

TRI-STATE GENERATION & TRANSMISSION, INC.

CROSSPOINT SUBSTATION FINAL DRAINAGE REPORT

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Prepared by:



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TRI-STATE GENERATION & TRANSMISSION, INC.

CROSSPOINT SUBSTATION FINAL DRAINAGE REPORT

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.



04/27/2026

Date

David Schieldt
Registered Professional Engineer
State of Colorado No. 47195

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

A handwritten signature in black ink, appearing to read "H. Steven Gray".

5/4/2026

Date

H. Steven Gray
Vice President, Land, Water, and Environmental Resources
Tri-State Generation and Transmission Association
1100 W. 116th Ave
Westminster, CO 80234

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua J. Palmer, P.E.
County Engineer / ECM Administrator

Date



TABLE OF CONTENTS

1.0	General Location and Description	1-1
1.1	Site Location	1-1
1.2	Site Description	1-1
2.0	Drainage Basins and Sub-Basins	2-1
2.1	Existing Drainage Sub-Basins	2-1
2.2	Proposed Drainage Sub-Basins	2-1
3.0	Drainage Design Criteria	3-1
3.1	Methodology	3-1
3.2	Land Cover Hydrologic Properties	3-1
3.3	Weighted Design Values	3-1
4.0	Drainage Facility Design	4-1
4.1	Historical Drainage	4-1
4.2	Proposed Drainage	4-1
5.0	Conclusions	5-1
5.1	Drainage Concept	5-1
5.2	Compliance with Common Practices	5-1
5.3	Four Step Process	5-2
5-2	Cost Estimate	5-3
6.0	References	6-1

Appendix A – Site Specific Physical Design Properties

Appendix B – SWMM Modeling Results

Appendix C – Site Maps & Design Drawings



1.0 General Location and Description

Tri-State Generation and Transmission (TSGT) in coordination with Del-Mont Consultants, Inc. (DMC) is in the process of designing a new substation yard. The scope of work includes the construction of the substation yard, driveway, detention pond and swales, installation of new perimeter fence, and the addition of high voltage electrical equipment and facilities. The purpose of this report is to present the findings from the hydrologic and hydraulic analyses that were performed on the existing property as well as present the results from a detailed analysis performed on the proposed improvements to the property.

1.1 Site Location

The proposed substation yard is located on a 81.67-acre parcel owned by TSGT, situated in the SE ¼ of Section 8, Township 14 South, Range 61 West, 6th Principal Meridian in El Paso County, Colorado. The substation site is accessed from N Lauppe Road. The site is in the Upper Pond Creek Drainage Basin.

1.2 Site Description

The site naturally drains to the south and is currently covered in various grasses. There are currently no features on the site to provide water quality or quantity treatment for discharge from the site. Site layout details will be discussed in more detail in **Section 2**.

There are currently no developments on the properties neighboring the site. No wetlands are present on the site and the site is not located within a floodplain per FIRM Map Number 08041C0875G.

To the knowledge of Del-Mont Consultants, no prior drainage studies have been conducted on this property.

2.0 Drainage Basins and Sub-Basins

The property functions as four small drainage basins, flowing to the south overland to Pond Creek, ultimately flowing into the Arkansas River. Proposed conditions produce several smaller sub-basins and will be discussed in detail in the following sections.

2.1 Existing Drainage Sub-Basins

The existing site was analyzed as four basins. A map illustrating the delineation of the existing property can be found in **Appendix C**. There are no developments on the neighboring properties. **Table 2-1** presents the existing basin and its corresponding acreage.

Table 2-1: Existing Basin Acreages

Sub-Basin	Total Area (Acres)
E1	31.82
E2	15.06
E3	26.94
E4	7.85

Currently, the existing subbasins experience unrestricted overland flow with no drainage detention measures in place. E1 generally drains to the southwest along North Lauppe Rd. E2 drains to the south into a low spot near the southern property line. E3 drains from the east and west into a depression that runs north/south. E4 drains offsite to the west beyond the western property line.

2.2 Proposed Drainage Sub-Basins

The proposed conditions will produce several different sub-basins. The proposed site is divided into 17 different sub-basins. The substation yard accounts for 10 of the basins (Y 1-10), which were broken out separately to size the subdrain pipes. The proposed undisturbed areas make up 4 basins (P 1-4), and the detention pond is a subbasin (EDB-1). The sloped grading away from the substation and the drainage swales will be an excluded subbasin (EXCL-1) per EPC ECM Appendix I.7.1.B.7, as this area is undeveloped land that will remain undeveloped. The access roads will be an excluded subbasin (EXCL-2) per ECM Appendix I.7.1.C.1.A, as this area is less than 1% of the total site area and totals less than 1 acre.

A map illustrating the delineation of the sub-basins can be found in **Appendix C**. The yard areas and the detention pond will be treated. The Proposed basins will follow historical discharge patterns, with a swale and culvert to direct flows under the access driveway. The run-on flows are minimal and will have negligible effects on the site. Most of the proposed basins will not be disturbed during construction and will not require water quality treatment. The disturbed areas of the proposed basins will be reseeded. **Table 2-2** presents the proposed sub-basins and their corresponding acreages.

Table 2-2: Proposed Sub-Basin Acreages

Sub-Basin	Total Area (Acres)
Y1	1.02
Y2	1.02
Y3	0.99
Y4	0.99
Y5	0.49
Y6	0.49
Y7	1.21
Y8	1.07
Y9	1.17
Y10	1.17
EDB-1	1.02
P1-N	21.25
P1-S	5.26
P2	8.54
P3	25.42
P4 (Unanalyzed)	7.85
EXCL-1	2.12
EXCL-2	0.48

3.0 Drainage Design Criteria

3.1 Methodology

The hydrologic/hydraulic analysis of the site was performed using the Autodesk Storm and Sanitary analysis utilizing the Rational Method model for a 5-year and a 100-year rainfall event. Runoff Coefficients were obtained from El Paso County Drainage Criteria Manual Volume 1 Update, Chapter 6, Section 3.1, Table 6-6. Rainfall Intensity was obtained from EPC DCM Volume 1 Update, Figure 6-5. Modeling results are presented in **Appendix B**.

The Mile High Flood District *Detention Basin Design Workbook* was utilized to determine the required water quality capture volume (WQCV) and detention and to aid in the design the outlet structure. The spreadsheets/worksheets can be found in **Appendix A** and are discussed in more detail in **Section 4.0**.

Soil data was obtained from a Geotechnical Study provided by Terracon and gives a hydrologic soil group B for the site.

The described methods/tools used in the analysis, are in accordance with common engineering practices and guidelines.

3.2 Land Cover Hydrologic Properties

Runoff Coefficients and Percent Impervious numbers, for hydrologic soil group B, were assigned to the various land cover types found on the project, both existing and proposed, and are presented in **Table 3-1**. Runoff coefficients were obtained from Table 6-6, Section 3-1, EPC DCM Volume 1 Update.

Table 3-1: Land Cover Hydrologic Properties

Land Cover Type	Percent Impervious	Runoff Coefficient 5 Year	Runoff Coefficient 100 Year
Gravel	80	0.59	0.70
Historical Flow Analysis	2	0.09	0.36
Pond	100	0.90	0.96

3.3 Weighted Design Values

Utilizing the land cover hydrologic properties presented above, a weighted Runoff Coefficient and Percent Impervious value was calculated for each of the sub-basins, presented in **Section 2.0** to be used for analysis. **Table 3-2** presents the weighted design values for existing conditions and **Table 3-3** presents the weighted design values for proposed conditions. Detailed calculations can be found in **Appendix A**.

Table 3-2: Existing Sub-Basin Weighted Design Values

Sub-Basin	Total Area (Acres)	Weighted Percent Impervious	Weighted Runoff Coefficient 5 year	Weighted Runoff Coefficient 100 year
E1	31.82	2%	0.09	0.36
E2	15.06	2%	0.09	0.36
E3	26.94	2%	0.09	0.36
E4	7.85	2%	0.09	0.36

Table 3-3: Proposed Sub-Basin Weighted Design Values

Sub-Basin	Total Area (Acres)	Weighted Percent Impervious	Weighted Runoff Coefficient 5 year	Weighted Runoff Coefficient 100 year
Y1	1.02	80%	0.59	0.70
Y2	1.02	80%	0.59	0.70
Y3	0.99	80%	0.59	0.70
Y4	0.99	80%	0.59	0.70
Y5	0.49	80%	0.59	0.70
Y6	0.49	80%	0.59	0.70
Y7	1.21	80%	0.59	0.70
Y8	1.07	80%	0.59	0.70
Y9	1.17	80%	0.59	0.70
Y10	1.17	80%	0.59	0.70
EDB-1	1.02	100%	0.90	0.96
P1-N	21.25	2%	0.09	0.36
P1-S	5.26	2%	0.09	0.36
P2	8.54	2%	0.09	0.36
P3	25.42	2%	0.09	0.36
P4	7.85	2%	0.09	0.36
EXCL-1	2.12	2%	0.09	0.36
EXCL-2	0.48	80%	0.59	0.70

4.0 Drainage Facility Design

4.1 Historical Drainage

Per common practice, the 100-year historical discharge value for the site shall be used to determine the allowable discharge from the site for the proposed conditions. Values presented in **Table 3-2** were used in the model to calculate a historical discharge rate for the existing property. **Table 4-1** presents the discharge rate for the existing property for both the 5-year and 100-year 1-hour storm events although the design is based on the 100-year discharge values.

Table 4-1: Existing Property Discharge Values

Sub-Basin	5-Year Discharge (CFS)	100-Year Discharge (CFS)
E1	7.59	50.95
E2	3.59	24.11
E3	6.40	42.91
E4	1.87	12.57

4.2 Proposed Drainage

Values presented in **Table 3-3** were utilized in the model to calculate the runoff for the proposed conditions. The Mile High Flood District *Detention Basin Design Workbook* was utilized to determine the WQCV in conjunction with the model to size the detention pond (EDB-1). Once the pond was sized, the Mile High Flood District *Detention Basin Design Workbook* was utilized to estimate required orifice sizes in the outlet structure to provide water quality treatment. The model was then used to verify all design elements of the pond and the outlet structure to ensure the pond not only retained the correct WQCV but to also discharge at or less than the required 100-year historic discharge rate presented in **Table 4-1** as well as drain the pond in less than the allowable time per State Requirements. The spreadsheet showing the detailed calculations can be found in **Appendix A**. The design of the outlet structure is detailed in the grading drawings.

The west drainage swales in subbasin EXCL-1 that will receive run-on flows were not analyzed as the contributing areas are extremely small. These swales are designed as a V-bottom swale with 4:1 side slopes, a minimum depth of 1 foot, and a flow line slope of 0.5%. The swale has a max flow capacity 20cfs, which will easily convey the negligible run-on flows.

The proposed detention pond (EDB-1) was designed to provide water quality treatment as well as detain the 100-year storm event while maintaining the required 1-foot of freeboard. The proposed detention pond stage-storage curve is presented in **Table 4-2**. The emergency spillway has been designed to convey the 100 year storm event, however the calculated 100 year water surface elevation is 1.5 feet below the emergency spillway.

Table 4-2: Detention Pond Stage-Storage Table

Elevation	Surface Area (Sq. Ft.)
6187.83 (Top of Micropool)	10
6188	10
6189	4,951
6190	19,823
6191	29,275
6192 (Spillway)	32,758
6193	36,021
6194 (Top of Bank)	39,455

The model of the proposed site conditions was utilized to calculate discharge flow rates from the outlet structure in order to size the pond discharge culvert. **Table 4-3** presents the hydraulic capacity of the culvert and the required capacity to discharge flow from the outlet structure for the 100-year event. Hydraulic calculations for the remainder of the piping systems and corresponding capacities are found in **Appendix B**.

Table 4-3: Outlet Pipe Hydraulic Capacity (100-year event)

Drainage Feature	Pipe Diameter (in)	Total Capacity (cfs)	Required Flow Capacity (cfs)	Remaining Capacity (cfs)
Pond Outlet	18	8.96	7.62	1.34

Table 4-4 presents the discharge rates for the proposed sub-basins for both the 5-year and 100-year 1-hour storm events prior to detention. This discharge value represents the flow rate that the pond is receiving. The discharge from the pond and other basins (total discharge from site) is summarized in **Table 5-1**.

Table 4-4: Proposed Sub-Basin Discharge Values (Pre-Detention)

Sub-Basin	5-Year Discharge (CFS)	100-Year Discharge (CFS)
Y1	2.40	4.79
Y2	2.40	4.79
Y3	2.36	4.69
Y4	2.36	4.69
Y5	1.19	2.38
Y6	1.19	2.38
Y7	2.91	5.79
Y8	2.57	5.13
Y9	2.73	5.44
Y10	2.71	5.39
EDB-1	3.79	6.79

Utilizing the flow rates presented above, the model was utilized to analyze the flow path of water through the piping and pond system. With the installation of the outlet structure, the pond was designed to pass both the 5-year and 100-year events, treat the required WQCV, and slowly release the water in the required length of time after the end of an event set forth by the State. The entire substation drains to the pond and the discharge rate leaving the pond is presented in **Table 5-1**.

Table 4-5 presents the hydraulic capacity of the subdrain pipes and the required capacity for the 100-year 1-hour storm event. These values were obtained from the SSA drainage model. Due to pipe cover grading constraints, subdrains could not be sized large enough to pass the 100-year storm event. This was determined not to be a major concern as all the surcharge times are less than five minutes and the overall system can handle a short term backup in the substation yard. A model schematic identifying each pipe can be found in **Appendix C**. Pipe slopes and inlet/outlet elevations can be found in the 'Link Summary' in **Appendix A**

Table 4-5: Subdrain Pipe Hydraulic Capacity (100-year event)

Subdrain (Link) ID	Pipe Diameter (in)	Total Capacity (cfs)	Required Flow Capacity (cfs)	Remaining Capacity (cfs)
1-15NP	15	6.06	4.75	1.31
2-18P	18	9.86	4.73	5.12
3-18NP	18	9.92	9.37	0.52
4-18NP	18	8.81	9.54	Surcharged <1m
5-15NP	15	6.02	4.66	1.37
6-18P	18	9.86	4.63	5.23
7-18NP	18	9.92	9.18	0.71
8-24NP	24	19.45	18.07	1.4
9-15P	15	8.01	2.35	5.66
10-30NP	30	17.33	18.75	Surcharged 4m
11-15NP	15	5.98	5.75	0.25
12-18P	18	9.86	5.71	4.14
13-24NP	24	21.37	10.64	10.66
14-15NP	15	6.06	5.40	0.67
15-18P	18	8.05	5.36	2.69
16-18NP	18	8.05	8.73	Surcharged 4m
17-18NP	18	8.05	8.71	Surcharged <1m
18-36NP	36	69.31	37.12	32.1

5.0 Conclusions

5.1 Drainage Concept

The drainage design has been prepared using sound engineering judgement and practices and will provide an effective means of controlling runoff on the project site as well as protect the site from damage. The design has been completed according to common engineering practices and will result in no downstream impacts to any people or structures. Historic flow paths, discharge rates, and water quality have been maintained or improved.

5.2 Compliance with Common Practices

Per common practices, the historical discharge rate from the 100-year storm shall be utilized to determine the allowable discharge rate for the proposed improvements. To demonstrate compliance with this requirement, both the existing and proposed conditions were combined into one overall sub-basin. **Table 5-1** presents the overall discharge rates for the overall basin as well as the individual basins.

Table 5-1: Overall Sub-Basin Discharge Values (Post Detention)

Basin	5-Year Discharge (CFS)		100-Year Discharge (CFS)	
	Existing	Proposed	Existing	Proposed
Yard Area (Y1-10 & EDB)	N/A	0.38*	N/A	5.78*
E1/P1**	7.59	6.76	50.95	47.13
E2/P2**	3.59	2.23	24.11	14.96
E3/P3**	6.40	6.04	42.91	40.56
E4/P4**	1.87	1.87	12.57	12.57
Total	19.45	17.34	130.54	122.84

*Value from MHFD-Detention Spreadsheet (Appendix A)

**Value from SSA Model

The proposed flows for the 5 and 100-year storm flows are less than the existing flows for the same storm events.

The detention pond was also sized according to UDFCD requirements to treat the WQCV, detain the 100-year event, maintain 1 foot of freeboard, and maintain historical discharge patterns resulting in no downstream impacts.

Inspections of the pond and outlet structure will be conducted by the owner on an annual basis as well as after large storm events. If deficiencies are identified or if maintenance is required, maintenance of the outlet structure will be performed by the owner of the property in an effort to return the structure to its original level of functionality. Maintenance may involve cleaning of sediment and debris from the facility, maintaining vegetation growth around the structure, and performing any additional maintenance required.

5.3 Four Step Process

The “Four Step Process” as recommended by the Urban Drainage Flood Control District has been addressed as follows:

Step 1 - Runoff Reduction

Runoff Reduction will be achieved by maintaining all perviousness in all areas not routed through the EDB. Any disturbance in these areas, including the construction of the swales, shall be reseeded and stabilized.

Step 2 – Stabilized Drainageways

All swales proposed on the site will be stabilized with grass cover and the use of Rip-Rap armoring will be implemented in areas of higher concentration and/or velocity. Riprap sizing and pond outlet swale calculations can be found in **Appendix A**.

Step 3 – Provide Water Quality Capture Volume

The detention pond and outlet structure on site have been designed to achieve WQCV. The Mile High Flood District *Detention Basin Design Workbook* was utilized to determine the required water quality capture volume (WQCV) and to aid in the design of the outlet structure. The spreadsheets/worksheets can be found in **Appendix A** and are discussed in more detail in **Section 4.0**. The design was then analyzed with Autodesk Storm and Sanitary analysis utilizing the Rational Method model for a 5-year and a 100-year rainfall event. Modeling results are presented in **Appendix B**.

Step 4 – Consider Need for Industrial and Commercial BMPs

The site has low potential for industrial pollution upon the completion of construction. The improved areas of the site that could see vehicular traffic are all routed through the detention pond system where it receives water quality treatment. The electrical equipment found inside of the yard also utilizes local containment basins to prevent the spilling of contaminants within the yard.

5.4 Cost Estimate

Line Item Description	Quantity	U.O.M.	Labor	Materials	Labor & Materials
D50=6" Rip Rap	85	SY	\$ 61.56	\$ 40.29	\$ 8,657.25
18" RCP Concrete Pipe	55	LF	\$ 123.47	\$ 48.28	\$ 9,446.25
18" RCP Concrete Pipe w/ Flared End Section	2	EA	\$ 1,262.59	\$ 759.20	\$ 4,043.58
6' Concrete Trickle Channel	227	LF	\$ 20.80	\$ 5.20	\$ 5,902.00
Concrete Outlet Structure, 5' X 6'-6" X 6'-8"	1	EA	\$10,324.00	\$ 830.00	\$11,154.00
Concrete Forebay, 19' X 16' X 2'	304	SQFT	\$ 20.00	\$ 15.00	\$10,640.00
EDB Access Road	404	CY	\$ 50.34	\$ 21.88	\$29,206.00
				TOTAL:	\$79,049.08

6.0 References

United States Department of Agriculture Natural Resources Conservation Service. Web Soil Survey

Mile High Flood District and Flood Control District. *Detention Basin Design Workbook*, Version 4.04, February 2021.

Urban Drainage and Flood Control District. *Urban Storm Drainage Criteria Manual*, Volume 1-3, June 2001.

El Paso County, Colorado, *Drainage Criteria Manual*, Volume 1-2, October 31, 2018

El Paso County, Colorado, *Engineering Criteria Manual*, December 13, 2016

Yeh and Associates, Inc. *Geotechnical Engineering Study, Crosspoint Substation. Yeh Project Number 221-290*. November 11, 2021

Appendix A

Site Specific Physical Design Properties



Crosspoint Drainage Design

Existing Conditions-5 Year

Area Name	Total Area		Flow Length	Slope (%)	TOC (min)
	(sf)	(acres)			
E1	1385995.8	31.82	500	2%	26.29
E2	656080.46	15.06	500	2%	26.29
E3	1173572.5	26.94	500	1%	26.56
E4	341751.69	7.85	300	2%	26.29

Land Cover Type	Percent Impervious	Runoff Coefficient
Historical Flow Analysis	2%	0.09
Gravel	80%	0.59
Pond	100%	0.9

Roughness Coefficient and Curve Number Analysis

E1						
	<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site		31.82	0.09	2.86	2%	64%
			sum	2.86		64%
Total Area (ac)		31.818	Weighted	0.09		2%
Weighted Runoff Coefficient		0.09				
Weighted Percent Impervious		2%				

E2						
	<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site		15.06	0.09	1.36	2%	30%
			sum	1.36		30%
Total Area (ac)		15.062	Weighted	0.09		2%
Weighted Runoff Coefficient		0.09				
Weighted Percent Impervious		2%				

E3						
	<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site		26.94	0.09	2.42	2%	54%
			sum	2.42		54%
Total Area (ac)		26.942	Weighted	0.09		2%
Weighted Runoff Coefficient		0.09				
Weighted Percent Impervious		2%				

E4						
	<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site		7.85	0.09	0.71	2%	16%
			sum	0.71		16%
Total Area (ac)		7.846	Weighted	0.09		2%
Weighted Runoff Coefficient		0.09				
Weighted Percent Impervious		2%				

Crosspoint Drainage Design

Proposed Conditions-5 Year

Area Name	Total Area		Flow Length	Slope (%)	TOC (min)
	(sf)	(acres)			
Y1	44288.27	1.02	180	1.25%	10.88
Y2	44288.27	1.02	180	1.25%	10.88
Y3	42940	0.99	170	1.25%	10.61
Y4	42940	0.99	170	1.25%	10.61
Y5	21548.35	0.49	70	1.25%	10.00
Y6	21306.61	0.49	140	1.25%	10.00
Y7	52742.59	1.21	160	1.25%	10.33
Y8	46782.44	1.07	160	1.25%	10.33
Y9	51068.27	1.17	190	1.25%	11.14
Y10	51068.27	1.17	190	1.25%	11.42
EDB-1	44613.98	1.02	40	3.00%	10.00
P1-N	959655.15	22.03	500	2.00%	26.29
P1-S	276731.97	6.35	450	2.00%	26.29
P2	406790.69	9.34	500	2.00%	26.29
P3	1108883.88	25.46	500	1.00%	25.56
P4 (Unchanged)	341751.69	7.85	300	2.00%	26.29

Land Cover Type	Percent Impervious	Runoff Coefficient
Historical Flow Analysis	2%	0.09
Gravel	80%	0.59
Pond	100%	0.9

Roughness Coefficient and Curve Number Analysis

Y1

Description	Total Area (ac)	Runoff Coefficient	A*C	Percent Impervious	A*%
Substation Yard (Gravel)	1.02	0.59	0.60	80%	81.3%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.60		81.3%
Total Area (ac)	1.02	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y2

Description	Total Area (ac)	Runoff Coefficient	A*C	Percent Impervious	A*%
Substation Yard (Gravel)	1.02	0.59	0.60	80%	81.3%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.60		81.3%
Total Area (ac)	1.02	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y3

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.99	0.59	0.58	80%	78.9%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.58		78.9%
Total Area (ac)	0.99	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y4

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.99	0.59	0.58	80%	78.9%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.58		78.9%
Total Area (ac)	0.99	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y5

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.49	0.59	0.29	80%	39.6%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.29		39.6%
Total Area (ac)	0.49	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y6

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.49	0.59	0.29	80%	39.1%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.29		39.1%
Total Area (ac)	0.49	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y7

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.21	0.59	0.71	80%	96.9%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.71		96.9%
Total Area (ac)	1.21	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y8

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.07	0.59	0.63	80%	85.9%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.63		85.9%
Total Area (ac)	1.07	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y9

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.17	0.59	0.69	80%	93.8%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.69		93.8%
Total Area (ac)	1.17	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

Y9

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.17	0.59	0.69	80%	93.8%
Native	0.00	0.09	0.00	2%	0.0%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.69		93.8%
Total Area (ac)	1.17	Weighted	0.59		80%
Weighted Runoff Coefficient	0.59				
Weighted Percent Impervious	80%				

EDB-1

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.00	0.59	0.00	80%	0.0%
Native	0.00	0.09	0.00	2%	0.0%
Pond	1.02	0.9	0.92	100%	102.4%
		sum	0.92		102.4%
Total Area (ac)	1.02	Weighted	0.90		100%
Weighted Runoff Coefficient	0.90				
Weighted Percent Impervious	100%				

P1-N

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.59	0.00	80%	0.0%
Native	22.03	0.09	1.98	2%	44.1%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	1.98		44.1%
Total Area (ac)	22.03	Weighted	0.09		2%
Weighted Runoff Coefficient	0.09				
Weighted Percent Impervious	2%				

P1-S

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.59	0.00	80%	0.0%
Native	6.35	0.09	0.57	2%	12.7%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.57		12.7%
Total Area (ac)	6.35	Weighted	0.09		2%
Weighted Runoff Coefficient	0.09				
Weighted Percent Impervious	2%				

P2

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.59	0.00	80%	0.0%
Native	9.34	0.09	0.84	2%	18.7%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.84		18.7%
Total Area (ac)	9.34	Weighted	0.09		2%
Weighted Runoff Coefficient	0.09				
Weighted Percent Impervious	2%				

P3

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.59	0.00	80%	0.0%
Native	25.46	0.09	2.29	2%	50.9%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	2.29		50.9%
Total Area (ac)	25.46	Weighted	0.09		2%
Weighted Runoff Coefficient	0.09				
Weighted Percent Impervious	2%				

P4

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.59	0.00	80%	0.0%
Native	7.85	0.09	0.71	2%	15.7%
Pond	0.00	0.9	0.00	100%	0.0%
		sum	0.71		15.7%
Total Area (ac)	7.85	Weighted	0.09		2%
Weighted Runoff Coefficient	0.09				
Weighted Percent Impervious	2%				

Crosspoint Drainage Design

Existing Conditions-100 Year

Area Name	Total Area		Flow Length	Slope (%)	TOC (min)
	(sf)	(acres)			
E1	1385995.8	31.82	500	2%	26.29
E2	656080.46	15.06	500	2%	26.29
E3	1173572.5	26.94	500	1%	26.56
E4	341751.69	7.85	300	2%	26.29

Land Cover Type	Percent Impervious	Runoff Coefficient
Historical Flow Analysis	2%	0.36
Gravel	80%	0.7
Pond	100%	0.96

Roughness Coefficient and Curve Number Analysis

E1					
<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site	31.82	0.36	11.45	2%	64%
		sum	11.45		64%
Total Area (ac)	31.818	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

E2					
<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site	15.06	0.36	5.42	2%	30%
		sum	5.42		30%
Total Area (ac)	15.062	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

E3					
<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site	26.94	0.36	9.70	2%	54%
		sum	9.70		54%
Total Area (ac)	26.942	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

E4					
<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Existing Site	7.85	0.36	2.82	2%	16%
		sum	2.82		16%
Total Area (ac)	7.846	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

Crosspoint Drainage Design

Proposed Conditions-100 Year

Area Name	Total Area		Flow Length	Slope (%)	TOC (min)
	(sf)	(acres)			
Y1	44288.27	1.02	180	1.25%	10.88
Y2	44288.27	1.02	180	1.25%	10.88
Y3	42940	0.99	170	1.25%	10.61
Y4	42940	0.99	170	1.25%	10.61
Y5	21548.35	0.49	70	1.25%	10.00
Y6	21306.61	0.49	140	1.25%	10.00
Y7	52742.59	1.21	160	1.25%	10.33
Y8	46782.44	1.07	160	1.25%	10.33
Y9	51068.27	1.17	190	1.25%	11.14
Y10	51068.27	1.17	190	1.25%	11.42
EDB-1	44613.98	1.02	40	3.00%	10.00
P1-N	959655.15	22.03	500	2.00%	26.29
P1-S	276731.97	6.35	450	2.00%	26.29
P2	406790.69	9.34	500	2.00%	26.29
P3	1108883.88	25.46	500	1.00%	25.56
P4 (Unchanged)	341751.69	7.85	300	2.00%	26.29

