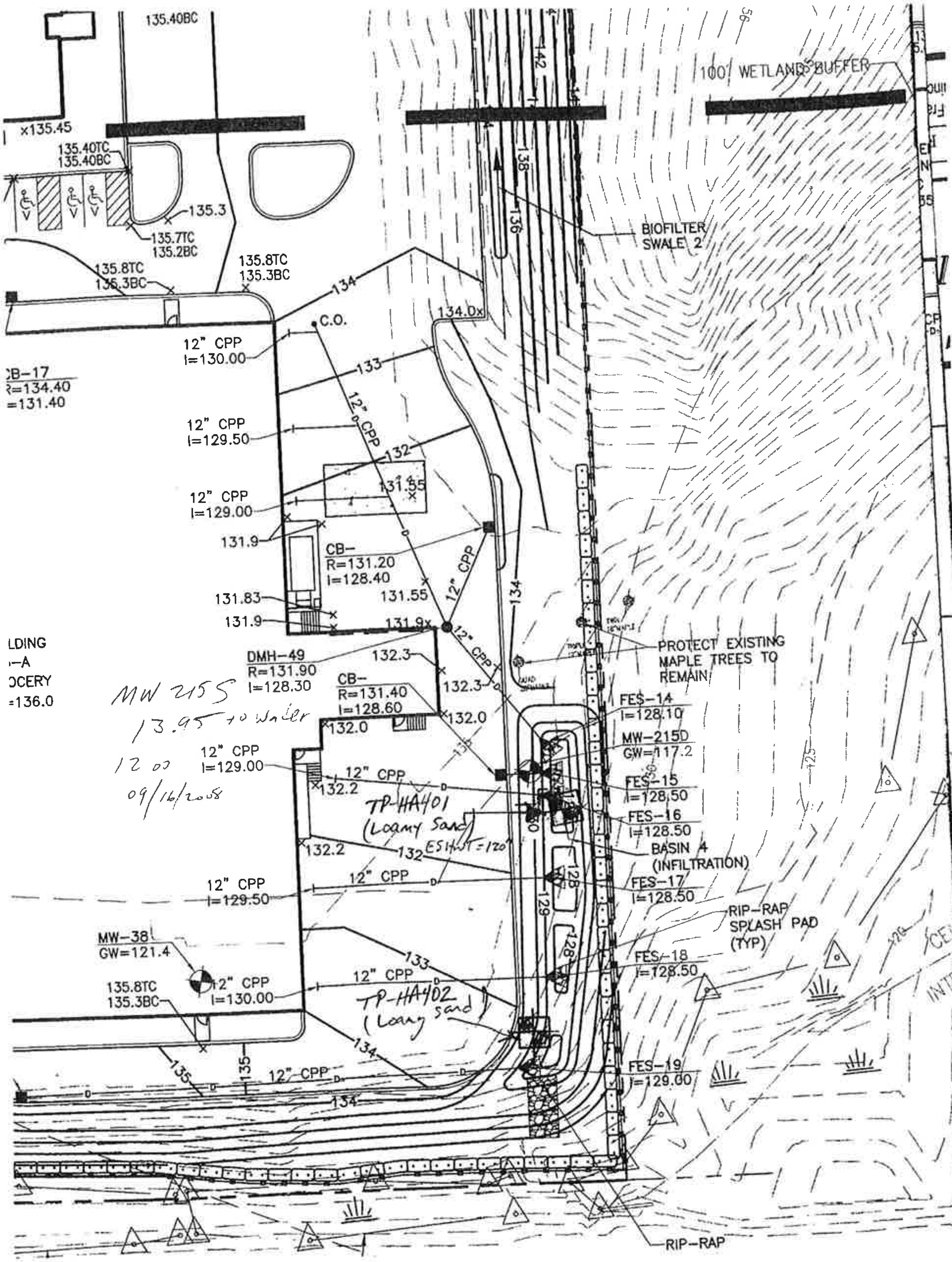
B. Test Results

	Date	Time	Date	Time
	9/17/2008			
Observation Hole #	TP-HA505			
Depth of Perc	80"			
Start Pre-Soak	13:20:00			
End Pre-Soak	13:50:00			
Time at 12"	13:51:00			
Time at 9"	14:14:30			
Time at 6"	15:29:30			
Time (9"-6")	75.0			
Rate (Min./Inch)	25 min./in.			
	Test Passed: ☑		Test Passed: ☐	
	Test Failed: ☐		Test Failed: ☐	

