HALEY & ALDRICH, INC.
6500 Rockside Road
Suite 200
Cleveland, OH 44131
216.739.0555

MEMORANDUM

24 February 2023
File No. 129342-046

SUBJECT: Run-on and Run-off Control System Plan – Update – Q1 2023
Associated Electric Cooperative, Inc.
New Madrid Power Plant – Utility Waste Landfill
Marston, MO

Associated Electric Cooperative, Inc. (AECI) operates the coal-fired New Madrid Power Plant (NMPP), including an active coal combustion residuals (CCR) Utility Waste Landfill (UWL, Unit), located near Marston, Missouri. The UWL is permitted through the Missouri Department of Natural Resources (MDNR) and is planned to continue receiving CCR generated by the NMPP plant into the future. Haley & Aldrich, Inc. (Haley & Aldrich) was retained by AECI to update this Run-on and Run-off Control Plan to comply with the requirements of 40 C.F.R. §257.81 *Run-on and run-off controls for CCR landfills*, specifically 40 C.F.R. §257.81(c) for the Run-on and Run-off Control System Plan (Plan) of the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities, 40 C.F.R. Part 257 (CCR Rule) effective 19 October 2015, including subsequent revisions.

The UWL is located approximately 1.7 miles southwest of the NMPP, in New Madrid County, Missouri. As of the date of this updated Plan, the northwest half of Cell 1 (Phase I) has received a final cover system and associated (non-contact) stormwater runoff has been redirected to a new NPDES permitted outfall. The southeast half of Cell 1 and all of Cell 2 (Phase III) remain active. The existing conditions of the UWL have been reviewed and associated stormwater modeling and analysis performed to meet the requirements of CCR Rule Section 40 C.F.R. §257.81 as described in the sections below.

Haley & Aldrich analyzed the existing stormwater run-on and run-off for the UWL for the 24-hour, 25-year storm event using the stormwater modeling software HydroCAD (version 10.20). The rainfall data for the site analysis was obtained from the NOAA Precipitation Frequency Data Server (PFDS) – Atlas 14, Volume 8, Version 2. The rainfall depth for the 24-hour, 25-year storm event is 6.62 inches. The Soil Conservation Service (SCS) Type-II 24-hour rainfall distribution pattern was used based on site location. The existing conditions and drainage areas for the Unit are shown in **Figure 1**. **Appendix A** includes the rainfall data used in the analysis and the results of the HydroCAD model are included in **Appendix B.**

40 C.F.R. §257.81(a): The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must design, construct, operate, and maintain:

40 C.F.R. §257.81(a)(1): A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm.

The UWL is surrounded by relatively flat agricultural fields, generally draining from the northeast to the southwest via two shallow field drainage ditches. The UWL is constructed with a

perimeter berm above existing grades, which also serves as an access road and is roughly 6 feet in height when measured to the existing topography outside of the UWL. This prevents stormwater run-on from outside the landfill footprint flowing onto the active and covered portions of the UWL – i.e., it is not feasible for the 24-hour, 25-year storm event to flow over the berm and onto the active portions of the UWL. Areas of the landfill which have received final cover are sloped away from the active portions and delineated by a Final Cover Separation Berm, generally three (3) feet in height, which prevents flow onto the active portions during the 24-hour, 25-year storm.

40 C.F.R. §257.81(a)(2): A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

Stormwater run-off from the active portions of the UWL is managed by drainage ditches along the interior of the perimeter berms. Stormwater runoff from the active portion of Cell 1 is conveyed in ditches along the east and south sides of the cell that drain from a high point in the northeast corner to a low point in the southwest corner of the cell. Stormwater is then conveyed via a 24-inch corrugated metal pipe (CMP) to the interior ditch in the northwest corner of Cell 2.

Similarly, Cell 2 stormwater runoff is managed in drainage ditches along the interior of the perimeter berms that drain from a high point in the northeast corner to a low point in the southwest corner of the cell. Stormwater runoff is then conveyed through the southern landfill berm and into a ditch located south of the landfill cells via a 24-inch diameter high density polyethylene (HDPE) pipe.

The southern ditch drains to the east and discharges into the southernmost of two Sedimentation Ponds via a 24-inch diameter HDPE pipe. The two ponds are then hydraulically connected via three (3) 24-inch diameter HDPE equilibration pipes. AECI generally maintains the water level in the Sedimentation Ponds at approximately El. 281 by periodically pumping water back onto active portions of the landfill for dust suppression and to aid with compaction of placed CCR material, or to a NPDES permitted outfall.

For the northern section of Cell 1 which received final cover system, stormwater is managed via internal berms and ditches to convey flows to the western side of the landfill footprint. Water is then discharged via three (3) 24-inch diameter HDPE pipes to a western ditch. This ditch conveys flows to one (1) 18-inch HDPE pipe that discharges through a separate NPDES permitted outfall to the existing farm ditch that drains south.

Additionally, AECI implements several best practices and erosion and sediment controls to manage runoff from active portions of the landfill during the years-long filling operations of each cell. These best practices and controls include rock check dams near the pipe inlets to filter suspended solids, temporary letdown pipes to convey flows down long slopes, and intermediate cover soils with vegetative cover to reduce erosion potential and limit infiltration and runoff by improving evapotranspiration.

40 C.F.R. §257.81(b): Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirement under §257.3-3.

40 C.F.R. §257.3-3(a): For purposes of section 4004(a) of the Act, a facility shall not cause a discharge of waters of the United States that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES) under section 402 of the Clean Water Act, as amended.

40 C.F.R. §257.3-3(b): For purposes of section 4004(a) of the Act, a facility shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under section 404 of the Clean Water Act, as amended.

40 C.F.R. §257.3-3(c): A facility or practice shall not cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been approved by the Administrator under section 208 of the Clean Water Act, as amended.

Stormwater runoff from the active portions of the UWL is managed on-site via evaporation or discharged via manually operated pumps from the Sedimentation Ponds to a NPDES permitted outfall.

As stated previously, AECI also implements several best practices and erosion and sediment controls to collect and control runoff from active portions of the landfill including rock check dams, temporary letdown pipes, and intermediate cover soils with vegetative cover.

40 C.F.R. §257.81(c)(1): Contents of plan. The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(3).

This document and all attachments serve as an update to the initial Run-on and Run-off Control System Plan and will be placed in the facility's operating record. Periodic Run-on and Run-off Control System Plans will be prepared at maximum 5-year increments or whenever determined necessary if there is a change in conditions that would substantially affect the Plan in effect.

40 C.F.R. §257.81(c)(2): Amendment of the plan. The owner or operator may amend the written run-on and run-off control plan at any time provided the revised plan is placed in the facility's operating record as required by §257.105(g)(3). The owner or operator must amend the written run-on and run-off control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

The Run-on and Run-off Control System Plan will be amended if conditions change that substantially affect the Plan in effect. Any amendments will include written certification from a qualified professional engineer that the revised Plan meets the requirements of the CCR Rule.

40 C.F.R. §257.81(c)(3): Timeframes for preparing the initial plan.

(i) Existing CCR landfills. The owner or operator of the CCR unit must prepare an initial run-on and run-off control system plan no later than October 17, 2016.

The initial Run-on and Run-off Control System Plan was prepared within the specified time.

(ii) New CCR landfills and any lateral expansion of a CCR landfill. The owner or operator must prepare the initial run-on and run-off control system plan no later than the date of initial receipt of CCR in the CCR unit.

This Plan will be amended no later than the date of initial receipt of CCR in any lateral expansion of the UWL.

40 C.F.R. §257.81(c)(4): Frequency of revising the plan. The owner or operator of a CCR unit must prepare periodic run-on and run-off control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(3).

The Run-on and Run-off Control System Plan, or any subsequent Plan, will be assessed and amended whenever there is a change in operation of the CCR landfill that would substantially affect the Plan or when unanticipated events necessitate a revision of the Plan.

Professional Engineer Certification

40 C.F.R. §257.81(c)(5): The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is permitting authority stating that the initial and periodic run-on and run-off control system plans meet the requirements of this section.

I certify that the above-referenced Run-on and Run-off Control System Plan for AECI's Utility Waste Landfill at the New Madrid Power Plant (NMPP) meets the USEPA's CCR Rule requirements of 40 C.F.R. §257.81.

Signed: _____
Certifying Engineer

Print Name: Steven F. Putrich
Missouri License No.: 2014035813
Title: Principal Consultant
Company: Haley & Aldrich, Inc.

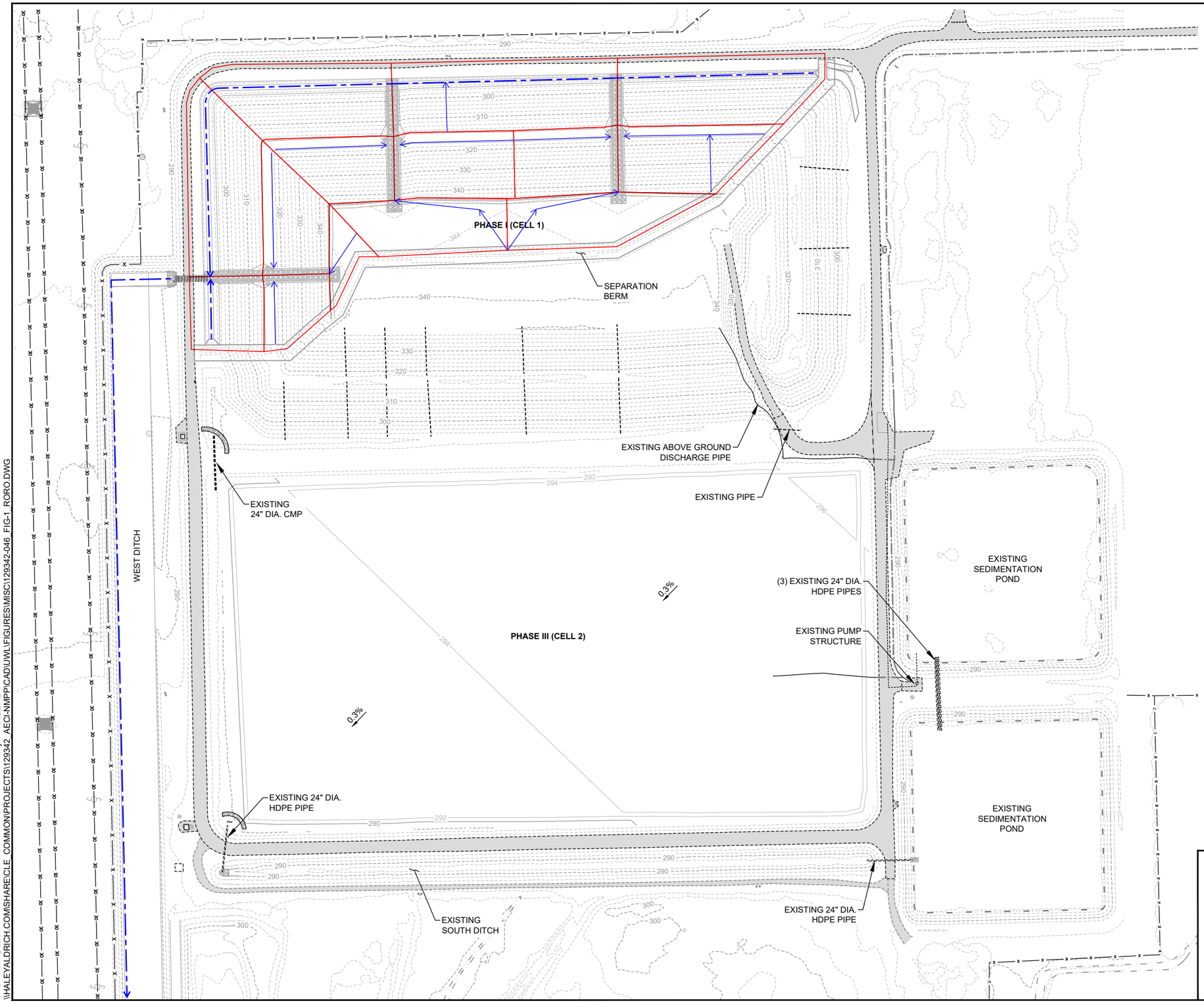
Professional Engineer's Seal:

Steven F. Putrich

Digitally signed by Steven F. Putrich
Date: 2023.02.24 17:08:02 -05'00'

Cc: Jenny Jones-AECI

Figures



NOTES

1. EXISTING CONDITIONS SURVEY BY HAMPTION, LENZINI, AND RENWICK, INC. (HLR), DATED 11-13 JUNE 2019.
2. GRADES SHOWN WITHIN THE EXTENTS OF THE PARTIAL CLOSURE OF PHASE I (CELL 1) REPRESENT PROPOSED TOP OF FINAL COVER.
3. GRADES SHOWN WITHIN PHASE III (CELL 2) REPRESENT EXISTING CONDITIONS GRADES WITH INITIAL PROPOSED ASH PLACEMENT LIFTS AS PREVIOUSLY PROVIDED BY HALEY & ALDRICH:
   - LIFT 1: 18-INCH, PROVIDED 17 JUNE 2019
   - LIFT 2: 24-INCH, PROVIDED 24 FEBRUARY 2020
   - LIFT 3: 24-INCH, PROVIDED 14 SEPTEMBER 2020

LEGEND

- EXISTING GRAVEL ROAD
- 290 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 294 ASH LIFT 3 MAJOR CONTOUR
- ASH LIFT 3 MINOR CONTOUR
- APPROXIMATE NORMAL WATER LEVEL
- x x EXISTING FENCE
- AT PROPOSED FINAL COVER LINER TEMPORARY ANCHOR TRENCH
- EXISTING CENTER LINE OF LEACHATE PIPES
- EXISTING DRAINAGE PIPES
- 2.0% SURFACE SLOPE
- oe oe EXISTING OVERHEAD POWER LINE
- ue ue EXISTING UNDERGROUND ELECTRIC

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0 200 400
SCALE IN FEET

HALEY ALDRICH

ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
MARSTON, MISSOURI

UTILITY WASTE LANDFILL
RUN-ON RUN-OFF CONTROLS

SCALE: AS SHOWN
OCTOBER 2022

FIGURE 1

SAUNDERS, LEE Printed: 10/28/2022 5:39:06 PM Layout: FIGURE 1
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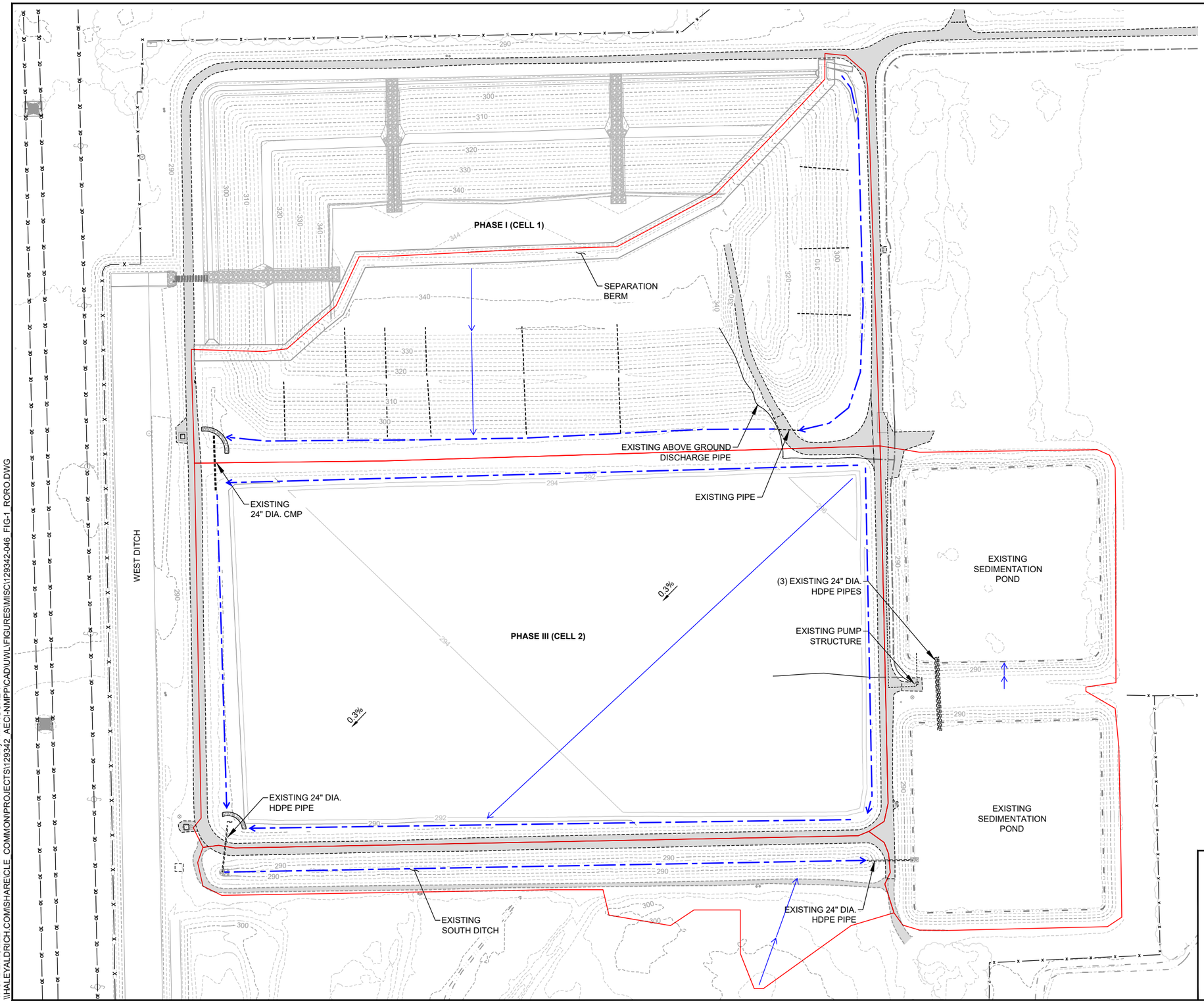

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HALEY ALDRICH

ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
MARSTON, MISSOURI

UTILITY WASTE LANDFILL
RUN-ON RUN-OFF CONTROLS

SCALE: AS SHOWN
OCTOBER 2022

FIGURE 1

SAUNDERS, LEE Printed: 10/28/2022 5:39:06 PM Layout: FIGURE 1
\\HALEYALDRICH.COM\SHARE\CLE_COMMON\PROJECTS\129342_AEC\-NMPP\CADD\LWL\FIGURES\MISC\129342-046_FIG-1_RORO.DWG

Appendix A

NOAA Rainfall Data

NOAA Atlas 14, Volume 8, Version 2
Location name: Portageville, Missouri, USA*
Latitude: 36.4941°, Longitude: -89.5872°
Elevation: 316.64 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point 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	**0.411** (0.329-0.515)	**0.476** (0.380-0.595)	**0.581** (0.463-0.729)	**0.670** (0.531-0.842)	**0.792** (0.610-1.02)	**0.888** (0.669-1.15)	**0.984** (0.720-1.30)	**1.08** (0.763-1.45)	**1.21** (0.826-1.66)	**1.31** (0.874-1.81)
10-min	**0.603** (0.482-0.753)	**0.697** (0.557-0.872)	**0.851** (0.678-1.07)	**0.981** (0.777-1.23)	**1.16** (0.893-1.49)	**1.30** (0.980-1.68)	**1.44** (1.05-1.90)	**1.58** (1.12-2.12)	**1.78** (1.21-2.42)	**1.92** (1.28-2.65)
15-min	**0.735** (0.588-0.919)	**0.849** (0.679-1.06)	**1.04** (0.827-1.30)	**1.20** (0.948-1.50)	**1.42** (1.09-1.82)	**1.59** (1.20-2.05)	**1.76** (1.29-2.31)	**1.93** (1.36-2.59)	**2.17** (1.48-2.96)	**2.34** (1.56-3.24)
30-min	**1.05** (0.842-1.32)	**1.22** (0.976-1.53)	**1.50** (1.19-1.88)	**1.73** (1.37-2.17)	**2.05** (1.57-2.62)	**2.29** (1.73-2.97)	**2.54** (1.86-3.34)	**2.79** (1.97-3.74)	**3.13** (2.13-4.27)	**3.38** (2.25-4.67)
60-min	**1.39** (1.11-1.74)	**1.60** (1.28-2.01)	**1.96** (1.56-2.46)	**2.26** (1.79-2.84)	**2.69** (2.07-3.46)	**3.03** (2.29-3.93)	**3.38** (2.47-4.45)	**3.73** (2.64-5.01)	**4.22** (2.88-5.77)	**4.60** (3.06-6.35)
2-hr	**1.73** (1.40-2.13)	**1.98** (1.60-2.45)	**2.42** (1.95-3.00)	**2.80** (2.24-3.47)	**3.33** (2.61-4.25)	**3.77** (2.88-4.84)	**4.21** (3.12-5.50)	**4.68** (3.34-6.22)	**5.32** (3.67-7.21)	**5.82** (3.92-7.95)
3-hr	**1.95** (1.59-2.39)	**2.23** (1.82-2.74)	**2.72** (2.21-3.34)	**3.14** (2.54-3.87)	**3.76** (2.96-4.76)	**4.26** (3.28-5.44)	**4.78** (3.57-6.21)	**5.33** (3.84-7.06)	**6.10** (4.24-8.23)	**6.71** (4.55-9.12)
6-hr	**2.38** (1.97-2.89)	**2.72** (2.24-3.29)	**3.30** (2.71-4.00)	**3.81** (3.12-4.64)	**4.57** (3.65-5.74)	**5.19** (4.05-6.57)	**5.85** (4.43-7.52)	**6.55** (4.77-8.59)	**7.53** (5.30-10.1)	**8.31** (5.69-11.2)
12-hr	**2.87** (2.40-3.44)	**3.28** (2.74-3.93)	**3.99** (3.32-4.78)	**4.61** (3.82-5.55)	**5.52** (4.46-6.85)	**6.27** (4.95-7.83)	**7.05** (5.40-8.96)	**7.88** (5.81-10.2)	**9.03** (6.43-11.9)	**9.94** (6.89-13.2)
24-hr	**3.40** (2.88-4.02)	**3.92** (3.31-4.63)	**4.79** (4.04-5.67)	**5.55** (4.65-6.58)	**6.62** (5.40-8.08)	**7.48** (5.97-9.22)	**8.37** (6.48-10.5)	**9.30** (6.93-11.9)	**10.6** (7.60-13.8)	**11.6** (8.11-15.2)
2-day	**3.98** (3.41-4.64)	**4.62** (3.95-5.38)	**5.67** (4.84-6.63)	**6.56** (5.57-7.69)	**7.81** (6.43-9.38)	**8.78** (7.09-10.7)	**9.78** (7.64-12.1)	**10.8** (8.13-13.6)	**12.2** (8.84-15.7)	**13.2** (9.38-17.2)
3-day	**4.37** (3.77-5.06)	**5.06** (4.36-5.86)	**6.20** (5.33-7.19)	**7.16** (6.13-8.33)	**8.51** (7.06-10.2)	**9.56** (7.77-11.5)	**10.6** (8.38-13.1)	**11.7** (8.90-14.7)	**13.2** (9.67-16.9)	**14.4** (10.3-18.6)
4-day	**4.68** (4.06-5.38)	**5.40** (4.68-6.22)	**6.60** (5.71-7.61)	**7.62** (6.55-8.81)	**9.05** (7.55-10.7)	**10.2** (8.31-12.2)	**11.3** (8.96-13.8)	**12.5** (9.53-15.6)	**14.1** (10.4-18.0)	**15.3** (11.0-19.8)
7-day	**5.40** (4.74-6.15)	**6.20** (5.43-7.06)	**7.54** (6.58-8.60)	**8.68** (7.55-9.94)	**10.3** (8.71-12.1)	**11.6** (9.60-13.8)	**12.9** (10.4-15.7)	**14.3** (11.0-17.8)	**16.2** (12.1-20.5)	**17.7** (12.8-22.7)
10-day	**6.07** (5.36-6.86)	**6.92** (6.11-7.83)	**8.35** (7.34-9.47)	**9.58** (8.38-10.9)	**11.3** (9.64-13.3)	**12.7** (10.6-15.0)	**14.2** (11.4-17.1)	**15.7** (12.1-19.3)	**17.7** (13.2-22.3)	**19.3** (14.1-24.6)
20-day	**8.17** (7.31-9.11)	**9.15** (8.18-10.2)	**10.8** (9.61-12.1)	**12.1** (10.8-13.6)	**14.1** (12.1-16.2)	**15.6** (13.1-18.1)	**17.1** (13.9-20.3)	**18.7** (14.6-22.6)	**20.8** (15.7-25.8)	**22.4** (16.5-28.1)
30-day	**9.99** (9.01-11.0)	**11.1** (10.0-12.3)	**12.9** (11.6-14.3)	**14.4** (12.9-16.1)	**16.5** (14.3-18.8)	**18.0** (15.3-20.8)	**19.6** (16.1-23.0)	**21.2** (16.7-25.4)	**23.2** (17.7-28.6)	**24.7** (18.4-30.9)
45-day	**12.3** (11.2-13.5)	**13.7** (12.4-15.0)	**15.8** (14.3-17.4)	**17.5** (15.8-19.3)	**19.8** (17.2-22.3)	**21.5** (18.3-24.5)	**23.1** (19.1-26.9)	**24.7** (19.6-29.4)	**26.6** (20.4-32.5)	**28.1** (21.0-34.9)
60-day	**14.3** (13.0-15.6)	**15.9** (14.5-17.3)	**18.3** (16.7-20.1)	**20.3** (18.4-22.3)	**22.8** (19.9-25.5)	**24.6** (21.1-27.9)	**26.3** (21.8-30.4)	**28.0** (22.3-33.1)	**29.9** (23.0-36.2)	**31.2** (23.5-38.6)

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

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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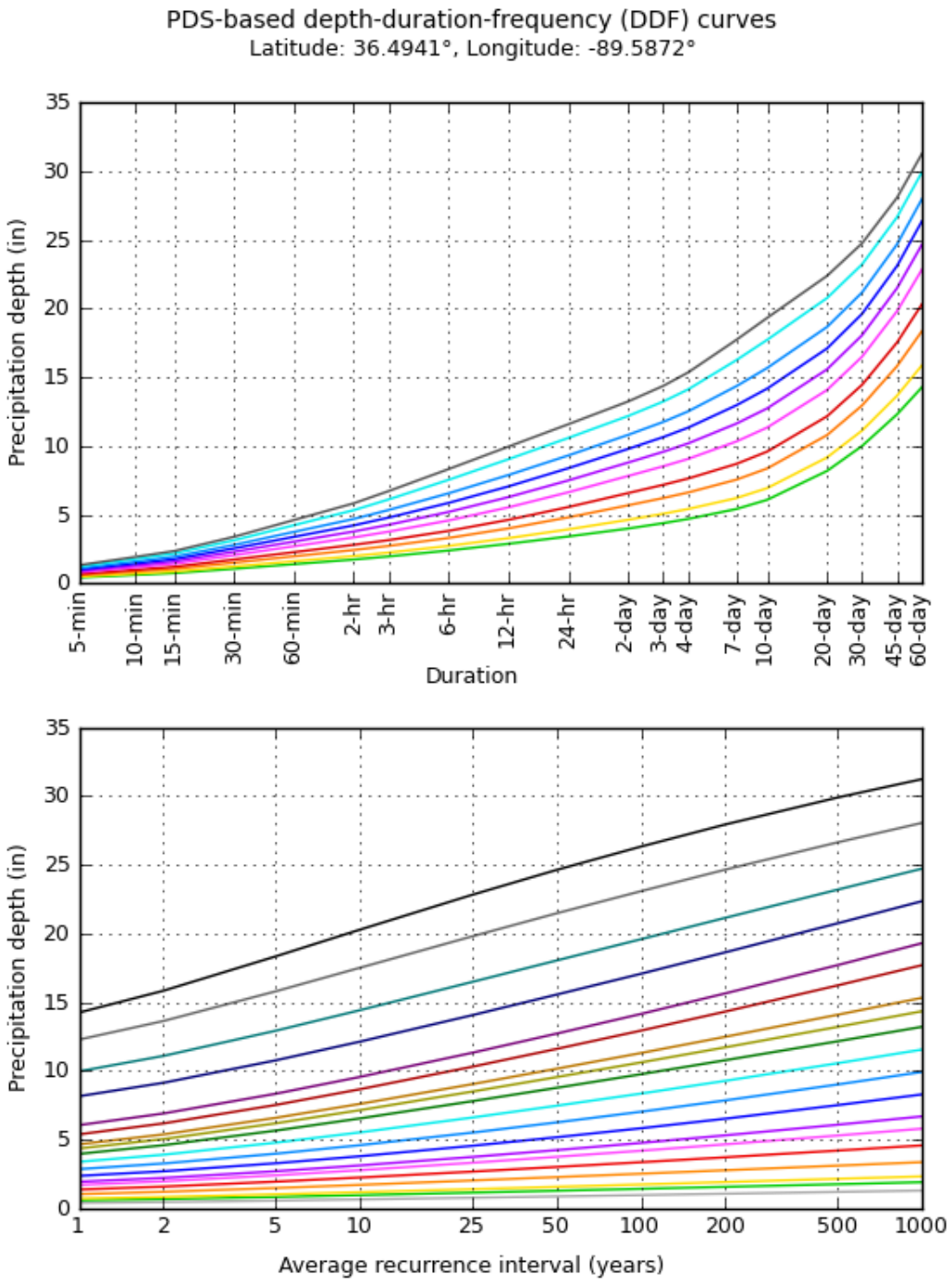
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Fri Jul 23 17:07:36 2021

