

Attachment 5

Bergholz Creek Tributary



Client: (T) WHEATFIELD

Job Number: 631040

Sheet: 1 of 2

Project: DRAINAGE STUDY

Sheets by: Dmb

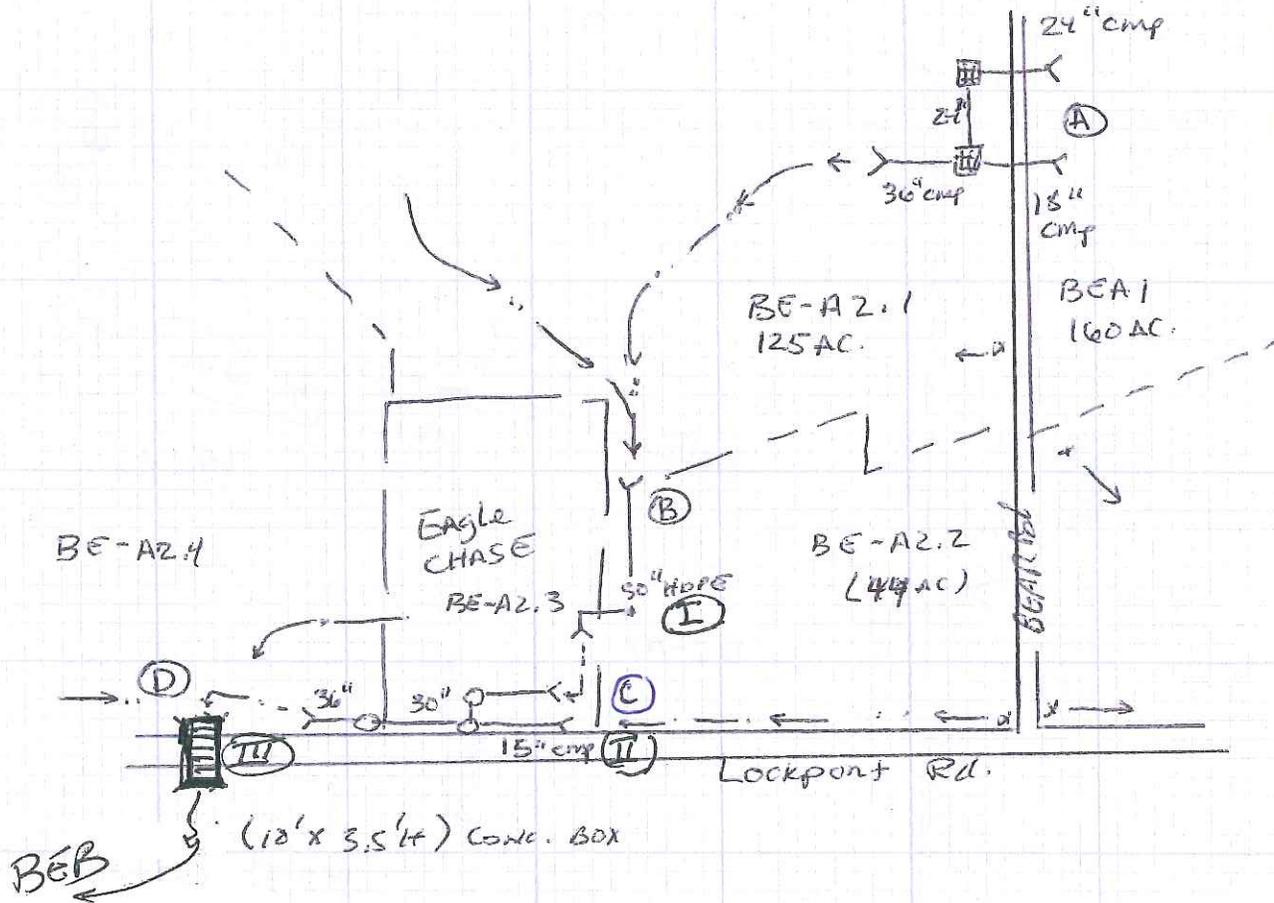
Date: July 2015

Subject: EAGLE CHASE SUBD. / offsite
EVAL.

Checked by:

Date:

BEB - TRIBUTARY



SECTION (A)

$Q_{10} = 44$ cfs
 $Q_{25} = 66$ cfs
 $Q_{100} = 113$ cfs

SECTION (B)

$Q_{10} = 19$ cfs
 $Q_{25} = 29$ cfs
 $Q_{100} = 49$ cfs

SECTION (C)

$Q_{10} = 43$ cfs
 $Q_{25} = 63$ cfs
 $Q_{100} = 121$ cfs

SECTION (D)

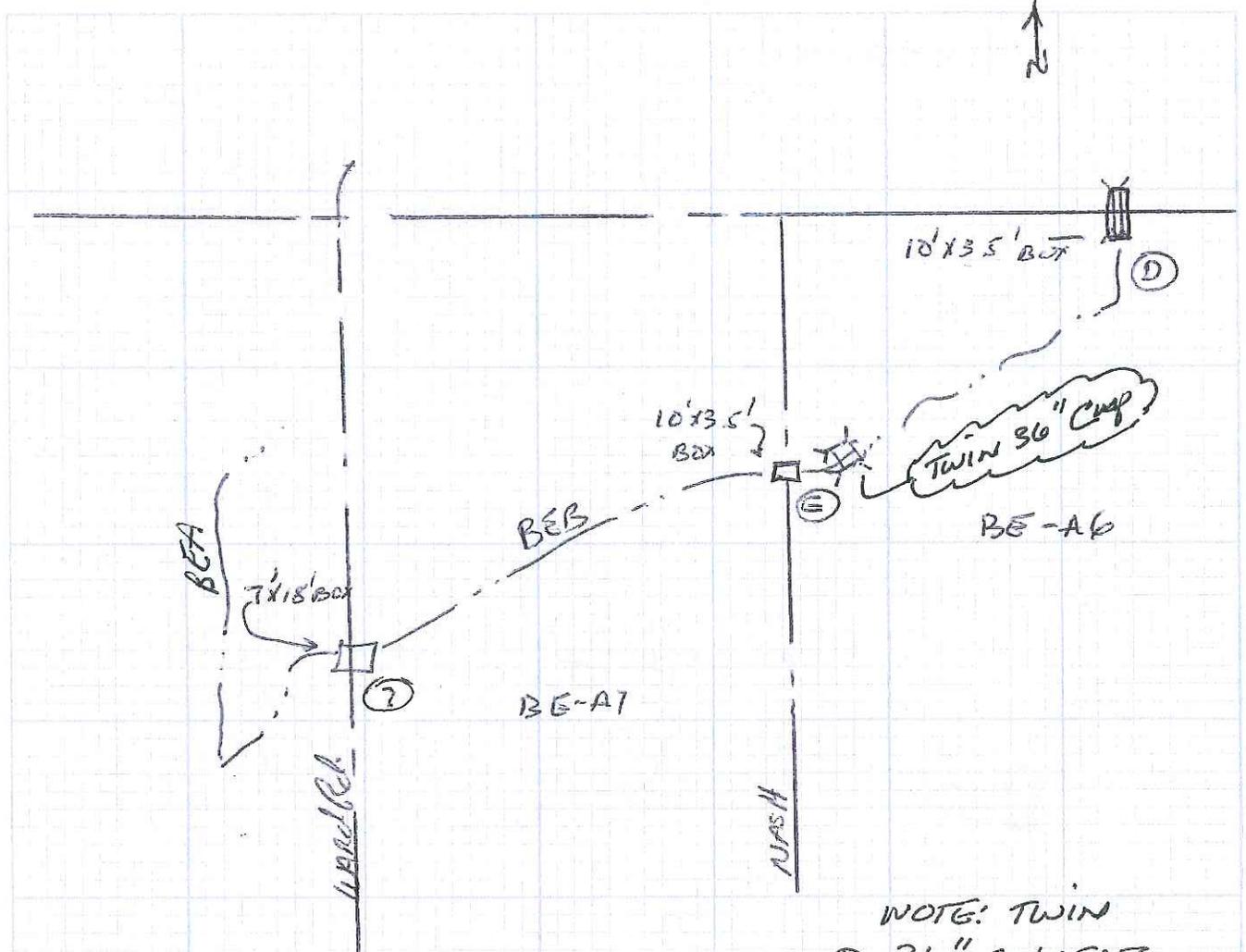
$Q_{10} = 60$ cfs
 $Q_{25} = 90$ cfs
 $Q_{100} = 173$ cfs

NOTES

- I 30" (By Pass)
 \therefore 50 cfs capacity (NO PROTECTION FROM STORM EVENTS (25 yr \rightarrow))
- II 15" cwp 8 cfs @ Elev. 608
 \therefore MAJOR RESTRICTION
- III 10' x 3.5' BOX
 NO CAPACITY ISSUES
 $Q_{CAP} > 200$ cfs @ Elev. 606



Client WHEATFIELD Job Number L31040 Sheet 2 of 2
 Project Wheatfield DRAINAGE STUDY Sheets by [Signature] Date July 2015
 Subject BERGHOFF TRIBUTARY BEB (Flow) Checked by [Signature] Date _____



- NOTE: TWIN
 (A) 36" CULVERTS
 HAS A RESTRICTIONS
 IN FLOW
 (B) NO OTHER
 RESTRICTIONS
 IN FLOW
 (C) FLOODS A RESULT
 OF LOW CHANNEL
 BANKS & CLEANING
 REQ'D.

SECTION (D)

$Q_{10} = 100 \text{ cfs}$, $Q_{25} = 90 \text{ cfs}$; $Q_{100} = 172 \text{ cfs}$

SECTION (E)

$Q_{10} = 105 \text{ cfs}$, $Q_{25} = 158 \text{ cfs}$ $Q_{100} = 310 \text{ cfs}$

SECTION (F)

$Q_{10} = 188 \text{ cfs}$; $Q_{25} = 282 \text{ cfs}$ $Q_{100} = 522 \text{ cfs}$

Culvert Report

30 inch ex. eagle chase offsite control

Invert Elev Dn (ft)	=	604.00
Pipe Length (ft)	=	180.00
Slope (%)	=	0.20
Invert Elev Up (ft)	=	604.36
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.010
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

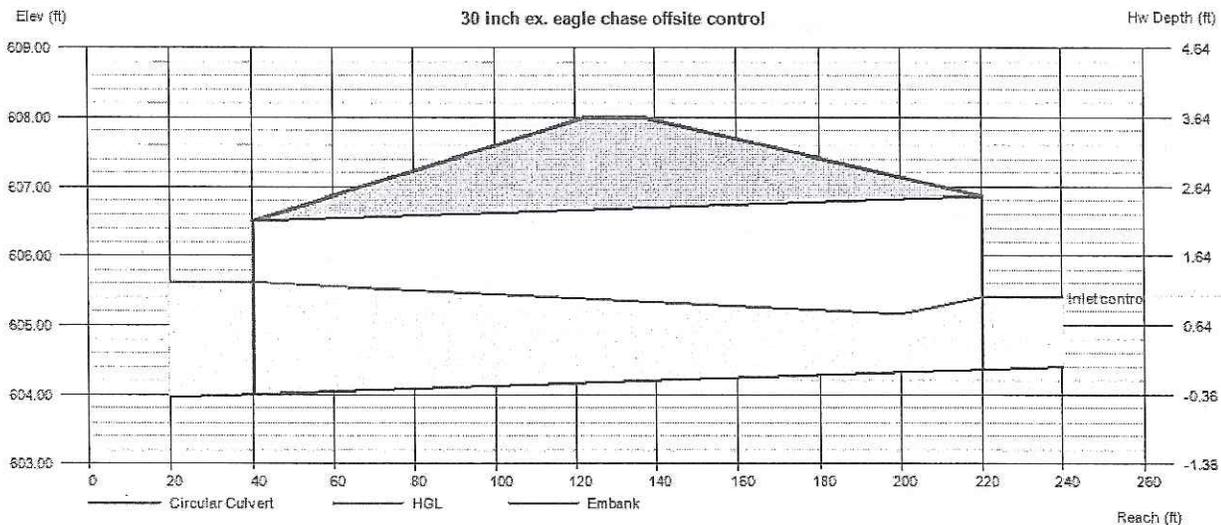
Embankment	
Top Elevation (ft)	= 608.00
Top Width (ft)	= 15.00
Crest Width (ft)	= 30.00

Calculations

Qmin (cfs)	=	5.00
Qmax (cfs)	=	50.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.00
Qpipe (cfs)	=	5.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.49
Veloc Up (ft/s)	=	4.14
HGL Dn (ft)	=	605.62
HGL Up (ft)	=	605.10
Hw Elev (ft)	=	605.41
Hw/D (ft)	=	0.42
Flow Regime	=	Inlet Control



Culvert Report

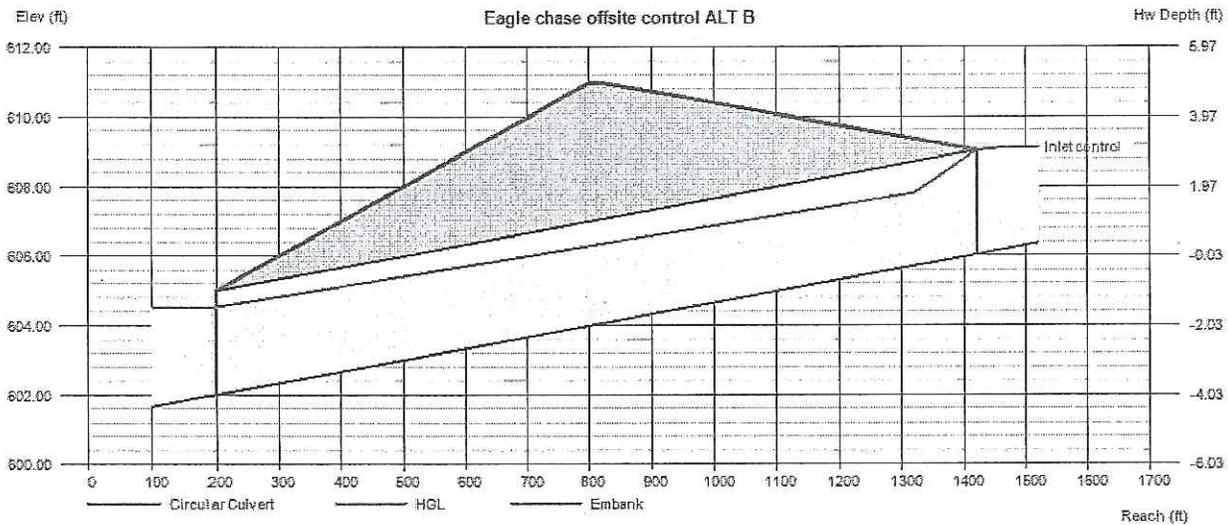
Eagle chase offsite control ALT B

Invert Elev Dn (ft)	=	602.00
Pipe Length (ft)	=	1220.00
Slope (%)	=	0.33
Invert Elev Up (ft)	=	606.03
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.010
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment	
Top Elevation (ft)	= 611.00
Top Width (ft)	= 15.00
Crest Width (ft)	= 30.00

Calculations	
Qmin (cfs)	= 5.00
Qmax (cfs)	= 50.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted	
Qtotal (cfs)	= 40.00
Qpipe (cfs)	= 40.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 6.29
Veloc Up (ft/s)	= 7.74
HGL Dn (ft)	= 604.53
HGL Up (ft)	= 608.09
Hw Elev (ft)	= 609.12
Hw/D (ft)	= 1.03
Flow Regime	= Inlet Control



Culvert Report

Box culvert Lockport Rd

Invert Elev Dn (ft) = 595.39
 Pipe Length (ft) = 40.00
 Slope (%) = 0.10
 Invert Elev Up (ft) = 595.43
 Rise (in) = 42.0
 Shape = Box
 Span (in) = 120.0
 No. Barrels = 1
 n-Value = 0.012
 Culvert Type = Rectangular Concrete
 Culvert Entrance = Tapered inlet throat
 Coeff. K,M,c,Y,k = 0.475, 0.667, 0.0179, 0.97, 0.2

Calculations

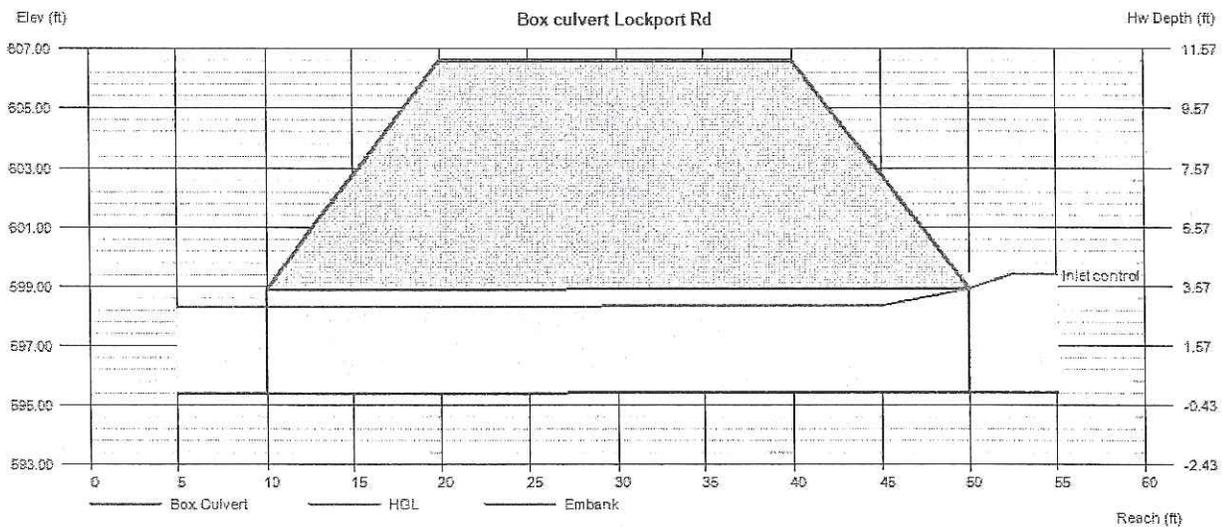
Qmin (cfs) = 50.00
 Qmax (cfs) = 300.00
 Tailwater Elev (ft) = (dc+D)/2

Highlighted

Qtotal (cfs) = 200.00
 Qpipe (cfs) = 200.00
 Qovertop (cfs) = 0.00
 Veloc Dn (ft/s) = 6.88
 Veloc Up (ft/s) = 6.81
 HGL Dn (ft) = 598.30
 HGL Up (ft) = 598.37
 Hw Elev (ft) = 599.41
 Hw/D (ft) = 1.14
 Flow Regime = Inlet Control

Embankment

Top Elevation (ft) = 606.60
 Top Width (ft) = 20.00
 Crest Width (ft) = 30.00



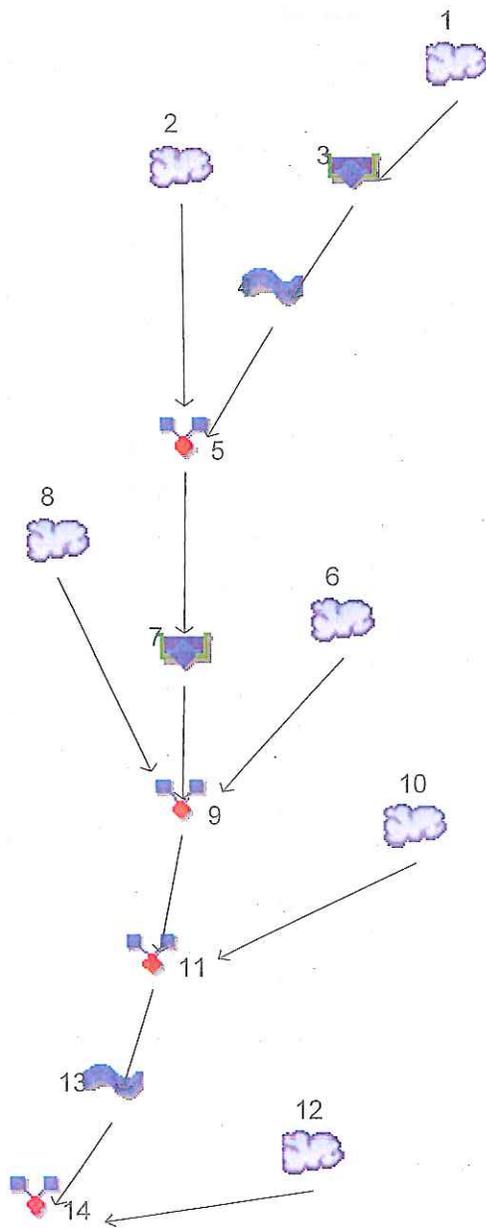
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Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Legend

Hyd. Origin	Description
1	SCS Runoff BE-A1
2	SCS Runoff BE-A2.1
3	Reservoir <no description>
4	Reach BE-A1 reach
5	Combine BE A2.1 A2.2
6	SCS Runoff BE-A2.2
7	Reservoir Routed offsite
8	SCS Runoff BE-A2.3/2.4
9	Combine (BEB (Lockport Rd))
10	SCS Runoff BE-A6
11	Combine <no description>
12	SCS Runoff BE-A7
13	Reach BE-A6 reach
14	Combine BEB (Ward Road)

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

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	----	----	----	----	----	37.64	57.60	----	102.09	BE-A1
2	SCS Runoff	----	----	----	----	----	32.39	48.91	----	85.29	BE-A2.1
3	Reservoir	1	----	----	----	----	19.21	24.54	----	65.67	<no description>
4	Reach	3	----	----	----	----	18.34	24.11	----	60.29	BE-A1 reach
5	Combine	2, 4	----	----	----	----	38.45	58.57	----	107.44	BE A2.1 A2.2
6	SCS Runoff	----	----	----	----	----	16.92	25.89	----	45.70	BE-A2.2
7	Reservoir	5	----	----	----	----	32.05	56.07	----	107.01	Routed offsite
8	SCS Runoff	----	----	----	----	----	38.88	57.78	----	98.74	BE-A2.3/2.4
9	Combine	6, 7, 8	----	----	----	----	62.52	94.80	----	172.22	(BEB (Lockport Rd)
10	SCS Runoff	----	----	----	----	----	52.82	78.72	----	135.16	BE-A6
11	Combine	9, 10	----	----	----	----	107.41	160.79	----	307.28	<no description>
12	SCS Runoff	----	----	----	----	----	94.13	140.18	----	241.07	BE-A7
13	Reach	11	----	----	----	----	93.77	142.84	----	279.99	BE-A6 reach
14	Combine	12, 13	----	----	----	----	187.49	282.91	----	519.93	BEB (Ward Road)

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

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	37.64	2	812	556,209	-----	-----	-----	BE-A1	
2	SCS Runoff	32.39	2	810	466,104	-----	-----	-----	BE-A2.1	
3	Reservoir	19.21	2	930	539,187	1	623.13	210,083	<no description>	
4	Reach	18.34	2	970	539,163	3	-----	-----	BE-A1 reach	
5	Combine	38.45	2	860	1,005,266	2, 4	-----	-----	BE A2.1 A2.2	
6	SCS Runoff	16.92	2	770	162,805	-----	-----	-----	BE-A2.2	
7	Reservoir	32.05	2	934	1,004,814	5	607.81	133,532	Routed offsite	
8	SCS Runoff	38.88	2	764	332,195	-----	-----	-----	BE-A2.3/2.4	
9	Combine	62.52	2	772	1,499,811	6, 7, 8	-----	-----	(BEB (Lockport Rd)	
10	SCS Runoff	52.82	2	812	758,933	-----	-----	-----	BE-A6	
11	Combine	107.41	2	802	2,258,746	9, 10	-----	-----	<no description>	
12	SCS Runoff	94.13	2	828	1,536,989	-----	-----	-----	BE-A7	
13	Reach	93.77	2	840	2,258,712	11	-----	-----	BE-A6 reach	
14	Combine	187.49	2	836	3,795,701	12, 13	-----	-----	BEB (Ward Road)	
Eagle Chase Offsite evaluation.gpw					Return Period: 10 Year			Thursday, 01 / 28 / 2016		

Hydrograph Report

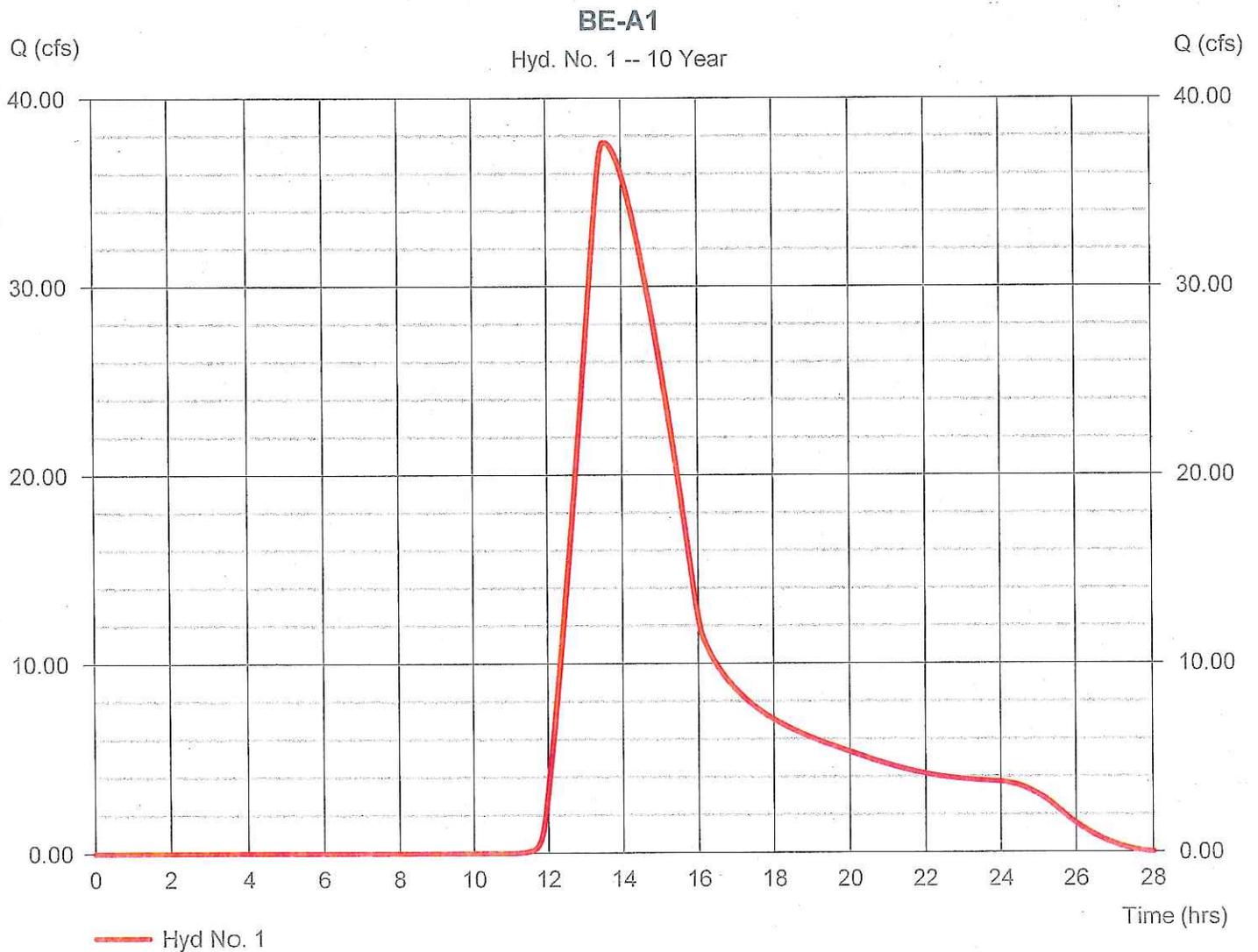
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 1