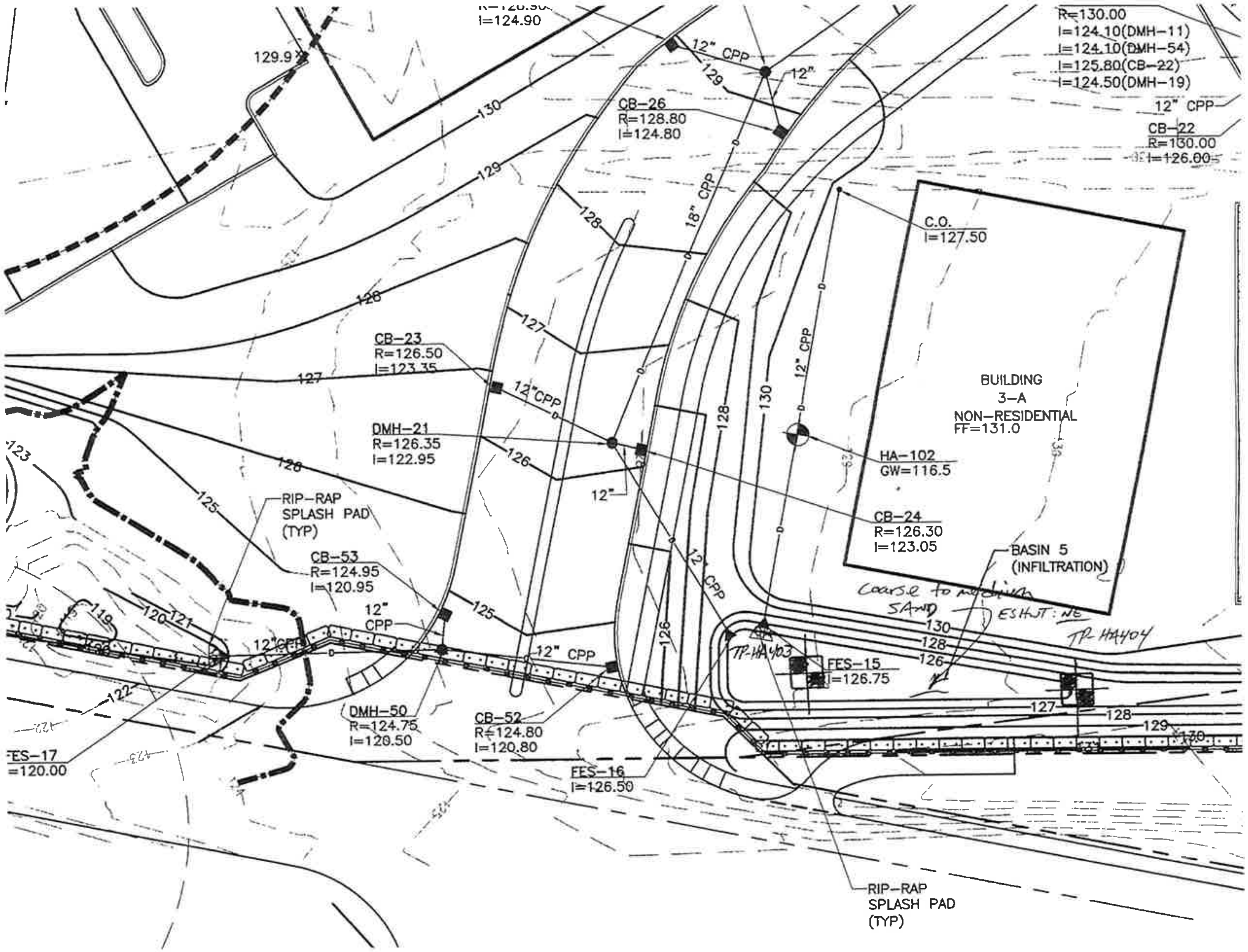
Mark D. Kelley, P.E.
Test Performed By:

Steven Calichman, Wayland Board of Health
Witnessed By:

Comments:



135.40BC
×135.45
135.40TC
135.40BC
135.3
135.7TC
135.2BC
135.8TC
135.3BC
135.8TC
135.3BC
100' WETLAND BUFFER
BIOFILTER SWALE 2
134
C.O.
134.0x
12" CPP
I=130.00
CB-17
R=134.40
I=131.40
133
12" CPP
I=129.50
132
131.55
12" CPP
I=129.00
131.9
CB-
R=131.20
I=128.40
12" CPP
131.55
131.83
131.9
131.9x
LDING
-A
OCERY
=136.0
DMH-49
R=131.90
I=128.30
132.3
CB-
R=131.40
I=128.60
132.3
132.0
132.0
PROTECT EXISTING MAPLE TREES TO REMAIN
FES-14
I=128.10
MW-215D
GW=117.2
FES-15
I=128.50
FES-16
I=128.50
BASIN 4 (INFILTRATION)
FES-17
I=128.50
RIP-RAP SPLASH PAD (TYP)
FES-18
I=128.50
FES-19
I=129.00
RIP-RAP
MW 215S
13.95 to water
12.00
09/16/2008
12" CPP
I=129.00
12" CPP
132.2
TP-HA401
(Loamy Sand)
ESHWT=120"
132.2
132
12" CPP
I=129.50
12" CPP
MW-38
GW=121.4
135.8TC
135.3BC
12" CPP
I=130.00
12" CPP
133
TP-HA402
(Loamy sand)
134
135
135
12" CPP
134
128
129
128



I=124.90
129.9
R=130.00
I=124.10(DMH-11)
I=124.10(DMH-54)
I=125.80(CB-22)
I=124.50(DMH-19)
12" CPP
CB-22
R=130.00
I=126.00
CB-26
R=128.80
I=124.80
18" CPP
C.O.
I=127.50
CB-23
R=126.50
I=123.35
12"CPP
BUILDING
3-A
NON-RESIDENTIAL
FF=131.0
DMH-21
R=126.35
I=122.95
HA-102
GW=116.5
CB-24
R=126.30
I=123.05
RIP-RAP
SPLASH PAD
(TYP)
BASIN 5
(INFILTRATION)
CB-53
R=124.95
I=120.95
Coarse to medium
SAND
ESHWT: NE
TP-HA404
TP-HA403
FES-15
I=126.75
DMH-50
R=124.75
I=120.50
CB-52
R=124.80
I=120.80
FES-17
I=120.00
FES-16
I=126.50
RIP-RAP
SPLASH PAD
(TYP)

BASIN # 4

GP FIELD DATA SHEET TP-HA4C1 **SECTION 2: STANDARDIZED PROCEDURE FOR PERMEAMETER READINGS AND CALCULATIONS** (60')

Date 09/16/2008 Investigator M. Kelley

Reservoir Constants: (See label on Permeamter)

Combined Reservoirs X	35.22	cm^2
Inner Reservoir Y		cm^2

☒ CHECK RESERVOIR USED

Depth of Well Hole 5.0' (Bottom) (Loamy Sand)

Note: In standardized procedure the radius of the well hole is always 3.0 cm

1st Set of Readings with height of water in well (H_1) set at 5 cm

READING NUMBER	TIME	TIME INTERVAL (MIN)	WATER LEVEL IN RESERVOIR, (CM)	WATER LEVEL CHANGE, (CM)	RATE OF WATER LEVEL CHANGE, R_1, (CM/MIN)
			155	4.5	
			155	5.8	
			155	6.8	
			155	7.7	
			"	8.5	
			"	9.2	
			"	10.0	
			"	10.7	0.7
				11.4	0.7
				12.1	0.7 x 4 (2.8)

2nd Set of Readings with height of water in well (H_2) set at 10 cm

READING NUMBER	TIME	TIME INTERVAL (MIN)	WATER LEVEL IN RESERVOIR, (CM)	WATER LEVEL CHANGE, (CM)	RATE OF WATER LEVEL CHANGE, R_2, (CM/MIN)
			15	17.4	
			15	18.7	
			15	19.6	
			15	20.8	
			15	21.9	1.1
			15	23.0	1.1
			15	24.1	1.1
			15	25.2	1.1
			15	26.3	1.1 x 4 (4.4)

CALCULATIONS

$\bar{R}$, the steady state rate of flow, is achieved when R is the same in three consecutive time intervals.

