

Drainage Report
For
Collective Church
Bryant, Saline County, Arkansas



May 2, 2025

Prepared by:

RICHARDSON ENGINEERING, PLLC

**325 W. South St.
Benton, AR 72015
501-315-7225**

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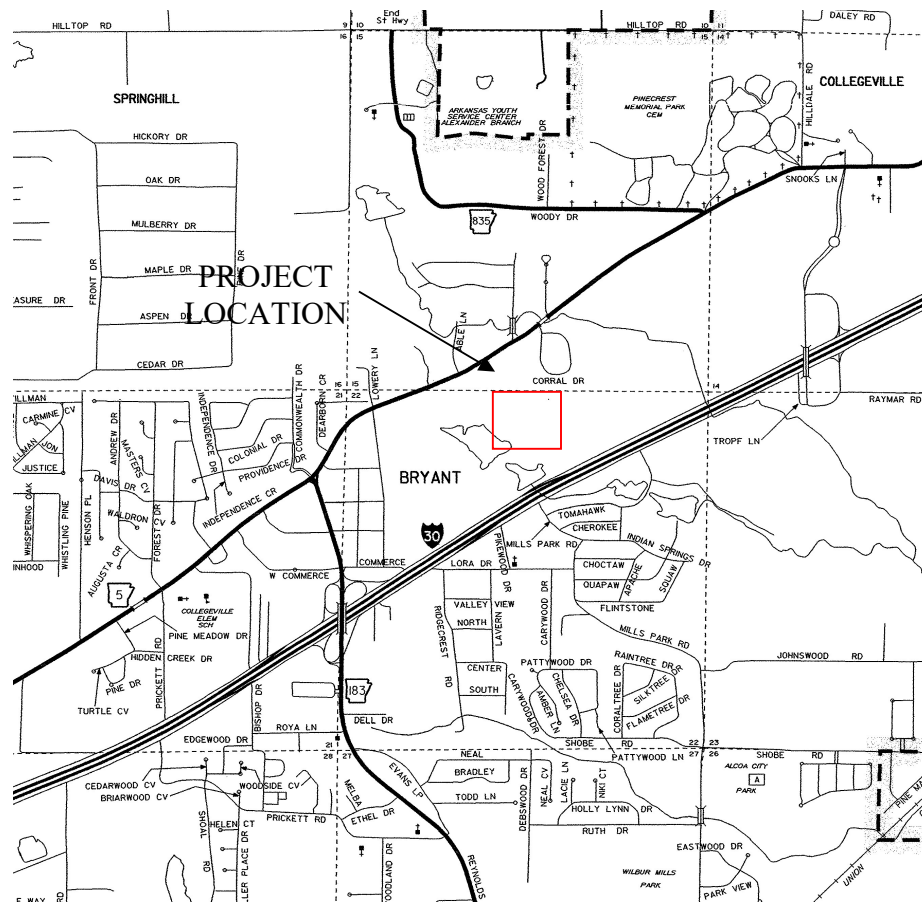
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Project Owner Information

Collective Church
3230 Markey Place Ave
Bryant, AR 72022

Project Location and Description

The project is located on Progress Way, part of the East Half of the Northwest Quarter, Section 22, Township 1-S, Range 14-W, Saline County, Arkansas.



Vicinity Map – N.T.S

This project is a Commercial Development for a Church, located in the City of Bryant, Saline County.

Site Drainage

Pre-Development

The pre-developed runoff for the site flows to the South to a regional detention basin for the overall commercial development. The pre-development runoff condition is undeveloped/woods.

Post-Development

The site drainage starts on the North side of the project and flows to the East and West. The drainage is intercepted into a storm sewer system and is discharged into the existing regional detention basin to the South of the proposed project. The post-development runoff conditions changed from undeveloped/woods to commercial development.

Runoff Summary

Drainage Basin "A"

(West Side of Project/30" ADS Discharge Point)

Pre-Development Drainage Area = 0.81 Ac

Post-Development Drainage Area = 6.28 Ac

Existing Condition runoff Coefficient: $C = 0.47$

Proposed runoff Coefficient: $C = 0.95$

Tc Undeveloped = 16 Minutes (TR55 Method)

Tc Developed = 6 Minutes

Design Storm	Pre-Development Flow Rate (cfs)	Post-Development Flow Rate (cfs)
2-yr	1.38	33.73
10-yr	1.85	45.13
25-yr	2.13	51.84
50-yr	2.33	56.64
100-yr	2.53	61.57

Drainage Basin "B"

(West side of Project/12" ADS Discharge Point)

Pre-Development Drainage Area = 5.62 Ac

Post-Development Drainage Area = 0.20 Ac

Existing Condition runoff Coefficient: $C = 0.47$

Proposed runoff Coefficient: $C = 0.95$

Tc Undeveloped = 13 Minutes (TR55 Method)

Tc Developed = 5 Minutes

Design Storm	Pre-Development Flow Rate (cfs)	Post-Development Flow Rate (cfs)
2-yr	10.53	1.17
10-yr	14.12	1.56
25-yr	16.22	1.79
50-yr	17.74	1.96
100-yr	19.26	2.13

Drainage Basin "C"

(East Side of Project/18" ADS Discharge Point)

Pre-Development Drainage Area = 0.64 Ac

Post-Development Drainage Area = 0.45 Ac

Existing Condition runoff Coefficient: $C = 0.47$

Proposed runoff Coefficient: $C = 0.95$

Tc Undeveloped = 9 Minutes (TR55 Method)

Tc Developed = 6 Minutes

Design Storm	Pre-Development Flow Rate (cfs)	Post-Development Flow Rate (cfs)
2-yr	1.41	2.42
10-yr	1.89	3.23
25-yr	2.18	3.72
50-yr	2.38	4.06
100-yr	2.59	4.41

Drainage Basin "D"
 (East Side of Project/24" ADS Discharge Point)
 Pre-Development Drainage Area = 0.47 Ac
 Post-Development Drainage Area = 3.90 Ac
 Existing Condition runoff Coefficient: $C = 0.47$
 Proposed runoff Coefficient: $C = 0.95$
 T_c Undeveloped = 19 Minutes (TR55 Method)
 T_c Developed = 10 Minutes

Design Storm	Pre-Development Flow Rate (cfs)	Post-Development Flow Rate (cfs)
2-yr	0.99	9.95
10-yr	1.33	13.36
25-yr	1.53	15.35
50-yr	1.67	16.80
100-yr	1.81	18.23

Recommendations/Summary

The proposed drainage improvements include a storm sewer system for the commercial development that will be discharged into the existing regional detention basin. The proposed storm system also catches water from the commercial lot to the North and Hunters Crossing subdivision and routes it to the existing regional detention basin.

Appendices

Site Drainage Map
Storm System Design (SSA)
Pond and Post Development Hydrographs (Hydrology Studio)

Drainage Ditch Design Calculations

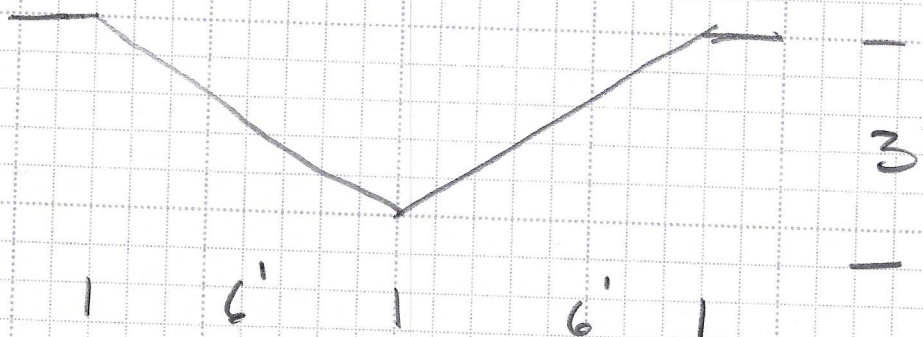
PROJECT 023-065 COLLECTIVE CITIZENSHIP

DATE 05/02/2025

DRAINAGE BASIN

3.7784 AC

$Q_{100} = 40.2$ CFS



$$Q = \frac{(1.49)}{N} * A * R_h^{(2/3)} * S^{1/2}$$

$$N = 0.03 \quad (\text{GRASS WATERWAY})$$

$$A = 18 \text{ FT}^2$$

$$W_p = 13.41 \text{ FT}$$

$$S = 2.0\% = 0.02 \text{ FT/FT}$$

$$Q = \frac{(1.49)}{0.03} * (18) * \left(\frac{18}{13.41}\right)^{(2/3)} * (0.02)^{1/2}$$

$$= 153.8 \text{ CFS} \quad \checkmark$$

Post-Development Tc Calculations



(1/4)

PROJECT 023-065 COLLECTIVE CHURCH

DATE 05/02/2025

POST-DEV BASIN "A" T_c

SUB FES-S : $T_c = 5 \text{ min}$

$$\text{PIPE 25} \quad T_{\text{run}} = \frac{L}{V} = \frac{53}{(13.66)(60)} = 0.06 \text{ min}$$

$$\text{PIPE 24} \quad \Rightarrow \quad \frac{177}{(10.49)(60)} = 0.28 \text{ min}$$

$$\text{PIPE 15} \quad \Rightarrow \quad \frac{106}{(10.84)(60)} = 0.16 \text{ min}$$

$$\underline{T_c = 5.5 \text{ min}}$$



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(2/4)

PROJECT 023-065 COLLECTIVE CHURCH

DATE 05/02/2025

POST-DEV BASIN "B"

SUB AD-24

$T_c = 5 \text{ min}$

$$\text{PIPE - 16 } T_{row} = \frac{L}{V} = \frac{LOS}{(6.4)(60)} = 0.27 \text{ min}$$

$$\text{PIPE 17 } \Rightarrow \frac{61}{(10.37)(60)} = 0.10 \text{ min}$$

$$\underline{T_c = 5.37 \text{ min}}$$



(3/4)

PROJECT 023-065 COLLECTIVE (HBRCH)

DATE 05/02/2025

POST-DEV BASIN "C"

SUB AP-29 $T_c = 5 \text{ min}$

$$\text{PIPE 19} \quad T_{\text{flow}} = \frac{L}{V} = \frac{106}{(6.41)(60)} = 0.27 \text{ min}$$

$$\text{PIPE 20} \quad \Rightarrow \quad \frac{20}{(7.03)(60)} = 0.05 \text{ min}$$

$$\text{PIPE 18} \quad \Rightarrow \quad \frac{141}{(6.47)(60)} = 0.36 \text{ min}$$

$$\text{PIPE 18(1)} \quad \Rightarrow \quad \frac{20}{(7.8)(60)} = 0.04 \text{ min}$$

$$\underline{T_c = 5.72 \text{ min}}$$



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PROJECT 023-665 COLLECTIVE CHURCH

DATE 05/02/2025

POST-DEV BASIN "D"

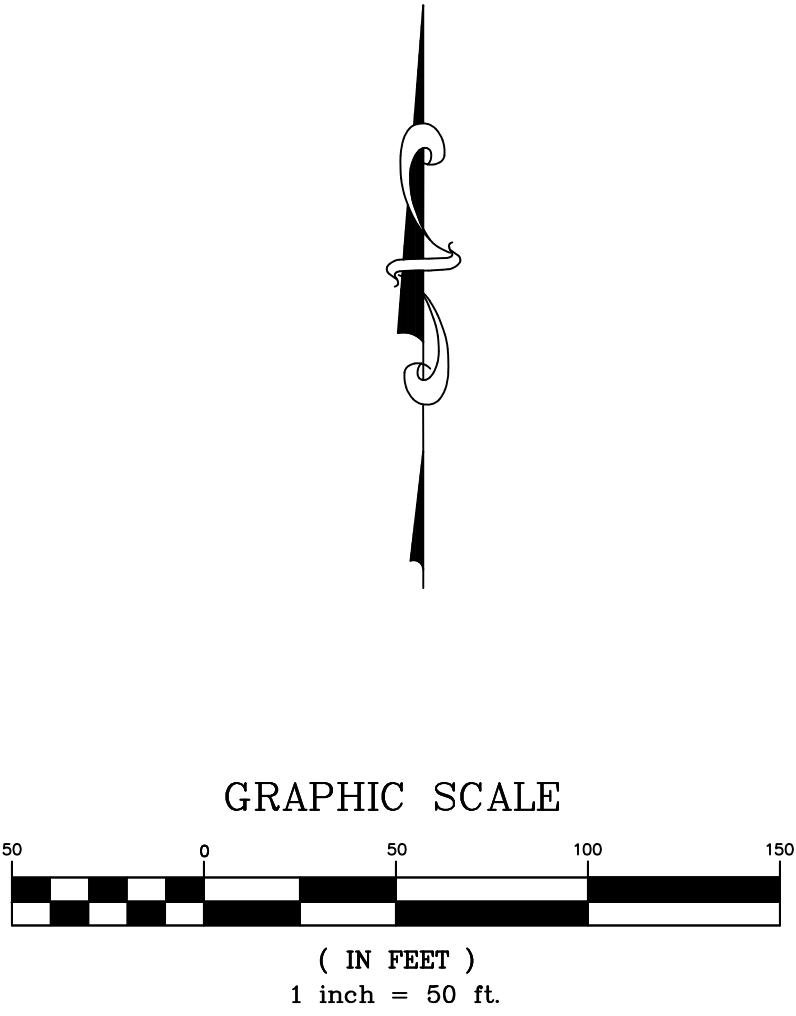
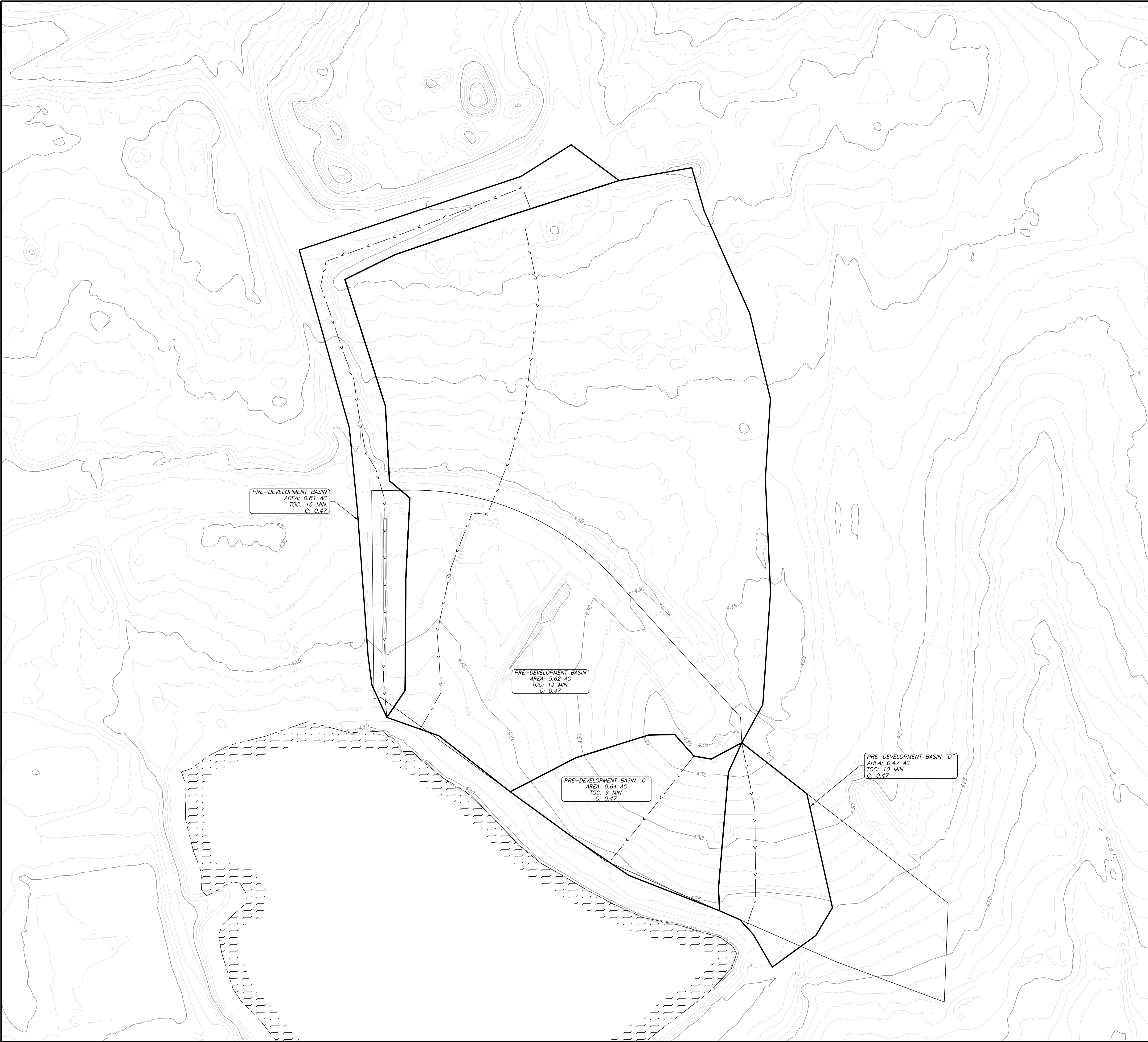
SUB FES-6 $T_L = 18.23 \text{ min}$

$$\text{PIPE 20} \quad T_{\text{flow}} = \frac{L}{V} = \frac{123}{(8.28)(60)} = 0.25 \text{ min}$$

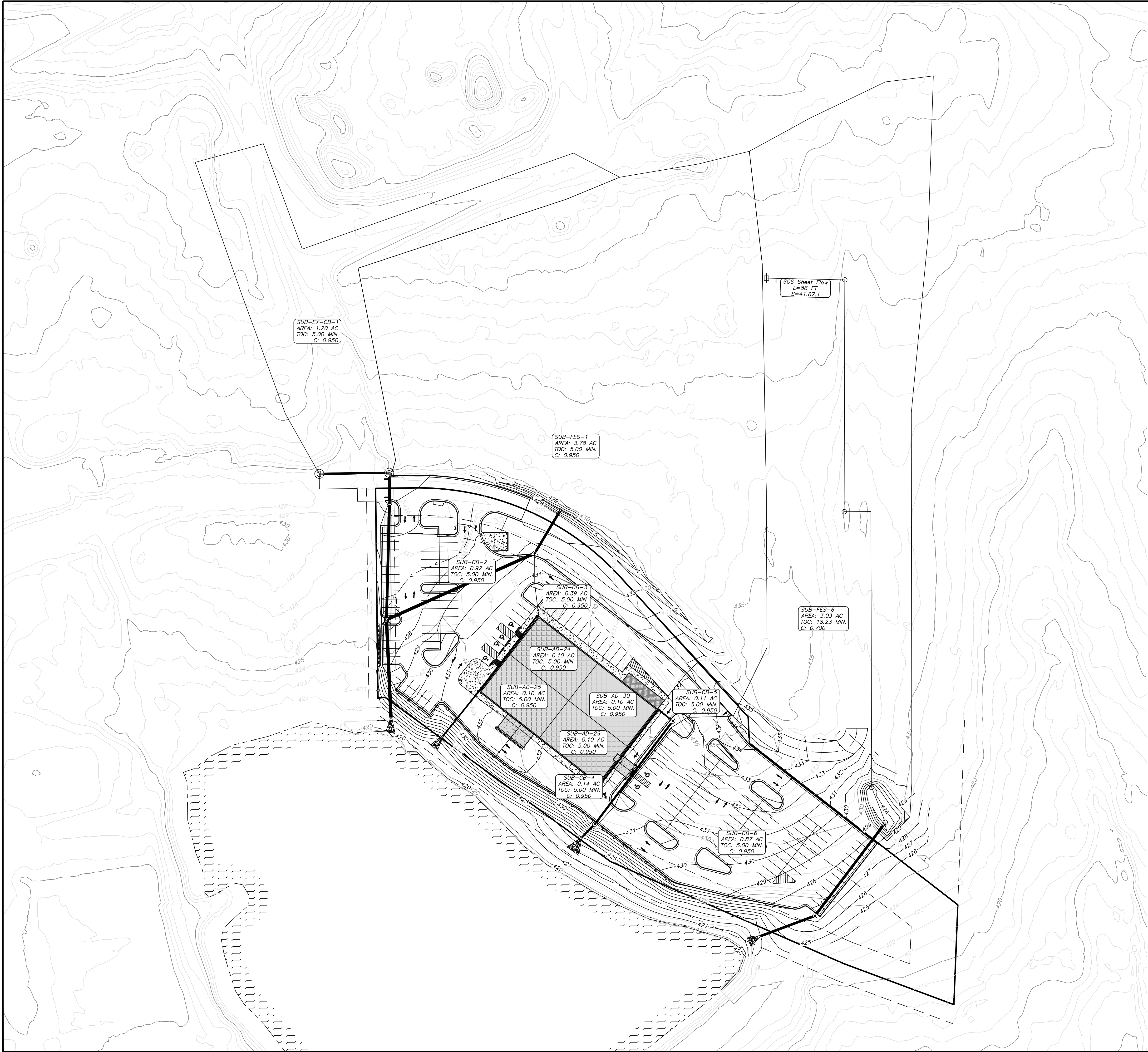
$$\text{PIPE 21} \quad \Rightarrow \quad \frac{63}{(9.38)(60)} = 0.11 \text{ min}$$

$$\underline{T_L = 18.59 \text{ min}}$$

Site Drainage Basin Maps



PROJECT #: 023-065		Prep: 05/02/2025		Scale: 1" = 50'		Sheet: 1 of 2	
Revisions		Date		Prepared For:		PRE-DEVELOPMENT DRAINAGE BASINS COLLECTIVE CHURCH 3230 MARKET PLACE AVE, SUITE 2 BRYANT, AR 72022	
No.		Richardson Engineering, Inc. No. 2519				RICHARDSON ENGINEERING Planning • Engineering • Development Consulting 325 W. SOUTH STREET, BENTON, AR 72015 (501)315-7225	



PROJECT #: 023-065

Scale: 1" = 50'

Sheet: 2 of 2

Revisions

No.

Date

Prepared For:

COLLECTIVE CHURCH
3230 MARKET PLACE AVE,
SUITE 2
BRYANT, AR 72022

POST-DEVELOPMENT DRAINAGE BASINS
COLLECTIVE CHURCH

PROPOSED BUILDING & PARKING
BRYANT, ARKANSAS

RE

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Arkansas Professional Engineer

Richardson Engineering

No. 2519

Storm System Design (SSA)

2 Year Design Storm

Project Description

File Name Collective Church Drainage 5-2-25.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method Rational
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On May 02, 2025 00:00:00
End Analysis On May 03, 2025 00:00:00
Start Reporting On May 02, 2025 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 0
Subbasins..... 12
Nodes..... 16
 Junctions 6
 Outfalls 4
 Flow Diversions 0
 Inlets 6
 Storage Nodes 0
Links..... 15
 Channels 1
 Pipes 14
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

Return Period..... 2 year(s)

Subbasin Summary

SN	Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Sub-AD- (24)	0.10	0.9500	0.51	0.49	0.05	0.58	0 00:05:00
2	Sub-AD- (25)	0.10	0.9500	0.51	0.49	0.05	0.58	0 00:05:00
3	Sub-AD- (29)	0.10	0.9500	0.51	0.49	0.05	0.58	0 00:05:00
4	Sub-AD- (30)	0.10	0.9500	0.51	0.49	0.05	0.58	0 00:05:00
5	Sub-CB-1	1.20	0.9500	0.51	0.49	0.58	6.99	0 00:05:00
6	Sub-CB-2	0.92	0.9500	0.51	0.49	0.45	5.35	0 00:05:00
7	Sub-CB-3	0.39	0.9500	0.51	0.49	0.19	2.26	0 00:05:00
8	Sub-CB-4	0.14	0.9500	0.51	0.49	0.07	0.82	0 00:05:00
9	Sub-CB-5	0.11	0.9500	0.51	0.49	0.06	0.67	0 00:05:00
10	Sub-CB-6	0.87	0.9500	0.51	0.49	0.42	5.10	0 00:05:00
11	Sub-FES-5	3.78	0.9500	0.51	0.49	1.84	22.04	0 00:05:00
12	Sub-FES-6	3.03	0.7000	1.02	0.71	2.16	7.14	0 00:18:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Ma Surcharg Dept Attaine
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(f
1	AD- (24)	Junction	429.05	432.47	429.05	432.47	10.00	0.58	429.32	0.0
2	AD- (25)	Junction	428.00	432.46	428.00	432.46	10.00	1.13	428.26	0.0
3	AD- (29)	Junction	429.06	432.45	429.06	432.45	10.00	0.58	429.32	0.0
4	AD- (30)	Junction	428.00	432.46	428.00	432.46	10.00	1.12	428.29	0.0
5	FES-5	Junction	425.10	427.00	425.10	427.50	0.00	22.04	426.14	0.0
6	FES-6	Junction	424.75	426.99	424.75	426.99	0.00	7.14	425.49	0.0
7	Out-1SL - (15)	Outfall	421.25					35.49	422.94	
8	Out-1SL - (17)	Outfall	423.50					1.12	423.72	
9	Out-1SL - (18) (1)	Outfall	424.50					2.52	424.90	
10	Out-1SL - (21)	Outfall	422.50					7.11	423.15	

Link Summary

SN	Element ID	Element Type	From (Inlet Node)	To (Outlet Node)	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	F
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	
1	L-SL - (24)	Pipe	CB-3	CB-2	199.68	430.66	426.94	1.8600	0.000	0.0320	0.36	0.00	0.00	0.00	0.00
2	L-SL-14	Pipe	CB-1	CB-2	135.67	423.42	422.50	0.6800	0.000	0.0150	2.77	0.00	0.00	0.00	0.00
3	SL - (14)	Pipe	CB-1	CB-2	127.66	423.42	422.80	0.4900	24.000	0.0130	4.16	15.77	0.26	7.45	
4	SL - (15)	Pipe	CB-2	Out-1SL - (15)	106.61	422.32	421.25	1.0000	30.000	0.0120	35.49	44.52	0.80	10.14	
5	SL - (16)	Pipe	AD- (24)	AD- (25)	105.49	429.05	428.00	1.0000	12.000	0.0120	0.57	3.86	0.15	5.59	
6	SL - (17)	Pipe	AD- (25)	Out-1SL - (17)	60.96	428.00	423.50	7.3800	12.000	0.0120	1.12	10.49	0.11	8.73	
7	SL - (18)	Pipe	CB-5	CB-4	141.40	427.00	424.90	1.4900	18.000	0.0120	1.76	13.88	0.13	5.45	
8	SL - (18) (1)	Pipe	CB-4	Out-1SL - (18) (1)	20.22	424.90	424.50	1.9700	18.000	0.0120	2.52	15.96	0.16	6.59	
9	SL - (19)	Pipe	AD- (29)	AD- (30)	106.07	429.06	428.00	1.0000	12.000	0.0120	0.57	3.86	0.15	5.60	
10	SL - (20)	Pipe	AD- (30)	CB-5	19.89	428.00	427.50	2.5100	12.000	0.0120	1.12	6.12	0.18	5.94	
11	SL - (21)	Pipe	CB-6	Out-1SL - (21)	63.64	423.50	422.50	1.5700	24.000	0.0120	7.11	30.72	0.23	7.96	
12	SL - (24)	Pipe	CB-3	CB-2	174.72	424.10	422.32	1.0200	30.000	0.0120	23.43	44.85	0.52	9.34	
13	SL - (25)	Pipe	FES-5	CB-3	52.99	425.10	424.10	1.8900	30.000	0.0120	21.93	61.04	0.36	11.83	
14	SL - (26)	Pipe	FES-6	CB-6	123.36	424.75	423.50	1.0100	24.000	0.0120	7.11	24.67	0.29	7.20	
15	L-SL - (18) (1)	Channel	CB-4	CB-6	272.73	431.93	427.30	1.7000	6.000	0.0150	0.00	7.95	0.00	0.00	

Inlet Summary

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation	Max (Rim) Elevation	Initial Water Elevation	Ponded Area	Peak Flow	Peak Flow Intercepted	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Allowable Spread	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow
				(ft)	(ft)	(ft)	(ft²)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
1	CB-1	On Grade	1	423.42	429.56	423.42	N/A	6.99	4.21	2.77	60.33	10.00	14.61	429.85
2	CB-2	On Sag	1	422.32	426.95	422.32	10.00	8.48	N/A	N/A	N/A	10.00	9.70	427.49
3	CB-3	On Grade	1	424.10	430.66	424.10	N/A	2.26	1.90	0.36	84.14	10.00	5.89	430.82
4	CB-4	On Grade	1	424.90	431.93	424.90	N/A	0.82	0.82	0.00	100.00	10.00	5.89	432.05
5	CB-5	On Sag	1	427.00	432.00	427.00	10.00	0.67	N/A	N/A	N/A	10.00	2.33	432.32
6	CB-6	On Sag	1	423.50	427.34	423.50	10.00	5.10	N/A	N/A	N/A	10.00	7.76	427.86

Subbasin Hydrology

Subbasin : Sub-AD- (24)

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
n = Manning's roughness
L_f = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
V = 20.3282 * (S_f^{0.5}) (paved surface)
V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
V = 5.0 * (S_f^{0.5}) (woodland surface)
V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
R = A_q / W_p
T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
R = Hydraulic Radius (ft)
A_q = Flow Area (ft²)
W_p = Wetted Perimeter (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (25)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (29)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (30)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-1

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-2

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-3

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-4

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-6

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-6**Time of Concentration**

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0.00	0.00
Flow Length (ft) :	85.71195638	0.00	0.00
Slope (%) :	2.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.36	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	12.01	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	253.76684919	31.23398630	93.388558
Slope (%) :	1.8	0.4	1.25
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.73	1.29	1.80
Computed Flow Time (min) :	1.55	4.29	0.38
Total TOC (min)	18.23		

Junction Input

SN	Element ID	Invert Elevation	Ground/Rim (Max) Elevation	Ground/Rim (Max) Offset	Initial Water Elevation	Initial Water Depth	Surcharge Elevation	Surcharge Depth	Ponded Area	Minimum Pipe Cover
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft²)	(in)
1	AD- (24)	429.05	432.47	3.41	429.05	0.00	432.47	0.00	10.00	0.00
2	AD- (25)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
3	AD- (29)	429.06	432.45	3.39	429.06	0.00	432.45	0.00	10.00	0.00
4	AD- (30)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
5	FES-5	425.10	427.00	1.90	425.10	0.00	427.50	0.50	0.00	0.00
6	FES-6	424.75	426.99	2.24	424.75	0.00	426.99	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time Max H Occurren
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:m
1	AD- (24)	0.58	0.58	429.32	0.27	0.00	3.15	429.06	0.01	0 00:
2	AD- (25)	1.13	0.58	428.26	0.26	0.00	4.21	428.00	0.00	0 00:
3	AD- (29)	0.58	0.58	429.32	0.26	0.00	3.13	429.06	0.00	0 00:
4	AD- (30)	1.12	0.58	428.29	0.29	0.00	4.17	428.00	0.00	0 00:
5	FES-5	22.04	22.04	426.14	1.04	0.00	1.46	425.10	0.00	0 00:
6	FES-6	7.14	7.14	425.49	0.74	0.00	1.50	424.76	0.01	0 00:

Channel Input

SN	Element ID	Length	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Mani Rough
1	L-SL - (18) (1)	272.73	431.93	7.03	427.30	3.80	4.63	1.7000	User-Defined	0.500	17.000	0

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	T Si
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (18) (1)	0.00	0 00:00	7.95	0.00	0.00		0.00	0.00	

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Material
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)	Roughness
1	L-SL - (24)	199.68	430.66	6.56	426.94	4.62	3.72	1.8600	Dummy	0.000	0.000	
2	L-SL-14	135.67	423.42	0.00	422.50	0.18	0.92	0.6800	Dummy	0.000	0.000	
3	SL - (14)	127.66	423.42	0.00	422.80	0.48	0.62	0.4900	CIRCULAR	24.000	24.000	
4	SL - (15)	106.61	422.32	0.00	421.25	0.00	1.07	1.0000	CIRCULAR	30.000	30.000	
5	SL - (16)	105.49	429.05	0.00	428.00	0.00	1.05	1.0000	CIRCULAR	12.000	12.000	
6	SL - (17)	60.96	428.00	0.00	423.50	0.00	4.50	7.3800	CIRCULAR	12.000	12.000	
7	SL - (18)	141.40	427.00	0.00	424.90	0.00	2.10	1.4900	CIRCULAR	18.000	18.000	
8	SL - (18) (1)	20.22	424.90	0.00	424.50	0.00	0.40	1.9700	CIRCULAR	18.000	18.000	
9	SL - (19)	106.07	429.06	0.00	428.00	0.00	1.06	1.0000	CIRCULAR	12.000	12.000	
10	SL - (20)	19.89	428.00	0.00	427.50	0.50	0.50	2.5100	CIRCULAR	12.000	12.000	
11	SL - (21)	63.64	423.50	0.00	422.50	0.00	1.00	1.5700	CIRCULAR	24.000	24.000	
12	SL - (24)	174.72	424.10	0.00	422.32	0.00	1.78	1.0200	CIRCULAR	30.000	30.000	
13	SL - (25)	52.99	425.10	0.00	424.10	0.00	1.00	1.8900	CIRCULAR	30.000	30.000	
14	SL - (26)	123.36	424.75	0.00	423.50	0.00	1.25	1.0100	CIRCULAR	24.000	24.000	

No. of
Barrels[illegible]

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	To Sur
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (24)	0.36	0 00:05	0.00	0.00	0.00		0.00	0.00	
2 L-SL-14	2.77	0 00:05	0.00	0.00	0.00		0.00	0.00	
3 SL - (14)	4.16	0 00:05	15.77	0.26	7.45	0.29	0.70	0.35	
4 SL - (15)	35.49	0 00:05	44.52	0.80	10.14	0.18	1.68	0.67	
5 SL - (16)	0.57	0 00:05	3.86	0.15	5.59	0.31	0.26	0.26	
6 SL - (17)	1.12	0 00:05	10.49	0.11	8.73	0.12	0.22	0.22	
7 SL - (18)	1.76	0 00:05	13.88	0.13	5.45	0.43	0.36	0.36	
8 SL - (18) (1)	2.52	0 00:05	15.96	0.16	6.59	0.05	0.40	0.27	
9 SL - (19)	0.57	0 00:05	3.86	0.15	5.60	0.32	0.26	0.26	
10 SL - (20)	1.12	0 00:05	6.12	0.18	5.94	0.06	0.29	0.29	
11 SL - (21)	7.11	0 00:18	30.72	0.23	7.96	0.13	0.65	0.33	
12 SL - (24)	23.43	0 00:05	44.85	0.52	9.34	0.31	1.28	0.51	
13 SL - (25)	21.93	0 00:05	61.04	0.36	11.83	0.07	1.04	0.41	
14 SL - (26)	7.11	0 00:18	24.67	0.29	7.20	0.29	0.73	0.37	

Inlet Input

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	CB-1	On Grade	1	423.42	429.56	6.14	423.42	0.00	N/A	0.00
2	CB-2	On Sag	1	422.32	426.95	4.63	422.32	0.00	10.00	0.00
3	CB-3	On Grade	1	424.10	430.66	6.56	424.10	0.00	N/A	0.00
4	CB-4	On Grade	1	424.90	431.93	7.03	424.90	0.00	N/A	0.00
5	CB-5	On Sag	1	427.00	432.00	5.00	427.00	0.00	10.00	0.00
6	CB-6	On Sag	1	423.50	427.34	3.84	423.50	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0100	0.0200	0.0150	0.0200	1.50	0.1312	10.00
2	CB-2	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
3	CB-3	0.0380	0.0300	0.0150	0.0200	1.50	0.1312	10.00
4	CB-4	0.0175	0.0200	0.0150	0.0200	1.50	0.1312	10.00
5	CB-5	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
6	CB-6	N/A	0.0350	0.0150	0.0200	1.50	0.1312	10.00

Inlet Results

SN	Element ID	Peak Flow	Peak Lateral Inflow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow	Max Gutter Water Depth during Peak Flow	1 Max Occu
		(cfs)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)	(days t
1	CB-1	6.99	6.99	4.21	2.77	60.33	14.61	429.85	0.29	(
2	CB-2	8.48	5.35	N/A	N/A	N/A	9.70	427.49	0.54	(
3	CB-3	2.26	2.26	1.90	0.36	84.14	5.89	430.82	0.16	(
4	CB-4	0.82	0.82	0.82	0.00	100.00	5.89	432.05	0.12	(
5	CB-5	0.67	0.67	N/A	N/A	N/A	2.33	432.32	0.32	(
6	CB-6	5.10	5.10	N/A	N/A	N/A	7.76	427.86	0.52	(

10 Year Design Storm

Project Description

File Name Collective Church Drainage 5-2-25.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method Rational
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On May 02, 2025 00:00:00
End Analysis On May 03, 2025 00:00:00
Start Reporting On May 02, 2025 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins.....	12
Nodes.....	16
<i>Junctions</i>	6
<i>Outfalls</i>	4
<i>Flow Diversions</i>	0
<i>Inlets</i>	6
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	1
<i>Pipes</i>	14
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period..... 10 year(s)

