Application Number: PL2022228
Application Type: Commercial Final Development Plan
Application Name: Living Faith Parking Lot Addition
Location: 1121 SW Hook Road, Lee's Summit, MO 64082

The As-Built detention basin constructed to serve Living Faith Church is detailed below. The approved Storm Water Drainage Study for the project was revised June 28, 2022 based on City comments received June 17, 2022.

Allowable Peak Discharge Rates for Sub-basin A, as outlined in Table 5-3, are as follows.

Sub-basin	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
A	2.98	11.92	17.88

The as-built detention basin data may be found on as-built Sheet C.202 attached to this document. The approved report detailed potential future conditions with the proposed detention design in Tables 6-5 and 6-6. This as-built report details the constructed or proposed condition with the as-built detention basin in Tables 6-5 and 6-6 below.

Table 6-5 Proposed Conditions & As-Built Detention Basin Data

	Peak Q In (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Vol. (cf)
Basin A						
2-Year	15.03	721	3.23	735	1009.20	16,787
10-Year	27.20	721	11.39	731	1009.85	27,522
100-Year	45.50	721	18.12	731	1010.79	45,033

Table 6-6 below provides a comparison of runoff data between Proposed/Constructed and Existing Conditions in addition to Proposed Conditions and Allowable Release Rates at the Point of Interest.

Table 6-6 Point of Interest Discharge Comparison

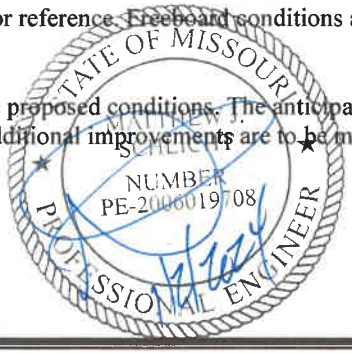
		Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
Point A	Proposed	3.23	11.39	18.12
	Existing	12.56	24.26	42.38
	Difference	-9.26	-12.87	-24.26
	Allowable	2.98	11.92	17.88
	Difference	0.25	-0.53	0.24

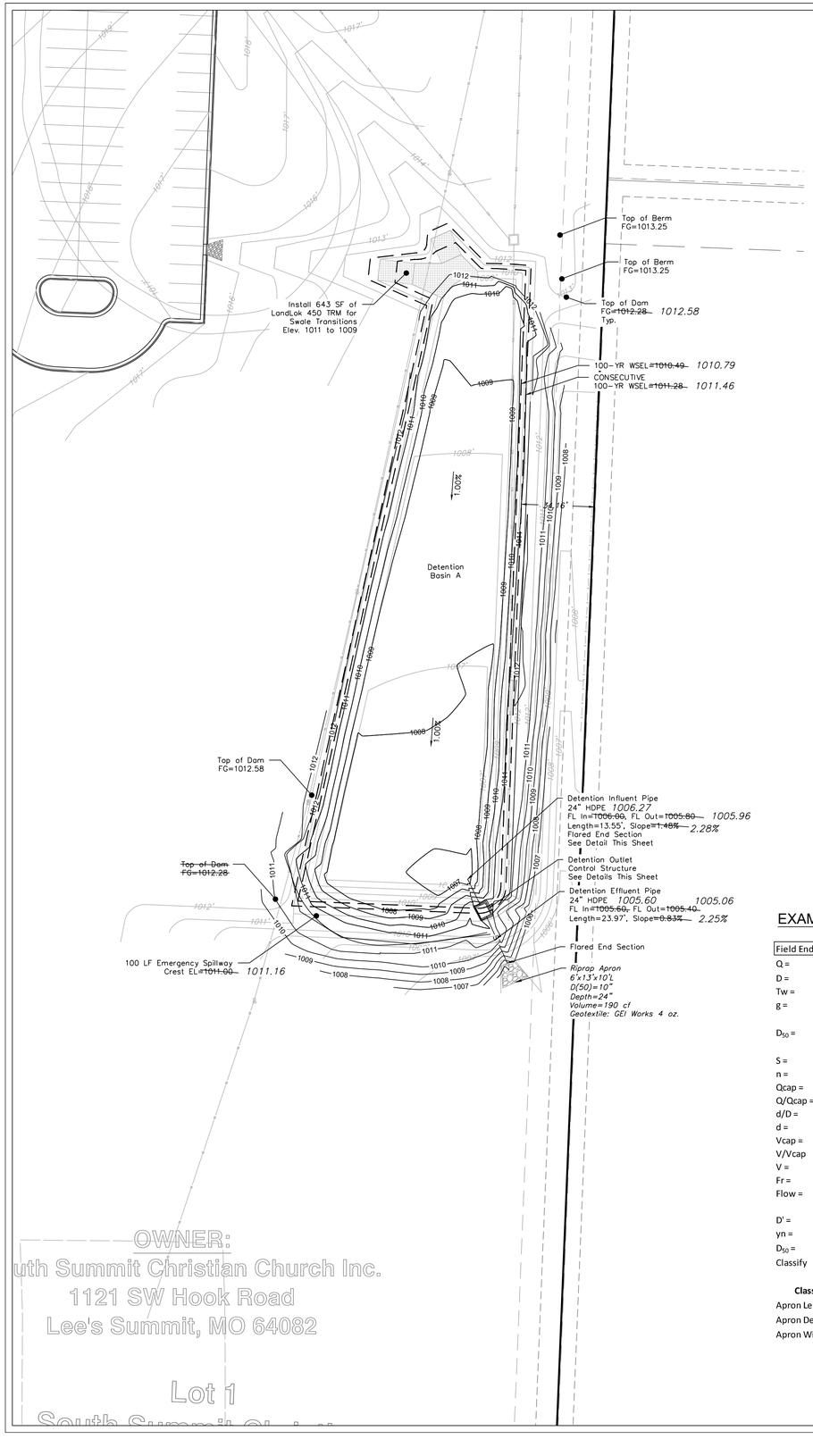
The proposed peak discharge rates are significantly lower than existing rates and are lower to within 10% difference of the allowable rates. A complete As-built Hydraflow Report is attached for reference. Freeboard conditions are detailed on As-Built Sheet C.202.

The As-Built Detention Basin will provide the necessary attenuation for the proposed conditions. The anticipated future conditions will not be met as discussed in the Approved Report. If additional improvements are to be made in the future another storm drainage study will be required.

Thanks,

Matt Schlicht





OWNER:
South Summit Christian Church Inc.
1121 SW Hook Road
Lee's Summit, MO 64082

Lot 1
South Summit Christian

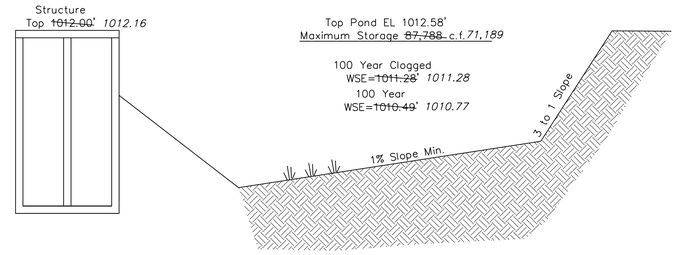
North

0 15' 30' 60'

DETENTION BASIN PLAN

SCALE: 1" = 30'

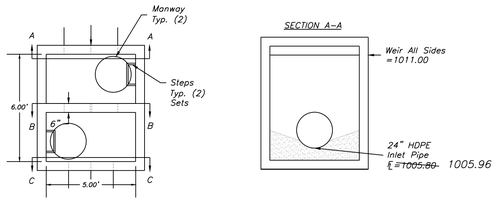
NOTES:
1. THE BASIN SHALL BE CONSTRUCTED WITH THE EROSION AND SEDIMENT CONTROL MEASURES.
2. AN AS-BUILT DETENTION BASIN PLAN SHALL BE SUBMITTED AND ACCEPTED PRIOR TO ISSUANCE OF A CERTIFICATE OF SUBSTANTIAL COMPLETION. THE FOLLOWING AS-BUILT PARAMETERS MUST BE CHECKED FOR COMPLIANCE: STORAGE, TOP OF DAM ELEVATION, EMERGENCY SPILLWAY ELEVATION, WEIR/ORIFICE ELEVATIONS, TOP OF CONTROL STRUCTURE AND BOTTOM OF BASIN ELEVATION.



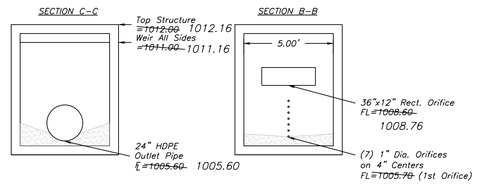
SECTION VIEW - BASIN A

N.T.S.

Storm	2-YR	10-YR	100-YR
Nominal Storage (cf)	23,828	35,439	54,908
Allowable Release Rate POI-A (cfs)	2.98	11.92	17.88
Proposed Release Rate	*3.23*	*11.39*	*18.12*

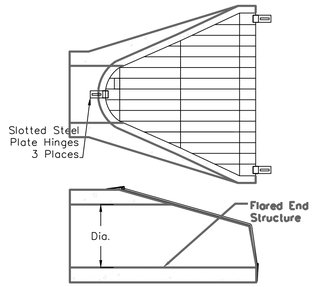


Structural Notes:
4,000 PSI Concrete
Grade 60 Rebar
Top: #5 Bars @ 6" O.C.E.W.
Walls: #5 Bars @ 12" O.C.E.W.
Slab: #5 Bars @ 6" O.C.E.W.



