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March 18, 2022
A21D0758

TO: **City of Lansing**

SUBJECT: Preliminary Stormwater Management Study

PROJECT: Gillman Road Business Park

Introduction

This Preliminary Stormwater Management Study was prepared to provide the city of Lansing, Kansas with the preliminary drainage calculations prepared for the proposed Gillman Road Business Park.

The proposed improvements include the development of 28.41 Acres of grass land into light industrial use. Above ground runoff and storm sewer will be used to direct runoff to an on-site detention pond to keep the Post-development stormwater discharge below the Pre-development.

Stormwater Design Criteria

The project site stormwater runoff was calculated using the Soil Conservation Service (SCS) Runoff Curve Number method using the 10 year and 100 year 24-hour Type II rainfall event to size the detention pond release rate. Rational method was used to ensure the proposed storm sewer can handle the 25year storm event, see attached for design sizing and recorded data.

On-Site Stormwater Detention Structures

As mentioned above detention will be provided by a surface detention basin located on the north side of the project. The proposed detention basin will discharge through a 5'x5' stormwater structure set over the existing 36" storm pipe that discharges to a curb inlet to the northwest of the site.

Surface Detention Pond

- Basins top elevation – 844.00
- Basins bottom elevation – 834.86
- Outlet structure primary discharge orifice – 14"-inch diameter @ elevation 835.00
- Emergency riser overflow elevation – 842.5
- Secondary Overflow Weir – 843.00

Total Actual Detention Provided = 176,674 CF (100 yr Design Storm)

See the attached Hydraflow Hydrograph reports for complete design information and detention pond reports.

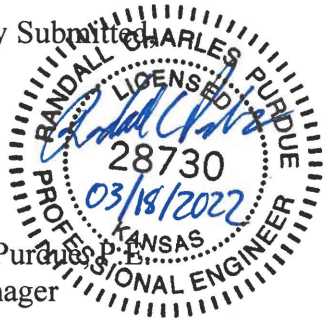
Table 1: Total Site Release Rate

Design Storm	A	B	C
	Total Pre-development runoff	Total Post-development runoff	Difference Between Pre and Post
	(cfs)	(cfs)	(cfs)
	Hydrograph #1	*Hydrograph #5*	*A - B*
10 yr	64.96	63.53	1.43
100 yr	118.93	101.67	17.26

Conclusion

The stormwater detention facilities will effectively capture on-site storm water flows to slow the runoff
post-development from the 10-year storm and 100-year storm to be below the runoff from the pre-development.
The proposed onsite storm sewer was sized to handle to 25-year storm event. Do not hesitate to contact me if you have any comments or questions.

