
Parkside Subdivision

Phase I

A distinguished project by:

Symmetry Ventures

Job No. 031.060

Stormwater Management

New Braunfels, Texas

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Prepared by:



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1.0 General Information

HMT Engineering and Surveying has been retained by Symmetry Ventures to provide professional engineering services for the future development of a 197.97 acre site located in the City of New Braunfels, Texas (Reference Attachment A). The site is currently undeveloped. The property is not within the 100-year floodplain, according to FEMA Flood Insurance Rate Map (FIRM) Number 4817C0120F date November 2, 2007 (Reference Attachment B). This report addresses the hydrology and hydraulics of the Parkside Subdivision.

The City of New Braunfels Drainage and Erosion Control Manual revised January 2018 was used for this analysis, and will be referred to as the DECM from this point on.

2.0 Hydrology Methodology SCS Method

The peak storm water runoff calculations were determined using the Soil Conservation Method as described in the City of New Braunfels Drainage and Erosion Control Manual. The time of concentration was calculated using sheet flow, shallow concentrated flow, and channel flow. The length of overland sheet flow conditions is limited to a maximum of 100 feet. The time of travel for sheet flow conditions is calculated using Manning's kinematic solution (Overtop and Meadows 1976). After 100 feet, the average velocity of the flow is determined using Figure 3-1 of the USDA Technical Release 55 Urban Hydrology for Small Watersheds. The time of travel for concentrated flow conditions is calculated using the equation below:

Sheet Flow

$$\text{Eq 4-4 } T_t = \frac{0.007(nL)^{0.8}}{(P_2^{0.5})(S^{0.4})} * 60$$

For shallow concentrated flow, using the average velocity as described above, the time of travel is calculated using this equation:

Shallow Concentration Flow

$$\text{Eq 4-5 } T_t = \frac{L}{(60)(16.1345)(S^{0.5})} * 60$$

For channelized flow, an estimated peak flow is used to calculate the velocity within the channel cross section for this segment. The time is then calculated using this velocity and the length of flow as shown in Eq 4-8 below.

Channel Flow

$$\text{Eq 4-8 } T_t = \frac{L}{60 * V} * 60$$

The runoff coefficient was determined based on the impervious cover within each sub-watershed. Rainfall intensities were calculated using the time of concentration and constants from Table 3-2 of the City of New Braunfels Drainage and Erosion Control manual for each storm event respectively (reference Attachment E for Hydrology Calculations).

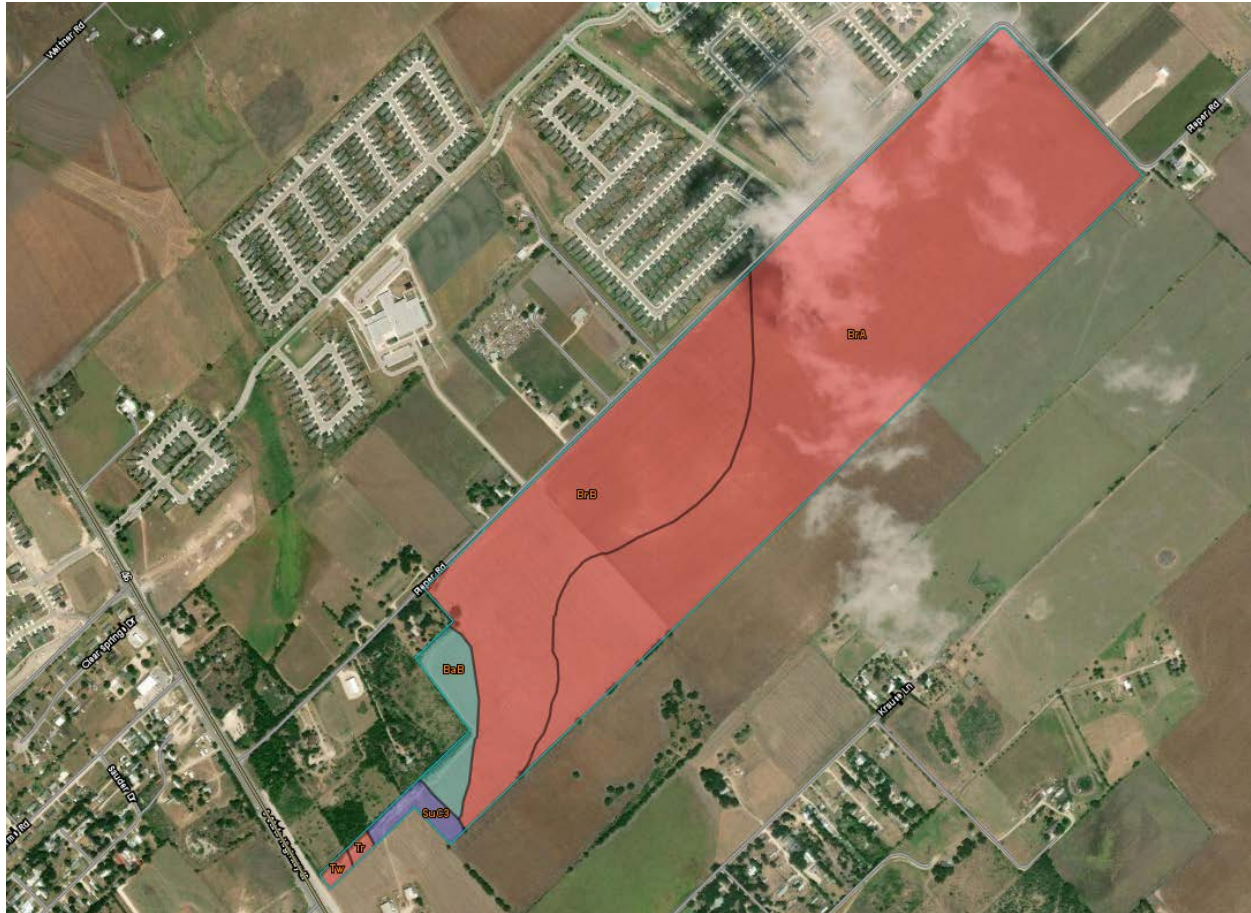


Table – Hydrologic Soil Group Site Summary Map

Summary by Map Unit – Guadalupe County, Texas (TX187)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BaB	Barbarosa silty clay, 1 to 3 percent slopes	C	6.5	3.3%
BrA	Branyon clay, 0 to 1 percent slopes	D	125.8	63.9%
BrB	Branyon clay, 1 to 3 percent slopes	D	60.8	30.9%
SuC3	Sunev loam, 3 to 5 percent slopes, eroded	B	2.7	1.3%
Tr	Tinn clay, 0 to 1 percent slopes, occasionally flooded	D	0.5	0.3%
Tw	Tinn clay, 0 to 1 percent slopes, frequently flooded	D	0.7	0.3%
Totals for Area of Interest			196.9	100.0%

3.0 Existing Conditions Hydrology

In order to be the most conservative with our calculations and because majority of the site is composed of Hydrologic Soil Group D, Soil Group D was assumed for all Curve Numbers. The Cover Description, Hydrologic Soil Group, and Curve Number used in our calculations to determine the weighted Curve Number can be found in the Table below.

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.
Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

The existing site is currently grass/farmland and undeveloped with no existing impervious cover. The existing drainage area is composed of three drainage areas.

- Drainage area EX A flows southwestwardly to concentration point EX A where the flow is channelized and discharges from the site into an existing TxDOT channel. Existing Drainage Area EX A has been further analyzed into four drainage sub-areas to accurately compare discharge points.
 - Existing Drainage Sub-Area EX A1 was analyzed to evaluate and consider the longest time of concentration for the overall analysis of existing drainage area EX A.
 - Existing Drainage Sub-Area EX A2 was analyzed to compare and ensure the longest time of concentration comparison for the overall analysis of drainage area EX A.
 - Existing Drainage Sub-Area EX A3 was analyzed to compare with the discharge from the Ultimate Proposed Drainage Area ULT B and the Intermediate Phase 1 Proposed drainage area.
 - Existing Drainage Sub-Area EX A4 was analyzed to compare and ensure the longest time of concentration comparison for the overall analysis of drainage area EX A.
- Drainage area EX B flows southwardly to concentration point EX B where the water then sheet flows onto the adjacent undeveloped property.

Please refer to Attachment C for the Existing Drainage Area Map.

Table 1 - Existing Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T_c	Curve Number	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
EX A	Discharge From Tiered Basin A Comparison	EX A	154.61	83.58	78.00	68.65	188.13	282.29	485.26
EX B	Discharge From Basin B Comparison (To be Analyzed with Future Development)	EX B	90.42	61.40	78.00	39.90	109.32	163.96	281.76

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EX B	Discharge From Basin B Comparison (To be Analyzed with Future Development)	EX B	90.42	61.40	78.00	39.90	109.32	163.96	281.76

4.0 Ultimate Proposed Conditions Hydrology

The proposed improvements of Parkside Subdivision will consist of residential lots, drainage features, park area, and streets. The Soil Conservation Service (SCS) method was used in this drainage analysis. In order to be the most conservative with our calculations and because majority of the site is composed of Hydrologic Soil Group D, Soil Group D was assumed for all Curve

Numbers. The Cover Description, Hydrologic Soil Group, and Curve Number used in our calculations to determine the weighted Curve Number can be found in the Table below.

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

The proposed site has been divided into three major drainage areas

- Drainage area ULT A flows southwestwardly and is ultimately conveyed to concentration point ULT A. Drainage area ULT A has been further analyzed into fourteen drainage sub-areas to size the proposed storm drain network, channels, and ensure street capacities (please refer to the further description of the drainage sub-areas below):
 - Drainage Sub-Area A1 consists of a portion of the Ultimate Parkside Subdivision development that will be designed in future phases. The ultimate flow calculated for sub-drainage area A1 was applied to storm drain pipe A2-9. This was done so that the proposed pipe network to be constructed in the Parkside Subdivision Phase 1 was sized and has capacity for the Ultimate Development Conditions.
 - Drainage Sub-Area A2 consists of a portion of the ultimate Parkside Subdivision development that will be designed in future phases. In ultimate conditions Drainage Sub-Area A2 storm water will enter into a storm network that discharges into Channel A2.
 - Drainage Sub-Area A3 was analyzed to size Inlet A2-3 and A2-4, and to ensure street capacities. The 10 year and 100 year storm event was analyzed for the steepest and flattest street slope within this drainage area. Based on these calculations we have ensured the streets within this drainage area meet all the criteria of the DECDM. Based on this analysis, it is our engineering judgment that

all other street slopes within this drainage sub-area meet the street capacity and velocity requirements of the City of New Braunfels DECDM.

- Drainage Sub-Area A4 was analyzed to compare and ensure the longest time of concentration for the overall analysis of drainage area ULT A.
- Drainage Sub-Area A5 was analyzed to size Inlet A3-1 and to ensure street capacities. The 10 year and 100 year storm event was analyzed for the steepest and flattest street slope within this drainage area. Based on these calculations we have ensured the streets within this drainage area meet all the criteria of the DECDM. Based on this analysis, it is our engineering judgment that all other street slopes within this drainage sub-area meet the street capacity and velocity requirements of the City of New Braunfels DECDM.
- Drainage Sub-Area A1-A5 was analyzed to size Channel A2 and storm drain line (SD LN) A2-3.
- Drainage Sub-Area A6 was analyzed to size Inlet A4-3, a portion of Channel A4, and ensure street capacities. The 10 year and 100 year storm event was analyzed for the steepest and flattest street slope within this drainage area. Based on these calculations we have ensured the streets within this drainage area meet all the criteria of the DECDM. Based on this analysis, it is our engineering judgment that all other street slopes within this drainage sub-area meet the street capacity and velocity requirements of the City of New Braunfels DECDM.
- Drainage Sub-Area A7 was analyzed to size Inlets A4-1 and A4-2 and ensure street capacities. The 10 year and 100 year storm event was analyzed for the steepest and flattest street slope within this drainage area. Based on these calculations we have ensured the streets within this drainage area meet all the criteria of the DECDM. Based on this analysis, it is our engineering judgment that all other street slopes within this drainage sub-area meet the street capacity and velocity requirements of the City of New Braunfels DECDM.
- Drainage Sub-Areas A6+A7 was analyzed to size a portion of Channel A4.
- Drainage Sub-Area A8 was analyzed to size Inlet A2-1 and A2-2.
- Drainage Sub-Area A9 was analyzed to compare and ensure the longest time of concentration for the overall analysis of drainage area ULT A.
- Drainage Sub-Areas A1-A9 discharge into Extended Batch Detention Basin A1 where the required volume of water is treated to remove 70% TSS. Drainage sub-area A1-A9 was analyzed to size Extended Batch Detention Basin A1.
- Drainage Sub-Areas A10, A11, A12, A13, and A14 were analyzed to compare and ensure the longest time of concentration for the overall analysis of drainage area ULT A. These drainage sub-areas are within a different phase of the Parkside

Development and will be further analyzed with the future development of the Parkside Subdivision.

- Drainage Sub-Area A15 consists of the extended detention basins A2 and has been analyzed to compare and ensure the longest time of concentration for the overall analysis of drainage area ULT A.
- Drainage Sub-Area A16 consists of pervious cover that discharges into the existing concrete channel along HWY 46, and was analyzed to compare existing drainage area EX A1 – A3 to the discharge from the proposed Parkside Development into the existing HWY 46 channel.
- Drainage Sub-Area A17 consists of pervious cover that discharges into Piper Street
- Drainage area ULT B is composed of the future development of Parkside Subdivision (which will include a proposed storm network and one Extended Batch Detention Basin B). Drainage area ULT B flows southeastwardly to concentration B and will be analyzed in the future to compare the proposed discharge of drainage area ULT B to the existing discharge of drainage area EX B.

Winchester Street Section

A breakdown of the drainage areas and flow rate that is carries on Winchester has been created to analyze the street capacity (refer to Attachment S). The most conservative analysis involved assuming a slope of 0.50% and carrying the largest runoff for the 10 year and 100 year analysis. Based on our analysis Winchester, in the most conservative situation, Winchester has capacity to carry the 100 year storm water within the right of way and there is an 11' of clearance during the 10 year storm event. Based on this analysis, it is our engineering judgment that the entirety of Winchester meets the collector street requirements from the DECDM.

Table 3 - Ultimate Proposed Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T_c	Curve Number	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
ULT A	Flow Contributing to Batch Detention Basin A1	ULT A	186.36	42.03	87.00	45.03	126.90	224.55	446.94
ULT B	Flow Contributing to Basin B (To be Analyzed in Future Development)	ULT B	58.58	28.81	87.00	60.56	133.35	187.01	299.48

Table 4 - Ultimate Proposed Drainage Sub-Area Conditions Hydrology Calculations - City of New Braunfels

Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
A1	Longest Time of Concentration Analysis	A1	59.15	31.20	87.00	60.20	132.76	186.10	298.18
A2	Longest Time of Concentration Analysis	A2	8.01	21.29	87.00	8.47	18.65	26.14	41.85
A1+A2	SD UN A-5 Sizing					68.32	150.63	211.22	338.20
A3	Inlet A2-3 & A2-4 Sizing	A3	6.58	22.04	87.00	9.47	20.84	29.21	46.77
A4	Longest Time of Concentration Analysis	A4	4.12	21.75	87.00	5.50	12.10	16.96	27.15
A5	Inlet A3-1 Sizing & Street Capacity Analysis	A5	6.02	20.56	87.00	7.40	16.29	22.84	36.56
A1-A5	Channel A2 Sizing					90.08	198.58	278.43	445.78
A6	Inlet A4-3 & Channel A4 Sizing & Street Capacity Analysis	A6	6.30	15.32	87.00	9.21	20.28	28.39	45.44
A7	Inlet A4-1 & A4-2 Sizing & Street Capacity Analysis	A7	5.20	15.69	87.00	7.61	16.74	23.43	37.51
A6+A7	Channel A4 Sizing					16.82	37.01	51.83	82.95
A8	Inlet A2-1 Sizing	A8	3.48	21.39	87.00	4.26	9.36	13.13	21.01
A9	Longest Time of Concentration Analysis	A9	10.40	10.00	87.00	16.46	36.26	50.78	81.18
A1-A9	Inflow into Extended Batch Detention Basin A1		109.26			122.58	270.17	378.79	606.37
A10	Future Development Analysis	A10	1.48	22.24	87.00	1.97	4.35	6.09	9.74
A11	Future Development Analysis	A11	7.82	21.01	87.00	8.95	19.71	27.62	44.19
A12	Future Development Analysis	A12	6.19	22.51	87.00	7.61	16.75	23.48	37.60
A10-A12	Future Development Analysis					18.48	40.69	57.03	91.25
A13	Future Development Analysis	A13	3.57	21.83	87.00	4.39	9.66	13.54	21.68
A10-A13	Future Development Analysis		19.06			22.86	50.35	70.56	112.88
A14	Future Development Analysis	A14	6.28	20.98	87.00	7.72	16.99	23.82	38.14
A15	Longest Time of Concentration Analysis	A15	4.60	10.00	87.00	7.28	16.04	22.46	35.91
A10-A15			29.94			36.97	81.42	114.06	182.53
A16	Longest Time of Concentration Analysis	A16	2.20	10.00	84.00	3.04	7.21	10.29	16.78
A17	Drainage Area EX A2 Comparison	A17	10.47	35.30	78.00	6.62	17.91	26.76	45.76
A18	Drainage Area EX A4 Comparison	A18	34.49	25.60	78.00	26.11	70.35	104.91	179.15

Table 5 - Basin A1 Summary

	2YR	10YR	25YR	100YR
Discharge (cfs)	34.49	123.26	189.09	327.41
Time to Drain (hrs)	16.73	19.07	20.07	23.03
Volume (cuft)	420,643	758,401	972,007	1,368,535
Water Surface Elevation	603.48	604.82	605.58	606.94

Table 6 - Basin A2 Summary

	2YR	10YR	25YR	100YR
Discharge (cfs)	22.24	101.75	173.26	328.36
Volume (cuft)	355,514.00	649,941	853,241	1,227,808
Water Surface Elevation	600.82	602.26	603.22	604.93

Table 7 - Existing to Proposed Discharge Comparison				
Drainage Area	2YR	10YR	25YR	100YR
EX A	68.65	188.13	282.29	485.26
ULT A	45.03	119.66	197.09	405.86
Proposed <= Existing	YES	YES	YES	YES

5.0 Intermediate Phase 1 Proposed Conditions Hydrology

The proposed improvements for Parkside Subdivision Phase 1 will consists of 149 residential lots, a storm drain network, and one extended batch detention. This Hydrology analysis was performed to examine the condition where Parkside Phase 1 is constructed, but the remainder of the tract is left undeveloped. The flows contributing to the drainage features and streets are less than the flows contributing in the Ultimate Conditions, therefore, being the most conservative, all drainage features and street capacities were analyzed with the Ultimate Condition flows. Because the drainage features were analyzed with the Ultimate Condition Flows, it is our engineering judgment that the drainage features and street capacities do not need to be analyzed with the Intermediate Proposed Phase 1 condition flows.

Drainage Area P1 A1 consists of undeveloped land that will be developed in the future phases of the Parkside Development. Drainage Area P1 A1 was analyzed to size the temporary swale. This temporary drainage feature has been placed in the intermediate development of the Parkside Subdivision in order to protect the adjacent lots. The temporary swale will be removed and replaced with a sidewalk box discharging into a channel in a drainage lot where it will discharge into future extension of Channel A2. The size of the sidewalk box, inlet, and channel will be sized in the analysis of the corresponding phase.

Drainage Area P1 A2 consists of the development of Parkside Subdivision Phase 1 and ultimately discharges into the existing HWY 46 concrete channel at concentration point P1 A1. The flow rate from Drainage Area P1 A1 is less than the flow rate the proposed drainage feature will experience under full development condition. Because of this, the drainage features have been sized for the Ultimate Condition Flow.

Drainage Area P1 B consists of undeveloped drainage area that flows southwestwardly to concentration point at concentration point P1 B. No improvements have been proposed in Drainage Area P1 B and is discharging less than EX B. Drainage Area P1 will be further analyzed with the future development of the Parkside Subdivision Development.

Table 8 - Phase 1 Proposed Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
P1 A	Flow Rate Comparison of Ultimate Conditions vs Intermediate Phase 1 Conditions to ensure most Conservative Calculations is Analyzed	P1 A	154.65	38.77	86.40	158.35	351.70	494.38	793.69
P1 A1	Temporary Swale Sizing	P1 A1	7.32	29.28	78.00	5.23	14.13	21.09	35.99
P1 A2	Flow Rate Comparison of Ultimate Conditions vs Intermediate Phase 1 Conditions to ensure most Conservative Calculations is Analyzed	P1 A2	102.30	30.35	87.00	104.12	229.61	321.86	515.70
P1 A3		P1 A3	10.47	35.30	87.00	10.06	22.20	31.13	49.88
P1 A4		P1 A4	34.56	25.60	87.00	39.56	87.11	122.07	195.31
P1 B		P1 B	90.39	61.40	78.00	39.88	109.28	163.90	281.67

6.0 Hydraulics

The proposed residential development will contain storm drains and channels with adequate capacity to convey the proposed storm water runoff. The analysis of this project contained more detailed calculations for the 2, 10, 25, and 100-year storm peak flows.

In order to accurately analyze the proposed storm network, the tailwater used for each drainage feature can be found in the table below:

Storm Network Tailwater Table				
	2 YR	10 YR	25YR	100YR
Channel A1	582.00	584.10	585.30	586.10
SD A2-1	-	-	605.58	606.94
SD A2-4	-	-	612.30	613.00
SD A3-1	-	-	608.74	609.43
Channel A4	-	-	605.58	606.94
SD 4-1	-	-	608.57	608.80

Channel A1 tailwater was interpolated from the HEC-RAS model performed for the Parkside Offsite analysis.

Interpolated WSE at Outfall of Channel A			16812.26	166192.6	interpolated XS
2-year	306.88		584	580.1	582.0
5-year	622.19	0.493226	585	581.6	583.3
10-year			585.6	582.7	584.1
25-year			586.4	584.2	585.3
100-year			587.3	584.9	586.1

Storm Retard

The natural fall of Channel A1 requires a slope that causes the velocities to be between 6 and 8 fps. According to the City of New Braunfels DECDM this velocity is too fast and therefore the natural fall of Channel A1 is too steep to be an earthen channel for the entirety of its length. Due to the velocities exceeding 6 fps, four proposed storm retards have been provided in Channel A1. Based on the criteria for Storm Retards in the City of New Braunfels Municode there is no maximum velocity for a proposed concrete storm retard (please refer to the portion of the City of New Braunfels Municode below):

Velocity (fps)	Type of Facility Required	Hydraulic Radius (ft.)	Correction Factor	Maximum Permissible Velocity (fps)
1 to 6 (Maximum Average Velocity = 6 fps)	Vegetated Earthen Channel	0-1 1-3 3-5 5-8 8-10 Over 10	0.8 0.9 1.05 1.15 1.225 1.25	5 5.5 6.3 6.9 7.35 7.5
6 to 12	Turf Reinforcement Mat (TRM)	N/A	N/A	12
6 to 8	Concrete Retards	N/A	N/A	N/A
>8	Concrete Lining or Drop Structures	N/A	N/A	N/A

*If Turf Reinforcement Mat (TRM) is proposed, please see City of San Antonio Standard Specifications for Construction Item 554 for submittal requirements. The improvement plan sheets should include the location of the placement, details, and manufacturer's installation instructions.

https://library.municode.com/tx/san_antonio/codes/unified_development_code?nodeId=APTOW_ADECRMA_CH9OPCH_9.3DEGU_9.3.8CHVE

The concrete has been extended at the downstream side of the proposed storm retards to ensure adequate erosion protection.

7.0 Detention

There are three detention basins proposed in the ultimate conditions of the Parkside Subdivision development. There will be two tiered detention basins (A1 and A2) that will discharge into one another and ultimately discharge into Channel A1. Extended Batch Detention Basin B will discharge into an area that has been designed to spread the concentrate flow back to sheet flow in order to match existing conditions, and discharge onto the adjacent property. Parkside Subdivision Phase 1 development will consist of Extended Detention Basin A1 and has been sized on the ultimate development conditions. The Extended Batch Detention Basin B will be designed in the future development of the Parkside Subdivision Development.

The Detention Basin Summaries can be found in the tables below:

Table 5 - Basin A1 Summary				
	2YR	10YR	25YR	100YR
Discharge (cfs)	34.49	123.26	189.09	327.41
Time to Drain (hrs)	16.73	19.07	20.07	23.03
Volume (cuft)	420,643	758,401	972,007	1,368,535
Water Surface Elevation	603.48	604.82	605.58	606.94

Table 6 - Basin A2 Summary				
	2YR	10YR	25YR	100YR
Discharge (cfs)	22.24	101.75	173.26	328.36
Volume (cuft)	355,514.00	649,941	853,241	1,227,808
Water Surface Elevation	600.82	602.26	603.22	604.93

An emergency weir has been designed for each detention basin. The corresponding emergency weirs were designed using the rectangular weir calculation, in the program FlowMaster. The 100-year water surface elevation for the corresponding basin was used as the crest elevation. This allows for complete control of the discharge through the desired control outfall, however, if in any case the control outfall is blocked, once the water surface elevation reaches the calculated 100-year water surface elevation the emergency weir will be engaged. The berm height of the corresponding basin was used as the headwater elevation, and the discharge calculated from the control outfall for the 100-year storm event was used as the discharge. With these variables (refer to the table below), the required length of emergency weir was calculated.

	Basin A1
Basin 100 YR WSE	606.94
Emergency Weir Elevation	607.00
Top of Berm Elevation	608.00
Contributing 25 YR Flow Rate (cfs)	189.09
Required Emergency Weir Length (ft)	56.78
Provided Emergency Weir Length (ft)	57.00

The emergency weir calculations will be analyzed and preformed in the corresponding phase of the Parkside Development.

The detention portion of the proposed basins are in accordance with the DECDM. The drawdown time for the detention portion of the proposed basins have been provided in attachment Q.

8.0 Water Quality

In order to calculate the volume of water that is required to be treated to achieve 70% TSS removal for the ultimate conditions of the Parkside Development, Equation 13-1 and 13-2 was used from the DECDM (refer to the equations and calculations below):

Equation 13-1

$$WQV (cuft) = \frac{0.5 \text{ inches}}{12 \frac{\text{inches}}{\text{foot}}} \times (\text{IC Area Post Construction} - \text{IC Area Pre Construction})(\text{sq. ft})$$

Equation 13-2

$$V = WQV * 1.2$$

Required TSS Removed for Site					
			Acre	Sq. FT.	
Total Site Acreage =			197.97	8623573	
Total Site Proposed Impervious Cover =			138.58	6036501	
Total Site Existing Impervious Cover=			0.00	0	
WQV=				251520.89	cuft
V=				301825.06	cuft

The three proposed extended batch detention basins (Basin A1, A2, and B) have been designed to treat portions of the required volume for the Parkside Development. The calculations have been provided for each extended batch detention basin below:

Extended Batch Detention Basin A1

Stormwater enters the Extended Detention Basin A1 from Channel A2 and A4. All impervious cover proposed within the development of Parkside Phase 1 is treated within Extended Batch Detention Basin A1.

Water Quality Facility Sizing

Extended Batch Detention Basin A1					
			Acre	Sq. FT.	
Total Contributing area =			109.26	4759366	
Total Proposed Impervious Cover =			76.48	3331556	
Total Existing Impervious Cover =			0	0	
WQV =				138814.8	cuft
V=				166577.8	cuft

Therefore, the required volume to treat 70% of TSS from the development of Parkside Phase 1 is 7166,578 cubic feet. The required water quality volume is achieved at 1.5' depth at elevation 602.50 (refer to the table below for the extended detention storage summary). Please note that because the water quality volume requires a depth of 1.5', the control weir for the detention portion of the Extended Detention Basin A1 has been set to begin at elevation 602.50.

Pond Name <input type="text" value="BASIN A1"/>						
Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage	Total Discharge
	(ft)	(ft)	(sqft)	(cuft)	(cuft)	(cfs)
0	0.00	601.00	62,767	0.000	0.000	0.000
1	1.00	602.00	126,224	94,496	94,496	0.000
2	1.50	602.50	232,937	89,790	184,286	0.000
3	2.00	603.00	237,423	117,590	301,876	12.36
4	3.00	604.00	246,471	241,947	543,823	64.23
5	4.00	605.00	279,202	262,837	806,659	138.21
6	5.00	606.00	289,970	284,586	1,091,245	228.95
7	6.00	607.00	298,355	294,163	1,385,408	333.77
8	7.00	608.00	301,306	299,831	1,685,238	451.00
9						

According to TCEQ an Extended Detention Basin has an efficiency of 75% TSS removal. In order to find the amount of TSS required to be removed and the amount of TSS removed from

Please note that the above equations assume a TSS removal of 75% and the City of New Braunfels DECM only requires the TSS removal of 70%. We are providing sufficient TSS treatment for 75% removal, therefore, we are providing sufficient TSS treatment for 70% removal (refer to Attachment RR for calculations).

Basin Configuration –

The ratio of flow path length to width from the inlet to the outlet should be at least 2:1 (L:W). The flow path length is defined as the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Please see Attachment P for the Extended Detention Basin A1 Dimension exhibit and the tables below providing the Extended Detention Basin dimension information.

The width of the extended Batch Detention Basin A1 is 650.16', therefore the minimum length (as defined above) must be $2 \times 650.16 = 1300.32$ linear feet. Refer to the table below for the lengths from each outfall.

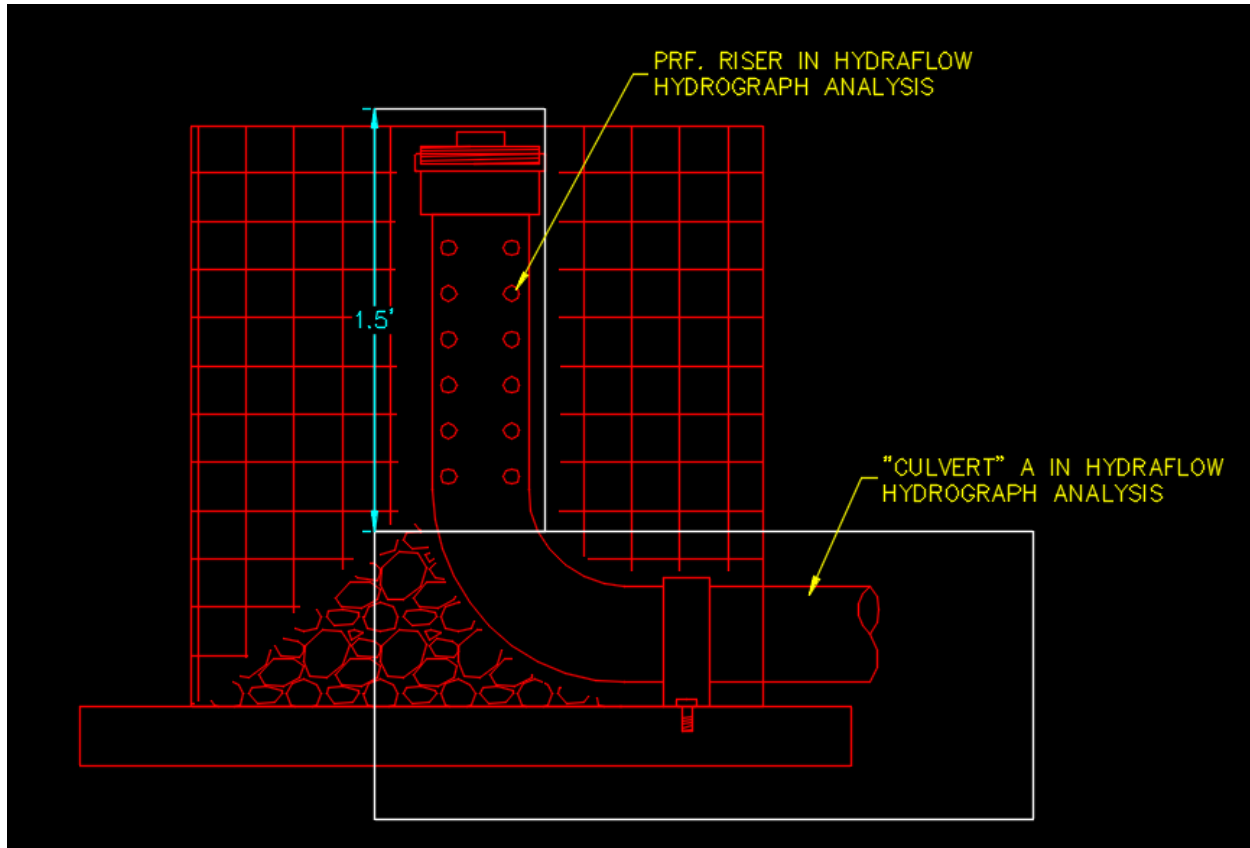
Total Length (Must be at least 2W or 1300.32')	
Section	Length (ft)
1	330.62
2	153.57
3	619.89
Total	1104.03

Outflow Structure -

A 6" PVC perforated pipe with a trash rack acts as the outflow structure for the water quality volume within the extended detention basin. This will allow for complete drawdown of the water quality volume in 48 hours, as well as no more than 50% of the water quality volume draining from the extended detention basin within the first 24 hours

The minimum required water that is not allow to discharge within 12 hour is:

$$\begin{aligned}\text{Minimum water to remain within 12 hours} &= \text{Required Volume}/2 \\ &= 166,578 \text{ Cubic feet}/2 \\ &= 83,289 \text{ Cubic feet}\end{aligned}$$



Perforated Riser

A perforated riser is a special kind of orifice structure which contains a series of same-size holes within a vertical height, see [Perforated Risers](#) on page 43. Hydraflow Hydrographs Extension uses the following formula (McEnroe, 1988) to estimate the outflow.

$$Q = C_p \frac{2A}{3H_s} \sqrt{2g} H^{3/2}$$

Where:

Q = discharge (cfs)

C_p = 0.61

A = cross-sectional area of all the holes (sqft)

H_s = distance from S/2 below the lowest row of holes to S/2 above the top row (ft)

The water surface elevation of Extended Detention Basin A1 for the 2-year storm (the minimum water surface elevation of the storm events analyzed) is 603.48. Since the Extended Detention Basin A1 Weir is set at 602.50, the weir is disengaged once the water surface elevation of the basin reaches 602.50. Therefore, we can assume that the water quality volume for any storm will be the volume at elevation 602.50, once the Extended Detention Basin A1 Weir is disengaged.

The flow rate of discharging from the perforated pipe was calculated using the Orifices Equation 10-1 from the DECDM (refer to the calculations below). From this information the perforate pipe discharge rate and remaining volume within the water quality portion of Extended Detention Basin C was calculated. Please refer calculations below. In the DECEM the requirements for a basin is that no "still" water shall remain in the basin for 36 hours unless the correct safety measures are taken (refer to the snippet of the referenced material below). TCEQ RG 348 requires that extended detention basins using a perforated pipe must be completely drained within 48 hours (refer to the snippet of the referenced material below). We have provided calculations and details for the designed perforated pipe to ensure that the water quality volume will be drained within the required 48 hours.

CNB DECDM:

- D. No detention or retention basin shall retain standing water longer than 36 hours unless it is designed and constructed to be a permanent pond with appropriate health, safety and water quality measures. Permanent ponds must comply with all applicable water rights requirements for such a body of water.

TCEQ RG 348:

preventing clogging at the entrance to the outflow pipes.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 48 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. A valve or orifice can be used to regulate the rate of discharge from the basin.

The facility should have a concrete drain pipe with a manual valve that can

10.3.1 Orifices

For a single orifice as illustrated in Figure 10-1 (a), orifice flow can be determined using Equation 10-1.

Equation 10-1

$$Q = C_o A_o (2gH_o)^{0.5}$$

Where:

Q = Orifice flow rate (cfs)

C_o = Discharge coefficient 0.40 – 0.60

A_o = Area of orifice (ft²)

H_o = Effective head on the orifice measured from the centroid of the opening (ft)

g = Gravitational acceleration = 32.2 ft/s².

Flow through multiple orifices (see Figure 10-1 (c)) can be computed by summing the flow through individual orifices. For multiple orifices of the same size and under the influence of the same effective head, the total flow can be determined by multiplying the discharge for a single orifice by the number of openings.

Based on these calculations, we assumed a water surface elevation of 602.50 and analyzed the discharge rate. Please refer Table 9 – Water Quality and Table 10 – Water Quality Perforated Pipe Summary:

Perforated Pipe Basin A1							
Pipe Height (ft) =	1.5						
Co =	0.5	Co =	0.5	Co =	0.5	Co =	0.5
D (ft) =	0.25	D (ft) =	0.25	D (ft) =	0.25	D (ft) =	0.25
Ao (ft) =	0.049063	Ao (ft) =	0.049063	Ao (ft) =	0.0490625	Ao (ft) =	0.0490625
Centorid Elevation (ft)	0.75	Centorid Elevation (ft) =	0.625	Centorid Elevation (ft) =	0.5	Centorid Elevation (ft) =	0.375
H (ft)=	0.75	H (ft)=	0.875	H (ft) =	1	H (ft) =	1.125
g =	32.2	g =	32.2	g =	32.2	g =	32.2
Q (cfs) =	0.17	Q (cfs) =	0.18	Q (cfs)=	0.20	Q (cfs) =	0.21
n =	3	n =	3	n =	3	n =	3
Q =	0.51	Q (cfs) =	0.55	Q (cfs) =	0.59	Q (cfs) =	0.63

Table 9 - Water Quality	
Storage Volume Provided (cuft)	184286
Storage Volume Required (cuft)	166578
1/2 Required Volume	83289
Water Surface Elevation	602.5
Water Quality Depth	1.5
Average Flow Rate (cfs)	2.28

Table 10 - Water Quality Perforated Pipe Summary	
Water Quality Volume =	184286.00
Required Water Quality Volume =	166578.00
1/2 of Required Water Quality Volume =	83289.00
Volume Discharged in 12 Hours =	98535.136
Volume Remaining after 12 Hours =	85750.86
Half or more required volume retained after 12 Hours?	YES
Total Time for Water Quality Volume to drain =	22.44

Based on our analysis over 50% of the water quality volume required to be treated remains within Extended Detention Basin A1 for more than 12 and 24 hours. The water quality and detention portion of the proposed basins are in accordance with the DECDM. The drawdown time for the water quality the proposed extended detention basin A1 has been provided in attachments P.

Extended Batch Detention Basin A2

Extended Detention Basin A2 will be designed to treat the impervious cover of the Stormwater that is contributing to the Extended Detention Basin A2. Extended Detention Basin A2 will be designed with the future development and design of Parkside Subdivision

Extended Batch Detention Basin B

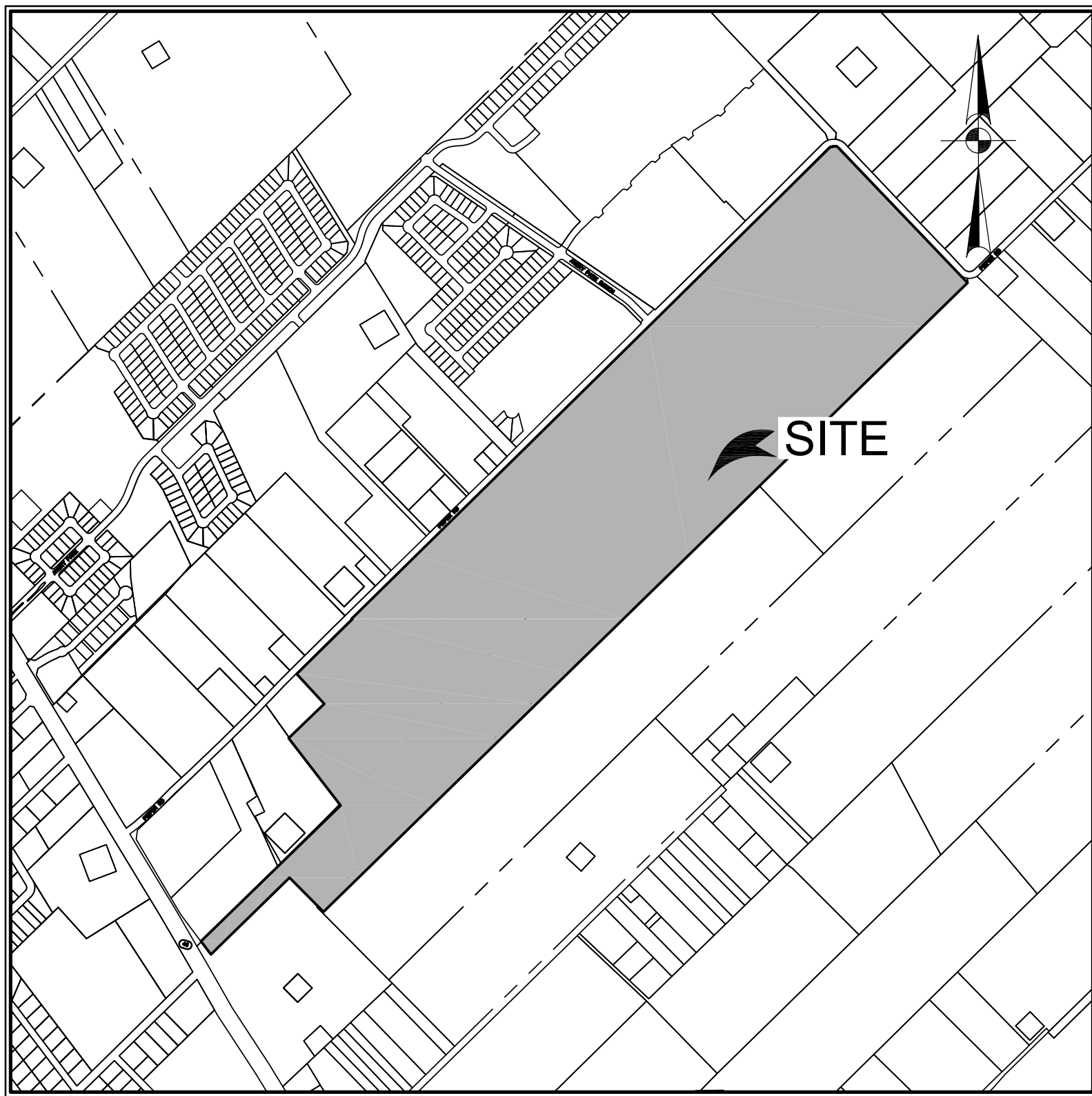
Extended Detention Basin B will be designed to treat the impervious cover of the Stormwater that is contributing to the Extended Detention Basin B. Extended Detention Basin B will be designed with the future development and design of Parkside Subdivision.

9.0 Conclusion

The Ultimate Proposed and Intermediate Phase 1 Proposed drainage improvements for the Parkside Subdivision was analyzed for the 2, 10, 25, and 100-year storm events. The water quality and detention portion of the proposed basins are in accordance with the DECDM. The drawdown time for the water quality and detention portions of the proposed basins have been provided in attachments PP and QQ respectively. These calculations were performed and extracted from the program Hydrograph. This analysis was performed in accordance with the City of New Braunfels Drainage and Erosion Control Manual revised January 2018.

Attachment A

Location Map

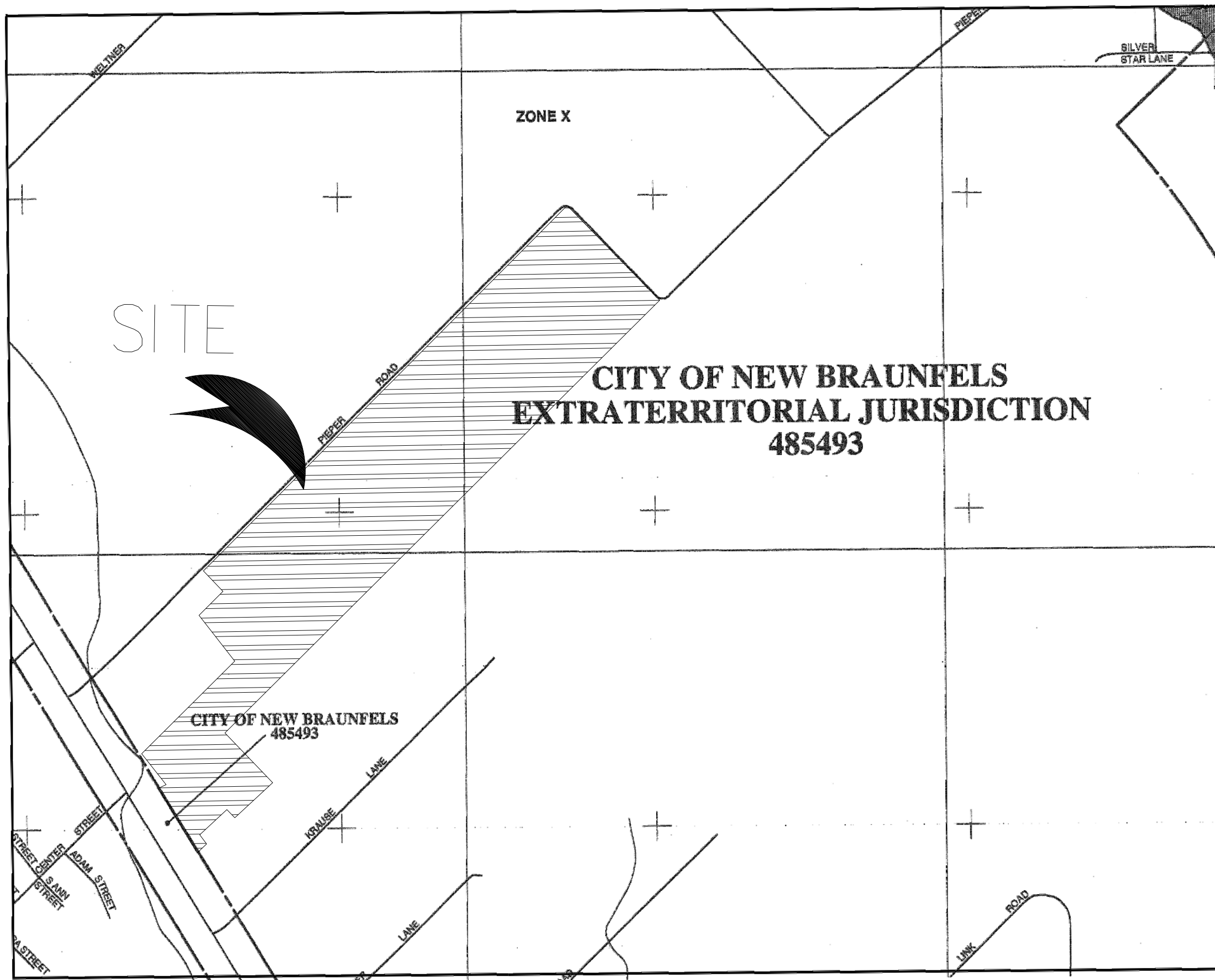


PROJECT LOCATION MAP

SCALE: N.T.S.

Attachment B

FEMA FIRM Map



MAP SCALE 1" = 1000'
500 0 1000 2000 FEET

FIRM
FLOOD INSURANCE RATE MAP
GUADALUPE COUNTY,
TEXAS
AND INCORPORATED AREAS

PANEL 120 OF 480
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUADALUPE COUNTY	480288	0120	F
NEW BRAUNFELS, CITY OF	485493	0120	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
48187C0120F
EFFECTIVE DATE
NOVEMBER 2, 2007

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.nema.fema.gov

Attachment C

Existing Drainage Area Map

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D8	Lqohw#D604#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D8	9135	53189	;:133	:173	4915<	551:7	69189
D40D8	Fkdqgho#D5#V1 }lgj#					<313;	4<;18;	5;:176	7781:;
D9	Lqohw#D706#)#Fkdqgho#D7#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v		9163	48165	;:133	<154	5315;	5;16<	78177
D:	Lqohw#D704#)#D705#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D:	8153	4819<	;:133	:194	491:7	56176	6:184
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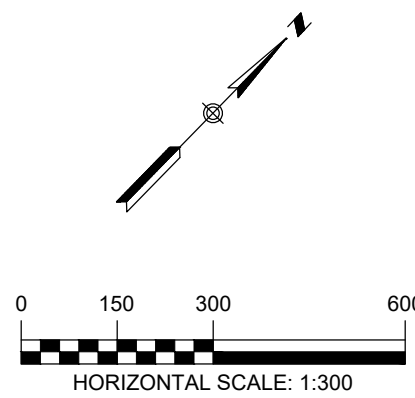
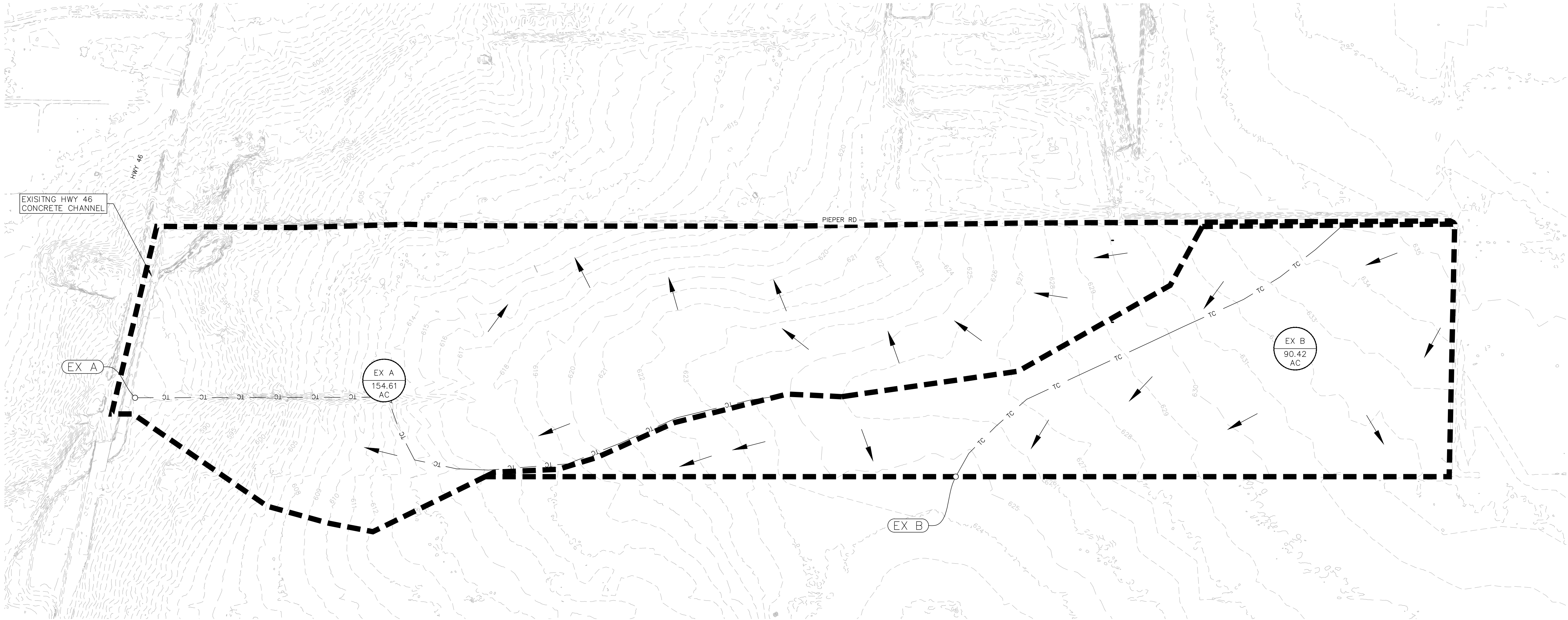
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S4#D6		S4#D6	4317:	68163	;:133	43139	55153	64146	7<1;;
S4#D7	Iorz#Udwh#Frpsdulvrq#ri#Xowlpdwh#Frgglwlrqv#yv#Lqwhuphg#D4#D		67189	58193	;:133	6<189	;:144	45513:	4<8164
S4#E	Skdvh#4#Frgglwlrqv#wr#hqvxuh#prvw#Frqvhuydwlh#Fdofoxodwlrqv#4#Dqdo }hg	S4#E	<316<	94173	;:133	6<1;;	43<15;	4961<3	5;419:

Drawing Name: N:_Projects\031 - DR Horton\031.060 - 175 Ac Friesenhain Cda\Phase 1\City Approval Cda\031.60_DRAG Pl.dwg User: callym-m Jul 20, 2020 - 10:50am

Table 1 - Existing Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
EX A	Discharge From Tiered Basin A Comparison	EX A	154.61	83.58	78.00	68.65	188.13	282.29	485.26
EX B	Discharge From Basin B Comparison (To be Analyzed with Future Development)	EX B	90.42	61.40	78.00	39.90	109.32	163.96	281.76

Table 2 - Existing Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
EX A1	Longest Time of Concentration Analysis	EX A1	25.12	49.73	78.00	35.56	54.39	53.26	91.28
EX A2	Longest Time of Concentration Analysis	EX A2	10.47	35.30	78.00	6.62	17.91	26.76	45.76
EX A3	Drainage Sub-Area A14 Comparison	EX A3	68.84	45.35	78.00	101.56	91.62	151.96	260.33
EX A4	Longest Time of Concentration Analysis	EX A4	50.18	86.98	78.00	48.80	133.80	73.41	126.61

PLEASE REFER TO THE PARKSIDE SUBDIVISION PHASE 1
DRAINAGE REPORT FOR FUTURE DRAINAGE AREA
ANALYSIS AND DRAINAGE SUB-AREAS



- LEGEND**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - B.L. BUILDING SETBACK LINE
 - U.E. UTILITY EASEMENT
 - D.E. DRAINAGE EASEMENT
 - DRAINAGE AREA
 - TC TIME OF CONCENTRATION
 - POINT OF CONCENTRATION
 - DRAINAGE FLOW DIRECTION
 - DRAINAGE AREA LABEL

290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

HMT
ENGINEERING & SURVEYING

CHRISTOPHER P. VAN HERDE
93047
LICENSED PROFESSIONAL ENGINEER
Chris Van Heerde, P.E.

07/21/2020

**EXISTING DRAINAGE
AREA MAP**
PARKSIDE SUBDIVISION
PHASE 1

NO.	REVISION DESCRIPTION	REVISION DATE

DATE: JUNE 2020
DRAWN BY: CAM
DESIGNED BY: CAM
REVIEWED BY: CVH/SWH
HMT PROJECT NO.: 031.060

SHEET
C1.01

Attachment D

Ultimate Drainage Area Map

Wdeoh#4#0#H{lvwlqj#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
H{#D	Glvfkdjuh#Iurp#Wlhuhg#Edvlg#D#Frpsdulvrq	H{#D	487194	;618;	;:133	9;198	4;:146	5;515<	7;8159
H{#E#	Glvfkdjuh#Iurp#Edvlg#E#F								
	+Wr#eh#Dqdo }hg#zlw#Iwxuh#Ghyhorsphqw,	H{#E	<3175	94173	;:133	6<1<3	43<165	4961<9	5;41:9

Wdeoh#5#0#H{lvwlqj#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
H{#D4	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	H{#D4	58145	7<1:6	;:133	68189	8716<	86159	<415;
H{#D5	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	H{#D5	4317:	68163	;:133	9195	4:1<4	591:9	781:9
H{#D6	Gudlqdjh#Vxe0Duhd#D47#Frpsdulvrq	H{#D6	9;1:7	78168	;:133	434189	<4195	4841<9	593166
H{#D	Orgjhvw#Wlph#ri#Frqfhgwudw	H{#D	8314	;91<	;:13	7;1;	4661;	:617	45919

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Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
XOW#D	Iorz#Frgwulexwlgj#wr#Edwfk#Ghwhqwrq#Edvlg#D4	XOW#D	4;9169	75136	;:133	78136	44<199	4<:13<	7381;9
XOW#E	Iorz#Frgwulexwlgj#wr#Edvlg#E								
	+Wr#eh#Dqdo }hg#lq#Iwxuh#Ghyhorsphqw,	XOW#E	8;18;	5;1:4	;:133	93189	466168	4;:134	5<<17;

Wdeoh#7#0#Xowlpdwh#Sursrvhg#Gudlqdjh#Vxe0Duhd#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
D4	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D4	8<148	64153	;:133	93153	4651:9	4;9143	5<;14;
D5	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D5	;134	5415<	;:133	;17:	4;198	59147	741:8
D4.D5	VG#OQ#D08#V1 }lgj#					9;165	483196	544155	66;153
D6	Lqohw#D506#)#D507#V1 }lgj	D6	918;	55137	;:133	<17:	531:7	5<154	791::
D7	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D7	7145	541:8	;:133	8183	45143	491<9	5:148
D8	Lqohw#D604#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D8	9135	53189	;:133	:173	4915<	551:7	69189
D40D8	Fkdqgho#D5#V1 }lgj#					<313;	4<;18;	5;:176	7781:;
D9	Lqohw#D706#)#Fkdqgho#D7#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v		9163	48165	;:133	<154	5315;	5;16<	78177
D:	Lqohw#D704#)#D705#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D:	8153	4819<	;:133	:194	491:7	56176	6:184
D9.D:	Fkdqgho#D7#V1 }lgj#					491;5	6:134	841:6	;51<8
D:	Lqohw#D504#V1 }lgj	D:	617;	5416<	;:133	7159	<169	46146	54134
D<	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D<	43173	43133	;:133	49179	69159	831:;	;414;
D40D<	Lqorz#lqwr#H{whqghg#Edwfk#Ghwhqwrq#Edvlg#D4		43<159			45518;	5:314:	6;1:;<	93916:
D43	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D43	417;	55157	;:133	41<:	7168	913<	<1:7
D44	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D44	:1;5	54134	;:133	;1<8	4<1:4	5:195	7714<
D45	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D45	914<	55184	;:133	:194	491:8	5617;	6:193
D430D45	Iwxuh#Ghyhorsphqw#Dqdo v1v#					4;17;	7319<	8:136	<4158
D46	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D46	618:	541:6	;:133	716<	<199	46187	5419;
D430D46	Iwxuh#Ghyhorsphqw#Dqdo v1v#		4<139			551:9	83168	:3189	4451:;
D47	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D47	915;	531<:	;:133	:1:5	491<<	561:5	6;147
D48	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D48	7193	43133	;:133	:15;	49137	55179	681<4
D430D48			5<1<7			691<:	;4175	447139	4;5186
D49	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D49	5153	43133	;7133	6137	:154	4315<	491:;
D4:	Gudlqdjh#Duhd#H{#D5#Frpsdulvrq	D4:	4317:	68163	;:133	9195	4:1<4	591:9	781:9
D4;	Gudlqdjh#Duhd#H{#D7#Frpsdulvrq	D4;	6717<	58193	;:133	59144	:3168	4371<4	4:~148

Wdeoh#8#0#Edvlg#D4#Vxppdu				
	S\U	43\U	58\U	433\U
Glvfkdjuh#+fiv,	6717<	456159	4;~13<	65:174
Wlph#wr#Gudlg#+kuv,	491:6	4<13:	5313:	56136
Yroxph#+fxiw,	753/976	:8;/734	<:5/33:	4/69;/868
Zdwhu#Vxuidfh#Hohydwlrg	93617;	9371:5	93818;	9391<7

Wdeoh#9#0#Edvlg#D5#Vxppdu				
	S\U	43\U	58\U	433\U
Glvfkdjuh#+fiv,	55157	4341:8	4:6159	65;169
Yroxph#+fxiw,	688/847133	97</~74	:86/574	4/55:~/3;
Zdwhu#Vxuidfh#Hohydwlrg	9331;5	935159	936155	9371<6

Wdeoh#:~0#H{lvwlqj#wr#Sursrvhg#Glvfkdjuh#Frpsdulvrq				
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H{#D		9;198	4;:146	5;515<
XOW#D		78136	44<199	4<:13<
Sursrvhg#?@#H{lvwlqj	\HV	\HV	\HV	\HV

Wdeoh#:~0#Skdvh#4#Sursrvhg#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
S4#D	Iorz#Udwh#Frpsdulvrq#ri#Xowlpdwh#Frgglwlrqv#yv#Lqwhuphg#D4#D Skdvh#4#Frgglwlrqv#wr#hqvxuh#prvw#Frqvhuydwlh#Fdofoxodwlrqv#lv#Dqdo }hg		487198	6;1:;	;9173	48;168	6841:3	7<716;	:~619<
S4#D4	Whpsrudu }#Vzdoh#V1 }lgj	S4#D4	:165	5<15;	;:133	8156	47146	5413<	681<<
S4#D5		S4#D5	435163	63168	;:133	437145	55<194	6541:9	8481:3
S4#D6		S4#D6	4317:	68163	;:133	43139	55153	64146	7<1;;
S4#D7	Iorz#Udwh#Frpsdulvrq#ri#Xowlpdwh#Frgglwlrqv#yv#Lqwhuphg#D4#D Skdvh#4#Frgglwlrqv#wr#hqvxuh#prvw#Frqvhuydwlh#Fdofoxodwlrqv#lv#Dqdo }hg		67189	58193	;:133	6<189	;:144	45513:	4<8164
S4#E		S4#E	<316<	94173	;:133	6<1;;	43<15;	4961<3	5;419:

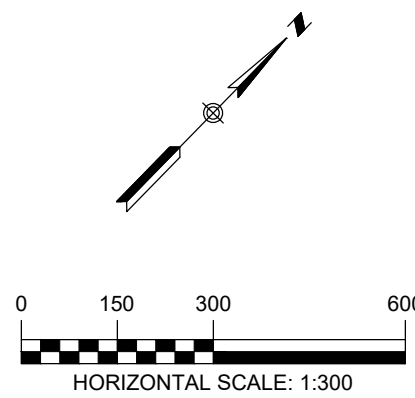
Table 3 - Ultimate Proposed Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
ULTA	Flow Contributing to Batch Detention Basin A1	ULTA	186.36	42.03	87.00	45.03	119.66	197.09	405.86
ULTB	Flow Contributing to Basin B (To be Analyzed in Future Development)	ULTB	58.58	28.81	87.00	60.56	133.35	187.01	299.48

Table 4 - Ultimate Proposed Drainage Sub-Area Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
A1	Longest Time of Concentration Analysis	A1	59.15	31.20	87.00	60.20	132.76	186.10	298.18
A2	Longest Time of Concentration Analysis	A2	8.01	21.29	87.00	8.47	18.65	26.14	41.85
A1+A2	SD LN A-5 Sizing					68.32	150.63	211.22	338.20
A3	Inlet A2-3 & A2-4 Sizing	A3	6.58	22.04	87.00	9.47	20.84	29.21	46.77
A4	Longest Time of Concentration Analysis	A4	4.12	21.75	87.00	5.50	12.10	16.96	27.15
A5	Inlet A3-1 Sizing & Street Capacity Analysis	A5	6.02	20.56	87.00	7.40	16.29	22.84	36.56
A1-A5	Channel A2 Sizing					90.08	198.58	278.43	445.78
A6	Inlet A4-3 & Channel A4 Sizing & Street Capacity Analysis	A6	6.30	15.32	87.00	9.21	20.28	28.39	45.44
A7	Inlet A4-1 & A4-2 Sizing & Street Capacity Analysis	A7	5.20	15.69	87.00	7.61	16.74	23.43	37.51
A6+A7	Channel A4 Sizing					16.82	37.01	51.83	82.95
A8	Inlet A2-1 Sizing	A8	3.48	21.39	87.00	4.26	9.36	13.13	21.01
A9	Longest Time of Concentration Analysis	A9	10.40	10.00	87.00	16.46	36.26	50.78	81.18
A1-A9	Inflow into Extended Batch Detention Basin A1		109.26			122.58	270.17	378.79	606.37
A10	Future Development Analysis	A10	1.48	22.24	87.00	1.97	4.35	6.09	9.74
A11	Future Development Analysis	A11	7.82	21.01	87.00	8.95	19.71	27.62	44.19
A12	Future Development Analysis	A12	6.19	22.51	87.00	7.61	16.75	23.48	37.60
A10-A12	Future Development Analysis					18.48	40.69	57.03	91.25
A13	Future Development Analysis	A13	3.57	21.83	87.00	4.39	9.66	13.54	21.68
A10-A13	Future Development Analysis		19.06			22.86	50.35	70.56	112.88
A14	Future Development Analysis	A14	6.28	20.98	87.00	7.72	16.99	23.82	38.14
A15	Longest Time of Concentration Analysis	A15	4.60	10.00	87.00	7.28	16.04	22.46	35.91
A10-A15			29.94			36.97	81.42	114.06	182.53
A16	Longest Time of Concentration Analysis	A16	2.20	10.00	84.00	3.04	7.21	10.29	16.78
A17	Drainage Area EX A2 Comparison	A17	10.47	35.30	78.00	6.62	17.91	26.76	45.76
A18	Drainage Area EX A4 Comparison	A18	34.49	25.60	78.00	26.11	70.35	104.91	179.15

DRAINAGE FEATURES, DETENTION BASIN MAINTENANCE AND EQUIPMENT ACCESS REQUIREMENTS:

SILT SHALL BE REMOVED AND THE BASIN RETURNED TO ORIGINAL LINES AND GRADES WHEN STANDING WATER CONDITIONS OCCUR OR THE BASIN STORAGE VOLUME IS REDUCED BY MORE THAN 10%.

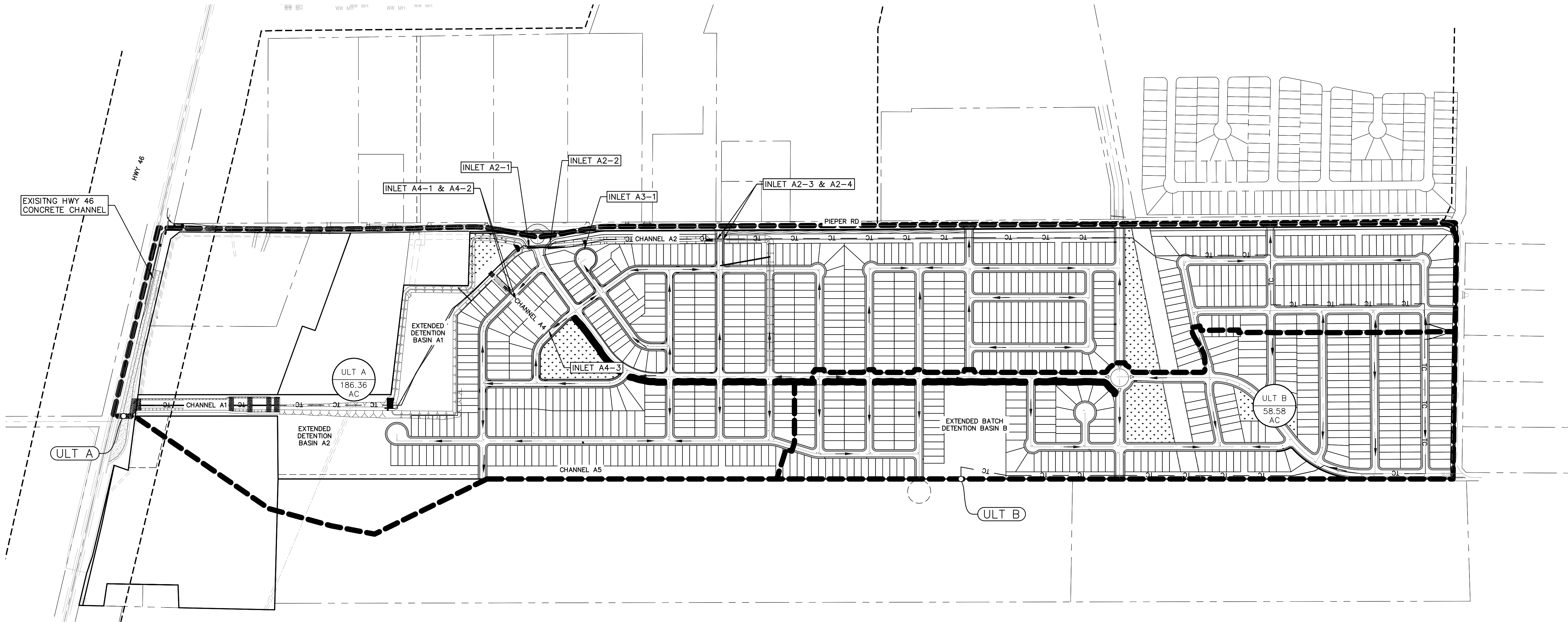
- A. TO LIMIT EROSION, NO UNVEGETATED AREA SHALL EXCEED 10 SQ. FT. IN EXTENT.
- B. ACCUMULATED PAPER, TRASH, AND DEBRIS SHALL BE REMOVED EVERY 6 MONTHS OR AS NECESSARY TO MAINTAIN PROPER OPERATION.
- C. BASINS SHALL BE MOWED ANNUALLY BETWEEN THE MONTHS OF JUNE AND SEPTEMBER.
- D. CORRECTIVE MAINTENANCE IS REQUIRED ANY TIME A BASIN DOES NOT DRAIN COMPLETELY WITHIN 60 HOURS OR CESSATION OF INFLOW (IE: NO STANDING WATER IS ALLOWED).
- E. STRUCTURAL INTEGRITY OF BASINS SHALL BE MAINTAINED AT ALL TIMES.
- F. MAINTENANCE VEHICLE FOR POND ACCESS SHOULD BE A BOBCAT S175 SKID STEER LOADER OR VEHICLE OF EQUAL TO LESSER SIZE.



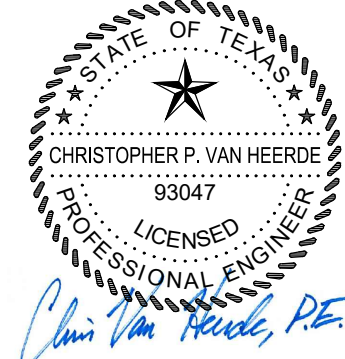
LEGEND	
— 700 —	EXISTING CONTOURS
— 700 —	PROPOSED CONTOURS
B.L.	BUILDING SETBACK LINE
U.E.	UTILITY EASEMENT
D.E.	DRAINAGE EASEMENT
— TC — TC —	TIME OF CONCENTRATION
○ A-1	POINT OF CONCENTRATION
←	DRAINAGE FLOW DIRECTION
DA ACRES	DRAINAGE AREA LABEL

Table 5 - Basin A1 Summary				
	2YR	10YR	25YR	100YR
Discharge (cfs)	34.49	123.26	189.09	327.41
Time to Drain (hrs)	16.73	19.07	20.07	23.03
Volume (cuft)	420,643	758,401	972,007	1,368,535
Water Surface Elevation	603.48	604.82	605.58	606.94

PLEASE REFER TO THE PARKSIDE SUBDIVISION PHASE 1 DRAINAGE REPORT FOR FUTURE DRAINAGE AREA ANALYSIS AND DRAINAGE SUB-AREAS



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600



06/22/2020

ULTIMATE PROPOSED
DRAINAGE AREA MAP
PARKSIDE SUBDIVISION
PHASE 1

NO.	REVISION DESCRIPTION	REVISION DATE

DATE: JUNE 2020
DRAWN BY: CAM
DESIGNED BY: CAM
REVIEWED BY: CVH/SMH
HMT PROJECT NO.: 031.060

SHEET
C1.02

Attachment E

Intermediate Phase 1 Drainage Area Map

Wdeoh#4#0#H{lvwlqj#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
H{#D	Glvfkdjuh#Iurp#Wlhuhg#Edvlg#D#Frpsdulvrq	H{#D	487194	;618;	;:133	9;198	4;:146	5;515<	7;8159
H{#E#	Glvfkdjuh#Iurp#Edvlg#E#F								
	+Wr#eh#Dqdo }hg#zlw#Iwxuh#Ghyhorsphqw,	H{#E	<3175	94173	;:133	6<1<3	43<165	4961<9	5;41:9

Wdeoh#5#0#H{lvwlqj#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
H{#D4	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	H{#D4	58145	7<1:6	;:133	68189	8716<	86159	<415;
H{#D5	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	H{#D5	4317:	68163	;:133	9195	4:1<4	591:9	781:9
H{#D6	Gudlqdjh#Vxe0Duhd#D47#Frpsdulvrq	H{#D6	9;1:7	78168	;:133	434189	<4195	4841<9	593166
H{#D	Orgjhvw#Wlph#ri#Frqfhgwudw	H{#D	8314	;91<	;:13	7;1;	4661;	:617	45919

Wdeoh#6#0#Xowlpdwh#Sursrvhg#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
XOW#D	Iorz#Frgwulexwlgj#wr#Edwfk#Ghwhqwrq#Edvlg#D4	XOW#D	4;9169	75136	;:133	78136	44<199	4<:13<	7381;9
XOW#E	Iorz#Frgwulexwlgj#wr#Edvlg#E								
	+Wr#eh#Dqdo }hg#lq#Iwxuh#Ghyhorsphqw,	XOW#E	8;18;	5;1:4	;:133	93189	466168	4;:134	5<<17;

Wdeoh#7#0#Xowlpdwh#Sursrvhg#Gudlqdjh#Vxe0Duhd#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
D4	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D4	8<148	64153	;:133	93153	4651:9	4;9143	5<;14;
D5	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D5	;134	5415<	;:133	;17:	4;198	59147	741:8
D4.D5	VG#OQ#D08#V1 }lgj#					9;165	483196	544155	66;153
D6	Lqohw#D506#)#D507#V1 }lgj	D6	918;	55137	;:133	<17:	531:7	5<154	791::
D7	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v	D7	7145	541:8	;:133	8183	45143	491<9	5:148
D8	Lqohw#D604#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D8	9135	53189	;:133	:173	4915<	551:7	69189
D40D8	Fkdqgho#D5#V1 }lgj#					<313;	4<;18;	5;:176	7781:;
D9	Lqohw#D706#)#Fkdqgho#D7#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v		9163	48165	;:133	<154	5315;	5;16<	78177
D:	Lqohw#D704#)#D705#V1 }lgj#)#Vvuhhw#Fdsdflw #Dqdo v1v	D:	8153	4819<	;:133	:194	491:7	56176	6:184
D9.D:	Fkdqgho#D7#V1 }lgj#					491;5	6:134	841:6	;51<8
D:	Lqohw#D504#V1 }lgj	D:	617;	5416<	;:133	7159	<169	46146	54134
D<	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D<	43173	43133	;:133	49179	69159	831:;	;414;
D40D<	Lqorz#lqwr#H{whqghg#Edwfk#Ghwhqwrq#Edvlg#D4		43<159			45518;	5:314:	6;1:;<	93916:
D43	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D43	417;	55157	;:133	41<:	7168	913<	<1:7
D44	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D44	:1;5	54134	;:133	;1<8	4<1:4	5:195	7714<
D45	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D45	914<	55184	;:133	:194	491:8	5617;	6:193
D430D45	Iwxuh#Ghyhorsphqw#Dqdo v1v#					4;17;	7319<	8:136	<4158
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D47	Iwxuh#Ghyhorsphqw#Dqdo v1v#	D47	915;	531<:	;:133	:1:5	491<<	561:5	6;147
D48	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D48	7193	43133	;:133	:15;	49137	55179	681<4
D430D48			5<1<7			691<:	;4175	447139	4;5186
D49	Orgjhvw#Wlph#ri#Frqfhgwudwlrq#Dqdo v1v#	D49	5153	43133	;7133	6137	:154	4315<	491:;
D4:	Gudlqdjh#Duhd#H{#D5#Frpsdulvrq	D4:	4317:	68163	;:133	9195	4:1<4	591:9	781:9
D4;	Gudlqdjh#Duhd#H{#D7#Frpsdulvrq	D4;	6717<	58193	;:133	59144	:3168	4371<4	4:~148

Wdeoh#8#0#Edvlg#D4#Vxppdu				
	S\U	43\U	58\U	433\U
Glvfkdjuh#~+fiv,	6717<	456159	4;~13<	65:174
Wlph#wr#Gudlg#+kuv,	491:6	4<13:	5313:	56136
Yroxph#+fxiw,	753/976	:8;/734	<:5/33:	4/69;/868
Zdwhu#Vxuidfh#Hohydwlrg	93617;	9371;5	93818;	9391<7

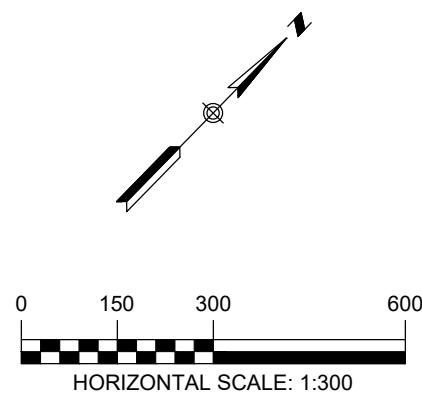
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Yroxph#+fxiw,	688/847133	97</~74	;86/574	4/55:~/3;
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Wdeoh#:~0#H{lvwlqj#wr#Sursrvhg#Glvfkdjuh#Frpsdulvrq				
	Gudlqdjh#Duhd	S\U	43\U	58\U
H{#D		9;198	4;:146	5;515<
XOW#D		78136	44<199	4<:13<
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Wdeoh#:~0#Skdvh#4#Sursrvhg#Frgglwlrqv#K gurorj #Fdofoxodwlrqv#0#Flw #ri#Qhz#Eudxqihov									
Srlqw#ri#Frqfhgwudwlrq	Ghvfulswlrq	Gudlqdjh#Duhd	Duhd	W _e	Fxuyh#Qxpehu	T ₂ #+fiv,	T ₃ #+fiv,	T ₅ #+fiv,	T ₁₃ #+fiv,
S4#D	Iorz#Udwh#Frpsdulvrq#ri#Xowlpdwh#Frgglwlrqv#yv#Lqwhuphg#D4#D		487198	6;1:;	;9173	48;168	6841:3	7<716;	:~619<
S4#D4	Skdvh#4#Frgglwlrq#wr#hqvxuh#prvw#Frqvhuydwlh#Fdofoxodwlrqv#1v#Dqdo }hg	S4#D4	:165	5<15;	;:133	8156	47146	5413<	681<<
S4#D5	Whpsrudu ~Vzdoh#V1 }lgj	S4#D5	435163	63168	;:133	437145	55<194	6541;9	8481:3
S4#D6		S4#D6	4317:	68163	;:133	43139	55153	64146	7<1;;
S4#D7	Iorz#Udwh#Frpsdulvrq#ri#Xowlpdwh#Frgglwlrqv#yv#Lqwhuphg#D4#D		67189	58193	;:133	6<189	;:144	45513:	4<8164
S4#E	Skdvh#4#Frgglwlrq#wr#hqvxuh#prvw#Frqvhuydwlh#Fdofoxodwlrqv#4#~#Dqdo }hg	S4#E	<316<	94173	;:133	6<1;;	43<15;	4961<3	5;419:

Drawing Name: N:_Projects\031 - DR Horton\031.060 - 175 Ac Friesenham Cda\Phase 1\031.60_DRWG P1 INT.dwg User: callynn-m Jun 22, 2020 - 2:16pm

Table 8 - Phase 1 Proposed Conditions Hydrology Calculations - City of New Braunfels									
Point of Concentration	Description	Drainage Area	Area	T _c	Curve Number	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
P1 A	Flow Rate Comparison of Ultimate Conditions vs Intermediate Phase 1 Conditions to ensure most Conservative Calculations is Analyzed	P1 A	154.65	38.77	86.40	158.35	351.70	494.38	793.69
P1 A1	Temporary Swale Sizing	P1 A1	7.32	29.28	78.00	5.23	14.13	21.09	35.99
P1 A2	Flow Rate Comparison of Ultimate Conditions vs Intermediate Phase 1 Conditions to ensure most Conservative Calculations is Analyzed	P1 A2	102.30	30.35	87.00	104.12	229.61	321.86	515.70
P1 A3		P1 A3	10.47	35.30	87.00	10.06	22.20	31.13	49.88
P1 A4		P1 A4	34.56	25.60	87.00	39.56	87.11	122.07	195.31
P1 B		P1 B	90.39	61.40	78.00	39.88	109.28	163.90	281.67



LEGEND

700

EXISTING CONTOURS

700

PROPOSED CONTOURS

B.L.

BUILDING SETBACK LINE

U.E.

UTILITY EASEMENT

D.E.

DRAINAGE EASEMENT

DRAINAGE AREA

TC

TC

TIME OF CONCENTRATION

A-1

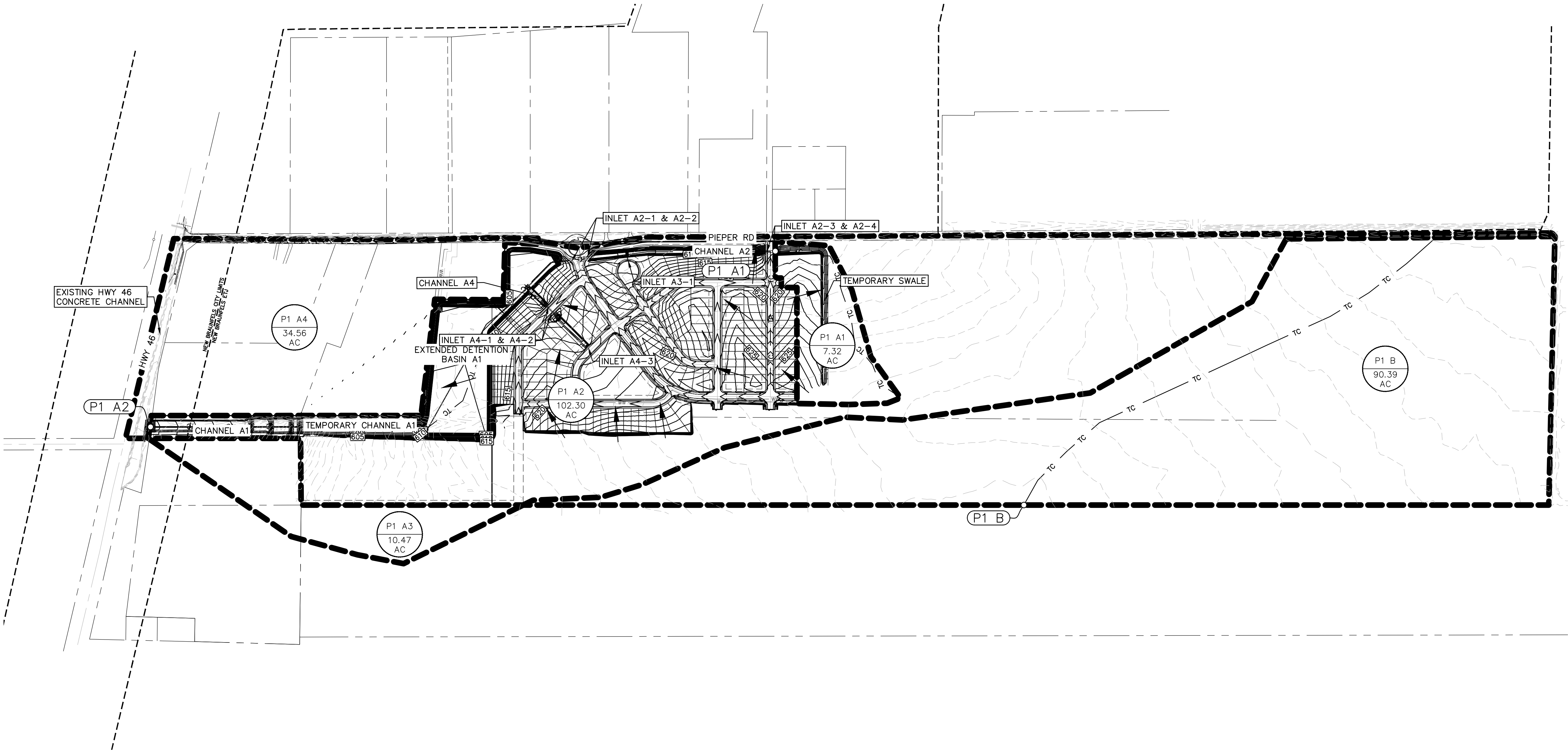
POINT OF CONCENTRATION

DRAINAGE FLOW DIRECTION

DA

ACRES

DRAINAGE AREA LABEL



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 1053600

HMT
ENGINEERING & SURVEYING

CHRISTOPHER P. VAN HERDE
93047
LICENSED PROFESSIONAL ENGINEER
Chris Van Heerde, P.E.

06/22/2020

**INTERMEDIATE PHASE 1
PROPOSED DRAINAGE AREA MAP**
PARKSIDE SUBDIVISION
PHASE 1

NO.	REVISION DESCRIPTION	REVISION DATE

DATE: JUNE 2020

DRAWN BY: CAM

DESIGNED BY: CAM

REVIEWED BY: CVH/SWH

HMT PROJECT NO.: 031.060

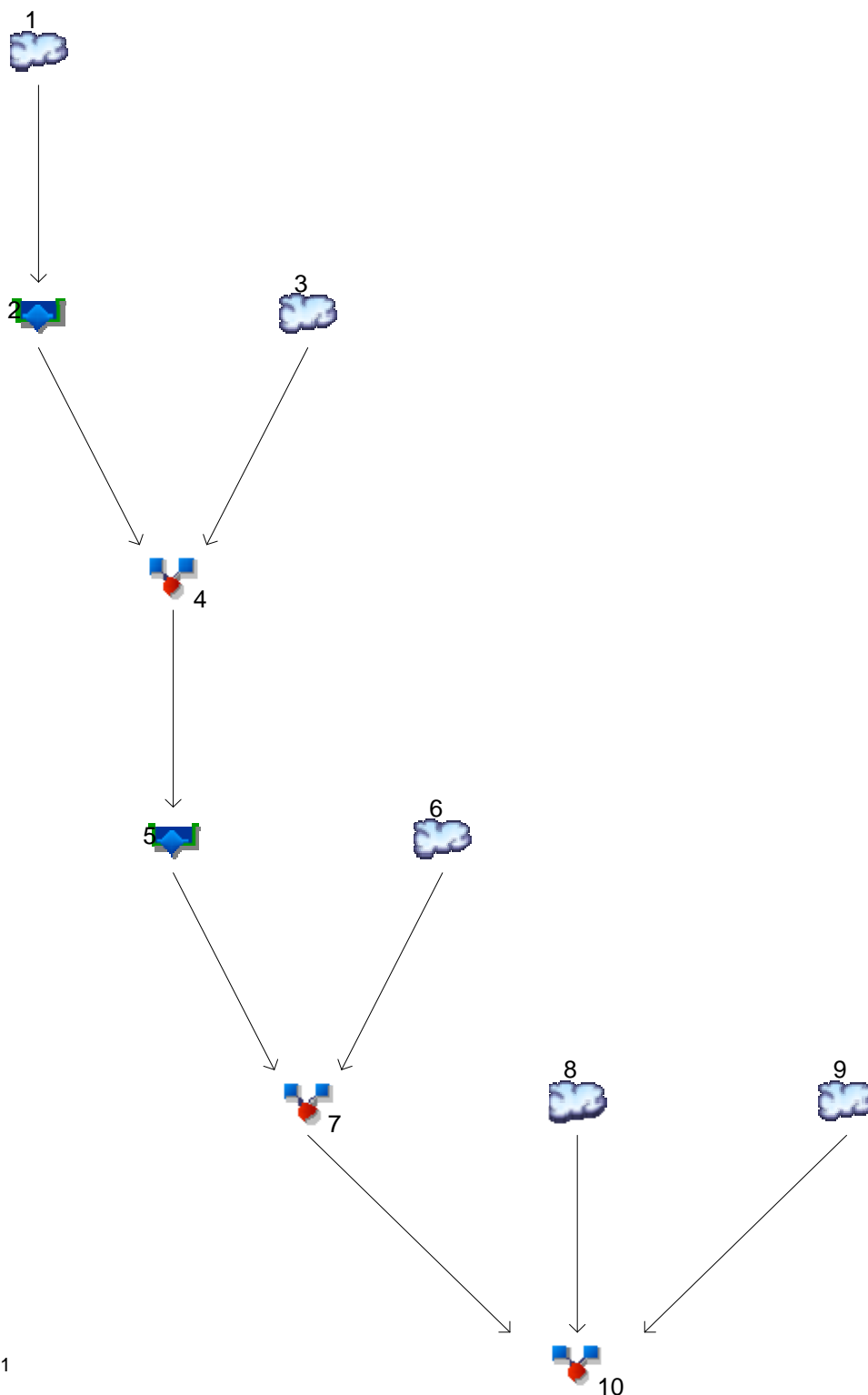
SHEET
C1.03

Attachment F

Hydrograph Calculations

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2



Legend

Hyd.	Origin	Description
1	SCS Runoff	A1-A9
2	Reservoir	A1-A9 + Basin A1
3	SCS Runoff	A10-A15
4	Combine	A10-15 + BASIN A1
5	Reservoir	BASIN A2
6	SCS Runoff	A16
7	Combine	Discharge Into TxDOT Channel
8	SCS Runoff	A17
9	SCS Runoff	A18
10	Combine	ULT A

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	-----	-----	100.07	-----	166.09	221.13	310.34	394.48	497.35	A1-A9
2	Reservoir	1	-----	34.49	-----	81.81	123.26	189.09	251.12	327.41	A1-A9 + Basin A1
3	SCS Runoff	-----	-----	32.44	-----	53.73	71.42	100.16	127.27	160.40	A10-A15
4	Combine	2, 3	-----	41.38	-----	101.43	153.89	238.36	317.40	413.63	A10-15 + BASIN A1
5	Reservoir	4	-----	22.24	-----	61.62	101.75	173.26	243.14	328.36	BASIN A2
6	SCS Runoff	-----	-----	3.482	-----	5.770	7.669	10.74	13.64	17.17	A16
7	Combine	5, 6	-----	22.43	-----	62.06	102.40	174.27	244.47	330.09	Discharge Into TxDOT Channel
8	SCS Runoff	-----	-----	8.885	-----	16.88	23.92	35.64	46.88	60.71	A17
9	SCS Runoff	-----	-----	33.78	-----	64.25	90.85	135.13	177.55	230.06	A18
10	Combine	7, 8, 9	-----	45.03	-----	84.79	119.66	197.09	289.84	405.86	ULT A
Proj. file: 031.060_Parkside Basins.gpw										Tuesday, 06 / 9 / 2020	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

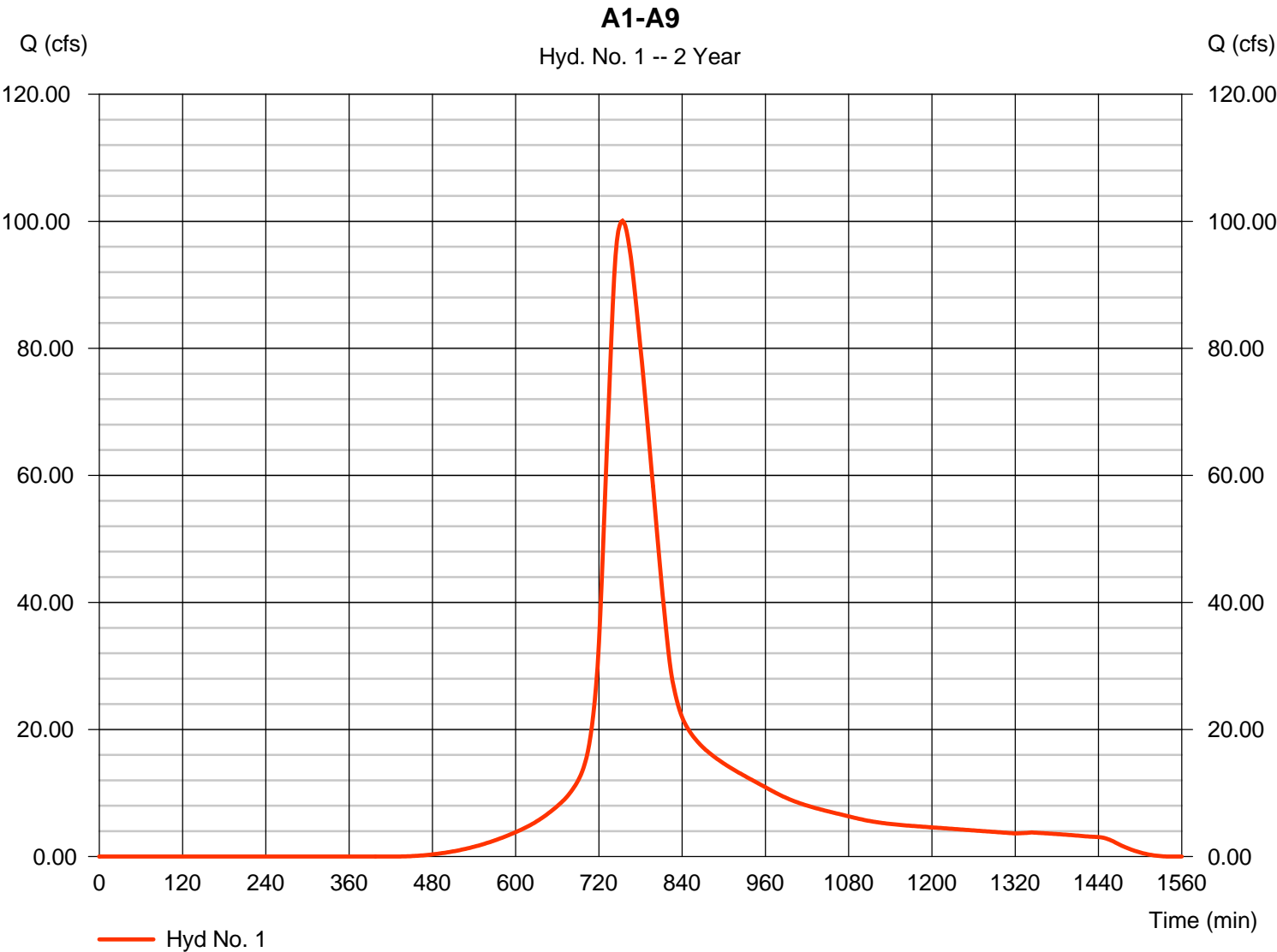
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	100.07	2	754	814,623	-----	-----	-----	A1-A9
2	Reservoir	34.49	2	818	630,308	1	603.49	420,643	A1-A9 + Basin A1
3	SCS Runoff	32.44	2	746	223,227	-----	-----	-----	A10-A15
4	Combine	41.38	2	788	853,535	2, 3	-----	-----	A10-15 + BASIN A1
5	Reservoir	22.24	2	954	660,659	4	600.82	355,514	BASIN A2
6	SCS Runoff	3.482	2	730	16,087	-----	-----	-----	A16
7	Combine	22.43	2	952	676,746	5, 6	-----	-----	Discharge Into TxDOT Channel
8	SCS Runoff	8.885	2	746	51,735	-----	-----	-----	A17
9	SCS Runoff	33.78	2	738	169,690	-----	-----	-----	A18
10	Combine	45.03	2	740	898,172	7, 8, 9	-----	-----	ULT A
031.060_Parkside Basins.gpw					Return Period: 2 Year			Tuesday, 06 / 9 / 2020	

Hydrograph Report

Hyd. No. 1

A1-A9

Hydrograph type	= SCS Runoff	Peak discharge	= 100.07 cfs
Storm frequency	= 2 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 814,623 cuft
Drainage area	= 109.260 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.90 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

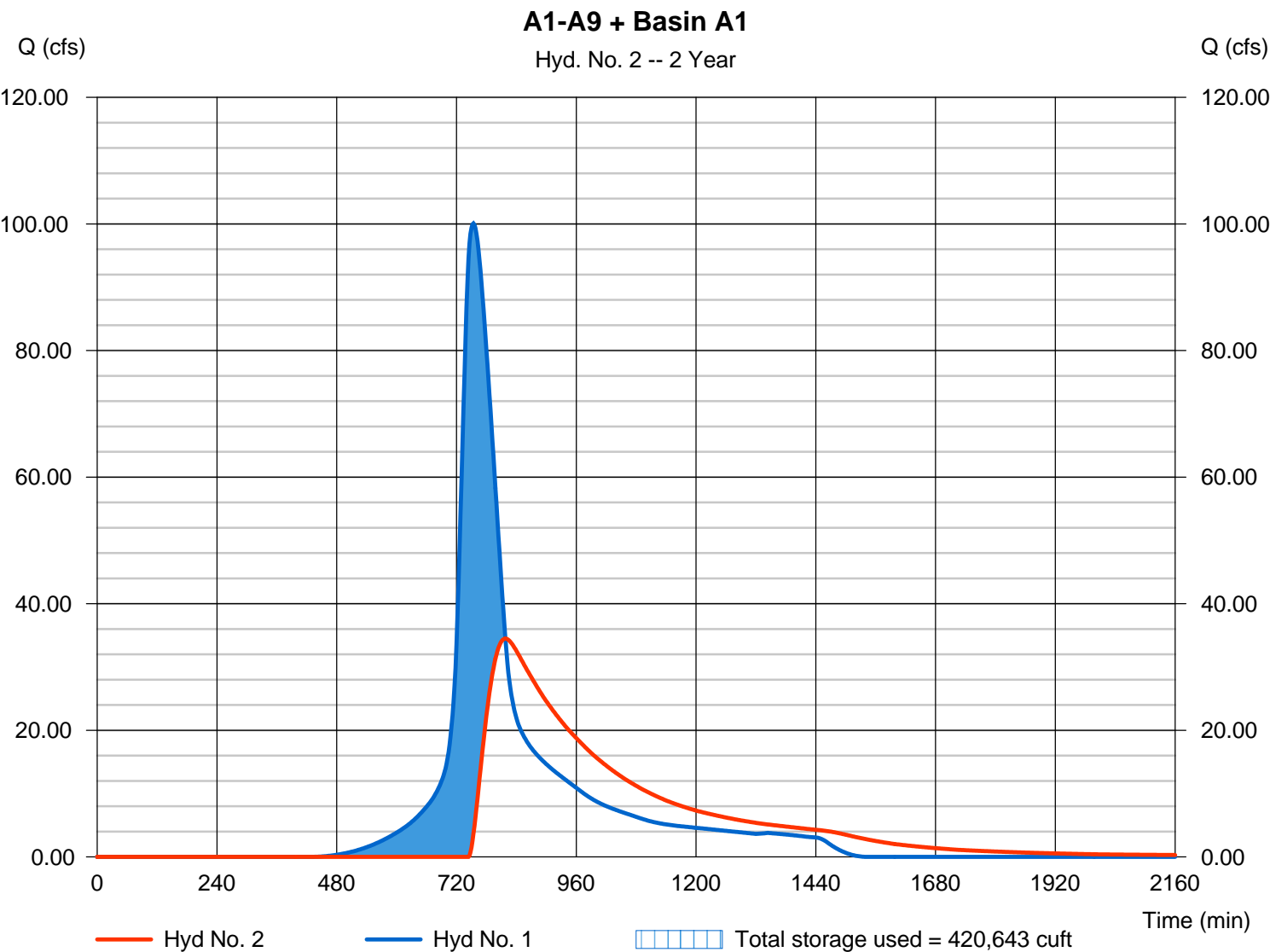
Tuesday, 06 / 9 / 2020

Hyd. No. 2

A1-A9 + Basin A1

Hydrograph type	= Reservoir	Peak discharge	= 34.49 cfs
Storm frequency	= 2 yrs	Time to peak	= 818 min
Time interval	= 2 min	Hyd. volume	= 630,308 cuft
Inflow hyd. No.	= 1 - A1-A9	Max. Elevation	= 603.49 ft
Reservoir name	= BASIN A1	Max. Storage	= 420,643 cuft

Storage Indication method used.



Pond Report

6

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Pond No. 1 - BASIN A1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 601.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	601.00	62,767	0	0
1.00	602.00	126,224	94,496	94,496
1.50	602.50	232,937	89,790	184,286
2.00	603.00	237,423	117,590	301,876
3.00	604.00	246,471	241,947	543,823
4.00	605.00	279,202	262,837	806,659
5.00	606.00	289,970	284,586	1,091,245
6.00	607.00	298,355	294,163	1,385,408
7.00	608.00	301,306	299,831	1,685,238

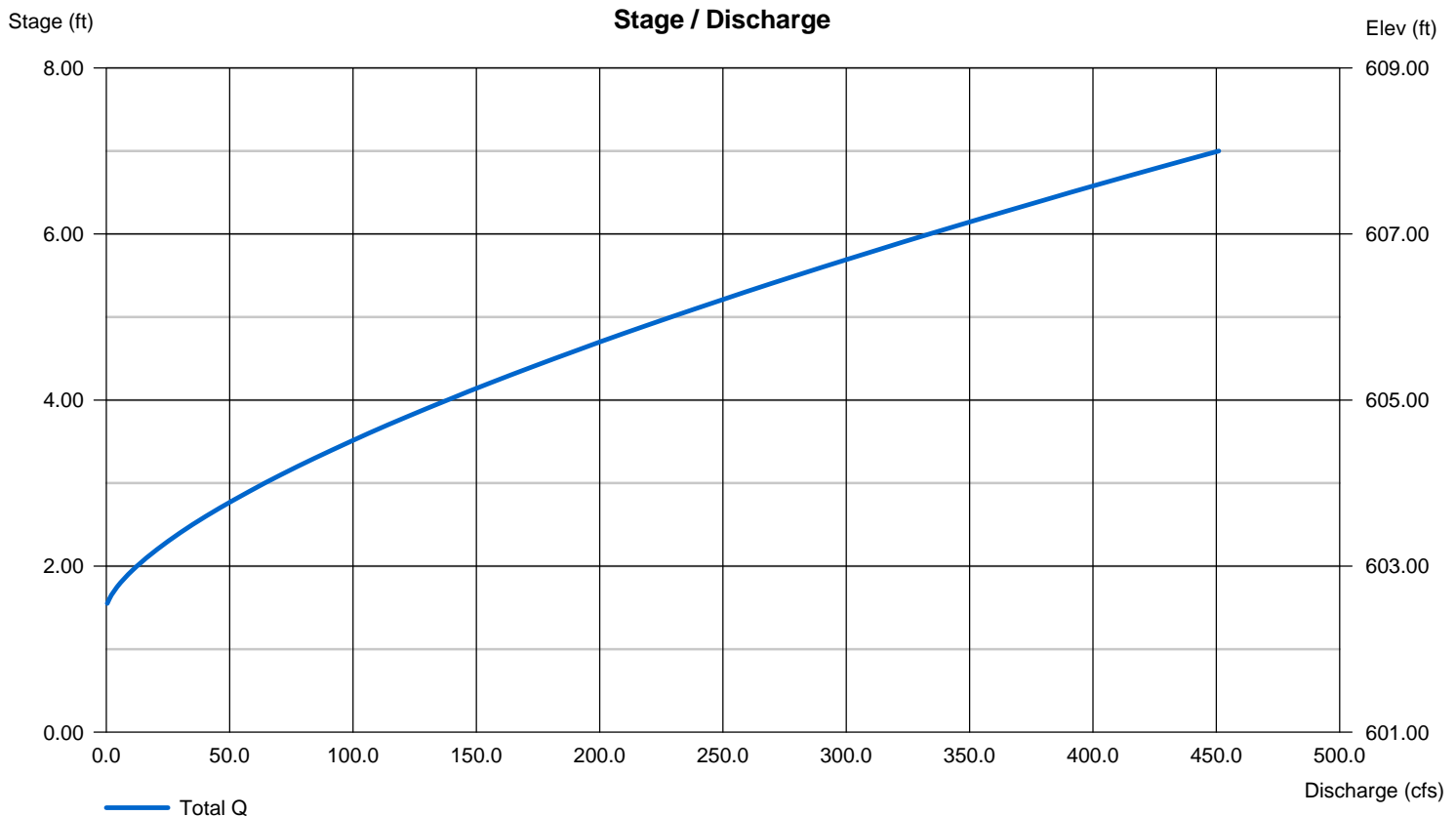
Culvert / Orifice Structures

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

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.50	Inactive	Inactive	Inactive
Crest El. (ft)	= 602.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

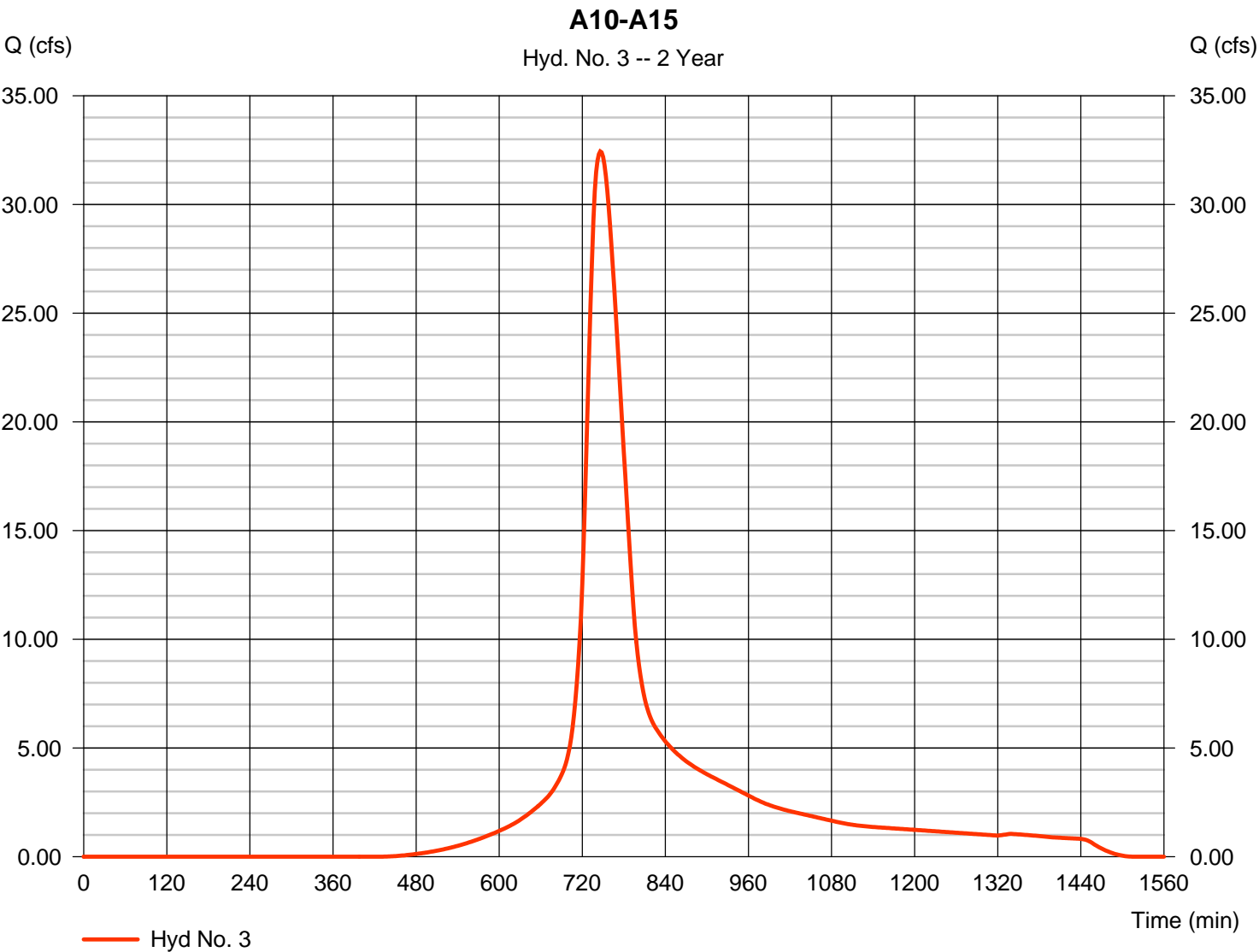
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 3

A10-A15

Hydrograph type	= SCS Runoff	Peak discharge	= 32.44 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 223,227 cuft
Drainage area	= 29.940 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.50 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

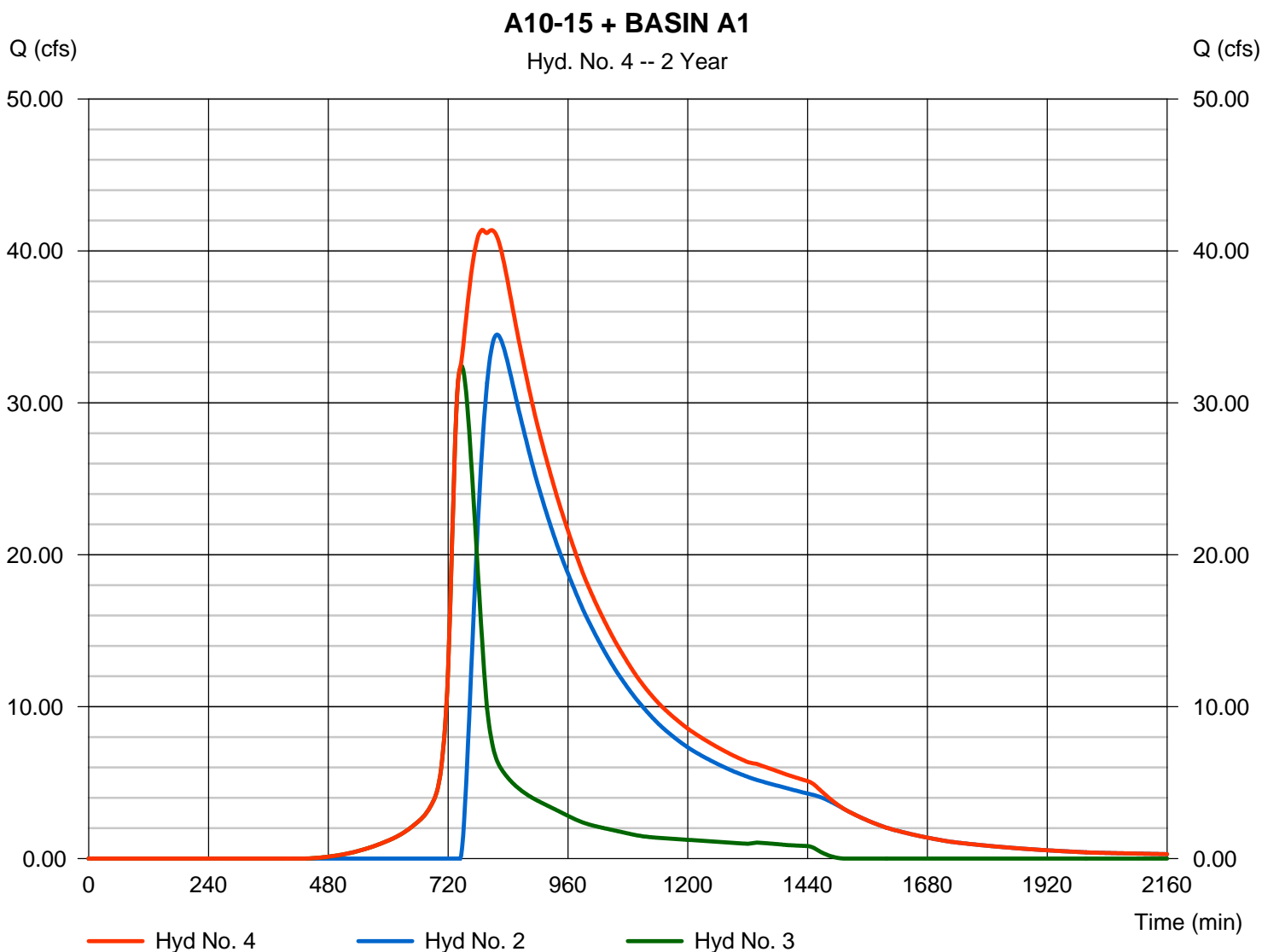
Tuesday, 06 / 9 / 2020

Hyd. No. 4

A10-15 + BASIN A1

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 2, 3

Peak discharge = 41.38 cfs
 Time to peak = 788 min
 Hyd. volume = 853,535 cuft
 Contrib. drain. area = 29.940 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

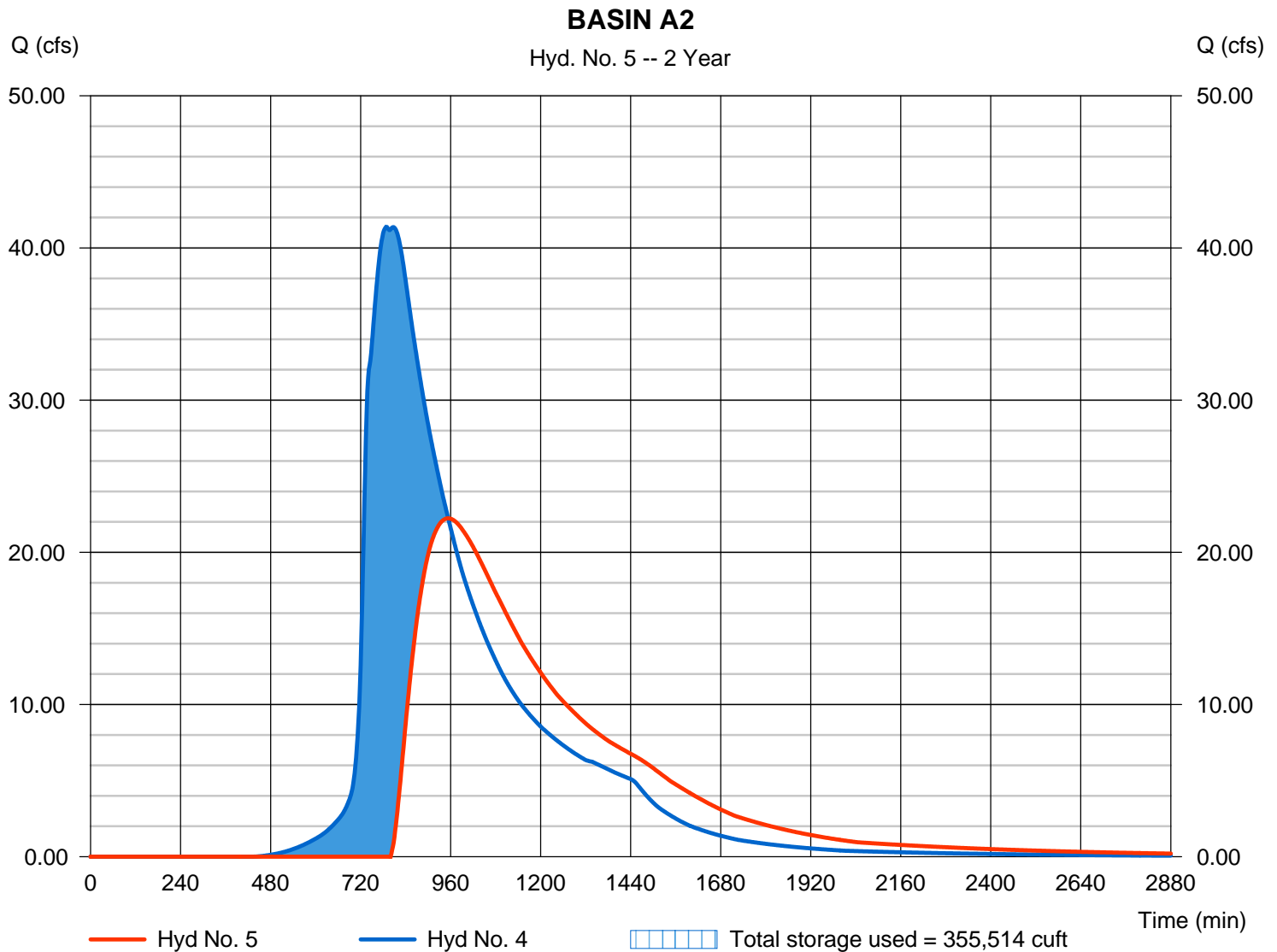
Tuesday, 06 / 9 / 2020

Hyd. No. 5

BASIN A2

Hydrograph type	= Reservoir	Peak discharge	= 22.24 cfs
Storm frequency	= 2 yrs	Time to peak	= 954 min
Time interval	= 2 min	Hyd. volume	= 660,659 cuft
Inflow hyd. No.	= 4 - A10-15 + BASIN A1	Max. Elevation	= 600.82 ft
Reservoir name	= BASIN A2	Max. Storage	= 355,514 cuft

Storage Indication method used.



Pond No. 2 - BASIN A2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 599.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	599.00	190,080	0	0
1.00	600.00	195,630	192,855	192,855
2.00	601.00	201,440	198,535	391,390
3.00	602.00	207,077	204,259	595,649
4.00	603.00	212,770	209,924	805,572
5.00	604.00	218,520	215,645	1,021,217
6.00	605.00	224,327	221,424	1,242,641
7.00	606.00	230,190	227,258	1,469,899

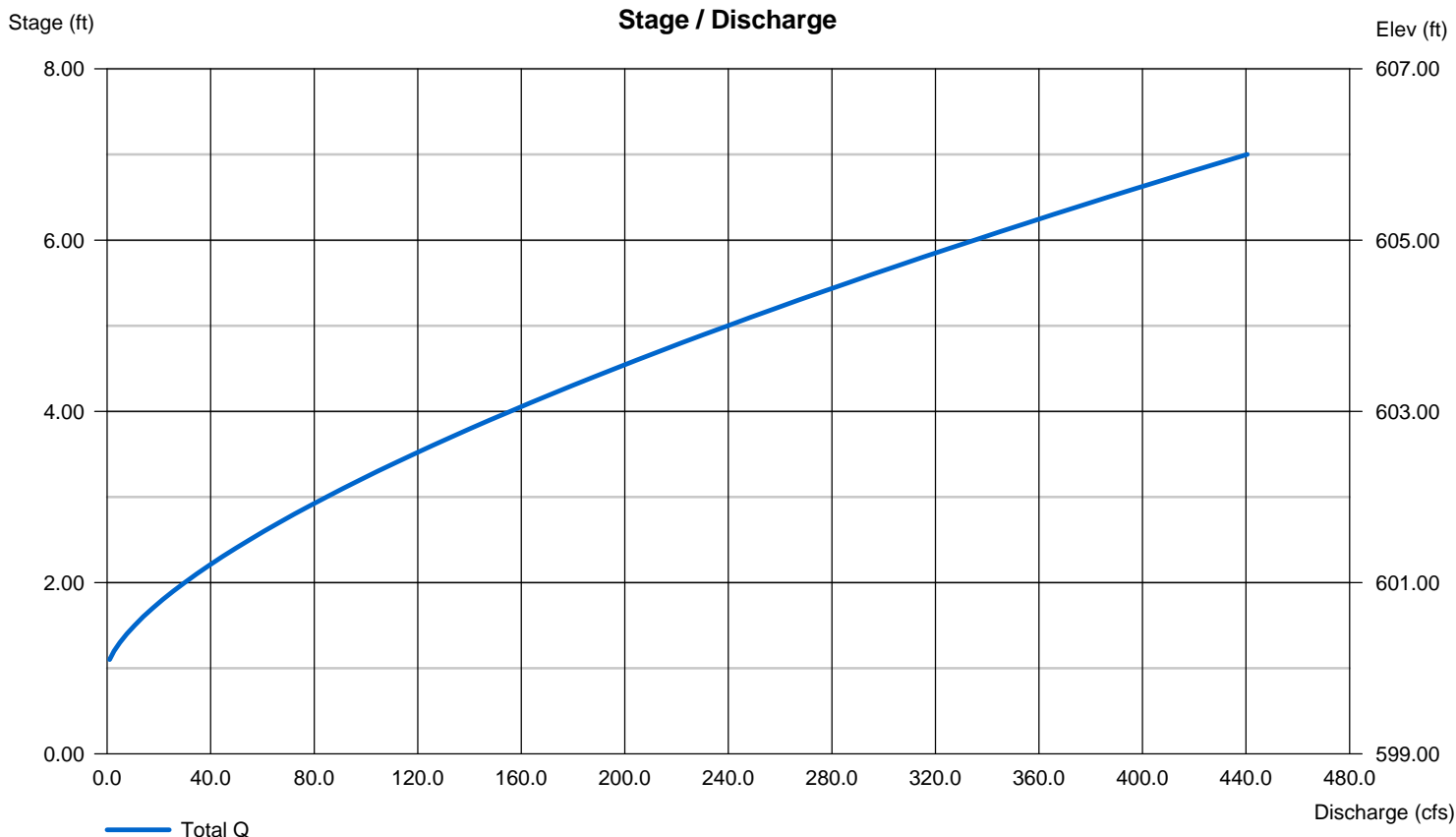
Culvert / Orifice Structures

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

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.00	0.00	Inactive	Inactive
Crest El. (ft)	= 600.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

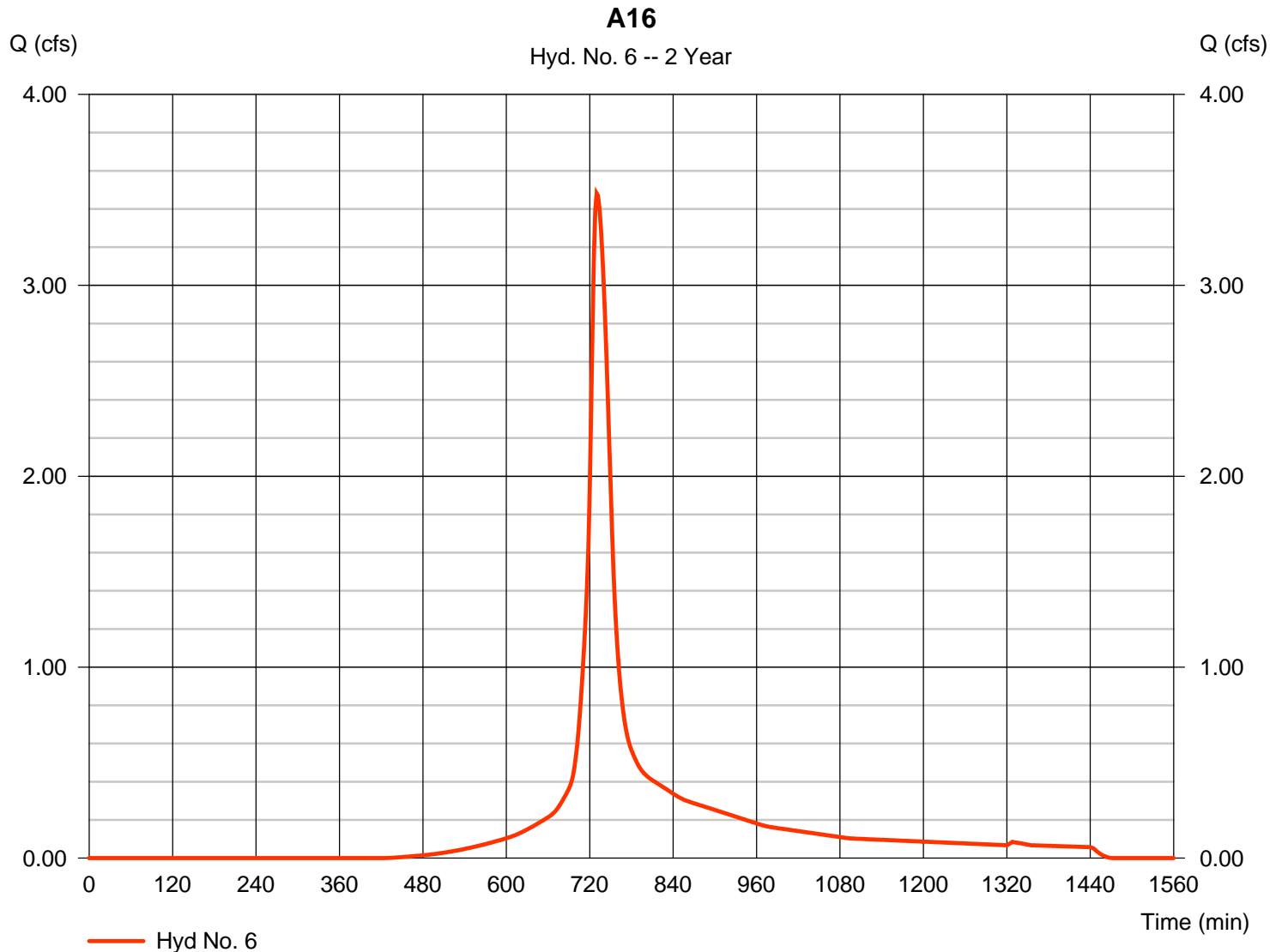
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 6

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 3.482 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 16,087 cuft
Drainage area	= 2.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

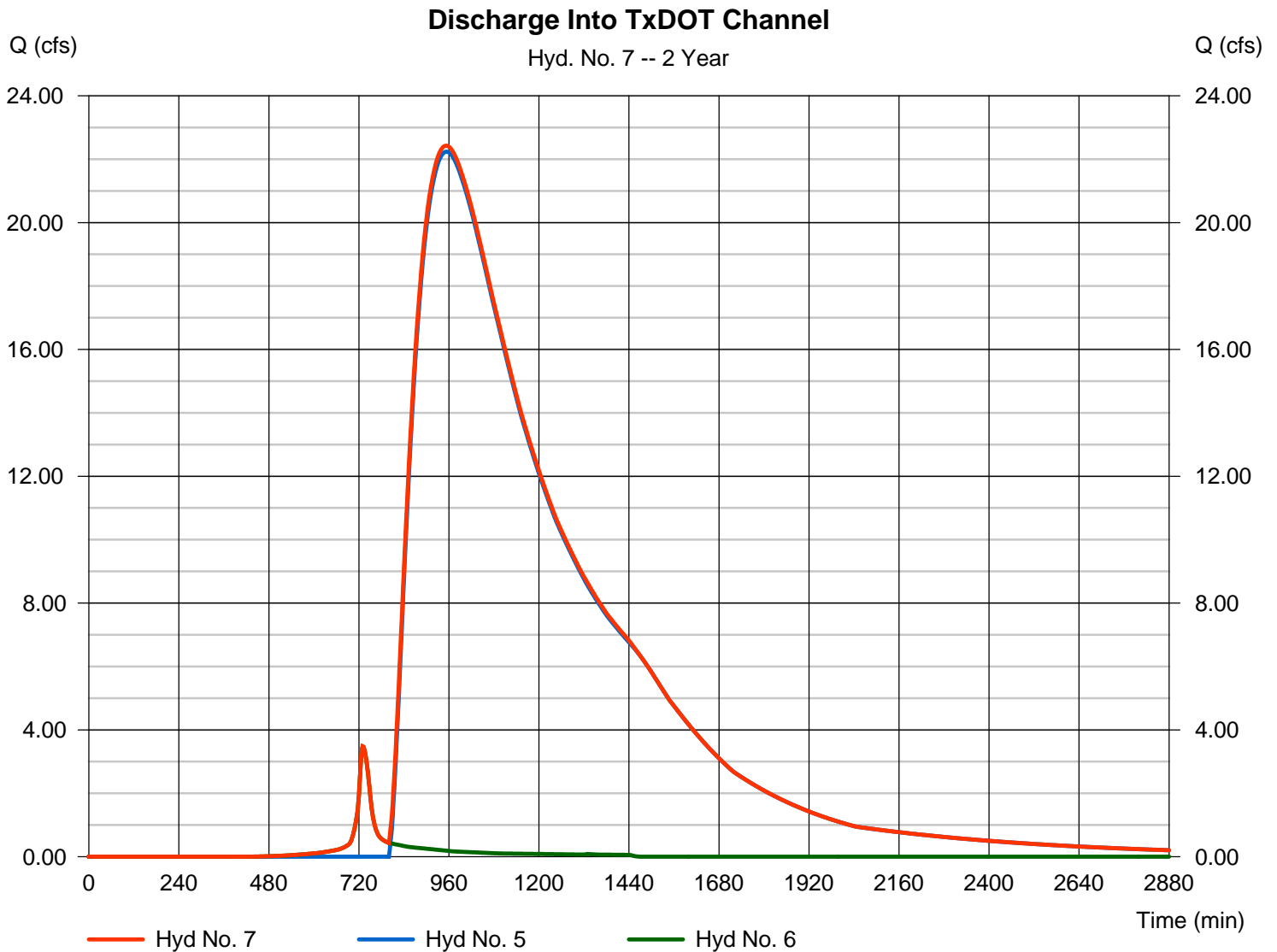
Tuesday, 06 / 9 / 2020

Hyd. No. 7

Discharge Into TxDOT Channel

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 5, 6

Peak discharge = 22.43 cfs
Time to peak = 952 min
Hyd. volume = 676,746 cuft
Contrib. drain. area = 2.200 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

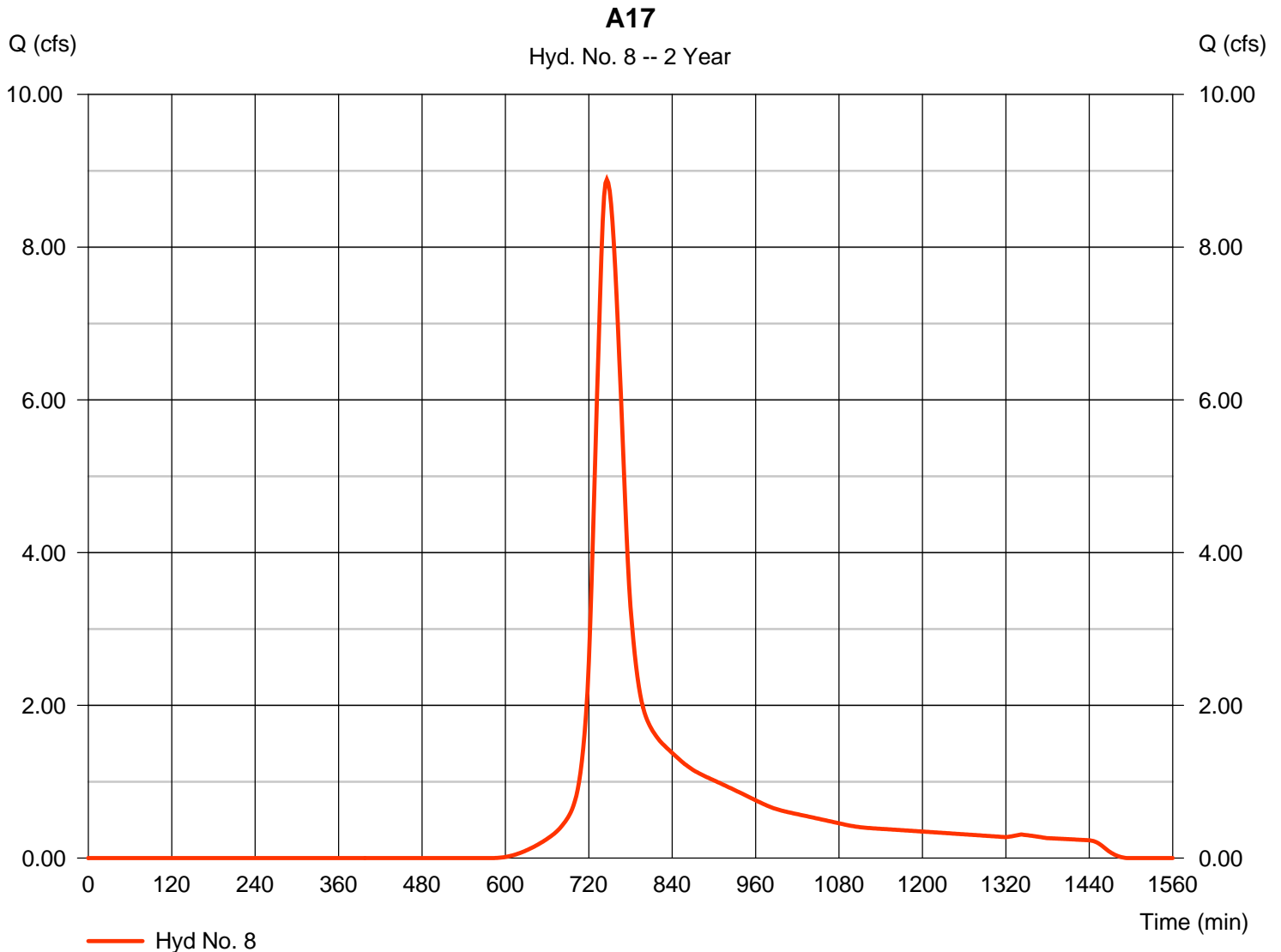
Tuesday, 06 / 9 / 2020

Hyd. No. 8

A17

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 8.885 cfs
 Time to peak = 746 min
 Hyd. volume = 51,735 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

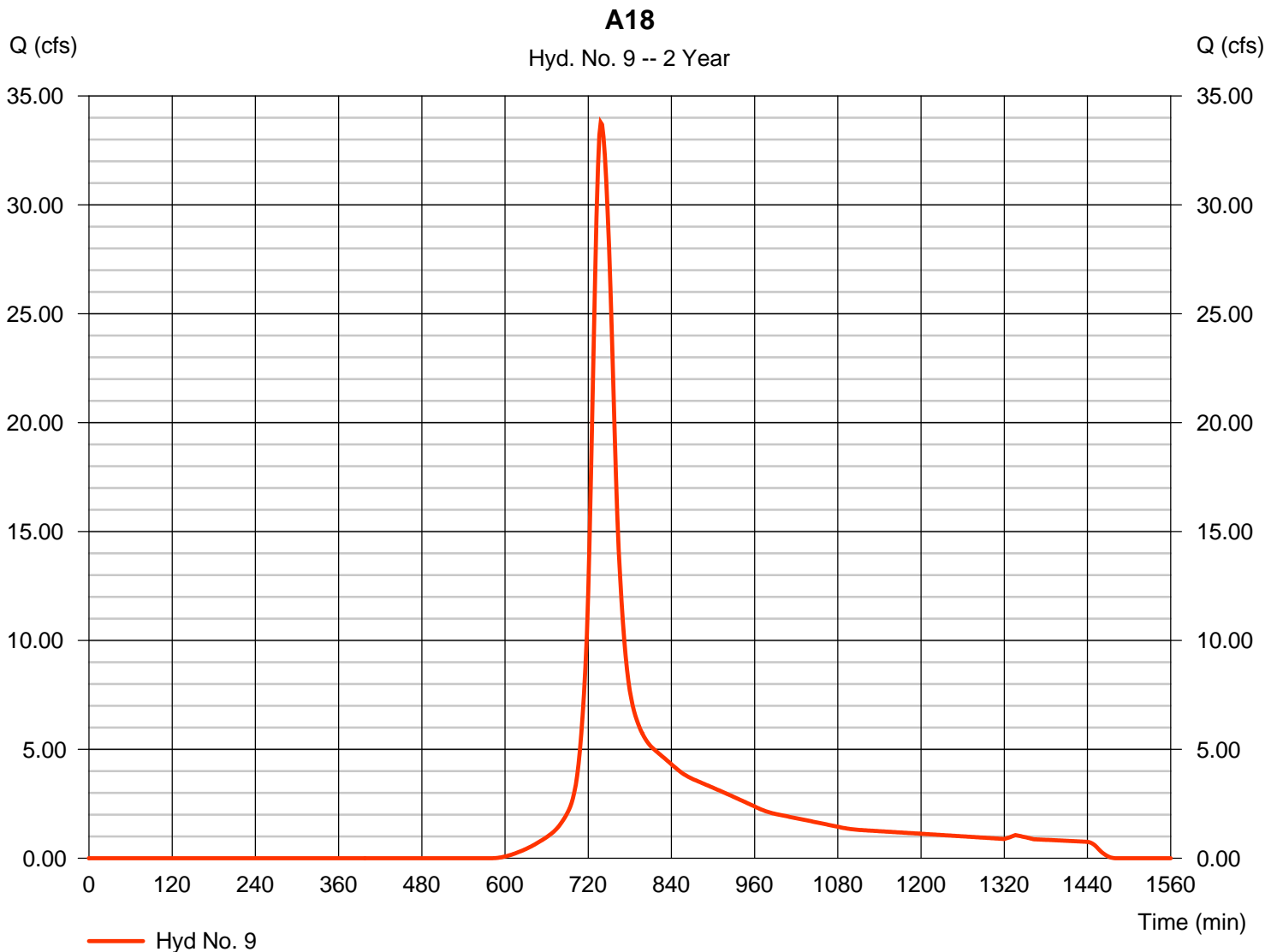
Tuesday, 06 / 9 / 2020

Hyd. No. 9

A18

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 33.78 cfs
 Time to peak = 738 min
 Hyd. volume = 169,690 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

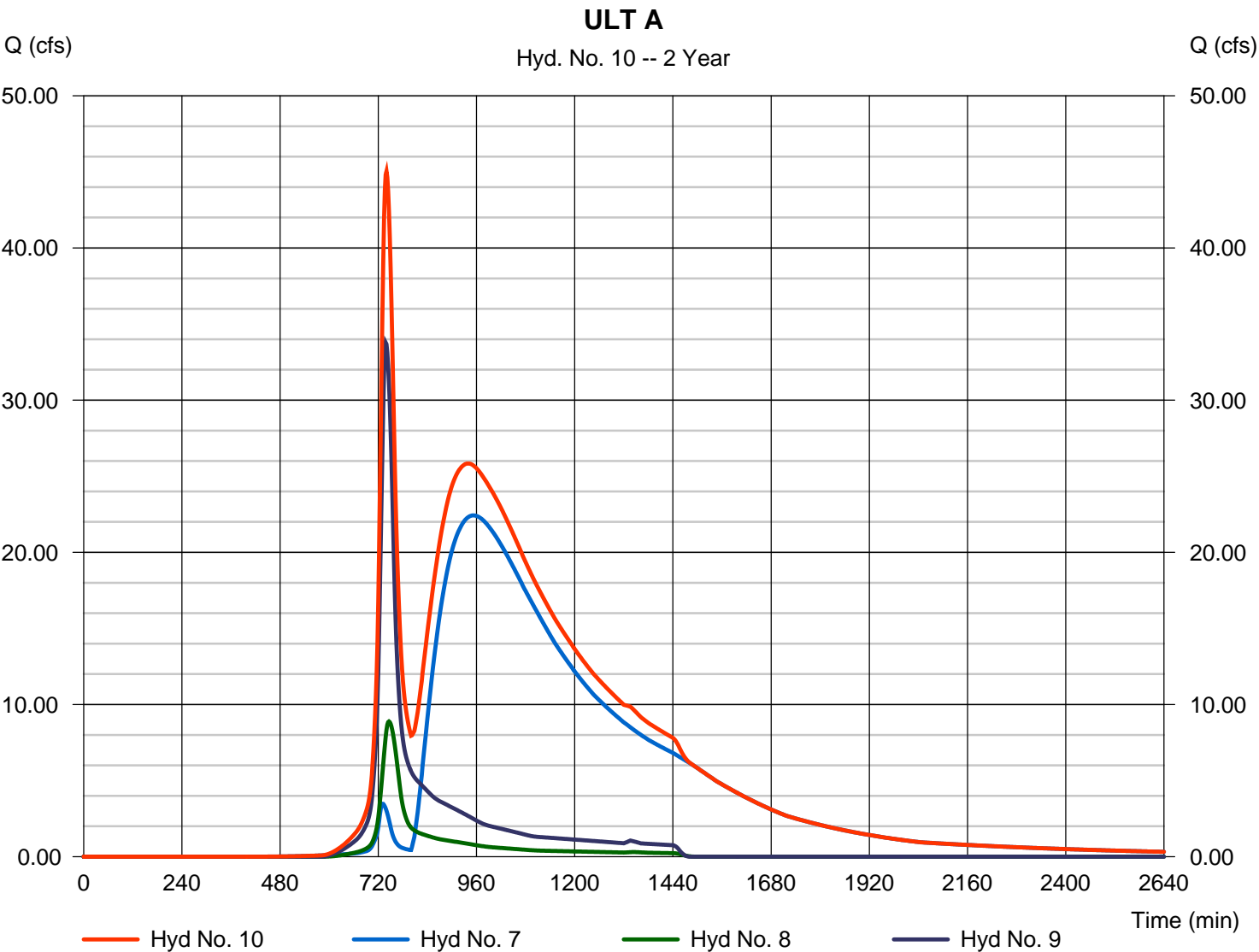
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 10

ULT A

Hydrograph type	= Combine	Peak discharge	= 45.03 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 898,172 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 44.960 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	166.09	2	752	1,361,220	-----	-----	-----	A1-A9
2	Reservoir	81.81	2	804	1,176,901	1	604.26	612,736	A1-A9 + Basin A1
3	SCS Runoff	53.73	2	746	373,008	-----	-----	-----	A10-A15
4	Combine	101.43	2	780	1,549,909	2, 3	-----	-----	A10-15 + BASIN A1
5	Reservoir	61.62	2	868	1,357,034	4	601.62	517,379	BASIN A2
6	SCS Runoff	5.770	2	730	26,882	-----	-----	-----	A16
7	Combine	62.06	2	868	1,383,915	5, 6	-----	-----	Discharge Into TxDOT Channel
8	SCS Runoff	16.88	2	744	96,490	-----	-----	-----	A17
9	SCS Runoff	64.25	2	738	316,486	-----	-----	-----	A18
10	Combine	84.79	2	738	1,796,892	7, 8, 9	-----	-----	ULT A
031.060_Parkside Basins.gpw					Return Period: 5 Year			Tuesday, 06 / 9 / 2020	

Hydrograph Report

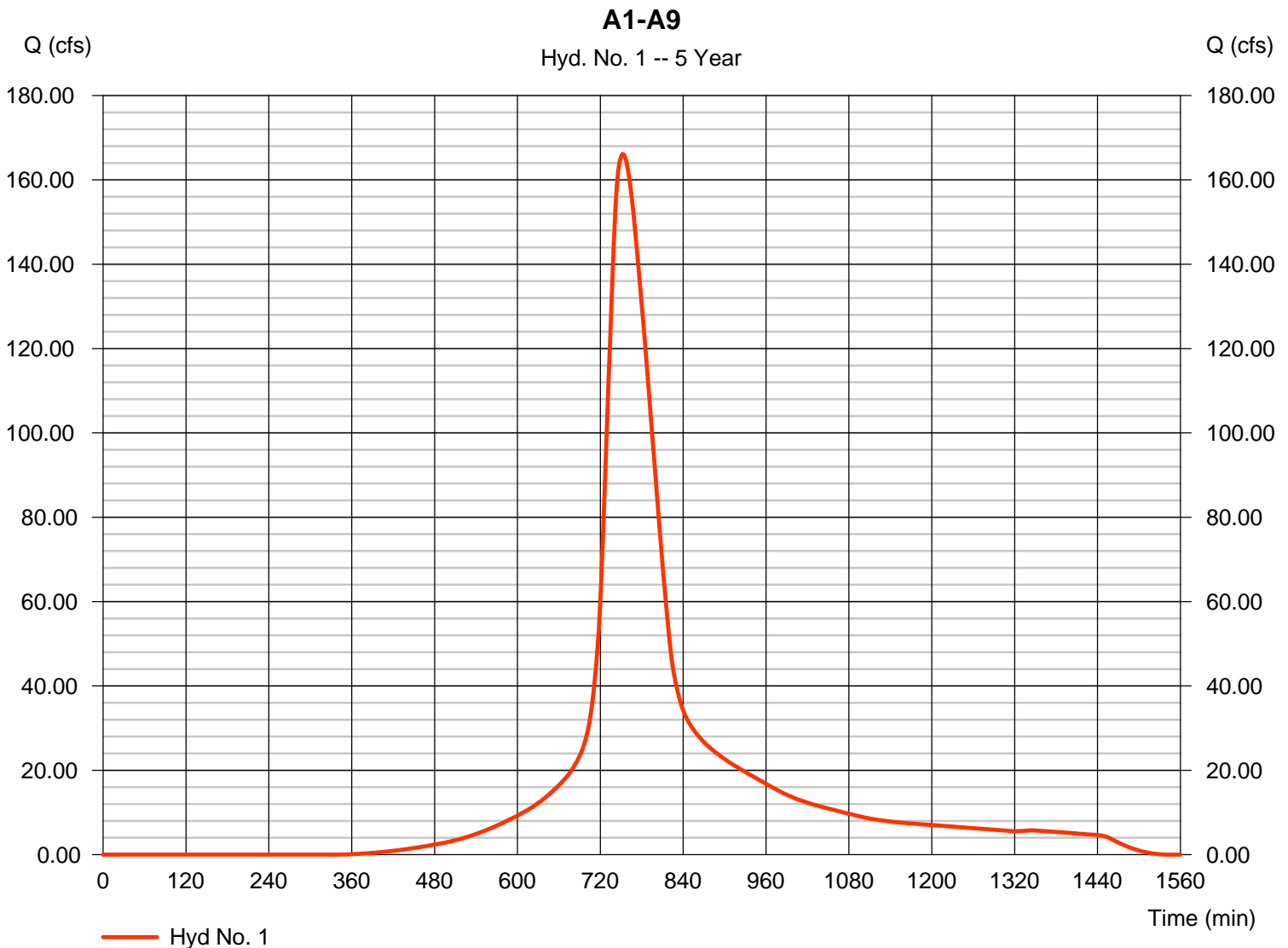
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 1

A1-A9

Hydrograph type	= SCS Runoff	Peak discharge	= 166.09 cfs
Storm frequency	= 5 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,361,220 cuft
Drainage area	= 109.260 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.90 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

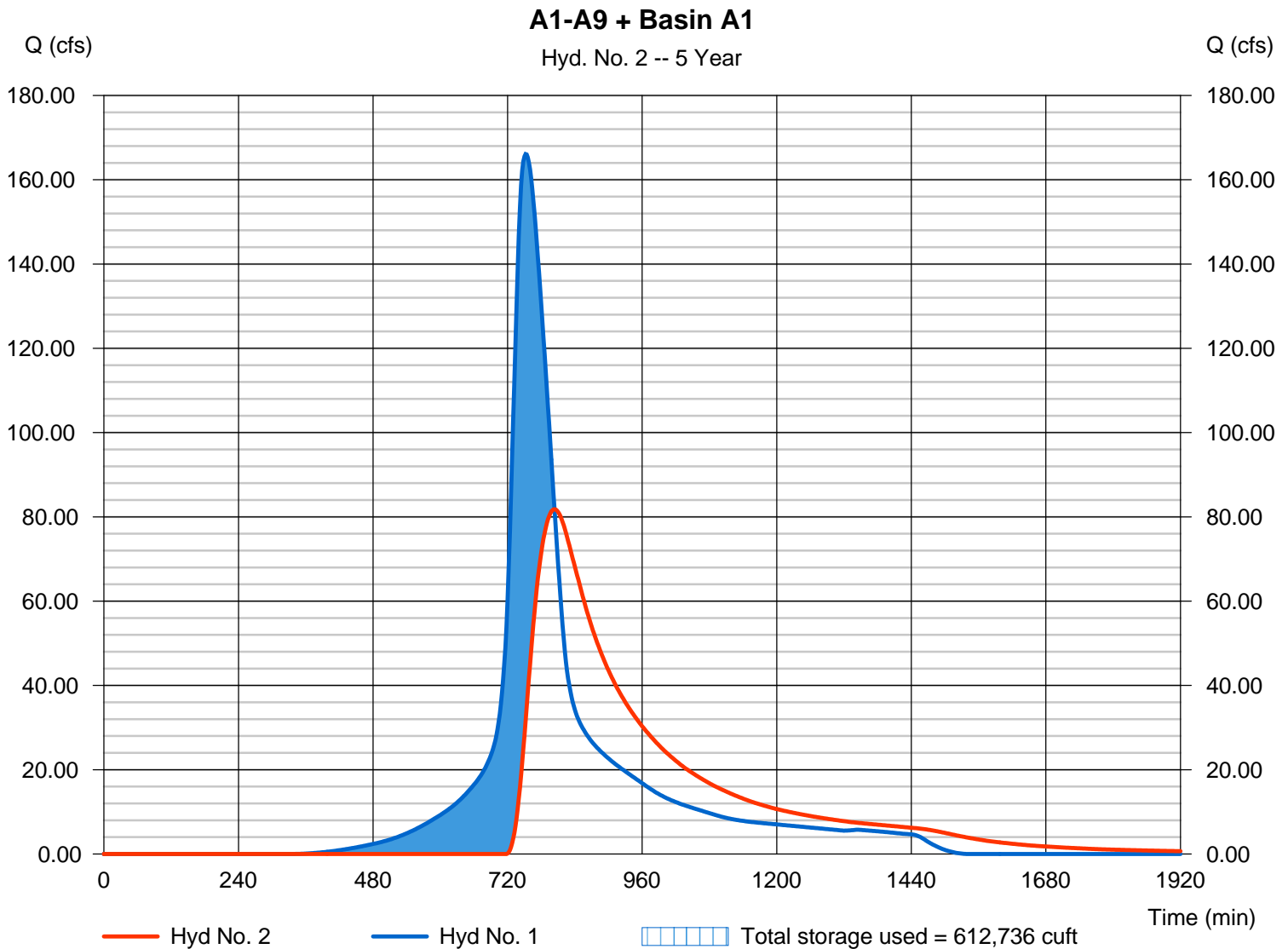
Hyd. No. 2

A1-A9 + Basin A1

Hydrograph type = Reservoir
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - A1-A9
 Reservoir name = BASIN A1

Peak discharge = 81.81 cfs
 Time to peak = 804 min
 Hyd. volume = 1,176,901 cuft
 Max. Elevation = 604.26 ft
 Max. Storage = 612,736 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

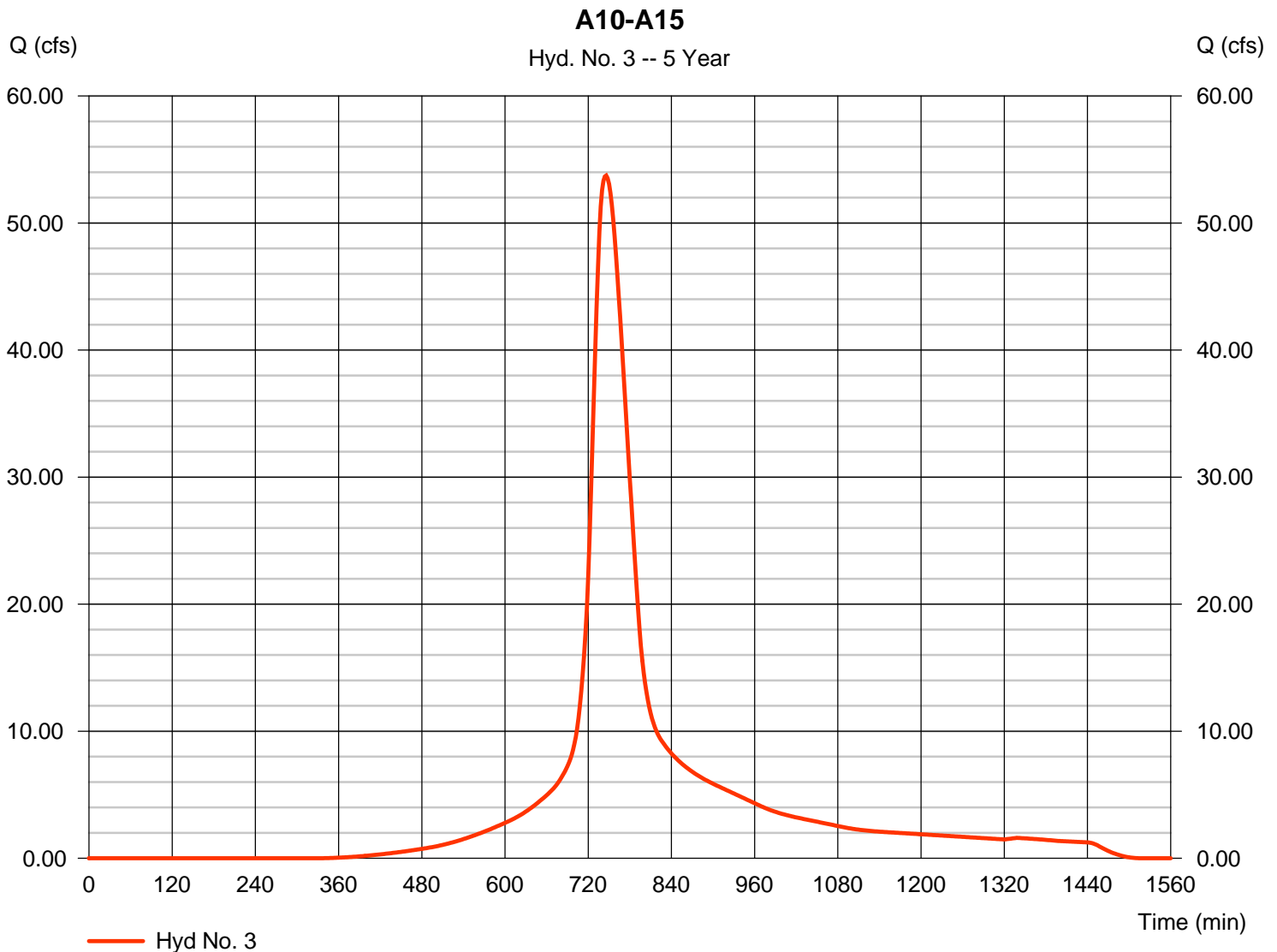
Tuesday, 06 / 9 / 2020

Hyd. No. 3

A10-A15

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 29.940 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 4.83 in
 Storm duration = 24 hrs

Peak discharge = 53.73 cfs
 Time to peak = 746 min
 Hyd. volume = 373,008 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 28.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

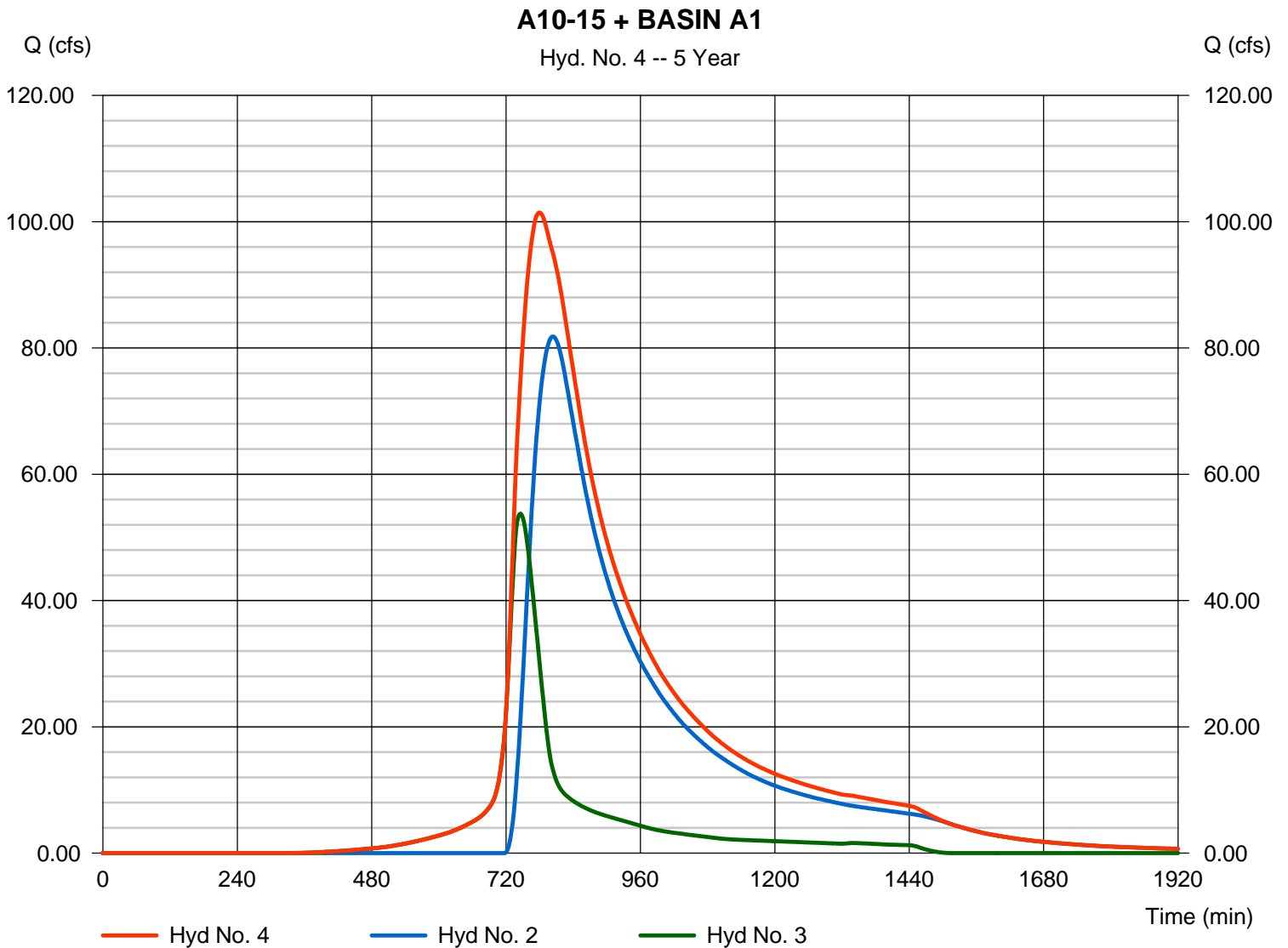
Tuesday, 06 / 9 / 2020

Hyd. No. 4

A10-15 + BASIN A1

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 2 min
Inflow hyds. = 2, 3

Peak discharge = 101.43 cfs
Time to peak = 780 min
Hyd. volume = 1,549,909 cuft
Contrib. drain. area = 29.940 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

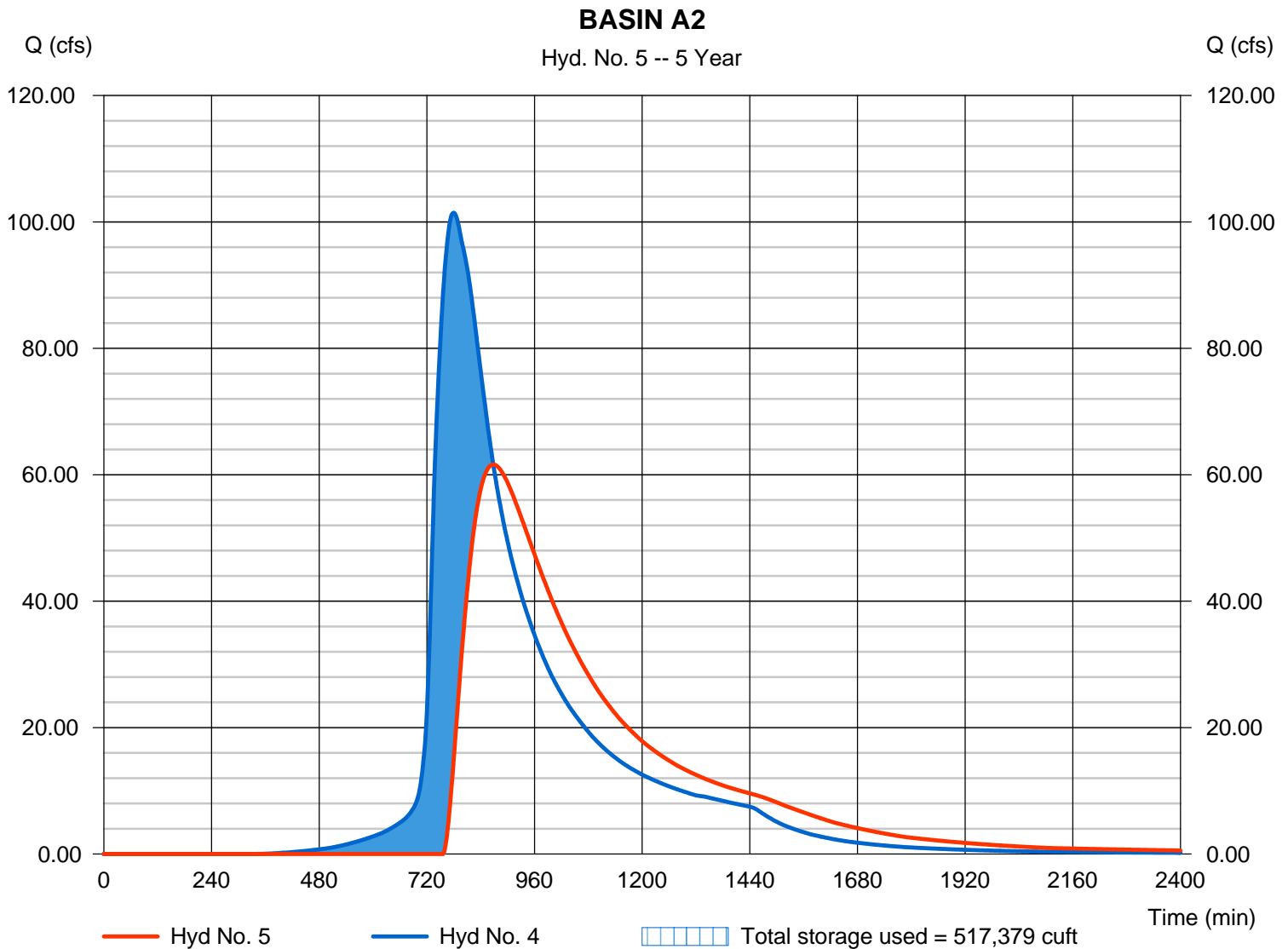
Tuesday, 06 / 9 / 2020

Hyd. No. 5

BASIN A2

Hydrograph type	= Reservoir	Peak discharge	= 61.62 cfs
Storm frequency	= 5 yrs	Time to peak	= 868 min
Time interval	= 2 min	Hyd. volume	= 1,357,034 cuft
Inflow hyd. No.	= 4 - A10-15 + BASIN A1	Max. Elevation	= 601.62 ft
Reservoir name	= BASIN A2	Max. Storage	= 517,379 cuft

Storage Indication method used.