BE-A1

Hydrograph type	= SCS Runoff	Peak discharge	= 37.64 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.53 hrs
Time interval	= 2 min	Hyd. volume	= 556,209 cuft
Drainage area	= 161.000 ac	Curve number	= 75
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 159.26 min
Total precip.	= 2.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

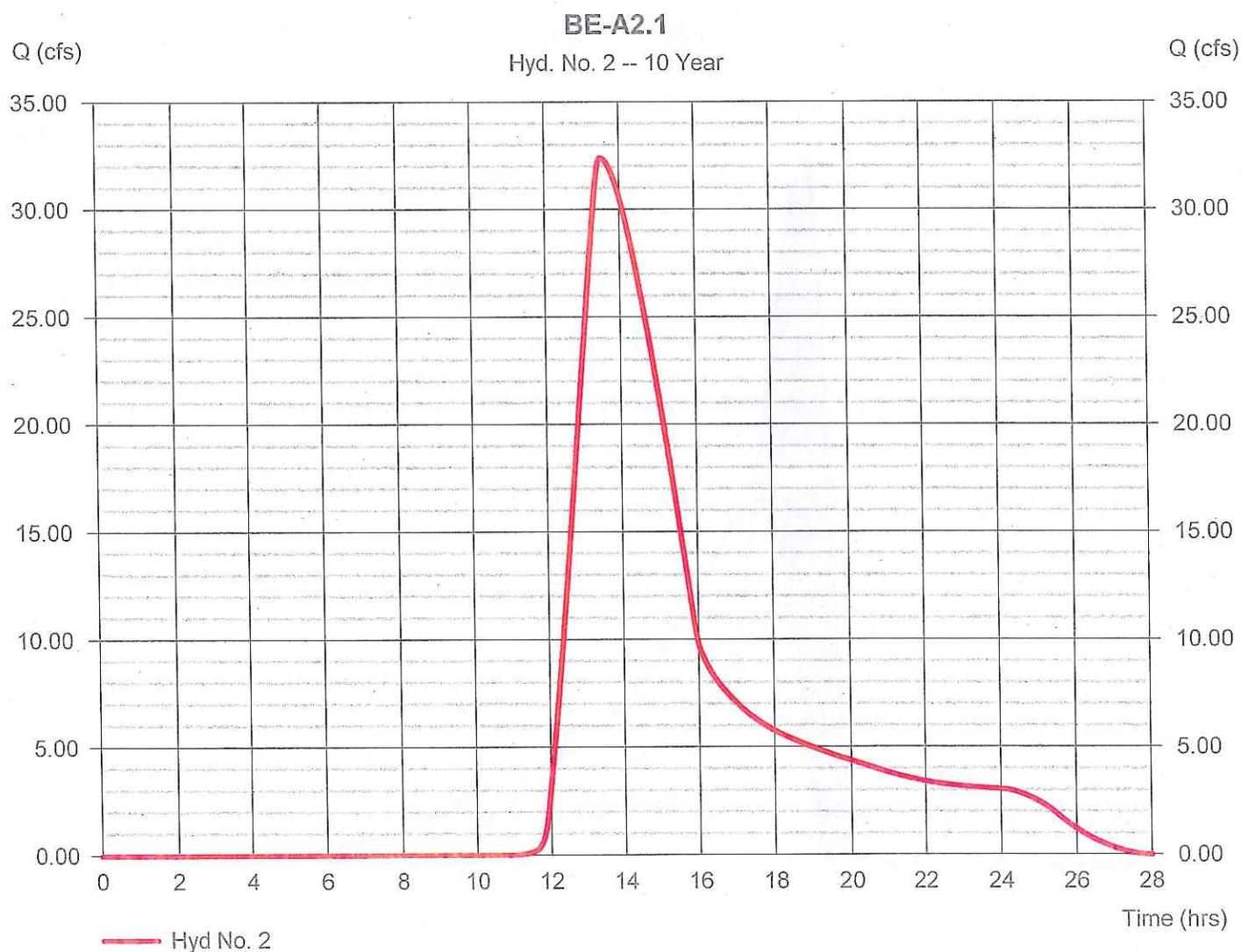
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 2

BE-A2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 32.39 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.50 hrs
Time interval	= 2 min	Hyd. volume	= 466,104 cuft
Drainage area	= 127.000 ac	Curve number	= 76
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 154.72 min
Total precip.	= 2.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

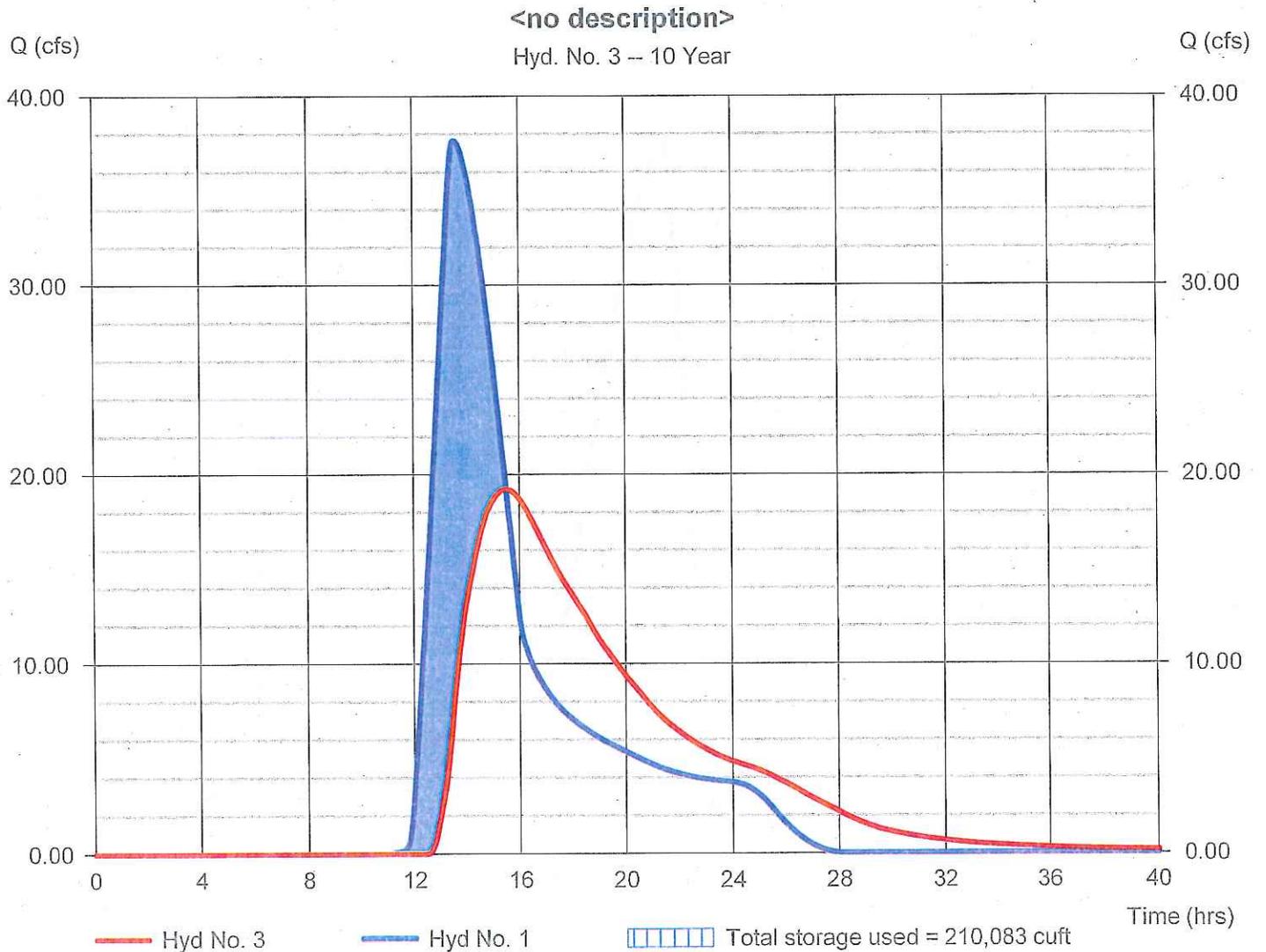
Thursday, 01 / 28 / 2016

Hyd. No. 3

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 19.21 cfs
Storm frequency	= 10 yrs	Time to peak	= 15.50 hrs
Time interval	= 2 min	Hyd. volume	= 539,187 cuft
Inflow hyd. No.	= 1 - BE-A1	Max. Elevation	= 623.13 ft
Reservoir name	= Impoundment at Bear Rd	Max. Storage	= 210,083 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Impoundment at Bear Rd

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beging Elevation = 620.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	620.50	35,000	0	0
1.00	621.50	75,000	53,740	53,740
2.00	622.50	100,000	87,192	140,932
3.00	623.50	120,000	109,837	250,769
4.00	624.50	160,000	139,508	390,276
5.00	625.50	250,000	203,313	593,589

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	24.00	18.00	Inactive
Span (in)	= 36.00	24.00	18.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 620.26	621.50	620.80	0.00
Length (ft)	= 200.00	200.00	40.00	0.00
Slope (%)	= 0.38	0.60	0.10	n/a
N-Value	= .018	.018	.018	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 624.50	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	620.50	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.10	5,374	620.60	0.40 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.20	10,748	620.70	0.40 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.30	16,122	620.80	0.40 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.40	21,496	620.90	0.40 oc	0.00	0.06 ic	---	0.00	---	---	---	---	---	0.058
0.50	26,870	621.00	0.40 oc	0.00	0.22 ic	---	0.00	---	---	---	---	---	0.218
0.60	32,244	621.10	0.49 oc	0.00	0.49 ic	---	0.00	---	---	---	---	---	0.490
0.70	37,618	621.20	0.86 oc	0.00	0.86 ic	---	0.00	---	---	---	---	---	0.842
0.80	42,992	621.30	1.29 oc	0.00	1.27 ic	---	0.00	---	---	---	---	---	1.265
0.90	48,366	621.40	1.84 oc	0.00	1.78 ic	---	0.00	---	---	---	---	---	1.777
1.00	53,740	621.50	2.37 oc	0.00	2.32 ic	---	0.00	---	---	---	---	---	2.316
1.10	62,459	621.60	3.16 oc	0.07 ic	2.96 ic	---	0.00	---	---	---	---	---	3.024
1.20	71,178	621.70	3.88 oc	0.25 ic	3.59 ic	---	0.00	---	---	---	---	---	3.835
1.30	79,897	621.80	4.89 oc	0.56 ic	4.28 ic	---	0.00	---	---	---	---	---	4.842
1.40	88,616	621.90	6.02 oc	1.01 ic	4.96 ic	---	0.00	---	---	---	---	---	5.969
1.50	97,336	622.00	7.26 oc	1.50 ic	5.65 ic	---	0.00	---	---	---	---	---	7.151
1.60	106,055	622.10	8.58 oc	2.10 ic	6.31 ic	---	0.00	---	---	---	---	---	8.409
1.70	114,774	622.20	9.69 oc	2.82 ic	6.67 ic	---	0.00	---	---	---	---	---	9.497
1.80	123,493	622.30	10.83 oc	3.65 ic	6.90 ic	---	0.00	---	---	---	---	---	10.55
1.90	132,213	622.40	11.70 oc	4.47 ic	7.05 ic	---	0.00	---	---	---	---	---	11.52
2.00	140,932	622.50	12.57 oc	5.35 ic	7.20 ic	---	0.00	---	---	---	---	---	12.55
2.10	151,915	622.60	13.74 oc	6.39 ic	7.23 ic	---	0.00	---	---	---	---	---	13.62
2.20	162,899	622.70	14.89 oc	7.36 ic	7.26 ic	---	0.00	---	---	---	---	---	14.62
2.30	173,883	622.80	16.03 oc	8.46 ic	7.30 ic	---	0.00	---	---	---	---	---	15.76
2.40	184,867	622.90	17.13 oc	9.55 ic	7.34 ic	---	0.00	---	---	---	---	---	16.89
2.50	195,850	623.00	18.18 oc	10.60 ic	7.39 ic	---	0.00	---	---	---	---	---	17.99
2.60	206,834	623.10	18.93 oc	11.44 ic	7.50 ic	---	0.00	---	---	---	---	---	18.93
2.70	217,818	623.20	19.89 oc	12.28 ic	7.60 ic	---	0.00	---	---	---	---	---	19.88
2.80	228,801	623.30	20.77 oc	13.01 ic	7.69 ic	---	0.00	---	---	---	---	---	20.70
2.90	239,785	623.40	21.38 oc	13.59 ic	7.78 ic	---	0.00	---	---	---	---	---	21.38
3.00	250,769	623.50	22.12 oc	14.15 ic	7.96 ic	---	0.00	---	---	---	---	---	22.12
3.10	264,720	623.60	22.62 oc	14.47 ic	8.14 ic	---	0.00	---	---	---	---	---	22.62
3.20	278,670	623.70	23.07 oc	14.76 ic	8.30 ic	---	0.00	---	---	---	---	---	23.07
3.30	292,621	623.80	23.59 oc	15.09 ic	8.49 ic	---	0.00	---	---	---	---	---	23.59
3.40	306,572	623.90	24.02 oc	15.35 ic	8.64 ic	---	0.00	---	---	---	---	---	23.99

Continues on next page...

Impoundment at Bear Rd

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.50	320,523	624.00	24.36 oc	15.59 ic	8.77 ic	---	0.00	---	---	---	---	---	24.36
3.60	334,473	624.10	24.67 oc	15.79 ic	8.88 ic	---	0.00	---	---	---	---	---	24.67
3.70	348,424	624.20	24.88 oc	15.92 ic	8.96 ic	---	0.00	---	---	---	---	---	24.88
3.80	362,375	624.30	24.75 oc	15.84 ic	8.91 ic	---	0.00	---	---	---	---	---	24.75
3.90	376,326	624.40	24.70 oc	15.81 ic	8.89 ic	---	0.00	---	---	---	---	---	24.70
4.00	390,276	624.50	25.35 oc	16.22 ic	9.12 ic	---	0.00	---	---	---	---	---	25.34
4.10	410,608	624.60	25.97 oc	16.62 ic	9.35 ic	---	2.47	---	---	---	---	---	28.44
4.20	430,939	624.70	26.58 oc	17.01 ic	9.57 ic	---	6.97	---	---	---	---	---	33.56
4.30	451,270	624.80	27.18 oc	17.39 ic	9.78 ic	---	12.81	---	---	---	---	---	39.99
4.40	471,602	624.90	27.76 oc	17.77 ic	9.99 ic	---	19.73	---	---	---	---	---	47.49
4.50	491,933	625.00	28.34 oc	18.13 ic	10.20 ic	---	27.57	---	---	---	---	---	55.90
4.60	512,264	625.10	28.90 oc	18.49 ic	10.40 ic	---	36.24	---	---	---	---	---	65.13
4.70	532,595	625.20	29.45 oc	18.85 ic	10.60 ic	---	45.66	---	---	---	---	---	75.11
4.80	552,927	625.30	29.99 oc	19.19 ic	10.80 ic	---	55.79	---	---	---	---	---	85.78
4.90	573,258	625.40	30.52 oc	19.53 ic	10.99 ic	---	66.57	---	---	---	---	---	97.09
5.00	593,589	625.50	31.04 oc	19.87 ic	11.17 ic	---	78.00	---	---	---	---	---	109.04

...End

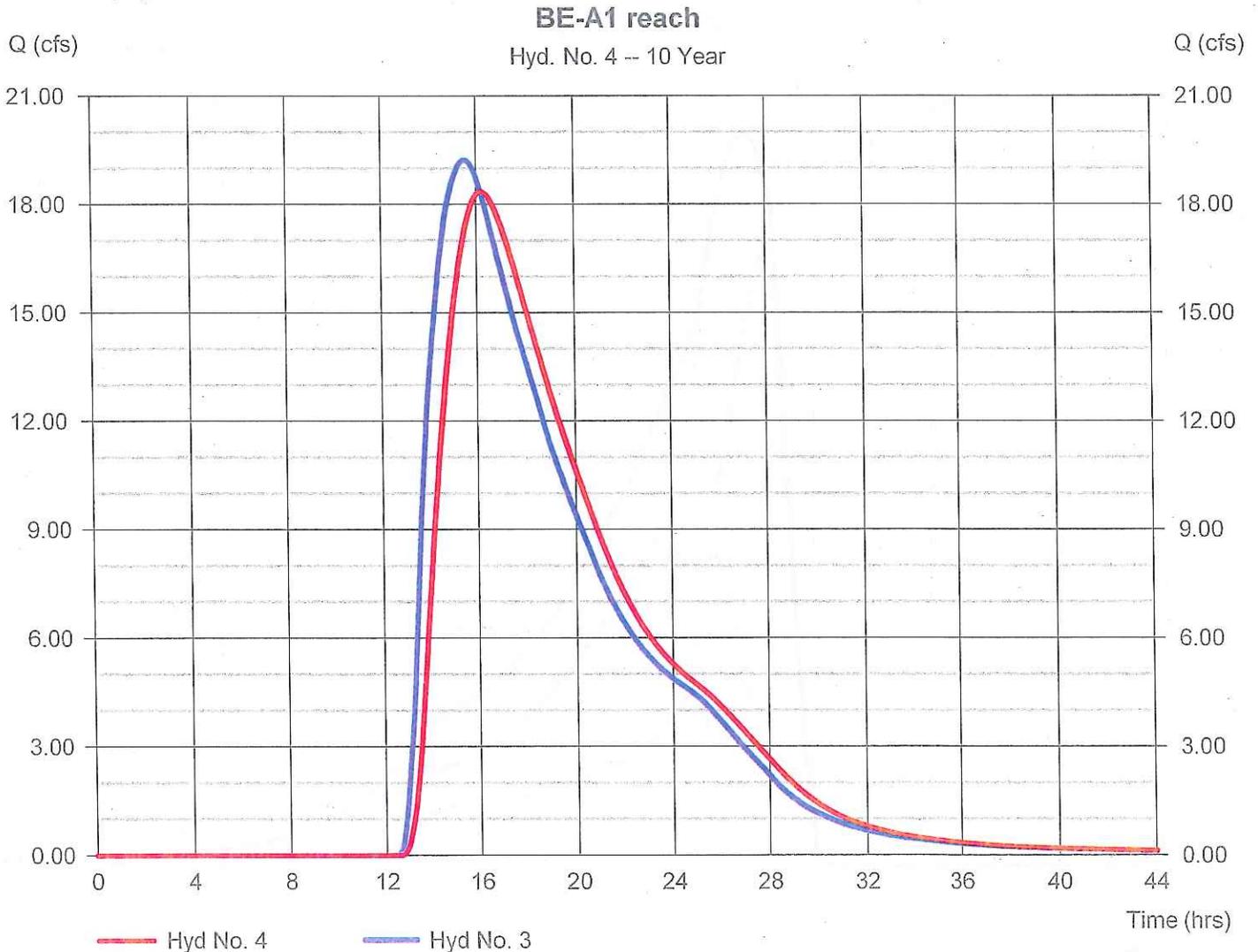
Hydrograph Report

Hyd. No. 4

BE-A1 reach

Hydrograph type	= Reach	Peak discharge	= 18.34 cfs
Storm frequency	= 10 yrs	Time to peak	= 16.17 hrs
Time interval	= 2 min	Hyd. volume	= 539,163 cuft
Inflow hyd. No.	= 3 - <no description>	Section type	= Trapezoidal
Reach length	= 3500.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.040	Bottom width	= 10.0 ft
Side slope	= 5.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.507	Rating curve m	= 1.312
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0527

Modified Att-Kin routing method used.



Hydrograph Report

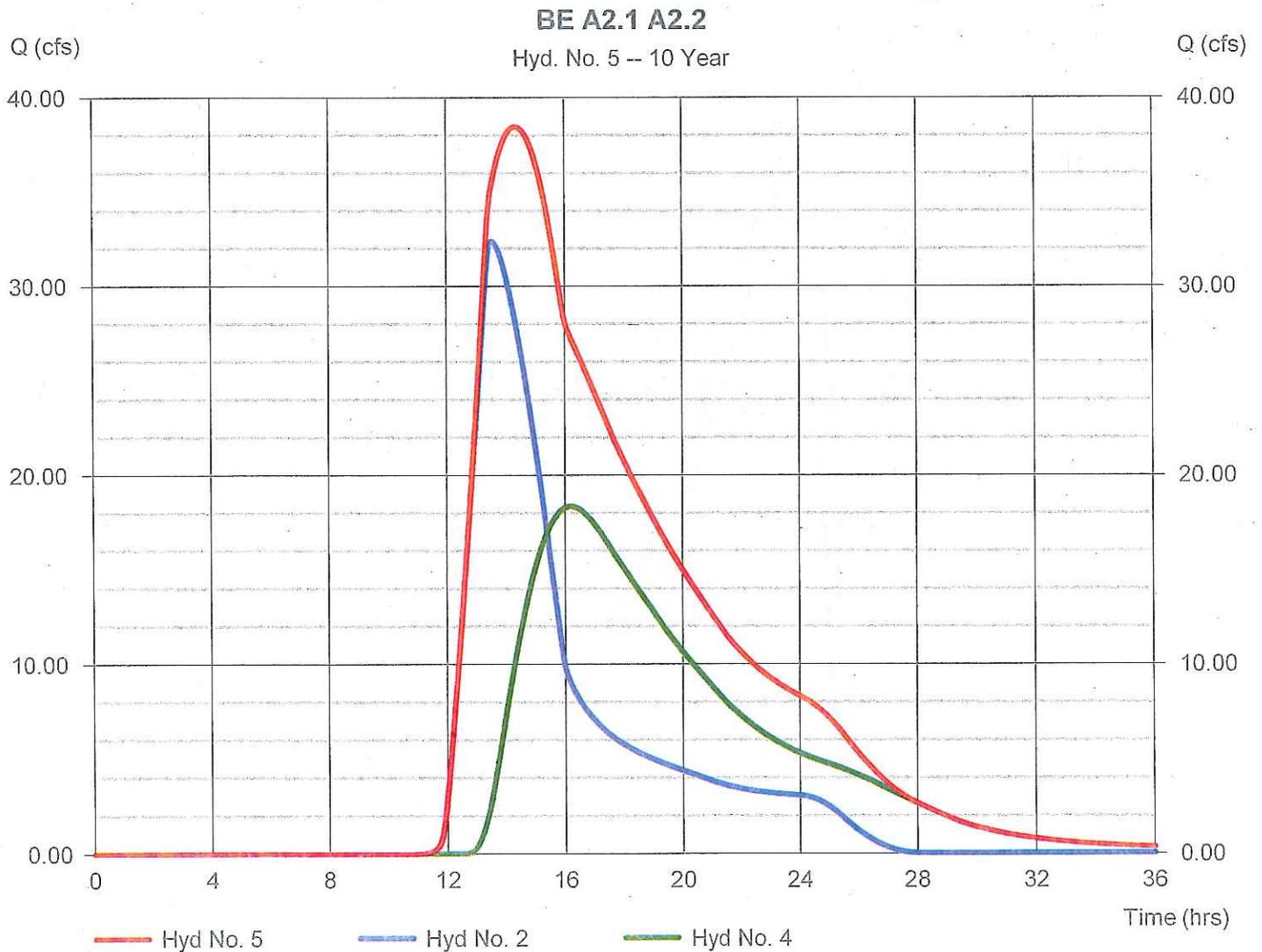
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 5

BE A2.1 A2.2

Hydrograph type	= Combine	Peak discharge	= 38.45 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.33 hrs
Time interval	= 2 min	Hyd. volume	= 1,005,266 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 127.000 ac



