



# PRELIMINARY PROJECT STORM DRAIN CALCULATIONS

FOR THE

## Leveton 99 Development

12935 SW Leveton Drive  
Tualatin, Oregon 97062

October 31, 2025

PRELIMINARY  
NOT FOR  
CONSTRUCTION  
10/31/25

### TABLE OF CONTENTS/INCLUSIONS:

Storm Drain Narrative:.....STM-1  
Tributary Area Maps:.....STM-2 to STM-3  
Storm Drainage Facilities Design:.....STM-4 to STM-8  
HydroCAD Printouts:.....STM-9 to STM-44  
Swale Design Printouts:.....STM-45 to STM-46



October 31, 2025

MDG  
4875 SW Griffith Drive, Ste 300  
Beaverton, Oregon 97005

**RE: "Project Storm Drainage Narrative"**  
**Leveton 99**  
**12935 SW Leveton Dr**  
**Tualatin, OR 97062**

At your request, WDY, Inc. has completed the following project storm drainage calculations in accordance with Clean Water Services (CWS) and the City of Tualatin's standards for treating and detaining stormwater runoff for the above referenced new commercial building development.

**Existing Conditions:**

The existing site consists of a single, vacant commercial lot consisting of mostly vegetation and a single patch of asphalt. The majority of the 4.3-acre site generally slopes down to the southwest at an average 2.8% slope. The site was previously subject to quarry activity and later became a construction debris landfill. Soil characteristics for the site could not be determined due to the immense variability of soil throughout the site.

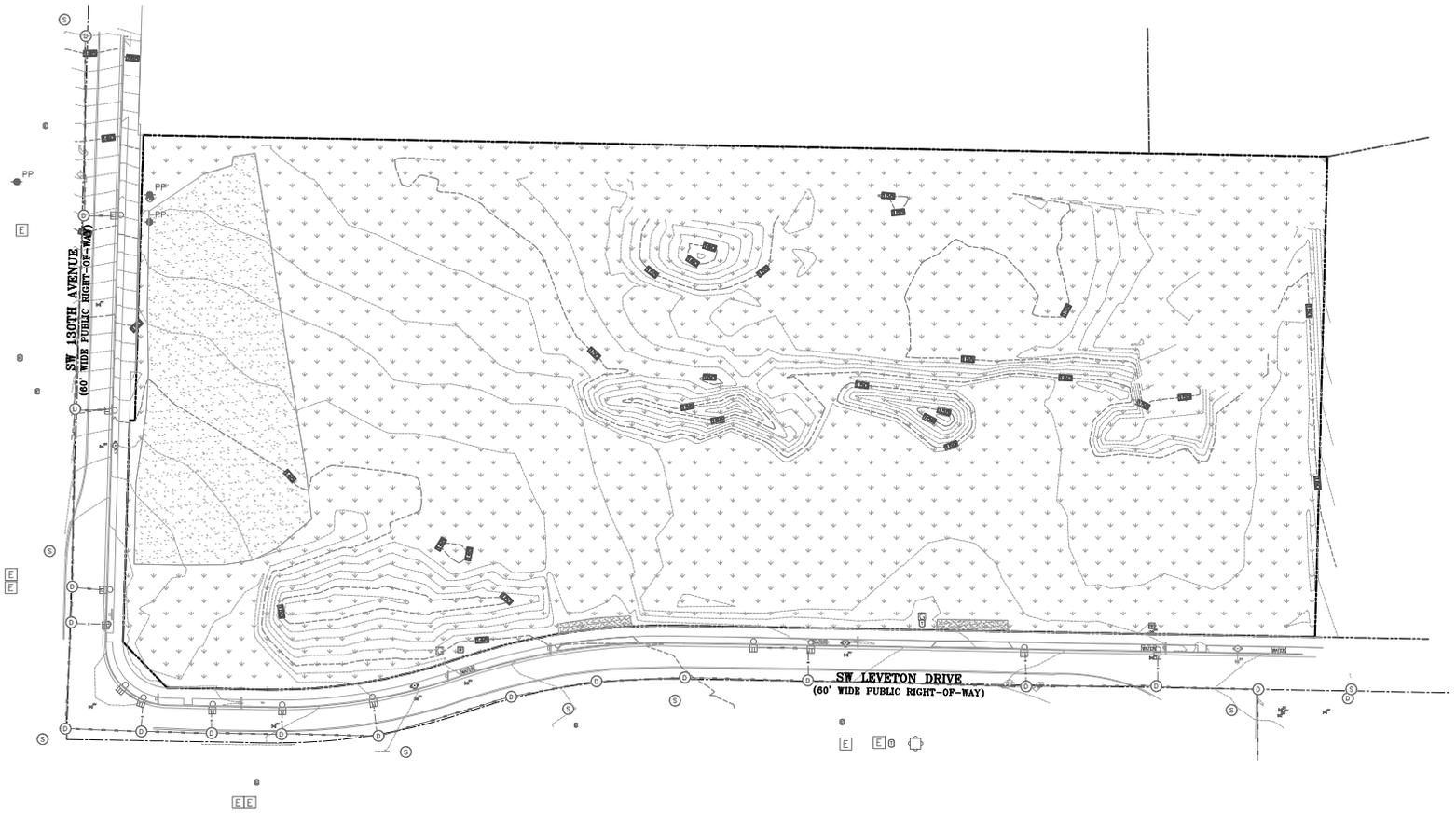
There are currently no known existing stormwater facilities onsite. Existing public storm infrastructure consists of a 12-inch diameter storm main that runs south in SW 130<sup>th</sup> Avenue and a 24-inch diameter storm main that runs east in SW Leveton Drive. Runoff from both of these frontages appear to be managed by a detention pond located to the southeast of the site, adjacent to SW 128<sup>th</sup> Avenue. See STM-2 for the Pre-Developed Tributary Area Map.

**Proposed New Site Development:**

The proposed project is to build two (2) new commercial buildings and a parking lot. Per the geotechnical report, soil characteristics could not be determined. Due to this, it was determined that infiltration facilities were not feasible. Stormwater runoff will be collected by onsite catch basins, landscape area drains, and roof drain downspouts. Tributary Area 1 on the west half of the site will be conveyed to a new vegetated swale, sized per CWS requirements. Runoff that exceeds the water quality storm will be detained by a vegetated detention pond. Tributary Area 2 on the east half of the site will be conveyed to a manhole with filter cartridges, sized per CWS requirements. Runoff that exceeds the water quality storm will be detained by MC-3500 Stormtech Chambers.

Public Improvements are minor and consist of two (2) new driveways and the closure of two (2) existing driveways. There is an existing catch basin, located within the new driveway that will be removed. There are no new stormwater management facilities proposed for the offsite public street runoff flows.

Sincerely,  
Kari Kuboyama, P.E.  
WDY, Inc



EXISTING ASPHALT  
17,304 SF  
CN=98

EXISTING LANDSCAPING  
170,052 SF  
CN=75 (UNDOCUMENTED FILL)



### EXISTING TRIBUTARY AREA MAP

**DETAIL:** STORMWATER EXISTING TRIBUTARY AREA MAP

**SCALE:** 1" = 100'-0"

**Job Name:** LEVETON 99

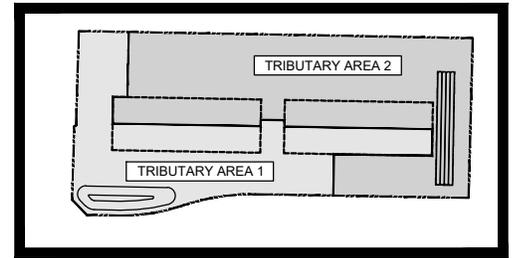
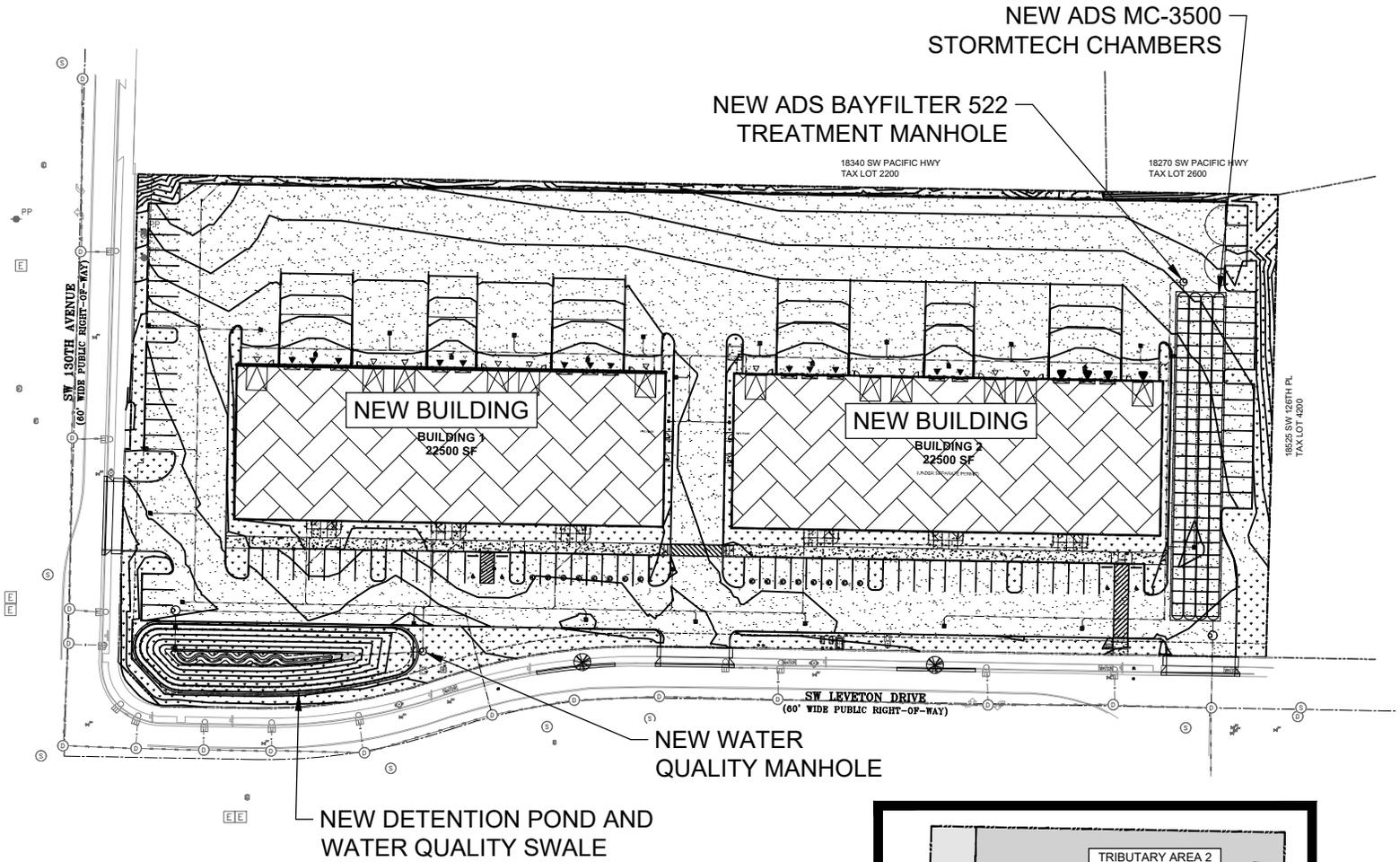
**Date:** OCTOBER 2025

**Job No.:** 25042

**Drawn:** AV

**Client:** MDG

**Sheet:** STM-2



ROAD SURFACING  
107,932 SF  
CN=98

ROOF  
45,615 SF  
CN=98

CONCRETE  
3,949 SF  
CN=98

LANDSCAPING  
29,860 SF  
CN=86



PROPOSED AREA MAP

**DETAIL:** STORMWATER PROPOSED TRIBUTARY AREA MAP  
**SCALE:** 1" = 100'-0"

**Job Name:** LEVETON 99

**Date:** OCTOBER 2025

**Job No.:** 25042

**Drawn:** AV

**Client:** MDG

**Sheet:** STM-3



Job Name: **Leveton 99**

Job No: **25042**

Sheet No: **STM-4**

Client: **MDG**

Date: **October 2025** By: AV

## Project Storm Drainage Design Criteria

The City of Tualatin has adopted the Clean Water Services (CWS) R&O 19-22 Design and Construction Standards.

### Rainfall Depths per CWS Standard Drawing No. 1280:

Storm Event	Rainfall Depth
2 yr	2.50 in
5 yr	3.10 in
10 yr	3.45 in
25 yr	3.90 in

Table 1: 24 Hour Rainfall Depths

- HydroCAD version 10.00 was used to analyze the storm water runoff. See the enclosed printouts for the detention facility and conveyance supporting information.
- Undocumented fill has been placed at the site and consists of significant amounts of large construction debris. Due to the highly variable composition of fill, and the unknown methods of placement and compaction, the geotechnical report states that reliable soil properties are extremely difficult to predict. Due to this, infiltration facilities are not feasible for this site.
  - An assumed curve number of 75 was used for the site undocumented fill.
- Hydromodification Requirement: Category 2, Peak Flow matching Detention per Section 4.08.6. See STM-7 for hydromodification assessment.
  - Total Disturbed Area = 187,356 SF (Large Project)
  - Developed/ Low
- Water Quality: Per 4.08.1:
  - Area = New Impervious + 3(Modified Impervious – Permanently Removed Impervious)
- Per Section 4.08.2, stormwater quality approaches will be designed for a storm event totaling 0.36 inches of precipitation falling in 4 hours with an average storm return period of 96 hours.



Job Name: **Leveton 99**

Job No: **25042**

Sheet No: **STM-5**

Client: **MDG**

Date: **October 2025** By: AV

### Time of Concentration

#### Typical Time of Concentration Equations

- Sheet Flow:  $T_c = \frac{0.42 (n * L)^{0.8}}{(I)^{0.5} (S)^{0.4}}$  ;
  - Where n = Manning's Roughness Coefficient; L = Length; I = Intensity; S = Slope
- Shallow Flow:  $T_c = \frac{L}{(V) (60 \text{ sec/min})}$  ;
  - Where V = Velocity =  $k (S)^{0.5}$  ; k = time of concentration velocity factor

#### Pre-Developed Time of Concentration

- Sheet Flow:
  - L = 177 ft; S = 2.8%; n = 0.24; I = 2.5"/hr
  - $T_{c1} = 22.3 \text{ min}$
- Shallow Flow
  - L = 408 ft; k = 7; S = 2.8%
  - $T_{c2} = 5.8 \text{ min}$
- $T_{Pre-Dev} = 28.1 \text{ min}$ ; **Use 28 min for design**
- **Time of Concentration  $T_c$  FOR PROPOSED CONDITIONS = 5 min**

### Project Areas

#### Pre-Developed Area Onsite = 187,356 SF = 4.30 AC

Asphalt (CN = 98) =	17,304 SF	<b>Total Impervious Area = 17,304 SF</b>
Landscape (CN=69) =	170,052 SF	

#### Post-Developed Area Onsite = 187,356 SF = 4.30 AC

New Roof (CN = 98) =	45,615 SF	<b>Total Impervious Area = 157,496 SF</b>
New Road Surfacing (CN = 98) =	107,932 SF	
New Hardscape (CN = 98) =	3,949 SF	
New Landscape (CN=86) =	29,860 SF	

#### Water Quality Area:

New Impervious (CN = 98) =	142,420 SF
Impervious Redeveloped (CN = 75) =	15,076 SF (CN=75 per section 4.08.6.d)
Impervious to be Removed =	2,228SF

Modified Area=  $3(15,076 \text{ SF} - 2,227 \text{ SF}) = 38,547 \text{ SF}$

Area=  $142,420 \text{ SF New} + 38,547 \text{ SF Modified} = 180,967 \text{ SF} > 157,496 \text{ SF}$ , **Use 157,496 SF in design**

#### Water Quantity Area:

157,496 SF Total Impervious  
 29,860 SF Total Pervious

## Hydromodification Assessment

The following hydromodification assessment follows the requirements Section 4.03.2 and 4.03.3.