Hydrograph Report

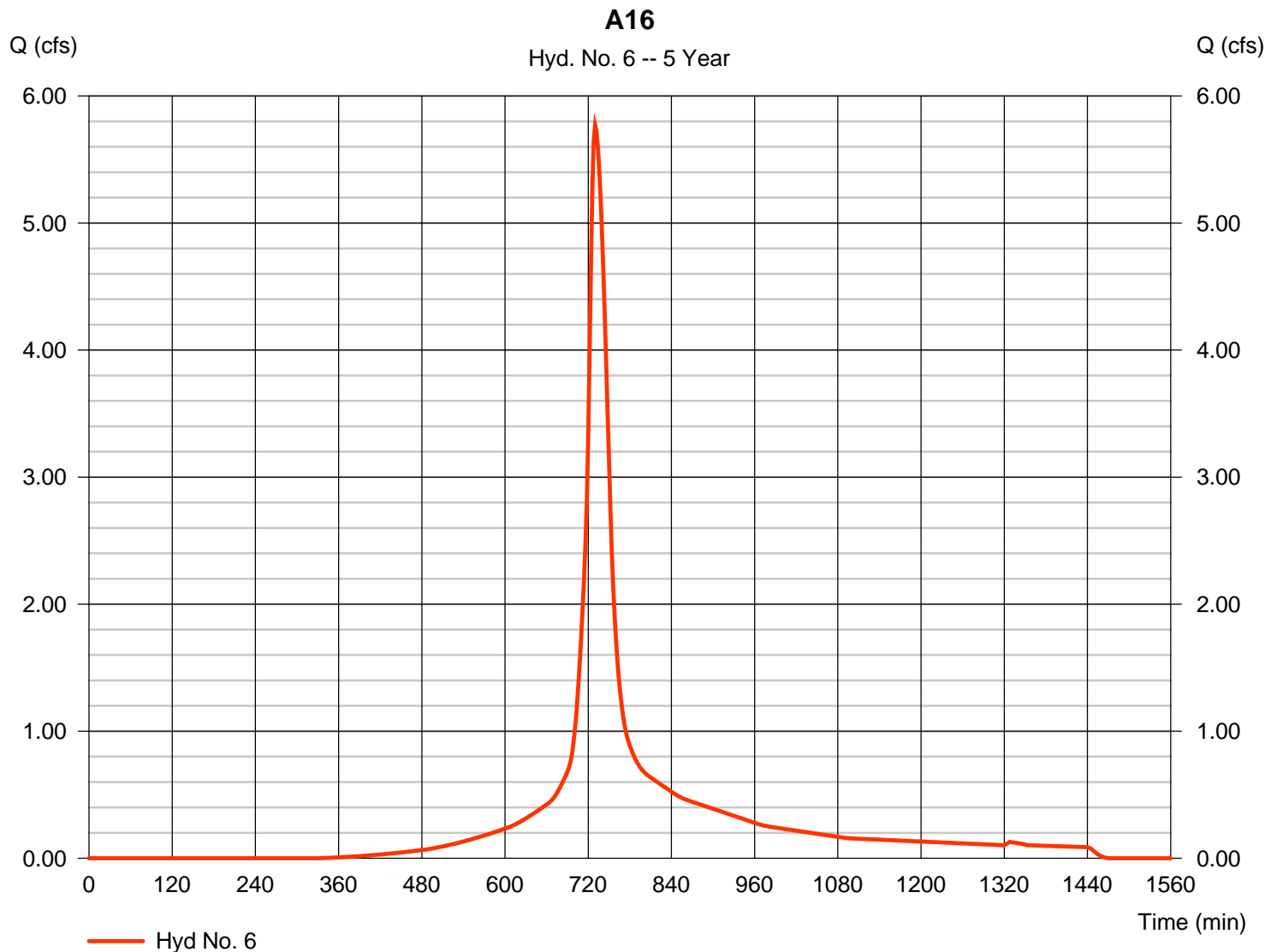
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 6

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 5.770 cfs
Storm frequency	= 5 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 26,882 cuft
Drainage area	= 2.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

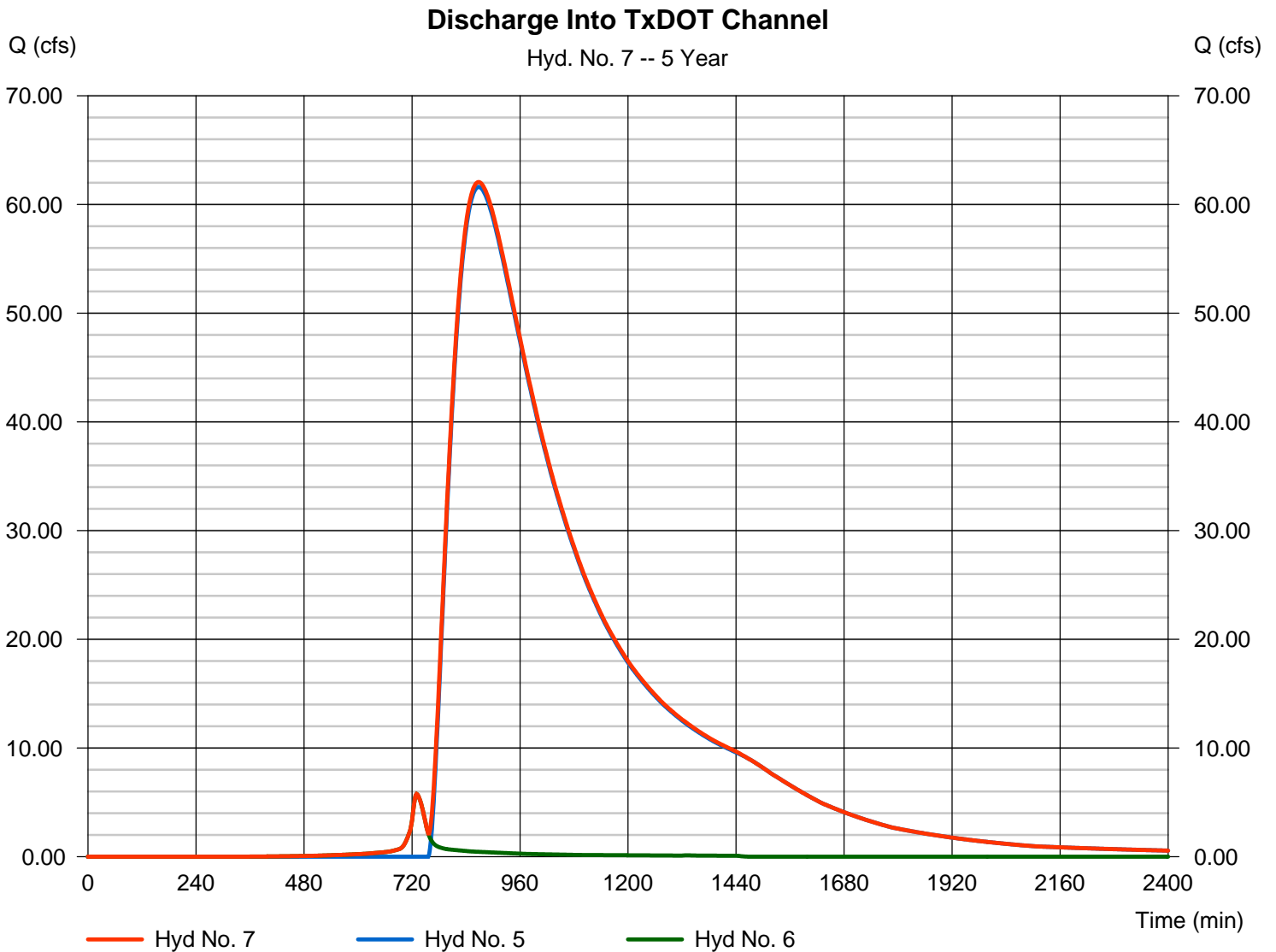
Tuesday, 06 / 9 / 2020

Hyd. No. 7

Discharge Into TxDOT Channel

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 5, 6

Peak discharge = 62.06 cfs
 Time to peak = 868 min
 Hyd. volume = 1,383,915 cuft
 Contrib. drain. area = 2.200 ac



Hydrograph Report

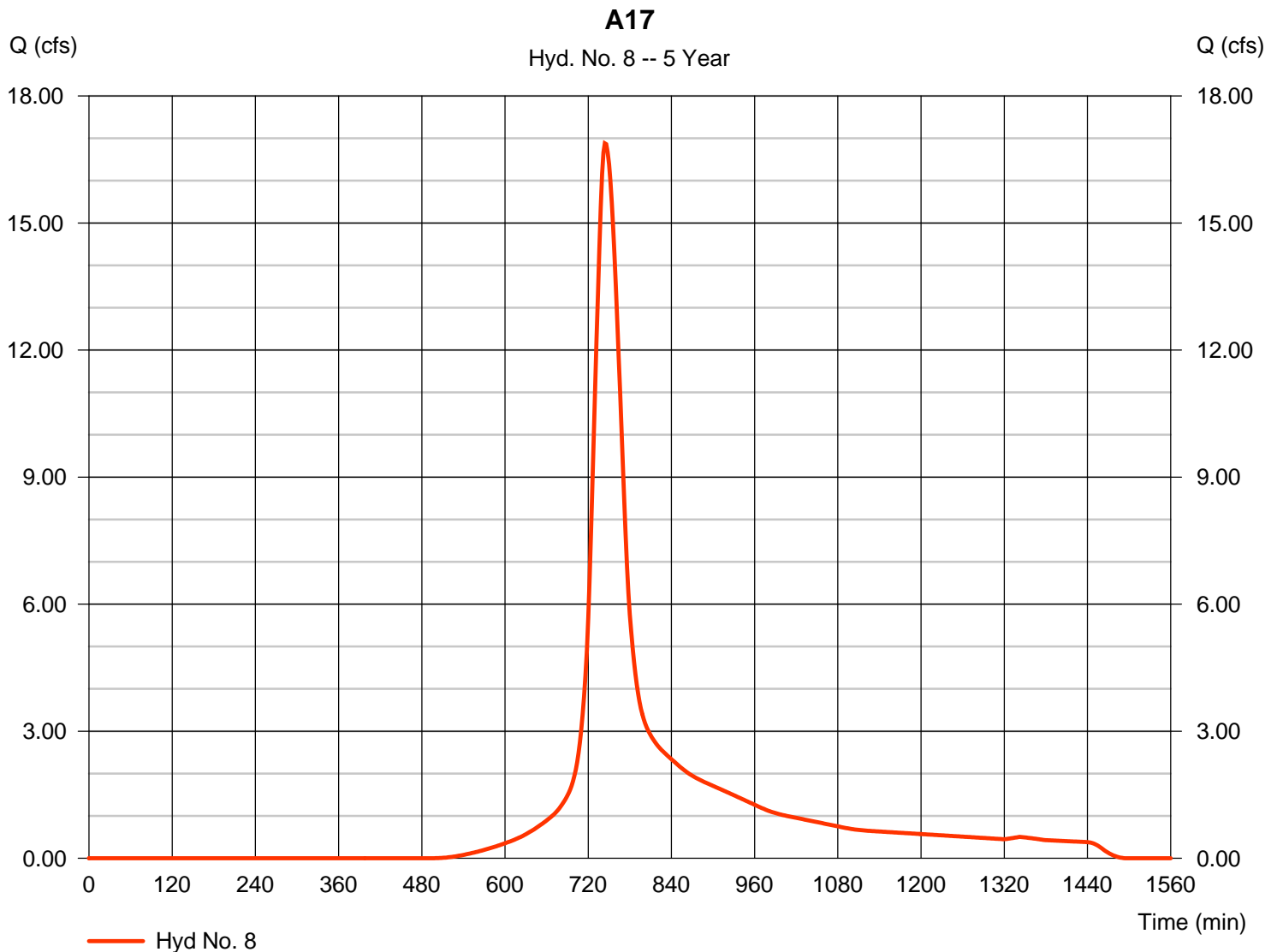
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 8

A17

Hydrograph type	= SCS Runoff	Peak discharge	= 16.88 cfs
Storm frequency	= 5 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 96,490 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

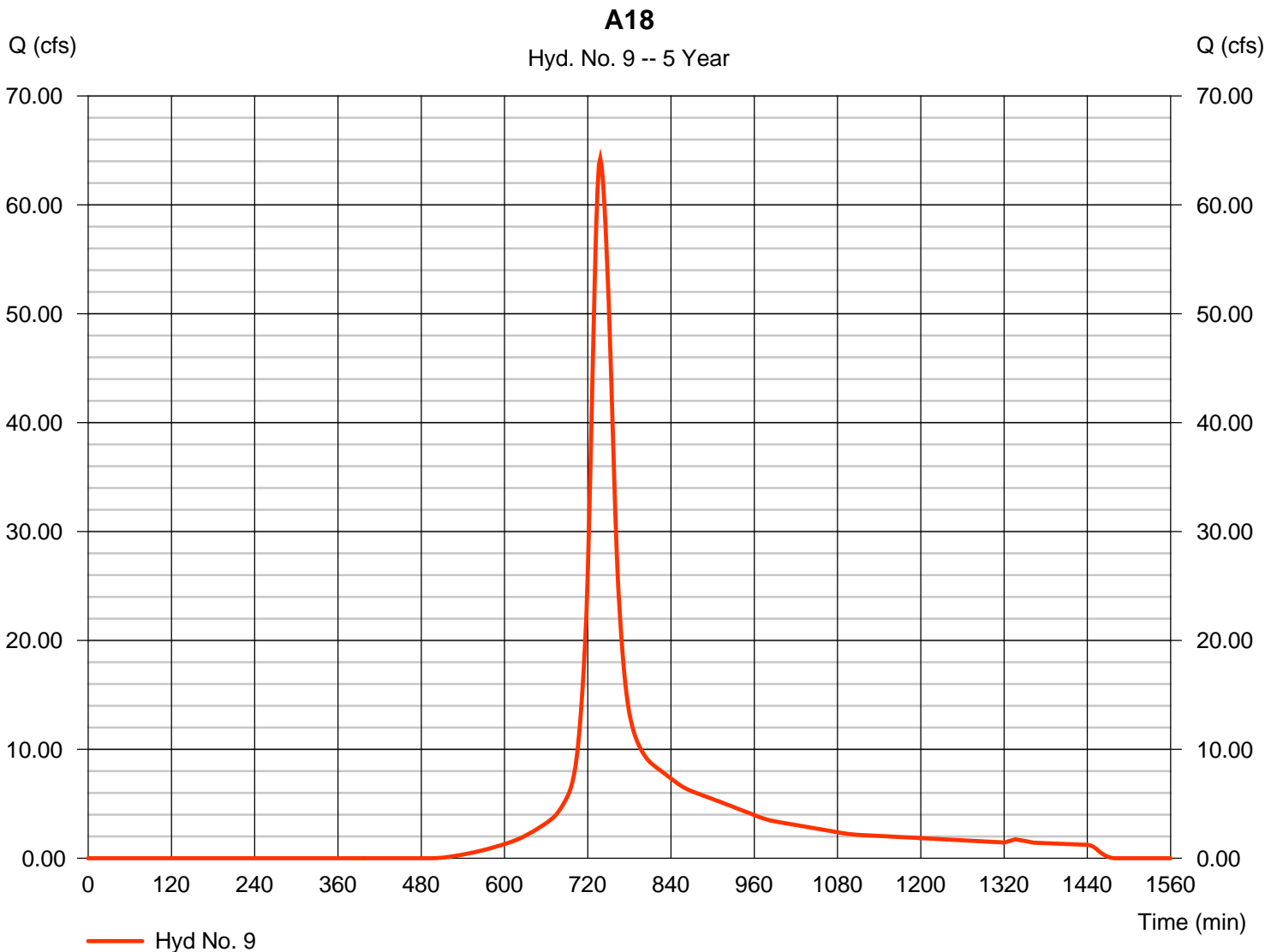
Tuesday, 06 / 9 / 2020

Hyd. No. 9

A18

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 4.83 in
 Storm duration = 24 hrs

Peak discharge = 64.25 cfs
 Time to peak = 738 min
 Hyd. volume = 316,486 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

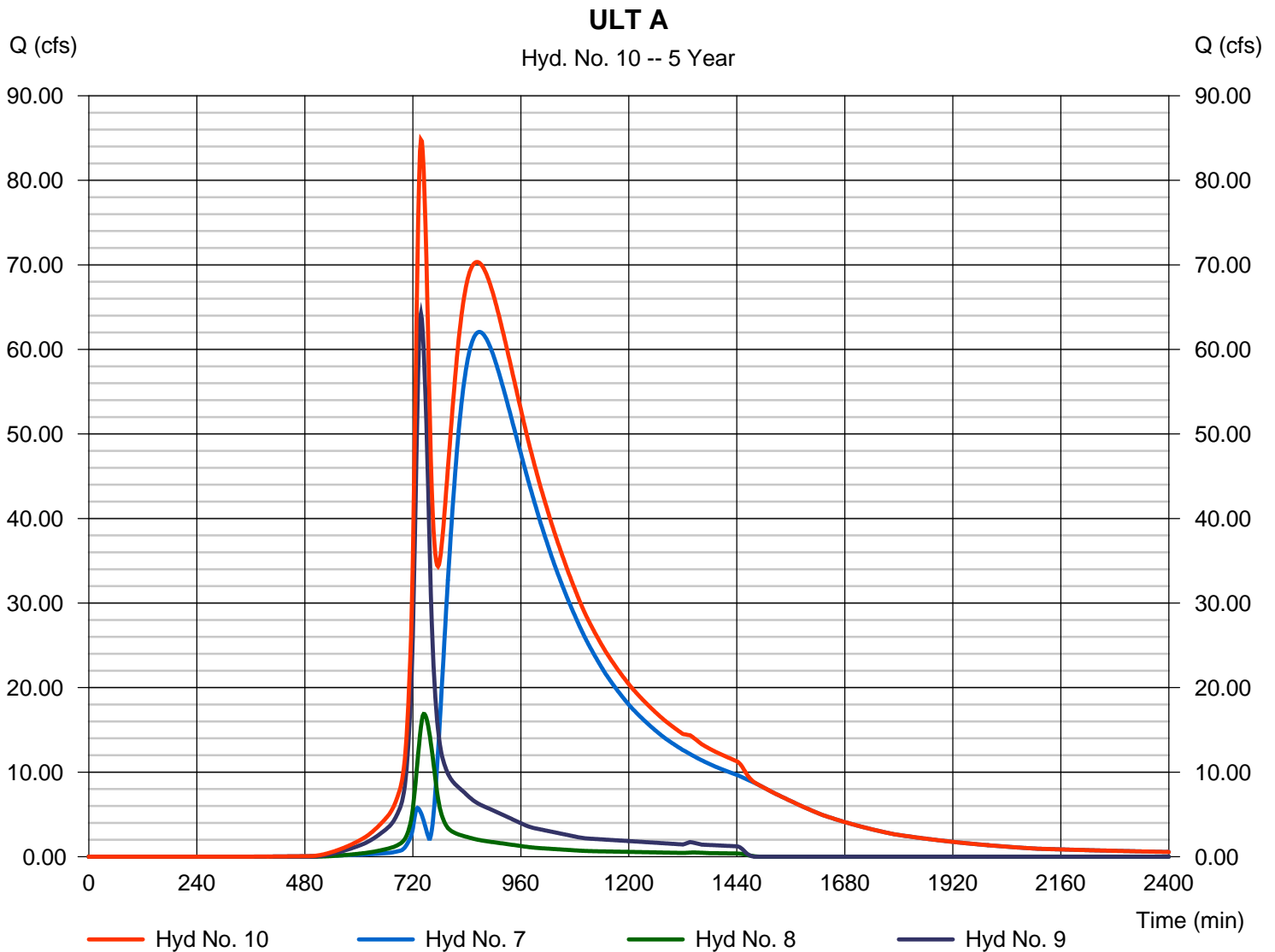
Tuesday, 06 / 9 / 2020

Hyd. No. 10

ULT A

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 84.79 cfs
 Time to peak = 738 min
 Hyd. volume = 1,796,892 cuft
 Contrib. drain. area = 44.960 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	221.13	2	752	1,827,487	-----	-----	-----	A1-A9
2	Reservoir	123.26	2	798	1,643,168	1	604.82	758,401	A1-A9 + Basin A1
3	SCS Runoff	71.42	2	746	500,777	-----	-----	-----	A10-A15
4	Combine	153.89	2	776	2,143,953	2, 3	-----	-----	A10-15 + BASIN A1
5	Reservoir	101.75	2	844	1,951,070	4	602.26	649,941	BASIN A2
6	SCS Runoff	7.669	2	730	36,090	-----	-----	-----	A16
7	Combine	102.40	2	844	1,987,160	5, 6	-----	-----	Discharge Into TxDOT Channel
8	SCS Runoff	23.92	2	744	136,468	-----	-----	-----	A17
9	SCS Runoff	90.85	2	738	447,611	-----	-----	-----	A18
10	Combine	119.66	2	738	2,571,248	7, 8, 9	-----	-----	ULT A
031.060_Parkside Basins.gpw					Return Period: 10 Year			Tuesday, 06 / 9 / 2020	

Hydrograph Report

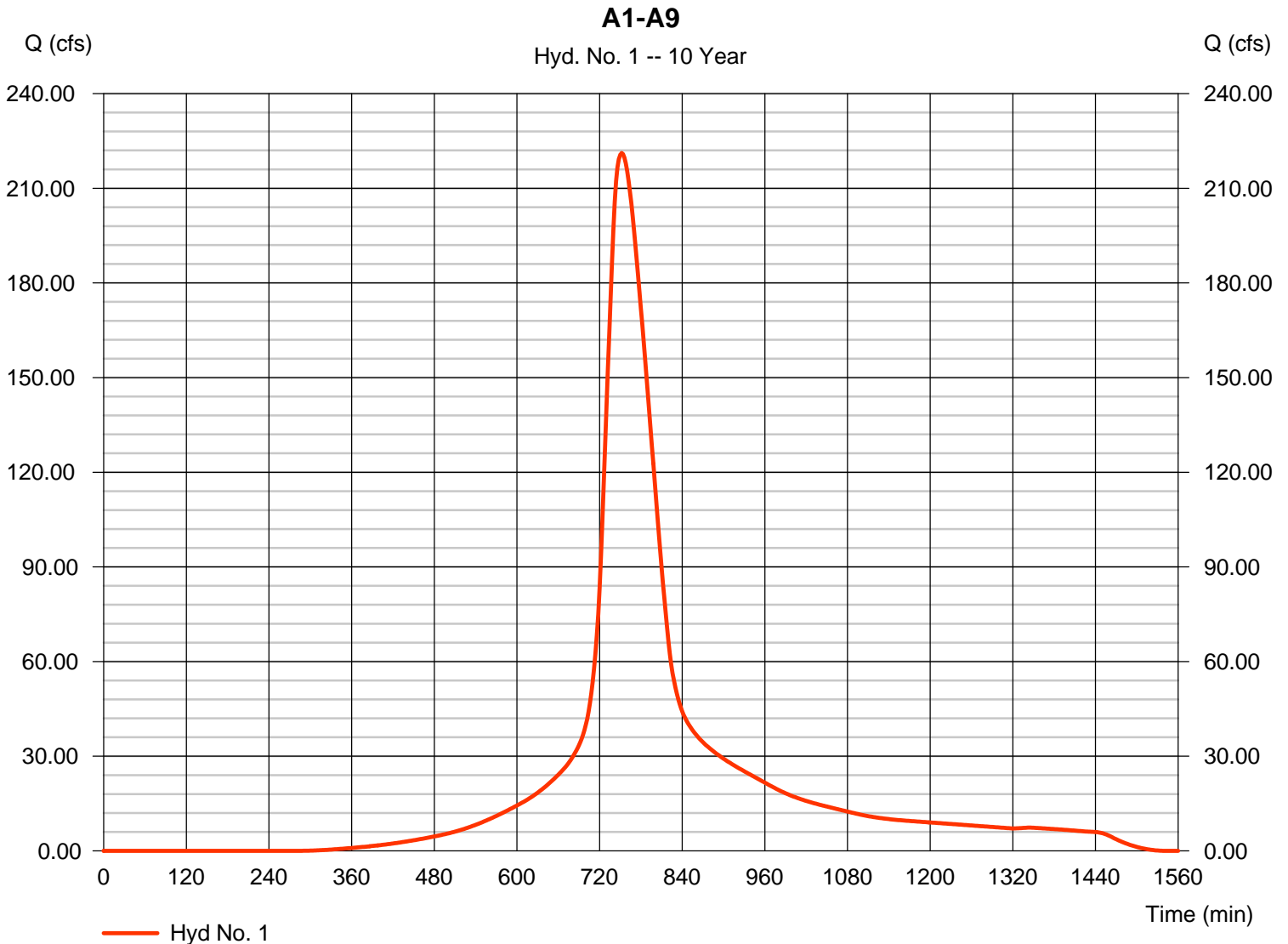
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 1

A1-A9

Hydrograph type	= SCS Runoff	Peak discharge	= 221.13 cfs
Storm frequency	= 10 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,827,487 cuft
Drainage area	= 109.260 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.90 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

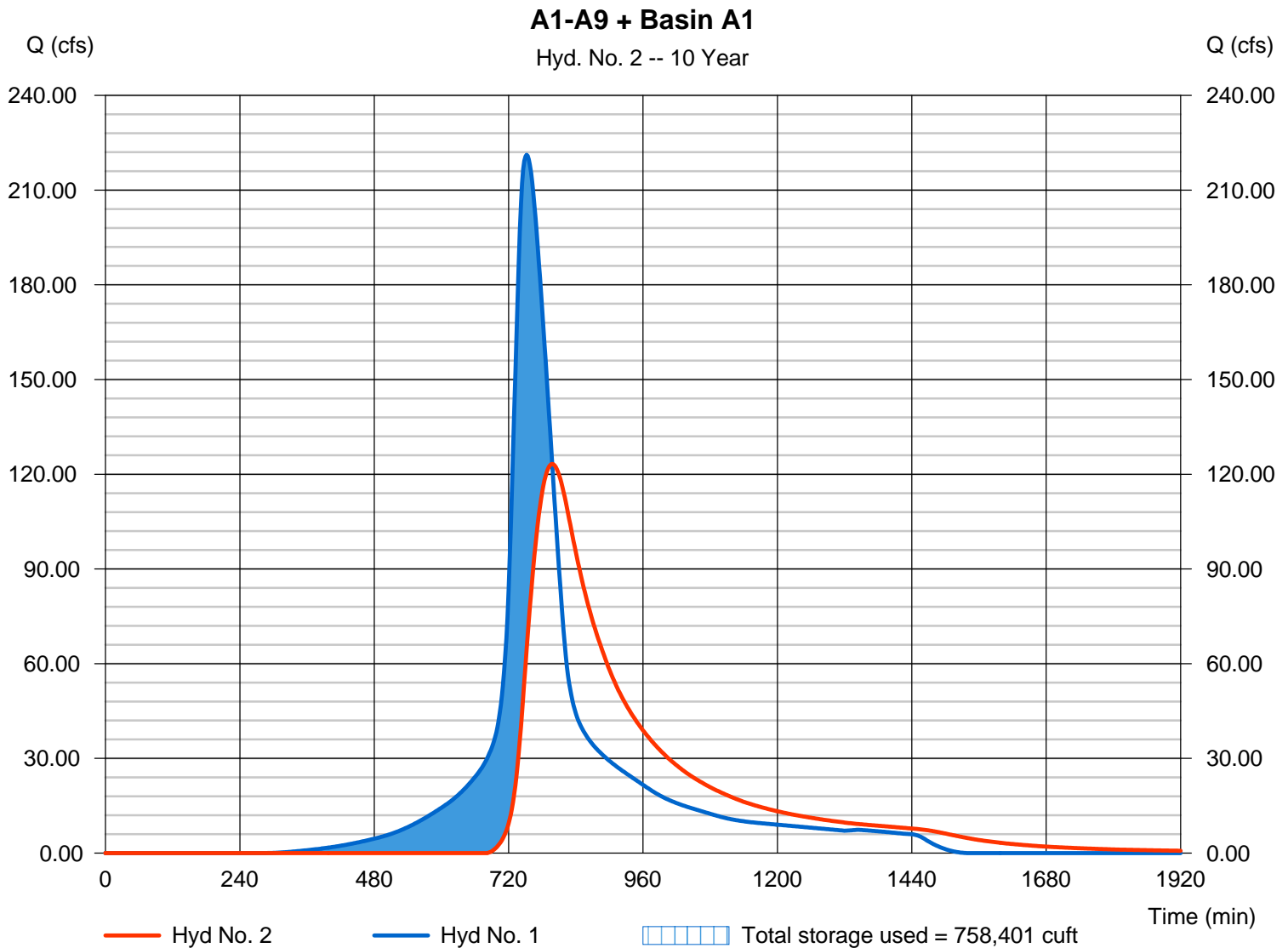
Hyd. No. 2

A1-A9 + Basin A1

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - A1-A9
 Reservoir name = BASIN A1

Peak discharge = 123.26 cfs
 Time to peak = 798 min
 Hyd. volume = 1,643,168 cuft
 Max. Elevation = 604.82 ft
 Max. Storage = 758,401 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

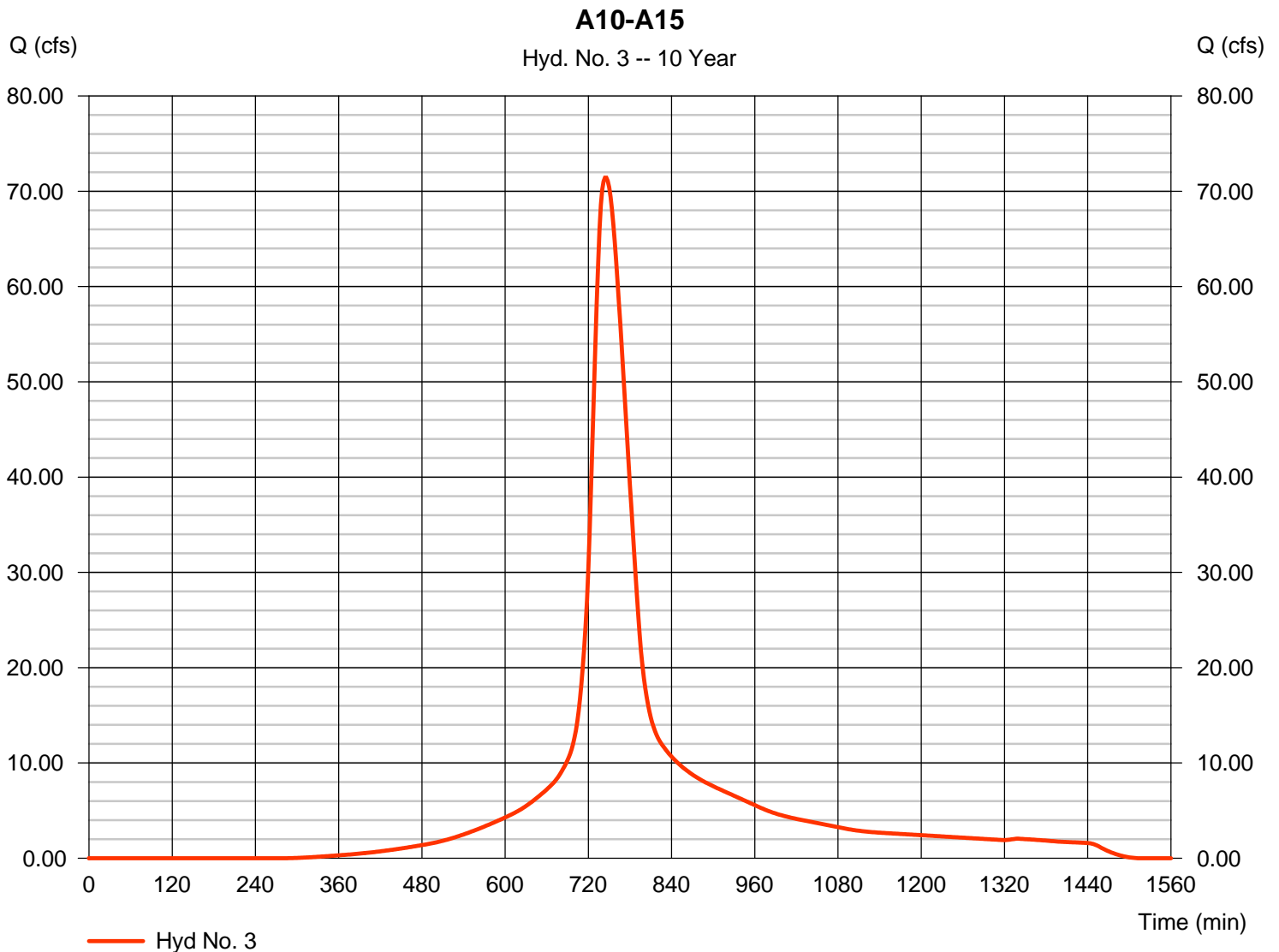
Tuesday, 06 / 9 / 2020

Hyd. No. 3

A10-A15

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 29.940 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 71.42 cfs
 Time to peak = 746 min
 Hyd. volume = 500,777 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 28.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

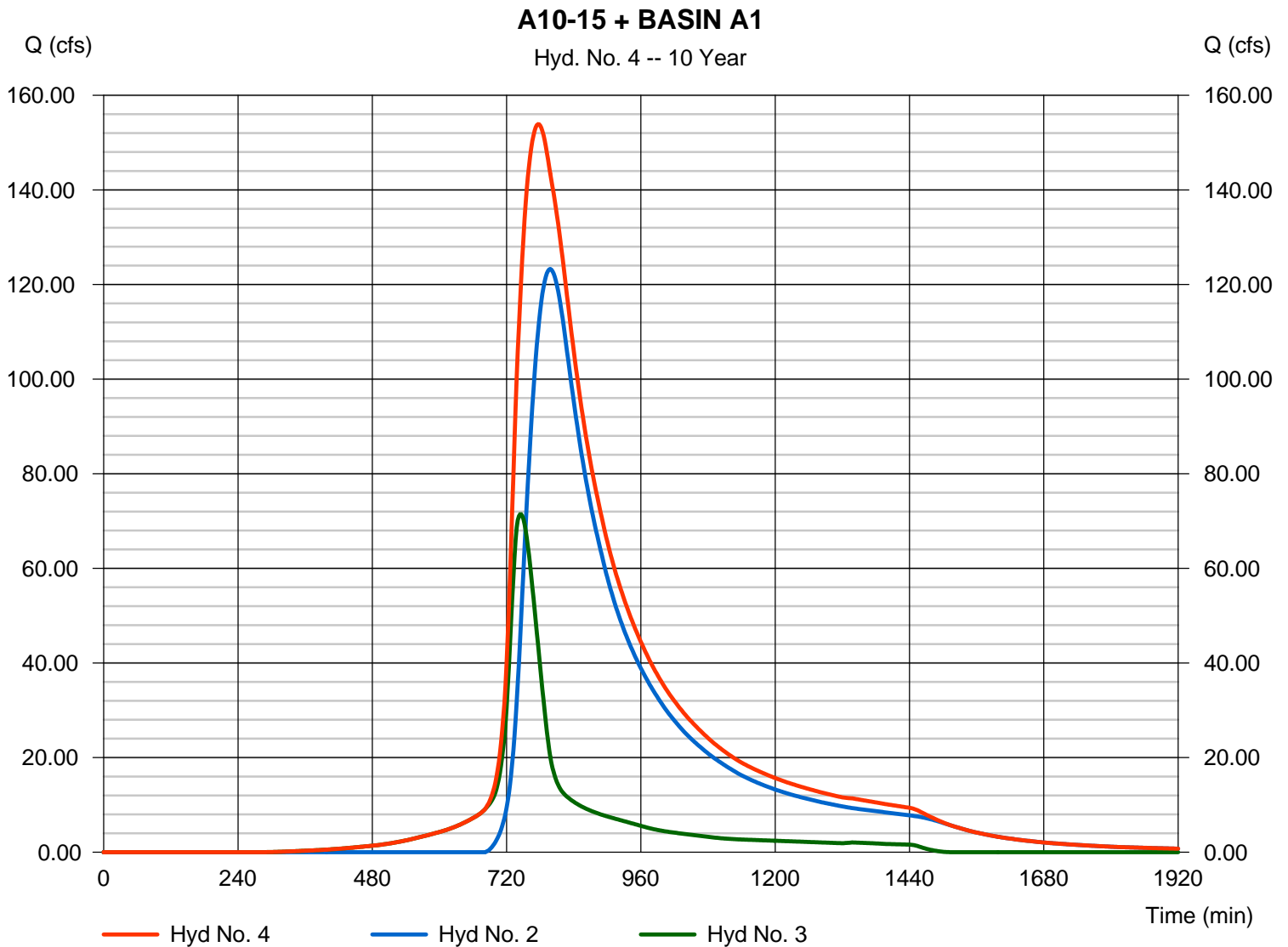
Tuesday, 06 / 9 / 2020

Hyd. No. 4

A10-15 + BASIN A1

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 2, 3

Peak discharge = 153.89 cfs
Time to peak = 776 min
Hyd. volume = 2,143,953 cuft
Contrib. drain. area = 29.940 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

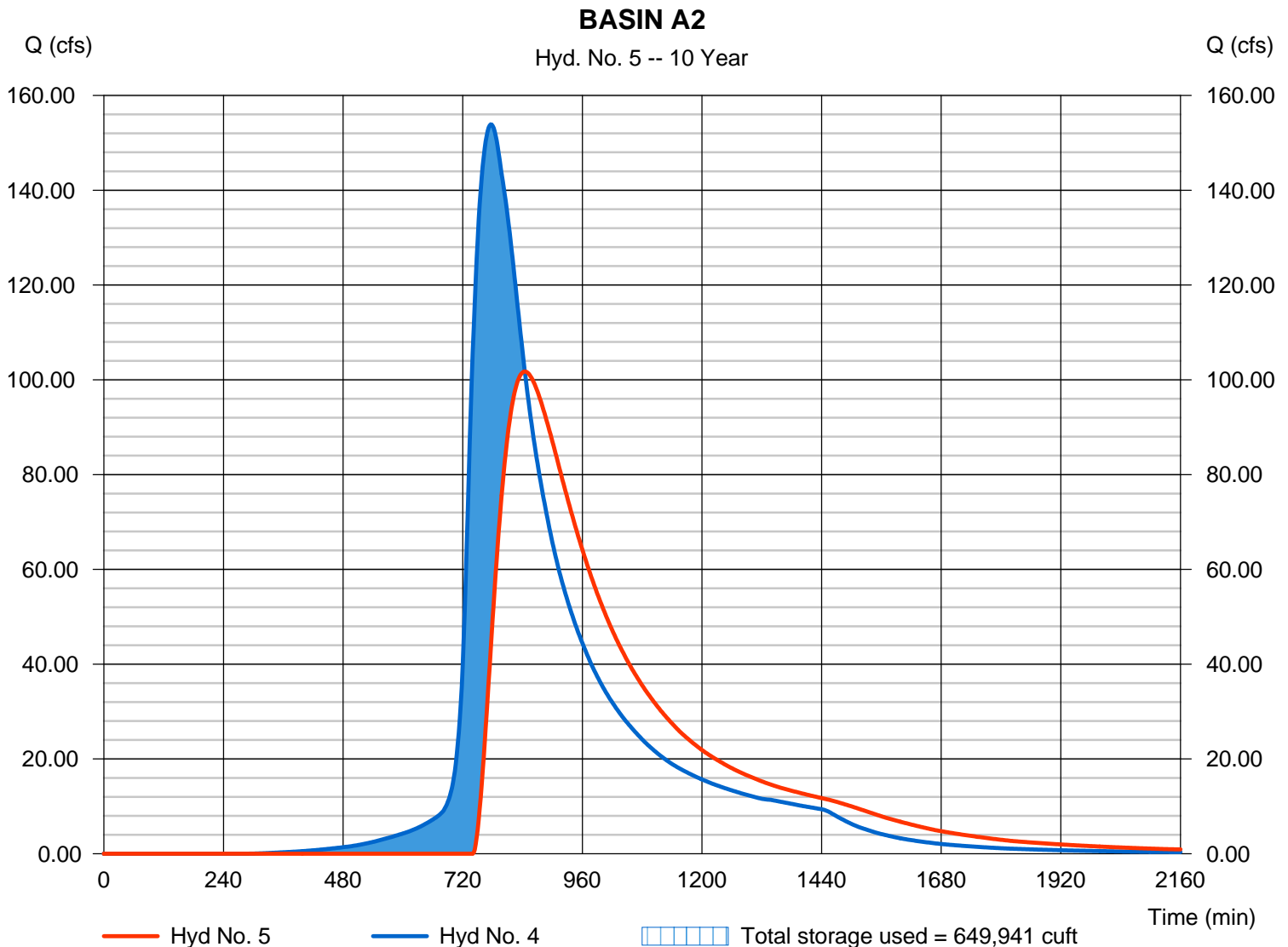
Tuesday, 06 / 9 / 2020

Hyd. No. 5

BASIN A2

Hydrograph type	= Reservoir	Peak discharge	= 101.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 844 min
Time interval	= 2 min	Hyd. volume	= 1,951,070 cuft
Inflow hyd. No.	= 4 - A10-15 + BASIN A1	Max. Elevation	= 602.26 ft
Reservoir name	= BASIN A2	Max. Storage	= 649,941 cuft

Storage Indication method used.



Hydrograph Report

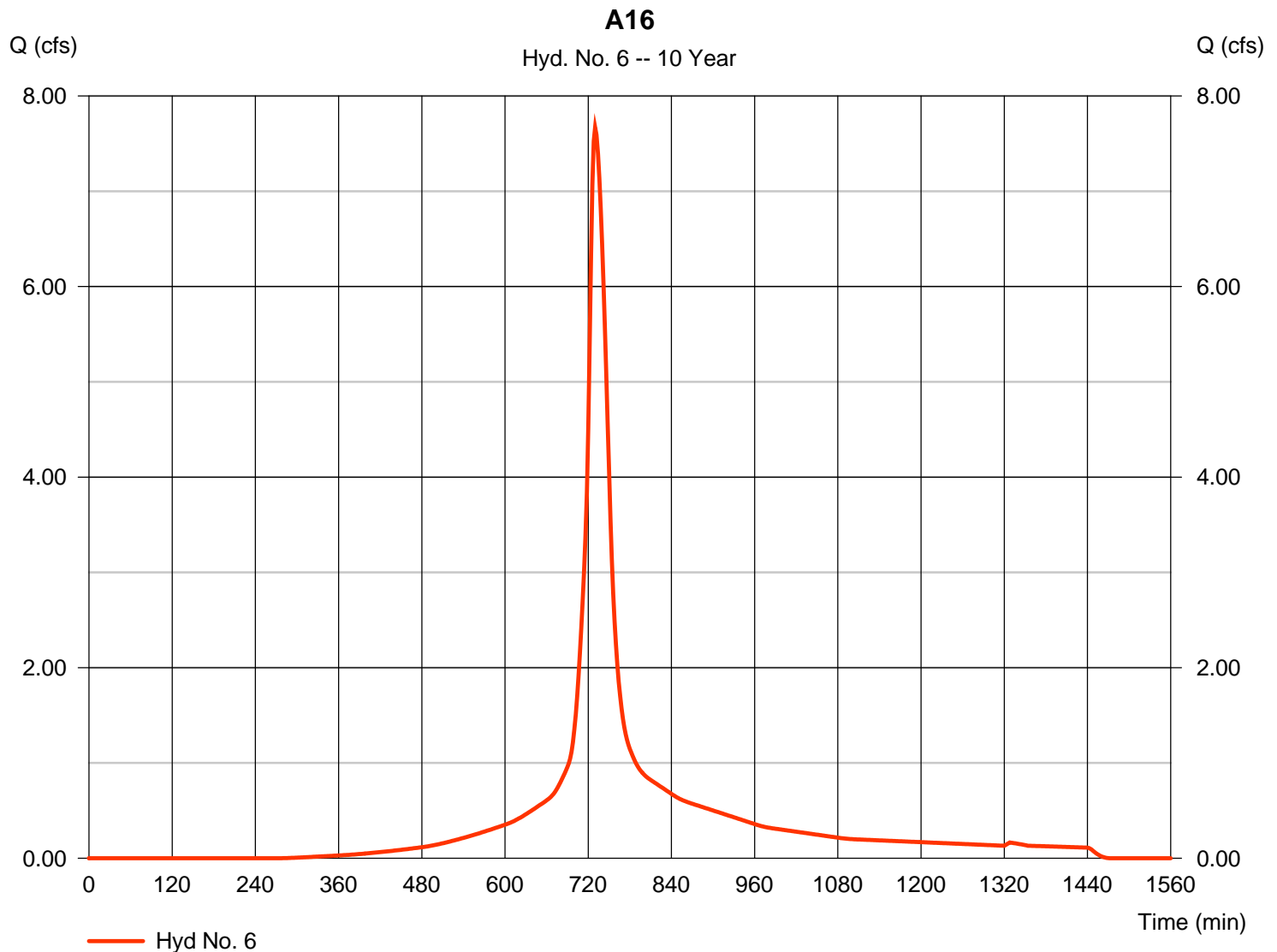
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 6

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 7.669 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 36,090 cuft
Drainage area	= 2.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

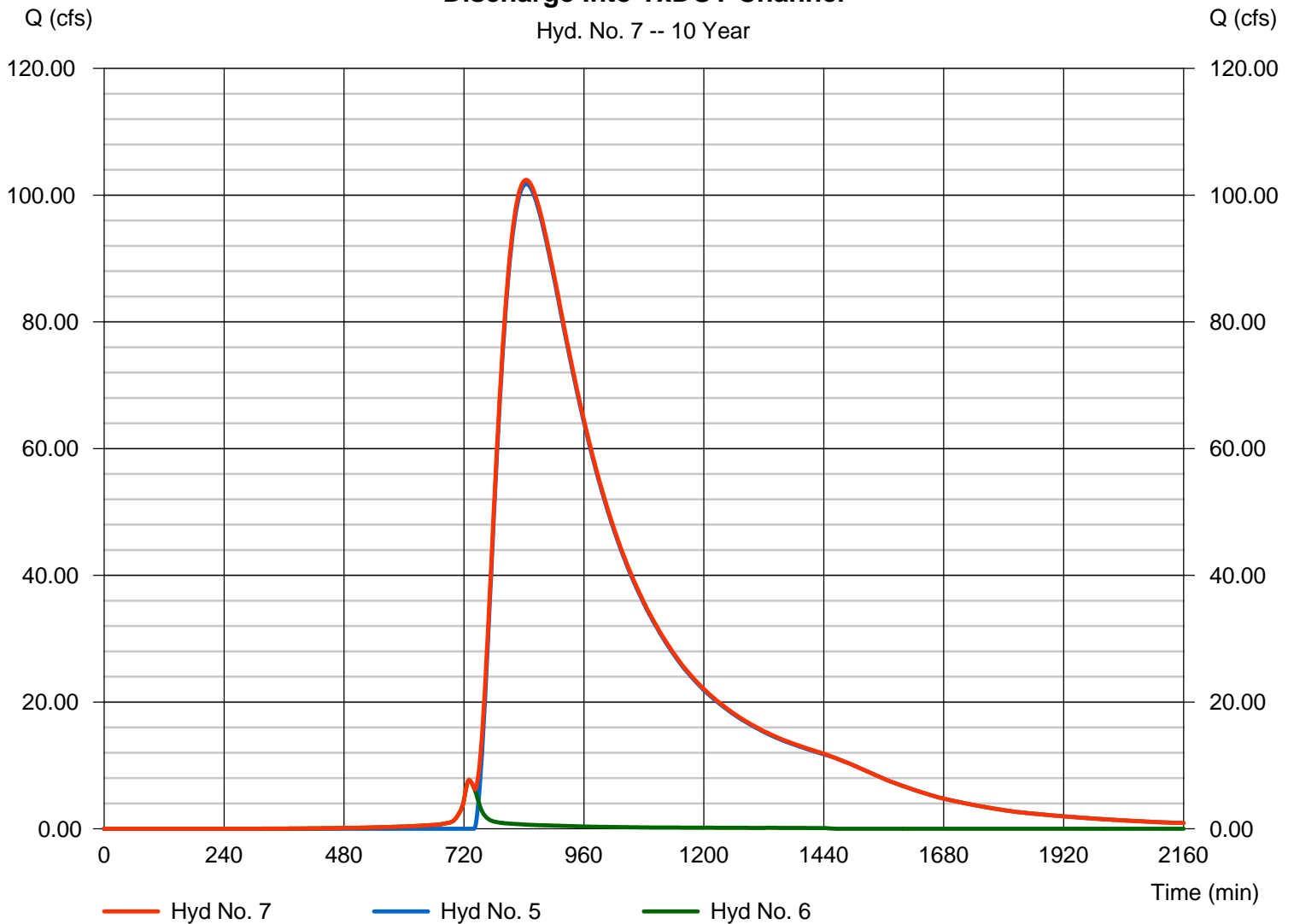
Hyd. No. 7

Discharge Into TxDOT Channel

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 5, 6

Peak discharge = 102.40 cfs
 Time to peak = 844 min
 Hyd. volume = 1,987,160 cuft
 Contrib. drain. area = 2.200 ac

Discharge Into TxDOT Channel



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

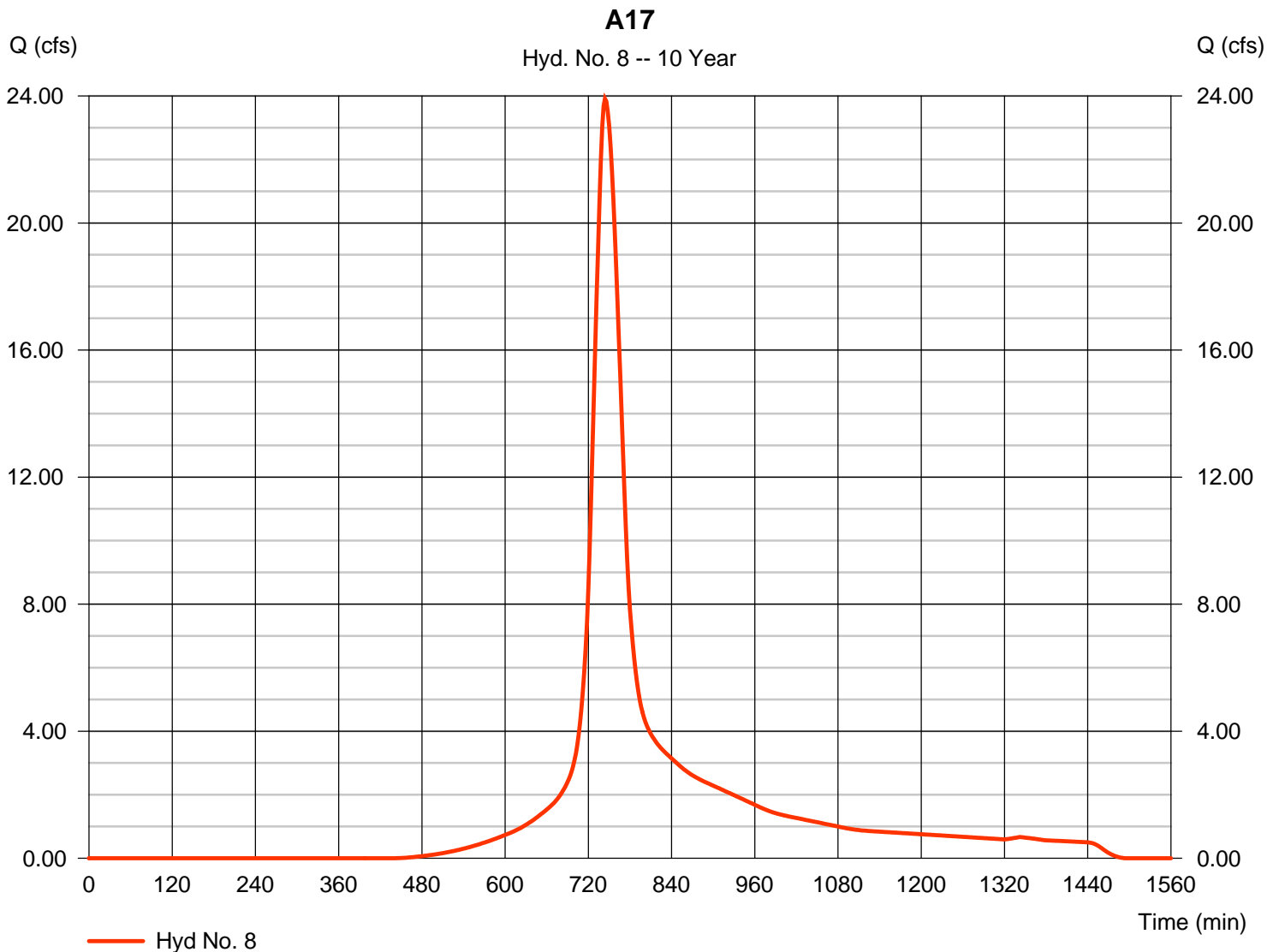
Tuesday, 06 / 9 / 2020

Hyd. No. 8

A17

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 23.92 cfs
 Time to peak = 744 min
 Hyd. volume = 136,468 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

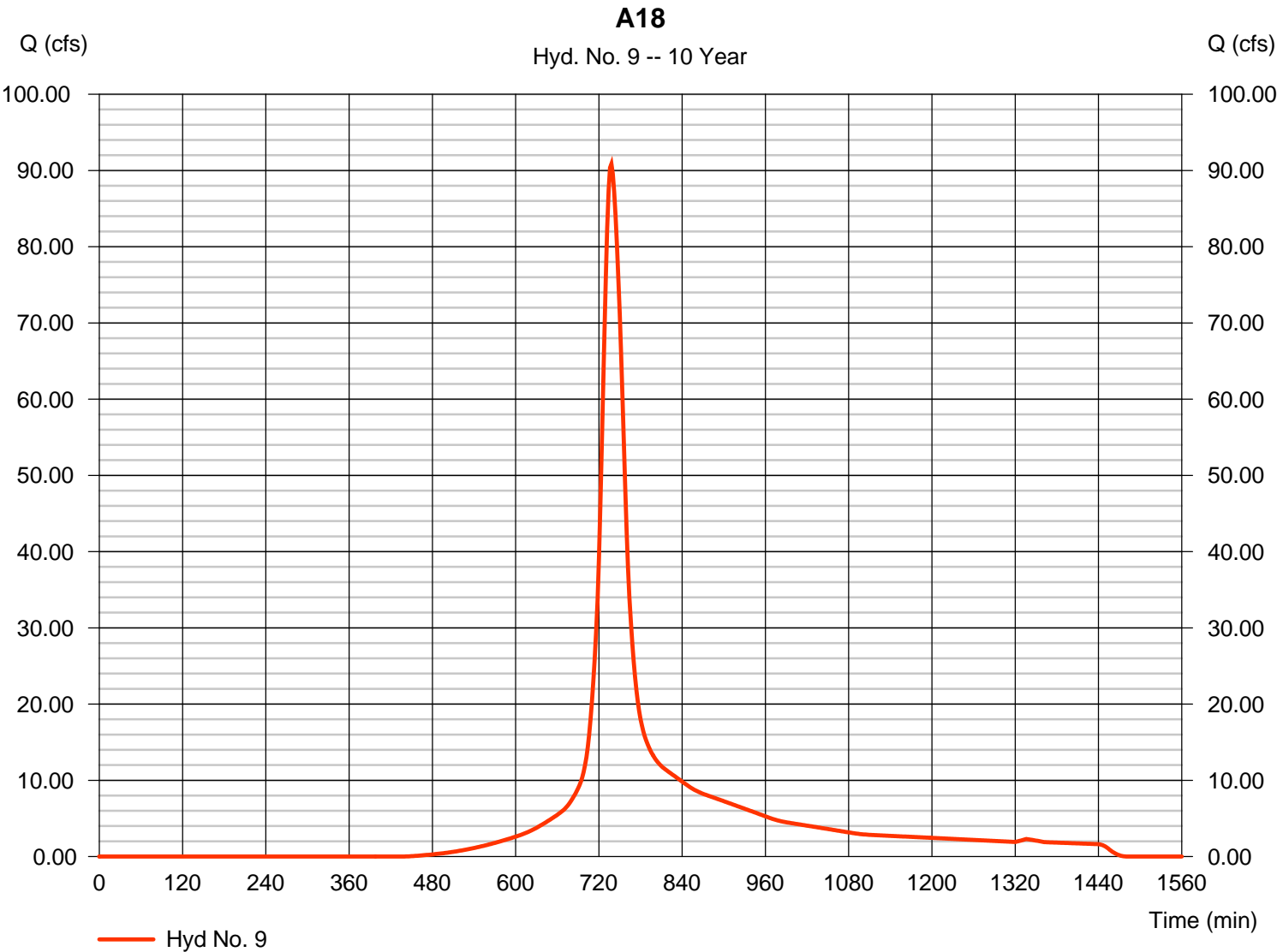
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 9

A18

Hydrograph type	= SCS Runoff	Peak discharge	= 90.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 447,611 cuft
Drainage area	= 34.490 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.60 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

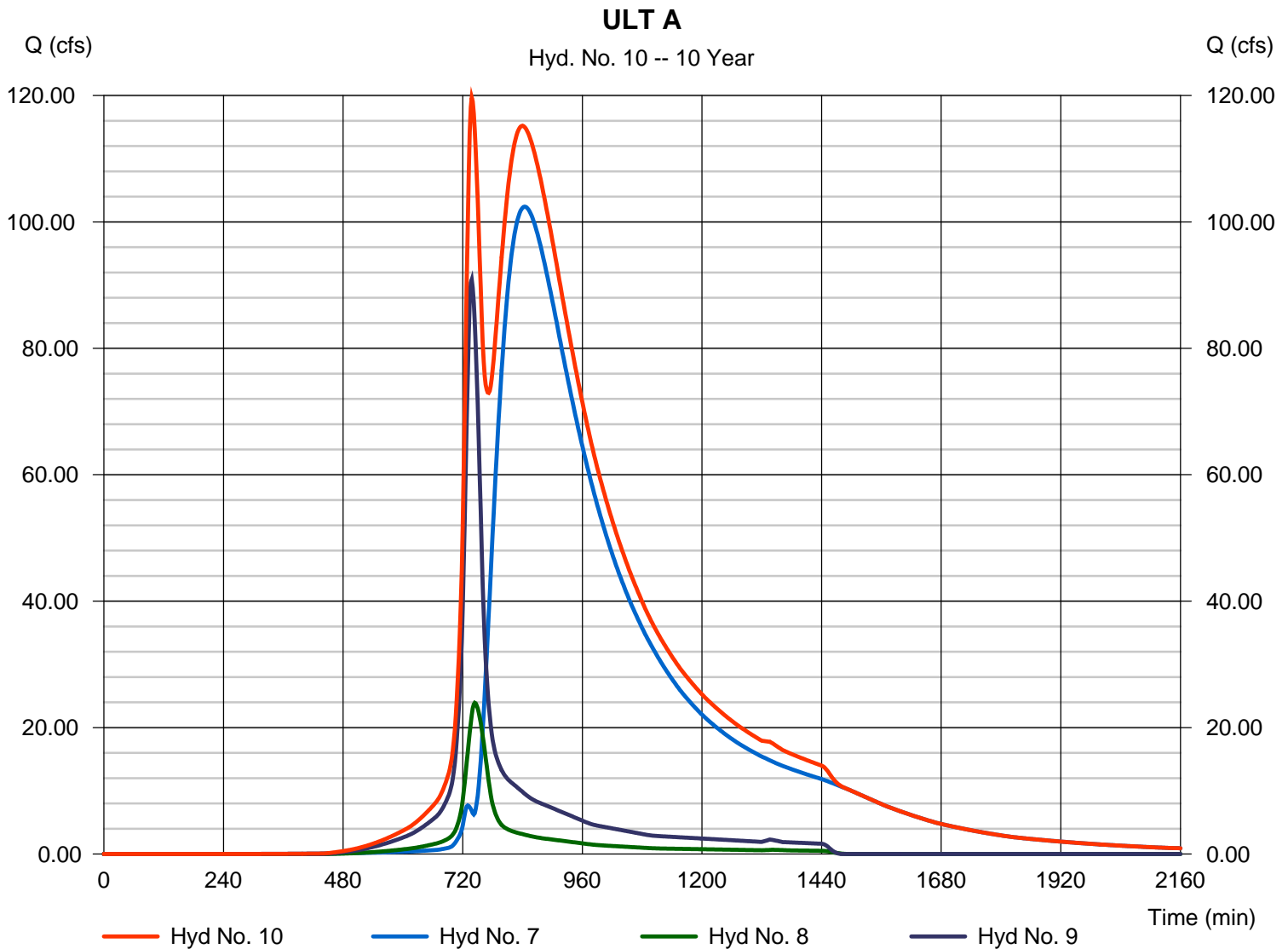
Tuesday, 06 / 9 / 2020

Hyd. No. 10

ULT A

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 119.66 cfs
 Time to peak = 738 min
 Hyd. volume = 2,571,248 cuft
 Contrib. drain. area = 44.960 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	310.34	2	752	2,599,887	-----	-----	-----	A1-A9
2	Reservoir	189.09	2	794	2,415,578	1	605.58	972,007	A1-A9 + Basin A1
3	SCS Runoff	100.16	2	744	712,434	-----	-----	-----	A10-A15
4	Combine	238.36	2	774	3,128,010	2, 3	-----	-----	A10-15 + BASIN A1
5	Reservoir	173.26	2	826	2,935,132	4	603.22	853,241	BASIN A2
6	SCS Runoff	10.74	2	730	51,343	-----	-----	-----	A16
7	Combine	174.27	2	826	2,986,477	5, 6	-----	-----	Discharge Into TxDOT Channel
8	SCS Runoff	35.64	2	744	204,648	-----	-----	-----	A17
9	SCS Runoff	135.13	2	738	671,242	-----	-----	-----	A18
10	Combine	197.09	2	742	3,862,362	7, 8, 9	-----	-----	ULT A
031.060_Parkside Basins.gpw					Return Period: 25 Year			Tuesday, 06 / 9 / 2020	

Hydrograph Report

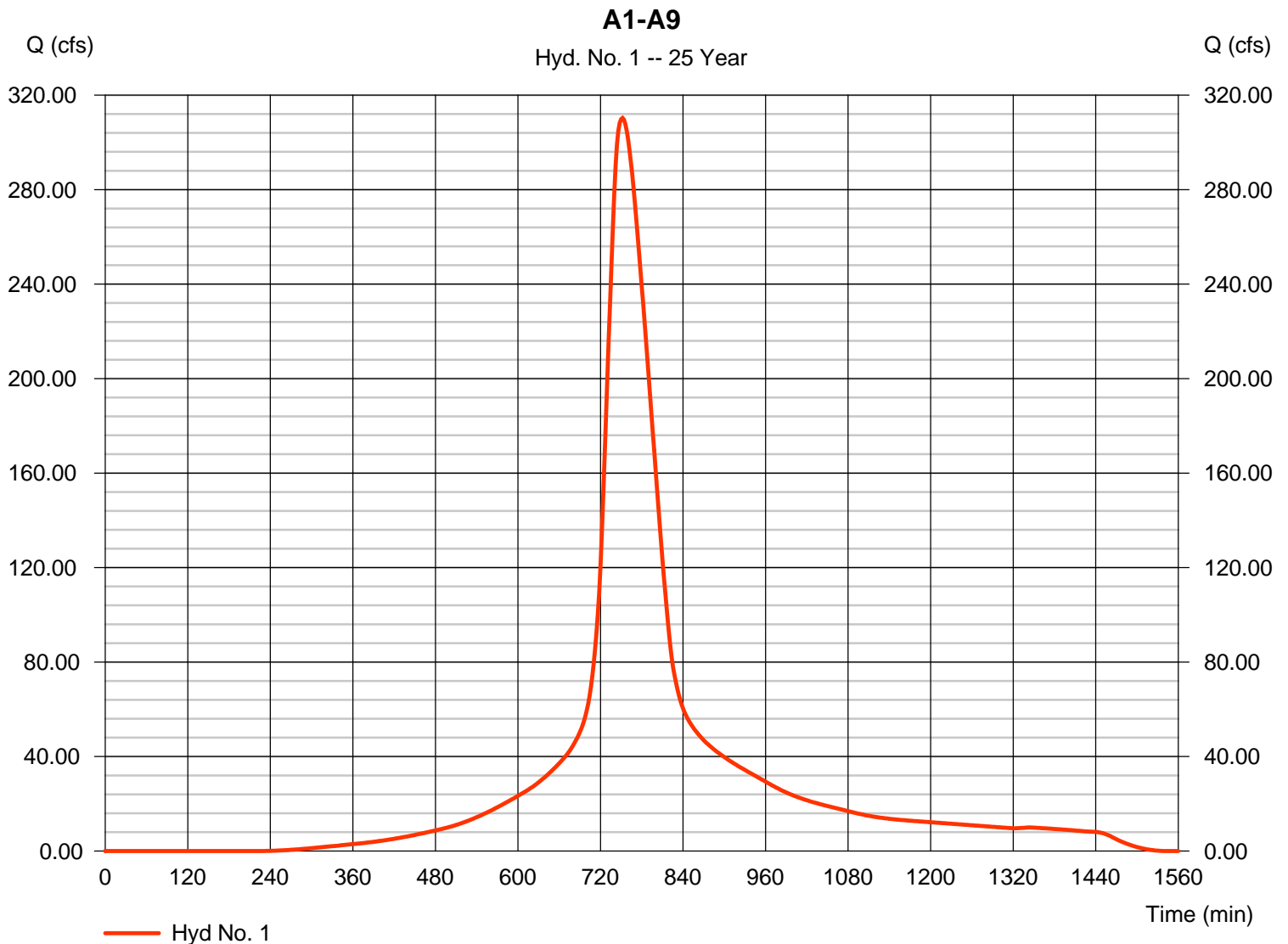
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 1

A1-A9

Hydrograph type	= SCS Runoff	Peak discharge	= 310.34 cfs
Storm frequency	= 25 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 2,599,887 cuft
Drainage area	= 109.260 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.90 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

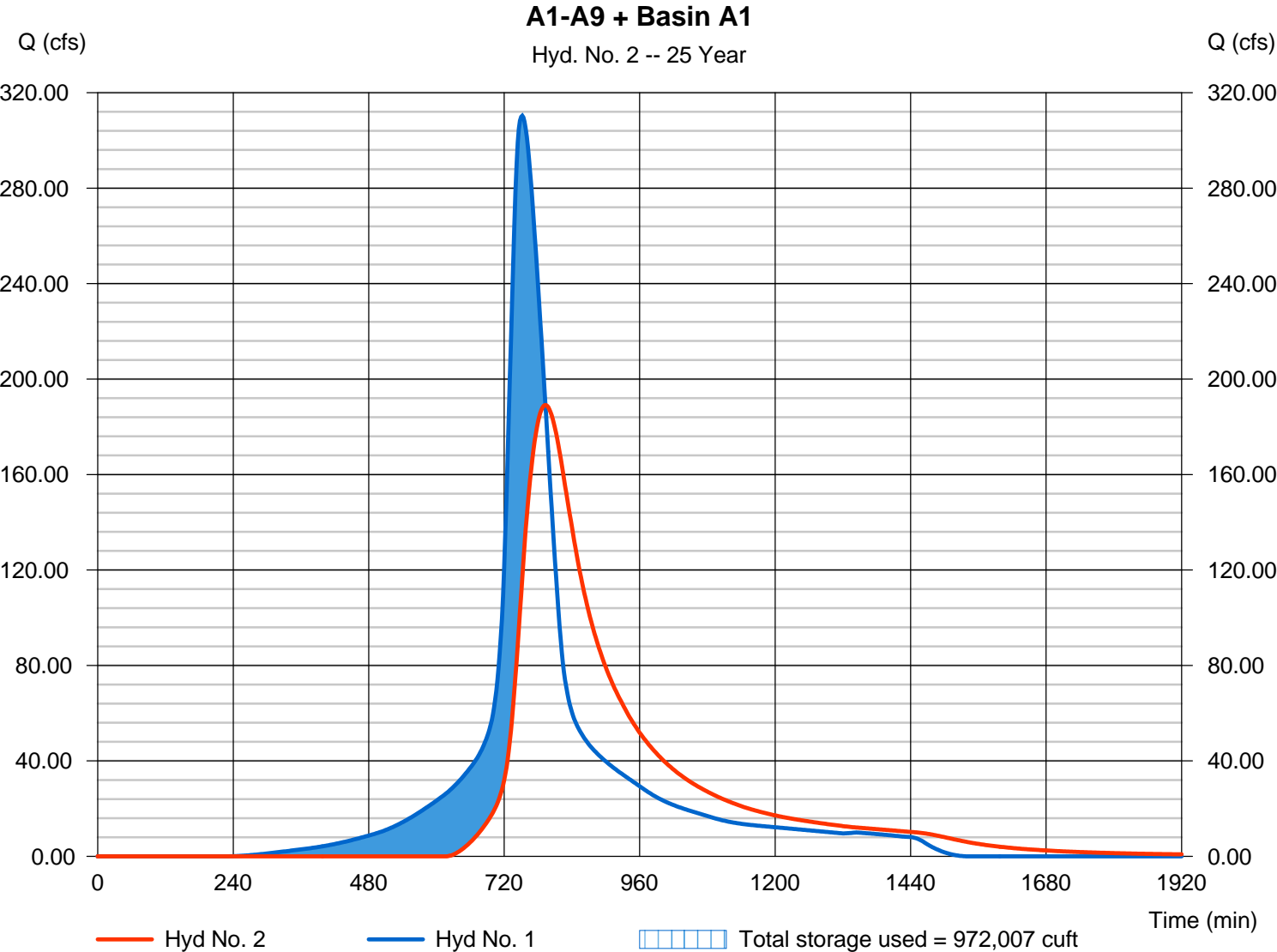
Tuesday, 06 / 9 / 2020

Hyd. No. 2

A1-A9 + Basin A1

Hydrograph type	= Reservoir	Peak discharge	= 189.09 cfs
Storm frequency	= 25 yrs	Time to peak	= 794 min
Time interval	= 2 min	Hyd. volume	= 2,415,578 cuft
Inflow hyd. No.	= 1 - A1-A9	Max. Elevation	= 605.58 ft
Reservoir name	= BASIN A1	Max. Storage	= 972,007 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

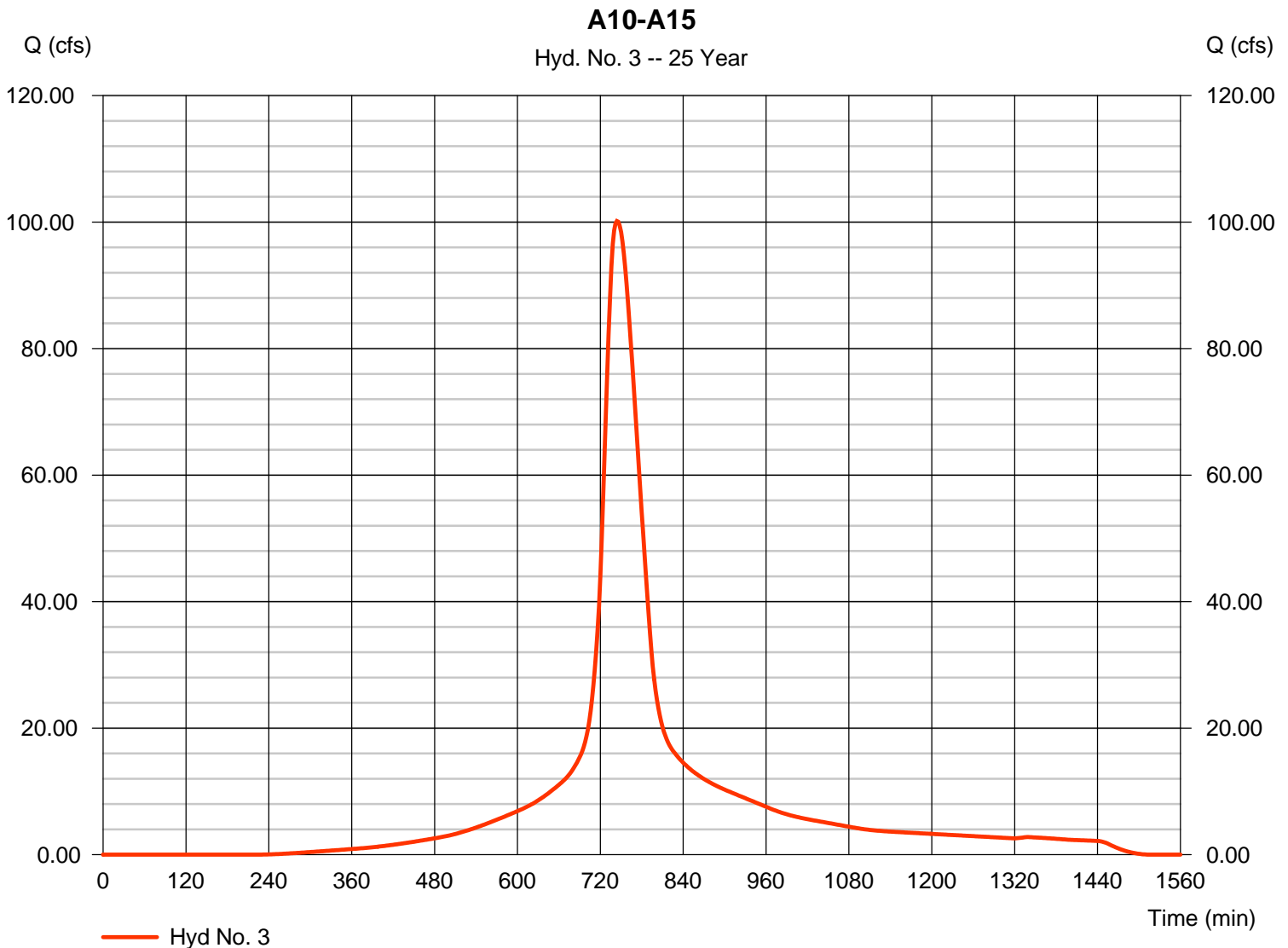
Tuesday, 06 / 9 / 2020

Hyd. No. 3

A10-A15

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 29.940 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 100.16 cfs
 Time to peak = 744 min
 Hyd. volume = 712,434 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 28.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

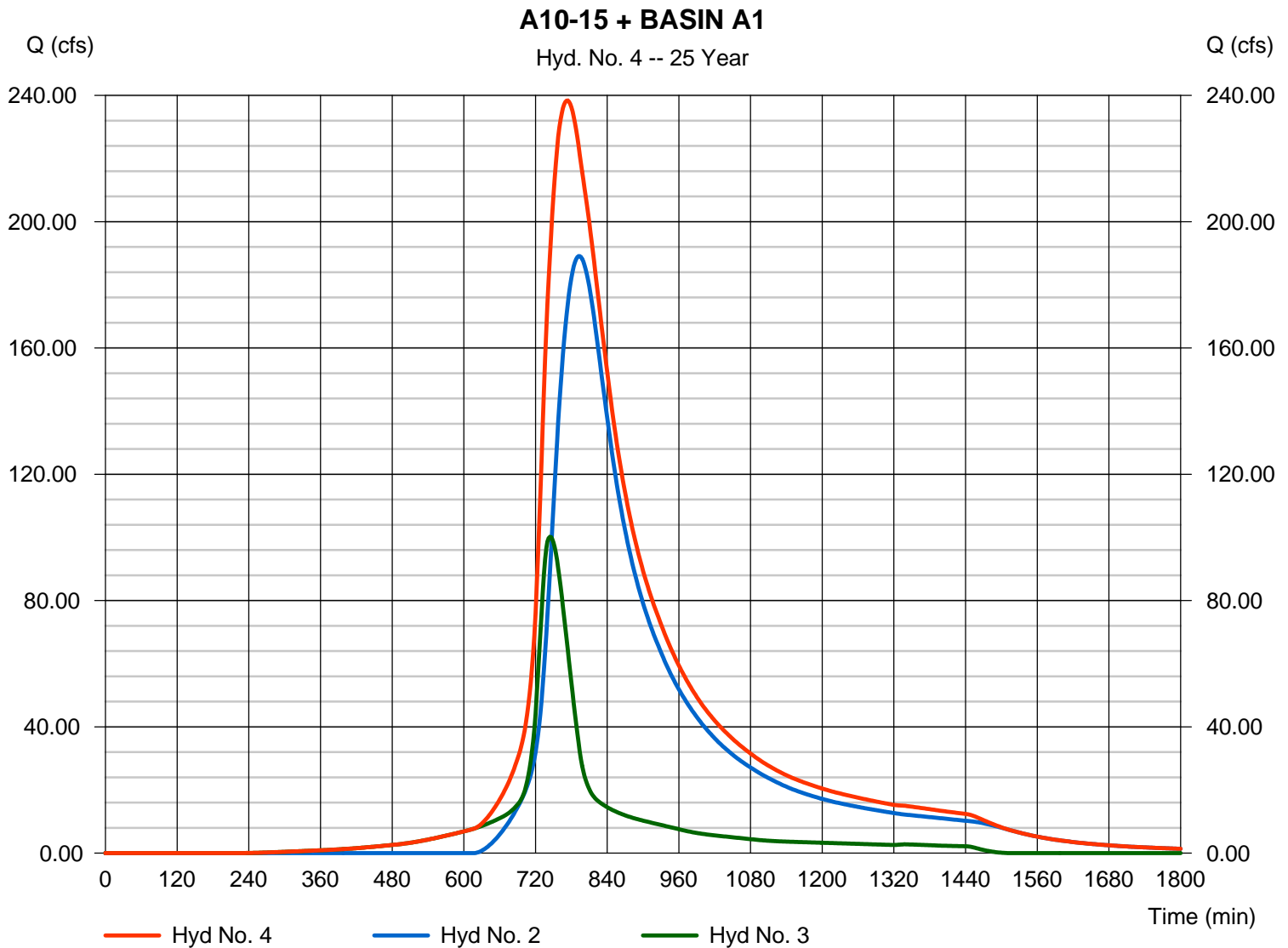
Tuesday, 06 / 9 / 2020

Hyd. No. 4

A10-15 + BASIN A1

Hydrograph type = Combine
 Storm frequency = 25 yrs
 Time interval = 2 min
 Inflow hyds. = 2, 3

Peak discharge = 238.36 cfs
 Time to peak = 774 min
 Hyd. volume = 3,128,010 cuft
 Contrib. drain. area = 29.940 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

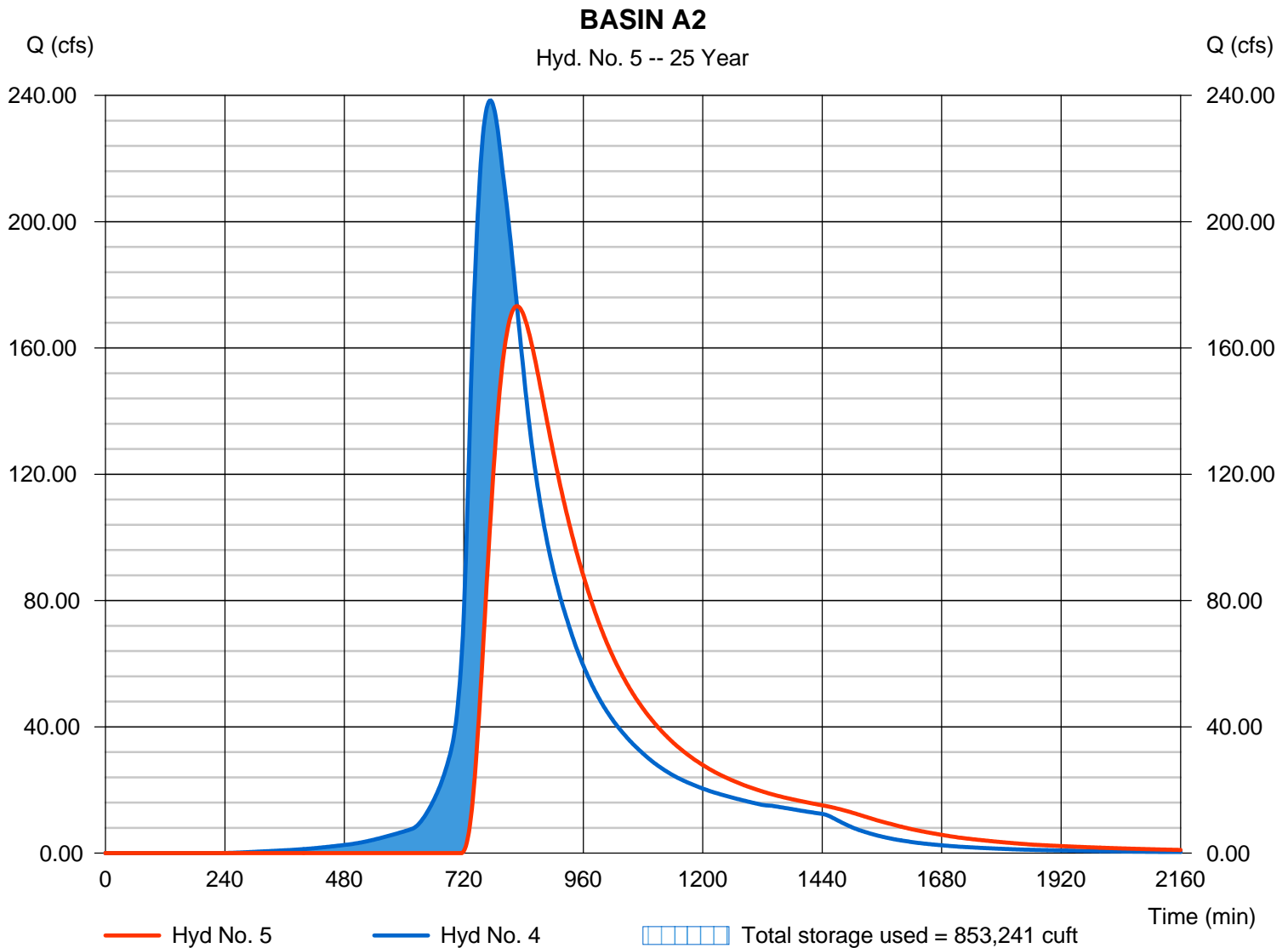
Tuesday, 06 / 9 / 2020

Hyd. No. 5

BASIN A2

Hydrograph type	= Reservoir	Peak discharge	= 173.26 cfs
Storm frequency	= 25 yrs	Time to peak	= 826 min
Time interval	= 2 min	Hyd. volume	= 2,935,132 cuft
Inflow hyd. No.	= 4 - A10-15 + BASIN A1	Max. Elevation	= 603.22 ft
Reservoir name	= BASIN A2	Max. Storage	= 853,241 cuft

Storage Indication method used.



Hydrograph Report

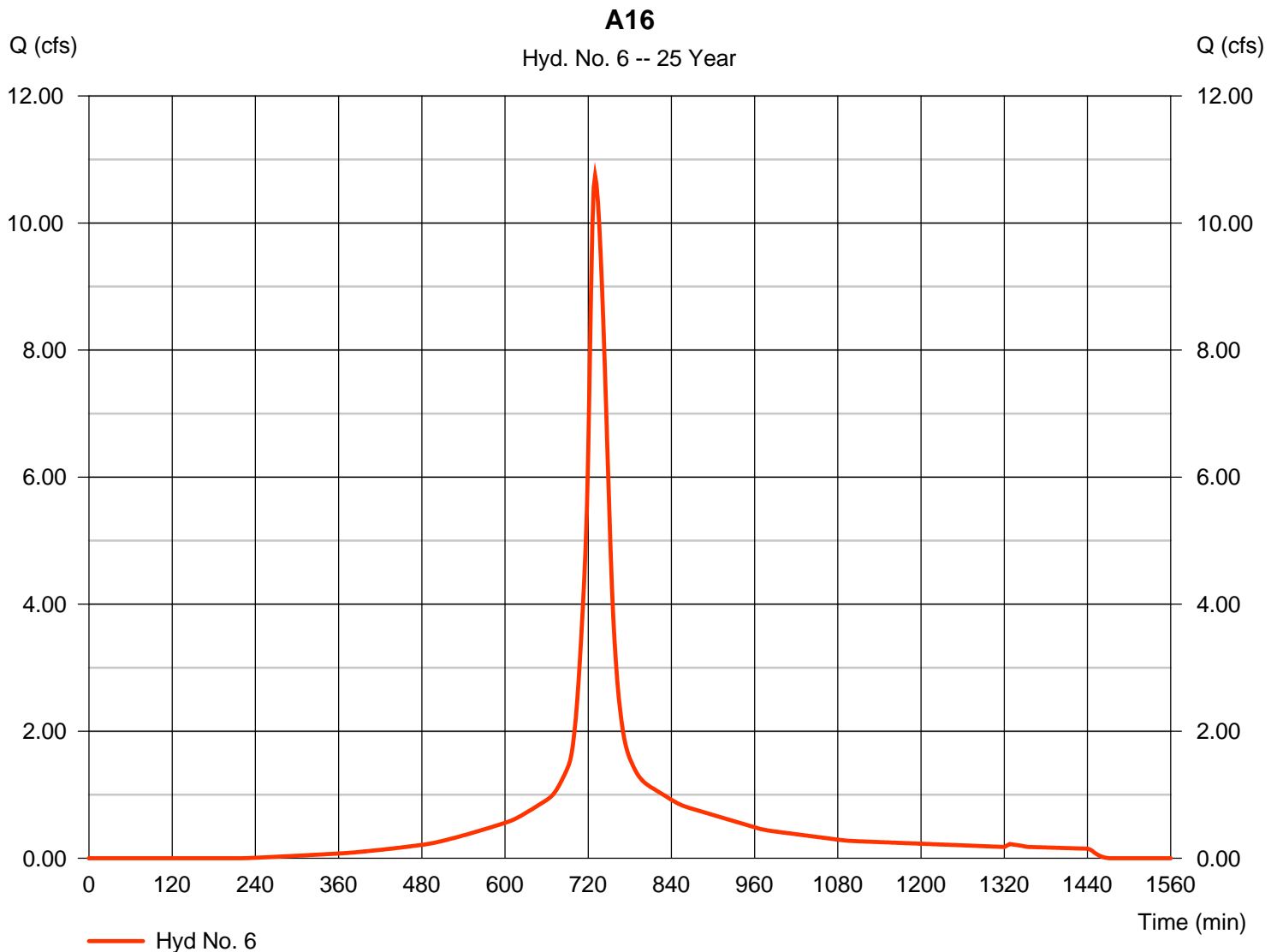
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 6

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 10.74 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 51,343 cuft
Drainage area	= 2.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 7

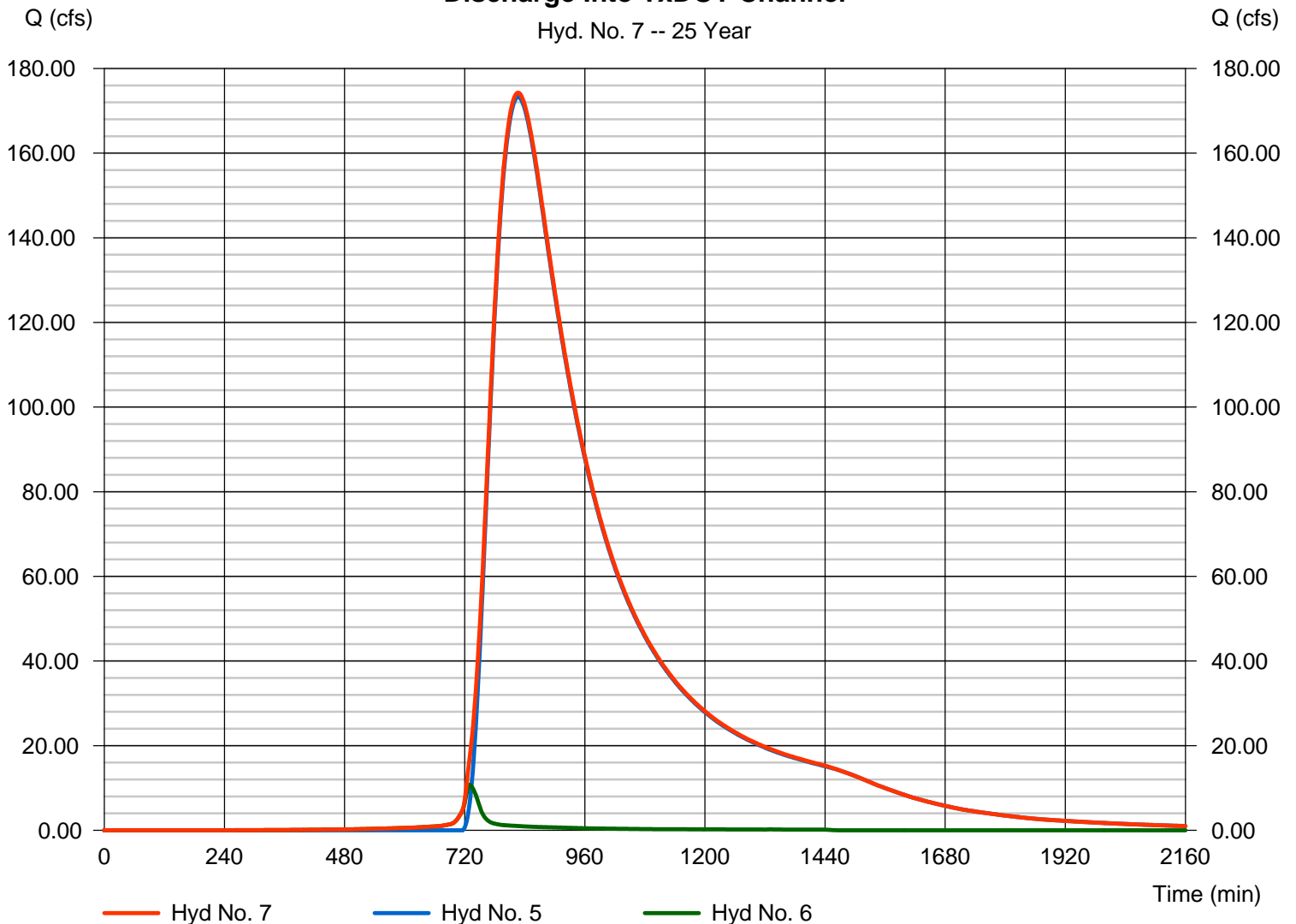
Discharge Into TxDOT Channel

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 5, 6

Peak discharge = 174.27 cfs
Time to peak = 826 min
Hyd. volume = 2,986,477 cuft
Contrib. drain. area = 2.200 ac

Discharge Into TxDOT Channel

Hyd. No. 7 -- 25 Year



Hydrograph Report

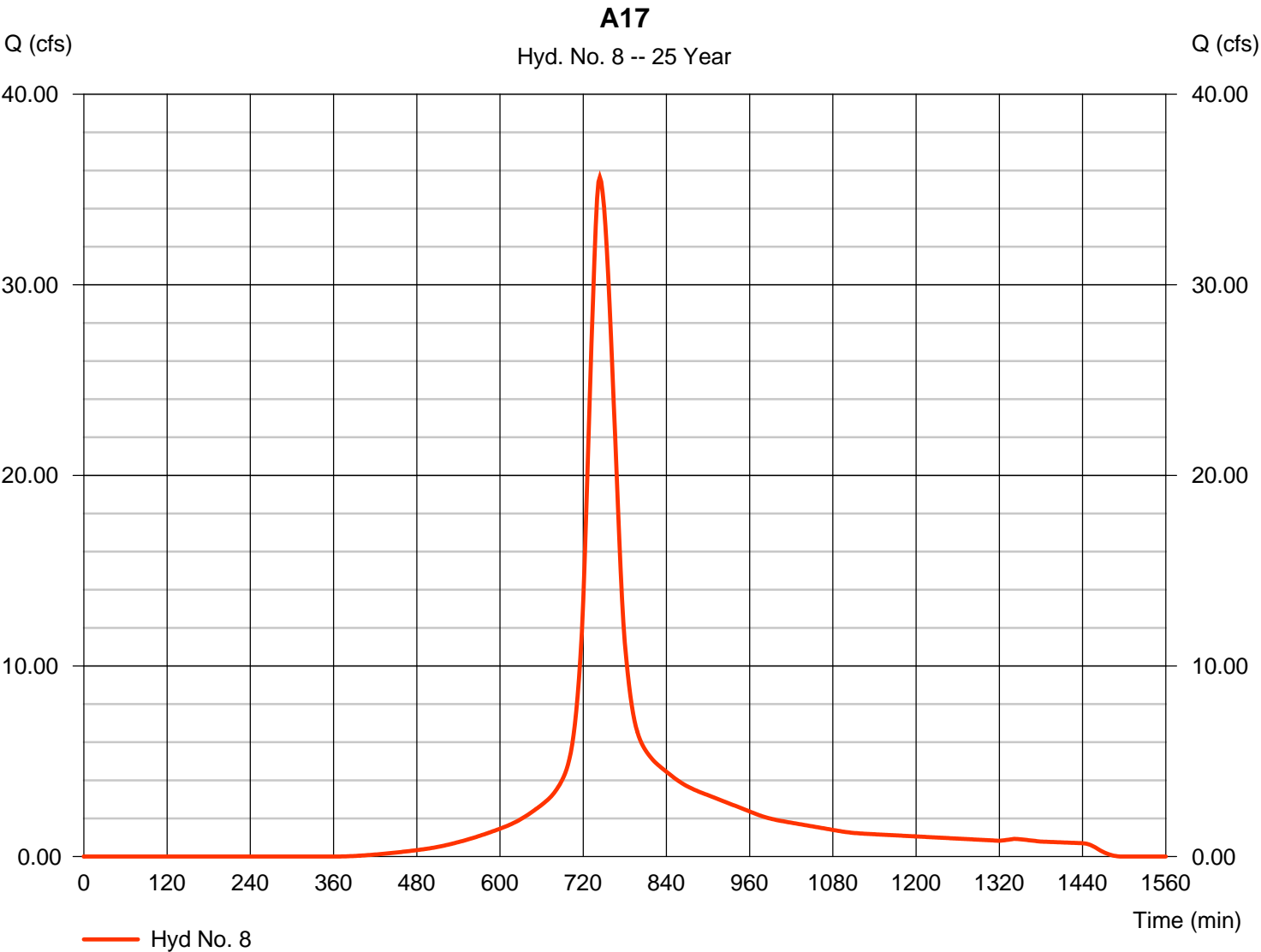
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 8

A17

Hydrograph type	= SCS Runoff	Peak discharge	= 35.64 cfs
Storm frequency	= 25 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 204,648 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

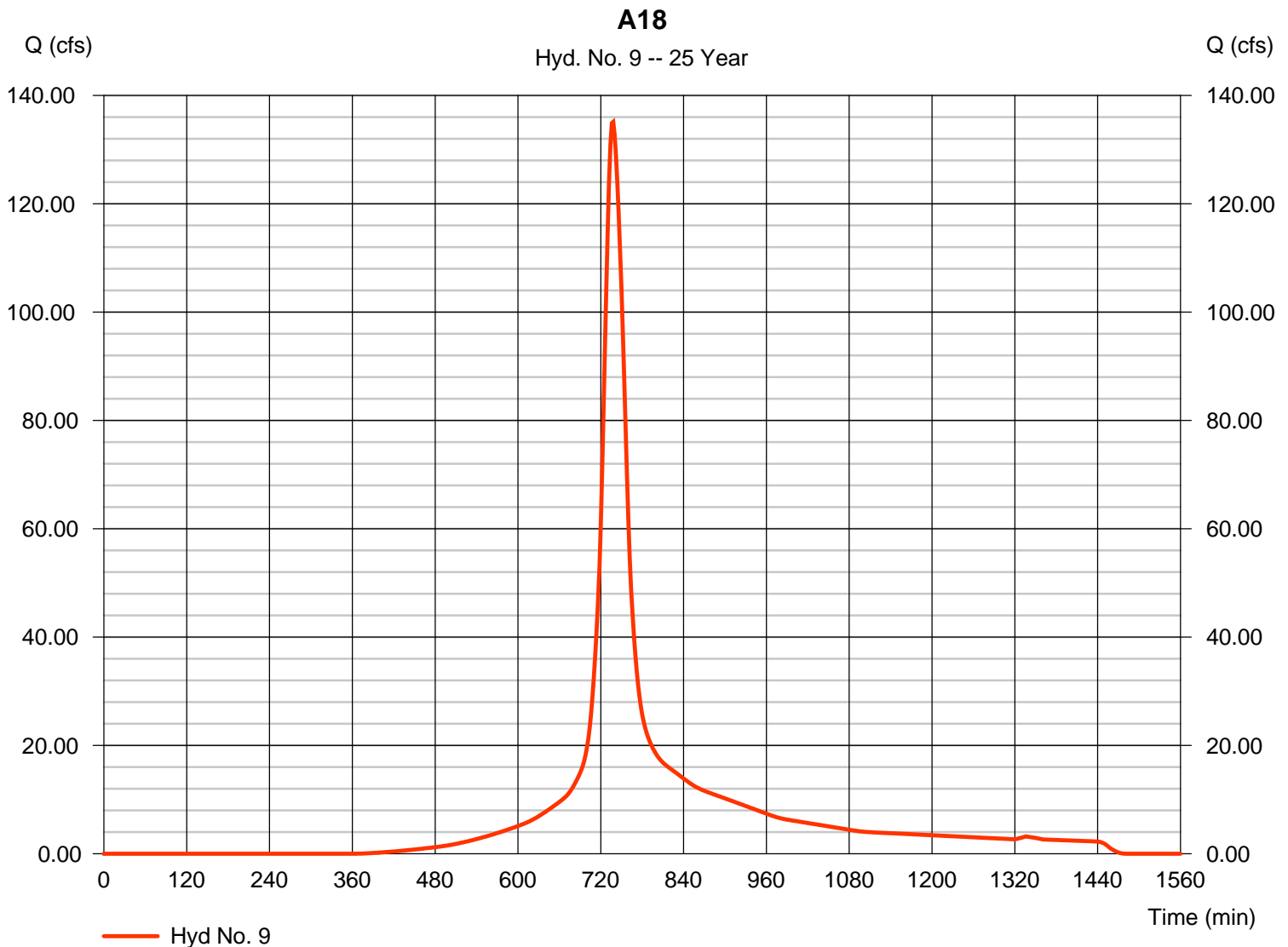
Tuesday, 06 / 9 / 2020

Hyd. No. 9

A18

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 135.13 cfs
 Time to peak = 738 min
 Hyd. volume = 671,242 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

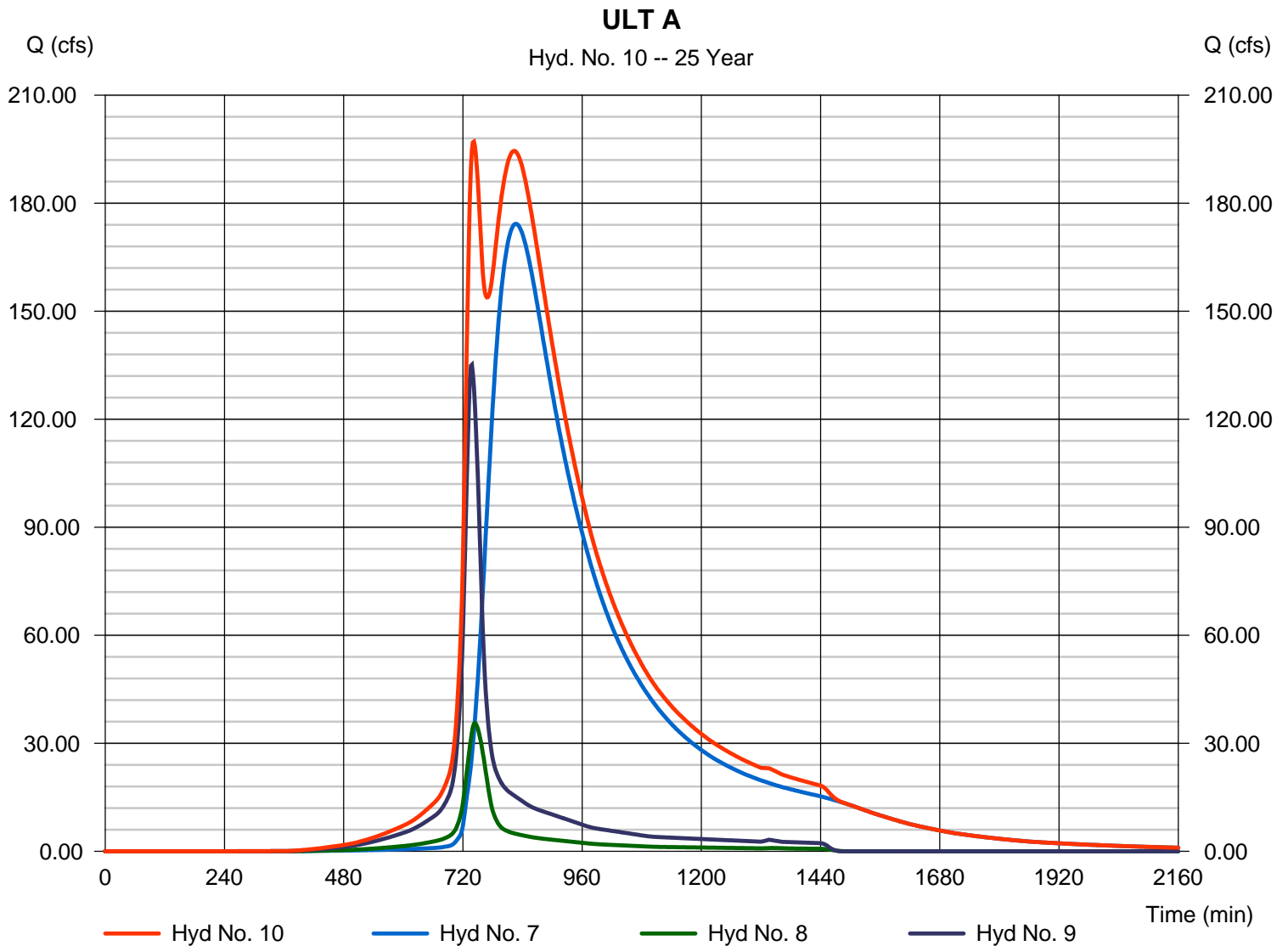
Tuesday, 06 / 9 / 2020

Hyd. No. 10

ULT A

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 7, 8, 9

Peak discharge = 197.09 cfs
Time to peak = 742 min
Hyd. volume = 3,862,362 cuft
Contrib. drain. area = 44.960 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	497.35	2	752	4,263,412	-----	-----	-----	A1-A9
2	Reservoir	327.41	2	788	4,079,100	1	606.94	1,368,535	A1-A9 + Basin A1
3	SCS Runoff	160.40	2	744	1,168,281	-----	-----	-----	A10-A15
4	Combine	413.63	2	772	5,247,361	2, 3	-----	-----	A10-15 + BASIN A1
5	Reservoir	328.36	2	812	5,054,492	4	604.93	1,227,808	BASIN A2
6	SCS Runoff	17.17	2	730	84,195	-----	-----	-----	A16
7	Combine	330.09	2	810	5,138,687	5, 6	-----	-----	Discharge Into TxDOT Channel
8	SCS Runoff	60.71	2	744	355,523	-----	-----	-----	A17
9	SCS Runoff	230.06	2	736	1,166,107	-----	-----	-----	A18
10	Combine	405.86	2	742	6,660,318	7, 8, 9	-----	-----	ULT A
031.060_Parkside Basins.gpw					Return Period: 100 Year			Tuesday, 06 / 9 / 2020	

Hydrograph Report

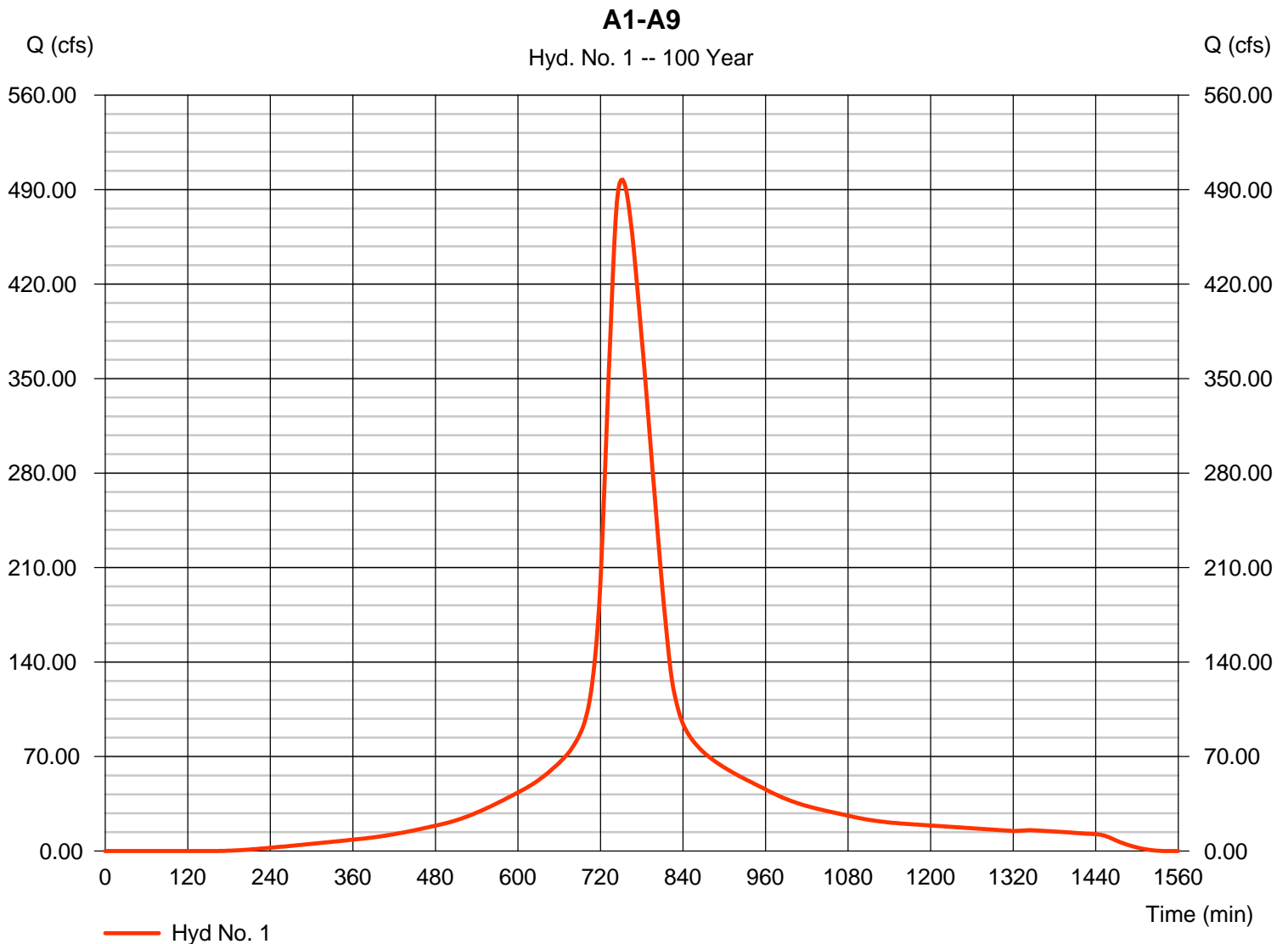
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 1

A1-A9

Hydrograph type	= SCS Runoff	Peak discharge	= 497.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 4,263,412 cuft
Drainage area	= 109.260 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.90 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

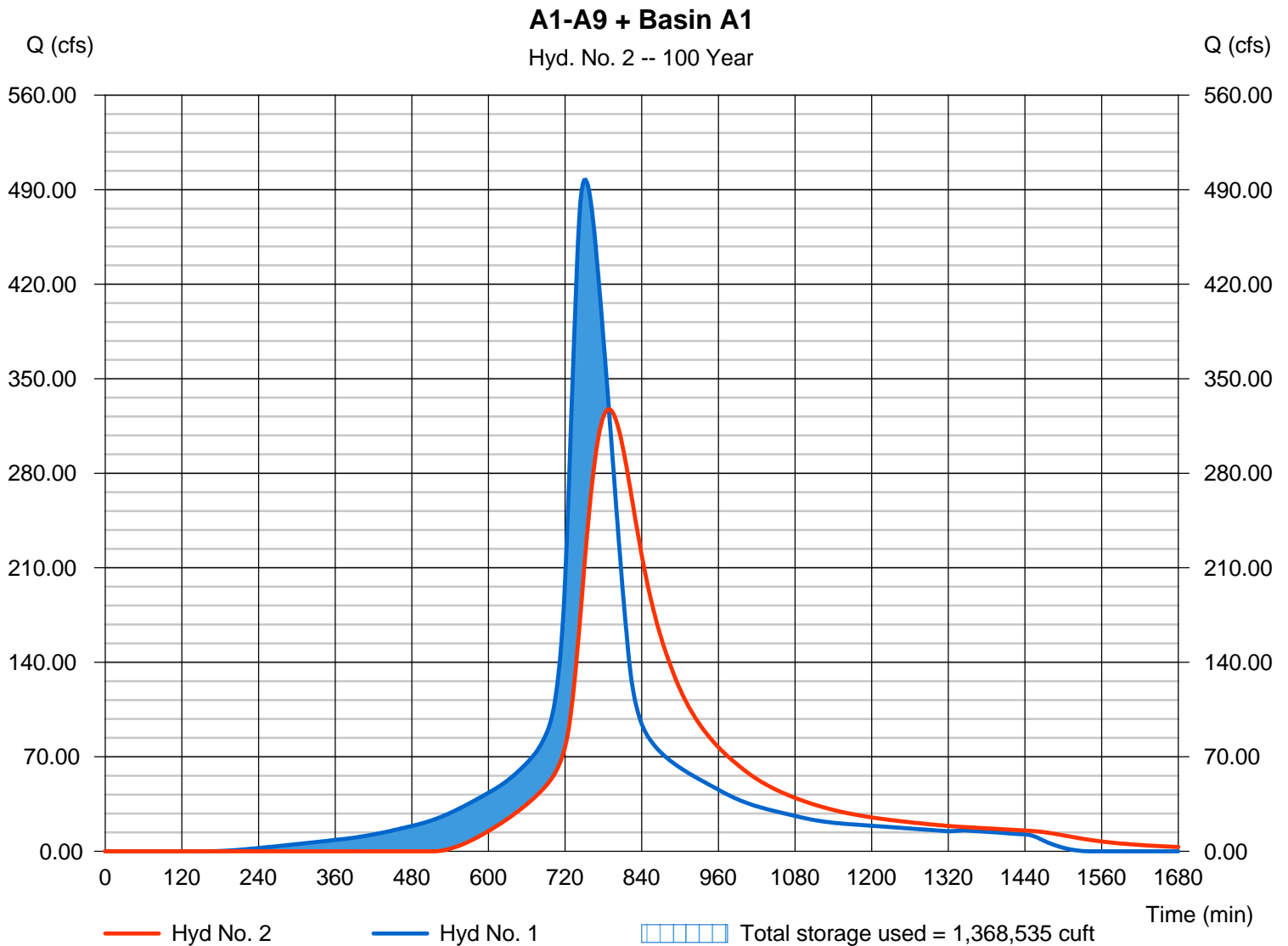
Hyd. No. 2

A1-A9 + Basin A1

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - A1-A9
 Reservoir name = BASIN A1

Peak discharge = 327.41 cfs
 Time to peak = 788 min
 Hyd. volume = 4,079,100 cuft
 Max. Elevation = 606.94 ft
 Max. Storage = 1,368,535 cuft

Storage Indication method used.



Hydrograph Report

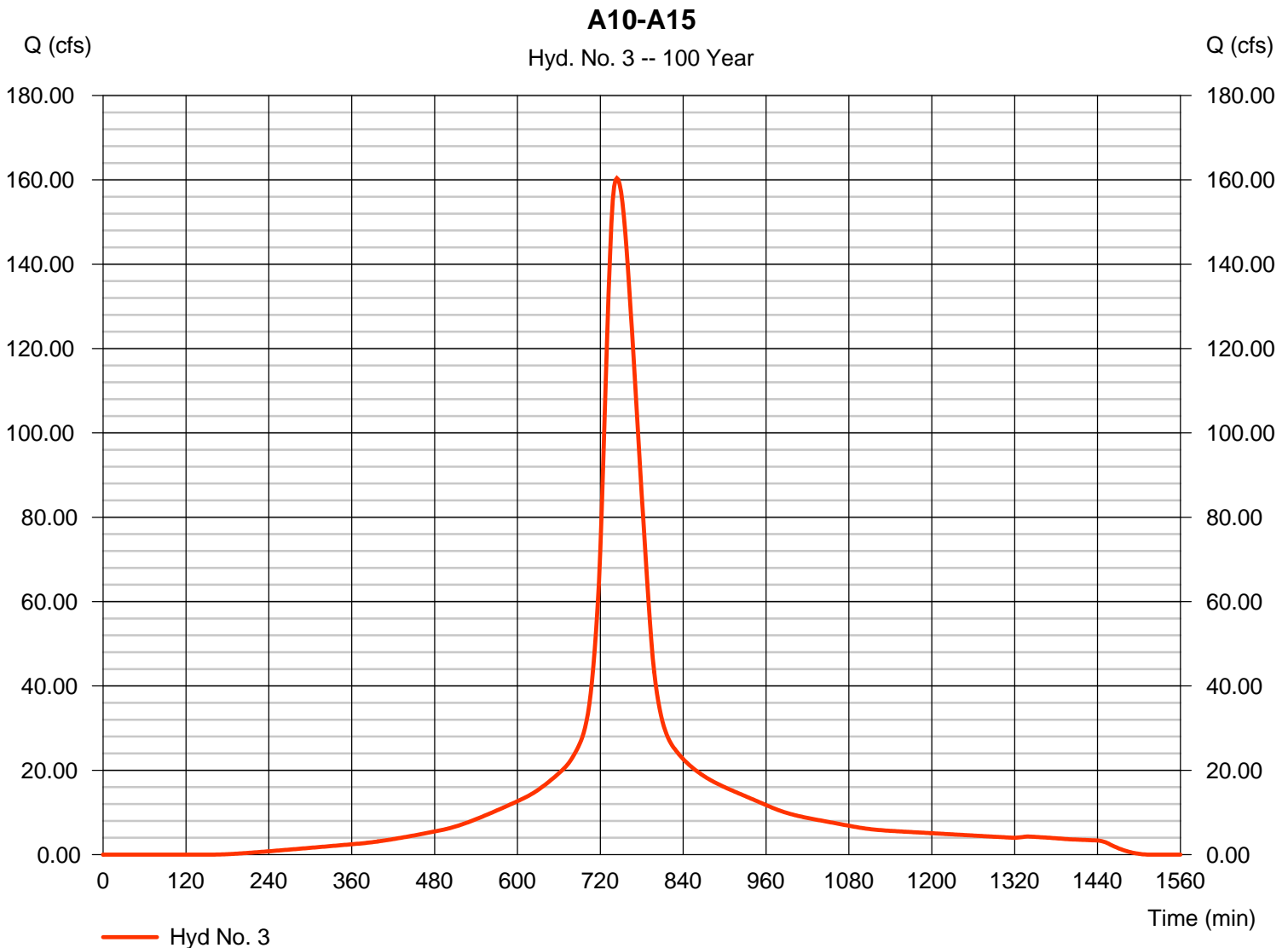
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 3

A10-A15

Hydrograph type	= SCS Runoff	Peak discharge	= 160.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 1,168,281 cuft
Drainage area	= 29.940 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.50 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

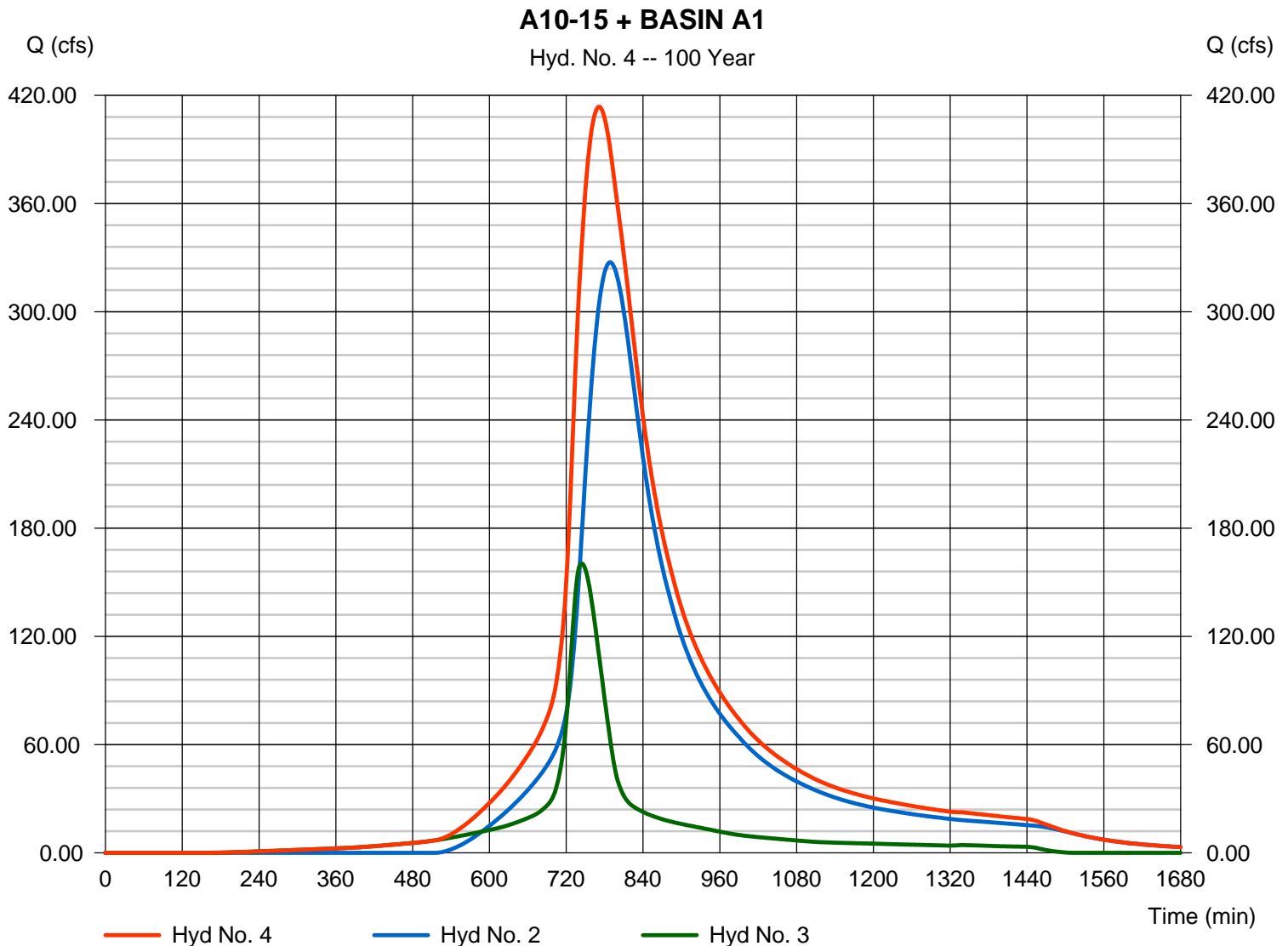
Tuesday, 06 / 9 / 2020

Hyd. No. 4

A10-15 + BASIN A1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 2, 3

Peak discharge = 413.63 cfs
 Time to peak = 772 min
 Hyd. volume = 5,247,361 cuft
 Contrib. drain. area = 29.940 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

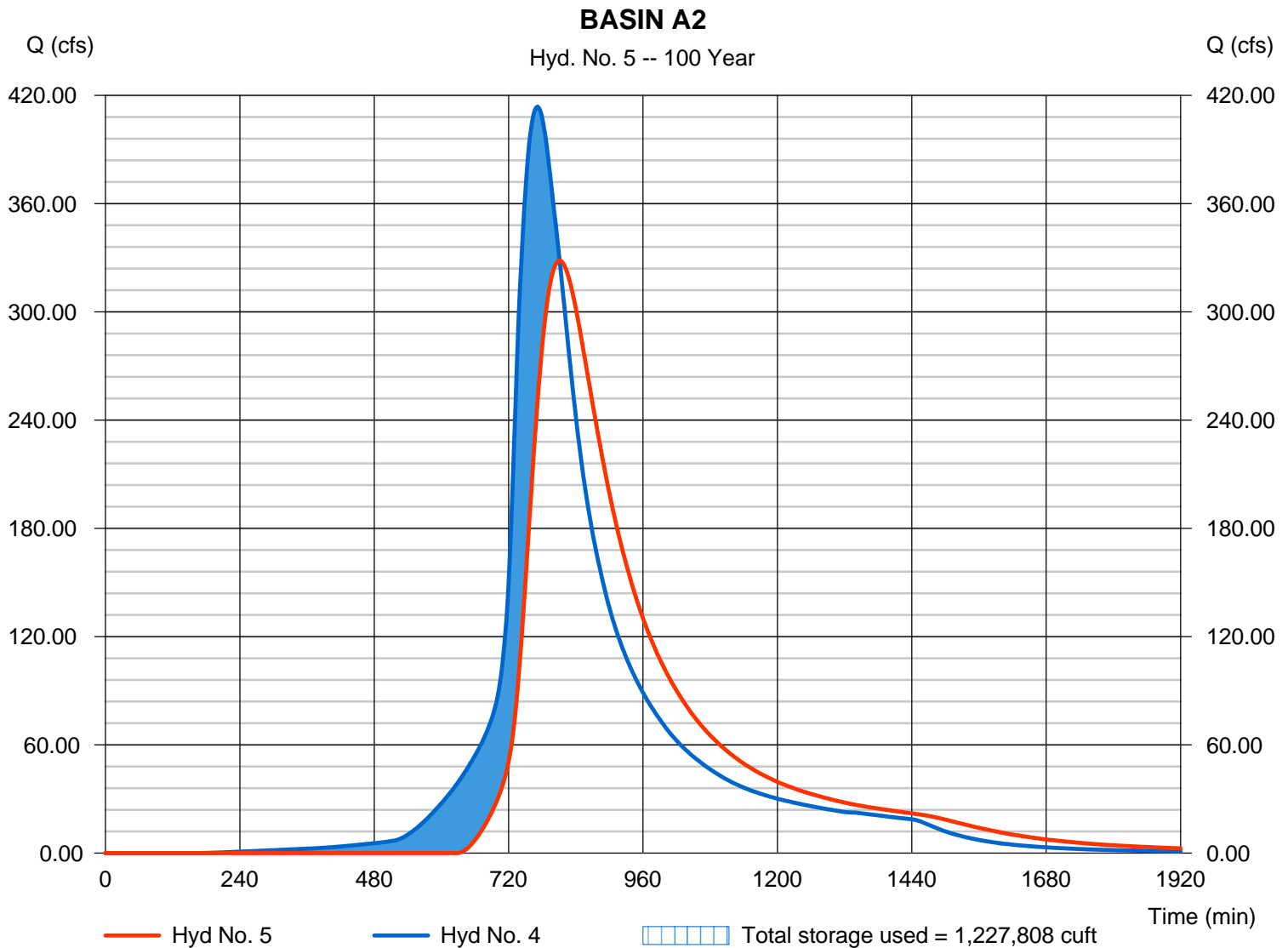
Tuesday, 06 / 9 / 2020

Hyd. No. 5

BASIN A2

Hydrograph type	= Reservoir	Peak discharge	= 328.36 cfs
Storm frequency	= 100 yrs	Time to peak	= 812 min
Time interval	= 2 min	Hyd. volume	= 5,054,492 cuft
Inflow hyd. No.	= 4 - A10-15 + BASIN A1	Max. Elevation	= 604.93 ft
Reservoir name	= BASIN A2	Max. Storage	= 1,227,808 cuft

Storage Indication method used.



Hydrograph Report

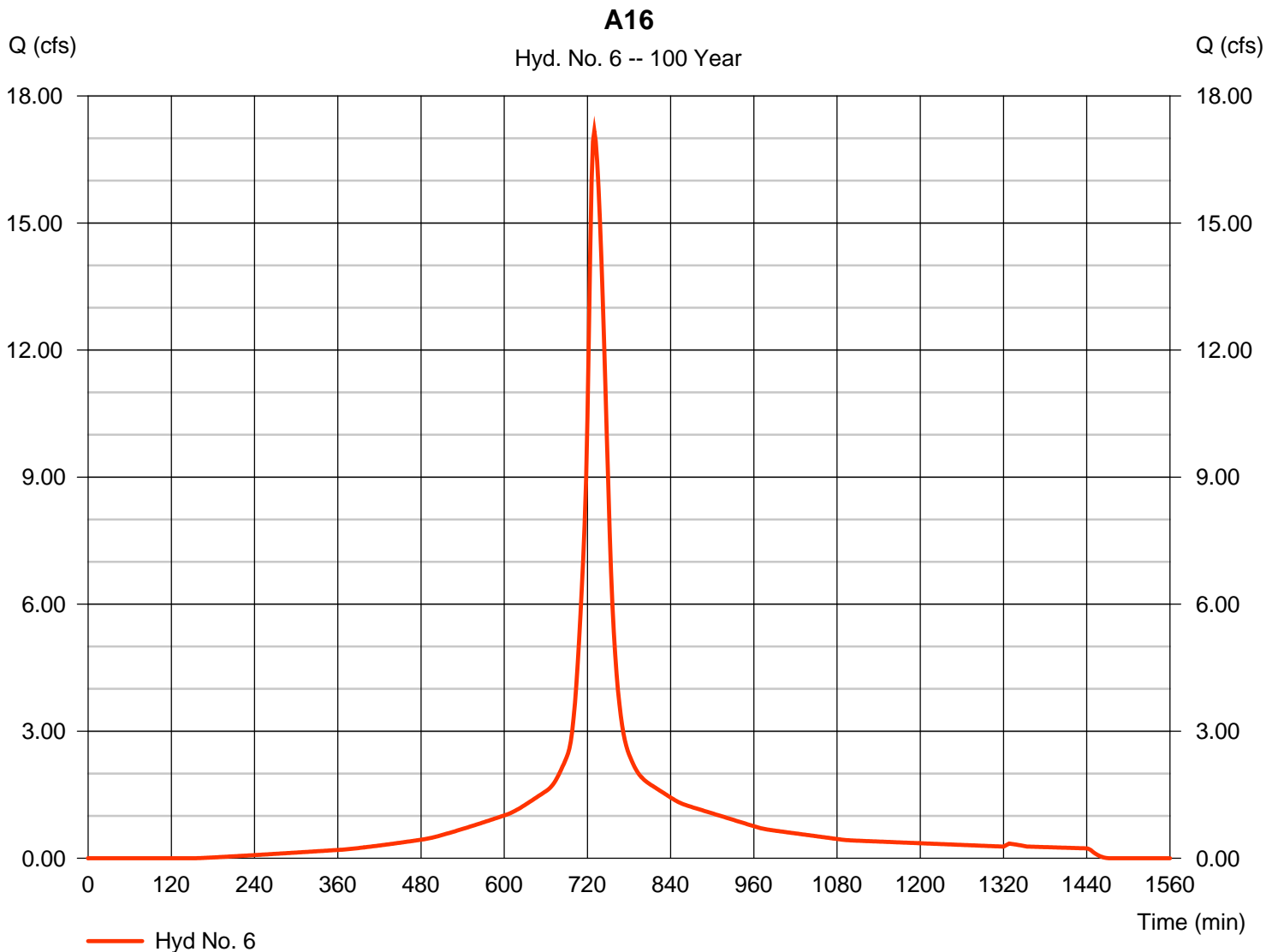
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 6

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 17.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 84,195 cuft
Drainage area	= 2.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

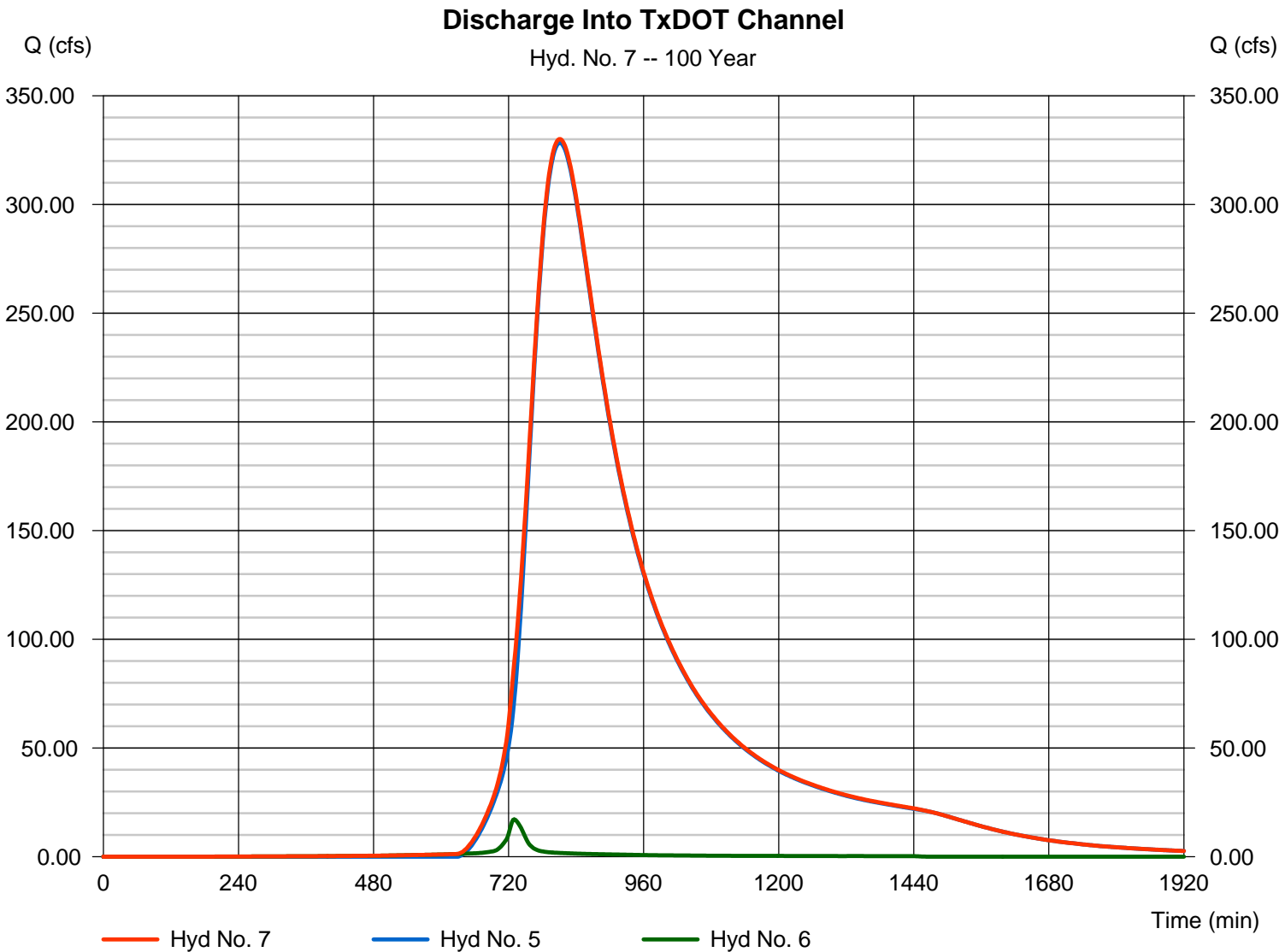
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 7

Discharge Into TxDOT Channel

Hydrograph type	= Combine	Peak discharge	= 330.09 cfs
Storm frequency	= 100 yrs	Time to peak	= 810 min
Time interval	= 2 min	Hyd. volume	= 5,138,687 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 2.200 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

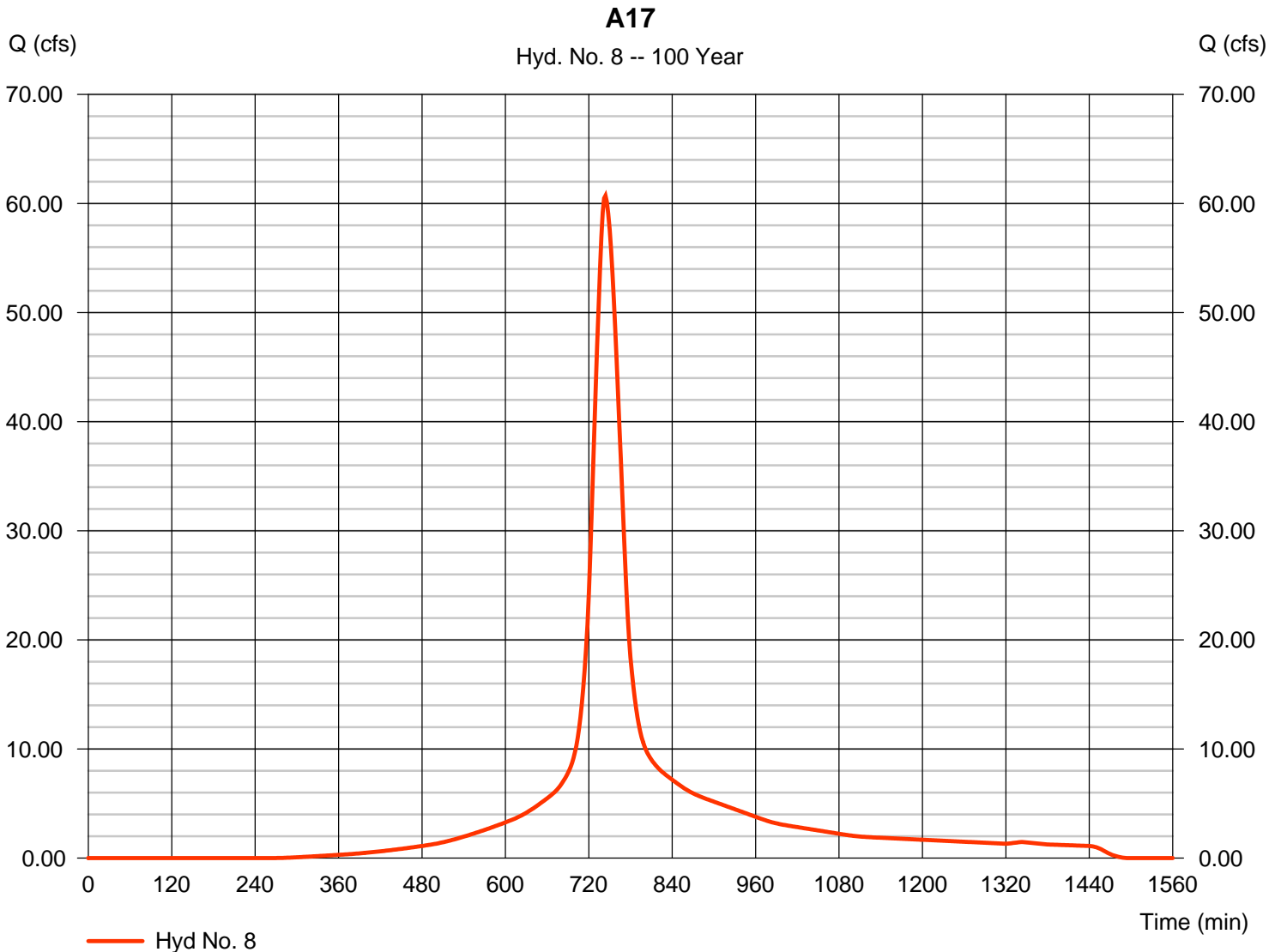
Tuesday, 06 / 9 / 2020

Hyd. No. 8

A17

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 60.71 cfs
 Time to peak = 744 min
 Hyd. volume = 355,523 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

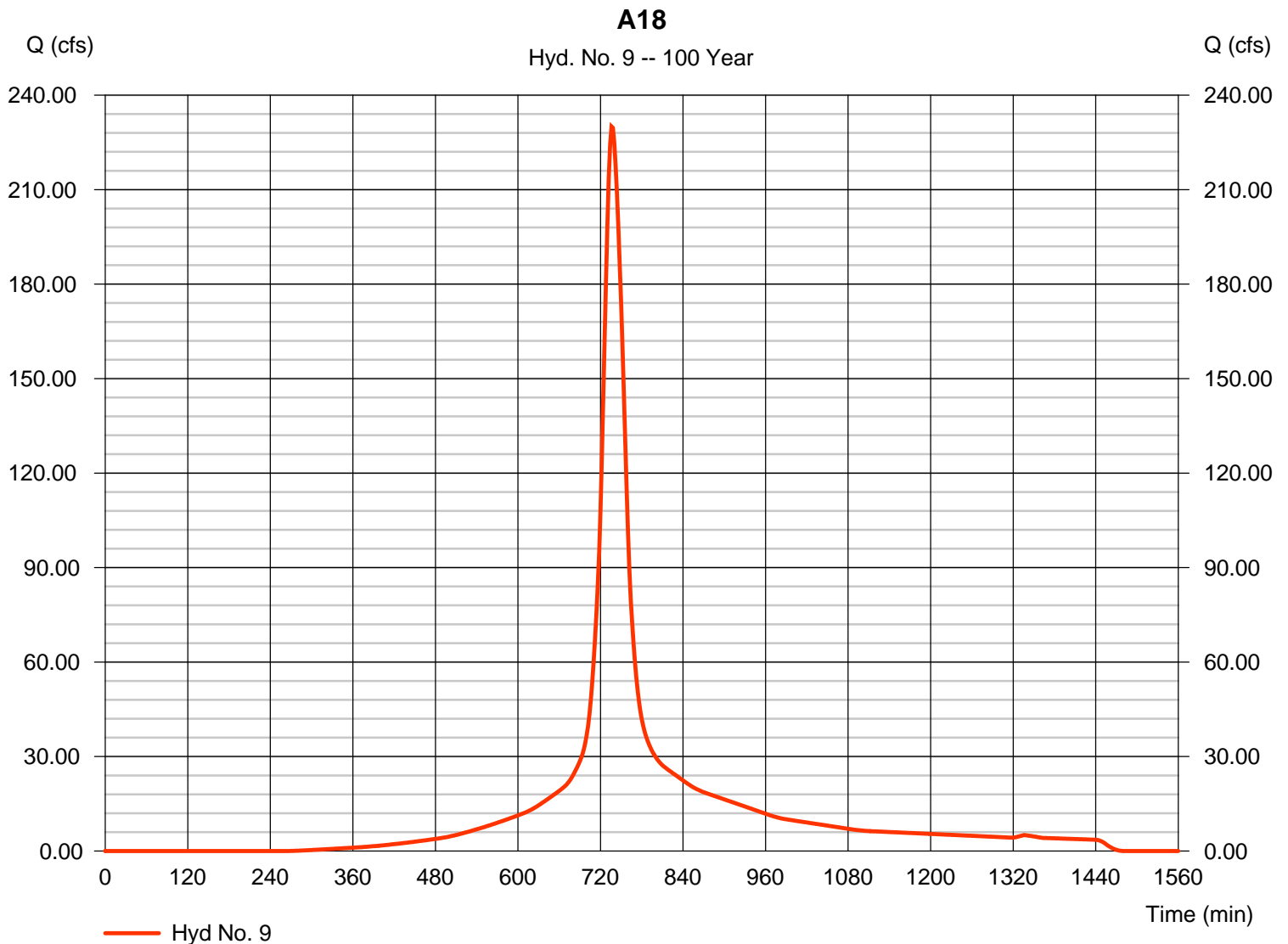
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Tuesday, 06 / 9 / 2020

Hyd. No. 9

A18

Hydrograph type	= SCS Runoff	Peak discharge	= 230.06 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 1,166,107 cuft
Drainage area	= 34.490 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.60 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

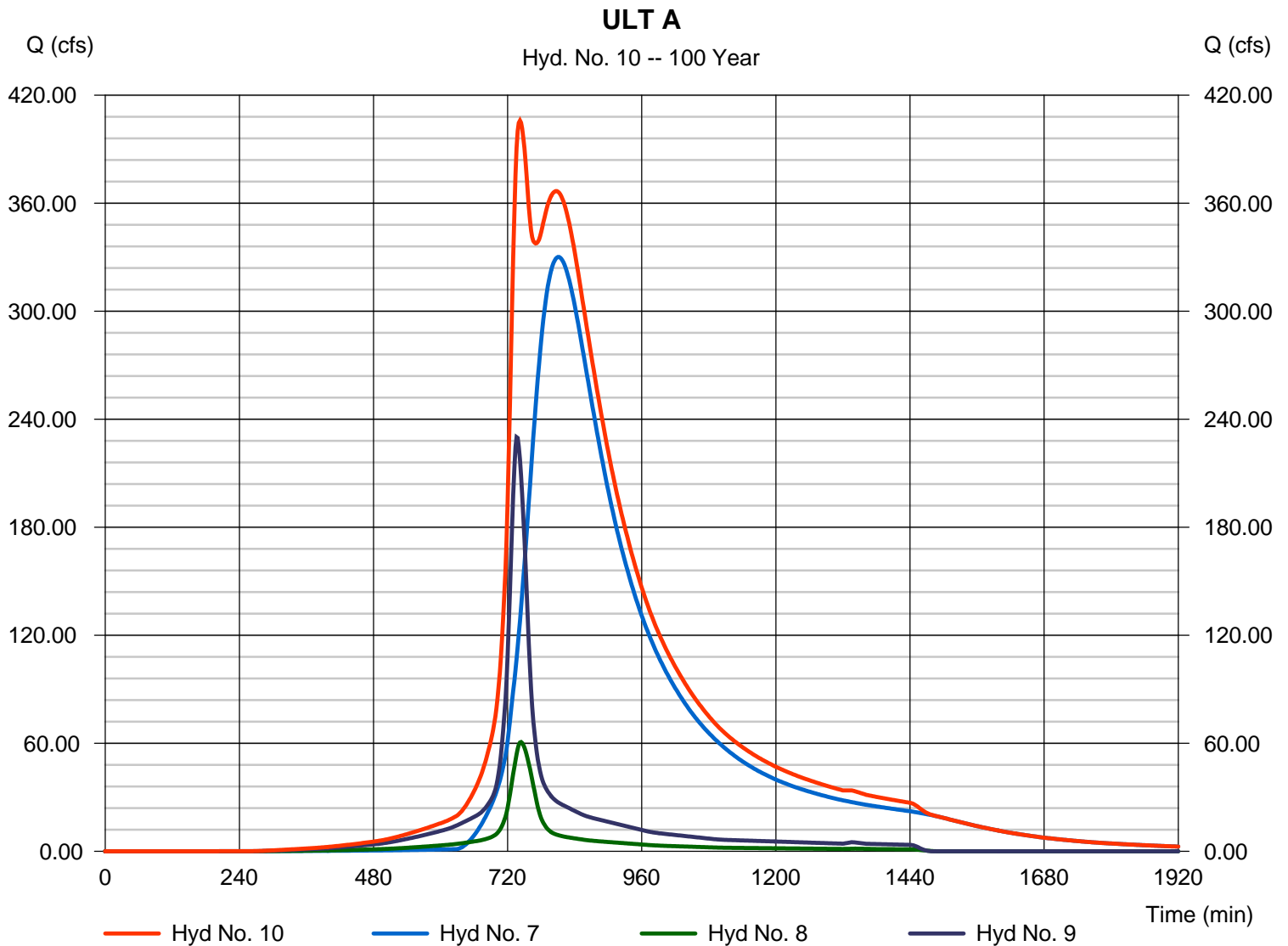
Tuesday, 06 / 9 / 2020

Hyd. No. 10

ULT A

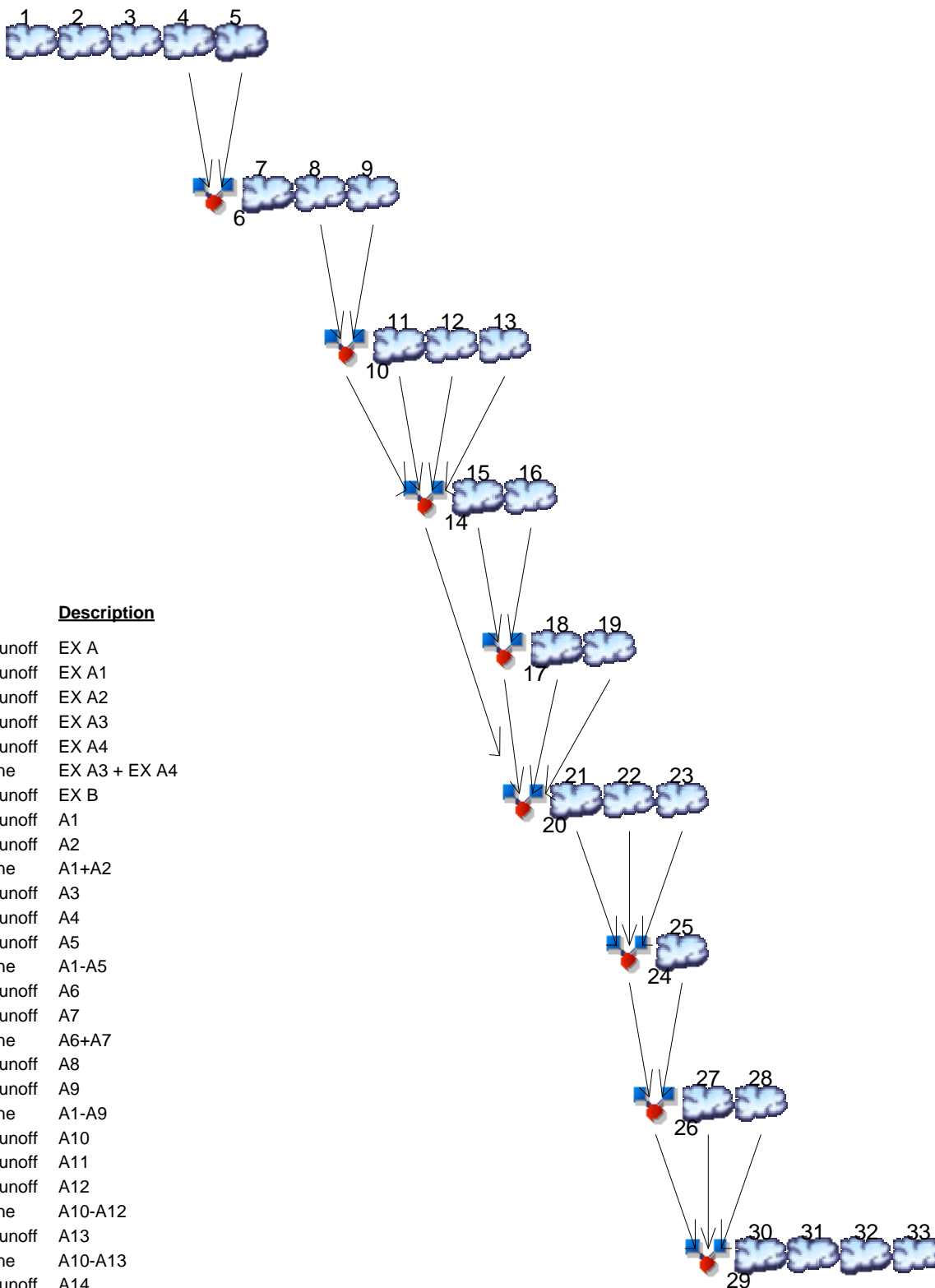
Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 405.86 cfs
 Time to peak = 742 min
 Hyd. volume = 6,660,318 cuft
 Contrib. drain. area = 44.960 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX A
2	SCS Runoff	EX A1
3	SCS Runoff	EX A2
4	SCS Runoff	EX A3
5	SCS Runoff	EX A4
6	Combine	EX A3 + EX A4
7	SCS Runoff	EX B
8	SCS Runoff	A1
9	SCS Runoff	A2
10	Combine	A1+A2
11	SCS Runoff	A3
12	SCS Runoff	A4
13	SCS Runoff	A5
14	Combine	A1-A5
15	SCS Runoff	A6
16	SCS Runoff	A7
17	Combine	A6+A7
18	SCS Runoff	A8
19	SCS Runoff	A9
20	Combine	A1-A9
21	SCS Runoff	A10
22	SCS Runoff	A11
23	SCS Runoff	A12
24	Combine	A10-A12
25	SCS Runoff	A13
26	Combine	A10-A13
27	SCS Runoff	A14
28	SCS Runoff	A15
29	Combine	Contributing to Basin A2
30	SCS Runoff	A16
31	SCS Runoff	A17
32	SCS Runoff	A18
33	SCS Runoff	ULT B

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	68.65	2	786	836,647	-----	-----	-----	EX A
2	SCS Runoff	13.05	2	764	126,460	-----	-----	-----	EX A1
3	SCS Runoff	6.615	2	754	51,971	-----	-----	-----	EX A2
4	SCS Runoff	37.32	2	762	342,748	-----	-----	-----	EX A3
5	SCS Runoff	17.67	2	792	251,123	-----	-----	-----	EX A4
6	Combine	52.45	2	770	593,871	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	39.90	2	774	453,353	-----	-----	-----	EX B
8	SCS Runoff	60.20	2	748	437,619	-----	-----	-----	A1
9	SCS Runoff	8.474	2	740	50,806	-----	-----	-----	A2
10	Combine	68.32	2	748	488,425	8, 9	-----	-----	A1+A2
11	SCS Runoff	9.470	2	740	56,779	-----	-----	-----	A3
12	SCS Runoff	5.497	2	740	32,961	-----	-----	-----	A4
13	SCS Runoff	7.404	2	740	44,391	-----	-----	-----	A5
14	Combine	90.08	2	746	622,557	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	9.214	2	734	47,694	-----	-----	-----	A6
16	SCS Runoff	7.605	2	734	39,367	-----	-----	-----	A7
17	Combine	16.82	2	734	87,061	15, 16	-----	-----	A6+A7
18	SCS Runoff	4.255	2	740	25,514	-----	-----	-----	A8
19	SCS Runoff	16.46	2	730	76,049	-----	-----	-----	A9
20	Combine	122.58	2	742	811,180	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	1.972	2	738	11,035	-----	-----	-----	A10
22	SCS Runoff	8.952	2	744	57,183	-----	-----	-----	A11
23	SCS Runoff	7.613	2	740	45,644	-----	-----	-----	A12
24	Combine	18.48	2	742	113,862	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	4.391	2	740	26,325	-----	-----	-----	A13
26	Combine	22.86	2	742	140,187	24, 25	-----	-----	A10-A13
27	SCS Runoff	7.723	2	740	46,308	-----	-----	-----	A14
28	SCS Runoff	7.280	2	730	33,637	-----	-----	-----	A15
29	Combine	36.97	2	738	220,132	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	3.064	2	732	14,202	-----	-----	-----	A16
31	SCS Runoff	6.615	2	754	51,971	-----	-----	-----	A17
32	SCS Runoff	26.11	2	746	170,291	-----	-----	-----	A18
33	SCS Runoff	63.47	2	746	436,762	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 2 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

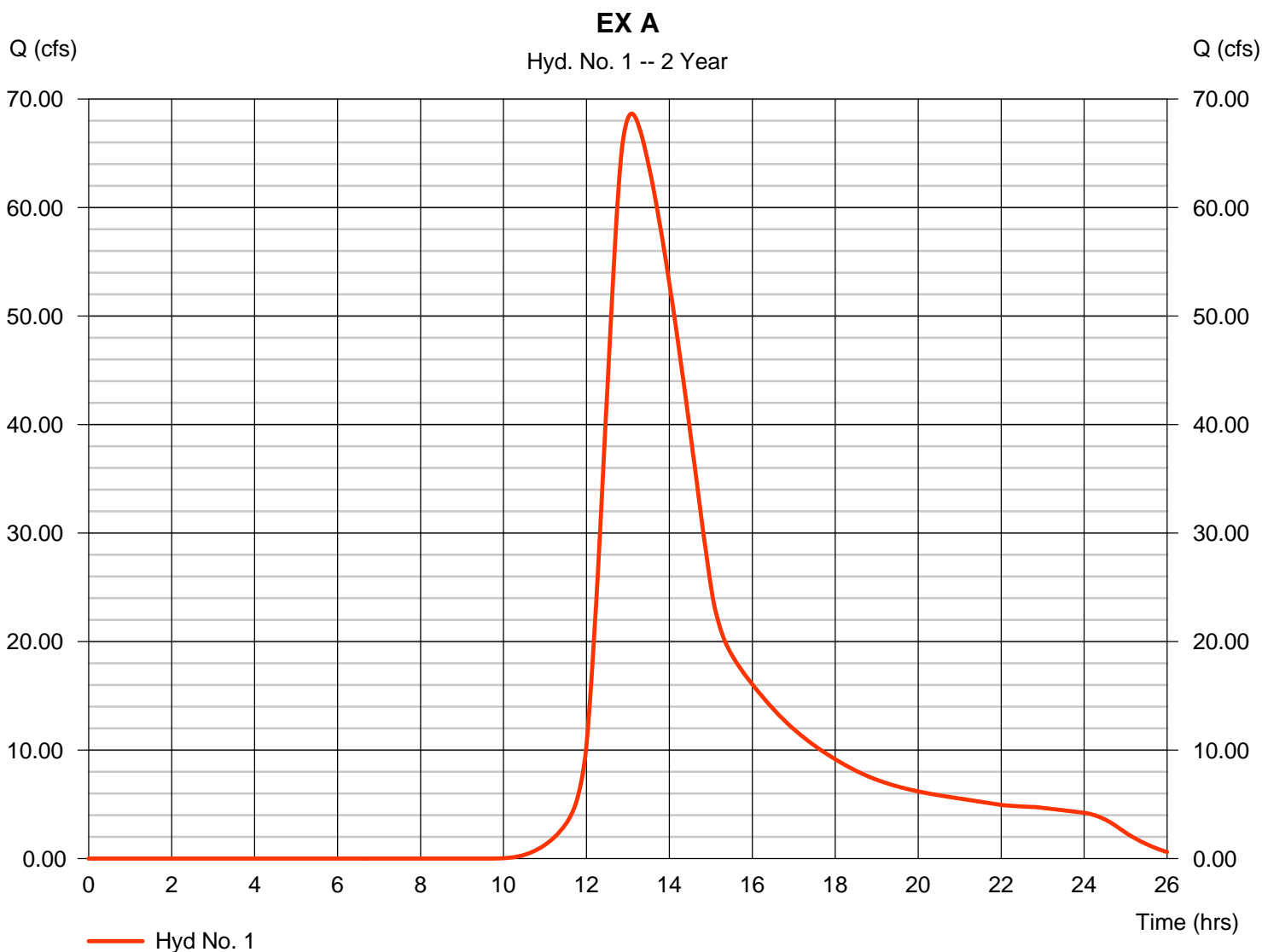
Wednesday, 07 / 15 / 2020

Hyd. No. 1

EX A

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 167.740 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 68.65 cfs
 Time to peak = 13.10 hrs
 Hyd. volume = 836,647 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 83.60 min
 Distribution = Type III
 Shape factor = 350



Hydrograph Report

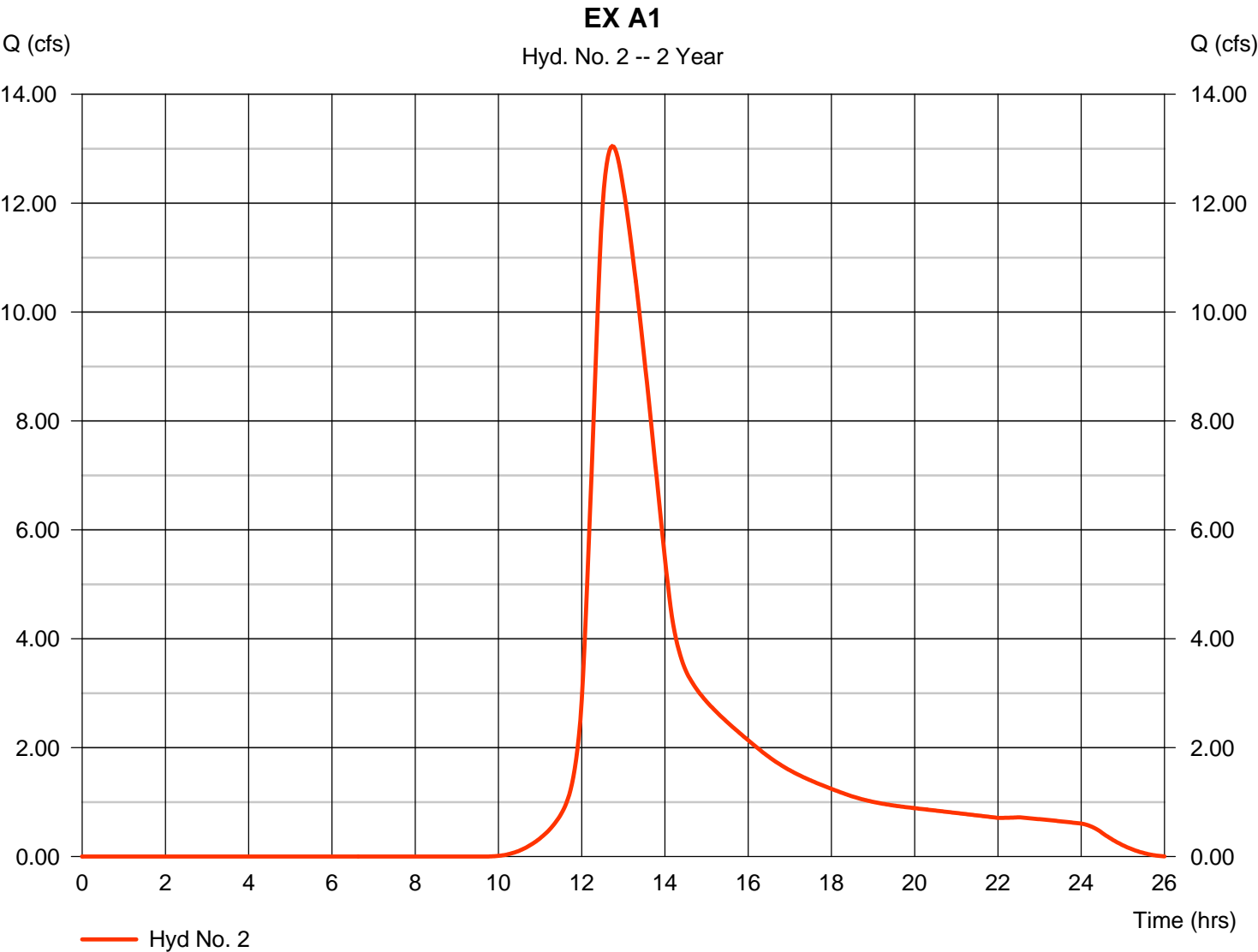
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type	= SCS Runoff	Peak discharge	= 13.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 126,460 cuft
Drainage area	= 25.120 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 49.70 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

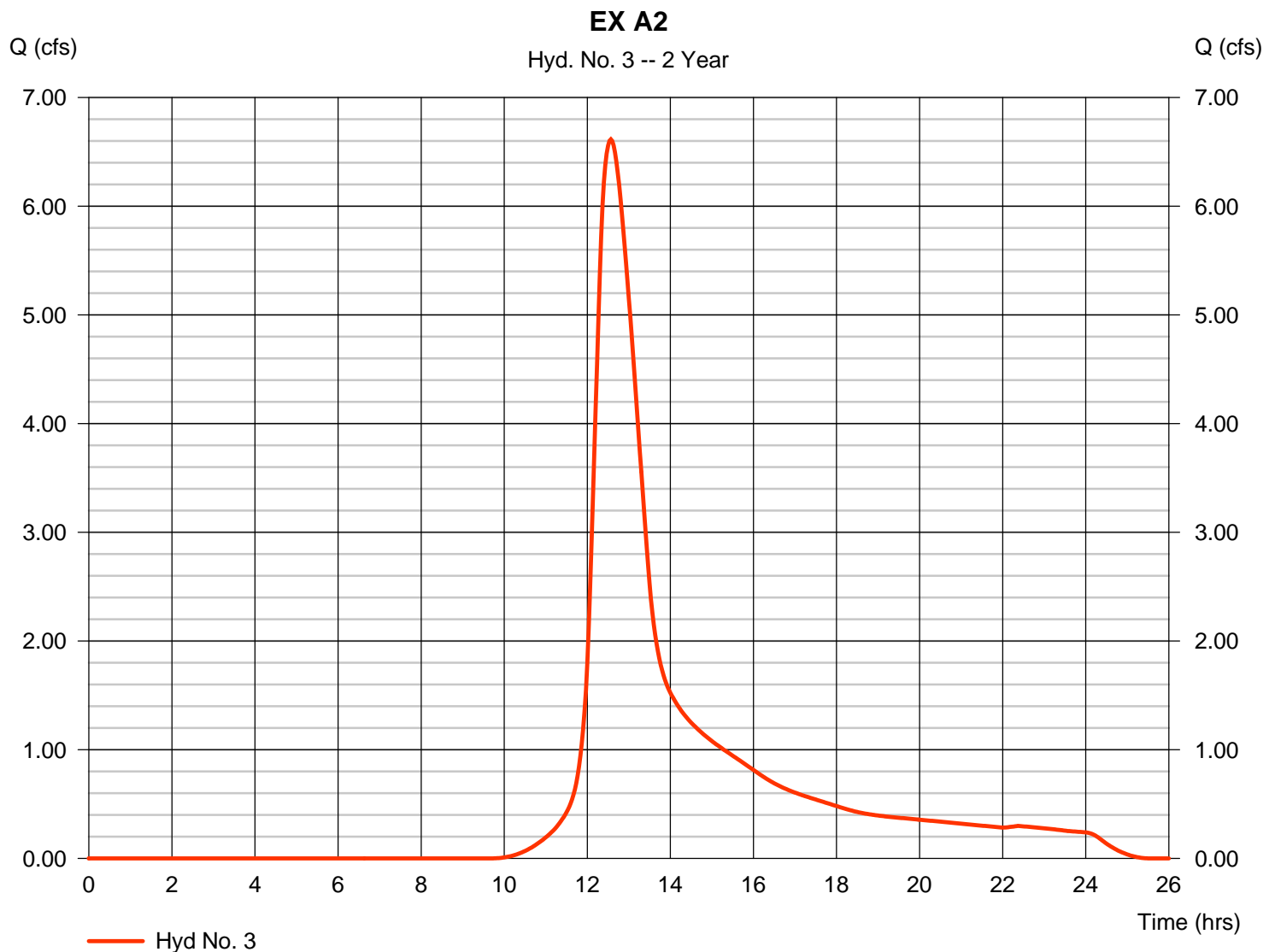
Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 6.615 cfs
 Time to peak = 12.57 hrs
 Hyd. volume = 51,971 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

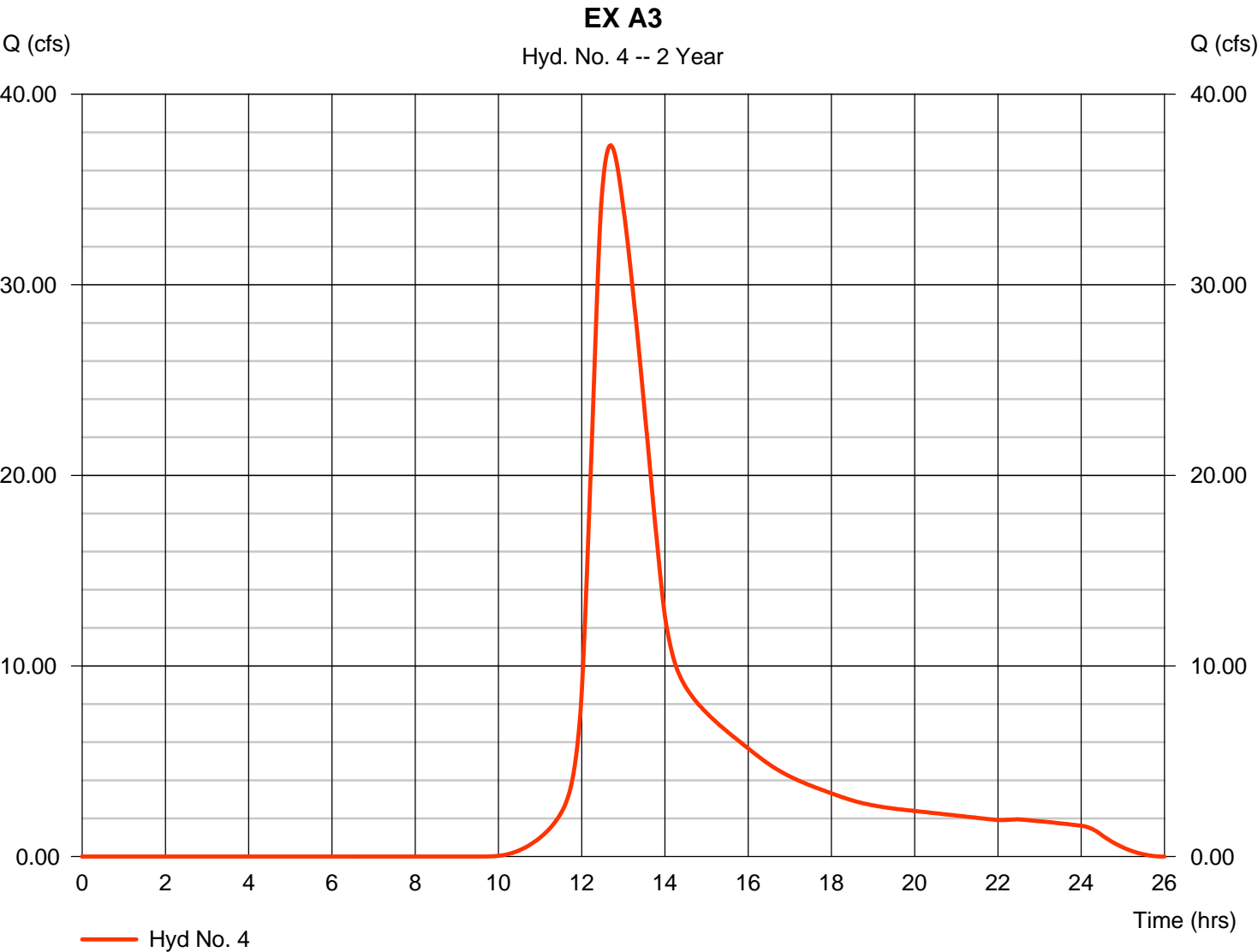
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 37.32 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 342,748 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

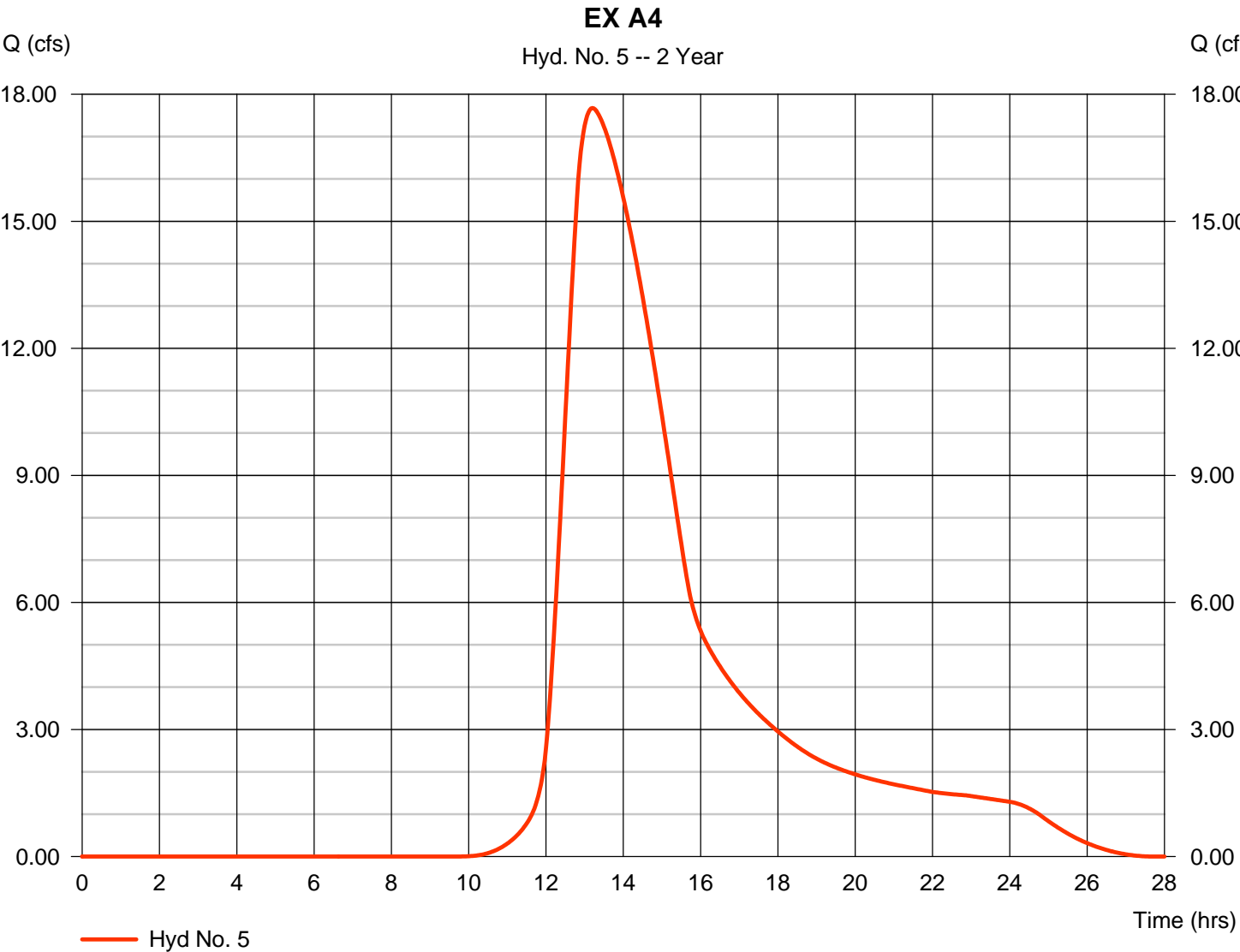
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type	= SCS Runoff	Peak discharge	= 17.67 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.20 hrs
Time interval	= 2 min	Hyd. volume	= 251,123 cuft
Drainage area	= 50.180 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 87.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

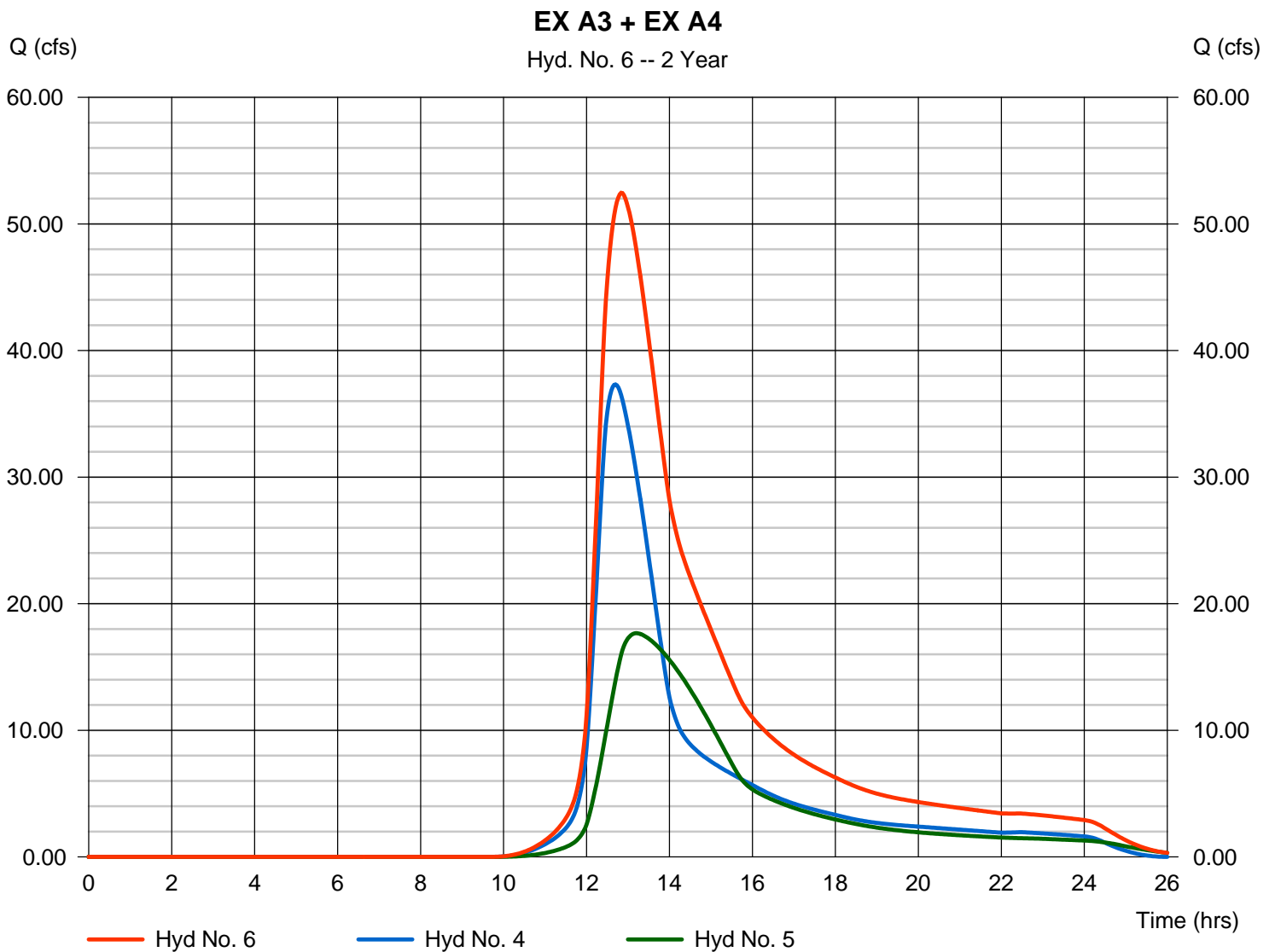
Wednesday, 07 / 15 / 2020

Hyd. No. 6

EX A3 + EX A4

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 52.45 cfs
Time to peak = 12.83 hrs
Hyd. volume = 593,871 cuft
Contrib. drain. area = 119.020 ac



Hydrograph Report

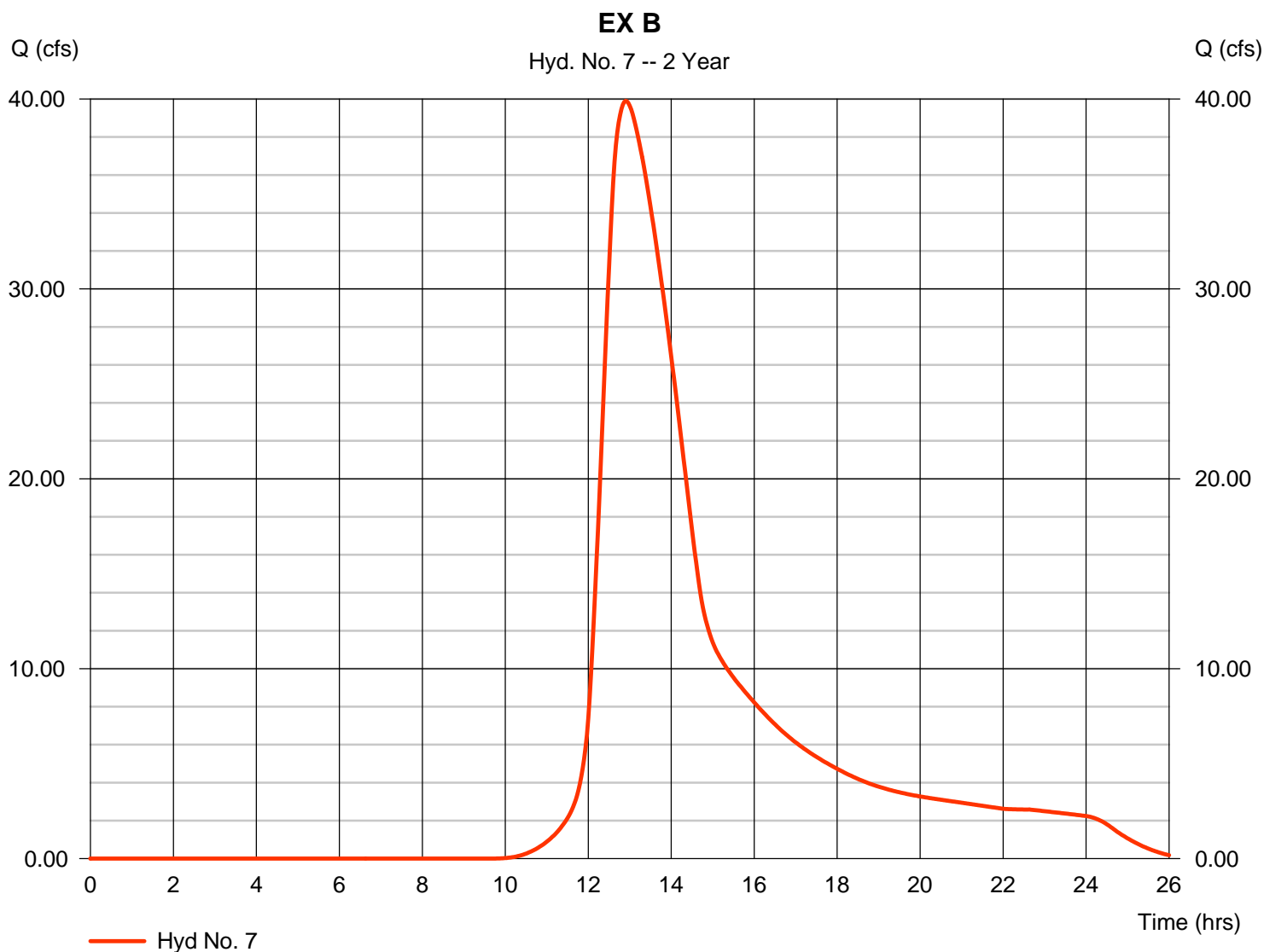
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 39.90 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.90 hrs
Time interval	= 2 min	Hyd. volume	= 453,353 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

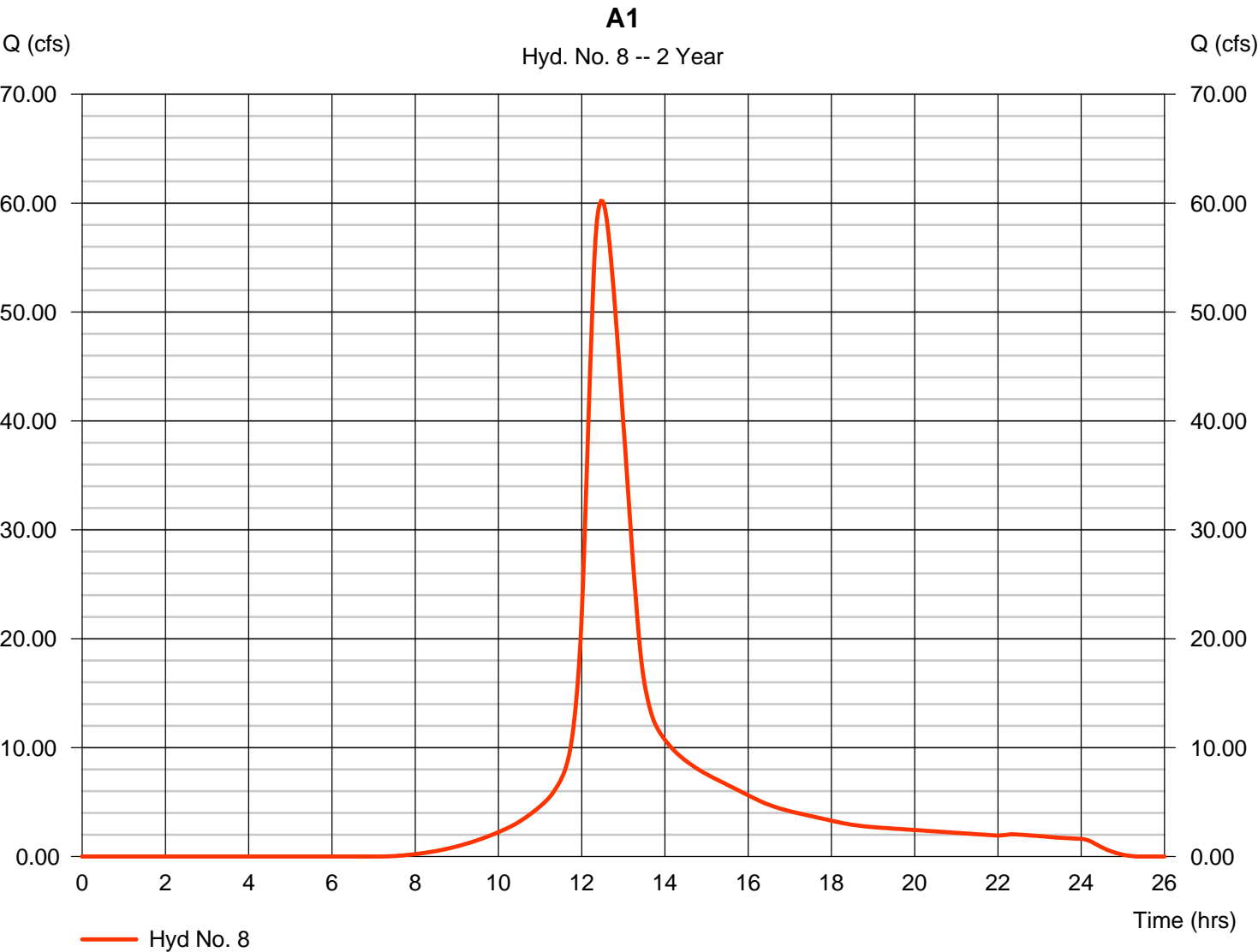
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 60.20 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 437,619 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

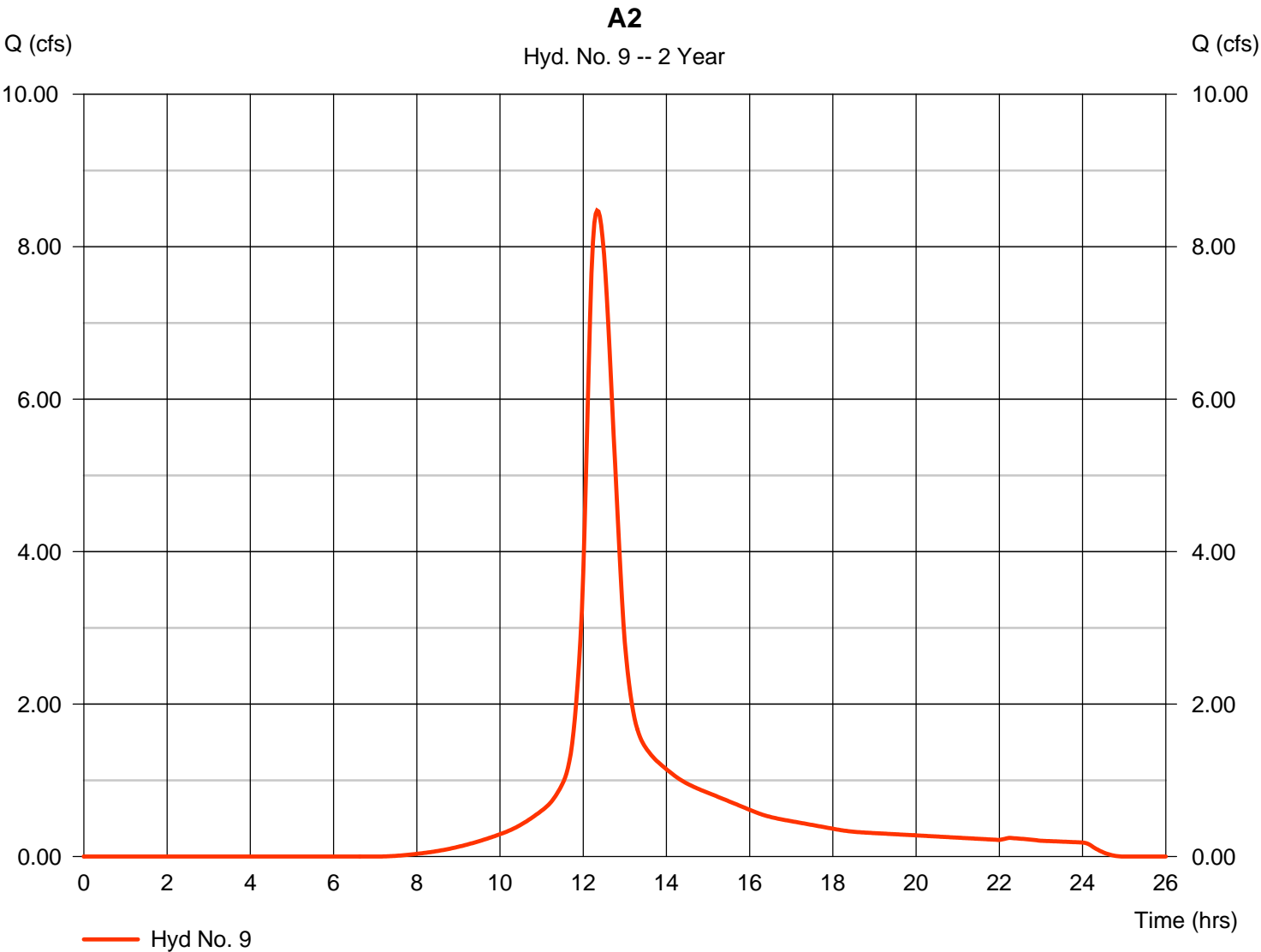
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 9

A2

Hydrograph type	= SCS Runoff	Peak discharge	= 8.474 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 50,806 cuft
Drainage area	= 6.890 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.50 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

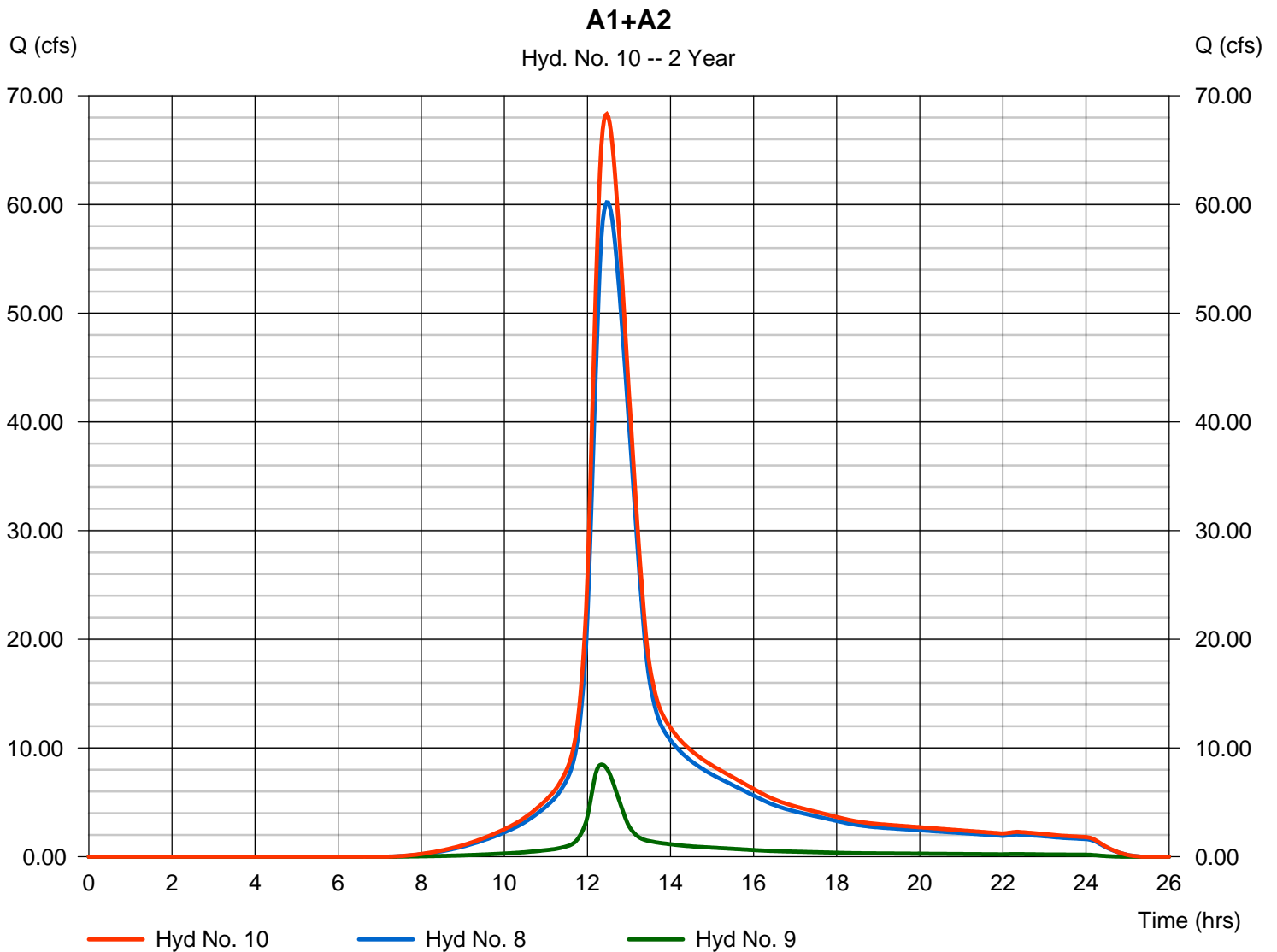
Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 8, 9

Peak discharge = 68.32 cfs
Time to peak = 12.47 hrs
Hyd. volume = 488,425 cuft
Contrib. drain. area = 66.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

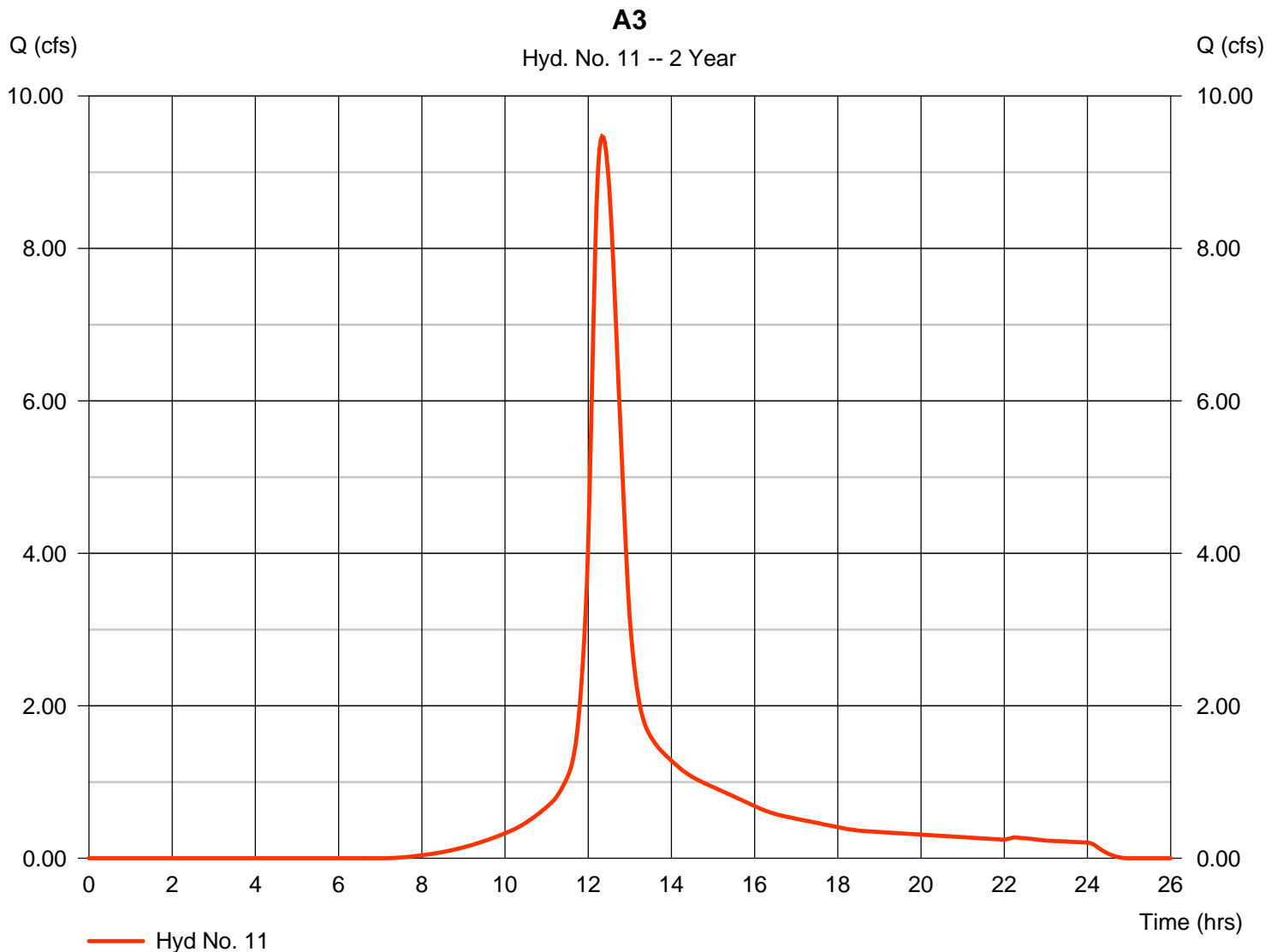
Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 7.700 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 9.470 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 56,779 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

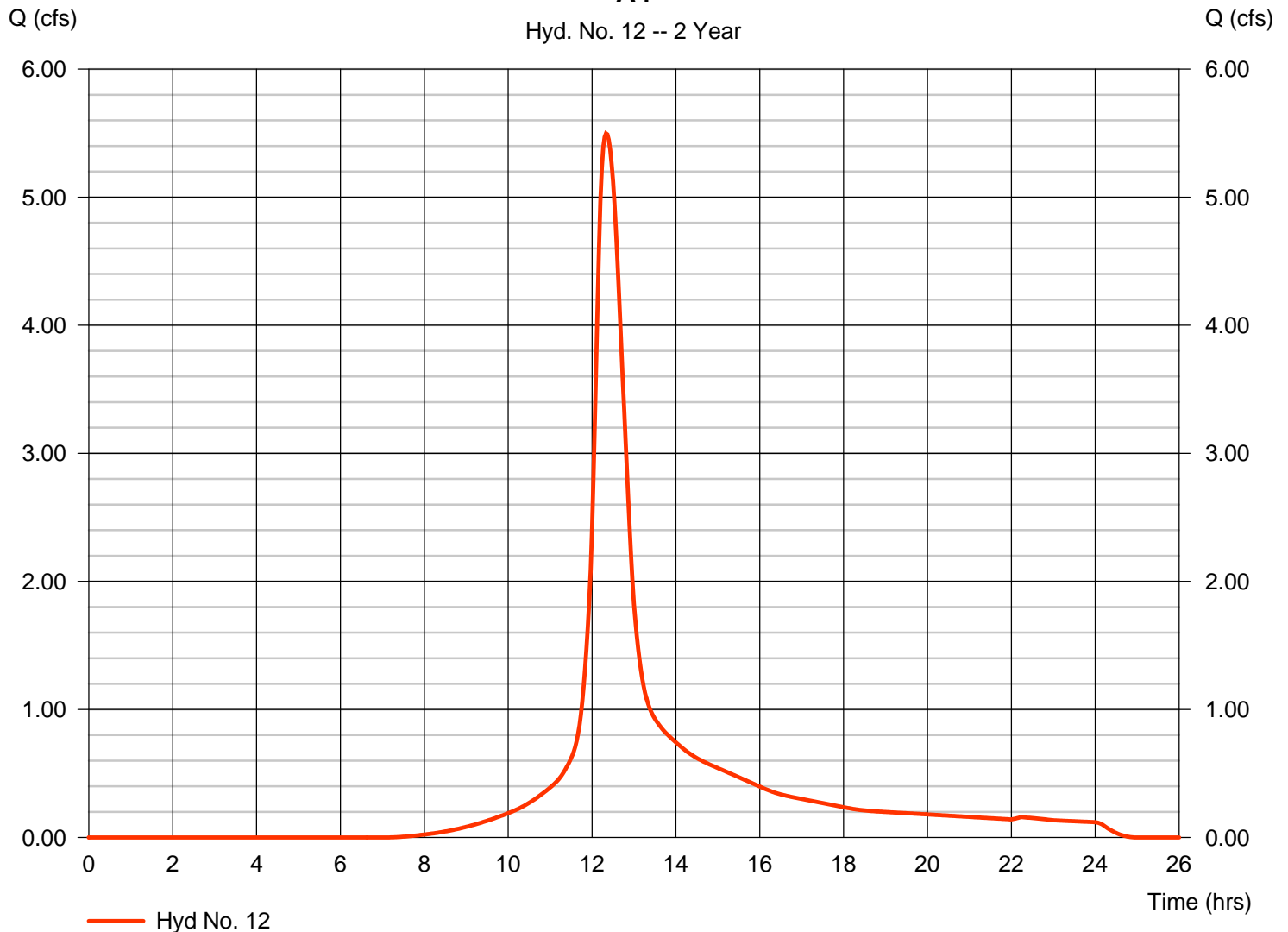
Hyd. No. 12

A4

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 4.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 5.497 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 32,961 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.70 min
 Distribution = Type III
 Shape factor = 300

A4



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

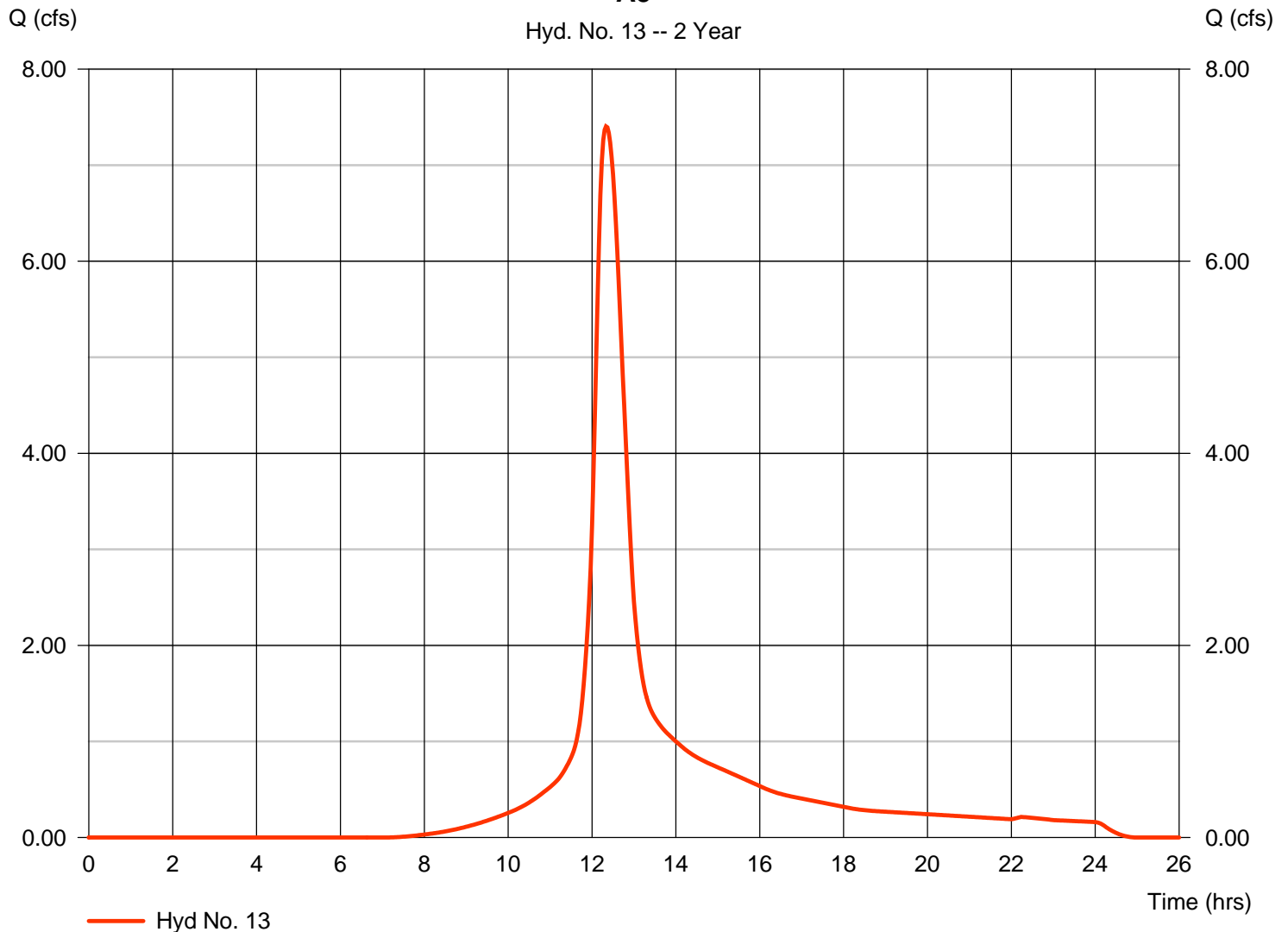
Hyd. No. 13

A5

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 6.020 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 7.404 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 44,391 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 20.60 min
 Distribution = Type III
 Shape factor = 300