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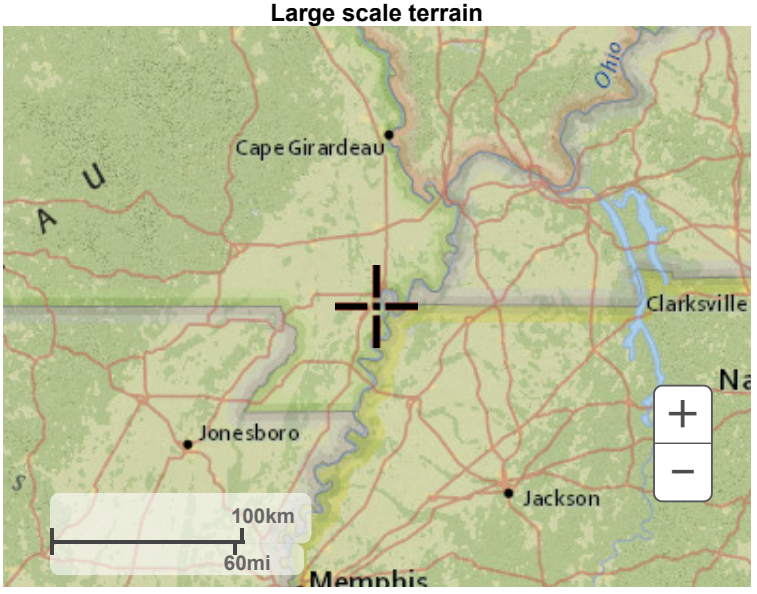
Maps & aerials

Small scale terrain

Large scale terrain



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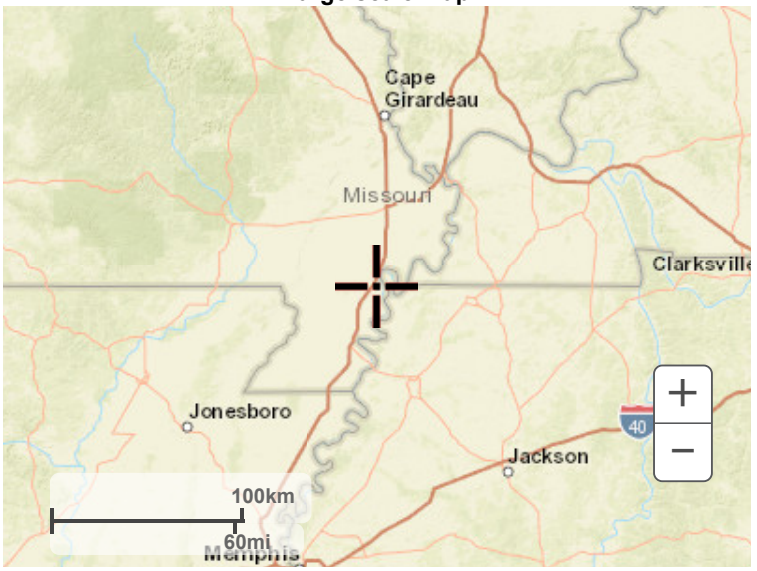

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix B

HydroCAD Results

Appendix B-1

Utility Waste Landfill – Active Portions
HydroCAD Results

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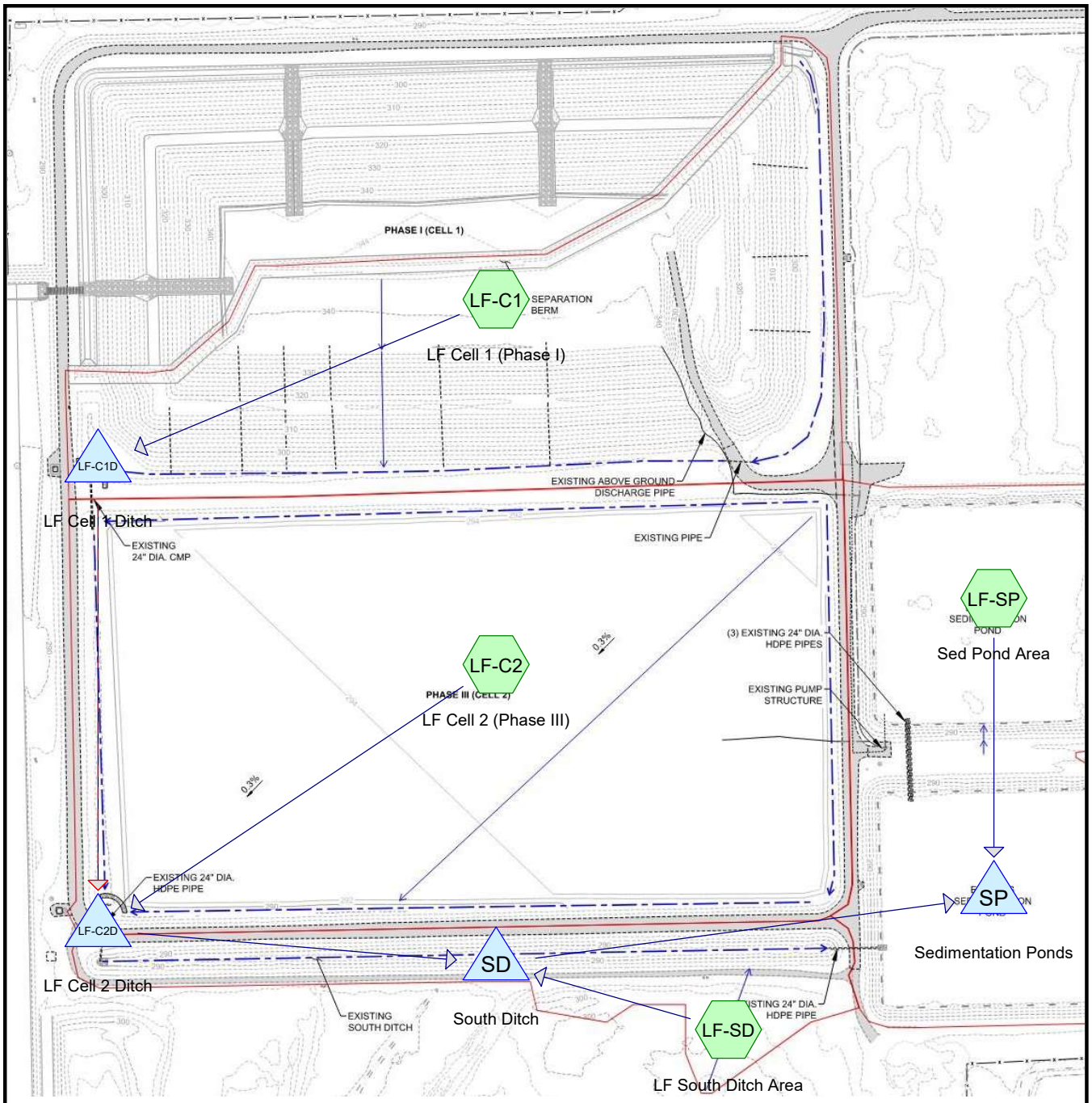


Subcat Reach Pond Link

Routing Diagram for 2022-1114_129342-046_UWL_Active
Prepared by Haley & Aldrich, Inc, Printed 1/3/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	24 Hr 25 Yr	Type II 24-hr		Default	24.00	1	6.62	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.000	74	>75% Grass cover, Good, HSG C (LF-C1)
7.600	80	>75% Grass cover, Good, HSG D (LF-SD, LF-SP)
24.600	89	Open Landfill (LF-C2)
6.600	98	Water Surface, HSG D (LF-SP)
52.800	**85**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment LF-C1: LF Cell 1 (Phase I) Runoff Area=14.000 ac 0.00% Impervious Runoff Depth=3.71"
Flow Length=325' Tc=15.0 min CN=74 Runoff=67.31 cfs 4.332 af

Subcatchment LF-C2: LF Cell 2 (Phase III) Runoff Area=24.600 ac 0.00% Impervious Runoff Depth=5.34"
Flow Length=1,000' Slope=0.0030 '/' Tc=35.3 min CN=89 Runoff=99.54 cfs 10.942 af

Subcatchment LF-SD: LF South Ditch Area Runoff Area=4.000 ac 0.00% Impervious Runoff Depth=4.35"
Flow Length=225' Tc=8.8 min CN=80 Runoff=27.39 cfs 1.448 af

Subcatchment LF-SP: Sed Pond Area Runoff Area=10.200 ac 64.71% Impervious Runoff Depth=5.68"
Flow Length=50' Tc=4.0 min CN=92 Runoff=98.63 cfs 4.828 af

Pond LF-C1D: LF Cell 1 Ditch Peak Elev=293.38' Storage=44,620 cf Inflow=67.31 cfs 4.332 af
Primary=16.66 cfs 3.636 af Secondary=25.57 cfs 0.696 af Outflow=40.99 cfs 4.332 af

Pond LF-C2D: LF Cell 2 Ditch Peak Elev=292.92' Storage=221,907 cf Inflow=134.90 cfs 15.274 af
24.0" Round Culvert n=0.013 L=92.9' S=-0.0026 '/' Outflow=25.15 cfs 15.274 af

Pond SD: South Ditch Peak Elev=288.93' Storage=77,277 cf Inflow=45.22 cfs 16.722 af
24.0" Round Culvert n=0.013 L=91.9' S=0.0012 '/' Outflow=22.92 cfs 16.717 af

Pond SP: Sedimentation Ponds Peak Elev=284.33' Storage=1,200,553 cf Inflow=113.37 cfs 21.545 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 52.800 ac Runoff Volume = 21.550 af Average Runoff Depth = 4.90"
87.50% Pervious = 46.200 ac 12.50% Impervious = 6.600 ac

Summary for Subcatchment LF-C1: LF Cell 1 (Phase I)

(2022) North and west faces closed, remainder received intermediate cover and vegetated. East and south interior ditches regraded for positive drainage (model as pond node due to minimal slope).

Intermediate cover soil is silty, sandy material (HSG C).

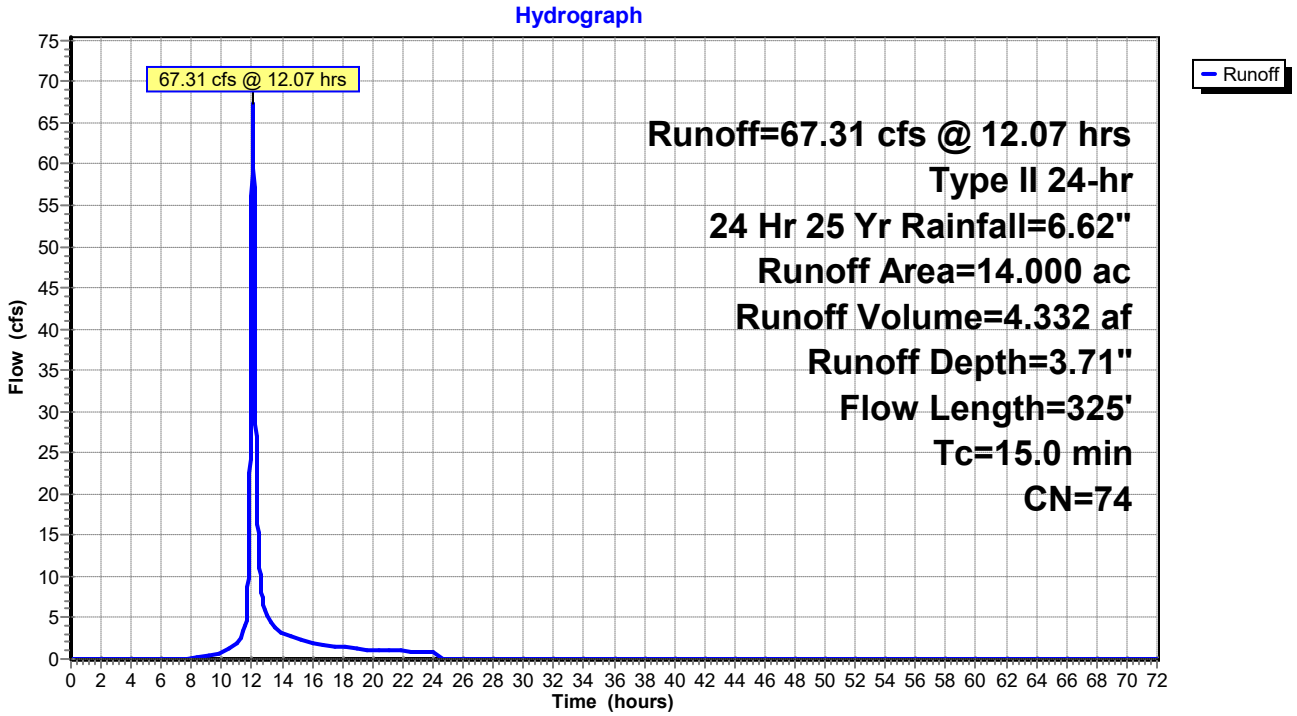
Runoff = 67.31 cfs @ 12.07 hrs, Volume= 4.332 af, Depth= 3.71"
Routed to Pond LF-C1D : LF Cell 1 Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (ac)	CN	Description
14.000	74	>75% Grass cover, Good, HSG C
14.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	125	0.0100	0.15		**Sheet Flow, Landfill Top** Grass: Short n= 0.150 P2= 3.92"
1.0	200	0.2500	3.50		**Shallow Concentrated Flow, Side Slopes** Short Grass Pasture Kv= 7.0 fps
15.0	325	Total			

Subcatchment LF-C1: LF Cell 1 (Phase I)



Summary for Subcatchment LF-C2: LF Cell 2 (Phase III)

(2022) Bypass CMP removed along west side of Cell 2; perimeter channels formed as filling continues (model as pond node due to minimal slope).

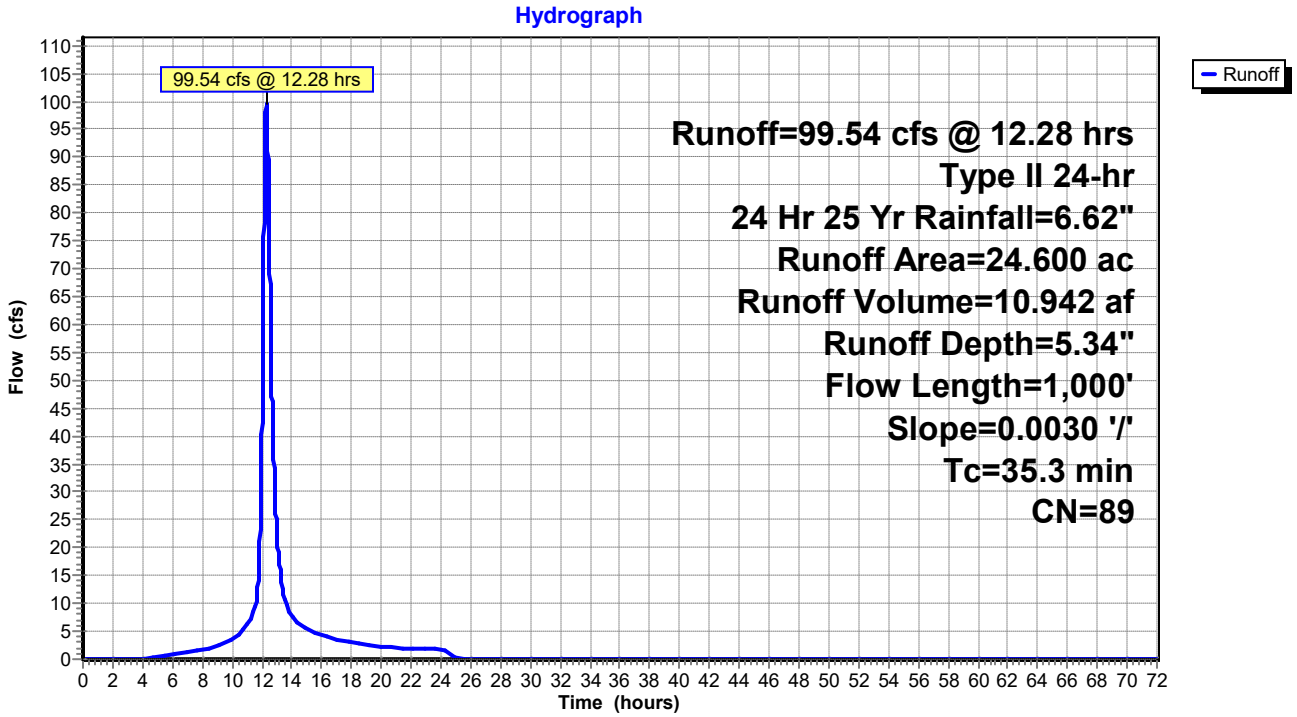
Runoff = 99.54 cfs @ 12.28 hrs, Volume= 10.942 af, Depth= 5.34"
Routed to Pond LF-C2D : LF Cell 2 Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

	Area (ac)	CN	Description
*	24.600	89	Open Landfill
	24.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.0030	0.21		**Sheet Flow, Open landfill** Fallow n= 0.050 P2= 3.92"
27.4	900	0.0030	0.55		**Shallow Concentrated Flow, Open landfill** Nearly Bare & Untilled Kv= 10.0 fps
35.3	1,000	Total			

Subcatchment LF-C2: LF Cell 2 (Phase III)



Summary for Subcatchment LF-SD: LF South Ditch Area

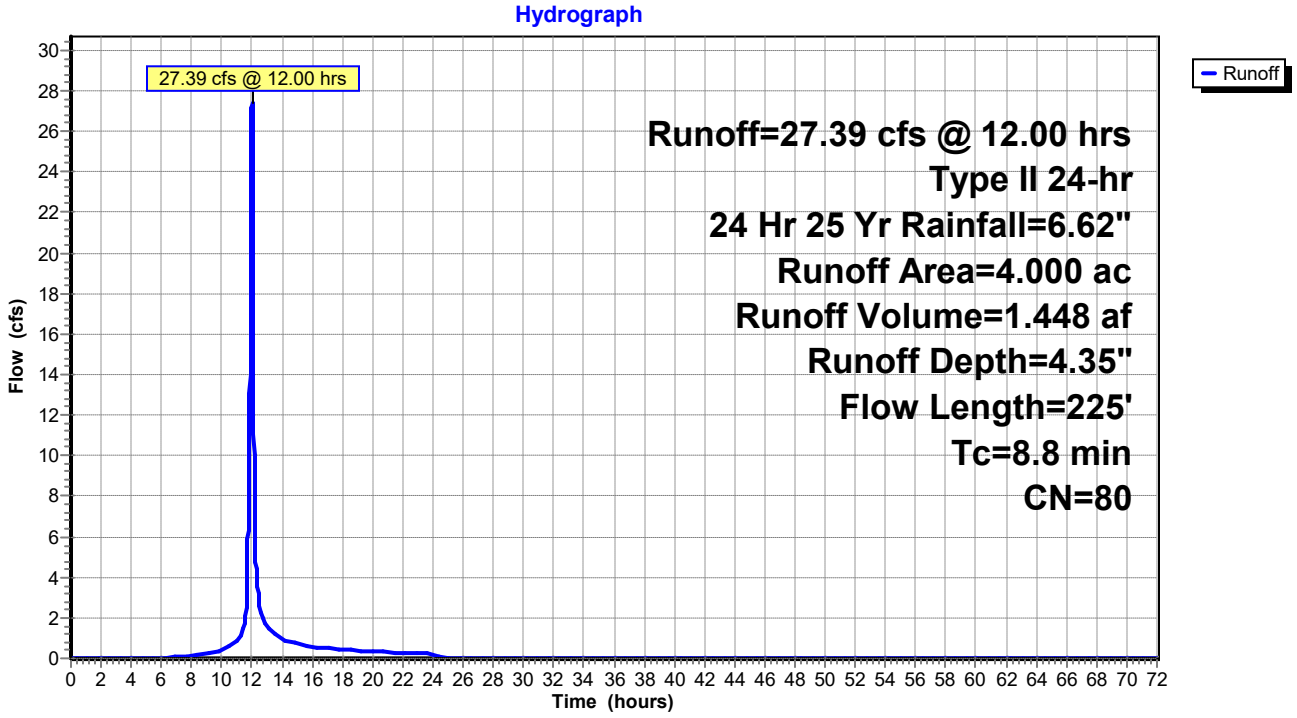
Runoff = 27.39 cfs @ 12.00 hrs, Volume= 1.448 af, Depth= 4.35"
Routed to Pond SD : South Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (ac)	CN	Description
4.000	80	>75% Grass cover, Good, HSG D
4.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.0300	0.22		**Sheet Flow, Grassed area** Grass: Short n= 0.150 P2= 3.92"
1.3	125	0.0560	1.66		**Shallow Concentrated Flow, Grassed area** Short Grass Pasture Kv= 7.0 fps
8.8	225	Total			

Subcatchment LF-SD: LF South Ditch Area



Summary for Subcatchment LF-SP: Sed Pond Area

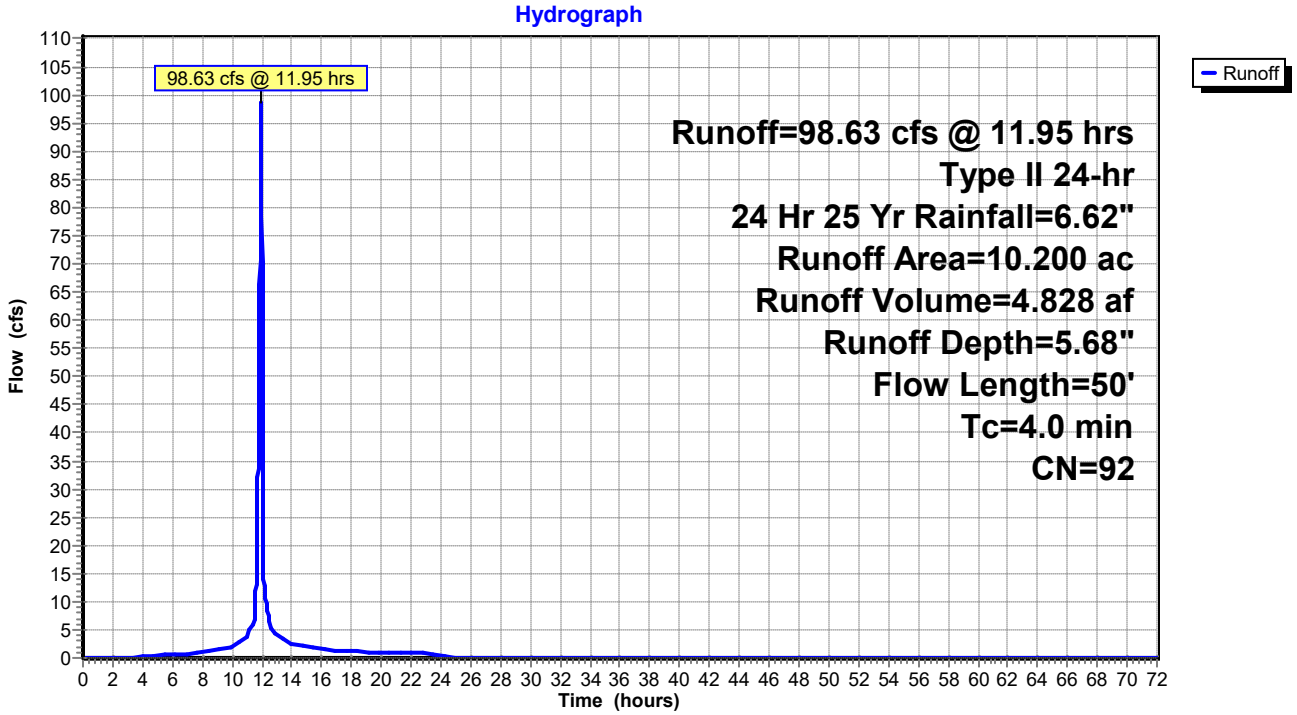
Runoff = 98.63 cfs @ 11.95 hrs, Volume= 4.828 af, Depth= 5.68"
Routed to Pond SP : Sedimentation Ponds

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (ac)	CN	Description
6.600	98	Water Surface, HSG D
3.600	80	>75% Grass cover, Good, HSG D
10.200	92	Weighted Average
3.600		35.29% Pervious Area
6.600		64.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	25	0.0100	0.11		**Sheet Flow, Grassed area** Grass: Short n= 0.150 P2= 3.92"
0.1	25	0.3300	4.02		**Shallow Concentrated Flow, Grassed area-side slope** Short Grass Pasture Kv= 7.0 fps
4.0	50	Total			

Subcatchment LF-SP: Sed Pond Area



Summary for Pond LF-C1D: LF Cell 1 Ditch

Bypass CMP removed along west side of Cell 2 (length and inverts adjusted accordingly, as surveyed).
Broad-crest weir (small emergency overflow at CMP) left as previously modeled.

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 14.000 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 67.31 cfs @ 12.07 hrs, Volume= 4.332 af
Outflow = 40.99 cfs @ 12.19 hrs, Volume= 4.332 af, Atten= 39%, Lag= 7.3 min
Primary = 16.66 cfs @ 12.13 hrs, Volume= 3.636 af
Routed to Pond LF-C2D : LF Cell 2 Ditch
Secondary = 25.57 cfs @ 12.20 hrs, Volume= 0.696 af
Routed to Pond LF-C2D : LF Cell 2 Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 293.38' @ 12.20 hrs Surf.Area= 25,497 sf Storage= 44,620 cf

Plug-Flow detention time= 47.4 min calculated for 4.331 af (100% of inflow)
Center-of-Mass det. time= 47.4 min (877.0 - 829.6)

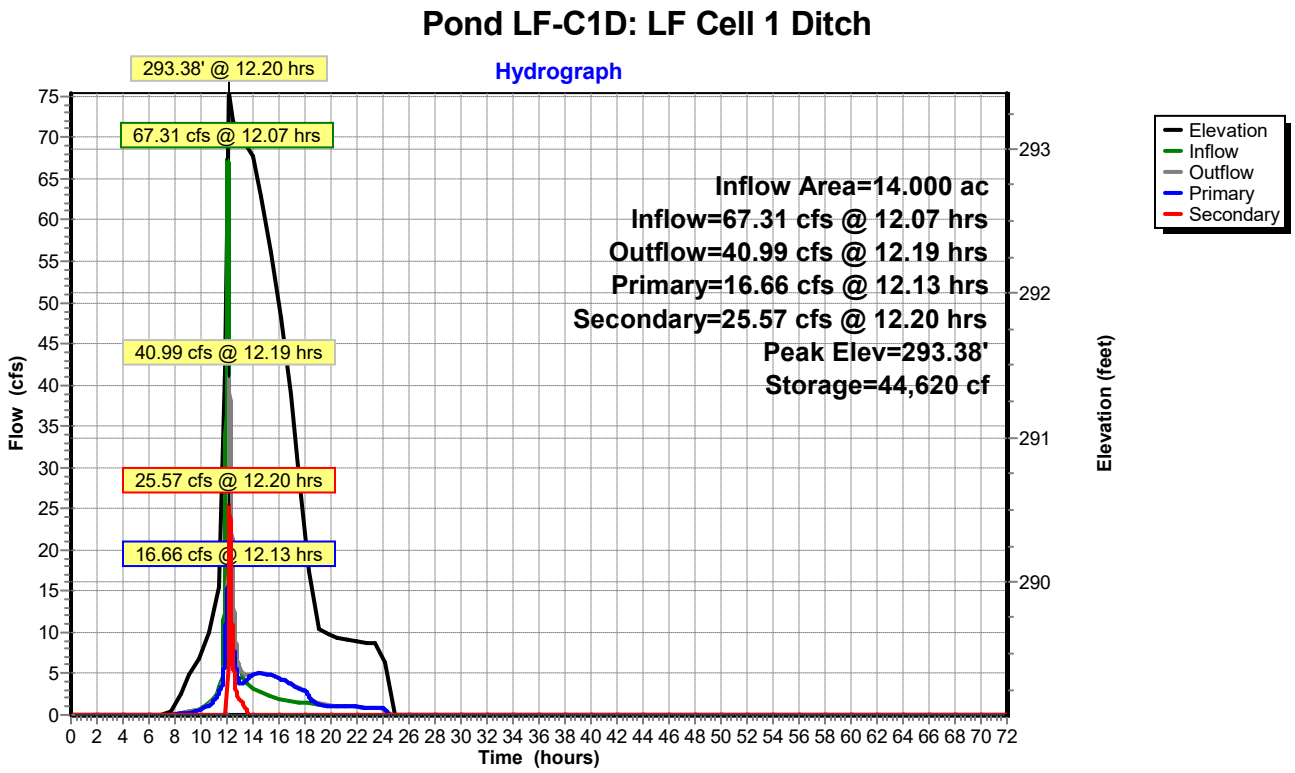
Volume	Invert	Avail.Storage	Storage Description
#1	289.08'	117,664 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
289.08	0	0	0
289.50	687	144	144
290.00	1,868	639	783
290.50	6,882	2,188	2,971
291.00	8,128	3,753	6,723
291.50	11,031	4,790	11,513
292.00	14,122	6,288	17,801
292.50	17,714	7,959	25,760
293.00	21,637	9,838	35,598
293.50	26,679	12,079	47,677
294.00	33,135	14,954	62,630
294.50	54,387	21,881	84,511
295.00	78,225	33,153	117,664

Device	Routing	Invert	Outlet Devices
#1	Primary	289.01'	**24.0" Round Culvert (Remainder of Bypass)** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 289.01' / 288.41' S= 0.0060 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	293.00'	**40.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=16.43 cfs @ 12.13 hrs HW=293.26' TW=290.49' (Dynamic Tailwater)
└**1=Culvert (Remainder of Bypass)** (Outlet Controls 16.43 cfs @ 5.23 fps)

Secondary OutFlow Max=25.55 cfs @ 12.20 hrs HW=293.38' TW=291.05' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 25.55 cfs @ 1.67 fps)



Summary for Pond LF-C2D: LF Cell 2 Ditch

Assumed least amount of stormwater storage in Cell 2 as landfill cell is filled (i.e., interior ditch only).

