PURPOSE:

This calculation will estimate the 1- through 100-year peak flow rates and runoff volumes to the Eastern and Western Inlets at the Bottom of the Pond D Embankment and the 72-inch culvert.

METHOD:

The Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2013 will be used to estimate a peak flow rate and runoff volume for each drainage area for multiple storm events. The two inlet flows will be combined to estimate peak flow rates to the existing 72-inch culvert under Possum Point Road for the design events.

INPUT DATA:

Rainfall Data (From NOAA Atlas 14, Volume 2, Version 3-Dumfries, VA):

1-yr, 24-hr event	=	2.57	in
2-yr, 24-hr event	=	3.12	in
5-yr, 24-hr event	=	4.04	in
10-yr, 24-hr event	=	4.84	in
25-yr, 24-hr event	=	6.06	in
100-yr, 24-hr event	=	8.35	in

Runoff Curve Numbers (from Table 2-2a, 2-2b, and 2-2c from TR-55 Manual):

Meadow	=	58
Gravel	=	85
Impervious/Roads	=	98

Land use was determined from the USDA mapping and aerial imagery. Soil type was determined to be Type B from the USDA Soil Map. Refer to the attached Drainage Area Map for aerial imagery and soil type boundaries.

HYDROLOGIC ANALYSIS:

The following pages contain the hydrologic analysis and include:

- a drainage area map
- precipitation data
- composite curve number determination (within the hydraflow software), and
- hydraflow input/output.

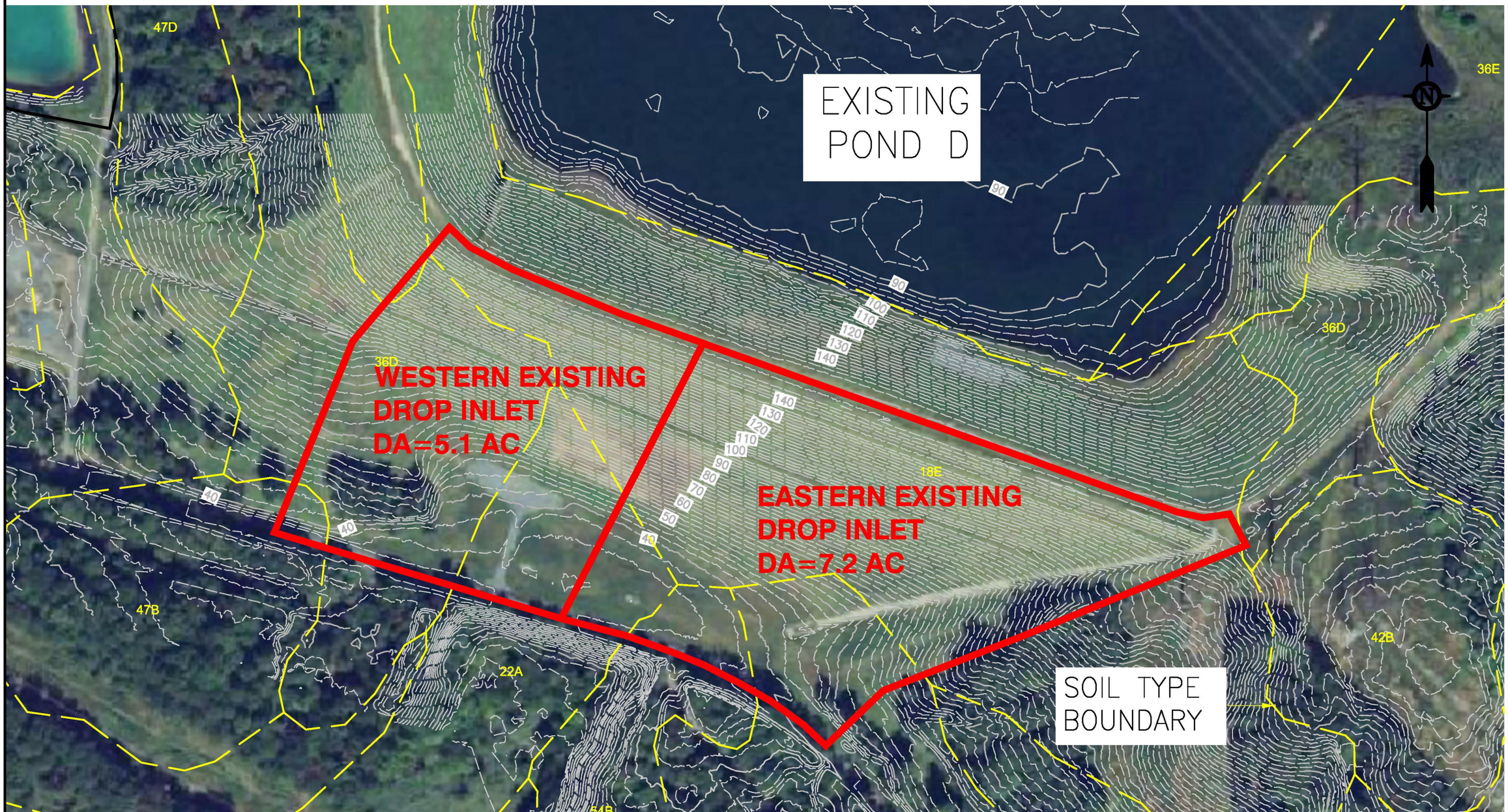
A composite curve number for the watershed was equal to 60. Due to the small size and steep nature of the embankment, a 5-minute time of concertation was assumed for each watershed.

SUMMARY OF RESULTS:

The following tables summarize peak flow rates and runoff volumes estimated at each inlet and the culvert.

	Estimated Flow Rate (cfs)			Estimated Runoff Volume (cf)		
Storm Event	**Western Inlet**	**Eastern Inlet**	**72" Culvert**	**Western Inlet**	**Eastern Inlet**	**72" Culvert**
1-year	0.8	1.1	2.0	3,723	5,201	8,924
2-year	2.6	3.7	6.3	7,266	10,149	17,415
5-year	6.7	9.4	16.2	15,038	21,007	36,045
10-year	11.1	15.5	26.6	23,257	32,488	55,745
25-year	18.6	26.0	44.6	37,731	52,705	90,436
100-year	34.5	48.2	82.6	69,231	96,709	165,940

DRAINAGE AREA MAP



DRAWING TITLE: INLET DRAINAGE AREA MAP

SCALE: 1" = 150'

150 0 150 300

DOMINION

POSSUM POINT POWER STATION

POND D CLOSURE

PITTSBURGH OFFICE • 385 EAST WATERFRONT DRIVE, HOMESTEAD, PA 15120-5005

gai consultants

DRAWN BY: BERKEME	APPROVED BY: -----
CHECKED BY:	DATE: --------
DRAWING NUMBER:	
This drawing was produced with computer aided drafting technology and is supported by electronic drawing files. Do not revise this drawing via manual drafting methods.	REVISION
SCALE:	SHT. NO. ___ OF 4

