

Project Drainage - PRELIMINARY

July 2015

Prepared for

Oak Hills Estate

Oak Hills Estate LLC

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805-543-1794

1.0 INTRODUCTION

The 16.9 acre proposed project site is located in Vandenberg Village within the County of Santa Barbara, just outside the City of Lompoc. The site is bound by Oak Hills Drive and residential development to the south, existing development to the east and by the Burton Mesa Preserve to the north and west. The proposed project includes development of 29 residential parcels and roads with nearly half the site remaining in natural and managed open space.

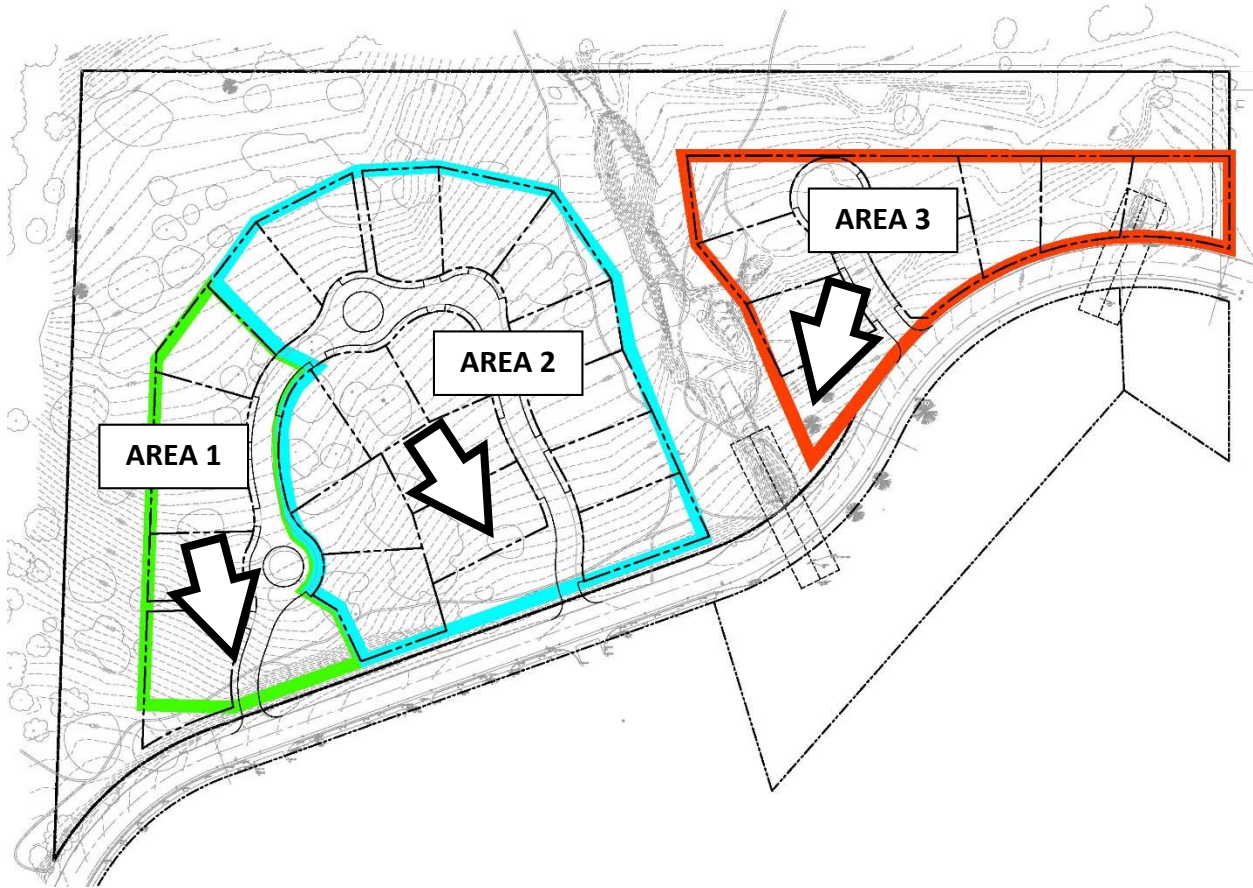


Project Vicinity Map (NTS)

This report includes hydrology analysis and basin sizing for the project's development area. Drainage from the undeveloped open space areas will continue to along historic routes to existing drainage structure without impacting on site development.

The existing site is divided into 3 drainage sub areas which generally flow southerly. The proposed site development will follow the existing landform form and existing drainage. The drainage sub areas and existing drainage patterns are shown in the figure below.

Drainage from sub area 1 mixes with existing upland flows south along Oak Hills Drive entering a downstream system of inlets and pipes. Drainage from areas 2 and 3 flow into the existing drainage culvert crossing Oak Hills Drive, mixing with existing upland flows, which enter the golf course property.



Project Site and Drainage Sub Areas

2.0 HYDROLOGY

Methodology

The Santa Barbara County Flood Control inputs for hydrologic modeling were used to develop pre and post development peak flows and storm water basin routing. Calculations were developed in the Hydraflow extension of AutoCAD 2013.

- Rainfall: 24-hour, Type I distribution
- Time Increment: 0.10 hour (6 minute) minimum
- NRCS Soil Classification: Class B (Areas 1 & 2) and Class A (Area3)

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Depth (in)	2.20	3.17	3.82	4.62	5.20	5.76

Lompoc Storm Depth – Santa Barbara County Flood Control

On Site Drainage

On site drainage is limited to the proposed 29 parcels, roadways and roadside vegetated swales. All site drainage is routed to and conveyed through vegetated roadside swales which discharge to adjoining storm water basins for each of the sub areas. Additionally, drainage from developed parcels is limited to 2,500 SF of impervious area. Any additional impervious run off from individual parcels must be retained and infiltrated on site. The table below summarizes the drainage areas within each sub area.

	Total Area (acres)	Impervious Lot Area	Pervious Lot Area	Roadway	Swale	Peak Post Dev Flow
Area 1	1.61	0.29	0.60	0.33	0.39	0.11
Area 2	3.98	0.92	2.28	0.38	0.40	0.28
Area 3	2.07	0.46	1.08	0.20	0.33	0.15

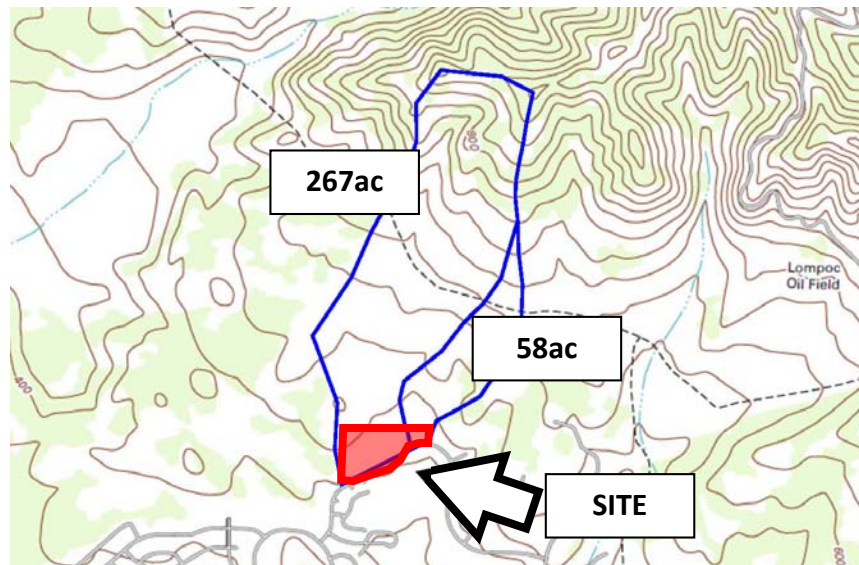
Peak post development flows will be attenuated to pre development levels for storm events up through 100-year. In addition, post development run-off is limited to 0.07cfs/ac for storms through the 25 yr event.

Basins

Basin modeling ONLY includes volumes and outfall structure sizing to attenuate the post development flows to predevelopment levels. Basin sizing as shown on the preliminary plans include additional retention volume in accordance with the requirements of Project Clean Water. Calculations provided under separate cover.

Upland Flows

Existing upland/off site flows are routed through the project site without mixing with on-site flows, following historic patterns, to existing drainage facilities. Calculations provided under separate cover.



Off site upland flows from a 325 acre portion of the Burton Reserve pass through the site and discharge through two 48" culverts under Oak Hill Drive. The westerly culvert handles a majority of the flows; Q100=72cfs. The easterly culvert conveys the remaining flow; Q100=16cfs. For purposes of this project it is assumed that these culverts are blocked and drainage overtops the street. Although Oak Hill is broad and relatively flat, it is assumed that the overflow is contained within the drainage easements; as such the flow depth for the Q100 event is approximately 6".

In compliance with County requirements, the minimum finished floor elevation shall be 2'6" above the lowest adjacent top of curb elevation along Oak Hill (6" of flow depth plus 2' of freeboard).

Project Pre Development

Predevelopment peak flows were calculated for the project development areas (1, 2 and 3). Complete Hydraflow outputs are found in the Attachments section of this report. The table below represents the existing peak flow from each sub-area.

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Area 1	0.01	0.06	0.17	0.45	0.70	0.96
Area 2	0.03	0.15	0.44	1.15	1.80	2.50
Area 3	0.02	0.08	0.23	0.60	0.93	1.29

Pre Development Peak Flow (Hydrographs 5, 2 & 8)

Project Post Development

Peak flow and volumes for the 2yr through 100yr storm events were determined using Hydraflow and routed through detention basins to ensure that peak flows are being attenuated to or below pre development levels. Basin depth is designed at a maximum of 2' with culverts sized to limit outflow to pre development levels. The table below represents the attenuated peak outflow from each basin by sub-area.

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Area 1	0.02	0.03	0.07	0.11	0.24	0.39
Area 2	0.06	0.15	0.21	0.27	0.64	1.03
Area 3	0.02	0.08	0.11	0.15	0.35	0.56

Post Development Peak Flow – Basin Outflow (Hydrographs 7, 4 & 10)

3.0 BASINS

All project area site drainage is routed by a storm drain pipe network or surface drainage to the drainage sub-area's respective detention/retention basin.

	Detention (CF)	Retention (CF)	Depth (FT)
Basin 1	7,500	1,800	2.0
Basin 2	15,400	3,600	2.0
Basin 3	7,800	1,700	2.0

Proposed basins are sized to provide approximately 0.5FT of retention and an additional 2.0FT of detention.

4.0 SUMMARY

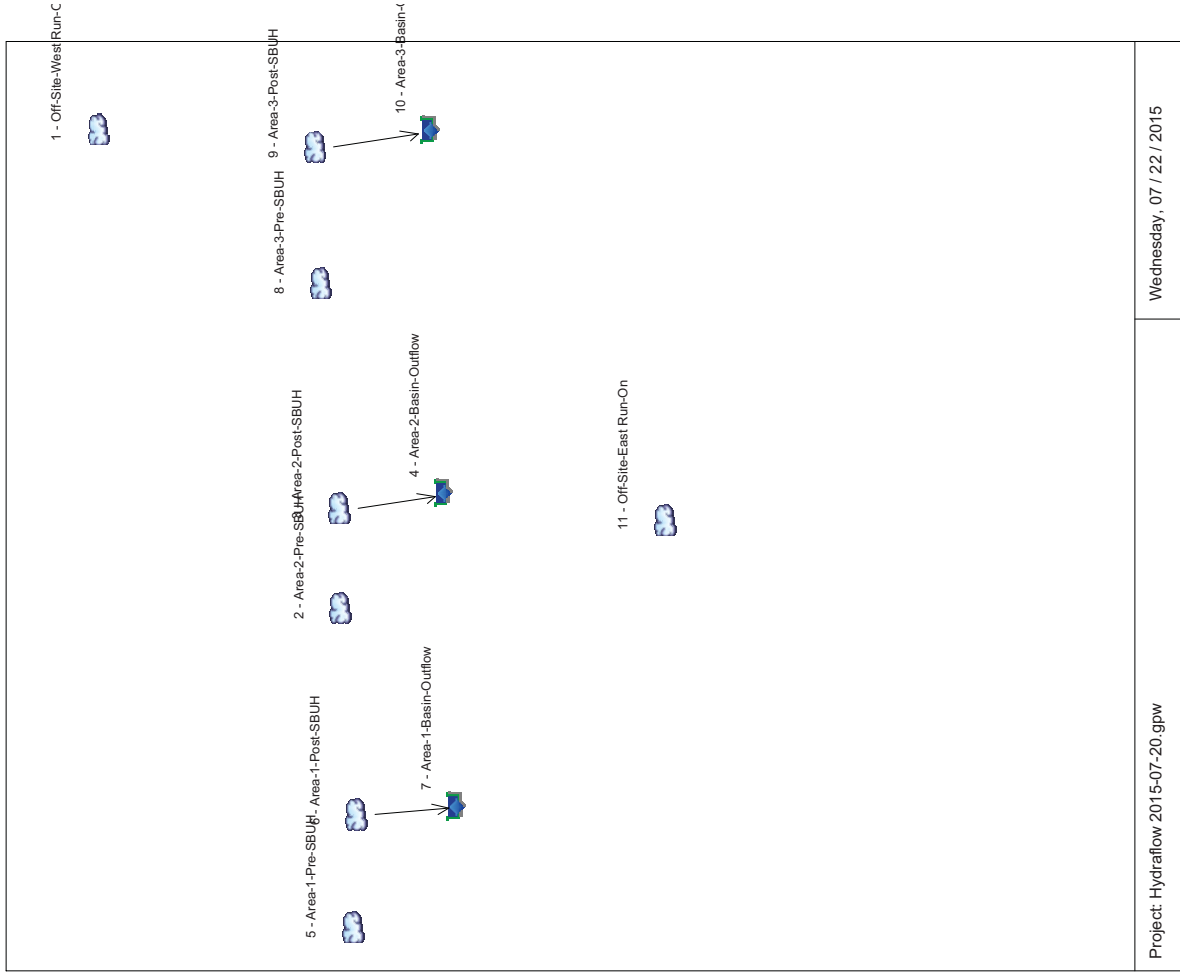
The project as proposed including the detention basins are in conformance with County Flood Control requirements.

- Basins are sized to attenuate post-development flow to pre-development levels.
- Flows for up to the 25 yr storm are additionally limited to 0.07cfs/ac.
- Proposed parcels shall have FF elevations a minimum of 2 feet above the off site overflow water surface elevation.

ATTACHMENTS

Watershed Model Schematic

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Project: Hydratflow 2015-07-20.gpw

Wednesday, 07 / 22 / 2015

Hydrograph Summary Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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 storage used (cuft)	Hydrograph Description
1	SBUH Runoff	1.850	6	1182	68,520	.....	.....	.....	Off-Site-West Run-On
2	SBUH Runoff	0.034	6	1146	1,257	.....	.....	.....	Area-2-Pre-SBUH
3	SBUH Runoff	0.431	6	606	5,972	.....	.....	.....	Area-2-Post-SBUH
4	Reservoir	0.060	6	1308	4,803	3	100.41	2,858	Area-2-Basin-Outflow
5	SBUH Runoff	0.013	6	1146	485	.....	.....	.....	Area-1-Pre-SBUH
6	SBUH Runoff	0.241	6	606	2,806	.....	.....	.....	Area-1-Post-SBUH
7	Reservoir	0.018	6	1440	2,057	6	100.61	1,688	Area-1-Basin-Outflow
8	SBUH Runoff	0.018	6	1146	649	.....	.....	.....	Area-3-Pre-SBUH
9	SBUH Runoff	0.225	6	606	3,121	.....	.....	.....	Area-3-Post-SBUH
10	Reservoir	0.018	6	1446	2,186	9	100.60	1,994	Area-3-Basin-Outflow
11	SBUH Runoff	0.402	6	1152	14,885	Off-Site-East Run-On

Hydratflow 2015-07-20.gpw

Return Period: 2 Year

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Hydrograph Report

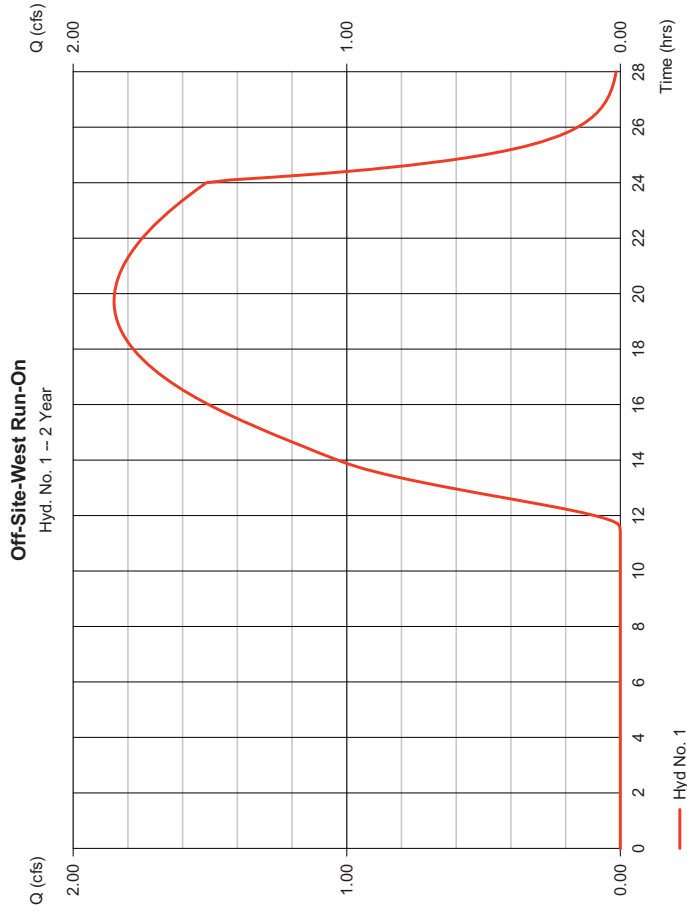
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.850 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.70 hrs
Time interval	= 6 min	Hyd. volume	= 68,520 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

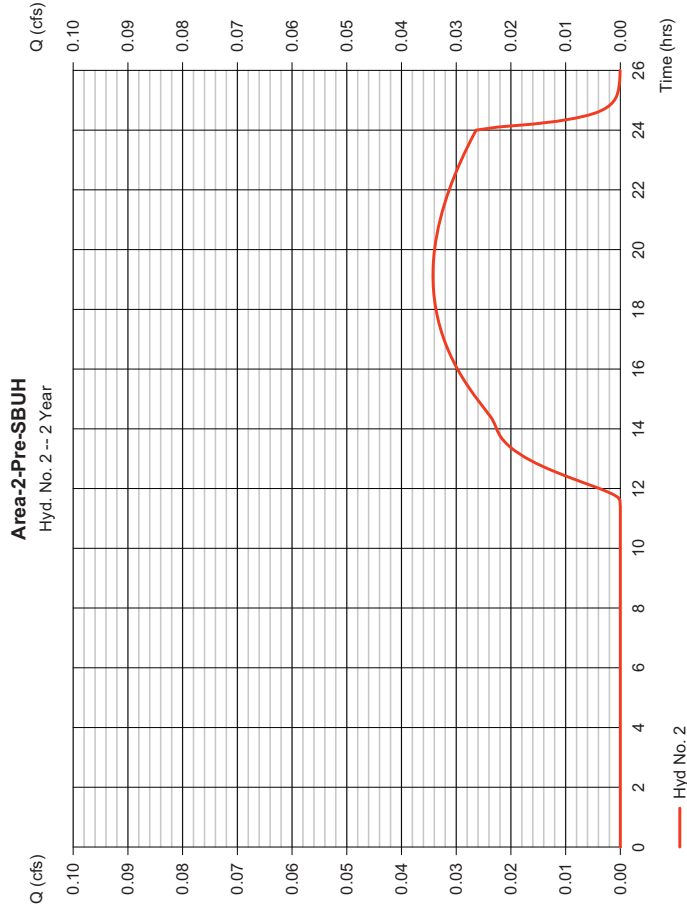
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.034 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.10 hrs
Time interval	= 6 min	Hyd. volume	= 1,257 cuft
Drainage area	= 4,900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

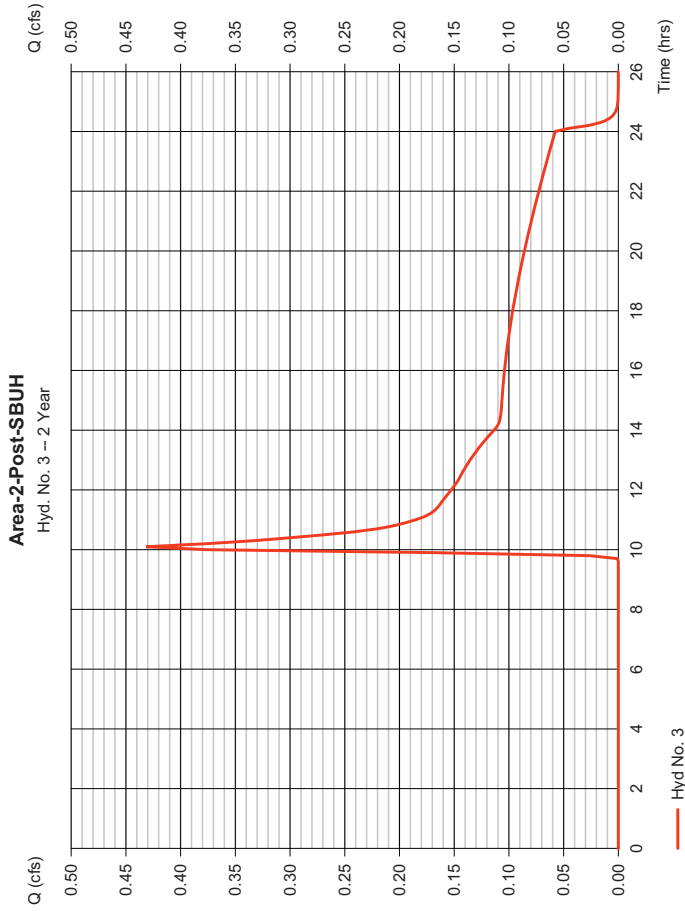
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Hyd. No. 3

Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.431 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 5,972 cuft
Drainage area	= 3,980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3,980