Land Cover Type	Percent Impervious	Runoff Coefficient
Historical Flow Analysis	2%	0.36
Gravel	80%	0.7
Pond	100%	0.96

Roughness Coefficient and Curve Number Analysis

Y1					
Description	Total Area (ac)	Runoff Coefficient	A°C	Percent Impervious	A*%
Substation Yard (Gravel)	1.02	0.7	0.71	80%	81.3%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.71		81.3%
Total Area (ac)	1.02	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y2					
Description	Total Area (ac)	Runoff Coefficient	A°C	Percent Impervious	A*%
Substation Yard (Gravel)	1.02	0.7	0.71	80%	81.3%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.71		81.3%
Total Area (ac)	1.02	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y3					
Description	Total Area (ac)	Runoff Coefficient	A°C	Percent Impervious	A*%
Substation Yard (Gravel)	0.99	0.7	0.69	80%	78.9%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.69		78.9%
Total Area (ac)	0.99	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y4

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.99	0.7	0.69	80%	78.9%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.69		78.9%
Total Area (ac)	0.99	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y5

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.49	0.7	0.35	80%	39.6%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.35		39.6%
Total Area (ac)	0.49	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y6

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.49	0.7	0.34	80%	39.1%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.34		39.1%
Total Area (ac)	0.49	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y7

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.21	0.7	0.85	80%	96.9%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.85		96.9%
Total Area (ac)	1.21	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y8

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.07	0.7	0.75	80%	85.9%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.75		85.9%
Total Area (ac)	1.07	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y9

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.17	0.7	0.82	80%	93.8%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.82		93.8%
Total Area (ac)	1.17	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

Y9

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	1.17	0.7	0.82	80%	93.8%
Native	0.00	0.36	0.00	2%	0.0%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	0.82		93.8%
Total Area (ac)	1.17	Weighted	0.70		80%
Weighted Runoff Coefficient	0.70				
Weighted Percent Impervious	80%				

EDB-1

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Substation Yard (Gravel)	0.00	0.7	0.00	80%	0.0%
Native	0.00	0.36	0.00	2%	0.0%
Pond	1.02	0.96	0.98	100%	102.4%
		sum	0.98		102.4%
Total Area (ac)	1.02	Weighted	0.96		100%
Weighted Runoff Coefficient	0.96				
Weighted Percent Impervious	100%				

P1-N

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.7	0.00	80%	0.0%
Native	22.03	0.36	7.93	2%	44.1%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	7.93		44.1%
Total Area (ac)	22.03	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

P1-S

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.7	0.00	80%	0.0%
Native	6.35	0.36	2.29	2%	12.7%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	2.29		12.7%
Total Area (ac)	6.35	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

P2

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.7	0.00	80%	0.0%
Native	9.34	0.36	3.36	2%	18.7%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	3.36		18.7%
Total Area (ac)	9.34	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

P3

<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A°C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.7	0.00	80%	0.0%
Native	25.46	0.36	9.16	2%	50.9%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	9.16		50.9%
Total Area (ac)	25.46	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

P4

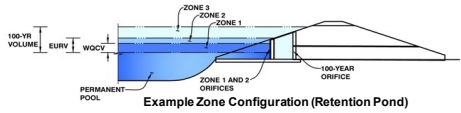
<u>Description</u>	<u>Total Area (ac)</u>	<u>Runoff Coefficient</u>	<u>A*C</u>	<u>Percent Impervious</u>	<u>A*%</u>
Gravel	0.00	0.7	0.00	80%	0.0%
Native	7.85	0.36	2.82	2%	15.7%
Pond	0.00	0.96	0.00	100%	0.0%
		sum	2.82		15.7%
Total Area (ac)	7.85	Weighted	0.36		2%
Weighted Runoff Coefficient	0.36				
Weighted Percent Impervious	2%				

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD- Detention, Version 4.07 (June 2025)

Project: **Crosspoint Substation**

Basin ID: **Detention Pond (EDB-1)**



Watershed Information

Selected SCM Type =	EDB	
Watershed Area =	10.64	acres
Watershed Length =	1,000	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.013	ft/ft
Watershed Imperviousness =	82.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click "Run CUHP" to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.303	acre-feet
Excess Urban Runoff Volume (EURV) =	0.970	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.845	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	1.114	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	1.336	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	1.579	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	1.807	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	2.066	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	2.639	acre-feet
Approximate 2-yr Detention Volume =	0.771	acre-feet
Approximate 5-yr Detention Volume =	1.014	acre-feet
Approximate 10-yr Detention Volume =	1.255	acre-feet
Approximate 25-yr Detention Volume =	1.344	acre-feet
Approximate 50-yr Detention Volume =	1.396	acre-feet
Approximate 100-yr Detention Volume =	1.467	acre-feet

Optional User Overrides

		acre-feet
	1.19	inches
	1.50	inches
	1.75	inches
	2.00	inches
	2.25	inches
	2.52	inches
		inches

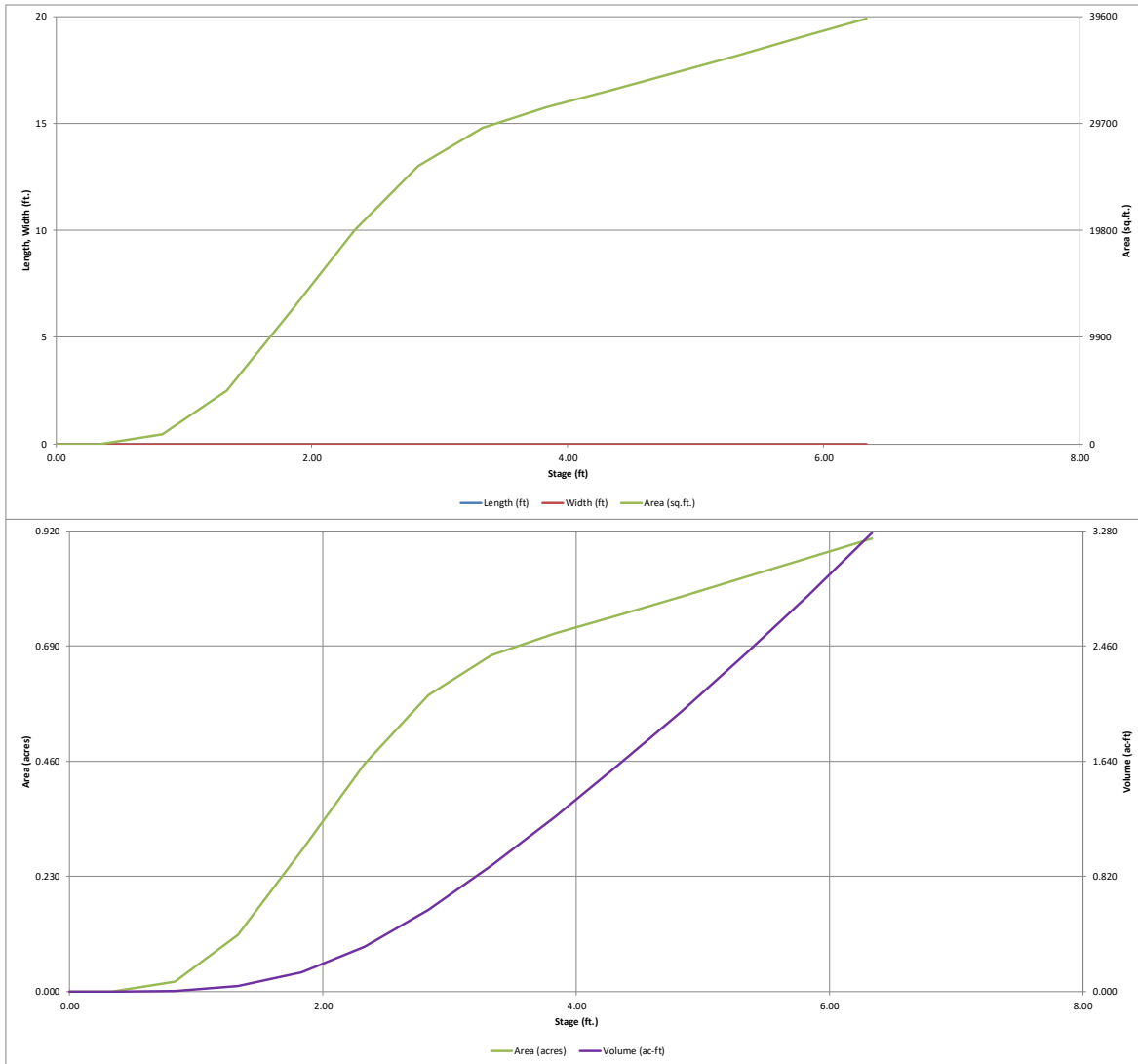
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.303	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.668	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.496	acre-feet
Total Detention Basin Volume =	1.467	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H _{total}) =	user	ft
Depth of Trickle Channel (H _{trc}) =	user	ft
Slope of Trickle Channel (S _{trc}) =	user	ft/ft
Slopes of Main Basin Sides (S _{main}) =	user	H:V
Basin Length-to-Width Ratio (R _{L/W}) =	user	
Initial Surcharge Area (A _{ISV}) =	user	ft ²
Surcharge Volume Length (L _{ISV}) =	user	ft
Surcharge Volume Width (W _{ISV}) =	user	ft
Depth of Basin Floor (H _{FLOOR}) =	user	ft
Length of Basin Floor (L _{FLOOR}) =	user	ft
Width of Basin Floor (W _{FLOOR}) =	user	ft
Area of Basin Floor (A _{FLOOR}) =	user	ft ²
Volume of Basin Floor (V _{FLOOR}) =	user	ft ³
Depth of Main Basin (H _{MAIN}) =	user	ft
Length of Main Basin (L _{MAIN}) =	user	ft
Width of Main Basin (W _{MAIN}) =	user	ft
Area of Main Basin (A _{MAIN}) =	user	ft ²
Volume of Main Basin (V _{MAIN}) =	user	ft ³
Calculated Total Basin Volume (V _{total}) =	user	acre-feet

Depth Increment = 0.50 ft									
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Optional Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	10	0.000		
6188	--	0.33	--	--	--	10	0.000	3	0.000
6188.5	--	0.83	--	--	--	882	0.020	223	0.005
6189	--	1.33	--	--	--	4,951	0.114	1,668	0.038
6189.5	--	1.83	--	--	--	12,246	0.281	5,944	0.136
6190	--	2.33	--	--	--	19,823	0.455	13,936	0.320
6190.5	--	2.83	--	--	--	25,776	0.592	25,317	0.581
6191	--	3.33	--	--	--	29,275	0.672	39,068	0.897
6191.5	--	3.83	--	--	--	31,178	0.716	54,175	1.244
6192 - Spillway	--	4.33	--	--	--	32,758	0.752	70,154	1.611
6192.5	--	4.83	--	--	--	34,372	0.789	86,931	1.996
6193	--	5.33	--	--	--	36,021	0.827	104,524	2.400
6193.5	--	5.83	--	--	--	37,713	0.866	122,952	2.823
6194 - T.O.B.	--	6.33	--	--	--	39,455	0.906	142,238	3.265

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

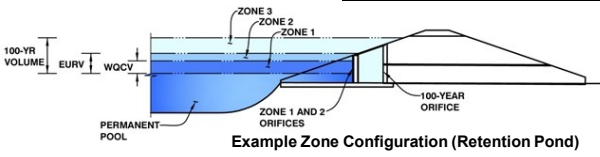
MHFD-Detention, Version 4.07 (June 2025)



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Crosspoint Substation
Basin ID: Detention Pond (EDB-1)



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.30	0.303	Orifice Plate
Zone 2 (EURV)	3.44	0.668	Orifice Plate
Zone 3 (100-year)	4.14	0.496	Weir&Pipe (Restrict)
Total (all zones)		1.467	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration SCM)

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)
 Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft²
 Underdrain Orifice Centroid = feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation SCM)

Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
 Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
 Orifice Plate: Orifice Vertical Spacing = inches
 Orifice Plate: Orifice Area per Row = sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row = ft²
 Elliptical Half-Width = feet
 Elliptical Slot Centroid = feet
 Elliptical Slot Area = ft²

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	1.50	2.00	2.50	3.00		
Orifice Area (sq. inches)	0.79	0.79	1.77	1.77	3.14	3.14		

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected
Invert of Vertical Orifice =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>
Depth at top of Zone using Vertical Orifice =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>
Vertical Orifice Diameter =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>

ft (relative to basin bottom at Stage = 0 ft)
 ft (relative to basin bottom at Stage = 0 ft)
 inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected
Vertical Orifice Area =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>
Vertical Orifice Centroid =	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>

ft²
 feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	<input type="text" value="3.83"/>	<input type="text" value="N/A"/>
Overflow Weir Front Edge Length =	<input type="text" value="4.00"/>	<input type="text" value="N/A"/>
Overflow Weir Grate Slope =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>
Horiz. Length of Weir Sides =	<input type="text" value="2.50"/>	<input type="text" value="N/A"/>
Overflow Grate Type =	<input type="text" value="Type C Grate"/>	<input type="text" value="N/A"/>
Debris Clogging % =	<input type="text" value="50%"/>	<input type="text" value="N/A"/>

ft (relative to basin bottom at Stage = 0 ft)
 feet
 H:V
 feet
 %

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected
Height of Grate Upper Edge, H ₁ =	<input type="text" value="3.83"/>	<input type="text" value="N/A"/>
Overflow Weir Slope Length =	<input type="text" value="2.50"/>	<input type="text" value="N/A"/>
Grate Open Area / 100-yr Orifice Area =	<input type="text" value="3.94"/>	<input type="text" value="N/A"/>
Overflow Grate Open Area w/o Debris =	<input type="text" value="6.96"/>	<input type="text" value="N/A"/>
Overflow Grate Open Area w/ Debris =	<input type="text" value="3.48"/>	<input type="text" value="N/A"/>

feet
 feet
 ft²
 ft²

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>
Outlet Pipe Diameter =	<input type="text" value="18.00"/>	<input type="text" value="N/A"/>
Restrictor Plate Height Above Pipe Invert =	<input type="text" value="18.00"/>	<input type="text" value="N/A"/>

ft (distance below basin bottom at Stage = 0 ft)
 inches
 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	<input type="text" value="1.77"/>	<input type="text" value="N/A"/>
Outlet Orifice Centroid =	<input type="text" value="0.75"/>	<input type="text" value="N/A"/>
Half-Central Angle of Restrictor Plate on Pipe =	<input type="text" value="3.14"/>	<input type="text" value="N/A"/>

ft²
 feet
 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = ft (relative to basin bottom at Stage = 0 ft)
 Spillway Crest Length = feet
 Spillway End Slopes = H:V
 Freeboard above Max Water Surface = feet

Calculated Parameters for Spillway

Spillway Design Flow Depth = feet
 Stage at Top of Freeboard = feet
 Basin Area at Top of Freeboard = acres
 Basin Volume at Top of Freeboard = acre-ft

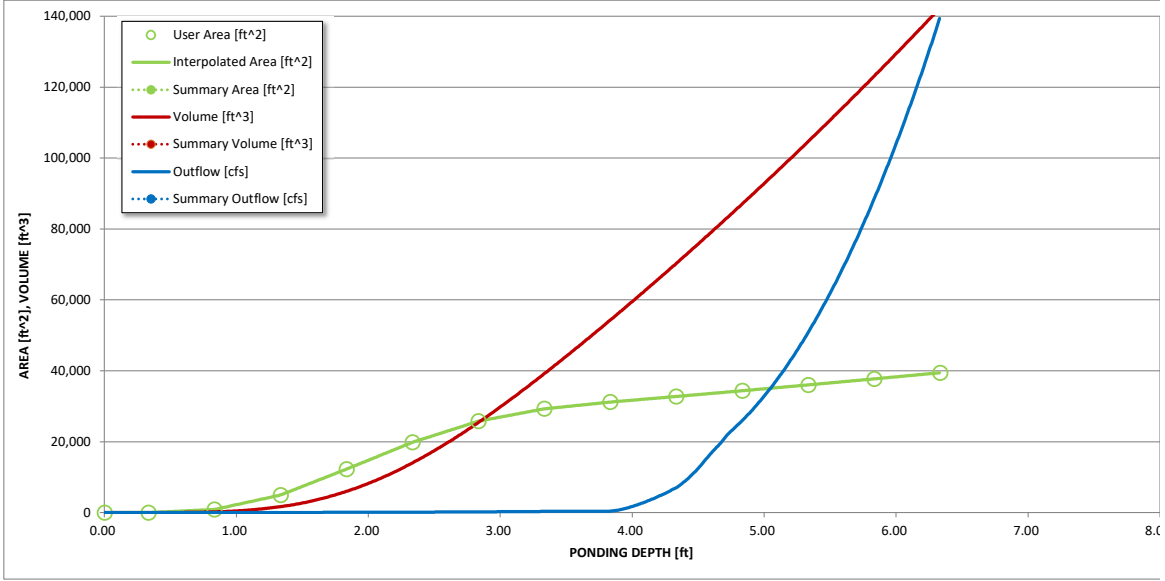
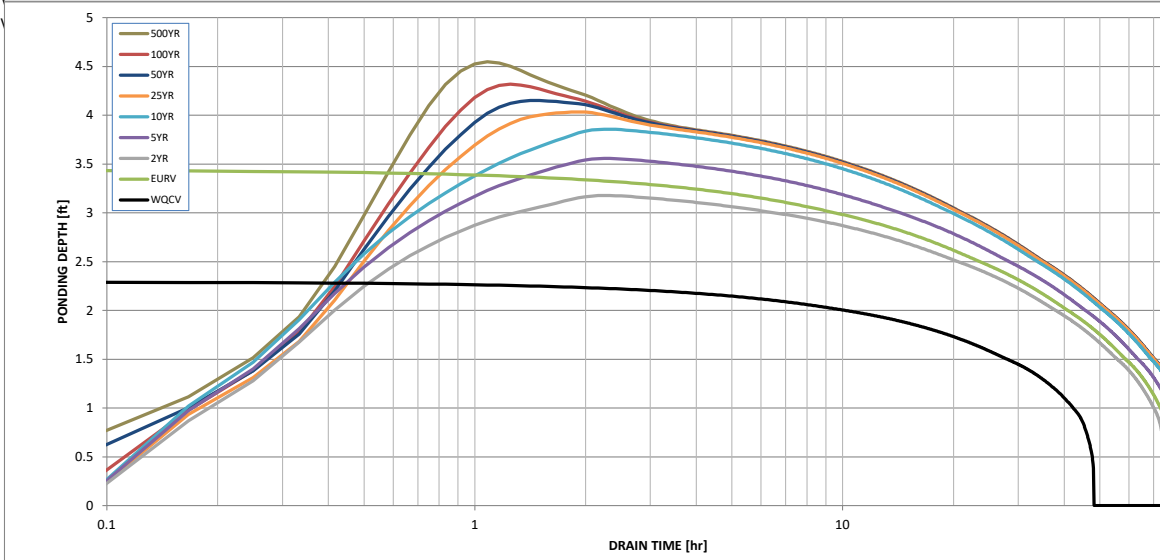
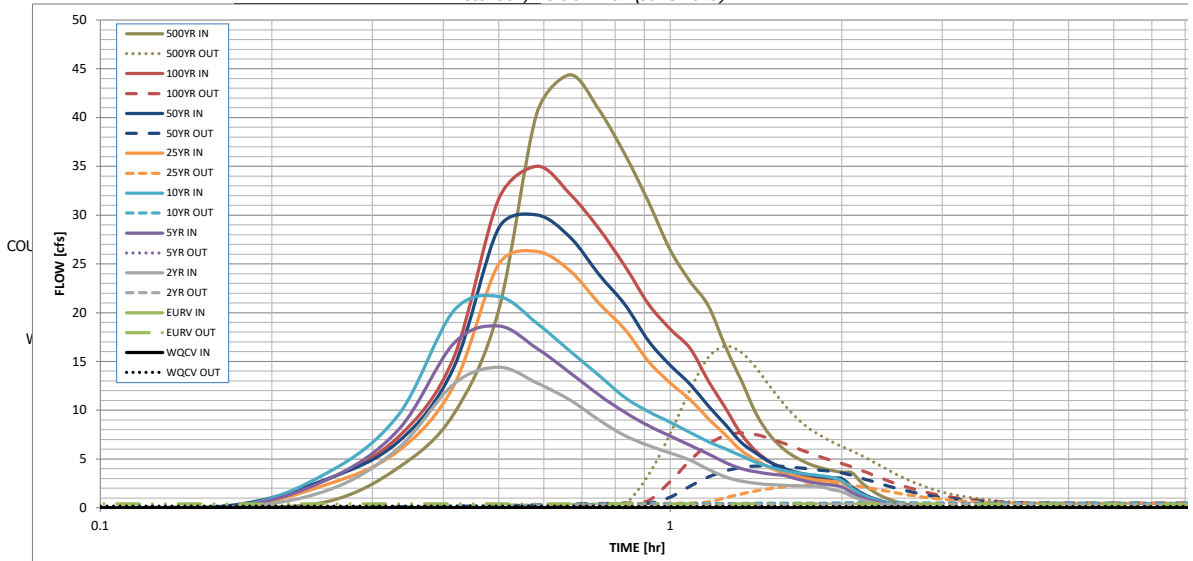
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.303	0.970	0.845	1.114	1.336	1.579	1.807	2.066	2.639
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.845	1.114	1.336	1.579	1.807	2.066	2.639
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.3	3.1	4.6	8.0	10.0	12.8	17.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.12	0.29	0.43	0.76	0.94	1.20	1.67
Peak Inflow Q (cfs) =	N/A	N/A	14.4	18.6	21.7	26.3	30.0	35.0	44.4
Peak Outflow Q (cfs) =	0.2	0.4	0.4	0.4	0.6	2.4	4.3	7.7	16.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.1	0.3	0.4	0.6	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.3	0.5	1.0	1.8
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	43	67	65	71	75	74	72	71	67
Time to Drain 99% of Inflow Volume (hours) =	46	74	72	78	83	83	82	81	80
Maximum Ponding Depth (ft) =	2.30	3.44	3.18	3.56	3.86	4.03	4.15	4.32	4.55
Area at Maximum Ponding Depth (acres) =	0.44	0.68	0.65	0.69	0.72	0.73	0.74	0.75	0.77
Maximum Volume Stored (acre-ft) =	0.306	0.971	0.791	1.047	1.258	1.388	1.469	1.595	1.770

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)



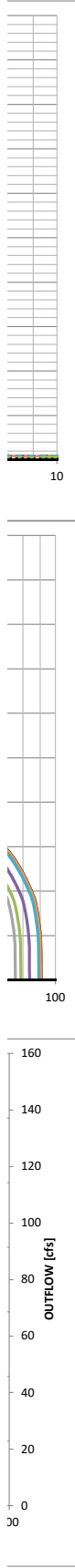
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.



SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]	CUHP
0:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.20	0.02	0.64	0.00
0:15:00	0	0.00	1.77	2.89	3.57	2.39	2.96	2.91	4.09	0.00
0:20:00	0	0.00	6.09	7.96	9.50	5.82	6.75	7.25	9.57	0.00
0:25:00	0	0.00	12.68	16.82	20.17	12.47	14.35	15.36	20.26	0.00
0:30:00	0	0.00	14.40	18.63	21.65	24.97	28.67	31.68	40.43	0.00
0:35:00	0	0.00	12.81	16.34	18.92	26.27	30.03	35.01	44.39	0.00
0:40:00	0	0.00	11.06	13.86	16.06	24.32	27.75	32.19	40.77	0.00
0:45:00	0	0.00	8.99	11.56	13.57	20.95	23.90	28.59	36.19	0.00
0:50:00	0	0.00	7.39	9.77	11.28	18.25	20.81	24.74	31.30	0.00
0:55:00	0	0.00	6.36	8.39	9.85	14.97	17.07	20.85	26.40	0.00
1:00:00	0	0.00	5.60	7.35	8.76	12.80	14.60	18.32	23.19	0.00
1:05:00	0	0.00	4.89	6.39	7.71	11.09	12.66	16.35	20.71	0.00
1:10:00	0	0.00	3.93	5.52	6.77	9.13	10.42	13.00	16.49	0.00
1:15:00	0	0.00	3.17	4.63	6.03	7.45	8.51	10.22	13.00	0.00
1:20:00	0	0.00	2.72	4.01	5.33	5.84	6.67	7.50	9.56	0.00
1:25:00	0	0.00	2.50	3.67	4.63	4.87	5.56	5.76	7.36	0.00
1:30:00	0	0.00	2.37	3.46	4.16	4.07	4.64	4.68	5.98	0.00
1:35:00	0	0.00	2.30	3.32	3.82	3.55	4.05	4.00	5.12	0.00
1:40:00	0	0.00	2.25	2.95	3.58	3.19	3.63	3.53	4.51	0.00
1:45:00	0	0.00	2.21	2.68	3.42	2.96	3.37	3.21	4.12	0.00
1:50:00	0	0.00	2.18	2.48	3.30	2.80	3.18	2.99	3.83	0.00
1:55:00	0	0.00	1.88	2.33	3.11	2.69	3.06	2.85	3.65	0.00
2:00:00	0	0.00	1.65	2.15	2.79	2.62	2.98	2.80	3.58	0.00
2:05:00	0	0.00	1.18	1.55	1.99	1.88	2.14	2.01	2.57	0.00
2:10:00	0	0.00	0.83	1.09	1.40	1.33	1.51	1.43	1.83	0.00
2:15:00	0	0.00	0.58	0.75	0.98	0.93	1.06	1.01	1.29	0.00
2:20:00	0	0.00	0.39	0.50	0.66	0.64	0.72	0.69	0.88	0.00
2:25:00	0	0.00	0.26	0.33	0.44	0.42	0.48	0.46	0.58	0.00
2:30:00	0	0.00	0.16	0.22	0.29	0.29	0.32	0.31	0.39	0.00
2:35:00	0	0.00	0.09	0.13	0.17	0.17	0.20	0.19	0.24	0.00
2:40:00	0	0.00	0.04	0.07	0.08	0.09	0.10	0.10	0.12	0.00
2:45:00	0	0.00	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.00
2:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

Designer: Thayne Clement
Company: Del-Mont Consultants
Date: June 20, 2025
Project: Crosspoint Substation
Location: Yoder, CO

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)

C) Contributing Watershed Area

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm

E) Design Concept
(Select EURV when also designing for flood control)

F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)$)

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_s * V_{DESIGN} / 0.43)$)

H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired)

I) NRCS Hydrologic Soil Groups of Tributary Watershed
 i) Percentage of Watershed consisting of Type A Soils
 ii) Percentage of Watershed consisting of Type B Soils
 iii) Percentage of Watershed consisting of Type C/D Soils

J) Excess Urban Runoff Volume (EURV) Design Volume
 For HSG A: $EURV_A = 1.68 * i^{1.28}$
 For HSG B: $EURV_B = 1.36 * i^{1.08}$
 For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$

K) User Input of Excess Urban Runoff Volume (EURV) Design Volume
(Only if a different EURV Design Volume is desired)

$I_a =$ %
 $i =$
 Area = ac
 $d_s =$ in

Choose One
 Water Quality Capture Volume (WQCV)
 Excess Urban Runoff Volume (EURV)

$V_{DESIGN} =$ ac-ft
 $V_{DESIGN\ OTHER} =$ ac-ft
 $V_{DESIGN\ USER} =$ ac-ft

$HSG_A =$ %
 $HSG_B =$ %
 $HSG_{C/D} =$ %

$EURV_{DESIGN} =$ ac-ft
 $EURV_{DESIGN\ USER} =$ ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

5. Forebay

A) Minimum Forebay Volume
($V_{MIN} =$ of the WQCV)

