Appendix D

Run-on and Run-off Control System Plan

Omaha Public Power District
Nebraska City Generating Station
NC2 Ash Disposal Area

January 2024

Revised March 2024

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Omaha Public Power District

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Attachments

Professional Engineer Certification

"I hereby certify that this Run-on and Run-off Control System Plan for the CCR landfill known as the NC2 Ash Disposal Area at the Nebraska City Generating Station, owned and operated by the Omaha Public Power District, meets the requirements of the Coal Combustion Residual Rule 40 CFR 257.81. I am a duly licensed independent Professional Engineer under the laws of the State of Nebraska."

Print Name: Garrett Williams

Signature:

Date: 3/12/24

License #: E-15124

My license renewal date is December 31st, 2024.

1 Introduction

1.1 Purpose

On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the final rule for the regulation and management of coal combustion residuals (CCR) under the Resource Conservation and Recovery Act (RCRA). 40 CFR 257.81 requires that an owner or operator of a CCR landfill must prepare a run-on and run-off control system plan. The plan must document how the control systems have been designed and constructed to meet the applicable requirements of the CCR rule, supported by appropriate engineering calculations. In accordance with the CCR rule 40 CFR 257.81, the intent of storm water management is to design, construct, operate, and maintain:

- 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; and
- 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. Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under 40 CFR 257.3-3.
- 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.

1.2 Facility Background

OPPD has a two-unit (Unit 1 and Unit 2) fossil fuel-fired generating plant at the Nebraska City Generating Station (Station) located 5.5 miles southeast of Nebraska City, Nebraska, along the west bank of the Missouri River. This Station has one (1) existing CCR landfill that is permitted under the current Nebraska Department of Environment and Energy (NDEE) Title 132 regulations for fossil fuel combustion ash disposal area: NC2 Ash Disposal Area. This run-on and run-off control system plan is for the NC2 Ash Disposal Area (NDEE Permit No. NE0204421, Facility ID 58343). Under the CCR rule, the NC2 Ash Disposal Area is an existing CCR landfill since it has and will receive CCR both before and after October 19, 2015 – the effective date of the CCR rule.

The NC2 Ash Disposal Area is an existing CCR landfill with a composite liner and leachate collection system, containing approximately 40.7 acres permitted disposal area. Cell 1 (approximately 14.4 acres) began accepting CCR in July 2009 and was closed prior to the construction of Cells 2 and 3. Notification to the NDEE and construction on NC2 Ash Disposal Area Cells 2 and 3 began prior to October 19, 2015.

The NDEE Title 132 permit for the NC2 Ash Disposal Area also includes descriptions, calculations and figures of run-on and run-off control system features. This plan checks, expands, and confirms compliance with the CCR rule for run-on and run-off controls from the active areas of the NC2 Ash Disposal Area.

2 Rainfall Computation

Rainfall computations utilizes NOAA Atlas 14 precipitation frequency for a 25-year, 24-hour, or 6.04 inches. Rainfall output from NOAA is included in **Attachment D-1**. The site was then delineated in areas for computation of runoff. See **Attachment D-1** for mapping of drainage areas.

Curve number for CCR materials is set as 93 and time of concentration (tc) for most areas conservatively set as 5 minutes. The exception to the 5 minute tc includes the top deck areas of Subbasins 4a and 4b. Time of concentration for these areas utilizes TR55 for 300 linear feet, 2.5% slope and manning's n of 0.05. Drainage areas are computed individually utilizing Hydroflow Hydrographs and added together as runoff accumulates. In general, the CCR disposal area drains from north to south, discharging to the west leachate pond. Runoff hydrographs for each Subbasin can be found in **Attachment D-2**.

3 Run-On Control System

The run-on control system for the NC2 Ash Disposal Area consists of perimeter berm roads, ditches and grading sloped away from the CCR landfill to prevent storm water run-on. As shown on the drawing in **Attachment D-1**, run-on to the NC2 Ash Disposal Area is prevented on the east, south and west sides by constructed berms and roadways. Along the north side, potential run-on would come from the railroad loop embankment. Perimeter ditches intercept, divert and prevent potential storm water run-on to the NC2 Ash Disposal Area. Calculations confirming the culvert capacities are included in **Attachment D-3**.

4 Run-Off Control System

The run-off control system for the NC2 Ash Disposal Area consists of interior collection channels, culverts and the west leachate pond. When ash elevations in the Cell(s) reached the perimeter road berms elevation, an interior perimeter drainage ditch within the disposal area was constructed at the edge of the CCR landfill to collect and control the storm water run-off from the active portions of the NC2 Ash Disposal Area. These temporary interior channels are constructed within the CCR disposal area footprint and graded to gravity drain storm water run-off through constructed culverts to the west leachate pond. The CCR fill within the NC2 Ash Disposal Area has been graded to facilitate surface water run-off towards the interior channels.

The side-slopes of the Cell(s) are planned to be constructed no steeper than 3 horizontal to 1 vertical grade. Run-off from the NC2 Ash Disposal Area side-slopes will be conveyed via an interior collection channel that will direct the water to the discharge point. Storm water will be generated from two sub-basin areas as shown in the drawing in **Attachment D-2 and D-4**. Subbasin 1 will generally consist of the storm water runoff from the north side-slope that is captured by the interior northern perimeter channel. Subbasin 2 will generally consist of the storm water runoff from the west side-slope, also collected in an interior perimeter channel. Subbasin

1 will be directed into the Subbasin 2 perimeter channel. Storm water collected in the interior perimeter channels flows south into the west leachate pond via three 24-inch HDPE culverts. The three HDPE culverts are approximately 46-feet in length and have an inlet invert elevation of 917.0 ft above mean sea level (AMSL).

The remainder of the surface runoff consists of runoff from the Cells, and the eastern and southern side-slopes. This area includes Subbasins 3a, 4a and 4b. The runoff from these areas will flow generally in the southern direction and will discharge into the leachate pond via three additional 24-inch HDPE culverts. All six 24 inch HDPE pipes convey runoff from the interior channel to the west leachate pond.

The interior collection channels were also sized to convey runoff for a 25-year, 24-hour storm event. The north collection channel was sized to convey runoff from Subbasin 1 and the west collection channel was sized to contain runoff from both Subbasin 1 and Subbasin 2. Both channels have a minimum bottom width of 2-feet, and graded at minimum slope of 0.5% and have a minimum depth of 2.5-feet. The bottom width and depth of the channel are consistent along the length of both channels. The channel side-slope towards the interior of the cell will be 1.5 horizontal to 1 vertical up to the intersection with the CCR fill side-slope of 3 horizontal to 1 vertical. The channel side-slope towards the outer perimeter of the cell is planned to be constructed at 3 horizontal to 1 vertical.

The south collection channel was sized to convey runoff from Subbasin 3a, Subbasin 4a, and Subbasin 4b to multiple culverts which drain to the leachate pond. The channel will have bottom width of 2-feet, graded to a minimum 0.5% slope and depth of 3 feet. The area in front of the culvert inlets have a constructed pad to facilitate clean-out of settled CCR sediment.

Calculations checking the capacity of the interior channels are included in **Attachment D-3**.

The leachate retention pond located south of Cell 3 was constructed as part of Cells 2 and 3 liner construction. This leachate retention pond is sized to adequately contain surface water run-off, leachate, and storm water from the 25-year, 24-hour storm event. The leachate retention pond has a capacity of approximately 735,000 cubic feet. In order to contain run-off for the 25-year, 24-hour storm event and provide 1-foot of freeboard, the pond water surface elevation must be maintained at 912.0 feet AMSL or lower. The pond has a bottom elevation of 911.0 feet AMSL with 1-foot of stone (912.0) and a top elevation of 919.0 feet AMSL. The pond has side-slopes at a 3 horizontal to 1 vertical grade. Water surface in the pond is controlled by a pump system that removes water from the west pond and discharges to the coal pile runoff pond. The pump is controlled by float switch to operate both manually and automatically to maintain appropriate water level in the west leachate pond.

Calculations, figures, and management of storm water run-off from the active portion of the NC2 Ash Disposal Area are contained in **Attachments D-2** and **D-4** of this plan.

Contact water generated from the 25-year, 24-hour storm (and lesser storms) will be collected, controlled, and conveyed to the leachate retention pond for management in accordance with existing surface water requirements of the Station's National Pollution Discharge Elimination System (NPDES) permit. A copy of the NPDES notice of intent and NDEE approval letter is contained in **Attachment D-5**.

Attachment D-1

NOAA Rainfall and Drainage Area Mapping

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NOAA Atlas 14, Volume 8, Version 2
Location name: Nebraska City, Nebraska, USA*
Latitude: 40.6264°, Longitude: -95.7899°
Elevation: 923 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	**0.405** (0.325-0.518)	**0.476** (0.381-0.609)	**0.596** (0.475-0.763)	**0.697** (0.553-0.894)	**0.841** (0.647-1.10)	**0.955** (0.717-1.26)	**1.07** (0.779-1.42)	**1.19** (0.832-1.60)	**1.36** (0.912-1.85)	**1.49** (0.972-2.04)
10-min	**0.593** (0.475-0.759)	**0.698** (0.558-0.892)	**0.872** (0.696-1.12)	**1.02** (0.810-1.31)	**1.23** (0.947-1.61)	**1.40** (1.05-1.84)	**1.57** (1.14-2.09)	**1.75** (1.22-2.35)	**1.99** (1.34-2.71)	**2.18** (1.42-2.98)
15-min	**0.724** (0.580-0.925)	**0.851** (0.681-1.09)	**1.06** (0.848-1.36)	**1.24** (0.988-1.60)	**1.50** (1.16-1.96)	**1.71** (1.28-2.24)	**1.91** (1.39-2.54)	**2.13** (1.49-2.87)	**2.43** (1.63-3.30)	**2.65** (1.74-3.64)
30-min	**1.02** (0.820-1.31)	**1.21** (0.968-1.55)	**1.52** (1.21-1.95)	**1.78** (1.42-2.29)	**2.16** (1.66-2.82)	**2.45** (1.84-3.22)	**2.75** (2.00-3.66)	**3.06** (2.14-4.12)	**3.49** (2.34-4.75)	**3.81** (2.49-5.22)
60-min	**1.33** (1.06-1.70)	**1.56** (1.25-2.00)	**1.98** (1.58-2.53)	**2.33** (1.85-3.00)	**2.86** (2.20-3.76)	**3.28** (2.47-4.33)	**3.73** (2.72-4.98)	**4.20** (2.94-5.67)	**4.86** (3.27-6.64)	**5.38** (3.52-7.37)
2-hr	**1.63** (1.32-2.06)	**1.92** (1.55-2.42)	**2.43** (1.96-3.07)	**2.88** (2.31-3.66)	**3.56** (2.78-4.64)	**4.12** (3.14-5.38)	**4.71** (3.47-6.23)	**5.35** (3.78-7.16)	**6.24** (4.24-8.46)	**6.95** (4.59-9.45)
3-hr	**1.81** (1.47-2.26)	**2.12** (1.73-2.66)	**2.70** (2.18-3.38)	**3.22** (2.59-4.04)	**4.00** (3.16-5.20)	**4.67** (3.58-6.08)	**5.38** (3.99-7.10)	**6.16** (4.38-8.22)	**7.26** (4.96-9.82)	**8.15** (5.41-11.0)
6-hr	**2.11** (1.74-2.61)	**2.48** (2.04-3.07)	**3.16** (2.59-3.91)	**3.78** (3.08-4.70)	**4.75** (3.79-6.12)	**5.58** (4.33-7.20)	**6.47** (4.85-8.46)	**7.45** (5.36-9.87)	**8.85** (6.12-11.9)	**10.0** (6.69-13.4)
12-hr	**2.43** (2.02-2.96)	**2.85** (2.37-3.48)	**3.63** (3.00-4.43)	**4.34** (3.58-5.32)	**5.44** (4.39-6.92)	**6.38** (5.00-8.13)	**7.39** (5.59-9.55)	**8.49** (6.16-11.1)	**10.1** (7.03-13.4)	**11.4** (7.68-15.1)
24-hr	**2.78** (2.34-3.35)	**3.24** (2.72-3.90)	**4.08** (3.42-4.92)	**4.85** (4.04-5.87)	**6.04** (4.91-7.58)	**7.04** (5.58-8.87)	**8.13** (6.21-10.4)	**9.31** (6.82-12.1)	**11.0** (7.75-14.5)	**12.4** (8.45-16.3)
2-day	**3.20** (2.72-3.81)	**3.69** (3.13-4.38)	**4.57** (3.87-5.44)	**5.39** (4.54-6.43)	**6.64** (5.46-8.23)	**7.70** (6.16-9.58)	**8.84** (6.83-11.2)	**10.1** (7.47-13.0)	**11.9** (8.45-15.5)	**13.3** (9.19-17.5)
3-day	**3.48** (2.98-4.10)	**4.03** (3.44-4.75)	**5.00** (4.26-5.90)	**5.88** (4.98-6.96)	**7.20** (5.94-8.83)	**8.30** (6.68-10.2)	**9.48** (7.36-11.9)	**10.8** (8.00-13.7)	**12.6** (8.97-16.3)	**14.0** (9.70-18.2)
4-day	**3.72** (3.20-4.36)	**4.31** (3.70-5.05)	**5.35** (4.57-6.28)	**6.27** (5.33-7.38)	**7.64** (6.32-9.30)	**8.77** (7.08-10.7)	**9.97** (7.76-12.4)	**11.3** (8.40-14.3)	**13.1** (9.36-16.9)	**14.5** (10.1-18.8)
7-day	**4.39** (3.81-5.09)	**5.02** (4.35-5.82)	**6.12** (5.29-7.11)	**7.10** (6.09-8.27)	**8.54** (7.13-10.3)	**9.72** (7.91-11.8)	**11.0** (8.62-13.5)	**12.3** (9.26-15.5)	**14.2** (10.3-18.2)	**15.7** (11.0-20.2)
10-day	**5.00** (4.36-5.75)	**5.68** (4.95-6.54)	**6.86** (5.96-7.91)	**7.91** (6.83-9.15)	**9.45** (7.93-11.3)	**10.7** (8.76-12.9)	**12.0** (9.50-14.8)	**13.5** (10.2-16.8)	**15.4** (11.2-19.7)	**17.0** (12.0-21.8)
20-day	**6.74** (5.95-7.64)	**7.68** (6.77-8.71)	**9.27** (8.15-10.5)	**10.6** (9.30-12.1)	**12.6** (10.7-14.8)	**14.2** (11.7-16.8)	**15.8** (12.6-19.1)	**17.5** (13.3-21.6)	**19.8** (14.5-24.9)	**21.6** (15.4-27.5)
30-day	**8.18** (7.27-9.19)	**9.35** (8.30-10.5)	**11.3** (9.99-12.7)	**12.9** (11.4-14.6)	**15.2** (12.9-17.6)	**17.0** (14.1-19.9)	**18.8** (15.0-22.5)	**20.6** (15.8-25.2)	**23.1** (17.0-28.9)	**25.0** (17.9-31.7)
45-day	**10.0** (8.96-11.2)	**11.4** (10.2-12.8)	**13.7** (12.2-15.4)	**15.6** (13.8-17.5)	**18.2** (15.5-20.9)	**20.2** (16.8-23.4)	**22.1** (17.8-26.2)	**24.1** (18.5-29.2)	**26.6** (19.7-33.1)	**28.5** (20.6-36.0)
60-day	**11.6** (10.4-12.8)	**13.2** (11.8-14.6)	**15.8** (14.1-17.5)	**17.8** (15.9-19.9)	**20.6** (17.6-23.4)	**22.6** (18.9-26.1)	**24.6** (19.9-29.0)	**26.6** (20.5-32.0)	**29.0** (21.6-35.9)	**30.9** (22.3-38.8)