For the 1st Set of Readings $\bar{R}_1$ = (2.8 (R_1))/60 = 0.0467 cm/sec

For the 2nd Set of Readings $\bar{R}_2$ = (4.4 (R_2))/60 = 0.0733 cm/sec

K_{fs} (FIELD SATURATED HYDRAULIC CONDUCTIVITY) = [(.0041)(35.22)(0.0733)] - [(.0054)(35.22)(0.0467)] = 0.001714 cm/sec

(RESERVOIR CONSTANT) (R_2 - STEADY STATE RATE OF FLOW) [0.0106] — (RESERVOIR CONSTANT) (R_1 - STEADY STATE RATE OF FLOW) [0.008875]

1.714×10^{-3} cm/sec

Φ_m (MATRIC FLUX POTENTIAL) = [(.0572)(____ RESERVOIR CONSTANT)(____ R_1 STEADY STATE RATE OF FLOW)] - [(.0237)(____ RESERVOIR CONSTANT)(____ R_2 STEADY STATE RATE OF FLOW)] = ____ cm^2/sec

α (ALPHA PARAMETER) = (____ K_{fs})/(____ Φ_m) = ____ cm^{-1}

$\Delta\theta$ (DELTA THETA) = (____ θ_{fs}, FIELD SATURATED WATER CONTENT OF SOIL, IN CM/CM) - (____ θ_i, AMBIENT WATER CONTENT OF SOIL, IN CM/CM) = ____ cm^3/cm^3

ESTIMATED	
MEASURED	

CHECK ONE

S (SORPTIVITY) = $\sqrt{2(\_\_\_\_ \Delta\theta)(\_\_\_\_ \Phi_m)}$ = ____ cm $sec^{-1/2}$

SOILMOISTURE EQUIPMENT CORP.
P.O. Box 30025, Santa Barbara, CA 93130 USA
Phone: 805-964-3525 - Fax: (805) 683-2189 - Email: sales@soilmoisture.com
Website: http://www.soilmoisture.com

SOILMOISTURE

BASIN #5

TP-HA404

GP FIELD DATA SHEET

SECTION 2: STANDARDIZED PROCEDURE FOR PERMEAMETER READINGS AND CALCULATIONS

Date 09/16/2008 Investigator Mark D. Kelley

Reservoir Constants: (See label on Permeamter)

Combined Reservoirs	X 35.22 cm²	☒
Inner Reservoir	Y 2.15 cm²	☐

CHECK RESERVOIR USED

Depth of Well Hole 4.5 ft. (Bottom of Test coarse to medium sand)

Note: In standardized procedure the radius of the well hole is always 3.0 cm

1st Set of Readings with height of water in well (H_1) set at 5 cm

READING NUMBER	TIME	TIME INTERVAL (MIN)	WATER LEVEL IN RESERVOIR, (CM)	WATER LEVEL CHANGE, (CM)	RATE OF WATER LEVEL CHANGE, R_1 (CM/MIN)
	1035		11.0		
			15.5		
		10s	18.0		
		10s	21.5		
		10	24.5		
			27.5		
			31.0		
			34.0	3.0	
			37.0	3.0	
			40	3.0	3×6=18

2nd Set of Readings with height of water in well (H_2) set at 10 cm

READING NUMBER	TIME	TIME INTERVAL (MIN)	WATER LEVEL IN RESERVOIR, (CM)	WATER LEVEL CHANGE, (CM)	RATE OF WATER LEVEL CHANGE, R_2 (CM/MIN)
		10s	52		
			58.5		
			65.5		
			73.0		
		10s	10.0		
			17.0		
			24.0		
		10s	31.0		
			38.0		
			43.0		
			50.5		
			57.5		
			63.5		
			69.0		
		10s	76.0	7.0	42.0 cm/min

- New water

7×6 = (42)

CALCULATIONS

$\bar{R}$, the steady state rate of flow, is achieved when R is the same in three consecutive time intervals.

For the 1st Set of Readings $\bar{R}_1$ = (18 $_{R_1}$)/60 = 0.30 cm/sec

For the 2nd Set of Readings $\bar{R}_2$ = (42 $_{R_2}$)/60 = 0.70 cm/sec

K_{fs} = [(.0041)(35.22)(0.70)] - [(.0054)(35.22)(0.30)] = 0.044 cm/sec
FIELD SATURATED HYDRAULIC CONDUCTIVITY — RESERVOIR CONSTANT; $\bar{R}_2$ - STEADY STATE RATE OF FLOW — [0.101] — [0.057] — RESERVOIR CONSTANT; $\bar{R}_1$ - STEADY STATE RATE OF FLOW

4.4×10⁻² cm/sec

ϕ_m = [(.0572)(____)(____)] - [(.0237)(____)(____)] = ____ cm²/sec
MATRIC FLUX POTENTIAL — RESERVOIR CONSTANT; $\bar{R}_2$ STEADY STATE RATE OF FLOW — RESERVOIR CONSTANT; $\bar{R}_1$ STEADY STATE RATE OF FLOW

α = (____ K_{fs})/(____ ϕ_m) = ____ cm⁻¹
ALPHA PARAMETER

Δθ = (________) - (________) = ____ cm³/cm³
DELTA THETA — θ_{fs}, FIELD SATURATED WATER CONTENT OF SOIL, IN CM³/CM³ — θ_1, AMBIENT WATER CONTENT OF SOIL, IN CM³/CM³

ESTIMATED	☐
MEASURED	☐

CHECK ONE

S = $\sqrt{2}$(____ Δθ)(____ ϕ_m) = ____ cm sec$^{-1/2}$
SORPTIVITY

SOILMOISTURE EQUIPMENT CORP.
P.O. Box 30025, Santa Barbara, CA 93130 USA
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SOILMOISTURE

TWENTY WAYLAND, LLC
c/o KGI Properties
260 Boston Post Road
Suite 901
Wayland, MA 01778
617-357-9300 (telephone)
617-357-9990 (facsimile)

October 21, 2008

Wayland Planning Board
Wayland Town Building
41 Cochituate Road
Wayland, MA 01778-2614
Attention: Joseph Laydon, Town Planner

Re: Response to Comments
TEC October 6, 2008 Review Letter
Wayland Town Center Project
400 Boston Post Road
Wayland, MA

Dear Mr. Laydon:

This letter provides responses to the referenced review letter.