B) Actual Forebay Volume

C) Forebay Depth
($D_F =$ inch maximum)

D) Forebay Discharge
 i) Undetained 100-year Peak Discharge
 ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$)

E) Forebay Discharge Design

F) Discharge Pipe Size (minimum 8-inches)

G) Rectangular Notch Width

$V_{MIN} =$ ac-ft
 $V_F =$ ac-ft
 $D_F =$ in
 $Q_{100} =$ cfs
 $Q_F =$ cfs

Choose One
 Berm With Pipe
 Wall with Rect. Notch
 Wall with V-Notch Weir

Flow too small for berm w/ pipe

Calculated $D_P =$ in
 Calculated $W_N =$ in

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 3

Designer: Thayne Clement
Company: Del-Mont Consultants
Date: June 20, 2025
Project: Crosspoint Substation
Location: Yoder, CO

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Choose One <input checked="" type="radio"/> Concrete <input type="radio"/> Soft Bottom </div> <p>S = <input type="text" value="0.0050"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft² minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D_M = <input type="text" value="2.5"/> ft</p> <p>A_M = <input type="text" value="10"/> sq ft</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Choose One <input checked="" type="radio"/> Orifice Plate <input type="radio"/> Other (Describe): </div> <hr/> <hr/> <p>D_{orifice} = <input type="text" value="1.13"/> inches</p> <p>A_{orifice} = <input type="text" value="8.50"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D_{IS} = <input type="text" value="4"/> in</p> <p>V_{IS} = <input type="text" value="38"/> cu ft</p> <p>V_e = <input type="text" value="3.3"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5 * (e^{-0.095D})$</p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="margin-left: 40px;">Other (Y/N): <input type="text" value="N"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H_{TR})</p> <p>G) Width of Water Quality Screen Opening (W_{opening}) (Minimum of 12 inches is recommended)</p>	<p>A_t = <input type="text" value="294"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;"> <i>S.S. Well Screen with 60% Open Area</i> </div> <hr/> <hr/> <p>User Ratio = <input type="text"/></p> <p>A_{total} = <input type="text" value="490"/> sq. in.</p> <p>H = <input type="text" value="1.77"/> feet</p> <p>H_{TR} = <input type="text" value="49.24"/> inches</p> <p>W_{opening} = <input type="text" value="12.0"/> inches</p> <p style="color: red; font-size: small;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</p>

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 3 of 3

Designer: Thayne Clement
Company: Del-Mont Consultants
Date: June 20, 2025
Project: Crosspoint Substation
Location: Yoder, CO

<p>10. Overflow Embankment</p> <p>A) Describe embankment protection for 100-year and greater overtopping:</p> <p>B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>Ze = <input type="text" value="4.00"/> ft / ft</p>
<p>11. Vegetation</p>	<p>Choose One</p> <p><input type="radio"/> Irrigated</p> <p><input checked="" type="radio"/> Not Irrigated</p>
<p>12. Access</p> <p>A) Describe Sediment Removal Procedures</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Notes: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	

Emergency Spillway Calculations

RipRap Sizing		
Izbash Formula: $D50 = (V^2)/(2*32.2*(0.86^2)*(2.55-1))^*12$		
Assume RipRap Specific Gravity 2.55		
Variable	Input	Units
100 year Discharge Rate (Q)	35	cfs
Discharge Velocity (V)	2.57	ft/s
Required D50 Value	1.07	in
Provided D50 Value	6.00	in

Spillway Geometry		
Spillway Bottom Width	10	ft
Spillway Side Slope (X:1)	4	ft
100yr Flow Depth	0.98	ft
Spillway XS Area	13.64	sqft

Appendix B

Rational Method Modeling Results



Project Description

File Name 23148-RM5.SPF

Project Options

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

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
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	19
Nodes.....	31
<i>Junctions</i>	23
<i>Outfalls</i>	7
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	1
Links.....	31
<i>Channels</i>	0
<i>Pipes</i>	23
<i>Pumps</i>	0
<i>Orifices</i>	6
<i>Weirs</i>	2
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period..... 5 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	E1	31.82	0.0900	1.16	0.11	3.34	7.59	0 00:26:17
2	E2	15.06	0.0900	1.16	0.11	1.58	3.59	0 00:26:17
3	E3	26.94	0.0900	1.17	0.11	2.83	6.40	0 00:26:33
4	E4	7.85	0.0900	1.16	0.11	0.82	1.87	0 00:26:17
5	EDB	1.02	0.9000	0.69	0.62	0.63	3.79	0 00:10:00
6	P1-N	22.03	0.0900	1.16	0.11	2.31	5.26	0 00:26:17
7	P1-S	6.35	0.0900	1.16	0.11	0.67	1.52	0 00:26:17
8	P2	9.34	0.0900	1.16	0.11	0.98	2.23	0 00:26:17
9	P3	25.46	0.0900	1.17	0.11	2.67	6.04	0 00:26:33
10	Y1	1.02	0.5900	0.72	0.43	0.43	2.40	0 00:10:52
11	Y10	1.17	0.5900	0.75	0.44	0.52	2.71	0 00:11:25
12	Y2	1.02	0.5900	0.72	0.43	0.43	2.40	0 00:10:52
13	Y3	0.99	0.5900	0.72	0.42	0.42	2.36	0 00:10:36
14	Y4	0.99	0.5900	0.72	0.42	0.42	2.36	0 00:10:36
15	Y5	0.49	0.5900	0.69	0.41	0.20	1.19	0 00:10:00
16	Y6	0.49	0.5900	0.69	0.41	0.20	1.19	0 00:10:00
17	Y7	1.21	0.5900	0.70	0.41	0.50	2.91	0 00:10:19
18	Y8	1.07	0.5900	0.70	0.41	0.44	2.57	0 00:10:19
19	Y9	1.17	0.5900	0.74	0.44	0.51	2.73	0 00:11:08

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)
1	Culvert-In	Junction	6174.43	6177.00	0.00	0.00	0.00	5.26	6174.96	0.00
2	Culvert-Out	Junction	6174.22	6177.00	0.00	0.00	0.00	5.25	6174.75	0.00
3	Forebay	Junction	6189.21	6191.50	6189.21	0.00	0.00	21.31	6190.35	0.00
4	J-01	Junction	6196.03	6198.98	6196.03	6195.86	0.00	2.40	6196.58	0.00
5	J-02	Junction	6195.11	6198.30	6195.11	6195.00	0.00	2.39	6195.91	0.00
6	J-03	Junction	6194.13	6197.33	6194.13	6194.11	0.00	4.69	6194.86	0.00
7	J-04	Junction	6194.04	6197.46	6194.04	6194.05	0.00	4.69	6194.82	0.00
8	J-05	Junction	6194.95	6198.18	6194.95	6194.95	0.00	2.36	6195.49	0.00
9	J-06	Junction	6194.03	6197.50	6194.03	6194.00	0.00	2.34	6194.82	0.00
10	J-07	Junction	6193.05	6196.53	6193.05	6193.20	0.00	4.59	6193.77	0.00
11	J-08	Junction	6192.46	6196.68	6192.46	6193.49	0.00	9.19	6193.74	0.00
12	J-09	Junction	6194.15	6197.10	6194.15	6193.08	0.00	1.19	6194.48	0.00
13	J-10	Junction	6190.90	6195.96	6190.90	6192.65	0.00	11.25	6192.47	0.00
14	J-11	Junction	6193.24	6196.48	6193.24	6193.50	0.00	2.91	6193.85	0.00
15	J-12	Junction	6192.32	6195.80	6192.32	6103.00	0.00	2.89	6193.18	0.00
16	J-13	Junction	6190.84	6194.83	6190.84	0.00	0.00	5.35	6191.89	0.00
17	J-14	Junction	6192.59	6195.78	6192.59	6194.61	0.00	2.73	6193.18	0.00
18	J-15	Junction	6191.66	6195.10	6191.66	6194.00	0.00	2.71	6192.49	0.00
19	J-16	Junction	6191.01	6194.13	6191.01	6192.86	0.00	5.38	6191.91	0.00
20	J-17	Junction	6190.95	6194.31	6190.95	6192.80	0.00	5.37	6191.85	0.00
21	J-18	Junction	6189.75	6195.02	6189.75	6192.31	0.00	21.31	6191.46	0.00
22	OutletPipe	Junction	6187.31	6188.81	6187.31	0.00	0.00	0.20	6187.56	0.00
23	OutletStructure	Junction	6187.67	6194.00	6187.67	0.00	0.00	0.20	6187.84	0.00
24	E-Out-1	Outfall	6173.75					7.59	6173.75	
25	E-Out-2	Outfall	6187.75					3.59	6187.75	
26	E-Out-3	Outfall	6195.50					6.39	6195.50	
27	E-Out-4	Outfall	6196.00					1.87	6196.00	
28	P-Out-1	Outfall	6173.75					6.76	6173.75	
29	P-Out-2	Outfall	6186.00					2.43	6186.00	
30	P-Out-3	Outfall	6195.50					6.04	6195.50	
31	DetentionPond	Storage Node	6188.00	6194.00	0.00		0.00	24.48	6190.13	

Link Summary

SN Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	
1	10-30NP	Pipe	J-10	J-18	122.00	6190.90	6190.29	0.5000	24.000	0.0120	11.24	17.33	0.65	5.89
2	11-15NP	Pipe	J-11	J-12	91.22	6193.24	6192.57	0.7300	15.000	0.0120	2.89	6.00	0.48	5.95
3	12-18P	Pipe	J-12	J-13	130.69	6192.32	6191.34	0.7500	18.000	0.0120	2.87	9.85	0.29	4.87
4	13-24NP	Pipe	J-13	J-18	11.92	6190.84	6190.75	0.7600	24.000	0.0120	5.35	21.30	0.25	5.64
5	14-15NP	Pipe	J-14	J-15	90.26	6192.59	6191.91	0.7500	15.000	0.0120	2.71	6.07	0.45	5.77
6	15-18P	Pipe	J-15	J-16	130.00	6191.66	6191.01	0.5000	18.000	0.0120	2.69	8.05	0.33	4.13
7	16-18NP	Pipe	J-16	J-17	11.92	6191.01	6190.95	0.5000	18.000	0.0120	5.37	8.07	0.67	4.89
8	17-18NP	Pipe	J-17	J-18	240.00	6190.95	6189.75	0.5000	18.000	0.0120	5.29	8.05	0.66	4.93
9	18-36NP	Pipe	J-18	Forebay	58.84	6189.75	6189.21	0.9200	36.000	0.0120	21.31	69.22	0.31	8.62
10	1-NP15	Pipe	J-01	J-02	89.45	6196.03	6195.36	0.7500	15.000	0.0120	2.39	6.06	0.39	5.65
11	2-18P	Pipe	J-02	J-03	130.81	6195.11	6194.13	0.7500	18.000	0.0120	2.37	9.85	0.24	4.62
12	3-18NP	Pipe	J-03	J-04	11.92	6194.13	6194.04	0.7600	18.000	0.0120	4.69	9.89	0.47	5.52
13	4-18NP	Pipe	J-04	J-08	180.00	6194.04	6192.96	0.6000	18.000	0.0120	4.67	8.81	0.53	5.11
14	5-15NP	Pipe	J-05	J-06	90.21	6194.95	6194.28	0.7400	15.000	0.0120	2.34	6.03	0.39	5.64
15	6-18P	Pipe	J-06	J-07	130.60	6194.03	6193.05	0.7500	18.000	0.0120	2.32	9.86	0.24	4.59
16	7-18NP	Pipe	J-07	J-08	11.92	6193.05	6192.96	0.7600	18.000	0.0120	4.59	9.89	0.46	5.49
17	8-24NP	Pipe	J-08	J-10	168.00	6192.46	6191.40	0.6300	24.000	0.0120	9.17	19.47	0.47	6.14
18	9-15P	Pipe	J-09	J-10	152.67	6194.15	6192.15	1.3100	15.000	0.0120	1.18	8.01	0.15	6.44
19	Culvert	Pipe	Culvert-In	Culvert-Out	42.05	6174.43	6174.22	0.5000	24.000	0.0120	5.25	34.64	0.15	3.98
20	Link-03	Pipe	OutletPipe	P-Out-2	228.62	6187.31	6186.00	0.5700	0.000	0.0150	0.20	0.00	0.15	0.00
21	Link-09	Pipe	Culvert-Out	P-Out-1	438.78	6174.21	6173.75	0.1000	0.000	0.0150	5.25	0.00	0.15	0.00
22	OutletPipe	Pipe	OutletStructure	OutletPipe	54.95	6187.67	6187.40	0.4900	18.000	0.0120	0.20	7.98	0.03	1.84
23	TrklChnl	Pipe	Forebay	DetentionPond	164.17	6189.73	6188.25	0.9000	0.000	0.0150	21.31	0.00	0.03	0.00
24	Orifice-01	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		1.000		0.04			
25	Orifice-02	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		1.000		0.03			
26	Orifice-03	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		1.500		0.08			
27	Orifice-04	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		1.500		0.04			
28	Orifice-05	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		2.000		0.00			
29	Orifice-06	Orifice	DetentionPond	OutletStructure		6188.00	6187.67		2.000		0.00			
30	EmeraencvSbillwav	Weir	DetentionPond	OutletPipe		6188.00	6187.31				0.00			

Subbasin Hydrology

Subbasin : E1

Input Data

Area (ac) 31.82
Weighted Runoff Coefficient 0.09

Runoff Coefficient

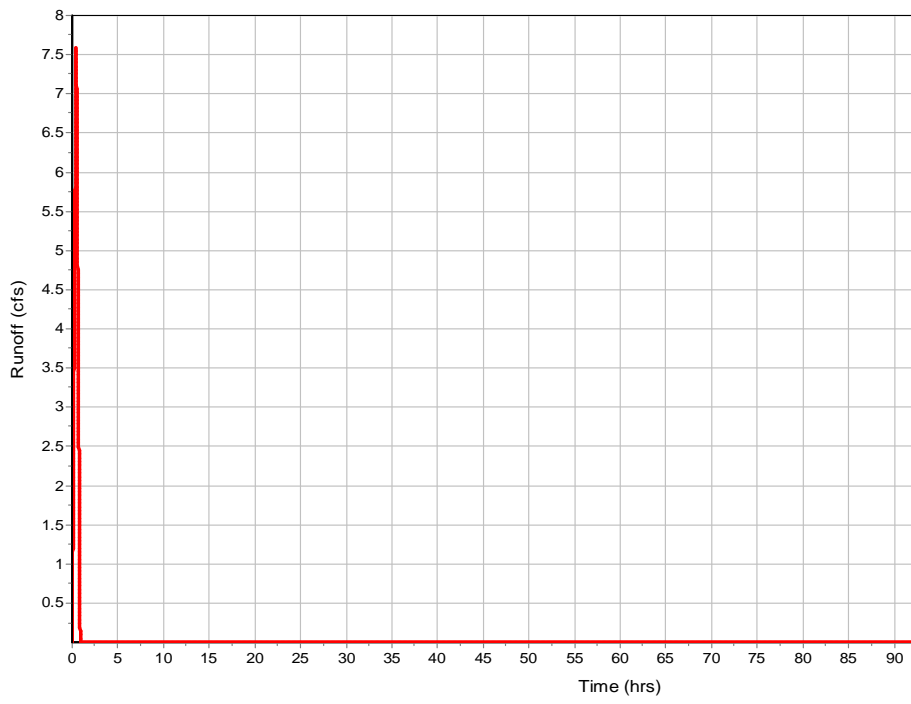
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	31.78	-	0.09
Composite Area & Weighted Runoff Coeff.	31.78		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 7.59
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E1

Runoff Hydrograph



Subbasin : E2

Input Data

Area (ac) 15.06
Weighted Runoff Coefficient 0.09

Runoff Coefficient

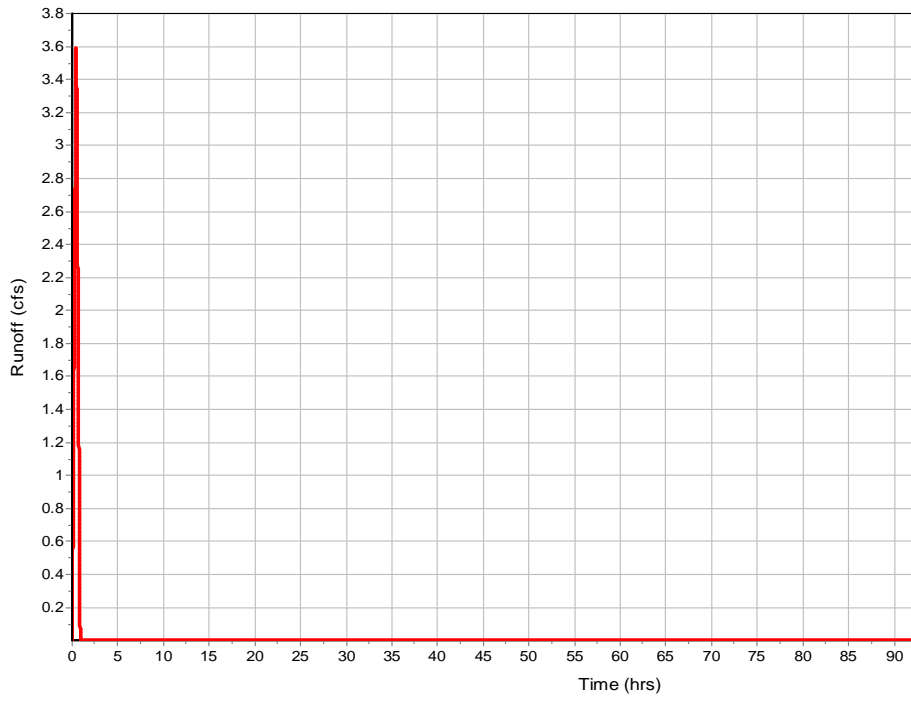
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	14.81	-	0.09
Composite Area & Weighted Runoff Coeff.	14.81		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 3.59
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E2

Runoff Hydrograph



Subbasin : E3

Input Data

Area (ac) 26.94
Weighted Runoff Coefficient 0.09

Runoff Coefficient

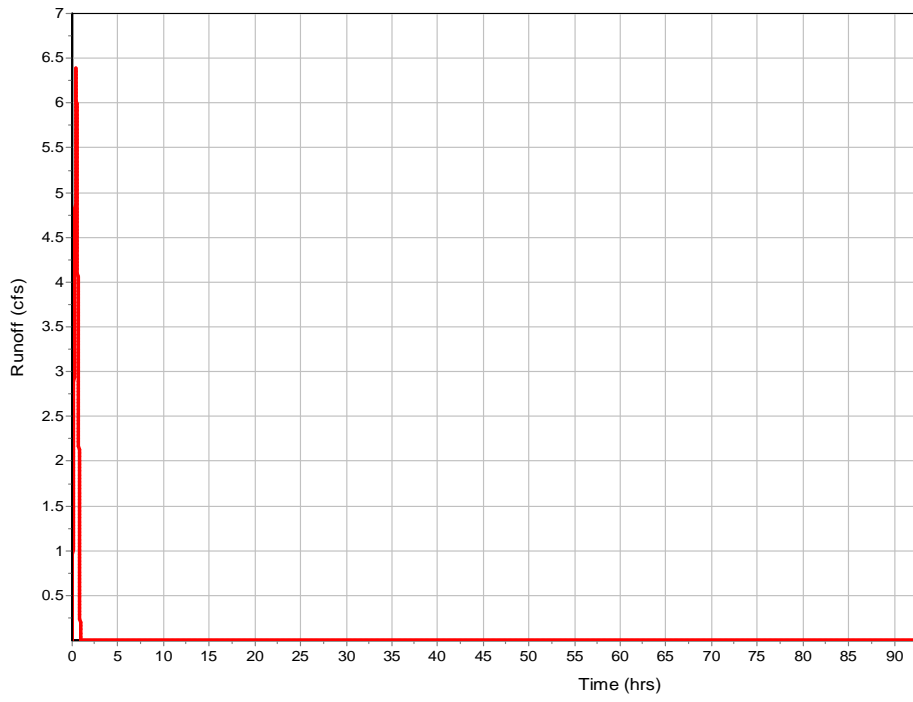
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	26.94	-	0.09
Composite Area & Weighted Runoff Coeff.	26.94		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.17
Total Runoff (in) 0.11
Peak Runoff (cfs) 6.4
Rainfall Intensity 2.637
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:34

Subbasin : E3

Runoff Hydrograph



Subbasin : E4

Input Data

Area (ac) 7.85
Weighted Runoff Coefficient 0.09

Runoff Coefficient

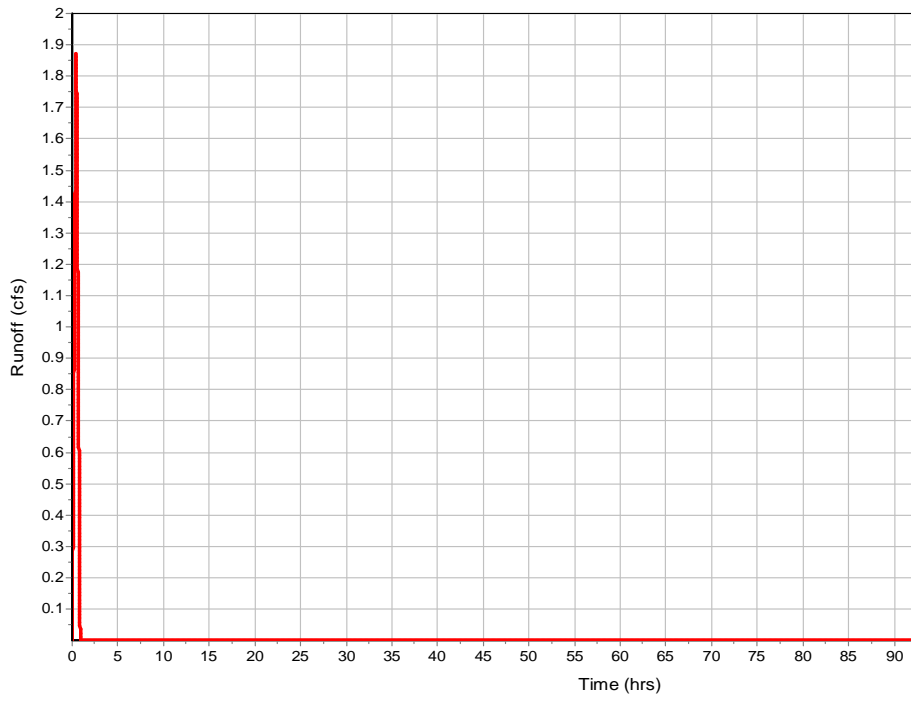
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	7.85	-	0.09
Composite Area & Weighted Runoff Coeff.	7.85		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 1.87
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E4

Runoff Hydrograph



Subbasin : EDB

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.9

Runoff Coefficient

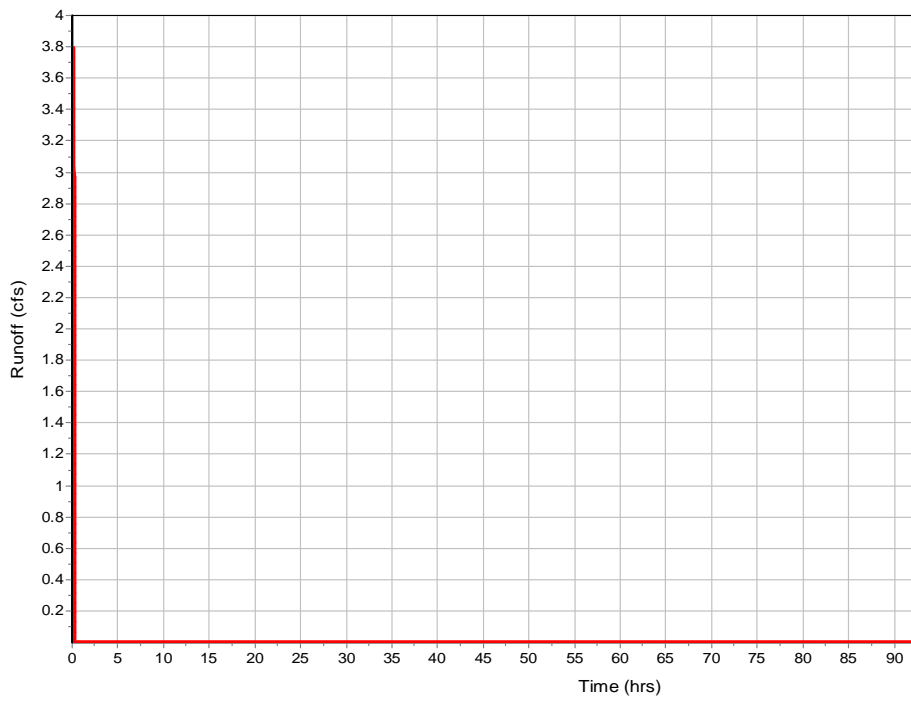
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.9
Composite Area & Weighted Runoff Coeff.	1.02		0.9

Subbasin Runoff Results

Total Rainfall (in) 0.69
Total Runoff (in) 0.62
Peak Runoff (cfs) 3.79
Rainfall Intensity 4.13
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : EDB

Runoff Hydrograph



Subbasin : P1-N

Input Data

Area (ac) 22.03
Weighted Runoff Coefficient 0.09

Runoff Coefficient

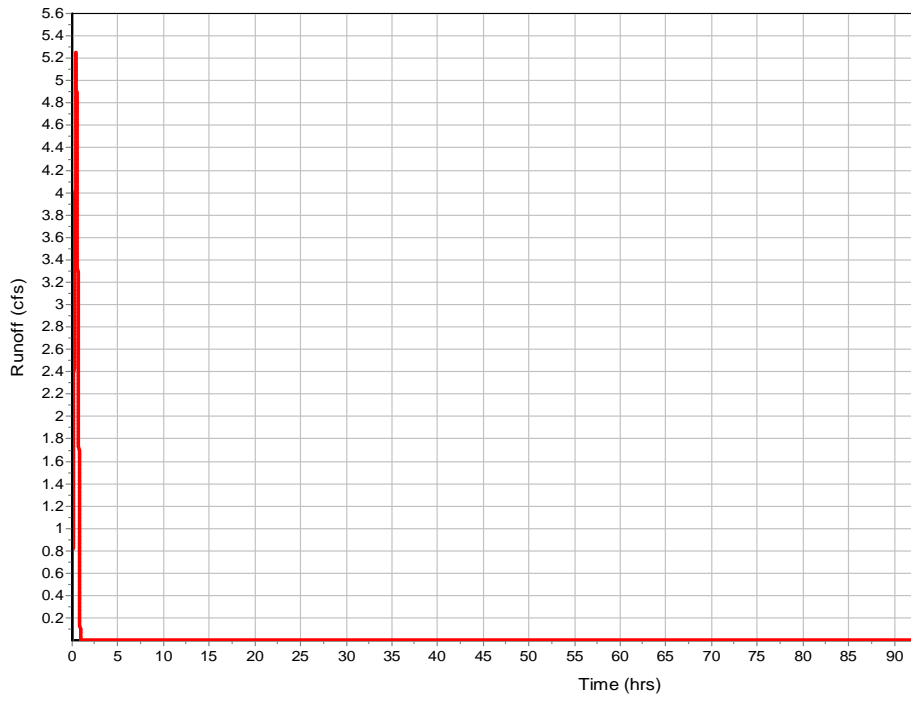
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	22.03	-	0.09
Composite Area & Weighted Runoff Coeff.	22.03		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 5.26
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P1-N

