FD#4

LBM Engineering, LLC
11 Hally Lane, Colchester, CT 06415-2133 Phone 860-416-9809 Email John@LBMEngineering.com

CIVIL ENGINEERING - LAND DEVELOPMENT - SITE PLANS - STORMWATER MANAGEMENT

Engineering Report
For Land Use Commissions Submittals
Kineo Estates Conservation Subdivision,
Ledyard, Connecticut

June 18, 2026

EXISTING CONDITIONS: Reference is made to the following Plan Set: "Plan Showing Kineo Estates Conservation Subdivision Prepared for Mt. Kineo Builders 12 Hyde Park Drive and 975 Long Cove Road, Ledyard, Connecticut" Scales as Shown March 2026, By Dieter & Gardner, Gales Ferry, CT. The property is located on the east side of Long Cove Road south of Hyde Park Drive. The property is wooded and drains to the south.

METHODOLOGY: The Rational Method was used for analyzing runoff rates per Part III of the Town of Ledyard's *Ordinance Regulating the Management of Stormwater Runoff*. The descending leg of the hydrographs are increased by a factor of 2.5 to provide additional stormwater volume. Gutter Flow Analysis and Storm System design are designed for a 25-year storm event. Intensity-Duration-Frequency (IDF) Curves were downloaded from the NOAA Atlas 14 web site.

STORMWATER MANAGEMENT: The proposed development will not change the existing drainage patterns. Pavement runoff from the proposed road, Ellie Rose Lane, will drain to three (3) water quality/detention basins. Each basin has outlet piping designed to reduce the peak rate of runoff from the pavement to a rate of undeveloped ground cover. The basins' outlets are extended detention under drains that hold the runoff for less than 12 hours and settle out suspended solids and drain empty after each storm. Discharge rate from the detention/water quality basin will be further reduced as it flows over 1,000 feet through wetlands and underbrush. The following table provides a comparison of computed peak rates of runoff from roadway pavement for undeveloped land versus the developed condition:

BASIN	AREA (ACRES)	RUNOFF COEFF. (O'LAND)	PRE-DEVELOPED PEAK RUNOFF RAINFALL INTENSITY (IN./HR.)			
			2-YR 3.46 IN./HR.	10 YR 5.14 IN./HR.	25 YR 6.18 IN./HR.	100-YR 7.80 IN./HR.
CB1	0.20	0.25	0.17 CFS	0.26 CFS	0.31 CFS	0.39 CFS
CB3	0.46	0.25	0.40 CFS	0.59 CFS	0.71 CFS	0.90 CFS
CB5	0.35	0.25	0.30 CFS	0.45 CFS	0.54 CFS	0.68 CFS

BASIN	PEAK OUTLET FLOW FROM BASINS			
	2-YR	10 YR	25 YR	100-YR
CB1	0.21 CFS +0.04	0.25 CFS -0.01	0.27 CFS -0.04	0.30 CFS -0.09
CB3	0.43 CFS +0.03	0.51 CFS -0.08	0.56 CFS -0.15	0.61 CFS -0.29
CB5	0.37 CFS +0.07	0.45 CFS -0.00	0.49 CFS -0.05	0.55 CFS -0.13

There is a slight computed increase (less than 0.10 CFS) in peak flow rate for the 2-year storm.

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There is a proposed cross-culvert that will carry an intermittent watercourse under Ellie Rose Lane. The drainage areas were delineated, and the 50-year peak flows were determined using USGS StreamStats (www.usgs.gov). The proposed 36-inch culvert was sized by verifying the inlet control headwater was no more than 1.5 times the pipe diameter. (HW/D). Calculations are attached to this report.

CONCLUSION: The proposed development will not have adverse effects on down-gradient properties and is in keeping with the policies and goals of the Ledyard Planning and Zoning Commission.

Submitted by:
LBM Engineering, LLC

John R. Martucci, P.E.

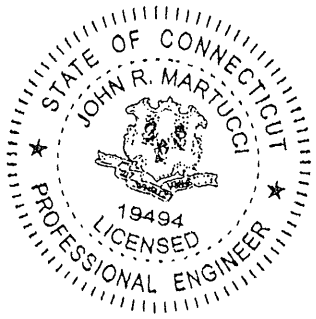

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TABLE OF CONTENTS

PREPARED BY	DATE PREPARED	LBM Engineering, LLC	JOB NUMBER	PAGE NUMBER
JRM	11/2024	11 HALLY LANE		
CHECKED BY	DATE CHECKED	COLCHESTER, CONNECTICUT 06415	CLIENT NAME	TOTAL PAGES
	REV 4/2024	TEL: (860)-416-9809		
		EMAIL: JOHN@LBMENGINEERING.COM		

CONSERVATION SUBDIVISION - KINED SUBDIVISION, LEDYARD

RATIONAL METHOD NOTE: RATIONAL METHOD WAS USED TO COMPUTE PEAK RATES OF RUNOFF, DRAINAGE AREAS ARE SMALL (< 1 ACRE)

$Q_{25} = C \times I \times A$ C PAVEMENT = 0.95
C OVERLAND = 0.25

T_C = 10 MINUTES I = 5.5 INCHES/HOUR

ELLIE ROSE LN
CB 1 STA. 12+75, RT

275' x 14' = 0.09 AC PAVEMENT C = 0.95
AC = 0.95 x 0.09 = 0.09
Q_{25} = 0.09 x 5.5 = 0.50 CFS

CB 2 STA 12+75, LT (MIRROR IMAGE OF CB 1)

ELLIE ROSE LN
CB 3 STA 16+97, RT (LOW POINT)

14+42 TO 18+66 = 424 x 14' = 0.14 AC PAV'T x 0.95 = 0.133

15+0 TO 16+00 RT = 1800 SF = 0.04 AC (overland) x 0.25 = 0.010
TOTAL AREA 0.18 0.143
WEIGHTED C 0.143 / 0.18 = 0.79

CB 4 STA 16+97 LT (MIRROR IMAGE OF CB 3)

PREPARED BY	DATE PREPARED	LBM Engineering, LLC	JOB NUMBER	PAGE NUMBER
JRM	4/2026	11 HALLY LANE COLCHESTER, CONNECTICUT 06415 TEL: (860)-416-9809 EMAIL: JOHN@LBMENGINEERING.COM		
CHECKED BY	DATE CHECKED		CLIENT NAME	TOTAL PAGES

CB 5 STA. 20+52 ELLIE ROSE LN

			A x C
10,442 SF PAVEMENT	0.24 ACRES	x 0.95	= 0.228
4774 SF O'LAND	0.11 AC	X 0.25	= 0.028
	0.35 Ac		0.256

WEIGHTED C = 0.256/0.35 = 0.73

CB 1A STA 14+42, RT ELLIE ROSE LN

(167'x14') = 0.05 Ac x (PAV'T) 0.95 = 0.048 AC

CB 1B STA 14+42, LT

MIRROR OF 1A

PROJECT: KINEO ESTATES SUBDIVISION
PROJECT NO.:
TOWN: Ledyard
ROAD: ELLIE ROSE LN
LOCATION: N/A

DESIGNED BY: JRM DATE: 01/03/25
REV:
CHECKED BY: DATE:

GUTTER FLOW ANALYSIS - 25 YR STORM

Inlet ID	Inlet Station and Offset	Area in Acres (A)	Runoff Coeff. (C)	Time to Inlet (min.)	Rainfall Intensity (in/hr)	AC	Total AC	Q to Inlet (cfs)	Grade of Gutter ft/ft (SL)	Cross Slope Of Shoulder ft/ft (Sx)	Depth of Flow of Gutter (ft)	Gutter Flow Width (ft)	Q Bypassing Inlet (cfs)	AC Bypassing Inlet	AC Entering Catch Basin	Inlet Type
ELLIE ROSE LN RIGHT GUTTER																
CB 1	12+75, RT	0.090	0.95	10	5.50	0.086	0.086	0.517	0.010	0.043	0.139	3.240	0.027	0.005	0.081	"C"
CB1A	14+42, RT	0.050	0.95	10	5.50	0.048	0.052	0.317	0.010	0.043	0.116	2.697	0.002	0.000	0.048	"C"
CB 3	16+97, RT	0.180	0.79	10	5.50	0.142	0.143	0.862	LOW PT	0.043	SEE LOW POINT ANALYSIS				0.142	"C"
ELLIE ROSE LN LEFT GUTTER																
CB 2	12+75, LT	0.090	0.95	10	5.50	0.086	0.086	0.517	0.010	0.043	0.139	3.240	0.027	0.005	0.081	"C"
CB2A	14+42, LT	0.050	0.95	10	5.50	0.048	0.052	0.317	0.010	0.043	0.116	2.697	0.002	0.000	0.048	"C"
CB 4	16+97, LT	0.180	0.79	10	5.50	0.142	0.143	0.862	LOW PT	0.043	SEE LOW POINT ANALYSIS				0.142	"C"
CB 5	20+52, RT	0.350	0.73	10	5.50	0.256	0.256	1.546	LOW PT	0.043	SEE LOW POINT ANALYSIS				0.256	"C"

NOTES:

LOW POINT ANALYSIS

INLET	Q TO INLET	PERIM.	C WEIR	d WEIR	WIDTH OF FLOW	d ORIFICE	
CB 3	0.862	5.020	3	0.148	2.97	0.010	<0.4' DEEP - OK
CB 4	0.862	5.020	3	0.148	2.97	0.010	<0.4' DEEP - OK
CB 5	1.546	5.020	3	0.219	4.38	0.008	<0.4' DEEP - OK

Notes:

1.) Manning's n = 0.016 (asphalt).
2.) Tc = 5 minutes minimum for areas with all pavement.
3.) Tc = 10 minutes minimum for small areas with pavement and grass.
4) All low points operate as a wier. Depth (d) over grate is less than 0 4 feet.

