

Periodic Run-On and Run-Off Control System Plan CCR Landfill



Evergy Metro, Inc.

**La Cygne Generating Station
Project No. 125196**

**Revision 1
10/1/2021**

Periodic Run-On and Run-Off Control System Plan CCR Landfill

prepared for

**Evergy Metro, Inc.
La Cygne Generating Station
Linn County, KS**

Project No. 125196

**Revision 1
10/1/2021**

prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

INDEX AND CERTIFICATION

**Evergy Metro, Inc.
Periodic Run-On and
Run-Off Control System Plan
CCR Landfill
Project No. 125196**

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Certification

I hereby certify, as a Professional Engineer in the state of Kansas, that the information in this document was assembled under my direct personal charge and that this periodic run-on and run-off control system plan meets the applicable requirements of 40 CFR 257.81. This report is not intended or represented to be suitable for reuse by Evergy Metro, Inc. or others without specific verification or adaptation by the Engineer.



Austin Muckenthaler, P.E.
Kansas License #27432

Date: 10/1/2021

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
CHDPE	corrugated high-density polyethylene
EPA	Environmental Protection Agency
Evergy	Evergy Metro, Inc.
HDPE	High-Density Polyethylene
KDHE	Kansas Department of Health and Environment
La Cygne	La Cygne Generating Station
NDPES	National Pollutant Discharge Elimination System
RCRA	Resource Conservations and Recovery Act
UAQCI	Upper AQC Impoundment
U.S.C.	United States Code

1.0 BACKGROUND

On April 17, 2015, the Environmental Protection Agency (EPA) issued the federal Coal Combustion Residuals Rule (CCR Rule) to regulate the disposal of CCR materials generated at coal-fired units. The rule is being administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], under Subtitle D.

Evergy Metro, Inc. (Evergy) is subject to the CCR Rule and as such must develop a run-on and run-off control system plan for the CCR Landfill at La Cygne Generating Station (La Cygne) per 40 Code of Federal Regulations (CFR) §257.81. This report serves as the periodic update to the run-on and run-off control system plan which was originally developed by AECOM. This run-on and run-off control system plan is in addition to, not in place of, any other applicable site permits, environmental standards, or work safety practices.

1.1 Facility Information

Name of Facility:	La Cygne Generating Station
Name of CCR Unit:	CCR Landfill
Name of Operator:	Evergy Metro, Inc.
Facility Mailing Address:	25166 E 2200th Rd La Cygne, KS 66040
Location:	Approximately seven miles east of La Cygne, KS
Facility Description:	The La Cygne Generating Station has two coal-fired units that produce fly ash, bottom ash, and gypsum. CCR not beneficially used is transported to the on-site landfill for disposal. Related landfill facilities include a groundwater monitoring system, stormwater management systems, and haul/access roads.

1.2 Regulatory Requirements

Per 40 CFR §257.81, the run-on and run-off control system plan must contain documentation (including supporting engineering calculations) that the control system has been designed and constructed to meet the applicable requirements of 40 CFR 257.81. The owner or operator of a CCR unit must prepare a written plan that includes the information specified in 40 CFR 257.81 (a) and (b) which is as follows:

- (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:

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

These items are addressed in Sections 2.0 and 3.0 of this document. Per 40 CFR §257.81(c)(5), Evergy must obtain certification from a qualified professional engineer that the run-on and run-off control system plan, and subsequent updates to the plan, meet the requirements of 40 CFR §257.81. This sealed document serves as that certification.

2.0 LANDFILL RUN-ON AND RUN-OFF CONTROLS

The La Cygne CCR Landfill is permitted with the Kansas Department of Health and Environment (KDHE). The landfill is approximately 140 acres. The permitted run-on and run-off control system design was prepared by AECOM in 2016. The system consists of a perimeter berm, ditches, and culverts which were designed to control the 25-year, 24-hour storm event in accordance with 40 CFR §257.81.

Modifications have been made to the landfill run-off control system design to support on-going landfill operations and other work adjacent to the landfill. These modifications allow for the continued control of the 25-year, 24-hour storm event.

2.1 Run-On Controls

The landfill perimeter berm prevents run-on to the landfill on all sides and serves as an access road for the landfill. The berm crest is significantly higher than surrounding grades outside of the landfill, so it directs stormwater away from the landfill. The berm was constructed with a top width of approximately 16-feet, 4H:1V side slopes, and a crest elevation of 886 feet.

2.2 Run-Off Controls

The landfill footprint is currently divided into a northside and a southside by an east-west access road. This access road also serves as a drainage area delineation line. On the north side of the landfill, run-off drains north towards the Northwest Landfill Water Control Structure (HydroCAD node: ST-5) and Northeast Landfill Water Control Structure (HydroCAD node: ST-6). Each of these structures has a 24-inch diameter high-density polyethylene (HDPE), DR 9 pipe which conveys water out of the landfill and into a ditch. This ditch also collects run-off from a 40-acre closed section of the Upper AQC Impoundment (UAQCI). Run-off drains east, where it passes through dual reinforced concrete box culverts before heading south to Outfall 00D, which is regulated under the site's National Pollutant Discharge Elimination System (NPDES) permit.

On the south side of the landfill, run-off is collected in perimeter ditches on the interior side of the landfill perimeter berm. The perimeter ditches are generally trapezoidal in shape but have varying widths, longitudinal slopes, side slopes, and surfacing. To be conservative, the calculations assume the perimeter ditches are a 7-foot-wide concrete-lined ditch with 3.5H:1V side slopes. As the landfill is built up, benches and letdown piping will aid in directing runoff flow to the perimeter ditches. From the perimeter ditches, runoff may discharge via one of two locations on the west side of the landfill. To the north is a 30-inch diameter HDPE DR11 culvert, and to the south are dual, 48-inch corrugated high-density polyethylene (CHDPE) culverts. Each of these locations discharge to a concrete-lined drainage ditch

which runs along the west and south sides of the landfill to Outfall 016, which is regulated under the site's NPDES permit.

Table 2-1 presents the excess capacities of the storm water run-off system components from the current active area for the 25-year, 24-hour design storm event.

Table 2-1: Run-Off Control Performance

Storm Water System Component	Peak Storm Water Elevation	Flood Elevation	Excess Capacity (Freeboard)	Units
Northwest Landfill Water Control Structure (ST-5)	881.4	886.0	4.6	feet
Northeast Landfill Water Control Structure (ST-6)	883.2	886.0	2.8	feet
Dual 4'x 5' Box Culverts (ST-9)	870.6	876.0	5.4	feet
30" diameter Culvert (ST-1)	879.5	886.0	6.5	feet
Dual 48" diameter Culverts (ST-2)	874.8	886.0	11.2	feet

As indicated in Table 2-1 and Appendix A, the landfill has significant excess capacity beyond the design 25-year, 24-hour storm event, therefore the run-off protection system exceeds the requirement to provide protection from run-off from the 25-year, 24-hour storm event.

3.0 RUN-OFF CONTROL FOR §257.3-3

The run-off from the La Cygne CCR Landfill active area is routed through the landfill perimeter ditches which discharge to NPDES-permitted outfalls. Per the current NPDES permit, discharged water is tested for pollutants and the discharge meets the minimum regulatory requirements of the permit. The facility does not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the NPDES under Section 402 of the Clean Water Act, and therefore meets the requirements of 40 CFR 257.81(b).

4.0 AMENDMENT OF RUN-ON AND RUN-OFF CONTROL PLAN

The owner or operator may amend the written run-off and run-on control system 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 runoff control system plan whenever there is a change in conditions that would substantially affect the written plan in effect. Additionally, the owner or operator of the CCR unit must prepare periodic run-on and runoff control system plans 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 completed plan is placed into the facility's operating record within a reasonable amount of time.

A written certification from a qualified professional engineer that the initial and any amendment of the written run-on and run-off control system plan meets the requirements of §257.81 must be obtained. Plan changes will be documented using the Revision History which follows this Plan. Changes to this Plan will be certified by a Qualified Professional Engineer.

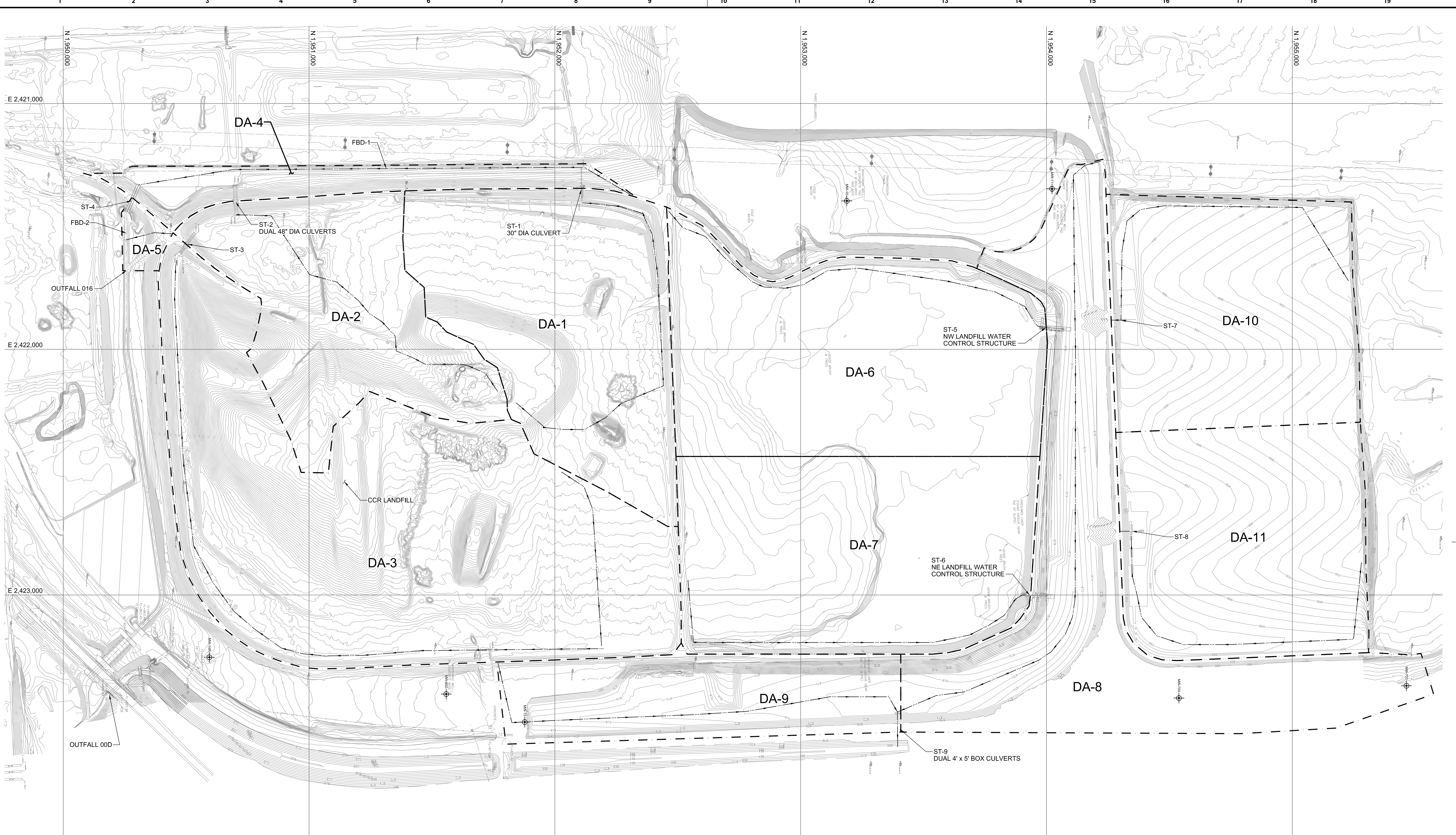
5.0 REFERENCES

1. U.S. Environmental Protection Agency, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, 40 CFR §257, Federal Register 80, Subpart D, April 17, 2015.
2. AECOM, Initial Run-On and Run-off Control System Plan, CCR Landfill, La Cygne Generating Station, October 17, 2016.
3. BHC, Topographic Survey, December 2020-June 2021.
4. AECOM, Alternative Cover Design Test Site – Upper AQC Impoundment, La Cygne Generating Station, 2020.
5. National Oceanic and Atmospheric Administration, NOAA Atlas 14 Point Precipitation Frequency Estimates, Volume 8, Version 2, Accessed: 2/19/2020.
6. USDA Natural Resources Conservation Service, Web Soil Survey, Hydrologic Soil Groups – Linn County, Kansas; Accessed: 2/24/2020.

6.0 RECORD OF REVISIONS

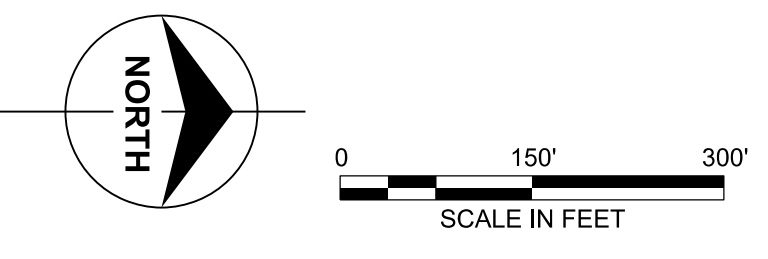
Revision Number	Date	Revisions Made	By Whom
0	10/17/2016	Initial Issue	AECOM
1	10/1/2021	Periodic Update	Burns & McDonnell

APPENDIX A – SUPPORTING CALCULATIONS



NOTES:
 1. THE NAMES FOR DRAINAGE AREAS, CULVERT CROSSINGS, AND DITCHES ON THIS SKETCH CORRESPOND TO THE NODES WITH MATCHING NAMES IN THE HYDROCAD REPORT IN APPENDIX A.

DRAINAGE AREA NAME	RUNOFF SURFACE AREA (ACRES)
DA-1	23.667
DA-2	17.965
DA-3	46.427
DA-4	5.891
DA-5	0.970
DA-6	27.558
DA-7	26.063
DA-8	30.000
DA-9	12.500
DA-10	21.337
DA-11	21.301



NOT FOR CONSTRUCTION

no.	date	by	ckd	description
0	10/01/21	AJM	KEW	ISSUED WITH LA CYGNE PERIODIC RUN-ON AND RUN-OFF CONTROL SYSTEM PLAN

no.	date	by	ckd	description

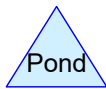
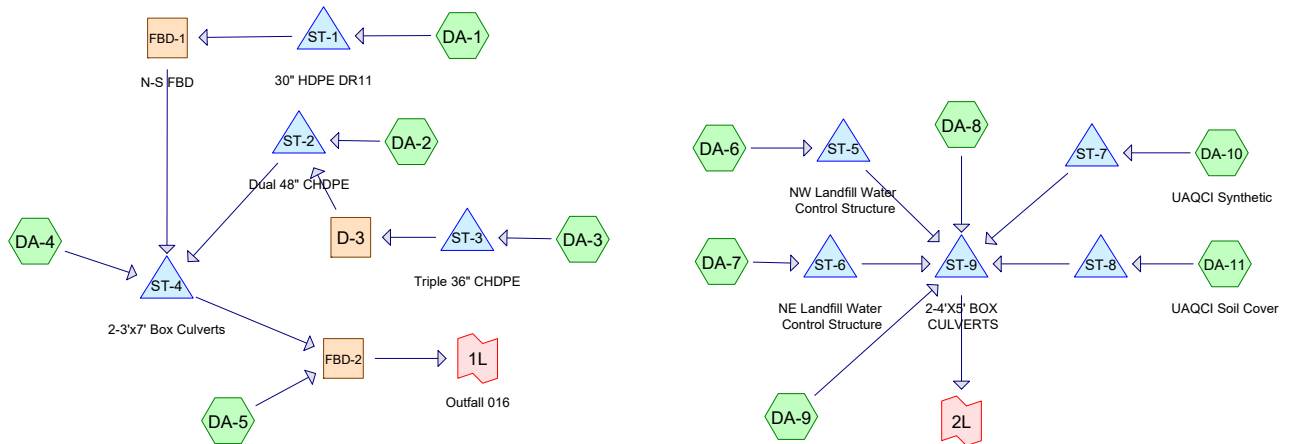
BURNS MCDONNELL
 9400 WARD PARKWAY
 KANSAS CITY, MO 64114
 816-333-9400
 Burns & McDonnell Engineering Co., Inc.
 FIRM LICENSE NO. E-65

designed: A.MUCKENTHALER
 detailed: A.MUCKENTHALER

evergy
 LA CYGNE GENERATING STATION
 CCR DITCH REROUTE
 LINN COUNTY, KS

LA CYGNE GENERATING STATION
 RUN-ON RUN-OFF CONTROL PLAN
 DRAINAGE AREA SKETCH

project: _____ contract: _____
 drawing: **SK-DA-001** rev. **0**
 sheet of sheets
 file 125196-SK-DA-001.DGN



Routing Diagram for 20210708_Dynamic_LaCygne RORO Control Plan
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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
45.425	84	50-75% Grass cover, Fair, HSG D (DA-4, DA-8, DA-9)
53.621	85	50-75% Grass cover, Fair, HSG D (DA-6, DA-7)
45.598	85	CCR (DA-3)
1.733	91	Gravel Road (DA-1, DA-2, DA-3)
0.366	91	Gravel roads, HSG D (DA-4)
2.810	98	Paved parking, HSG D (DA-4, DA-5)
21.301	85	Soil Cover (DA-11)
40.728	85	Soil Cover / CCR (DA-1, DA-2)
21.337	98	Synthetic Cover (DA-10)
0.760	85	Veg Cover / CCR (DA-5)
233.679	86	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
102.222	HSG D	DA-4, DA-5, DA-6, DA-7, DA-8, DA-9
131.457	Other	DA-1, DA-10, DA-11, DA-2, DA-3, DA-5
233.679		TOTAL AREA

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La Cygne CCR Landfill RORO Model

Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Subcatchment DA-1:

Runoff = 105.52 cfs @ 12.19 hrs, Volume= 9.513 af, Depth= 4.82"

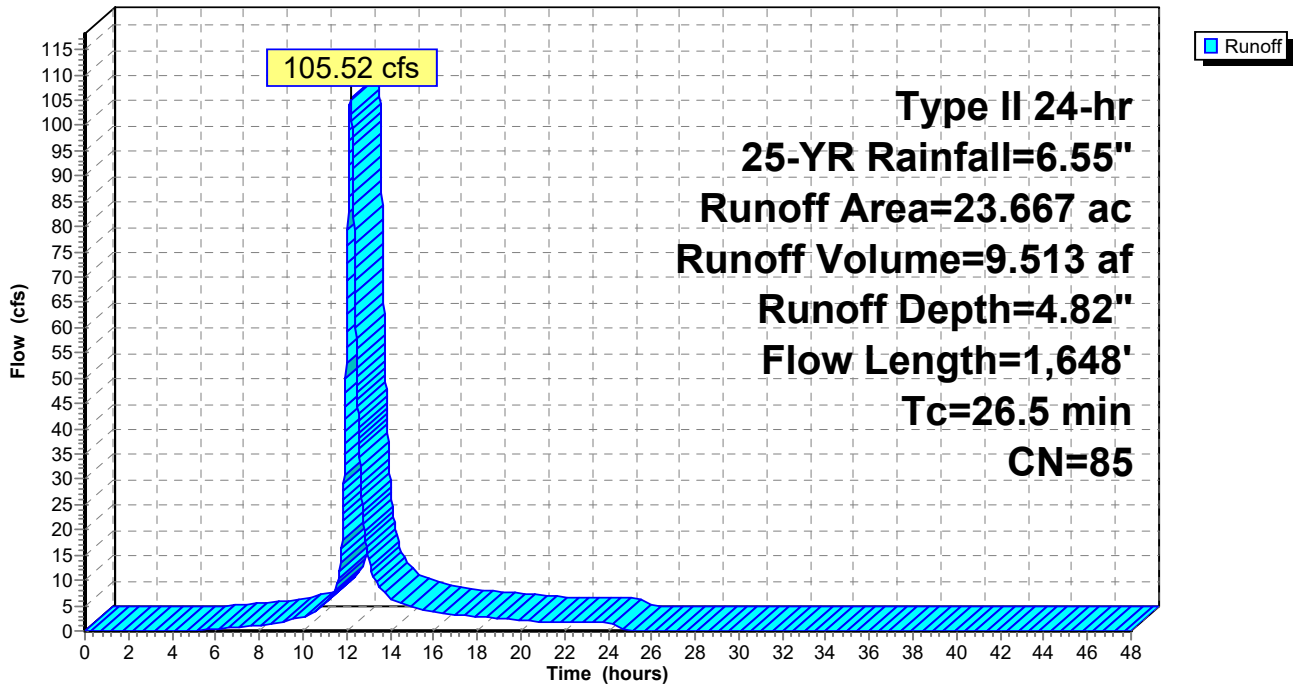
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 0.385	91	Gravel Road
* 23.282	85	Soil Cover / CCR
23.667	85	Weighted Average
23.667		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	300	0.0567	0.34		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
2.8	384	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.1	964	0.0121	1.77		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
26.5	1,648	Total			

Subcatchment DA-1:

Hydrograph



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Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Subcatchment DA-10: UAQCI Synthetic

Runoff = 121.22 cfs @ 12.14 hrs, Volume= 11.222 af, Depth= 6.31"

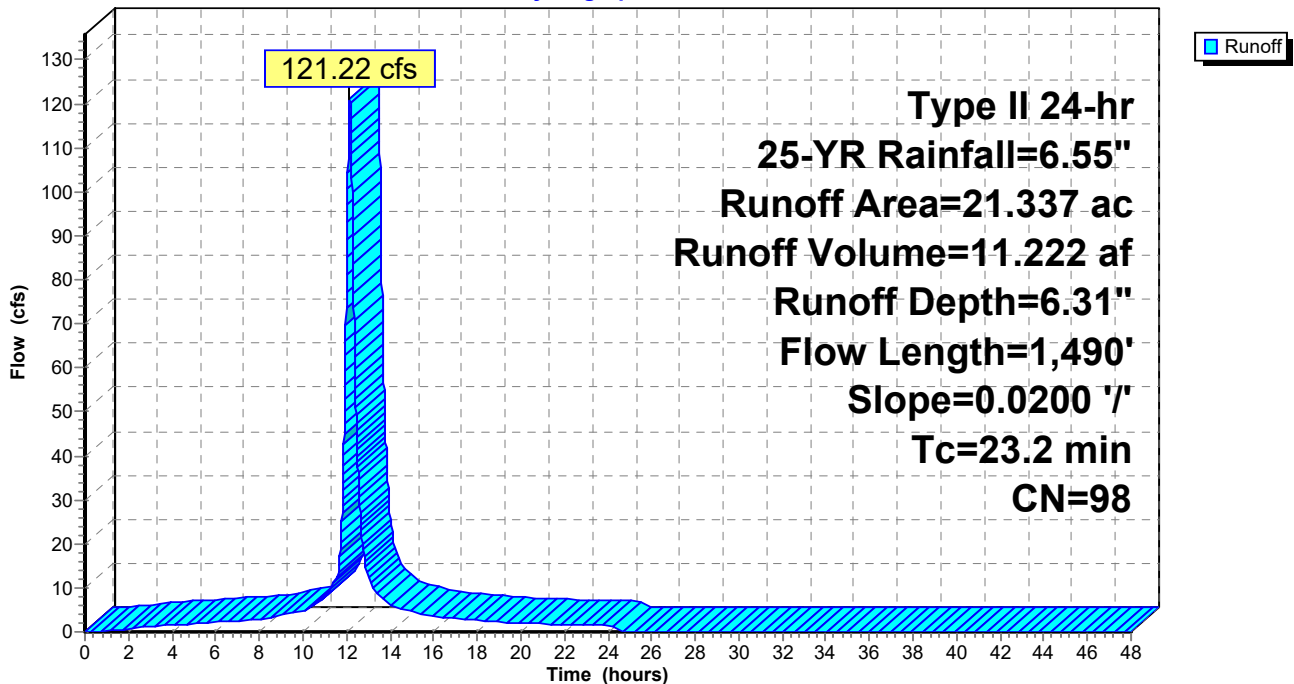
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 21.337	98	Synthetic Cover
21.337		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	150	0.0200	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
10.5	1,340	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
23.2	1,490	Total			