Civil Design (Parking & Traffic Control) Plans:

1. ***A 'Speed Hump' warning sign (W17-1) with yellow speed limit placard (W13-1) should be placed on each end of Street 'A' leading into the project. They may be used to replace the white R2-1 (15 mph) signs in the same general location. The Manual on Uniform Traffic Control Devices (MUTCD) Section 2C.24 permits one sign to be placed in advance of a series of speed humps as driver notification.***

   Applicant's Response: This will be incorporated.

2. ***The detail on Sheet C-12 labeled 'Typical Raised Crosswalk' should be amended to include the standard pavement markings for speed humps as outlined in the MUTCD Section 3B.27.***

   Applicant's Response: This will be incorporated.

3. ***The plans currently depict a post with W11A-2 and R1-6 signs at each crosswalk. The current version of the MUTCD recommends a fluorescent yellow-green pedestrian crossing sign (W11-2) and supplemental placard with an arrow pointing down toward the crosswalk (W16-7P). The R1-6 signs are typically used as an in-street sign with a breakaway mount that is placed on the double-yellow centerline at the crosswalk. The R1-***

6 signs are appropriate along Street 'A' where traffic volumes are likely to be higher and may not be necessary in other locations.

Applicant's Response: This will be incorporated at all raised crosswalks and intersections. The 30" x 30" size will be changed to 18" x 18". The black and white sign will be replaced with the fluorescent yellow-green per MUTCD standard.

4. ***A stop sign should be added at the end of Street 'E'. The stop sign at the southerly end of Street 'A' near Route 20 should be eliminated as this approach will operate under traffic signal control.***

   Applicant's Response: The stop sign at the end of Street A will be eliminated but the Stop Sign at the end of Street E will not be installed until the Municipal Parcel is developed.

5. ***An additional R3-7L sign should be placed near the Street 'A' stop line at Route 20 to confirm lane use for those exiting from the property.***

   Applicant's Response: This will be incorporated and, based on discussions with TEC, the R3-7L sign in the median area of Street A near the Rt 20 entrance will be deleted.

6. ***Two additional 'No Parking Anytime' signs (R7-1) should be considered along the easterly side of Street 'C', just north of its intersection with Street 'E'.***

   Applicant's Response: R7-1 signs will be added to the post for the two W11-2/W16-7P (as modified by Comment #3 above) along the east side of Street A between the Street E crosswalk and the residential buildings on the edge of the Formal Green. In addition a R7-1 sign will be placed on the eastern side of Street C prior to driveway split near the residential building.

7. ***Some of the traffic control signs along Street 'C' in the vicinity of the residential structures are shown within the proposed driveways. These should be moved to nearby landscaped islands.***

   Applicant's Response: This will be incorporated.

8. ***Additional 'Do Not Enter' (R5-1) and 'One Way' (R6-1) signs should be placed at the two one-way driveways adjacent to Building 4-A.***

   Applicant's Response: Two R5-1 signs will be provided at the exit drive to the north of Building 4-A. A R5-1 sign will be provided along the entrance south of Building 4-A and it will be situated in the landscape area near the pavement at the southeast building corner.

9. *The queue from the proposed drive-thru aisle for Building 4-A may impact part of the parking field directly east of the building, depending on the intended use. The parking on the south side of the exiting aisle may need to be reserved for employee parking to reduce the frequency of conflicts between parking maneuvers and the queue. The parking on the north side of this aisle may need to be converted to angled stalls to make it easier for patrons to access the stalls.*

   Applicant's Response: The nine spaces in the northern area of the parking field (just south of the proposed residential building and southwest of the existing wastewater treatment plant) will be converted to angle parking. The angle transition area between the 90-degree parking and the angles parking will be stripped. The decision to designate the parking on the south side of the aisle as employee parking will ultimately depend upon the tenant. If the tenant develops an entrance on the building east side, which faces the parking area, then the area will not be designated as employee parking.

10. *The designer should consider a special sign at the southwesterly corner of Building 4-A, which reads "Truck Access Only". This should be coupled with one or two 'Do Not Enter' signs (R5-1) on the southeast corner of the building.*

    Applicant's Response: This will be incorporated.

11. *The off-site wayfinding signs for vehicles leaving the site bound for Route 126 North should be shown on Sheet C-5B or L9.0. These signs may be part of the off-site improvement plans, but referenced on this plan set as it affects traffic leaving the site as part of the Site Plan review. A sample guide sign is provided as an attachment to this letter.*

    Applicant's Response: The off-site Wayfinding signs will be incorporated.

12. *Additional bollards should be placed in the areas of speed hump transition curbs. All bollards should be placed at least 24" from the face of curb.*

    Applicant's Response: Bollards will be placed on the approach side of each raised intersection and crosswalk. The limits of the bollard installation will be from the transition when the curb reveal is less than 6" up to the Flat Table area.

13. *The detail on Sheet C-13 labeled 'Typical Painted "Stop" Detail' should be modified to reflect to 4" yellow lines for the double-yellow centerline and a 12" stop line, which should be a minimum of 4' behind the closest painted crosswalk line, if applicable.*

    Applicant's Response: This will be incorporated. In addition the stop bar for the entrance of Street C to Street B northwest of Building 4A shall be provided across the entire pavement width since Street C is one-way.

Please do not hesitate to contact me with any questions or concerns.

Sincerely,
TWENTY WAYLAND, LLC

By: Francis X. Dougherty
Francis X. Dougherty, authorized representative

c: K. Dandrade, TEC

TWENTY WAYLAND, LLC
c/o KGI Properties
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Suite 901
Wayland, MA 01778
617-357-9300 (telephone)
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~~October 21, 2008~~
October 22, 2008

Wayland Planning Board
Wayland Town Building
41 Cochituate Road
Wayland, MA 01778-2614
Attention: Joseph Laydon, Town Planner

Re: Site Plan II Updated Information
Phase I Site Plan Application
Town Center Project
400 Boston Post Road
Wayland, MA

Dear Mr. Laydon;

This letter provides supplemental information in accordance with the board's Rules and Regulations; Master Special Permit Decision; and Response to Comments from Marchionda Associates.

