

Short Environmental Assessment Form

Part 1 - Project Information

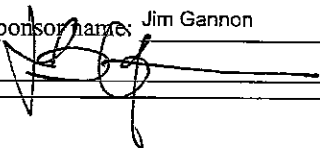
Instructions for Completing

Part 1 - Project Information. The applicant or project sponsor is responsible for the completion of Part 1. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification. Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information.

Complete all items in Part 1. You may also provide any additional information which you believe will be needed by or useful to the lead agency; attach additional pages as necessary to supplement any item.

Part 1 - Project and Sponsor Information			
Name of Action or Project: WH Greene & Associates - Parking Expansion			
Project Location (describe, and attach a location map): 400 Quaker Rd. East Aurora, NY 14052			
Brief Description of Proposed Action: 7,062 sf. Parking Expansion project to create twenty (20) additional parking spaces for WH Greene & Associates.			
Name of Applicant or Sponsor: Jim Gannon, Scheid Architecural on behalf of WH Greene & Associates		Telephone: 716-884-0059	
		E-Mail: jgannon@scheidaia.com	
Address: 111 Elmwood Ave.			
City/PO: Buffalo		State: NY	Zip Code: 14201
1. Does the proposed action only involve the legislative adoption of a plan, local law, ordinance, administrative rule, or regulation? If Yes, attach a narrative description of the intent of the proposed action and the environmental resources that may be affected in the municipality and proceed to Part 2. If no, continue to question 2.			NO <input type="checkbox"/>
			YES <input type="checkbox"/>
2. Does the proposed action require a permit, approval or funding from any other governmental Agency? If Yes, list agency(s) name and permit or approval: Town of Aurora Building Department - Building Permit			NO <input type="checkbox"/>
			YES <input checked="" type="checkbox"/>
3.a. Total acreage of the site of the proposed action?		.17 acres	
b. Total acreage to be physically disturbed?		.41 acres	
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor?		2.40 acres	
4. Check all land uses that occur on, adjoining and near the proposed action.			
<input type="checkbox"/> Urban <input type="checkbox"/> Rural (non-agriculture) <input checked="" type="checkbox"/> Industrial <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Residential (suburban)			
<input type="checkbox"/> Forest <input type="checkbox"/> Agriculture <input type="checkbox"/> Aquatic <input type="checkbox"/> Other (specify): _____			
<input type="checkbox"/> Parkland			

5. Is the proposed action, a. A permitted use under the zoning regulations?	NO	YES	N/A	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b. Consistent with the adopted comprehensive plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
		NO	YES	
6. Is the proposed action consistent with the predominant character of the existing built or natural landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
7. Is the site of the proposed action located in, or does it adjoin, a state listed Critical Environmental Area? If Yes, identify: _____	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
8. a. Will the proposed action result in a substantial increase in traffic above present levels?	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
	b. Are public transportation service(s) available at or near the site of the proposed action?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	c. Are any pedestrian accommodations or bicycle routes available on or near site of the proposed action?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9. Does the proposed action meet or exceed the state energy code requirements? If the proposed action will exceed requirements, describe design features and technologies: Not Applicable	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
10. Will the proposed action connect to an existing public/private water supply? If No, describe method for providing potable water: _____ Not Applicable	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
11. Will the proposed action connect to existing wastewater utilities? If No, describe method for providing wastewater treatment: _____ Not Applicable	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
12. a. Does the site contain a structure that is listed on either the State or National Register of Historic Places?	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
b. Is the proposed action located in an archeological sensitive area?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
		NO	YES	
13. a. Does any portion of the site of the proposed action, or lands adjoining the proposed action, contain wetlands or other waterbodies regulated by a federal, state or local agency?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	b. Would the proposed action physically alter, or encroach into, any existing wetland or waterbody? If Yes, identify the wetland or waterbody and extent of alterations in square feet or acres: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14. Identify the typical habitat types that occur on, or are likely to be found on the project site. Check all that apply: <input type="checkbox"/> Shoreline <input type="checkbox"/> Forest <input type="checkbox"/> Agricultural/grasslands <input type="checkbox"/> Early mid-successional <input type="checkbox"/> Wetland <input type="checkbox"/> Urban <input checked="" type="checkbox"/> Suburban				
15. Does the site of the proposed action contain any species of animal, or associated habitats, listed by the State or Federal government as threatened or endangered?	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
16. Is the project site located in the 100 year flood plain?	NO	YES		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
17. Will the proposed action create storm water discharge, either from point or non-point sources? If Yes, a. Will storm water discharges flow to adjacent properties? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	NO	YES		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	b. Will storm water discharges be directed to established conveyance systems (runoff and storm drains)? If Yes, briefly describe: <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES See attached storm water letter and analysis from GPI Engineering.			

<p>18. Does the proposed action include construction or other activities that result in the impoundment of water or other liquids (e.g. retention pond, waste lagoon, dam)?</p> <p>If Yes, explain purpose and size: _____</p> <p>See attached storm water letter and analysis from GPI Engineering.</p> <p>_____</p>	<p>NO</p> <p><input type="checkbox"/></p>	<p>YES</p> <p><input checked="" type="checkbox"/></p>
<p>19. Has the site of the proposed action or an adjoining property been the location of an active or closed solid waste management facility?</p> <p>If Yes, describe: _____</p> <p>_____</p>	<p>NO</p> <p><input checked="" type="checkbox"/></p>	<p>YES</p> <p><input type="checkbox"/></p>
<p>20. Has the site of the proposed action or an adjoining property been the subject of remediation (ongoing or completed) for hazardous waste?</p> <p>If Yes, describe: _____</p> <p>_____</p>	<p>NO</p> <p><input checked="" type="checkbox"/></p>	<p>YES</p> <p><input type="checkbox"/></p>
<p>I AFFIRM THAT THE INFORMATION PROVIDED ABOVE IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE</p> <p>Applicant/sponsor name: Jim Gannon Date: 2018-07-23</p> <p>Signature: </p>		

July 20, 2018

James B. Gannon, AIA
Scheid Architectural, PLLC
111 Elmwood Avenue
Buffalo, New York 14201

**RE: 400 Quaker Road – Parking Lot Expansion
East Aurora, NY 14052
GPI Project No. BUF-2018056.00**

Dear Mr. Gannon:

As requested by Scheid Architectural (SA), GPI has performed a stormwater analysis to assess the impacts to the existing stormwater management system due to the proposed parking lot expansion which will provide 20 additional parking spaces for the existing commercial property located at 400 Quaker Road, East Aurora, NY. This letter discusses the existing site conditions and stormwater management system, and proposed stormwater management system improvements to accommodate the parking expansion.

SUMMARY OF DRAINAGE ANALYSIS

Existing Conditions:

The existing 2.40 +/- acre property is located on the southeast corner of NYS Route 20 (aka: Quaker Road) and Commerce Way. The site is occupied by an 10,000+/- sf commercial building, 1368 +/- sf garage/barn, and 17,600 +/- sf of asphalt pavement (providing 36 parking spaces), with the remaining area being greenspace. The land generally slopes from north to south. Stormwater runoff from the westerly portion of the site drains via overland flow to an on-site ditch along the west property line, flows from the ditch are conveyed westerly by a 12" pipe to the existing 24" storm sewer along the east side of Commerce Way, the 24" storm sewer flows southerly along Commerce Way and ultimately discharges to the East Branch of Cazenovia Creek. Stormwater runoff from the easterly portion of the site drains via overland flow to an on-site French Drain system which flows southerly from the east side of the commercial building to the southerly property line where it turns to the west discharging into an existing ditch/low area in the southwest corner of the property. Stormwater runoff from the extreme southeastern portion of the property (the general location of the proposed parking lot expansion) flows to the south property line via overland through lawn and a wooded area.

Proposed Conditions:

The proposed parking expansion (20 spaces) in the southeasterly section of the property will replace 0.17 acres of existing greenspace (lawn and wooded area) with an impervious asphalt pavement surface. Stormwater runoff from the proposed parking lot will flow from the north side of the lot to the south side via overland flow to a proposed Dry Detention Basin which is designed to attenuate the increased runoff from the new impervious area for storm events up to the 100yr/24hr storm. The Detention Basin will store the increased runoff volume, which will be released at a controlled rate through a proposed 6" diameter outlet control pipe to be located at the west end of the Detention Basin. At that point, flows are then combined with the flows from the existing on-site French Drain system from the north; this combined flow will be routed through a regraded swale along the south property line to a proposed 12" pipe in the southwest corner of the site, this pipe will flow into a new catch basin to be built in line with and connected to the existing 24" storm sewer system along Commerce Way, flows into the existing 24" storm sewer will continue southerly to the ultimate discharge into the East Branch of Cazenovia Creek.

Stormwater Modeling:

Hydrologic modeling was performed for the existing and proposed conditions in the area of the proposed parking lot (outlined below) using the Hydraflow Hydrographs watershed modeling software. The SCS Unit Hydrograph Method for calculating runoff rates was utilized.

Existing Conditions: Drainage Area = 0.257 acres, CN=80 (HSG=D), Tc = 28.4 minutes
 Existing Impervious Area = 0.008 acres
 Existing Pervious Area = 0.249 acres

Proposed Conditions: Drainage Area = 0.257 acres, CN=92 (HSG=D), Tc = 14.87 minutes
 Proposed Impervious Area = 0.178 acres
 Proposed Pervious Area = 0.079 acres

The 1 year-24 hour storm, 10 year-24 hour storm and 100 year-24 hour storm were analyzed for existing and proposed conditions. A type II synthetic rainfall distribution was used for the analysis. The type II distribution is an intense short duration rainfall developed for areas of the northeast United States. 24 hour rainfall amounts for the project site were taken from the Northeast Regional Climate Center (included in the enclosed stormwater calculations and as shown below).

24-HOUR RAINFALL	
Design Storm	Rainfall (in)
1-Year	1.88
10-Year	3.14
100-Year	5.25

The following table summarizes the peak runoff rates, in cubic feet per second (cfs), expected to be discharged from the project area under existing and proposed conditions.