[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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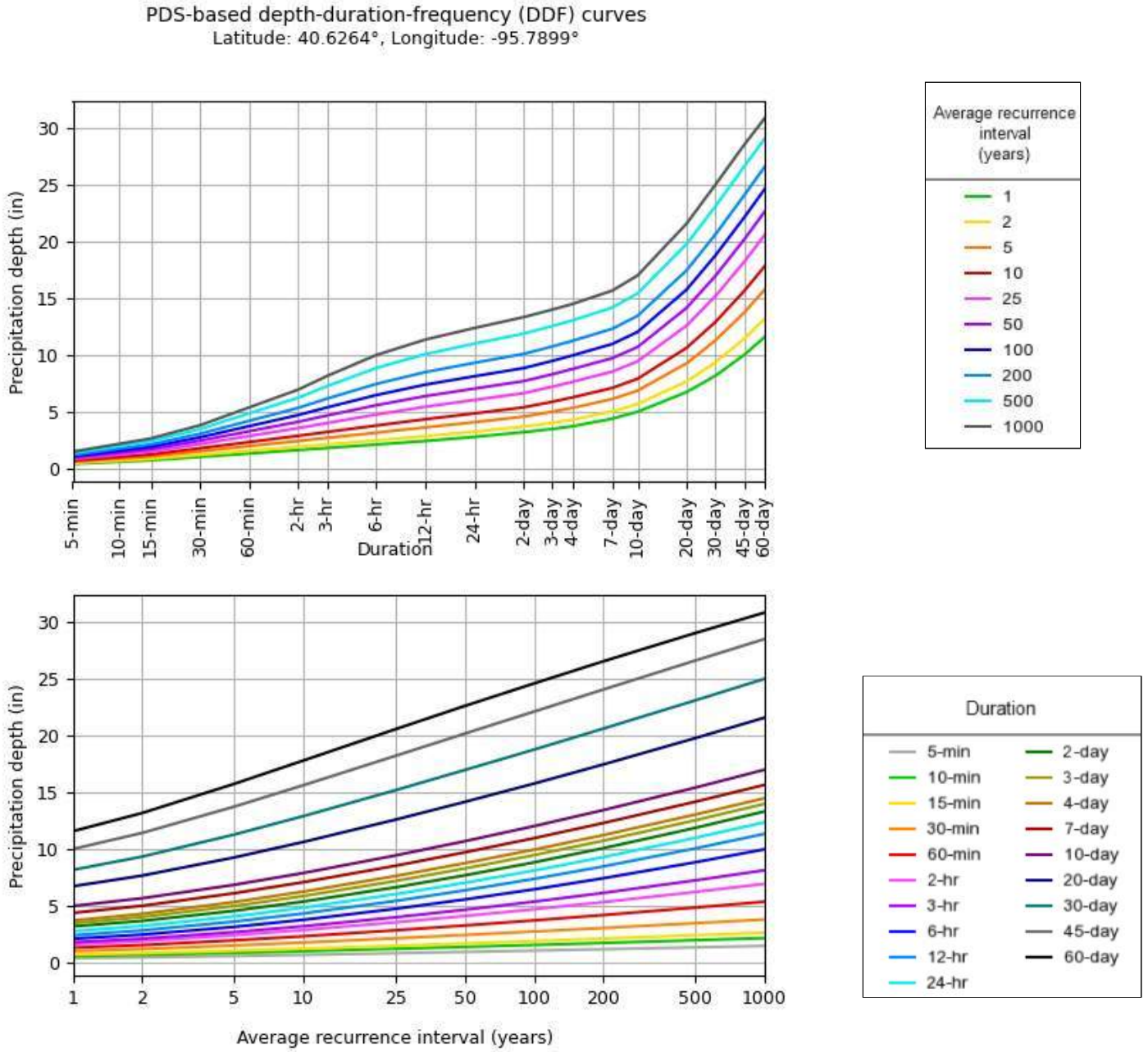
PF graphical



NOAA Atlas 14, Volume 8, Version 2

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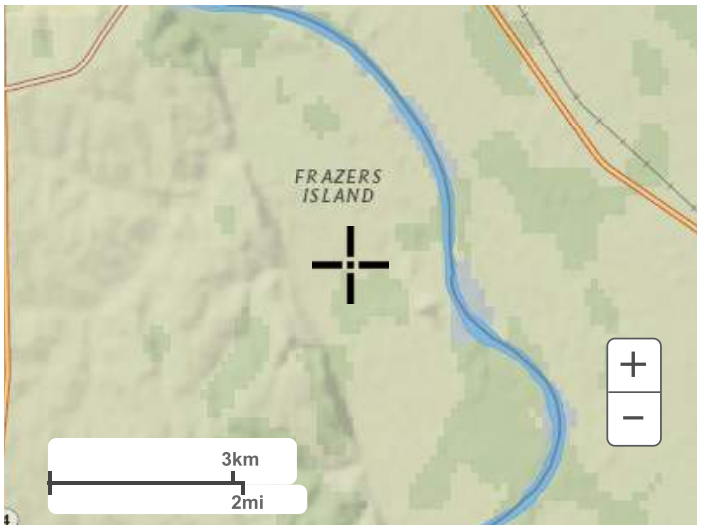
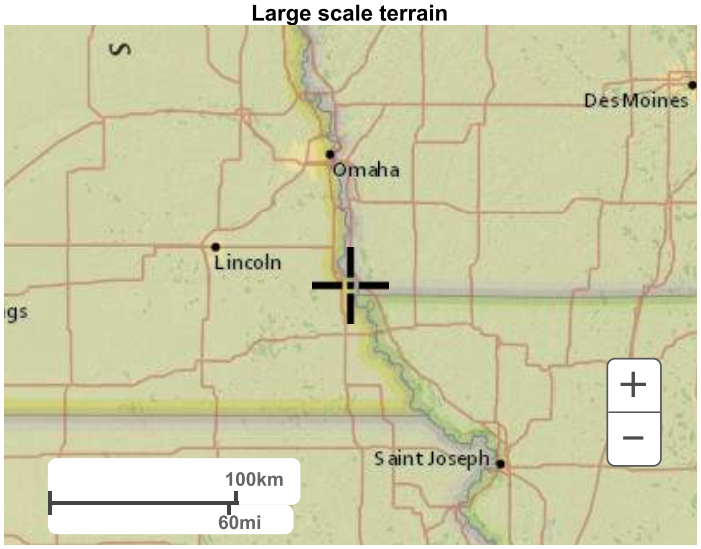
Maps & aerials

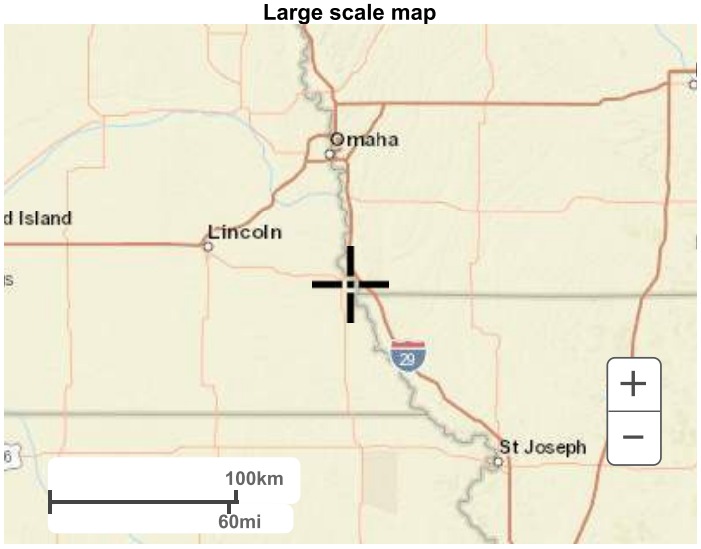
Small scale terrain



Large scale terrain



Large scale map



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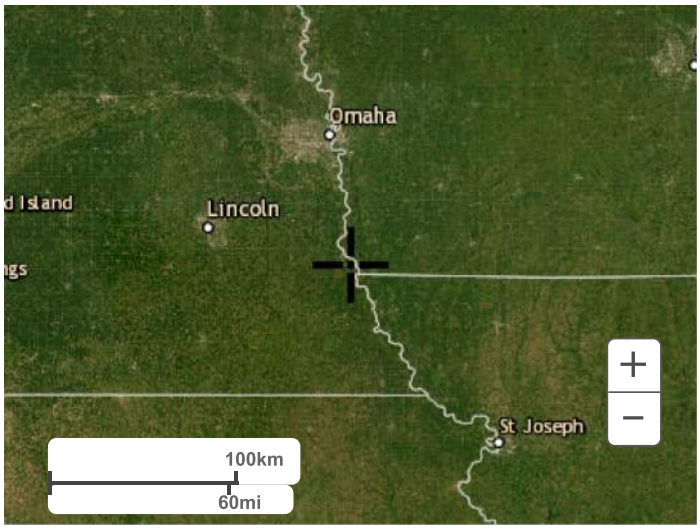