Subbasin Summary

SN	Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Sub-AD- (24)	0.10	0.9500	0.68	0.65	0.06	0.78	0 00:05:00
2	Sub-AD- (25)	0.10	0.9500	0.68	0.65	0.06	0.78	0 00:05:00
3	Sub-AD- (29)	0.10	0.9500	0.68	0.65	0.06	0.78	0 00:05:00
4	Sub-AD- (30)	0.10	0.9500	0.68	0.65	0.06	0.78	0 00:05:00
5	Sub-CB-1	1.20	0.9500	0.68	0.65	0.78	9.34	0 00:05:00
6	Sub-CB-2	0.92	0.9500	0.68	0.65	0.60	7.15	0 00:05:00
7	Sub-CB-3	0.39	0.9500	0.68	0.65	0.25	3.03	0 00:05:00
8	Sub-CB-4	0.14	0.9500	0.68	0.65	0.09	1.09	0 00:05:00
9	Sub-CB-5	0.11	0.9500	0.68	0.65	0.07	0.89	0 00:05:00
10	Sub-CB-6	0.87	0.9500	0.68	0.65	0.57	6.82	0 00:05:00
11	Sub-FES-5	3.78	0.9500	0.68	0.65	2.46	29.47	0 00:05:00
12	Sub-FES-6	3.03	0.7000	1.36	0.96	2.89	9.55	0 00:18:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Ma Surcharg Dept Attaine
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(f
1	AD- (24)	Junction	429.05	432.47	429.05	432.47	10.00	0.78	429.36	0.0
2	AD- (25)	Junction	428.00	432.46	428.00	432.46	10.00	1.50	428.30	0.0
3	AD- (29)	Junction	429.06	432.45	429.06	432.45	10.00	0.78	429.36	0.0
4	AD- (30)	Junction	428.00	432.46	428.00	432.46	10.00	1.51	428.34	0.0
5	FES-5	Junction	425.10	427.00	425.10	427.50	0.00	29.47	426.32	0.0
6	FES-6	Junction	424.75	426.99	424.75	426.99	0.00	9.55	425.61	0.0
7	Out-1SL - (15)	Outfall	421.25					48.16	423.54	
8	Out-1SL - (17)	Outfall	423.50					1.50	423.76	
9	Out-1SL - (18) (1)	Outfall	424.50					3.38	424.97	
10	Out-1SL - (21)	Outfall	422.50					9.51	423.26	

Link Summary

SN	Element ID	Element Type	From (Inlet Node)	To (Outlet Node)	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	F
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	
1	L-SL - (24)	Pipe	CB-3	CB-2	199.68	430.66	426.94	1.8600	0.000	0.0320	0.73	0.00	0.00	0.00	0.00
2	L-SL-14	Pipe	CB-1	CB-2	135.67	423.42	422.50	0.6800	0.000	0.0150	4.42	0.00	0.00	0.00	0.00
3	SL - (14)	Pipe	CB-1	CB-2	127.66	423.42	422.80	0.4900	24.000	0.0130	4.86	15.77	0.31	7.88	
4	SL - (15)	Pipe	CB-2	Out-1SL - (15)	106.61	422.32	421.25	1.0000	30.000	0.0120	48.16	44.52	1.08	10.66	
5	SL - (16)	Pipe	AD- (24)	AD- (25)	105.49	429.05	428.00	1.0000	12.000	0.0120	0.75	3.86	0.20	5.92	
6	SL - (17)	Pipe	AD- (25)	Out-1SL - (17)	60.96	428.00	423.50	7.3800	12.000	0.0120	1.50	10.49	0.14	9.47	
7	SL - (18)	Pipe	CB-5	CB-4	141.40	427.00	424.90	1.4900	18.000	0.0120	2.36	13.88	0.17	5.92	
8	SL - (18) (1)	Pipe	CB-4	Out-1SL - (18) (1)	20.22	424.90	424.50	1.9700	18.000	0.0120	3.38	15.96	0.21	7.17	
9	SL - (19)	Pipe	AD- (29)	AD- (30)	106.07	429.06	428.00	1.0000	12.000	0.0120	0.76	3.86	0.20	5.93	
10	SL - (20)	Pipe	AD- (30)	CB-5	19.89	428.00	427.50	2.5100	12.000	0.0120	1.50	6.12	0.25	6.45	
11	SL - (21)	Pipe	CB-6	Out-1SL - (21)	63.64	423.50	422.50	1.5700	24.000	0.0120	9.51	30.72	0.31	8.62	
12	SL - (24)	Pipe	CB-3	CB-2	174.72	424.10	422.32	1.0200	30.000	0.0120	31.14	44.85	0.69	9.98	
13	SL - (25)	Pipe	FES-5	CB-3	52.99	425.10	424.10	1.8900	30.000	0.0120	29.34	61.04	0.48	12.41	
14	SL - (26)	Pipe	FES-6	CB-6	123.36	424.75	423.50	1.0100	24.000	0.0120	9.51	24.67	0.39	7.69	
15	L-SL - (18) (1)	Channel	CB-4	CB-6	272.73	431.93	427.30	1.7000	6.000	0.0150	0.01	7.95	0.00	0.90	

Inlet Summary

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation	Max (Rim) Elevation	Initial Water Elevation	Ponded Area	Peak Flow	Peak Flow Intercepted	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Allowable Spread	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow
				(ft)	(ft)	(ft)	(ft²)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
1	CB-1	On Grade	1	423.42	429.56	423.42	N/A	9.34	4.92	4.42	52.73	10.00	16.29	429.88
2	CB-2	On Sag	1	422.32	426.95	422.32	10.00	12.30	N/A	N/A	N/A	10.00	12.42	427.57
3	CB-3	On Grade	1	424.10	430.66	424.10	N/A	3.03	2.29	0.73	75.84	10.00	6.55	430.84
4	CB-4	On Grade	1	424.90	431.93	424.90	N/A	1.09	1.09	0.00	100.00	10.00	6.57	432.06
5	CB-5	On Sag	1	427.00	432.00	427.00	10.00	0.89	N/A	N/A	N/A	10.00	2.83	432.34
6	CB-6	On Sag	1	423.50	427.34	423.50	10.00	6.81	N/A	N/A	N/A	10.00	9.41	427.92

Subbasin Hydrology

Subbasin : Sub-AD- (24)

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
n = Manning's roughness
L_f = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
V = 20.3282 * (S_f^{0.5}) (paved surface)
V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
V = 5.0 * (S_f^{0.5}) (woodland surface)
V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
R = A_q / W_p
T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
R = Hydraulic Radius (ft)
A_q = Flow Area (ft²)
W_p = Wetted Perimeter (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (25)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (29)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (30)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-1

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-2

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-3

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-4

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-6

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-6**Time of Concentration**

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.3	0.00	0.00
Flow Length (ft) :	85.71195638	0.00	0.00
Slope (%) :	2.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.36	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	12.01	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	253.76684919	31.23398630	93.388558
Slope (%) :	1.8	0.4	1.25
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.73	1.29	1.80
Computed Flow Time (min) :	1.55	4.29	0.38
Total TOC (min)	18.23		

Junction Input

SN	Element ID	Invert Elevation	Ground/Rim (Max) Elevation	Ground/Rim (Max) Offset	Initial Water Elevation	Initial Water Depth	Surcharge Elevation	Surcharge Depth	Ponded Area	Minimum Pipe Cover
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft²)	(in)
1	AD- (24)	429.05	432.47	3.41	429.05	0.00	432.47	0.00	10.00	0.00
2	AD- (25)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
3	AD- (29)	429.06	432.45	3.39	429.06	0.00	432.45	0.00	10.00	0.00
4	AD- (30)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
5	FES-5	425.10	427.00	1.90	425.10	0.00	427.50	0.50	0.00	0.00
6	FES-6	424.75	426.99	2.24	424.75	0.00	426.99	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time Max H Occurren
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:m
1	AD- (24)	0.78	0.78	429.36	0.31	0.00	3.11	429.06	0.01	0 00:
2	AD- (25)	1.50	0.78	428.30	0.30	0.00	4.16	428.00	0.00	0 00:
3	AD- (29)	0.78	0.78	429.36	0.30	0.00	3.09	429.06	0.00	0 00:
4	AD- (30)	1.51	0.78	428.34	0.34	0.00	4.12	428.00	0.00	0 00:
5	FES-5	29.47	29.47	426.32	1.22	0.00	1.28	425.11	0.01	0 00:
6	FES-6	9.55	9.55	425.61	0.86	0.00	1.37	424.76	0.01	0 00:

Channel Input

SN	Element ID	Length	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Mani Rough
1	L-SL - (18) (1)	272.73	431.93	7.03	427.30	3.80	4.63	1.7000	User-Defined	0.500	17.000	0

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	T Si
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (18) (1)	0.01	0 00:05	7.95	0.00	0.90	5.05	0.02	0.05	

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manhole Roundness
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)	
1	L-SL - (24)	199.68	430.66	6.56	426.94	4.62	3.72	1.8600	Dummy	0.000	0.000	
2	L-SL-14	135.67	423.42	0.00	422.50	0.18	0.92	0.6800	Dummy	0.000	0.000	
3	SL - (14)	127.66	423.42	0.00	422.80	0.48	0.62	0.4900	CIRCULAR	24.000	24.000	
4	SL - (15)	106.61	422.32	0.00	421.25	0.00	1.07	1.0000	CIRCULAR	30.000	30.000	
5	SL - (16)	105.49	429.05	0.00	428.00	0.00	1.05	1.0000	CIRCULAR	12.000	12.000	
6	SL - (17)	60.96	428.00	0.00	423.50	0.00	4.50	7.3800	CIRCULAR	12.000	12.000	
7	SL - (18)	141.40	427.00	0.00	424.90	0.00	2.10	1.4900	CIRCULAR	18.000	18.000	
8	SL - (18) (1)	20.22	424.90	0.00	424.50	0.00	0.40	1.9700	CIRCULAR	18.000	18.000	
9	SL - (19)	106.07	429.06	0.00	428.00	0.00	1.06	1.0000	CIRCULAR	12.000	12.000	
10	SL - (20)	19.89	428.00	0.00	427.50	0.50	0.50	2.5100	CIRCULAR	12.000	12.000	
11	SL - (21)	63.64	423.50	0.00	422.50	0.00	1.00	1.5700	CIRCULAR	24.000	24.000	
12	SL - (24)	174.72	424.10	0.00	422.32	0.00	1.78	1.0200	CIRCULAR	30.000	30.000	
13	SL - (25)	52.99	425.10	0.00	424.10	0.00	1.00	1.8900	CIRCULAR	30.000	30.000	
14	SL - (26)	123.36	424.75	0.00	423.50	0.00	1.25	1.0100	CIRCULAR	24.000	24.000	

No. of
Barrels

1

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	To Sur
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (24)	0.73	0 00:05	0.00	0.00	0.00		0.02	0.05	
2 L-SL-14	4.42	0 00:05	0.00	0.00	0.00		0.02	0.05	
3 SL - (14)	4.86	0 00:05	15.77	0.31	7.88	0.27	0.76	0.38	
4 SL - (15)	48.16	0 00:05	44.52	1.08	10.66	0.17	2.32	0.93	
5 SL - (16)	0.75	0 00:05	3.86	0.20	5.92	0.30	0.30	0.30	
6 SL - (17)	1.50	0 00:05	10.49	0.14	9.47	0.11	0.26	0.26	
7 SL - (18)	2.36	0 00:05	13.88	0.17	5.92	0.40	0.42	0.28	
8 SL - (18) (1)	3.38	0 00:05	15.96	0.21	7.17	0.05	0.47	0.31	
9 SL - (19)	0.76	0 00:05	3.86	0.20	5.93	0.30	0.30	0.30	
10 SL - (20)	1.50	0 00:05	6.12	0.25	6.45	0.05	0.34	0.34	
11 SL - (21)	9.51	0 00:18	30.72	0.31	8.62	0.12	0.76	0.38	
12 SL - (24)	31.14	0 00:05	44.85	0.69	9.98	0.29	1.53	0.61	
13 SL - (25)	29.34	0 00:05	61.04	0.48	12.41	0.07	1.22	0.49	
14 SL - (26)	9.51	0 00:18	24.67	0.39	7.69	0.27	0.86	0.43	

Inlet Input

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	CB-1	On Grade	1	423.42	429.56	6.14	423.42	0.00	N/A	0.00
2	CB-2	On Sag	1	422.32	426.95	4.63	422.32	0.00	10.00	0.00
3	CB-3	On Grade	1	424.10	430.66	6.56	424.10	0.00	N/A	0.00
4	CB-4	On Grade	1	424.90	431.93	7.03	424.90	0.00	N/A	0.00
5	CB-5	On Sag	1	427.00	432.00	5.00	427.00	0.00	10.00	0.00
6	CB-6	On Sag	1	423.50	427.34	3.84	423.50	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0100	0.0200	0.0150	0.0200	1.50	0.1312	10.00
2	CB-2	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
3	CB-3	0.0380	0.0300	0.0150	0.0200	1.50	0.1312	10.00
4	CB-4	0.0175	0.0200	0.0150	0.0200	1.50	0.1312	10.00
5	CB-5	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
6	CB-6	N/A	0.0350	0.0150	0.0200	1.50	0.1312	10.00

Inlet Results

SN	Element ID	Peak Flow	Peak Lateral Inflow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow	Max Gutter Water Depth during Peak Flow	Max Occu
		(cfs)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)	(days)
1	CB-1	9.34	9.34	4.92	4.42	52.73	16.29	429.88	0.33	
2	CB-2	12.30	7.15	N/A	N/A	N/A	12.42	427.57	0.62	
3	CB-3	3.03	3.03	2.29	0.73	75.84	6.55	430.84	0.18	
4	CB-4	1.09	1.09	1.09	0.00	100.00	6.57	432.06	0.13	
5	CB-5	0.89	0.89	N/A	N/A	N/A	2.83	432.34	0.33	
6	CB-6	6.81	6.81	N/A	N/A	N/A	9.41	427.92	0.58	

25 Year Design Storm

Project Description

File Name Collective Church Drainage 5-2-25.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method Rational
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On May 02, 2025 00:00:00
End Analysis On May 03, 2025 00:00:00
Start Reporting On May 02, 2025 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 0
Subbasins..... 12
Nodes..... 16
 Junctions 6
 Outfalls 4
 Flow Diversions 0
 Inlets 6
 Storage Nodes 0
Links..... 15
 Channels 1
 Pipes 14
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

Return Period..... 25 year(s)

Subbasin Summary

SN	Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Sub-AD- (24)	0.10	0.9500	0.79	0.75	0.07	0.89	0 00:05:00
2	Sub-AD- (25)	0.10	0.9500	0.79	0.75	0.07	0.89	0 00:05:00
3	Sub-AD- (29)	0.10	0.9500	0.79	0.75	0.07	0.89	0 00:05:00
4	Sub-AD- (30)	0.10	0.9500	0.79	0.75	0.07	0.89	0 00:05:00
5	Sub-CB-1	1.20	0.9500	0.79	0.75	0.89	10.73	0 00:05:00
6	Sub-CB-2	0.92	0.9500	0.79	0.75	0.68	8.21	0 00:05:00
7	Sub-CB-3	0.39	0.9500	0.79	0.75	0.29	3.48	0 00:05:00
8	Sub-CB-4	0.14	0.9500	0.79	0.75	0.10	1.26	0 00:05:00
9	Sub-CB-5	0.11	0.9500	0.79	0.75	0.09	1.03	0 00:05:00
10	Sub-CB-6	0.87	0.9500	0.79	0.75	0.65	7.83	0 00:05:00
11	Sub-FES-5	3.78	0.9500	0.79	0.75	2.82	33.85	0 00:05:00
12	Sub-FES-6	3.03	0.7000	1.57	1.10	3.32	10.98	0 00:18:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Ma Surcharg Dept Attaine
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(f
1	AD- (24)	Junction	429.05	432.47	429.05	432.47	10.00	0.89	429.38	0.0
2	AD- (25)	Junction	428.00	432.46	428.00	432.46	10.00	1.73	428.32	0.0
3	AD- (29)	Junction	429.06	432.45	429.06	432.45	10.00	0.89	429.39	0.0
4	AD- (30)	Junction	428.00	432.46	428.00	432.46	10.00	1.73	428.36	0.0
5	FES-5	Junction	425.10	427.00	425.10	427.50	0.00	33.85	426.43	0.0
6	FES-6	Junction	424.75	426.99	424.75	426.99	0.00	10.98	425.68	0.0
7	Out-1SL - (15)	Outfall	421.25					48.16	423.75	
8	Out-1SL - (17)	Outfall	423.50					1.73	423.77	
9	Out-1SL - (18) (1)	Outfall	424.50					3.86	425.00	
10	Out-1SL - (21)	Outfall	422.50					10.93	423.32	

Link Summary

SN	Element ID	Element Type	From (Inlet Node)	To (Outlet Node)	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	F
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	
1	L-SL - (24)	Pipe	CB-3	CB-2	199.68	430.66	426.94	1.8600	0.000	0.0320	0.98	0.00	0.00	0.00	0.00
2	L-SL-14	Pipe	CB-1	CB-2	135.67	423.42	422.50	0.6800	0.000	0.0150	5.43	0.00	0.00	0.00	0.00
3	SL - (14)	Pipe	CB-1	CB-2	127.66	423.42	422.80	0.4900	24.000	0.0130	5.23	15.77	0.33	8.17	
4	SL - (15)	Pipe	CB-2	Out-1SL - (15)	106.61	422.32	421.25	1.0000	30.000	0.0120	48.16	44.52	1.08	10.82	
5	SL - (16)	Pipe	AD- (24)	AD- (25)	105.49	429.05	428.00	1.0000	12.000	0.0120	0.87	3.86	0.23	6.22	
6	SL - (17)	Pipe	AD- (25)	Out-1SL - (17)	60.96	428.00	423.50	7.3800	12.000	0.0120	1.73	10.49	0.16	9.88	
7	SL - (18)	Pipe	CB-5	CB-4	141.40	427.00	424.90	1.4900	18.000	0.0120	2.71	13.88	0.19	6.15	
8	SL - (18) (1)	Pipe	CB-4	Out-1SL - (18) (1)	20.22	424.90	424.50	1.9700	18.000	0.0120	3.86	15.96	0.24	7.44	
9	SL - (19)	Pipe	AD- (29)	AD- (30)	106.07	429.06	428.00	1.0000	12.000	0.0120	0.87	3.86	0.23	6.23	
10	SL - (20)	Pipe	AD- (30)	CB-5	19.89	428.00	427.50	2.5100	12.000	0.0120	1.73	6.12	0.28	6.70	
11	SL - (21)	Pipe	CB-6	Out-1SL - (21)	63.64	423.50	422.50	1.5700	24.000	0.0120	10.93	30.72	0.36	8.95	
12	SL - (24)	Pipe	CB-3	CB-2	174.72	424.10	422.32	1.0200	30.000	0.0120	35.74	44.85	0.80	10.29	
13	SL - (25)	Pipe	FES-5	CB-3	52.99	425.10	424.10	1.8900	30.000	0.0120	33.72	61.04	0.55	12.97	
14	SL - (26)	Pipe	FES-6	CB-6	123.36	424.75	423.50	1.0100	24.000	0.0120	10.94	24.67	0.44	7.91	
15	L-SL - (18) (1)	Channel	CB-4	CB-6	272.73	431.93	427.30	1.7000	6.000	0.0150	0.01	7.95	0.00	1.43	

Inlet Summary

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation	Max (Rim) Elevation	Initial Water Elevation	Ponded Area	Peak Flow	Peak Flow Intercepted	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Allowable Spread	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow
				(ft)	(ft)	(ft)	(ft²)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
1	CB-1	On Grade	1	423.42	429.56	423.42	N/A	10.73	5.29	5.43	49.35	10.00	17.15	429.90
2	CB-2	On Sag	1	422.32	426.95	422.32	10.00	14.63	N/A	N/A	N/A	10.00	13.95	427.61
3	CB-3	On Grade	1	424.10	430.66	424.10	N/A	3.48	2.50	0.98	71.85	10.00	6.88	430.85
4	CB-4	On Grade	1	424.90	431.93	424.90	N/A	1.25	1.25	0.01	99.54	10.00	6.92	432.07
5	CB-5	On Sag	1	427.00	432.00	427.00	10.00	1.03	N/A	N/A	N/A	10.00	3.11	432.35
6	CB-6	On Sag	1	423.50	427.34	423.50	10.00	7.83	N/A	N/A	N/A	10.00	10.33	427.95

Subbasin Hydrology

Subbasin : Sub-AD- (24)

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
n = Manning's roughness
L_f = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
V = 20.3282 * (S_f^{0.5}) (paved surface)
V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
V = 5.0 * (S_f^{0.5}) (woodland surface)
V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
R = A_q / W_p
T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
R = Hydraulic Radius (ft)
A_q = Flow Area (ft²)
W_p = Wetted Perimeter (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (25)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (29)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (30)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-1

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-2

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-3

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-4

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-6

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-6

Time of Concentration

	Subarea A	Subarea B	Subarea C
Sheet Flow Computations			
Manning's Roughness :	0.3	0.00	0.00
Flow Length (ft) :	85.71195638	0.00	0.00
Slope (%) :	2.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.36	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	12.01	0.00	0.00
	Subarea A	Subarea B	Subarea C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	253.76684919	31.23398630	93.388558
Slope (%) :	1.8	0.4	1.25
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.73	1.29	1.80
Computed Flow Time (min) :	1.55	4.29	0.38
Total TOC (min)	18.23		

Junction Input

SN	Element ID	Invert Elevation	Ground/Rim (Max) Elevation	Ground/Rim (Max) Offset	Initial Water Elevation	Initial Water Depth	Surcharge Elevation	Surcharge Depth	Ponded Area	Minimum Pipe Cover
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft²)	(in)
1	AD- (24)	429.05	432.47	3.41	429.05	0.00	432.47	0.00	10.00	0.00
2	AD- (25)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
3	AD- (29)	429.06	432.45	3.39	429.06	0.00	432.45	0.00	10.00	0.00
4	AD- (30)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
5	FES-5	425.10	427.00	1.90	425.10	0.00	427.50	0.50	0.00	0.00
6	FES-6	424.75	426.99	2.24	424.75	0.00	426.99	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time Max H Occurren
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:m
1	AD- (24)	0.89	0.89	429.38	0.33	0.00	3.08	429.06	0.01	0 00:
2	AD- (25)	1.73	0.89	428.32	0.32	0.00	4.14	428.00	0.00	0 00:
3	AD- (29)	0.89	0.89	429.39	0.33	0.00	3.07	429.06	0.00	0 00:
4	AD- (30)	1.73	0.89	428.36	0.36	0.00	4.10	428.00	0.00	0 00:
5	FES-5	33.85	33.85	426.43	1.33	0.00	1.17	425.11	0.01	0 00:
6	FES-6	10.98	10.98	425.68	0.93	0.00	1.30	424.77	0.02	0 00:

Channel Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Shape	Height	Width	Mani Rough
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)	
1	L-SL - (18) (1)	272.73	431.93	7.03	427.30	3.80	4.63	1.7000	User-Defined	0.500	17.000	0

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	T Si
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (18) (1)	0.01	0 00:06	7.95	0.00	1.43	3.18	0.03	0.07	

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Material
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)	Roughness
1	L-SL - (24)	199.68	430.66	6.56	426.94	4.62	3.72	1.8600	Dummy	0.000	0.000	
2	L-SL-14	135.67	423.42	0.00	422.50	0.18	0.92	0.6800	Dummy	0.000	0.000	
3	SL - (14)	127.66	423.42	0.00	422.80	0.48	0.62	0.4900	CIRCULAR	24.000	24.000	
4	SL - (15)	106.61	422.32	0.00	421.25	0.00	1.07	1.0000	CIRCULAR	30.000	30.000	
5	SL - (16)	105.49	429.05	0.00	428.00	0.00	1.05	1.0000	CIRCULAR	12.000	12.000	
6	SL - (17)	60.96	428.00	0.00	423.50	0.00	4.50	7.3800	CIRCULAR	12.000	12.000	
7	SL - (18)	141.40	427.00	0.00	424.90	0.00	2.10	1.4900	CIRCULAR	18.000	18.000	
8	SL - (18) (1)	20.22	424.90	0.00	424.50	0.00	0.40	1.9700	CIRCULAR	18.000	18.000	
9	SL - (19)	106.07	429.06	0.00	428.00	0.00	1.06	1.0000	CIRCULAR	12.000	12.000	
10	SL - (20)	19.89	428.00	0.00	427.50	0.50	0.50	2.5100	CIRCULAR	12.000	12.000	
11	SL - (21)	63.64	423.50	0.00	422.50	0.00	1.00	1.5700	CIRCULAR	24.000	24.000	
12	SL - (24)	174.72	424.10	0.00	422.32	0.00	1.78	1.0200	CIRCULAR	30.000	30.000	
13	SL - (25)	52.99	425.10	0.00	424.10	0.00	1.00	1.8900	CIRCULAR	30.000	30.000	
14	SL - (26)	123.36	424.75	0.00	423.50	0.00	1.25	1.0100	CIRCULAR	24.000	24.000	

No. of
Barrels[illegible]

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	To Sur
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (24)	0.98	0 00:05	0.00	0.00	0.00		0.03	0.07	
2 L-SL-14	5.43	0 00:05	0.00	0.00	0.00		0.03	0.07	
3 SL - (14)	5.23	0 00:05	15.77	0.33	8.17	0.26	0.79	0.40	
4 SL - (15)	48.16	0 00:05	44.52	1.08	10.82	0.16	2.50	1.00	
5 SL - (16)	0.87	0 00:05	3.86	0.23	6.22	0.28	0.32	0.32	
6 SL - (17)	1.73	0 00:05	10.49	0.16	9.88	0.10	0.27	0.27	
7 SL - (18)	2.71	0 00:05	13.88	0.19	6.15	0.38	0.45	0.30	
8 SL - (18) (1)	3.86	0 00:05	15.96	0.24	7.44	0.05	0.50	0.34	
9 SL - (19)	0.87	0 00:05	3.86	0.23	6.23	0.28	0.32	0.32	
10 SL - (20)	1.73	0 00:05	6.12	0.28	6.70	0.05	0.36	0.36	
11 SL - (21)	10.93	0 00:18	30.72	0.36	8.95	0.12	0.82	0.41	
12 SL - (24)	35.74	0 00:05	44.85	0.80	10.29	0.28	1.68	0.67	
13 SL - (25)	33.72	0 00:05	61.04	0.55	12.97	0.07	1.33	0.53	
14 SL - (26)	10.94	0 00:18	24.67	0.44	7.91	0.26	0.93	0.47	

Inlet Input

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	CB-1	On Grade	1	423.42	429.56	6.14	423.42	0.00	N/A	0.00
2	CB-2	On Sag	1	422.32	426.95	4.63	422.32	0.00	10.00	0.00
3	CB-3	On Grade	1	424.10	430.66	6.56	424.10	0.00	N/A	0.00
4	CB-4	On Grade	1	424.90	431.93	7.03	424.90	0.00	N/A	0.00
5	CB-5	On Sag	1	427.00	432.00	5.00	427.00	0.00	10.00	0.00
6	CB-6	On Sag	1	423.50	427.34	3.84	423.50	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0100	0.0200	0.0150	0.0200	1.50	0.1312	10.00
2	CB-2	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
3	CB-3	0.0380	0.0300	0.0150	0.0200	1.50	0.1312	10.00
4	CB-4	0.0175	0.0200	0.0150	0.0200	1.50	0.1312	10.00
5	CB-5	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
6	CB-6	N/A	0.0350	0.0150	0.0200	1.50	0.1312	10.00

Inlet Results

SN	Element ID	Peak Flow	Peak Lateral Inflow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow	Max Gutter Water Depth during Peak Flow	Max Occu
		(cfs)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)	(days)
1	CB-1	10.73	10.73	5.29	5.43	49.35	17.15	429.90	0.34	
2	CB-2	14.63	8.21	N/A	N/A	N/A	13.95	427.61	0.67	
3	CB-3	3.48	3.48	2.50	0.98	71.85	6.88	430.85	0.19	
4	CB-4	1.25	1.25	1.25	0.01	99.54	6.92	432.07	0.14	
5	CB-5	1.03	1.03	N/A	N/A	N/A	3.11	432.35	0.34	
6	CB-6	7.83	7.83	N/A	N/A	N/A	10.33	427.95	0.61	

50 Year Design Storm

Project Description

File Name Collective Church Drainage 5-2-25.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method Rational
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On May 02, 2025 00:00:00
End Analysis On May 03, 2025 00:00:00
Start Reporting On May 02, 2025 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

Qty
Rain Gages 0
Subbasins..... 12
Nodes..... 16
 Junctions 6
 Outfalls 4
 Flow Diversions 0
 Inlets 6
 Storage Nodes 0
Links..... 15
 Channels 1
 Pipes 14
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

Return Period..... 50 year(s)

Subbasin Summary

SN	Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Sub-AD- (24)	0.10	0.9500	0.86	0.82	0.08	0.97	0 00:05:00
2	Sub-AD- (25)	0.10	0.9500	0.86	0.82	0.08	0.97	0 00:05:00
3	Sub-AD- (29)	0.10	0.9500	0.86	0.82	0.08	0.97	0 00:05:00
4	Sub-AD- (30)	0.10	0.9500	0.86	0.82	0.08	0.97	0 00:05:00
5	Sub-CB-1	1.20	0.9500	0.86	0.82	0.98	11.72	0 00:05:00
6	Sub-CB-2	0.92	0.9500	0.86	0.82	0.75	8.97	0 00:05:00
7	Sub-CB-3	0.39	0.9500	0.86	0.82	0.32	3.80	0 00:05:00
8	Sub-CB-4	0.14	0.9500	0.86	0.82	0.11	1.37	0 00:05:00
9	Sub-CB-5	0.11	0.9500	0.86	0.82	0.09	1.12	0 00:05:00
10	Sub-CB-6	0.87	0.9500	0.86	0.82	0.71	8.55	0 00:05:00
11	Sub-FES-5	3.78	0.9500	0.86	0.82	3.08	36.97	0 00:05:00
12	Sub-FES-6	3.03	0.7000	1.72	1.20	3.64	12.03	0 00:18:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Ma Surcharg Dept Attaine
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(f
1	AD- (24)	Junction	429.05	432.47	429.05	432.47	10.00	0.97	429.40	0.0
2	AD- (25)	Junction	428.00	432.46	428.00	432.46	10.00	1.89	428.34	0.0
3	AD- (29)	Junction	429.06	432.45	429.06	432.45	10.00	0.97	429.40	0.0
4	AD- (30)	Junction	428.00	432.46	428.00	432.46	10.00	1.89	428.38	0.0
5	FES-5	Junction	425.10	427.00	425.10	427.50	0.00	36.97	426.50	0.0
6	FES-6	Junction	424.75	426.99	424.75	426.99	0.00	12.03	425.74	0.0
7	Out-1SL - (15)	Outfall	421.25					48.16	423.75	
8	Out-1SL - (17)	Outfall	423.50					1.89	423.79	
9	Out-1SL - (18) (1)	Outfall	424.50					4.23	425.03	
10	Out-1SL - (21)	Outfall	422.50					11.98	423.37	

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	F
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	
1	L-SL - (24)	Pipe	CB-3	CB-2	199.68	430.66	426.94	1.8600	0.000	0.0320	1.17	0.00	0.00	0.00	0.00
2	L-SL-14	Pipe	CB-1	CB-2	135.67	423.42	422.50	0.6800	0.000	0.0150	6.18	0.00	0.00	0.00	0.00
3	SL - (14)	Pipe	CB-1	CB-2	127.66	423.42	422.80	0.4900	24.000	0.0130	5.48	15.77	0.35	8.34	
4	SL - (15)	Pipe	CB-2	Out-1SL - (15)	106.61	422.32	421.25	1.0000	30.000	0.0120	48.16	44.52	1.08	10.82	
5	SL - (16)	Pipe	AD- (24)	AD- (25)	105.49	429.05	428.00	1.0000	12.000	0.0120	0.95	3.86	0.25	6.31	
6	SL - (17)	Pipe	AD- (25)	Out-1SL - (17)	60.96	428.00	423.50	7.3800	12.000	0.0120	1.89	10.49	0.18	10.12	
7	SL - (18)	Pipe	CB-5	CB-4	141.40	427.00	424.90	1.4900	18.000	0.0120	2.96	13.88	0.21	6.31	
8	SL - (18) (1)	Pipe	CB-4	Out-1SL - (18) (1)	20.22	424.90	424.50	1.9700	18.000	0.0120	4.23	15.96	0.26	7.63	
9	SL - (19)	Pipe	AD- (29)	AD- (30)	106.07	429.06	428.00	1.0000	12.000	0.0120	0.95	3.86	0.25	6.31	
10	SL - (20)	Pipe	AD- (30)	CB-5	19.89	428.00	427.50	2.5100	12.000	0.0120	1.89	6.12	0.31	6.86	
11	SL - (21)	Pipe	CB-6	Out-1SL - (21)	63.64	423.50	422.50	1.5700	24.000	0.0120	11.98	30.72	0.39	9.17	
12	SL - (24)	Pipe	CB-3	CB-2	174.72	424.10	422.32	1.0200	30.000	0.0120	38.93	44.85	0.87	10.44	
13	SL - (25)	Pipe	FES-5	CB-3	52.99	425.10	424.10	1.8900	30.000	0.0120	36.76	61.04	0.60	13.23	
14	SL - (26)	Pipe	FES-6	CB-6	123.36	424.75	423.50	1.0100	24.000	0.0120	11.98	24.67	0.49	8.11	
15	L-SL - (18) (1)	Channel	CB-4	CB-6	272.73	431.93	427.30	1.7000	6.000	0.0150	0.02	7.95	0.00	1.51	

Inlet Summary

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation	Max (Rim) Elevation	Initial Water Elevation	Ponded Area	Peak Flow	Peak Flow Intercepted	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Allowable Spread	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow
				(ft)	(ft)	(ft)	(ft²)	(cfs)		(cfs)	(%)	(ft)	(ft)	(ft)
1	CB-1	On Grade	1	423.42	429.56	423.42	N/A	11.72	5.54	6.18	47.29	10.00	17.73	429.91
2	CB-2	On Sag	1	422.32	426.95	422.32	10.00	16.31	N/A	N/A	N/A	10.00	15.00	427.65
3	CB-3	On Grade	1	424.10	430.66	424.10	N/A	3.80	2.63	1.16	69.34	10.00	7.11	430.86
4	CB-4	On Grade	1	424.90	431.93	424.90	N/A	1.37	1.35	0.02	98.50	10.00	7.15	432.07
5	CB-5	On Sag	1	427.00	432.00	427.00	10.00	1.12	N/A	N/A	N/A	10.00	3.29	432.35
6	CB-6	On Sag	1	423.50	427.34	423.50	10.00	8.55	N/A	N/A	N/A	10.00	10.95	427.97

Subbasin Hydrology

Subbasin : Sub-AD- (24)

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
n = Manning's roughness
L_f = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
V = 20.3282 * (S_f^{0.5}) (paved surface)
V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
V = 5.0 * (S_f^{0.5}) (woodland surface)
V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
R = A_q / W_p
T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
R = Hydraulic Radius (ft)
A_q = Flow Area (ft²)
W_p = Wetted Perimeter (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (25)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (29)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (30)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-1

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-2

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-3

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-4

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-6

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-6

Time of Concentration

	Subarea A	Subarea B	Subarea C
Sheet Flow Computations			
Manning's Roughness :	0.3	0.00	0.00
Flow Length (ft) :	85.71195638	0.00	0.00
Slope (%) :	2.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.36	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	12.01	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	253.76684919	31.23398630	93.388558
Slope (%) :	1.8	0.4	1.25
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.73	1.29	1.80
Computed Flow Time (min) :	1.55	4.29	0.38
Total TOC (min)	18.23		

Junction Input

SN	Element ID	Invert Elevation	Ground/Rim (Max) Elevation	Ground/Rim (Max) Offset	Initial Water Elevation	Initial Water Depth	Surcharge Elevation	Surcharge Depth	Ponded Area	Minimum Pipe Cover
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft²)	(in)
1	AD- (24)	429.05	432.47	3.41	429.05	0.00	432.47	0.00	10.00	0.00
2	AD- (25)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
3	AD- (29)	429.06	432.45	3.39	429.06	0.00	432.45	0.00	10.00	0.00
4	AD- (30)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
5	FES-5	425.10	427.00	1.90	425.10	0.00	427.50	0.50	0.00	0.00
6	FES-6	424.75	426.99	2.24	424.75	0.00	426.99	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time Max H Occurren
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:m
1	AD- (24)	0.97	0.97	429.40	0.35	0.00	3.07	429.06	0.01	0 00:
2	AD- (25)	1.89	0.97	428.34	0.34	0.00	4.13	428.00	0.00	0 00:
3	AD- (29)	0.97	0.97	429.40	0.34	0.00	3.05	429.06	0.00	0 00:
4	AD- (30)	1.89	0.97	428.38	0.38	0.00	4.08	428.00	0.00	0 00:
5	FES-5	36.97	36.97	426.50	1.40	0.00	1.10	425.11	0.01	0 00:
6	FES-6	12.03	12.03	425.74	0.99	0.00	1.25	424.77	0.02	0 00:

