Stormwater Memorandum

for:

D-Bat

540 NE Town Centre Drive
Lee's Summit, MO 64086

Prepared for:
WHD Management
PO Box 1059
Lee's Summit, MO 64063

Prepared by:
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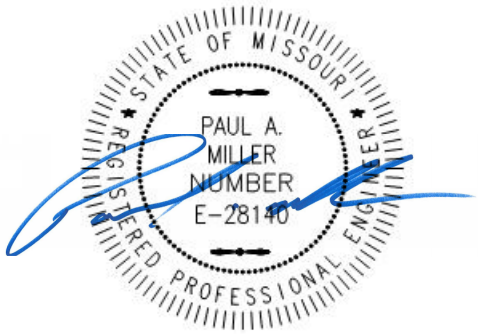

05/20/2022

May 20th, 2022

Loic Nguinguiri, I.E.
City of Lee's Summit
220 SE Green St
Lee's Summit, MO 64063

Re: PL2022043
D-Bat – Town Centre Lot 1C
Lee's Summit, MO

Mr. Nguinguiri,

This letter is intended to accompany the approved Micro Storm Water Study for Lot 1 of Lee's Summit's Town Centre Development and illustrate how the stormwater runoff from the D-Bat Facility will be managed.

The regional detention and private stormwater systems for the entire Town Centre Lot 1 Development, which includes Lots 1A, 1B, 1C & Tract A, are designed to handle the runoff from the fully developed site once all future phases of construction are completed. The D-Bat facility is located on Lot 1C. The Proposed Drainage Area Map for the entire development is attached to this memorandum.

Runoff from the D-Bat site will sheet flow away from the proposed building and drain into private curb inlets located along the back of the curb of the parking lot. The runoff will continue through 15" and 18" HDPE private storm lines and ultimately discharge into the regional detention basin for the entire development. The roof of the proposed building is pitched to drain runoff from the south to the north and discharge through gutters and downspouts on the north side of the building. The runoff will then collect in the gutters of the privates drives north of the building and will flow into private curb inlets and eventually into the detention basin.

Discharge from the detention basin will be controlled by an outlet structure that is designed to control the discharge from the 90% mean annual event to meet the minimum forty-hour extended detention requirement for comprehensive control. All runoff from the D-Bat facility will pass through the detention basin and be subject to the minimum forty-hour extended detention requirement.

The D-Bat Property, which is located on Lot 1C of the Town Centre Development, is made up of 1.99 acres that is currently completely pervious. After development, 1.41 of those acres will be impervious with the addition of the building, parking, and associated infrastructure. The existing peak flow rates from Lot 1C are 3.08 cfs & 4.67 cfs for the 10-year and 100-year storm events, respectively, and sheet flows to the north into an existing pond. After the development of the site and with the increase in impervious ground cover, peak flow rates from the site will increase to 7.50 cfs & 11.37 cfs for the 10-year and 100-year storm events, respectively. The runoff will then

be directed to the proposed regional detention basin and discharge from the basin's outlet structure at a rate less than those specified for the Comprehensive Control Detention Strategy in KCAPWA Section 5608.4.C.1. Please refer to the approved Micro Storm Water Study for Lot 1 of Lee's Summit's Town Centre Development for the complete detention basin calculations and discharge rates. The existing and proposed peak runoff rates and hydrographs for the D-Bat development have been attached to this memorandum.

In conclusion, the proposed D-Bat Facility located on Lot 1C of the Town Centre Development will increase the amount of impervious surface area on Lot 1C by 1.41 acres. An extended dry detention basin will be added to Tract A of the Lee's Summit Town Centre Development to reduce site runoff due to the increase in impervious area. A new private storm sewer system will be added to convey the runoff into the on-site detention basin and eventually into the detention basin on the neighboring property to the east.

Please feel free to contact me with any questions.

Sincerely,

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Local Benchmarks:

BM-1: (Sanitary Sewer Manhole, Center of Lid)
Elevation: 1006.88'
N: 1013449.78
E: 2826933.88

BM-2: (Storm Sewer Curb Inlet, Center of Lid)
Elevation: 994.34'
N: 1013518.71
E: 2826136.03

Drainage Legend

drainage area

Property Legend

right of way
property lines
easements
setbacks

Grading Legend

existing minor contour
existing major contour
proposed minor contour
proposed major contour