GAI DRAWING FILE NO. POND DTOE DRAIN INLETS CEU

00012799

gai consultants

PRECIPITATION DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Dumfries, Virginia, US*
Latitude: 38.5352°, Longitude: -77.2816°
Elevation: 30 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.357 (0.323–0.393)	0.428 (0.387–0.472)	0.509 (0.460–0.561)	0.568 (0.512–0.626)	0.643 (0.576–0.709)	0.699 (0.624–0.771)	0.755 (0.670–0.834)	0.810 (0.713–0.896)	0.880 (0.766–0.979)	0.934 (0.808–1.04)
10-min	0.570 (0.516–0.629)	0.685 (0.620–0.755)	0.815 (0.737–0.898)	0.909 (0.820–1.00)	1.03 (0.918–1.13)	1.11 (0.993–1.23)	1.20 (1.06–1.33)	1.28 (1.13–1.42)	1.39 (1.21–1.55)	1.47 (1.27–1.65)
15-min	0.713 (0.645–0.786)	0.861 (0.779–0.949)	1.03 (0.932–1.14)	1.15 (1.04–1.27)	1.30 (1.16–1.43)	1.41 (1.26–1.56)	1.52 (1.35–1.68)	1.62 (1.43–1.79)	1.75 (1.53–1.95)	1.85 (1.60–2.06)
30-min	0.978 (0.884–1.08)	1.19 (1.08–1.31)	1.47 (1.32–1.62)	1.67 (1.50–1.84)	1.93 (1.72–2.12)	2.12 (1.89–2.34)	2.32 (2.06–2.57)	2.52 (2.22–2.79)	2.79 (2.43–3.10)	2.99 (2.59–3.34)
60-min	1.22 (1.10–1.34)	1.49 (1.35–1.64)	1.88 (1.70–2.07)	2.17 (1.96–2.39)	2.56 (2.30–2.83)	2.88 (2.57–3.17)	3.20 (2.84–3.53)	3.54 (3.11–3.91)	4.00 (3.48–4.45)	4.37 (3.78–4.88)
2-hr	1.42 (1.28–1.58)	1.73 (1.56–1.92)	2.20 (1.98–2.43)	2.56 (2.30–2.83)	3.07 (2.74–3.39)	3.49 (3.10–3.85)	3.92 (3.46–4.34)	4.39 (3.84–4.86)	5.04 (4.36–5.61)	5.57 (4.77–6.23)
3-hr	1.53 (1.38–1.72)	1.87 (1.68–2.09)	2.37 (2.12–2.64)	2.77 (2.47–3.08)	3.33 (2.96–3.71)	3.80 (3.35–4.23)	4.30 (3.76–4.78)	4.82 (4.18–5.38)	5.58 (4.77–6.25)	6.20 (5.24–6.97)
6-hr	1.89 (1.70–2.12)	2.29 (2.06–2.56)	2.89 (2.59–3.23)	3.38 (3.02–3.78)	4.11 (3.64–4.59)	4.72 (4.15–5.28)	5.39 (4.69–6.02)	6.11 (5.26–6.84)	7.17 (6.08–8.07)	8.06 (6.73–9.11)
12-hr	2.29 (2.05–2.58)	2.76 (2.47–3.11)	3.51 (3.13–3.95)	4.14 (3.68–4.65)	5.10 (4.49–5.72)	5.94 (5.17–6.66)	6.87 (5.91–7.70)	7.90 (6.71–8.88)	9.46 (7.88–10.7)	10.8 (8.86–12.3)
24-hr	2.57 (2.34–2.89)	3.12 (2.83–3.50)	4.04 (3.66–4.52)	4.84 (4.37–5.40)	6.06 (5.43–6.74)	7.14 (6.35–7.90)	8.35 (7.37–9.21)	9.73 (8.50–10.7)	11.8 (10.2–13.0)	13.7 (11.6–15.0)
2-day	2.99 (2.70–3.33)	3.63 (3.29–4.04)	4.68 (4.24–5.21)	5.59 (5.04–6.21)	6.96 (6.24–7.70)	8.16 (7.27–9.00)	9.49 (8.38–10.5)	11.0 (9.62–12.1)	13.3 (11.4–14.6)	15.2 (13.0–16.7)
3-day	3.17 (2.88–3.53)	3.84 (3.49–4.28)	4.95 (4.48–5.50)	5.90 (5.32–6.54)	7.32 (6.56–8.09)	8.56 (7.63–9.43)	9.93 (8.78–10.9)	11.5 (10.1–12.6)	13.8 (11.9–15.1)	15.8 (13.5–17.3)
4-day	3.35 (3.05–3.72)	4.06 (3.69–4.52)	5.21 (4.73–5.79)	6.20 (5.61–6.87)	7.67 (6.89–8.48)	8.95 (8.00–9.87)	10.4 (9.19–11.4)	11.9 (10.5–13.1)	14.3 (12.4–15.7)	16.3 (14.0–17.9)
7-day	3.90 (3.57–4.28)	4.70 (4.30–5.16)	5.95 (5.44–6.53)	7.00 (6.39–7.69)	8.58 (7.80–9.40)	9.93 (8.97–10.9)	11.4 (10.2–12.5)	13.1 (11.6–14.2)	15.5 (13.6–16.9)	17.6 (15.2–19.1)
10-day	4.46 (4.11–4.87)	5.36 (4.93–5.86)	6.69 (6.15–7.30)	7.79 (7.15–8.49)	9.39 (8.57–10.2)	10.7 (9.76–11.7)	12.2 (11.0–13.2)	13.7 (12.3–14.9)	16.0 (14.2–17.3)	17.8 (15.7–19.4)
20-day	6.01 (5.59–6.49)	7.16 (6.65–7.73)	8.65 (8.04–9.33)	9.86 (9.15–10.6)	11.6 (10.7–12.4)	12.9 (11.9–13.9)	14.3 (13.2–15.4)	15.8 (14.5–17.0)	17.9 (16.2–19.2)	19.5 (17.6–21.0)
30-day	7.39 (6.89–7.92)	8.74 (8.17–9.38)	10.4 (9.71–11.2)	11.7 (10.9–12.6)	13.6 (12.6–14.5)	15.0 (13.9–16.0)	16.5 (15.2–17.6)	18.0 (16.6–19.2)	20.0 (18.3–21.4)	21.6 (19.7–23.1)
45-day	9.29 (8.72–9.86)	11.0 (10.3–11.6)	12.8 (12.0–13.6)	14.3 (13.4–15.1)	16.1 (15.1–17.1)	17.6 (16.4–18.6)	19.0 (17.7–20.1)	20.4 (18.9–21.6)	22.1 (20.5–23.5)	23.5 (21.7–25.0)
60-day	11.0 (10.4–11.7)	13.0 (12.2–13.7)	15.0 (14.1–15.9)	16.5 (15.6–17.4)	18.5 (17.4–19.5)	19.9 (18.7–21.0)	21.3 (19.9–22.5)	22.6 (21.1–23.9)	24.2 (22.6–25.7)	25.4 (23.6–26.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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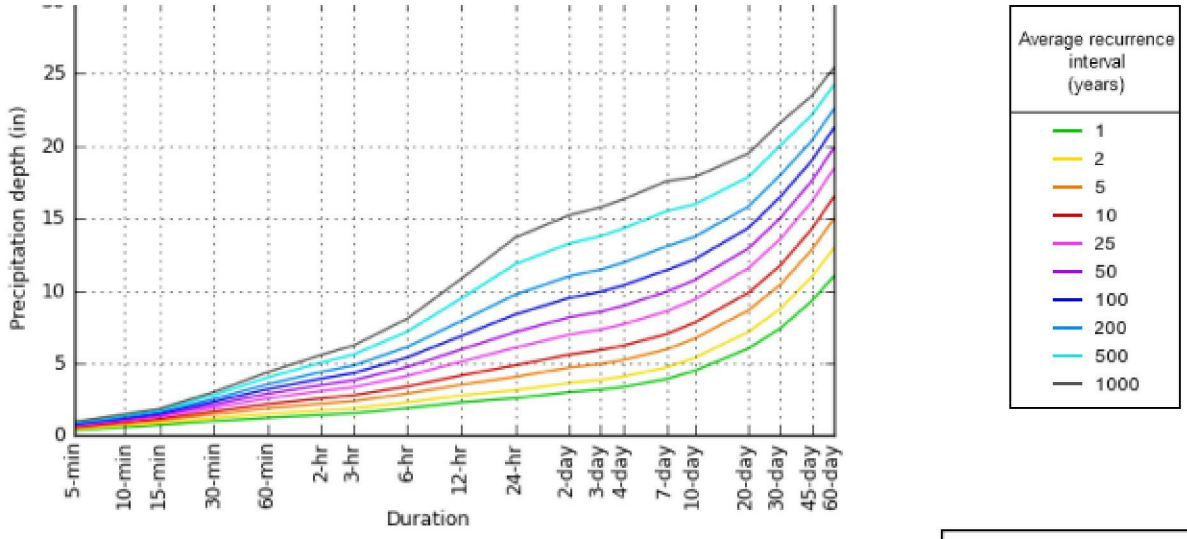
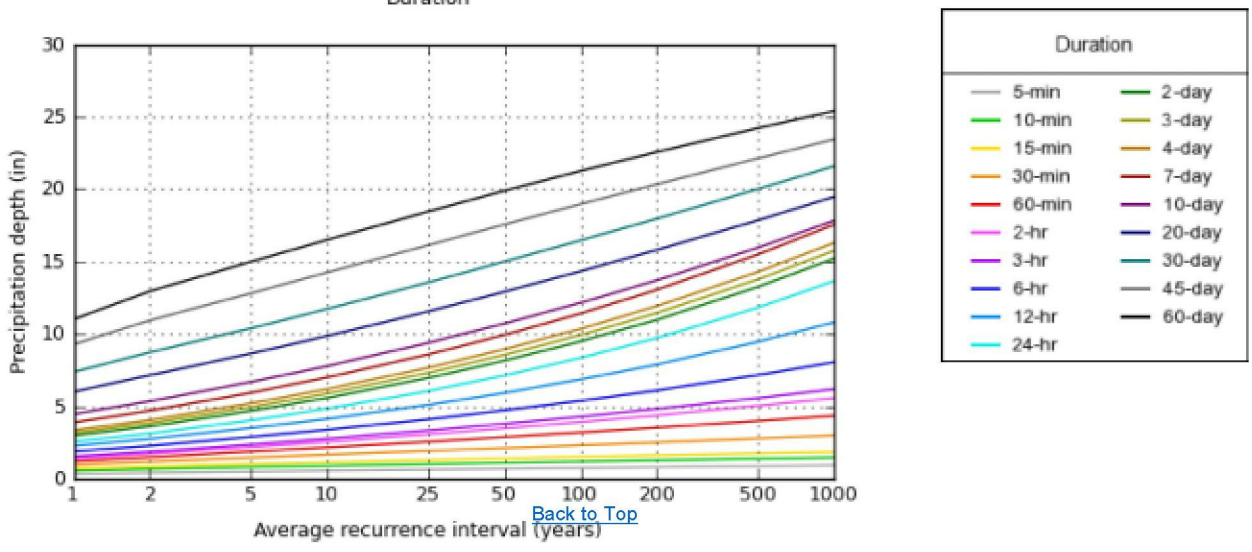
PF graphical





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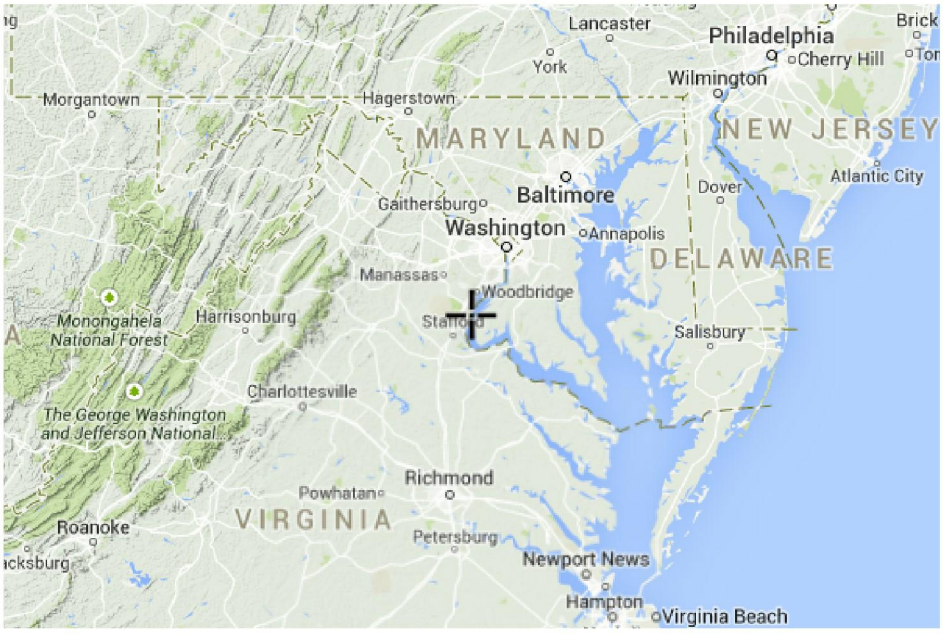
Maps & aerials

NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Mar 9 13:33:02 2015

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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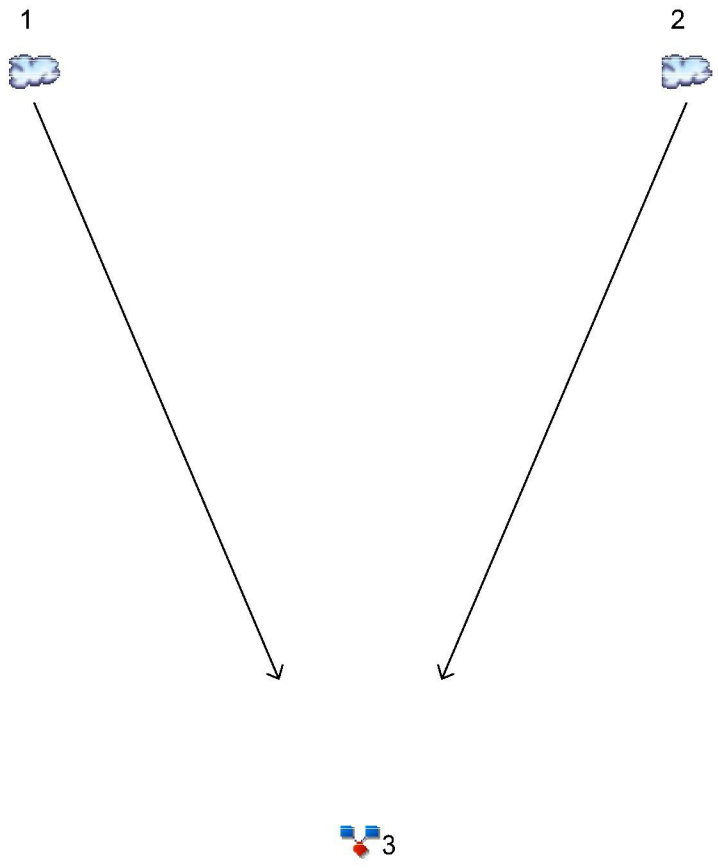
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Office of Hydrologic Development
1325 East West Highway
Silver Spring, MD 20910

gai consultants

HYDRAFLOW INPUT/OUTPUT

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10



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Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	0.822	1	721	3,723	------	------	------	Western Inlet
2	SCS Runoff	1.148	1	721	5,201	------	------	------	Eastern Inlet
3	Combine	1.970	1	721	8,924	1, 2	------	------	72 Inch Culvert