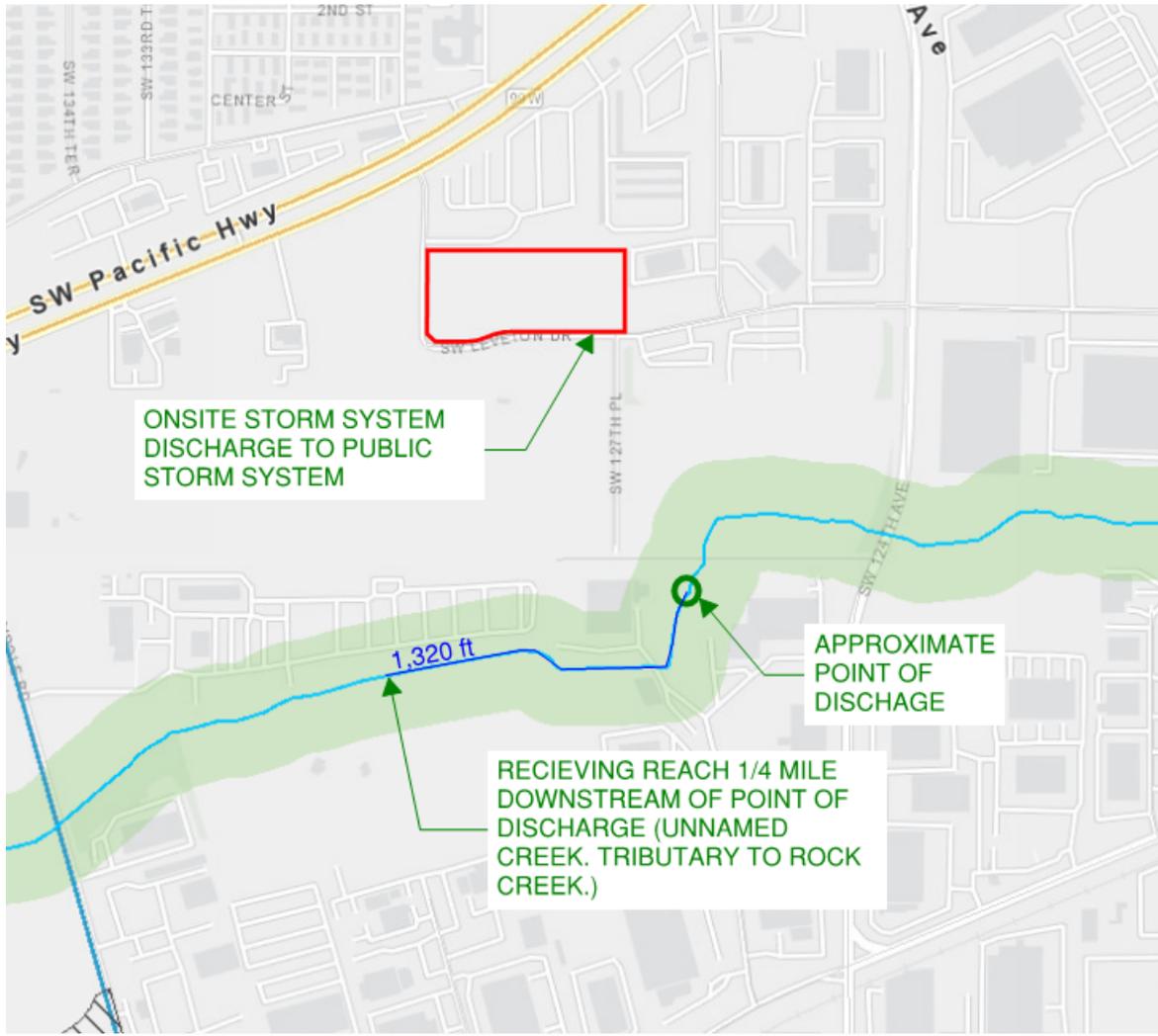


Figure 1 Hydromodification Risk Level Map

- Risk Level per CWS Hydromodification Map: **Low** (Receiving Reach: Tributary to Rock Creek)
- Development Class per CWS Hydromodification Map: **Developed Area**
- Project Size Category: 187,356 sf Disturbed Area, **Large** (>80,000 sf)

The receiving reach (Tributary to Rock Creek) does not require further reach-specific risk evaluation as described in section 4.03.4.

Per Table 4-2 in Section 4.03.5 and the assessment above, the development will require a minimum hydromodification approach of category 2. To meet the category 2 hydromodification requirements, the development will provide peak-flow matching detention as described in section 4.08.6.



Job Name: **Leveton 99**

Job No: **25042**

Sheet No: **STM-7**

Client: **MDG**

Date: **October 2025** By: AV

## Summary for Storm Water Quantity

Stormwater quantity management is required as a hydromodification approach as described in the previous section. Per Section 4.08.6.c and Table 4-7, onsite detention is required to be designed such that post-developed run-off rates do not exceed the pre-developed runoff rates for the 2-, 5-, and 10-year, 24-hour storm. Run-off from the developed 2-year, 24-hour storm is required to match 50% of the pre-developed 2-year, 24-hour storm. The city of Tualatin is also requiring the site to match pre and post developed runoff for the 25-year storm.

The site proposes to meet the requirements of Section 4.08.6.c by providing underground detention meeting the sizing and design criteria described in Section 4.09.3 for the loading docks due to lack of depth, and a detention pond for the remaining area meeting the sizing and design criteria described in Section 4.09.2. The site has been designed to provide detention using (104) ADS Stormtech underground detention chambers. The overflow will connect to the existing storm manholes in the right-of-way.

Post-Development Peak Runoff Rate	Pre-Development Peak Runoff Rate Target	Pre-Development Rate	Target Rate for Site	Detained Rate for Chambers	Detained Rate for Pond	Runoff Rate
2-yr, 24 hr	50% of 2-yr, 24 hr	0.27 cfs	0.13 cfs	0.07 cfs	0.06 cfs	<b>0.13 cfs</b>
5-yr, 24 hr	5-yr, 24 hr	0.55 cfs	0.55 cfs	0.24 cfs	0.15 cfs	<b>0.39 cfs</b>
10-yr, 24 hr	10-yr, 24 hr	0.73 cfs	0.73 cfs	0.31 cfs	0.19 cfs	<b>0.50 cfs</b>
25-yr, 24 hr	10-yr, 24 hr	1.00 cfs	1.00 cfs	0.43 cfs	0.25 cfs	<b>0.68 cfs</b>

Table 2: Detention Requirements

## Stormwater Quality Sizing Calculations

- Tributary Area 2 Filtered Manhole Impervious Area = 98,777 SF
  - Flow (WQF) =  $\frac{(0.36 \text{ in}) \times (98,777 \text{ sf})}{(12 \text{ in/ft}) (4 \text{ hr}) (60 \text{ min/hr}) (60 \text{ sec/min})} = 0.21 \text{ cfs}$
  - # of Cartridges =  $\frac{(WQF) \times (60 \text{ sec/min}) \times (7.48 \text{ gal/ft}^3)}{22.5} = 4.1 \text{ Cartridges (min), } \mathbf{5 \text{ Cartridges Used}}$
- Tributary Area 1 Swale Impervious Area = 58,719 SF
  - Water Quality Volume (WQV) =  $\frac{0.36 \text{ (in)} \times \text{Area (sf)}}{12 \text{ (in/ft)}} = 1,762 \text{ cu. ft.}$
  - Water Quality Flow (WQF) =  $\frac{WQV}{14,400 \text{ seconds}} = 0.122 \text{ cfs}$



Job Name: **Leveton 99**

Job No: **25042**

Sheet No: **STM-8**

Client: **MDG**

Date: **October 2025** By: AV

- Water Quality Depth: Manning's equation for determining flow depth
  - $Q=VA= \frac{1.486 \times A \times R^{2/3} \times S^{1/2}}{n}$ 
    - Where  $n = 0.24$  for open channel flow,
    - $A$  = Flow area,
    - $R$  = Hydraulic radius,
    - $S$  = Slope = 0.5%
  - WQ Flow Depth = 0.27 ft < 0.50 ft OK (See Channel Flow Analysis Print-Out)
- Max Velocity for 25-yr storm = 2.0 fps:
  - $Q_{25} = 1.53$  cfs
  - $A_{\text{bottom swale cross section}} = 2.0$  sf
  - $V=0.77$  fps < 2.0 fps OK (See Channel Flow Analysis Print-Out)
- Minimum Swale Length:
  - Residence time of 9 minutes = 540 seconds
  - $Q_{WQ}=0.122$  cfs
  - At WQ depth of = 0.27 ft,  $A= 0.83$  sf
  - $Q=VA$ ,  $V=0.147$  fps
  - $L=VT$ ,  $L=79$  ft minimum
  - Minimum length of swale bottom is 100 ft, Provided 100 ft OK

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 1

**Summary for Subcatchment 28S: Pre Development Total, CN 75**

Runoff = 0.27 cfs @ 8.25 hrs, Volume= 0.233 af, Depth> 0.65"

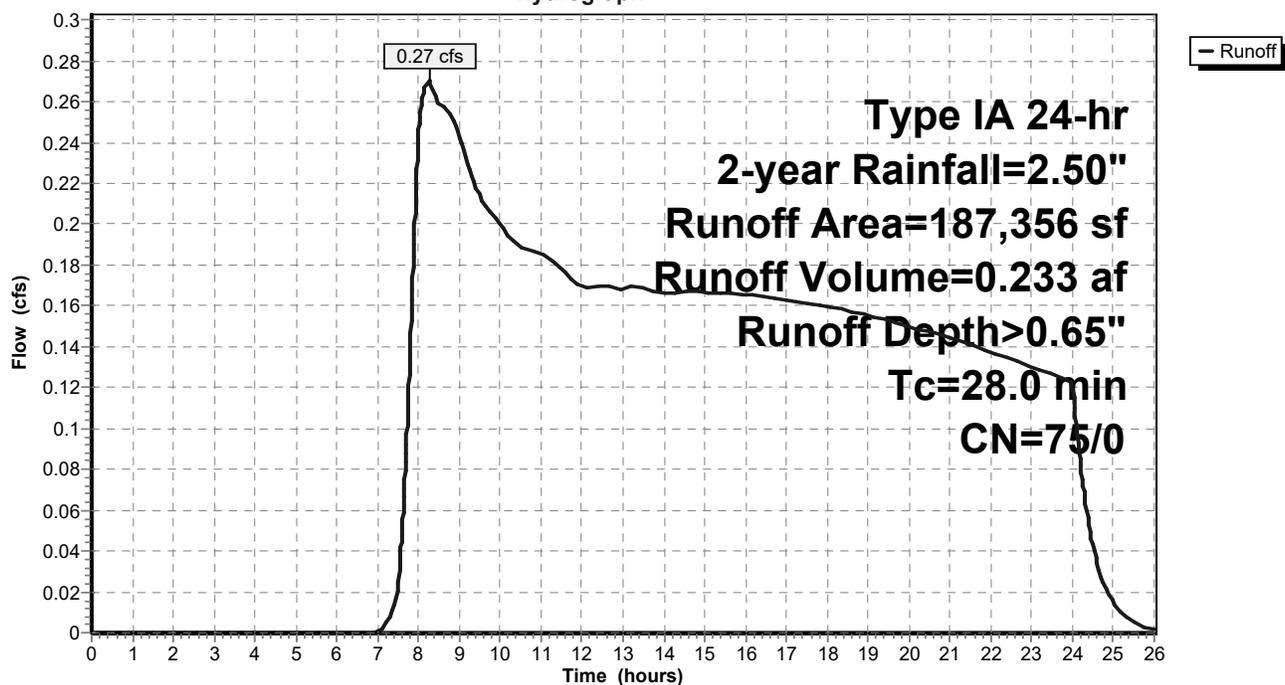
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 2-year Rainfall=2.50"

Area (sf)	CN	Description
* 187,356	75	Undocumented Fill
187,356	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0					Direct Entry, Pre-Developed

**Subcatchment 28S: Pre Development Total, CN 75**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 2

**Summary for Subcatchment 28S: Pre Development Total, CN 75**

Runoff = 0.55 cfs @ 8.13 hrs, Volume= 0.368 af, Depth> 1.03"

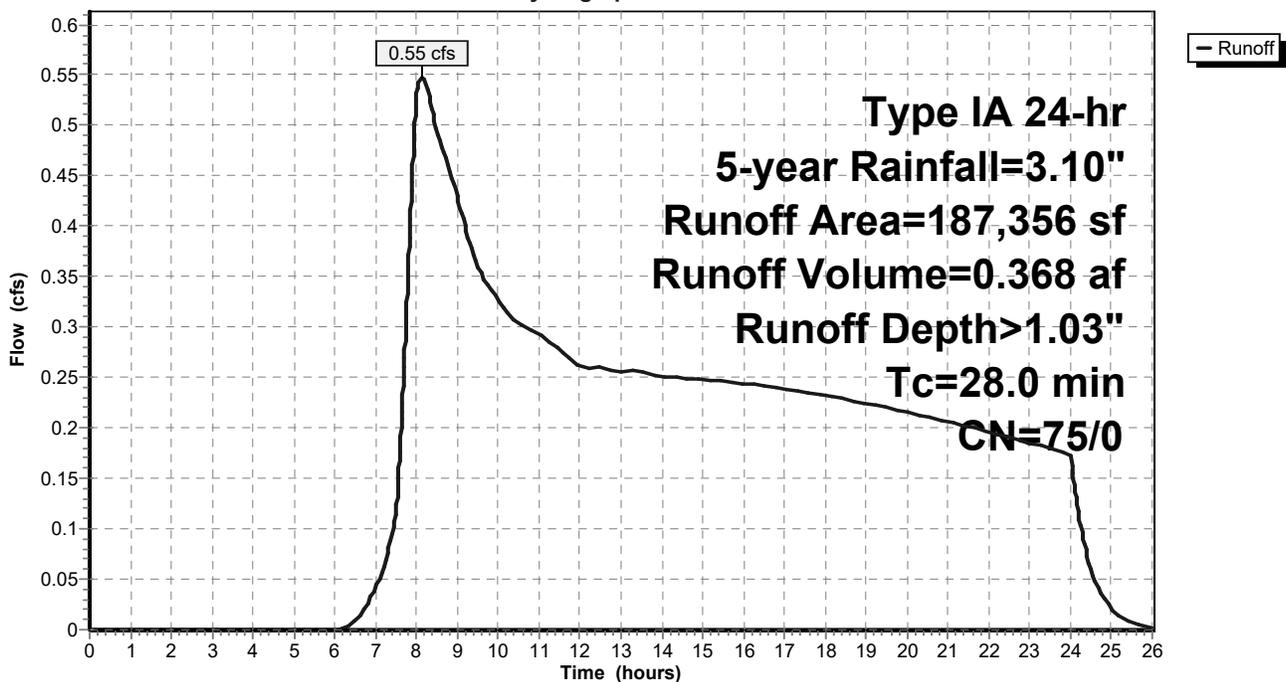
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 5-year Rainfall=3.10"