Subcatchment DA-10: UAQCI Synthetic

Hydrograph



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Summary for Subcatchment DA-11: UAQCI Soil Cover

Runoff = 101.07 cfs @ 12.16 hrs, Volume= 8.562 af, Depth= 4.82"

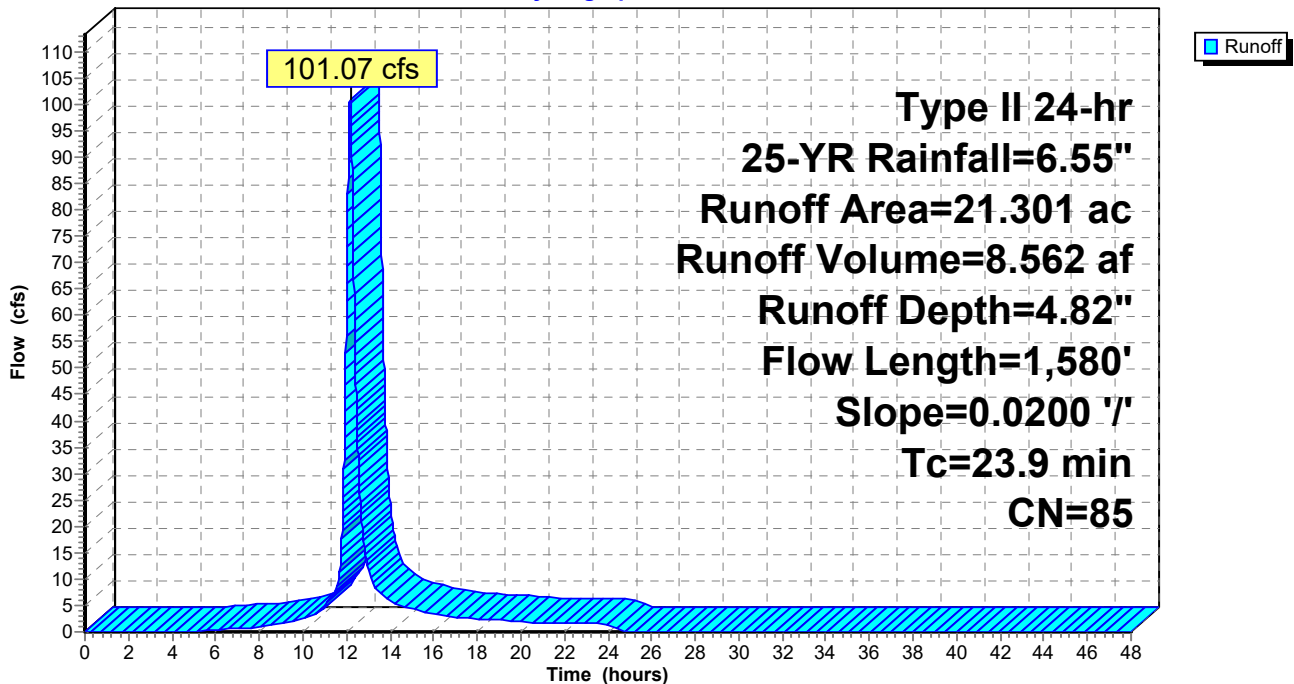
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 21.301	85	Soil Cover
21.301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	150	0.0200	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
11.2	1,430	0.0200	2.12		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
23.9	1,580	Total			

Subcatchment DA-11: UAQCI Soil Cover

Hydrograph



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Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Subcatchment DA-2:

Runoff = 86.29 cfs @ 12.15 hrs, Volume= 7.221 af, Depth= 4.82"

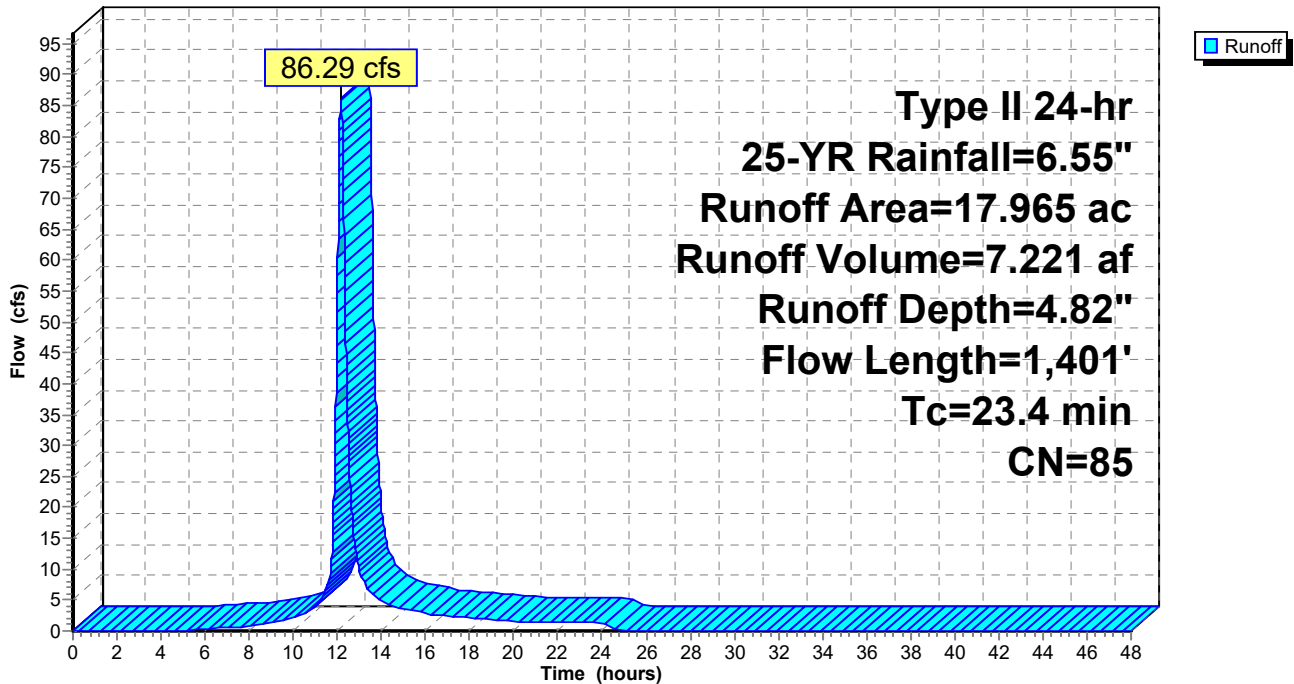
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 0.519	91	Gravel Road
* 17.446	85	Soil Cover / CCR
17.965	85	Weighted Average
17.965		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.8	190	0.0316	0.25		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
4.1	783	0.0396	3.20		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.5	428	0.0047	1.10		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.4	1,401	Total			

Subcatchment DA-2:

Hydrograph



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Summary for Subcatchment DA-3:

Runoff = 87.19 cfs @ 13.00 hrs, Volume= 18.662 af, Depth= 4.82"

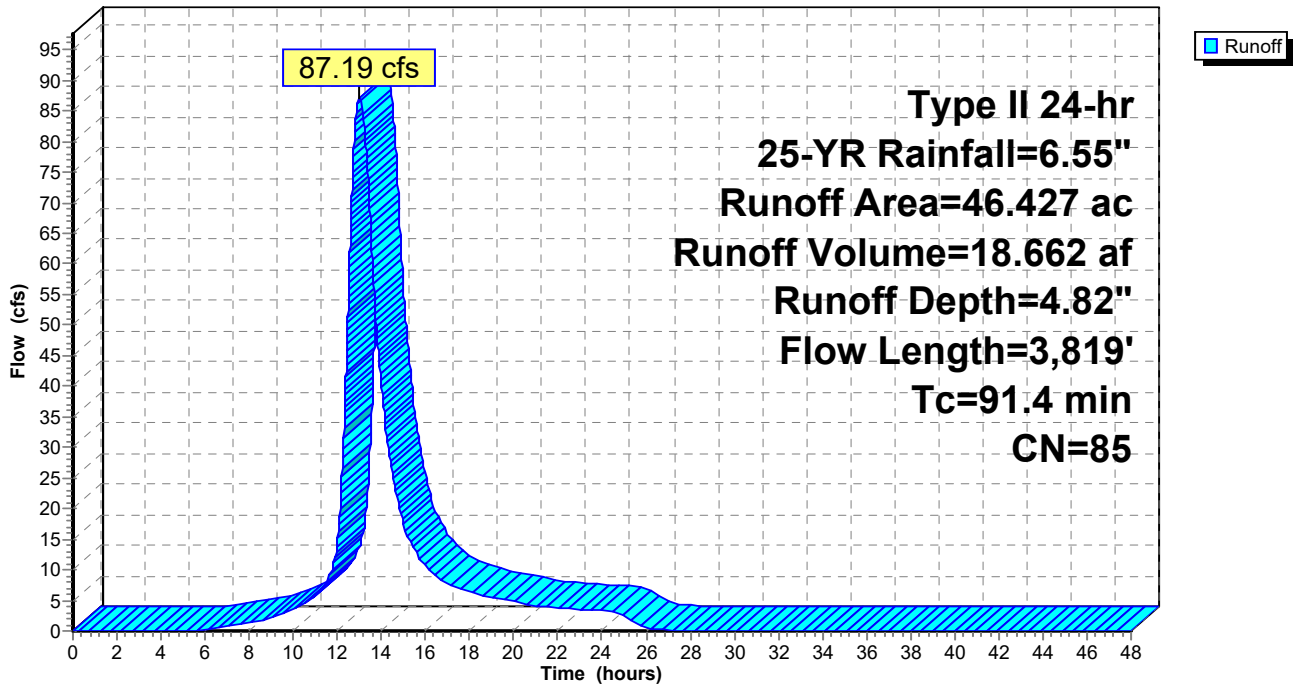
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 0.829	91	Gravel Road
* 45.598	85	CCR
46.427	85	Weighted Average
46.427		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.0	300	0.0133	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
3.6	474	0.0190	2.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
61.8	3,045	0.0026	0.82		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
91.4	3,819	Total			

Subcatchment DA-3:

Hydrograph



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Summary for Subcatchment DA-4:

Runoff = 43.47 cfs @ 12.03 hrs, Volume= 2.698 af, Depth= 5.50"

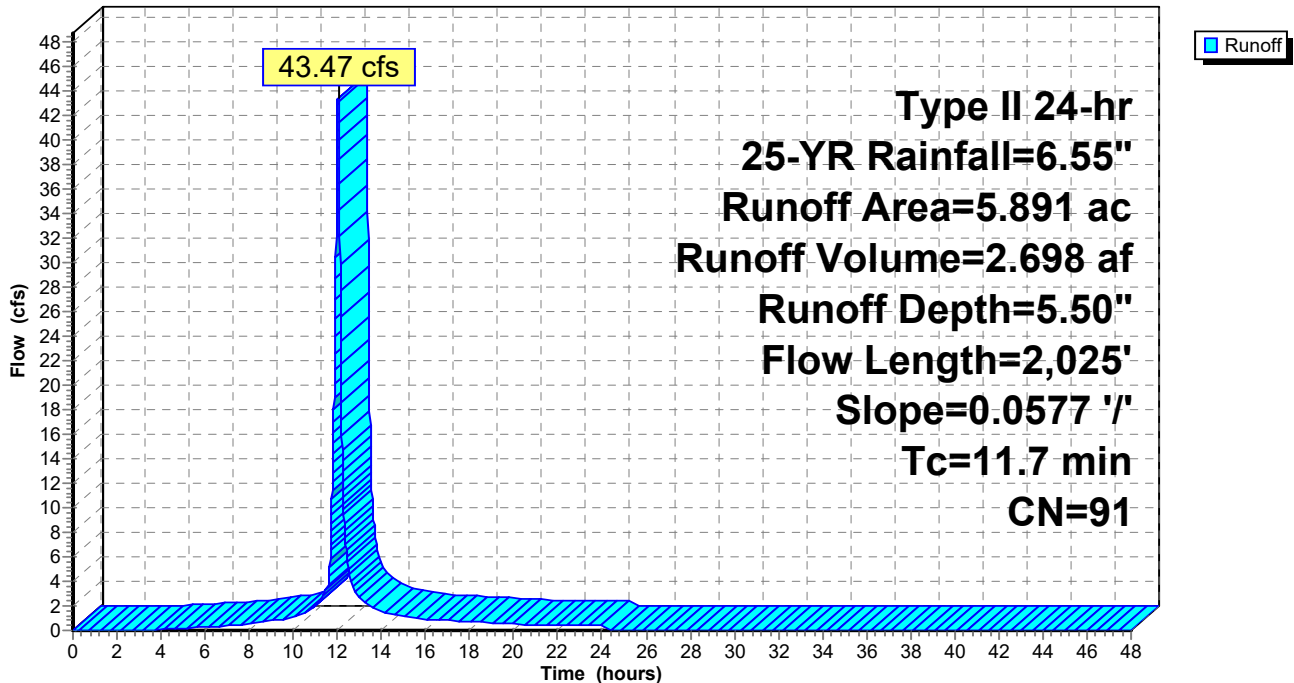
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
0.366	91	Gravel roads, HSG D
2.600	98	Paved parking, HSG D
2.925	84	50-75% Grass cover, Fair, HSG D
5.891	91	Weighted Average
3.291		55.86% Pervious Area
2.600		44.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	208	0.0577	2.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.64"
10.4	1,817		2.90		Direct Entry,
11.7	2,025	Total			

Subcatchment DA-4:

Hydrograph



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Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Subcatchment DA-5:

Runoff = 8.39 cfs @ 11.96 hrs, Volume= 0.417 af, Depth= 5.16"

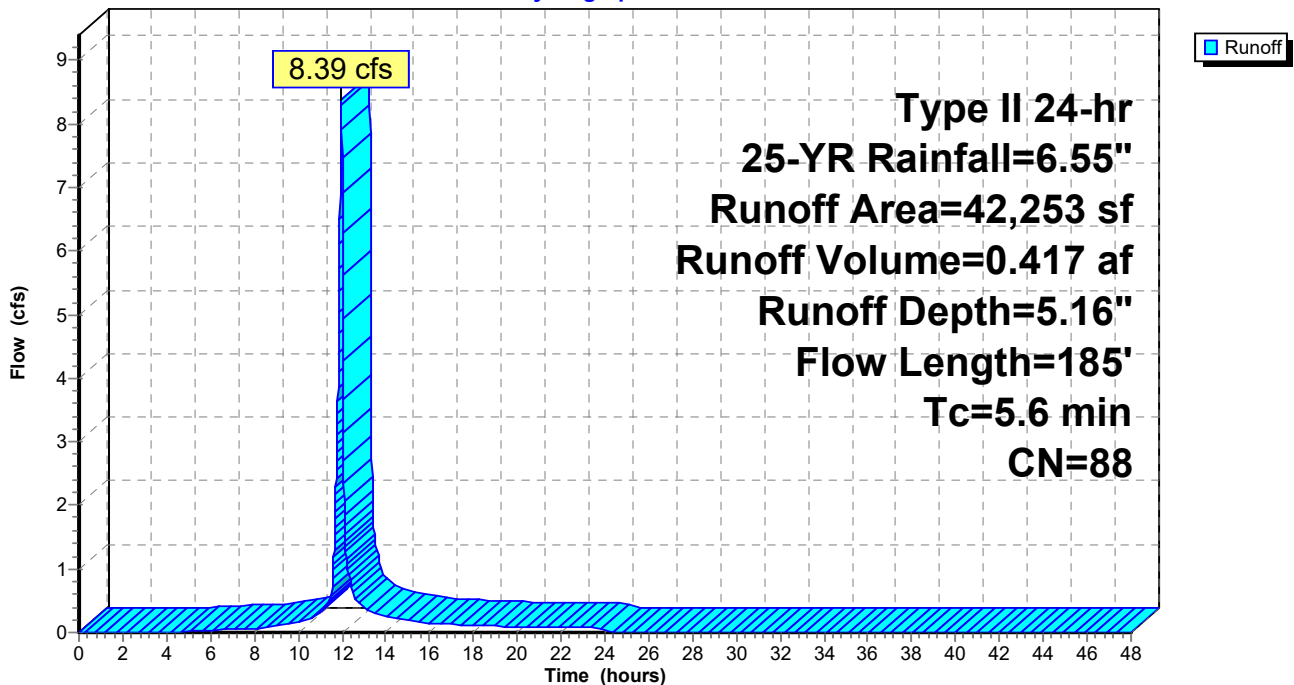
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (sf)	CN	Description
* 33,105	85	Veg Cover / CCR
9,148	98	Paved parking, HSG D
42,253	88	Weighted Average
33,105		78.35% Pervious Area
9,148		21.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	63	0.1500	0.37		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
2.4	57	0.5000	0.40		Sheet Flow, Grass: Dense n= 0.240 P2= 3.64"
0.4	65	0.0400	3.00		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
5.6	185	Total			

Subcatchment DA-5:

Hydrograph



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Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Subcatchment DA-6:

Runoff = 87.49 cfs @ 12.39 hrs, Volume= 11.077 af, Depth= 4.82"

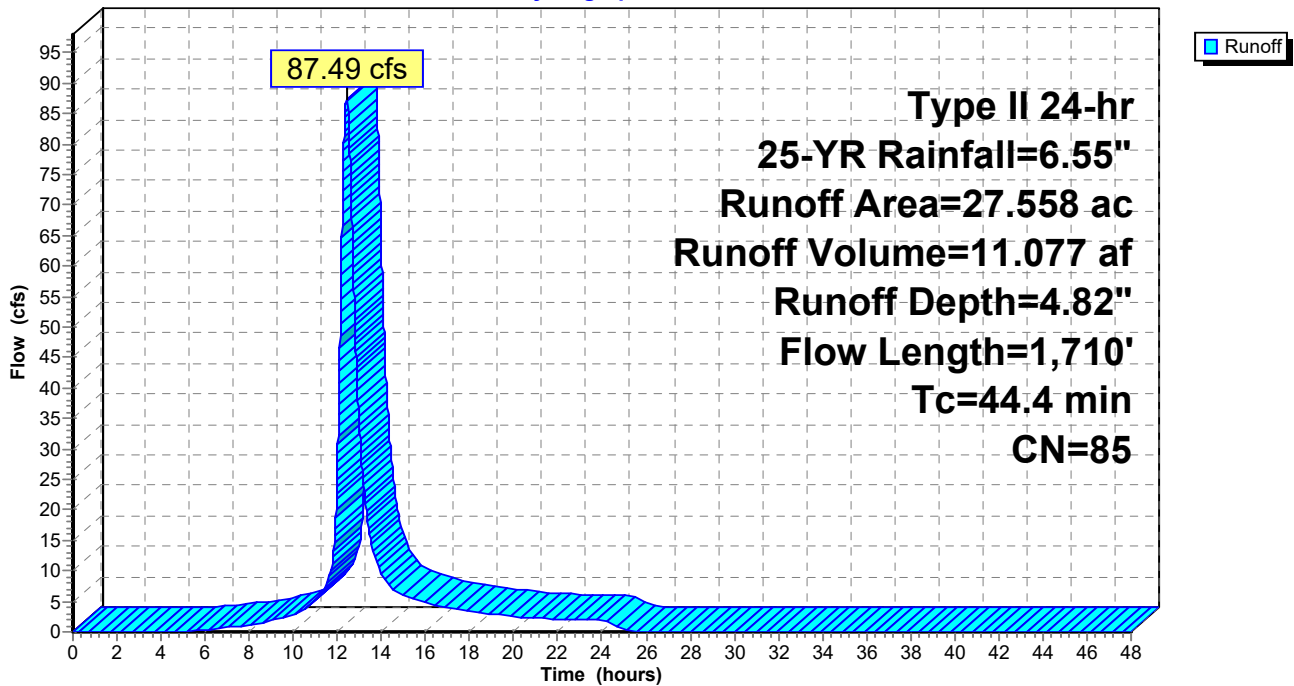
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 27.558	85	50-75% Grass cover, Fair, HSG D
27.558		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	150	0.0130	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
29.3	1,560	0.0035	0.89		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
44.4	1,710	Total			

Subcatchment DA-6:

Hydrograph



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Summary for Subcatchment DA-7:

Runoff = 92.49 cfs @ 12.34 hrs, Volume= 10.476 af, Depth= 4.82"

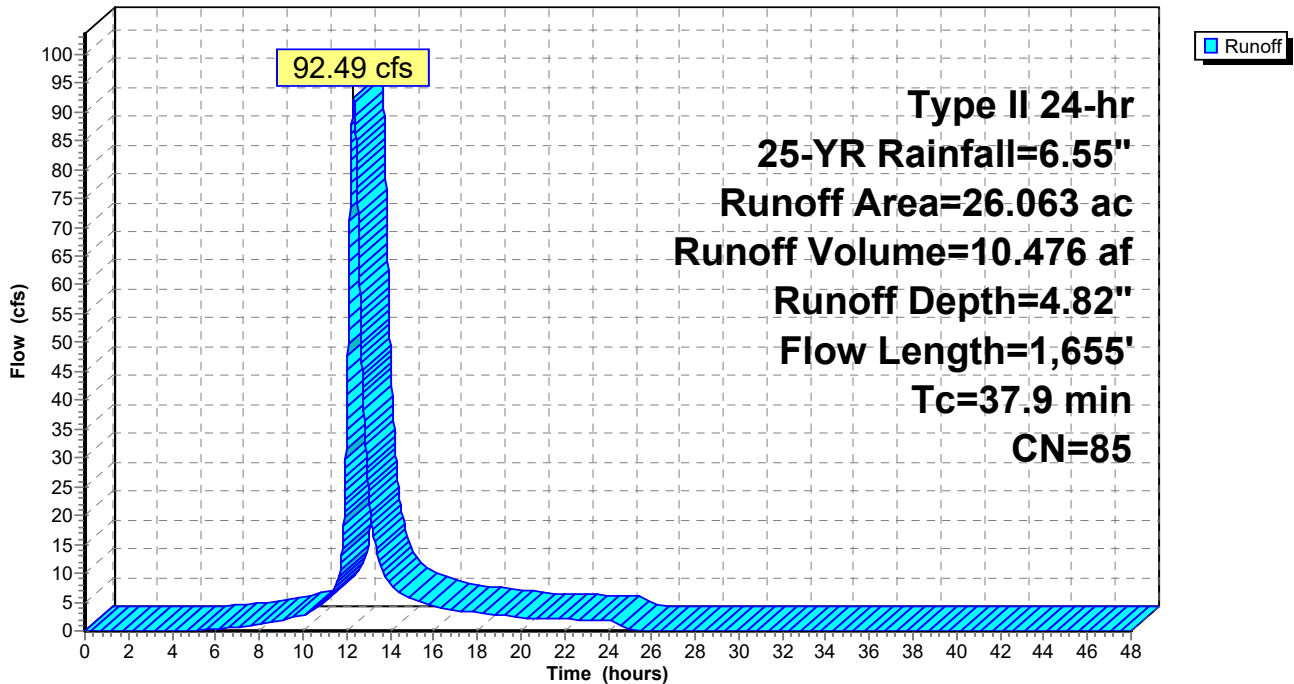
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
* 26.063	85	50-75% Grass cover, Fair, HSG D
26.063		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	150	0.0200	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
7.4	703	0.0110	1.57		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
17.8	802	0.0025	0.75		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
37.9	1,655	Total			