Utility Legend

existing
proposed

Linetypes

sanm — sanitary main
sans — sanitary service
storm sewer (existing)
storm sewer (solid wall, proposed)
stm — storm sewer (solid wall, proposed)
storm sewer (perforated, proposed)
wtrm — water main
wtrf — water service (fire)
wtrd — water service (domestic)
wtri — water service (irrigation)

gasm — natural gas main
gass — natural gas service schematic

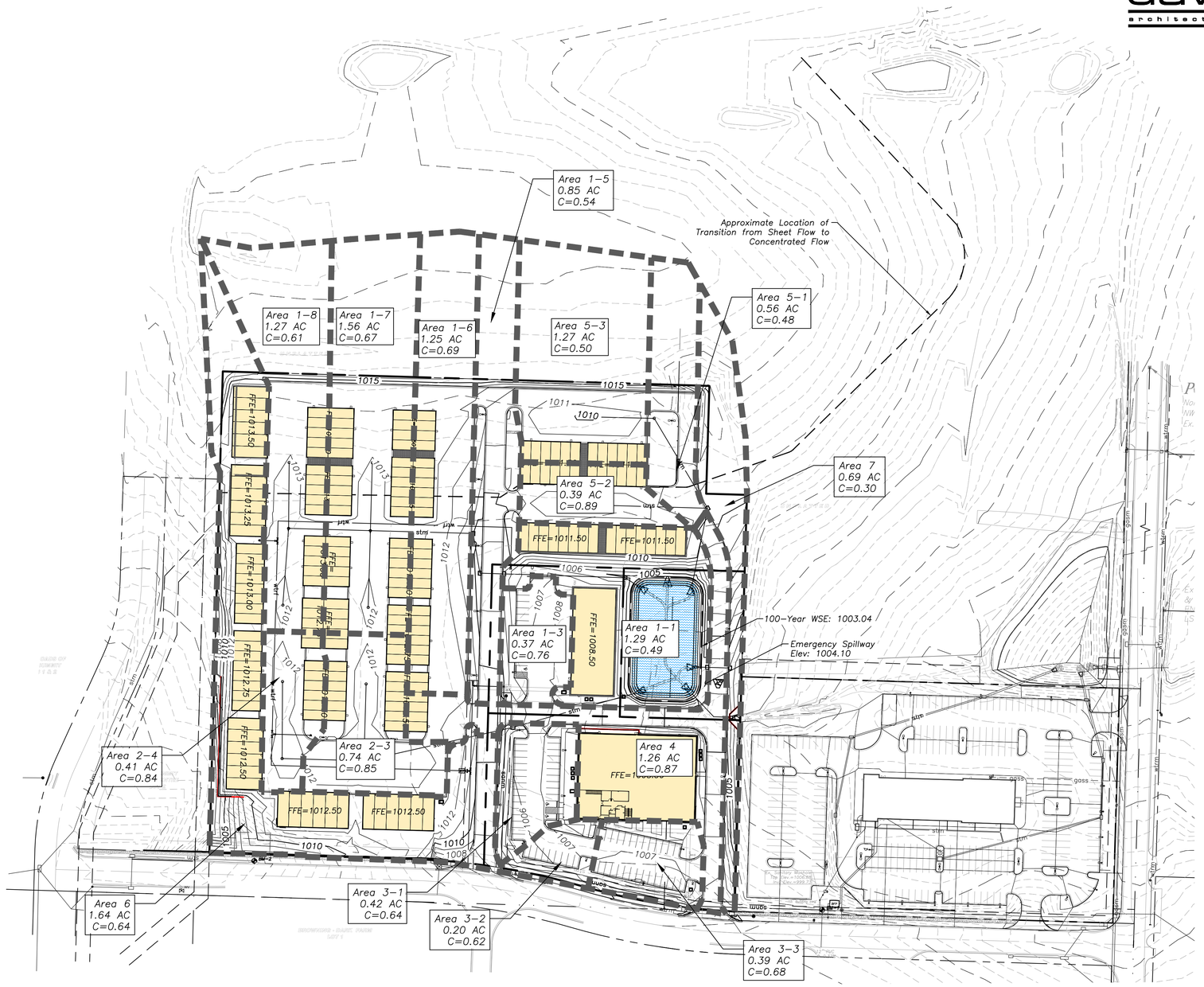
elpu — underground primary electric
elsu — underground secondary electric
elpo — overhead electric

datu — underground cable/phone/data
datsu — underground cable/phone/data service

fence-chainlink
fence-wood
fence-barbed wire
treeline

Symbols

sanitary manhole
co — service cleanout
fmv — force main release valve
rectangular structure
circular structure
fire hydrant
wv — water valve
M — water meter
BFP — backflow preventer
gm — natural gas meter
T — service transformer (pad mount)
S — primary switch gear
light pole
C — cable/phone/data junction box
street light
pedestrian street light
electric pole
guy wire
end section



north

1 Future Conditions Drainage Area Map
scale: 1"=80'
0 40 80 160

Post-Construction Impervious Area Calculations

		Square Feet	Acres
Area of Site		505,723	11.61
Impervious Area		350,108	8.04
Pervious Area		155,615	3.57
Q: 10 year		16.24 cfs	
100 year		27.04 cfs	