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

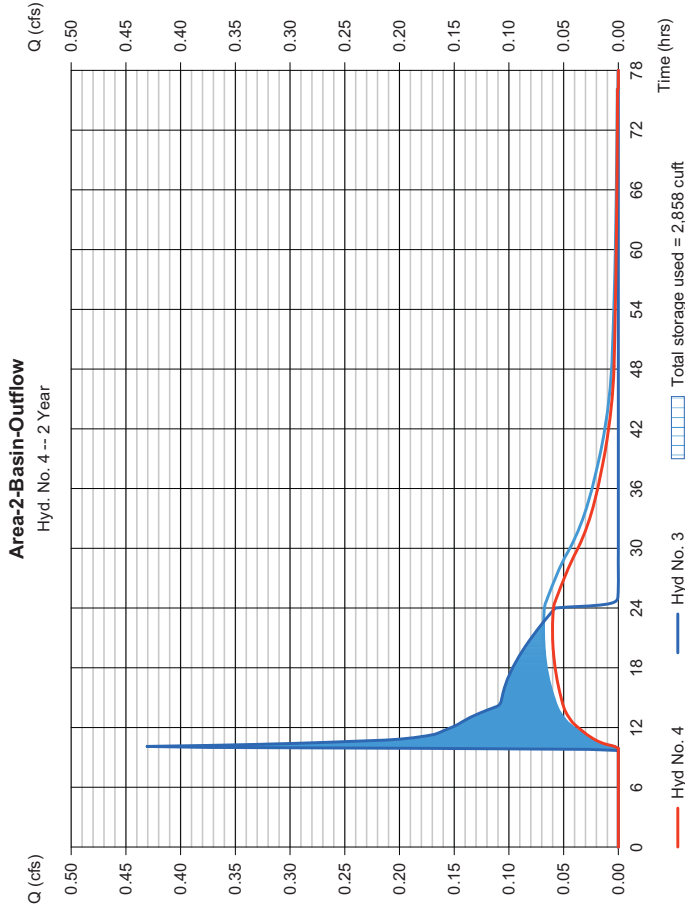
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Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.060 cfs
Storm frequency	= 2 yrs	Time to peak	= 21.80 hrs
Time interval	= 6 min	Hyd. volume	= 4,803 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 100.41 ft
Reservoir name	= Basin 2	Max. Storage	= 2,858 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Pond No. 2 - Basin 2

Trapezoid -Bottom L x W = 110.0 x 60.0 ft. Side slope = 4:00:1. Bottom elev. = 100.00 ft. Depth = 5.00 ft.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	6,600	0	0
0.50	100.50	7,296	3,473	3,473
1.00	101.00	8,024	7,301	7,301
1.50	101.50	8,784	4,201	11,502
2.00	102.00	9,576	4,689	16,091
2.50	102.50	10,400	4,893	21,083
3.00	103.00	11,256	5,413	26,496
3.50	103.50	12,144	5,849	32,345
4.00	104.00	13,064	6,301	38,645
4.50	104.50	14,016	6,769	45,414
5.00	105.00	15,000	7,253	52,667

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]	[A]	[B]	[C]	[D]
Rise (in)	= 2.00	Inactive	2.00	0.00	Crest Len (ft)	= 24.00	0.00	0.00
Span (in)	= 2.00	0.00	2.00	0.00	Crest El. (ft)	= 101.95	0.00	0.00
No. Barrels	= 1	1	0	0	Weir Coeff.	= 2.60	3.33	3.33
Invert El. (ft)	= 100.00	0.00	100.50	0.00	Weir Type	= Broad	---	---
Length (ft)	= 2.00	0.00	2.00	0.00	Multi-Stage	= No	No	No
Slope (%)	= 2.00	0.00	2.00	n/a				
N-Value	= .013	.013	.013	n/a				
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(m/hr)	= 0.100 (by Wet area)		
Multi-Stage	= n/a	No	No	No	TW Elev. (ft)	= 0.00		

Weir Structures

Stage	Storage	Elevation	Civ A	Civ B	Civ C	PrfRsr	Wr A	Wr B	Wr C	Wr D	Exfil	User	Total
ft	cuft	ft	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
0.00	0	100.00	0.00	---	0.00	---	0.00	---	---	---	0.000	---	0.000
0.50	3,473	100.50	0.07 ic	---	0.00	---	0.00	---	---	---	0.017	---	0.085
1.00	7,301	101.00	0.10 ic	---	0.00	---	0.00	---	---	---	0.019	---	0.187
1.50	11,502	101.50	0.13 ic	---	0.10 ic	---	0.00	---	---	---	0.020	---	0.246
2.00	16,091	102.00	0.15 ic	---	0.13 ic	---	0.70	---	---	---	0.022	---	0.991
2.50	21,083	102.50	0.16 ic	---	0.15 ic	---	25.45	---	---	---	0.024	---	25.79
3.00	26,496	103.00	0.18 ic	---	0.16 ic	---	67.14	---	---	---	0.026	---	67.51
3.50	32,345	103.50	0.19 ic	---	0.18 ic	---	120.42	---	---	---	0.029	---	120.82
4.00	38,645	104.00	0.21 ic	---	0.19 ic	---	183.15	---	---	---	0.031	---	183.59
4.50	45,414	104.50	0.22 ic	---	0.21 ic	---	254.09	---	---	---	0.033	---	254.56
5.00	52,667	105.00	0.23 ic	---	0.22 ic	---	332.38	---	---	---	0.035	---	332.87

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

Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

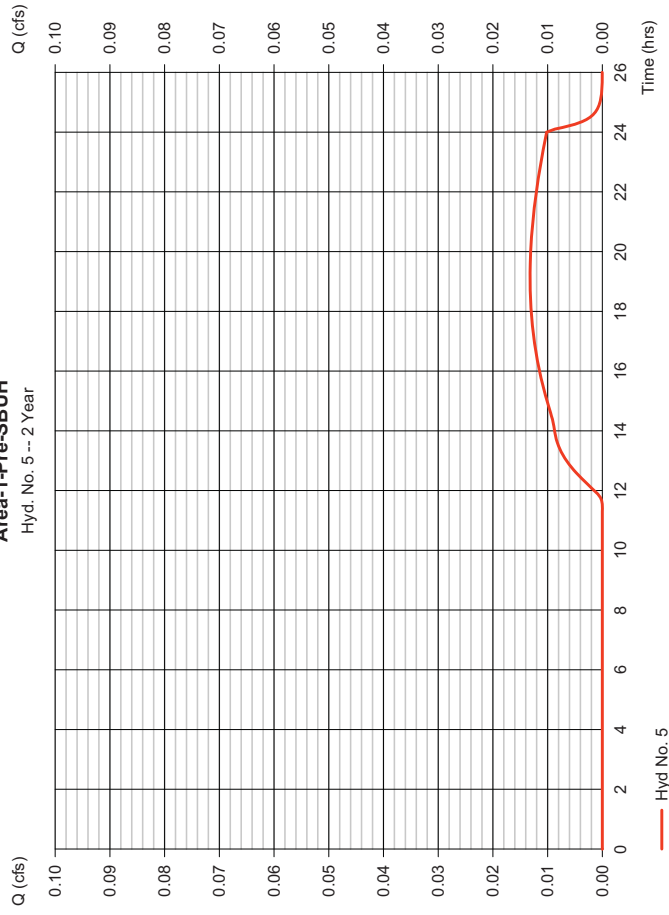
Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.013 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.10 hrs
Time interval	= 6 min	Hyd. volume	= 485 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-1-Pre-SBUH

Hyd. No. 5 -- 2 Year



Hyd No. 5

Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

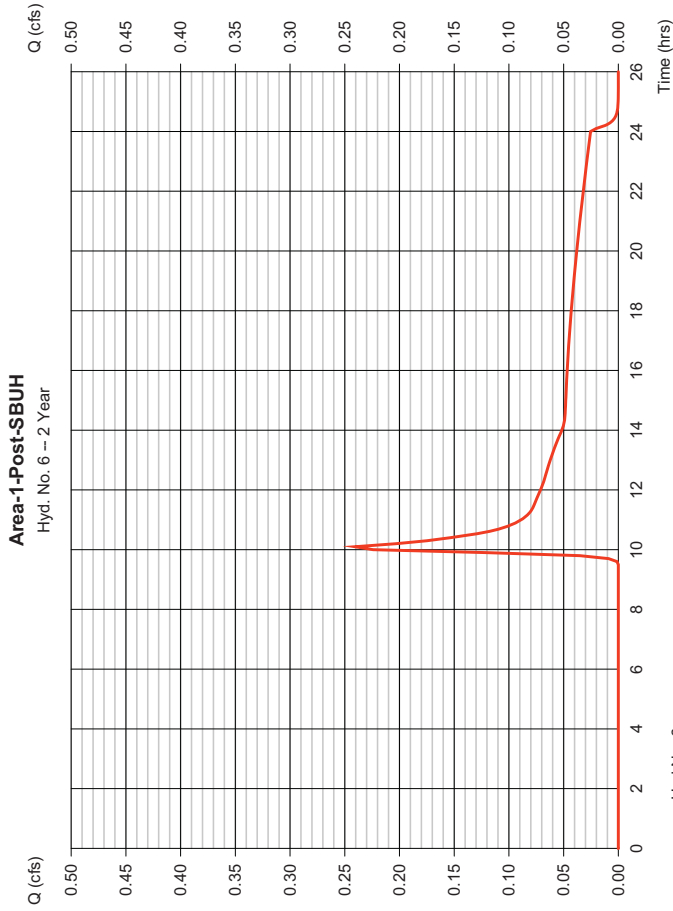
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Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.241 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 2,806 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

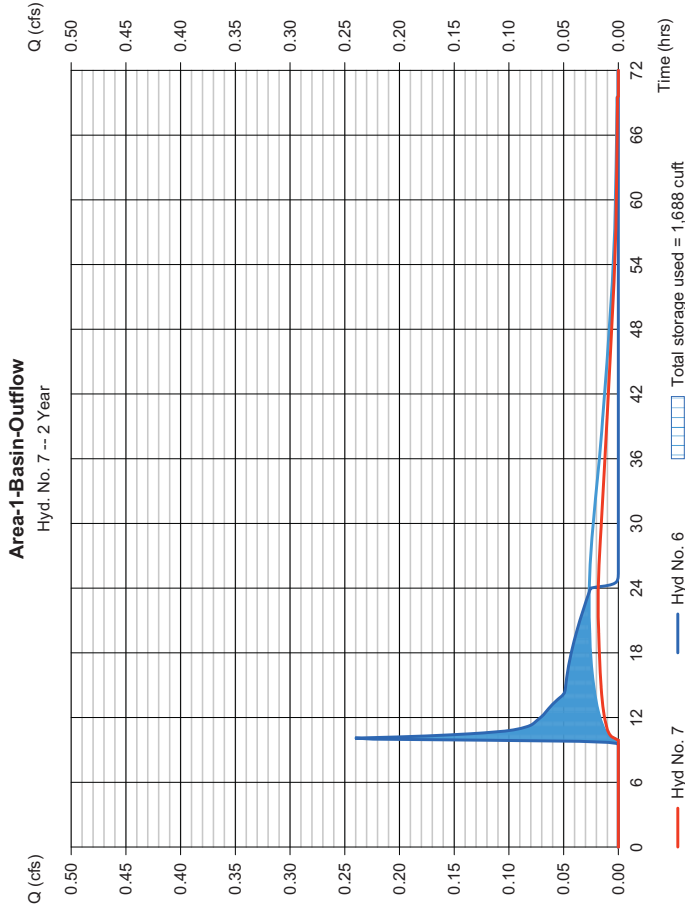
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.018 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.00 hrs
Time interval	= 6 min	Hyd. volume	= 2,057 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 100.61 ft
Reservoir name	= Basin 1	Max. Storage	= 1,688 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Pond No. 1 - Basin 1

Trapezoid -Bottom L x W = 55.0 x 45.0 ft., Side slope = 4:00-1, Bottom elev. = 100.00 ft., Depth = 5.00 ft.

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	2,475	0	0
0.50	100.50	2,891	1,340	1,340
1.00	101.00	3,339	1,556	2,896
1.50	101.50	3,819	1,788	4,684
2.00	102.00	4,331	2,036	6,721
2.50	102.50	4,875	2,300	9,021
3.00	103.00	5,451	2,580	11,601
3.50	103.50	6,059	2,876	14,477
4.00	104.00	6,699	3,188	17,665
4.50	104.50	7,371	3,516	21,181
5.00	105.00	8,075	3,850	25,042

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]	[A]	[B]	[C]	[D]
Rise (in)	= 1.00	2.00	0.00	0.00	Crest Len (ft)	= 12.00	0.00	0.00
Span (in)	= 1.00	2.00	0.00	0.00	Crest El. (ft)	= 102.20	0.00	0.00
No. Barrels	= 1	1	0	0	Weir Coeff.	= 2.60	3.33	3.33
Invert El. (ft)	= 100.00	101.60	0.00	0.00	Weir Type	= Broad	---	---
Length (ft)	= 2.00	2.00	0.00	0.00	Multi-Stage	= No	No	No
Slope (%)	= 2.00	2.00	0.00	n/a				
N-Value	= .013	.013	.013	n/a				
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(m/hr)	= 0.100 (by Wet area)		
Multi-Stage	= n/a	No	No	No	TW Elev. (ft)	= 0.00		

Stage / Storage / Discharge Table	Civ A	Civ B	Civ C	PrfRsr	Wr A	Wr B	Wr C	Wr D	Exfil	User	Total
ft	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.50	1,340	0.02 oc	0.00	0.00	0.00	0.00	0.00	0.00	0.007	0.007	0.023
1.00	2,896	0.02 oc	0.00	0.00	0.00	0.00	0.00	0.00	0.008	0.008	0.032
1.50	4,684	0.03 oc	0.00	0.00	0.00	0.00	0.00	0.00	0.009	0.009	0.039
2.00	6,721	0.03 oc	0.00	0.00	0.00	0.00	0.00	0.00	0.010	0.010	0.04
2.50	9,021	0.04 oc	0.00	0.00	5.13	0.00	0.00	0.00	0.011	0.011	0.04
3.00	11,601	0.04 oc	0.00	0.00	22.33	0.00	0.00	0.00	0.013	0.013	0.04
3.50	14,477	0.05 oc	0.00	0.00	48.25	0.00	0.00	0.00	0.014	0.014	0.04
4.00	17,665	0.05 oc	0.00	0.00	75.35	0.00	0.00	0.00	0.016	0.016	0.04
4.50	21,181	0.05 oc	0.00	0.00	108.83	0.00	0.00	0.00	0.018	0.018	0.04
5.00	25,042	0.05 oc	0.00	0.00	146.18	0.00	0.00	0.00	0.019	0.019	0.04

Note: Culvert/Orifice outflows are analyzed under inlet (ci) and outlet (co) control. Weir risers checked for orifice conditions (ci) and submergence (s).

Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

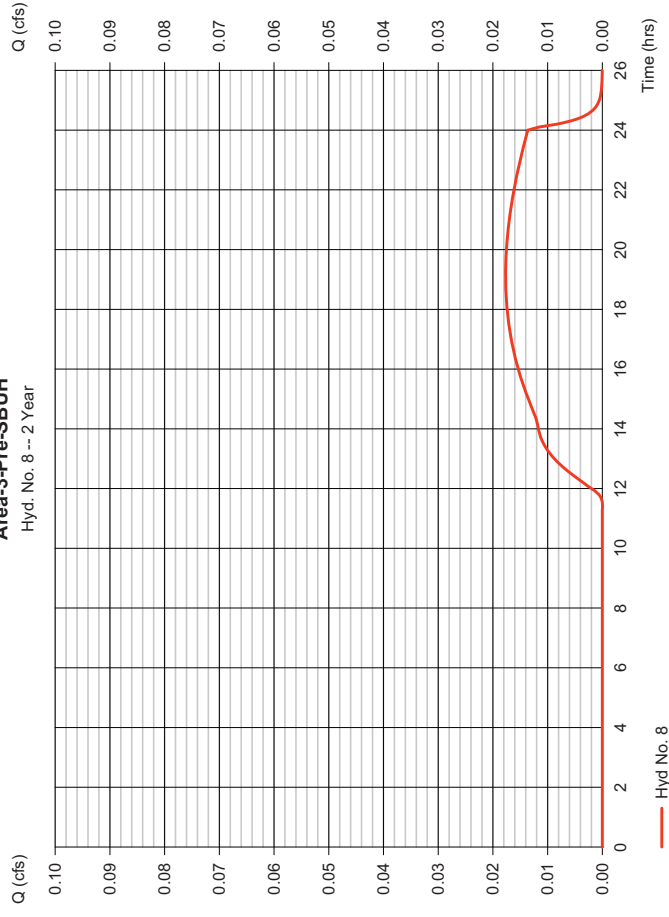
Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.10 hrs
Time interval	= 6 min	Hyd. volume	= 649 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-3-Pre-SBUH

Hyd. No. 8 -- 2 Year



Hyd No. 8

Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

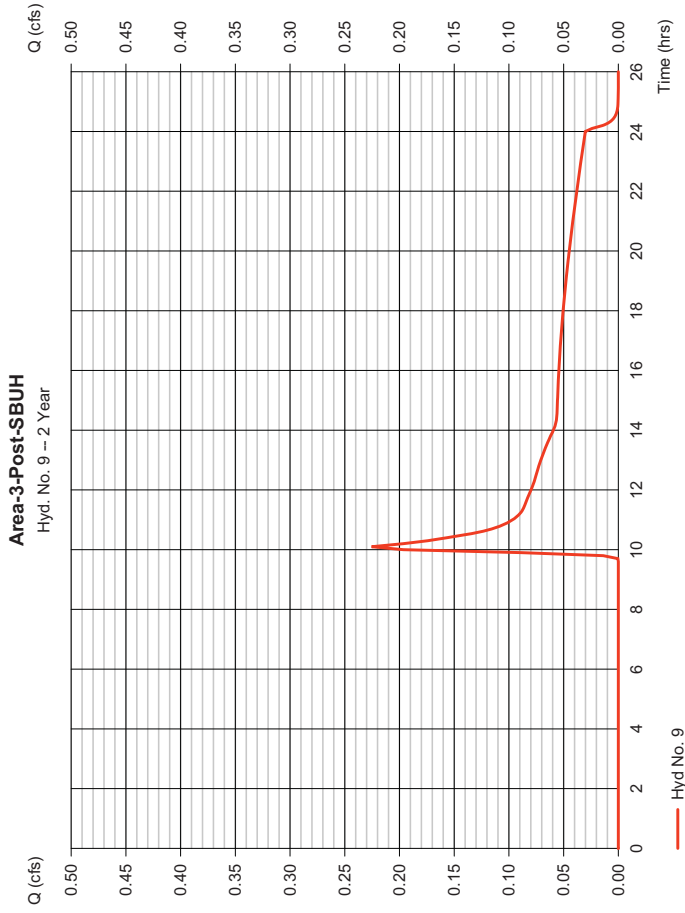
Wednesday, 07 / 22 / 2015

Hyd. No. 9

Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.225 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 3,121 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.460 x 98) + (1.080 x 61) + (0.200 x 98) + (0.100 x 61) + (0.230 x 61)] / 2.080



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

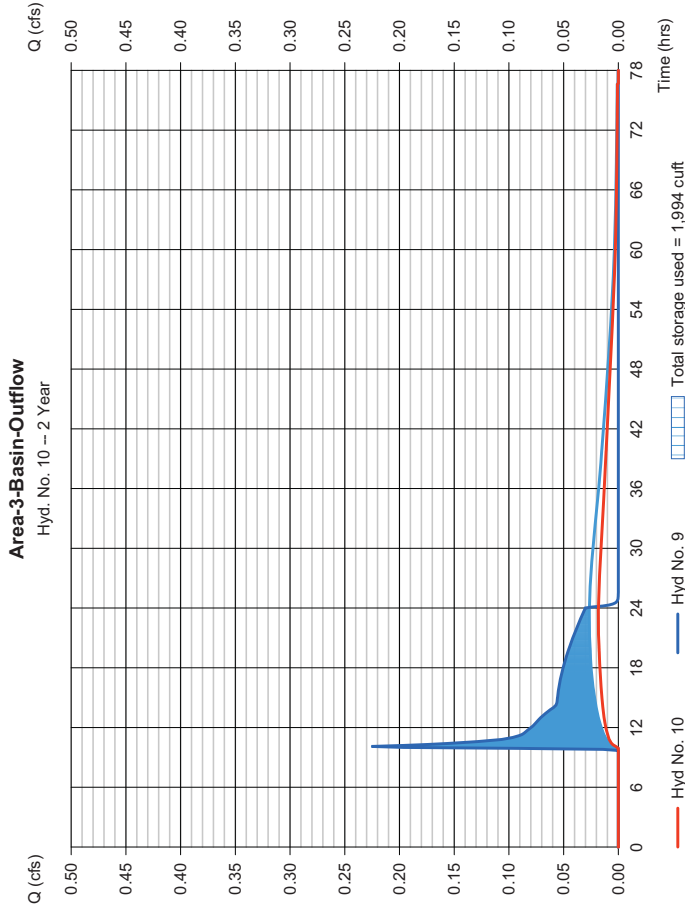
Wednesday, 07 / 22 / 2015

Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.018 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.10 hrs
Time interval	= 6 min	Hyd. volume	= 2,186 cuft
Inflow hyd. No.	= 9 - Area-3-Post-SBUH	Max. Elevation	= 100.60 ft
Reservoir name	= Basin 3	Max. Storage	= 1,994 cuft

Storage indication method used. Exfiltration extracted from Outflow.



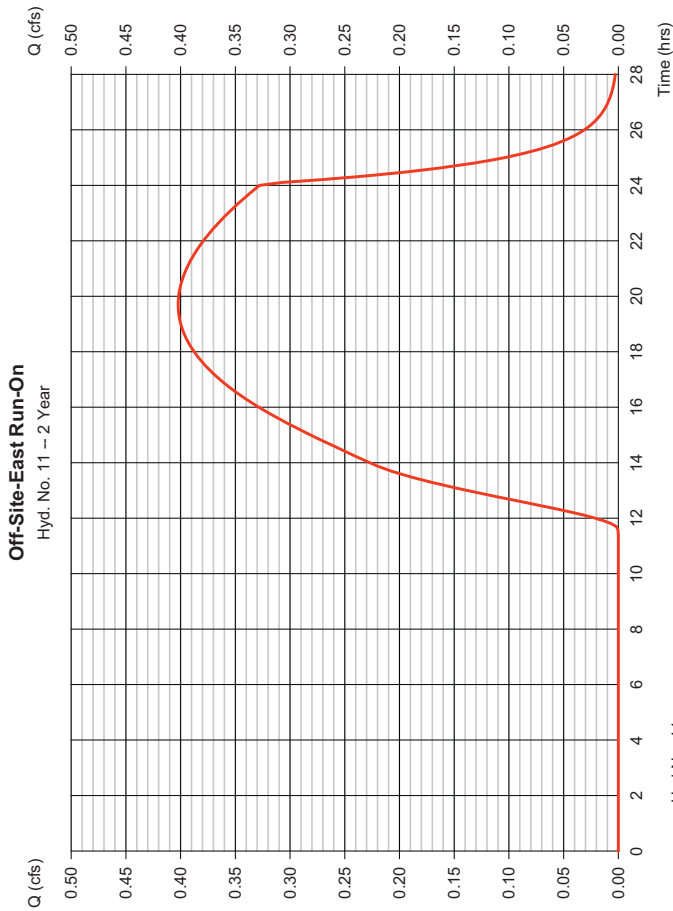
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
Wednesday, 07 / 22 / 2015

Hyd. No. 11

Off-Site-East Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.402 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.70 hrs
Time interval	= 6 min	Hyd. volume	= 14,885 cuft
Drainage area	= 58,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 49.80 min
Total precip.	= 2.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Pond Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
Wednesday, 07 / 22 / 2015

Pond No. 3 - Basin 3

Pond Data

Trapezoid -Bottom L x W = 68.0 x 44.0 ft., Side slope = 4:00-1, Bottom elev. = 100.00 ft., Depth = 5.00 ft.