SUMMARY OF PEAK STORMWATER RUNOFF RATES AND POST DEVELOPMENT DISCHARGE RATES

Storm Event	Existing Conditions Runoff (cfs)	Proposed Conditions To Detention Basin Runoff (cfs)	Difference in Runoff (cfs)	Post Development Discharge From Detention Basin (cfs)
1 YR/24 HR	0.102	0.370	+ 0.268	0.009 (< Exist., okay)
+10 YR/24 HR	0.314	0.734	+ 0.420	0.218 (< Exist., okay)
++100 YR/24 HR	0.735	1.341	+ 0.606	0.735 (= Exist., okay)

Notes:

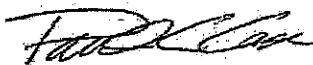
- + The Detention Basin discharge/outlet pipe was sized to limit the discharge rate to less than the existing conditions peak runoff rate from the 10 YR/24HR Storm Event.
- ++ The Detention Basin was sized to provide storage of the difference in runoff volume between the existing and proposed conditions for the 100 YR/24HR Storm Event.

Existing Conditions Runoff Volume = 2937 cf
Proposed Conditions Runoff Volume = 3988 cf
 100YR/24HR Storage Volume Required = 1051 cf

Storage Volume Provided = 1148 cf > 1051 required, okay.

In addition, the proposed limit of soil disturbance is less than 1-acre, therefore a NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-015-002 will not be required.

Sincerely,
 GPI/Greenman-Pedersen, Inc.



Paul C. Case, P.E., LEED AP
 Senior Project Engineer

Enclosure: Stormwater Calculations

STORMWATER CALCULATIONS

400 QUAKER ROAD
PARKING LOT EXPANSION

EAST AURORA
ERIE COUNTY, NEW YORK

Prepared for:

Scheid Architectural, PLLC
111 Elmwood Avenue
Buffalo, NY 14201

Prepared by:

GPI

Greenman-Pedersen, Inc.
4950 Genesee Street, Suite 100
Buffalo, New York 14225



Job No. BUF-2018056.00

July 20, 2018

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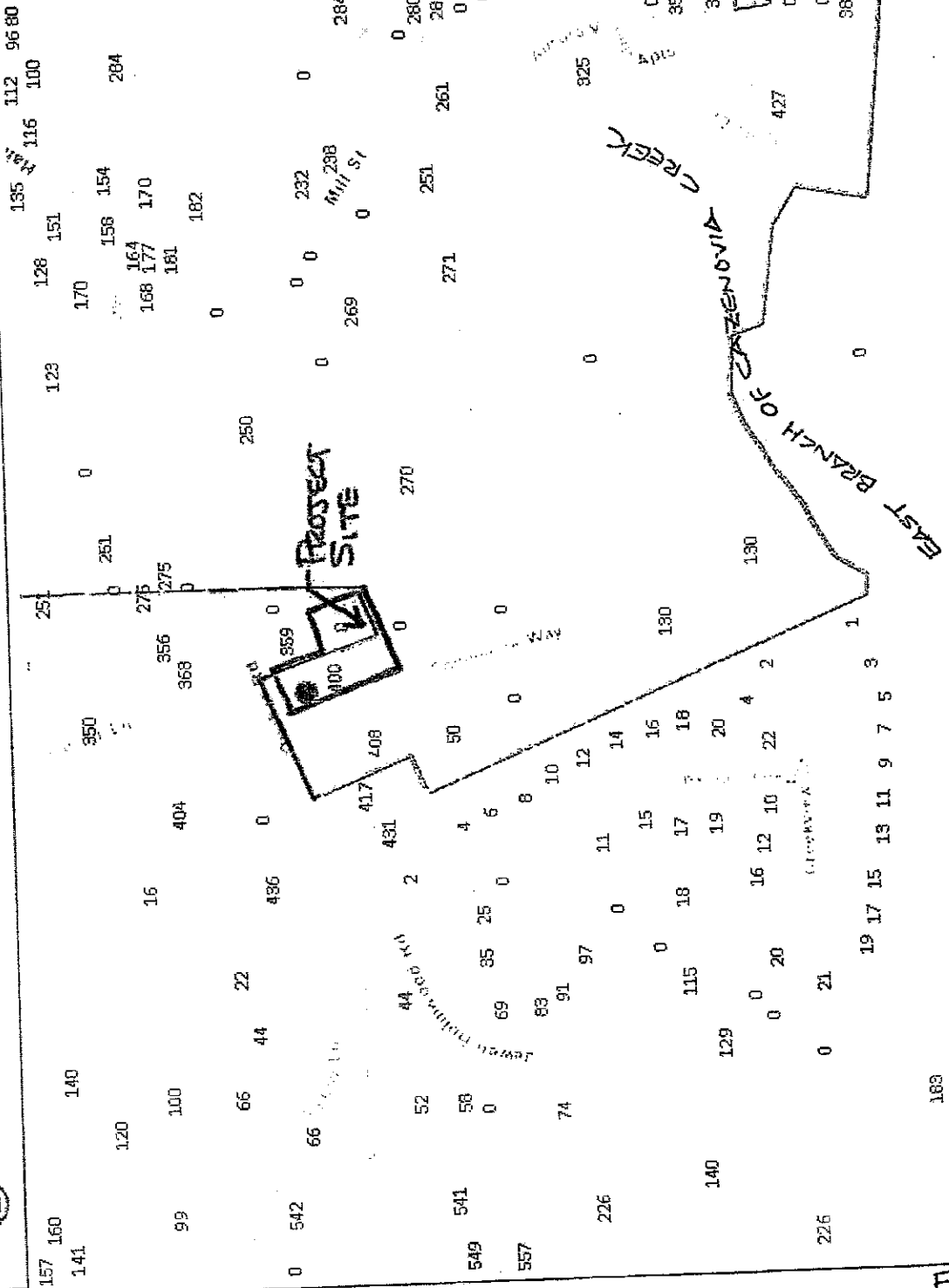
- I. EXHIBITS**
 - A. PROJECT LOCATION MAP
 - B. AERIAL IMAGE OF PROJECT SITE
 - C. DRAINAGE EXHIBIT

- II. HYDROLOGIC MODELING USING HYDRAFLOW HYDROGRAPHS**
 - A. 1-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)
 - B. 10-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)
 - C. 100-YEAR/24-HOUR STORM (PRE AND POST DEVELOPMENT)
 - D. HYDRAFLOW RAINFALL REPORT
 - E. NORTHEAST REGIONAL CLIMATE CENTER – EXTREME PRECIPITATION TABLES
 - F. DETENTION BASIN CALCULATIONS

- III. STORM PIPE CALCULATIONS**

I. EXHIBITS

Erie County On-Line Mapping Application



Legend
 Parcels
 Municipal Boundaries

This map is a user generated static output from an internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

ERIE COUNTY
 DEPARTMENT OF ENVIRONMENT & PLANNING
 OFFICE OF GIS

752.33 1,504.7 Feet
 WGS_1984_Web_Mercator_Auxiliary_Sphere
 THIS MAP IS NOT TO BE USED FOR NAVIGATION

1: 9,028

EXHIBIT A

Erie County On-Line Mapping Application



Legend	
<input type="checkbox"/>	Parcels
<input type="checkbox"/>	Municipal Boundaries
SBL: 175.10-1-2	1.4071-AC.
400 QUAKER RD	
SBL: 175.06-3-8	0.9971-AC.

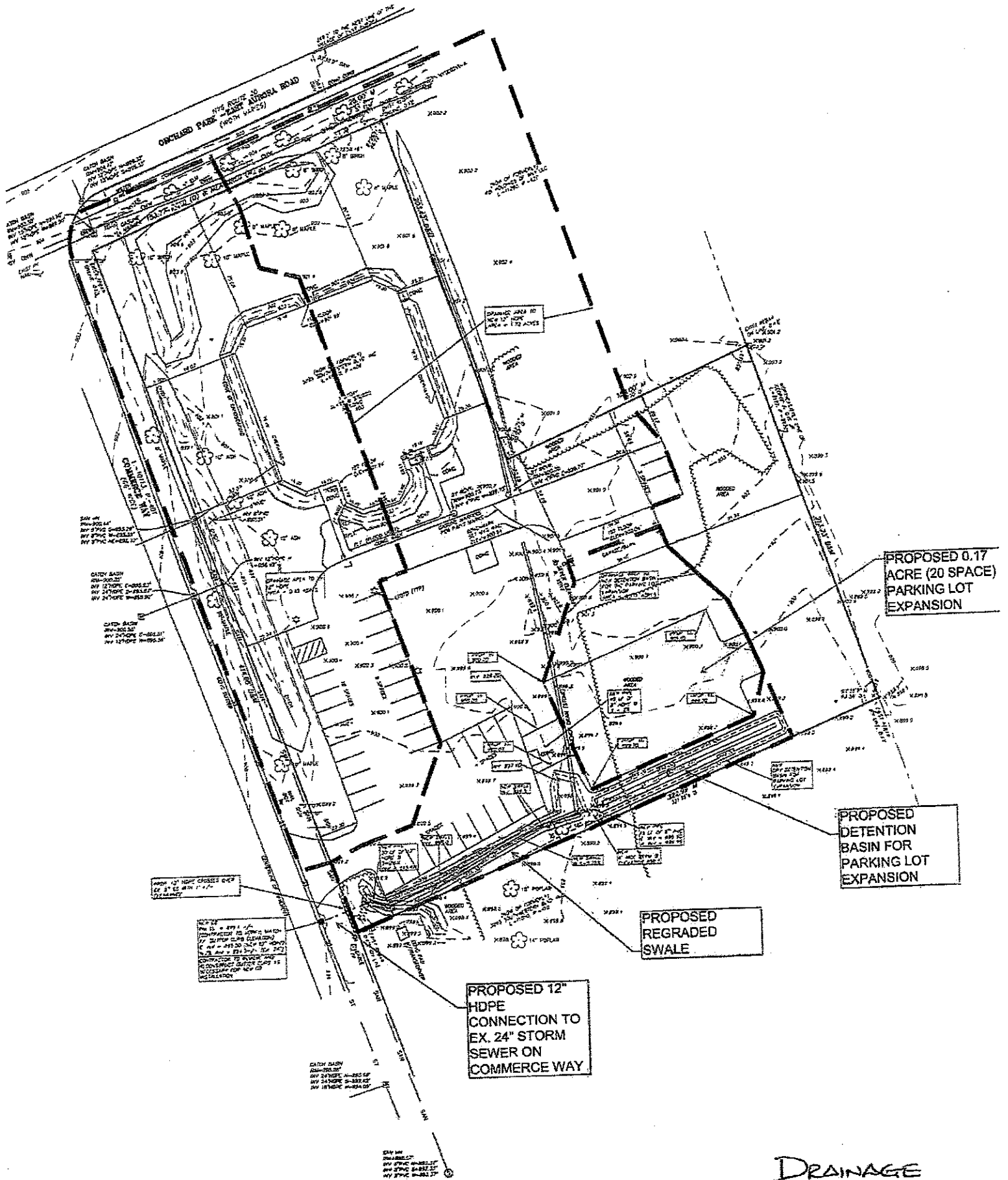
0 188.08 376.2 Feet
 WGS - 1984_Web_Mercator_Auxiliary_Sphere
 THIS MAP IS NOT TO BE USED FOR NAVIGATION