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP-CALL BEFORE YOU DIG!

a new development for
Town Centre Lot 1
520 NE Town Centre Drive
Lee's Summit, Missouri

date
02.18.2022
drawn by
JMP
checked by
PAM
revisions

sheet number
C3.3
drawing type
FDP
project number
20231

Hydraflow Table of Contents

New.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 05 / 19 / 2022

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	Rational	D-Bat Existing Runoff
2	Rational	D-Bat Proposed Runoff

Hydrograph Return Period Recap

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	Rational	------	1.511	2.216	-------	2.725	3.084	3.782	3.997	4.672	D-Bat Existing Runoff
2	Rational	------	3.678	5.392	-------	6.632	7.503	9.204	9.725	11.37	D-Bat Proposed Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

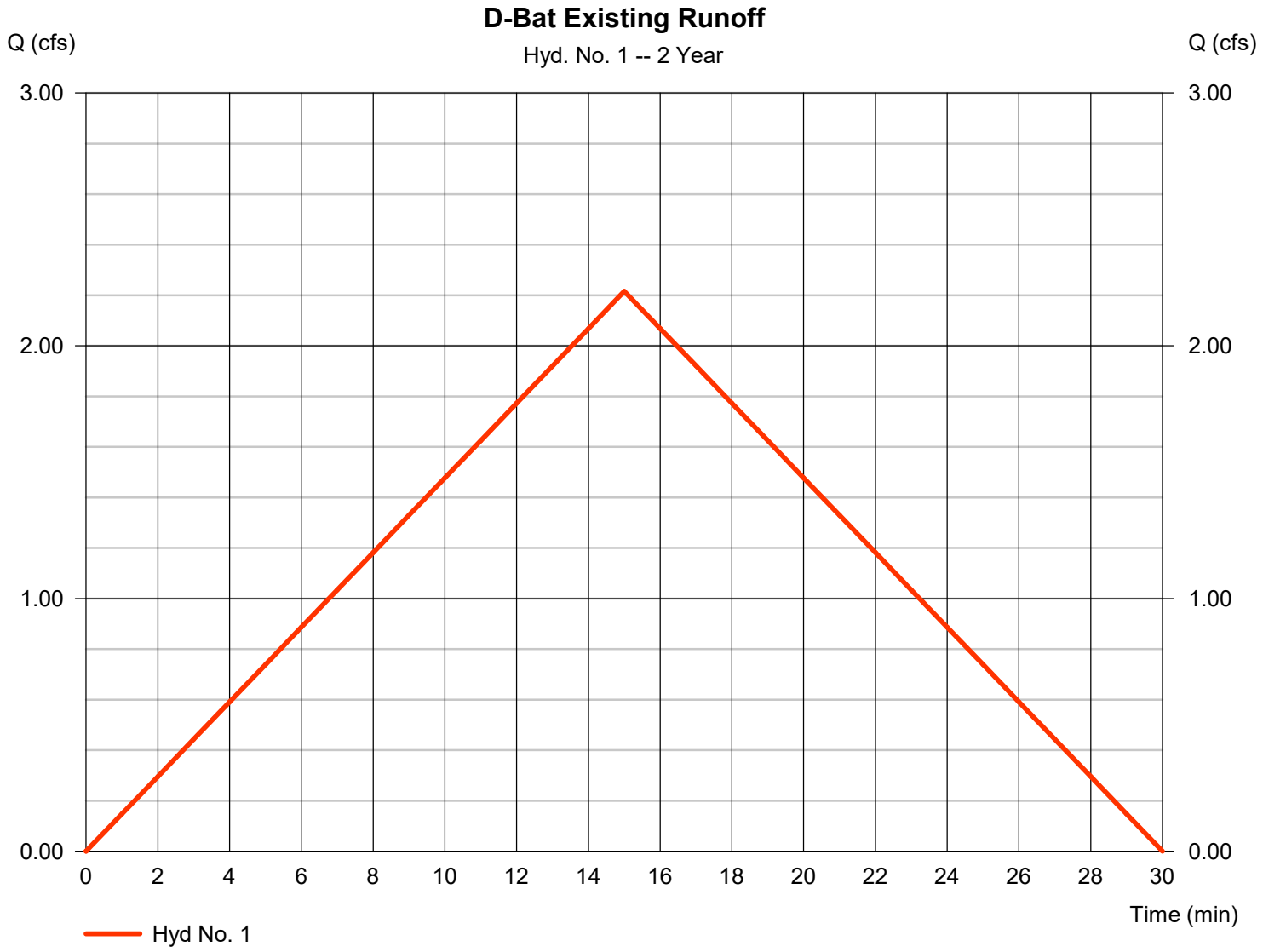
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	2.216	1	15	1,994	------	------	------	D-Bat Existing Runoff
2	Rational	5.392	1	15	4,853	------	------	------	D-Bat Proposed Runoff