GRATES	PERIM	AREA
C	5.02	3.13
C DOUB	7.33	6.26
CL	7.33	3.13
CL DOUB	11.96	6.26

STORM SEWER SYSTEM DESIGN

Client:
Project: KINEO ESTATES SUBDIVISION
Road: ELLIE ROSE LANE
Return Period for Design: 25-YR

Prepared By: JRM Date: 01/03/25 Revised:

Line Segment		Time to Inlet	Time in Pipe	Accumul. Time	A x C Entering System	Sum of A x C in System	Rainfall Intensity,	**Q in System**	Pipe Data						
From	To	(min.)	(min.)	(min.)			R (in./hr.)	**(c.f.s.)**	Size (in.)	Length (ft.)	Slope (ft./ft.)	Avg. Vel. (f.p.s.)	**Full Cap. (c.f.s.)**	Headwater (ft.)	Manning "n"
CB 2 12++75,LT	CB 1 12+75, RT	10	0.10	10.0	0.081	0.081	5.5	0.45	15	24	0.010	4.0	6.99	0.20	0.012
CB 1 12+75.RT	BASIN	10	0.41	10.1	0.081	0.162	5.5	0.89	15	124	0.014	5.0	8.28	0.30	0.012
CB 2A 14+42,LT	CB 1A 14+42, RT	10	0.13	10.0	0.048	0.048	5.5	0.26	15	24	0.010	3.0	6.99	0.20	0.012
CB 1A 14+42.RT	CB 3 16+97,RT	10	1.07	10.1	0.048	0.096	5.5	0.53	15	256	0.010	4.0	6.99	0.20	0.012
CB 4 16+97,LT	CB 3 16+97,RT	10	0.08	10.0	0.142	0.142	5.5	0.78	15	24	0.010	5.0	6.99	0.30	0.012
CB 3 16+97.RT	BASIN	10	0.08	10.1	0.142	0.38	5.5	2.09	15	45	0.067	10.0	18.10	0.40	0.012
CB 5 20+55,RT	BASIN	10	0.47	10.0	0.256	0.256	5.5	1.41	15	140	0.010	5.0	6.99	0.40	0.012

Manning's "n" for. HDPE and RC pipe = 0.012

NOTE: ALL PIPES ARE BELOW FULL CAPACITY.

General Information
The Document
Previous Publications
FAQ
Glossary

Precipitation Frequency
Data Server
GIS Grids
Maps
Time Series
Temporals
Documents

Probable Maximum Precipitation
Publications

Miscellaneous
Publications
Storm Analysis
Record Precipitation

Contact Us
Impressum

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CT

Data description

Data type: Precipitation depth **Units:** English **Time series type:** Partial duration

Select location

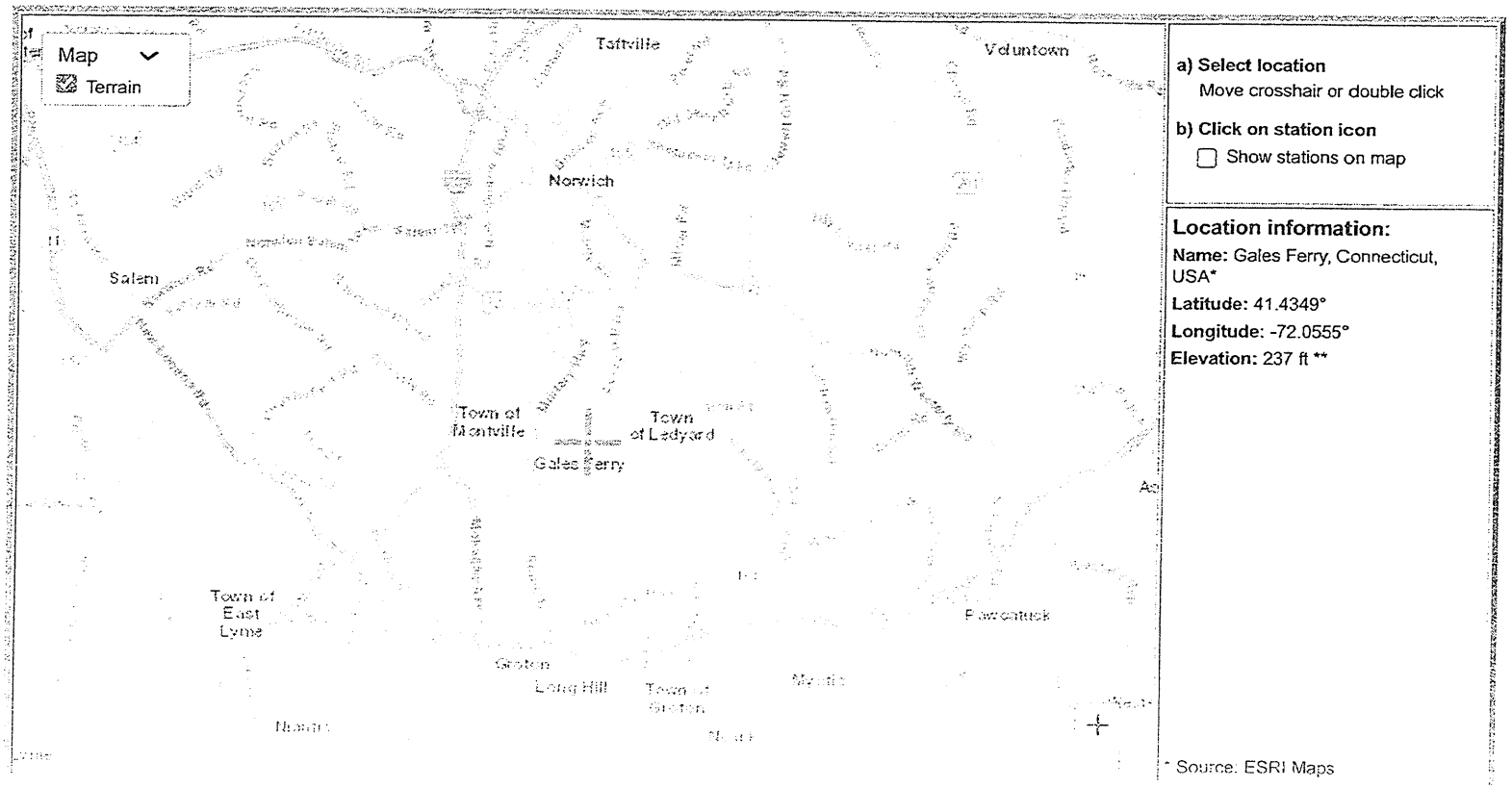
1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: Longitude: Submit

b) By station (list of CT stations): Select station

c) By address Search

2) Use map:



** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 10, Version 3

PF tabular PF graphical Supplementary information

Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.341** (0.265-0.434)	**0.407** (0.316-0.519)	**0.515** (0.398-0.657)	**0.605** (0.466-0.776)	**0.729** (0.544-0.964)	**0.822** (0.601-1.10)	**0.919** (0.654-1.27)	**1.03** (0.693-1.44)	**1.19** (0.771-1.70)	**1.32** (0.836-1.92)
10-min	**0.483** (0.376-0.615)	**0.577** (0.448-0.735)	**0.731** (0.565-0.934)	**0.858** (0.660-1.10)	**1.03** (0.770-1.37)	**1.16** (0.852-1.56)	**1.30** (0.926-1.80)	**1.46** (0.982-2.04)	**1.69** (1.09-2.41)	**1.87** (1.18-2.71)
15-min	**0.569** (0.442-0.724)	**0.679** (0.527-0.865)	**0.859** (0.665-1.10)	**1.01** (0.777-1.29)	**1.22** (0.906-1.61)	**1.37** (1.00-1.84)	**1.53** (1.09-2.12)	**1.72** (1.16-2.39)	**1.98** (1.28-2.83)	**2.20** (1.39-3.19)
30-min	**0.805** (0.626-1.02)	**0.960** (0.746-1.22)	**1.21** (0.939-1.55)	**1.42** (1.10-1.82)	**1.71** (1.28-2.27)	**1.93** (1.41-2.59)	**2.16** (1.54-2.98)	**2.42** (1.63-3.37)	**2.80** (1.81-3.99)	**3.10** (1.96-4.50)
60-min	**1.04** (0.810-1.33)	**1.24** (0.965-1.58)	**1.57** (1.21-2.00)	**1.84** (1.42-2.36)	**2.21** (1.65-2.92)	**2.49** (1.82-3.34)	**2.78** (1.98-3.85)	**3.12** (2.10-4.35)	**3.61** (2.34-5.15)	**4.01** (2.54-5.81)
2-hr	**1.37** (1.07-1.73)	**1.63** (1.28-2.06)	**2.06** (1.61-2.60)	**2.41** (1.87-3.06)	**2.90** (2.18-3.80)	**3.27** (2.41-4.35)	**3.66** (2.62-5.00)	**4.10** (2.77-5.66)	**4.74** (3.08-6.71)	**5.26** (3.35-7.57)
3-hr	**1.59** (1.25-1.99)	**1.89** (1.49-2.37)	**2.38** (1.87-3.00)	**2.79** (2.18-3.53)	**3.36** (2.54-4.38)	**3.78** (2.80-5.01)	**4.23** (3.04-5.76)	**4.74** (3.22-6.52)	**5.48** (3.58-7.73)	**6.09** (3.88-8.72)
6-hr	**2.01** (1.60-2.50)	**2.39** (1.90-2.97)	**3.01** (2.38-3.75)	**3.52** (2.77-4.40)	**4.22** (3.22-5.46)	**4.75** (3.55-6.24)	**5.31** (3.85-7.17)	**5.95** (4.07-8.12)	**6.87** (4.52-9.62)	**7.64** (4.90-10.8)
12-hr	**2.48** (2.00-3.06)	**2.94** (2.36-3.62)	**3.69** (2.96-4.56)	**4.32** (3.44-5.35)	**5.18** (3.98-6.63)	**5.82** (4.38-7.57)	**6.50** (4.74-8.70)	**7.28** (5.01-9.85)	**8.41** (5.56-11.7)	**9.35** (6.02-13.2)
24-hr	**2.90** (2.36-3.54)	**3.46** (2.80-4.22)	**4.36** (3.52-5.33)	**5.11** (4.11-6.28)	**6.15** (4.77-7.81)	**6.92** (5.26-8.94)	**7.74** (5.71-10.3)	**8.70** (6.02-11.7)	**10.1** (6.72-13.9)	**11.3** (7.32-15.8)
2-day	**3.24** (2.66-3.91)	**3.90** (3.19-4.71)	**4.98** (4.06-6.02)	**5.87** (4.76-7.13)	**7.10** (5.56-8.95)	**8.01** (6.14-10.3)	**8.99** (6.70-11.9)	**10.2** (7.08-13.5)	**11.9** (7.96-16.3)	**13.4** (8.73-18.6)
3-day	**3.52** (2.90-4.22)	**4.22** (3.48-5.07)	**5.38** (4.42-6.48)	**6.35** (5.17-7.67)	**7.67** (6.04-9.62)	**8.65** (6.67-11.0)	**9.71** (7.27-12.8)	**11.0** (7.68-14.5)	**12.9** (8.63-17.5)	**14.5** (9.47-20.0)
4-day	**3.77** (3.12-4.51)	**4.51** (3.73-5.40)	**5.73** (4.72-6.87)	**6.74** (5.52-8.11)	**8.13** (6.43-10.1)	**9.16** (7.08-11.6)	**10.3** (7.70-13.5)	**11.6** (8.12-15.3)	**13.6** (9.12-18.4)	**15.3** (9.99-21.0)
7-day	**4.49** (3.75-5.32)	**5.30** (4.42-6.29)	**6.63** (5.50-7.86)	**7.73** (6.36-9.23)	**9.24** (7.35-11.4)	**10.4** (8.06-13.0)	**11.6** (8.71-15.0)	**13.0** (9.15-17.0)	**15.1** (10.2-20.3)	**16.8** (11.1-23.0)
10-day	**5.20** (4.37-6.14)	**6.05** (5.07-7.14)	**7.44** (6.21-8.80)	**8.59** (7.12-10.2)	**10.2** (8.13-12.5)	**11.4** (8.86-14.2)	**12.6** (9.50-16.2)	**14.0** (9.94-18.3)	**16.1** (10.9-21.6)	**17.8** (11.7-24.3)
20-day	**7.39** (6.27-8.63)	**8.30** (7.02-9.69)	**9.78** (8.24-11.5)	**11.0** (9.22-12.9)	**12.7** (10.2-15.4)	**14.0** (11.0-17.2)	**15.3** (11.5-19.3)	**16.7** (11.9-21.5)	**18.5** (12.6-24.5)	**19.9** (13.2-26.9)
30-day	**9.21** (7.86-10.7)	**10.2** (8.65-11.8)	**11.7** (9.92-13.6)	**13.0** (10.9-15.2)	**14.7** (11.9-17.7)	**16.1** (12.7-19.6)	**17.5** (13.1-21.7)	**18.8** (13.5-24.1)	**20.4** (14.0-26.9)	**21.6** (14.3-28.9)
45-day	**11.5** (9.83-13.2)	**12.5** (10.7-14.4)	**14.1** (12.0-16.3)	**15.5** (13.1-18.0)	**17.3** (14.1-20.6)	**18.8** (14.8-22.7)	**20.2** (15.2-24.8)	**21.4** (15.5-27.3)	**22.9** (15.8-30.0)	**23.9** (15.9-31.9)
60-day	**13.3** (11.5-15.3)	**14.4** (12.4-16.5)	**16.1** (13.8-18.6)	**17.5** (14.9-20.3)	**19.5** (15.9-23.1)	**21.1** (16.7-25.3)	**22.6** (17.0-27.6)	**23.8** (17.2-30.2)	**25.2** (17.4-32.9)	**26.0** (17.5-34.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Summary for Subcatchment 1AB: AREA B