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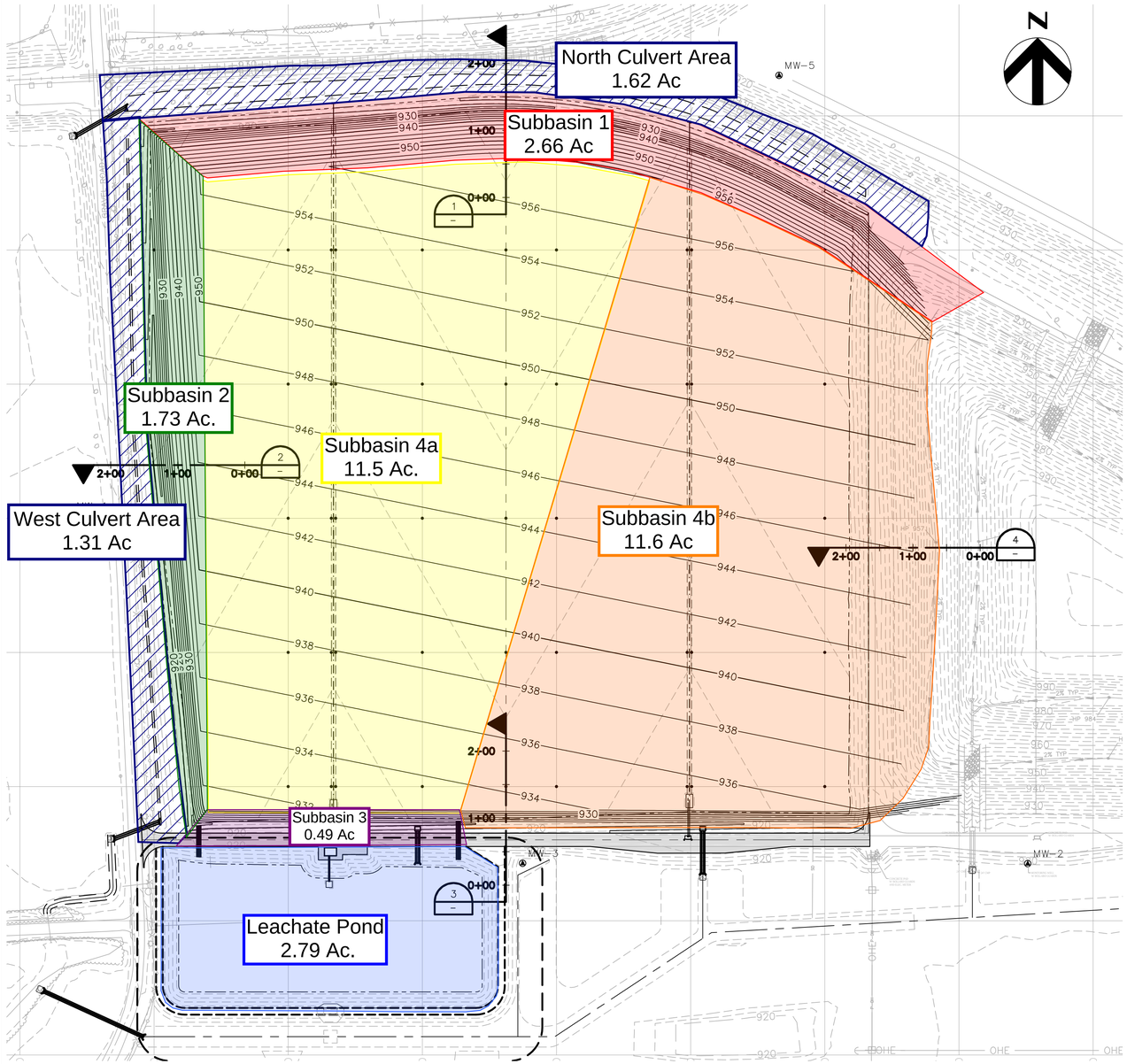
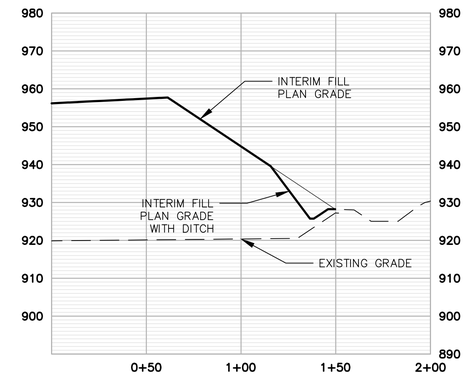
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov



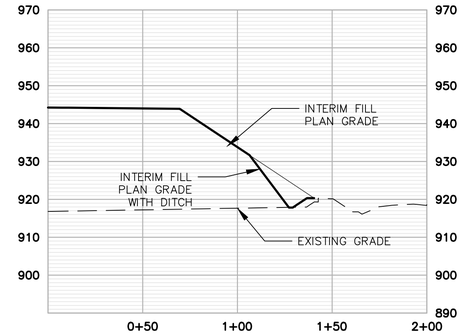
INTERIM FILL PLAN #1 – TOP OF COVER GRADES

1" = 100'



1 – CROSS SECTION – NORTH

1" = 40' HORIZONTAL
1" = 20' VERTICAL



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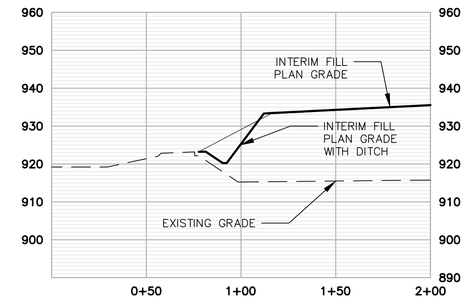
1" = 20' VERTICAL



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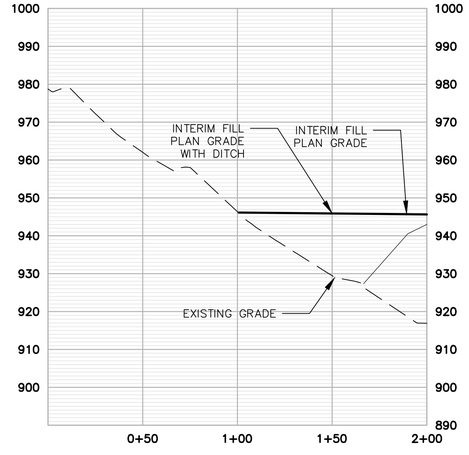
1" = 20' VERTICAL



4 – CROSS SECTION – EAST

1" = 40' HORIZONTAL
1" = 20' VERTICAL

ISSUE	DATE	DESCRIPTION
0		

PROJECT MANAGER	G. WILLIAMS
CIVIL	G. WILLIAMS
PROJECT NUMBER	10028555

OPPD Nebraska City Station Unit 2
Ash Landfill Expansion

CELLS 2 AND 3 LINER
INTERIM FILL PLAN #1
PLAN AND CROSS-SECTIONS

0 1" 2"

FILENAME #1A.3 Plan.dwg
SCALE AS SHOWN
SHEET 1

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Attachment D-2

Storm Water Hydrograph Calculations

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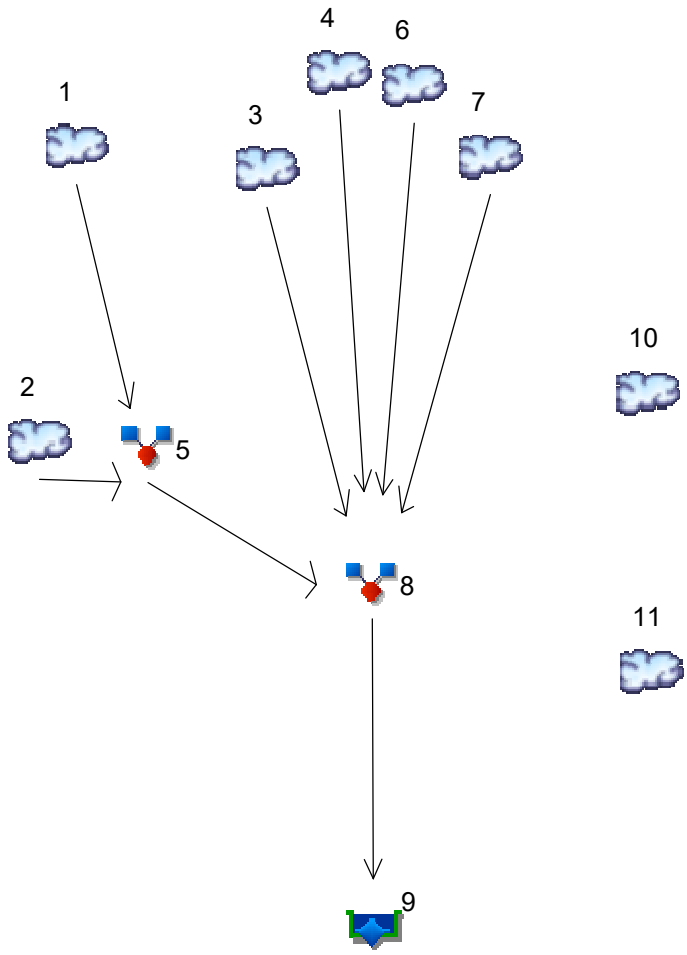
Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Subbasin 1
2	SCS Runoff	Subbasin 2
3	SCS Runoff	Subbasin 3
4	SCS Runoff	Subbasin 4a
5	Combine	Sub1 and Sub 2 Combine
6	SCS Runoff	Subbasin 4b
7	SCS Runoff	Direct Pond
8	Combine	Total Runoff
9	Reservoir	West Leachate Pond
10	SCS Runoff	North Culvert
11	SCS Runoff	West Culvert

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

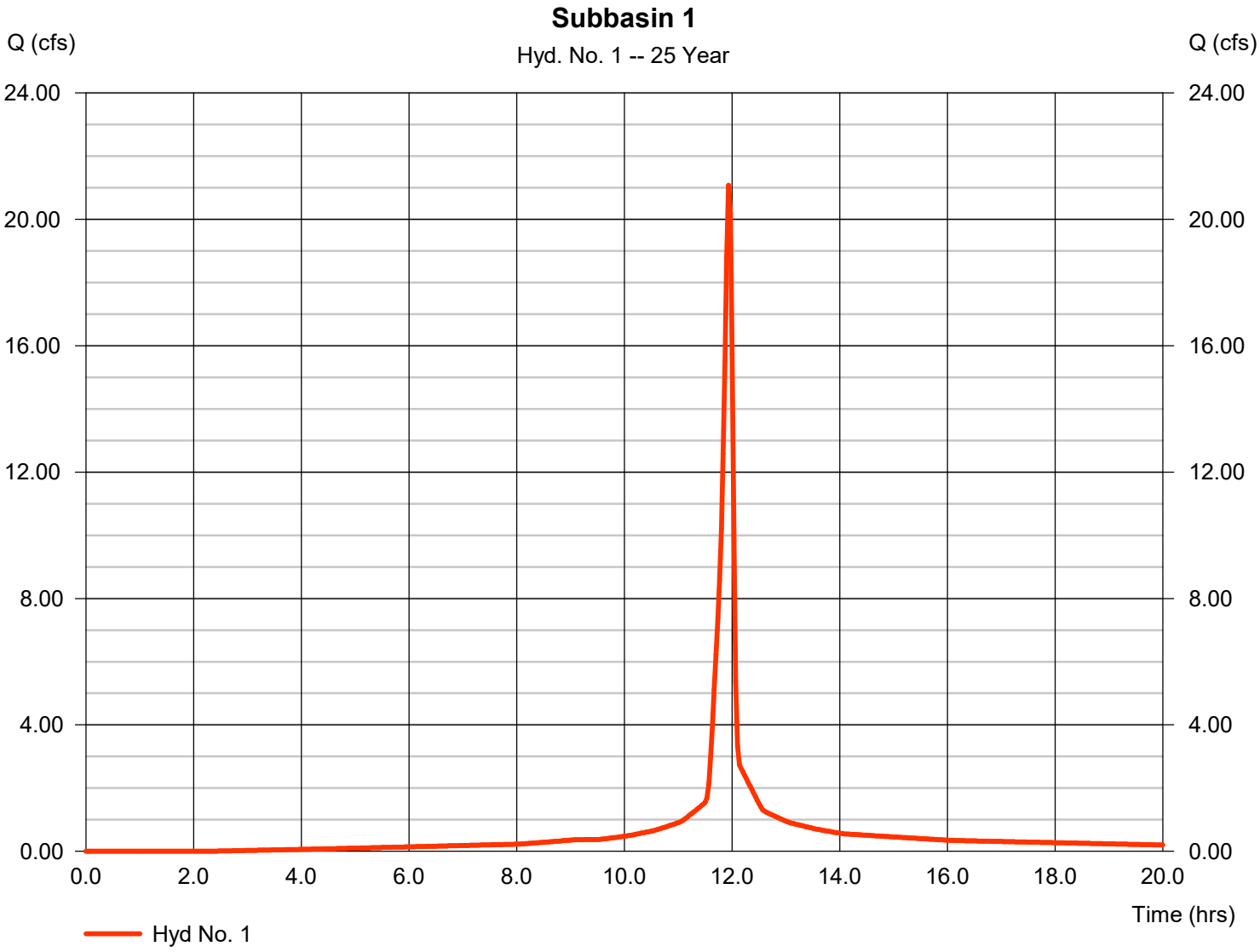
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	21.08	2	716	47,272	------	------	------	Subbasin 1
2	SCS Runoff	13.71	2	716	30,744	------	------	------	Subbasin 2
3	SCS Runoff	3.883	2	716	8,708	------	------	------	Subbasin 3
4	SCS Runoff	86.92	2	718	217,995	------	------	------	Subbasin 4a
5	Combine	34.79	2	716	78,016	1, 2,	------	------	Sub1 and Sub 2 Combine
6	SCS Runoff	87.68	2	718	219,891	------	------	------	Subbasin 4b
7	SCS Runoff	23.03	2	716	57,348	------	------	------	Direct Pond
8	Combine	233.60	2	718	581,958	3, 4, 5, 6, 7	------	------	Total Runoff
9	Reservoir	1.321	2	1444	14,207	8	918.08	637,338	West Leachate Pond
10	SCS Runoff	12.84	2	716	28,790	------	------	------	North Culvert
11	SCS Runoff	10.38	2	716	23,280	------	------	------	West Culvert