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	2,992	0	0
0.50	100.50	3,456	1,611	1,611
1.00	101.00	3,952	1,851	3,461
1.50	101.50	4,480	2,107	5,568
2.00	102.00	5,040	2,379	7,947
2.50	102.50	5,632	2,667	10,613
3.00	103.00	6,256	2,871	13,584
3.50	103.50	6,912	3,291	16,875
4.00	104.00	7,600	3,627	20,501
4.50	104.50	8,320	3,979	24,480
5.00	105.00	9,072	4,347	28,827

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]	[A]	[B]	[C]	[D]
Rise (in)	= 1.00	2.00	0.00	0.00	Crest Len (ft)	= 12.00	0.00	0.00
Span (in)	= 1.00	2.00	0.00	0.00	Crest El. (ft)	= 102.00	0.00	0.00
No. Barrels	= 1	1	0	0	Weir Coeff.	= 2.60	3.33	3.33
Invert El. (ft)	= 100.00	100.70	0.00	0.00	Weir Type	= Broad	--	--
Length (ft)	= 2.00	2.00	0.00	0.00	Multi-Stage	= No	No	No
Slope (%)	= 2.00	2.00	0.00	n/a				
N-Value	= .013	.013	.013	n/a				
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(m/hr)	= 0.100 (by Wet area)		
Multi-Stage	= n/a	No	No	No	TW Elev. (ft)	= 0.00		

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	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.50	1,611	100.50	0.02 oc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.008	0.009	0.025
1.00	3,461	101.00	0.02 oc	0.05 ic	0.00	0.00	0.00	0.00	0.00	0.00	0.010	0.010	0.082
1.50	5,568	101.50	0.03 oc	0.09 ic	0.00	0.00	0.00	0.00	0.00	0.00	0.012	0.012	0.129
2.00	7,947	102.00	0.03 oc	0.12 ic	0.00	0.00	0.00	0.00	0.00	0.00	0.013	0.013	0.162
2.50	10,613	102.50	0.04 oc	0.14 ic	0.00	0.00	11.03	0.00	0.00	0.00	0.015	0.015	1.122
3.00	13,584	103.00	0.04 oc	0.16 ic	0.00	0.00	31.20	0.00	0.00	0.00	0.016	0.016	3.141
3.50	16,875	103.50	0.05 oc	0.17 ic	0.00	0.00	57.32	0.00	0.00	0.00	0.018	0.018	5.755
4.00	20,501	104.00	0.05 oc	0.19 ic	0.00	0.00	88.25	0.00	0.00	0.00	0.020	0.020	8.850
4.50	24,480	104.50	0.05 oc	0.20 ic	0.00	0.00	123.33	0.00	0.00	0.00	0.022	0.022	123.60
5.00	28,827	105.00	0.05 oc	0.22 ic	0.00	0.00	162.12	0.00	0.00	0.00	0.022	0.022	162.41

Note: Culvert/Orifice outflows are analyzed under inlet (ci) and outlet (co) control. Weir rises checked for orifice conditions (ci) and submergence (s).

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	SBUH Runoff	7.584	6	774	320,543				Off-Site-West Run-On
2	SBUH Runoff	0.146	6	708	5,883				Area-2-Pre-SBUH
3	SBUH Runoff	1.513	6	600	13,923				Area-2-Post-SBUH
4	Reservoir	0.154	6	1170	11,913	3	100.90	6,517	Area-2-Basin-Outflow
5	SBUH Runoff	0.056	6	708	2,269				Area-1-Pre-SBUH
6	SBUH Runoff	0.725	6	600	6,236				Area-1-Post-SBUH
7	Reservoir	0.029	6	1446	4,681	6	101.45	4,488	Area-1-Basin-Outflow
8	SBUH Runoff	0.075	6	708	3,037				Area-3-Pre-SBUH
9	SBUH Runoff	0.791	6	600	7,276				Area-3-Post-SBUH
10	Reservoir	0.080	6	1176	5,913	9	101.06	3,707	Area-3-Basin-Outflow
11	SBUH Runoff	1.653	6	768	69,631				Off-Site-East Run-On

Hydraflow 2015-07-20.gpw

Return Period: 5 Year

Wednesday, 07 / 22 / 2015

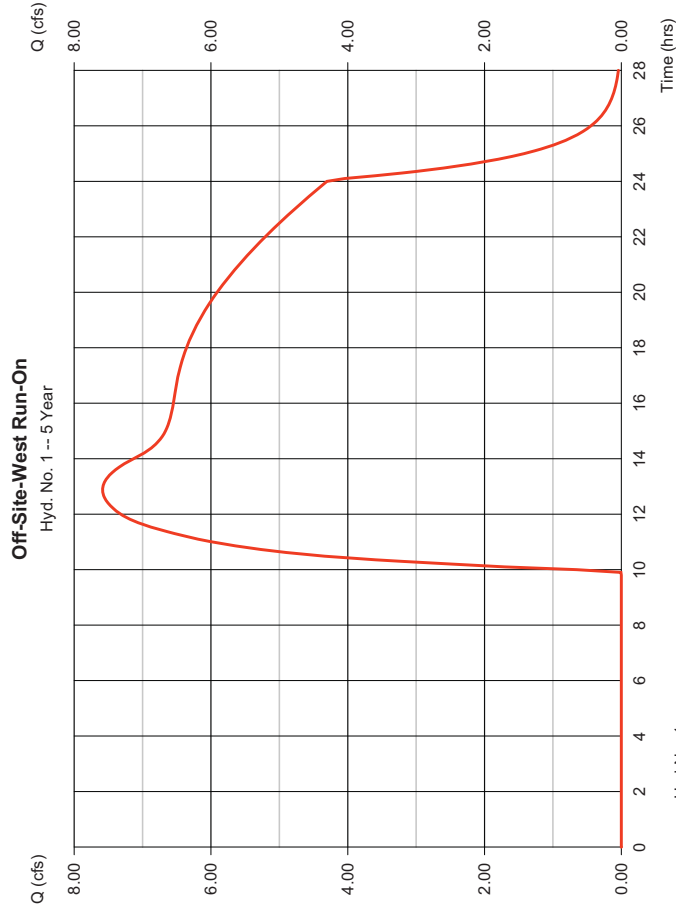
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 7.584 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.90 hrs
Time interval	= 6 min	Hyd. volume	= 320,543 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

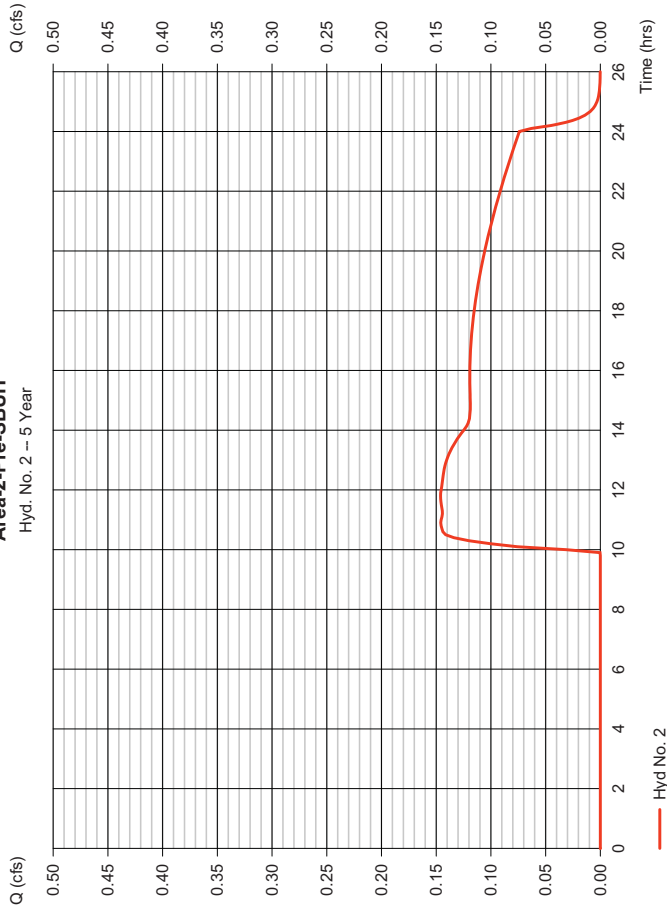
Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.146 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.80 hrs
Time interval	= 6 min	Hyd. volume	= 5,883 cuft
Drainage area	= 4.900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-2-Pre-SBUH

Hyd. No. 2 -- 5 Year



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

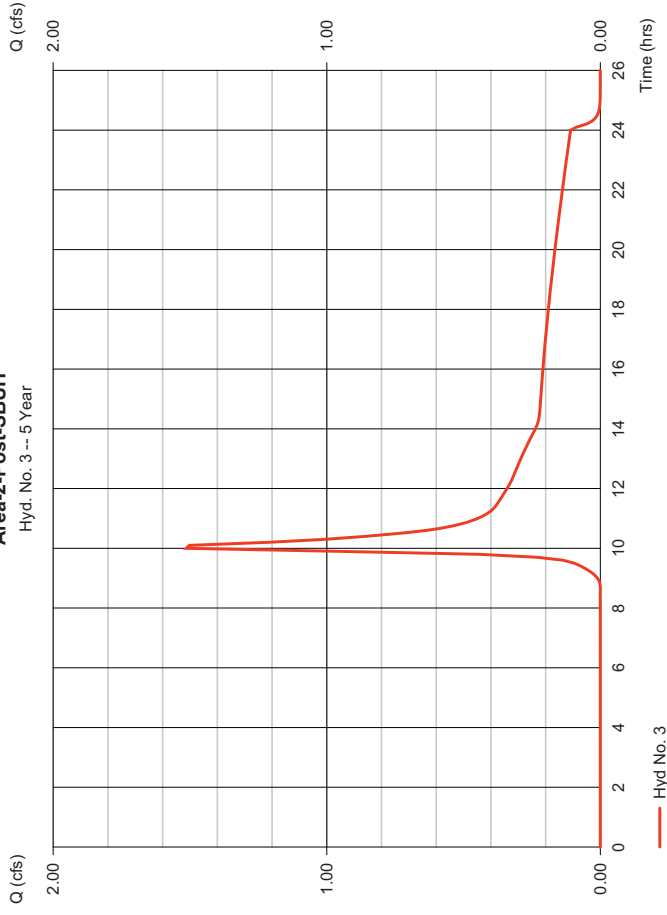
Hyd. No. 3

Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.513 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 13,923 cuft
Drainage area	= 3.980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-2-Post-SBUH

Hyd. No. 3 -- 5 Year



* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3,980

Hydrograph Report

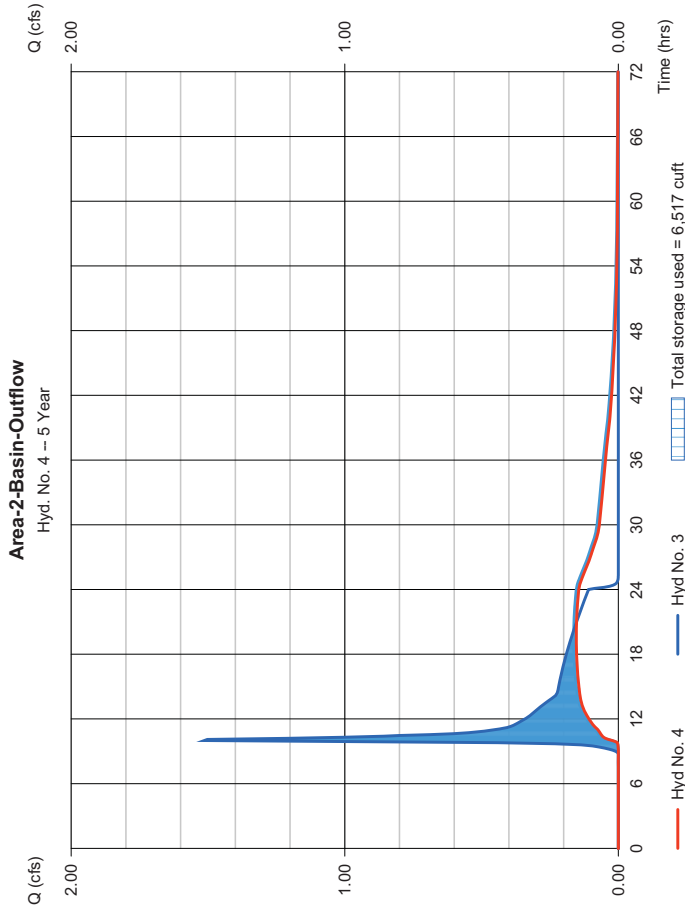
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.154 cfs
Storm frequency	= 5 yrs	Time to peak	= 19.50 hrs
Time interval	= 6 min	Hyd. volume	= 11,913 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 100.90 ft
Reservoir name	= Basin 2	Max. Storage	= 6,517 cuft

Storage indication method used. Exfiltration extracted from Outflow.



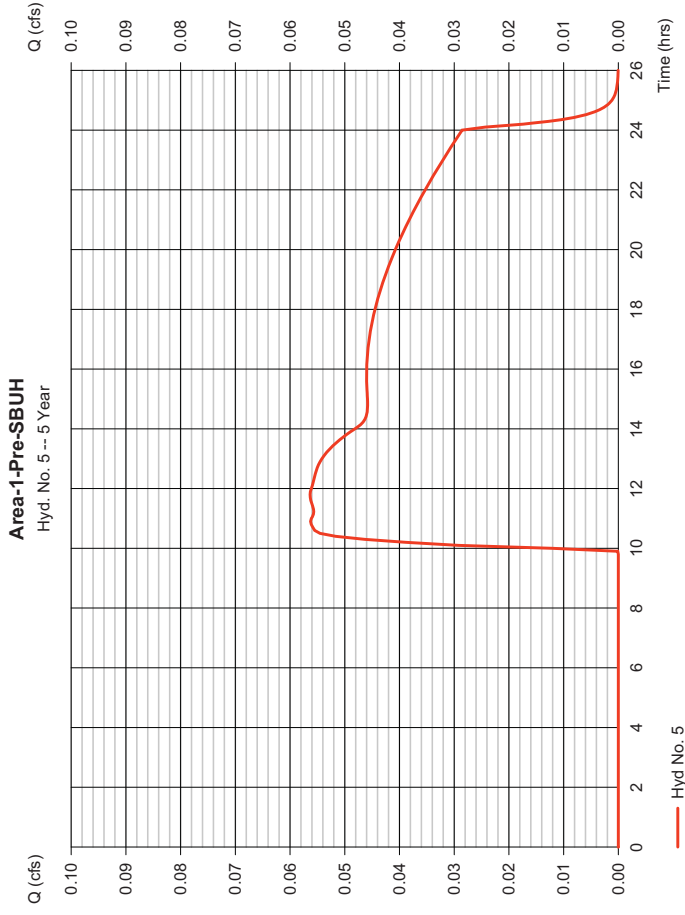
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.056 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.80 hrs
Time interval	= 6 min	Hyd. volume	= 2,269 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

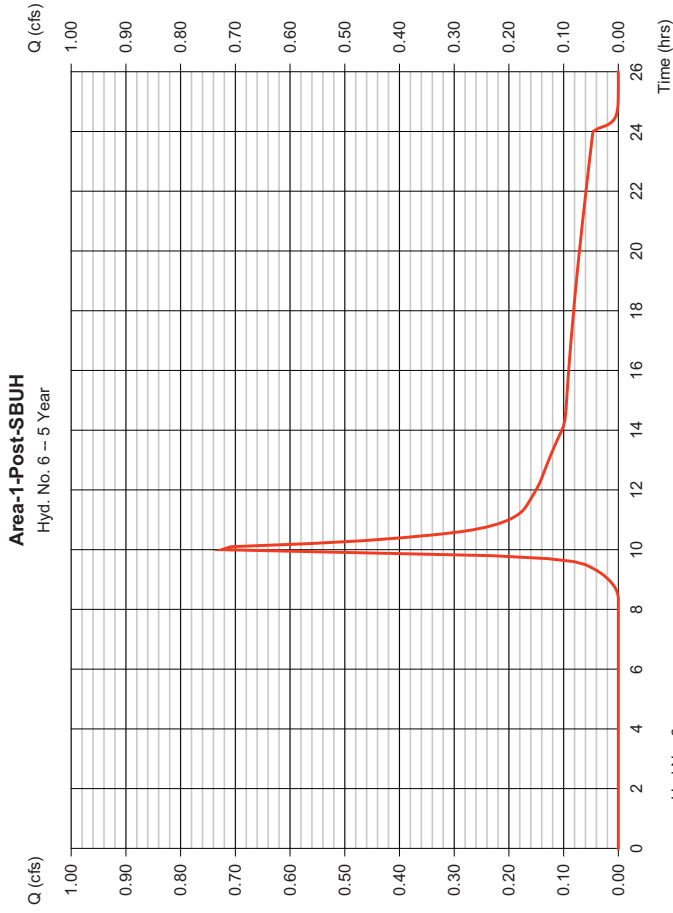
Wednesday, 07 / 22 / 2015

Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.725 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 6,236 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

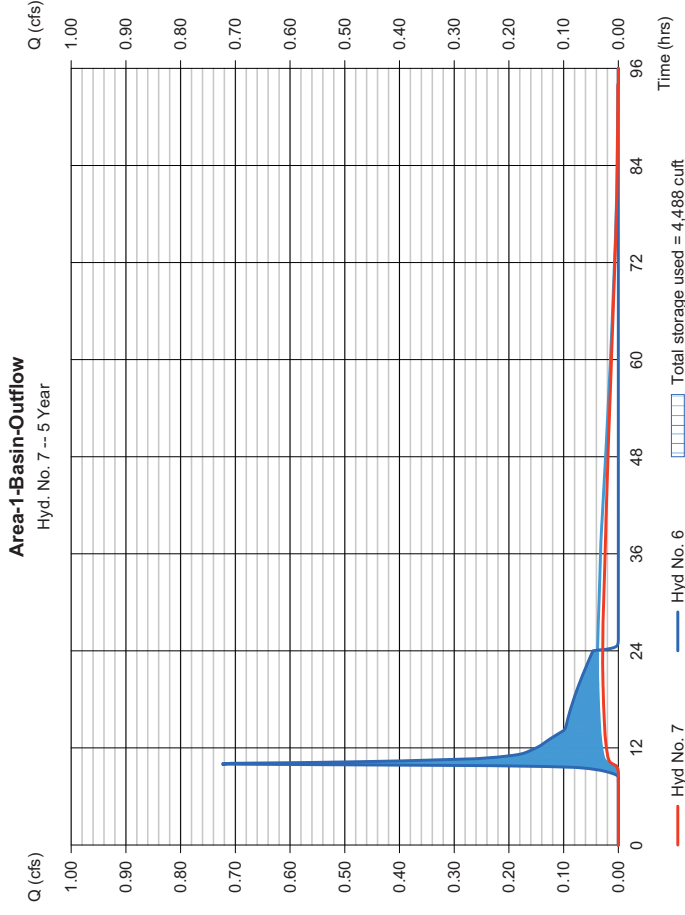
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.029 cfs
Storm frequency	= 5 yrs	Time to peak	= 24.10 hrs
Time interval	= 6 min	Hyd. volume	= 4,681 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 101.45 ft
Reservoir name	= Basin 1	Max. Storage	= 4,488 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

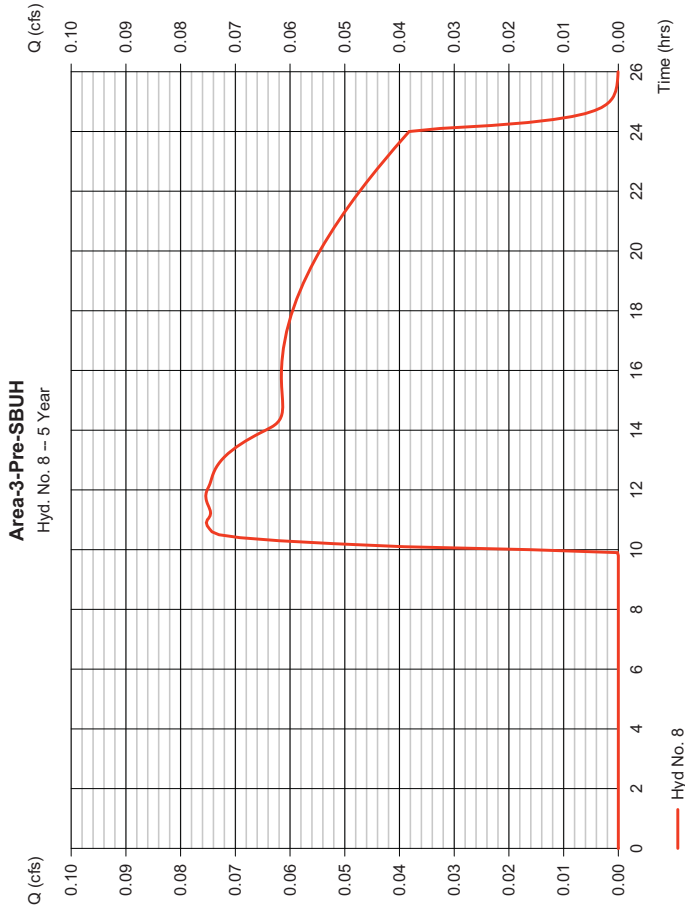
Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.075 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.80 hrs
Time interval	= 6 min	Hyd. volume	= 3.037 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