Planning Board Rules and Regulations

Waiver Requests

Our June 9, 2008 application was amended to include certain drawings that resulted in some of the waivers requested in Attachment B of the application not to be required. Other waivers were requested based on design reviews. Therefore please consider this letter as an update on the waivers requested for the referenced application.

Updated Waiver Requests from June 9, 2008 Application

	§304-12 Provision	**Submittal Requirement To Be Waived**
1.	*C(2)*	*Plans to have suitable scale. A site plan shall be prepared for recording.* The Planning Board has not indicated what design features are to be included on the plan for recording. Given the property size and improvements it was discussed that recording all the site plans is not feasible. We suggest that the board considering a requirement for a site plan to be recorded prior to the

§304-12 Provision		**Submittal Requirement To Be Waived**
		first occupancy permit being issued. The plan would be a single 24" x 36" sheet and would include the location of Street A, Street B, Street C, Street D and Street E. The edge of curbing would be denoted for each street. It should also include the permitted footprint for any building. The plan could be updated as more project features are approved such as the residential buildings, Municipal Parcel, Building 3A and 4A, and associated roads, etc.
2.	C(5)a[4]	*Existing and proposed easements shall be shown.* Existing easements are shown on the drawings. It is not possible to depict proposed easements until all tenants are signed; residential units sold; and other issues such as resolution of the town's wastewater treatment plant are complete.
3.	C(5)b[2]:	*Show building design, elevations, materials, and heights.* Such information has been shown on other site plan applications or will be developed in future submittals (Building 3-A, 4-A, Municipal Parcel, Residential Units).
4.	C(5)b[3]:	*Table summarizing gross floor area for retail, office, municipal, and residential uses.* Such information has been shown on other site plan applications or will be developed in future submittals (Building 3-A, 4-A, Municipal Parcel, Residential Units).

<u>Additional Waiver Requests</u>

During design review the following waivers were identified to be required.

§304-12 Provision		**Submittal Requirement To Be Waived**
1.	*C(5)c[4]*	*Depict All Proposed Fire Hydrants On Site. The location of proposed fire alarm boxes or other warning systems and fire lanes shall be provided.* Proposed Fire Hydrants are shown on the Site Plan II (Submission 2) documents fire alarm boxes but cannot be finalized until all buildings are designed. In addition, the ultimate location of fire hydrants will be stipulated after the buildings are designed and features such as wall hydrants are identified. We suggest that this provision be waived and the applicant provide to the Planning Board, for record purposes, a copy of the fire department's approval of the fire hydrants, alarm boxes, or other warning systems prior to the first building permit being issued. This condition would apply for those areas of the site that are being developed and would not include future development areas such as the Municipal Parcel, Residential Areas, etc as appropriate.

Waiver Requests from June 9, 2008 Application That Are Not Required

	§304-12 Provision	Submittal Requirement Waiver Not Necessary
1.	*C(5)b[5]*	*Existing and Proposed Signs.* Existing signs are not required to be shown since those features will be demolished. The proposed signs were provided for the buildings in Site Plan I (Submission 1), Site Plan III (Submission 3), and Site Plan IV (Submission 4). Site and traffic control signs were provided in Site Plan II (Submission 2) documents. No waiver is required.
2.	*C(5)b[6]*	*Existing and Proposed Lighting.* Existing lighting is not required to be shown since those features will be demolished. Proposed lighting was provided as part of the Site Plan II (Submission 2) plans. No waiver is required.
3.	*C(5)b[8]*	*Outdoor Storage Areas Are To Be Shown.* The only outdoor storage area proposed are dumpsters situated throughout the site and compactors for Buildings 2A and Building 4A. Both compactors are screened as depicted in Site Plan III and Site Plan IV submittals. No waiver is required.
4.	*C(5)b[9]*	*Underground storage containers are to be shown.* No underground storage containers are to be utilized therefore no wavier is necessary. No waiver is required.
5.	*C(5)c[6]*	*Solid Waste Disposal Facilities To Be Shown.* Dumpsters and compactors are shown as described above. No waiver is required.
6.	*C(5)d[4]*	*Show Outdoor Structures and Lighting, Signs, Benches, Waste Receptacles, Bicycle Racks, etc.* Information is provided in Site Plan II documents and no waiver is required. No waiver is required.
7.	*D(7)*	*Proposed Signage including project signage, directional signage, and tenant signage.* Tenant signage was addressed in Site Plan I, Site Plan III, and Site Plan IV. Site signage was provided in Site Plan II documents. No waiver is required.

§304-12 Provision		Submittal Requirement Waiver Not Necessary
8	*D(8)*	*Proposed Lighting.* This information was provided as part of the Site Plan II documents. No waiver is required.
9	*D(9)*	*Proposed Waste Disposal Practices.* Dumpsters and Compactors are to be utilized on-site. No waiver is required.

Tabulations of Coverage Areas (§304-12C(5)e{3})

Calculate Net Upland Area

Total Area Above Elevation 124.0 (1)	40.1	Acres
Less Wetlands In Area Above Elev. 124.0	(0.2)	Acres
Net Upland Area	39.9	Acres

Calculate Impervious Area

Pavement	12.6	Acres
Sidewalk and Hardscape	2.9	Acres
Building Footprints (2)	6.0	Acres
Total Impervious Area	21.5	Acres

Calculate Percentage Of Upland Area That Is Impervious

Total Impervious Area	21.5	Acres
Net Upland Area	39.9	Acres
% (23.3/39.9)	55%	**[65% Max Allowed]**

Summary of Open Spaces and Wooded Areas

	Existing	Proposed
Open Spaces, Acres	16.3	16.1
Wooded, Acres	19.6	19.3
Impervious Area, Acres	21.0	21.5
Total Site Area, Acres	56.9	56.9

(1). Elevation 124 is the elevation designated in the Zoning Bylaw for the Floodplain.