Runoff Hydrograph



Subbasin : P1-S

Input Data

Area (ac) 6.35
Weighted Runoff Coefficient 0.09

Runoff Coefficient

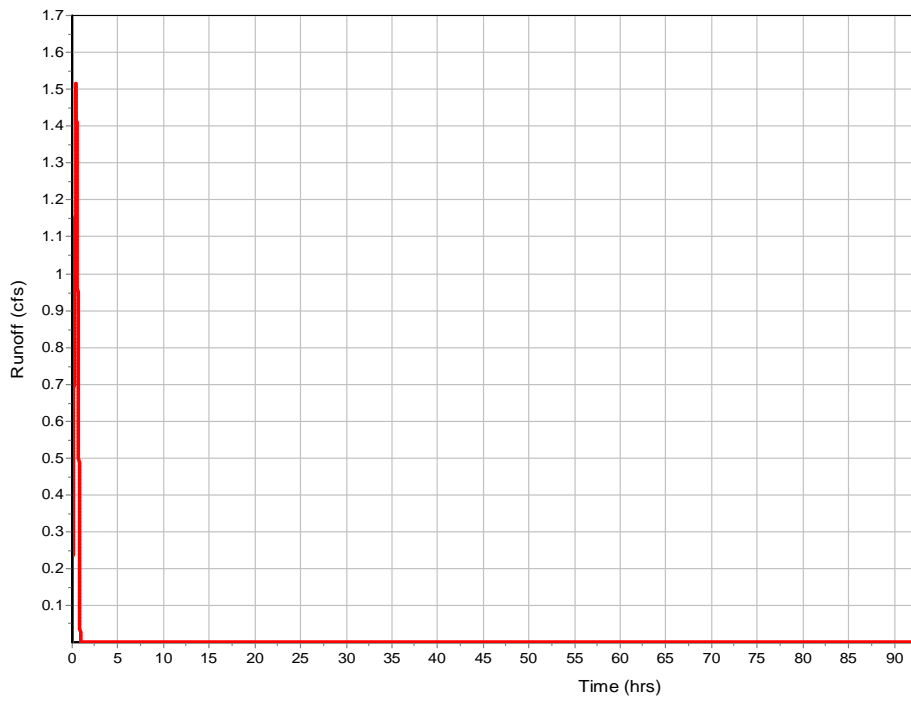
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	6.35	-	0.09
Composite Area & Weighted Runoff Coeff.	6.35		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 1.52
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P1-S

Runoff Hydrograph



Subbasin : P2

Input Data

Area (ac) 9.34
Weighted Runoff Coefficient 0.09

Runoff Coefficient

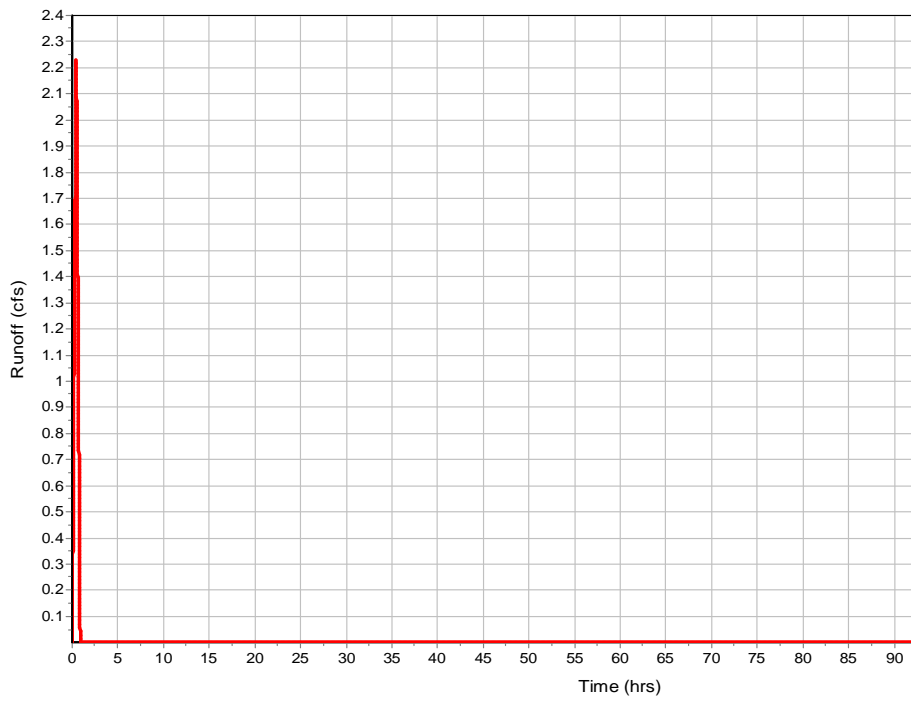
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	9.34	-	0.09
Composite Area & Weighted Runoff Coeff.	9.34		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.11
Peak Runoff (cfs) 2.23
Rainfall Intensity 2.651
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P2

Runoff Hydrograph



Subbasin : P3

Input Data

Area (ac) 25.46
Weighted Runoff Coefficient 0.09

Runoff Coefficient

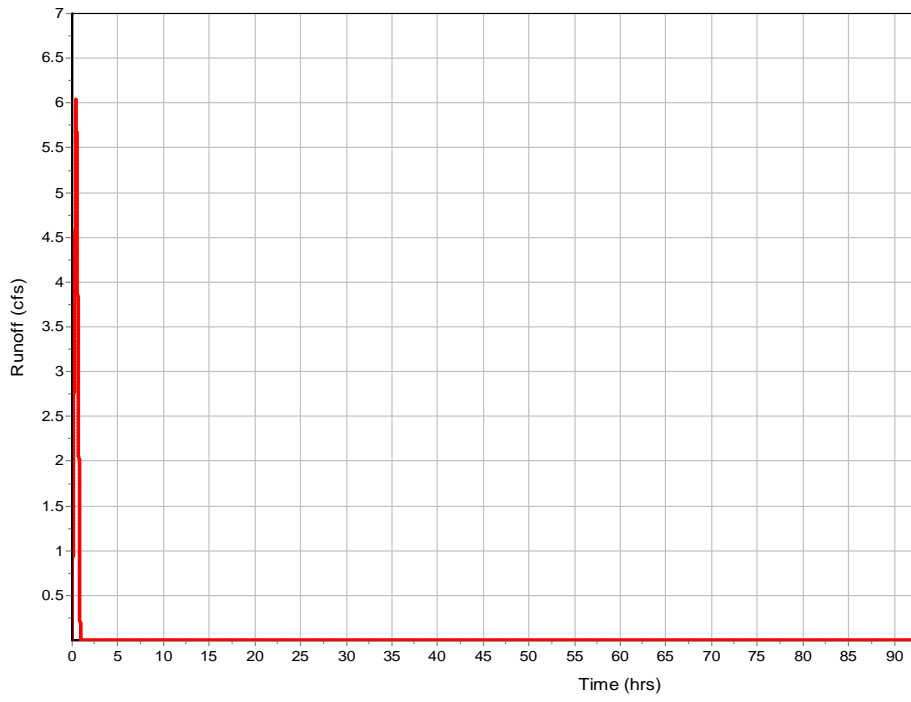
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	25.46	-	0.09
Composite Area & Weighted Runoff Coeff.	25.46		0.09

Subbasin Runoff Results

Total Rainfall (in) 1.17
Total Runoff (in) 0.11
Peak Runoff (cfs) 6.04
Rainfall Intensity 2.637
Weighted Runoff Coefficient 0.09
Time of Concentration (days hh:mm:ss) 0 00:26:34

Subbasin : P3

Runoff Hydrograph



Subbasin : Y1

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.59

Runoff Coefficient

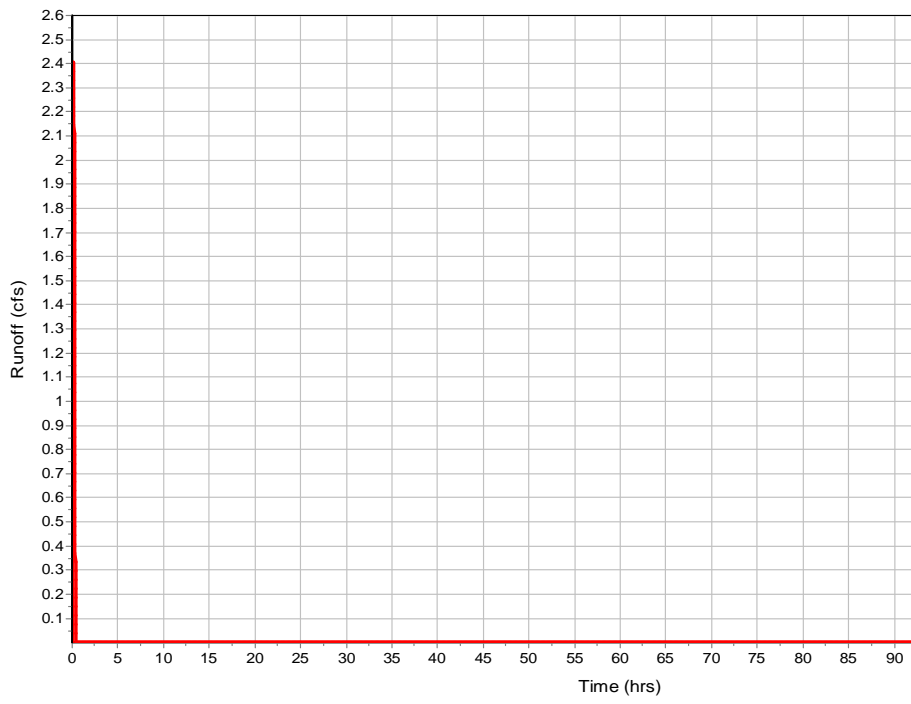
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.59
Composite Area & Weighted Runoff Coeff.	1.02		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.72
Total Runoff (in) 0.43
Peak Runoff (cfs) 2.4
Rainfall Intensity 3.995
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:53

Subbasin : Y1

Runoff Hydrograph



Subbasin : Y10

Input Data

Area (ac) 1.17
Weighted Runoff Coefficient 0.59

Runoff Coefficient

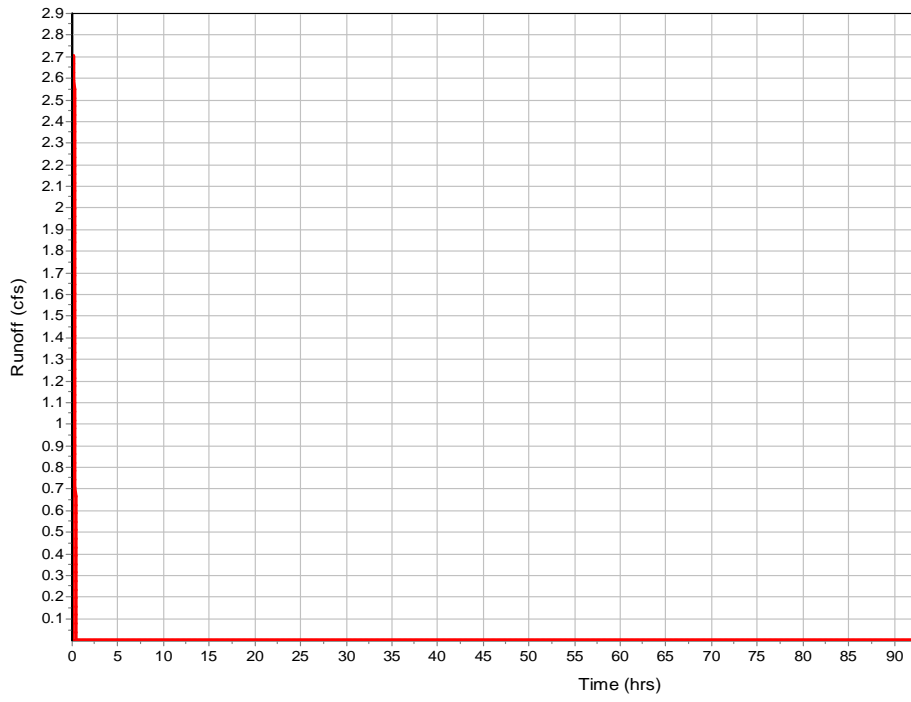
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.17	-	0.59
Composite Area & Weighted Runoff Coeff.	1.17		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.75
Total Runoff (in) 0.44
Peak Runoff (cfs) 2.71
Rainfall Intensity 3.919
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:11:25

Subbasin : Y10

Runoff Hydrograph



Subbasin : Y2

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.59

Runoff Coefficient

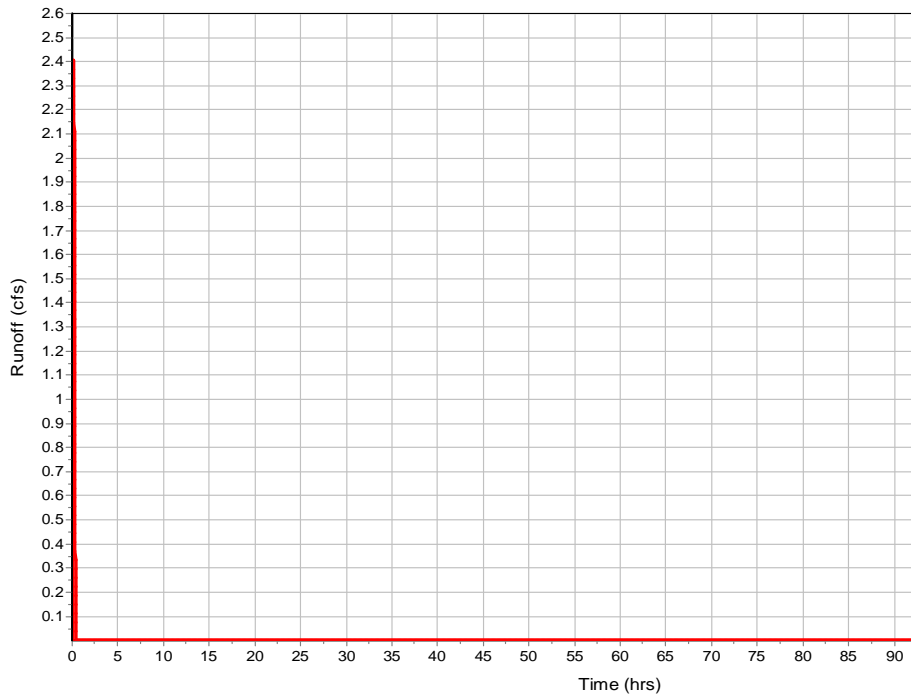
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.59
Composite Area & Weighted Runoff Coeff.	1.02		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.72
Total Runoff (in) 0.43
Peak Runoff (cfs) 2.4
Rainfall Intensity 3.995
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:53

Subbasin : Y2

Runoff Hydrograph



Subbasin : Y3

Input Data

Area (ac) 0.99
Weighted Runoff Coefficient 0.59

Runoff Coefficient

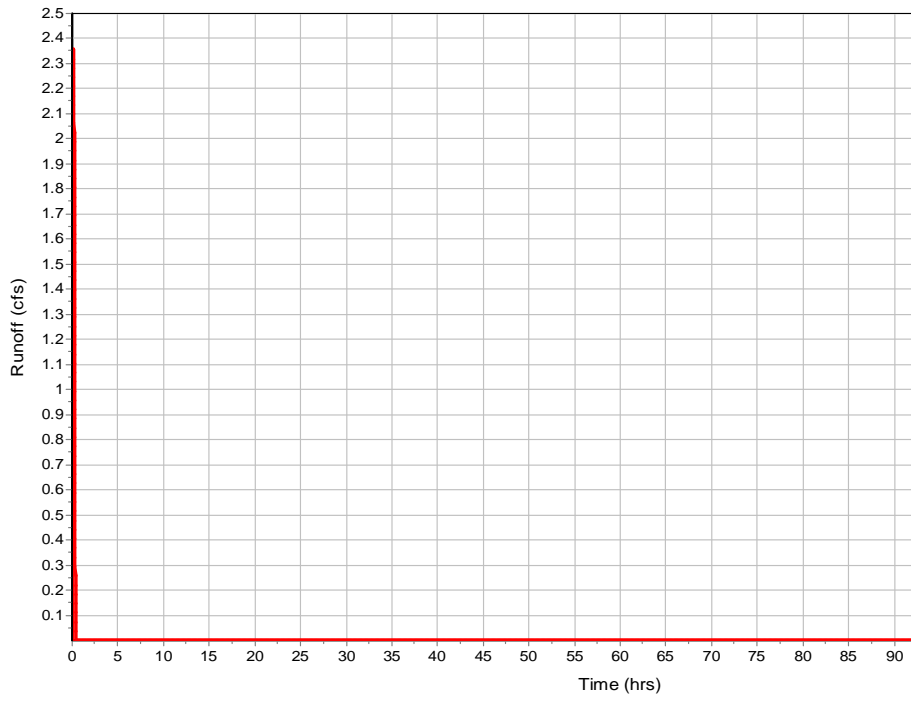
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.99	-	0.59
Composite Area & Weighted Runoff Coeff.	0.99		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.72
Total Runoff (in) 0.42
Peak Runoff (cfs) 2.36
Rainfall Intensity 4.035
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:37

Subbasin : Y3

Runoff Hydrograph



Subbasin : Y4

Input Data

Area (ac) 0.99
Weighted Runoff Coefficient 0.59

Runoff Coefficient

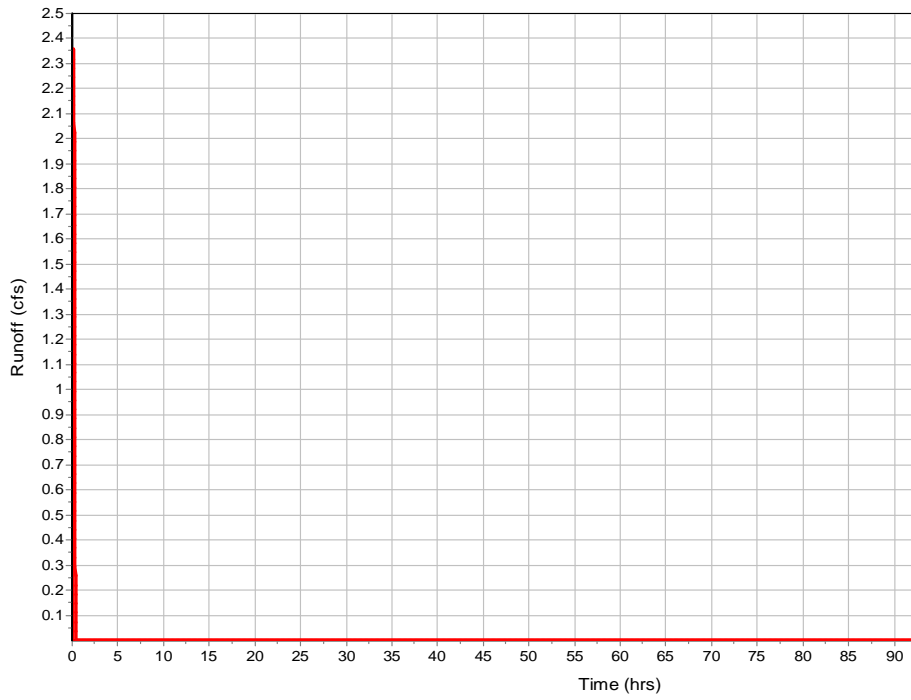
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.99	-	0.59
Composite Area & Weighted Runoff Coeff.	0.99		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.72
Total Runoff (in) 0.42
Peak Runoff (cfs) 2.36
Rainfall Intensity 4.035
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:37

Subbasin : Y4

Runoff Hydrograph



Subbasin : Y5

Input Data

Area (ac) 0.49
Weighted Runoff Coefficient 0.59

Runoff Coefficient

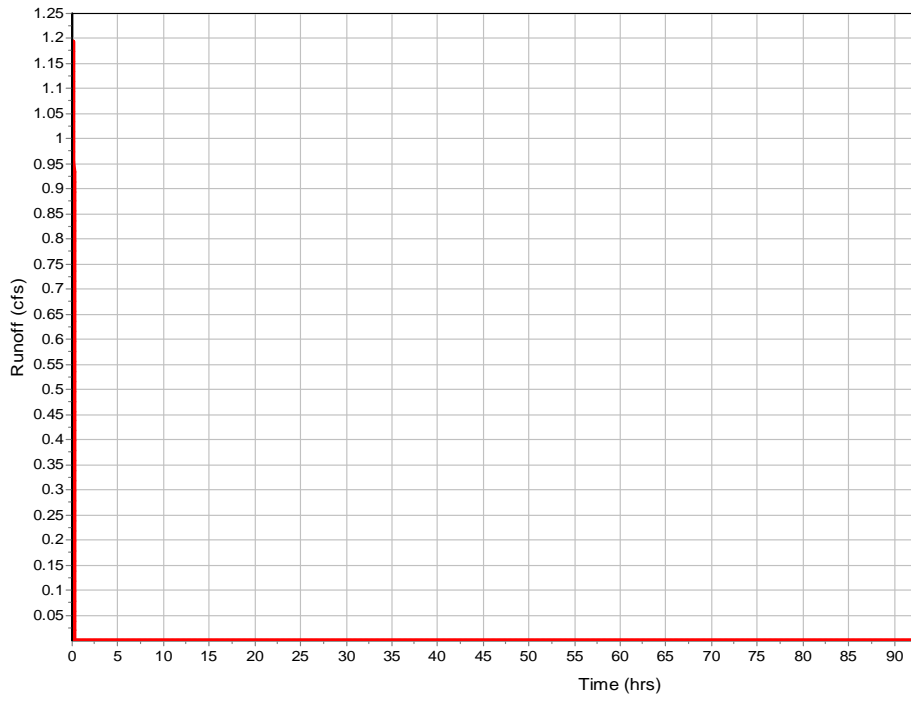
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.49	-	0.59
Composite Area & Weighted Runoff Coeff.	0.49		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.69
Total Runoff (in) 0.41
Peak Runoff (cfs) 1.19
Rainfall Intensity 4.13
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Y5

Runoff Hydrograph



Subbasin : Y6

Input Data

Area (ac) 0.49
Weighted Runoff Coefficient 0.59

Runoff Coefficient

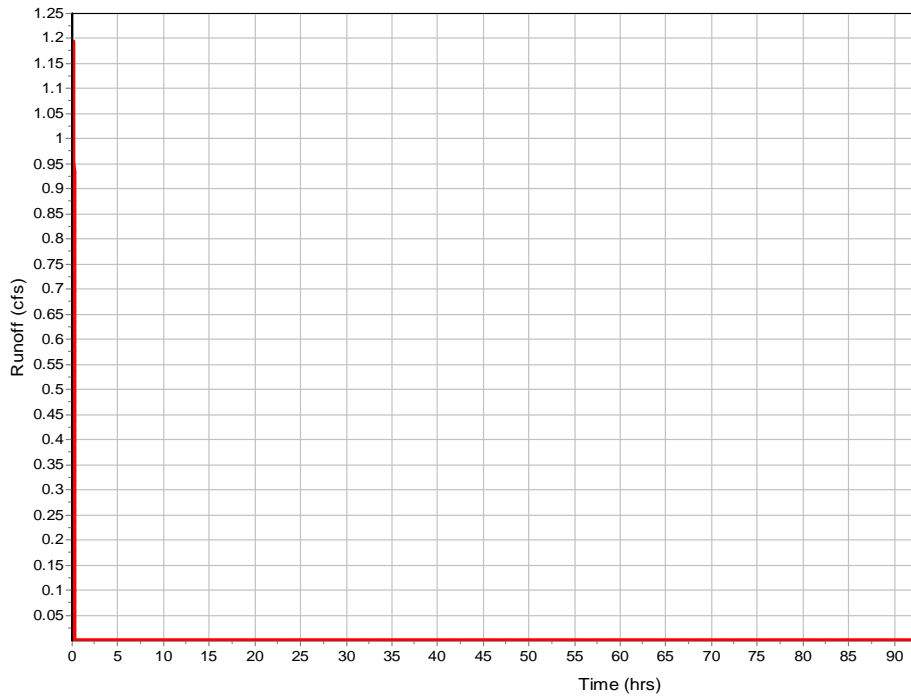
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.49	-	0.59
Composite Area & Weighted Runoff Coeff.	0.49		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.69
Total Runoff (in) 0.41
Peak Runoff (cfs) 1.19
Rainfall Intensity 4.13
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Y6

Runoff Hydrograph



Subbasin : Y7

Input Data

Area (ac) 1.21
Weighted Runoff Coefficient 0.59

Runoff Coefficient

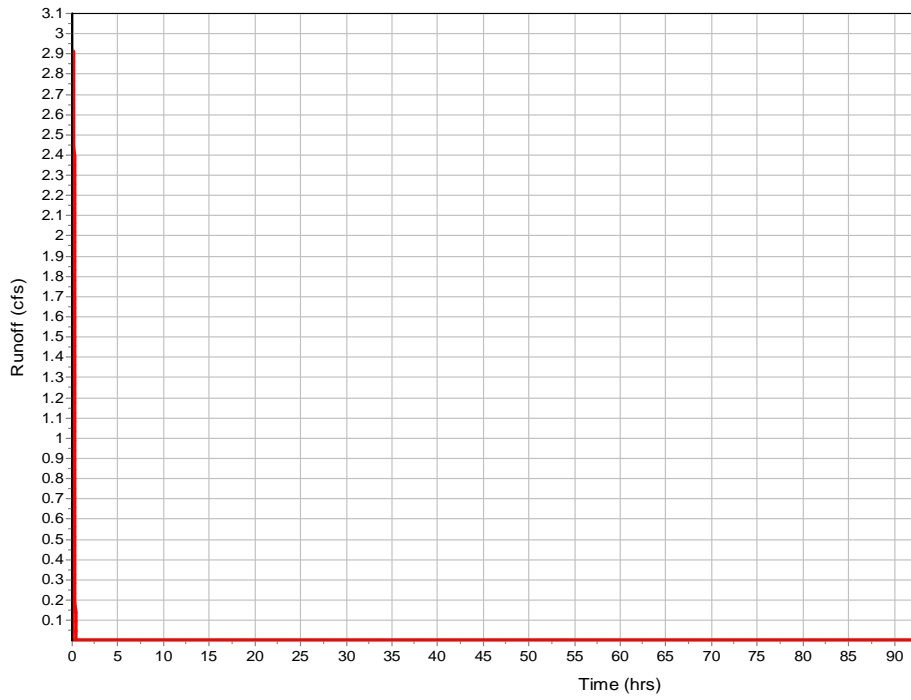
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.21	-	0.59
Composite Area & Weighted Runoff Coeff.	1.21		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.7
Total Runoff (in) 0.41
Peak Runoff (cfs) 2.91
Rainfall Intensity 4.077
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:20

Subbasin : Y7

Runoff Hydrograph



Subbasin : Y8

Input Data

Area (ac) 1.07
Weighted Runoff Coefficient 0.59

Runoff Coefficient

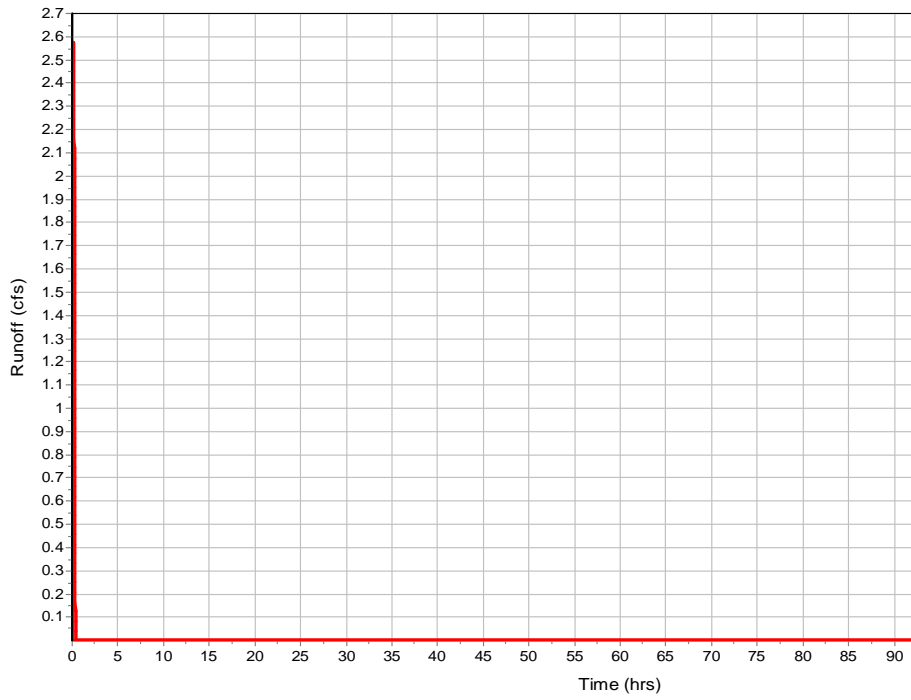
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.07	-	0.59
Composite Area & Weighted Runoff Coeff.	1.07		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.7
Total Runoff (in) 0.41
Peak Runoff (cfs) 2.57
Rainfall Intensity 4.077
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:10:20