Hydrograph Report

Hyd. No. 1

Subbasin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 21.08 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 47,272 cuft
Drainage area	= 2.660 ac	Curve number	= 93
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

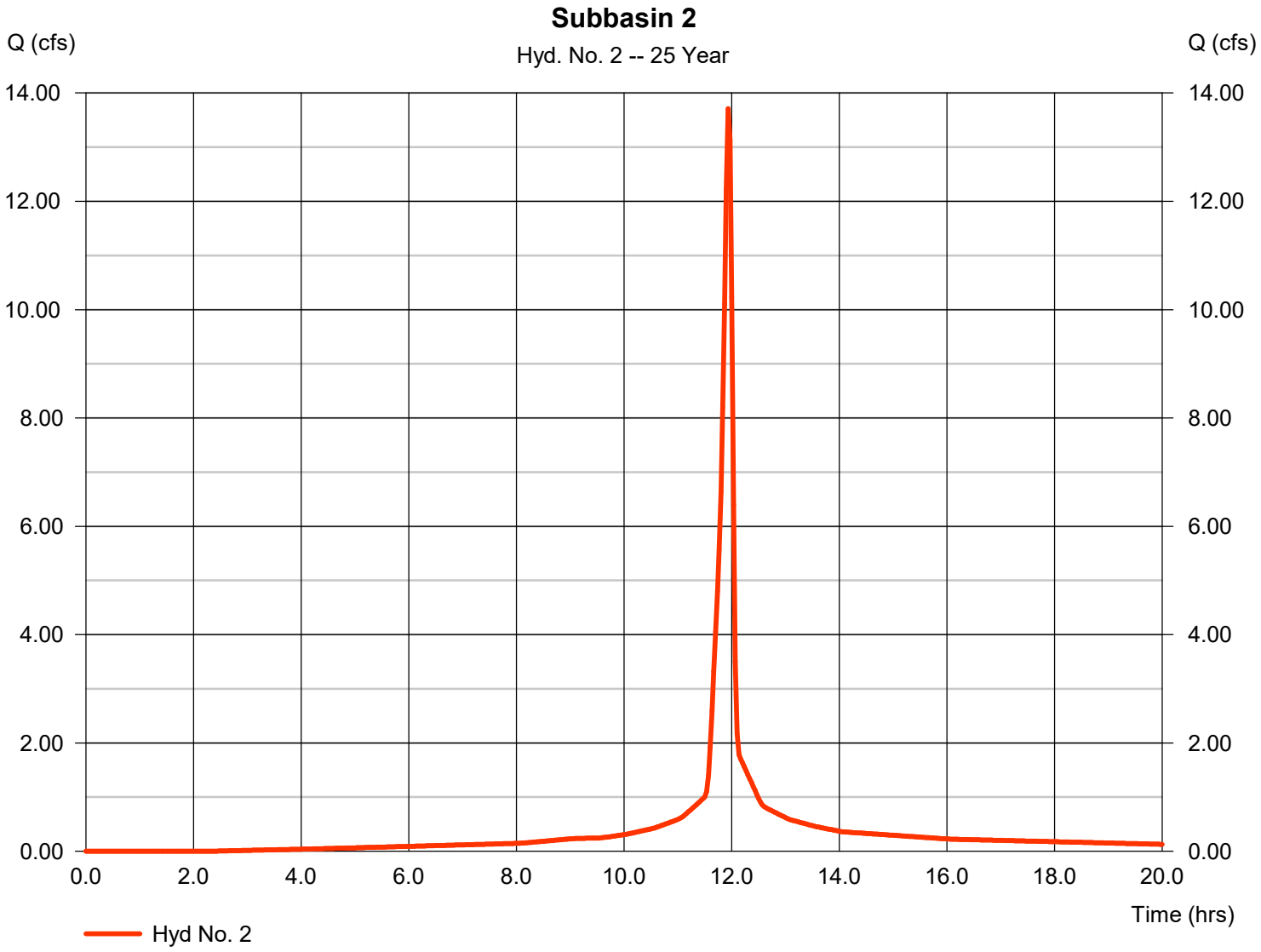


Hydrograph Report

Hyd. No. 2

Subbasin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 13.71 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 30,744 cuft
Drainage area	= 1.730 ac	Curve number	= 93
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

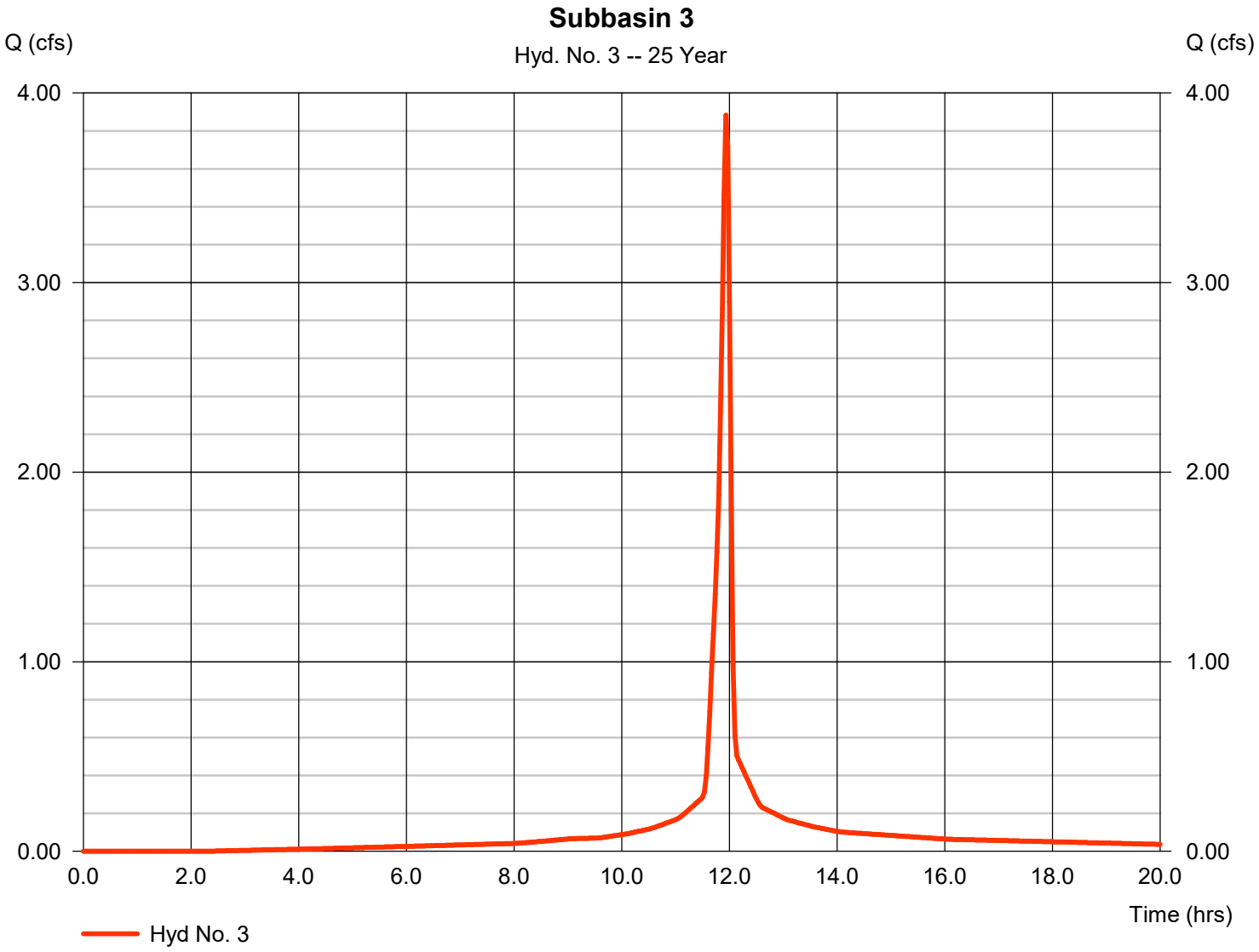


Hydrograph Report

Hyd. No. 3

Subbasin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.883 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	8,708 cuft
Drainage area	=	0.490 ac	Curve number	=	93
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

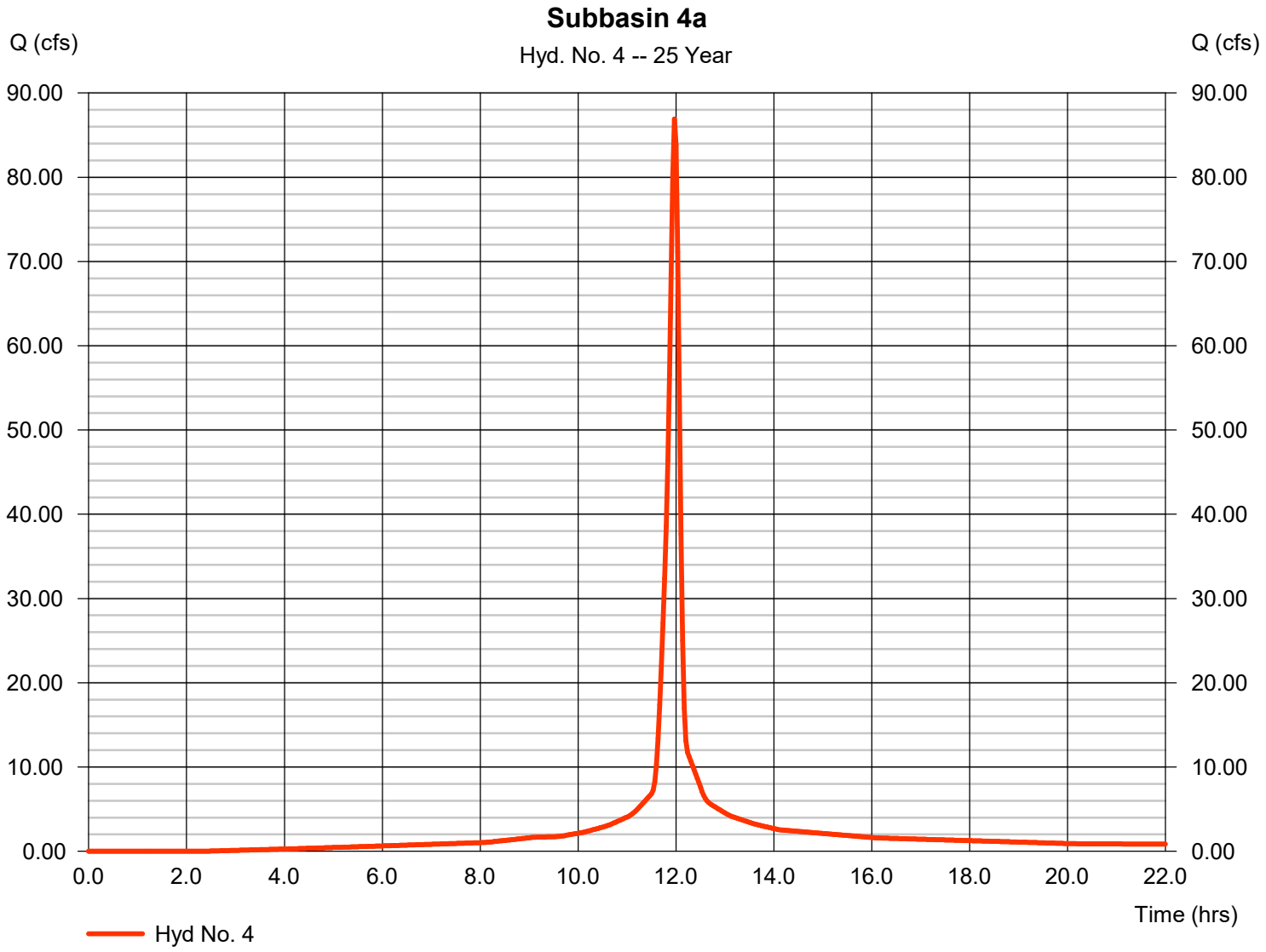


Hydrograph Report

Hyd. No. 4

Subbasin 4a

Hydrograph type	=	SCS Runoff	Peak discharge	=	86.92 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	217,995 cuft
Drainage area	=	11.500 ac	Curve number	=	93
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.90 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