[48] Hint: Peak<CiA due to short duration

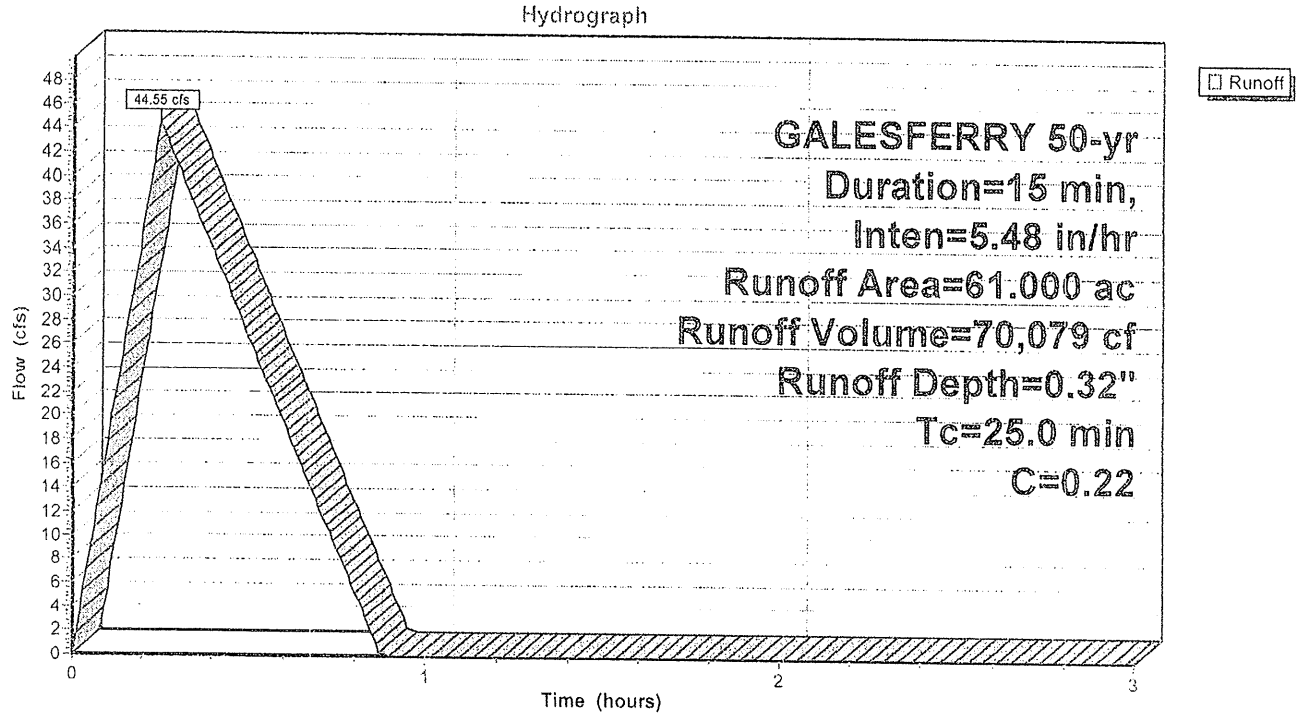
Runoff = 44.55 cfs @ 0.25 hrs, Volume= 70,079 cf, Depth= 0.32"
Routed to Pond 3P : 36" INLET

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
GALESFERRY 50-yr Duration=15 min, Inten=5.48 in/hr

Area (ac)	C	Description	Land Use
61.000	0.22	AREA TO X-ING	Meadow
61.000		100.00% Pervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					Direct Entry, TO BASIN

Subcatchment 1AB: AREA B



Summary for Pond 3P: 36" INLET

[57] Hint: Peaked at 163.21' (Flood elevation advised)

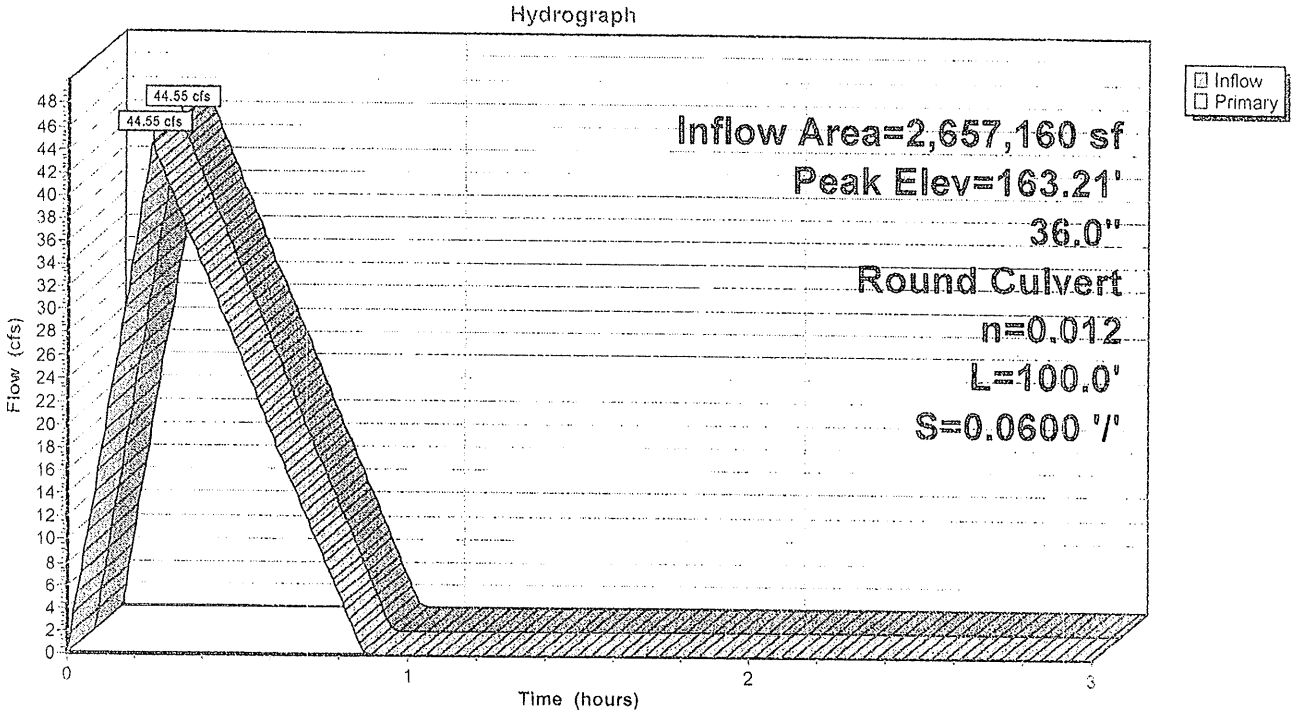
Inflow Area =	2,657,160 sf,	0.00% Impervious,	Inflow Depth =	0.32"	for 50-yr event
Inflow =	44.55 cfs @	0.25 hrs, Volume=	70,079 cf		
Outflow =	44.55 cfs @	0.25 hrs, Volume=	70,079 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	44.55 cfs @	0.25 hrs, Volume=	70,079 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 163.21' @ 0.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**36.0" Round Culvert** L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 154.00' S= 0.0600 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=44.34 cfs @ 0.25 hrs HW=163.20' (Free Discharge)
└**1=Culvert** (Inlet Controls 44.34 cfs @ 6.27 fps)