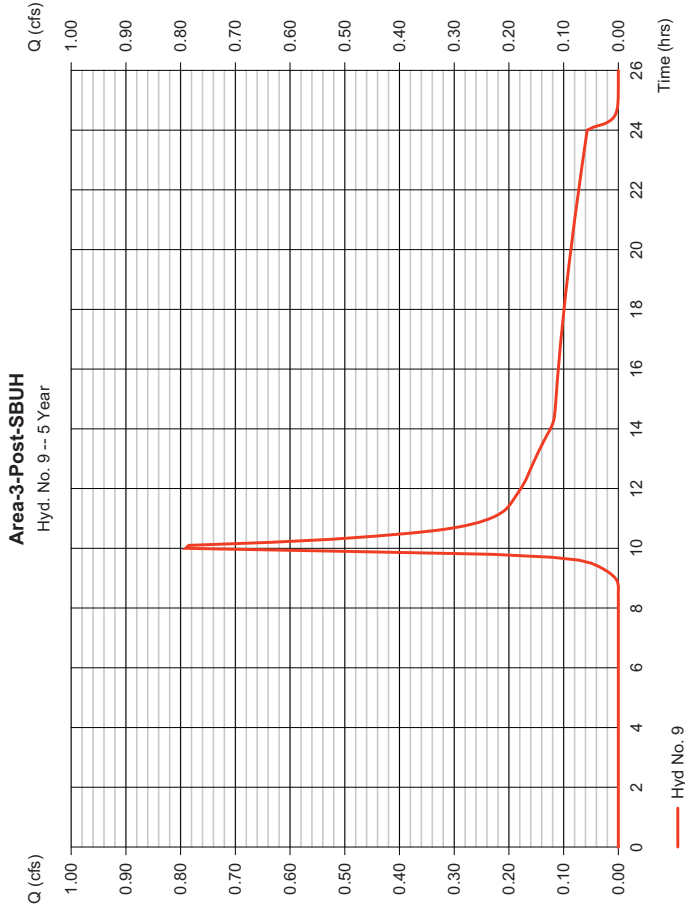
Wednesday, 07 / 22 / 2015

Hyd. No. 9

Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.791 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 7.276 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.460 x 98) + (1.080 x 61) + (0.200 x 98) + (0.100 x 61) + (0.230 x 61)] / 2.080



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

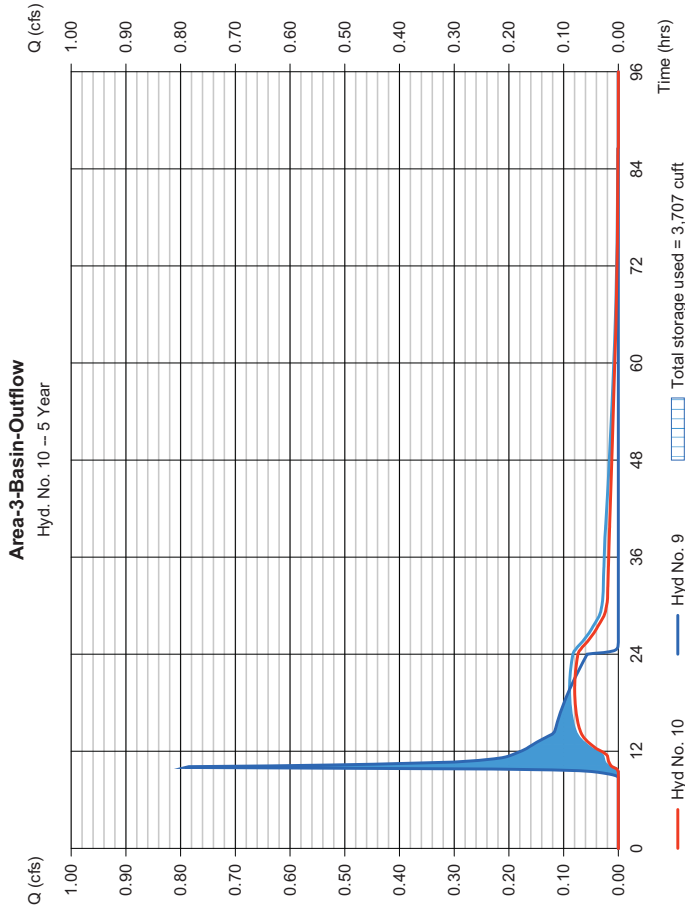
Wednesday, 07 / 22 / 2015

Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.080 cfs
Storm frequency	= 5 yrs	Time to peak	= 19.60 hrs
Time interval	= 6 min	Hyd. volume	= 5,913 cuft
Inflow hyd. No.	= 9 - Area-3-Post-SBUH	Max. Elevation	= 101.06 ft
Reservoir name	= Basin 3	Max. Storage	= 3,707 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

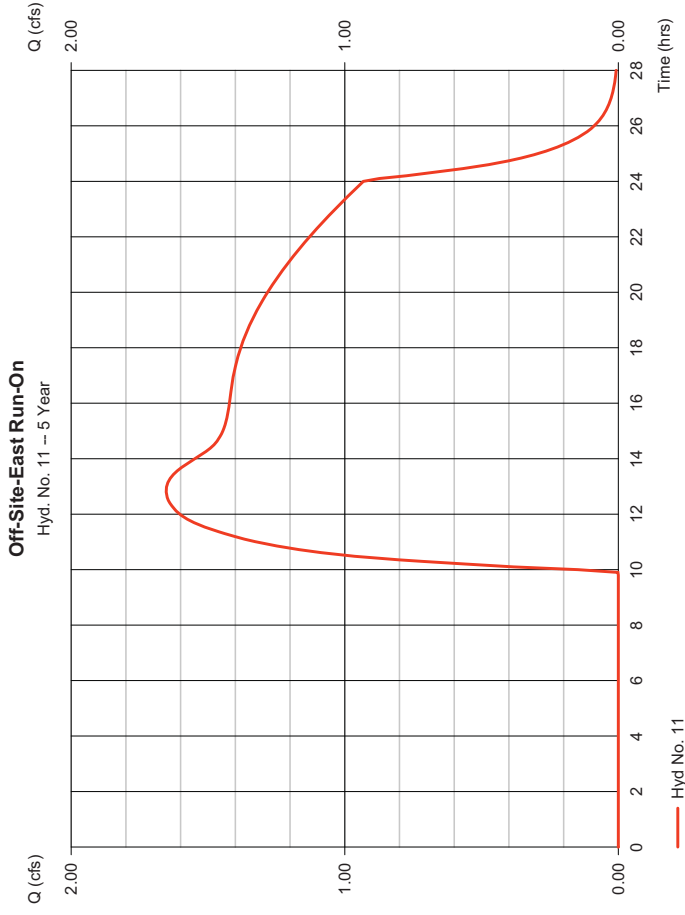
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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Hyd. No. 11

Off-Site-East Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.653 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.80 hrs
Time interval	= 6 min	Hyd. volume	= 69,631 cuft
Drainage area	= 58,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 49.80 min
Total precip.	= 3.17 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	SBUH Runoff	15.64	6	660	567,130				Off-Site-West Run-On
2	SBUH Runoff	0.440	6	612	10,408				Area-2-Pre-SBUH
3	SBUH Runoff	2.450	6	600	20,221				Area-2-Post-SBUH
4	Reservoir	0.207	6	1188	17,794	3	101.32	10,016	Area-2-Basin-Outflow
5	SBUH Runoff	0.170	6	612	4,015				Area-1-Pre-SBUH
6	SBUH Runoff	1.125	6	600	8,903				Area-1-Post-SBUH
7	Reservoir	0.070	6	1308	7,005	6	101.83	6,017	Area-1-Basin-Outflow
8	SBUH Runoff	0.227	6	612	5,374				Area-3-Pre-SBUH
9	SBUH Runoff	1.280	6	600	10,568				Area-3-Post-SBUH
10	Reservoir	0.113	6	1158	9,018	9	101.42	5,243	Area-3-Basin-Outflow
11	SBUH Runoff	3.443	6	654	123,197				Off-Site-East Run-On

Hydratflow 2015-07-20.gpw

Return Period: 10 Year

Wednesday, 07 / 22 / 2015

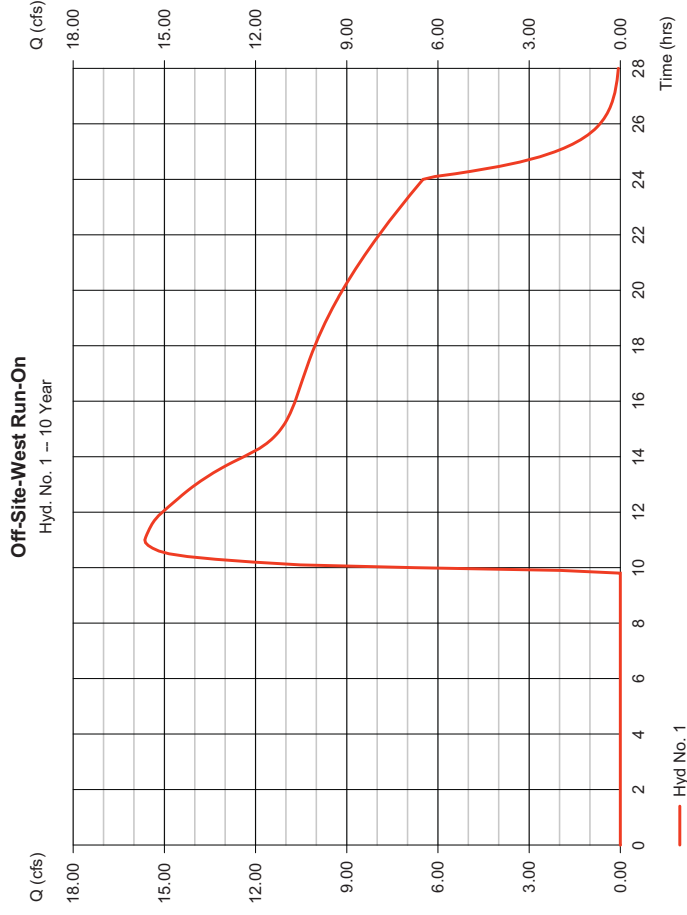
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 15.64 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.00 hrs
Time interval	= 6 min	Hyd. volume	= 567,130 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

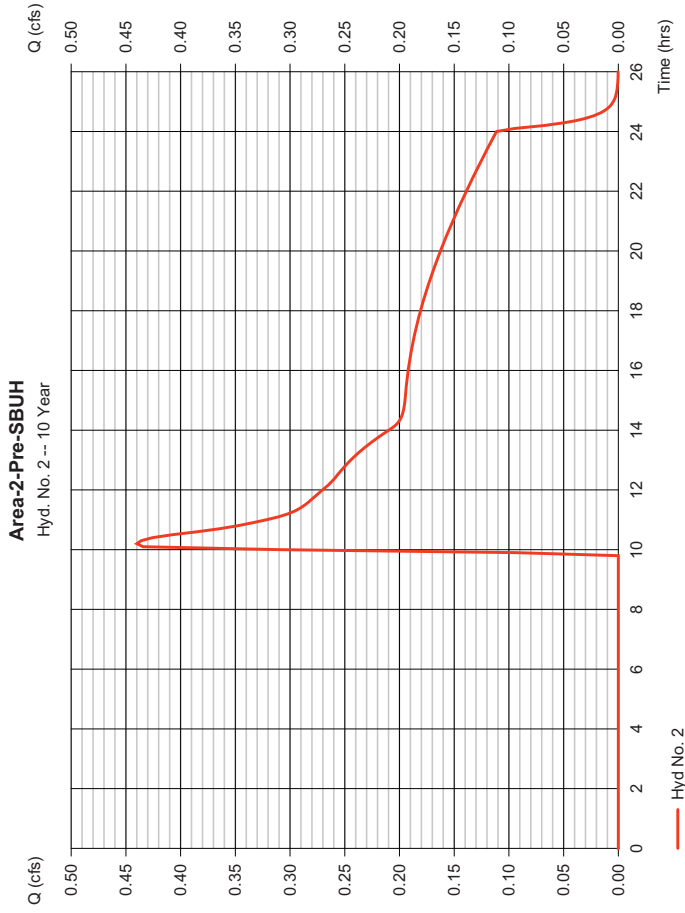
Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.440 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.20 hrs
Time interval	= 6 min	Hyd. volume	= 10,408 cuft
Drainage area	= 4.900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

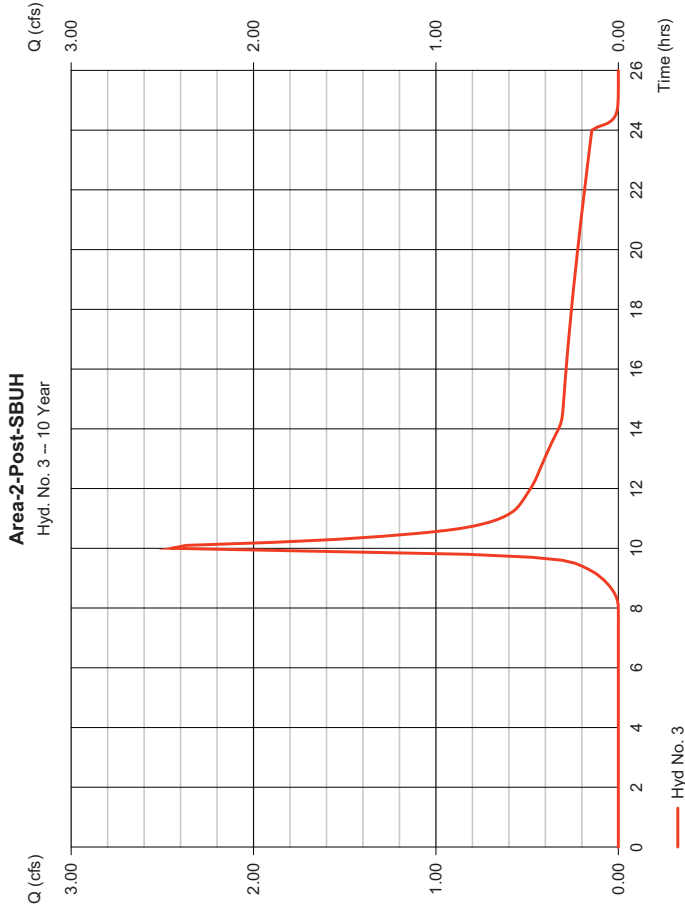
Wednesday, 07 / 22 / 2015

Hyd. No. 3

Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.450 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 20,221 cuft
Drainage area	= 3.980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3,980



Hydrograph Report

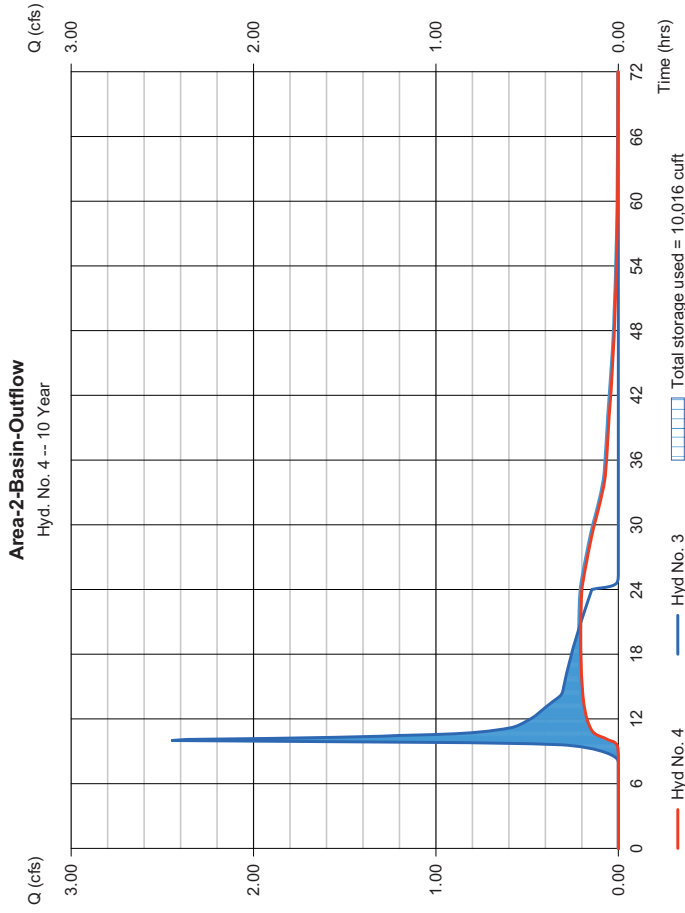
Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.207 cfs
Storm frequency	= 10 yrs	Time to peak	= 19.80 hrs
Time interval	= 6 min	Hyd. volume	= 17,794 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 101.32 ft
Reservoir name	= Basin 2	Max. Storage	= 10,016 cuft

Storage indication method used. Exfiltration extracted from Outflow.



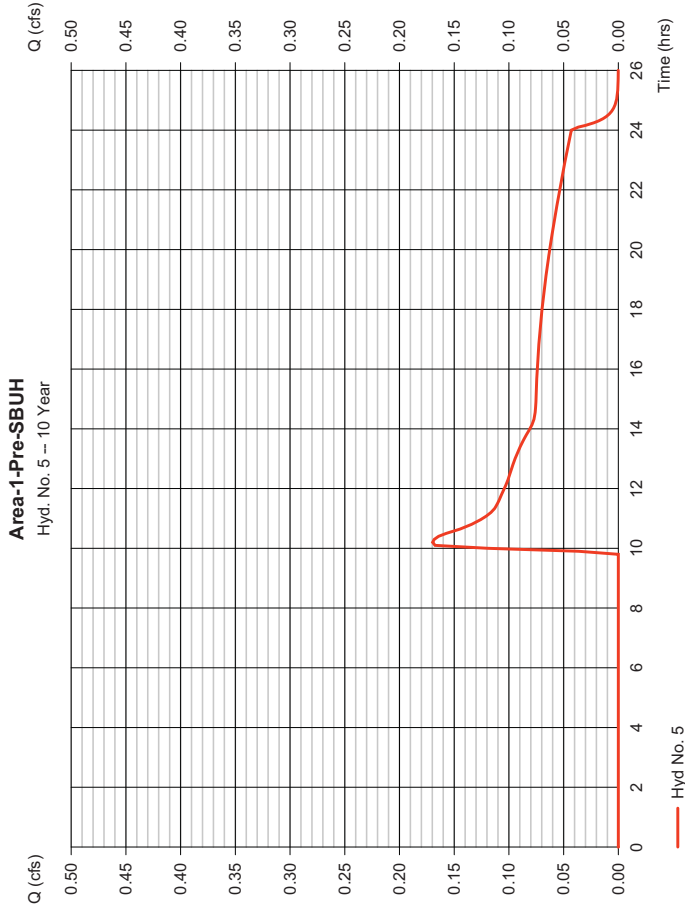
Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.170 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.20 hrs
Time interval	= 6 min	Hyd. volume	= 4,015 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

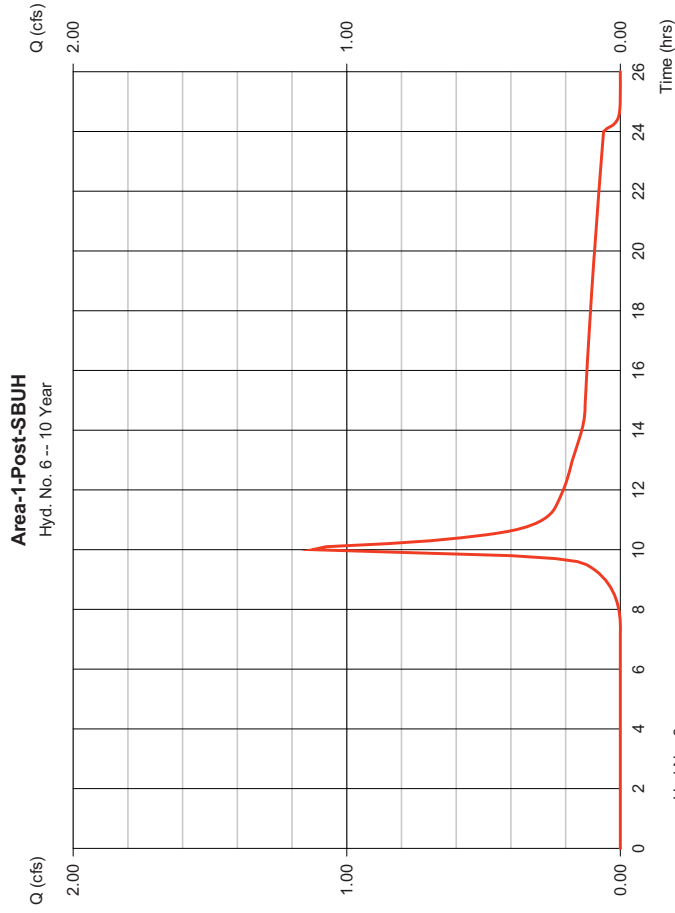
Wednesday, 07 / 22 / 2015

Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.125 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 8,903 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

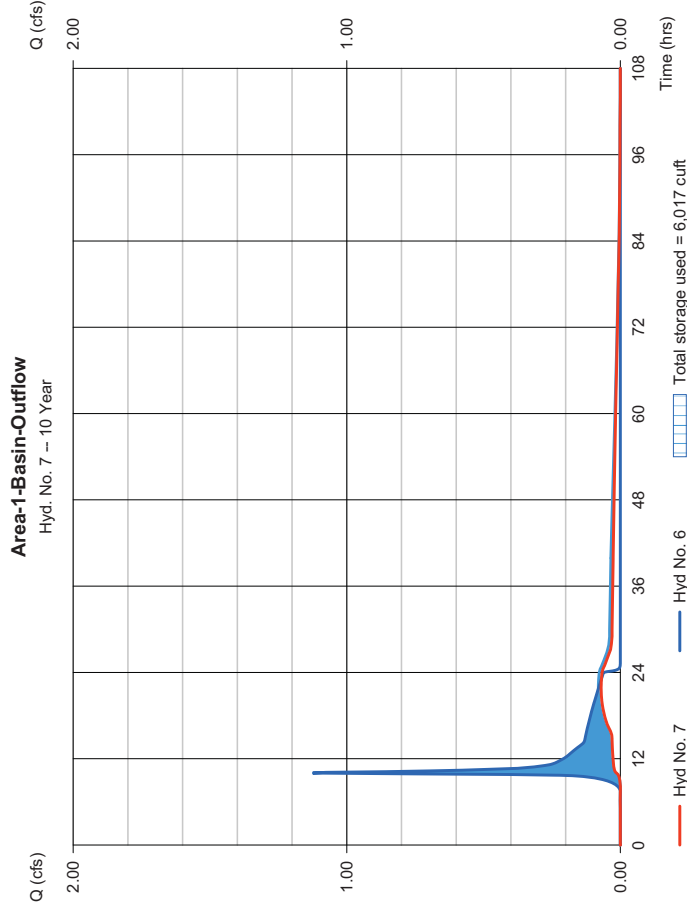
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.070 cfs
Storm frequency	= 10 yrs	Time to peak	= 21.80 hrs
Time interval	= 6 min	Hyd. volume	= 7,005 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 101.83 ft
Reservoir name	= Basin 1	Max. Storage	= 6,017 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