Area (sf)	CN	Description
* 187,356	75	Undocumented Fill
187,356	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0					Direct Entry, Pre-Developed

**Subcatchment 28S: Pre Development Total, CN 75**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 3

**Summary for Subcatchment 28S: Pre Development Total, CN 75**

Runoff = 0.73 cfs @ 8.09 hrs, Volume= 0.454 af, Depth> 1.27"

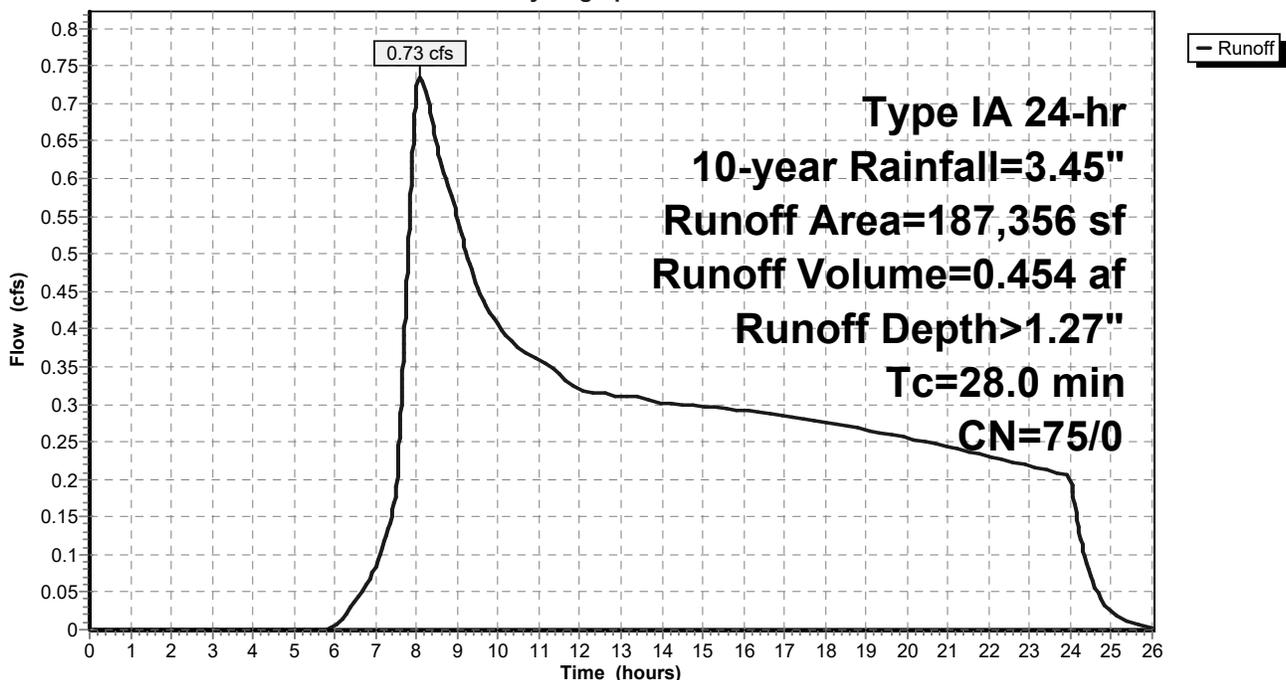
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 10-year Rainfall=3.45"

Area (sf)	CN	Description
* 187,356	75	Undocumented Fill
187,356	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0					Direct Entry, Pre-Developed

**Subcatchment 28S: Pre Development Total, CN 75**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 4

**Summary for Subcatchment 28S: Pre Development Total, CN 75**

Runoff = 1.00 cfs @ 8.06 hrs, Volume= 0.571 af, Depth> 1.59"

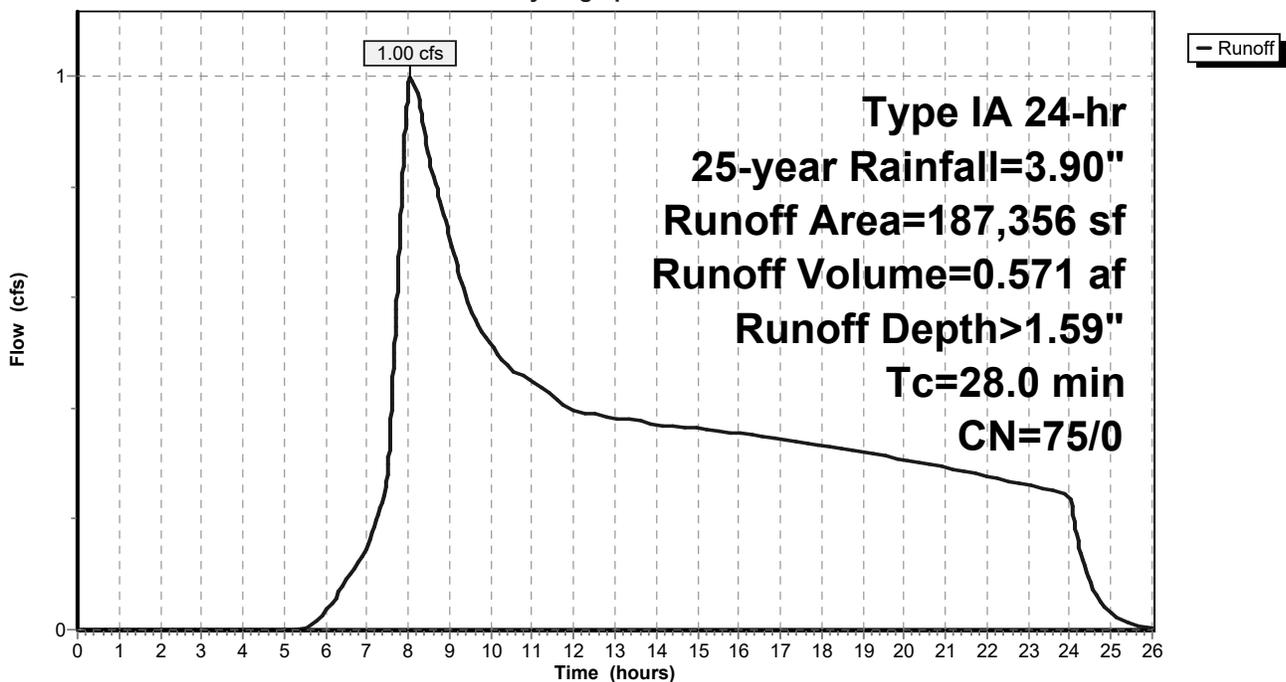
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 25-year Rainfall=3.90"

Area (sf)	CN	Description
* 187,356	75	Undocumented Fill
187,356	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0					Direct Entry, Pre-Developed

**Subcatchment 28S: Pre Development Total, CN 75**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 1

**Summary for Subcatchment 54S: Post-Developed Total**

Runoff = 2.28 cfs @ 7.89 hrs, Volume= 0.755 af, Depth= 2.11"

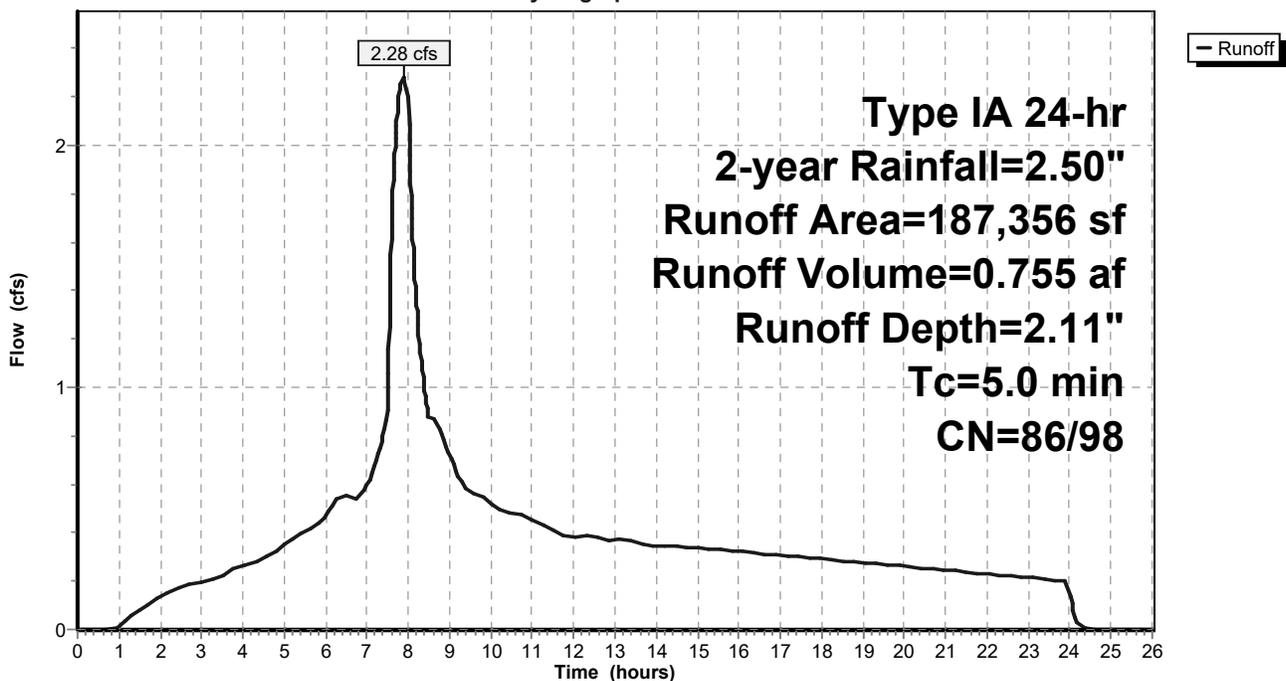
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 2-year Rainfall=2.50"

	Area (sf)	CN	Description
*	157,496	98	Impervious
*	29,860	86	Pervious
	187,356	96	Weighted Average
	29,860	86	15.94% Pervious Area
	157,496	98	84.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 54S: Post-Developed Total**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 2

**Summary for Subcatchment 54S: Post-Developed Total**

Runoff = 2.90 cfs @ 7.89 hrs, Volume= 0.964 af, Depth= 2.69"

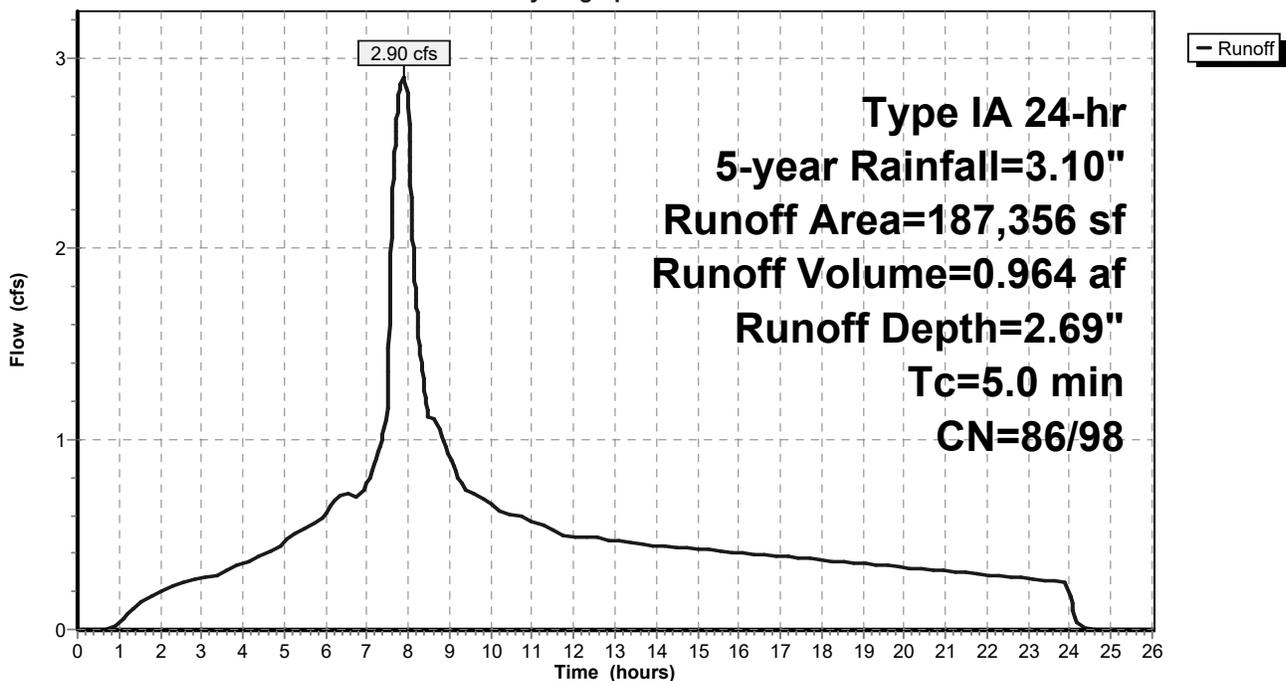
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 5-year Rainfall=3.10"

	Area (sf)	CN	Description
*	157,496	98	Impervious
*	29,860	86	Pervious
	187,356	96	Weighted Average
	29,860	86	15.94% Pervious Area
	157,496	98	84.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 54S: Post-Developed Total**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 3

**Summary for Subcatchment 54S: Post-Developed Total**

Runoff = 3.26 cfs @ 7.88 hrs, Volume= 1.087 af, Depth= 3.03"

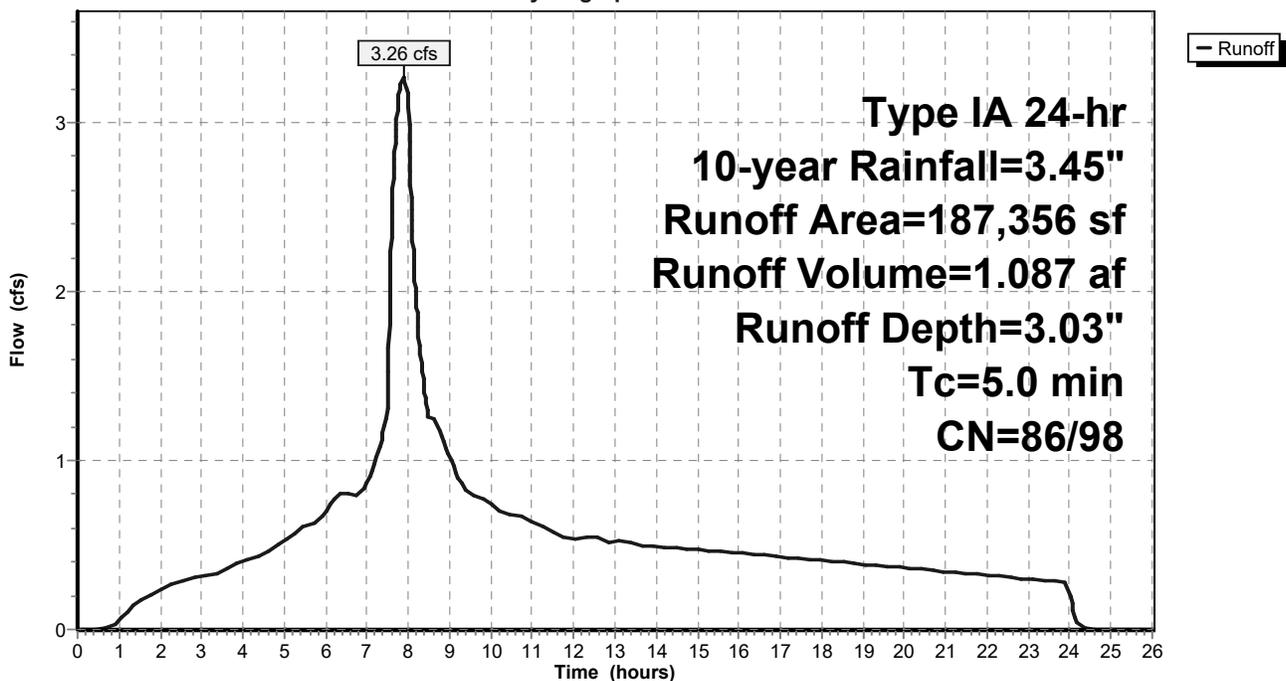
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 10-year Rainfall=3.45"