CONTROL STRUCTURE - BASIN A

1" = 1'-0"



Galvanized
Trash Guard
For Influent Flared Ends

EXAMPLE CALCULATION

Field End Section #		1-1
Q =	17.21	cfs
D =	2	ft
Tw =	0.8	ft
g =	32.2	ft/s^2
D_{50} =	5.23	inches
S =	0.0083	ft/ft
n =	0.01	
Qcap =	26.72	ft^3/s
Q/Qcap =	0.64	
d/D =	0.58	
d =	1.16	ft
Vcap =	8.51	ft^2/s
V/Vcap	1.0599	
V =	9.02	ft/s
Fr =	1.48	
Flow =	Supercritical	
D' =	1.58	ft
yn =	1.16	ft
D_{50} =	7.16	inches
Classify	7.16	inches

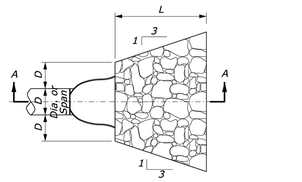
D_{50} = riprap size, m(ft)
Q = design discharge, m^3/s (ft^3/s)
D = culvert diameter (circular), m(ft)
Tw = tailwater depth, m(ft), if unknown use 0.4*D
g = acceleration due to gravity, 9.81 m/s^2 (32.2 ft/s^2)
Subcritical Flow

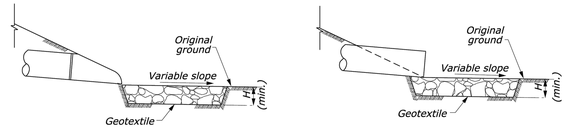
S = pipe slope, m/m(ft/ft)
n = manning's roughness coefficient, unitless
Qcap = full pipe capacity, m^3/s(ft^3/s)
Q/Qcap = design discharge/full pipe capacity, unitless
d/D = water depth/pipe diameter, unitless
d = depth of flow, m(ft)
Velocity Full m^2/s(ft^2/s)
V/Vcap = design velocity/full pipe velocity, unitless
V = velocity of flow segment, m^2/s(ft^2/s)
Fr > 1 Supercritical, Fr = 1 Critical, Fr < 1 Subcritical
If flow is Supercritical adjust culvert diameter

D' = culvert diameter adjustment, m(ft)
yn = normal (supercritcal) depth in culvert, m(ft)

Class 3	Use D_{50} = 10			
Apron Length =	5 * D	10.00 ft	Use	10.00 ft
Apron Depth =	2.4 * D_{50}	24.00 inches	Use	24.00 inches
Apron Width =	3*D+(2/3)L	12.67 ft	Use	13.00 ft

STANDARD RIPRAP APRON DETAIL





NOTES:
1. ALL RIPRAP APRONS SHALL CONFORM TO THE STANDARD CONFIGURATION SHOWN IN THE STANDARD DETAIL ABOVE UNLESS OTHERWISE NOTED. PLAN VIEW DIMENSIONS SHOWN SHALL BE MET OR EXCEEDED INCLUDING AREAS OF LONGITUDINAL AND/OR TRANSVERSE SLOPE.
2. DIMENSIONS FOR EACH RIPRAP APRON AND ASSOCIATED RIPRAP ARE DETAILED IN THE PLAN SET.
3. GEOTEXTILE SHALL BE "GEI WORKS 4 OUNCE" NON-WOVEN FILTER FABRIC DESIGNED FOR FILTRATION, STABILIZATION AND SEPARATION WRAPPED CONTINUOUSLY ALONG THE SIDEWALLS AND BOTTOM OF THE PREPARED AREA OR SLOPE.
   - WATER FLOW = 120 GPM/SF
   - GRAB STRENGTH (MIN) = 400 N
   - PUNCTURE STRENGTH (MIN) = 178 N
   - TRAPEZOIDAL TEAR (MIN) = 133 N
   - ELONGATION (MIN) = 15%

ENGINEERING SOLUTIONS
ENGINEERING & SURVEYING
50 SE 30TH STREET
LEE'S SUMMIT, MO 64082
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Professional Registration
Missouri
Engineering 2005002186-D
Surveying 2005008319-D
Kansas
Engineering E-1695
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

LIVING FAITH CHURCH
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

Project: LIVING FAITH CHURCH-LSMO
Issue Date: January 28, 2022

Detention Basin Plan
Construction Plans for:
LIVING FAITH CHURCH
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER PE-2006019708
01/15/2023
PROFESSIONAL ENGINEER

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226

REVISIONS
11/15/2023 As-Built

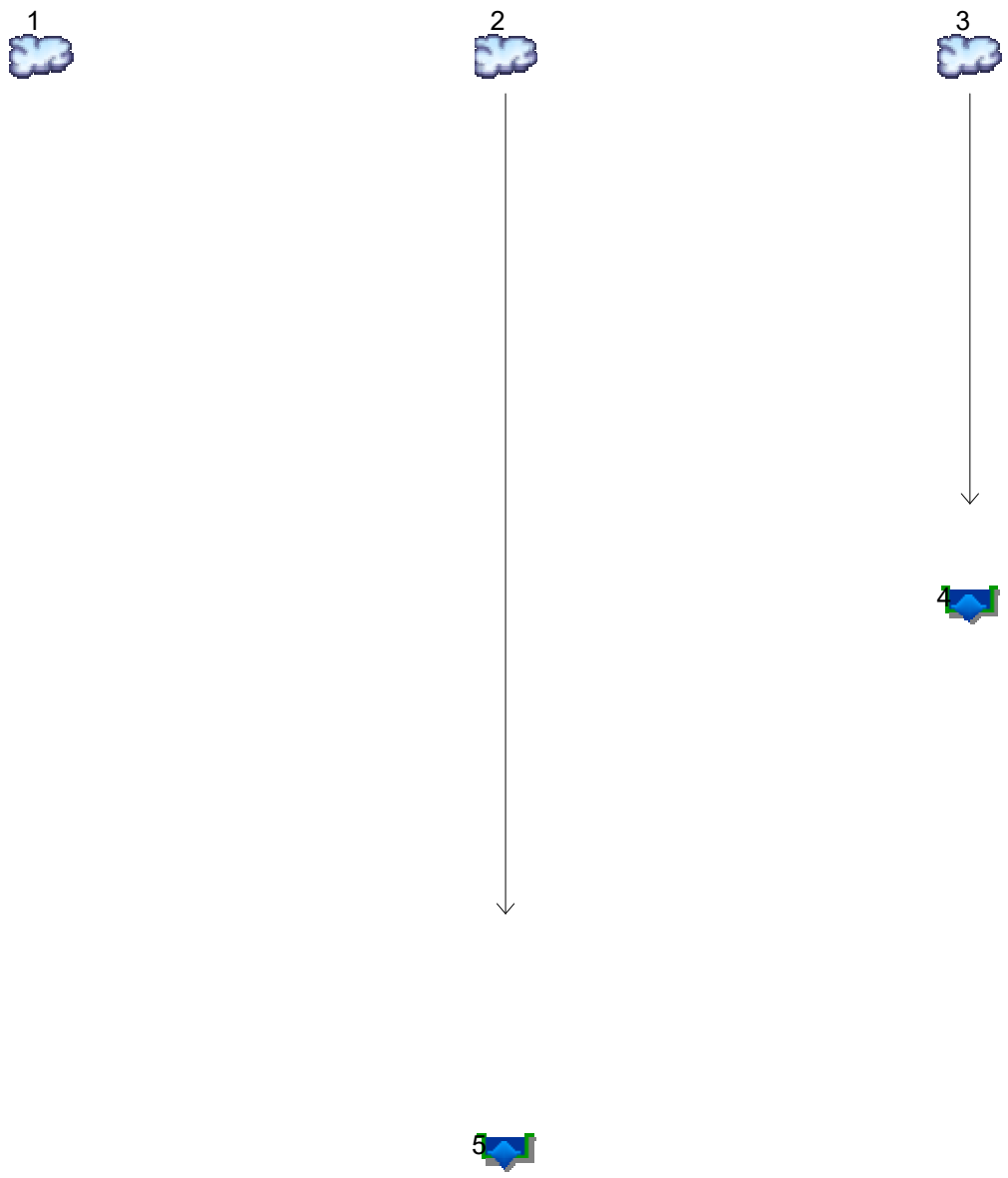
RECORD DRAWING
The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by my firm.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

Date: 11/15/2023
Certified by: Matthew J. Schlicht
Title: Engineer
Firm: Engineering Solutions

Hydraflow Table of Contents

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX. A
2	SCS Runoff	PROP. A
3	SCS Runoff	FUTURE A
4	Reservoir	Future A Routed
5	Reservoir	Prop. A Routed

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	SCS Runoff	------	-------	12.56	-------	-------	24.26	-------	-------	42.38	EX. A
2	SCS Runoff	------	-------	15.03	-------	-------	27.20	-------	-------	45.50	PROP. A
3	SCS Runoff	------	-------	16.30	-------	-------	28.62	-------	-------	46.94	FUTURE A
4	Reservoir	3	-------	4.153	-------	-------	12.29	-------	-------	18.64	Future A Routed
5	Reservoir	2	-------	3.233	-------	-------	11.39	-------	-------	18.12	Prop. A Routed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

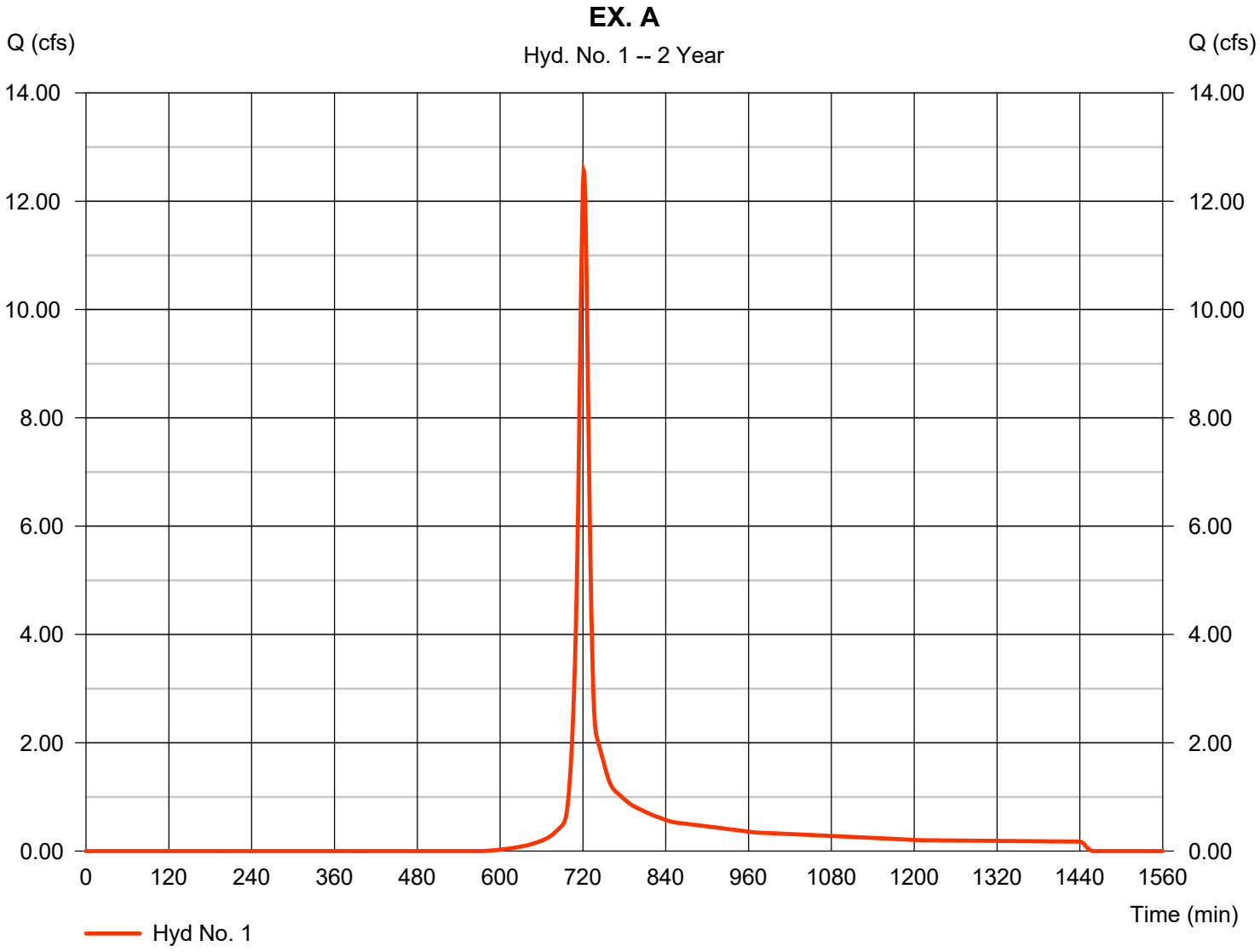
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	12.56	1	721	31,889	------	------	------	EX. A
2	SCS Runoff	15.03	1	721	37,964	------	------	------	PROP. A
3	SCS Runoff	16.30	1	721	41,241	------	------	------	FUTURE A
4	Reservoir	4.153	1	734	41,227	3	1009.28	18,199	Future A Routed
5	Reservoir	3.233	1	735	37,951	2	1009.20	16,787	Prop. A Routed