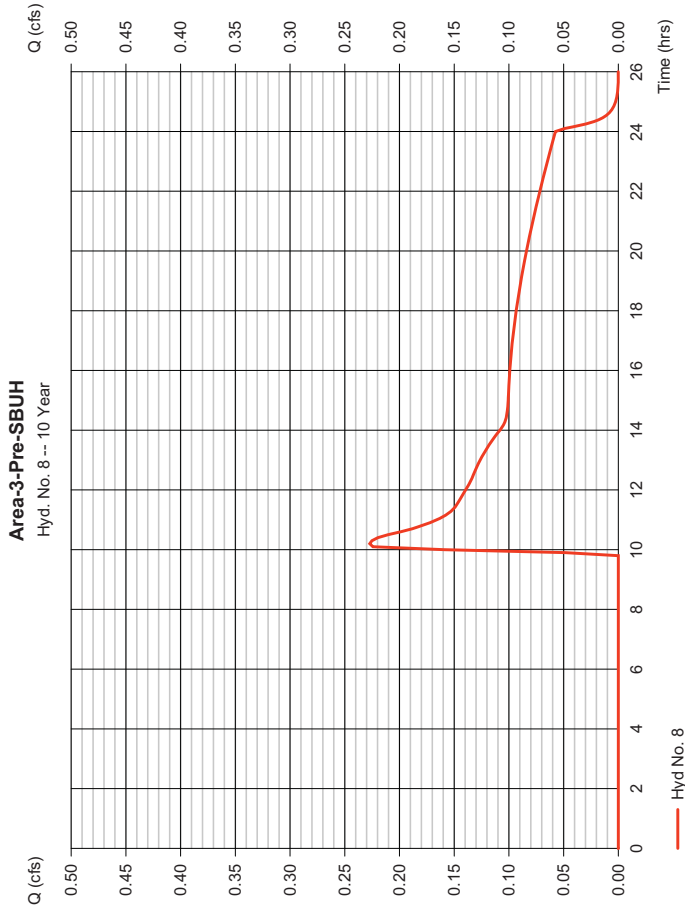
Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.227 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.20 hrs
Time interval	= 6 min	Hyd. volume	= 5,374 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

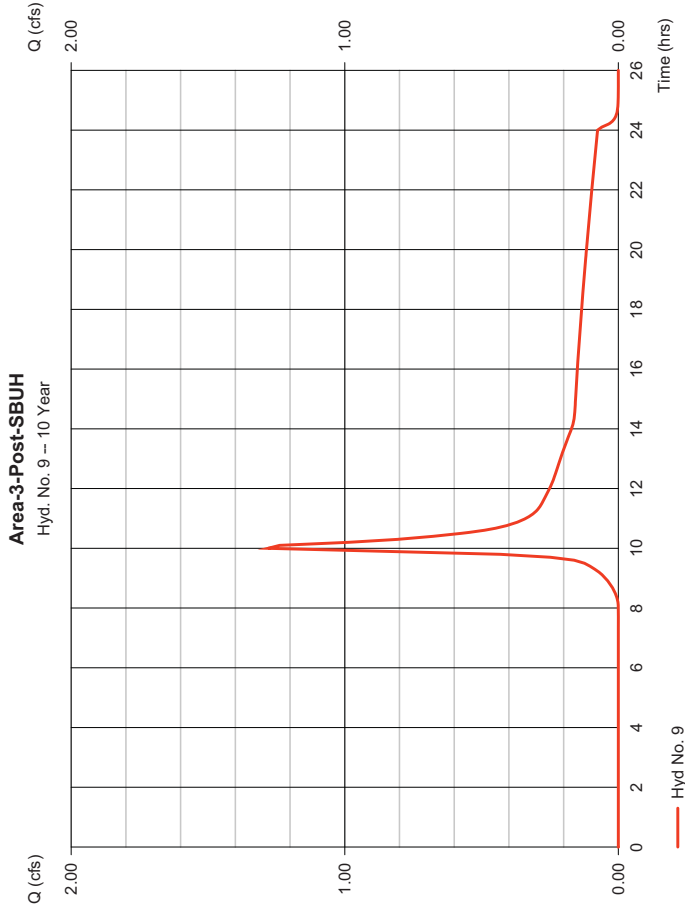
Wednesday, 07 / 22 / 2015

Hyd. No. 9

Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.280 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 10,568 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = $[(0.460 \times 98) + (1.080 \times 61) + (0.200 \times 98) + (0.100 \times 61) + (0.230 \times 61)] / 2.080$



Hydrograph Report

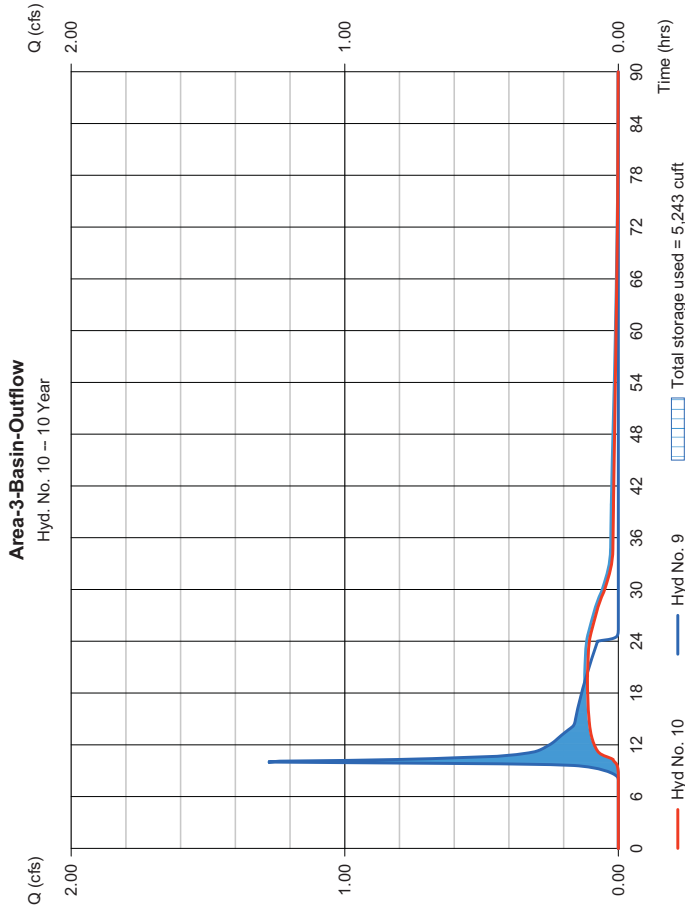
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.113 cfs
Storm frequency	= 10 yrs	Time to peak	= 19.30 hrs
Time interval	= 6 min	Hyd. volume	= 9,018 cuft
Inflow hyd. No.	= 9 - Area-3-Post-SBUH	Max. Elevation	= 101.42 ft
Reservoir name	= Basin 3	Max. Storage	= 5,243 cuft

Storage indication method used. Exfiltration extracted from Outflow.



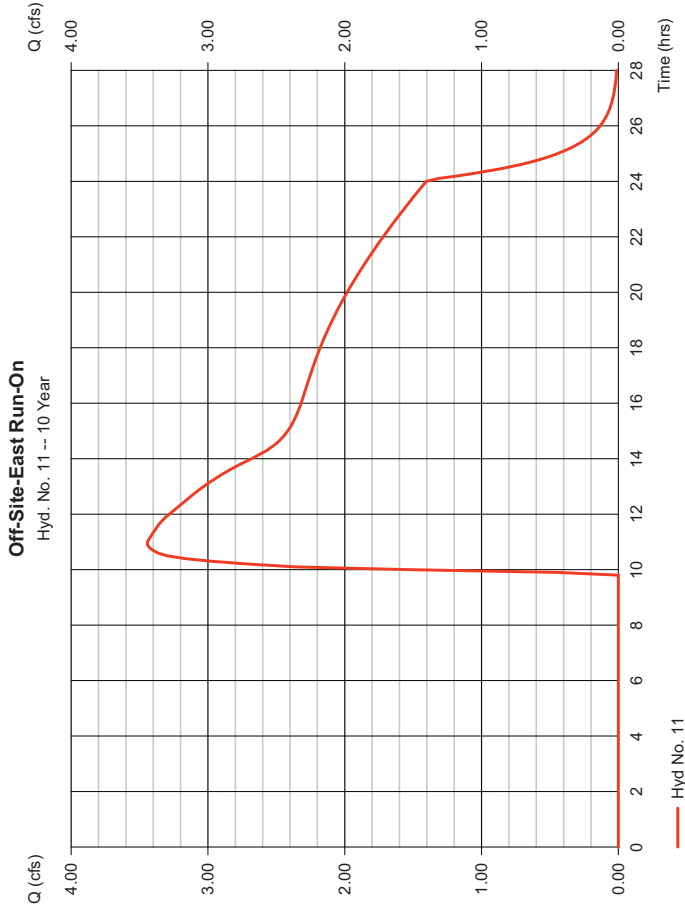
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 11

Off-Site-East Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.443 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.90 hrs
Time interval	= 6 min	Hyd. volume	= 123,197 cuft
Drainage area	= 58,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 49.80 min
Total precip.	= 3.82 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	SBUH Runoff	34.03	6	630	936,329				Off-Site-West Run-On
2	SBUH Runoff	1.154	6	606	17,184				Area-2-Pre-SBUH
3	SBUH Runoff	3.728	6	600	28,702				Area-2-Post-SBUH
4	Reservoir	0.265	6	1218	25,705	3	101.93	15,446	Area-2-Basin-Outflow
5	SBUH Runoff	0.445	6	606	6,628				Area-1-Pre-SBUH
6	SBUH Runoff	1.663	6	600	12,457				Area-1-Post-SBUH
7	Reservoir	0.109	6	1224	10,367	6	102.17	7,497	Area-1-Basin-Outflow
8	SBUH Runoff	0.596	6	606	8,872				Area-3-Pre-SBUH
9	SBUH Runoff	1.948	6	600	15,000				Area-3-Post-SBUH
10	Reservoir	0.148	6	1170	13,178	9	101.97	7,795	Area-3-Basin-Outflow
11	SBUH Runoff	7.543	6	630	203,397				Off-Site-East Run-On

Hydratflow 2015-07-20.gpw

Return Period: 25 Year

Wednesday, 07 / 22 / 2015

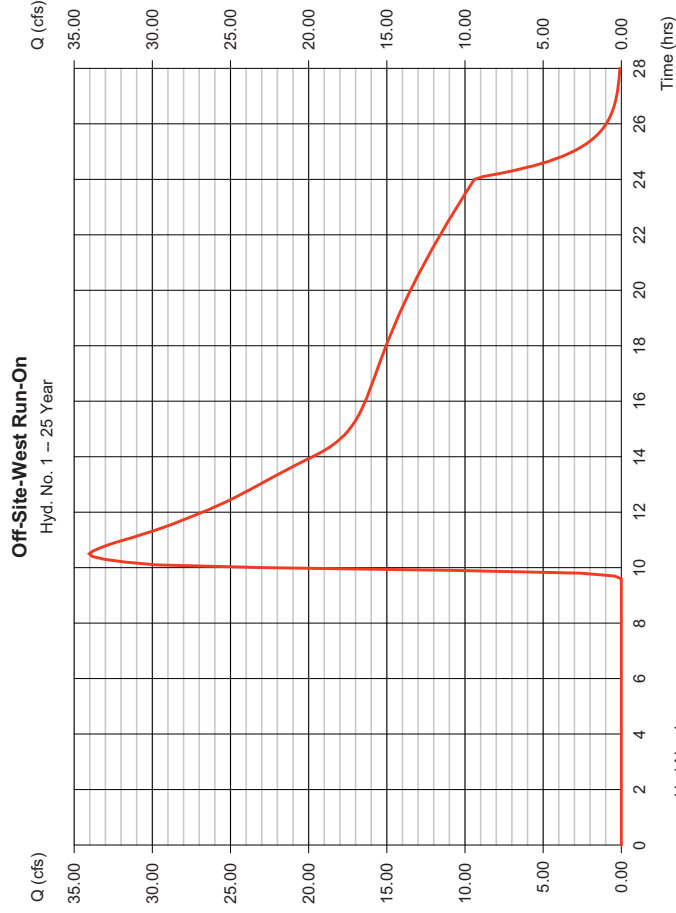
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 34.03 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.50 hrs
Time interval	= 6 min	Hyd. volume	= 936,329 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

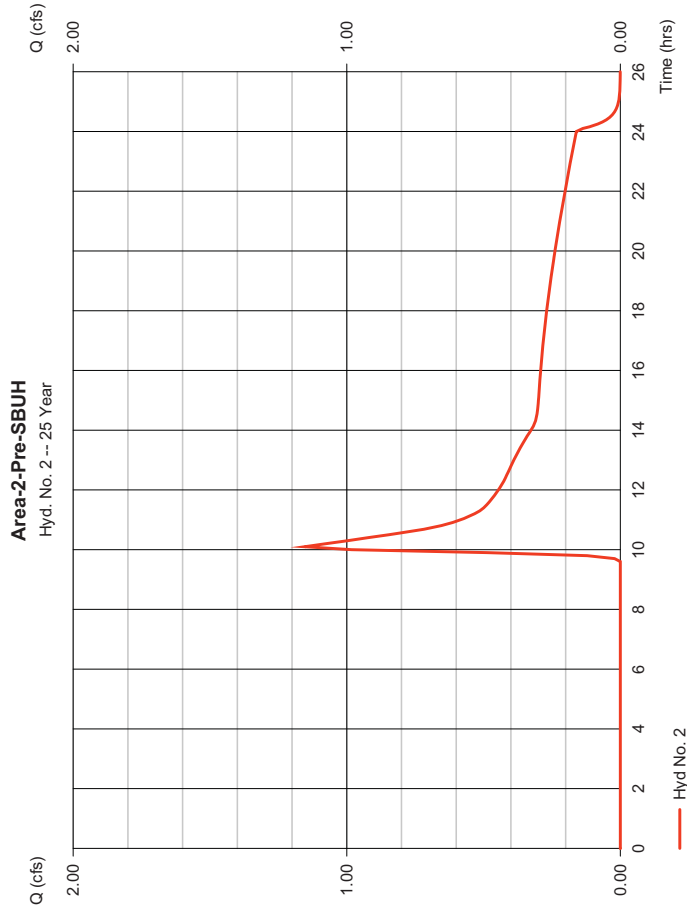
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.154 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 17,184 cuft
Drainage area	= 4.900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

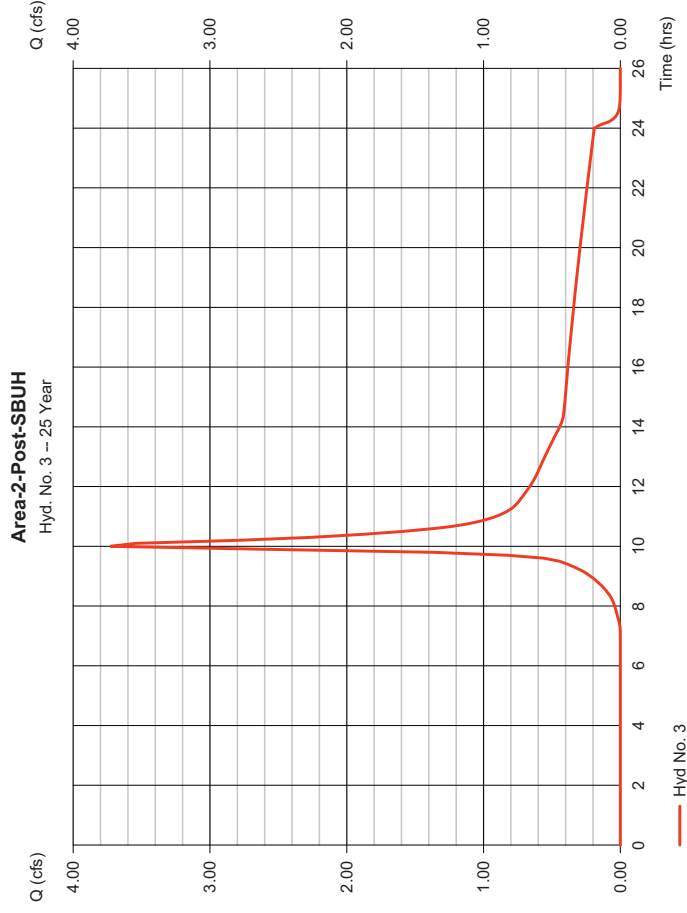
Wednesday, 07 / 22 / 2015

Hyd. No. 3

Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.728 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 28,702 cuft
Drainage area	= 3.980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3.980



Hydrograph Report

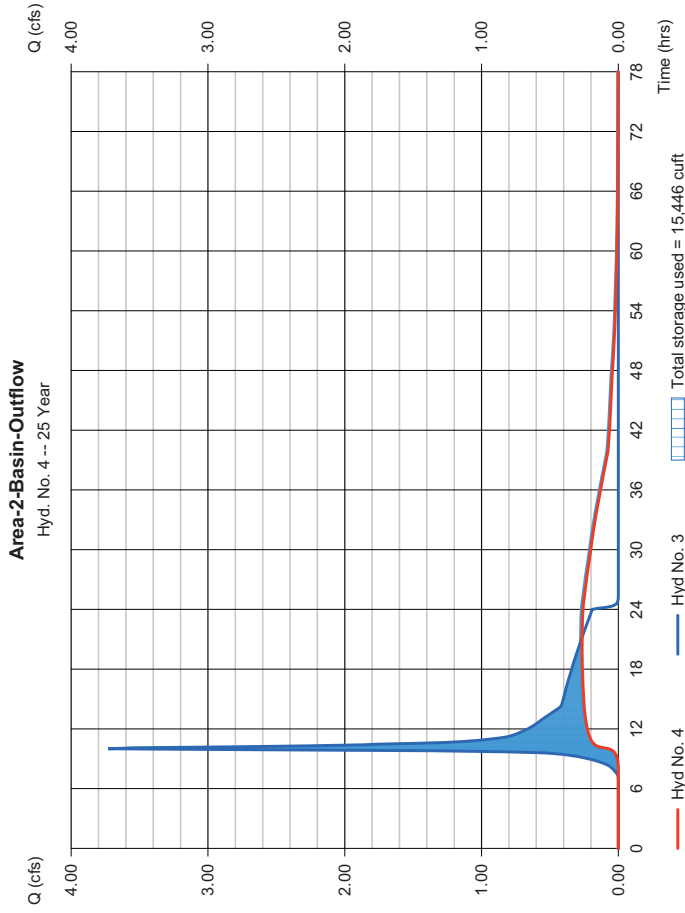
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.265 cfs
Storm frequency	= 25 yrs	Time to peak	= 20.30 hrs
Time interval	= 6 min	Hyd. volume	= 25,705 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 101.93 ft
Reservoir name	= Basin 2	Max. Storage	= 15,446 cuft

Storage indication method used. Exfiltration extracted from Outflow.



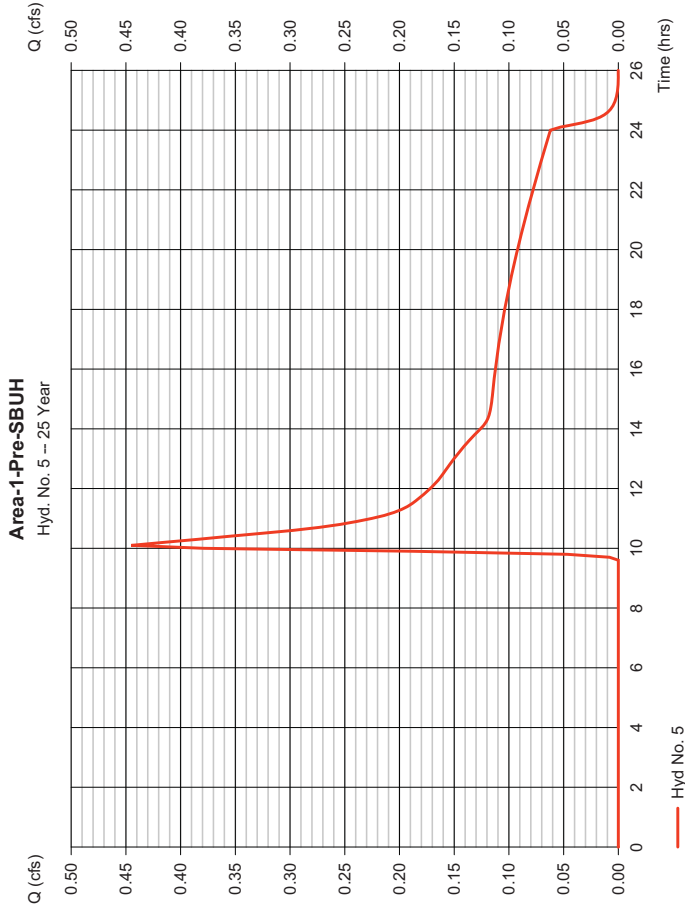
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.445 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 6,628 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

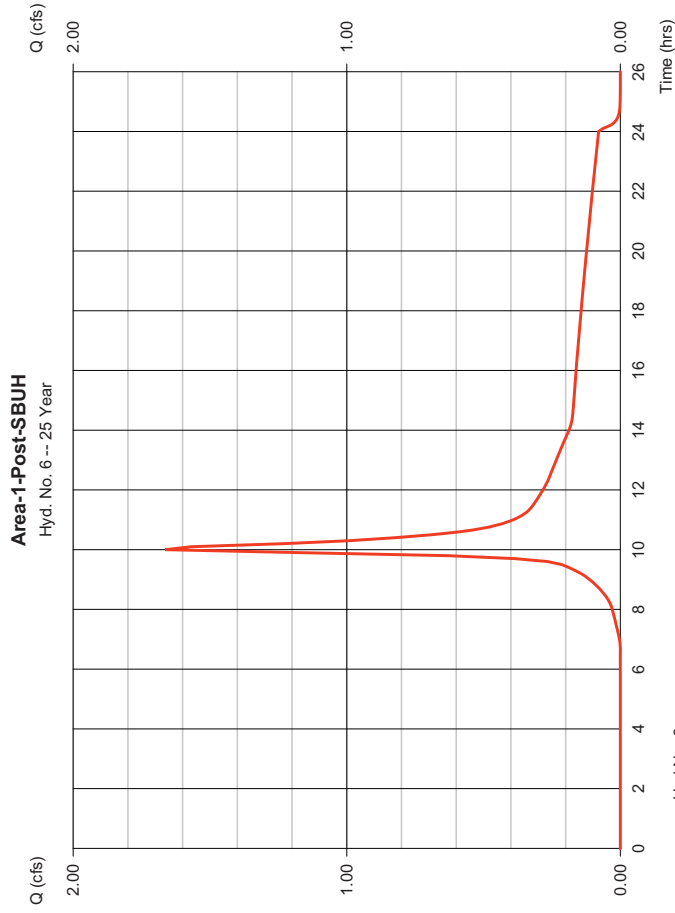
Wednesday, 07 / 22 / 2015

Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.663 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 12,457 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