Subcatchment DA-7:

Hydrograph



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Summary for Subcatchment DA-8:

Runoff = 65.24 cfs @ 12.72 hrs, Volume= 11.784 af, Depth= 4.71"

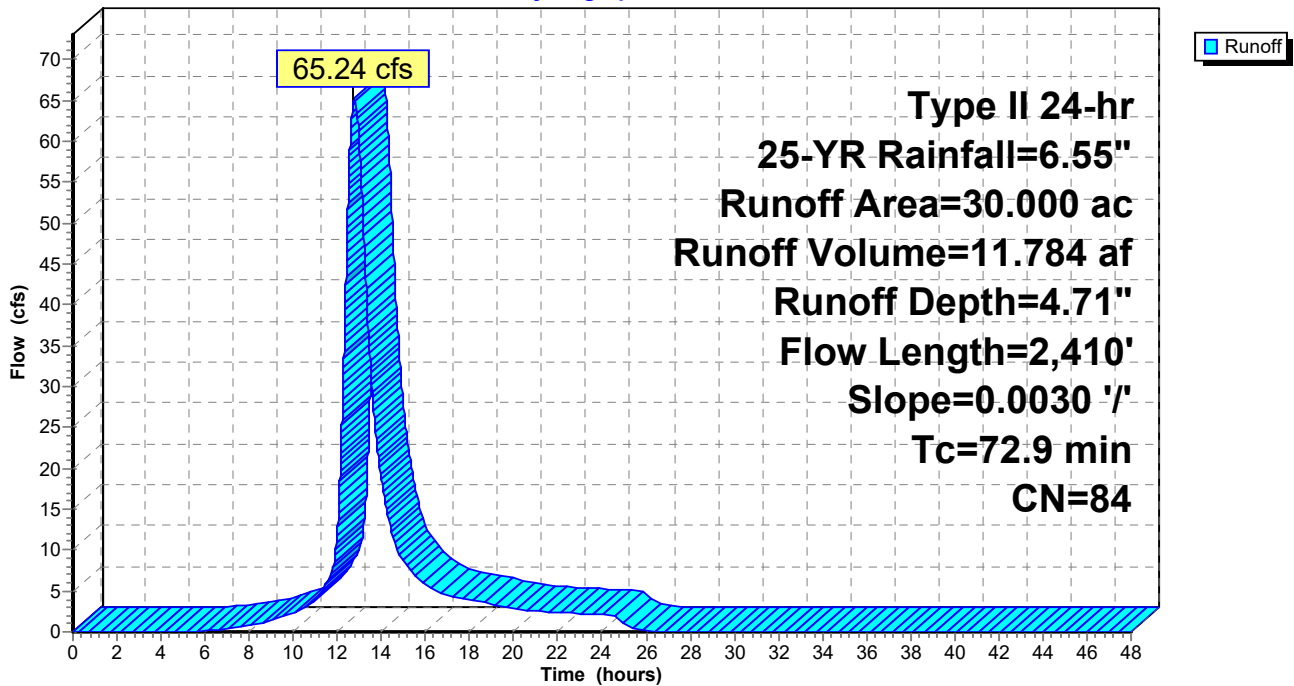
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
30.000	84	50-75% Grass cover, Fair, HSG D
30.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.1	150	0.0030	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
45.8	2,260	0.0030	0.82		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
72.9	2,410	Total			

Subcatchment DA-8:

Hydrograph



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Summary for Subcatchment DA-9:

Runoff = 39.94 cfs @ 12.39 hrs, Volume= 4.910 af, Depth= 4.71"

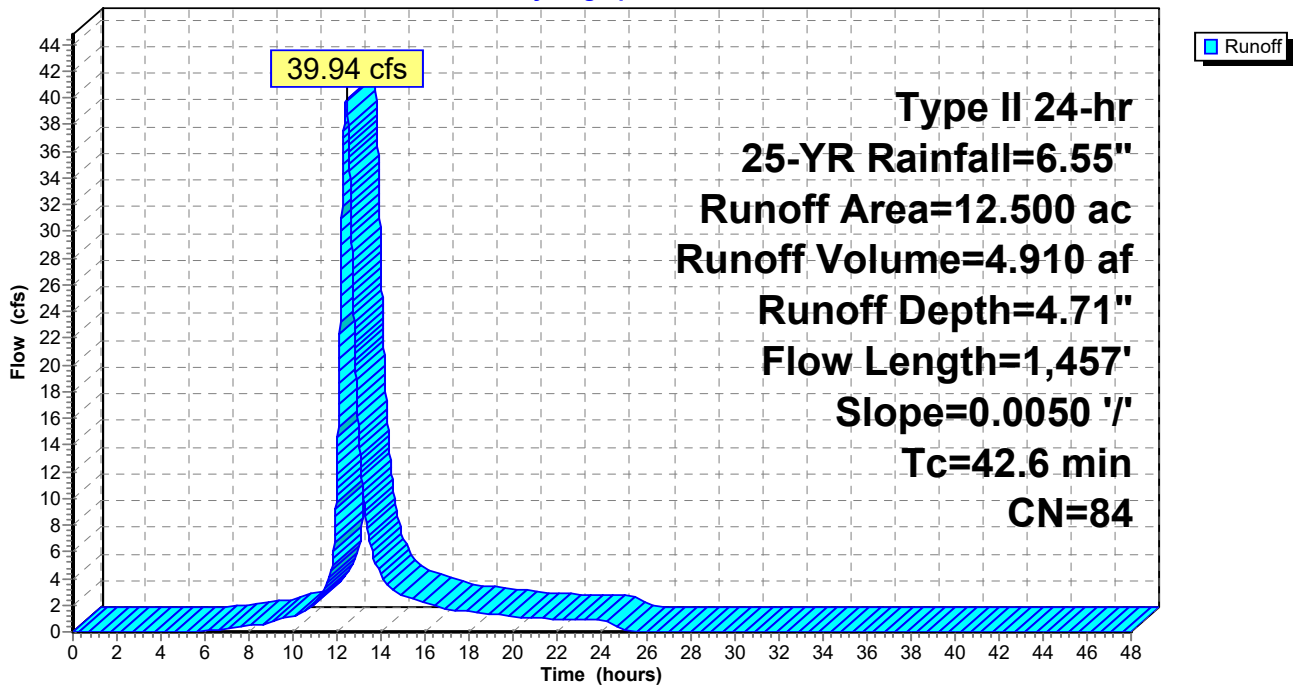
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.55"

Area (ac)	CN	Description
12.500	84	50-75% Grass cover, Fair, HSG D
12.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0050	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.64"
20.5	1,307	0.0050	1.06		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
42.6	1,457	Total			

Subcatchment DA-9:

Hydrograph



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Summary for Reach D-3:

Inflow Area = 46.427 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
Inflow = 82.22 cfs @ 13.22 hrs, Volume= 18.648 af
Outflow = 82.21 cfs @ 13.23 hrs, Volume= 18.648 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.45 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 1.7 min

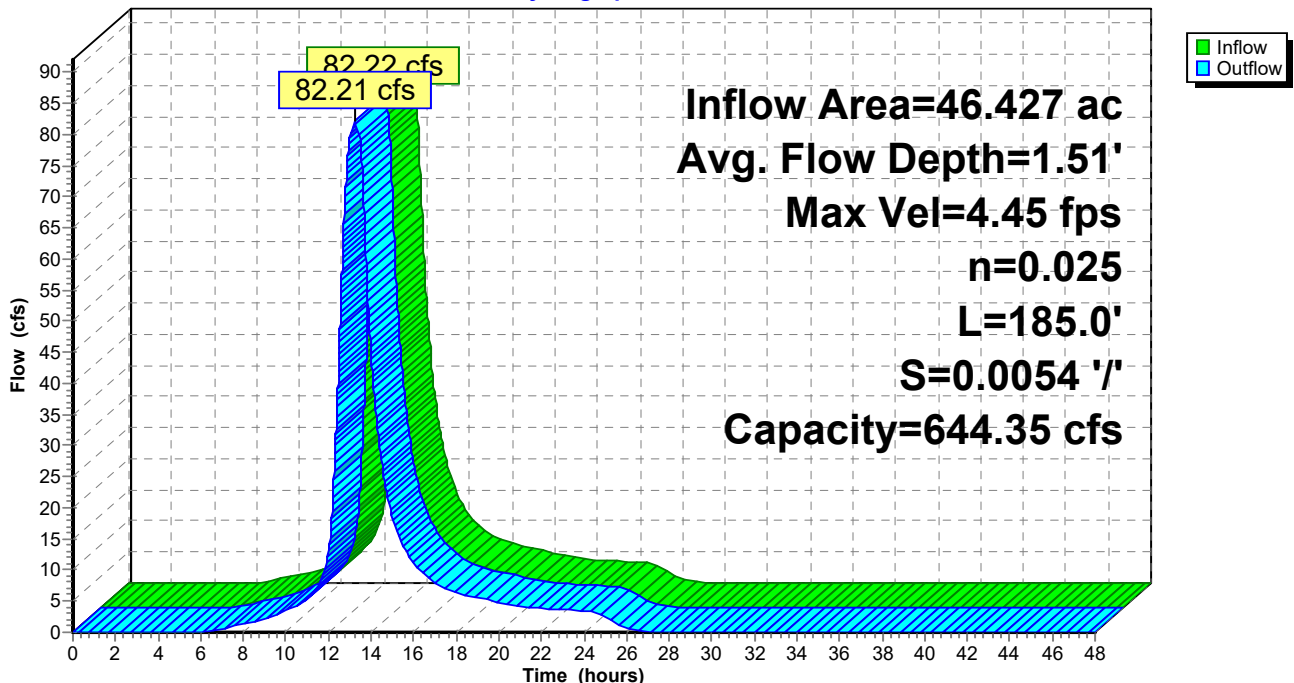
Peak Storage= 3,416 cf @ 13.23 hrs
Average Depth at Peak Storage= 1.51'
Bank-Full Depth= 4.00' Flow Area= 84.0 sf, Capacity= 644.35 cfs

7.00' x 4.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.5 ' / ' Top Width= 35.00'
Length= 185.0' Slope= 0.0054 ' / '
Inlet Invert= 874.00', Outlet Invert= 873.00'



Reach D-3:

Hydrograph



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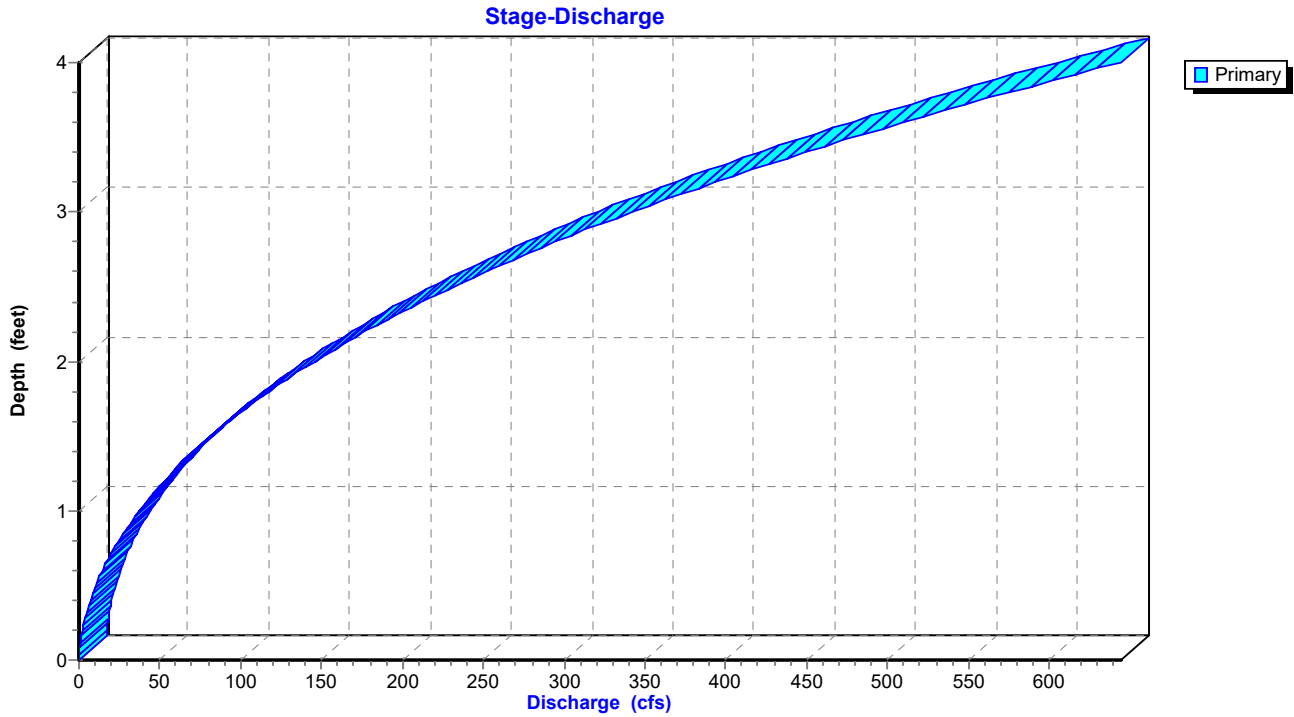
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Type II 24-hr 25-YR Rainfall=6.55"

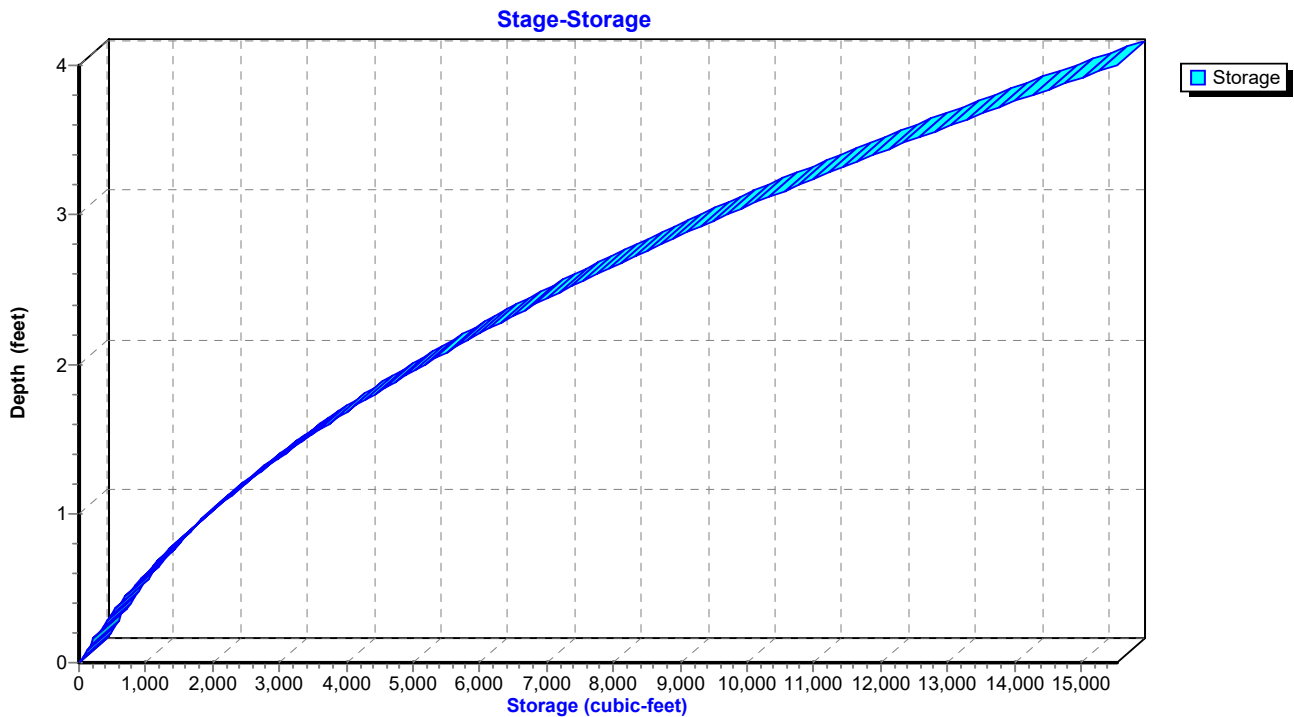
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Reach D-3:



Reach D-3:



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Type II 24-hr 25-YR Rainfall=6.55"

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Summary for Reach FBD-1: N-S FBD

Inflow Area = 23.667 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
Inflow = 28.96 cfs @ 12.67 hrs, Volume= 9.510 af
Outflow = 28.90 cfs @ 12.75 hrs, Volume= 9.510 af, Atten= 0%, Lag= 4.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.90 fps, Min. Travel Time= 6.2 min
Avg. Velocity= 1.09 fps, Avg. Travel Time= 22.1 min

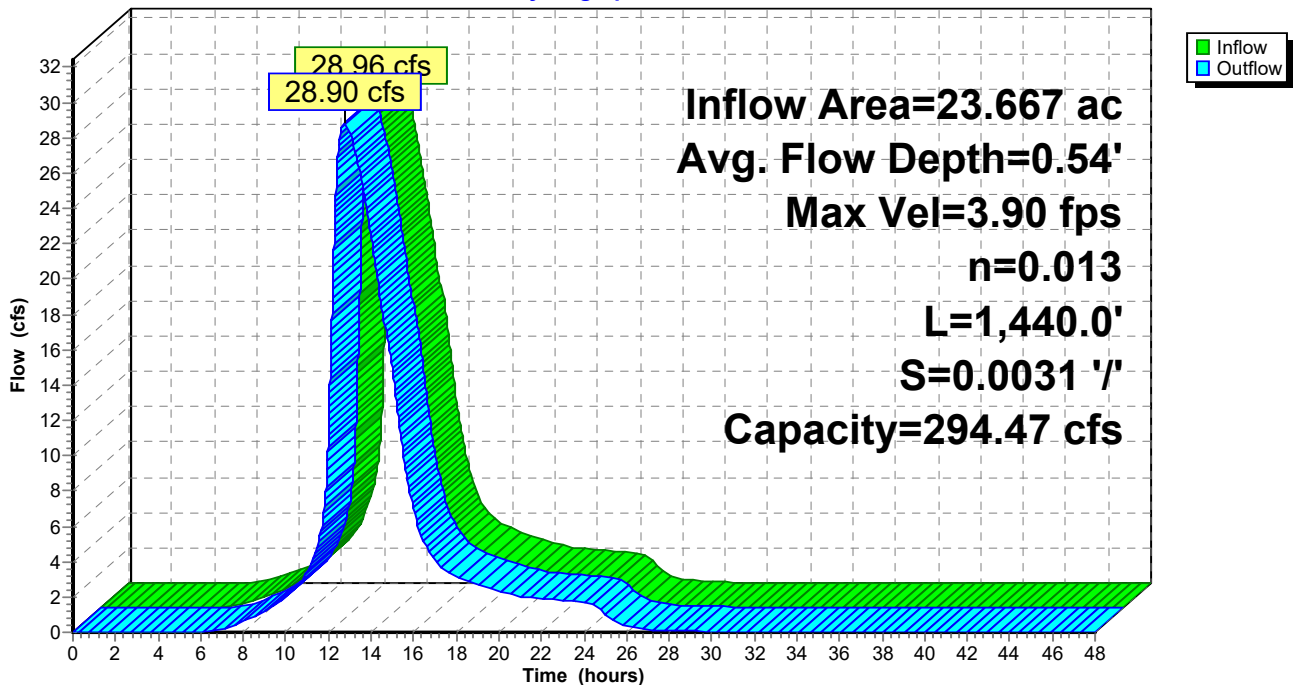
Peak Storage= 10,677 cf @ 12.75 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 294.47 cfs

12.00' x 2.00' deep channel, n= 0.013 Concrete, trowel finish
Side Slope Z-value= 3.0 ' / ' Top Width= 24.00'
Length= 1,440.0' Slope= 0.0031 ' / '
Inlet Invert= 874.00', Outlet Invert= 869.55'