Hydrograph Report

Hyd. No. 1

EX. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.56 cfs
Storm frequency	=	2 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	31,889 cuft
Drainage area	=	5.960 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

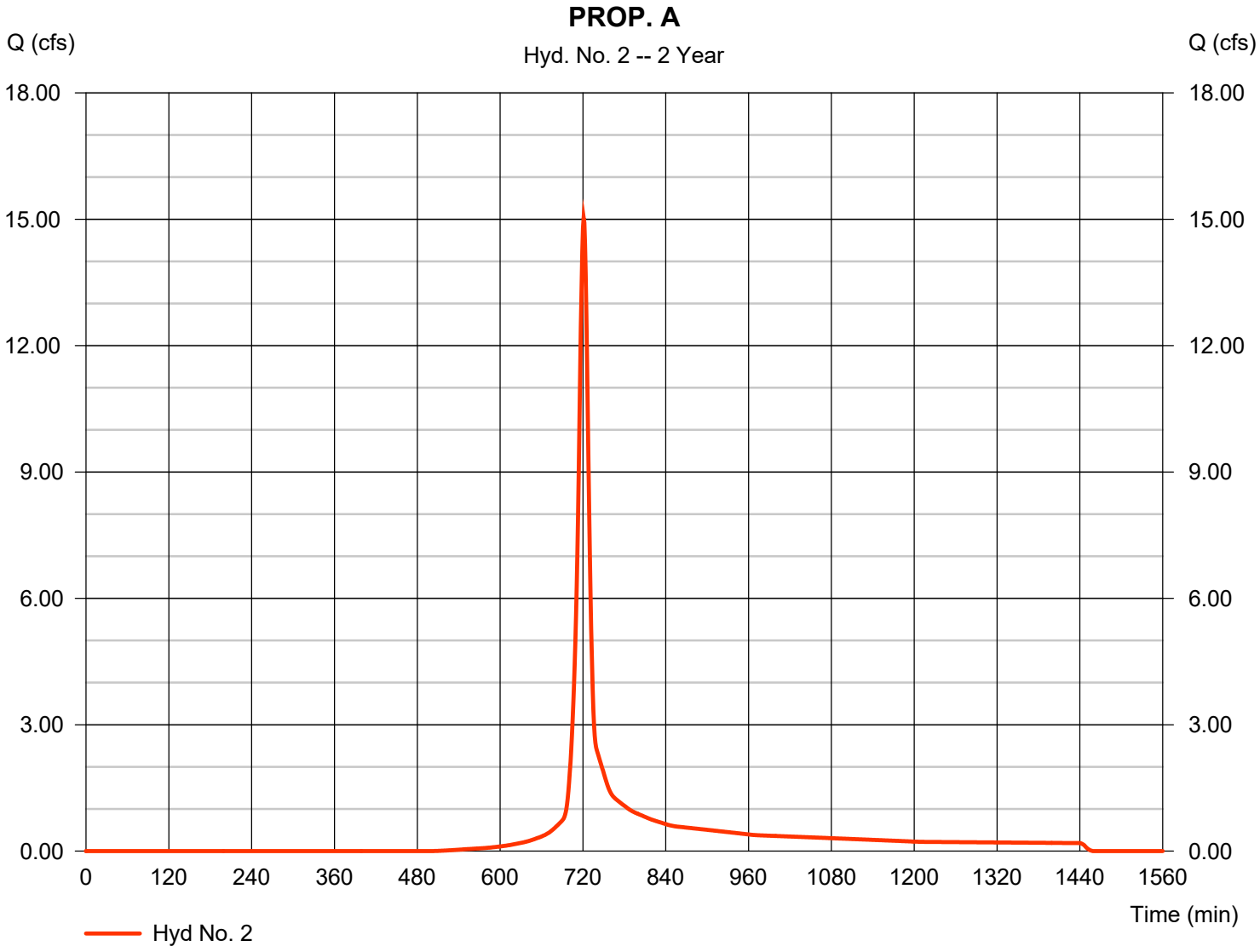


Hydrograph Report

Hyd. No. 2

PROP. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.03 cfs
Storm frequency	=	2 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	37,964 cuft
Drainage area	=	5.960 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

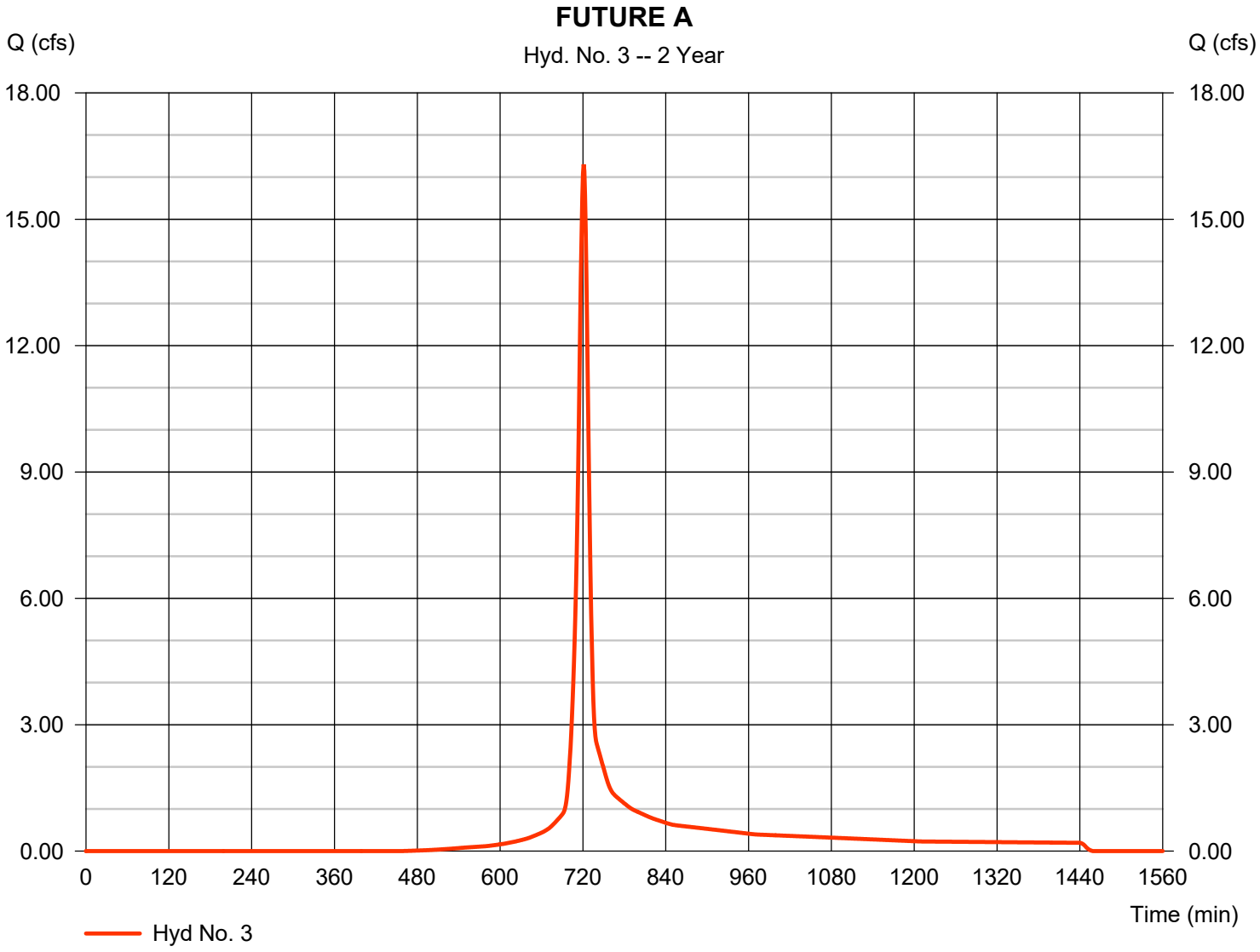


Hydrograph Report

Hyd. No. 3

FUTURE A

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.30 cfs
Storm frequency	=	2 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	41,241 cuft
Drainage area	=	5.960 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