Channel Input

SN Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Shape	Height	Width	Mani Rough
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)	
1 L-SL - (18) (1)	272.73	431.93	7.03	427.30	3.80	4.63	1.7000	User-Defined	0.500	17.000	0

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	T Si
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (18) (1)	0.02	0 00:06	7.95	0.00	1.51	3.01	0.04	0.08	

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manhole Roundness
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)	
1	L-SL - (24)	199.68	430.66	6.56	426.94	4.62	3.72	1.8600	Dummy	0.000	0.000	
2	L-SL-14	135.67	423.42	0.00	422.50	0.18	0.92	0.6800	Dummy	0.000	0.000	
3	SL - (14)	127.66	423.42	0.00	422.80	0.48	0.62	0.4900	CIRCULAR	24.000	24.000	
4	SL - (15)	106.61	422.32	0.00	421.25	0.00	1.07	1.0000	CIRCULAR	30.000	30.000	
5	SL - (16)	105.49	429.05	0.00	428.00	0.00	1.05	1.0000	CIRCULAR	12.000	12.000	
6	SL - (17)	60.96	428.00	0.00	423.50	0.00	4.50	7.3800	CIRCULAR	12.000	12.000	
7	SL - (18)	141.40	427.00	0.00	424.90	0.00	2.10	1.4900	CIRCULAR	18.000	18.000	
8	SL - (18) (1)	20.22	424.90	0.00	424.50	0.00	0.40	1.9700	CIRCULAR	18.000	18.000	
9	SL - (19)	106.07	429.06	0.00	428.00	0.00	1.06	1.0000	CIRCULAR	12.000	12.000	
10	SL - (20)	19.89	428.00	0.00	427.50	0.50	0.50	2.5100	CIRCULAR	12.000	12.000	
11	SL - (21)	63.64	423.50	0.00	422.50	0.00	1.00	1.5700	CIRCULAR	24.000	24.000	
12	SL - (24)	174.72	424.10	0.00	422.32	0.00	1.78	1.0200	CIRCULAR	30.000	30.000	
13	SL - (25)	52.99	425.10	0.00	424.10	0.00	1.00	1.8900	CIRCULAR	30.000	30.000	
14	SL - (26)	123.36	424.75	0.00	423.50	0.00	1.25	1.0100	CIRCULAR	24.000	24.000	

No. of
Barrels[illegible]

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	To Sur
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1	L-SL - (24)	1.17	0 00:05	0.00	0.00	0.00		0.04	0.08	
2	L-SL-14	6.18	0 00:05	0.00	0.00	0.00		0.04	0.08	
3	SL - (14)	5.48	0 00:05	15.77	0.35	8.34	0.26	0.81	0.41	
4	SL - (15)	48.16	0 00:04	44.52	1.08	10.82	0.16	2.50	1.00	
5	SL - (16)	0.95	0 00:05	3.86	0.25	6.31	0.28	0.34	0.34	
6	SL - (17)	1.89	0 00:05	10.49	0.18	10.12	0.10	0.29	0.29	
7	SL - (18)	2.96	0 00:05	13.88	0.21	6.31	0.37	0.47	0.31	
8	SL - (18) (1)	4.23	0 00:05	15.96	0.26	7.63	0.04	0.53	0.35	
9	SL - (19)	0.95	0 00:05	3.86	0.25	6.31	0.28	0.34	0.34	
10	SL - (20)	1.89	0 00:05	6.12	0.31	6.86	0.05	0.38	0.38	
11	SL - (21)	11.98	0 00:18	30.72	0.39	9.17	0.12	0.87	0.43	
12	SL - (24)	38.93	0 00:05	44.85	0.87	10.44	0.28	1.79	0.72	
13	SL - (25)	36.76	0 00:05	61.04	0.60	13.23	0.07	1.40	0.56	
14	SL - (26)	11.98	0 00:18	24.67	0.49	8.11	0.25	0.98	0.49	

Inlet Input

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	CB-1	On Grade	1	423.42	429.56	6.14	423.42	0.00	N/A	0.00
2	CB-2	On Sag	1	422.32	426.95	4.63	422.32	0.00	10.00	0.00
3	CB-3	On Grade	1	424.10	430.66	6.56	424.10	0.00	N/A	0.00
4	CB-4	On Grade	1	424.90	431.93	7.03	424.90	0.00	N/A	0.00
5	CB-5	On Sag	1	427.00	432.00	5.00	427.00	0.00	10.00	0.00
6	CB-6	On Sag	1	423.50	427.34	3.84	423.50	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0100	0.0200	0.0150	0.0200	1.50	0.1312	10.00
2	CB-2	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
3	CB-3	0.0380	0.0300	0.0150	0.0200	1.50	0.1312	10.00
4	CB-4	0.0175	0.0200	0.0150	0.0200	1.50	0.1312	10.00
5	CB-5	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
6	CB-6	N/A	0.0350	0.0150	0.0200	1.50	0.1312	10.00

Inlet Results

SN	Element ID	Peak Flow	Peak Lateral Inflow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow	Max Gutter Water Depth during Peak Flow	Max Occu
		(cfs)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)	(days)
1	CB-1	11.72	11.72	5.54	6.18	47.29	17.73	429.91	0.35	
2	CB-2	16.31	8.97	N/A	N/A	N/A	15.00	427.65	0.70	
3	CB-3	3.80	3.80	2.63	1.16	69.34	7.11	430.86	0.20	
4	CB-4	1.37	1.37	1.35	0.02	98.50	7.15	432.07	0.14	
5	CB-5	1.12	1.12	N/A	N/A	N/A	3.29	432.35	0.35	
6	CB-6	8.55	8.55	N/A	N/A	N/A	10.95	427.97	0.63	

100 Year Design Storm

Project Description

File Name Collective Church Drainage 5-2-25.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method Rational
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Kinematic Wave
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On May 02, 2025 00:00:00
End Analysis On May 03, 2025 00:00:00
Start Reporting On May 02, 2025 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 30 seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins.....	12
Nodes.....	16
<i>Junctions</i>	6
<i>Outfalls</i>	4
<i>Flow Diversions</i>	0
<i>Inlets</i>	6
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	1
<i>Pipes</i>	14
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period..... 100 year(s)

Subbasin Summary

SN	Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
		(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	Sub-AD- (24)	0.10	0.9500	0.93	0.89	0.09	1.06	0 00:05:00
2	Sub-AD- (25)	0.10	0.9500	0.93	0.89	0.09	1.06	0 00:05:00
3	Sub-AD- (29)	0.10	0.9500	0.93	0.89	0.09	1.06	0 00:05:00
4	Sub-AD- (30)	0.10	0.9500	0.93	0.89	0.09	1.06	0 00:05:00
5	Sub-CB-1	1.20	0.9500	0.93	0.89	1.06	12.74	0 00:05:00
6	Sub-CB-2	0.92	0.9500	0.93	0.89	0.81	9.75	0 00:05:00
7	Sub-CB-3	0.39	0.9500	0.93	0.89	0.34	4.13	0 00:05:00
8	Sub-CB-4	0.14	0.9500	0.93	0.89	0.12	1.49	0 00:05:00
9	Sub-CB-5	0.11	0.9500	0.93	0.89	0.10	1.22	0 00:05:00
10	Sub-CB-6	0.87	0.9500	0.93	0.89	0.77	9.30	0 00:05:00
11	Sub-FES-5	3.78	0.9500	0.93	0.89	3.35	40.20	0 00:05:00
12	Sub-FES-6	3.03	0.7000	1.86	1.30	3.95	13.04	0 00:18:13

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Ma Surcharg Dept Attaine
			(ft)	(ft)	(ft)	(ft)	(ft²)	(cfs)	(ft)	(f
1	AD- (24)	Junction	429.05	432.47	429.05	432.47	10.00	1.06	429.41	0.0
2	AD- (25)	Junction	428.00	432.46	428.00	432.46	10.00	2.05	428.35	0.0
3	AD- (29)	Junction	429.06	432.45	429.06	432.45	10.00	1.06	429.42	0.0
4	AD- (30)	Junction	428.00	432.46	428.00	432.46	10.00	2.06	428.40	0.0
5	FES-5	Junction	425.10	427.00	425.10	427.50	0.00	40.20	426.58	0.0
6	FES-6	Junction	424.75	426.99	424.75	426.99	0.00	13.04	425.78	0.0
7	Out-1SL - (15)	Outfall	421.25					48.15	423.75	
8	Out-1SL - (17)	Outfall	423.50					2.05	423.80	
9	Out-1SL - (18) (1)	Outfall	424.50					4.59	425.05	
10	Out-1SL - (21)	Outfall	422.50					12.99	423.41	

Link Summary

SN	Element ID	Element Type	From (Inlet Node)	To (Outlet Node)	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	F
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	
1	L-SL - (24)	Pipe	CB-3	CB-2	199.68	430.66	426.94	1.8600	0.000	0.0320	1.36	0.00	0.00	0.00	0.00
2	L-SL-14	Pipe	CB-1	CB-2	135.67	423.42	422.50	0.6800	0.000	0.0150	6.96	0.00	0.00	0.00	0.00
3	SL - (14)	Pipe	CB-1	CB-2	127.66	423.42	422.80	0.4900	24.000	0.0130	5.71	15.77	0.36	8.46	
4	SL - (15)	Pipe	CB-2	Out-1SL - (15)	106.61	422.32	421.25	1.0000	30.000	0.0120	48.15	44.52	1.08	10.82	
5	SL - (16)	Pipe	AD- (24)	AD- (25)	105.49	429.05	428.00	1.0000	12.000	0.0120	1.03	3.86	0.27	6.40	
6	SL - (17)	Pipe	AD- (25)	Out-1SL - (17)	60.96	428.00	423.50	7.3800	12.000	0.0120	2.05	10.49	0.20	10.37	
7	SL - (18)	Pipe	CB-5	CB-4	141.40	427.00	424.90	1.4900	18.000	0.0120	3.22	13.88	0.23	6.47	
8	SL - (18) (1)	Pipe	CB-4	Out-1SL - (18) (1)	20.22	424.90	424.50	1.9700	18.000	0.0120	4.59	15.96	0.29	7.80	
9	SL - (19)	Pipe	AD- (29)	AD- (30)	106.07	429.06	428.00	1.0000	12.000	0.0120	1.03	3.86	0.27	6.41	
10	SL - (20)	Pipe	AD- (30)	CB-5	19.89	428.00	427.50	2.5100	12.000	0.0120	2.06	6.12	0.34	7.03	
11	SL - (21)	Pipe	CB-6	Out-1SL - (21)	63.64	423.50	422.50	1.5700	24.000	0.0120	12.99	30.72	0.42	9.38	
12	SL - (24)	Pipe	CB-3	CB-2	174.72	424.10	422.32	1.0200	30.000	0.0120	42.23	44.85	0.94	10.56	
13	SL - (25)	Pipe	FES-5	CB-3	52.99	425.10	424.10	1.8900	30.000	0.0120	40.05	61.04	0.66	13.66	
14	SL - (26)	Pipe	FES-6	CB-6	123.36	424.75	423.50	1.0100	24.000	0.0120	13.00	24.67	0.53	8.28	
15	L-SL - (18) (1)	Channel	CB-4	CB-6	272.73	431.93	427.30	1.7000	6.000	0.0150	0.03	7.95	0.00	1.61	

Inlet Summary

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation	Max (Rim) Elevation	Initial Water Elevation	Ponded Area	Peak Flow	Peak Flow Intercepted	Peak Flow Bypassing	Inlet Efficiency during Peak Flow	Allowable Spread	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow
				(ft)	(ft)	(ft)	(ft²)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)
1	CB-1	On Grade	1	423.42	429.56	423.42	N/A	12.74	5.79	6.96	45.40	10.00	18.29	429.92
2	CB-2	On Sag	1	422.32	426.95	422.32	10.00	18.08	N/A	N/A	N/A	10.00	16.06	427.68
3	CB-3	On Grade	1	424.10	430.66	424.10	N/A	4.13	2.76	1.36	66.97	10.00	7.33	430.87
4	CB-4	On Grade	1	424.90	431.93	424.90	N/A	1.49	1.45	0.04	97.12	10.00	7.38	432.08
5	CB-5	On Sag	1	427.00	432.00	427.00	10.00	1.22	N/A	N/A	N/A	10.00	3.48	432.36
6	CB-6	On Sag	1	423.50	427.34	423.50	10.00	9.30	N/A	N/A	N/A	10.00	11.58	427.99

Subbasin Hydrology

Subbasin : Sub-AD- (24)

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
n = Manning's roughness
L_f = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
V = 20.3282 * (S_f^{0.5}) (paved surface)
V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
V = 5.0 * (S_f^{0.5}) (woodland surface)
V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
R = A_q / W_p
T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
L_f = Flow Length (ft)
R = Hydraulic Radius (ft)
A_q = Flow Area (ft²)
W_p = Wetted Perimeter (ft)
V = Velocity (ft/sec)
S_f = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (25)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (29)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-AD- (30)

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-1

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-2

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-3

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-4

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-CB-6

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-5

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin : Sub-FES-6

Time of Concentration

	Subarea A	Subarea B	Subarea C
Sheet Flow Computations			
Manning's Roughness :	0.3	0.00	0.00
Flow Length (ft) :	85.71195638	0.00	0.00
Slope (%) :	2.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.36	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	12.01	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	253.76684919	31.23398630	0.93388558
Slope (%) :	1.8	0.4	1.25
Surface Type :	Paved	Paved	Unpaved
Velocity (ft/sec) :	2.73	1.29	1.80
Computed Flow Time (min) :	1.55	4.29	0.38
Total TOC (min)	18.23		

Junction Input

SN	Element ID	Invert Elevation	Ground/Rim (Max) Elevation	Ground/Rim (Max) Offset	Initial Water Elevation	Initial Water Depth	Surcharge Elevation	Surcharge Depth	Ponded Area	Minimum Pipe Cover
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft²)	(in)
1	AD- (24)	429.05	432.47	3.41	429.05	0.00	432.47	0.00	10.00	0.00
2	AD- (25)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
3	AD- (29)	429.06	432.45	3.39	429.06	0.00	432.45	0.00	10.00	0.00
4	AD- (30)	428.00	432.46	4.46	428.00	0.00	432.46	0.00	10.00	0.00
5	FES-5	425.10	427.00	1.90	425.10	0.00	427.50	0.50	0.00	0.00
6	FES-6	424.75	426.99	2.24	424.75	0.00	426.99	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time Max H Occurren
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:m
1	AD- (24)	1.06	1.06	429.41	0.36	0.00	3.05	429.06	0.01	0 00:
2	AD- (25)	2.05	1.06	428.35	0.35	0.00	4.11	428.00	0.00	0 00:
3	AD- (29)	1.06	1.06	429.42	0.36	0.00	3.04	429.06	0.00	0 00:
4	AD- (30)	2.06	1.06	428.40	0.40	0.00	4.06	428.00	0.00	0 00:
5	FES-5	40.20	40.20	426.58	1.48	0.00	1.02	425.11	0.01	0 00:
6	FES-6	13.04	13.04	425.78	1.03	0.00	1.20	424.77	0.02	0 00:

Channel Input

SN Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Shape	Height	Width	Mani Rough
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(ft)	(ft)	
1 L-SL - (18) (1)	272.73	431.93	7.03	427.30	3.80	4.63	1.7000	User-Defined	0.500	17.000	0

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	T Si
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (18) (1)	0.03	0 00:06	7.95	0.00	1.61	2.82	0.04	0.09	

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manhole Roundness
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)	
1	L-SL - (24)	199.68	430.66	6.56	426.94	4.62	3.72	1.8600	Dummy	0.000	0.000	
2	L-SL-14	135.67	423.42	0.00	422.50	0.18	0.92	0.6800	Dummy	0.000	0.000	
3	SL - (14)	127.66	423.42	0.00	422.80	0.48	0.62	0.4900	CIRCULAR	24.000	24.000	
4	SL - (15)	106.61	422.32	0.00	421.25	0.00	1.07	1.0000	CIRCULAR	30.000	30.000	
5	SL - (16)	105.49	429.05	0.00	428.00	0.00	1.05	1.0000	CIRCULAR	12.000	12.000	
6	SL - (17)	60.96	428.00	0.00	423.50	0.00	4.50	7.3800	CIRCULAR	12.000	12.000	
7	SL - (18)	141.40	427.00	0.00	424.90	0.00	2.10	1.4900	CIRCULAR	18.000	18.000	
8	SL - (18) (1)	20.22	424.90	0.00	424.50	0.00	0.40	1.9700	CIRCULAR	18.000	18.000	
9	SL - (19)	106.07	429.06	0.00	428.00	0.00	1.06	1.0000	CIRCULAR	12.000	12.000	
10	SL - (20)	19.89	428.00	0.00	427.50	0.50	0.50	2.5100	CIRCULAR	12.000	12.000	
11	SL - (21)	63.64	423.50	0.00	422.50	0.00	1.00	1.5700	CIRCULAR	24.000	24.000	
12	SL - (24)	174.72	424.10	0.00	422.32	0.00	1.78	1.0200	CIRCULAR	30.000	30.000	
13	SL - (25)	52.99	425.10	0.00	424.10	0.00	1.00	1.8900	CIRCULAR	30.000	30.000	
14	SL - (26)	123.36	424.75	0.00	423.50	0.00	1.25	1.0100	CIRCULAR	24.000	24.000	

No. of
Barrels[illegible]

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	To Sur
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		
1 L-SL - (24)	1.36	0 00:05	0.00	0.00	0.00		0.04	0.09	
2 L-SL-14	6.96	0 00:05	0.00	0.00	0.00		0.04	0.09	
3 SL - (14)	5.71	0 00:05	15.77	0.36	8.46	0.25	0.83	0.42	
4 SL - (15)	48.15	0 00:04	44.52	1.08	10.82	0.16	2.50	1.00	
5 SL - (16)	1.03	0 00:05	3.86	0.27	6.40	0.27	0.35	0.35	
6 SL - (17)	2.05	0 00:05	10.49	0.20	10.37	0.10	0.30	0.30	
7 SL - (18)	3.22	0 00:05	13.88	0.23	6.47	0.36	0.49	0.33	
8 SL - (18) (1)	4.59	0 00:05	15.96	0.29	7.80	0.04	0.55	0.37	
9 SL - (19)	1.03	0 00:05	3.86	0.27	6.41	0.28	0.35	0.35	
10 SL - (20)	2.06	0 00:05	6.12	0.34	7.03	0.05	0.40	0.40	
11 SL - (21)	12.99	0 00:18	30.72	0.42	9.38	0.11	0.91	0.45	
12 SL - (24)	42.23	0 00:05	44.85	0.94	10.56	0.28	1.92	0.77	
13 SL - (25)	40.05	0 00:05	61.04	0.66	13.66	0.06	1.48	0.59	
14 SL - (26)	13.00	0 00:18	24.67	0.53	8.28	0.25	1.03	0.52	

Inlet Input

SN	Element ID	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	CB-1	On Grade	1	423.42	429.56	6.14	423.42	0.00	N/A	0.00
2	CB-2	On Sag	1	422.32	426.95	4.63	422.32	0.00	10.00	0.00
3	CB-3	On Grade	1	424.10	430.66	6.56	424.10	0.00	N/A	0.00
4	CB-4	On Grade	1	424.90	431.93	7.03	424.90	0.00	N/A	0.00
5	CB-5	On Sag	1	427.00	432.00	5.00	427.00	0.00	10.00	0.00
6	CB-6	On Sag	1	423.50	427.34	3.84	423.50	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0100	0.0200	0.0150	0.0200	1.50	0.1312	10.00
2	CB-2	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
3	CB-3	0.0380	0.0300	0.0150	0.0200	1.50	0.1312	10.00
4	CB-4	0.0175	0.0200	0.0150	0.0200	1.50	0.1312	10.00
5	CB-5	N/A	0.0300	0.0150	0.0200	1.50	0.1312	10.00
6	CB-6	N/A	0.0350	0.0150	0.0200	1.50	0.1312	10.00

Inlet Results

SN	Element ID	Peak Flow	Peak Lateral Inflow	Peak Flow Intercepted by Inlet	Peak Flow Bypassing Inlet	Inlet Efficiency during Peak Flow	Max Gutter Spread during Peak Flow	Max Gutter Water Elev. during Peak Flow	Max Gutter Water Depth during Peak Flow	Max Occu
		(cfs)	(cfs)	(cfs)	(cfs)	(%)	(ft)	(ft)	(ft)	(days)
1	CB-1	12.74	12.74	5.79	6.96	45.40	18.29	429.92	0.37	
2	CB-2	18.08	9.75	N/A	N/A	N/A	16.06	427.68	0.73	
3	CB-3	4.13	4.13	2.76	1.36	66.97	7.33	430.87	0.20	
4	CB-4	1.49	1.49	1.45	0.04	97.12	7.38	432.08	0.15	
5	CB-5	1.22	1.22	N/A	N/A	N/A	3.48	432.36	0.35	
6	CB-6	9.30	9.30	N/A	N/A	N/A	11.58	427.99	0.66	

Pre and Post Development Hydrographs (Hydrology Studio)

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Hydrology Studio v 3.0.0.27

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Hydrograph Reports

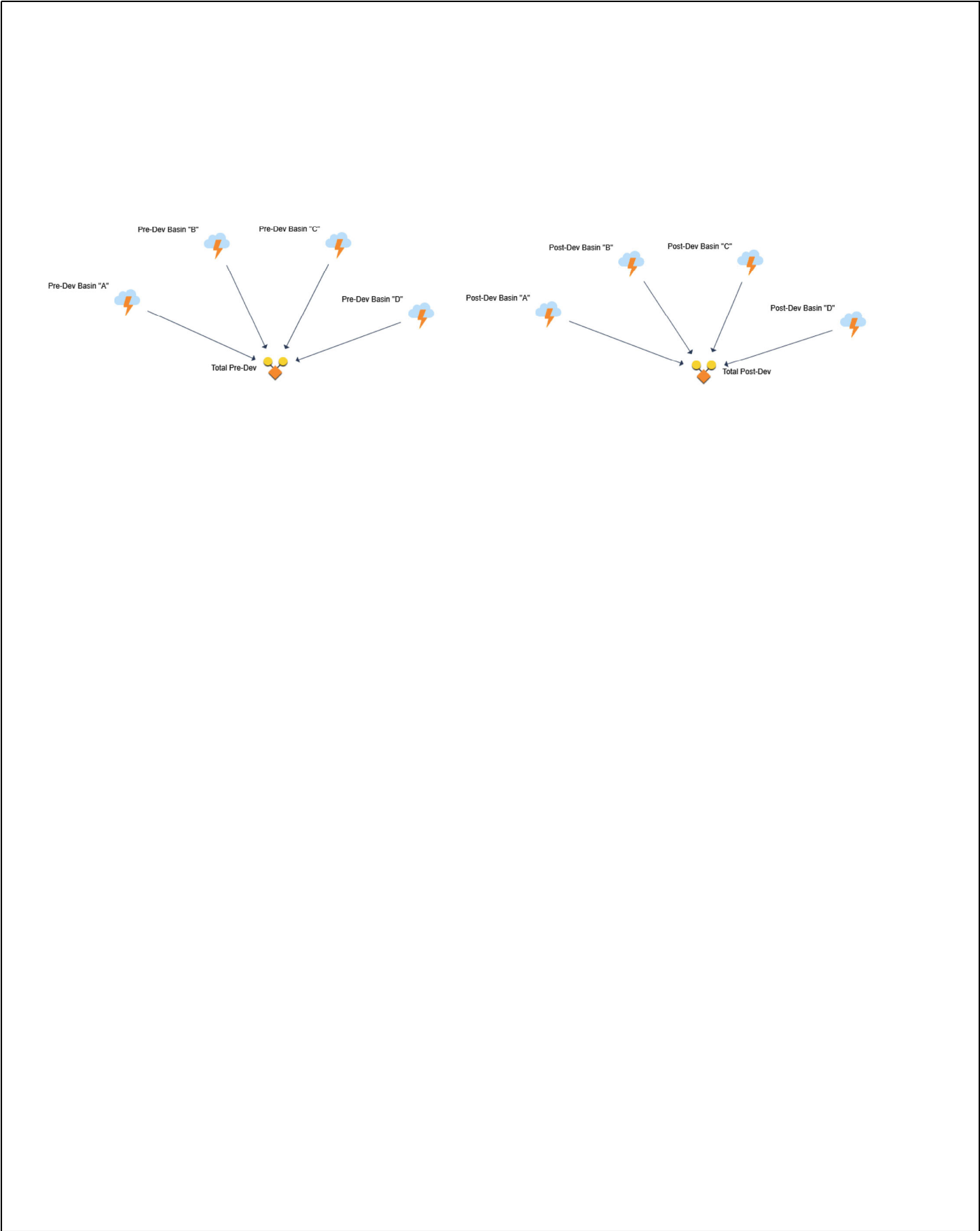
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Basin Model

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Project Name: Collective Church

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Hydrograph by Return Period

Project Name: Collective Church

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05-02-2025

[illegible]

Hydrograph 2-yr Summary

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

05-02-2025

[illegible]

Hydrograph Report

Project Name: Collective Church

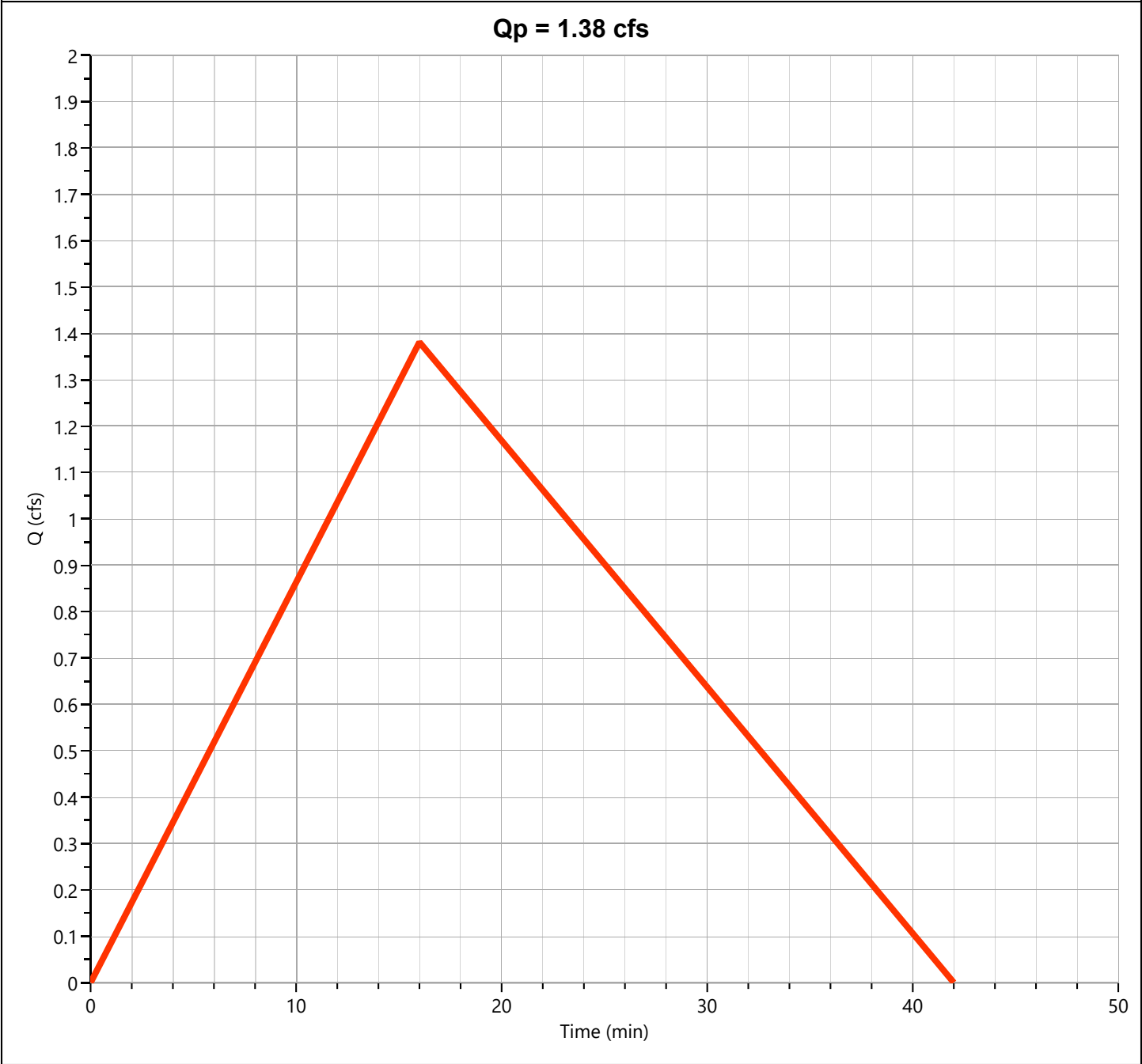
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "A"

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.381 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.27 hrs
Time Interval	= 1 min	Runoff Volume	= 1,770 cuft
Drainage Area	= 0.81 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 3.63 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Tc by TR55 Worksheet

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "A" Rational

Hyd. No. 1

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description				
Manning's n	0.300	0.013	0.013	
Flow Length (ft)	100			
2-yr, 24-hr Precip. (in)	4.36	2.28	2.28	
Land Slope (%)	3.7			
Travel Time (min)	11.43	0.00	0.00	11.43
Shallow Concentrated Flow				
Flow Length (ft)	673			
Watercourse Slope (%)	2.70	0.00	0.00	
Surface Description	Unpaved	Paved	Paved	
Average Velocity (ft/s)	2.65			
Travel Time (min)	4.23	0.00	0.00	4.23
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				16 min

Hydrograph Report

Project Name: Collective Church

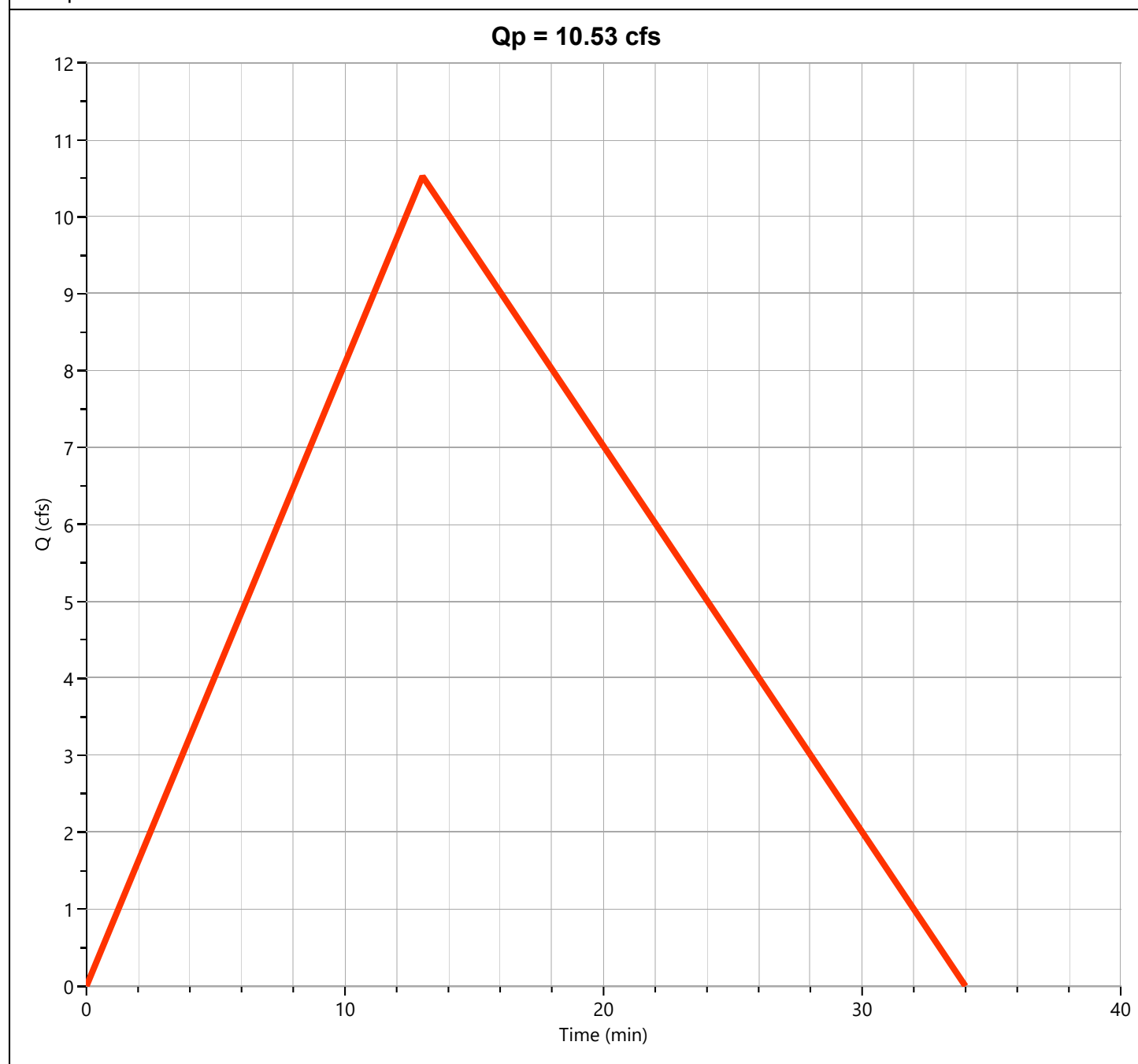
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "B"

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 10.53 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Runoff Volume	= 10,961 cuft
Drainage Area	= 5.62 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 13.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 3.99 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Tc by TR55 Worksheet

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "B" Rational

Hyd. No. 2

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description				
Manning's n	0.300	0.013	0.013	
Flow Length (ft)	100			
2-yr, 24-hr Precip. (in)	4.36	2.28	2.28	
Land Slope (%)	5			
Travel Time (min)	10.13	0.00	0.00	10.13
Shallow Concentrated Flow				
Flow Length (ft)	492			
Watercourse Slope (%)	2.85	0.00	0.00	
Surface Description	Unpaved	Paved	Paved	
Average Velocity (ft/s)	2.72			
Travel Time (min)	3.01	0.00	0.00	3.01
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				13 min

Hydrograph Report

Project Name: Collective Church

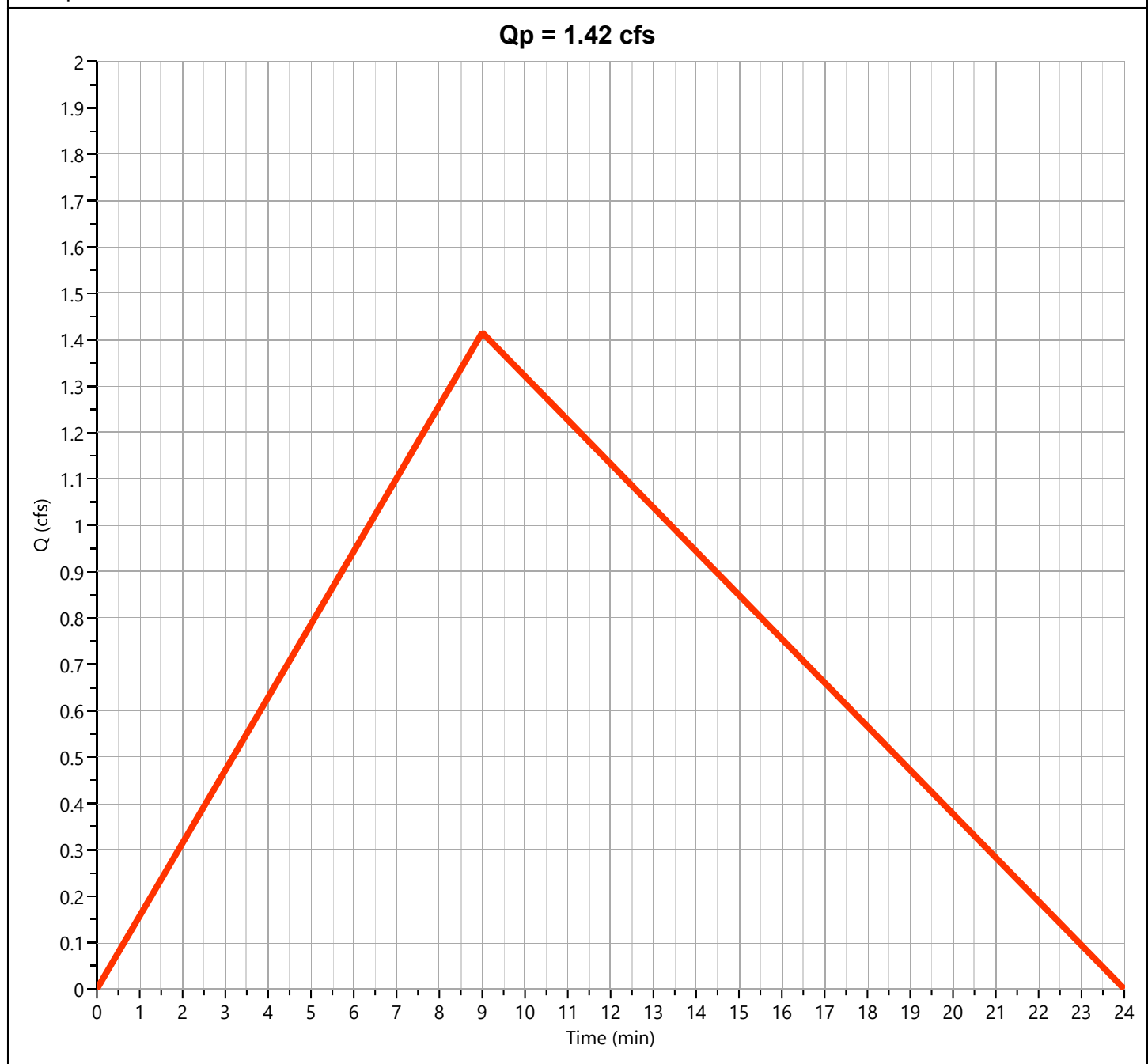
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "C"