Hydrograph Report

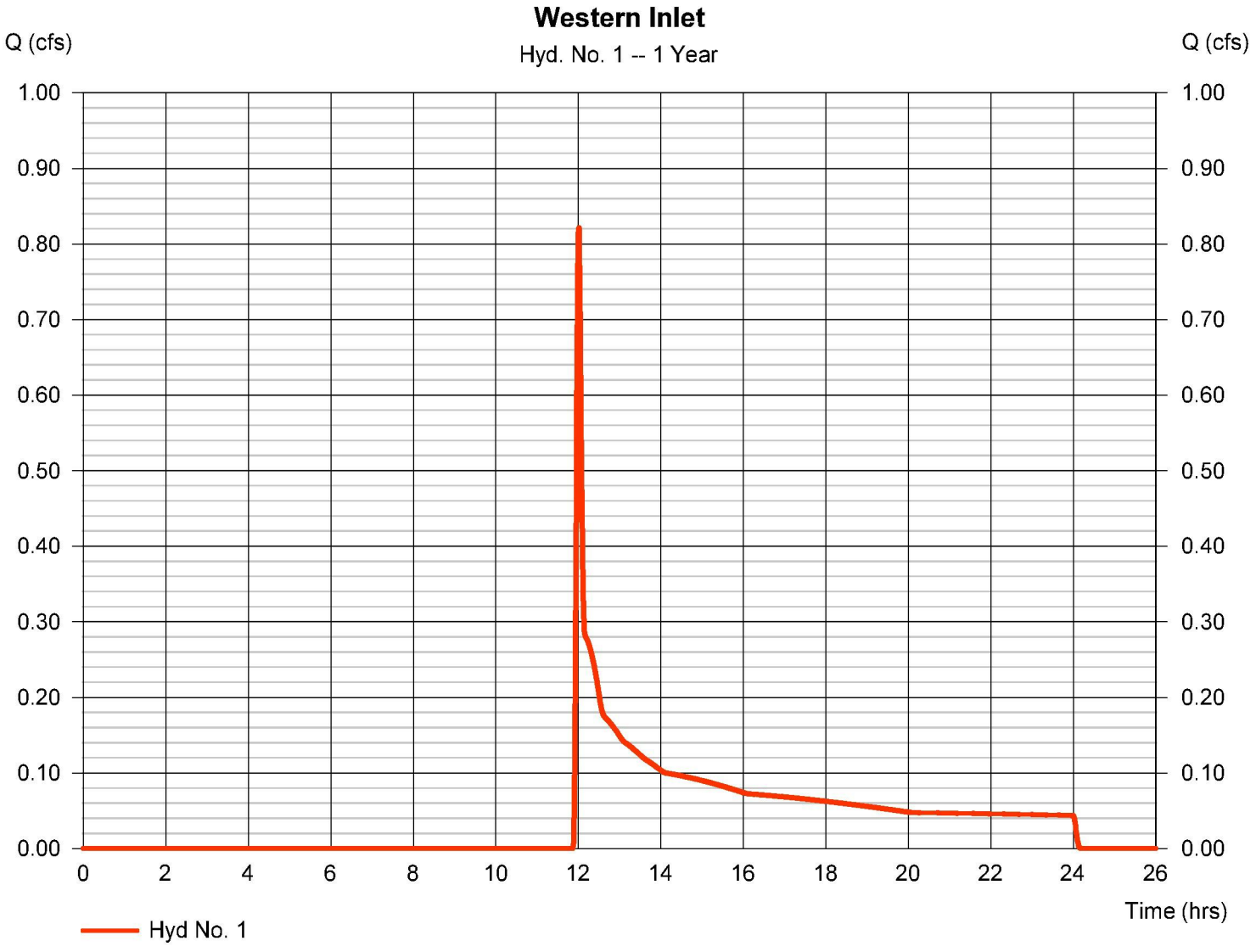
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 0.822 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 3,723 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

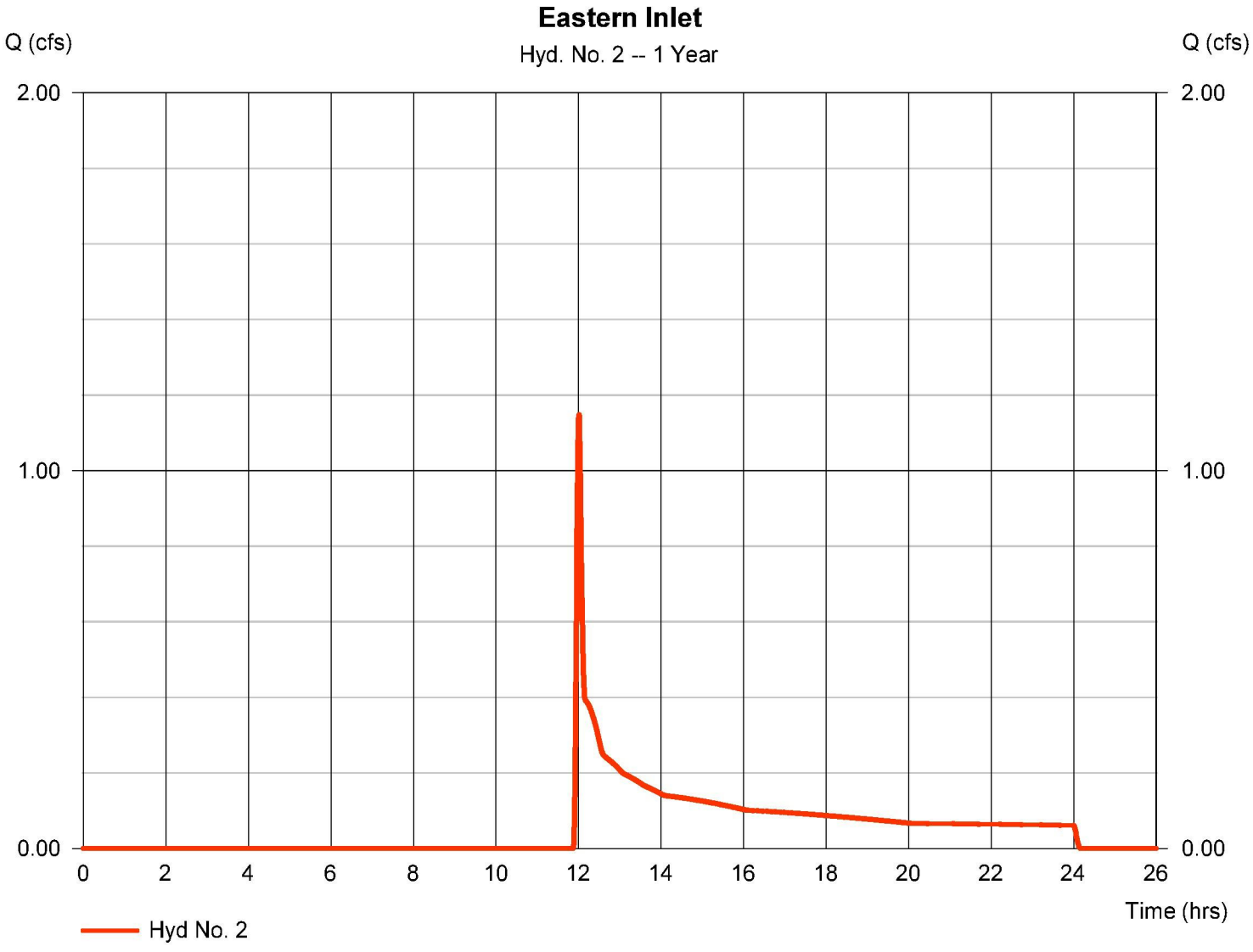
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 1.148 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 5,201 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



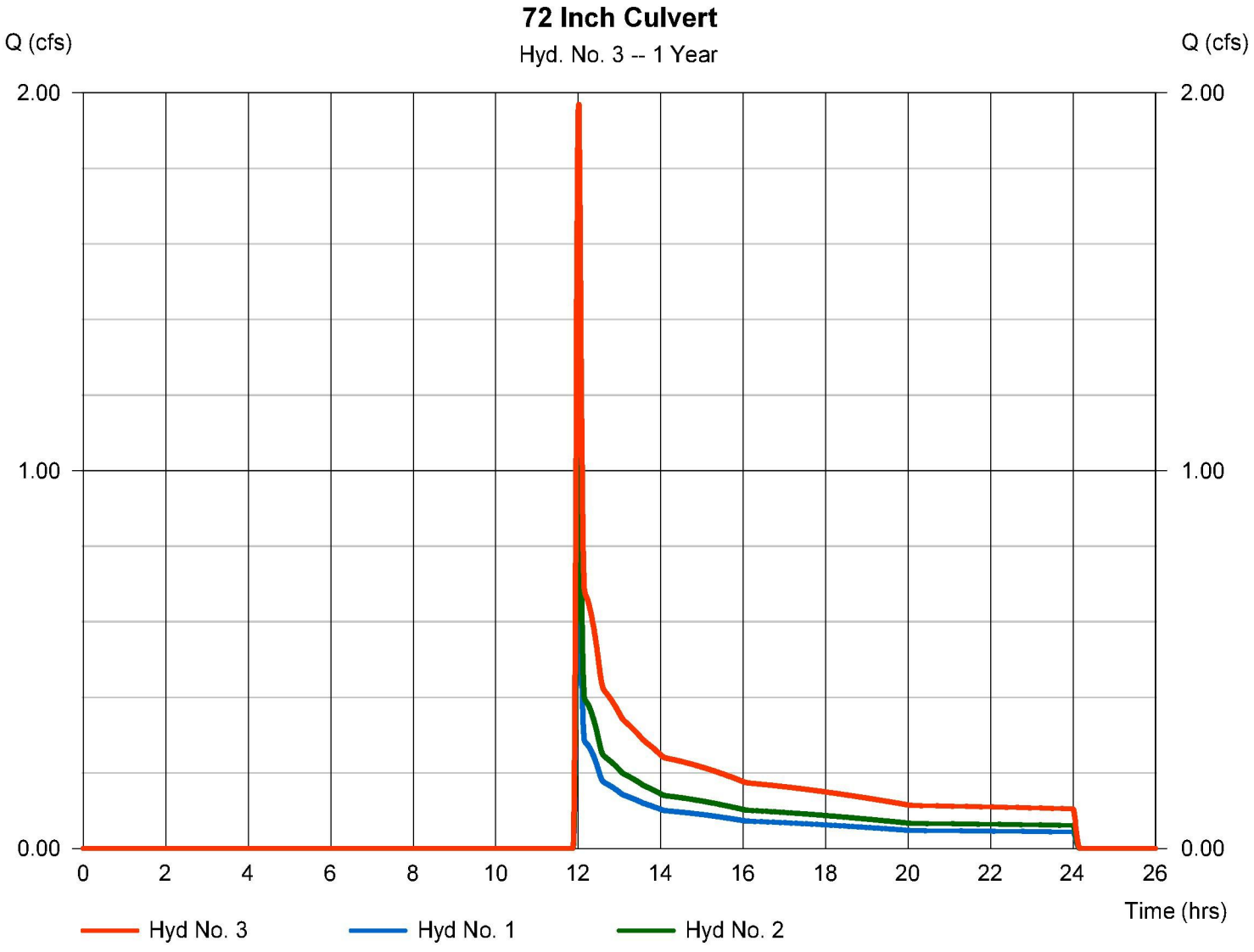
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 1.970 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 8,924 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	2.622	1	719	7,266	------	------	------	Western Inlet
2	SCS Runoff	3.663	1	719	10,149	------	------	------	Eastern Inlet
3	Combine	6.286	1	719	17,415	1, 2	------	------	72 Inch Culvert