Hydrograph Report

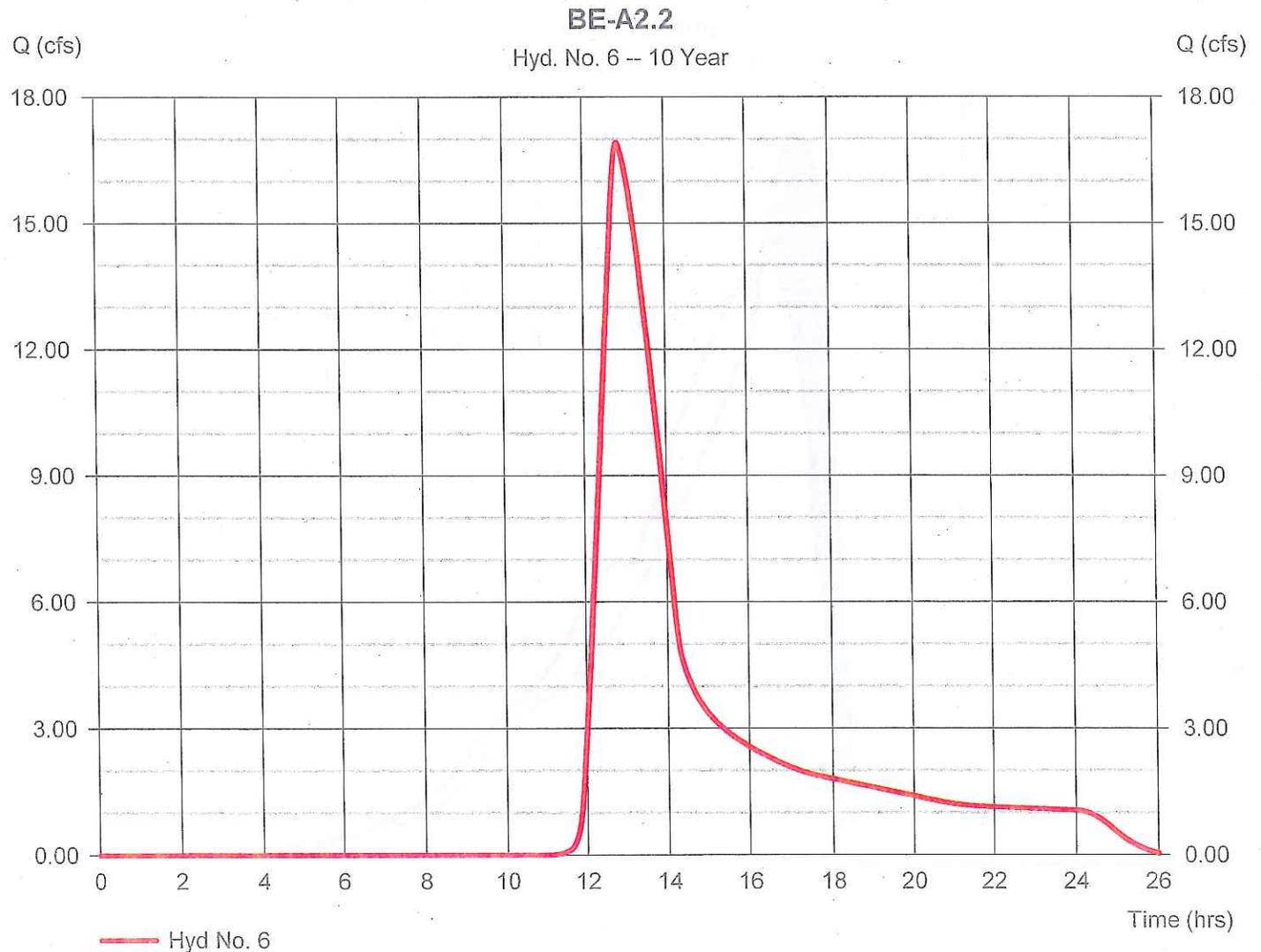
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 6

BE-A2.2

Hydrograph type	= SCS Runoff	Peak discharge	= 16.92 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.83 hrs
Time interval	= 2 min	Hyd. volume	= 162,805 cuft
Drainage area	= 47.000 ac	Curve number	= 75
Basin Slope	= 0.6 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 89.29 min
Total precip.	= 2.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

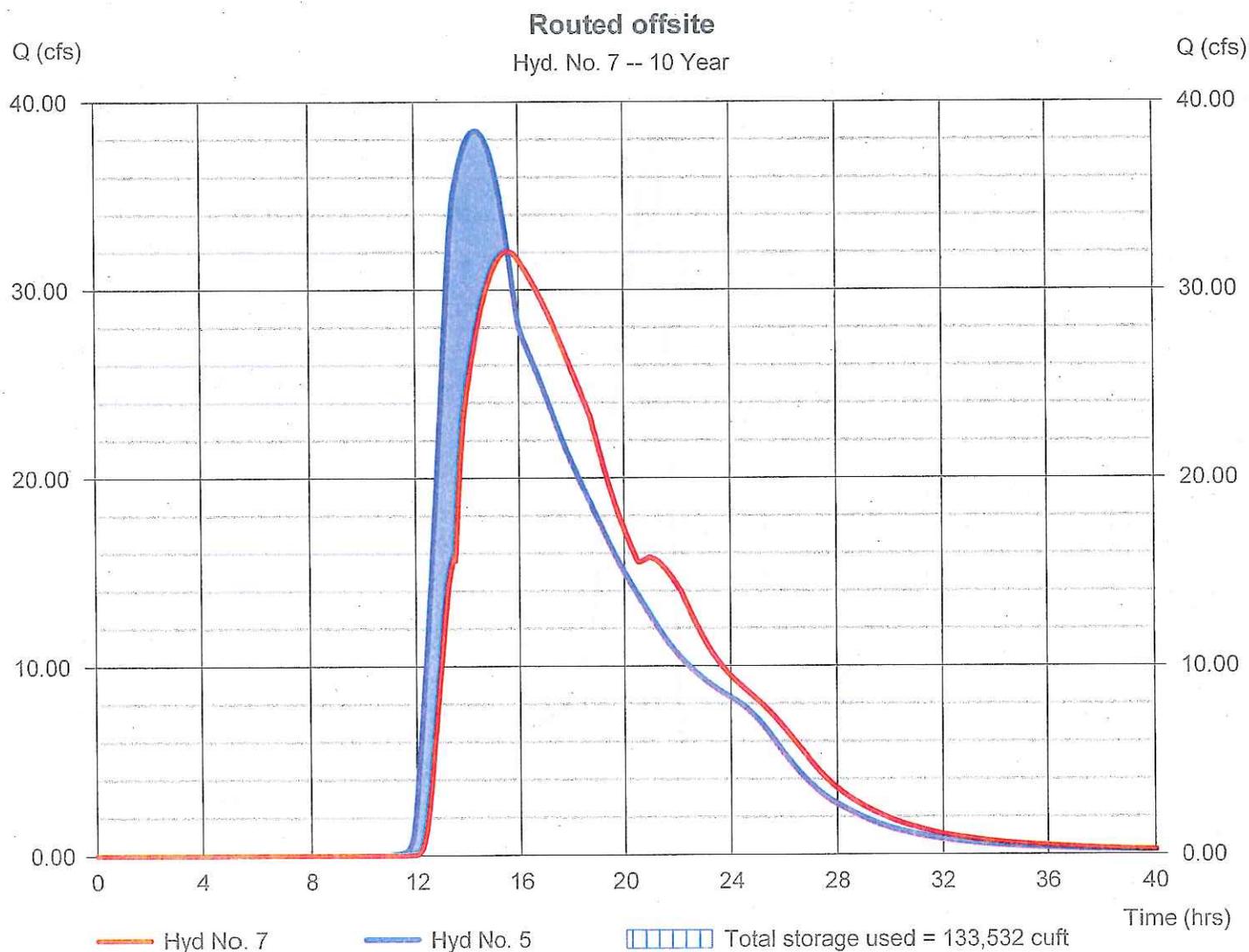
Thursday, 01 / 28 / 2016

Hyd. No. 7

Routed offsite

Hydrograph type	= Reservoir	Peak discharge	= 32.05 cfs
Storm frequency	= 10 yrs	Time to peak	= 15.57 hrs
Time interval	= 2 min	Hyd. volume	= 1,004,814 cuft
Inflow hyd. No.	= 5 - BE A2.1 A2.2	Max. Elevation	= 607.81 ft
Reservoir name	= Offsite area impoundment	Max. Storage	= 133,532 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Offsite area impoundment

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginging Elevation = 604.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	604.00	19,000	0	0
1.00	605.00	24,000	21,449	21,449
2.00	606.00	28,000	25,972	47,421
3.00	607.00	50,000	38,468	85,889
4.00	608.00	68,000	58,764	144,653
5.00	609.00	100,000	83,479	228,132

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 604.00	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	= .010	.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)	= 40.00	0.00	0.00	0.00
Crest El. (ft)	= 608.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciphti	---	---	---
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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	604.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.10	2,145	604.10	0.07 oc	---	---	---	0.00	---	---	---	---	---	0.070
0.20	4,290	604.20	0.28 ic	---	---	---	0.00	---	---	---	---	---	0.282
0.30	6,435	604.30	0.62 ic	---	---	---	0.00	---	---	---	---	---	0.624
0.40	8,580	604.40	1.09 ic	---	---	---	0.00	---	---	---	---	---	1.092
0.50	10,725	604.50	1.69 ic	---	---	---	0.00	---	---	---	---	---	1.687
0.60	12,870	604.60	2.36 oc	---	---	---	0.00	---	---	---	---	---	2.357
0.70	15,014	604.70	3.08 oc	---	---	---	0.00	---	---	---	---	---	3.080
0.80	17,159	604.80	3.86 oc	---	---	---	0.00	---	---	---	---	---	3.864
0.90	19,304	604.90	4.69 oc	---	---	---	0.00	---	---	---	---	---	4.688
1.00	21,449	605.00	5.53 oc	---	---	---	0.00	---	---	---	---	---	5.534
1.10	24,046	605.10	6.42 oc	---	---	---	0.00	---	---	---	---	---	6.419
1.20	26,644	605.20	7.31 oc	---	---	---	0.00	---	---	---	---	---	7.309
1.30	29,241	605.30	8.21 oc	---	---	---	0.00	---	---	---	---	---	8.209
1.40	31,838	605.40	9.11 oc	---	---	---	0.00	---	---	---	---	---	9.105
1.50	34,435	605.50	10.00 oc	---	---	---	0.00	---	---	---	---	---	10.000
1.60	37,032	605.60	10.86 oc	---	---	---	0.00	---	---	---	---	---	10.86
1.70	39,629	605.70	11.71 oc	---	---	---	0.00	---	---	---	---	---	11.71
1.80	42,227	605.80	12.51 oc	---	---	---	0.00	---	---	---	---	---	12.51
1.90	44,824	605.90	13.29 oc	---	---	---	0.00	---	---	---	---	---	13.29
2.00	47,421	606.00	13.99 oc	---	---	---	0.00	---	---	---	---	---	13.99
2.10	51,268	606.10	14.62 oc	---	---	---	0.00	---	---	---	---	---	14.62
2.20	55,115	606.20	15.16 oc	---	---	---	0.00	---	---	---	---	---	15.16
2.30	58,961	606.30	15.57 oc	---	---	---	0.00	---	---	---	---	---	15.57
2.40	62,808	606.40	15.80 oc	---	---	---	0.00	---	---	---	---	---	15.80
2.50	66,655	606.50	15.52 oc	---	---	---	0.00	---	---	---	---	---	15.52
2.60	70,502	606.60	17.32 oc	---	---	---	0.00	---	---	---	---	---	17.32
2.70	74,349	606.70	18.98 oc	---	---	---	0.00	---	---	---	---	---	18.98
2.80	78,196	606.80	20.50 oc	---	---	---	0.00	---	---	---	---	---	20.50
2.90	82,042	606.90	21.91 oc	---	---	---	0.00	---	---	---	---	---	21.91
3.00	85,889	607.00	23.25 oc	---	---	---	0.00	---	---	---	---	---	23.25
3.10	91,766	607.10	24.50 oc	---	---	---	0.00	---	---	---	---	---	24.50
3.20	97,642	607.20	25.70 oc	---	---	---	0.00	---	---	---	---	---	25.70
3.30	103,519	607.30	26.84 oc	---	---	---	0.00	---	---	---	---	---	26.84
3.40	109,395	607.40	27.94 oc	---	---	---	0.00	---	---	---	---	---	27.94

Continues on next page...

Offsite area impoundment

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.50	115,271	607.50	28.99 oc	---	---	---	0.00	---	---	---	---	---	28.99
3.60	121,148	607.60	30.01 oc	---	---	---	0.00	---	---	---	---	---	30.01
3.70	127,024	607.70	30.99 oc	---	---	---	0.00	---	---	---	---	---	30.99
3.80	132,901	607.80	31.95 oc	---	---	---	0.00	---	---	---	---	---	31.95
3.90	138,777	607.90	32.87 oc	---	---	---	0.00	---	---	---	---	---	32.87
4.00	144,653	608.00	33.78 oc	---	---	---	0.00	---	---	---	---	---	33.78
4.10	153,001	608.10	34.65 oc	---	---	---	4.21	---	---	---	---	---	38.86
4.20	161,349	608.20	35.51 oc	---	---	---	11.91	---	---	---	---	---	47.42
4.30	169,697	608.30	36.34 oc	---	---	---	21.88	---	---	---	---	---	58.22
4.40	178,045	608.40	37.16 oc	---	---	---	33.68	---	---	---	---	---	70.85
4.50	186,393	608.50	37.96 oc	---	---	---	47.08	---	---	---	---	---	85.04
4.60	194,741	608.60	38.74 oc	---	---	---	61.88	---	---	---	---	---	100.63
4.70	203,089	608.70	39.51 oc	---	---	---	77.98	---	---	---	---	---	117.49
4.80	211,437	608.80	40.26 oc	---	---	---	95.28	---	---	---	---	---	135.54
4.90	219,784	608.90	41.00 oc	---	---	---	113.69	---	---	---	---	---	154.69
5.00	228,132	609.00	41.73 oc	---	---	---	133.20	---	---	---	---	---	174.93

...End

Hydrograph Report

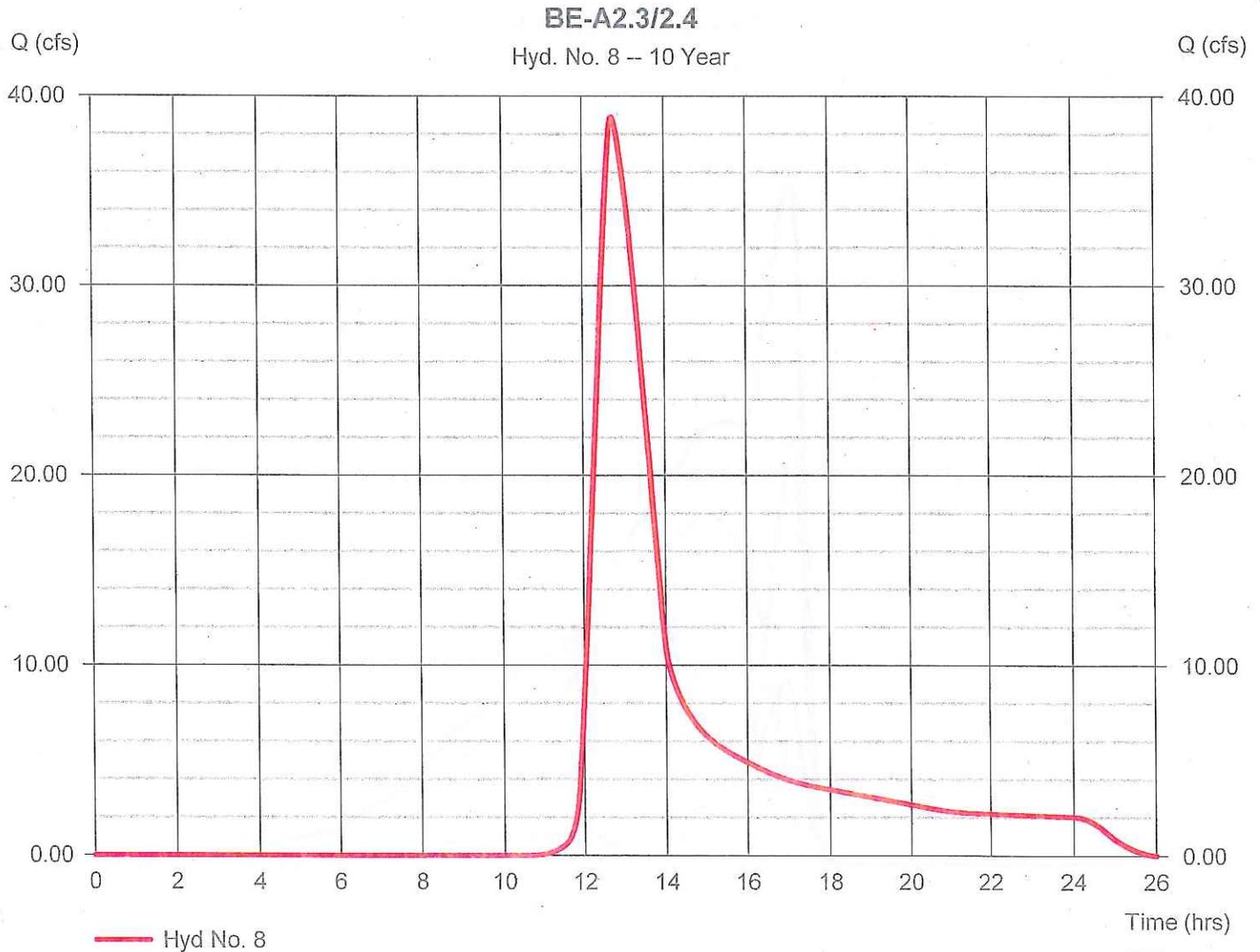
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 8

BE-A2.3/2.4

Hydrograph type	= SCS Runoff	Peak discharge	= 38.88 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 332,195 cuft
Drainage area	= 86.000 ac	Curve number	= 77
Basin Slope	= 0.6 %	Hydraulic length	= 2000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.40 min
Total precip.	= 2.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

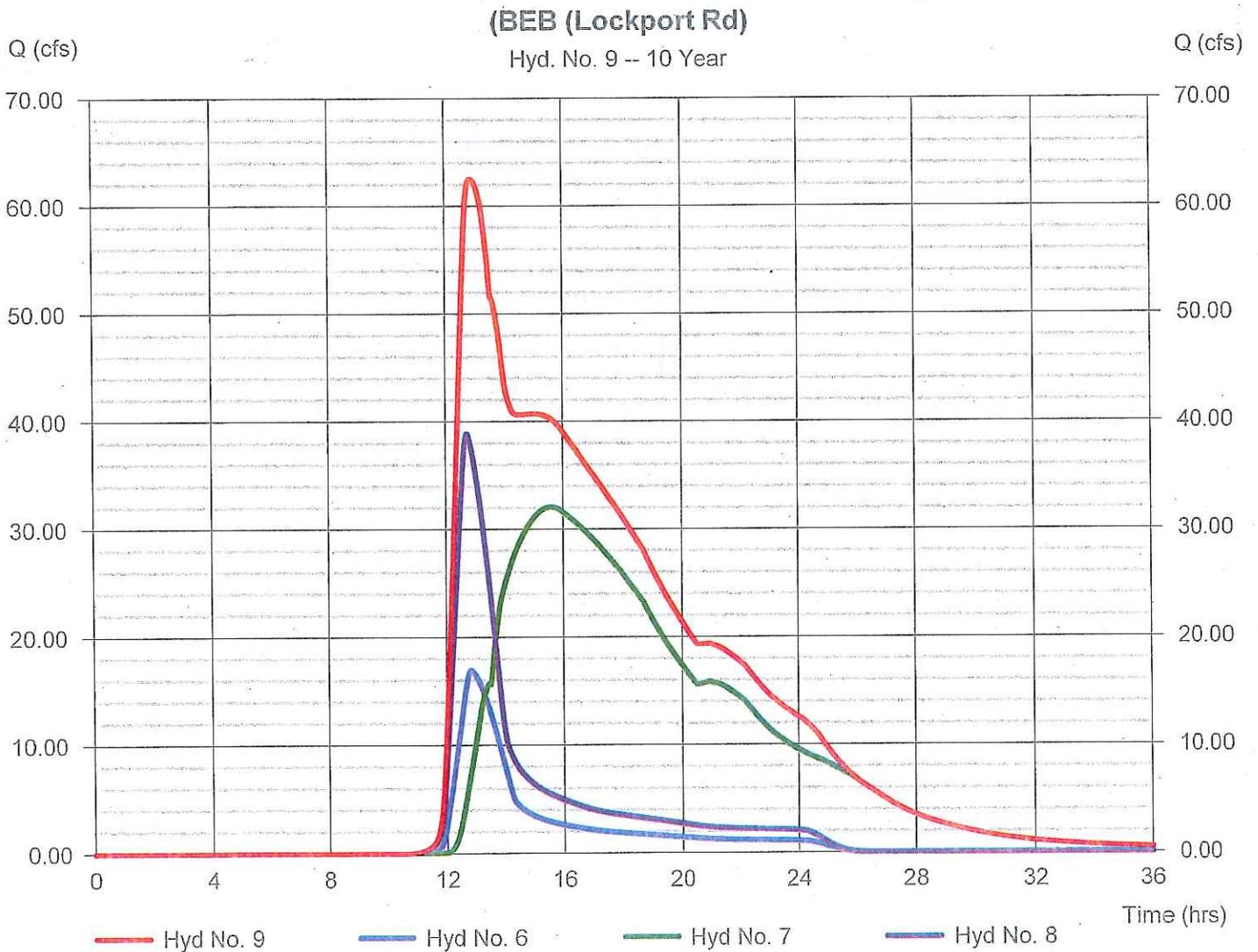
Thursday, 01 / 28 / 2016

Hyd. No. 9

(BEB (Lockport Rd))

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 6, 7, 8

Peak discharge = 62.52 cfs
 Time to peak = 12.87 hrs
 Hyd. volume = 1,499,811 cuft
 Contrib. drain. area = 133.000 ac



Hydrograph Report

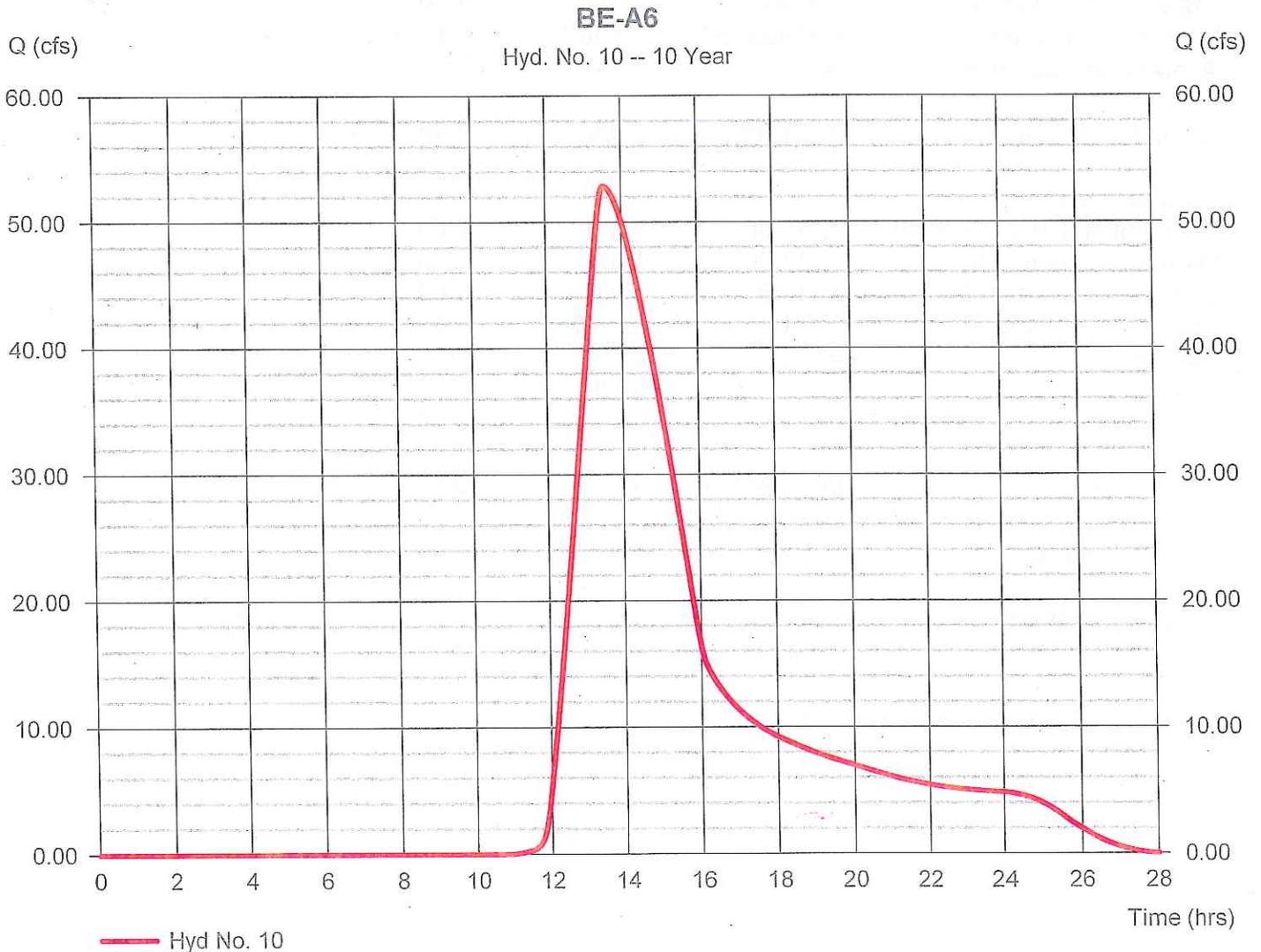
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 10

BE-A6

Hydrograph type	= SCS Runoff	Peak discharge	= 52.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.53 hrs
Time interval	= 2 min	Hyd. volume	= 758,933 cuft
Drainage area	= 197.000 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 158.00 min
Total precip.	= 2.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No. 10

BE-A6

<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)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.12	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 110.62	+ 0.00	+ 0.00	= 110.62
Shallow Concentrated Flow				
Flow length (ft)	= 2200.00	0.00	0.00	
Watercourse slope (%)	= 0.35	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=0.95	0.00	0.00	
Travel Time (min)	= 38.41	+ 0.00	+ 0.00	= 38.41
Channel Flow				
X sectional flow area (sqft)	= 55.00	0.00	0.00	
Wetted perimeter (ft)	= 22.00	0.00	0.00	
Channel slope (%)	= 0.45	0.00	0.00	
Manning's n-value	= 0.045	0.015	0.015	
Velocity (ft/s)	=4.10	0.00	0.00	
Flow length (ft)	2200.0	0.0	0.0	
Travel Time (min)	= 8.93	+ 0.00	+ 0.00	= 8.93
Total Travel Time, Tc				158.00 min