ERIE COUNTY
 DEPARTMENT OF ENVIRONMENT & PLANNING
 OFFICE OF GIS

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1: 2,257

EXHIBIT B



PROPOSED 0.17
ACRE (20 SPACE)
PARKING LOT
EXPANSION

PROPOSED
DETENTION
BASIN FOR
PARKING LOT
EXPANSION

PROPOSED
REGRADED
SWALE

PROPOSED 12"
HDPE
CONNECTION TO
EX. 24" STORM
SEWER ON
COMMERCE WAY

DRAINAGE
EXHIBIT C

II. HYDROLOGIC MODELING USING HYDRAFLOW HYDROGRAPHS

1-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)

10-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)

100-YEAR/24-HOUR STORM (PRE AND POST DEVELOPMENT)

HYDRAFLOW RAINFALL REPORT

NORTHEAST REGIONAL CLIMATE CENTER – EXTREME
PRECIPITATION TABLES

DETENTION BASIN

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	---	0.102	---	---	---	0.314	---	---	0.735	Pkg. Exp. Area: Pre-Dev
2	SCS Runoff	---	0.370	---	---	---	0.734	---	---	1.341	Pkg. Area Exp.: PostDev

1-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

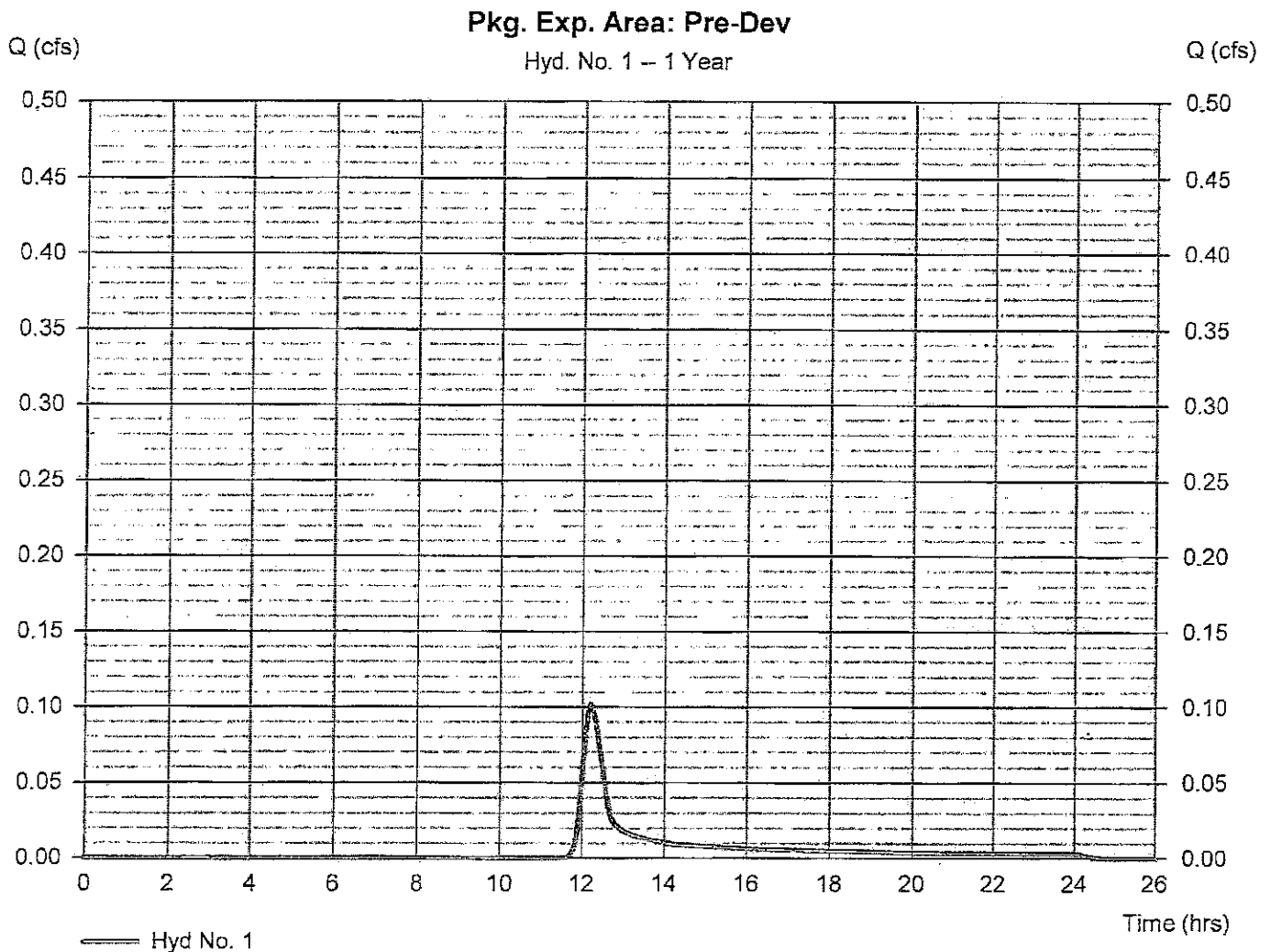
Thursday, 07 / 19 / 2018

Hyd. No. 1

Pkg. Exp. Area: Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.102 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 463 cuft
Drainage area	= 0.260 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.40 min
Total precip.	= 1.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.249 x 79) + (0.008 x 98)] / 0.260



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No. 1

Pkg. Exp. Area: Pre-Dev

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 112.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	= 28.36	+ 0.00	+ 0.00	= 28.36
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	0.00	0.00	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Channel Flow				
X sectional flow area (sqft)	= 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	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				28.40 min

Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

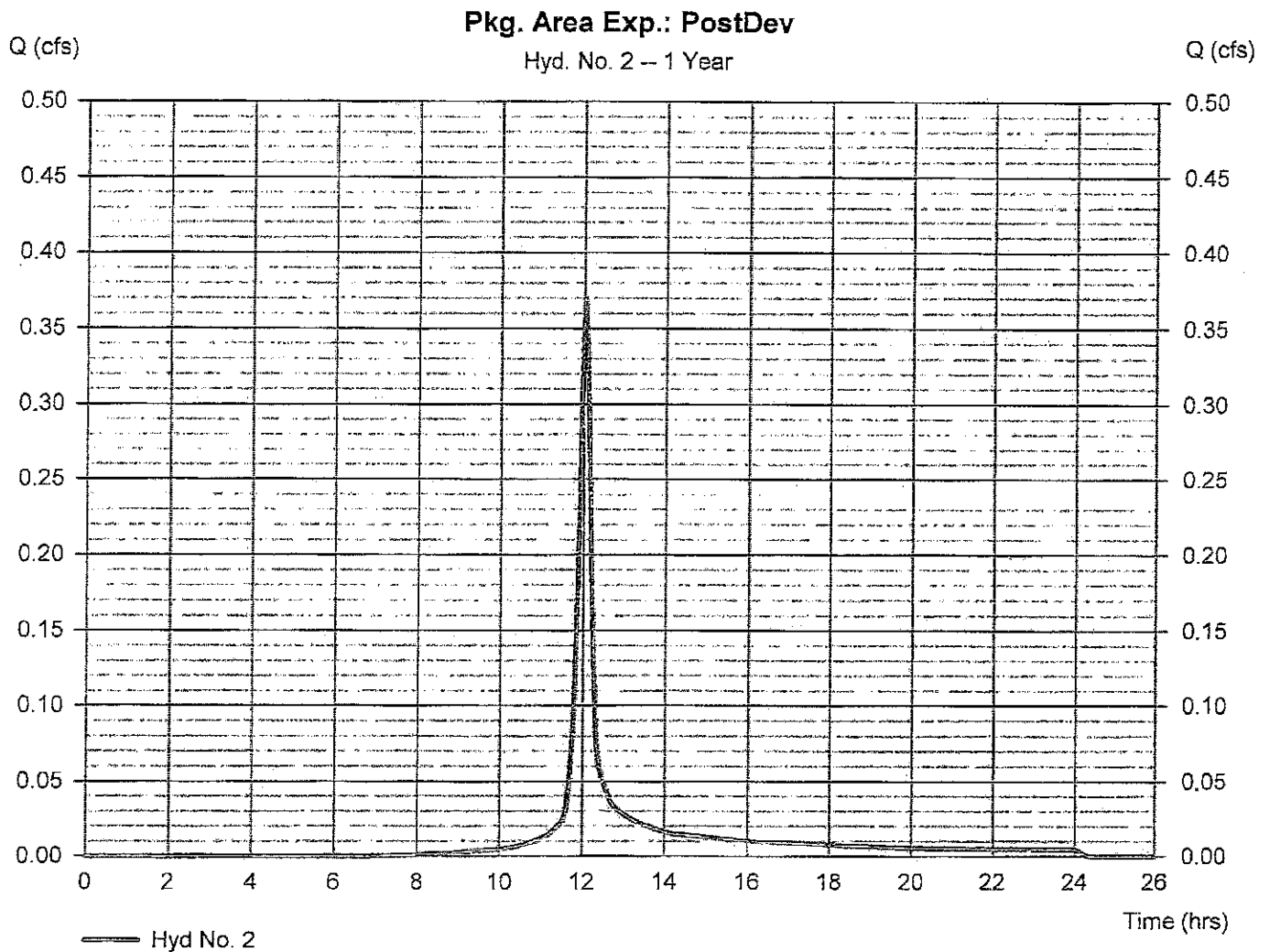
Thursday, 07 / 19 / 2018

Hyd. No. 2

Pkg. Area Exp.: PostDev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.370 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,040 cuft
Drainage area	= 0.260 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.00 min
Total precip.	= 1.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.079 x 79) + (0.178 x 98)] / 0.260