	Area (sf)	CN	Description
*	157,496	98	Impervious
*	29,860	86	Pervious
	187,356	96	Weighted Average
	29,860	86	15.94% Pervious Area
	157,496	98	84.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 54S: Post-Developed Total**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 4

**Summary for Subcatchment 54S: Post-Developed Total**

Runoff = 3.73 cfs @ 7.88 hrs, Volume= 1.245 af, Depth= 3.47"

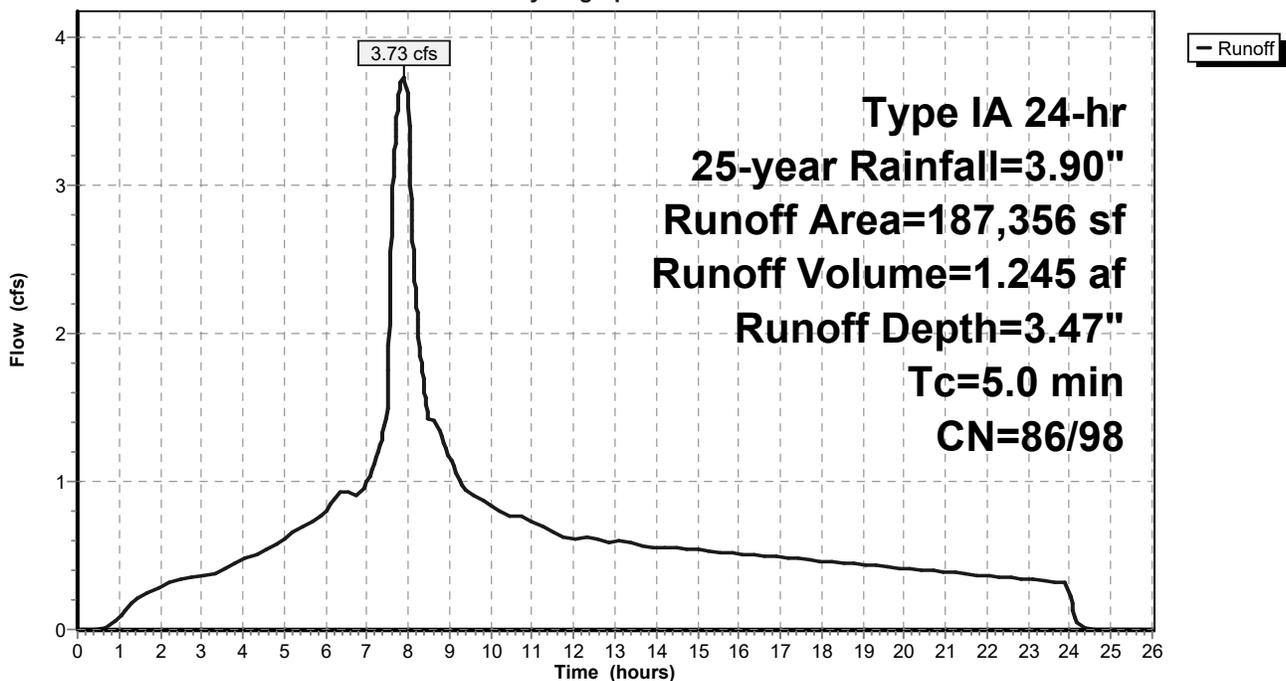
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 25-year Rainfall=3.90"

	Area (sf)	CN	Description
*	157,496	98	Impervious
*	29,860	86	Pervious
	187,356	96	Weighted Average
	29,860	86	15.94% Pervious Area
	157,496	98	84.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 54S: Post-Developed Total**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 1

**Summary for Subcatchment 52S: Tributary Area 1**

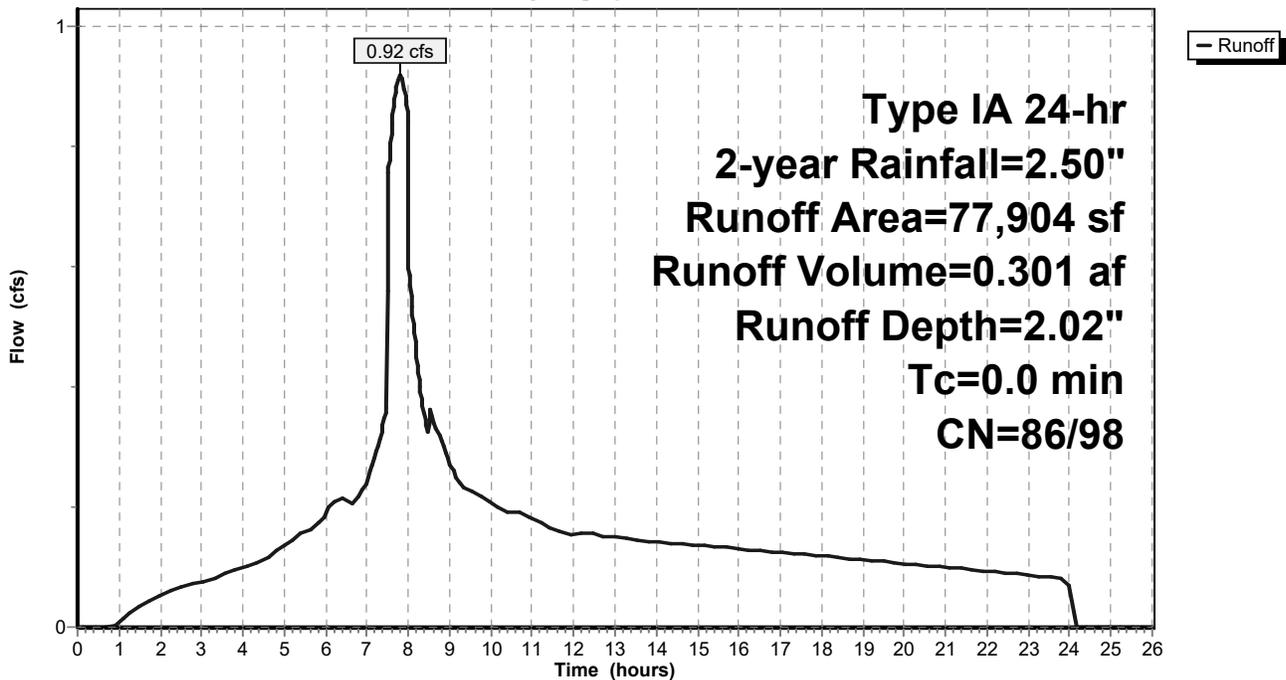
Runoff = 0.92 cfs @ 7.81 hrs, Volume= 0.301 af, Depth= 2.02"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr 2-year Rainfall=2.50"

	Area (sf)	CN	Description
*	58,719	98	Impervious
*	19,185	86	Pervious
	77,904	95	Weighted Average
	19,185	86	24.63% Pervious Area
	58,719	98	75.37% Impervious Area

**Subcatchment 52S: Tributary Area 1**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 2

**Summary for Subcatchment 52S: Tributary Area 1**

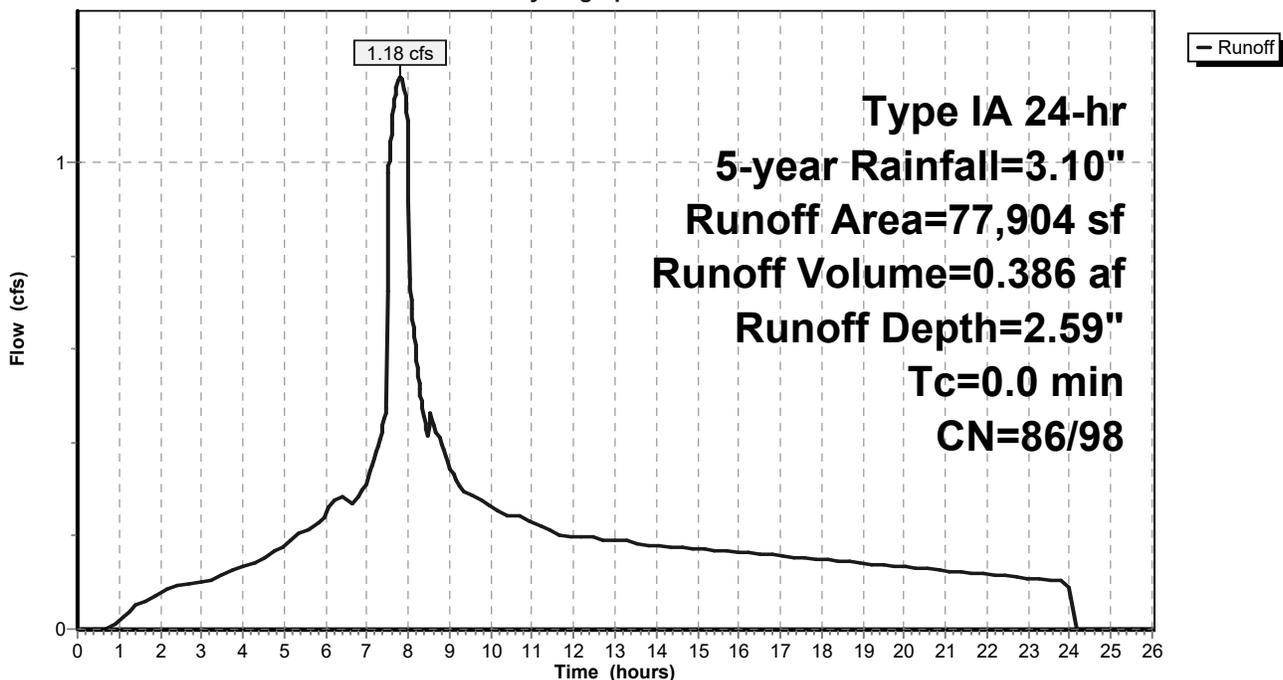
Runoff = 1.18 cfs @ 7.80 hrs, Volume= 0.386 af, Depth= 2.59"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 5-year Rainfall=3.10"

	Area (sf)	CN	Description
*	58,719	98	Impervious
*	19,185	86	Pervious
	77,904	95	Weighted Average
	19,185	86	24.63% Pervious Area
	58,719	98	75.37% Impervious Area

**Subcatchment 52S: Tributary Area 1**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 3

**Summary for Subcatchment 52S: Tributary Area 1**

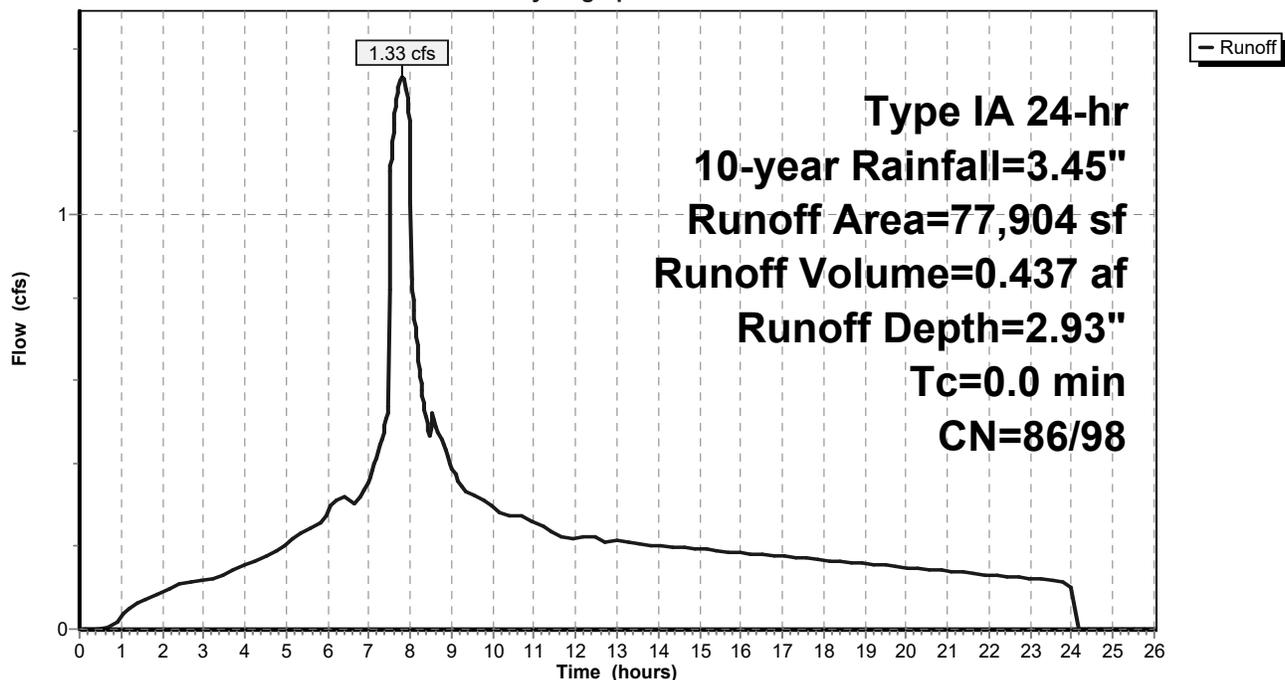
Runoff = 1.33 cfs @ 7.80 hrs, Volume= 0.437 af, Depth= 2.93"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 10-year Rainfall=3.45"

	Area (sf)	CN	Description
*	58,719	98	Impervious
*	19,185	86	Pervious
	77,904	95	Weighted Average
	19,185	86	24.63% Pervious Area
	58,719	98	75.37% Impervious Area