Respectfully Submitted,
Sincerely,



Randall C. Purdue, P.E.
Project Manager

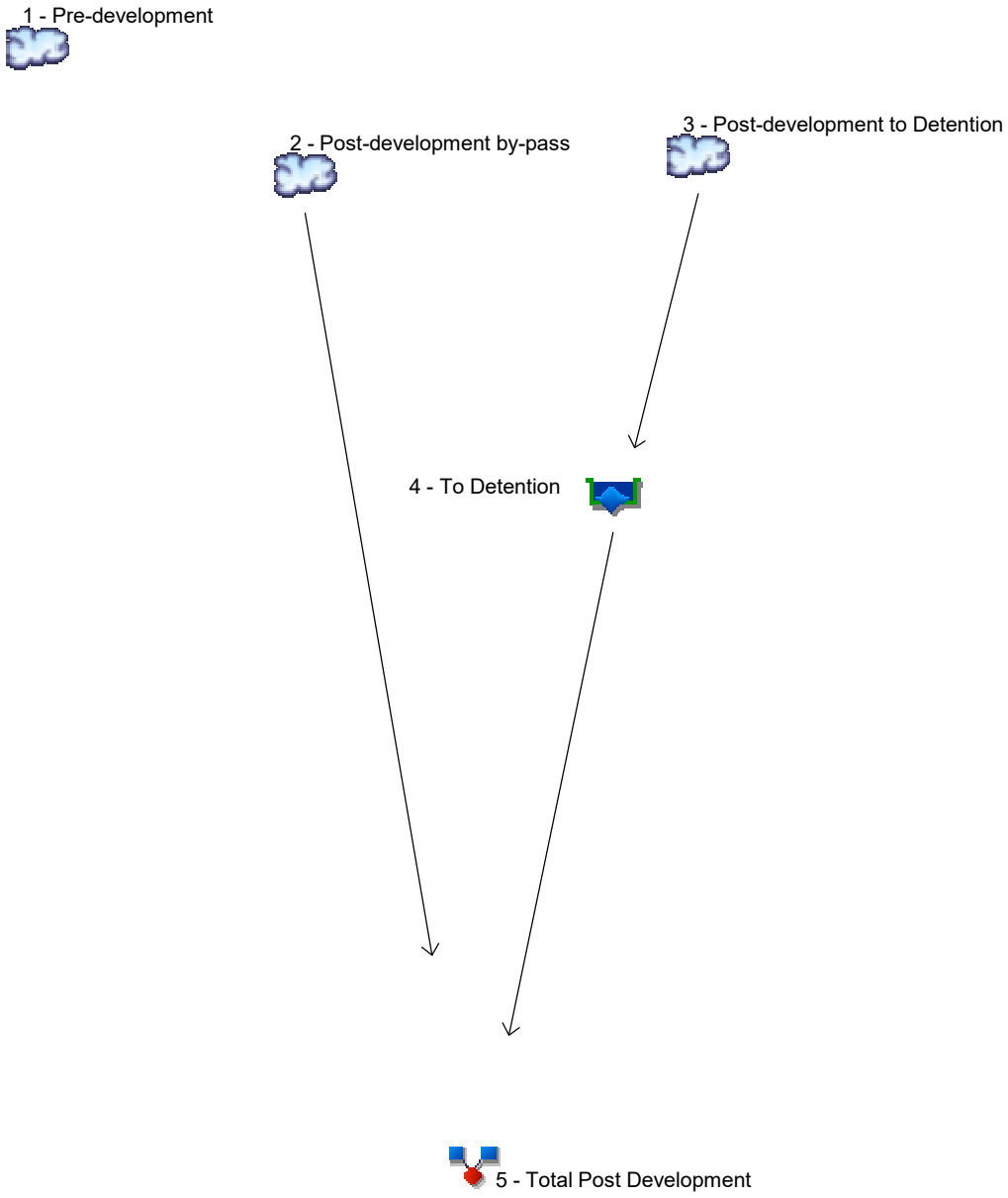
RCP:bt
\\VMJC-FILE\Projects\A21_0758\DSN\Drainage\Report_22-0318 Preliminary Stormwater Management Study For .Docx

Attachments: Hydraflow Hydrographs Report Pages
Hydraflow Storm Sewer Report Pages