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No. 2

Pkg. Area Exp.: PostDev

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 50.0	62.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	2.20	0.00	
Land slope (%)	= 2.00	1.60	0.00	
Travel Time (min)	= 14.87	+ 1.09	+ 0.00	= 15.96
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	0.00	0.00	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Channel Flow				
X sectional flow area (sqft)	= 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	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				16.00 min

10-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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	0.314	2	732	1,280	---	---	---	Pkg. Exp. Area: Pre-Dev Pkg. Area Exp.: PostDev
2	SCS Runoff	0.734	2	722	2,111	---	---	---	

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

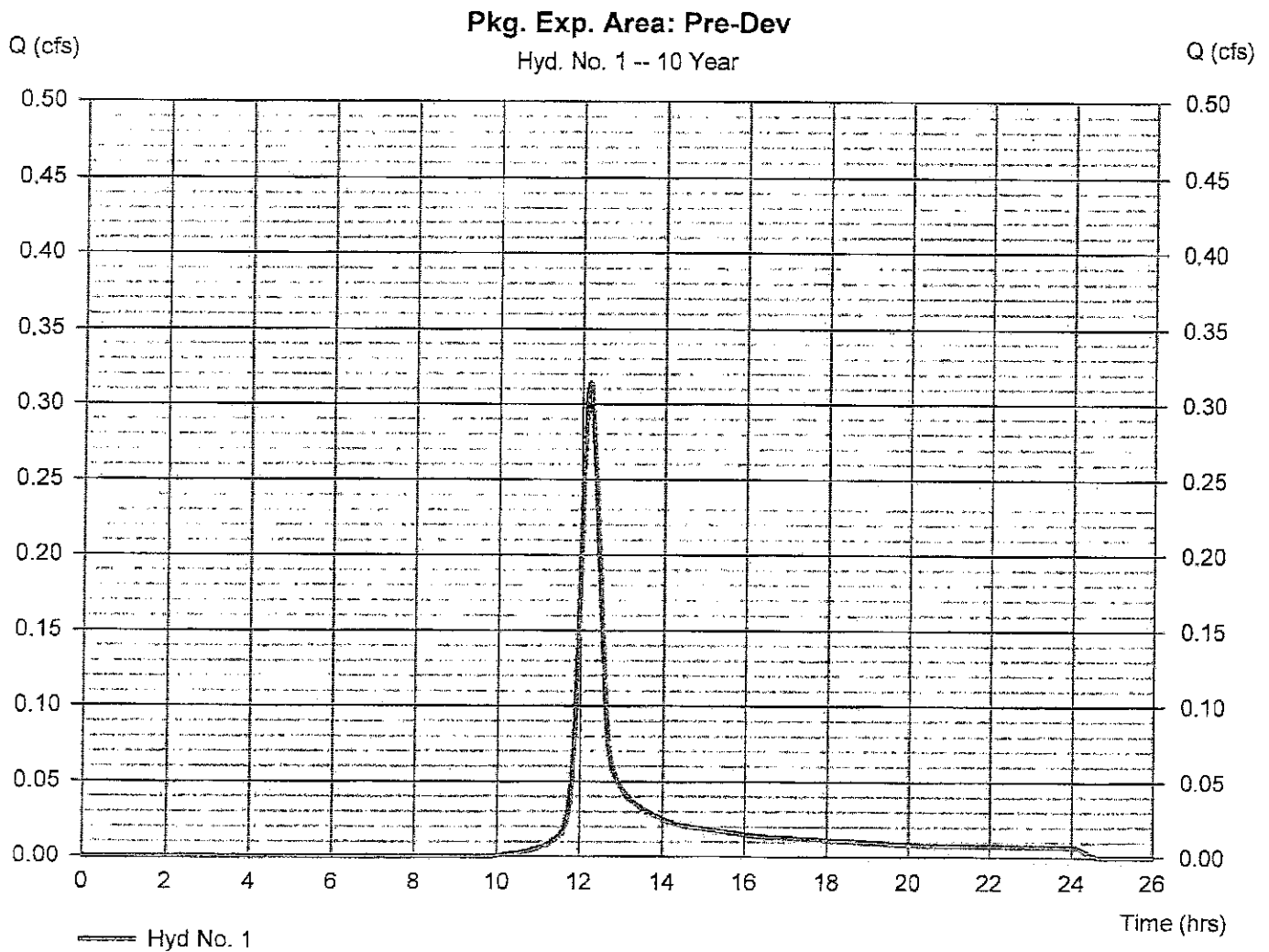
Thursday, 07 / 19 / 2018

Hyd. No. 1

Pkg. Exp. Area: Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.314 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 1,280 cuft
Drainage area	= 0.260 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.40 min
Total precip.	= 3.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.249 \times 79) + (0.008 \times 98)] / 0.260$



Hydrograph Report

Thursday, 07 / 19 / 2018

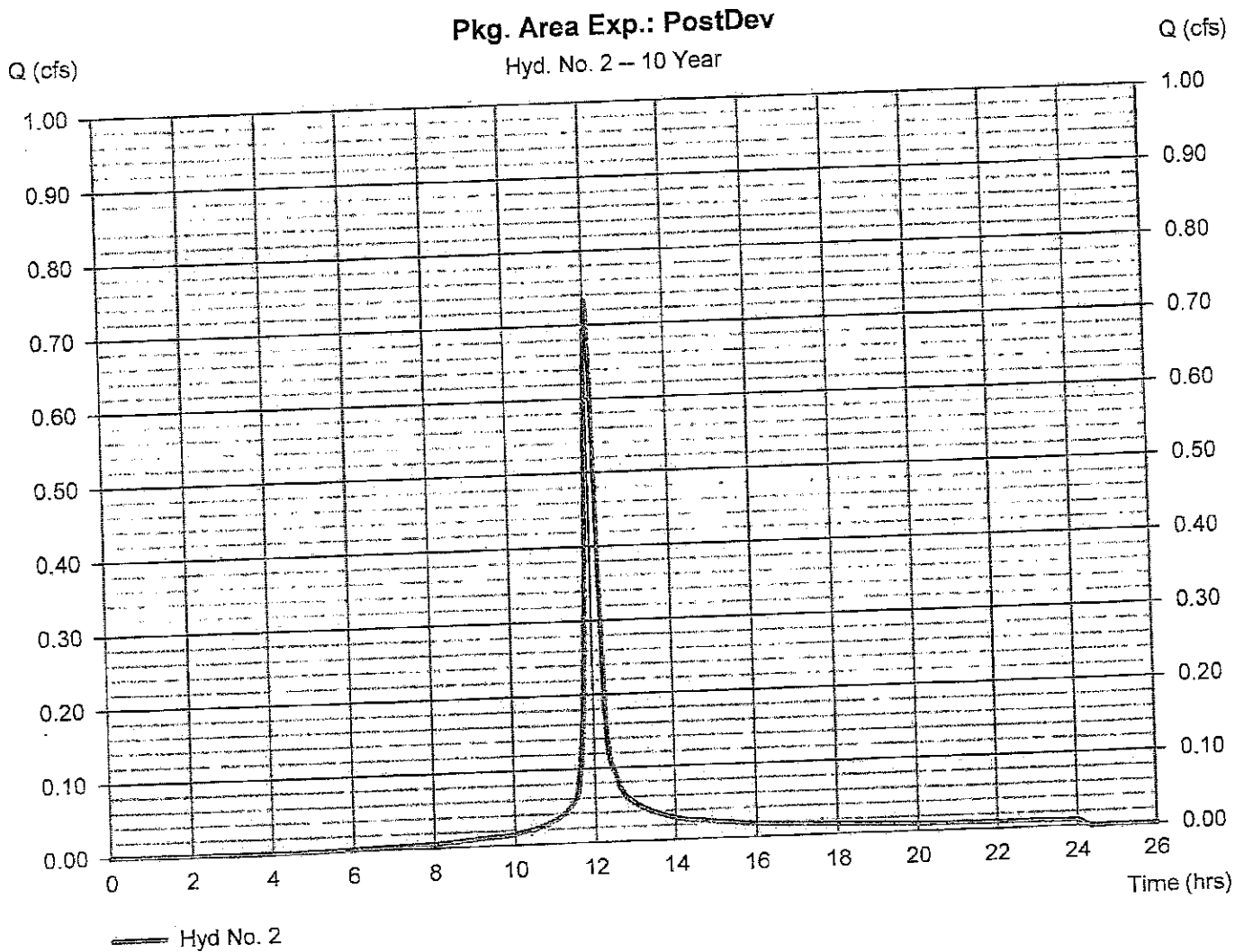
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No. 2

Pkg. Area Exp.: PostDev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.734 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 2,111 cuft
Drainage area	= 0.260 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.00 min
Total precip.	= 3.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.079 x 79) + (0.178 x 98)] / 0.260



100-YEAR /24-HOUR STORM (PRE AND POST DEVELOPMENT)

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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	0.735	2	730	2,937	---	---	---	Pkg. Exp. Area: Pre-Dev
2	SCS Runoff	1.341	2	722	3,988	---	---	---	Pkg. Area Exp.: PostDev