**Subcatchment 52S: Tributary Area 1**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 4

**Summary for Subcatchment 52S: Tributary Area 1**

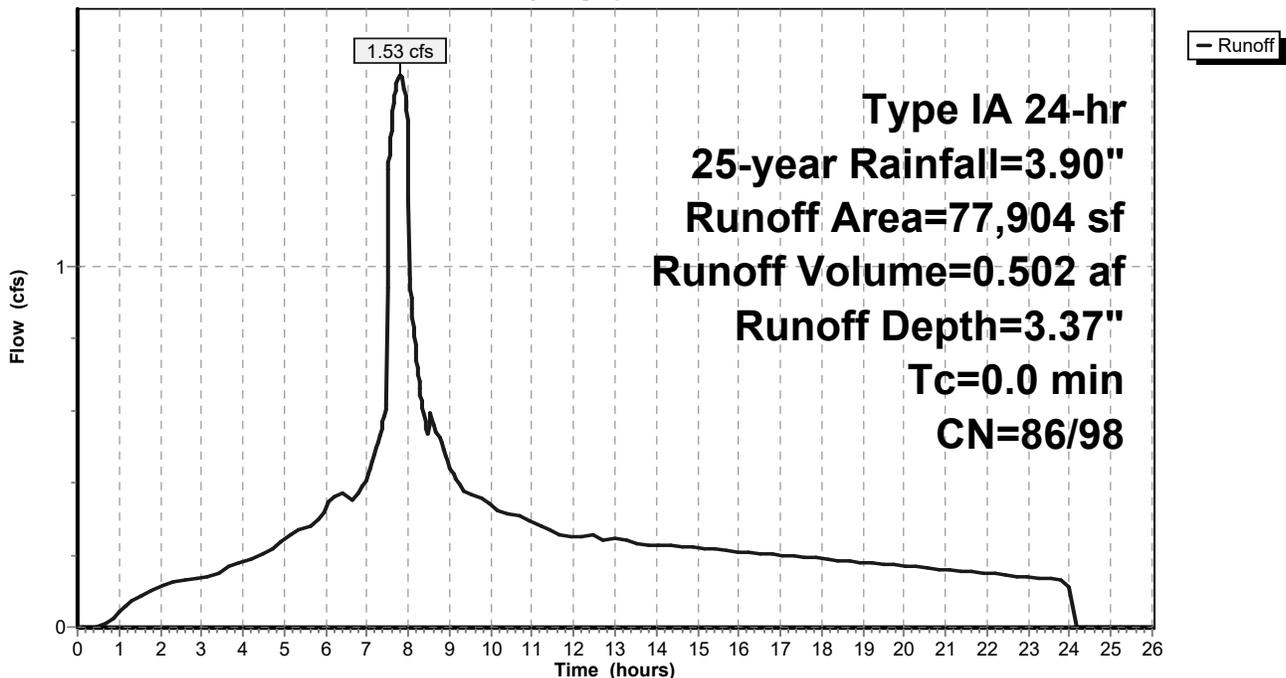
Runoff = 1.53 cfs @ 7.80 hrs, Volume= 0.502 af, Depth= 3.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 25-year Rainfall=3.90"

	Area (sf)	CN	Description
*	58,719	98	Impervious
*	19,185	86	Pervious
	77,904	95	Weighted Average
	19,185	86	24.63% Pervious Area
	58,719	98	75.37% Impervious Area

**Subcatchment 52S: Tributary Area 1**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 1

**Summary for Subcatchment 53S: Tributary Area 2**

Runoff = 1.38 cfs @ 7.89 hrs, Volume= 0.454 af, Depth= 2.17"

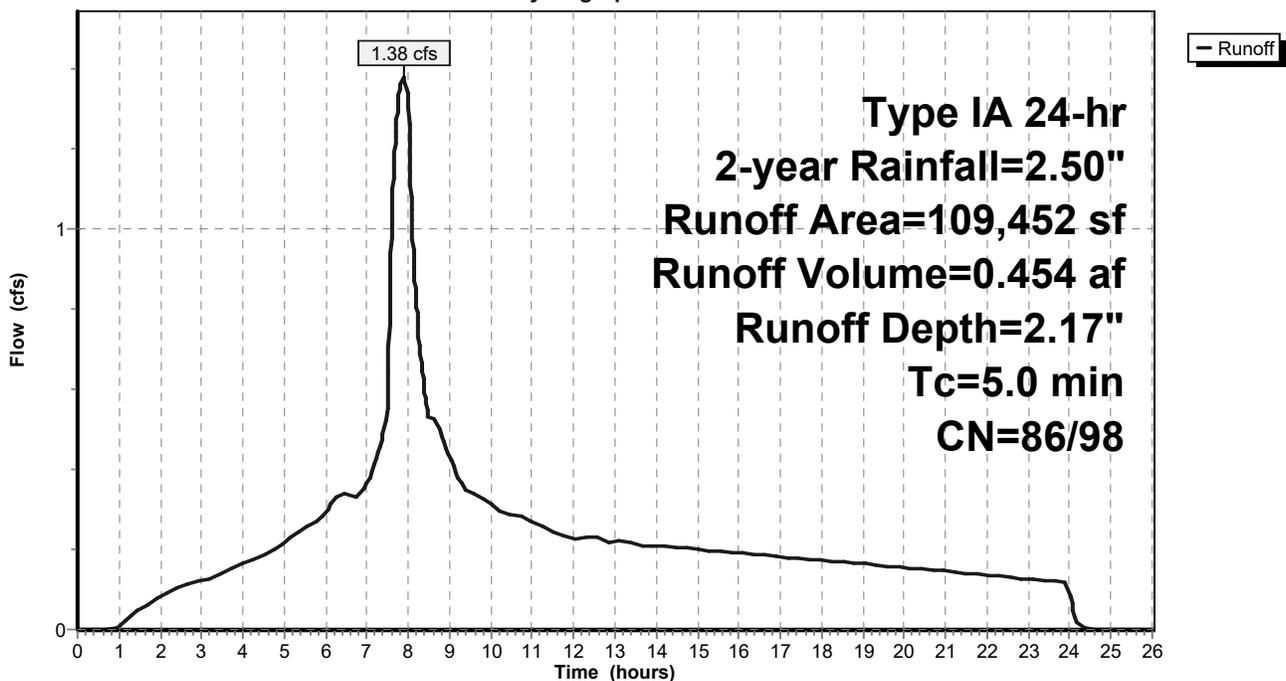
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 2-year Rainfall=2.50"

	Area (sf)	CN	Description
*	98,777	98	Impervious
*	10,675	86	Pervious
	109,452	97	Weighted Average
	10,675	86	9.75% Pervious Area
	98,777	98	90.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 53S: Tributary Area 2**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 2

**Summary for Subcatchment 53S: Tributary Area 2**

Runoff = 1.74 cfs @ 7.88 hrs, Volume= 0.578 af, Depth= 2.76"

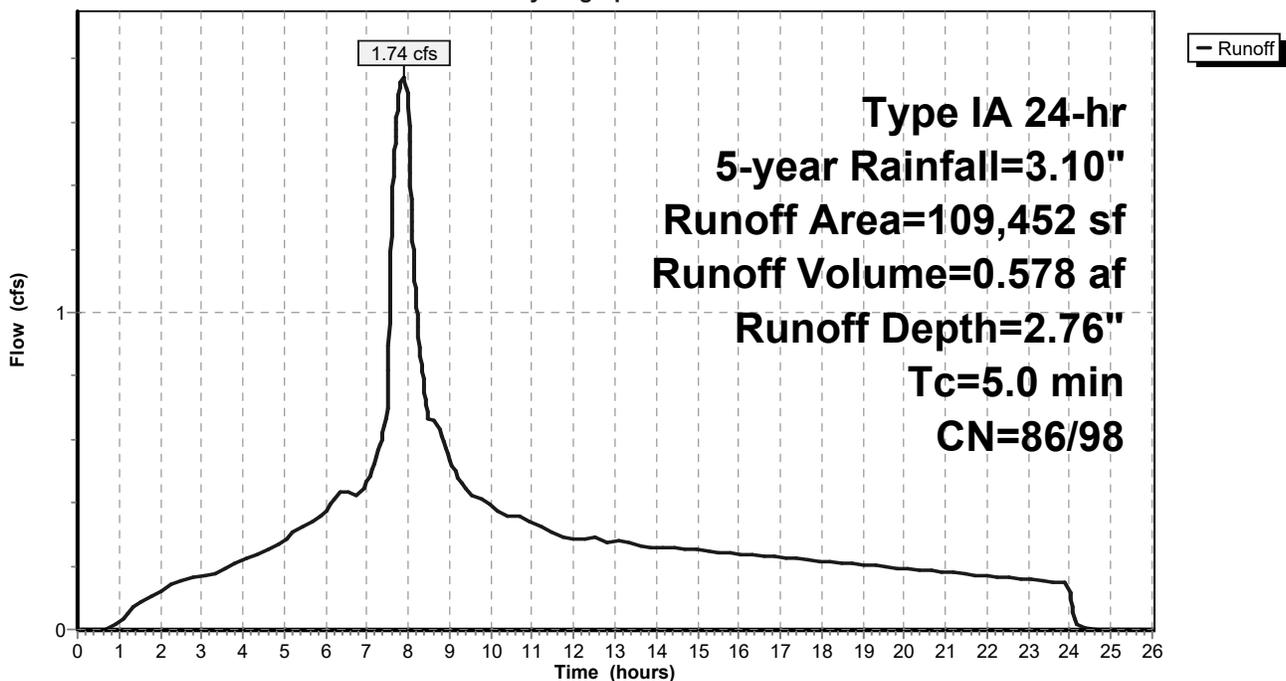
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 5-year Rainfall=3.10"

	Area (sf)	CN	Description
*	98,777	98	Impervious
*	10,675	86	Pervious
	109,452	97	Weighted Average
	10,675	86	9.75% Pervious Area
	98,777	98	90.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 53S: Tributary Area 2**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 3

**Summary for Subcatchment 53S: Tributary Area 2**

Runoff = 1.95 cfs @ 7.88 hrs, Volume= 0.650 af, Depth= 3.10"

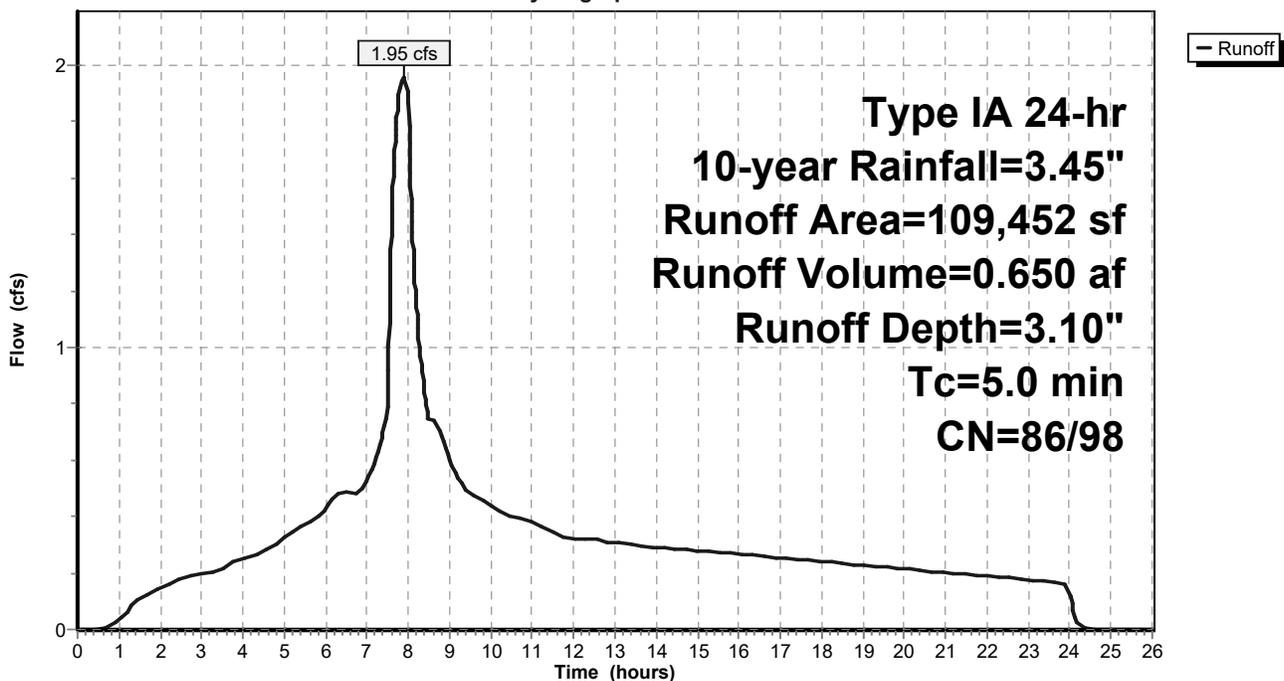
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 10-year Rainfall=3.45"

	Area (sf)	CN	Description
*	98,777	98	Impervious
*	10,675	86	Pervious
	109,452	97	Weighted Average
	10,675	86	9.75% Pervious Area
	98,777	98	90.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 53S: Tributary Area 2**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 4

**Summary for Subcatchment 53S: Tributary Area 2**

Runoff = 2.23 cfs @ 7.88 hrs, Volume= 0.743 af, Depth= 3.55"

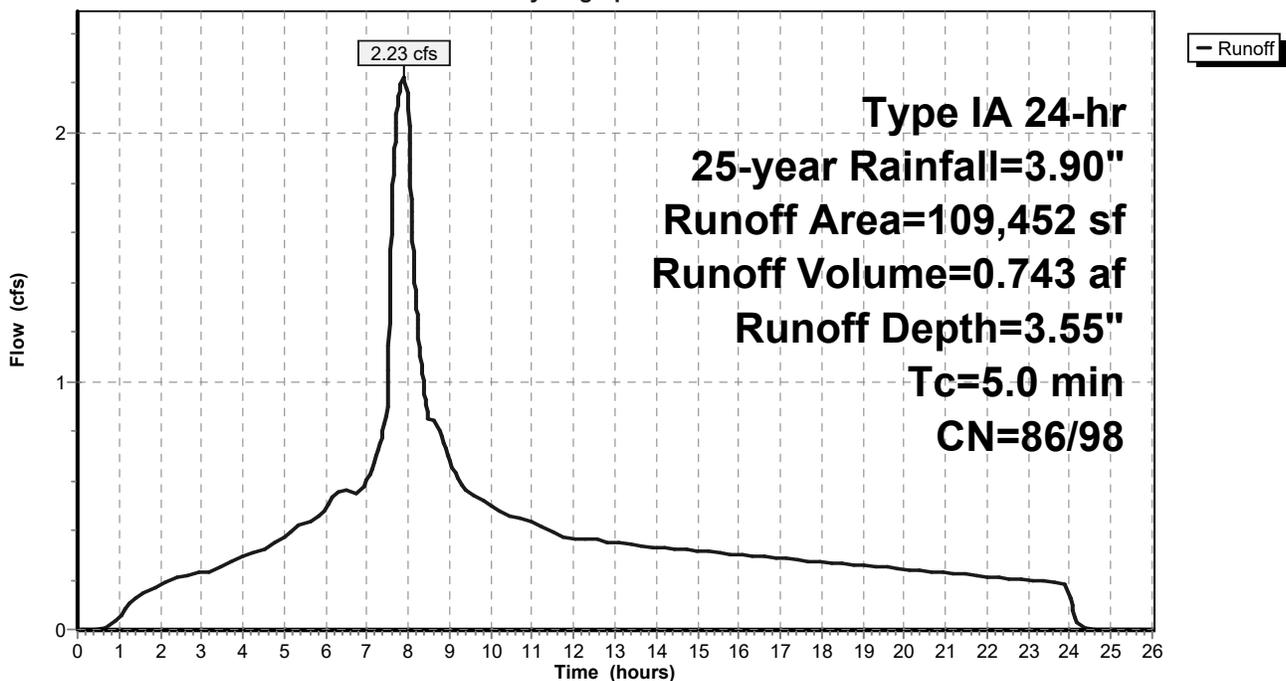
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
Type IA 24-hr 25-year Rainfall=3.90"

	Area (sf)	CN	Description
*	98,777	98	Impervious
*	10,675	86	Pervious
	109,452	97	Weighted Average
	10,675	86	9.75% Pervious Area
	98,777	98	90.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Post-Developed

**Subcatchment 53S: Tributary Area 2**

Hydrograph



**25042\_Storm**

Type IA 24-hr 2-year Rainfall=2.50"

Prepared by WDY, Inc.