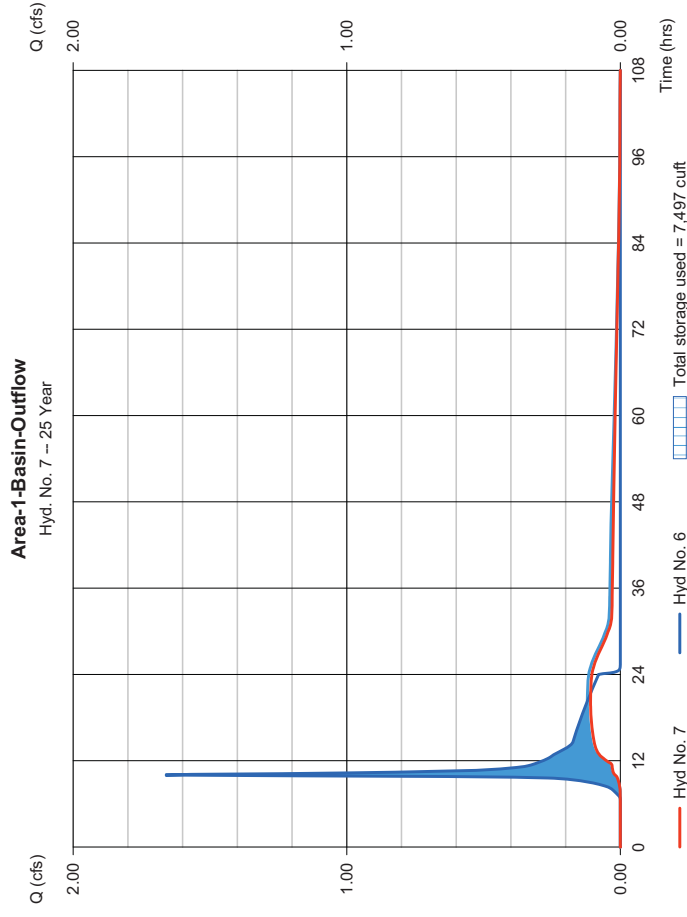
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.109 cfs
Storm frequency	= 25 yrs	Time to peak	= 20.40 hrs
Time interval	= 6 min	Hyd. volume	= 10,367 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 102.17 ft
Reservoir name	= Basin 1	Max. Storage	= 7,497 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

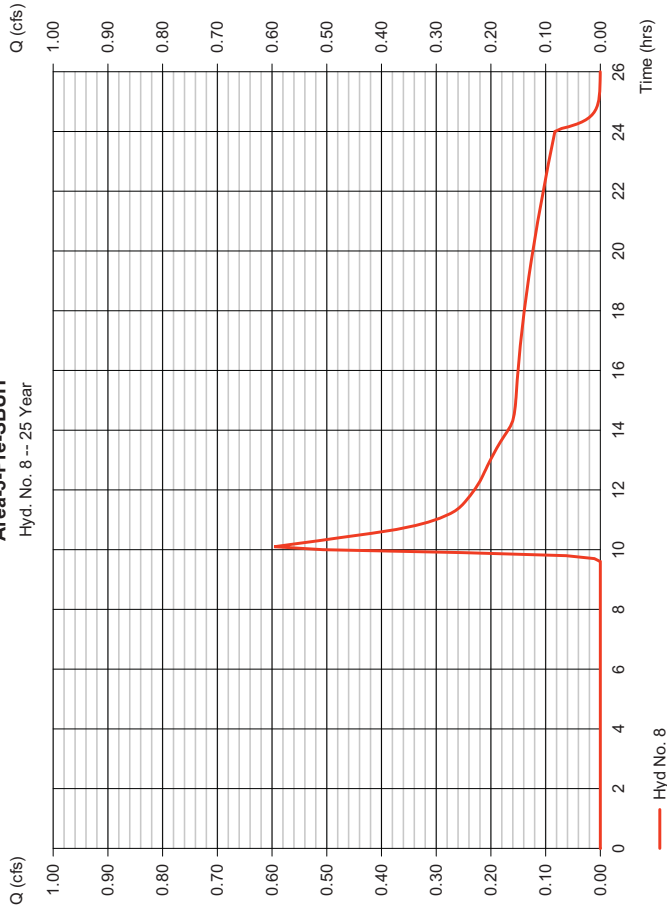
Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.596 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 8,872 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-3-Pre-SBUH

Hyd. No. 8 -- 25 Year



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 9

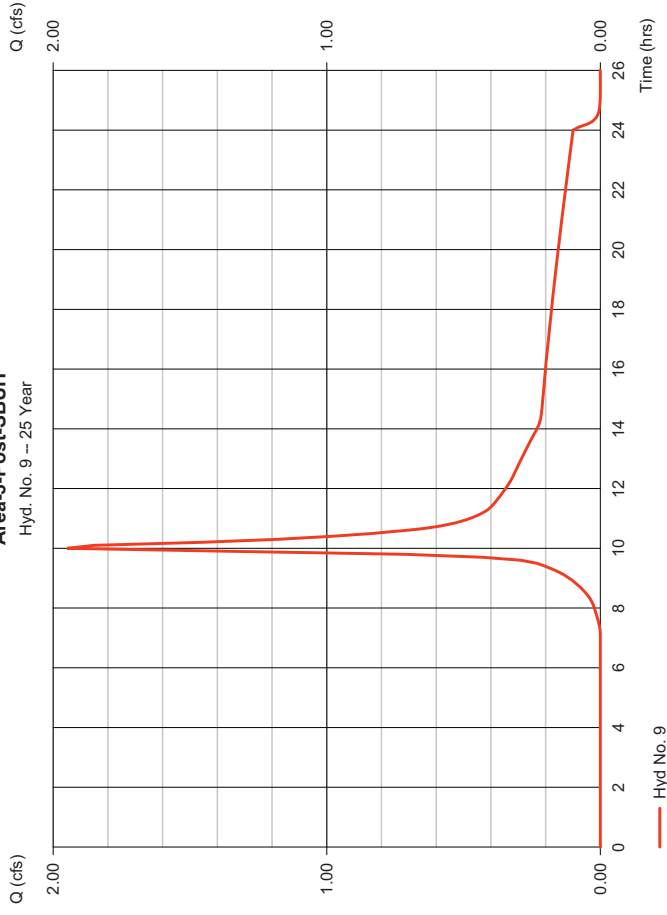
Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.948 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 15,000 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.460 x 98) + (1.080 x 61) + (0.200 x 98) + (0.100 x 61) + (0.230 x 61)] / 2.080

Area-3-Post-SBUH

Hyd. No. 9 -- 25 Year



Hydrograph Report

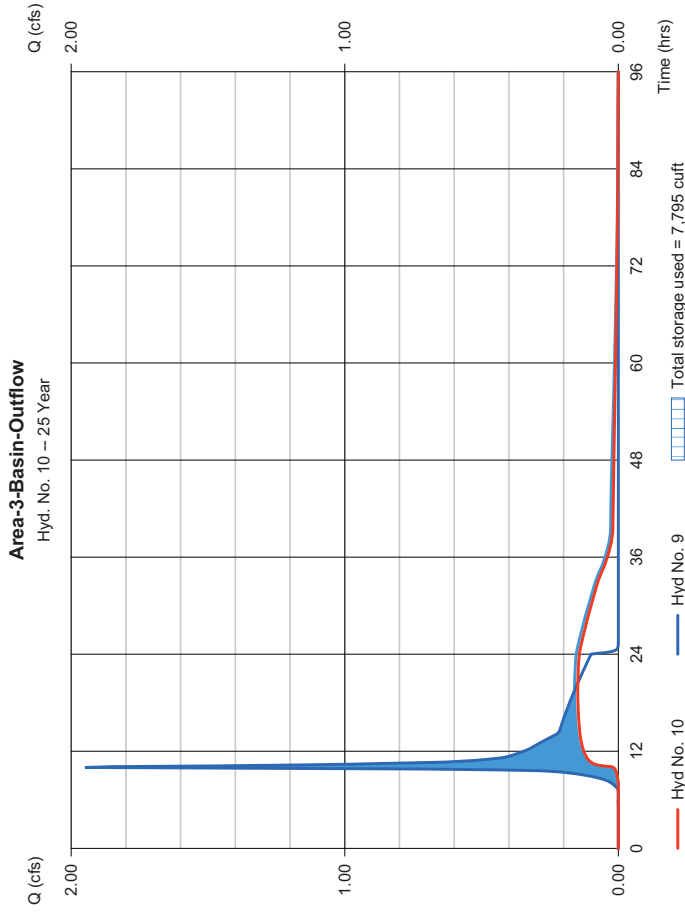
Hydralflo Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.148 cfs
Storm frequency	= 25 yrs	Time to peak	= 19.50 hrs
Time interval	= 6 min	Hyd. volume	= 13,178 cuft
Inflow hyd. No.	= 9 - Area-3-Post-SBUH	Max. Elevation	= 101.97 ft
Reservoir name	= Basin 3	Max. Storage	= 7,795 cuft

Storage indication method used. Exfiltration extracted from Outflow.



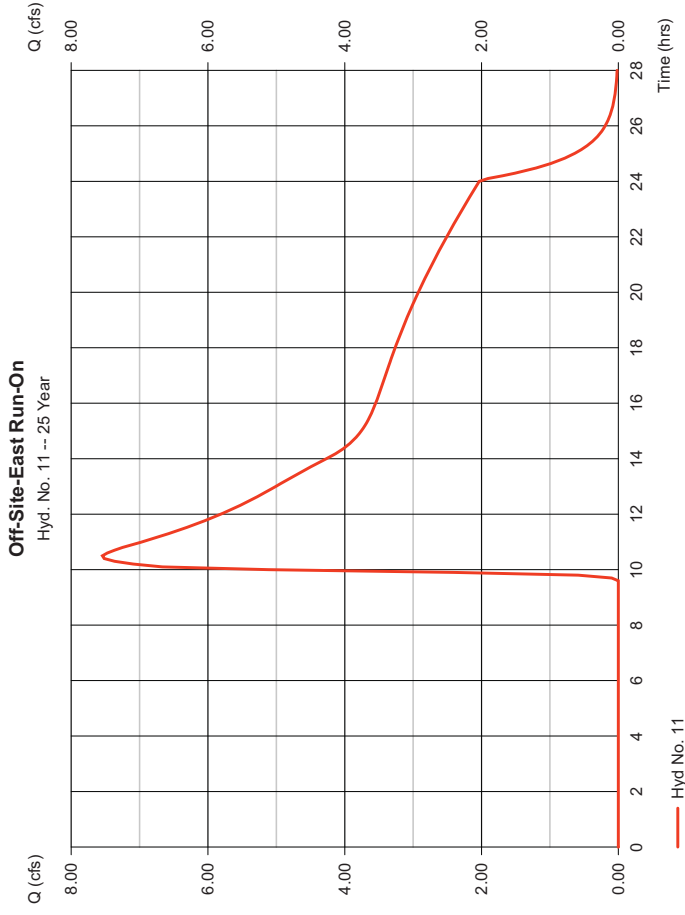
Hydrograph Report

Hydralflo Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 11

Off-Site-East Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 7.543 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.50 hrs
Time interval	= 6 min	Hyd. volume	= 203,397 cuft
Drainage area	= 58,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 49.80 min
Total precip.	= 4.62 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	SBUH Runoff	51.71	6	624	1,240,964				Off-Site-West Run-On
2	SBUH Runoff	1.803	6	606	22,774				Area-2-Pre-SBUH
3	SBUH Runoff	4.718	6	600	35,227				Area-2-Post-SBUH
4	Reservoir	0.642	6	780	32,143	3	101.98	15,977	Area-2-Basin-Outflow
5	SBUH Runoff	0.695	6	606	8,784				Area-1-Pre-SBUH
6	SBUH Runoff	2.076	6	600	15,173				Area-1-Post-SBUH
7	Reservoir	0.236	6	816	13,032	6	102.22	7,722	Area-1-Basin-Outflow
8	SBUH Runoff	0.931	6	606	11,759				Area-3-Pre-SBUH
9	SBUH Runoff	2.466	6	600	18,410				Area-3-Post-SBUH
10	Reservoir	0.346	6	768	16,532	9	102.03	8,095	Area-3-Basin-Outflow
11	SBUH Runoff	11.48	6	624	269,573				Off-Site-East Run-On

Hydratflow 2015-07-20.gpw

Return Period: 50 Year

Wednesday, 07 / 22 / 2015

Hydrograph Report

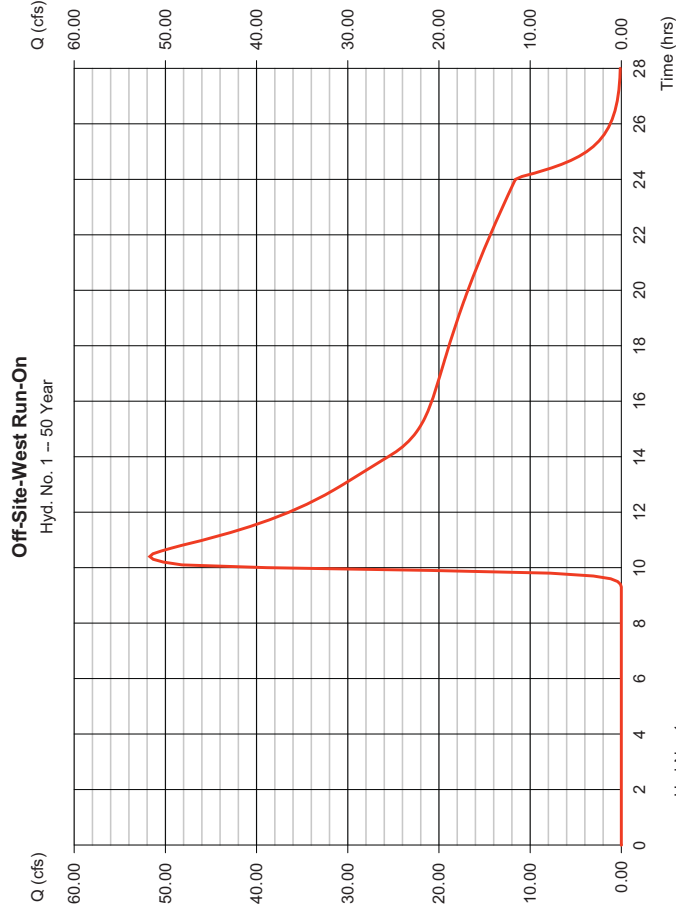
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 51.71 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.40 hrs
Time interval	= 6 min	Hyd. volume	= 1,240,964 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

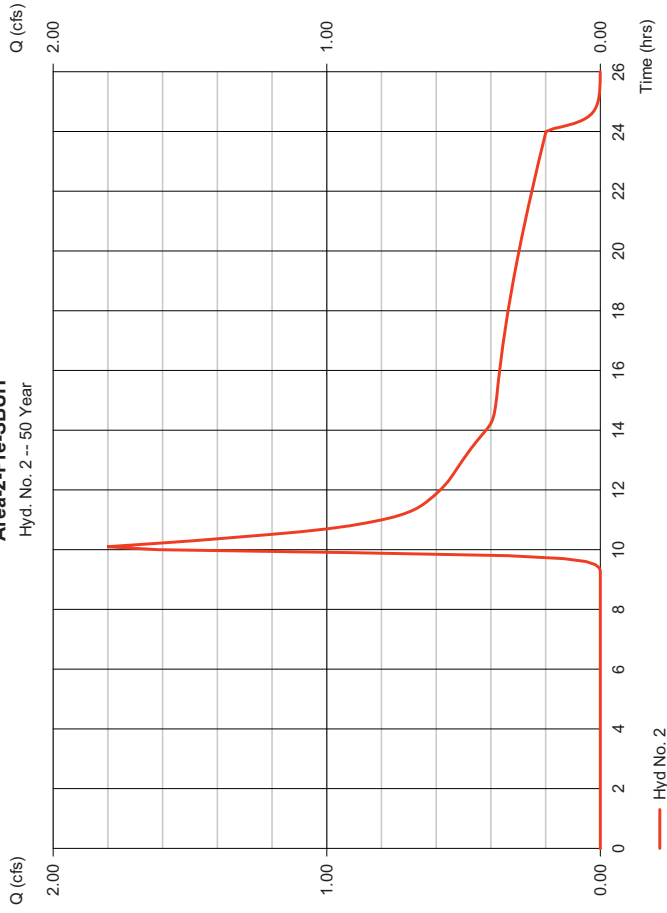
Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1,803 cfs
Storm frequency	= 50 yrs	Time to peak	= 10, 10 hrs
Time interval	= 6 min	Hyd. volume	= 22,774 cuft
Drainage area	= 4,900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18,00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-2-Pre-SBUH

Hyd. No. 2 -- 50 Year



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 3

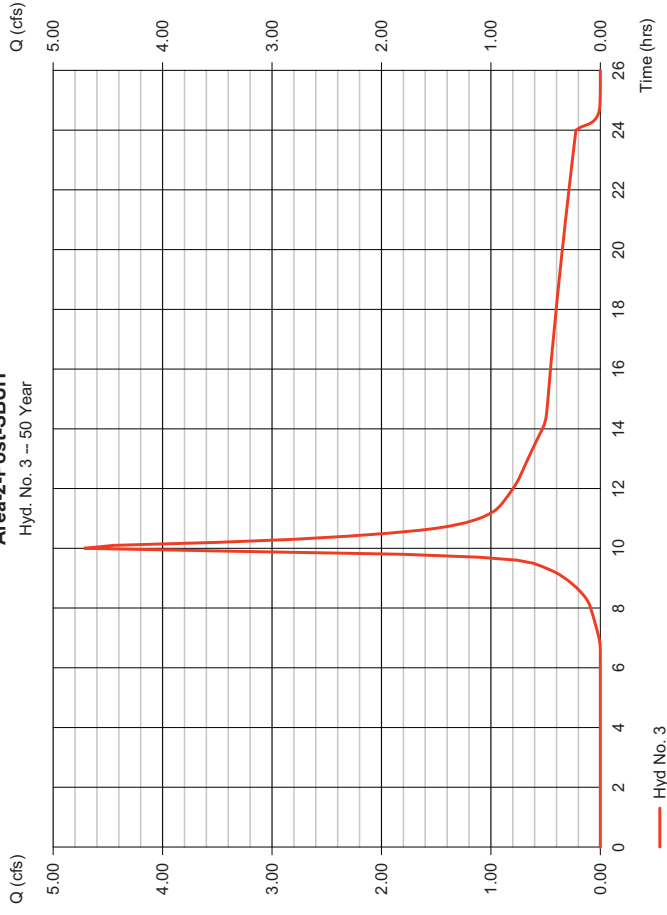
Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 4,718 cfs
Storm frequency	= 50 yrs	Time to peak	= 10, 00 hrs
Time interval	= 6 min	Hyd. volume	= 35,227 cuft
Drainage area	= 3,980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12,00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3,980

Area-2-Post-SBUH

Hyd. No. 3 -- 50 Year



Hydrograph Report

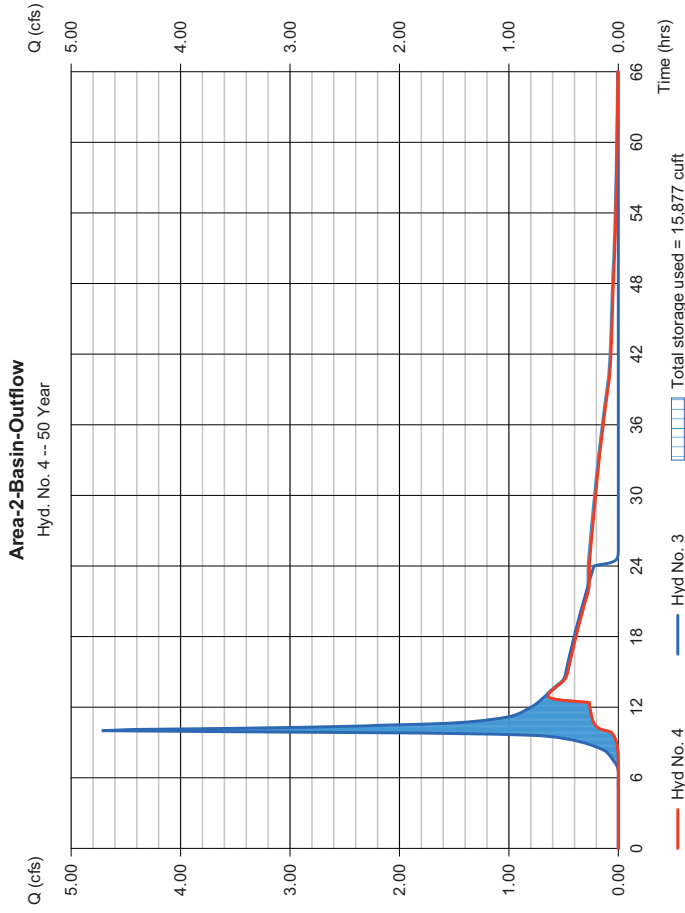
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.642 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.00 hrs
Time interval	= 6 min	Hyd. volume	= 32,143 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 101.98 ft
Reservoir name	= Basin 2	Max. Storage	= 15,877 cuft

Storage indication method used. Exfiltration extracted from Outflow.