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

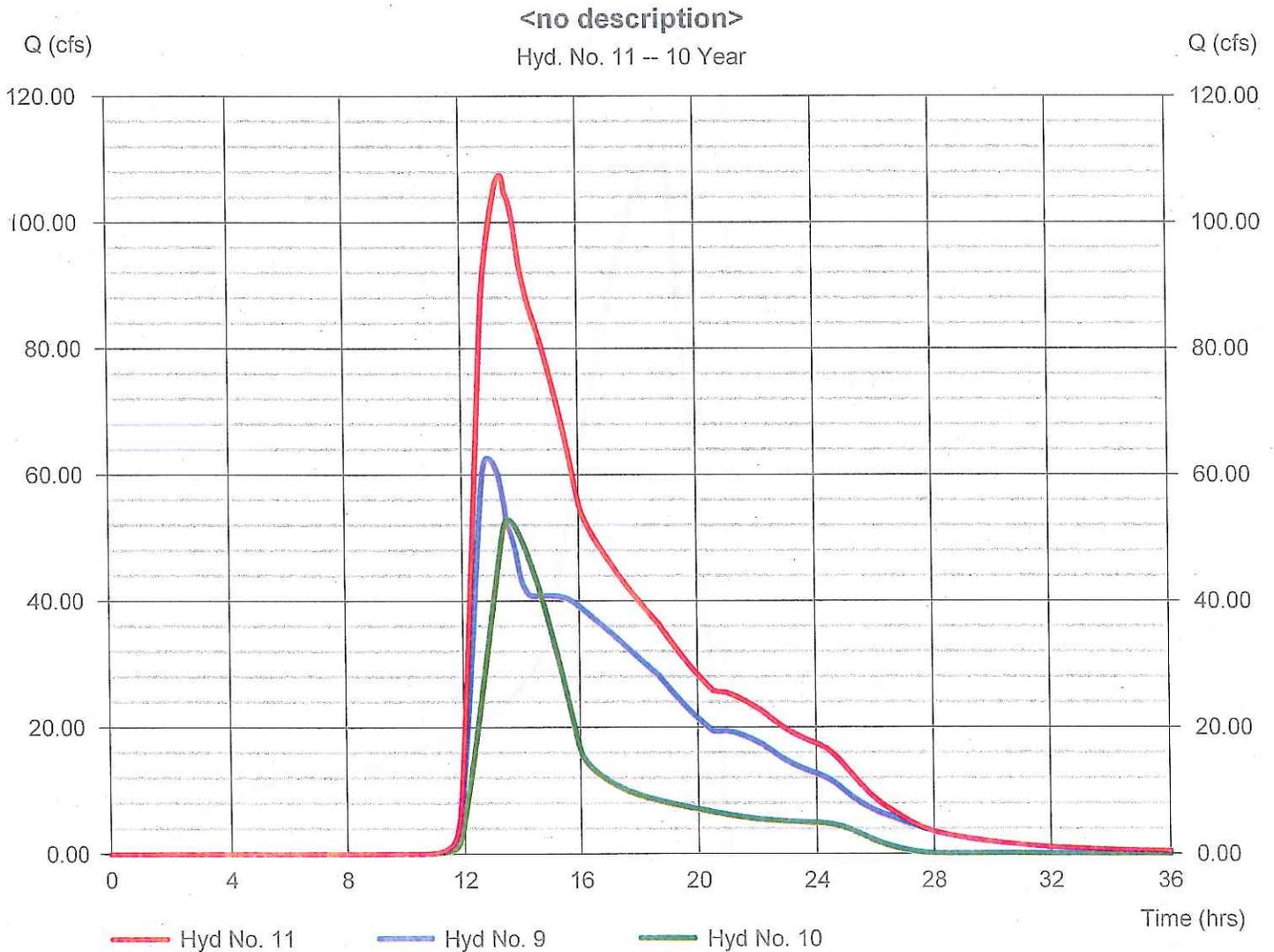
Thursday, 01 / 28 / 2016

Hyd. No. 11

<no description>

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 9, 10

Peak discharge = 107.41 cfs
 Time to peak = 13.37 hrs
 Hyd. volume = 2,258,746 cuft
 Contrib. drain. area = 197.000 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

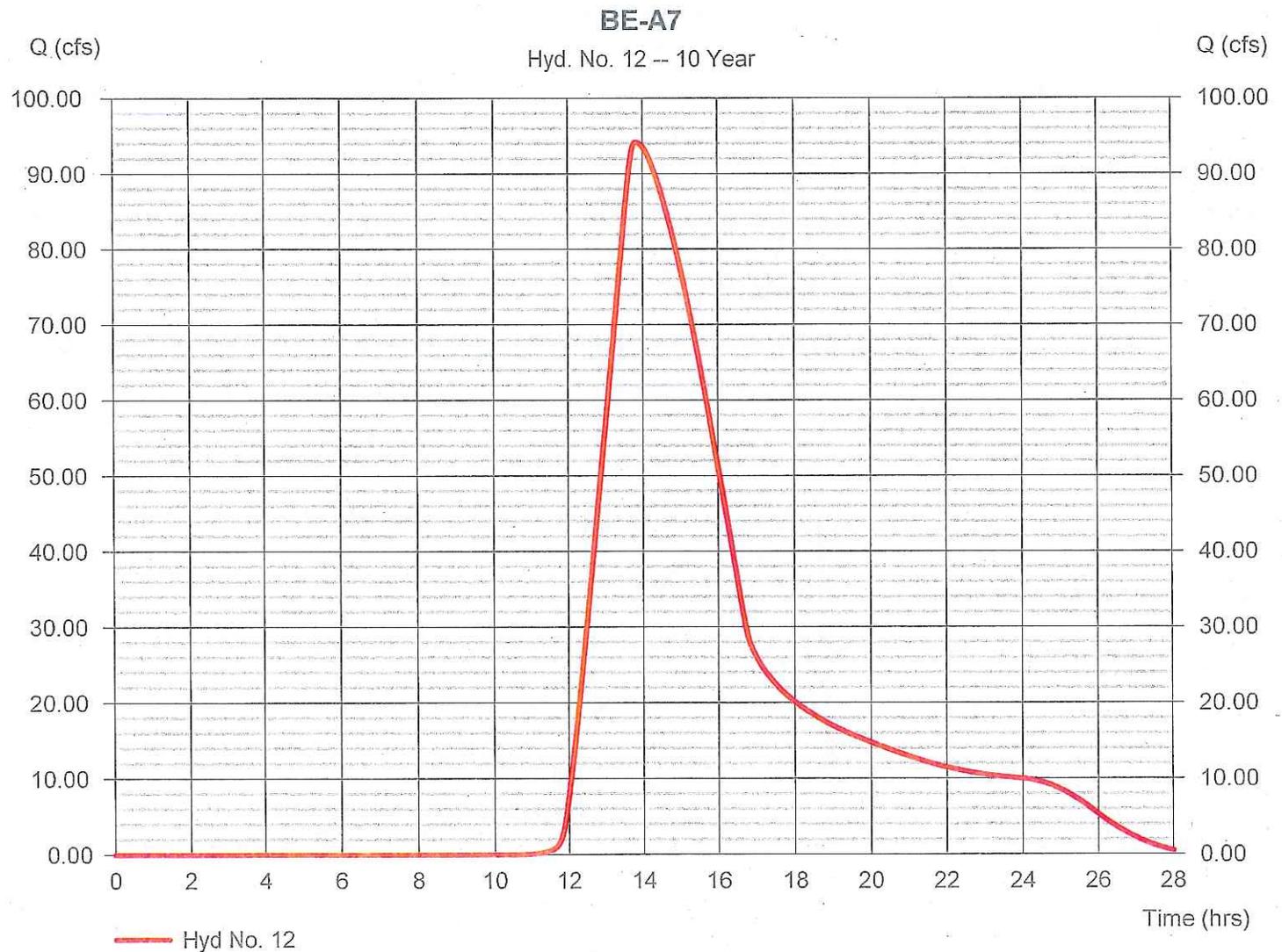
Thursday, 01 / 28 / 2016

Hyd. No. 12

BE-A7

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 397.000 ac
 Basin Slope = 0.4 %
 Tc method = TR55
 Total precip. = 2.99 in
 Storm duration = 24 hrs

Peak discharge = 94.13 cfs
 Time to peak = 13.80 hrs
 Hyd. volume = 1,536,989 cuft
 Curve number = 77
 Hydraulic length = 5500 ft
 Time of conc. (Tc) = 183.60 min
 Distribution = Type II
 Shape factor = 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No. 12

BE-A7

<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)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.12	0.00	0.00	
Land slope (%)	= 0.35	0.00	0.00	
Travel Time (min)	= 127.58	+ 0.00	+ 0.00	= 127.58
Shallow Concentrated Flow				
Flow length (ft)	= 2000.00	0.00	0.00	
Watercourse slope (%)	= 0.40	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.02	0.00	0.00	
Travel Time (min)	= 32.67	+ 0.00	+ 0.00	= 32.67
Channel Flow				
X sectional flow area (sqft)	= 45.00	0.00	0.00	
Wetted perimeter (ft)	= 21.00	0.00	0.00	
Channel slope (%)	= 0.40	0.00	0.00	
Manning's n-value	= 0.040	0.015	0.015	
Velocity (ft/s)	=3.93	0.00	0.00	
Flow length (ft)	5500.0	0.0	0.0	
Travel Time (min)	= 23.35	+ 0.00	+ 0.00	= 23.35
Total Travel Time, Tc				183.60 min

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 13

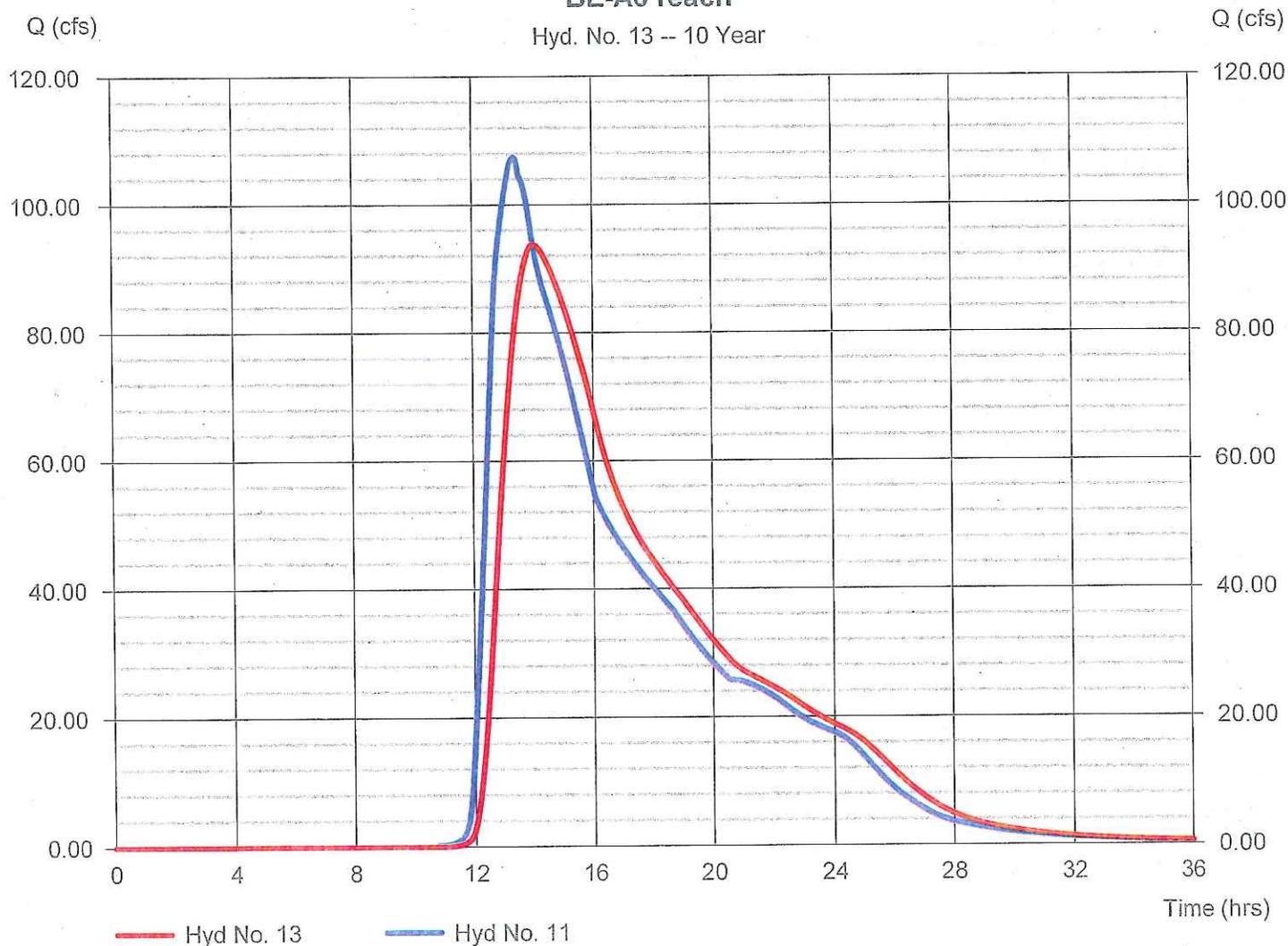
BE-A6 reach

Hydrograph type	= Reach	Peak discharge	= 93.77 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.00 hrs
Time interval	= 2 min	Hyd. volume	= 2,258,712 cuft
Inflow hyd. No.	= 11 - <no description>	Section type	= Trapezoidal
Reach length	= 7500.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.040	Bottom width	= 15.0 ft
Side slope	= 2.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.357	Rating curve m	= 1.483
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0529

Modified Att-Kin routing method used.

BE-A6 reach

Hyd. No. 13 -- 10 Year



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

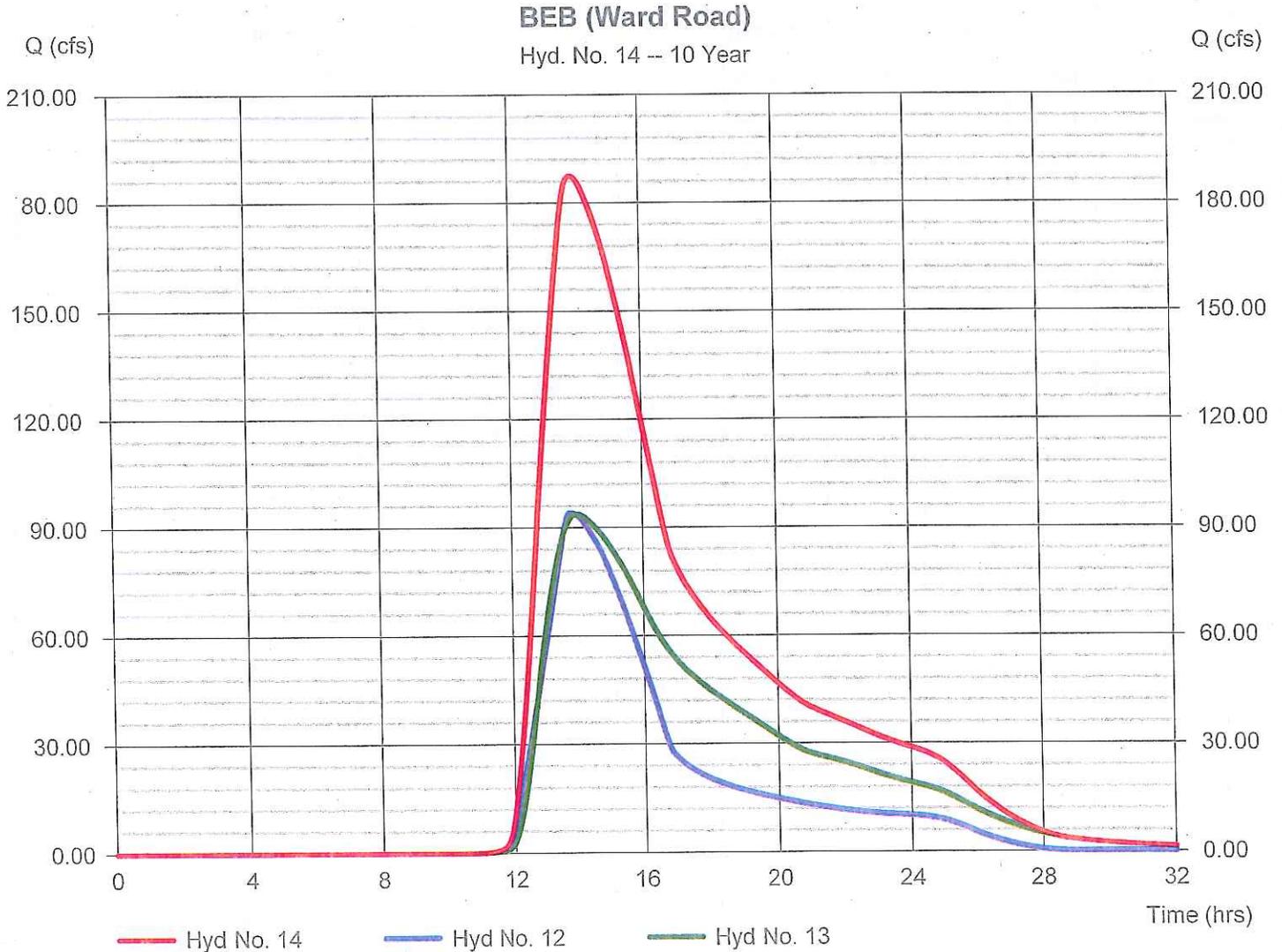
Thursday, 01 / 28 / 2016

Hyd. No. 14

BEB (Ward Road)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 12, 13

Peak discharge = 187.49 cfs
 Time to peak = 13.93 hrs
 Hyd. volume = 3,795,701 cuft
 Contrib. drain. area = 397.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

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	57.60	2	810	812,881	-----	-----	-----	BE-A1	
2	SCS Runoff	48.91	2	808	675,078	-----	-----	-----	BE-A2.1	
3	Reservoir	24.54	2	938	795,830	1	624.06	328,817	<no description>	
4	Reach	24.11	2	984	795,810	3	-----	-----	BE-A1 reach	
5	Combine	58.57	2	846	1,470,887	2, 4	-----	-----	BE A2.1 A2.2	
6	SCS Runoff	25.89	2	770	237,933	-----	-----	-----	BE-A2.2	
7	Reservoir	56.07	2	878	1,470,421	5	608.28	168,034	Routed offsite	
8	SCS Runoff	57.78	2	762	476,943	-----	-----	-----	BE-A2.3/2.4	
9	Combine	94.80	2	770	2,185,290	6, 7, 8	-----	-----	(BEB (Lockport Rd)	
10	SCS Runoff	78.72	2	810	1,089,625	-----	-----	-----	BE-A6	
11	Combine	160.79	2	804	3,274,915	9, 10	-----	-----	<no description>	
12	SCS Runoff	140.18	2	826	2,206,702	-----	-----	-----	BE-A7	
13	Reach	142.84	2	830	3,274,890	11	-----	-----	BE-A6 reach	
14	Combine	282.91	2	828	5,481,584	12, 13	-----	-----	BEB (Ward Road)	
Eagle Chase Offsite evaluation.gpw					Return Period: 25 Year			Thursday, 01 / 28 / 2016		

Hydrograph Report

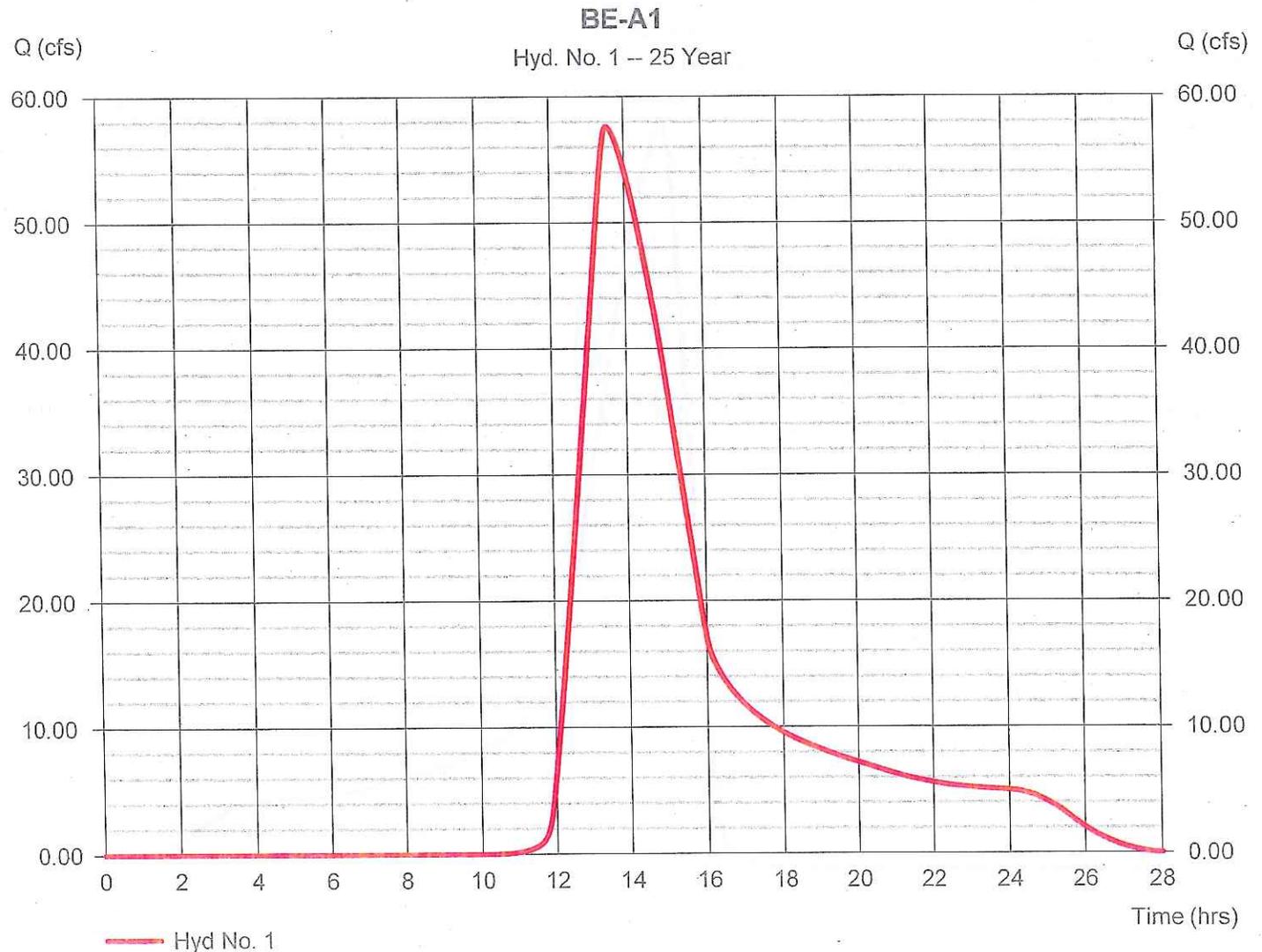
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 1

BE-A1

Hydrograph type	= SCS Runoff	Peak discharge	= 57.60 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.50 hrs
Time interval	= 2 min	Hyd. volume	= 812,881 cuft
Drainage area	= 161.000 ac	Curve number	= 75
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 159.26 min
Total precip.	= 3.63 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

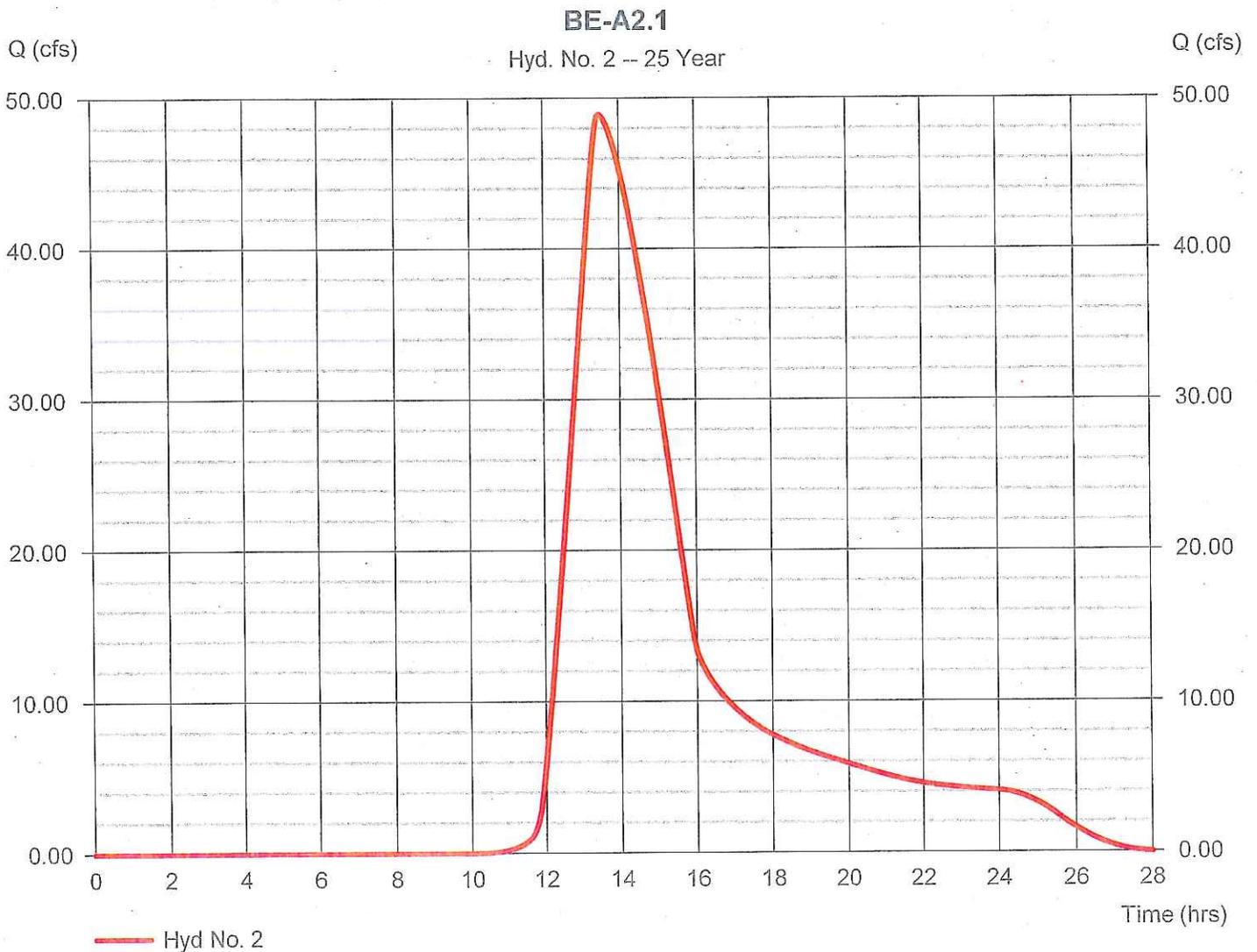
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 2

BE-A2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 48.91 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.47 hrs
Time interval	= 2 min	Hyd. volume	= 675,078 cuft
Drainage area	= 127.000 ac	Curve number	= 76
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 154.72 min
Total precip.	= 3.63 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