Hydrograph Report

Hyd. No. 1

D-Bat Existing Runoff

Hydrograph type	=	Rational	Peak discharge	=	2.216 cfs
Storm frequency	=	2 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	1,994 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.3
Intensity	=	3.712 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1

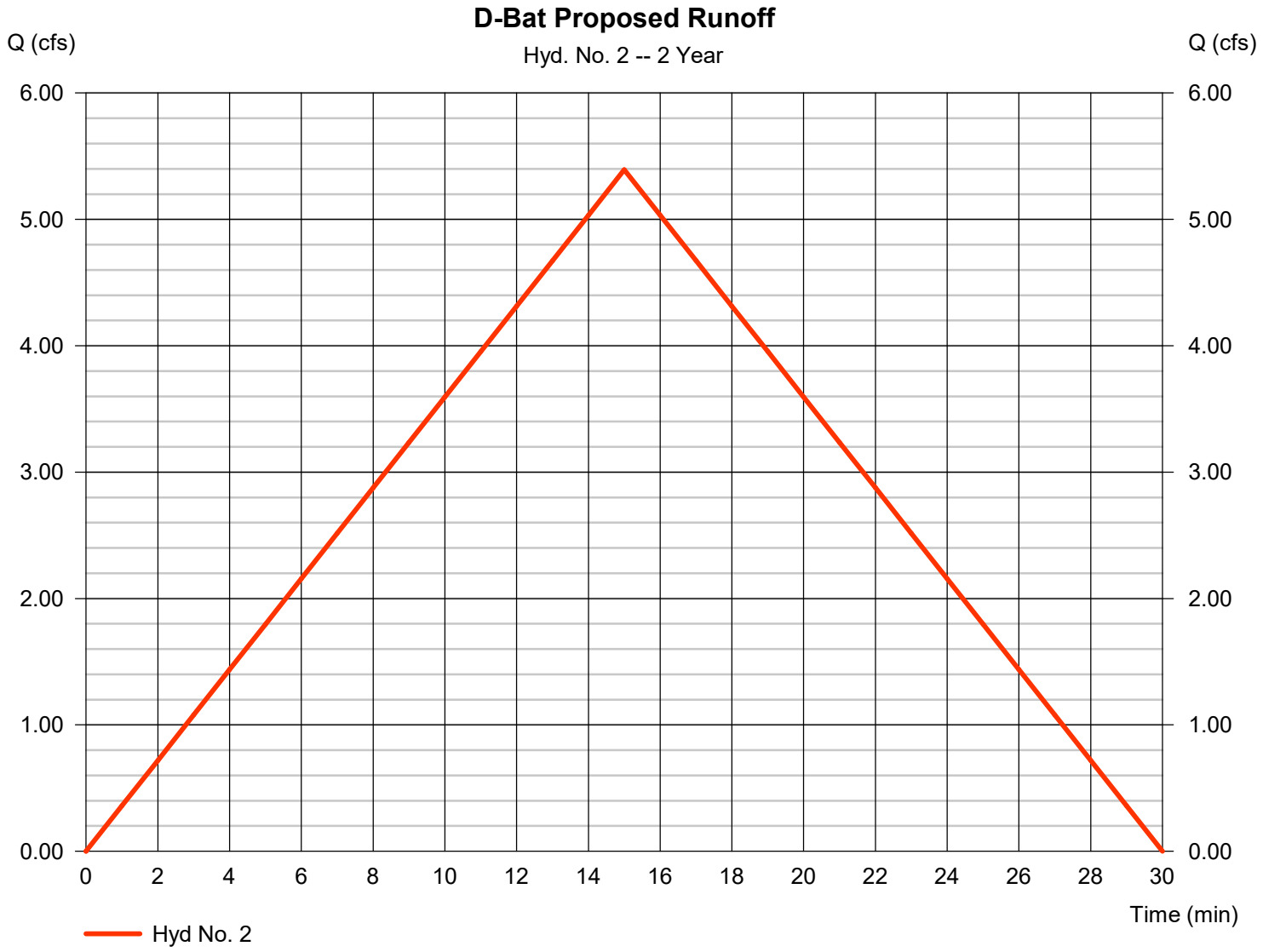


Hydrograph Report

Hyd. No. 2

D-Bat Proposed Runoff

Hydrograph type	=	Rational	Peak discharge	=	5.392 cfs
Storm frequency	=	2 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	4,853 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.73
Intensity	=	3.712 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