A5



Hydrograph Report

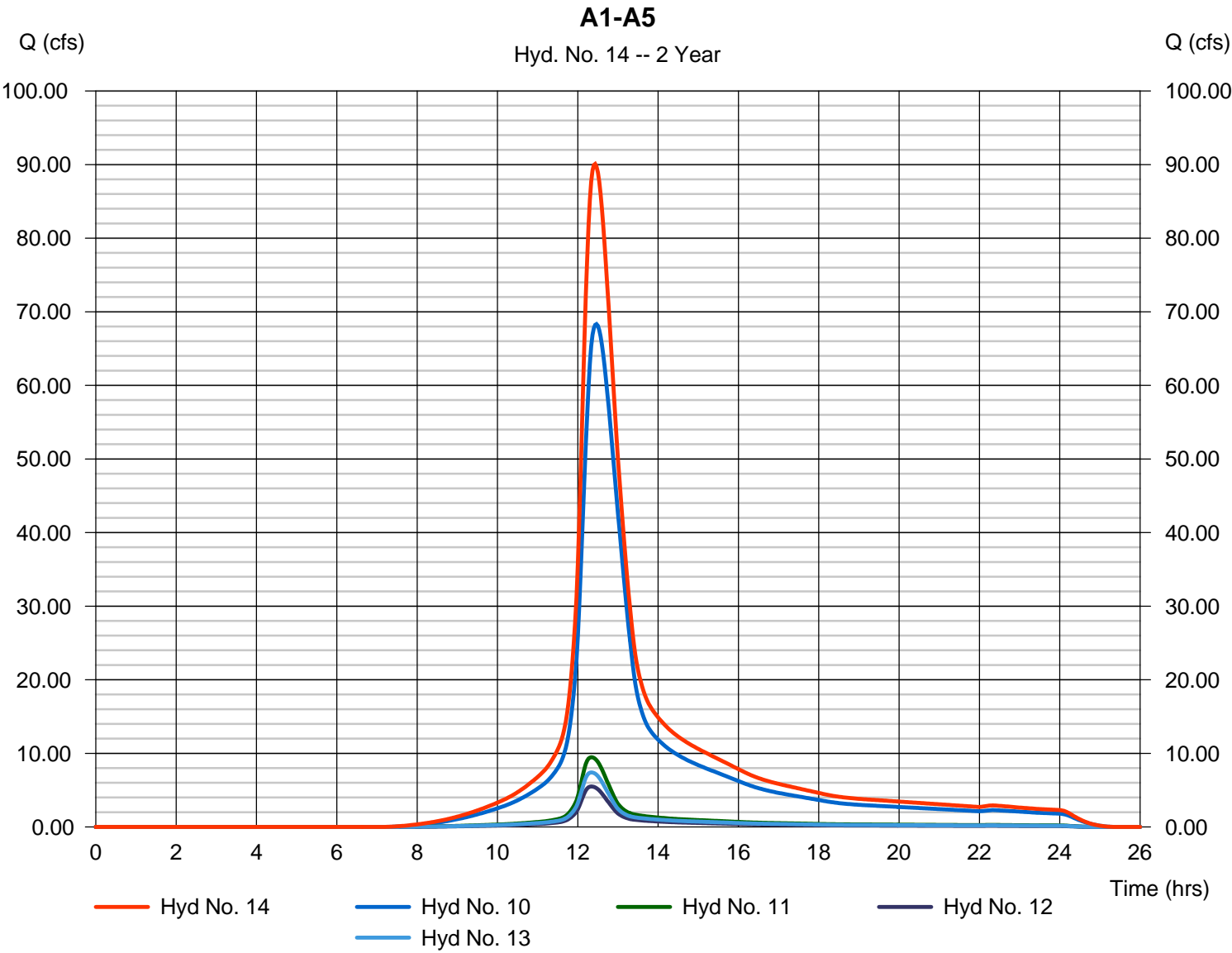
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type	= Combine	Peak discharge	= 90.08 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 622,557 cuft
Inflow hyds.	= 10, 11, 12, 13	Contrib. drain. area	= 18.190 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

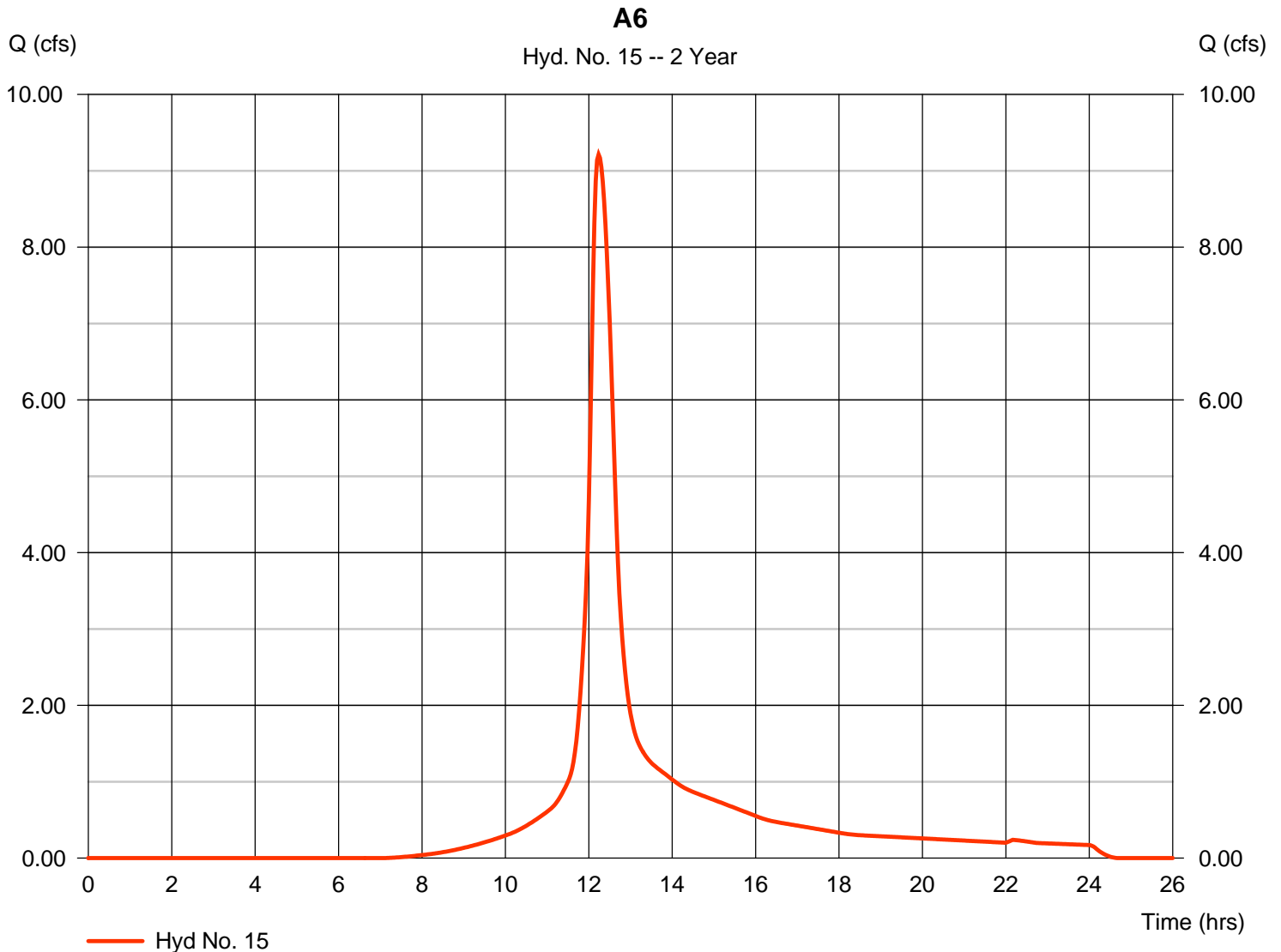
Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 6.300 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 9.214 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 47,694 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

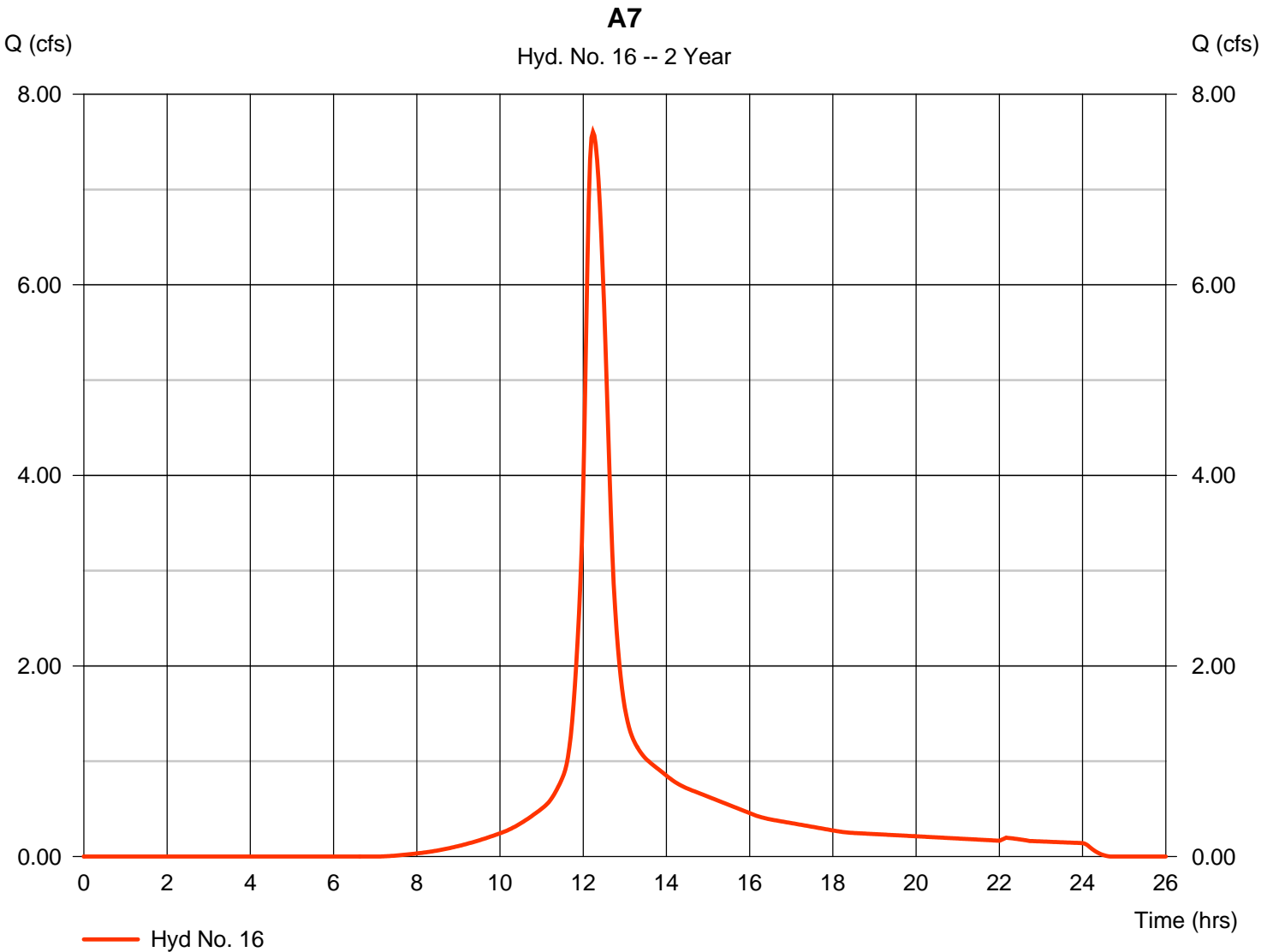
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type	= SCS Runoff	Peak discharge	= 7.605 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 39,367 cuft
Drainage area	= 5.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.70 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

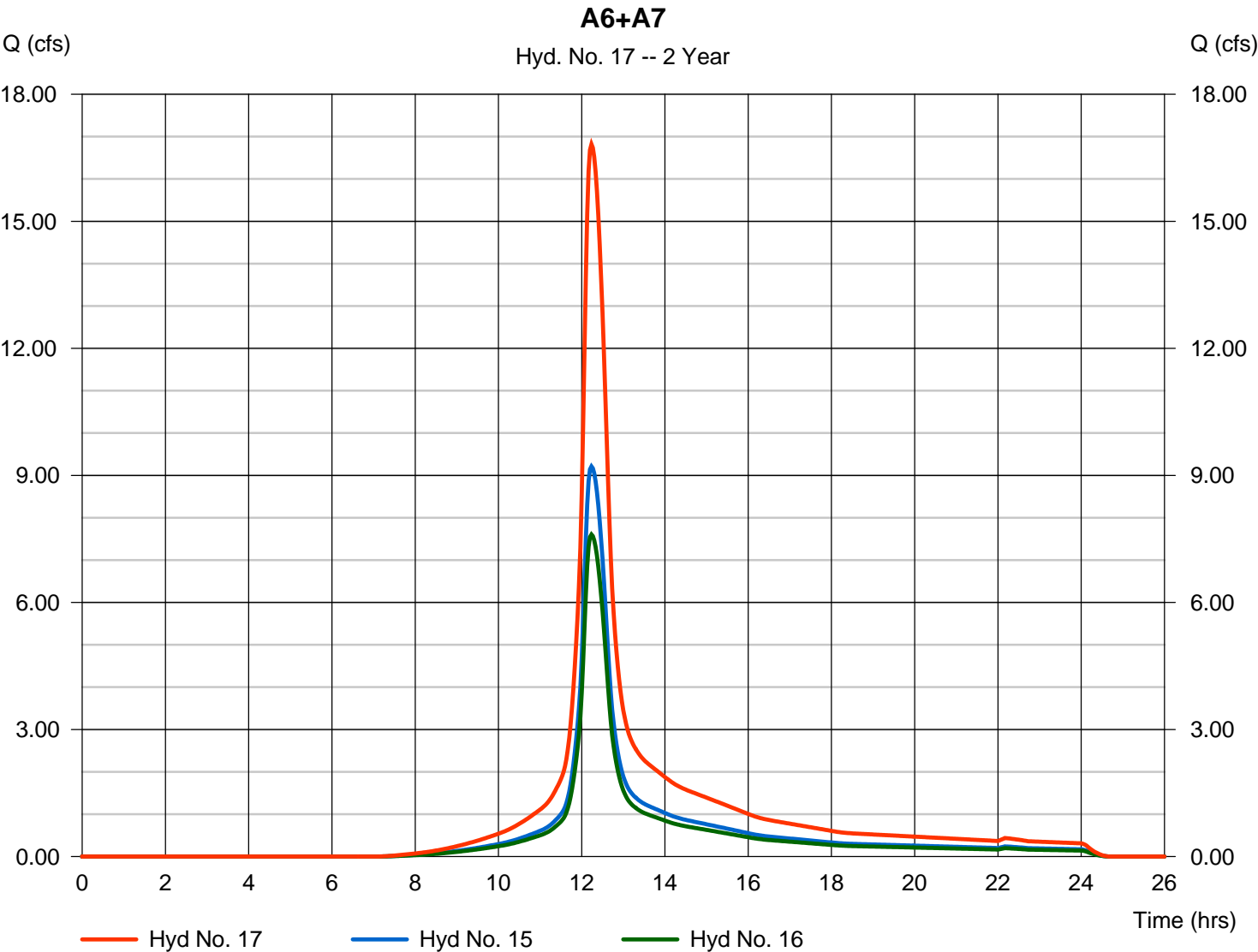
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type	= Combine	Peak discharge	= 16.82 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 87,061 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 11.500 ac



Hydrograph Report

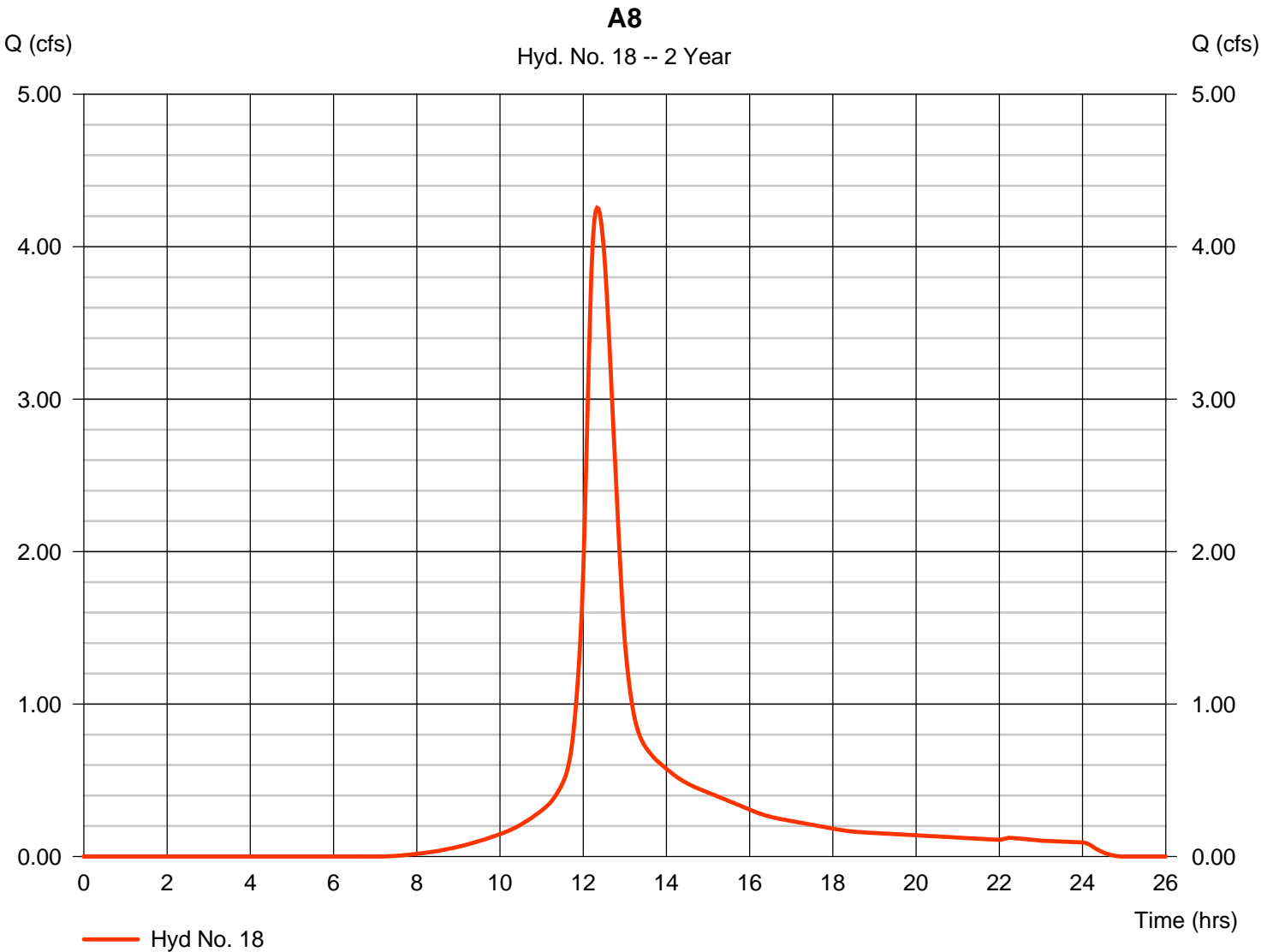
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type	= SCS Runoff	Peak discharge	= 4.255 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 25,514 cuft
Drainage area	= 3.460 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.40 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

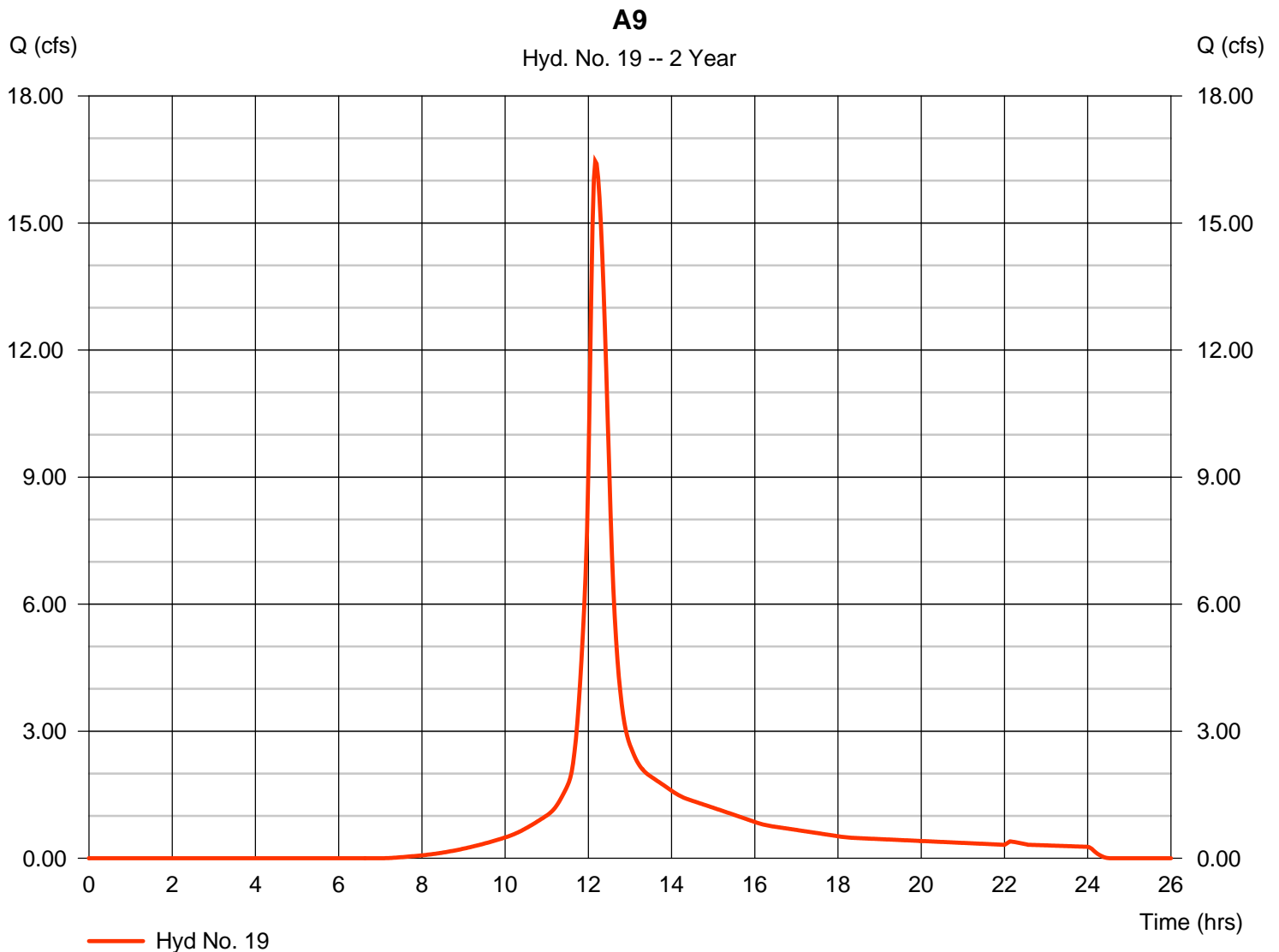
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Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type	= SCS Runoff	Peak discharge	= 16.46 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 76,049 cuft
Drainage area	= 10.400 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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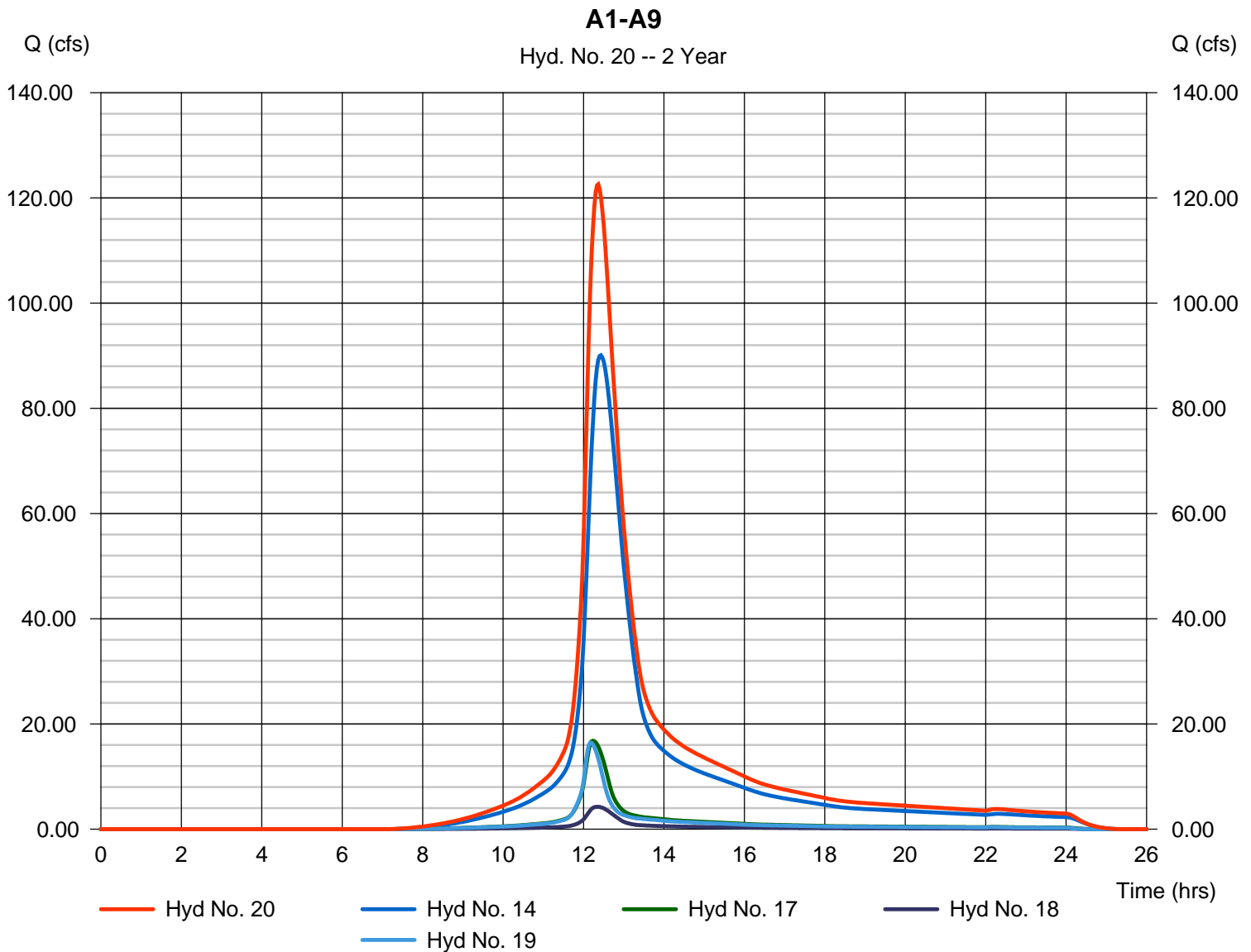
Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 14, 17, 18, 19

Peak discharge = 122.58 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 811,180 cuft
 Contrib. drain. area = 13.860 ac



Hydrograph Report

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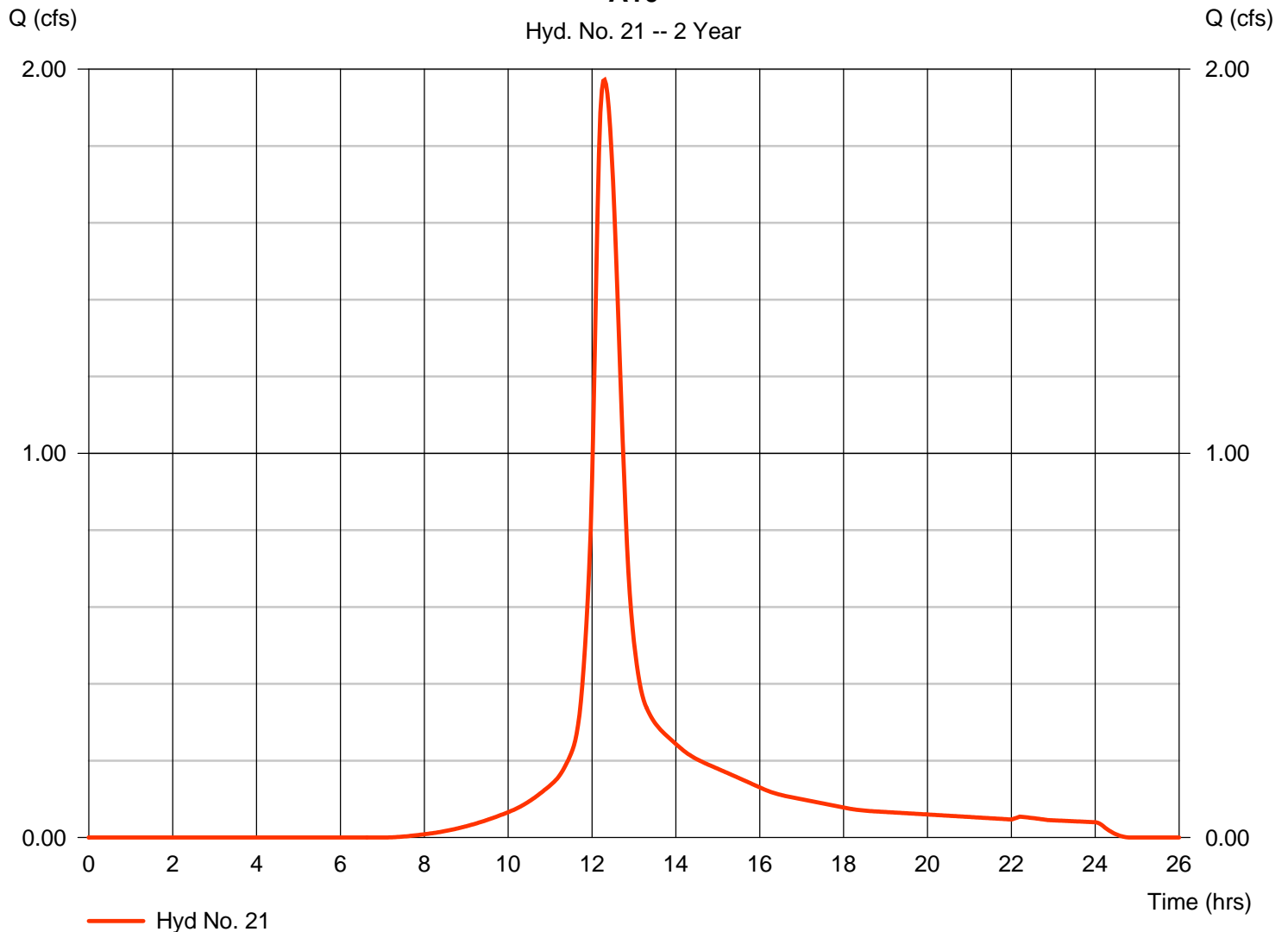
Wednesday, 07 / 15 / 2020

Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 1.972 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 11,035 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A10



Hydrograph Report

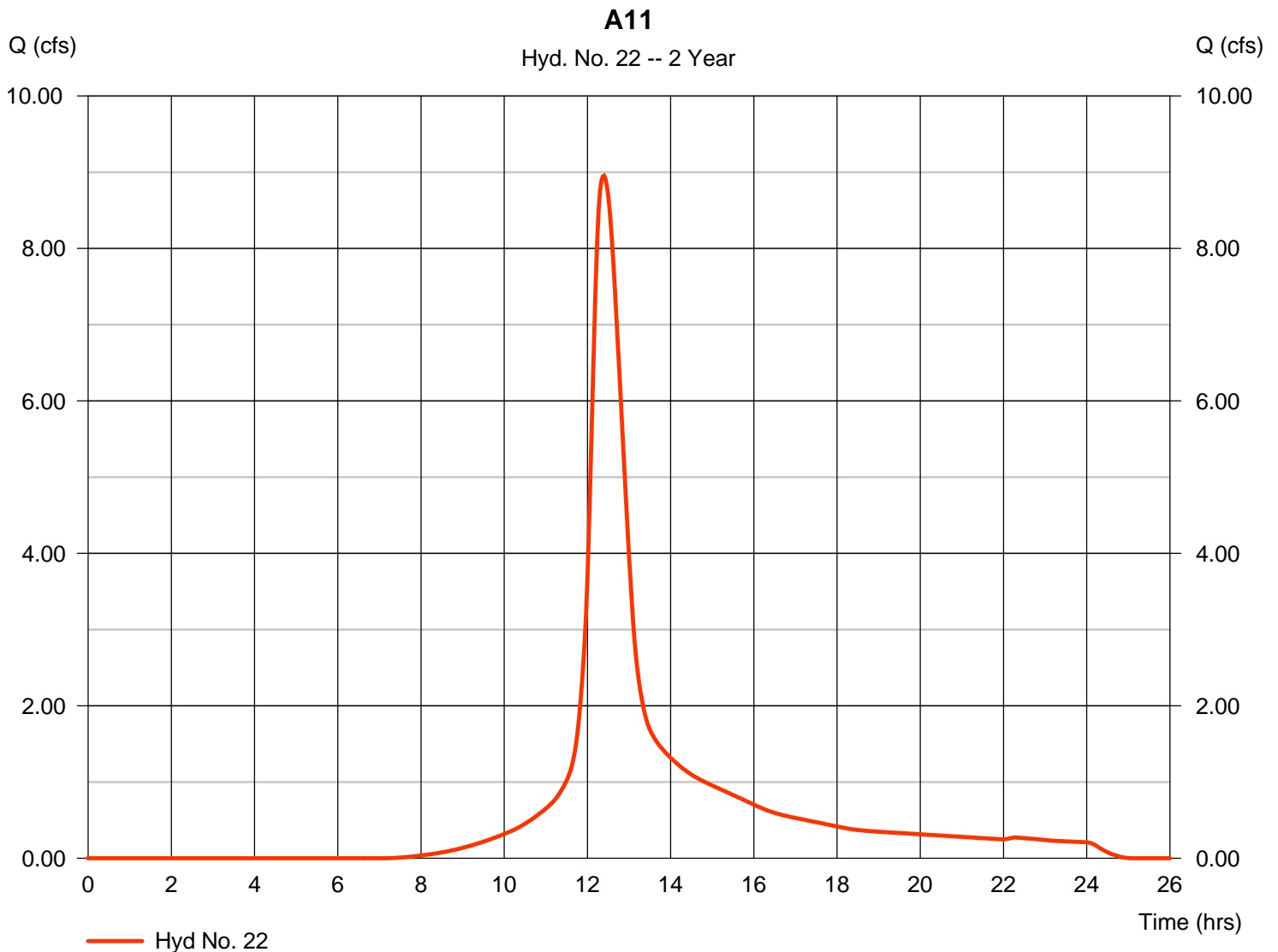
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type	= SCS Runoff	Peak discharge	= 8.952 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 57,183 cuft
Drainage area	= 7.820 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

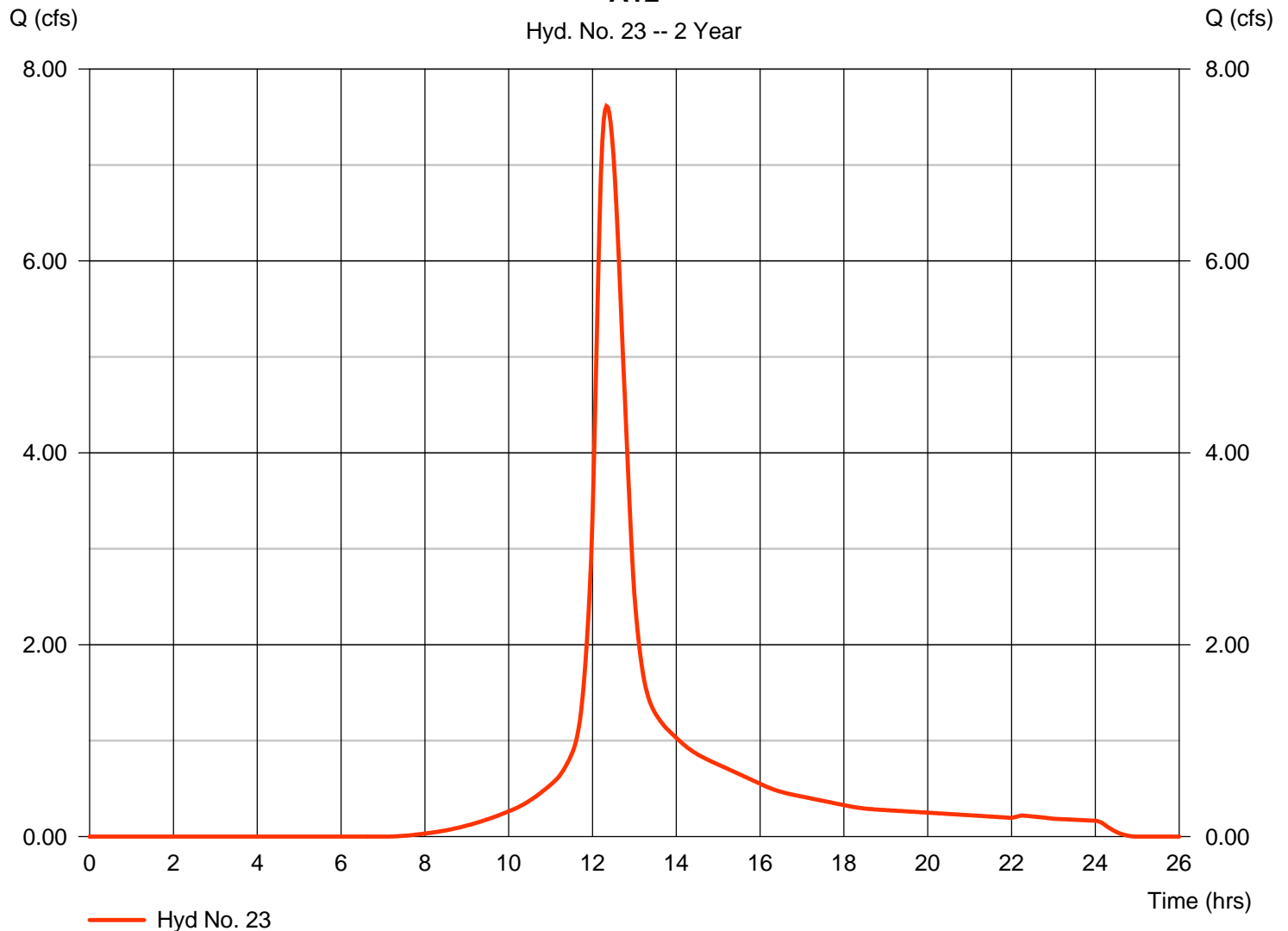
Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type	= SCS Runoff	Peak discharge	= 7.613 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 45,644 cuft
Drainage area	= 6.190 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.50 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A12



Hydrograph Report

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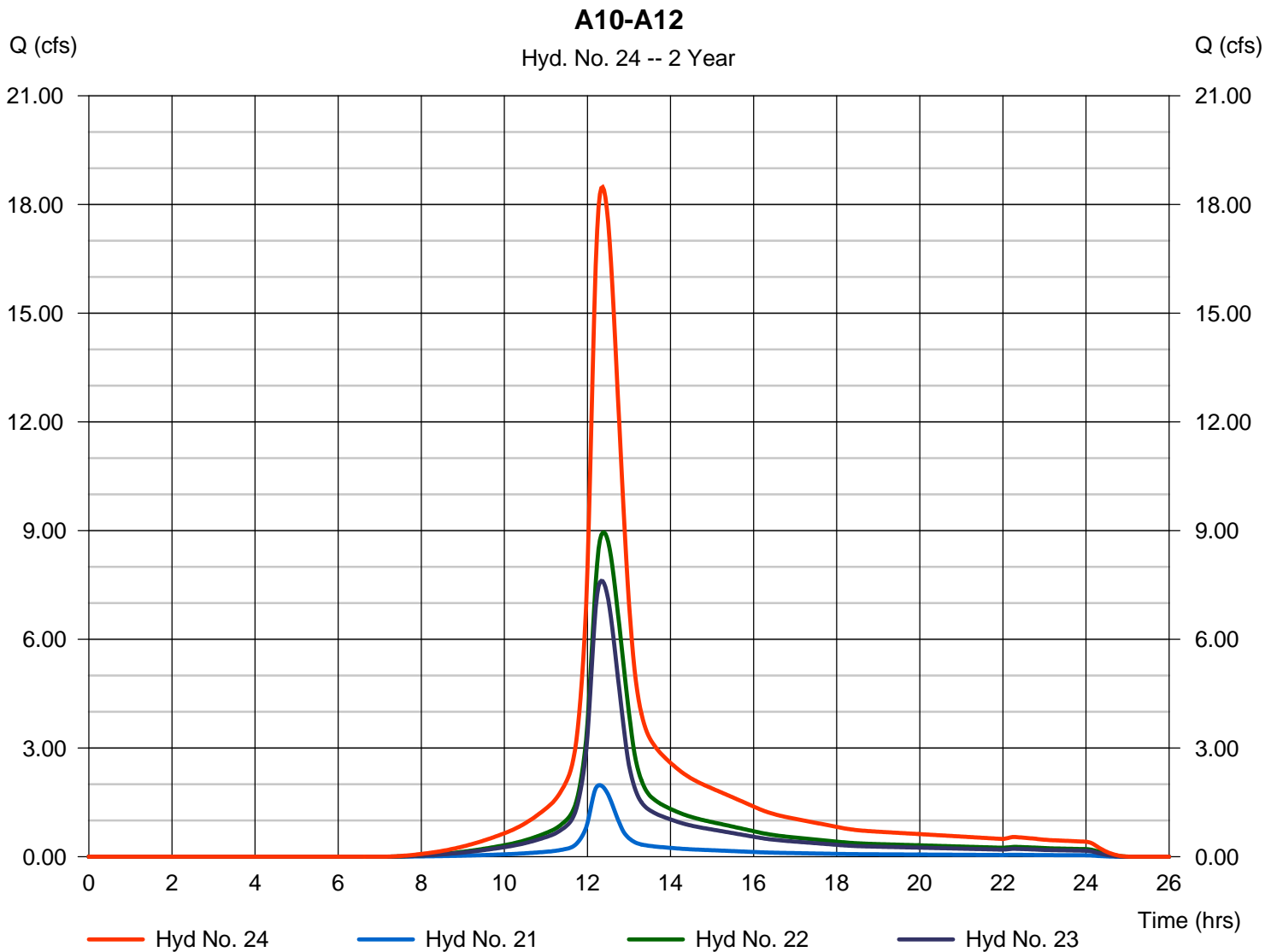
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 21, 22, 23

Peak discharge = 18.48 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 113,862 cuft
 Contrib. drain. area = 15.490 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

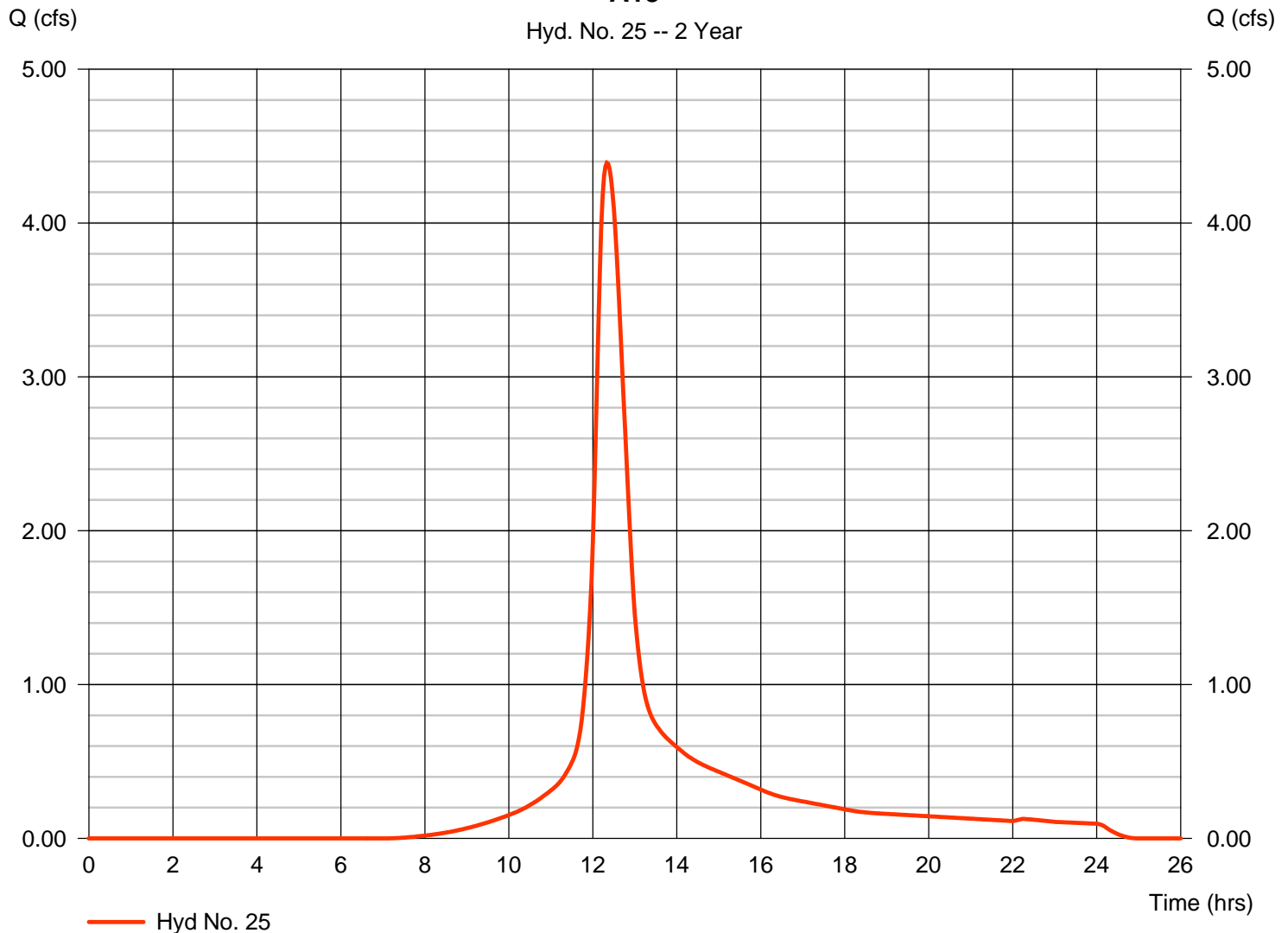
Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type	= SCS Runoff	Peak discharge	= 4.391 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 26,325 cuft
Drainage area	= 3.570 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.80 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A13



Hydrograph Report

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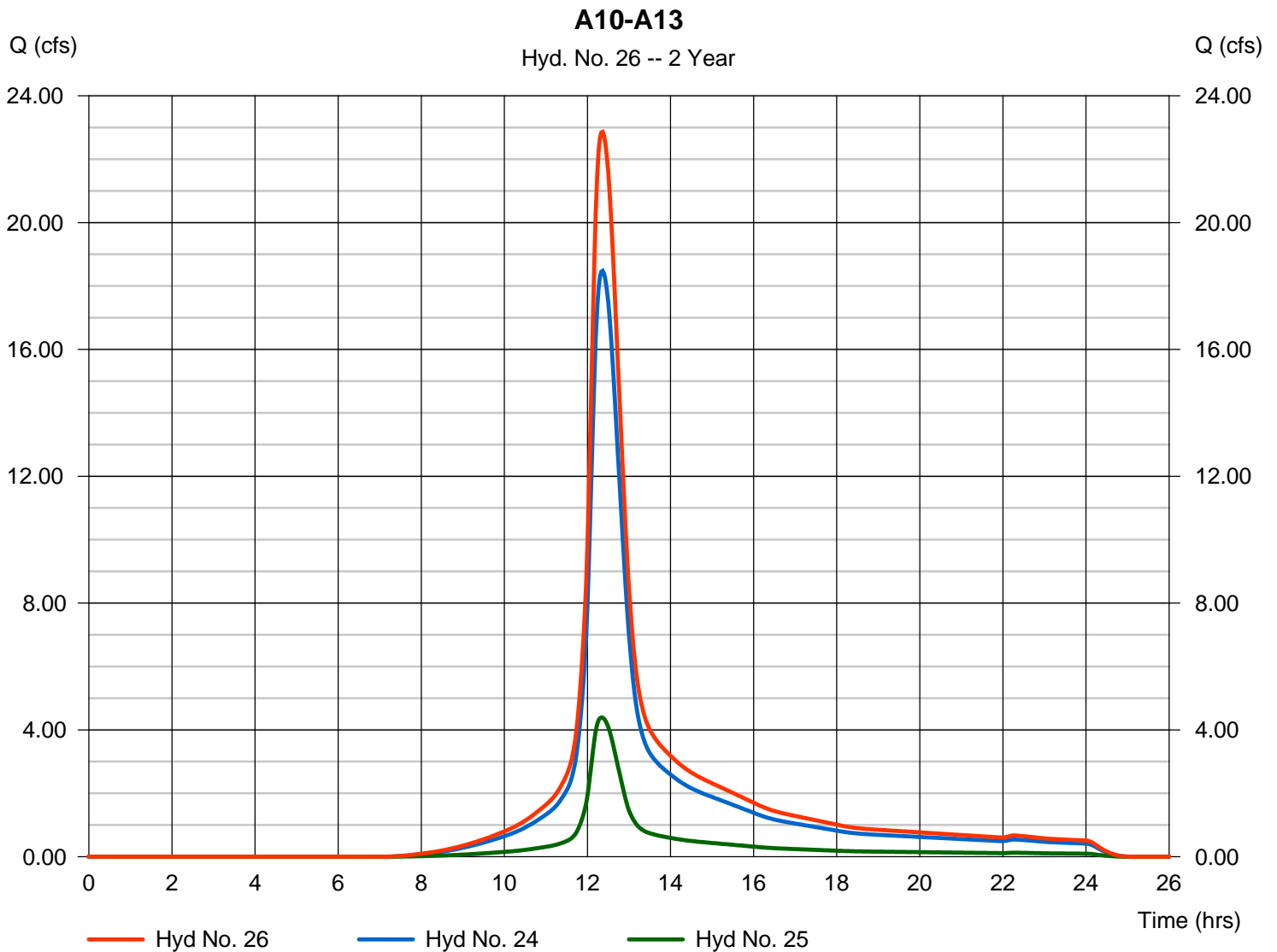
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 24, 25

Peak discharge = 22.86 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 140,187 cuft
 Contrib. drain. area = 3.570 ac



Hydrograph Report

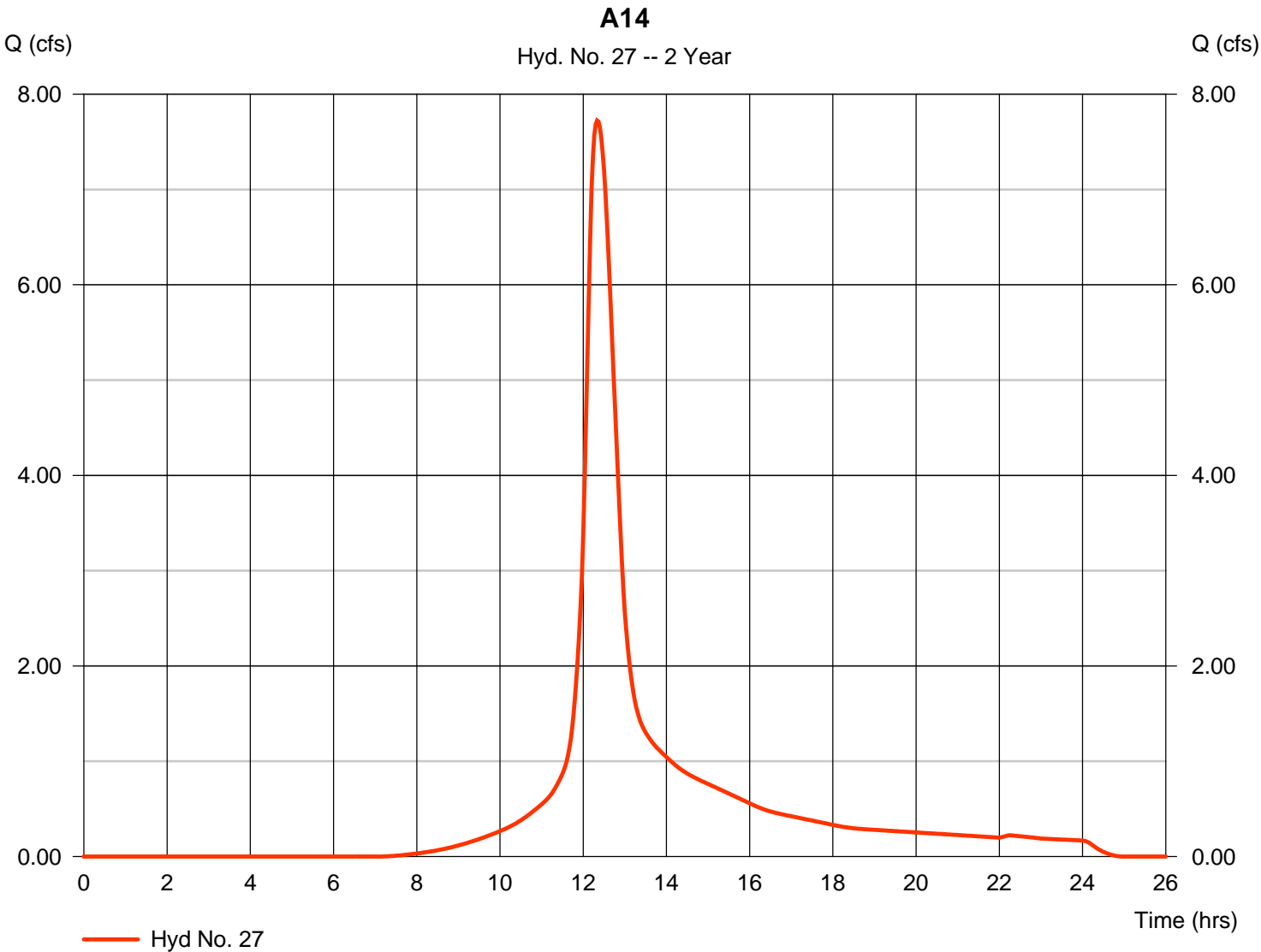
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type	= SCS Runoff	Peak discharge	= 7.723 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 46,308 cuft
Drainage area	= 6.280 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

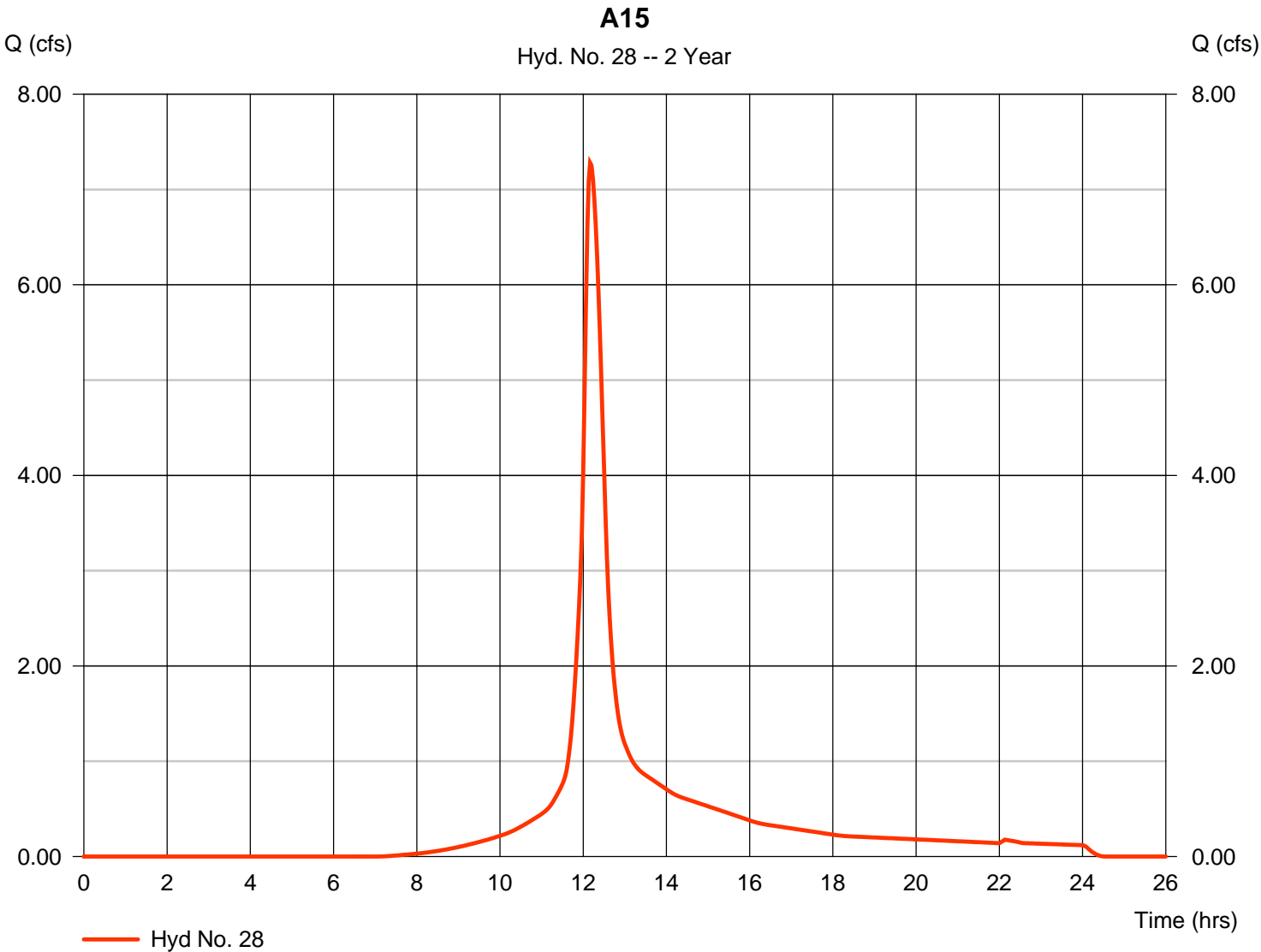
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type	= SCS Runoff	Peak discharge	= 7.280 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 33,637 cuft
Drainage area	= 4.600 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

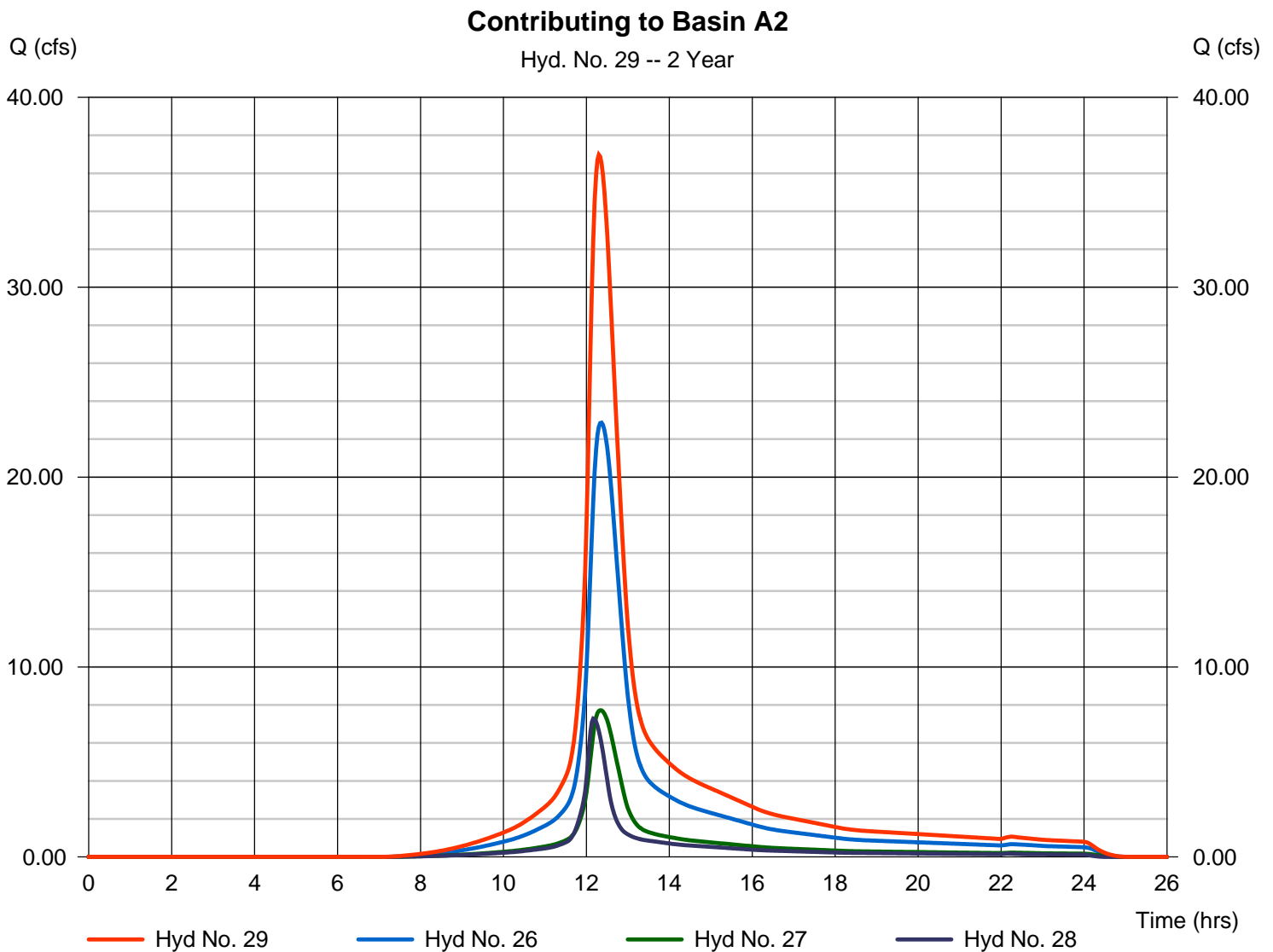
Wednesday, 07 / 15 / 2020

Hyd. No. 29

Contributing to Basin A2

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 26, 27, 28

Peak discharge = 36.97 cfs
Time to peak = 12.30 hrs
Hyd. volume = 220,132 cuft
Contrib. drain. area = 10.880 ac



Hydrograph Report

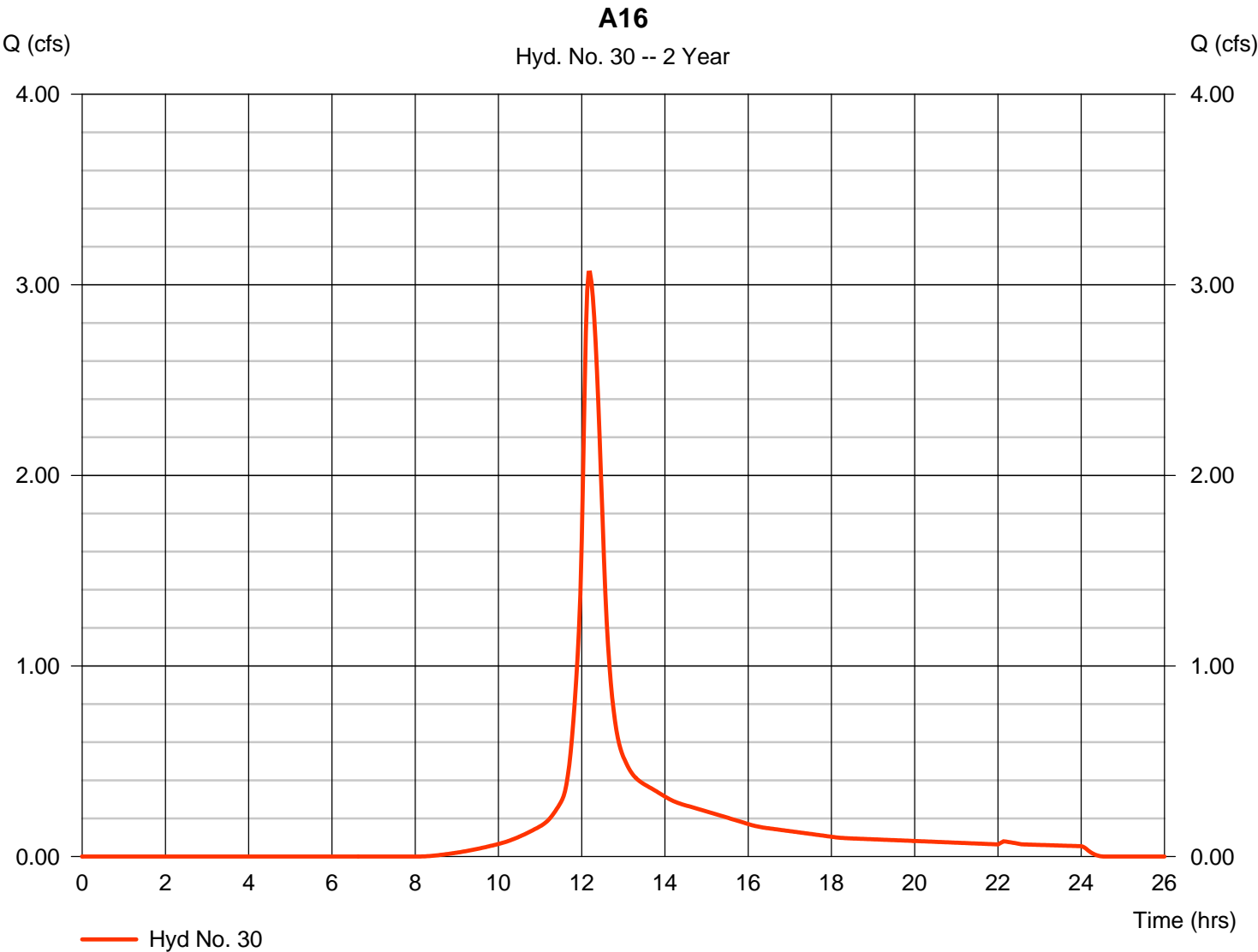
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Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 3.064 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 14,202 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

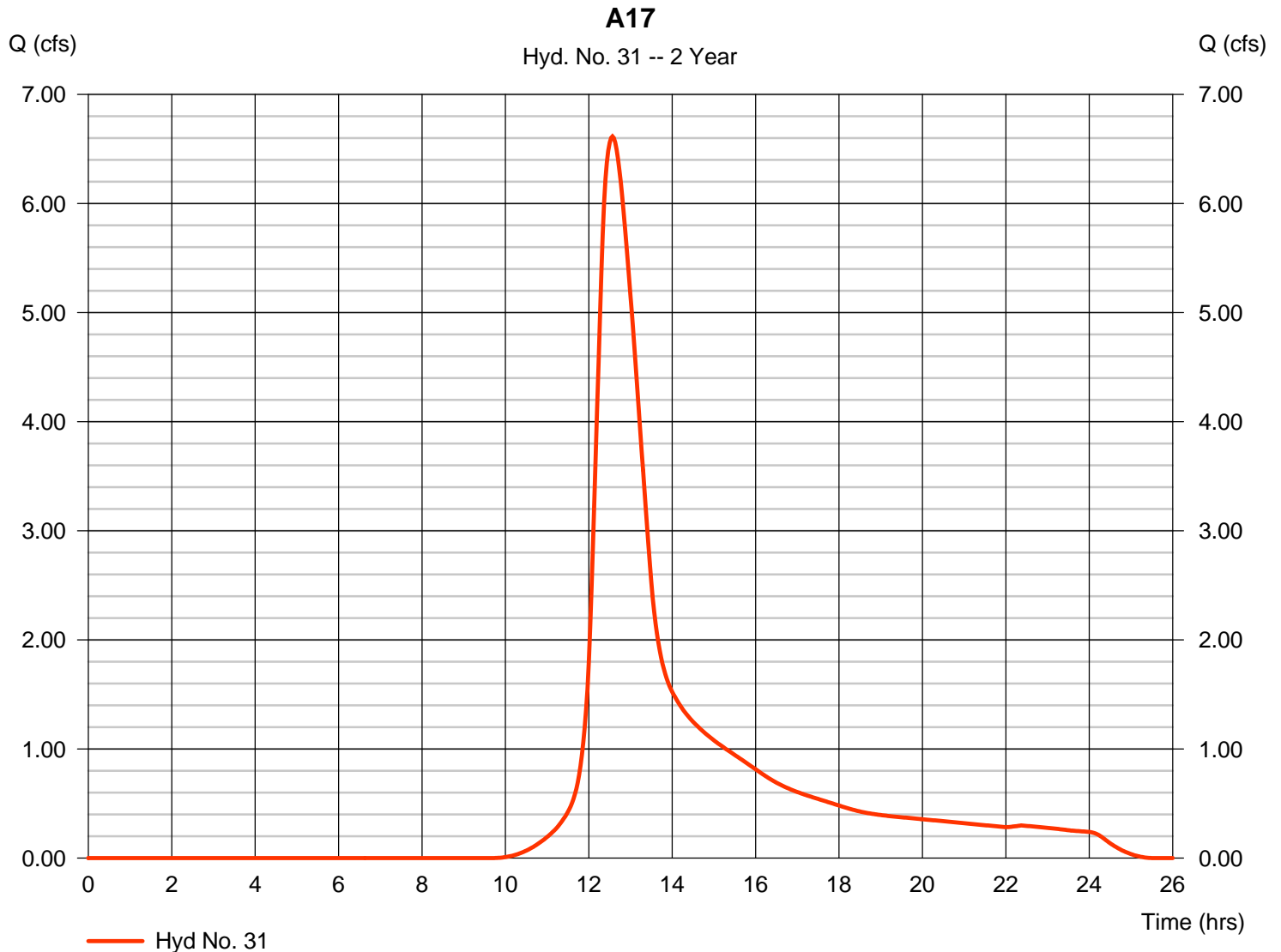
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type	= SCS Runoff	Peak discharge	= 6.615 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 51,971 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

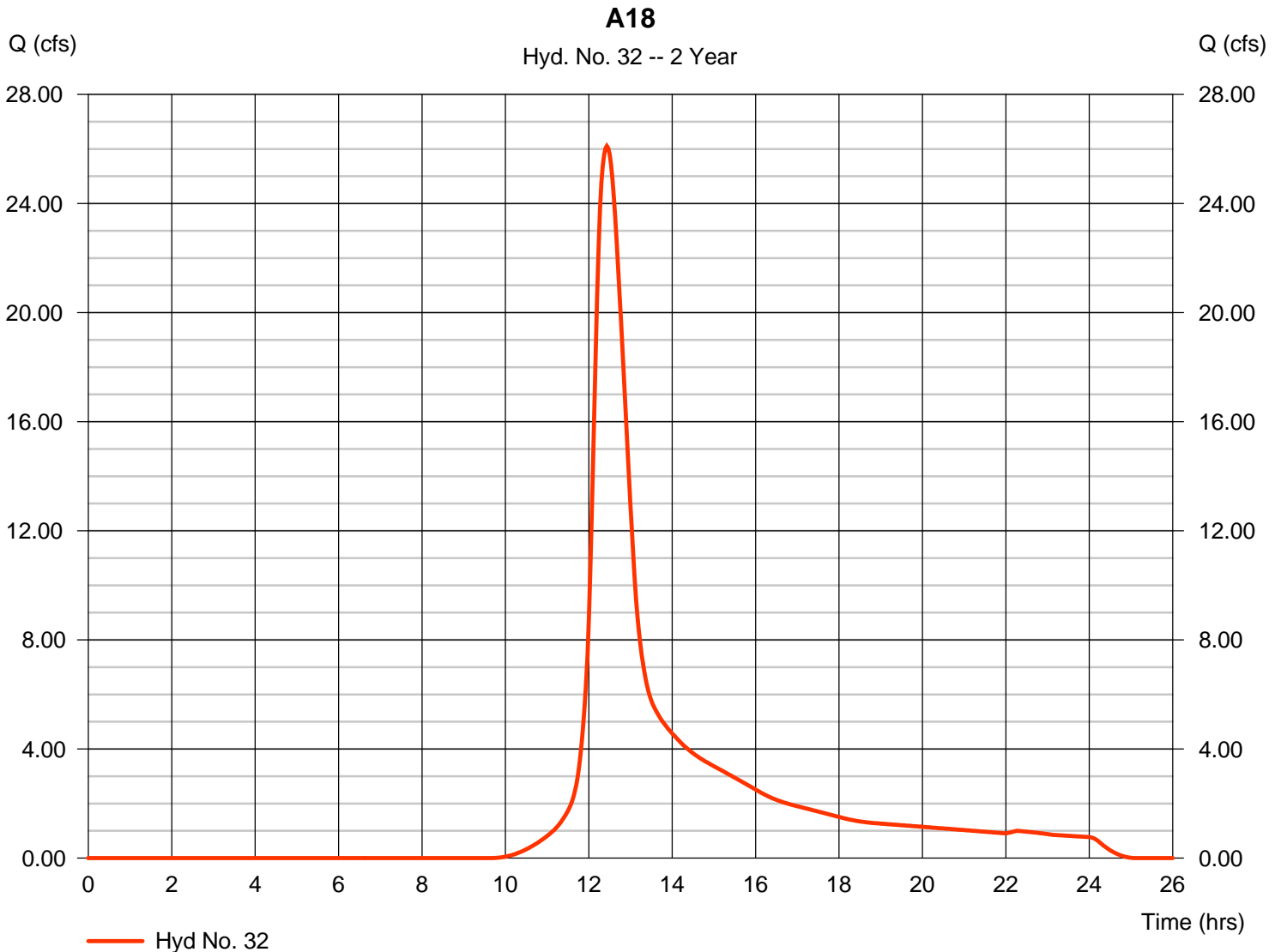
Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 26.11 cfs
 Time to peak = 12.43 hrs
 Hyd. volume = 170,291 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

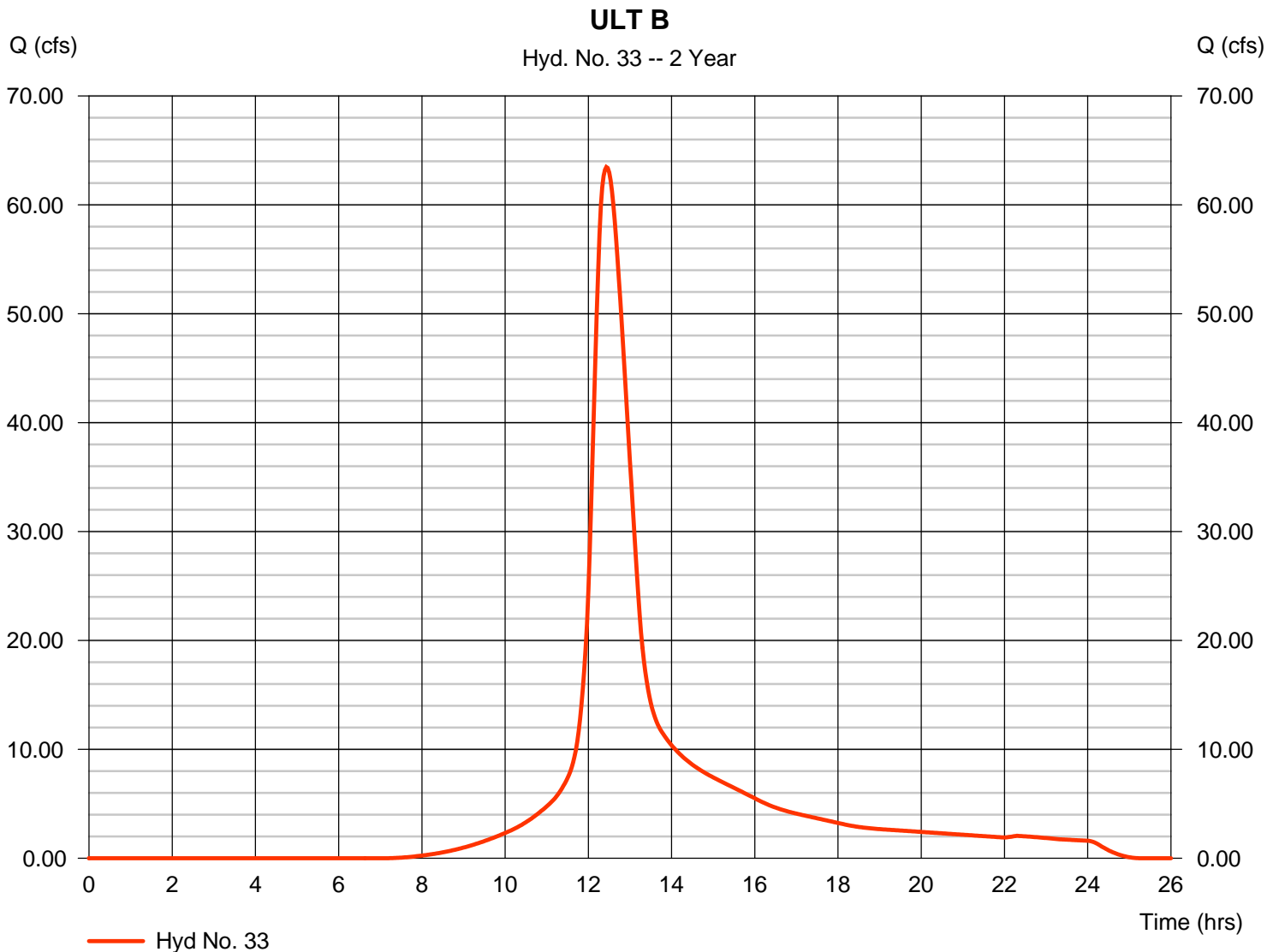
Wednesday, 07 / 15 / 2020

Hyd. No. 33

ULT B

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 58.580 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 3.34 in
 Storm duration = 24 hrs

Peak discharge = 63.47 cfs
 Time to peak = 12.43 hrs
 Hyd. volume = 436,762 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 28.80 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

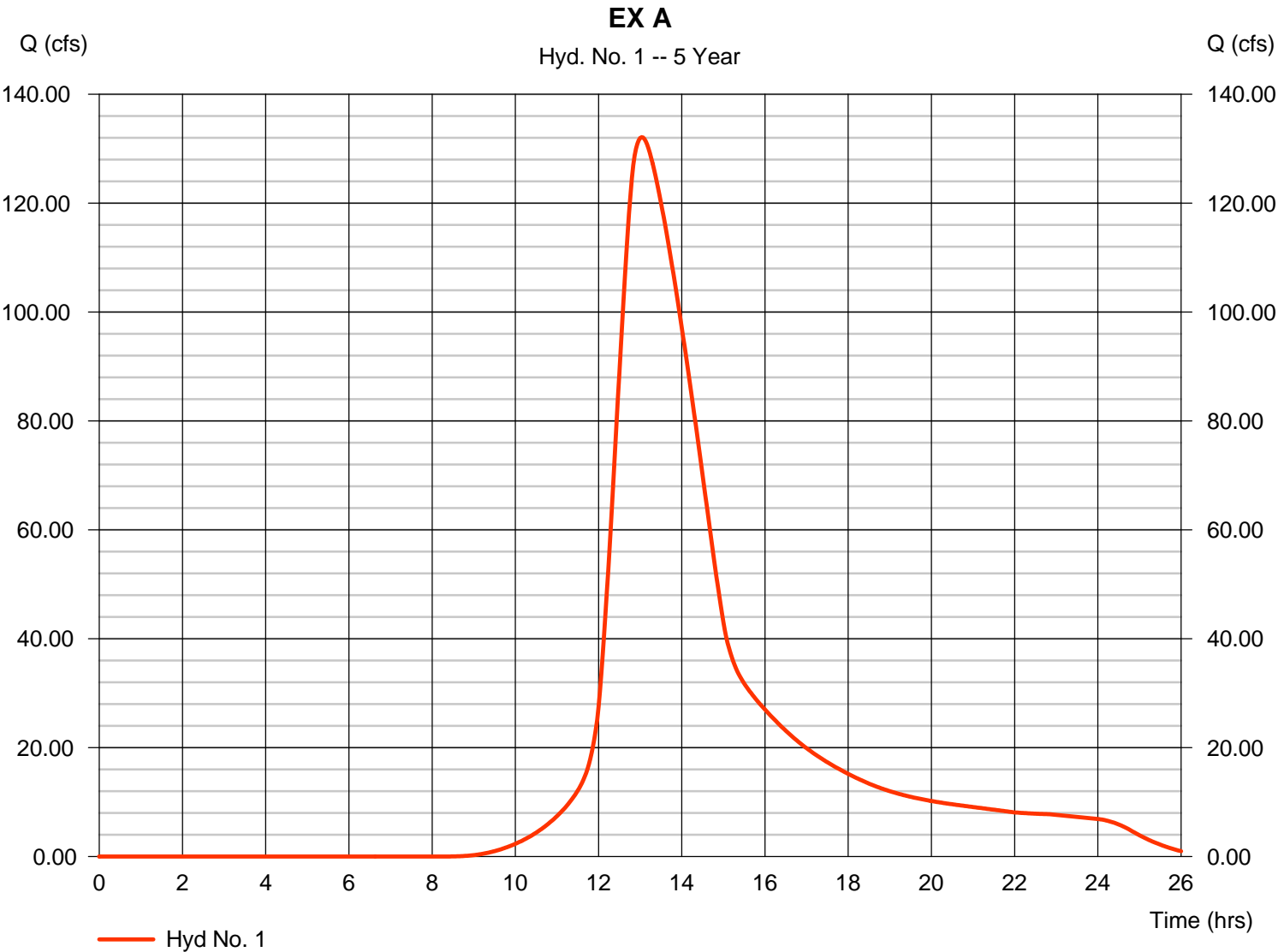
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	132.11	2	782	1,560,413	-----	-----	-----	EX A
2	SCS Runoff	25.02	2	762	235,857	-----	-----	-----	EX A1
3	SCS Runoff	12.63	2	752	96,930	-----	-----	-----	EX A2
4	SCS Runoff	71.48	2	760	639,252	-----	-----	-----	EX A3
5	SCS Runoff	34.18	2	788	468,365	-----	-----	-----	EX A4
6	Combine	100.81	2	768	1,107,616	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	76.77	2	772	845,538	-----	-----	-----	EX B
8	SCS Runoff	99.83	2	748	731,253	-----	-----	-----	A1
9	SCS Runoff	14.03	2	740	84,896	-----	-----	-----	A2
10	Combine	113.22	2	746	816,149	8, 9	-----	-----	A1+A2
11	SCS Runoff	15.68	2	740	94,876	-----	-----	-----	A3
12	SCS Runoff	9.103	2	740	55,078	-----	-----	-----	A4
13	SCS Runoff	12.26	2	740	74,176	-----	-----	-----	A5
14	Combine	149.26	2	744	1,040,279	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	15.26	2	734	79,696	-----	-----	-----	A6
16	SCS Runoff	12.59	2	734	65,781	-----	-----	-----	A7
17	Combine	27.85	2	734	145,477	15, 16	-----	-----	A6+A7
18	SCS Runoff	7.046	2	740	42,633	-----	-----	-----	A8
19	SCS Runoff	27.28	2	730	127,077	-----	-----	-----	A9
20	Combine	203.10	2	740	1,355,466	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	3.267	2	736	18,439	-----	-----	-----	A10
22	SCS Runoff	14.82	2	742	95,552	-----	-----	-----	A11
23	SCS Runoff	12.61	2	740	76,271	-----	-----	-----	A12
24	Combine	30.60	2	740	190,261	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	7.270	2	740	43,988	-----	-----	-----	A13
26	Combine	37.87	2	740	234,250	24, 25	-----	-----	A10-A13
27	SCS Runoff	12.79	2	740	77,380	-----	-----	-----	A14
28	SCS Runoff	12.07	2	730	56,207	-----	-----	-----	A15
29	Combine	61.26	2	738	367,837	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	5.312	2	730	24,577	-----	-----	-----	A16
31	SCS Runoff	12.63	2	752	96,930	-----	-----	-----	A17
32	SCS Runoff	49.66	2	744	317,607	-----	-----	-----	A18
33	SCS Runoff	105.14	2	746	729,821	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 5 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

Hyd. No. 1

EX A

Hydrograph type	= SCS Runoff	Peak discharge	= 132.11 cfs
Storm frequency	= 5 yrs	Time to peak	= 13.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,560,413 cuft
Drainage area	= 167.740 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 83.60 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 350



Hydrograph Report

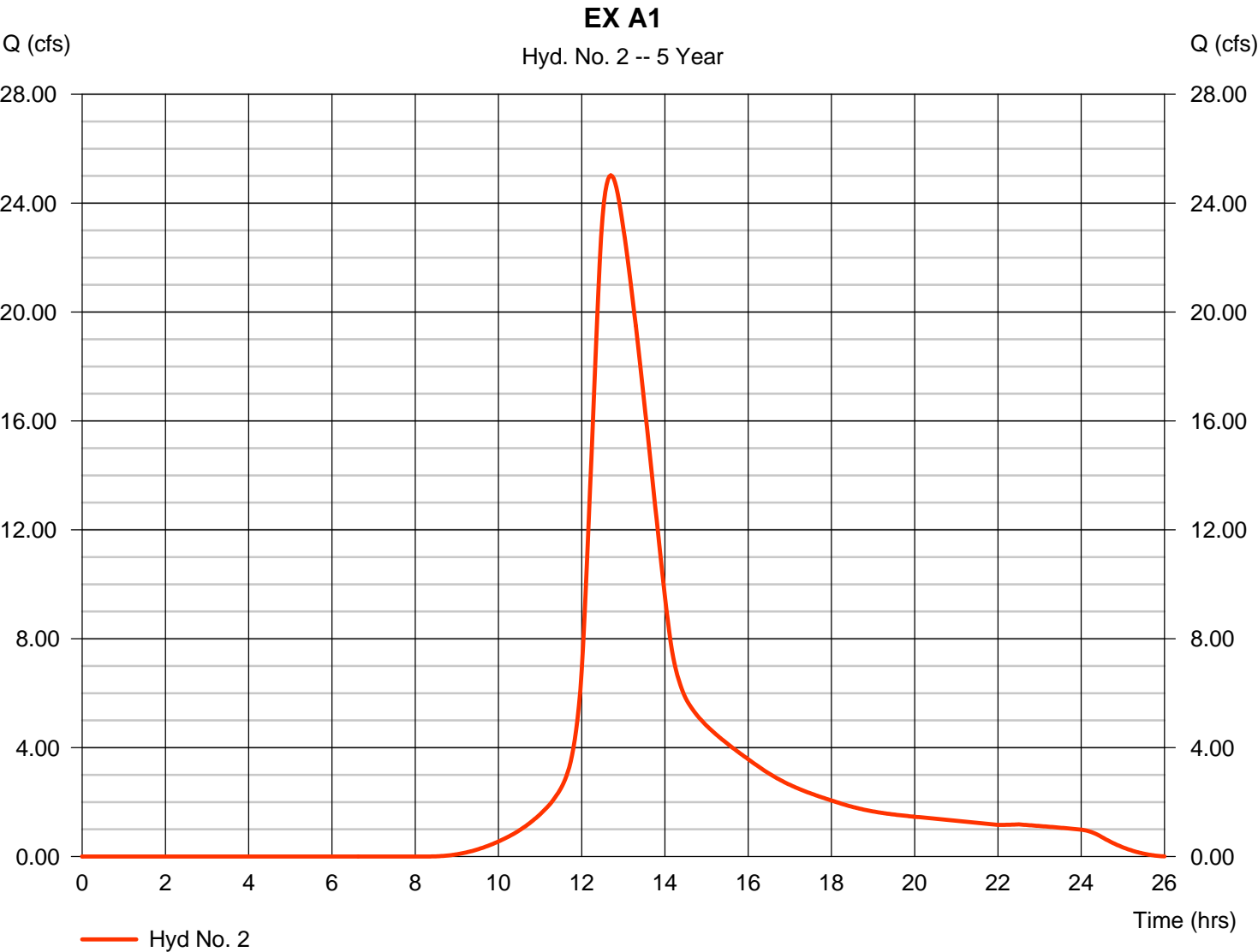
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Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type	= SCS Runoff	Peak discharge	= 25.02 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 235,857 cuft
Drainage area	= 25.120 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 49.70 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

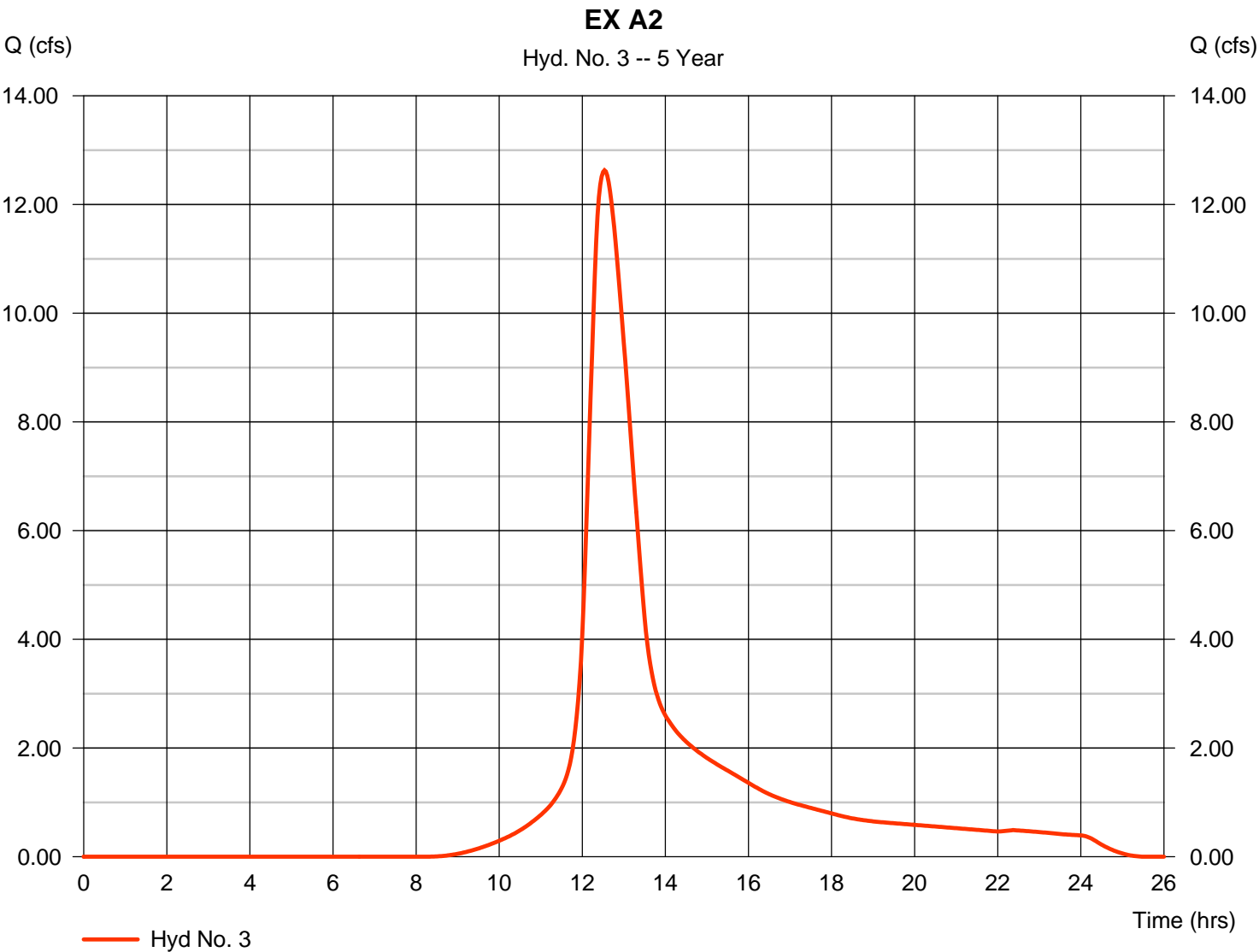
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Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type	= SCS Runoff	Peak discharge	= 12.63 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 96,930 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

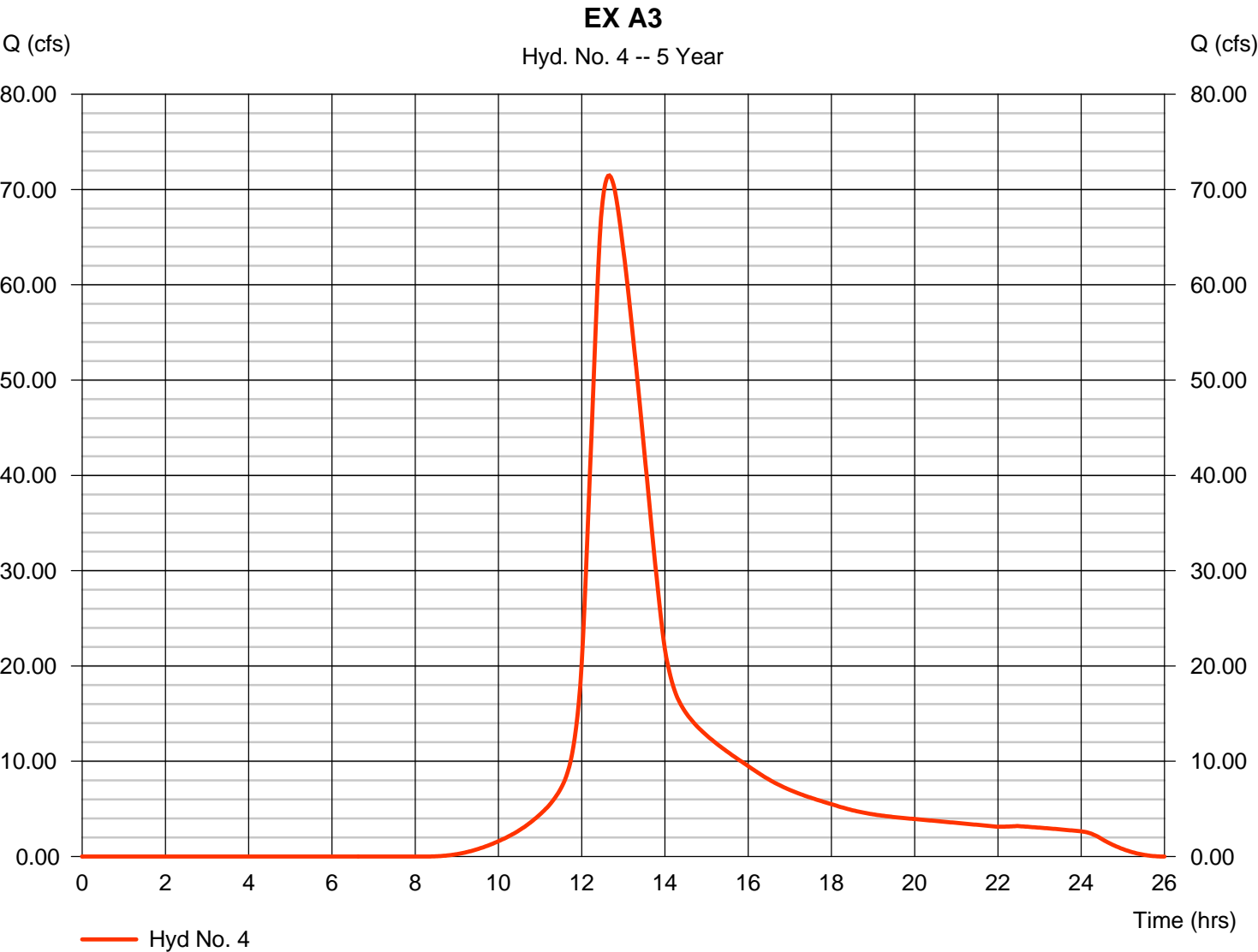
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Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 71.48 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 639,252 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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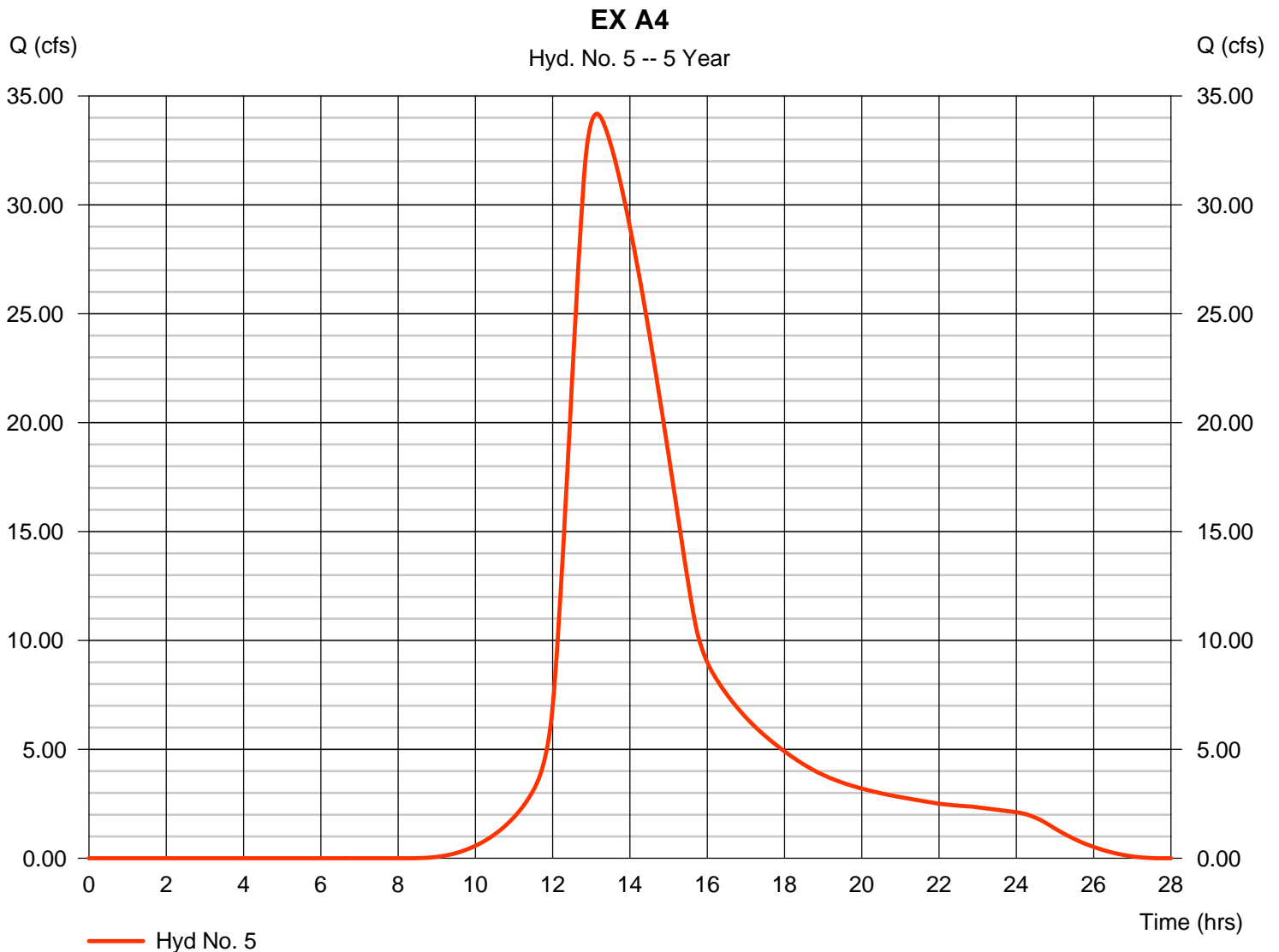
Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 50.180 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 4.83 in
 Storm duration = 24 hrs

Peak discharge = 34.18 cfs
 Time to peak = 13.13 hrs
 Hyd. volume = 468,365 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 87.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

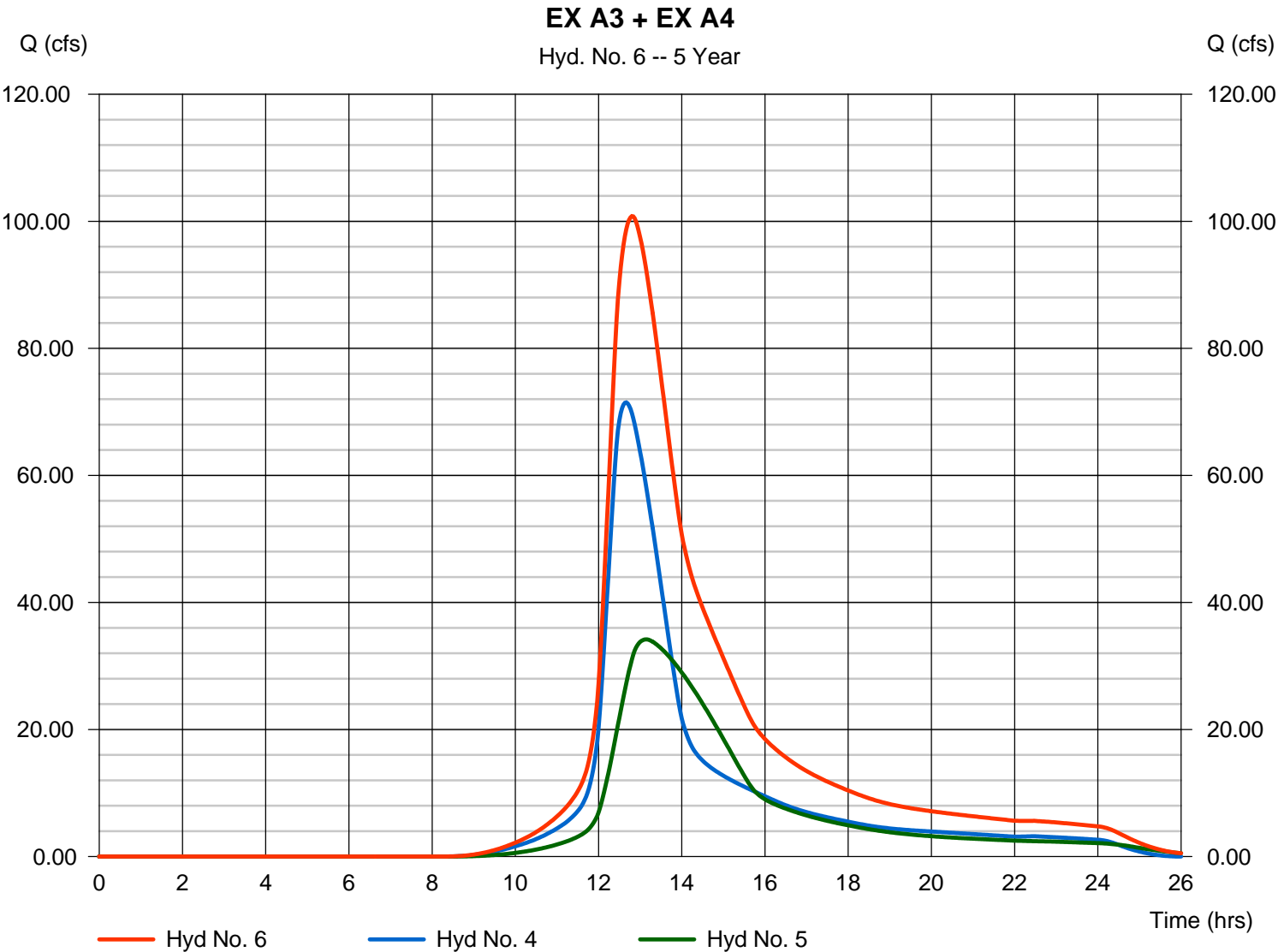
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Hyd. No. 6

EX A3 + EX A4

Hydrograph type	= Combine	Peak discharge	= 100.81 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.80 hrs
Time interval	= 2 min	Hyd. volume	= 1,107,616 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 119.020 ac



Hydrograph Report

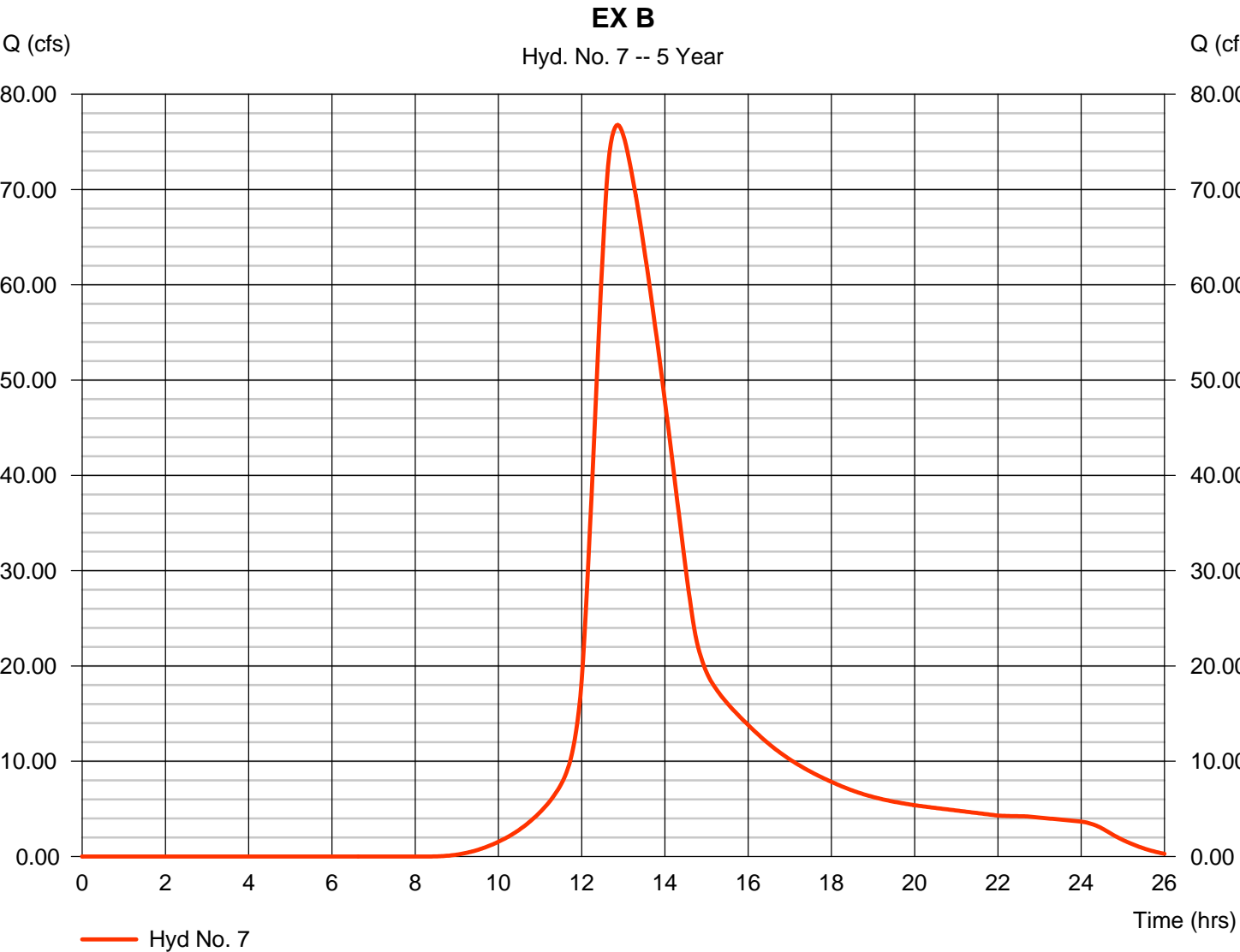
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Wednesday, 07 / 15 / 2020

Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 76.77 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 845,538 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

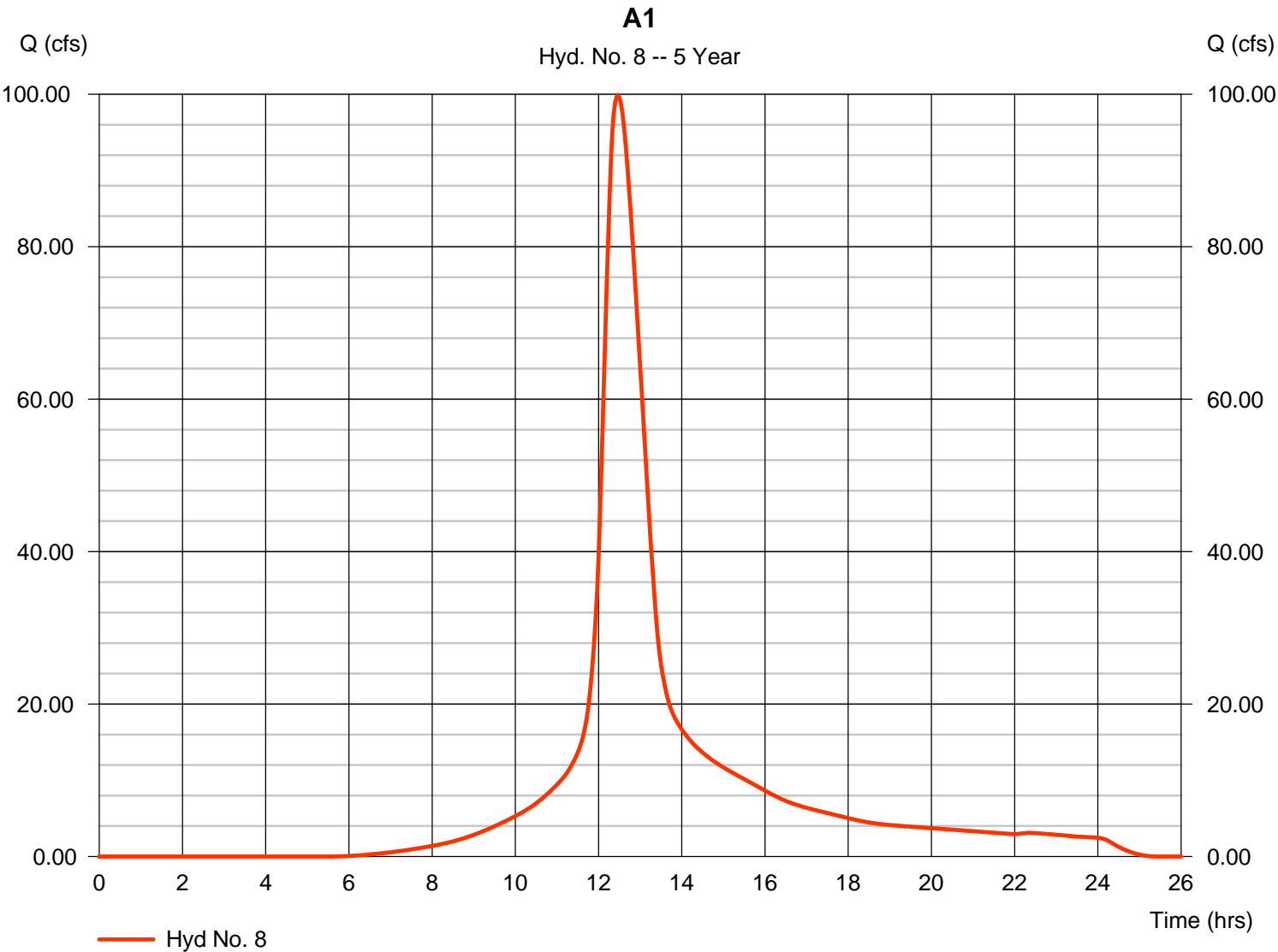
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Wednesday, 07 / 15 / 2020

Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 99.83 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 731,253 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

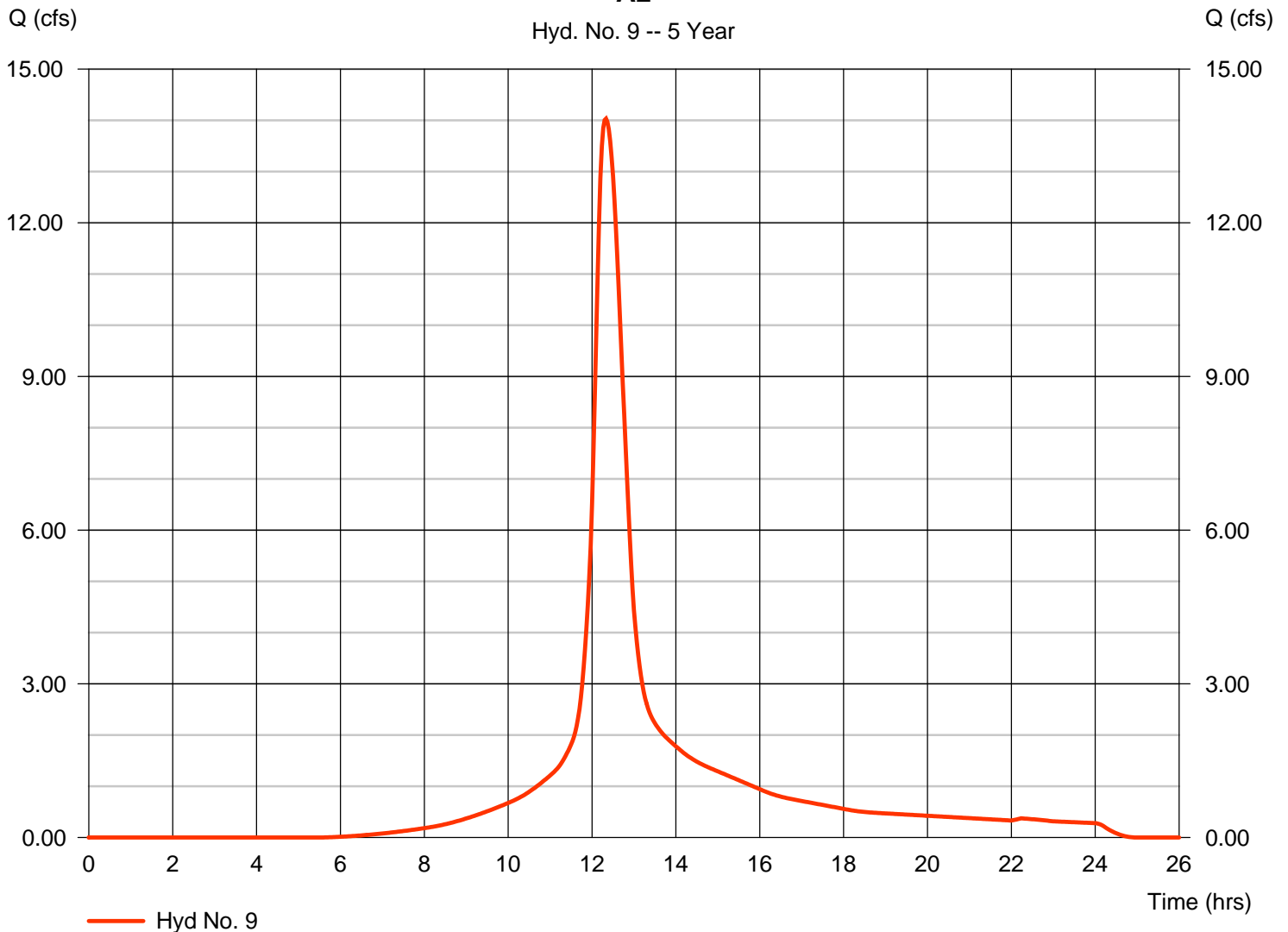
Hyd. No. 9

A2

Hydrograph type	= SCS Runoff	Peak discharge	= 14.03 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 84,896 cuft
Drainage area	= 6.890 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.50 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A2

Hyd. No. 9 -- 5 Year



Hydrograph Report

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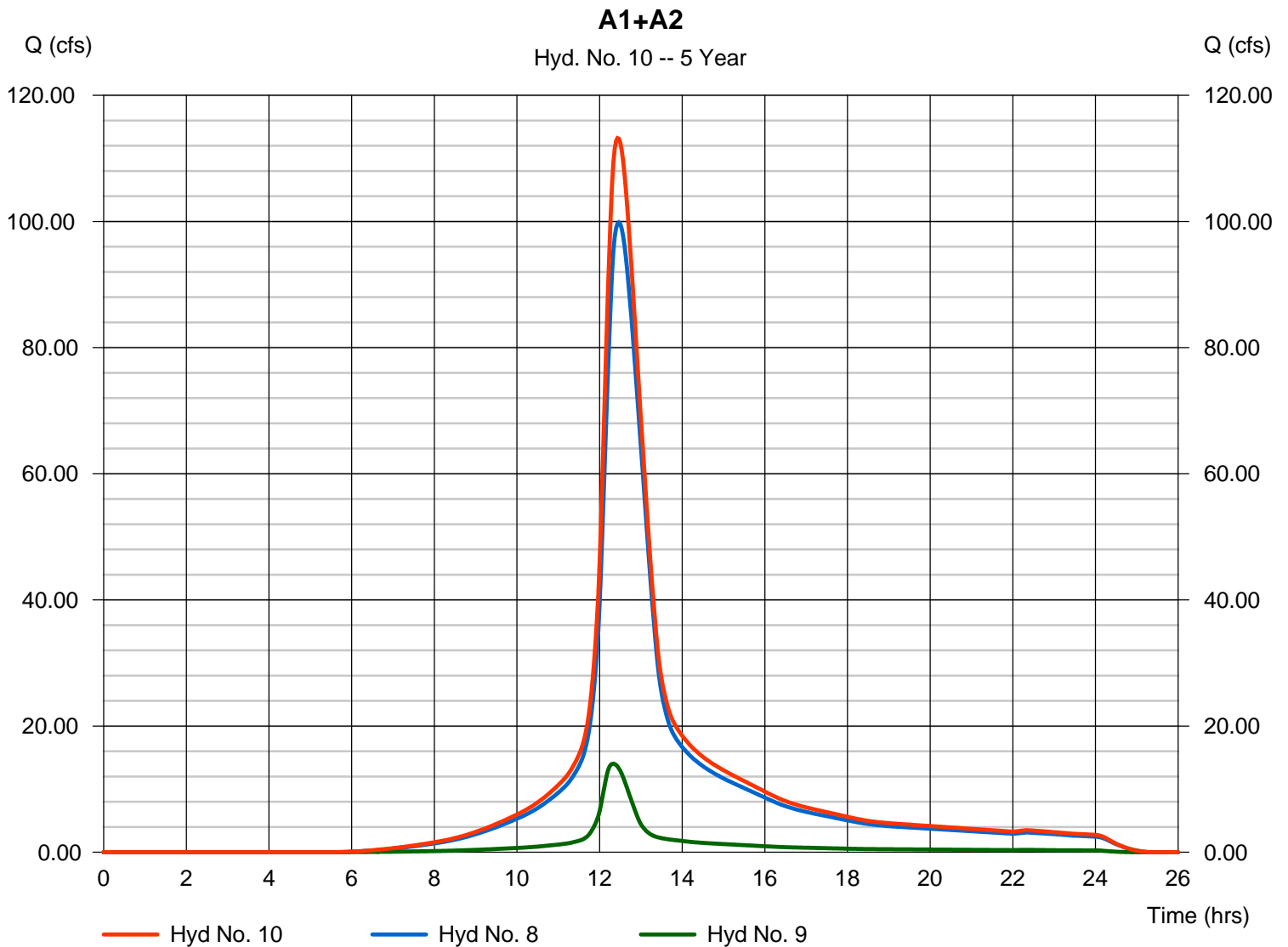
Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 8, 9

Peak discharge = 113.22 cfs
 Time to peak = 12.43 hrs
 Hyd. volume = 816,149 cuft
 Contrib. drain. area = 66.040 ac



Hydrograph Report

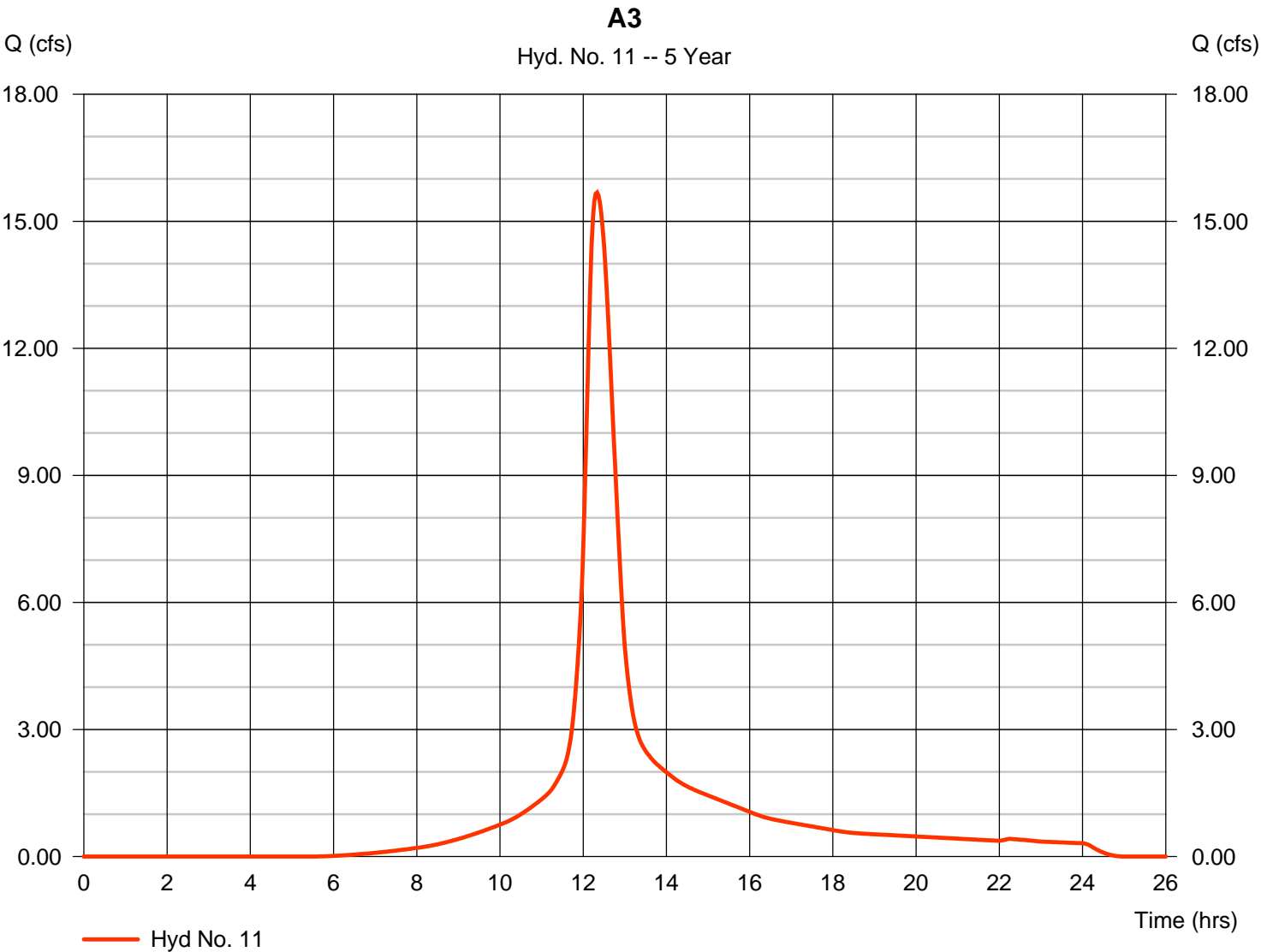
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Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type	= SCS Runoff	Peak discharge	= 15.68 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 94,876 cuft
Drainage area	= 7.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

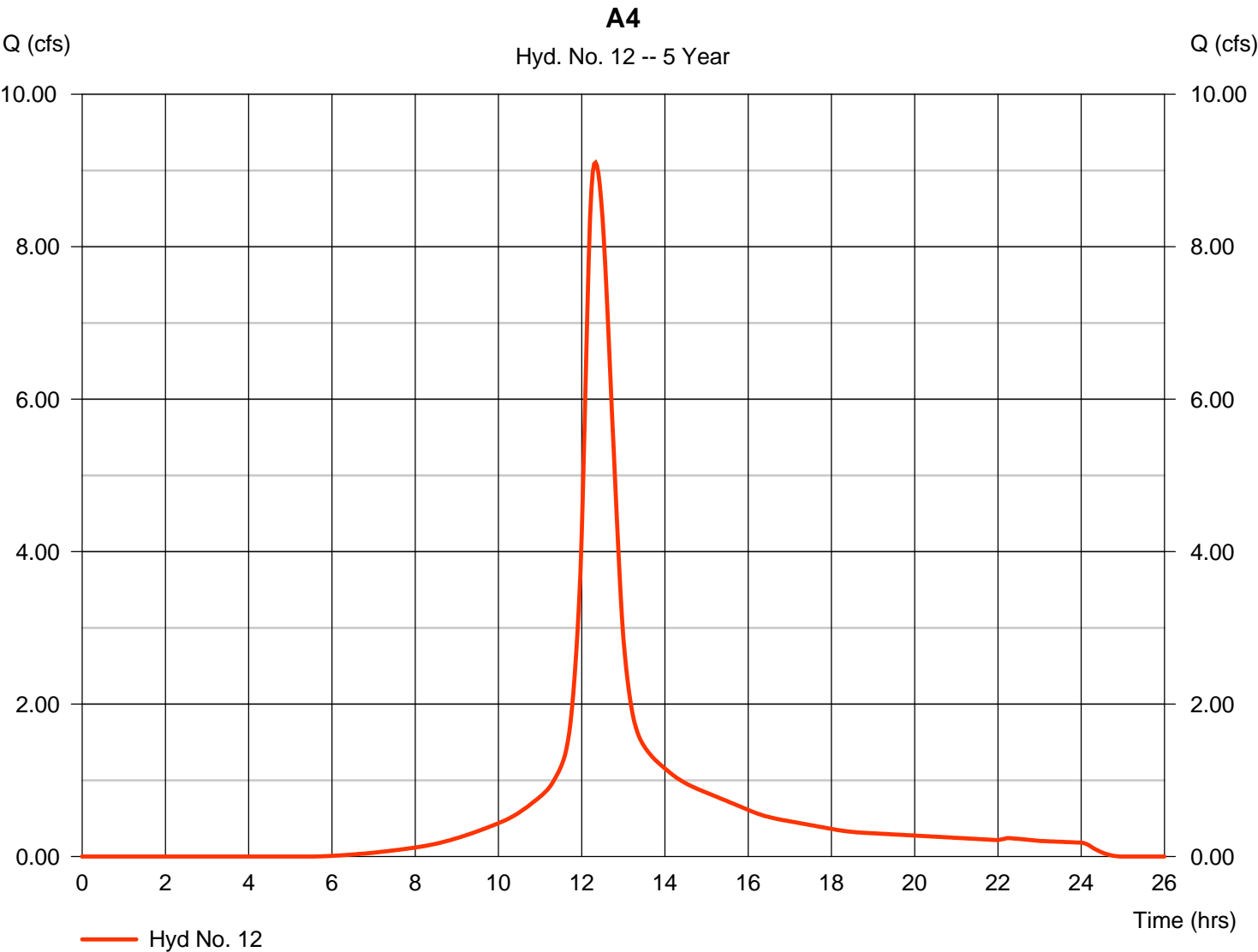
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Wednesday, 07 / 15 / 2020

Hyd. No. 12

A4

Hydrograph type	= SCS Runoff	Peak discharge	= 9.103 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 55,078 cuft
Drainage area	= 4.470 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.70 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

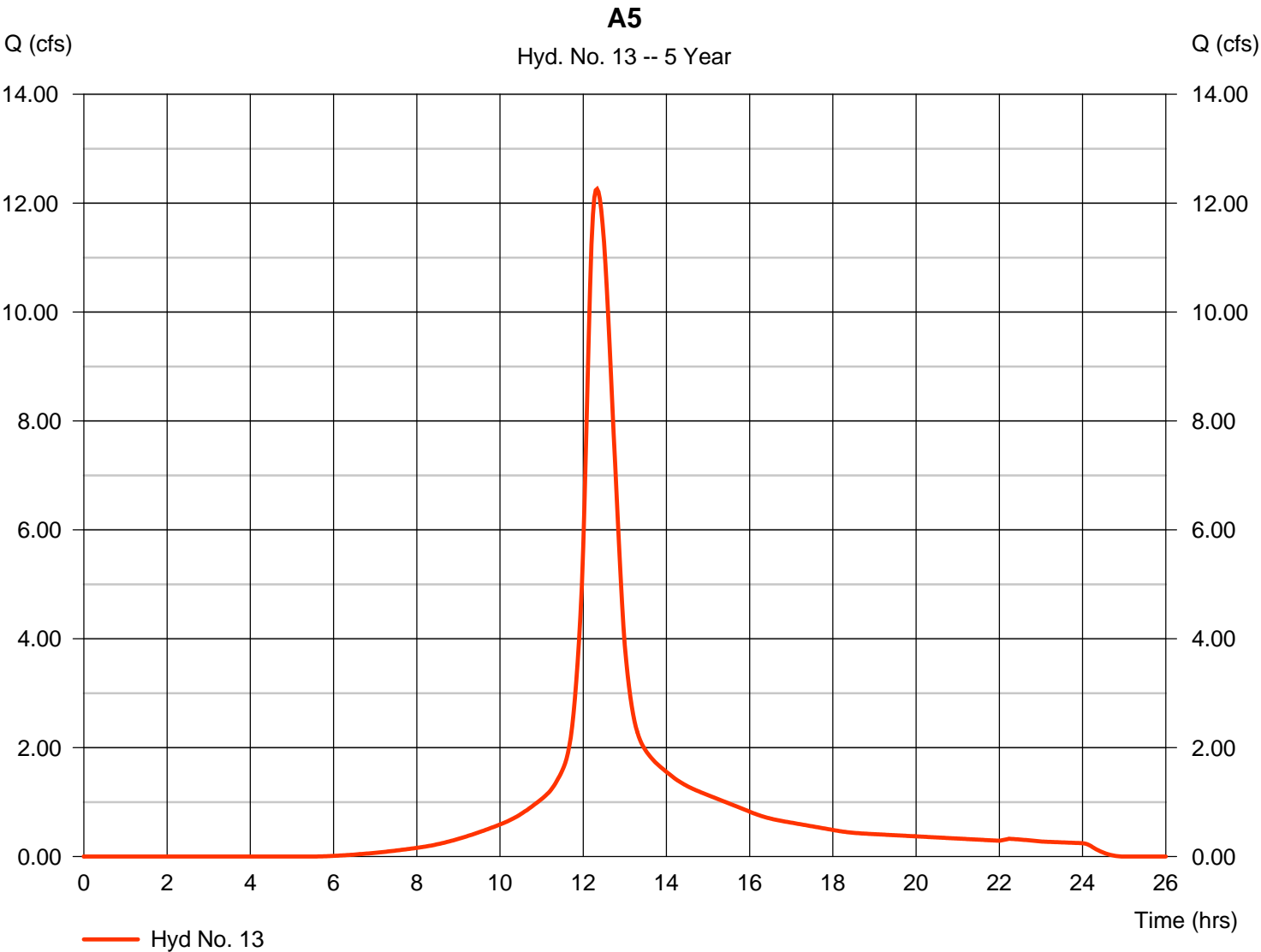
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Wednesday, 07 / 15 / 2020

Hyd. No. 13

A5

Hydrograph type	= SCS Runoff	Peak discharge	= 12.26 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 74,176 cuft
Drainage area	= 6.020 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.60 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

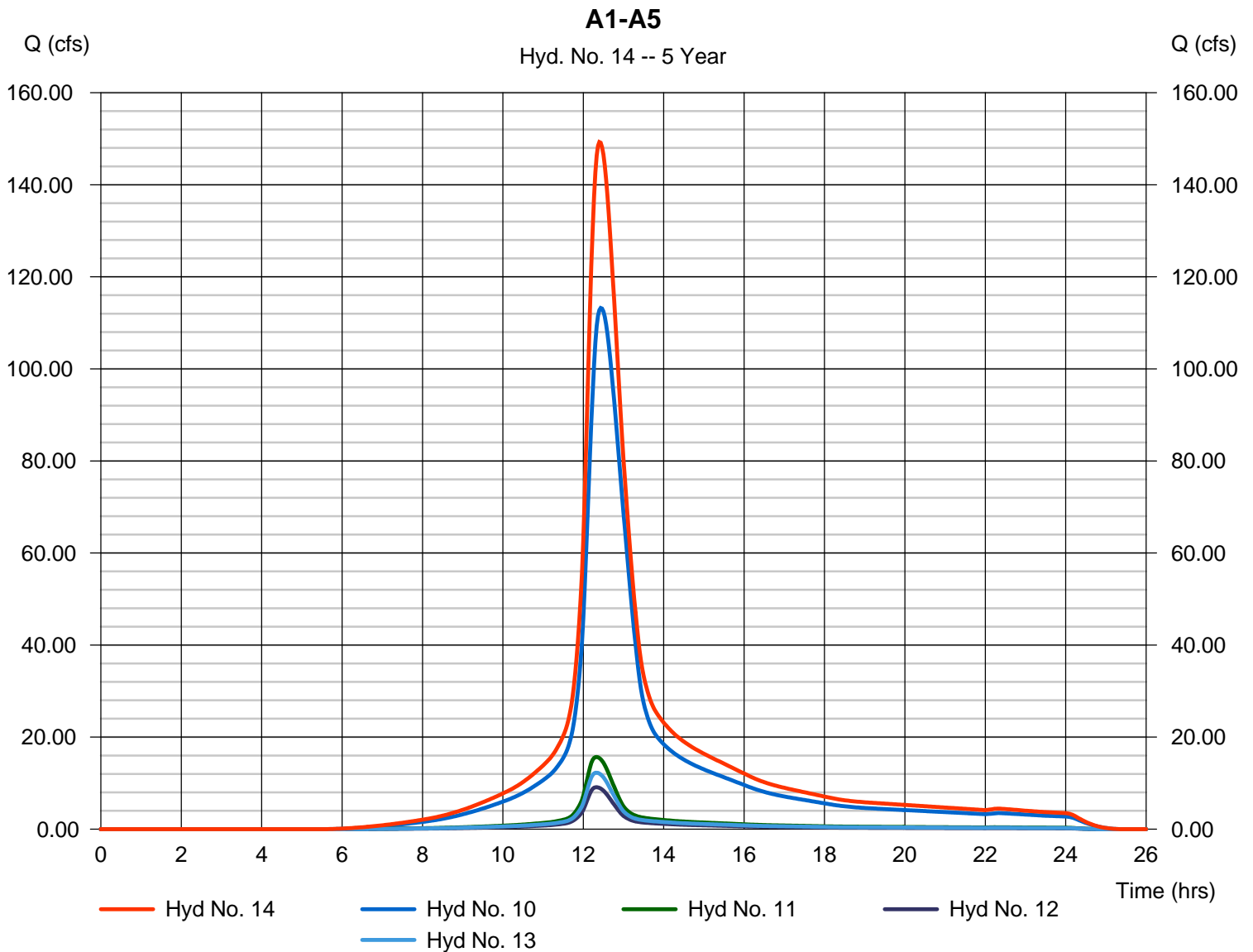
Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 2 min
Inflow hyds. = 10, 11, 12, 13

Peak discharge = 149.26 cfs
Time to peak = 12.40 hrs
Hyd. volume = 1,040,279 cuft
Contrib. drain. area = 18.190 ac



Hydrograph Report

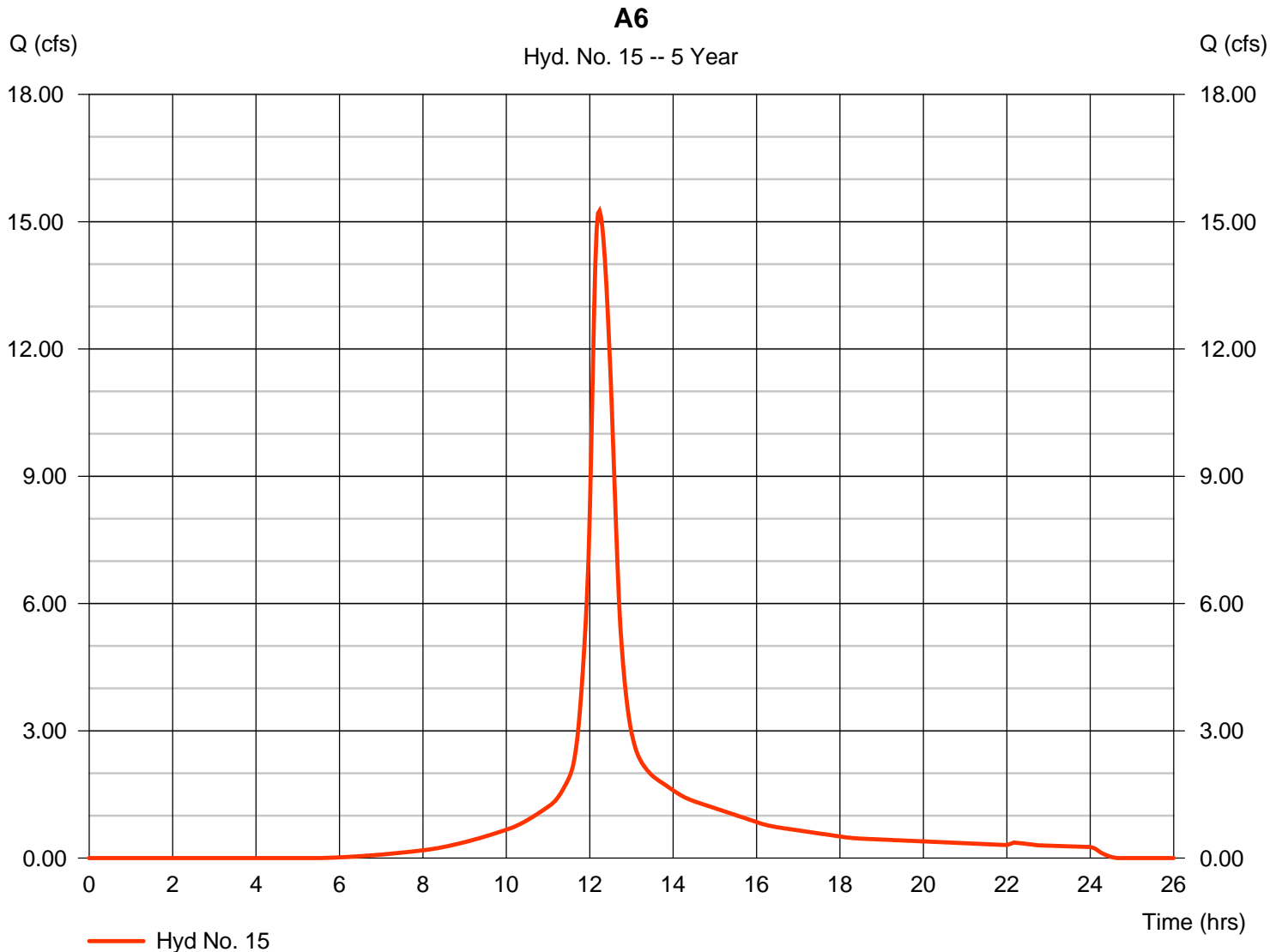
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Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type	= SCS Runoff	Peak discharge	= 15.26 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 79,696 cuft
Drainage area	= 6.300 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.30 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

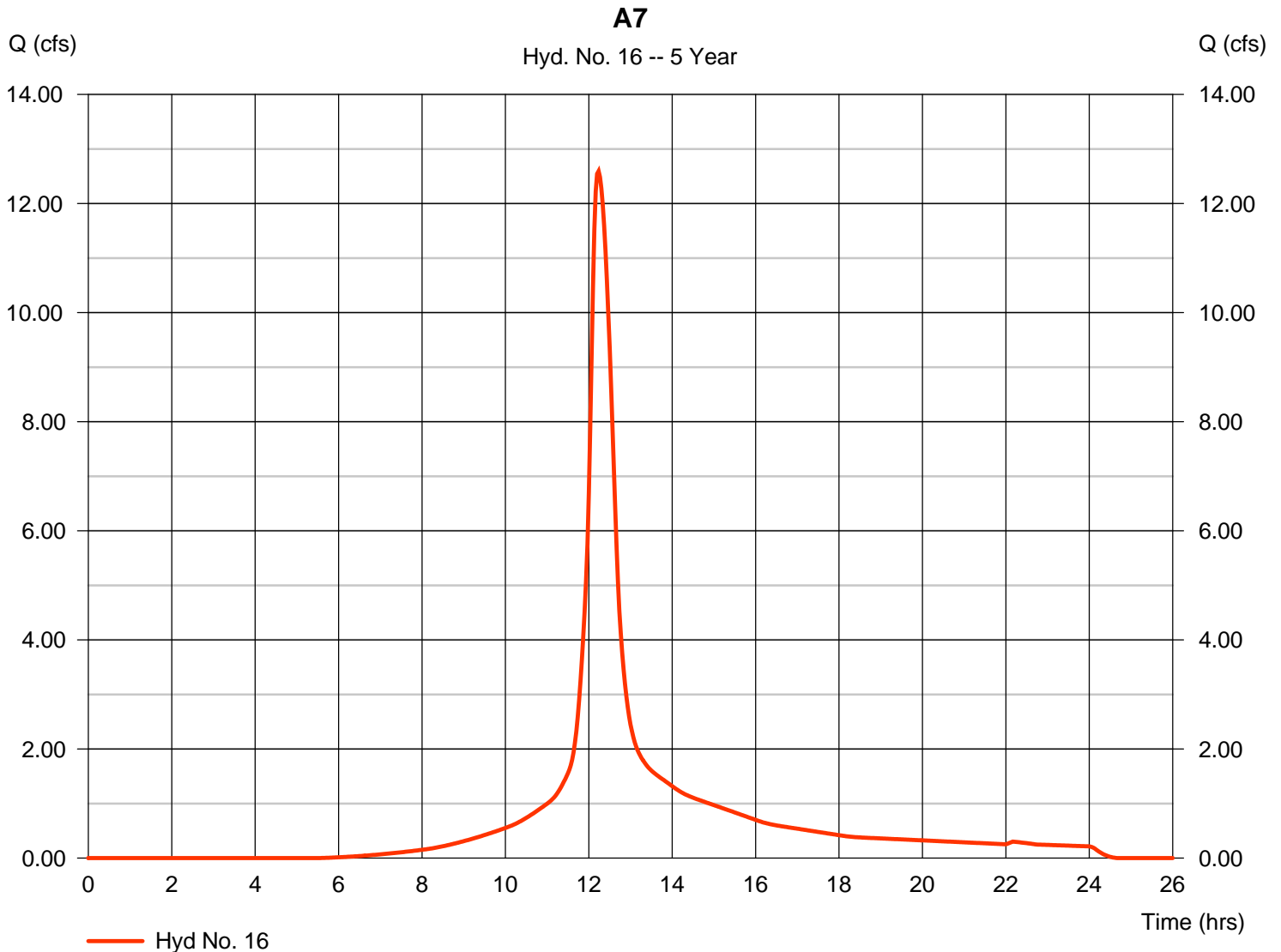
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Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type	= SCS Runoff	Peak discharge	= 12.59 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 65,781 cuft
Drainage area	= 5.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.70 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

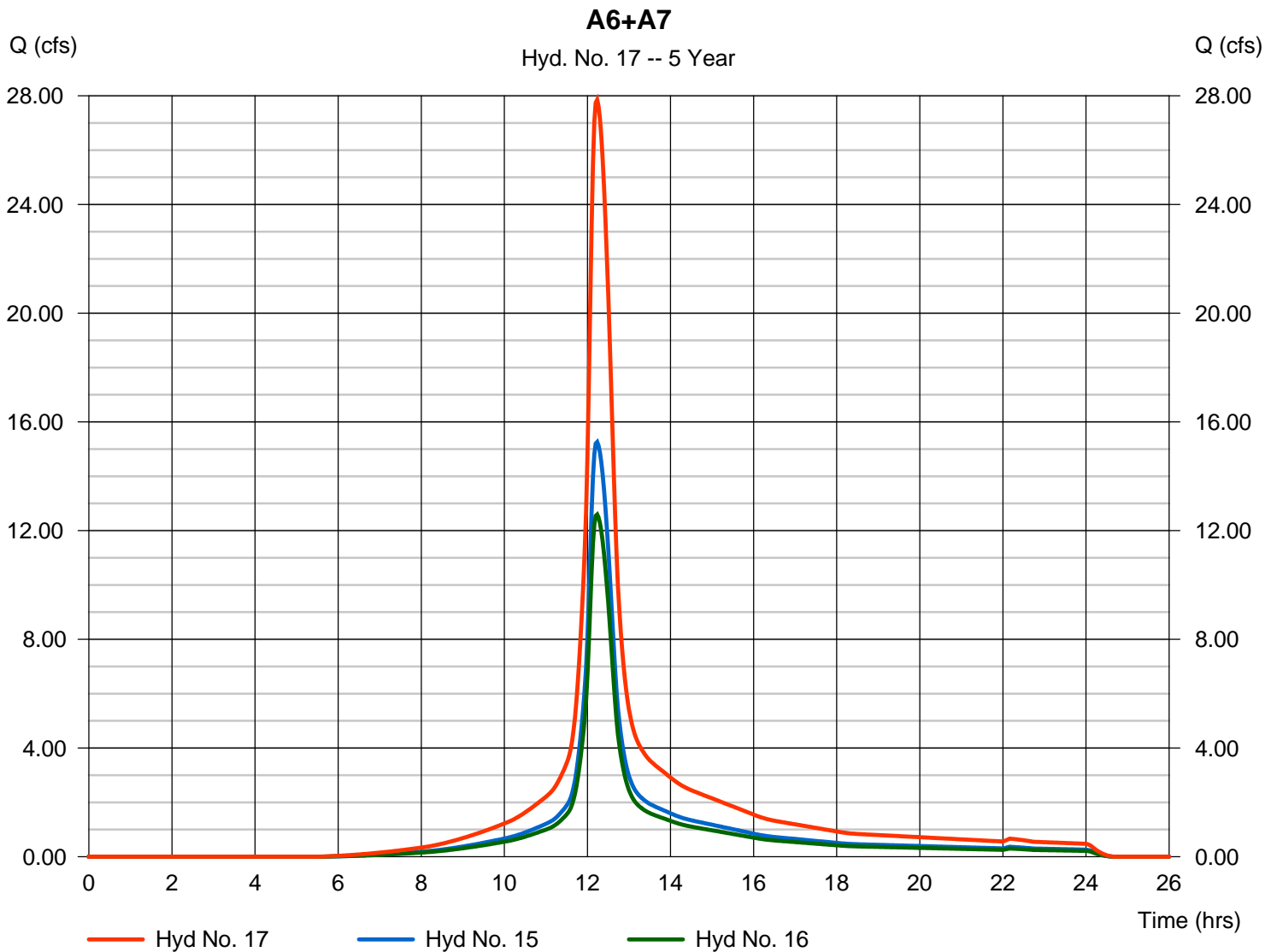
Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 2 min
Inflow hyds. = 15, 16

Peak discharge = 27.85 cfs
Time to peak = 12.23 hrs
Hyd. volume = 145,477 cuft
Contrib. drain. area = 11.500 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

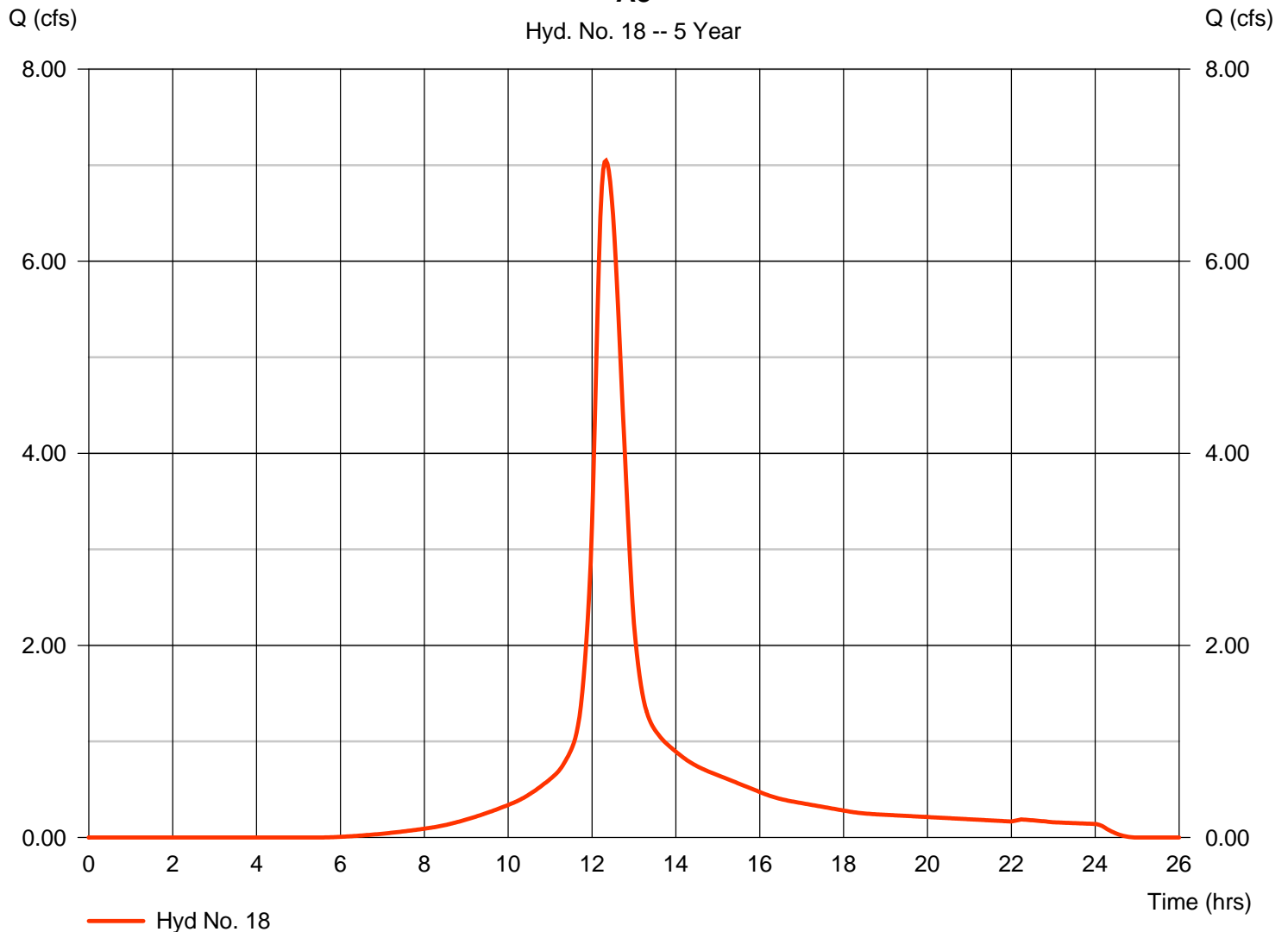
Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type	= SCS Runoff	Peak discharge	= 7.046 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 42,633 cuft
Drainage area	= 3.460 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.40 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A8



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

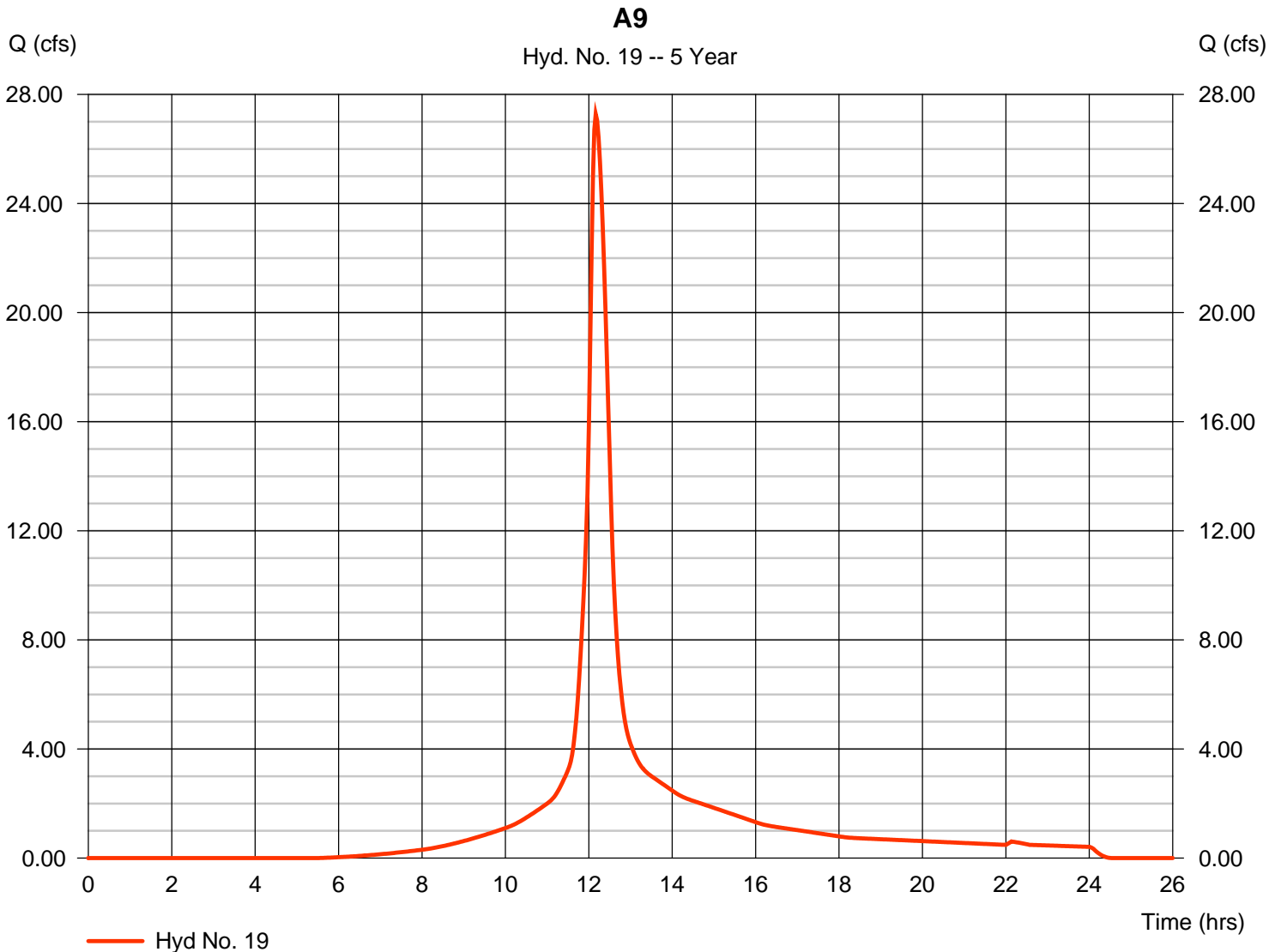
Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 10.400 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 4.83 in
 Storm duration = 24 hrs

Peak discharge = 27.28 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 127,077 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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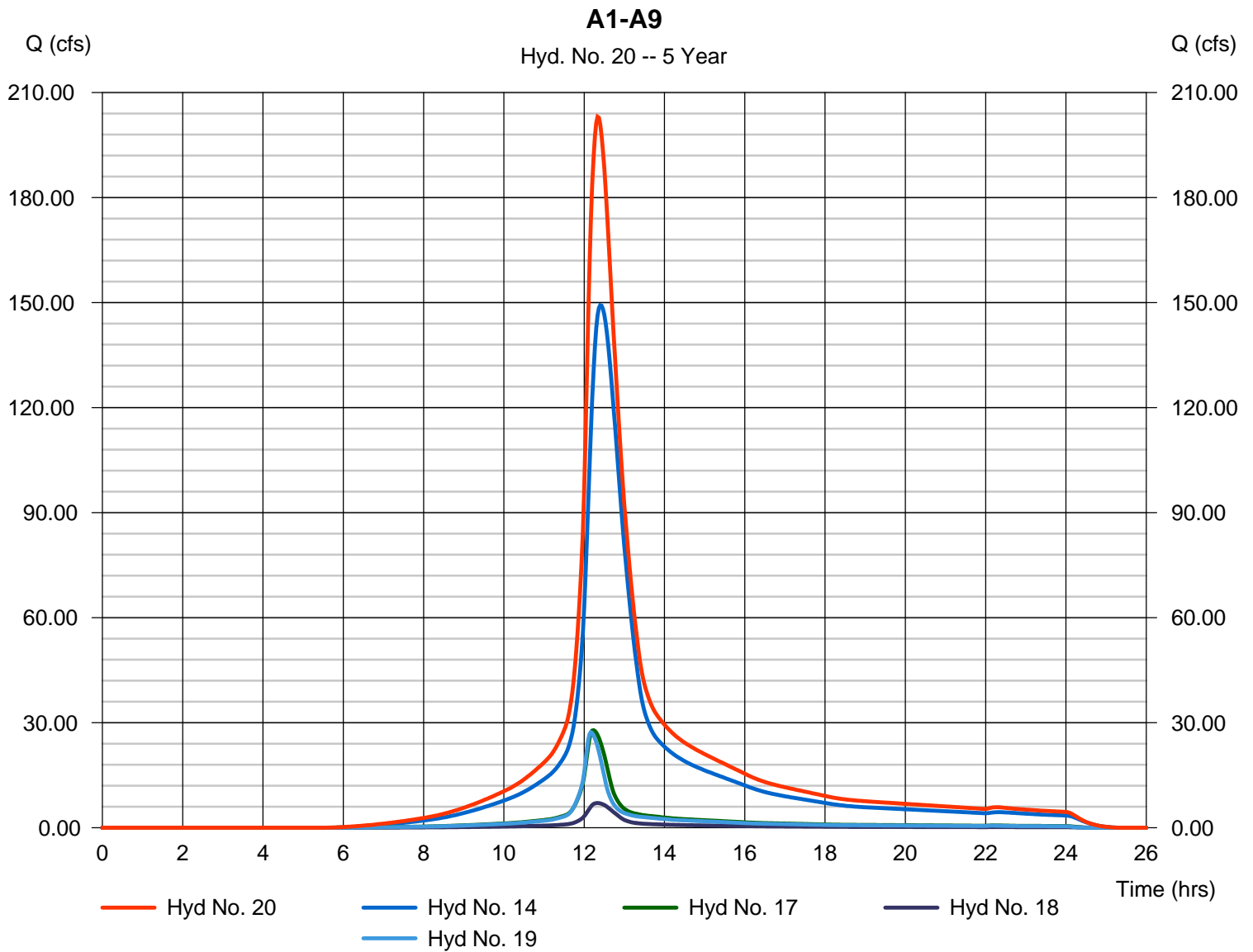
Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 2 min
Inflow hyds. = 14, 17, 18, 19

Peak discharge = 203.10 cfs
Time to peak = 12.33 hrs
Hyd. volume = 1,355,466 cuft
Contrib. drain. area = 13.860 ac



Hydrograph Report

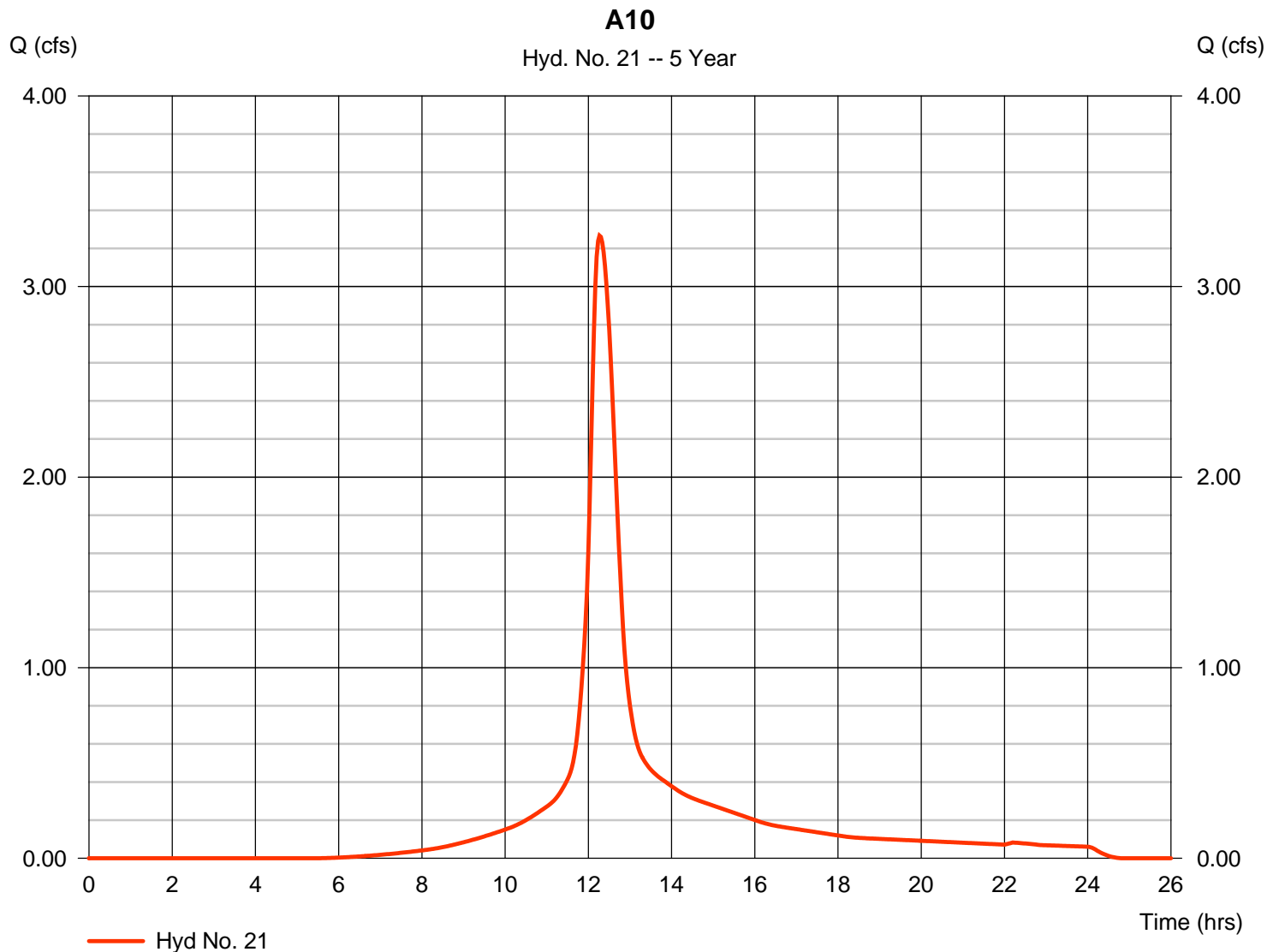
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Wednesday, 07 / 15 / 2020

Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 3.267 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 18,439 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

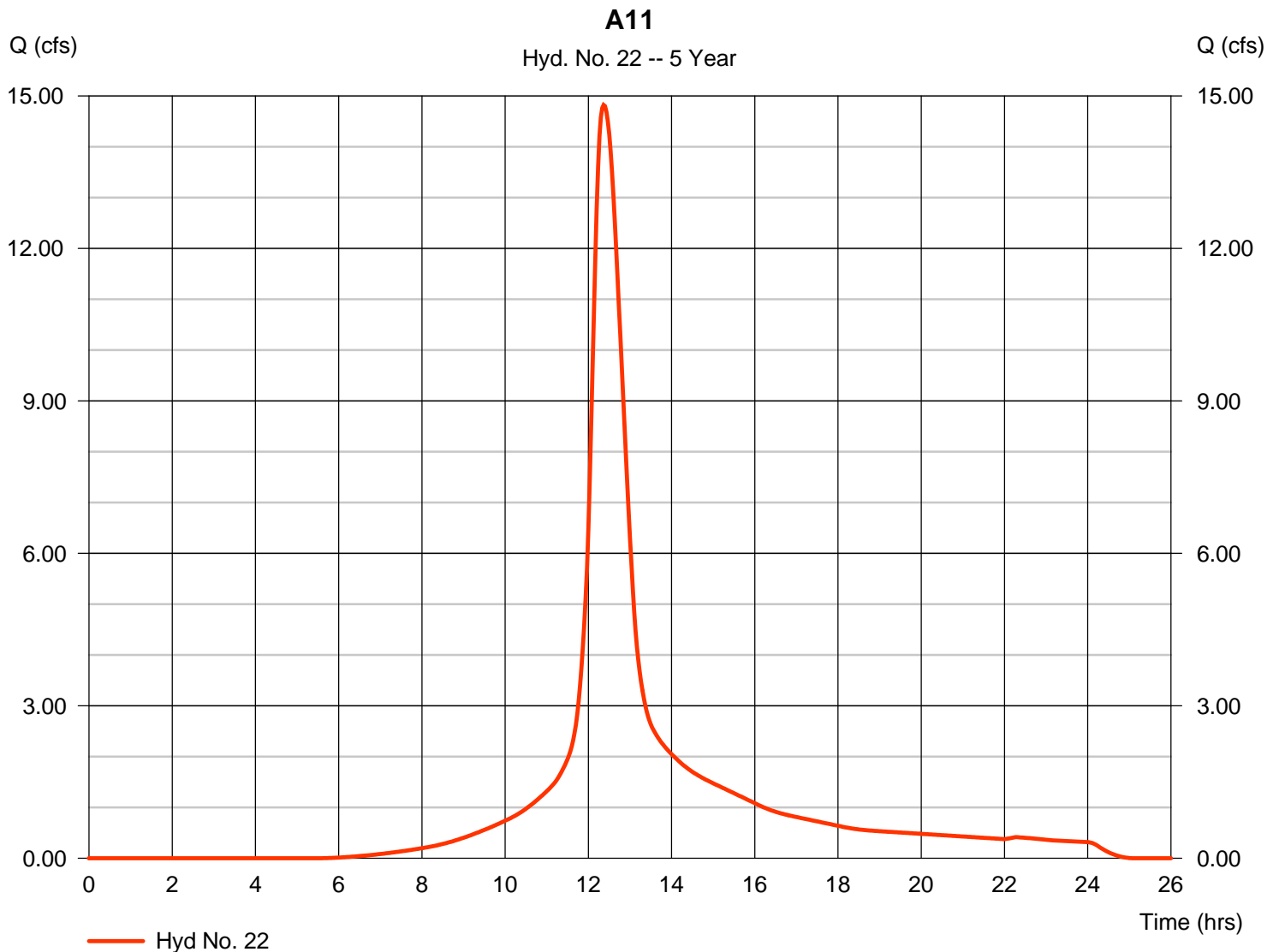
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Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type	= SCS Runoff	Peak discharge	= 14.82 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 95,552 cuft
Drainage area	= 7.820 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

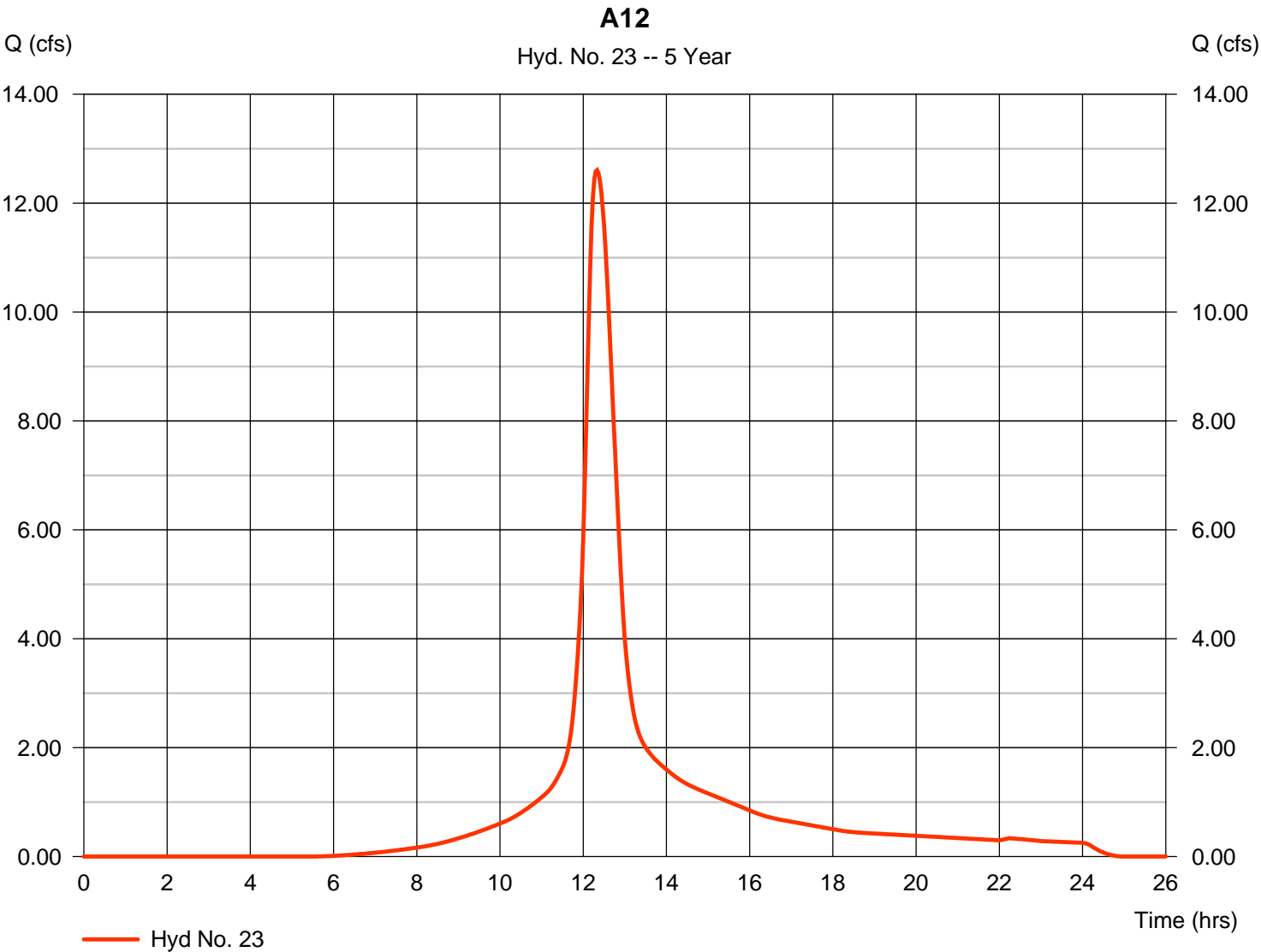
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type	= SCS Runoff	Peak discharge	= 12.61 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 76,271 cuft
Drainage area	= 6.190 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.50 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

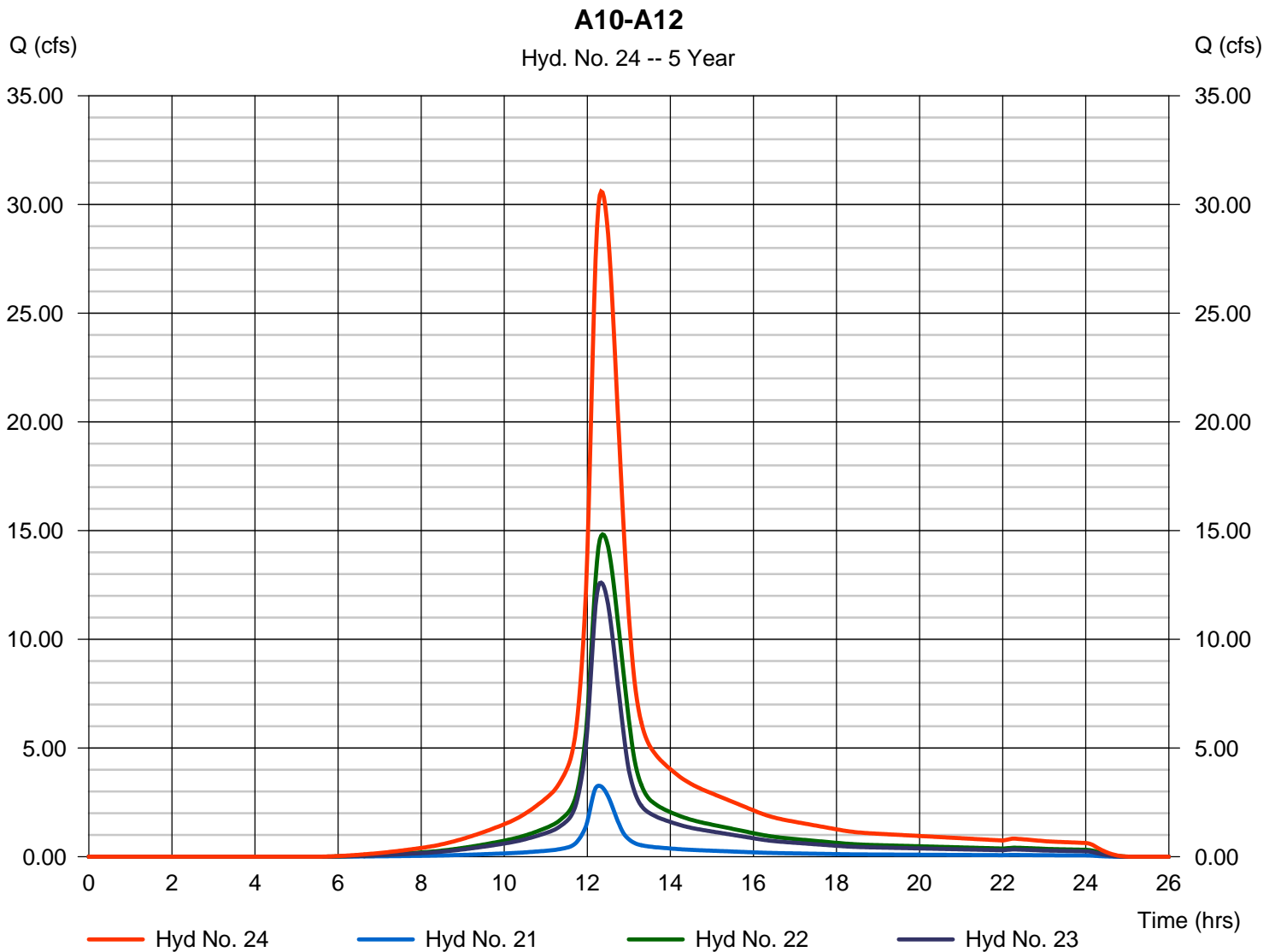
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 21, 22, 23

Peak discharge = 30.60 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 190,261 cuft
 Contrib. drain. area = 15.490 ac



Hydrograph Report

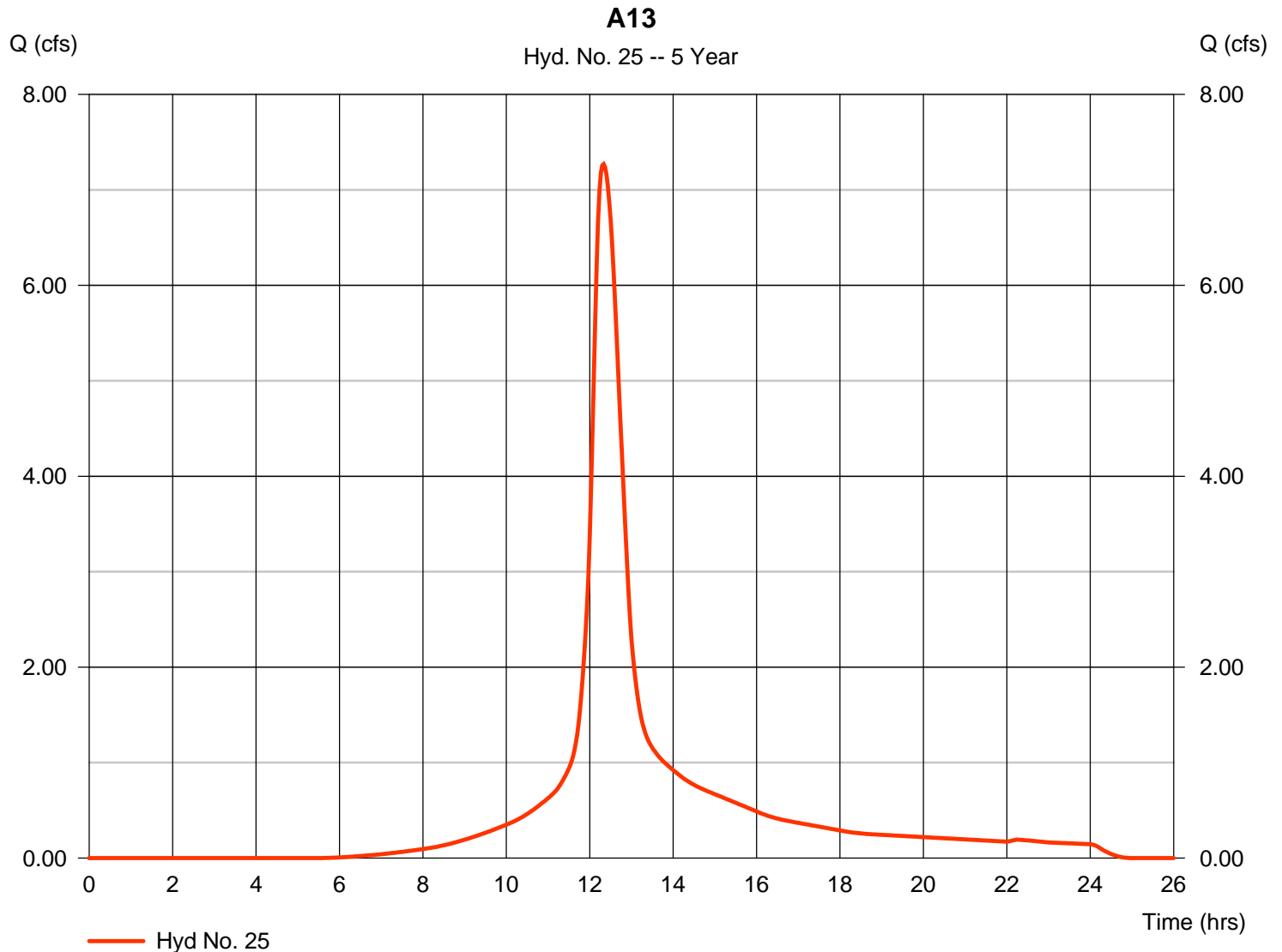
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type	= SCS Runoff	Peak discharge	= 7.270 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 43,988 cuft
Drainage area	= 3.570 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.80 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

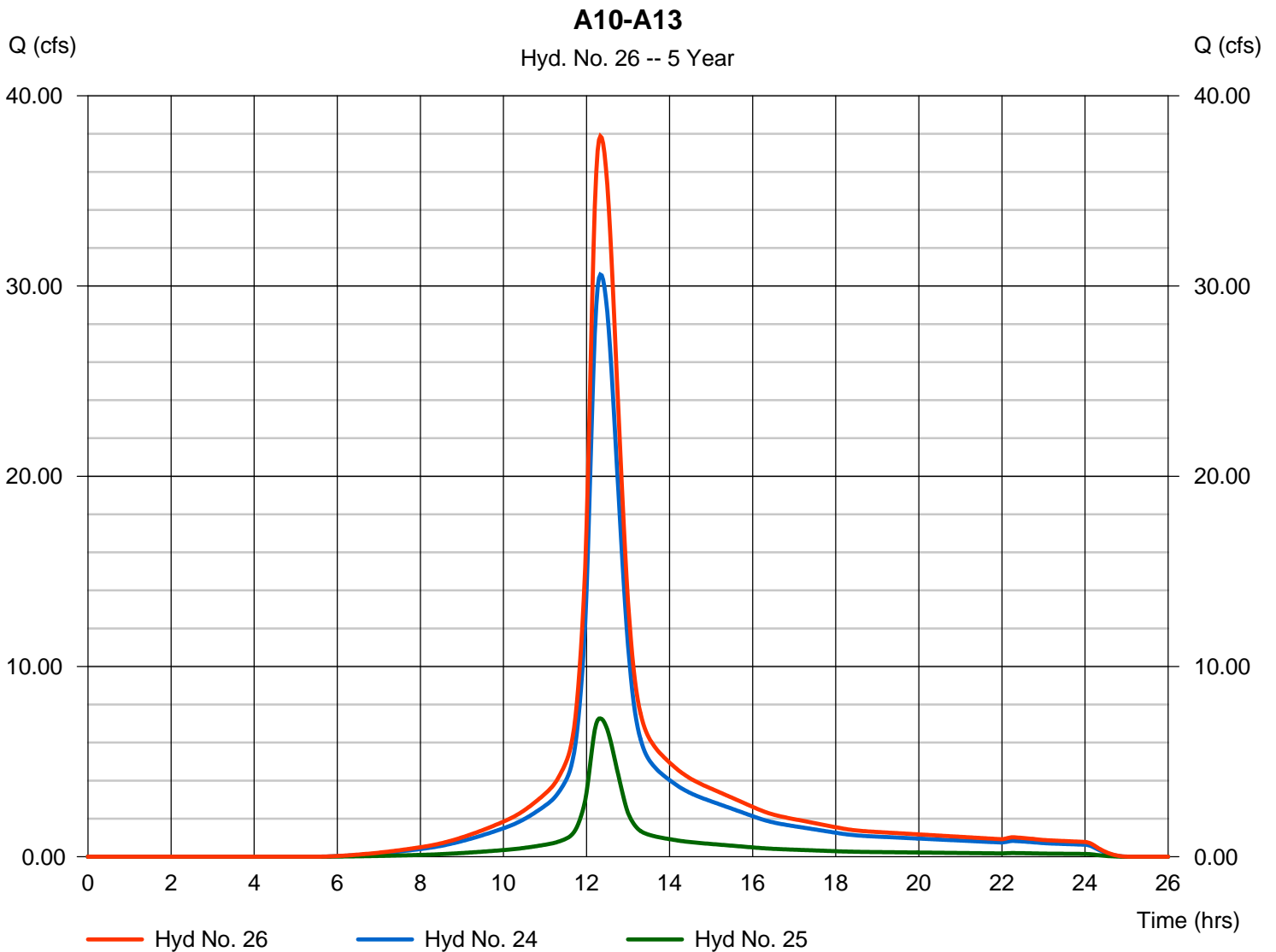
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 24, 25