Reach FBD-1: N-S FBD

Hydrograph



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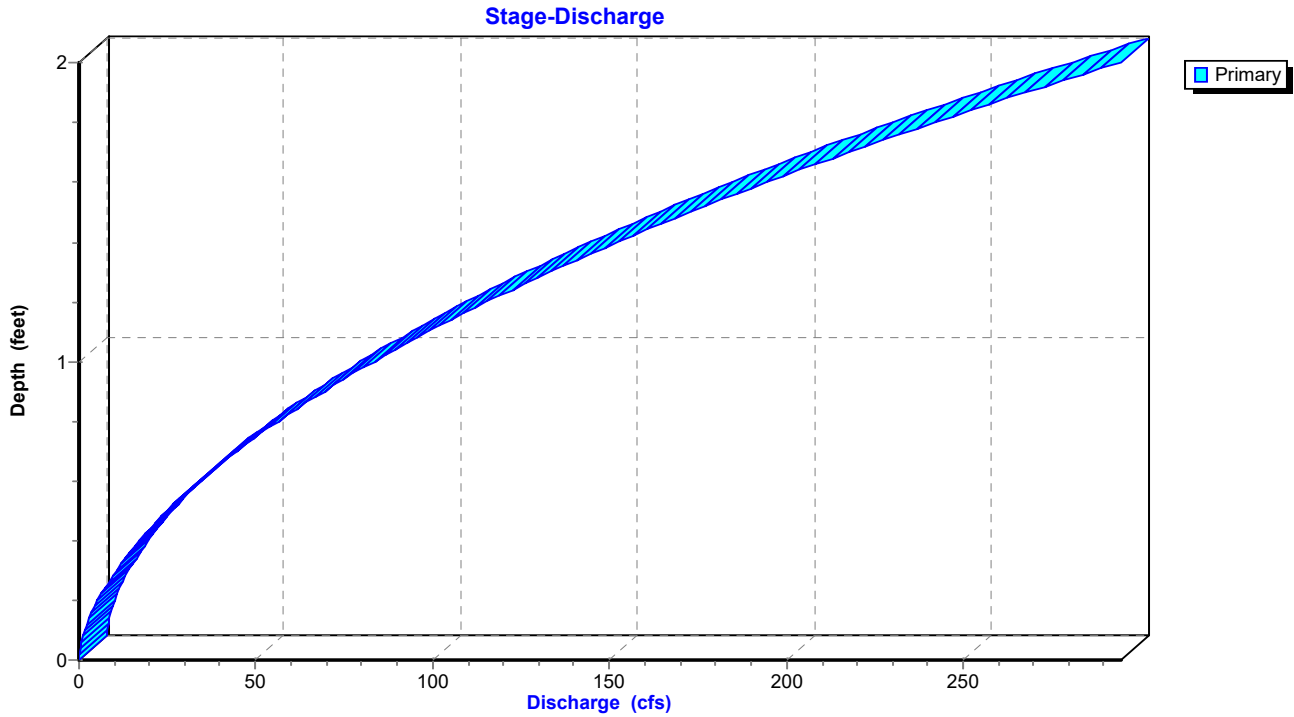
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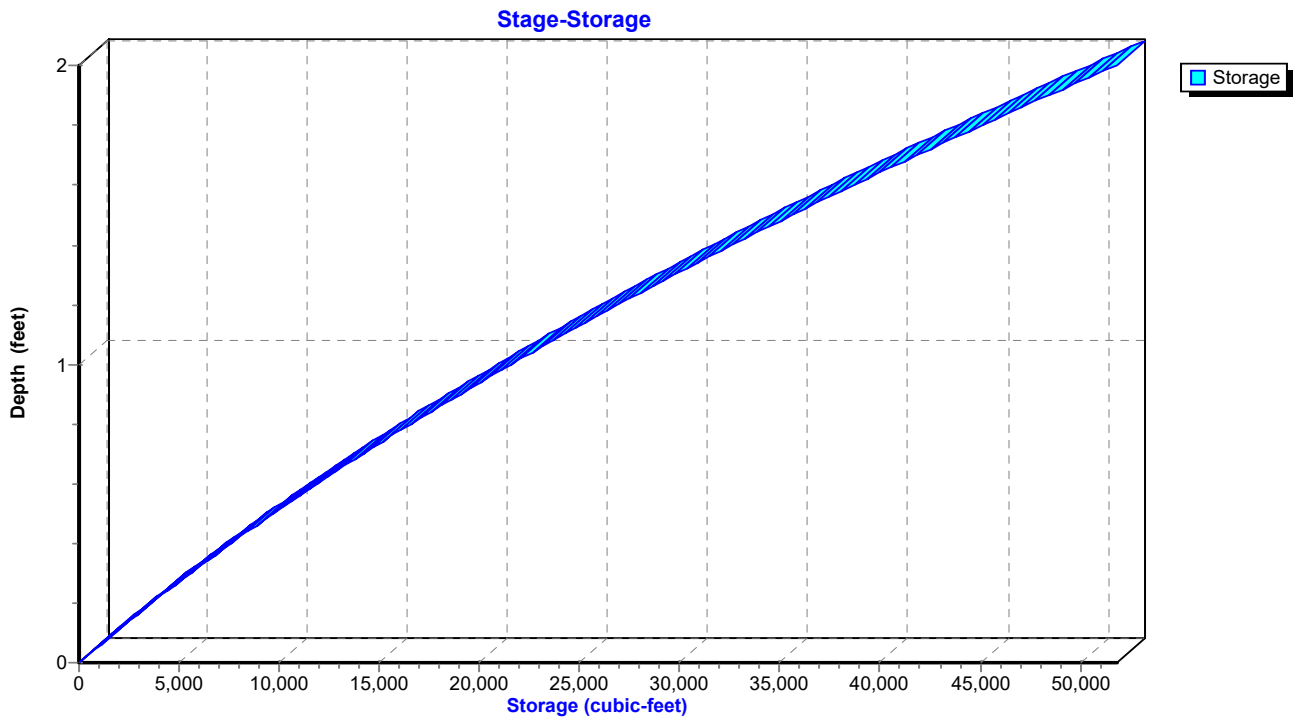
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Reach FBD-1: N-S FBD



Reach FBD-1: N-S FBD



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Summary for Reach FBD-2:

Inflow Area = 94.920 ac, 2.96% Impervious, Inflow Depth = 4.87" for 25-YR event
Inflow = 117.52 cfs @ 13.36 hrs, Volume= 38.492 af
Outflow = 117.48 cfs @ 13.40 hrs, Volume= 38.492 af, Atten= 0%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.81 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 11.8 min

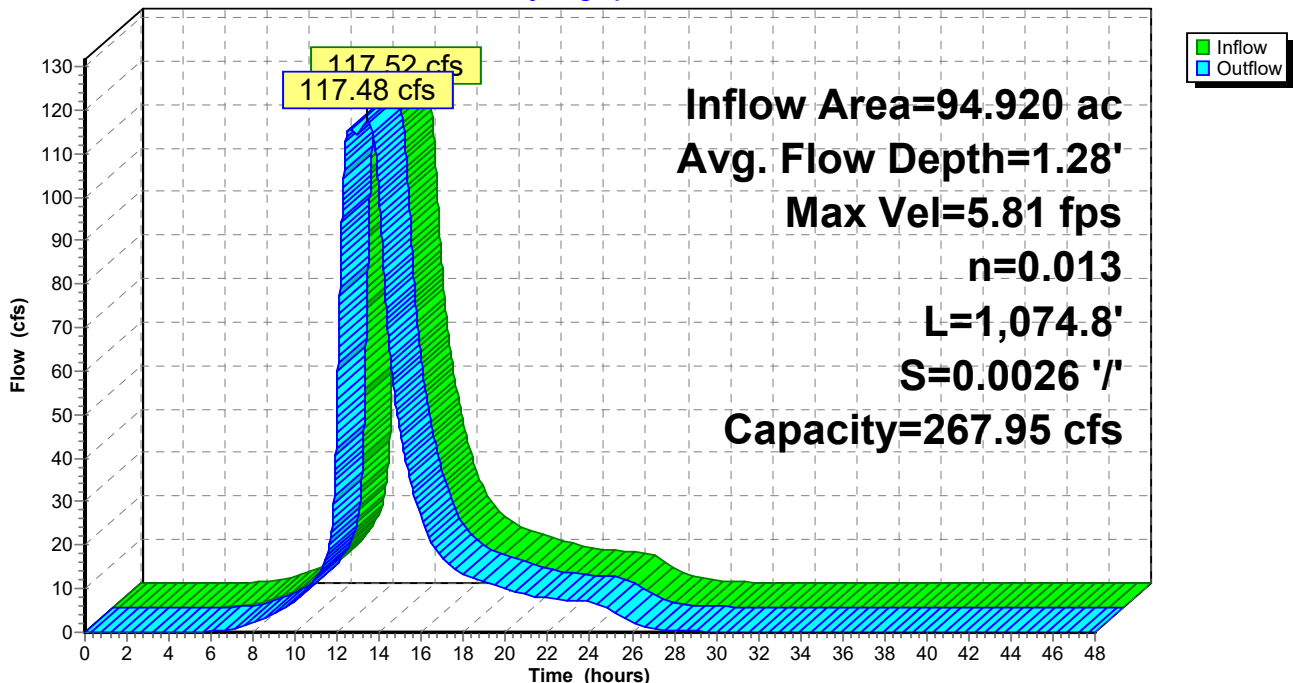
Peak Storage= 21,734 cf @ 13.40 hrs
Average Depth at Peak Storage= 1.28'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 267.95 cfs

12.00' x 2.00' deep channel, n= 0.013 Concrete, trowel finish
Side Slope Z-value= 3.0 ' / ' Top Width= 24.00'
Length= 1,074.8' Slope= 0.0026 ' / '
Inlet Invert= 867.92', Outlet Invert= 865.17'



Reach FBD-2:

Hydrograph



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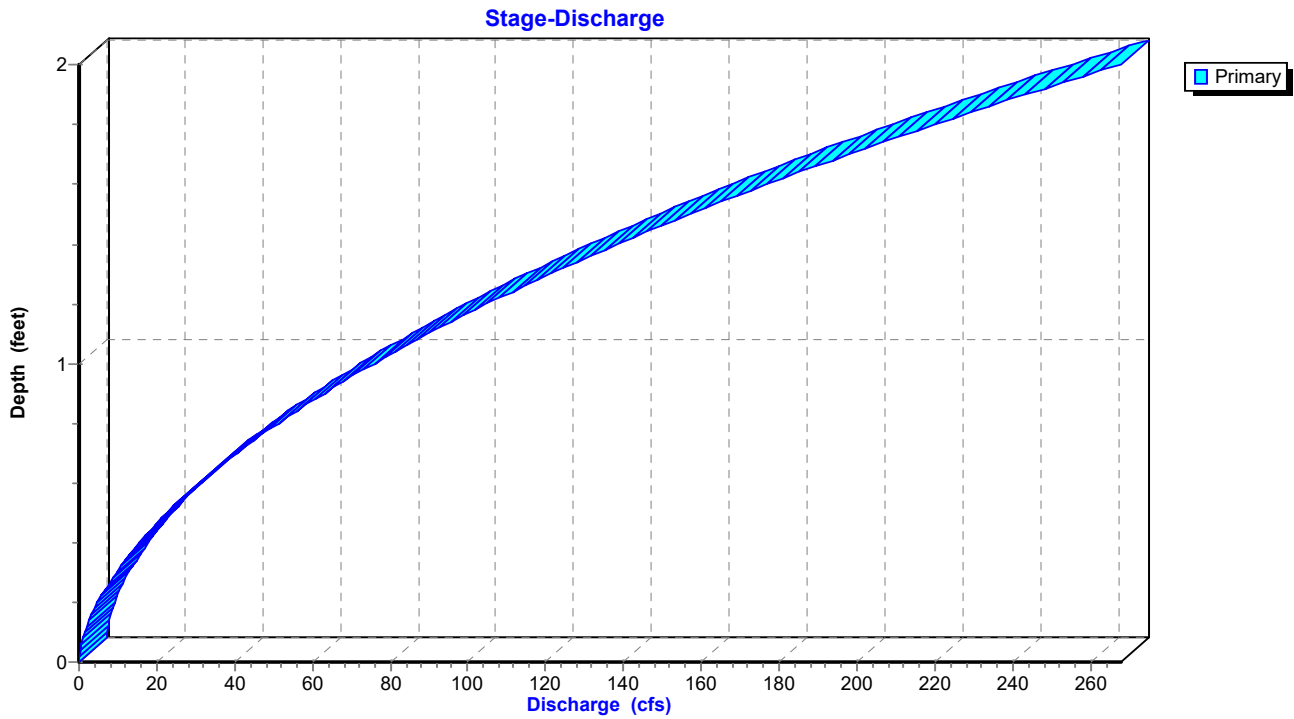
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Type II 24-hr 25-YR Rainfall=6.55"

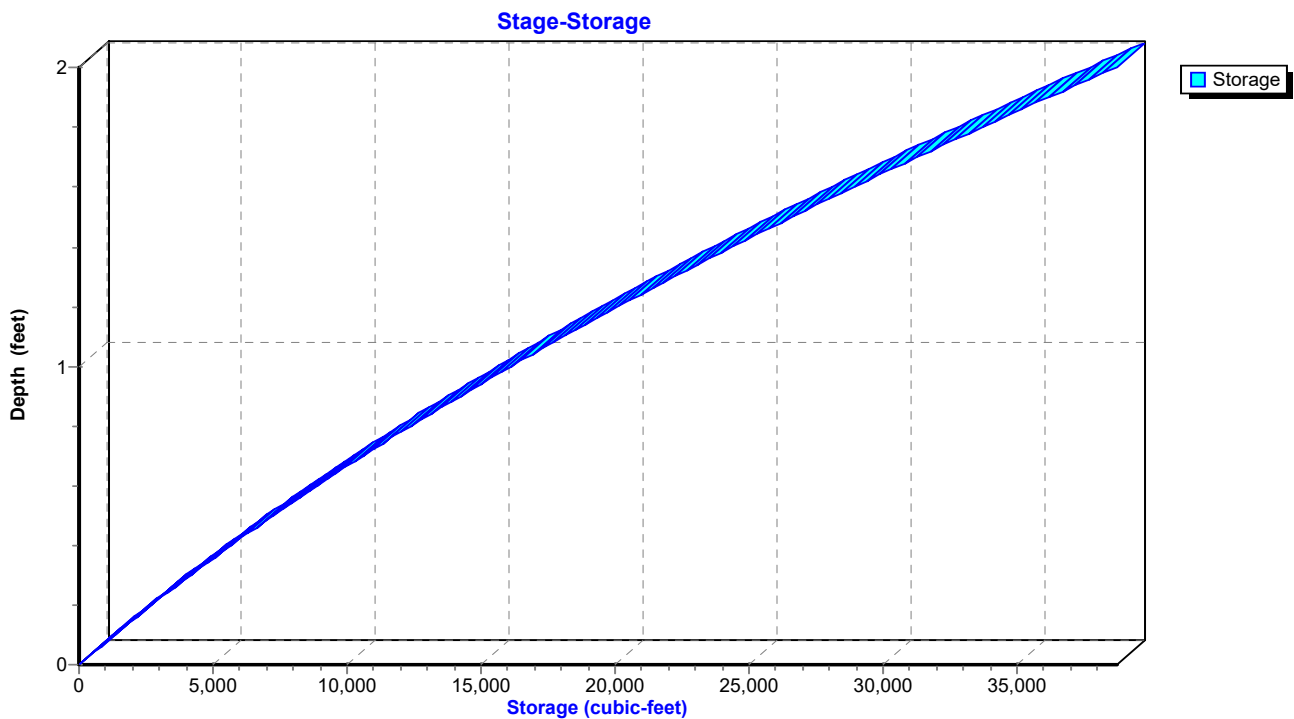
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Reach FBD-2:



Reach FBD-2:



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Summary for Pond ST-1: 30" HDPE DR11

HDPE DR11

OD = 30"

ID = ~24"

Inflow Area = 23.667 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
Inflow = 105.52 cfs @ 12.19 hrs, Volume= 9.513 af
Outflow = 28.96 cfs @ 12.67 hrs, Volume= 9.510 af, Atten= 73%, Lag= 28.5 min
Primary = 28.96 cfs @ 12.67 hrs, Volume= 9.510 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 874.50' Surf.Area= 5,751 sf Storage= 1,627 cf
Peak Elev= 879.51' @ 12.67 hrs Surf.Area= 52,119 sf Storage= 149,430 cf (147,804 cf above start)

Plug-Flow detention time= 64.5 min calculated for 9.473 af (100% of inflow)
Center-of-Mass det. time= 59.9 min (873.2 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	874.00'	398,361 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
874.00	756	0	0
875.00	10,746	5,751	5,751
876.00	20,832	15,789	21,540
877.00	29,558	25,195	46,735
878.00	38,802	34,180	80,915
879.00	47,542	43,172	124,087
880.00	56,542	52,042	176,129
881.00	66,344	61,443	237,572
882.00	79,024	72,684	310,256
883.00	97,185	88,105	398,361

Device	Routing	Invert	Outlet Devices
#1	Primary	874.50'	24.2" Round Culvert L= 140.0' Ke= 0.500 Inlet / Outlet Invert= 874.50' / 874.00' S= 0.0036 '/' Cc= 0.900 n= 0.011, Flow Area= 3.19 sf

Primary OutFlow Max=28.96 cfs @ 12.67 hrs HW=879.51' TW=874.54' (Dynamic Tailwater)
↑1=Culvert (Barrel Controls 28.96 cfs @ 9.07 fps)

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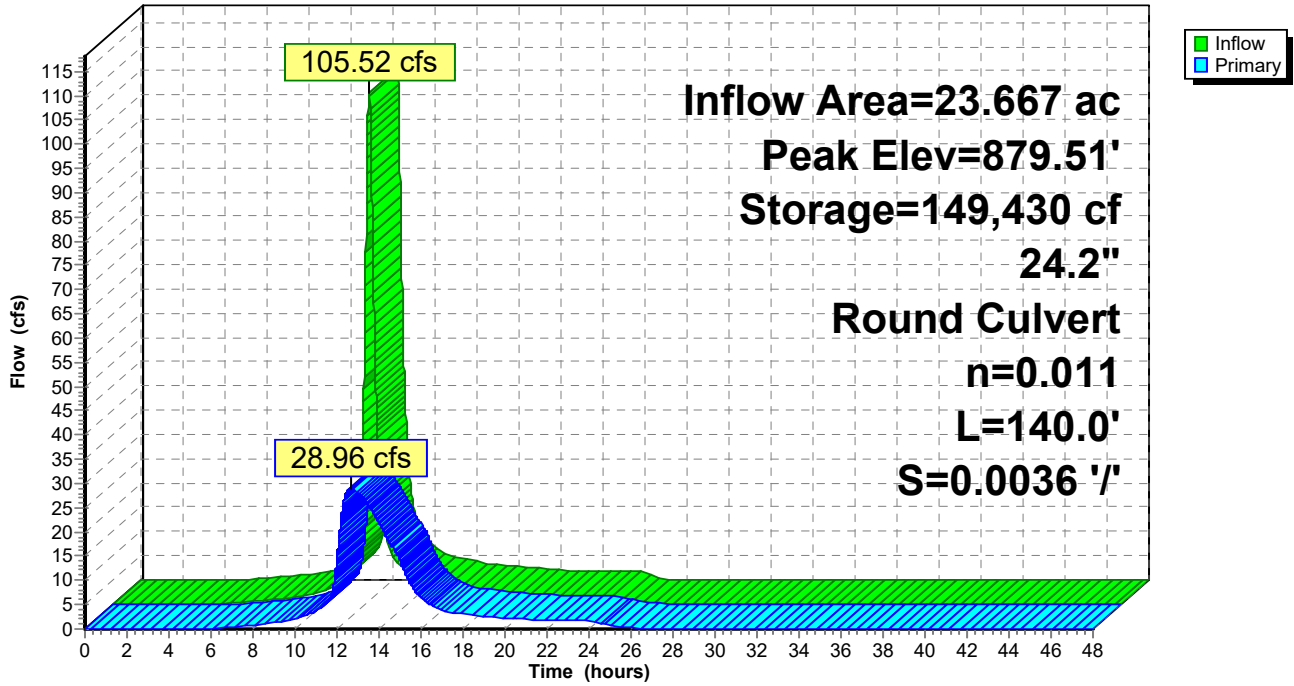
Type II 24-hr 25-YR Rainfall=6.55"

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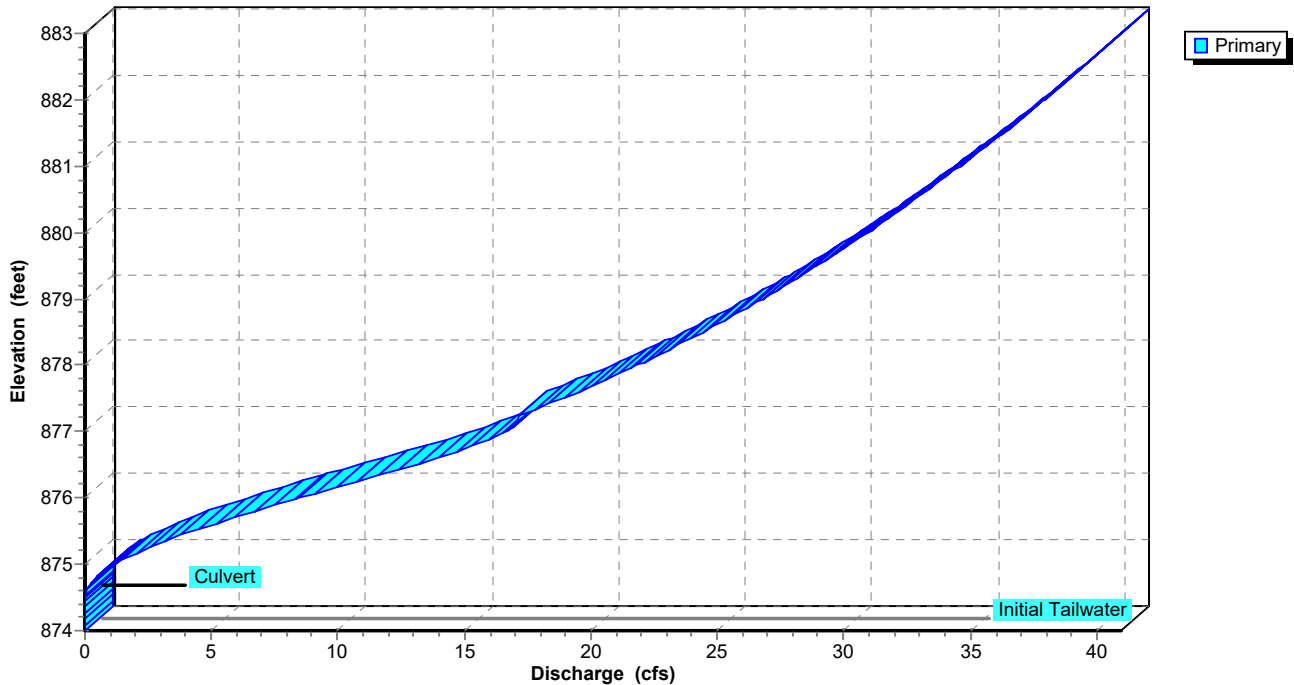
Pond ST-1: 30" HDPE DR11