Hydrograph Report

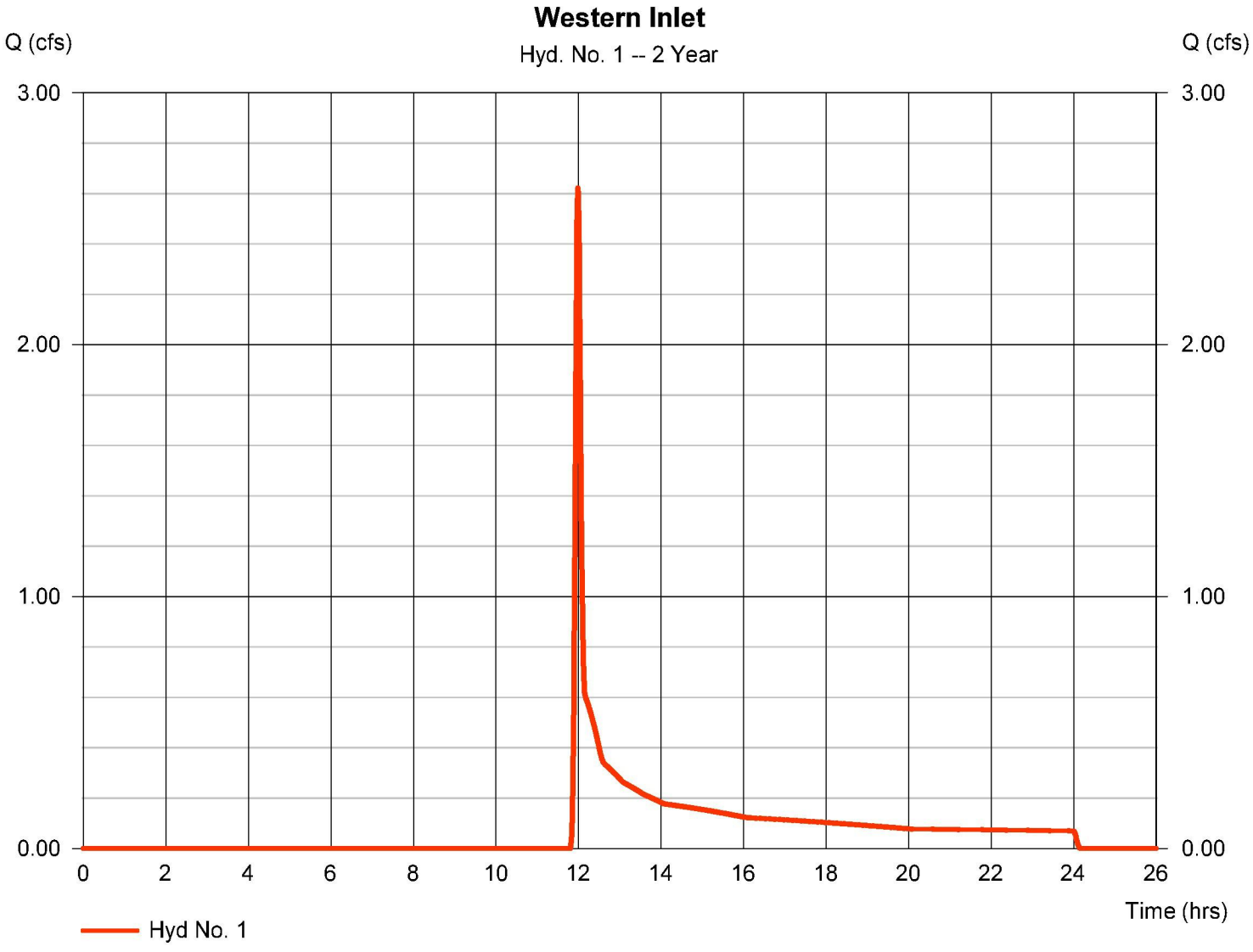
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 2.622 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 7,266 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

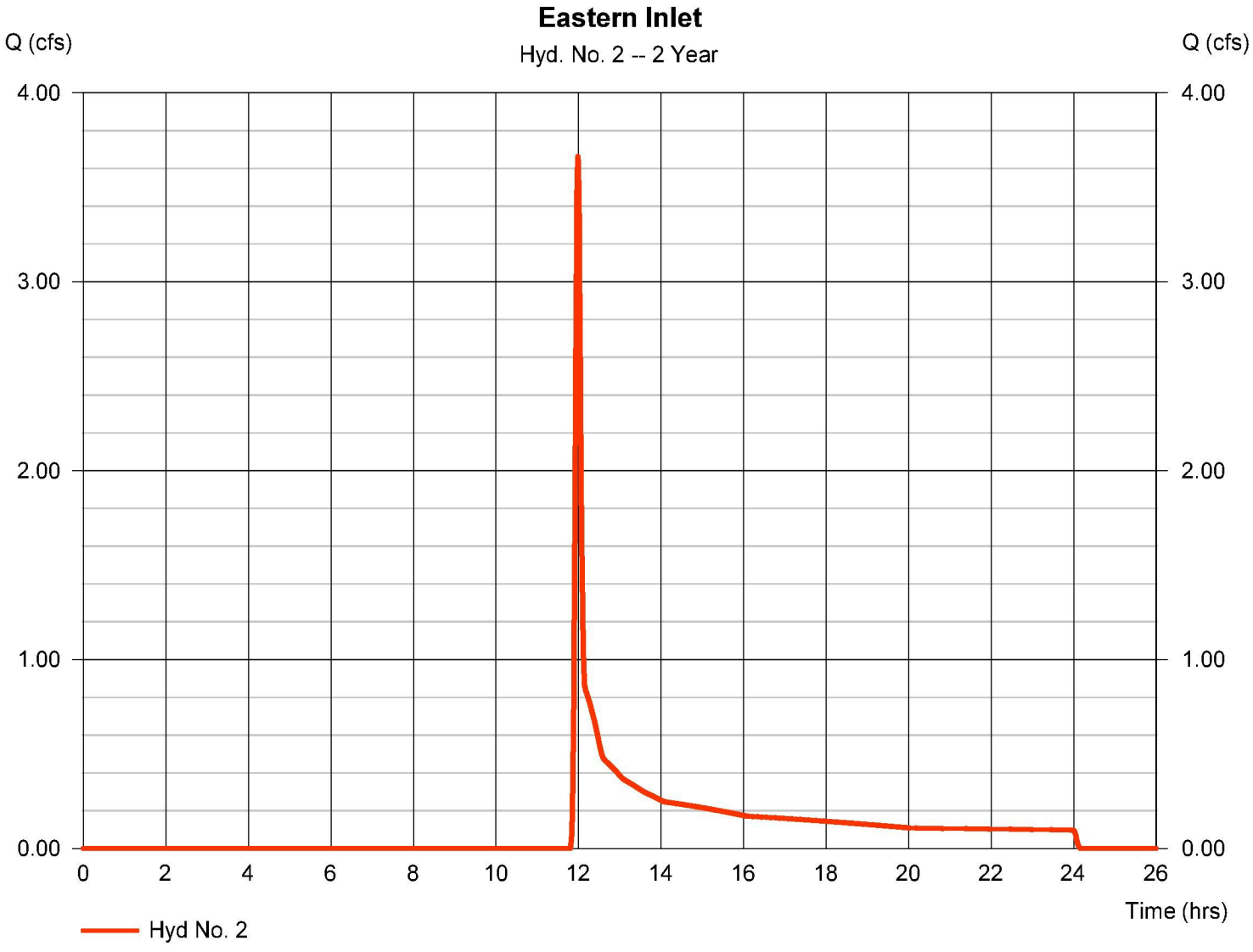
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 3.663 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 10,149 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.12 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



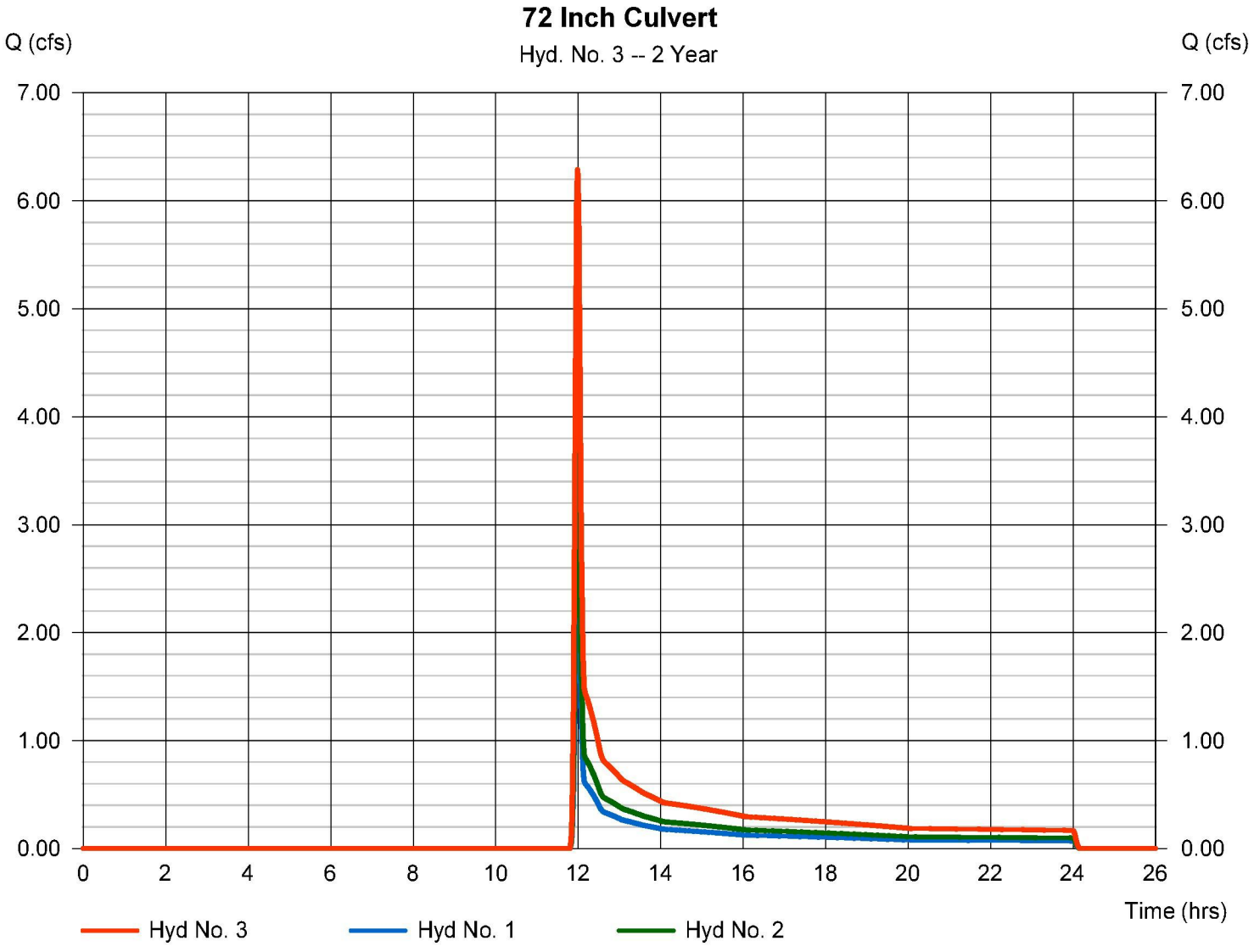
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 6.286 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 17,415 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	6.746	1	718	15,038	------	------	------	Western Inlet
2	SCS Runoff	9.424	1	718	21,007	------	------	------	Eastern Inlet
3	Combine	16.17	1	718	36,045	1, 2	------	------	72 Inch Culvert