Peak discharge = 37.87 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 234,250 cuft
 Contrib. drain. area = 3.570 ac



Hydrograph Report

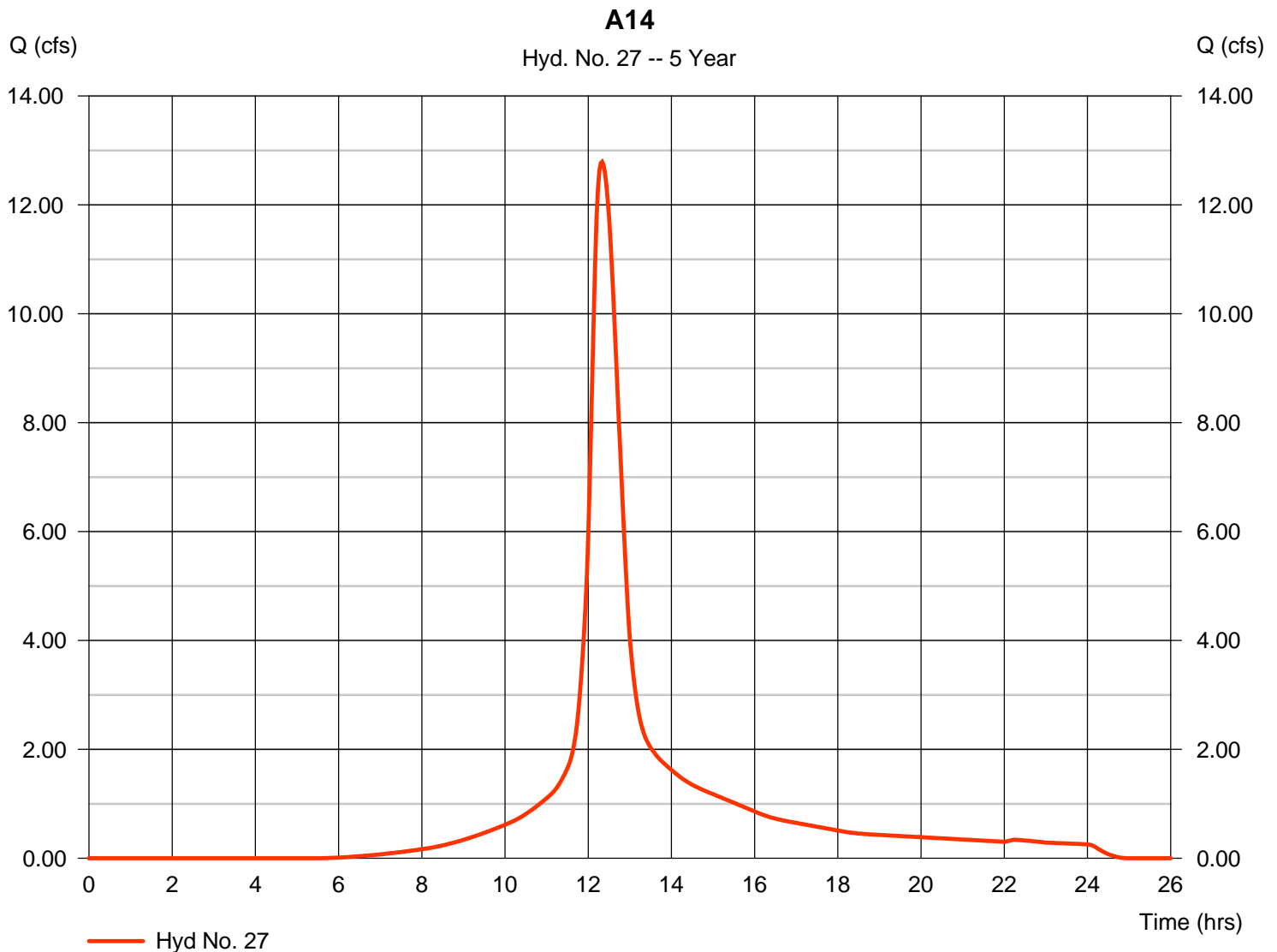
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type	= SCS Runoff	Peak discharge	= 12.79 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 77,380 cuft
Drainage area	= 6.280 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

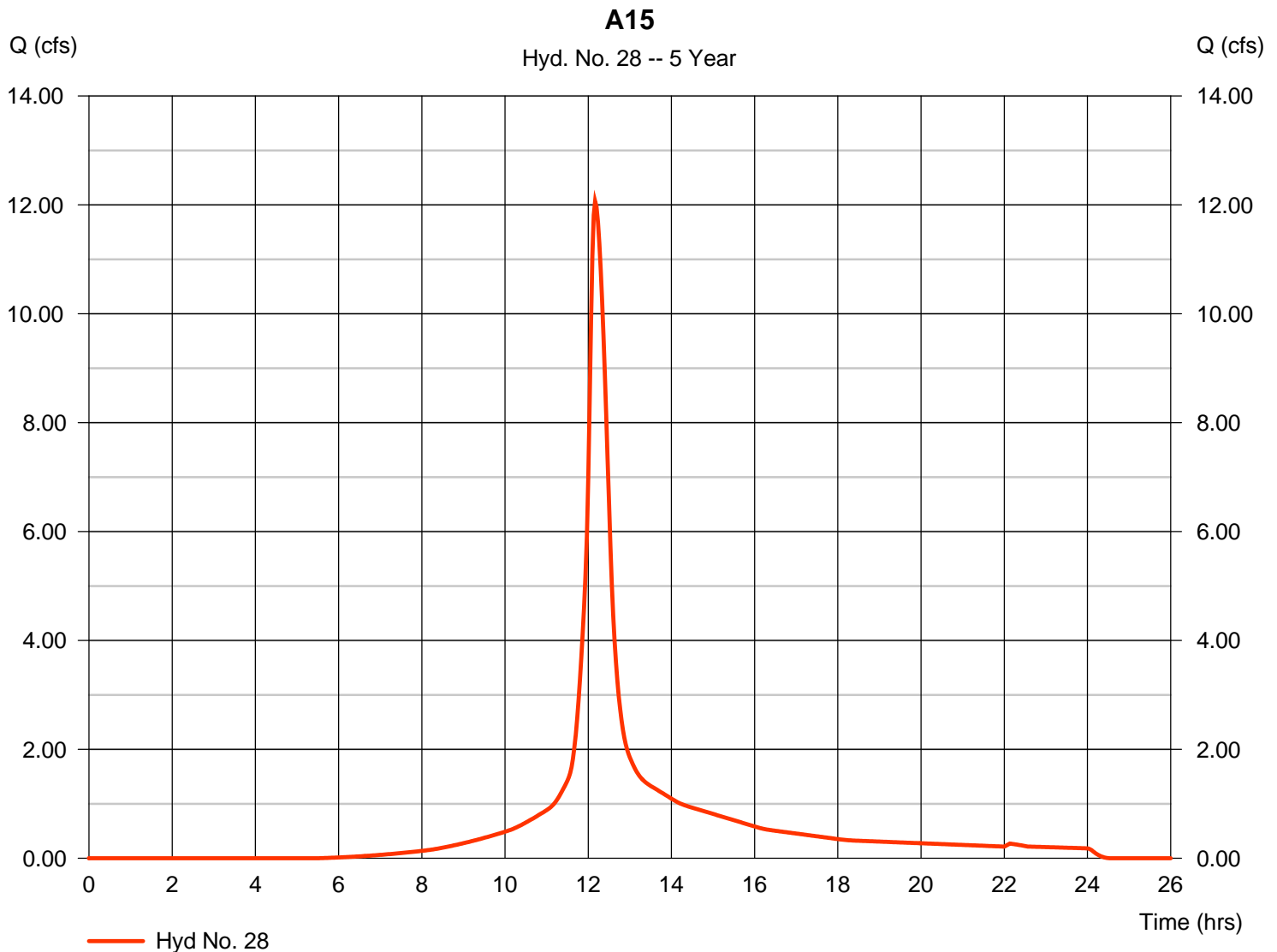
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type	= SCS Runoff	Peak discharge	= 12.07 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 56,207 cuft
Drainage area	= 4.600 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

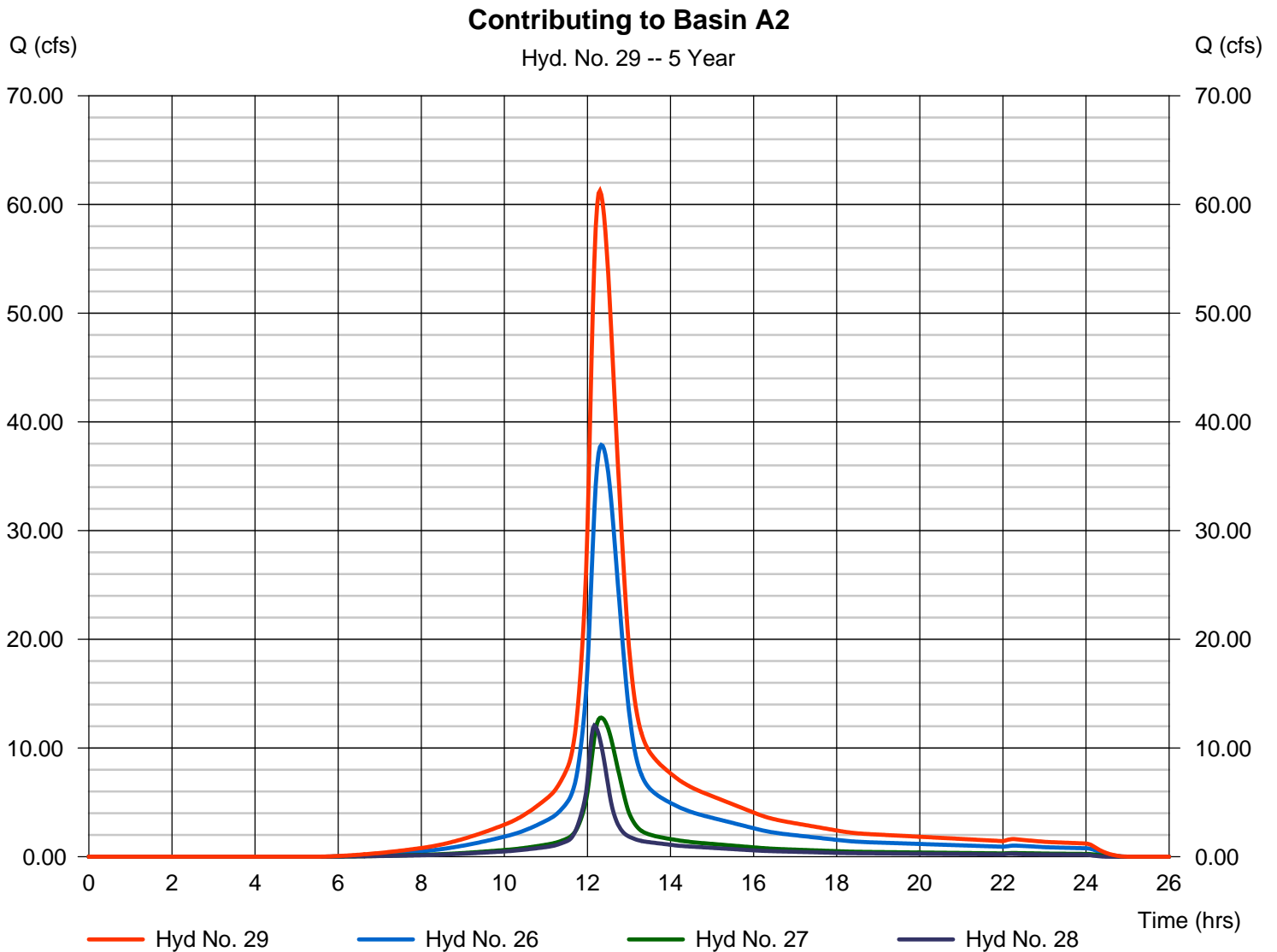
Wednesday, 07 / 15 / 2020

Hyd. No. 29

Contributing to Basin A2

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 26, 27, 28

Peak discharge = 61.26 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 367,837 cuft
 Contrib. drain. area = 10.880 ac



Hydrograph Report

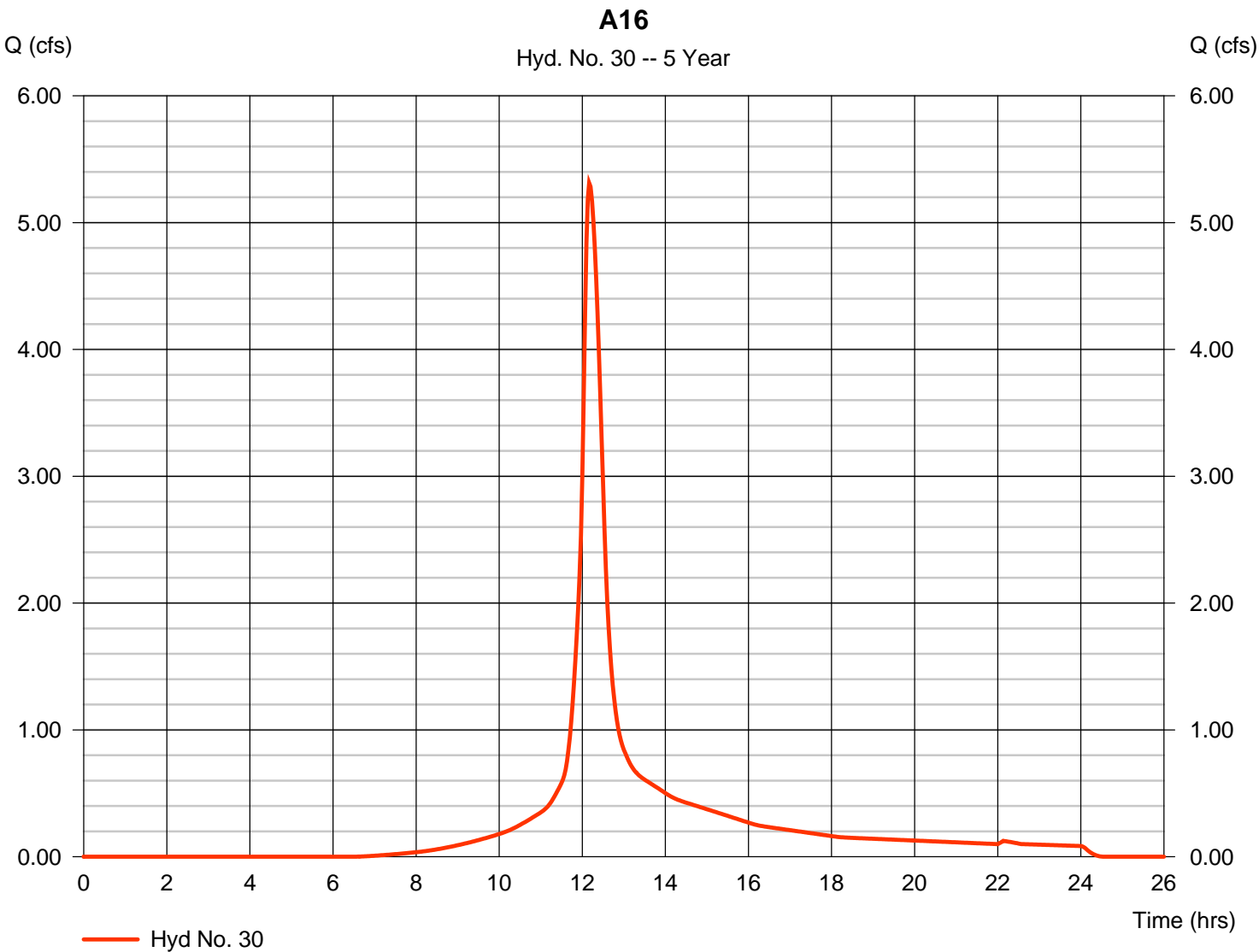
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 5.312 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 24,577 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

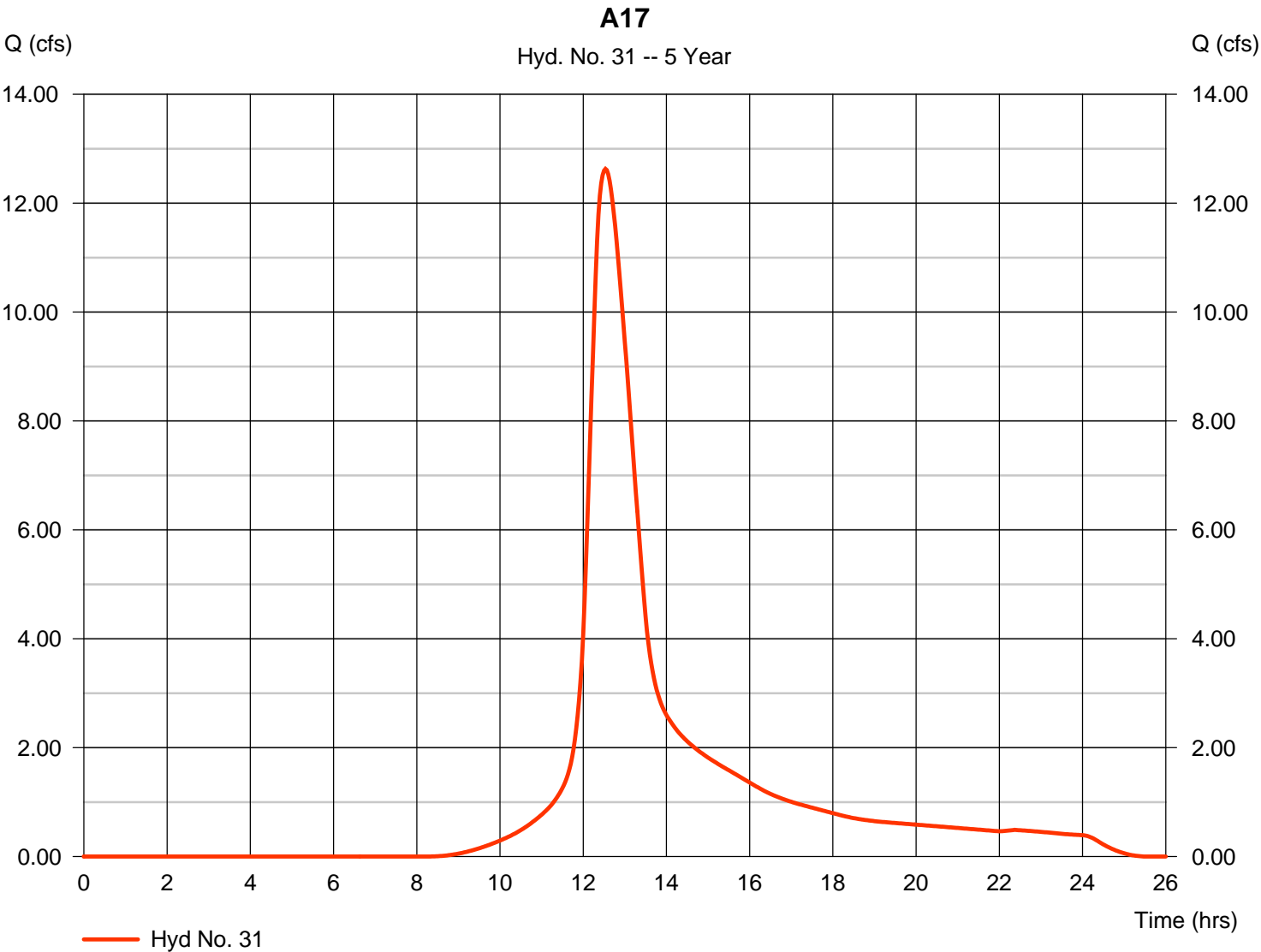
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Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type	= SCS Runoff	Peak discharge	= 12.63 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 96,930 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

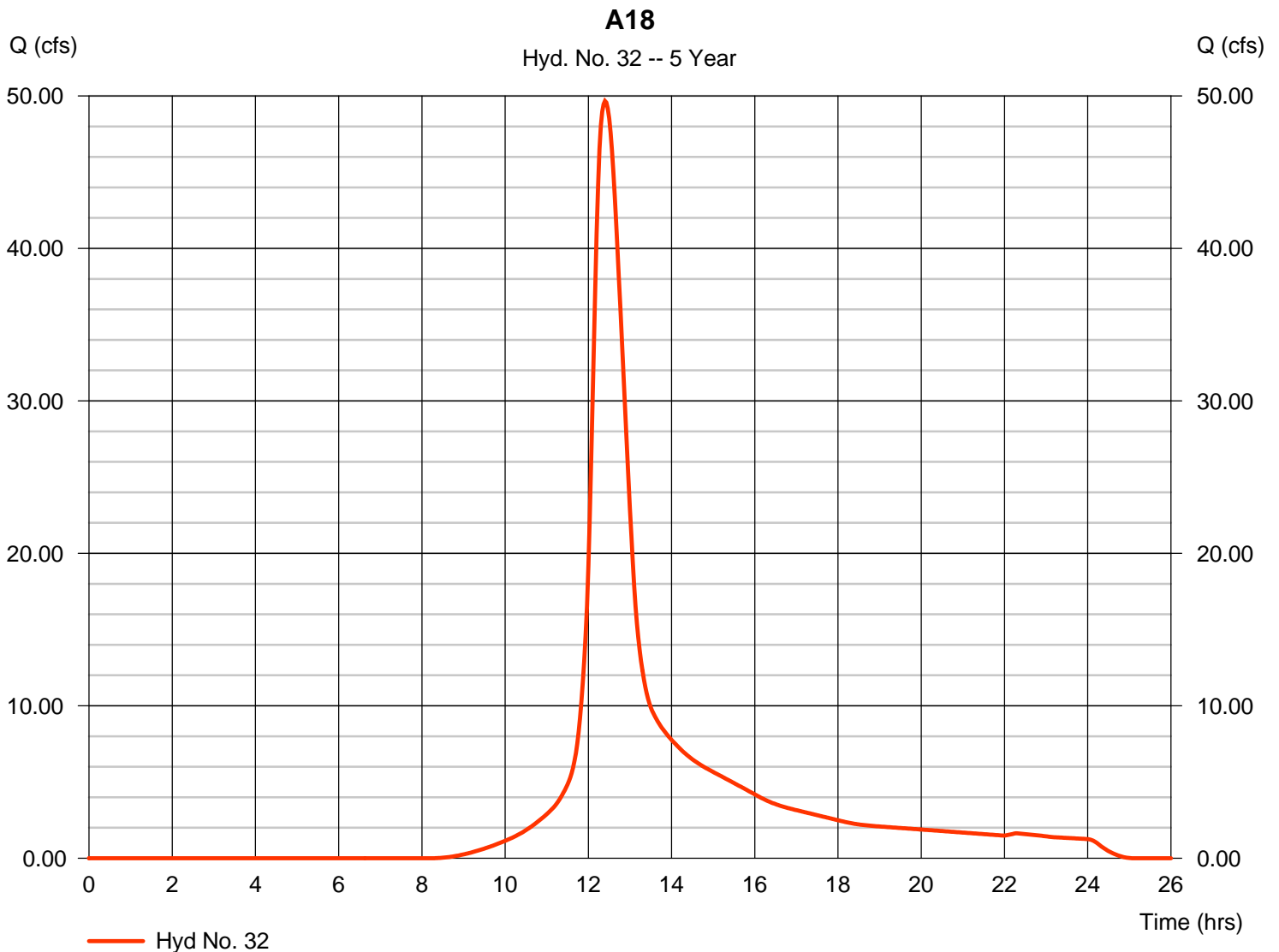
Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 4.83 in
 Storm duration = 24 hrs

Peak discharge = 49.66 cfs
 Time to peak = 12.40 hrs
 Hyd. volume = 317,607 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

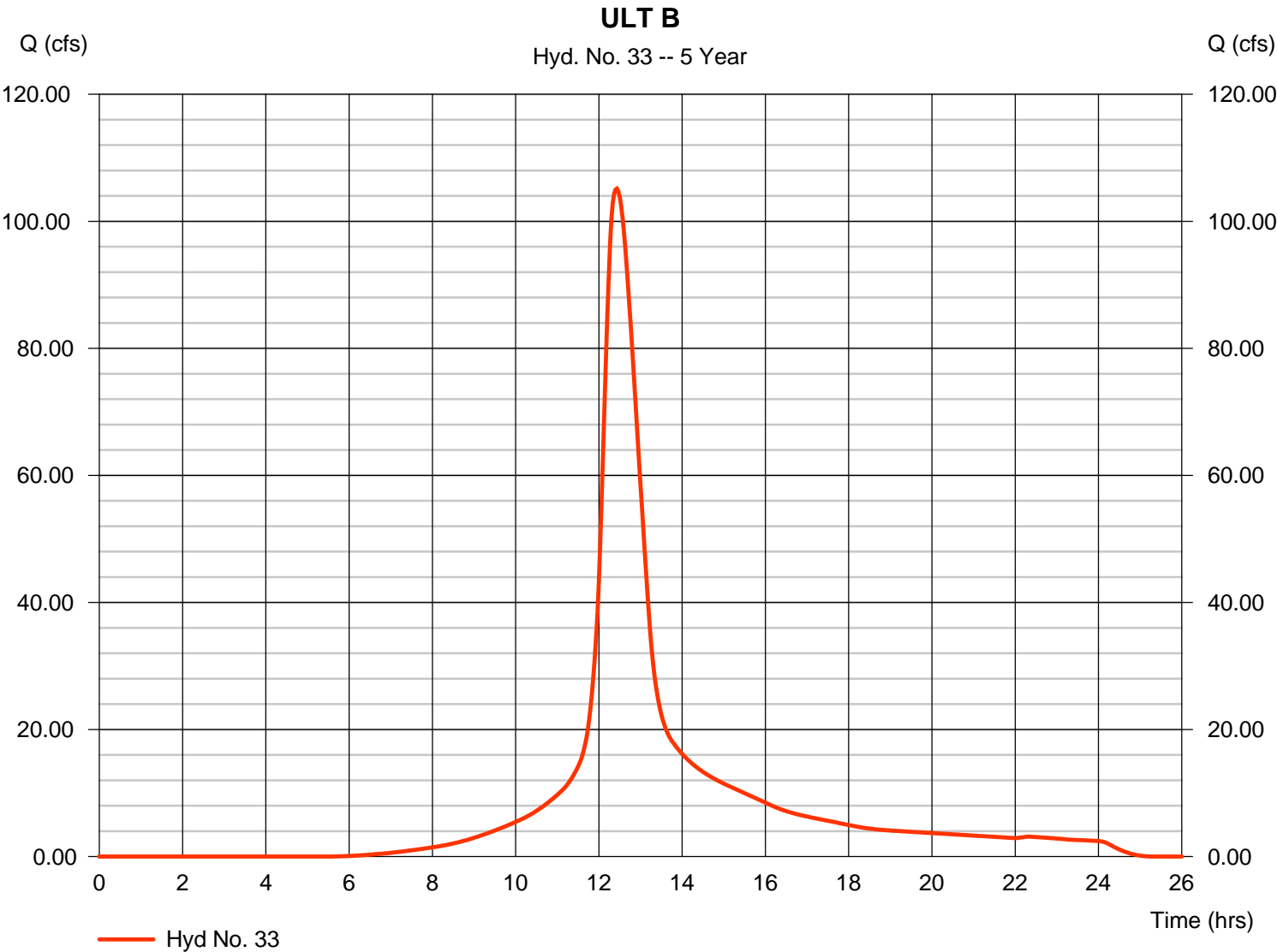
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Wednesday, 07 / 15 / 2020

Hyd. No. 33

ULT B

Hydrograph type	= SCS Runoff	Peak discharge	= 105.14 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 729,821 cuft
Drainage area	= 58.580 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.80 min
Total precip.	= 4.83 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	188.13	2	782	2,206,920	-----	-----	-----	EX A
2	SCS Runoff	35.56	2	762	333,578	-----	-----	-----	EX A1
3	SCS Runoff	17.91	2	752	137,090	-----	-----	-----	EX A2
4	SCS Runoff	101.56	2	758	904,104	-----	-----	-----	EX A3
5	SCS Runoff	48.80	2	786	662,416	-----	-----	-----	EX A4
6	Combine	143.46	2	768	1,566,520	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	109.32	2	770	1,195,859	-----	-----	-----	EX B
8	SCS Runoff	132.76	2	748	981,734	-----	-----	-----	A1
9	SCS Runoff	18.65	2	740	113,976	-----	-----	-----	A2
10	Combine	150.63	2	746	1,095,710	8, 9	-----	-----	A1+A2
11	SCS Runoff	20.84	2	740	127,375	-----	-----	-----	A3
12	SCS Runoff	12.10	2	740	73,944	-----	-----	-----	A4
13	SCS Runoff	16.29	2	740	99,584	-----	-----	-----	A5
14	Combine	198.58	2	744	1,396,613	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	20.28	2	734	106,995	-----	-----	-----	A6
16	SCS Runoff	16.74	2	734	88,313	-----	-----	-----	A7
17	Combine	37.01	2	734	195,308	15, 16	-----	-----	A6+A7
18	SCS Runoff	9.363	2	740	57,236	-----	-----	-----	A8
19	SCS Runoff	36.26	2	730	170,605	-----	-----	-----	A9
20	Combine	270.17	2	740	1,819,763	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	4.345	2	736	24,755	-----	-----	-----	A10
22	SCS Runoff	19.71	2	742	128,282	-----	-----	-----	A11
23	SCS Runoff	16.75	2	740	102,396	-----	-----	-----	A12
24	Combine	40.69	2	740	255,433	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	9.661	2	740	59,056	-----	-----	-----	A13
26	Combine	50.35	2	740	314,489	24, 25	-----	-----	A10-A13
27	SCS Runoff	16.99	2	740	103,885	-----	-----	-----	A14
28	SCS Runoff	16.04	2	730	75,460	-----	-----	-----	A15
29	Combine	81.42	2	738	493,834	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	7.206	2	730	33,550	-----	-----	-----	A16
31	SCS Runoff	17.91	2	752	137,090	-----	-----	-----	A17
32	SCS Runoff	70.35	2	744	449,197	-----	-----	-----	A18
33	SCS Runoff	139.75	2	746	979,811	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 10 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

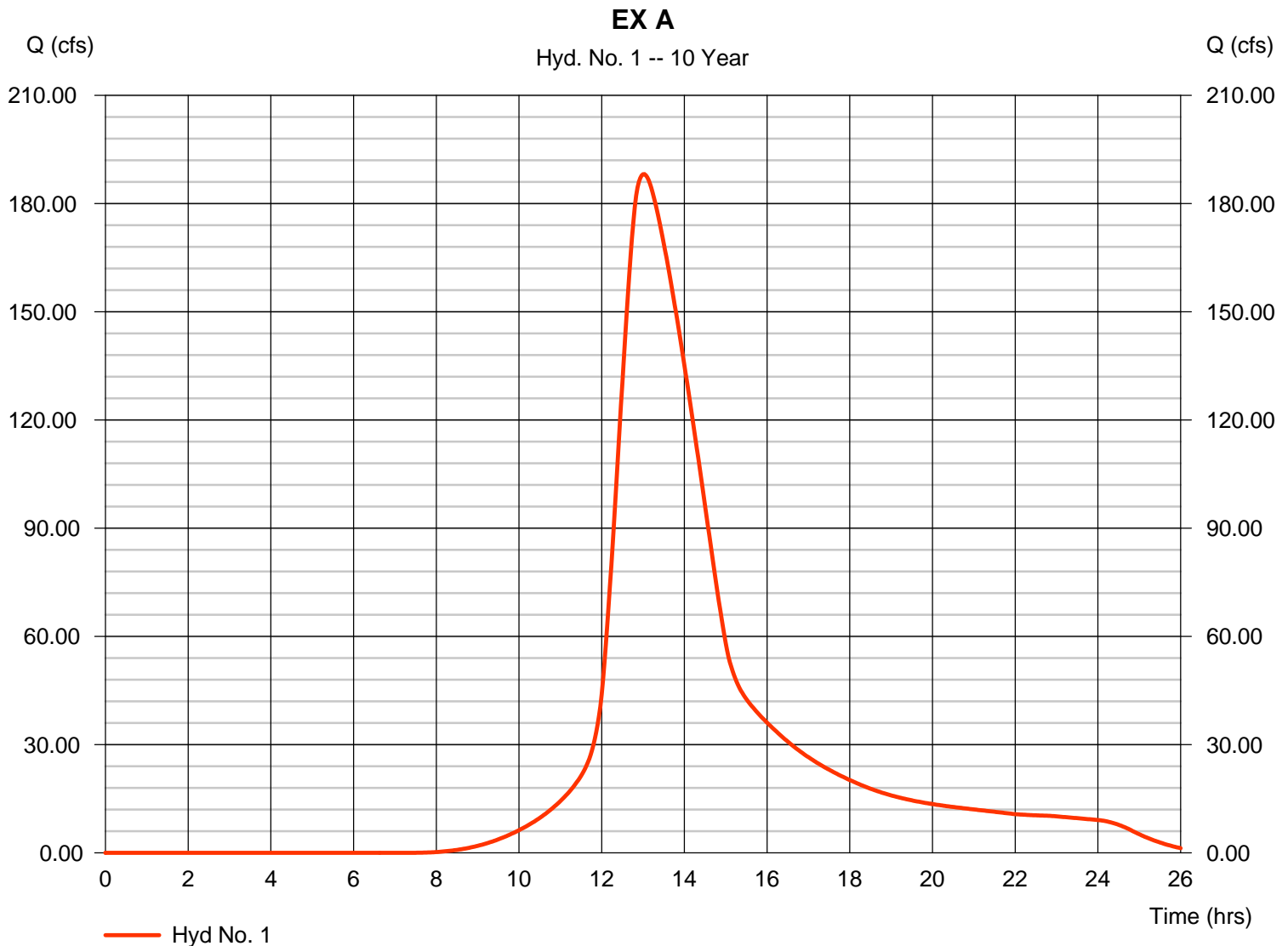
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 1

EX A

Hydrograph type	= SCS Runoff	Peak discharge	= 188.13 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.03 hrs
Time interval	= 2 min	Hyd. volume	= 2,206,920 cuft
Drainage area	= 167.740 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 83.60 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 350



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

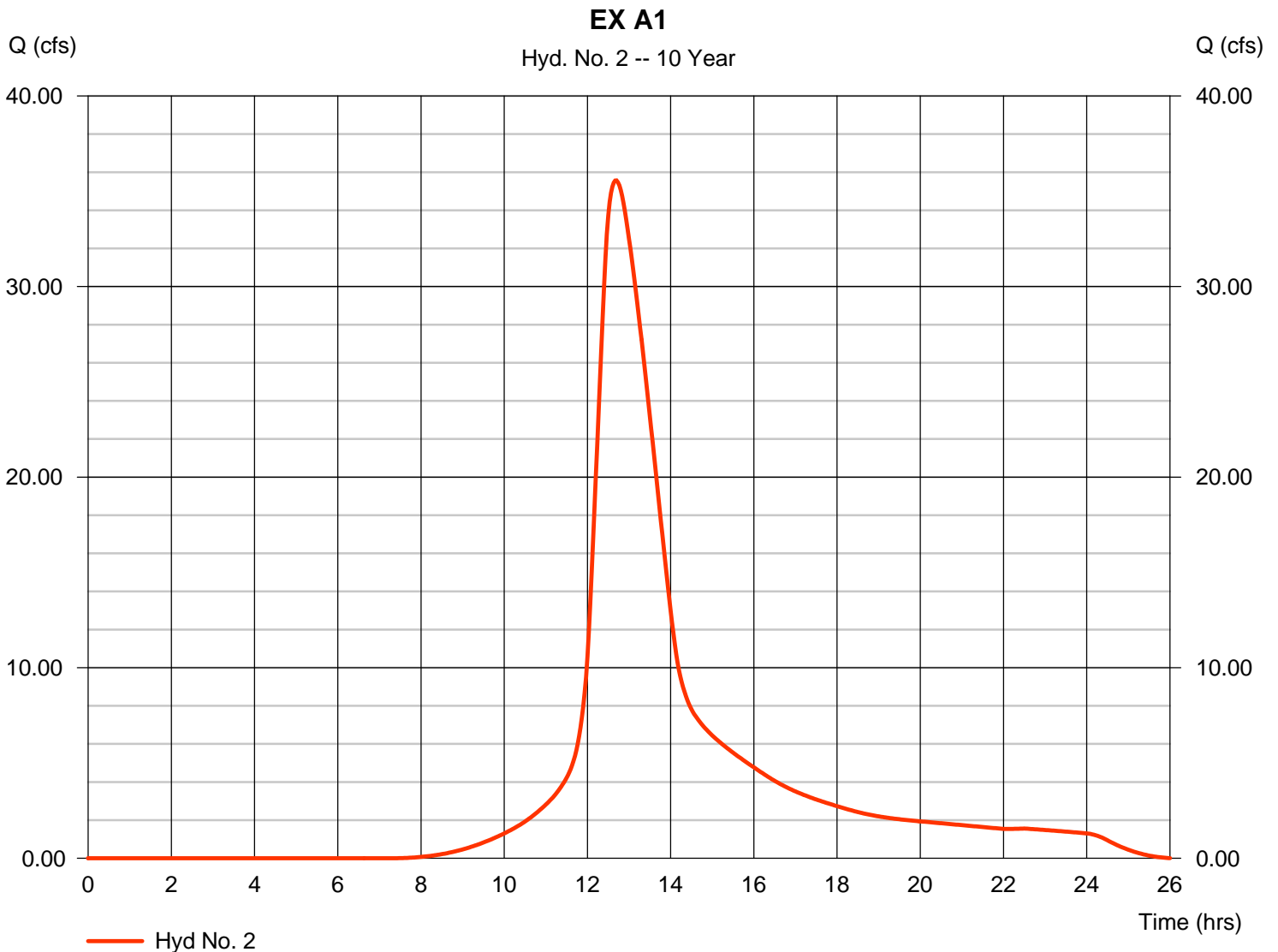
Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 25.120 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 35.56 cfs
 Time to peak = 12.70 hrs
 Hyd. volume = 333,578 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 49.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

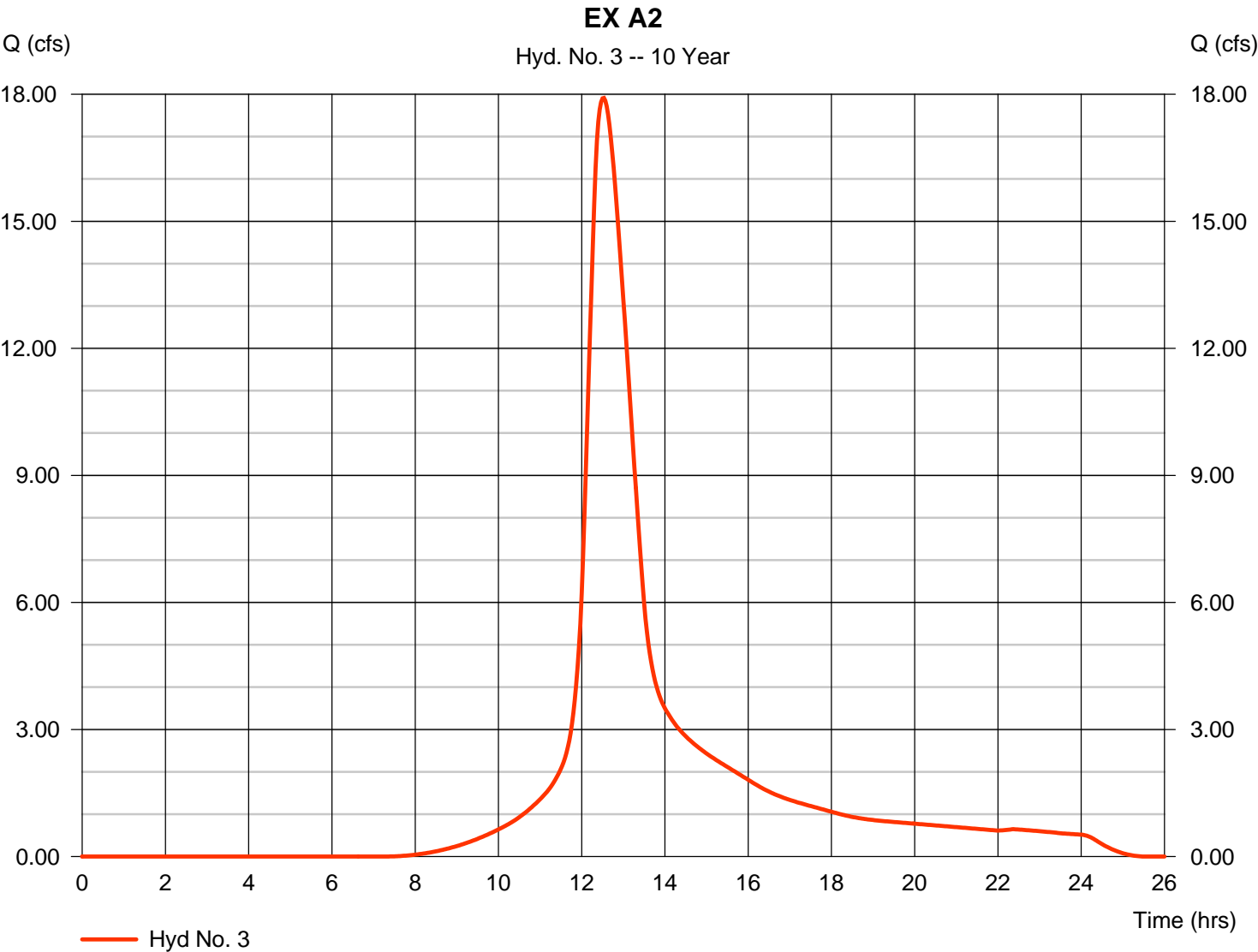
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type	= SCS Runoff	Peak discharge	= 17.91 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 137,090 cuft
Drainage area	= 10.470 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.30 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

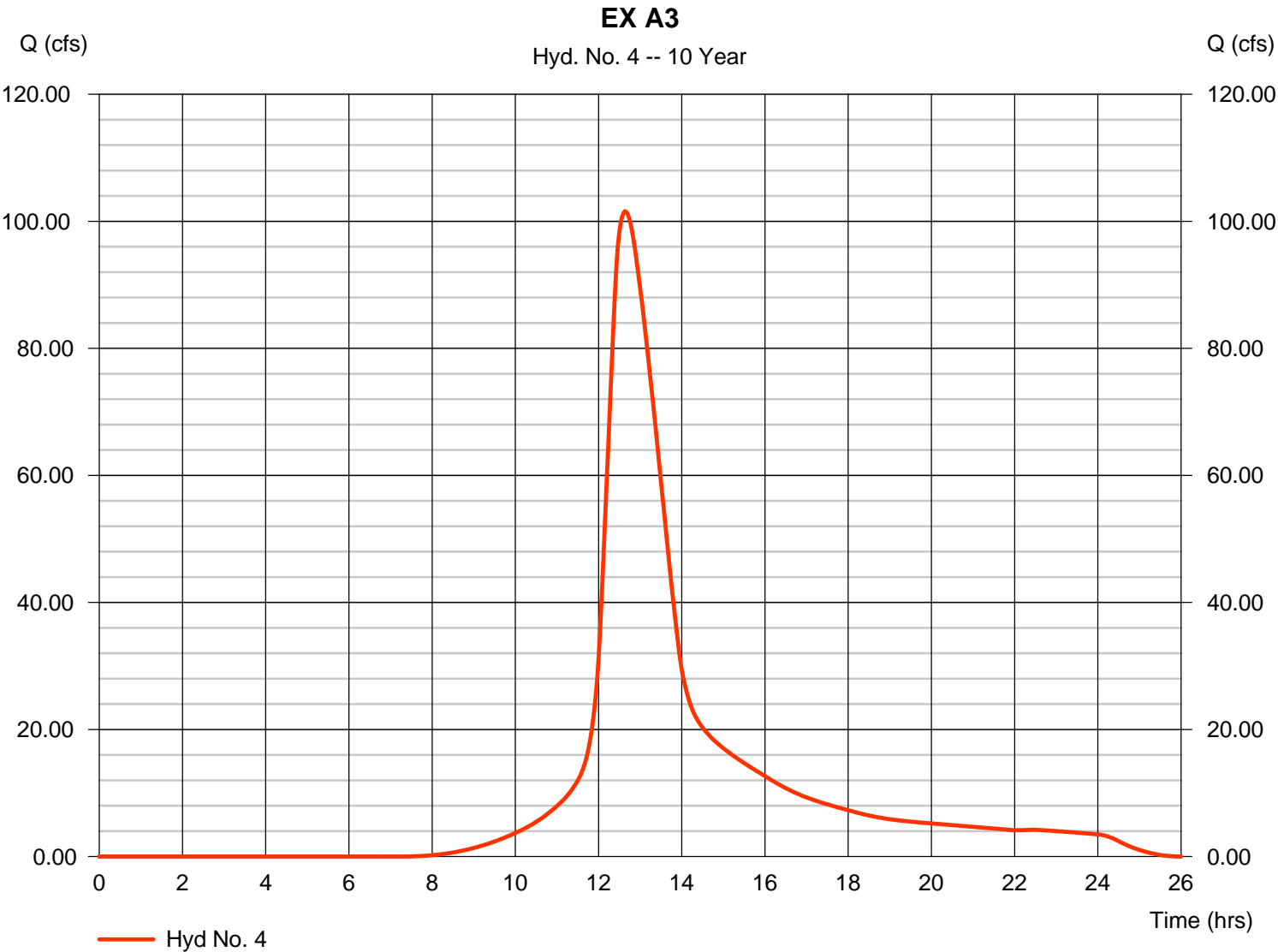
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Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 101.56 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 904,104 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

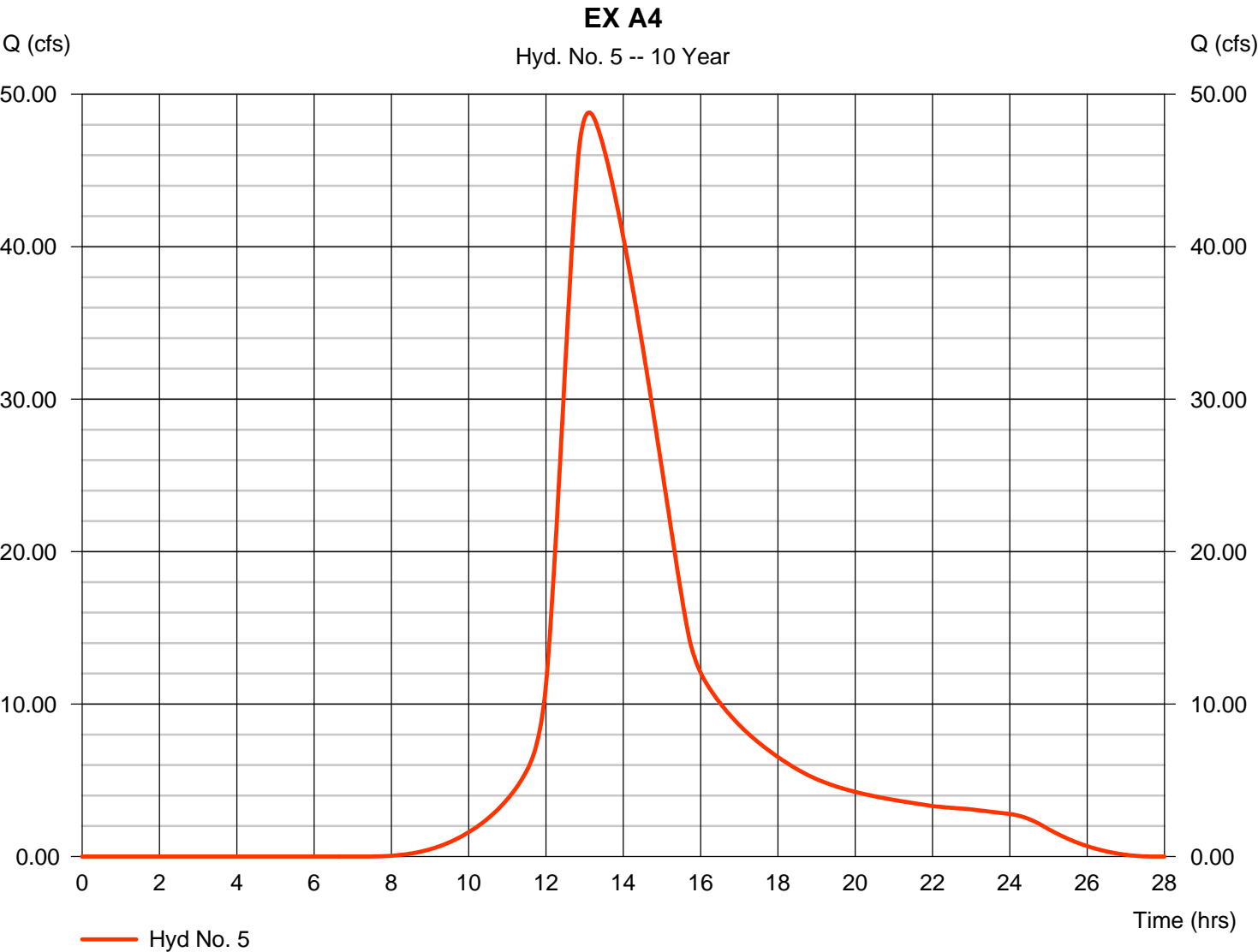
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type	= SCS Runoff	Peak discharge	= 48.80 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.10 hrs
Time interval	= 2 min	Hyd. volume	= 662,416 cuft
Drainage area	= 50.180 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 87.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

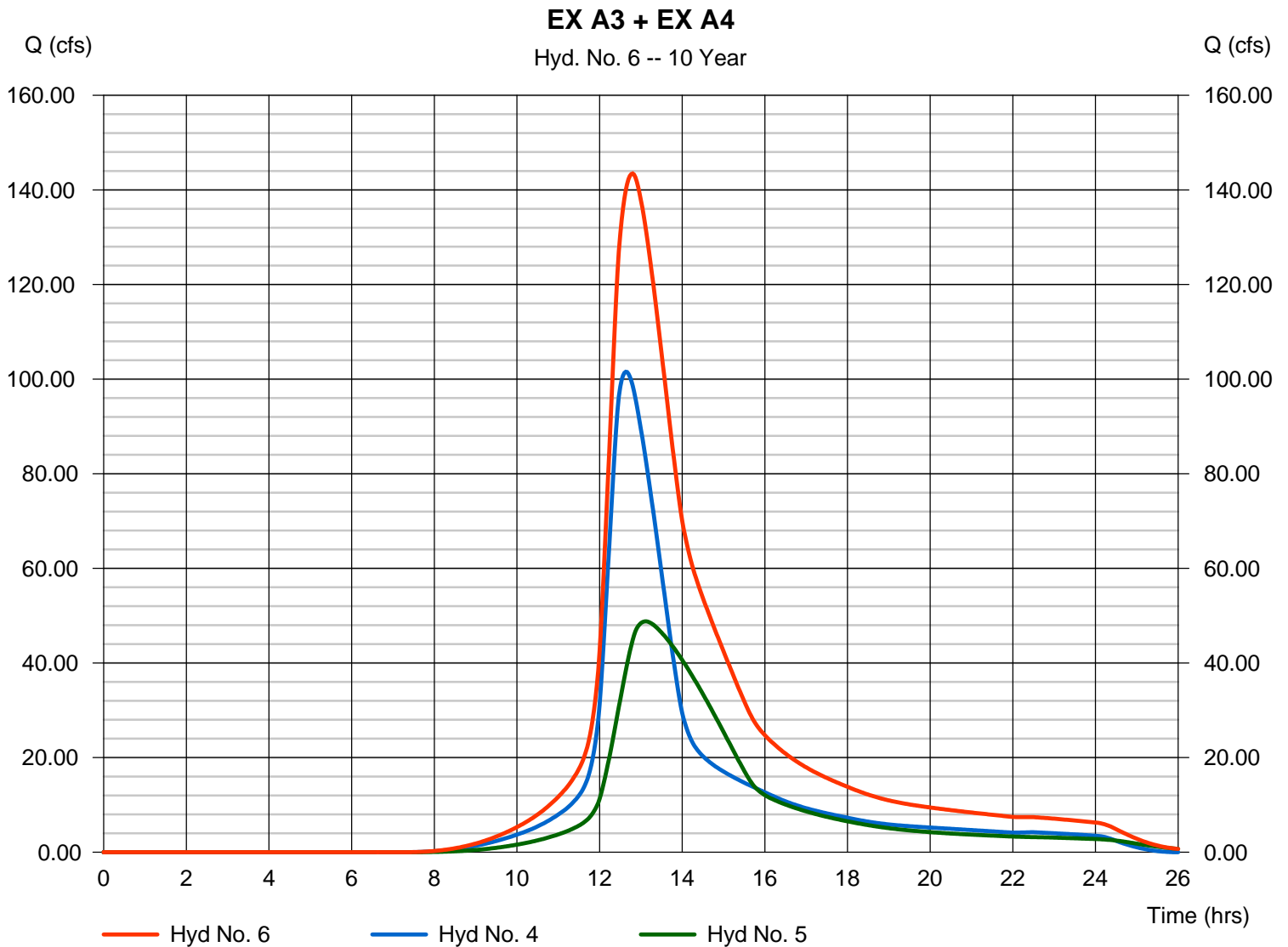
Wednesday, 07 / 15 / 2020

Hyd. No. 6

EX A3 + EX A4

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 143.46 cfs
Time to peak = 12.80 hrs
Hyd. volume = 1,566,520 cuft
Contrib. drain. area = 119.020 ac



Hydrograph Report

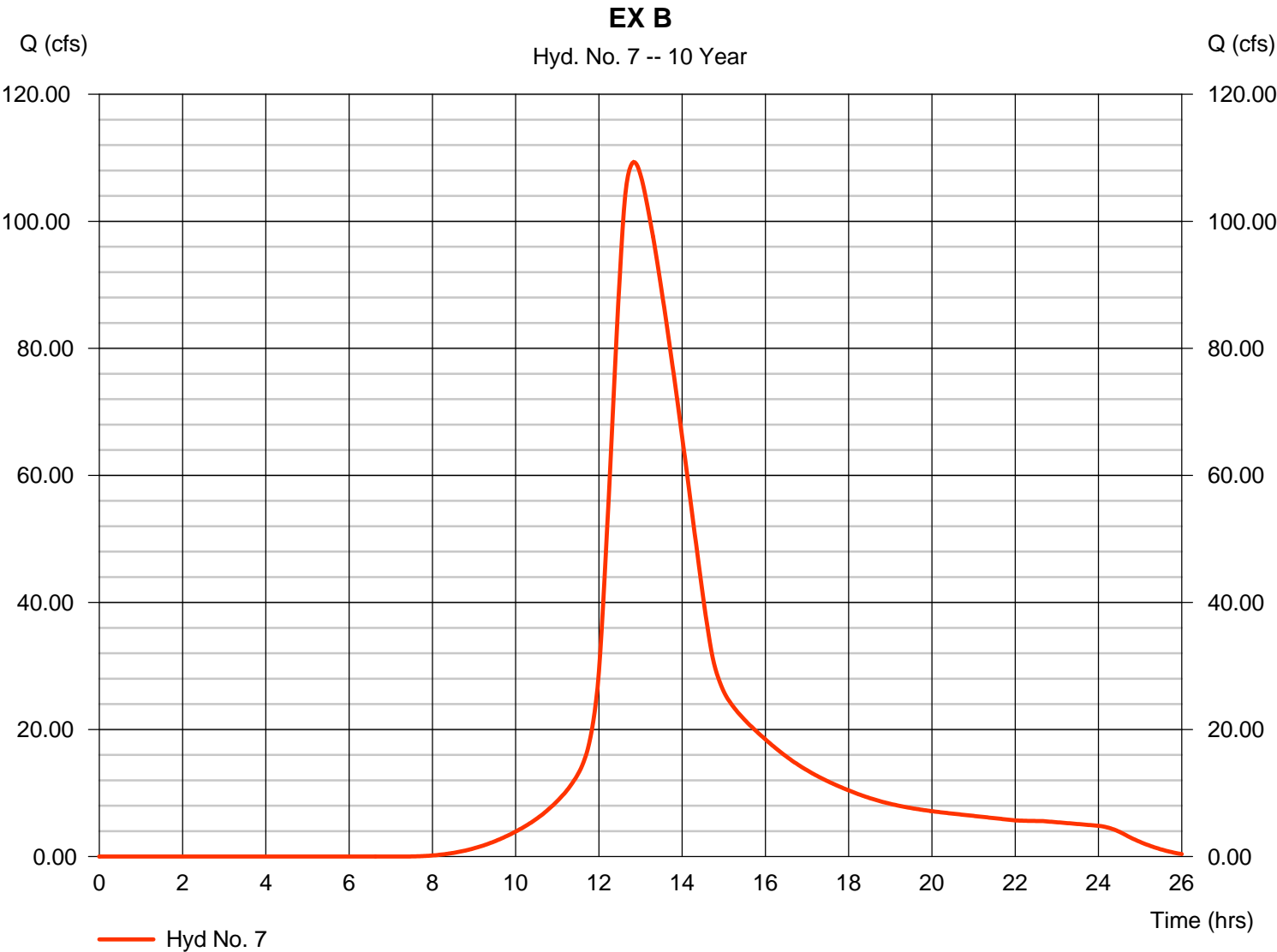
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 109.32 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,195,859 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

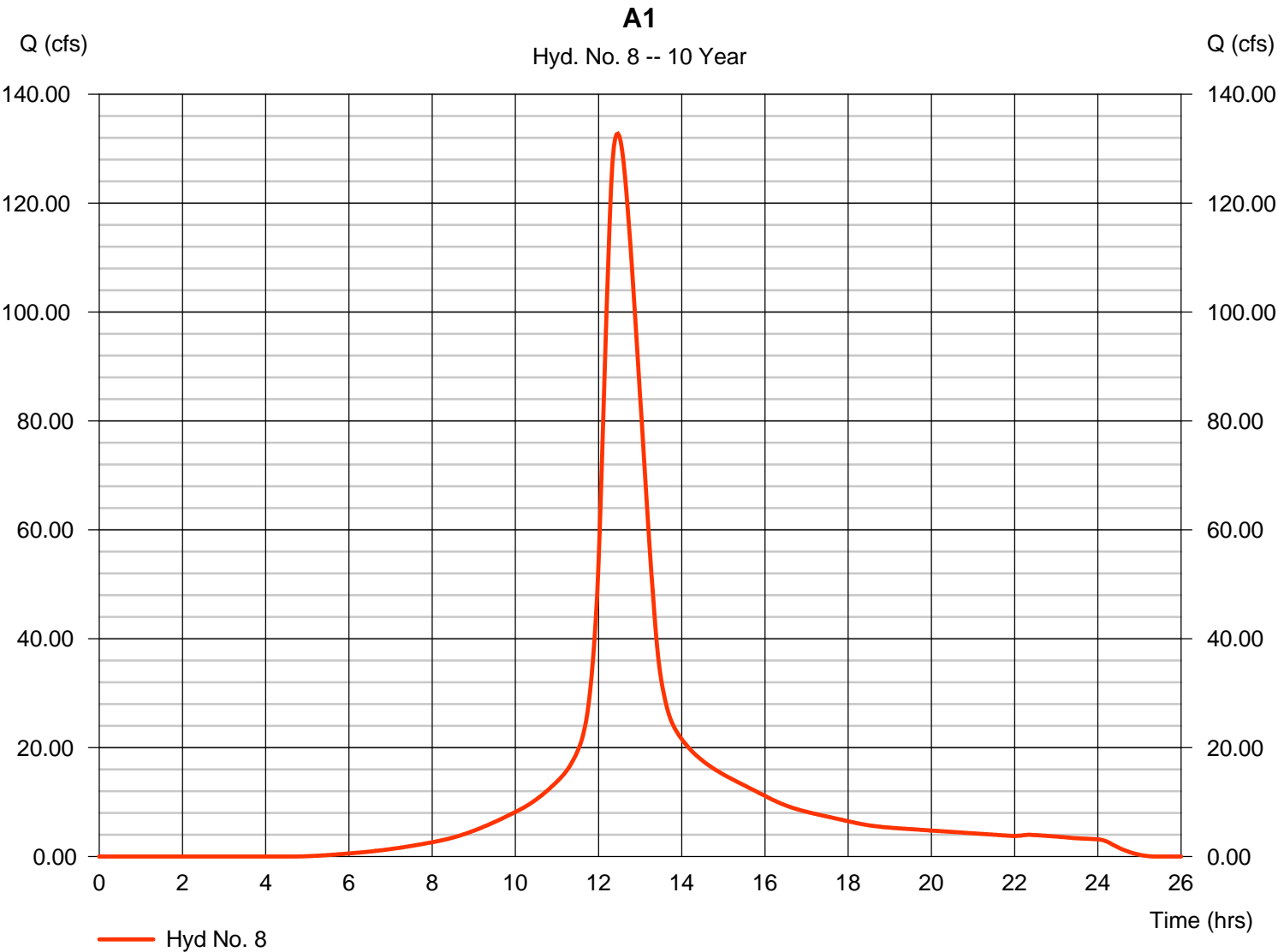
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Wednesday, 07 / 15 / 2020

Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 132.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 981,734 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

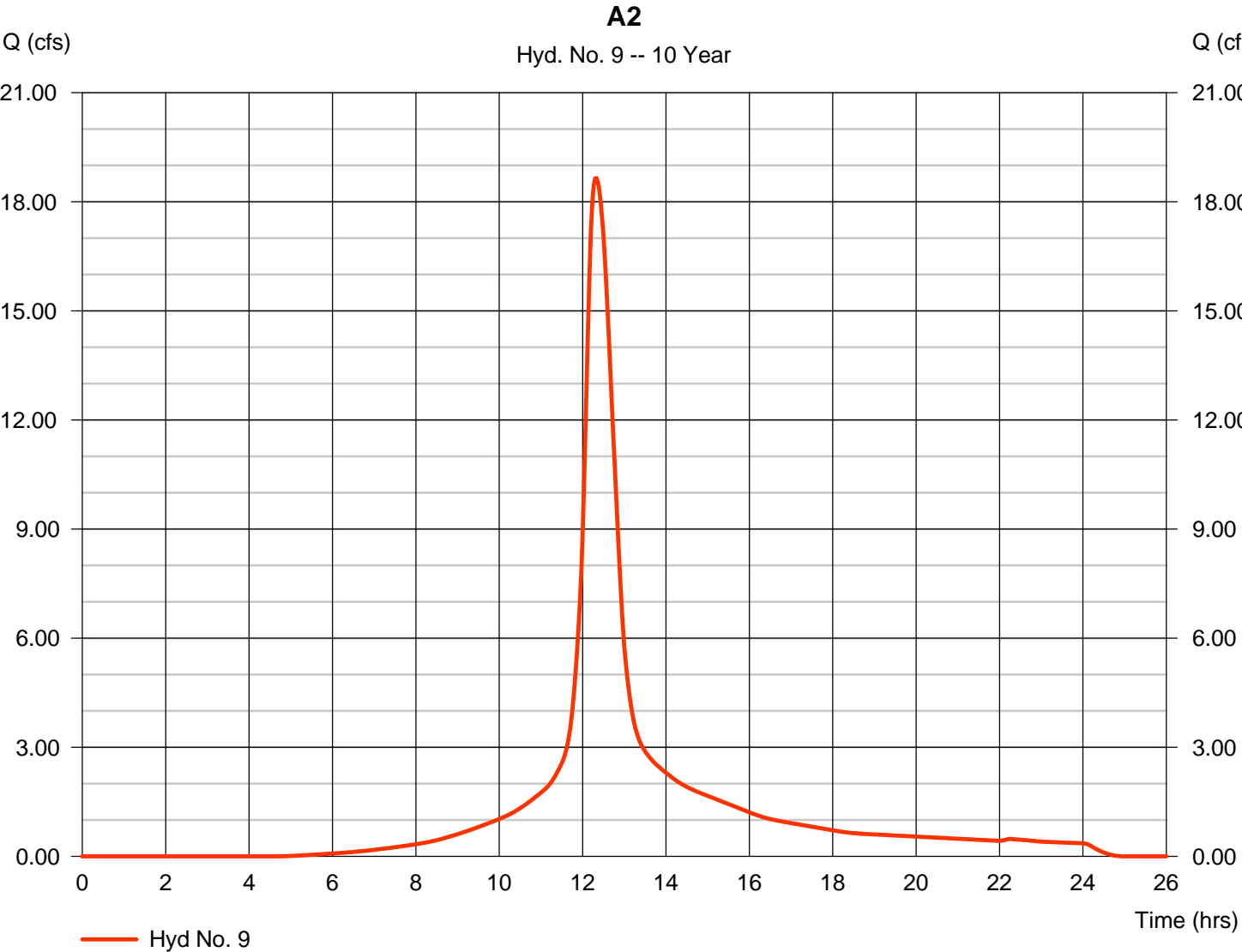
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 9

A2

Hydrograph type	= SCS Runoff	Peak discharge	= 18.65 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 113,976 cuft
Drainage area	= 6.890 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.50 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

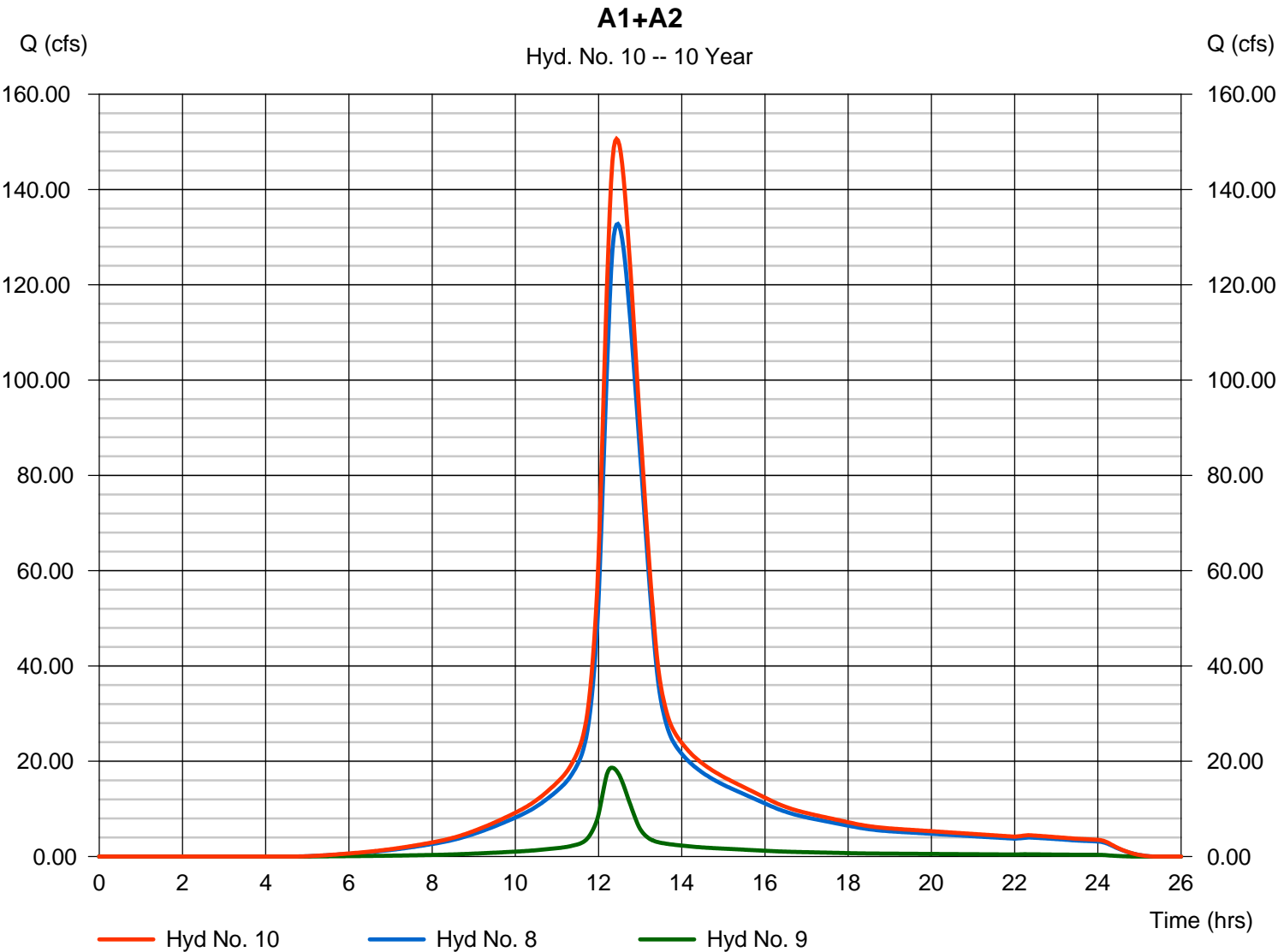
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type	= Combine	Peak discharge	= 150.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,095,710 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 66.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

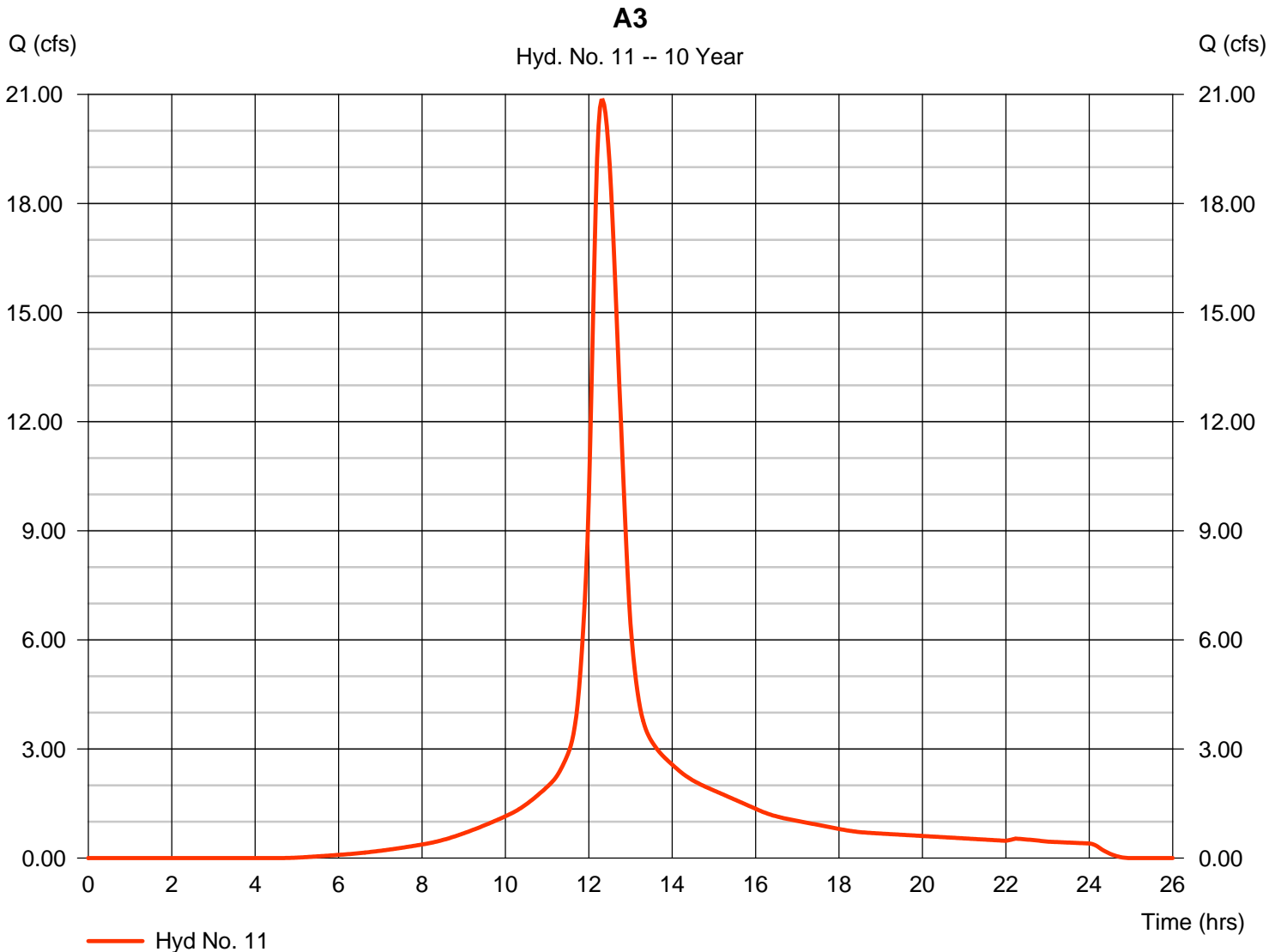
Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 7.700 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 20.84 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 127,375 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

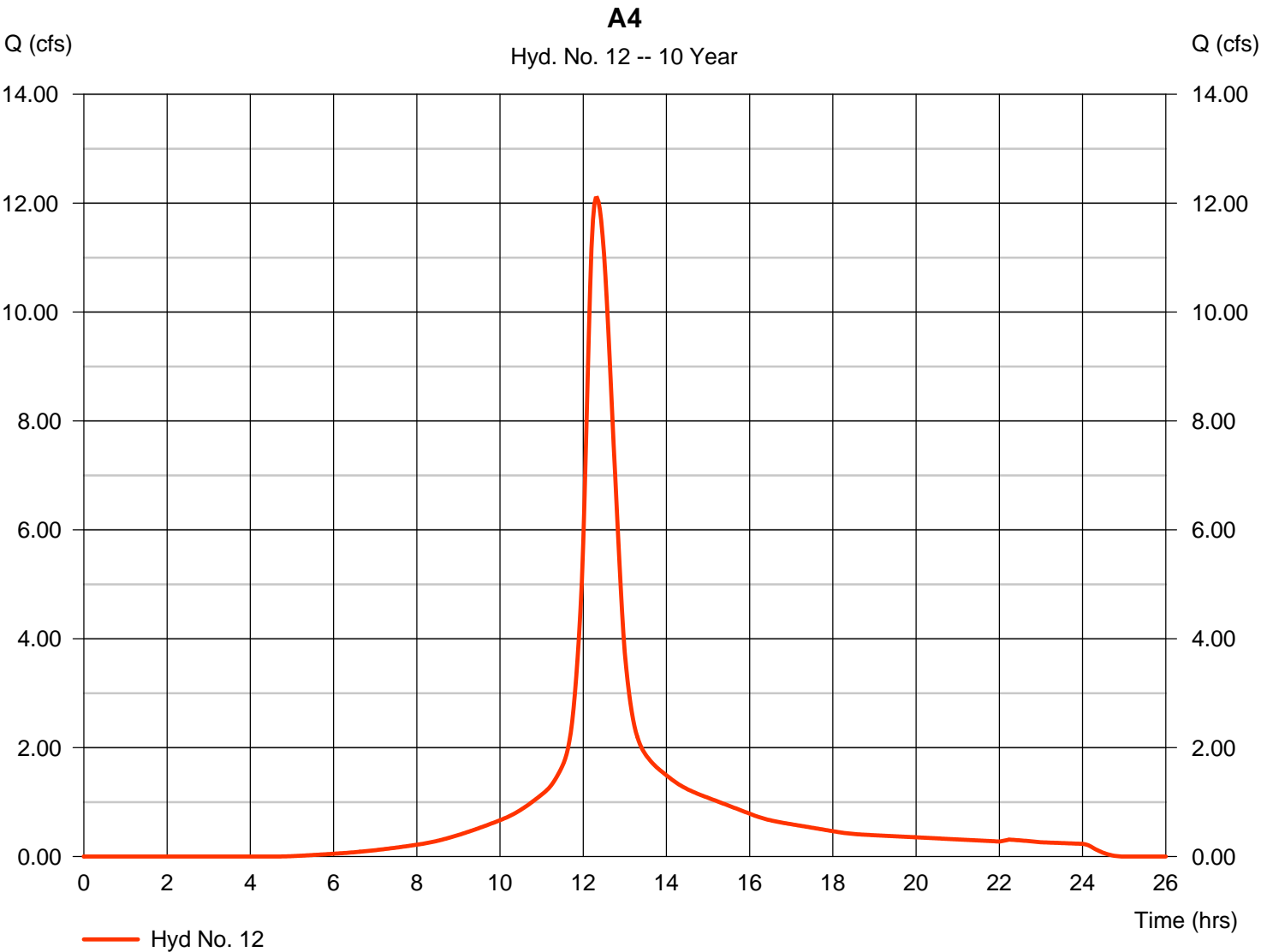
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 12

A4

Hydrograph type	= SCS Runoff	Peak discharge	= 12.10 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 73,944 cuft
Drainage area	= 4.470 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.70 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

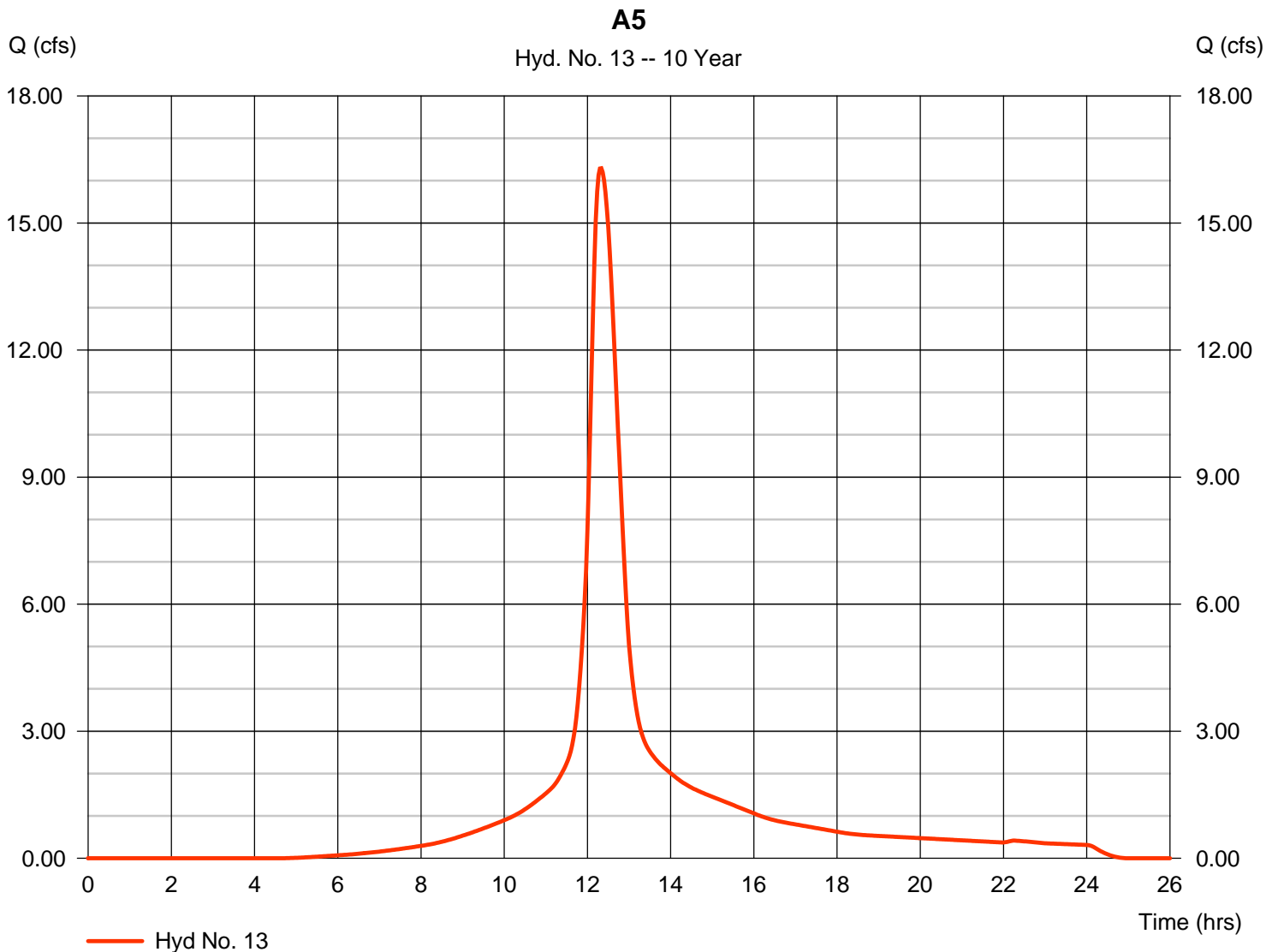
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 13

A5

Hydrograph type	= SCS Runoff	Peak discharge	= 16.29 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 99,584 cuft
Drainage area	= 6.020 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.60 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

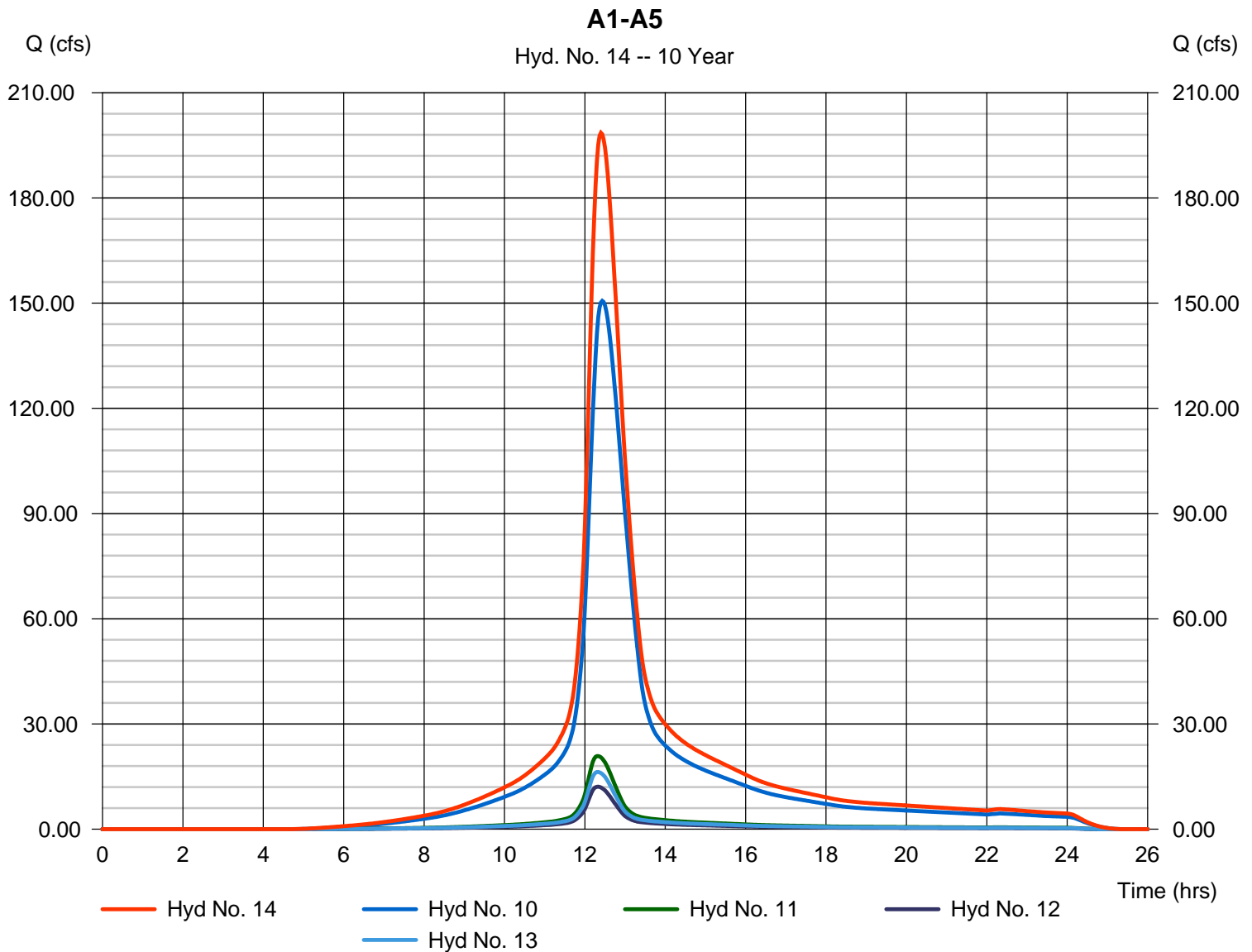
Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 10, 11, 12, 13

Peak discharge = 198.58 cfs
 Time to peak = 12.40 hrs
 Hyd. volume = 1,396,613 cuft
 Contrib. drain. area = 18.190 ac



Hydrograph Report

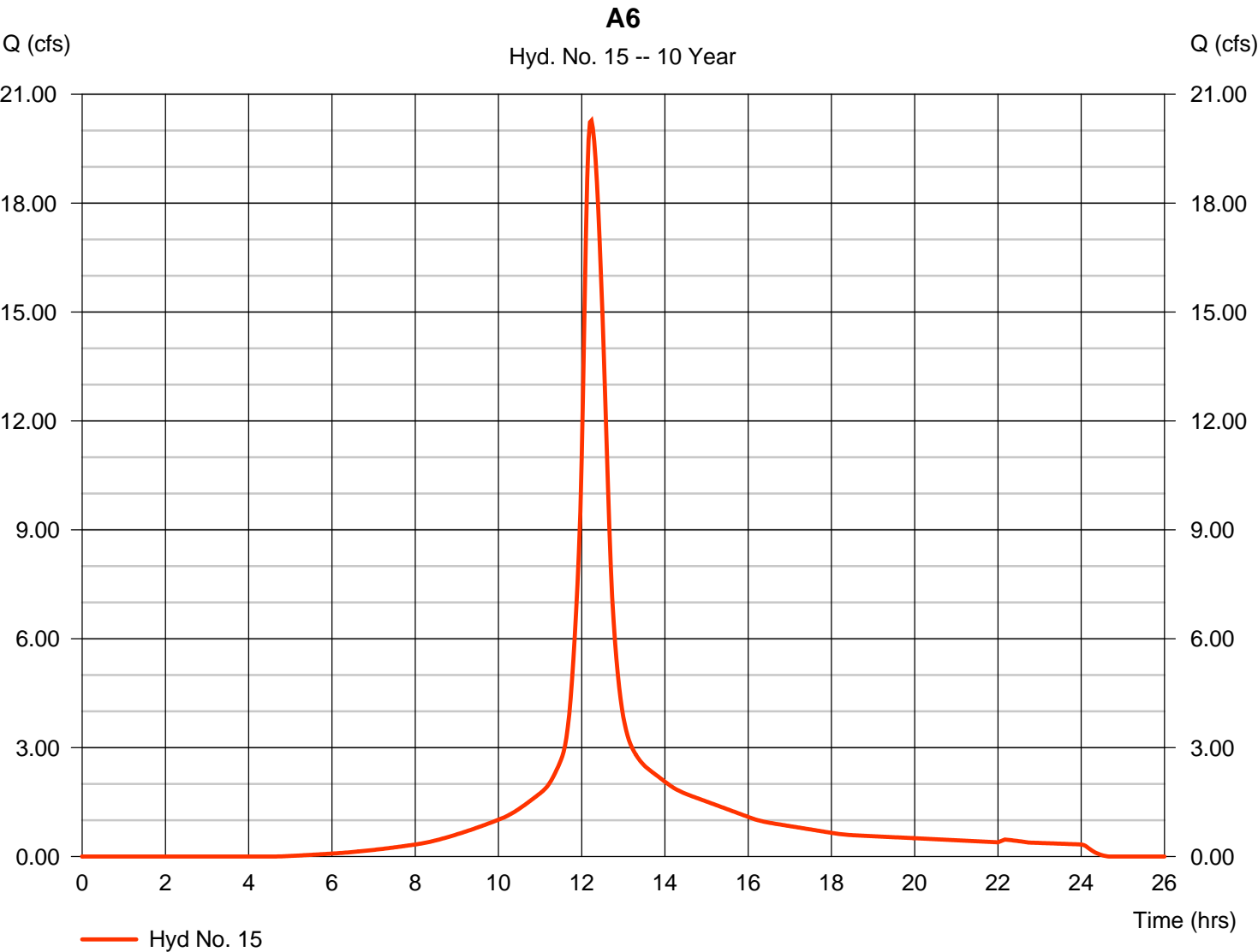
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type	= SCS Runoff	Peak discharge	= 20.28 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 106,995 cuft
Drainage area	= 6.300 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.30 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

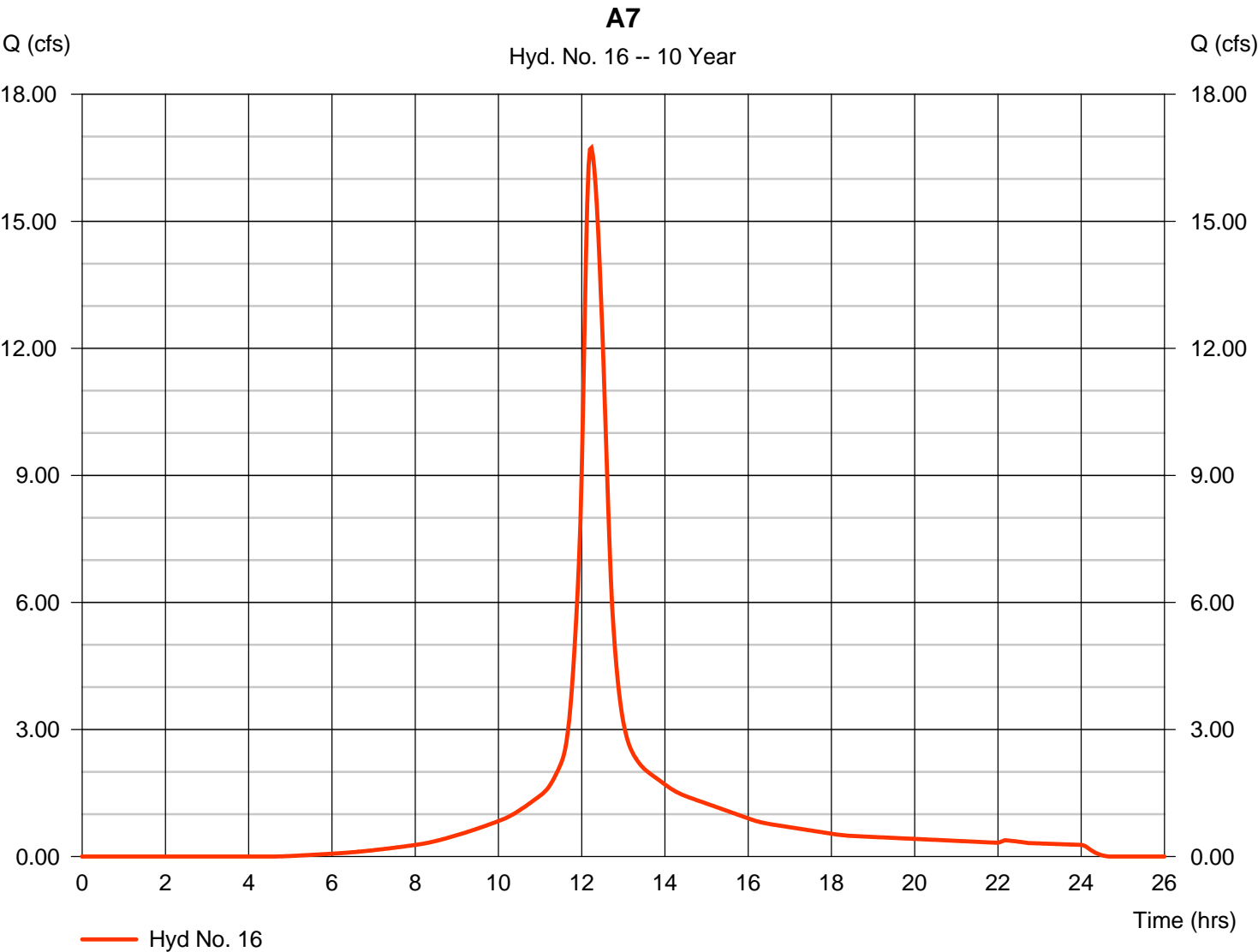
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type	= SCS Runoff	Peak discharge	= 16.74 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 88,313 cuft
Drainage area	= 5.200 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.70 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

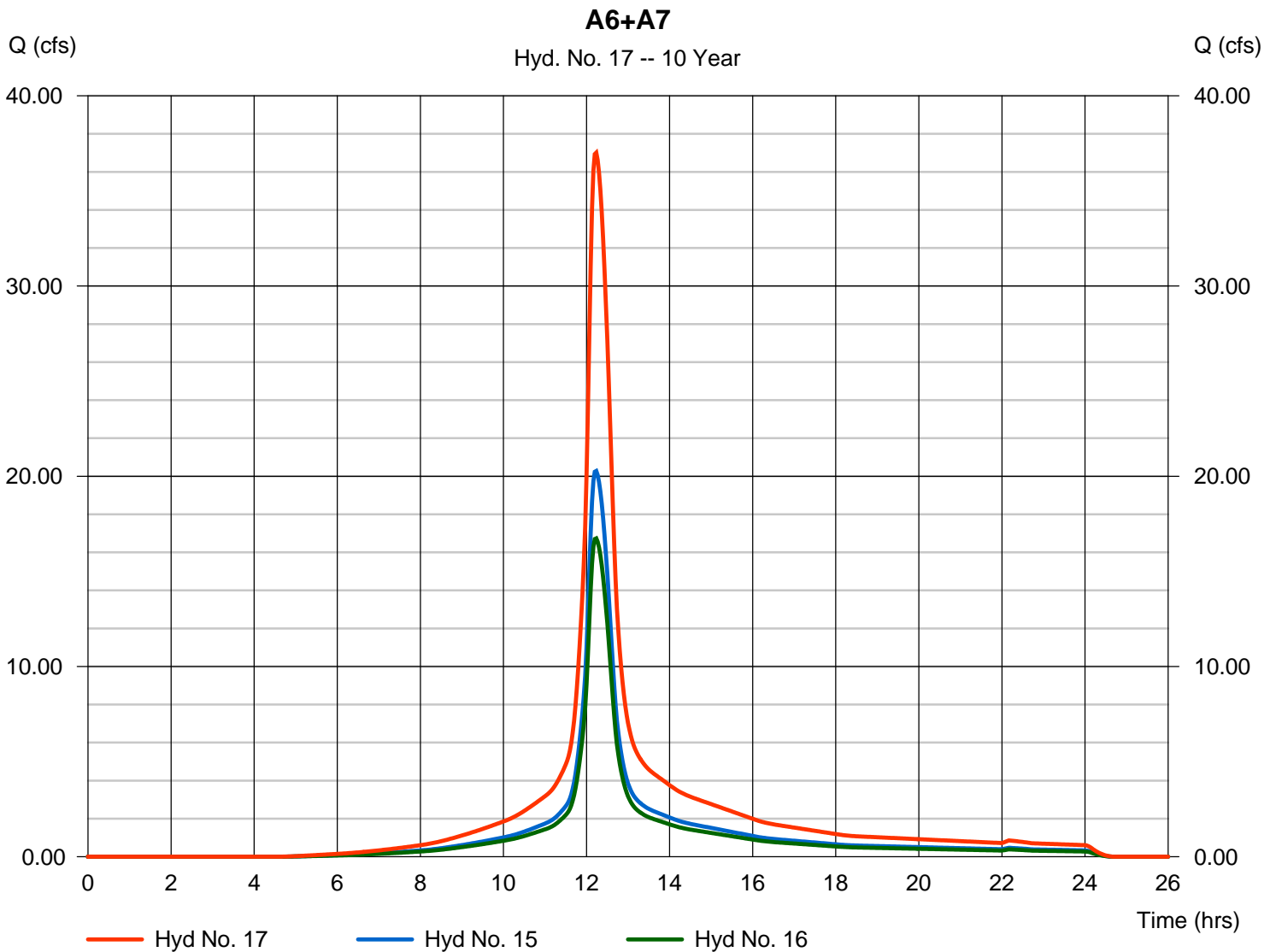
Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 15, 16

Peak discharge = 37.01 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 195,308 cuft
 Contrib. drain. area = 11.500 ac



Hydrograph Report

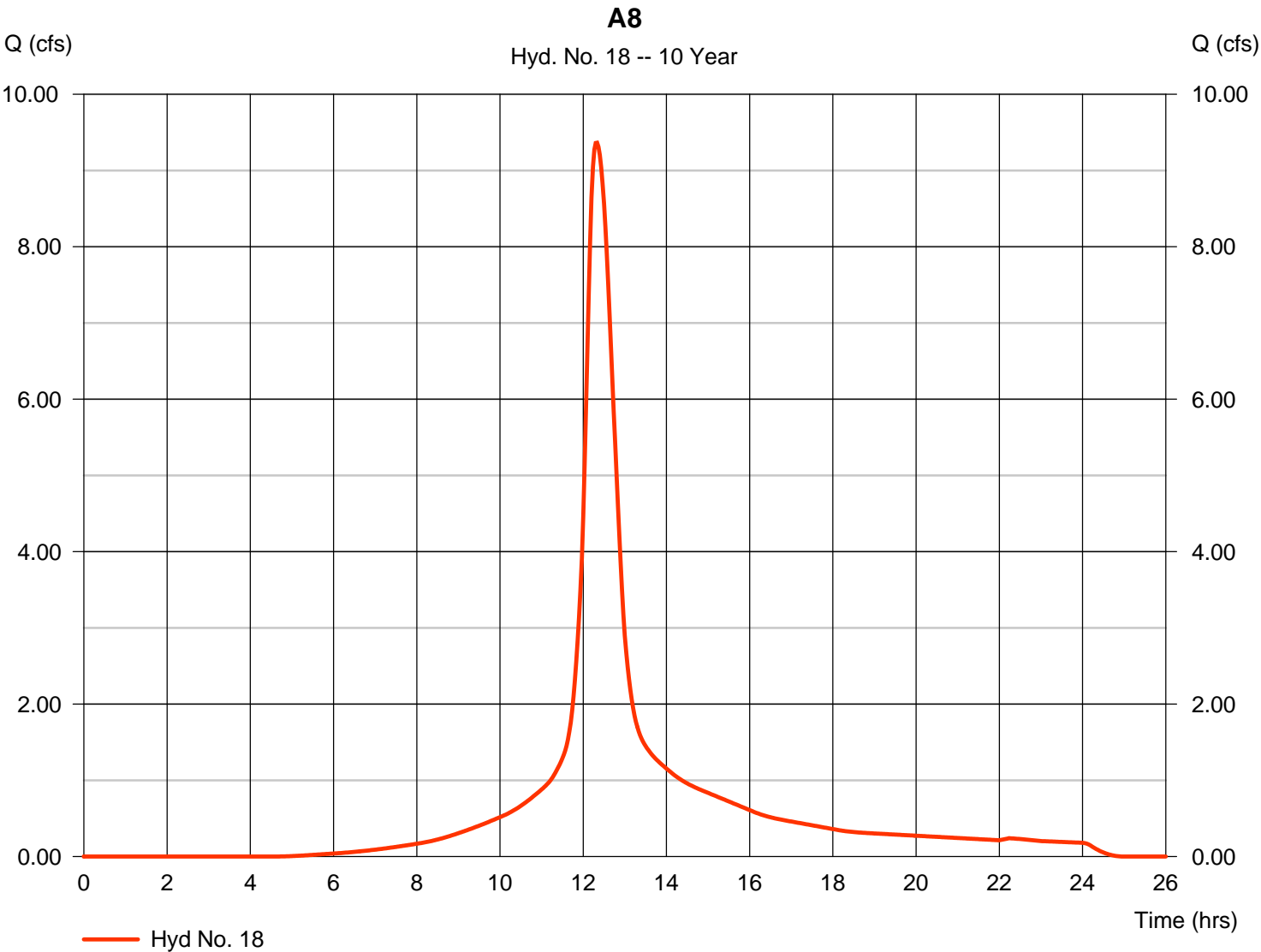
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type	= SCS Runoff	Peak discharge	= 9.363 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 57,236 cuft
Drainage area	= 3.460 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.40 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

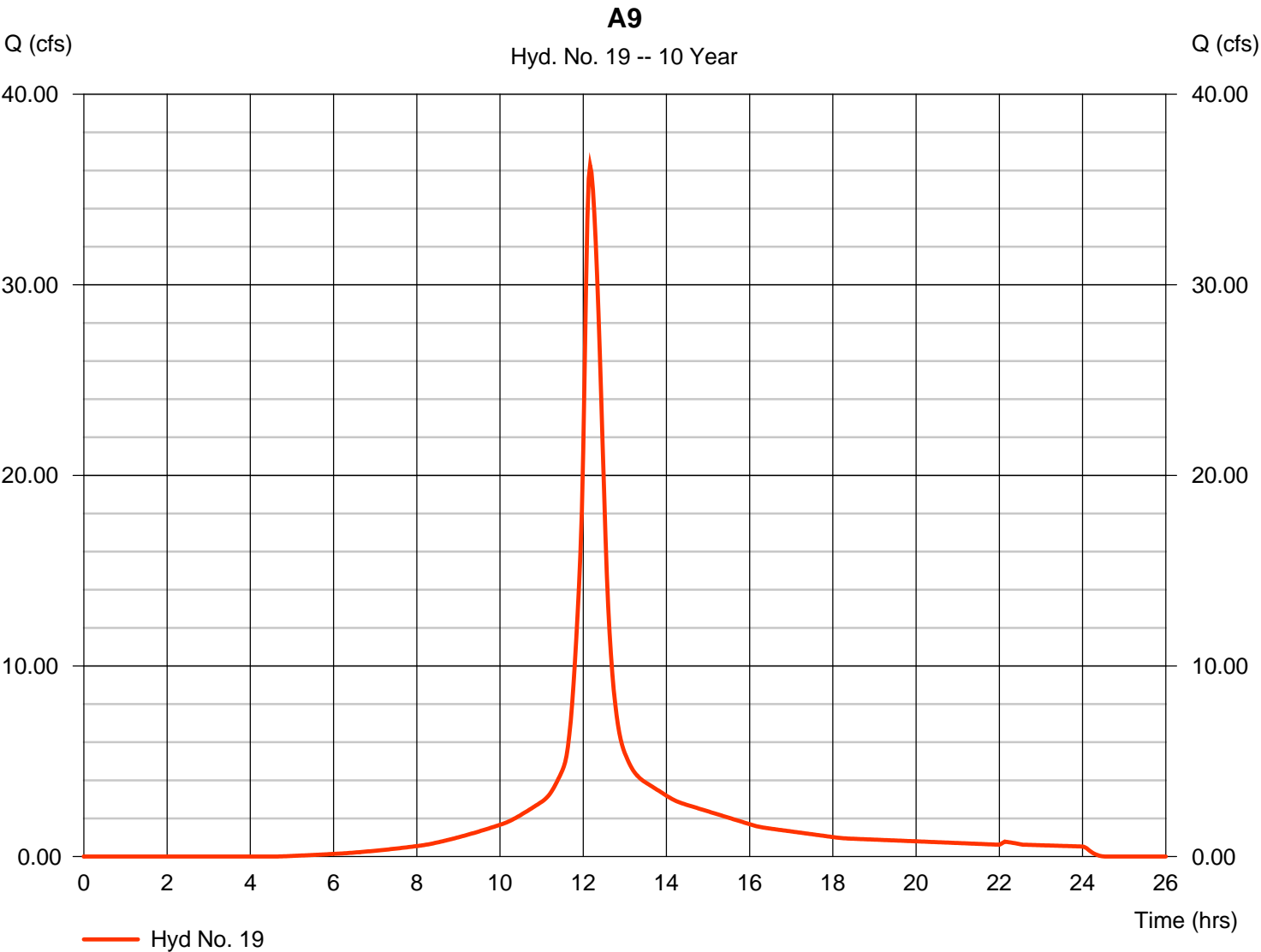
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type	= SCS Runoff	Peak discharge	= 36.26 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 170,605 cuft
Drainage area	= 10.400 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

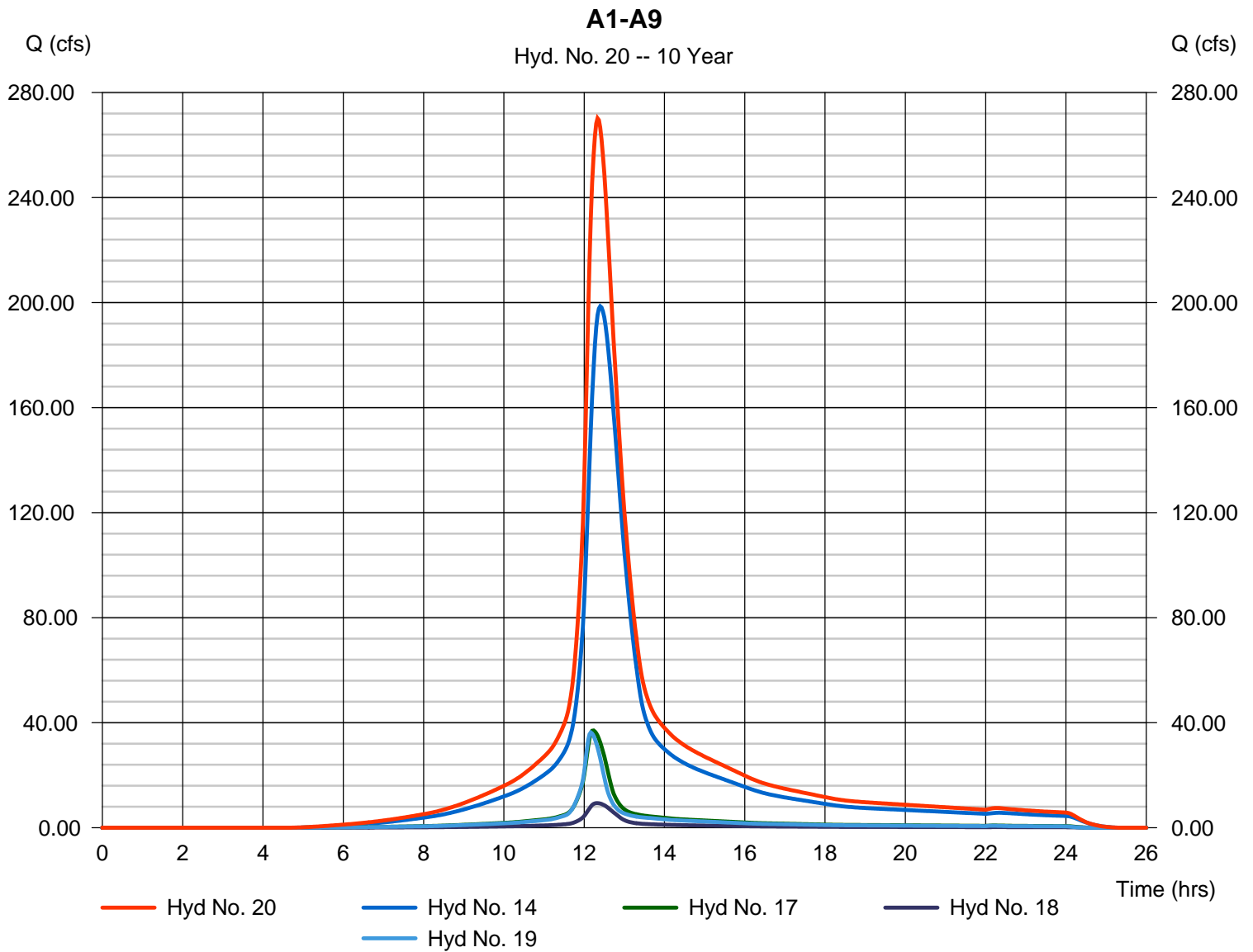
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type	= Combine	Peak discharge	= 270.17 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 1,819,763 cuft
Inflow hyds.	= 14, 17, 18, 19	Contrib. drain. area	= 13.860 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

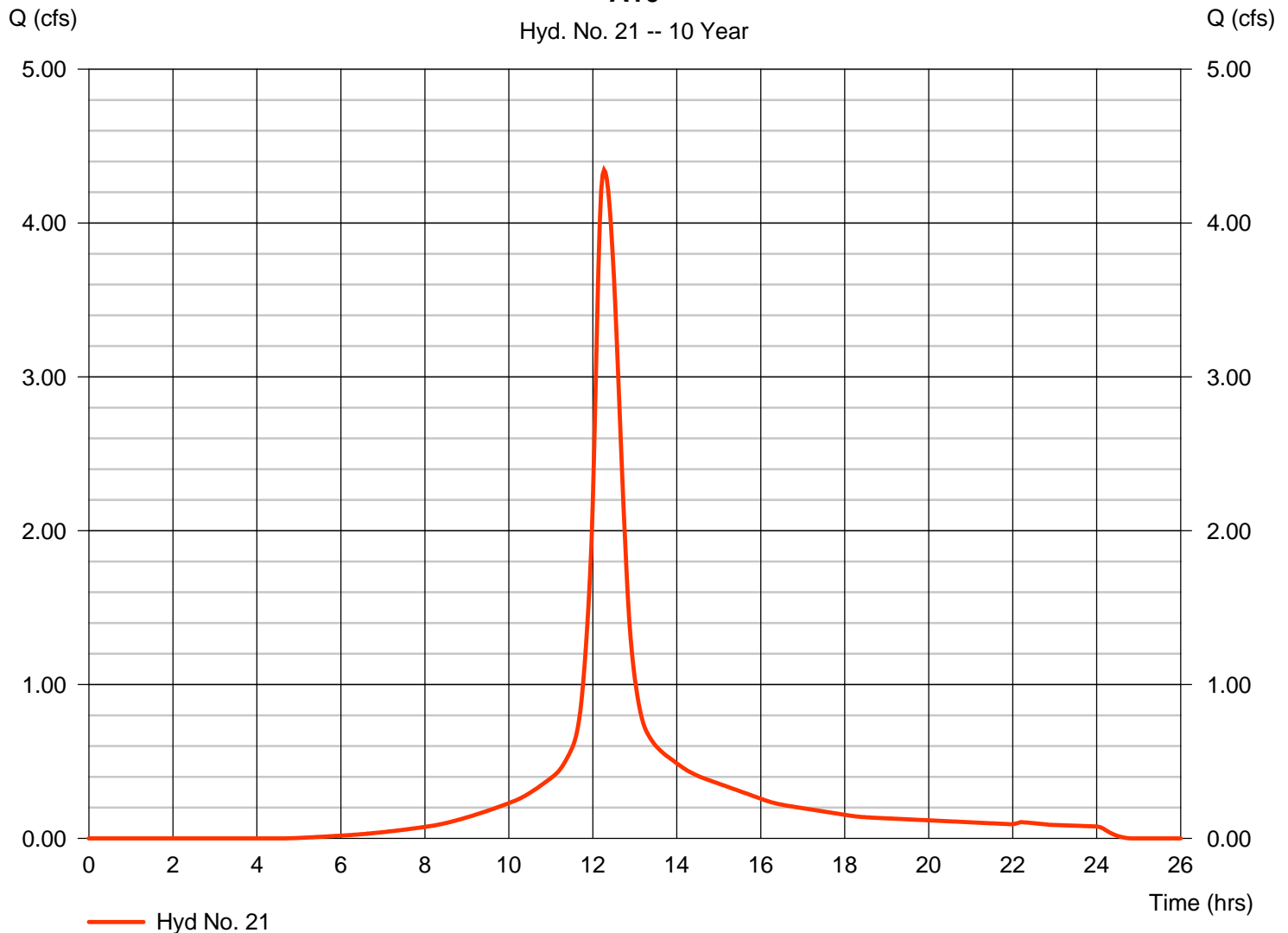
Wednesday, 07 / 15 / 2020

Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 4.345 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 24,755 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

A10



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

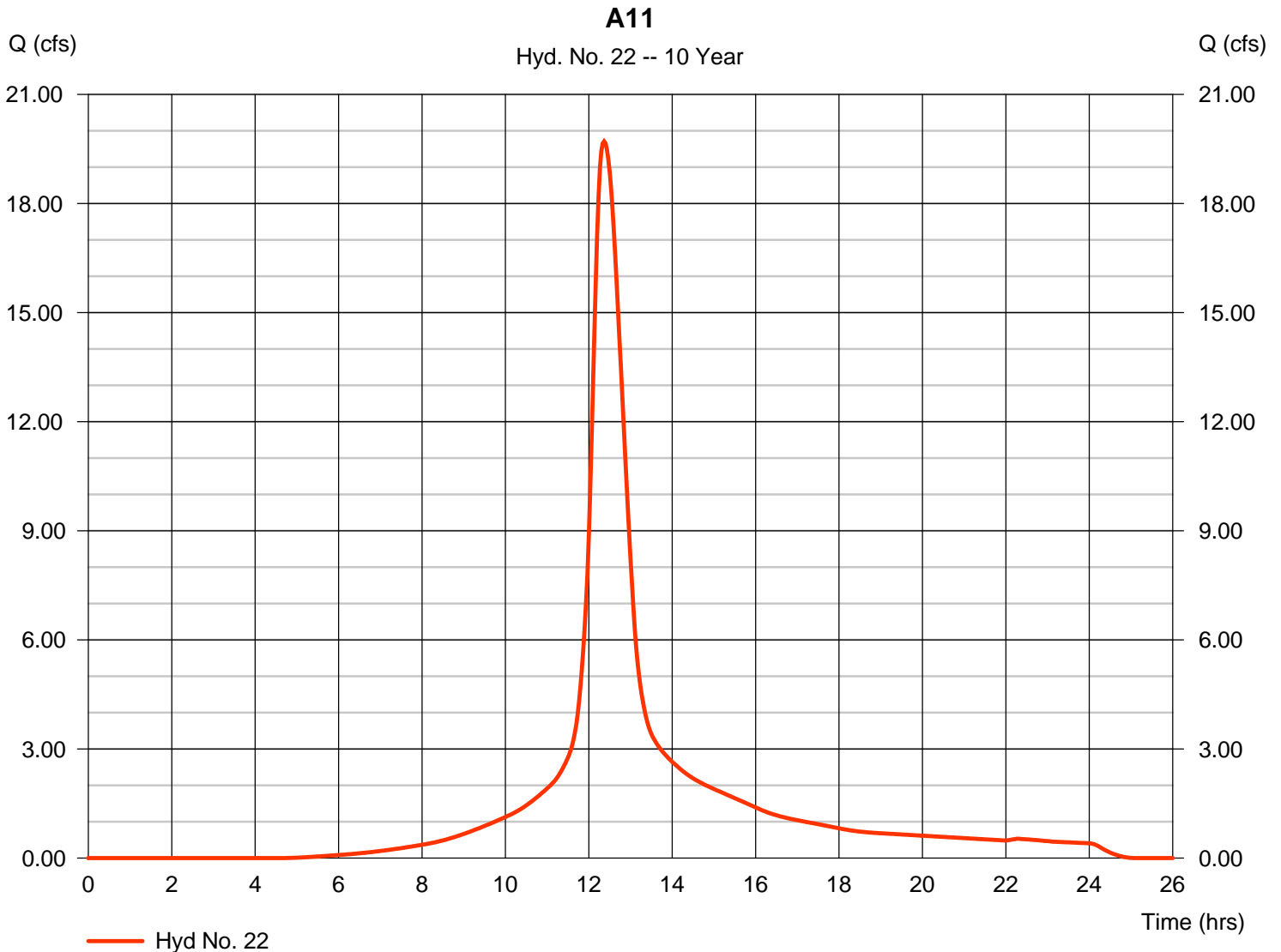
Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 7.820 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 19.71 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 128,282 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

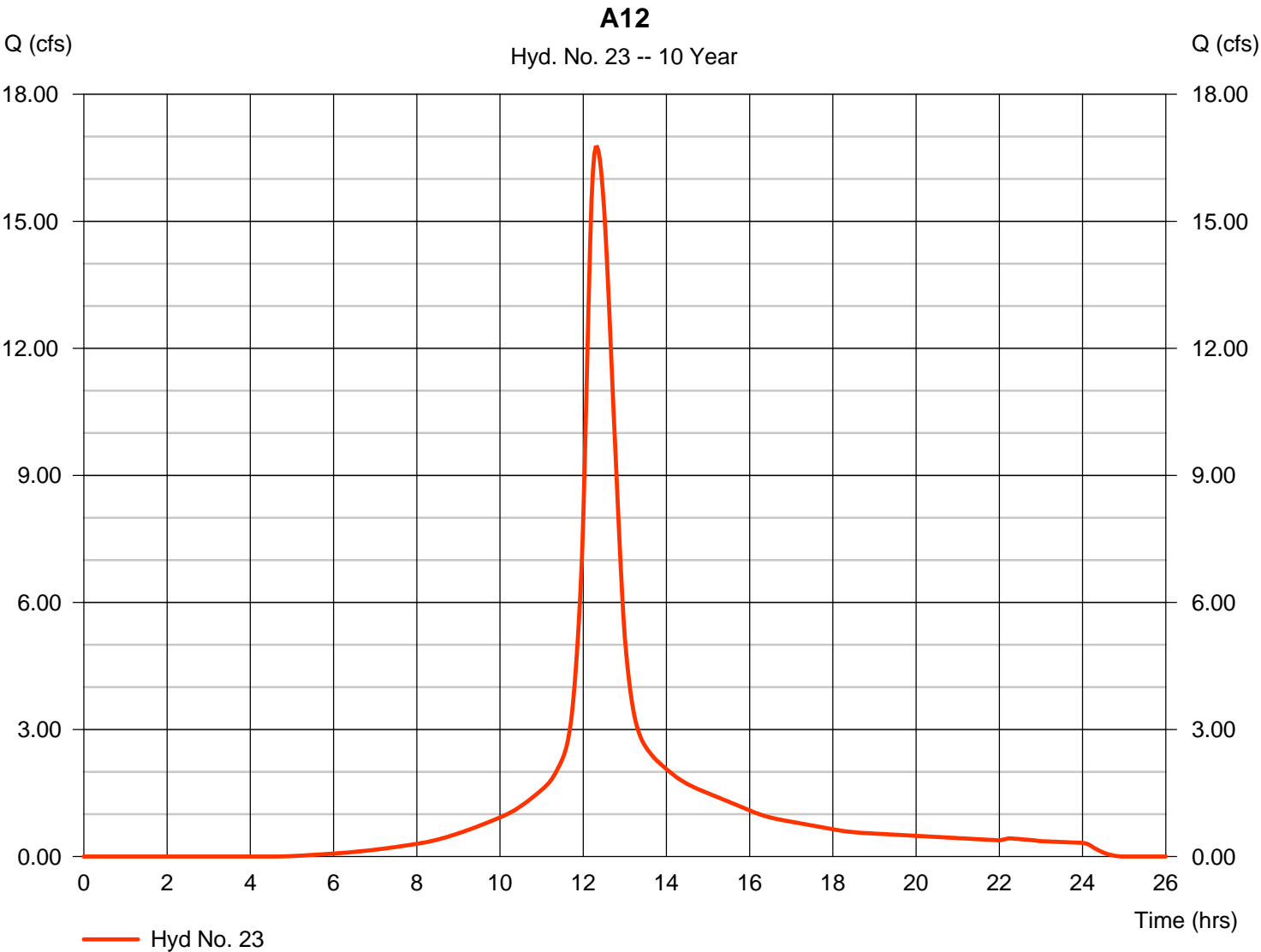
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Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type	= SCS Runoff	Peak discharge	= 16.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 102,396 cuft
Drainage area	= 6.190 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.50 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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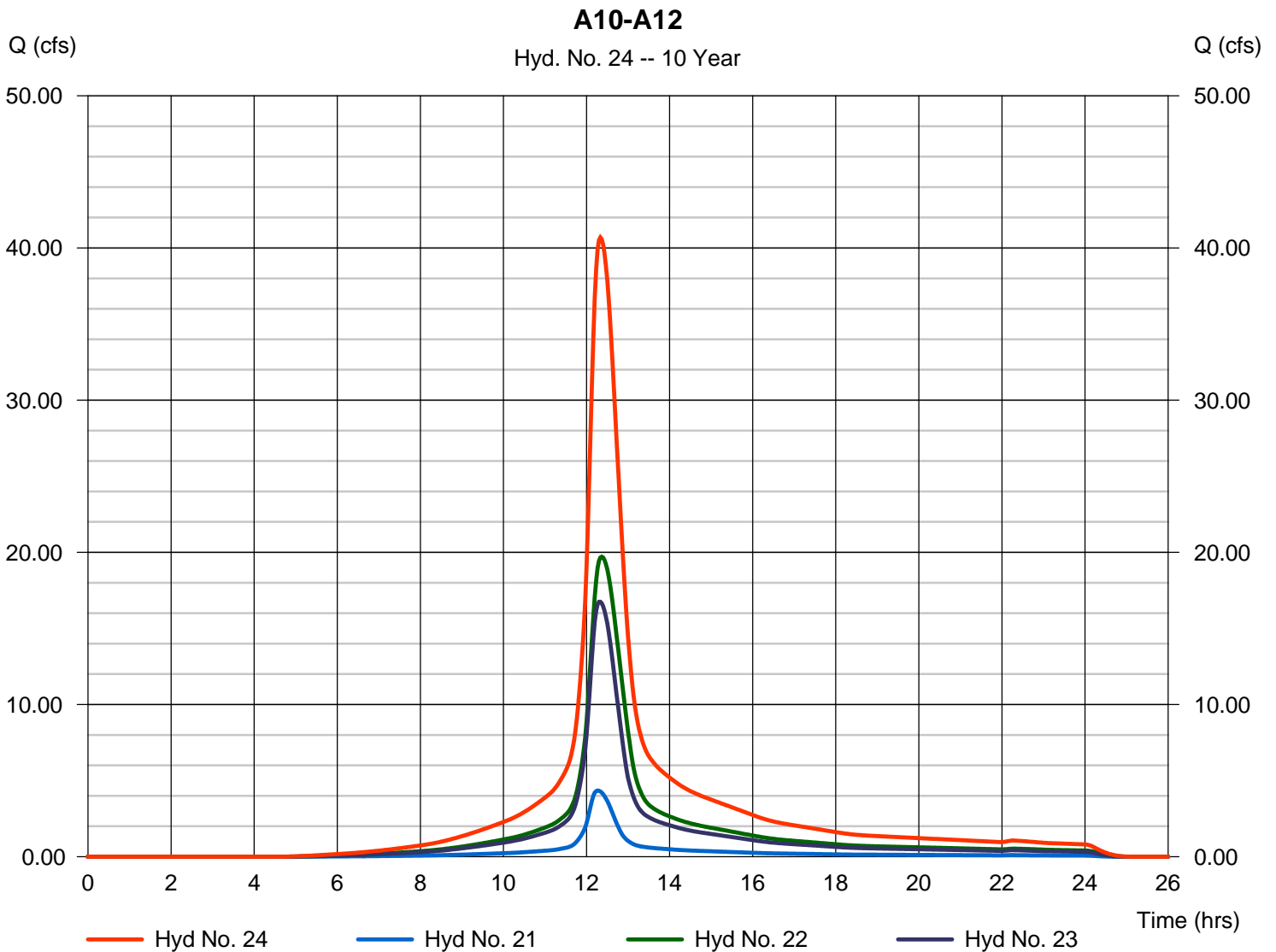
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 21, 22, 23

Peak discharge = 40.69 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 255,433 cuft
 Contrib. drain. area = 15.490 ac



Hydrograph Report

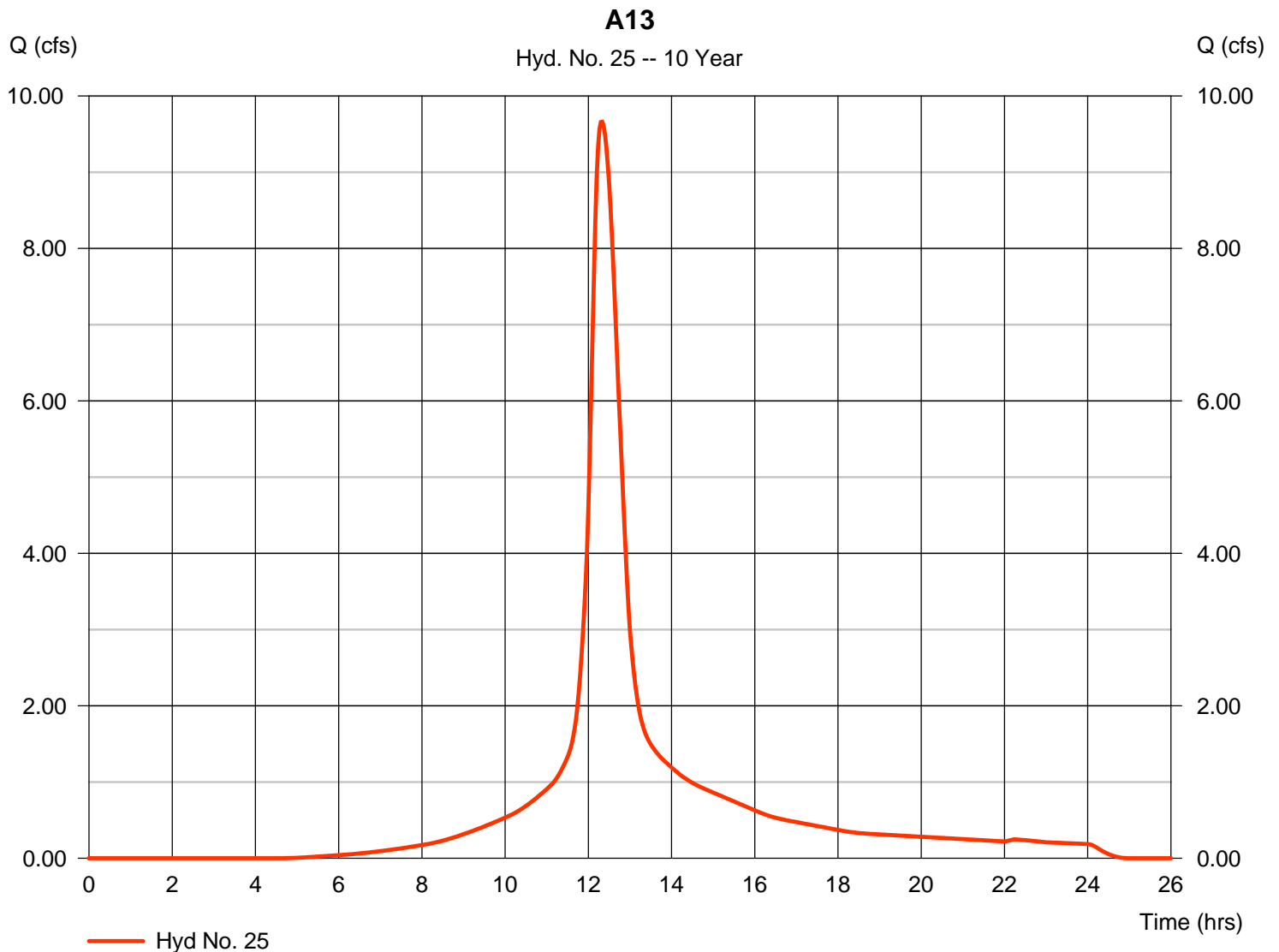
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Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type	= SCS Runoff	Peak discharge	= 9.661 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 59,056 cuft
Drainage area	= 3.570 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.80 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

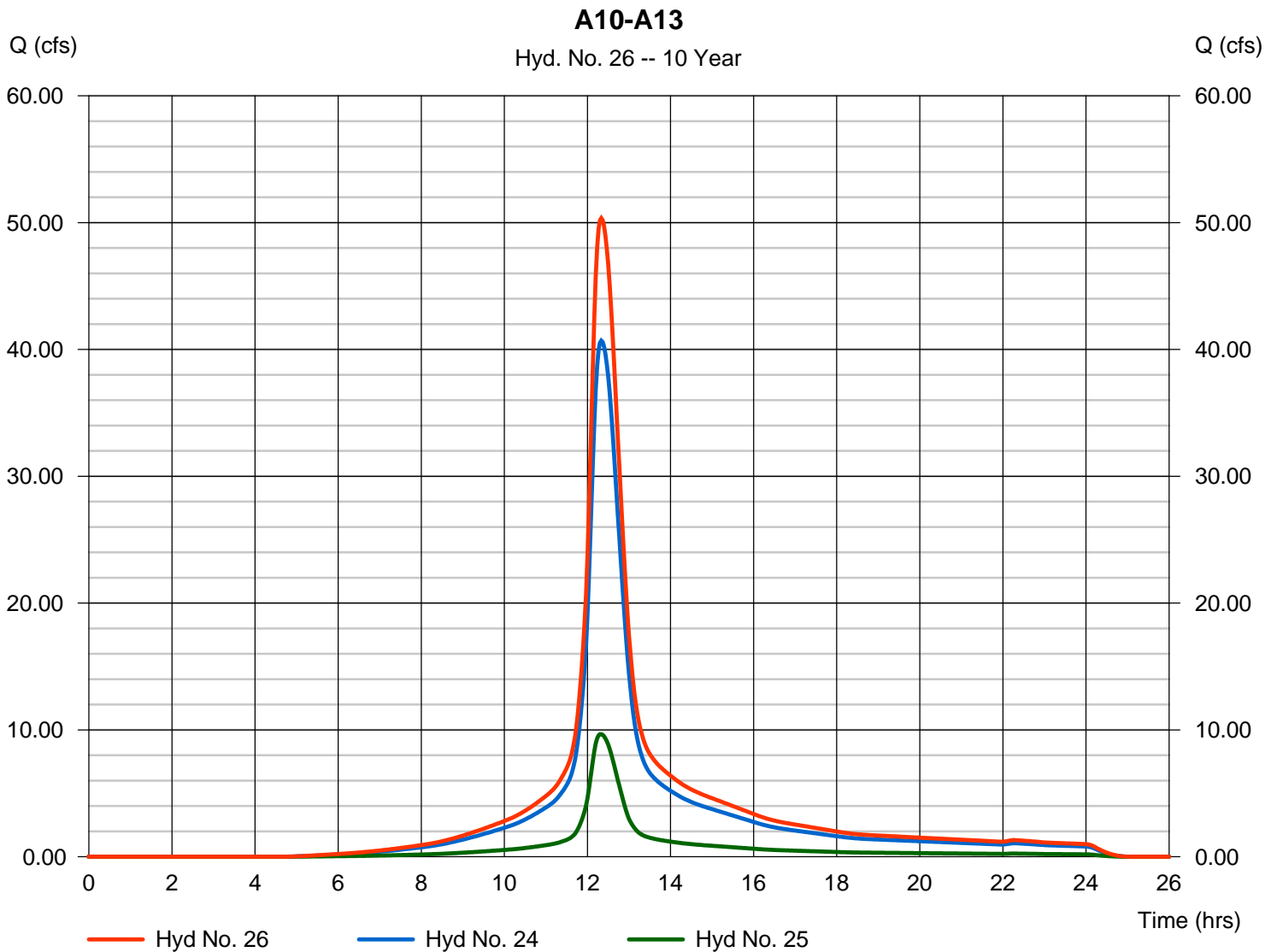
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 24, 25

Peak discharge = 50.35 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 314,489 cuft
 Contrib. drain. area = 3.570 ac



Hydrograph Report

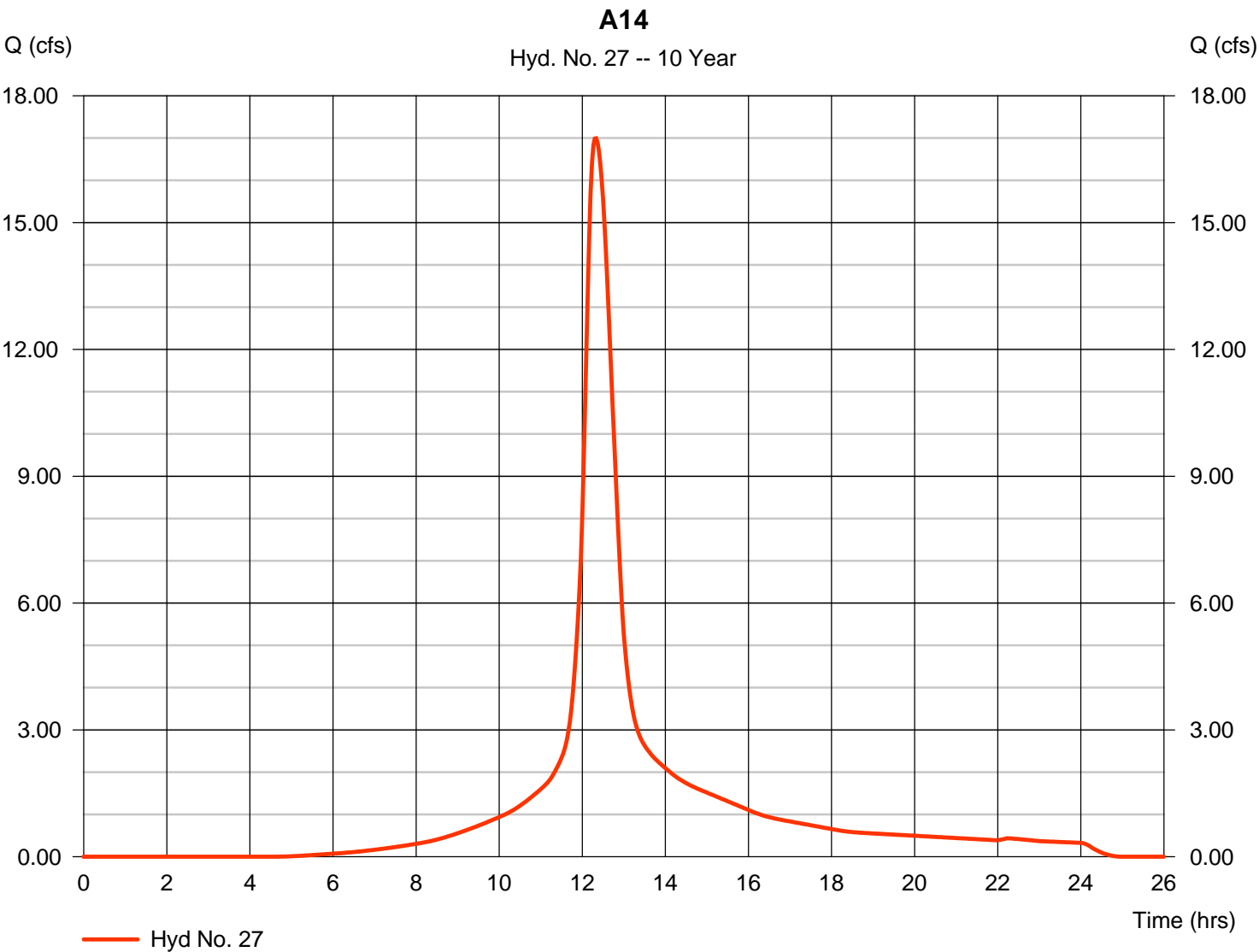
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Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type	= SCS Runoff	Peak discharge	= 16.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 103,885 cuft
Drainage area	= 6.280 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

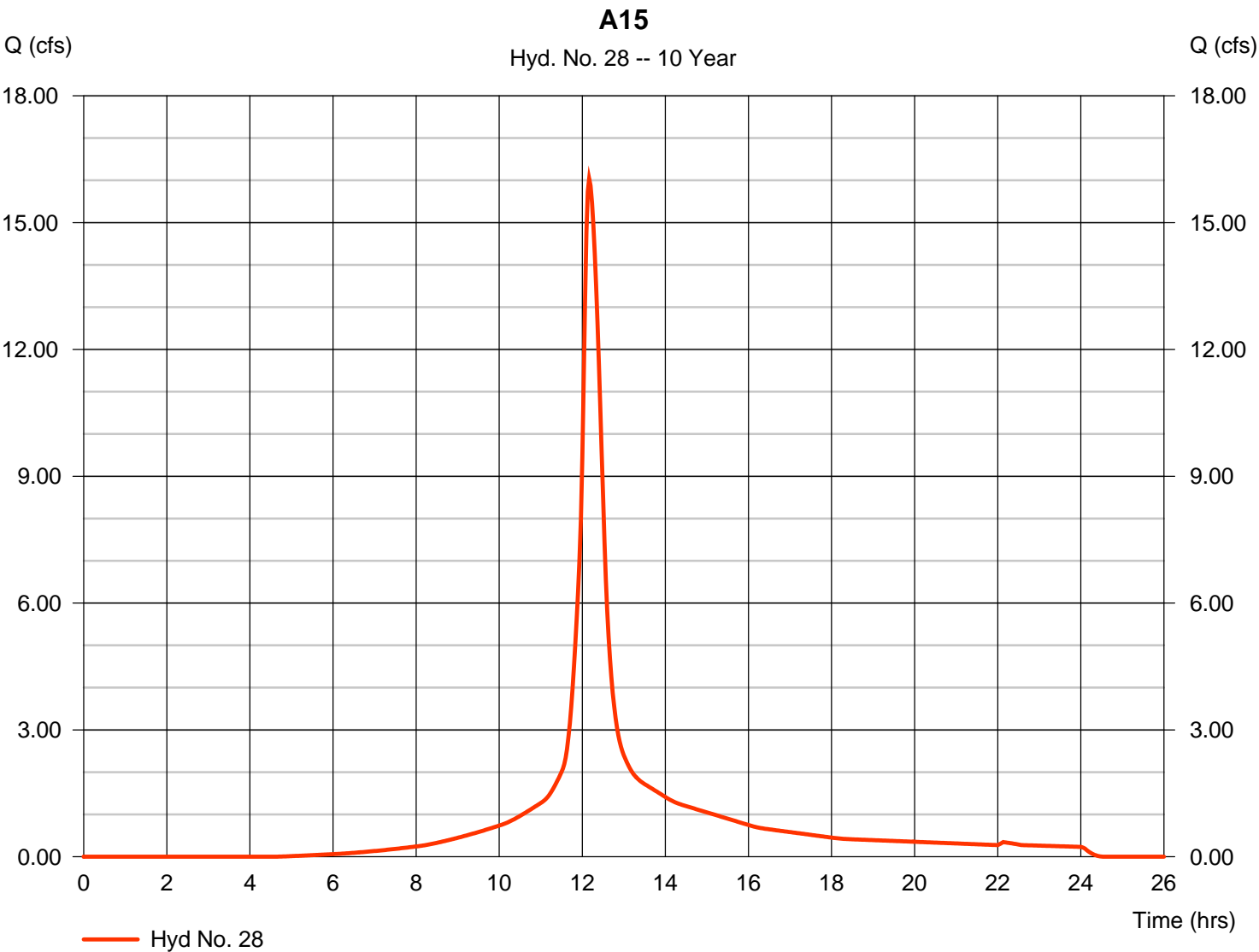
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Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type	= SCS Runoff	Peak discharge	= 16.04 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 75,460 cuft
Drainage area	= 4.600 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300

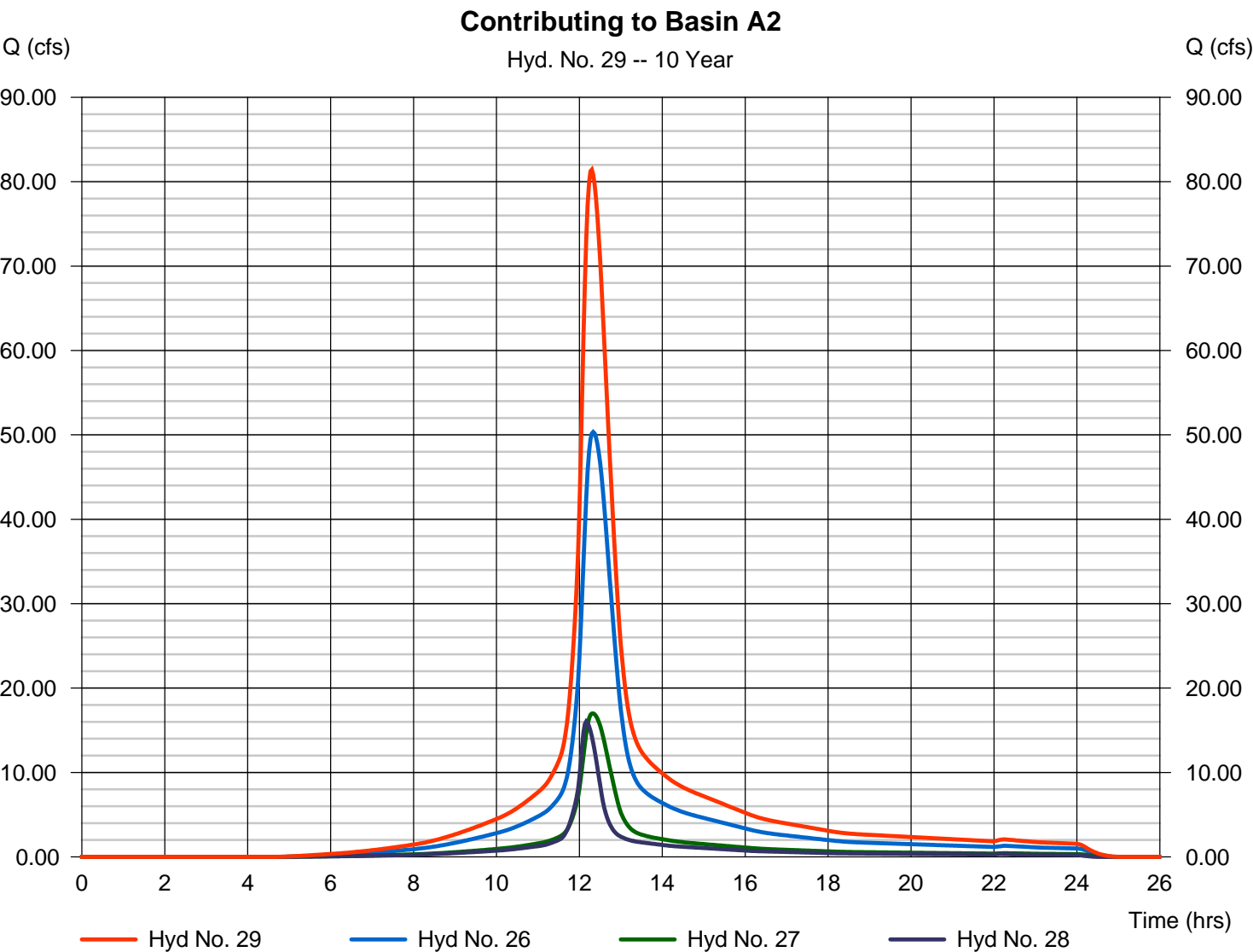


Hydrograph Report

Hyd. No. 29

Contributing to Basin A2

Hydrograph type	= Combine	Peak discharge	= 81.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 493,834 cuft
Inflow hyds.	= 26, 27, 28	Contrib. drain. area	= 10.880 ac



Hydrograph Report

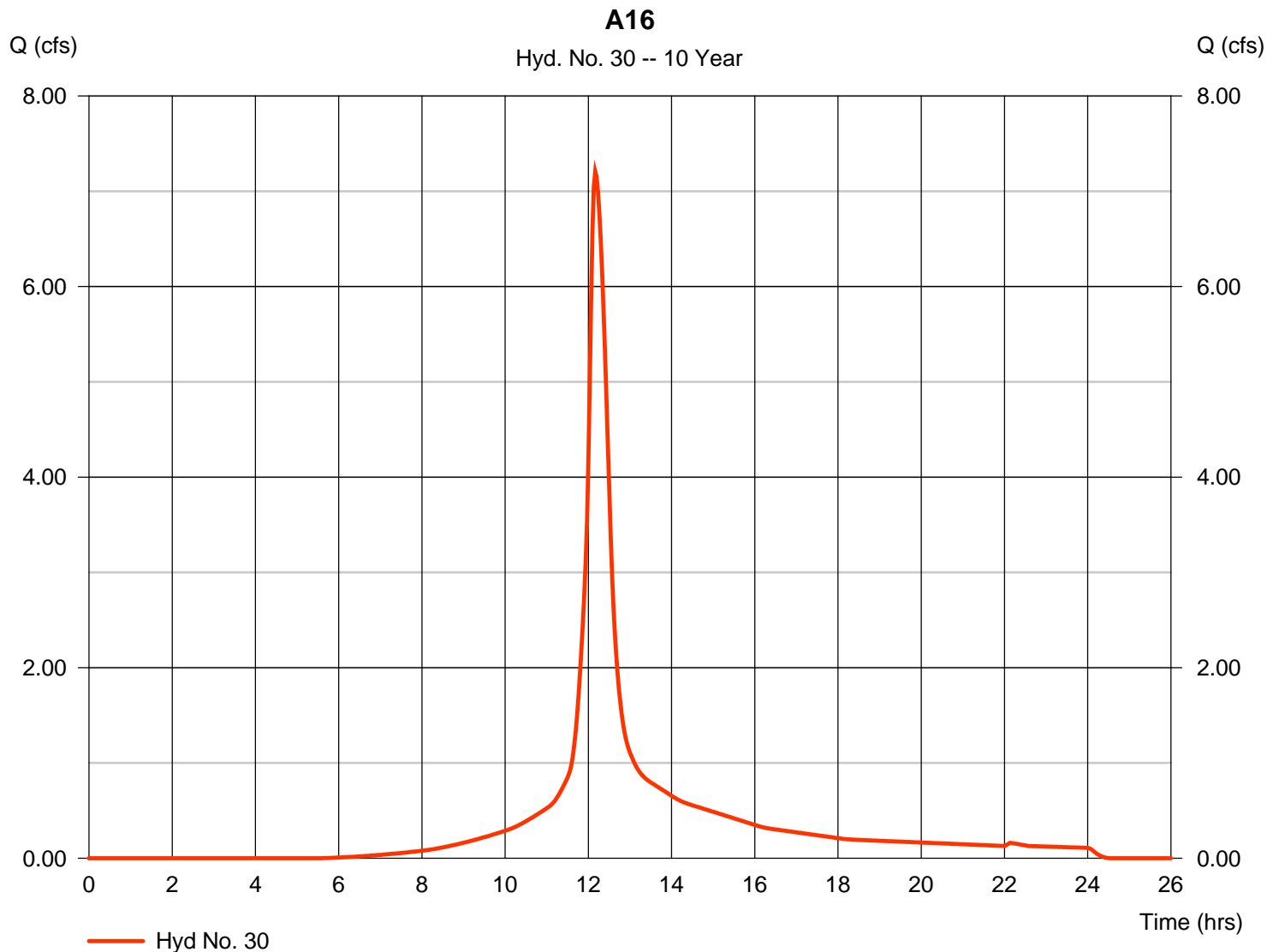
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Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 7.206 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 33,550 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

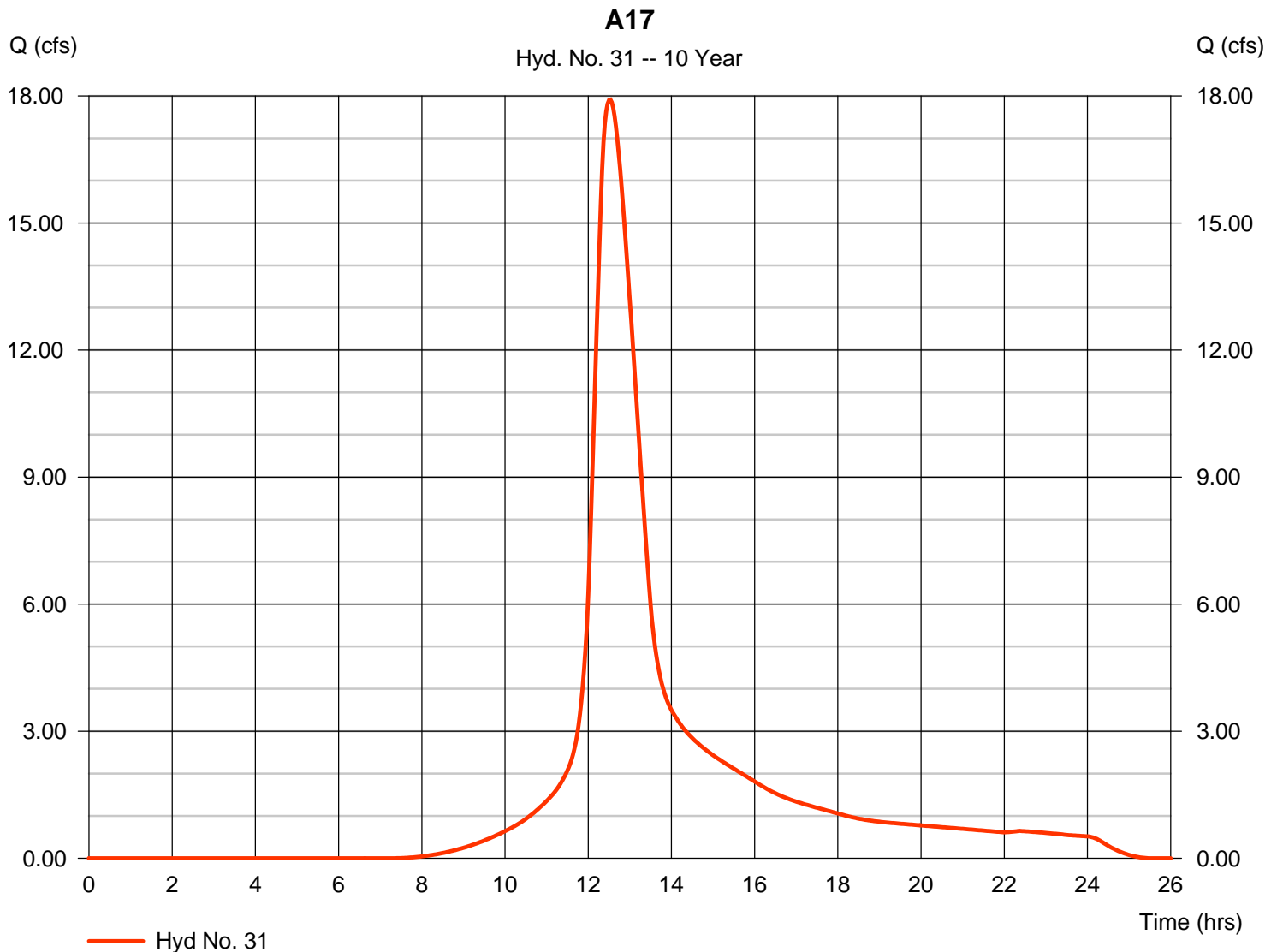
Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 17.91 cfs
 Time to peak = 12.53 hrs
 Hyd. volume = 137,090 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

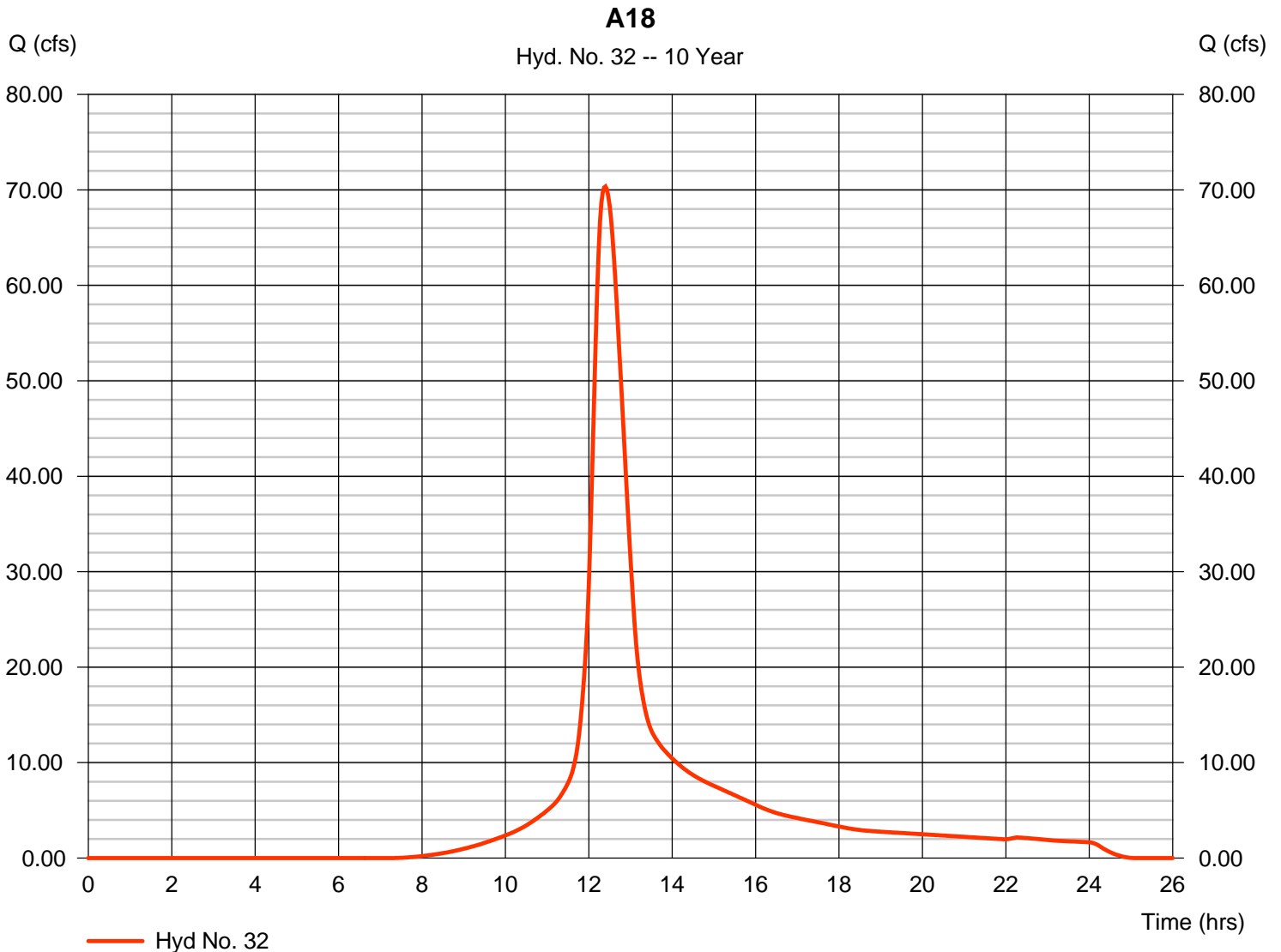
Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 70.35 cfs
 Time to peak = 12.40 hrs
 Hyd. volume = 449,197 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

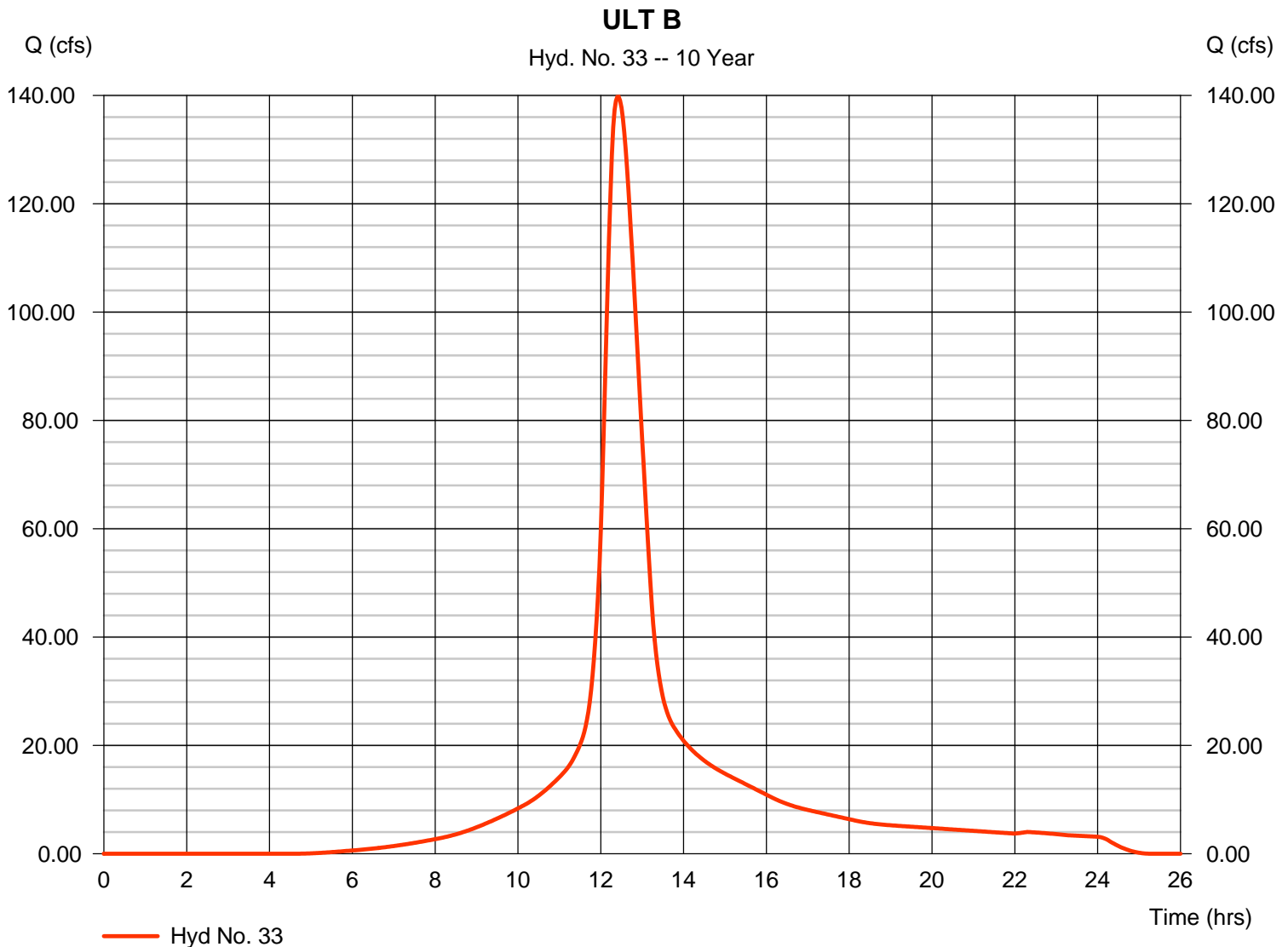
Wednesday, 07 / 15 / 2020

Hyd. No. 33

ULT B

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 58.580 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 139.75 cfs
 Time to peak = 12.43 hrs
 Hyd. volume = 979,811 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 28.80 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	282.29	2	780	3,309,510	-----	-----	-----	EX A
2	SCS Runoff	53.26	2	760	500,235	-----	-----	-----	EX A1
3	SCS Runoff	26.76	2	750	205,582	-----	-----	-----	EX A2
4	SCS Runoff	151.96	2	758	1,355,801	-----	-----	-----	EX A3
5	SCS Runoff	73.41	2	786	993,364	-----	-----	-----	EX A4
6	Combine	214.98	2	766	2,349,165	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	163.96	2	770	1,793,318	-----	-----	-----	EX B
8	SCS Runoff	186.10	2	746	1,396,669	-----	-----	-----	A1
9	SCS Runoff	26.14	2	738	162,149	-----	-----	-----	A2
10	Combine	211.22	2	746	1,558,818	8, 9	-----	-----	A1+A2
11	SCS Runoff	29.21	2	738	181,211	-----	-----	-----	A3
12	SCS Runoff	16.96	2	738	105,196	-----	-----	-----	A4
13	SCS Runoff	22.84	2	738	141,674	-----	-----	-----	A5
14	Combine	278.43	2	744	1,986,901	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	28.39	2	734	152,217	-----	-----	-----	A6
16	SCS Runoff	23.43	2	734	125,640	-----	-----	-----	A7
17	Combine	51.83	2	734	277,857	15, 16	-----	-----	A6+A7
18	SCS Runoff	13.13	2	738	81,427	-----	-----	-----	A8
19	SCS Runoff	50.78	2	730	242,713	-----	-----	-----	A9
20	Combine	378.79	2	740	2,588,899	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	6.089	2	736	35,217	-----	-----	-----	A10
22	SCS Runoff	27.62	2	742	182,501	-----	-----	-----	A11
23	SCS Runoff	23.48	2	738	145,675	-----	-----	-----	A12
24	Combine	57.03	2	740	363,393	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	13.54	2	738	84,016	-----	-----	-----	A13
26	Combine	70.56	2	740	447,409	24, 25	-----	-----	A10-A13
27	SCS Runoff	23.82	2	738	147,793	-----	-----	-----	A14
28	SCS Runoff	22.46	2	730	107,354	-----	-----	-----	A15
29	Combine	114.06	2	738	702,556	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	10.29	2	730	48,540	-----	-----	-----	A16
31	SCS Runoff	26.76	2	750	205,582	-----	-----	-----	A17
32	SCS Runoff	104.91	2	742	673,619	-----	-----	-----	A18
33	SCS Runoff	195.98	2	744	1,393,933	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 25 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

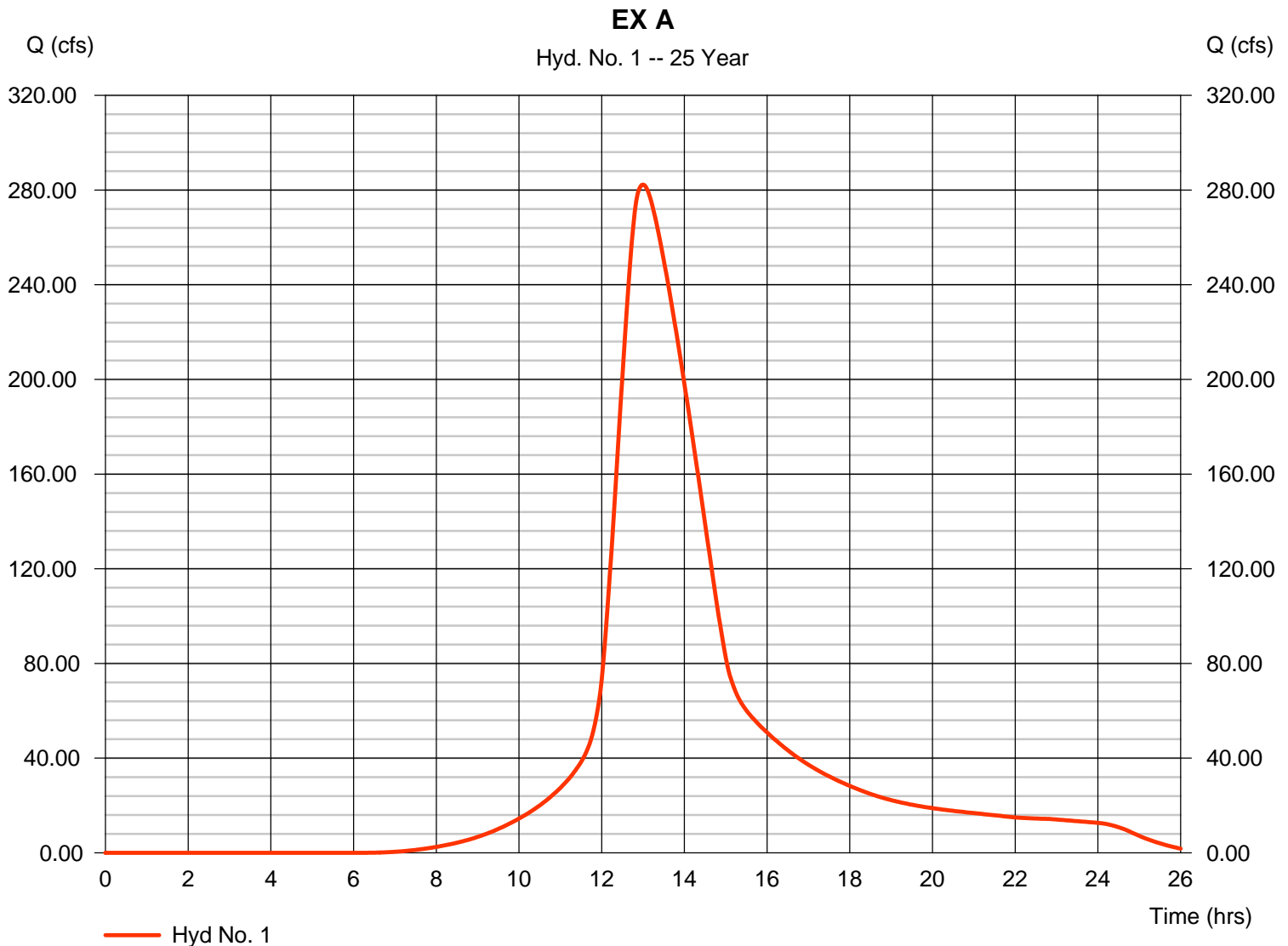
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 1

EX A

Hydrograph type	= SCS Runoff	Peak discharge	= 282.29 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.00 hrs
Time interval	= 2 min	Hyd. volume	= 3,309,510 cuft
Drainage area	= 167.740 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 83.60 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 350



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

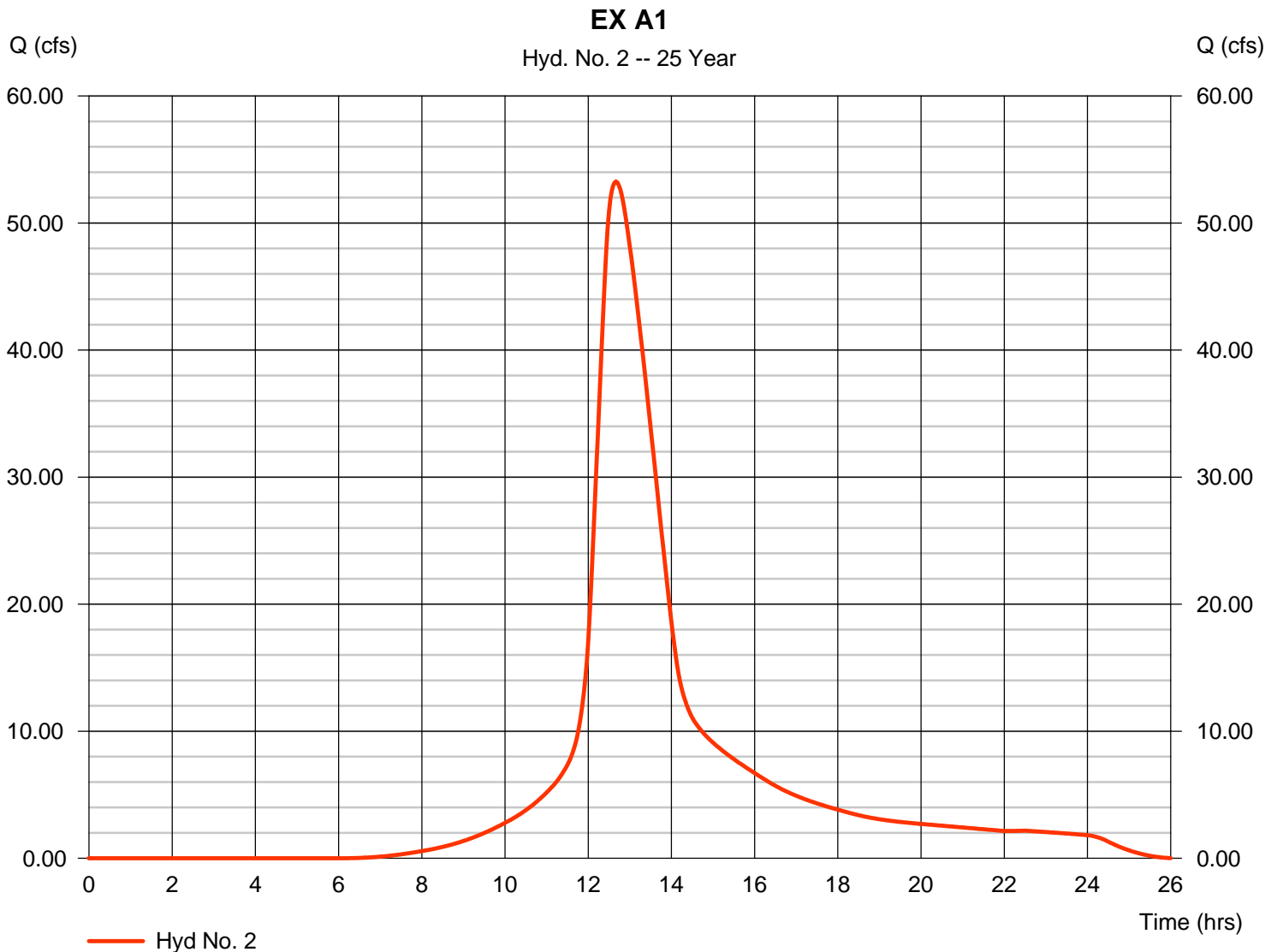
Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 25.120 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 53.26 cfs
 Time to peak = 12.67 hrs
 Hyd. volume = 500,235 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 49.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

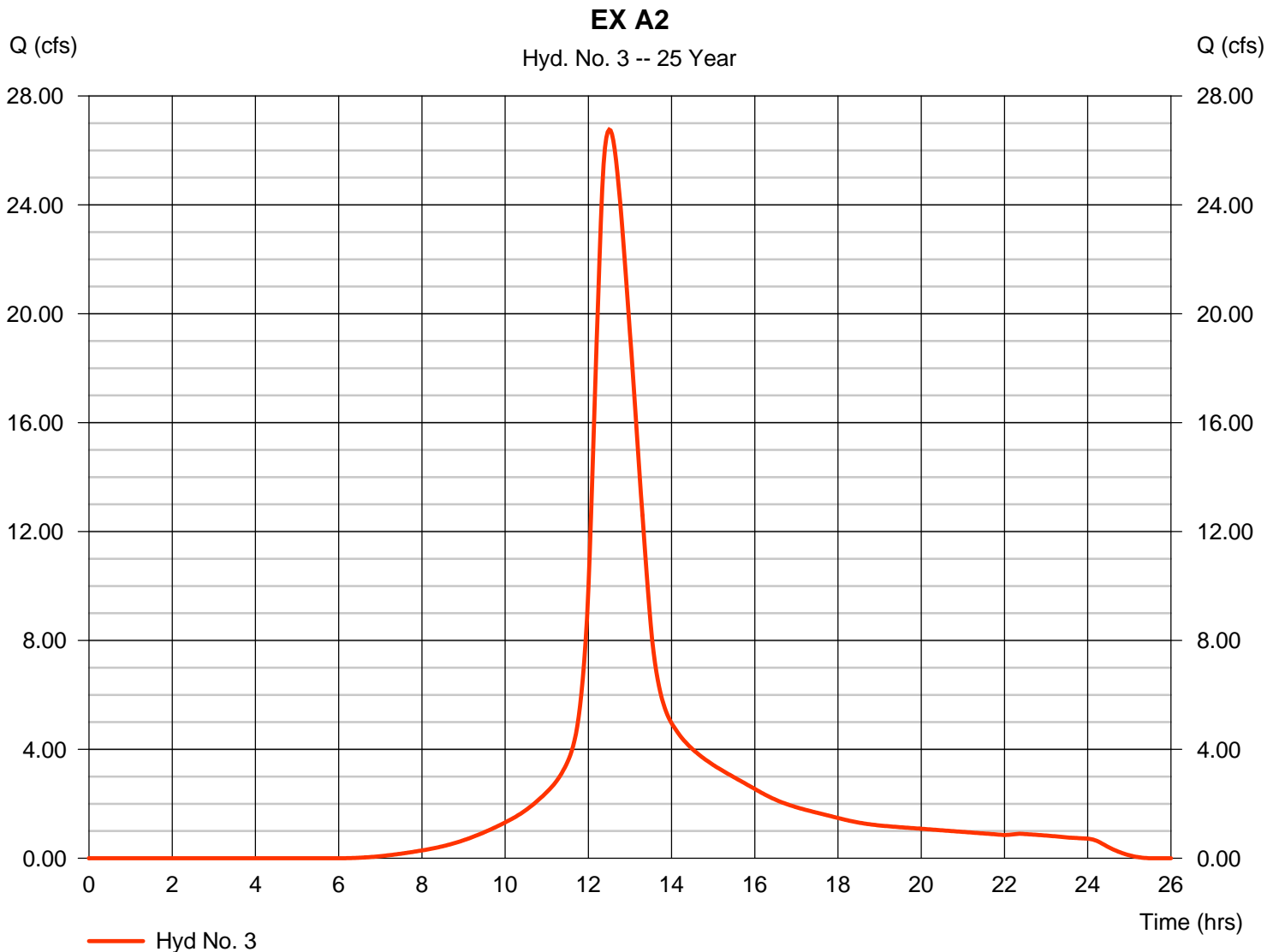
Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 26.76 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 205,582 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

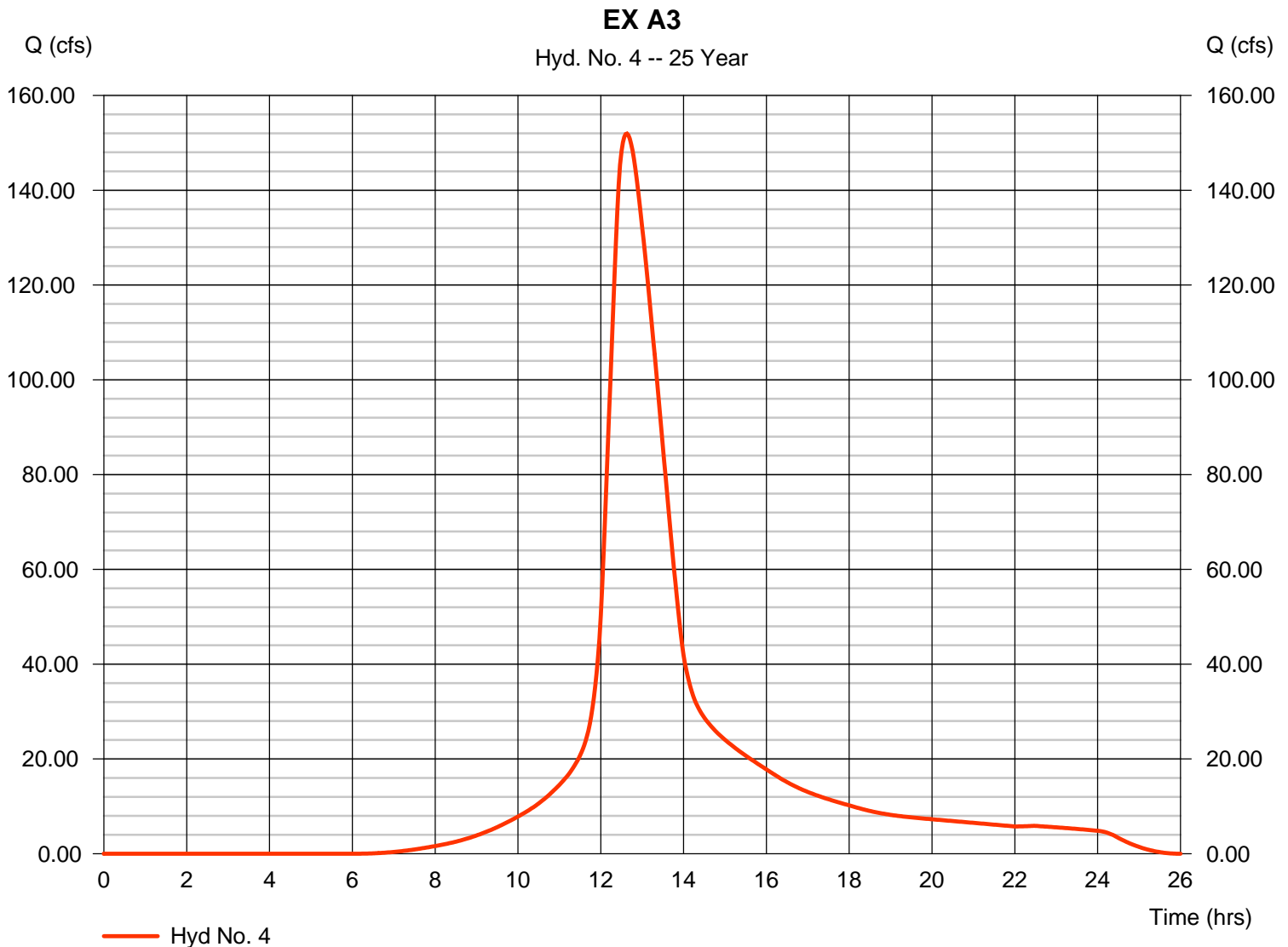
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Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 151.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 1,355,801 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

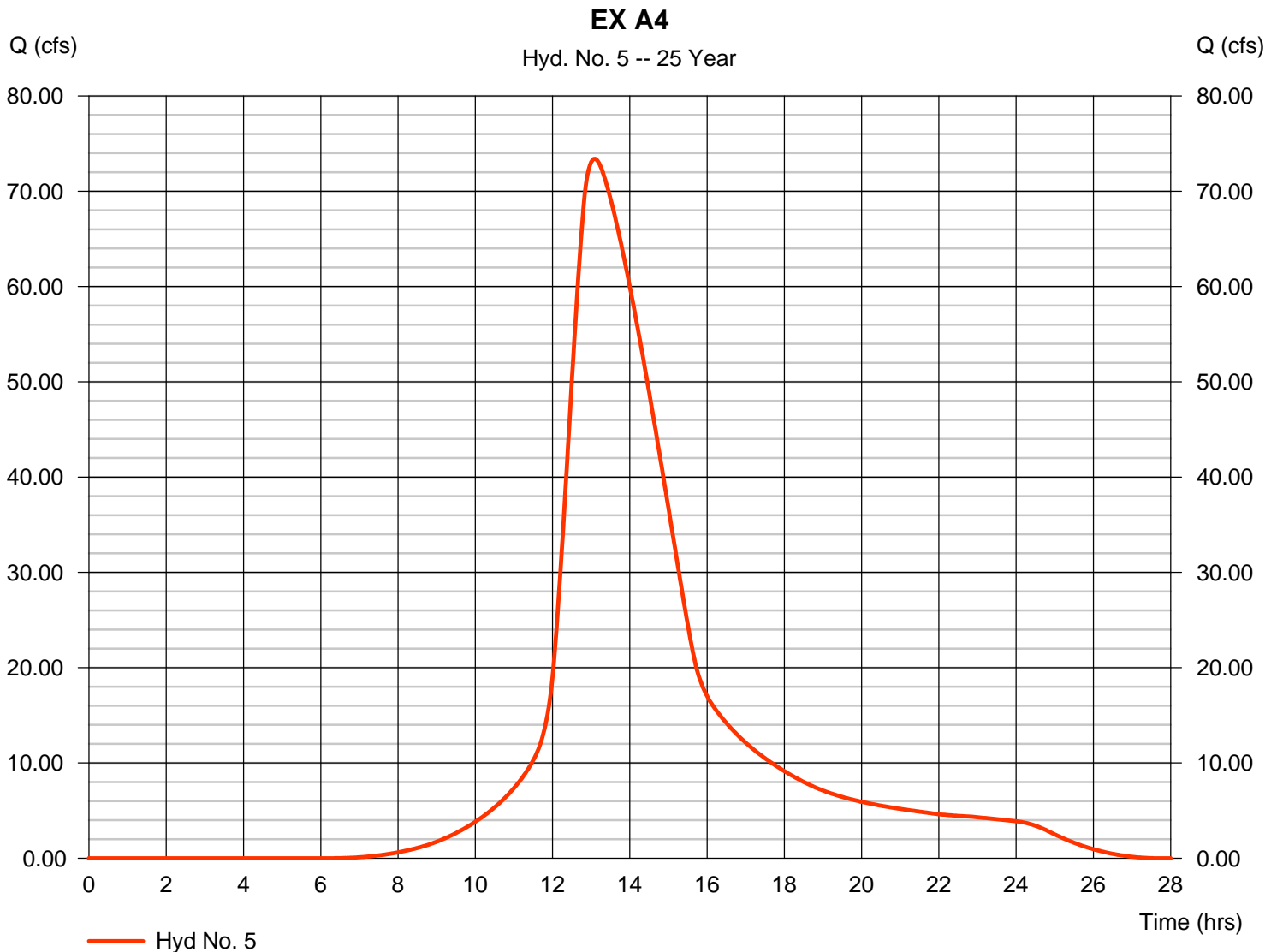
Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 50.180 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.06 in
Storm duration = 24 hrs