Printed 10/31/2025

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Page 1

**Summary for Pond 34P: 4.0' Pond**

Inflow Area = 1.788 ac, 75.37% Impervious, Inflow Depth = 2.02" for 2-year event  
 Inflow = 0.92 cfs @ 7.81 hrs, Volume= 0.301 af  
 Outflow = 0.06 cfs @ 24.00 hrs, Volume= 0.099 af, Atten= 93%, Lag= 971.7 min  
 Primary = 0.06 cfs @ 24.00 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 142.77' @ 24.00 hrs Surf.Area= 4,286 sf Storage= 9,232 cf

Plug-Flow detention time= 572.6 min calculated for 0.099 af (33% of inflow)  
 Center-of-Mass det. time= 250.8 min ( 938.0 - 687.2 )

Volume	Invert	Avail.Storage	Storage Description		
#1	139.15'	16,150 cf	<b>4' Pond (Irregular)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
139.15	893	228.0	0	0	893
139.65	1,369	282.5	561	561	3,111
140.15	1,800	292.0	790	1,351	3,568
140.65	2,245	301.4	1,009	2,360	4,036
141.15	2,704	310.8	1,235	3,596	4,519
141.65	3,177	320.3	1,469	5,064	5,022
142.15	3,665	329.7	1,709	6,773	5,534
142.65	4,166	339.1	1,956	8,730	6,062
143.15	4,682	348.5	2,211	10,941	6,604
144.15	5,756	367.4	5,210	16,150	7,739

Device	Routing	Invert	Outlet Devices
#1	Primary	138.95'	<b>12.0" Round Culvert</b> L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 138.95' / 138.85' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	143.15'	<b>24.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	139.15'	<b>1.1" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	142.80'	<b>3.7" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.06 cfs @ 24.00 hrs HW=142.77' (Free Discharge)

- 1=Culvert (Passes 0.06 cfs of 5.44 cfs potential flow)
- 2=Overflow ( Controls 0.00 cfs)
- 3=Bottom Orifice (Orifice Controls 0.06 cfs @ 9.16 fps)
- 4=Center Orifice ( Controls 0.00 cfs)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

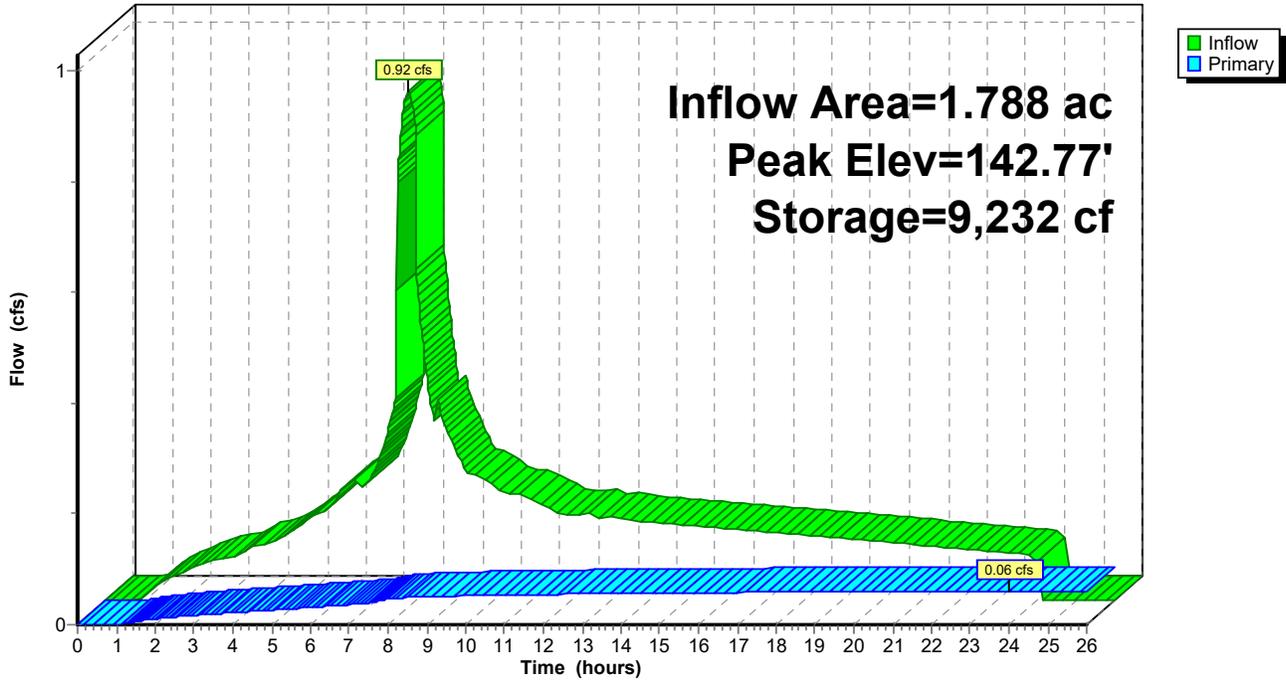
Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 2

**Pond 34P: 4.0' Pond**

Hydrograph



**25042\_Storm**

Type IA 24-hr 5-year Rainfall=3.10"

Prepared by WDY, Inc.

Printed 10/31/2025

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Page 3

**Summary for Pond 34P: 4.0' Pond**

Inflow Area = 1.788 ac, 75.37% Impervious, Inflow Depth = 2.59" for 5-year event  
 Inflow = 1.18 cfs @ 7.80 hrs, Volume= 0.386 af  
 Outflow = 0.15 cfs @ 18.13 hrs, Volume= 0.169 af, Atten= 87%, Lag= 619.7 min  
 Primary = 0.15 cfs @ 18.13 hrs, Volume= 0.169 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 143.01' @ 18.13 hrs Surf.Area= 4,536 sf Storage= 10,303 cf

Plug-Flow detention time= 619.5 min calculated for 0.169 af (44% of inflow)  
 Center-of-Mass det. time= 331.2 min ( 1,011.3 - 680.2 )

Volume	Invert	Avail.Storage	Storage Description		
#1	139.15'	16,150 cf	<b>4' Pond (Irregular)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
139.15	893	228.0	0	0	893
139.65	1,369	282.5	561	561	3,111
140.15	1,800	292.0	790	1,351	3,568
140.65	2,245	301.4	1,009	2,360	4,036
141.15	2,704	310.8	1,235	3,596	4,519
141.65	3,177	320.3	1,469	5,064	5,022
142.15	3,665	329.7	1,709	6,773	5,534
142.65	4,166	339.1	1,956	8,730	6,062
143.15	4,682	348.5	2,211	10,941	6,604
144.15	5,756	367.4	5,210	16,150	7,739

Device	Routing	Invert	Outlet Devices
#1	Primary	138.95'	<b>12.0" Round Culvert</b> L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 138.95' / 138.85' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	143.15'	<b>24.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	139.15'	<b>1.1" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	142.80'	<b>3.7" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.15 cfs @ 18.13 hrs HW=143.01' (Free Discharge)

- 1=Culvert (Passes 0.15 cfs of 5.63 cfs potential flow)
- 2=Overflow ( Controls 0.00 cfs)
- 3=Bottom Orifice (Orifice Controls 0.06 cfs @ 9.46 fps)
- 4=Center Orifice (Orifice Controls 0.09 cfs @ 1.57 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

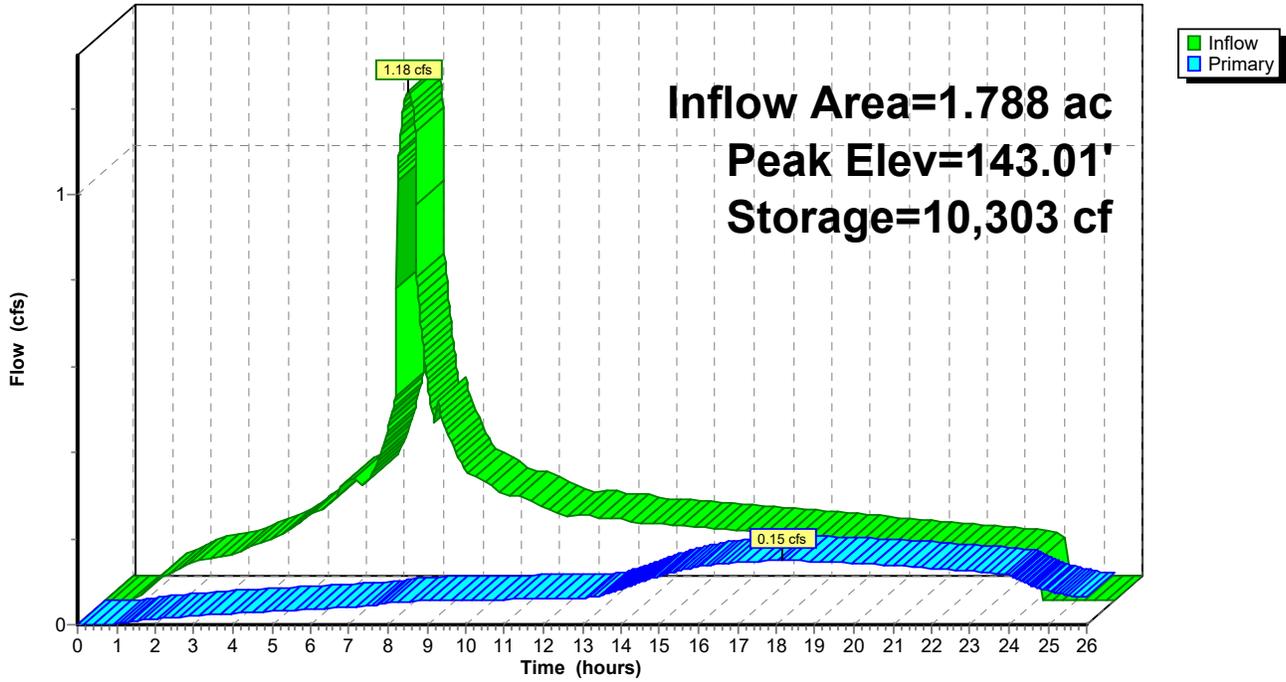
Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 4

**Pond 34P: 4.0' Pond**

Hydrograph



**25042\_Storm**

Type IA 24-hr 10-year Rainfall=3.45"

Prepared by WDY, Inc.

Printed 10/31/2025

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Page 5

**Summary for Pond 34P: 4.0' Pond**

Inflow Area = 1.788 ac, 75.37% Impervious, Inflow Depth = 2.93" for 10-year event  
 Inflow = 1.33 cfs @ 7.80 hrs, Volume= 0.437 af  
 Outflow = 0.19 cfs @ 15.86 hrs, Volume= 0.218 af, Atten= 86%, Lag= 483.5 min  
 Primary = 0.19 cfs @ 15.86 hrs, Volume= 0.218 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 143.07' @ 15.86 hrs Surf.Area= 4,600 sf Storage= 10,579 cf

Plug-Flow detention time= 585.2 min calculated for 0.218 af (50% of inflow)  
 Center-of-Mass det. time= 316.4 min ( 993.3 - 676.9 )

Volume	Invert	Avail.Storage	Storage Description		
#1	139.15'	16,150 cf	<b>4' Pond (Irregular)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
139.15	893	228.0	0	0	893
139.65	1,369	282.5	561	561	3,111
140.15	1,800	292.0	790	1,351	3,568
140.65	2,245	301.4	1,009	2,360	4,036
141.15	2,704	310.8	1,235	3,596	4,519
141.65	3,177	320.3	1,469	5,064	5,022
142.15	3,665	329.7	1,709	6,773	5,534
142.65	4,166	339.1	1,956	8,730	6,062
143.15	4,682	348.5	2,211	10,941	6,604
144.15	5,756	367.4	5,210	16,150	7,739

Device	Routing	Invert	Outlet Devices
#1	Primary	138.95'	<b>12.0" Round Culvert</b> L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 138.95' / 138.85' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	143.15'	<b>24.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	139.15'	<b>1.1" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	142.80'	<b>3.7" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.19 cfs @ 15.86 hrs HW=143.07' (Free Discharge)

- 1=Culvert (Passes 0.19 cfs of 5.68 cfs potential flow)
- 2=Overflow ( Controls 0.00 cfs)
- 3=Bottom Orifice (Orifice Controls 0.06 cfs @ 9.54 fps)
- 4=Center Orifice (Orifice Controls 0.12 cfs @ 1.78 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

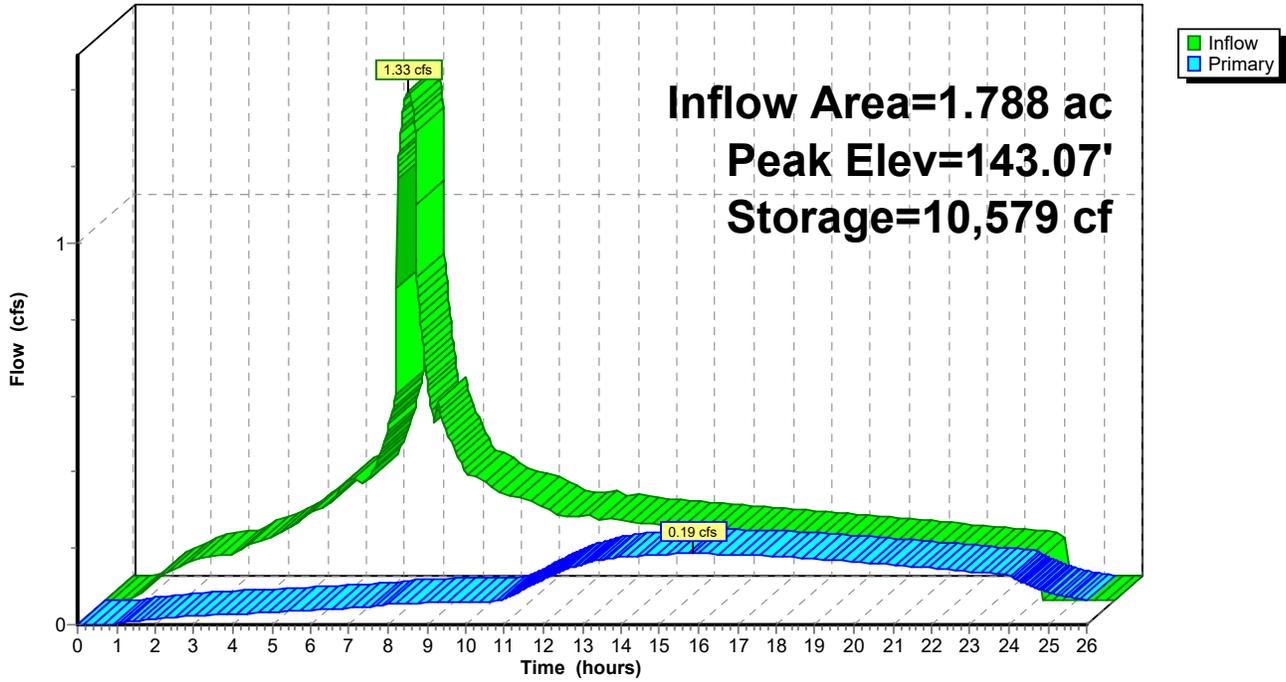
Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 6

**Pond 34P: 4.0' Pond**

Hydrograph



**25042\_Storm**

Type IA 24-hr 25-year Rainfall=3.90"

Prepared by WDY, Inc.