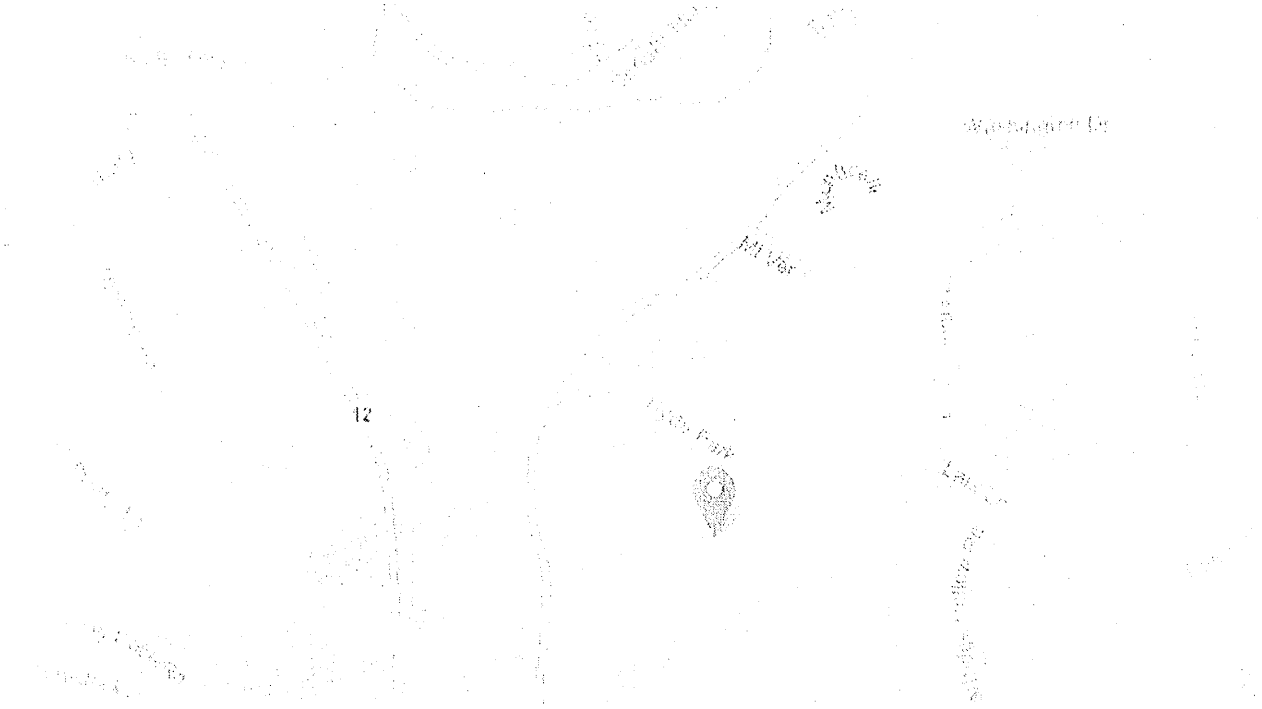
Pond 3P: 36" INLET



CROSS CULVERT
ELLIE ROSE LANE
STA 16+75

StreamStats Report

Region ID: CT
Workspace ID: CT20241015123229026000
Clicked Point (Latitude, Longitude): 41.41357, -72.06568
Time: 2024-10-15 08:32:51 -0400



Collapse All

Basin Characteristics

SEE PG 3 OF 5 FOR 50-YR FLOW

61 ACRES

Parameter Code	Parameter Description	Value	Unit
CRSDFT	Percentage of area of coarse-grained stratified drift	0	percent
DRNAREA	Area that drains to a point on a stream	0.0949	square miles
ELEV	Mean Basin Elevation	258	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.74	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.05	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.82	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.12	inches

Parameter Code	Parameter Description	Value	Unit
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.17	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.23	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.93	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.24	inches
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.0656	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0949	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0949	square miles	0.69	325
I24H2Y	24 Hour 2 Year Precipitation	3.17	inches	2.77	3.32
SSURGOCCDD	Percent soil type C or D from SSURGO	0.0656	percent	0.118	0.945
I24H5Y	24 Hour 5 Year Precipitation	4.24	inches	4	4.7
I24H10Y	24 Hour 10 Year Precipitation	5.05	inches	4.86	5.79
I24H25Y	24 Hour 25 Year Precipitation	6.12	inches	5.99	7.22
I24H50Y	24 Hour 50 Year Precipitation	6.93	inches	6.81	8.3
I24H100Y	24 Hour 100 Year Precipitation	7.74	inches	7.62	9.38
I24H200Y	24 Hour 200 YearPrecipitation	8.82	inches	8.7	11.22
I24H500Y	24 Hour 500 Year Precipitation	10.23	inches	10.1	13.64

Peak-Flow Statistics Disclaimers [Statewide DA only SIR 2020 5054]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

Statistic	Value	Unit
Drainage Area Only 50-percent AEP flood	10.3	ft^3/s
Drainage Area Only 20-percent AEP flood	18.5	ft^3/s
Drainage Area Only 10-percent AEP flood	25.4	ft^3/s
Drainage Area Only 4-percent AEP flood	35.6	ft^3/s
Drainage Area Only 2-percent AEP flood	44.2	ft^3/s
Drainage Area Only 1-percent AEP flood	53.5	ft^3/s
Drainage Area Only 0.5-percent AEP flood	63.9	ft^3/s
Drainage Area Only 0.2-percent AEP flood	79.2	ft^3/s

Peak-Flow Statistics Disclaimers [Statewide Multiparameter SIR 2020 5054]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

Statistic	Value	Unit
50-percent AEP flood	5.38	ft^3/s
20-percent AEP flood	8.85	ft^3/s
10-percent AEP flood	11.6	ft^3/s
4-percent AEP flood	15.9	ft^3/s
2-percent AEP flood	19.5	ft^3/s
1-percent AEP flood	23.5	ft^3/s
0.5-percent AEP flood	28.7	ft^3/s
0.2-percent AEP flood	36.3	ft^3/s

Peak-Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Drainage Area Only 50-percent AEP flood	10.3	ft^3/s
Drainage Area Only 20-percent AEP flood	18.5	ft^3/s
Drainage Area Only 10-percent AEP flood	25.4	ft^3/s
Drainage Area Only 4-percent AEP flood	35.6	ft^3/s
Drainage Area Only 2-percent AEP flood	44.2	ft^3/s
Drainage Area Only 1-percent AEP flood	53.5	ft^3/s
Drainage Area Only 0.5-percent AEP flood	63.9	ft^3/s
Drainage Area Only 0.2-percent AEP flood	79.2	ft^3/s
50-percent AEP flood	5.38	ft^3/s

Statistic	Value	Unit
20-percent AEP flood	8.85	ft^3/s
10-percent AEP flood	11.6	ft^3/s
4-percent AEP flood	15.9	ft^3/s
2-percent AEP flood	19.5	ft^3/s
1-percent AEP flood	23.5	ft^3/s
0.5-percent AEP flood	28.7	ft^3/s
0.2-percent AEP flood	36.3	ft^3/s

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0949	square miles	0.92	150
ELEV	Mean Basin Elevation	258	feet	168	1287
CRSDFT	Percent Coarse Stratified Drift	0	percent	0.1	55.1

Flow-Duration Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration	0.248	ft^3/s
99 Percent Duration	0.0000495	ft^3/s

Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Maximum Probable Flood Statistics

Maximum Probable Flood Statistics Parameters [Crippen Bue Region 2]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0949	square miles	0.1	3000

Maximum Probable Flood Statistics Disclaimers [Crippen Bue Region 2]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Maximum Probable Flood Statistics Flow Report [Crippen Bue Region 2]