Subbasin : Y8

Runoff Hydrograph



Subbasin : Y9

Input Data

Area (ac) 1.17
Weighted Runoff Coefficient 0.59

Runoff Coefficient

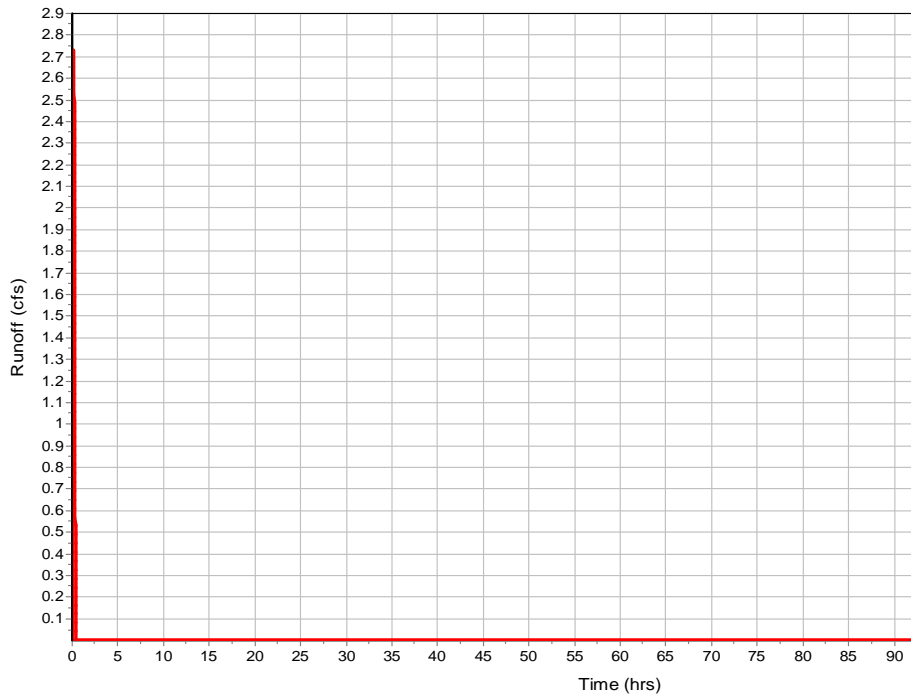
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.17	-	0.59
Composite Area & Weighted Runoff Coeff.	1.17		0.59

Subbasin Runoff Results

Total Rainfall (in) 0.74
Total Runoff (in) 0.44
Peak Runoff (cfs) 2.73
Rainfall Intensity 3.958
Weighted Runoff Coefficient 0.59
Time of Concentration (days hh:mm:ss) 0 00:11:08

Subbasin : Y9

Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimur Pipe Cove (ft)
1	Culvert-In	6174.43	6177.00	2.57	0.00	-6174.43	0.00	-6177.00	0.00	0.0
2	Culvert-Out	6174.22	6177.00	2.78	0.00	-6174.22	0.00	-6177.00	0.00	0.0
3	Forebay	6189.21	6191.50	2.29	6189.21	0.00	0.00	-6191.50	0.00	0.0
4	J-01	6196.03	6198.98	2.95	6196.03	0.00	6195.86	-3.13	0.00	0.0
5	J-02	6195.11	6198.30	3.19	6195.11	0.00	6195.00	-3.30	0.00	0.0
6	J-03	6194.13	6197.33	3.20	6194.13	0.00	6194.11	-3.23	0.00	0.0
7	J-04	6194.04	6197.46	3.42	6194.04	0.00	6194.05	-3.42	0.00	0.0
8	J-05	6194.95	6198.18	3.23	6194.95	0.00	6194.95	-3.23	0.00	0.0
9	J-06	6194.03	6197.50	3.47	6194.03	0.00	6194.00	-3.50	0.00	0.0
10	J-07	6193.05	6196.53	3.48	6193.05	0.00	6193.20	-3.33	0.00	0.0
11	J-08	6192.46	6196.68	4.22	6192.46	0.00	6193.49	-3.19	0.00	0.0
12	J-09	6194.15	6197.10	2.95	6194.15	0.00	6193.08	-4.02	0.00	0.0
13	J-10	6190.90	6195.96	5.06	6190.90	0.00	6192.65	-3.31	0.00	0.0
14	J-11	6193.24	6196.48	3.24	6193.24	0.00	6193.50	-2.98	0.00	0.0
15	J-12	6192.32	6195.80	3.48	6192.32	0.00	6103.00	-92.80	0.00	0.0
16	J-13	6190.84	6194.83	3.99	6190.84	0.00	0.00	-6194.83	0.00	0.0
17	J-14	6192.59	6195.78	3.19	6192.59	0.00	6194.61	-1.18	0.00	0.0
18	J-15	6191.66	6195.10	3.44	6191.66	0.00	6194.00	-1.10	0.00	0.0
19	J-16	6191.01	6194.13	3.12	6191.01	0.00	6192.86	-1.28	0.00	0.0
20	J-17	6190.95	6194.31	3.36	6190.95	0.00	6192.80	-1.52	0.00	0.0
21	J-18	6189.75	6195.02	5.27	6189.75	0.00	6192.31	-2.71	0.00	0.0
22	OutletPipe	6187.31	6188.81	1.50	6187.31	0.00	0.00	-6188.81	0.00	0.0
23	OutletStructure	6187.67	6194.00	6.33	6187.67	0.00	0.00	-6194.00	0.00	0.0

Junction Results

SN Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time to Max HGL Occurrence (days hh:mm)
1 Culvert-In	5.26	5.26	6174.96	0.53	0.00	2.04	6174.43	0.00	0 00:2
2 Culvert-Out	5.25	0.00	6174.75	0.53	0.00	2.25	6174.22	0.00	0 00:2
3 Forebay	21.31	0.00	6190.35	1.14	0.00	1.86	6189.73	0.52	0 00:1
4 J-01	2.40	2.40	6196.58	0.55	0.00	2.40	6196.03	0.00	0 00:1
5 J-02	2.39	0.00	6195.91	0.80	0.00	2.39	6195.36	0.25	0 00:1
6 J-03	4.69	2.40	6194.86	0.73	0.00	2.47	6194.13	0.00	0 00:1
7 J-04	4.69	0.00	6194.82	0.78	0.00	2.64	6194.04	0.00	0 00:1
8 J-05	2.36	2.36	6195.49	0.54	0.00	2.69	6194.95	0.00	0 00:1
9 J-06	2.34	0.00	6194.82	0.79	0.00	2.68	6194.28	0.25	0 00:1
10 J-07	4.59	2.36	6193.77	0.72	0.00	2.76	6193.05	0.00	0 00:1
11 J-08	9.19	0.00	6193.74	1.28	0.00	2.94	6192.96	0.50	0 00:1
12 J-09	1.19	1.19	6194.48	0.33	0.00	2.62	6194.15	0.00	0 00:1
13 J-10	11.25	1.19	6192.47	1.57	0.00	3.49	6192.15	1.25	0 00:1
14 J-11	2.91	2.91	6193.85	0.61	0.00	2.63	6193.24	0.00	0 00:1
15 J-12	2.89	0.00	6193.18	0.86	0.00	2.62	6192.57	0.25	0 00:1
16 J-13	5.35	2.57	6191.89	1.05	0.00	2.94	6191.34	0.50	0 00:1
17 J-14	2.73	2.73	6193.18	0.59	0.00	2.60	6192.59	0.00	0 00:1
18 J-15	2.71	0.00	6192.49	0.83	0.00	2.61	6191.91	0.25	0 00:1
19 J-16	5.38	2.71	6191.91	0.90	0.00	2.22	6191.01	0.00	0 00:1
20 J-17	5.37	0.00	6191.85	0.90	0.00	2.46	6190.95	0.00	0 00:1
21 J-18	21.31	0.00	6191.46	1.71	0.00	3.56	6190.75	1.00	0 00:1
22 OutletPipe	0.20	0.00	6187.56	0.25	0.00	5.75	6187.44	0.13	0 00:2
23 OutletStructure	0.20	0.00	6187.84	0.17	0.00	6.16	6187.71	0.04	0 00:2

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness
1 10-30NP	122.00	6190.90	0.00	6190.29	0.54	0.61	0.5000	CIRCULAR	24.000	24.000	0.0120
2 11-15NP	91.22	6193.24	0.00	6192.57	0.25	0.67	0.7300	CIRCULAR	15.000	15.000	0.0120
3 12-18P	130.69	6192.32	0.00	6191.34	0.50	0.98	0.7500	CIRCULAR	18.000	18.000	0.0120
4 13-24NP	11.92	6190.84	0.00	6190.75	1.00	0.09	0.7600	CIRCULAR	24.000	24.000	0.0120
5 14-15NP	90.26	6192.59	0.00	6191.91	0.25	0.68	0.7500	CIRCULAR	15.000	15.000	0.0120
6 15-18P	130.00	6191.66	0.00	6191.01	0.00	0.65	0.5000	CIRCULAR	18.000	18.000	0.0120
7 16-18NP	11.92	6191.01	0.00	6190.95	0.00	0.06	0.5000	CIRCULAR	18.000	18.000	0.0120
8 17-18NP	240.00	6190.95	0.00	6189.75	0.00	1.20	0.5000	CIRCULAR	18.000	18.000	0.0120
9 18-36NP	58.84	6189.75	0.00	6189.21	0.00	0.54	0.9200	CIRCULAR	36.000	36.000	0.0120
10 1-NP15	89.45	6196.03	0.00	6195.36	0.25	0.67	0.7500	CIRCULAR	15.000	15.000	0.0120
11 2-18P	130.81	6195.11	0.00	6194.13	0.00	0.98	0.7500	CIRCULAR	18.000	18.000	0.0120
12 3-18NP	11.92	6194.13	0.00	6194.04	0.00	0.09	0.7600	CIRCULAR	18.000	18.000	0.0120
13 4-18NP	180.00	6194.04	0.00	6192.96	0.50	1.08	0.6000	CIRCULAR	18.000	18.000	0.0120
14 5-15NP	90.21	6194.95	0.00	6194.28	0.25	0.67	0.7400	CIRCULAR	15.000	15.000	0.0120
15 6-18P	130.60	6194.03	0.00	6193.05	0.00	0.98	0.7500	CIRCULAR	18.000	18.000	0.0120
16 7-18NP	11.92	6193.05	0.00	6192.96	0.50	0.09	0.7600	CIRCULAR	18.000	18.000	0.0120
17 8-24NP	168.00	6192.46	0.00	6191.40	0.50	1.06	0.6300	CIRCULAR	24.000	24.000	0.0120
18 9-15P	152.67	6194.15	0.00	6192.15	1.25	2.00	1.3100	CIRCULAR	15.000	15.000	0.0120
19 Culvert	42.05	6174.43	0.00	6174.22	0.00	0.21	0.5000	CIRCULAR	24.000	24.000	0.0120
20 Link-03	228.62	6187.31	0.00	6186.00	0.00	1.31	0.5700	Dummy	0.000	0.000	0.0150
21 Link-09	438.78	6174.21	-0.01	6173.75	0.00	0.46	0.1000	Dummy	0.000	0.000	0.0150
22 OutletPipe	54.95	6187.67	0.00	6187.40	0.09	0.27	0.4900	CIRCULAR	18.000	18.000	0.0120
23 Trk1Chnl	164.17	6189.73	0.52	6188.25	0.25	1.48	0.9000	Dummy	0.000	0.000	0.0150

Pipe Results

SN Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)
1 10-30NP	11.24	0 00:11	17.33	0.65	5.89	0.35	1.17	0.59	0.00
2 11-15NP	2.89	0 00:10	6.00	0.48	5.95	0.26	0.61	0.49	0.00
3 12-18P	2.87	0 00:10	9.85	0.29	4.87	0.45	0.55	0.37	0.00
4 13-24NP	5.35	0 00:10	21.30	0.25	5.64	0.04	0.68	0.34	0.00
5 14-15NP	2.71	0 00:11	6.07	0.45	5.77	0.26	0.58	0.47	0.00
6 15-18P	2.69	0 00:11	8.05	0.33	4.13	0.52	0.60	0.40	0.00
7 16-18NP	5.37	0 00:11	8.07	0.67	4.89	0.04	0.89	0.60	0.00
8 17-18NP	5.29	0 00:12	8.05	0.66	4.93	0.81	0.89	0.59	0.00
9 18-36NP	21.31	0 00:11	69.22	0.31	8.62	0.11	1.14	0.38	0.00
10 1-NP15	2.39	0 00:11	6.06	0.39	5.65	0.26	0.54	0.44	0.00
11 2-18P	2.37	0 00:11	9.85	0.24	4.62	0.47	0.50	0.33	0.00
12 3-18NP	4.69	0 00:11	9.89	0.47	5.52	0.04	0.73	0.48	0.00
13 4-18NP	4.67	0 00:11	8.81	0.53	5.11	0.59	0.78	0.52	0.00
14 5-15NP	2.34	0 00:11	6.03	0.39	5.64	0.27	0.54	0.43	0.00
15 6-18P	2.32	0 00:11	9.86	0.24	4.59	0.47	0.49	0.33	0.00
16 7-18NP	4.59	0 00:11	9.89	0.46	5.49	0.04	0.72	0.48	0.00
17 8-24NP	9.17	0 00:11	19.47	0.47	6.14	0.46	0.97	0.48	0.00
18 9-15P	1.18	0 00:10	8.01	0.15	6.44	0.40	0.32	0.26	0.00
19 Culvert	5.25	0 00:26	34.64	0.15	3.98	0.18	0.53	0.26	0.00
20 Link-03	0.20	0 00:26	0.00	0.15	0.00		0.53	0.26	0.00
21 Link-09	5.25	0 00:26	0.00	0.15	0.00		0.53	0.26	0.00
22 OutletPipe	0.20	0 00:26	7.98	0.03	1.84	0.50	0.17	0.11	0.00
23 TrkIChnl	21.31	0 00:11	0.00	0.03	0.00		0.17	0.11	0.00

Storage Nodes

Storage Node : DetentionPond

Input Data

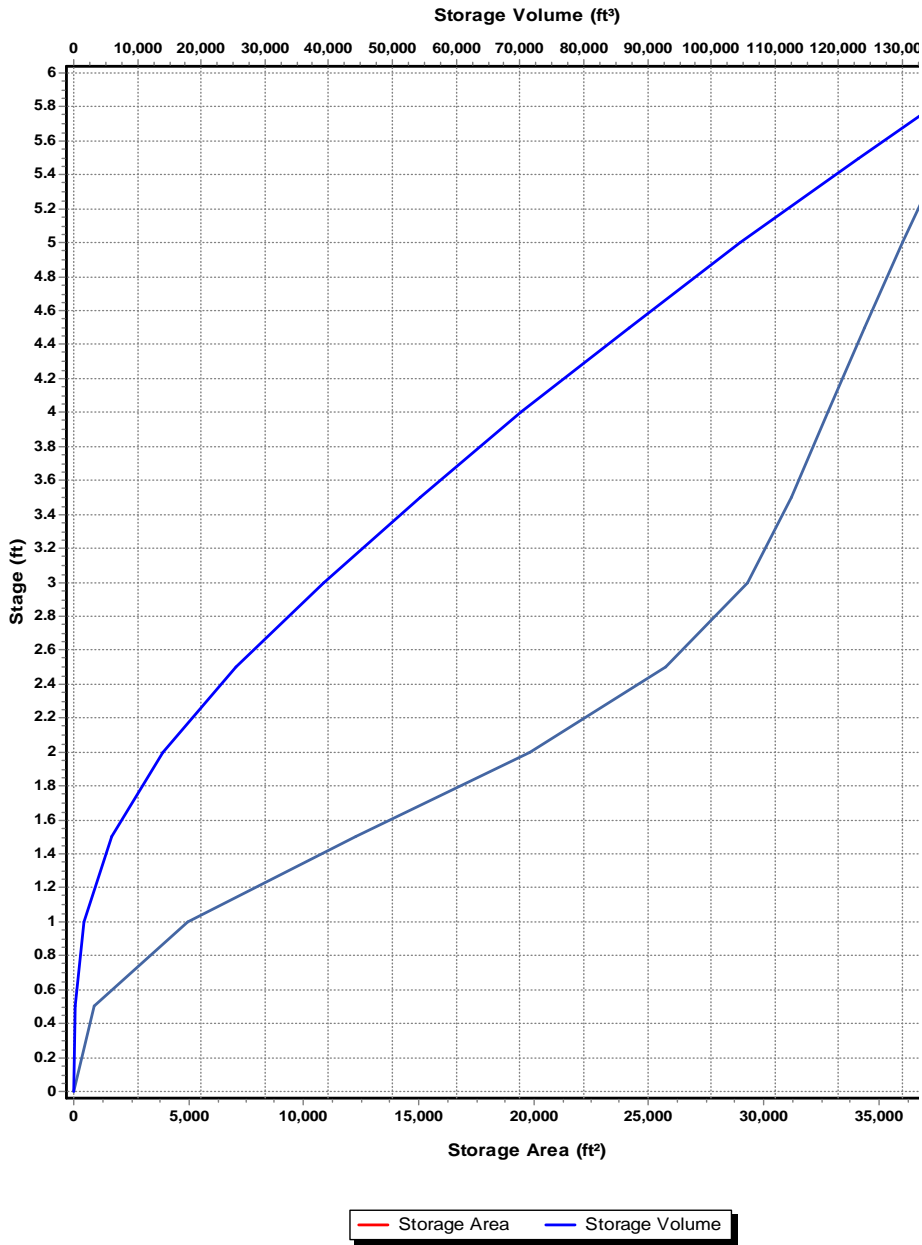
Invert Elevation (ft)	6188.00
Max (Rim) Elevation (ft)	6194.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-6188.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	10	0
0.5	882.13	223.03
1	4951.3	1681.39
1.5	12246.1	5980.74
2	19823.28	13998.09
2.5	25766.41	25395.51
3	29274.59	39155.76
3.5	31177.97	54268.9
4	32757.61	70252.8
4.5	34372.11	87035.23
5	36021.48	104633.63
5.5	37713.37	123067.34
6	39455.42	142359.54

Storage Area Volume Curves



Storage Node : DetentionPond (continued)

Outflow Weirs

SN Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)
1 EmergencySpillway	Trapezoidal	No	6192.00	4.00	10.00	2.00
2 Weir	Trapezoidal	No	6191.50	3.50	4.00	1.00

Outflow Orifices

SN Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)
1 Orifice-01	Side	CIRCULAR	No	1.00		
2 Orifice-02	Side	CIRCULAR	No	1.00		
3 Orifice-03	Side	CIRCULAR	No	1.50		
4 Orifice-04	Side	CIRCULAR	No	1.50		
5 Orifice-05	Side	CIRCULAR	No	2.00		
6 Orifice-06	Side	CIRCULAR	No	2.00		

Output Summary Results

Peak Inflow (cfs)	24.48
Peak Lateral Inflow (cfs)	3.79
Peak Outflow (cfs)	0.2
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	6190.13
Max HGL Depth Attained (ft)	2.13
Average HGL Elevation Attained (ft)	6188.43
Average HGL Depth Attained (ft)	0.43
Time of Max HGL Occurrence (days hh:mm)	0 00:26
Total Exfiltration Volume (1000-ft ³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name 23148-RM100.SPF

Project Options

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

Analysis Options

Start Analysis On 00:00:00 0:00:00
End Analysis On 00:00:00 0:00:00
Start Reporting On 00:00:00 0:00:00
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	19
Nodes.....	31
<i>Junctions</i>	23
<i>Outfalls</i>	7
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	1
Links.....	31
<i>Channels</i>	0
<i>Pipes</i>	23
<i>Pumps</i>	0
<i>Orifices</i>	6
<i>Weirs</i>	2
<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	E1	31.82	0.3600	1.95	0.70	22.37	50.95	0 00:26:17
2	E2	15.06	0.3600	1.95	0.70	10.59	24.11	0 00:26:17
3	E3	26.94	0.3600	1.95	0.70	18.97	42.91	0 00:26:33
4	E4	7.85	0.3600	1.95	0.70	5.52	12.57	0 00:26:17
5	EDB	1.02	0.9600	1.16	1.11	1.13	6.79	0 00:10:00
6	P1-N	22.03	0.3600	1.95	0.70	15.49	35.27	0 00:26:17
7	P1-S	6.35	0.3600	1.95	0.70	4.46	10.17	0 00:26:17
8	P2	9.34	0.3600	1.95	0.70	6.57	14.96	0 00:26:17
9	P3	25.46	0.3600	1.95	0.70	17.92	40.56	0 00:26:33
10	Y1	1.02	0.7000	1.21	0.85	0.86	4.79	0 00:10:52
11	Y10	1.17	0.7000	1.26	0.88	1.03	5.39	0 00:11:25
12	Y2	1.02	0.7000	1.21	0.85	0.86	4.79	0 00:10:52
13	Y3	0.99	0.7000	1.20	0.84	0.83	4.69	0 00:10:36
14	Y4	0.99	0.7000	1.20	0.84	0.83	4.69	0 00:10:36
15	Y5	0.49	0.7000	1.16	0.81	0.40	2.38	0 00:10:00
16	Y6	0.49	0.7000	1.16	0.81	0.40	2.38	0 00:10:00
17	Y7	1.21	0.7000	1.18	0.83	1.00	5.80	0 00:10:19
18	Y8	1.07	0.7000	1.18	0.83	0.88	5.13	0 00:10:19
19	Y9	1.17	0.7000	1.24	0.87	1.01	5.44	0 00:11:08

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)
1	Culvert-In	Junction	6174.43	6178.00	0.00	0.00	0.00	35.27	6178.00	0.00
2	Culvert-Out	Junction	6174.22	6178.00	0.00	0.00	0.00	37.15	6176.03	0.00
3	Forebay	Junction	6189.21	6191.50	6189.21	0.00	0.00	37.12	6190.77	0.00
4	1-Jun	Junction	6195.11	6198.30	6195.11	6195.00	0.00	4.75	6196.19	0.00
5	2-Jun	Junction	6194.03	6197.50	6194.03	6194.00	0.00	4.66	6195.10	0.00
6	3-Jun	Junction	6192.32	6195.80	6192.32	6103.00	0.00	5.75	6193.55	0.00
7	4-Jun	Junction	6191.66	6195.10	6191.66	6194.00	0.00	5.40	6192.83	0.00
8	Null Structure	Junction	6190.84	6194.83	6190.84	0.00	0.00	10.64	6192.16	0.00
9	OutletPipe	Junction	6187.31	6188.81	6187.31	0.00	0.00	0.26	6187.58	0.00
10	OutletStructure	Junction	6187.67	6194.00	6187.67	0.00	0.00	0.26	6187.85	0.00
11	Structure - (10)	Junction	6190.90	6195.96	6190.90	6192.65	0.00	22.23	6195.96	0.00
12	Structure - (11)	Junction	6194.95	6198.18	6194.95	6194.95	0.00	4.69	6195.78	0.00
13	Structure - (12)	Junction	6193.05	6196.53	6193.05	6193.20	0.00	9.18	6194.19	0.00
14	Structure - (13)	Junction	6192.46	6196.68	6192.46	6193.49	0.00	18.12	6194.36	0.00
15	Structure - (15)	Junction	6196.03	6198.98	6196.03	6195.86	0.00	4.79	6196.87	0.00
16	Structure - (16)	Junction	6194.13	6197.33	6194.13	6194.11	0.00	9.37	6195.29	0.00
17	Structure - (17)	Junction	6194.04	6197.46	6194.04	6194.05	0.00	9.37	6197.46	0.00
18	Structure - (2)	Junction	6191.01	6194.13	6191.01	6192.86	0.00	10.72	6194.13	0.00
19	Structure - (22)	Junction	6194.15	6197.10	6194.15	6193.08	0.00	2.38	6194.62	0.00
20	Structure - (3)	Junction	6190.95	6194.31	6190.95	6192.80	0.00	8.73	6194.31	0.00
21	Structure - (6)	Junction	6193.24	6196.48	6193.24	6193.50	0.00	5.80	6194.23	0.00
22	Structure - (8)	Junction	6189.75	6195.02	6189.75	6192.31	0.00	37.07	6192.29	0.00
23	Structure-(4)	Junction	6192.59	6195.78	6192.59	6194.61	0.00	5.44	6193.51	0.00
24	E-Out-1	Outfall	6173.75					50.95	6173.75	
25	E-Out-2	Outfall	6187.75					24.11	6187.75	
26	E-Out-3	Outfall	6195.50					42.91	6195.50	
27	E-Out-4	Outfall	6196.00					12.57	6196.00	
28	P-Out-1	Outfall	6173.75					47.13	6173.75	
29	P-Out-2	Outfall	6186.00					15.21	6186.00	
30	P-Out-3	Outfall	6195.50					40.56	6195.50	
31	DetentionPond	Storage Node	6188.00	6194.00	0.00		0.00	43.91	6190.72	