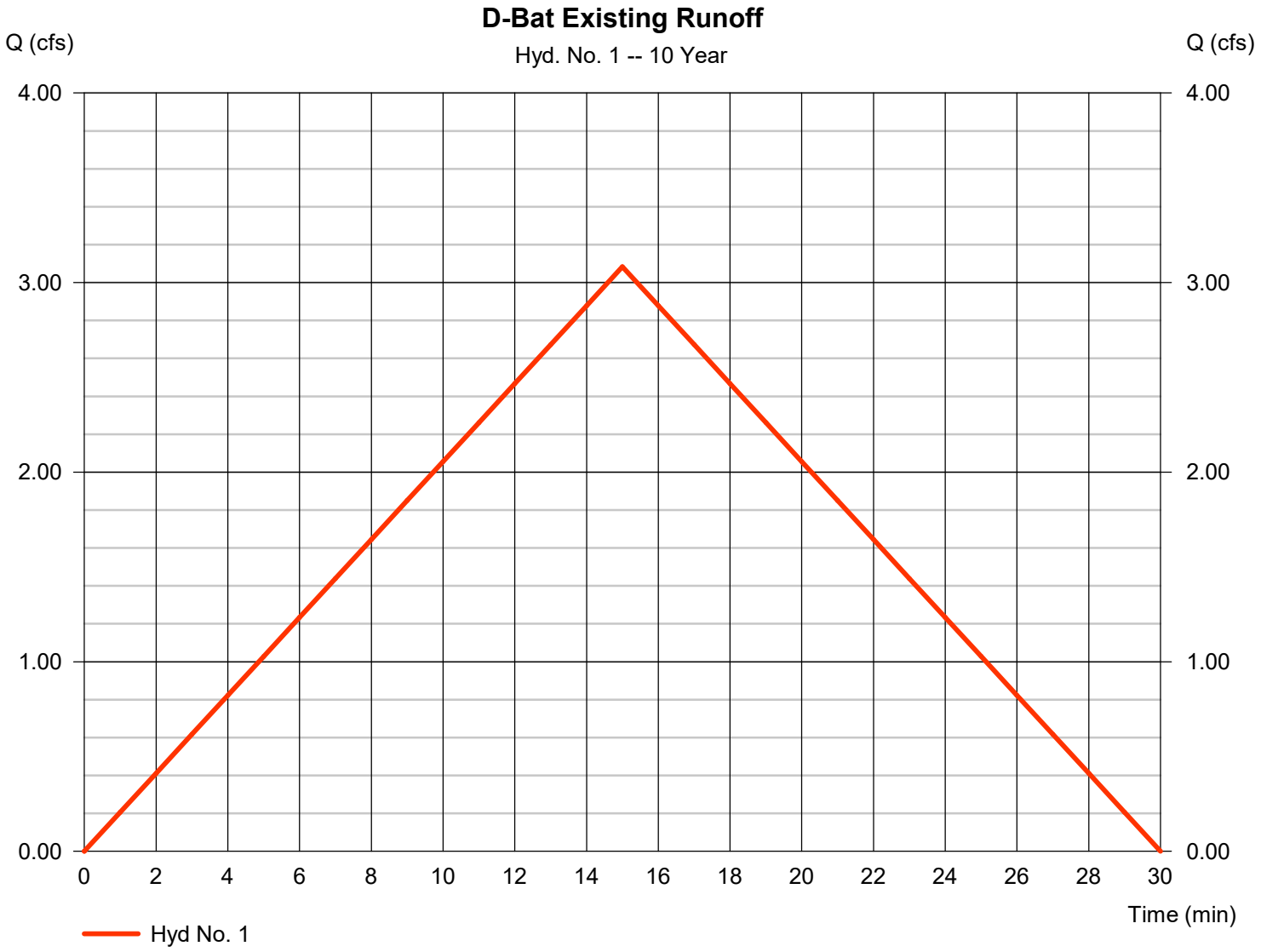
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	3.084	1	15	2,775	------	------	------	D-Bat Existing Runoff
2	Rational	7.503	1	15	6,753	------	------	------	D-Bat Proposed Runoff

Hydrograph Report

Hyd. No. 1

D-Bat Existing Runoff

Hydrograph type	=	Rational	Peak discharge	=	3.084 cfs
Storm frequency	=	10 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	2,775 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.3
Intensity	=	5.165 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1