Hydrograph Report

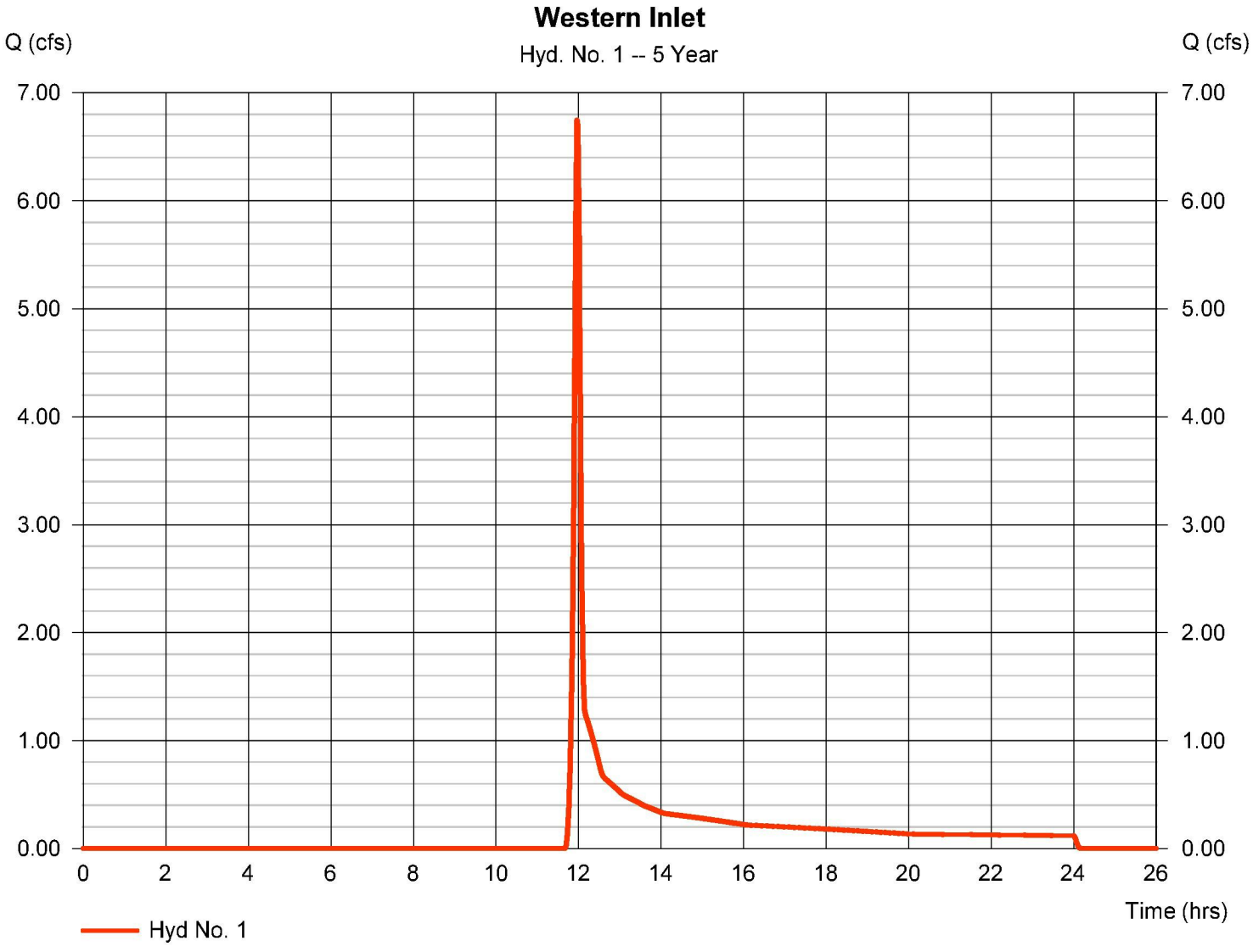
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 6.746 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 15,038 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

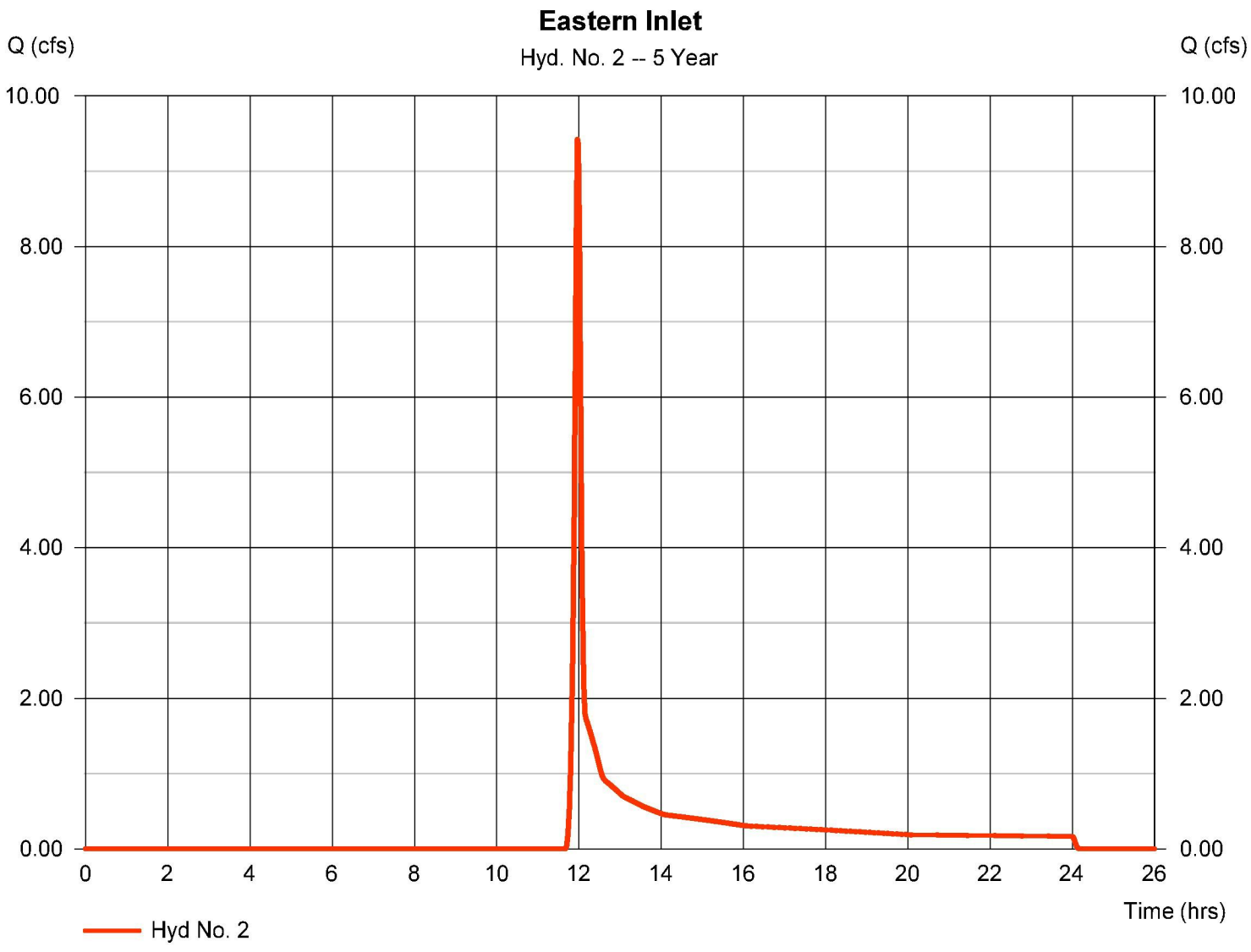
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 9.424 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 21,007 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



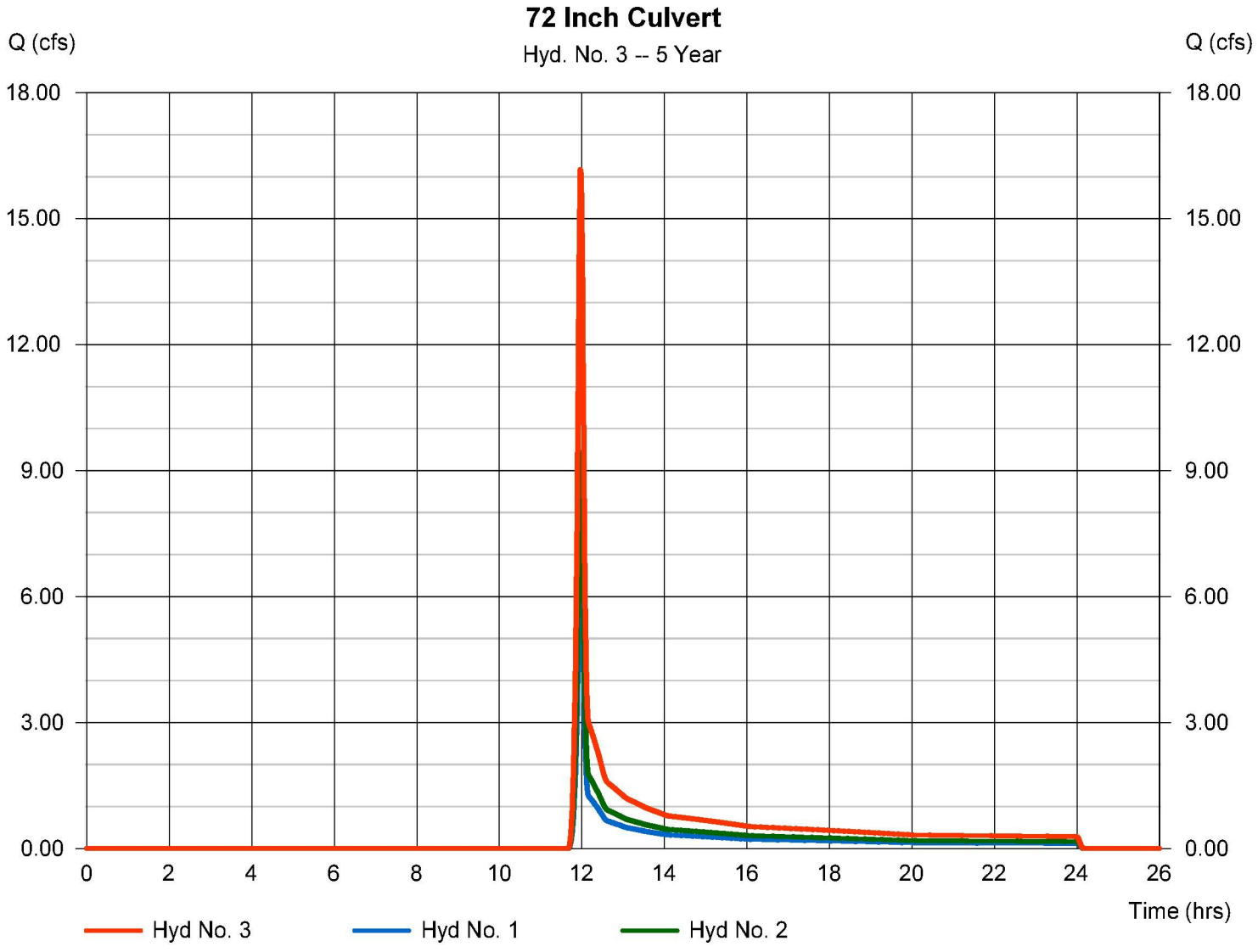
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 16.17 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 36,045 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	11.11	1	718	23,257	------	------	------	Western Inlet
2	SCS Runoff	15.52	1	718	32,488	------	------	------	Eastern Inlet
3	Combine	26.63	1	718	55,745	1, 2	------	------	72 Inch Culvert