Link Summary

SN Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Fit Veloc (ft/s)
1	10-30NP	Pipe	Structure - (10) Structure - (8)	122.00	6190.90	6190.29	0.5000	24.000	0.0120	18.75	17.33	1.08	6.
2	11-15NP	Pipe	Structure - (6) 3-Jun	91.22	6193.24	6192.57	0.7300	15.000	0.0120	5.75	6.00	0.96	6.
3	12-18P	Pipe	3-Jun Null Structure	130.69	6192.32	6191.34	0.7500	18.000	0.0120	5.71	9.85	0.58	5.
4	13-24NP	Pipe	Null Structure Structure - (8)	11.92	6190.84	6190.75	0.7600	24.000	0.0120	10.64	21.30	0.50	6.
5	14-15NP	Pipe	Structure-(4) 4-Jun	90.26	6192.59	6191.91	0.7500	15.000	0.0120	5.40	6.07	0.89	6.
6	15-18P	Pipe	4-Jun Structure - (2)	130.00	6191.66	6191.01	0.5000	18.000	0.0120	5.36	8.05	0.67	4.
7	16-18NP	Pipe	Structure - (2) Structure - (3)	11.92	6191.01	6190.95	0.5000	18.000	0.0120	8.73	8.07	1.08	5.
8	17-18NP	Pipe	Structure - (3) Structure - (8)	240.00	6190.95	6189.75	0.5000	18.000	0.0120	8.71	8.05	1.08	5.
9	18-36NP	Pipe	Structure - (8) Forebay	58.84	6189.75	6189.21	0.9200	36.000	0.0120	37.12	69.22	0.54	10.
10	1-NP15	Pipe	Structure - (15) 1-Jun	89.45	6196.03	6195.36	0.7500	15.000	0.0120	4.75	6.06	0.78	6.
11	2-18P	Pipe	1-Jun Structure - (16)	130.81	6195.11	6194.13	0.7500	18.000	0.0120	4.73	9.85	0.48	5.
12	3-18NP	Pipe	Structure - (16) Structure - (17)	11.92	6194.13	6194.04	0.7600	18.000	0.0120	9.37	9.89	0.95	6.
13	4-18NP	Pipe	Structure - (17) Structure - (13)	180.00	6194.04	6192.96	0.6000	18.000	0.0120	9.54	8.81	1.08	5.
14	5-15NP	Pipe	Structure - (11) 2-Jun	90.21	6194.95	6194.28	0.7400	15.000	0.0120	4.66	6.03	0.77	6.
15	6-18P	Pipe	2-Jun Structure - (12)	130.60	6194.03	6193.05	0.7500	18.000	0.0120	4.63	9.86	0.47	5.
16	7-18NP	Pipe	Structure - (12) Structure - (13)	11.92	6193.05	6192.96	0.7600	18.000	0.0120	9.18	9.89	0.93	6.
17	8-24NP	Pipe	Structure - (13) Structure - (10)	168.00	6192.46	6191.40	0.6300	24.000	0.0120	18.07	19.47	0.93	7.
18	9-15P	Pipe	Structure - (22) Structure - (10)	152.67	6194.15	6192.15	1.3100	15.000	0.0120	2.35	8.01	0.29	7.
19	Culvert	Pipe	Culvert-In Culvert-Out	42.05	6174.43	6174.22	0.5000	24.000	0.0120	37.15	34.64	1.07	6.
20	Link-03	Pipe	OutletPipe P-Out-2	228.62	0.00	0.00	0.0000	0.000	0.0150	0.26	0.00	1.07	0.
21	Link-09	Pipe	Culvert-Out P-Out-1	423.13	0.00	6173.75	-1459.0700	0.000	0.0150	37.15	0.00	1.07	0.
22	OutletPipe	Pipe	OutletStructure OutletPipe	54.95	6187.67	6187.40	0.4900	18.000	0.0120	0.26	7.98	0.03	2.
23	TrklChnl	Pipe	Forebay DetentionPond	164.17	6189.73	6188.25	0.9000	0.000	0.0150	37.12	0.00	0.03	0.
24	Orifice-01	Orifice	DetentionPond OutletStructure		6188.00	6187.67		1.000		0.04			
25	Orifice-02	Orifice	DetentionPond OutletStructure		6188.00	6187.67		1.000		0.04			
26	Orifice-03	Orifice	DetentionPond OutletStructure		6188.00	6187.67		1.000		0.04			
27	Orifice-04	Orifice	DetentionPond OutletStructure		6188.00	6187.67		1.500		0.06			
28	Orifice-05	Orifice	DetentionPond OutletStructure		6188.00	6187.67		1.500		0.05			
29	Orifice-06	Orifice	DetentionPond OutletStructure		6188.00	6187.67		2.000		0.02			
30	EmeraencvSbillwav	Weir	DetentionPond OutletPipe		6188.00	6187.31				0.00			

Subbasin Hydrology

Subbasin : E1

Input Data

Area (ac) 31.82
Weighted Runoff Coefficient 0.36

Runoff Coefficient

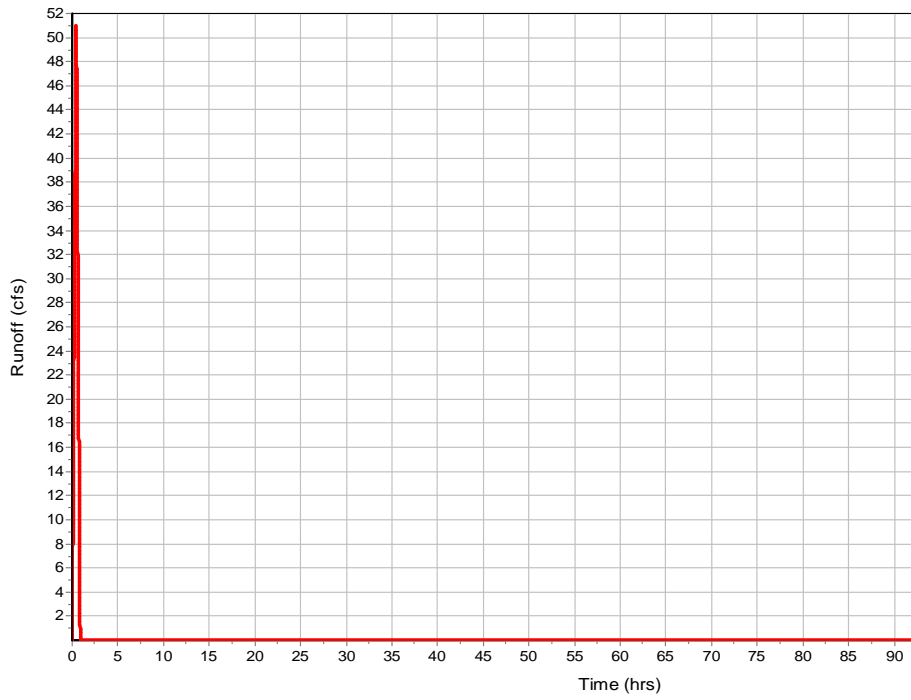
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	31.78	-	0.36
Composite Area & Weighted Runoff Coeff.	31.78		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 50.95
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E1

Runoff Hydrograph



Subbasin : E2

Input Data

Area (ac) 15.06
Weighted Runoff Coefficient 0.36

Runoff Coefficient

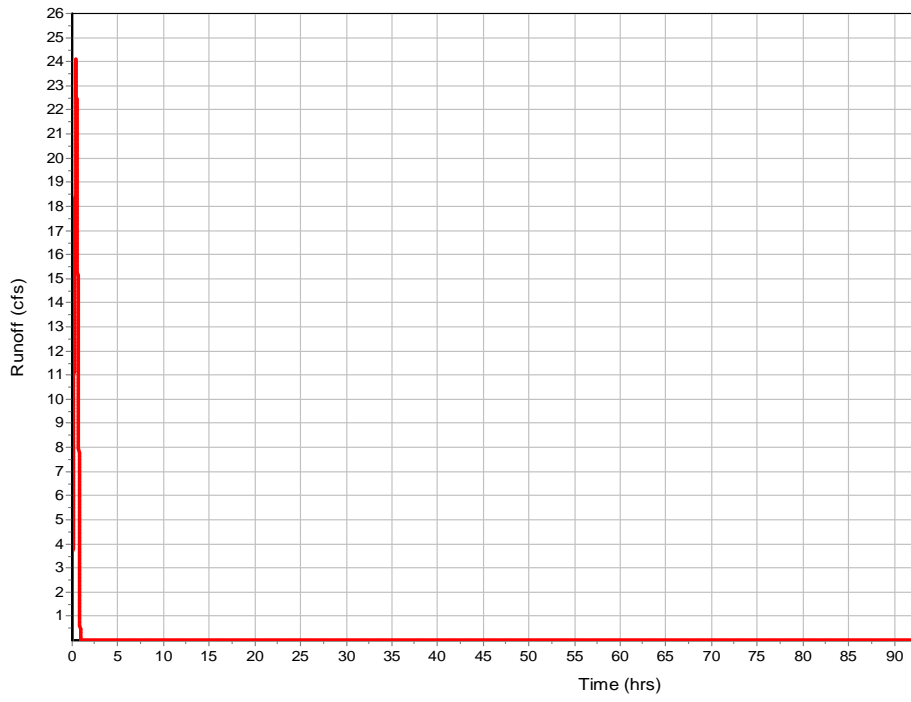
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	14.81	-	0.36
Composite Area & Weighted Runoff Coeff.	14.81		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 24.11
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E2

Runoff Hydrograph



Subbasin : E3

Input Data

Area (ac) 26.94
Weighted Runoff Coefficient 0.36

Runoff Coefficient

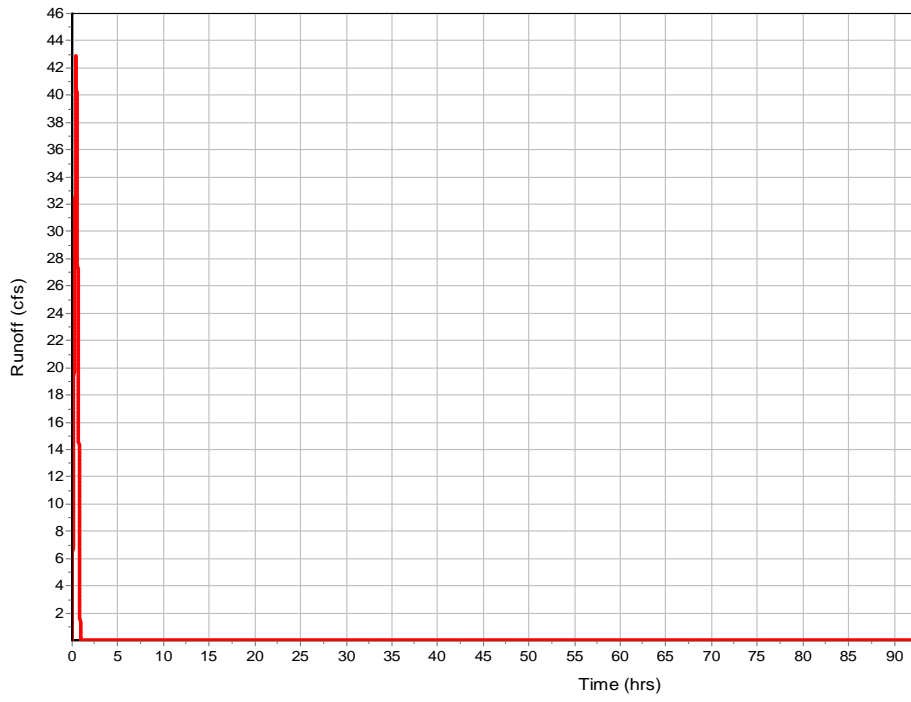
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	26.94	-	0.36
Composite Area & Weighted Runoff Coeff.	26.94		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 42.91
Rainfall Intensity 4.425
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:34

Subbasin : E3

Runoff Hydrograph



Subbasin : E4

Input Data

Area (ac) 7.85
Weighted Runoff Coefficient 0.36

Runoff Coefficient

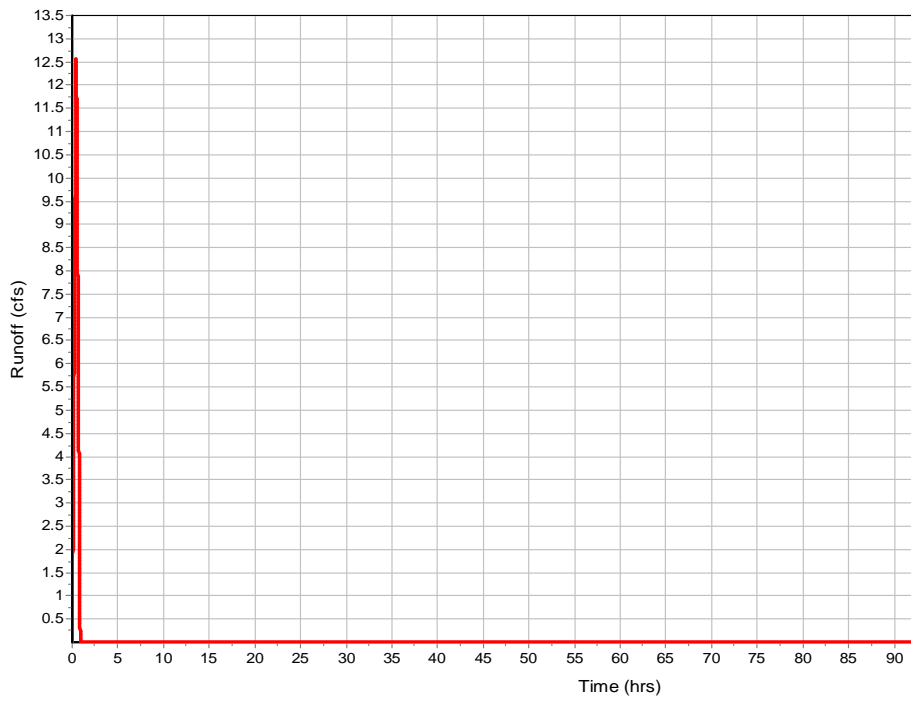
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	7.85	-	0.36
Composite Area & Weighted Runoff Coeff.	7.85		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 12.57
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : E4

Runoff Hydrograph



Subbasin : EDB

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.96

Runoff Coefficient

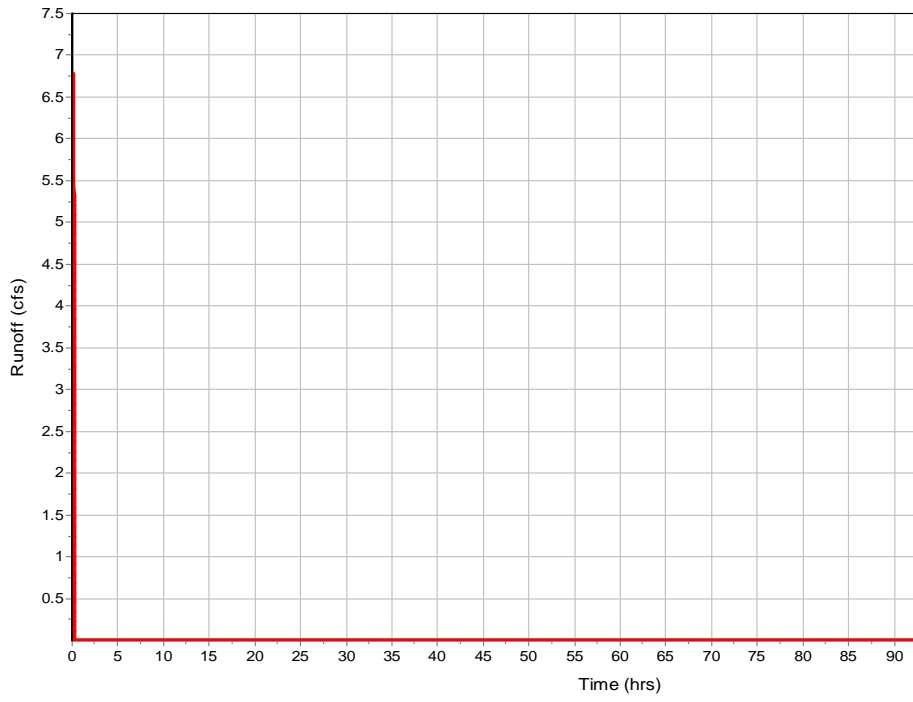
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.96
Composite Area & Weighted Runoff Coeff.	1.02		0.96

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 1.11
Peak Runoff (cfs) 6.79
Rainfall Intensity 6.93
Weighted Runoff Coefficient 0.96
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : EDB

Runoff Hydrograph



Subbasin : P1-N

Input Data

Area (ac) 22.03
Weighted Runoff Coefficient 0.36

Runoff Coefficient

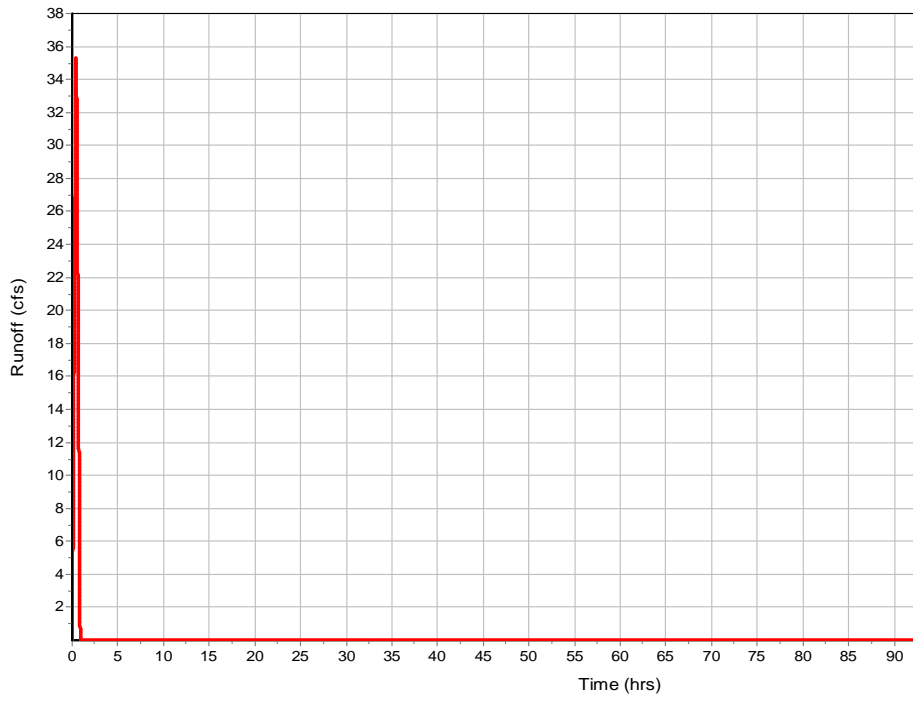
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	22.03	-	0.36
Composite Area & Weighted Runoff Coeff.	22.03		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 35.27
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P1-N

Runoff Hydrograph



Subbasin : P1-S

Input Data

Area (ac) 6.35
Weighted Runoff Coefficient 0.36

Runoff Coefficient

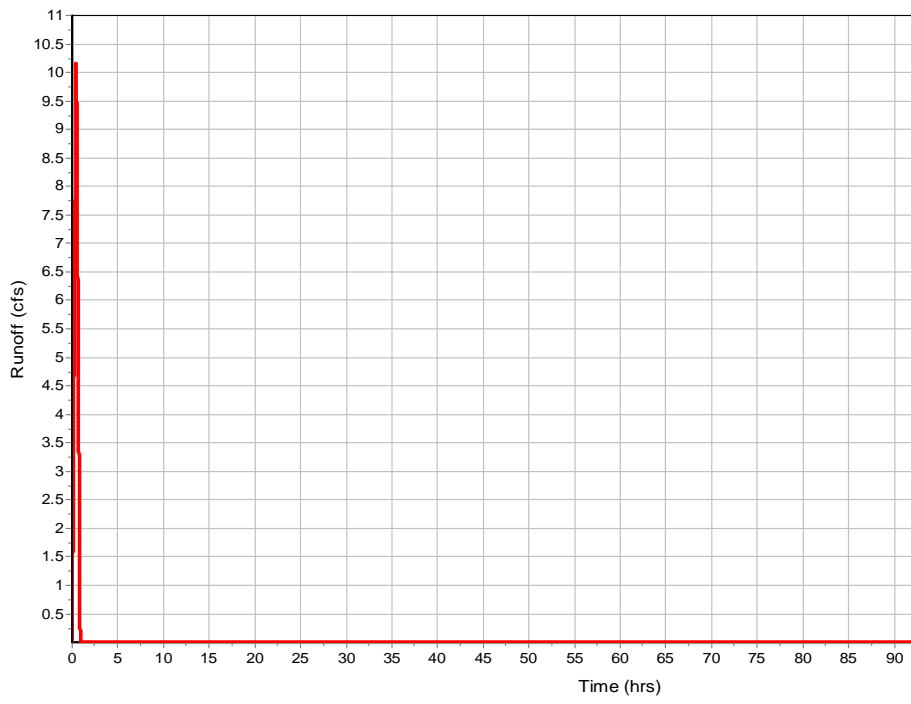
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	6.35	-	0.36
Composite Area & Weighted Runoff Coeff.	6.35		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 10.17
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P1-S

Runoff Hydrograph



Subbasin : P2

Input Data

Area (ac) 9.34
Weighted Runoff Coefficient 0.36

Runoff Coefficient

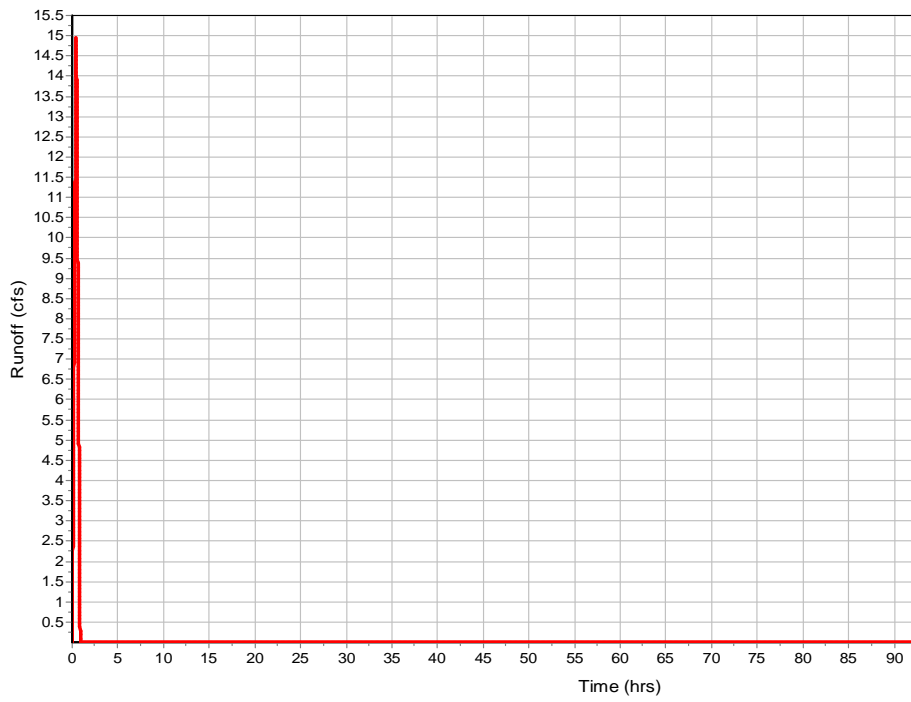
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	14.81	-	0.36
Composite Area & Weighted Runoff Coeff.	14.81		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 14.96
Rainfall Intensity 4.448
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:17

Subbasin : P2

Runoff Hydrograph



Subbasin : P3

Input Data

Area (ac) 25.46
Weighted Runoff Coefficient 0.36

Runoff Coefficient

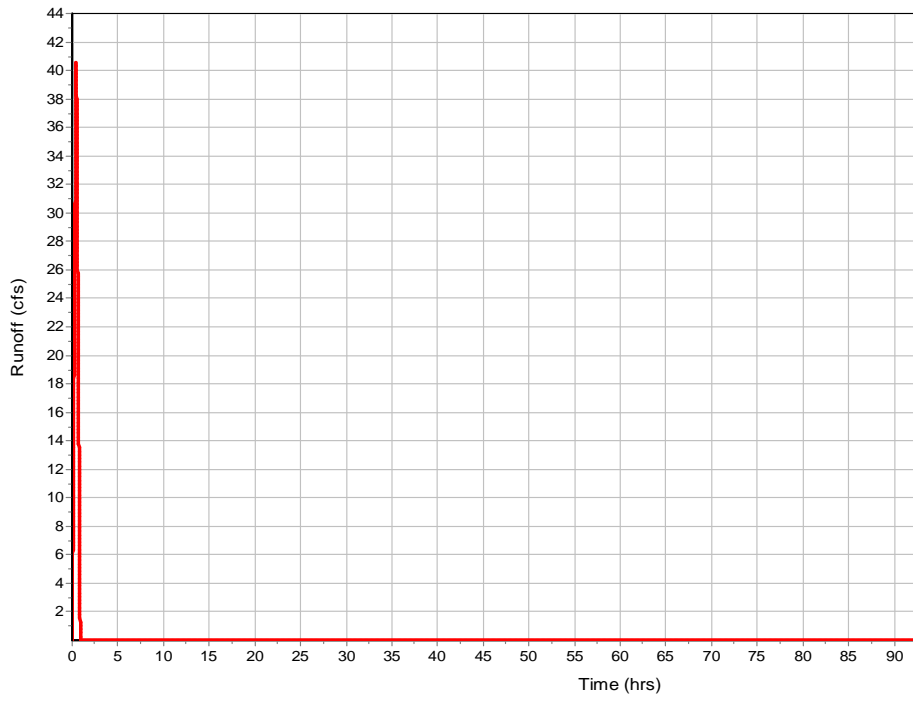
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	26.94	-	0.36
Composite Area & Weighted Runoff Coeff.	26.94		0.36

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 0.7
Peak Runoff (cfs) 40.56
Rainfall Intensity 4.425
Weighted Runoff Coefficient 0.36
Time of Concentration (days hh:mm:ss) 0 00:26:34

Subbasin : P3

Runoff Hydrograph



Subbasin : Y1

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.7

Runoff Coefficient

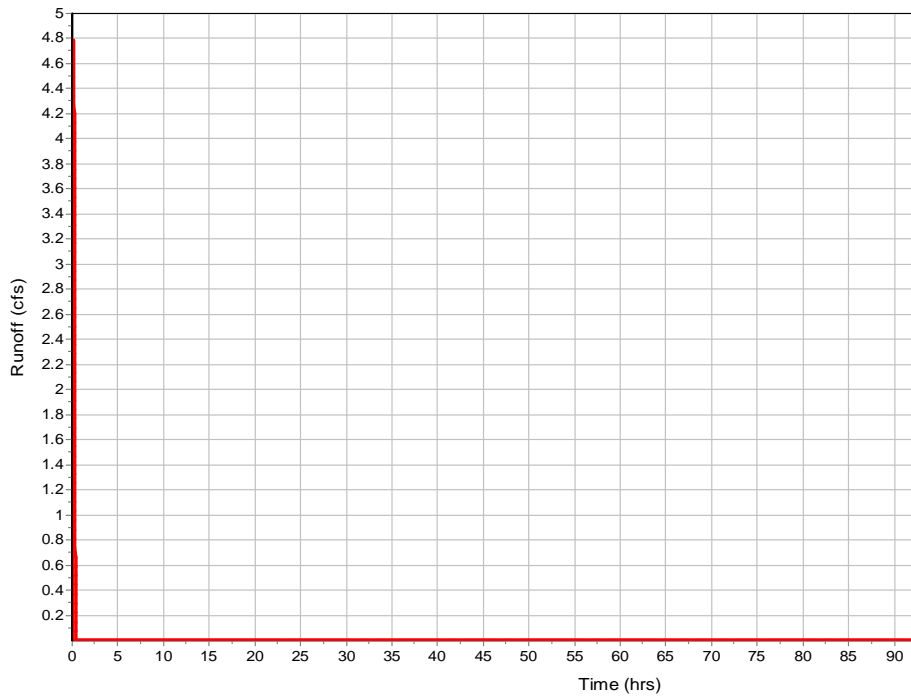
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.7
Composite Area & Weighted Runoff Coeff.	1.02		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.21
Total Runoff (in) 0.85
Peak Runoff (cfs) 4.79
Rainfall Intensity 6.704
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:53

Subbasin : Y1

Runoff Hydrograph



Subbasin : Y10

Input Data

Area (ac) 1.17
Weighted Runoff Coefficient 0.7

Runoff Coefficient

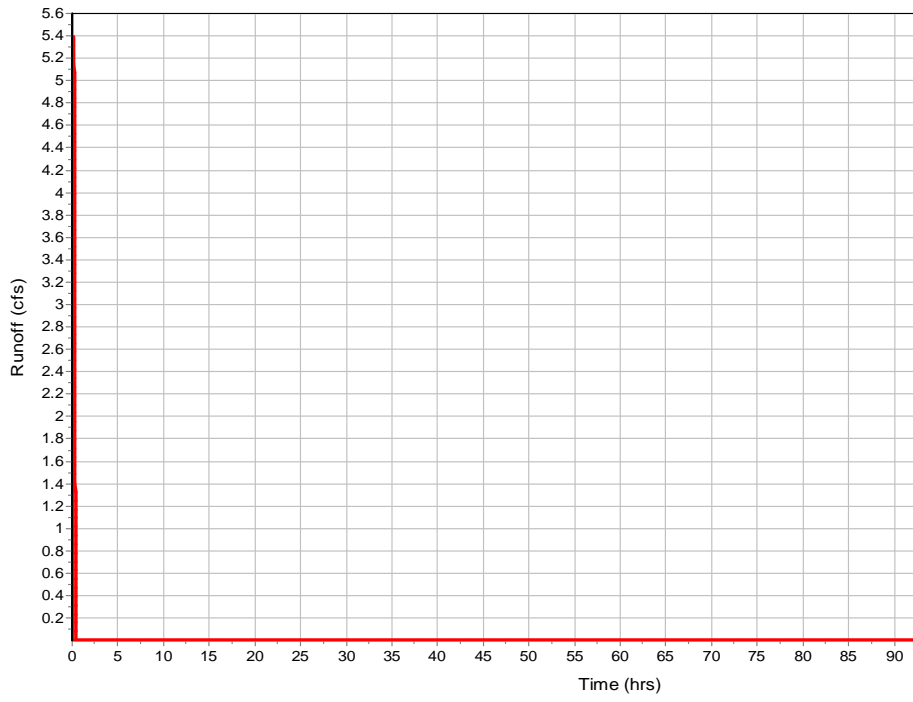
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.17	-	0.7
Composite Area & Weighted Runoff Coeff.	1.17		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.26
Total Runoff (in) 0.88
Peak Runoff (cfs) 5.39
Rainfall Intensity 6.578
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:11:25