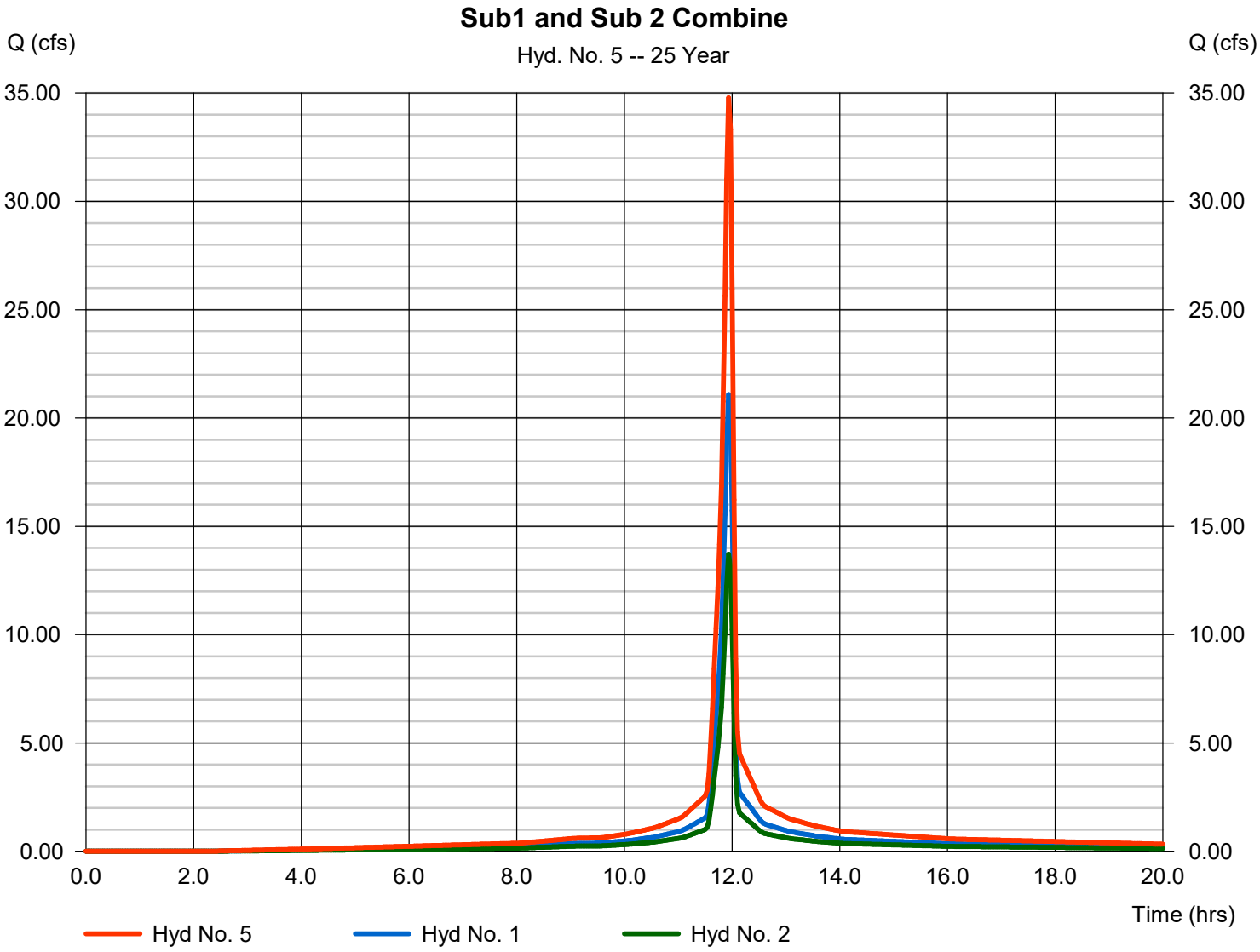


Hydrograph Report

Hyd. No. 5

Sub1 and Sub 2 Combine

Hydrograph type	= Combine	Peak discharge	= 34.79 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 78,016 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.390 ac

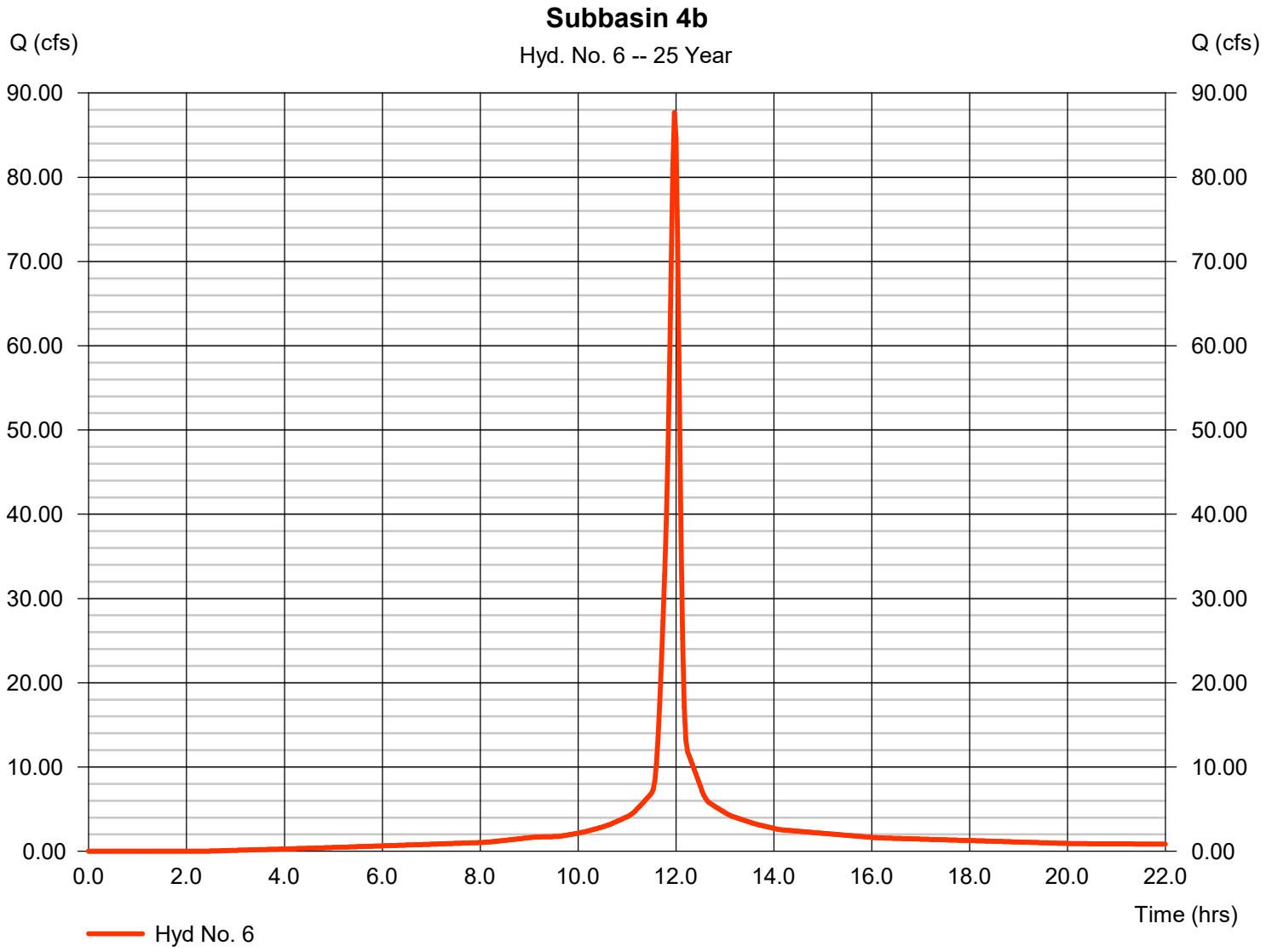


Hydrograph Report

Hyd. No. 6

Subbasin 4b

Hydrograph type	=	SCS Runoff	Peak discharge	=	87.68 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	219,891 cuft
Drainage area	=	11.600 ac	Curve number	=	93
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.90 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

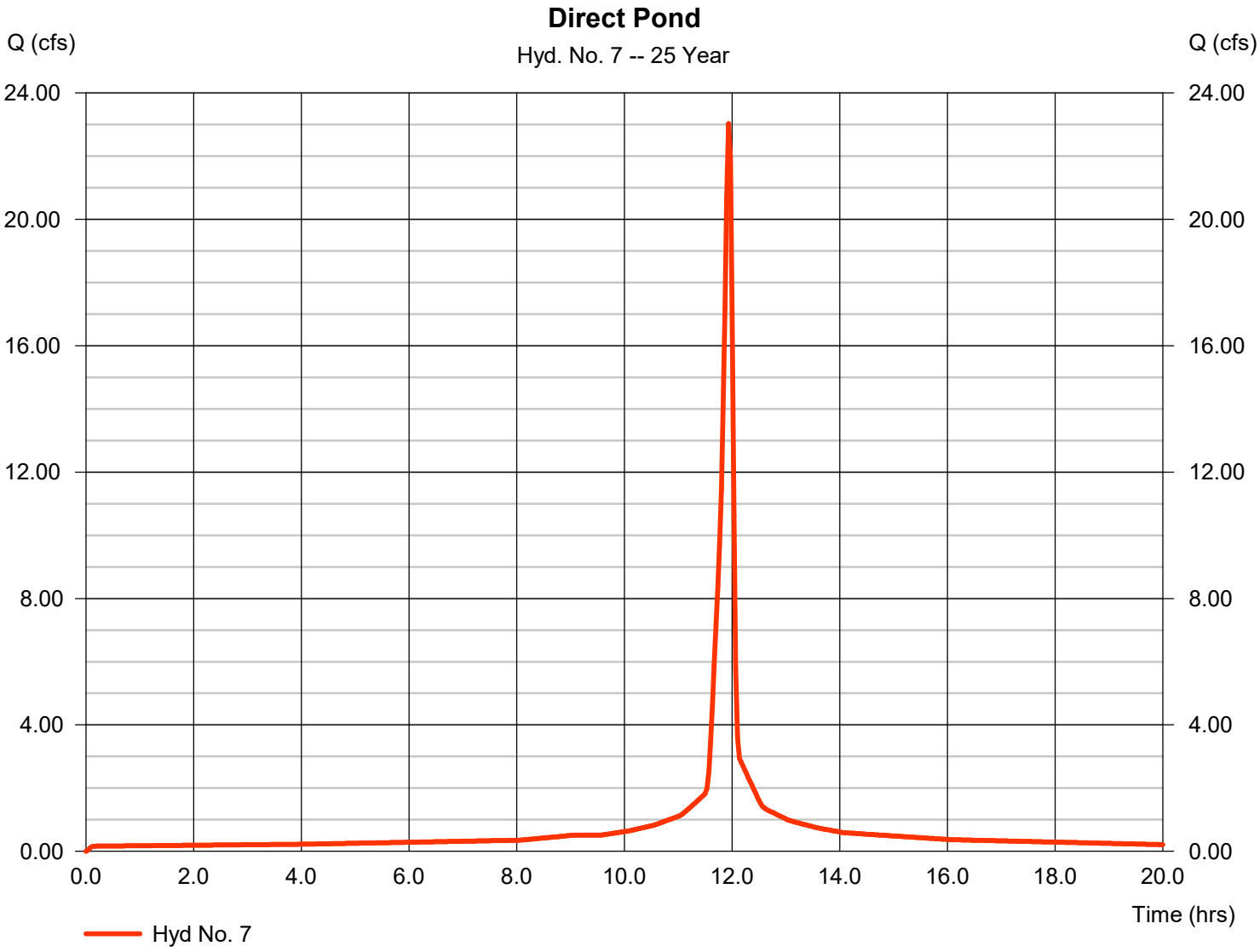


Hydrograph Report

Hyd. No. 7

Direct Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.03 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	57,348 cuft
Drainage area	=	2.790 ac	Curve number	=	100
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