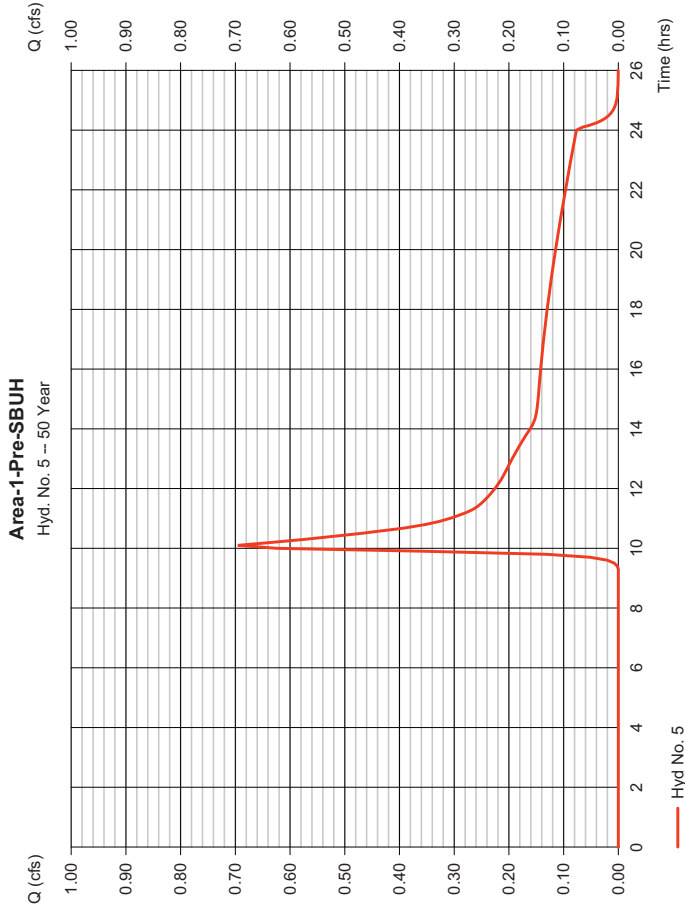
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 07 / 22 / 2015

Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.695 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 8,784 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

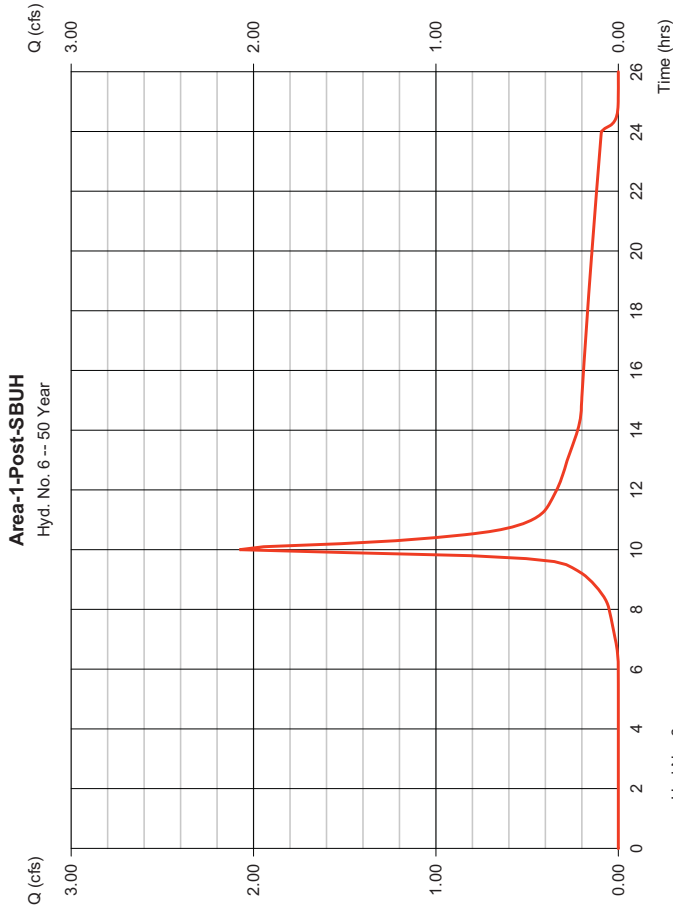
Wednesday, 07 / 22 / 2015

Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.076 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 15,173 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

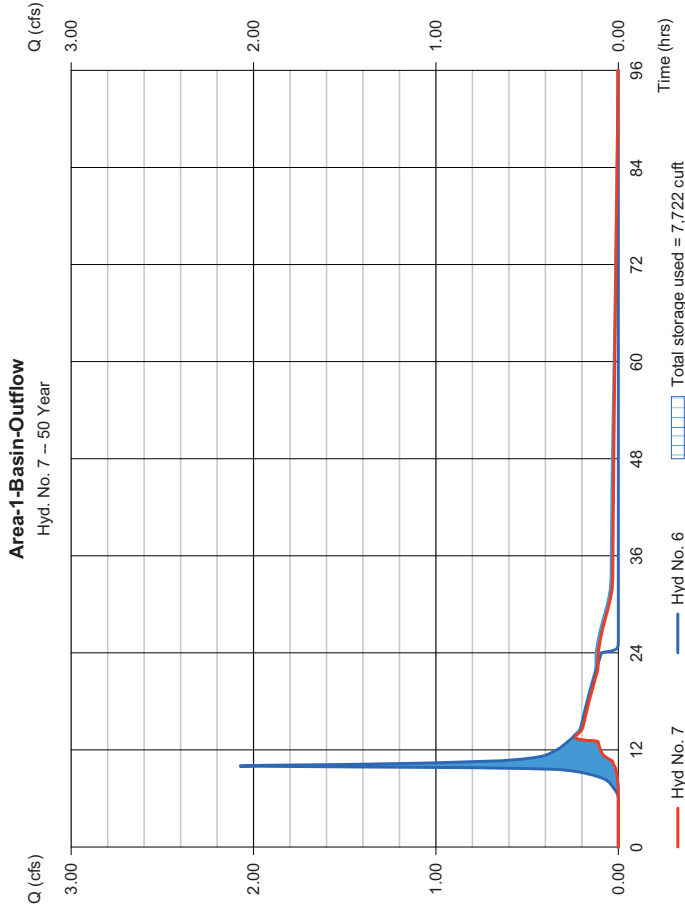
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.236 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.60 hrs
Time interval	= 6 min	Hyd. volume	= 13,032 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 102.22 ft
Reservoir name	= Basin 1	Max. Storage	= 7,722 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

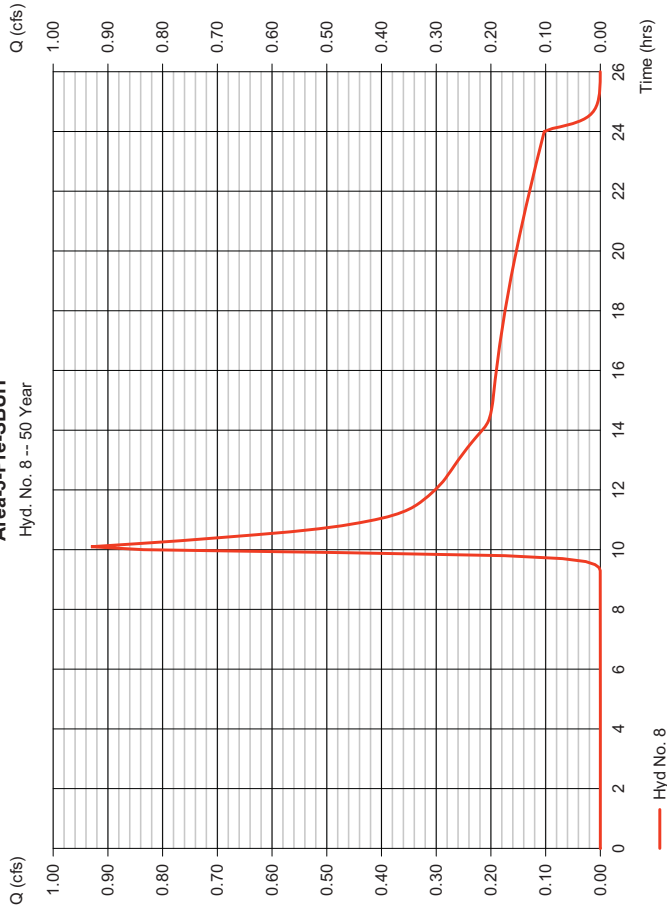
Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.931 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 11,759 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-3-Pre-SBUH

Hyd. No. 8 -- 50 Year



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 9

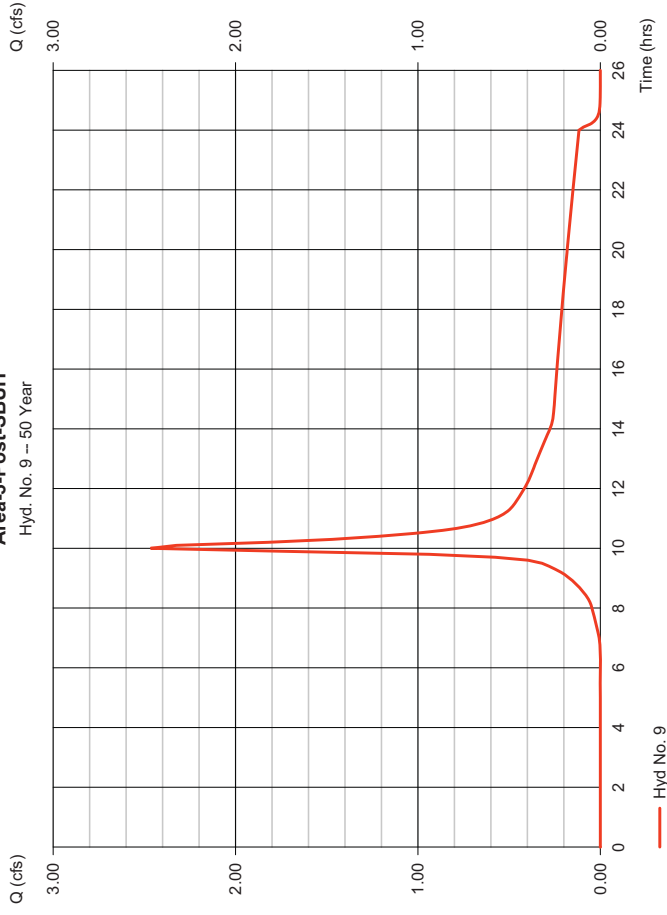
Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.486 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 18,410 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.460 x 98) + (1.080 x 61) + (0.200 x 98) + (0.100 x 61) + (0.230 x 61)] / 2.080

Area-3-Post-SBUH

Hyd. No. 9 -- 50 Year



Hydrograph Report

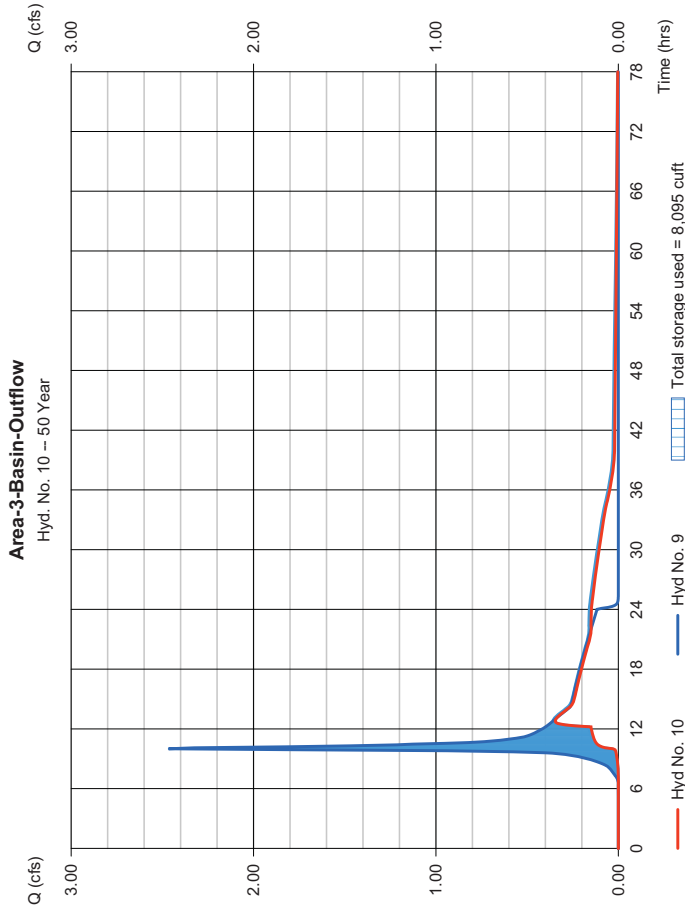
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.346 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.80 hrs
Time interval	= 6 min	Hyd. volume	= 16,532 cuft
Inflow hyd. No.	= 9 - Area-3-Post-SBUH	Max. Elevation	= 102.03 ft
Reservoir name	= Basin 3	Max. Storage	= 8,095 cuft

Storage indication method used. Exfiltration extracted from Outflow.



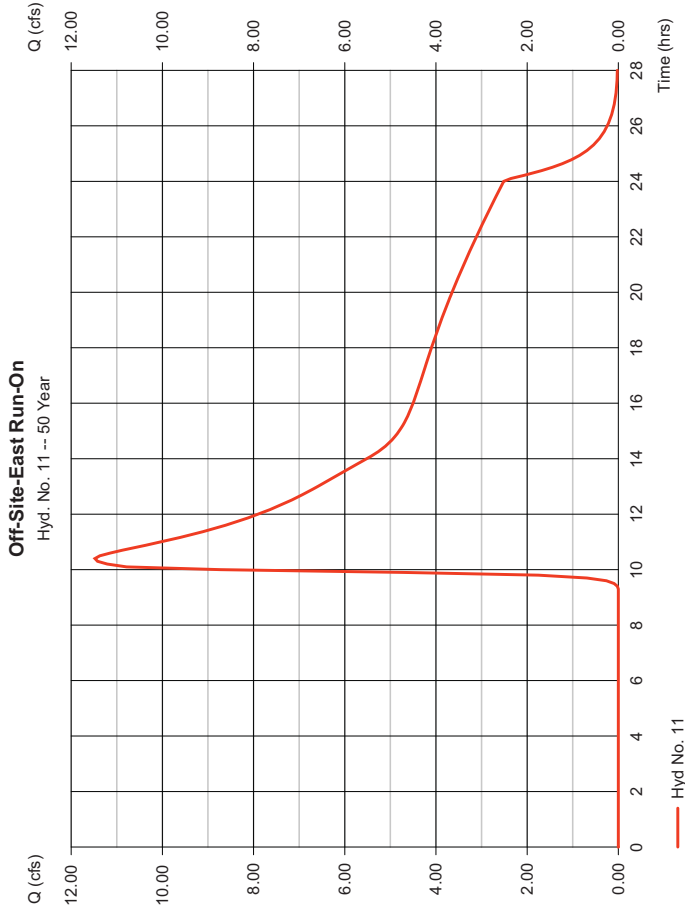
Hydrograph Report

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Hyd. No. 11

Off-Site-East Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 11.48 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.40 hrs
Time interval	= 6 min	Hyd. volume	= 269,573 cuft
Drainage area	= 58,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 49.80 min
Total precip.	= 5.20 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	SBUH Runoff	71.40	6	618	1,559,628				Off-Site-West Run-On
2	SBUH Runoff	2,500	6	606	28,622				Area-2-Pre-SBUH
3	SBUH Runoff	5,713	6	600	41,762				Area-2-Post-SBUH
4	Reservoir	1,034	6	690	38,636	3	102.00	16,116	Area-2-Basin-Outflow
5	SBUH Runoff	0,964	6	606	11,040				Area-1-Pre-SBUH
6	SBUH Runoff	2,489	6	600	17,880				Area-1-Post-SBUH
7	Reservoir	0,385	6	720	15,716	6	102.24	7,819	Area-1-Basin-Outflow
8	SBUH Runoff	1,291	6	606	14,779				Area-3-Pre-SBUH
9	SBUH Runoff	2,986	6	600	21,825				Area-3-Post-SBUH
10	Reservoir	0,563	6	678	19,922	9	102.06	8,239	Area-3-Basin-Outflow
11	SBUH Runoff	15.88	6	618	338,796				Off-Site-East Run-On

Hydratflow 2015-07-20.gpw

Return Period: 100 Year

Wednesday, 07 / 22 / 2015

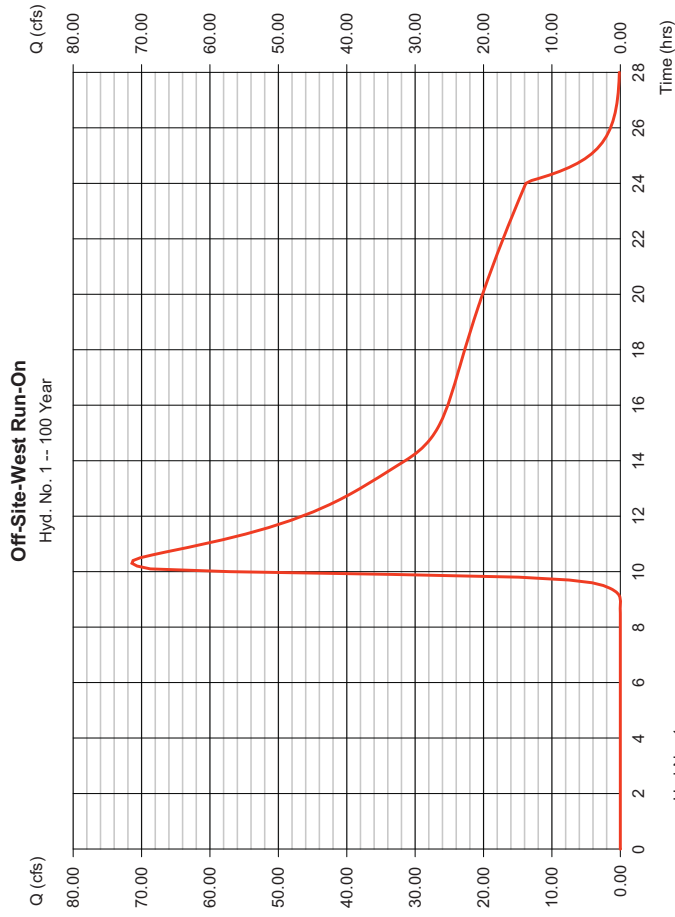
Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No. 1

Off-Site-West Run-On

Hydrograph type	= SBUH Runoff	Peak discharge	= 71.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.30 hrs
Time interval	= 6 min	Hyd. volume	= 1,559,628 cuft
Drainage area	= 267,000 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hyd No. 1

Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

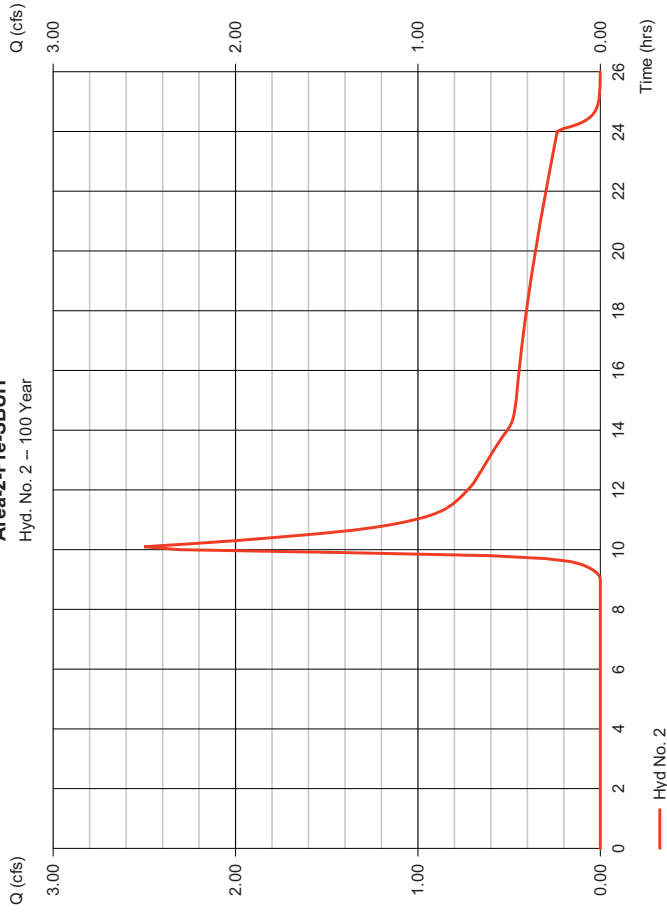
Hyd. No. 2

Area-2-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2,500 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 28,622 cuft
Drainage area	= 4,900 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-2-Pre-SBUH

Hyd. No. 2 -- 100 Year



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

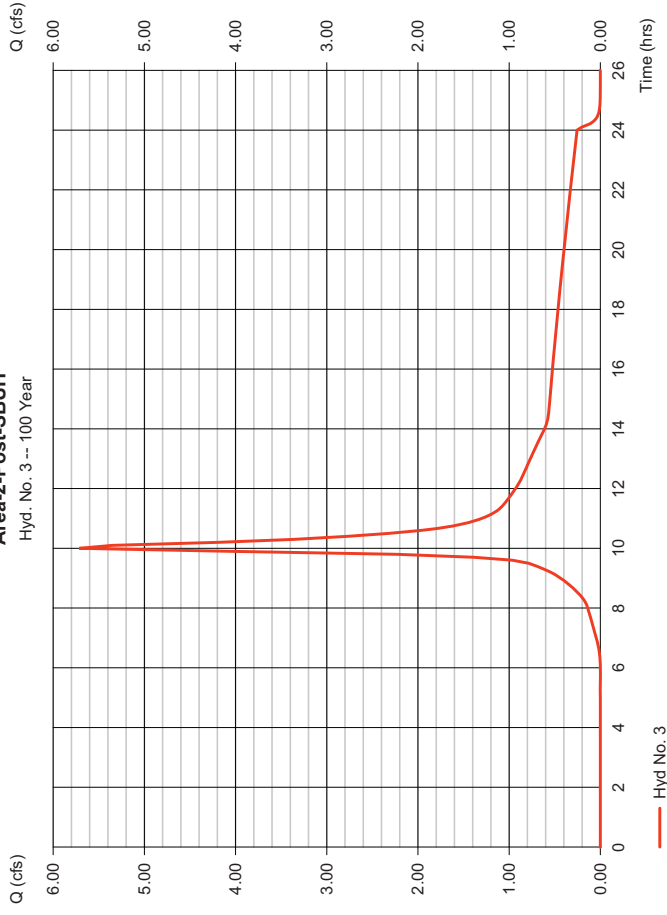
Hyd. No. 3

Area-2-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 5,713 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 41,762 cuft
Drainage area	= 3,980 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

Area-2-Post-SBUH

Hyd. No. 3 -- 100 Year



* Composite (Area/CN) = [(0.920 x 98) + (2.280 x 61) + (0.380 x 98) + (0.220 x 61) + (0.180 x 61)] / 3,980

Hydrograph Report

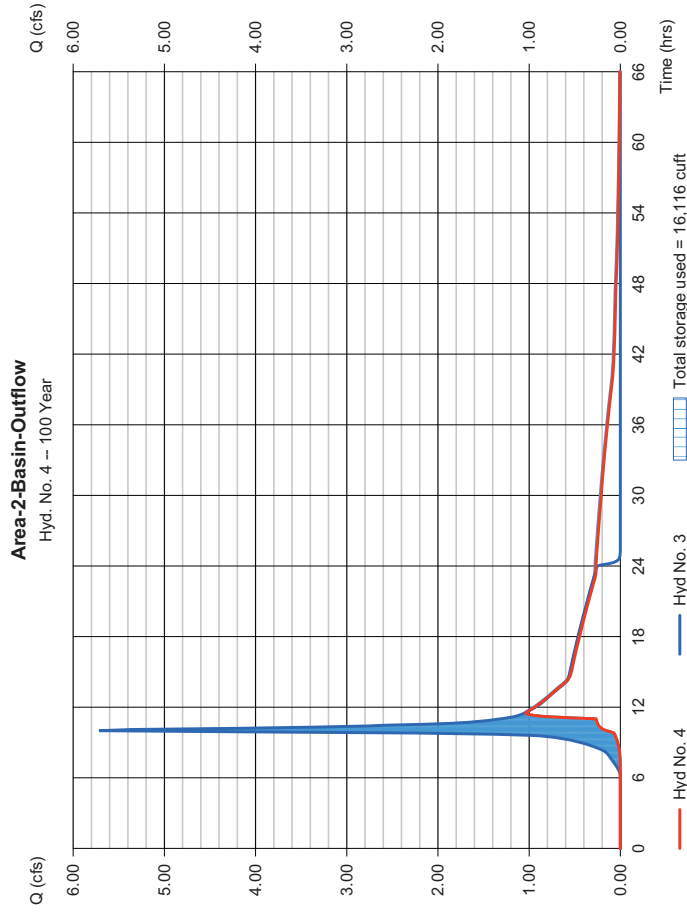
Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 4

Area-2-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 1.034 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.50 hrs
Time interval	= 6 min	Hyd. volume	= 38,636 cuft
Inflow hyd. No.	= 3 - Area-2-Post-SBUH	Max. Elevation	= 102.00 ft
Reservoir name	= Basin 2	Max. Storage	= 16,116 cuft

Storage indication method used. Exfiltration extracted from Outflow.