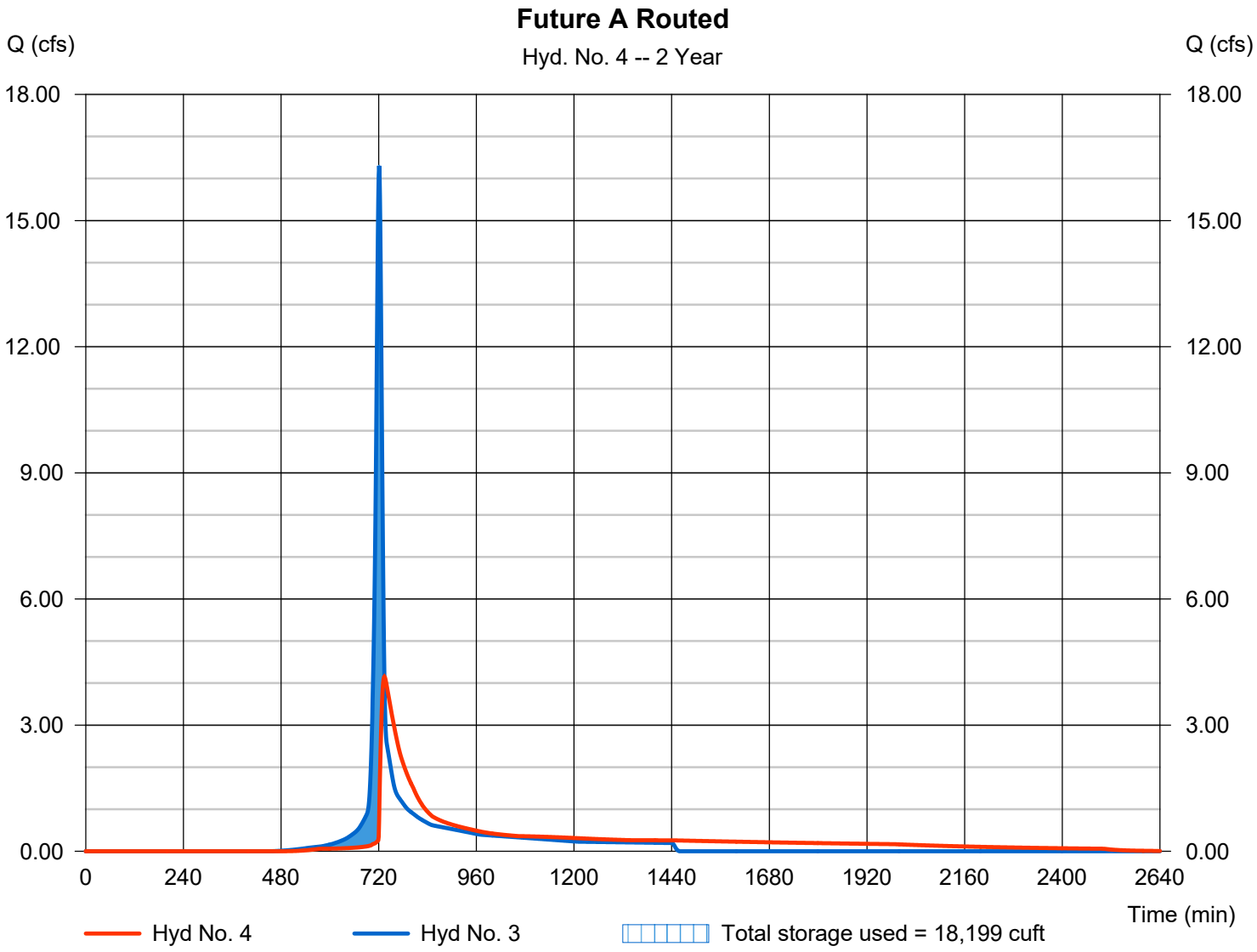
Hydrograph Report

Hyd. No. 4

Future A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	4.153 cfs
Storm frequency	=	2 yrs	Time to peak	=	734 min
Time interval	=	1 min	Hyd. volume	=	41,227 cuft
Inflow hyd. No.	=	3 - FUTURE A	Max. Elevation	=	1009.28 ft
Reservoir name	=	Detention Pond	Max. Storage	=	18,199 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1006.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1006.00	00	0	0
1.00	1007.00	454	227	227
2.00	1008.00	5,828	3,141	3,368
3.00	1009.00	14,603	10,216	13,584
4.00	1010.00	18,004	16,304	29,887
5.00	1011.00	20,488	19,246	49,133
6.00	1012.00	23,623	22,056	71,189

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	12.00	0.00	1.00
Span (in)	= 24.00	36.00	0.00	1.00
No. Barrels	= 1	1	0	7
Invert El. (ft)	= 1005.60	1008.76	0.00	1005.86
Length (ft)	= 23.97	0.00	0.00	2.06
Slope (%)	= 2.25	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.50	0.00	0.00	0.00
Crest El. (ft)	= 1011.16	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1006.00	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.000
1.00	227	1007.00	1.01 ic	0.00	---	0.06	0.00	---	---	---	---	---	0.059
2.00	3,368	1008.00	1.01 ic	0.00	---	0.17	0.00	---	---	---	---	---	0.168
3.00	13,584	1009.00	1.49 ic	1.20 ic	---	0.29	0.00	---	---	---	---	---	1.495
4.00	29,887	1010.00	12.69 ic	12.43 ic	---	0.26	0.00	---	---	---	---	---	12.69
5.00	49,133	1011.00	19.33 ic	19.05 ic	---	0.27	0.00	---	---	---	---	---	19.33
6.00	71,189	1012.00	24.20 ic	23.91 ic	---	0.28	26.92	---	---	---	---	---	51.12

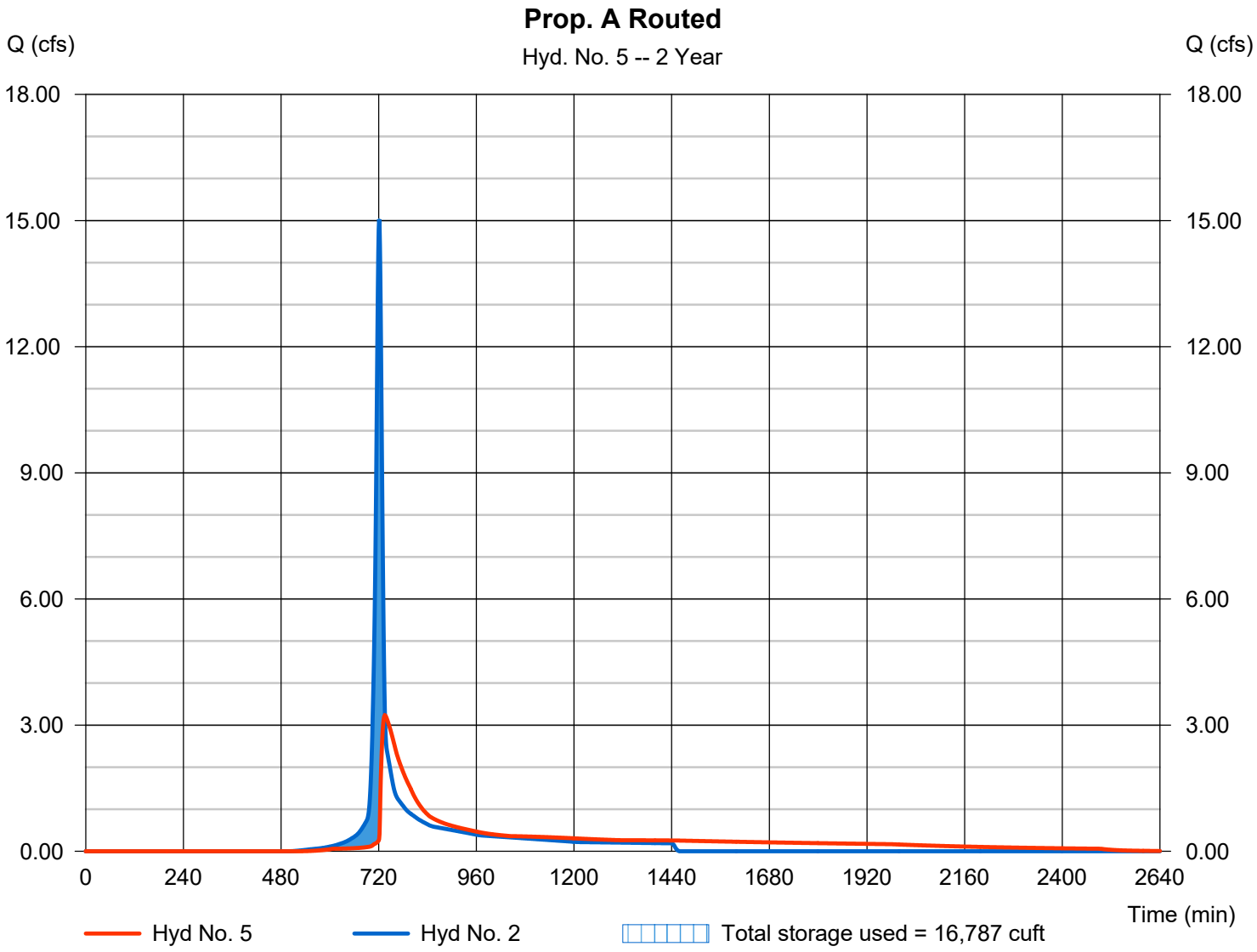
Hydrograph Report

Hyd. No. 5

Prop. A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	3.233 cfs
Storm frequency	=	2 yrs	Time to peak	=	735 min
Time interval	=	1 min	Hyd. volume	=	37,951 cuft
Inflow hyd. No.	=	2 - PROP. A	Max. Elevation	=	1009.20 ft
Reservoir name	=	Detention Pond	Max. Storage	=	16,787 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1006.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1006.00	00	0	0
1.00	1007.00	454	227	227
2.00	1008.00	5,828	3,141	3,368
3.00	1009.00	14,603	10,216	13,584
4.00	1010.00	18,004	16,304	29,887
5.00	1011.00	20,488	19,246	49,133
6.00	1012.00	23,623	22,056	71,189

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	12.00	0.00	1.00
Span (in)	= 24.00	36.00	0.00	1.00
No. Barrels	= 1	1	0	7
Invert El. (ft)	= 1005.60	1008.76	0.00	1005.86
Length (ft)	= 23.97	0.00	0.00	2.06
Slope (%)	= 2.25	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.50	0.00	0.00	0.00
Crest El. (ft)	= 1011.16	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1006.00	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.000
1.00	227	1007.00	1.01 ic	0.00	---	0.06	0.00	---	---	---	---	---	0.059
2.00	3,368	1008.00	1.01 ic	0.00	---	0.17	0.00	---	---	---	---	---	0.168
3.00	13,584	1009.00	1.49 ic	1.20 ic	---	0.29	0.00	---	---	---	---	---	1.495
4.00	29,887	1010.00	12.69 ic	12.43 ic	---	0.26	0.00	---	---	---	---	---	12.69
5.00	49,133	1011.00	19.33 ic	19.05 ic	---	0.27	0.00	---	---	---	---	---	19.33
6.00	71,189	1012.00	24.20 ic	23.91 ic	---	0.28	26.92	---	---	---	---	---	51.12