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 38.600 ac, 0.00% Impervious, Inflow Depth = 4.75" for 24 Hr 25 Yr event
Inflow = 134.90 cfs @ 12.24 hrs, Volume= 15.274 af
Outflow = 25.15 cfs @ 12.76 hrs, Volume= 15.274 af, Atten= 81%, Lag= 31.6 min
Primary = 25.15 cfs @ 12.76 hrs, Volume= 15.274 af
Routed to Pond SD : South Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 292.92' @ 13.08 hrs Surf.Area= 106,402 sf Storage= 221,907 cf

Plug-Flow detention time= 76.6 min calculated for 15.274 af (100% of inflow)
Center-of-Mass det. time= 76.6 min (904.8 - 828.2)

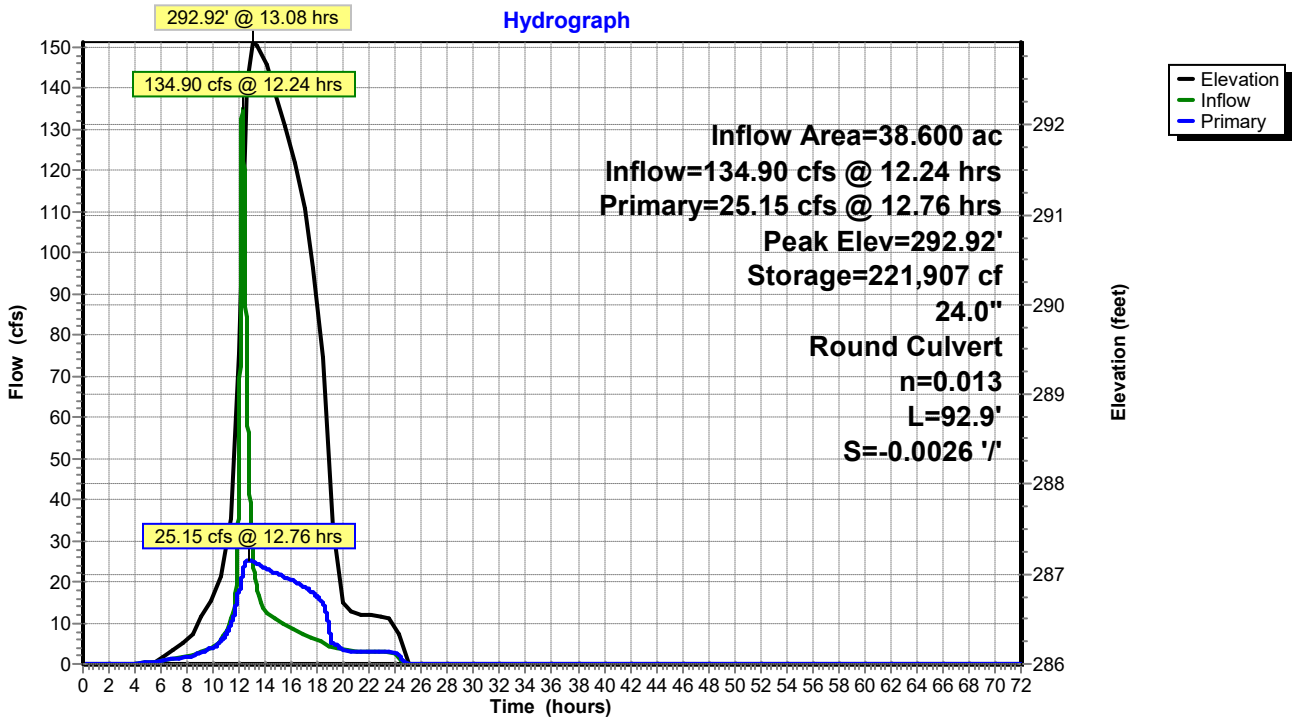
Volume	Invert	Avail.Storage	Storage Description
#1	286.00'	505,789 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
286.00	0	0	0
287.00	2,281	1,141	1,141
288.00	3,043	2,662	3,803
289.00	10,614	6,829	10,631
290.00	28,938	19,776	30,407
291.00	51,290	40,114	70,521
292.00	79,642	65,466	135,987
293.00	108,614	94,128	230,115
294.00	135,335	121,975	352,090
295.00	172,063	153,699	505,789

Device	Routing	Invert	Outlet Devices
#1	Primary	285.66'	**24.0" Round Culvert** L= 92.9' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 285.42' / 285.66' S= -0.0026 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.13 cfs @ 12.76 hrs HW=292.83' TW=288.41' (Dynamic Tailwater)
1=Culvert (Inlet Controls 25.13 cfs @ 8.00 fps)

Pond LF-C2D: LF Cell 2 Ditch



Summary for Pond SD: South Ditch

Inflow Area = 42.600 ac, 0.00% Impervious, Inflow Depth = 4.71" for 24 Hr 25 Yr event
Inflow = 45.22 cfs @ 12.00 hrs, Volume= 16.722 af
Outflow = 22.92 cfs @ 14.74 hrs, Volume= 16.717 af, Atten= 49%, Lag= 164.1 min
Primary = 22.92 cfs @ 14.74 hrs, Volume= 16.717 af
Routed to Pond SP : Sedimentation Ponds

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 288.93' @ 14.74 hrs Surf.Area= 34,718 sf Storage= 77,277 cf

Plug-Flow detention time= 43.2 min calculated for 16.717 af (100% of inflow)
Center-of-Mass det. time= 42.8 min (939.4 - 896.6)

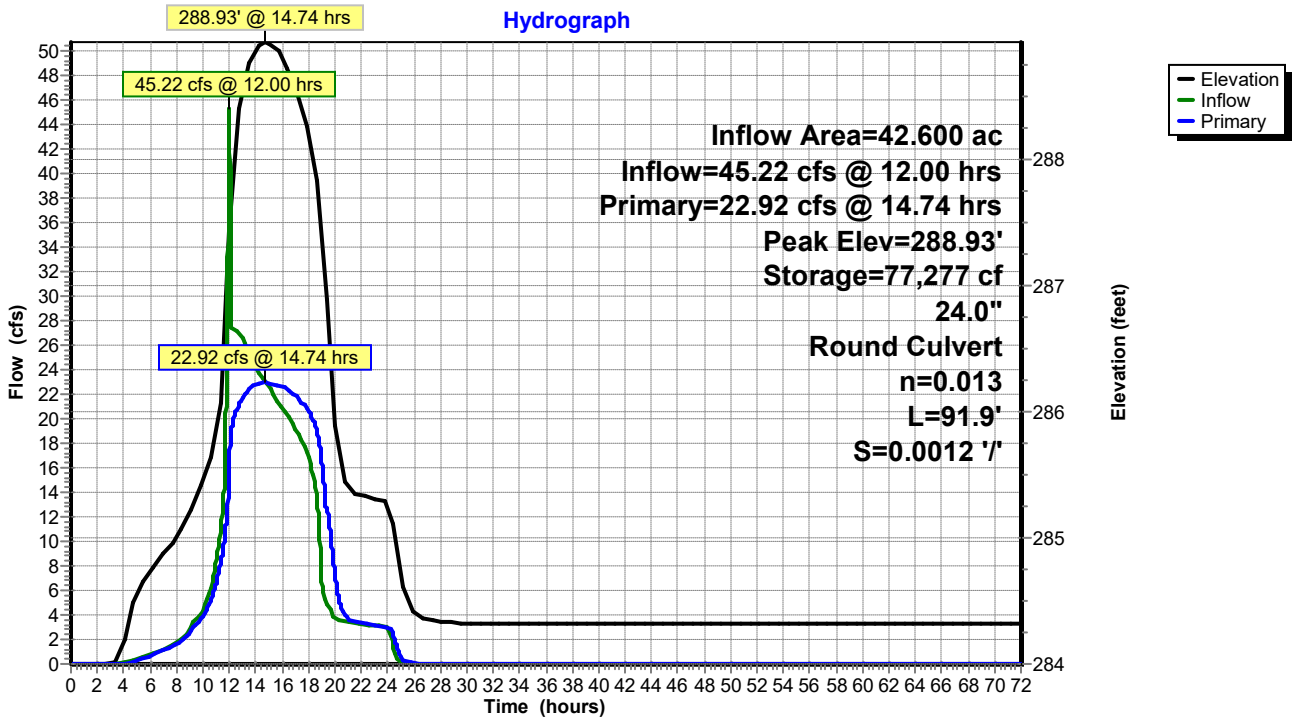
Volume	Invert	Avail.Storage	Storage Description
#1	284.00'	437,028 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
284.00	0	0	0
285.00	3,803	1,902	1,902
286.00	11,513	7,658	9,560
287.00	19,365	15,439	24,999
288.00	27,272	23,319	48,317
289.00	35,241	31,257	79,574
290.00	43,262	39,252	118,825
291.00	51,348	47,305	166,130
292.00	59,483	55,416	221,546
293.00	67,685	63,584	285,130
294.00	75,935	71,810	356,940
295.00	84,242	80,089	437,028

Device	Routing	Invert	Outlet Devices
#1	Primary	284.25'	**24.0" Round Culvert** L= 91.9' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 284.25' / 284.14' S= 0.0012 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=22.92 cfs @ 14.74 hrs HW=288.93' TW=282.71' (Dynamic Tailwater)
1=Culvert (Inlet Controls 22.92 cfs @ 7.30 fps)

Pond SD: South Ditch



Summary for Pond SP: Sedimentation Ponds

Cell 1 (Phase I) and Cell 2 (Phase III) Sedimentation Ponds connected by three 24-in. dia. HDPE equalization pipes; modeled as single pond storage, based on available site survey and design grades.

Inflow Area = 52.800 ac, 12.50% Impervious, Inflow Depth = 4.90" for 24 Hr 25 Yr event
Inflow = 113.37 cfs @ 11.95 hrs, Volume= 21.545 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

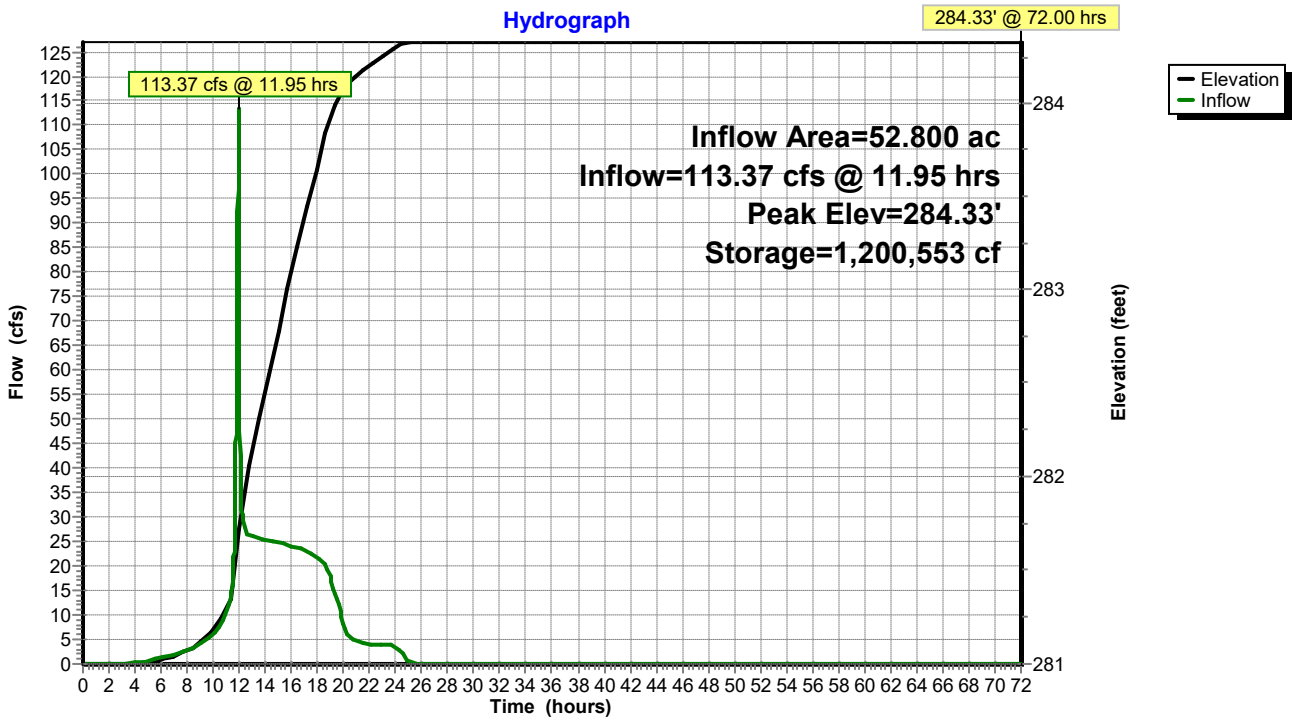
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 281.00' Surf.Area= 265,953 sf Storage= 262,039 cf
Peak Elev= 284.33' @ 72.00 hrs Surf.Area= 297,432 sf Storage= 1,200,553 cf (938,514 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	4,919,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
279.50	127,449	0	0
280.00	129,600	64,262	64,262
281.00	265,953	197,777	262,039
282.00	276,693	271,323	533,362
283.00	285,422	281,058	814,419
284.00	294,460	289,941	1,104,360
285.00	303,605	299,033	1,403,393
286.00	312,858	308,232	1,711,624
287.00	322,219	317,539	2,029,163
288.00	331,775	326,997	2,356,160
289.00	341,278	336,527	2,692,686
290.00	351,087	346,183	3,038,869
291.00	360,937	356,012	3,394,881
292.00	370,900	365,919	3,760,799
293.00	380,978	375,939	4,136,738
294.00	391,169	386,074	4,522,812
295.00	401,675	396,422	4,919,234

Pond SP: Sedimentation Ponds



Appendix B-2

Utility Waste Landfill – Partial Closure Area
HydroCAD Results

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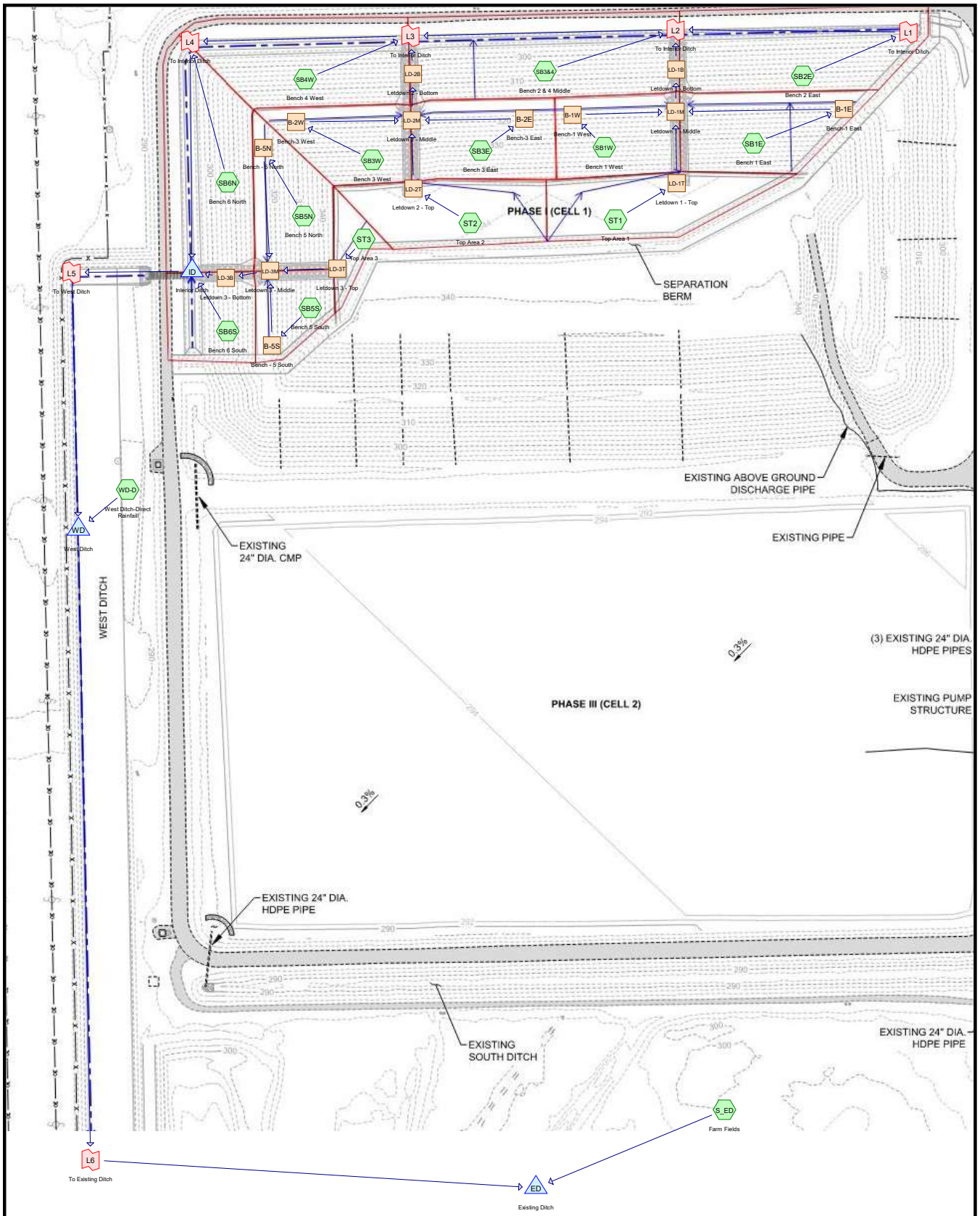


Routing Diagram for 2022-1101_129342-046_UWL_Partial Closure
Prepared by Haley & Aldrich, Inc, Printed 1/3/2023
HydroCAD® 10.20-2g s/n 03902 © 2022 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
55.600	88	Fallow, crop residue, Good, HSG C (S_ED)
11.070	74	Pasture/grassland/range, Good, HSG C (SB1E, SB1W, SB2E, SB3&4, SB3E, SB3W, SB4W, SB5N, SB5S, SB6N, SB6S, ST1, ST2, ST3)
2.800	98	Water Surface, 0% imp, HSG C (WD-D)
69.470	**86**	**TOTAL AREA**

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SB1E: Bench 1 East Runoff Area=35,786 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=6.52 cfs 0.254 af

Subcatchment SB1W: Bench 1 West Runoff Area=27,833 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=5.07 cfs 0.198 af

Subcatchment SB2E: Bench 2 East Runoff Area=53,937 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=9.82 cfs 0.383 af

Subcatchment SB3&4: Bench 2 & 4 Middle Runoff Area=63,096 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=11.49 cfs 0.448 af

Subcatchment SB3E: Bench 3 East Runoff Area=32,010 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=5.83 cfs 0.227 af

Subcatchment SB3W: Bench 3 West Runoff Area=26,241 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=4.78 cfs 0.186 af

Subcatchment SB4W: Bench 4 West Runoff Area=49,322 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=8.98 cfs 0.350 af

Subcatchment SB5N: Bench 5 North Runoff Area=27,482 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=5.01 cfs 0.195 af

Subcatchment SB5S: Bench 5 South Runoff Area=16,557 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=115' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=3.02 cfs 0.118 af

Subcatchment SB6N: Bench 6 North Runoff Area=51,199 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=9.32 cfs 0.364 af

Subcatchment SB6S: Bench 6 South Runoff Area=21,964 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.2500 '/' Tc=0.5 min CN=74 Runoff=4.00 cfs 0.156 af

Subcatchment ST1: Top Area 1 Runoff Area=34,197 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=270' Slope=0.0200 '/' Tc=16.6 min CN=74 Runoff=3.59 cfs 0.243 af

Subcatchment ST2: Top Area 2 Runoff Area=33,784 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=270' Slope=0.0200 '/' Tc=16.6 min CN=74 Runoff=3.55 cfs 0.240 af

Subcatchment ST3: Top Area 3 Runoff Area=8,820 sf 0.00% Impervious Runoff Depth=3.71"
Flow Length=100' Slope=0.0200 '/' Tc=8.9 min CN=74 Runoff=1.20 cfs 0.063 af

Subcatchment S_ED: Farm Fields Runoff Area=2,421,936 sf 0.00% Impervious Runoff Depth=5.22"
Flow Length=572' Tc=29.4 min CN=88 Runoff=248.38 cfs 24.208 af

Subcatchment WD-D: West Ditch-Direct Runoff Area=121,968 sf 0.00% Impervious Runoff Depth=6.38"
Flow Length=1,100' Slope=0.0010 '/' Tc=40.2 min CN=98 Runoff=11.41 cfs 1.489 af

Reach B-1E: Bench-1 East Avg. Flow Depth=1.07' Max Vel=0.35 fps Inflow=6.52 cfs 0.254 af
n=0.137 L=281.0' S=0.0025 '/' Capacity=8.64 cfs Outflow=3.49 cfs 0.254 af

Reach B-1W: Bench-1 West Avg. Flow Depth=1.03' Max Vel=0.35 fps Inflow=5.07 cfs 0.198 af
n=0.137 L=195.0' S=0.0025 '/' Capacity=8.68 cfs Outflow=3.19 cfs 0.198 af

Reach B-2E: Bench-3 East Avg. Flow Depth=1.06' Max Vel=0.35 fps Inflow=5.83 cfs 0.227 af
n=0.137 L=228.0' S=0.0025 '/' Capacity=8.66 cfs Outflow=3.45 cfs 0.227 af

Reach B-2W: Bench-3 West Avg. Flow Depth=0.98' Max Vel=0.34 fps Inflow=4.78 cfs 0.186 af
n=0.137 L=223.0' S=0.0025 '/' Capacity=8.68 cfs Outflow=2.79 cfs 0.186 af

Reach B-5N: Bench - 5 North Avg. Flow Depth=1.00' Max Vel=0.34 fps Inflow=5.01 cfs 0.195 af
n=0.137 L=230.0' S=0.0025 '/' Capacity=8.62 cfs Outflow=2.89 cfs 0.195 af

Reach B-5S: Bench - 5 South Avg. Flow Depth=0.85' Max Vel=0.30 fps Inflow=3.02 cfs 0.118 af
n=0.137 L=173.0' S=0.0025 '/' Capacity=8.63 cfs Outflow=1.88 cfs 0.118 af

Reach LD-1B: Letdown 1 - Bottom Avg. Flow Depth=0.19' Max Vel=4.46 fps Inflow=8.93 cfs 0.695 af
n=0.053 L=88.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=8.93 cfs 0.695 af

Reach LD-1M: Letdown 1 - Middle Avg. Flow Depth=0.23' Max Vel=3.65 fps Inflow=8.93 cfs 0.695 af
n=0.046 L=20.0' S=0.1000 '/' Capacity=411.60 cfs Outflow=8.93 cfs 0.695 af

Reach LD-1T: Letdown 1 - Top Avg. Flow Depth=0.11' Max Vel=3.16 fps Inflow=3.59 cfs 0.243 af
n=0.053 L=100.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=3.59 cfs 0.243 af

Reach LD-2B: Letdown 2 - Bottom Avg. Flow Depth=0.18' Max Vel=4.37 fps Inflow=8.48 cfs 0.654 af
n=0.053 L=88.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=8.47 cfs 0.654 af

Reach LD-2M: Letdown 2 - Middle Avg. Flow Depth=0.22' Max Vel=3.58 fps Inflow=8.48 cfs 0.654 af
n=0.046 L=20.0' S=0.1000 '/' Capacity=411.60 cfs Outflow=8.48 cfs 0.654 af

Reach LD-2T: Letdown 2 - Top Avg. Flow Depth=0.11' Max Vel=3.14 fps Inflow=3.55 cfs 0.240 af
n=0.053 L=100.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=3.54 cfs 0.240 af

Reach LD-3B: Letdown 3 - Bottom Avg. Flow Depth=0.15' Max Vel=3.79 fps Inflow=5.80 cfs 0.375 af
n=0.053 L=88.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=5.79 cfs 0.375 af

Reach LD-3M: Letdown 3 - Middle Avg. Flow Depth=0.18' Max Vel=3.11 fps Inflow=5.80 cfs 0.375 af
n=0.046 L=20.0' S=0.1000 '/' Capacity=411.60 cfs Outflow=5.80 cfs 0.375 af

Reach LD-3T: Letdown 3 - Top Avg. Flow Depth=0.06' Max Vel=2.07 fps Inflow=1.20 cfs 0.063 af
n=0.053 L=100.0' S=0.2500 '/' Capacity=564.84 cfs Outflow=1.19 cfs 0.063 af

Pond ED: Existing Ditch Peak Elev=290.34' Storage=956,184 cf Inflow=251.37 cfs 29.123 af
15.0" Round Culvert n=0.013 L=40.0' S=0.0058 '/' Outflow=5.68 cfs 28.364 af

Pond ID: Interior Ditch Peak Elev=293.89' Storage=26,406 cf Inflow=61.60 cfs 3.425 af
21.0" Round Culvert x 3.00 n=0.013 L=60.0' S=0.0167 '/' Outflow=27.66 cfs 3.425 af

Pond WD: West Ditch Peak Elev=289.91' Storage=117,107 cf Inflow=35.95 cfs 4.914 af
15.7" Round Culvert n=0.013 L=45.0' S=0.0002 '/' Outflow=4.27 cfs 4.915 af

Link L1: To Interior Ditch Inflow=9.82 cfs 0.383 af
Primary=9.82 cfs 0.383 af

Link L2: To Interior Ditch Inflow=28.18 cfs 1.526 af
Primary=28.18 cfs 1.526 af

Link L3: To Interior Ditch Inflow=43.71 cfs 2.530 af
Primary=43.71 cfs 2.530 af

Link L4: To Interior Ditch Inflow=52.99 cfs 2.894 af
Primary=52.99 cfs 2.894 af

Link L5: To West Ditch Inflow=27.66 cfs 3.425 af
Primary=27.66 cfs 3.425 af

Link L6: To Existing Ditch Inflow=4.27 cfs 4.915 af
Primary=4.27 cfs 4.915 af

Total Runoff Area = 69.470 ac Runoff Volume = 29.122 af Average Runoff Depth = 5.03"
100.00% Pervious = 69.470 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment SB1E: Bench 1 East

[49] Hint: Tc<2dt may require smaller dt

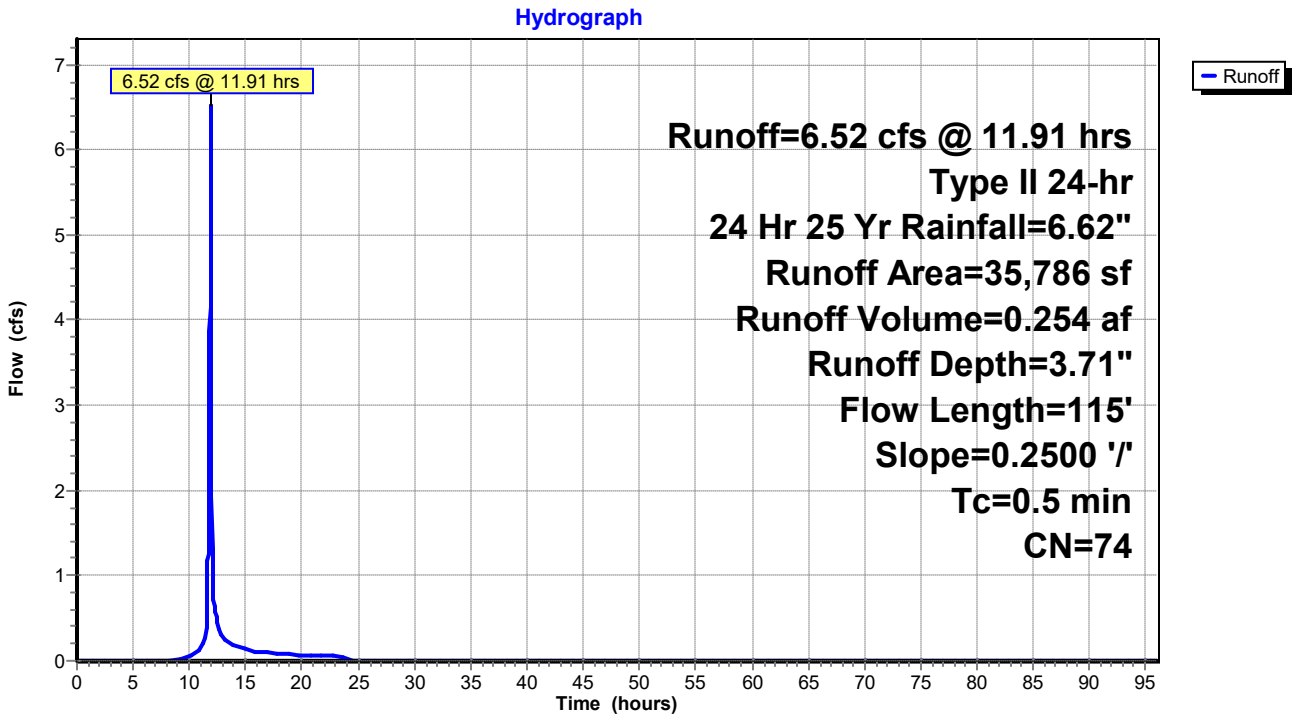
Runoff = 6.52 cfs @ 11.91 hrs, Volume= 0.254 af, Depth= 3.71"
Routed to Reach B-1E : Bench-1 East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
35,786	74	Pasture/grassland/range, Good, HSG C
35,786		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB1E: Bench 1 East