Hyd. No. 3

Hydrograph Type	= Rational	Peak Flow	= 1.416 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,021 cuft
Drainage Area	= 0.64 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 9.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 4.71 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Tc by TR55 Worksheet

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "C" Rational

Hyd. No. 3

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description				
Manning's n	0.300	0.013	0.013	
Flow Length (ft)	100			
2-yr, 24-hr Precip. (in)	4.36	2.28	2.28	
Land Slope (%)	6.88			
Travel Time (min)	8.92	0.00	0.00	8.92
Shallow Concentrated Flow				
Flow Length (ft)	47			
Watercourse Slope (%)	10.00	0.00	0.00	
Surface Description	Unpaved	Paved	Paved	
Average Velocity (ft/s)	5.1			
Travel Time (min)	0.15	0.00	0.00	0.15
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				9 min

Hydrograph Report

Project Name: Collective Church

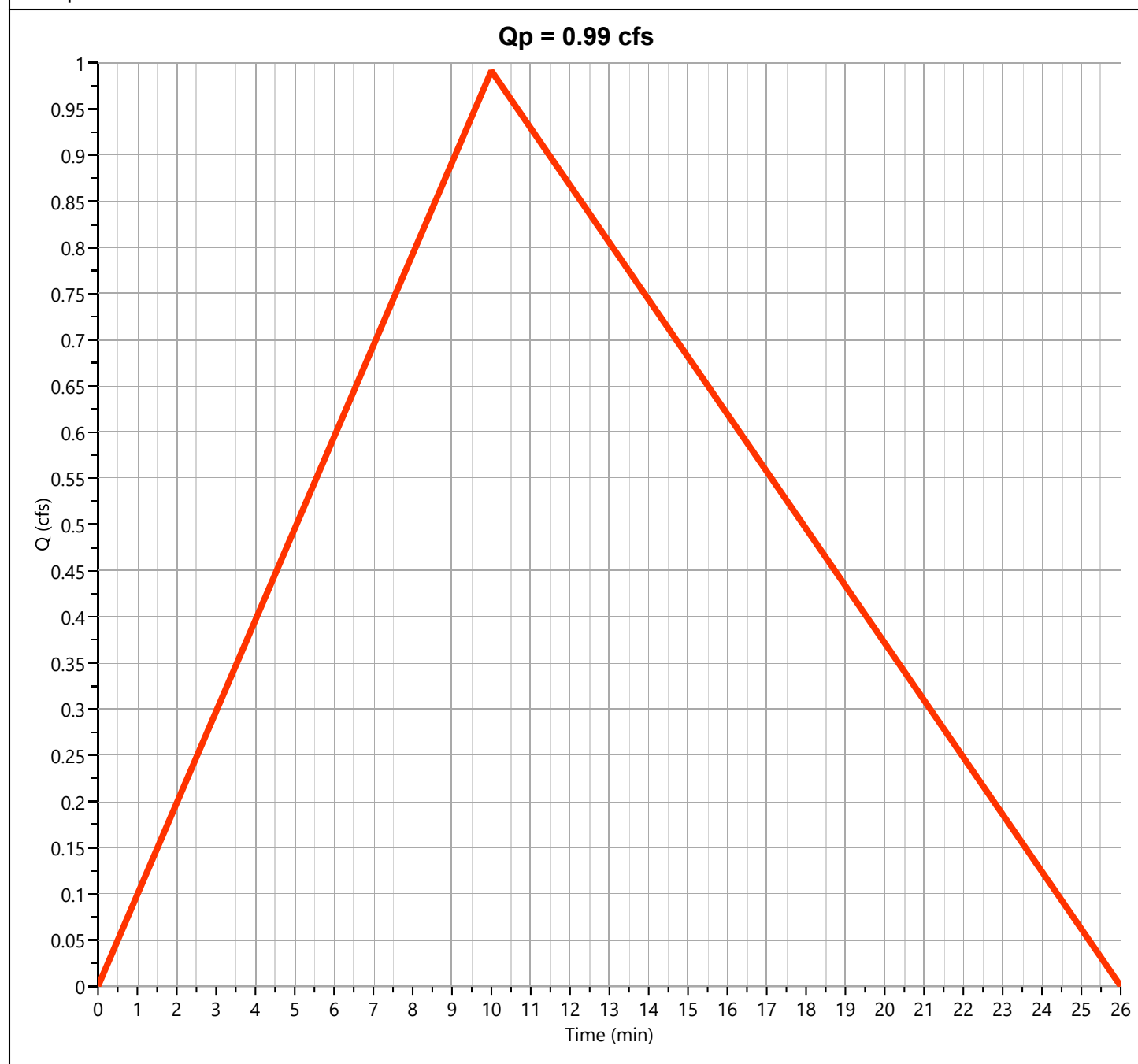
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "D"

Hyd. No. 4

Hydrograph Type	= Rational	Peak Flow	= 0.991 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 794 cuft
Drainage Area	= 0.47 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 4.49 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Tc by TR55 Worksheet

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "D" Rational

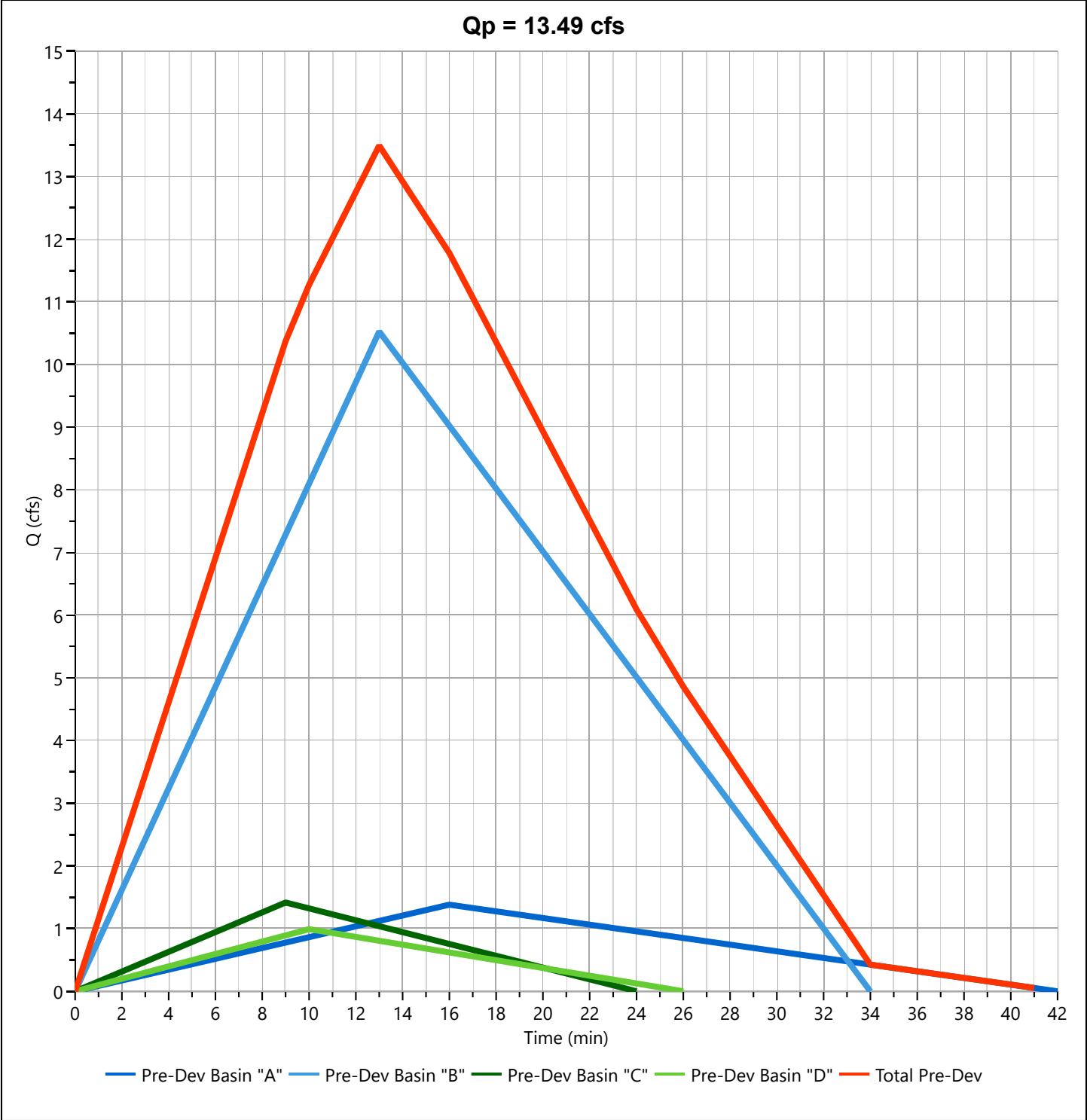
Hyd. No. 4

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description				
Manning's n	0.300	0.013	0.013	
Flow Length (ft)	100			
2-yr, 24-hr Precip. (in)	4.36	2.28	2.28	
Land Slope (%)	6.3			
Travel Time (min)	9.24	0.00	0.00	9.24
Shallow Concentrated Flow				
Flow Length (ft)	104			
Watercourse Slope (%)	7.60	0.00	0.00	
Surface Description	Unpaved	Paved	Paved	
Average Velocity (ft/s)	4.45			
Travel Time (min)	0.39	0.00	0.00	0.39
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				10 min

Total Pre-Dev

Hyd. No. 5

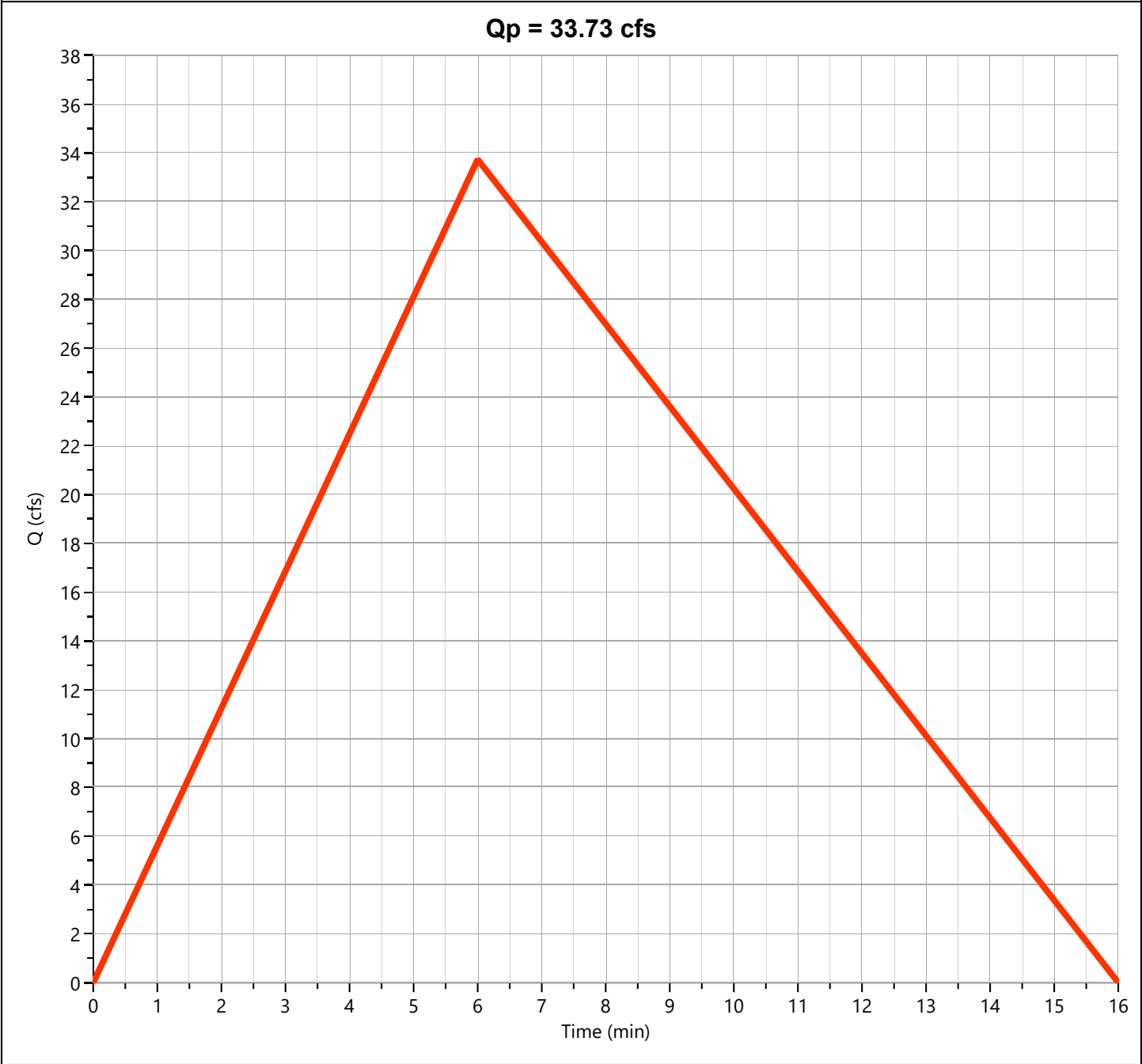
Hydrograph Type	= Junction	Peak Flow	= 13.49 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,270 cuft
Inflow Hydrographs	= 1, 2, 3, 4	Total Contrib. Area	= 7.54 ac



Post-Dev Basin "A"

Hyd. No. 6

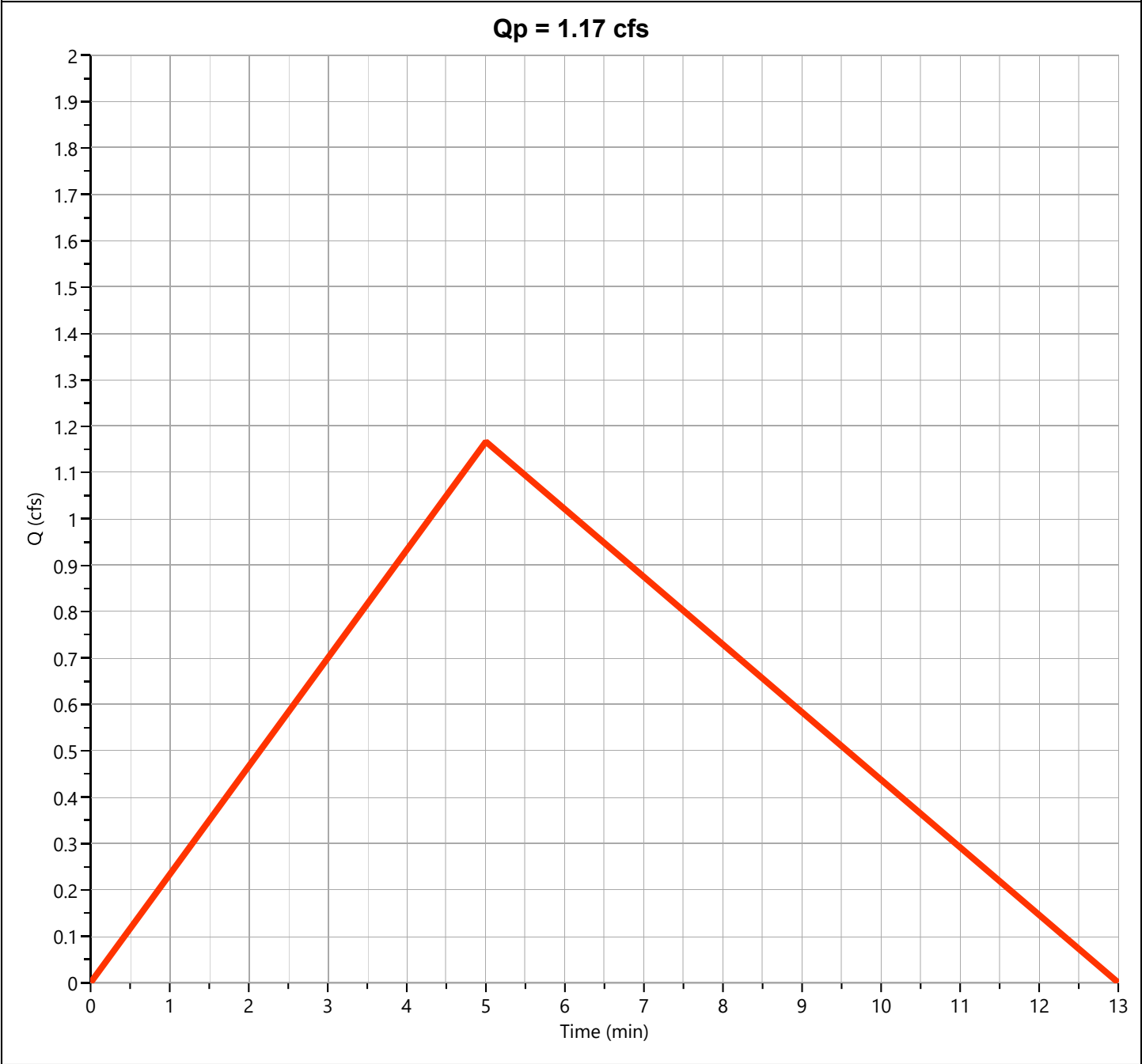
Hydrograph Type	= Rational	Peak Flow	= 33.73 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 16,211 cuft
Drainage Area	= 6.28 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.65 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "B"

Hyd. No. 7

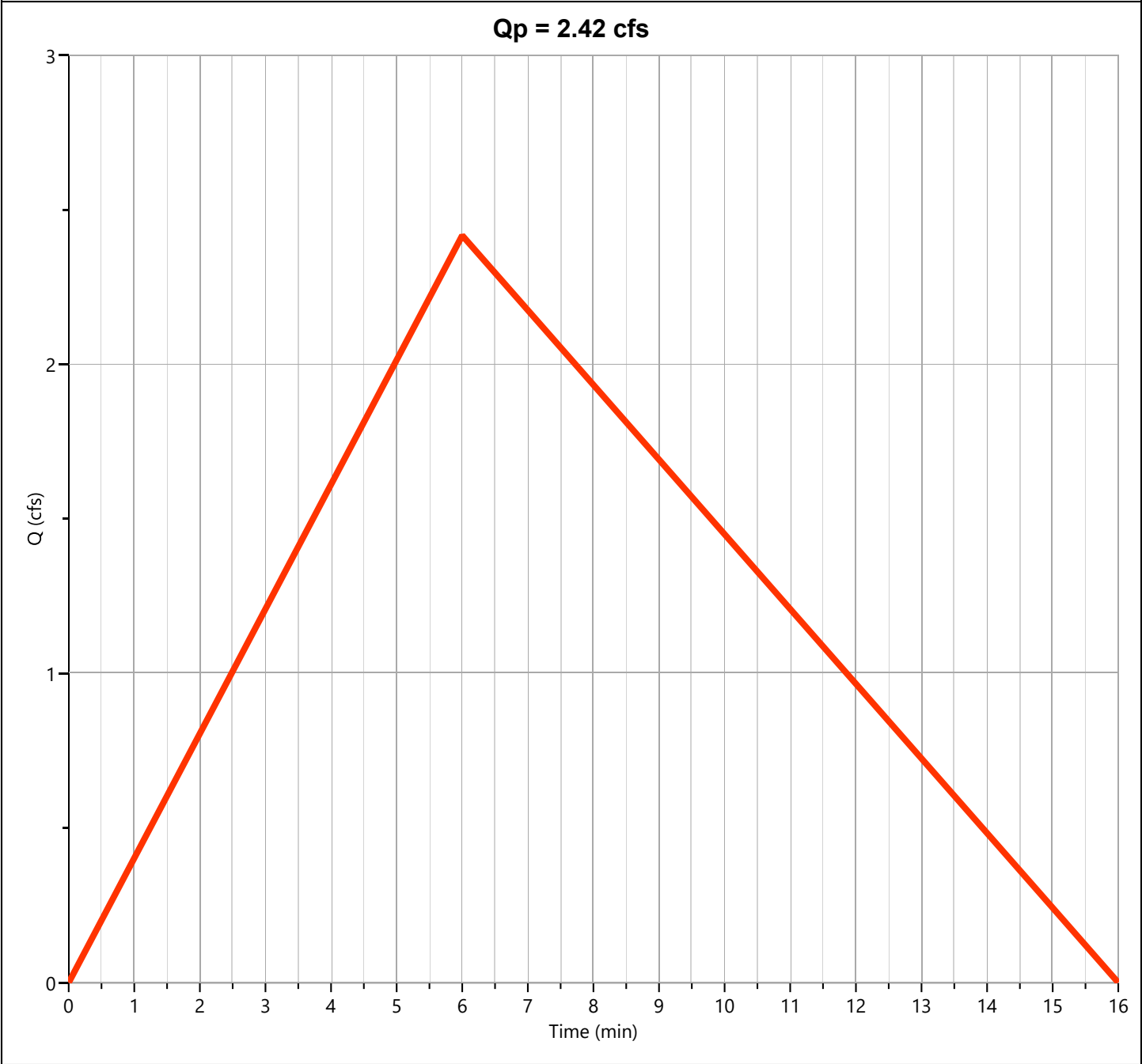
Hydrograph Type	= Rational	Peak Flow	= 1.167 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.08 hrs
Time Interval	= 1 min	Runoff Volume	= 467 cuft
Drainage Area	= 0.2 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.14 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "C"

Hyd. No. 8

Hydrograph Type	= Rational	Peak Flow	= 2.417 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,162 cuft
Drainage Area	= 0.45 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.65 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

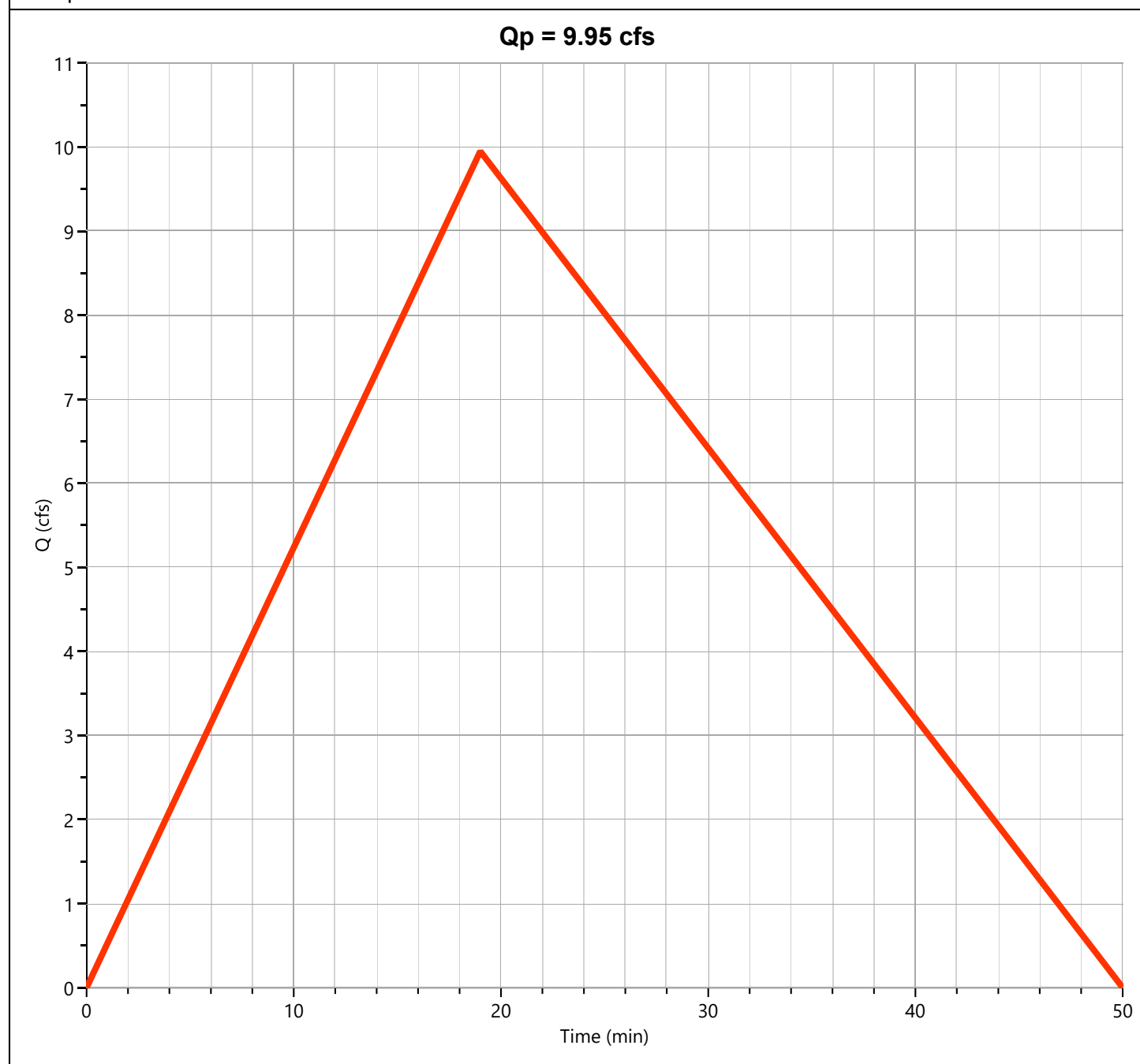
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "D"

Hyd. No. 9

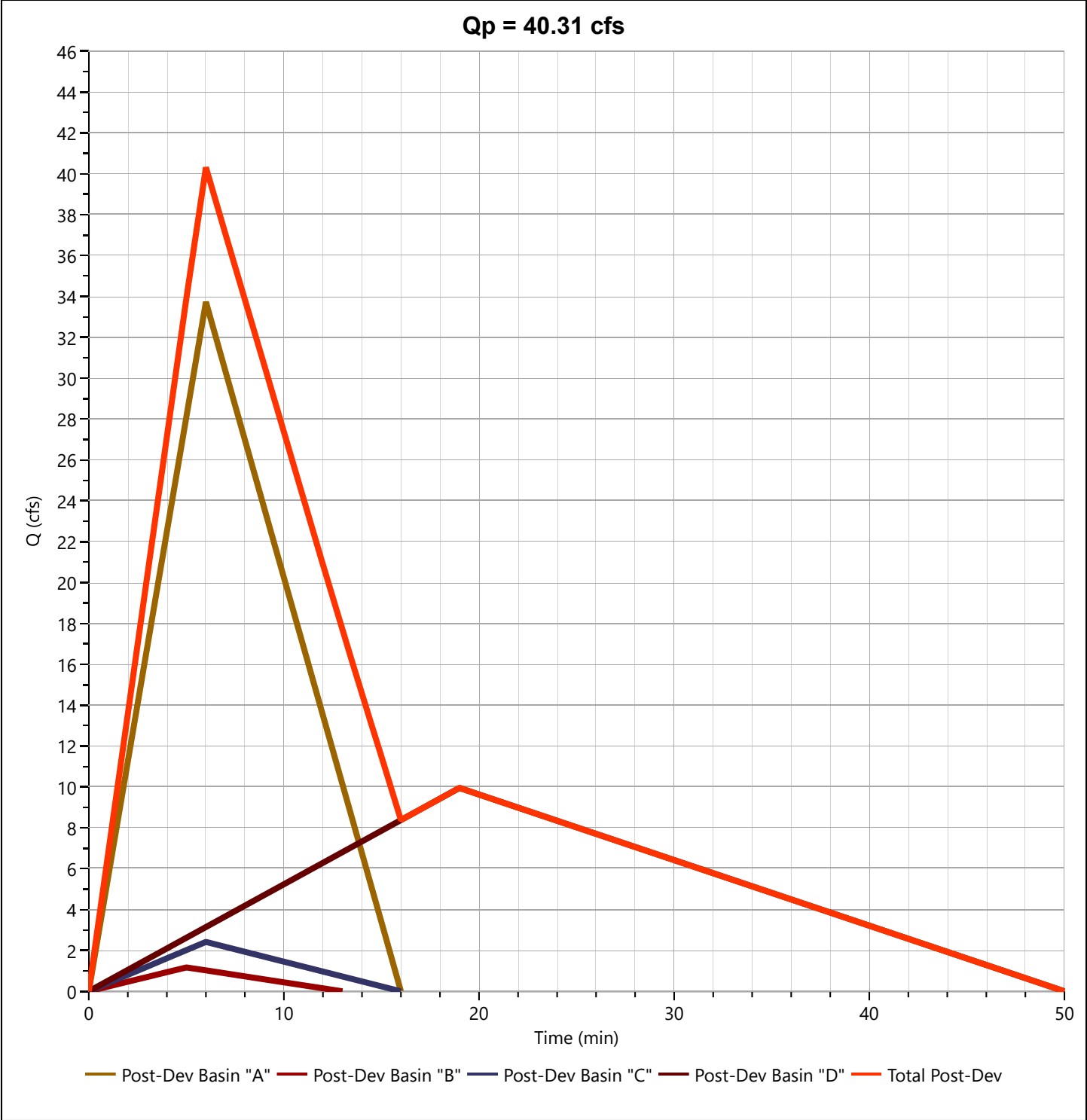
Hydrograph Type	= Rational	Peak Flow	= 9.949 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Runoff Volume	= 15,141 cuft
Drainage Area	= 3.9 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 3.36 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Post-Dev

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 40.31 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 32,730 cuft
Inflow Hydrographs	= 6, 7, 8, 9	Total Contrib. Area	= 10.83 ac



Hydrograph 10-yr Summary

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

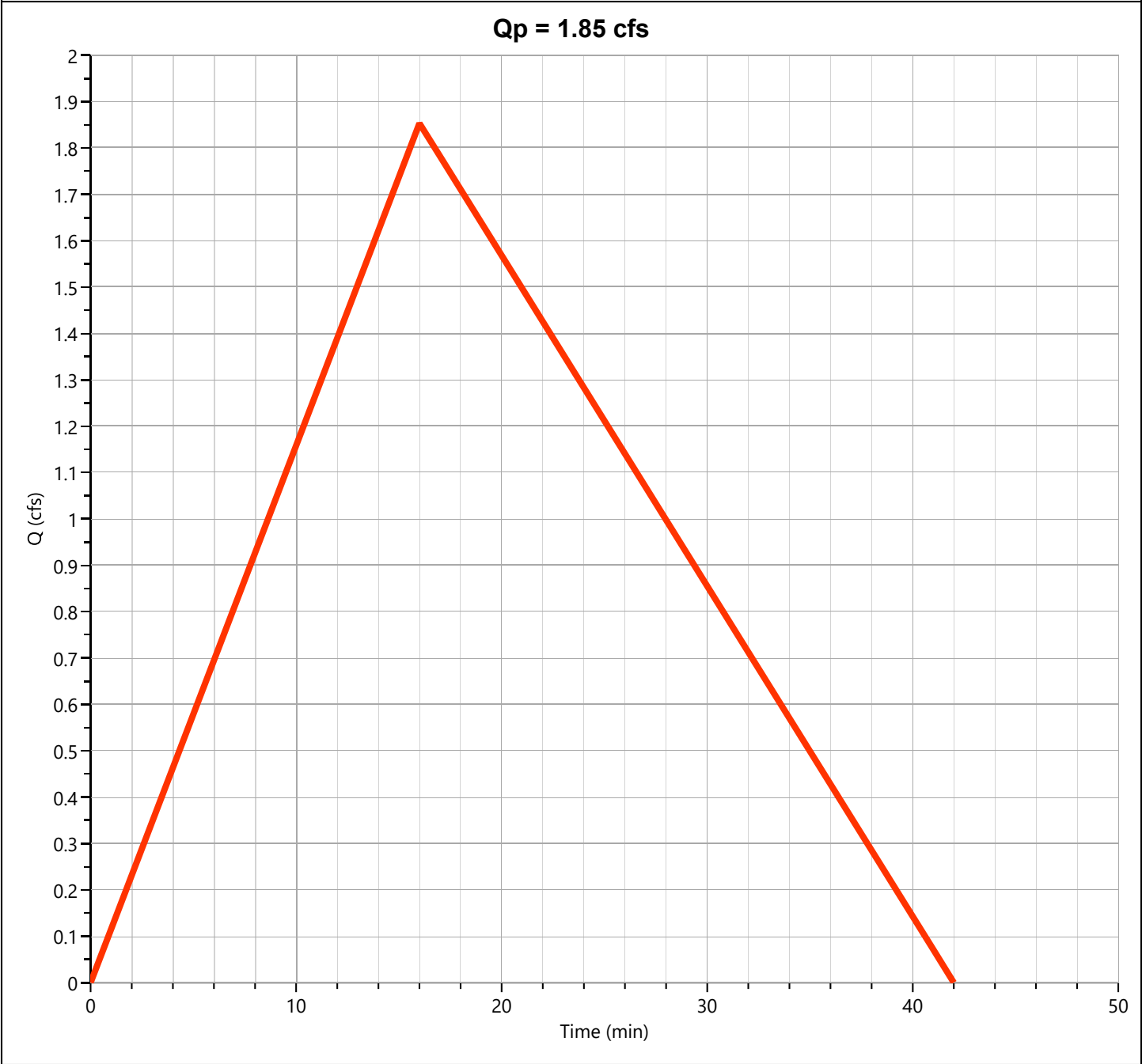
05-02-2025

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Pre-Dev Basin "A"

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.853 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.27 hrs
Time Interval	= 1 min	Runoff Volume	= 2,375 cuft
Drainage Area	= 0.81 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 4.87 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

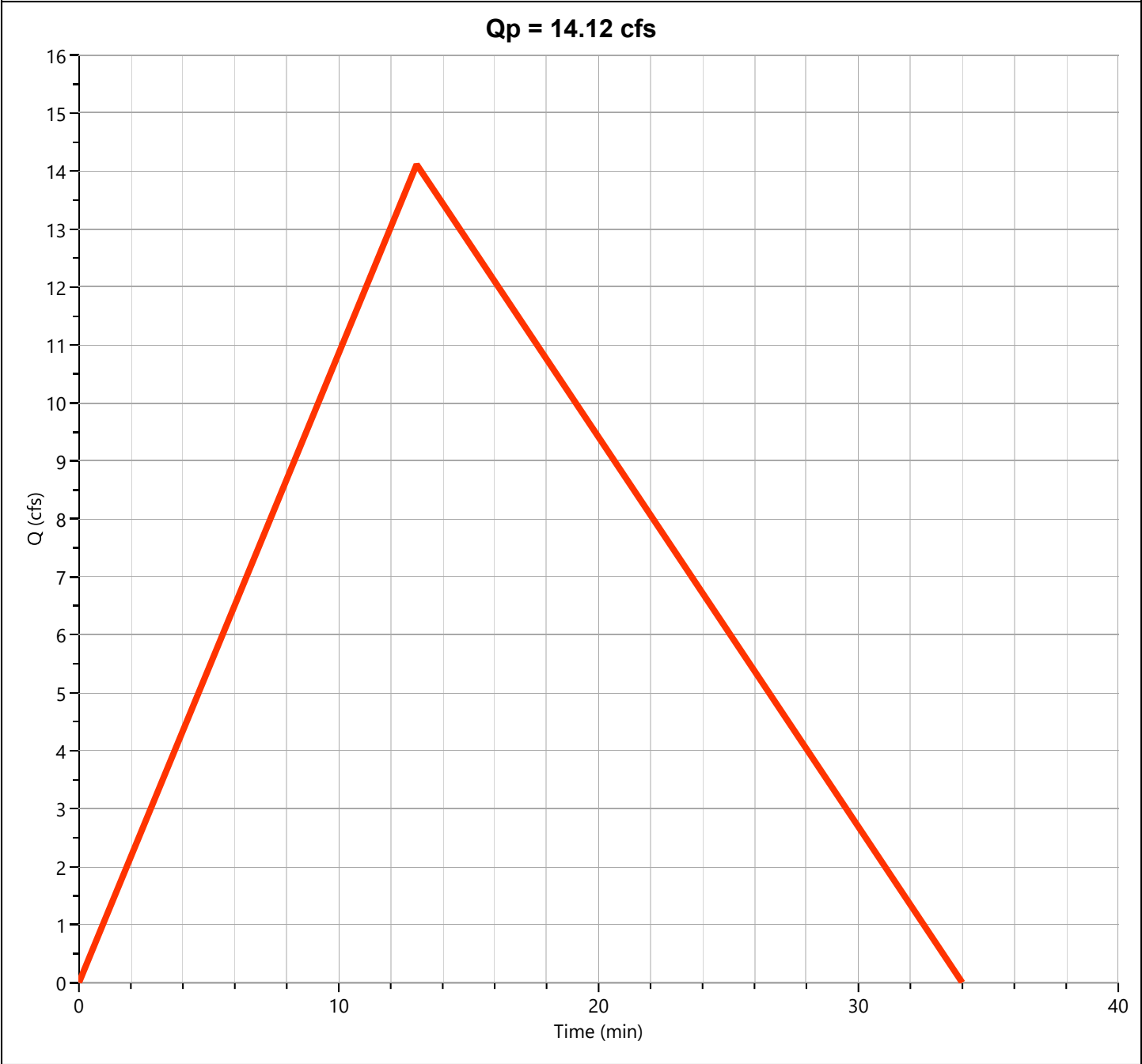
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "B"