Hydrograph



Pond ST-1: 30" HDPE DR11

Stage-Discharge



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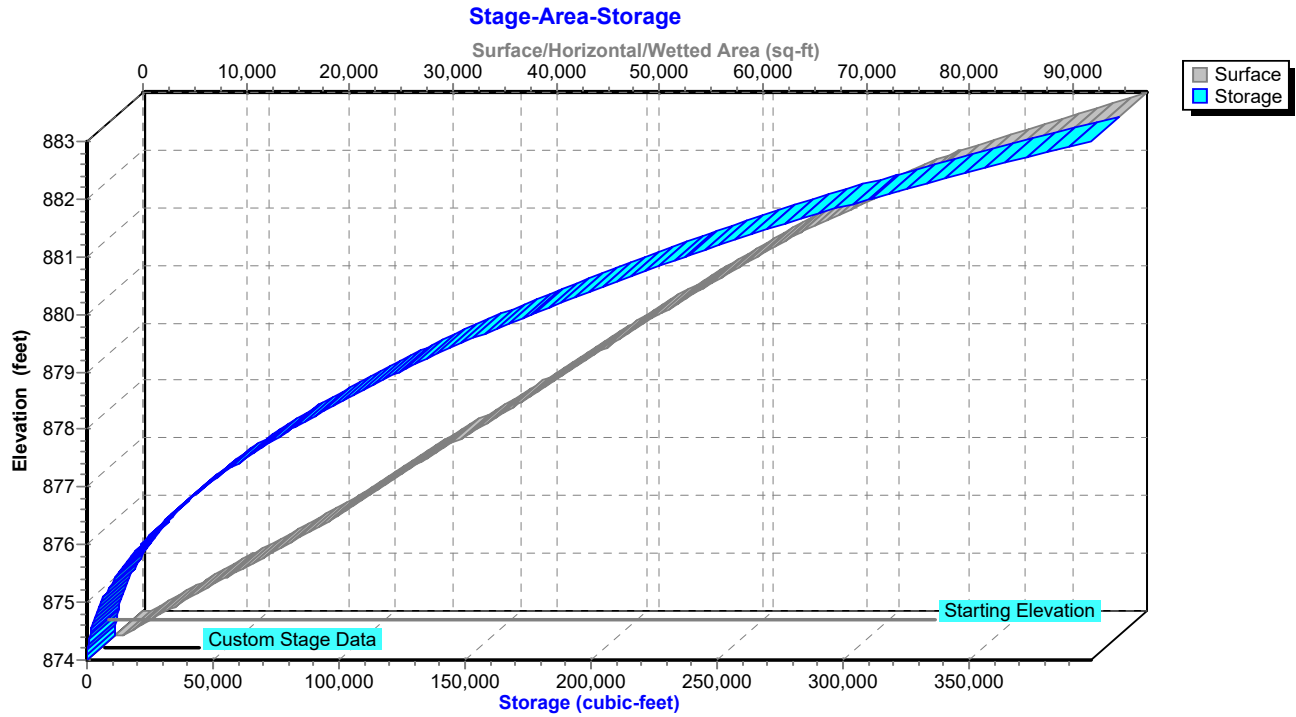
La Cygne CCR Landfill RORO Model

Type II 24-hr 25-YR Rainfall=6.55"

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Pond ST-1: 30" HDPE DR11



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Summary for Pond ST-2: Dual 48" CHDPE

Inflow Area = 64.392 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
 Inflow = 105.27 cfs @ 12.17 hrs, Volume= 25.869 af
 Outflow = 91.51 cfs @ 12.30 hrs, Volume= 25.868 af, Atten= 13%, Lag= 7.7 min
 Primary = 91.51 cfs @ 12.30 hrs, Volume= 25.868 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 874.82' @ 12.30 hrs Surf.Area= 42,257 sf Storage= 24,183 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 2.2 min (862.7 - 860.5)

Volume	Invert	Avail.Storage	Storage Description
#1	873.00'	640,467 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
873.00	1,155	0	0
874.00	6,824	3,990	3,990
875.00	49,885	28,355	32,344
876.00	87,867	68,876	101,220
877.00	118,726	103,297	204,517
878.00	139,012	128,869	333,386
879.00	154,273	146,643	480,028
880.00	166,604	160,439	640,467

Device	Routing	Invert	Outlet Devices
#1	Primary	872.28'	48.0" Round Culvert X 2.00 L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 872.28' / 869.83' S= 0.0204 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 12.57 sf

Primary OutFlow Max=91.51 cfs @ 12.30 hrs HW=874.82' TW=871.34' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 91.51 cfs @ 5.43 fps)

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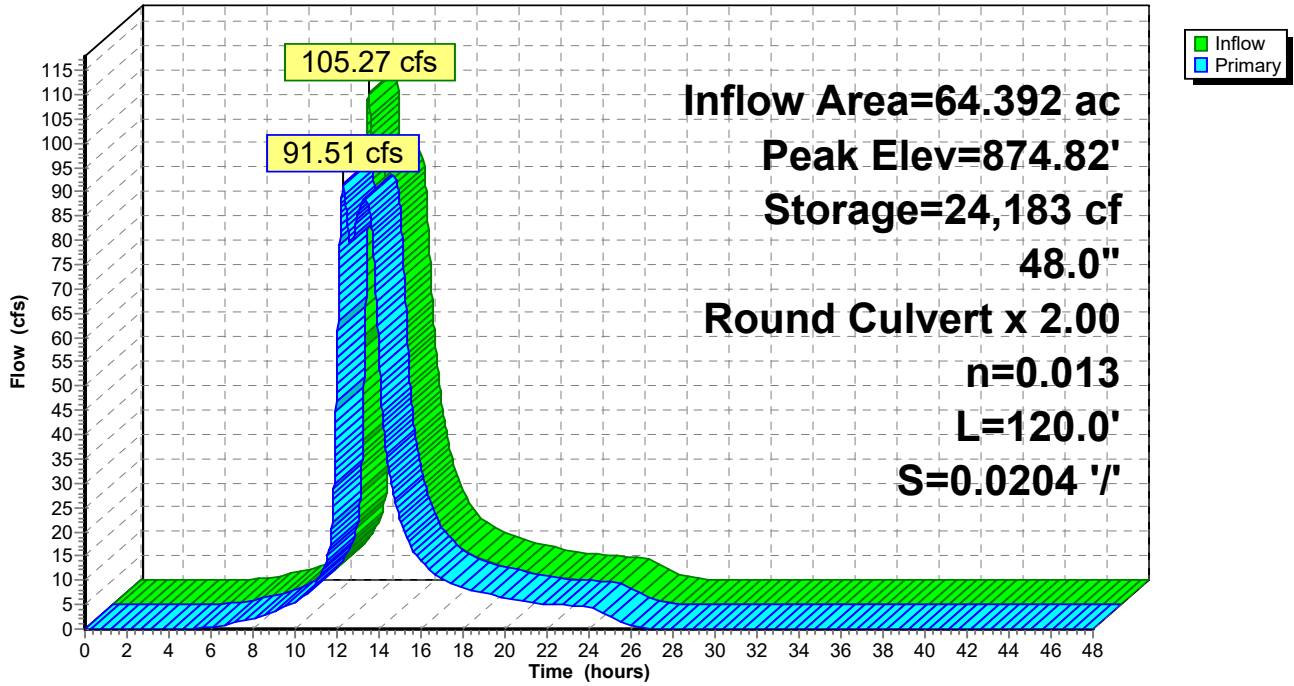
Type II 24-hr 25-YR Rainfall=6.55"

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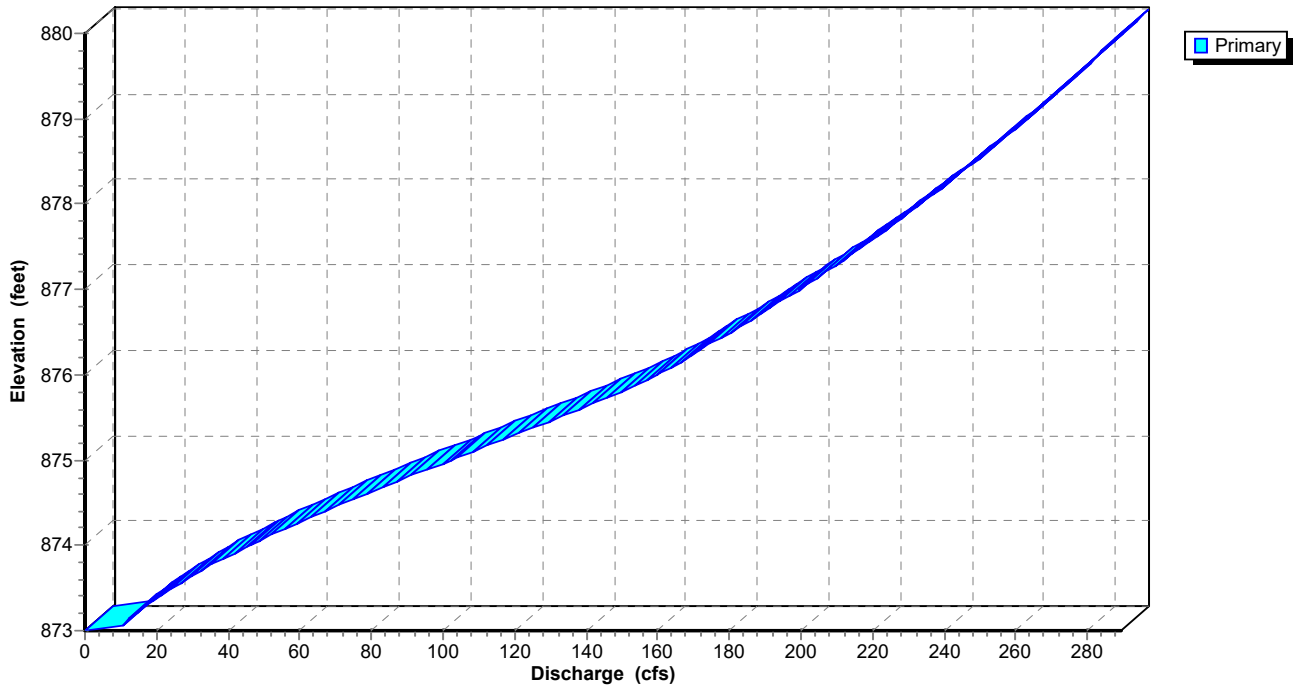
Pond ST-2: Dual 48" CHDPE

Hydrograph



Pond ST-2: Dual 48" CHDPE

Stage-Discharge



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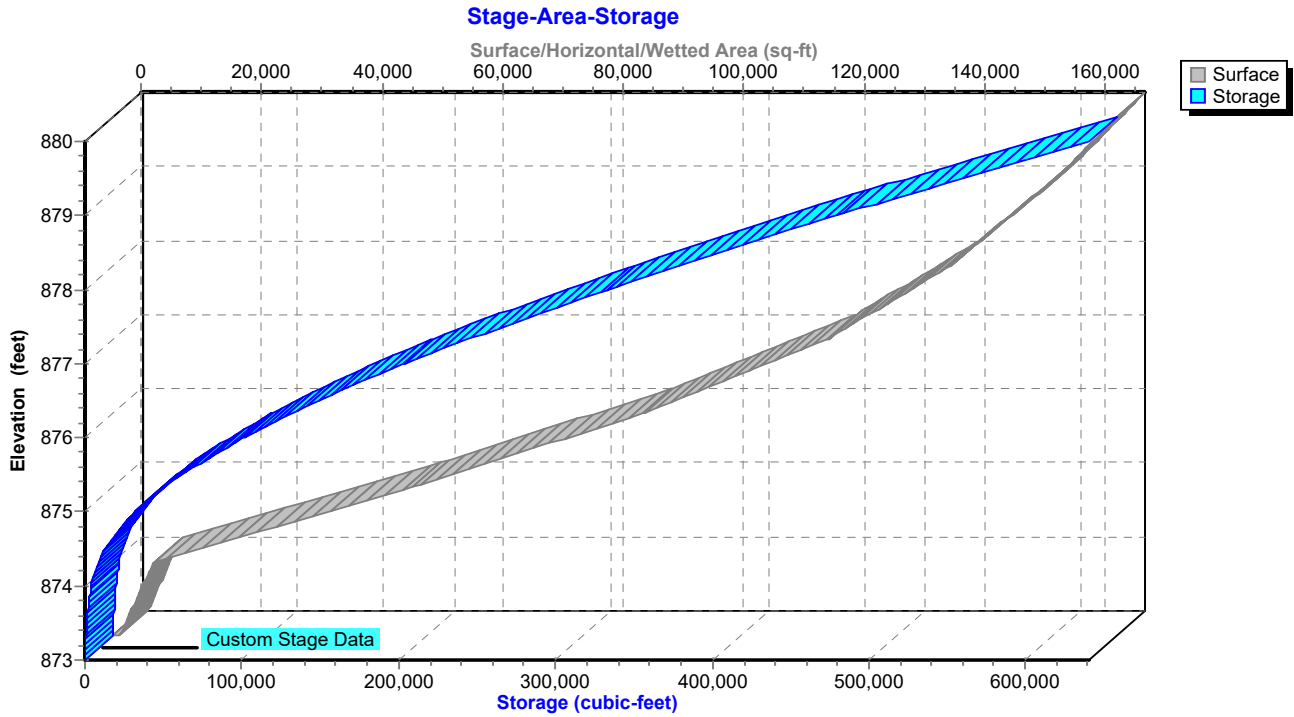
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Type II 24-hr 25-YR Rainfall=6.55"

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Pond ST-2: Dual 48" CHDPE



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Summary for Pond ST-3: Triple 36" CHDPE

Inflow Area = 46.427 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
 Inflow = 87.19 cfs @ 13.00 hrs, Volume= 18.662 af
 Outflow = 82.22 cfs @ 13.22 hrs, Volume= 18.648 af, Atten= 6%, Lag= 13.2 min
 Primary = 82.22 cfs @ 13.22 hrs, Volume= 18.648 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 877.47' @ 13.22 hrs Surf.Area= 19,580 sf Storage= 34,589 cf

Plug-Flow detention time= 6.0 min calculated for 18.648 af (100% of inflow)
 Center-of-Mass det. time= 5.4 min (878.8 - 873.4)

Volume	Invert	Avail.Storage	Storage Description
#1	873.40'	510,465 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
873.40	0	0	0
874.00	2,059	618	618
875.00	6,190	4,125	4,742
876.00	10,177	8,184	12,926
877.00	16,312	13,245	26,170
878.00	23,278	19,795	45,965
879.00	31,651	27,465	73,430
880.00	41,716	36,684	110,113
881.00	54,378	48,047	158,160
882.00	68,049	61,214	219,374
883.00	86,557	77,303	296,677
884.00	106,231	96,394	393,071
885.00	128,557	117,394	510,465

Device	Routing	Invert	Outlet Devices
#1	Primary	873.40'	36.0" Round Culvert X 2.00 L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 873.40' / 873.30' S= 0.0010 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Primary	879.00'	36.0" Round Culvert L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 879.00' / 878.00' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

Primary OutFlow Max=82.22 cfs @ 13.22 hrs HW=877.47' TW=875.50' (Dynamic Tailwater)

1=Culvert (Barrel Controls 82.22 cfs @ 5.82 fps)
 2=Culvert (Controls 0.00 cfs)

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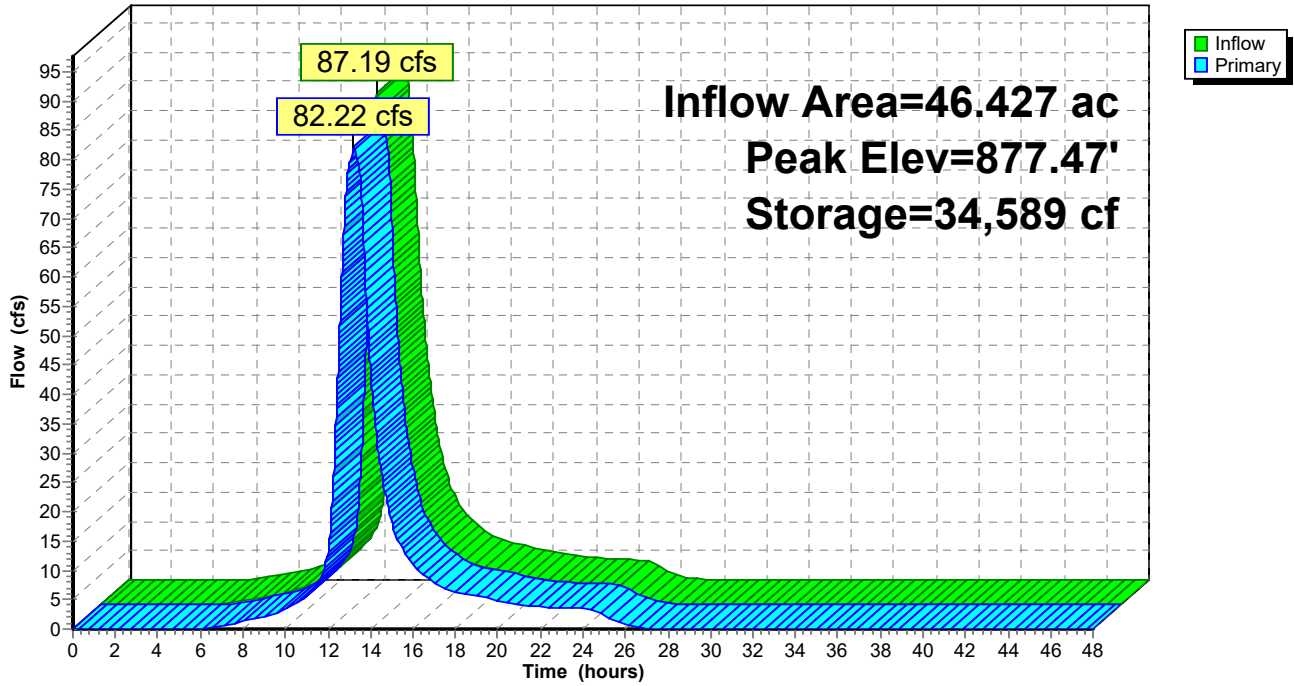
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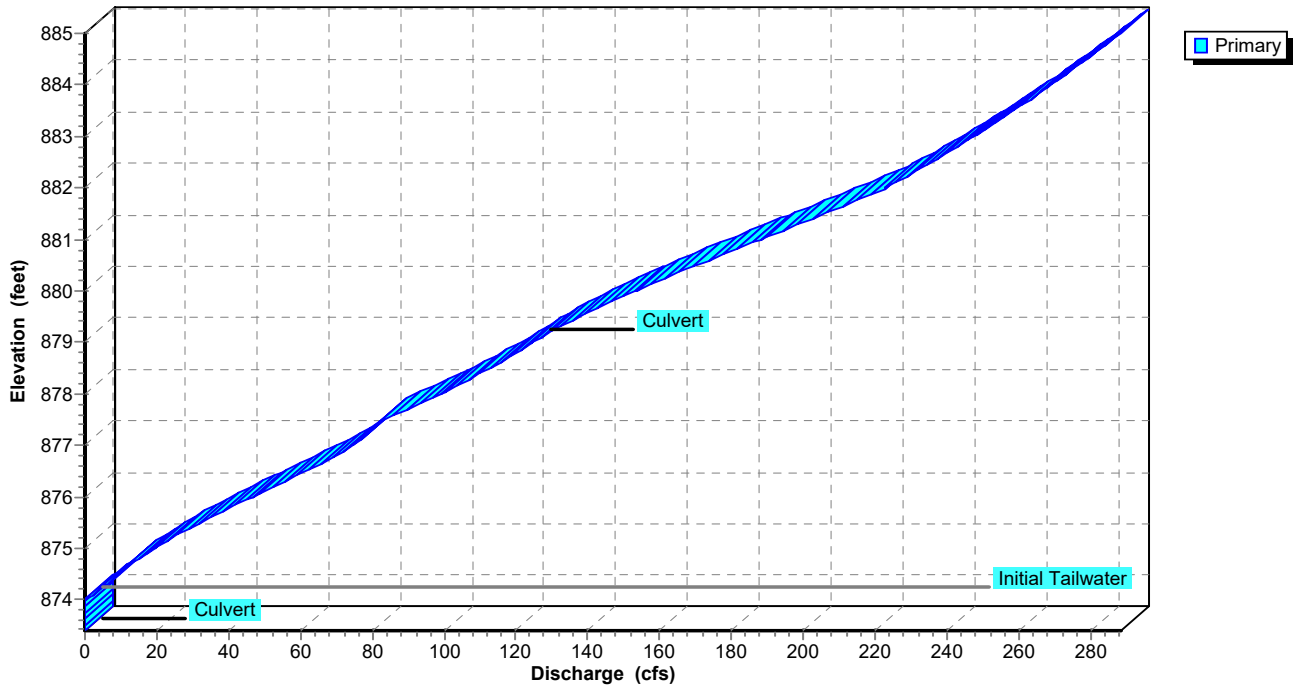
Pond ST-3: Triple 36" CHDPE

Hydrograph



Pond ST-3: Triple 36" CHDPE

Stage-Discharge



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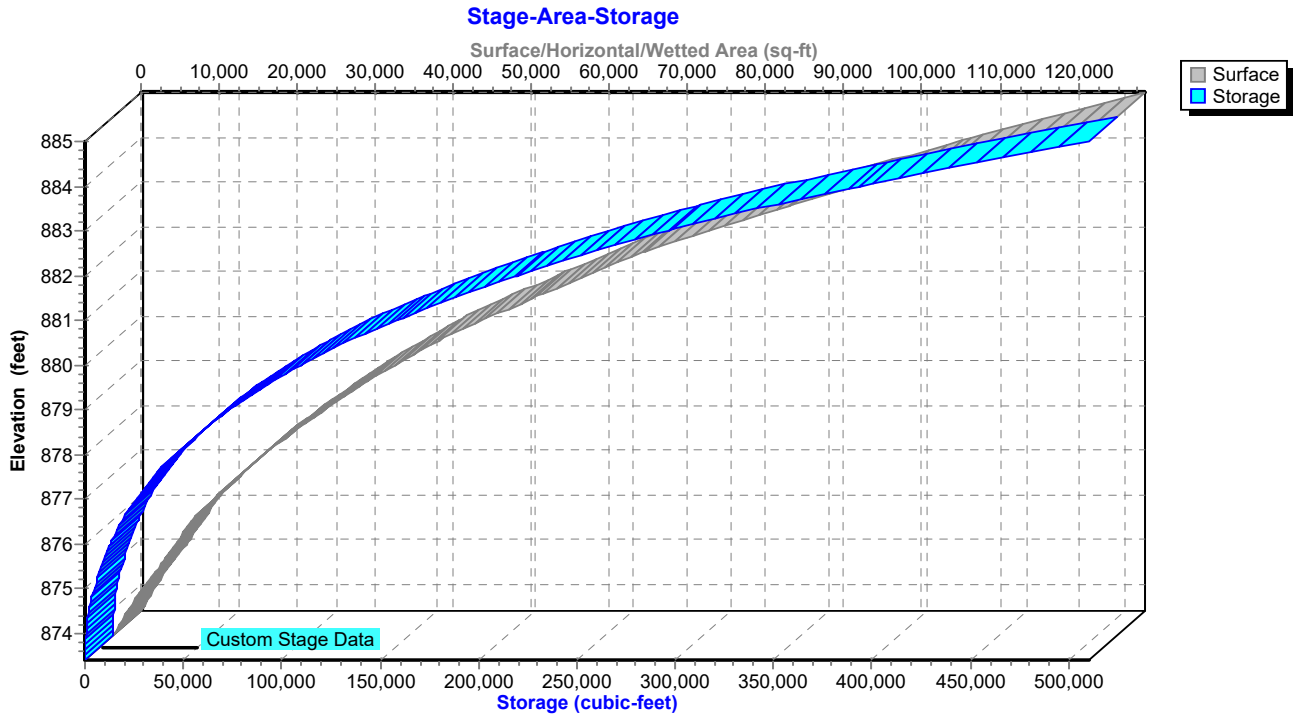
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Pond ST-3: Triple 36" CHDPE



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Summary for Pond ST-4: 2-3'x7' Box Culverts