Summary for Subcatchment SB1W: Bench 1 West

[49] Hint: Tc<2dt may require smaller dt

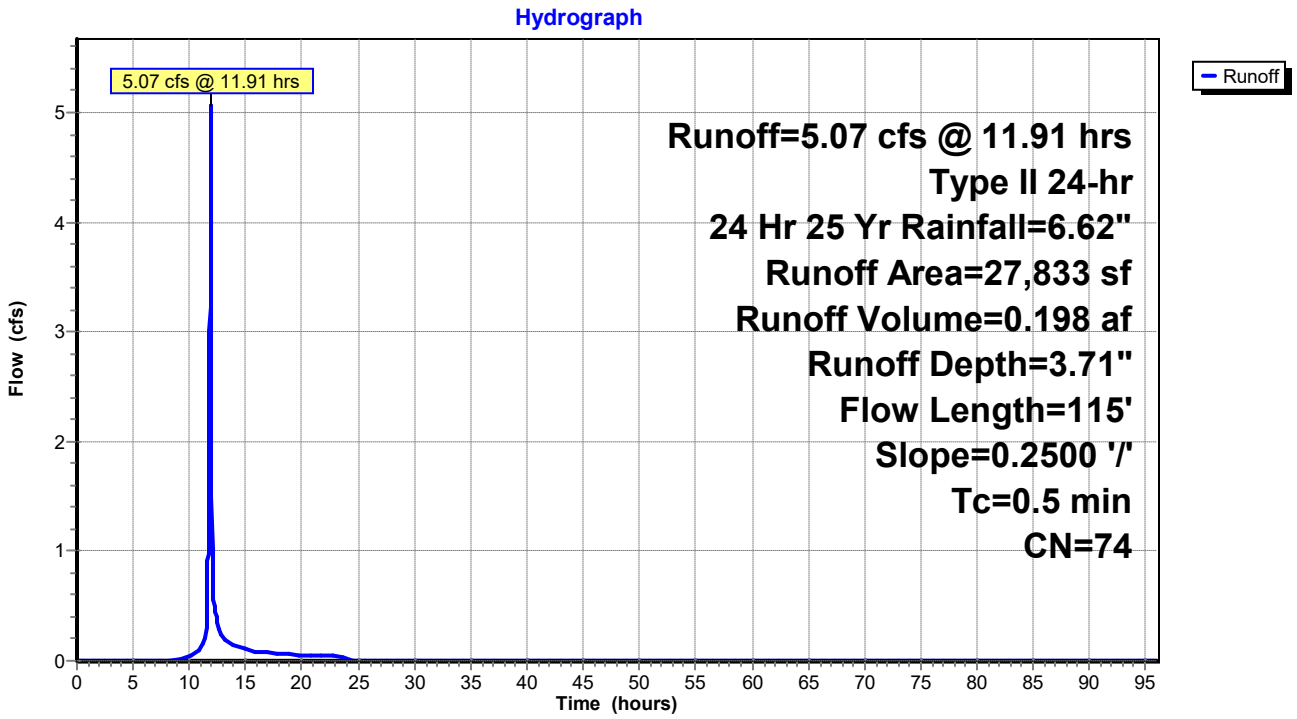
Runoff = 5.07 cfs @ 11.91 hrs, Volume= 0.198 af, Depth= 3.71"
Routed to Reach B-1W : Bench-1 West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
27,833	74	Pasture/grassland/range, Good, HSG C
27,833		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB1W: Bench 1 West



Summary for Subcatchment SB2E: Bench 2 East

[49] Hint: Tc<2dt may require smaller dt

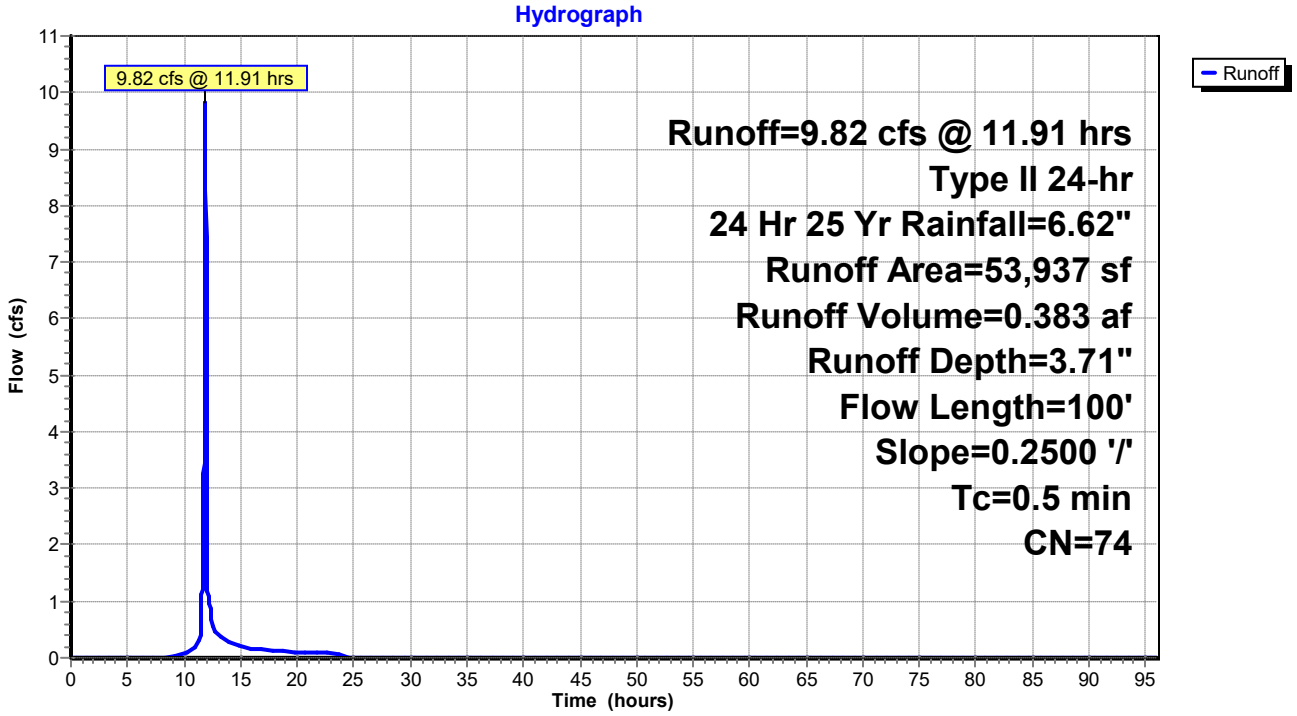
Runoff = 9.82 cfs @ 11.91 hrs, Volume= 0.383 af, Depth= 3.71"
Routed to Link L1 : To Interior Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
53,937	74	Pasture/grassland/range, Good, HSG C
53,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	100	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB2E: Bench 2 East



Summary for Subcatchment SB3&4: Bench 2 & 4 Middle

[49] Hint: Tc<2dt may require smaller dt

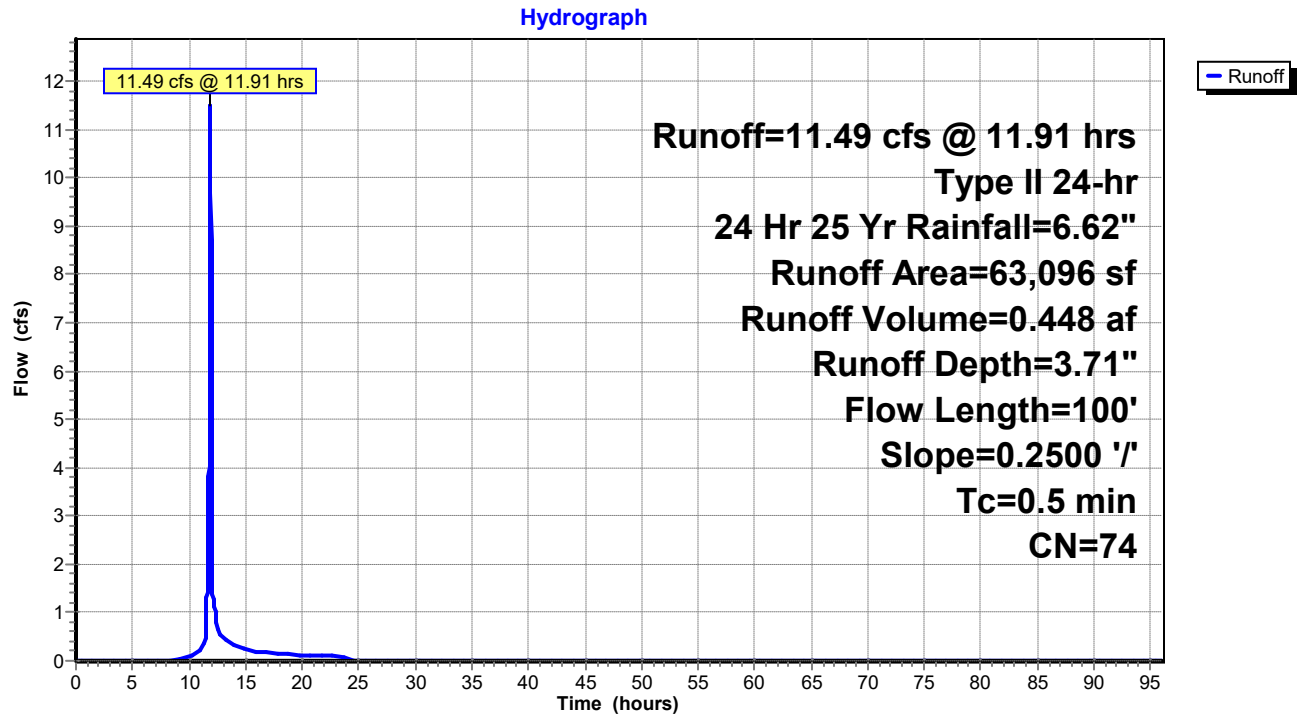
Runoff = 11.49 cfs @ 11.91 hrs, Volume= 0.448 af, Depth= 3.71"
Routed to Link L2 : To Interior Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
63,096	74	Pasture/grassland/range, Good, HSG C
63,096		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	100	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB3&4: Bench 2 & 4 Middle



Summary for Subcatchment SB3E: Bench 3 East

[49] Hint: Tc<2dt may require smaller dt

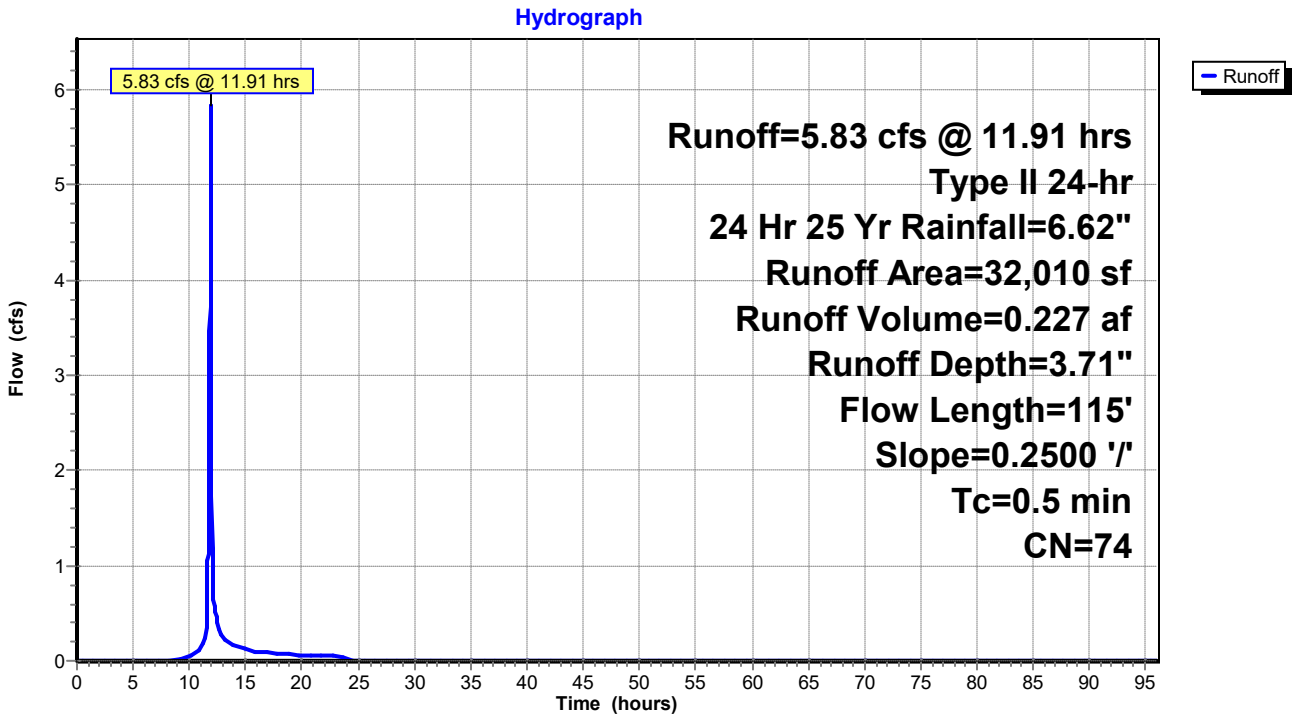
Runoff = 5.83 cfs @ 11.91 hrs, Volume= 0.227 af, Depth= 3.71"
Routed to Reach B-2E : Bench-3 East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
32,010	74	Pasture/grassland/range, Good, HSG C
32,010		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB3E: Bench 3 East



Summary for Subcatchment SB3W: Bench 3 West

[49] Hint: Tc<2dt may require smaller dt

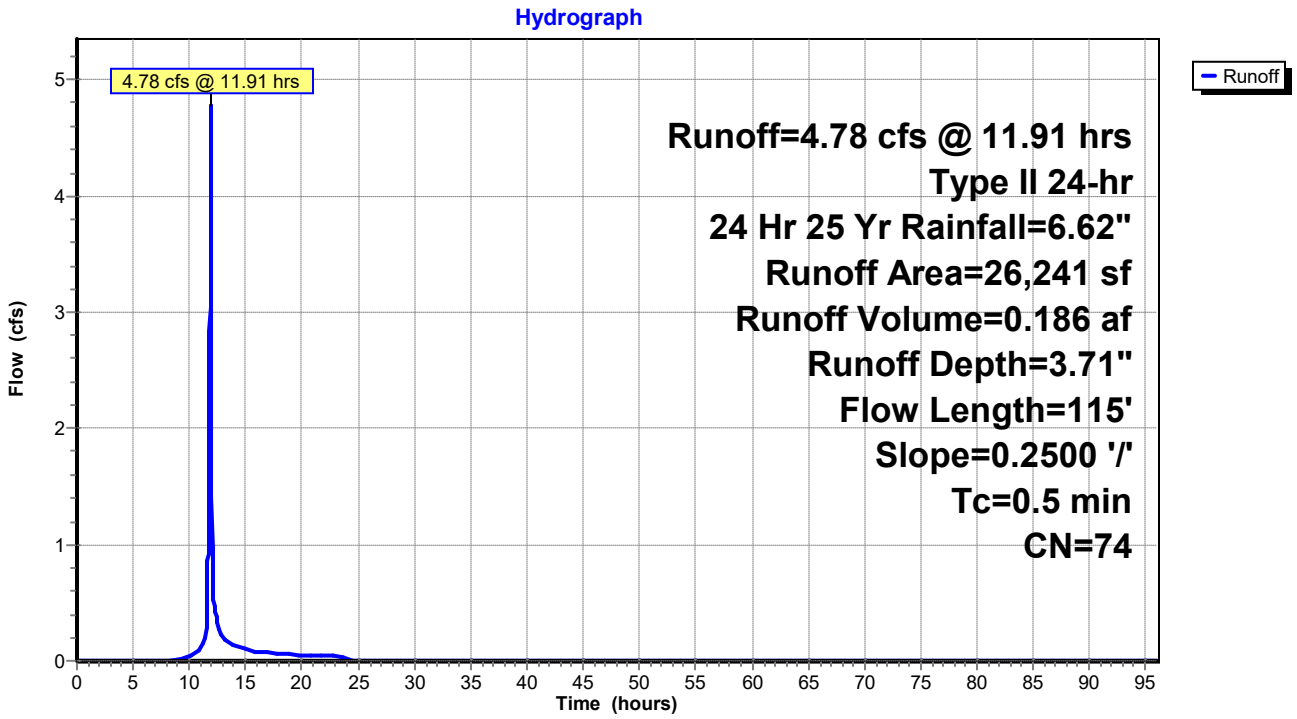
Runoff = 4.78 cfs @ 11.91 hrs, Volume= 0.186 af, Depth= 3.71"
Routed to Reach B-2W : Bench-3 West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
26,241	74	Pasture/grassland/range, Good, HSG C
26,241		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB3W: Bench 3 West



Summary for Subcatchment SB4W: Bench 4 West

[49] Hint: Tc<2dt may require smaller dt

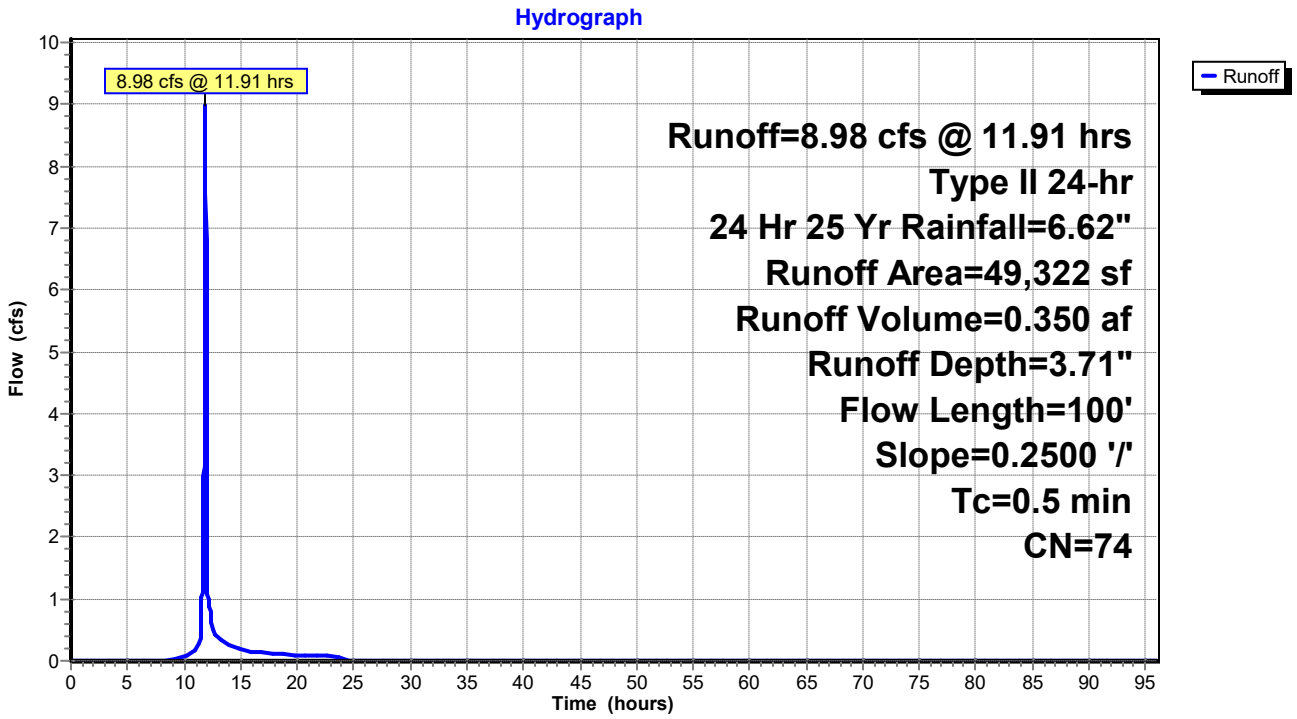
Runoff = 8.98 cfs @ 11.91 hrs, Volume= 0.350 af, Depth= 3.71"
Routed to Link L3 : To Interior Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
49,322	74	Pasture/grassland/range, Good, HSG C
49,322		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	100	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB4W: Bench 4 West



Summary for Subcatchment SB5N: Bench 5 North

[49] Hint: Tc<2dt may require smaller dt

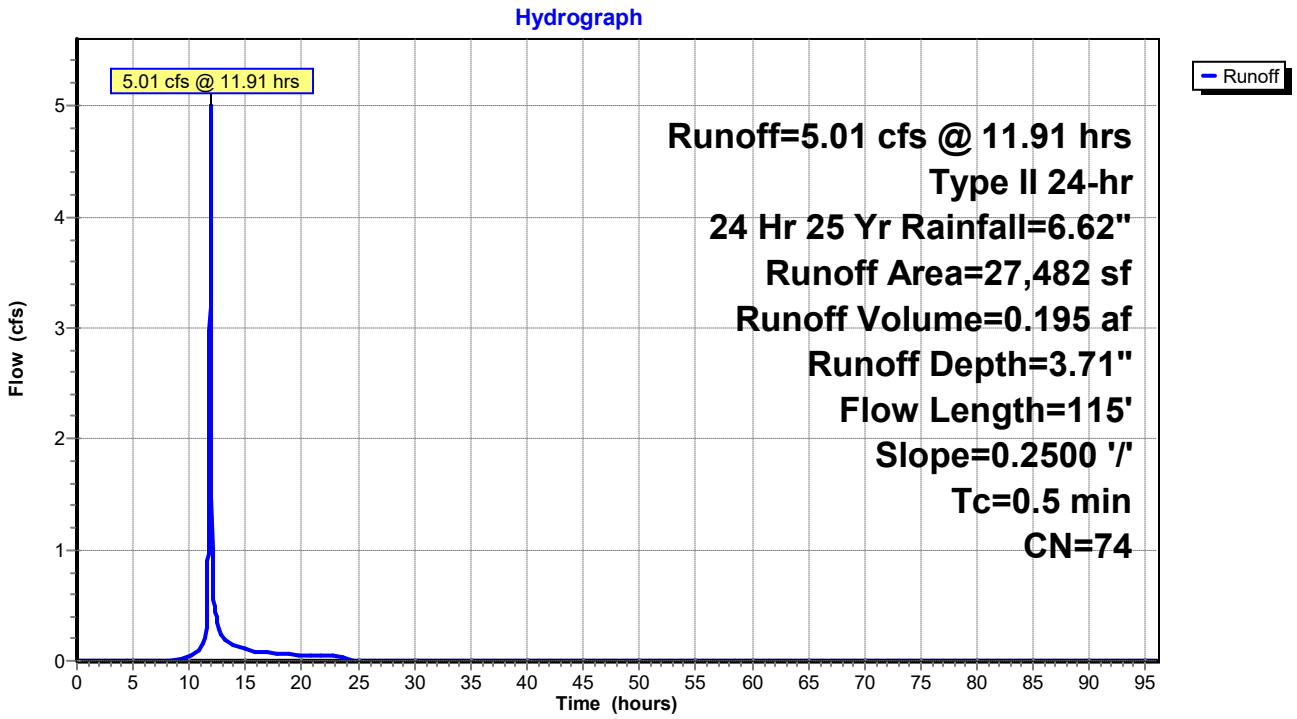
Runoff = 5.01 cfs @ 11.91 hrs, Volume= 0.195 af, Depth= 3.71"
Routed to Reach B-5N : Bench - 5 North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
27,482	74	Pasture/grassland/range, Good, HSG C
27,482		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB5N: Bench 5 North



Summary for Subcatchment SB5S: Bench 5 South

[49] Hint: Tc<2dt may require smaller dt

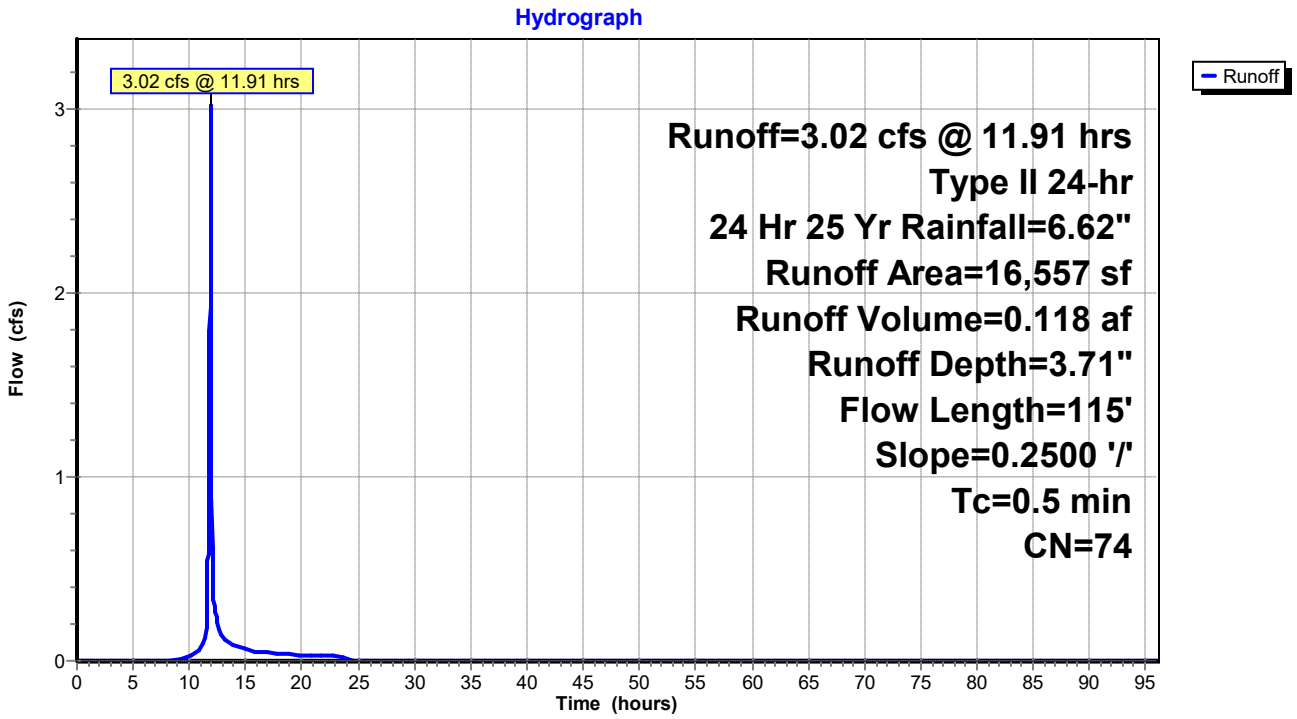
Runoff = 3.02 cfs @ 11.91 hrs, Volume= 0.118 af, Depth= 3.71"
Routed to Reach B-5S : Bench - 5 South

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
16,557	74	Pasture/grassland/range, Good, HSG C
16,557		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	115	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB5S: Bench 5 South