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

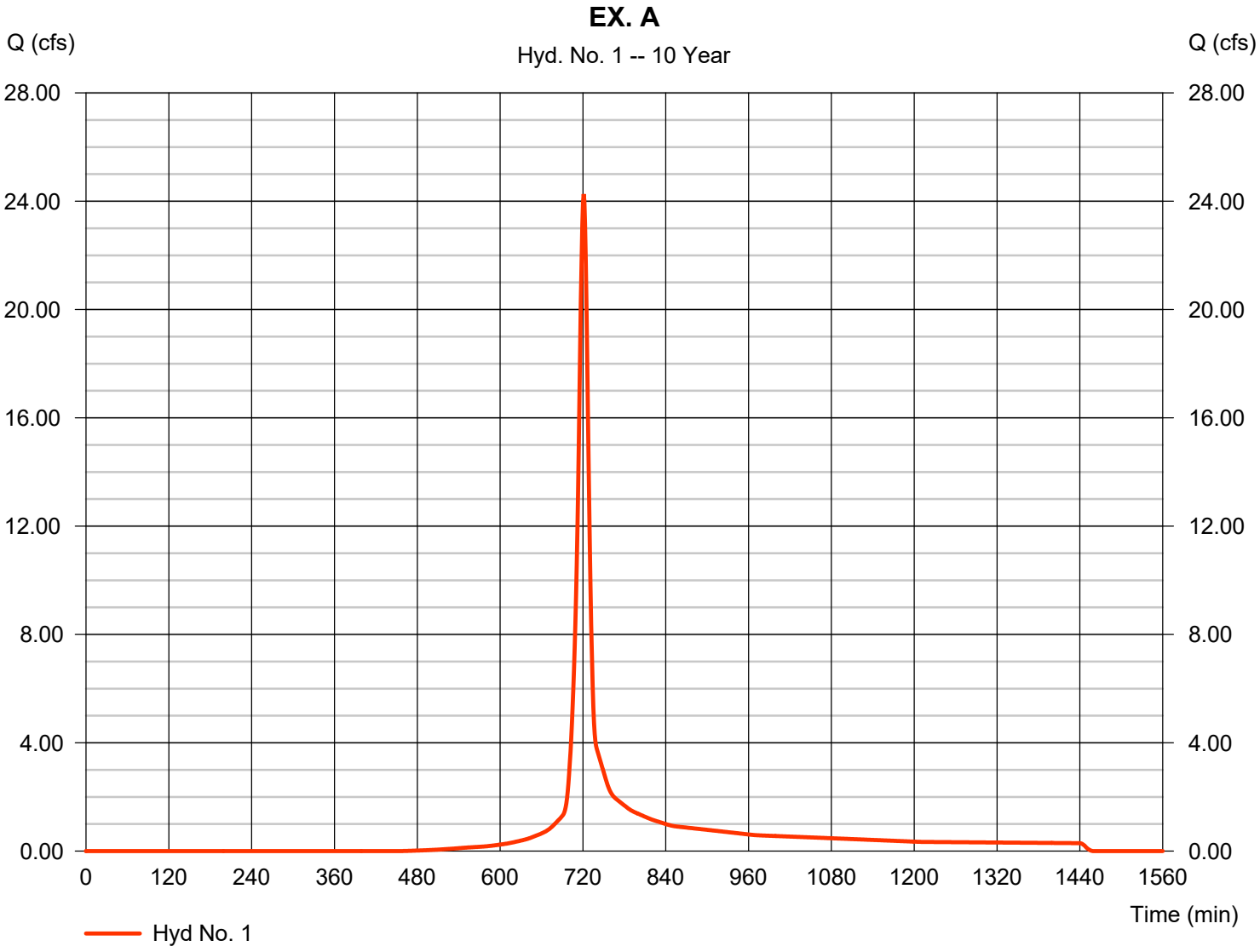
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	24.26	1	721	61,383	------	------	------	EX. A
2	SCS Runoff	27.20	1	721	69,397	------	------	------	PROP. A
3	SCS Runoff	28.62	1	721	73,556	------	------	------	FUTURE A
4	Reservoir	12.29	1	730	73,538	3	1009.95	29,133	Future A Routed
5	Reservoir	11.39	1	731	69,378	2	1009.85	27,522	Prop. A Routed

Hydrograph Report

Hyd. No. 1

EX. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	24.26 cfs
Storm frequency	=	10 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	61,383 cuft
Drainage area	=	5.960 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

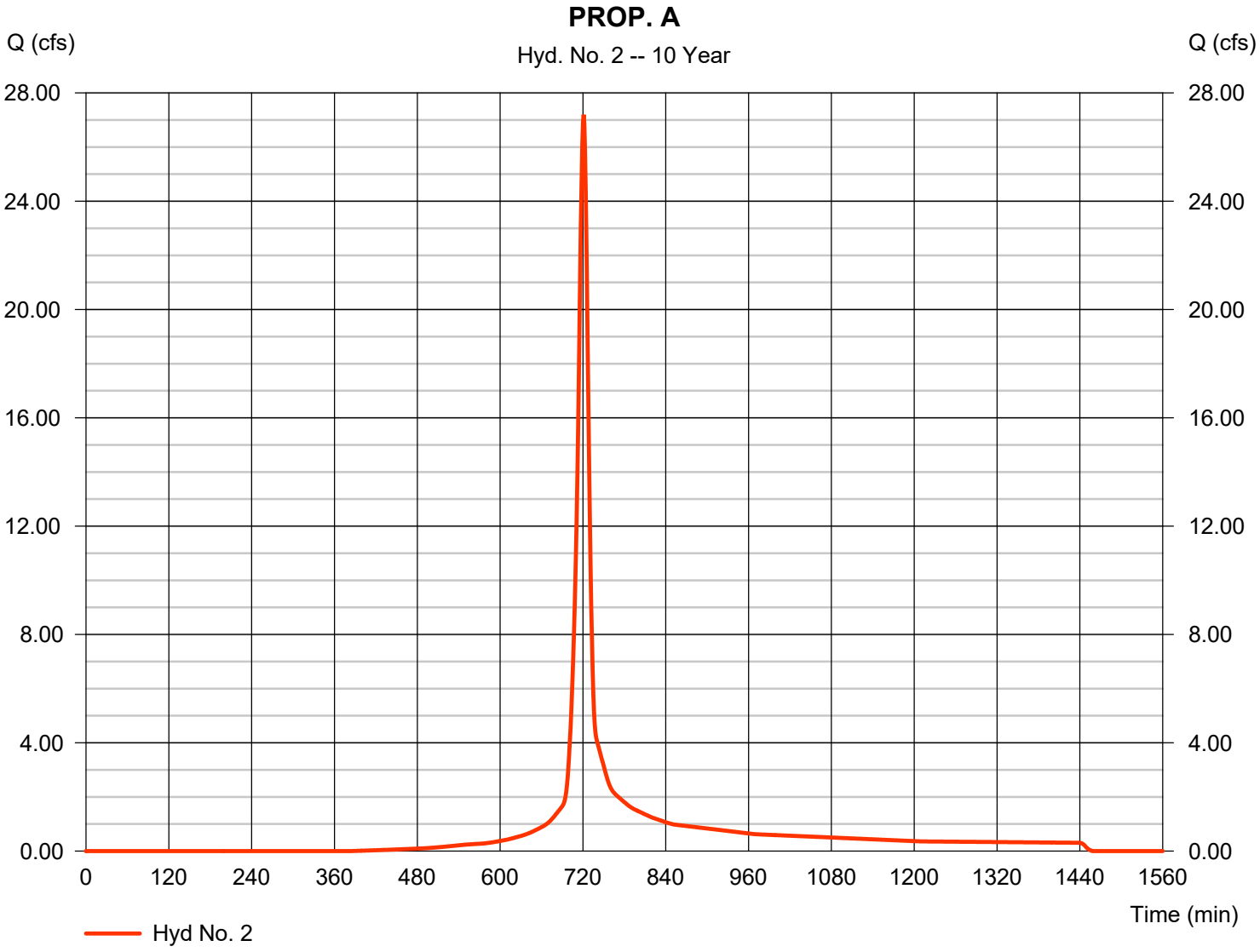


Hydrograph Report

Hyd. No. 2

PROP. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	27.20 cfs
Storm frequency	=	10 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	69,397 cuft
Drainage area	=	5.960 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

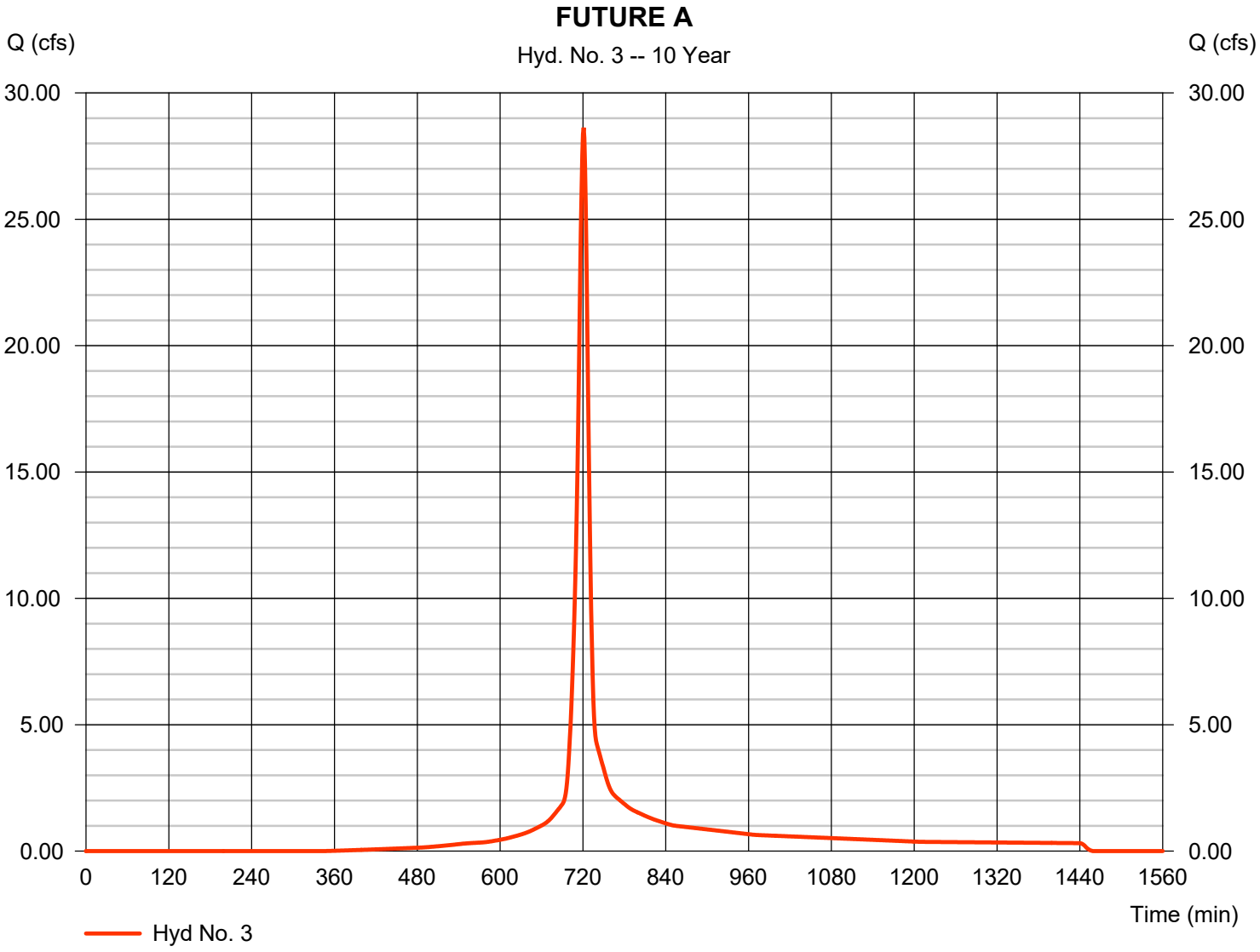


Hydrograph Report

Hyd. No. 3

FUTURE A

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	73,556 cuft
Drainage area	=	5.960 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