Peak discharge = 73.41 cfs
Time to peak = 13.10 hrs
Hyd. volume = 993,364 cuft
Curve number = 78
Hydraulic length = 0 ft
Time of conc. (Tc) = 87.00 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

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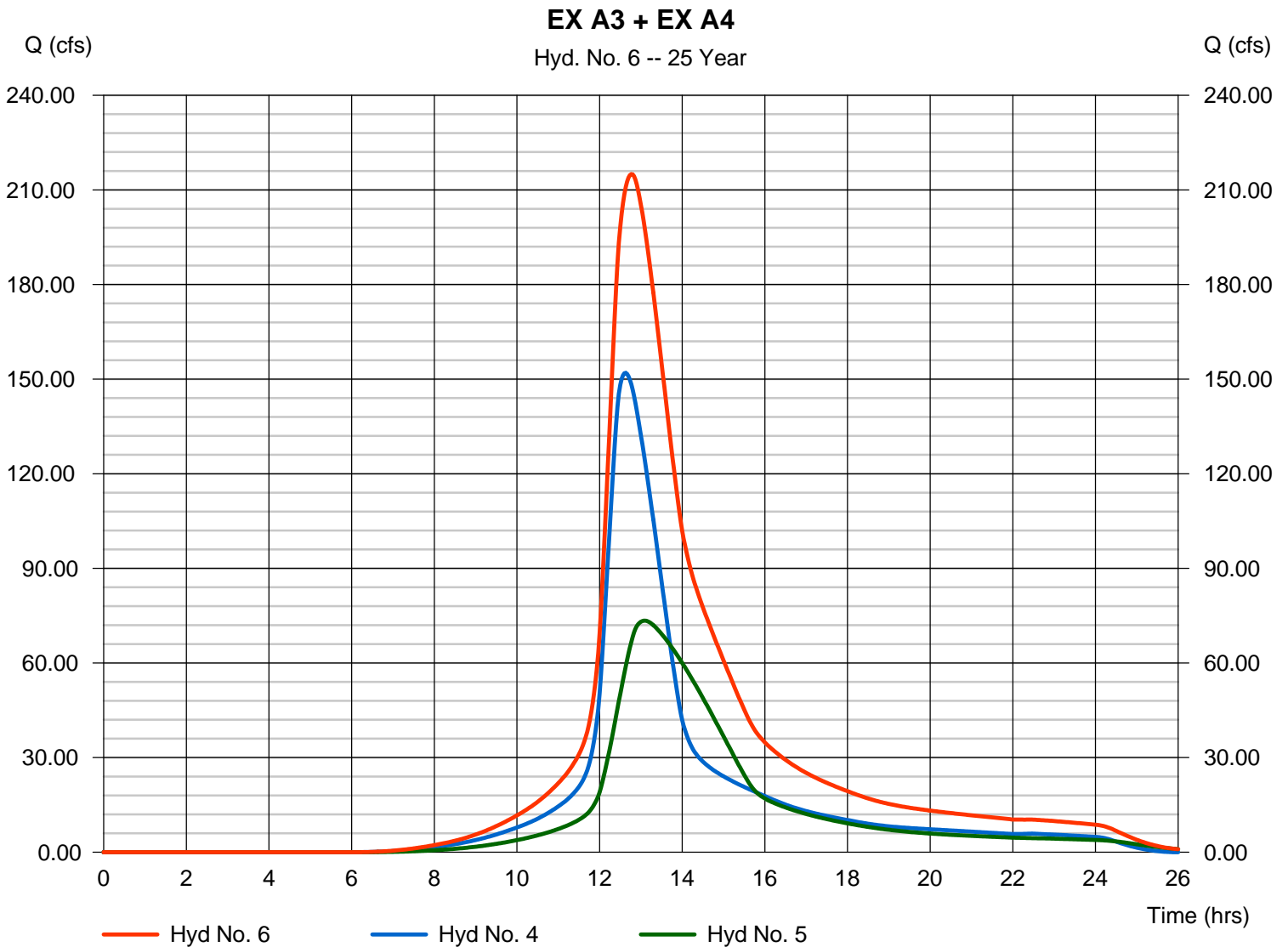
Wednesday, 07 / 15 / 2020

Hyd. No. 6

EX A3 + EX A4

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 214.98 cfs
Time to peak = 12.77 hrs
Hyd. volume = 2,349,165 cuft
Contrib. drain. area = 119.020 ac



Hydrograph Report

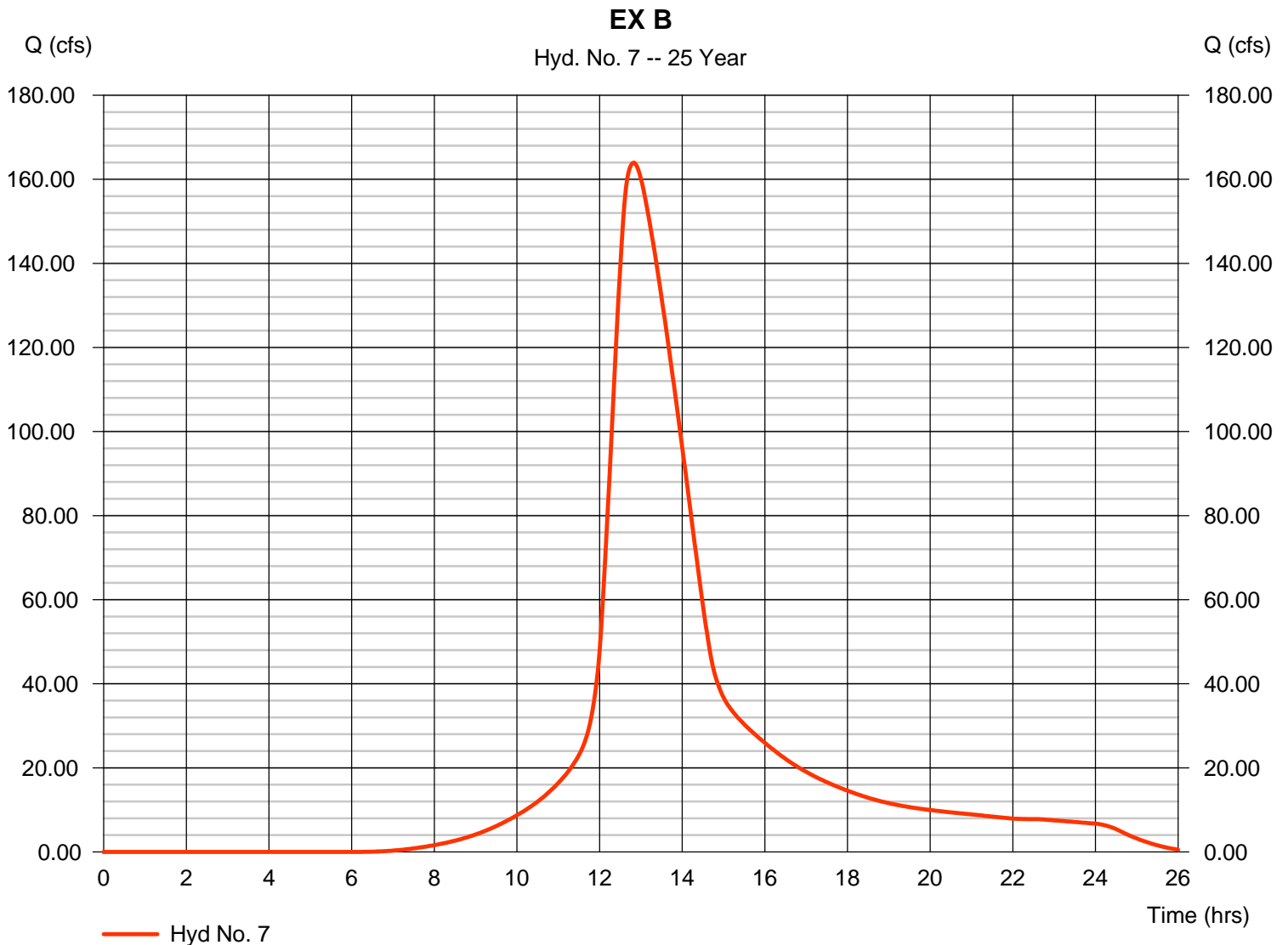
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Wednesday, 07 / 15 / 2020

Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 163.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,793,318 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

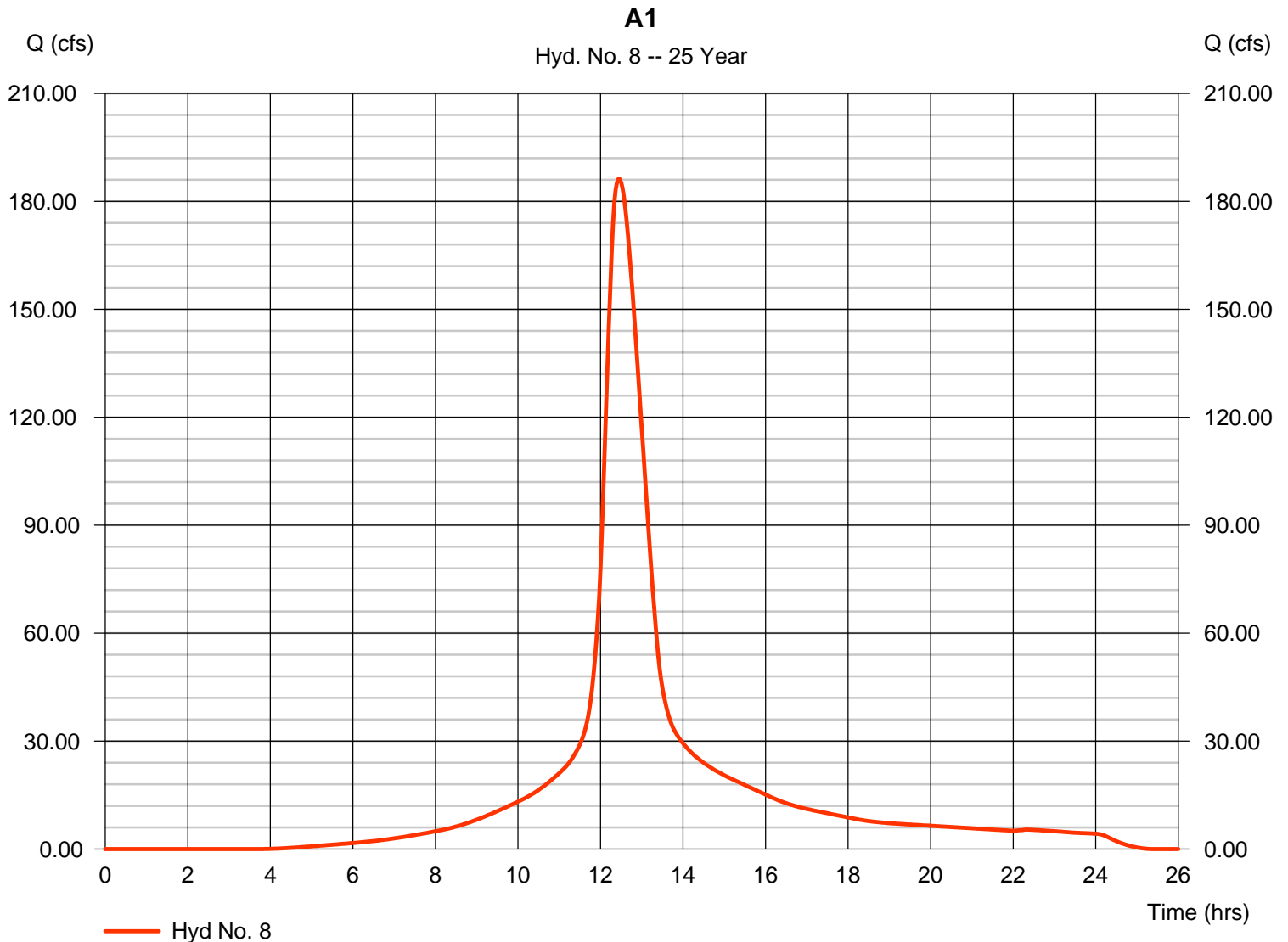
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 186.10 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,396,669 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

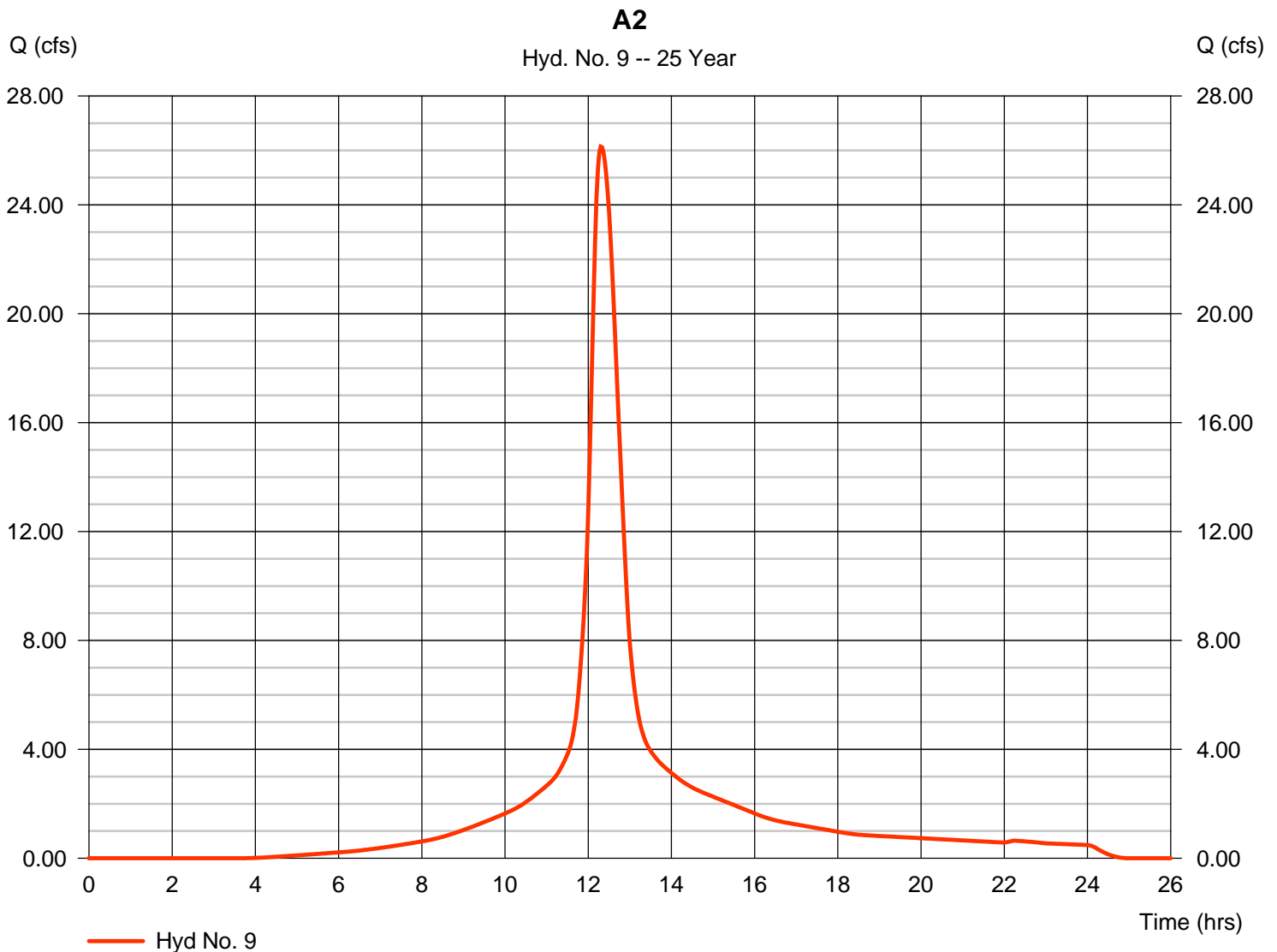
Wednesday, 07 / 15 / 2020

Hyd. No. 9

A2

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 6.890 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.06 in
Storm duration = 24 hrs

Peak discharge = 26.14 cfs
Time to peak = 12.30 hrs
Hyd. volume = 162,149 cuft
Curve number = 87
Hydraulic length = 0 ft
Time of conc. (Tc) = 21.50 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

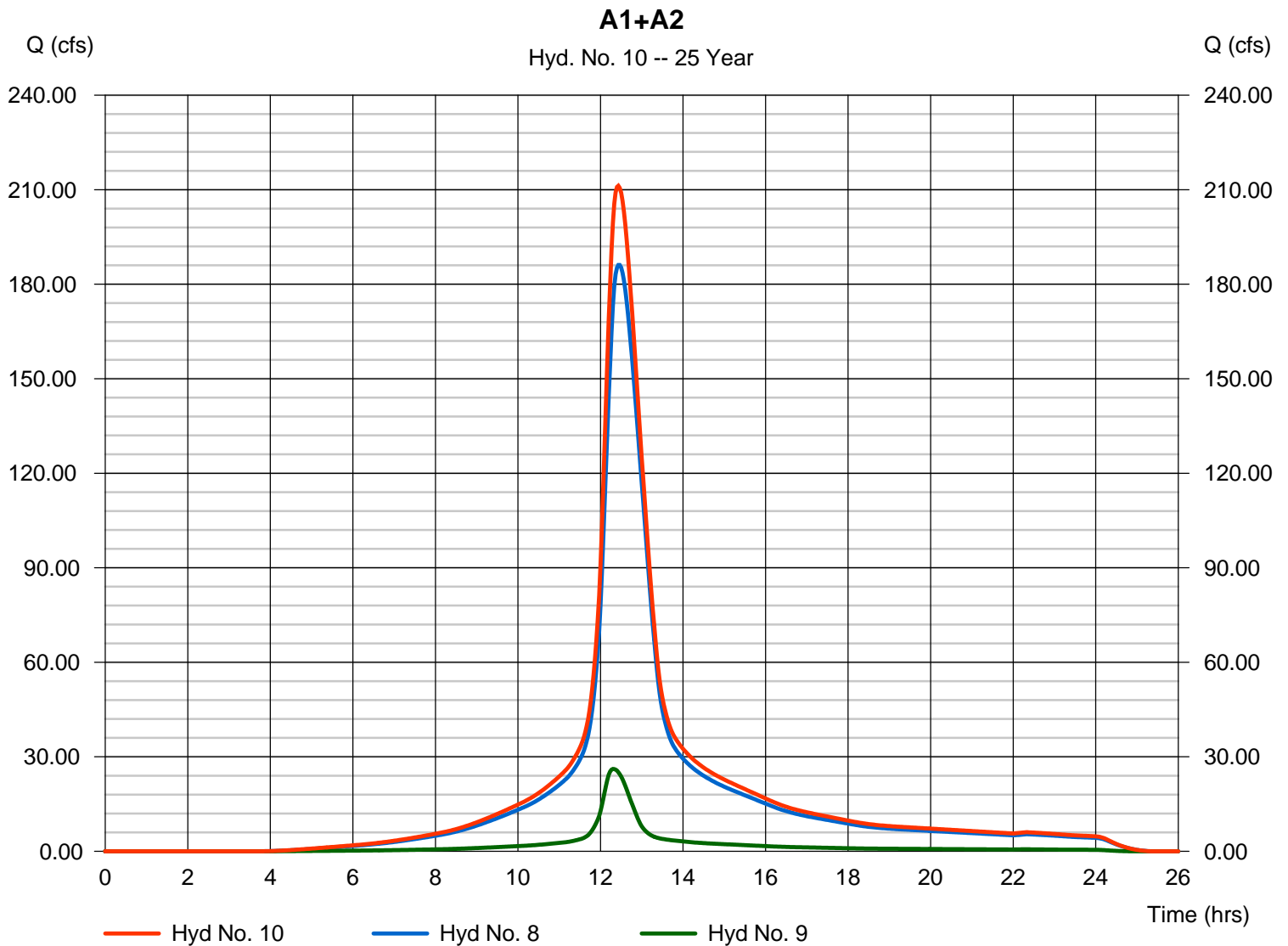
Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 8, 9

Peak discharge = 211.22 cfs
Time to peak = 12.43 hrs
Hyd. volume = 1,558,818 cuft
Contrib. drain. area = 66.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

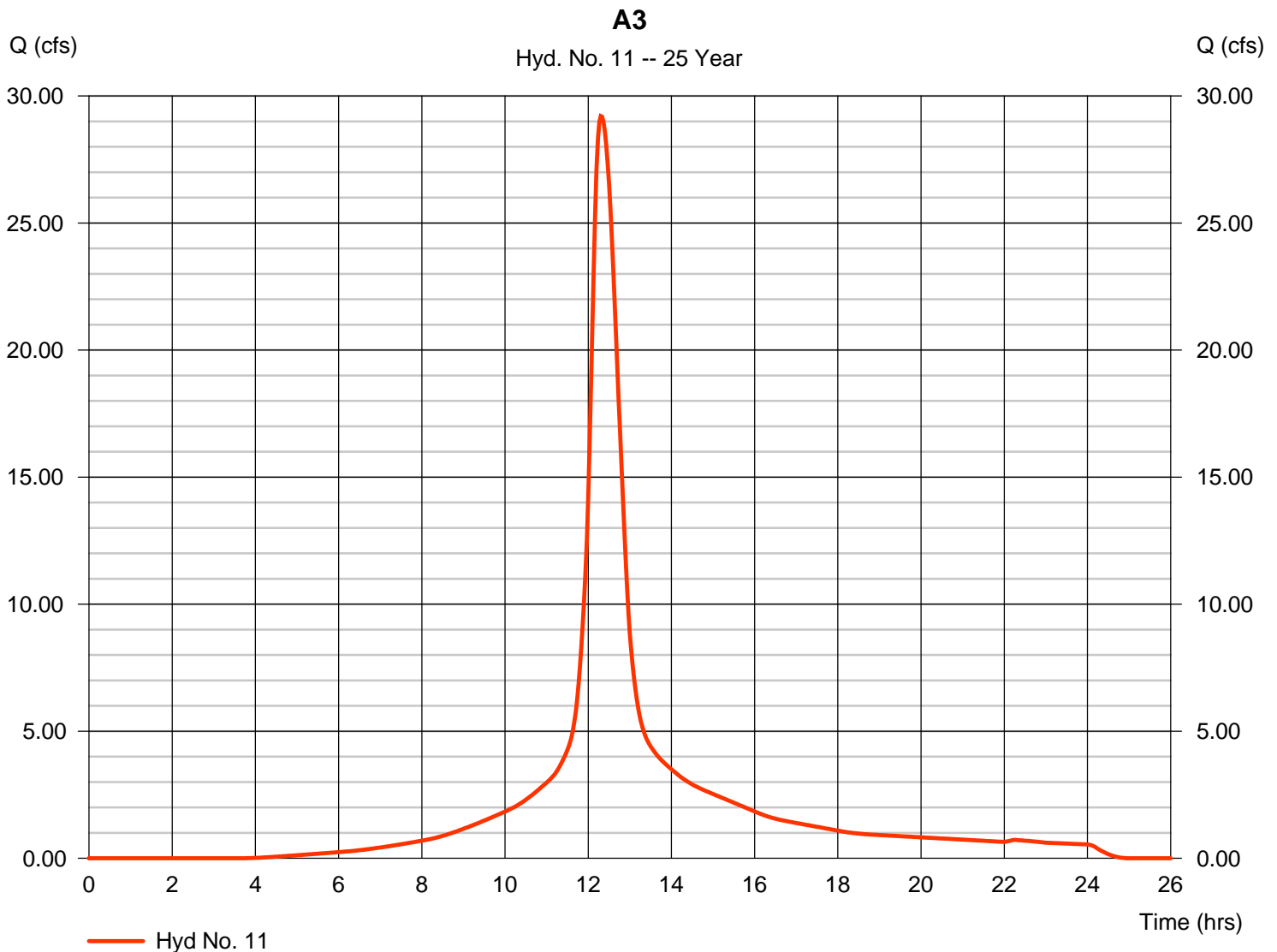
Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 7.700 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 29.21 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 181,211 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

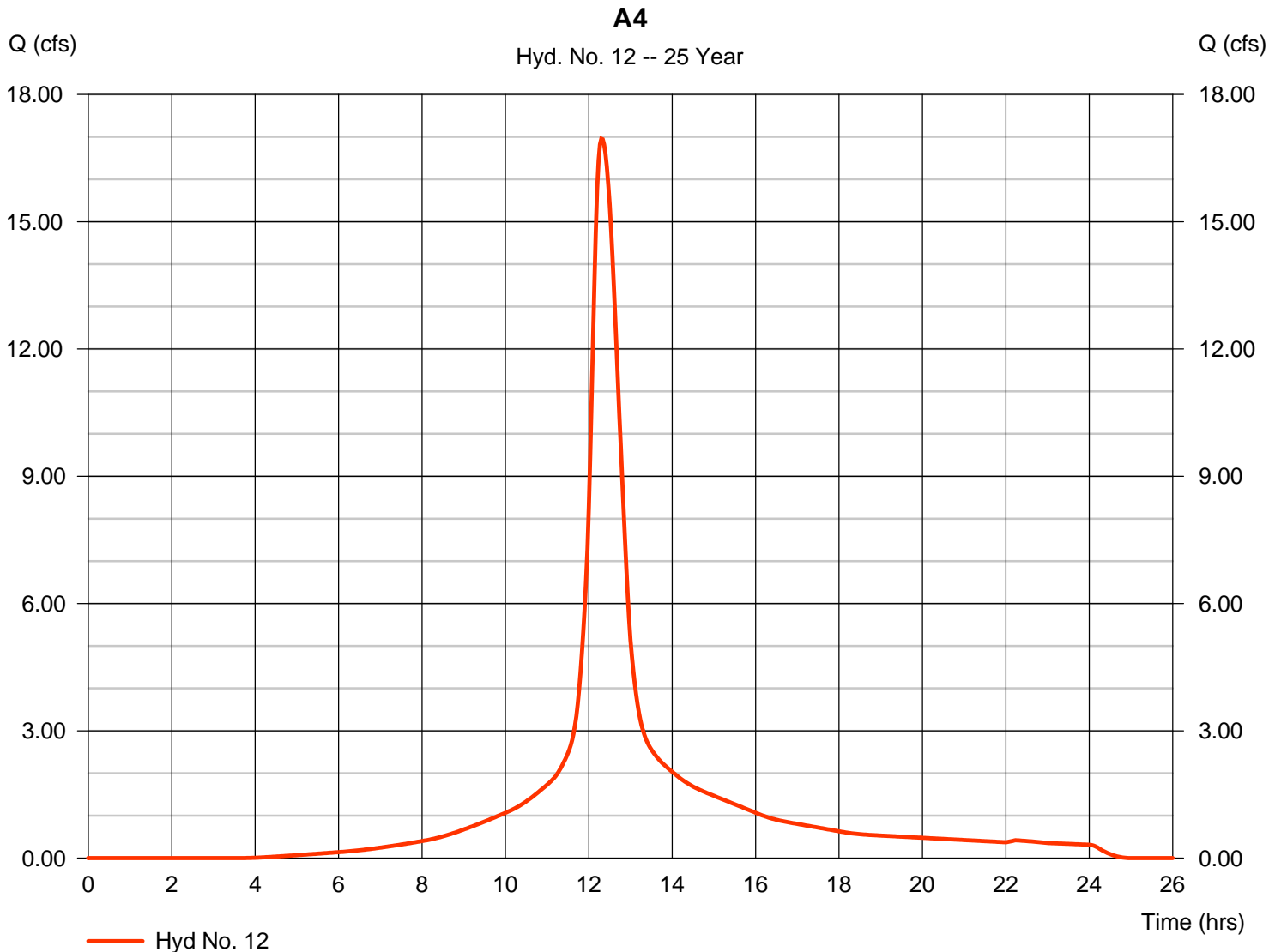
Wednesday, 07 / 15 / 2020

Hyd. No. 12

A4

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 4.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 16.96 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 105,196 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

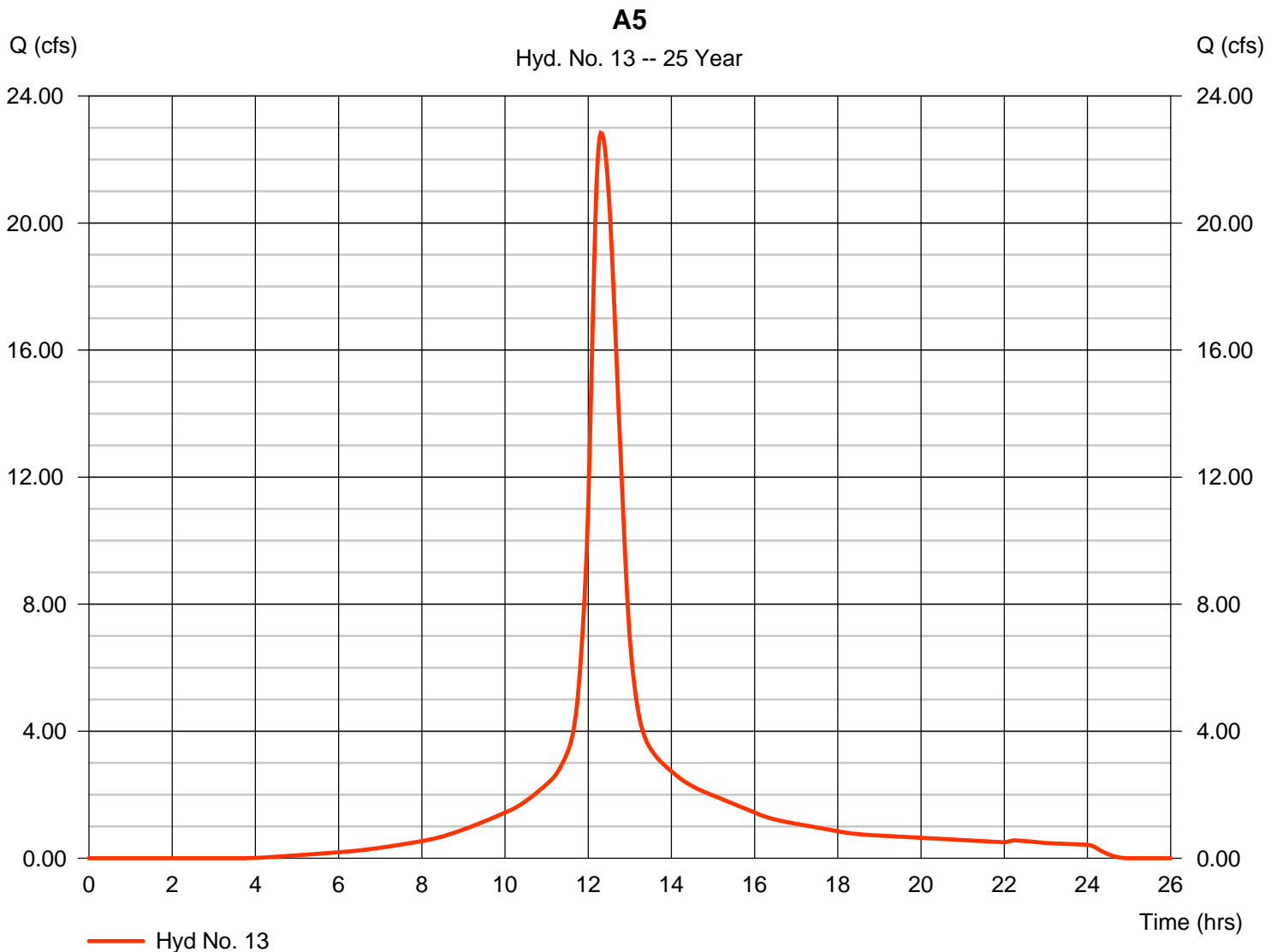
Wednesday, 07 / 15 / 2020

Hyd. No. 13

A5

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 6.020 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 22.84 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 141,674 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 20.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

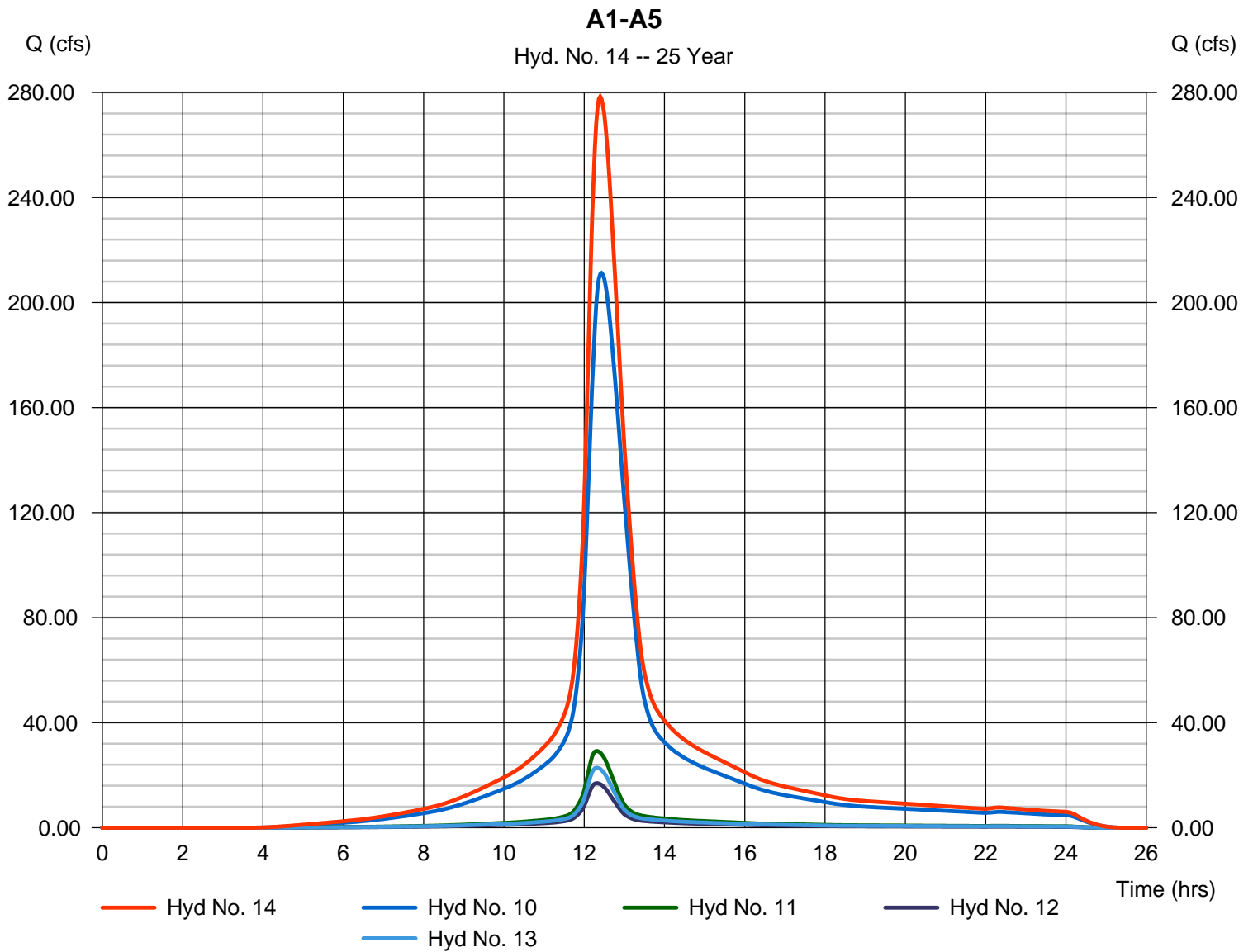
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type	= Combine	Peak discharge	= 278.43 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 1,986,901 cuft
Inflow hyds.	= 10, 11, 12, 13	Contrib. drain. area	= 18.190 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

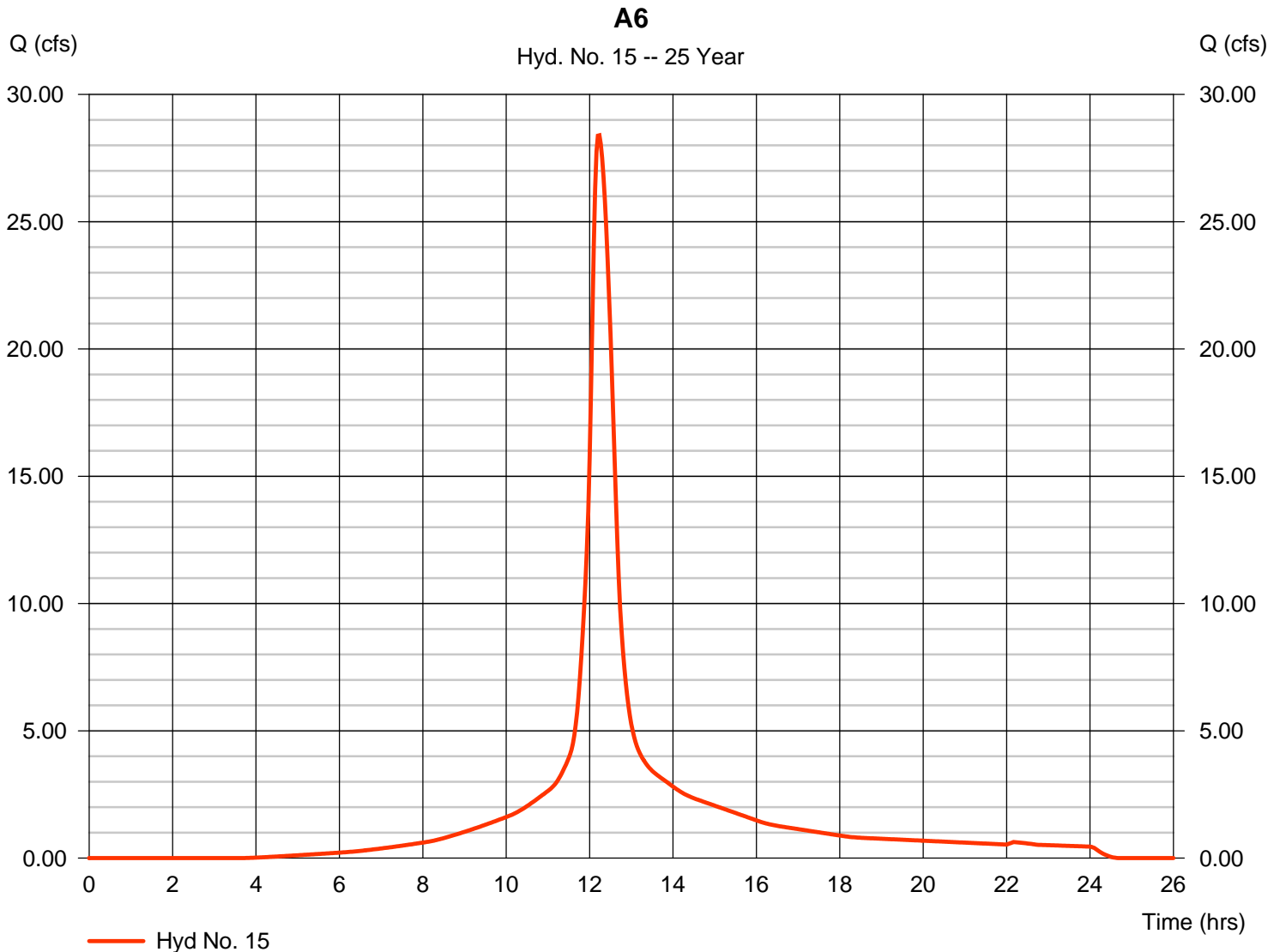
Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 6.300 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 28.39 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 152,217 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

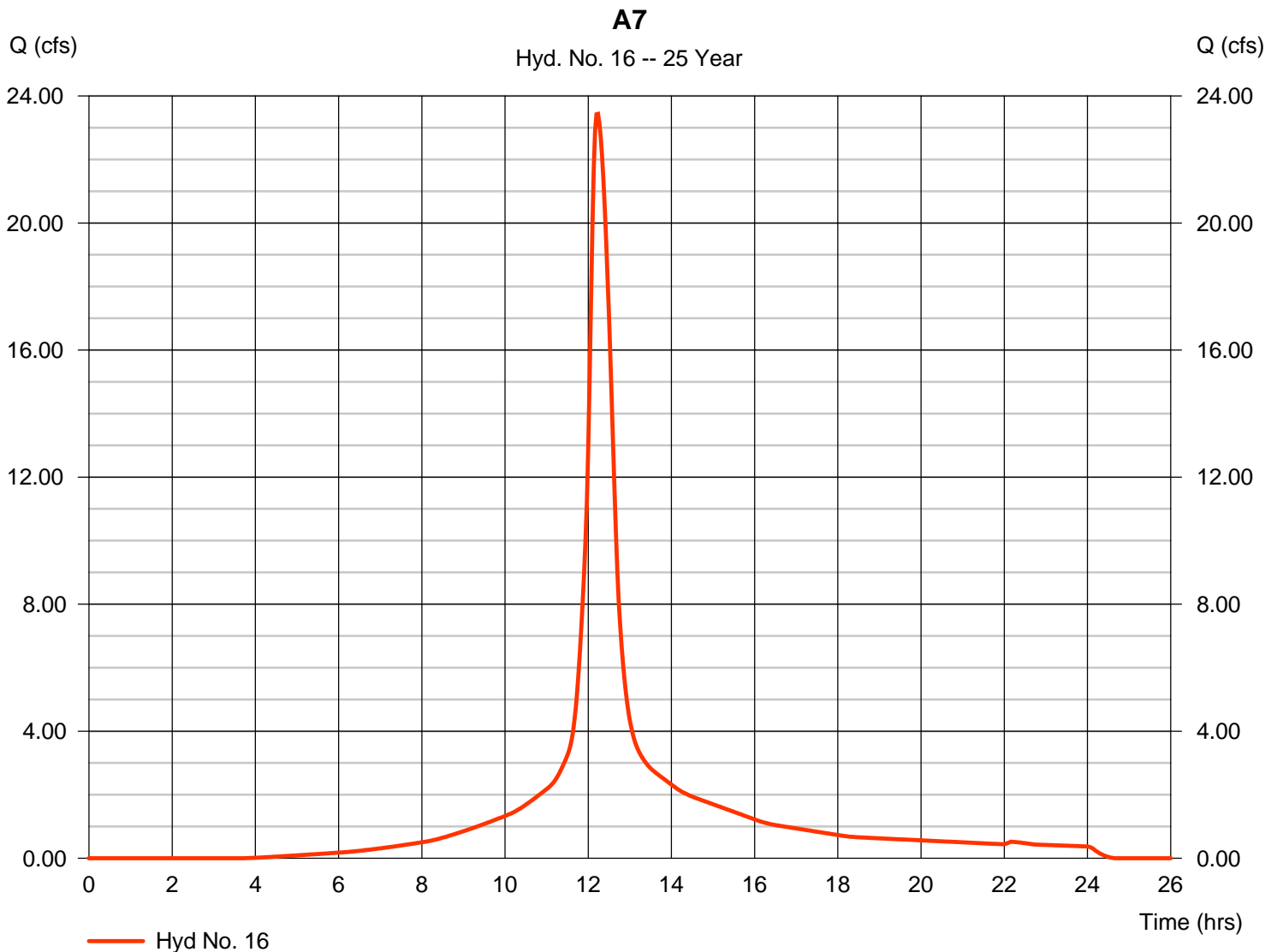
Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 5.200 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 23.43 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 125,640 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

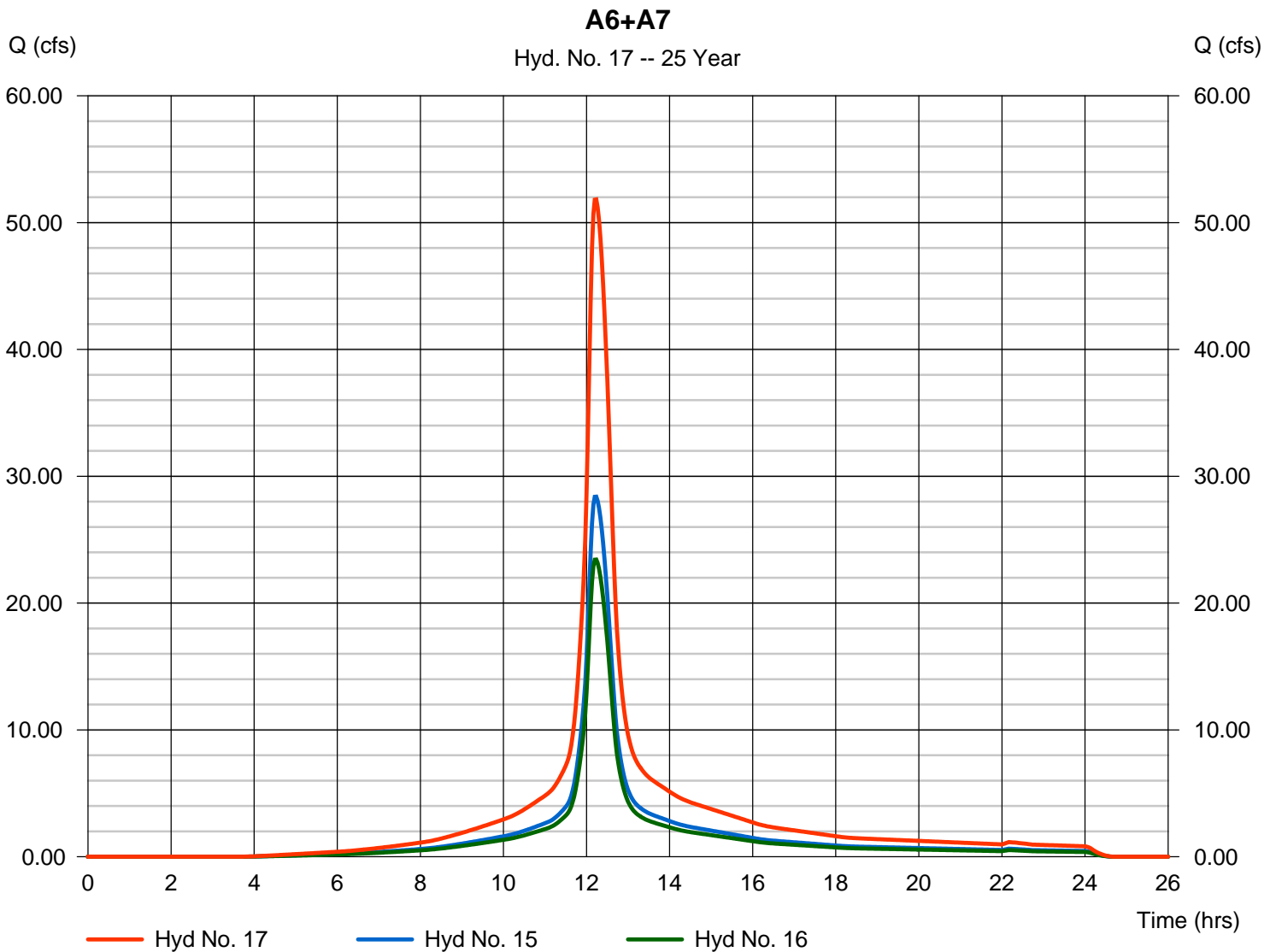
Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 15, 16

Peak discharge = 51.83 cfs
Time to peak = 12.23 hrs
Hyd. volume = 277,857 cuft
Contrib. drain. area = 11.500 ac



Hydrograph Report

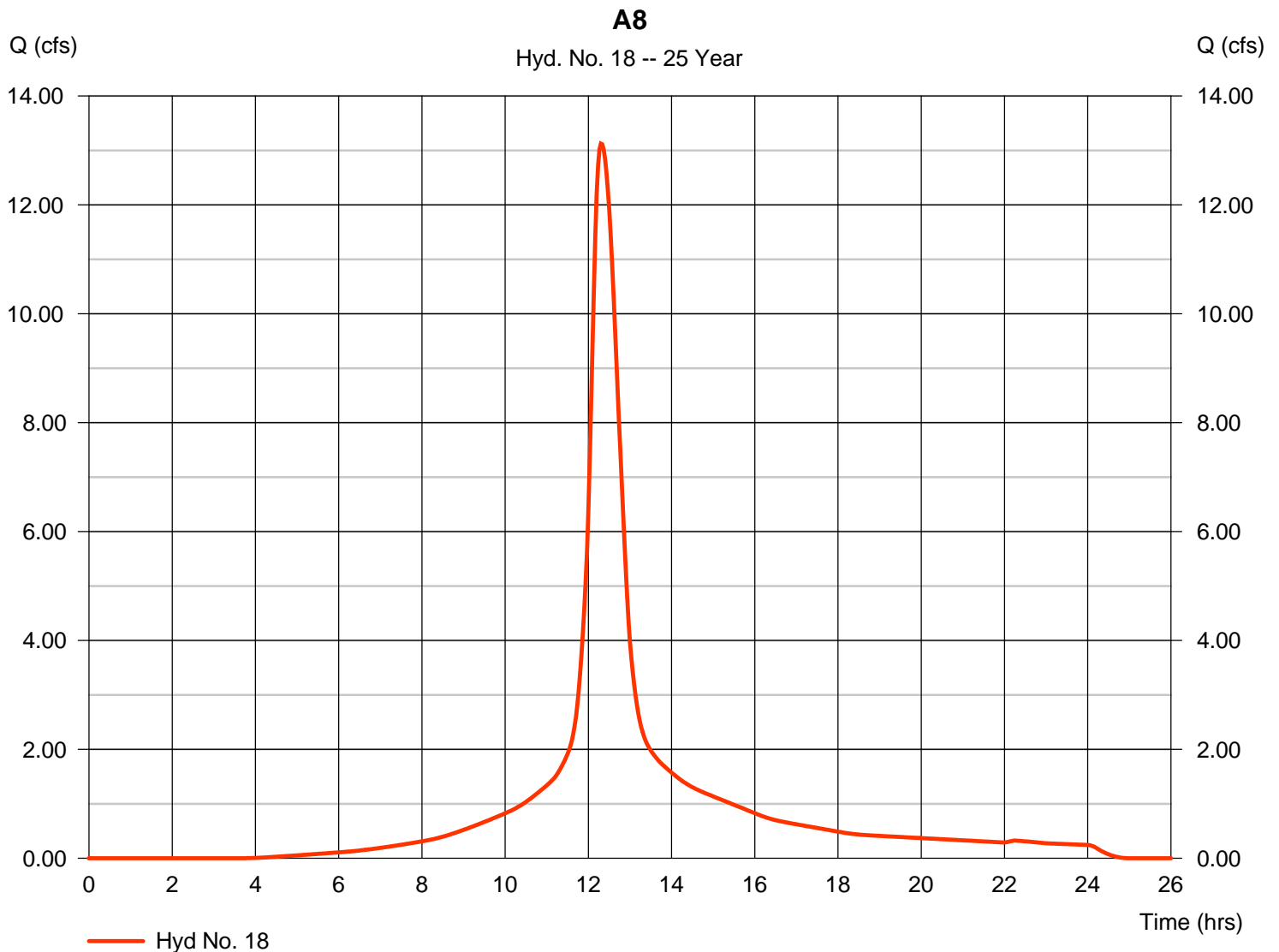
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type	= SCS Runoff	Peak discharge	= 13.13 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 81,427 cuft
Drainage area	= 3.460 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.40 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

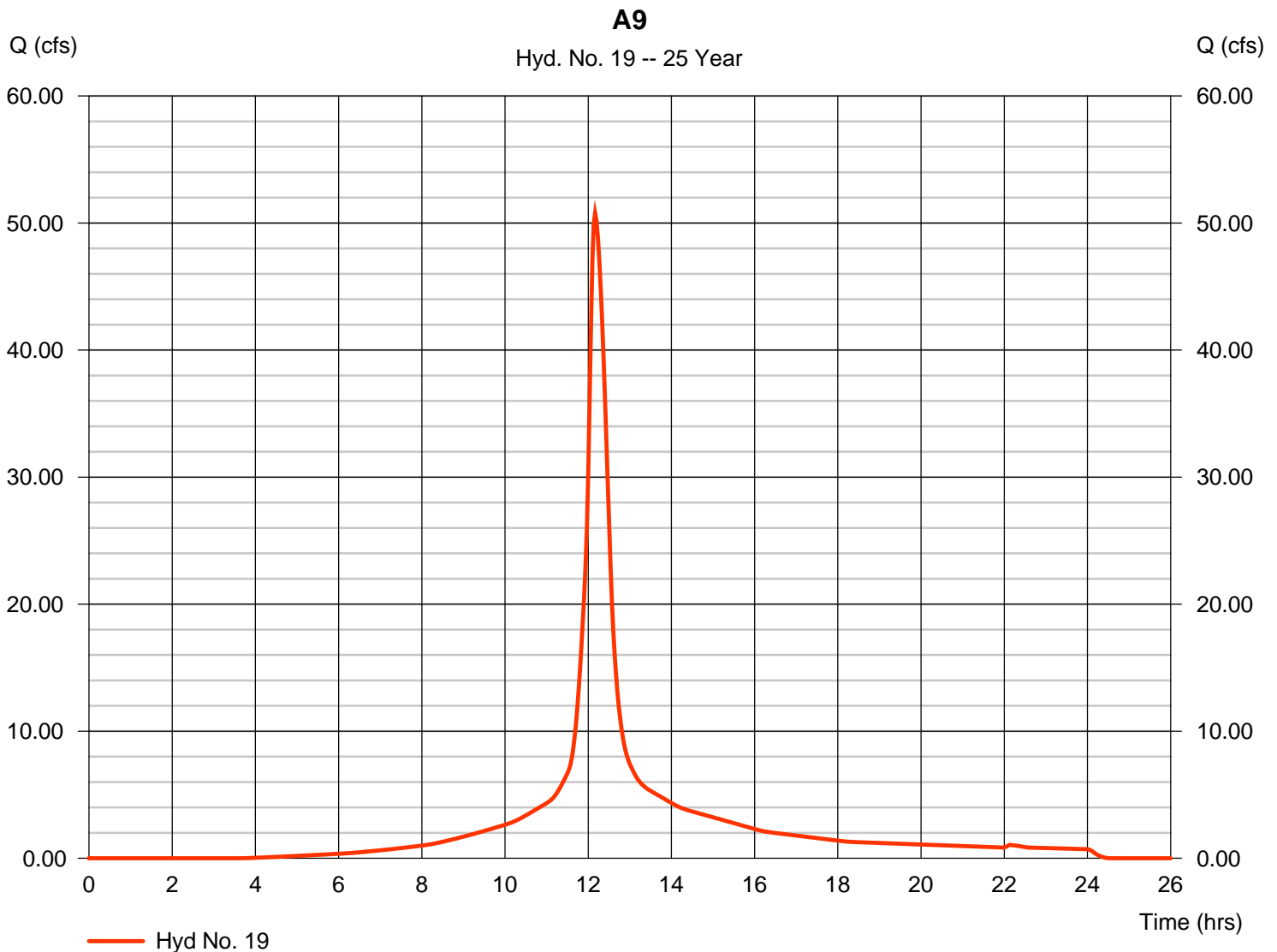
Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 10.400 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.06 in
Storm duration = 24 hrs

Peak discharge = 50.78 cfs
Time to peak = 12.17 hrs
Hyd. volume = 242,713 cuft
Curve number = 87
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

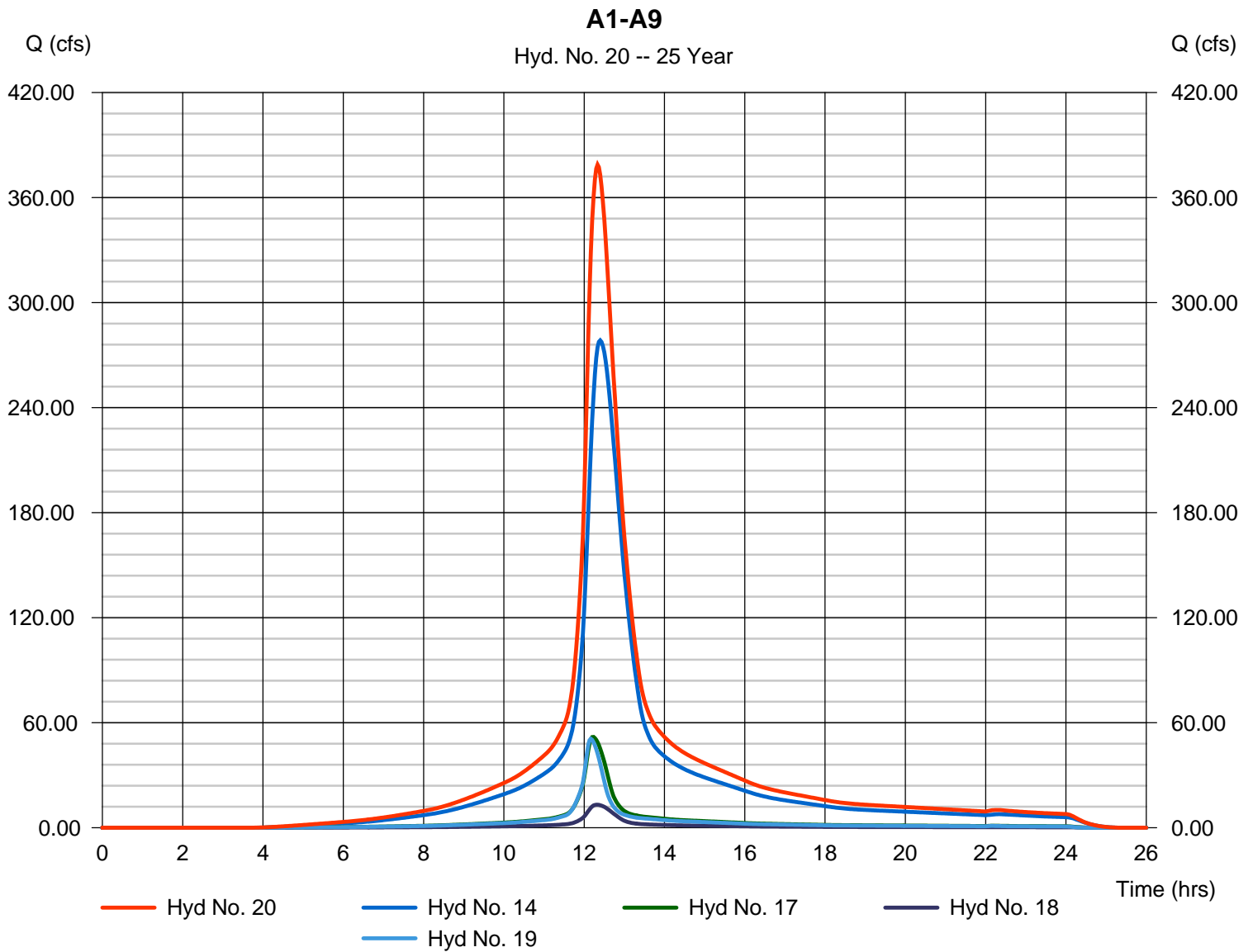
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type	= Combine	Peak discharge	= 378.79 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 2,588,899 cuft
Inflow hyds.	= 14, 17, 18, 19	Contrib. drain. area	= 13.860 ac



Hydrograph Report

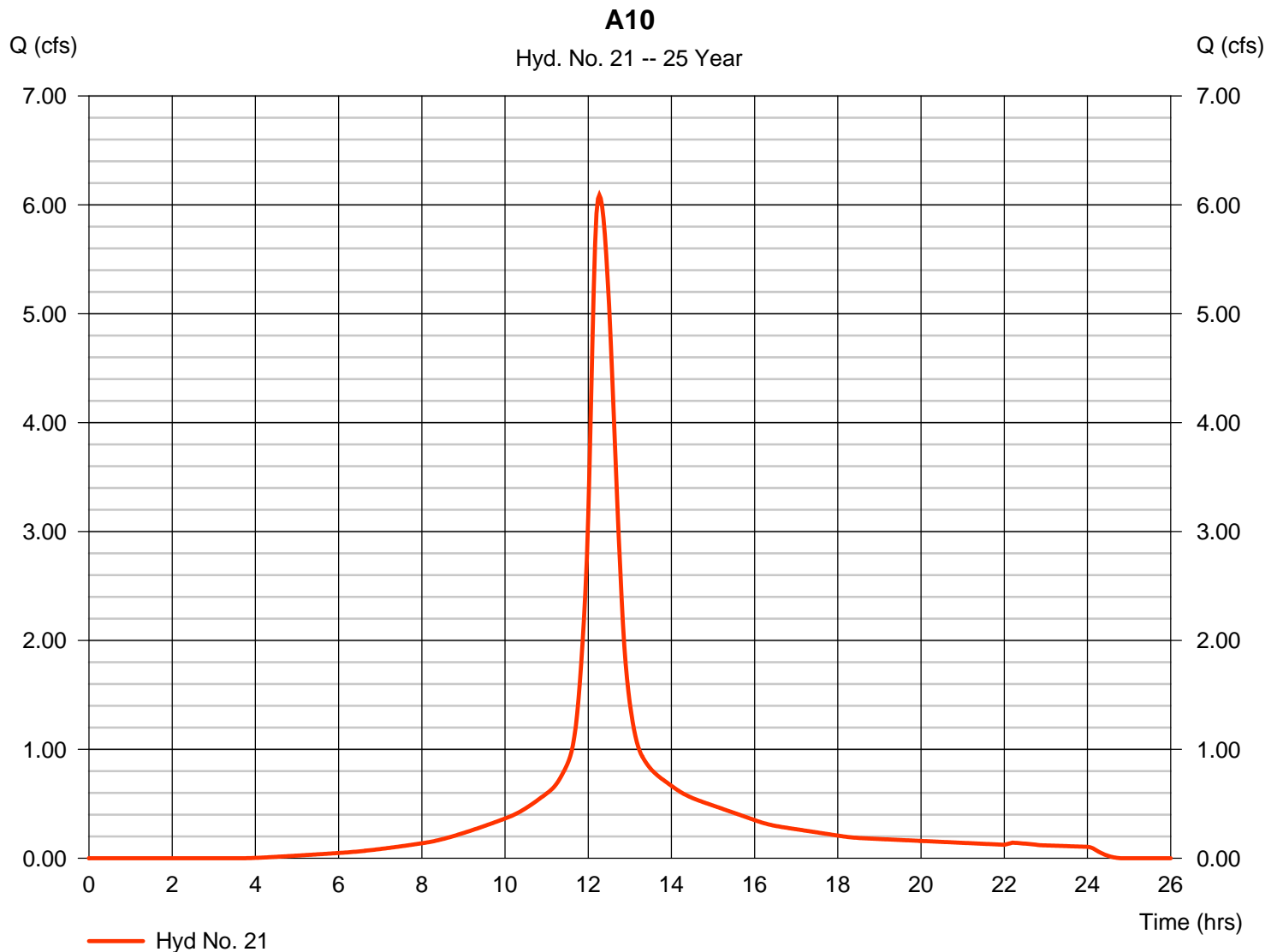
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Wednesday, 07 / 15 / 2020

Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 6.089 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 35,217 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

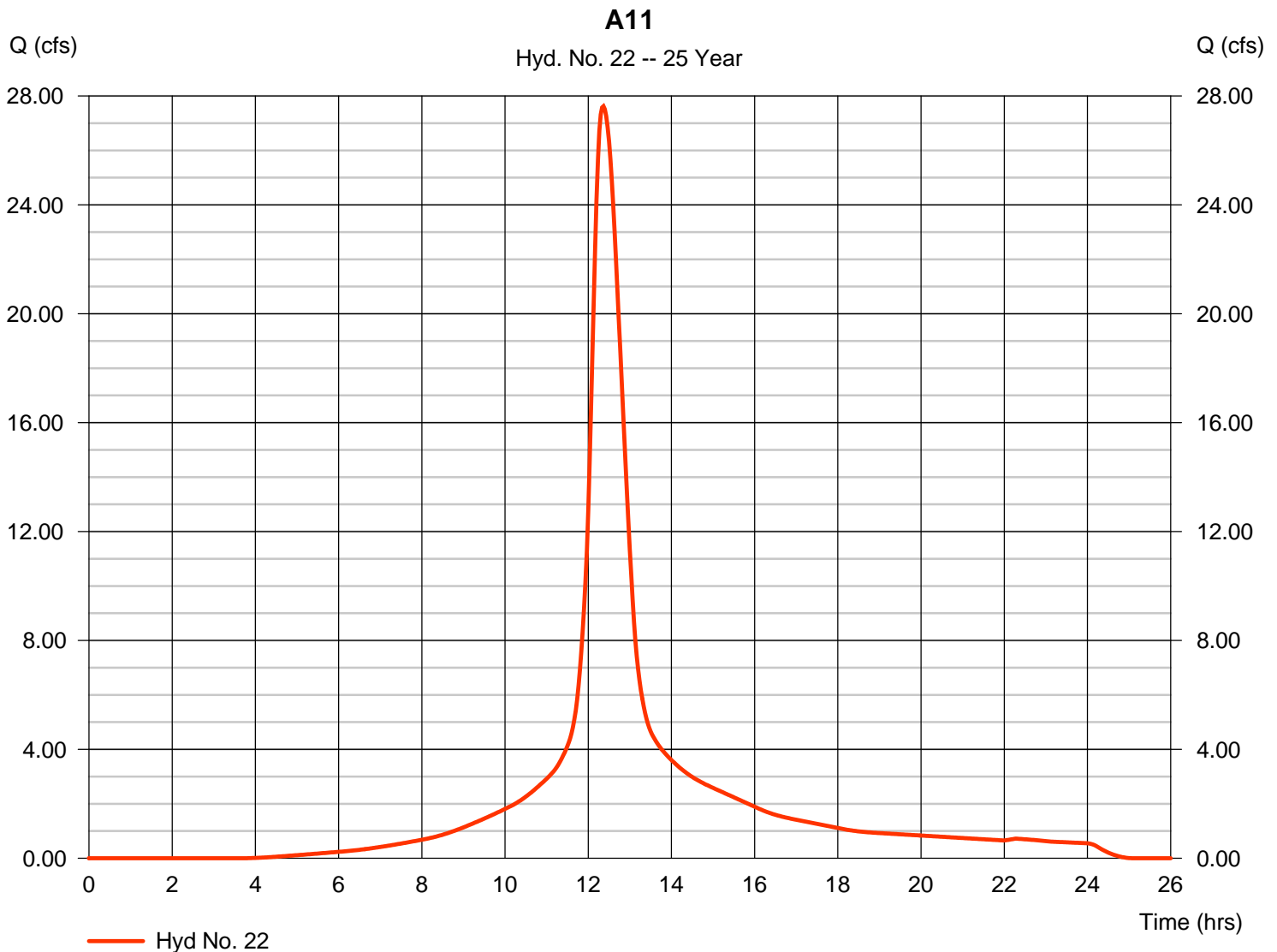
Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 7.820 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 27.62 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 182,501 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

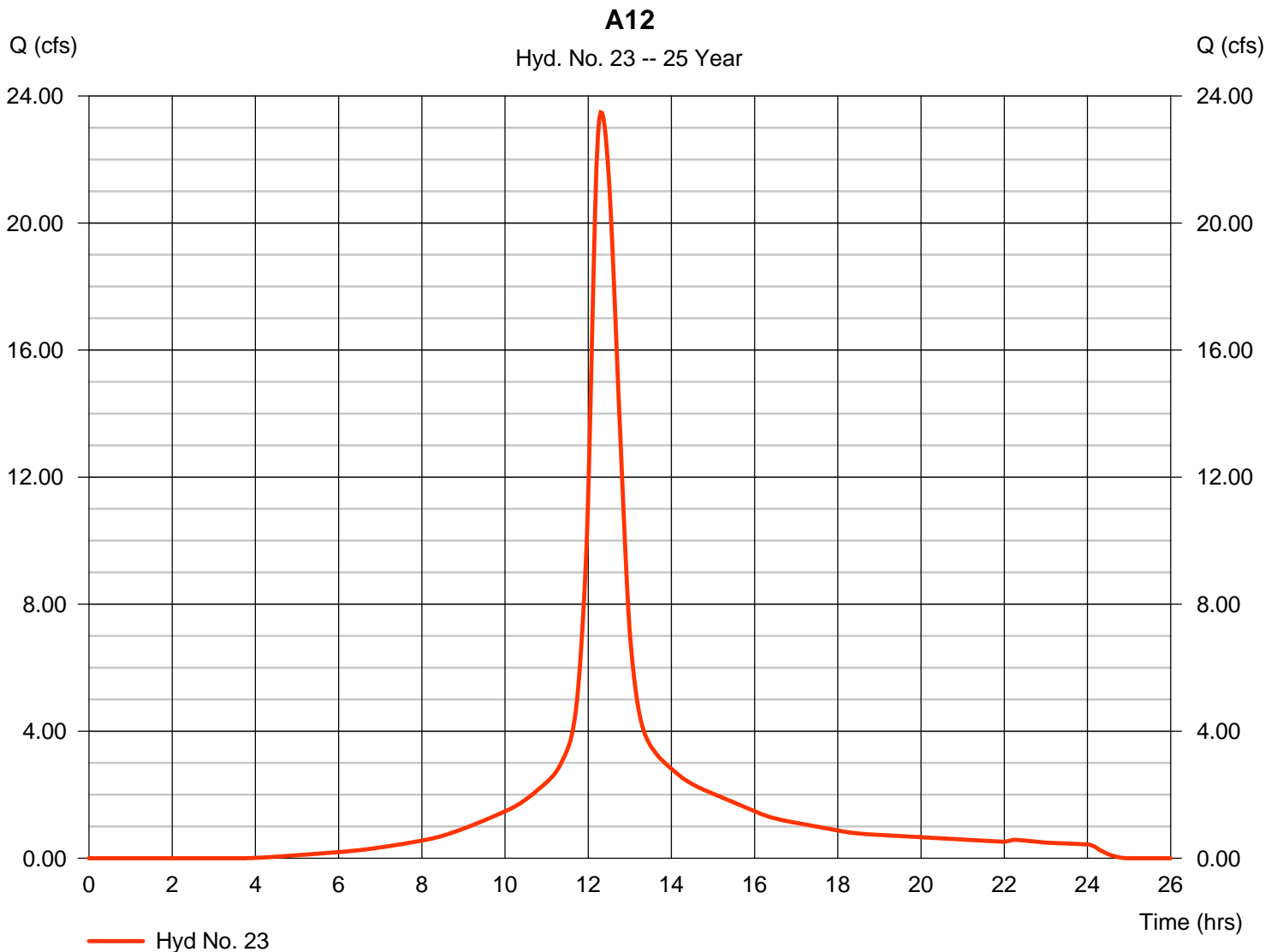
Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 6.190 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 23.48 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 145,675 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 22.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

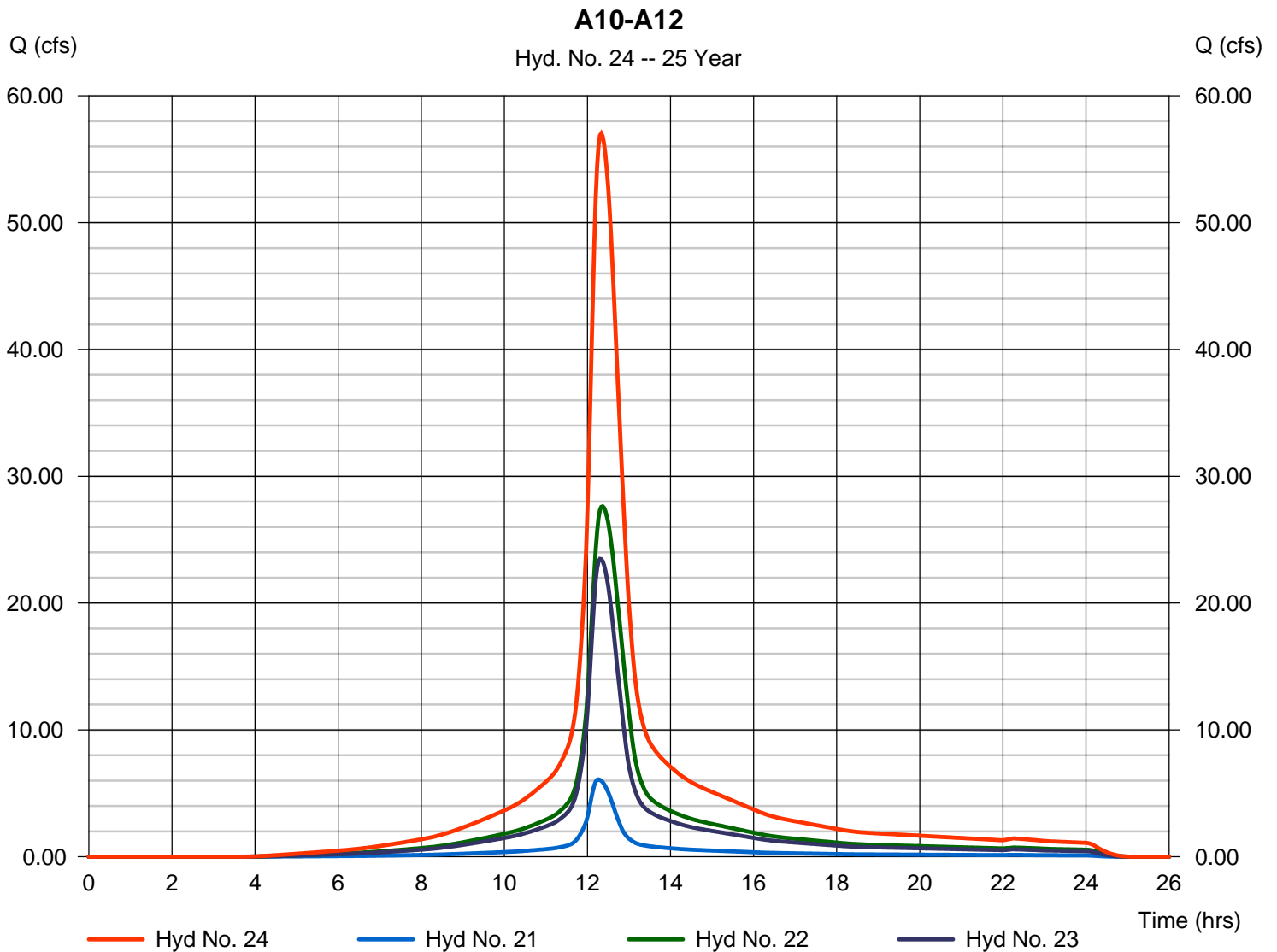
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 21, 22, 23

Peak discharge = 57.03 cfs
Time to peak = 12.33 hrs
Hyd. volume = 363,393 cuft
Contrib. drain. area = 15.490 ac



Hydrograph Report

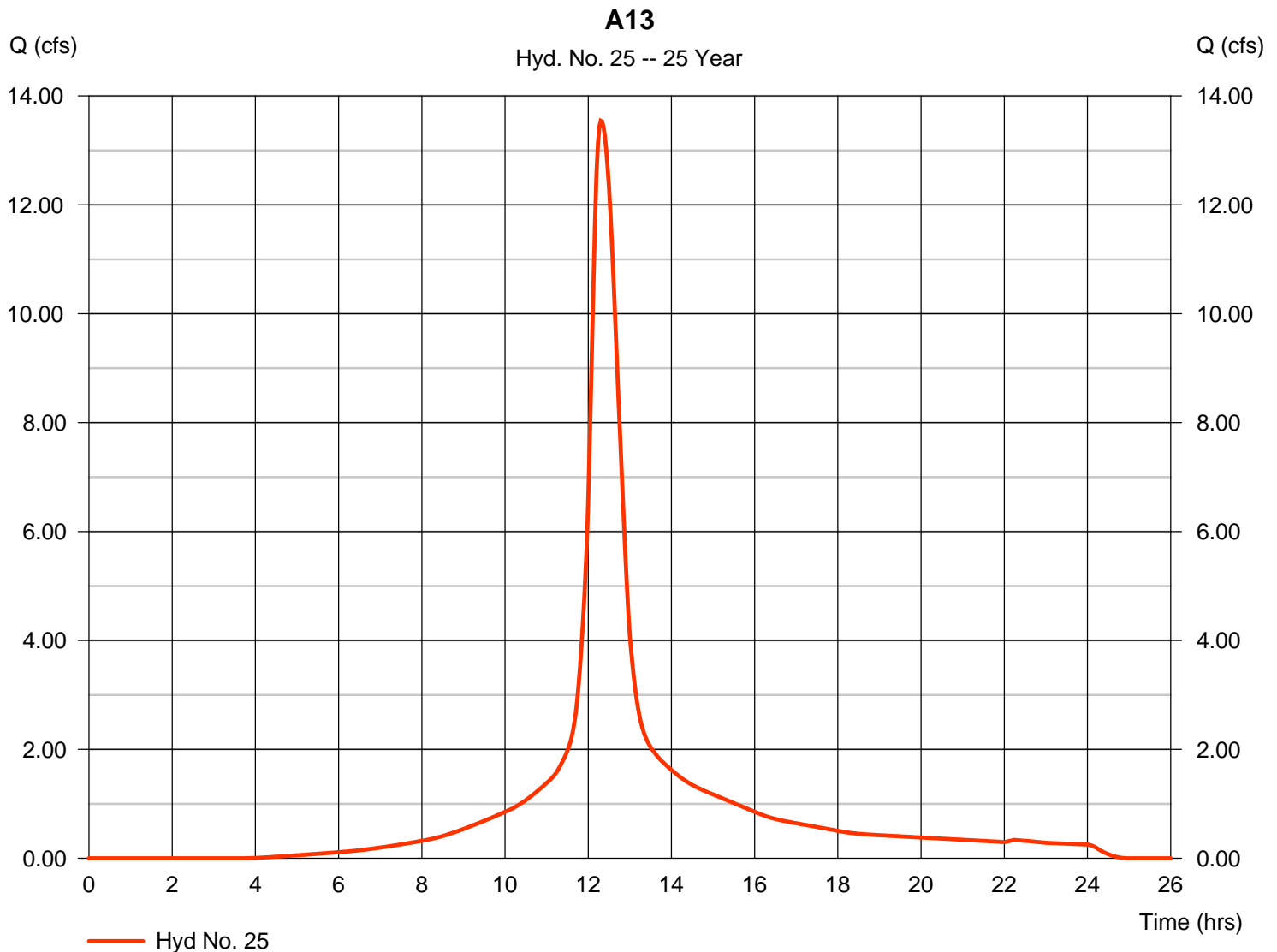
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type	= SCS Runoff	Peak discharge	= 13.54 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 84,016 cuft
Drainage area	= 3.570 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.80 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

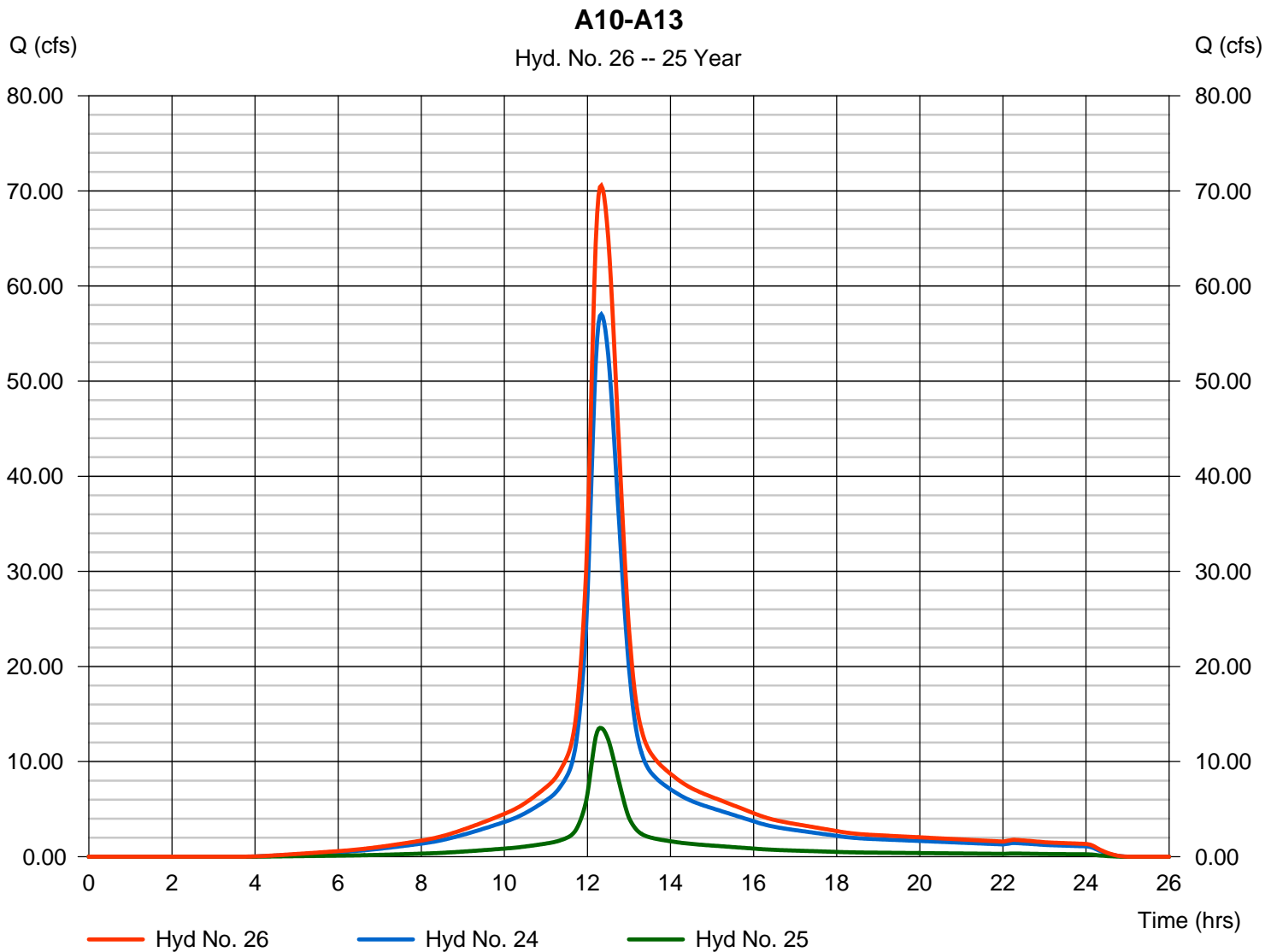
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 24, 25

Peak discharge = 70.56 cfs
Time to peak = 12.33 hrs
Hyd. volume = 447,409 cuft
Contrib. drain. area = 3.570 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

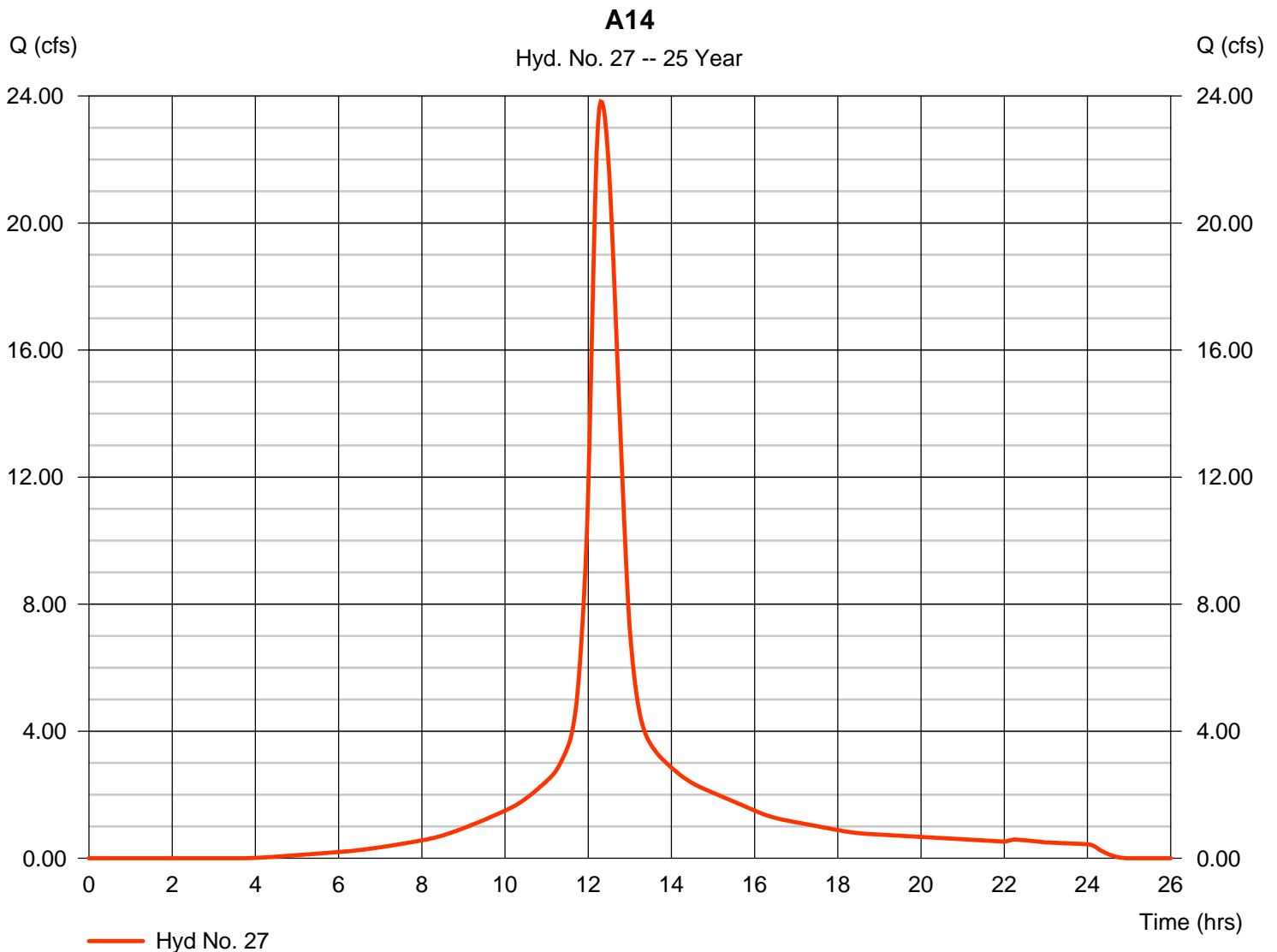
Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 6.280 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 23.82 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 147,793 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

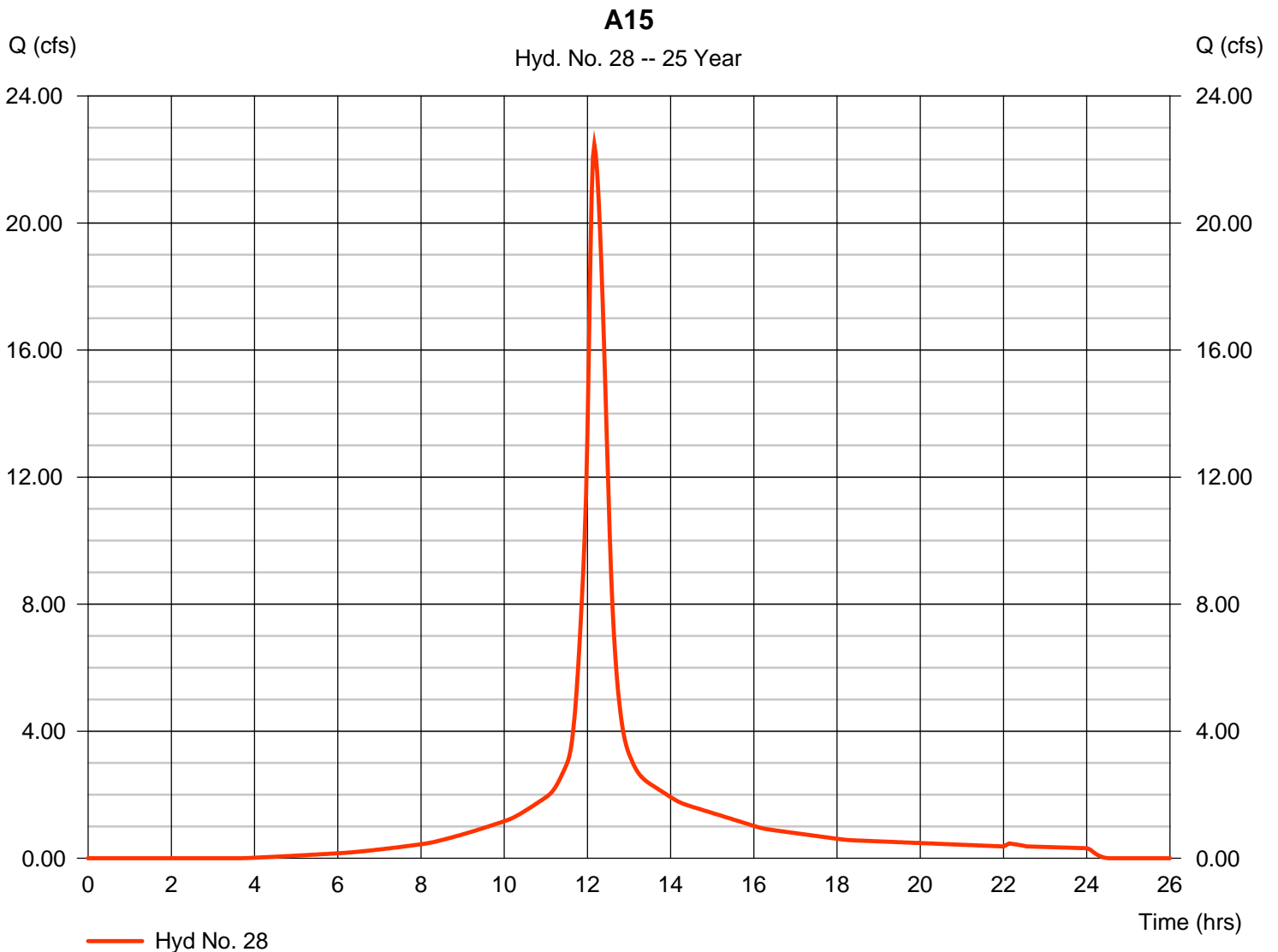
Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 4.600 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 22.46 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 107,354 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 29

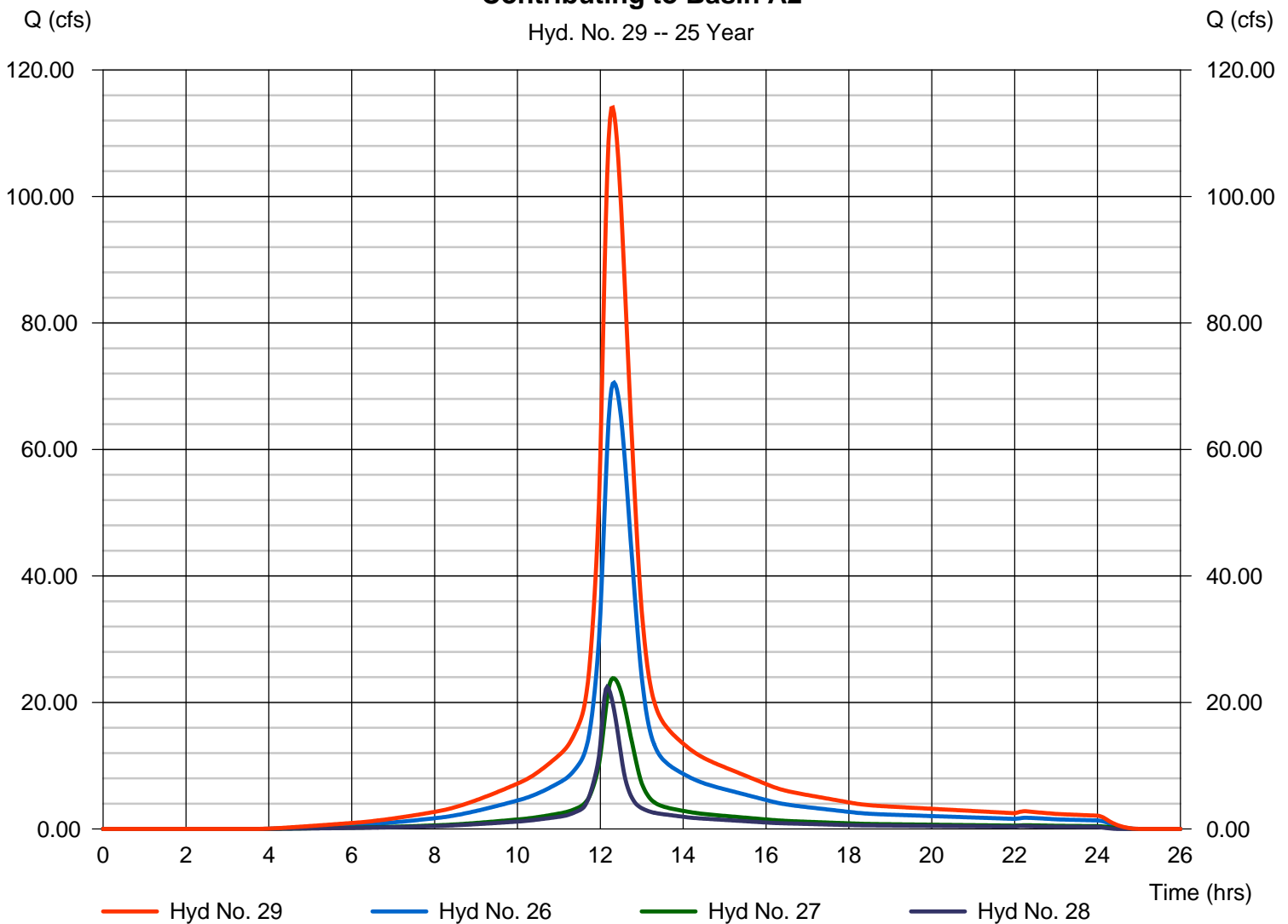
Contributing to Basin A2

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 26, 27, 28

Peak discharge = 114.06 cfs
Time to peak = 12.30 hrs
Hyd. volume = 702,556 cuft
Contrib. drain. area = 10.880 ac

Contributing to Basin A2

Hyd. No. 29 -- 25 Year



Hydrograph Report

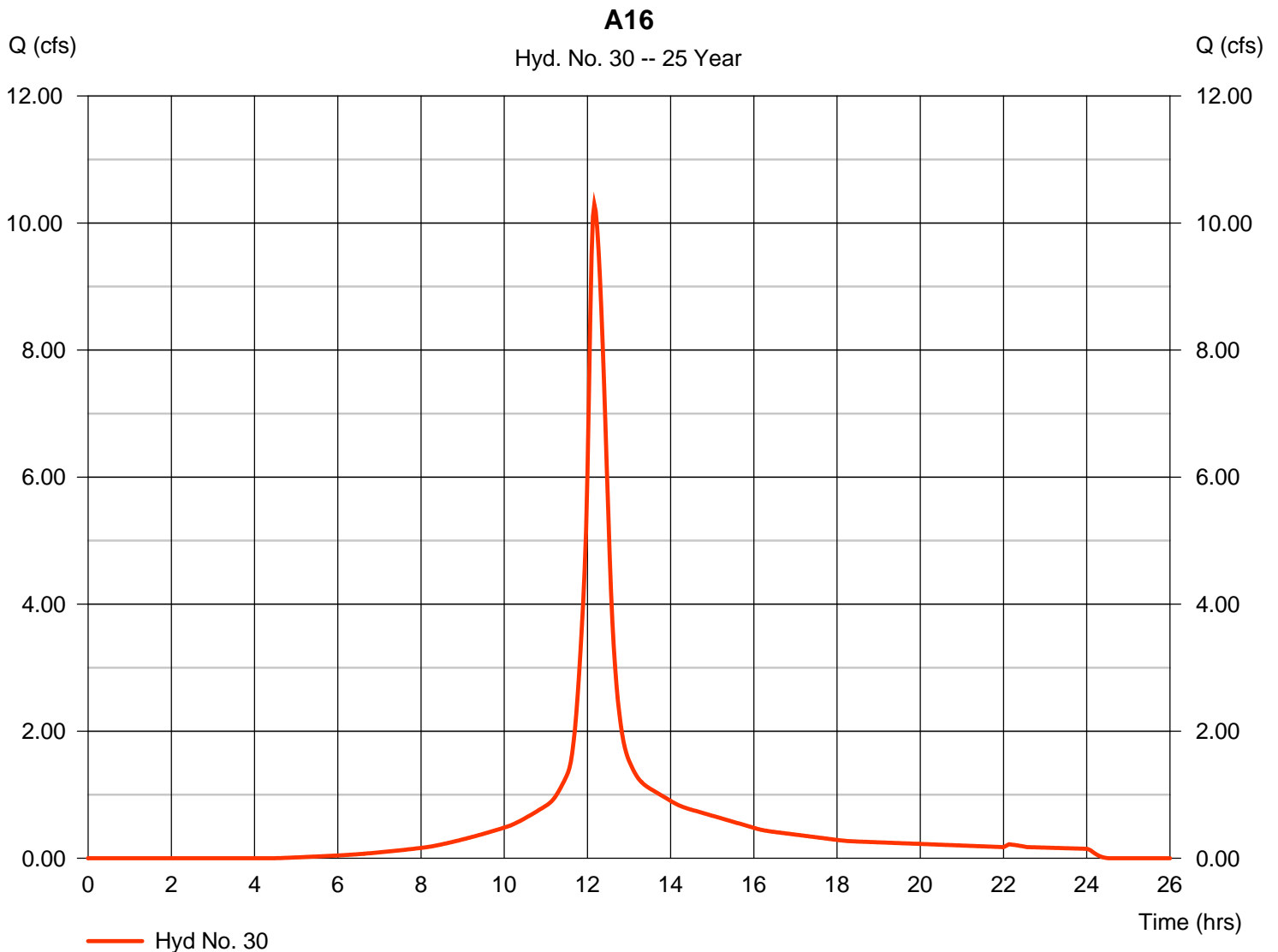
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 10.29 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 48,540 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

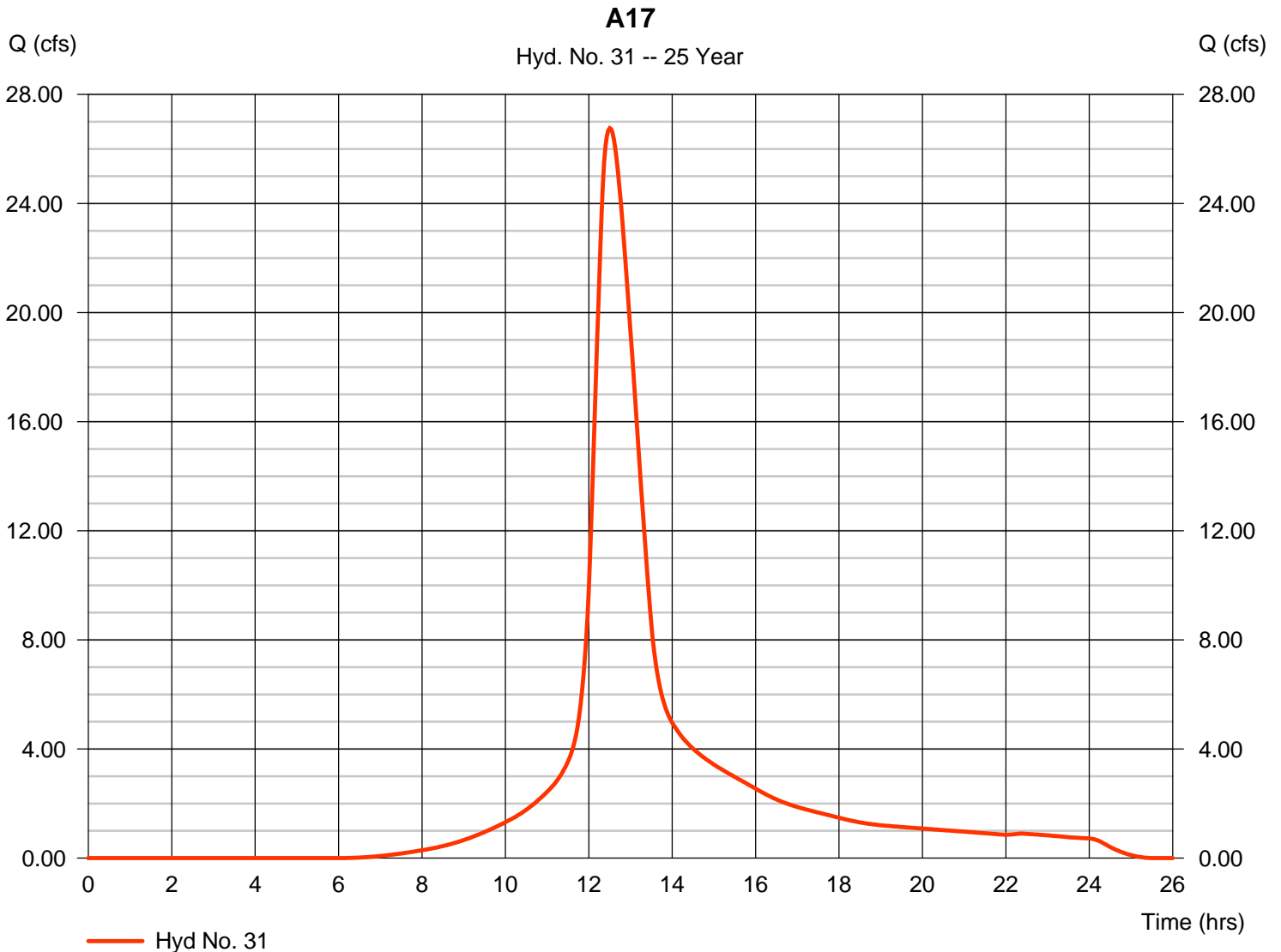
Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 26.76 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 205,582 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

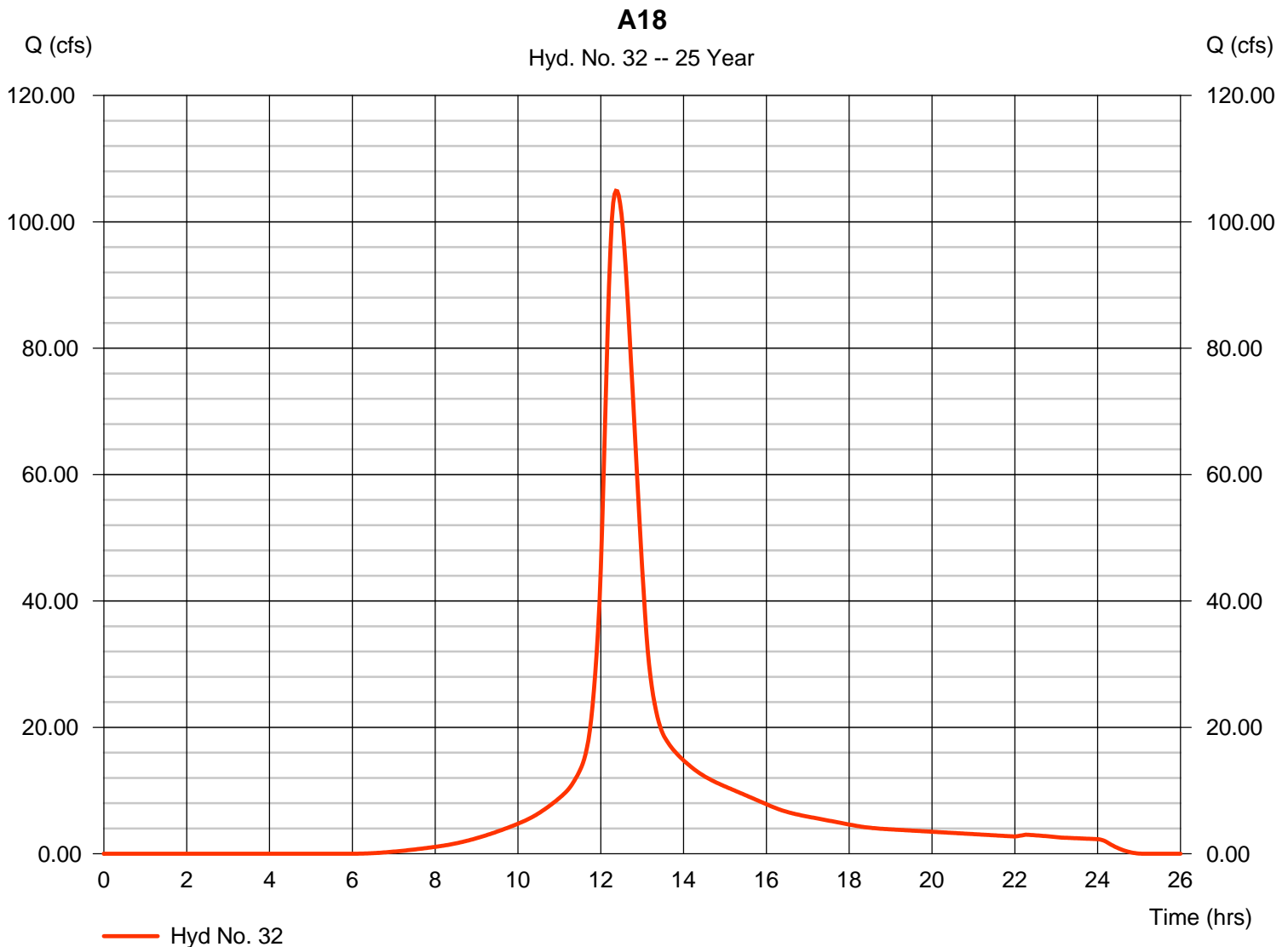
Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 8.06 in
 Storm duration = 24 hrs

Peak discharge = 104.91 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 673,619 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

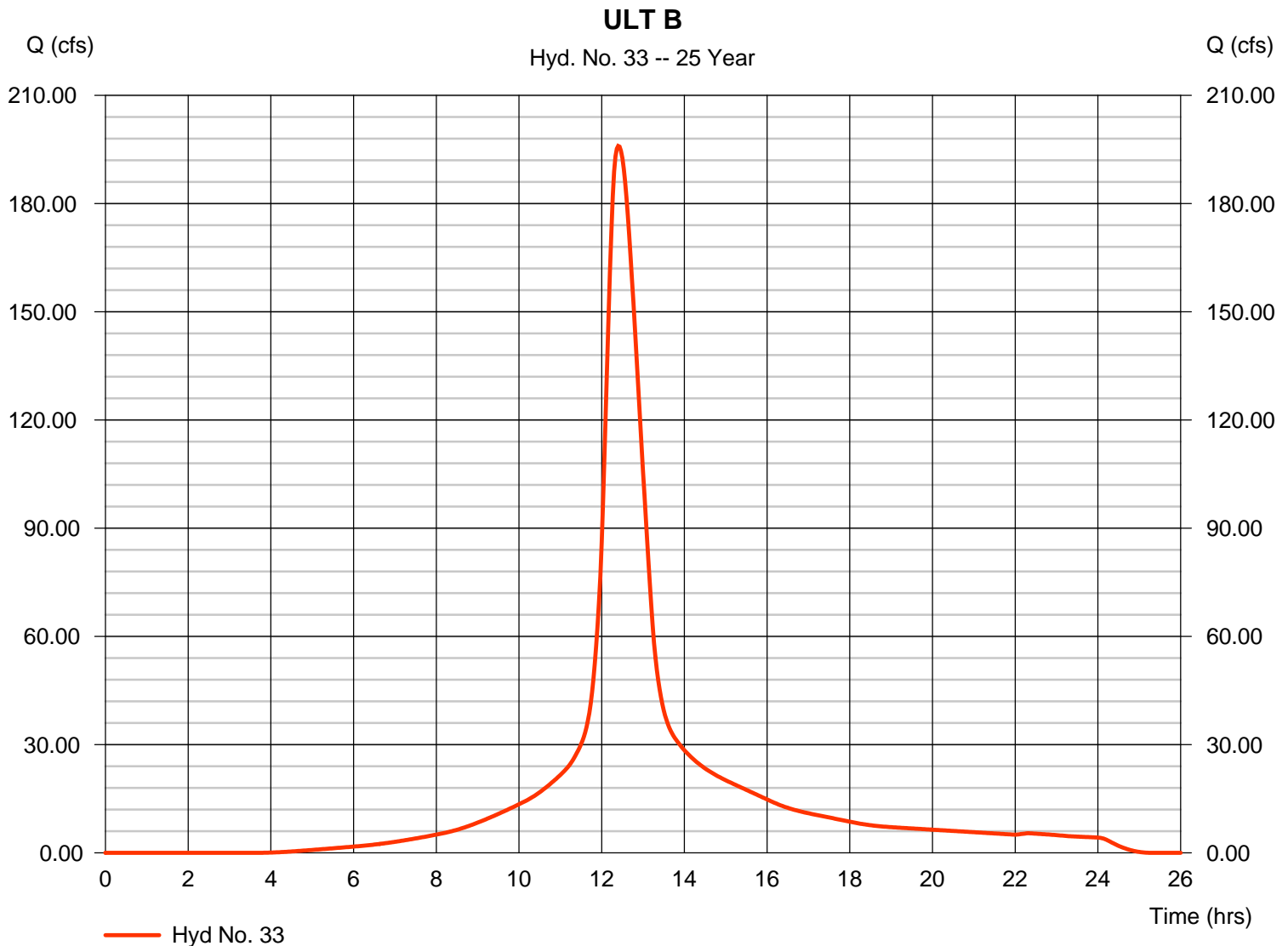
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 33

ULT B

Hydrograph type	= SCS Runoff	Peak discharge	= 195.98 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 1,393,933 cuft
Drainage area	= 58.580 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.80 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	373.01	2	780	4,391,145	-----	-----	-----	EX A
2	SCS Runoff	70.28	2	760	663,725	-----	-----	-----	EX A1
3	SCS Runoff	35.27	2	750	272,771	-----	-----	-----	EX A2
4	SCS Runoff	200.41	2	756	1,798,914	-----	-----	-----	EX A3
5	SCS Runoff	97.18	2	784	1,318,021	-----	-----	-----	EX A4
6	Combine	283.94	2	766	3,116,936	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	216.64	2	768	2,379,425	-----	-----	-----	EX B
8	SCS Runoff	236.53	2	746	1,795,598	-----	-----	-----	A1
9	SCS Runoff	33.21	2	738	208,463	-----	-----	-----	A2
10	Combine	268.36	2	746	2,004,061	8, 9	-----	-----	A1+A2
11	SCS Runoff	37.11	2	738	232,970	-----	-----	-----	A3
12	SCS Runoff	21.54	2	738	135,244	-----	-----	-----	A4
13	SCS Runoff	29.01	2	738	182,140	-----	-----	-----	A5
14	Combine	353.73	2	744	2,554,416	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	36.06	2	732	195,695	-----	-----	-----	A6
16	SCS Runoff	29.76	2	732	161,526	-----	-----	-----	A7
17	Combine	65.82	2	732	357,221	15, 16	-----	-----	A6+A7
18	SCS Runoff	16.68	2	738	104,685	-----	-----	-----	A8
19	SCS Runoff	64.46	2	730	312,039	-----	-----	-----	A9
20	Combine	481.20	2	740	3,328,362	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	7.733	2	736	45,276	-----	-----	-----	A10
22	SCS Runoff	35.08	2	742	234,629	-----	-----	-----	A11
23	SCS Runoff	29.83	2	738	187,284	-----	-----	-----	A12
24	Combine	72.42	2	740	467,189	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	17.21	2	738	108,013	-----	-----	-----	A13
26	Combine	89.60	2	740	575,202	24, 25	-----	-----	A10-A13
27	SCS Runoff	30.27	2	738	190,007	-----	-----	-----	A14
28	SCS Runoff	28.51	2	730	138,017	-----	-----	-----	A15
29	Combine	144.82	2	738	903,227	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	13.21	2	730	63,035	-----	-----	-----	A16
31	SCS Runoff	35.27	2	750	272,771	-----	-----	-----	A17
32	SCS Runoff	138.18	2	742	893,776	-----	-----	-----	A18
33	SCS Runoff	249.01	2	744	1,792,081	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 50 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

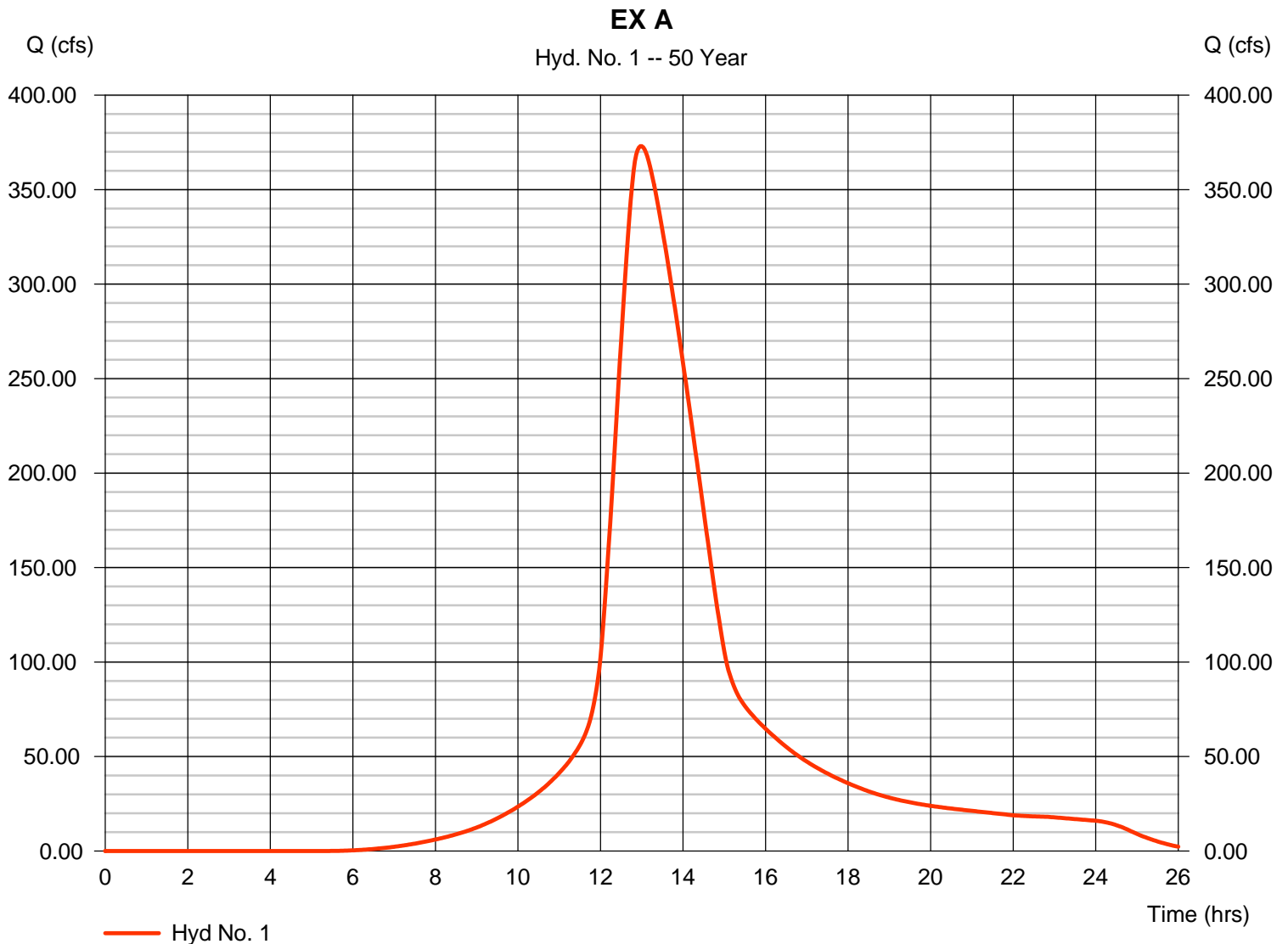
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 1

EX A

Hydrograph type	= SCS Runoff	Peak discharge	= 373.01 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.00 hrs
Time interval	= 2 min	Hyd. volume	= 4,391,145 cuft
Drainage area	= 167.740 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 83.60 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 350



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

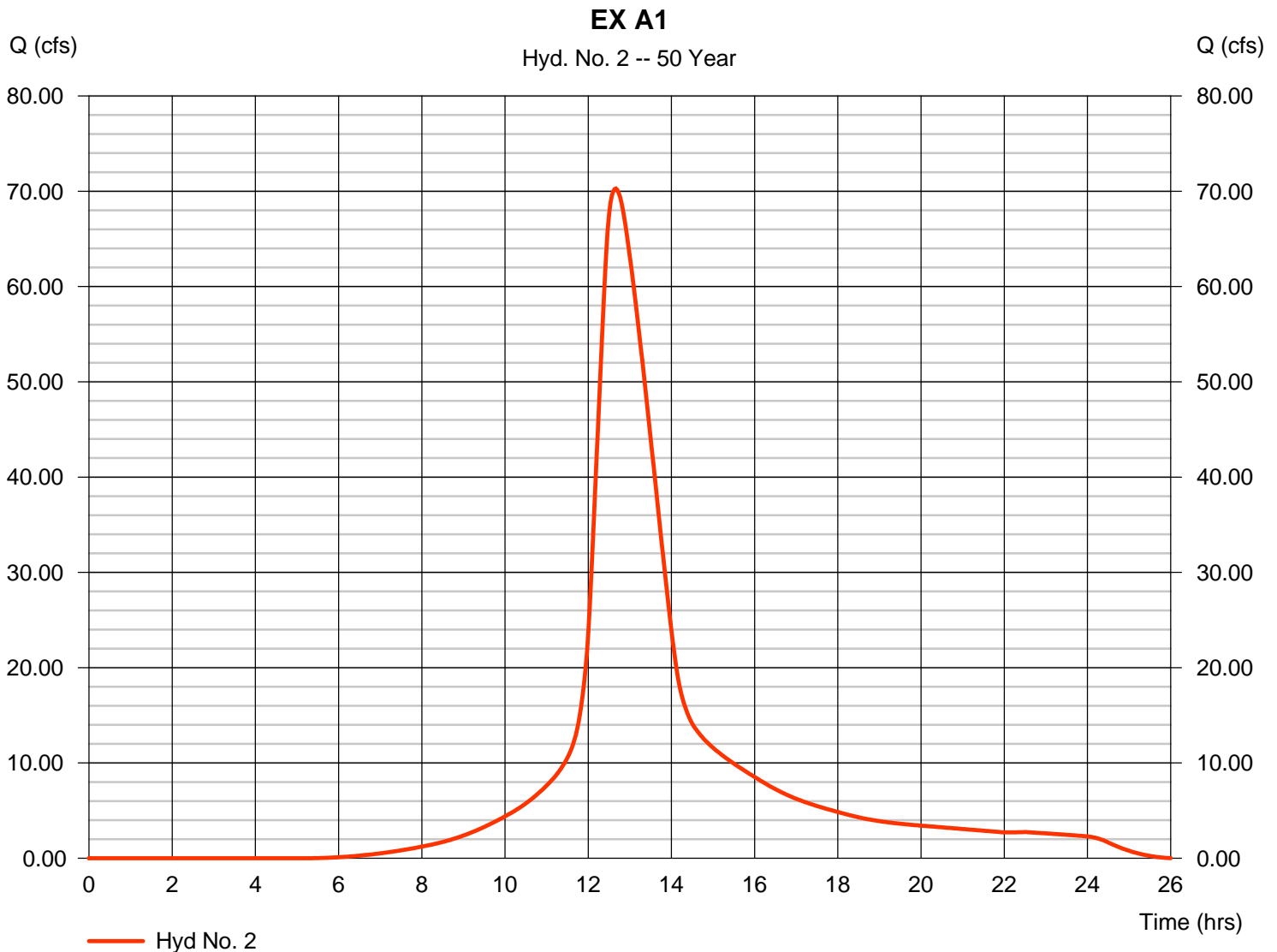
Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Time interval = 2 min
Drainage area = 25.120 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 9.96 in
Storm duration = 24 hrs

Peak discharge = 70.28 cfs
Time to peak = 12.67 hrs
Hyd. volume = 663,725 cuft
Curve number = 78
Hydraulic length = 0 ft
Time of conc. (Tc) = 49.70 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

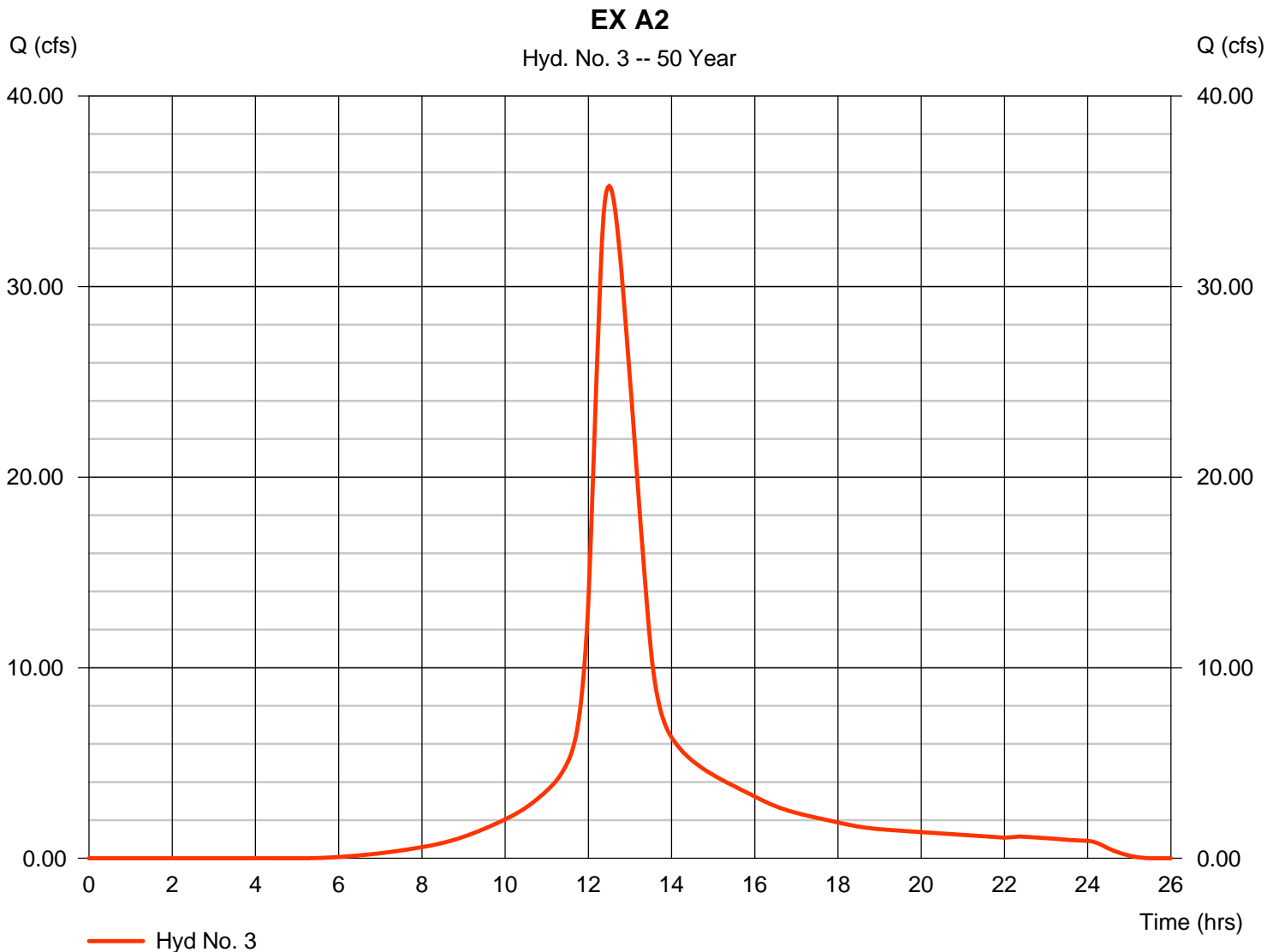
Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 35.27 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 272,771 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

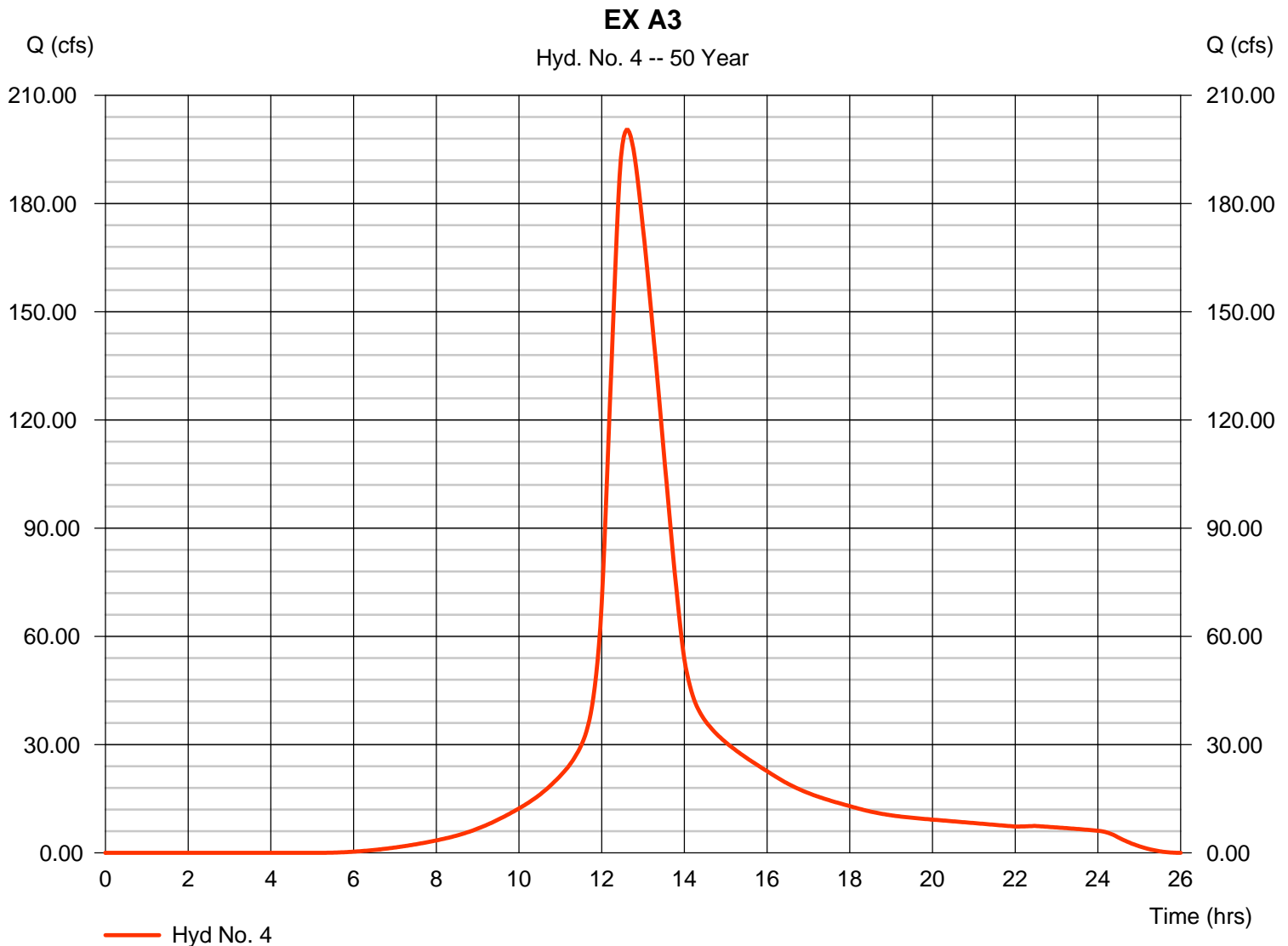
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 200.41 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 1,798,914 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

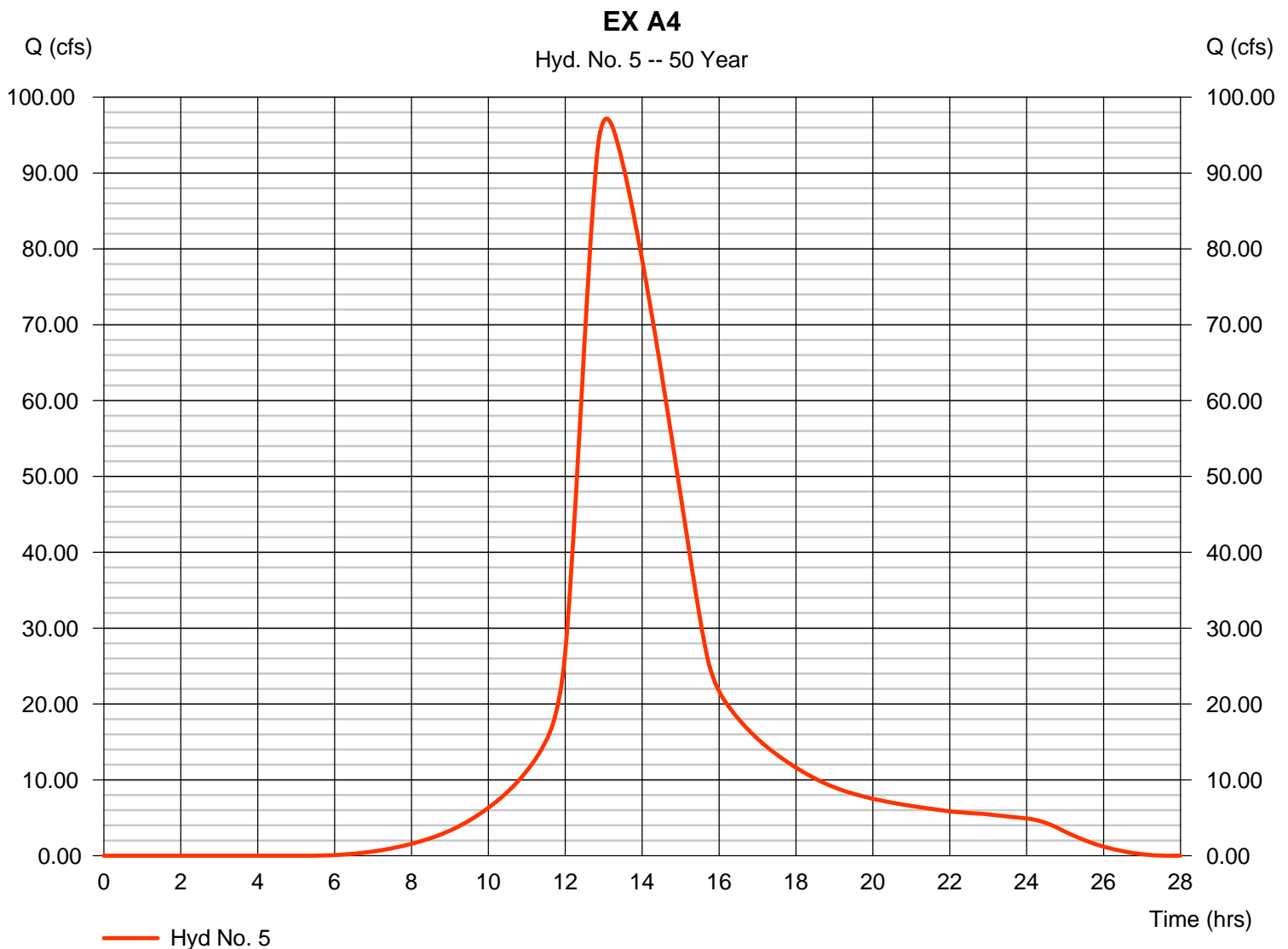
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type	= SCS Runoff	Peak discharge	= 97.18 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,318,021 cuft
Drainage area	= 50.180 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 87.00 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

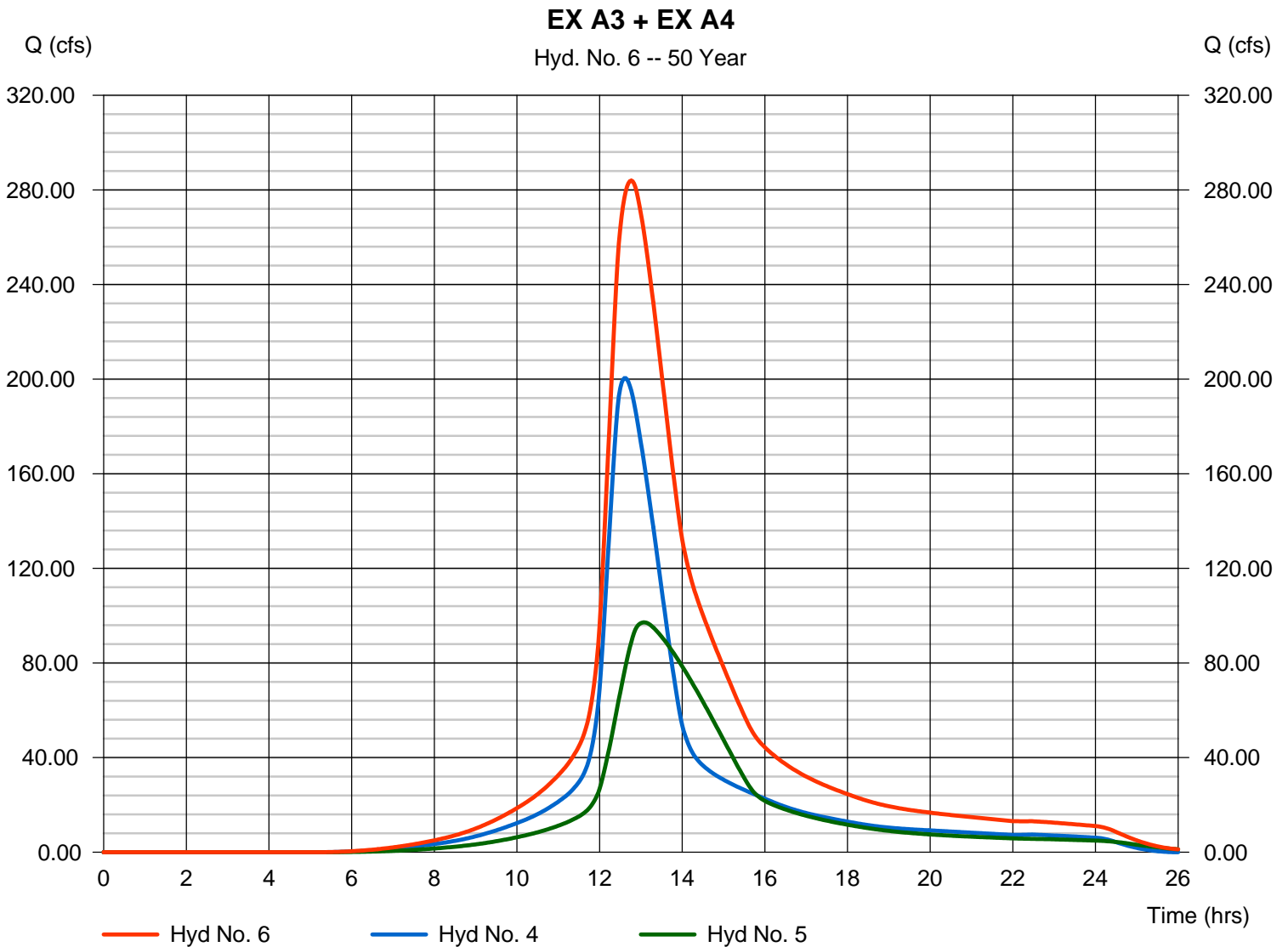
Wednesday, 07 / 15 / 2020

Hyd. No. 6

EX A3 + EX A4

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 283.94 cfs
Time to peak = 12.77 hrs
Hyd. volume = 3,116,936 cuft
Contrib. drain. area = 119.020 ac



Hydrograph Report

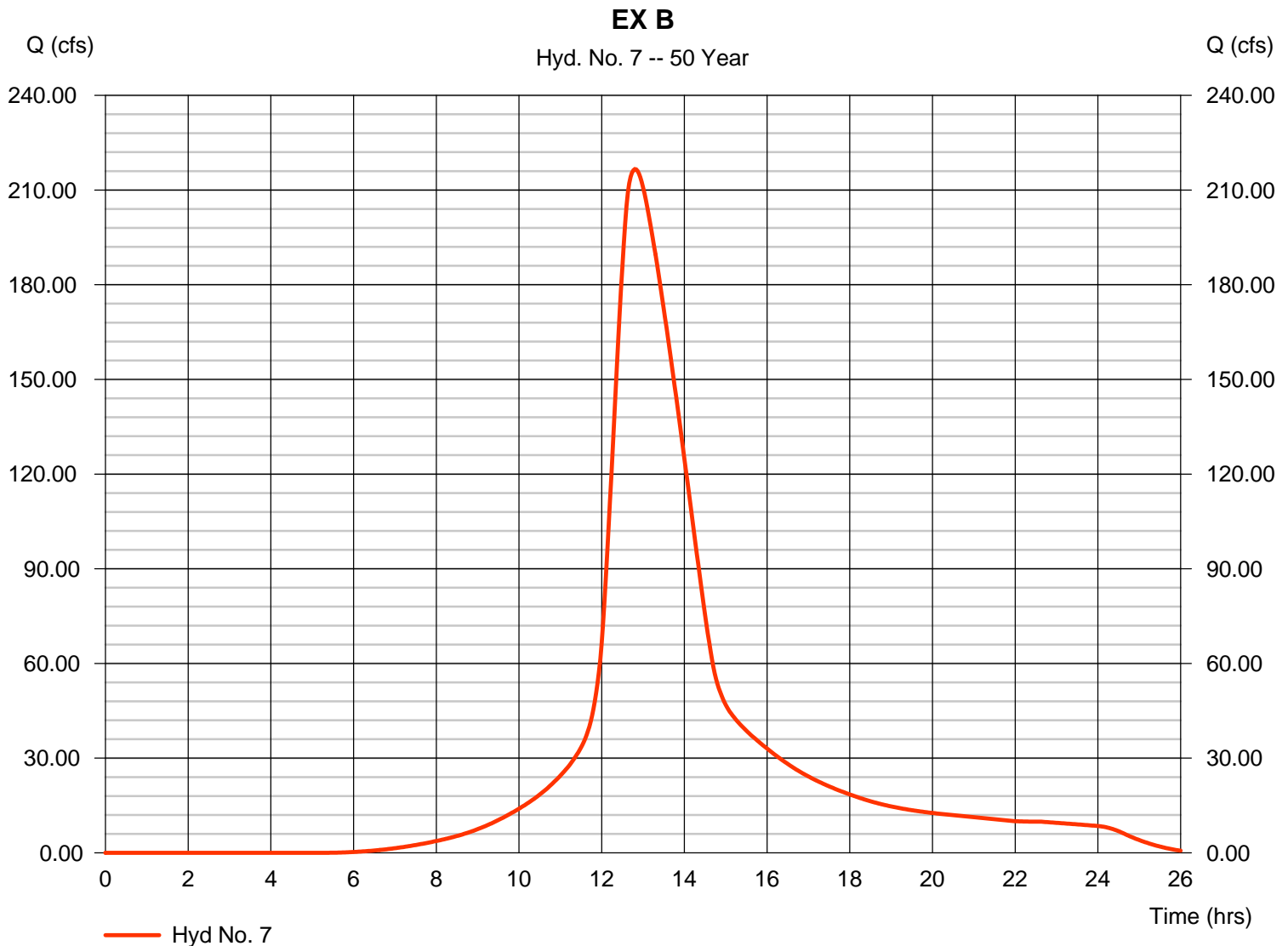
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 216.64 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.80 hrs
Time interval	= 2 min	Hyd. volume	= 2,379,425 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

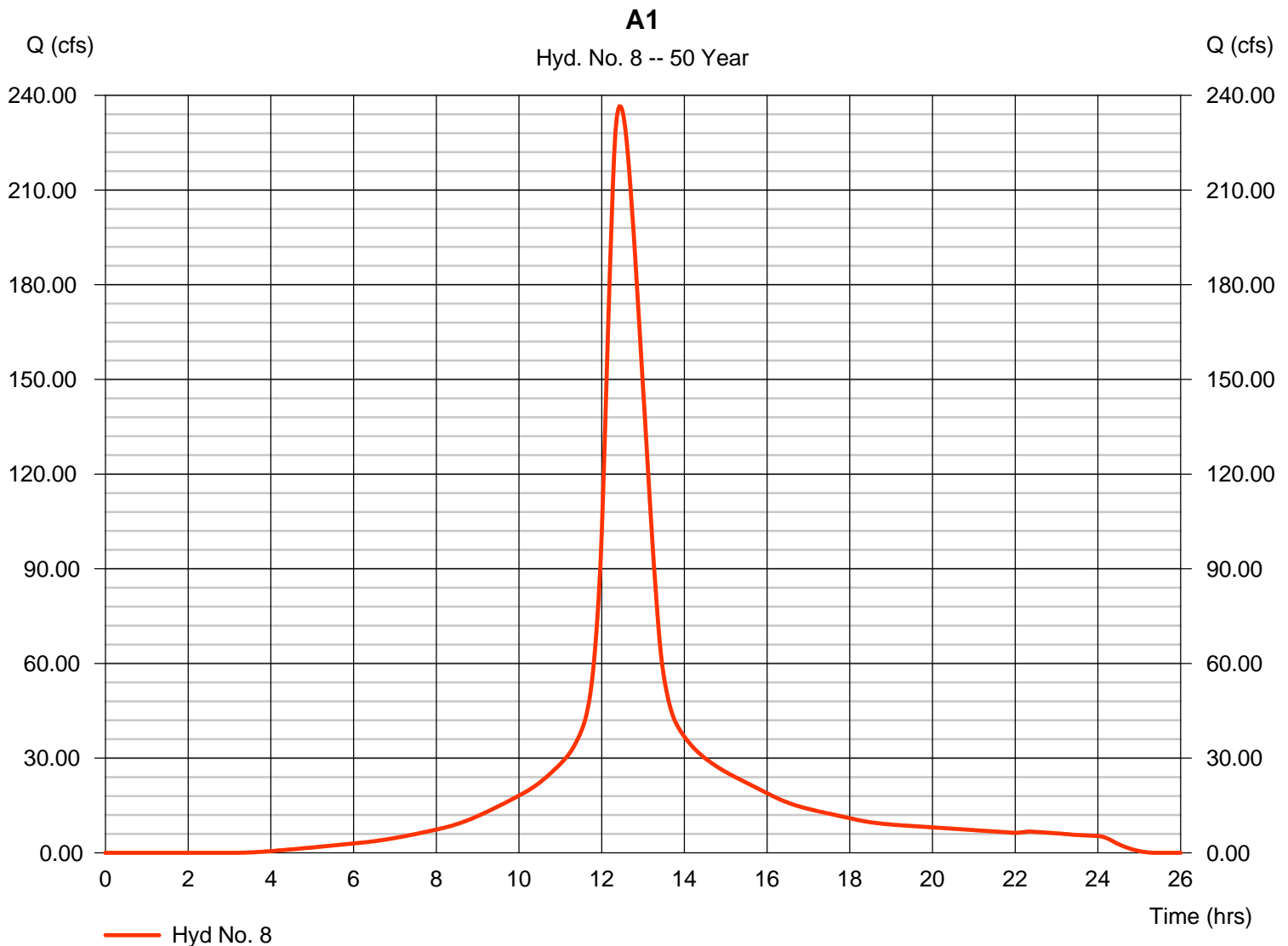
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 236.53 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,795,598 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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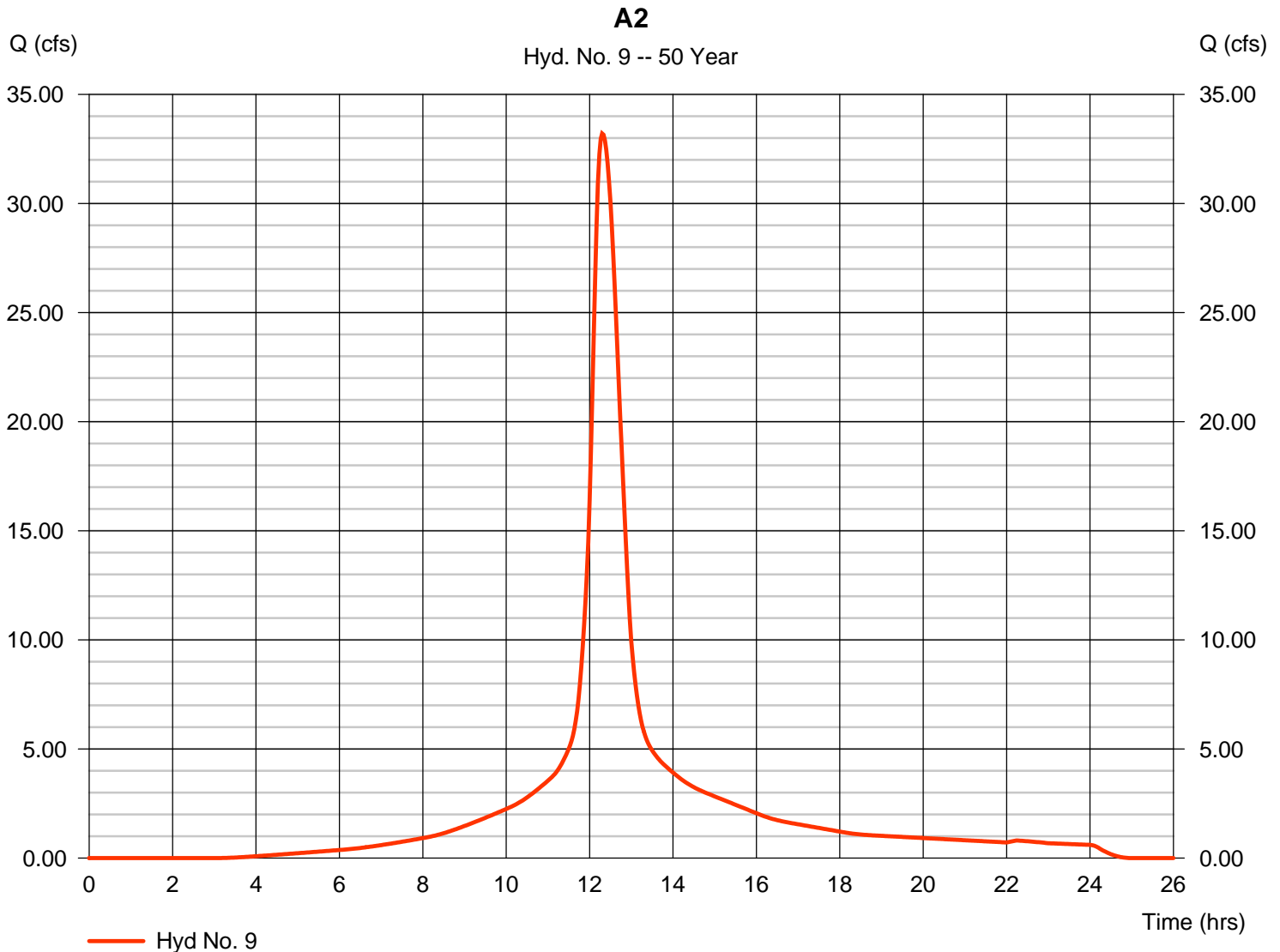
Wednesday, 07 / 15 / 2020

Hyd. No. 9

A2

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.890 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 33.21 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 208,463 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

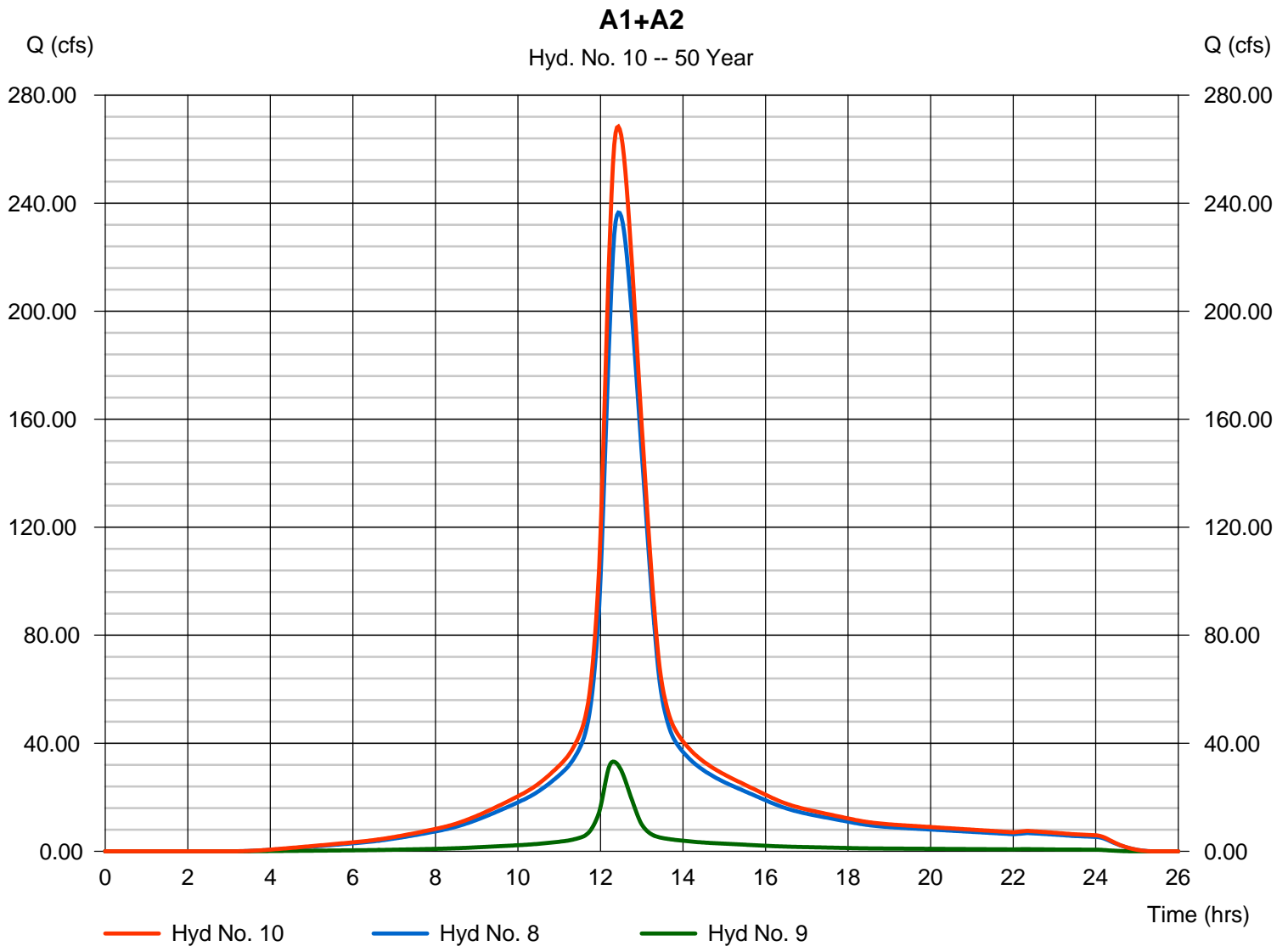
Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 8, 9

Peak discharge = 268.36 cfs
Time to peak = 12.43 hrs
Hyd. volume = 2,004,061 cuft
Contrib. drain. area = 66.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

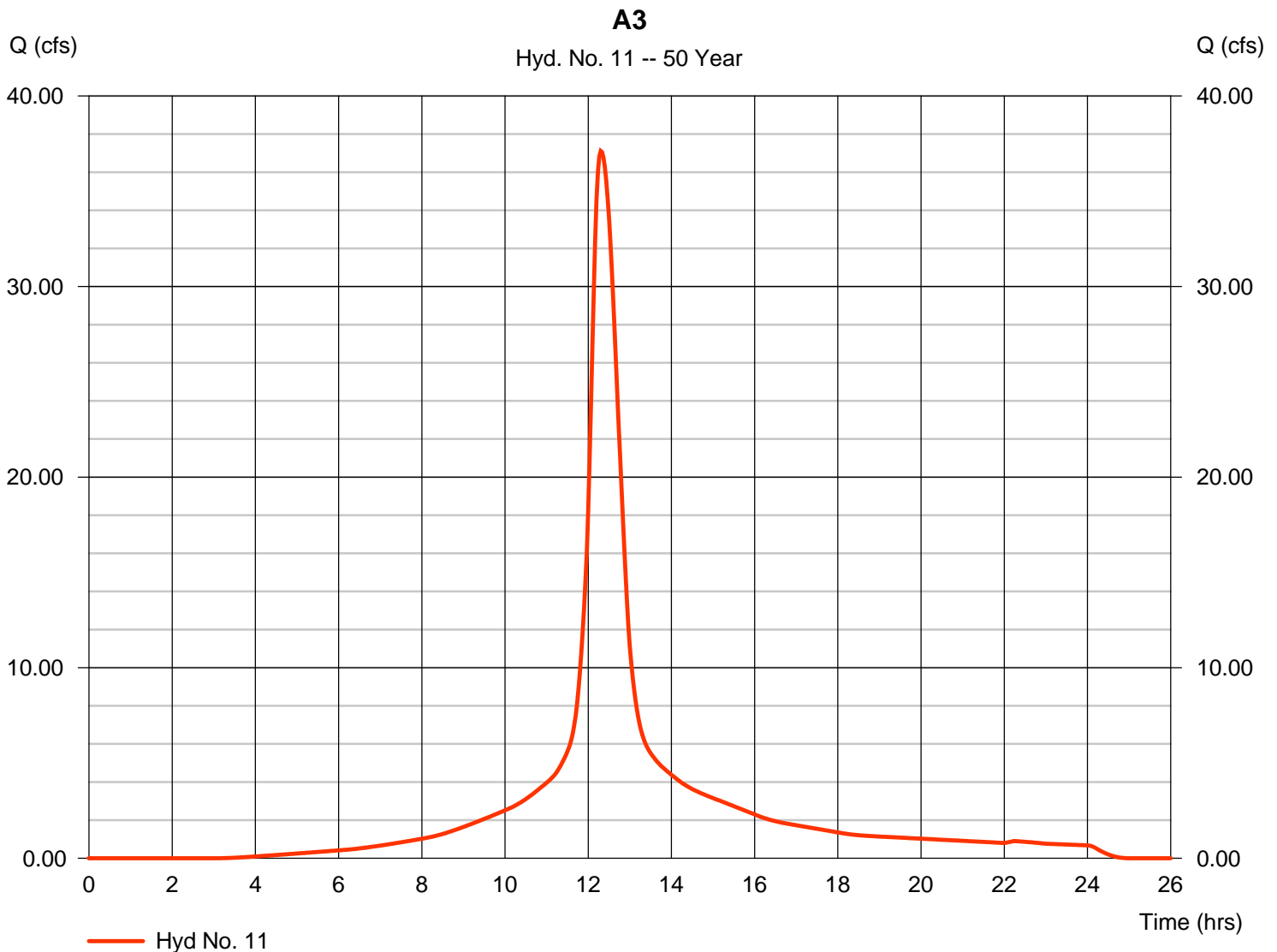
Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 7.700 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 37.11 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 232,970 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

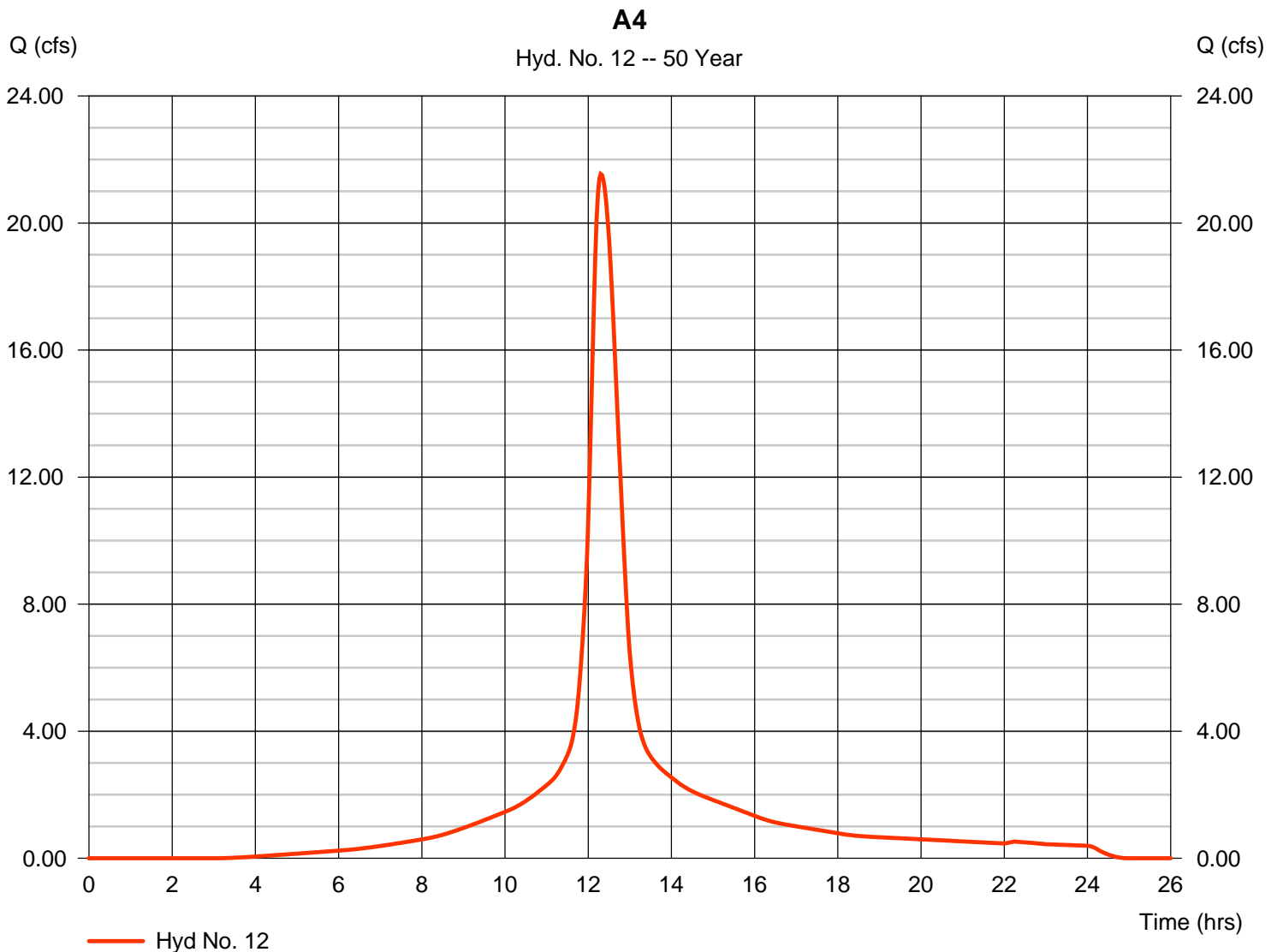
Wednesday, 07 / 15 / 2020

Hyd. No. 12

A4

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 4.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 21.54 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 135,244 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

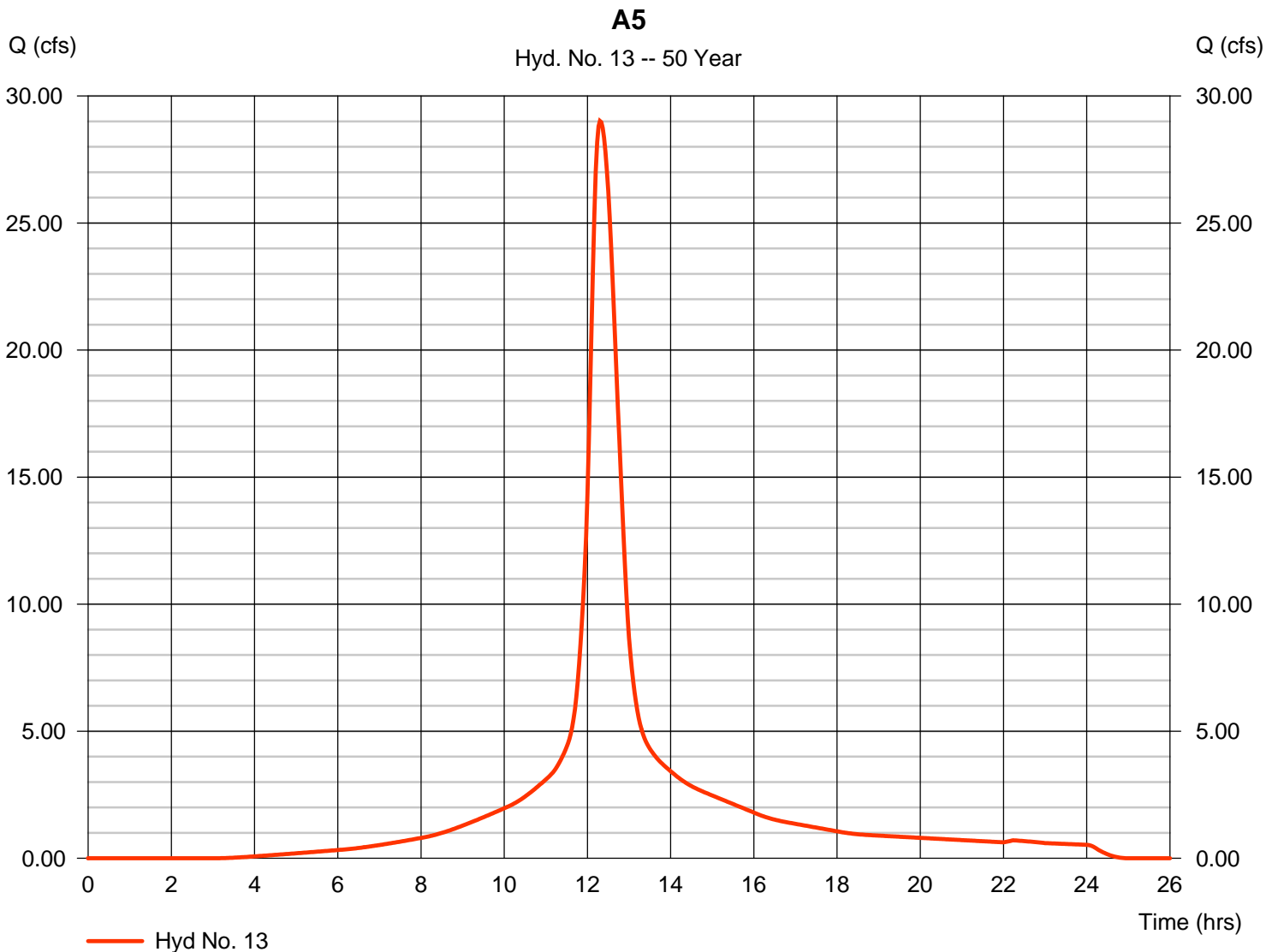
Wednesday, 07 / 15 / 2020

Hyd. No. 13

A5

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.020 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 29.01 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 182,140 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 20.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

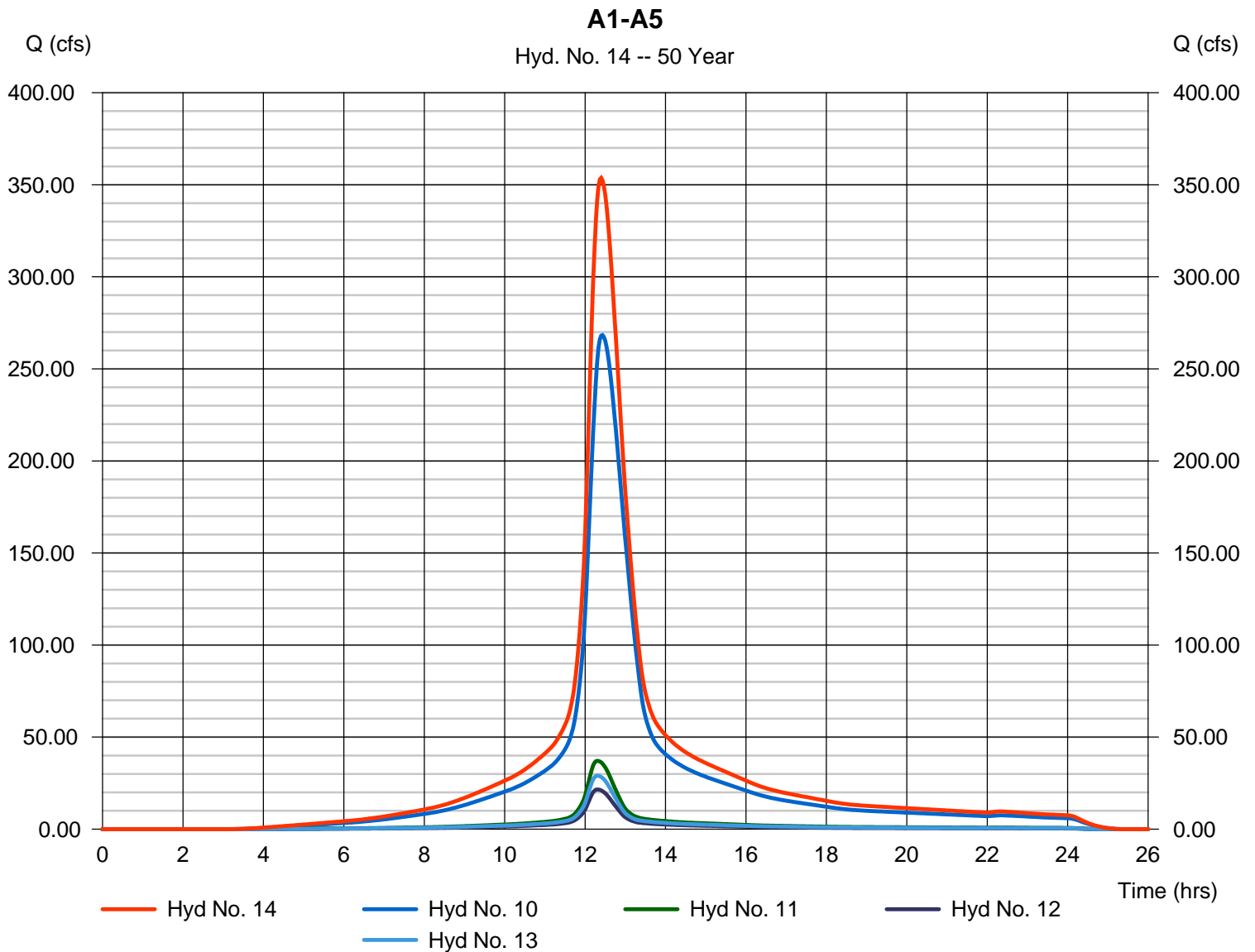
Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type = Combine
 Storm frequency = 50 yrs
 Time interval = 2 min
 Inflow hyds. = 10, 11, 12, 13

Peak discharge = 353.73 cfs
 Time to peak = 12.40 hrs
 Hyd. volume = 2,554,416 cuft
 Contrib. drain. area = 18.190 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

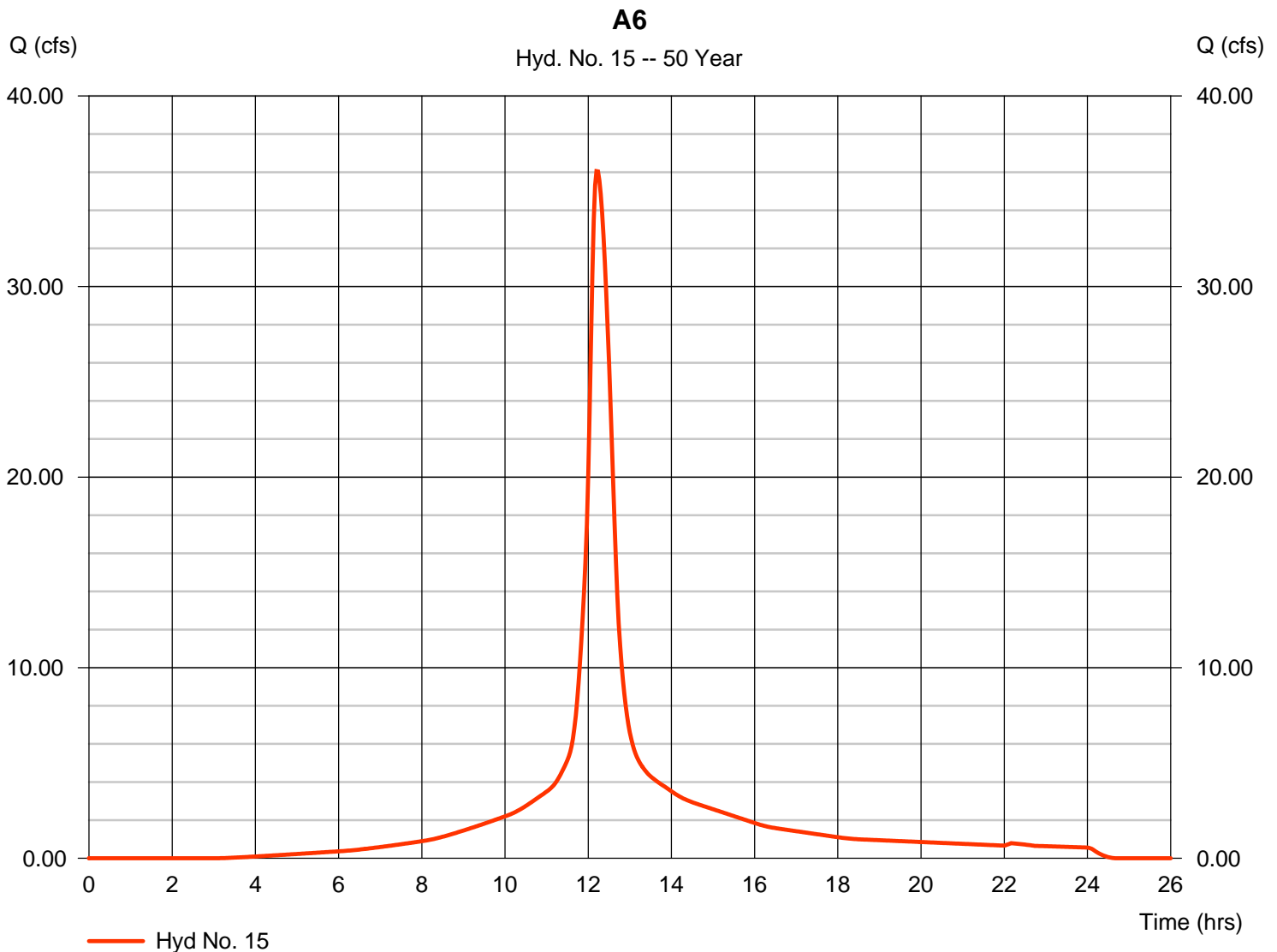
Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.300 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 36.06 cfs
 Time to peak = 12.20 hrs
 Hyd. volume = 195,695 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

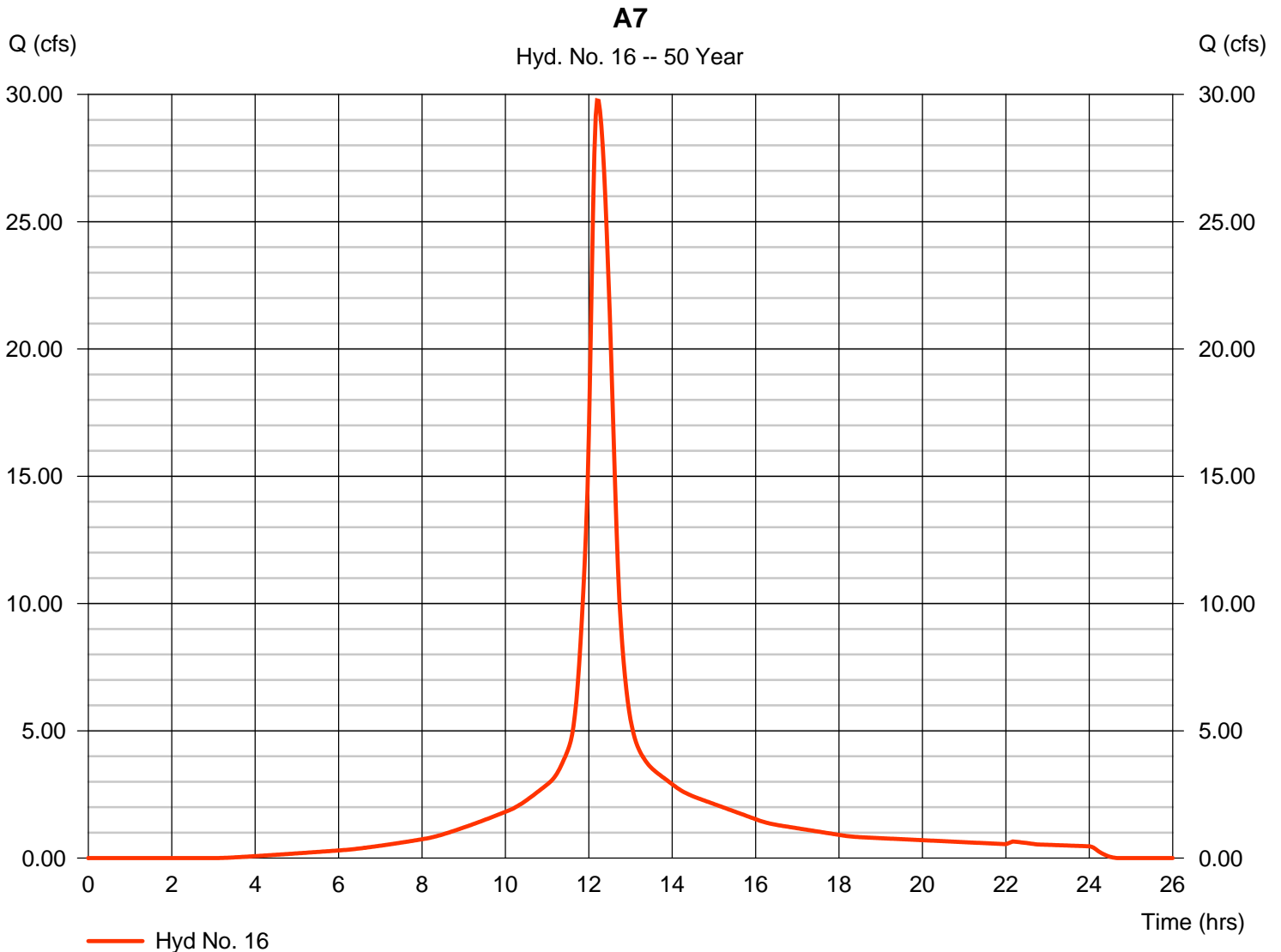
Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 5.200 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 29.76 cfs
 Time to peak = 12.20 hrs
 Hyd. volume = 161,526 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

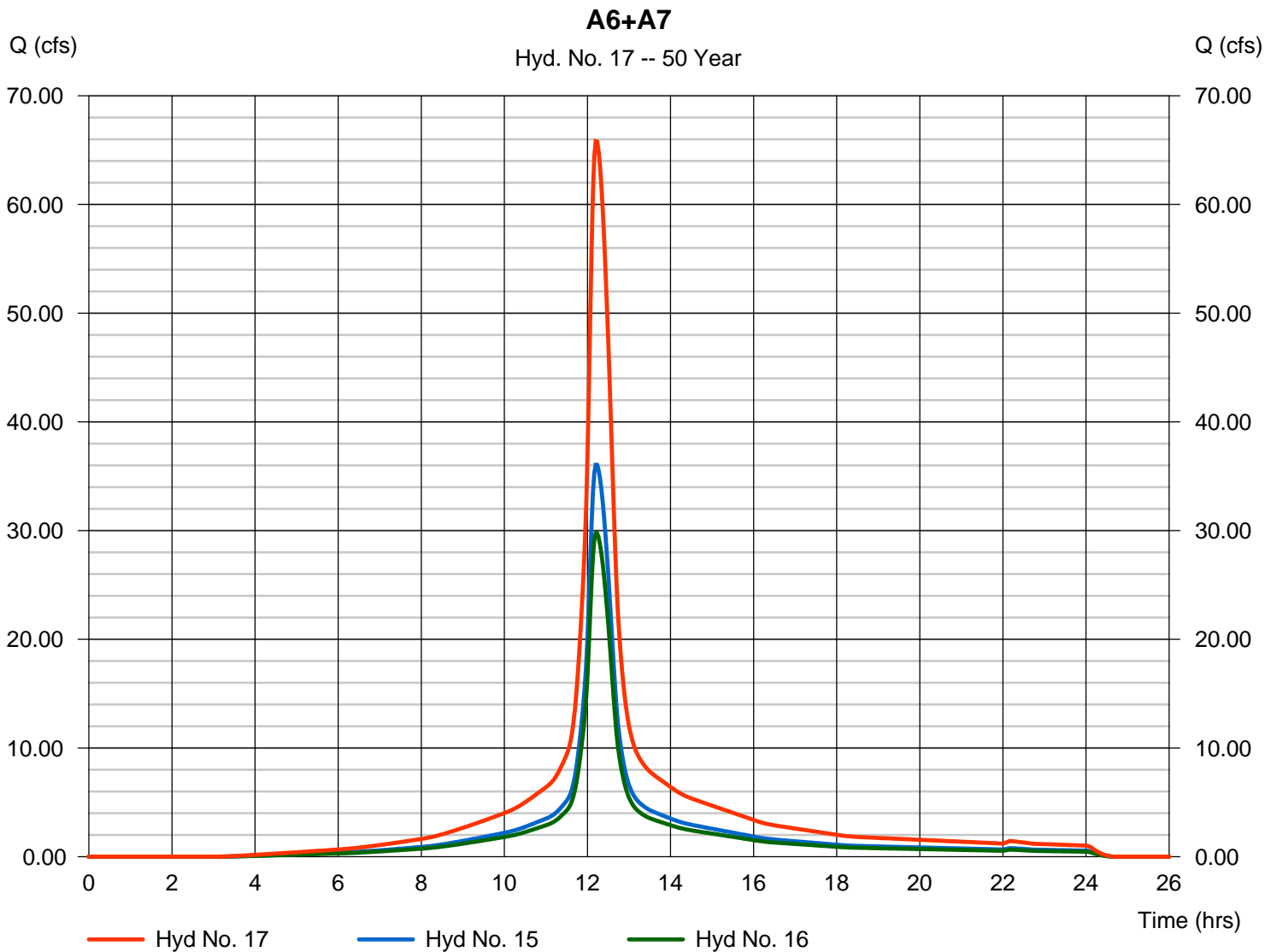
Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 15, 16

Peak discharge = 65.82 cfs
Time to peak = 12.20 hrs
Hyd. volume = 357,221 cuft
Contrib. drain. area = 11.500 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

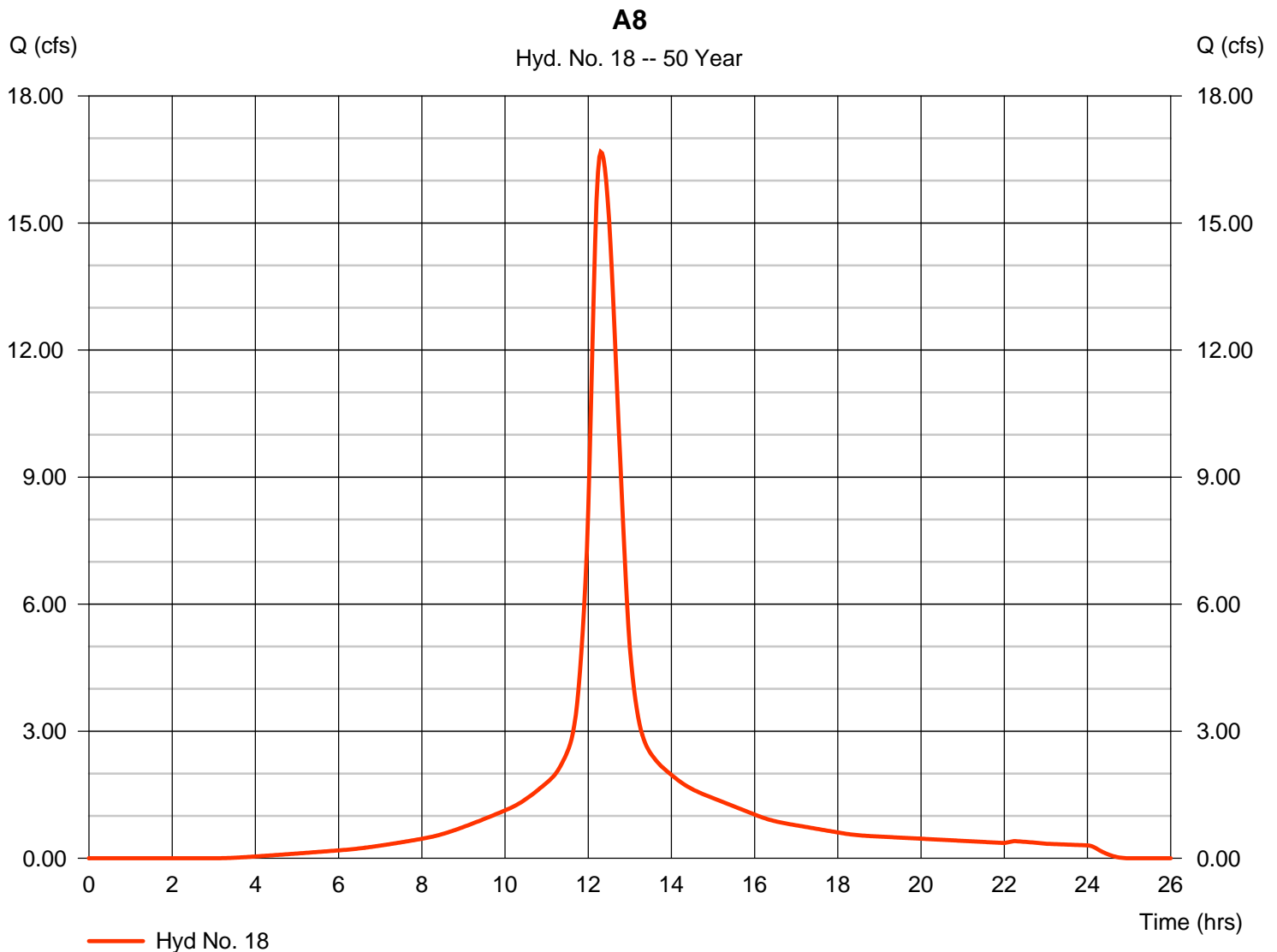
Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 3.460 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 16.68 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 104,685 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.40 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