Summary for Subcatchment SB6N: Bench 6 North

[49] Hint: Tc<2dt may require smaller dt

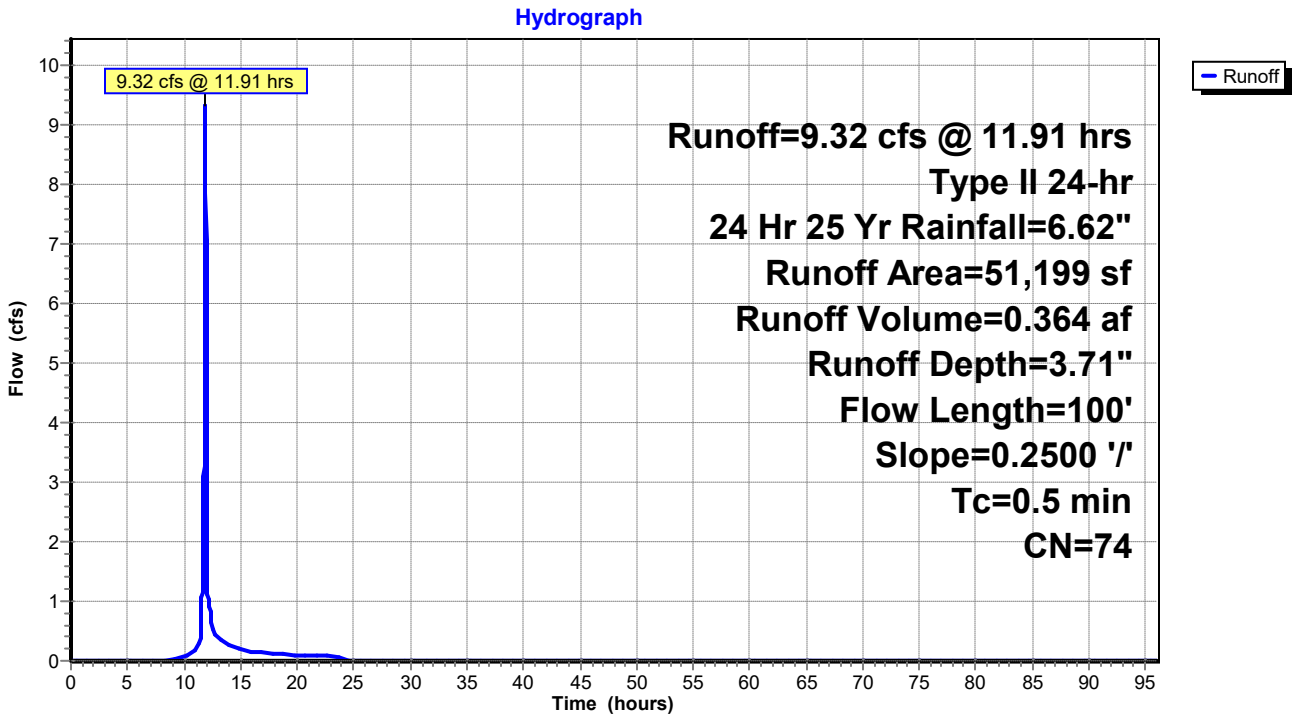
Runoff = 9.32 cfs @ 11.91 hrs, Volume= 0.364 af, Depth= 3.71"
Routed to Link L4 : To Interior Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
51,199	74	Pasture/grassland/range, Good, HSG C
51,199		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	100	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB6N: Bench 6 North



Summary for Subcatchment SB6S: Bench 6 South

[49] Hint: Tc<2dt may require smaller dt

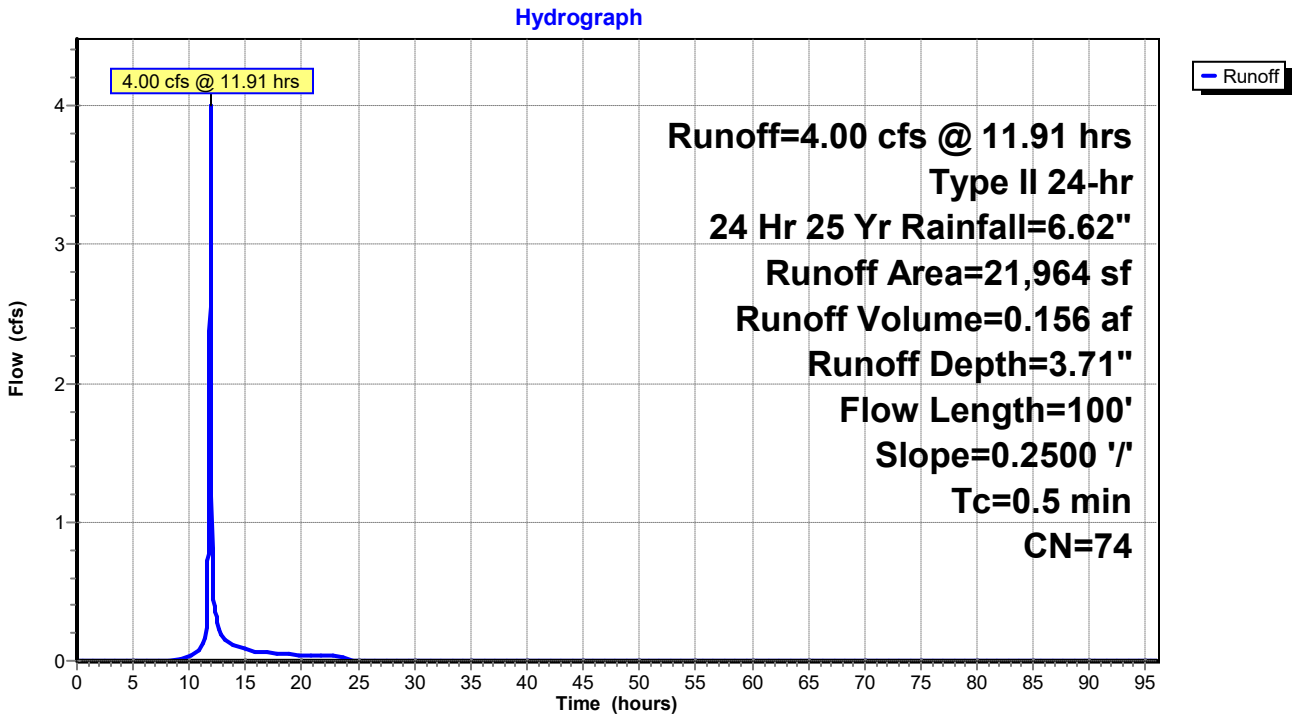
Runoff = 4.00 cfs @ 11.91 hrs, Volume= 0.156 af, Depth= 3.71"
Routed to Pond ID : Interior Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
21,964	74	Pasture/grassland/range, Good, HSG C
21,964		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	100	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment SB6S: Bench 6 South



Summary for Subcatchment ST1: Top Area 1

Partial closure top area draining to letdowns and west ditch.

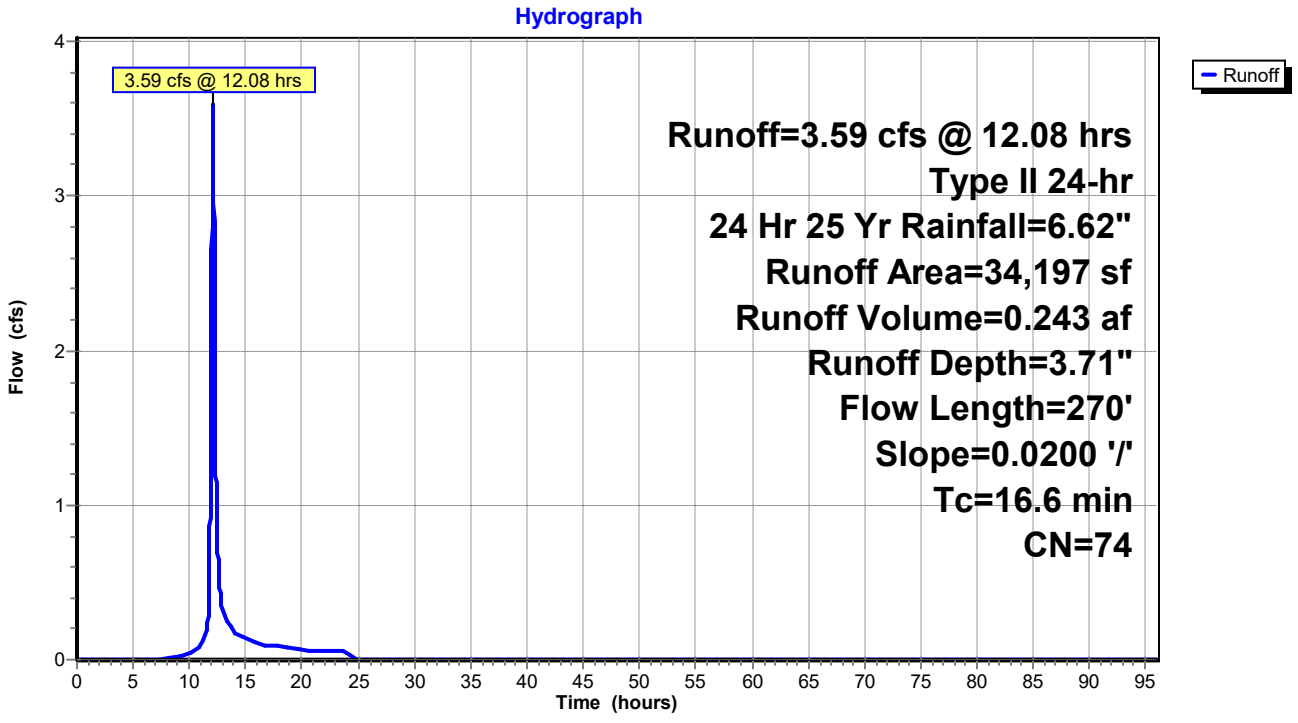
Runoff = 3.59 cfs @ 12.08 hrs, Volume= 0.243 af, Depth= 3.71"
Routed to Reach LD-1T : Letdown 1 - Top

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
34,197	74	Pasture/grassland/range, Good, HSG C
34,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	200	0.0200	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.92"
1.2	70	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	270	Total			

Subcatchment ST1: Top Area 1



Summary for Subcatchment ST2: Top Area 2

Partial closure top area draining to letdowns and west ditch.

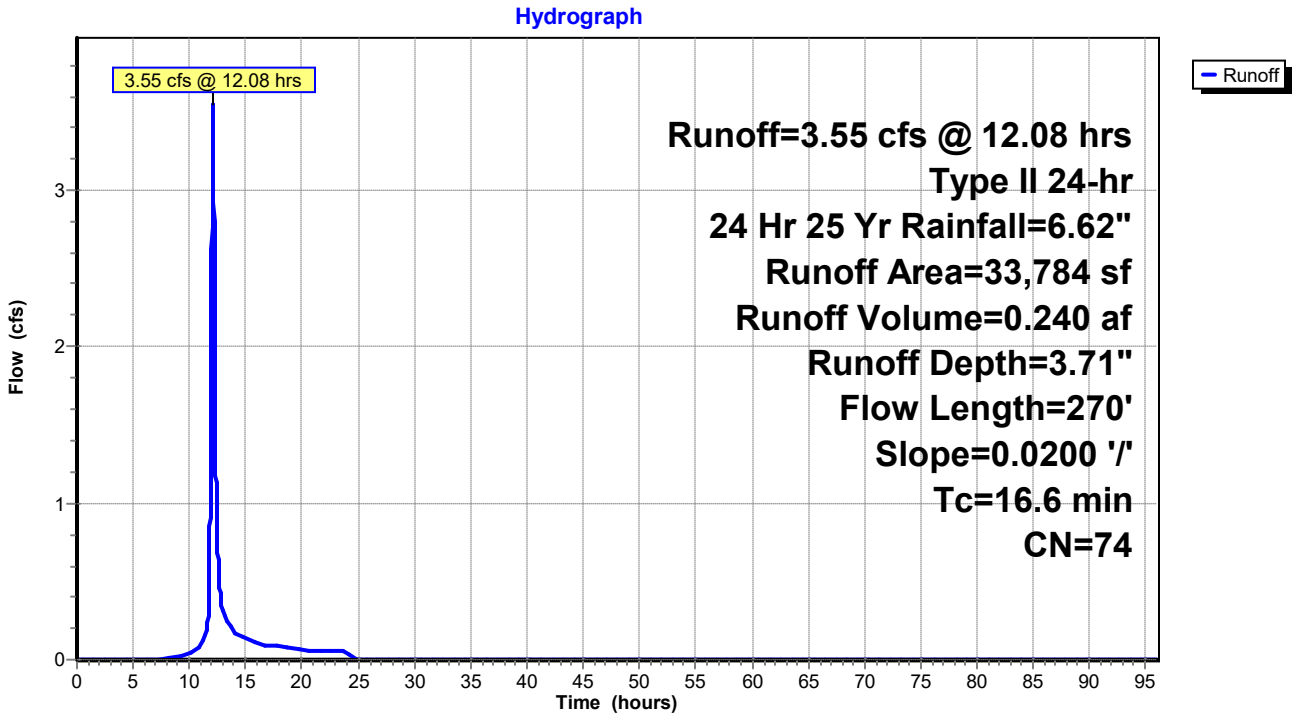
Runoff = 3.55 cfs @ 12.08 hrs, Volume= 0.240 af, Depth= 3.71"
Routed to Reach LD-2T : Letdown 2 - Top

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
33,784	74	Pasture/grassland/range, Good, HSG C
33,784		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	200	0.0200	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.92"
1.2	70	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	270	Total			

Subcatchment ST2: Top Area 2



Summary for Subcatchment ST3: Top Area 3

Partial closure top area draining to letdowns and west ditch.

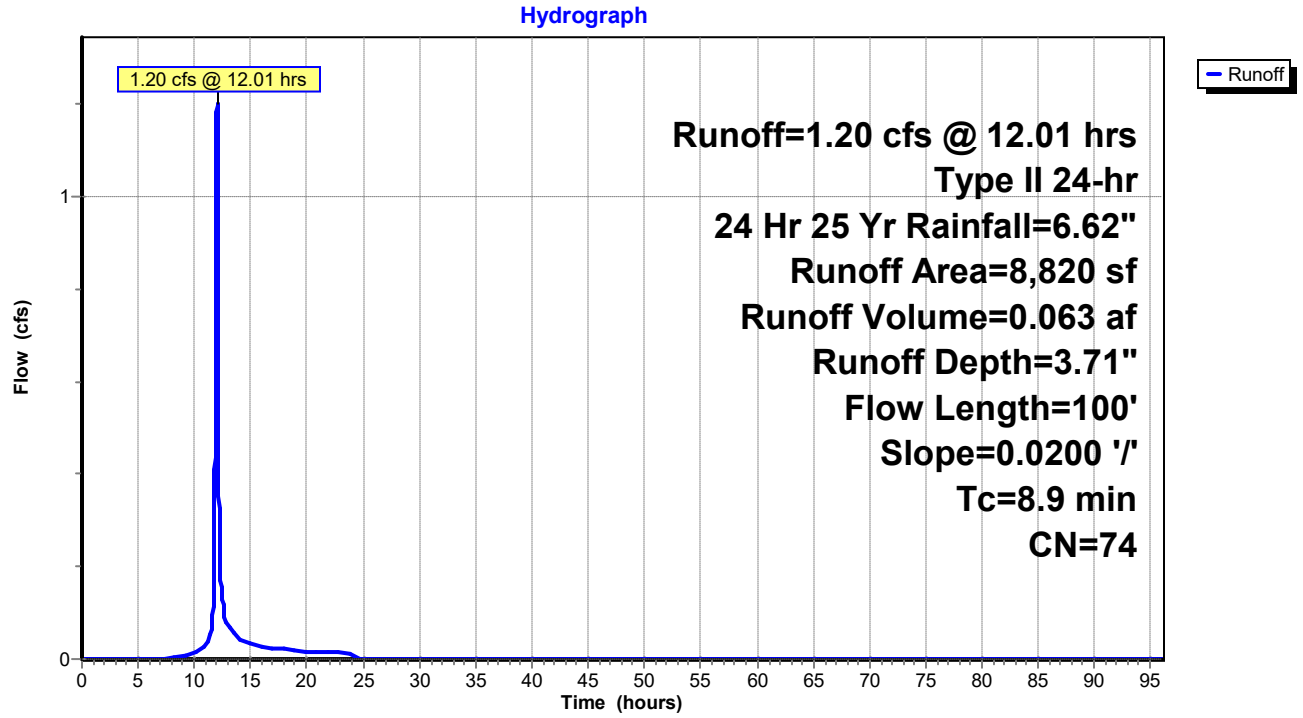
Runoff = 1.20 cfs @ 12.01 hrs, Volume= 0.063 af, Depth= 3.71"
Routed to Reach LD-3T : Letdown 3 - Top

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
8,820	74	Pasture/grassland/range, Good, HSG C
8,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.92"

Subcatchment ST3: Top Area 3



Summary for Subcatchment S_ED: Farm Fields

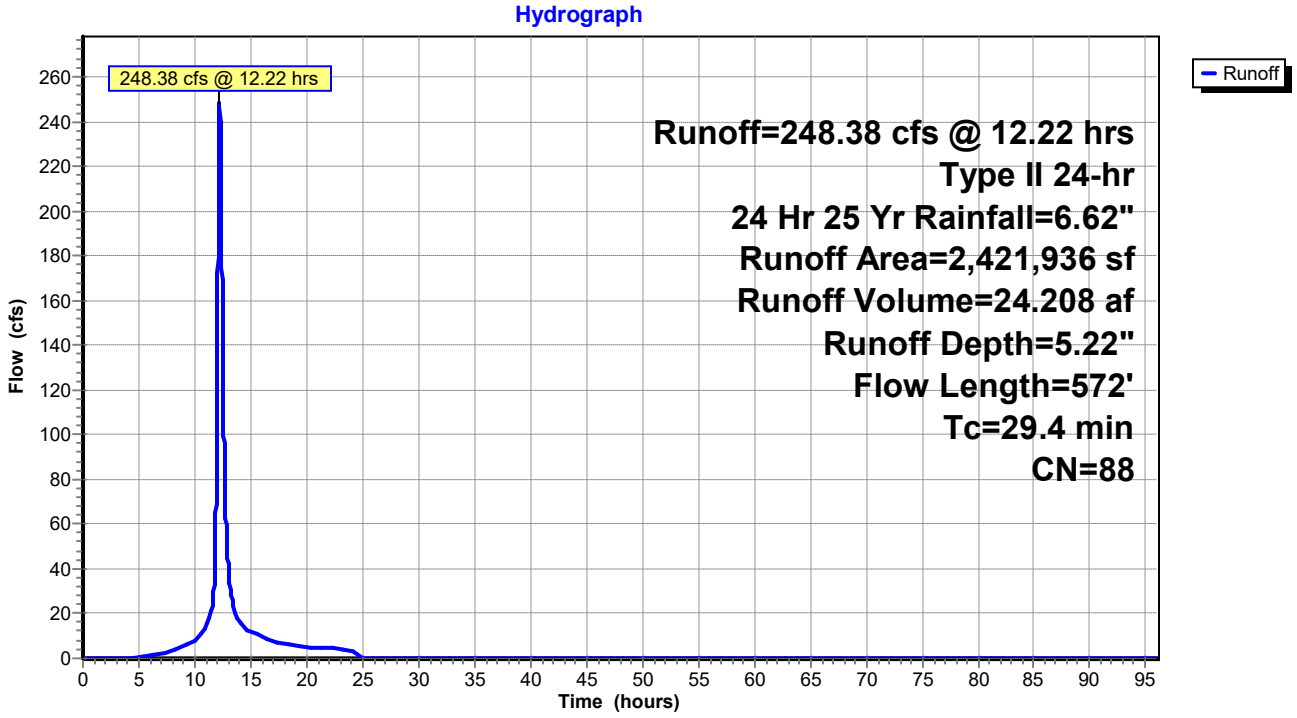
Runoff = 248.38 cfs @ 12.22 hrs, Volume= 24.208 af, Depth= 5.22"
Routed to Pond ED : Existing Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
2,421,936	88	Fallow, crop residue, Good, HSG C
2,421,936		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	185	0.0100	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.92"
10.3	387	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.4	572	Total			

Subcatchment S_ED: Farm Fields



Summary for Subcatchment WD-D: West Ditch-Direct Rainfaill

[47] Hint: Peak is 165% of capacity of segment #1

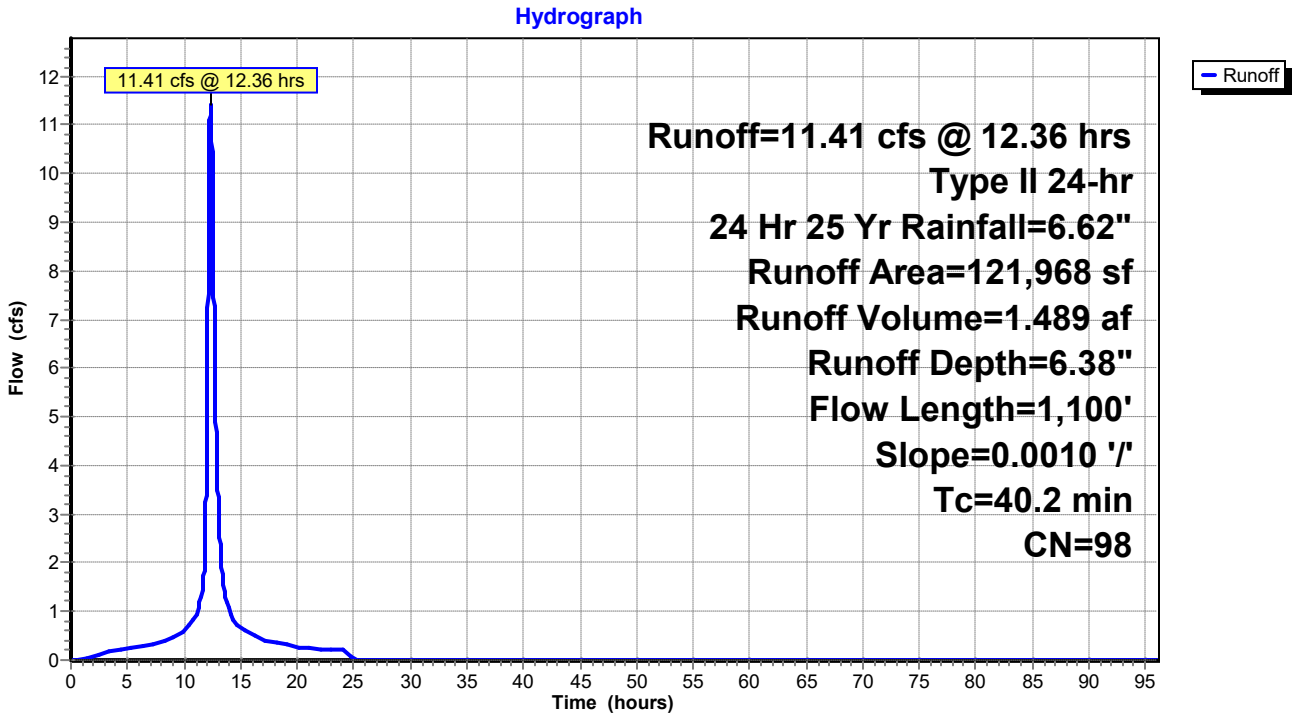
Runoff = 11.41 cfs @ 12.36 hrs, Volume= 1.489 af, Depth= 6.38"
Routed to Pond WD : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 24 Hr 25 Yr Rainfall=6.62"

Area (sf)	CN	Description
121,968	98	Water Surface, 0% imp, HSG C
121,968		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.2	1,100	0.0010	0.46	6.90	**Trap/Vee/Rect Channel Flow,** Bot.W=75.00' D=0.20' Z= 3.0 '/' Top.W=76.20' n= 0.035 High grass

Subcatchment WD-D: West Ditch-Direct Rainfaill



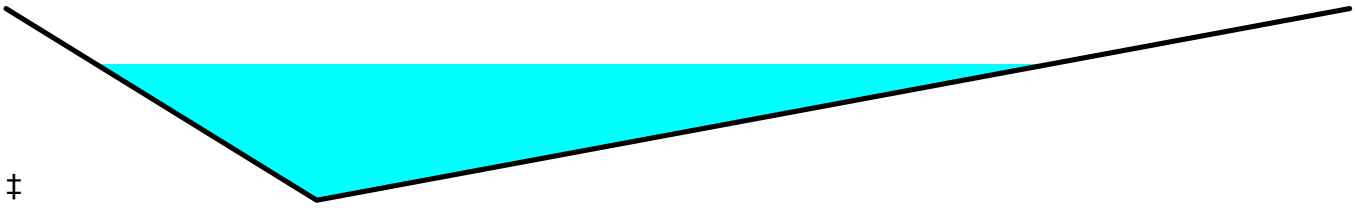
Summary for Reach B-1E: Bench-1 East

Inflow Area = 0.822 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 6.52 cfs @ 11.91 hrs, Volume= 0.254 af
Outflow = 3.49 cfs @ 11.96 hrs, Volume= 0.254 af, Atten= 46%, Lag= 3.5 min
Routed to Reach LD-1M : Letdown 1 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 13.2 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 57.6 min

Peak Storage= 2,771 cf @ 11.96 hrs
Average Depth at Peak Storage= 1.07' , Surface Width= 18.47'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.64 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 281.0' Slope= 0.0025 '/'
Inlet Invert= 316.70', Outlet Invert= 316.00'



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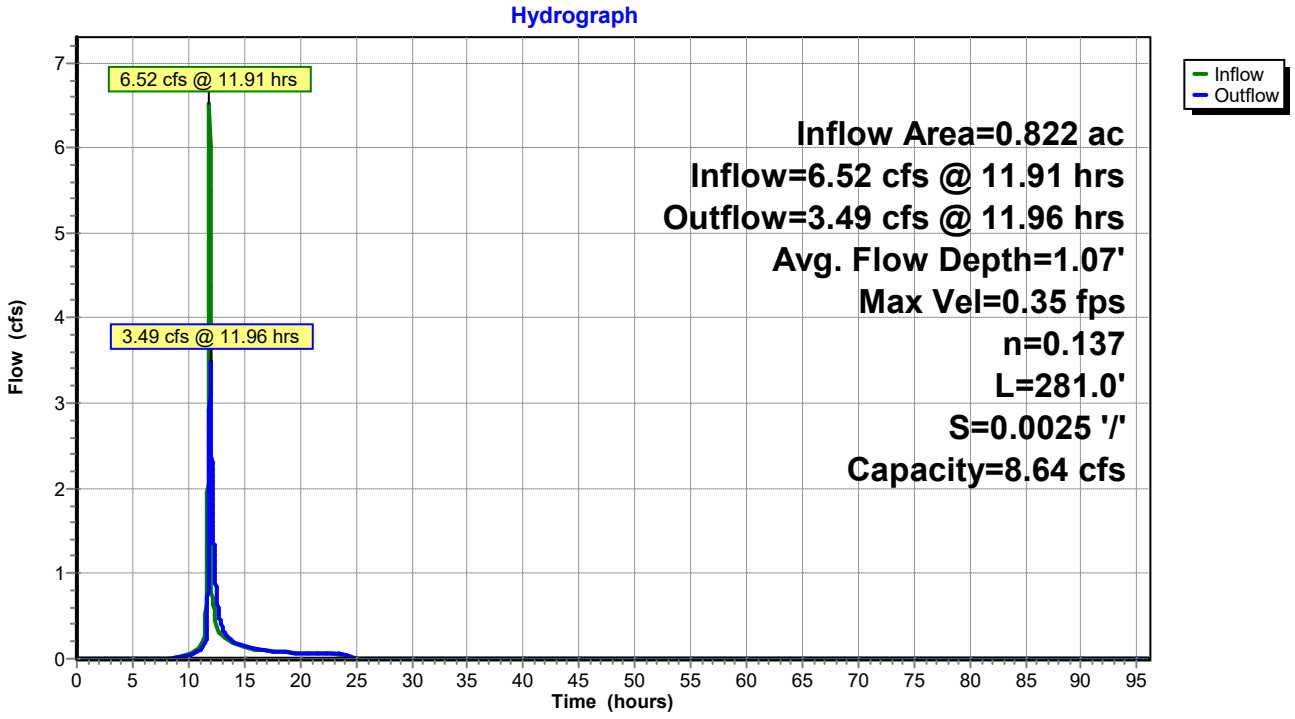
Reach B-1E: Bench-1 East



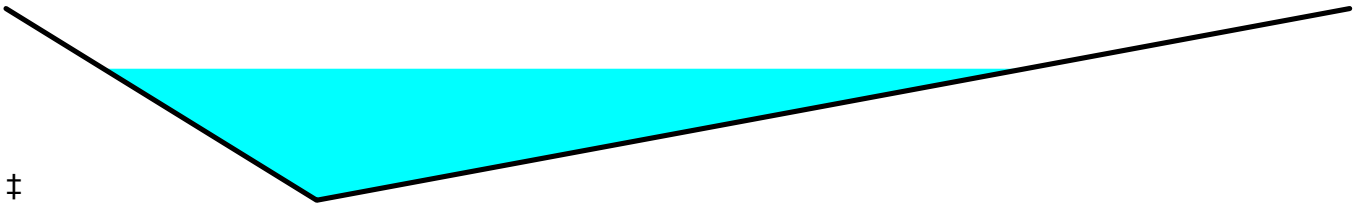
Summary for Reach B-1W: Bench-1 West

Inflow Area = 0.639 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 5.07 cfs @ 11.91 hrs, Volume= 0.198 af
Outflow = 3.19 cfs @ 11.95 hrs, Volume= 0.198 af, Atten= 37%, Lag= 2.9 min
Routed to Reach LD-1M : Letdown 1 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 9.4 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 37.4 min