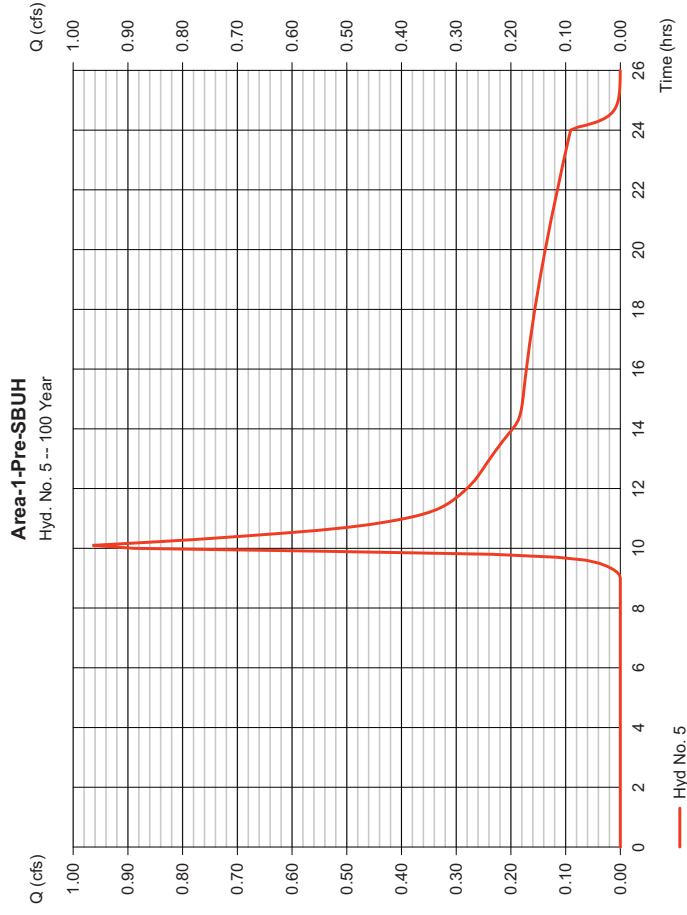
Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 5

Area-1-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.964 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 11,040 cuft
Drainage area	= 1.890 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

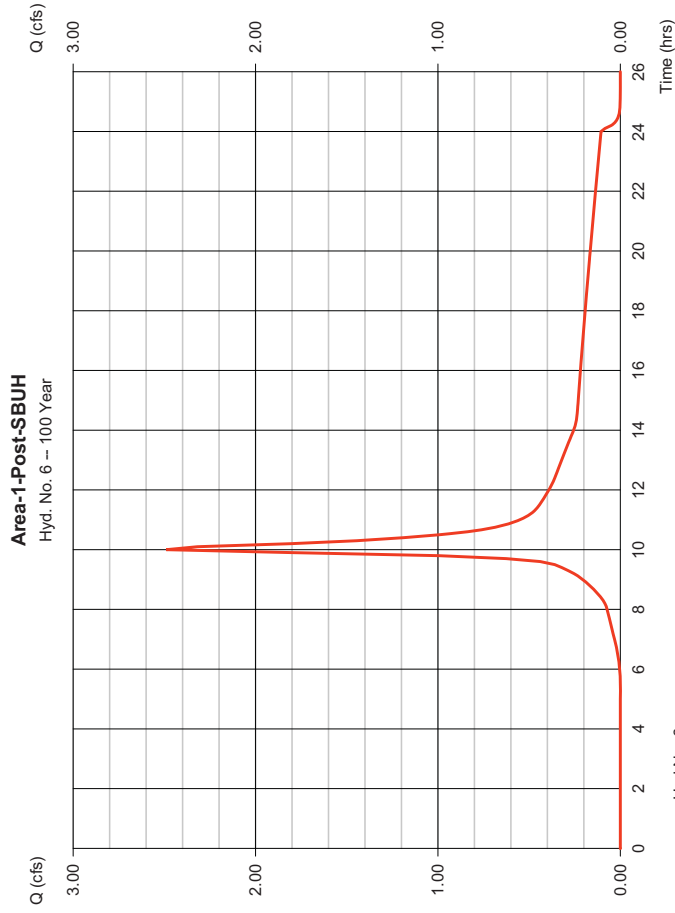
Wednesday, 07 / 22 / 2015

Hyd. No. 6

Area-1-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.489 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 17,880 cuft
Drainage area	= 1.600 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.290 x 98) + (0.600 x 61) + (0.330 x 98) + (0.180 x 61) + (0.210 x 61)] / 1.600



Hydrograph Report

Hydralflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

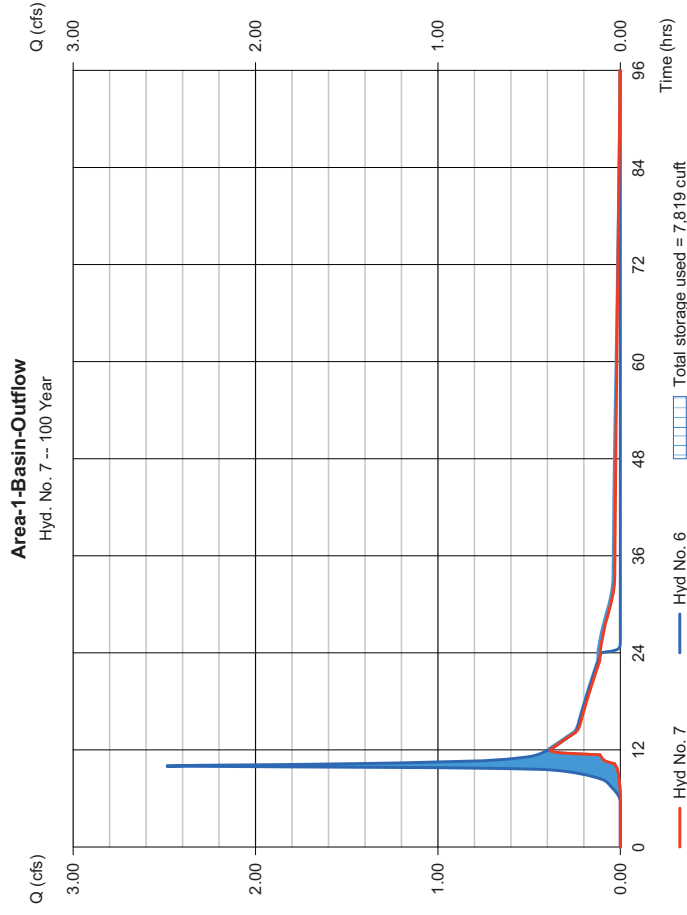
Wednesday, 07 / 22 / 2015

Hyd. No. 7

Area-1-Basin-Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.385 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 6 min	Hyd. volume	= 15,716 cuft
Inflow hyd. No.	= 6 - Area-1-Post-SBUH	Max. Elevation	= 102.24 ft
Reservoir name	= Basin 1	Max. Storage	= 7,819 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

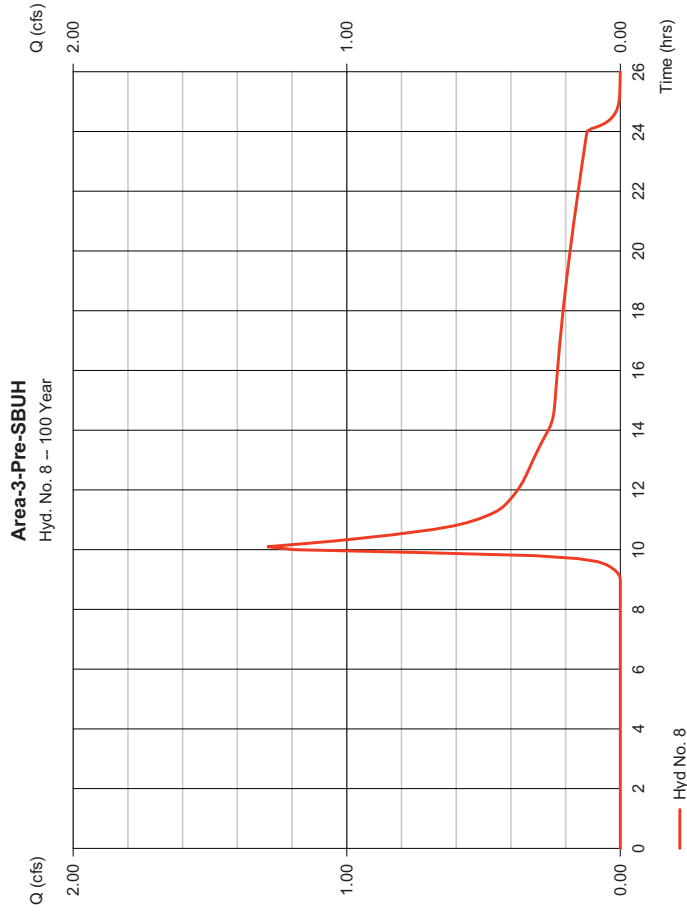
Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 07 / 22 / 2015

Hyd. No. 8

Area-3-Pre-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.291 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.10 hrs
Time interval	= 6 min	Hyd. volume	= 14,779 cuft
Drainage area	= 2.530 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydralfow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

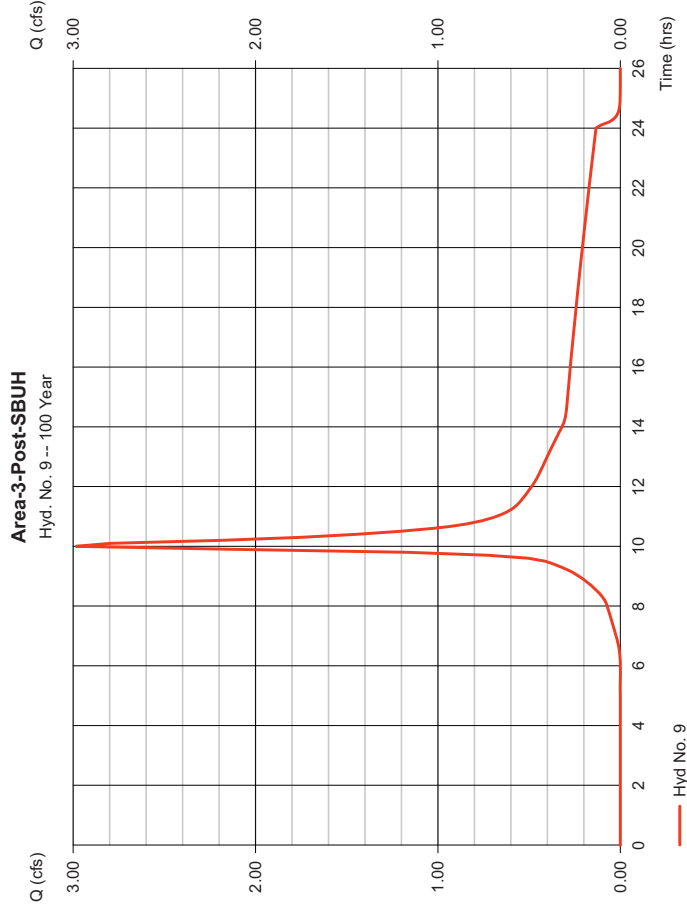
Wednesday, 07 / 22 / 2015

Hyd. No. 9

Area-3-Post-SBUH

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.986 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.00 hrs
Time interval	= 6 min	Hyd. volume	= 21,825 cuft
Drainage area	= 2.080 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.00 min
Total precip.	= 5.76 in	Distribution	= Type I
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.460 x 98) + (1.080 x 61) + (0.200 x 98) + (0.100 x 61) + (0.230 x 61)] / 2.080



Hydrograph Report

Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

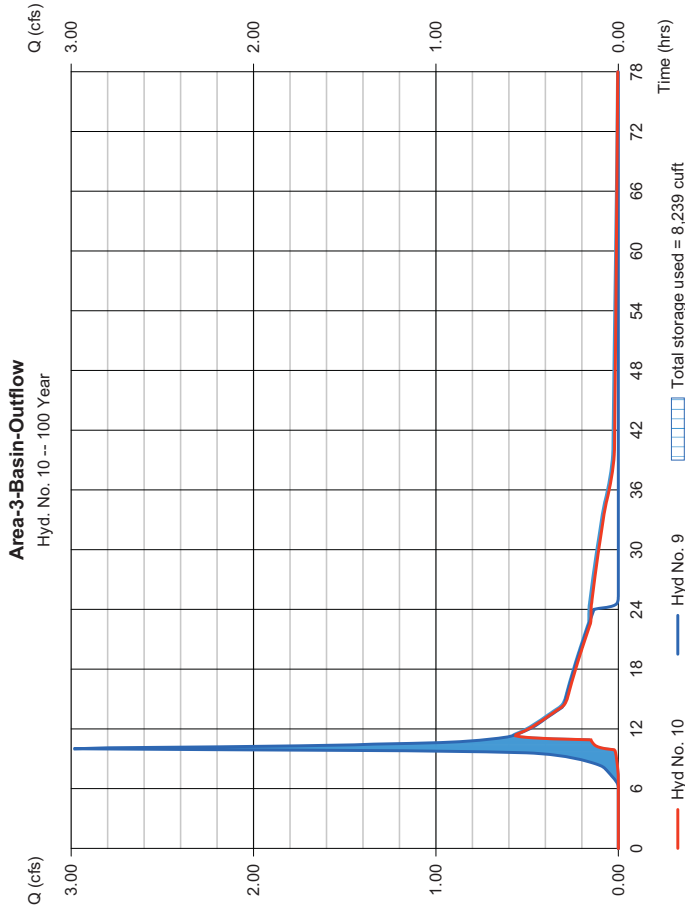
Hyd. No. 10

Area-3-Basin-Outflow

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 6 min
 Inflow hyd. No. = 9 - Area-3-Post-SBUH
 Reservoir name = Basin 3

Peak discharge = 0.563 cfs
 Time to peak = 11.30 hrs
 Hyd. volume = 19,922 cuft
 Max. Elevation = 102.06 ft
 Max. Storage = 8,239 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

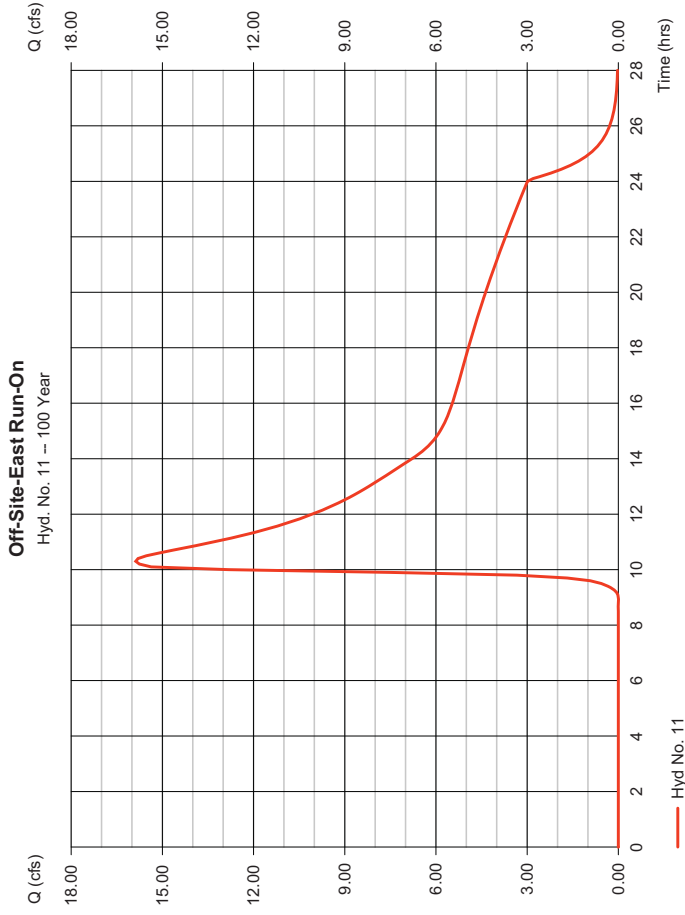
Hydratflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4
 Wednesday, 07 / 22 / 2015

Hyd. No. 11

Off-Site-East Run-On

Hydrograph type = SBUH Runoff
 Storm frequency = 100 yrs
 Time interval = 6 min
 Drainage area = 58,000 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 5.76 in
 Storm duration = 24 hrs

Peak discharge = 15.88 cfs
 Time to peak = 10.30 hrs
 Hyd. volume = 338,796 cuft
 Curve number = 58
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 49.80 min
 Distribution = Type I
 Shape factor = n/a



Weir Report

<Name>

Trapezoidal Weir

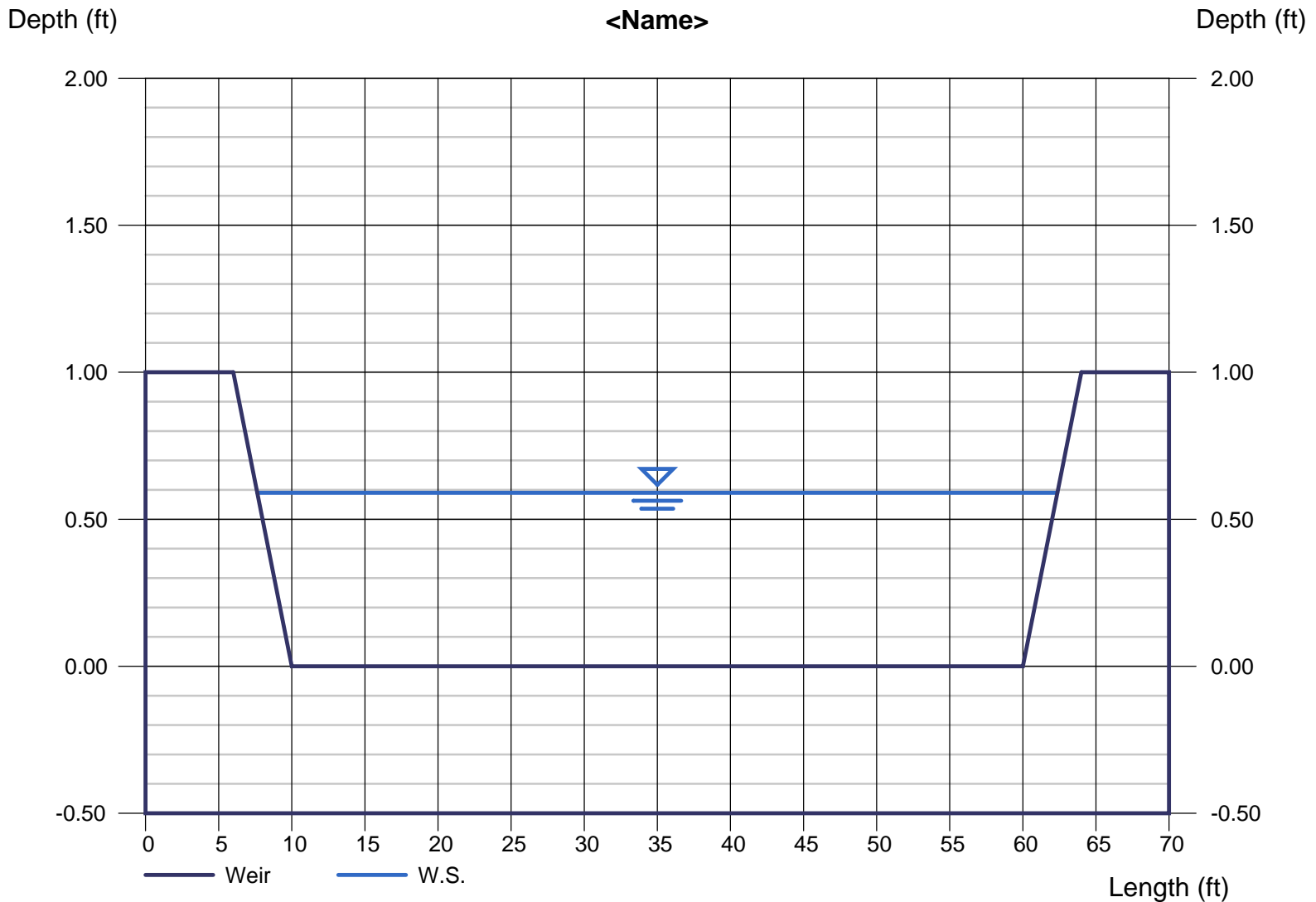
Crest = Sharp
Bottom Length (ft) = 50.00
Total Depth (ft) = 1.00
Side Slope (z:1) = 4.00

Highlighted

Depth (ft) = 0.59
Q (cfs) = 72.00
Area (sqft) = 30.89
Velocity (ft/s) = 2.33
Top Width (ft) = 54.72

Calculations

Weir Coeff. Cw = 3.10
Compute by: Known Q
Known Q (cfs) = 72.00



Weir Report

<Name>

Trapezoidal Weir

Crest = Sharp
Bottom Length (ft) = 12.00
Total Depth (ft) = 1.00
Side Slope (z:1) = 4.00

Highlighted

Depth (ft) = 0.53
Q (cfs) = 16.00
Area (sqft) = 7.48
Velocity (ft/s) = 2.14
Top Width (ft) = 16.24

Calculations

Weir Coeff. Cw = 3.10
Compute by: Known Q
Known Q (cfs) = 16.00