Hyd. No. 2

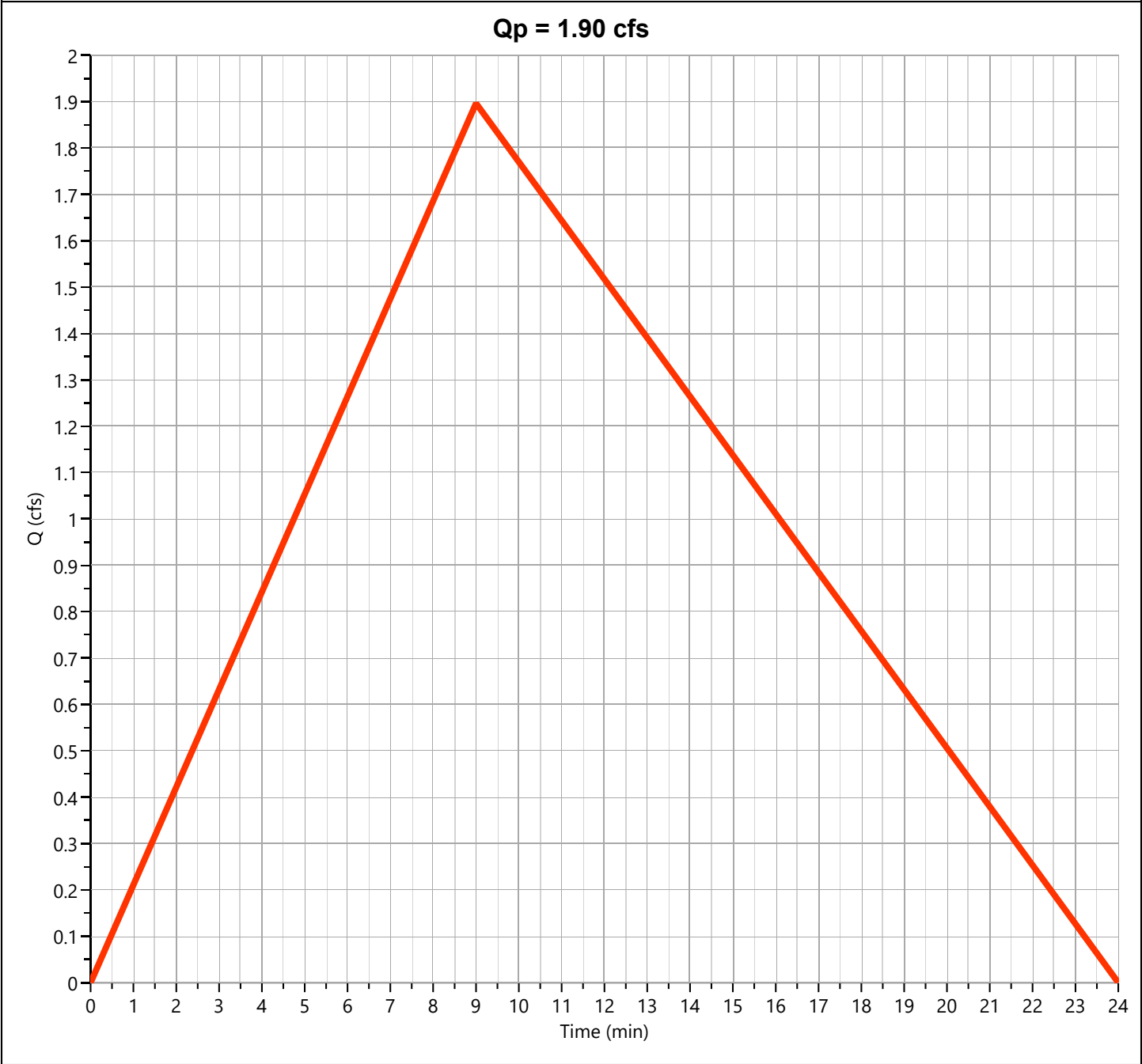
Hydrograph Type	= Rational	Peak Flow	= 14.12 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Runoff Volume	= 14,699 cuft
Drainage Area	= 5.62 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 13.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.34 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "C"

Hyd. No. 3

Hydrograph Type	= Rational	Peak Flow	= 1.896 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,367 cuft
Drainage Area	= 0.64 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 9.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.30 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

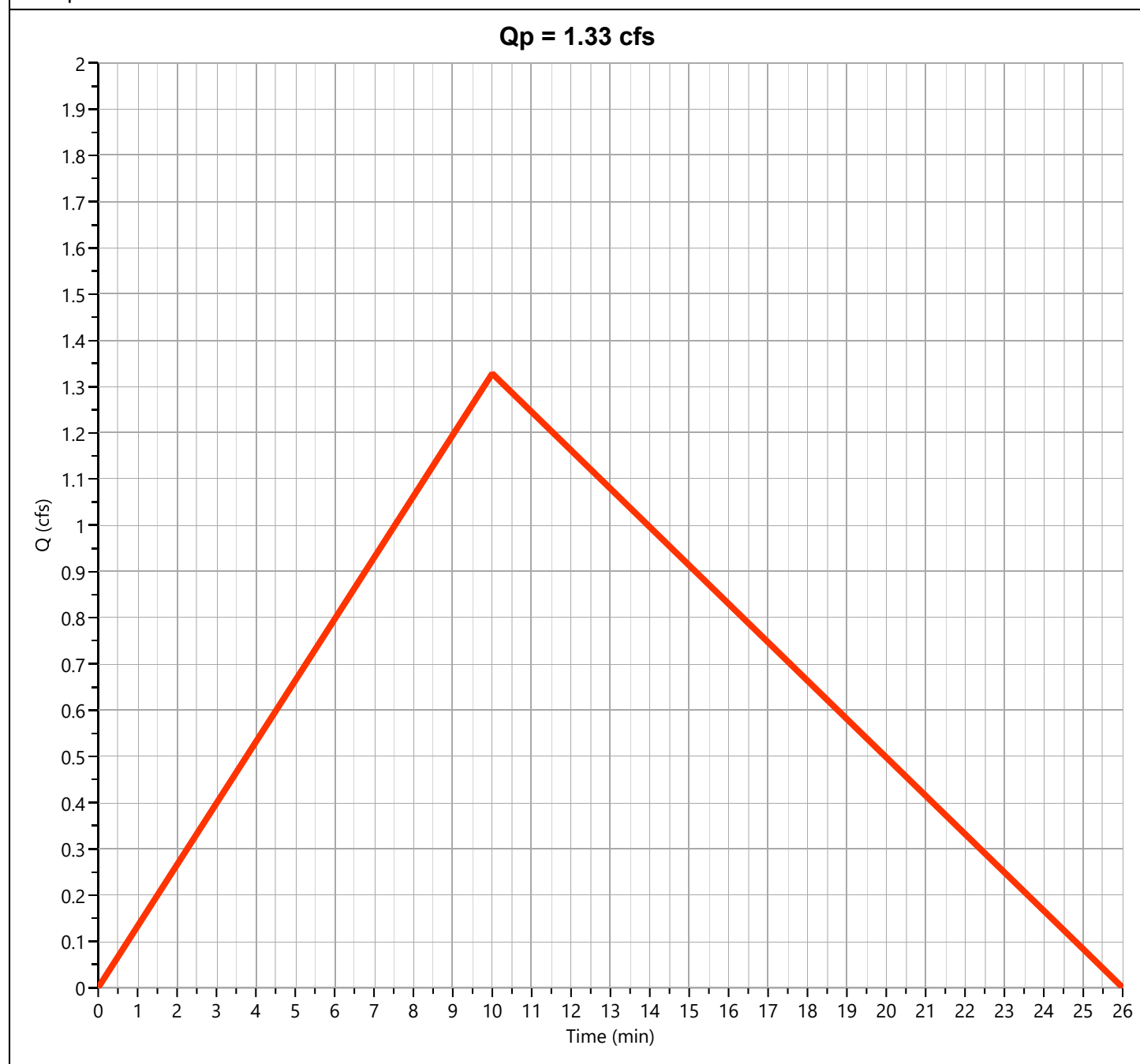
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "D"

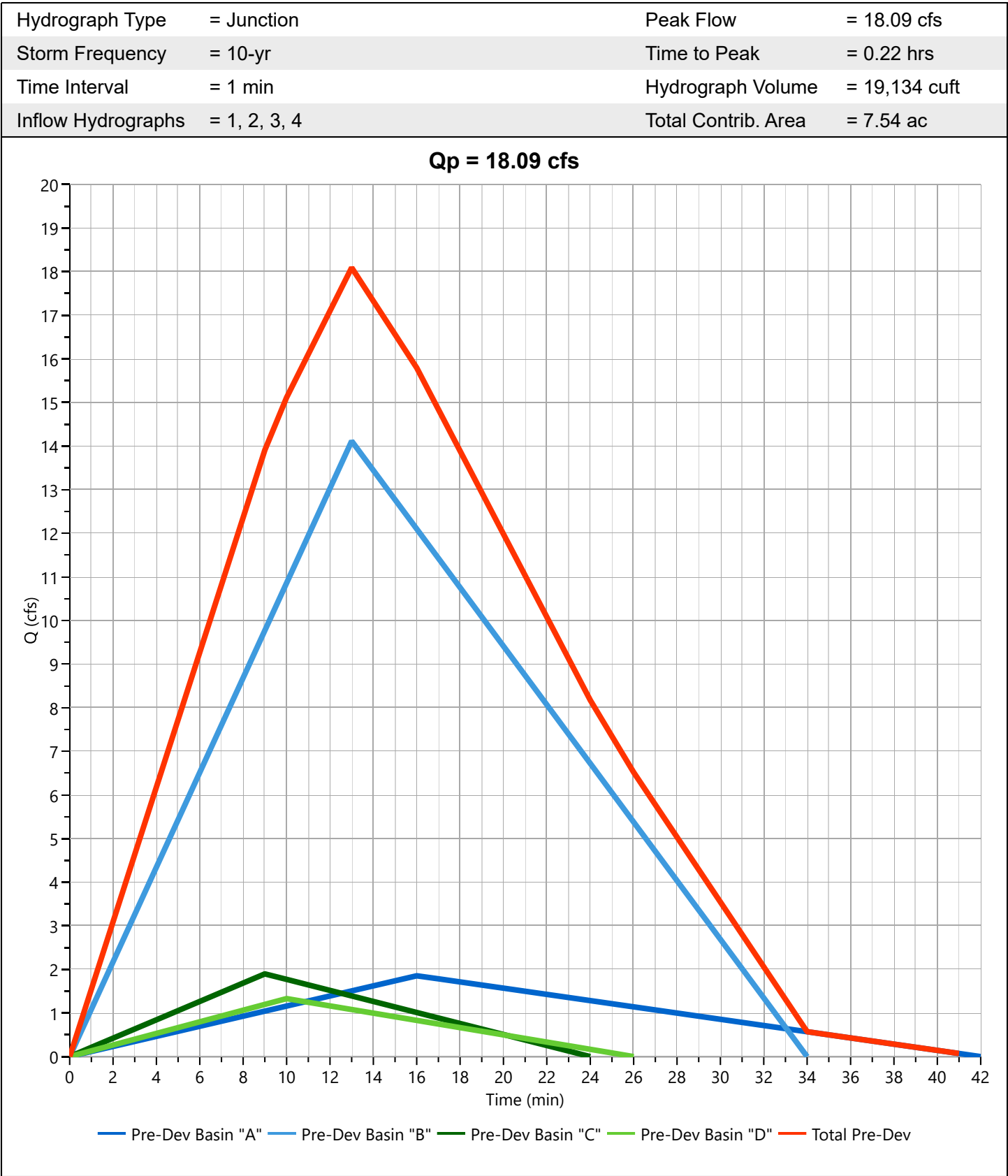
Hyd. No. 4

Hydrograph Type	= Rational	Peak Flow	= 1.328 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,064 cuft
Drainage Area	= 0.47 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.01 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Pre-Dev

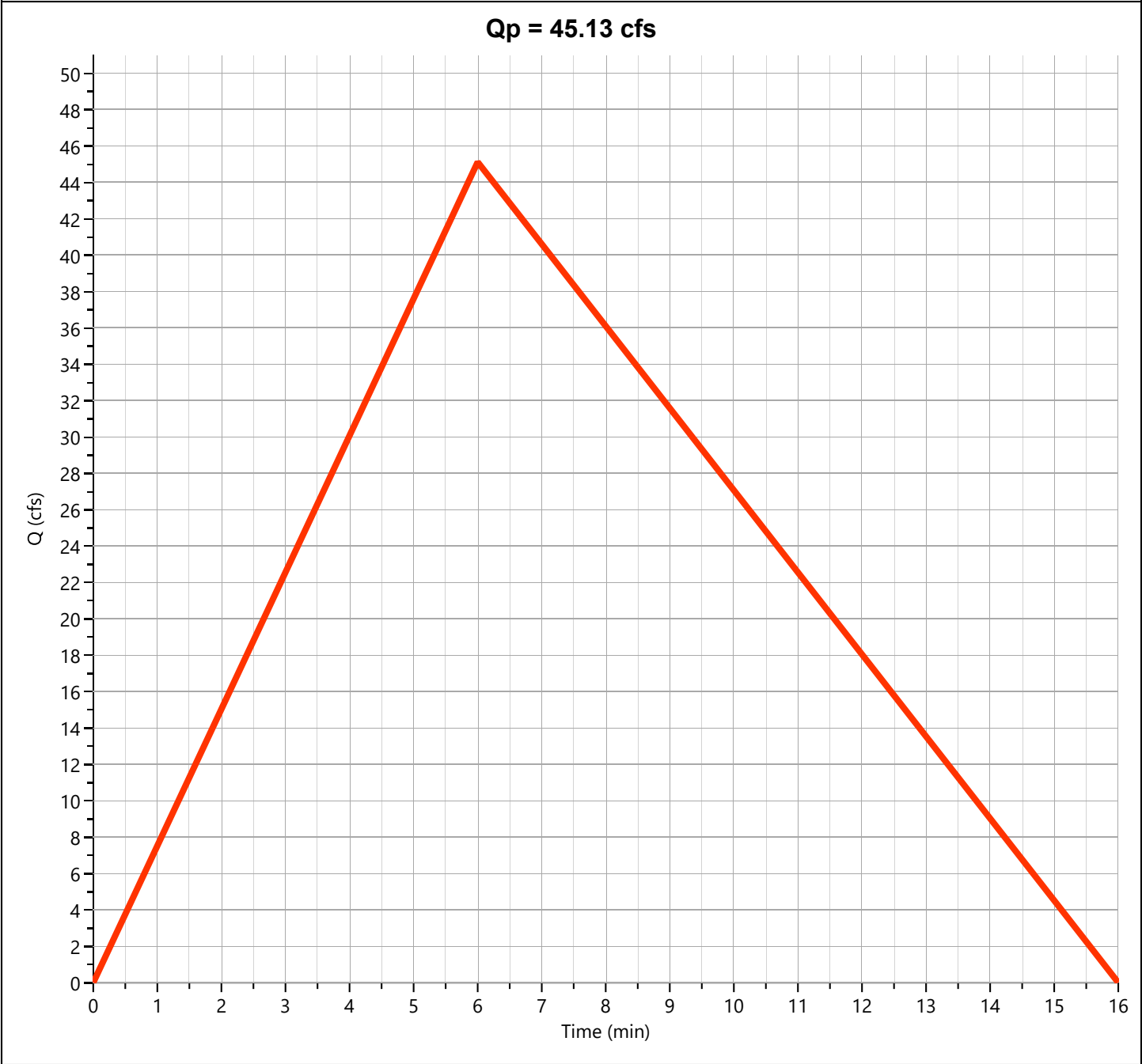
Hyd. No. 5



Post-Dev Basin "A"

Hyd. No. 6

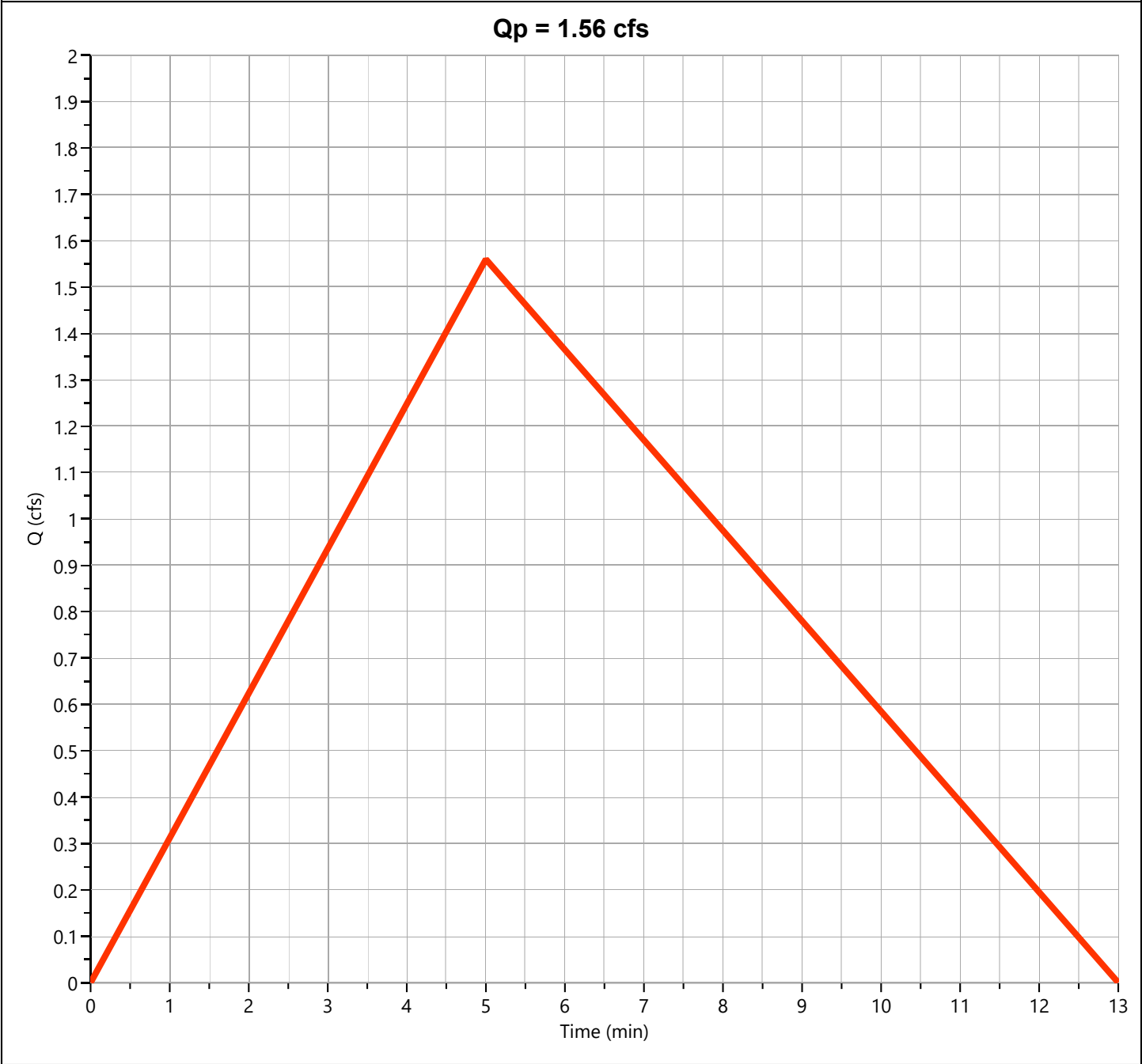
Hydrograph Type	= Rational	Peak Flow	= 45.13 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 21,688 cuft
Drainage Area	= 6.28 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.56 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "B"

Hyd. No. 7

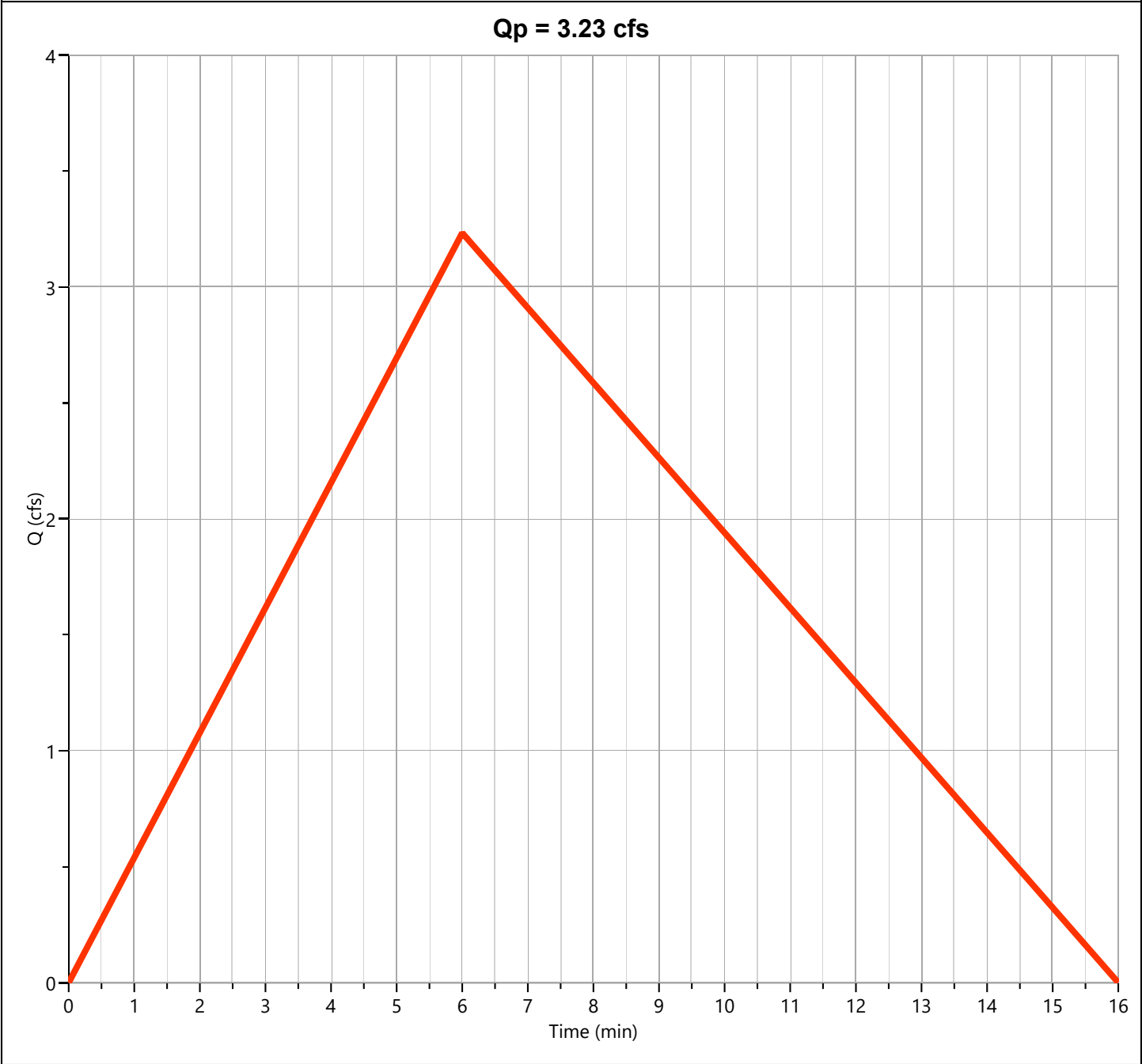
Hydrograph Type	= Rational	Peak Flow	= 1.560 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.08 hrs
Time Interval	= 1 min	Runoff Volume	= 625 cuft
Drainage Area	= 0.2 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 8.21 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "C"

Hyd. No. 8

Hydrograph Type	= Rational	Peak Flow	= 3.234 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,554 cuft
Drainage Area	= 0.45 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.56 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

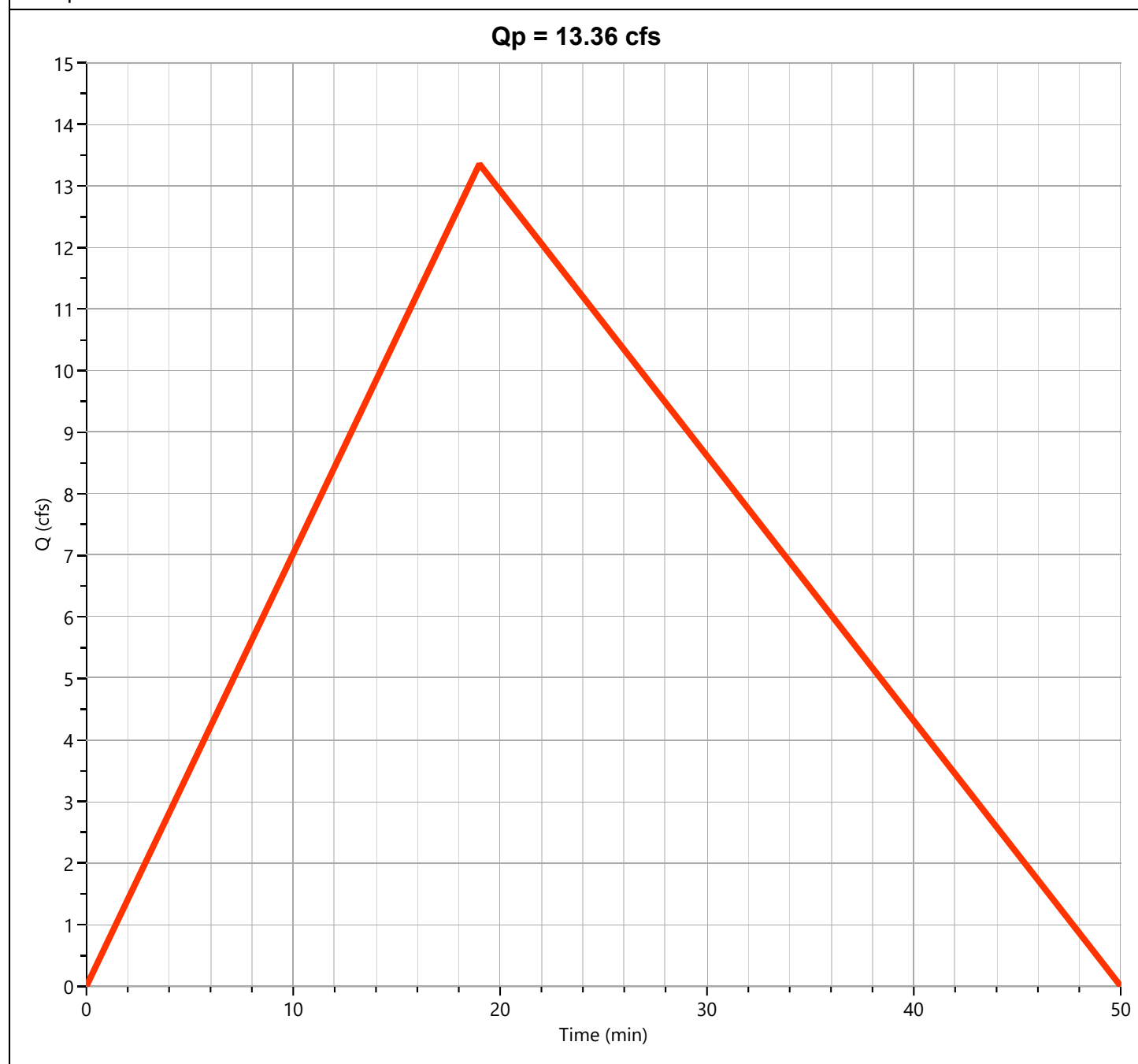
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "D"

Hyd. No. 9

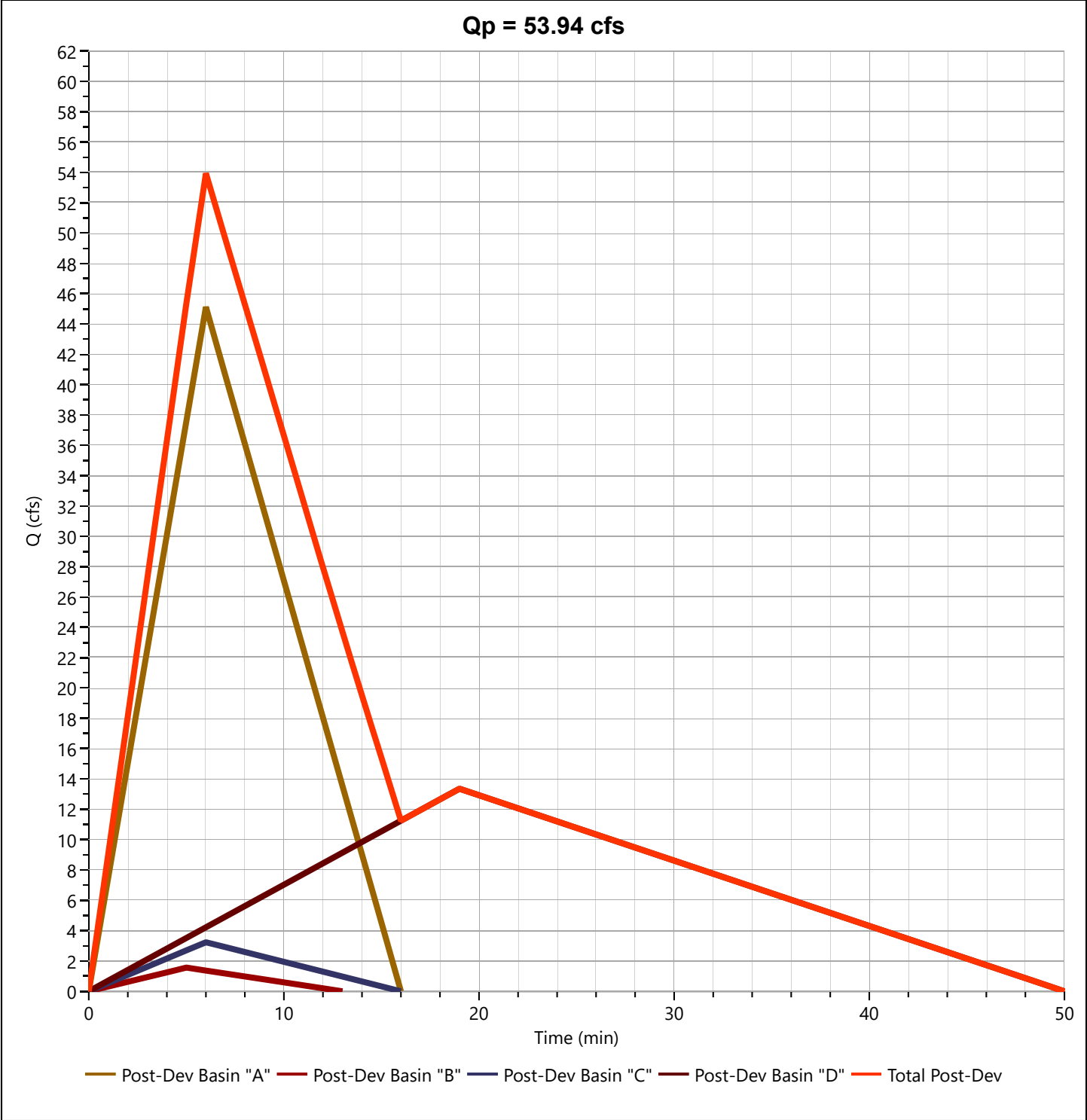
Hydrograph Type	= Rational	Peak Flow	= 13.36 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Runoff Volume	= 20,327 cuft
Drainage Area	= 3.9 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 4.51 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Post-Dev

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 53.94 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 43,856 cuft
Inflow Hydrographs	= 6, 7, 8, 9	Total Contrib. Area	= 10.83 ac



Hydrograph 25-yr Summary

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

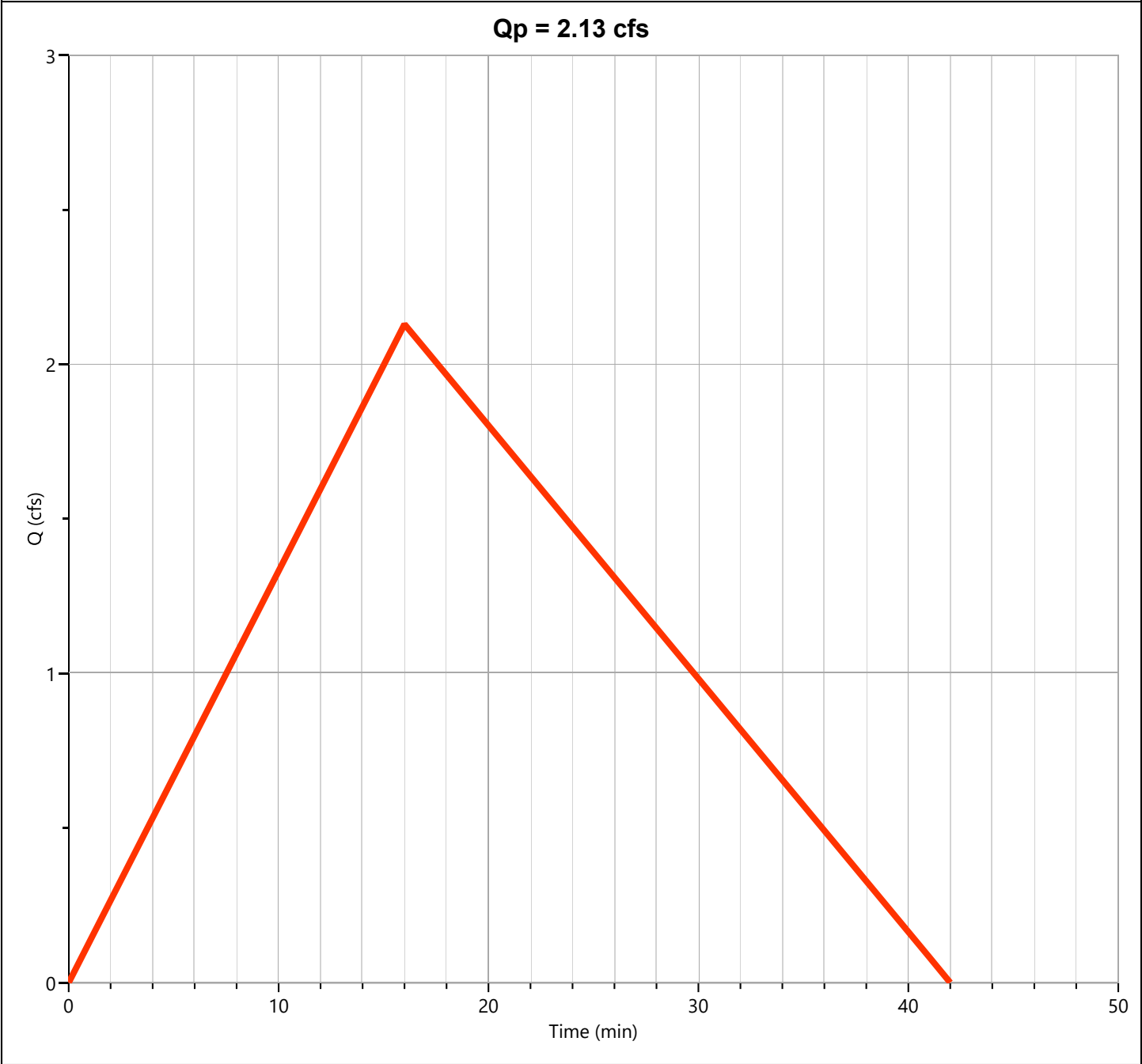
05-02-2025

[illegible]

Pre-Dev Basin "A"

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 2.130 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.27 hrs
Time Interval	= 1 min	Runoff Volume	= 2,730 cuft
Drainage Area	= 0.81 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.60 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