Peak Storage= 1,791 cf @ 11.95 hrs
Average Depth at Peak Storage= 1.03' , Surface Width= 17.83'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.68 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 195.0' Slope= 0.0025 '/'
Inlet Invert= 316.49', Outlet Invert= 316.00'



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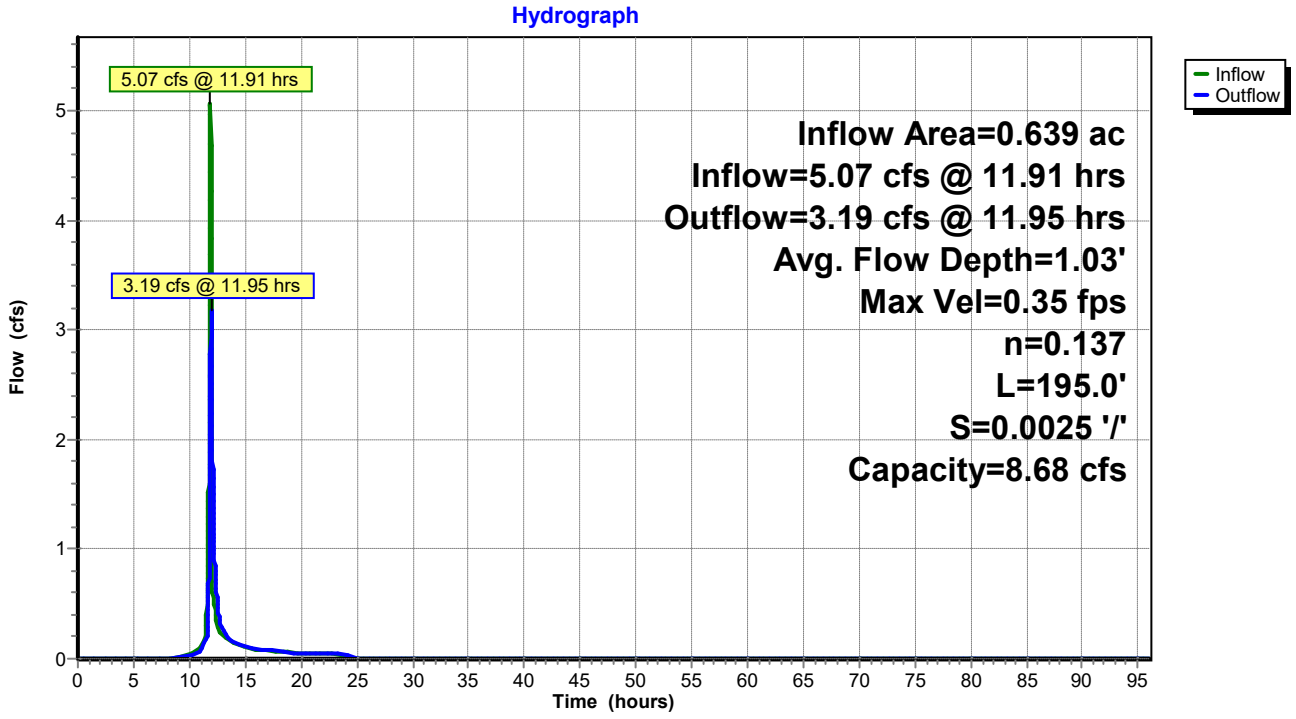
Reach B-1W: Bench-1 West



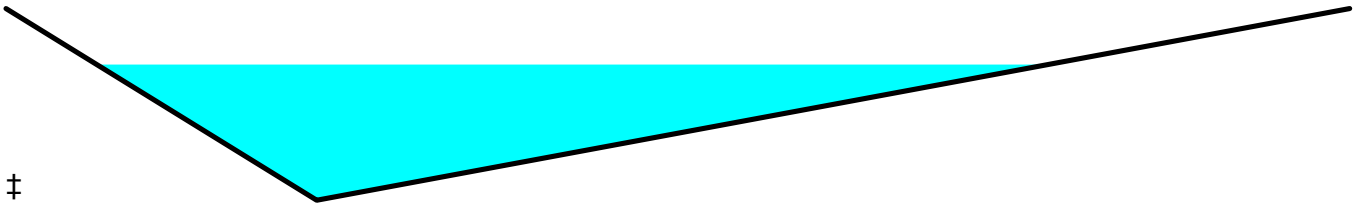
Summary for Reach B-2E: Bench-3 East

Inflow Area = 0.735 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 5.83 cfs @ 11.91 hrs, Volume= 0.227 af
Outflow = 3.45 cfs @ 11.96 hrs, Volume= 0.227 af, Atten= 41%, Lag= 3.1 min
Routed to Reach LD-2M : Letdown 2 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 44.6 min

Peak Storage= 2,226 cf @ 11.96 hrs
Average Depth at Peak Storage= 1.06' , Surface Width= 18.38'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.66 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 228.0' Slope= 0.0025 '/'
Inlet Invert= 316.57', Outlet Invert= 316.00'



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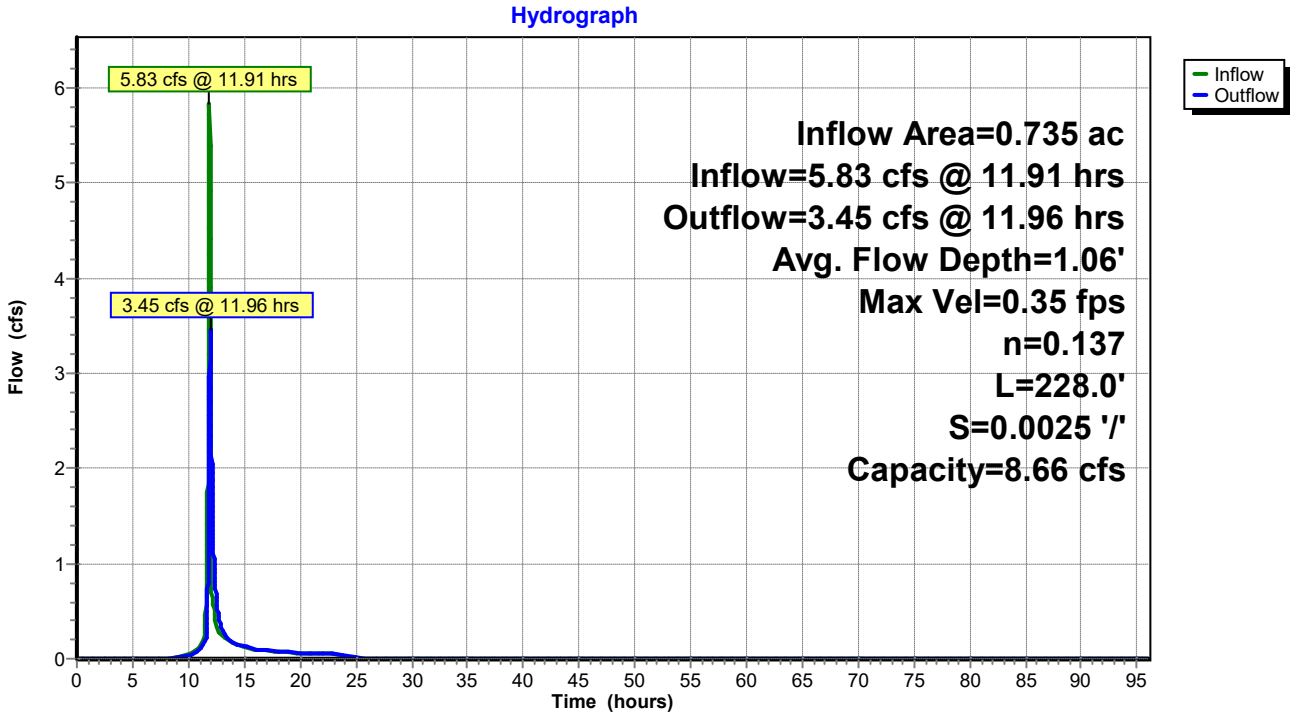
Reach B-2E: Bench-3 East



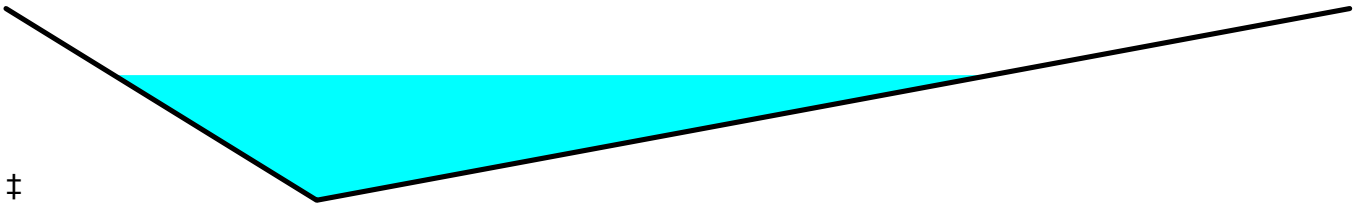
Summary for Reach B-2W: Bench-3 West

Inflow Area = 0.602 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 4.78 cfs @ 11.91 hrs, Volume= 0.186 af
Outflow = 2.79 cfs @ 11.96 hrs, Volume= 0.186 af, Atten= 42%, Lag= 3.2 min
Routed to Reach LD-2M : Letdown 2 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.34 fps, Min. Travel Time= 11.1 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 45.0 min

Peak Storage= 1,854 cf @ 11.96 hrs
Average Depth at Peak Storage= 0.98' , Surface Width= 16.96'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.68 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 223.0' Slope= 0.0025 '/'
Inlet Invert= 316.56', Outlet Invert= 316.00'



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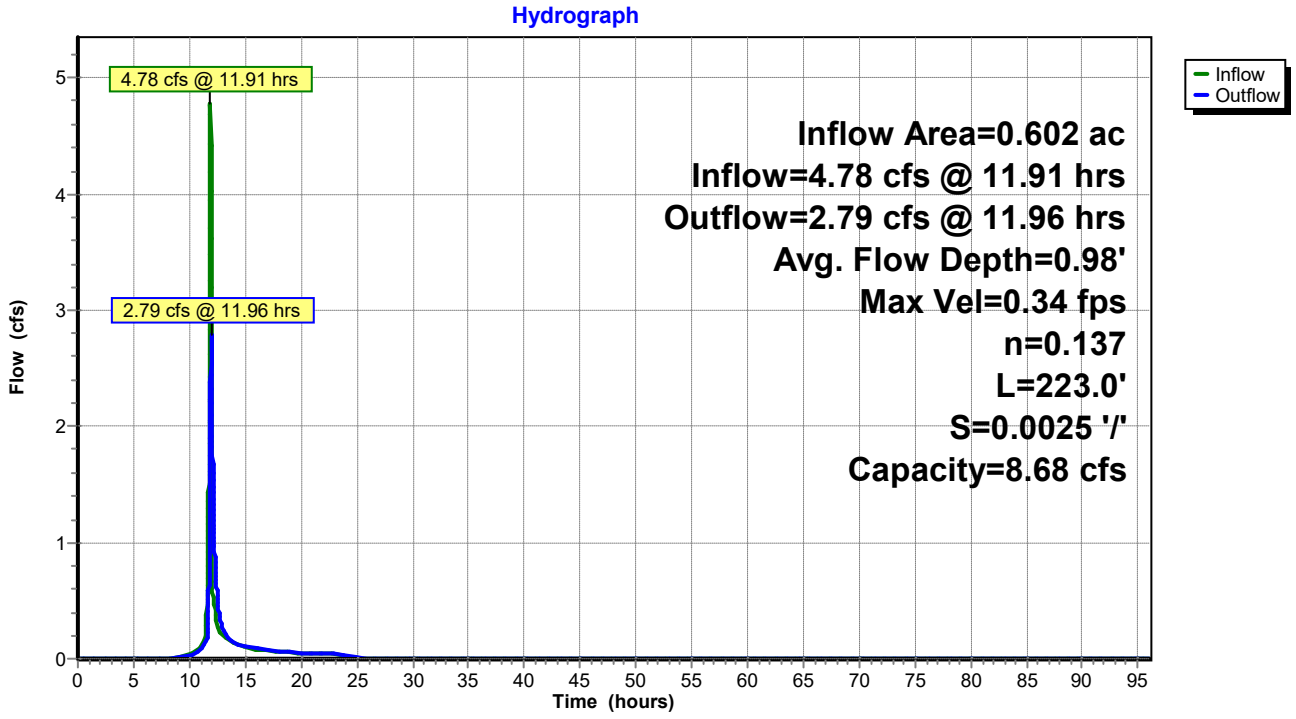
Reach B-2W: Bench-3 West



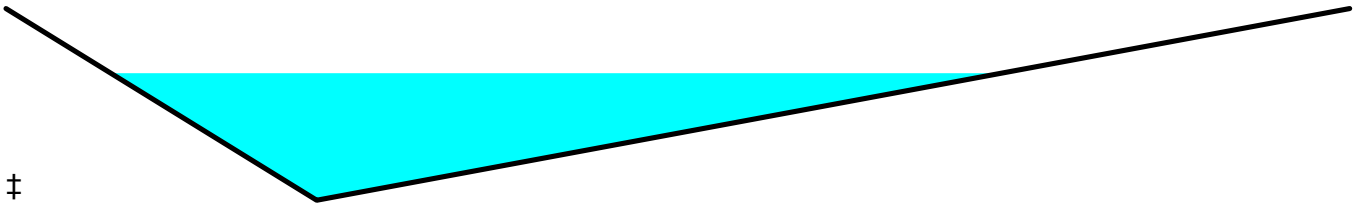
Summary for Reach B-5N: Bench - 5 North

Inflow Area = 0.631 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 5.01 cfs @ 11.91 hrs, Volume= 0.195 af
Outflow = 2.89 cfs @ 11.96 hrs, Volume= 0.195 af, Atten= 42%, Lag= 3.2 min
Routed to Reach LD-3M : Letdown 3 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.34 fps, Min. Travel Time= 11.4 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 46.8 min

Peak Storage= 1,970 cf @ 11.96 hrs
Average Depth at Peak Storage= 1.00' , Surface Width= 17.22'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.62 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 230.0' Slope= 0.0025 '/'
Inlet Invert= 316.57', Outlet Invert= 316.00'



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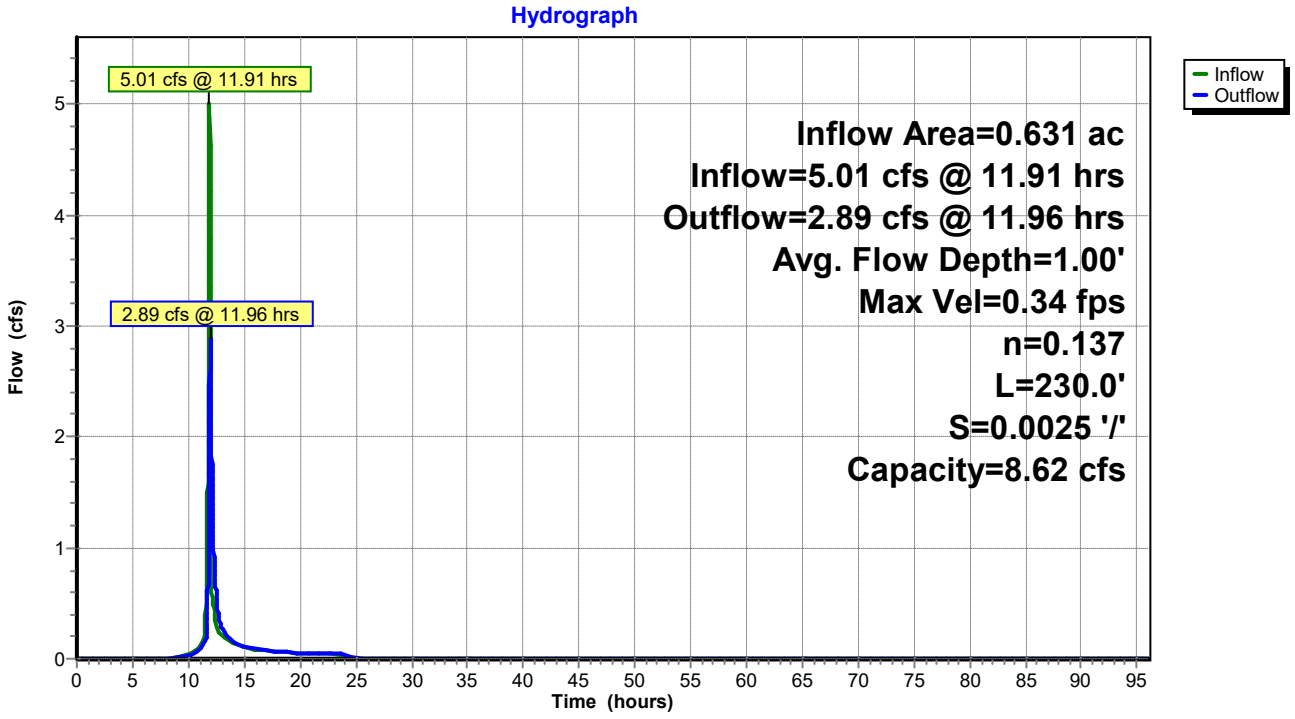
Reach B-5N: Bench - 5 North



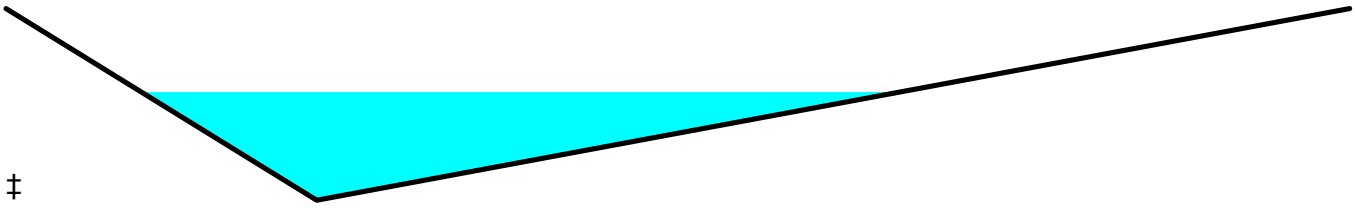
Summary for Reach B-5S: Bench - 5 South

Inflow Area = 0.380 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 3.02 cfs @ 11.91 hrs, Volume= 0.118 af
Outflow = 1.88 cfs @ 11.95 hrs, Volume= 0.118 af, Atten= 38%, Lag= 2.9 min
Routed to Reach LD-3M : Letdown 3 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.30 fps, Min. Travel Time= 9.5 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 36.0 min

Peak Storage= 1,075 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.85' , Surface Width= 14.66'
Bank-Full Depth= 1.50' Flow Area= 19.5 sf, Capacity= 8.63 cfs

0.00' x 1.50' deep channel, n= 0.137
Side Slope Z-value= 4.0 13.3 '/' Top Width= 25.95'
Length= 173.0' Slope= 0.0025 '/'
Inlet Invert= 316.43', Outlet Invert= 316.00'



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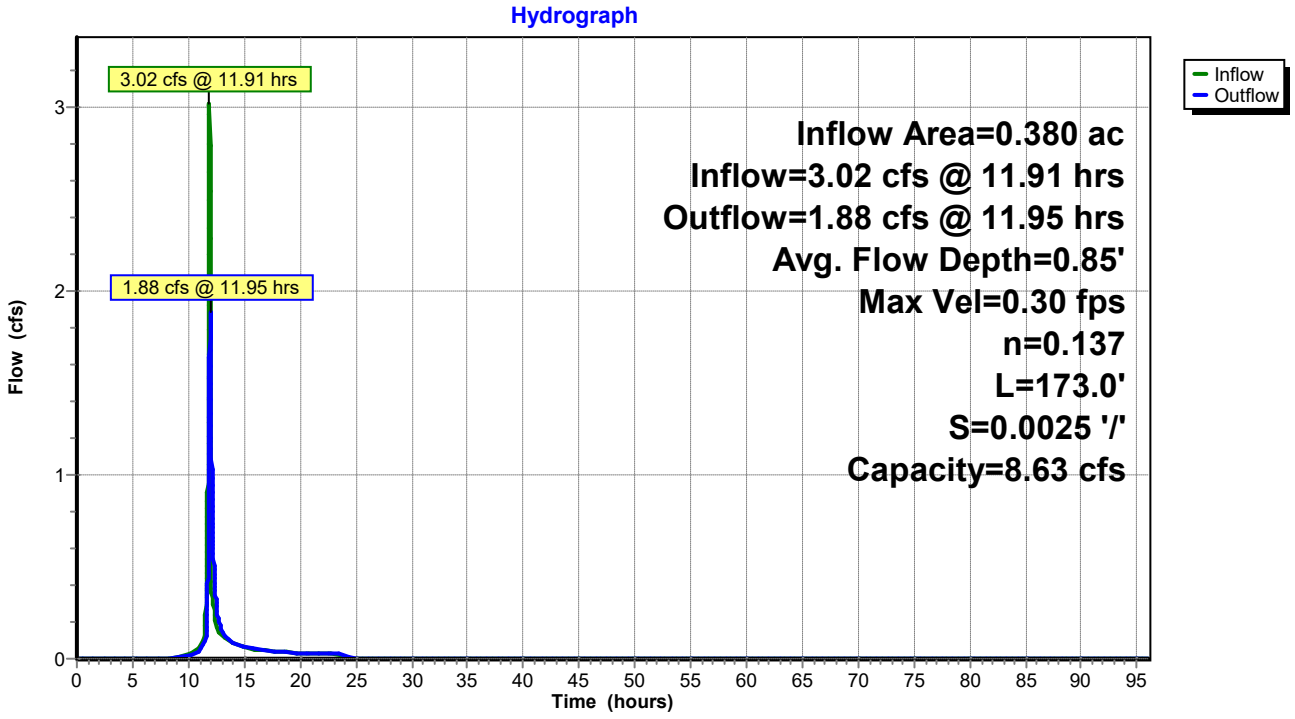
Reach B-5S: Bench - 5 South



Summary for Reach LD-1B: Letdown 1 - Bottom

[61] Hint: Exceeded Reach LD-1M outlet invert by 0.19' @ 11.99 hrs

Inflow Area = 2.246 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 8.93 cfs @ 11.98 hrs, Volume= 0.695 af
Outflow = 8.93 cfs @ 11.99 hrs, Volume= 0.695 af, Atten= 0%, Lag= 0.2 min
Routed to Link L2 : To Interior Ditch

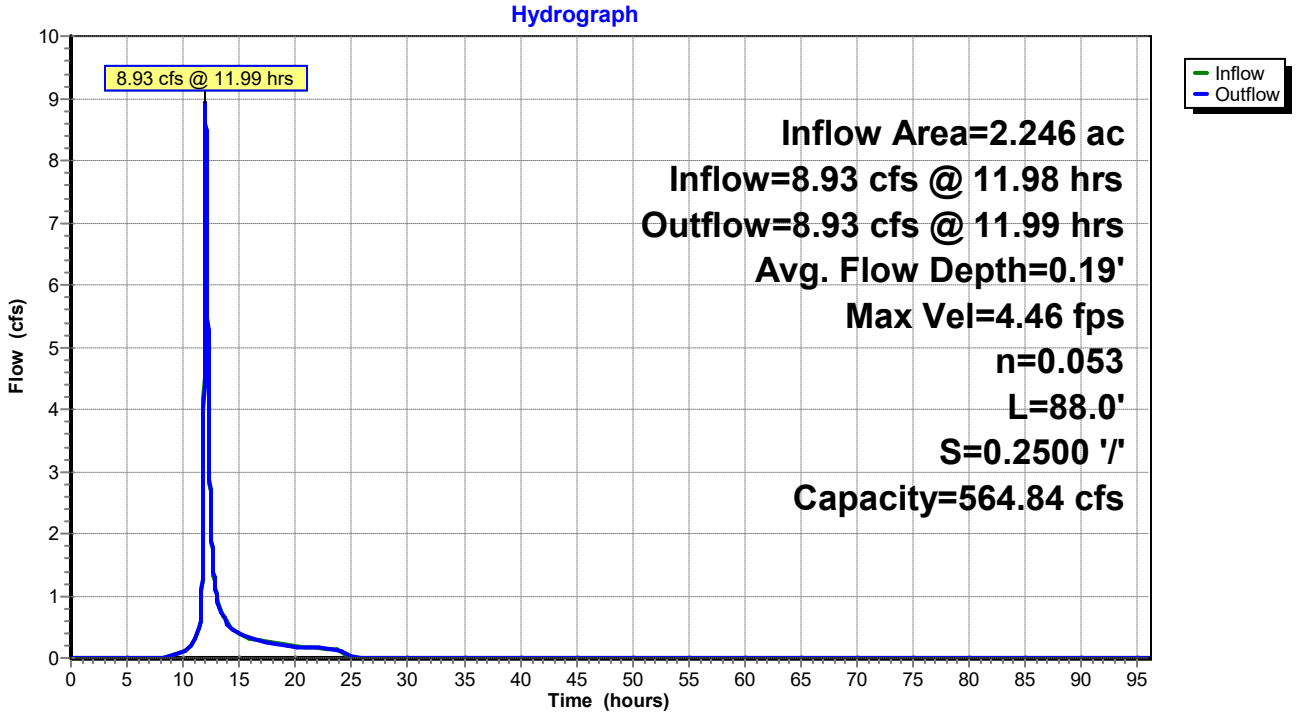
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.46 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 1.2 min

Peak Storage= 176 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 11.14'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 88.0' Slope= 0.2500 '/'
Inlet Invert= 314.10', Outlet Invert= 292.10'

‡

Reach LD-1B: Letdown 1 - Bottom



Summary for Reach LD-1M: Letdown 1 - Middle

[62] Hint: Exceeded Reach B-1E OUTLET depth by 0.10' @ 0.00 hrs
[62] Hint: Exceeded Reach B-1W OUTLET depth by 0.10' @ 92.23 hrs
[62] Hint: Exceeded Reach LD-1T OUTLET depth by 0.15' @ 11.95 hrs

Inflow Area = 2.246 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 8.93 cfs @ 11.98 hrs, Volume= 0.695 af
Outflow = 8.93 cfs @ 11.98 hrs, Volume= 0.695 af, Atten= 0%, Lag= 0.1 min
Routed to Reach LD-1B : Letdown 1 - Bottom

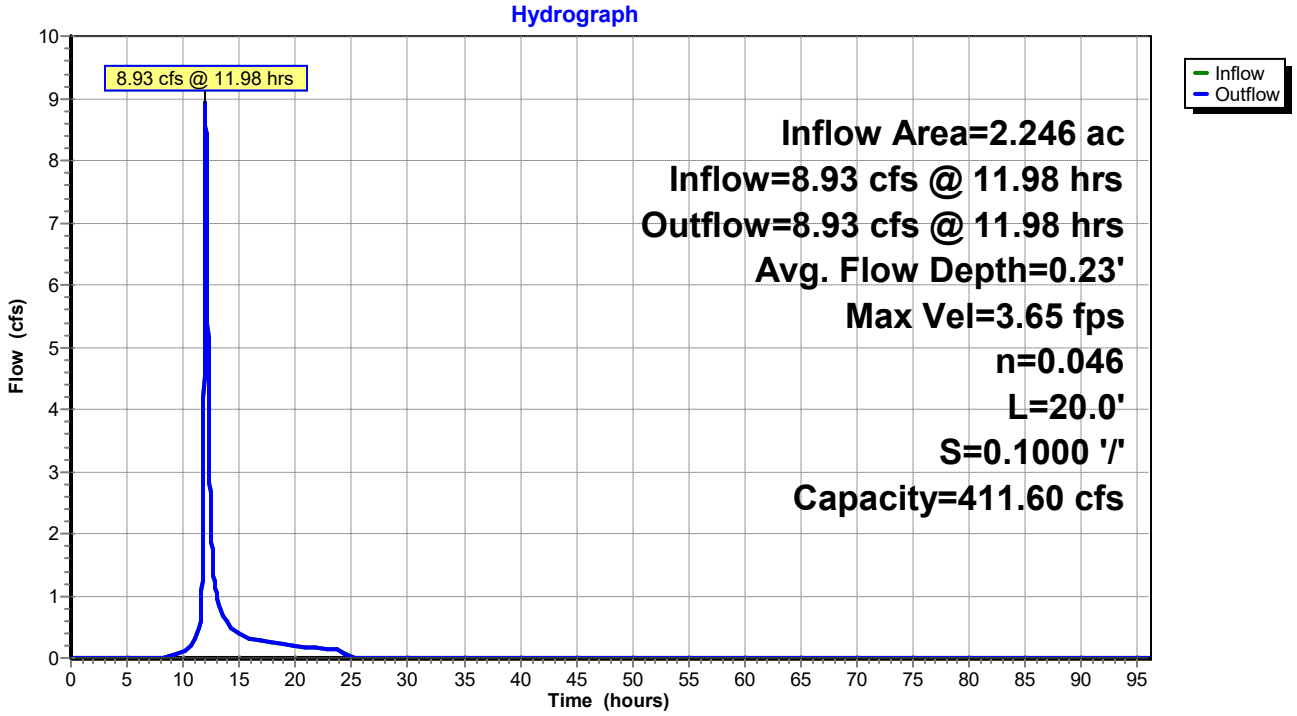
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.65 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.4 min