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc, v12

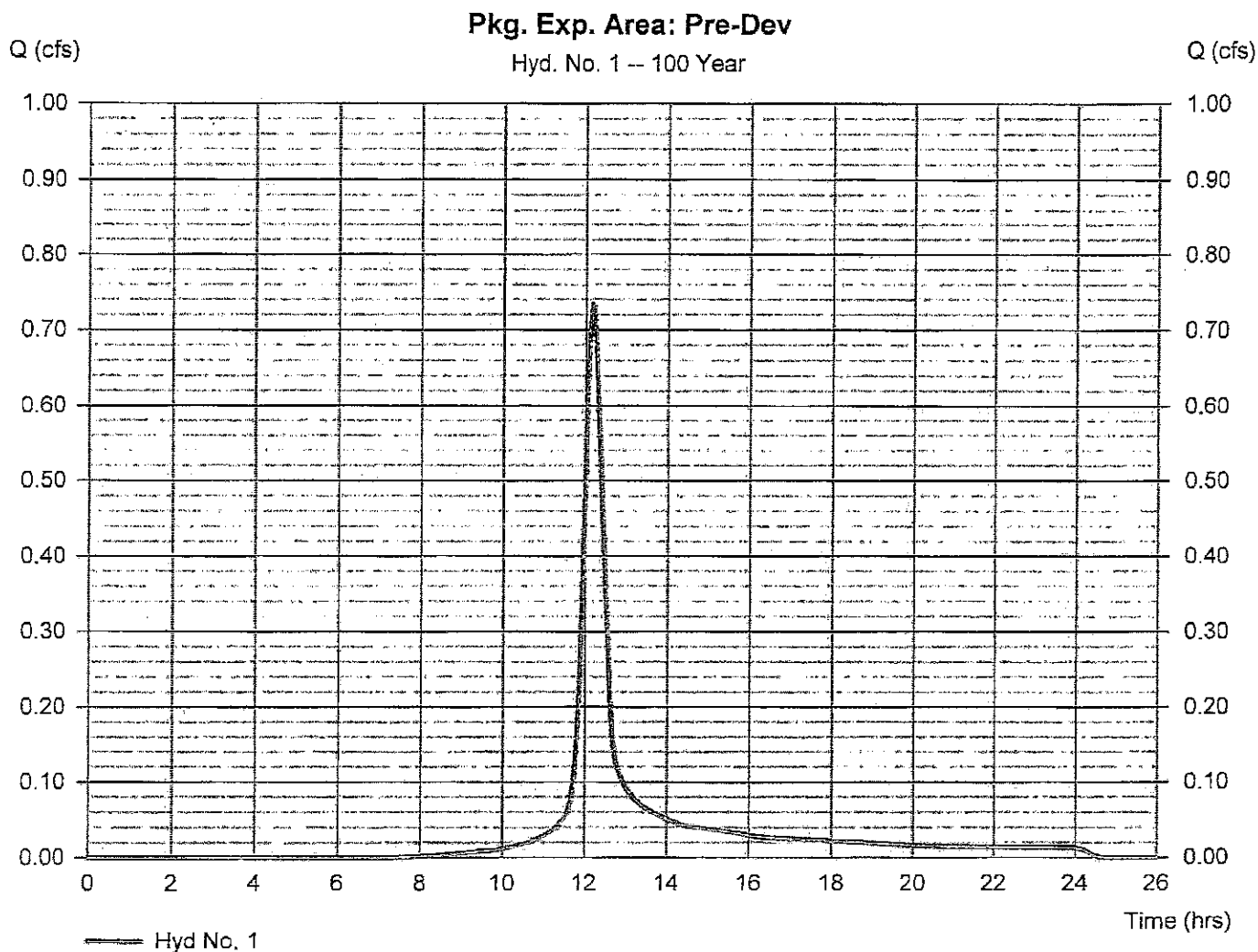
Thursday, 07 / 19 / 2018

Hyd. No. 1

Pkg. Exp. Area: Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.735 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,937 cuft
Drainage area	= 0.260 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.40 min
Total precip.	= 5.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.249 x 79) + (0.008 x 98)] / 0.260



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

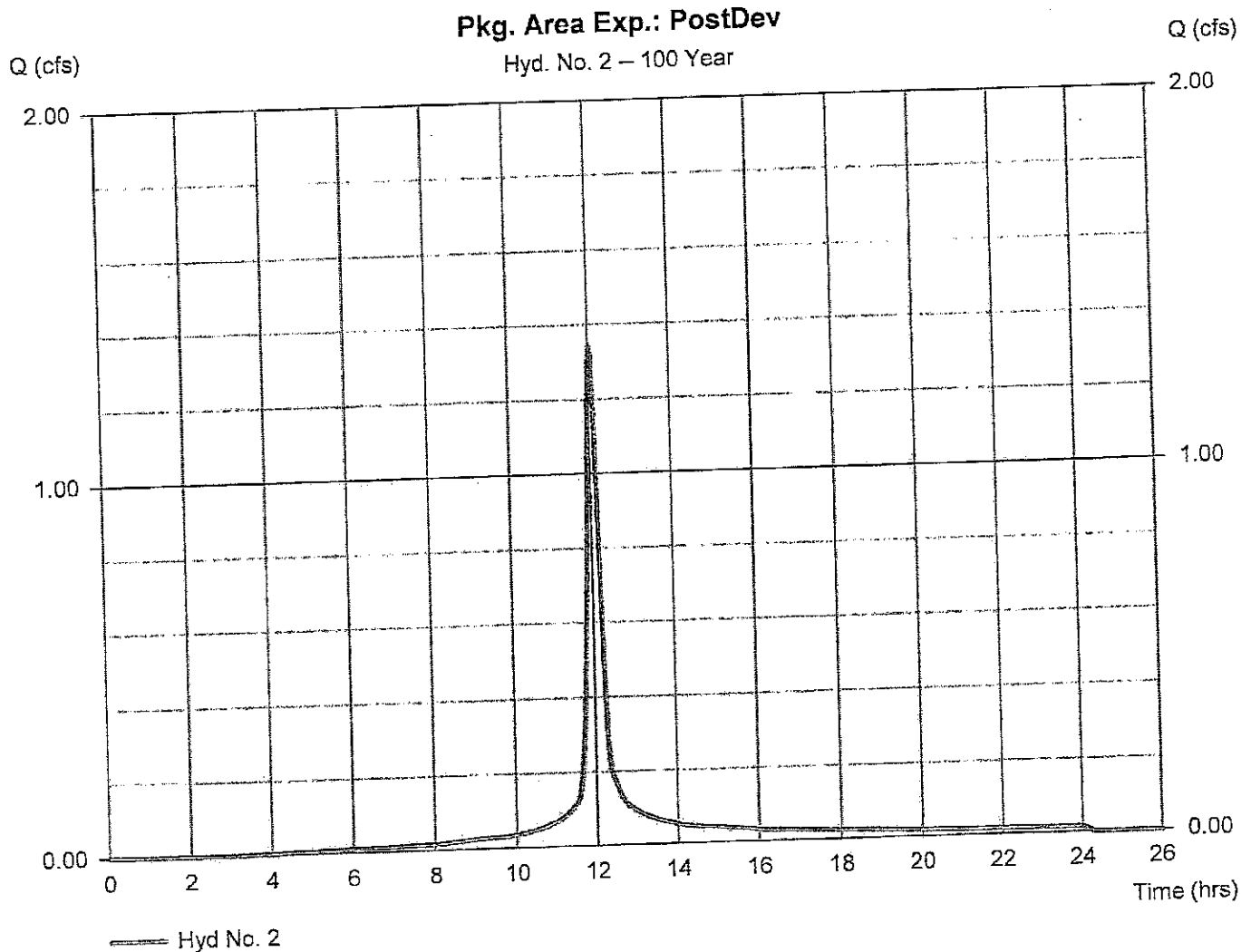
Thursday, 07 / 19 / 2018

Hyd. No. 2

Pkg. Area Exp.: PostDev

Hydrograph type	= SCS Runoff	Peak discharge	= 1.341 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 3,988 cuft
Drainage area	= 0.260 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.00 min
Total precip.	= 5.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.079 \times 79) + (0.178 \times 98)] / 0.260$



HYDRAFLOW RAINFALL REPORT

Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Thursday, 07 / 19 / 2018

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	---
2	69.8703	13.1000	0.8658	---
3	0.0000	0.0000	0.0000	---
5	79.2597	14.6000	0.8369	---
10	88.2351	15.5000	0.8279	---
25	102.6072	16.5000	0.8217	---
50	114.8193	17.2000	0.8199	---
100	127.1596	17.8000	0.8186	---

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.88	2.20	0.00	2.70	3.14	3.85	4.50	5.25
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

NORTHEAST REGIONAL CLIMATE CENTER –
EXTREME PRECIPITATION TABLES

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	78.638 degrees West
Latitude	42.762 degrees North
Elevation	0 feet
Date/Time	Thu, 19 Jul 2018 14:28:38 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.27	0.42	0.52	0.68	0.85	1.04	1yr	0.73	0.96	1.17	1.38	1.62	1.88	2.21	1yr	1.66	2.12	2.59	3.11	3.56	1yr
2yr	0.32	0.49	0.61	0.81	1.01	1.24	2yr	0.87	1.15	1.39	1.64	1.91	2.20	2.54	2yr	1.95	2.44	2.91	3.45	3.95	2yr
5yr	0.38	0.59	0.74	0.99	1.27	1.56	5yr	1.10	1.43	1.76	2.06	2.37	2.70	3.09	5yr	2.39	2.97	3.50	4.11	4.73	5yr
10yr	0.43	0.67	0.85	1.16	1.51	1.86	10yr	1.30	1.70	2.09	2.44	2.79	3.14	3.60	10yr	2.78	3.46	4.03	4.69	5.43	10yr
25yr	0.51	0.81	1.04	1.43	1.89	2.34	25yr	1.63	2.14	2.63	3.05	3.46	3.85	4.39	25yr	3.41	4.22	4.85	5.60	6.52	25yr
50yr	0.58	0.93	1.19	1.67	2.25	2.80	50yr	1.94	2.54	3.14	3.63	4.08	4.50	5.11	50yr	3.98	4.91	5.58	6.39	7.49	50yr
100yr	0.67	1.08	1.39	1.97	2.68	3.33	100yr	2.32	3.02	3.74	4.29	4.80	5.25	5.94	100yr	4.65	5.71	6.43	7.31	8.60	100yr
200yr	0.76	1.24	1.61	2.31	3.20	3.98	200yr	2.76	3.59	4.46	5.09	5.64	6.13	6.91	200yr	5.43	6.65	7.41	8.36	9.89	200yr
500yr	0.92	1.52	1.98	2.88	4.04	5.02	500yr	3.49	4.53	5.61	6.36	7.00	7.53	8.46	500yr	6.67	8.13	8.94	9.98	11.90	500yr