(2). Impervious Areas include areas designated in Site Plan I, II, III, and IV. It also includes the area for future development (the Municipal Parcel, Residential Buildings, Building 3A, and Building 4A).

Tabulations of Proposed Building Gross Floor Areas (§304-12C(5)b{3})

	Total	Residential	Municipal	Office	Retail
Municipal Building	40,000	0	40,000	0	0
Residential Bldgs	155,500	155,500	0	0	0
Bldg 1A	15,877	0	0	6,279	9,598
Bldg 1B	7,689	0	0	0	7,689
Bldg 1C/2C	16,008	0	0	0	16,008
Bldg 2D	4,519	0	0	0	4,519
Bldg 2E	2,453	0	0	0	2,453
Bldg 2F	25,283	12,000	0	0	13,283
Bldg 2G	3,800	0	0	0	3,800
Bldg 3A	12,900	0	0	0	12,900
Bldg 2B	21,579	0	0	0	21,579
Bldg 2A	18,171	0	0	0	18,171
Bldg 4A	3,721	0	0	3,721	0
Bldg 5A	45,000	0	0	0	45,000
Total SF	372,500	167,500	40,000	10,000	155,000

Landscape Maintenance Plan (§304-12D(6))

Landscaping shall be maintained to ensure that all lawns are mowed regularly, shrubs are appropriately trimmed and noxious weeds are eliminated. Routine pruning and trimming is permitted. Any landscape material removed from the site must be replaced within a 30 day period depending upon weather conditions.

In general, irrigation water conservation at the Wayland Town Center site will be achieved through a program of design and management practices. After the grow-in period, irrigation to the landscaping buffer areas will be minimized. This will be accomplished through the use of drought tolerant and native plant species for landscaping. Once vegetation has been established, the property line perimeter buffer areas, landscaped parking lot islands, and the Municipal Building lot area will not be irrigated.

We evaluated the feasibility of installing a cistern system to harvest rainfall to irrigate the "Town Green" area and determined that it was not cost effective. Therefore the "Town Green" area will not be irrigated. The remaining landscaped areas around the buildings, residential areas, and rain gardens (stormwater treatment areas) will be irrigated with drip irrigation for planter areas and sprinkler irrigation for other areas.

Waste Management Policies (§304-12D(9))

The waste management program for the project consists of a series of screened dumpsters and screened compactors. Dumpsters are provided in areas depicted on the landscape plans. Compactors are contemplated for Building 4A and Building 2B. Both compactors are screened as depicted in Site Plan III (Submission 3) and Site Plan IV (Submission 4) submittals. In addition we expect restaurants to have temporary grease containers per code. The project will also have trash containers situated in pedestrian areas, such as mews, to allow for convenient trash disposal areas.

The Property Manager will contract with a waste management firm to remove all waste, trash, rubbish or refuse of all kinds from the property at regular intervals. In some instances the tenants will contract directly to have the waste removed at regular intervals. Such intervals shall not exceed one (1) week and trash collections shall be made more often if necessary to prevent the accumulation of refuse so as to create a nuisance. In addition, property management staff will patrol the site regularly to collect debris that was not deposited in containers.

A vacuum truck will be utilized at least once per month to clean all paved areas within the project limits. A street sweeper will be utilized in spring (typically in March, April, and June) to collect any sand or debris from the winter.

Master Special Permit Decision

Location of Outdoor Seating Areas (MSP III, pg 34)

The MSP required the applicant to designate the locations of outdoor seating for restaurants. ~~It is possible that outdoor seating.~~ Given that the project is not completely leased it is possibly that outdoor seating may be required for any building except for Building 4A, 1B, 1C, and 2C.

Parking Summary (MSP IV B.4(a), pg 48)

The MSP required an aggregate of 1,099 off street parking spaces. The current design has 815 spaces within the commercial area (including the apartments over retail); allows for the town to construct 100 spaces in the Municipal Parcel; and projects that 176 spaces will be constructed when the residential areas are developed. Therefore the current design has 1,091 spaces or 8 spaces less than the MSP required.

We intend to construct the additional 8 spaces once the land beneath the current wastewater treatment plant is transferred to Twenty Wayland for redevelopment. Therefore we request that the board designate the area beneath the existing wastewater treatment plant as a reserve parking area.

Town Green Lighting (MSP IV (F)2, pg 56)

The MSP required the applicant to designate the proposed specifications for lighting around the perimeter of the Town Green. We suggest that the maximum foot-candles (FC) within the Town Greens shall be 3.0. All other criteria in the MSP Decision IV(F)3, page 56 and 57 shall apply.

Marchionda Associates' October 3, 2008 Review Letter

The review letter identified two items that required resolution.

23. ***M&A: The site plans have been revised with the information requested. It appears that stormwater in the street gutter of Old Sudbury Road will pass through the intersection with Street "A" to the existing catch basin northwest of the intersection. A catch basin southeast of the intersection capturing gutter flow prior to entering the intersection should be considered as part of the Sudbury Road improvements.***

    Applicant's Response: The drainage improvements are anticipated as part of the Old Sudbury Road (Rt 27) improvements. Drawings 8 and 9 from that design contract were provided in the September 29, 2008 Site Plan II documents for reference.

24. ***M&A: The revised O&M Plan submitted addressed the maintenance requirements of the proposed BMPs. This document should be dated to insure that it is properly referenced.***

    Applicant's Response: The document has been dated. A current copy is provided as Attachment A.

Please do not hesitate to contact me with any questions or concerns.

Sincerely,
TWENTY WAYLAND, LLC

By: Francis X Dougherty
Francis X. Dougherty, authorized representative

c: K. Buckland, Cecil Group
K. Dandrade, TEC
J. Barrows, Marchionda Associates

ATTACHMENT A
OCTOBER 3, 2008 STORMWATER O&M PLAN

STORMWATER MANAGEMENT SYSTEM (SMS)
OPERATION AND MAINTENANCE PLAN
October 3, 2008

Applicant: Twenty Wayland, LLC
260 Boston Post Road, Suite 9
Wayland, MA 02109

Prepared by: R.J. O'Connell & Associates
80 Montvale Avenue
Stoneham, MA

A. SMS DESCRIPTION

The on-site drainage system, which collects and conveys storm water runoff from the parking lot consists of deep sump catch basins with oil/grease hoods on the outlets, drain manholes, closed drainage piping, biofilter swales, rain gardens, and curbing along pavement edges.