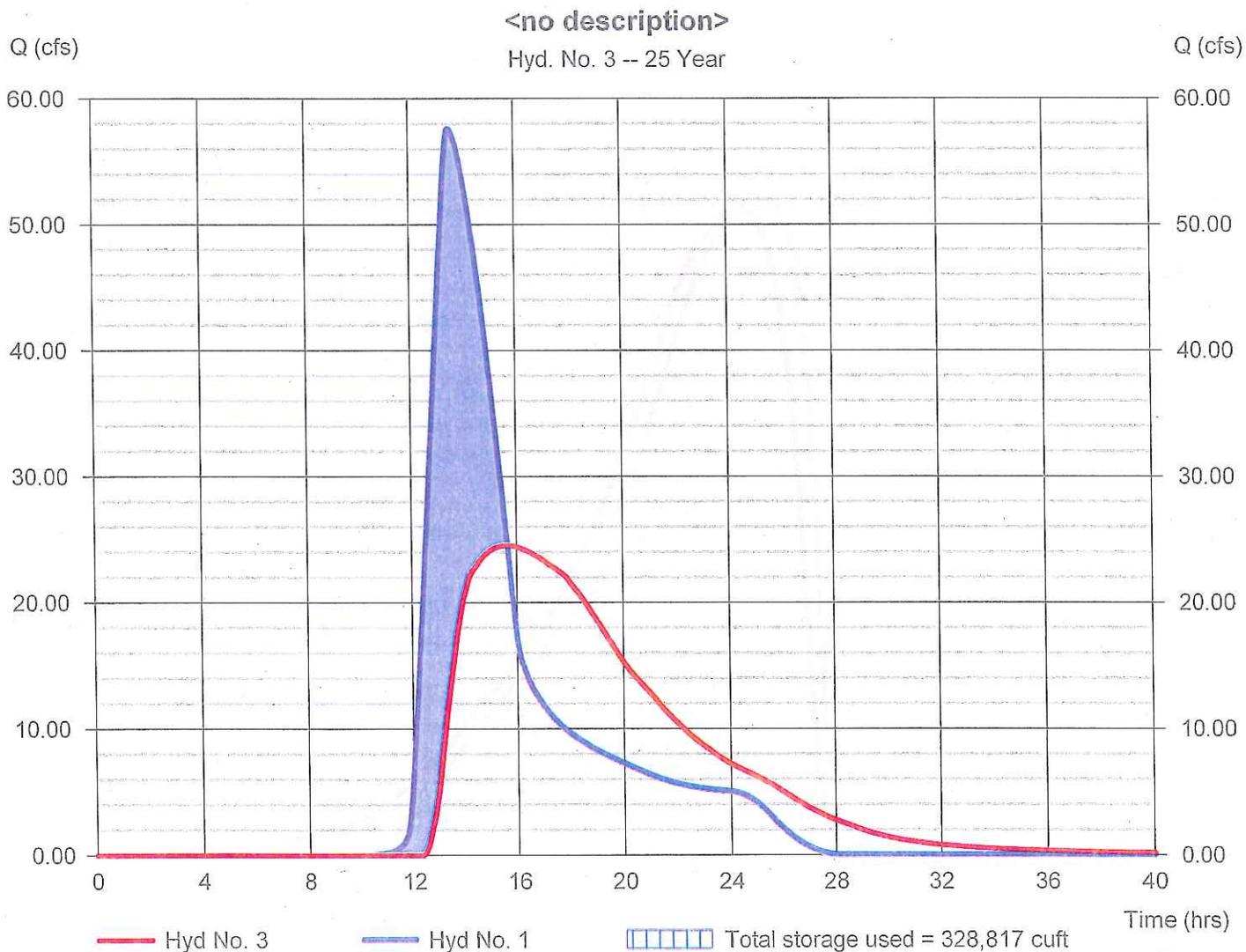
Thursday, 01 / 28 / 2016

Hyd. No. 3

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 24.54 cfs
Storm frequency	= 25 yrs	Time to peak	= 15.63 hrs
Time interval	= 2 min	Hyd. volume	= 795,830 cuft
Inflow hyd. No.	= 1 - BE-A1	Max. Elevation	= 624.06 ft
Reservoir name	= Impoundment at Bear Rd	Max. Storage	= 328,817 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

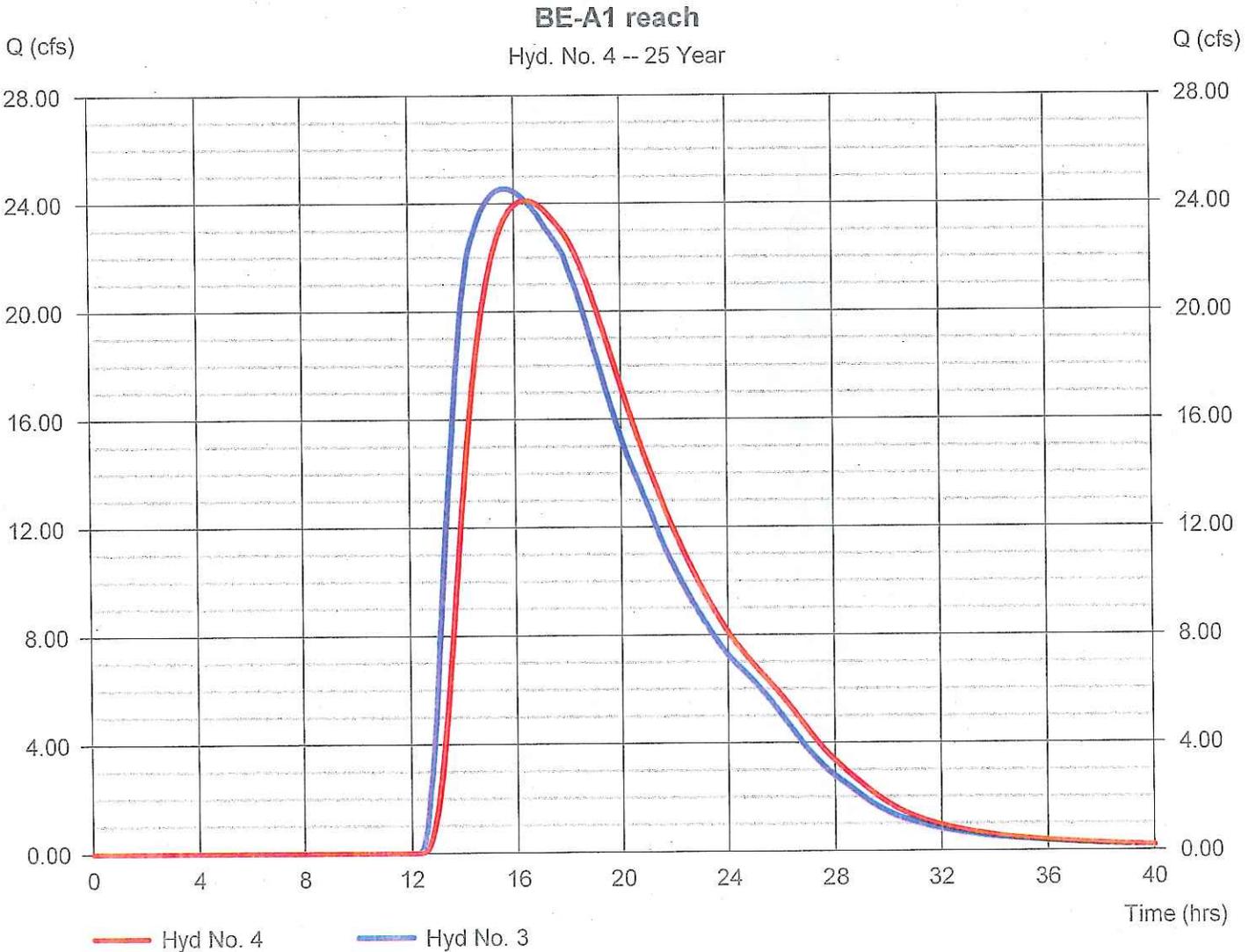
Thursday, 01 / 28 / 2016

Hyd. No. 4

BE-A1 reach

Hydrograph type	= Reach	Peak discharge	= 24.11 cfs
Storm frequency	= 25 yrs	Time to peak	= 16.40 hrs
Time interval	= 2 min	Hyd. volume	= 795,810 cuft
Inflow hyd. No.	= 3 - <no description>	Section type	= Trapezoidal
Reach length	= 3500.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.040	Bottom width	= 10.0 ft
Side slope	= 5.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.507	Rating curve m	= 1.312
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0557

Modified Att-Kin routing method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

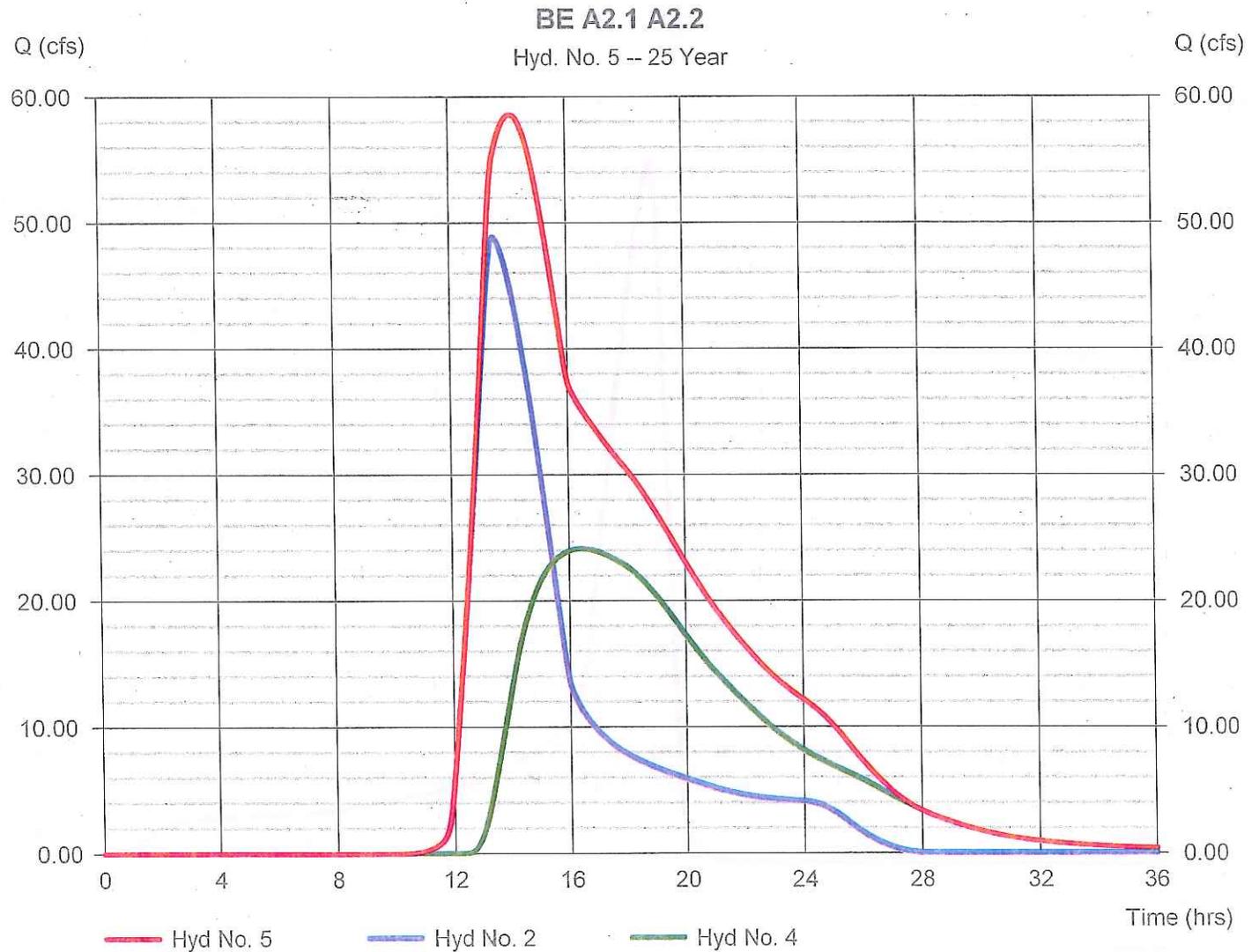
Thursday, 01 / 28 / 2016

Hyd. No. 5

BE A2.1 A2.2

Hydrograph type = Combine
 Storm frequency = 25 yrs
 Time interval = 2 min
 Inflow hyds. = 2, 4

Peak discharge = 58.57 cfs
 Time to peak = 14.10 hrs
 Hyd. volume = 1,470,887 cuft
 Contrib. drain. area = 127.000 ac



Hydrograph Report

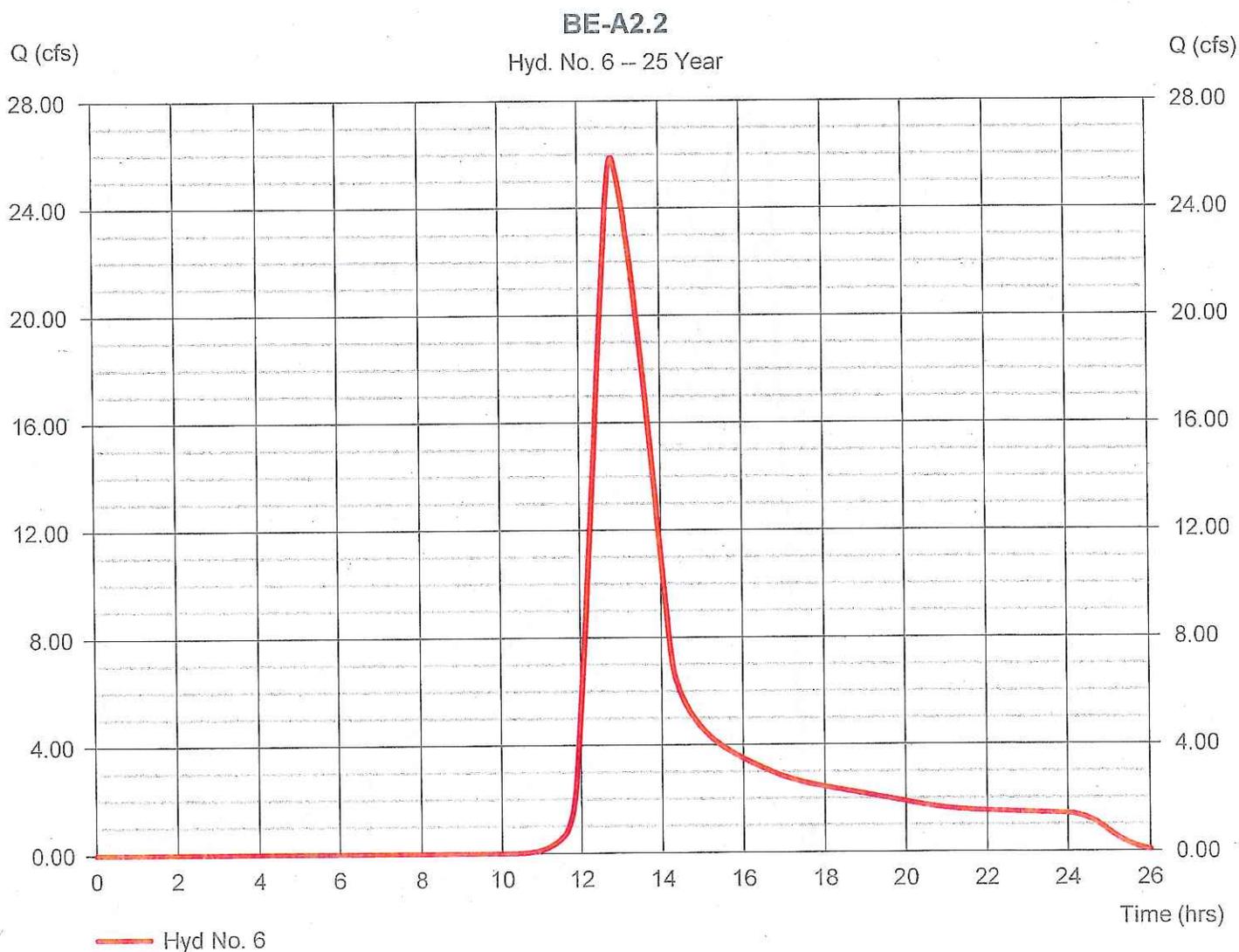
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 6

BE-A2.2

Hydrograph type	= SCS Runoff	Peak discharge	= 25.89 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.83 hrs
Time interval	= 2 min	Hyd. volume	= 237,933 cuft
Drainage area	= 47.000 ac	Curve number	= 75
Basin Slope	= 0.6 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 89.29 min
Total precip.	= 3.63 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



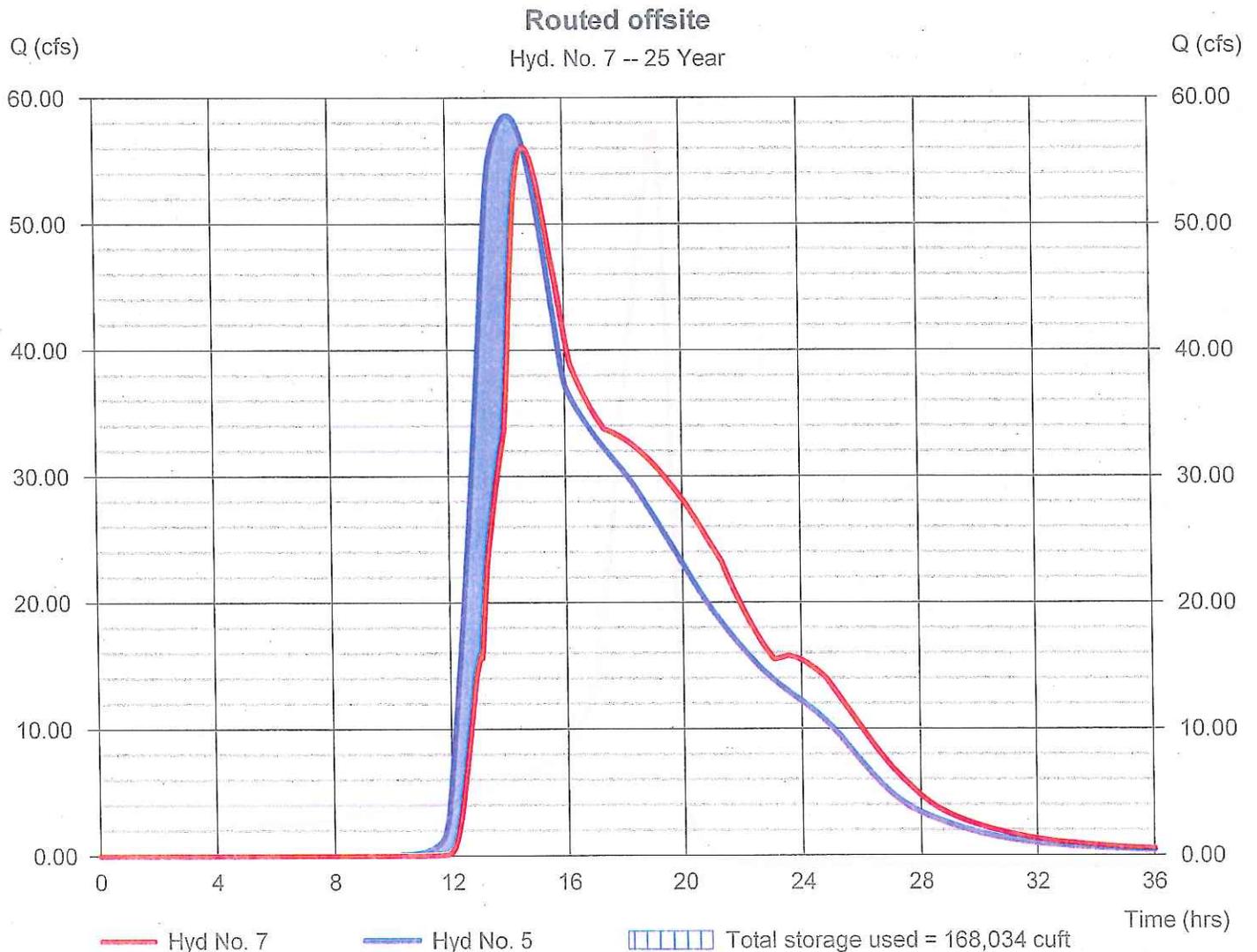
Hydrograph Report

Hyd. No. 7

Routed offsite

Hydrograph type	= Reservoir	Peak discharge	= 56.07 cfs
Storm frequency	= 25 yrs	Time to peak	= 14.63 hrs
Time interval	= 2 min	Hyd. volume	= 1,470,421 cuft
Inflow hyd. No.	= 5 - BE A2.1 A2.2	Max. Elevation	= 608.28 ft
Reservoir name	= Offsite area impoundment	Max. Storage	= 168,034 cuft

Storage Indication method used.



Hydrograph Report

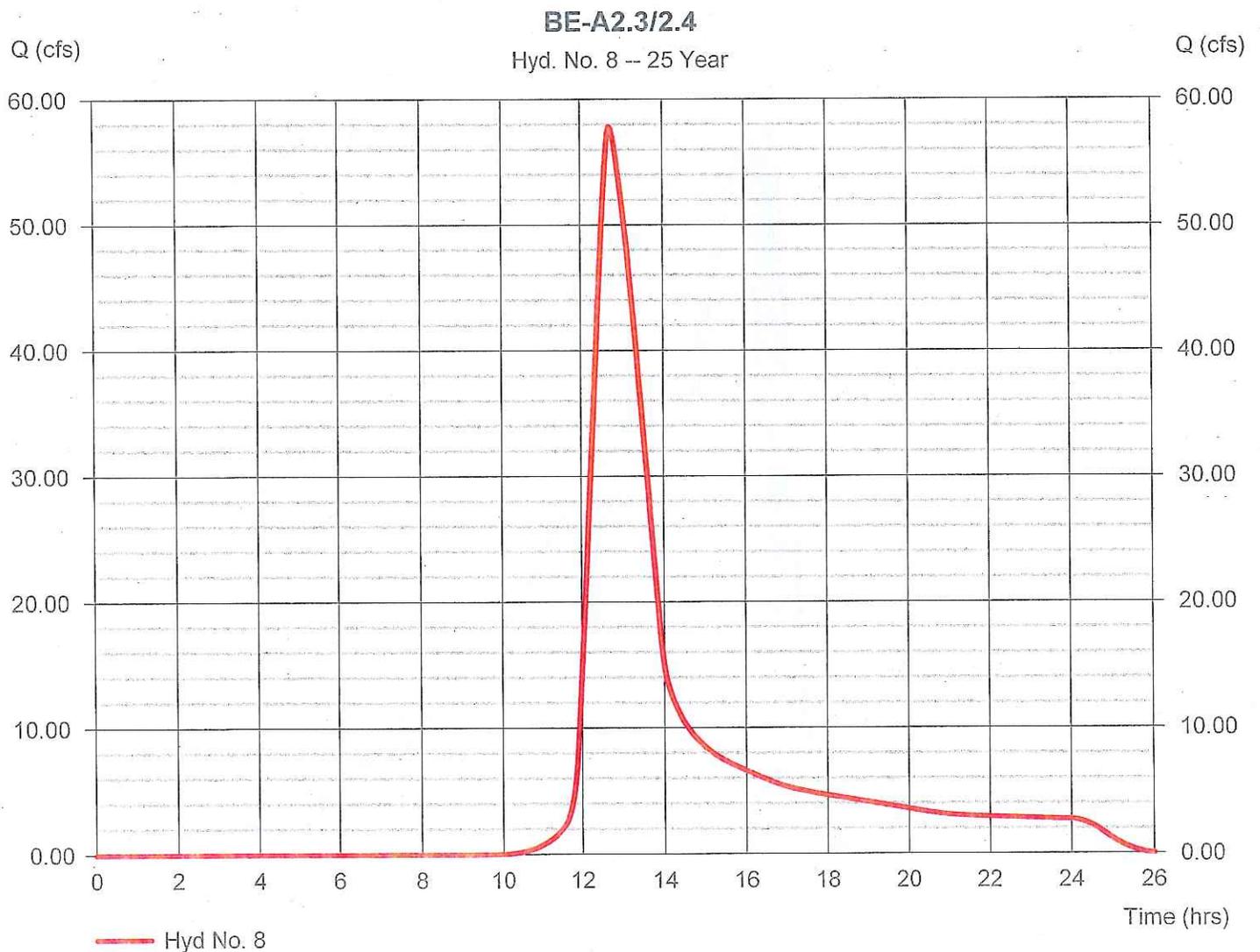
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 8