Printed 10/31/2025

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Page 7

**Summary for Pond 34P: 4.0' Pond**

Inflow Area = 1.788 ac, 75.37% Impervious, Inflow Depth = 3.37" for 25-year event  
 Inflow = 1.53 cfs @ 7.80 hrs, Volume= 0.502 af  
 Outflow = 0.25 cfs @ 12.52 hrs, Volume= 0.281 af, Atten= 84%, Lag= 283.4 min  
 Primary = 0.25 cfs @ 12.52 hrs, Volume= 0.281 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 143.15' @ 12.52 hrs Surf.Area= 4,687 sf Storage= 10,963 cf

Plug-Flow detention time= 538.3 min calculated for 0.281 af (56% of inflow)  
 Center-of-Mass det. time= 291.5 min ( 964.9 - 673.3 )

Volume	Invert	Avail.Storage	Storage Description		
#1	139.15'	16,150 cf	<b>4' Pond (Irregular)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
139.15	893	228.0	0	0	893
139.65	1,369	282.5	561	561	3,111
140.15	1,800	292.0	790	1,351	3,568
140.65	2,245	301.4	1,009	2,360	4,036
141.15	2,704	310.8	1,235	3,596	4,519
141.65	3,177	320.3	1,469	5,064	5,022
142.15	3,665	329.7	1,709	6,773	5,534
142.65	4,166	339.1	1,956	8,730	6,062
143.15	4,682	348.5	2,211	10,941	6,604
144.15	5,756	367.4	5,210	16,150	7,739

Device	Routing	Invert	Outlet Devices
#1	Primary	138.95'	<b>12.0" Round Culvert</b> L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 138.95' / 138.85' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	143.15'	<b>24.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	139.15'	<b>1.1" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	142.80'	<b>3.7" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.23 cfs @ 12.52 hrs HW=143.15' (Free Discharge)

- 1=Culvert (Passes 0.23 cfs of 5.75 cfs potential flow)
- 2=Overflow (Weir Controls 0.01 cfs @ 0.23 fps)
- 3=Bottom Orifice (Orifice Controls 0.06 cfs @ 9.64 fps)
- 4=Center Orifice (Orifice Controls 0.16 cfs @ 2.16 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

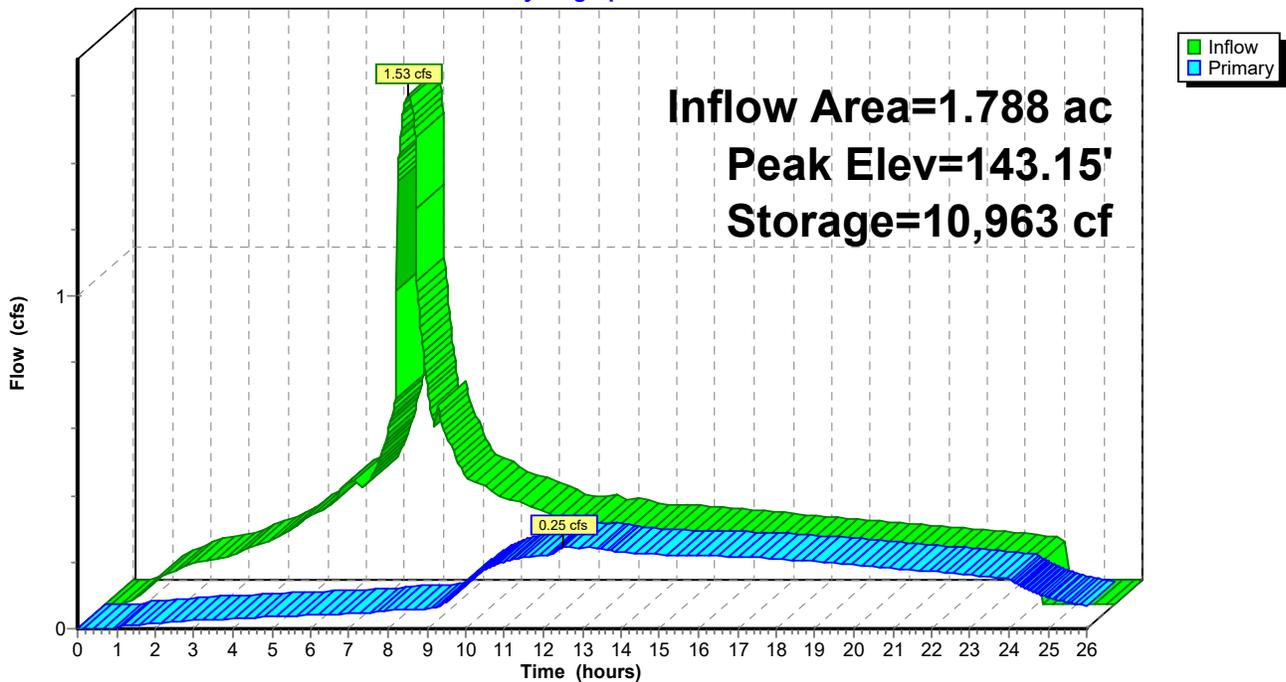
Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 8

**Pond 34P: 4.0' Pond**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 1

**Summary for Pond 46P: MC-3500**

Inflow Area = 2.513 ac, 90.25% Impervious, Inflow Depth = 2.17" for 2-year event  
 Inflow = 1.38 cfs @ 7.89 hrs, Volume= 0.454 af  
 Outflow = 0.07 cfs @ 24.04 hrs, Volume= 0.101 af, Atten= 95%, Lag= 969.5 min  
 Primary = 0.07 cfs @ 24.04 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 140.41' @ 24.04 hrs Surf.Area= 5,718 sf Storage= 15,906 cf

Plug-Flow detention time= 707.6 min calculated for 0.101 af (22% of inflow)  
 Center-of-Mass det. time= 339.1 min ( 1,018.9 - 679.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	135.85'	5,968 cf	<b>29.92'W x 191.12'L x 5.50'H Field A</b> 31,447 cf Overall - 11,554 cf Embedded = 19,893 cf x 30.0% Voids
#2A	136.60'	11,554 cf	<b>ADS_StormTech MC-3500 d +Capx 104 Inside #1</b> Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 104 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		17,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.40'	<b>12.0" Round Culvert</b> L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.40' / 136.20' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	136.60'	<b>1.2" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	141.35'	<b>12.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	140.50'	<b>6.0" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.07 cfs @ 24.04 hrs HW=140.41' (Free Discharge)

- 1=Culvert (Passes 0.07 cfs of 5.59 cfs potential flow)
- 2=Bottom Orifice (Orifice Controls 0.07 cfs @ 9.40 fps)
- 3=Overflow ( Controls 0.00 cfs)
- 4=Center Orifice ( Controls 0.00 cfs)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 2

**Pond 46P: MC-3500 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)**

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf

Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap

Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +6.0" End Stone x 2 = 191.12' Base Length

4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width

9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

104 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 11,554.2 cf Chamber Storage

31,447.2 cf Field - 11,554.2 cf Chambers = 19,893.0 cf Stone x 30.0% Voids = 5,967.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,522.1 cf = 0.402 af

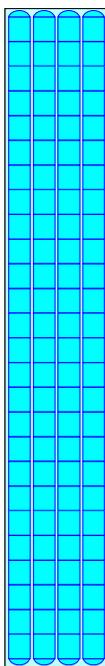
Overall Storage Efficiency = 55.7%

Overall System Size = 191.12' x 29.92' x 5.50'

104 Chambers

1,164.7 cy Field

736.8 cy Stone



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

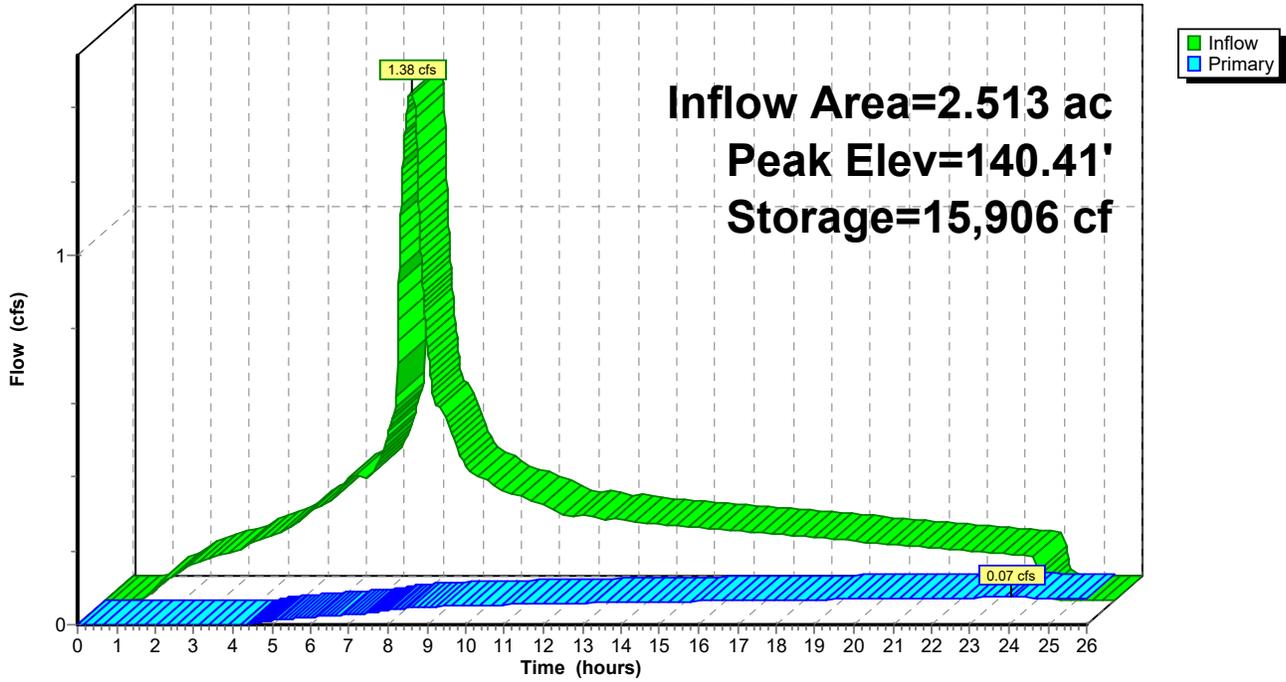
Type IA 24-hr 2-year Rainfall=2.50"

Printed 10/31/2025

Page 3

**Pond 46P: MC-3500**

Hydrograph



**25042\_Storm**

Type IA 24-hr 5-year Rainfall=3.10"

Prepared by WDY, Inc.

Printed 10/31/2025

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Page 4

**Summary for Pond 46P: MC-3500**

Inflow Area = 2.513 ac, 90.25% Impervious, Inflow Depth = 2.76" for 5-year event  
 Inflow = 1.74 cfs @ 7.88 hrs, Volume= 0.578 af  
 Outflow = 0.24 cfs @ 15.93 hrs, Volume= 0.216 af, Atten= 86%, Lag= 482.9 min  
 Primary = 0.24 cfs @ 15.93 hrs, Volume= 0.216 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 140.75' @ 15.93 hrs Surf.Area= 5,718 sf Storage= 16,486 cf

Plug-Flow detention time= 689.5 min calculated for 0.216 af (37% of inflow)  
 Center-of-Mass det. time= 384.1 min ( 1,057.3 - 673.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	135.85'	5,968 cf	<b>29.92'W x 191.12'L x 5.50'H Field A</b> 31,447 cf Overall - 11,554 cf Embedded = 19,893 cf x 30.0% Voids
#2A	136.60'	11,554 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 104 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 104 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		17,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.40'	<b>12.0" Round Culvert</b> L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.40' / 136.20' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	136.60'	<b>1.2" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	141.35'	<b>12.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	140.50'	<b>6.0" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.24 cfs @ 15.93 hrs HW=140.75' (Free Discharge)

- 1=Culvert (Passes 0.24 cfs of 5.85 cfs potential flow)
- 2=Bottom Orifice (Orifice Controls 0.08 cfs @ 9.80 fps)
- 3=Overflow ( Controls 0.00 cfs)
- 4=Center Orifice (Orifice Controls 0.16 cfs @ 1.69 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 5

**Pond 46P: MC-3500 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)**

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf

Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap

Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +6.0" End Stone x 2 = 191.12' Base Length

4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width

9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

104 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 11,554.2 cf Chamber Storage

31,447.2 cf Field - 11,554.2 cf Chambers = 19,893.0 cf Stone x 30.0% Voids = 5,967.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,522.1 cf = 0.402 af

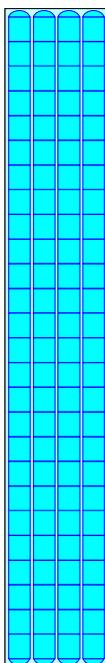
Overall Storage Efficiency = 55.7%

Overall System Size = 191.12' x 29.92' x 5.50'

104 Chambers

1,164.7 cy Field

736.8 cy Stone



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

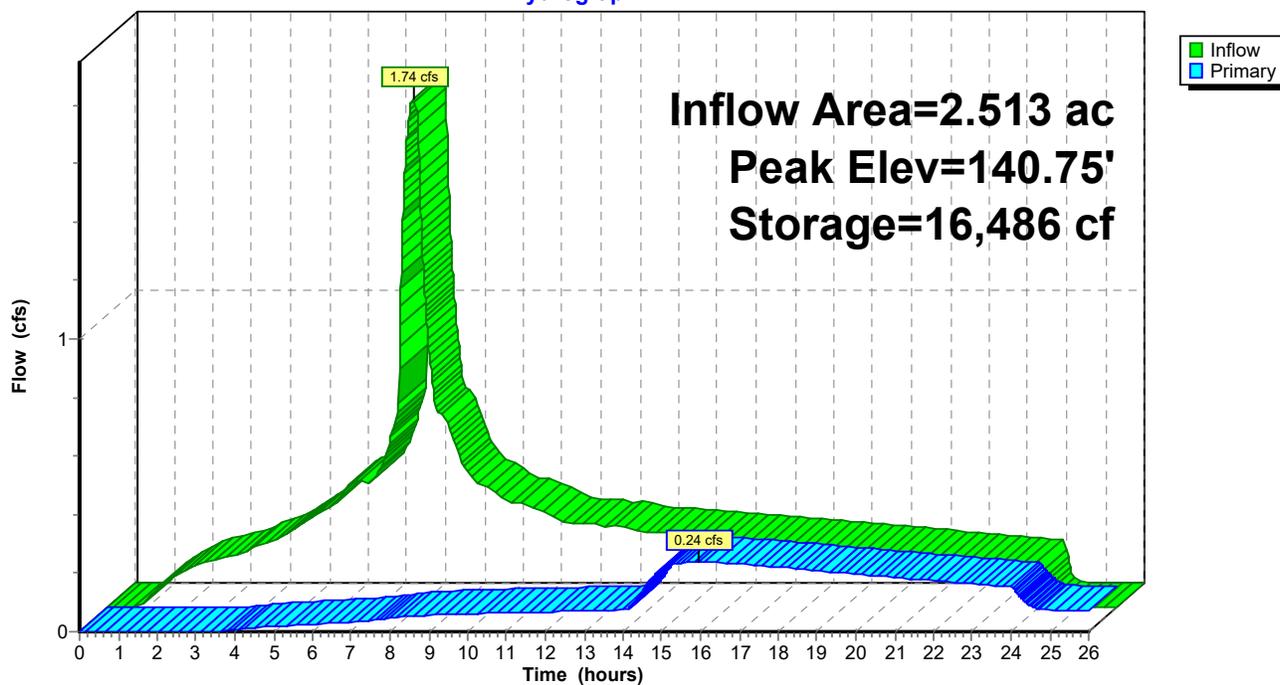
Type IA 24-hr 5-year Rainfall=3.10"