Hydraflow Hydrographs Report Pages

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

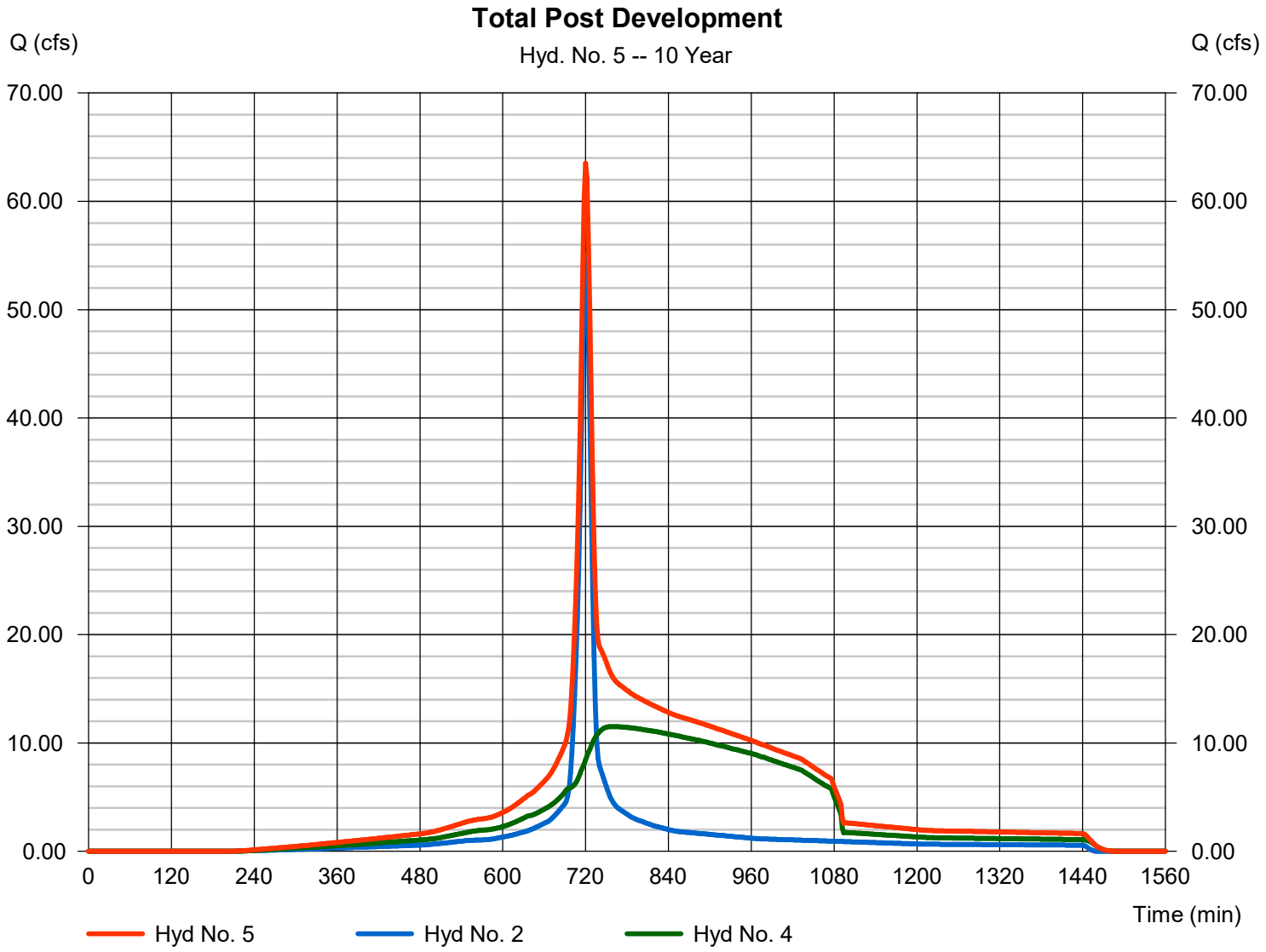
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	70.68	2	736	342,557	------	------	------	Pre-development
2	SCS Runoff	55.11	2	720	150,630	------	------	------	Post-development by-pass
3	SCS Runoff	75.45	2	728	287,112	------	------	------	Post-development to Detention
4	Reservoir	11.51	2	760	287,105	3	841.16	114,395	To Detention
5	Combine	63.53	2	720	437,735	2, 4	------	------	Total Post Development

Hydrograph Report

Hyd. No. 5

Total Post Development

Hydrograph type	= Combine	Peak discharge	= 63.53 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 437,735 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 9.480 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