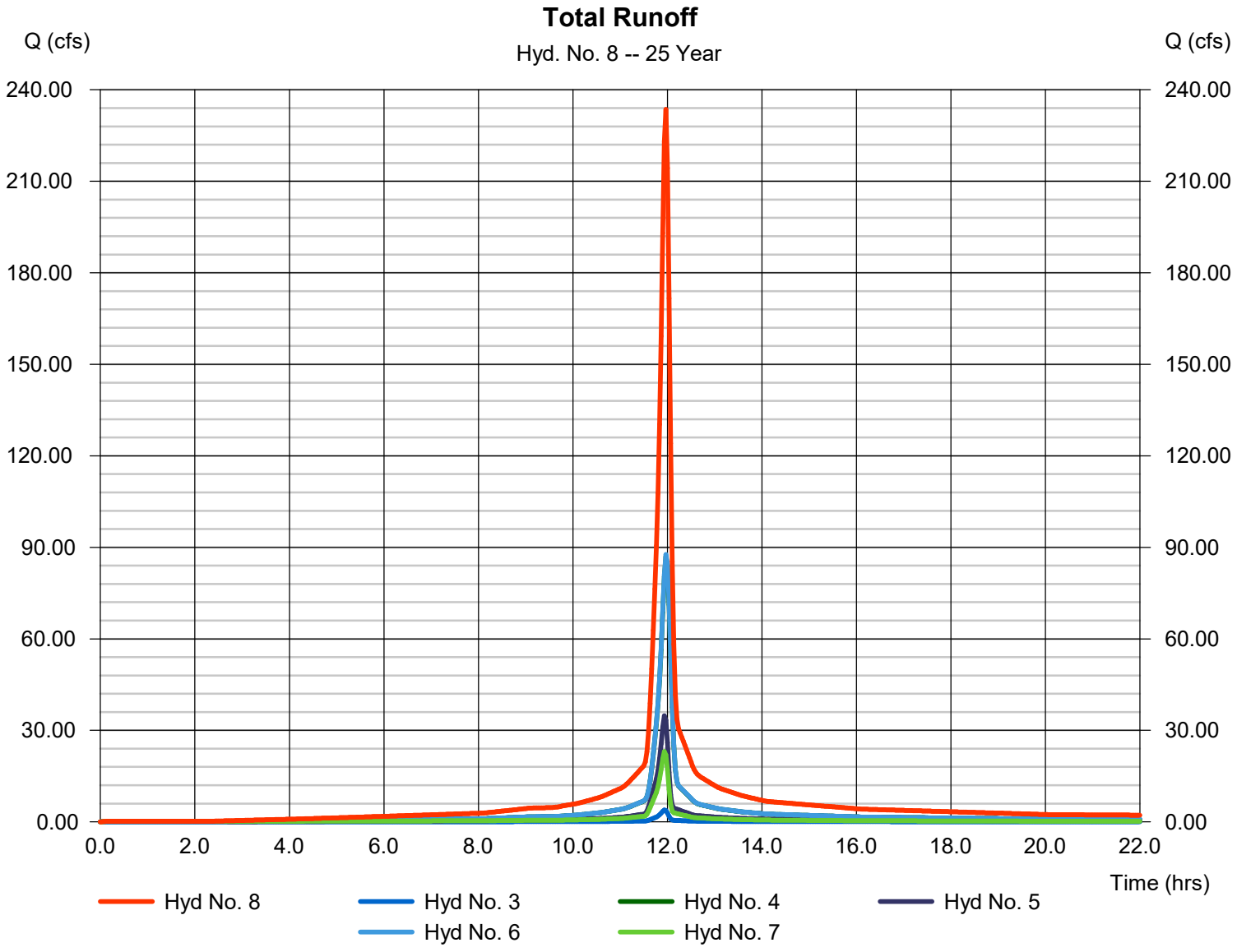


Hydrograph Report

Hyd. No. 8

Total Runoff

Hydrograph type	=	Combine	Peak discharge	=	233.60 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	581,958 cuft
Inflow hyds.	=	3, 4, 5, 6, 7	Contrib. drain. area	=	26.380 ac



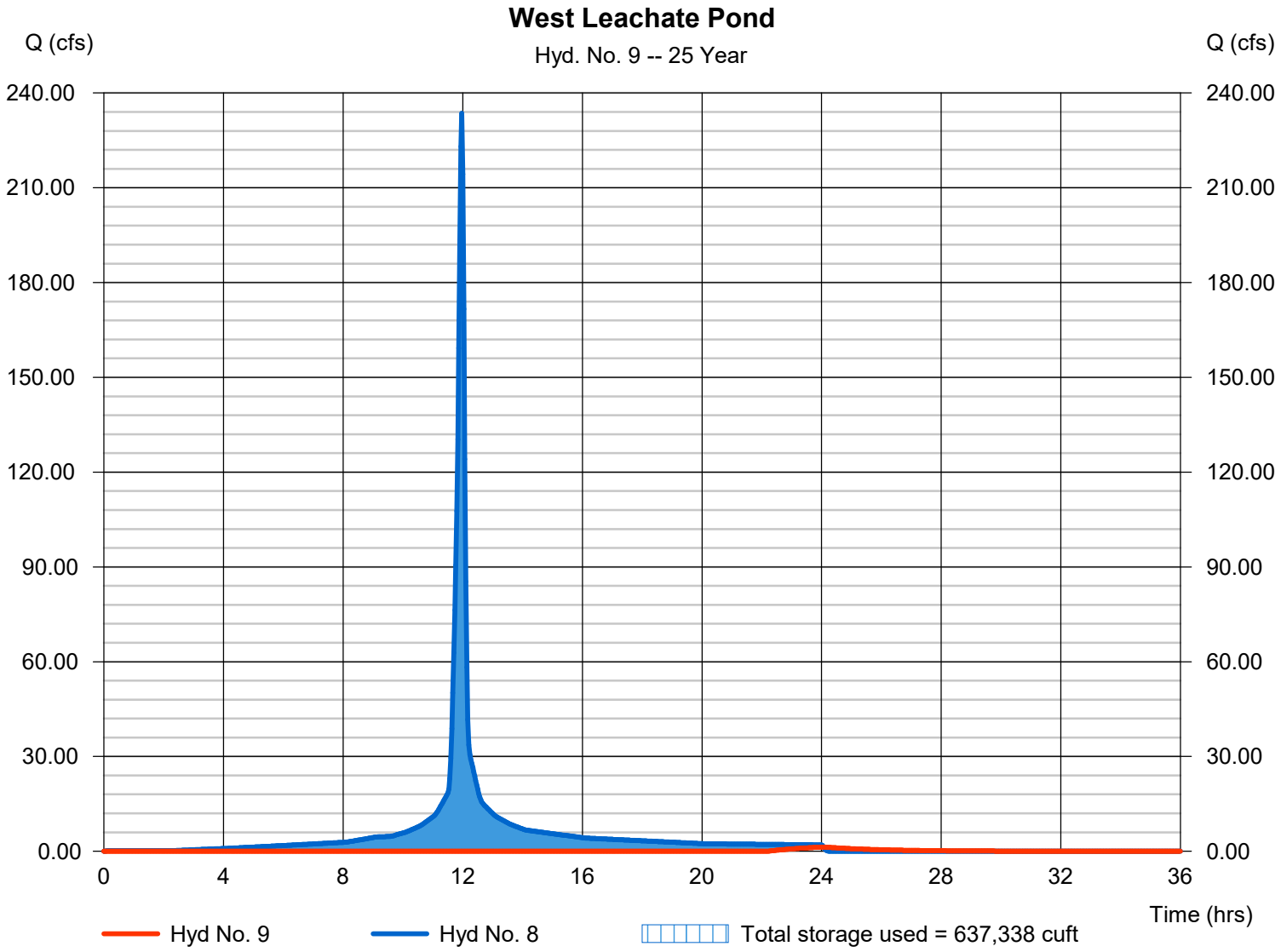
Hydrograph Report

Hyd. No. 9

West Leachate Pond

Hydrograph type	=	Reservoir	Peak discharge	=	1.321 cfs
Storm frequency	=	25 yrs	Time to peak	=	24.07 hrs
Time interval	=	2 min	Hyd. volume	=	14,207 cuft
Inflow hyd. No.	=	8 - Total Runoff	Max. Elevation	=	918.08 ft
Reservoir name	=	West Leachate Pond	Max. Storage	=	637,338 cuft

Storage Indication method used. Wet pond routing start elevation = 912.00 ft.



Pond Report

Pond No. 1 - West Leachate Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 911.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	911.00	40,000	0	0
1.00	912.00	81,891	60,946	60,946
2.00	913.00	85,549	83,720	144,666
3.00	914.00	91,523	88,536	233,202
4.00	915.00	93,969	92,746	325,948
5.00	916.00	98,132	96,051	421,998
6.00	917.00	103,814	100,973	522,971
7.00	918.00	107,626	105,720	628,691
8.00	919.00	107,626	107,626	736,317

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

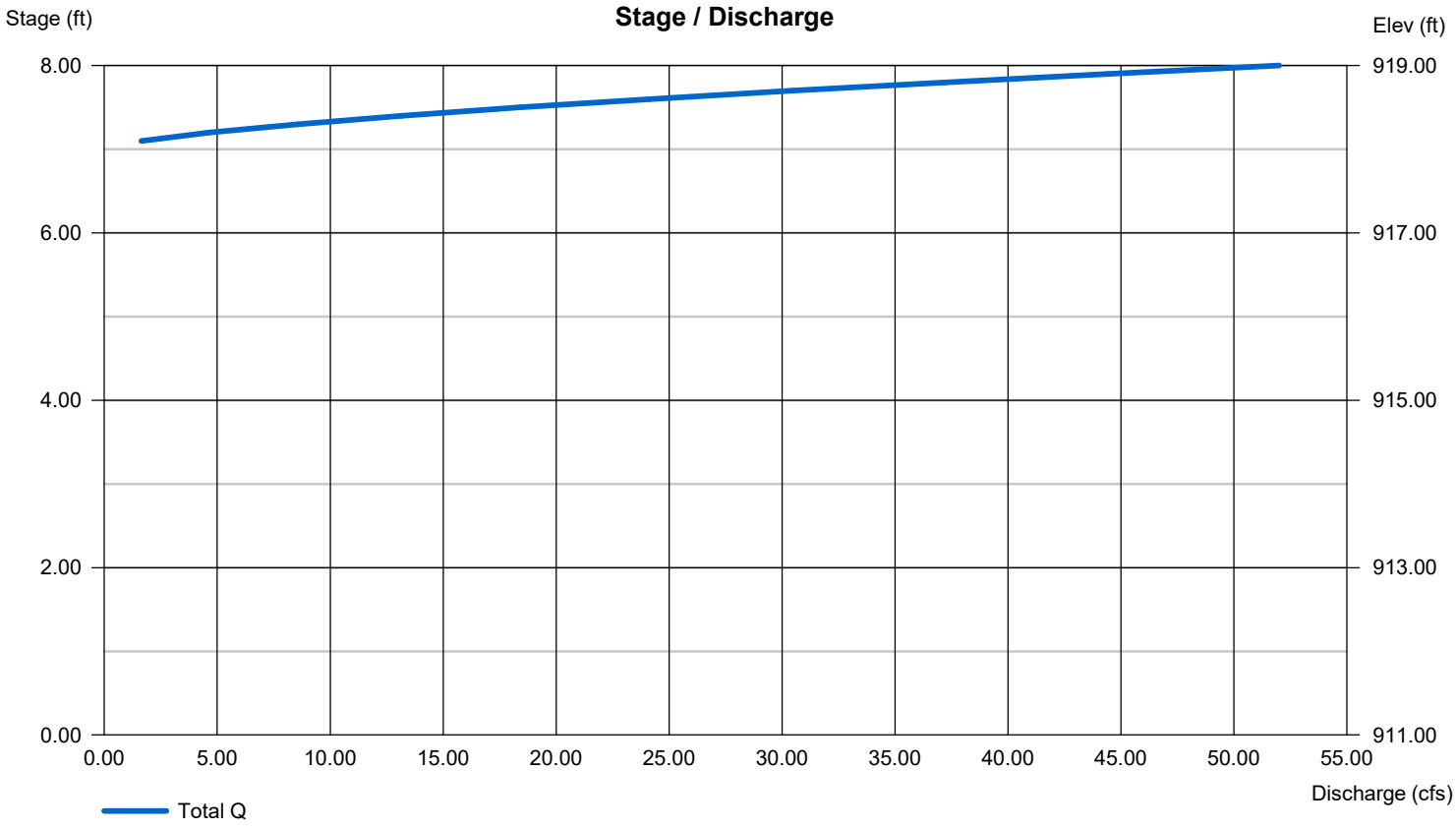
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 918.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