Printed 10/31/2025

Page 6

**Pond 46P: MC-3500**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 7

**Summary for Pond 46P: MC-3500**

Inflow Area = 2.513 ac, 90.25% Impervious, Inflow Depth = 3.10" for 10-year event  
 Inflow = 1.95 cfs @ 7.88 hrs, Volume= 0.650 af  
 Outflow = 0.31 cfs @ 13.33 hrs, Volume= 0.288 af, Atten= 84%, Lag= 326.8 min  
 Primary = 0.31 cfs @ 13.33 hrs, Volume= 0.288 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 140.80' @ 13.33 hrs Surf.Area= 5,718 sf Storage= 16,578 cf

Plug-Flow detention time= 627.2 min calculated for 0.288 af (44% of inflow)  
 Center-of-Mass det. time= 342.4 min ( 1,012.6 - 670.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	135.85'	5,968 cf	<b>29.92'W x 191.12'L x 5.50'H Field A</b> 31,447 cf Overall - 11,554 cf Embedded = 19,893 cf x 30.0% Voids
#2A	136.60'	11,554 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 104 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 104 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		17,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.40'	<b>12.0" Round Culvert</b> L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.40' / 136.20' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	136.60'	<b>1.2" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	141.35'	<b>12.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	140.50'	<b>6.0" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.31 cfs @ 13.33 hrs HW=140.80' (Free Discharge)

- 1=Culvert (Passes 0.31 cfs of 5.90 cfs potential flow)
- 2=Bottom Orifice (Orifice Controls 0.08 cfs @ 9.87 fps)
- 3=Overflow ( Controls 0.00 cfs)
- 4=Center Orifice (Orifice Controls 0.23 cfs @ 1.86 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 8

**Pond 46P: MC-3500 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)**

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf

Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap

Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +6.0" End Stone x 2 = 191.12' Base Length

4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width

9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

104 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 11,554.2 cf Chamber Storage

31,447.2 cf Field - 11,554.2 cf Chambers = 19,893.0 cf Stone x 30.0% Voids = 5,967.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,522.1 cf = 0.402 af

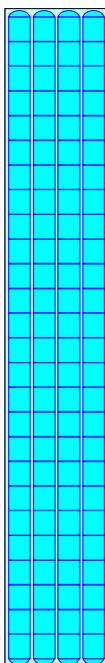
Overall Storage Efficiency = 55.7%

Overall System Size = 191.12' x 29.92' x 5.50'

104 Chambers

1,164.7 cy Field

736.8 cy Stone



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

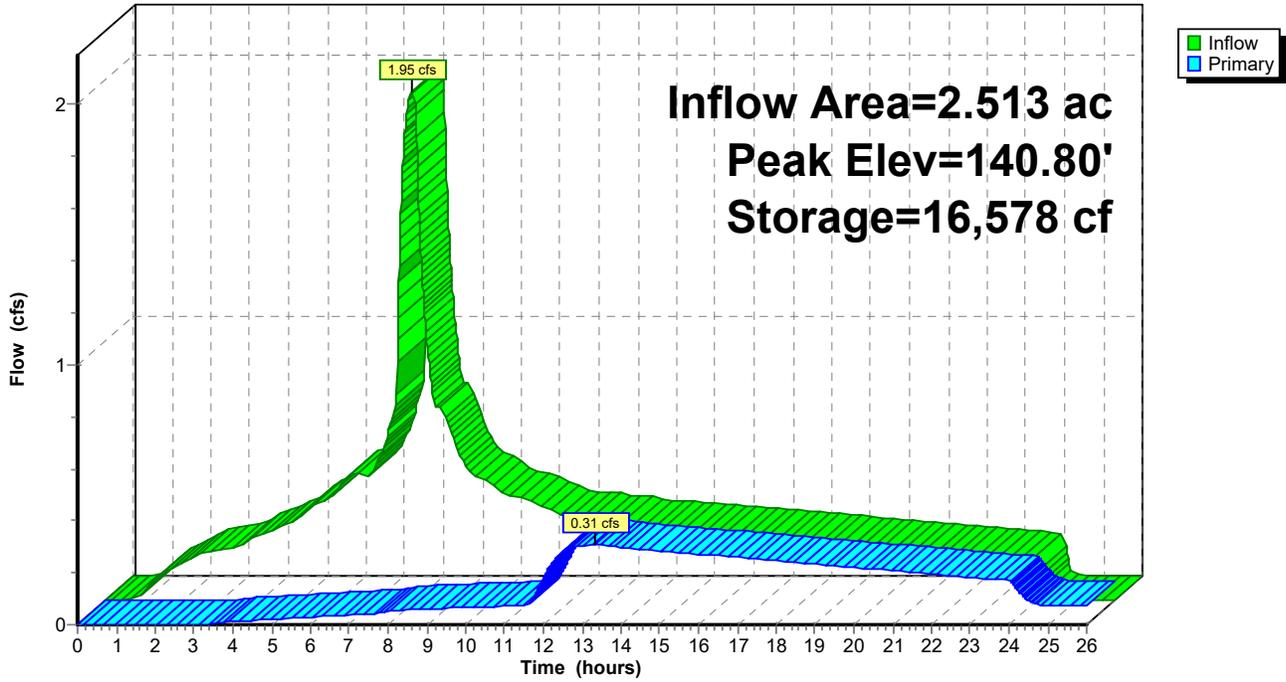
Type IA 24-hr 10-year Rainfall=3.45"

Printed 10/31/2025

Page 9

**Pond 46P: MC-3500**

Hydrograph



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 10

**Summary for Pond 46P: MC-3500**

Inflow Area = 2.513 ac, 90.25% Impervious, Inflow Depth = 3.55" for 25-year event  
 Inflow = 2.23 cfs @ 7.88 hrs, Volume= 0.743 af  
 Outflow = 0.43 cfs @ 11.00 hrs, Volume= 0.380 af, Atten= 81%, Lag= 187.5 min  
 Primary = 0.43 cfs @ 11.00 hrs, Volume= 0.380 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs  
 Peak Elev= 140.89' @ 11.00 hrs Surf.Area= 5,718 sf Storage= 16,737 cf

Plug-Flow detention time= 556.5 min calculated for 0.380 af (51% of inflow)  
 Center-of-Mass det. time= 293.1 min ( 960.1 - 667.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	135.85'	5,968 cf	<b>29.92'W x 191.12'L x 5.50'H Field A</b> 31,447 cf Overall - 11,554 cf Embedded = 19,893 cf x 30.0% Voids
#2A	136.60'	11,554 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 104 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 104 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		17,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.40'	<b>12.0" Round Culvert</b> L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.40' / 136.20' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	136.60'	<b>1.2" Horiz. Bottom Orifice</b> C= 0.600 Limited to weir flow at low heads
#3	Device 1	141.35'	<b>12.0" Horiz. Overflow</b> C= 0.600 Limited to weir flow at low heads
#4	Device 1	140.50'	<b>6.0" Vert. Center Orifice</b> C= 0.600

**Primary OutFlow** Max=0.43 cfs @ 11.00 hrs HW=140.89' (Free Discharge)

- 1=Culvert (Passes 0.43 cfs of 5.97 cfs potential flow)
- 2=Bottom Orifice (Orifice Controls 0.08 cfs @ 9.98 fps)
- 3=Overflow ( Controls 0.00 cfs)
- 4=Center Orifice (Orifice Controls 0.35 cfs @ 2.13 fps)

**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 11

**Pond 46P: MC-3500 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)**

Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf

Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap

Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +6.0" End Stone x 2 = 191.12' Base Length

4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width

9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

104 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 11,554.2 cf Chamber Storage

31,447.2 cf Field - 11,554.2 cf Chambers = 19,893.0 cf Stone x 30.0% Voids = 5,967.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,522.1 cf = 0.402 af

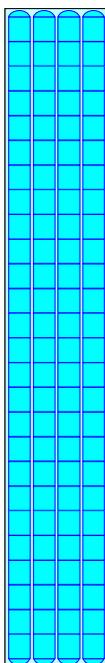
Overall Storage Efficiency = 55.7%

Overall System Size = 191.12' x 29.92' x 5.50'

104 Chambers

1,164.7 cy Field

736.8 cy Stone



**25042\_Storm**

Prepared by WDY, Inc.

HydroCAD® 10.00-26 s/n 07105 © 2020 HydroCAD Software Solutions LLC

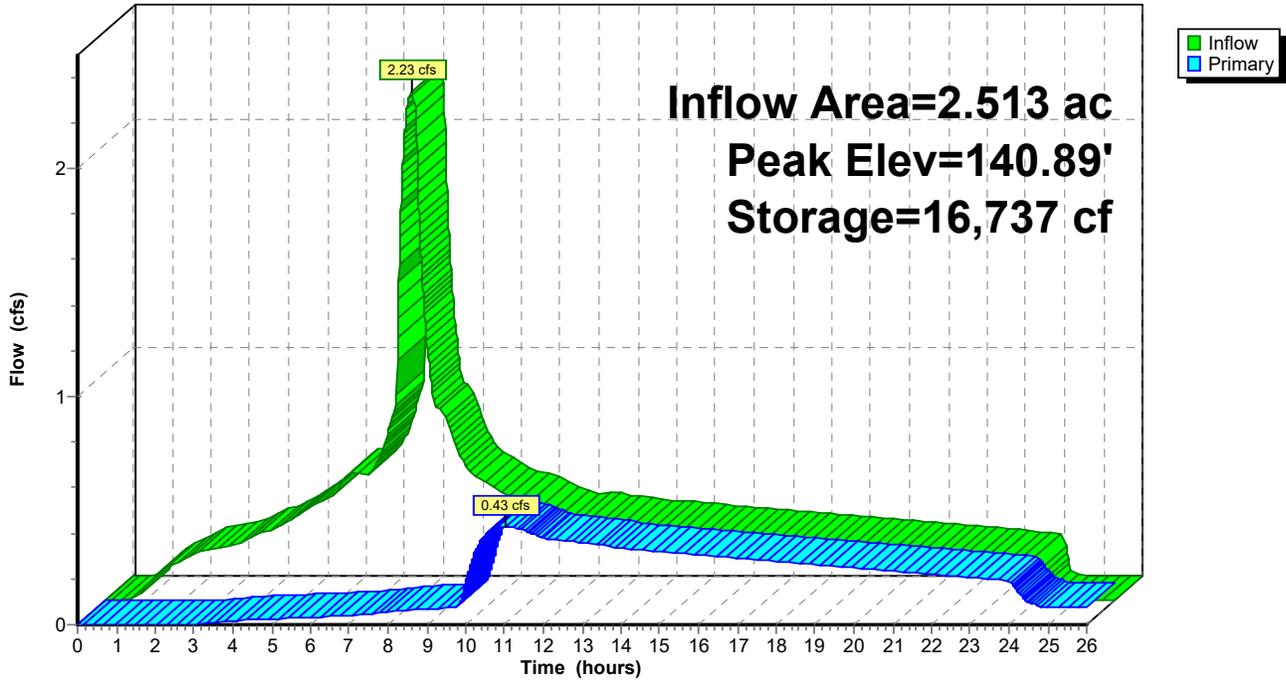
Type IA 24-hr 25-year Rainfall=3.90"

Printed 10/31/2025

Page 12

**Pond 46P: MC-3500**

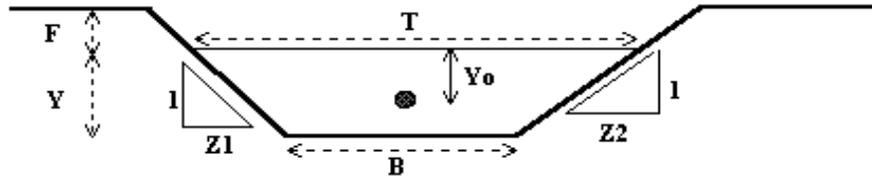
Hydrograph



## WATER QUALITY STORM

## Normal Flow Analysis - Trapezoidal Channel

Project: \_\_\_\_\_  
 Channel ID: \_\_\_\_\_



### Design Information (Input)

Channel Invert Slope	$S_o =$ <u>0.0050</u> ft/ft
Manning's n	$n =$ <u>0.240</u>
Bottom Width	$B =$ <u>2.00</u> ft
Left Side Slope	$Z1 =$ <u>4.00</u> ft/ft
Right Side Slope	$Z2 =$ <u>4.00</u> ft/ft
Freeboard Height	$F =$ <u>0.00</u> ft
Design Water Depth	$Y =$ <u>0.27</u> ft

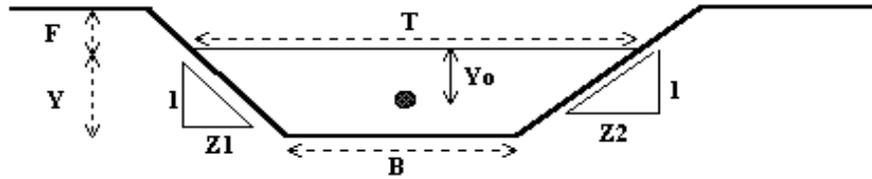
### Normal Flow Condition (Calculated)

<b>Discharge</b>	$Q =$ <u>0.12</u> cfs
<b>Froude Number</b>	$Fr =$ <u>0.06</u>
<b>Flow Velocity</b>	$V =$ <u>0.15</u> fps
Flow Area	$A =$ <u>0.83</u> sq ft
Top Width	$T =$ <u>4.16</u> ft
Wetted Perimeter	$P =$ <u>4.23</u> ft
Hydraulic Radius	$R =$ <u>0.20</u> ft
Hydraulic Depth	$D =$ <u>0.20</u> ft
Specific Energy	$E_s =$ <u>0.27</u> ft
Centroid of Flow Area	$Y_o =$ <u>0.12</u> ft
Specific Force	$F_s =$ <u>0.01</u> kip

25-YEAR STORM

**Normal Flow Analysis - Trapezoidal Channel**

Project: \_\_\_\_\_  
 Channel ID: \_\_\_\_\_



<b>Design Information (Input)</b>	
Channel Invert Slope	So = 0.0050 ft/ft
Manning's n	n = 0.240
Bottom Width	B = 2.00 ft
Left Side Slope	Z1 = 4.00 ft/ft
Right Side Slope	Z2 = 4.00 ft/ft
Freeboard Height	F = 1.00 ft
Design Water Depth	Y = 0.92 ft
<b>Normal Flow Condition (Calculated)</b>	
<b>Discharge</b>	<b>Q = 1.53 cfs</b>
<b>Froude Number</b>	<b>Fr = 0.07</b>
<b>Flow Velocity</b>	<b>V = 0.29 fps</b>
Flow Area	A = 5.23 sq ft
Top Width	T = 9.36 ft
Wetted Perimeter	P = 9.59 ft
Hydraulic Radius	R = 0.55 ft
Hydraulic Depth	D = 0.56 ft
Specific Energy	Es = 0.92 ft
Centroid of Flow Area	Yo = 0.36 ft
Specific Force	Fs = 0.12 kip