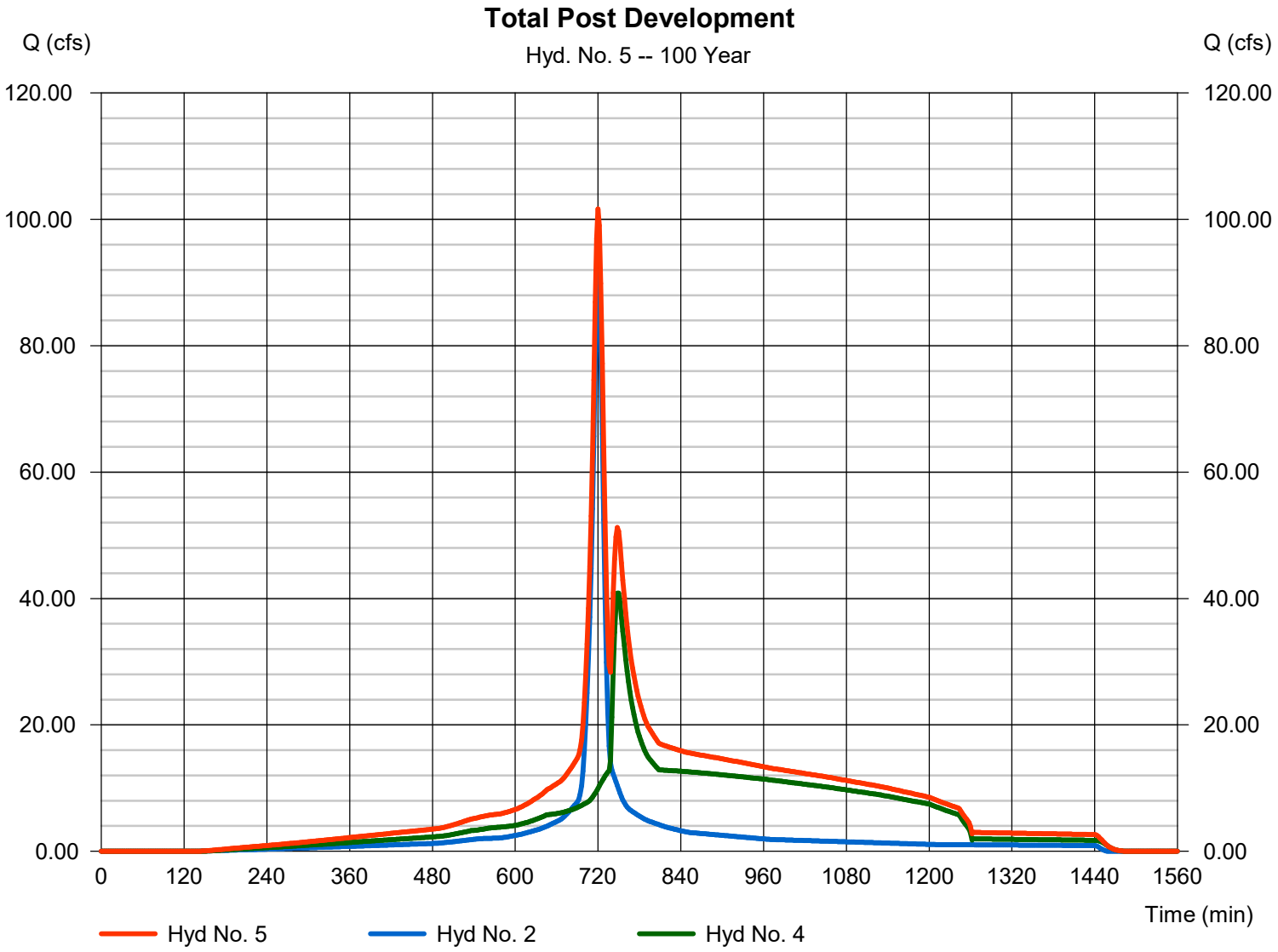
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	130.56	2	736	640,603	------	------	------	Pre-development
2	SCS Runoff	91.72	2	720	258,704	------	------	------	Post-development by-pass
3	SCS Runoff	126.02	2	728	493,109	------	------	------	Post-development to Detention
4	Reservoir	40.84	2	750	493,102	3	843.04	196,307	To Detention
5	Combine	101.67	2	720	751,807	2, 4	------	------	Total Post Development