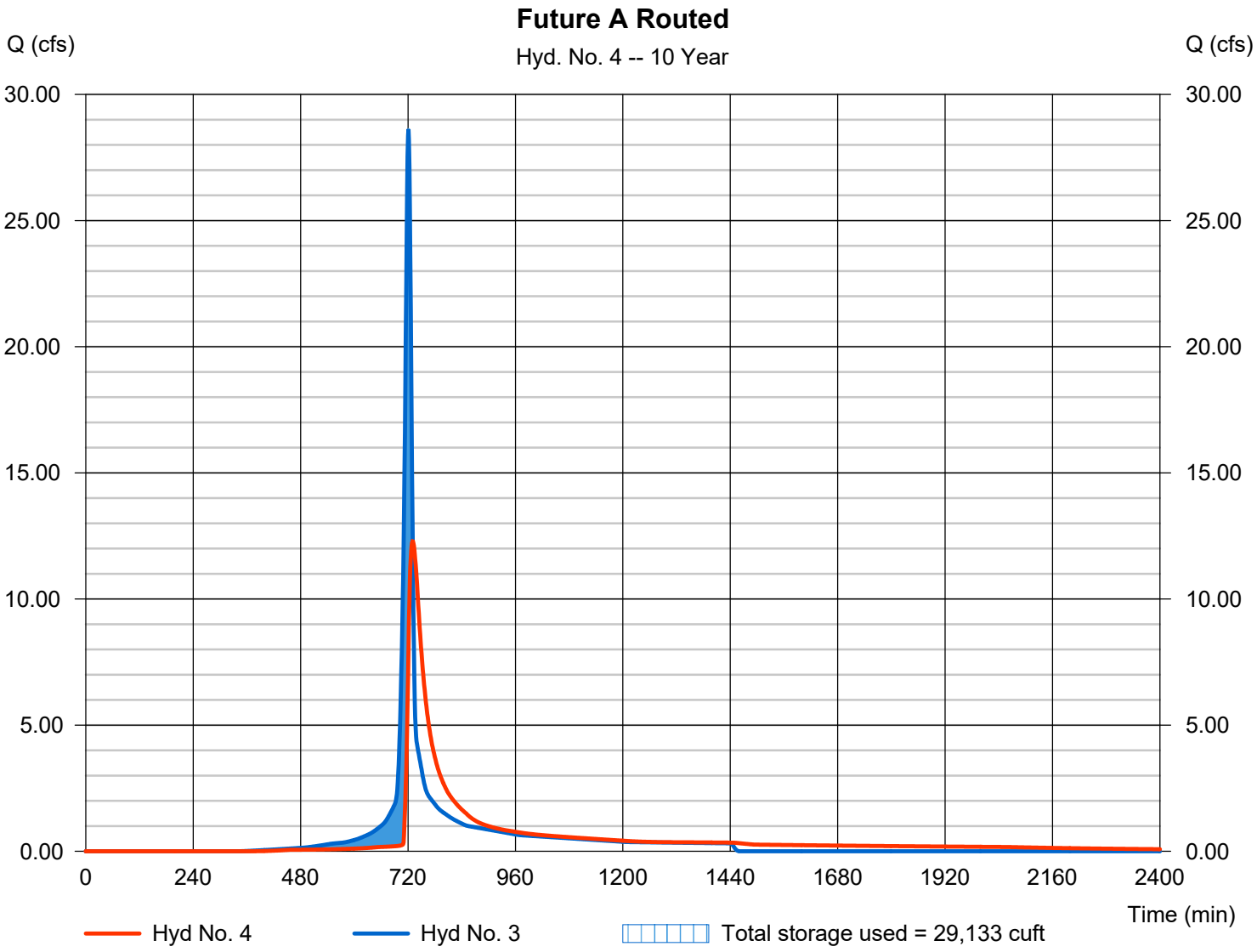
Hydrograph Report

Hyd. No. 4

Future A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	12.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	73,538 cuft
Inflow hyd. No.	=	3 - FUTURE A	Max. Elevation	=	1009.95 ft
Reservoir name	=	Detention Pond	Max. Storage	=	29,133 cuft

Storage Indication method used.



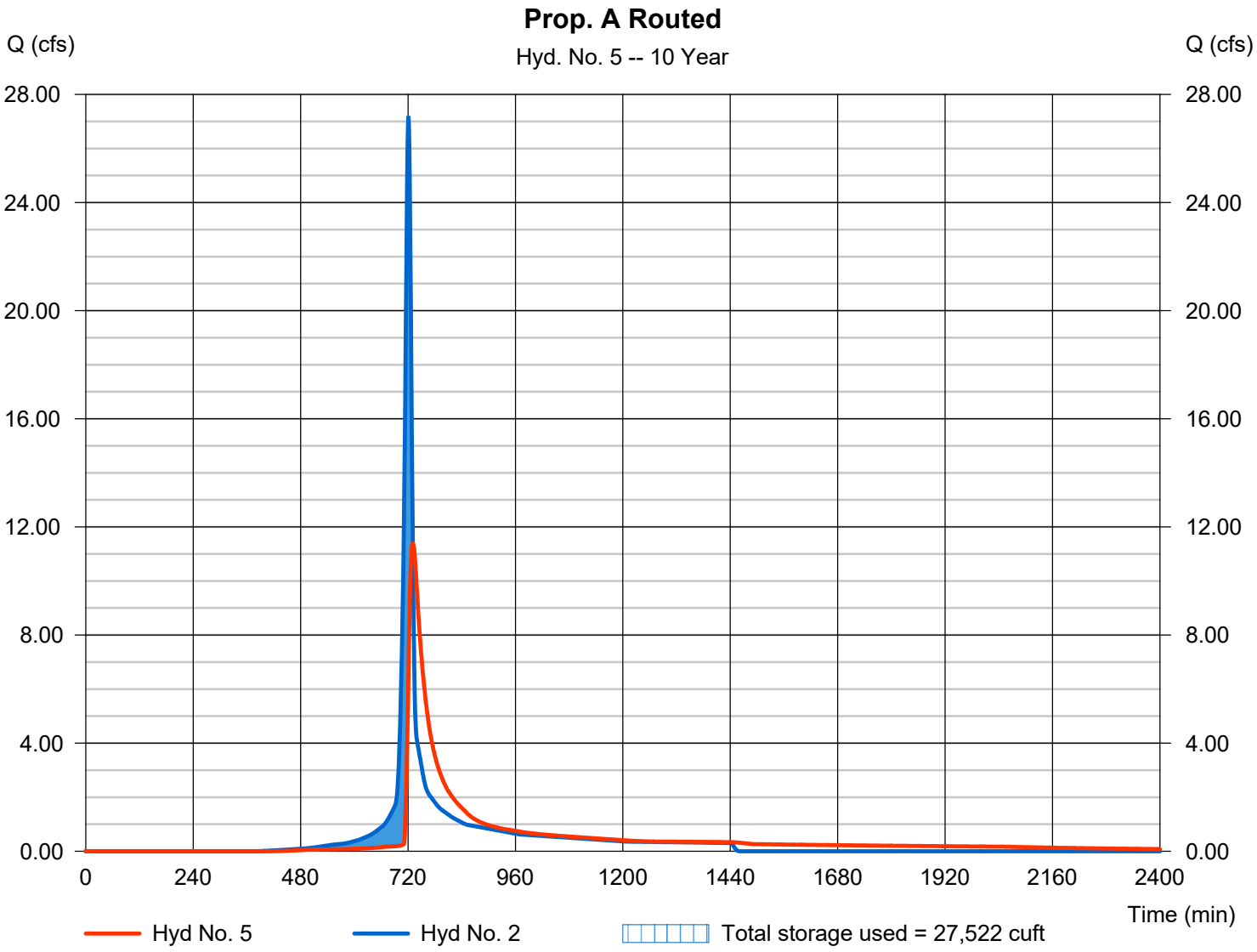
Hydrograph Report

Hyd. No. 5

Prop. A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	11.39 cfs
Storm frequency	=	10 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	69,378 cuft
Inflow hyd. No.	=	2 - PROP. A	Max. Elevation	=	1009.85 ft
Reservoir name	=	Detention Pond	Max. Storage	=	27,522 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