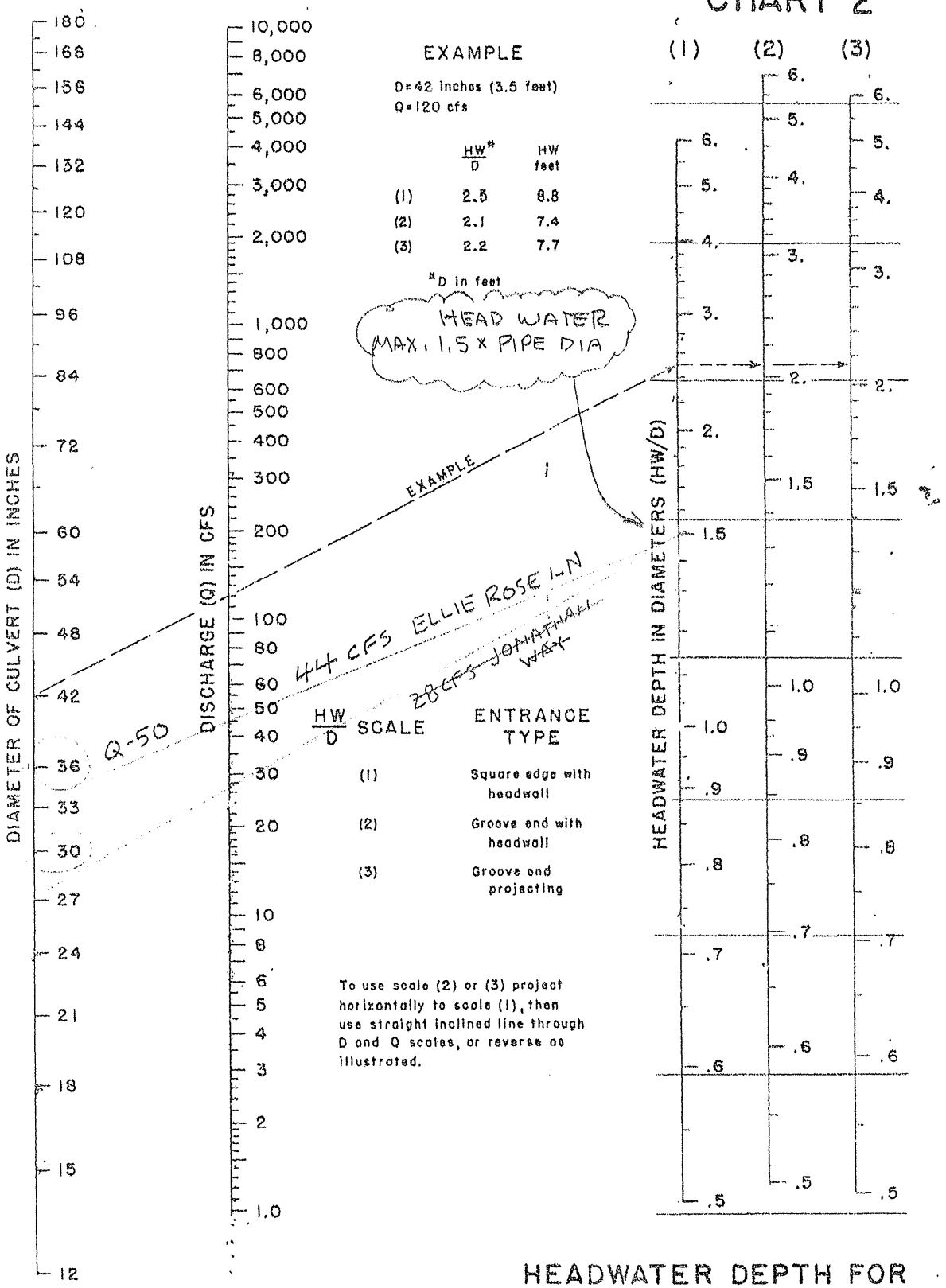
Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	1020	ft^3/s

Maximum Probable Flood Statistics Citations

Crippen, J.R. and Bue, Conrad D.1977, Maximum Floodflows in the Conterminous United States, Geological Survey Water-Supply Paper 1887, 52p. (https://pubs.usgs.gov/wsp/1887/report.pdf)

Application Version: 4.24.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

CHART 2

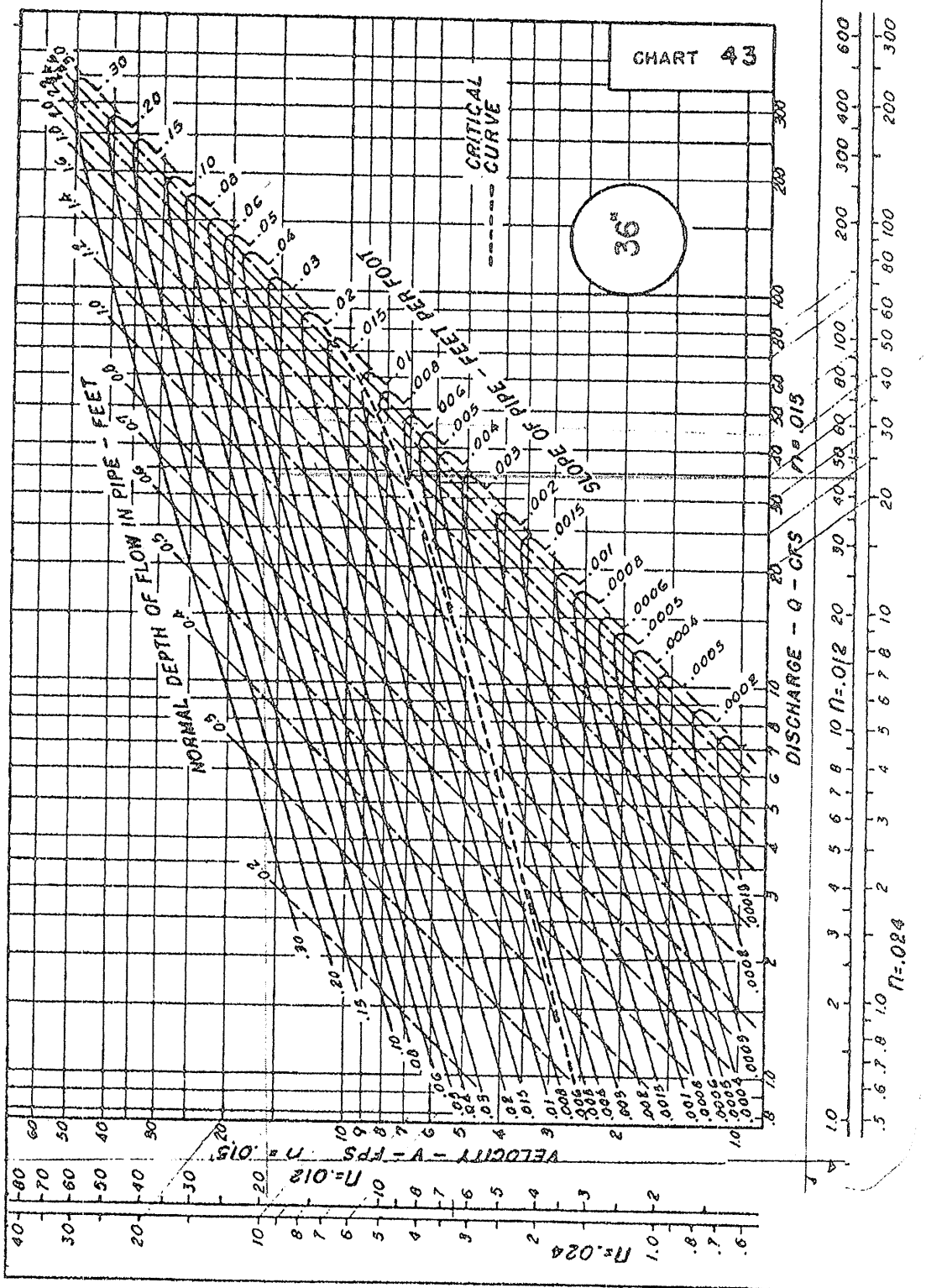


HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN 1963

PIPE FLOW CHART
15-INCH DIAMETER



PIPE FLOW CHART
36-INCH DIAMETER

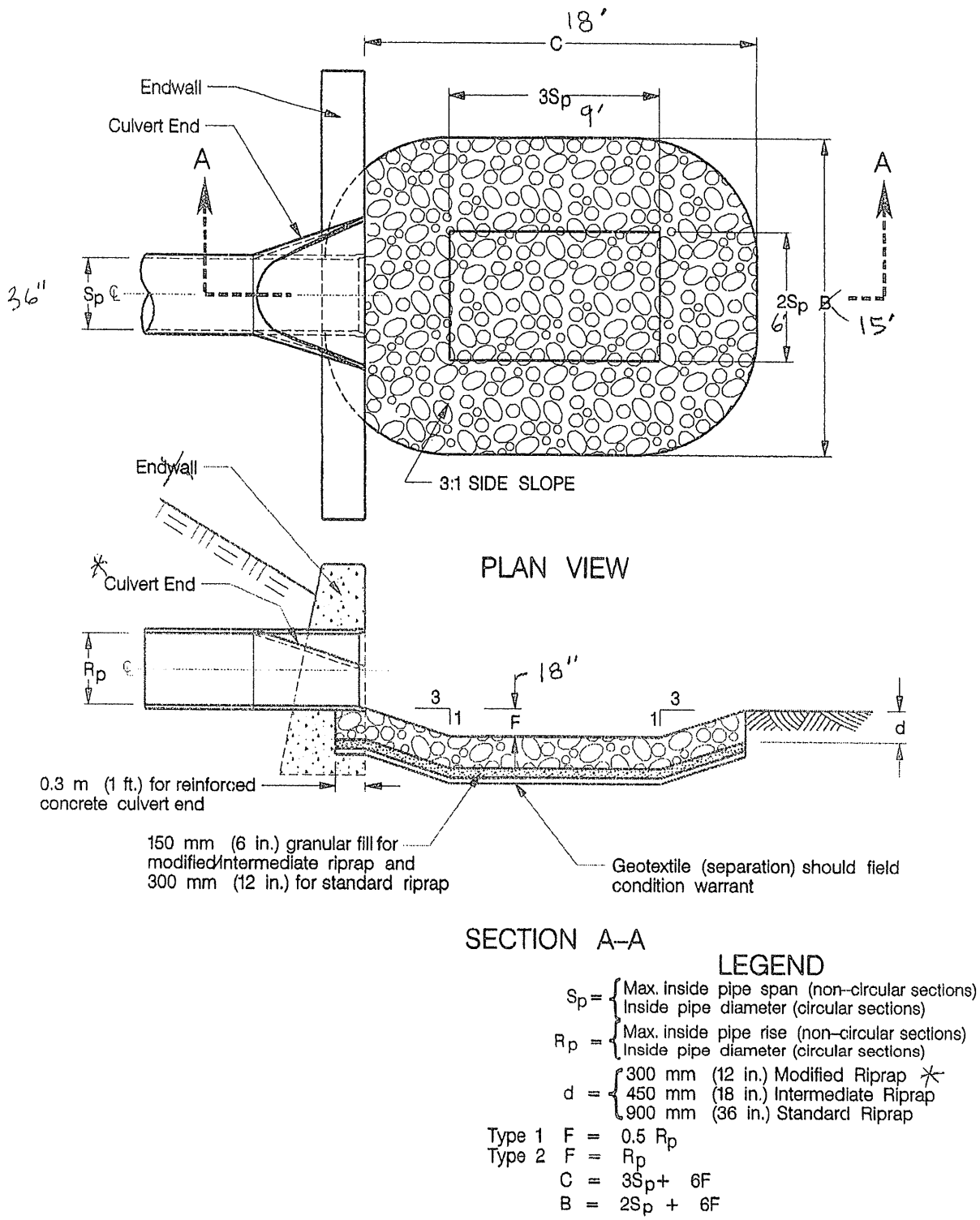


Figure 11-15 Preformed Scour Hole Type 1 and Type 2

19

OUTLET PROTECTION
OUTLET VELOCITY > 14 feet/sec or Length of Apron exceeds limits shown on Tables 11-12.1 and 11-13.1