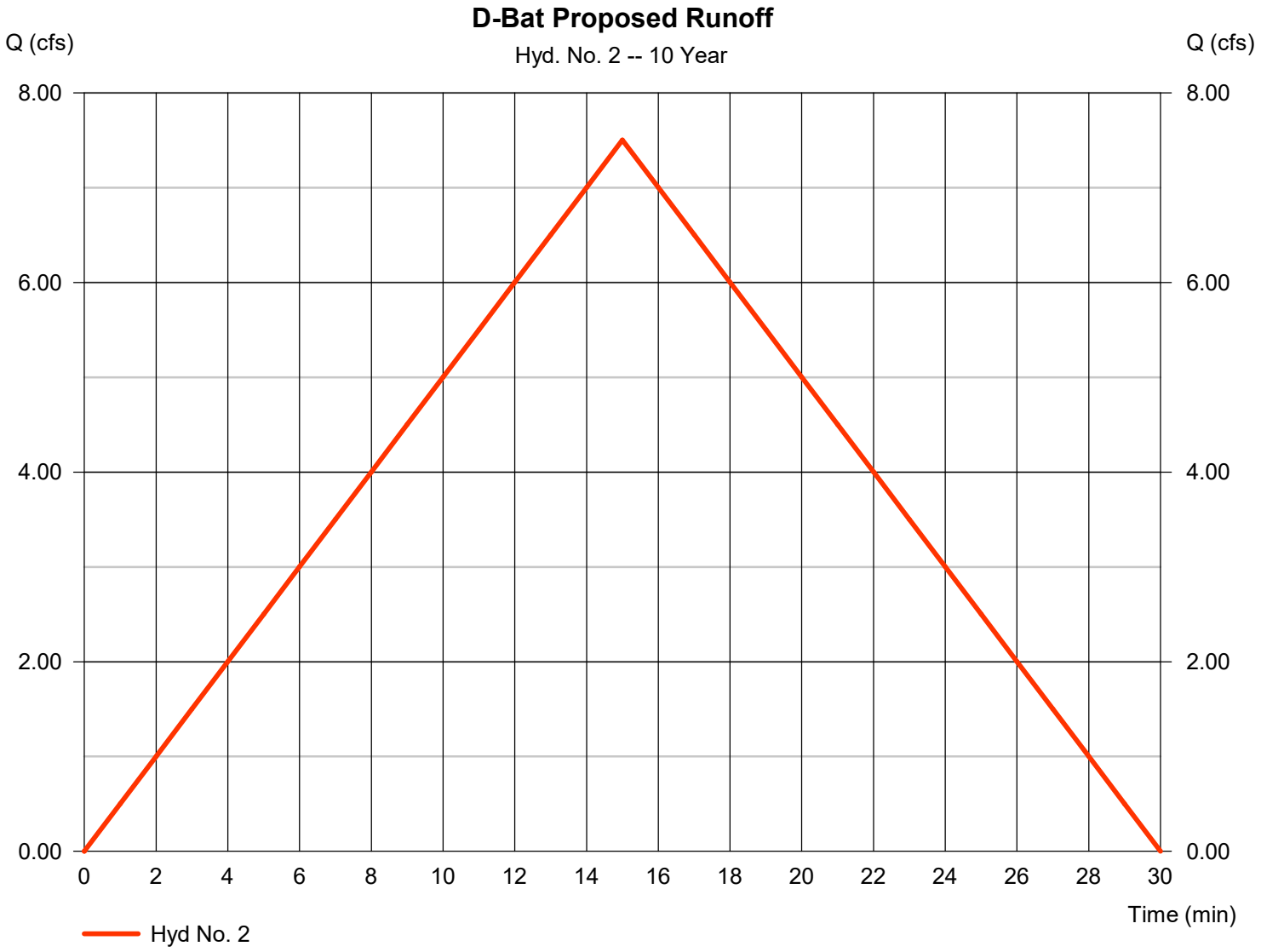


Hydrograph Report

Hyd. No. 2

D-Bat Proposed Runoff

Hydrograph type	=	Rational	Peak discharge	=	7.503 cfs
Storm frequency	=	10 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	6,753 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.73
Intensity	=	5.165 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