Hydrograph Report

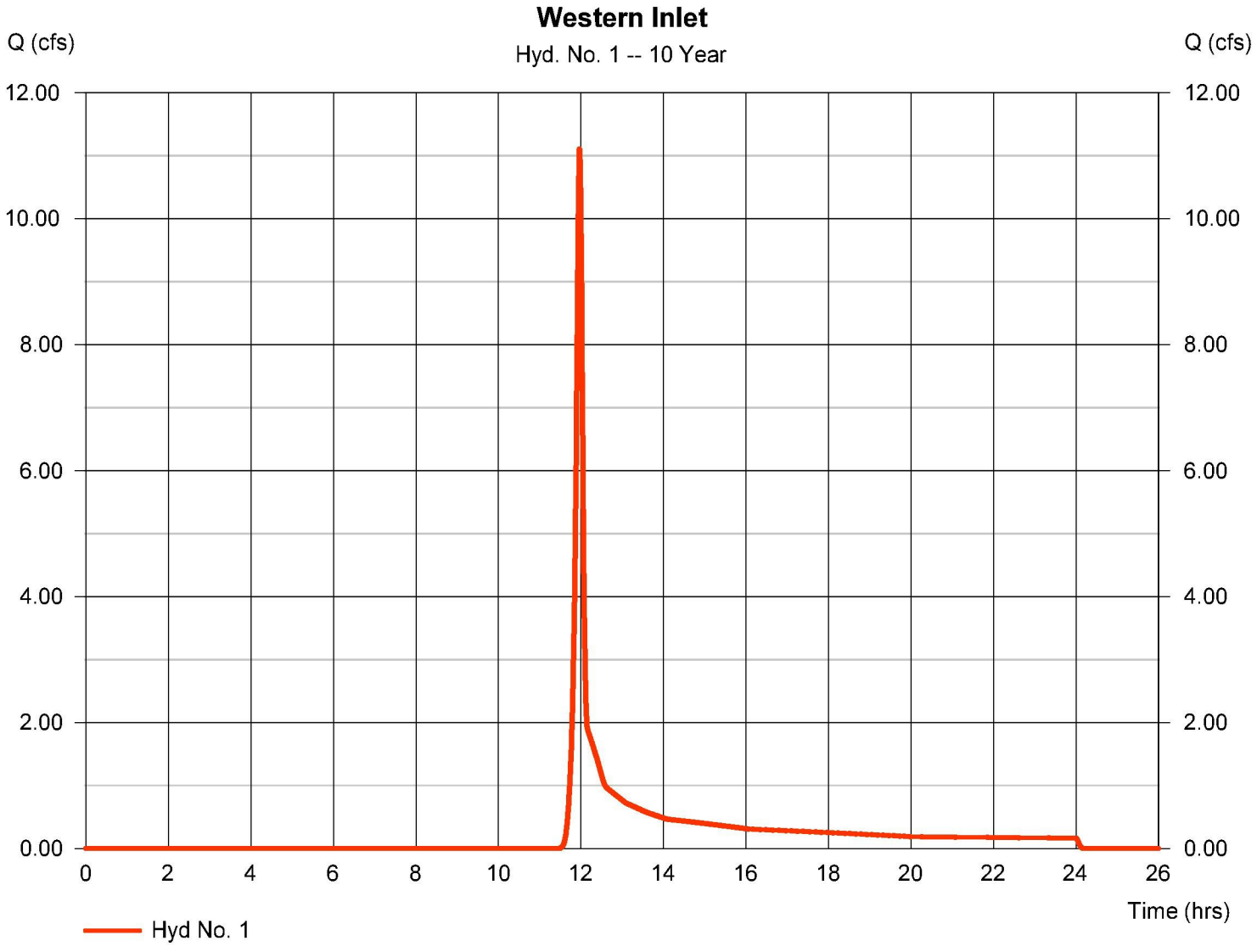
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 11.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 23,257 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.84 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

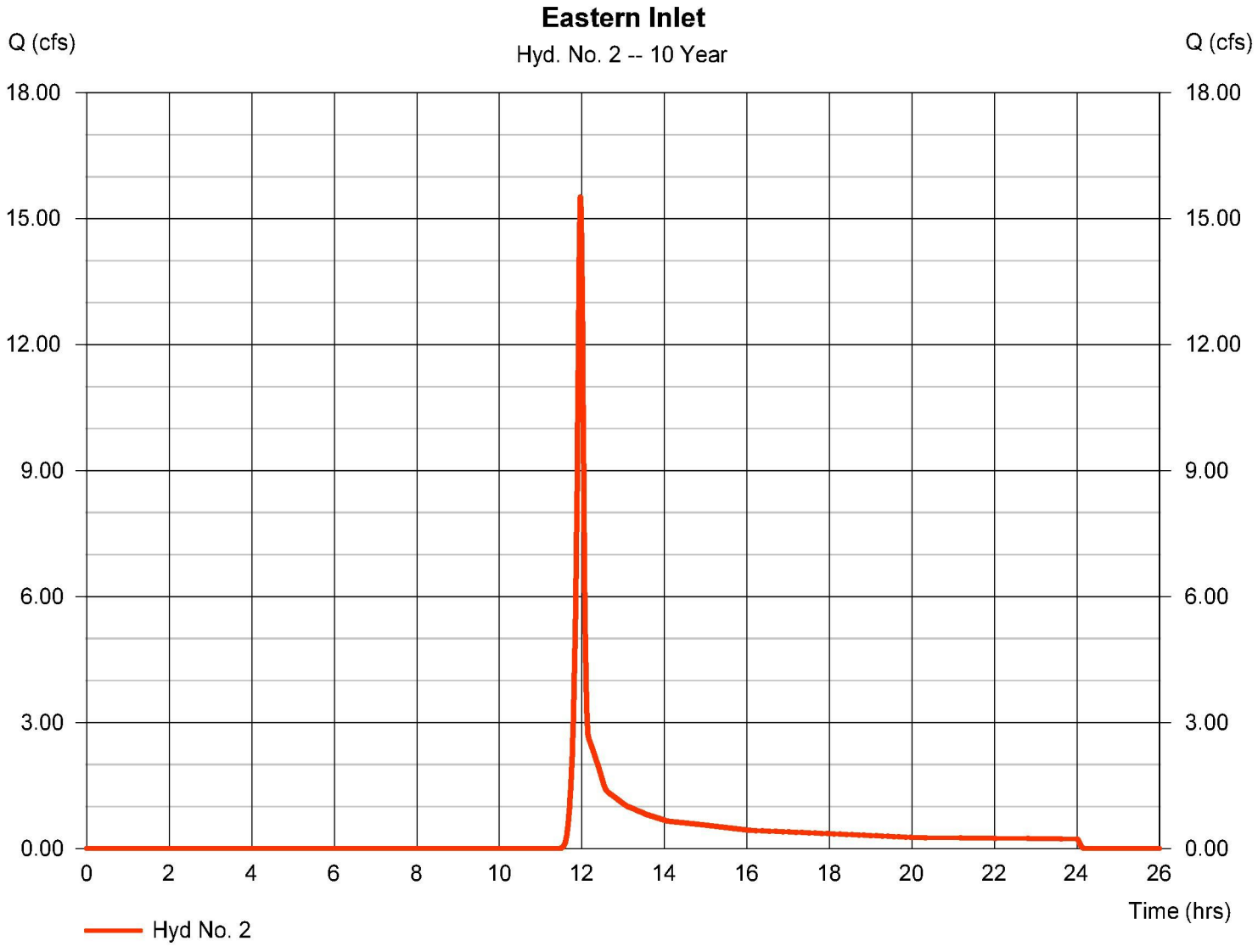
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 15.52 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 32,488 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.84 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



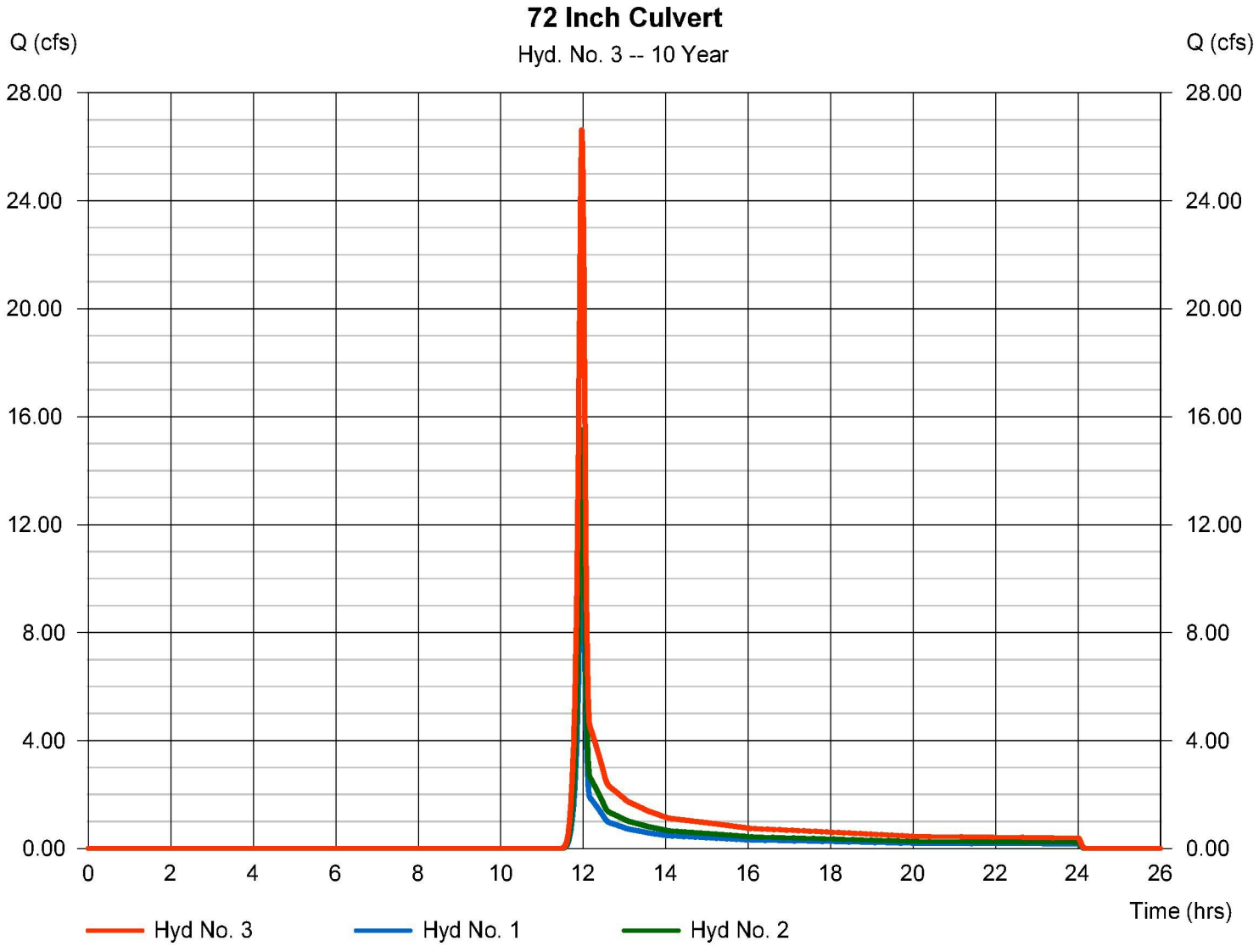
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 26.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 55,745 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	18.62	1	718	37,731	------	------	------	Western Inlet
2	SCS Runoff	26.01	1	718	52,705	------	------	------	Eastern Inlet
3	Combine	44.63	1	718	90,436	1, 2	------	------	72 Inch Culvert