BE-A2.3/2.4

Hydrograph type	= SCS Runoff	Peak discharge	= 57.78 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 476,943 cuft
Drainage area	= 86.000 ac	Curve number	= 77
Basin Slope	= 0.6 %	Hydraulic length	= 2000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.40 min
Total precip.	= 3.63 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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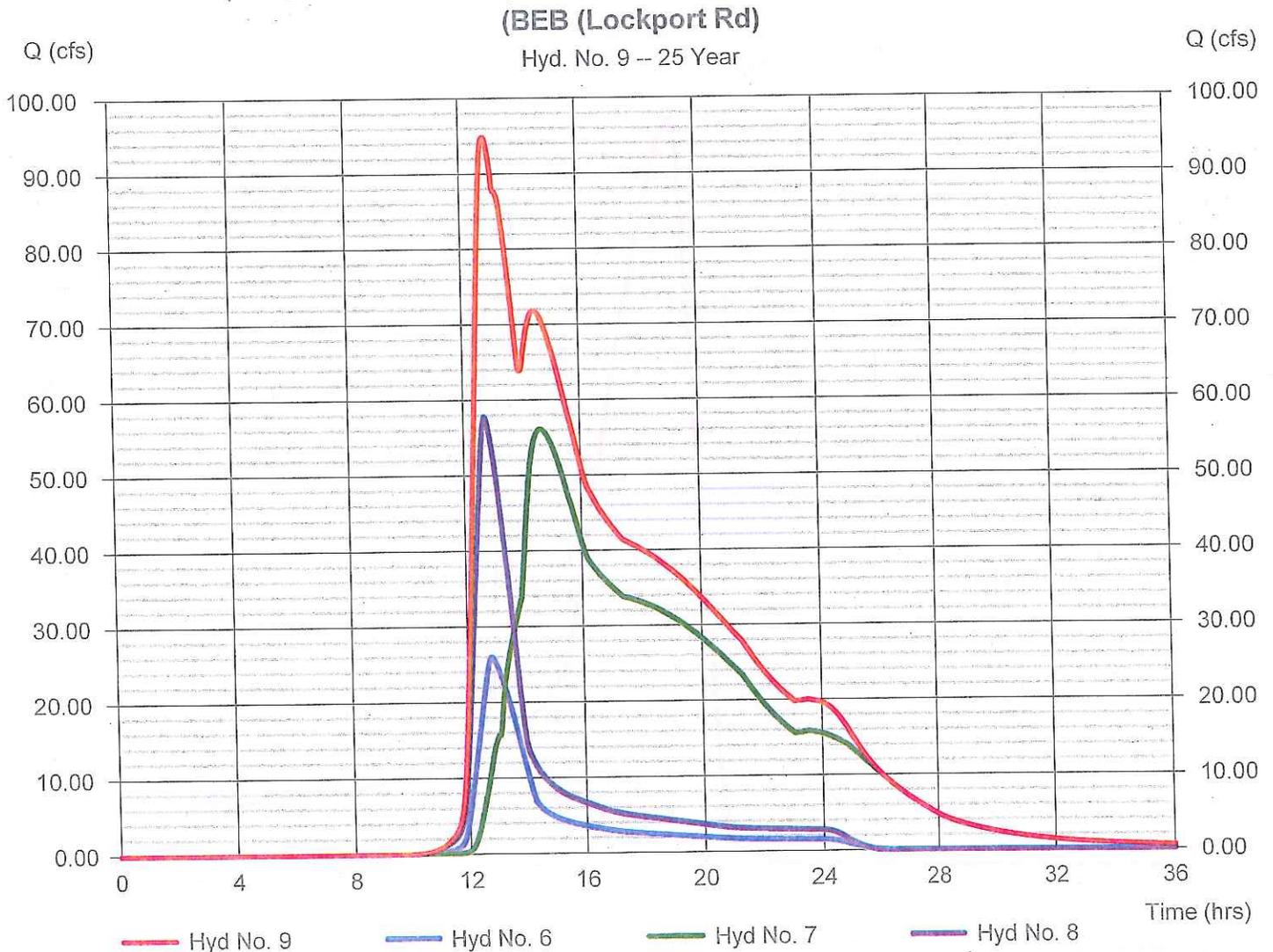
Thursday, 01 / 28 / 2016

Hyd. No. 9

(BEB (Lockport Rd))

Hydrograph type = Combine
 Storm frequency = 25 yrs
 Time interval = 2 min
 Inflow hyds. = 6, 7, 8

Peak discharge = 94.80 cfs
 Time to peak = 12.83 hrs
 Hyd. volume = 2,185,290 cuft
 Contrib. drain. area = 133.000 ac



Hydrograph Report

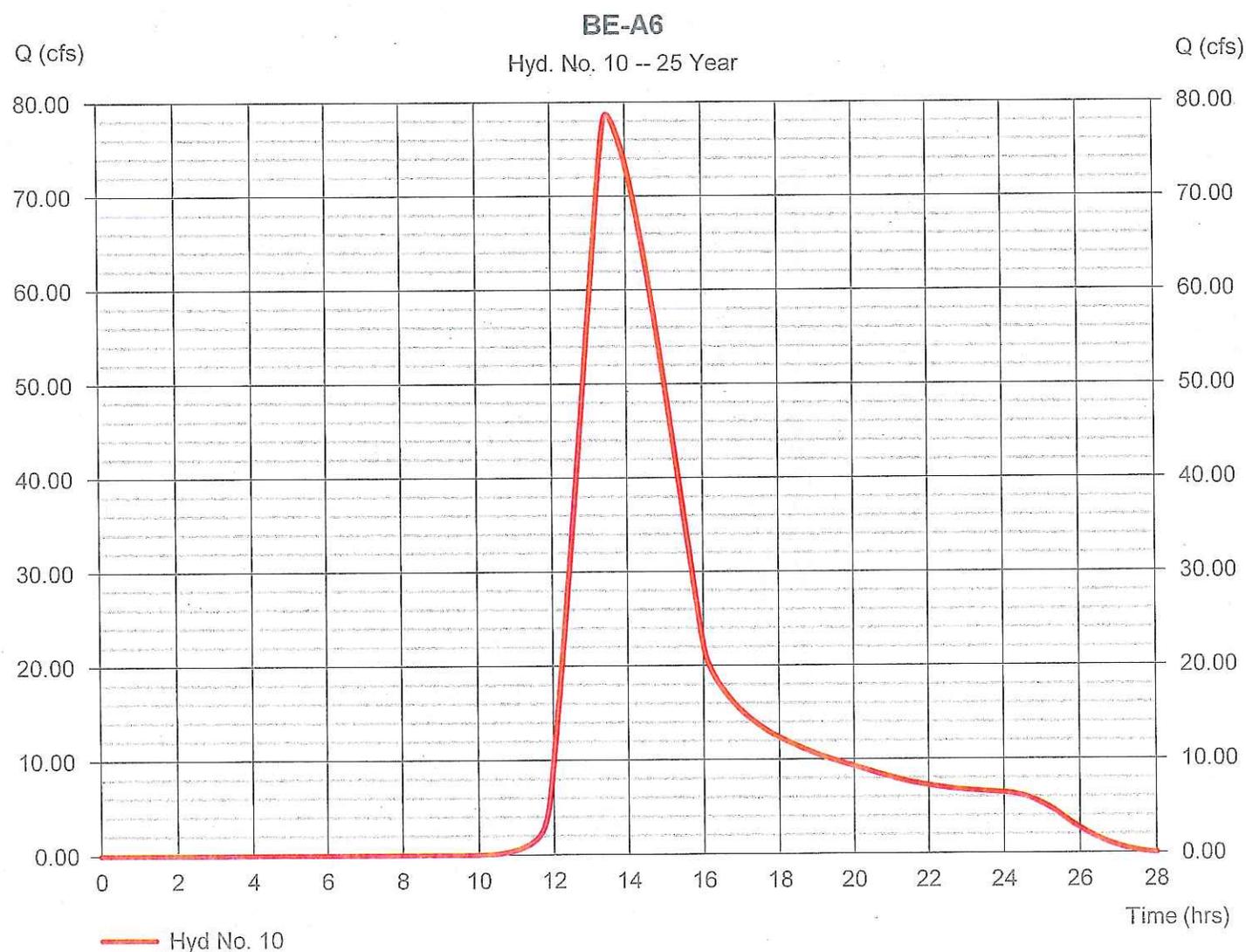
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 10

BE-A6

Hydrograph type	= SCS Runoff	Peak discharge	= 78.72 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.50 hrs
Time interval	= 2 min	Hyd. volume	= 1,089,625 cuft
Drainage area	= 197.000 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 158.00 min
Total precip.	= 3.63 in.	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

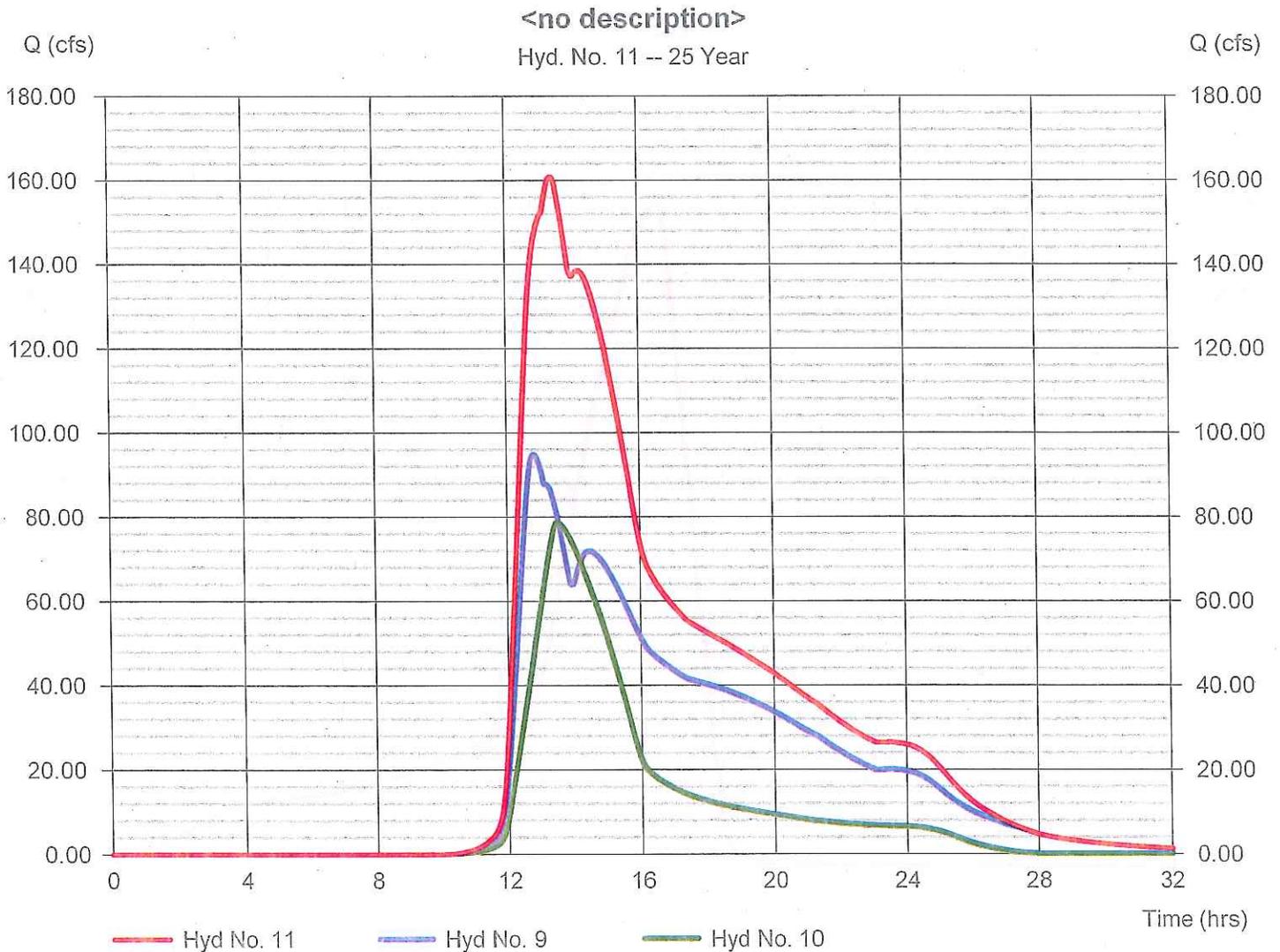
Thursday, 01 / 28 / 2016

Hyd. No. 11

<no description>

Hydrograph type = Combine
 Storm frequency = 25 yrs
 Time interval = 2 min
 Inflow hyds. = 9, 10

Peak discharge = 160.79 cfs
 Time to peak = 13.40 hrs
 Hyd. volume = 3,274,915 cuft
 Contrib. drain. area = 197.000 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

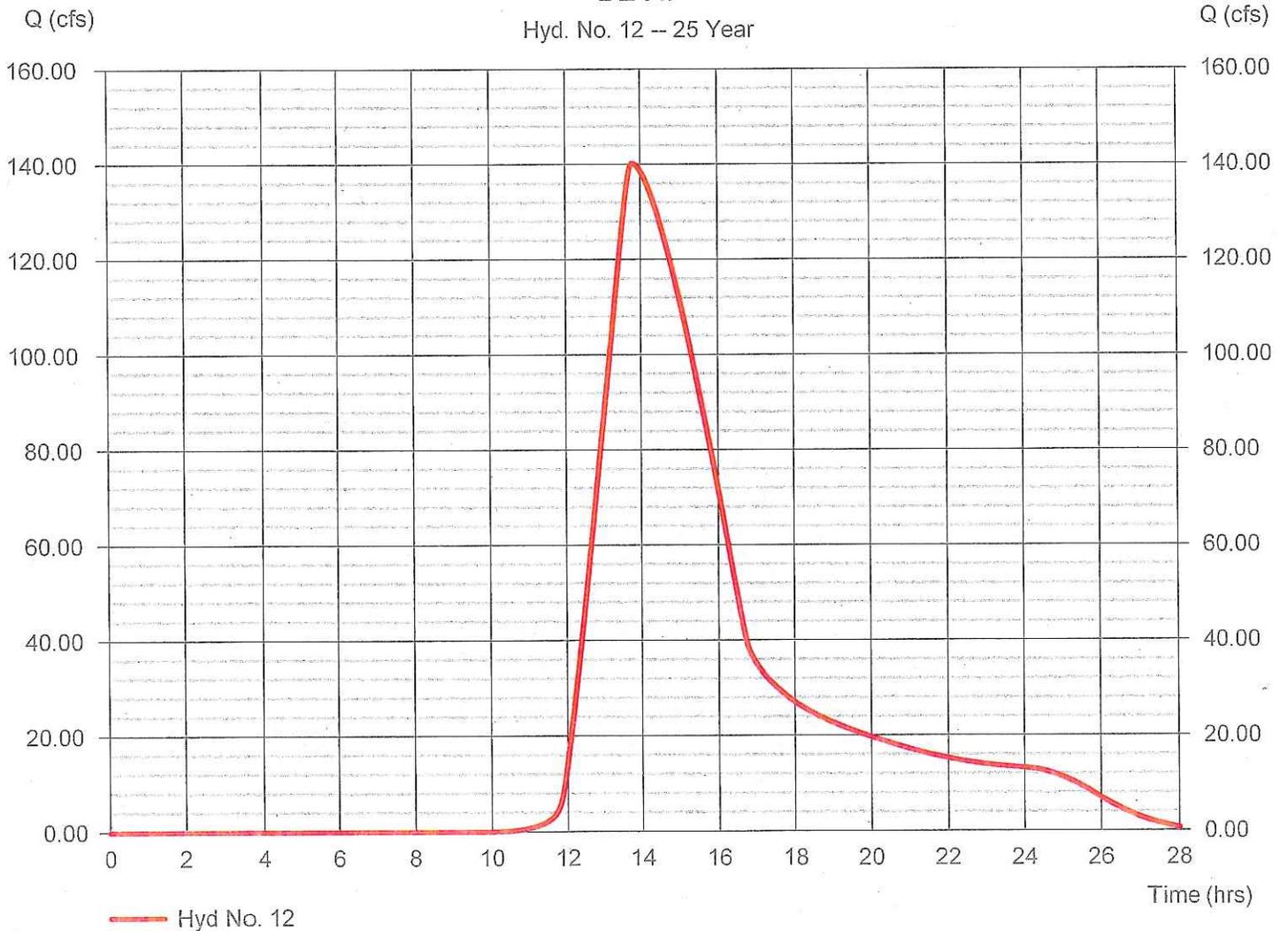
Hyd. No. 12

BE-A7

Hydrograph type	= SCS Runoff	Peak discharge	= 140.18 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.77 hrs
Time interval	= 2 min	Hyd. volume	= 2,206,702 cuft
Drainage area	= 397.000 ac	Curve number	= 77
Basin Slope	= 0.4 %	Hydraulic length	= 5500 ft
Tc method	= TR55	Time of conc. (Tc)	= 183.60 min
Total precip.	= 3.63 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

BE-A7

Hyd. No. 12 -- 25 Year



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 13

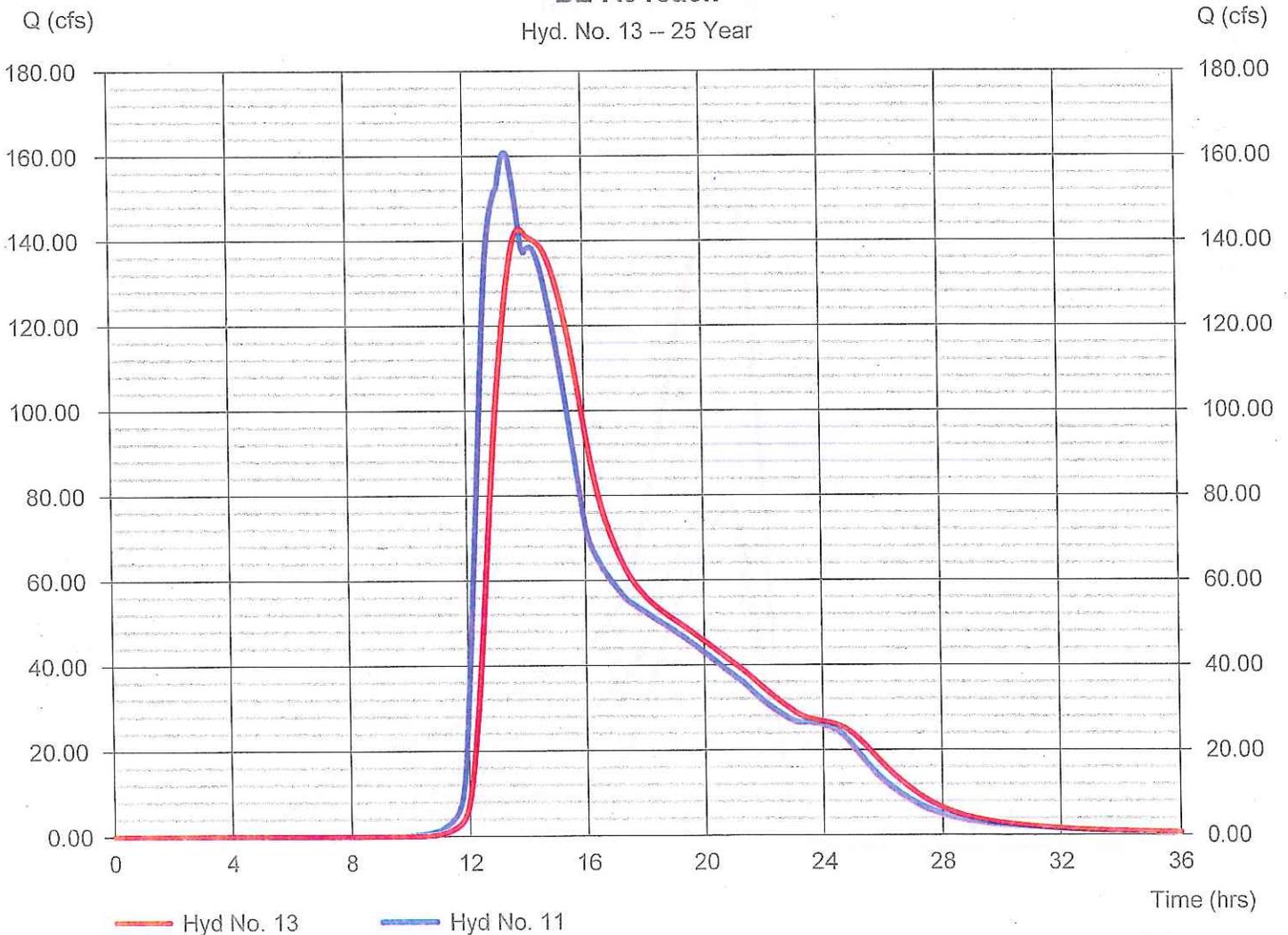
BE-A6 reach

Hydrograph type	= Reach	Peak discharge	= 142.84 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.83 hrs
Time interval	= 2 min	Hyd. volume	= 3,274,890 cuft
Inflow hyd. No.	= 11 - <no description>	Section type	= Trapezoidal
Reach length	= 7500.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.040	Bottom width	= 15.0 ft
Side slope	= 2.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.357	Rating curve m	= 1.483
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0601

Modified Att-Kin routing method used.

BE-A6 reach

Hyd. No. 13 -- 25 Year



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

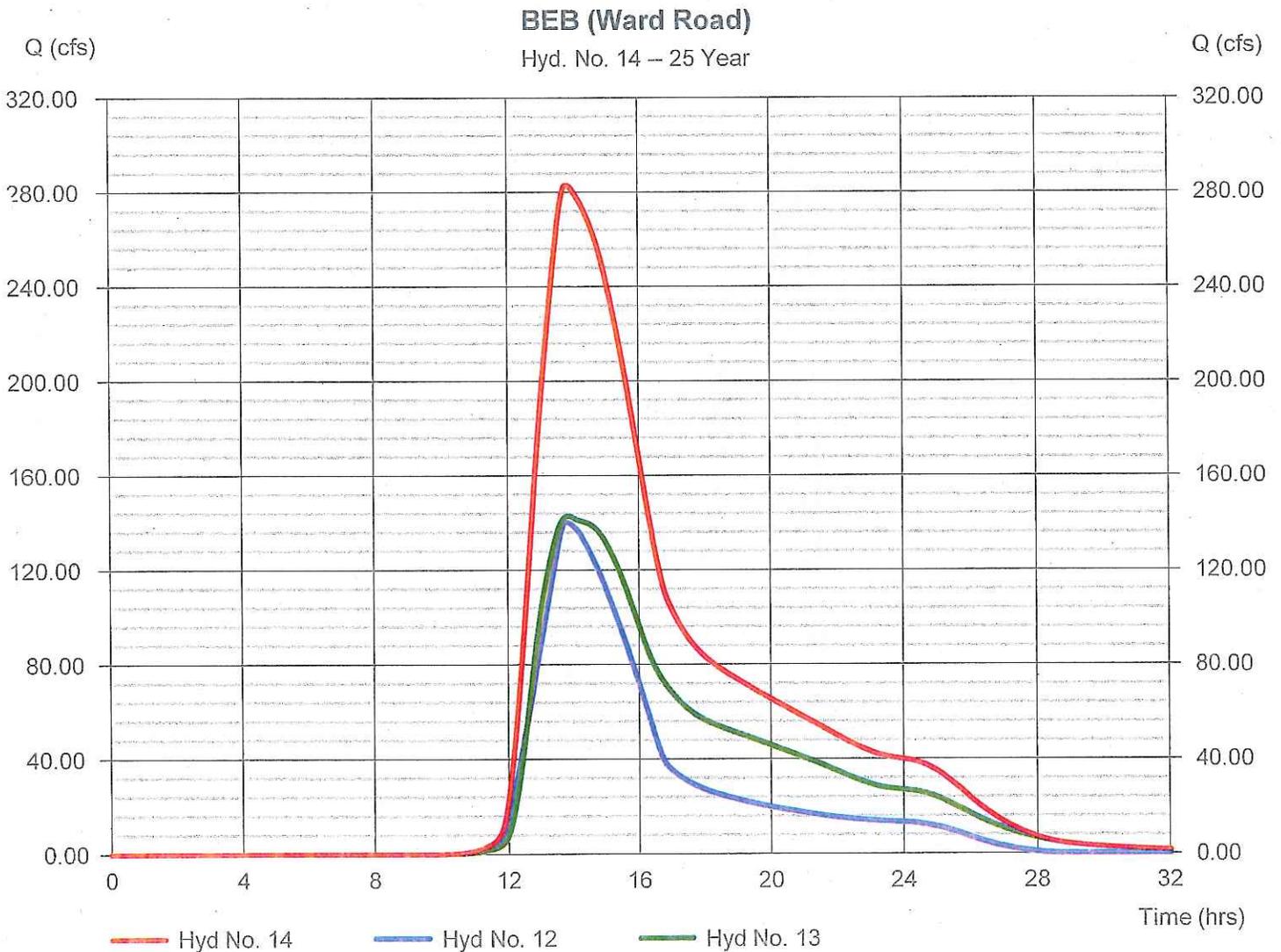
Thursday, 01 / 28 / 2016

Hyd. No. 14

BEB (Ward Road)

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 12, 13

Peak discharge = 282.91 cfs
Time to peak = 13.80 hrs
Hyd. volume = 5,481,584 cuft
Contrib. drain. area = 397.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

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	102.09	2	810	1,380,500	-----	-----	-----	BE-A1	
2	SCS Runoff	85.29	2	808	1,134,098	-----	-----	-----	BE-A2.1	
3	Reservoir	65.67	2	896	1,363,409	1	625.11	513,355	<no description>	
4	Reach	60.29	2	926	1,363,389	3	-----	-----	BE-A1 reach	
5	Combine	107.44	2	890	2,497,486	2, 4	-----	-----	BE A2.1 A2.2	
6	SCS Runoff	45.70	2	768	404,078	-----	-----	-----	BE-A2.2	
7	Reservoir	107.01	2	896	2,497,003	5	608.64	197,903	Routed offsite	
8	SCS Runoff	98.74	2	762	792,797	-----	-----	-----	BE-A2.3/2.4	
9	Combine	172.22	2	812	3,693,878	6, 7, 8	-----	-----	(BEB (Lockport Rd)	
10	SCS Runoff	135.16	2	810	1,811,227	-----	-----	-----	BE-A6	
11	Combine	307.28	2	810	5,505,098	9, 10	-----	-----	<no description>	
12	SCS Runoff	241.07	2	826	3,668,087	-----	-----	-----	BE-A7	
13	Reach	279.99	2	832	5,505,079	11	-----	-----	BE-A6 reach	
14	Combine	519.93	2	830	9,173,137	12, 13	-----	-----	BEB (Ward Road)	
Eagle Chase Offsite evaluation.gpw					Return Period: 100 Year			Thursday, 01 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