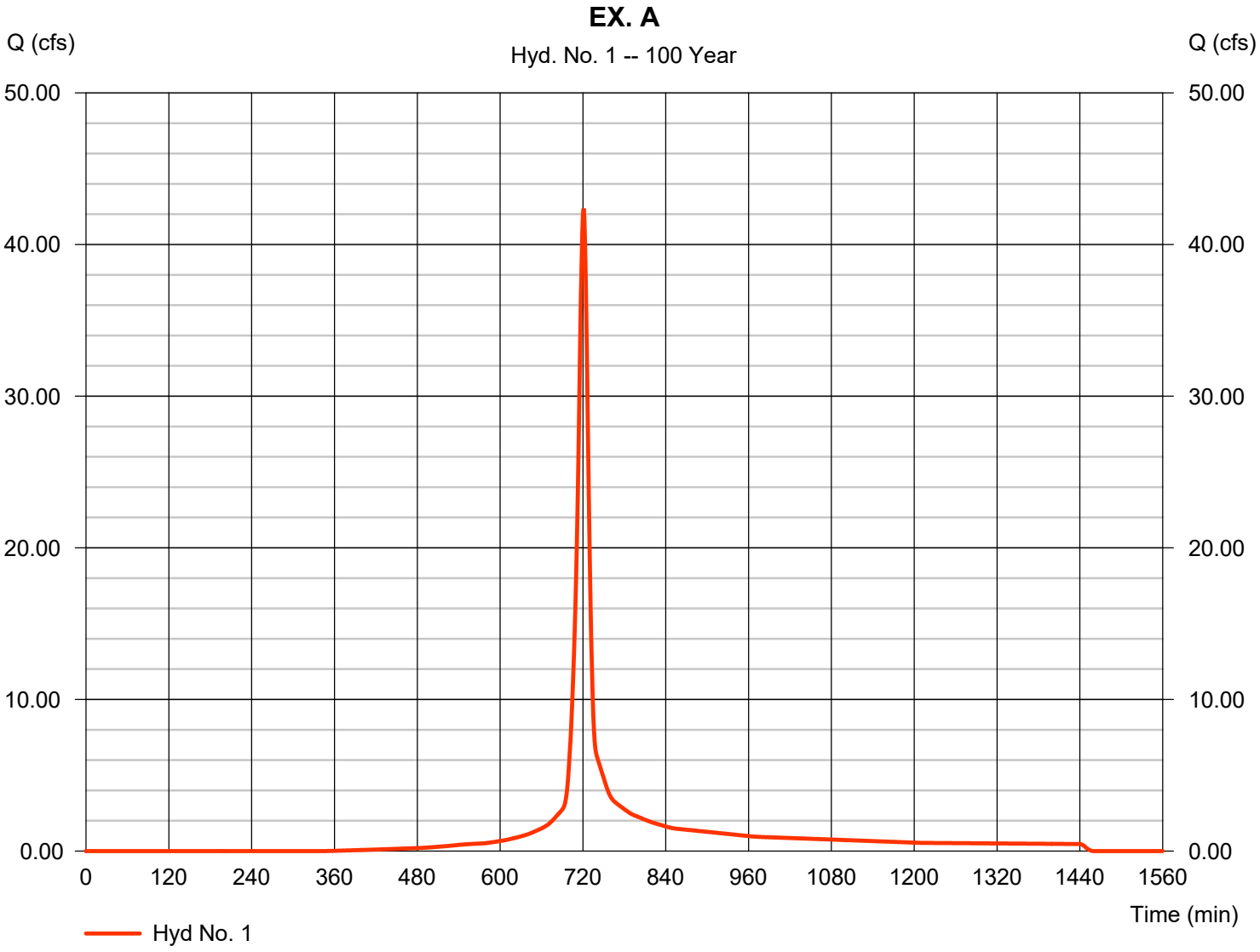
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	42.38	1	721	108,920	------	------	------	EX. A
2	SCS Runoff	45.50	1	721	118,739	------	------	------	PROP. A
3	SCS Runoff	46.94	1	721	123,684	------	------	------	FUTURE A
4	Reservoir	18.64	1	731	123,662	3	1010.88	46,762	Future A Routed
5	Reservoir	18.12	1	731	118,717	2	1010.79	45,033	Prop. A Routed

Hydrograph Report

Hyd. No. 1

EX. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	42.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	108,920 cuft
Drainage area	=	5.960 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	7.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

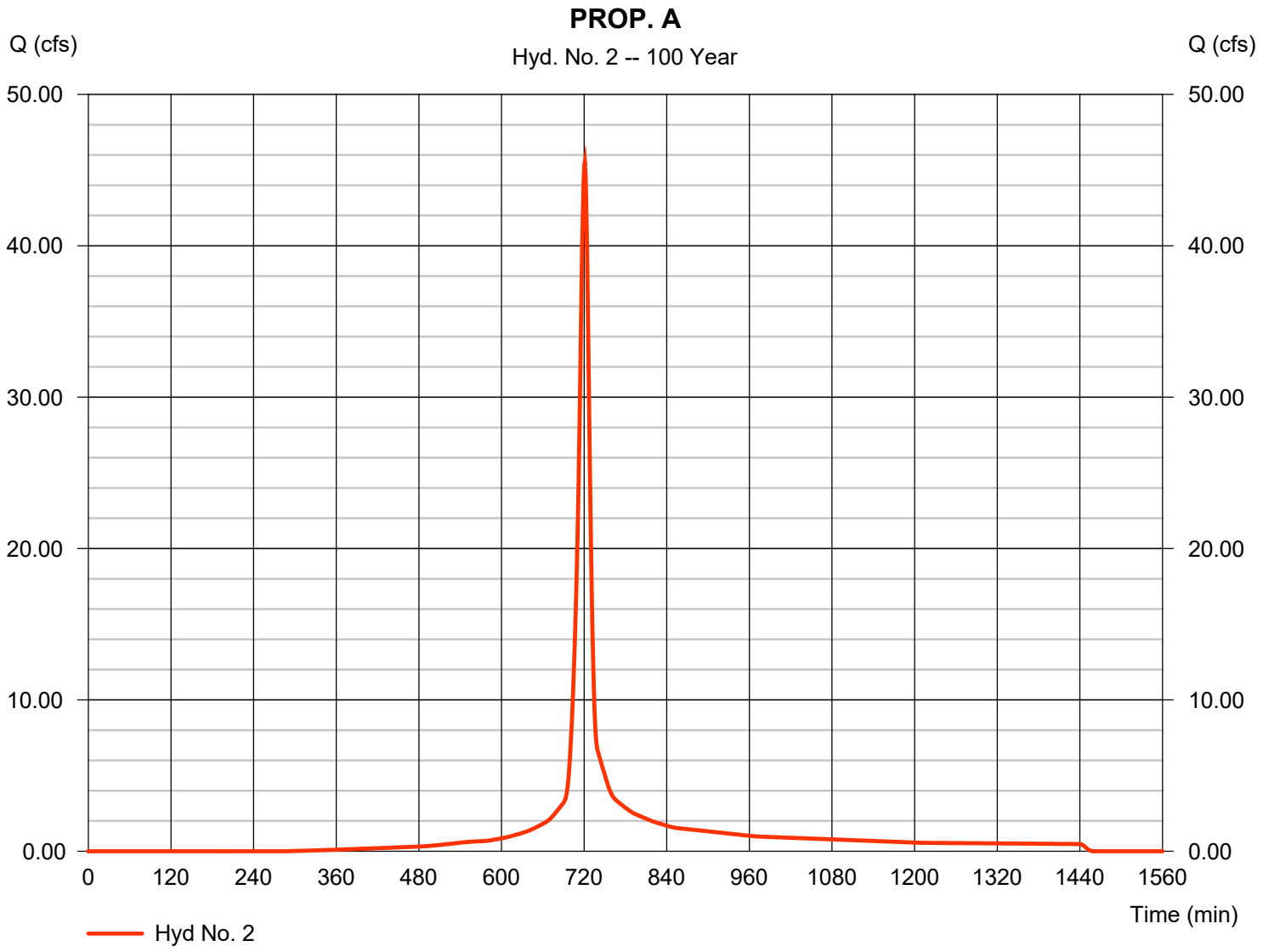


Hydrograph Report

Hyd. No. 2

PROP. A

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.50 cfs
Storm frequency	=	100 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	118,739 cuft
Drainage area	=	5.960 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	7.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

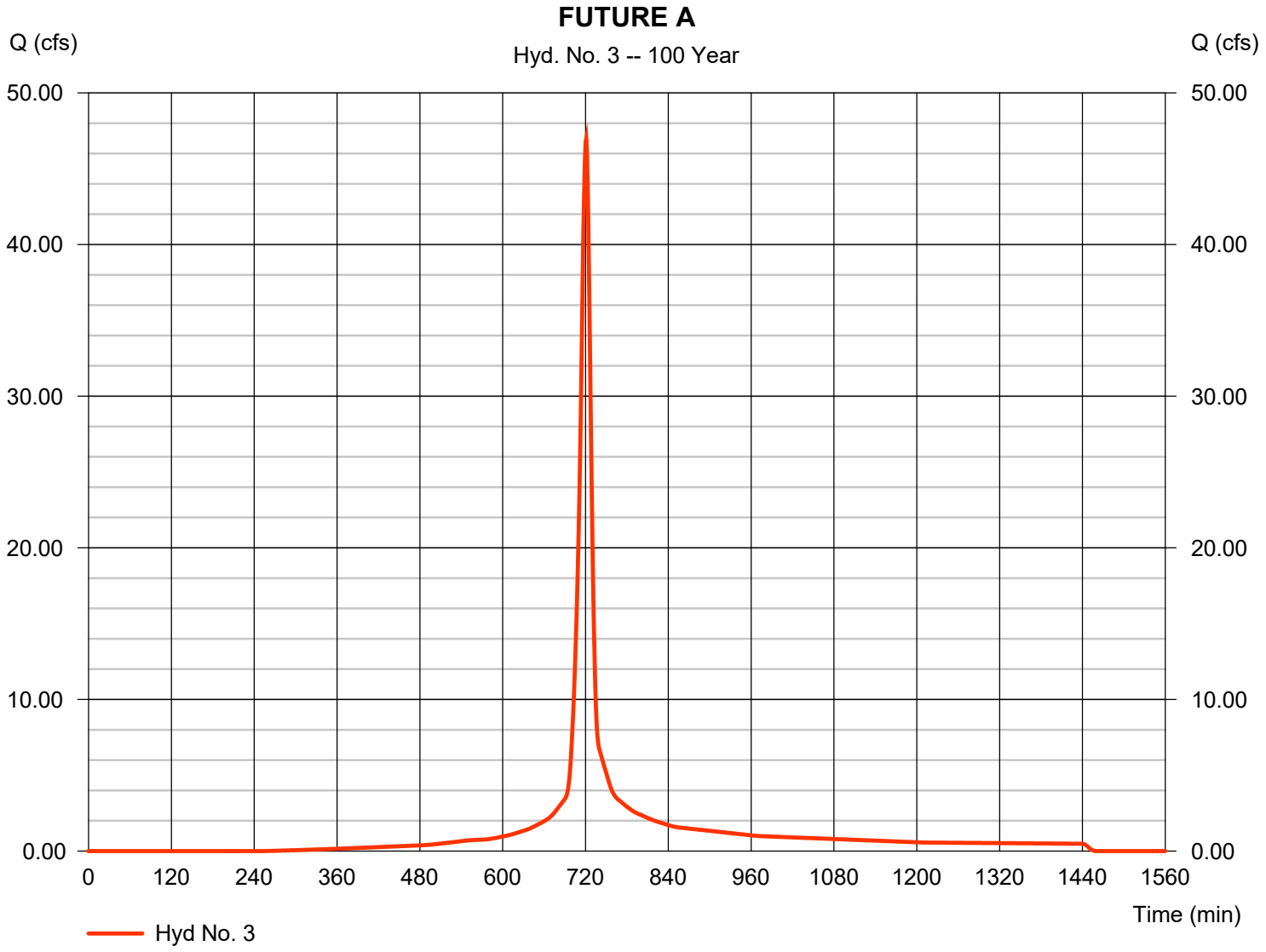


Hydrograph Report

Hyd. No. 3

FUTURE A

Hydrograph type	=	SCS Runoff	Peak discharge	=	46.94 cfs
Storm frequency	=	100 yrs	Time to peak	=	721 min
Time interval	=	1 min	Hyd. volume	=	123,684 cuft
Drainage area	=	5.960 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.40 min
Total precip.	=	7.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