Hydrograph Report

Hyd. No. 5

Total Post Development

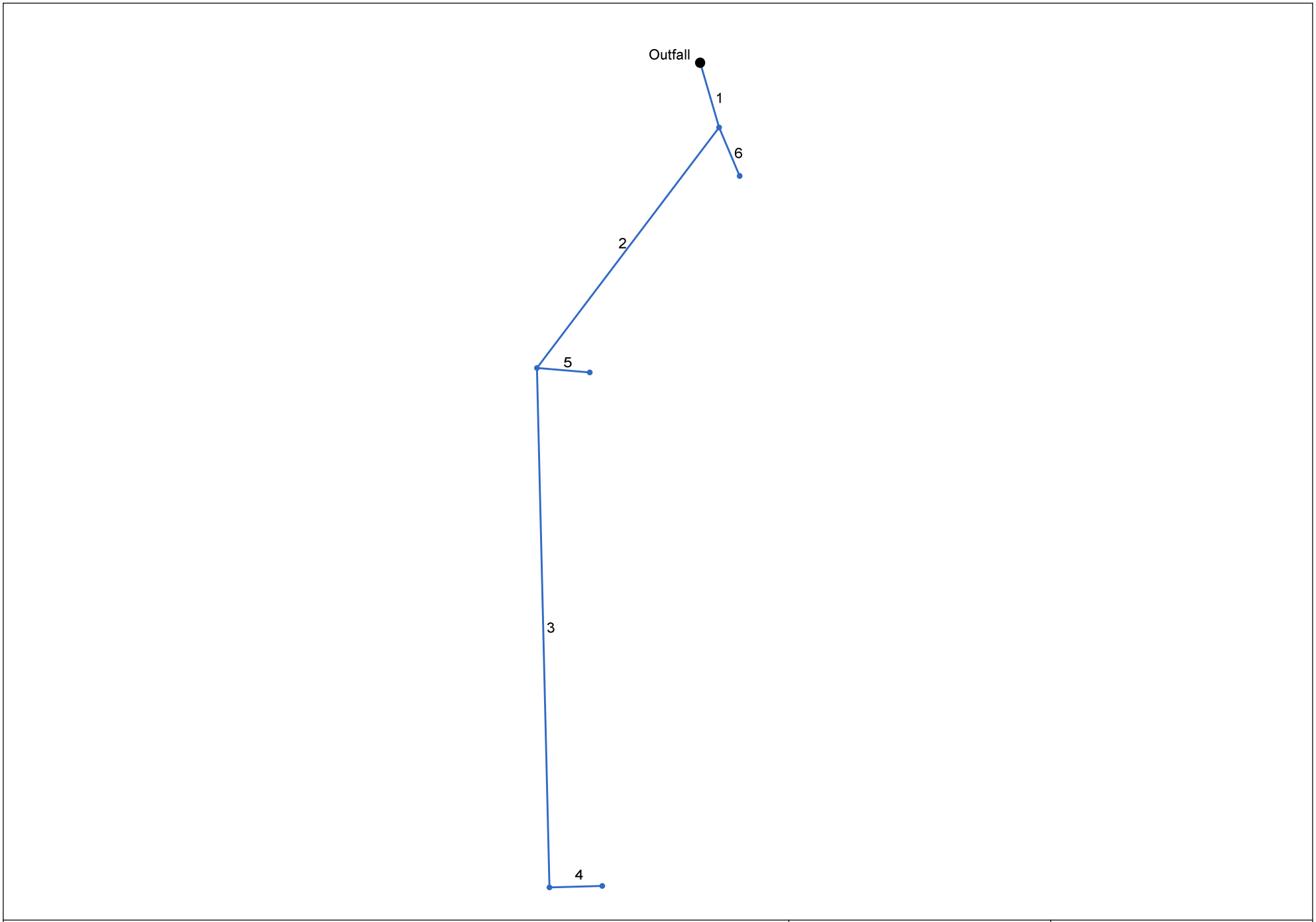
Hydrograph type	= Combine	Peak discharge	= 101.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 751,807 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 9.480 ac



Hydraflow Table of Contents

Hydraflow Storm Sewer Report Pages

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: 0758STORM_2022-03-17.stm	Number of lines: 6	Date: 3/17/2022

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (4)	49.72	30	Cir	52.545	840.00	842.47	4.702	841.50	844.77	n/a	844.77	End	DropCurb
2	Pipe - (3)	38.04	30	Cir	234.891	842.97	848.00	2.141	844.77	850.08	1.77	850.08	1	DropCurb
3	Pipe - (2)	17.14	24	Cir	405.102	848.50	859.65	2.753	850.08	861.14	n/a	861.14 j	2	DropCurb
4	Pipe - (1)	10.68	18	Cir	41.000	860.15	860.77	1.513	861.14	862.02	n/a	862.02	3	DropCurb
5	A3 TO A3.1	17.80	24	Cir	41.000	848.50	849.50	2.441	850.08	851.02	n/a	851.02 j	2	DropCurb
6	A2 A2.1	11.27	18	Cir	41.000	843.35	843.97	1.514	844.77	845.25	n/a	845.25 j	1	DropCurb

Project File: 0758STORM_2022-03-17.stm | Number of lines: 6 | Run Date: 3/17/2022

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.