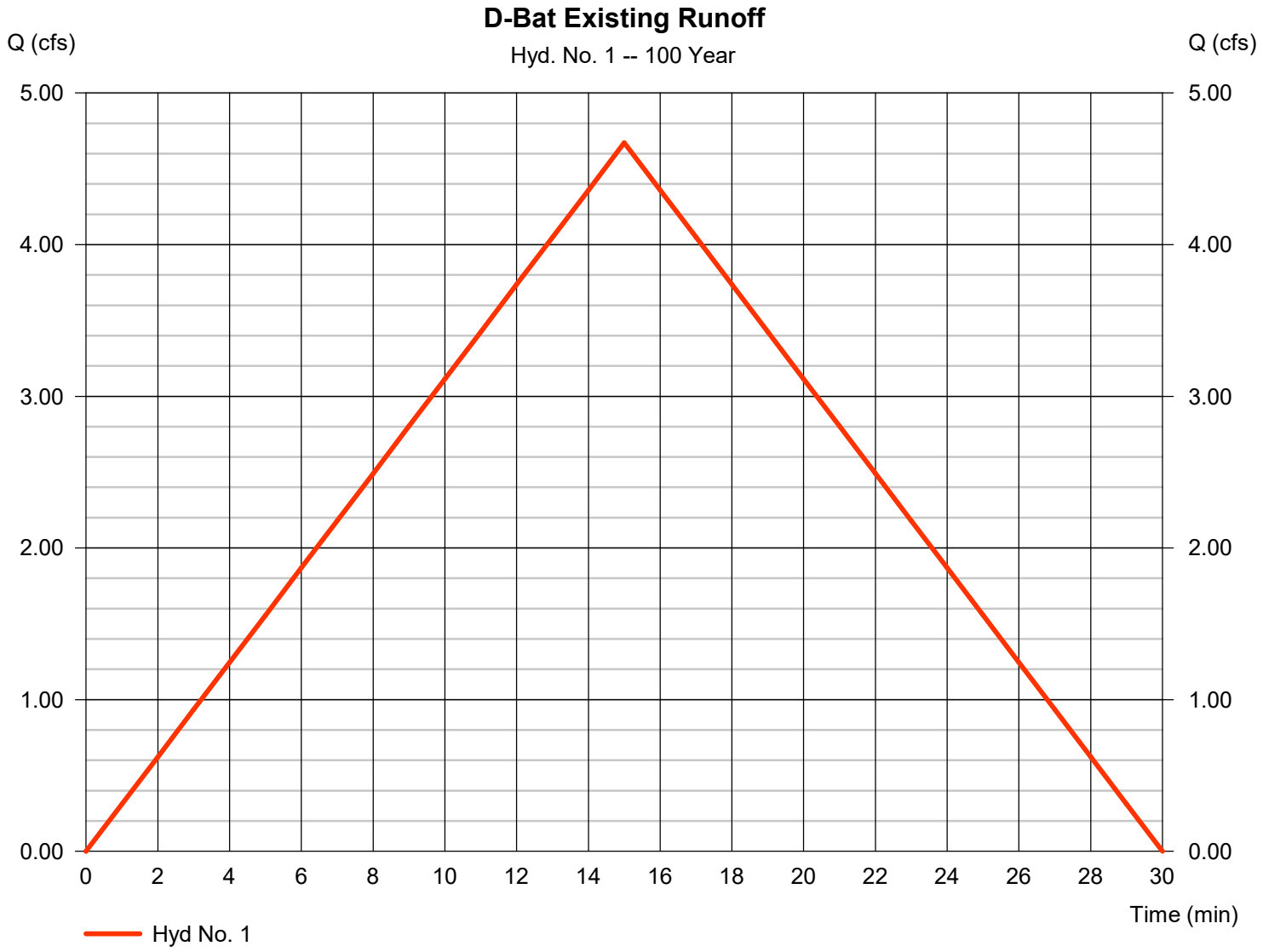
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	4.672	1	15	4,205	------	------	------	D-Bat Existing Runoff
2	Rational	11.37	1	15	10,231	------	------	------	D-Bat Proposed Runoff

Hydrograph Report

Hyd. No. 1

D-Bat Existing Runoff

Hydrograph type	=	Rational	Peak discharge	=	4.672 cfs
Storm frequency	=	100 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	4,205 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.3
Intensity	=	7.825 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1