Peak Storage= 49 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 11.37'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 411.60 cfs

10.00' x 2.00' deep channel, n= 0.046
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 20.0' Slope= 0.1000 '/'
Inlet Invert= 316.10', Outlet Invert= 314.10'

‡

Reach LD-1M: Letdown 1 - Middle



Summary for Reach LD-1T: Letdown 1 - Top

Inflow Area = 0.785 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 3.59 cfs @ 12.08 hrs, Volume= 0.243 af
Outflow = 3.59 cfs @ 12.09 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.5 min
Routed to Reach LD-1M : Letdown 1 - Middle

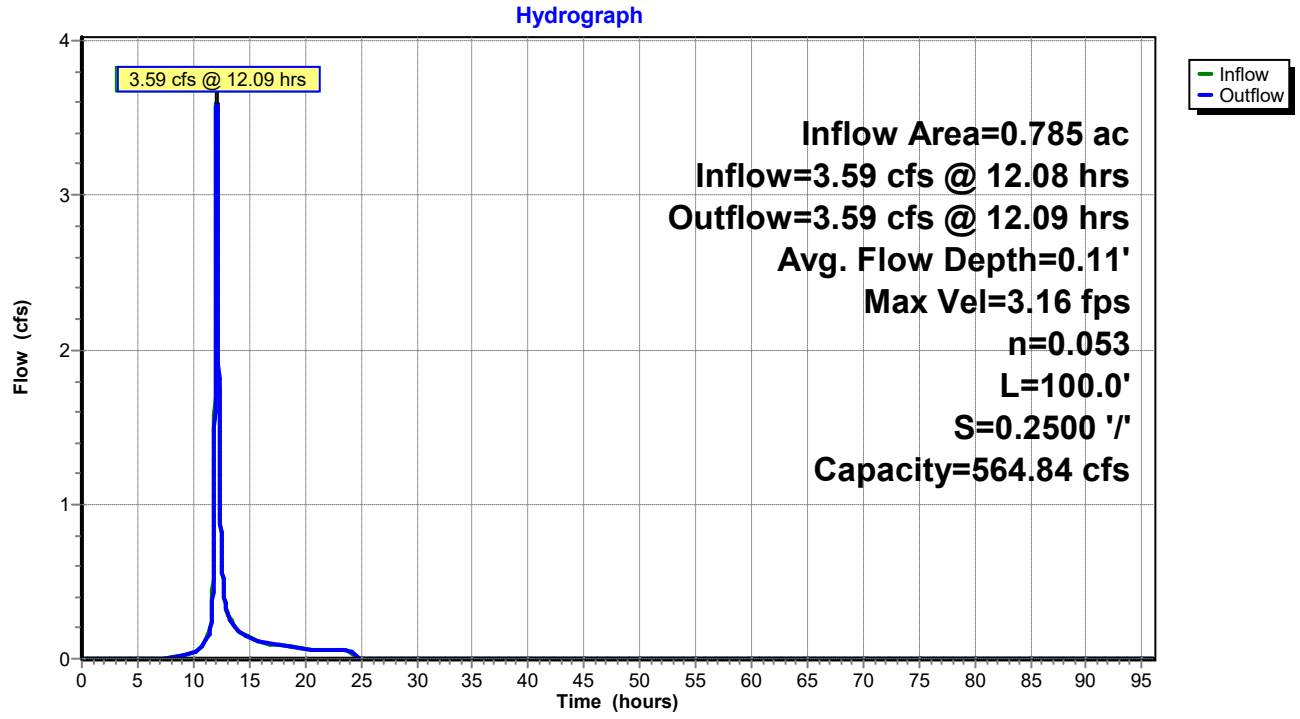
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.16 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.5 min

Peak Storage= 114 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 10.66'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 100.0' Slope= 0.2500 '/'
Inlet Invert= 341.10', Outlet Invert= 316.10'

‡

Reach LD-1T: Letdown 1 - Top



Summary for Reach LD-2B: Letdown 2 - Bottom

[61] Hint: Exceeded Reach LD-2M outlet invert by 0.18' @ 11.99 hrs

Inflow Area = 2.113 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 8.48 cfs @ 11.98 hrs, Volume= 0.654 af
Outflow = 8.47 cfs @ 11.99 hrs, Volume= 0.654 af, Atten= 0%, Lag= 0.2 min
Routed to Link L3 : To Interior Ditch

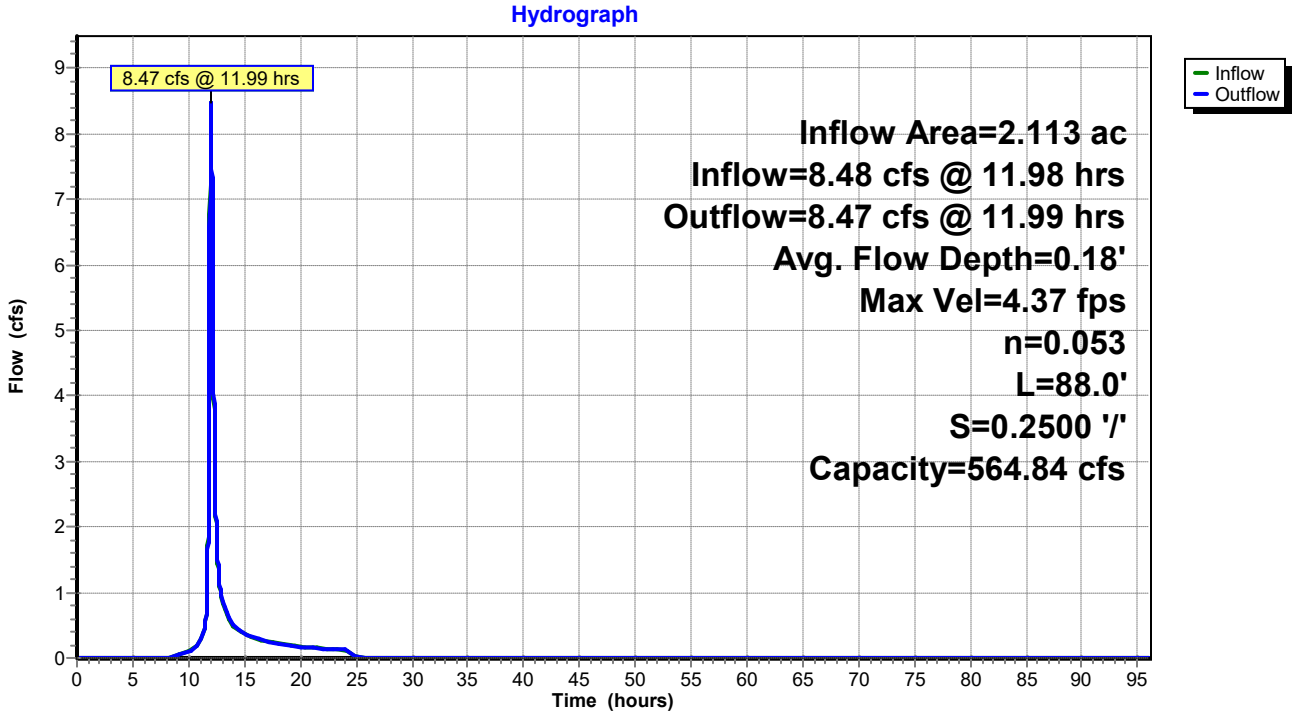
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.37 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 1.2 min

Peak Storage= 171 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 11.10'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 88.0' Slope= 0.2500 '/'
Inlet Invert= 314.10', Outlet Invert= 292.10'

‡

Reach LD-2B: Letdown 2 - Bottom



Summary for Reach LD-2M: Letdown 2 - Middle

[62] Hint: Exceeded Reach B-2E OUTLET depth by 0.10' @ 0.00 hrs
[62] Hint: Exceeded Reach B-2W OUTLET depth by 0.10' @ 0.00 hrs
[62] Hint: Exceeded Reach LD-2T OUTLET depth by 0.14' @ 11.95 hrs

Inflow Area = 2.113 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 8.48 cfs @ 11.98 hrs, Volume= 0.654 af
Outflow = 8.48 cfs @ 11.98 hrs, Volume= 0.654 af, Atten= 0%, Lag= 0.1 min
Routed to Reach LD-2B : Letdown 2 - Bottom

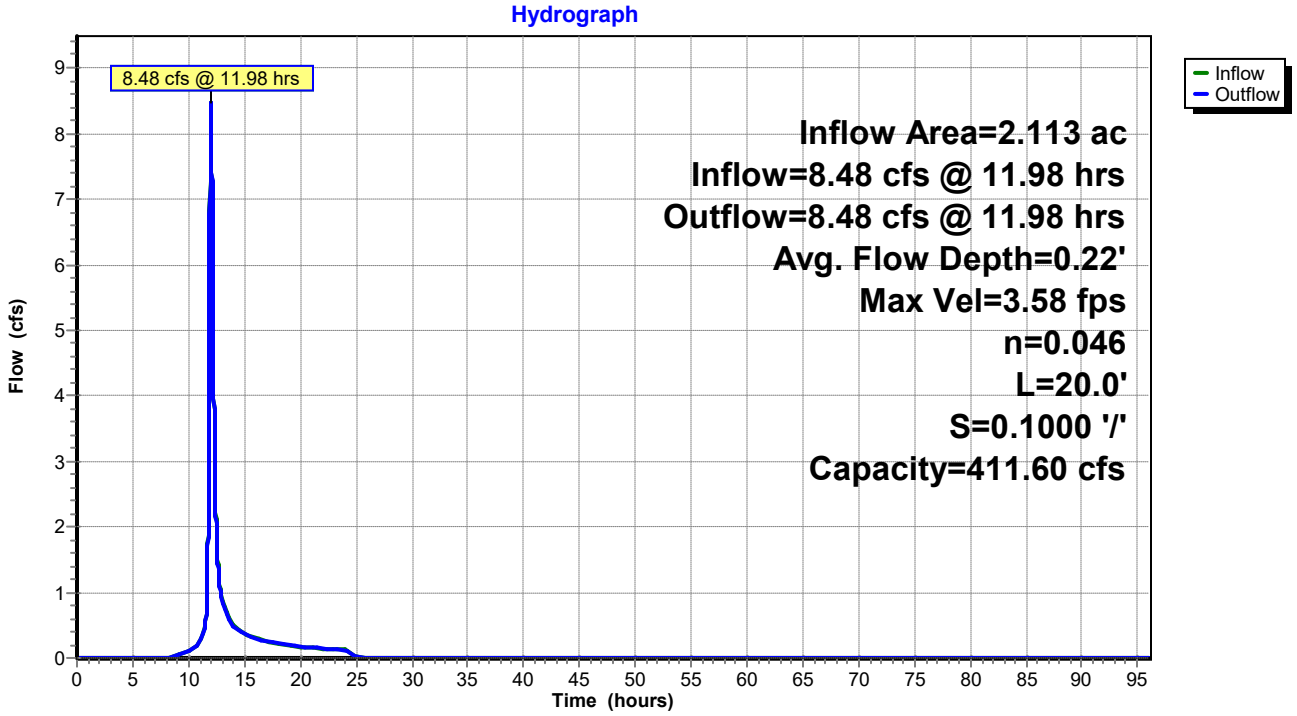
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.58 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 0.4 min

Peak Storage= 47 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 11.33'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 411.60 cfs

10.00' x 2.00' deep channel, n= 0.046
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 20.0' Slope= 0.1000 '/'
Inlet Invert= 316.10', Outlet Invert= 314.10'

‡

Reach LD-2M: Letdown 2 - Middle



Summary for Reach LD-2T: Letdown 2 - Top

Inflow Area = 0.776 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 3.55 cfs @ 12.08 hrs, Volume= 0.240 af
Outflow = 3.54 cfs @ 12.09 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.5 min
Routed to Reach LD-2M : Letdown 2 - Middle

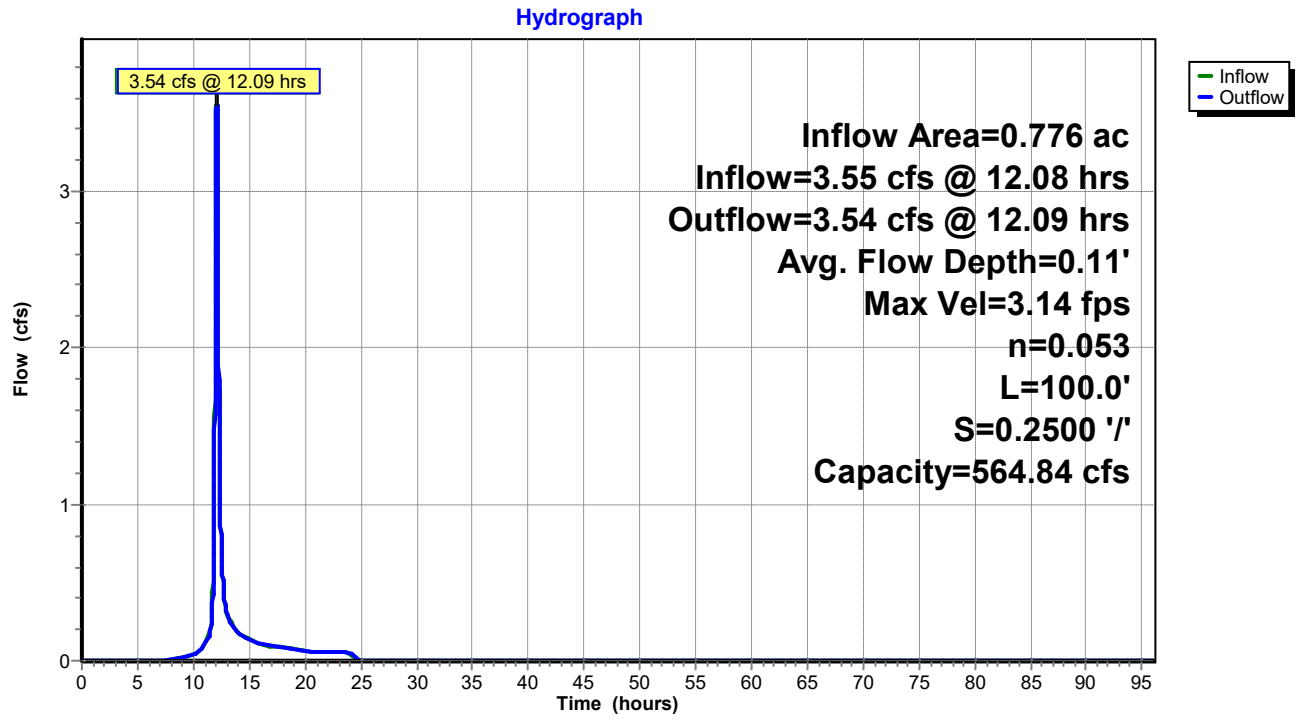
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.5 min

Peak Storage= 113 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 10.65'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 100.0' Slope= 0.2500 '/'
Inlet Invert= 341.10', Outlet Invert= 316.10'

‡

Reach LD-2T: Letdown 2 - Top



Summary for Reach LD-3B: Letdown 3 - Bottom

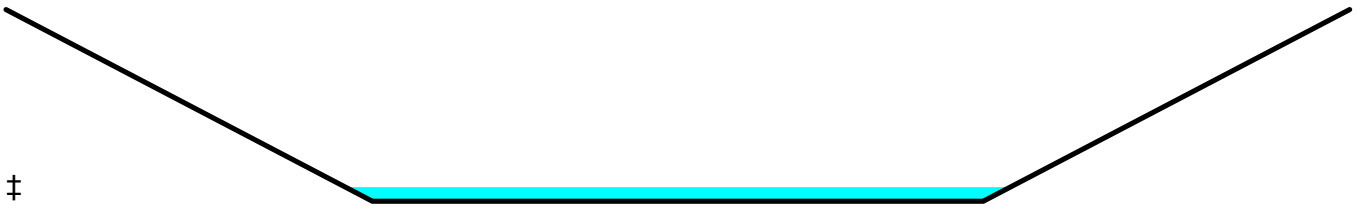
[61] Hint: Exceeded Reach LD-3M outlet invert by 0.15' @ 11.97 hrs

Inflow Area = 1.213 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 5.80 cfs @ 11.97 hrs, Volume= 0.375 af
Outflow = 5.79 cfs @ 11.97 hrs, Volume= 0.375 af, Atten= 0%, Lag= 0.2 min
Routed to Pond ID : Interior Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.79 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 1.3 min

Peak Storage= 135 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 10.88'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 88.0' Slope= 0.2500 '/'
Inlet Invert= 314.10', Outlet Invert= 292.10'



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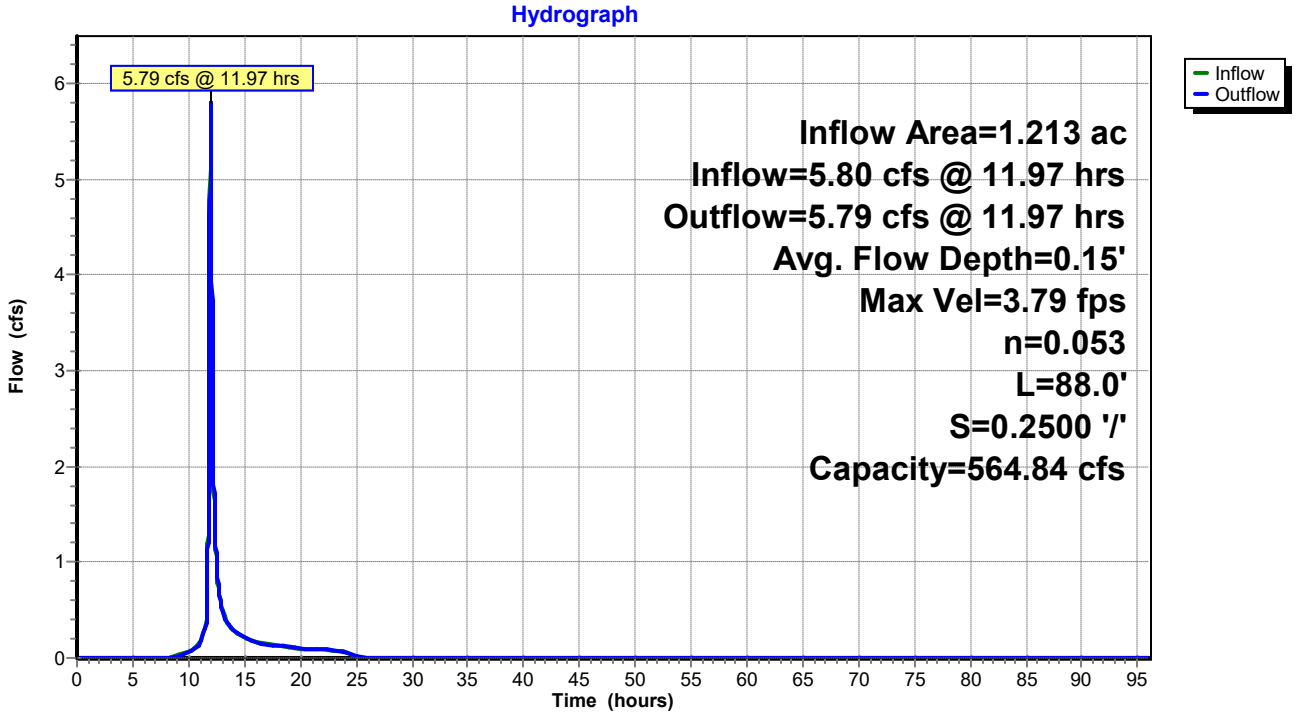
Reach LD-3B: Letdown 3 - Bottom



Summary for Reach LD-3M: Letdown 3 - Middle

[62] Hint: Exceeded Reach B-5N OUTLET depth by 0.10' @ 0.00 hrs
[62] Hint: Exceeded Reach B-5S OUTLET depth by 0.10' @ 0.00 hrs
[62] Hint: Exceeded Reach LD-3T OUTLET depth by 0.13' @ 11.95 hrs

Inflow Area = 1.213 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 5.80 cfs @ 11.97 hrs, Volume= 0.375 af
Outflow = 5.80 cfs @ 11.97 hrs, Volume= 0.375 af, Atten= 0%, Lag= 0.1 min
Routed to Reach LD-3B : Letdown 3 - Bottom

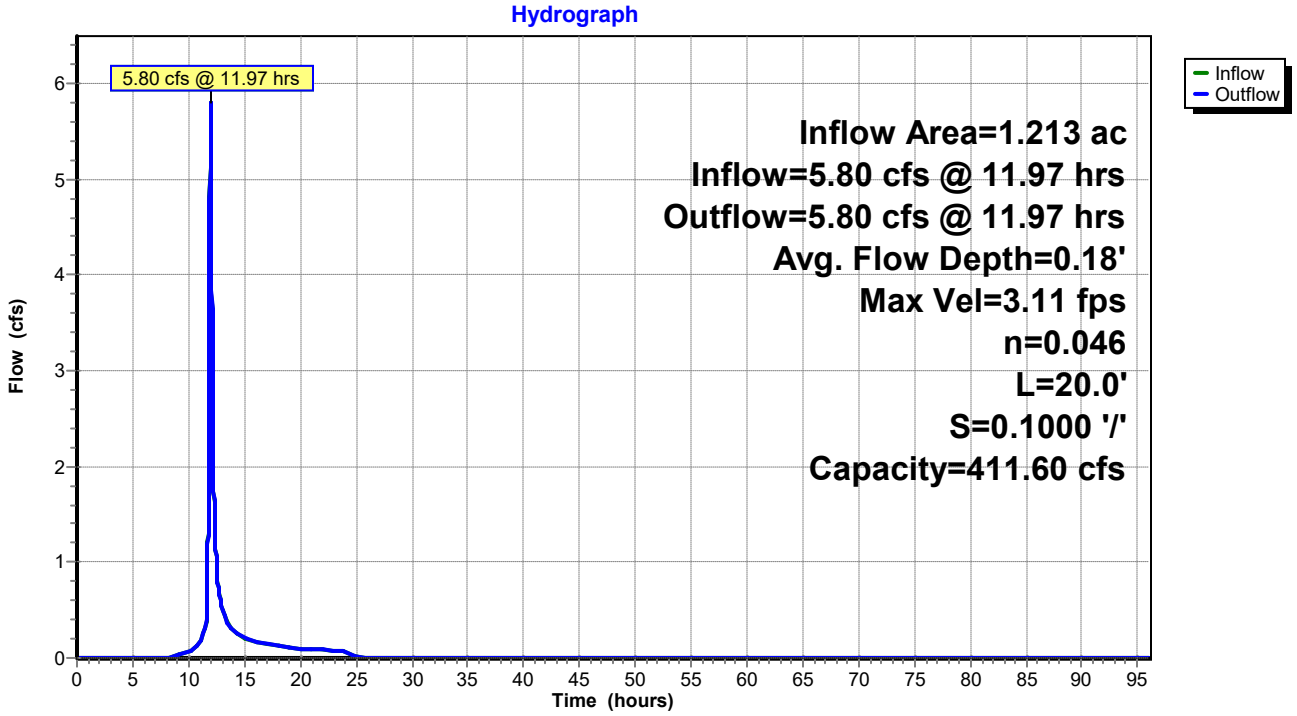
Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.11 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 0.4 min

Peak Storage= 37 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 11.06'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 411.60 cfs

10.00' x 2.00' deep channel, n= 0.046
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 20.0' Slope= 0.1000 '/'
Inlet Invert= 316.10', Outlet Invert= 314.10'

‡

Reach LD-3M: Letdown 3 - Middle



Summary for Reach LD-3T: Letdown 3 - Top

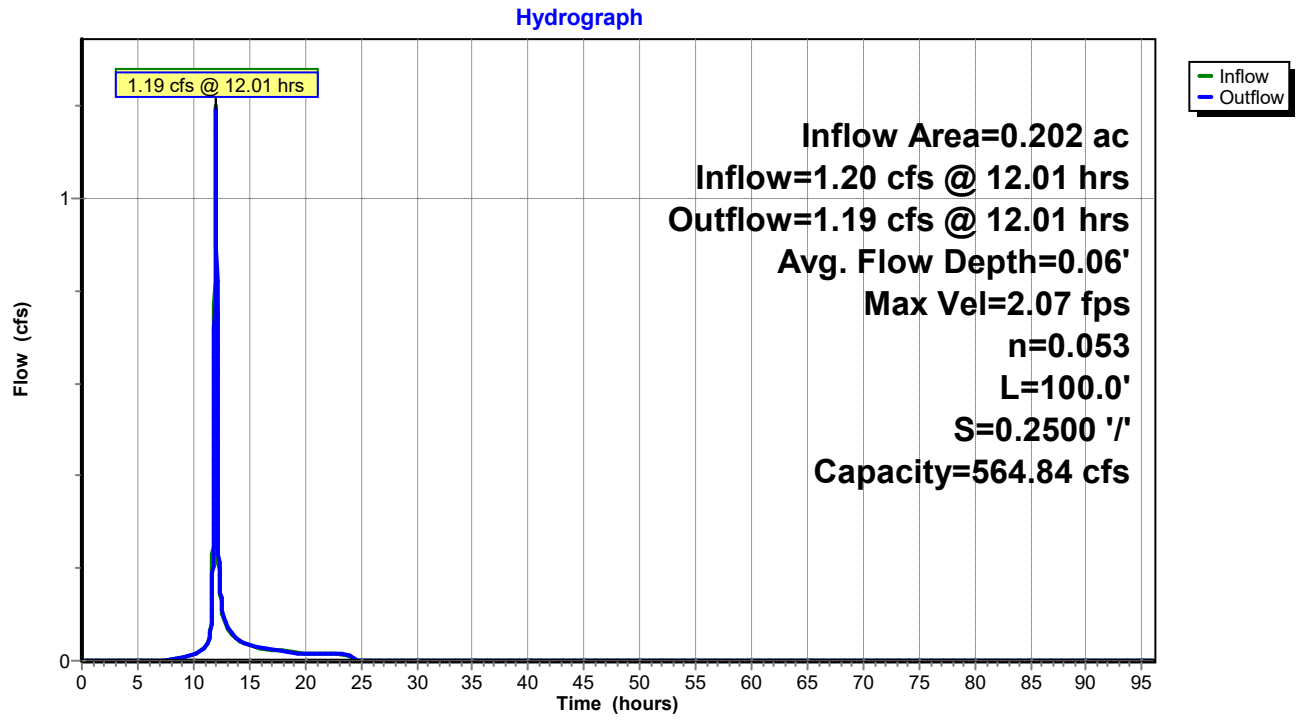
Inflow Area = 0.202 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 1.20 cfs @ 12.01 hrs, Volume= 0.063 af
Outflow = 1.19 cfs @ 12.01 hrs, Volume= 0.063 af, Atten= 1%, Lag= 0.5 min
Routed to Reach LD-3M : Letdown 3 - Middle

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 1.6 min

Peak Storage= 58 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 10.34'
Bank-Full Depth= 2.00' Flow Area= 32.0 sf, Capacity= 564.84 cfs

10.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 100.0' Slope= 0.2500 '/'
Inlet Invert= 341.10', Outlet Invert= 316.10'

‡



Summary for Pond ED: Existing Ditch

Inflow Area = 69.470 ac, 0.00% Impervious, Inflow Depth = 5.03" for 24 Hr 25 Yr event
Inflow = 251.37 cfs @ 12.22 hrs, Volume= 29.123 af
Outflow = 5.68 cfs @ 24.27 hrs, Volume= 28.364 af, Atten= 98%, Lag= 722.9 min
Primary = 5.68 cfs @ 24.27 hrs, Volume= 28.364 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Starting Elev= 288.23' Surf.Area= 15,636 sf Storage= 2,125 cf
Peak Elev= 290.34' @ 24.27 hrs Surf.Area= 1,077,075 sf Storage= 956,184 cf (954,059 cf above start)

Plug-Flow detention time= 1,843.2 min calculated for 28.312 af (97% of inflow)
Center-of-Mass det. time= 1,814.0 min (2,681.5 - 867.5)