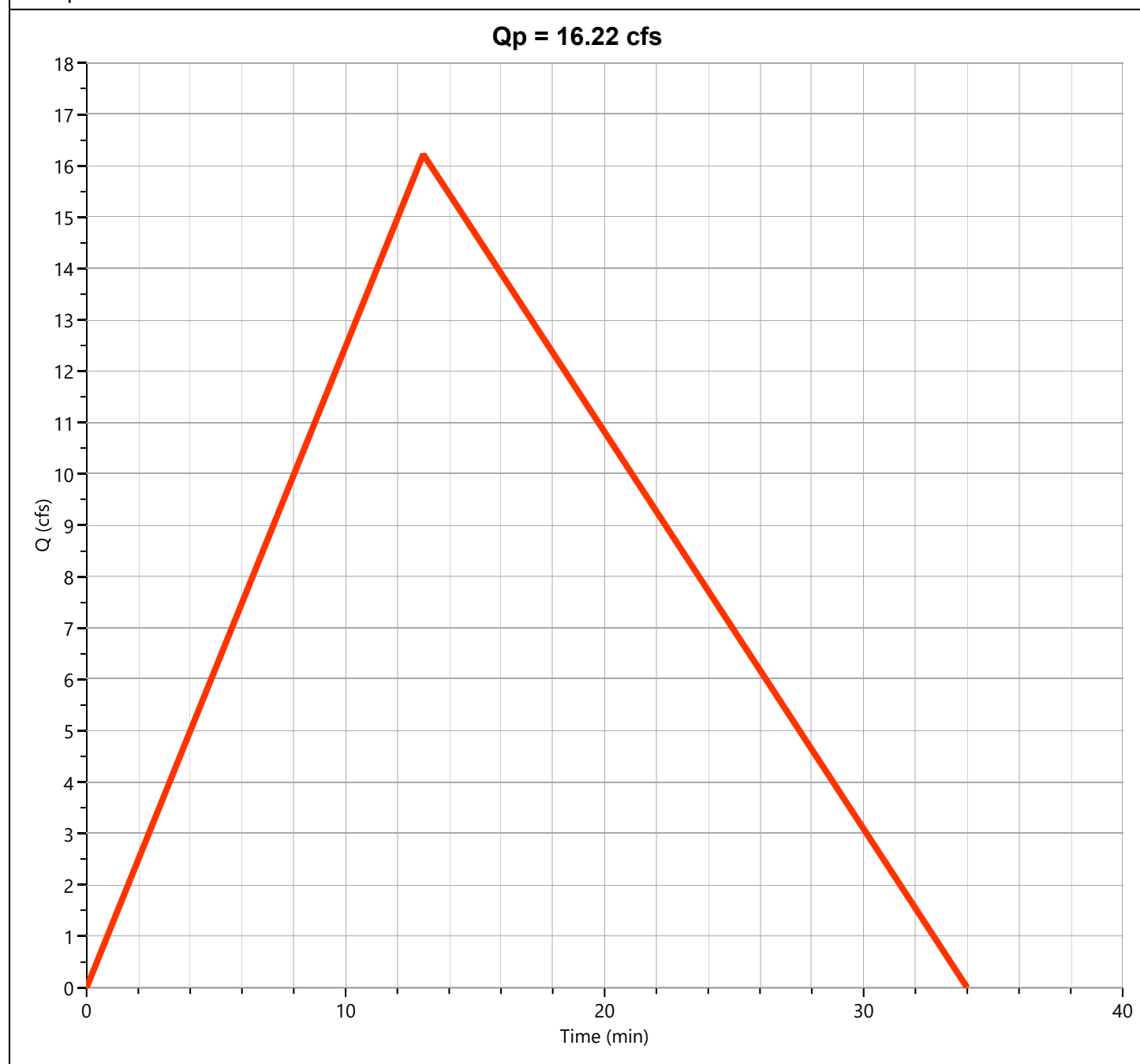
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "B"

Hyd. No. 2

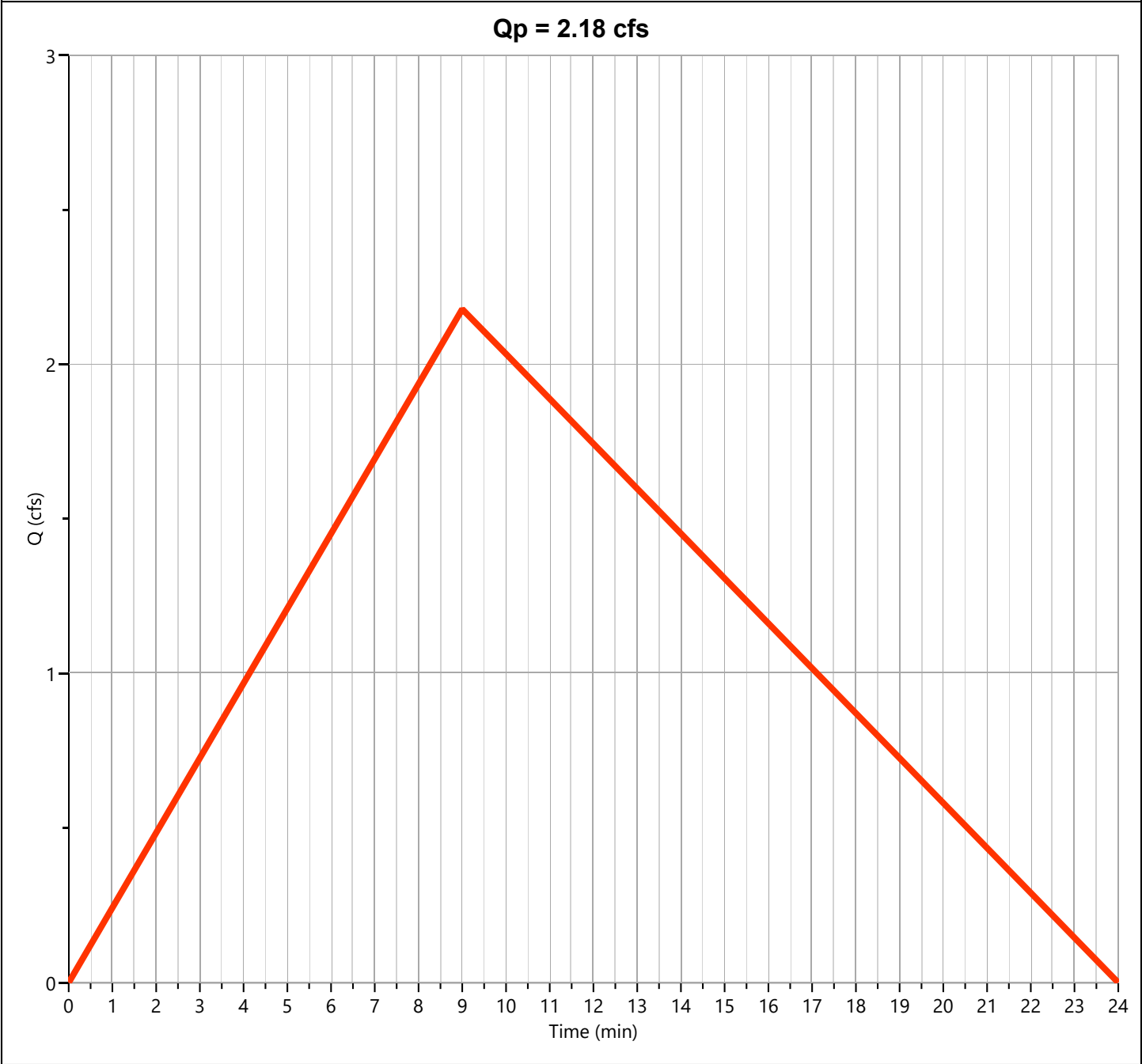
Hydrograph Type	= Rational	Peak Flow	= 16.22 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Runoff Volume	= 16,893 cuft
Drainage Area	= 5.62 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 13.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.14 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "C"

Hyd. No. 3

Hydrograph Type	= Rational	Peak Flow	= 2.179 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,571 cuft
Drainage Area	= 0.64 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 9.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.24 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

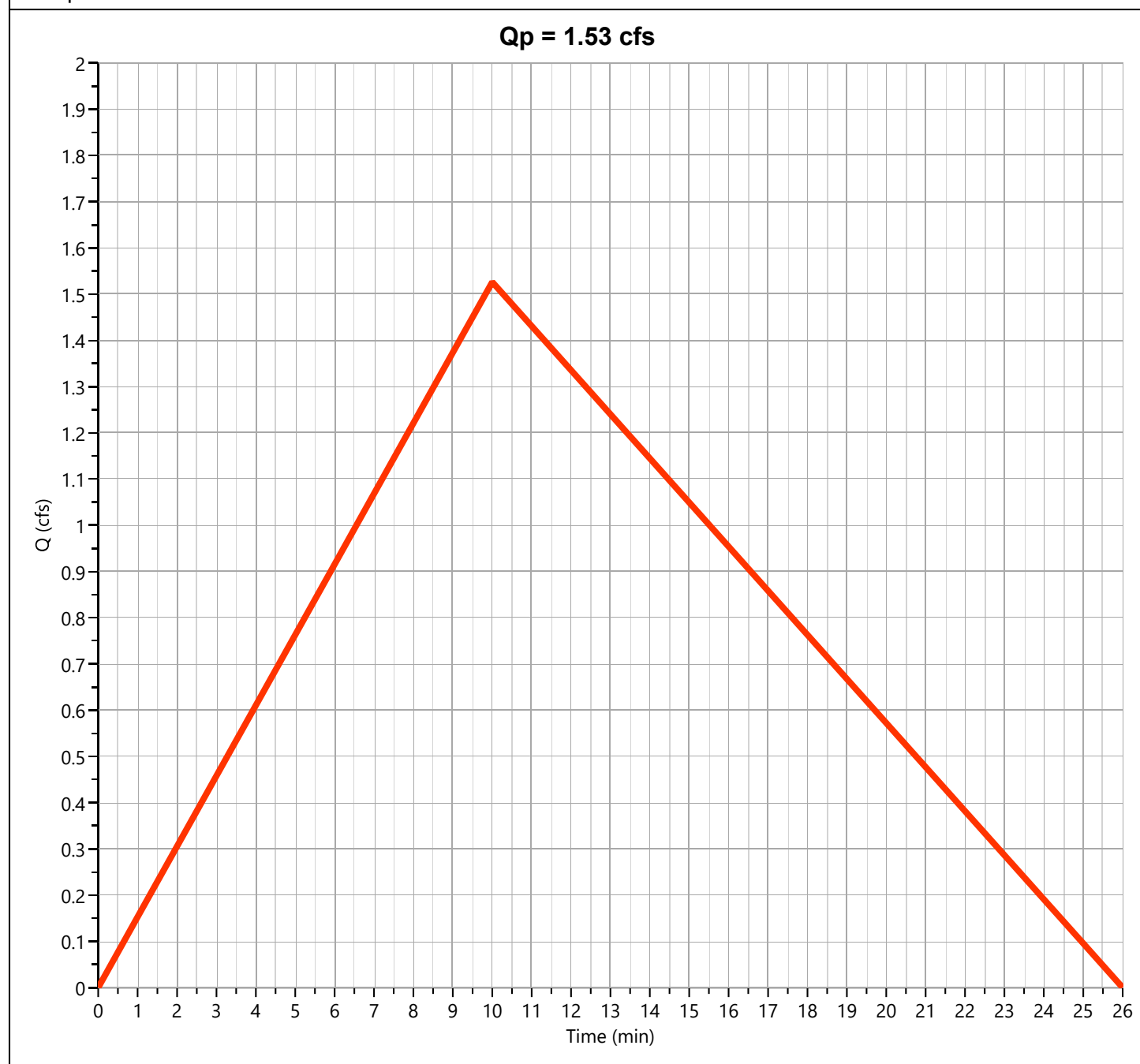
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "D"

Hyd. No. 4

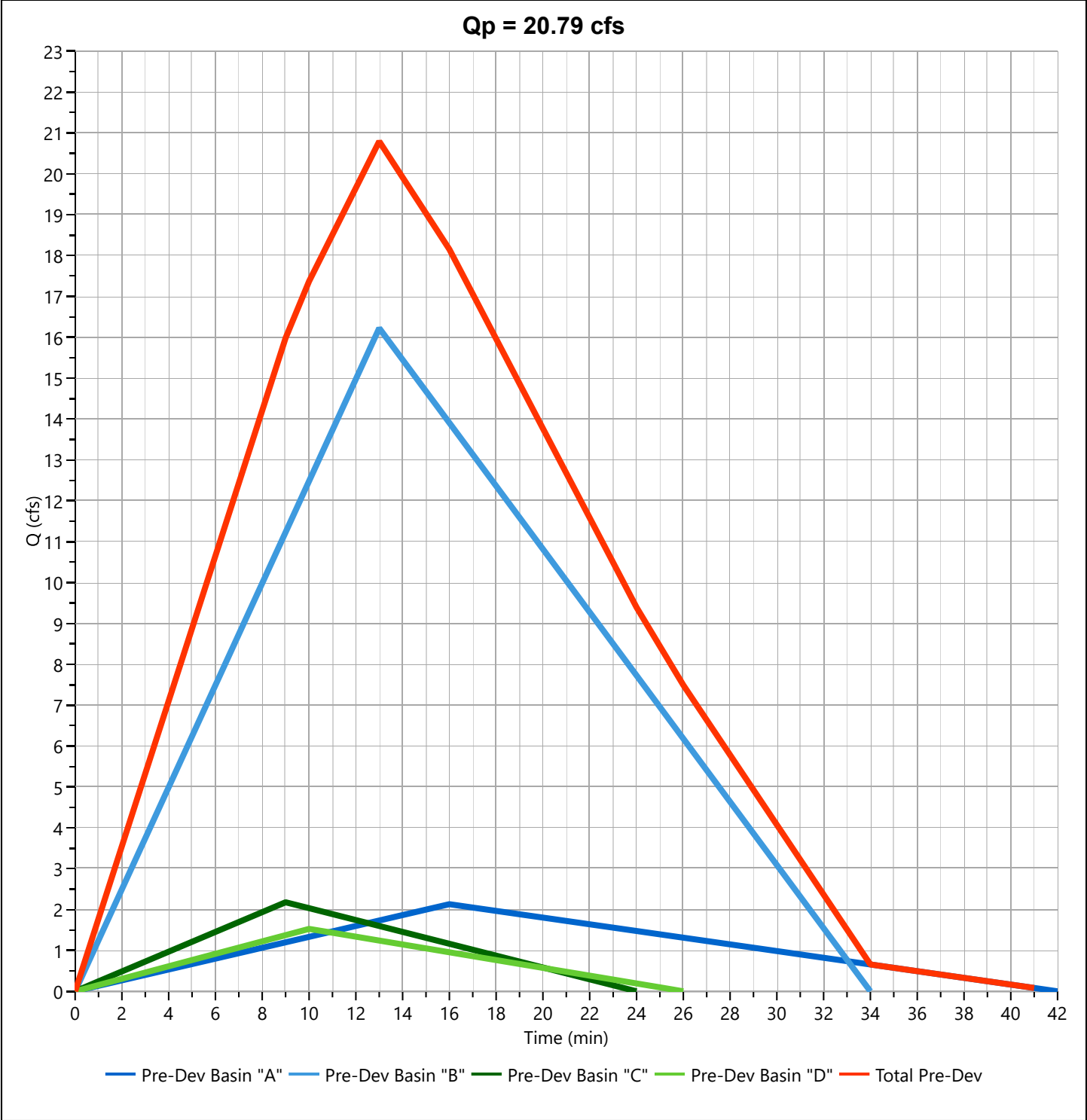
Hydrograph Type	= Rational	Peak Flow	= 1.526 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,223 cuft
Drainage Area	= 0.47 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.91 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Pre-Dev

Hyd. No. 5

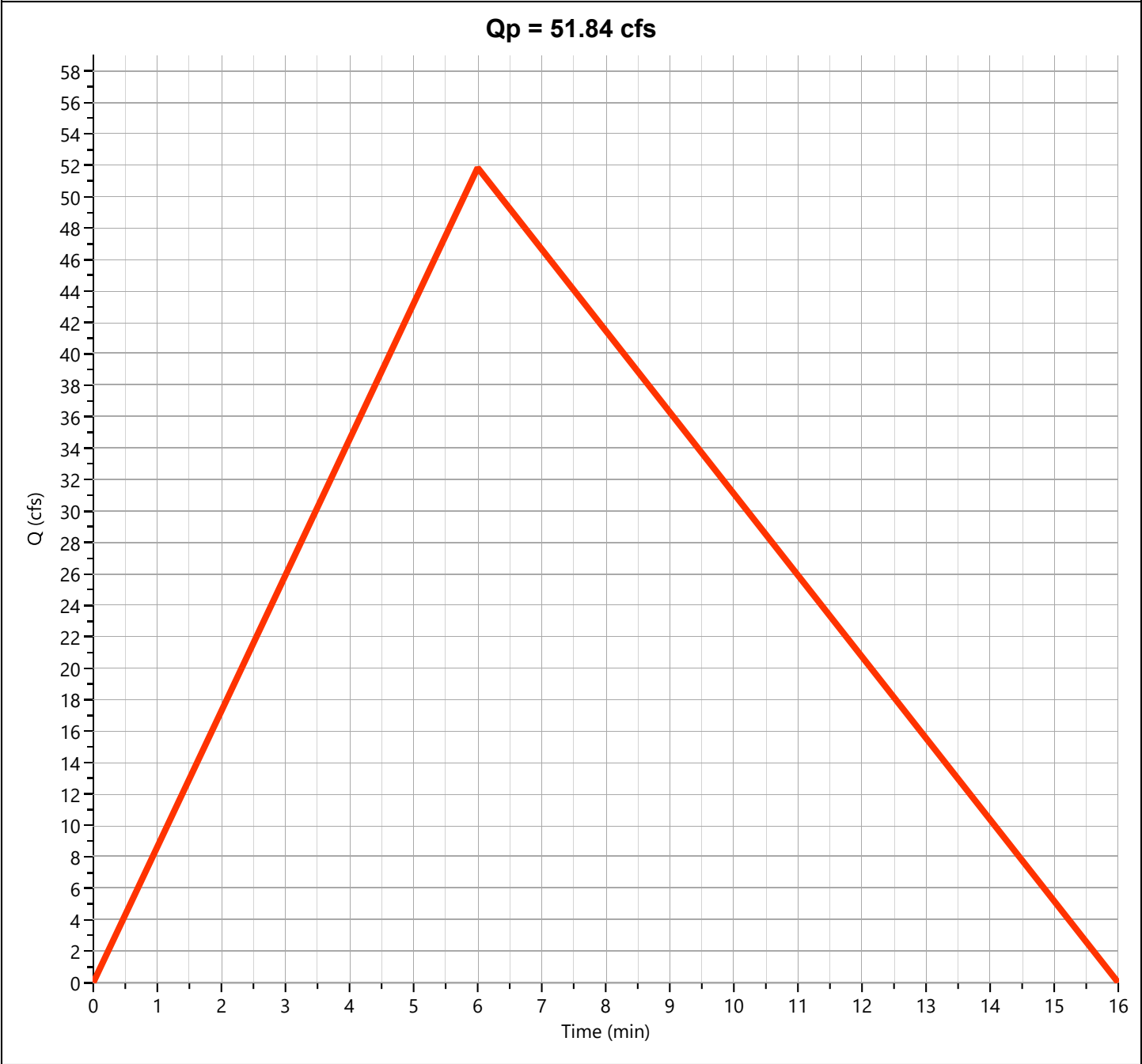
Hydrograph Type	= Junction	Peak Flow	= 20.79 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,990 cuft
Inflow Hydrographs	= 1, 2, 3, 4	Total Contrib. Area	= 7.54 ac



Post-Dev Basin "A"

Hyd. No. 6

Hydrograph Type	= Rational	Peak Flow	= 51.84 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 24,914 cuft
Drainage Area	= 6.28 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 8.69 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

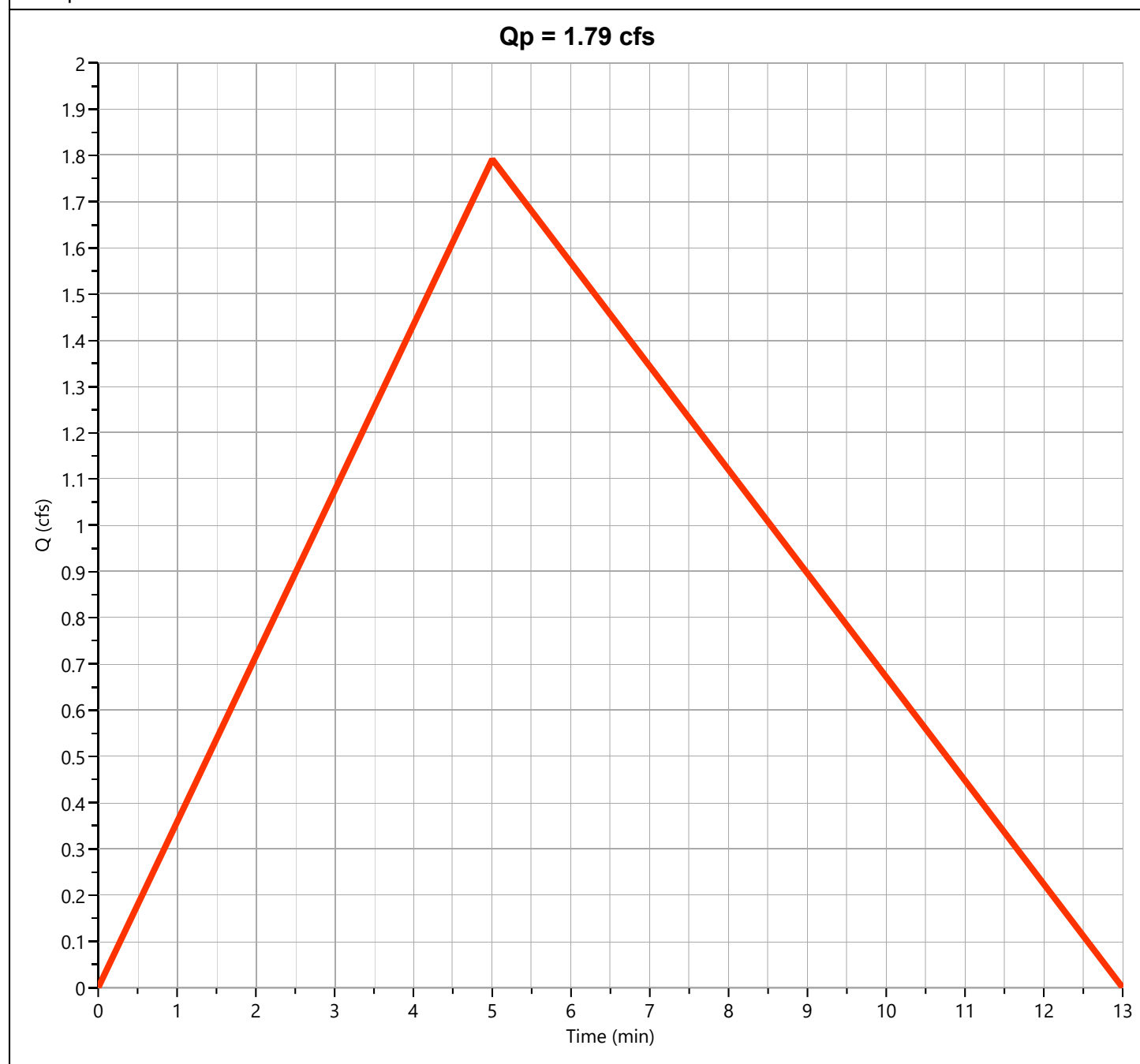
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "B"

Hyd. No. 7

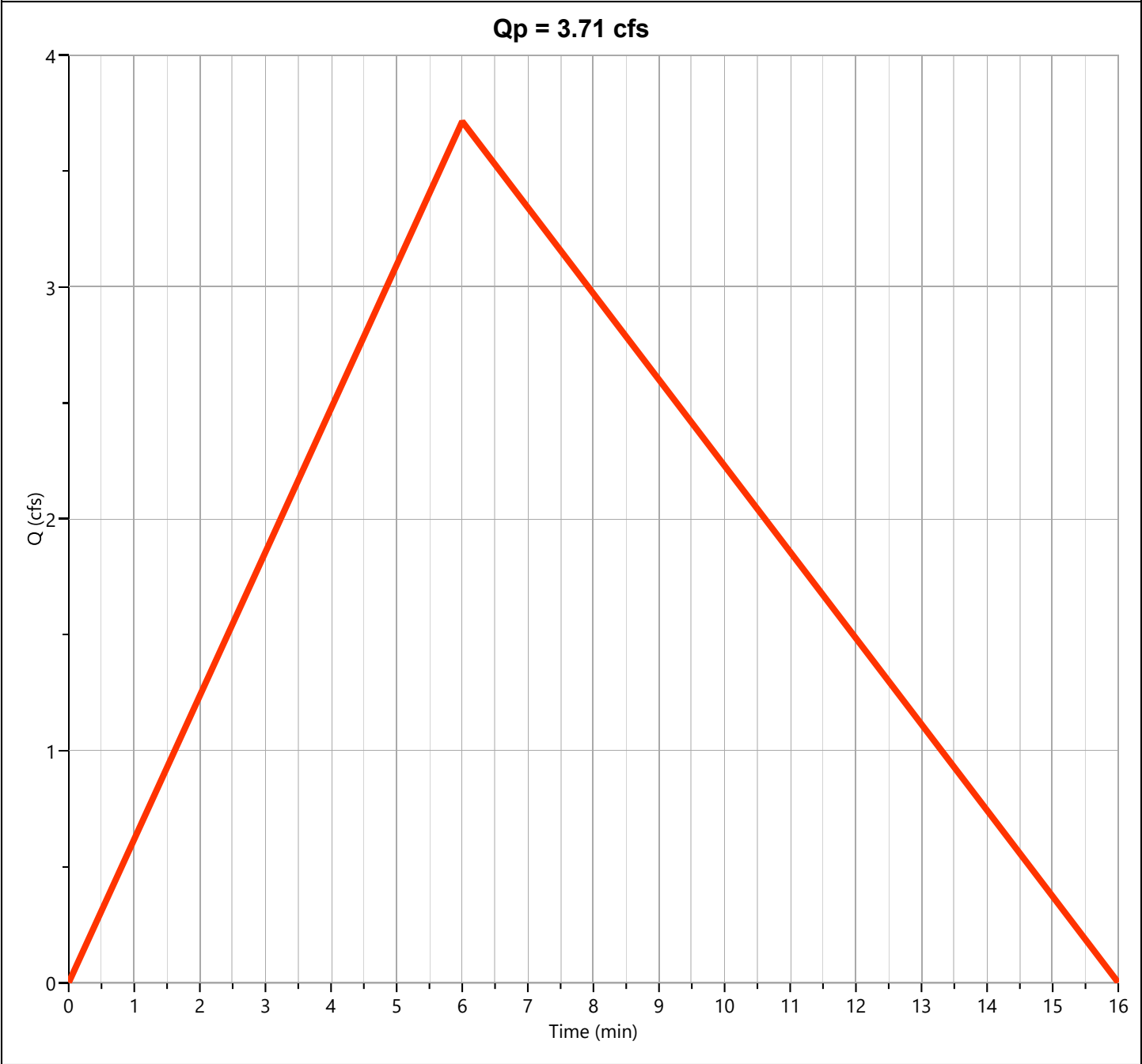
Hydrograph Type	= Rational	Peak Flow	= 1.792 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.08 hrs
Time Interval	= 1 min	Runoff Volume	= 718 cuft
Drainage Area	= 0.2 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 9.43 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "C"

Hyd. No. 8

Hydrograph Type	= Rational	Peak Flow	= 3.715 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,785 cuft
Drainage Area	= 0.45 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 8.69 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

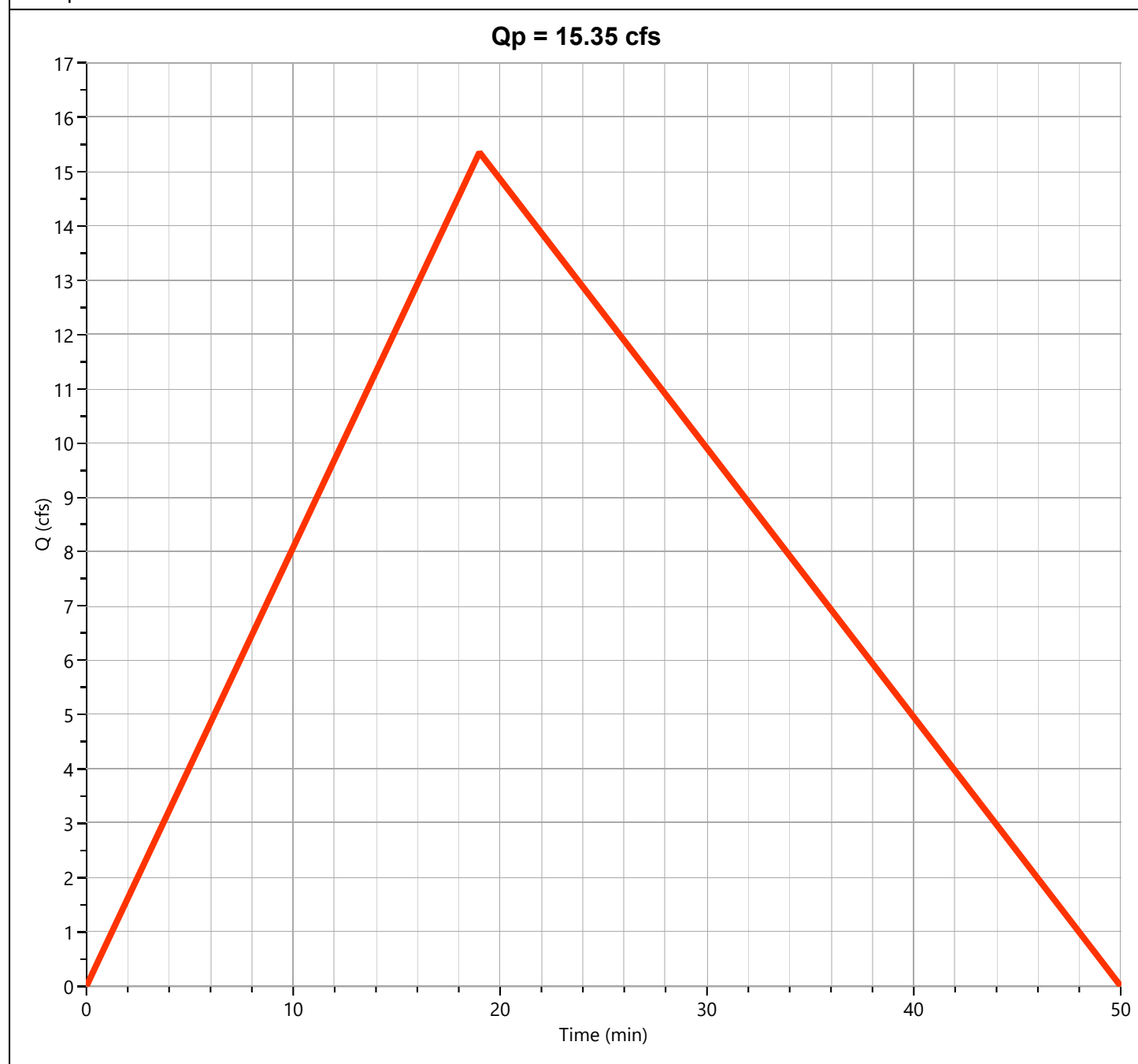
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "D"

Hyd. No. 9

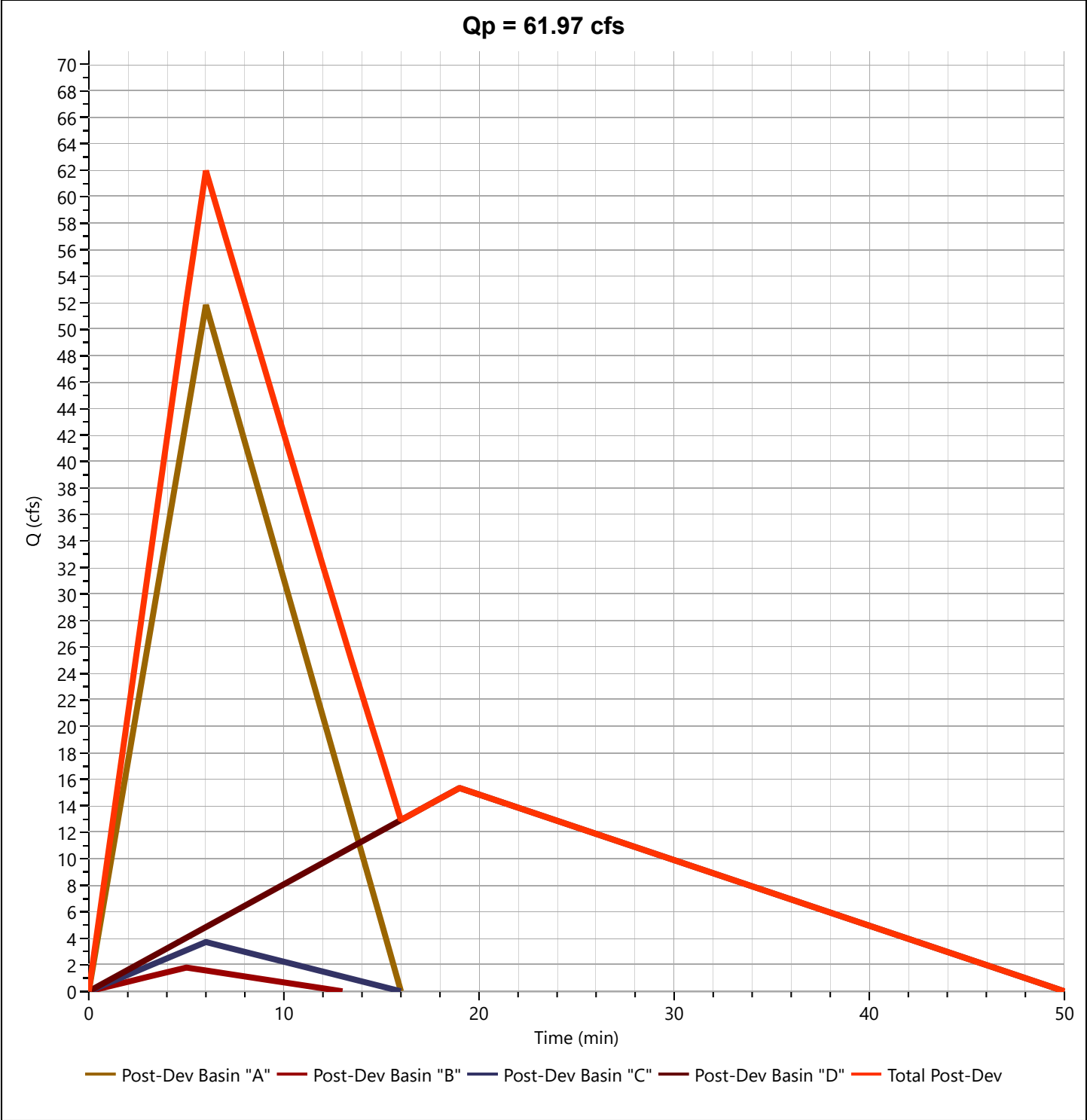
Hydrograph Type	= Rational	Peak Flow	= 15.35 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Runoff Volume	= 23,367 cuft
Drainage Area	= 3.9 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.18 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Post-Dev

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 61.97 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 50,395 cuft
Inflow Hydrographs	= 6, 7, 8, 9	Total Contrib. Area	= 10.83 ac



Hydrograph 50-yr Summary

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

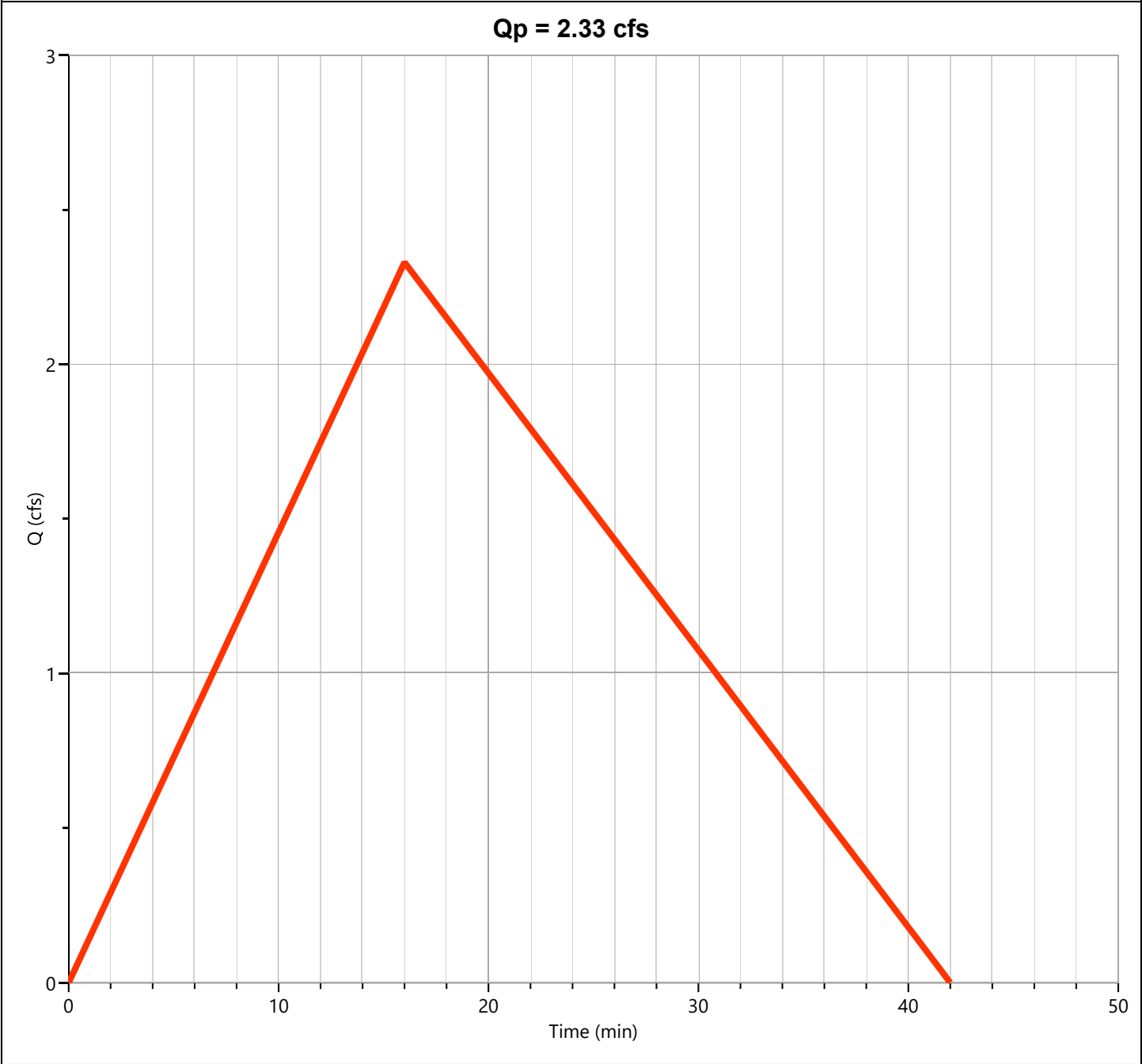
05-02-2025

[illegible]