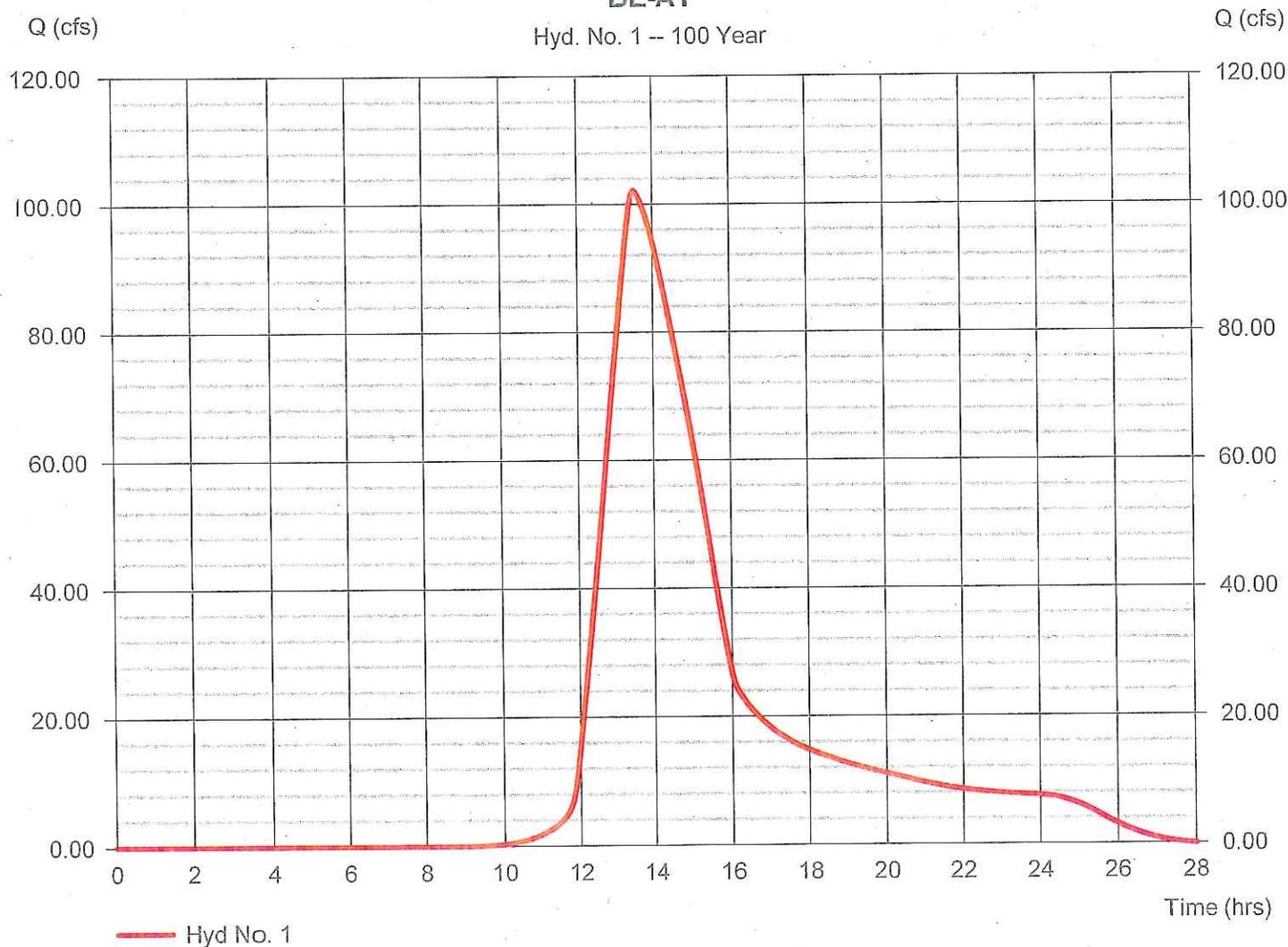
Hyd. No. 1

BE-A1

Hydrograph type	= SCS Runoff	Peak discharge	= 102.09 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.50 hrs
Time interval	= 2 min	Hyd. volume	= 1,380,500 cuft
Drainage area	= 161.000 ac	Curve number	= 75
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 159.26 min
Total precip.	= 4.90 in.	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

BE-A1

Hyd. No. 1 -- 100 Year



Hydrograph Report

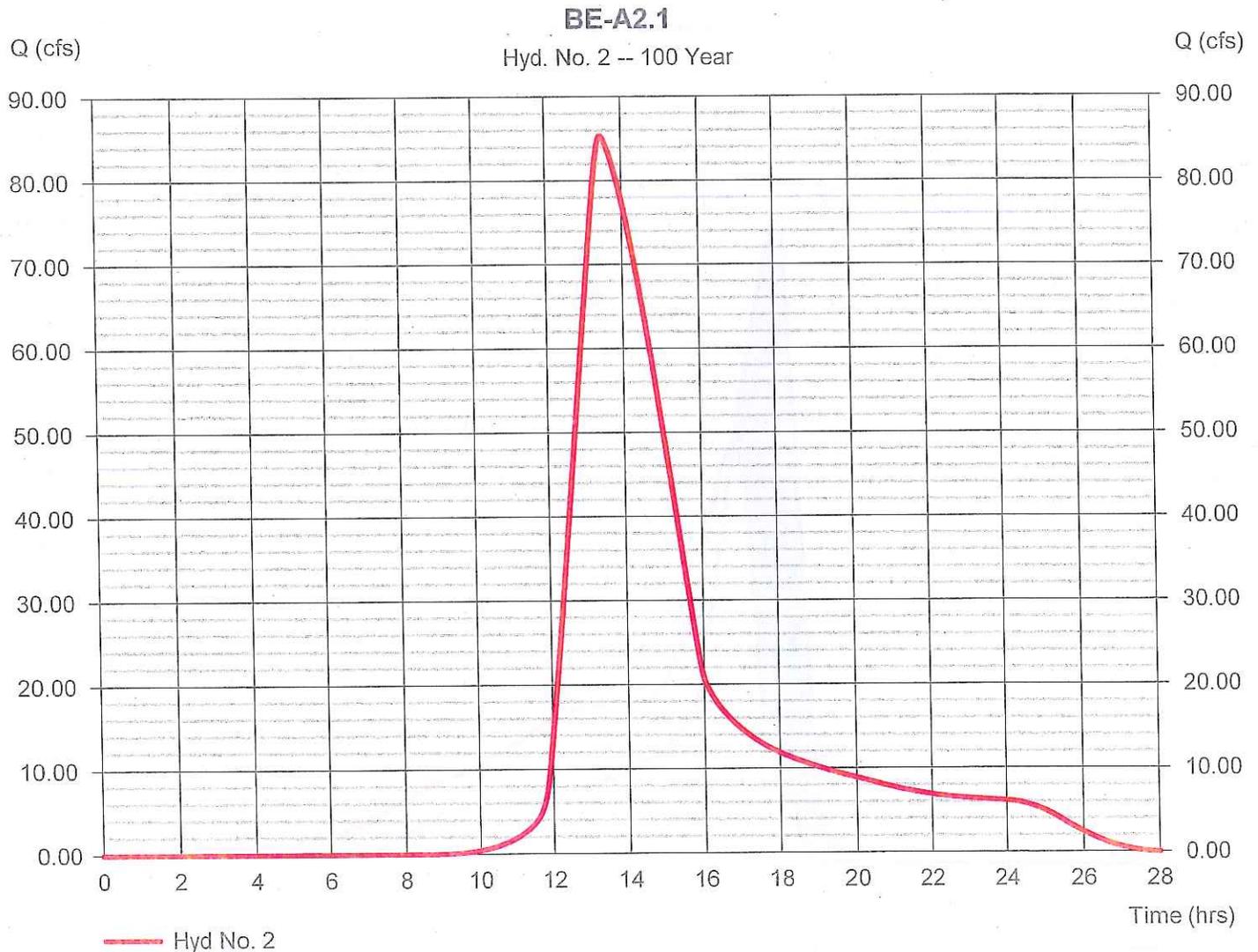
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 2

BE-A2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 85.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.47 hrs
Time interval	= 2 min	Hyd. volume	= 1,134,098 cuft
Drainage area	= 127.000 ac	Curve number	= 76
Basin Slope	= 0.4 %	Hydraulic length	= 3500 ft
Tc method	= LAG	Time of conc. (Tc)	= 154.72 min
Total precip.	= 4.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 3

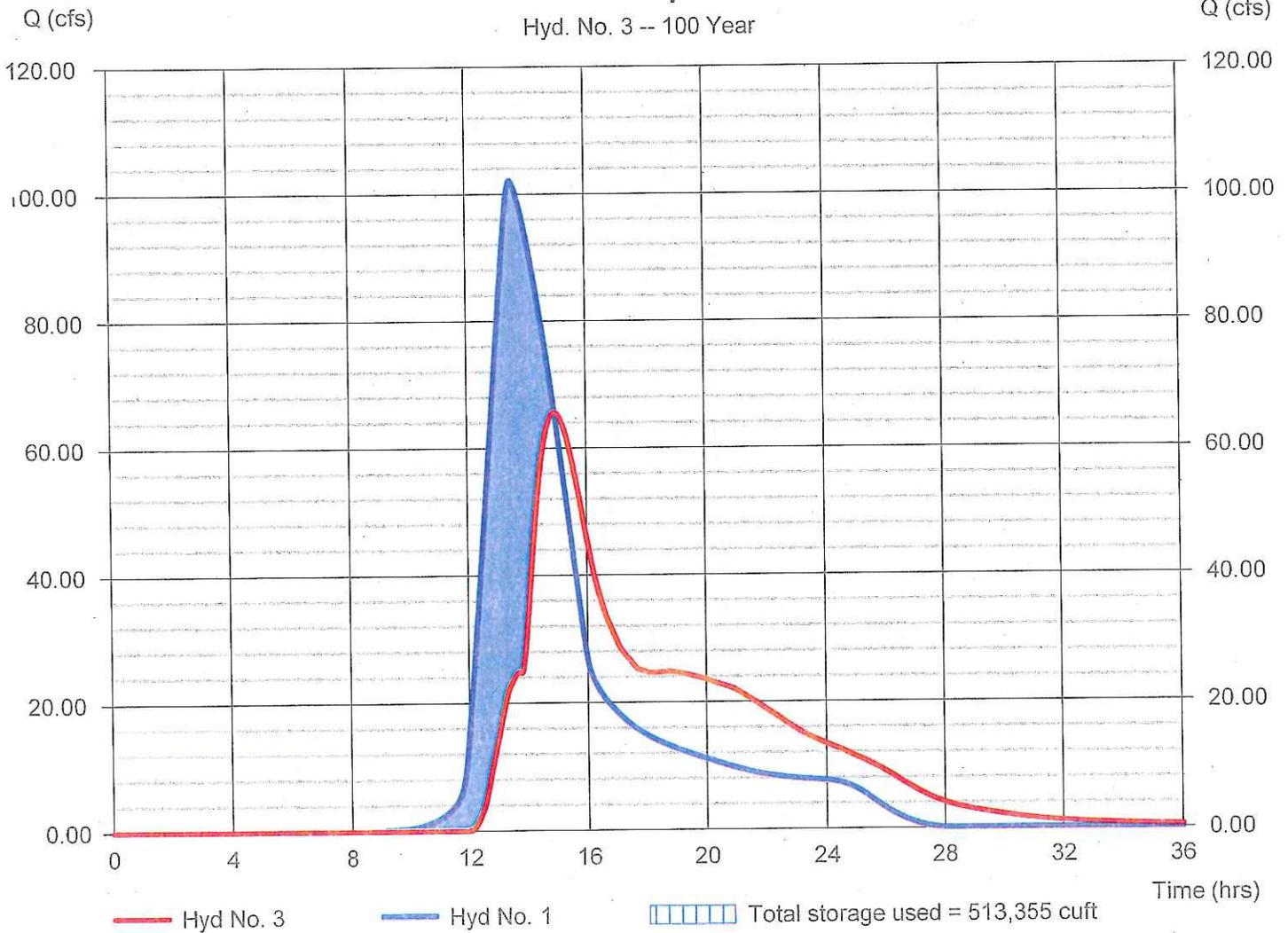
<no description>

Hydrograph type	= Reservoir	Peak discharge	= 65.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,363,409 cuft
Inflow hyd. No.	= 1 - BE-A1	Max. Elevation	= 625.11 ft
Reservoir name	= Impoundment at Bear Rd	Max. Storage	= 513,355 cuft

Storage Indication method used.

<no description>

Hyd. No. 3 -- 100 Year



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

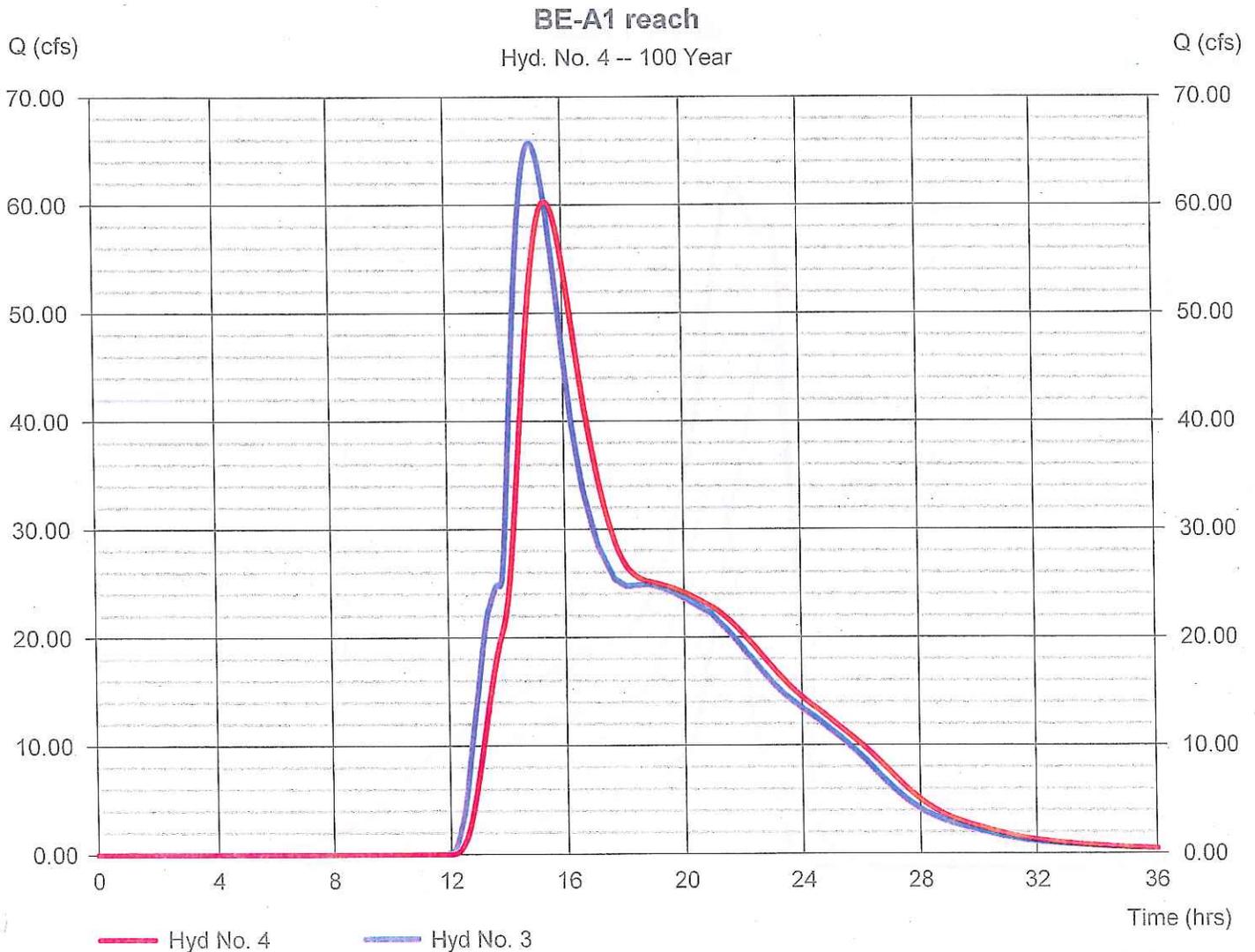
Thursday, 01 / 28 / 2016

Hyd. No. 4

BE-A1 reach

Hydrograph type	= Reach	Peak discharge	= 60.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 15.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,363,389 cuft
Inflow hyd. No.	= 3 - <no description>	Section type	= Trapezoidal
Reach length	= 3500.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.040	Bottom width	= 10.0 ft
Side slope	= 5.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.507	Rating curve m	= 1.312
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0699

Modified Att-Kin routing method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

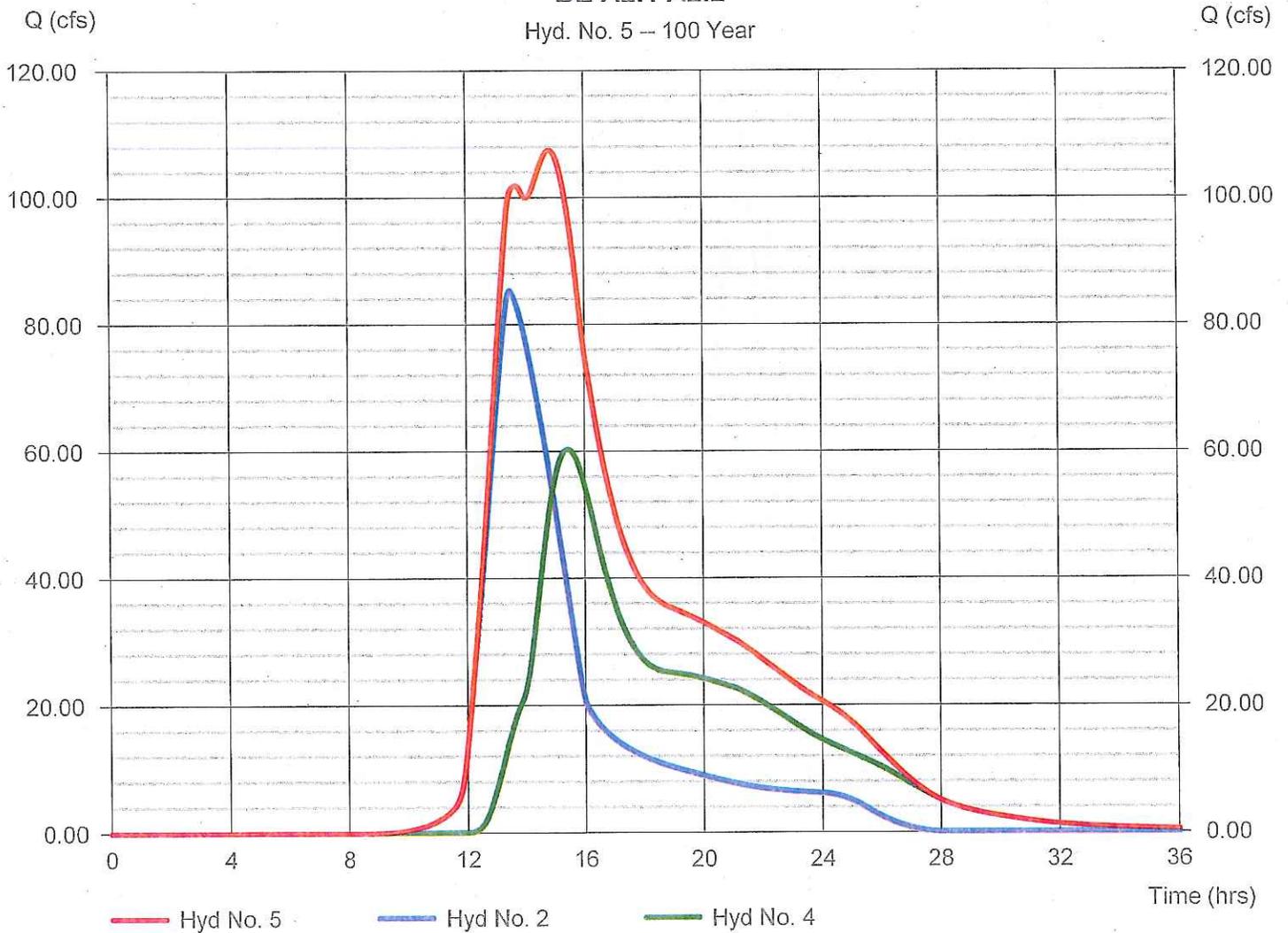
Hyd. No. 5

BE A2.1 A2.2

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 2, 4

Peak discharge = 107.44 cfs
 Time to peak = 14.83 hrs
 Hyd. volume = 2,497,486 cuft
 Contrib. drain. area = 127.000 ac

BE A2.1 A2.2
 Hyd. No. 5 -- 100 Year



Hydrograph Report

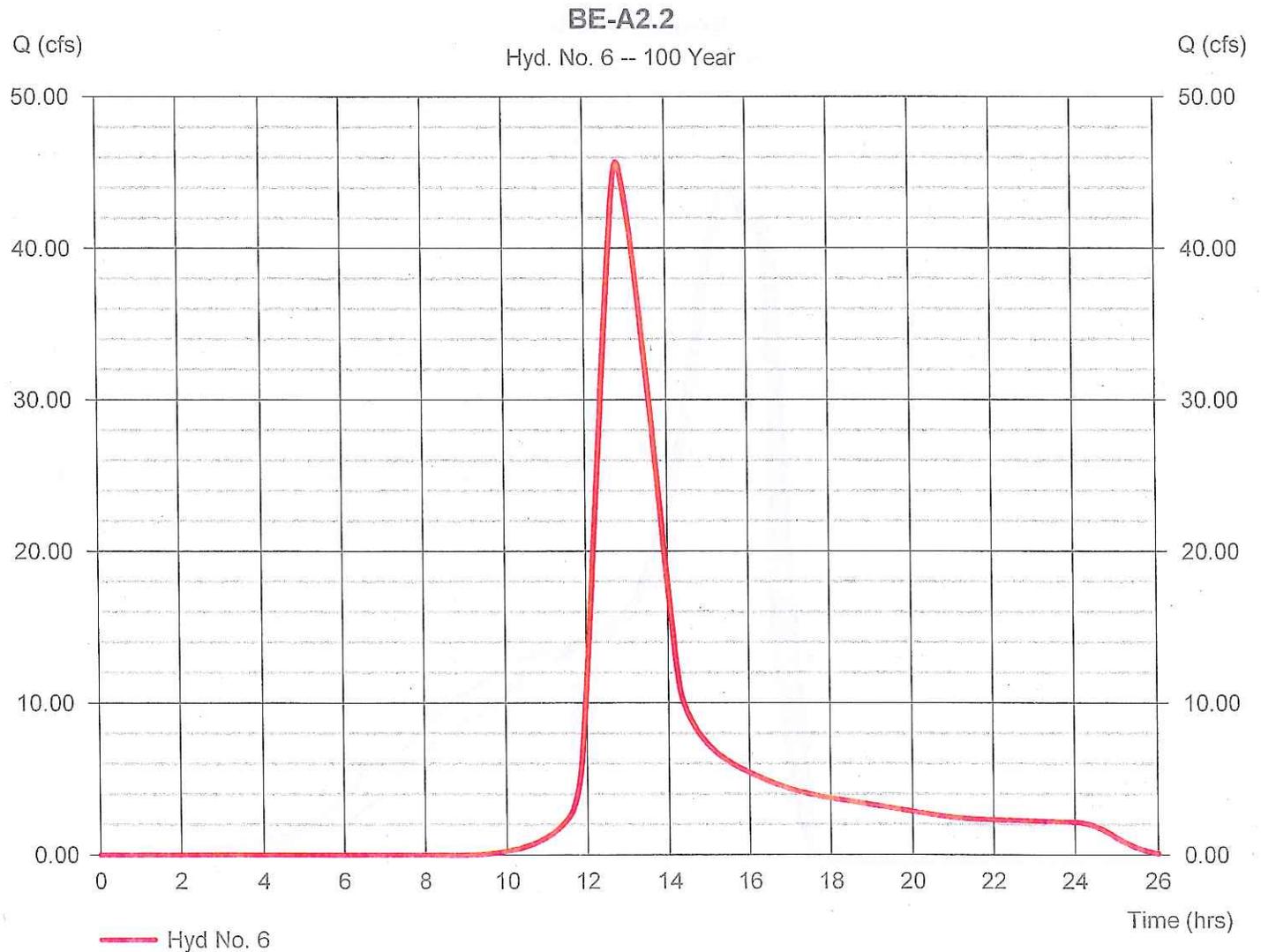
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 6

BE-A2.2

Hydrograph type	= SCS Runoff	Peak discharge	= 45.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.80 hrs
Time interval	= 2 min	Hyd. volume	= 404,078 cuft
Drainage area	= 47.000 ac	Curve number	= 75
Basin Slope	= 0.6 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 89.29 min
Total precip.	= 4.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

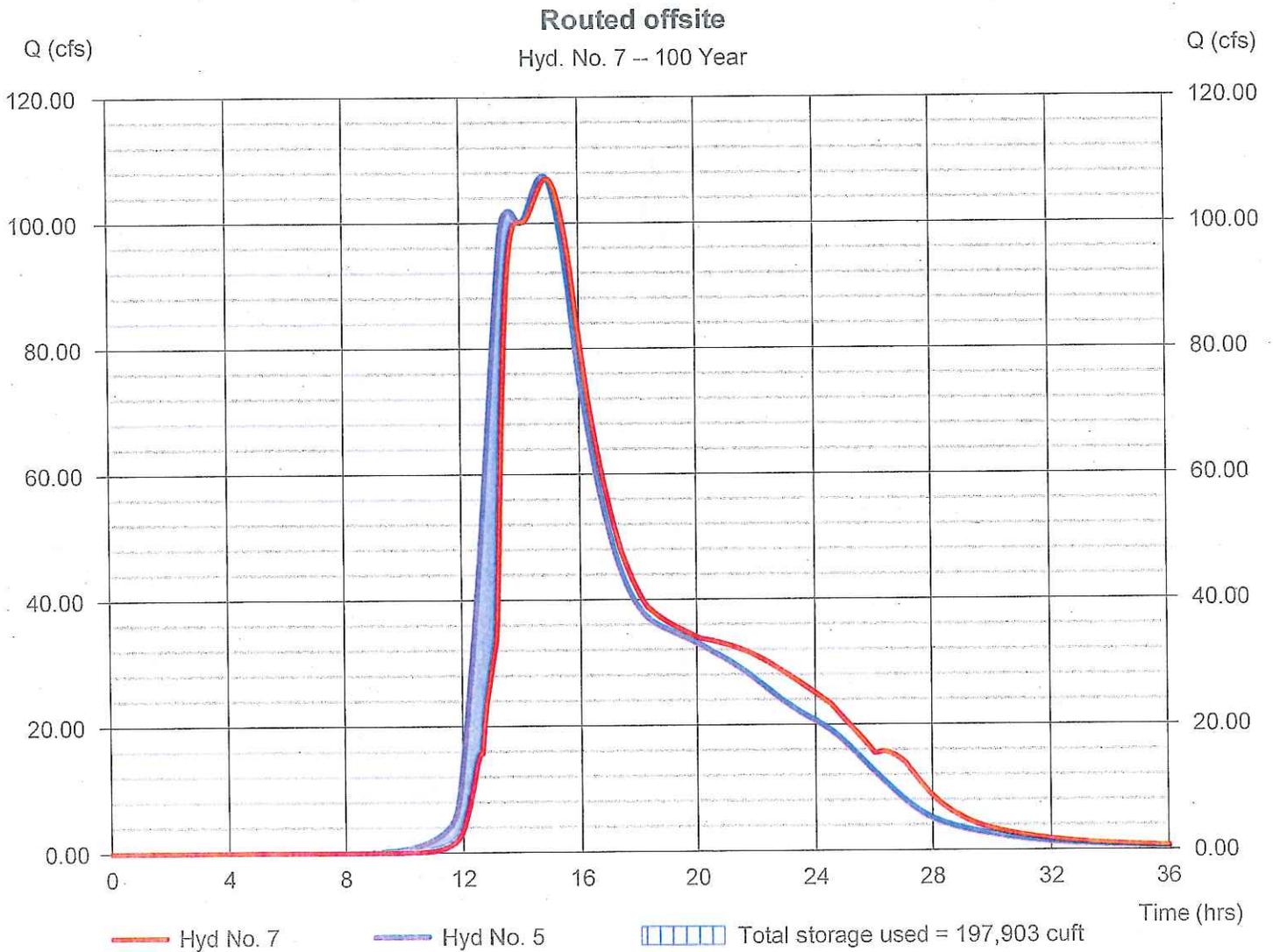
Thursday, 01 / 28 / 2016

Hyd. No. 7

Routed offsite

Hydrograph type	= Reservoir	Peak discharge	= 107.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.93 hrs
Time interval	= 2 min	Hyd. volume	= 2,497,003 cuft
Inflow hyd. No.	= 5 - BE A2.1 A2.2	Max. Elevation	= 608.64 ft
Reservoir name	= Offsite area impoundment	Max. Storage	= 197,903 cuft

Storage Indication method used.