Subbasin : Y10

Runoff Hydrograph



Subbasin : Y2

Input Data

Area (ac) 1.02
Weighted Runoff Coefficient 0.7

Runoff Coefficient

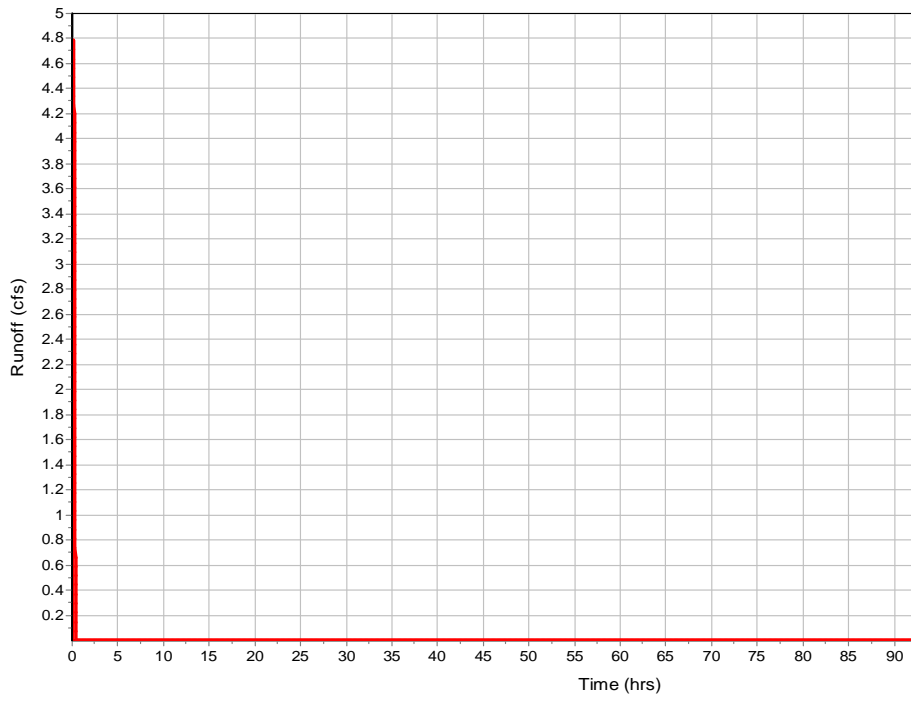
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.02	-	0.7
Composite Area & Weighted Runoff Coeff.	1.02		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.21
Total Runoff (in) 0.85
Peak Runoff (cfs) 4.79
Rainfall Intensity 6.704
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:53

Subbasin : Y2

Runoff Hydrograph



Subbasin : Y3

Input Data

Area (ac) 0.99
Weighted Runoff Coefficient 0.7

Runoff Coefficient

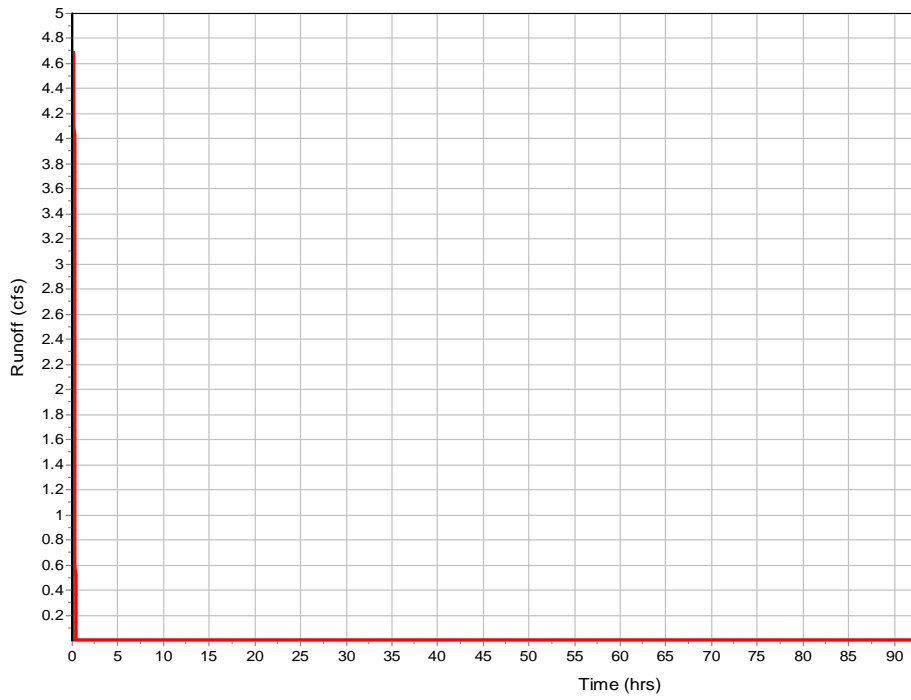
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.99	-	0.7
Composite Area & Weighted Runoff Coeff.	0.99		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.2
Total Runoff (in) 0.84
Peak Runoff (cfs) 4.69
Rainfall Intensity 6.771
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:37

Subbasin : Y3

Runoff Hydrograph



Subbasin : Y4

Input Data

Area (ac) 0.99
Weighted Runoff Coefficient 0.7

Runoff Coefficient

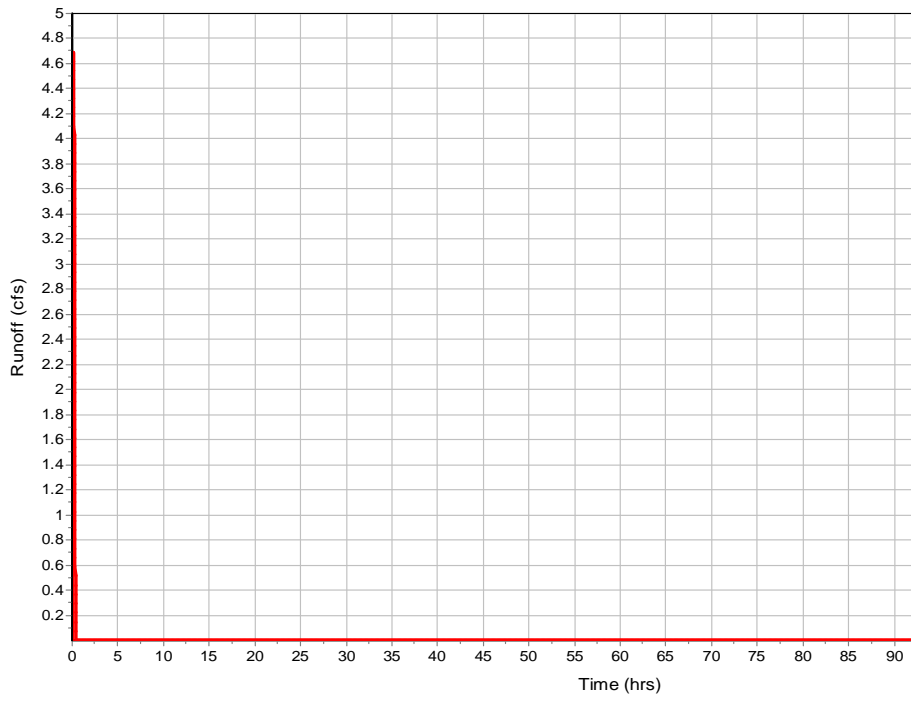
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.99	-	0.7
Composite Area & Weighted Runoff Coeff.	0.99		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.2
Total Runoff (in) 0.84
Peak Runoff (cfs) 4.69
Rainfall Intensity 6.771
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:37

Subbasin : Y4

Runoff Hydrograph



Subbasin : Y5

Input Data

Area (ac) 0.49
Weighted Runoff Coefficient 0.7

Runoff Coefficient

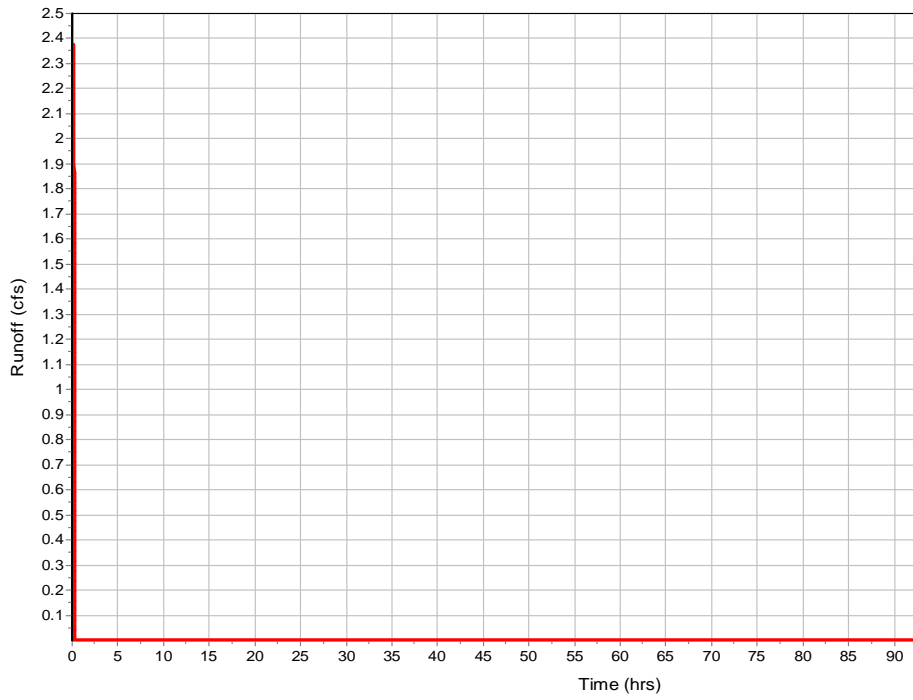
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.49	-	0.7
Composite Area & Weighted Runoff Coeff.	0.49		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.81
Peak Runoff (cfs) 2.38
Rainfall Intensity 6.93
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Y5

Runoff Hydrograph



Subbasin : Y6

Input Data

Area (ac) 0.49
Weighted Runoff Coefficient 0.7

Runoff Coefficient

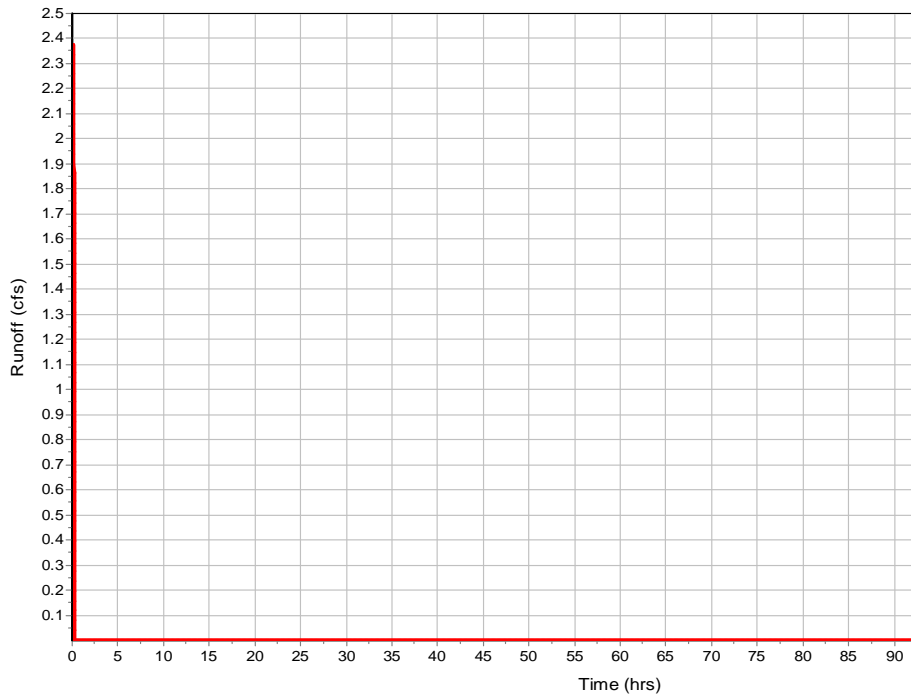
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.49	-	0.7
Composite Area & Weighted Runoff Coeff.	0.49		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.16
Total Runoff (in) 0.81
Peak Runoff (cfs) 2.38
Rainfall Intensity 6.93
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Y6

Runoff Hydrograph



Subbasin : Y7

Input Data

Area (ac) 1.21
Weighted Runoff Coefficient 0.7

Runoff Coefficient

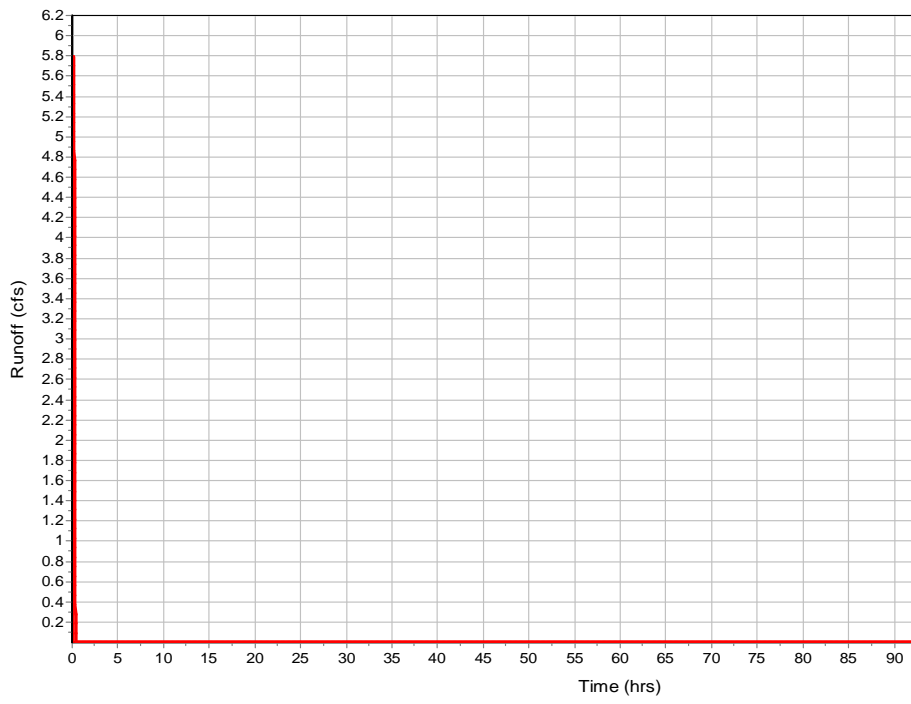
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.21	-	0.7
Composite Area & Weighted Runoff Coeff.	1.21		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.18
Total Runoff (in) 0.83
Peak Runoff (cfs) 5.8
Rainfall Intensity 6.842
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:20

Subbasin : Y7

Runoff Hydrograph



Subbasin : Y8

Input Data

Area (ac) 1.07
Weighted Runoff Coefficient 0.7

Runoff Coefficient

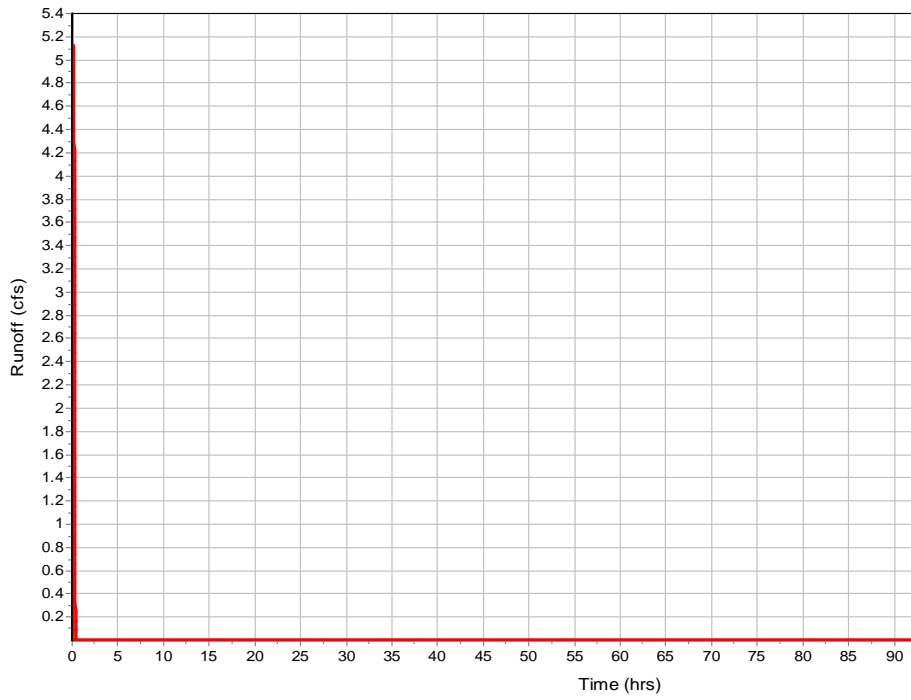
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.07	-	0.7
Composite Area & Weighted Runoff Coeff.	1.07		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.18
Total Runoff (in) 0.83
Peak Runoff (cfs) 5.13
Rainfall Intensity 6.842
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:10:20

Subbasin : Y8

Runoff Hydrograph



Subbasin : Y9

Input Data

Area (ac) 1.17
Weighted Runoff Coefficient 0.7

Runoff Coefficient

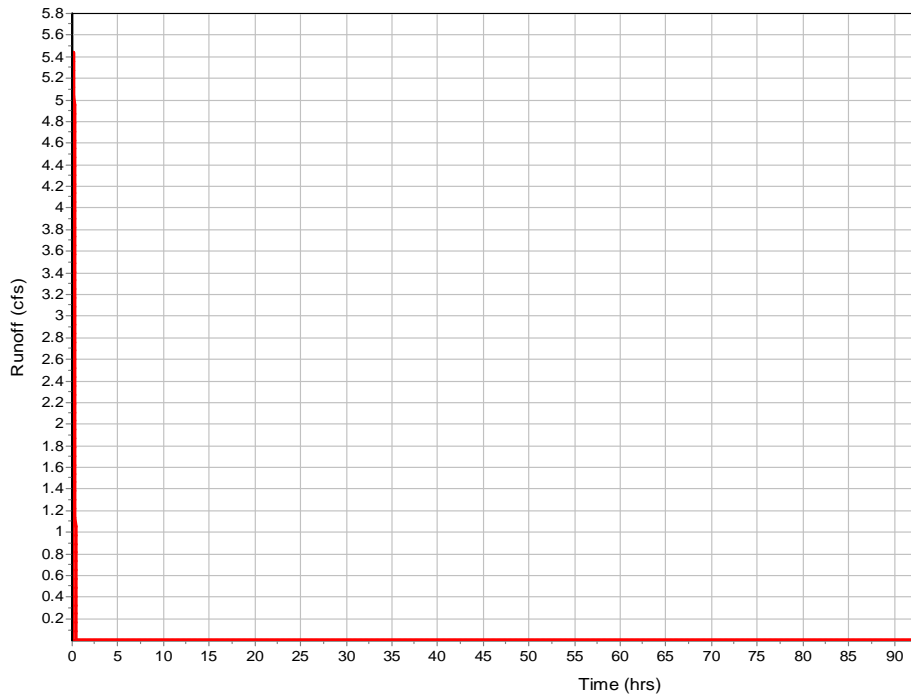
Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.17	-	0.7
Composite Area & Weighted Runoff Coeff.	1.17		0.7

Subbasin Runoff Results

Total Rainfall (in) 1.24
Total Runoff (in) 0.87
Peak Runoff (cfs) 5.44
Rainfall Intensity 6.642
Weighted Runoff Coefficient 0.7
Time of Concentration (days hh:mm:ss) 0 00:11:08

Subbasin : Y9

Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimur Pipe Cove (ft)
1	Culvert-In	6174.43	6178.00	3.57	0.00	-6174.43	0.00	-6178.00	0.00	0.0
2	Culvert-Out	6174.22	6178.00	3.78	0.00	-6174.22	0.00	-6178.00	0.00	0.0
3	Forebay	6189.21	6191.50	2.29	6189.21	0.00	0.00	-6191.50	0.00	0.0
4	1-Jun	6195.11	6198.30	3.19	6195.11	0.00	6195.00	-3.30	0.00	0.0
5	2-Jun	6194.03	6197.50	3.47	6194.03	0.00	6194.00	-3.50	0.00	0.0
6	3-Jun	6192.32	6195.80	3.48	6192.32	0.00	6103.00	-92.80	0.00	0.0
7	4-Jun	6191.66	6195.10	3.44	6191.66	0.00	6194.00	-1.10	0.00	0.0
8	Null Structure	6190.84	6194.83	3.99	6190.84	0.00	0.00	-6194.83	0.00	0.0
9	OutletPipe	6187.31	6188.81	1.50	6187.31	0.00	0.00	-6188.81	0.00	0.0
10	OutletStructure	6187.67	6194.00	6.33	6187.67	0.00	0.00	-6194.00	0.00	0.0
11	Structure - (10)	6190.90	6195.96	5.06	6190.90	0.00	6192.65	-3.31	0.00	0.0
12	Structure - (11)	6194.95	6198.18	3.23	6194.95	0.00	6194.95	-3.23	0.00	0.0
13	Structure - (12)	6193.05	6196.53	3.48	6193.05	0.00	6193.20	-3.33	0.00	0.0
14	Structure - (13)	6192.46	6196.68	4.22	6192.46	0.00	6193.49	-3.19	0.00	0.0
15	Structure - (15)	6196.03	6198.98	2.95	6196.03	0.00	6195.86	-3.13	0.00	0.0
16	Structure - (16)	6194.13	6197.33	3.20	6194.13	0.00	6194.11	-3.23	0.00	0.0
17	Structure - (17)	6194.04	6197.46	3.42	6194.04	0.00	6194.05	-3.42	0.00	0.0
18	Structure - (2)	6191.01	6194.13	3.12	6191.01	0.00	6192.86	-1.28	0.00	0.0
19	Structure - (22)	6194.15	6197.10	2.95	6194.15	0.00	6193.08	-4.02	0.00	0.0
20	Structure - (3)	6190.95	6194.31	3.36	6190.95	0.00	6192.80	-1.52	0.00	0.0
21	Structure - (6)	6193.24	6196.48	3.24	6193.24	0.00	6193.50	-2.98	0.00	0.0
22	Structure - (8)	6189.75	6195.02	5.27	6189.75	0.00	6192.31	-2.71	0.00	0.0
23	Structure-(4)	6192.59	6195.78	3.19	6192.59	0.00	6194.61	-1.18	0.00	0.0

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation (ft)	Max HGL Depth (ft)	Max Surge Depth (ft)	Min Freeboard (ft)	Average HGL Elevation (ft)	Average HGL Depth (ft)	Time to Max HGL Occurrence (days hh:mm)
1	Culvert-In	35.27	35.27	6178.00	3.57	0.00	0.00	6174.44	0.01	0 00:2
2	Culvert-Out	37.15	0.00	6176.03	1.81	0.00	1.97	6174.23	0.01	0 00:2
3	Forebay	37.12	0.00	6190.77	1.56	0.00	1.44	6189.74	0.53	0 00:1
4	1-Jun	4.75	0.00	6196.19	1.08	0.00	2.11	6195.36	0.25	0 00:1
5	2-Jun	4.66	0.00	6195.10	1.07	0.00	2.40	6194.28	0.25	0 00:1
6	3-Jun	5.75	0.00	6193.55	1.23	0.00	2.25	6192.57	0.25	0 00:1
7	4-Jun	5.40	0.00	6192.83	1.17	0.00	2.27	6191.91	0.25	0 00:1
8	Null Structure	10.64	5.12	6192.16	1.32	0.00	2.67	6191.34	0.50	0 00:1
9	OutletPipe	0.26	0.00	6187.58	0.27	0.00	5.73	6187.47	0.16	0 00:2
10	OutletStructure	0.26	0.00	6187.85	0.18	0.00	6.15	6187.75	0.08	0 00:2
11	Structure - (10)	22.23	2.38	6195.96	5.06	0.00	0.00	6192.15	1.25	0 00:0
12	Structure - (11)	4.69	4.69	6195.78	0.83	0.00	2.40	6194.95	0.00	0 00:1
13	Structure - (12)	9.18	4.69	6194.19	1.14	0.00	2.34	6193.05	0.00	0 00:1
14	Structure - (13)	18.12	0.00	6194.36	1.90	0.00	2.32	6192.96	0.50	0 00:1
15	Structure - (15)	4.79	4.79	6196.87	0.84	0.00	2.11	6196.03	0.00	0 00:1
16	Structure - (16)	9.37	4.79	6195.29	1.16	0.00	2.04	6194.13	0.00	0 00:1
17	Structure - (17)	9.37	0.00	6197.46	3.42	0.00	0.00	6194.04	0.00	0 00:1
18	Structure - (2)	10.72	5.39	6194.13	3.12	0.00	0.00	6191.01	0.00	0 00:0
19	Structure - (22)	2.38	2.38	6194.62	0.47	0.00	2.48	6194.15	0.00	0 00:1
20	Structure - (3)	8.73	0.00	6194.31	3.36	0.00	0.00	6190.95	0.00	0 00:0
21	Structure - (6)	5.80	5.80	6194.23	0.99	0.00	2.25	6193.24	0.00	0 00:1
22	Structure - (8)	37.07	0.00	6192.29	2.54	0.00	2.73	6190.75	1.00	0 00:1
23	Structure-(4)	5.44	5.44	6193.51	0.92	0.00	2.27	6192.59	0.00	0 00:1