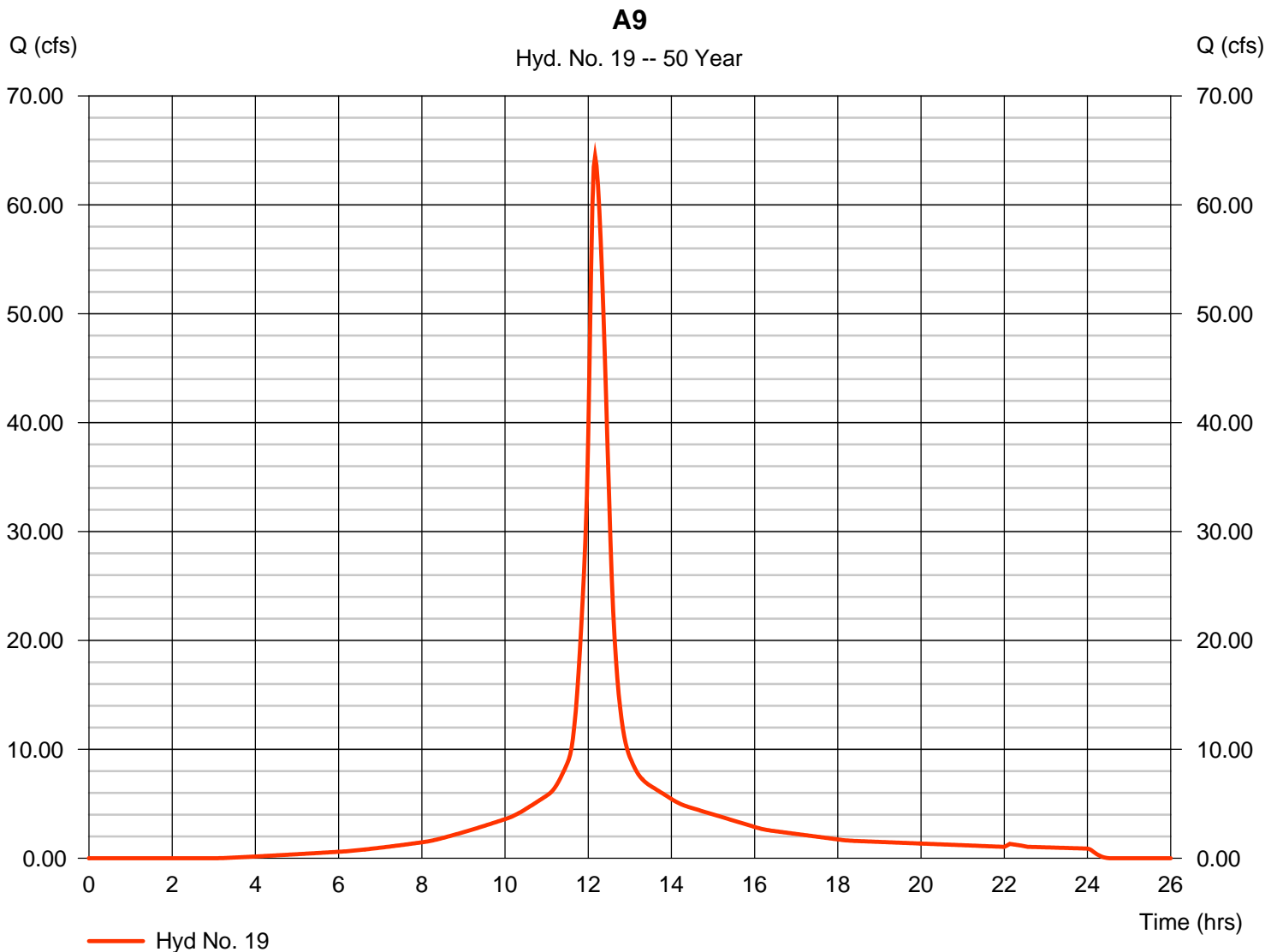
Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 10.400 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 64.46 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 312,039 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

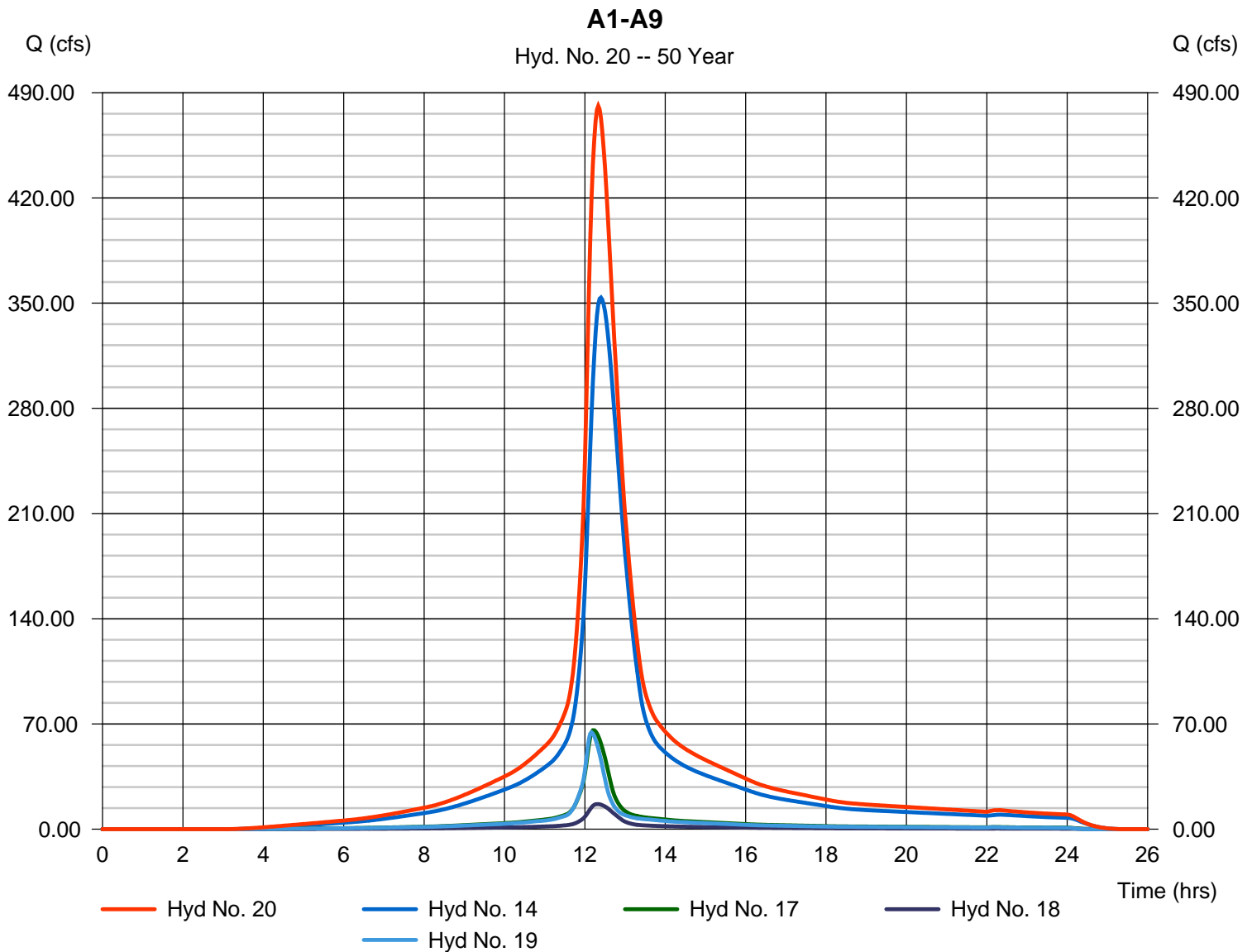
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Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type	= Combine	Peak discharge	= 481.20 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 3,328,362 cuft
Inflow hyds.	= 14, 17, 18, 19	Contrib. drain. area	= 13.860 ac



Hydrograph Report

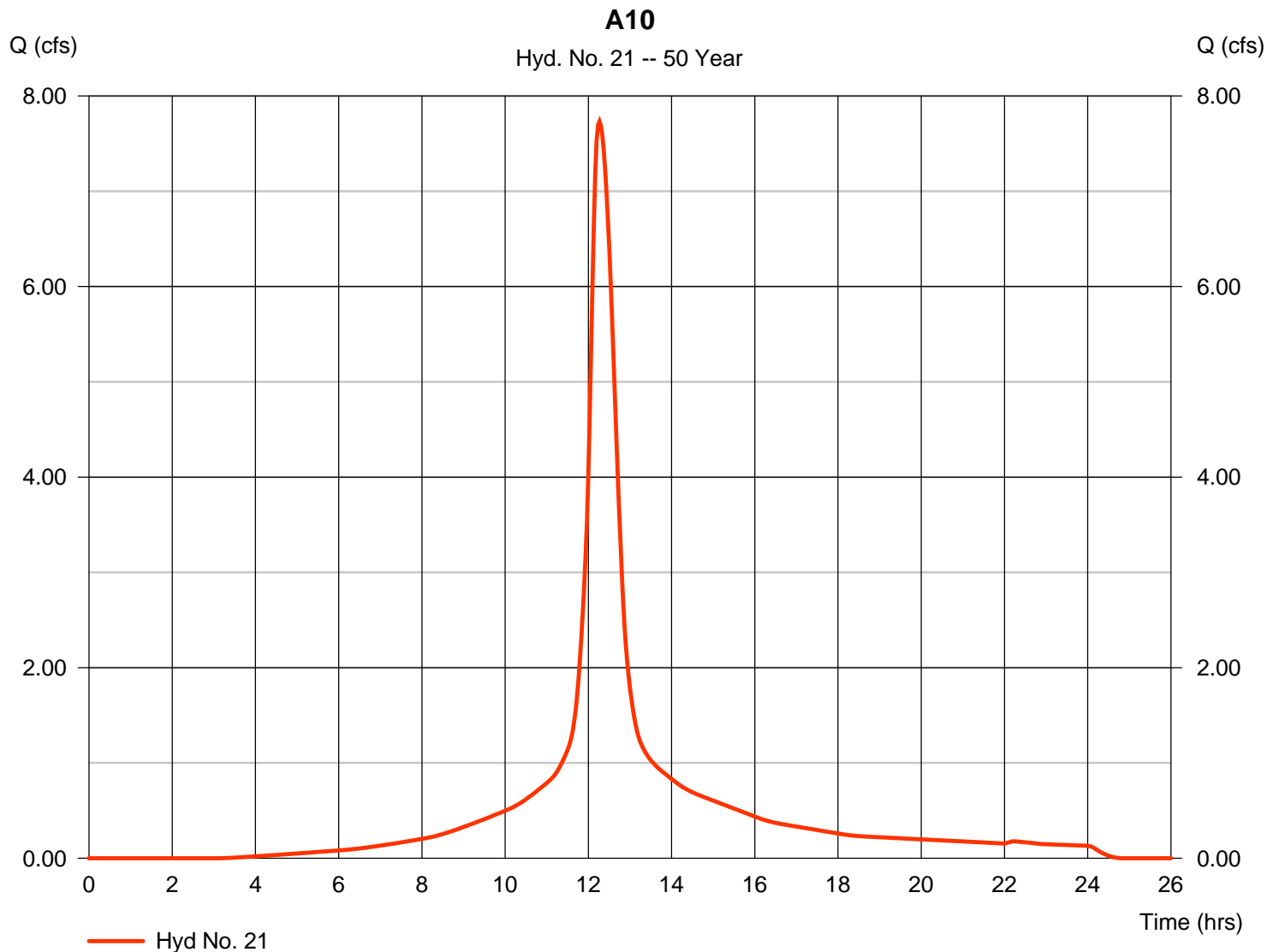
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 7.733 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 45,276 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

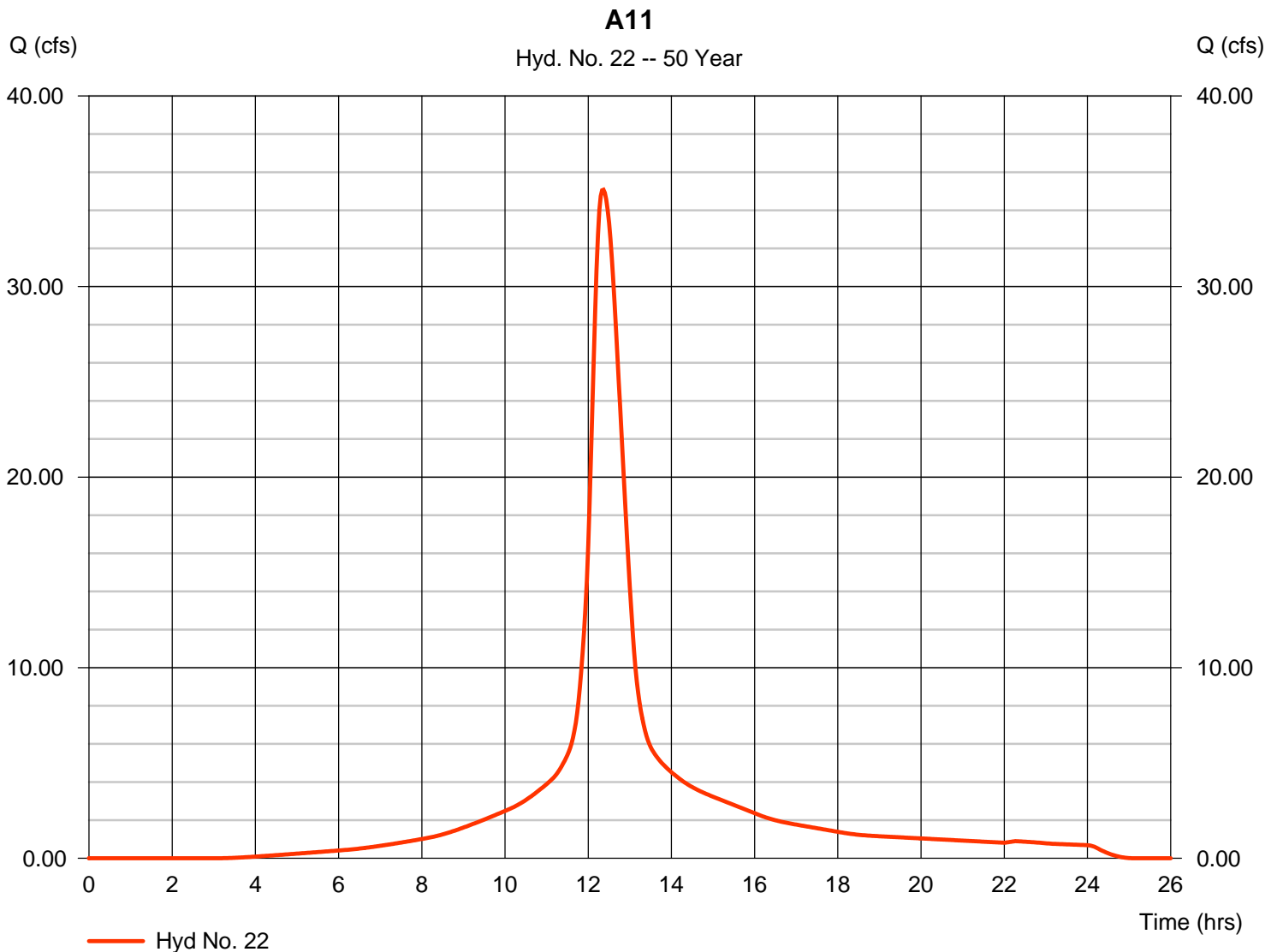
Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 7.820 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 35.08 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 234,629 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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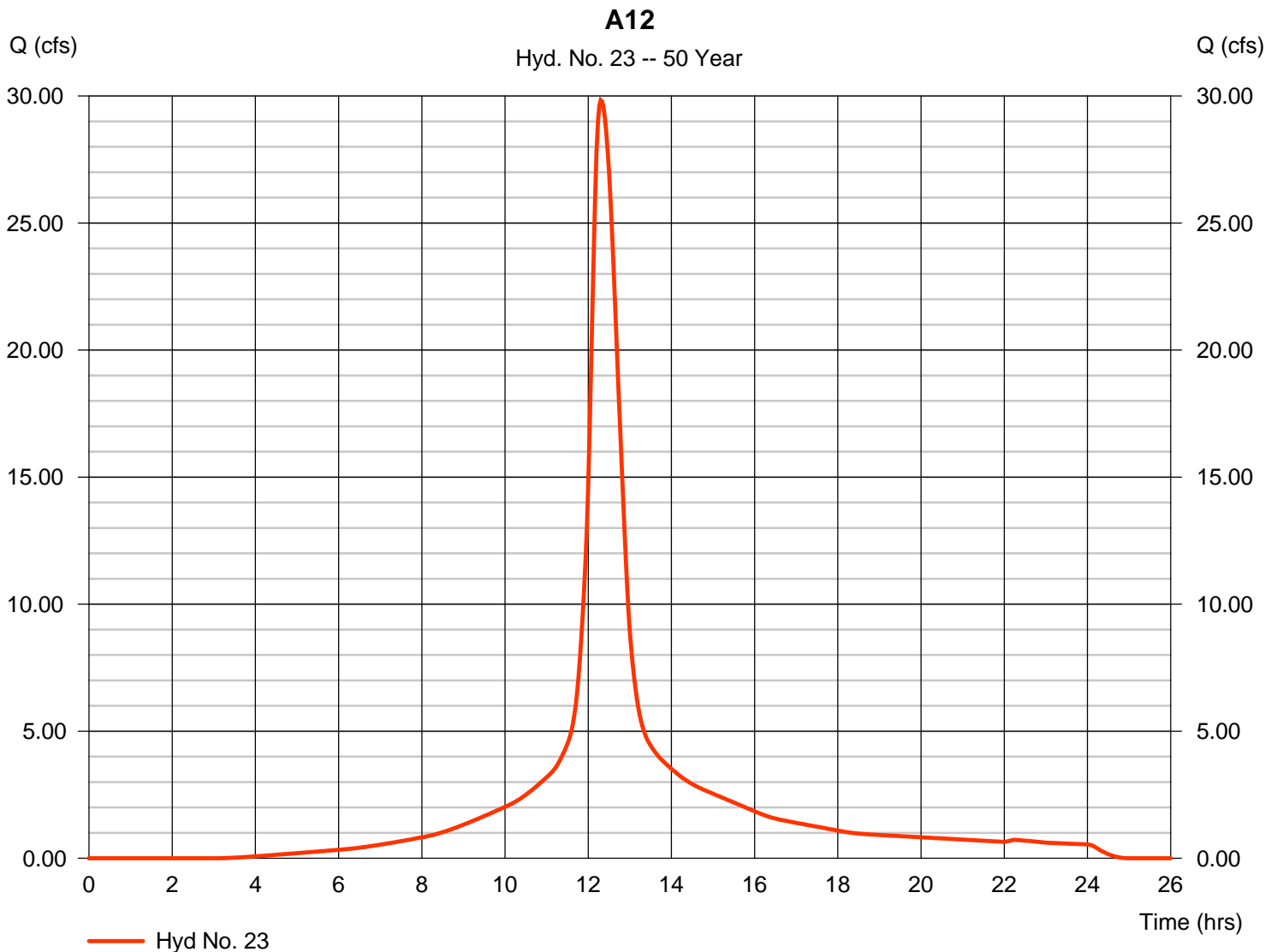
Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.190 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 29.83 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 187,284 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 22.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

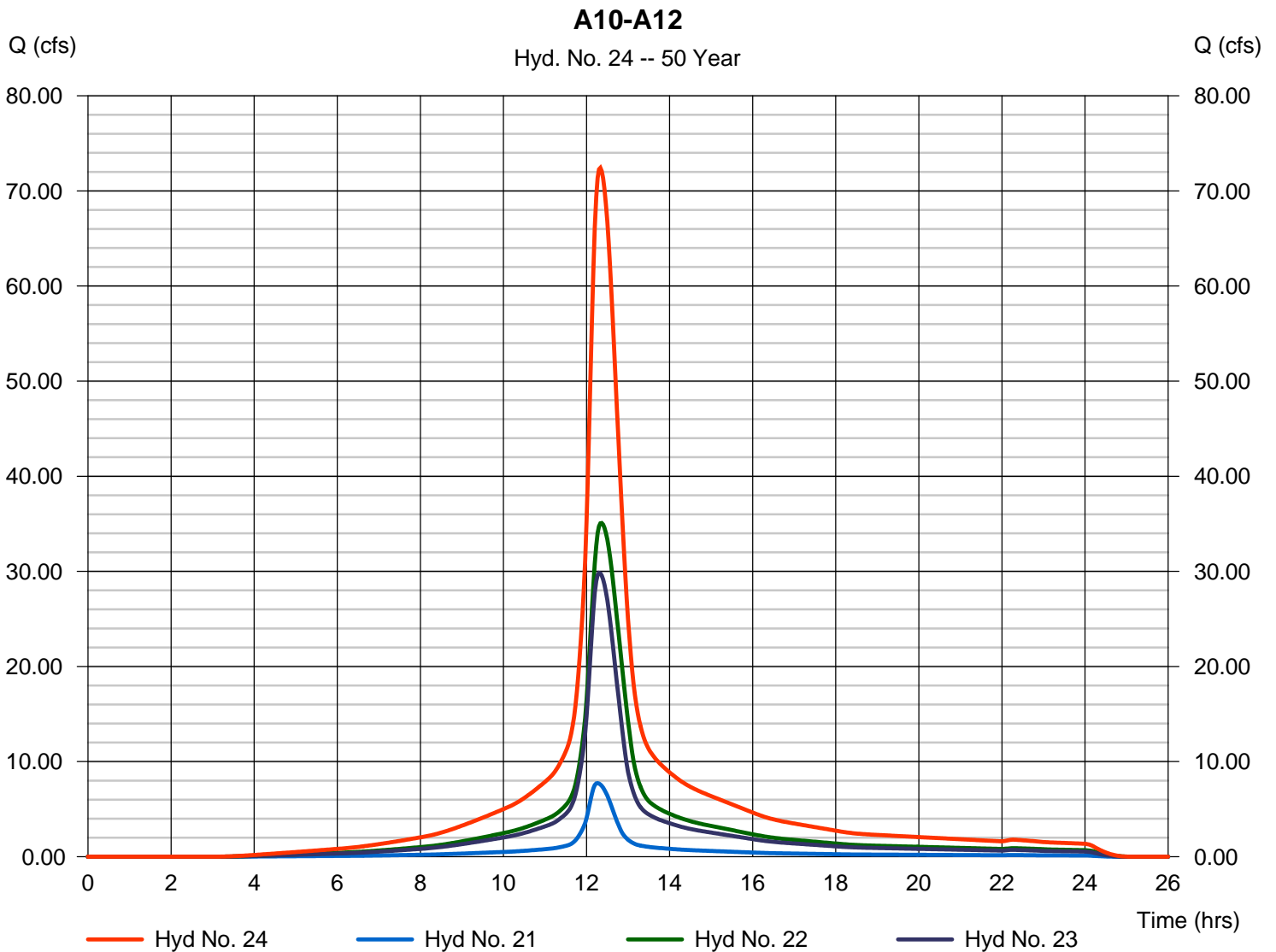
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 21, 22, 23

Peak discharge = 72.42 cfs
Time to peak = 12.33 hrs
Hyd. volume = 467,189 cuft
Contrib. drain. area = 15.490 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

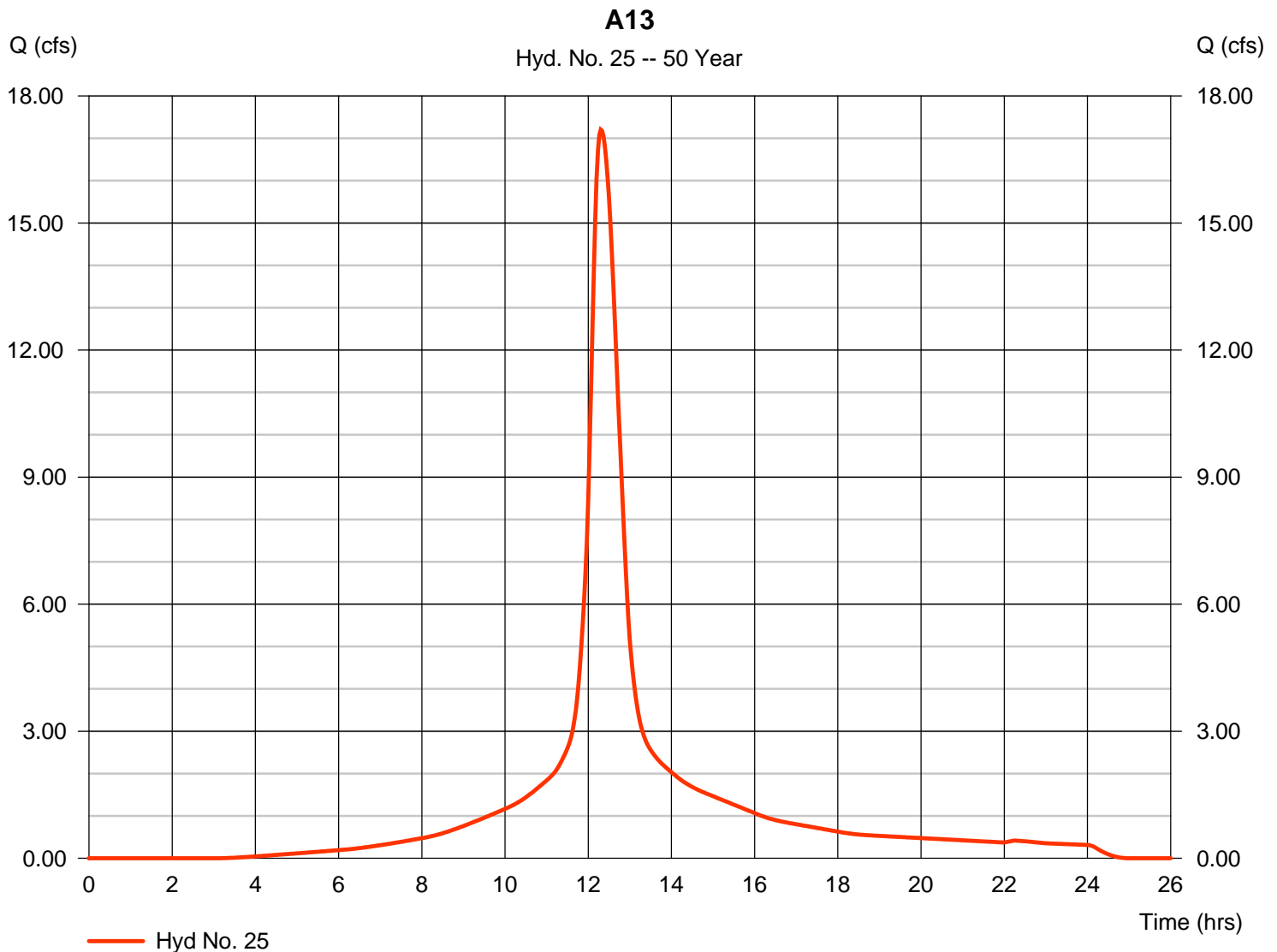
Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 3.570 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 17.21 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 108,013 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.80 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

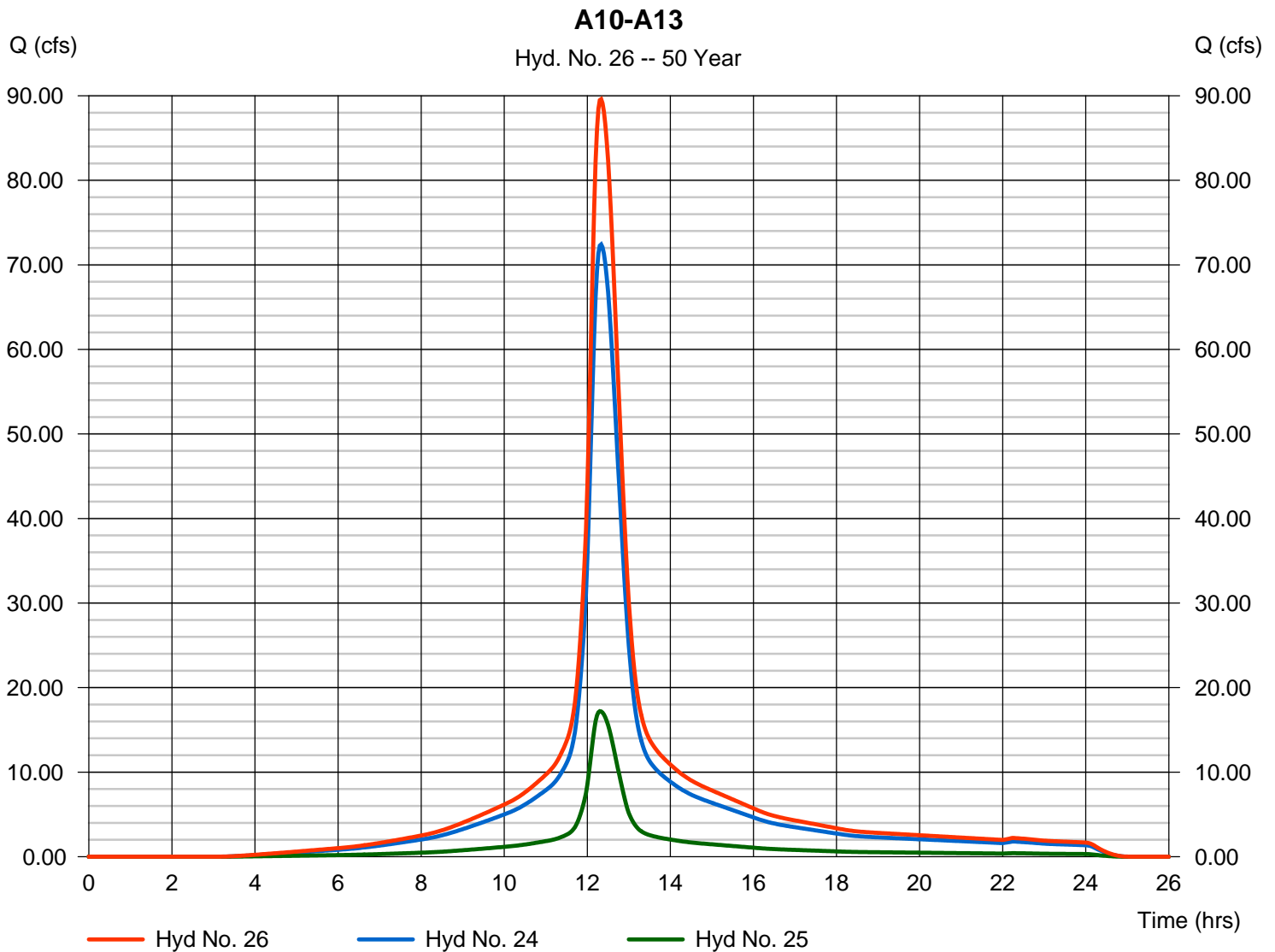
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 24, 25

Peak discharge = 89.60 cfs
Time to peak = 12.33 hrs
Hyd. volume = 575,202 cuft
Contrib. drain. area = 3.570 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

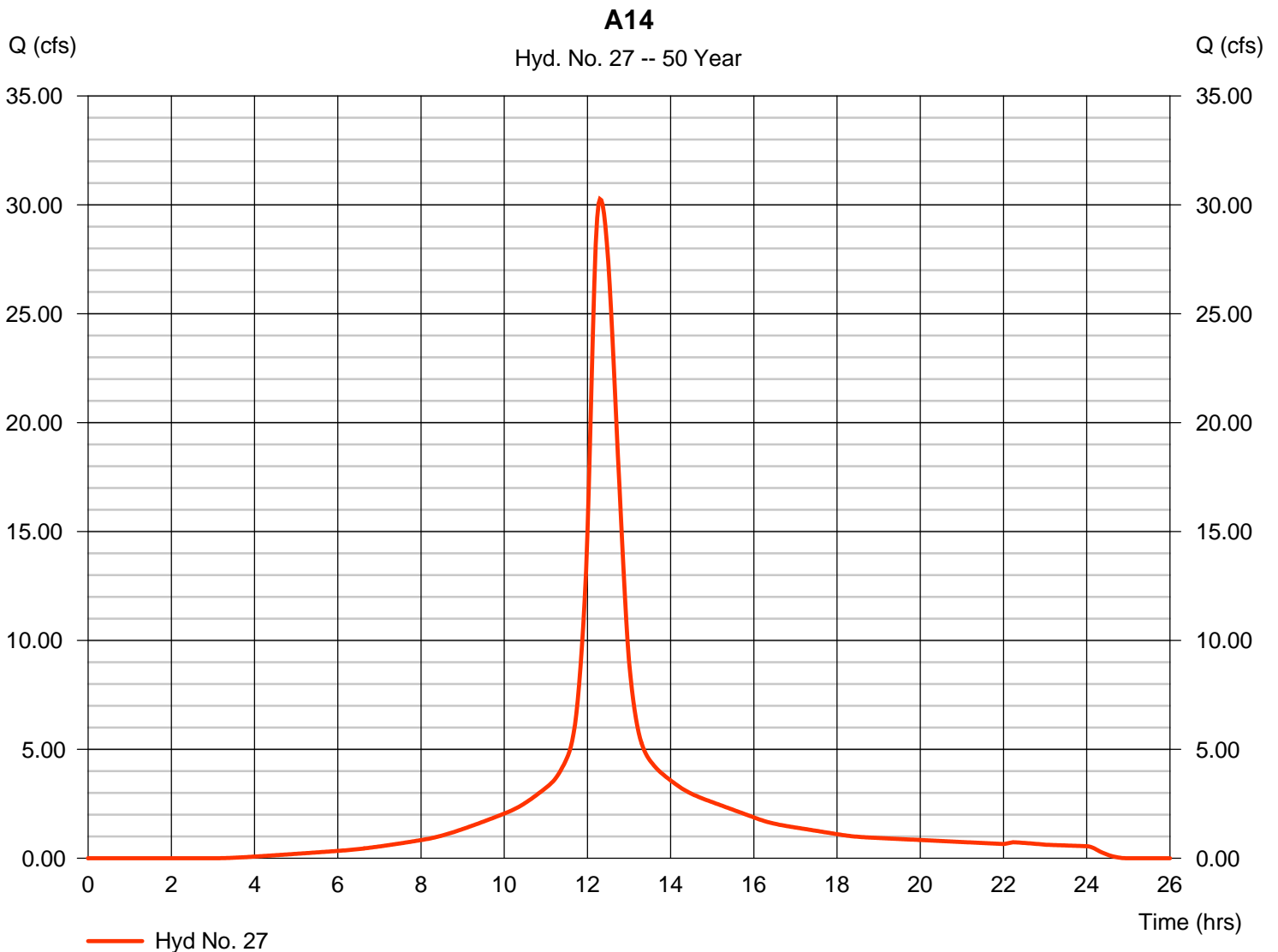
Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.280 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 30.27 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 190,007 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

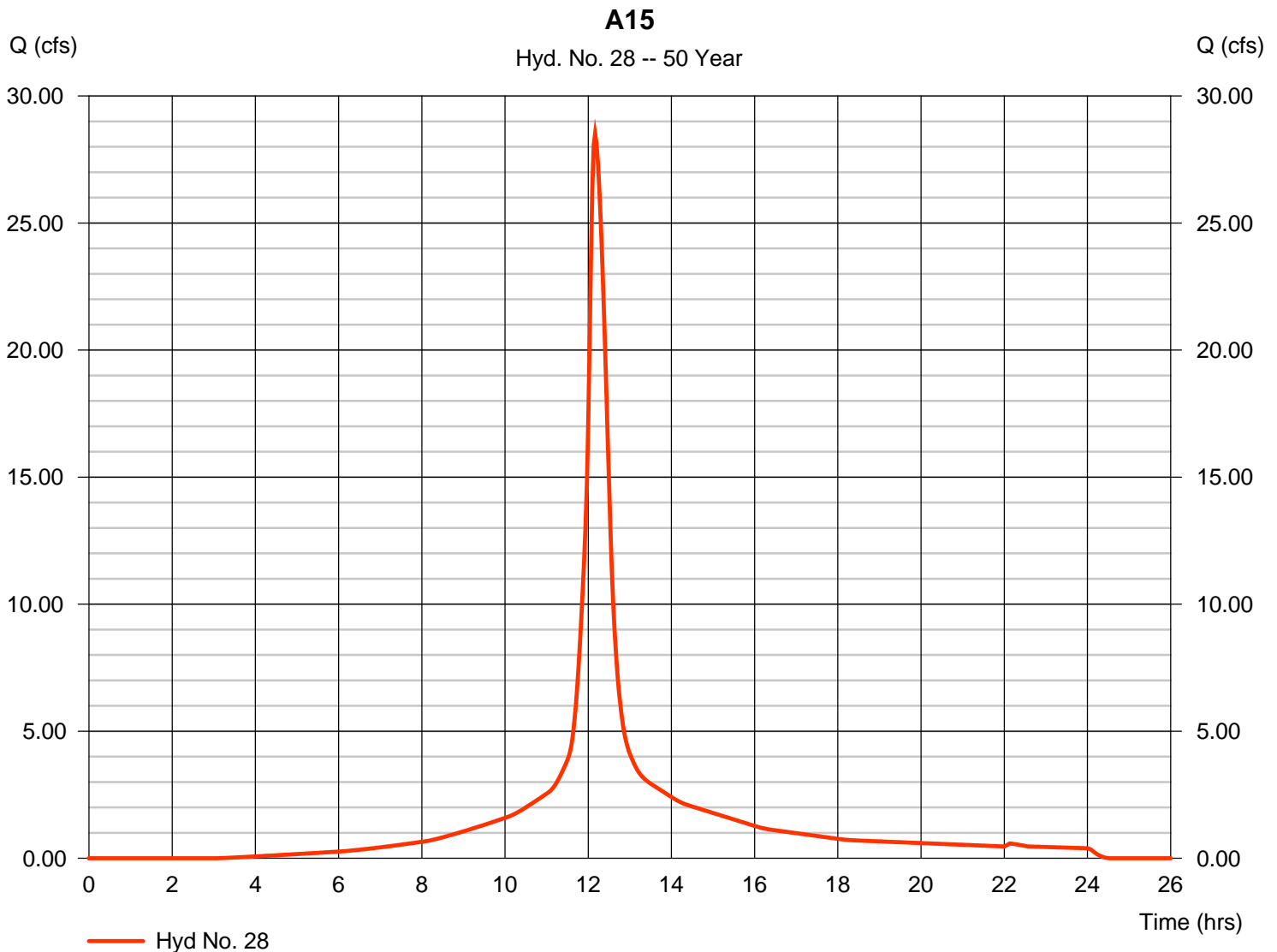
Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 4.600 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 28.51 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 138,017 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 29

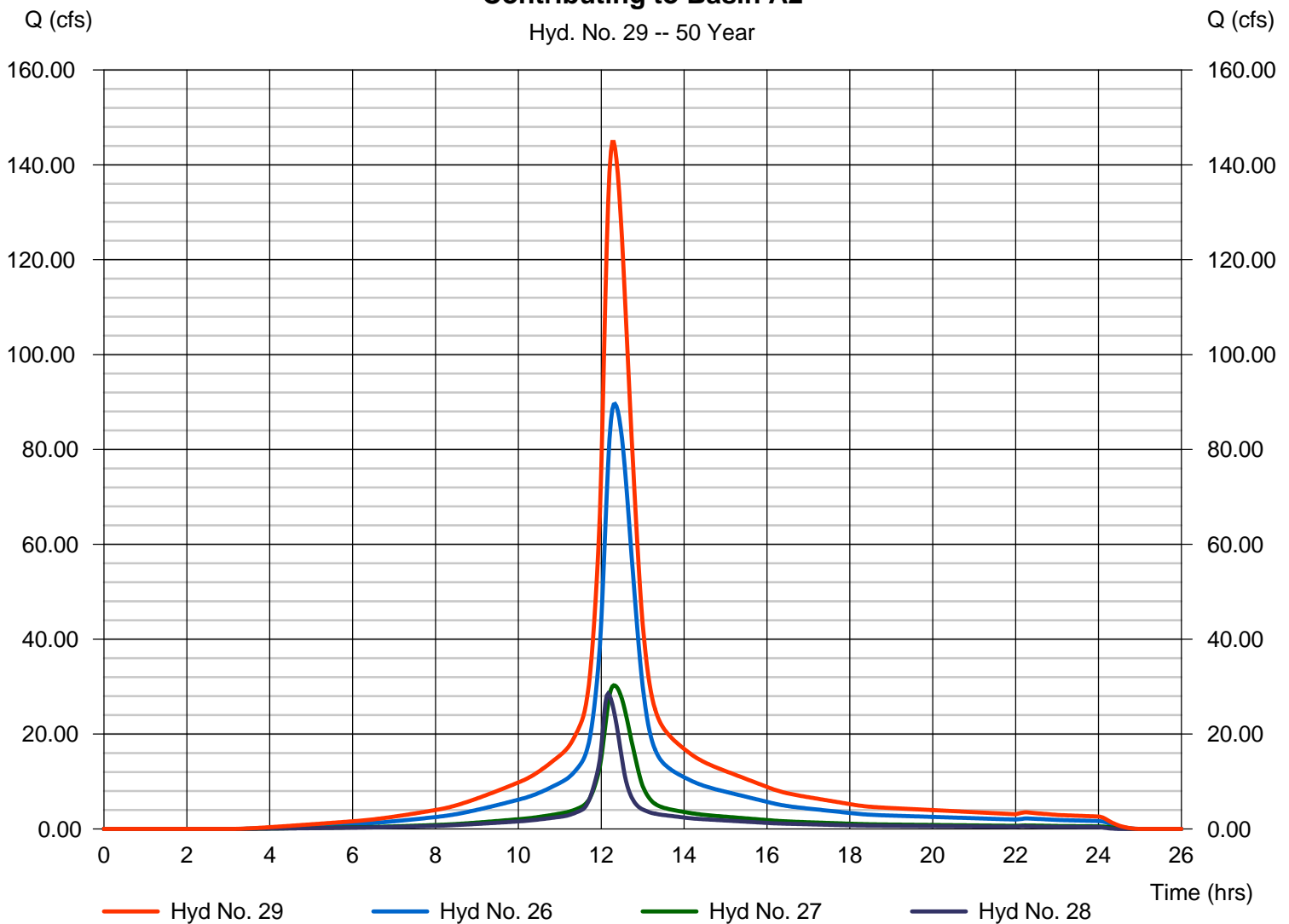
Contributing to Basin A2

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 26, 27, 28

Peak discharge = 144.82 cfs
Time to peak = 12.30 hrs
Hyd. volume = 903,227 cuft
Contrib. drain. area = 10.880 ac

Contributing to Basin A2

Hyd. No. 29 -- 50 Year



Hydrograph Report

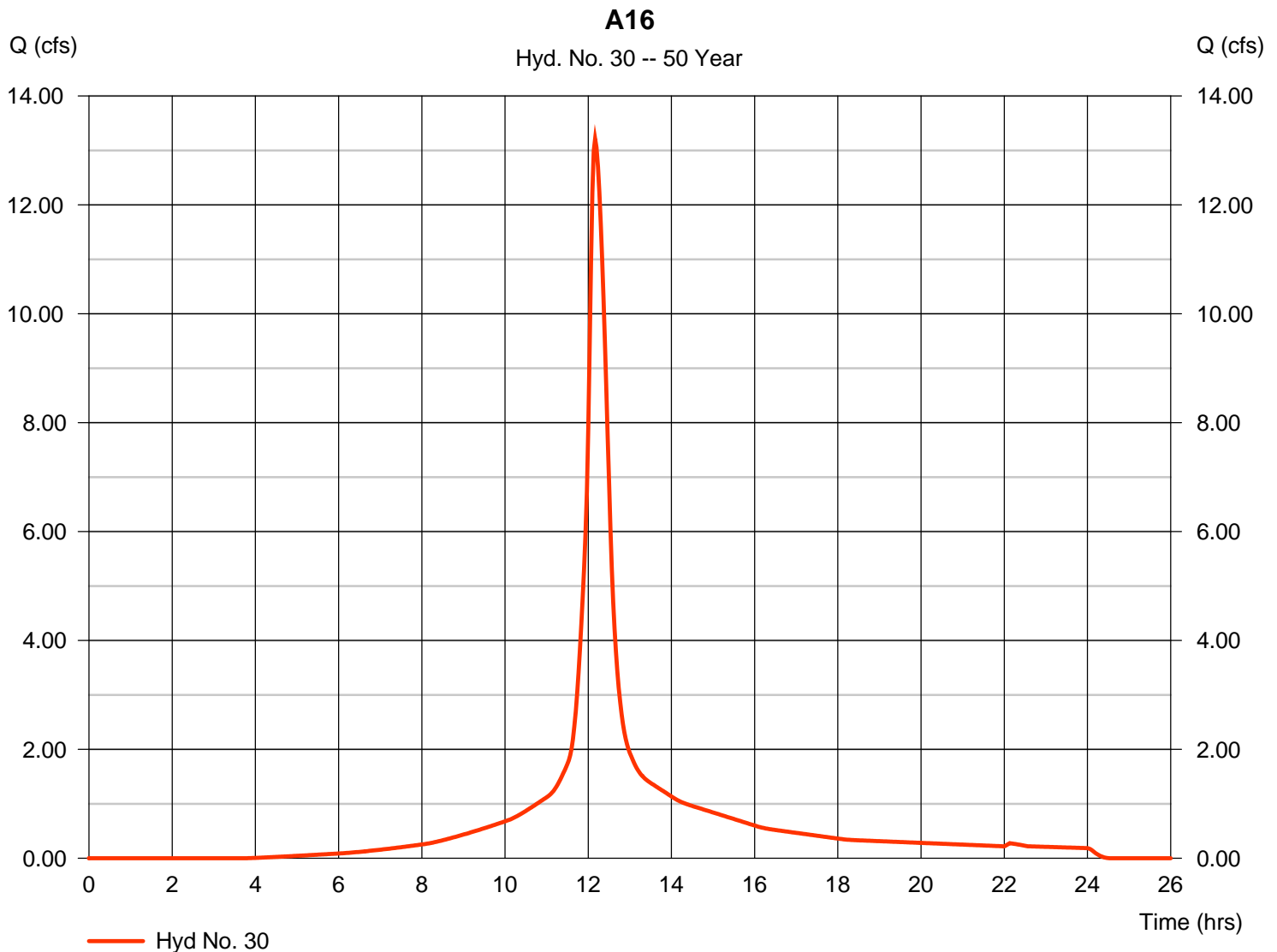
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 13.21 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 63,035 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

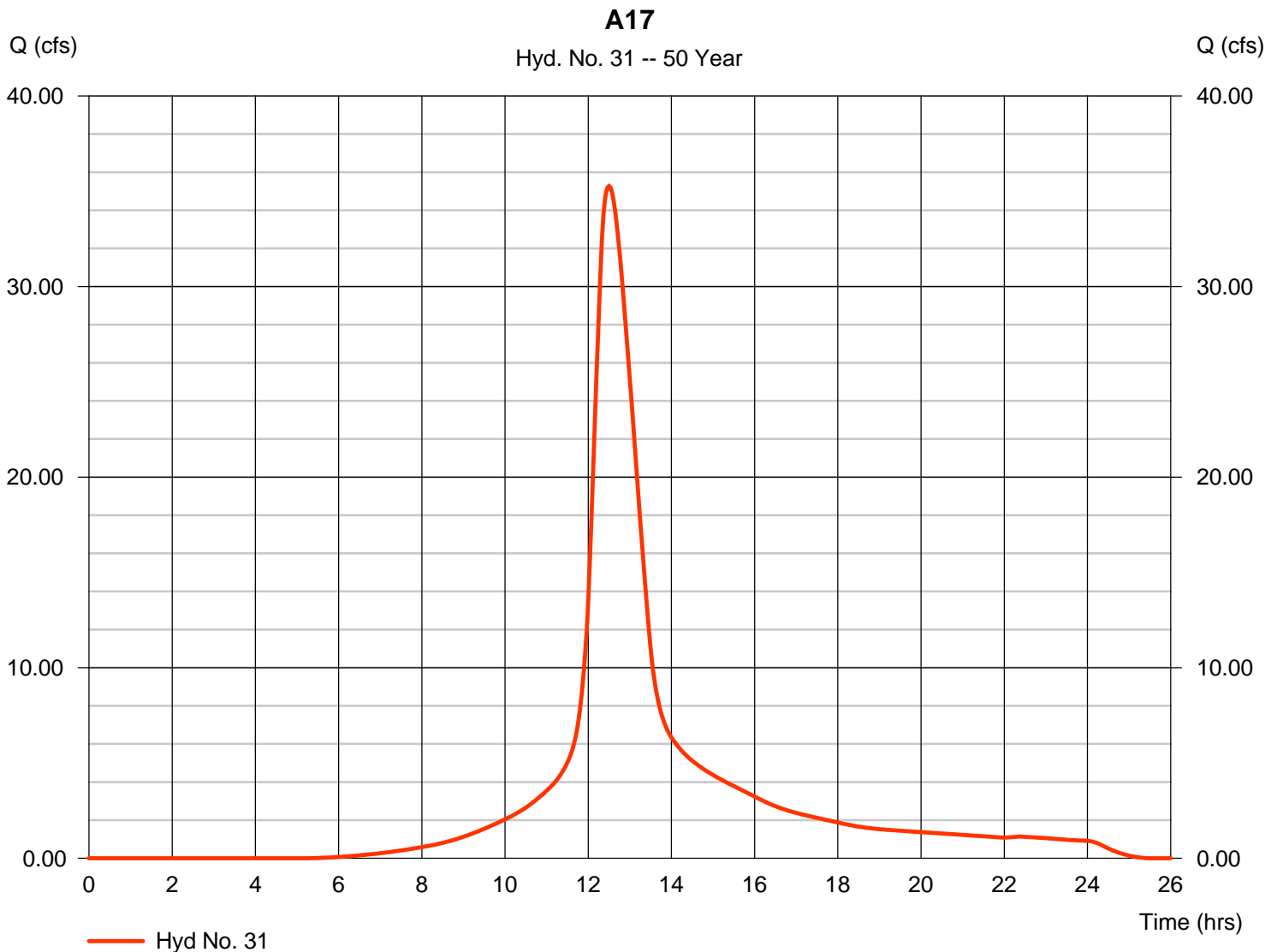
Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 35.27 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 272,771 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

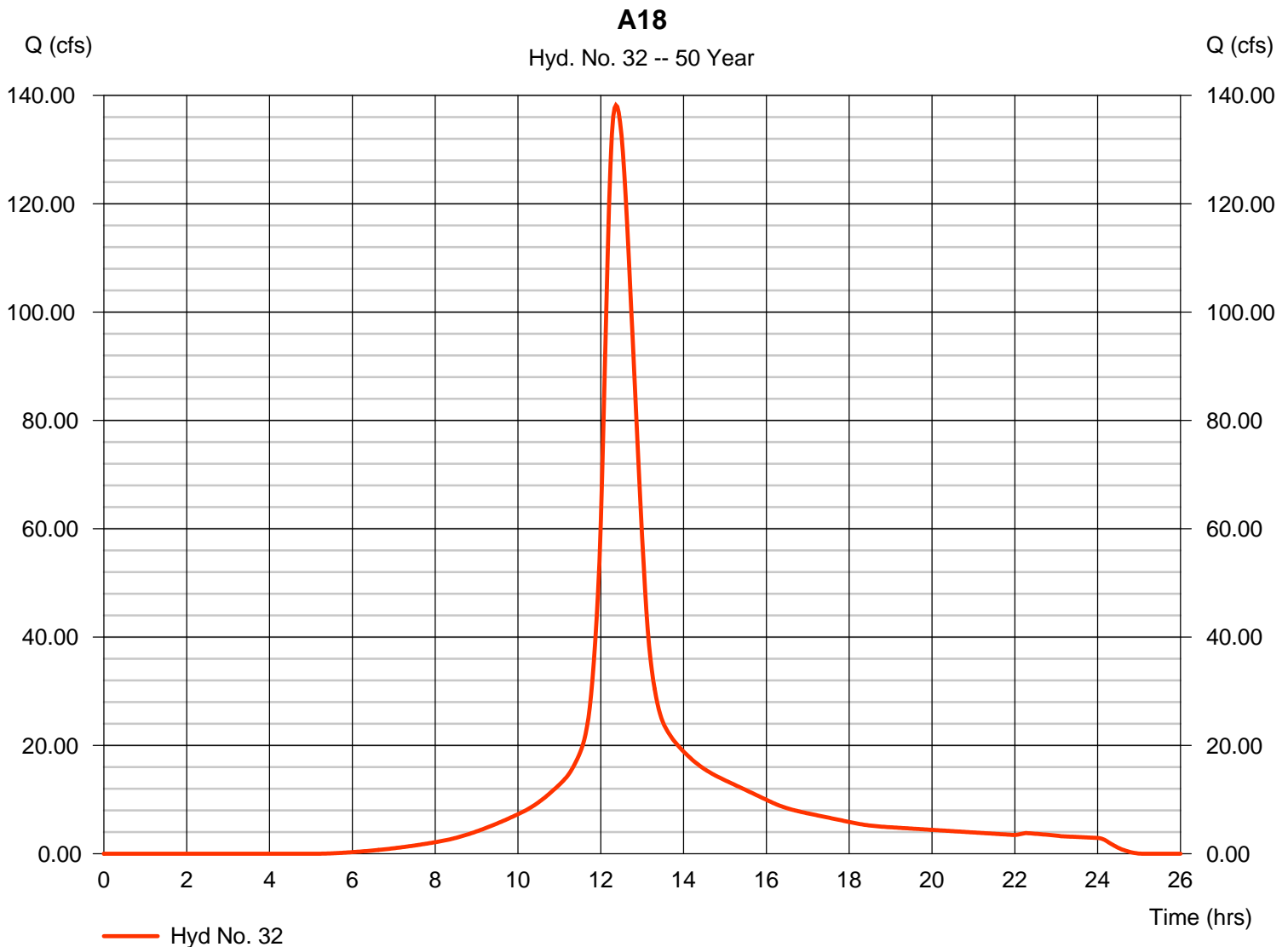
Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 34.490 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 9.96 in
 Storm duration = 24 hrs

Peak discharge = 138.18 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 893,776 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

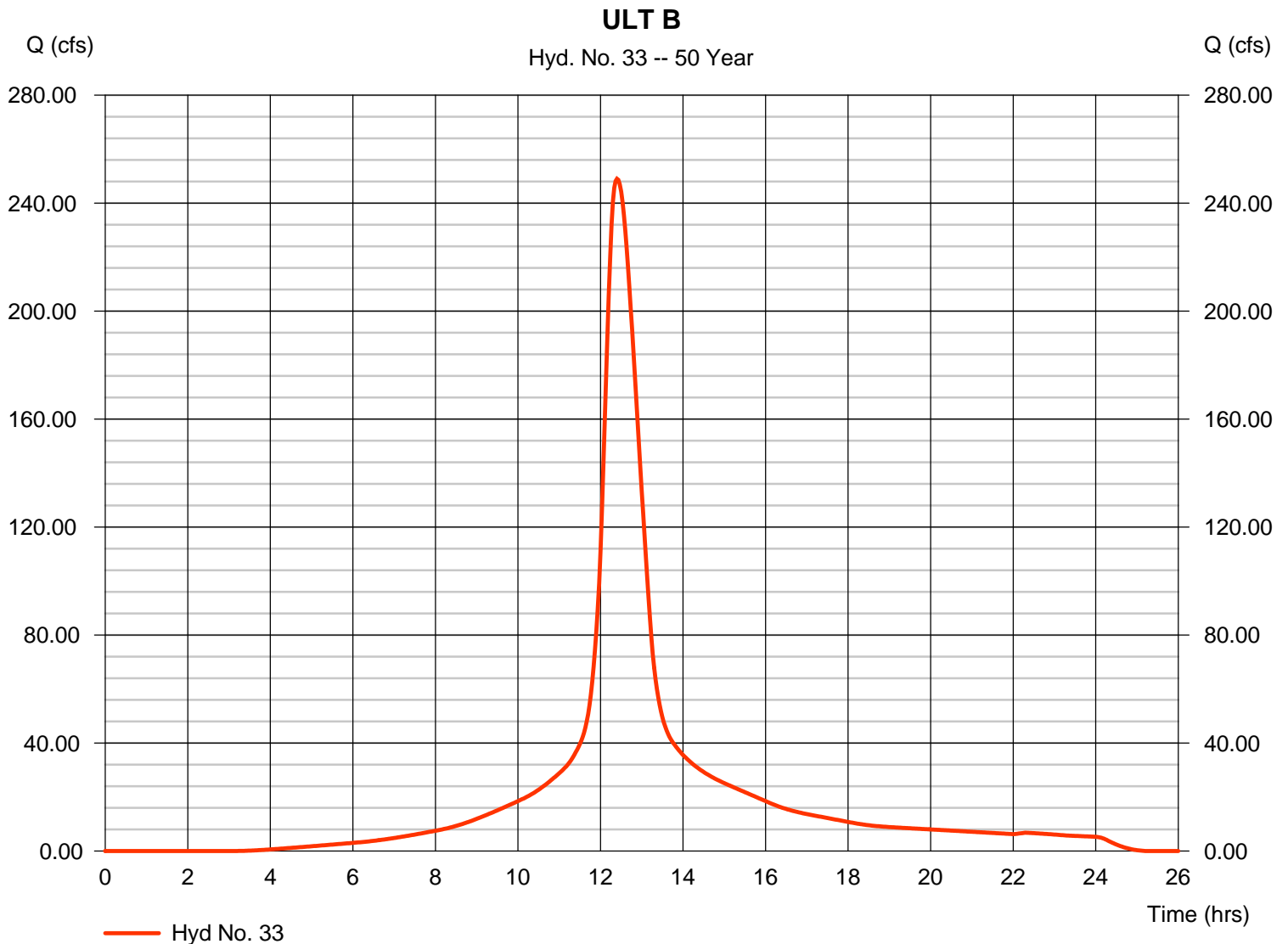
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Wednesday, 07 / 15 / 2020

Hyd. No. 33

ULT B

Hydrograph type	= SCS Runoff	Peak discharge	= 249.01 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 1,792,081 cuft
Drainage area	= 58.580 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.80 min
Total precip.	= 9.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	485.26	2	778	5,749,416	-----	-----	-----	EX A
2	SCS Runoff	91.28	2	758	869,027	-----	-----	-----	EX A1
3	SCS Runoff	45.76	2	750	357,144	-----	-----	-----	EX A2
4	SCS Runoff	260.33	2	756	2,355,352	-----	-----	-----	EX A3
5	SCS Runoff	126.61	2	784	1,725,710	-----	-----	-----	EX A4
6	Combine	369.08	2	766	4,081,059	4, 5	-----	-----	EX A3 + EX A4
7	SCS Runoff	281.76	2	768	3,115,422	-----	-----	-----	EX B
8	SCS Runoff	298.18	2	746	2,290,320	-----	-----	-----	A1
9	SCS Runoff	41.85	2	738	265,899	-----	-----	-----	A2
10	Combine	338.20	2	746	2,556,220	8, 9	-----	-----	A1+A2
11	SCS Runoff	46.77	2	738	297,158	-----	-----	-----	A3
12	SCS Runoff	27.15	2	738	172,506	-----	-----	-----	A4
13	SCS Runoff	36.56	2	738	232,324	-----	-----	-----	A5
14	Combine	445.78	2	744	3,258,210	10, 11, 12, 13	-----	-----	A1-A5
15	SCS Runoff	45.44	2	732	249,613	-----	-----	-----	A6
16	SCS Runoff	37.51	2	732	206,030	-----	-----	-----	A7
17	Combine	82.95	2	732	455,642	15, 16	-----	-----	A6+A7
18	SCS Runoff	21.01	2	738	133,528	-----	-----	-----	A8
19	SCS Runoff	81.18	2	730	398,012	-----	-----	-----	A9
20	Combine	606.37	2	740	4,245,389	14, 17, 18, 19	-----	-----	A1-A9
21	SCS Runoff	9.743	2	736	57,751	-----	-----	-----	A10
22	SCS Runoff	44.19	2	742	299,274	-----	-----	-----	A11
23	SCS Runoff	37.60	2	738	238,884	-----	-----	-----	A12
24	Combine	91.25	2	740	595,909	21, 22, 23	-----	-----	A10-A12
25	SCS Runoff	21.68	2	738	137,773	-----	-----	-----	A13
26	Combine	112.88	2	740	733,682	24, 25	-----	-----	A10-A13
27	SCS Runoff	38.14	2	738	242,357	-----	-----	-----	A14
28	SCS Runoff	35.91	2	730	176,044	-----	-----	-----	A15
29	Combine	182.53	2	736	1,152,083	26, 27, 28	-----	-----	Contributing to Basin A2
30	SCS Runoff	16.78	2	730	81,074	-----	-----	-----	A16
31	SCS Runoff	45.76	2	750	357,144	-----	-----	-----	A17
32	SCS Runoff	179.15	2	742	1,170,238	-----	-----	-----	A18
33	SCS Runoff	313.84	2	744	2,285,834	-----	-----	-----	ULT B
031.060_Parkside.gpw					Return Period: 100 Year			Wednesday, 07 / 15 / 2020	

Hydrograph Report

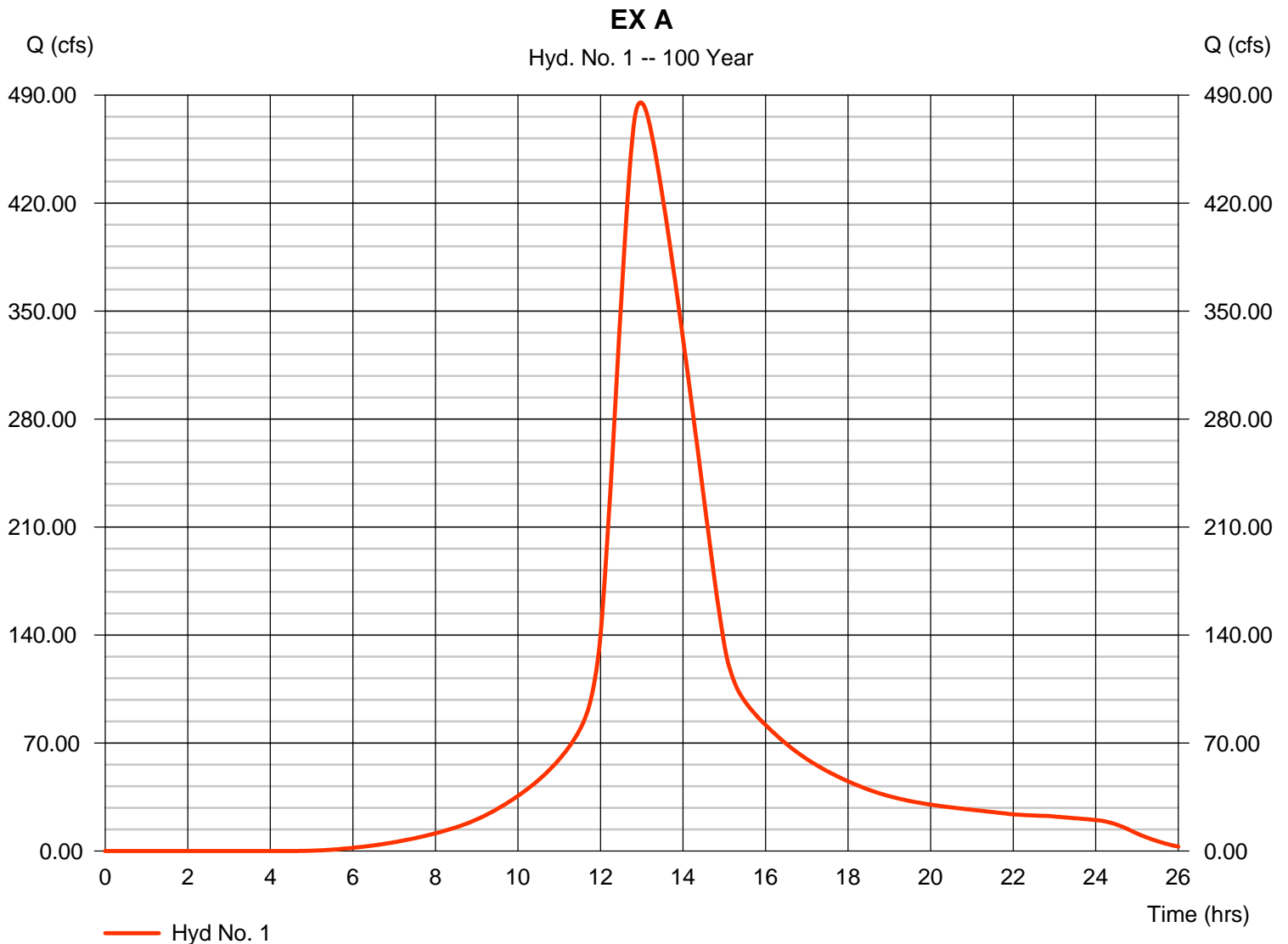
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 1

EX A

Hydrograph type	= SCS Runoff	Peak discharge	= 485.26 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.97 hrs
Time interval	= 2 min	Hyd. volume	= 5,749,416 cuft
Drainage area	= 167.740 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 83.60 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 350



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

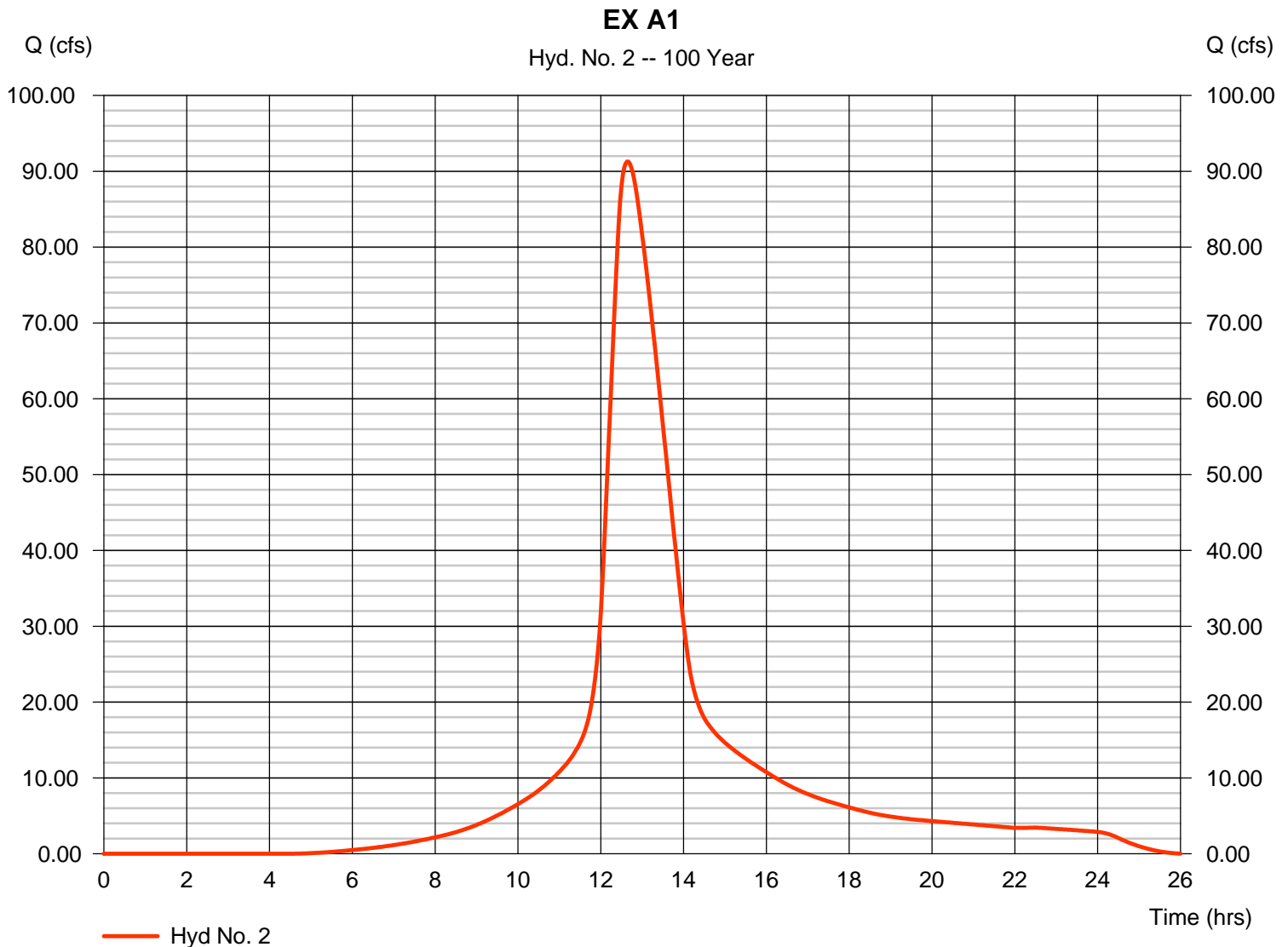
Wednesday, 07 / 15 / 2020

Hyd. No. 2

EX A1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 25.120 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 12.30 in
Storm duration = 24 hrs

Peak discharge = 91.28 cfs
Time to peak = 12.63 hrs
Hyd. volume = 869,027 cuft
Curve number = 78
Hydraulic length = 0 ft
Time of conc. (Tc) = 49.70 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

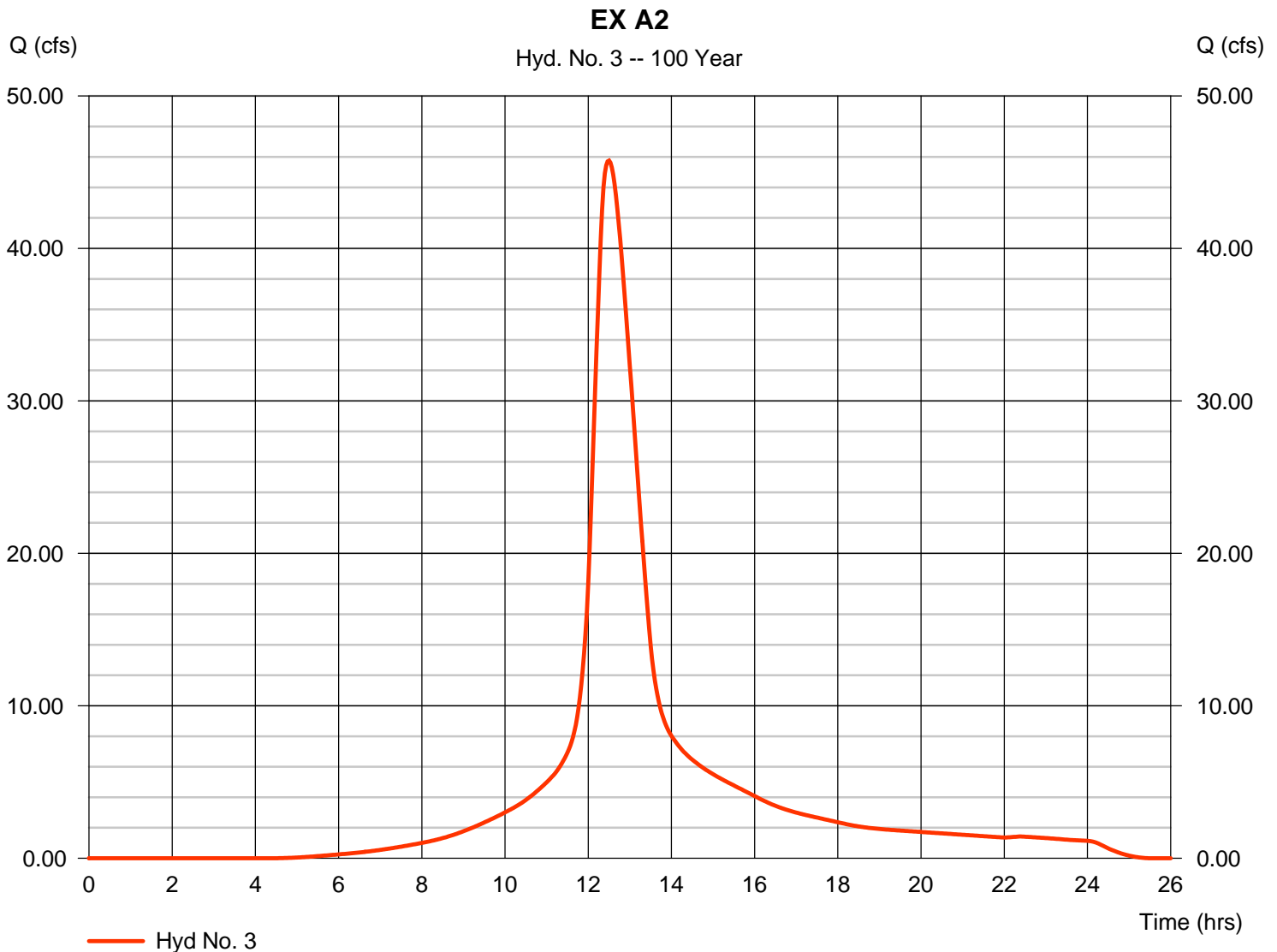
Wednesday, 07 / 15 / 2020

Hyd. No. 3

EX A2

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 45.76 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 357,144 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

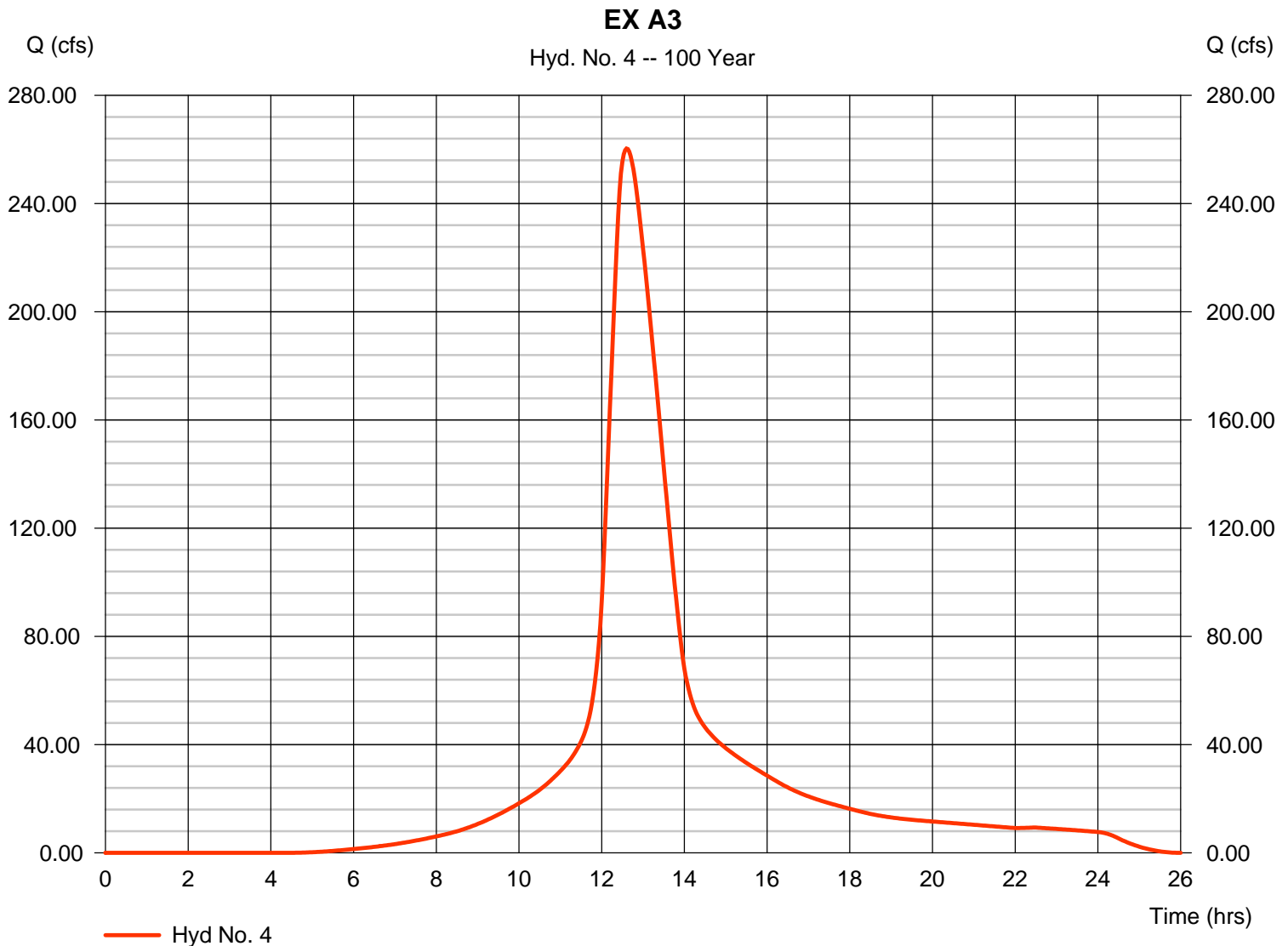
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Wednesday, 07 / 15 / 2020

Hyd. No. 4

EX A3

Hydrograph type	= SCS Runoff	Peak discharge	= 260.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 2,355,352 cuft
Drainage area	= 68.840 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.30 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

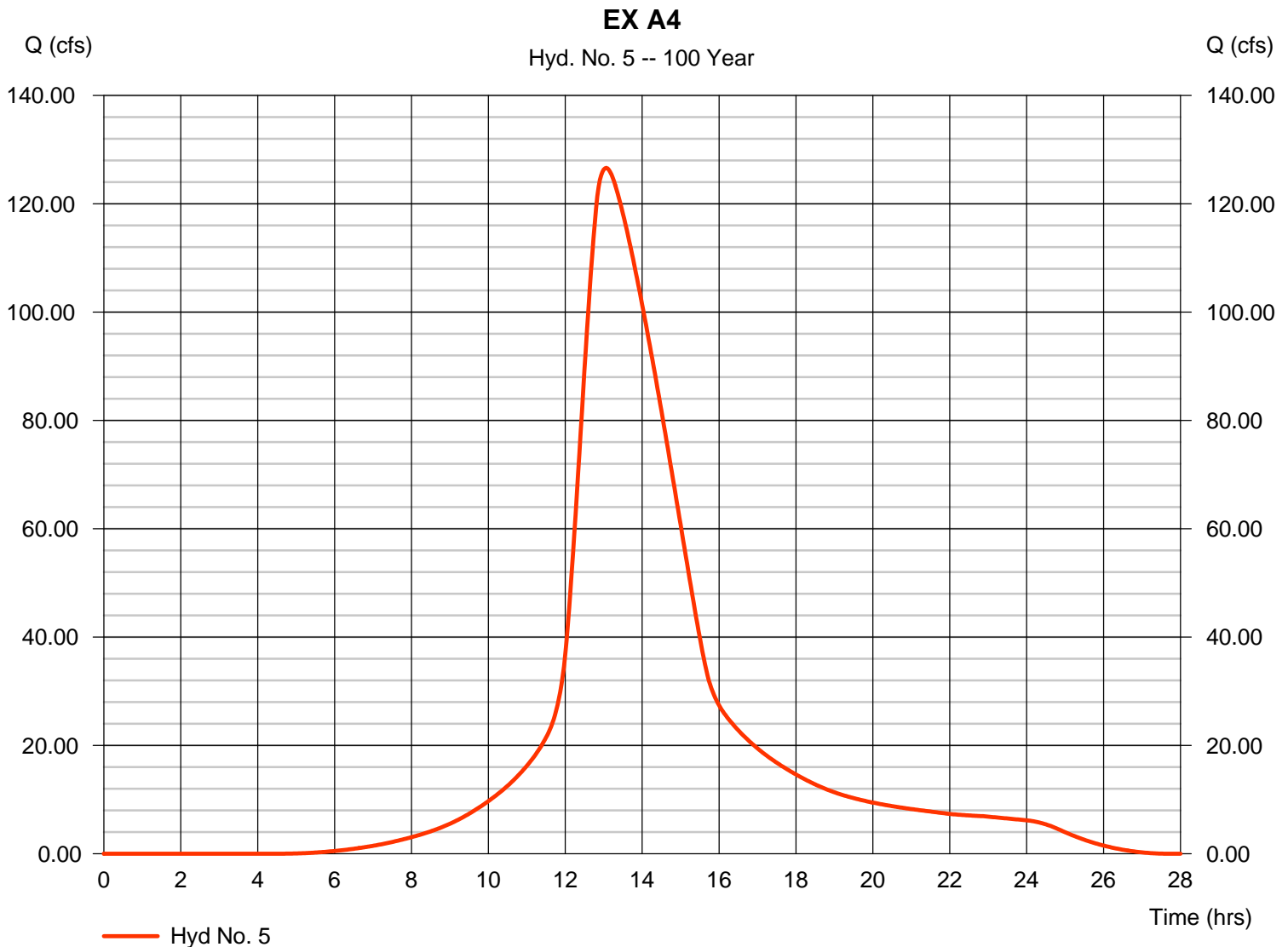
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Wednesday, 07 / 15 / 2020

Hyd. No. 5

EX A4

Hydrograph type	= SCS Runoff	Peak discharge	= 126.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,725,710 cuft
Drainage area	= 50.180 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 87.00 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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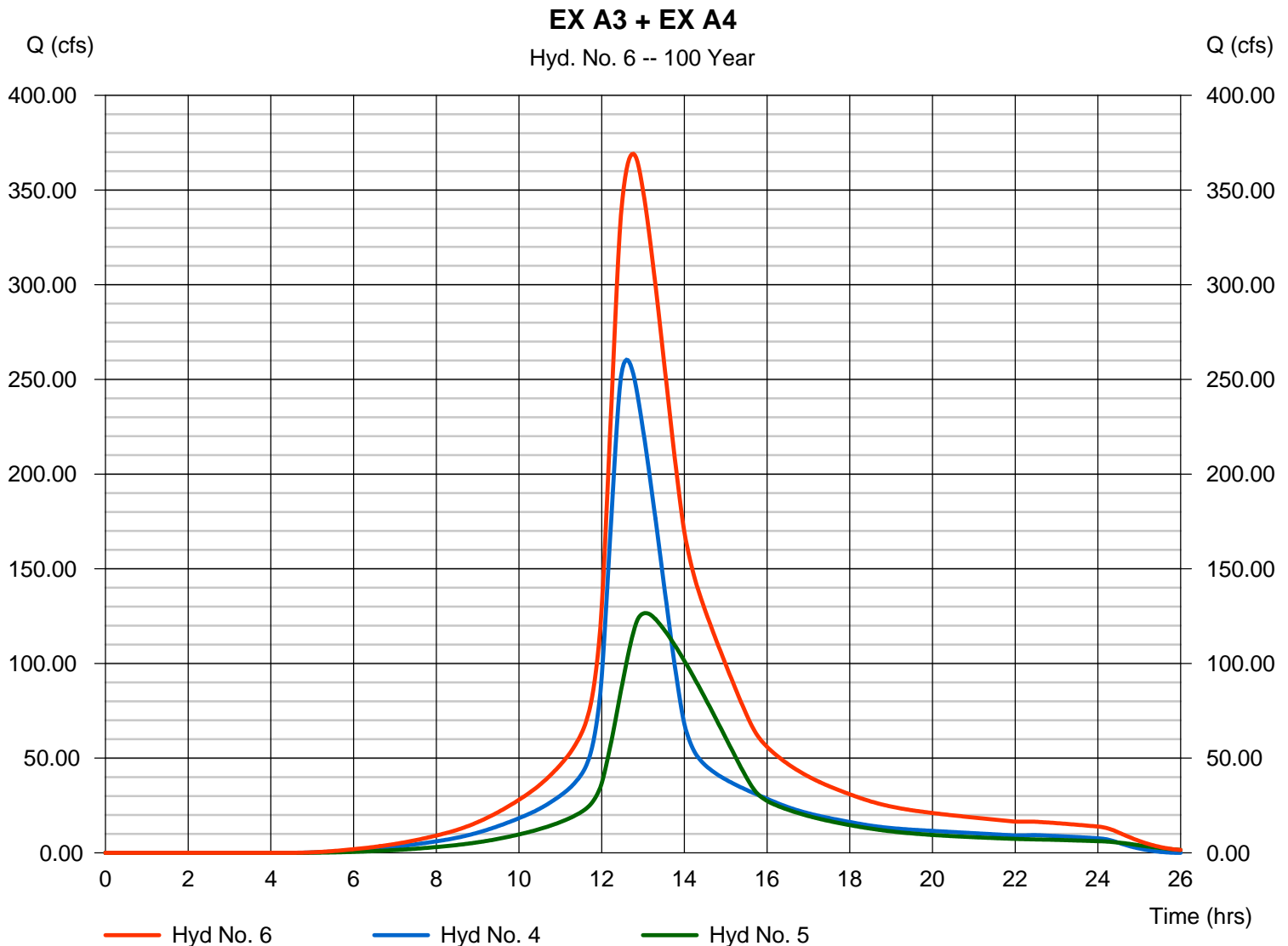
Wednesday, 07 / 15 / 2020

Hyd. No. 6

EX A3 + EX A4

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 369.08 cfs
Time to peak = 12.77 hrs
Hyd. volume = 4,081,059 cuft
Contrib. drain. area = 119.020 ac



Hydrograph Report

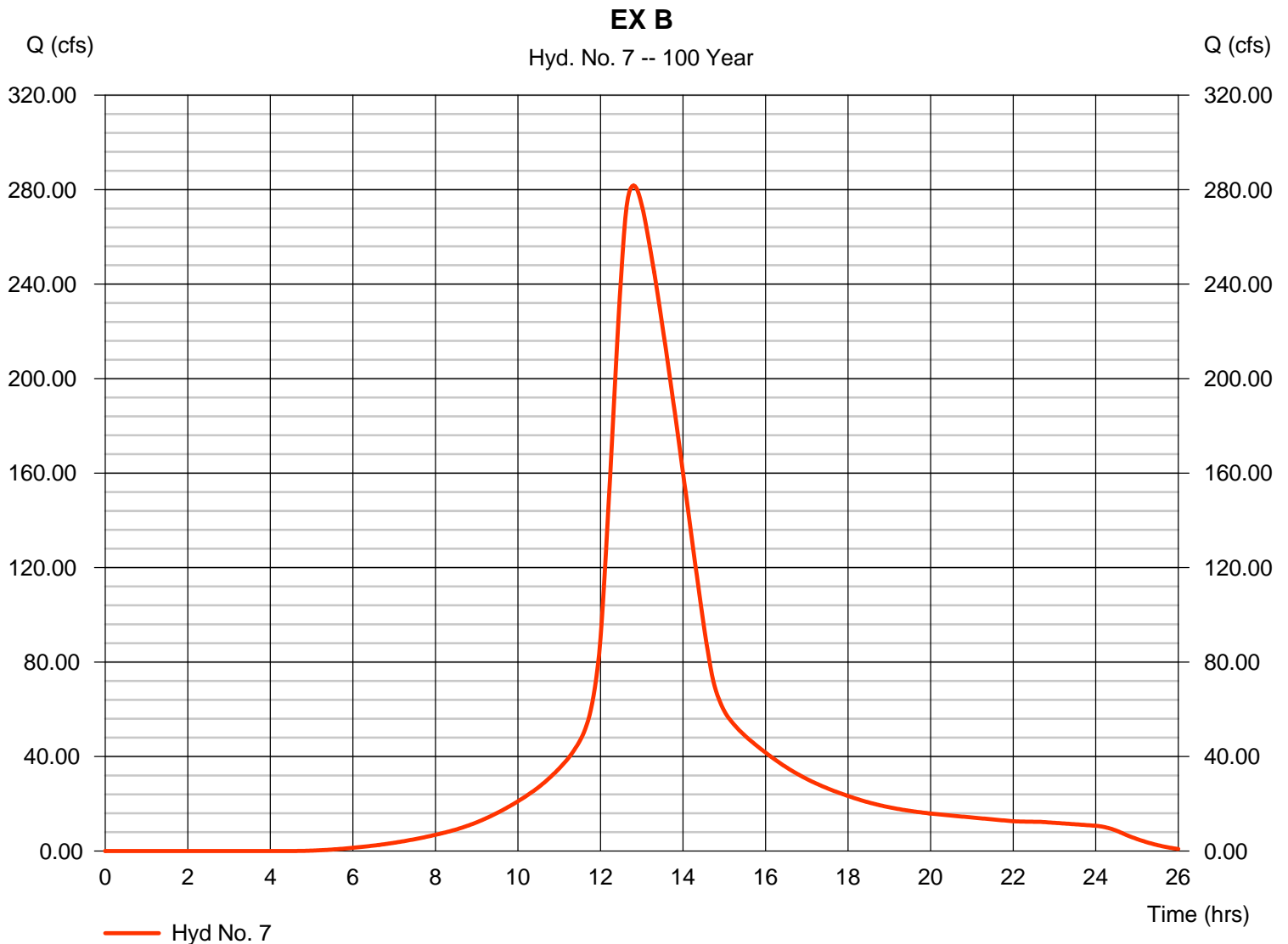
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Hyd. No. 7

EX B

Hydrograph type	= SCS Runoff	Peak discharge	= 281.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.80 hrs
Time interval	= 2 min	Hyd. volume	= 3,115,422 cuft
Drainage area	= 90.420 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 61.40 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

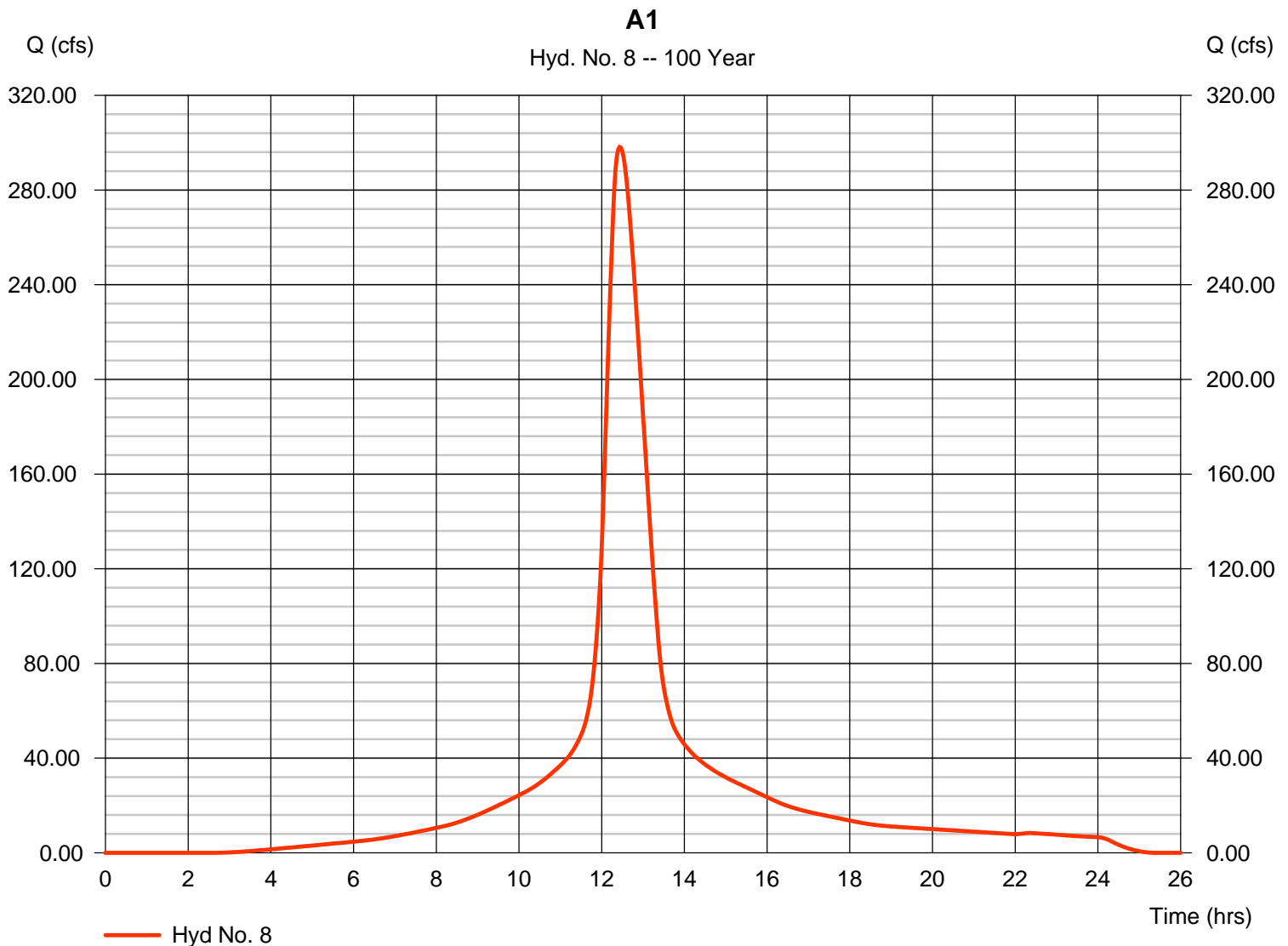
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Wednesday, 07 / 15 / 2020

Hyd. No. 8

A1

Hydrograph type	= SCS Runoff	Peak discharge	= 298.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 2,290,320 cuft
Drainage area	= 59.150 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.20 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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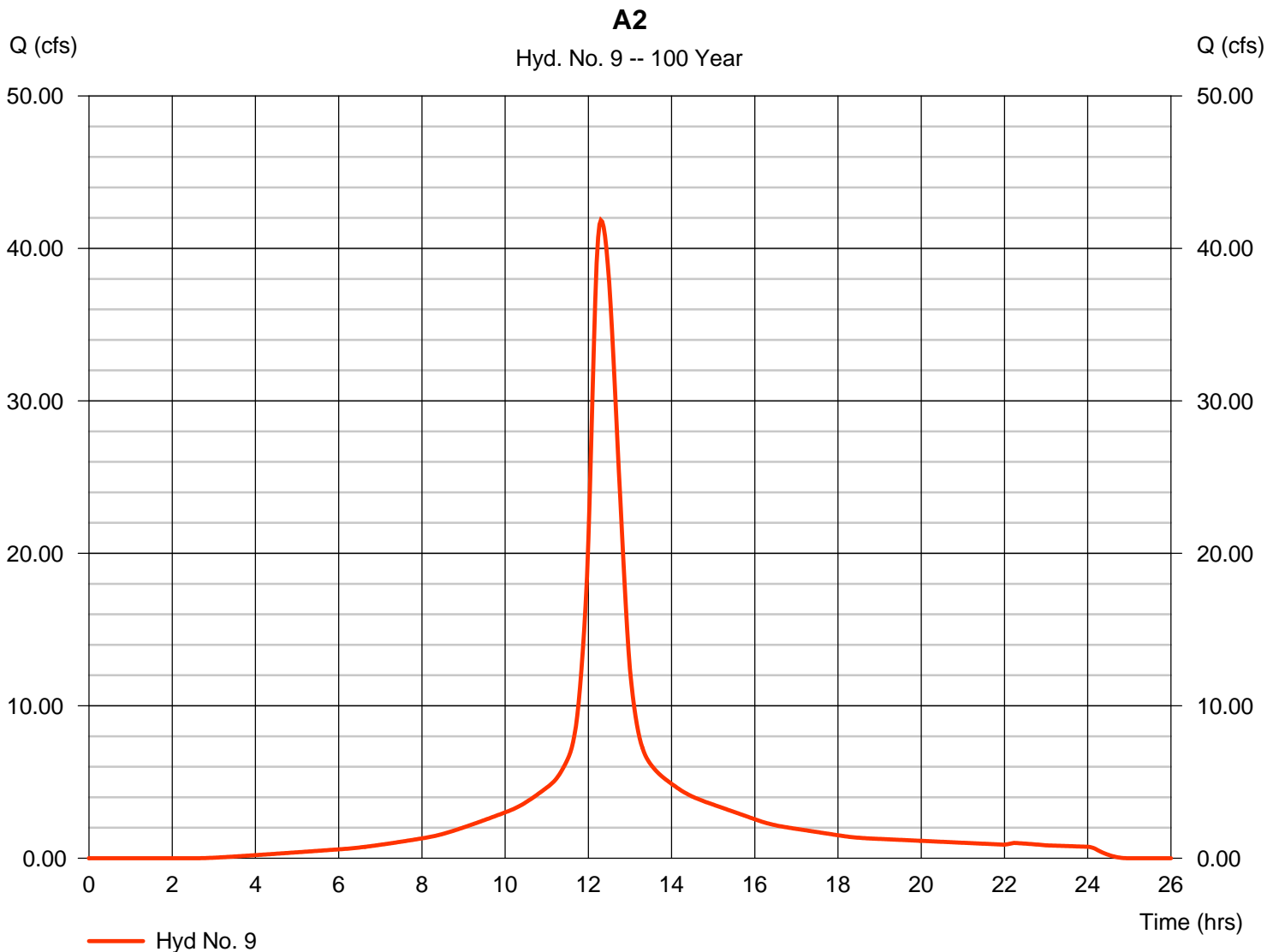
Wednesday, 07 / 15 / 2020

Hyd. No. 9

A2

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 6.890 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 41.85 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 265,899 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

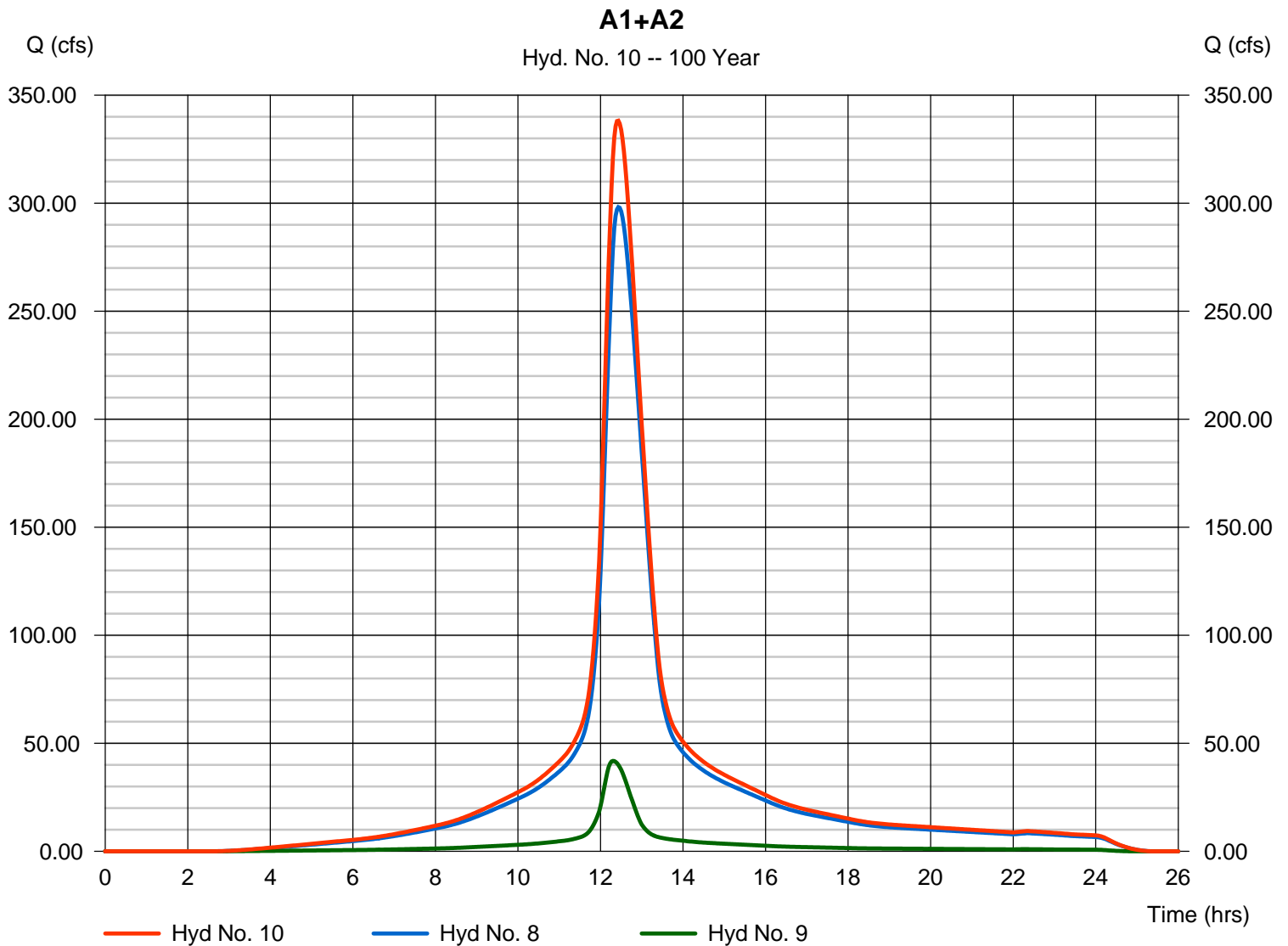
Wednesday, 07 / 15 / 2020

Hyd. No. 10

A1+A2

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 8, 9

Peak discharge = 338.20 cfs
Time to peak = 12.43 hrs
Hyd. volume = 2,556,220 cuft
Contrib. drain. area = 66.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

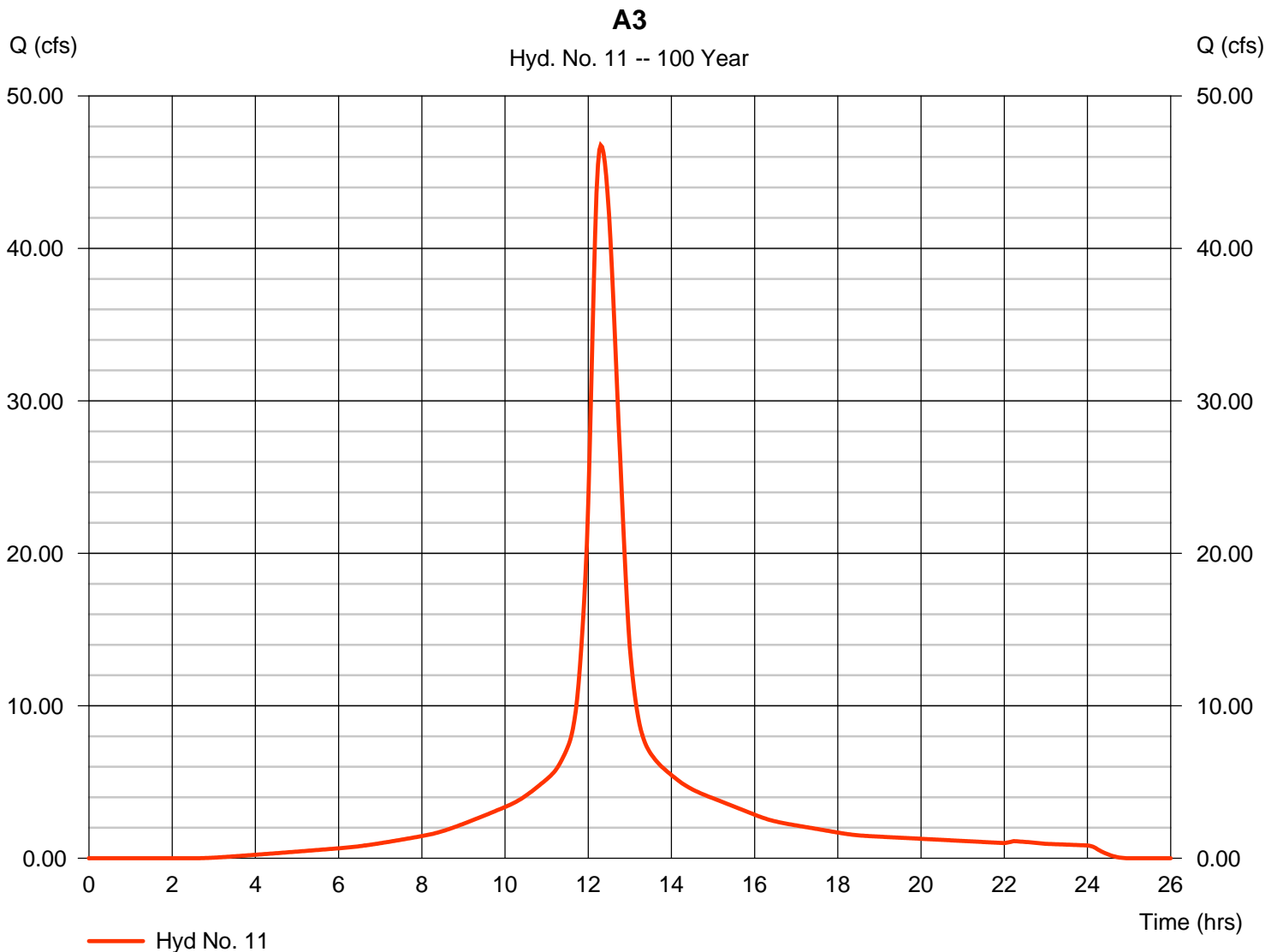
Wednesday, 07 / 15 / 2020

Hyd. No. 11

A3

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 7.700 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 46.77 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 297,158 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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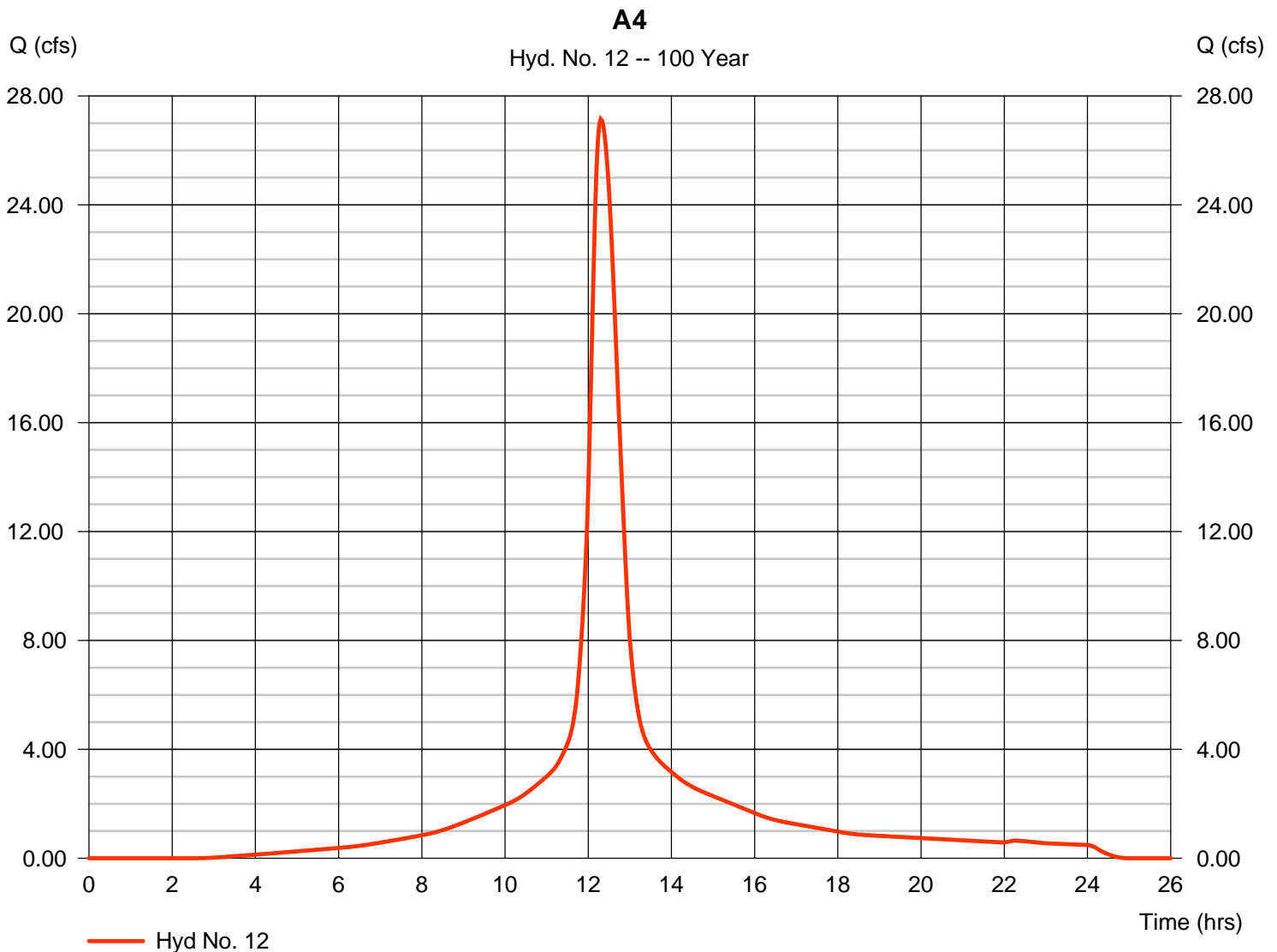
Wednesday, 07 / 15 / 2020

Hyd. No. 12

A4

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 4.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 27.15 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 172,506 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

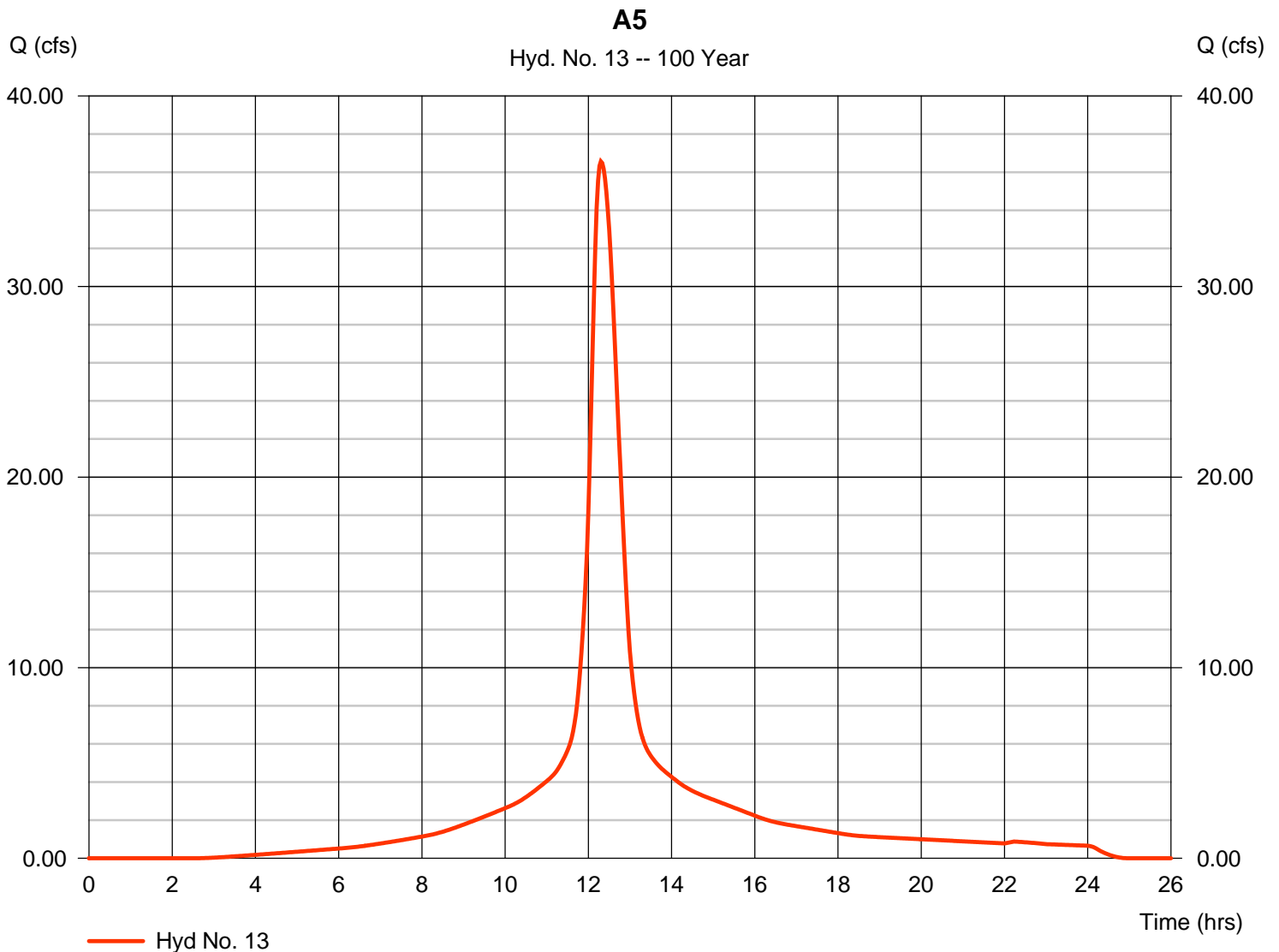
Wednesday, 07 / 15 / 2020

Hyd. No. 13

A5

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 6.020 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 36.56 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 232,324 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 20.60 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

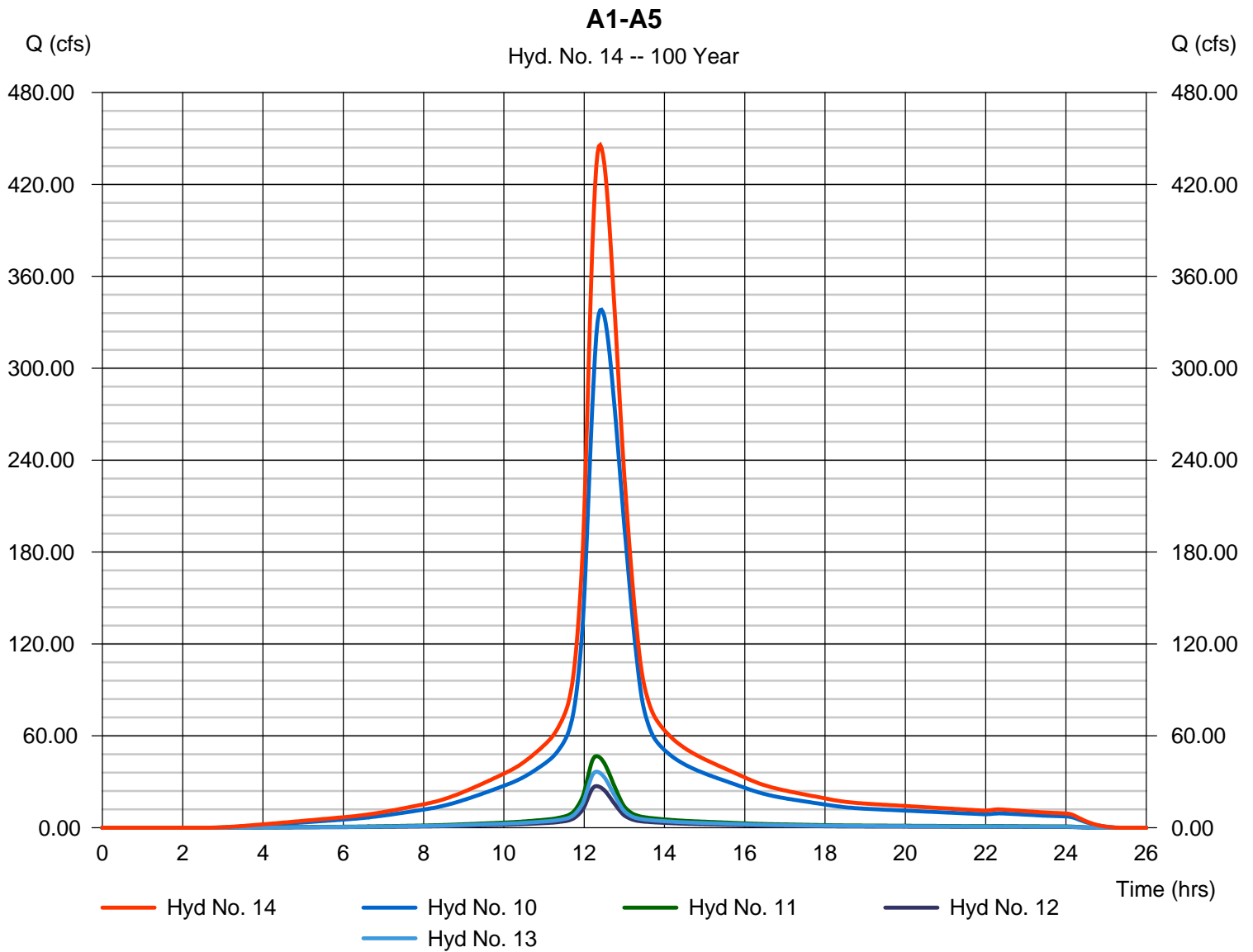
Wednesday, 07 / 15 / 2020

Hyd. No. 14

A1-A5

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 10, 11, 12, 13

Peak discharge = 445.78 cfs
Time to peak = 12.40 hrs
Hyd. volume = 3,258,210 cuft
Contrib. drain. area = 18.190 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

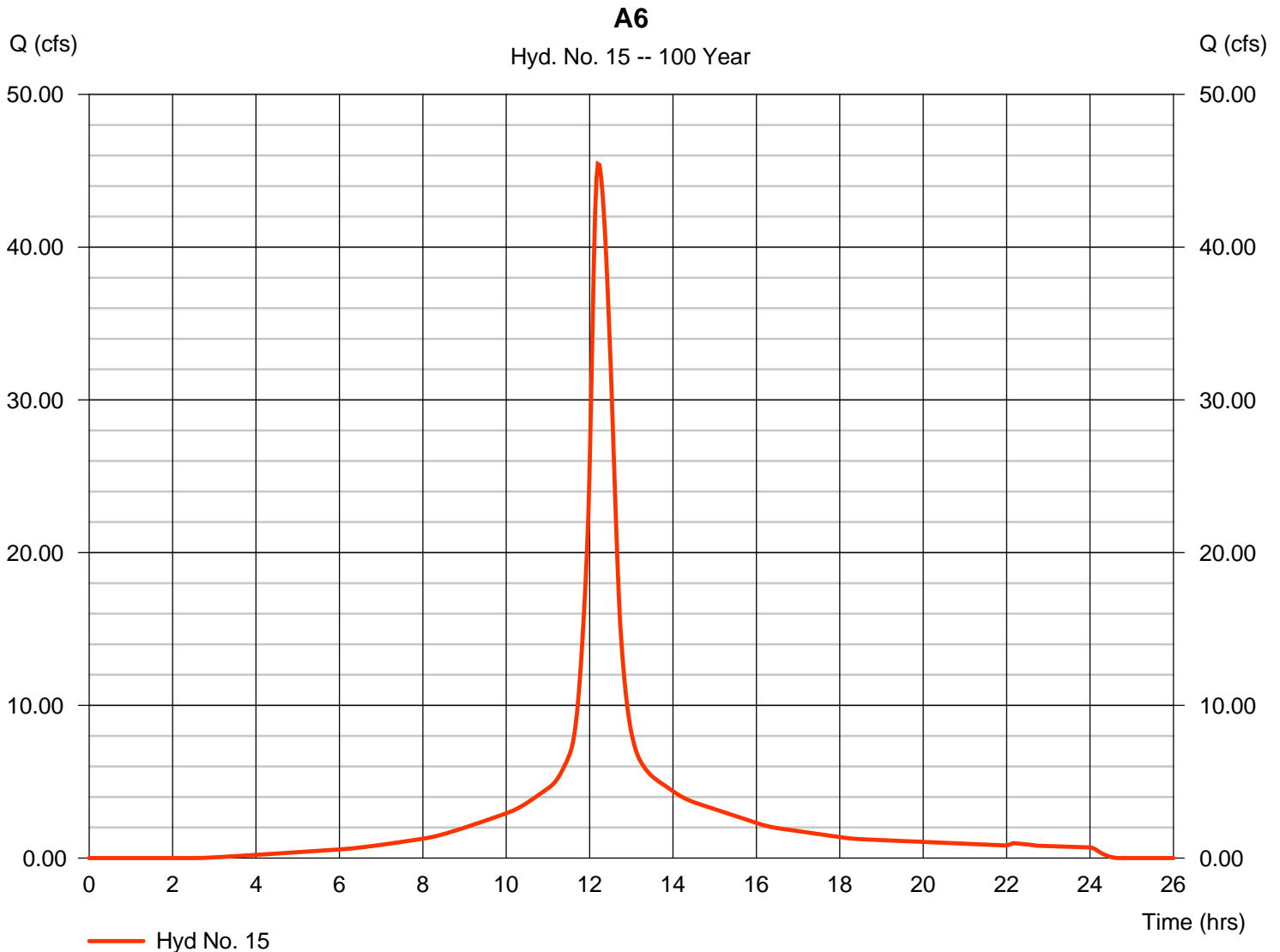
Wednesday, 07 / 15 / 2020

Hyd. No. 15

A6

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 6.300 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 45.44 cfs
 Time to peak = 12.20 hrs
 Hyd. volume = 249,613 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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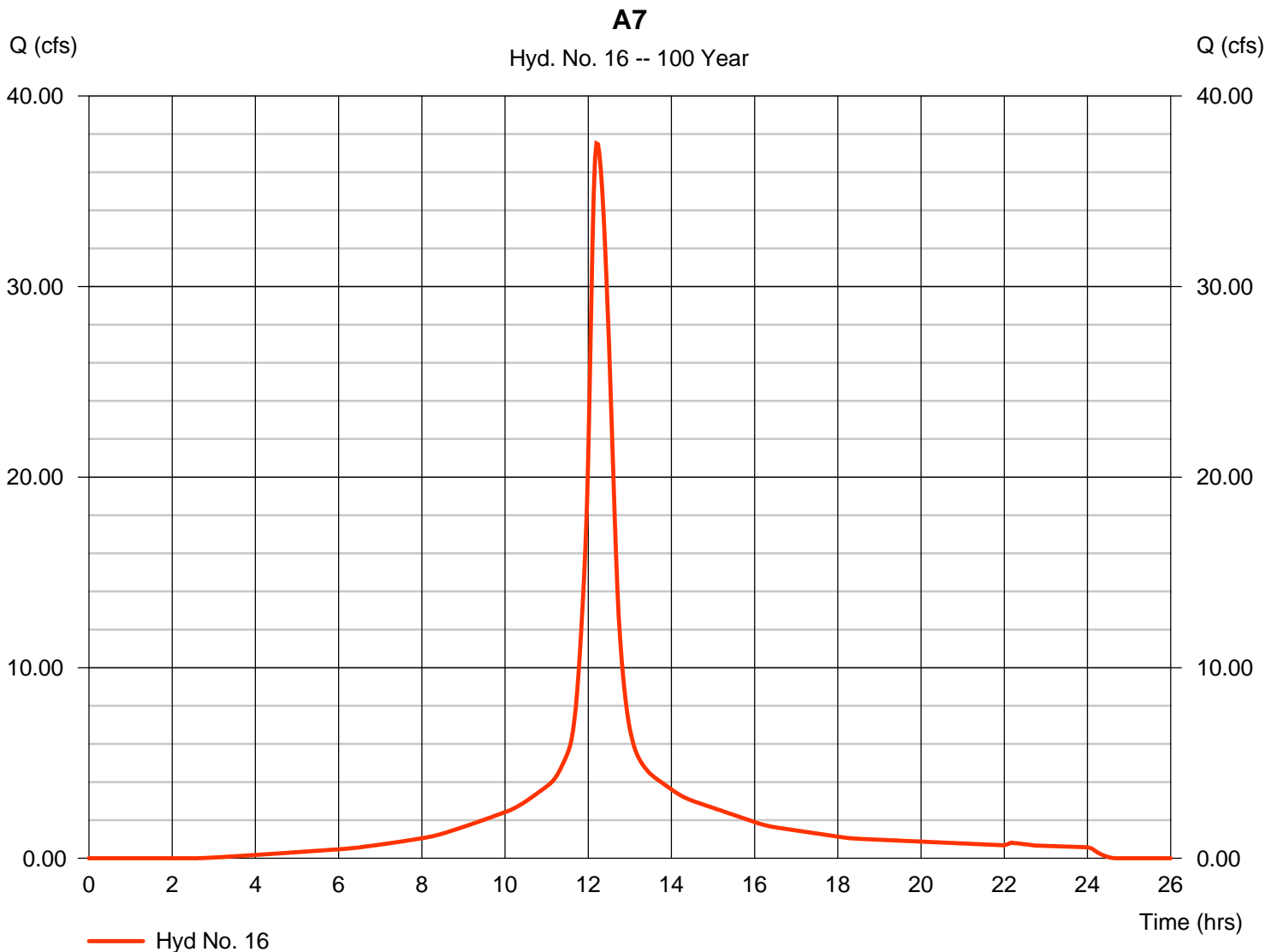
Wednesday, 07 / 15 / 2020

Hyd. No. 16

A7

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 5.200 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 37.51 cfs
 Time to peak = 12.20 hrs
 Hyd. volume = 206,030 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.70 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

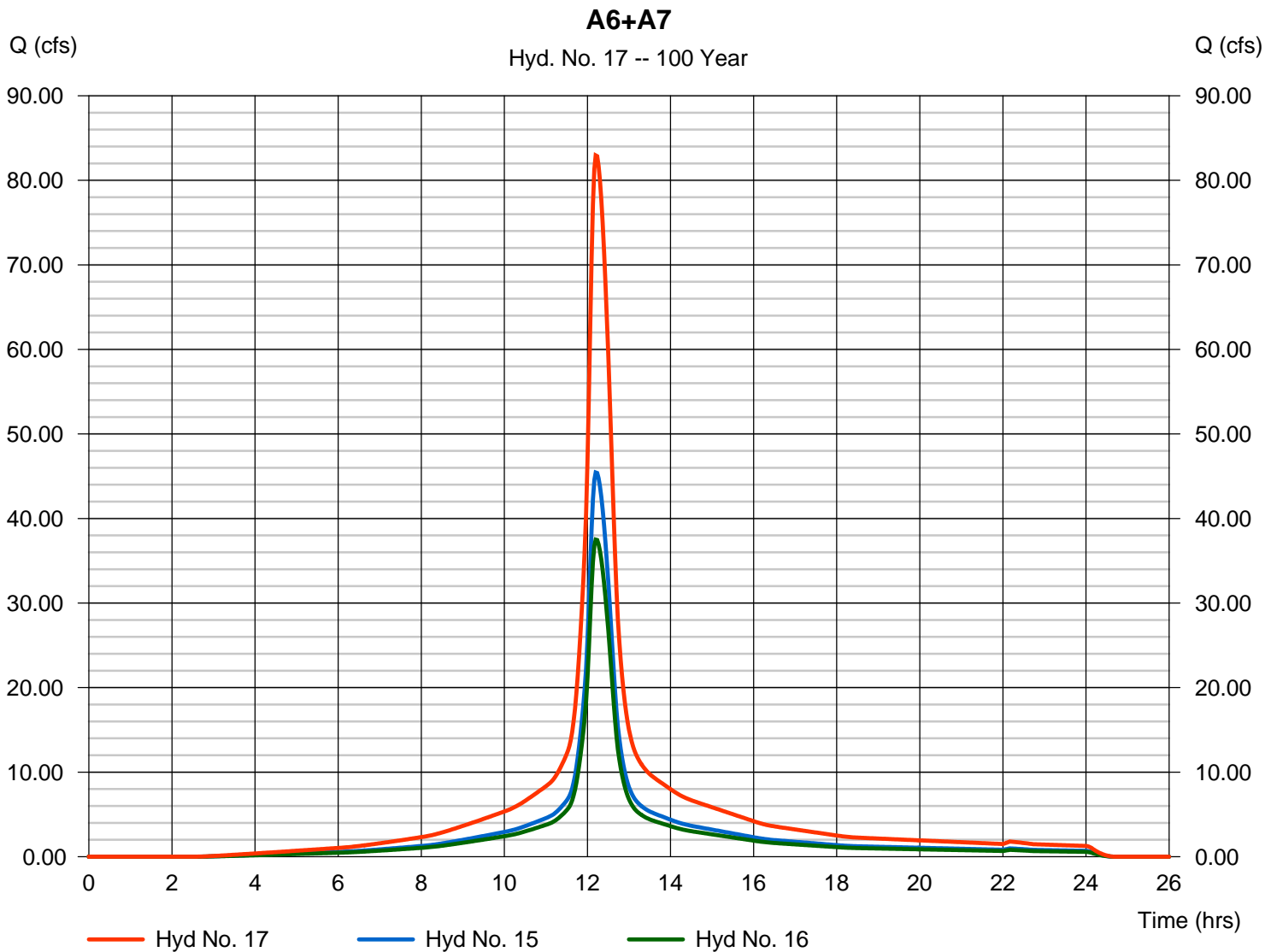
Wednesday, 07 / 15 / 2020

Hyd. No. 17

A6+A7

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 15, 16

Peak discharge = 82.95 cfs
Time to peak = 12.20 hrs
Hyd. volume = 455,642 cuft
Contrib. drain. area = 11.500 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

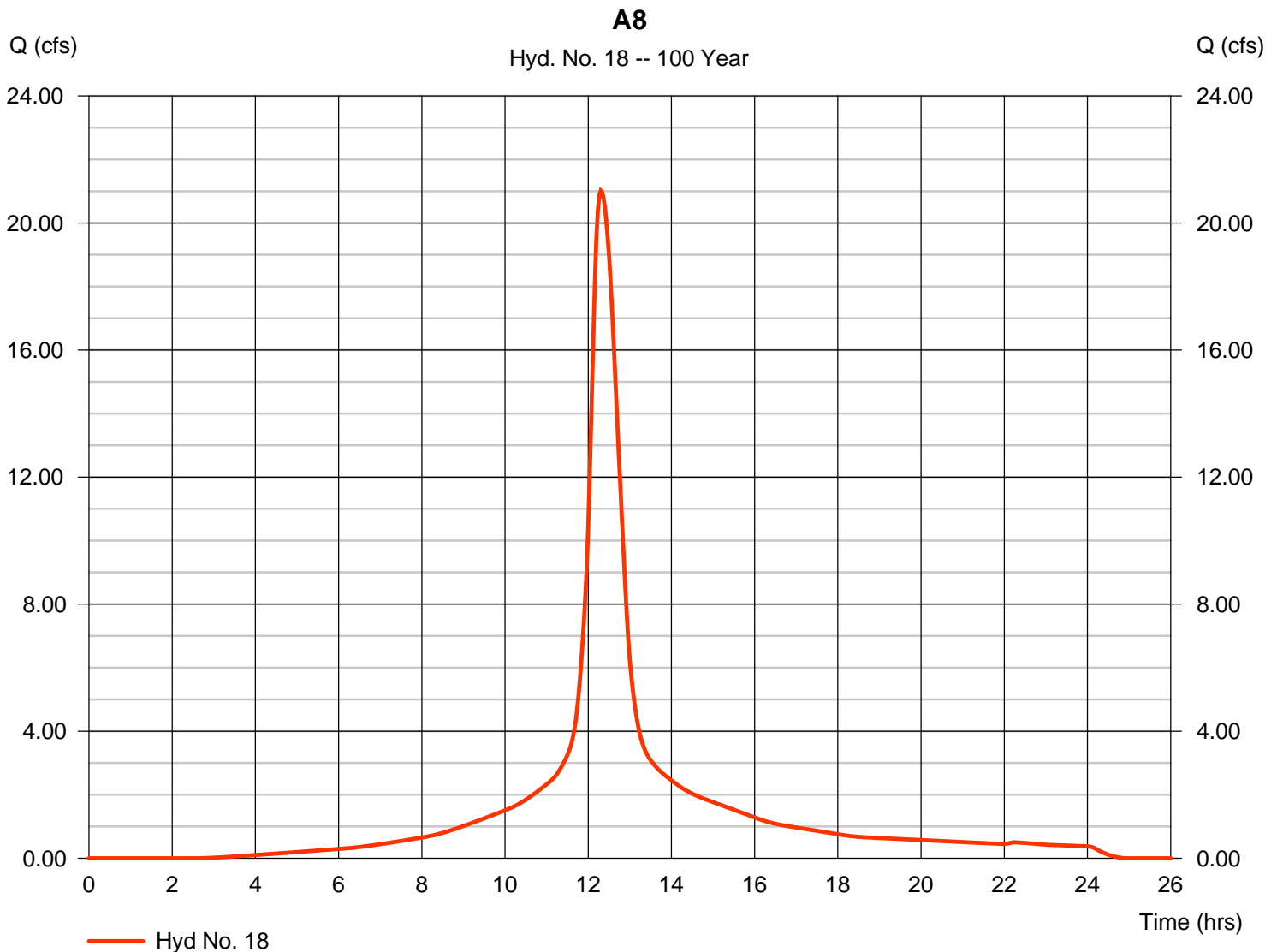
Wednesday, 07 / 15 / 2020

Hyd. No. 18

A8

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 3.460 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 21.01 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 133,528 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.40 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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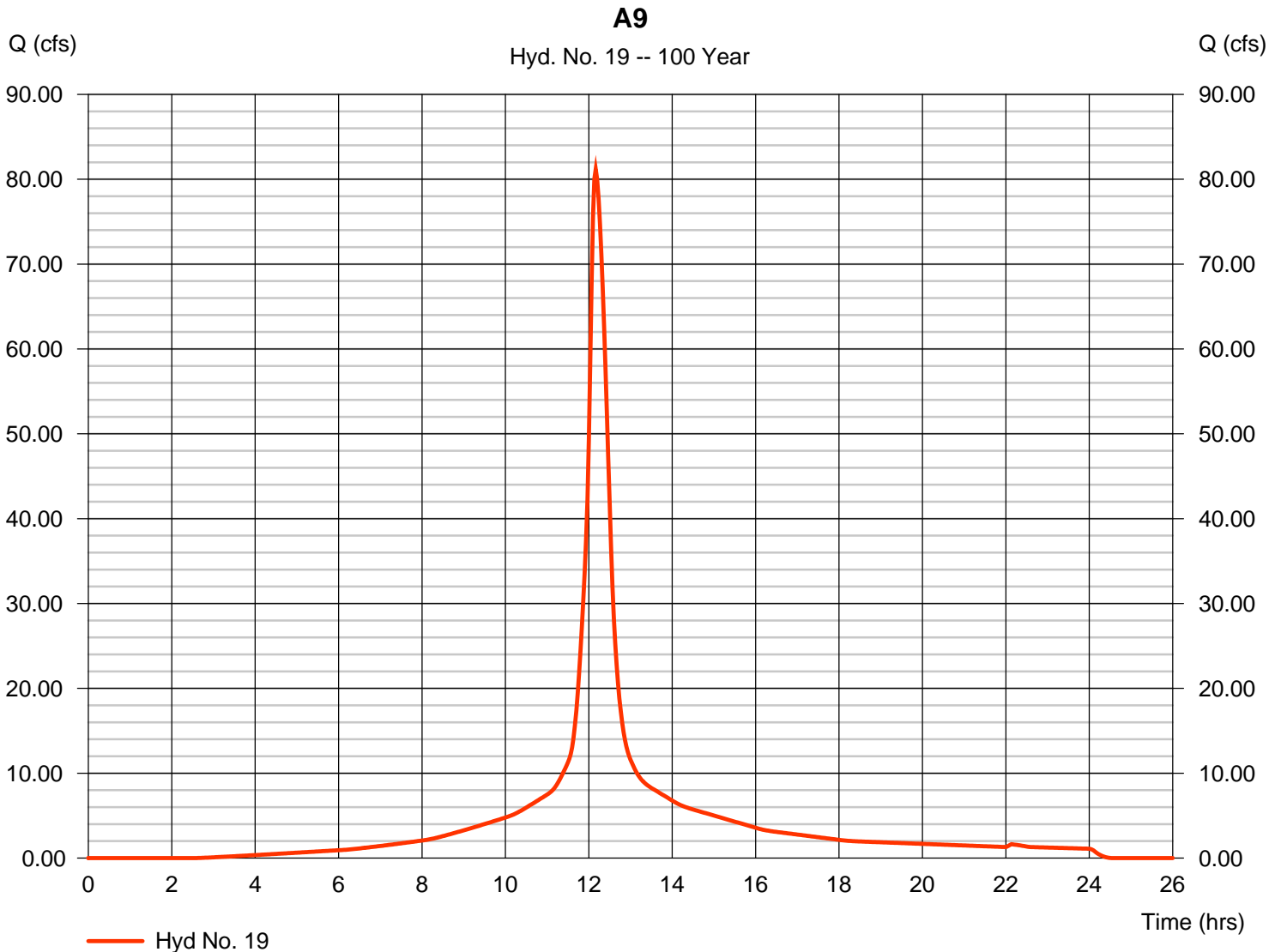
Wednesday, 07 / 15 / 2020

Hyd. No. 19

A9

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 10.400 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 12.30 in
Storm duration = 24 hrs

Peak discharge = 81.18 cfs
Time to peak = 12.17 hrs
Hyd. volume = 398,012 cuft
Curve number = 87
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

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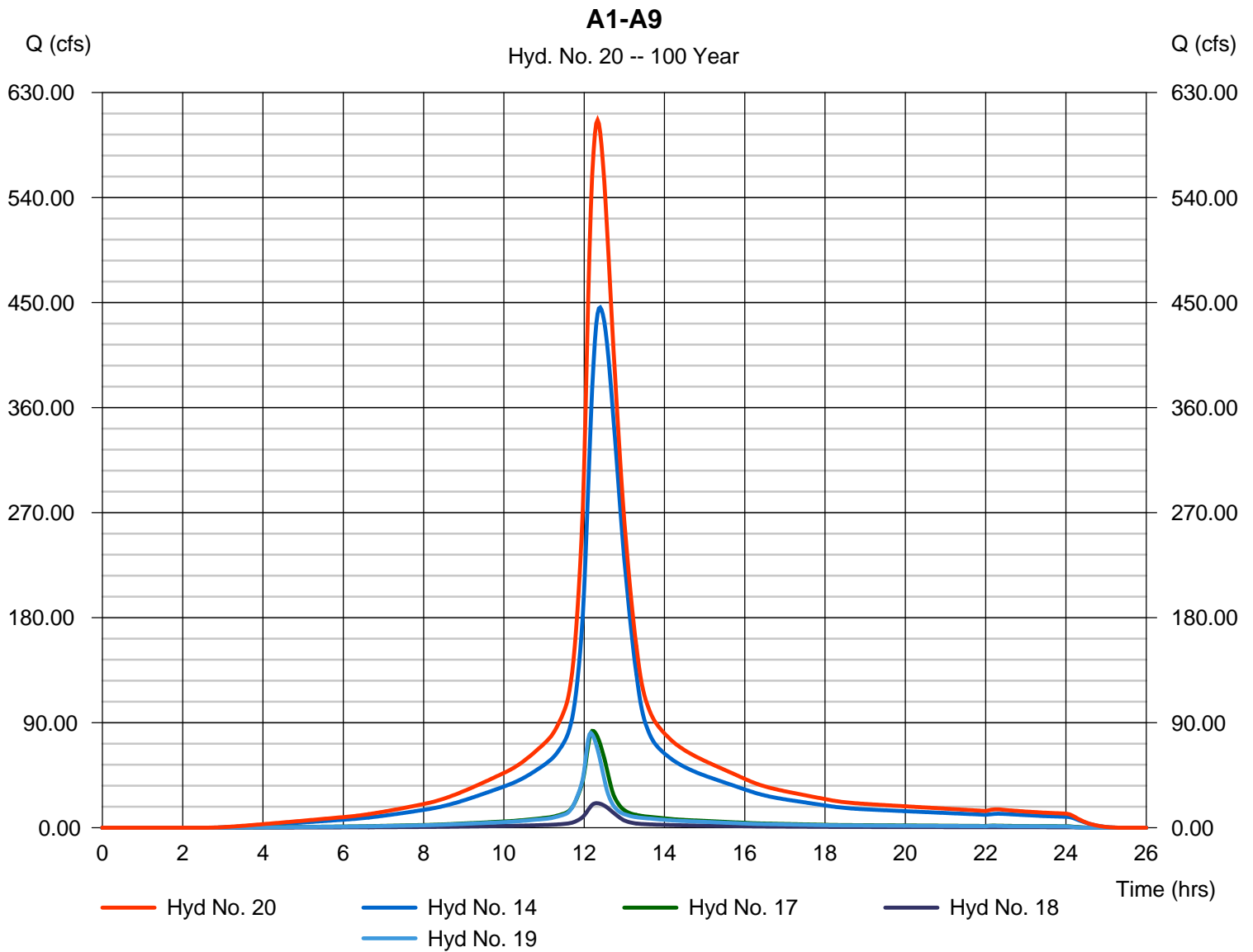
Wednesday, 07 / 15 / 2020

Hyd. No. 20

A1-A9

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 14, 17, 18, 19

Peak discharge = 606.37 cfs
 Time to peak = 12.33 hrs
 Hyd. volume = 4,245,389 cuft
 Contrib. drain. area = 13.860 ac



Hydrograph Report

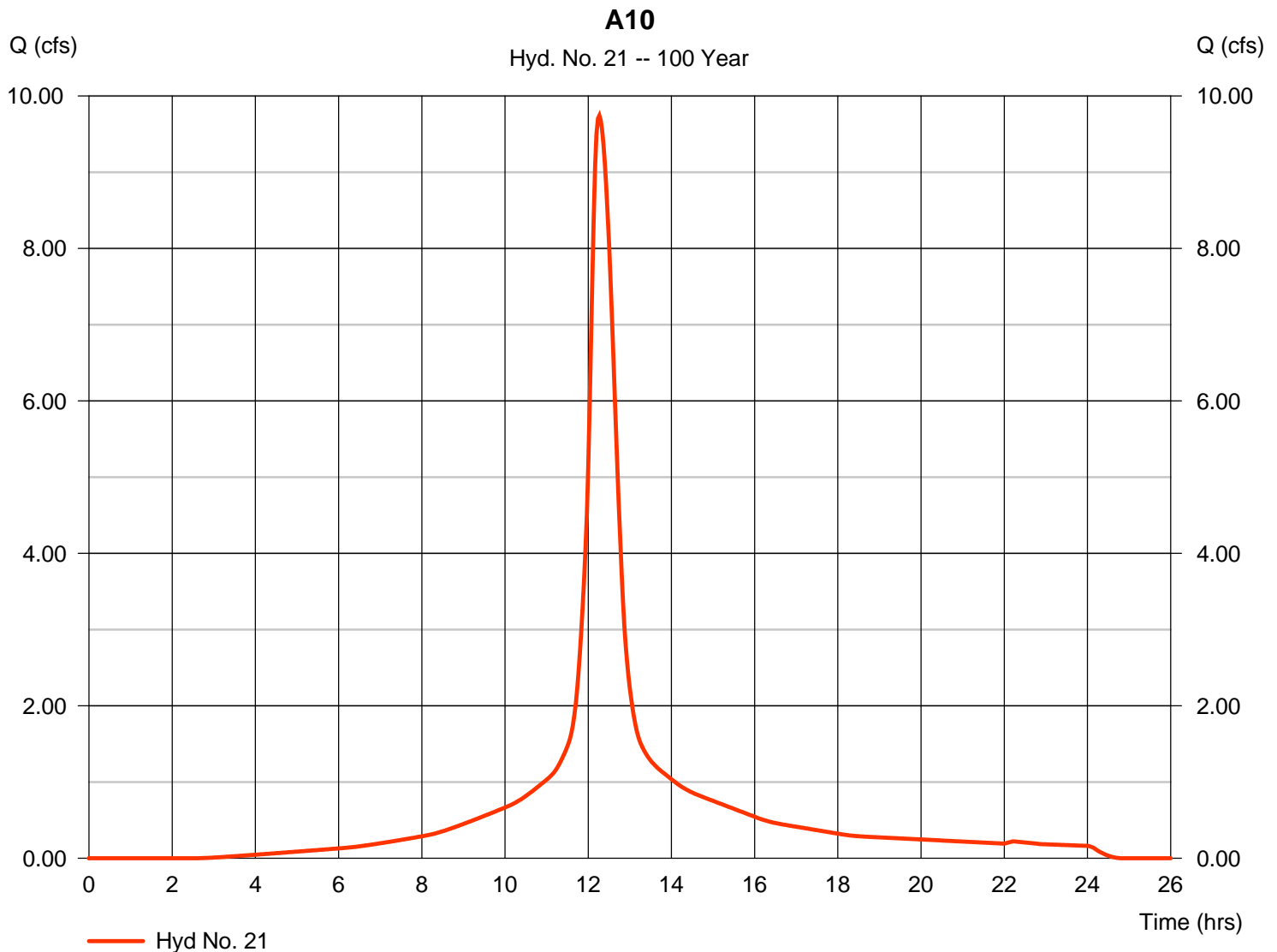
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Hyd. No. 21

A10

Hydrograph type	= SCS Runoff	Peak discharge	= 9.743 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 57,751 cuft
Drainage area	= 1.480 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.70 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

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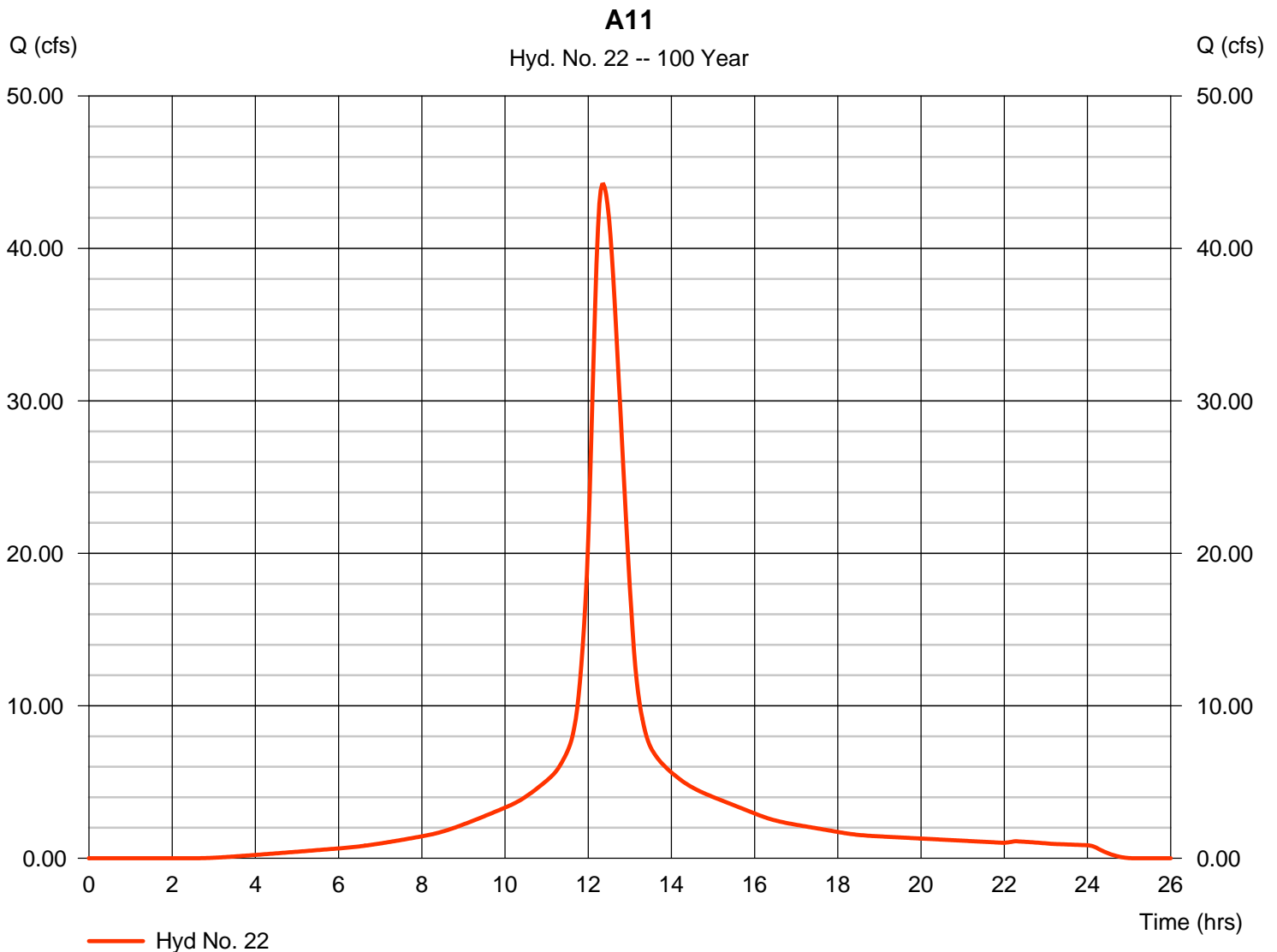
Wednesday, 07 / 15 / 2020

Hyd. No. 22

A11

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 7.820 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 44.19 cfs
 Time to peak = 12.37 hrs
 Hyd. volume = 299,274 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 25.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

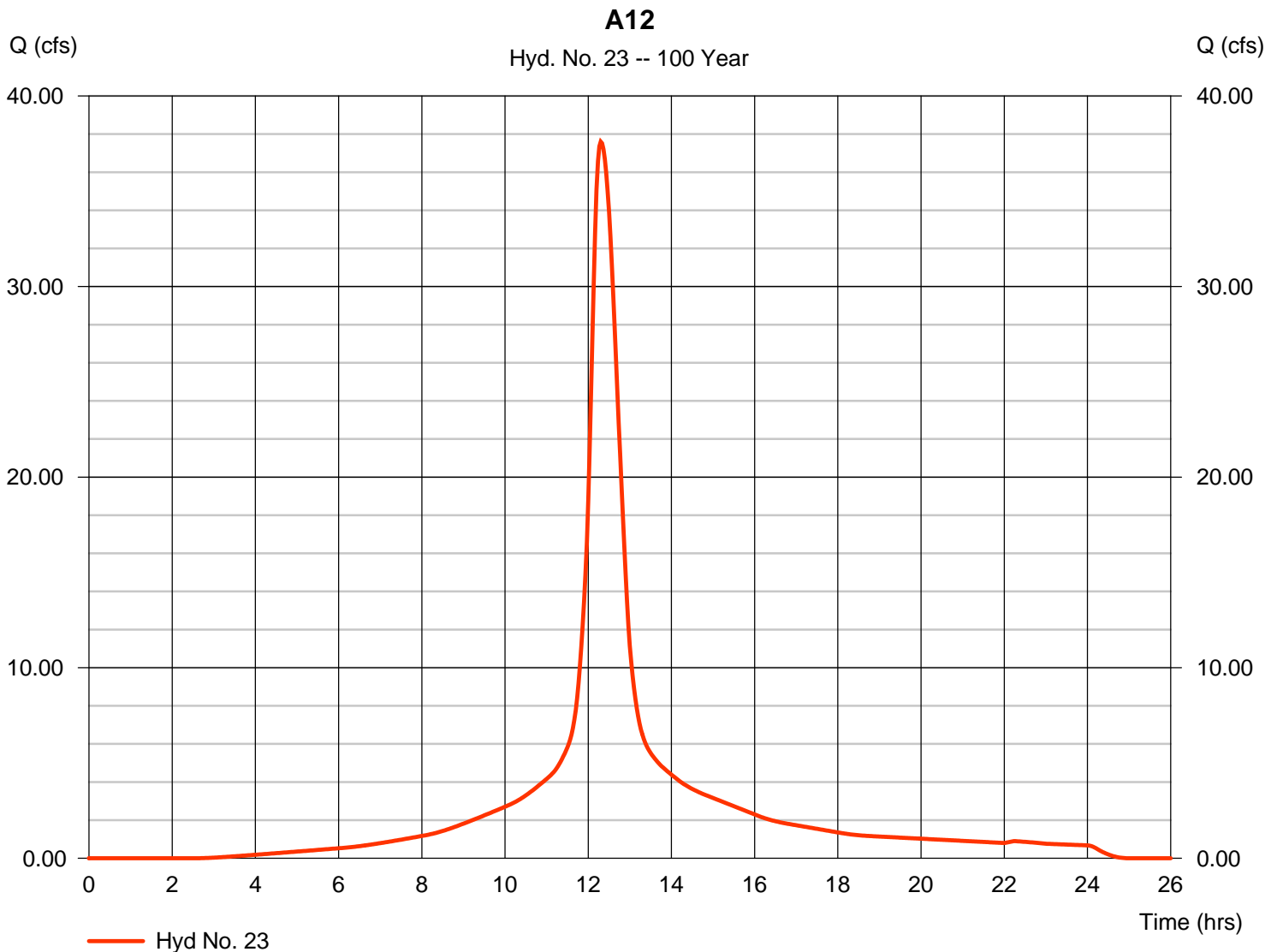
Wednesday, 07 / 15 / 2020

Hyd. No. 23

A12

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 6.190 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 37.60 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 238,884 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 22.50 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

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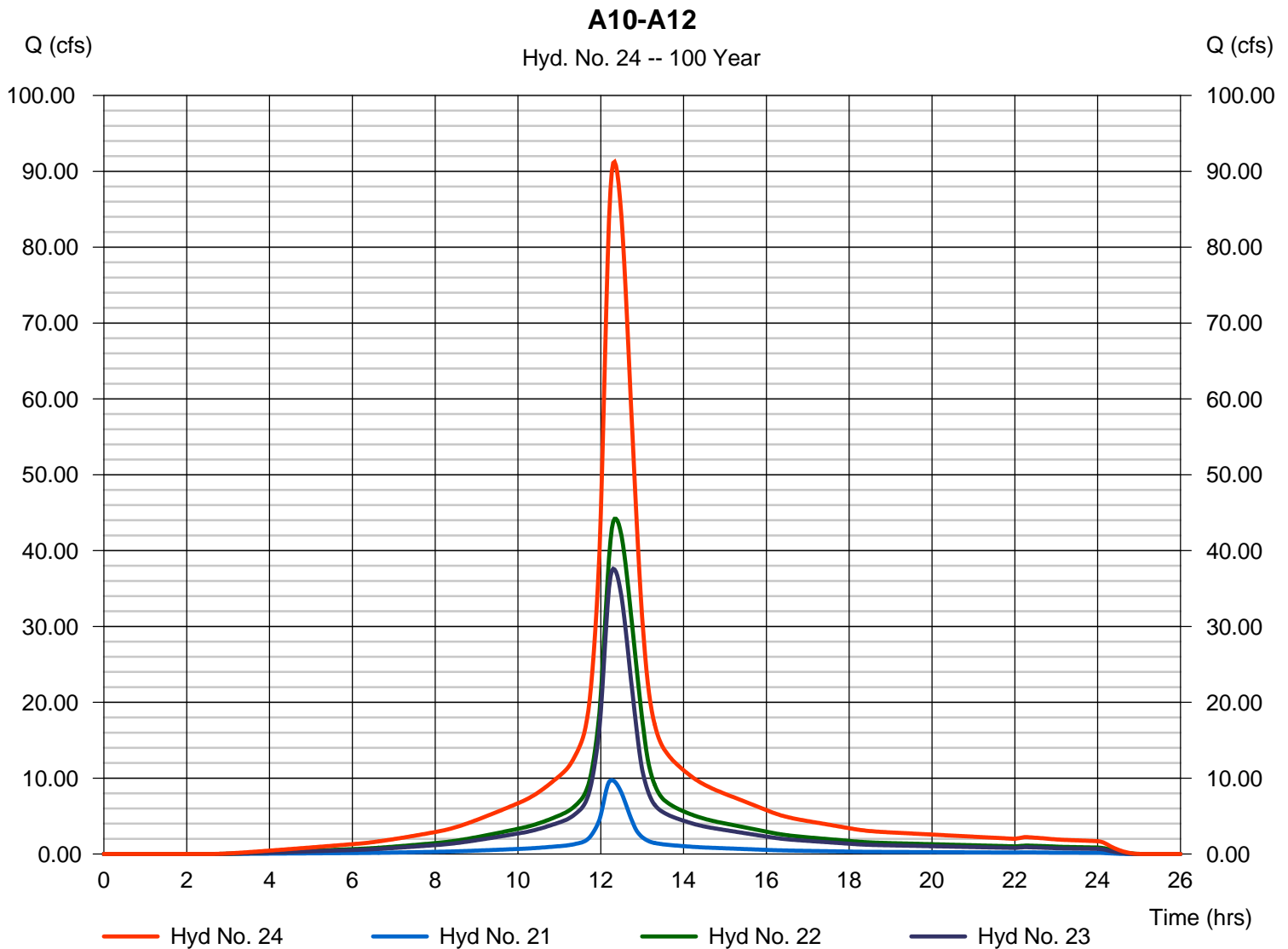
Wednesday, 07 / 15 / 2020

Hyd. No. 24

A10-A12

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 21, 22, 23

Peak discharge = 91.25 cfs
Time to peak = 12.33 hrs
Hyd. volume = 595,909 cuft
Contrib. drain. area = 15.490 ac



Hydrograph Report

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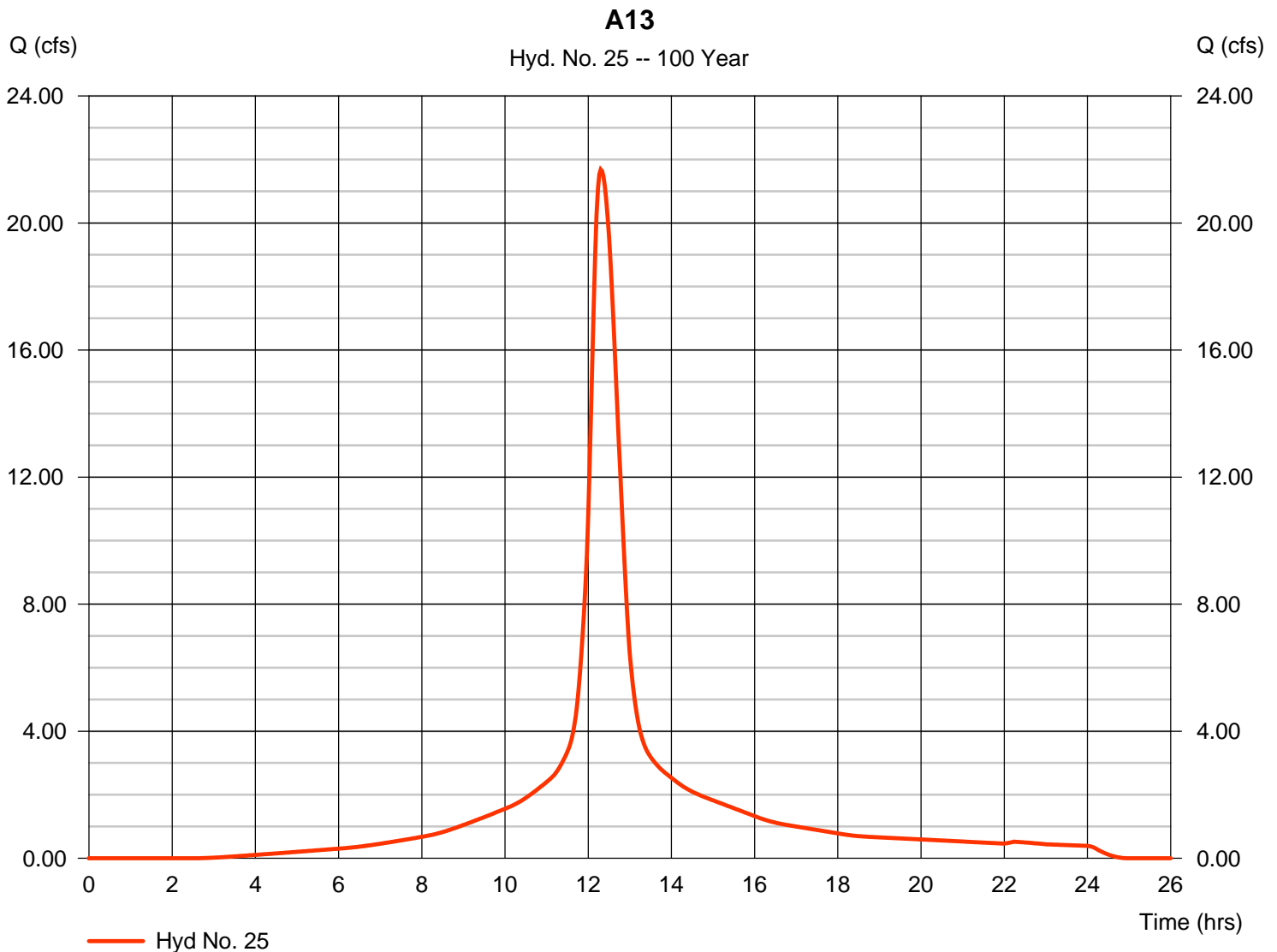
Wednesday, 07 / 15 / 2020

Hyd. No. 25

A13

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 3.570 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 21.68 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 137,773 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.80 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

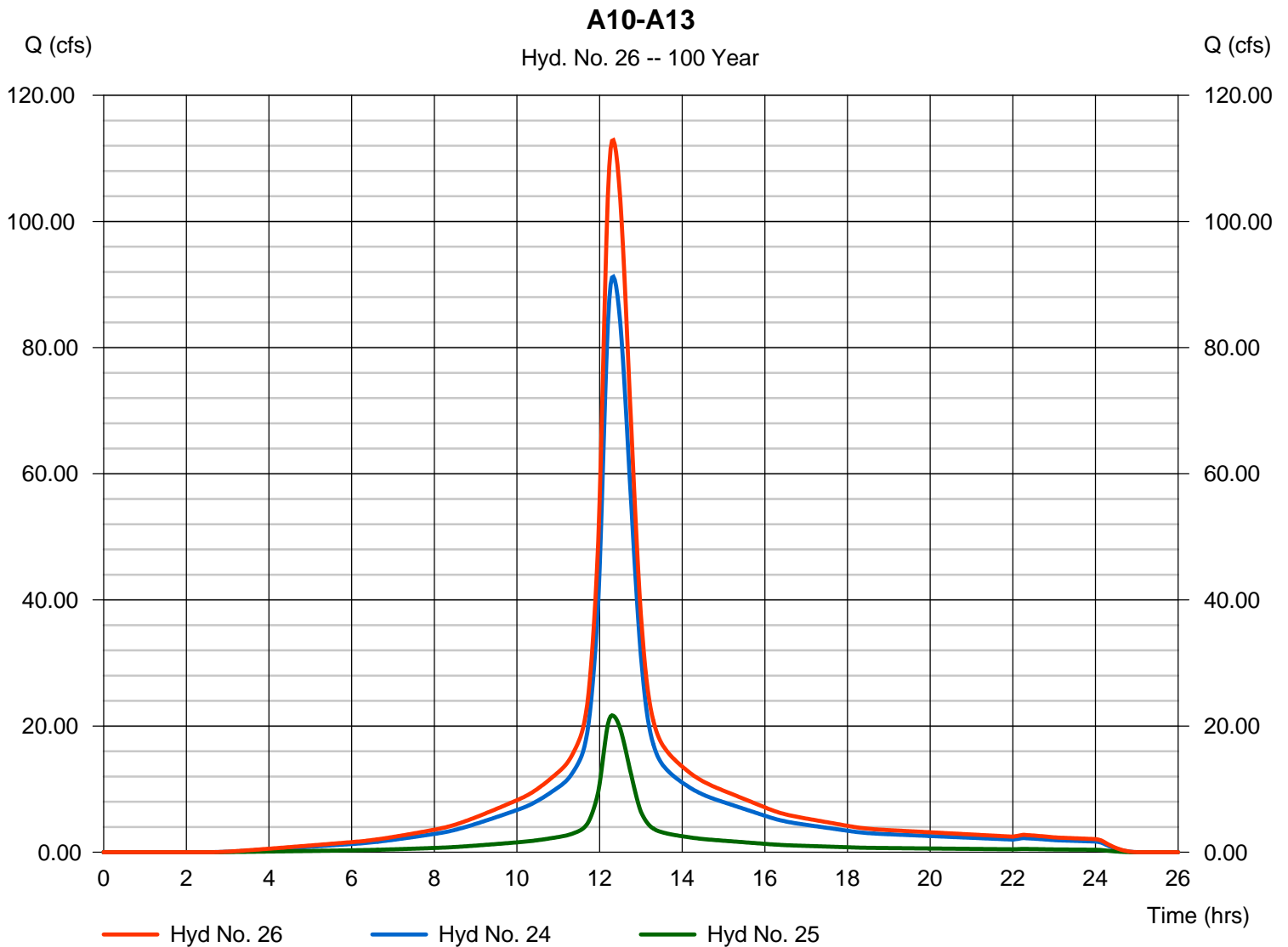
Wednesday, 07 / 15 / 2020

Hyd. No. 26

A10-A13

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 24, 25

Peak discharge = 112.88 cfs
Time to peak = 12.33 hrs
Hyd. volume = 733,682 cuft
Contrib. drain. area = 3.570 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

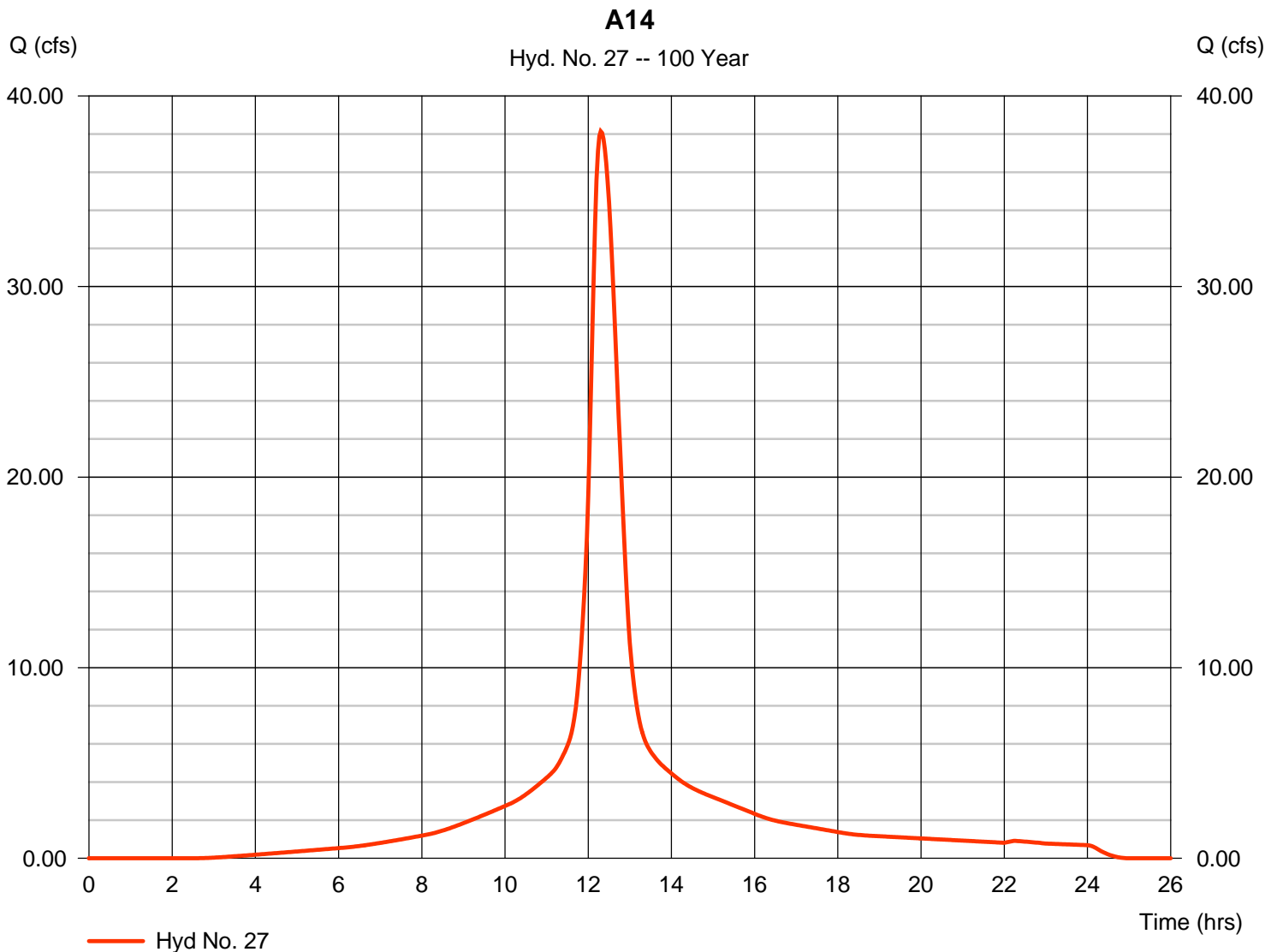
Wednesday, 07 / 15 / 2020

Hyd. No. 27

A14

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 6.280 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 38.14 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 242,357 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 21.00 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

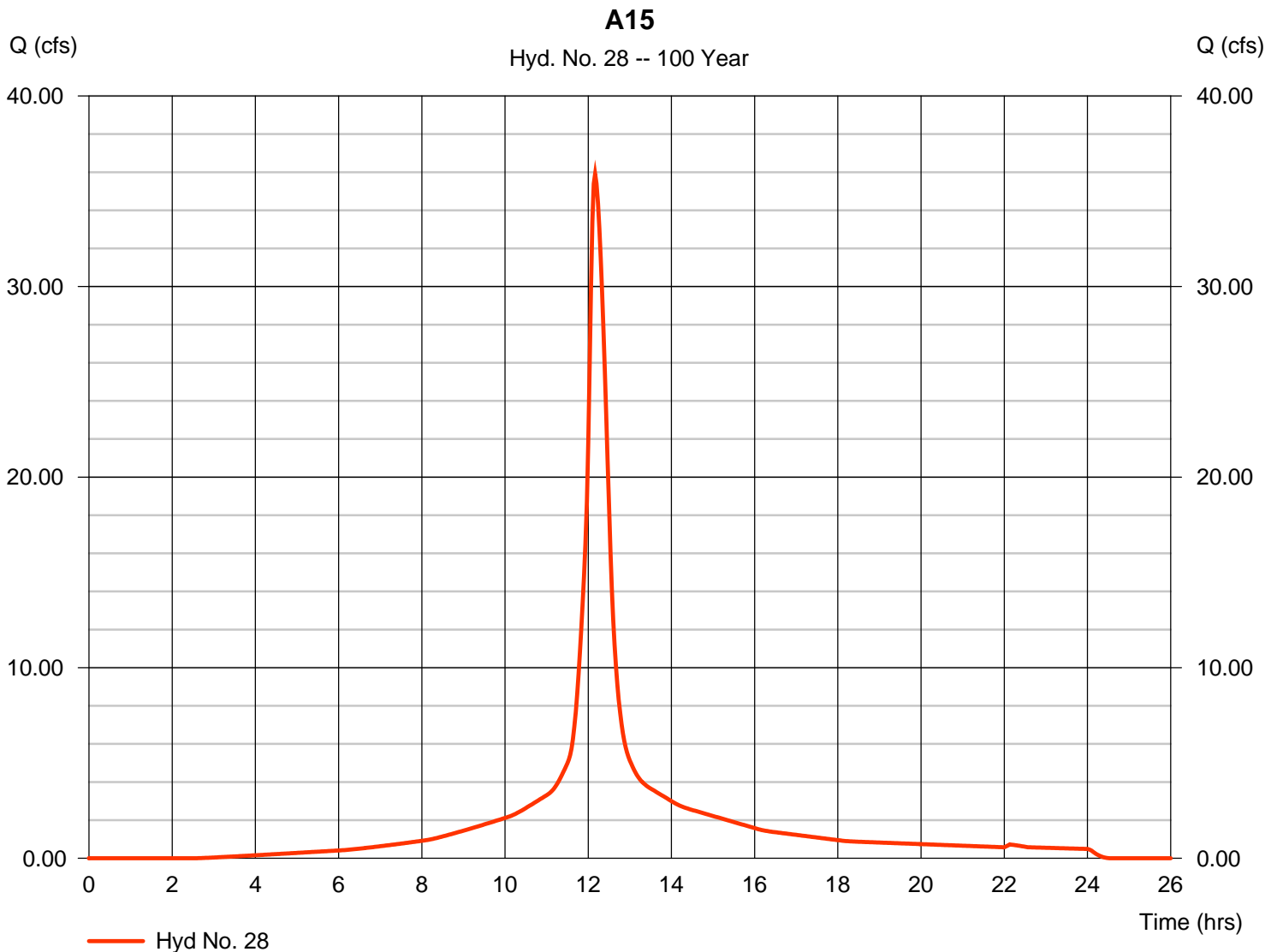
Wednesday, 07 / 15 / 2020

Hyd. No. 28

A15

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 4.600 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 12.30 in
Storm duration = 24 hrs

Peak discharge = 35.91 cfs
Time to peak = 12.17 hrs
Hyd. volume = 176,044 cuft
Curve number = 87
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Type III
Shape factor = 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

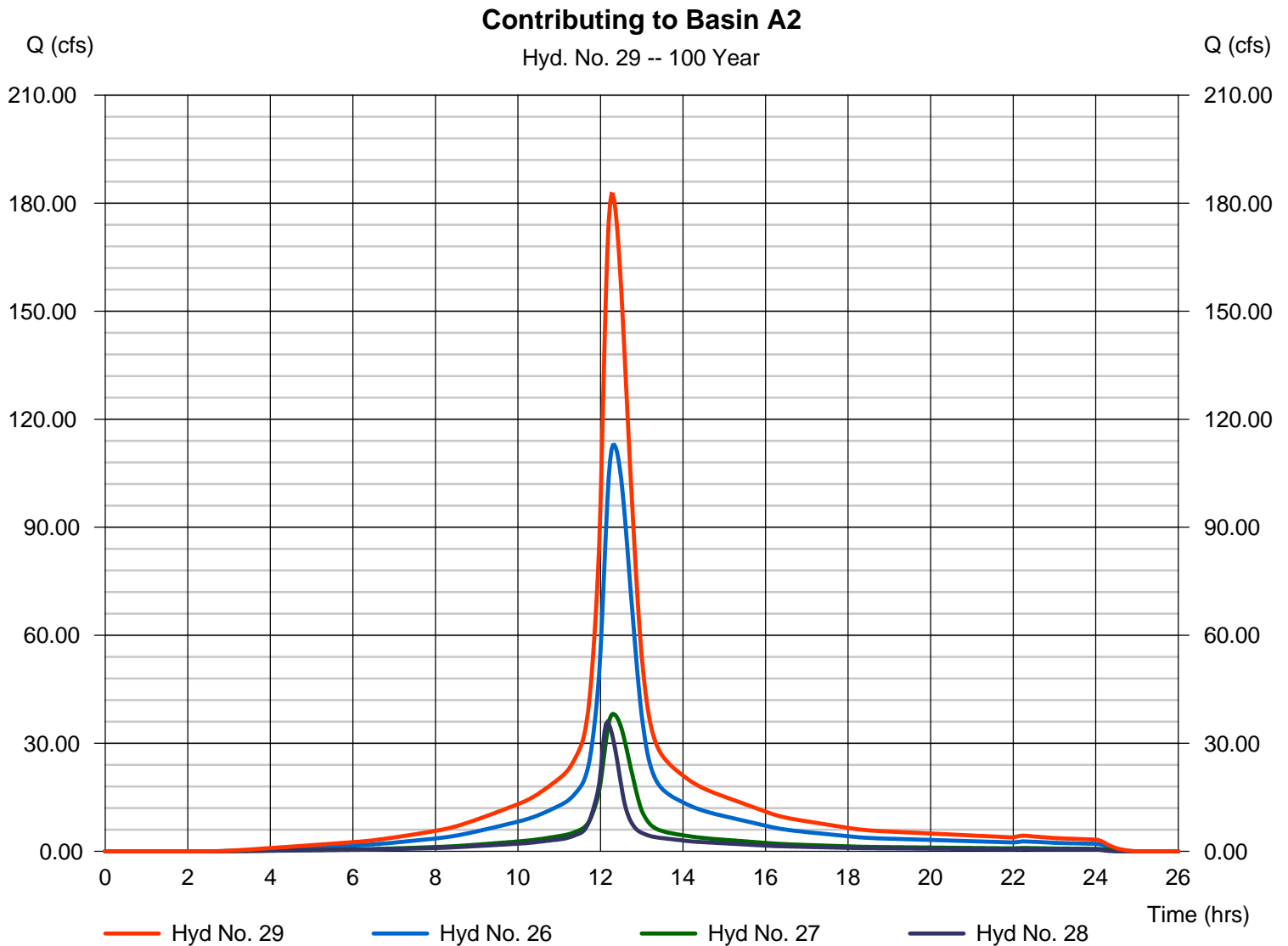
Wednesday, 07 / 15 / 2020

Hyd. No. 29

Contributing to Basin A2

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 26, 27, 28

Peak discharge = 182.53 cfs
Time to peak = 12.27 hrs
Hyd. volume = 1,152,083 cuft
Contrib. drain. area = 10.880 ac



Hydrograph Report

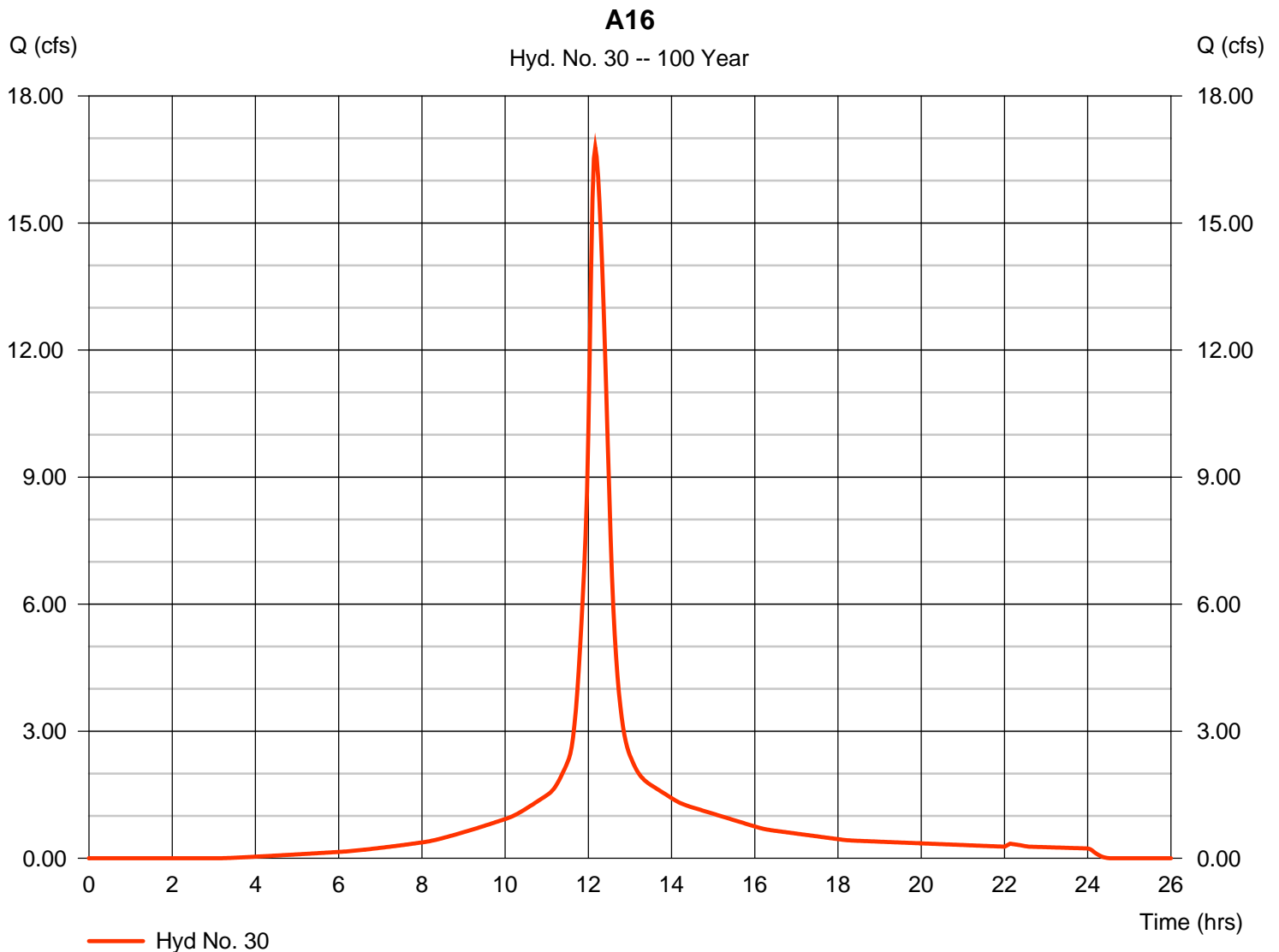
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 30