Hydrograph Report

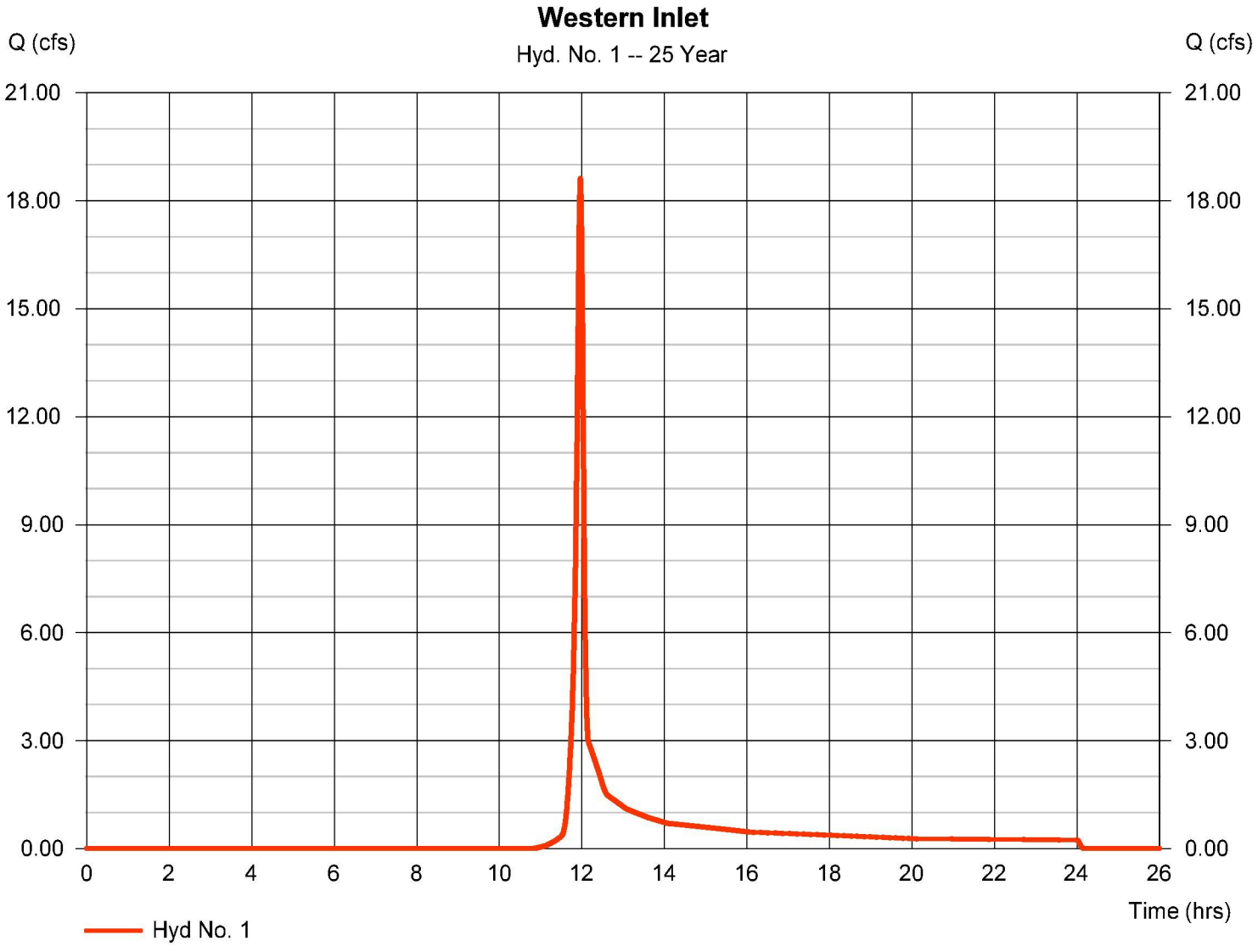
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 18.62 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 37,731 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

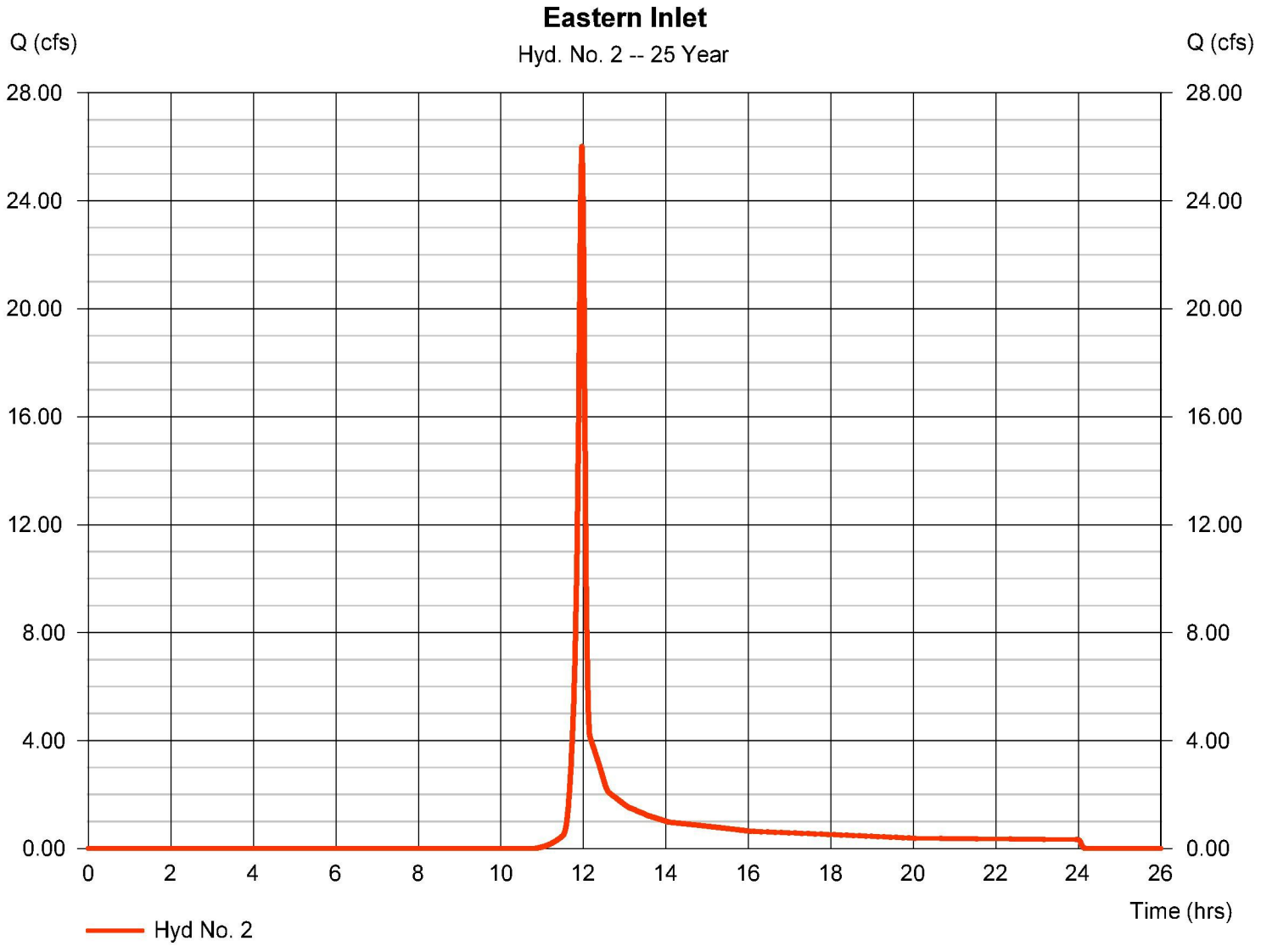
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 26.01 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 52,705 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



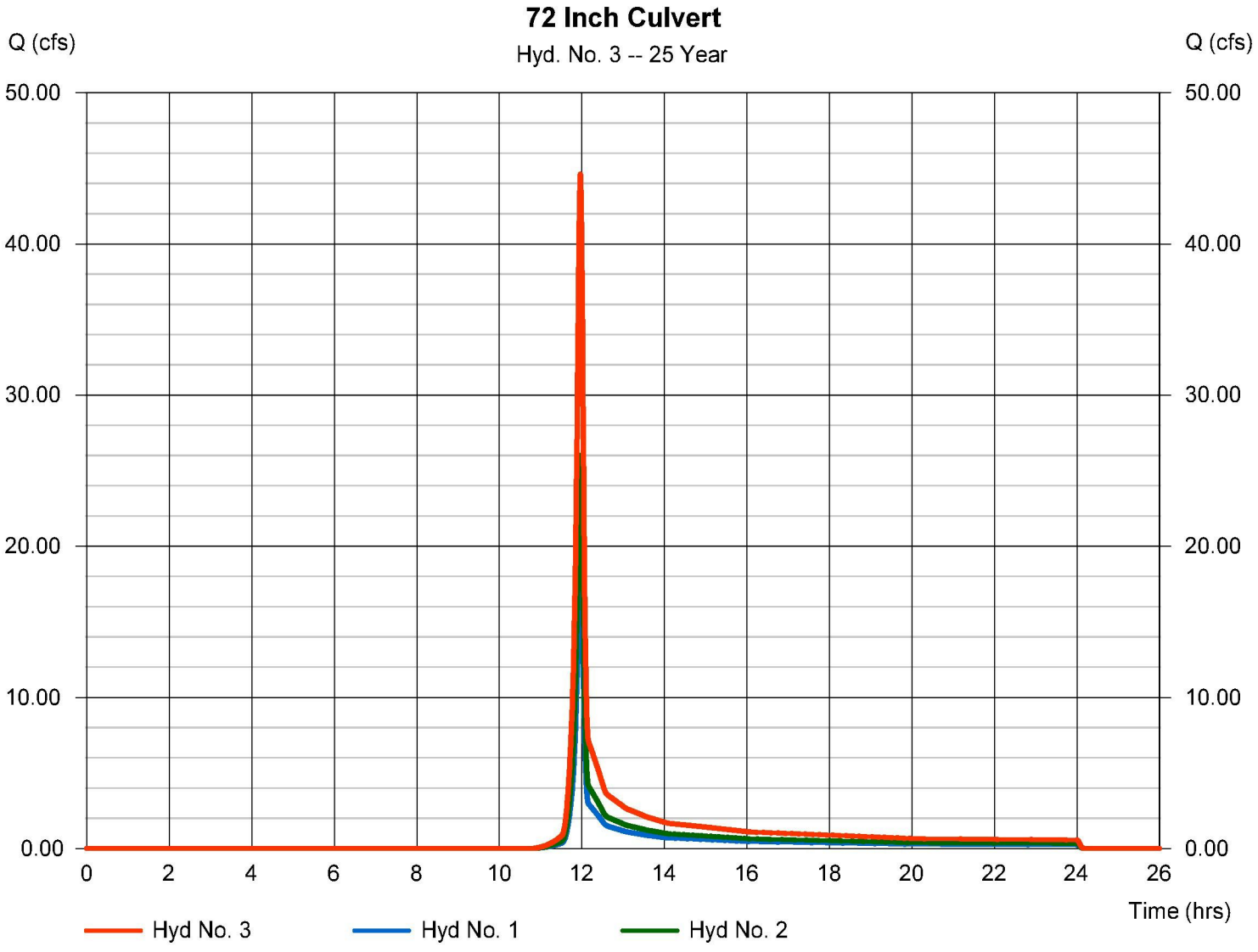
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 44.63 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 90,436 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	34.47	1	718	69,231	------	------	------	Western Inlet
2	SCS Runoff	48.15	1	718	96,709	------	------	------	Eastern Inlet
3	Combine	82.62	1	718	165,940	1, 2	------	------	72 Inch Culvert