Preformed Scour Hole										
(See Figure 11-15)	PIPE DIAMETER OR SPAN (in)									
	12	15	18	24	30	36	42	48	54	60
Type 1										
B	5	6	8	10	13	15	18	20	23	25
C	6	8	9	12	15	18	21	24	27	30
d	MODIFIED Depends on riprap type(see Figure 11-15)									
$2S_p$	2.0	2.6	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
$3S_p$	3.0	3.9	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0
$F = 0.5\ S_p$	0.5	0.625	0.75	1	1.25	1.5	1.75	2	2.25	2.5
Type 2										
B	8	10	12	16	20	24	28	32	36	40
C	9	11	14	18	23	27	32	36	41	45
d	Depends on riprap size (see Figure 11-15)									
$2S_p$	2.0	2.6	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
$3S_p$	3.0	3.9	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0
$F = S_p$	1.0	1.3	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0

Table 11-14.1 - Dimensions of Preformed Scour Hole (Feet)

Empirical Preformed Scour Hole Equations:

Type 1: Scour Hole Depression = one-half pipe rise, m (ft)

$d_{50} = (0.0276\ R_p^2\ /TW)\ (Q/R_p^{2.5})^{1.333}$ ($d_{50} = (0.0125 R_p^2/TW)\ (Q/R_p^{2.5})^{1.333}$) (11.35)

$= [(0.0125)(3^2)/1]\ [(44/3^{2.5})\ 1.333$ 0.1125 2.823 $= 0.22'$

Type 2: Scour Hole Depression = full pipe rise, m (ft)

$d_{50} = (0.0181\ R_p^2\ /TW)\ (Q/R_p^{2.5})^{1.333}$ ($d_{50} = (0.0082 R_p^2/TW)\ (Q/R_p^{2.5})^{1.333}$) (11.36)

44 cfs

d_{50} = median stone size required, m (ft)

For variables S_p, R_p, TW and Q, see Section 11.13.5.

R = 3'
Q = 45 cfs

Type 1 and 2 preformed scour hole dimensions (See Figure 11-15)

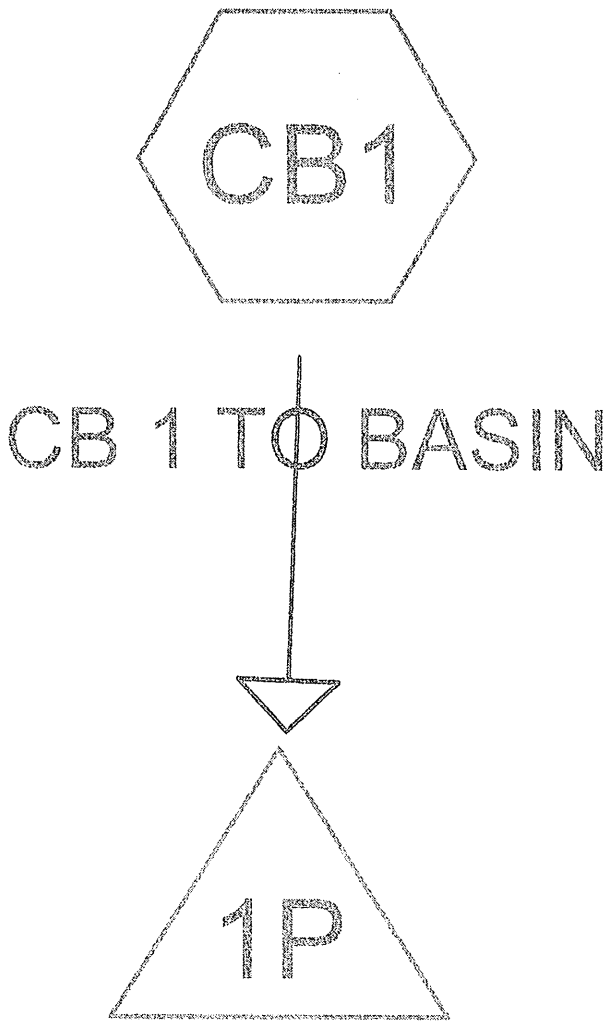
$C = 3S_p + 6F$	Basin Length m (ft)	
$B = 2S_p + 6F$	Basin Inlet and Outlet Width m (ft)	(11.37)
$F = 0.5R_p$ (Type 1) or R_p (Type 2)	Basin Depression m (ft)	

Table 11-14 solves the above set of equations for Type 1 and 2 preformed scour holes for various pipe sizes.

The type of riprap required is as follows:

Modified	$d_{50} < 0.13$m (0.42 ft)
Intermediate	0.13m (0.42 ft) $< d_{50} <$ 0.20m (0.67 ft)
Standard	0.20m (0.67 ft) $< d_{50} <$ 0.38m (1.25 ft)
Special Design	0.38m (1.25 ft) $< d_{50}$

Reference: Report No. FHWA-RD-75-508 ("Culvert Outlet Protection Design: Computer Program Documentation")



FROM CB1

Subcat Reach Pond Link

Routing Diagram for BASIN FROM CB1
Prepared by LBM Engineering LLC, Printed 6/19/2026
HydroCAD® 10.20-9a s/n 09192 © 2026 HydroCAD Software Solutions LLC

Summary for Subcatchment CB1: CB 1 TO BASIN

Runoff = 0.66 cfs @ 0.17 hrs, Volume= 696 cf, Depth= 0.96"
Routed to Pond 1P : FROM CB1

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 2-yr Duration=10 min, Inten=3.46 in/hr

Area (ac)	C	Description	Land Use
0.200	0.95	AREA TO BASIN	Pavement
0.200		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 1P: FROM CB1

Inflow Area = 8,712 sf,100.00% Impervious, Inflow Depth = 0.96" for 2-yr event
Inflow = 0.66 cfs @ 0.17 hrs, Volume= 696 cf
Outflow = 0.21 cfs @ 0.45 hrs, Volume= 693 cf, Atten= 68%, Lag= 16.7 min
Primary = 0.21 cfs @ 0.45 hrs, Volume= 693 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 166.29' @ 0.45 hrs Surf.Area= 410 sf Storage= 406 cf

Plug-Flow detention time= 23.1 min calculated for 693 cf (100% of inflow)
Center-of-Mass det. time= 23.0 min (38.0 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	1,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	225	0	0
166.00	361	293	293
167.00	529	445	738
168.00	729	629	1,367

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**3.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior. Flow Area= 0.05 sf

Primary OutFlow Max=0.21 cfs @ 0.45 hrs HW=166.29' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.21 cfs @ 4.36 fps)

Summary for Subcatchment CB1: CB 1 TO BASIN

Runoff = 0.98 cfs @ 0.17 hrs, Volume= 1,034 cf, Depth= 1.42"
Routed to Pond 1P : FROM CB1

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 10-yr Duration=10 min, Inten=5.14 in/hr

Area (ac)	C	Description	Land Use
0.200	0.95	AREA TO BASIN	Pavement
0.200		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 1P: FROM CB1

Inflow Area = 8,712 sf,100.00% Impervious, Inflow Depth = 1.42" for 10-yr event
Inflow = 0.98 cfs @ 0.17 hrs, Volume= 1,034 cf
Outflow = 0.25 cfs @ 0.48 hrs, Volume= 1,030 cf, Atten= 74%, Lag= 18.3 min
Primary = 0.25 cfs @ 0.48 hrs, Volume= 1,030 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 166.88' @ 0.48 hrs Surf.Area= 509 sf Storage= 675 cf

Plug-Flow detention time= 30.1 min calculated for 1,027 cf (99% of inflow)
Center-of-Mass det. time= 30.4 min (45.4 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	1,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	225	0	0
166.00	361	293	293
167.00	529	445	738
168.00	729	629	1,367

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**3.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.05 sf

Primary OutFlow Max=0.25 cfs @ 0.48 hrs HW=166.88' (Free Discharge)
↑—1=**Culvert** (Barrel Controls 0.25 cfs @ 5.17 fps)

Summary for Subcatchment CB1: CB 1 TO BASIN

Runoff = 1.17 cfs @ 0.17 hrs, Volume= 1,243 cf, Depth= 1.71"
Routed to Pond 1P : FROM CB1

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 25-yr Duration=10 min, Inten=6.18 in/hr

Area (ac)	C	Description	Land Use
0.200	0.95	AREA TO BASIN	Pavement
0.200		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 1P: FROM CB1

Inflow Area = 8,712 sf,100.00% Impervious, Inflow Depth = 1.71" for 25-yr event
Inflow = 1.17 cfs @ 0.17 hrs, Volume= 1,243 cf
Outflow = 0.27 cfs @ 0.49 hrs, Volume= 1,238 cf, Atten= 77%, Lag= 19 0 min
Primary = 0.27 cfs @ 0.49 hrs, Volume= 1,238 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 167.20' @ 0.49 hrs Surf.Area= 570 sf Storage= 850 cf

Plug-Flow detention time= 34.5 min calculated for 1,234 cf (99% of inflow)
Center-of-Mass det. time= 34.7 min (49.7 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	1,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	225	0	0
166.00	361	293	293
167.00	529	445	738
168.00	729	629	1,367

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**3.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0 05 sf

Primary OutFlow Max=0.27 cfs @ 0.49 hrs HW=167.20' (Free Discharge)
└1=**Culvert** (Barrel Controls 0.27 cfs @ 5.56 fps)

Summary for Subcatchment CB1: CB 1 TO BASIN

Runoff = 1.48 cfs @ 0.17 hrs, Volume= 1,569 cf, Depth= 2.16"
Routed to Pond 1P : FROM CB1

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 100-yr Duration=10 min, Inten=7.80 in/hr

Area (ac)	C	Description	Land Use
0.200	0.95	AREA TO BASIN	Pavement
0.200		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 1P: FROM CB1