A16

Hydrograph type	= SCS Runoff	Peak discharge	= 16.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 81,074 cuft
Drainage area	= 2.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

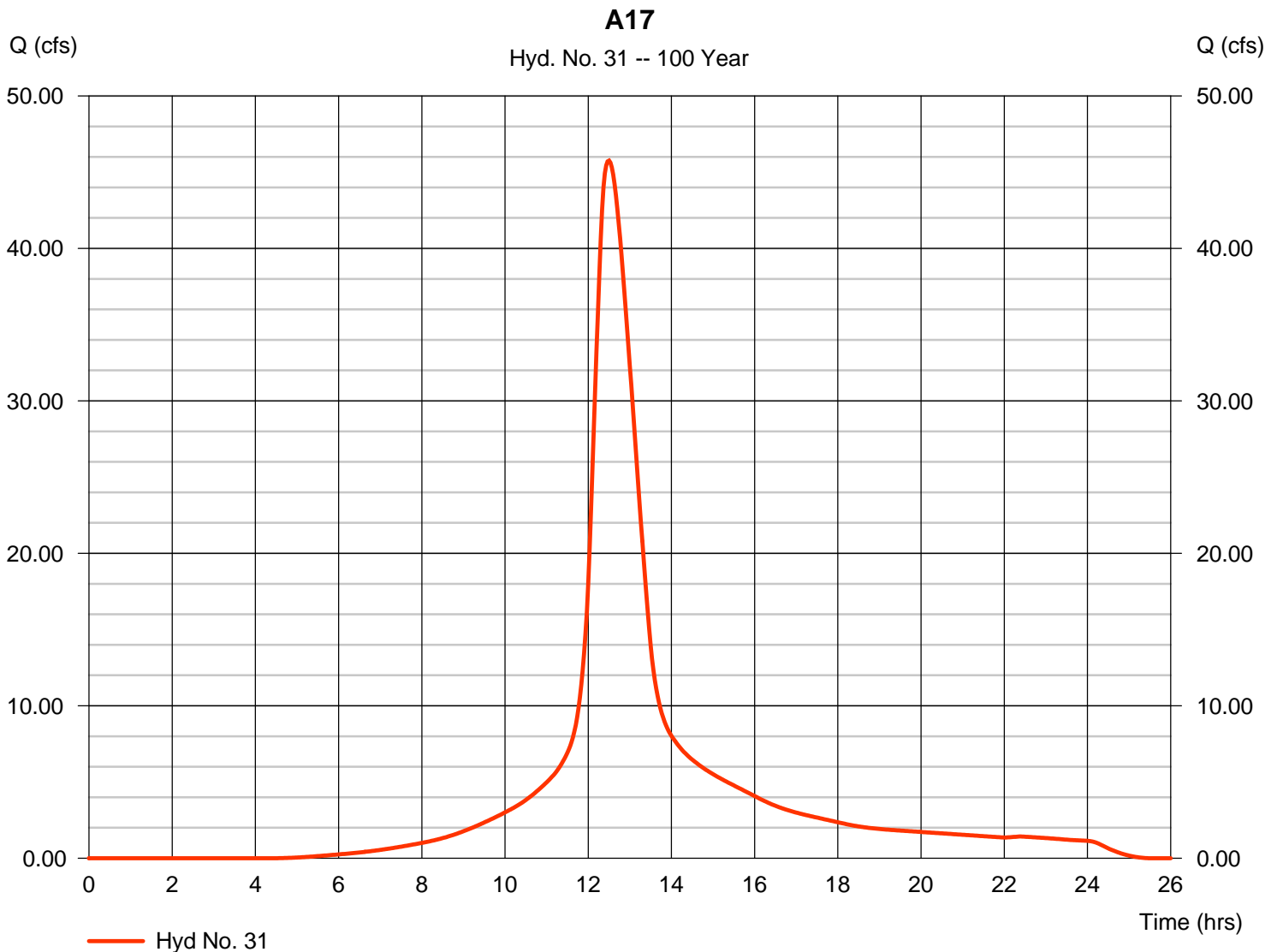
Wednesday, 07 / 15 / 2020

Hyd. No. 31

A17

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 10.470 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 45.76 cfs
 Time to peak = 12.50 hrs
 Hyd. volume = 357,144 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 35.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Report

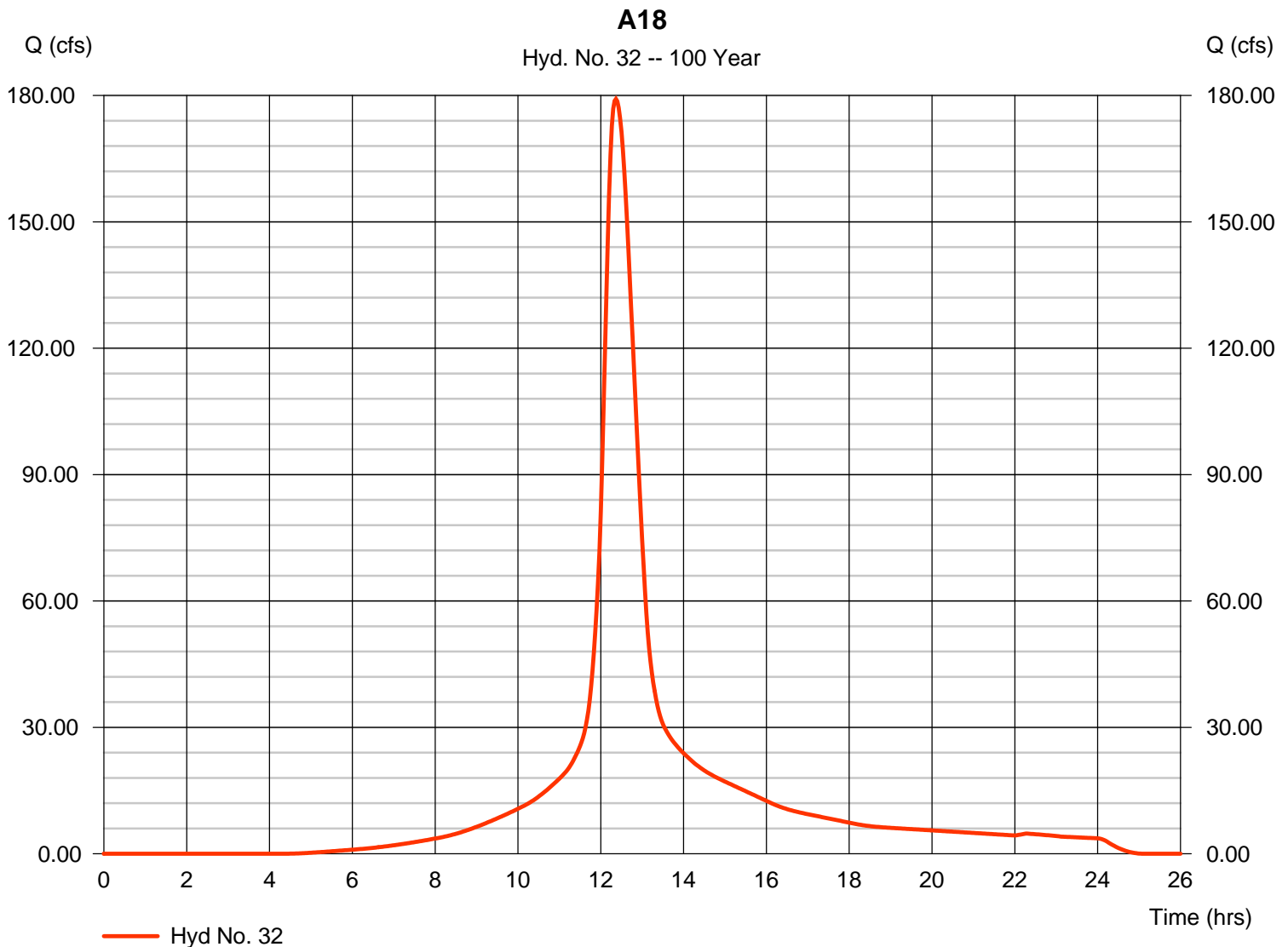
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 32

A18

Hydrograph type	= SCS Runoff	Peak discharge	= 179.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 1,170,238 cuft
Drainage area	= 34.490 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.60 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Report

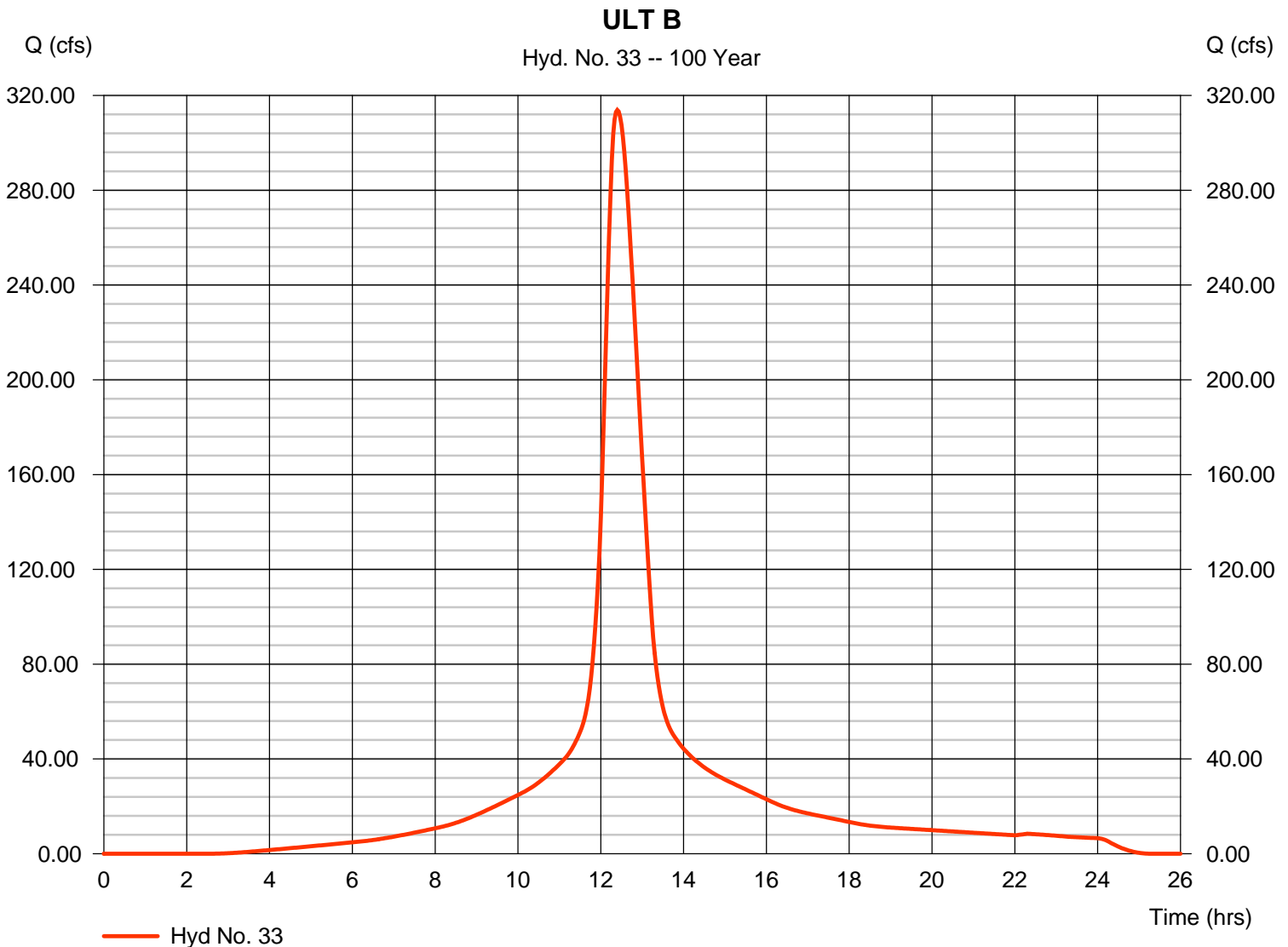
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 07 / 15 / 2020

Hyd. No. 33

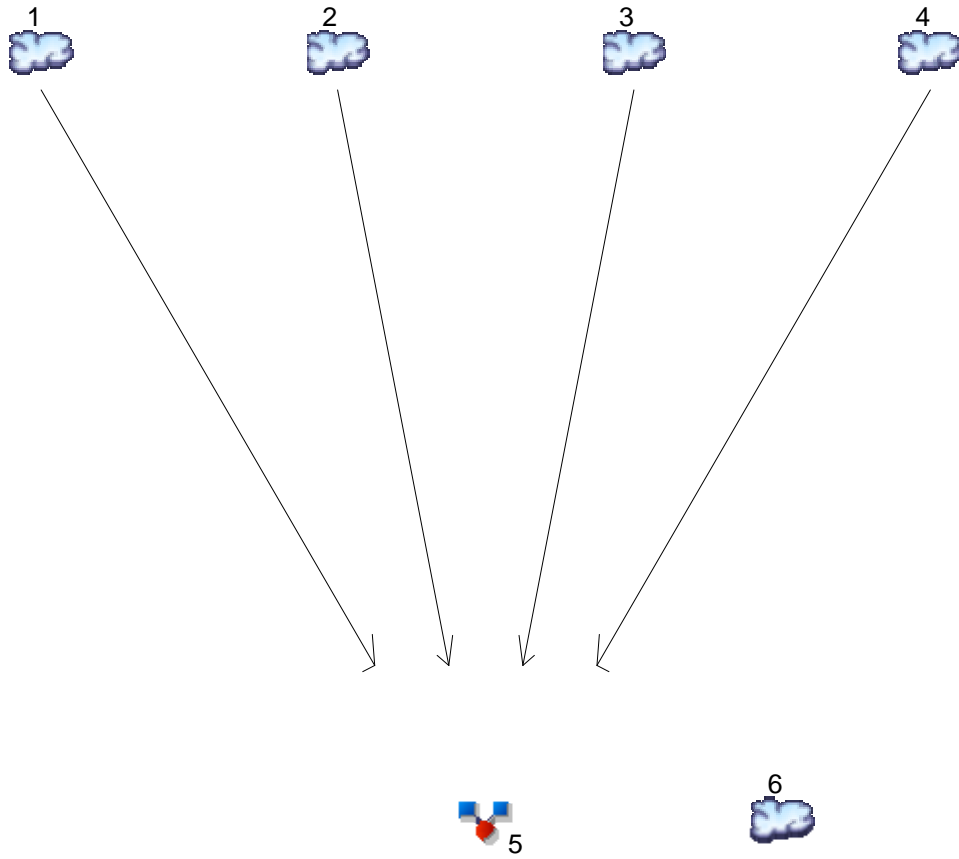
ULT B

Hydrograph type	= SCS Runoff	Peak discharge	= 313.84 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 2,285,834 cuft
Drainage area	= 58.580 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.80 min
Total precip.	= 12.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2



Hydrograph Return Period Recap

Hydratlow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	-----	-----	5.232	-----	-----	14.13	21.09	27.76	35.99	P1 A1
2	SCS Runoff	-----	-----	104.12	-----	-----	229.61	321.86	409.08	515.70	P1 A2
3	SCS Runoff	-----	-----	10.06	-----	-----	22.20	31.13	39.56	49.88	P1 A3
4	SCS Runoff	-----	-----	39.56	-----	-----	87.11	122.07	155.03	195.31	P1 A4
5	Combine	1, 2, 3, 4	-----	158.35	-----	-----	351.70	494.38	629.03	793.69	P1 A
6	SCS Runoff	-----	-----	39.88	-----	-----	109.28	163.90	216.57	281.67	P1 B
Proj. file: 031.060_Parkside Phase 1.gpw										Wednesday, 06 / 10 / 2020	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

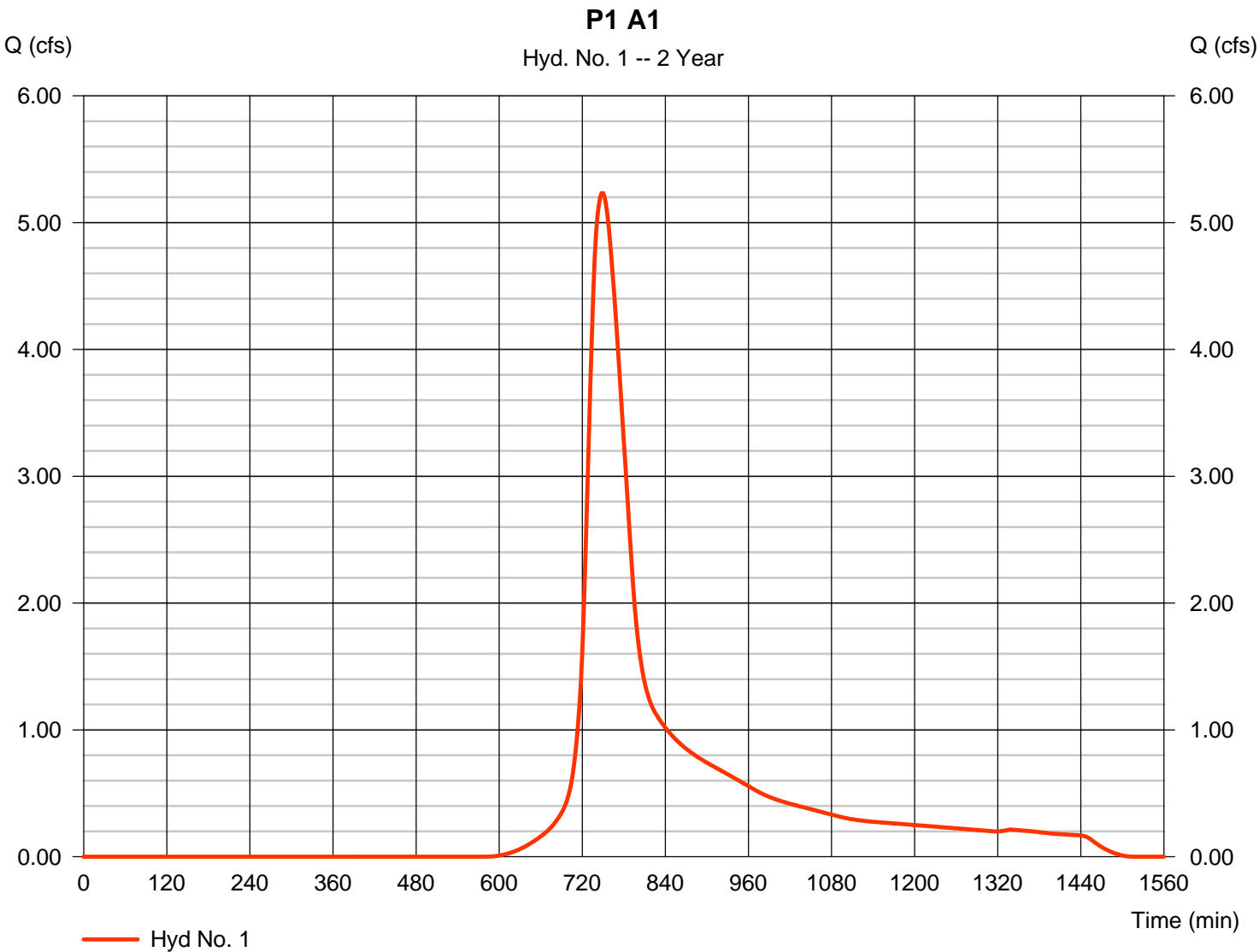
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.232	2	750	36,851	-----	-----	-----	P1 A1
2	SCS Runoff	104.12	2	748	756,863	-----	-----	-----	P1 A2
3	SCS Runoff	10.06	2	752	76,971	-----	-----	-----	P1 A3
4	SCS Runoff	39.56	2	744	252,718	-----	-----	-----	P1 A4
5	Combine	158.35	2	748	1,123,403	1, 2, 3, 4	-----	-----	P1 A
6	SCS Runoff	39.88	2	774	453,202	-----	-----	-----	P1 B
031.060_Parkside Phase 1.gpw					Return Period: 2 Year			Wednesday, 06 / 10 / 2020	

Hydrograph Report

Hyd. No. 1

P1 A1

Hydrograph type	= SCS Runoff	Peak discharge	= 5.232 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 36,851 cuft
Drainage area	= 7.320 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 29.30 min
Total precip.	= 3.34 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	14.13	2	746	97,205	-----	-----	-----	P1 A1
2	SCS Runoff	229.61	2	748	1,697,909	-----	-----	-----	P1 A2
3	SCS Runoff	22.20	2	750	172,672	-----	-----	-----	P1 A3
4	SCS Runoff	87.11	2	742	566,935	-----	-----	-----	P1 A4
5	Combine	351.70	2	746	2,534,721	1, 2, 3, 4	-----	-----	P1 A
6	SCS Runoff	109.28	2	770	1,195,462	-----	-----	-----	P1 B
031.060_Parkside Phase 1.gpw					Return Period: 10 Year			Wednesday, 06 / 10 / 2020	

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

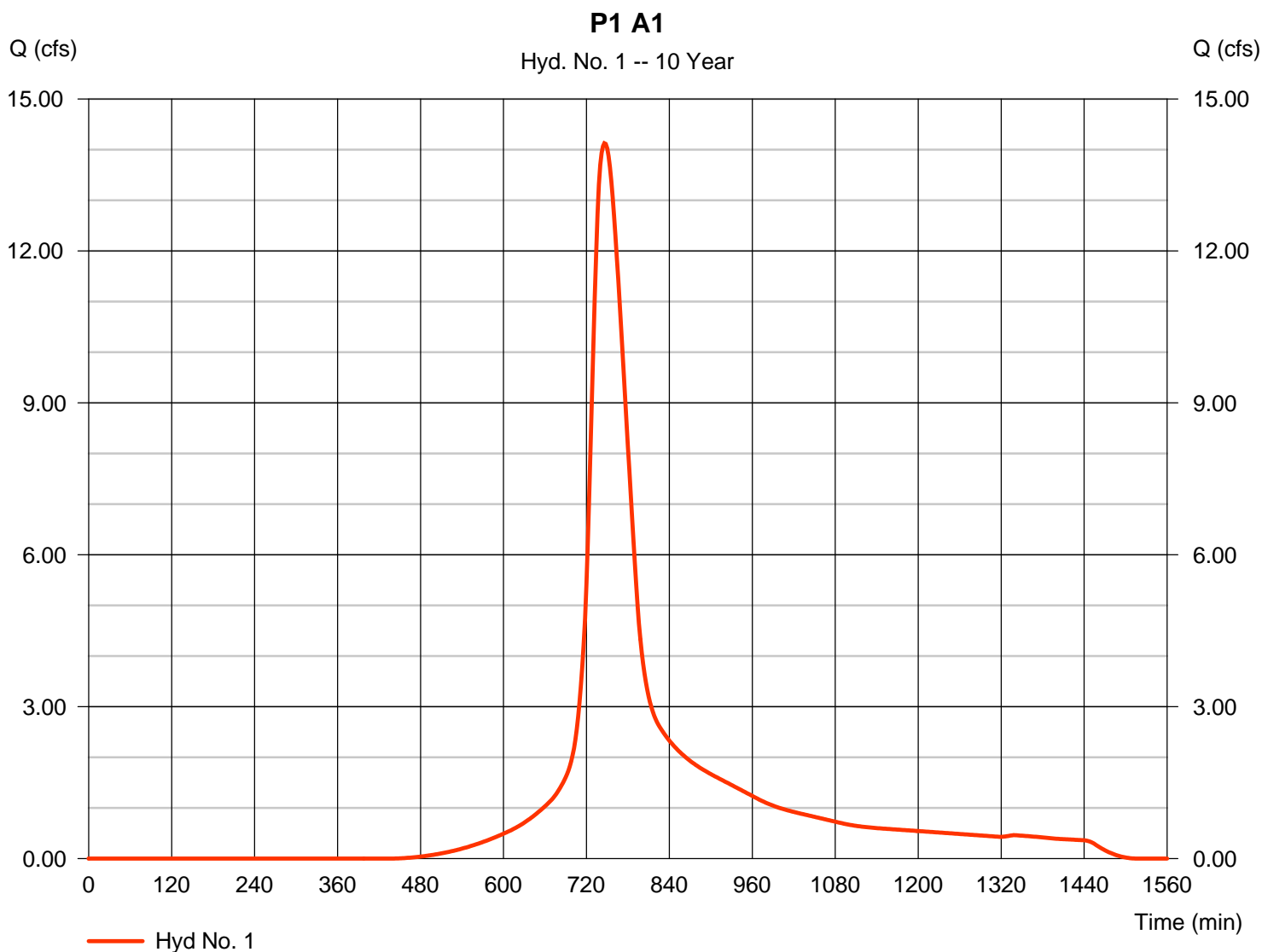
Wednesday, 06 / 10 / 2020

Hyd. No. 1

P1 A1

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 7.320 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 14.13 cfs
 Time to peak = 746 min
 Hyd. volume = 97,205 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 29.30 min
 Distribution = Type III
 Shape factor = 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	21.09	2	746	145,769	-----	-----	-----	P1 A1
2	SCS Runoff	321.86	2	746	2,415,542	-----	-----	-----	P1 A2
3	SCS Runoff	31.13	2	750	245,653	-----	-----	-----	P1 A3
4	SCS Runoff	122.07	2	742	806,553	-----	-----	-----	P1 A4
5	Combine	494.38	2	746	3,613,518	1, 2, 3, 4	-----	-----	P1 A
6	SCS Runoff	163.90	2	770	1,792,723	-----	-----	-----	P1 B
031.060_Parkside Phase 1.gpw					Return Period: 25 Year			Wednesday, 06 / 10 / 2020	

Hydrograph Report

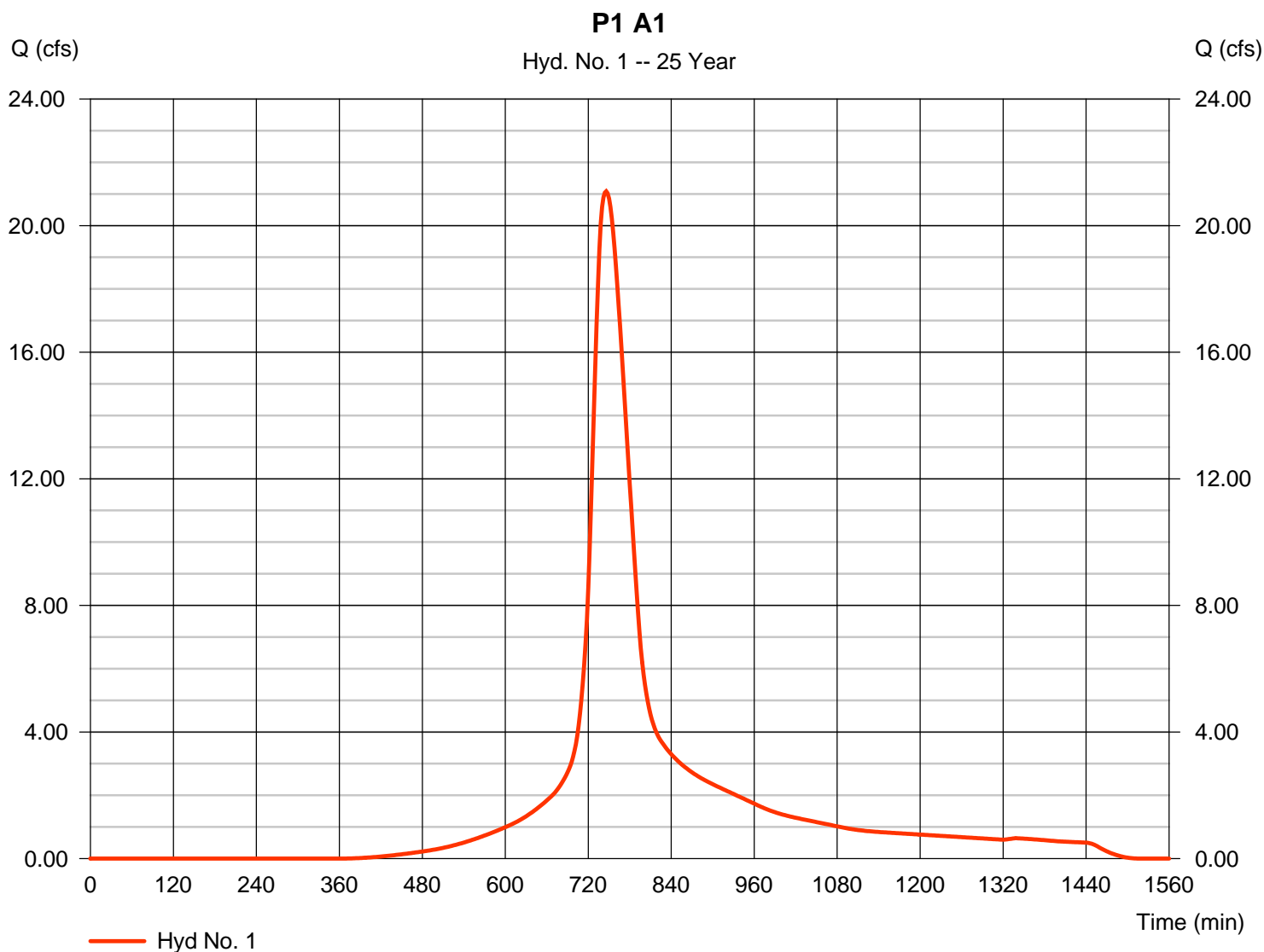
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Wednesday, 06 / 10 / 2020

Hyd. No. 1

P1 A1

Hydrograph type	= SCS Runoff	Peak discharge	= 21.09 cfs
Storm frequency	= 25 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 145,769 cuft
Drainage area	= 7.320 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 29.30 min
Total precip.	= 8.06 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 300



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	35.99	2	744	253,236	-----	-----	-----	P1 A1
2	SCS Runoff	515.70	2	746	3,961,117	-----	-----	-----	P1 A2
3	SCS Runoff	49.88	2	748	402,833	-----	-----	-----	P1 A3
4	SCS Runoff	195.31	2	742	1,322,623	-----	-----	-----	P1 A4
5	Combine	793.69	2	746	5,939,805	1, 2, 3, 4	-----	-----	P1 A
6	SCS Runoff	281.67	2	768	3,114,385	-----	-----	-----	P1 B
031.060_Parkside Phase 1.gpw					Return Period: 100 Year			Wednesday, 06 / 10 / 2020	

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

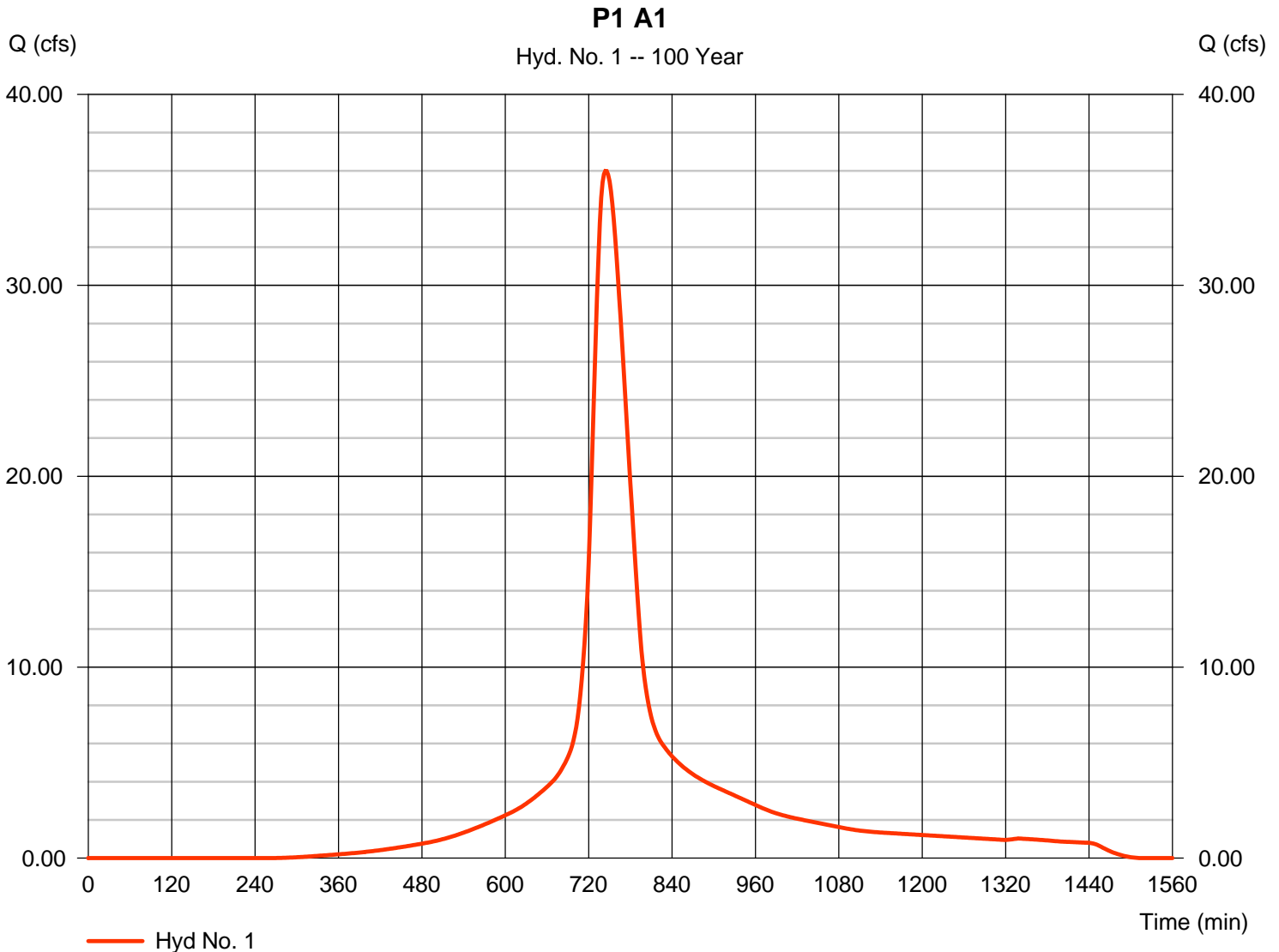
Wednesday, 06 / 10 / 2020

Hyd. No. 1

P1 A1

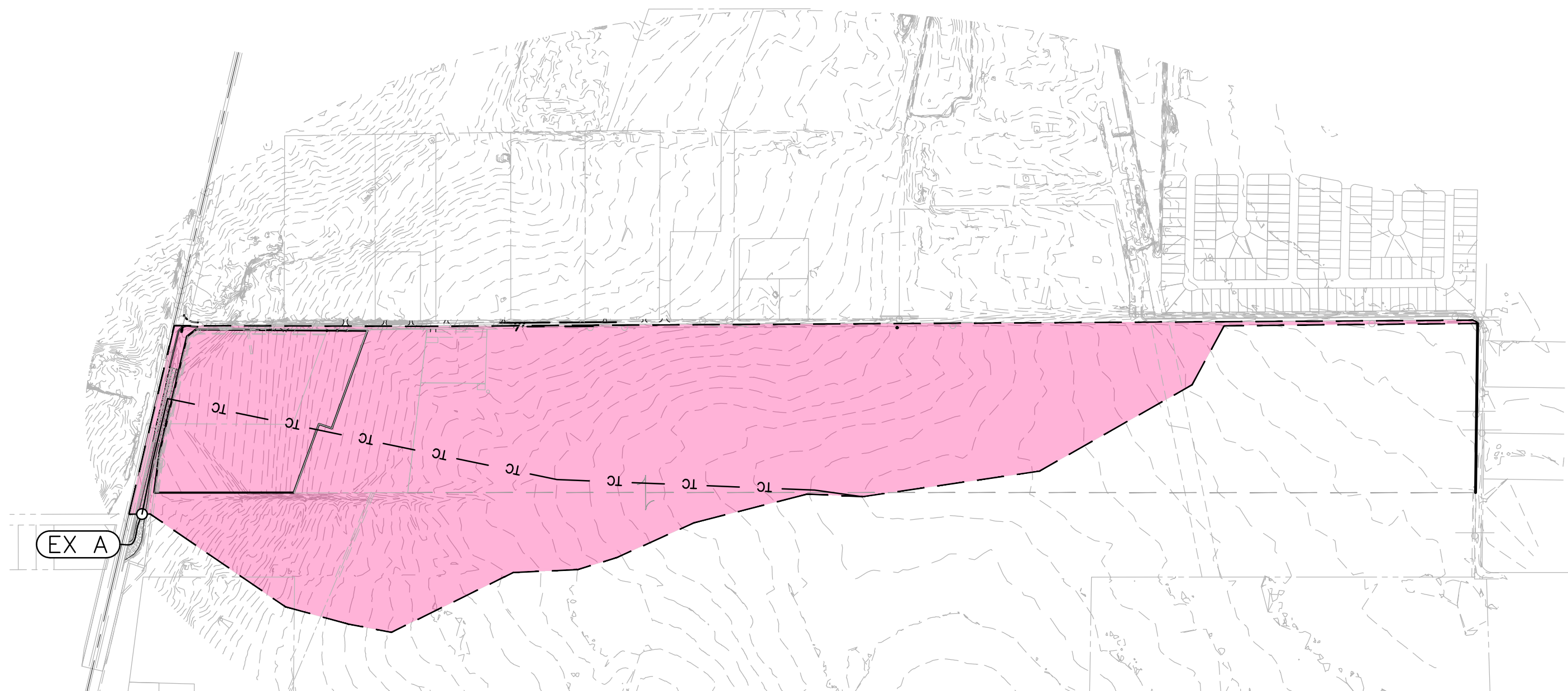
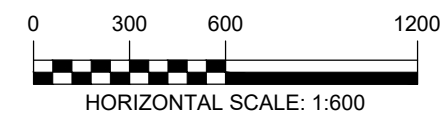
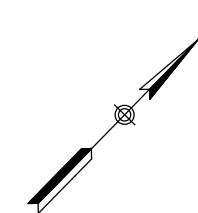
Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 7.320 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 12.30 in
 Storm duration = 24 hrs

Peak discharge = 35.99 cfs
 Time to peak = 744 min
 Hyd. volume = 253,236 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 29.30 min
 Distribution = Type III
 Shape factor = 300



Attachment G

Existing Drainage Area EX A



EXISTING DRAINAGE AREA EX A



410 N. SEGUIN AVE.
NEW BRAUNFELS,
TEXAS, 78130
WWW.HMTNB.COM
PH: (830)625-8555

Existing

Watershed -

EX A

154.61 Acres

Time of Concentration

EX A

Description

Discharge From Tiered Basin A Comparison

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.40			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	3637	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.37	Tt=		
				Tt=	61.76
Channel Flow	L (ft) =	662			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.8

Tc	83.6 min.
----	-----------

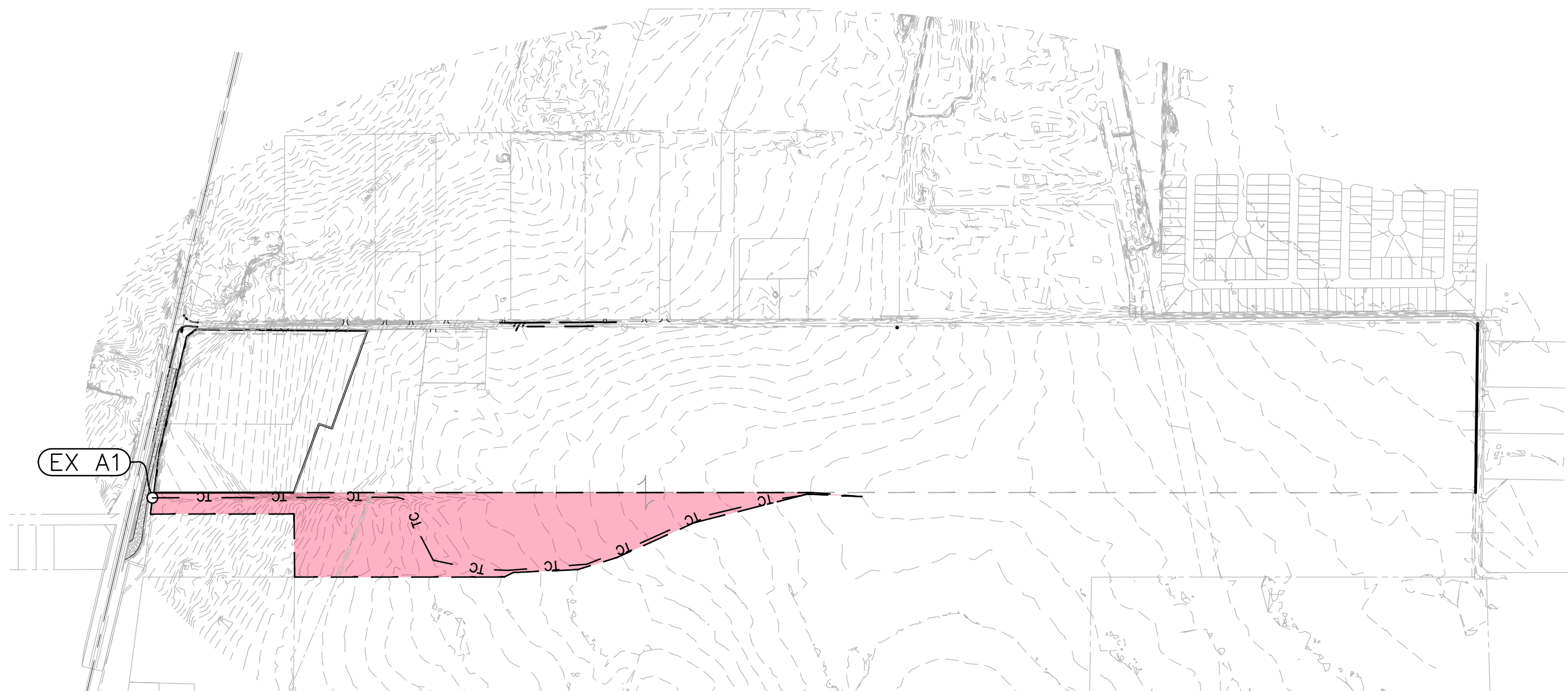
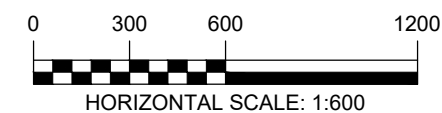
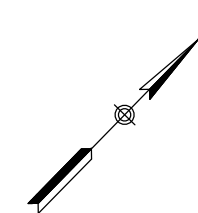
Curve Number	78.00
--------------	-------

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86
¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch. Fair: 50 to 75 percent ground cover and not heavily grazed. Good: greater than 75 percent ground cover and lightly or only occasionally grazed. ² Poor: less than 50 percent ground cover. Fair: 50 to 75 percent ground cover. Good: greater than 75 percent ground cover. ³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture. ⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil. Source: TR-55 [3]					

Attachment H

Existing Drainage Sub-Area EX A Sub-Areas



EXISTING DRAINAGE SUB-AREA EX A1



410 N. SEGUIN AVE.
NEW BRAUNFELS,
TEXAS, 78130
WWW.HMTNB.COM
PH: (830)625-8555

Existing

Watershed -

EX A1

25.12 Acres

Time of Concentration

EX A1

Description

Longest Time of Concentration Analysis

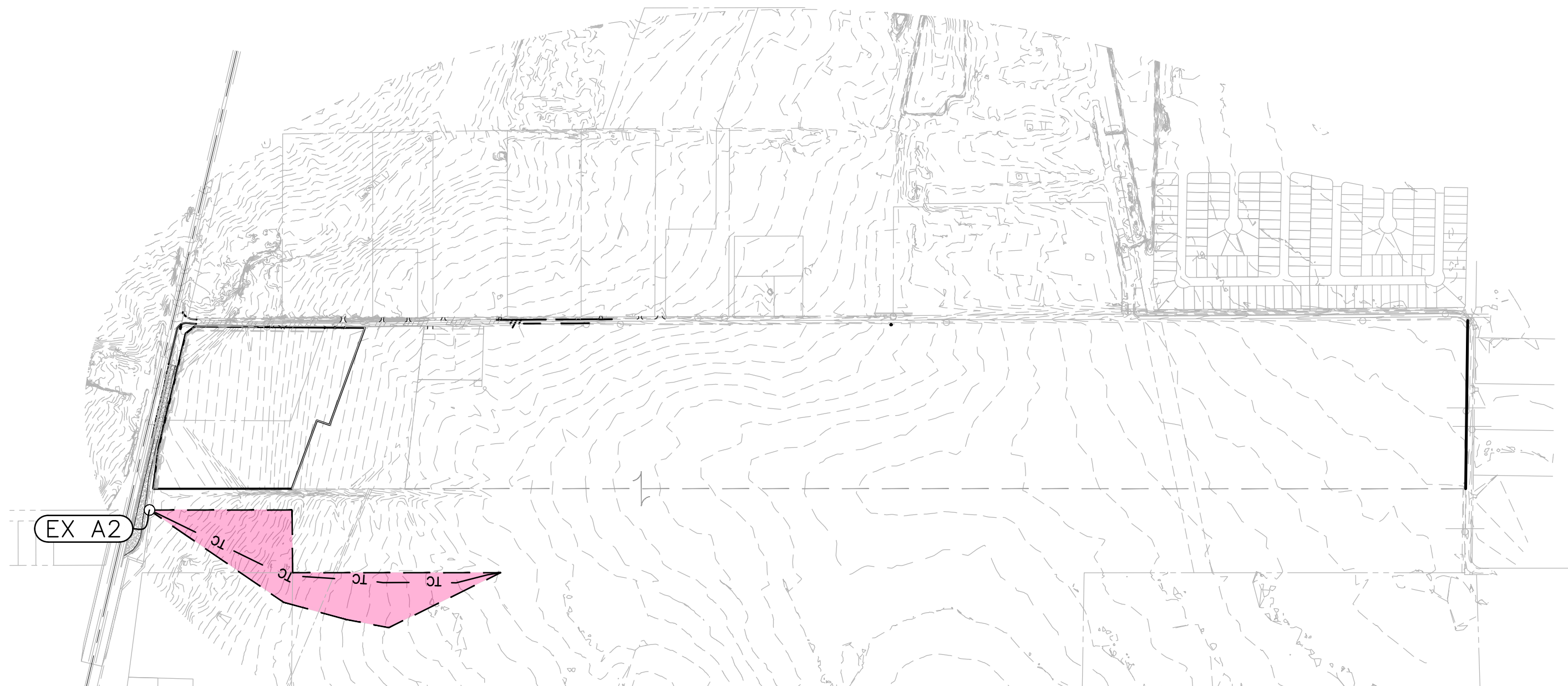
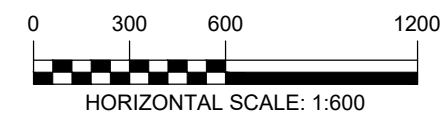
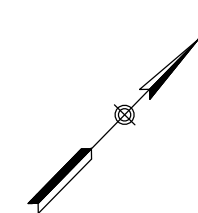
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.60			
	P ₂ =	3.34	Tt=	0.25	15.3
Shallow Flow	L (ft) =	2037	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.51	Tt=		
				Tt=	29.46
Channel Flow	L (ft) =	1797			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.08	5.0

Tc	49.7 min.
----	-----------

Curve Number	78.00
--------------	-------

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
<i>Impervious areas:</i>					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
<i>Streets and roads:</i>					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
<i>Agricultural lands</i>					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86
¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch. Fair: 50 to 75 percent ground cover and not heavily grazed. Good: greater than 75 percent ground cover and lightly or only occasionally grazed. ² Poor: less than 50 percent ground cover. Fair: 50 to 75 percent ground cover. Good: greater than 75 percent ground cover. ³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture. ⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil. Source: TR-55 [3]					



EXISTING DRAINAGE SUB-AREA EX A2

Existing

Watershed -

EX A2

10.47 Acres

Time of Concentration

EX A2

Description

Longest Time of Concentration Analysis

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.50			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	1967	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1.76	Tt=		
				Tt=	15.32
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

Tc	35.3 min.
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Curve Number	78.00
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor Fair Good	68 49 39	79 69 61	86 79 74	89 84 80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor Fair Good	48 35 30	67 56 48	77 70 65	83 77 73
Woods—grass combination (orchard or tree farm). ⁴	Poor Fair Good	57 43 32	73 65 58	82 76 72	86 82 79
Woods ⁵	Poor Fair Good	45 36 30	66 60 55	77 73 70	83 79 77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

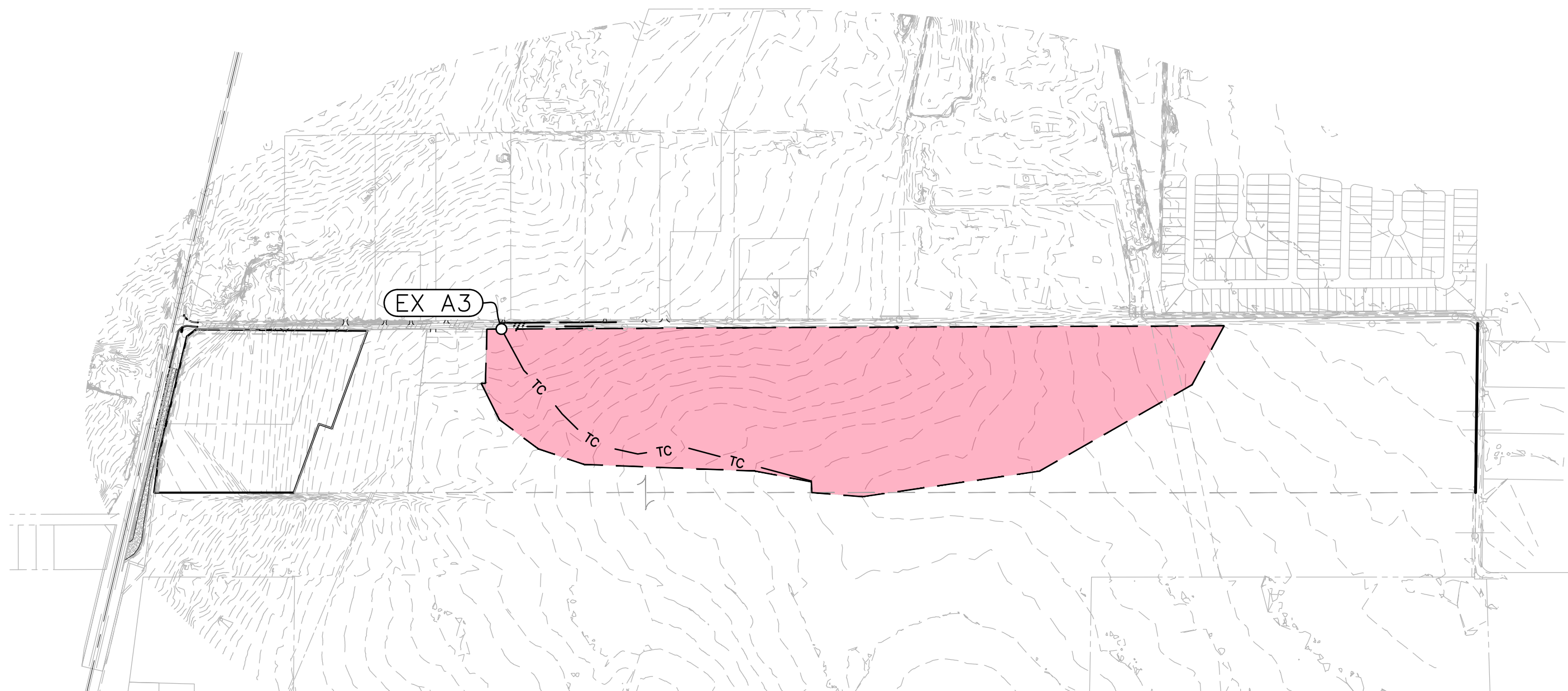
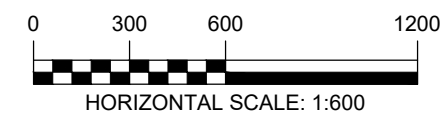
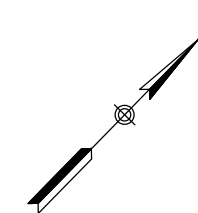
¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.
Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]



EXISTING DRAINAGE SUB-AREA EX A3

Existing

Watershed -
Time of Concentration
Description

EX A3
EX A3
Drainage Sub-Area A14 Comparison

68.84 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.20			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	1980	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.65	Tt=		
				Tt=	25.37
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

Tc **45.3 min.**

Curve Number **78.00**

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

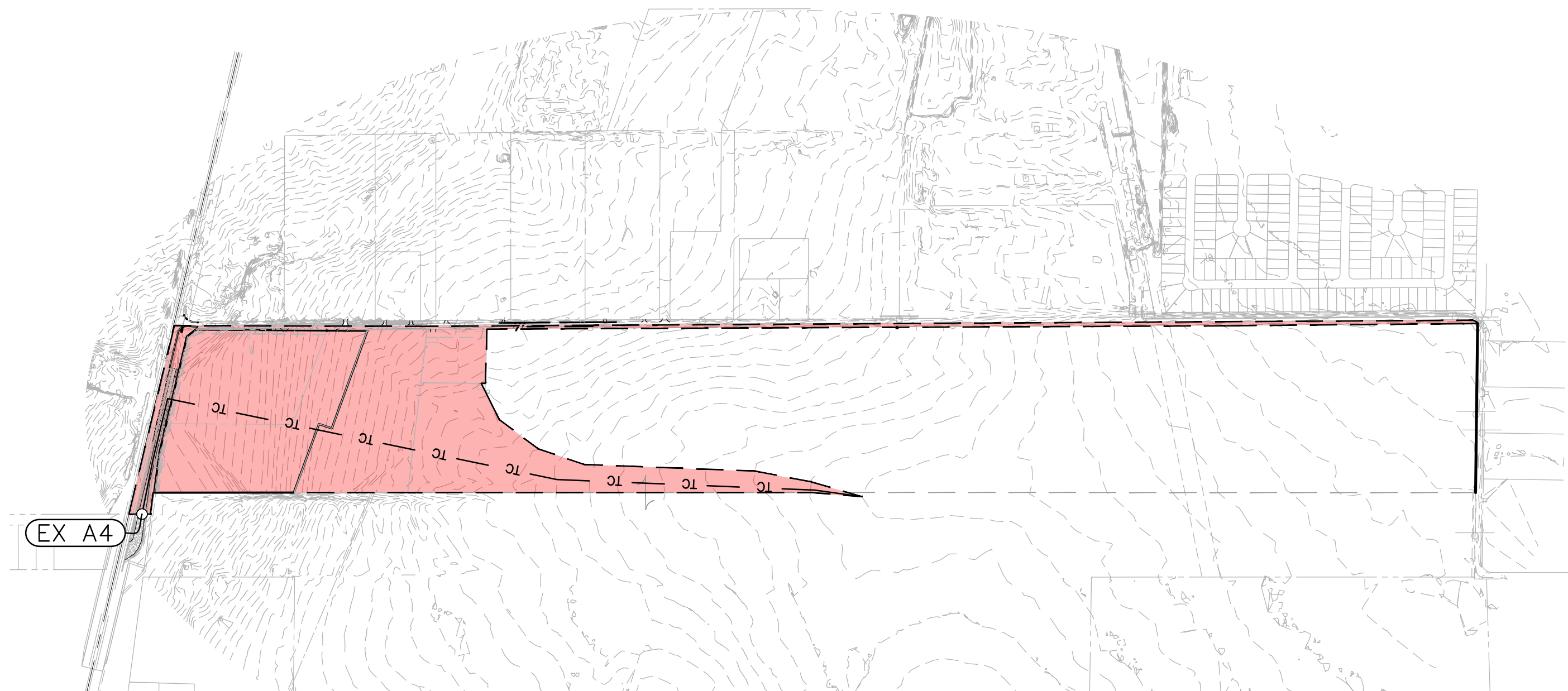
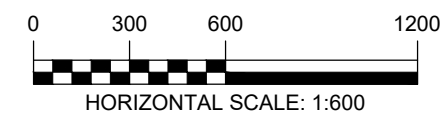
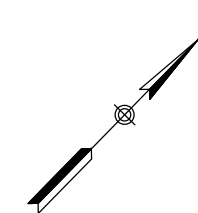
² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]



EXISTING DRAINAGE SUB-AREA EX A4

Existing

Watershed -

EX A4

50.18 Acres

Time of Concentration

EX A4

Description

Longest Time of Concentration Analysis

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.40			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	3837	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.37	Tt=		
				Tt=	65.16
Channel Flow	L (ft) =	662			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.8

Tc	87.0 min.
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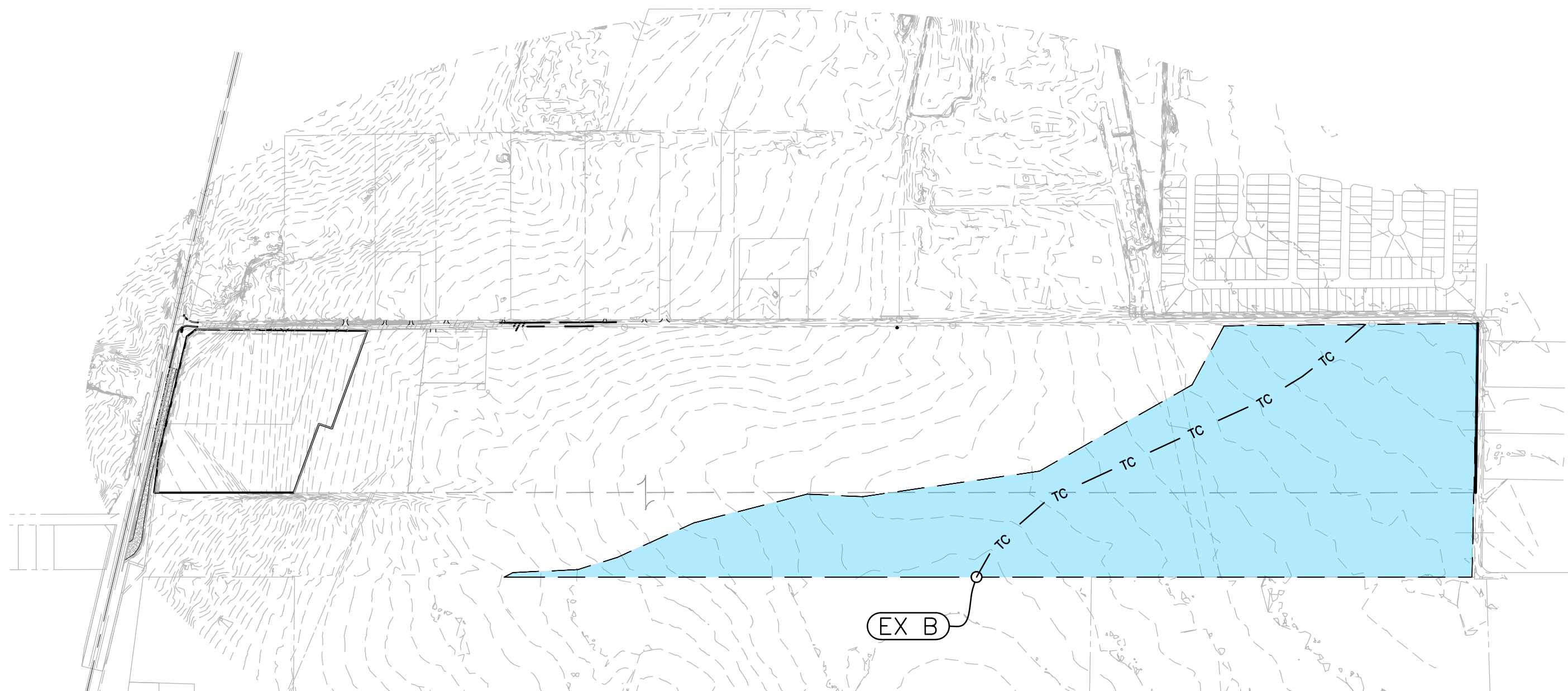
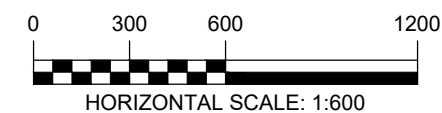
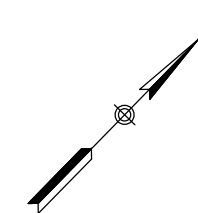
Curve Number	78.00
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86
¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch. Fair: 50 to 75 percent ground cover and not heavily grazed. Good: greater than 75 percent ground cover and lightly or only occasionally grazed. ² Poor: less than 50 percent ground cover. Fair: 50 to 75 percent ground cover. Good: greater than 75 percent ground cover. ³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture. ⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil. Source: TR-55 [3]					

Attachment I

Existing Drainage Area EX B



EXISTING DRAINAGE AREA EX B

Existing

Watershed -
Time of Concentration

EX B
EX B

90.42 Acres

Discharge From Basin B Comparison
(To be Analyzed with Future Development)

Description

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.70			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	2536	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.4	Tt=		
				Tt=	41.42
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

Tc 61.4 min.

Curve Number 78.00

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

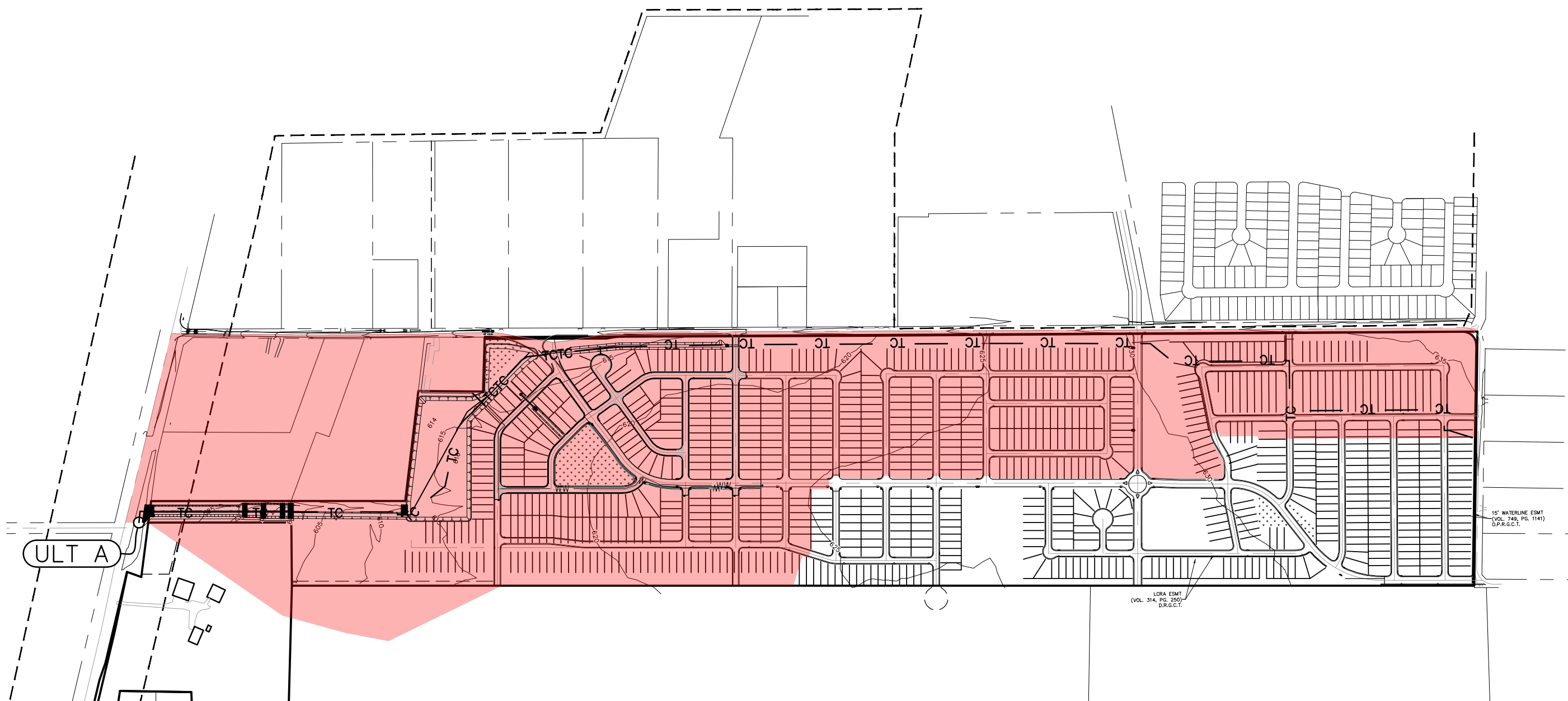
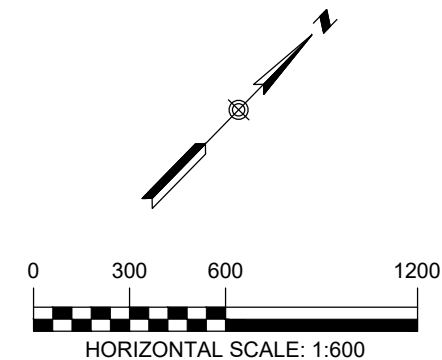
Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

Attachment J

Drainage Area A



Proposed

Watershed -

ULT A

186.36 Acres

Time of Concentration

ULT A

Description

Flow Contributing to Batch Detention Basin A1

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	63	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.65
Channel Flow	L (ft) =	8261			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.38	22.9

Tc	42.0 min.
----	------------------

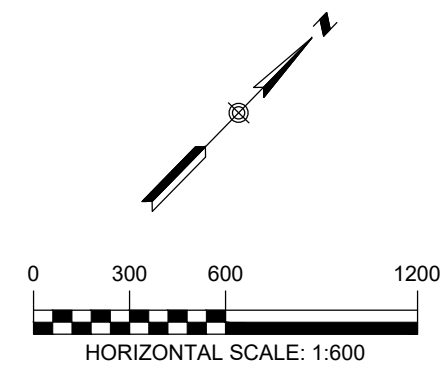
Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Attachment K

Drainage Area A Sub-Areas



Proposed

Watershed -

A1

59.15 Acres

Time of Concentration

A1

Description

Longest Time of Concentration Analysis

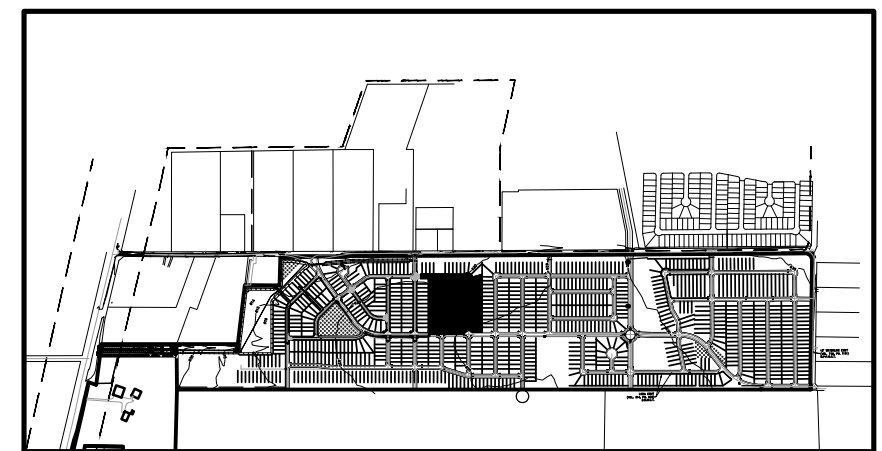
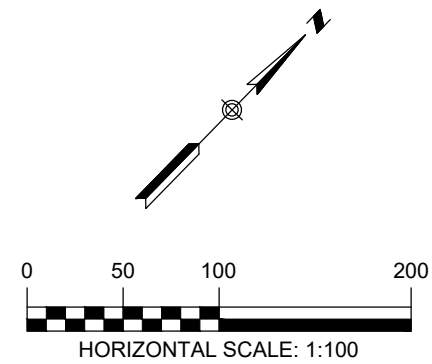
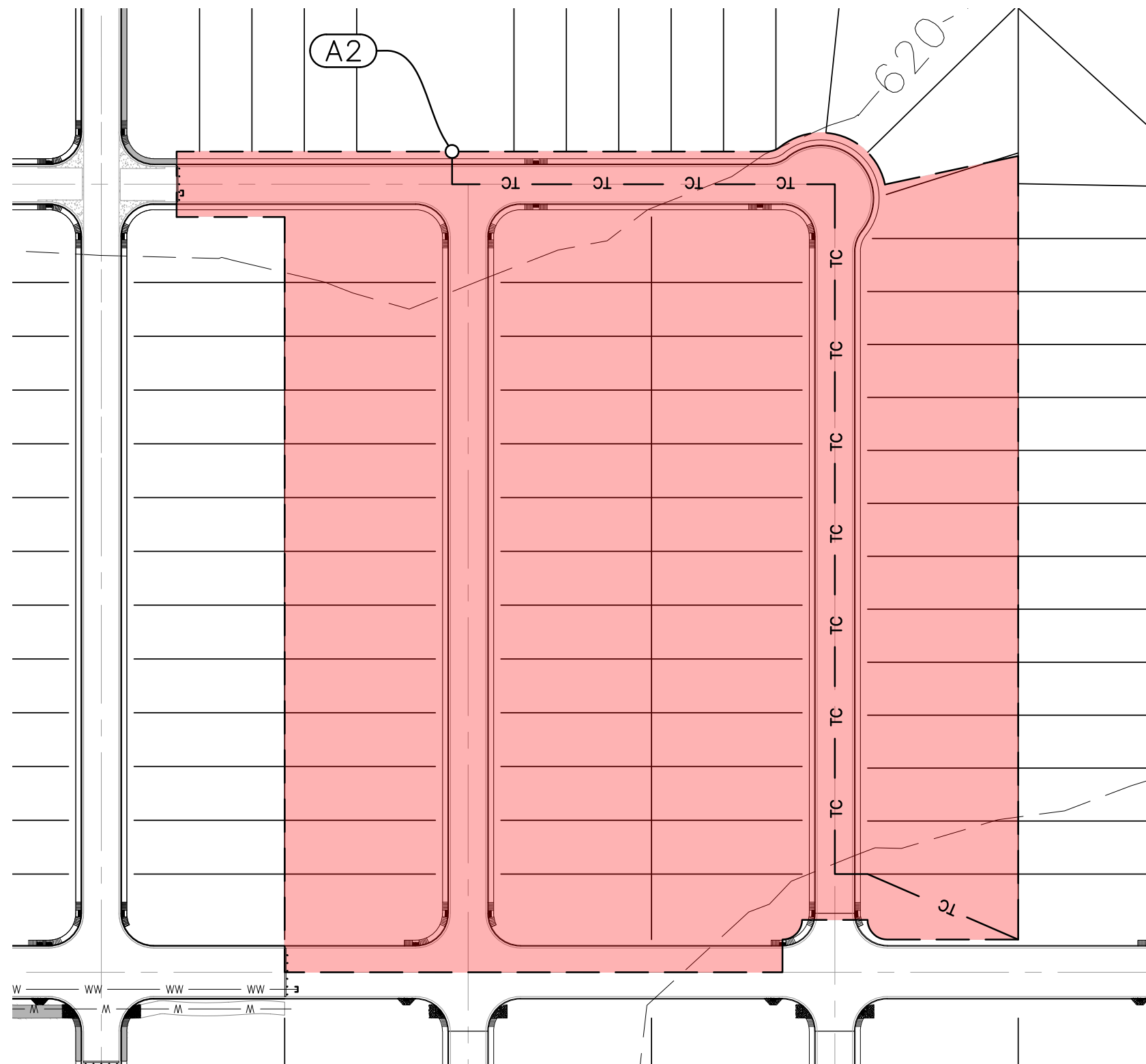
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	63	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.65
Channel Flow	L (ft) =	4361			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.20	12.1

Tc	31.2 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.

DRAINAGE SUB-AREA A2



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

Proposed

Watershed -

A2

8.01 Acres

Time of Concentration

A2

Description

Longest Time of Concentration Analysis

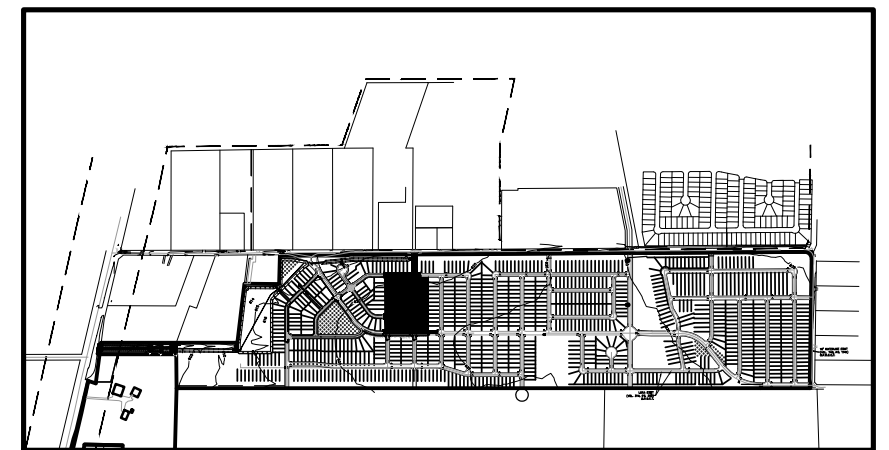
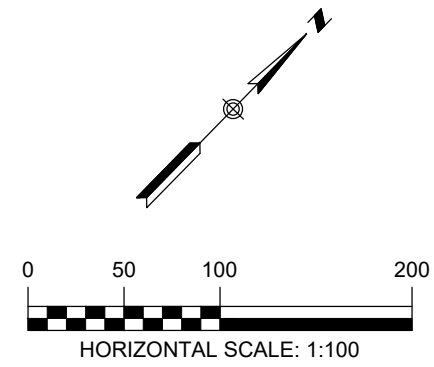
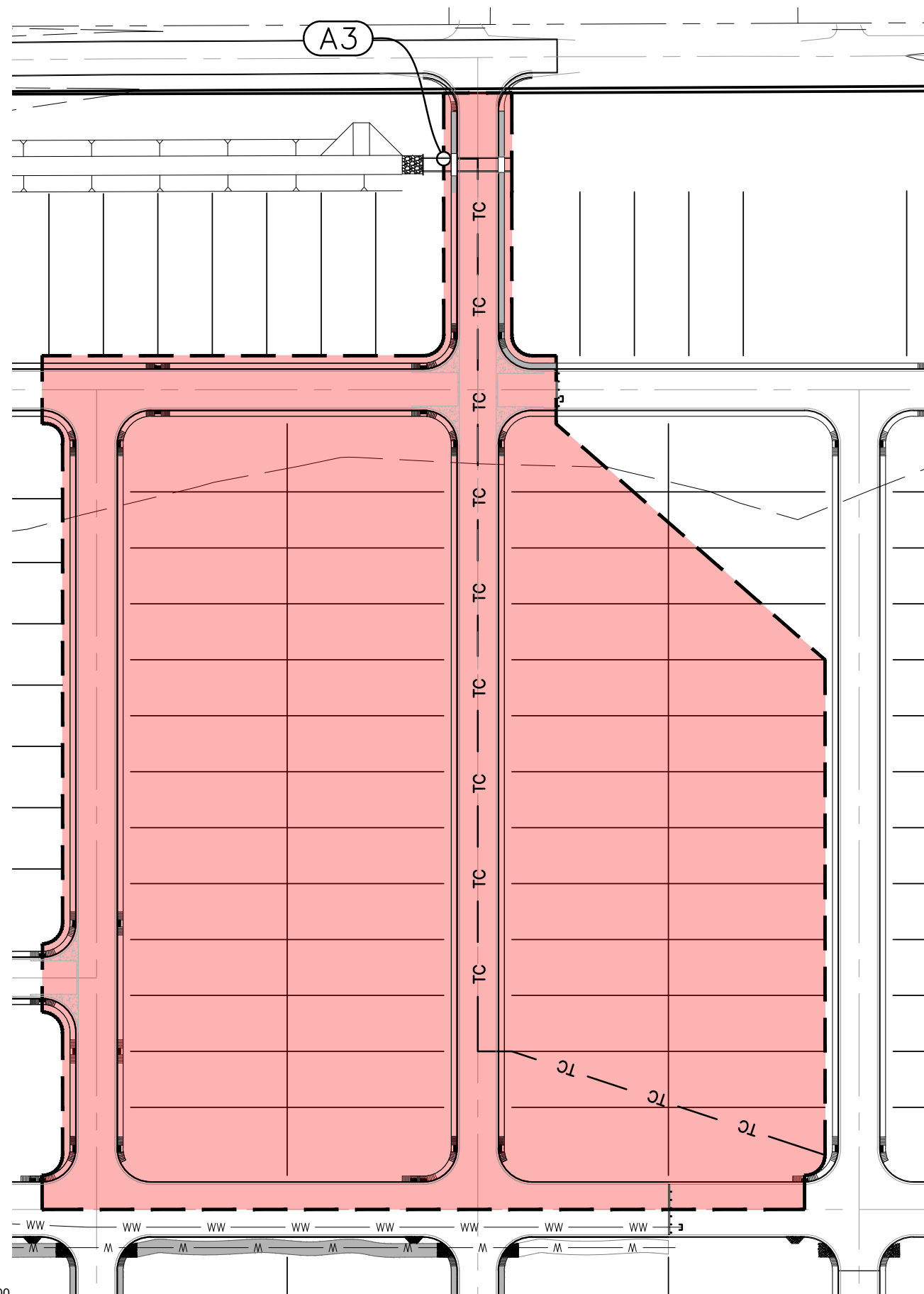
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	50	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.52
Channel Flow	L (ft) =	844			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.04	2.3

Tc	21.3 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.

DRAINAGE SUB-AREA A3

Proposed

Watershed -

A3

6.58 Acres

Time of Concentration

A3

Description

Inlet A2-3 & A2-4 Sizing

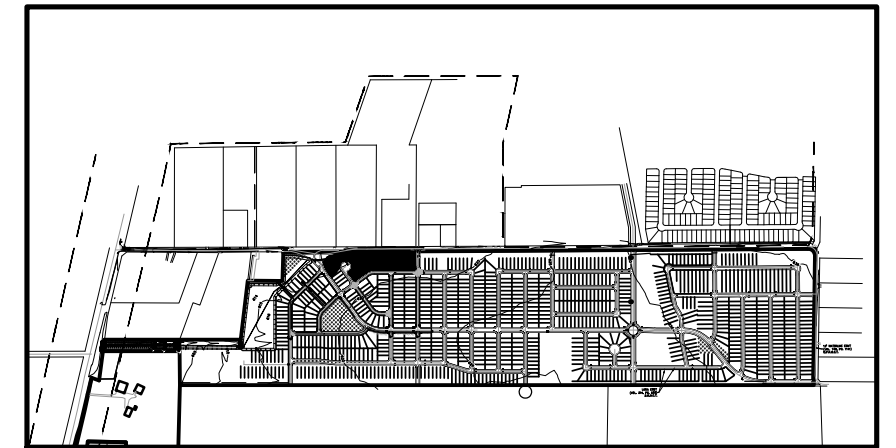
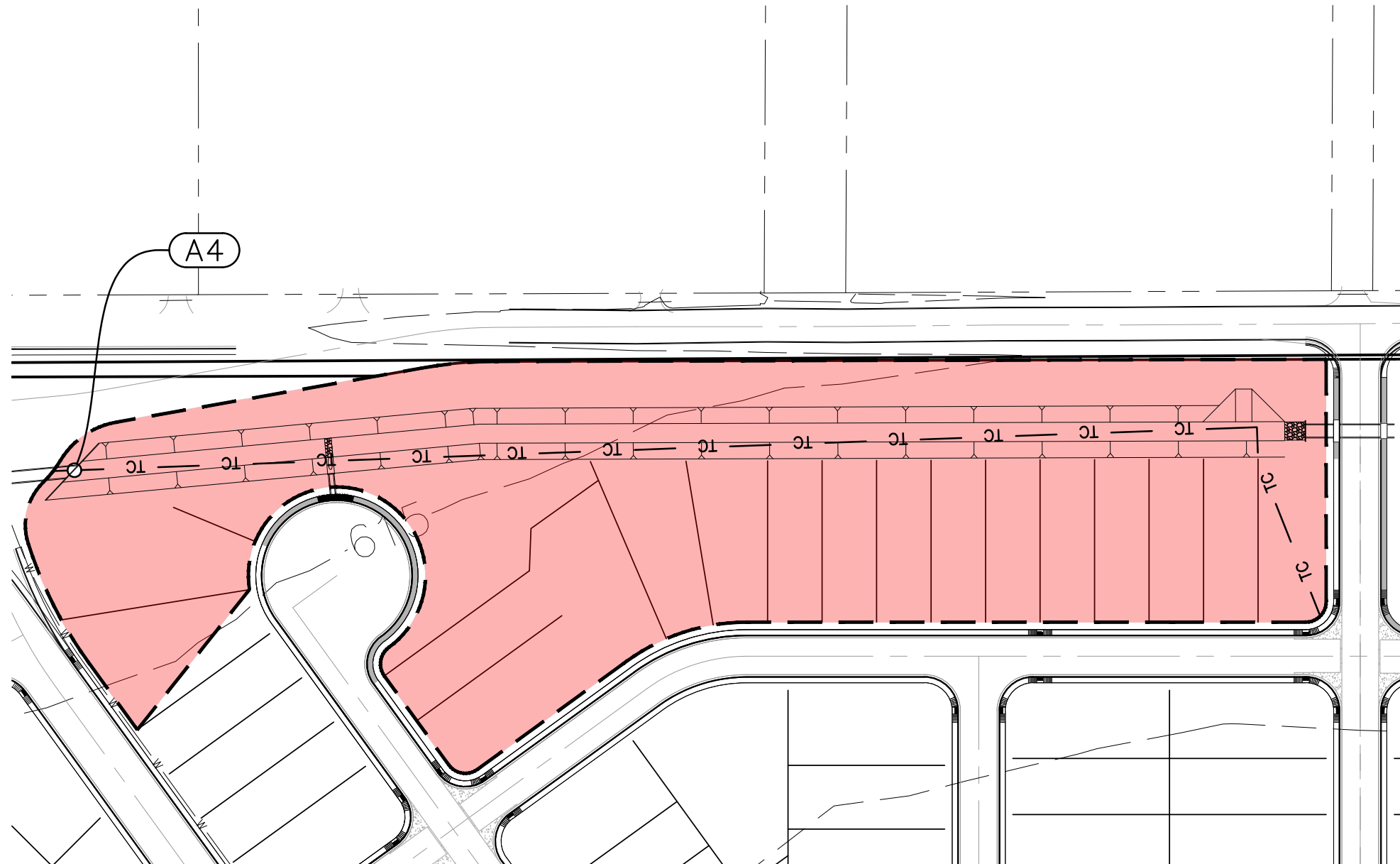
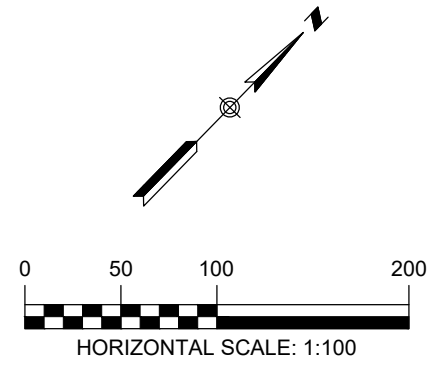
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	167	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	1.73
Channel Flow	L (ft) =	680			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.9

Tc	22.0 min.
----	------------------

Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.

Proposed

Watershed -

A4

4.12 Acres

Time of Concentration

A4

Description

Longest Time of Concentration Analysis

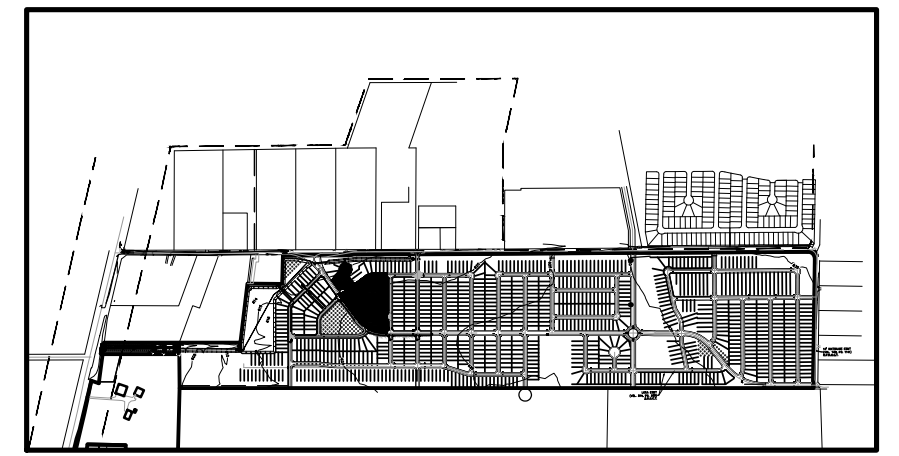
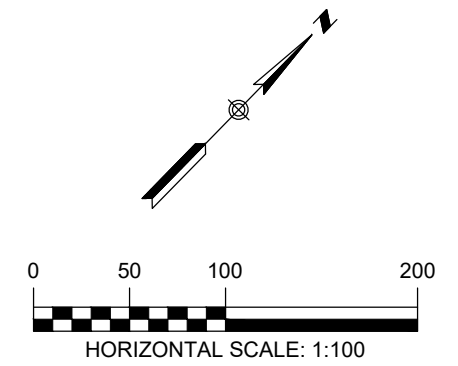
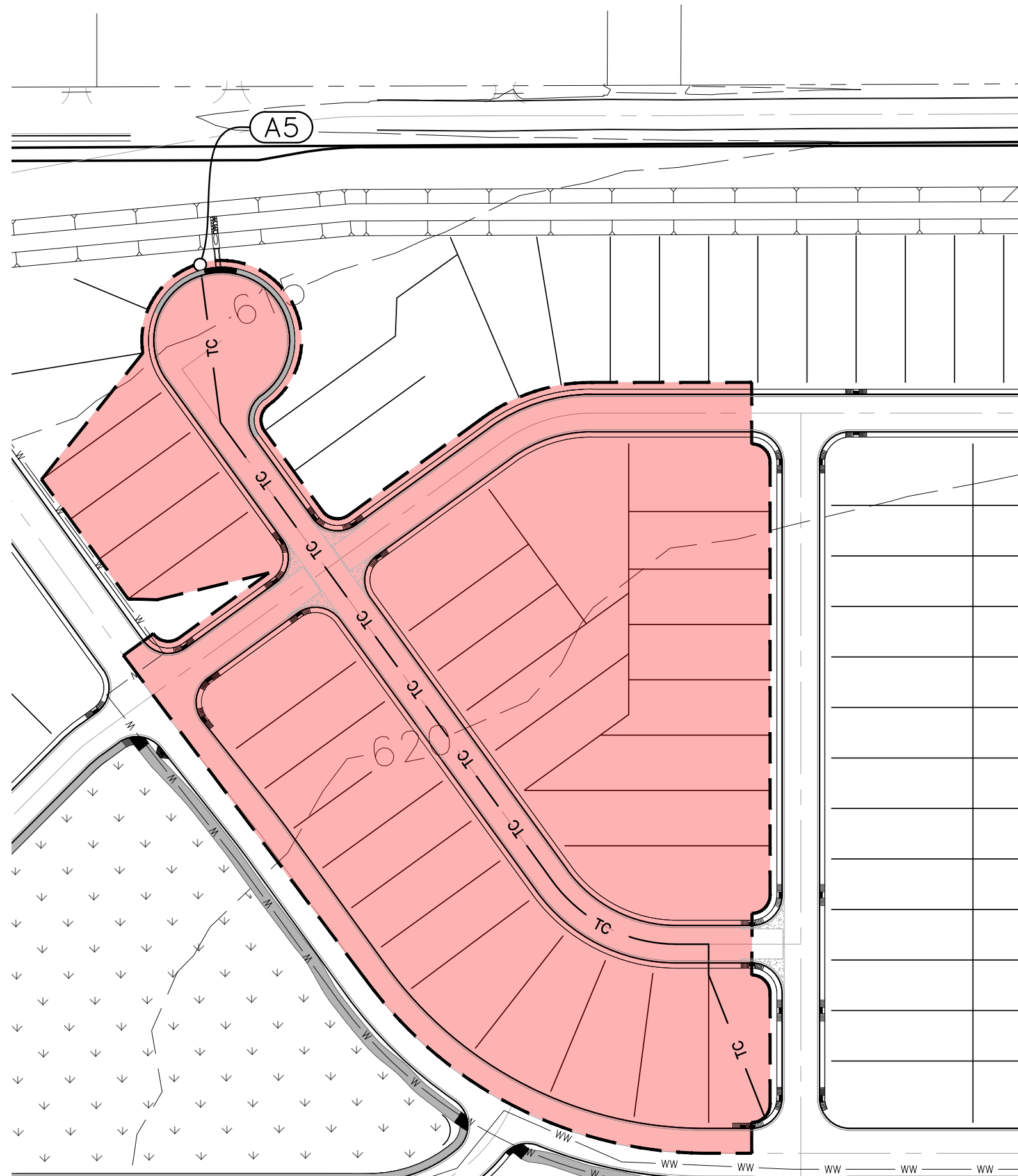
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	54	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.56
Channel Flow	L (ft) =	994			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.05	2.8

Tc	21.7 min.
----	------------------

Curve Number	87.00
--------------	--------------

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.

DRAINAGE SUB-AREA A5



290 S. CASTELL AVE., STE. 100
 NEW BRAUNFELS, TX 78130
 TBPE FIRM F-10961
 TBPLS FIRM 10153600

Drawing Name: C:\Users\callynn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: callynn-m Jun 10, 2020 - 1:44pm

Proposed

Watershed -

A5

6.02 Acres

Time of Concentration

A5

Description

Inlet A3-1 Sizing & Street Capacity Analysis

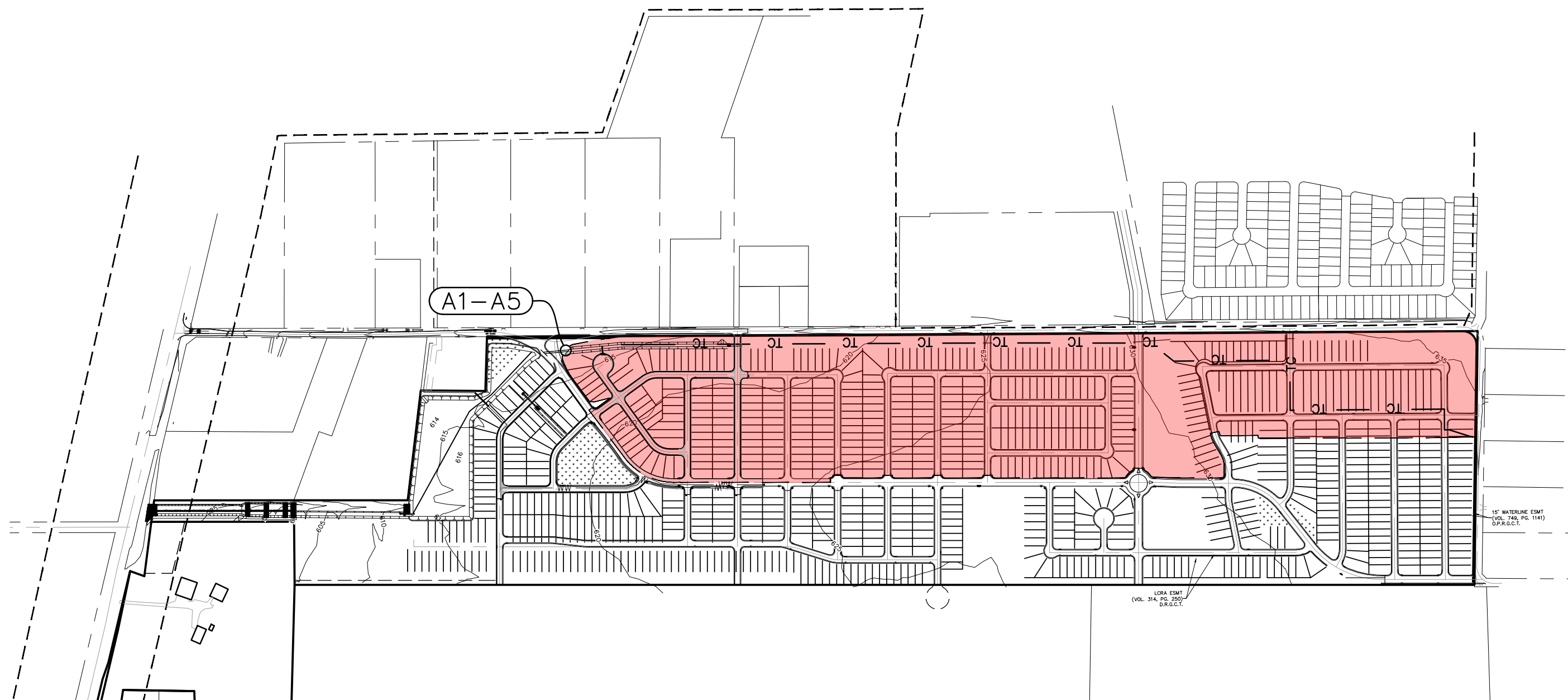
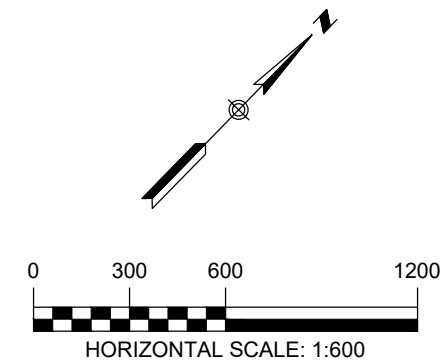
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	52	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.54
Channel Flow	L (ft) =	573			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.6

Tc	20.6 min.
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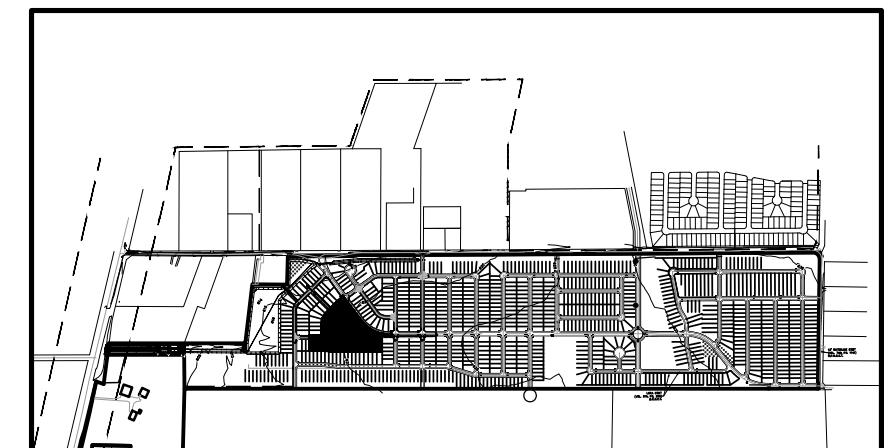
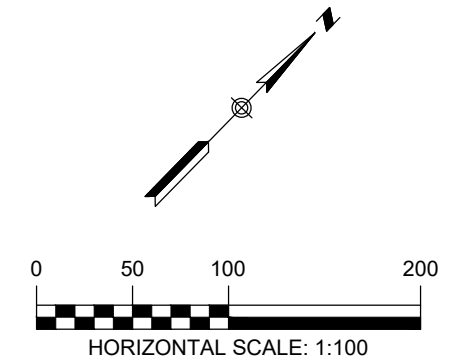
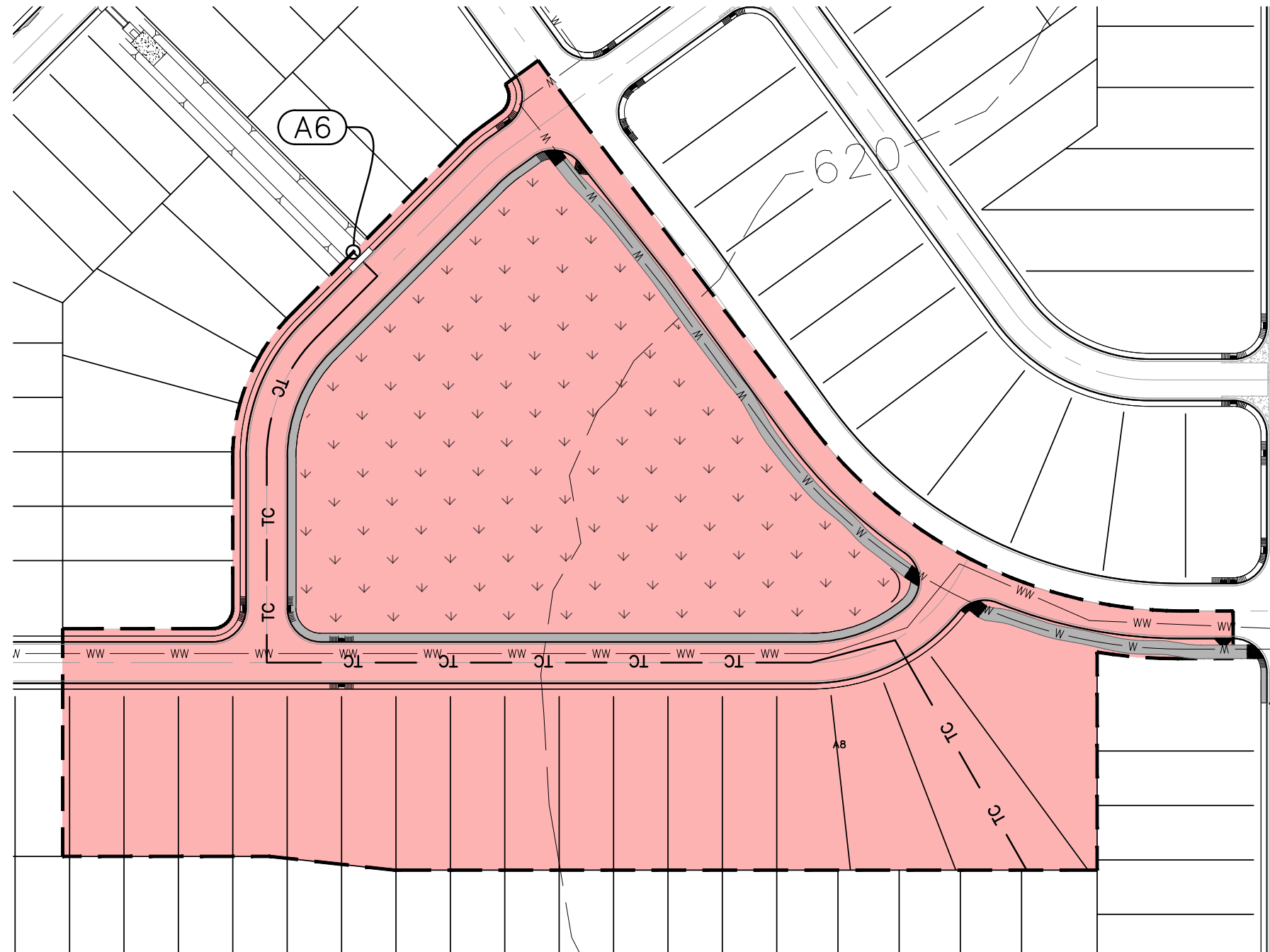
Curve Number	87.00
--------------	--------------

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA A1-A5



DRAINAGE SUB-AREA LOCATION N.T.S.

DRAINAGE SUB-AREA A6



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

Proposed

Watershed -

A6

6.30 Acres

Time of Concentration

A6

Description

Inlet A4-3 & Channel A4 Sizing & Street Capacity Analysis

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.23	14.0
Shallow Flow	L (ft) =	55	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	2	Tt=		
				Tt=	0.40
Channel Flow	L (ft) =	342			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.02	1.0

Tc	15.3 min.
----	------------------

Curve Number	87.00
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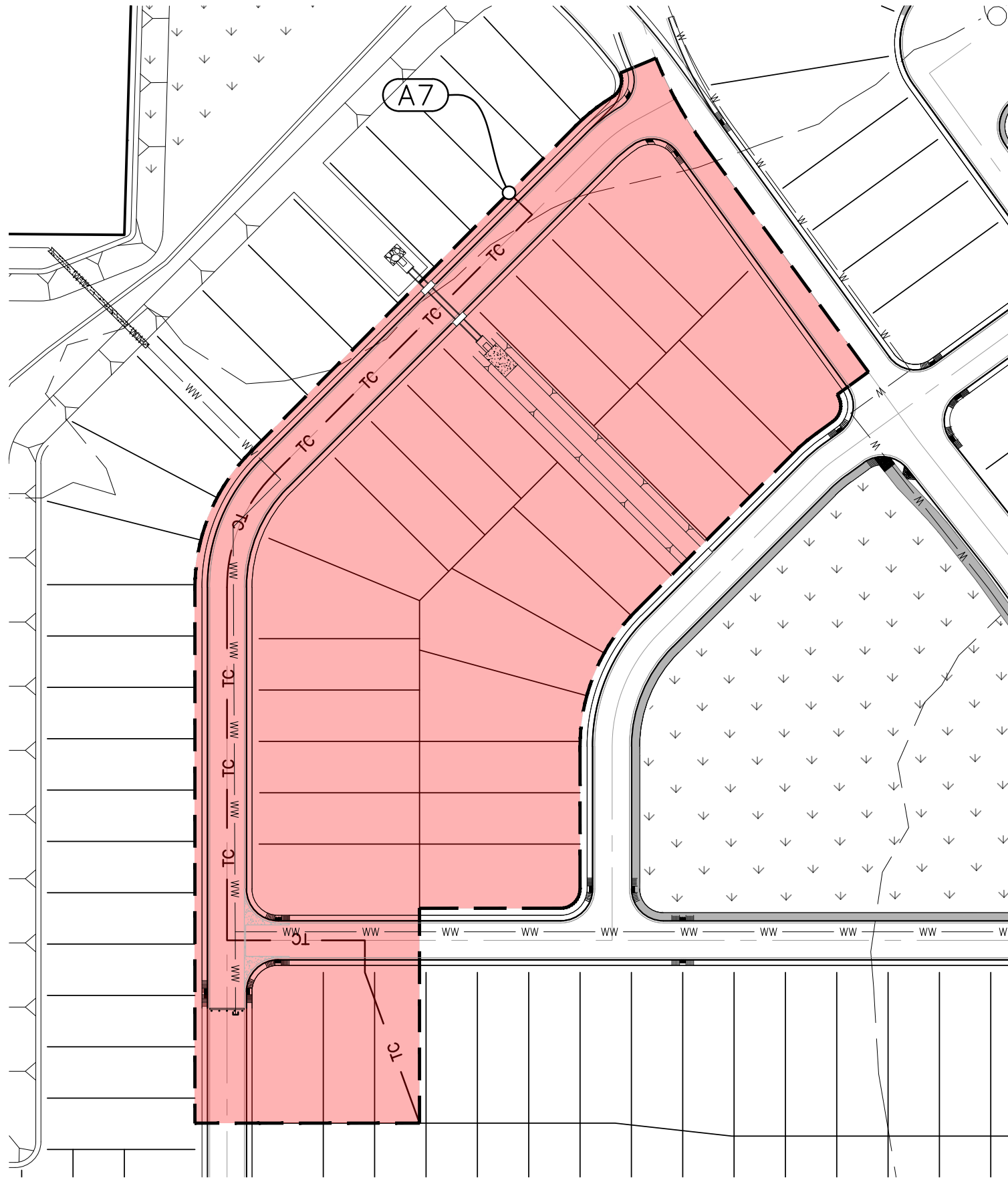
Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

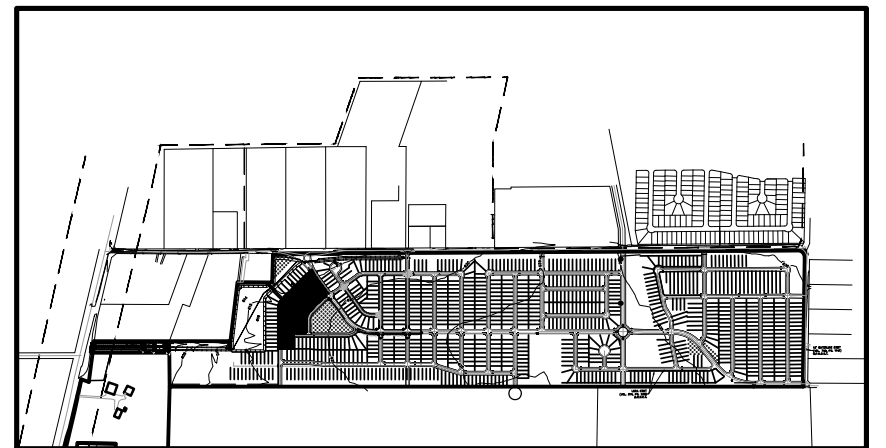
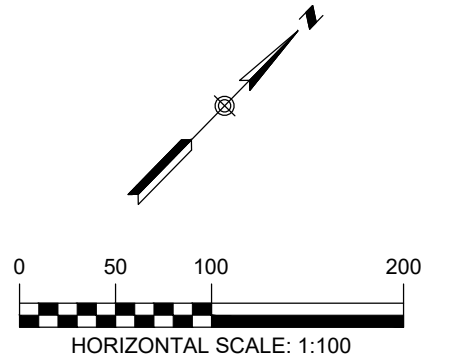
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290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600



DRAINAGE SUB-AREA A7



DRAINAGE SUB-AREA LOCATION N.T.S.

Proposed

Watershed -

A7

5.20 Acres

Time of Concentration

A7

Description

Inlet A4-1 & A4-2 Sizing & Street Capacity Analysis

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.23	14.0
Shallow Flow	L (ft) =	48	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	2	Tt=		
				Tt=	0.35
Channel Flow	L (ft) =	493			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.02	1.4

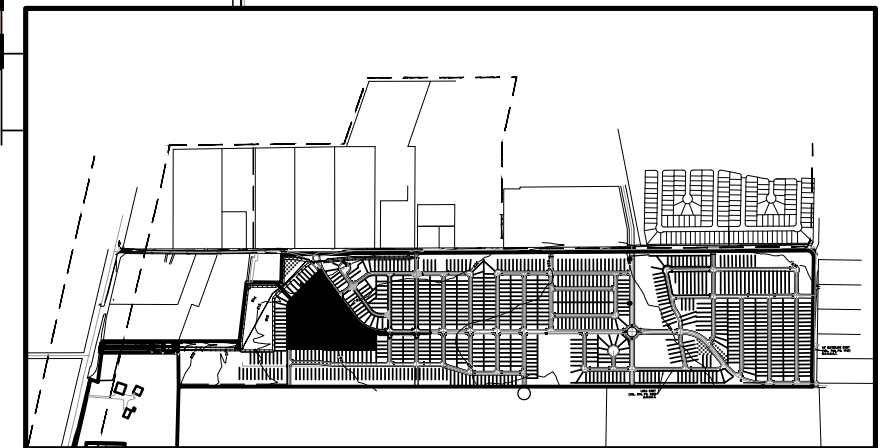
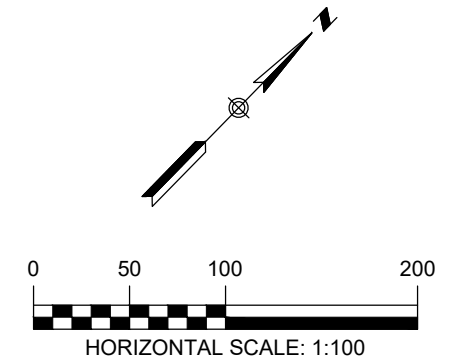
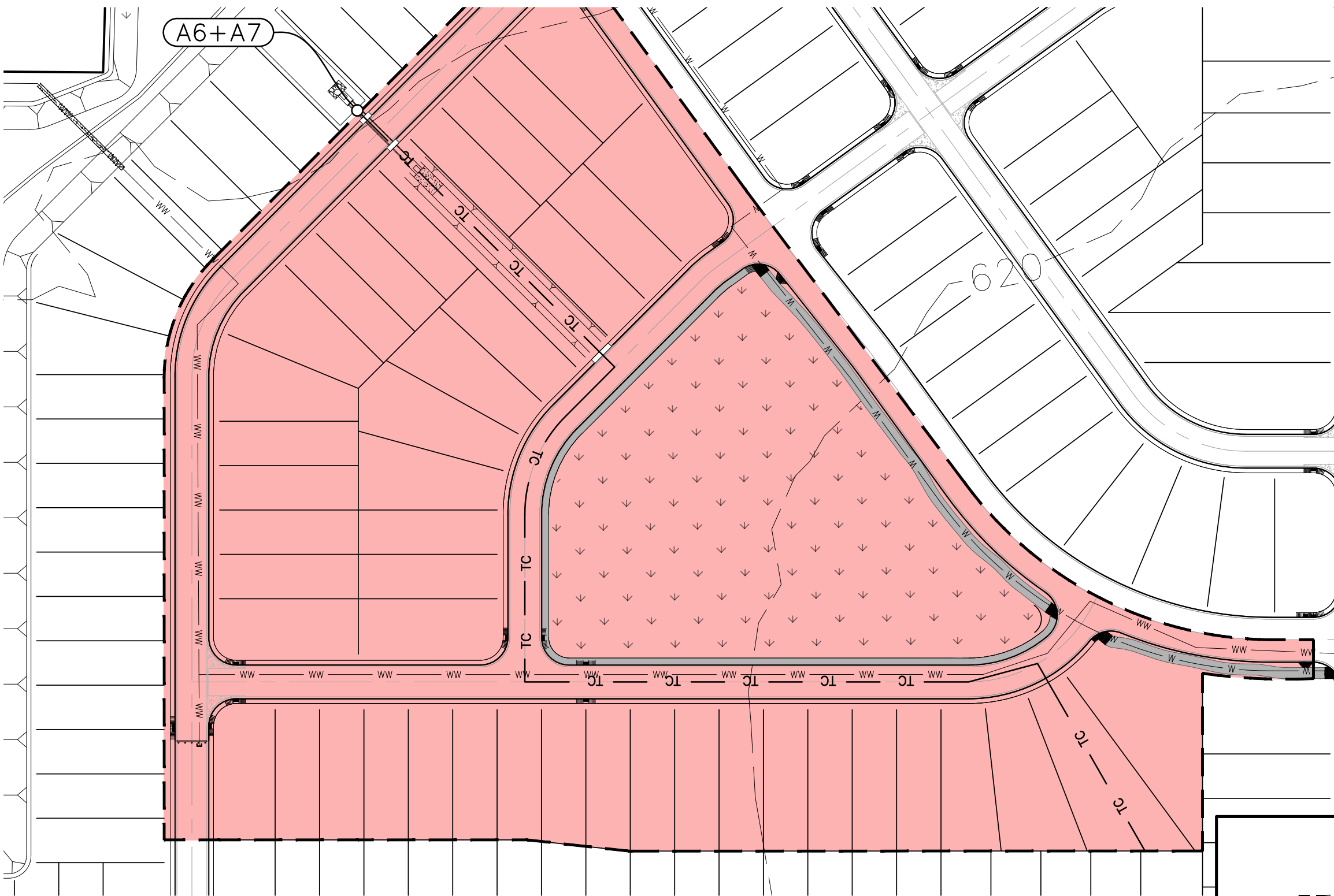
Tc	15.7 min.
----	------------------

Curve Number	87.00
--------------	--------------

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

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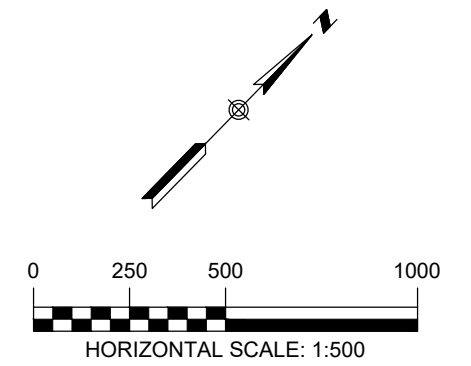


DRAINAGE SUB-AREA LOCATION N.T.S.



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A6+A7



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A8

Proposed

Watershed -

A8

3.48 Acres

Time of Concentration

A8

Description

Inlet A2-1 Sizing

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	50	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.52
Channel Flow	L (ft) =	878			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.04	2.4

Tc

21.4 min.

Curve Number

87.00

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Proposed

Watershed -

A9

10.40 Acres

Time of Concentration

A9

Description

Longest Time of Concentration Analysis

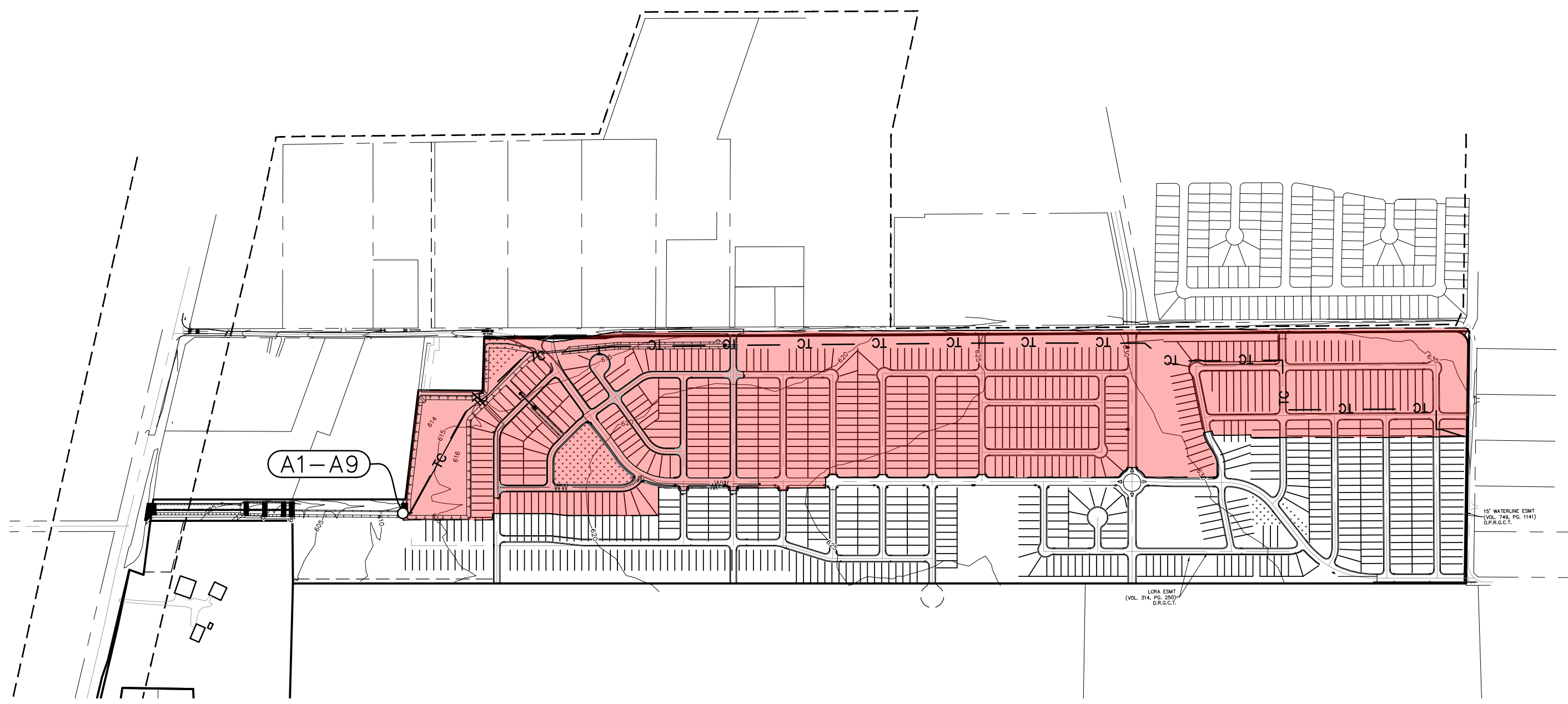
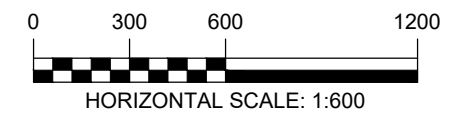
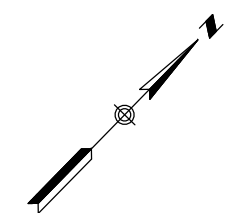
				hrs	min.
Sheet Flow	L (ft) =	0	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.00	0.0
Shallow Flow	L (ft) =	0	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.00
Channel Flow	L (ft) =	794			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.04	2.2

Tc	10.0 min.
----	------------------

Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

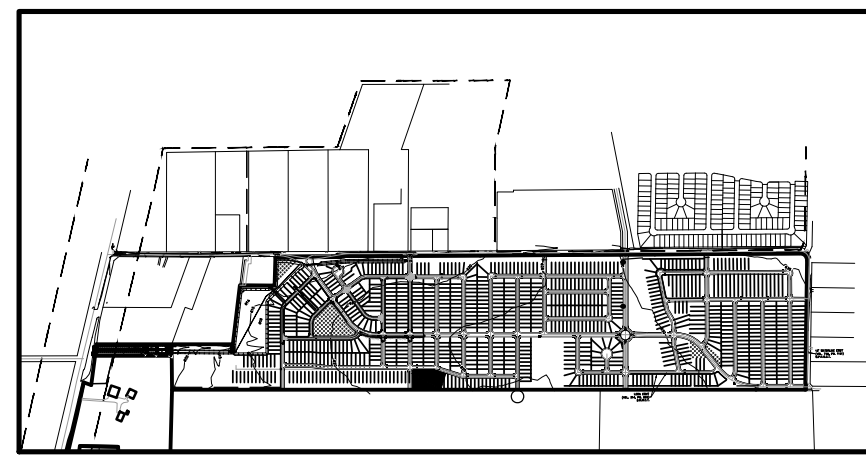
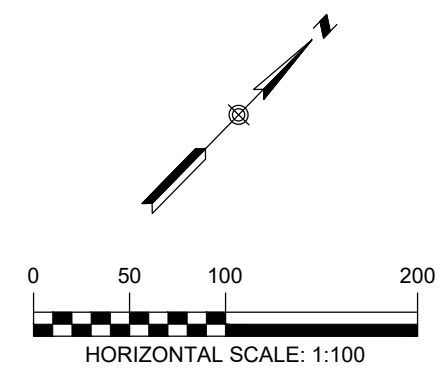
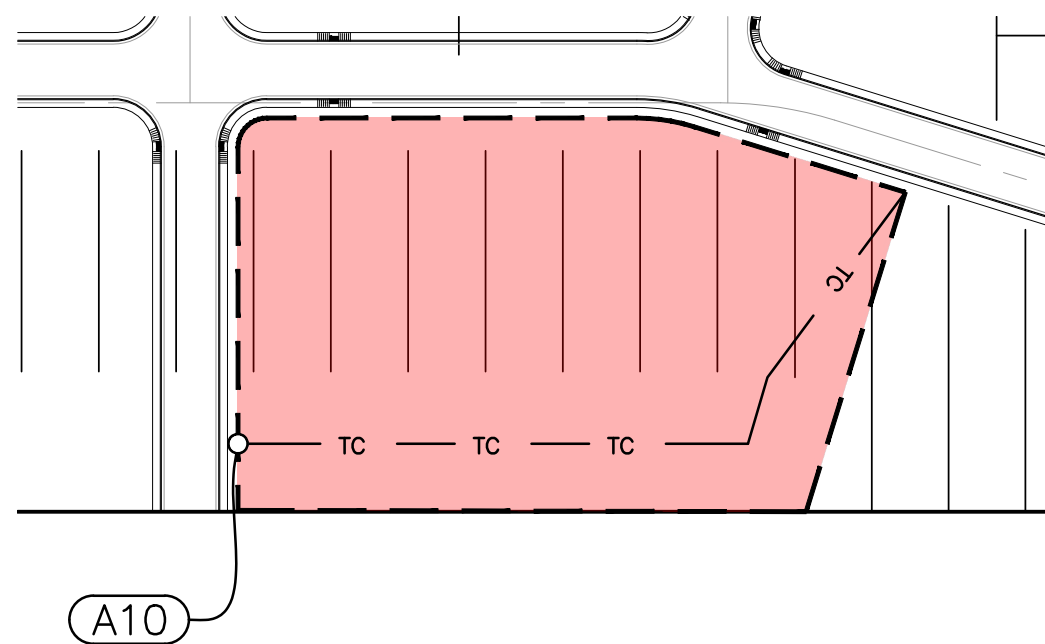
Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A1-A9

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DRAINAGE SUB-AREA LOCATION N.T.S.



290 S. CASTELL AVE., STE. 100
 NEW BRAUNFELS, TX 78130
 TBPE FIRM F-10961
 TBPLS FIRM 10153600

DRAINAGE SUB-AREA A10

Drawing Name: C:\Users\callynn-m\AppData\Local\Temp\AcPublish_18392\DRNG EXHIBIT.dwg User: callynn-m Jun 10, 2020 - 1:44pm

Proposed

Watershed -
Time of Concentration
Description

A10
A10
Future Development Analysis

1.48 Acres

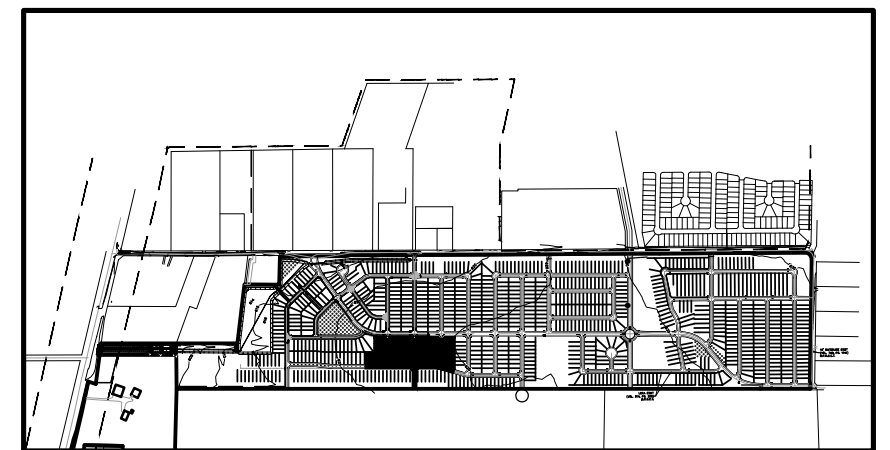
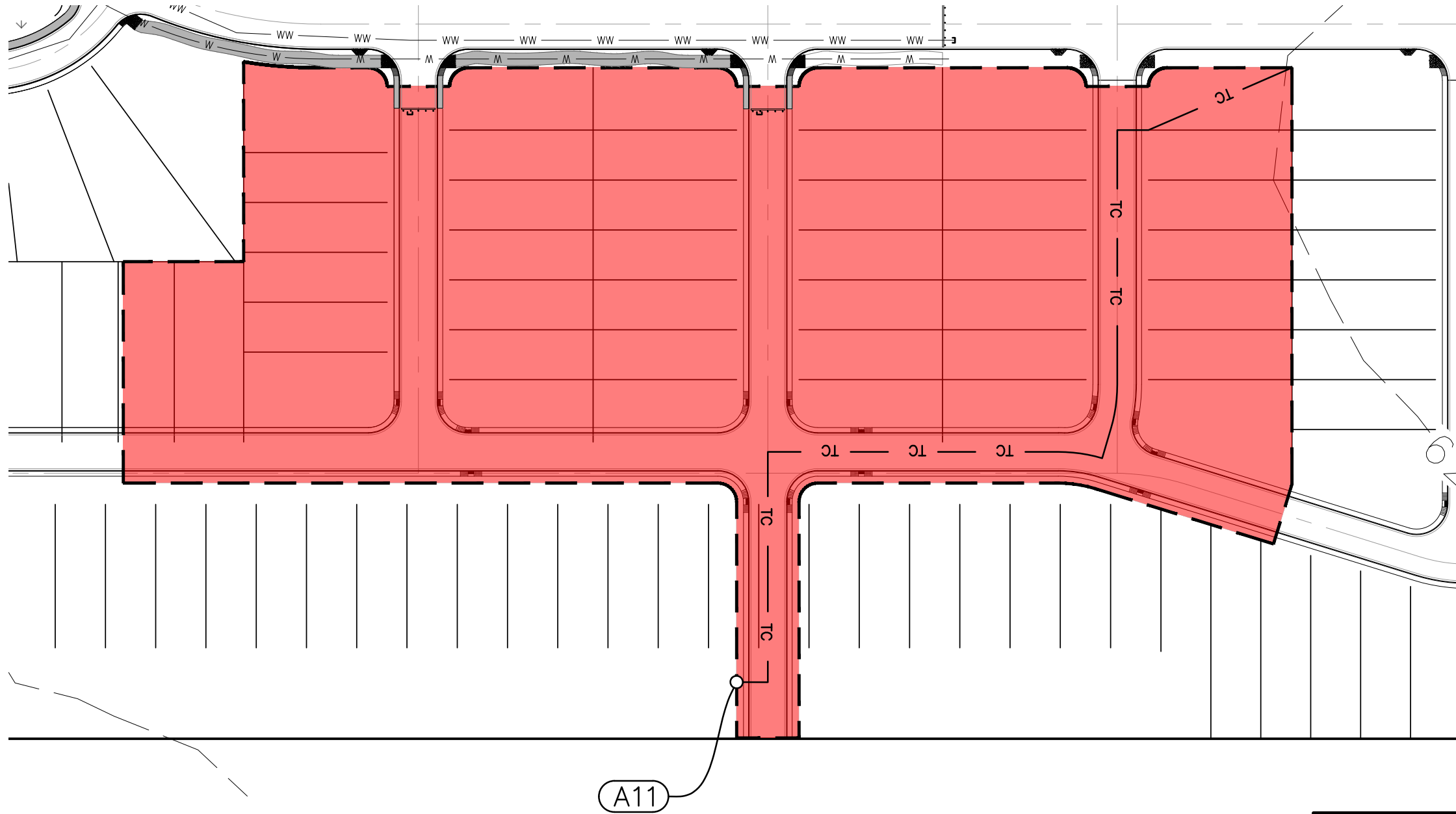
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	69	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.71
Channel Flow	L (ft) =	1116			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.05	3.1

Tc	22.2 min.
----	------------------

Curve Number	87.00
--------------	--------------

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.

Proposed

Watershed -
Time of Concentration
Description

A11
A11
Future Development Analysis

7.82 Acres

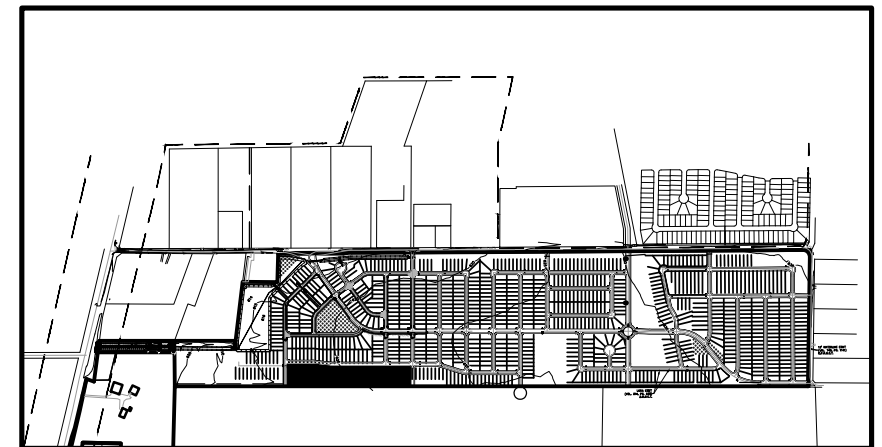
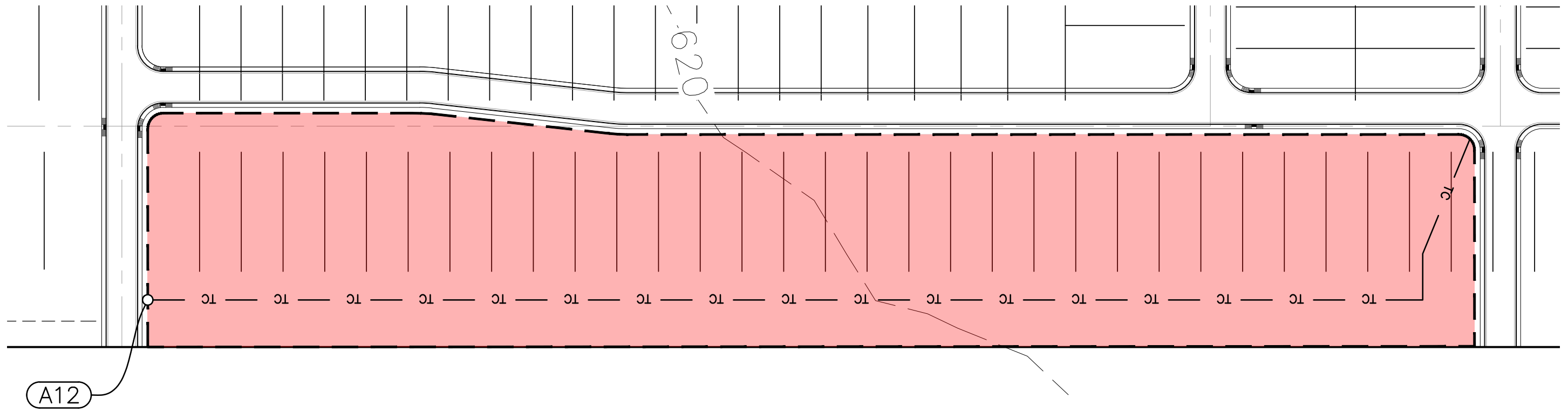
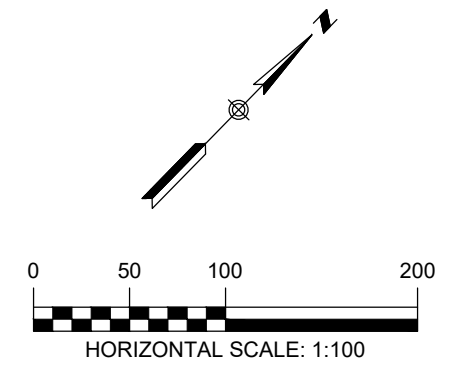
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	50	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.52
Channel Flow	L (ft) =	742.5			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	2.1

Tc	21.0 min.
----	------------------

Curve Number	87.00
--------------	--------------

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



DRAINAGE SUB-AREA LOCATION N.T.S.



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A12

Proposed

Watershed -

A12

6.19 Acres

Time of Concentration

A12

Description

Future Development Analysis

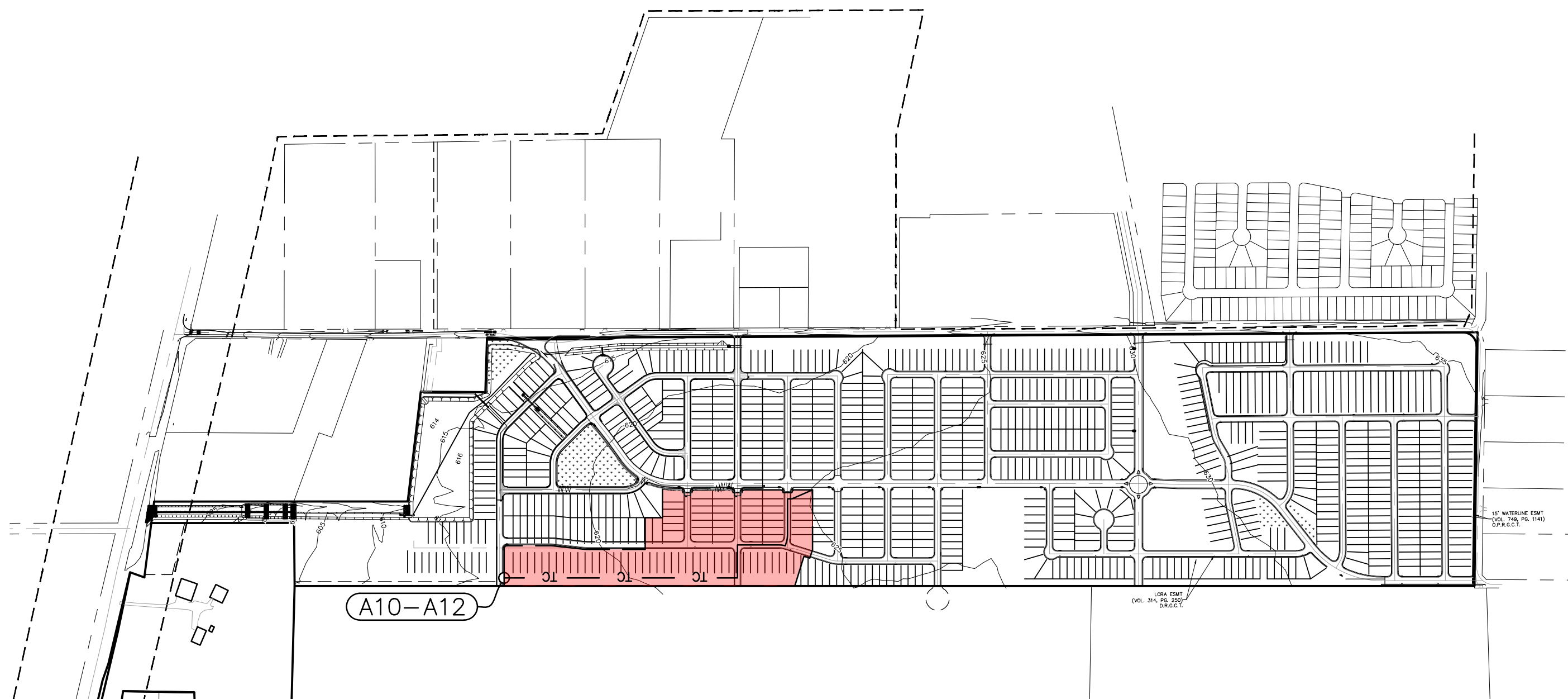
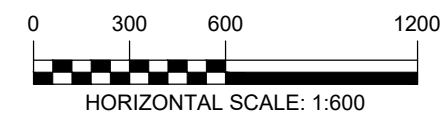
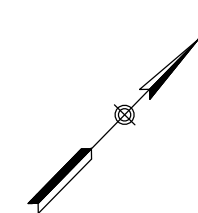
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	64	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.66
Channel Flow	L (ft) =	1231			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.06	3.4

Tc	22.5 min.
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Curve Number	87.00
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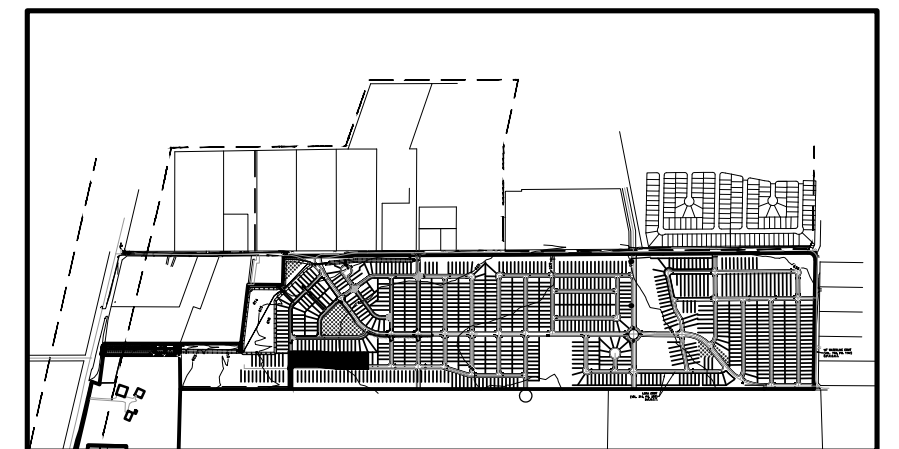
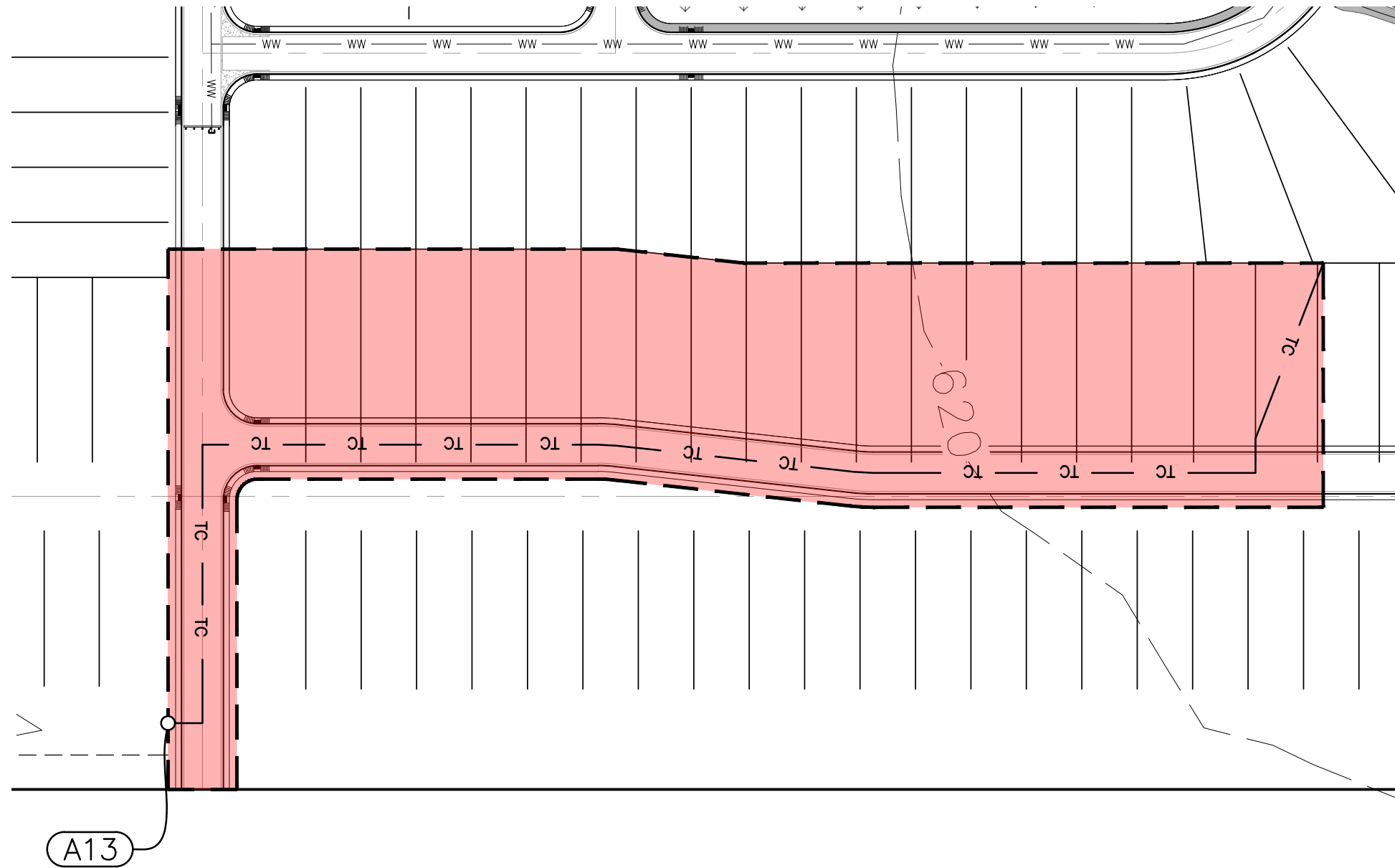
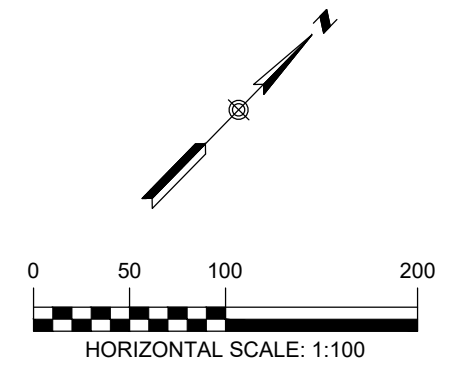
Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A10-A12



DRAINAGE SUB-AREA LOCATION N.T.S.

Proposed

Watershed -
Time of Concentration
Description

A13
A13
Future Development Analysis

3.57 Acres

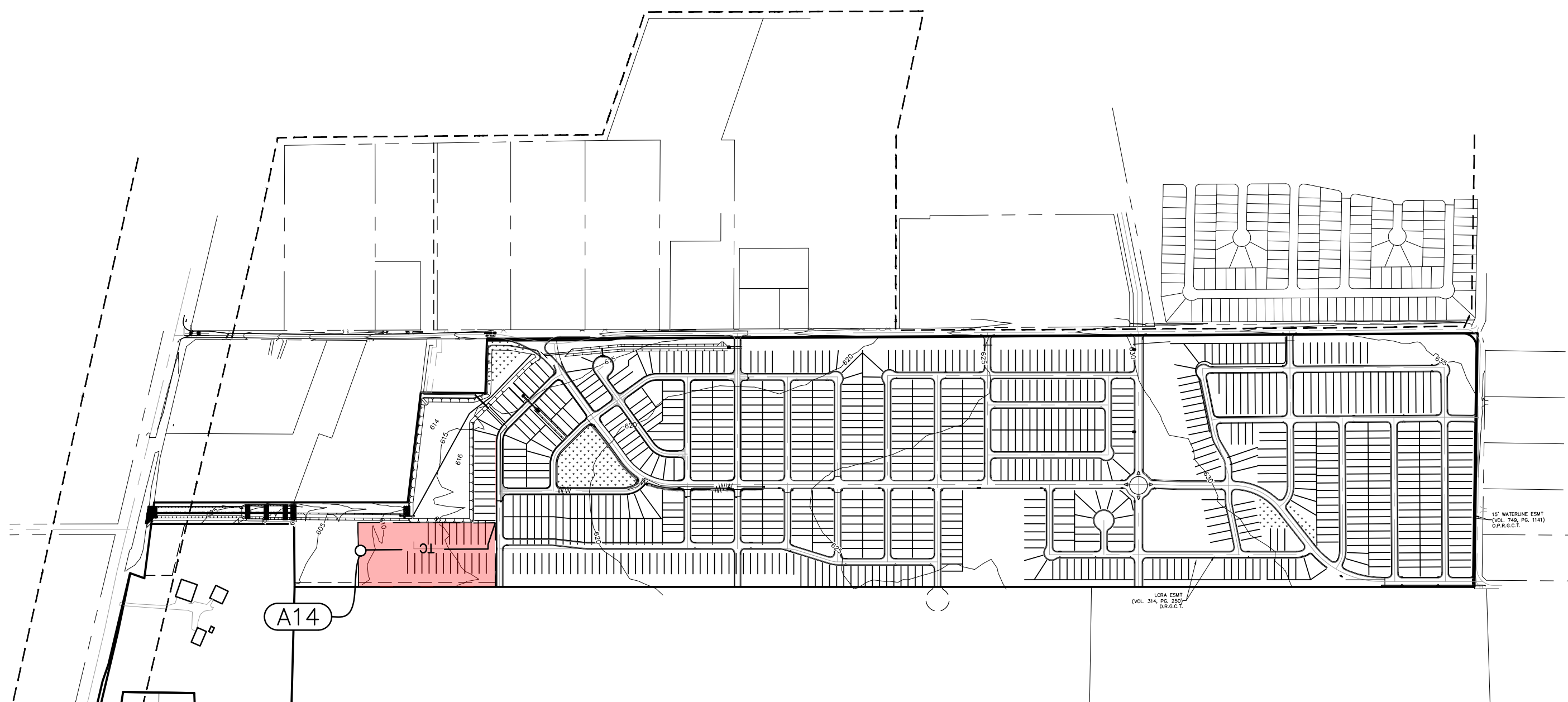
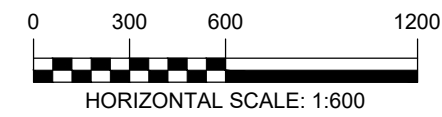
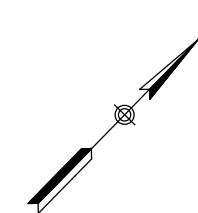
				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	62	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.64
Channel Flow	L (ft) =	993			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.05	2.8

Tc	21.8 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A14

Drawing Name: C:\Users\cattlyn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: cattlyn-m Jun 10, 2020 1:45pm

Proposed

Watershed -
Time of Concentration
Description

A14
A14
Future Development Analysis

6.28 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	51	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.53
Channel Flow	L (ft) =	727			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	2.0

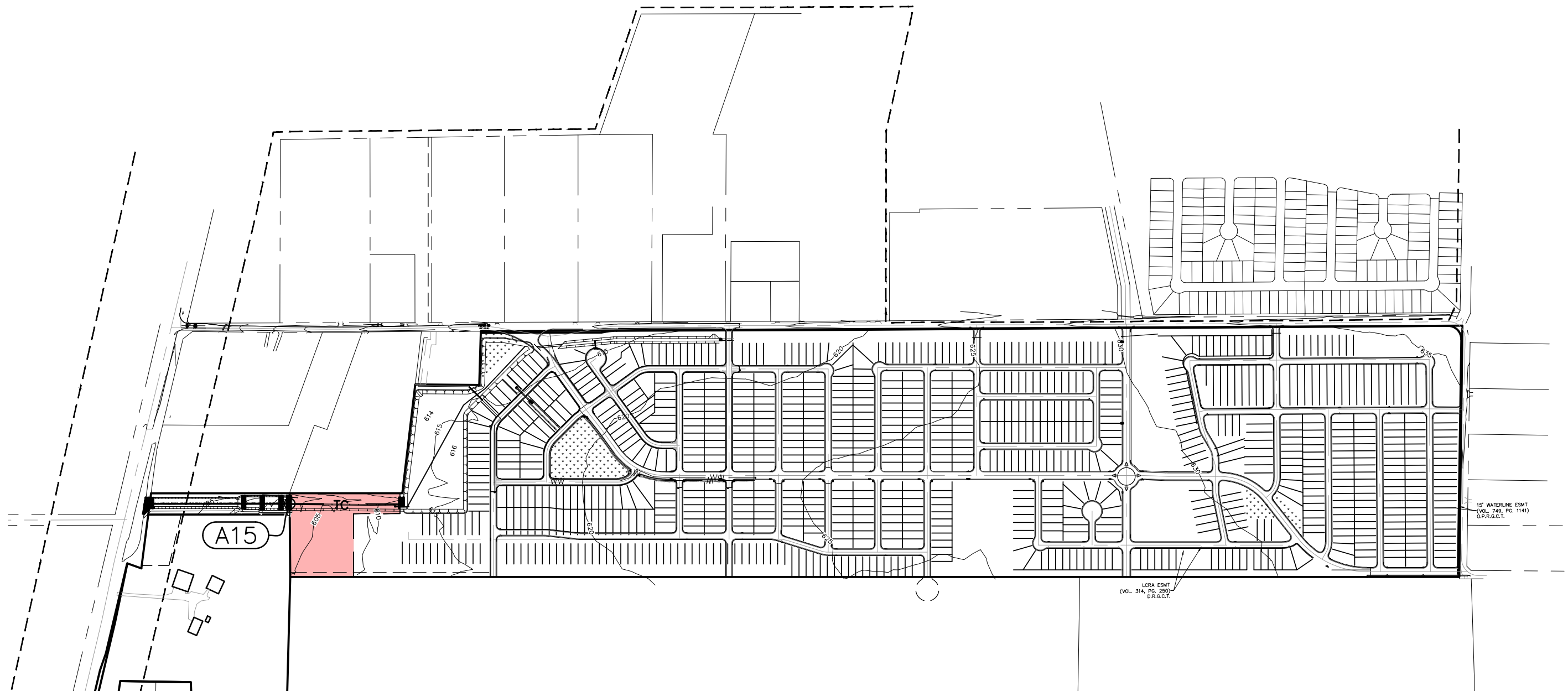
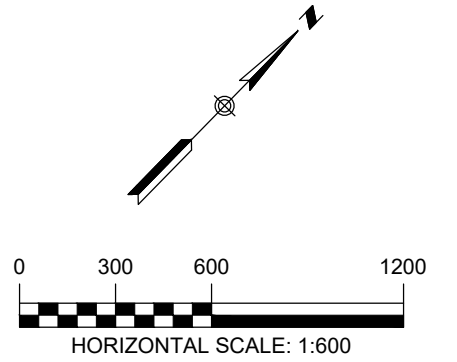
Tc	21.0 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Drawing Name: C:\Users\cattlyn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: cattlyn-m Jun 10, 2020 - 1:45pm



DRAINAGE SUB-AREA A15

Proposed

Watershed -

A15

4.60 Acres

Time of Concentration

A15

Description

Longest Time of Concentration Analysis

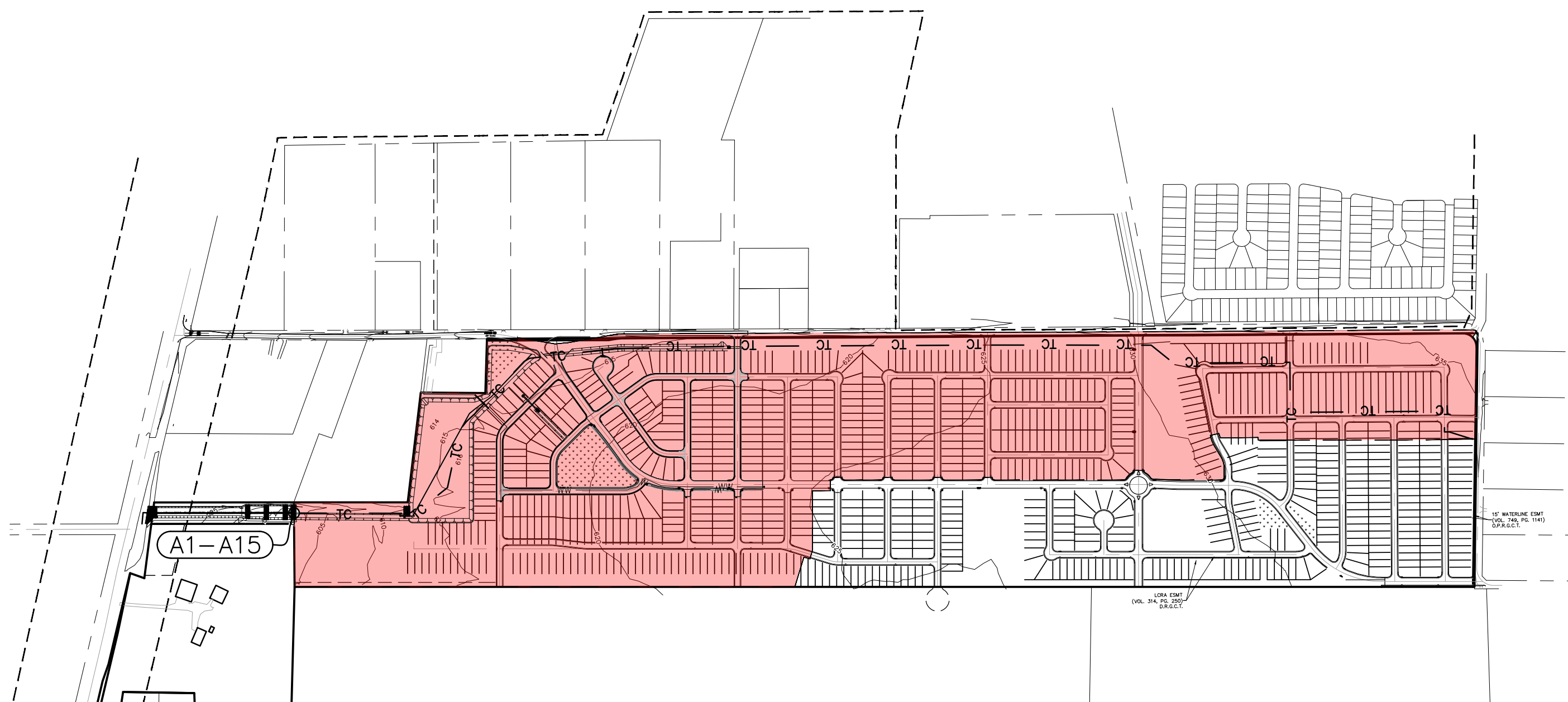
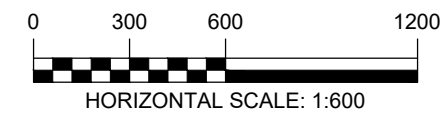
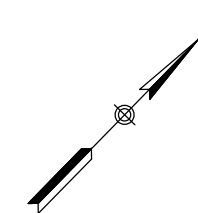
				hrs	min.
Sheet Flow	L (ft) =	0	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.00	0.0
Shallow Flow	L (ft) =	0	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.00
Channel Flow	L (ft) =	623			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.7

Tc	10.0 min.
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Curve Number	87.00
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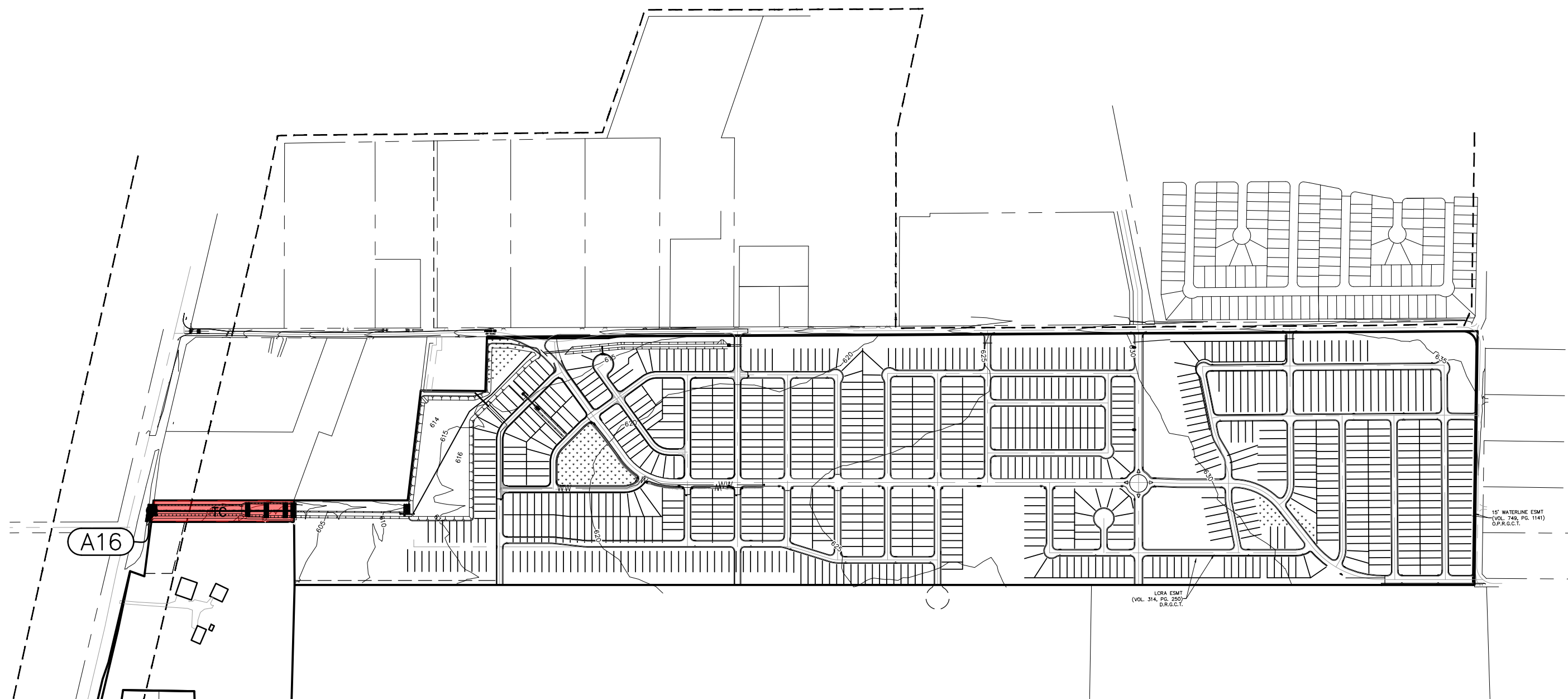
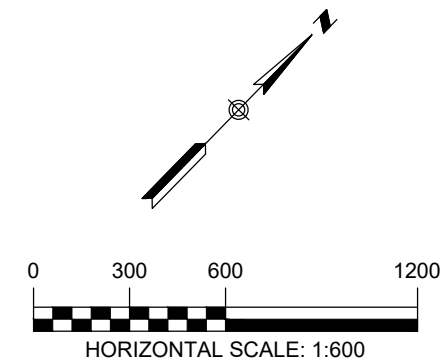
Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A1-A15



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A16

Proposed

Watershed -
Time of Concentration
Description

A16
A16
Longest Time of Concentration Analysis

2.20 Acres

				hrs	min.
Sheet Flow	L (ft) =	0	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.20			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.00	0.0
Shallow Flow	L (ft) =	0	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.00
Channel Flow	L (ft) =	795			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.04	2.2

Tc	10.0 min.
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Curve Number	84.00
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
<i>Impervious areas:</i>					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
<i>Streets and roads:</i>					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
<i>Agricultural lands</i>					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush weed grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.

Fair: 50 to 75 percent ground cover and not heavily grazed.

Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.

Fair: 50 to 75 percent ground cover.

Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

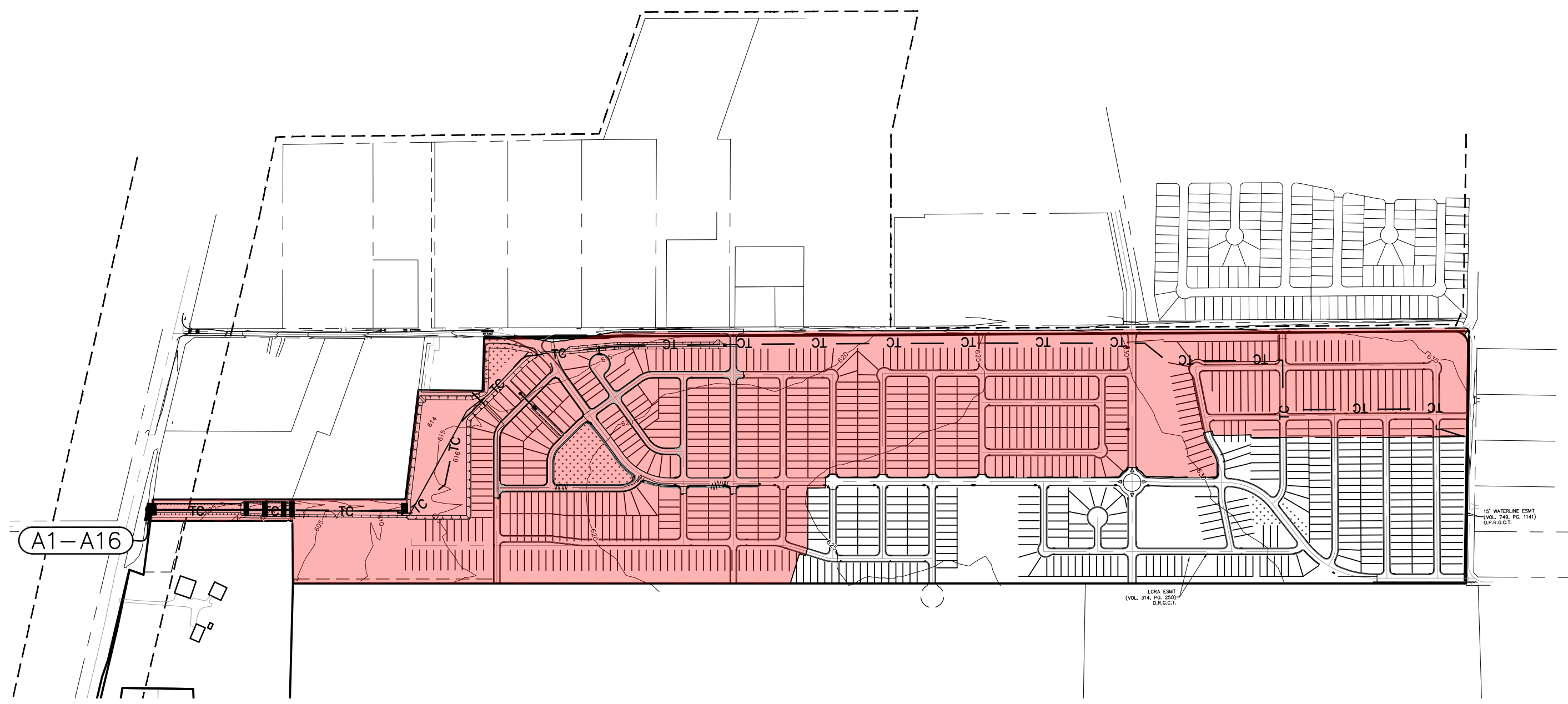
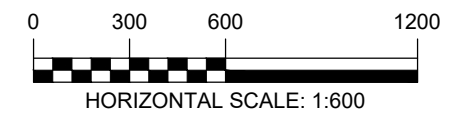
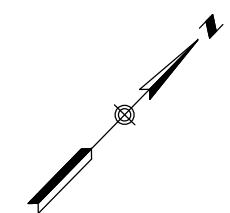
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95

Source: TR-55 [3]



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A1-A16
BASIN A3 DISCHARGE + A16

Drawing Name: C:\Users\cattlyn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: cattlyn-m Jun 10, 2020 1:45pm

Proposed

Watershed -
Time of Concentration
Description

A17
A17
Drainage Area EX A2 Comparison

10.47 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.50			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	1967	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1.76	Tt=		
				Tt=	15.32
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

Tc **35.3 min.**

Curve Number **78.00**

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush weed grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.
Other combinations of conditions may be computed from the curve numbers for woods and pasture.

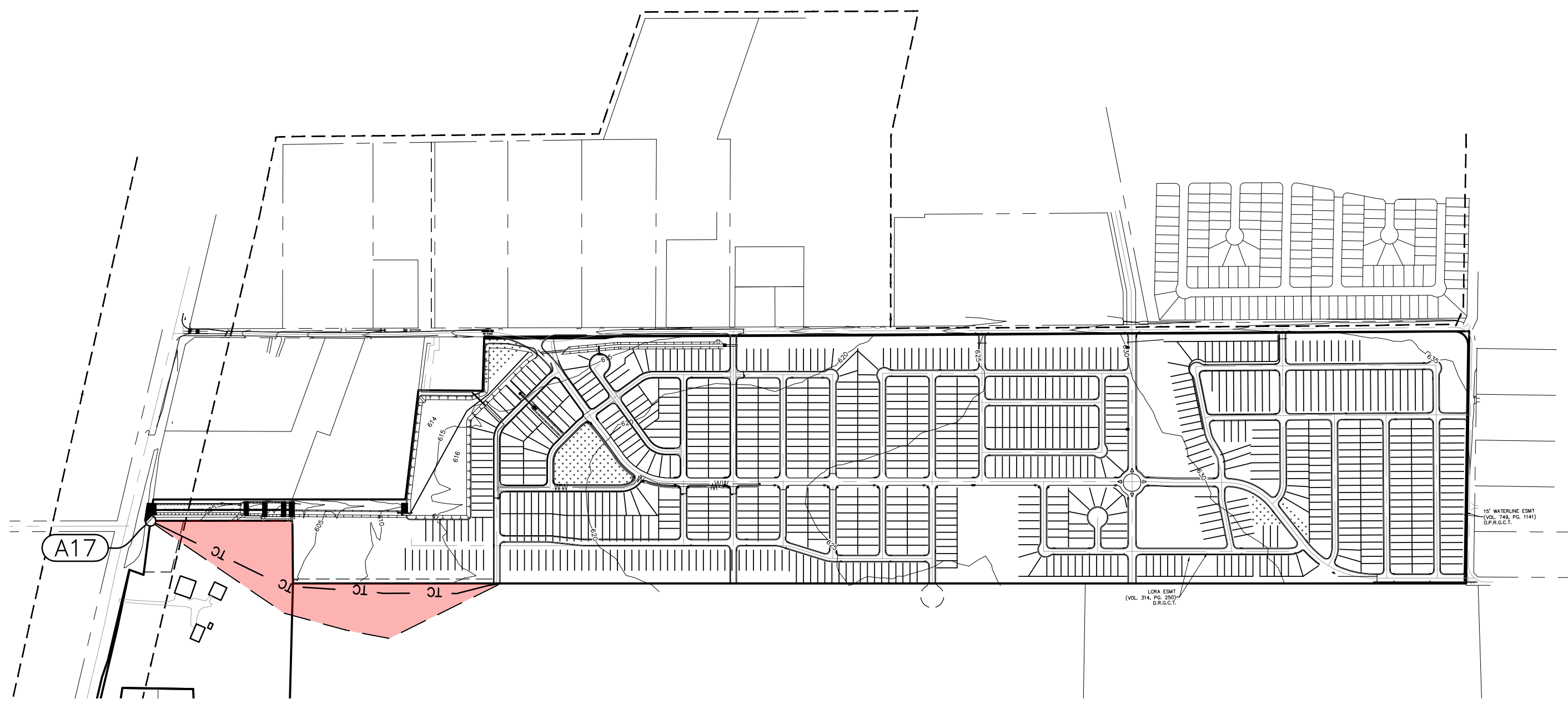
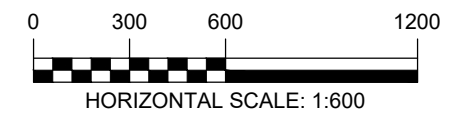
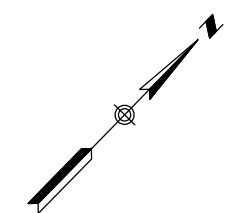
⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95

Source: TR-55 [3]



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE SUB-AREA A17

Drawing Name: C:\Users\cattlyn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: cattlyn-m Jun 10, 2020 1:45pm

Proposed

Watershed -
Time of Concentration
Description

A18
A18
Drainage Area EX A4 Comparison

34.49 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.70			
	P ₂ =	3.34	Tt=	0.25	14.9
Shallow Flow	L (ft) =	1300	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	2.3	Tt=		
				Tt=	8.85
Channel Flow	L (ft) =	662			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.8

Tc	25.6 min.
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Curve Number	78.00
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
<i>Impervious areas:</i>					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
<i>Streets and roads:</i>					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
<i>Agricultural lands</i>					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.

Fair: 50 to 75 percent ground cover and not heavily grazed.

Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.

Fair: 50 to 75 percent ground cover.

Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

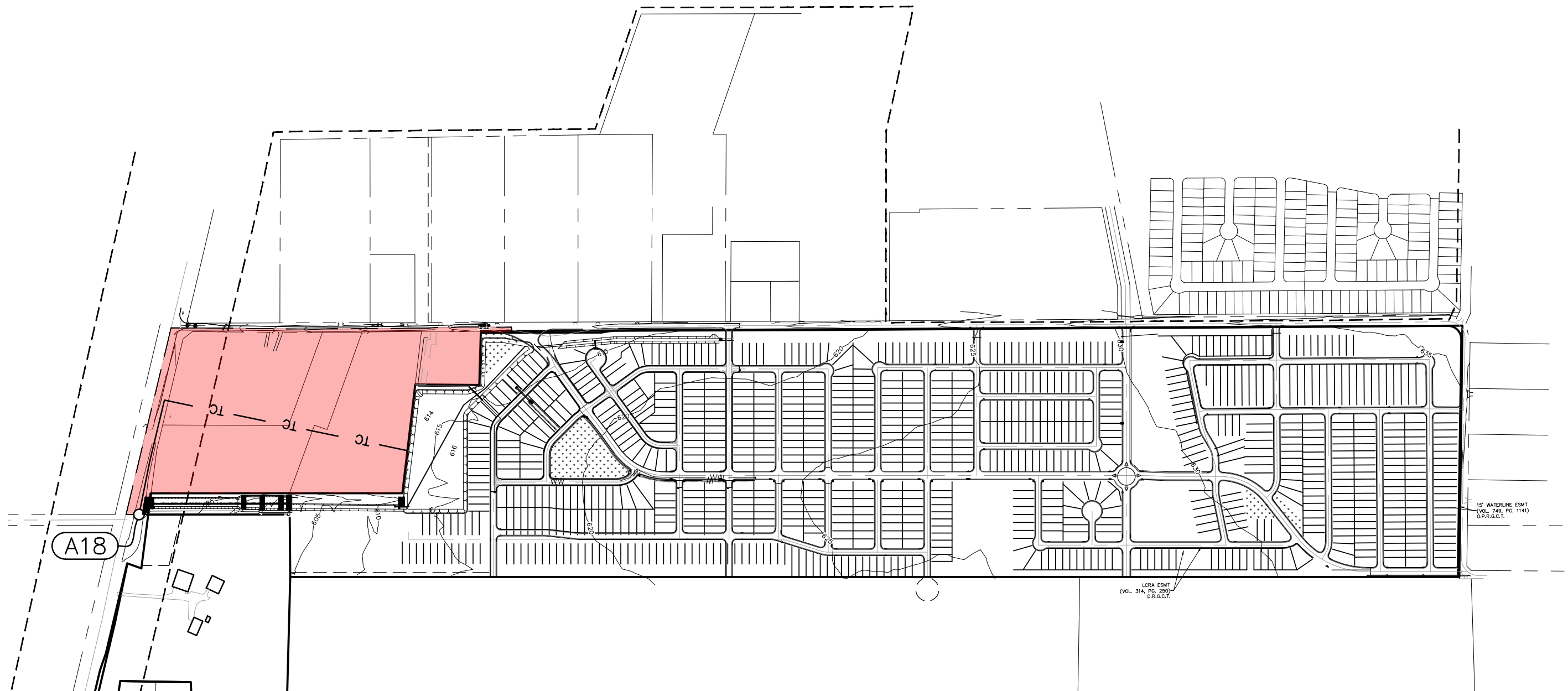
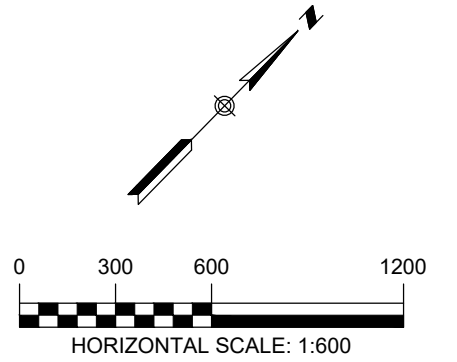
Source: TR-55 [3]

Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95

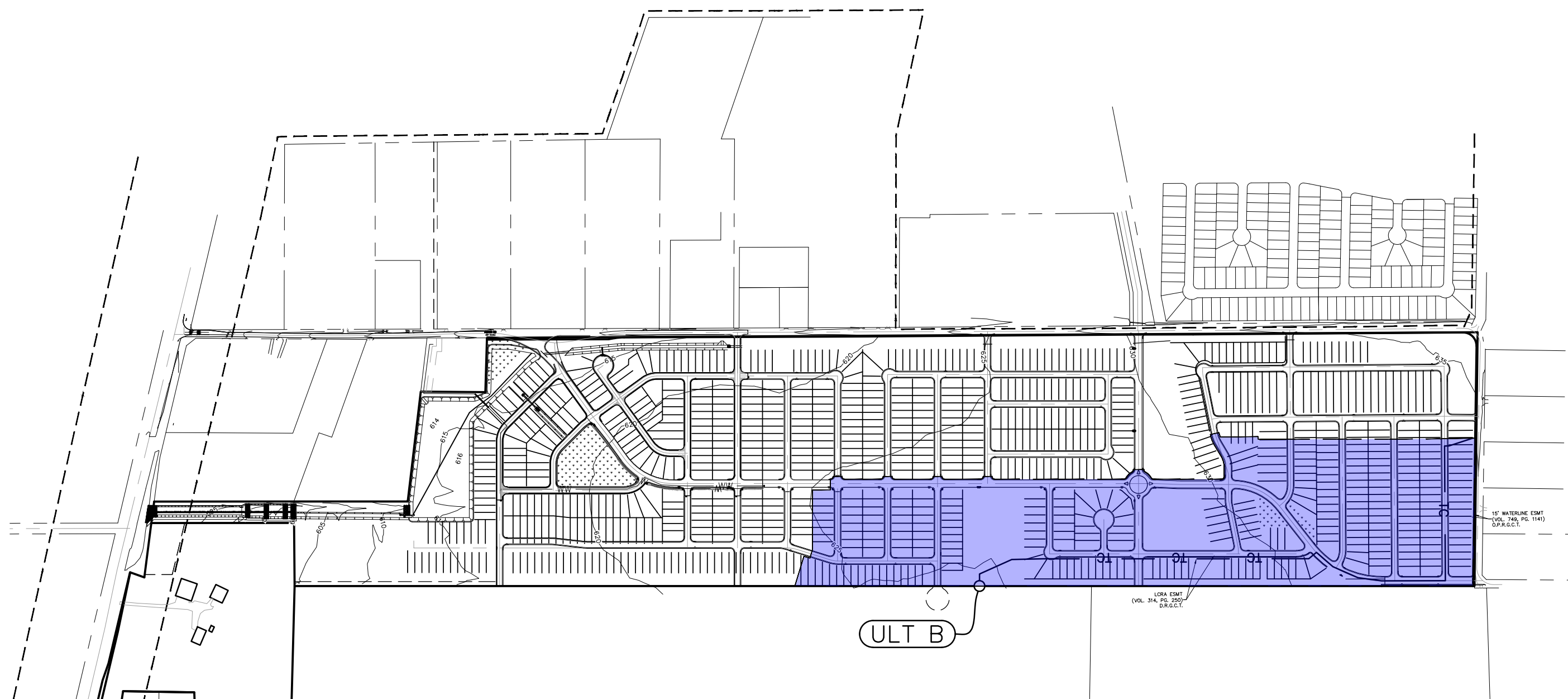
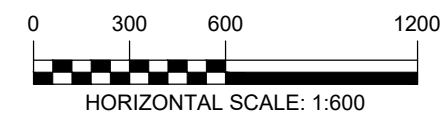
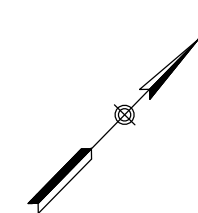
Source: TR-55 [3]

Drawing Name: C:\Users\cattlyn-m\AppData\Local\Temp\AsPublish_18392\DRNG EXHIBIT.dwg User: cattlyn-m Jun 10, 2020 - 1:45pm



Attachment L

Drainage Area B



ULT B

LORA ESMT
(VOL. 314, PG. 250)
D.R.G.C.T.

15" WATERLINE ESMT
(VOL. 749, PG. 1141)
O.P.R.G.C.T.



410 N. SEGUIN AVE.
NEW BRAUNFELS,
TEXAS, 78130
WWW.HMTNB.COM
PH: (830)625-8555

DRAINAGE AREA ULT B

Proposed

Watershed -
Time of Concentration

ULT B
ULT B

58.58 Acres

Flow Contributing to Basin B
(To be Analyzed in Future Development)

Description

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.00			
	P ₂ =	3.34	Tt=	0.31	18.4
Shallow Flow	L (ft) =	63	Tt=	$(L)/(60*16.1345*S^{0.5})$	
(Unpaved)	S (%) =	1	Tt=		
				Tt=	0.65
Channel Flow	L (ft) =	3502			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.16	9.7

Tc	28.8 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Attachment M

Drainage Area P1 A

Drawing Name: N:\Projects\031 - DR Horton\031.060 - 175 Ac. Friesenhahn CDs\Phase 1\Reports\Drainage\Attachments\DRNG EXHIBIT P1.dwg User: callynn-m Jun 10, 2020 - 1:36pm



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

DRAINAGE AREA P1 A

Proposed

Watershed -
Time of Concentration
Description

P1 A
P1 A
Temporary Area Inlet A7 Sizing

154.65 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.30			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	476	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.63	Tt=		
				Tt=	6.19
Channel Flow	L (ft) =	4536			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.21	12.6

Tc	38.8 min.
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Curve Number	86.40
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.

Other combinations of conditions may be computed from the curve numbers for woods and pasture.

⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: TR-55 [3]

Composite Curve Number

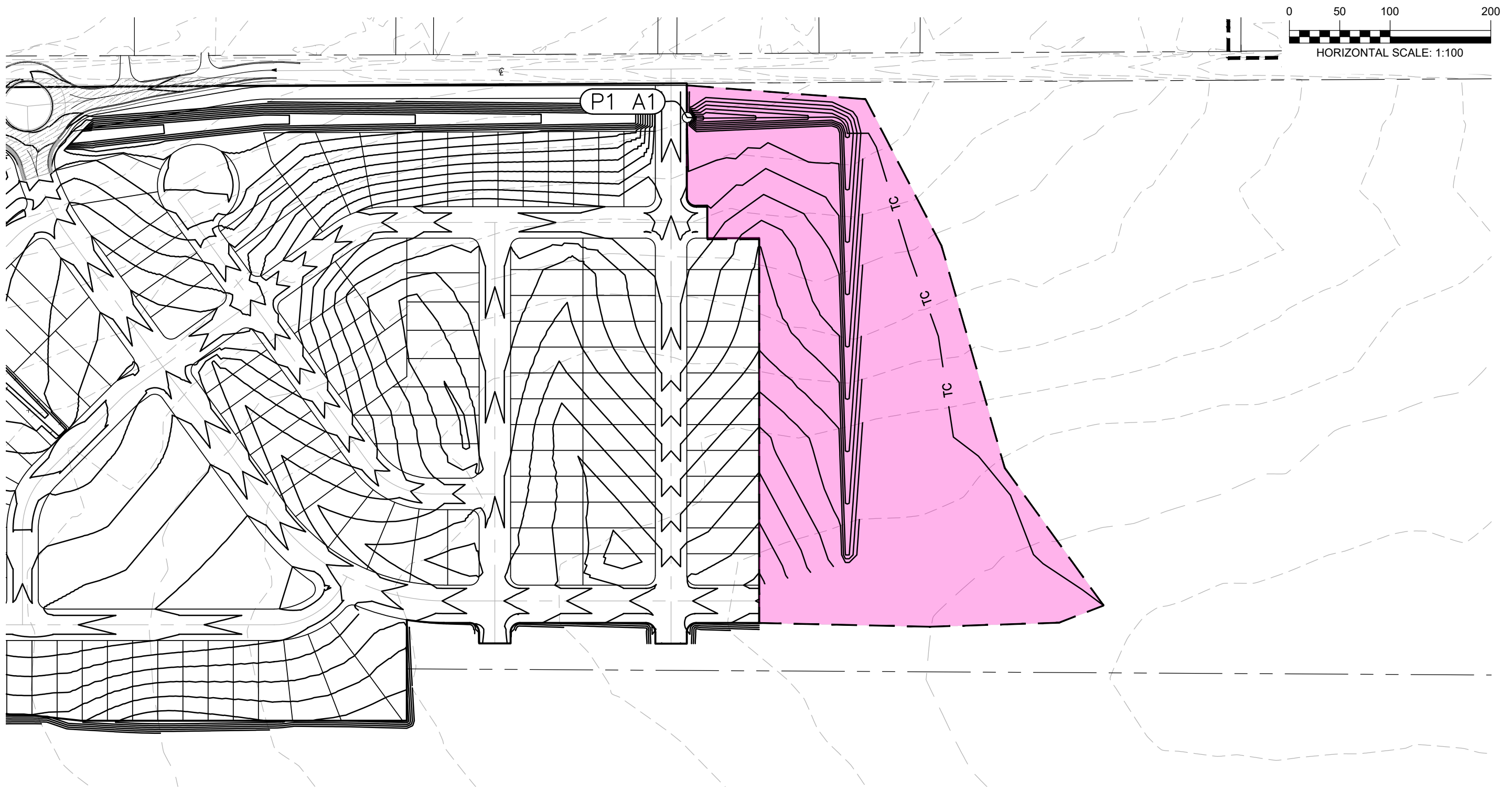
Drainage Area	Area	Curve Number
P1 A1	7.32	78.00
P1 A2	102.30	87.00

Curve Number = 86.40

Attachment N

Drainage Area P1 A Sub-Areas

Drawing Name: N:\Projects\031 - DR Horton\031.060 - 175 Ac. Friesenhahn CDs\Phase 1\Reports\Drainage Attachments\DRNG EXHIBIT P1.dwg User: callynn-m Jun 10, 2020 - 1:36pm



DRAINAGE SUB-AREA P1 A1

Proposed

Watershed -
Time of Concentration
Description

P1 A1
P1 A1
Temporary Swale Sizing

7.32 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.50			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	807	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	0.95	Tt=		
				Tt=	8.55
Channel Flow	L (ft) =	269			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.01	0.7

Tc	29.3 min.
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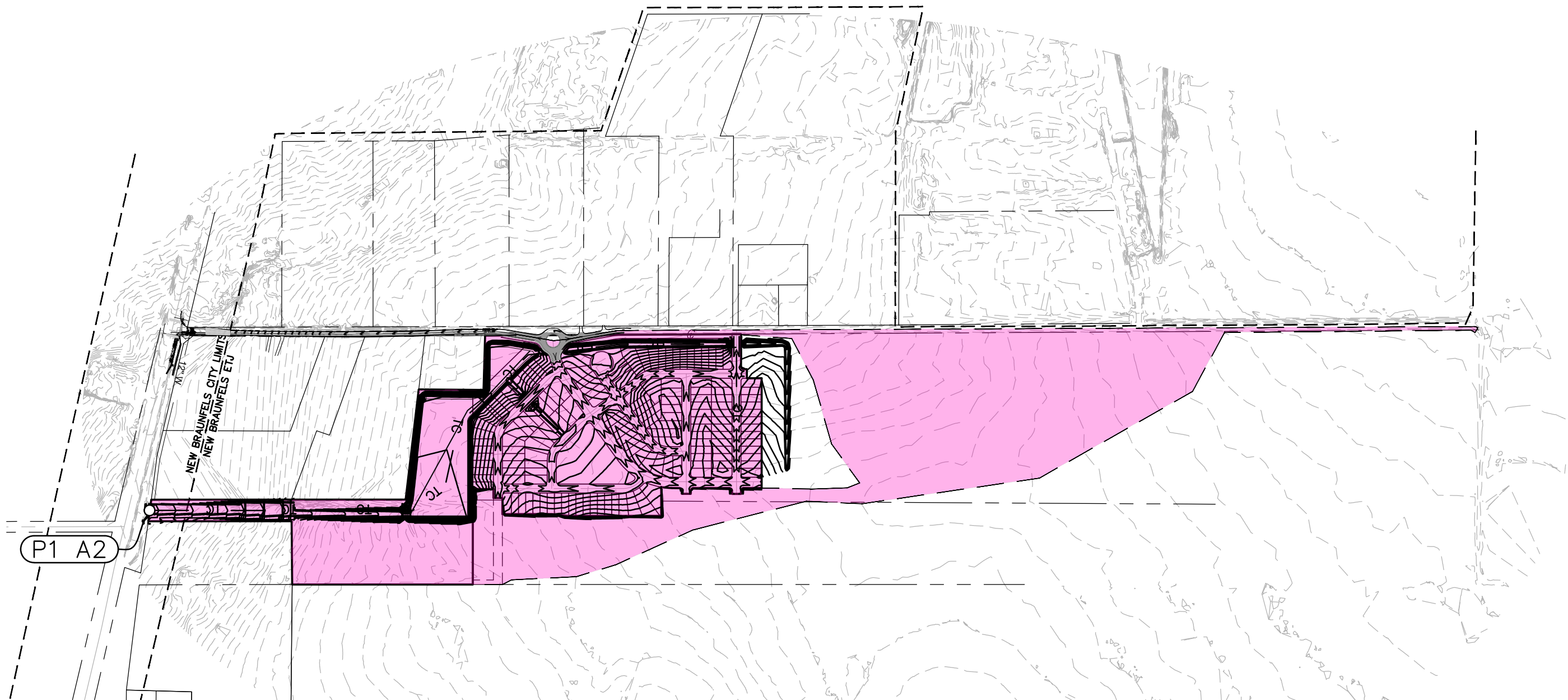
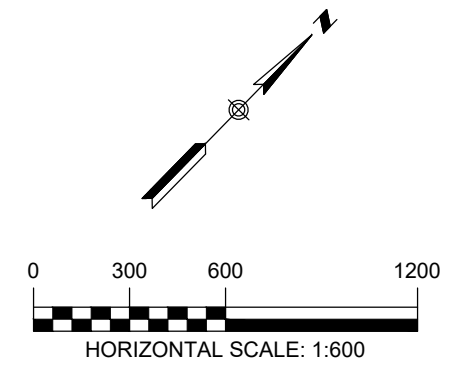
Curve Number	78.00
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Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
<i>Impervious areas:</i>					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
<i>Streets and roads:</i>					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
<i>Agricultural lands</i>					
Grassland, or range-continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86

¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.
² Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.
³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover.
Other combinations of conditions may be computed from the curve numbers for woods and pasture.
⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.
Source: TR-55 [3]

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DRAINAGE SUB-AREA P1 A2

Proposed

Watershed -
Time of Concentration

P1 A2
P1 A2

102.30 Acres

Flow Rate Comparison of Ultimate Conditions vs
Intermediate Phase 1 Conditions to ensure most
Conservative Calculations is Analyzed

Description

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.40			
	P ₂ =	3.34	Tt=	0.27	16.1
Shallow Flow	L (ft) =	50	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	2.2	Tt=		
				Tt=	0.35
Channel Flow	L (ft) =	5000			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.23	13.9

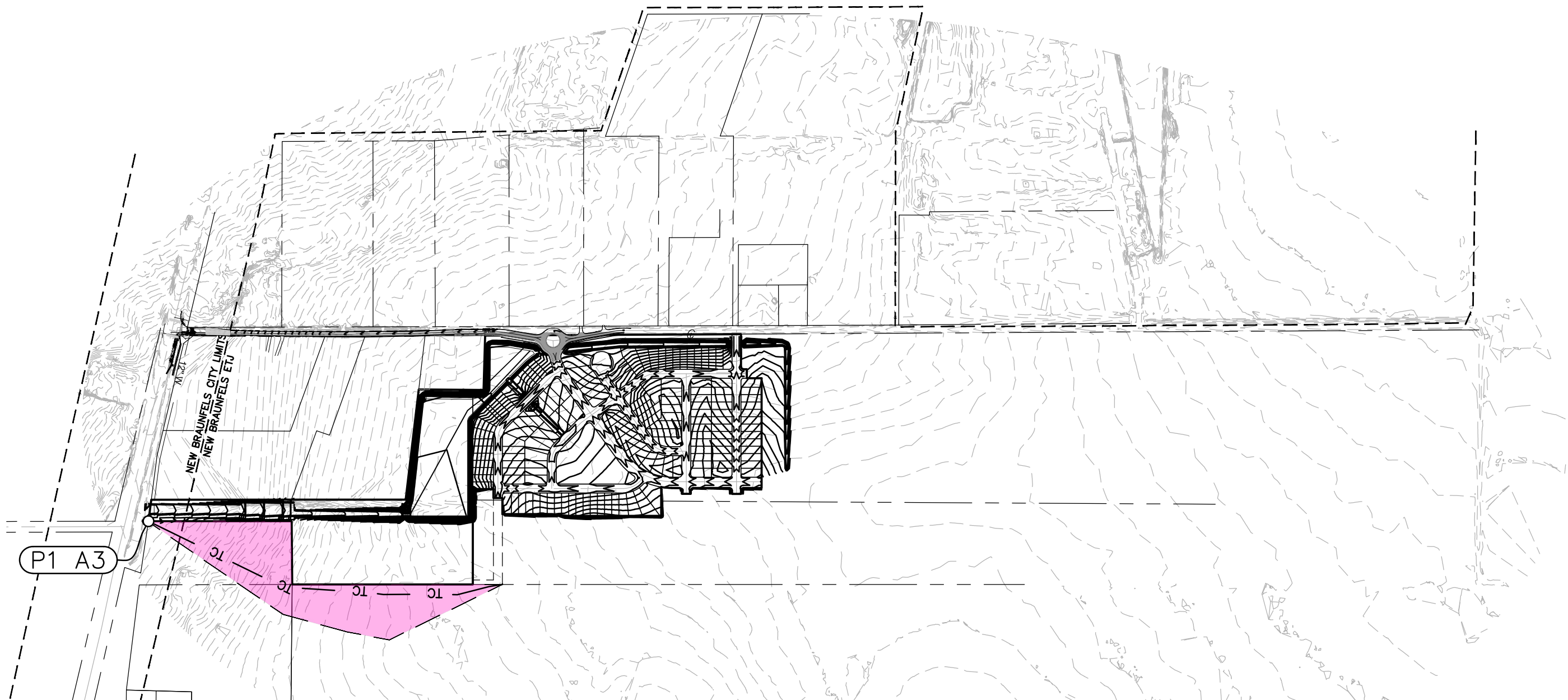
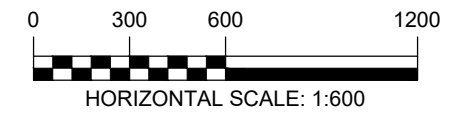
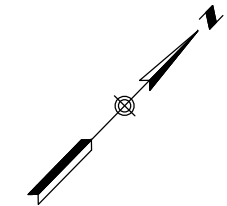
Tc	30.3 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Drawing Name: N:\Projects\031 - DR Horton\031.060 - 175 Ac. Friesenhahn CDs\Phase 1\Reports\Drainage\Attachments\DRNG EXHIBIT P1.dwg User: callynn-m Jun 10, 2020 - 1:36pm



DRAINAGE SUB-AREA P1 A3



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

Proposed

Watershed -
Time of Concentration
Description

P1 A3
P1 A3

10.47 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.50			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	1967	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	1.76	Tt=		
				Tt=	15.32
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

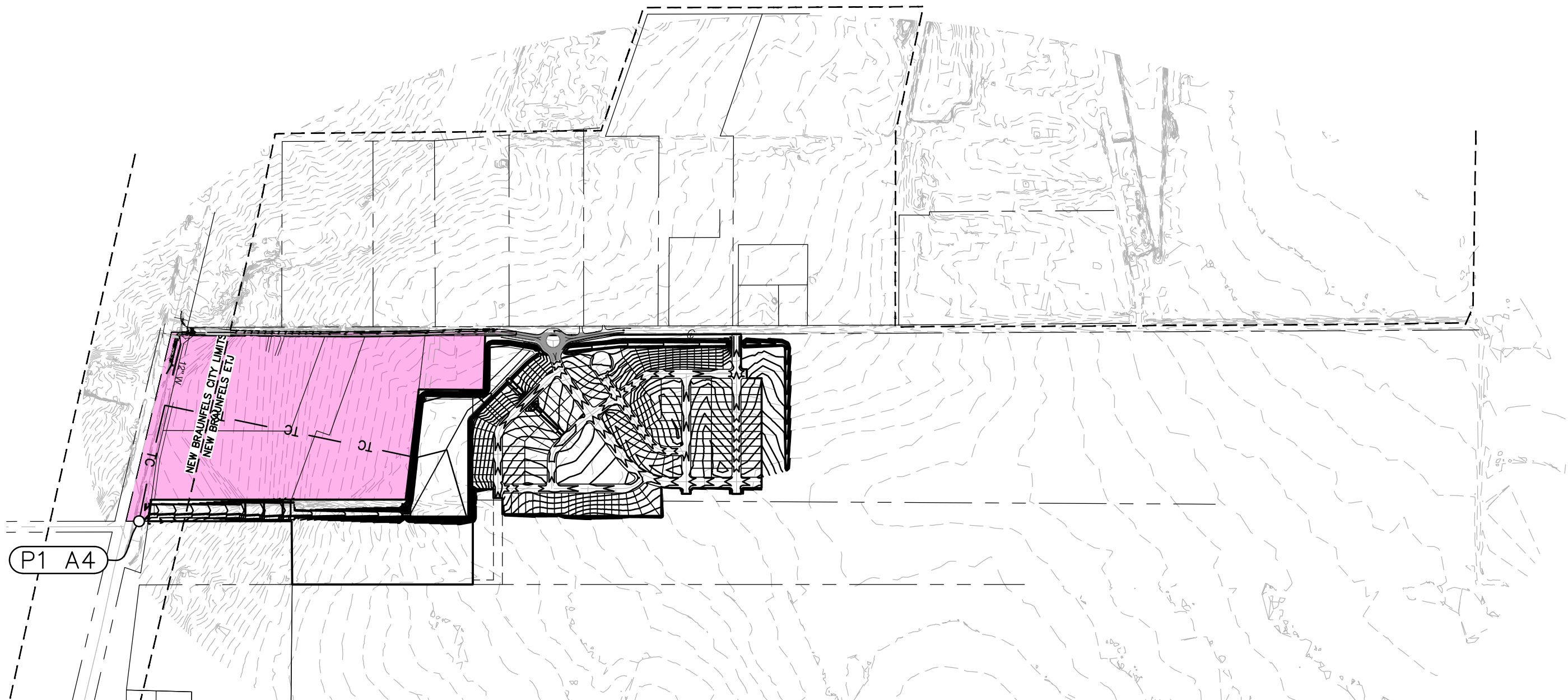
Tc	35.3 min.
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Curve Number	87.00
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Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Drawing Name: N:\Projects\031 - DR Horton\031.060 - 175 Ac. Friesenhahn CDs\Phase 1\Reports\Drainage\Attachments\DRNG EXHIBIT P1.dwg User: callynn-m Jun 10, 2020 - 1:36pm



DRAINAGE SUB-AREA P1 A4

Proposed

Watershed -
Time of Concentration
Description

P1 A4
P1 A4

34.56 Acres

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	1.70			
	P ₂ =	3.34	Tt=	0.25	14.9
Shallow Flow	L (ft) =	1300	Tt=	$(L)/(60*16.1345*S^{(0.5)})$	
(Unpaved)	S (%) =	2.3	Tt=		
				Tt=	8.85
Channel Flow	L (ft) =	662			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.03	1.8

Tc	25.6 min.
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Curve Number	87.00
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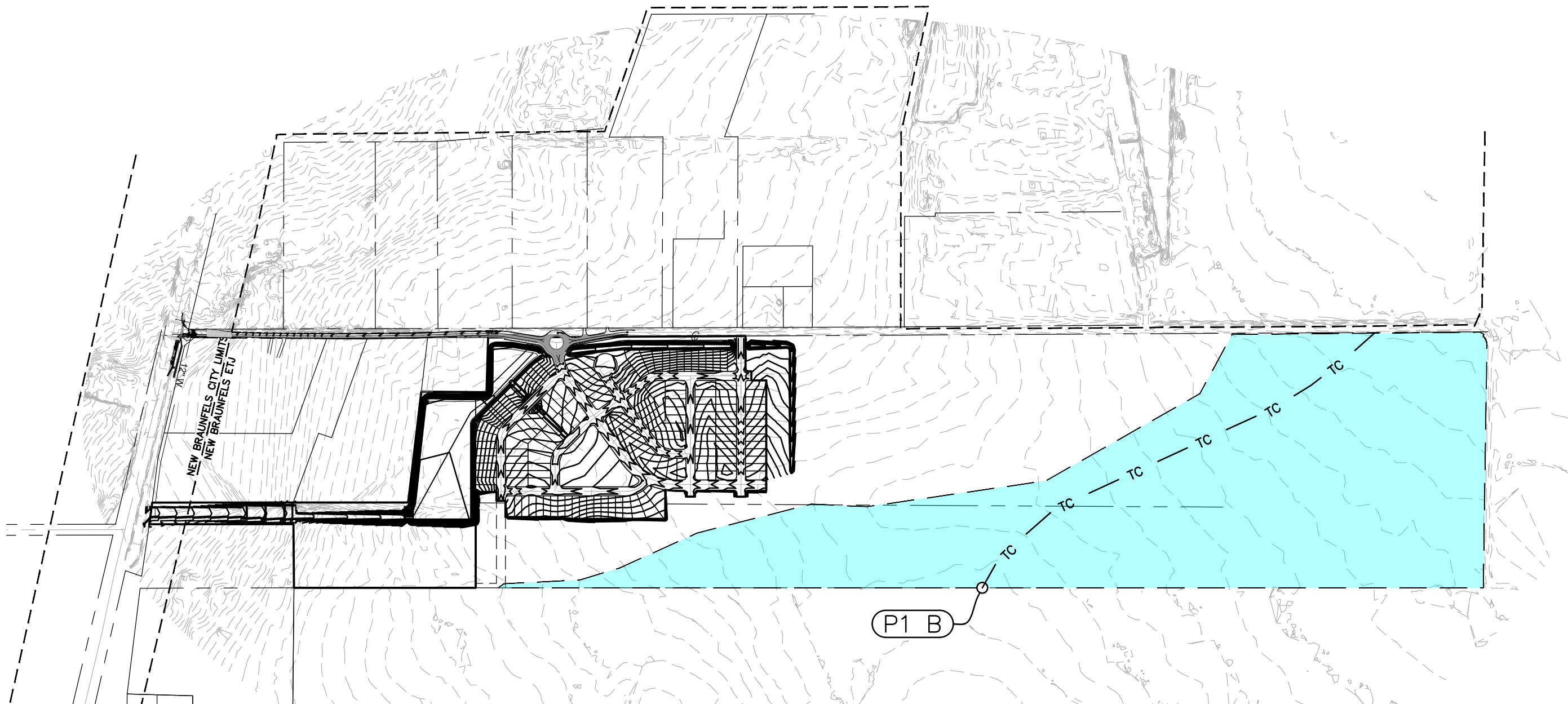
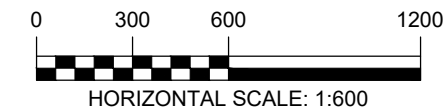
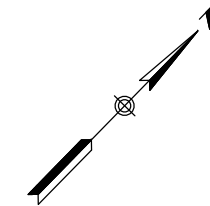
Table 4-4: Curve Numbers for Fully Developed Conditions

Zone	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
R-1/R-1A Single family	61	75	83	87
R-2/R-2A Single and two family	77	85	90	92
R-3/R-3L Multi family high density	77	89	92	94
R-3/R-3H Multi family low density	77	85	90	92
B-1/B-1A Convent & mobile homes	61	75	83	87
TH/TH-A Townhouse	77	89	92	92
ZH/ZH-A Zero lot line homes	68	79	87	90
C-1/C1A Neighborhood business	83	89	92	93
C-2/C-1B General Business	77	86	93	94
C-3 Commercial	89	92	94	95
C-4/C-4A Resort Commercial/PUD (must use composite values)	-	-	-	-
M-1/M1A Light industry	68	79	87	90
M-2/M-2A Heavy industry	89	92	94	95
Source: TR-55 [3]				

Attachment O

Drainage Area P1 B

Drawing Name: N:\Projects\031 - DR Horton\031.060 - 175 Ac. Friesenhahn CDs\Phase 1\Reports\Drainage Attachments\DRNG EXHIBIT P1.dwg User: callynn-m Jun 10, 2020 - 1:36pm



DRAINAGE P1 B

Proposed

Watershed -
Time of Concentration

P1 B
P1 B

90.39 Acres

Flow Rate Comparison of Ultimate Conditions vs
Intermediate Phase 1 Conditions to ensure most
Conservative Calculations is Analyzed

Description

				hrs	min.
Sheet Flow	L (ft) =	100	Tt=	$.007(n*L)^{0.8}/P_2^{0.5} \times S^{0.4}$	
	n=	0.24			
	S (%) =	0.70			
	P ₂ =	3.34	Tt=	0.33	20.0
Shallow Flow	L (ft) =	2536	Tt=	$(L)/(60*16.1345*S^{0.5})$	
(Unpaved)	S (%) =	0.4	Tt=		
				Tt=	41.42
Channel Flow	L (ft) =	0			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L/(60*V)$	
			Tt=	0.00	0.0

Tc	61.4 min.
-----------	------------------

Curve Number	78.00
---------------------	--------------

Table 4-3: NRCS Runoff Curve Numbers for Urban Areas and Agricultural Lands

Cover Description	Average % Impervious Area ¹	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right of way)		98	98	98	98
Paved; open ditches (including right of way)		83	89	92	93
Gravel (including right of way)		76	85	89	91
Dirt (including right of way)		72	82	87	89
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94
Agricultural lands					
Grassland, or range-continuous forage for grazing: ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		30	58	71	78
Brush—brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods—grass combination (orchard or tree farm). ⁴	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁵	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads—buildings, lanes, driveways and surrounding lots		59	74	82	86
¹ Poor: less than 50 percent ground cover or heavily grazed with no mulch. Fair: 50 to 75 percent ground cover and not heavily grazed. Good: greater than 75 percent ground cover and lightly or only occasionally grazed.					
² Poor: less than 50 percent ground cover. Fair: 50 to 75 percent ground cover. Good: greater than 75 percent ground cover.					
³ Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture.					
⁴ Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil.					
Source: TR-55 [3]					

Attachment P

Extended Batch Detention Basin A1

$$WQV \text{ (cuft)} = \frac{0.5 \text{ inches}}{12 \frac{\text{inches}}{\text{foot}}} \times (\text{IC Area Post Construction} - \text{IC Area Pre Construction}) (\text{sq. ft})$$

$$V = WQV * 1.2$$

Required TSS Removed for Site		
	Acre	Sq. FT.
Total Site Acreage =	197.97	8623573
Total Site Proposed Impervious Cover =	138.58	6036501
Total Site Existing Impervious Cover =	0.00	0
WQV =		251520.89 cuft
V =		301825.06 cuft

Total Number of Outfall 3

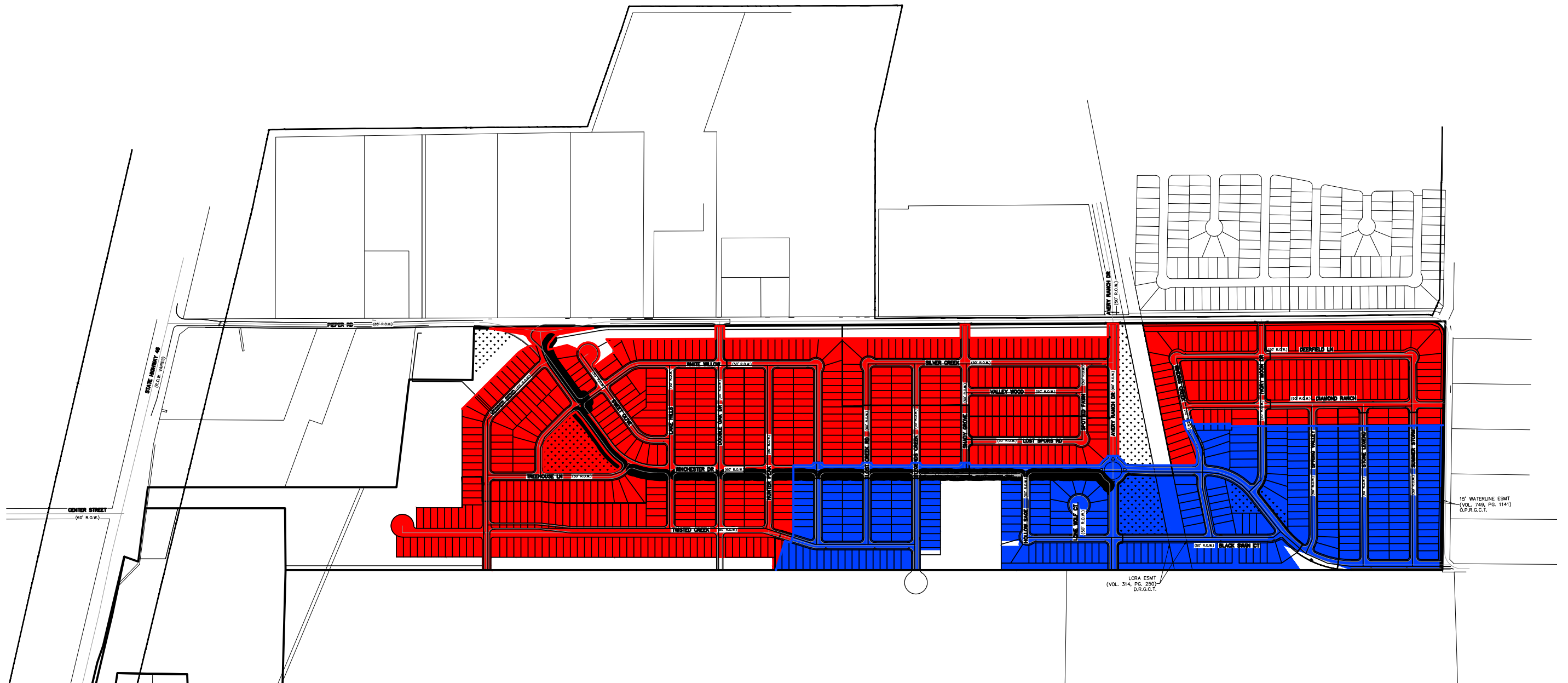
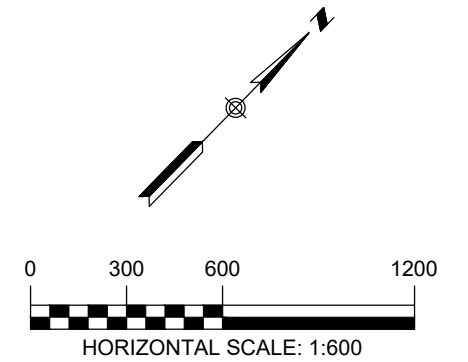
Parkside Development Water Quality	
Volume Required To Be Treated	301825.062
Treatment Outfall	Volume Treated
Basin A1	166577.796
Basin A2	49000.644
Basin A3	89295.822
Total Treated	304874.26
Development Removing Required TSS	YES

Extended Batch Detention Basin A1		
	Acre	Sq. FT.
Total Contributing area =	109.26	4759366
Total Proposed Impervious Cover =	76.48	3331556
Total Existing Impervious Cover =	0	0
WQV =		138814.8 cuft
V =		166577.8 cuft

Extended Batch Detention Basin A2		
	Acre	Sq. FT.
Total Contributing area =	32.14	1400018
Total Proposed Impervious Cover =	22.50	980012.9
Total Existing Impervious Cover =	0	0
WQV =		40833.87 cuft
V =		49000.64 cuft

Extended Batch Detention Basin B		
	Acre	Sq. FT.
Total Contributing area =	58.57	2551309
Total Proposed Impervious Cover =	41.00	1785916
Total Existing Impervious Cover =	0	0
WQV =		74413.19 cuft
V =		89295.82 cuft

- AREA A IMPERVIOUS COVER
- AREA B IMPERVIOUS COVER



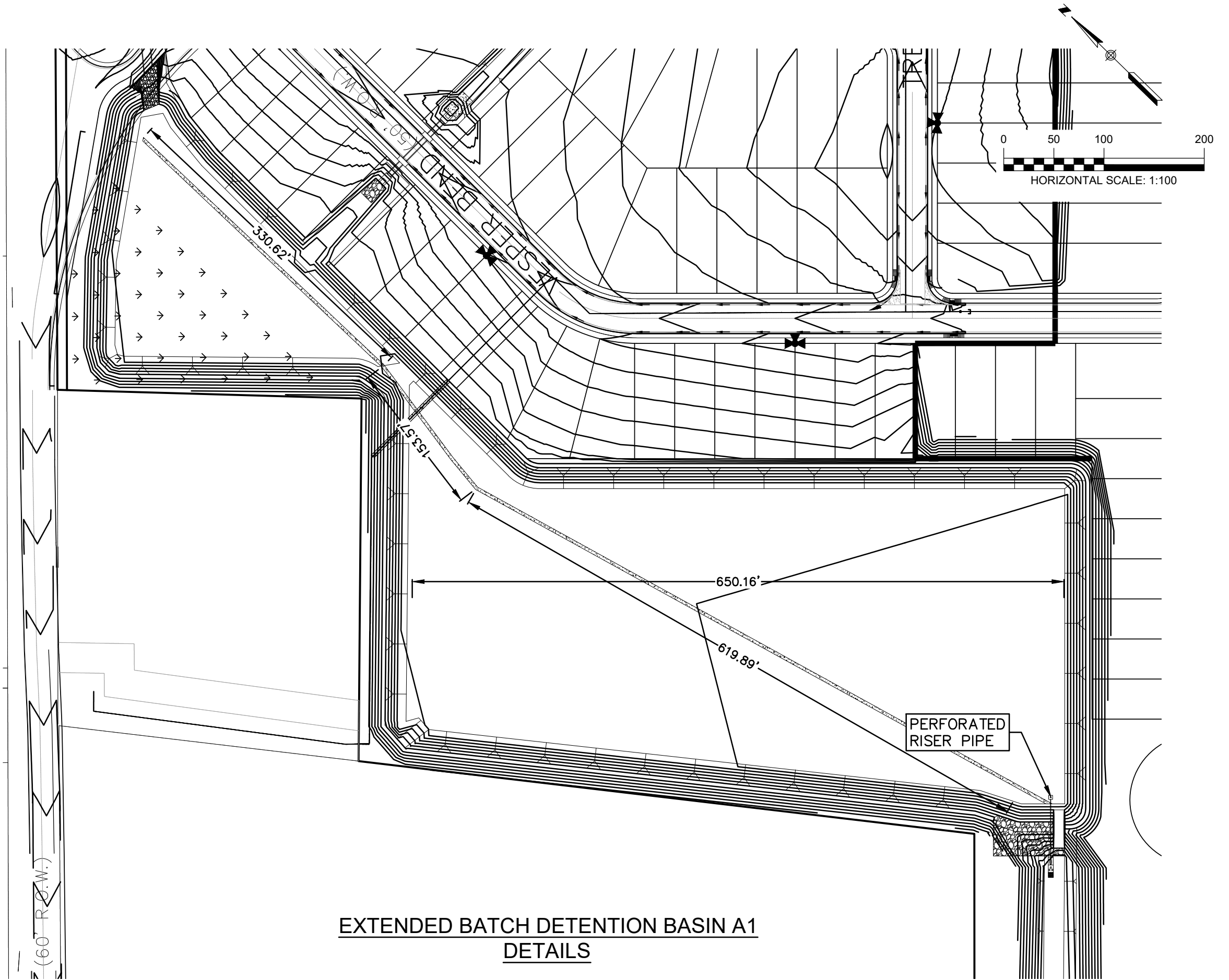
410 N. SEGUIN AVE.
NEW BRAUNFELS,
TEXAS, 78130
WWW.HMTNB.COM
PH: (830)625-8555

WATER QUALITY IMPERVIOUS COVER EXHIBIT

Drawing Name: C:\Users\cattlynn-m\AppData\Local\Temp\AsPublish_2355\031.060_Imperious Cover Exhibit.dwg User: cattlynn-m Jun 11, 2020 - 6:51 am



410 N. SEGUIN AVE.
NEW BRAUNFELS,
TEXAS, 78130
WWW.HMTNB.COM
PH: (830)625-8555



Attachment Q

Detention Basins Emergency Weir and Drawdown Calculations

Cross Section for BASIN A1 EMERGENCY WEIR

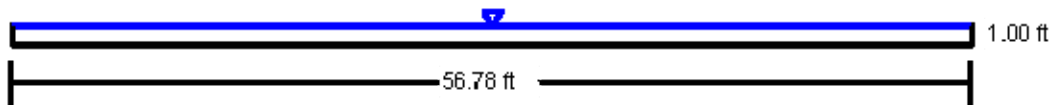
Project Description

Solve For Crest Length

Input Data

Discharge	189.09	ft ³ /s
Headwater Elevation	608.00	ft
Crest Elevation	607.00	ft
Tailwater Elevation	0.00	ft
Weir Coefficient	3.33	US
Crest Length	56.78	ft
Number Of Contractions	0	

Cross Section Image



V: 1
H: 1

Worksheet for BASIN A1 EMERGENCY WEIR

Project Description

Solve For Crest Length

Input Data

Discharge	189.09	ft ³ /s
Headwater Elevation	608.00	ft
Crest Elevation	607.00	ft
Tailwater Elevation	0.00	ft
Weir Coefficient	3.33	US
Number Of Contractions	0	

Results

Crest Length	56.78	ft
Headwater Height Above Crest	1.00	ft
Tailwater Height Above Crest	-607.00	ft
Flow Area	56.78	ft ²
Velocity	3.33	ft/s
Wetted Perimeter	58.78	ft
Top Width	56.78	ft

Extended Detention Basin A1 Draw Down Time															
100 YR Storm Event				25 YR Storm Event				10YR Storm Event				2 YR Storm Event			
Time(hr)	Q(cfs)		Q(cfs)		Q(cfs)		Q(cfs)		Q(cfs)						
0.00	0.00	Time to Drain =	23.03	0.00	Time to Drain =	20.07	0.00	Time to Drain =	19.07	0.00	Time to Drain =	16.73			
8.90	1.16			0.00			0.00			0.00					
8.93	1.40			0.00			0.00			0.00					
8.97	1.65			0.00			0.00			0.00					
9.00	1.90			0.00			0.00			0.00					
9.03	2.17			0.00			0.00			0.00					
9.07	2.47			0.00			0.00			0.00					
9.10	2.77			0.00			0.00			0.00					
9.13	3.08			0.00			0.00			0.00					
9.17	3.41			0.00			0.00			0.00					
9.20	3.76			0.00			0.00			0.00					
9.23	4.11			0.00			0.00			0.00					
9.27	4.47			0.00			0.00			0.00					
9.30	4.85			0.00			0.00			0.00					
9.33	5.24			0.00			0.00			0.00					
9.37	5.63			0.00			0.00			0.00					
9.40	6.05			0.00			0.00			0.00					
9.43	6.48			0.00			0.00			0.00					
9.47	6.91			0.00			0.00			0.00					
9.50	7.34			0.00			0.00			0.00					
9.53	7.80			0.00			0.00			0.00					
9.57	8.27			0.00			0.00			0.00					
9.60	8.73			0.00			0.00			0.00					
9.63	9.22			0.00			0.00			0.00					
9.67	9.71			0.00			0.00			0.00					
9.70	10.21			0.00			0.00			0.00					
9.73	10.71			0.00			0.00			0.00					
9.77	11.23			0.00			0.00			0.00					
9.80	11.76			0.00			0.00			0.00					
9.83	12.28			0.00			0.00			0.00					
9.87	12.83			0.00			0.00			0.00					
9.90	13.38			0.00			0.00			0.00					
9.93	13.92			0.00			0.00			0.00					
9.97	14.47			0.00			0.00			0.00					
10.00	15.02			0.00			0.00			0.00					
10.03	15.56			0.00			0.00			0.00					
10.07	16.11			0.00			0.00			0.00					
10.10	16.69			0.00			0.00			0.00					
10.13	17.29			0.00			0.00			0.00					
10.17	17.88			0.00			0.00			0.00					
10.20	18.47			0.00			0.00			0.00					
10.23	19.06			0.00			0.00			0.00					
10.27	19.65			0.00			0.00			0.00					
10.30	20.25			0.00			0.00			0.00					
10.33	20.86			0.05			0.00			0.00					
10.37	21.50			0.16			0.00			0.00					
10.40	22.14			0.27			0.00			0.00					
10.43	22.78			0.38			0.00			0.00					
10.47	23.41			0.57			0.00			0.00					
10.50	24.06			0.77			0.00			0.00					
10.53	24.70			0.98			0.00			0.00					
10.57	25.36			1.21			0.00			0.00					
10.60	26.05			1.49			0.00			0.00					
10.63	26.74			1.76			0.00			0.00					
10.67	27.44			2.04			0.00			0.00					
10.70	28.13			2.37			0.00			0.00					
10.73	28.83			2.70			0.00			0.00					
10.77	29.54			3.04			0.00			0.00					
10.80	30.27			3.41			0.00			0.00					
10.83	31.02			3.79			0.00			0.00					
10.87	31.78			4.18			0.00			0.00					
10.90	32.53			4.59			0.00			0.00					
10.93	33.30			5.02			0.00			0.00					
10.97	34.07			5.46			0.00			0.00					
11.00	34.84			5.91			0.00			0.00					
11.03	35.65			6.39			0.00			0.00					
11.07	36.47			6.87			0.00			0.00					
11.10	37.30			7.36			0.00			0.00					
11.13	38.13			7.88			0.00			0.00					
11.17	38.97			8.40			0.00			0.00					
11.20	39.82			8.93			0.00			0.00					
11.23	40.69			9.50			0.00			0.00					
11.27	41.60			10.07			0.00			0.00					
11.30	42.52			10.65			0.00			0.00					
11.33	43.46			11.26			0.00			0.00					
11.37	44.41			11.88			0.02			0.00					
11.40	45.39			12.51			0.14			0.00					
11.43	46.40			13.18			0.26			0.00					
11.47	47.46			13.85			0.39			0.00					

11.50	48.55	14.54	0.62	0.00
11.53	49.67	15.23	0.86	0.00
11.57	50.83	15.95	1.11	0.00
11.60	52.03	16.71	1.44	0.00
11.63	53.33	17.53	1.78	0.00
11.67	54.70	18.37	2.15	0.00
11.70	56.15	19.25	2.58	0.00
11.73	57.71	20.18	3.03	0.00
11.77	59.45	21.21	3.55	0.00
11.80	61.35	22.33	4.12	0.00
11.83	63.43	23.54	4.76	0.00
11.87	65.65	24.84	5.47	0.00
11.90	68.07	26.33	6.27	0.00
11.93	70.76	27.97	7.16	0.00
11.97	73.88	29.78	8.21	0.00
12.00	77.43	31.91	9.39	0.00
12.03	81.62	34.32	10.77	0.00
12.07	86.48	37.14	12.38	0.00
12.10	92.08	40.34	14.26	0.00
12.13	98.49	44.05	16.32	0.00
12.17	105.72	48.21	18.77	0.00
12.20	113.78	52.84	21.48	0.00
12.23	122.67	57.97	24.52	0.00
12.27	132.39	63.63	27.93	0.00
12.30	142.55	69.32	31.65	0.00
12.33	152.93	75.40	35.70	0.00
12.37	163.90	81.85	40.05	0.00
12.40	175.33	88.60	44.68	0.00
12.43	186.99	95.54	49.49	0.18
12.47	198.68	102.56	54.42	0.71
12.50	210.29	109.60	59.40	1.51
12.53	221.72	116.57	64.38	2.51
12.57	232.72	123.42	68.98	3.66
12.60	243.11	130.10	73.51	4.92
12.63	253.06	136.61	77.92	6.28
12.67	262.52	142.49	82.25	7.72
12.70	271.41	147.96	86.41	9.20
12.73	279.70	153.15	90.40	10.72
12.77	287.38	158.02	94.21	12.27
12.80	294.37	162.55	97.79	13.82
12.83	300.67	166.73	101.17	15.30
12.87	306.31	170.55	104.31	16.76
12.90	311.22	174.00	107.20	18.23
12.93	315.48	177.09	109.87	19.63
12.97	319.06	179.81	112.27	20.99
13.00	321.97	182.16	114.43	22.33
13.03	324.25	184.18	116.36	23.59
13.07	325.91	185.84	118.04	24.77
13.10	326.96	187.15	119.48	25.92
13.13	327.41	188.12	120.67	27.01
13.17	327.30	188.76	121.63	28.02
13.20	326.63	189.08	122.37	28.94
13.23	325.44	189.09	122.88	29.79
13.27	323.73	188.80	123.18	30.59
13.30	321.56	188.23	123.26	31.31
13.33	318.94	187.37	123.14	31.96
13.37	315.89	186.25	122.82	32.52
13.40	312.43	184.88	122.32	33.01
13.43	308.63	183.28	121.64	33.42
13.47	304.47	181.45	120.80	33.76
13.50	300.00	179.44	119.81	34.03
13.53	295.27	177.24	118.67	34.24
13.57	290.27	174.86	117.39	34.38
13.60	285.08	172.32	115.99	34.47
13.63	279.68	169.67	114.47	34.49
13.67	274.16	166.89	112.88	34.47
13.70	268.51	164.01	111.21	34.39
13.73	262.82	161.10	109.47	34.28
13.77	257.11	158.14	107.68	34.13
13.80	251.45	155.16	105.88	33.96
13.83	245.87	152.23	104.09	33.76
13.87	240.37	149.30	102.30	33.55
13.90	234.99	146.40	100.50	33.31
13.93	229.71	143.57	98.72	33.07
13.97	224.42	140.77	96.99	32.81
14.00	219.22	138.00	95.28	32.55
14.03	214.22	135.11	93.58	32.27
14.07	209.33	132.28	91.91	32.00
14.10	204.62	129.51	90.29	31.71
14.13	200.03	126.86	88.71	31.43
14.17	195.63	124.26	87.16	31.14
14.20	191.33	121.73	85.63	30.86

14.23	187.21	119.31	84.14	30.57
14.27	183.20	116.94	82.71	30.28
14.30	179.33	114.63	81.31	29.99
14.33	175.59	112.41	79.93	29.71
14.37	171.96	110.25	78.58	29.44
14.40	168.46	108.14	77.26	29.17
14.43	165.06	106.09	76.00	28.90
14.47	161.78	104.13	74.76	28.63
14.50	158.60	102.21	73.55	28.36
14.53	155.51	100.34	72.35	28.09
14.57	152.54	98.52	71.19	27.83
14.60	149.66	96.78	70.07	27.56
14.63	146.84	95.08	68.98	27.30
14.67	144.15	93.41	67.91	27.04
14.70	141.52	91.79	66.87	26.78
14.73	138.96	90.24	65.84	26.53
14.77	136.36	88.73	64.83	26.27
14.80	133.77	87.25	63.83	26.02
14.83	131.26	85.80	62.81	25.77
14.87	128.84	84.39	61.82	25.52
14.90	126.51	83.04	60.84	25.28
14.93	124.24	81.73	59.89	25.03
14.97	122.03	80.44	58.95	24.81
15.00	119.91	79.18	58.04	24.58
15.03	117.86	77.94	57.17	24.36
15.07	115.85	76.75	56.33	24.14
15.10	113.90	75.60	55.50	23.92
15.13	112.03	74.48	54.69	23.70
15.17	110.20	73.37	53.89	23.49
15.20	108.42	72.29	53.11	23.27
15.23	106.68	71.23	52.35	23.06
15.27	105.02	70.21	51.60	22.85
15.30	103.39	69.22	50.89	22.64
15.33	101.81	68.25	50.20	22.44
15.37	100.25	67.30	49.51	22.23
15.40	98.74	66.37	48.84	22.03
15.43	97.29	65.45	48.19	21.83
15.47	95.87	64.55	47.54	21.63
15.50	94.48	63.64	46.90	21.43
15.53	93.12	62.73	46.28	21.23
15.57	91.79	61.83	45.68	21.04
15.60	90.51	60.96	45.10	20.85
15.63	89.26	60.10	44.53	20.66
15.67	88.04	59.25	43.97	20.47
15.70	86.84	58.43	43.42	20.29
15.73	85.66	57.63	42.87	20.12
15.77	84.50	56.86	42.34	19.95
15.80	83.39	56.10	41.81	19.78
15.83	82.30	55.36	41.29	19.60
15.87	81.23	54.63	40.78	19.44
15.90	80.17	53.92	40.28	19.27
15.93	79.14	53.21	39.80	19.10
15.97	78.12	52.52	39.34	18.93
16.00	77.12	51.83	38.87	18.77
16.03	76.16	51.18	38.42	18.60
16.07	75.22	50.54	37.96	18.44
16.10	74.28	49.91	37.52	18.28
16.13	73.36	49.29	37.08	18.12
16.17	72.45	48.68	36.64	17.96
16.20	71.56	48.07	36.21	17.80
16.23	70.67	47.48	35.79	17.64
16.27	69.83	46.89	35.37	17.48
16.30	68.99	46.31	34.96	17.32
16.33	68.17	45.75	34.57	17.17
16.37	67.36	45.21	34.18	17.01
16.40	66.55	44.67	33.80	16.86
16.43	65.76	44.14	33.42	16.70
16.47	64.98	43.62	33.05	16.55
16.50	64.21	43.11	32.68	16.40
16.53	63.41	42.60	32.32	16.25
16.57	62.62	42.10	31.96	16.11
16.60	61.84	41.61	31.61	15.98
16.63	61.08	41.12	31.26	15.84
16.67	60.33	40.64	30.91	15.71
16.70	59.59	40.18	30.57	15.58
16.73	58.86	39.73	30.23	15.44
16.77	58.15	39.29	29.90	15.31
16.80	57.46	38.86	29.59	15.18
16.83	56.79	38.43	29.28	15.05
16.87	56.14	38.00	28.98	14.93
16.90	55.49	37.59	28.68	14.80
16.93	54.85	37.18	28.38	14.67

16.97	54.23	36.77	28.09	14.55
17.00	53.61	36.37	27.80	14.42
17.03	53.00	35.98	27.52	14.30
17.07	52.40	35.59	27.23	14.18
17.10	51.82	35.21	26.96	14.06
17.13	51.26	34.84	26.68	13.94
17.17	50.71	34.48	26.41	13.82
17.20	50.17	34.13	26.14	13.70
17.23	49.64	33.79	25.88	13.59
17.27	49.12	33.45	25.62	13.47
17.30	48.60	33.11	25.36	13.36
17.33	48.09	32.78	25.11	13.24
17.37	47.59	32.46	24.87	13.13
17.40	47.10	32.13	24.64	13.02
17.43	46.61	31.82	24.41	12.91
17.47	46.13	31.50	24.18	12.80
17.50	45.67	31.19	23.95	12.69
17.53	45.23	30.89	23.73	12.59
17.57	44.79	30.59	23.51	12.48
17.60	44.35	30.29	23.30	12.38
17.63	43.92	29.99	23.08	12.27
17.67	43.50	29.71	22.87	12.18
17.70	43.08	29.44	22.66	12.08
17.73	42.67	29.17	22.45	11.98
17.77	42.26	28.91	22.25	11.88
17.80	41.86	28.64	22.04	11.79
17.83	41.46	28.38	21.84	11.69
17.87	41.07	28.13	21.65	11.60
17.90	40.68	27.87	21.45	11.51
17.93	40.30	27.62	21.25	11.42
17.97	39.94	27.37	21.06	11.32
18.00	39.58	27.12	20.87	11.23
18.03	39.23	26.88	20.68	11.14
18.07	38.88	26.64	20.50	11.05
18.10	38.53	26.40	20.32	10.96
18.13	38.18	26.16	20.15	10.87
18.17	37.84	25.93	19.98	10.79
18.20	37.50	25.69	19.81	10.70
18.23	37.17	25.46	19.65	10.61
18.27	36.84	25.24	19.48	10.53
18.30	36.51	25.01	19.32	10.45
18.33	36.18	24.80	19.15	10.37
18.37	35.86	24.59	18.99	10.29
18.40	35.54	24.39	18.83	10.21
18.43	35.23	24.18	18.68	10.13
18.47	34.92	23.98	18.52	10.06
18.50	34.63	23.78	18.36	9.98
18.53	34.34	23.58	18.21	9.90
18.57	34.05	23.38	18.06	9.83
18.60	33.77	23.19	17.91	9.75
18.63	33.49	23.00	17.76	9.68
18.67	33.21	22.81	17.61	9.61
18.70	32.94	22.62	17.47	9.53
18.73	32.67	22.43	17.32	9.46
18.77	32.40	22.25	17.18	9.39
18.80	32.14	22.07	17.04	9.32
18.83	31.88	21.89	16.90	9.25
18.87	31.63	21.72	16.77	9.18
18.90	31.37	21.54	16.63	9.11
18.93	31.13	21.37	16.50	9.04
18.97	30.88	21.20	16.37	8.98
19.00	30.64	21.03	16.24	8.91
19.03	30.40	20.87	16.12	8.84
19.07	30.17	20.70	16.00	8.78
19.10	29.93	20.54	15.89	8.72
19.13	29.71	20.39	15.77	8.66
19.17	29.50	20.25	15.66	8.60
19.20	29.29	20.10	15.55	8.55
19.23	29.09	19.96	15.44	8.49
19.27	28.88	19.82	15.33	8.43
19.30	28.68	19.68	15.22	8.37
19.33	28.48	19.55	15.12	8.32
19.37	28.29	19.41	15.01	8.26
19.40	28.10	19.28	14.91	8.21
19.43	27.91	19.15	14.81	8.15
19.47	27.72	19.02	14.71	8.10
19.50	27.54	18.89	14.61	8.05
19.53	27.35	18.77	14.51	8.00
19.57	27.18	18.64	14.41	7.94
19.60	27.00	18.52	14.32	7.89
19.63	26.83	18.40	14.22	7.84
19.67	26.66	18.28	14.13	7.79

19.70	26.49	18.16	14.04	7.74
19.73	26.32	18.05	13.95	7.69
19.77	26.16	17.93	13.86	7.64
19.80	26.00	17.82	13.77	7.60
19.83	25.84	17.71	13.68	7.55
19.87	25.68	17.60	13.59	7.50
19.90	25.52	17.49	13.51	7.46
19.93	25.37	17.38	13.42	7.41
19.97	25.22	17.27	13.34	7.37
20.00	25.07	17.17	13.26	7.32
20.03	24.93	17.07	13.18	7.28
20.07	24.79	16.96	13.09	7.23
20.10	24.66	16.86	13.01	7.19
20.13	24.53	16.76	12.94	7.15
20.17	24.39	16.66	12.86	7.11
20.20	24.26	16.57	12.78	7.07
20.23	24.13	16.47	12.71	7.03
20.27	24.01	16.37	12.63	6.99
20.30	23.88	16.28	12.56	6.96
20.33	23.76	16.19	12.48	6.92
20.37	23.63	16.11	12.41	6.88
20.40	23.51	16.02	12.34	6.84
20.43	23.39	15.94	12.27	6.81
20.47	23.27	15.86	12.20	6.77
20.50	23.15	15.78	12.14	6.73
20.53	23.03	15.69	12.07	6.70
20.57	22.92	15.61	12.00	6.66
20.60	22.80	15.53	11.94	6.63
20.63	22.69	15.46	11.87	6.59
20.67	22.57	15.38	11.81	6.55
20.70	22.46	15.30	11.75	6.52
20.73	22.35	15.22	11.68	6.49
20.77	22.24	15.15	11.62	6.45
20.80	22.13	15.07	11.56	6.42
20.83	22.02	15.00	11.50	6.38
20.87	21.91	14.92	11.44	6.35
20.90	21.81	14.85	11.38	6.32
20.93	21.70	14.77	11.32	6.29
20.97	21.60	14.70	11.26	6.25
21.00	21.49	14.63	11.20	6.22
21.03	21.39	14.56	11.14	6.19
21.07	21.29	14.49	11.09	6.16
21.10	21.19	14.42	11.03	6.13
21.13	21.08	14.35	10.97	6.09
21.17	20.98	14.28	10.92	6.06
21.20	20.89	14.21	10.86	6.03
21.23	20.79	14.14	10.81	6.00
21.27	20.69	14.07	10.75	5.97
21.30	20.59	14.00	10.70	5.94
21.33	20.49	13.94	10.64	5.91
21.37	20.40	13.87	10.59	5.88
21.40	20.32	13.80	10.54	5.85
21.43	20.23	13.74	10.49	5.82
21.47	20.14	13.67	10.44	5.79
21.50	20.05	13.61	10.39	5.76
21.53	19.96	13.54	10.34	5.74
21.57	19.88	13.48	10.29	5.71
21.60	19.79	13.42	10.24	5.68
21.63	19.71	13.35	10.19	5.66
21.67	19.62	13.29	10.15	5.63
21.70	19.53	13.23	10.10	5.61
21.73	19.45	13.17	10.05	5.58
21.77	19.37	13.10	10.00	5.55
21.80	19.28	13.04	9.96	5.53
21.83	19.20	12.98	9.91	5.50
21.87	19.11	12.92	9.87	5.48
21.90	19.03	12.86	9.82	5.45
21.93	18.95	12.80	9.77	5.43
21.97	18.87	12.74	9.73	5.40
22.00	18.78	12.68	9.68	5.38
22.03	18.70	12.62	9.64	5.36
22.07	18.62	12.57	9.59	5.33
22.10	18.55	12.51	9.55	5.31
22.13	18.48	12.46	9.51	5.29
22.17	18.40	12.40	9.47	5.26
22.20	18.34	12.35	9.43	5.24
22.23	18.27	12.31	9.39	5.22
22.27	18.21	12.26	9.36	5.20
22.30	18.15	12.22	9.32	5.18
22.33	18.09	12.17	9.29	5.16
22.37	18.03	12.13	9.25	5.14
22.40	17.98	12.09	9.22	5.12

22.43	17.93	12.06	9.19	5.10
22.47	17.87	12.02	9.16	5.08
22.50	17.82	11.98	9.12	5.06
22.53	17.77	11.94	9.09	5.05
22.57	17.72	11.90	9.06	5.03
22.60	17.67	11.86	9.03	5.01
22.63	17.61	11.83	9.00	4.99
22.67	17.56	11.79	8.97	4.97
22.70	17.51	11.75	8.94	4.95
22.73	17.46	11.71	8.91	4.94
22.77	17.40	11.67	8.88	4.92
22.80	17.35	11.64	8.84	4.90
22.83	17.30	11.60	8.82	4.88
22.87	17.25	11.56	8.79	4.86
22.90	17.19	11.52	8.76	4.85
22.93	17.14	11.48	8.73	4.83
22.97	17.09	11.45	8.70	4.81
23.00	17.03	11.41	8.67	4.79
23.03	16.98	11.37	8.64	4.78
23.07	16.92	11.33	8.61	4.76
23.10	16.87	11.29	8.58	4.74
23.13	16.82	11.25	8.56	4.72
23.17	16.76	11.22	8.53	4.71
23.20	16.71	11.18	8.50	4.69
23.23	16.65	11.14	8.47	4.67
23.27	16.60	11.10	8.44	4.65
23.30	16.54	11.06	8.41	4.64
23.33	16.48	11.02	8.38	4.62
23.37	16.43	10.98	8.35	4.60
23.40	16.37	10.95	8.32	4.58
23.43	16.31	10.91	8.29	4.57
23.47	16.26	10.87	8.26	4.55
23.50	16.20	10.83	8.23	4.53
23.53	16.15	10.79	8.20	4.51
23.57	16.10	10.75	8.17	4.50
23.60	16.04	10.71	8.14	4.48
23.63	15.99	10.67	8.11	4.46
23.67	15.93	10.63	8.08	4.44
23.70	15.88	10.59	8.05	4.43
23.73	15.82	10.55	8.02	4.41
23.77	15.77	10.51	7.99	4.39
23.80	15.71	10.47	7.96	4.37
23.83	15.65	10.43	7.93	4.36
23.87	15.60	10.39	7.90	4.34
23.90	15.54	10.36	7.87	4.33
23.93	15.49	10.32	7.84	4.31
23.97	15.43	10.28	7.81	4.30
24.00	15.38	10.24	7.78	4.28
24.03	15.32	10.20	7.75	4.27
24.07	15.26	10.17	7.72	4.25
24.10	15.21	10.13	7.69	4.23
24.13	15.15	10.09	7.66	4.22
24.17	15.08	10.04	7.63	4.20
24.20	15.02	10.00	7.59	4.18
24.23	14.94	9.95	7.56	4.17
24.27	14.87	9.90	7.52	4.15
24.30	14.79	9.85	7.48	4.13
24.33	14.70	9.79	7.44	4.11
24.37	14.61	9.74	7.39	4.09
24.40	14.51	9.67	7.35	4.06
24.43	14.40	9.60	7.30	4.04
24.47	14.28	9.53	7.24	4.01
24.50	14.16	9.45	7.19	3.99
24.53	14.04	9.38	7.14	3.96
24.57	13.90	9.29	7.08	3.93
24.60	13.77	9.21	7.02	3.90
24.63	13.62	9.12	6.96	3.87
24.67	13.48	9.03	6.90	3.84
24.70	13.32	8.93	6.83	3.81
24.73	13.17	8.84	6.77	3.78
24.77	13.01	8.74	6.70	3.75
24.80	12.85	8.65	6.63	3.71
24.83	12.68	8.55	6.56	3.68
24.87	12.51	8.45	6.49	3.65
24.90	12.34	8.35	6.42	3.61
24.93	12.18	8.25	6.34	3.58
24.97	12.01	8.15	6.27	3.54
25.00	11.84	8.05	6.19	3.50
25.03	11.67	7.94	6.12	3.47
25.07	11.50	7.84	6.04	3.43
25.10	11.32	7.73	5.96	3.39
25.13	11.15	7.62	5.89	3.36

25.17	10.98	7.52	5.81	3.32
25.20	10.80	7.41	5.73	3.28
25.23	10.63	7.30	5.66	3.24
25.27	10.46	7.20	5.59	3.21
25.30	10.29	7.10	5.52	3.17
25.33	10.13	7.00	5.45	3.13
25.37	9.97	6.90	5.38	3.10
25.40	9.80	6.80	5.31	3.07
25.43	9.64	6.70	5.23	3.03
25.47	9.48	6.61	5.16	3.00
25.50	9.32	6.51	5.09	2.97
25.53	9.16	6.41	5.02	2.93
25.57	9.01	6.32	4.96	2.90
25.60	8.85	6.22	4.89	2.87
25.63	8.71	6.13	4.82	2.84
25.67	8.57	6.03	4.75	2.81
25.70	8.43	5.94	4.69	2.78
25.73	8.29	5.85	4.62	2.75
25.77	8.16	5.77	4.56	2.71
25.80	8.03	5.68	4.49	2.68
25.83	7.90	5.60	4.43	2.65
25.87	7.77	5.53	4.37	2.63
25.90	7.64	5.45	4.31	2.60
25.93	7.52	5.37	4.26	2.57
25.97	7.39	5.30	4.21	2.54
26.00	7.27	5.22	4.15	2.51
26.03	7.16	5.15	4.10	2.48
26.07	7.05	5.08	4.05	2.45
26.10	6.95	5.01	4.00	2.43
26.13	6.84	4.94	3.95	2.40
26.17	6.74	4.87	3.90	2.37
26.20	6.64	4.80	3.85	2.35
26.23	6.54	4.74	3.80	2.32
26.27	6.44	4.67	3.75	2.30
26.30	6.34	4.60	3.70	2.27
26.33	6.24	4.54	3.66	2.24
26.37	6.15	4.48	3.61	2.22
26.40	6.06	4.42	3.57	2.20
26.43	5.96	4.36	3.52	2.17
26.47	5.87	4.30	3.48	2.15
26.50	5.79	4.25	3.43	2.12
26.53	5.70	4.19	3.39	2.10
26.57	5.62	4.14	3.35	2.08
26.60	5.54	4.09	3.30	2.05
26.63	5.47	4.04	3.26	2.03
26.67	5.39	3.99	3.22	2.01
26.70	5.32	3.93	3.18	1.99
26.73	5.24	3.89	3.14	1.97
26.77	5.17	3.84	3.10	1.95
26.80	5.10	3.79	3.07	1.94
26.83	5.03	3.74	3.04	1.92
26.87	4.96	3.69	3.00	1.90
26.90	4.89	3.65	2.97	1.88
26.93	4.82	3.60	2.94	1.86
26.97	4.75	3.56	2.90	1.85
27.00	4.68	3.51	2.87	1.83
27.03	4.62	3.47	2.84	1.81
27.07	4.56	3.42	2.81	1.80
27.10	4.49	3.38	2.78	1.78
27.13	4.43	3.34	2.75	1.76
27.17	4.37	3.29	2.71	1.75
27.20	4.31	3.25	2.68	1.73
27.23	4.26	3.21	2.65	1.71
27.27	4.20	3.17	2.63	1.70
27.30	4.15	3.13	2.60	1.68
27.33	4.10	3.10	2.57	1.66
27.37	4.05	3.06	2.54	1.65
27.40	4.00	3.03	2.51	1.63
27.43	3.95	2.99	2.48	1.62
27.47	3.90	2.96	2.45	1.60
27.50	3.85	2.93	2.43	1.59
27.53	3.80	2.90	2.40	1.57
27.57	3.75	2.86	2.37	1.56
27.60	3.70	2.83	2.35	1.54
27.63	3.66	2.80	2.32	1.53
27.67	3.61	2.77	2.30	1.51
27.70	3.57	2.74	2.27	1.50
27.73	3.52	2.71	2.24	1.49
27.77	3.48	2.68	2.22	1.47
27.80	3.43	2.65	2.20	1.46
27.83	3.39	2.62	2.17	1.44
27.87	3.35	2.59	2.15	1.43

27.90	3.30	2.56	2.12	1.42
27.93	3.26	2.53	2.10	1.40
27.97	3.22	2.50	2.08	1.39
28.00	3.18	2.48	2.05	1.38
28.03	3.14	2.45	2.03	1.37
28.07	3.10	2.42	2.01	1.35
28.10	3.07	2.39	1.99	1.34
28.13	3.04	2.37	1.97	1.33
28.17	3.00	2.34	1.95	1.31
28.20	2.97	2.32	1.94	1.30
28.23	2.94	2.29	1.92	1.29
28.27	2.90	2.26	1.90	1.28
28.30	2.87	2.24	1.88	1.27
28.33	2.84	2.21	1.86	1.25
28.37	2.81	2.19	1.85	1.24
28.40	2.78	2.16	1.83	1.23
28.43	2.74	2.14	1.81	1.22
28.47	2.71	2.12	1.80	1.21
28.50	2.68	2.09	1.78	1.20
28.53	2.65	2.07	1.76	1.19
28.57	2.62	2.05	1.75	1.17
28.60	2.60	2.03	1.73	1.16
28.63	2.57	2.01	1.71	1.15
28.67	2.54	1.99	1.70	1.14
28.70	2.51	1.97	1.68	1.13
28.73	2.48	1.95	1.66	1.12
28.77	2.45	1.93	1.65	1.11
28.80	2.43	1.91	1.63	1.10
28.83	2.40	1.90	1.62	1.09
28.87	2.37	1.88	1.60	1.08
28.90	2.35	1.86	1.59	1.08
28.93	2.32	1.84	1.57	1.07
28.97	2.30	1.83	1.56	1.06
29.00	2.27	1.81	1.54	1.05
29.03	2.24	1.79	1.53	1.05
29.07	2.22	1.77	1.51	1.04
29.10	2.19	1.76	1.50	1.03
29.13	2.17	1.74	1.49	1.02
29.17	2.15	1.73	1.47	1.02
29.20	2.12	1.71	1.46	1.01
29.23	2.10	1.69	1.45	1.00
29.27	2.08	1.68	1.43	0.99
29.30	2.05	1.66	1.42	0.99
29.33	2.03	1.65	1.40	0.98
29.37	2.01	1.63	1.39	0.97
29.40	1.99	1.61	1.38	0.96
29.43	1.97	1.60	1.37	0.96
29.47	1.95	1.58	1.35	0.95
29.50	1.94	1.57	1.34	0.94
29.53	1.92	1.55	1.33	0.94
29.57	1.90	1.54	1.31	0.93
29.60	1.88	1.53	1.30	0.92
29.63	1.86	1.51	1.29	0.92
29.67	1.85	1.50	1.28	0.91
29.70	1.83	1.48	1.27	0.90
29.73	1.81	1.47	1.25	0.90
29.77	1.80	1.46	1.24	0.89
29.80	1.78	1.44	1.23	0.88
29.83	1.76	1.43	1.22	0.88
29.87	1.75	1.41	1.21	0.87
29.90	1.73	1.40	1.20	0.87
29.93	1.71	1.39	1.19	0.86
29.97	1.70	1.38	1.17	0.85
30.00	1.68	1.36	1.16	0.85
30.03	1.66	1.35	1.15	0.84
30.07	1.65	1.34	1.14	0.83
30.10	1.63	1.32	1.13	0.83
30.13	1.62	1.31	1.12	0.82
30.17	1.60	1.30	1.11	0.82
30.20	1.59	1.29	1.10	0.81
30.23	1.57	1.28	1.09	0.80
30.27	1.56	1.26	1.08	0.80
30.30	1.54	1.25	1.08	0.79
30.33	1.53	1.24	1.07	0.79
30.37	1.51	1.23	1.06	0.78
30.40	1.50	1.22	1.05	0.78
30.43	1.49	1.20	1.05	0.77
30.47	1.47	1.19	1.04	0.76
30.50	1.46	1.18	1.03	0.76
30.53	1.44	1.17	1.02	0.75
30.57	1.43	1.16	1.02	0.75
30.60	1.42	1.15	1.01	0.74

30.63	1.40	1.14	1.00	0.74
30.67	1.39	1.13	0.99	0.73
30.70	1.38	1.12	0.99	0.73
30.73	1.37	1.11	0.98	0.72
30.77	1.35	1.10	0.97	0.72
30.80	1.34	1.09	0.97	0.71
30.83	1.33	1.08	0.96	0.71
30.87	1.31	1.07	0.95	0.70
30.90	1.30	1.07	0.94	0.70
30.93	1.29	1.06	0.94	0.69
30.97	1.28	1.05	0.93	0.68
31.00	1.27	1.04	0.92	0.68
31.03	1.25	1.04	0.92	0.68
31.07	1.24	1.03	0.91	0.67
31.10	1.23	1.02	0.90	0.67
31.13	1.22	1.01	0.90	0.66
31.17	1.21	1.01	0.89	0.66
31.20	1.20	1.00	0.88	0.65
31.23	1.18	0.99	0.88	0.65
31.27	1.17	0.98	0.87	0.64
31.30	1.16	0.98	0.87	0.64
31.33	1.15	0.97	0.86	0.63
31.37	1.14	0.96	0.85	0.63
31.40	1.13	0.96	0.85	0.62
31.43	1.12	0.95	0.84	0.62
31.47	1.11	0.94	0.83	0.61
31.50	1.10	0.94	0.83	0.61
31.53	1.09	0.93	0.82	0.61
31.57	1.08	0.92	0.82	0.60
31.60	1.08	0.92	0.81	0.60
31.63	1.07	0.91	0.80	0.59
31.67	1.06	0.90	0.80	0.59
31.70	1.05	0.90	0.79	0.58
31.73	1.05	0.89	0.79	0.58
31.77	1.04	0.88	0.78	0.58
31.80	1.03	0.88	0.78	0.57
31.83	1.02	0.87	0.77	0.57
31.87	1.02	0.86	0.76	0.56
31.90	1.01	0.86	0.76	0.56
31.93	1.00	0.85	0.75	0.55

10.3.1 Orifices

For a single orifice as illustrated in Figure 10-1 (a), orifice flow can be determined using Equation 10-1.

Equation 10-1

$$Q = C_o A_o (2gH_o)^{0.5}$$

Where:

Q = Orifice flow rate (cfs)

C_o = Discharge coefficient 0.40 – 0.60

A_o = Area of orifice (ft²)

H_o = Effective head on the orifice measured from the centroid of the opening (ft)

g = Gravitational acceleration = 32.2 ft/s².

Flow through multiple orifices (see Figure 10-1 (c)) can be computed by summing the flow through individual orifices. For multiple orifices of the same size and under the influence of the same effective head, the total flow can be determined by multiplying the discharge for a single orifice by the number of openings.

Equation 10-1

$$Q=C_o*A_o(2*g*H_o)^{.5}$$

Perforated Pipe Basin A1							
Pipe Height (ft) =		1.5					
Co =	0.5	Co =	0.5	Co =	0.5	Co =	0.5
D (ft) =	0.25	D (ft) =	0.25	D (ft) =	0.25	D (ft) =	0.25
Ao (ft) =	0.049063	Ao (ft) =	0.049063	Ao (ft) =	0.0490625	Ao (ft) =	0.0490625
Centorid Elevation (ft) =	0.75	Centorid Elevation (ft) =	0.625	Centorid Elevation (ft) =	0.5	Centorid Elevation (ft) =	0.375
H (ft)=	0.75	H (ft)=	0.875	H (ft) =	1	H (ft) =	1.125
g =	32.2	g =	32.2	g =	32.2	g =	32.2
Q (cfs) =		Q (cfs) =		Q (cfs)=		Q (cfs) =	
n =	3	n =	3	n =	3	n =	3
Q =		Q (cfs) =		Q (cfs) =		Q (cfs) =	

Co = Discharge coefficient
D=Diameter of orifice
Ao= Area of orifice
n= number of holes per row
H= Head

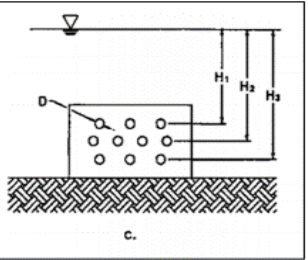


Table 9 - Water Quality	
Storage Volume Provided (cuft)	184286
Storage Volume Required (cuft)	166578
1/2 Required Volume	83289
Water Surface Elevation	602.5
Water Quality Depth	1.5
Average Flow Rate (cfs)	2.28

Table 10 - Water Quality Perforated Pipe Summary	
Water Quality Volume =	184286.00
Required Water Quality Volume =	166578.00
1/2 of Required Water Quality Volume =	83289.00
Volume Discharged in 12 Hours =	98535.136
Volume Remaining after 12 Hours =	85750.86
Half or more required volume retained after 12 Hours?	YES
Total Time for Water Quality Volume to drain =	22.44

Total Discharge (cuft per sec) = 2.28

Total Discharge (cuft per hour) = 8211.26

Attachment R

Storm Network Calculations

INLET A2-1 & A2-2

100 Year

Node A8
Curb Inlet In Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 10.51	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 2.27	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 4.54	(Length of Inlet-Required)	
Use a	5	Foot Curb Inlet Length
	0.68	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 10.51	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	
Ponded Width		
T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 0.44		

Q(total)= 21.01 cfs

25 Year

Node A8
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 6.57	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 1.42	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 2.84	(Length of Inlet-Required)	
Use a	5	Foot Curb Inlet Length
	0.50	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 6.57	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	
Ponded Width		
T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 0.27		

Q(total)= 13.13 cfs

INLET A2-1 & A2-2

10 Year

Node **A8**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 4.68	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 1.01	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 2.02	(Length of Inlet-Required)	
Use a	5	Foot Curb Inlet Length
	0.40	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 4.68	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.00	(Head at inlet, ft.)	
Ponded Width T= y/S _x		
y= 0.00	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.19		

Q(total)= 9.36 cfs

2 Year

Node **A8**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 2.13	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 0.46	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 0.92	(Length of Inlet-Required)	
Use a	5	Foot Curb Inlet Length
	0.24	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 2.13	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.00	(Head at inlet, ft.)	
Ponded Width T= y/S _x		
y= 0.00	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.09		

Q(total)= 4.26 cfs

INLET A2-3 & A2-4

100 Year

Node A3
Curb Inlet In Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 46.77	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 10.11	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 20.22	(Length of Inlet-Required)	
Use a	25	Foot Curb Inlet Length
	0.71	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 46.77	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.04	(Head at inlet, ft.)	

Ponded Width		
T= y/S _x		
y= 0.04	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 1.94		

Q(total)= 46.77 cfs

25 Year

Node A3
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 29.21	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 6.32	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 12.63	(Length of Inlet-Required)	
Use a	25	Foot Curb Inlet Length
	0.52	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 29.21	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width		
T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 1.21		

Q(total)= 29.21 cfs

INLET A2-3 & A2-4

10 Year

Node **A3**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 20.84	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 4.51	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 9.01	(Length of Inlet-Required)	
Use a	25	Foot Curb Inlet Length
	0.41	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 20.84	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.86		

Q(total)= 20.84 cfs

2 Year

Node **A3**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 9.47	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 2.05	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 4.09	(Length of Inlet-Required)	
Use a	25	Foot Curb Inlet Length
	0.24	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 9.47	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.39		

Q(total)= 9.47 cfs

INLETA3-1

100 Year

Node A5
Curb Inlet In Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 36.56	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 7.90	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 15.81	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.69	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 36.56	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.03	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.03	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 1.51		

Q(total)= 36.56 cfs

25 Year

Node A5
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 22.84	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 4.94	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 9.88	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.51	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 22.84	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 0.95		

Q(total)= 22.84 cfs

INLETA3-1

10 Year

Node **A5**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 16.29	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 3.52	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 7.04	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.40	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 16.29	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.67		

Q(total)= 16.29 cfs

2 Year

Node **A5**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 7.40	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 1.60	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 3.20	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.24	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^3/8$		
Q ₁₀₀ = 7.40	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.31		

Q(total)= 7.40 cfs

INLETA4-1 & A4-2

100 Year

Node A7
Curb Inlet In Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 18.76	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 4.05	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 8.11	(Length of Inlet-Required)	
Use a	10	Foot Curb Inlet Length
	0.68	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 18.76	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 0.78		

Q(total)= 37.51 cfs

25 Year

Node A7
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 11.72	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 2.53	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 5.07	(Length of Inlet-Required)	
Use a	10	Foot Curb Inlet Length
	0.50	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 11.72	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 0.49		

Q(total)= 23.43 cfs

INLETA4-1 & A4-2

10 Year

Node **A7**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 8.37	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 1.81	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 3.62	(Length of Inlet-Required)	
Use a	10	Foot Curb Inlet Length
	0.40	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 8.37	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.35		

Q(total)= 16.74 cfs

2 Year

Node **A7**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))]^0.5$		
Q ₁₀₀ = 3.81	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 0.82	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 1.65	(Length of Inlet-Required)	
Use a	10	Foot Curb Inlet Length
	0.23	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 3.81	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.00	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.00	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.16		

Q(total)= 7.61 cfs

INLETA4-3

100 Year

Node A6
Curb Inlet In Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 45.44	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 9.82	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 19.65	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.80	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 45.44	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.04	(Head at inlet, ft.)	

Ponded Width		
T= y/S _x		
y= 0.04	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 1.88		

Q(total)= 45.44 cfs

25 Year

Node A6
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Qi=Co*A*[2*g*(y-(h/2))]^{0.5}$		
Q ₁₀₀ = 28.39	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 6.14	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 12.28	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.58	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*Sx)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 28.39	(Flowrate, cfs)	
Sx= 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width		
T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
Sx= 0.02	(Crown Slope, ft/ft)	
T= 1.18		

Q(total)= 28.39 cfs

INLETA4-3

10 Year

Node **A6**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))])^{0.5}$		
Q ₁₀₀ = 20.28	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 4.38	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 8.77	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.47	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 20.28	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.02	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.02	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.84		

Q(total)= 20.28 cfs

2 Year

Node **A6**
Curb Inlet In-Sag
(Drainage and Erosion Control Manual, Eq 7-25, 7-29)

Design Point		
$Q_i=Co*A*[2*g*(y-(h/2))])^{0.5}$		
Q ₁₀₀ = 9.21	(Flowrate, cfs)	
Q ₁₀₀ = 0.67	(Orifice coefficient)	
h= 0.500	(height of curb opening, ft)	
A= 1.99	(area of curb opening, ft^2)	
g= 32.2	(Acceleration due to Gravity, ft/sec^2)	
y*= 0.99	(Head at inlet, ft.)	
C= 3.00	Weir Coefficient of Discharge	
L= 3.98	(Length of Inlet-Required)	
Use a	20	Foot Curb Inlet Length
	0.28	Actual Depth at Inlet
* Assume 9.5"(depth of CI opening) + 0.2' (Depth of full ROW from TOC)		

Gutter Flow Depth in straight Sections, triangular channel
Q₁₀₀=

$y=[(Q*n*S_x)/(0.56*S^{1/2})]^{3/8}$		
Q ₁₀₀ = 9.21	(Flowrate, cfs)	
S _x = 0.02	(Crown Slope, ft/ft)	
n= 0.016	(Manning's Coefficient of roughness)	
s= 0.020	(Gutter Slope, ft/ft)	
y= 0.01	(Head at inlet, ft.)	

Ponded Width T= y/S _x		
y= 0.01	Depth of Water in the curb and gutter cross section	
S _x = 0.02	(Crown Slope, ft/ft)	
T= 0.38		

Q(total)= 9.21 cfs

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	A2-4	385.0	48x108	Box	40.045	609.75	609.92	0.424	613.59	613.76	0.96	613.76	End	Curb-
2	A2-5	361.6	48x108	Box	34.667	609.92	610.12	0.577	613.76	613.80	n/a	613.80 j	1	Curb-
3	A2-6	338.2	48x108	Box	22.667	610.12	610.26	0.618	613.80	613.78	n/a	613.78 j	2	Manhole
4	A4-1	82.96	24x48	Box	32.313	607.86	608.08	0.681	609.86	610.08	n/a	610.08	End	Curb-
5	A4-2	64.20	24x48	Box	34.674	608.08	608.30	0.634	610.08	610.30	0.50	610.30	4	Curb-
6	A4-3	45.44	24x48	Box	32.137	608.16	608.77	1.898	610.30	610.36	n/a	610.36 j	5	Manhole
7	A3-1	36.56	36	Cir	29.459	606.28	606.45	0.577	609.43*	609.52*	0.42	609.93	End	Curb-
8	A2-1	466.8	60x96	Box	23.083	604.08	604.25	0.736	607.90	608.97	1.19	608.97	End	Curb-
9	A2-2	456.3	60x96	Box	89.151	604.25	604.87	0.695	608.97	609.52	1.17	609.52	8	Curb-
10	A2-3	445.8	60x96	Box	25.821	604.87	605.07	0.775	609.52	609.65	n/a	609.65 j	9	Manhole
Project File: 031.060_STRM NTWK 100YR.stm									Number of lines: 10			Run Date: 6/10/2020		
NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.														

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp Line No	
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)		Depr (in)
1	15' INLET A2-3	23.39*	0.00	23.39	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.74	34.05	0.74	34.05	0.0	Off
2	10' INLET A2-4	23.39*	0.00	23.39	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	1.42	68.07	1.42	68.07	0.0	Off
3	HEADWALL A2-3	338.22*	0.00	0.00	338.22	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	10' INLET A4-1	18.76*	0.00	18.76	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.98	46.23	0.98	46.23	0.0	Off
5	10' INLET A4-2	18.76*	0.00	18.76	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.98	46.23	0.98	46.23	0.0	Off
6	HEADWALL A4-2	45.44*	0.00	0.00	45.44	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	20' INLET A3-1	36.56*	0.00	36.56	0.00	Curb	4.0	20.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.94	44.24	0.94	44.24	0.0	Off
8	5' INLET A2-1	10.51*	0.00	10.51	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	1.19	56.29	1.19	56.29	0.0	Off
9	5' INLET A2-2	10.51*	0.00	10.51	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	1.19	56.29	1.19	56.29	0.0	Off
10	A2-2 HEADWALL	445.78*	0.00	0.00	445.78	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
Project File: 031.060_STRM NTWK 100YR.stm														Number of lines: 10				Run Date: 6/10/2020				
NOTES: Inlet N-Values = 0.016; Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.																						

Line No.	Line ID	Flow Rate	Known Q	Vel Ave	HGL Dn	HGL Up	Crit Depth			
		(cfs)	(cfs)	(ft/s)	(ft)	(ft)	(ft)			
1	A2-4	385.00	23.39	11.14	613.59	613.76	3.84			
2	A2-5	361.61	23.39	10.68	613.76	613.80 j	3.68			
3	A2-6	338.22	338.22	10.43	613.80	613.78 j	3.52			
4	A4-1	82.96	18.76	10.37	609.86	610.08	2.00			
5	A4-2	64.20	18.76	8.03	610.08	610.30	2.00			
6	A4-3	45.44	45.44	6.42	610.30	610.36 j	1.59			
7	A3-1	36.56	36.56	5.17	609.43	609.52	1.96			
8	A2-1	466.80	10.51	13.81	607.90	608.97	4.72			
9	A2-2	456.29	10.51	12.17	608.97	609.52	4.65			
10	A2-3	445.78	445.78	12.07	609.52	609.65 j	4.58			
Project File: 031.060_STRM NTWK 100YR.stm							Number of lines: 10		Date: 6/10/2020	
NOTES: ** Critical depth										

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	A2-4	305.5	48x108	Box	40.045	609.75	609.92	0.424	613.75	613.79	0.60	614.39	End	Curb-
2	A2-5	286.9	48x108	Box	34.667	609.92	610.12	0.577	614.39*	614.50*	0.49	614.99	1	Curb-
3	A2-6	268.4	48x108	Box	22.667	610.12	610.26	0.618	614.99*	615.05*	0.86	615.92	2	Manhole
4	A4-1	65.82	24x48	Box	32.313	607.86	608.08	0.681	609.86	610.08	n/a	610.08	End	Curb-
5	A4-2	50.94	24x48	Box	34.674	608.08	608.30	0.634	610.08	610.09	0.39	610.48	4	Curb-
6	A4-3	36.06	24x48	Box	32.137	608.16	608.77	1.898	610.48	610.50	0.42	610.92	5	Manhole
7	A3-1	29.01	36	Cir	29.459	606.28	606.45	0.577	609.28	609.32	0.27	609.59	End	Curb-
8	A2-1	370.4	60x96	Box	23.083	604.08	604.25	0.736	609.08	609.09	0.71	609.80	End	Curb-
9	A2-2	362.1	60x96	Box	89.151	604.25	604.87	0.695	609.80*	610.12*	0.64	610.75	8	Curb-
10	A2-3	353.7	60x96	Box	25.821	604.87	605.07	0.775	610.75*	610.84*	1.22	612.06	9	Manhole
Project File: 031.060_STRM NTWK 50YR.stm									Number of lines: 10			Run Date: 7/15/2020		
NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown).														

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	15' INLET A2-3	18.56*	0.00	18.56	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.63	28.65	0.63	28.65	0.0	Off
2	10' INLET A2-4	18.56*	0.00	18.56	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.97	45.39	0.97	45.39	0.0	Off
3	HEADWALL A2-3	268.36*	0.00	0.00	268.36	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	10' INLET A4-1	14.88*	0.00	14.88	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.69	31.62	0.69	31.62	0.0	Off
5	10' INLET A4-2	14.88*	0.00	14.88	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.69	31.62	0.69	31.62	0.0	Off
6	HEADWALL A4-2	36.06*	0.00	0.00	36.06	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	20' INLET A3-1	29.01*	0.00	29.01	0.00	Curb	4.0	20.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.67	30.38	0.67	30.38	0.0	Off
8	5' INLET A2-1	8.34*	0.00	8.34	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.82	37.98	0.82	37.98	0.0	Off
9	5' INLET A2-2	8.34*	0.00	8.34	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.82	37.98	0.82	37.98	0.0	Off
10	A2-2 HEADWALL	353.73*	0.00	0.00	353.73	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
Project File: 031.060_STRM NTWK 50YR.stm														Number of lines: 10					Run Date: 7/15/2020			
NOTES: Inlet N-Values = 0.016; Intensity = 114.82 / (Inlet time + 17.20) ^ 0.82; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are throat.																						

Line No.	Line ID	Flow Rate (cfs)	Known Q (cfs)	Vel Ave (ft/s)	HGL Dn (ft)	HGL Up (ft)	Crit Depth (ft)			
1	A2-4	305.48	18.56	8.63	613.75	613.79	3.29			
2	A2-5	286.92	18.56	7.97	614.39	614.50	3.16			
3	A2-6	268.36	268.36	7.45	614.99	615.05	3.02			
4	A4-1	65.82	14.88	8.23	609.86	610.08	2.00			
5	A4-2	50.94	14.88	6.74	610.08	610.09	1.71			
6	A4-3	36.06	36.06	4.87	610.48	610.50	1.36			
7	A3-1	29.01	29.01	4.13	609.28	609.32	1.74			
8	A2-1	370.41	8.34	9.41	609.08	609.09	4.05			
9	A2-2	362.07	8.34	9.05	609.80	610.12	3.99			
10	A2-3	353.73	353.73	8.84	610.75	610.84	3.93			
Project File: 031.060_STRM NTWK 50YR.stm							Number of lines: 10		Date: 7/15/2020	
NOTES: ** Critical depth										

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	15' INLET A2-3	14.61*	0.00	14.61	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.55	24.42	0.55	24.42	0.0	Off
2	10' INLET A2-4	14.61*	0.00	14.61	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.67	30.73	0.67	30.73	0.0	Off
3	HEADWALL A2-3	211.22*	0.00	0.00	211.22	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	10' INLET A4-1	11.72*	0.00	11.72	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.58	25.98	0.58	25.98	0.0	Off
5	10' INLET A4-2	11.72*	0.00	11.72	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.58	25.98	0.58	25.98	0.0	Off
6	HEADWALL A4-2	28.39*	0.00	0.00	28.39	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	20' INLET A3-1	22.84*	0.00	22.84	0.00	Curb	4.0	20.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.62	28.07	0.62	28.07	0.0	Off
8	5' INLET A2-1	6.57*	0.00	6.57	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.58	26.16	0.58	26.16	0.0	Off
9	5' INLET A2-2	6.57*	0.00	6.57	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.58	26.16	0.58	26.16	0.0	Off
10	A2-2 HEADWALL	278.43*	0.00	0.00	278.43	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
Project File: 031.060_STRM NTWK 25YR.stm														Number of lines: 10				Run Date: 6/10/2020				
NOTES: Inlet N-Values = 0.016; Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.																						

Line No.	Line ID	Flow Rate	Known Q	Vel Ave	HGL Dn	HGL Up	Crit Depth			
		(cfs)	(cfs)	(ft/s)	(ft)	(ft)	(ft)			
1	A2-4	240.44	14.61	9.94	612.33	612.73	2.81			
2	A2-5	225.83	14.61	9.13	612.73	612.81	2.69			
3	A2-6	211.22	211.22	8.91	612.81	612.84	2.58			
4	A4-1	51.83	11.72	8.00	609.38	609.81	1.73			
5	A4-2	40.11	11.72	6.32	609.81	609.76 j	1.46			
6	A4-3	28.39	28.39	5.27	609.76	609.93	1.16			
7	A3-1	22.84	22.84	4.97	608.74	607.99	1.54			
8	A2-1	291.57	6.57	11.98	606.80	607.70	3.45			
9	A2-2	285.00	6.57	10.40	607.70	608.27 j	3.40			
10	A2-3	278.43	278.43	10.32	608.27	608.42	3.35			
Project File: 031.060_STRM NTWK 25YR.stm							Number of lines: 10		Date: 6/10/2020	
NOTES: ** Critical depth										

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	A2-4	77.80	48x108	Box	40.045	609.75	609.92	0.424	610.97	611.24	0.33	611.24	End	Curb-
2	A2-5	73.06	48x108	Box	34.667	609.92	610.12	0.577	611.24	611.39	n/a	611.39	1	Curb-
3	A2-6	68.32	48x108	Box	22.667	610.12	610.26	0.618	611.39	611.47	n/a	611.47	2	Manhole
4	A4-1	16.83	24x48	Box	32.313	607.86	608.08	0.681	608.56	608.90	n/a	608.90	End	Curb-
5	A4-2	13.02	24x48	Box	34.674	608.08	608.30	0.634	608.90	608.99	0.17	608.99	4	Curb-
6	A4-3	9.21	24x48	Box	32.137	608.16	608.77	1.898	608.99	609.32	0.27	609.32	5	Manhole
7	A3-1	7.40	36	Cir	29.459	606.28	606.45	0.577	607.06	607.31	0.31	607.31	End	Curb-
8	A2-1	94.34	60x96	Box	23.083	604.08	604.25	0.736	605.34	605.88	n/a	605.88	End	Curb-
9	A2-2	92.21	60x96	Box	89.151	604.25	604.87	0.695	605.88	606.47	n/a	606.47 j	8	Curb-
10	A2-3	90.08	60x96	Box	25.821	604.87	605.07	0.775	606.47	606.65	0.79	606.65	9	Manhole
Project File: 031.060_STRM NTWK 2YR.stm									Number of lines: 10				Run Date: 7/20/2020	
NOTES: Return period = 2 Yrs. ; j - Line contains hyd. jump.														

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	15' INLET A2-3	4.74*	0.00	4.74	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.29	11.53	0.29	11.53	0.0	Off
2	10' INLET A2-4	4.74*	0.00	4.74	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.34	14.20	0.34	14.20	0.0	Off
3	HEADWALL A2-3	68.32*	0.00	0.00	68.32	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	10' INLET A4-1	3.81*	0.00	3.81	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.31	12.28	0.31	12.28	0.0	Off
5	10' INLET A4-2	3.81*	0.00	3.81	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.31	12.28	0.31	12.28	0.0	Off
6	HEADWALL A4-2	9.21*	0.00	0.00	9.21	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	20' INLET A3-1	7.40*	0.00	7.40	0.00	Curb	4.0	20.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.32	13.24	0.32	13.24	0.0	Off
8	5' INLET A2-1	2.13*	0.00	2.13	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.29	11.31	0.29	11.31	0.0	Off
9	5' INLET A2-2	2.13*	0.00	2.13	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.000	0.29	11.31	0.29	11.31	0.0	Off
10	A2-2 HEADWALL	90.08*	0.00	0.00	90.08	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
Project File: 031.060_STRM NTWK 2YR.stm														Number of lines: 10				Run Date: 7/20/2020				
NOTES: Inlet N-Values = 0.016; Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period = 2 Yrs. ; * Indicates Known Q added. All curb inlets are throat.																						

Line No.	Line ID	Flow Rate	Known Q	Vel Ave	HGL Dn	HGL Up	Crit Depth			
		(cfs)	(cfs)	(ft/s)	(ft)	(ft)	(ft)			
1	A2-4	77.80	4.74	6.81	610.97	611.24	1.32			
2	A2-5	73.06	4.74	6.26	611.24	611.39	1.27			
3	A2-6	68.32	68.32	6.11	611.39	611.47	1.21			
4	A4-1	16.83	3.81	5.57	608.56	608.90	0.82			
5	A4-2	13.02	3.81	4.34	608.90	608.99	0.69			
6	A4-3	9.21	9.21	3.48	608.99	609.32	0.55			
7	A3-1	7.40	7.40	4.78	607.06	607.31	0.86			
8	A2-1	94.34	2.13	8.30	605.34	605.88	1.63			
9	A2-2	92.21	2.13	7.13	605.88	606.47 j	1.60			
10	A2-3	90.08	90.08	7.08	606.47	606.65	1.58			
Project File: 031.060_STRM NTWK 2YR.stm							Number of lines: 10		Date: 7/20/2020	
NOTES: ** Critical depth										

Cross Section for Channel A1 1+51.04 - 6+63.52 100 YR

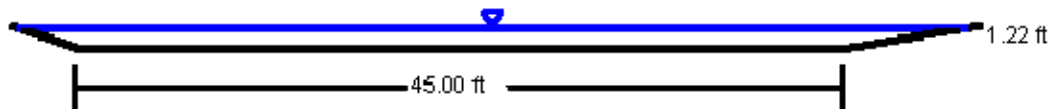
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01040	ft/ft
Normal Depth	1.22	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	330.09	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 1+51.04 - 6+63.52 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01040	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	330.09	ft³/s

Results

Normal Depth	1.22	ft
Flow Area	61.56	ft²
Wetted Perimeter	56.27	ft
Hydraulic Radius	1.09	ft
Top Width	55.97	ft
Critical Depth	1.14	ft
Critical Slope	0.01305	ft/ft
Velocity	5.36	ft/s
Velocity Head	0.45	ft
Specific Energy	1.67	ft
Froude Number	0.90	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.22	ft
Critical Depth	1.14	ft
Channel Slope	0.01040	ft/ft

Worksheet for Channel A1 1+51.04 - 6+63.52 100 YR

GVF Output Data

Critical Slope 0.01305 ft/ft

Cross Section for Channel A1 1+51.04 - 6+63.52 25 YR

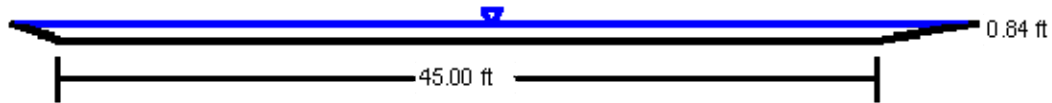
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01040	ft/ft
Normal Depth	0.84	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	174.27	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 1+51.04 - 6+63.52 25 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01040	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	174.27	ft ³ /s

Results

Normal Depth	0.84	ft
Flow Area	40.88	ft ²
Wetted Perimeter	52.75	ft
Hydraulic Radius	0.77	ft
Top Width	52.54	ft
Critical Depth	0.76	ft
Critical Slope	0.01480	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energy	1.12	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.84	ft
Critical Depth	0.76	ft
Channel Slope	0.01040	ft/ft

Worksheet for Channel A1 1+51.04 - 6+63.52 25 YR

GVF Output Data

Critical Slope 0.01480 ft/ft

Cross Section for Channel A1 1+51.04 - 6+63.52 2 YR

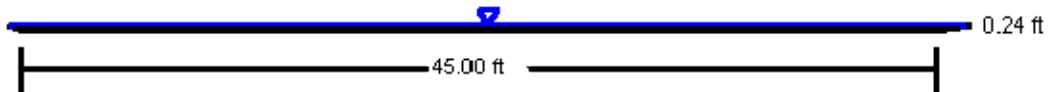
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.029	
Channel Slope	0.01040	ft/ft
Normal Depth	0.24	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	22.43	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 1+51.04 - 6+63.52 2 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.029	
Channel Slope	0.01040	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	22.43	ft ³ /s

Results

Normal Depth	0.24	ft
Flow Area	11.21	ft ²
Wetted Perimeter	47.25	ft
Hydraulic Radius	0.24	ft
Top Width	47.19	ft
Critical Depth	0.20	ft
Critical Slope	0.02125	ft/ft
Velocity	2.00	ft/s
Velocity Head	0.06	ft
Specific Energy	0.31	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.20	ft
Channel Slope	0.01040	ft/ft

Worksheet for Channel A1 1+51.04 - 6+63.52 2 YR

GVF Output Data

Critical Slope 0.02125 ft/ft

Cross Section for Channel A1 6+63.52 - 7+42.45 100 YR

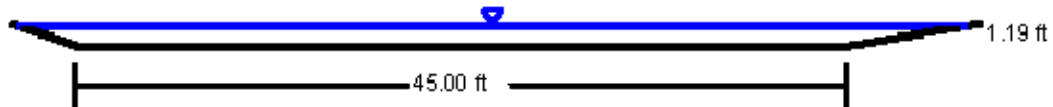
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Normal Depth	1.19	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	330.09	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 6+63.52 - 7+42.45 2 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	22.43	ft ³ /s

Results

Normal Depth	0.24	ft
Flow Area	11.15	ft ²
Wetted Perimeter	47.24	ft
Hydraulic Radius	0.24	ft
Top Width	47.18	ft
Critical Depth	0.20	ft
Critical Slope	0.02273	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energy	0.30	ft
Froude Number	0.73	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.20	ft
Channel Slope	0.01130	ft/ft

Worksheet for Channel A1 6+63.52 - 7+42.45 2 YR

GVF Output Data

Critical Slope 0.02273 ft/ft

Cross Section for Channel A1 6+63.52 - 7+42.45 25 YR

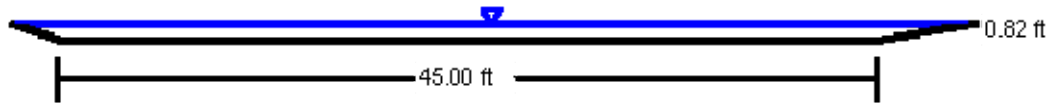
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Normal Depth	0.82	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	174.27	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 6+63.52 - 7+42.45 25 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	174.27	ft ³ /s

Results

Normal Depth	0.82	ft
Flow Area	39.84	ft ²
Wetted Perimeter	52.57	ft
Hydraulic Radius	0.76	ft
Top Width	52.36	ft
Critical Depth	0.76	ft
Critical Slope	0.01480	ft/ft
Velocity	4.37	ft/s
Velocity Head	0.30	ft
Specific Energy	1.12	ft
Froude Number	0.88	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.82	ft
Critical Depth	0.76	ft
Channel Slope	0.01130	ft/ft

Worksheet for Channel A1 6+63.52 - 7+42.45 25 YR

GVF Output Data

Critical Slope 0.01480 ft/ft

Cross Section for Channel A1 6+63.52 - 7+42.45 2 YR

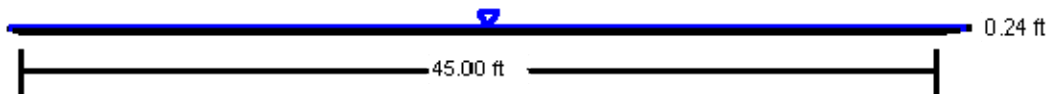
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Normal Depth	0.24	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	22.43	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 6+63.52 - 7+42.45 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01130	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	45.00	ft
Discharge	330.09	ft³/s

Results

Normal Depth	1.19	ft
Flow Area	59.93	ft²
Wetted Perimeter	56.00	ft
Hydraulic Radius	1.07	ft
Top Width	55.71	ft
Critical Depth	1.14	ft
Critical Slope	0.01305	ft/ft
Velocity	5.51	ft/s
Velocity Head	0.47	ft
Specific Energy	1.66	ft
Froude Number	0.94	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.19	ft
Critical Depth	1.14	ft
Channel Slope	0.01130	ft/ft

Worksheet for Channel A1 6+63.52 - 7+42.45 100 YR

GVF Output Data

Critical Slope 0.01305 ft/ft

Cross Section for Channel A1 7+42.45 - 10+00.00 100 YR

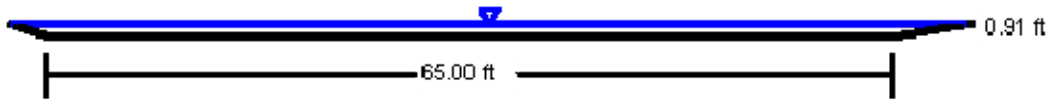
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00950	ft/ft
Normal Depth	0.91	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	330.09	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 7+42.45 - 10+00.00 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00950	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	330.09	ft³/s

Results

Normal Depth	0.91	ft
Flow Area	63.05	ft²
Wetted Perimeter	73.44	ft
Hydraulic Radius	0.86	ft
Top Width	73.21	ft
Critical Depth	0.91	ft
Critical Slope	0.00962	ft/ft
Velocity	5.24	ft/s
Velocity Head	0.43	ft
Specific Energy	1.34	ft
Froude Number	0.99	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	0.91	ft
Channel Slope	0.00950	ft/ft

Worksheet for Channel A1 7+42.45 - 10+00.00 100 YR

GVF Output Data

Critical Slope 0.00962 ft/ft

Cross Section for Channel A1 7+42.45 - 10+00.00 25 YR

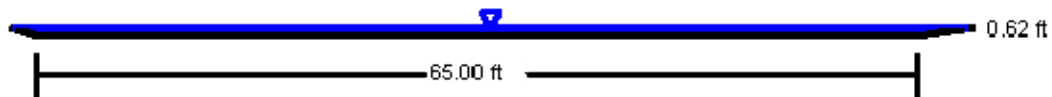
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00950	ft/ft
Normal Depth	0.62	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	174.27	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 7+42.45 - 10+00.00 25 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00950	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	174.27	ft³/s

Results

Normal Depth	0.62	ft
Flow Area	42.37	ft²
Wetted Perimeter	70.78	ft
Hydraulic Radius	0.60	ft
Top Width	70.62	ft
Critical Depth	0.60	ft
Critical Slope	0.01098	ft/ft
Velocity	4.11	ft/s
Velocity Head	0.26	ft
Specific Energy	0.89	ft
Froude Number	0.94	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.60	ft
Channel Slope	0.00950	ft/ft

Worksheet for Channel A1 7+42.45 - 10+00.00 25 YR

GVF Output Data

Critical Slope 0.01098 ft/ft

Cross Section for Channel A1 7+42.45 - 10+00.00 2 YR

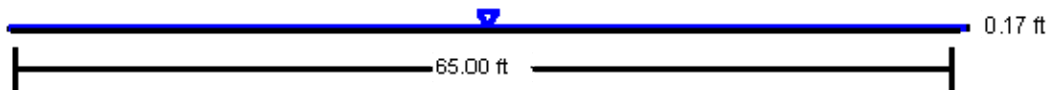
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00950	ft/ft
Normal Depth	0.17	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	22.43	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A1 7+42.45 - 10+00.00 2 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00950	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	22.43	ft ³ /s

Results

Normal Depth	0.17	ft
Flow Area	11.19	ft ²
Wetted Perimeter	66.57	ft
Hydraulic Radius	0.17	ft
Top Width	66.53	ft
Critical Depth	0.15	ft
Critical Slope	0.01321	ft/ft
Velocity	2.00	ft/s
Velocity Head	0.06	ft
Specific Energy	0.23	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.17	ft
Critical Depth	0.15	ft
Channel Slope	0.00950	ft/ft

Worksheet for Channel A1 7+42.45 - 10+00.00 2 YR

GVF Output Data

Critical Slope 0.01321 ft/ft

Cross Section for Retards 100 YR

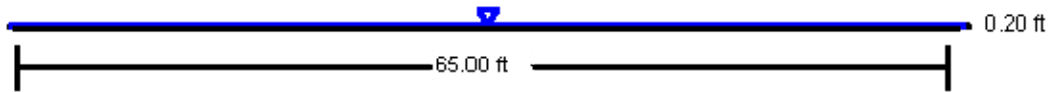
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Normal Depth	0.20	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	330.09	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Retards 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	330.09	ft³/s

Results

Normal Depth	0.20	ft
Flow Area	12.90	ft²
Wetted Perimeter	66.81	ft
Hydraulic Radius	0.19	ft
Top Width	66.76	ft
Critical Depth	0.91	ft
Critical Slope	0.00260	ft/ft
Velocity	25.59	ft/s
Velocity Head	10.17	ft
Specific Energy	10.37	ft
Froude Number	10.26	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.20	ft
Critical Depth	0.91	ft
Channel Slope	0.45000	ft/ft

Worksheet for Retards 100 YR

GVF Output Data

Critical Slope 0.00260 ft/ft

Cross Section for Retards 25 YR

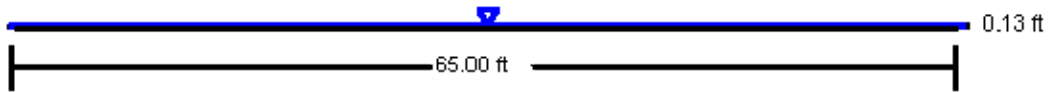
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Normal Depth	0.13	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	174.27	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Retards 25 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	174.27	ft ³ /s

Results

Normal Depth	0.13	ft
Flow Area	8.75	ft ²
Wetted Perimeter	66.23	ft
Hydraulic Radius	0.13	ft
Top Width	66.20	ft
Critical Depth	0.60	ft
Critical Slope	0.00297	ft/ft
Velocity	19.91	ft/s
Velocity Head	6.16	ft
Specific Energy	6.29	ft
Froude Number	9.65	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.13	ft
Critical Depth	0.60	ft
Channel Slope	0.45000	ft/ft

Worksheet for Retards 25 YR

GVF Output Data

Critical Slope 0.00297 ft/ft

Cross Section for Retards 2 YR

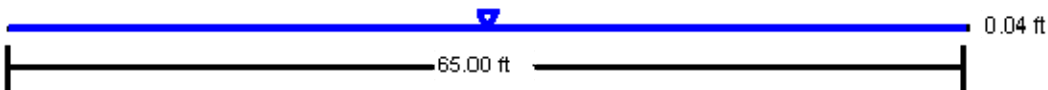
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Normal Depth	0.04	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	22.43	ft ³ /s

Cross Section Image



V: 1
H: 1



Worksheet for Retards 2 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.45000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	65.00	ft
Discharge	22.43	ft ³ /s

Results

Normal Depth	0.04	ft
Flow Area	2.55	ft ²
Wetted Perimeter	65.36	ft
Hydraulic Radius	0.04	ft
Top Width	65.35	ft
Critical Depth	0.15	ft
Critical Slope	0.00461	ft/ft
Velocity	8.81	ft/s
Velocity Head	1.21	ft
Specific Energy	1.25	ft
Froude Number	7.87	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.04	ft
Critical Depth	0.15	ft
Channel Slope	0.45000	ft/ft

Worksheet for Retards 2 YR

GVF Output Data

Critical Slope 0.00461 ft/ft

Cross Section for TEMPORARY CHANNEL A1 100YR

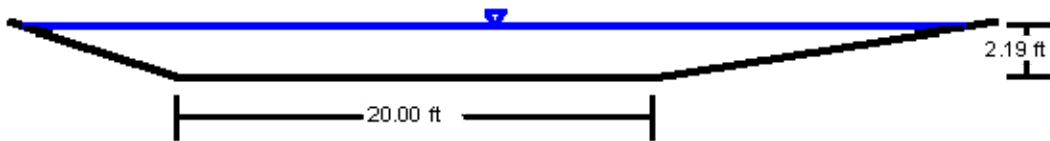
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Normal Depth	2.19	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	330.09	ft³/s

Cross Section Image



V: 1
H: 1

Worksheet for TEMPORARY CHANNEL A1 100YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	330.09	ft³/s

Results

Normal Depth	2.19	ft
Flow Area	65.55	ft²
Wetted Perimeter	40.29	ft
Hydraulic Radius	1.63	ft
Top Width	39.75	ft
Critical Depth	1.77	ft
Critical Slope	0.01197	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.39	ft
Specific Energy	2.59	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.19	ft
Critical Depth	1.77	ft
Channel Slope	0.00540	ft/ft

Worksheet for TEMPORARY CHANNEL A1 100YR

GVF Output Data

Critical Slope 0.01197 ft/ft

Cross Section for TEMPORARY CHANNEL A1 25YR

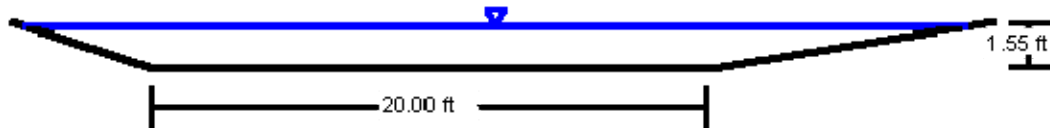
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Normal Depth	1.55	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	174.27	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for TEMPORARY CHANNEL A1 25YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	174.27	ft³/s

Results

Normal Depth	1.55	ft
Flow Area	41.92	ft²
Wetted Perimeter	34.36	ft
Hydraulic Radius	1.22	ft
Top Width	33.98	ft
Critical Depth	1.21	ft
Critical Slope	0.01330	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	1.82	ft
Froude Number	0.66	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.55	ft
Critical Depth	1.21	ft
Channel Slope	0.00540	ft/ft

Worksheet for TEMPORARY CHANNEL A1 25YR

GVF Output Data

Critical Slope 0.01330 ft/ft

Cross Section for TEMPORARY CHANNEL A1 2YR

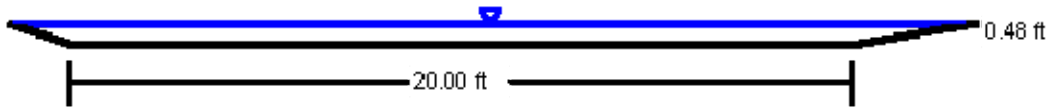
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Normal Depth	0.48	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	22.43	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for TEMPORARY CHANNEL A1 2YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00540	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	22.43	ft³/s

Results

Normal Depth	0.48	ft
Flow Area	10.70	ft²
Wetted Perimeter	24.46	ft
Hydraulic Radius	0.44	ft
Top Width	24.34	ft
Critical Depth	0.33	ft
Critical Slope	0.01948	ft/ft
Velocity	2.10	ft/s
Velocity Head	0.07	ft
Specific Energy	0.55	ft
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.48	ft
Critical Depth	0.33	ft
Channel Slope	0.00540	ft/ft

Worksheet for TEMPORARY CHANNEL A1 2YR

GVF Output Data

Critical Slope 0.01948 ft/ft

Cross Section for Channel A2 100YR

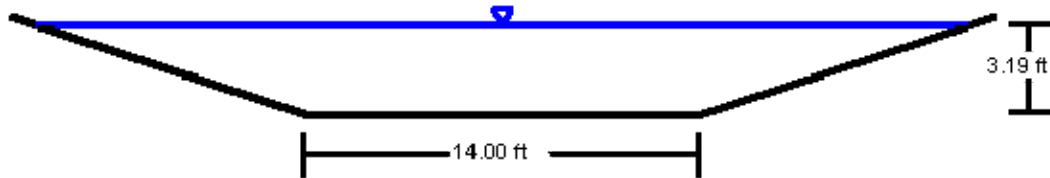
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	3.19	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	445.78	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A2 100YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	445.78	ft ³ /s

Results

Normal Depth	3.19	ft
Flow Area	75.23	ft ²
Wetted Perimeter	34.18	ft
Hydraulic Radius	2.20	ft
Top Width	33.15	ft
Critical Depth	2.60	ft
Critical Slope	0.01096	ft/ft
Velocity	5.93	ft/s
Velocity Head	0.55	ft
Specific Energy	3.74	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.19	ft
Critical Depth	2.60	ft
Channel Slope	0.00500	ft/ft

Worksheet for Channel A2 100YR

GVF Output Data

Critical Slope 0.01096 ft/ft

Cross Section for Channel A2 25YR

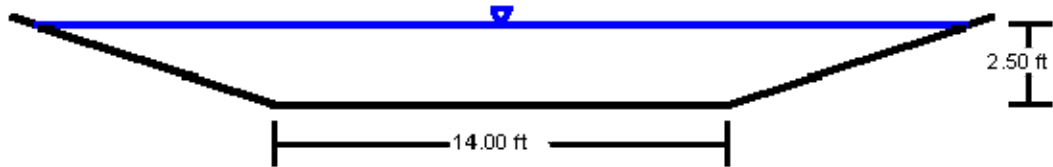
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	2.50	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	278.43	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A2 25YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	278.43	ft³/s

Results

Normal Depth	2.50	ft
Flow Area	53.70	ft²
Wetted Perimeter	29.80	ft
Hydraulic Radius	1.80	ft
Top Width	28.99	ft
Critical Depth	1.99	ft
Critical Slope	0.01176	ft/ft
Velocity	5.19	ft/s
Velocity Head	0.42	ft
Specific Energy	2.92	ft
Froude Number	0.67	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	1.99	ft
Channel Slope	0.00500	ft/ft

Worksheet for Channel A2 25YR

GVF Output Data

Critical Slope 0.01176 ft/ft

Cross Section for Channel A2 2YR

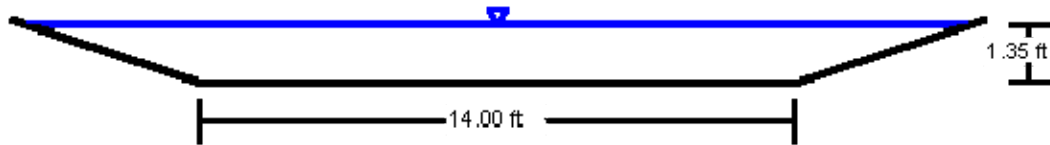
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	1.35	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	90.08	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Channel A2 2YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	90.08	ft ³ /s

Results

Normal Depth	1.35	ft
Flow Area	24.40	ft ²
Wetted Perimeter	22.55	ft
Hydraulic Radius	1.08	ft
Top Width	22.11	ft
Critical Depth	1.01	ft
Critical Slope	0.01411	ft/ft
Velocity	3.69	ft/s
Velocity Head	0.21	ft
Specific Energy	1.56	ft
Froude Number	0.62	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.35	ft
Critical Depth	1.01	ft
Channel Slope	0.00500	ft/ft

Worksheet for Channel A2 2YR

GVF Output Data

Critical Slope 0.01411 ft/ft

Cross Section for Temporary Swale 100 YR

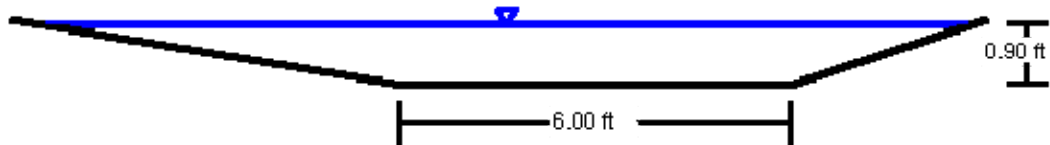
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.01200 ft/ft
Normal Depth	0.90 ft
Left Side Slope	6.00 ft/ft (H:V)
Right Side Slope	3.00 ft/ft (H:V)
Bottom Width	6.00 ft
Discharge	35.99 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Temporary Swale 100 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01200	ft/ft
Left Side Slope	6.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	35.99	ft³/s

Results

Normal Depth	0.90	ft
Flow Area	9.02	ft²
Wetted Perimeter	14.30	ft
Hydraulic Radius	0.63	ft
Top Width	14.08	ft
Critical Depth	0.84	ft
Critical Slope	0.01583	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	1.15	ft
Froude Number	0.88	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.90	ft
Critical Depth	0.84	ft
Channel Slope	0.01200	ft/ft

Worksheet for Temporary Swale 100 YR

GVF Output Data

Critical Slope 0.01583 ft/ft

Cross Section for Temporary Swale 25 YR

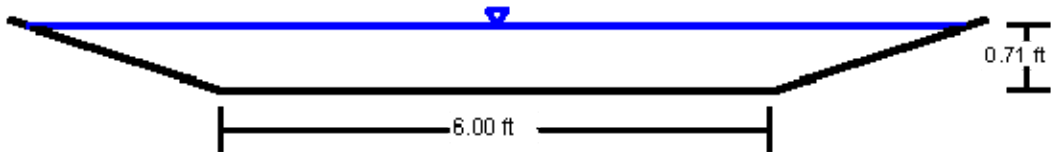
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01200	ft/ft
Normal Depth	0.71	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	21.09	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Temporary Swale 25 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01200	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	21.09	ft ³ /s

Results

Normal Depth	0.71	ft
Flow Area	5.79	ft ²
Wetted Perimeter	10.50	ft
Hydraulic Radius	0.55	ft
Top Width	10.27	ft
Critical Depth	0.65	ft
Critical Slope	0.01676	ft/ft
Velocity	3.65	ft/s
Velocity Head	0.21	ft
Specific Energy	0.92	ft
Froude Number	0.86	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.71	ft
Critical Depth	0.65	ft
Channel Slope	0.01200	ft/ft

Worksheet for Temporary Swale 25 YR

GVF Output Data

Critical Slope 0.01676 ft/ft

Cross Section for Temporary Swale 2 YR

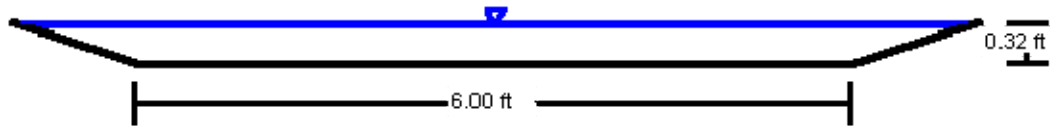
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01200	ft/ft
Normal Depth	0.32	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	5.23	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Temporary Swale 2 YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01200	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	5.23	ft³/s

Results

Normal Depth	0.32	ft
Flow Area	2.25	ft²
Wetted Perimeter	8.04	ft
Hydraulic Radius	0.28	ft
Top Width	7.94	ft
Critical Depth	0.27	ft
Critical Slope	0.02131	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.41	ft
Froude Number	0.77	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.27	ft
Channel Slope	0.01200	ft/ft

Worksheet for Temporary Swale 2 YR

GVF Output Data

Critical Slope 0.02131 ft/ft

Cross Section for CHANNEL A4 100YR 1+61.33 - 2+74.00

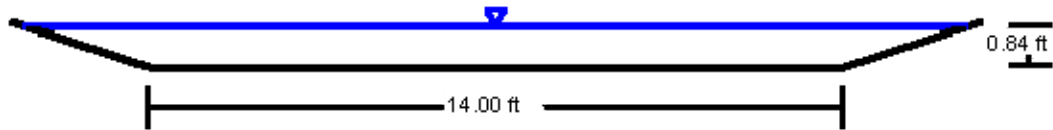
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Normal Depth	0.84	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	82.95	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 100YR 1+61.33 - 2+74.00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	82.95	ft³/s

Results

Normal Depth	0.84	ft
Flow Area	13.90	ft²
Wetted Perimeter	19.32	ft
Hydraulic Radius	0.72	ft
Top Width	19.05	ft
Critical Depth	0.96	ft
Critical Slope	0.01431	ft/ft
Velocity	5.97	ft/s
Velocity Head	0.55	ft
Specific Energy	1.39	ft
Froude Number	1.23	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.84	ft
Critical Depth	0.96	ft
Channel Slope	0.02250	ft/ft

Worksheet for CHANNEL A4 100YR 1+61.33 - 2+74.00

GVF Output Data

Critical Slope 0.01431 ft/ft

Cross Section for CHANNEL A4 25YR 1+61.33 - 2+74.00

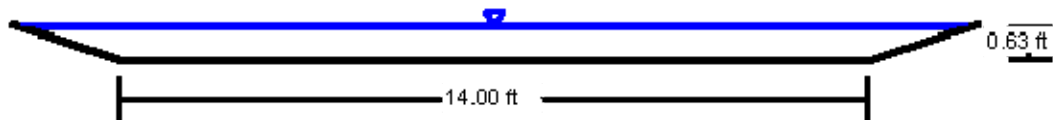
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Normal Depth	0.63	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	50.78	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 25YR 1+61.33 - 2+74.00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	50.78	ft³/s

Results

Normal Depth	0.63	ft
Flow Area	10.07	ft²
Wetted Perimeter	18.01	ft
Hydraulic Radius	0.56	ft
Top Width	17.80	ft
Critical Depth	0.70	ft
Critical Slope	0.01562	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.40	ft
Specific Energy	1.03	ft
Froude Number	1.18	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.63	ft
Critical Depth	0.70	ft
Channel Slope	0.02250	ft/ft

Worksheet for CHANNEL A4 25YR 1+61.33 - 2+74.00

GVF Output Data

Critical Slope 0.01562 ft/ft

Cross Section for CHANNEL A4 2YR 1+61.33 - 2+74.00

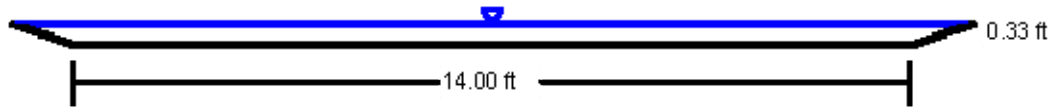
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Normal Depth	0.33	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	16.46	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 2YR 1+61.33 - 2+74.00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02250	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	16.46	ft ³ /s

Results

Normal Depth	0.33	ft
Flow Area	4.89	ft ²
Wetted Perimeter	16.07	ft
Hydraulic Radius	0.30	ft
Top Width	15.96	ft
Critical Depth	0.34	ft
Critical Slope	0.01936	ft/ft
Velocity	3.36	ft/s
Velocity Head	0.18	ft
Specific Energy	0.50	ft
Froude Number	1.07	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.34	ft
Channel Slope	0.02250	ft/ft

Worksheet for CHANNEL A4 2YR 1+61.33 - 2+74.00

GVF Output Data

Critical Slope 0.01936 ft/ft

Cross Section for CHANNEL A4 100YR 3+73.13 - END

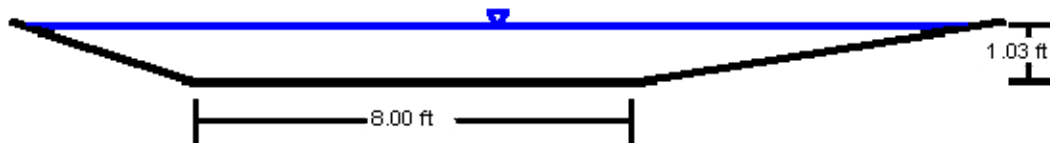
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Normal Depth	1.03	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	45.44	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 100YR 3+73.13 - END

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	45.44	ft³/s

Results

Normal Depth	1.03	ft
Flow Area	12.94	ft²
Wetted Perimeter	17.49	ft
Hydraulic Radius	0.74	ft
Top Width	17.23	ft
Critical Depth	0.85	ft
Critical Slope	0.01548	ft/ft
Velocity	3.51	ft/s
Velocity Head	0.19	ft
Specific Energy	1.22	ft
Froude Number	0.71	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.03	ft
Critical Depth	0.85	ft
Channel Slope	0.00750	ft/ft

Worksheet for CHANNEL A4 100YR 3+73.13 - END

GVF Output Data

Critical Slope 0.01548 ft/ft

Cross Section for CHANNEL A4 25YR 3+73.13 - END

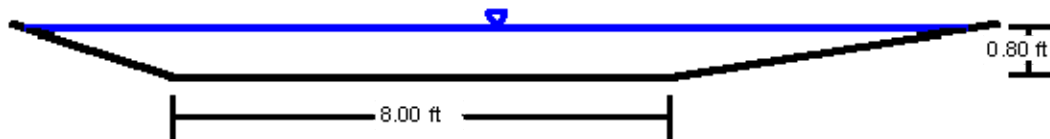
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Normal Depth	0.80	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	28.39	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 25YR 3+73.13 - END

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	28.39	ft³/s

Results

Normal Depth	0.80	ft
Flow Area	9.28	ft²
Wetted Perimeter	15.40	ft
Hydraulic Radius	0.60	ft
Top Width	15.20	ft
Critical Depth	0.64	ft
Critical Slope	0.01668	ft/ft
Velocity	3.06	ft/s
Velocity Head	0.15	ft
Specific Energy	0.95	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	0.64	ft
Channel Slope	0.00750	ft/ft

Worksheet for CHANNEL A4 25YR 3+73.13 - END

GVF Output Data

Critical Slope 0.01668 ft/ft

Cross Section for CHANNEL A4 2YR 3+73.13 - END

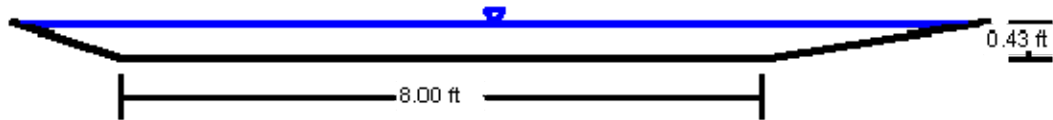
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Normal Depth	0.43	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	9.21	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for CHANNEL A4 2YR 3+73.13 - END

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00750	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	9.21	ft³/s

Results

Normal Depth	0.43	ft
Flow Area	4.27	ft²
Wetted Perimeter	11.97	ft
Hydraulic Radius	0.36	ft
Top Width	11.87	ft
Critical Depth	0.32	ft
Critical Slope	0.02023	ft/ft
Velocity	2.16	ft/s
Velocity Head	0.07	ft
Specific Energy	0.50	ft
Froude Number	0.63	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.43	ft
Critical Depth	0.32	ft
Channel Slope	0.00750	ft/ft

Worksheet for CHANNEL A4 2YR 3+73.13 - END

GVF Output Data

Critical Slope 0.02023 ft/ft

Energy Dissipation - OUTFALL A2-1		
Velocity out of Pipe	10.51	
Suggested Outlet Protection	WIRE ENCLOSED OR GROUTED ROCK RIPRAP Table 10-3 CoNB DECDM	
Riprap Run Out Apron		
$L_R (ft) = 1.7d * Q / D^{2.5} + 8$		Eq. 10-6 CoNB DECDM
d=	4.72 ft	
D=	8.0 ft	
Q=	466.8 ft ³	
<div>L_R= 28.69 ft</div>		
Channel Shear Stress		
$\tau_d = \gamma d S_0$		HEC 15 (Eq 2.4)
S ₀ =	ft/ft	Average Bottom Slope
d=	ft	Maximum Depth of Flow in the Channel for the Design Discharge
γ=	lb/ft ³	Unit Weight of Water
τ _d = 0.00 lb/ft ²		
Minimum Use		
<div>D₅₀= 0.5 ft Rock Riprap</div>		per HEC 15 (Table 2.3)

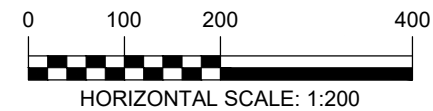
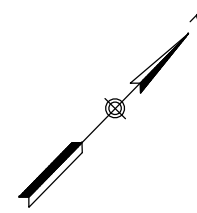
Energy Dissipation - OUTFALL A2-4		
Velocity out of Pipe	11.14	
Suggested Outlet Protection	WIRE ENCLOSED OR GROUTED ROCK RIPRAP	
Riprap Run Out Apron		
$L_R (ft) = 1.7d * Q / D^{2.5} + 8$		
d=	3.84 ft	
D=	9.0 ft	
Q=	385 ft ³	
	<div>L_R= 18.34 ft</div>	
Channel Shear Stress		
$\tau_d = \gamma d S_0$		
S ₀ =	ft/ft	Average Bottom Slope
d=	ft	Maximum Depth of Flow in the Channel for the Design Discharge
γ=	lb/ft ³	Unit Weight of Water
τd=	0.00 lb/ft ²	
Minimum Use		
	<div>D₅₀= 0.5 ft Rock Riprap</div>	

Energy Dissipation - OUTFALL A4-1		
Velocity out of Pipe	10.37	
Suggested Outlet Protection	WIRE ENCLOSED OR GROUTED ROCK RIPRAP	
Riprap Run Out Apron		
$L_R (ft) = 1.7d * Q / D^{2.5} + 8$		
d=	2.00 ft	
D=	4.0 ft	
Q=	82.96 ft ³	
	<div>L_R= 16.81 ft</div>	
Channel Shear Stress		
$\tau_d = \gamma d S_0$		
S ₀ =	ft/ft	Average Bottom Slope
d=	ft	Maximum Depth of Flow in the Channel for the Design Discharge
γ=	lb/ft ³	Unit Weight of Water
τ _d =	0.00 lb/ft ²	
Minimum Use		
	<div>D₅₀= 0.5 ft Rock Riprap</div>	

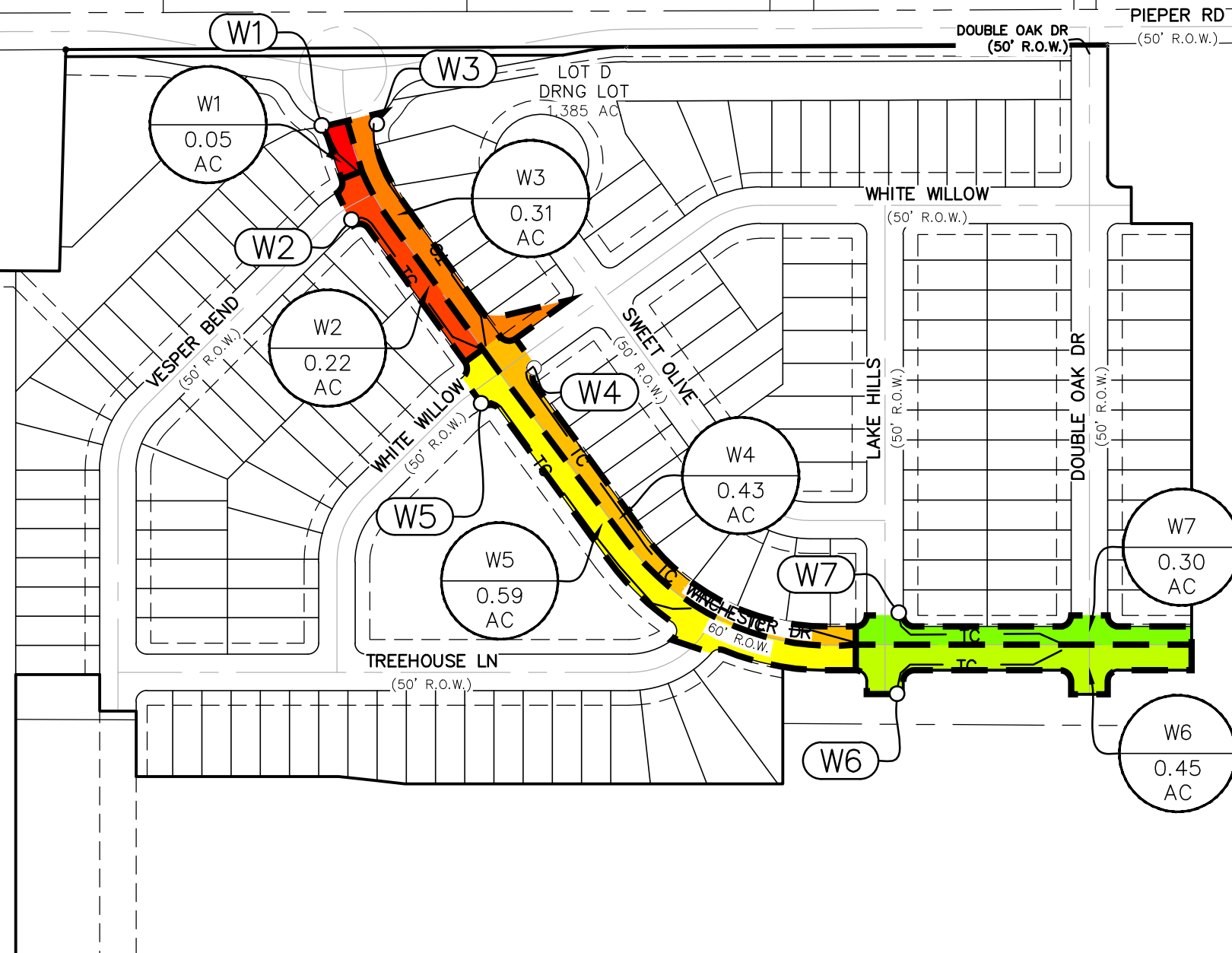
Attachment S

Street Calculations

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LOT W
DRNG LOT
17.905 AC.



290 S. CASTELL AVE., STE. 100
NEW BRAUNFELS, TX 78130
TBPE FIRM F-10961
TBPLS FIRM 10153600

WINCHESTER SUB-AREAS W1-W7

Table 2 - Winchester Drainage Sub-Area Conditions Hydrology Calculations - City of New Braunfels																
Point of Concentration	Description	Drainage Area	Area	T _c	C (2yr)	C (10yr)	C (25yr)	C (100yr)	I (20yr)	I (10yr)	I (25yr)	I (100yr)	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
W1	Drainage Sub Area W1	W1	0.05	10.00	0.65	0.72	0.77	0.86	4.92	7.56	9.07	11.94	0.16	0.27	0.35	0.51
W2	Drainage Sub Area W2	W2	0.22	10.00	0.66	0.73	0.78	0.87	4.92	7.56	9.07	11.94	0.71	1.22	1.56	2.28
W3	Drainage Sub Area W3	W3	0.31	10.00	0.64	0.71	0.76	0.85	4.92	7.56	9.07	11.94	0.98	1.67	2.14	3.13
W4	Drainage Sub Area W4	W4	0.43	10.00	0.66	0.73	0.78	0.86	4.92	7.56	9.07	11.94	1.39	2.37	3.03	4.44
W5	Drainage Sub Area W5	W5	0.59	10.00	0.66	0.73	0.78	0.86	4.92	7.56	9.07	11.94	1.90	3.25	4.16	6.09
W6	Drainage Sub Area W6	W6	0.45	10.00	0.67	0.74	0.79	0.88	4.92	7.56	9.07	11.94	1.48	2.53	3.23	4.72
W7	Drainage Sub Area W7	W7	0.30	10.00	0.66	0.74	0.79	0.87	4.92	7.56	9.07	11.94	0.98	1.67	2.14	3.13

Cross Section for Winchester 100YR

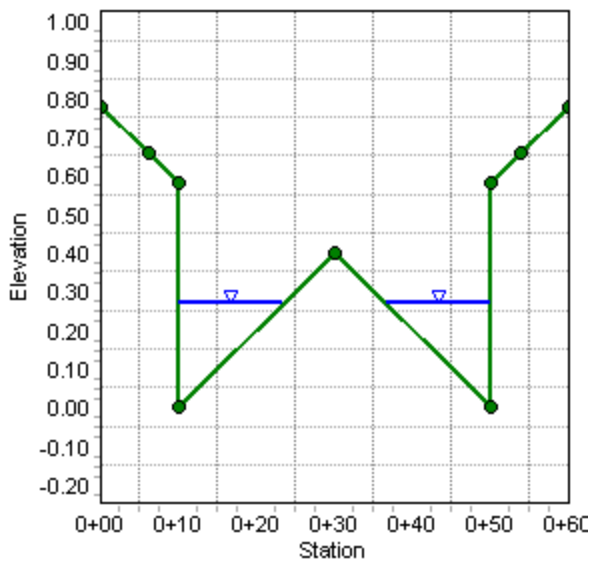
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.27	ft
Discharge	6.09	ft ³ /s

Cross Section Image



Worksheet for Winchester 100YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	6.09	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+30.00	0.40
0+50.00	0.00
0+50.00	0.58
0+54.00	0.66
0+60.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+30.00, 0.40)	0.016
(0+30.00, 0.40)	(0+50.00, 0.00)	0.016
(0+50.00, 0.00)	(0+50.00, 0.58)	0.016
(0+50.00, 0.58)	(0+54.00, 0.66)	0.016
(0+54.00, 0.66)	(0+60.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for Winchester 100YR

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.27	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	3.58	ft ²
Wetted Perimeter	27.31	ft
Hydraulic Radius	0.13	ft
Top Width	26.77	ft
Normal Depth	0.27	ft
Critical Depth	0.25	ft
Critical Slope	0.00769	ft/ft
Velocity	1.70	ft/s
Velocity Head	0.04	ft
Specific Energy	0.31	ft
Froude Number	0.82	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.25	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00769	ft/ft

Cross Section for Winchester 10YR

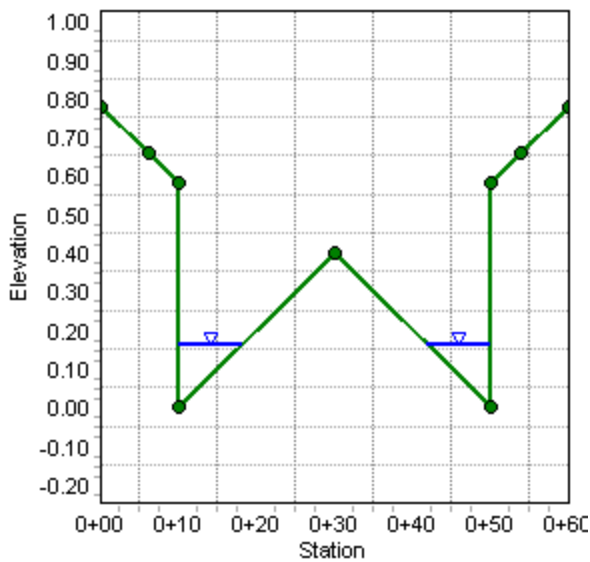
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.16	ft
Discharge	1.67	ft ³ /s

Cross Section Image



Worksheet for Winchester 10YR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	1.67	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+30.00	0.40
0+50.00	0.00
0+50.00	0.58
0+54.00	0.66
0+60.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+30.00, 0.40)	0.016
(0+30.00, 0.40)	(0+50.00, 0.00)	0.016
(0+50.00, 0.00)	(0+50.00, 0.58)	0.016
(0+50.00, 0.58)	(0+54.00, 0.66)	0.016
(0+54.00, 0.66)	(0+60.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for Winchester 10YR

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.16	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		1.36	ft ²
Wetted Perimeter		16.83	ft
Hydraulic Radius		0.08	ft
Top Width		16.50	ft
Normal Depth		0.16	ft
Critical Depth		0.15	ft
Critical Slope		0.00914	ft/ft
Velocity		1.23	ft/s
Velocity Head		0.02	ft
Specific Energy		0.19	ft
Froude Number		0.75	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.16	ft
Critical Depth	0.15	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00914	ft/ft

Winchester Drainage Sub Area

Watershed -

W1

0.05 Acres

Time of Concentration

W1

Description

Drainage Sub Area W1

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	52			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.00	0.1

Tc	10.0 min.
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I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.65	0.72	0.77	0.86
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	2-year	10-year	25-year	100-year
Q (cfs)=	0.16	0.27	0.35	0.51

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.01	0.33	0.38	0.42	0.49
Asphalt	0.04	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.65	0.72	0.77	0.86

Winchester Drainage Sub Area

Watershed -

W2

0.22 Acres

Time of Concentration

W2

Description

Drainage Sub Area W2

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	250			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.01	0.7

Tc	10.0 min.
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I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.66	0.73	0.78	0.87
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	2-year	10-year	25-year	100-year
Q (cfs)=	0.71	1.22	1.56	2.28

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.04	0.33	0.38	0.42	0.49
Asphalt	0.18	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.66	0.73	0.78	0.87

Winchester Drainage Sub Area

Watershed -

W3

0.31 Acres

Time of Concentration

W3

Description

Drainage Sub Area W3

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	336			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.02	0.9

Tc	10.0 min.
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I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.64	0.71	0.76	0.85
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	2-year	10-year	25-year	100-year
Q (cfs)=	0.98	1.67	2.14	3.13

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.07	0.33	0.38	0.42	0.49
Asphalt	0.24	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.64	0.71	0.76	0.85

Winchester Drainage Sub Area

Watershed -

W4

0.43 Acres

Time of Concentration

W4

Description

Drainage Sub Area W4

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	615			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.03	1.7

Tc	10.0 min.
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I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.66	0.73	0.78	0.86
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	2-year	10-year	25-year	100-year
Q (cfs)=	1.39	2.37	3.03	4.44

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.08	0.33	0.38	0.42	0.49
Asphalt	0.35	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.66	0.73	0.78	0.86

Winchester Drainage Sub Area

Watershed -

W5

0.59 Acres

Time of Concentration

W5

Description

Drainage Sub Area W5

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	615			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.03	1.7

Tc	10.0 min.
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I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.66	0.73	0.78	0.86
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	2-year	10-year	25-year	100-year
Q (cfs)=	1.90	3.25	4.16	6.09

	Area		"C" Coefficient			
		2-year	10-year	25-year	100-year	
Developed Grass (Fair, Average 2-7%)	0.11	0.33	0.38	0.42	0.49	
Asphalt	0.48	0.73	0.81	0.86	0.95	
Concrete/Roof	0.00	0.75	0.83	0.88	0.97	
Composite "C" Value		0.66	0.73	0.78	0.86	

Winchester Drainage Sub Area

Watershed -

W6

0.45 Acres

Time of Concentration

W6

Description

Drainage Sub Area W6

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	244			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.01	0.7

Tc	10.0 min.
----	------------------

I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.67	0.74	0.79	0.88
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	2-year	10-year	25-year	100-year
Q (cfs)=	1.48	2.53	3.23	4.72

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.07	0.33	0.38	0.42	0.49
Asphalt	0.38	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.67	0.74	0.79	0.88

Winchester Drainage Sub Area

Watershed -

W7

0.30 Acres

Time of Concentration

W7

Description

Drainage Sub Area W7

				hrs	min.
Sheet Flow	L (ft) =	12	Tt=	$60 \cdot 0.007 \cdot (n \cdot L)^{0.8} / (P_2^{0.5}) \cdot S^{0.4}$	
	n=	0.016			
	S (%) =	2.00			
	P ₂ =	3.34	Tt=	0.00	0.3
Shallow Flow	L (ft) =	0	Tt=	$L / (60 \cdot 20.3282 \cdot S^{(0.5)})$	
(Paved)	S (%) =	1.05			
			Tt=	0.00	0.00
Channel Flow	L (ft) =	227			
(Channel Flow)	Est. V (ft/sec)=	6	V (fps) =	6.00	
			Tt=	$L / (60 \cdot V)$	
			Tt=	0.01	0.6

Tc	10.0 min.
----	------------------

I=	$I = b / (TC + d)^e$			
	2-year	10-year	25-year	100-year
b	69.7	59.8	64.6	74.9
d	12.03	7.69	7.14	5.95
e	0.857	0.72	0.691	0.663
I (in/hr)=	4.92	7.56	9.07	11.94

"C" Value	0.66	0.74	0.79	0.87
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	2-year	10-year	25-year	100-year
Q (cfs)=	0.98	1.67	2.14	3.13

	Area	<u>"C" Coefficient</u>			
		2-year	10-year	25-year	100-year
Developed Grass (Fair, Average 2-7%)	0.05	0.33	0.38	0.42	0.49
Asphalt	0.25	0.73	0.81	0.86	0.95
Concrete/Roof	0.00	0.75	0.83	0.88	0.97
Composite "C" Value		0.66	0.74	0.79	0.87

Cross Section for DA A2 100YR MIN. SLOPE

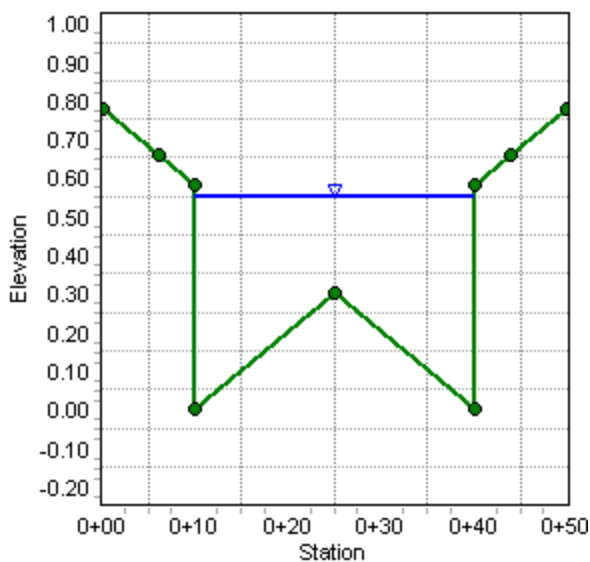
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.55	ft
Discharge	41.85	ft ³ /s

Cross Section Image



Worksheet for DA A2 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	41.85	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A2 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.55	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	12.01	ft ²
Wetted Perimeter	31.11	ft
Hydraulic Radius	0.39	ft
Top Width	30.00	ft
Normal Depth	0.55	ft
Critical Depth	0.54	ft
Critical Slope	0.00534	ft/ft
Velocity	3.48	ft/s
Velocity Head	0.19	ft
Specific Energy	0.74	ft
Froude Number	0.97	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.54	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00534	ft/ft

Cross Section for DA A2 10YR MIN. SLOPE

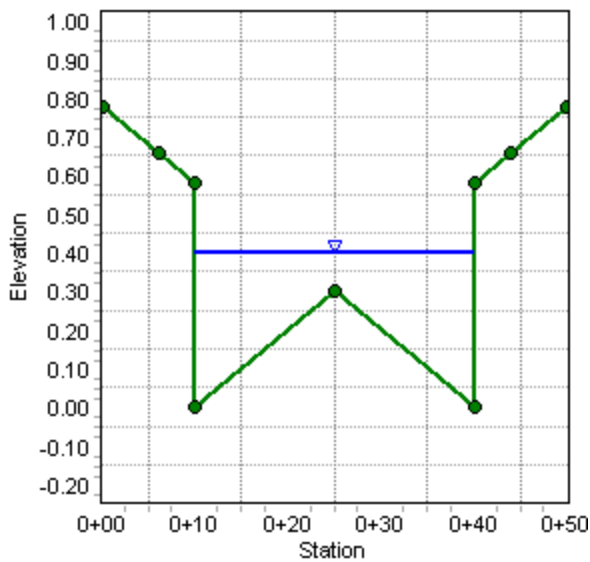
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.40	ft
Discharge	18.65	ft ³ /s

Cross Section Image



Worksheet for DA A2 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	18.65	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A2 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.40	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		7.36	ft ²
Wetted Perimeter		30.80	ft
Hydraulic Radius		0.24	ft
Top Width		30.00	ft
Normal Depth		0.40	ft
Critical Depth		0.38	ft
Critical Slope		0.00630	ft/ft
Velocity		2.53	ft/s
Velocity Head		0.10	ft
Specific Energy		0.50	ft
Froude Number		0.90	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.38	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00630	ft/ft

Cross Section for DA A3 100YR MAX. SLOPE

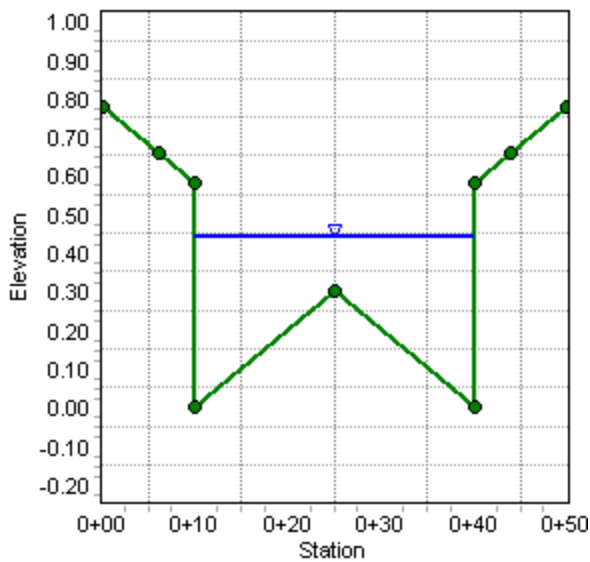
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01790	ft/ft
Normal Depth	0.44	ft
Discharge	46.77	ft ³ /s

Cross Section Image



Worksheet for DA A3 100YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01790	ft/ft
Discharge	46.77	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A3 100YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.44	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		8.74	ft ²
Wetted Perimeter		30.89	ft
Hydraulic Radius		0.28	ft
Top Width		30.00	ft
Normal Depth		0.44	ft
Critical Depth		0.57	ft
Critical Slope		0.00523	ft/ft
Velocity		5.35	ft/s
Velocity Head		0.44	ft
Specific Energy		0.89	ft
Froude Number		1.75	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.44	ft
Critical Depth	0.57	ft
Channel Slope	0.01790	ft/ft
Critical Slope	0.00523	ft/ft

Cross Section for DA A3 100YR MIN. SLOPE

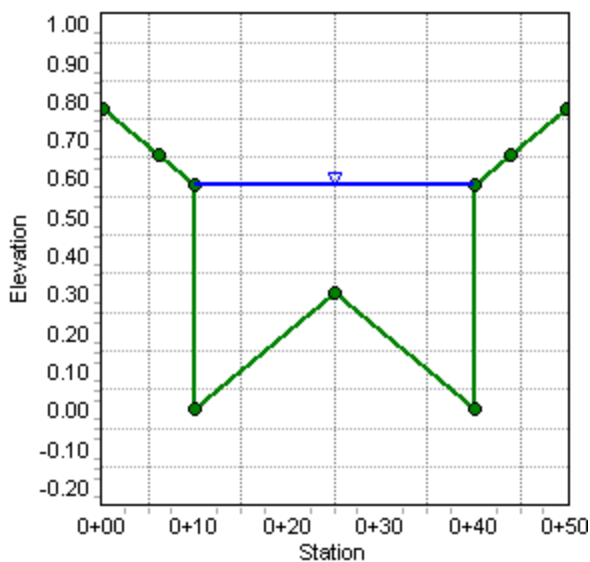
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.58	ft
Discharge	46.77	ft ³ /s

Cross Section Image



Worksheet for DA A3 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	46.77	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A3 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.58	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	12.85	ft ²
Wetted Perimeter	31.16	ft
Hydraulic Radius	0.41	ft
Top Width	30.00	ft
Normal Depth	0.58	ft
Critical Depth	0.57	ft
Critical Slope	0.00523	ft/ft
Velocity	3.64	ft/s
Velocity Head	0.21	ft
Specific Energy	0.78	ft
Froude Number	0.98	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.58	ft
Critical Depth	0.57	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00523	ft/ft

Cross Section for DA A3 10YR MAX. SLOPE

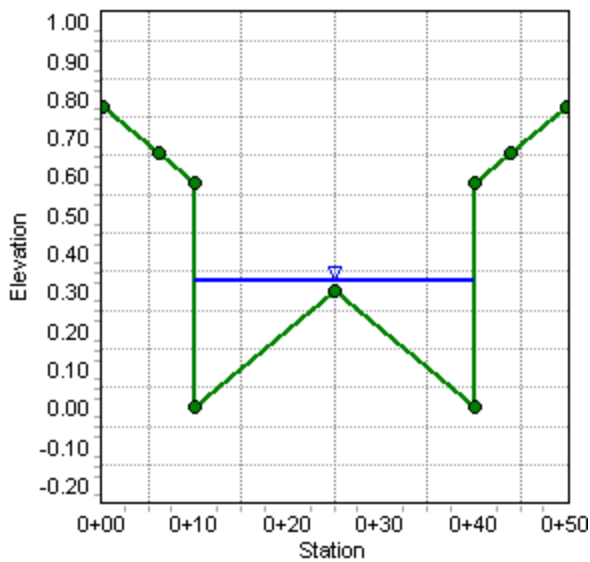
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01790	ft/ft
Normal Depth	0.33	ft
Discharge	20.84	ft ³ /s

Cross Section Image



Worksheet for DA A3 10YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01790	ft/ft
Discharge	20.84	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A3 10YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.33	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	5.36	ft ²
Wetted Perimeter	30.66	ft
Hydraulic Radius	0.17	ft
Top Width	30.00	ft
Normal Depth	0.33	ft
Critical Depth	0.40	ft
Critical Slope	0.00616	ft/ft
Velocity	3.89	ft/s
Velocity Head	0.23	ft
Specific Energy	0.56	ft
Froude Number	1.62	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.40	ft
Channel Slope	0.01790	ft/ft
Critical Slope	0.00616	ft/ft

Cross Section for DA A3 10YR MIN. SLOPE

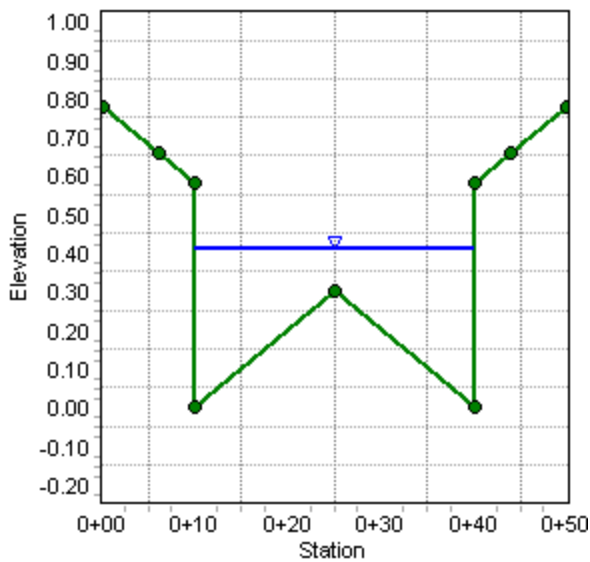
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.41	ft
Discharge	20.84	ft ³ /s

Cross Section Image



Worksheet for DA A3 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	20.84	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A3 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.41	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	7.87	ft ²
Wetted Perimeter	30.83	ft
Hydraulic Radius	0.26	ft
Top Width	30.00	ft
Normal Depth	0.41	ft
Critical Depth	0.40	ft
Critical Slope	0.00616	ft/ft
Velocity	2.65	ft/s
Velocity Head	0.11	ft
Specific Energy	0.52	ft
Froude Number	0.91	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.40	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00616	ft/ft

Cross Section for DA A5 100YR MAX. SLOPE

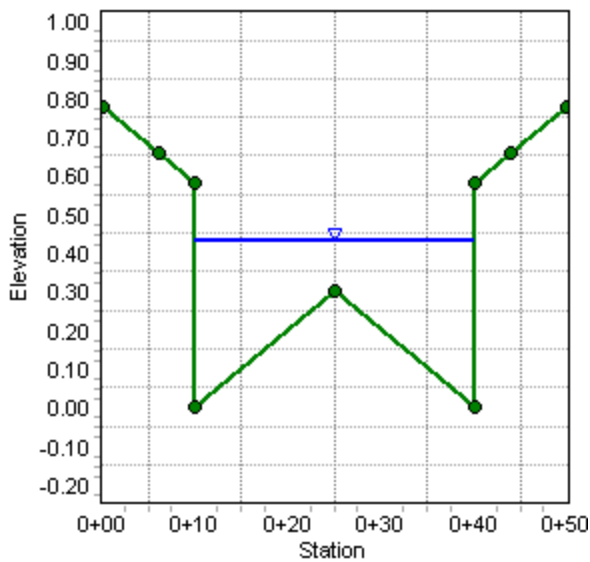
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01310	ft/ft
Normal Depth	0.43	ft
Discharge	36.56	ft ³ /s

Cross Section Image



Worksheet for DA A5 100YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01310	ft/ft
Discharge	36.56	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A5 100YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.43	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	8.27	ft ²
Wetted Perimeter	30.86	ft
Hydraulic Radius	0.27	ft
Top Width	30.00	ft
Normal Depth	0.43	ft
Critical Depth	0.51	ft
Critical Slope	0.00549	ft/ft
Velocity	4.42	ft/s
Velocity Head	0.30	ft
Specific Energy	0.73	ft
Froude Number	1.48	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.43	ft
Critical Depth	0.51	ft
Channel Slope	0.01310	ft/ft
Critical Slope	0.00549	ft/ft

Cross Section for DA A5 100YR MIN. SLOPE

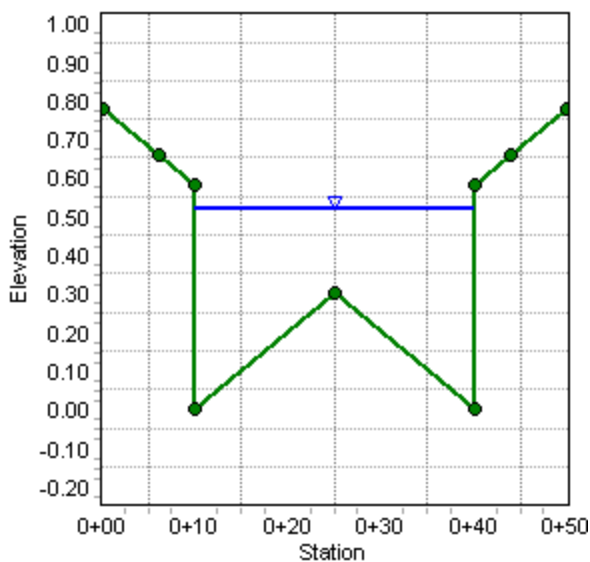
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.52	ft
Discharge	36.56	ft ³ /s

Cross Section Image



Worksheet for DA A5 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	36.56	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A5 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.52	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	11.07	ft ²
Wetted Perimeter	31.04	ft
Hydraulic Radius	0.36	ft
Top Width	30.00	ft
Normal Depth	0.52	ft
Critical Depth	0.51	ft
Critical Slope	0.00549	ft/ft
Velocity	3.30	ft/s
Velocity Head	0.17	ft
Specific Energy	0.69	ft
Froude Number	0.96	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.51	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00549	ft/ft

Cross Section for DA A5 10YR MAX. SLOPE

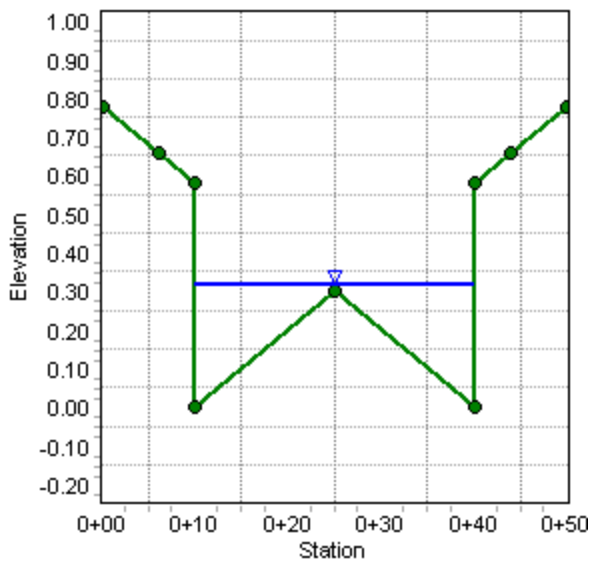
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01310	ft/ft
Normal Depth	0.32	ft
Discharge	16.29	ft ³ /s

Cross Section Image



Worksheet for DA A5 10YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01310	ft/ft
Discharge	16.29	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A5 10YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	5.07	ft ²
Wetted Perimeter	30.64	ft
Hydraulic Radius	0.17	ft
Top Width	30.00	ft
Normal Depth	0.32	ft
Critical Depth	0.36	ft
Critical Slope	0.00649	ft/ft
Velocity	3.21	ft/s
Velocity Head	0.16	ft
Specific Energy	0.48	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.36	ft
Channel Slope	0.01310	ft/ft
Critical Slope	0.00649	ft/ft

Cross Section for DA A5 10YR MIN. SLOPE

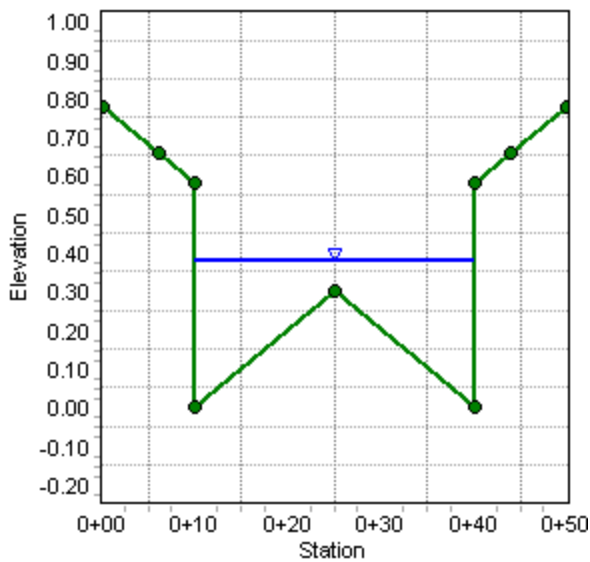
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.38	ft
Discharge	16.29	ft ³ /s

Cross Section Image



Worksheet for DA A5 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	16.29	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A5 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.38	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		6.79	ft ²
Wetted Perimeter		30.76	ft
Hydraulic Radius		0.22	ft
Top Width		30.00	ft
Normal Depth		0.38	ft
Critical Depth		0.36	ft
Critical Slope		0.00649	ft/ft
Velocity		2.40	ft/s
Velocity Head		0.09	ft
Specific Energy		0.47	ft
Froude Number		0.89	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.36	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00649	ft/ft

Cross Section for DA A6 100YR MAX. SLOPE

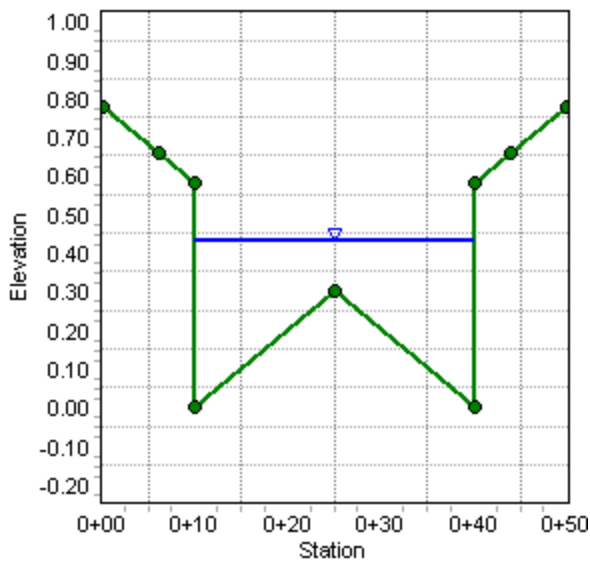
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01930	ft/ft
Normal Depth	0.43	ft
Discharge	45.44	ft ³ /s

Cross Section Image



Worksheet for DA A6 100YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01930	ft/ft
Discharge	45.44	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A6 100YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.43	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	8.39	ft ²
Wetted Perimeter	30.87	ft
Hydraulic Radius	0.27	ft
Top Width	30.00	ft
Normal Depth	0.43	ft
Critical Depth	0.56	ft
Critical Slope	0.00526	ft/ft
Velocity	5.42	ft/s
Velocity Head	0.46	ft
Specific Energy	0.89	ft
Froude Number	1.81	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.43	ft
Critical Depth	0.56	ft
Channel Slope	0.01930	ft/ft
Critical Slope	0.00526	ft/ft

Cross Section for DA A6 100YR MIN. SLOPE

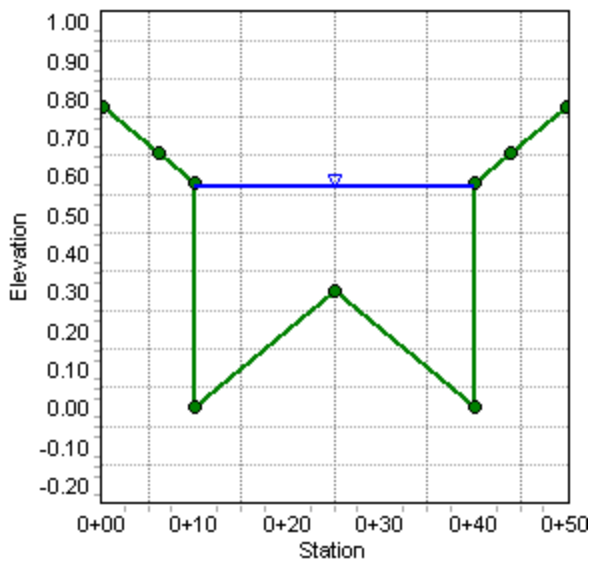
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.57	ft
Discharge	45.44	ft ³ /s

Cross Section Image



Worksheet for DA A6 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	45.44	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A6 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.57	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	12.63	ft ²
Wetted Perimeter	31.15	ft
Hydraulic Radius	0.41	ft
Top Width	30.00	ft
Normal Depth	0.57	ft
Critical Depth	0.56	ft
Critical Slope	0.00526	ft/ft
Velocity	3.60	ft/s
Velocity Head	0.20	ft
Specific Energy	0.77	ft
Froude Number	0.98	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.57	ft
Critical Depth	0.56	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00526	ft/ft

Cross Section for DA A6 10YR MAX. SLOPE

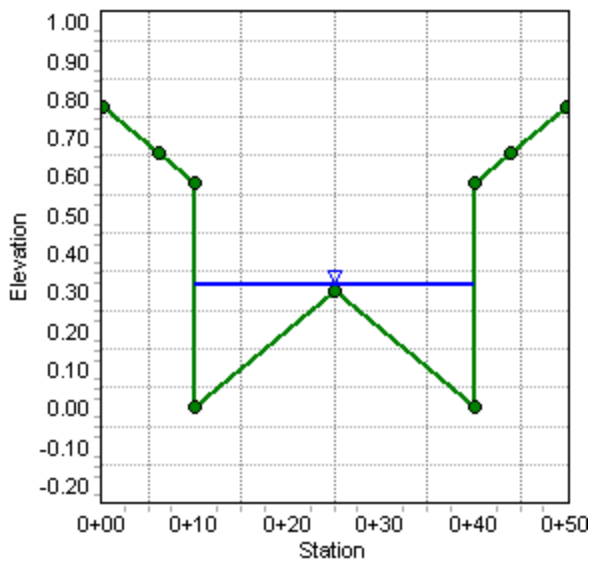
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01930	ft/ft
Normal Depth	0.32	ft
Discharge	20.28	ft ³ /s

Cross Section Image



Worksheet for DA A6 10YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01930	ft/ft
Discharge	20.28	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A6 10YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	5.15	ft ²
Wetted Perimeter	30.65	ft
Hydraulic Radius	0.17	ft
Top Width	30.00	ft
Normal Depth	0.32	ft
Critical Depth	0.39	ft
Critical Slope	0.00620	ft/ft
Velocity	3.94	ft/s
Velocity Head	0.24	ft
Specific Energy	0.56	ft
Froude Number	1.67	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.39	ft
Channel Slope	0.01930	ft/ft
Critical Slope	0.00620	ft/ft

Cross Section for DA A6 10YR MIN. SLOPE

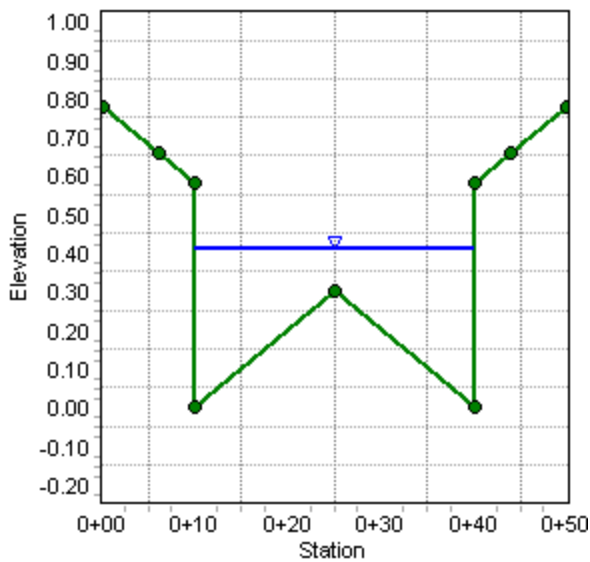
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.41	ft
Discharge	20.28	ft ³ /s

Cross Section Image



Worksheet for DA A6 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	20.28	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A6 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.41	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	7.76	ft ²
Wetted Perimeter	30.82	ft
Hydraulic Radius	0.25	ft
Top Width	30.00	ft
Normal Depth	0.41	ft
Critical Depth	0.39	ft
Critical Slope	0.00620	ft/ft
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energy	0.51	ft
Froude Number	0.91	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.39	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00620	ft/ft

Cross Section for DA A7 100YR MAX. SLOPE

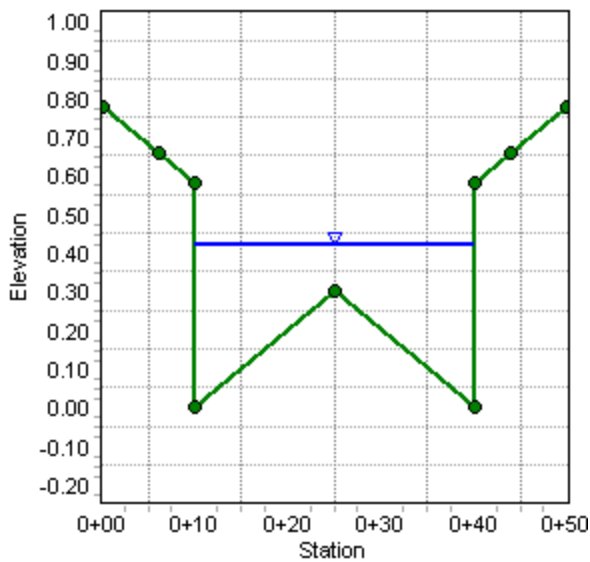
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01470	ft/ft
Normal Depth	0.42	ft
Discharge	37.51	ft ³ /s

Cross Section Image



Worksheet for DA A7 100YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01470	ft/ft
Discharge	37.51	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A7 100YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.42	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	8.11	ft ²
Wetted Perimeter	30.85	ft
Hydraulic Radius	0.26	ft
Top Width	30.00	ft
Normal Depth	0.42	ft
Critical Depth	0.51	ft
Critical Slope	0.00546	ft/ft
Velocity	4.62	ft/s
Velocity Head	0.33	ft
Specific Energy	0.75	ft
Froude Number	1.57	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.51	ft
Channel Slope	0.01470	ft/ft
Critical Slope	0.00546	ft/ft

Cross Section for DA A7 100YR MIN. SLOPE

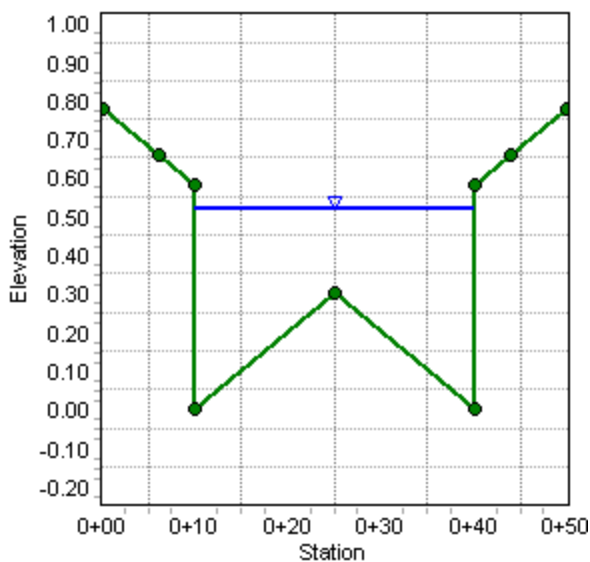
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.52	ft
Discharge	37.51	ft ³ /s

Cross Section Image



Worksheet for DA A7 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	37.51	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A7 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.52	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	11.24	ft ²
Wetted Perimeter	31.06	ft
Hydraulic Radius	0.36	ft
Top Width	30.00	ft
Normal Depth	0.52	ft
Critical Depth	0.52	ft
Critical Slope	0.00546	ft/ft
Velocity	3.34	ft/s
Velocity Head	0.17	ft
Specific Energy	0.70	ft
Froude Number	0.96	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.52	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00546	ft/ft

Cross Section for DA A7 10YR MAX. SLOPE

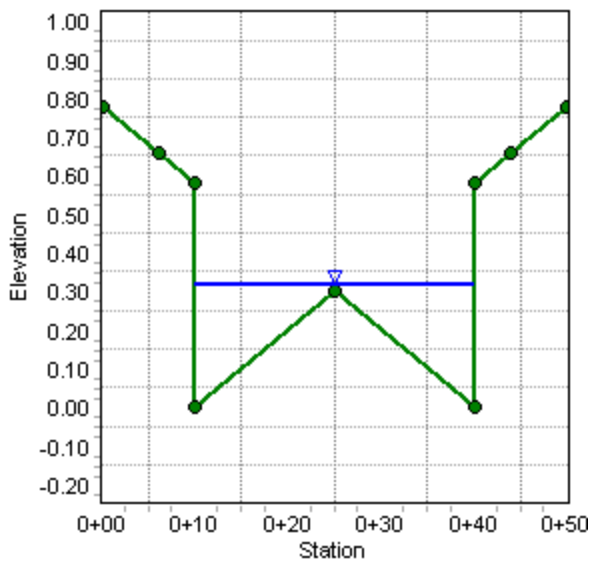
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01470	ft/ft
Normal Depth	0.32	ft
Discharge	16.74	ft ³ /s

Cross Section Image



Worksheet for DA A7 10YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01470	ft/ft
Discharge	16.74	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A7 10YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	4.98	ft ²
Wetted Perimeter	30.64	ft
Hydraulic Radius	0.16	ft
Top Width	30.00	ft
Normal Depth	0.32	ft
Critical Depth	0.36	ft
Critical Slope	0.00645	ft/ft
Velocity	3.36	ft/s
Velocity Head	0.18	ft
Specific Energy	0.49	ft
Froude Number	1.45	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.36	ft
Channel Slope	0.01470	ft/ft
Critical Slope	0.00645	ft/ft

Cross Section for DA A7 10YR MIN. SLOPE

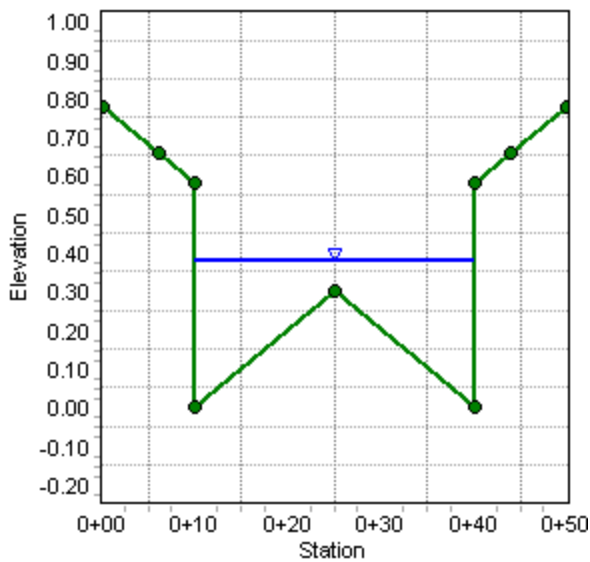
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.38	ft
Discharge	16.74	ft ³ /s

Cross Section Image



Worksheet for DA A7 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	16.74	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A7 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.38	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		6.90	ft ²
Wetted Perimeter		30.77	ft
Hydraulic Radius		0.22	ft
Top Width		30.00	ft
Normal Depth		0.38	ft
Critical Depth		0.36	ft
Critical Slope		0.00645	ft/ft
Velocity		2.43	ft/s
Velocity Head		0.09	ft
Specific Energy		0.47	ft
Froude Number		0.89	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.36	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00645	ft/ft

Cross Section for DA A8 100YR MAX. SLOPE

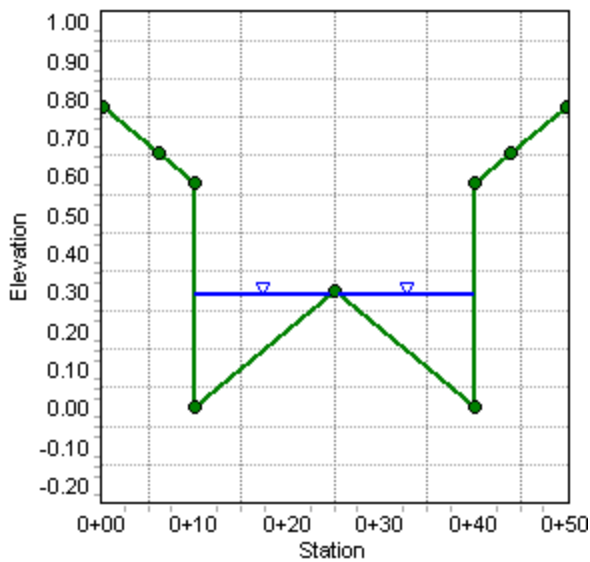
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03690	ft/ft
Normal Depth	0.29	ft
Discharge	21.01	ft ³ /s

Cross Section Image



Worksheet for DA A8 100YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03690	ft/ft
Discharge	21.01	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A8 100YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.29	ft
Elevation Range	0.00 to 0.78 ft		
Flow Area		4.29	ft ²
Wetted Perimeter		29.89	ft
Hydraulic Radius		0.14	ft
Top Width		29.30	ft
Normal Depth		0.29	ft
Critical Depth		0.40	ft
Critical Slope		0.00615	ft/ft
Velocity		4.89	ft/s
Velocity Head		0.37	ft
Specific Energy		0.67	ft
Froude Number		2.25	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.40	ft
Channel Slope	0.03690	ft/ft
Critical Slope	0.00615	ft/ft

Cross Section for DA A8 100YR MIN. SLOPE

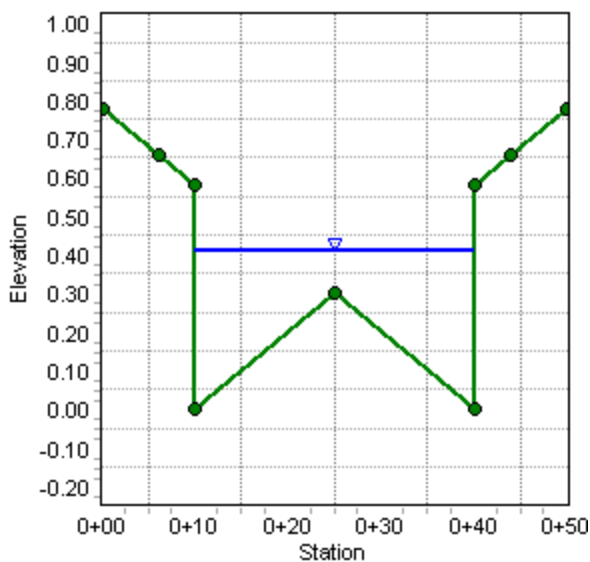
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.41	ft
Discharge	21.01	ft ³ /s

Cross Section Image



Worksheet for DA A8 100YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	21.01	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A8 100YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.41	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	7.91	ft ²
Wetted Perimeter	30.83	ft
Hydraulic Radius	0.26	ft
Top Width	30.00	ft
Normal Depth	0.41	ft
Critical Depth	0.40	ft
Critical Slope	0.00615	ft/ft
Velocity	2.66	ft/s
Velocity Head	0.11	ft
Specific Energy	0.52	ft
Froude Number	0.91	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.40	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00615	ft/ft

Cross Section for DA A8 10YR MAX. SLOPE

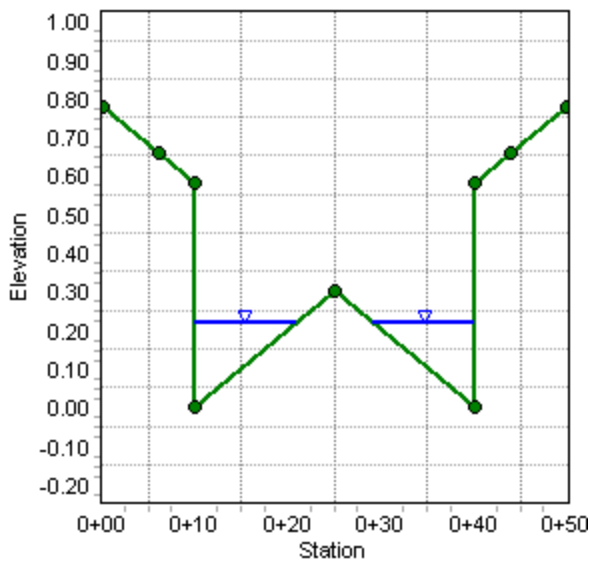
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03690	ft/ft
Normal Depth	0.22	ft
Discharge	9.36	ft ³ /s

Cross Section Image



Worksheet for DA A8 10YR MAX. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03690	ft/ft
Discharge	9.36	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A8 10YR MAX. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.22	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	2.34	ft ²
Wetted Perimeter	22.07	ft
Hydraulic Radius	0.11	ft
Top Width	21.63	ft
Normal Depth	0.22	ft
Critical Depth	0.29	ft
Critical Slope	0.00726	ft/ft
Velocity	4.00	ft/s
Velocity Head	0.25	ft
Specific Energy	0.47	ft
Froude Number	2.15	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.29	ft
Channel Slope	0.03690	ft/ft
Critical Slope	0.00726	ft/ft

Cross Section for DA A8 10YR MIN. SLOPE

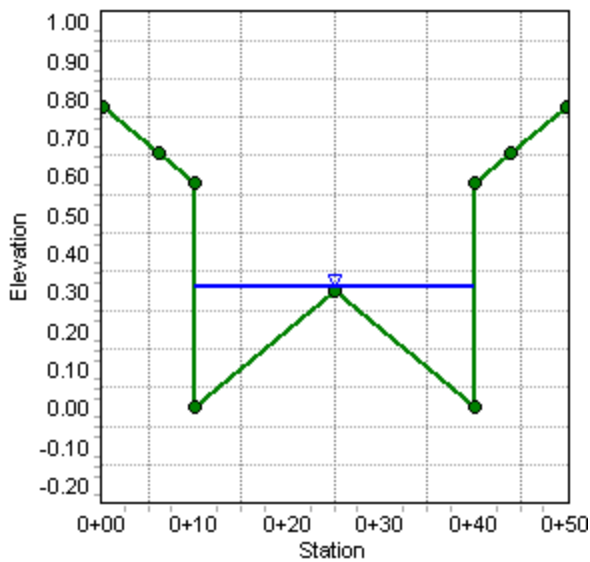
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.31	ft
Discharge	9.36	ft ³ /s

Cross Section Image



Worksheet for DA A8 10YR MIN. SLOPE

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	9.36	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.78
0+06.00	0.66
0+10.00	0.58
0+10.00	0.00
0+25.00	0.30
0+40.00	0.00
0+40.00	0.58
0+44.00	0.66
0+50.00	0.78

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.78)	(0+06.00, 0.66)	0.035
(0+06.00, 0.66)	(0+10.00, 0.58)	0.016
(0+10.00, 0.58)	(0+10.00, 0.00)	0.016
(0+10.00, 0.00)	(0+25.00, 0.30)	0.016
(0+25.00, 0.30)	(0+40.00, 0.00)	0.016
(0+40.00, 0.00)	(0+40.00, 0.58)	0.016
(0+40.00, 0.58)	(0+44.00, 0.66)	0.016
(0+44.00, 0.66)	(0+50.00, 0.78)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for DA A8 10YR MIN. SLOPE

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.31	ft
Elevation Range	0.00 to 0.78	ft
Flow Area	4.86	ft ²
Wetted Perimeter	30.63	ft
Hydraulic Radius	0.16	ft
Top Width	30.00	ft
Normal Depth	0.31	ft
Critical Depth	0.29	ft
Critical Slope	0.00726	ft/ft
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.37	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.29	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00726	ft/ft

Attachment T

Parkside Offsite Drainage Report