Inflow Area = 93.950 ac, 2.77% Impervious, Inflow Depth = 4.86" for 25-YR event
Inflow = 123.93 cfs @ 12.29 hrs, Volume= 38.077 af
Outflow = 117.20 cfs @ 13.36 hrs, Volume= 38.075 af, Atten= 5%, Lag= 64.3 min
Primary = 117.20 cfs @ 13.36 hrs, Volume= 38.075 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 871.44' @ 13.36 hrs Surf.Area= 65,254 sf Storage= 99,982 cf

Plug-Flow detention time= 19.2 min calculated for 38.075 af (100% of inflow)
Center-of-Mass det. time= 19.1 min (881.0 - 861.8)

Volume	Invert	Avail.Storage	Storage Description
#1	869.55'	382,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
869.55	42,800	0	0
870.00	46,941	20,192	20,192
871.00	57,889	52,415	72,607
872.00	74,453	66,171	138,778
872.34	81,300	26,478	165,256
875.00	82,000	217,189	382,445

Device	Routing	Invert	Outlet Devices
#1	Primary	869.55'	84.0" W x 36.0" H Box Culvert X 2.00 L= 118.0' Ke= 0.500 Inlet / Outlet Invert= 869.55' / 867.92' S= 0.0138 ' S Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 21.00 sf

Primary OutFlow Max=117.19 cfs @ 13.36 hrs HW=871.44' TW=869.20' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 117.19 cfs @ 4.42 fps)

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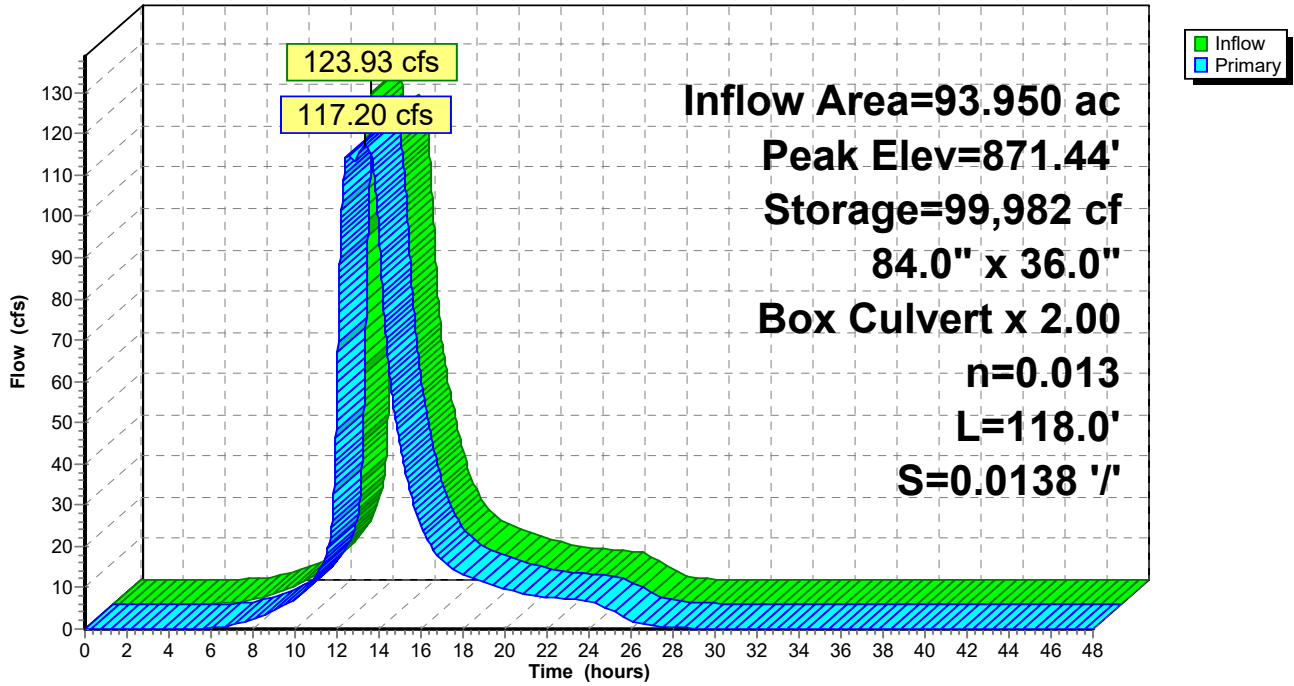
Type II 24-hr 25-YR Rainfall=6.55"

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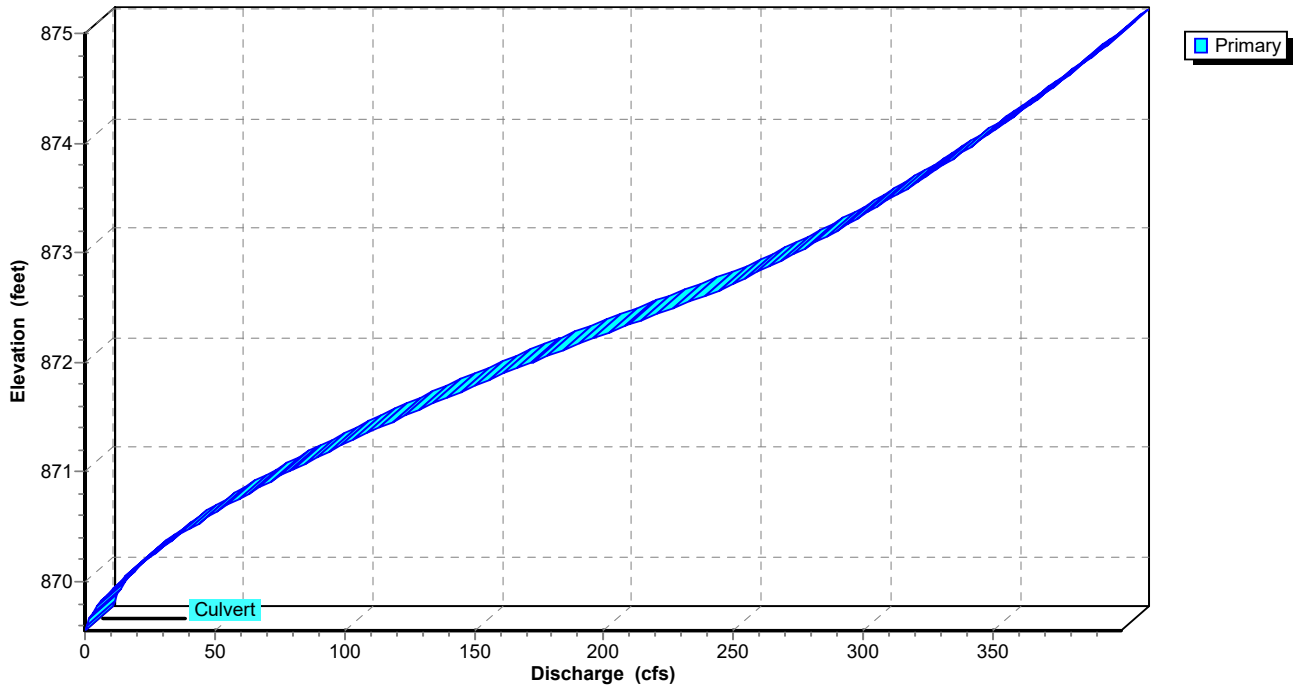
Pond ST-4: 2-3'x7' Box Culverts

Hydrograph



Pond ST-4: 2-3'x7' Box Culverts

Stage-Discharge



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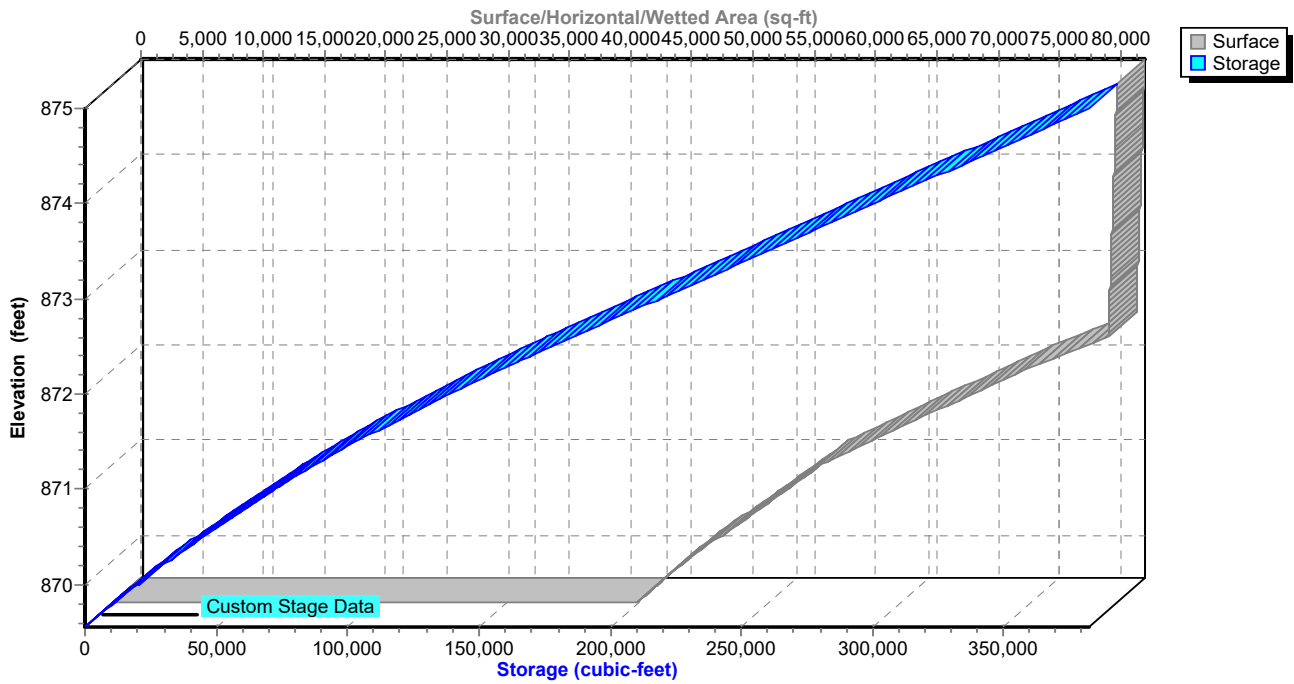
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Pond ST-4: 2-3'x7' Box Culverts

Stage-Area-Storage



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Summary for Pond ST-5: NW Landfill Water Control Structure

Inflow Area = 27.558 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
 Inflow = 87.49 cfs @ 12.39 hrs, Volume= 11.077 af
 Outflow = 15.97 cfs @ 13.47 hrs, Volume= 11.051 af, Atten= 82%, Lag= 64.5 min
 Primary = 15.97 cfs @ 13.47 hrs, Volume= 11.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 881.36' @ 13.47 hrs Surf.Area= 80,110 sf Storage= 232,325 cf

Plug-Flow detention time= 182.1 min calculated for 11.051 af (100% of inflow)
 Center-of-Mass det. time= 180.6 min (1,010.5 - 829.9)

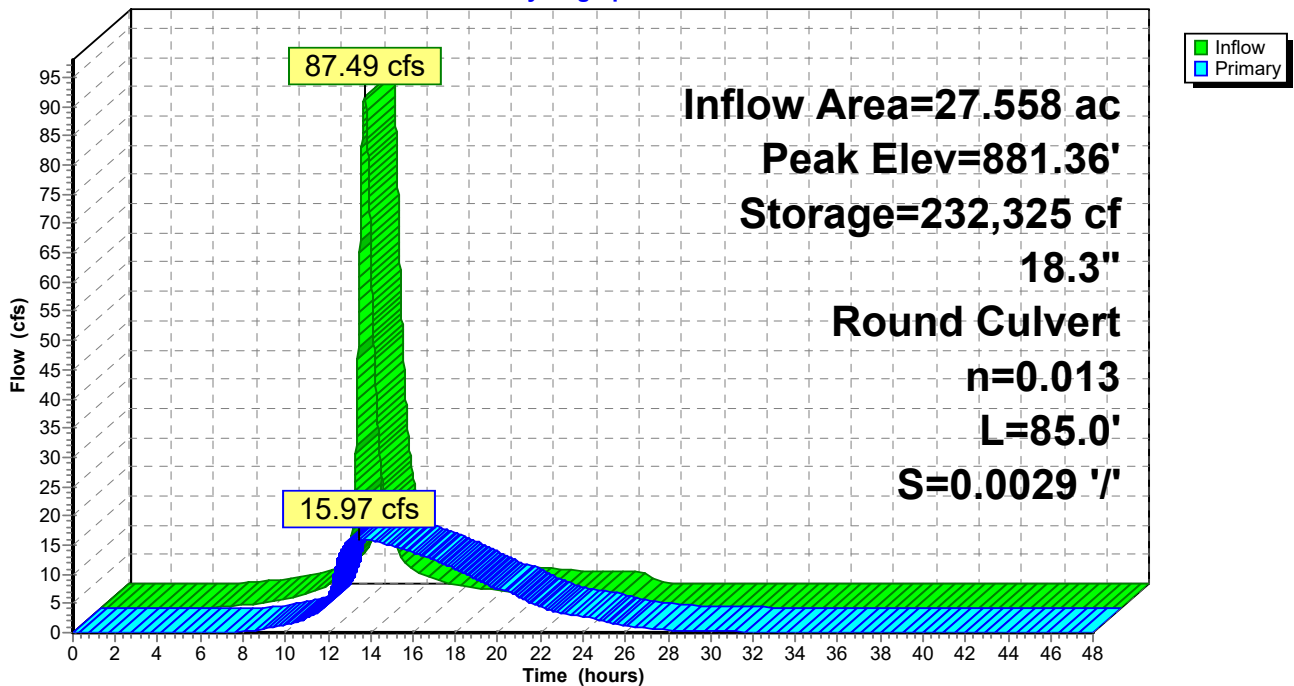
Volume	Invert	Avail.Storage	Storage Description
#1	876.50'	551,083 cf	10.00'W x 1,600.00'L x 8.00'H Prismatic Z=4.0

Device	Routing	Invert	Outlet Devices
#1	Primary	876.50'	18.3" Round Culvert L= 85.0' Ke= 0.500 Inlet / Outlet Invert= 876.50' / 876.25' S= 0.0029 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.83 sf

Primary OutFlow Max=15.97 cfs @ 13.47 hrs HW=881.36' TW=870.58' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 15.97 cfs @ 8.74 fps)

Pond ST-5: NW Landfill Water Control Structure

Hydrograph



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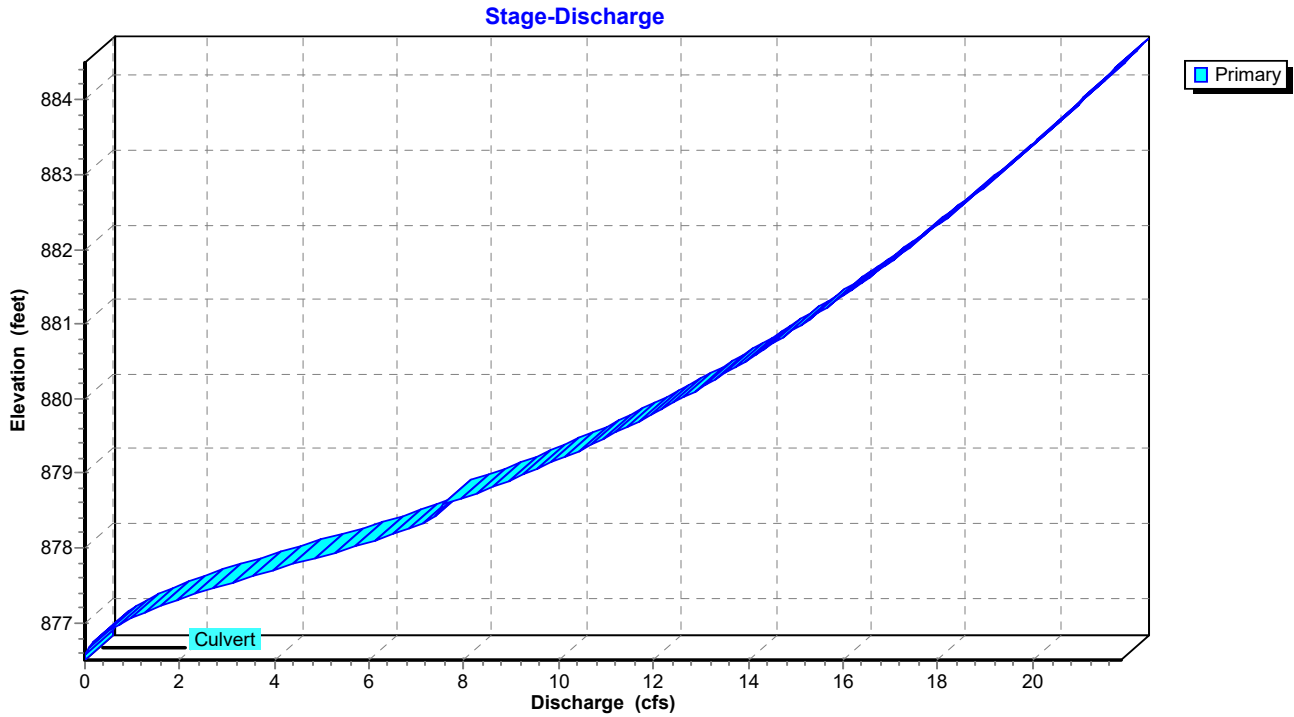
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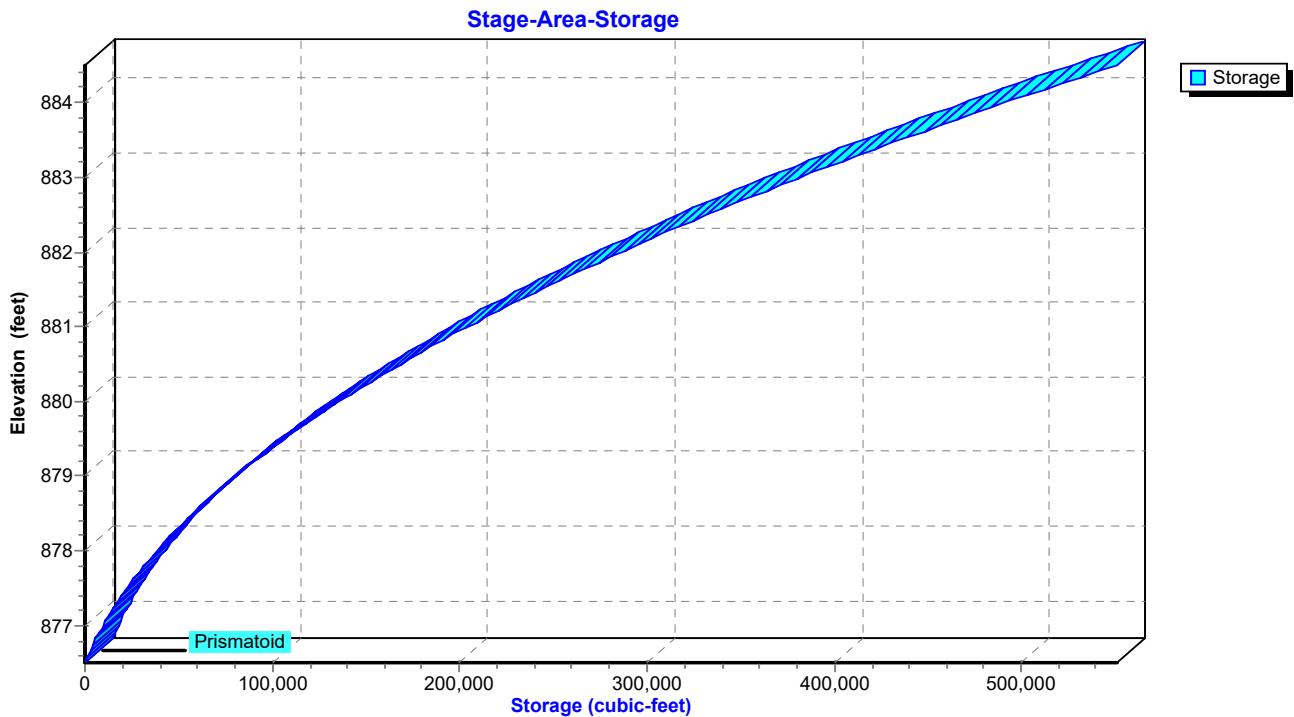
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Pond ST-5: NW Landfill Water Control Structure



Pond ST-5: NW Landfill Water Control Structure



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Summary for Pond ST-6: NE Landfill Water Control Structure

Inflow Area = 26.063 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
 Inflow = 92.49 cfs @ 12.34 hrs, Volume= 10.476 af
 Outflow = 16.92 cfs @ 13.23 hrs, Volume= 10.459 af, Atten= 82%, Lag= 53.6 min
 Primary = 16.92 cfs @ 13.23 hrs, Volume= 10.459 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 883.19' @ 13.23 hrs Surf.Area= 69,102 sf Storage= 211,516 cf

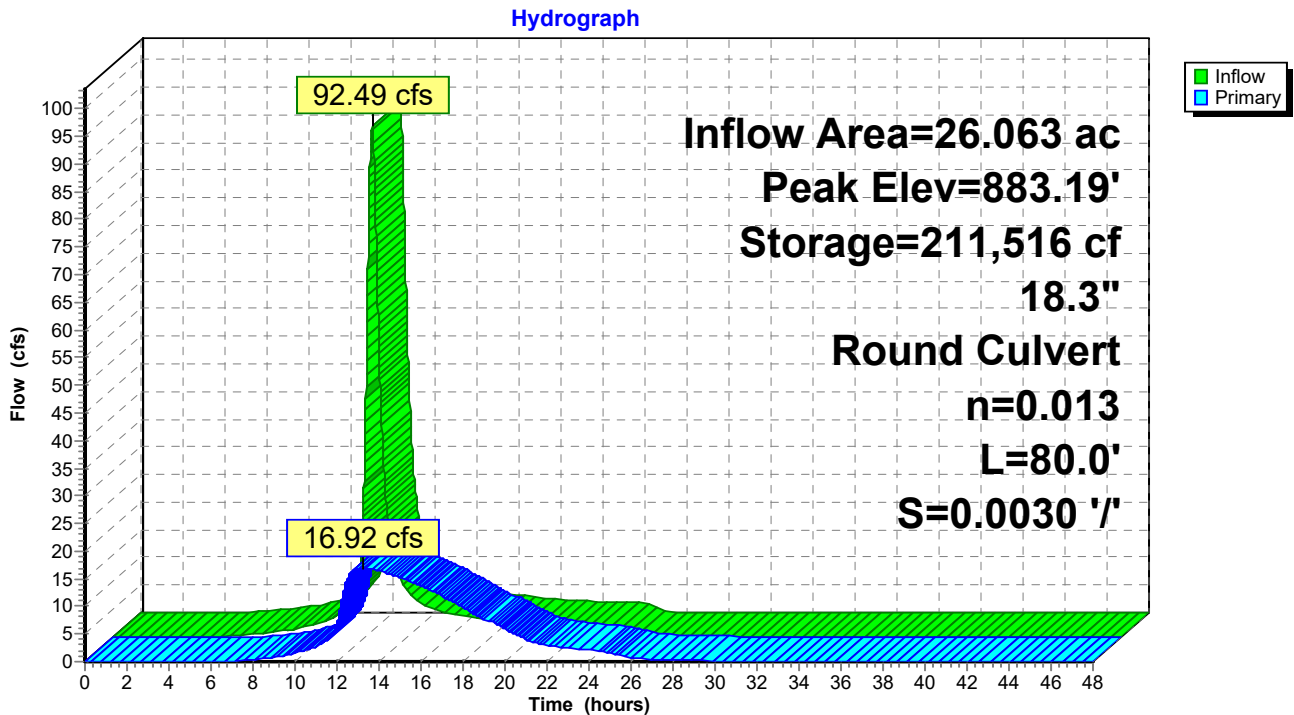
Plug-Flow detention time= 152.3 min calculated for 10.457 af (100% of inflow)
 Center-of-Mass det. time= 151.4 min (975.3 - 823.9)