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)
1 10-30NP	122.00	6190.90	0.00	6190.29	0.54	0.61	0.5000	CIRCULAR	24.000	24.000
2 11-15NP	91.22	6193.24	0.00	6192.57	0.25	0.67	0.7300	CIRCULAR	15.000	15.000
3 12-18P	130.69	6192.32	0.00	6191.34	0.50	0.98	0.7500	CIRCULAR	18.000	18.000
4 13-24NP	11.92	6190.84	0.00	6190.75	1.00	0.09	0.7600	CIRCULAR	24.000	24.000
5 14-15NP	90.26	6192.59	0.00	6191.91	0.25	0.68	0.7500	CIRCULAR	15.000	15.000
6 15-18P	130.00	6191.66	0.00	6191.01	0.00	0.65	0.5000	CIRCULAR	18.000	18.000
7 16-18NP	11.92	6191.01	0.00	6190.95	0.00	0.06	0.5000	CIRCULAR	18.000	18.000
8 17-18NP	240.00	6190.95	0.00	6189.75	0.00	1.20	0.5000	CIRCULAR	18.000	18.000
9 18-36NP	58.84	6189.75	0.00	6189.21	0.00	0.54	0.9200	CIRCULAR	36.000	36.000
10 1-NP15	89.45	6196.03	0.00	6195.36	0.25	0.67	0.7500	CIRCULAR	15.000	15.000
11 2-18P	130.81	6195.11	0.00	6194.13	0.00	0.98	0.7500	CIRCULAR	18.000	18.000
12 3-18NP	11.92	6194.13	0.00	6194.04	0.00	0.09	0.7600	CIRCULAR	18.000	18.000
13 4-18NP	180.00	6194.04	0.00	6192.96	0.50	1.08	0.6000	CIRCULAR	18.000	18.000
14 5-15NP	90.21	6194.95	0.00	6194.28	0.25	0.67	0.7400	CIRCULAR	15.000	15.000
15 6-18P	130.60	6194.03	0.00	6193.05	0.00	0.98	0.7500	CIRCULAR	18.000	18.000
16 7-18NP	11.92	6193.05	0.00	6192.96	0.50	0.09	0.7600	CIRCULAR	18.000	18.000
17 8-24NP	168.00	6192.46	0.00	6191.40	0.50	1.06	0.6300	CIRCULAR	24.000	24.000
18 9-15P	152.67	6194.15	0.00	6192.15	1.25	2.00	1.3100	CIRCULAR	15.000	15.000
19 Culvert	42.05	6174.43	0.00	6174.22	0.00	0.21	0.5000	CIRCULAR	24.000	24.000
20 Link-03	228.62	0.00	-6187.31	0.00	-6186.00	0.00	0.0000	Dummy	0.000	0.000
21 Link-09	423.13	0.00	-6174.22	6173.75	0.00	-6173.75	-1459.0700	Dummy	0.000	0.000
22 OutletPipe	54.95	6187.67	0.00	6187.40	0.09	0.27	0.4900	CIRCULAR	18.000	18.000
23 Trk1Chnl	164.17	6189.73	0.52	6188.25	0.25	1.48	0.9000	Dummy	0.000	0.000

Pipe Results

SN Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)
1 10-30NP	18.75	0 00:09	17.33	1.08	6.58	0.31	2.00	1.00	4.00
2 11-15NP	5.75	0 00:10	6.00	0.96	6.87	0.22	0.98	0.78	0.00
3 12-18P	5.71	0 00:10	9.85	0.58	5.82	0.37	0.82	0.55	0.00
4 13-24NP	10.64	0 00:10	21.30	0.50	6.78	0.03	1.00	0.50	0.00
5 14-15NP	5.40	0 00:11	6.07	0.89	6.69	0.22	0.92	0.73	0.00
6 15-18P	5.36	0 00:11	8.05	0.67	4.91	0.44	0.89	0.60	0.00
7 16-18NP	8.73	0 00:10	8.07	1.08	5.33	0.04	1.50	1.00	4.00
8 17-18NP	8.71	0 00:14	8.05	1.08	5.42	0.74	1.38	0.92	0.00
9 18-36NP	37.12	0 00:10	69.22	0.54	10.08	0.10	1.56	0.52	0.00
10 1-NP15	4.75	0 00:11	6.06	0.78	6.50	0.23	0.83	0.67	0.00
11 2-18P	4.73	0 00:11	9.85	0.48	5.55	0.39	0.73	0.49	0.00
12 3-18NP	9.37	0 00:11	9.89	0.95	6.36	0.03	1.16	0.78	0.00
13 4-18NP	9.54	0 00:12	8.81	1.08	5.87	0.51	1.39	0.92	0.00
14 5-15NP	4.66	0 00:11	6.03	0.77	6.50	0.23	0.82	0.66	0.00
15 6-18P	4.63	0 00:11	9.86	0.47	5.53	0.39	0.72	0.48	0.00
16 7-18NP	9.18	0 00:11	9.89	0.93	6.35	0.03	1.14	0.76	0.00
17 8-24NP	18.07	0 00:11	19.47	0.93	7.13	0.39	1.52	0.76	0.00
18 9-15P	2.35	0 00:10	8.01	0.29	7.53	0.34	0.46	0.37	0.00
19 Culvert	37.15	0 00:26	34.64	1.07	6.46	0.11	1.83	0.91	0.00
20 Link-03	0.26	0 00:26	0.00	1.07	0.00		1.83	0.91	0.00
21 Link-09	37.15	0 00:26	0.00	1.07	0.00		1.83	0.91	0.00
22 OutletPipe	0.26	0 00:26	7.98	0.03	2.07	0.44	0.18	0.12	0.00
23 Trk1Chnl	37.12	0 00:10	0.00	0.03	0.00		0.18	0.12	0.00

Storage Nodes

Storage Node : DetentionPond

Input Data

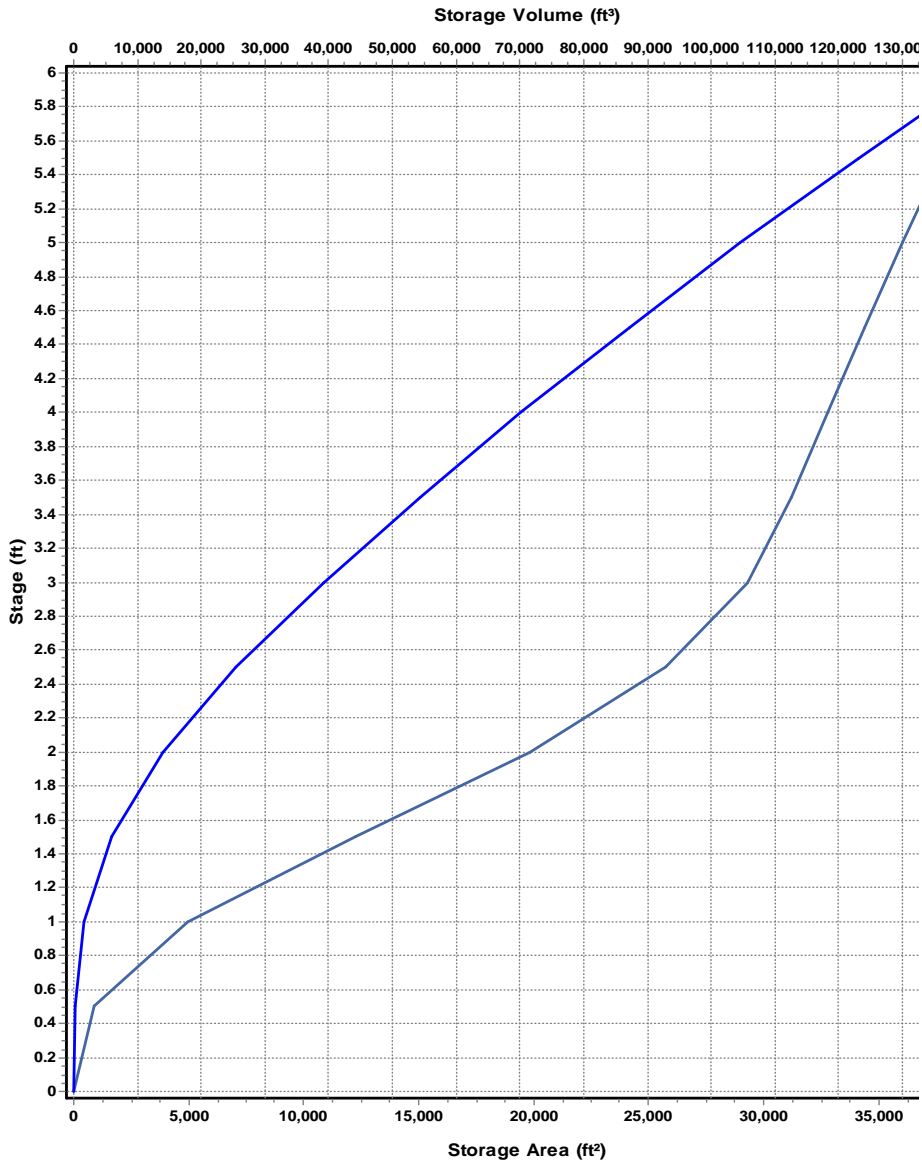
Invert Elevation (ft)	6188.00
Max (Rim) Elevation (ft)	6194.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-6188.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage	Storage Area	Storage Volume
(ft)	(ft²)	(ft³)
0	10	0
0.5	882.13	223.03
1	4951.3	1681.39
1.5	12246.1	5980.74
2	19823.28	13998.09
2.5	25766.41	25395.51
3	29274.59	39155.76
3.5	31177.97	54268.9
4	32757.61	70252.8
4.5	34372.11	87035.23
5	36021.48	104633.63
5.5	37713.37	123067.34
6	39455.42	142359.54

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : DetentionPond (continued)

Outflow Weirs

SN Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)
1 EmergencySpillway	Trapezoidal	No	6192.00	4.00	10.00	2.00
2 Weir	Trapezoidal	No	6191.50	3.50	4.00	1.00

Outflow Orifices

SN Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)
1 Orifice-01	Side	CIRCULAR	No	1.00		
2 Orifice-02	Side	CIRCULAR	No	1.00		
3 Orifice-03	Side	CIRCULAR	No	1.00		
4 Orifice-04	Side	CIRCULAR	No	1.50		
5 Orifice-05	Side	CIRCULAR	No	1.50		
6 Orifice-06	Side	CIRCULAR	No	2.00		

Output Summary Results

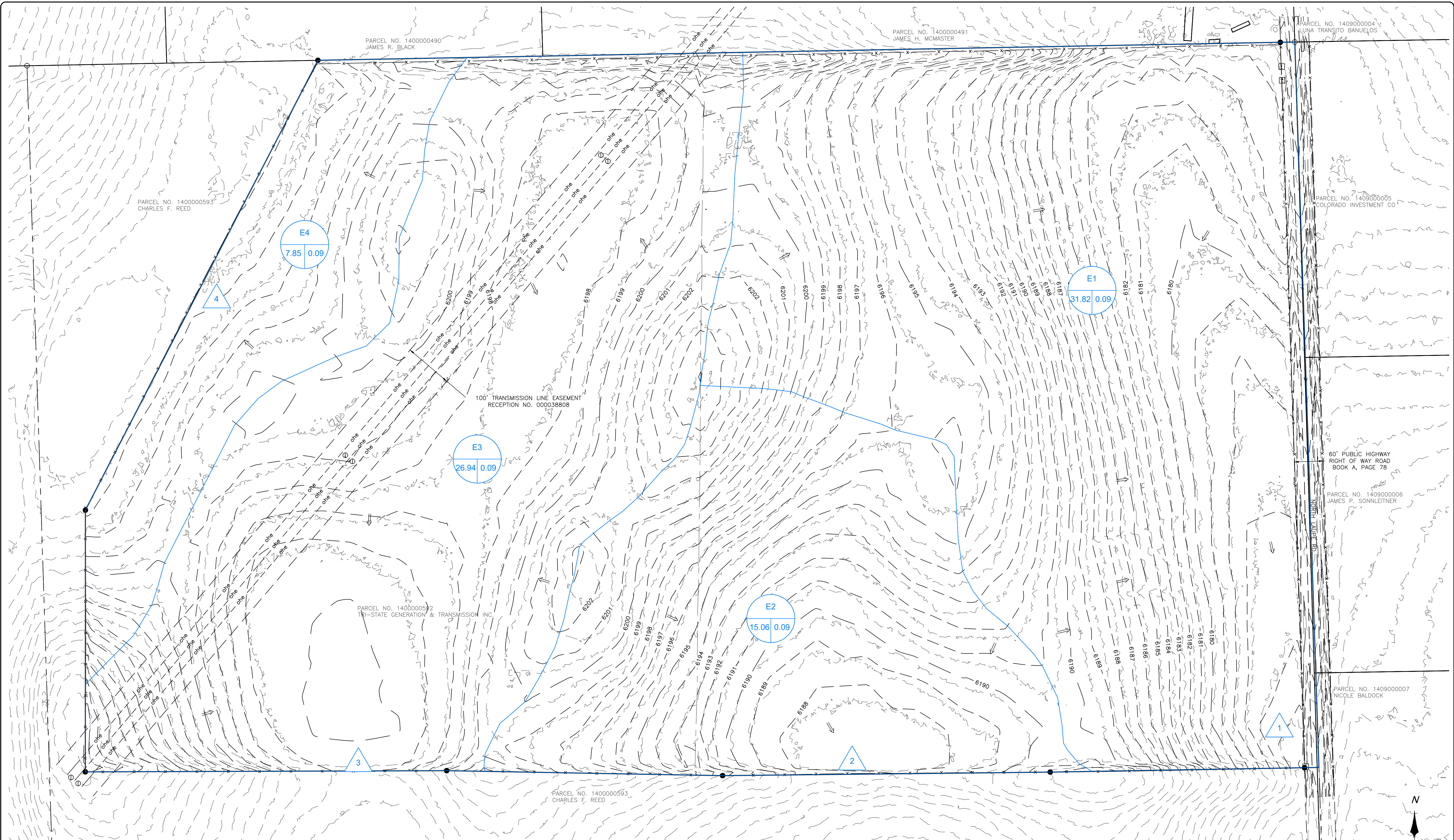
Peak Inflow (cfs)	43.91
Peak Lateral Inflow (cfs)	6.79
Peak Outflow (cfs)	0.26
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	6190.72
Max HGL Depth Attained (ft)	2.72
Average HGL Elevation Attained (ft)	6189.01
Average HGL Depth Attained (ft)	1.01
Time of Max HGL Occurrence (days hh:mm)	0 00:26
Total Exfiltration Volume (1000-ft ³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Appendix C

Site Maps & Design Drawings

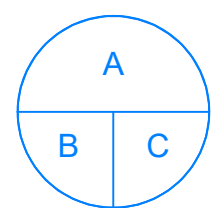


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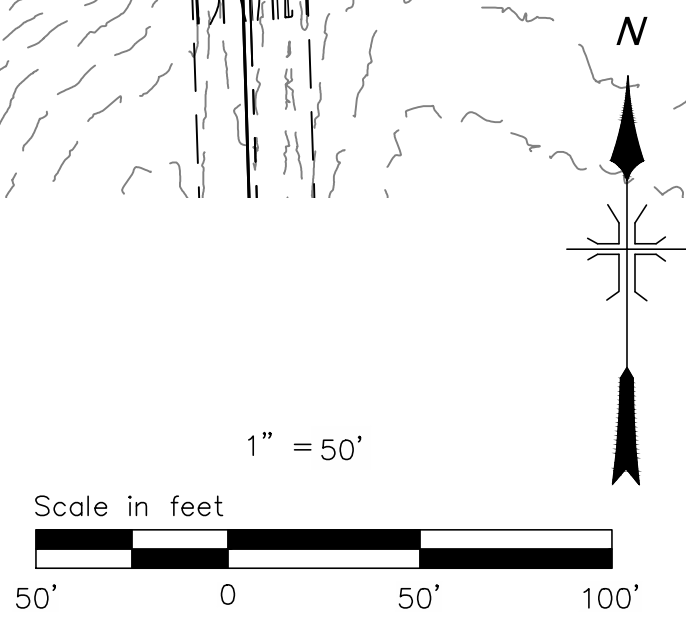
- 5800 EXISTING INDEX CONTOUR
- 5796 EXISTING INTERMEDIATE CONTOUR
- EXISTING DRAINAGE FLOWLINE
- FLOW ARROW
- DRAINAGE BASIN
- UNANALYZED DRAINAGE AREA = 0.37 ACRES



- A = BASIN
- B = AREA IN ACRES
- C = WEIGHTED RUNOFF COEFFICIENT

Summary Runoff Tables			
Existing			
Design Point	Contributing Area (acres)	Runoff Peak 5-year Event (cfs)	Runoff Peak 100-year Event (cfs)
1	31.82	7.59	50.95
2	15.06	3.59	24.11
3	26.94	6.40	42.91
4	7.85	1.87	12.57

NOTE: BACKSHADED CONTOURS ARE SOURCED FROM FROM CWCB LIDAR DATA AND INCLUDED TO SHOW OFFSITE FLOW.



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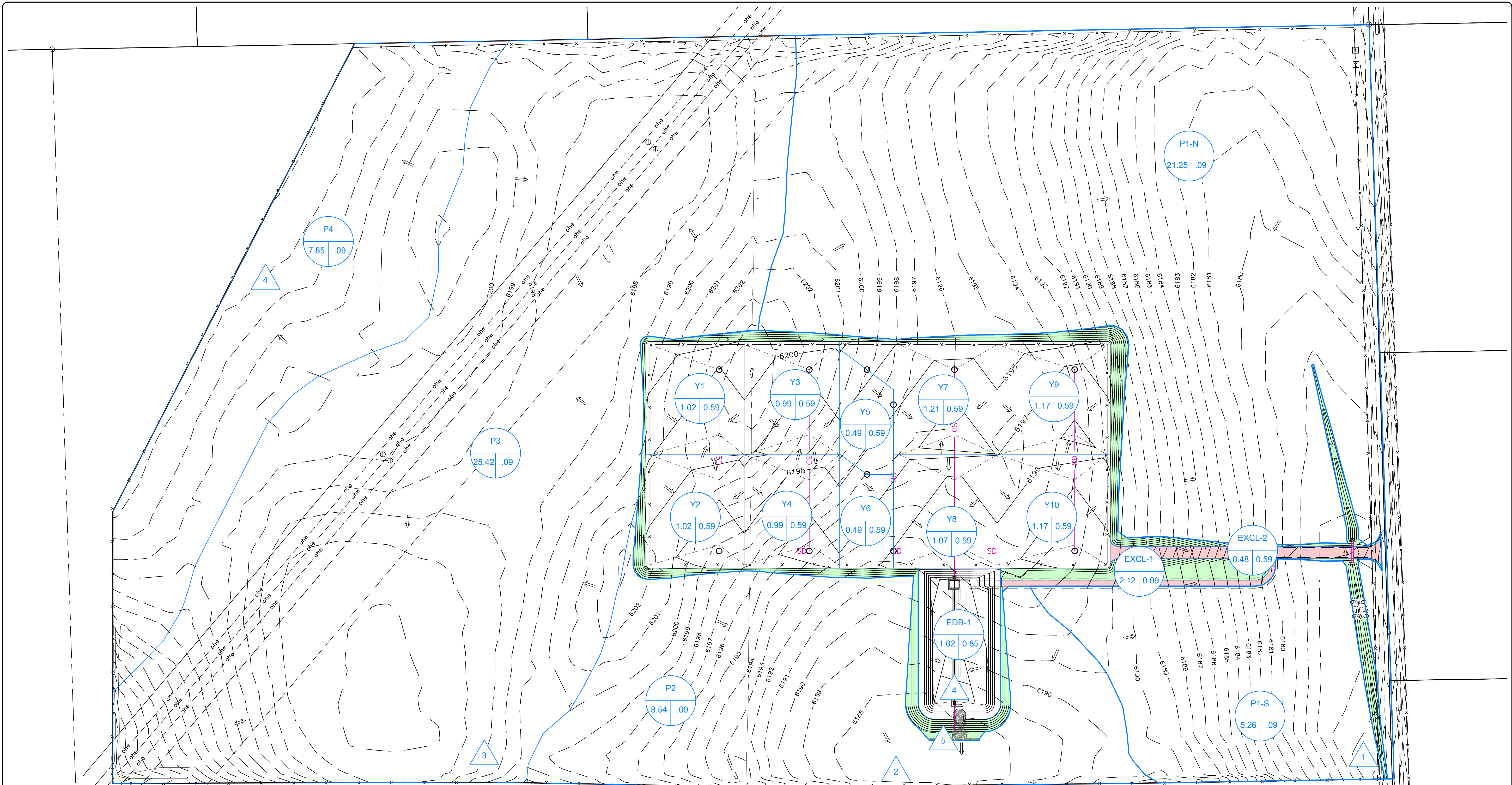
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 ENGINEERING & SURVEYING
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 www.delmont.com • service@delmont.com

DESIGNED BY: DWS
 DATE DESIGNED: 11/17/25
 CHECKED BY: TMC
 DATE CHECKED: 11/17/25
 DRAWN BY: TMC
 DATE DRAWN: 11/17/25

TRISTATE GENERATION & TRANSMISSION
 CROSSPOINT SUBSTATION
 WELD COUNTY, CO

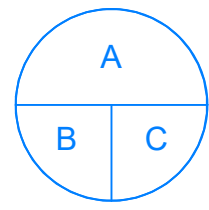
EXISTING DRAINAGE BASINS

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LEGEND

- 5800- EXISTING INDEX CONTOUR
- 5796- EXISTING INTERMEDIATE CONTOUR
- 5800 PROPOSED INDEX CONTOUR
- 5796 PROPOSED INTERMEDIATE CONTOUR
- PROPOSED DRAINAGE FLOWLINE
- FLOW ARROW
- ▭ PROPOSED DRAINAGE BASIN



- A = BASIN
- B = AREA IN ACRES
- C = WEIGHTED RUNOFF COEFFICIENT



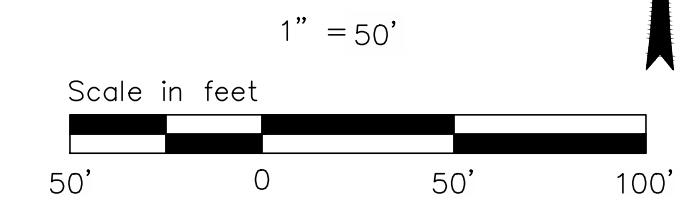
- D = DESIGN POINT DESIGNATION

Summary Runoff Tables			
Existing			
Design Point	Contributing Area (acres)	Runoff Peak 5-year Event (cfs)	Runoff Peak 100-year Event (cfs)
1	31.82	7.59	50.95
2	15.06	3.59	24.11
3	26.94	6.40	42.91
4	7.85	1.87	12.57

Summary Runoff Tables			
Proposed			
Design Point	Contributing Area (acres)	Runoff Peak 5-year Event (cfs)	Runoff Peak 100-year Event (cfs)
1	28.38	6.76	47.13
2	9.34	2.23	14.96
3	25.46	6.04	40.56
4	10.64	1.87	12.57
5	10.64	3.79	6.79

Water Quality Treatment Summary Table		
Basin ID(s)	PCM Tributary Area	PCM ID
Y1-Y10	9.62	EDB-1
EDB-1	1.02	EDB-1
P1-P3	60.47	None (Existing Conditions)
EXCL-1	2.12	EXCLUDED
EXCL-2	0.48	EXCLUDED

NOTE: THIS DRAWING IS A SCHEMATIC REPRESENTATION OF THE PROPOSED DRAINAGE BASINS. FOR ALL DESIGN SPECIFIC INFORMATION SEE CIVIL PLANS.



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 SCALE: AS NOTED
 DATE ISSUED: 11/17/25

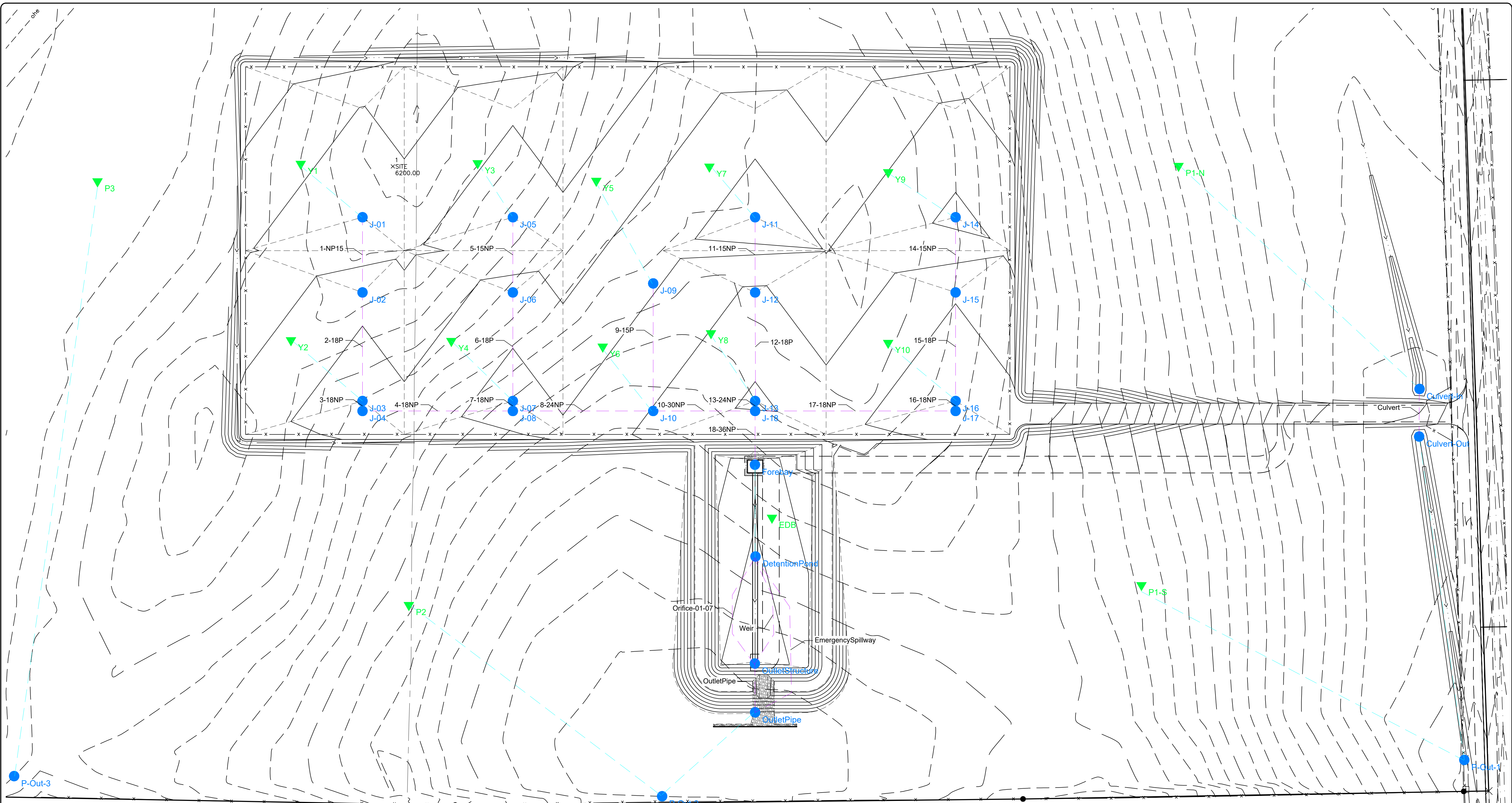
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 CROSSPOINT SUBSTATION
 WELD COUNTY, CO

PROPOSED DRAINAGE BASINS

DMC JOB NO: 23148

SHEET NO: **C-2**
 2 SHEETS

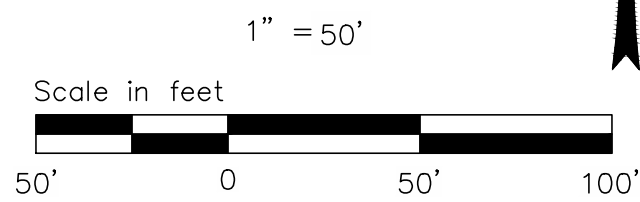
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LEGEND

- 5800 PROPOSED INDEX CONTOUR
- 5796 PROPOSED INTERMEDIATE CONTOUR
- PROPOSED DRAINAGE FLOWLINE
- DRAINAGE LINK
- DIRECT LINK
- DRAINAGE BASIN
- Pond DRAINAGE NODE
- Yard SUB-BASIN

NOTE: THIS DRAWING IS A SCHEMATIC REPRESENTATION OF THE AUTODESK STORM AND SANITARY ANALYSIS MODEL. FOR ALL DESIGN SPECIFIC INFORMATION SEE CIVIL PLANS.



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CHECKED BY: AS NOTED
SCALE: TMC FILE NAME: 23148C_BASE.DWG

TRI-STATE GENERATION & TRANSMISSION
CROSSPOINT SUBSTATION
WELD COUNTY, CO

DRAINAGE MODEL SCHEMATIC

DMC JOB NO:	23148
SHEET NO:	C-3
OF	2 SHEETS