B. OPERATION AND MAINTENANCE RESPONSIBILITY

During construction:
Site Contractor (Not Selected at this time)

Post construction:
Twenty Wayland, LLC

C. INSPECTION AND MAINTENANCE SCHEDULE

Schedule During Construction:

See Erosion Control Notes (below). These notes are also included on the site design plans. The NPDES general permit which is prepared prior to construction will also include schedule information for the inspection and maintenance of erosion controls during and immediately following construction.

EROSION CONTROL NOTES:

ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH D.E.Q.E.'S (DEP) EROSION AND SEDIMENTATION CONTROL GUIDELINES, AUGUST 1983, THE U.S.D.A. S.C.S. EROSION AND SEDIMENT CONTROL IN SITE DEVELOPMENT, MASSACHUSETTS CONSERVATION GUIDE, SEPTEMBER 1983 AND ALL LOCAL MUNICIPAL REGULATIONS.

EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE COMMENCEMENT OF ANY SITE WORK OR EARTHWORK OPERATIONS, SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITE WORK IS COMPLETE AND GROUND COVER IS ESTABLISHED.

STOCKPILES SHALL BE SURROUNDED ON THEIR PERIMETERS WITH STAKED HAY BALES AND/OR SILTATION FENCES TO PREVENT AND/OR CONTROL SILTATION AND EROSION.

TOPS OF STOCKPILES SHALL BE COVERED IN SUCH A MANNER THAT STORMWATER DOES NOT INFILTRATE THE MATERIALS AND THEREBY RENDER THE SAME UNSUITABLE FOR FILL USE.

ALL DISTURBED OR EXPOSED AREAS SUBJECT TO EROSION SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER. WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED OR HAVE TEMPORARILY BEEN SUSPENDED FOR MORE THAN FOURTEEN DAYS, OR WHEN FINAL GRADES ARE REACHED IN ANY PORTION OF THE SITE, STABILIZATION PRACTICES SHALL BE IMPLEMENTED WITHIN THREE DAYS. AREAS WHICH REMAIN DISTURBED BUT INACTIVE FOR AT LEAST FOURTEEN DAYS SHALL RECEIVE TEMPORARILY SEEDING IN ACCORDANCE WITH MASSACHUSETTS DEP EROSION AND SEDIMENT CONTROL GUIDELINES. IN ALL CASES, STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE.

EARTHWORK ACTIVITY ON THE SITE SHALL BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO THE TEMPORARY DRAINAGE SWALES & SEDIMENT BASINS.

THE LOCATION OF TEMPORARY DRAINAGE SWALES AND SEDIMENTATION TRAPS SHALL BE REVISED AS REQUIRED AS CONSTRUCTION PROGRESSES

HAYBALES AND/OR FILTER BAGS SHALL BE PLACED AROUND CATCH BASINS AS REQUIRED DURING CONSTRUCTION.

ALL EROSION CONTROL MEASURES SHALL BE ROUTINELY INSPECTED OR A WEEKLY BASIS (ONCE EVERY SEVEN DAYS), CLEANED AND REPAIRED OR REPLACED AS NECESSARY THROUGHOUT ALL PHASES OF CONSTRUCTION. IN ADDITION, INSPECTION SHALL TAKE PLACE AFTER EACH RAINFALL EVENT. THE CONTRACTOR SHALL STRICTLY ADHERE TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) DURING CONSTRUCTION OPERATIONS.

ALL PROPOSED SLOPES (EXCLUDING RIP RAP SLOPES) STEEPER THAN 3H:1V SHALL BE STABILIZED WITH A CURLEX EROSION CONTROL MATTING BY AMERICAN EXCELSIOR COMPANY (OR EGINEER APPROVED EQUAL) PRIOR TO HYDROSEEDING AND PROTECTED FROM EROSION.

THE CONTRACTOR SHALL KEEP ON SITE AT ALL TIMES ADDITIONAL HAYBALES AND EXTRA SILTATION FENCING FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER AND/OR CONSERVATION COMMISSION AGENT TO MITIGATE ANY EMERGENCY CONDITION.

THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ANY PERMITS AND/OR CONNECTION FEES REQUIRED TO CARRY OUT THE WORK INCLUDING BUT NOT LIMITED TO DEMOLITION.

THE LIMIT OF WORK LINE FOR THE AREA TO BE CLEARED AND GRUBBED SHALL BE THE SAME AS THE LIMIT OF WORK LINE NECESSARY FOR GRADING PURPOSES, (I.E.., THE GRADING LIMITS AROUND THE PERIMETER OF THE PROJECT AREA).

THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AS DETERMINED BY THE ENGINEER OR OWNER'S REPRESENTATIVE.

THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY.

CATCH BASINS WHICH SERVE AS TEMPORARY SEDIMENT TRAPS MUST BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT. SEDIMENT WILL BE REMOVED FROM EACH BASIN WHEN SEDIMENT HAS ACCUMULATED TO WITHIN 1' BELOW THE INVERT ELEVATION OF THE OUTFALL PIPE.

UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

ALL CONSTRUCTION SHALL MEET OR EXCEED THE TOWN OF WAYLAND'S ENGINEERING DEPARTMENT SPECIFICATIONS.

ALL SLOPES EXCEEDING FIFTEEN (15) PERCENT RESULTING FROM THE SITE GRADING SHALL BE EITHER COVERED WITH SIX (6) INCHES OF TOPSOIL AND PLANTED WITH A VEGETATIVE COVER SUFFICIENT TO PREVENT EROSION OR BE STABILIZED BY A RETAINING WALL.

DUST CONTROL SHALL BE USED DURING GRADING OPERATIONS. DUST CONTROL METHODS SHALL CONSIST OF DAMPENING THE GROUND WITH WATER. IF WATER DOES NOT PROVIDE ADEQUATE DUST CONTROL, AN EMULSION SOIL STABLIZER SHALL BE APPLIED TO SUSCEPTIBLE SOILS.