Volume	Invert	Avail.Storage	Storage Description
#1	878.00'	450,283 cf	10.00'W x 1,300.00'L x 8.00'H Prismatic Z=4.0

Device	Routing	Invert	Outlet Devices
#1	Primary	878.00'	18.3" Round Culvert L= 80.0' Ke= 0.500 Inlet / Outlet Invert= 878.00' / 877.76' S= 0.0030 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.83 sf

Primary OutFlow Max=16.92 cfs @ 13.23 hrs HW=883.19' TW=870.61' (Dynamic Tailwater)
 ←1=Culvert (Barrel Controls 16.92 cfs @ 9.26 fps)

Pond ST-6: NE Landfill Water Control Structure



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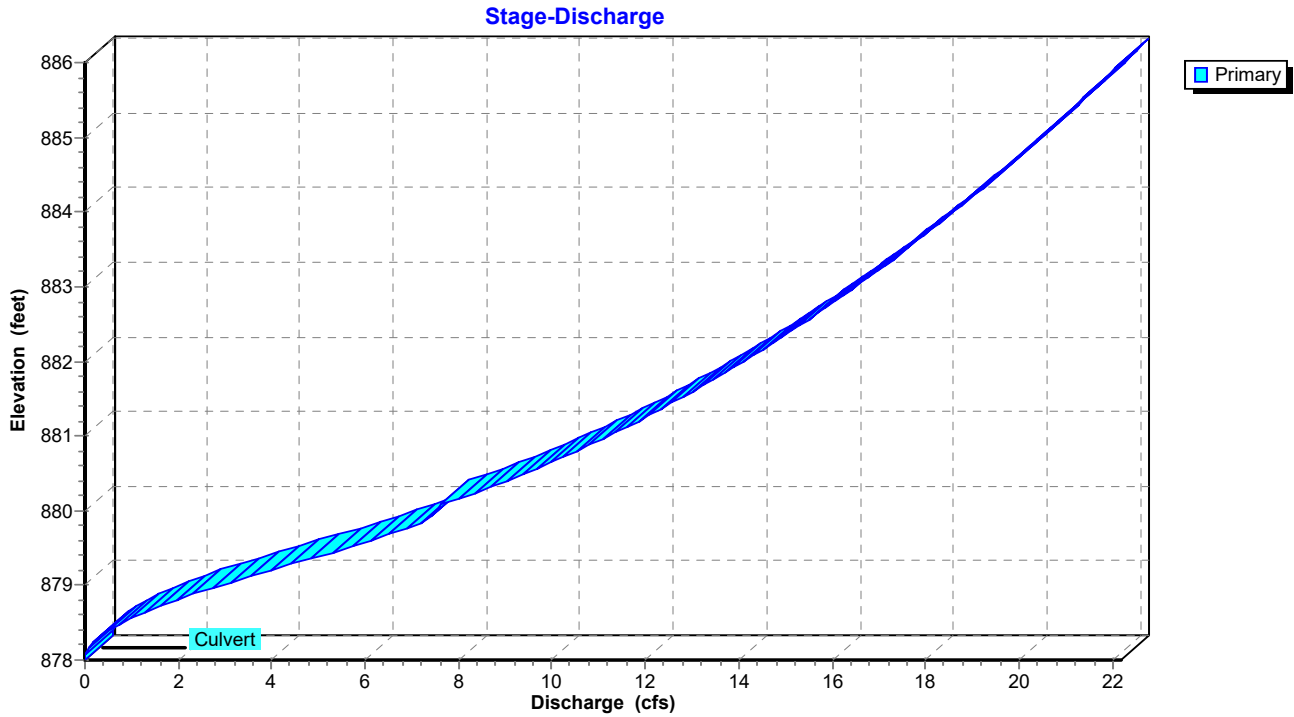
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Type II 24-hr 25-YR Rainfall=6.55"

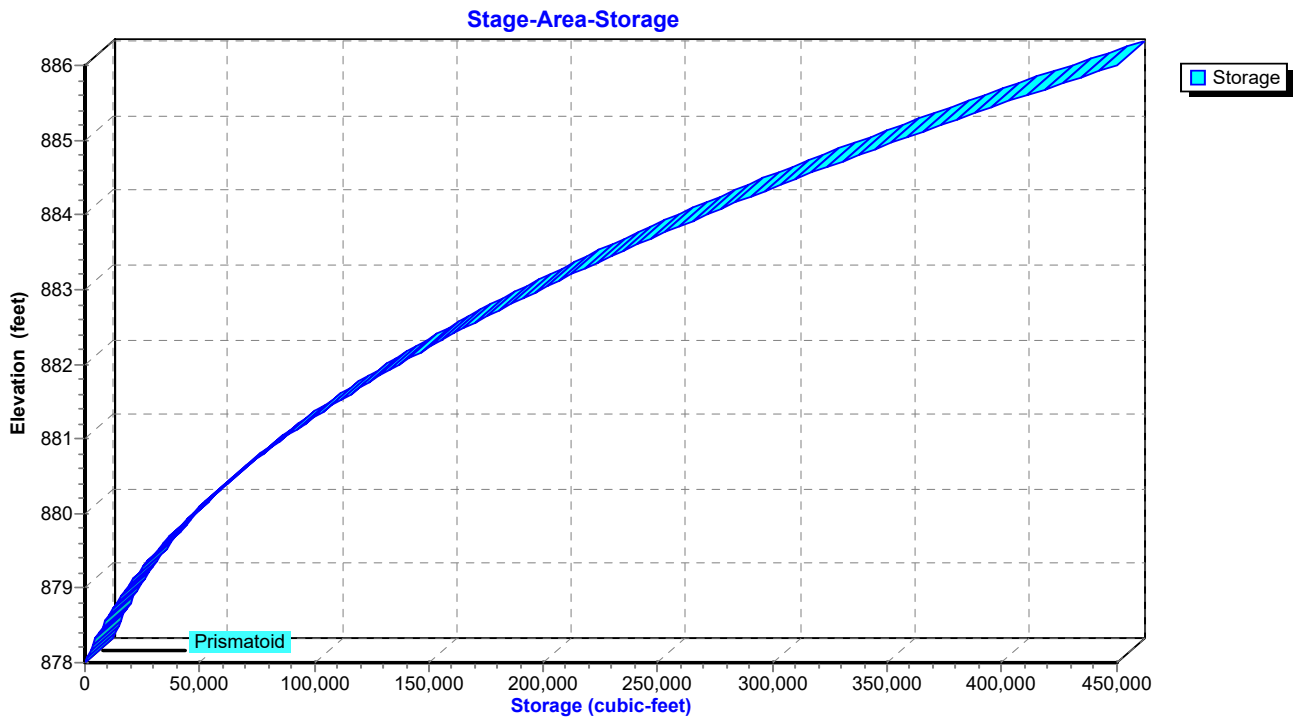
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Pond ST-6: NE Landfill Water Control Structure



Pond ST-6: NE Landfill Water Control Structure



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Summary for Pond ST-7:

Inflow Area = 21.337 ac, 100.00% Impervious, Inflow Depth = 6.31" for 25-YR event
 Inflow = 121.22 cfs @ 12.14 hrs, Volume= 11.222 af
 Outflow = 11.05 cfs @ 13.10 hrs, Volume= 11.222 af, Atten= 91%, Lag= 57.6 min
 Primary = 11.05 cfs @ 13.10 hrs, Volume= 11.222 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 892.53' @ 13.10 hrs Surf.Area= 132,324 sf Storage= 219,074 cf

Plug-Flow detention time= 170.6 min calculated for 11.220 af (100% of inflow)
 Center-of-Mass det. time= 170.5 min (926.2 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1	888.00'	634,154 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
888.00	120	0	0
888.50	5,122	1,311	1,311
889.00	10,988	4,028	5,338
889.50	18,054	7,261	12,599
890.00	31,902	12,489	25,088
890.50	45,214	19,279	44,367
891.00	62,406	26,905	71,272
891.50	83,656	36,516	107,787
892.00	107,062	47,680	155,467
892.50	130,236	59,325	214,791
893.00	162,235	73,118	287,909
893.50	200,834	90,767	378,676
894.00	250,544	112,845	491,521
894.50	319,991	142,634	634,154

Device	Routing	Invert	Outlet Devices
#1	Primary	888.00'	15.3" Round Culvert L= 92.0' Ke= 0.500 Inlet / Outlet Invert= 888.00' / 887.08' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.28 sf

Primary OutFlow Max=11.05 cfs @ 13.10 hrs HW=892.53' TW=870.60' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 11.05 cfs @ 8.66 fps)

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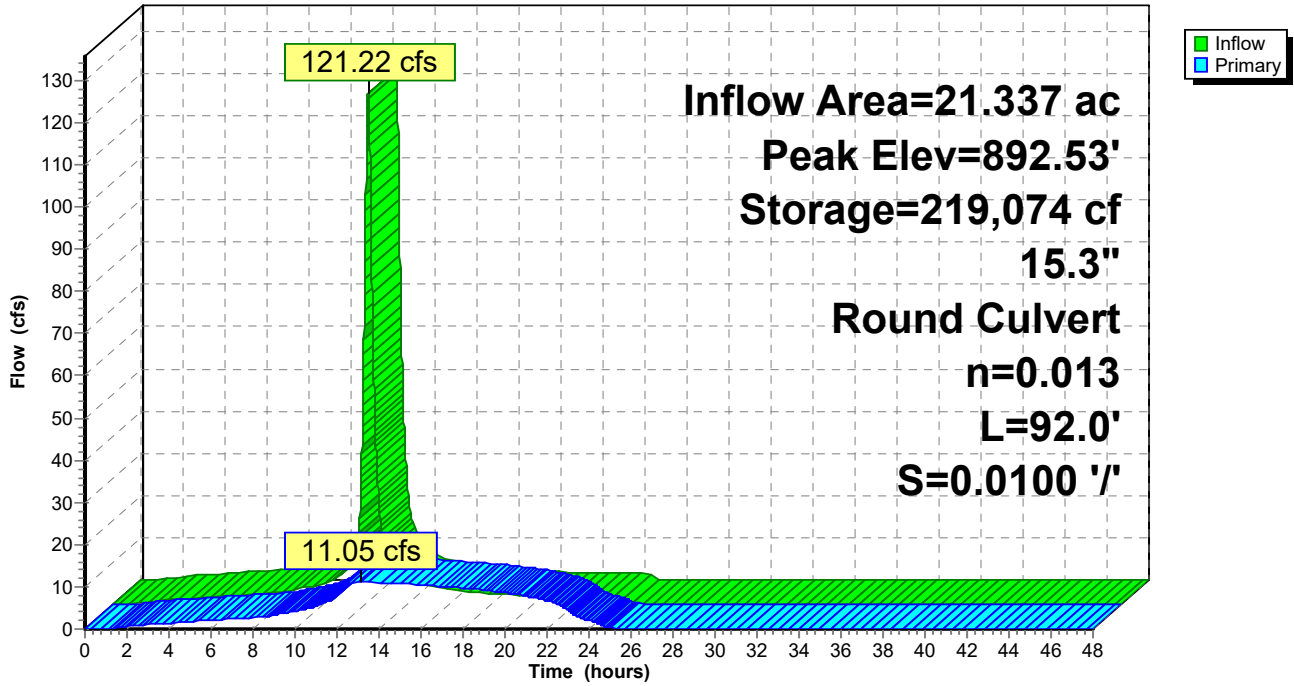
Type II 24-hr 25-YR Rainfall=6.55"

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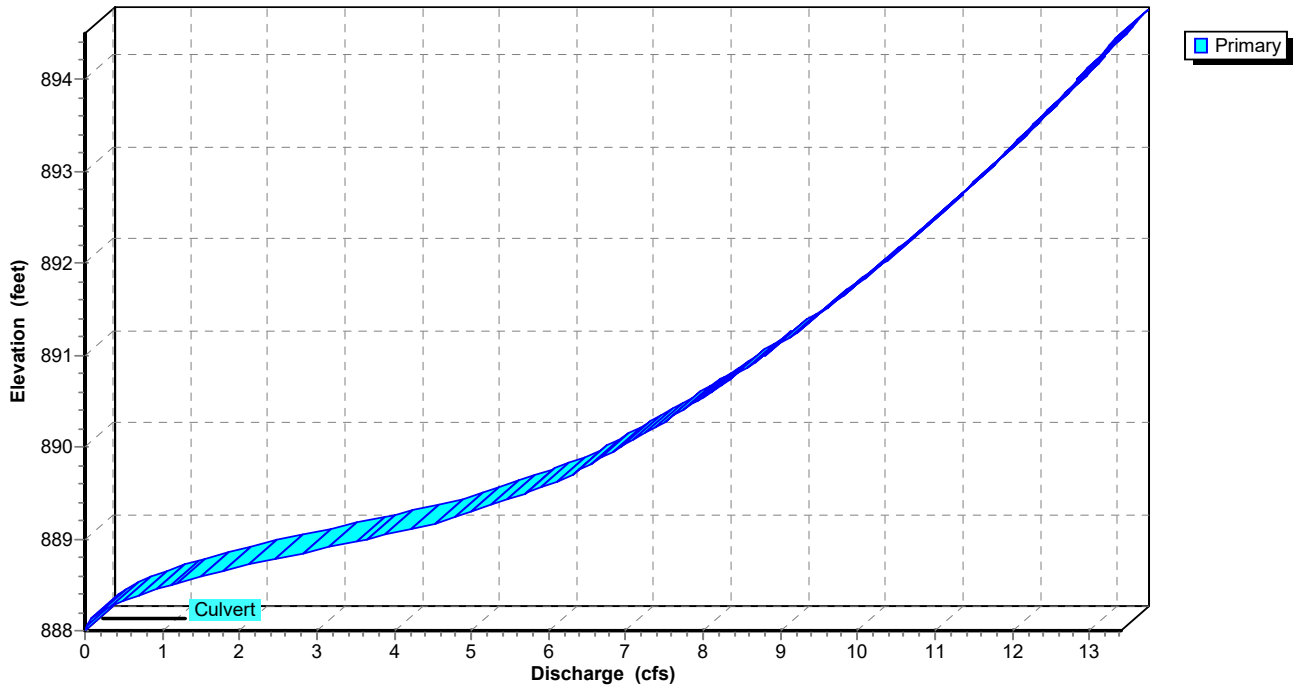
Pond ST-7:

Hydrograph



Pond ST-7:

Stage-Discharge



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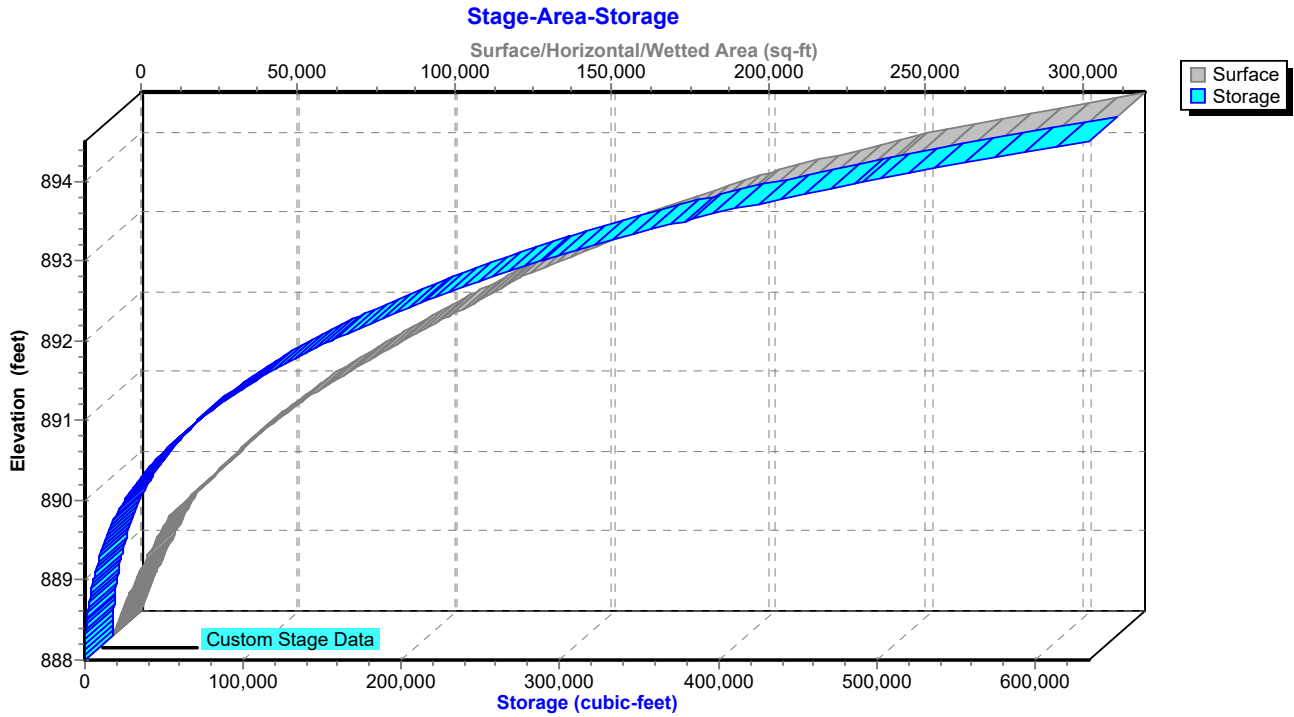
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Type II 24-hr 25-YR Rainfall=6.55"

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Pond ST-7:



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Summary for Pond ST-8:

Inflow Area = 21.301 ac, 0.00% Impervious, Inflow Depth = 4.82" for 25-YR event
 Inflow = 101.07 cfs @ 12.16 hrs, Volume= 8.562 af
 Outflow = 10.90 cfs @ 13.06 hrs, Volume= 8.562 af, Atten= 89%, Lag= 53.9 min
 Primary = 10.90 cfs @ 13.06 hrs, Volume= 8.562 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 891.98' @ 13.06 hrs Surf.Area= 127,808 sf Storage= 166,687 cf

Plug-Flow detention time= 134.2 min calculated for 8.562 af (100% of inflow)
 Center-of-Mass det. time= 134.1 min (945.0 - 810.9)

Volume	Invert	Avail.Storage	Storage Description
#1	887.50'	761,964 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
887.50	120	0	0
888.00	795	229	229
888.50	5,589	1,596	1,825
889.00	11,591	4,295	6,120
889.50	19,621	7,803	13,923
890.00	31,064	12,671	26,594
890.50	45,704	19,192	45,786
891.00	67,588	28,323	74,109
891.50	91,577	39,791	113,900
892.00	129,222	55,200	169,100
892.50	168,250	74,368	243,468
893.00	212,464	95,179	338,647
893.50	257,547	117,503	456,149
894.00	306,453	141,000	597,149
894.50	352,806	164,815	761,964

Device	Routing	Invert	Outlet Devices
#1	Primary	887.50'	15.3" Round Culvert L= 96.0' Ke= 0.500 Inlet / Outlet Invert= 887.50' / 886.54' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.28 sf

Primary OutFlow Max=10.90 cfs @ 13.06 hrs HW=891.98' TW=870.59' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 10.90 cfs @ 8.54 fps)

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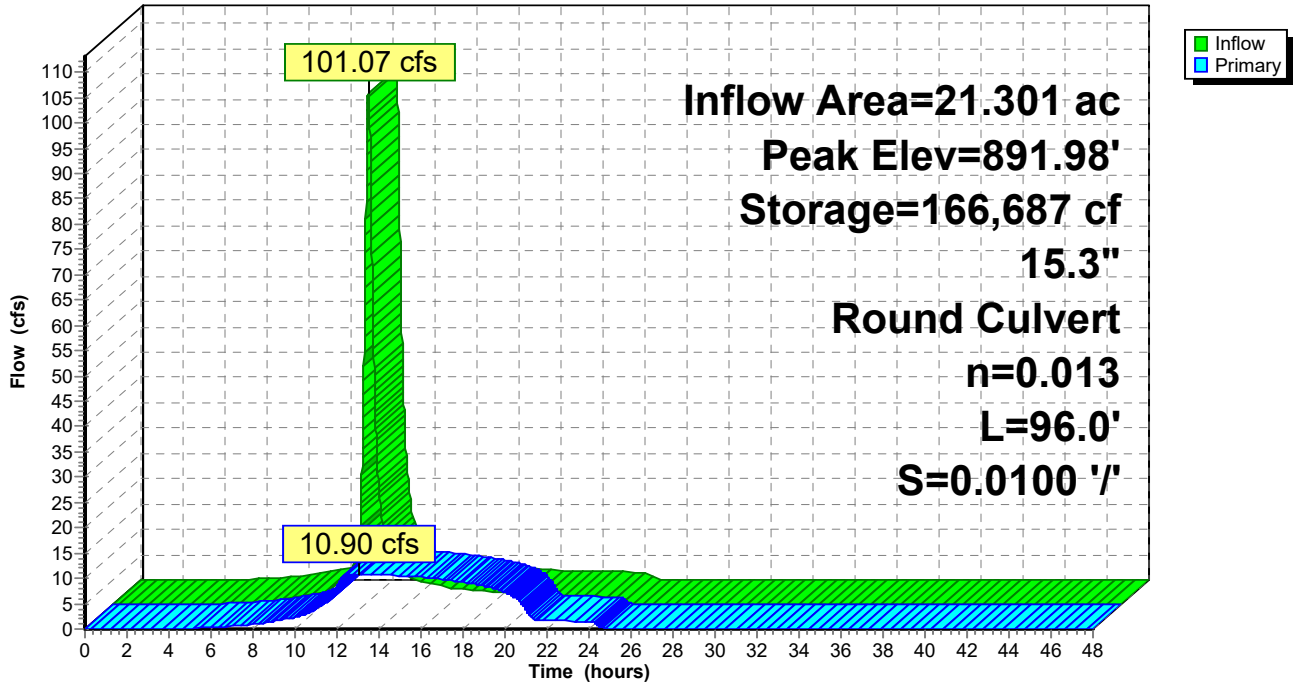
Type II 24-hr 25-YR Rainfall=6.55"