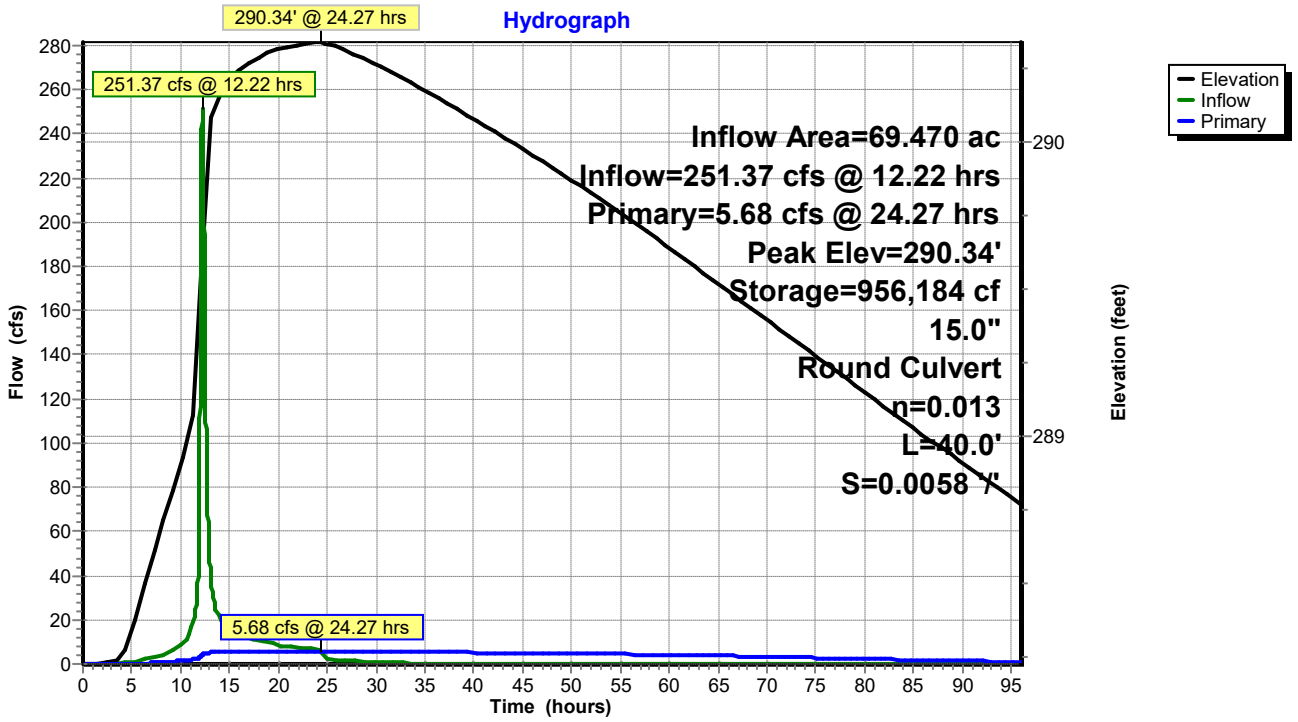
Volume	Invert	Avail.Storage	Storage Description
#1	287.50'	2,524,229 cf	**Stream/Pond Storage (Pyramidal)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
287.50	2	0	0	2
288.00	2,000	344	344	2,001
288.50	48,109	9,986	10,331	48,110
289.00	262,612	70,520	80,851	262,615
289.50	538,999	196,307	277,157	539,004
290.00	879,254	351,112	628,269	879,263
290.50	1,181,098	513,235	1,141,504	1,181,114
291.00	1,394,045	643,051	1,784,555	1,394,073
291.50	1,566,321	739,673	2,524,229	1,566,366

Device	Routing	Invert	Outlet Devices
#1	Primary	288.23'	**15.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 288.23' / 288.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 1.23 sf

Primary OutFlow Max=5.68 cfs @ 24.27 hrs HW=290.34' (Free Discharge)
1=Culvert (Inlet Controls 5.68 cfs @ 4.63 fps)

Pond ED: Existing Ditch



Summary for Pond ID: Interior Ditch

[62] Hint: Exceeded Reach LD-3B OUTLET depth by 1.66' @ 12.07 hrs

Inflow Area = 11.070 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 61.60 cfs @ 11.91 hrs, Volume= 3.425 af
Outflow = 27.66 cfs @ 12.02 hrs, Volume= 3.425 af, Atten= 55%, Lag= 6.6 min
Primary = 27.66 cfs @ 12.02 hrs, Volume= 3.425 af
Routed to Link L5 : To West Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 293.89' @ 12.02 hrs Surf.Area= 27,863 sf Storage= 26,406 cf

Plug-Flow detention time= 11.3 min calculated for 3.425 af (100% of inflow)
Center-of-Mass det. time= 11.3 min (837.3 - 826.0)

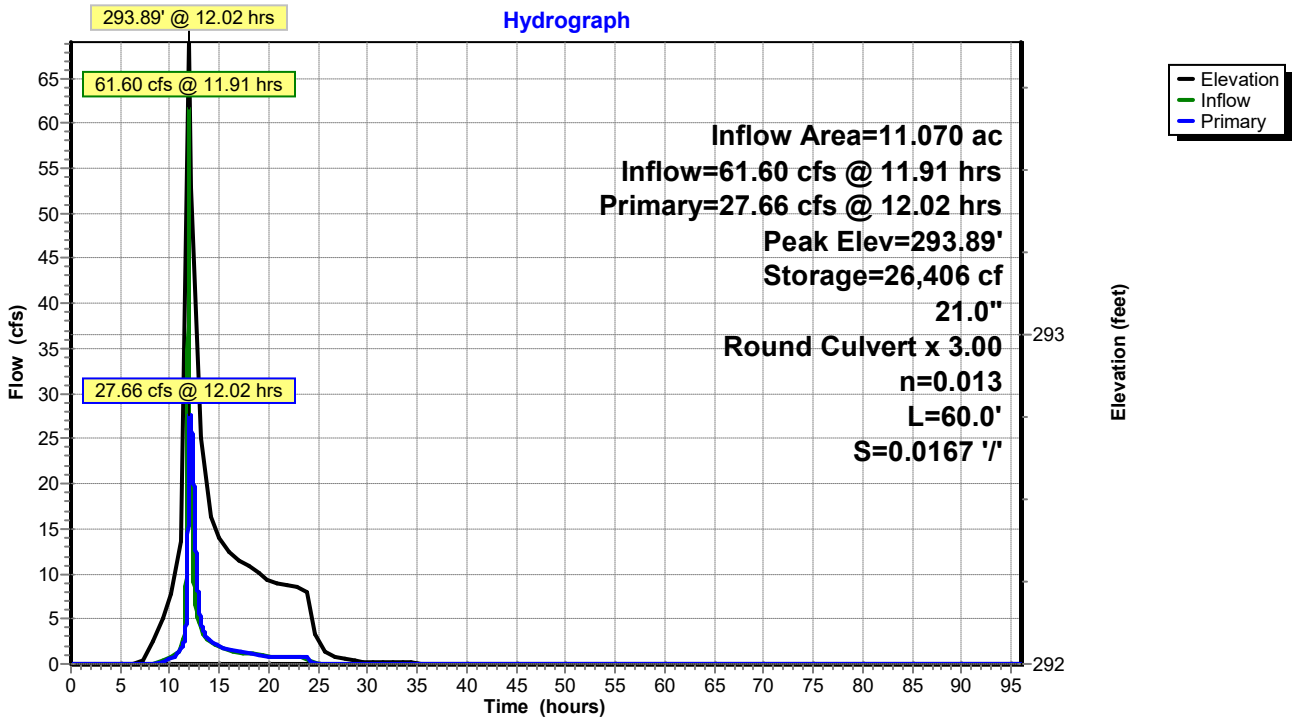
Volume	Invert	Avail.Storage	Storage Description
#1	292.00'	63,289 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
292.00	0	0	0
292.50	7,253	1,813	1,813
293.00	14,570	5,456	7,269
293.50	22,494	9,266	16,535
294.00	29,342	12,959	29,494
294.50	35,504	16,212	45,706
294.90	52,412	17,583	63,289

Device	Routing	Invert	Outlet Devices
#1	Primary	292.00'	**21.0" Round Culvert X 3.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.00' / 291.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 2.41 sf

Primary OutFlow Max=27.66 cfs @ 12.02 hrs HW=293.89' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 27.66 cfs @ 3.83 fps)

Pond ID: Interior Ditch



Summary for Pond WD: West Ditch

Pipe diameter based on 18" dia. SDR-17 HDPE pipe (15.75" avg ID)

Inflow Area = 13.870 ac, 0.00% Impervious, Inflow Depth = 4.25" for 24 Hr 25 Yr event
Inflow = 35.95 cfs @ 12.24 hrs, Volume= 4.914 af
Outflow = 4.27 cfs @ 13.73 hrs, Volume= 4.915 af, Atten= 88%, Lag= 89.2 min
Primary = 4.27 cfs @ 13.73 hrs, Volume= 4.915 af
Routed to Link L6 : To Existing Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Starting Elev= 288.23' Surf.Area= 1,122 sf Storage= 22 cf
Peak Elev= 289.91' @ 13.73 hrs Surf.Area= 139,311 sf Storage= 117,107 cf (117,084 cf above start)

Plug-Flow detention time= 350.1 min calculated for 4.914 af (100% of inflow)
Center-of-Mass det. time= 350.1 min (1,167.3 - 817.3)

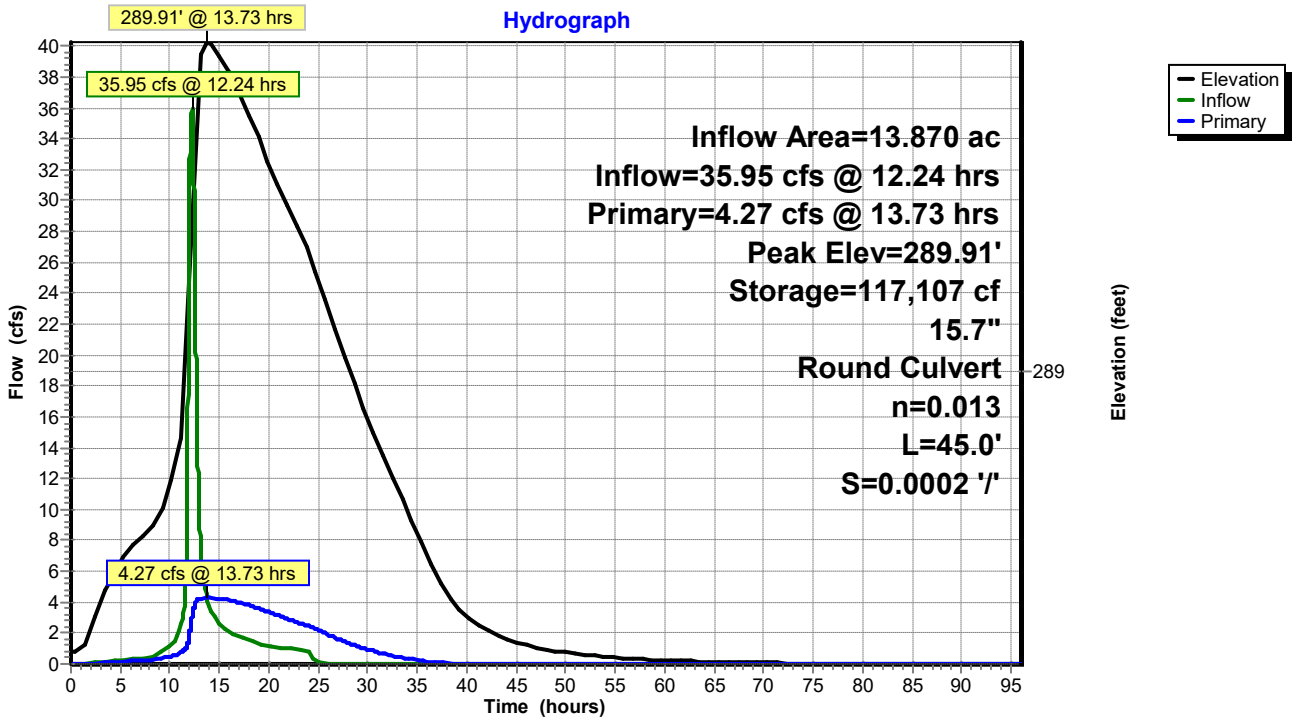
Volume	Invert	Avail.Storage	Storage Description
#1	288.19'	876,247 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
288.19	0	0	0
288.50	8,695	1,348	1,348
289.00	62,739	17,859	19,206
289.50	118,165	45,226	64,432
290.00	144,006	65,543	129,975
290.50	161,321	76,332	206,307
291.00	173,674	83,749	290,055
291.50	180,467	88,535	378,591
292.00	187,458	91,981	470,572
292.50	193,436	95,224	565,795
293.00	202,396	98,958	664,753
293.50	209,683	103,020	767,773
294.00	224,211	108,474	876,247

Device	Routing	Invert	Outlet Devices
#1	Primary	288.19'	**15.7" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 288.19' / 288.18' S= 0.0002 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.34 sf

Primary OutFlow Max=4.27 cfs @ 13.73 hrs HW=289.91' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 4.27 cfs @ 3.19 fps)

Pond WD: West Ditch

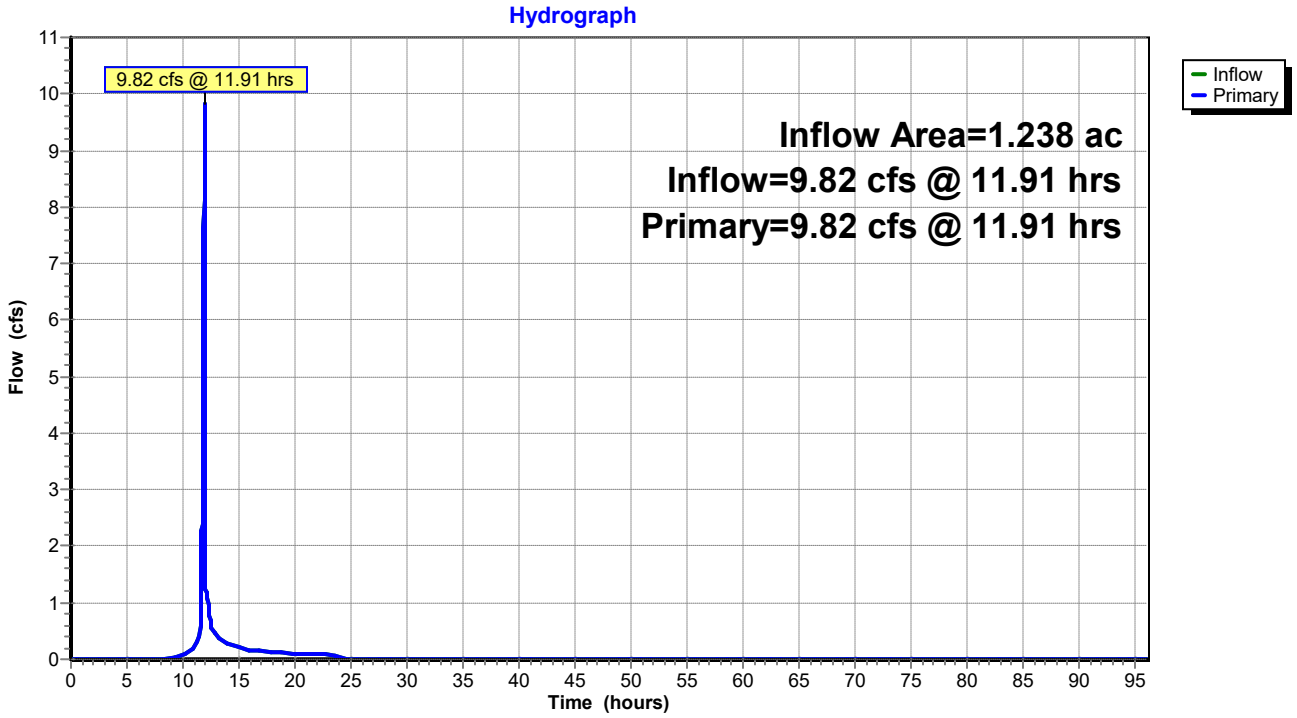


Summary for Link L1: To Interior Ditch

Inflow Area = 1.238 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 9.82 cfs @ 11.91 hrs, Volume= 0.383 af
Primary = 9.82 cfs @ 11.91 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min
Routed to Link L2 : To Interior Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L1: To Interior Ditch

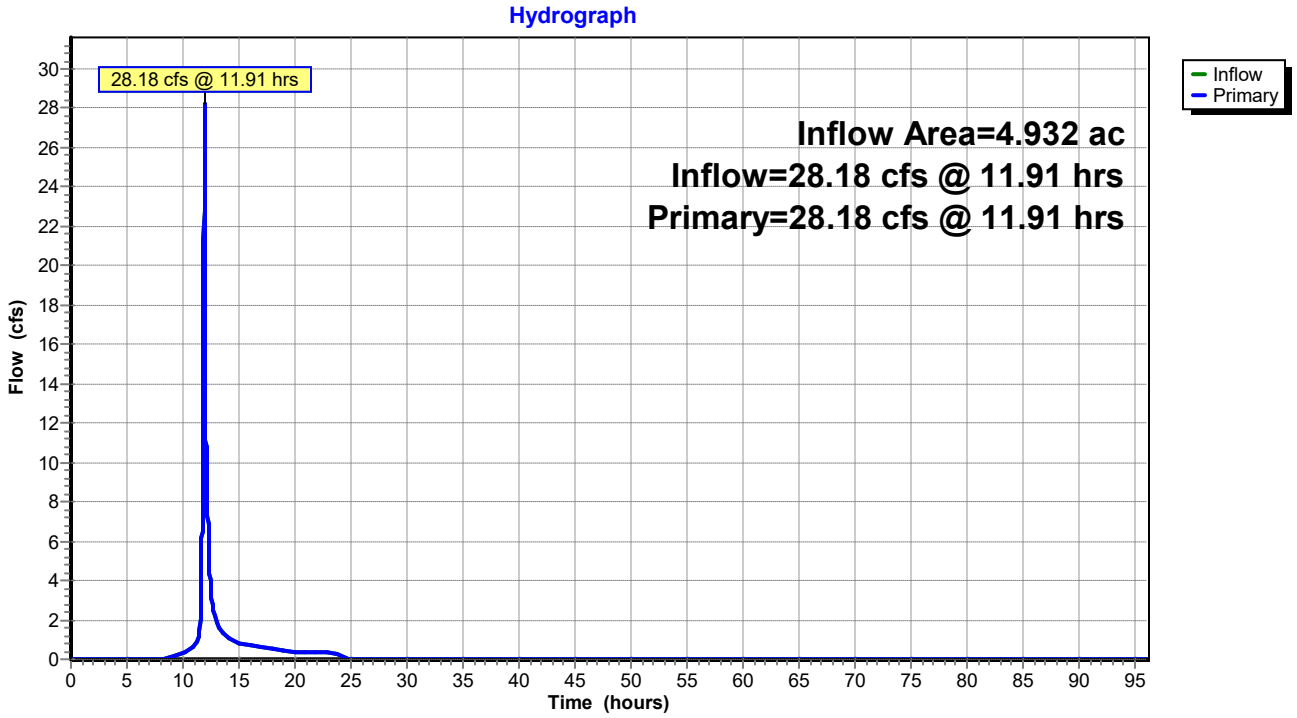


Summary for Link L2: To Interior Ditch

Inflow Area = 4.932 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 28.18 cfs @ 11.91 hrs, Volume= 1.526 af
Primary = 28.18 cfs @ 11.91 hrs, Volume= 1.526 af, Atten= 0%, Lag= 0.0 min
Routed to Link L3 : To Interior Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L2: To Interior Ditch

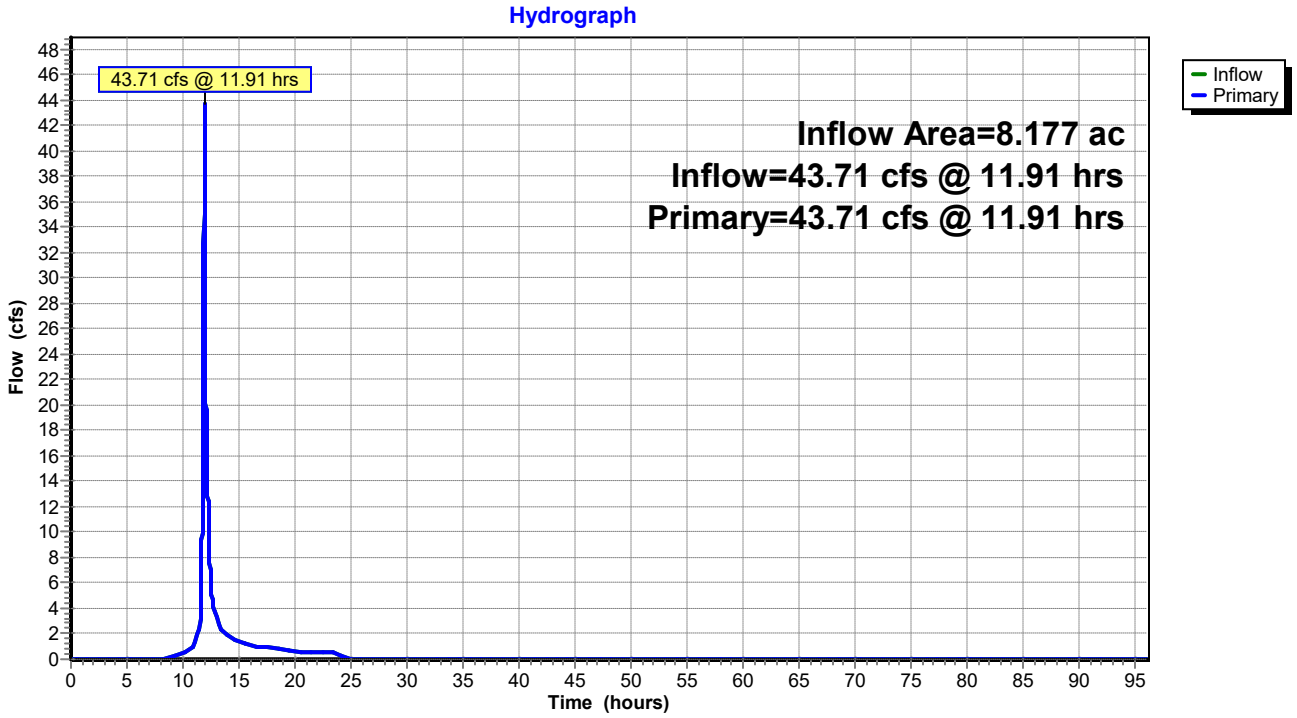


Summary for Link L3: To Interior Ditch

Inflow Area = 8.177 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 43.71 cfs @ 11.91 hrs, Volume= 2.530 af
Primary = 43.71 cfs @ 11.91 hrs, Volume= 2.530 af, Atten= 0%, Lag= 0.0 min
Routed to Link L4 : To Interior Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L3: To Interior Ditch

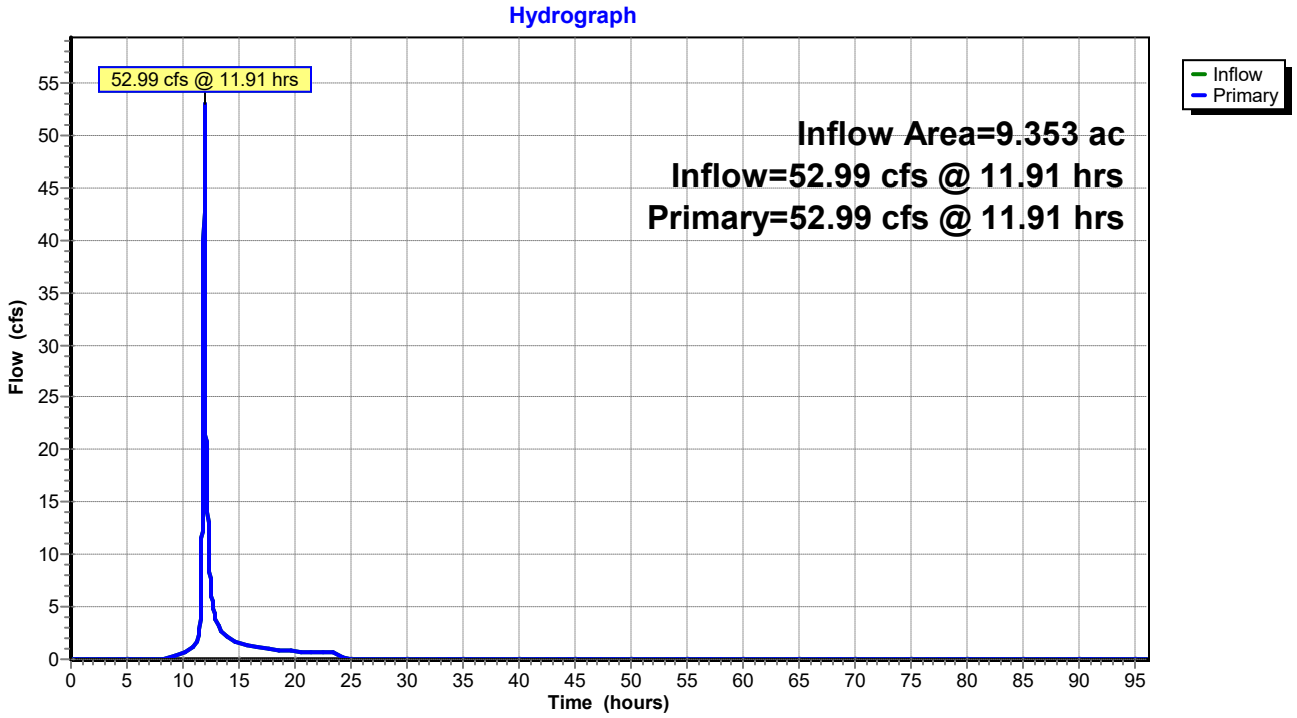


Summary for Link L4: To Interior Ditch

Inflow Area = 9.353 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 52.99 cfs @ 11.91 hrs, Volume= 2.894 af
Primary = 52.99 cfs @ 11.91 hrs, Volume= 2.894 af, Atten= 0%, Lag= 0.0 min
Routed to Pond ID : Interior Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L4: To Interior Ditch

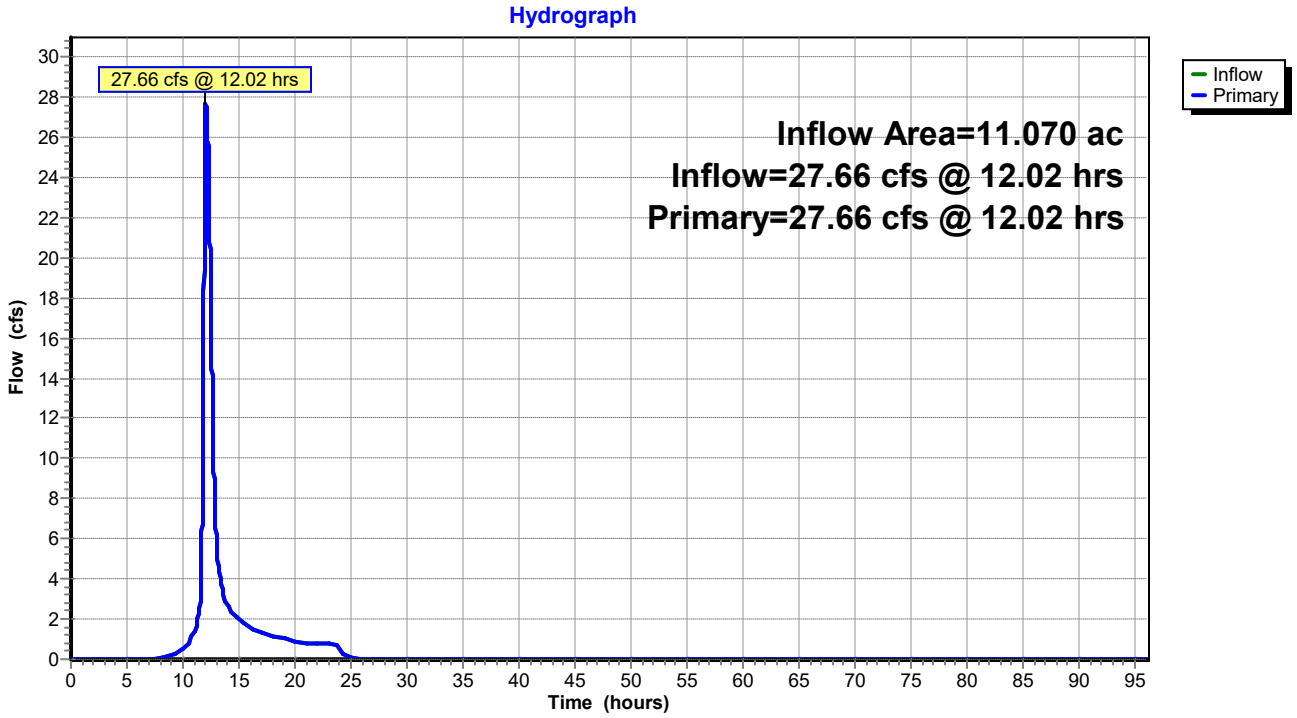


Summary for Link L5: To West Ditch

Inflow Area = 11.070 ac, 0.00% Impervious, Inflow Depth = 3.71" for 24 Hr 25 Yr event
Inflow = 27.66 cfs @ 12.02 hrs, Volume= 3.425 af
Primary = 27.66 cfs @ 12.02 hrs, Volume= 3.425 af, Atten= 0%, Lag= 0.0 min
Routed to Pond WD : West Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L5: To West Ditch



Summary for Link L6: To Existing Ditch

Inflow Area = 13.870 ac, 0.00% Impervious, Inflow Depth = 4.25" for 24 Hr 25 Yr event
Inflow = 4.27 cfs @ 13.73 hrs, Volume= 4.915 af
Primary = 4.27 cfs @ 13.73 hrs, Volume= 4.915 af, Atten= 0%, Lag= 0.0 min
Routed to Pond ED : Existing Ditch

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Link L6: To Existing Ditch