Inflow Area = 8,712 sf,100.00% Impervious, Inflow Depth = 2.16" for 100-yr event
Inflow = 1.48 cfs @ 0.17 hrs, Volume= 1,569 cf
Outflow = 0.30 cfs @ 0.50 hrs, Volume= 1,563 cf, Atten= 80%, Lag= 19.8 min
Primary = 0.30 cfs @ 0.50 hrs, Volume= 1,563 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 167.66' @ 0.50 hrs Surf.Area= 661 sf Storage= 1,131 cf

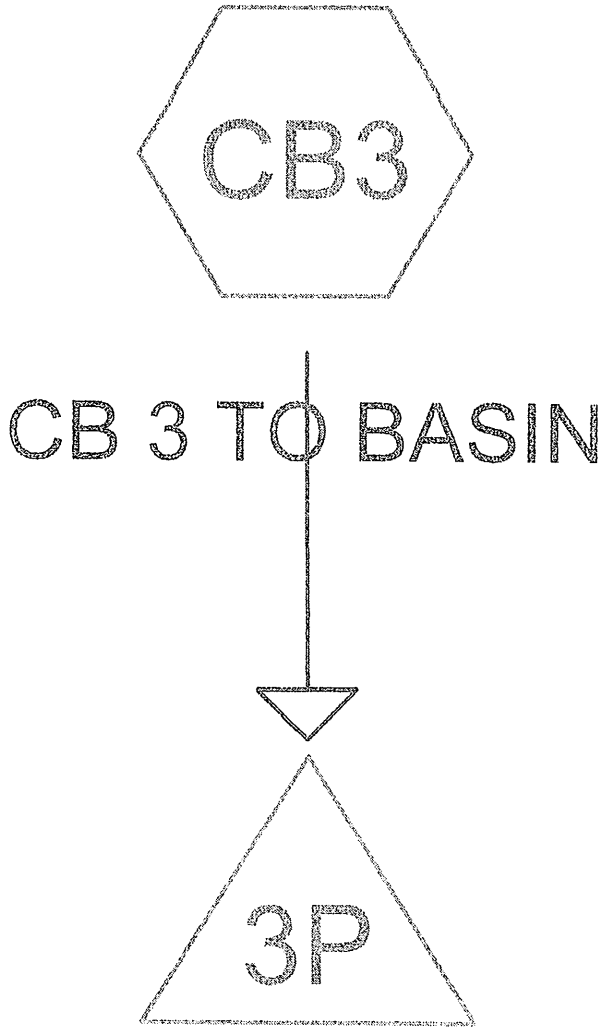
Plug-Flow detention time= 41.0 min calculated for 1,558 cf (99% of inflow)
Center-of-Mass det. time= 41.2 min (56.2 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	1,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	225	0	0
166.00	361	293	293
167.00	529	445	738
168.00	729	629	1,367

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**3.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.05 sf

Primary OutFlow Max=0.30 cfs @ 0.50 hrs HW=167.66' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.30 cfs @ 6.08 fps)



FROM CB3

Subcat Reach Pond Link

Routing Diagram for BASIN FROM CB3
Prepared by LBM Engineering LLC, Printed 6/19/2026
HydroCAD® 10.20-9a s/n 09192 © 2026 HydroCAD Software Solutions LLC

Summary for Subcatchment CB3: CB 3 TO BASIN

Runoff = 1.51 cfs @ 0.17 hrs, Volume= 1,601 cf, Depth= 0.96"
Routed to Pond 3P : FROM CB3

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 2-yr Duration=10 min, Inten=3.46 in/hr

Area (ac)	C	Description	Land Use
0.460	0.95	AREA TO BASIN	Pavement
0.460		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 3P: FROM CB3

Inflow Area = 20,038 sf,100.00% Impervious, Inflow Depth = 0.96" for 2-yr event
Inflow = 1.51 cfs @ 0.17 hrs, Volume= 1,601 cf
Outflow = 0.43 cfs @ 0.47 hrs, Volume= 1,577 cf, Atten= 72%, Lag= 17.8 min
Primary = 0.43 cfs @ 0.47 hrs, Volume= 1,577 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 153.35' @ 0.47 hrs Surf.Area= 927 sf Storage= 1,038 cf

Plug-Flow detention time= 30.5 min calculated for 1,577 cf (98% of inflow)
Center-of-Mass det. time= 30.2 min (45.2 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	152.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.00	625	0	0
153.00	841	733	733
154.00	1,089	965	1,698
155.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 152.00' / 151.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.43 cfs @ 0.47 hrs HW=153.35' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.43 cfs @ 4.88 fps)

Summary for Subcatchment CB3: CB 3 TO BASIN

Runoff = 2.25 cfs @ 0.17 hrs, Volume= 2,379 cf, Depth= 1.42"
Routed to Pond 3P : FROM CB3

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 10-yr Duration=10 min, Inten=5.14 in/hr

Area (ac)	C	Description	Land Use
0.460	0.95	AREA TO BASIN	Pavement
0.460		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 3P: FROM CB3

Inflow Area = 20,038 sf,100.00% Impervious, Inflow Depth = 1.42" for 10-yr event
Inflow = 2.25 cfs @ 0.17 hrs, Volume= 2,379 cf
Outflow = 0.51 cfs @ 0.49 hrs, Volume= 2,348 cf, Atten= 77%, Lag= 19.1 min
Primary = 0.51 cfs @ 0.49 hrs, Volume= 2,348 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 153.98' @ 0.49 hrs Surf.Area= 1,083 sf Storage= 1,672 cf

Plug-Flow detention time= 37.6 min calculated for 2,340 cf (98% of inflow)
Center-of-Mass det. time= 37.7 min (52.7 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	152.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.00	625	0	0
153.00	841	733	733
154.00	1,089	965	1,698
155.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**4.0" Round Culvert**
			L= 20.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 152.00' / 151.60' S= 0.0200 '/' Cc= 0.900
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.51 cfs @ 0.49 hrs HW=153.98' (Free Discharge)
↑—1=**Culvert** (Barrel Controls 0.51 cfs @ 5.87 fps)

Summary for Subcatchment CB3: CB 3 TO BASIN

Runoff = 2.70 cfs @ 0.17 hrs, Volume= 2,859 cf, Depth= 1.71"
Routed to Pond 3P : FROM CB3

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 25-yr Duration=10 min, Inten=6.18 in/hr

Area (ac)	C	Description	Land Use
0.460	0.95	AREA TO BASIN	Pavement
0.460		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 3P: FROM CB3

Inflow Area = 20,038 sf,100.00% Impervious, Inflow Depth = 1.71" for 25-yr event
Inflow = 2.70 cfs @ 0.17 hrs, Volume= 2,859 cf
Outflow = 0.56 cfs @ 0.50 hrs, Volume= 2,823 cf, Atten= 79%, Lag= 19.7 min
Primary = 0.56 cfs @ 0.50 hrs, Volume= 2,823 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 154.34' @ 0.50 hrs Surf.Area= 1,183 sf Storage= 2,080 cf

Plug-Flow detention time= 42.4 min calculated for 2,823 cf (99% of inflow)
Center-of-Mass det. time= 42.2 min (57.2 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	152.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.00	625	0	0
153.00	841	733	733
154.00	1,089	965	1,698
155.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 152.00' / 151.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.56 cfs @ 0.50 hrs HW=154.34' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.56 cfs @ 6.37 fps)

Summary for Subcatchment CB3: CB 3 TO BASIN

Runoff = 3.41 cfs @ 0.17 hrs, Volume= 3,608 cf, Depth= 2.16"
Routed to Pond 3P : FROM CB3

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 100-yr Duration=10 min, Inten=7.80 in/hr

Area (ac)	C	Description	Land Use
0.460	0.95	AREA TO BASIN	Pavement
0.460		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 3P: FROM CB3

Inflow Area = 20,038 sf,100.00% Impervious, Inflow Depth = 2.16" for 100-yr event
Inflow = 3.41 cfs @ 0.17 hrs, Volume= 3,608 cf
Outflow = 0.61 cfs @ 0.51 hrs, Volume= 3,560 cf, Atten= 82%, Lag= 20.3 min
Primary = 0.61 cfs @ 0.51 hrs, Volume= 3,560 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 154.86' @ 0.51 hrs Surf.Area= 1,329 sf Storage= 2,732 cf

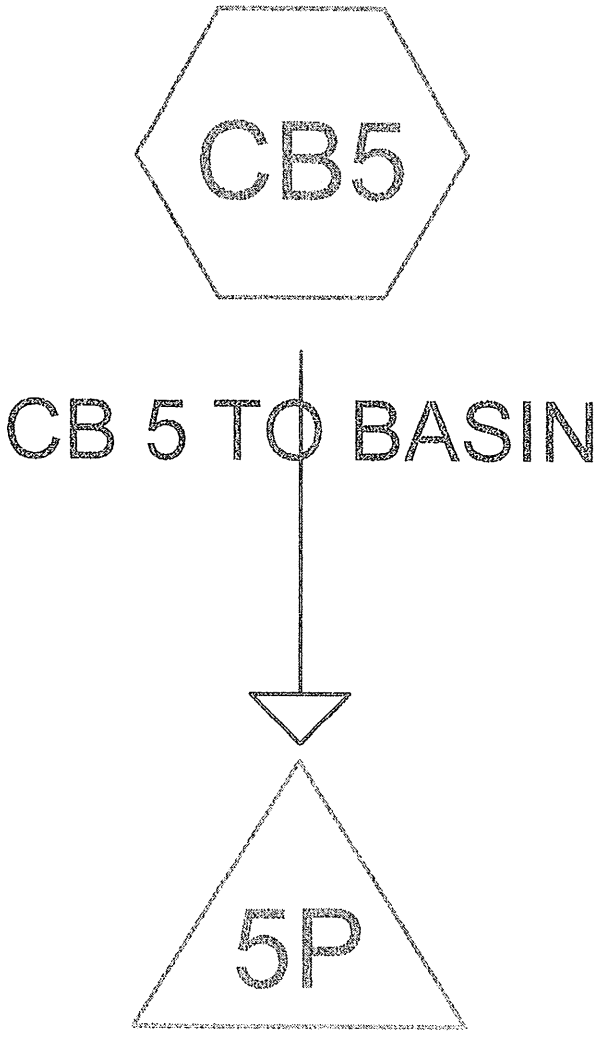
Plug-Flow detention time= 48.7 min calculated for 3,548 cf (98% of inflow)
Center-of-Mass det. time= 48.8 min (63.8 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	152.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.00	625	0	0
153.00	841	733	733
154.00	1,089	965	1,698
155.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 152.00' / 151.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.61 cfs @ 0.51 hrs HW=154.86' (Free Discharge)
↑—1=**Culvert** (Barrel Controls 0.61 cfs @ 7.02 fps)