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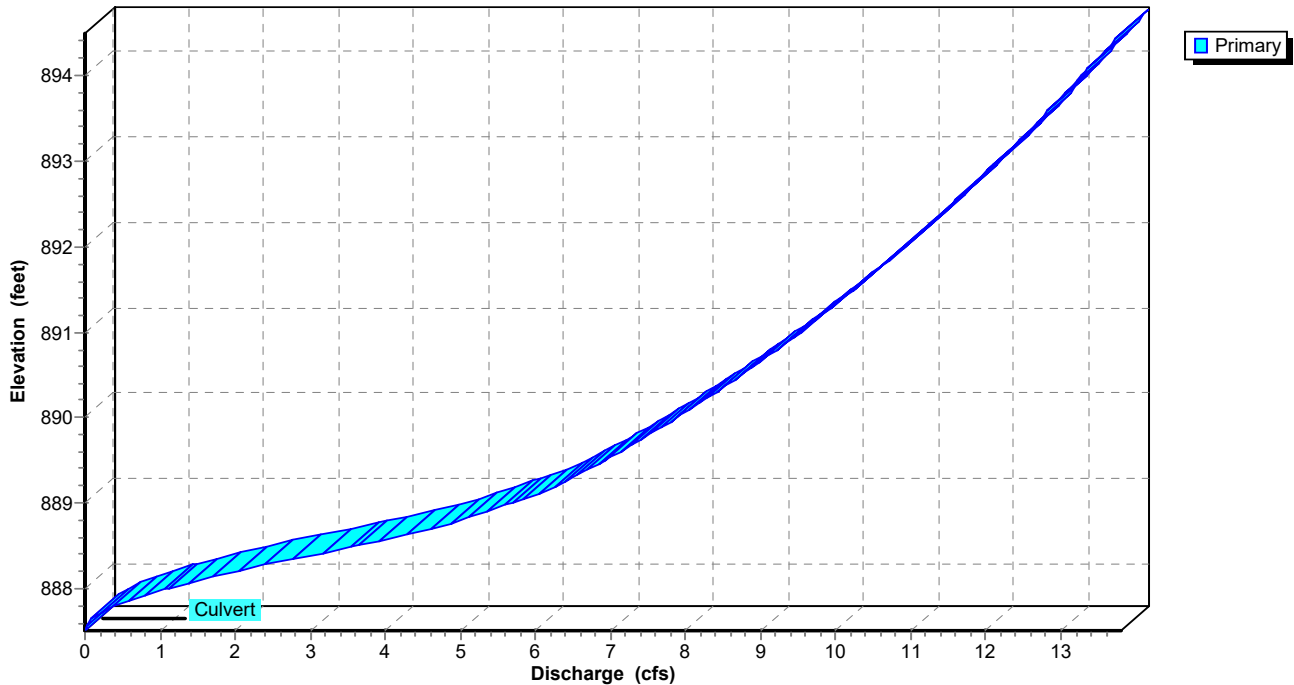
Pond ST-8:

Hydrograph



Pond ST-8:

Stage-Discharge



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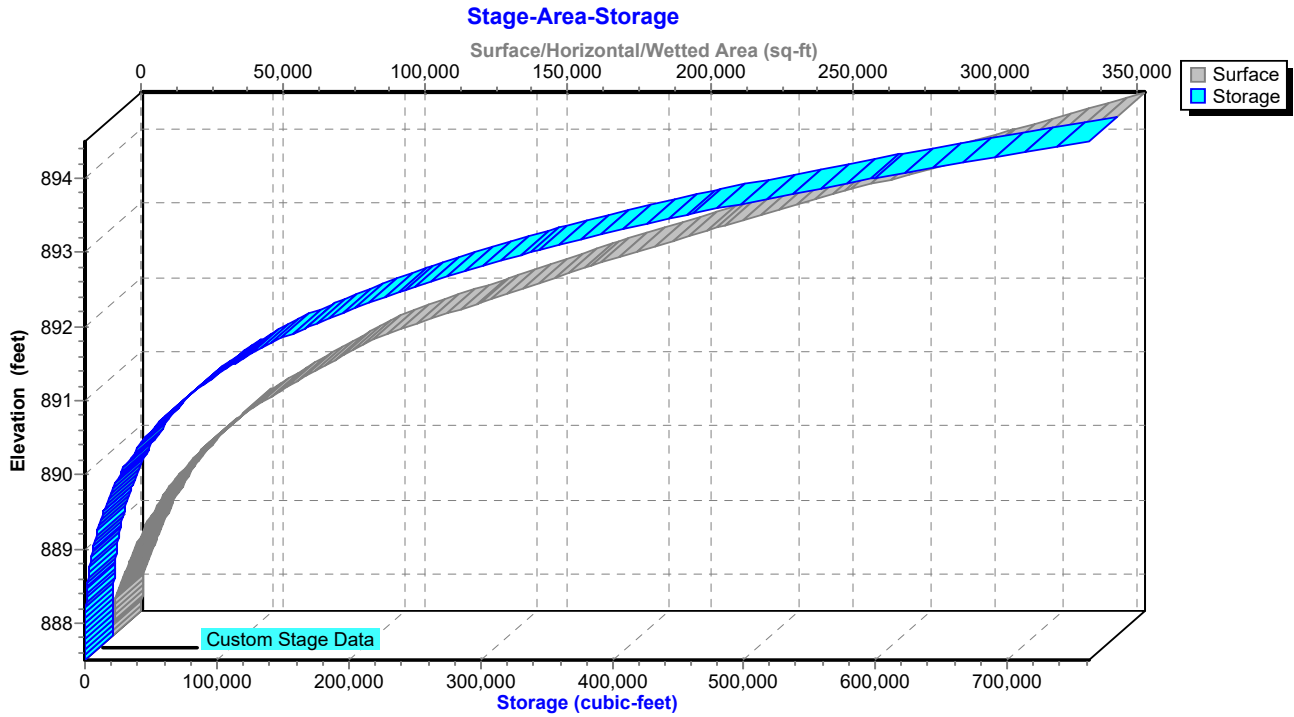
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Type II 24-hr 25-YR Rainfall=6.55"

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Pond ST-8:



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Summary for Pond ST-9: 2-4'X5' BOX CULVERTS

Inflow Area = 138.759 ac, 15.38% Impervious, Inflow Depth > 5.01" for 25-YR event
Inflow = 144.70 cfs @ 12.63 hrs, Volume= 57.988 af
Outflow = 109.89 cfs @ 13.23 hrs, Volume= 57.988 af, Atten= 24%, Lag= 36.2 min
Primary = 109.89 cfs @ 13.23 hrs, Volume= 57.988 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 870.61' @ 13.23 hrs Surf.Area= 179,205 sf Storage= 210,156 cf

Plug-Flow detention time= 21.9 min calculated for 57.988 af (100% of inflow)
Center-of-Mass det. time= 21.9 min (954.1 - 932.2)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	2,626,917 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
868.00	25	0	0
869.00	50,869	25,447	25,447
870.00	129,907	90,388	115,835
871.00	210,687	170,297	286,132
872.00	307,780	259,234	545,366
873.00	414,327	361,054	906,419
874.00	520,234	467,281	1,373,700
875.00	619,358	569,796	1,943,496
876.00	747,485	683,422	2,626,917

Device	Routing	Invert	Outlet Devices
#1	Primary	868.00'	60.0" W x 48.0" H Box Culvert X 2.00 L= 93.0' Ke= 0.500 Inlet / Outlet Invert= 868.00' / 867.72' S= 0.0030 1' Cc= 0.900 n= 0.013, Flow Area= 20.00 sf

Primary OutFlow Max=109.89 cfs @ 13.23 hrs HW=870.61' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 109.89 cfs @ 5.61 fps)

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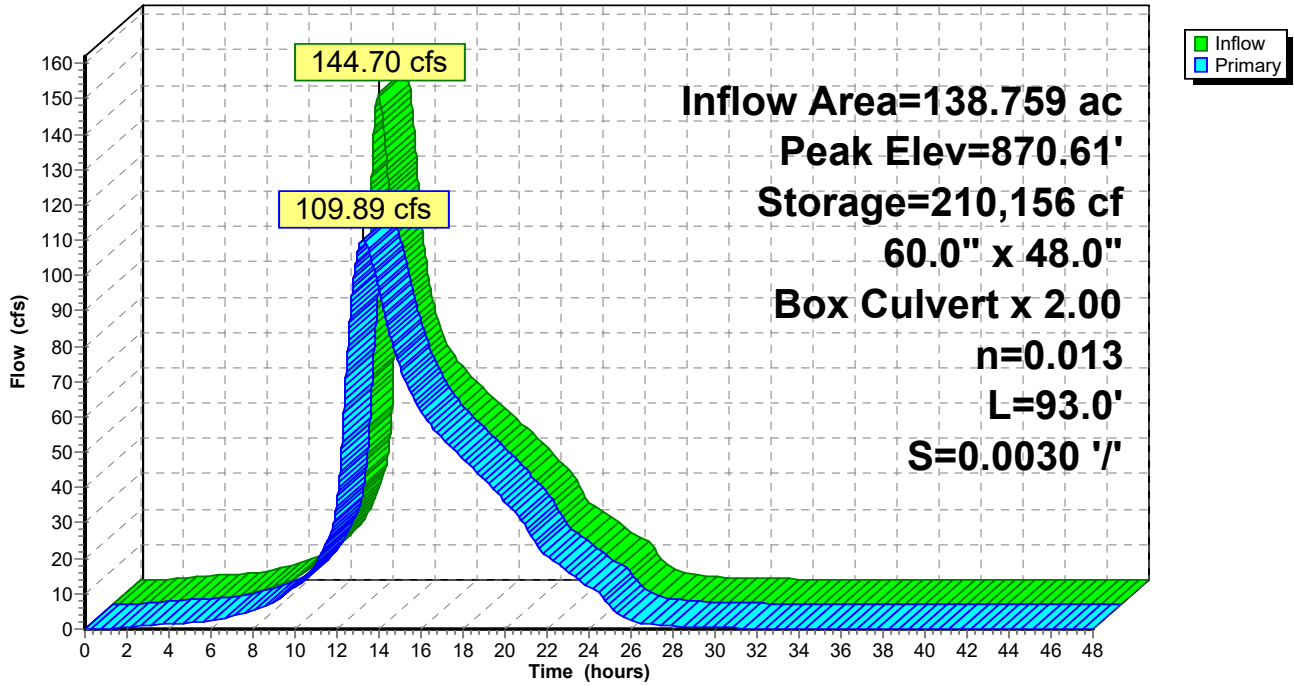
Type II 24-hr 25-YR Rainfall=6.55"

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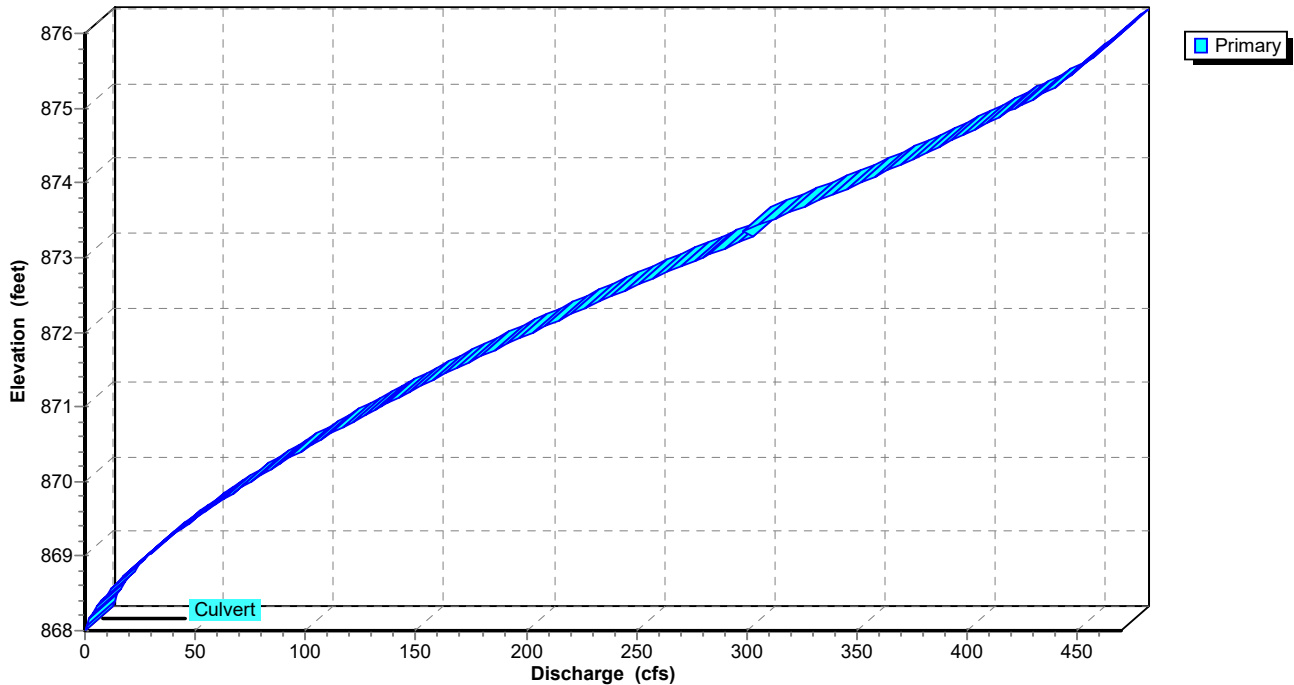
Pond ST-9: 2-4'X5' BOX CULVERTS

Hydrograph



Pond ST-9: 2-4'X5' BOX CULVERTS

Stage-Discharge



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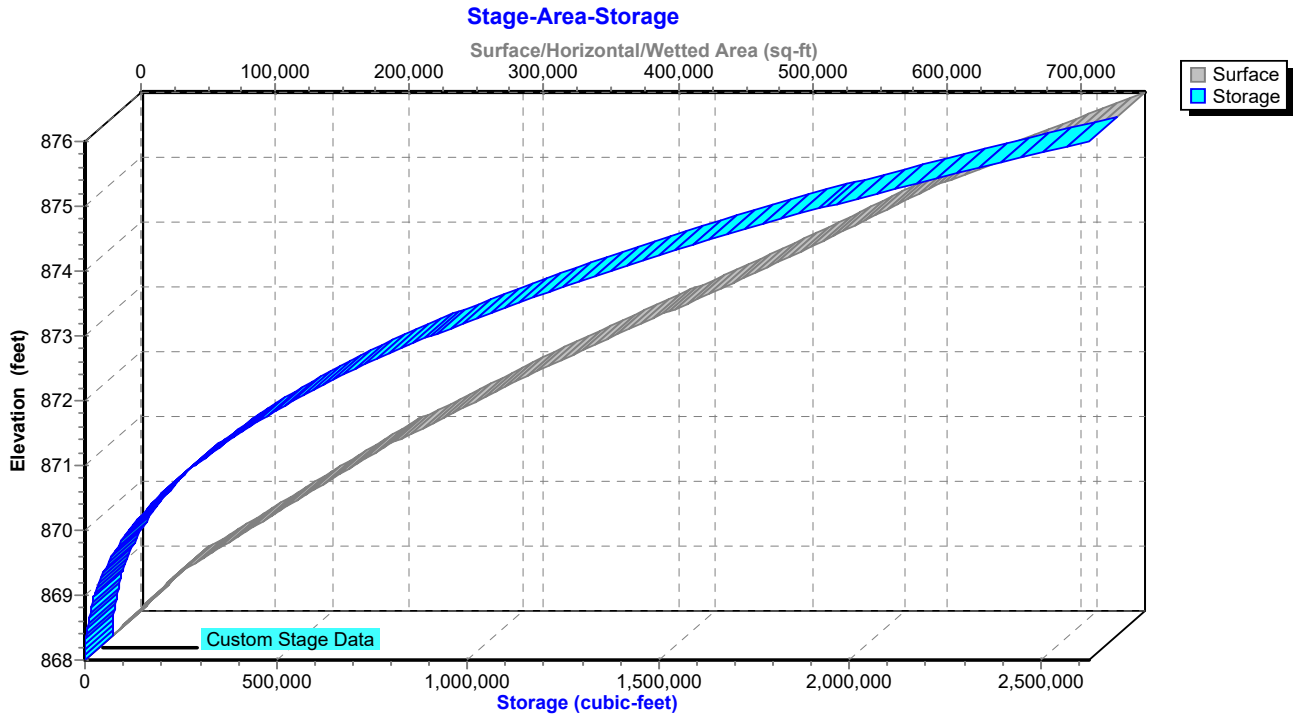
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Type II 24-hr 25-YR Rainfall=6.55"

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Pond ST-9: 2-4'X5' BOX CULVERTS



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Type II 24-hr 25-YR Rainfall=6.55"

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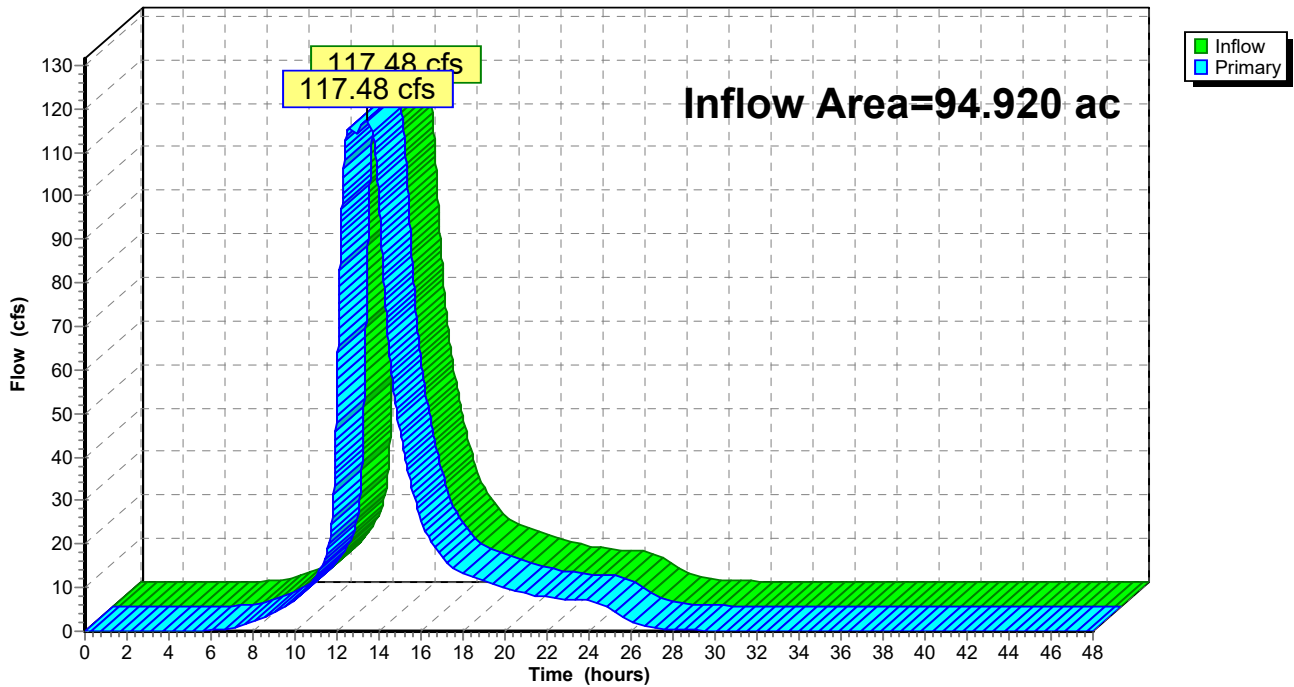
Summary for Link 1L: Outfall 016

Inflow Area = 94.920 ac, 2.96% Impervious, Inflow Depth = 4.87" for 25-YR event
Inflow = 117.48 cfs @ 13.40 hrs, Volume= 38.492 af
Primary = 117.48 cfs @ 13.40 hrs, Volume= 38.492 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Outfall 016

Hydrograph



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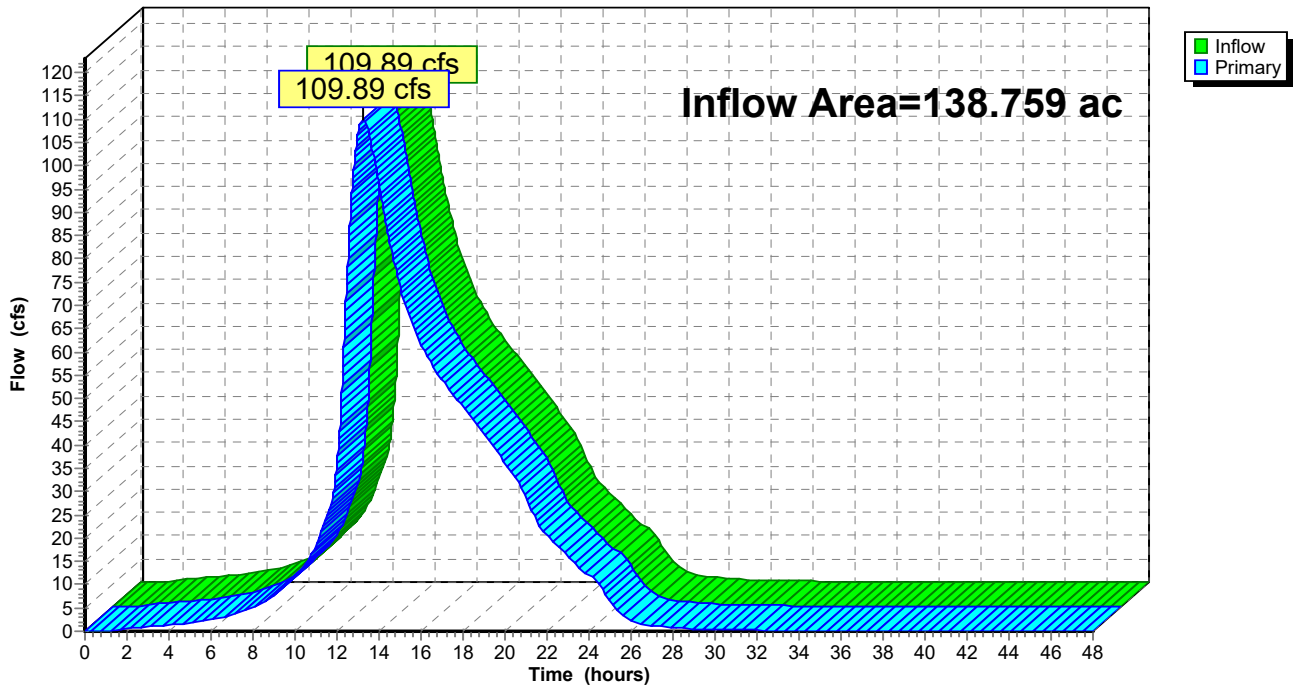
Summary for Link 2L:

Inflow Area = 138.759 ac, 15.38% Impervious, Inflow Depth > 5.01" for 25-YR event
Inflow = 109.89 cfs @ 13.23 hrs, Volume= 57.988 af
Primary = 109.89 cfs @ 13.23 hrs, Volume= 57.988 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L:

Hydrograph





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