Pre-Dev Basin "A"

Hyd. No. 1

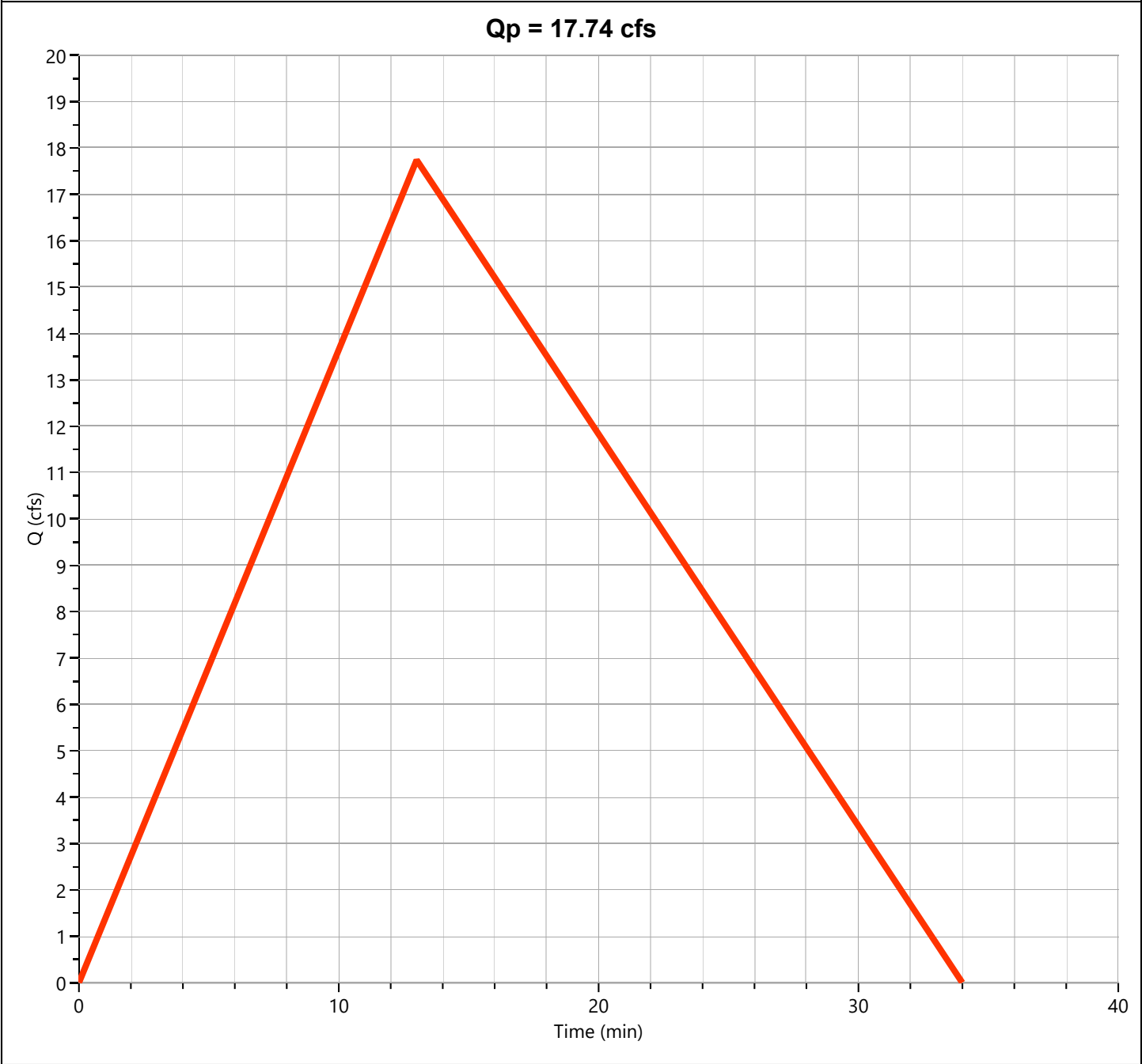
Hydrograph Type	= Rational	Peak Flow	= 2.330 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.27 hrs
Time Interval	= 1 min	Runoff Volume	= 2,986 cuft
Drainage Area	= 0.81 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.12 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "B"

Hyd. No. 2

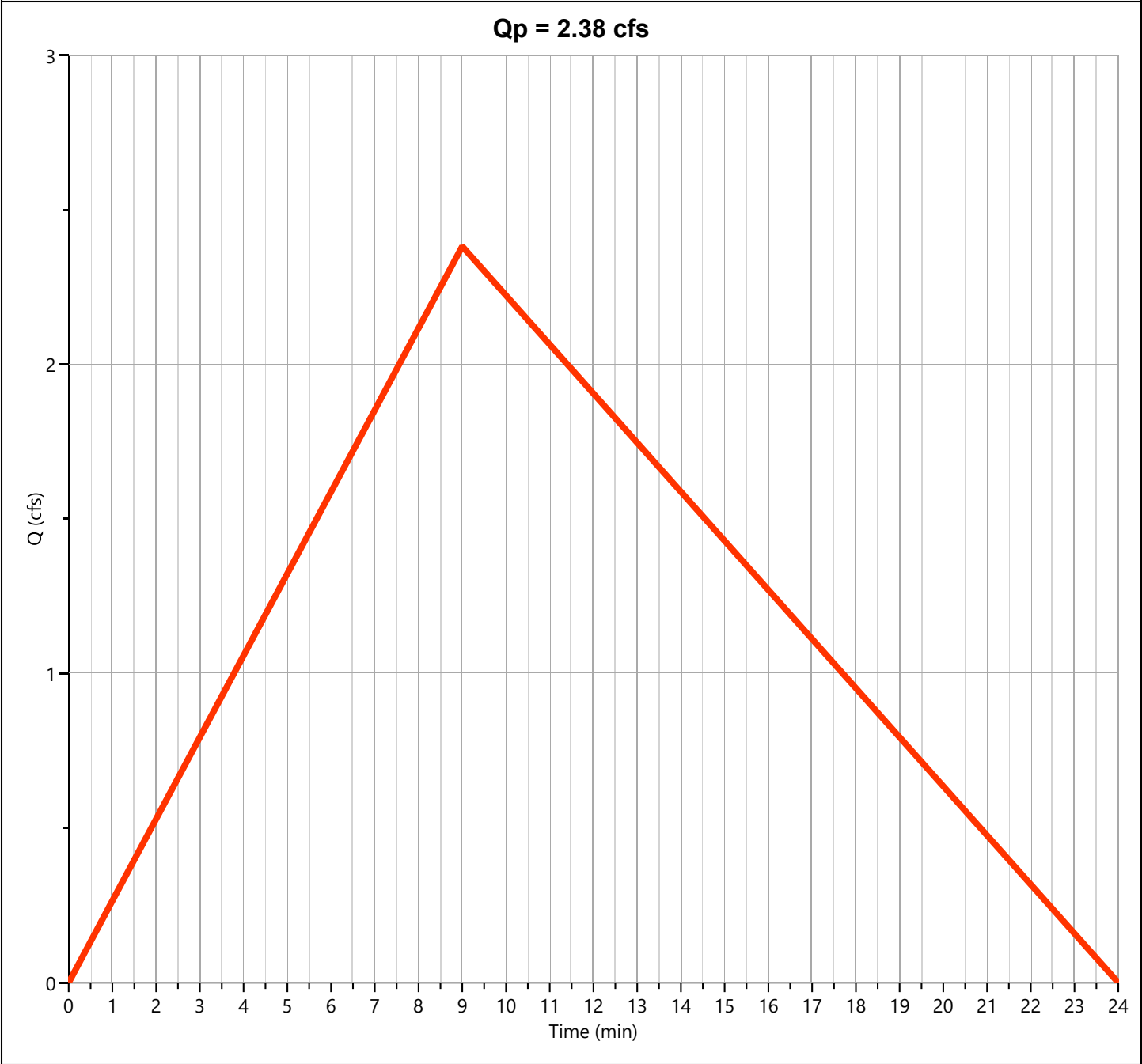
Hydrograph Type	= Rational	Peak Flow	= 17.74 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Runoff Volume	= 18,474 cuft
Drainage Area	= 5.62 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 13.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.72 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "C"

Hyd. No. 3

Hydrograph Type	= Rational	Peak Flow	= 2.382 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,717 cuft
Drainage Area	= 0.64 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 9.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.92 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

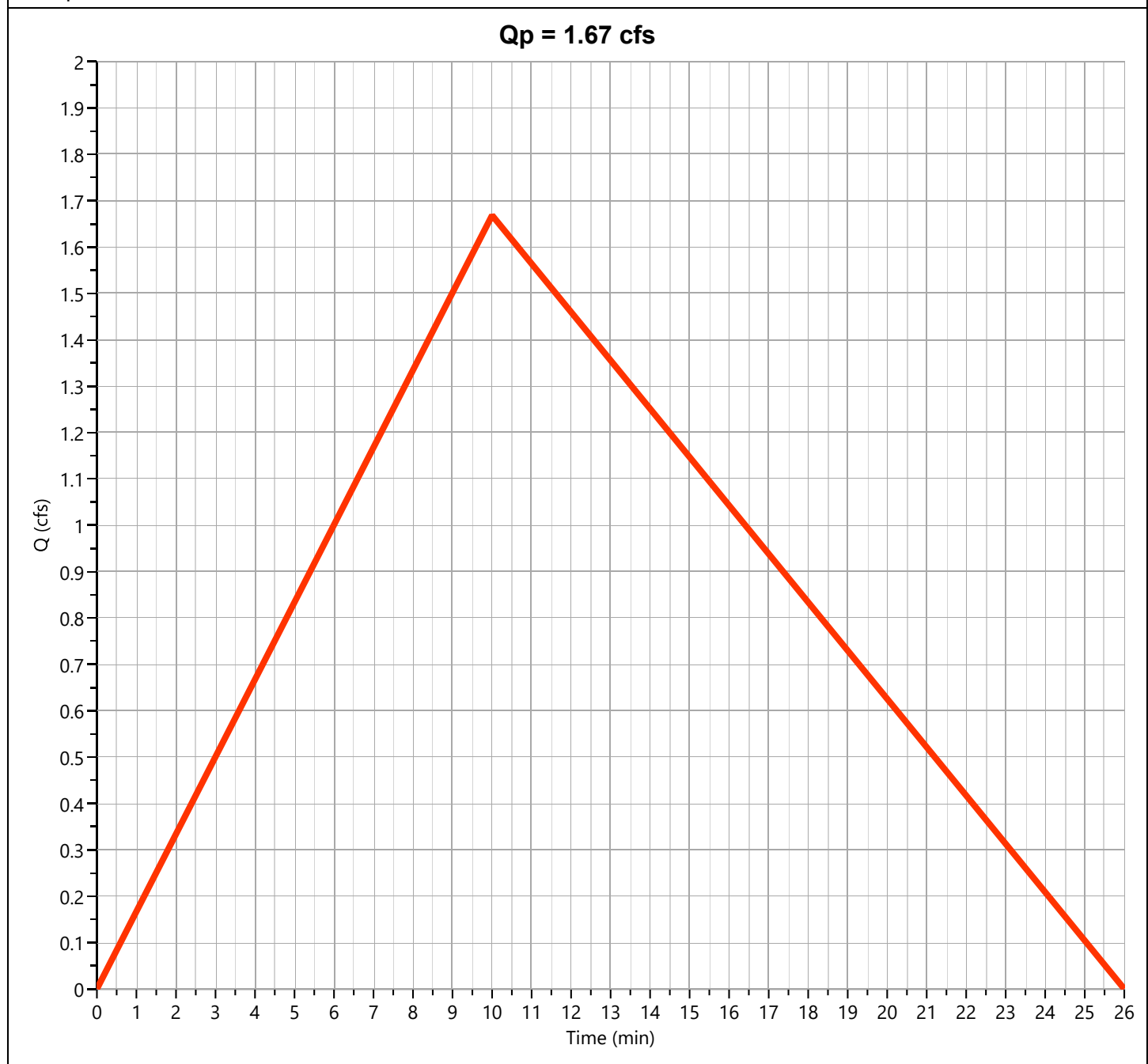
Hydrology Studio v 3.0.0.27

05-02-2025

Pre-Dev Basin "D"

Hyd. No. 4

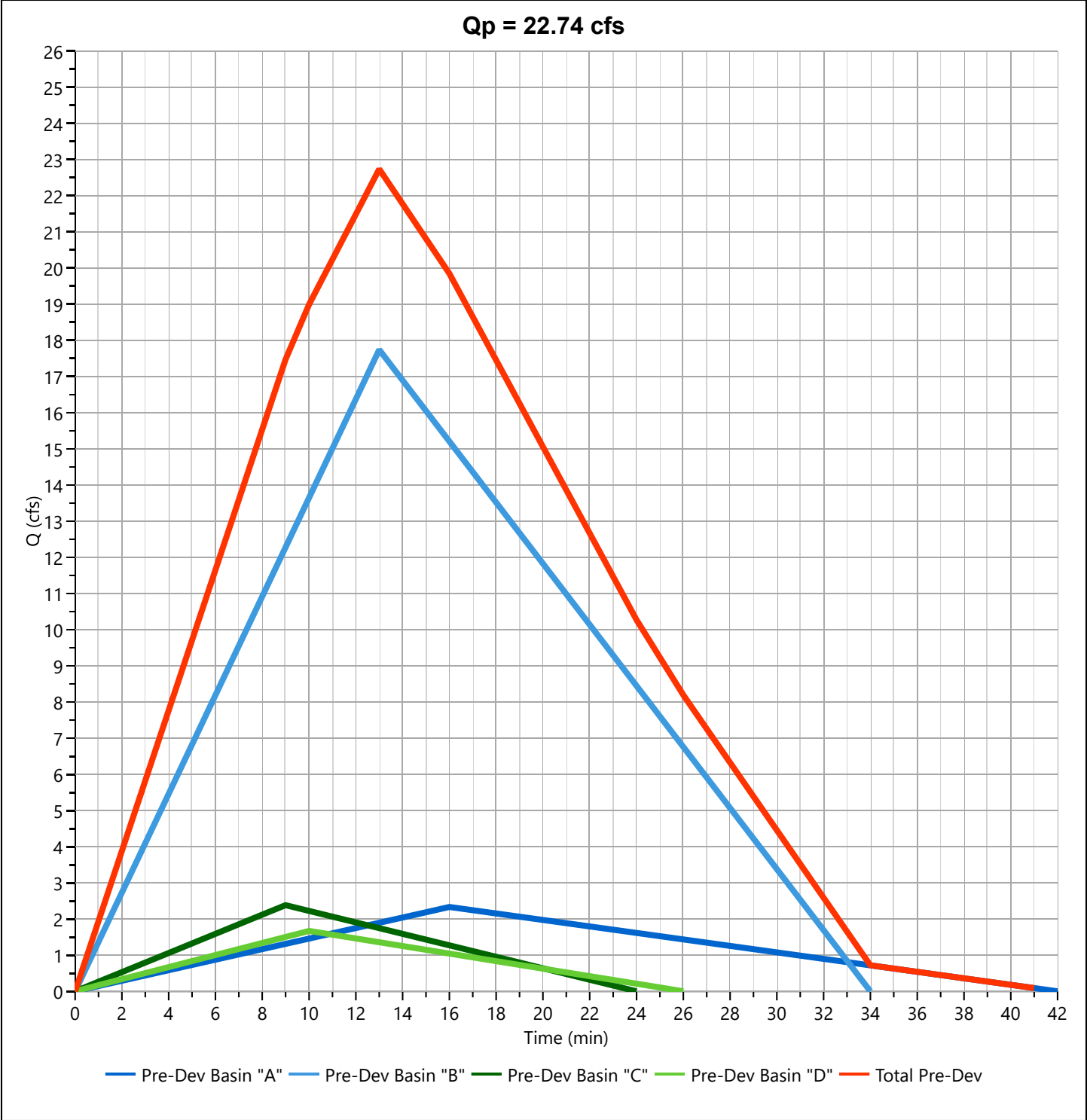
Hydrograph Type	= Rational	Peak Flow	= 1.669 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,336 cuft
Drainage Area	= 0.47 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.55 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Pre-Dev

Hyd. No. 5

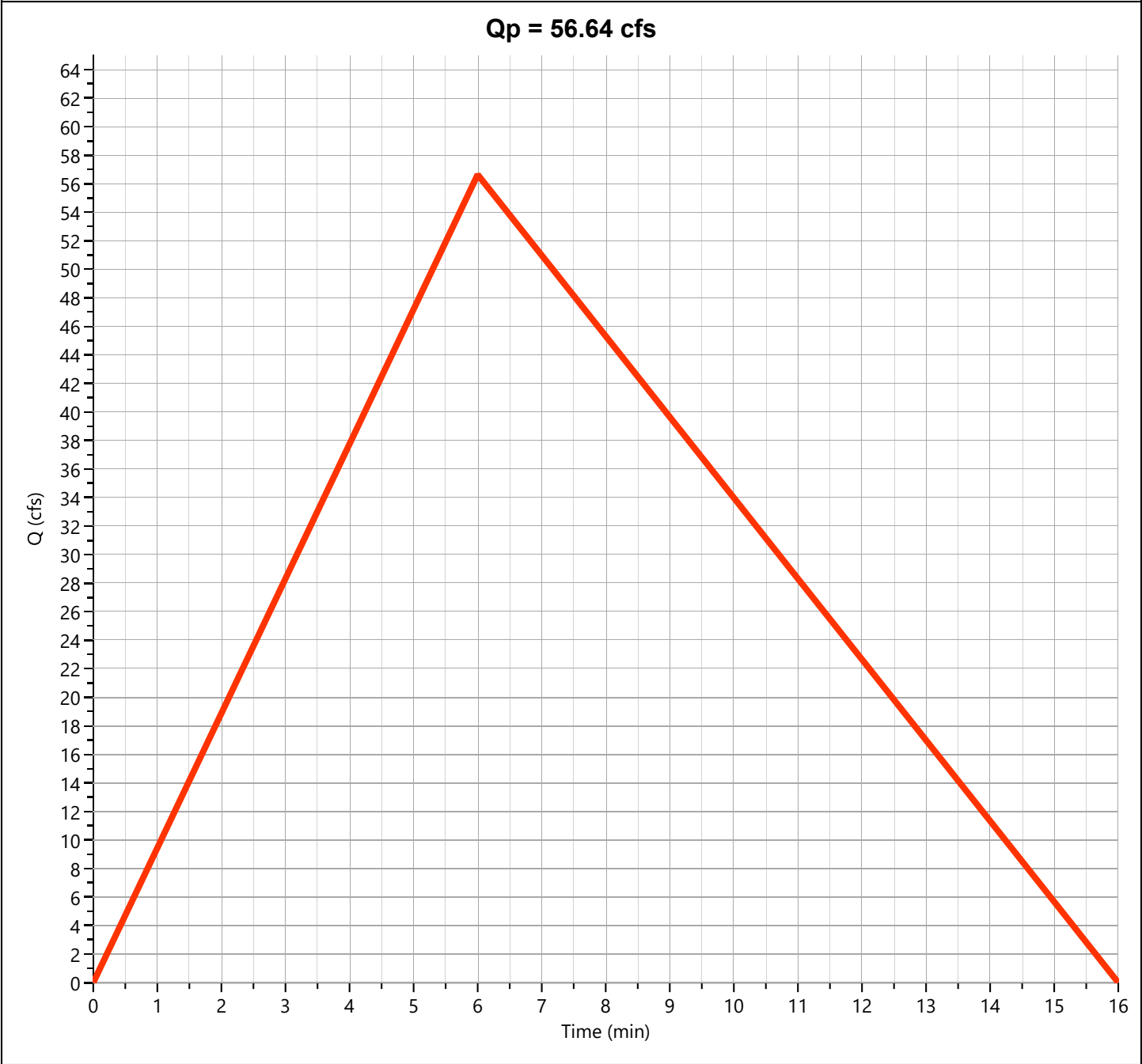
Hydrograph Type	= Junction	Peak Flow	= 22.74 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 24,048 cuft
Inflow Hydrographs	= 1, 2, 3, 4	Total Contrib. Area	= 7.54 ac



Post-Dev Basin "A"

Hyd. No. 6

Hydrograph Type	= Rational	Peak Flow	= 56.64 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 27,219 cuft
Drainage Area	= 6.28 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 9.49 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Hydrograph Report

Project Name: Collective Church

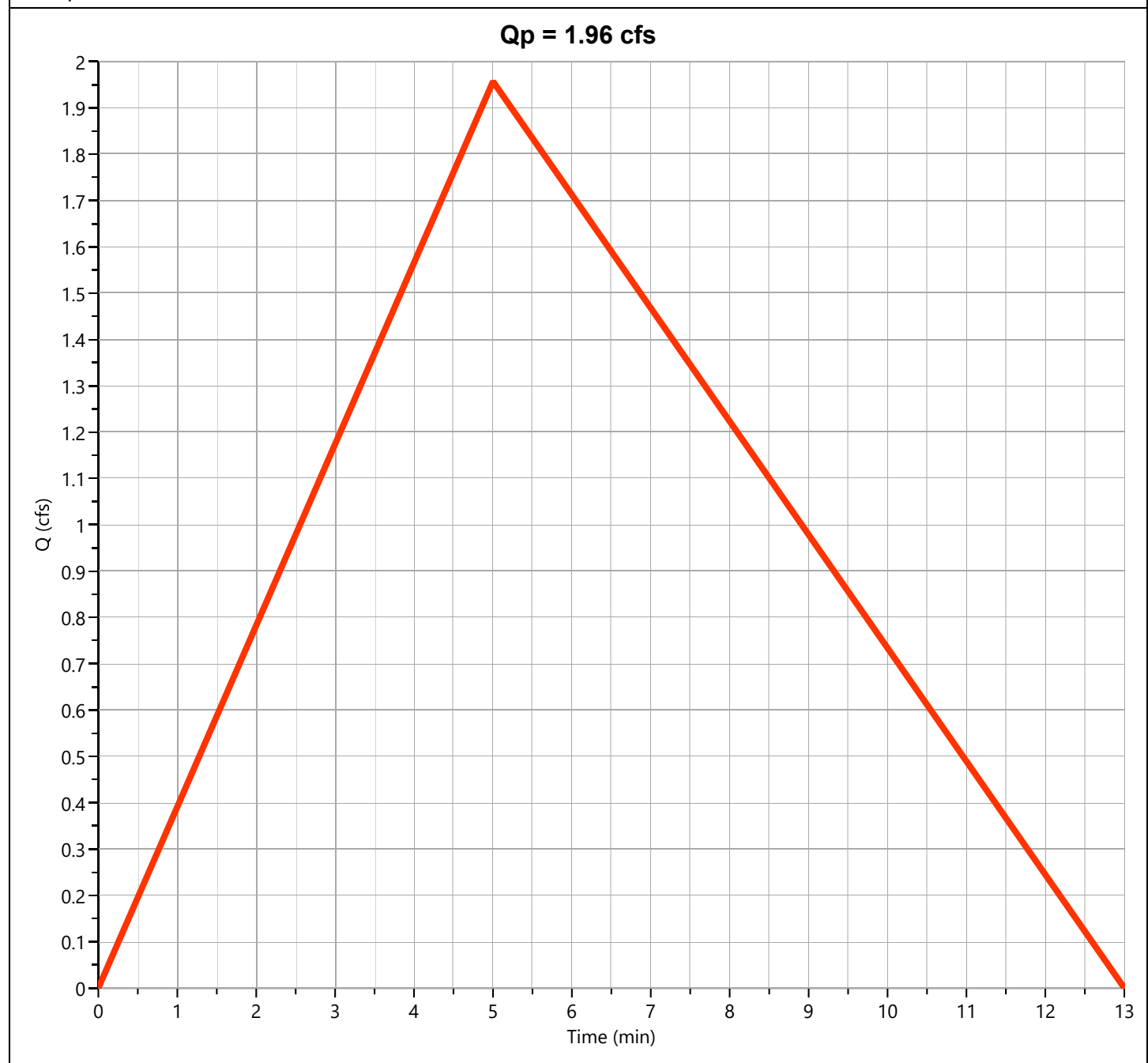
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "B"

Hyd. No. 7

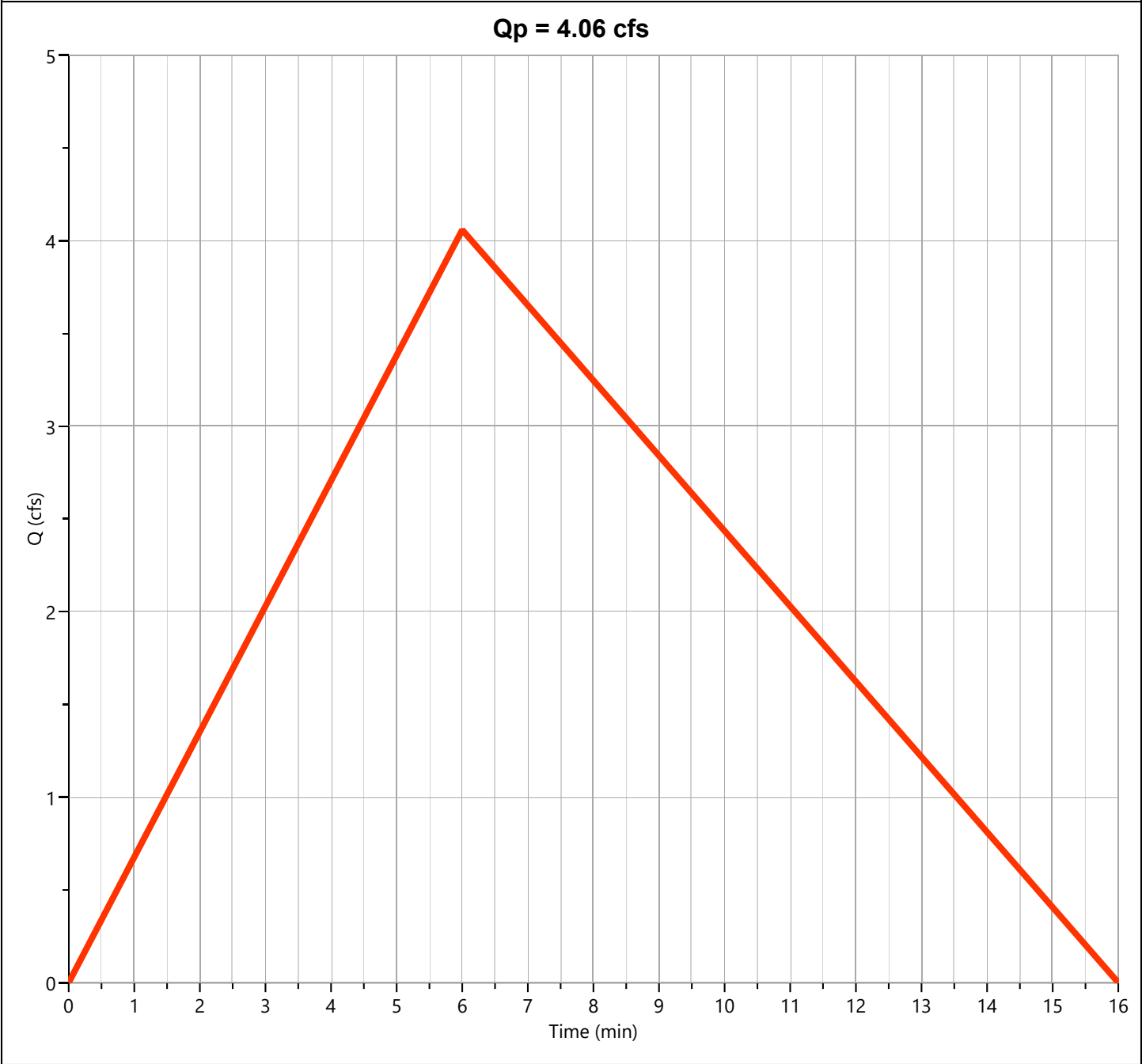
Hydrograph Type	= Rational	Peak Flow	= 1.957 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.08 hrs
Time Interval	= 1 min	Runoff Volume	= 784 cuft
Drainage Area	= 0.2 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 10.30 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "C"

Hyd. No. 8

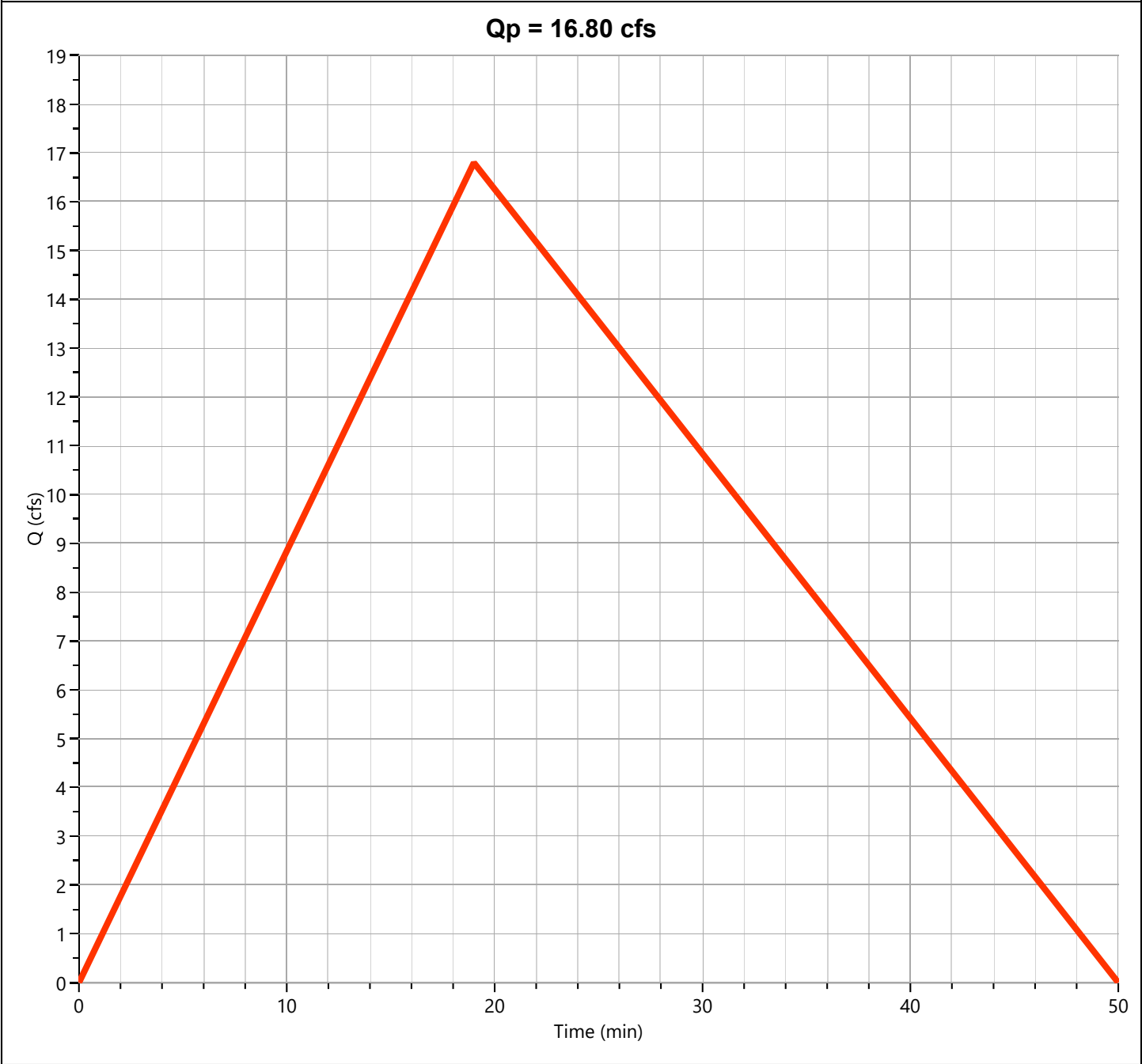
Hydrograph Type	= Rational	Peak Flow	= 4.058 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,950 cuft
Drainage Area	= 0.45 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 9.49 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "D"

Hyd. No. 9

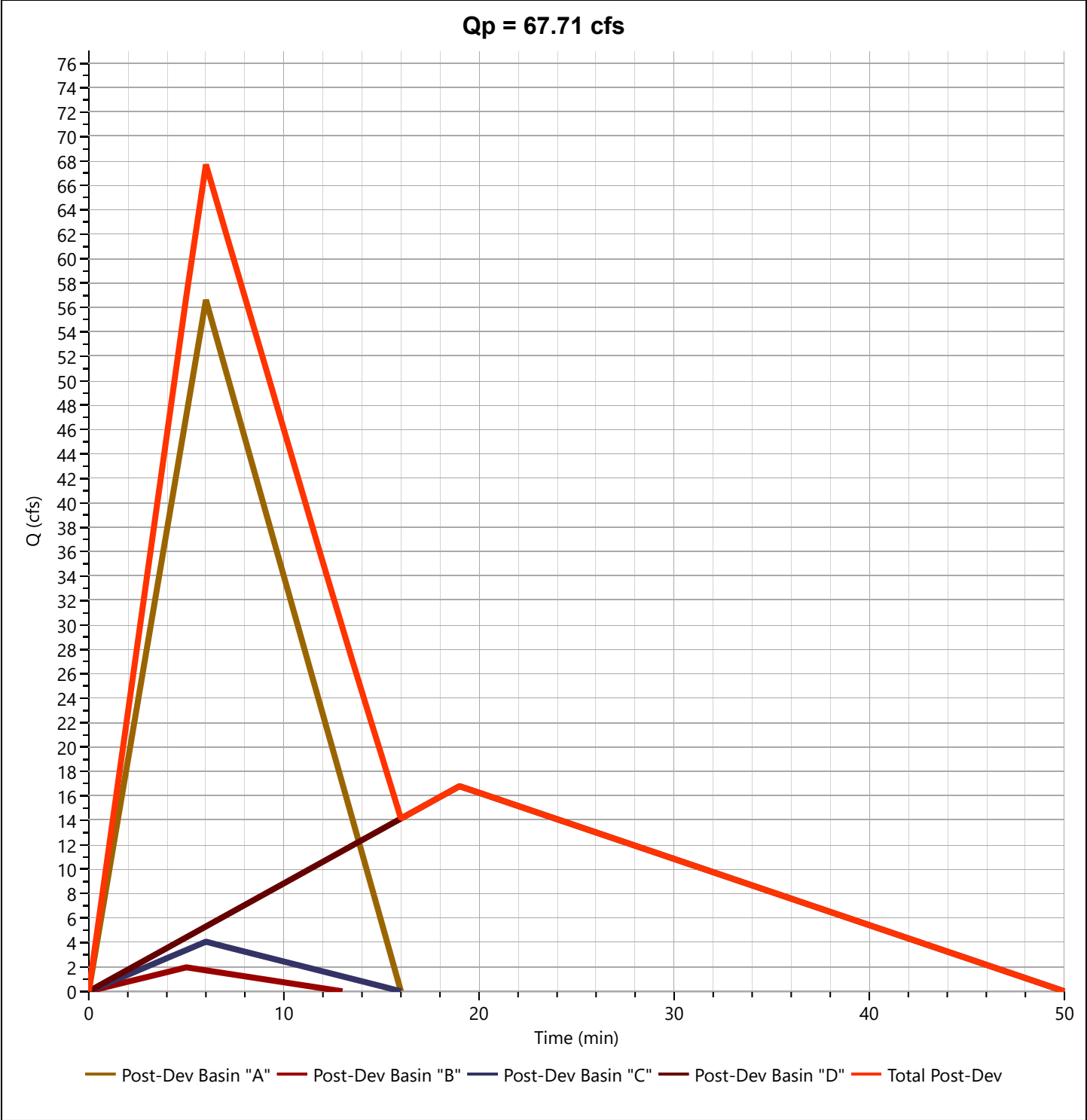
Hydrograph Type	= Rational	Peak Flow	= 16.80 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Runoff Volume	= 25,566 cuft
Drainage Area	= 3.9 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 5.67 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Post-Dev