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.46	0.61	0.75	0.86	1yr	0.65	0.84	0.85	1.11	1.46	1.64	1.88	1yr	1.45	1.81	2.22	2.81	3.29	1yr
2yr	0.31	0.48	0.59	0.79	0.98	1.13	2yr	0.84	1.10	1.24	1.50	1.78	2.13	2.46	2yr	1.88	2.37	2.82	3.35	3.83	2yr
5yr	0.35	0.54	0.67	0.91	1.16	1.33	5yr	1.00	1.30	1.48	1.78	2.11	2.47	2.85	5yr	2.18	2.74	3.25	3.85	4.40	5yr
10yr	0.38	0.59	0.73	1.02	1.32	1.49	10yr	1.14	1.46	1.68	2.01	2.39	2.75	3.18	10yr	2.43	3.06	3.61	4.27	4.88	10yr
25yr	0.44	0.67	0.83	1.18	1.56	1.76	25yr	1.35	1.72	1.96	2.34	2.80	3.18	3.68	25yr	2.81	3.54	4.13	4.91	5.60	25yr
50yr	0.48	0.73	0.91	1.31	1.77	1.97	50yr	1.53	1.93	2.21	2.64	3.17	3.53	4.13	50yr	3.14	3.97	4.58	5.45	6.22	50yr
100yr	0.53	0.80	1.01	1.46	2.00	2.22	100yr	1.72	2.17	2.49	2.96	3.56	3.95	4.62	100yr	3.50	4.44	5.08	6.07	6.93	100yr
200yr	0.59	0.88	1.12	1.62	2.26	2.48	200yr	1.95	2.43	2.80	3.32	4.00	4.40	5.17	200yr	3.89	4.97	5.63	6.78	7.71	200yr
500yr	0.67	1.00	1.29	1.87	2.66	2.87	500yr	2.20	2.81	3.27	3.85	4.65	5.05	6.01	500yr	4.47	5.78	6.46	7.86	8.93	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.46	0.57	0.76	0.94	1.08	1yr	0.81	1.06	1.21	1.43	1.74	2.12	2.38	1yr	1.88	2.29	2.77	3.30	3.76	1yr
2yr	0.33	0.51	0.63	0.86	1.05	1.24	2yr	0.91	1.21	1.36	1.64	1.94	2.30	2.65	2yr	2.03	2.53	3.02	3.58	4.12	2yr
5yr	0.42	0.64	0.80	1.09	1.39	1.60	5yr	1.20	1.56	1.77	2.13	2.55	2.94	3.37	5yr	2.60	3.24	3.75	4.41	5.10	5yr
10yr	0.50	0.77	0.95	1.33	1.72	1.96	10yr	1.48	1.92	2.18	2.62	3.16	3.56	4.06	10yr	3.15	3.90	4.43	5.18	6.02	10yr
25yr	0.64	0.98	1.22	1.74	2.29	2.66	25yr	1.97	2.60	2.89	3.47	4.21	4.59	5.18	25yr	4.06	4.98	5.53	6.41	7.49	25yr
50yr	0.77	1.18	1.46	2.10	2.83	3.31	50yr	2.44	3.24	3.58	4.30	5.23	5.57	6.23	50yr	4.93	6.00	6.56	7.51	8.85	50yr
100yr	0.94	1.42	1.78	2.57	3.52	4.13	100yr	3.04	4.02	4.45	5.34	6.52	6.77	7.49	100yr	5.99	7.20	7.77	8.82	10.44	100yr
200yr	1.14	1.71	2.17	3.14	4.38	5.11	200yr	3.78	5.00	5.54	6.64	8.15	8.23	9.01	200yr	7.28	8.67	9.21	10.55	12.31	200yr
500yr	1.48	2.20	2.84	4.12	5.86	6.81	500yr	5.06	6.66	7.41	8.85	10.91	10.66	11.51	500yr	9.43	11.07	11.52	12.76	15.30	500yr



DETENTION BASIN CALCULATIONS

Hydrograph Report

Friday, 07 / 20 / 2018

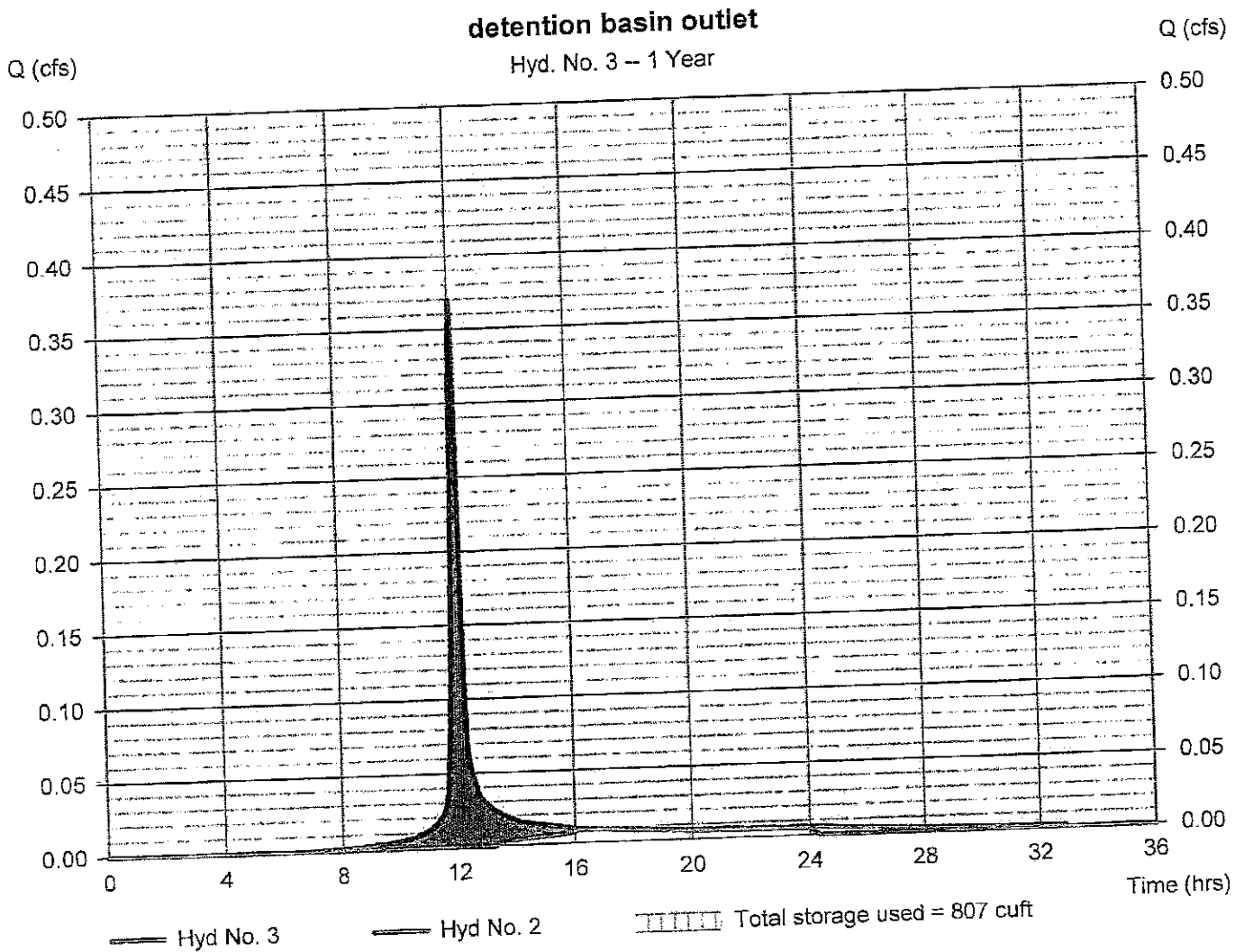
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No. 3

detention basin outlet

Hydrograph type	= Reservoir	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.60 hrs
Time interval	= 2 min	Hyd. volume	= 333 cuft
Inflow hyd. No.	= 2 - Pkg. Area Exp.: PostDev	Max. Elevation	= 898.06 ft
Reservoir name	= new pkg detention area	Max. Storage	= 807 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

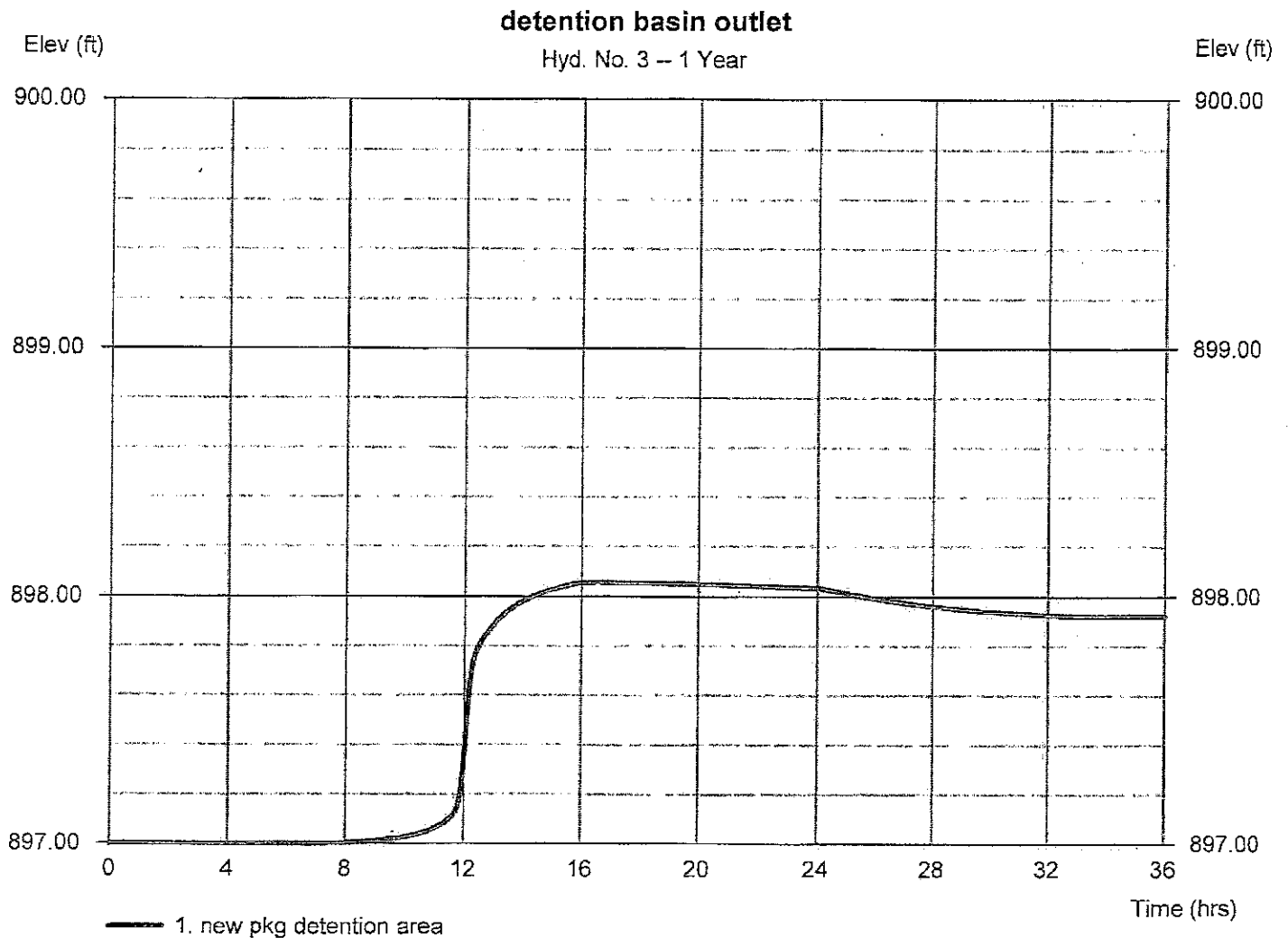
Friday, 07 / 20 / 2018

Hyd. No. 3

detention basin outlet

Hydrograph type	= Reservoir	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.60 hrs
Time interval	= 2 min	Hyd. volume	= 333 cuft
Inflow hyd. No.	= 2 - Pkg. Area Exp.: PostDev	Max. Elevation	= 898.06 ft
Reservoir name	= new pkg detention area	Max. Storage	= 807 cuft

Storage Indication method used.