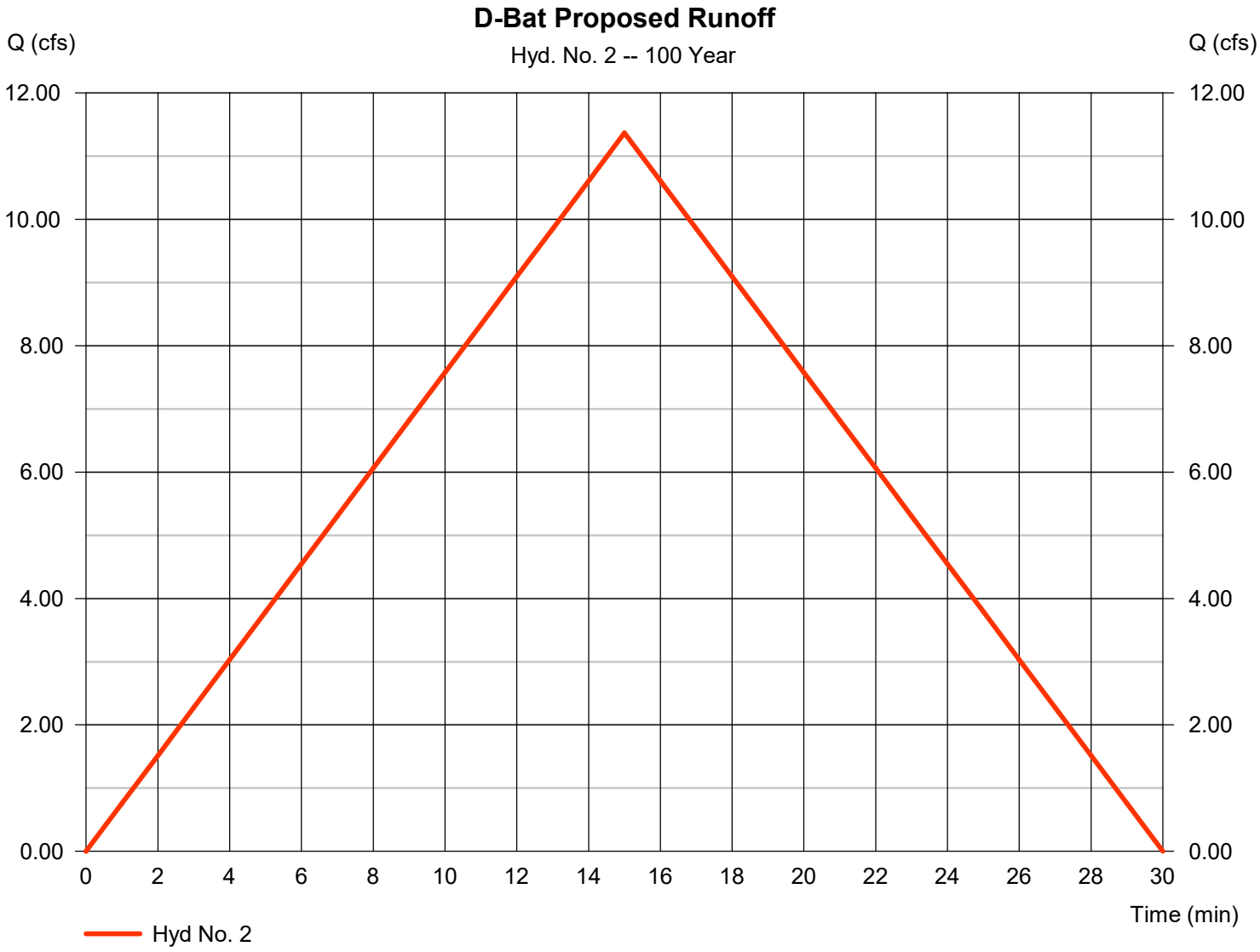


Hydrograph Report

Hyd. No. 2

D-Bat Proposed Runoff

Hydrograph type	=	Rational	Peak discharge	=	11.37 cfs
Storm frequency	=	100 yrs	Time to peak	=	15 min
Time interval	=	1 min	Hyd. volume	=	10,231 cuft
Drainage area	=	1.990 ac	Runoff coeff.	=	0.73
Intensity	=	7.825 in/hr	Tc by User	=	15.00 min
IDF Curve	=	Olathe KS.IDF	Asc/Rec limb fact	=	1/1



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	72.6358	19.6000	0.9472	--------
2	110.7137	16.5000	0.9842	--------
3	0.0000	0.0000	0.0000	--------
5	168.3971	19.5000	1.0189	--------
10	171.3956	18.7000	0.9956	--------
25	10382.7998	50.1998	1.7718	--------
50	237.3568	20.0000	1.0036	--------
100	86.2939	6.3000	0.7848	--------

File name: Olathe KS.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.50	2.94	2.53	2.23	1.99	1.80	1.64	1.51	1.40	1.31	1.22	1.15
2	5.41	4.40	3.71	3.21	2.83	2.53	2.29	2.09	1.92	1.78	1.66	1.55
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.47	5.35	4.56	3.98	3.52	3.16	2.86	2.62	2.41	2.24	2.08	1.95
10	7.33	6.06	5.17	4.50	3.99	3.58	3.25	2.97	2.74	2.54	2.37	2.22
25	8.51	7.30	6.34	5.56	4.92	4.39	3.94	3.56	3.24	2.96	2.71	2.50
50	9.38	7.81	6.69	5.85	5.20	4.68	4.25	3.90	3.60	3.34	3.12	2.92
100	12.87	9.65	7.83	6.63	5.79	5.15	4.65	4.25	3.93	3.65	3.41	3.21

Tc = time in minutes. Values may exceed 60.

Precip. file name: P:\DAE Civil\Hydraflow Storm Sewer\SCS 24-hr Rainfall.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.85	3.50	0.00	4.50	5.30	6.10	6.90	7.50
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	2.90	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10