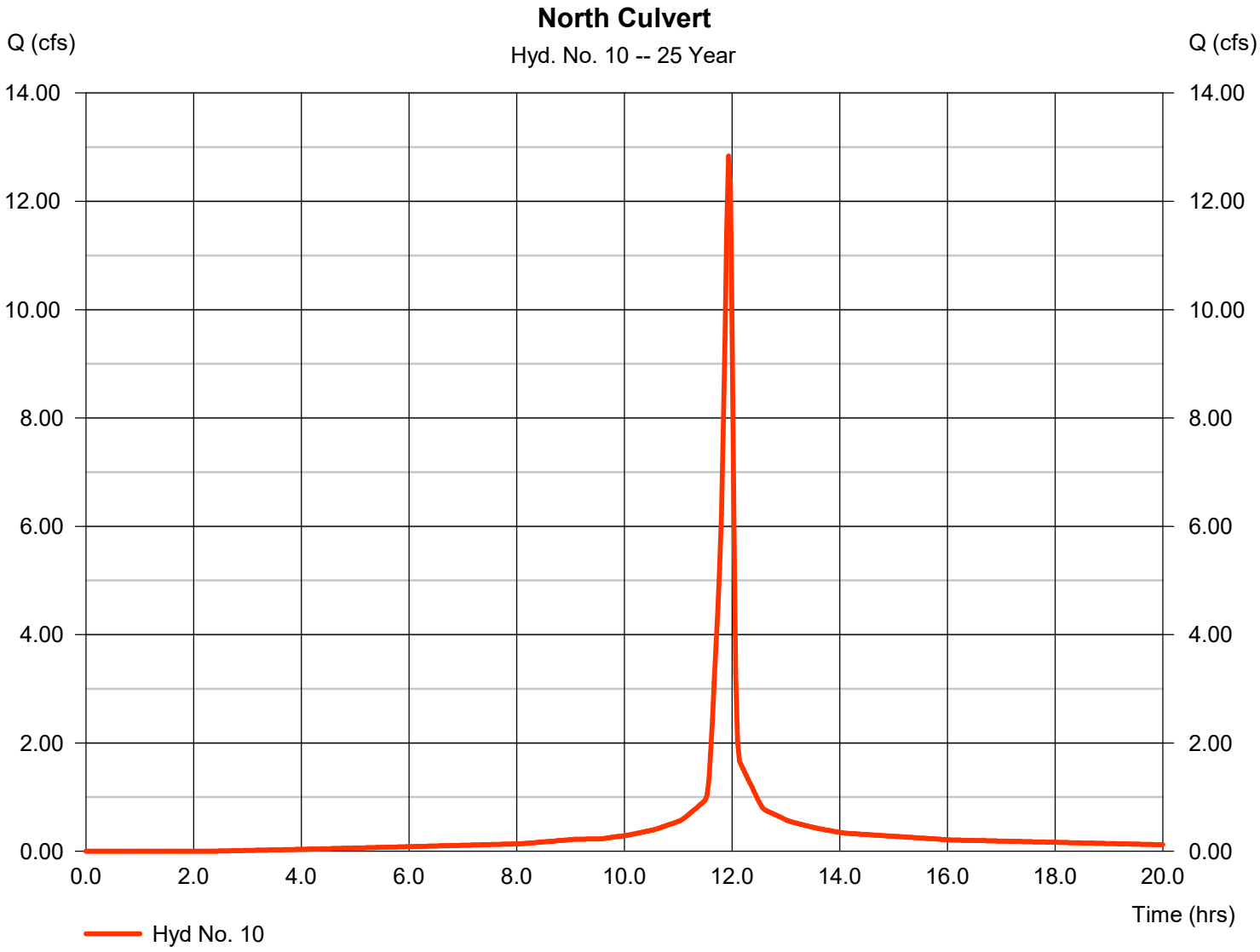


Hydrograph Report

Hyd. No. 10

North Culvert

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.84 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	28,790 cuft
Drainage area	=	1.620 ac	Curve number	=	93
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

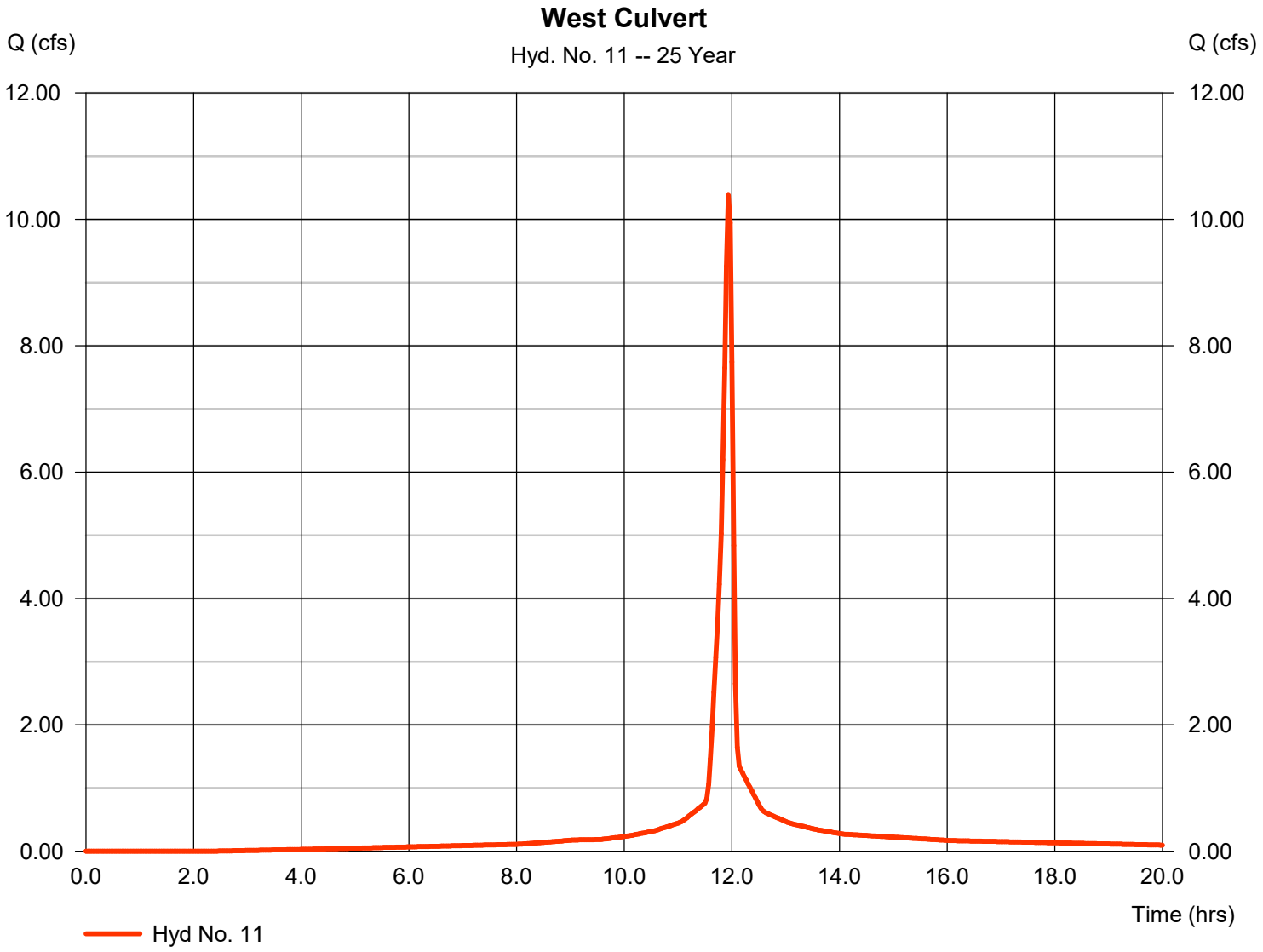


Hydrograph Report

Hyd. No. 11

West Culvert

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.38 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	23,280 cuft
Drainage area	=	1.310 ac	Curve number	=	93
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydraflow Table of Contents

25 - Year

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Attachment D-3

Run On Culvert Capacity

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Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 26 2023

North Culvert - 2-30 Inch RCP

Invert Elev Dn (ft)	=	923.11
Pipe Length (ft)	=	84.20
Slope (%)	=	-2.51
Invert Elev Up (ft)	=	921.00
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

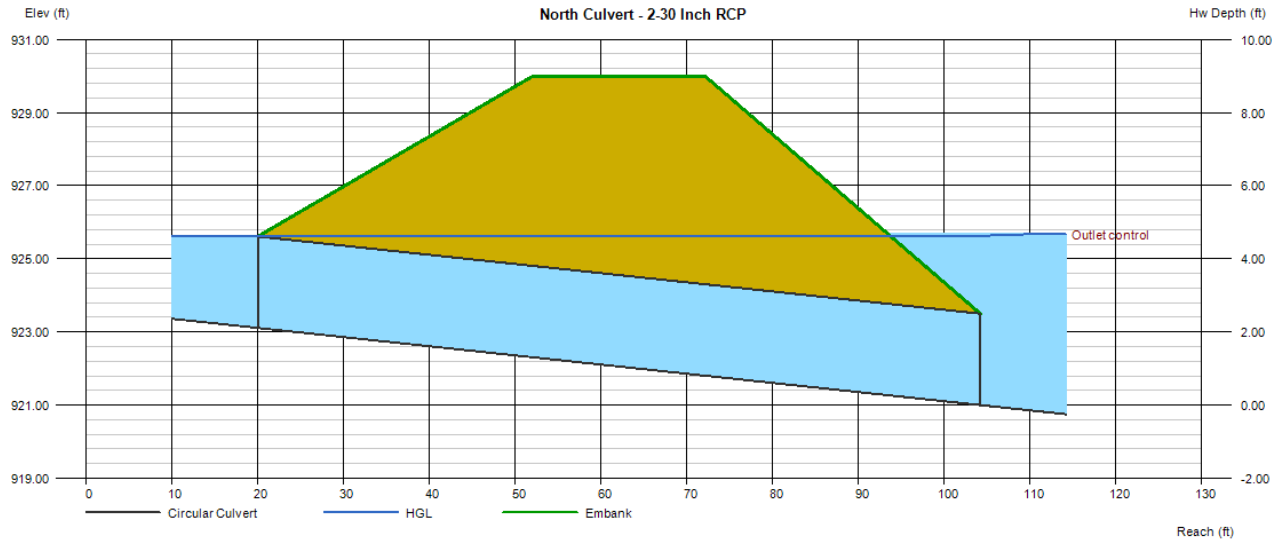
Top Elevation (ft)	=	930.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	12.84
Qmax (cfs)	=	20.00
Tailwater Elev (ft)	=	Crown

Highlighted

Qtotal (cfs)	=	12.84
Qpipe (cfs)	=	12.84
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.31
Veloc Up (ft/s)	=	1.31
HGL Dn (ft)	=	925.61
HGL Up (ft)	=	925.63
Hw Elev (ft)	=	925.67
Hw/D (ft)	=	1.87
Flow Regime	=	Outlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 26 2023

West Culvert - 2-30 Inch RCP

Invert Elev Dn (ft)	=	913.00
Pipe Length (ft)	=	70.00
Slope (%)	=	1.43
Invert Elev Up (ft)	=	914.00
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

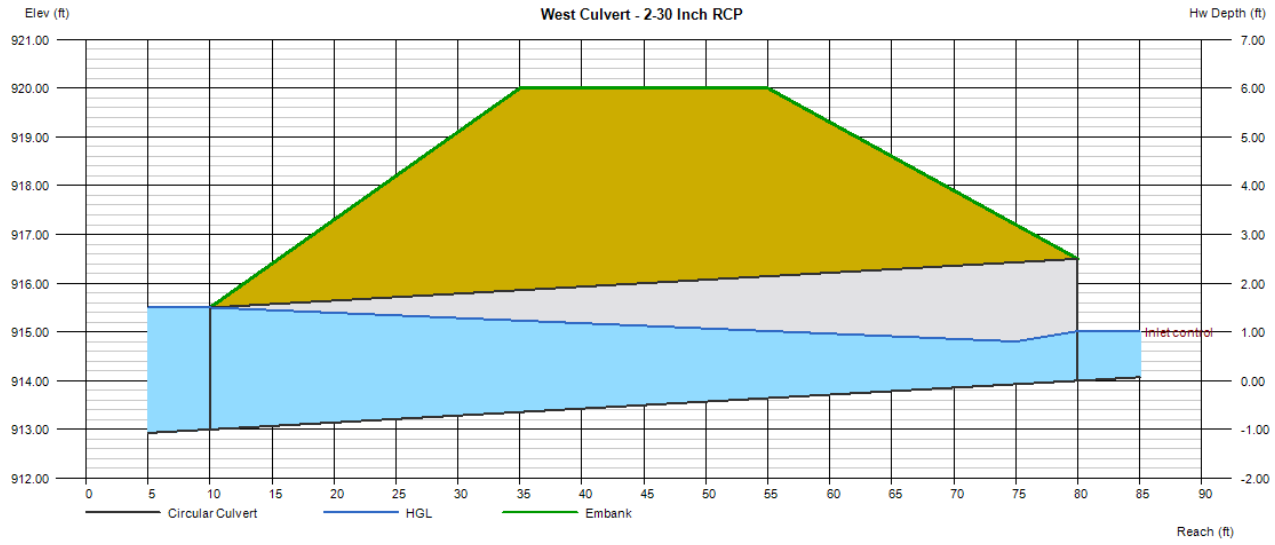
Top Elevation (ft)	=	920.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	10.38
Qmax (cfs)	=	20.00
Tailwater Elev (ft)	=	Crown

Highlighted

Qtotal (cfs)	=	10.38
Qpipe (cfs)	=	10.38
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.06
Veloc Up (ft/s)	=	4.18
HGL Dn (ft)	=	915.50
HGL Up (ft)	=	914.75
Hw Elev (ft)	=	915.02
Hw/D (ft)	=	0.41
Flow Regime	=	Inlet Control



Attachment D-4

Run Off and Leachate Pond Calculations

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Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 26 2023