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 67.71 cfs
Storm Frequency	= 50-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 55,095 cuft
Inflow Hydrographs	= 6, 7, 8, 9	Total Contrib. Area	= 10.83 ac



Hydrograph 100-yr Summary

Project Name: Collective Church

Hydrology Studio v 3.0.0.27

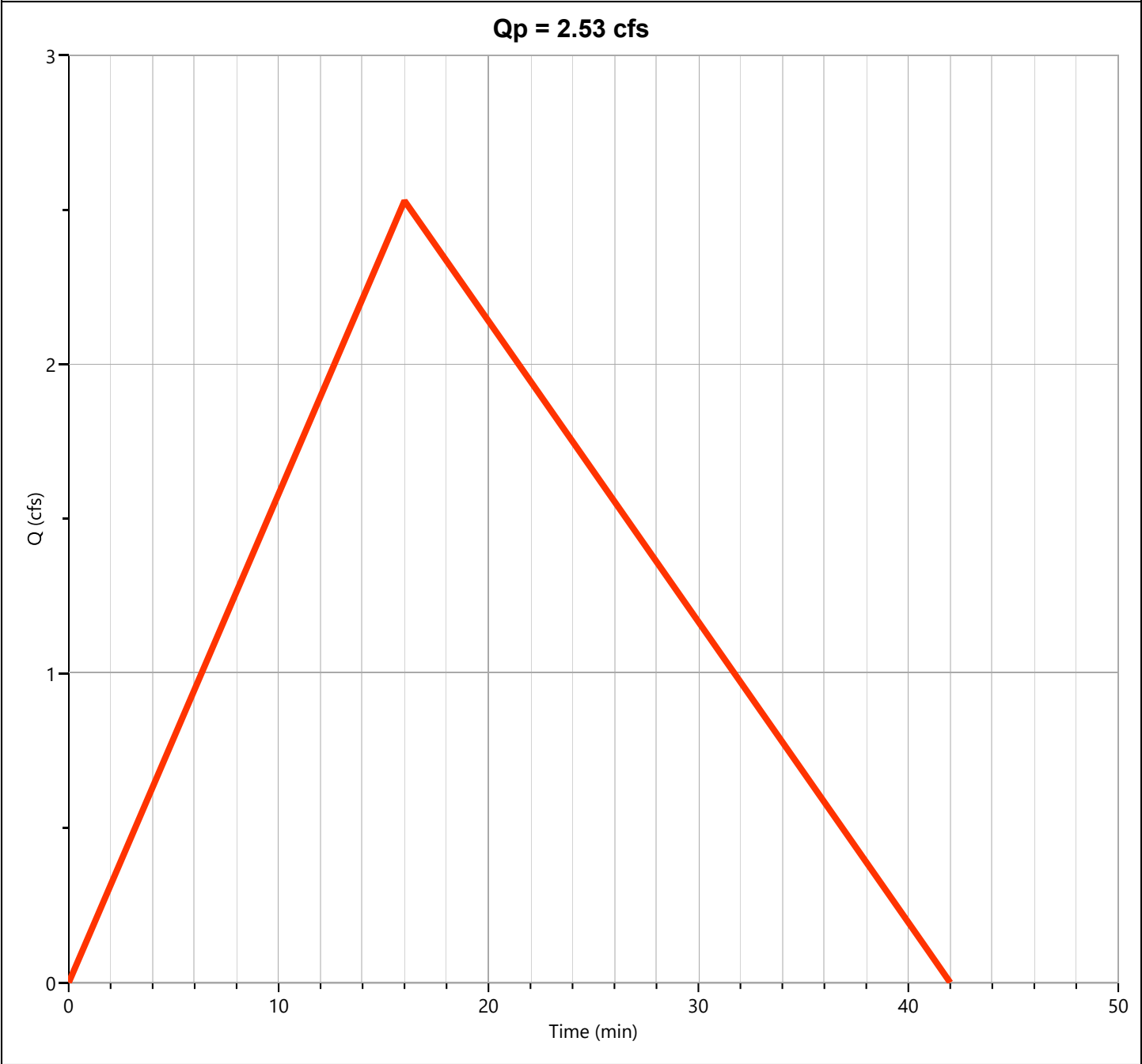
05-02-2025

[illegible]

Pre-Dev Basin "A"

Hyd. No. 1

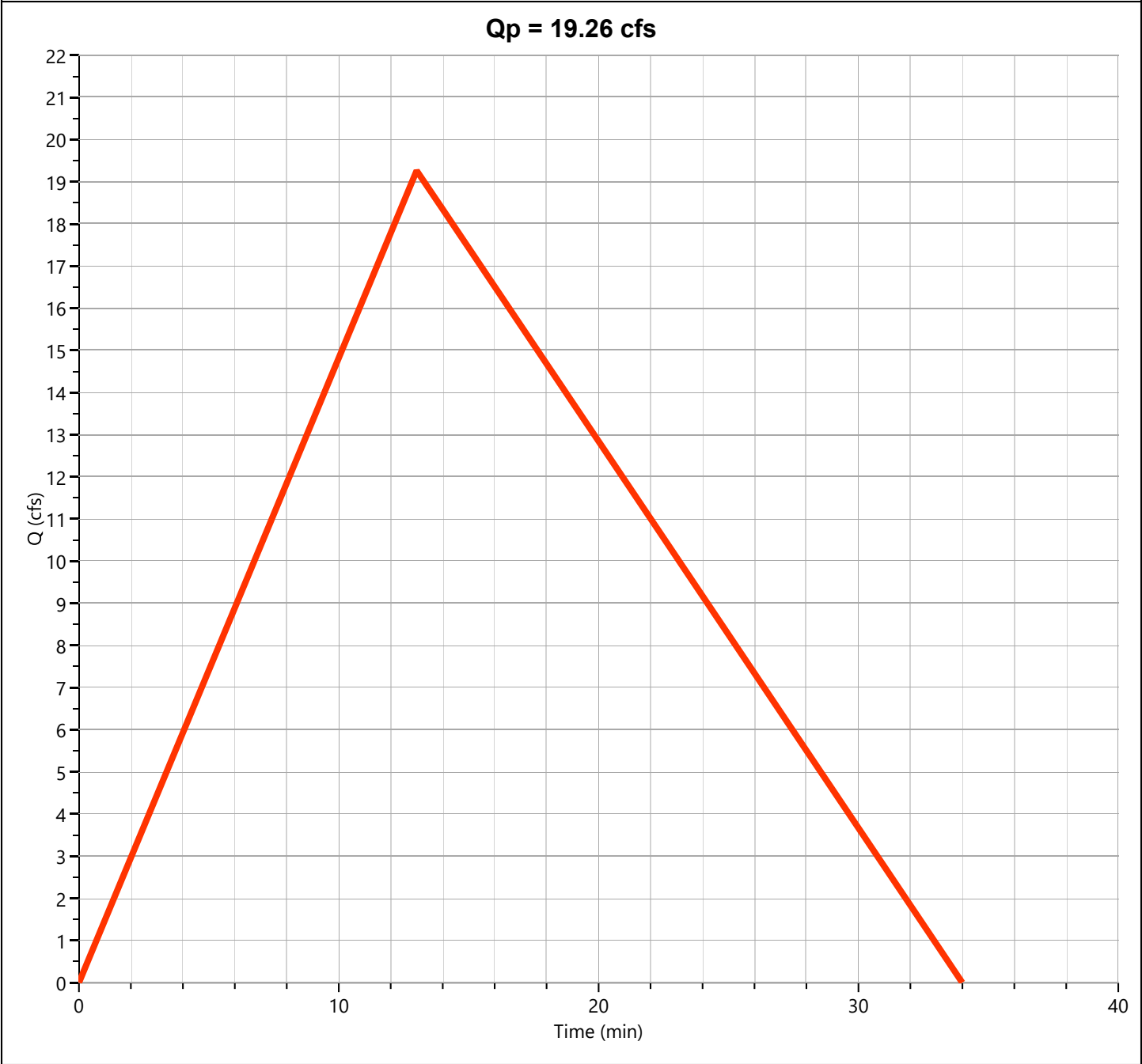
Hydrograph Type	= Rational	Peak Flow	= 2.529 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.27 hrs
Time Interval	= 1 min	Runoff Volume	= 3,242 cuft
Drainage Area	= 0.81 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.64 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "B"

Hyd. No. 2

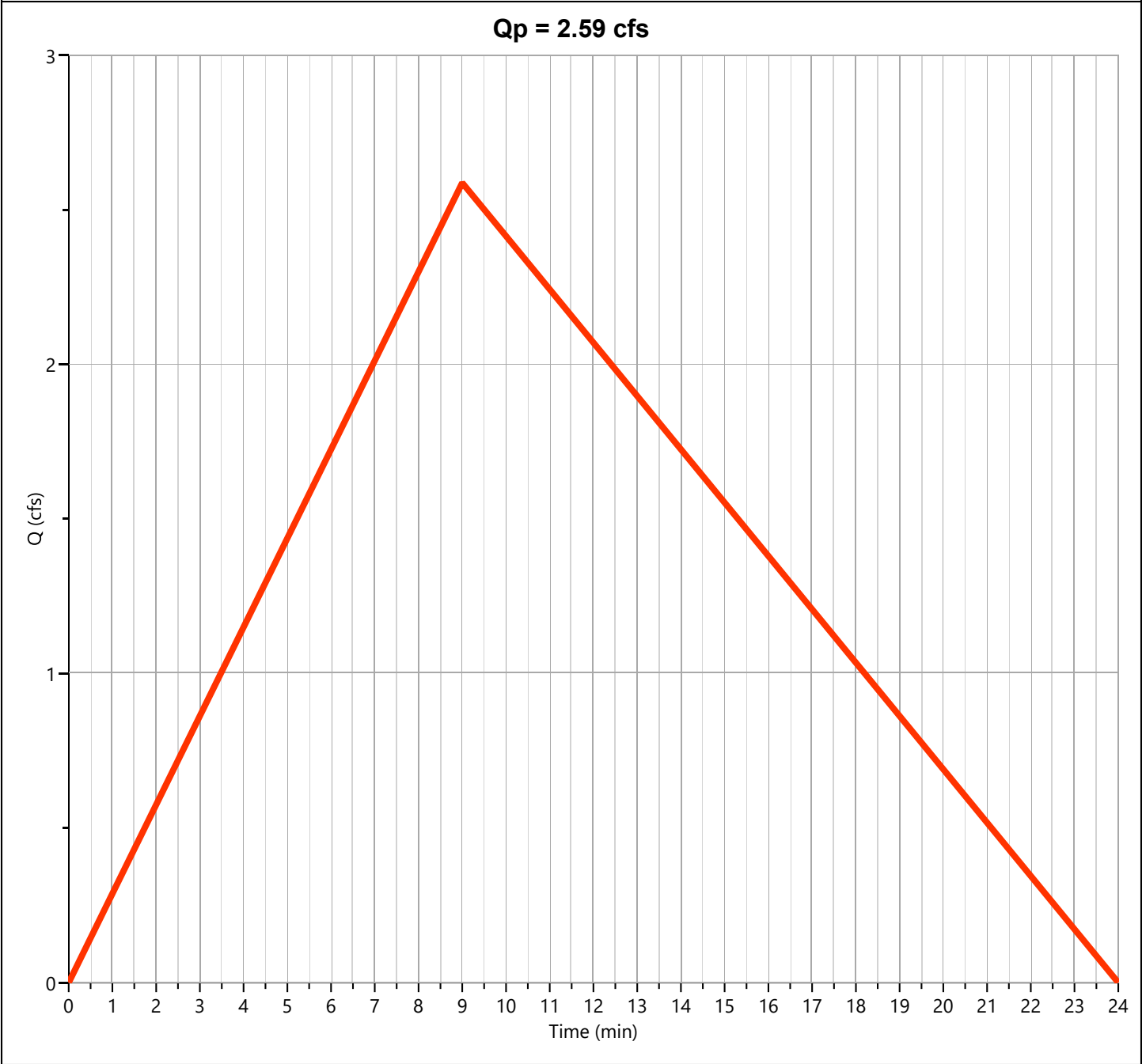
Hydrograph Type	= Rational	Peak Flow	= 19.26 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Runoff Volume	= 20,059 cuft
Drainage Area	= 5.62 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 13.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 7.29 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "C"

Hyd. No. 3

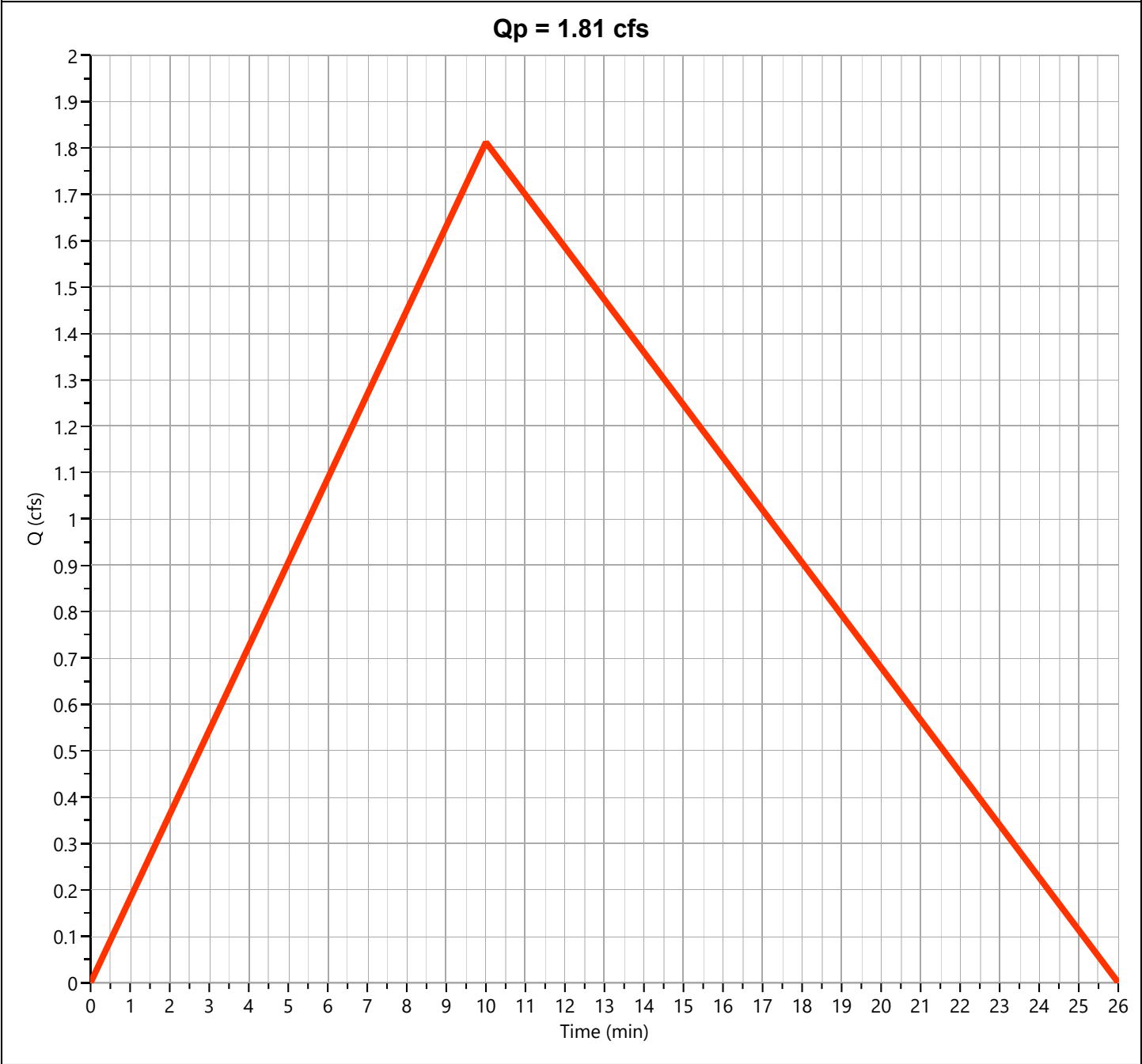
Hydrograph Type	= Rational	Peak Flow	= 2.588 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,865 cuft
Drainage Area	= 0.64 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 9.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 8.60 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Pre-Dev Basin "D"

Hyd. No. 4

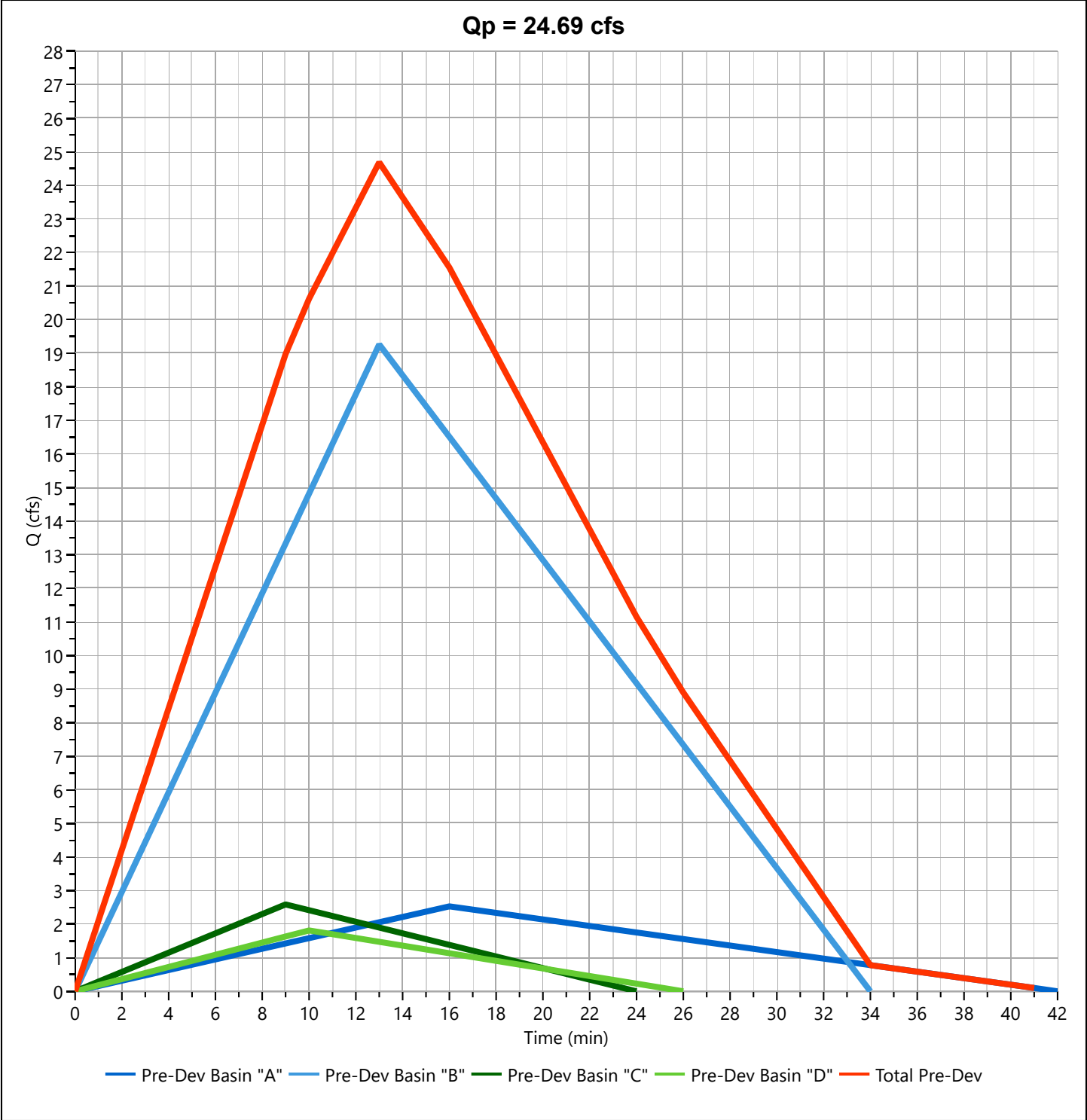
Hydrograph Type	= Rational	Peak Flow	= 1.812 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,452 cuft
Drainage Area	= 0.47 ac	Runoff Coeff.	= 0.47
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 8.20 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Pre-Dev

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 24.69 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 26,112 cuft
Inflow Hydrographs	= 1, 2, 3, 4	Total Contrib. Area	= 7.54 ac



Hydrograph Report

Project Name: Collective Church

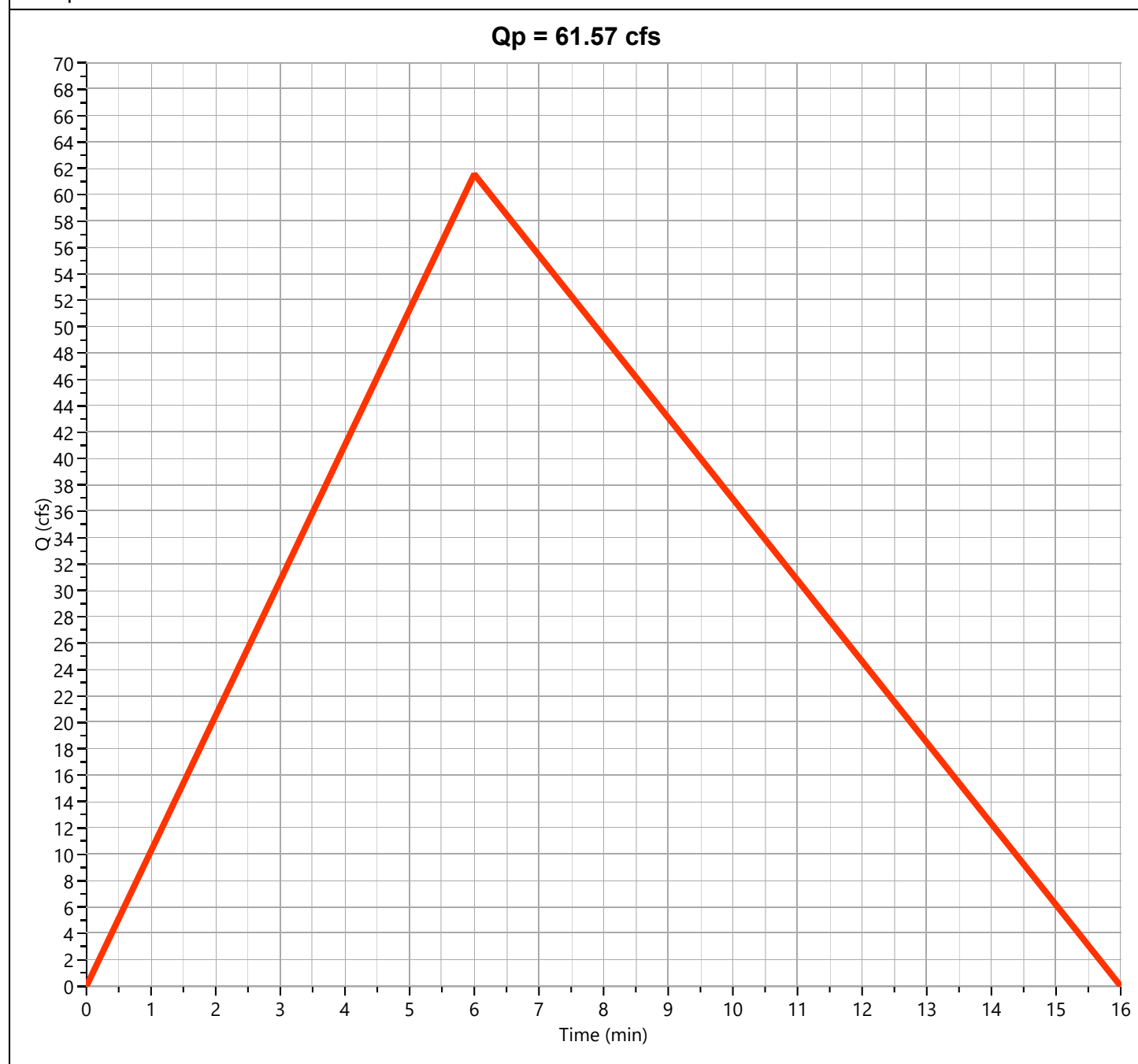
Hydrology Studio v 3.0.0.27

05-02-2025

Post-Dev Basin "A"

Hyd. No. 6

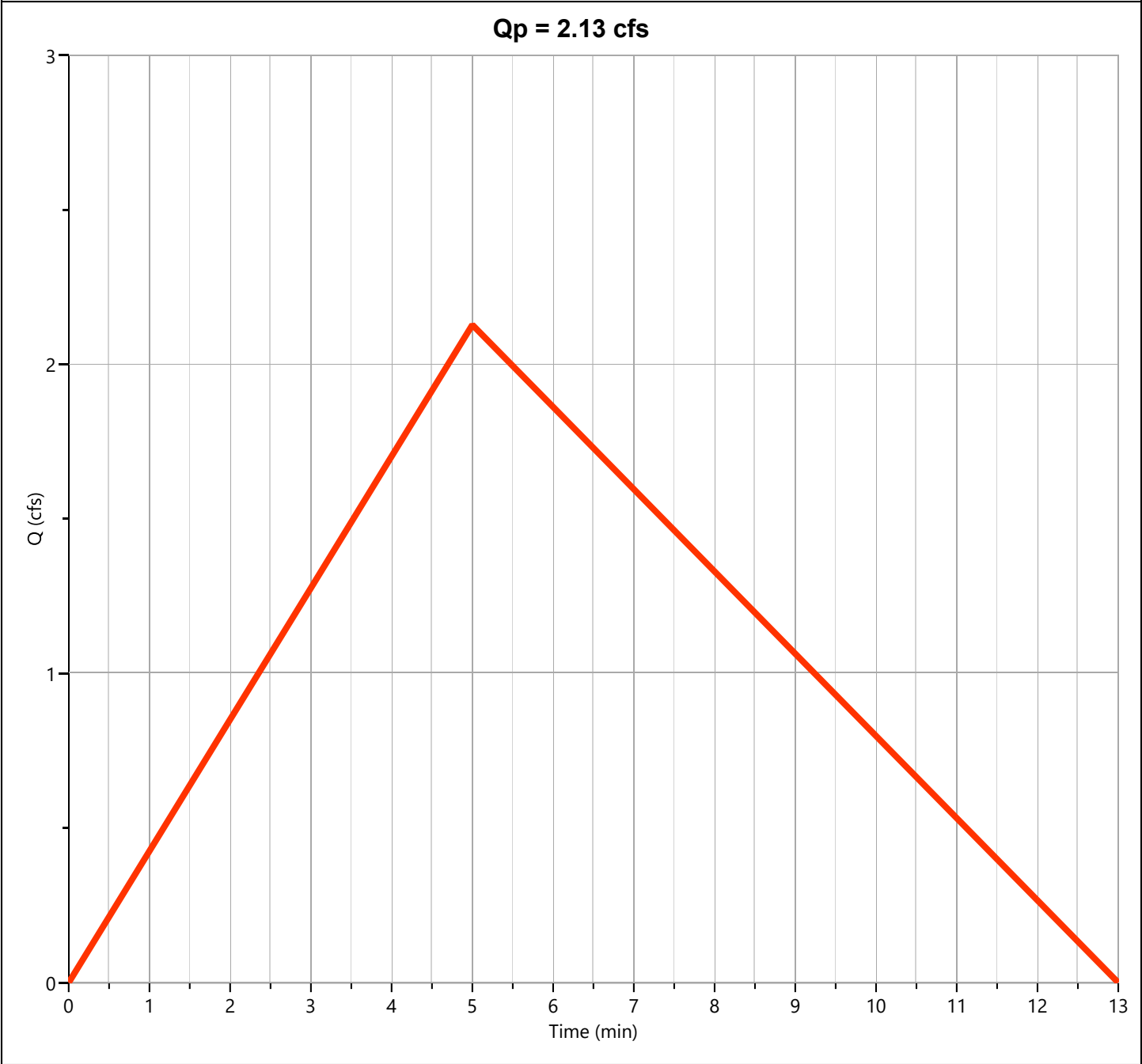
Hydrograph Type	= Rational	Peak Flow	= 61.57 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 29,589 cuft
Drainage Area	= 6.28 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 10.32 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "B"

Hyd. No. 7

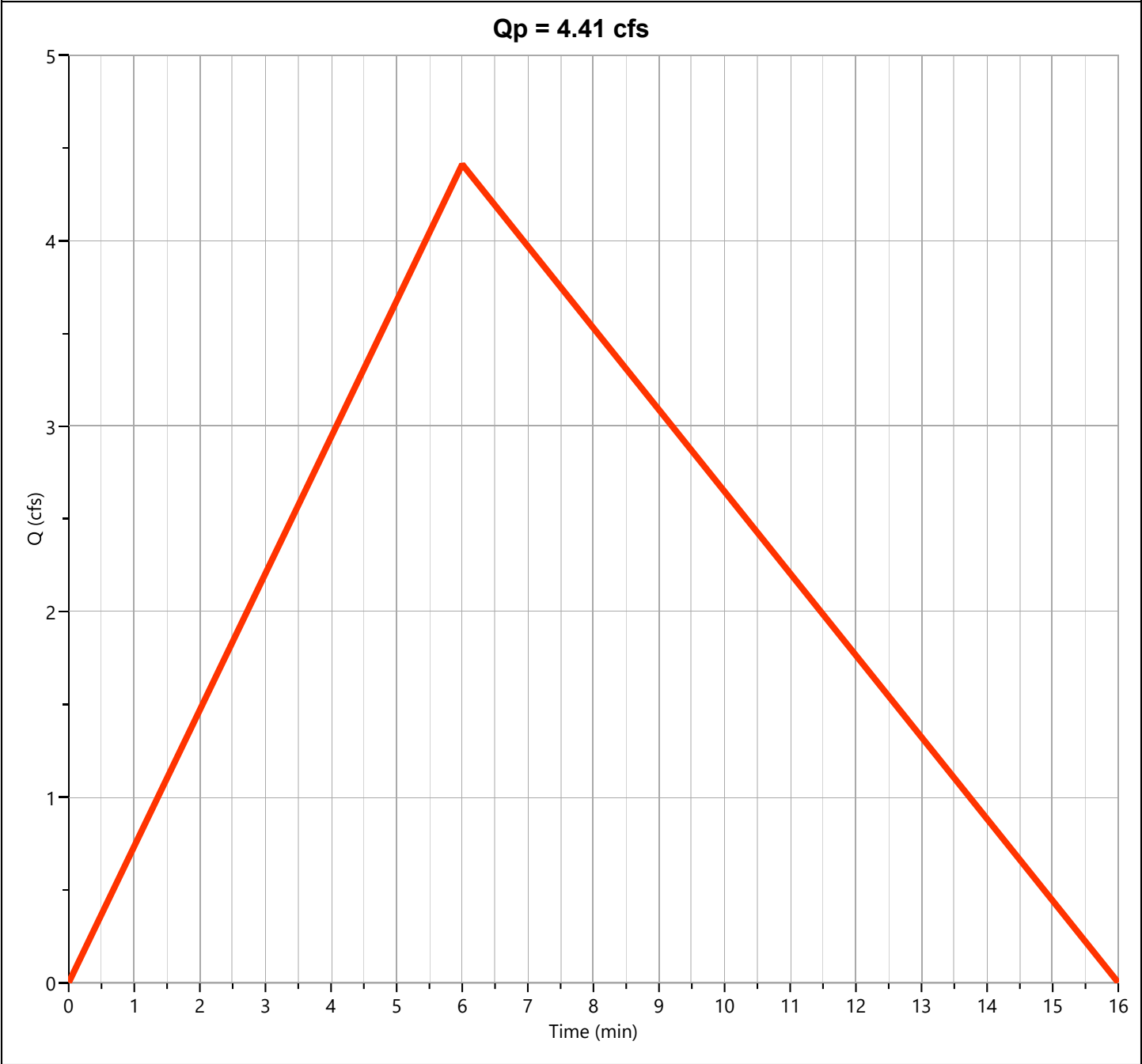
Hydrograph Type	= Rational	Peak Flow	= 2.128 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.08 hrs
Time Interval	= 1 min	Runoff Volume	= 852 cuft
Drainage Area	= 0.2 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 11.20 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "C"

Hyd. No. 8

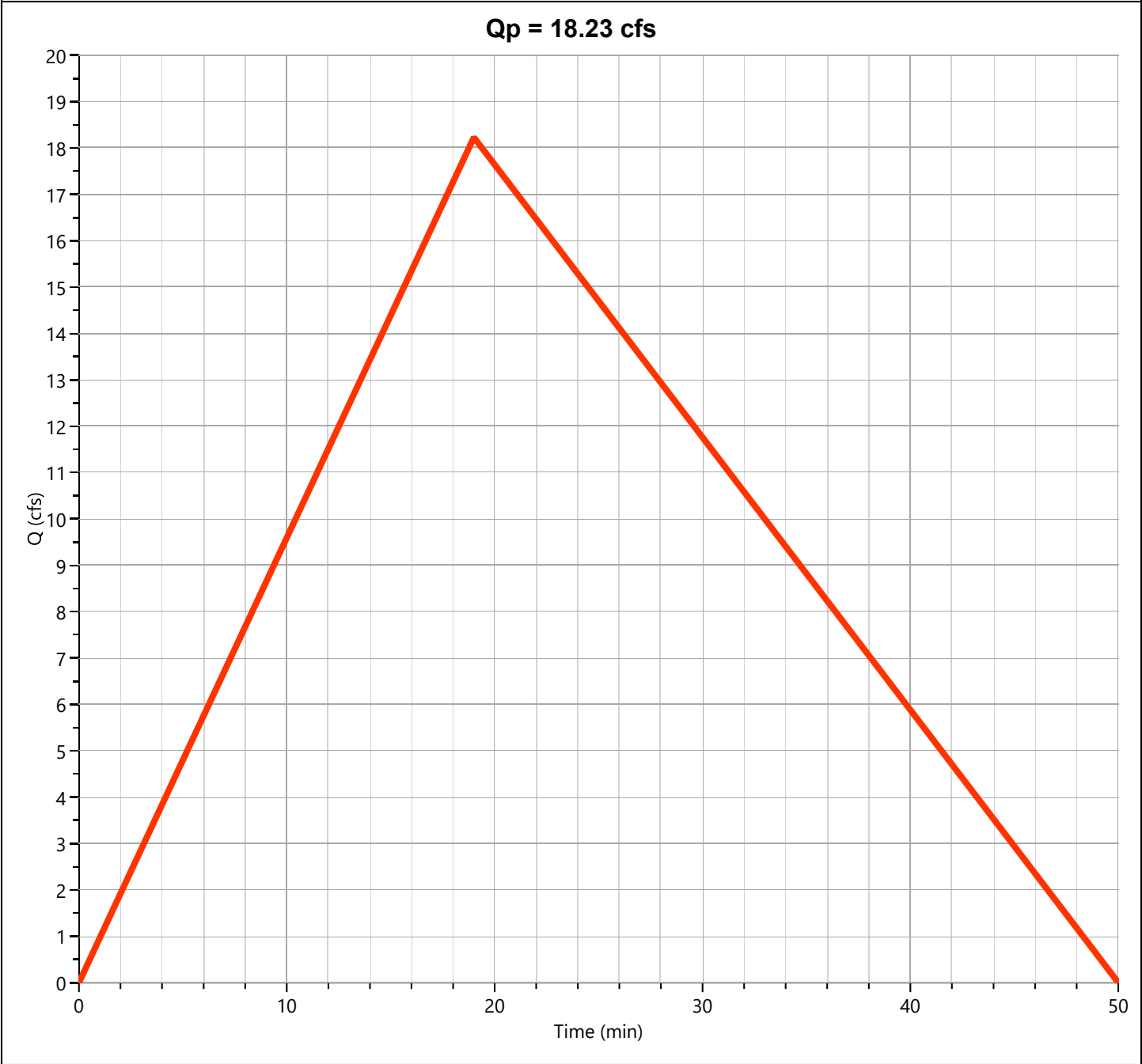
Hydrograph Type	= Rational	Peak Flow	= 4.412 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,120 cuft
Drainage Area	= 0.45 ac	Runoff Coeff.	= 0.95
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 10.32 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Post-Dev Basin "D"

Hyd. No. 9

Hydrograph Type	= Rational	Peak Flow	= 18.23 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Runoff Volume	= 27,744 cuft
Drainage Area	= 3.9 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
IDF Curve	= City of Bryant IDF Curve.idf	Intensity	= 6.15 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1.67



Total Post-Dev

Hyd. No. 10