Hydrograph Report

Friday, 07 / 20 / 2018

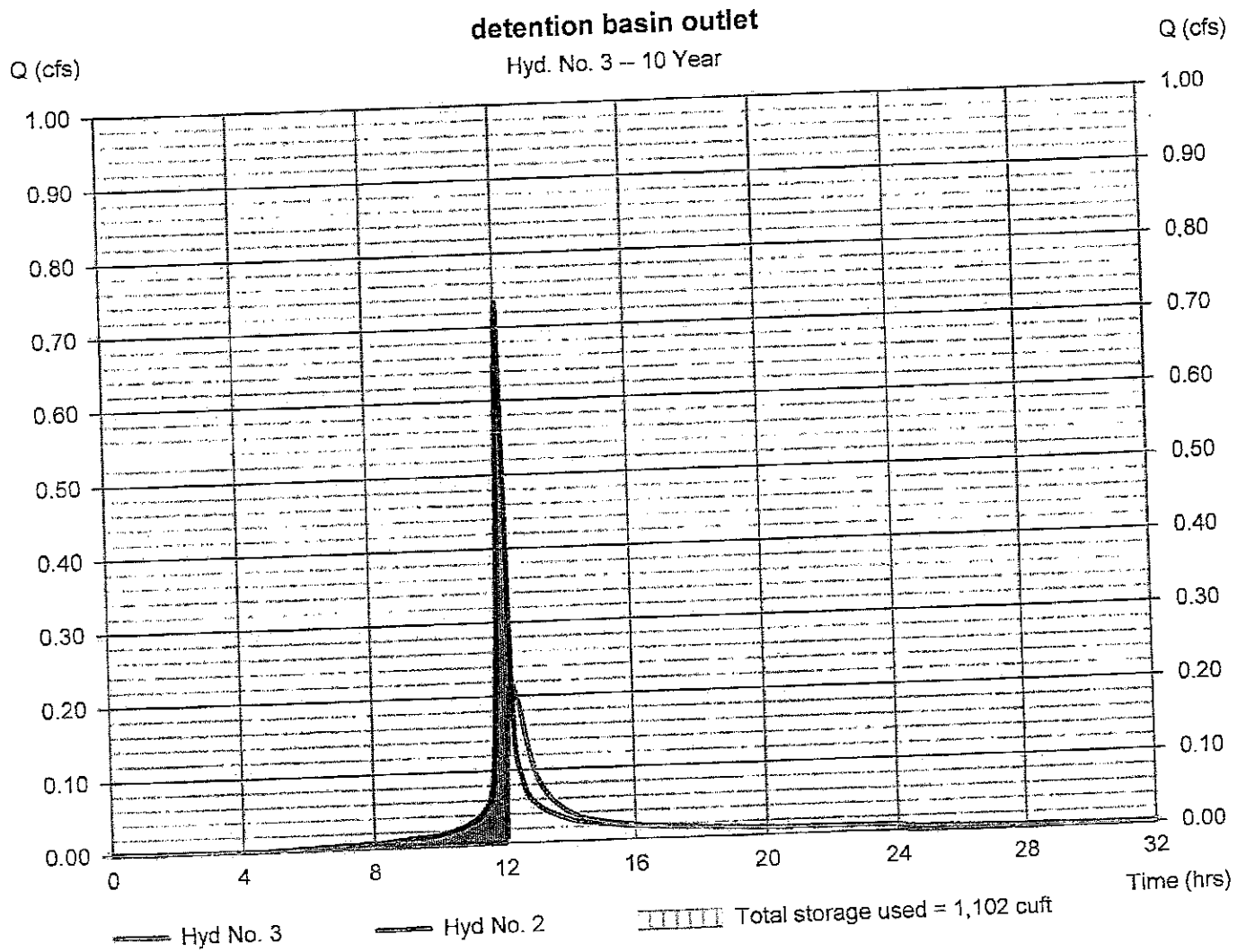
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No. 3

detention basin outlet

Hydrograph type	= Reservoir	Peak discharge	= 0.218 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 1,404 cuft
Inflow hyd. No.	= 2 - Pkg. Area Exp.: PostDev	Max. Elevation	= 898.44 ft
Reservoir name	= new pkg detention area	Max. Storage	= 1,102 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

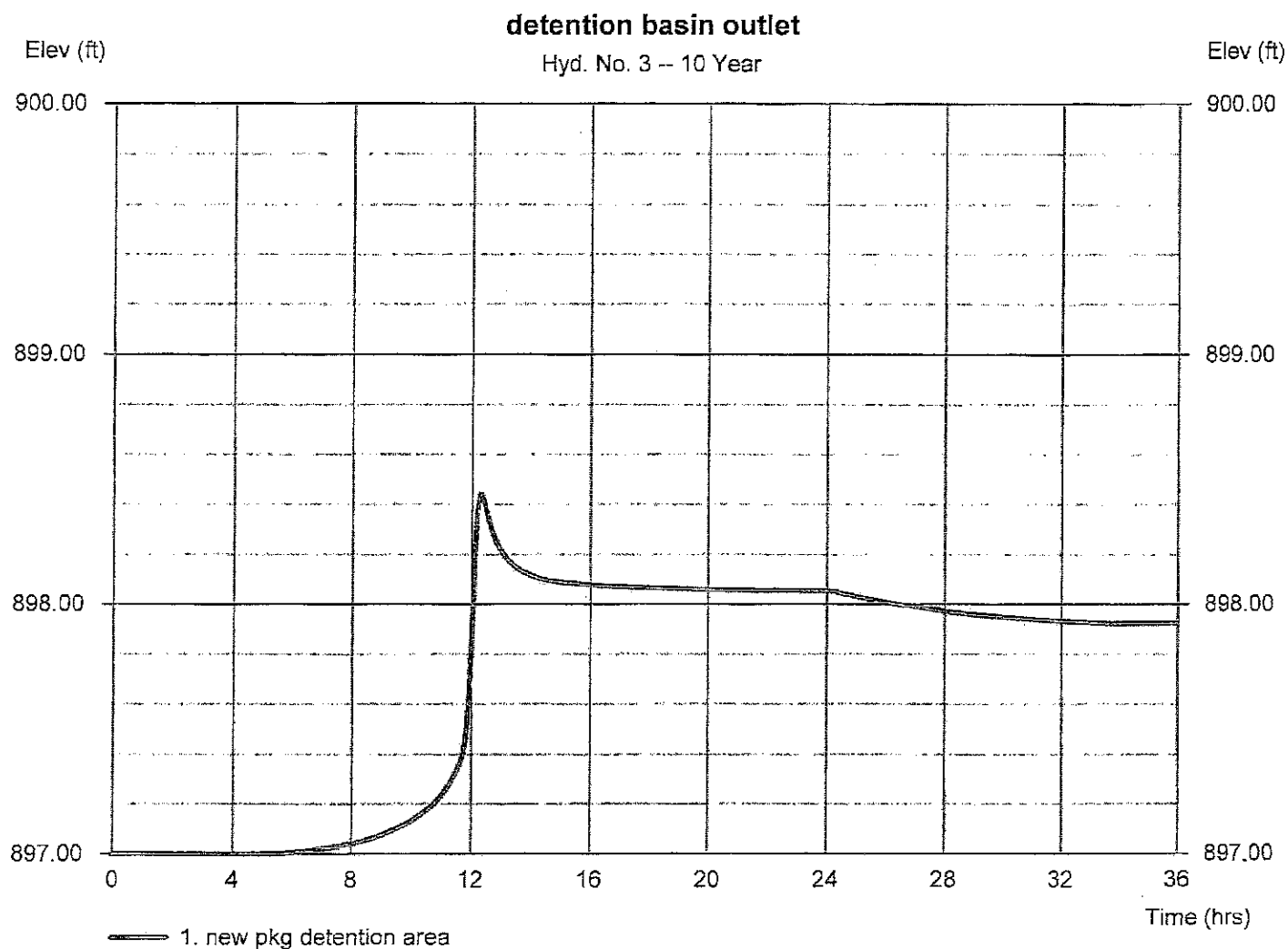
Friday, 07 / 20 / 2018

Hyd. No. 3

detention basin outlet

Hydrograph type	= Reservoir	Peak discharge	= 0.218 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 1,404 cuft
Inflow hyd. No.	= 2 - Pkg. Area Exp.: PostDev	Max. Elevation	= 898.44 ft
Reservoir name	= new pkg detention area	Max. Storage	= 1,102 cuft

Storage Indication method used.