North Interior Channel

Trapezoidal

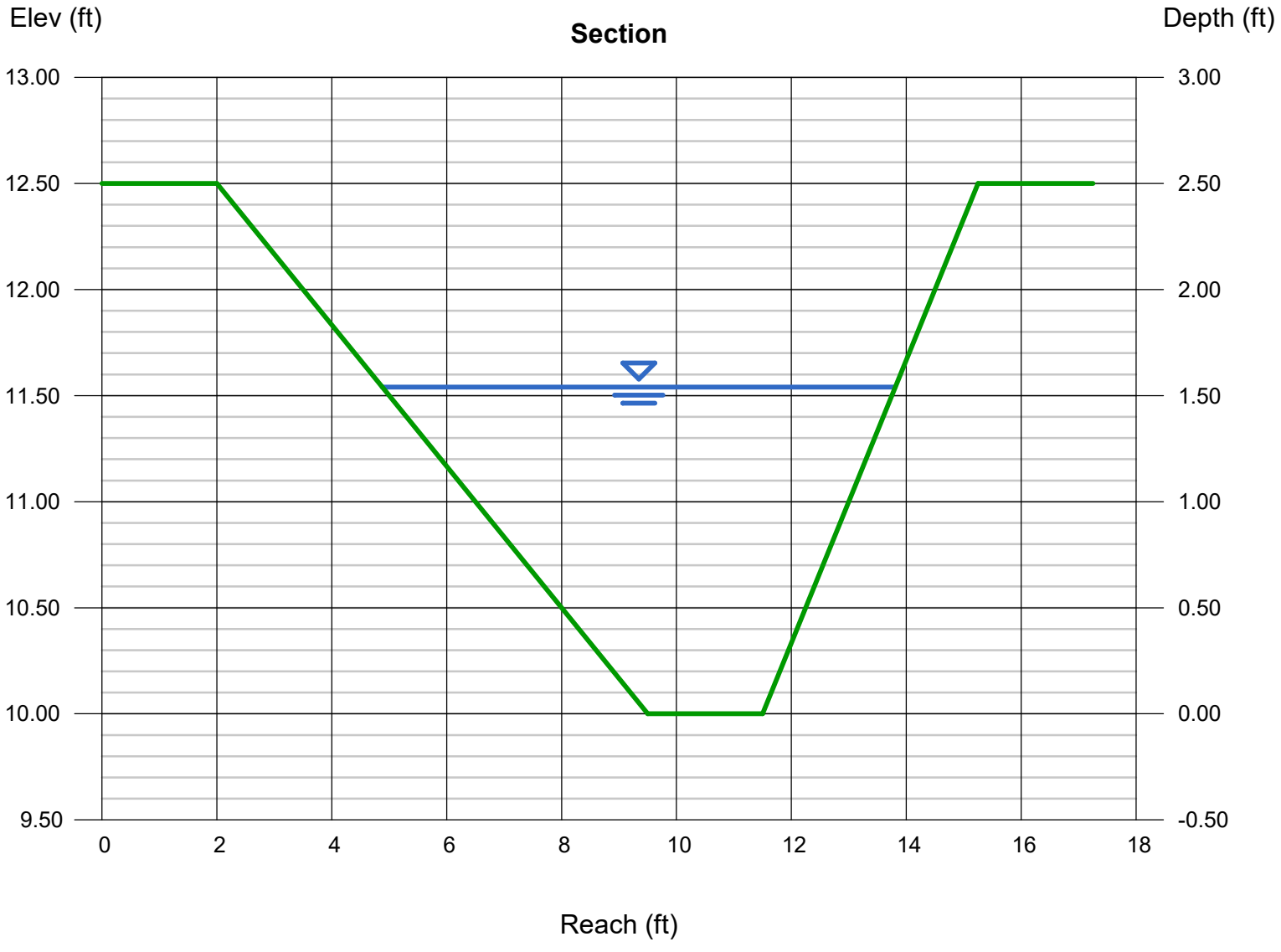
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 1.50
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 10.00
Slope (%)	= 0.05
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 21.08

Highlighted

Depth (ft)	= 1.54
Q (cfs)	= 21.08
Area (sqft)	= 8.42
Velocity (ft/s)	= 2.50
Wetted Perim (ft)	= 9.65
Crit Depth, Yc (ft)	= 1.05
Top Width (ft)	= 8.93
EGL (ft)	= 1.64



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 26 2023

West Interior Channel

Trapezoidal

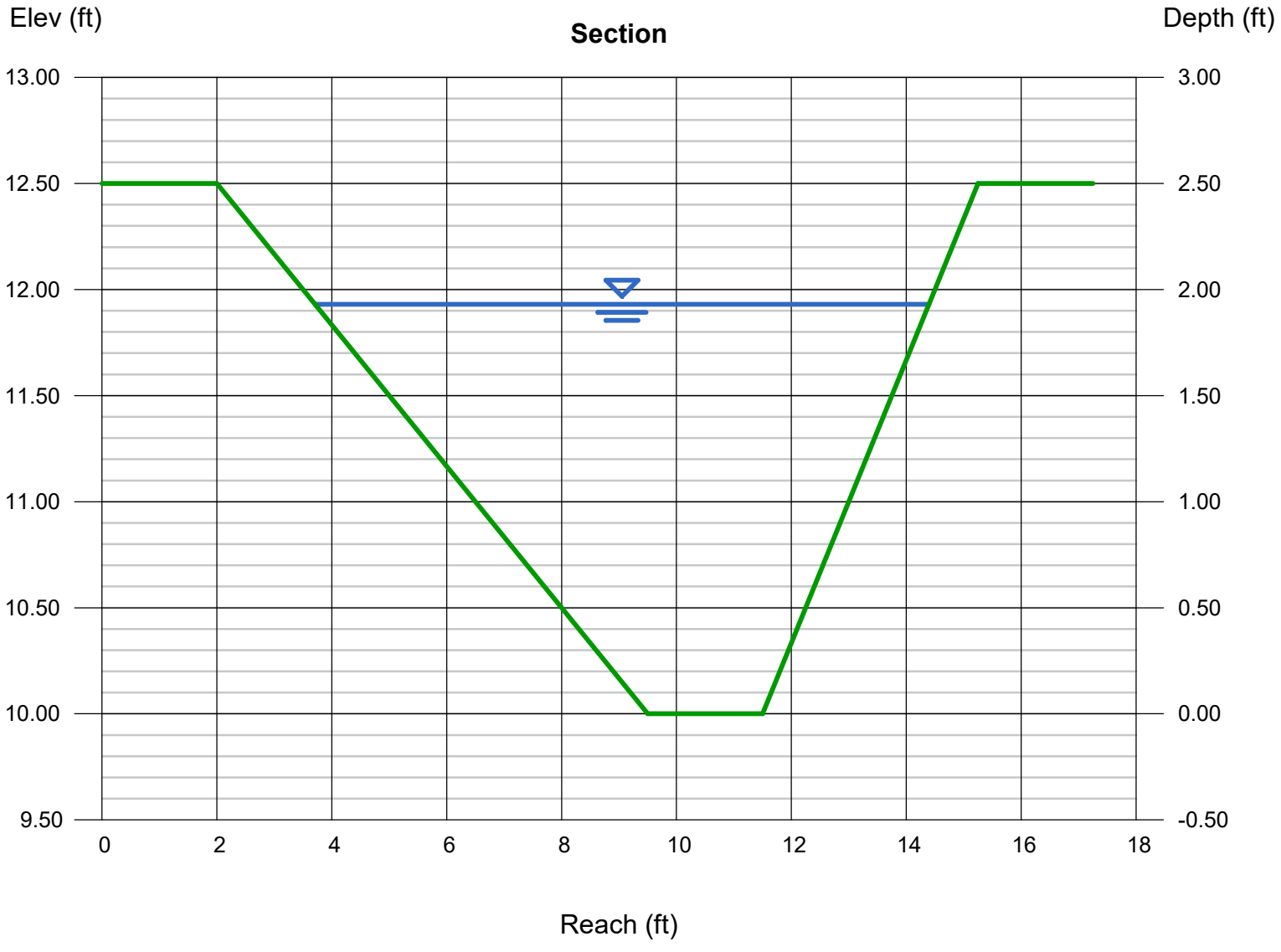
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 1.50
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 10.00
Slope (%)	= 0.05
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 34.79

Highlighted

Depth (ft)	= 1.93
Q (cfs)	= 34.79
Area (sqft)	= 12.24
Velocity (ft/s)	= 2.84
Wetted Perim (ft)	= 11.58
Crit Depth, Yc (ft)	= 1.34
Top Width (ft)	= 10.68
EGL (ft)	= 2.06



Culvert Report

Perimeter Channel to West Leachate Pond - 2x_3 - 24 Inch HDPE

Invert Elev Dn (ft)	=	916.00
Pipe Length (ft)	=	61.00
Slope (%)	=	1.64
Invert Elev Up (ft)	=	917.00
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	3
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

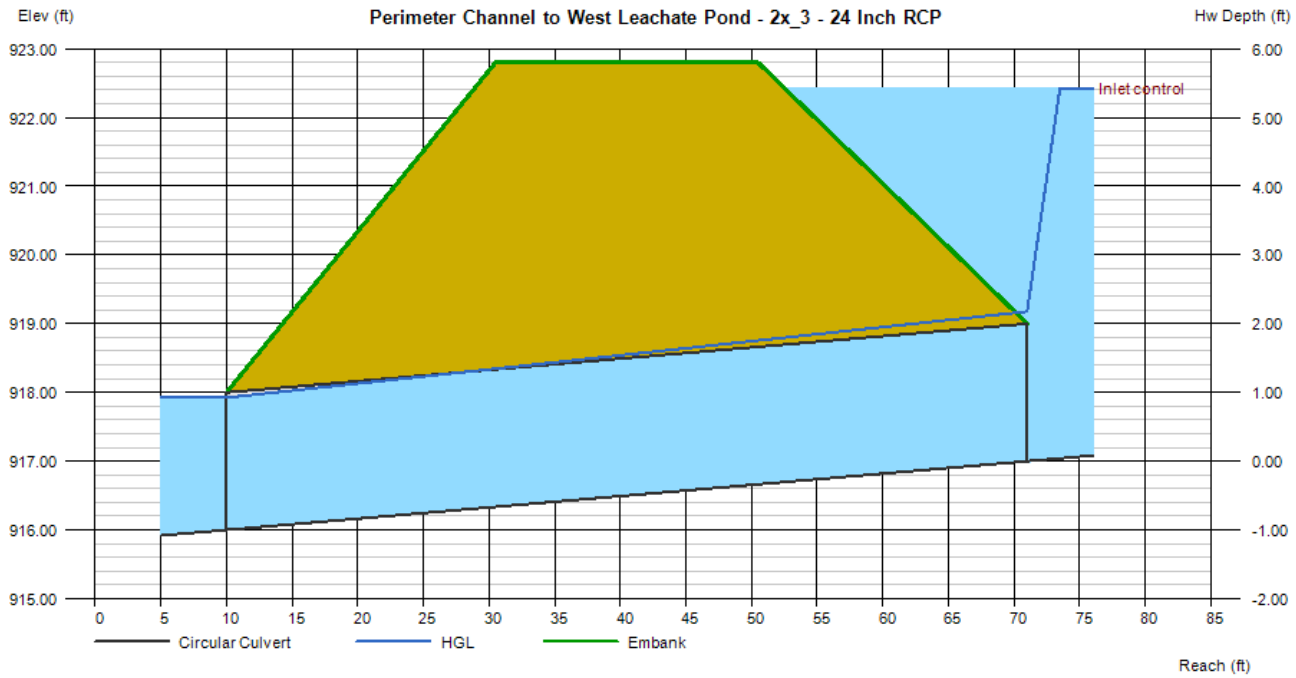
Top Elevation (ft)	=	922.80
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	106.64
Qmax (cfs)	=	185.00
Tailwater Elev (ft)	=	0.00

Highlighted

Qtotal (cfs)	=	106.64
Qpipe (cfs)	=	106.64
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	11.46
Veloc Up (ft/s)	=	11.31
HGL Dn (ft)	=	917.92
HGL Up (ft)	=	919.18
Hw Elev (ft)	=	922.42
Hw/D (ft)	=	2.71
Flow Regime	=	Inlet Control



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Attachment D-5

NPDES Letter

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NEBRASKA
Good Life. Great Resources.
DEPT. OF ENVIRONMENT AND ENERGY

Pete Ricketts, Governor

Lisa Olson
Omaha Public Power District
444 South 16th Street Mal
Omaha, NE 68102

RE: OPPD Nebraska City Station, 7264 L Rd, Nebraska City, Nebraska.
NDEE ID: 58343
Program ID: ISW-202200959

Subject: Industrial Storm Water Discharge Notification; Authorization Number ISW-202200959

Dear Lisa Olson:

This letter is to acknowledge receipt of the Industrial Storm Water Notice of Intent form on November 21, 2022, for the facility referenced above. As of November 21, 2022, this facility has authorization to discharge storm water under the terms and conditions of the NPDES Industrial Storm Water General Permit NER920000. Authorization under this permit is valid until a new Industrial Storm Water General Permit is issued by the Department.

Please ensure that your Storm Water Pollution Prevention Plan is in compliance with all conditions of Section 5 of the General Permit. A copy of this letter must be kept available at the facility.

If you have any question regarding your requirements according to the permit, please contact our office at (402) 471-2867.

Sincerely,

Hannah Lionberger, Environmental Specialist
NPDES and State Permits Section
Nebraska Department of Environment and Energy

Department of Environment and Energy
P.O. Box 98922
Lincoln, Nebraska 68509-8922

Jim Macy, Director
OFFICE 402-471-2186 FAX 402-471-2909
ndee.moreinfo@nebraska.gov

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