THE CONTRACTOR SHALL BE AWARE THAT SOIL, GRADES AND WETLANDS PROXIMITY AT THIS SITE MAKE IT PARTICULARLY SUSCEPTIBLE TO SOIL EROSION AND SENSITIVE TO IT'S CONSEQUENCES. IT SHOULD BE NOTED THAT THE EROSION CONTROL MEASURES AS SHOWN ON THE DRAWINGS DEPICT THE MINIMUM REQUIRED CONTROL AND ARE REPRESENTATIVE OF A SINGLE STAGE OF CONSTRUCTION FOR EACH PHASE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITING, RELOCATION AND AUGMENTATION OF EROSION CONTROL DEVICES AS THE PROJECT PROGRESSES AND SITE DRAINAGE CONDITIONS CHANGE.

THE CONTRACTOR SHALL ANTICIPATE AND MODIFY EROSION CONTROL MEASURES BASED ON PAST AND CURRENT WEATHER CONDITIONS, SEASON AND EXPECTED FUTURE CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL MINIMIZE THE AREA OF DISTURBED SOIL. EFFORTS SHALL BE MADE TO LIMIT THE TIME OF EXPOSURE OF DISTURBED AREAS.

THE CONTRACTOR SHALL AT HIS EXPENSE SURVEY AND MARK OUT IN THE FIELD THE LIMITS OF CLEARING (I.E. HAYBALE/SILTFENCE LINE) AND THE WETLAND BUFFER BOUNDARY FOR APPROVAL BY THE TOWN PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING ACTIVITIES.

THE CONTRACTOR SHALL NOTIFY THE TOWN'S PLANNING STAFF AND CONSERVATION AGENT AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF SITEWORK.

PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AT THE SITE, THE CONTRACTOR SHALL ENGAGE AN INDIVIDUAL WITH SPECIFIC PROFESSIONAL TRAINING AND EXPERTISE IN EROSION AND SEDIMENT CONTROL. THE EROSION CONTROL MONITOR SHALL PREPARE A WEEKLY REPORT WHICH SHALL BE KEPT ON SITE AT ALL TIMES AND SHALL BE SHOWN TO LOCAL, STATE AND FEDERAL AGENTS UPON REQUEST. THIS REPORT SHALL INDICATE THE STATUS OF THE EROSION CONTROLS AND ANY MAINTENANCE REQUIRED AND PERFORMED. THIS REPORT SHALL CONFORM TO THE REQUIREMENTS OF THE EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT.

HAYBALE DIKES SHALL BE CONSTRUCTED AT ALL EXISTING & PROPOSED CATCH BASINS LOCATED IN FILL AREAS & SUBJECT TO STORMWATER RUN-OFF FROM PROPOSED FILL AREAS DURING CONSTRUCTION, OR AS DIRECTED BY THE OWNER/ENGINEER. NO SEDIMENTS SHALL ENTER THE ON-SITE DRAINAGE SYSTEM AT ANY TIME.

THE FOREBAY BASINS SHALL BE USED AS SEDIMENTATION BASINS THROUGHOUT CONSTRUCTION AND SHALL BE PERIODICALLY CLEANED DURING CONSTRUCTION, AND AT THE COMPLETION OF CONSTRUCTION. ALL TEMPORARY SWALES SHALL BE DIRECTED TO THE FOREBAY LOCATION WHEN POSSIBLE.

THE LOCATION OF HAYBALE CHECK DAMS SHALL BE FIELD VERIFIED DURING SITE PREPARATION OPERATIONS BY THE CONTRACTOR.

UPON COMPLETION OF ALL SITE WORK CONSTRUCTION SITE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, DRAINAGE SWALES, FOREBAYS, & THE DETENTION POND AND REMOVE ALL SEDIMENT AND TRASH DEBRIS THAT HAS ACCUMULATED WITHIN EACH STRUCTURE DURING THE COURSE OF CONSTRUCTION.

Post Construction Schedule

A checklist of all maintenance items will be developed and used for each stormwater treatment component. Each time an inspection is completed or a maintenance procedure is performed, it will be documented on the checklist. The checklist will be kept on the project site. The property owner will be financially responsible for the implementation of this plan and for future system repairs as needed.

General Site Inspections and Maintenance:

Sweep parking lot and driveway areas to remove sediments before they can enter the stormwater management system, twice annually, in the early spring and late fall, and on an as needed basis at other times.

Inspect dumpster and compactor areas for spillage and clean as necessary.

Inspect landscape areas and edges of paved areas for any signs of erosion. Perform any necessary curb replacement, earth repair, reseeding or mulching upon identification.

Routinely pick up and remove litter from the parking areas and perimeter landscape areas. Clean leaves or trash from catch basin grates when observed.

Stormwater Management System Inspections and Maintenance:

Deep Sump Catch Basins:

Activity	Frequency
Inspect units	Four times per year
Clean units	Whenever the depth of sediment is greater than two feet.

Sediment Forebays:

Activity	Frequency
Inspect sediment forebays	Monthly
Clean sediment forebays	Whenever the depth of sediment is greater than two feet.

Rain Gardens (Bioretention Areas):

Activity	Frequency
Inspect and remove trash	Monthly
Mow	2 to 12 times per year
Mulch	Annually
Fertilize	Annually
Remove dead vegetation	Annually
Prune	Annually

Biofilter Swales (Grassed Channel):

Activity	**Frequency**
Remove sediment from grass channel	**Annually**
Mow	**Once a month during growing season**
Repair areas of erosion and revegetate	**As needed, but no less than once per year**

Wet Basins:

Activity	**Frequency**
Inspect wet basins to ensure they are operation as designed	**At least once per year**
Mow the side slopes and embankments	**At least twice per year**
Check the sediment forebays for accumulated sediment, trash, and debris and remove it	**At least twice per year**
Remove sediment from basin	**As necessary, and at least once every 10 years.**

Infiltration Basins:

Activity	**Frequency**
Preventative maintenance	**Twice per year**
Inspect to ensure proper functioning	**After every major storm during the first 3 months of operation and twice per year thereafter**
Mow the bottom and side slopes; remove trash and debris; remove grass clippings and accumulated organic matter	**Twice per year**
Inspect and clean pretreatment devices	**At least twice per year, and after every major storm event.**