Hydrograph Report

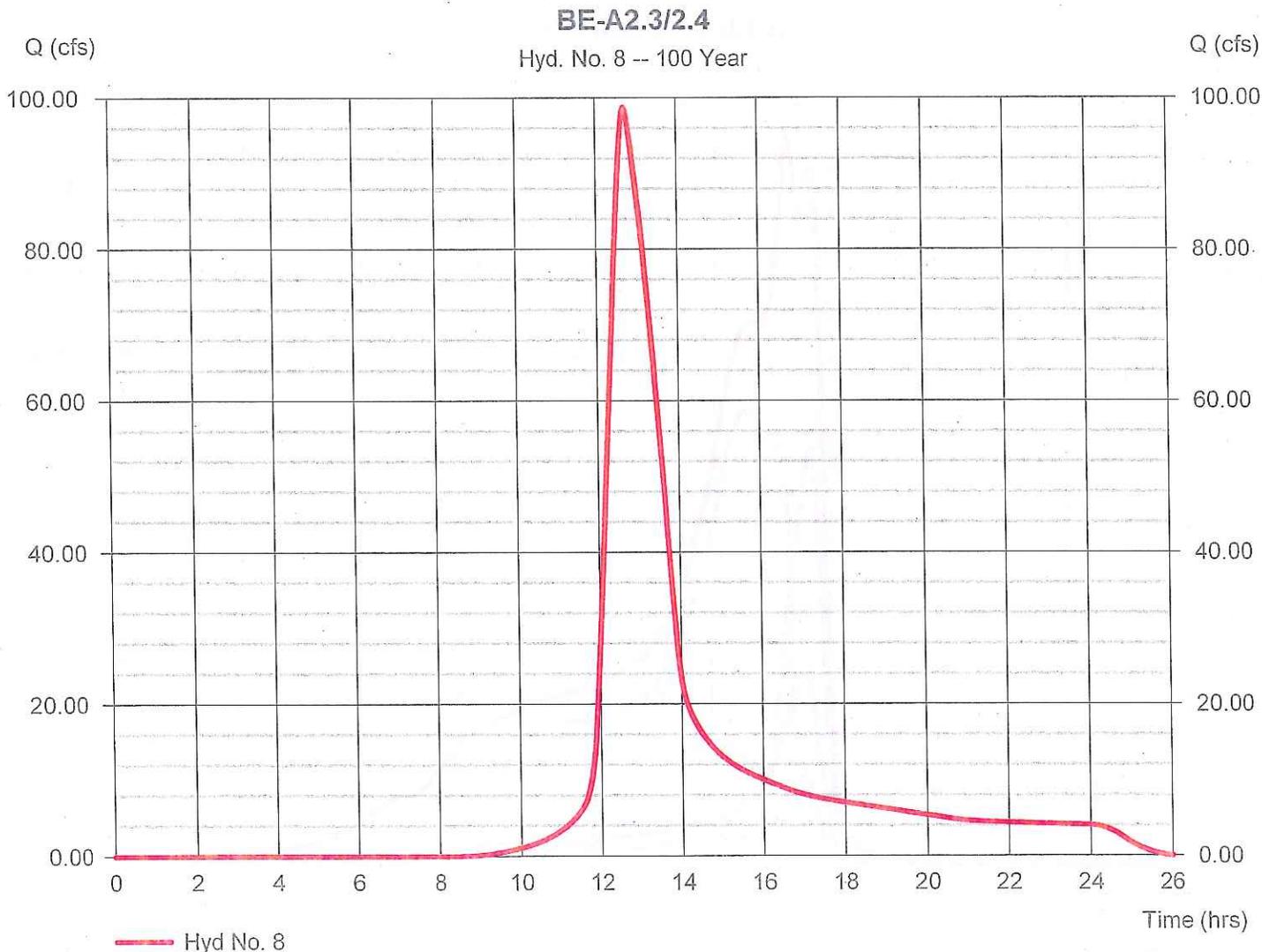
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 8

BE-A2.3/2.4

Hydrograph type	= SCS Runoff	Peak discharge	= 98.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 792,797 cuft
Drainage area	= 86.000 ac	Curve number	= 77
Basin Slope	= 0.6 %	Hydraulic length	= 2000 ft
Tc method	= LAG	Time of conc. (Tc)	= 78.40 min
Total precip.	= 4.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

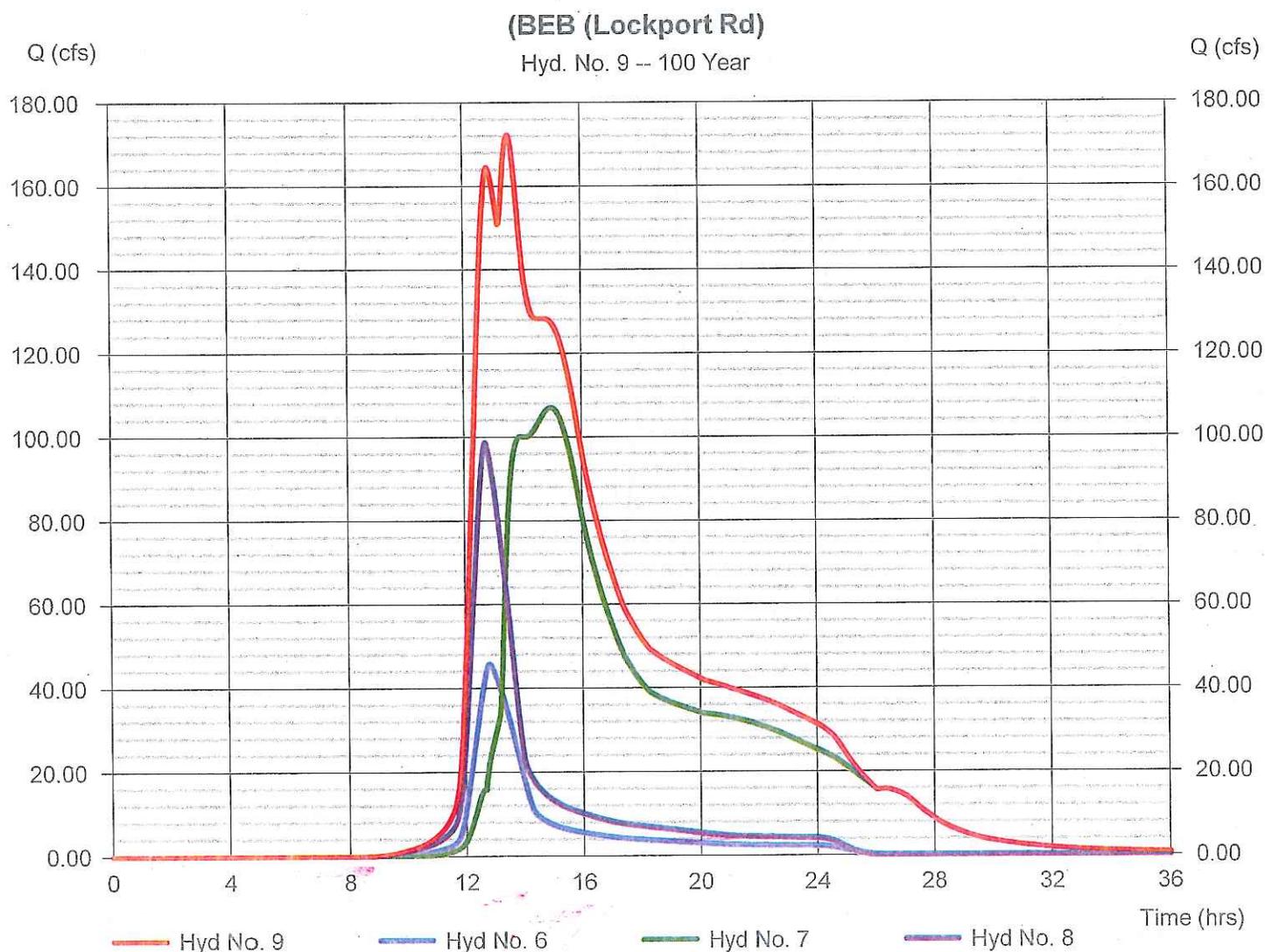
Thursday, 01 / 28 / 2016

Hyd. No. 9

(BEB (Lockport Rd))

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 6, 7, 8

Peak discharge = 172.22 cfs
 Time to peak = 13.53 hrs
 Hyd. volume = 3,693,878 cuft
 Contrib. drain. area = 133.000 ac



Hydrograph Report

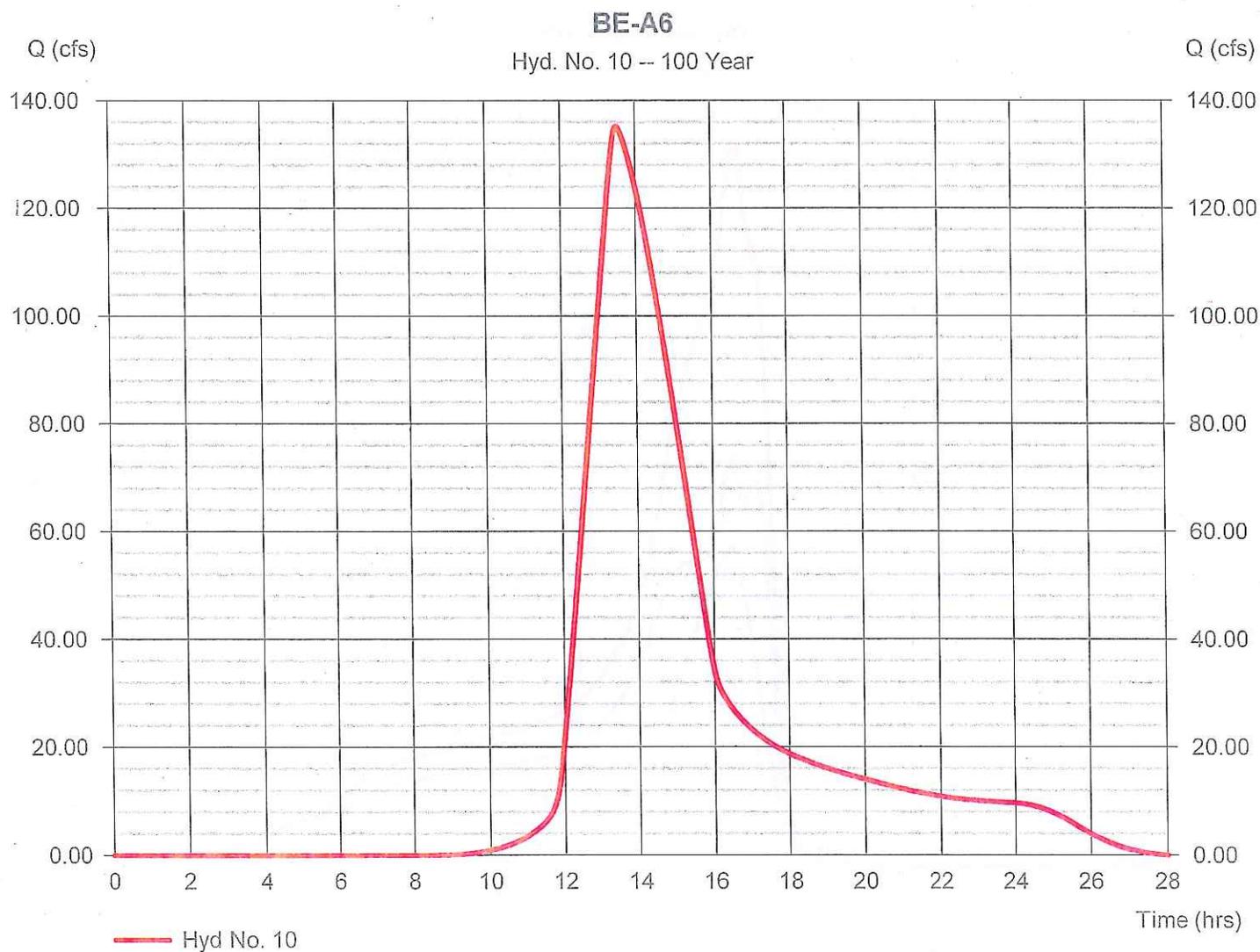
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

Hyd. No. 10

BE-A6

Hydrograph type	= SCS Runoff	Peak discharge	= 135.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.50 hrs
Time interval	= 2 min	Hyd. volume	= 1,811,227 cuft
Drainage area	= 197.000 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 158.00 min
Total precip.	= 4.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Thursday, 01 / 28 / 2016

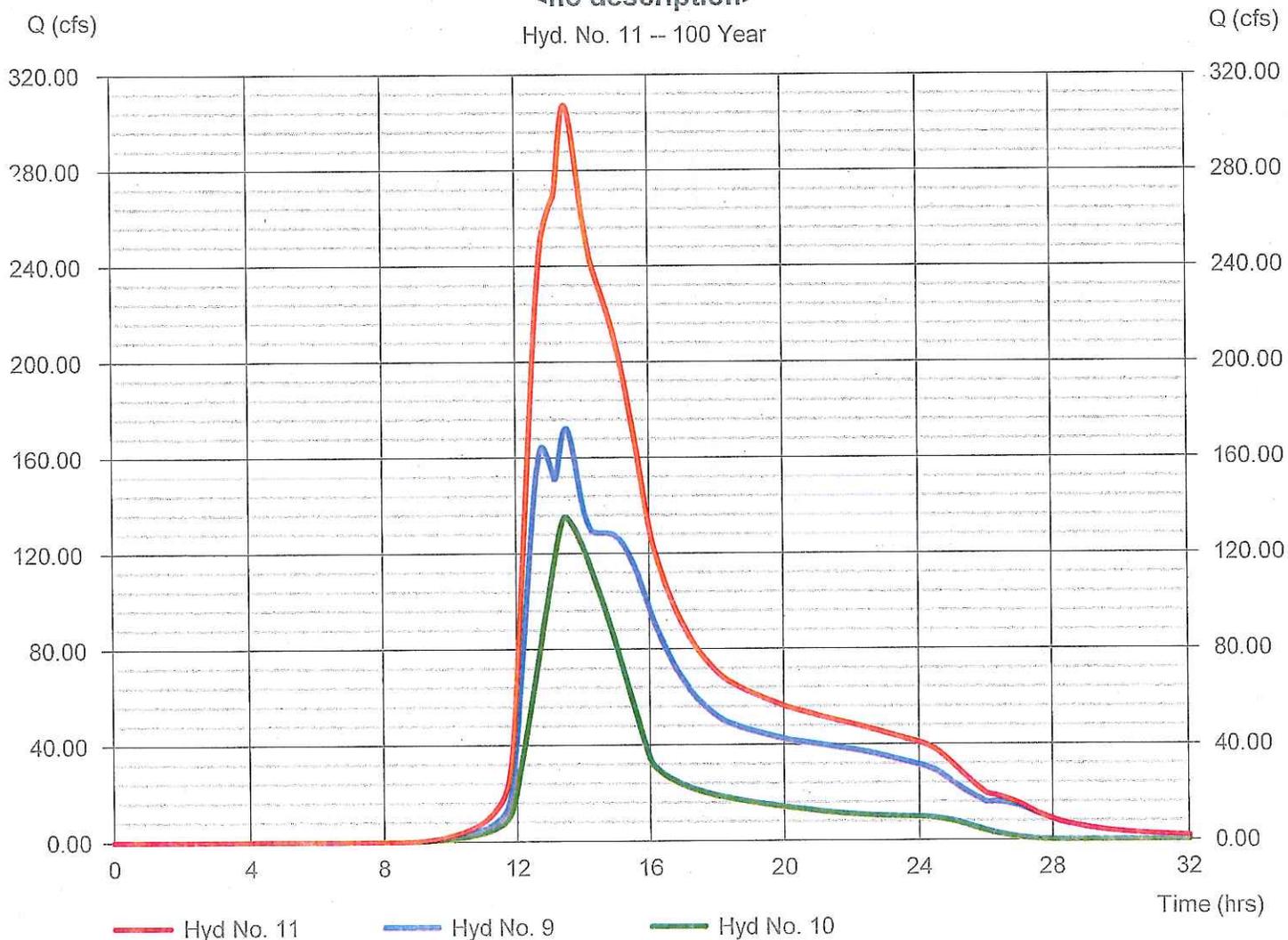
Hyd. No. 11

<no description>

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 9, 10

Peak discharge = 307.28 cfs
 Time to peak = 13.50 hrs
 Hyd. volume = 5,505,098 cuft
 Contrib. drain. area = 197.000 ac

<no description>
 Hyd. No. 11 -- 100 Year

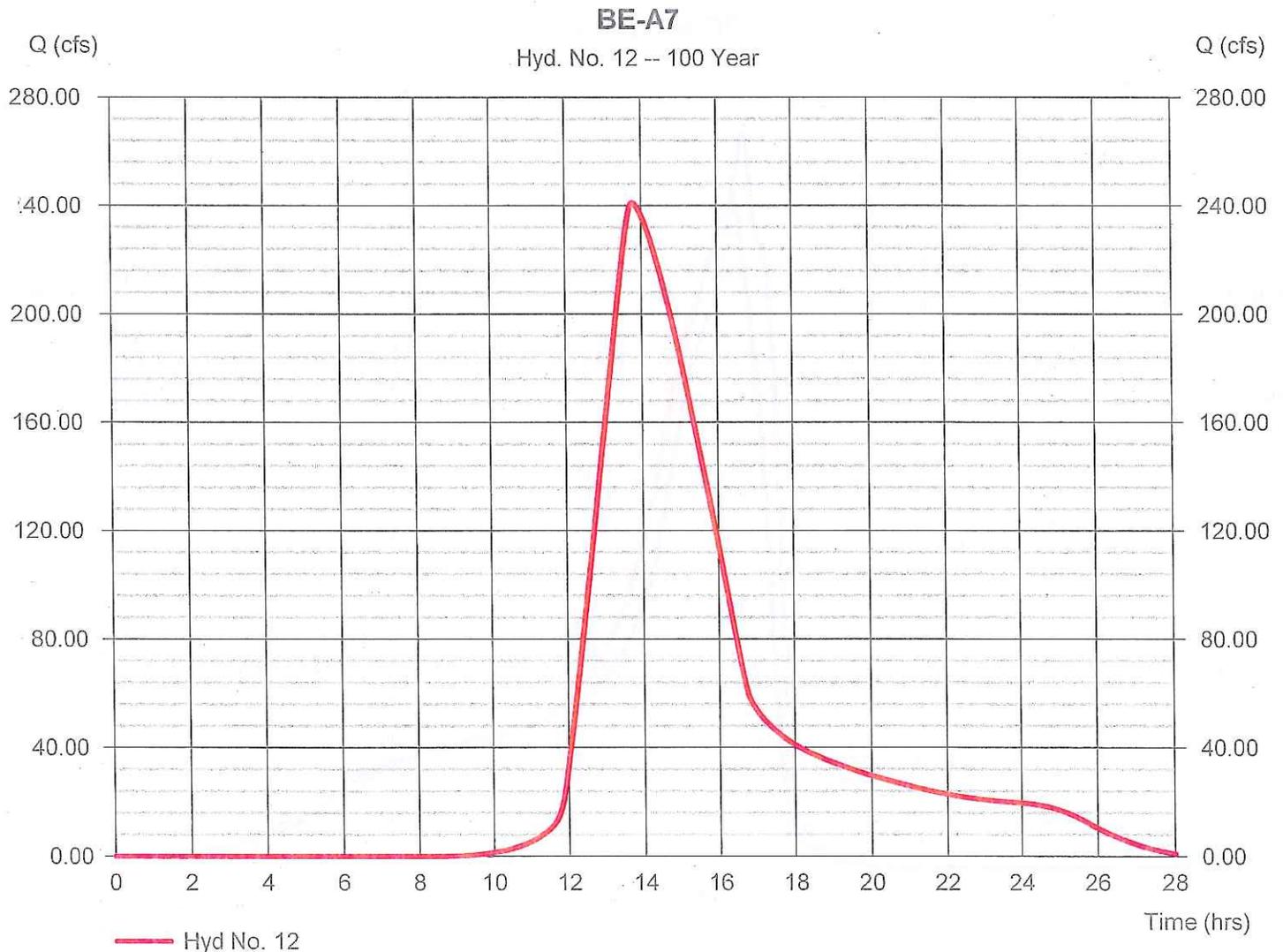


Hydrograph Report

Hyd. No. 12

BE-A7

Hydrograph type	= SCS Runoff	Peak discharge	= 241.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.77 hrs
Time interval	= 2 min	Hyd. volume	= 3,668,087 cuft
Drainage area	= 397.000 ac	Curve number	= 77
Basin Slope	= 0.4 %	Hydraulic length	= 5500 ft
Tc method	= TR55	Time of conc. (Tc)	= 183.60 min
Total precip.	= 4.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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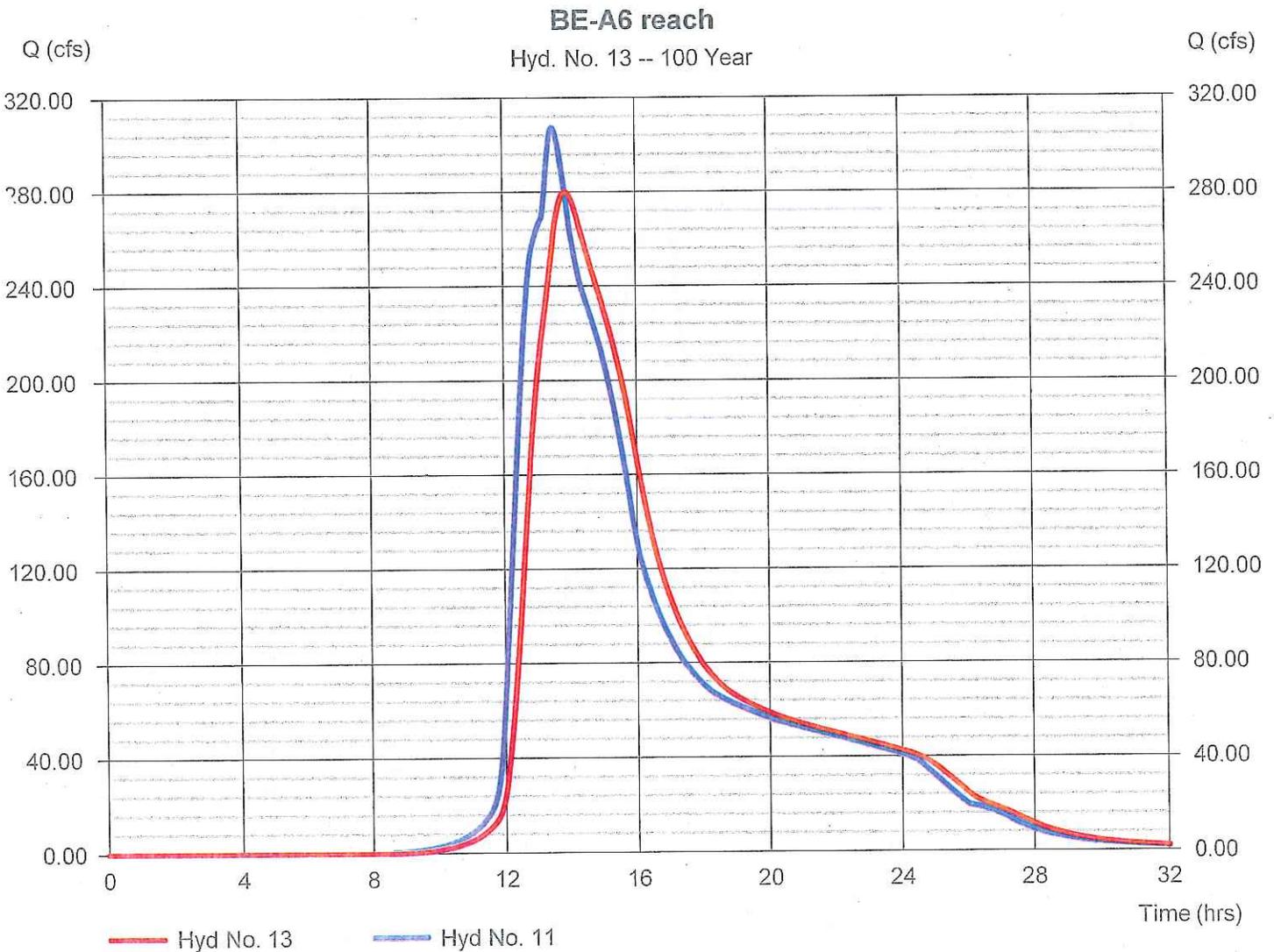
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Hyd. No. 13

BE-A6 reach

Hydrograph type	= Reach	Peak discharge	= 279.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.87 hrs
Time interval	= 2 min	Hyd. volume	= 5,505,079 cuft
Inflow hyd. No.	= 11 - <no description>	Section type	= Trapezoidal
Reach length	= 7500.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.040	Bottom width	= 15.0 ft
Side slope	= 2.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.357	Rating curve m	= 1.483
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0737

Modified Att-Kin routing method used.



Hydrograph Report

Hyd. No. 14

BEB (Ward Road)

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 12, 13

Peak discharge = 519.93 cfs
Time to peak = 13.83 hrs
Hyd. volume = 9,173,137 cuft
Contrib. drain. area = 397.000 ac