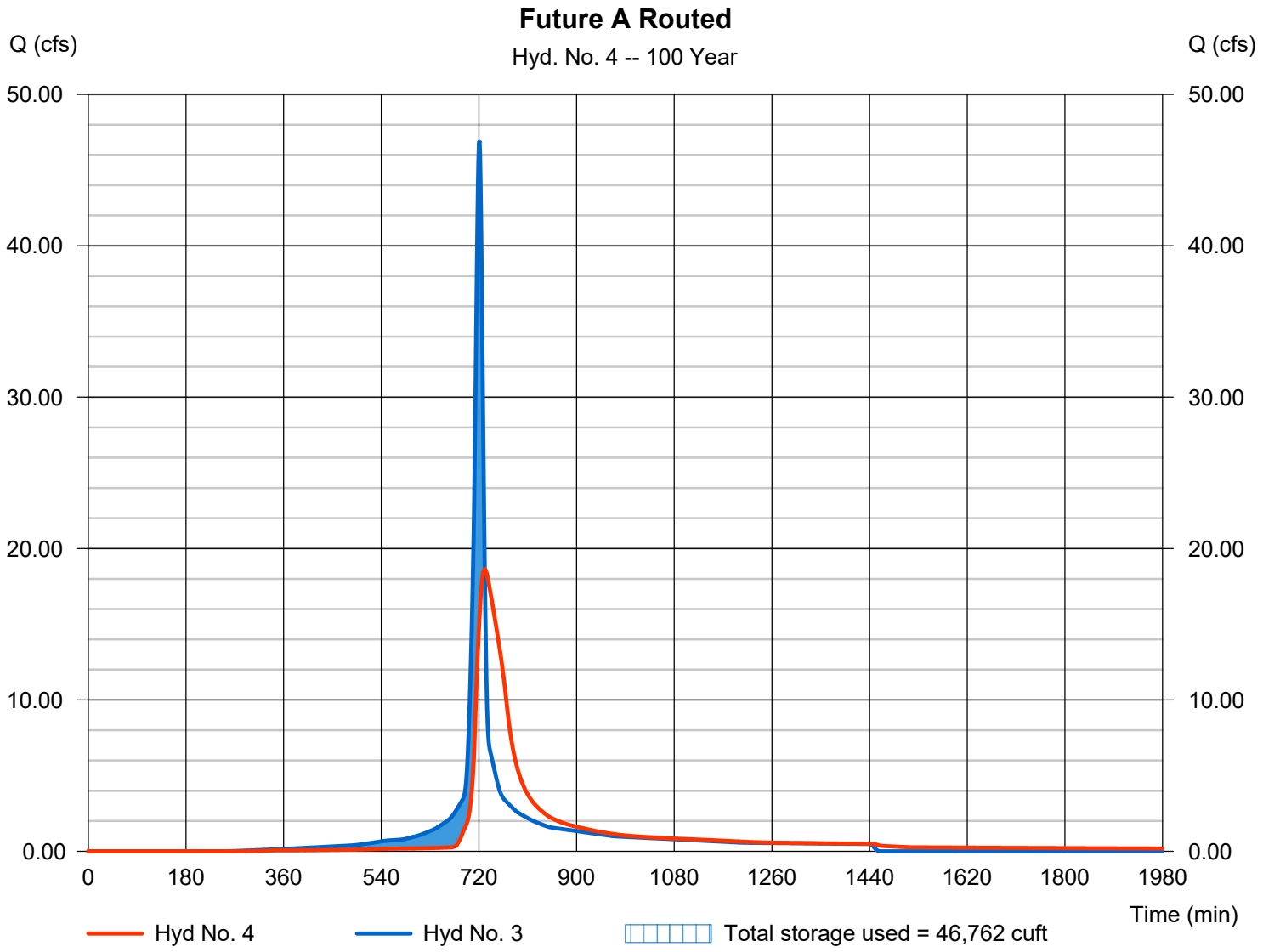
Hydrograph Report

Hyd. No. 4

Future A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	18.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	123,662 cuft
Inflow hyd. No.	=	3 - FUTURE A	Max. Elevation	=	1010.88 ft
Reservoir name	=	Detention Pond	Max. Storage	=	46,762 cuft

Storage Indication method used.



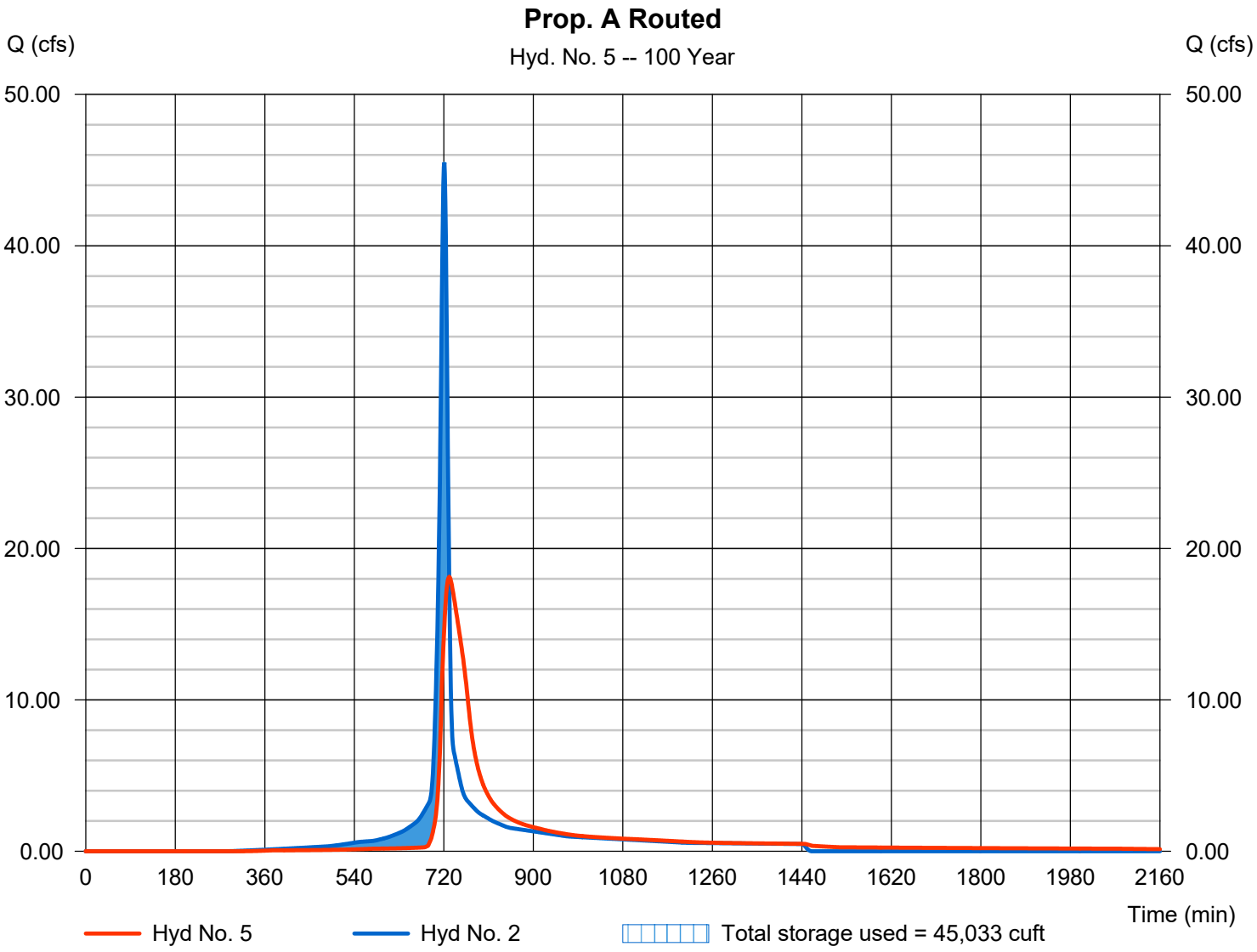
Hydrograph Report

Hyd. No. 5

Prop. A Routed

Hydrograph type	=	Reservoir	Peak discharge	=	18.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	118,717 cuft
Inflow hyd. No.	=	2 - PROP. A	Max. Elevation	=	1010.79 ft
Reservoir name	=	Detention Pond	Max. Storage	=	45,033 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	64.1474	17.7000	0.8922	--------
2	95.7859	19.2000	0.9317	--------
3	0.0000	0.0000	0.0000	--------
5	118.7799	19.1000	0.9266	--------
10	125.1300	18.2000	0.9051	--------
25	158.9867	18.7000	0.9180	--------
50	171.2459	18.3000	0.9078	--------
100	187.3624	18.1000	0.9031	--------

File name: KCMO.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	3.96	3.31	2.86	2.52	2.25	2.04	1.87	1.72	1.60	1.49	1.40	1.32
2	4.92	4.13	3.56	3.14	2.81	2.54	2.32	2.14	1.98	1.85	1.73	1.63
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	6.23	5.23	4.51	3.98	3.56	3.22	2.94	2.71	2.52	2.35	2.20	2.07
10	7.27	6.09	5.26	4.63	4.14	3.75	3.43	3.16	2.93	2.74	2.57	2.42
25	8.70	7.30	6.30	5.54	4.96	4.49	4.10	3.78	3.51	3.27	3.07	2.89
50	9.83	8.24	7.11	6.26	5.60	5.07	4.64	4.27	3.97	3.70	3.47	3.27
100	11.00	9.21	7.95	7.00	6.26	5.67	5.19	4.78	4.44	4.14	3.89	3.66

Tc = time in minutes. Values may exceed 60.

Precip. file name: Z:\acad\KCMO.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	3.50	3.50	0.00	3.30	5.20	6.00	6.80	7.70
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	3.25	3.10	0.00	4.01	4.64	5.52	6.21	6.90
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	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Weir Report

Emergency Spillway - 107 LF Earthen Broad Crested Weir

Rectangular Weir

Crest	= Broad
Bottom Length (ft)	= 107.00
Total Depth (ft)	= 1.30

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Q
Known Q (cfs)	= 45.50

Highlighted

Depth (ft)	= 0.30
Q (cfs)	= 45.50
Area (sqft)	= 31.98
Velocity (ft/s)	= 1.42
Top Width (ft)	= 107.00