FROM CB5

Subcat Reach Pond Link

Routing Diagram for BASIN FROM CB5
Prepared by LBM Engineering LLC. Printed 6/19/2026
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Summary for Subcatchment CB5: CB 5 TO BASIN

Runoff = 1.15 cfs @ 0.17 hrs, Volume= 1,218 cf, Depth= 0.96"
Routed to Pond 5P : FROM CB5

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 2-yr Duration=10 min, Inten=3.46 in/hr

Area (ac)	C	Description	Land Use
0.350	0.95	AREA TO BASIN	Pavement
0.350		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 5P: FROM CB5

Inflow Area = 15,246 sf,100.00% Impervious, Inflow Depth = 0.96" for 2-yr event
Inflow = 1.15 cfs @ 0.17 hrs, Volume= 1,218 cf
Outflow = 0.37 cfs @ 0.45 hrs, Volume= 1,197 cf, Atten= 68%, Lag= 16.7 min
Primary = 0.37 cfs @ 0.45 hrs, Volume= 1,197 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 162.01' @ 0.45 hrs Surf.Area= 844 sf Storage= 745 cf

Plug-Flow detention time= 26.5 min calculated for 1,193 cf (98% of inflow)
Center-of-Mass det. time= 26.6 min (41.6 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	161.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
161.00	625	0	0
162.00	841	733	733
163.00	1,089	965	1,698
164.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.37 cfs @ 0.45 hrs HW=162.01' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.37 cfs @ 4.27 fps)

Summary for Subcatchment CB5: CB 5 TO BASIN

Runoff = 1.71 cfs @ 0.17 hrs, Volume= 1,810 cf, Depth= 1.42"
Routed to Pond 5P : FROM CB5

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 10-yr Duration=10 min, Inten=5.14 in/hr

Area (ac)	C	Description	Land Use
0.350	0.95	AREA TO BASIN	Pavement
0.350		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 5P: FROM CB5

Inflow Area = 15,246 sf,100.00% Impervious, Inflow Depth = 1.42" for 10-yr event
Inflow = 1.71 cfs @ 0.17 hrs, Volume= 1,810 cf
Outflow = 0.45 cfs @ 0.47 hrs, Volume= 1,784 cf, Atten= 74%, Lag= 18.2 min
Primary = 0.45 cfs @ 0.47 hrs, Volume= 1,784 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 162.52' @ 0.47 hrs Surf.Area= 970 sf Storage= 1,204 cf

Plug-Flow detention time= 32.5 min calculated for 1,784 cf (99% of inflow)
Center-of-Mass det. time= 32.3 min (47.3 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	161.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
161.00	625	0	0
162.00	841	733	733
163.00	1,089	965	1,698
164.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.45 cfs @ 0.47 hrs HW=162.52' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.45 cfs @ 5.18 fps)

Summary for Subcatchment CB5: CB 5 TO BASIN

Runoff = 2.06 cfs @ 0.17 hrs, Volume= 2,175 cf, Depth= 1.71"
Routed to Pond 5P : FROM CB5

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 25-yr Duration=10 min, Inten=6.18 in/hr

Area (ac)	C	Description	Land Use
0.350	0.95	AREA TO BASIN	Pavement
0.350		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 5P: FROM CB5

Inflow Area = 15,246 sf,100.00% Impervious, Inflow Depth = 1.71" for 25-yr event
Inflow = 2.06 cfs @ 0.17 hrs, Volume= 2,175 cf
Outflow = 0.49 cfs @ 0.48 hrs, Volume= 2,146 cf, Atten= 76%, Lag= 18.8 min
Primary = 0.49 cfs @ 0.48 hrs, Volume= 2,146 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 162.82' @ 0.48 hrs Surf.Area= 1,044 sf Storage= 1,503 cf

Plug-Flow detention time= 35.7 min calculated for 2,139 cf (98% of inflow)
Center-of-Mass det. time= 35.8 min (50.8 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	161.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
161.00	625	0	0
162.00	841	733	733
163.00	1,089	965	1,698
164.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.49 cfs @ 0.48 hrs HW=162.82' (Free Discharge)
↳**1=Culvert** (Barrel Controls 0.49 cfs @ 5.64 fps)

Summary for Subcatchment CB5: CB 5 TO BASIN

Runoff = 2.59 cfs @ 0.17 hrs, Volume= 2,745 cf, Depth= 2.16"
Routed to Pond 5P : FROM CB5

Runoff by Rational method, Rise/Fall=1.0/2.5 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Gales Ferry 2 100-yr Duration=10 min, Inten=7.80 in/hr

Area (ac)	C	Description	Land Use
0.350	0.95	AREA TO BASIN	Pavement
0.350		100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, TO BASIN**

Summary for Pond 5P: FROM CB5

Inflow Area = 15,246 sf,100.00% Impervious, Inflow Depth = 2.16" for 100-yr event
Inflow = 2.59 cfs @ 0.17 hrs, Volume= 2,745 cf
Outflow = 0.55 cfs @ 0.50 hrs, Volume= 2,711 cf, Atten= 79%, Lag= 19.5 min
Primary = 0.55 cfs @ 0.50 hrs, Volume= 2,711 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 163.25' @ 0.50 hrs Surf.Area= 1,160 sf Storage= 1,983 cf

Plug-Flow detention time= 41.4 min calculated for 2,711 cf (99% of inflow)
Center-of-Mass det. time= 41.1 min (56.1 - 15.0)

Volume	Invert	Avail.Storage	Storage Description
#1	161.00'	2,927 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
161.00	625	0	0
162.00	841	733	733
163.00	1,089	965	1,698
164.00	1,369	1,229	2,927

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**4.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.55 cfs @ 0.50 hrs HW=163.25' (Free Discharge)
↑—1=**Culvert** (Barrel Controls 0.55 cfs @ 6.26 fps)

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JRM	01/2025	11 HALLY LANE		
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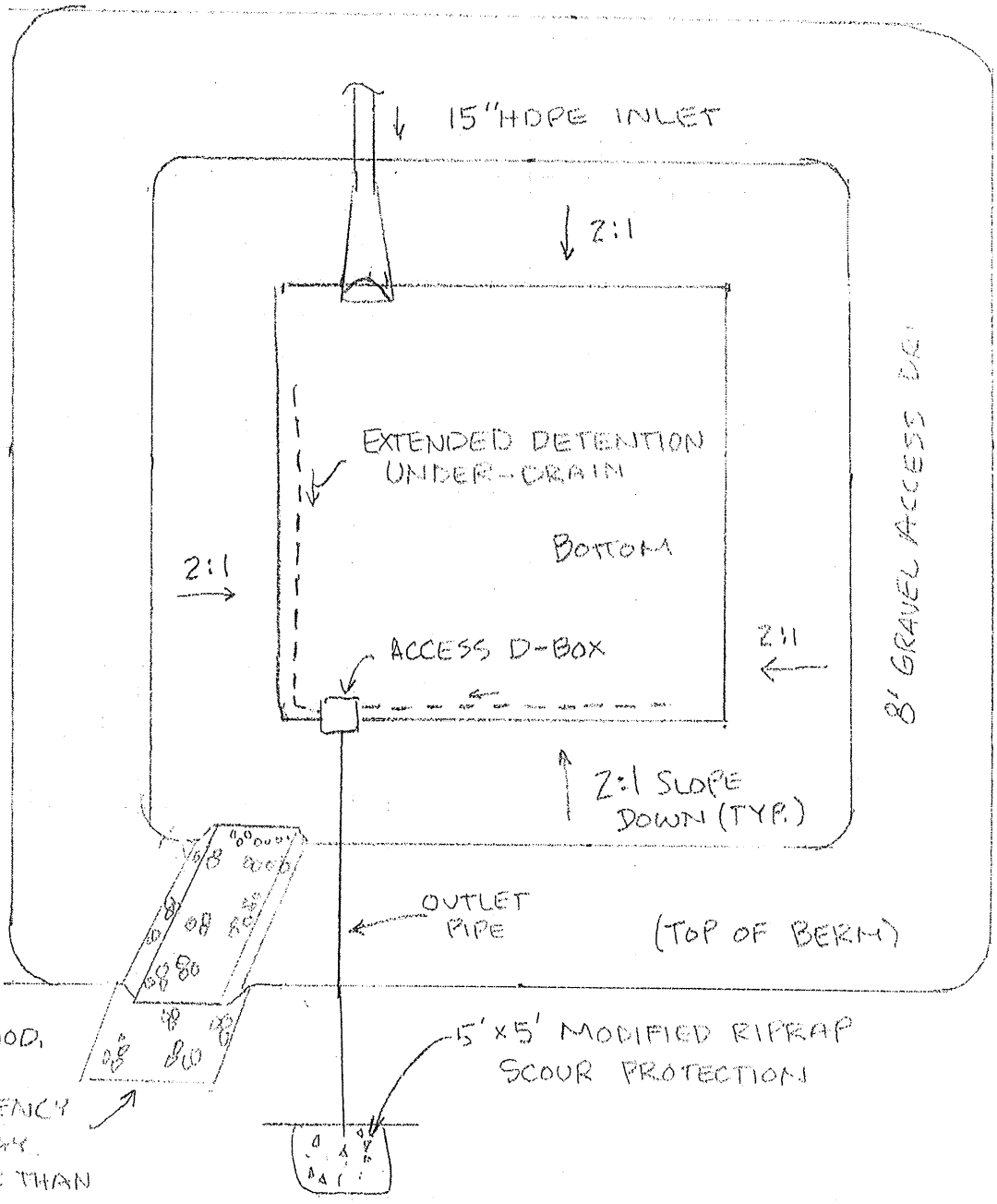

DETAIL DETENTION / WATER QUALITY BASIN

(NOT TO SCALE)