Hydrograph Report

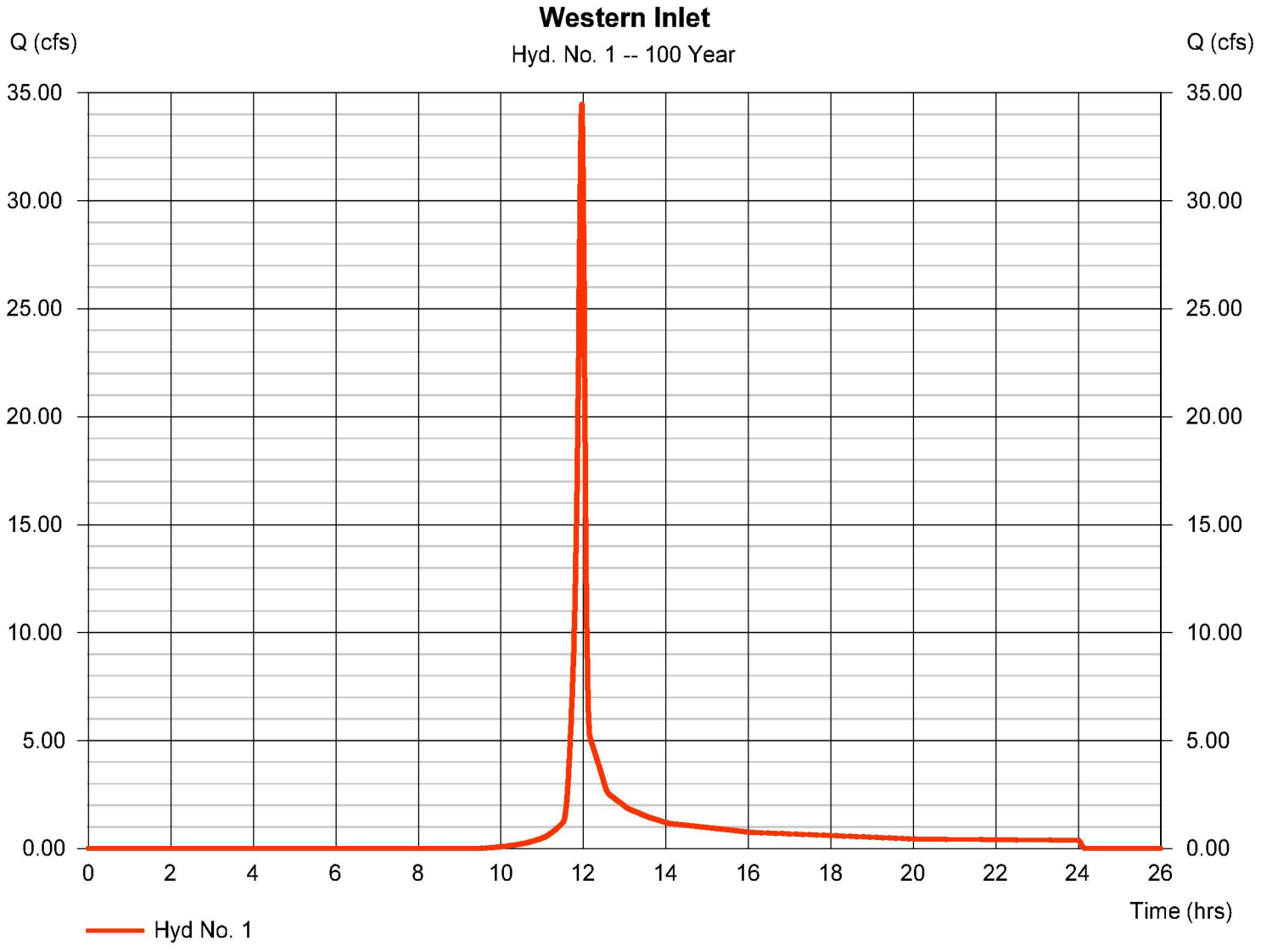
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 1

Western Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 34.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 69,231 cuft
Drainage area	= 5.140 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.35 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(4.790 x 58) + (0.210 x 85) + (0.140 x 98)] / 5.140



Hydrograph Report

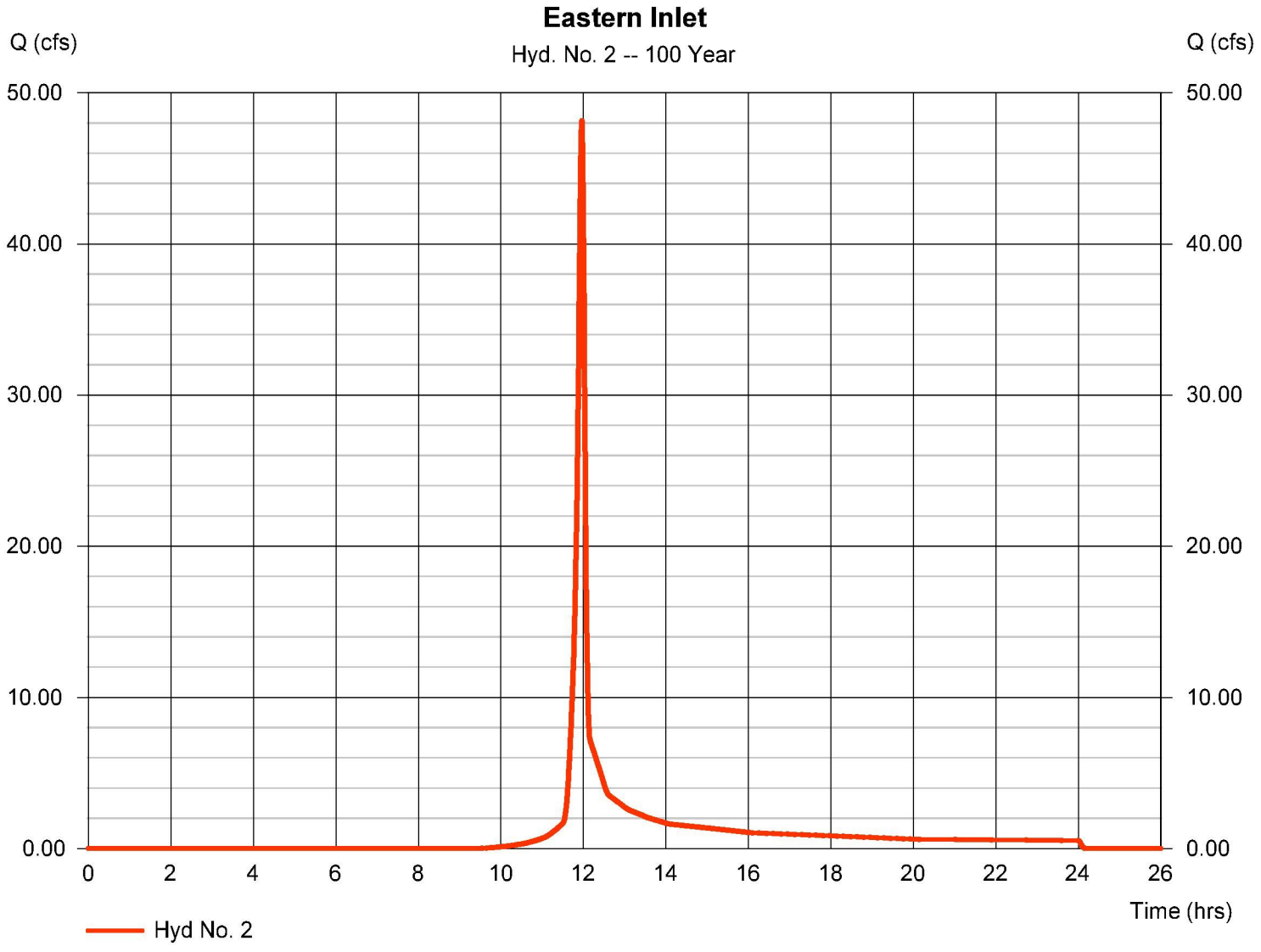
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 2

Eastern Inlet

Hydrograph type	= SCS Runoff	Peak discharge	= 48.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 96,709 cuft
Drainage area	= 7.180 ac	Curve number	= 60*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.35 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

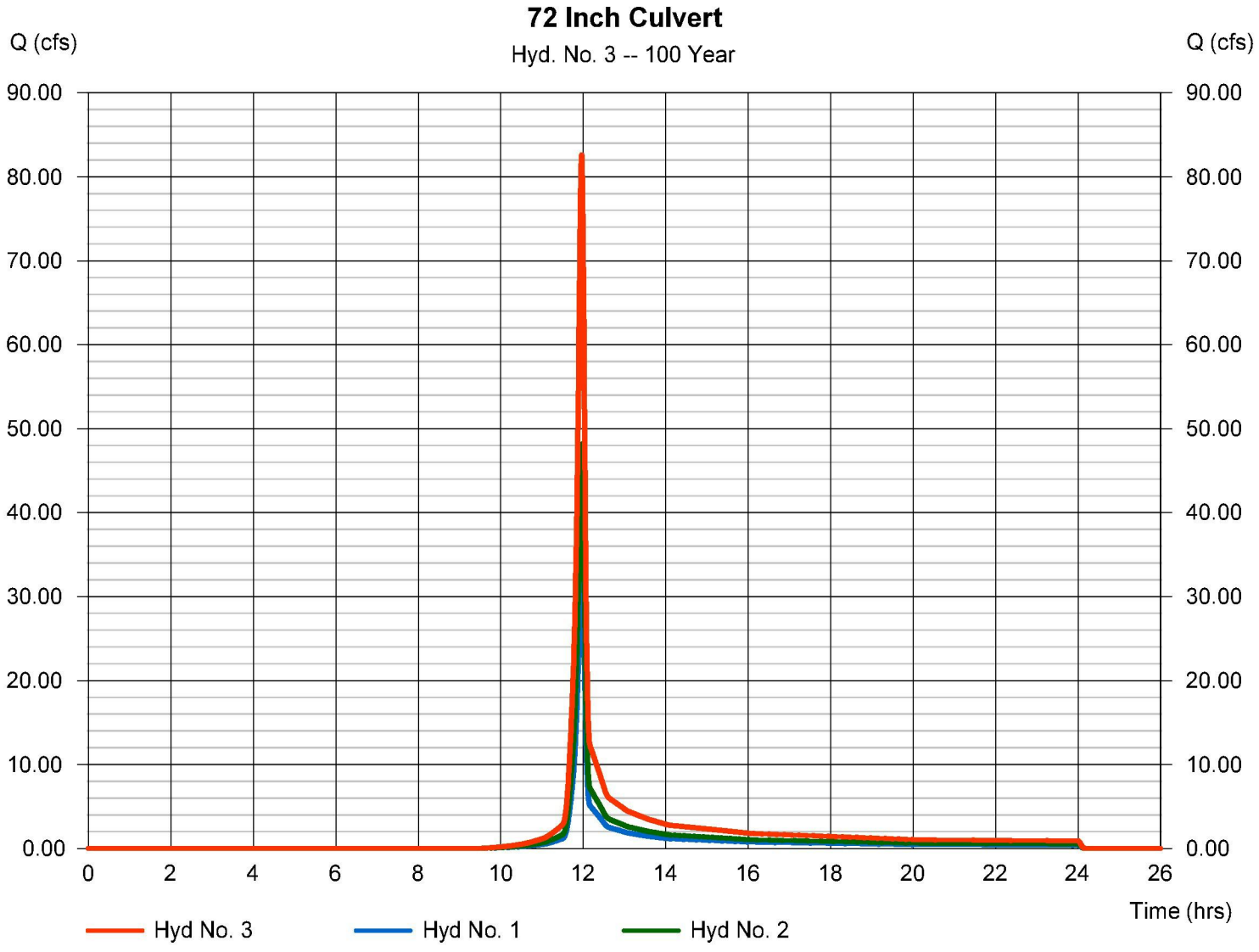
* Composite (Area/CN) = [(0.150 x 98) + (0.230 x 85) + (6.800 x 58)] / 7.180



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Tuesday, 02 / 2 / 2016

Hyd. No. 3

72 Inch Culvert

Hydrograph type	= Combine	Peak discharge	= 82.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 165,940 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.320 ac