Pond Report

Friday, 07 / 20 / 2018

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Pond No. 1 - new pkg detention area

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 897.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	897.00	230	0	0
1.50	898.50	1,300	1,148	1,148

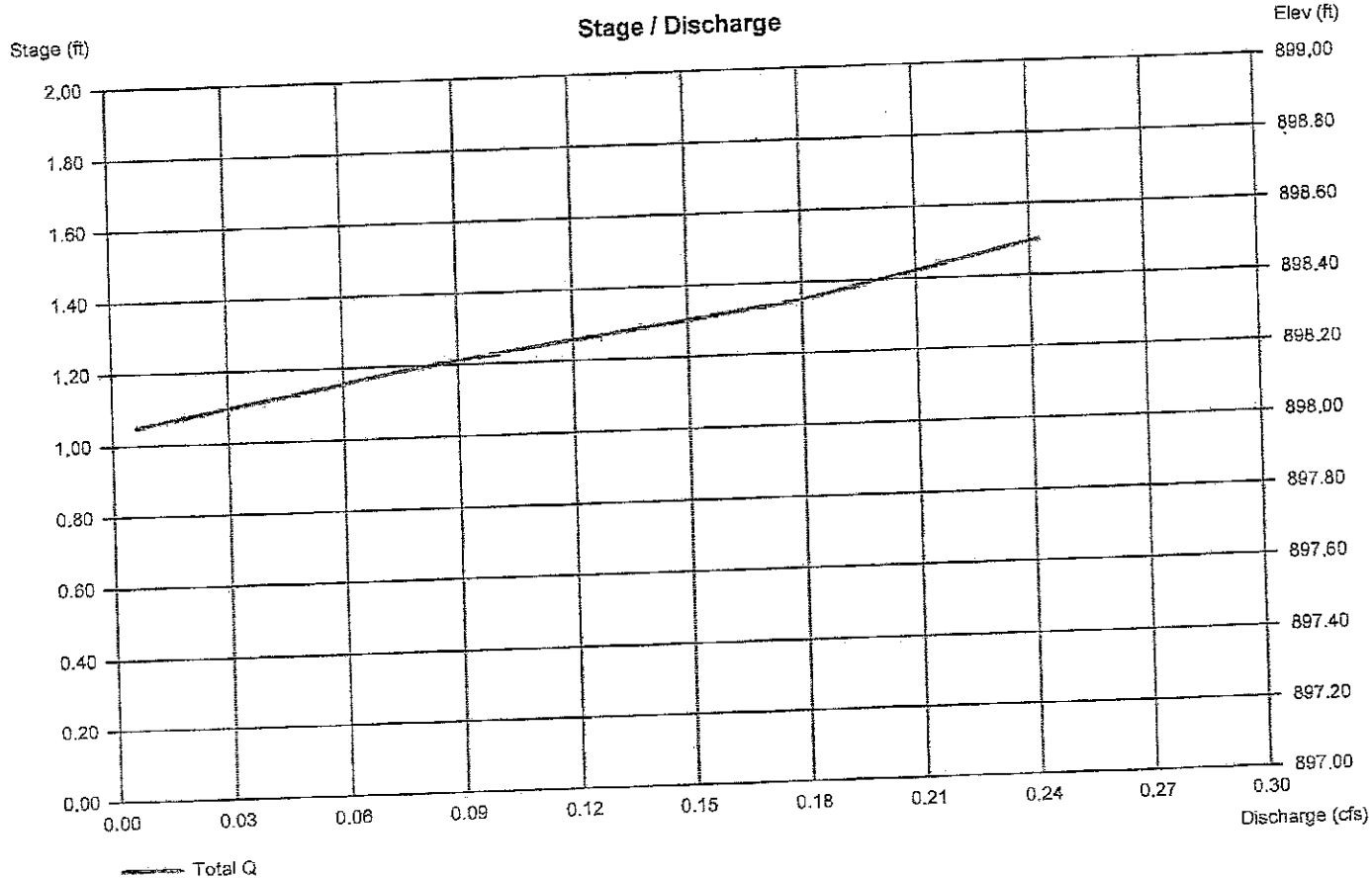
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	Inactive	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	1	0
Invert El. (ft)	= 897.00	0.00	898.00	0.00
Length (ft)	= 15.00	0.00	10.00	0.00
Slope (%)	= 0.25	0.00	3.00	n/a
N-Value	= .012	.013	.120	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)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 898.50	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 Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under Inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



III. STORM PIPE CALCULATIONS

GREENMAN-PEDERSEN, INC.

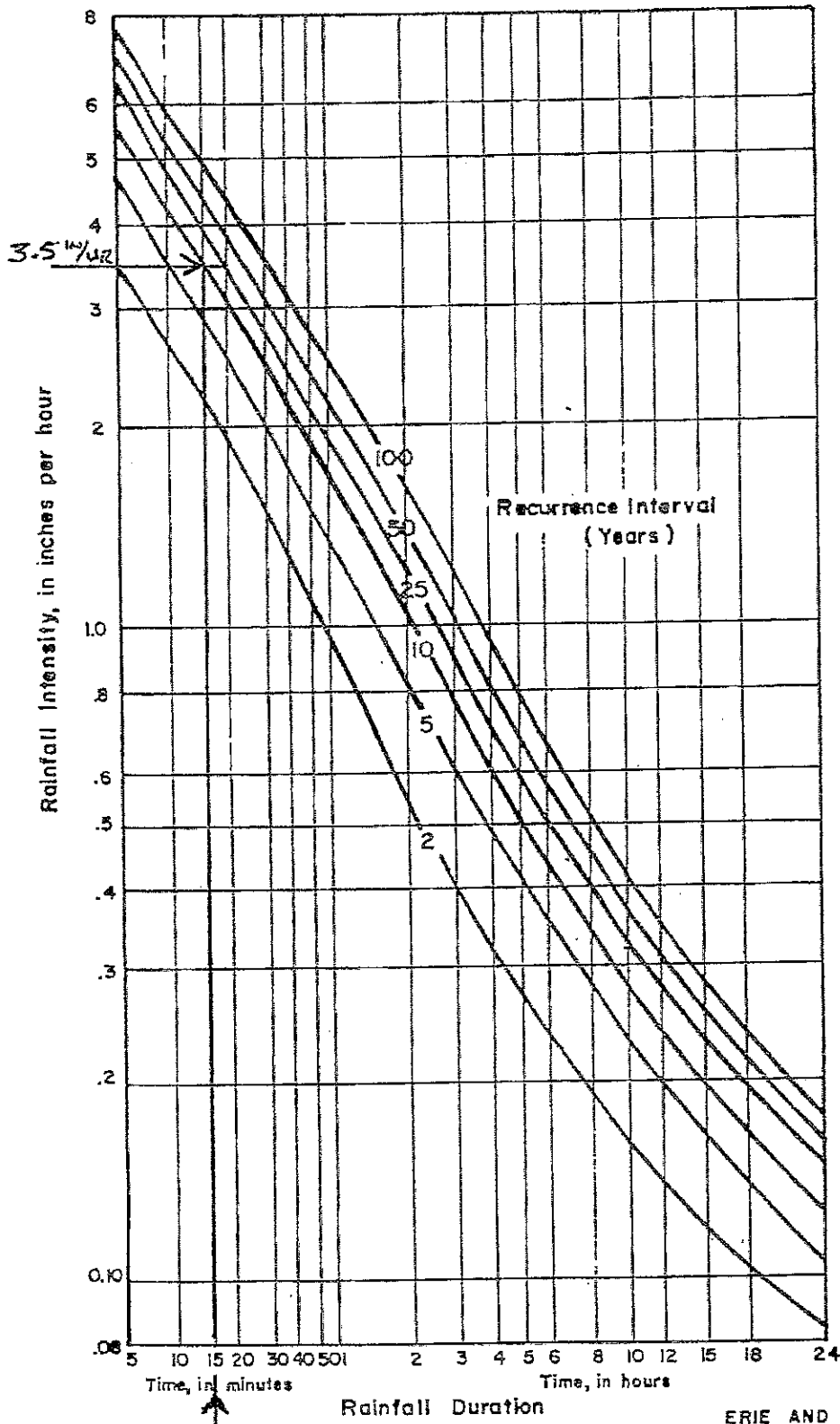
STORM SEWER TABULATION FORM

PROJECT NO.: BUF-2010055 00
 PROJECT: 400 QUAKER ROAD - PARKING LOT EXPANSION
 COUNTY / TOWN: ERIE / EAST AURORA

PREPARED BY: P. CASE, CHECKED BY: _____
 DATE: 7/20/2018 DATE: _____
 REVISED: _____

STRUCT. NO.	STRUCT. TYPE	LINE TYPE	LINE LENGTH (FT)	DRAINAGE AREA			SUBTOTAL CA	TIME OF CONC. (MIN)	TIME OF FLOW IN SECTION (MIN)	i (IN/HR)	TOTAL CA	TOTAL RUNOFF, Q (CFS)	INLET ELEV. (FT)	H.G. ELEV.			DIA. (IN.)	SLOPE (%)	V (FPS)	CAPACITY (CFS)	NOTES & REMARKS
				P _{max} (ACRES)	C _a	C _s								UPPER END	LOWER END	FALL (FT)					
				Incremental	Subtotal																
				0.36	0.53		15.00	0.13	3.50	0.82	2.89	808.10	808.68	805.40	0.18	12	0.30	3.8	3.0		
				0.27	0.26								808.87	808.07	0.80			5.3	1.9		
				0.00	0.00		15.00	0.13	3.60	0.45	1.71	900.20	898.87	894.07	0.80	8	2.00	5.1	1.9		
				0.03	0.23								898.20	897.40	0.80		2.68				
NEW 12" PIPE CONNECTION TO COMMERCE WAY STORM SEWER		HDPE	30																		
NEW 6" PIPE UNDER PROPOSED PARKING LOT CONNECTION		HDPE	40																		

Formulas used for calculations herein are based on Rational Method, Q=CIA, C=VA, and Manning's Equation
 V=Q/3.1416r²/2.31; R=Q/4
 V=1.486/r^{48.6} S^{0.486} S^{-0.149}
 S=(Q/4.49V)^{1.486} S^{0.486} S^{-0.149}
 S=(V/1.486(Q/4.49))^{1.486} S^{0.486} S^{-0.149}



THE PREPARATION OF THIS REPORT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT UNDER THE PROVISIONS OF THE HOUSING ACT OF 1954 AS AMENDED.

Source: U.S. Weather Bureau

HARZA ENGINEERING COMPANY, APRIL 1972

ERIE AND NIAGARA COUNTIES
REGIONAL PLANNING BOARD

REGIONAL STORM-SURFACE WATER
DRAINAGE MANAGEMENT STUDY
RAINFALL INTENSITY-DURATION-FREQUENCY, BUFFALO, NEW YORK

