INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MONTOUR ASH BASIN NO. 1

MONTOUR STEAM ELECTRIC STATION
DERRY TOWNSHIP
MONTOUR COUNTY, PENNSYLVANIA

Prepared for:

MONTOUR, LLC
WASHINGTONVILLE, PENNSYLVANIA

Prepared by:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 BALDWIN ROAD
PITTSBURGH, PA 15205

CEC Project 150-989.0006

October 2016

TABLE OF CONTENTS

APPENDICES

1.0 PURPOSE

On behalf of Montour, LLC, Civil & Environmental Consultants, Inc. (CEC) has evaluated the Hydrologic and Hydraulic Capacity Requirements for the Montour Steam Electric Station (MSES) Ash Basin No. 1 (Basin 1) to meet the requirements in Code of Federal Rules, Title 40, Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, dated April 17, 2015 (CCR Rule). This evaluation specifically addresses the requirements in Section 257.82 (§257.82) – Hydrologic and Hydraulic Capacity Requirements for CCR Surface Impoundments. Basin 1 is classified as an existing CCR surface impoundment by definition in §257.53.

2.0 SITE DESCRIPTION

Montour owns and operates the Montour Steam Electric Station (MSES), which is located in Derry Township, Montour County, Pennsylvania. Basin No. 1 was constructed to dispose of coal combustion residuals (CCR) and to treat wastewater from the MSES. The location of Basin No. 1 is shown on Figure 1 – Site Location Map in Appendix A.

Basin 1 is permitted by Pennsylvania Department of Environmental Protection (PADEP) as a Class II Residual Waste Disposal Impoundment under Permit No. 301315, which expires in April 2018. Basin 1 is also regulated by the PADEP Bureau of Waterways Engineering Division of Dam Safety under Permit No. 47-009 and National Pollutant Discharge Elimination System (NPDES) Permit No. PA0008443.

Basin No. 1 is an unlined, earthen dike disposal impoundment. The permitted disposal area is approximately 155 acres. Basin 1 went into service in 1971 and was developed by excavating site soils to construct an embankment dike around the excavation. The perimeter of Basin 1 is approximately 11,000 feet in length and up to approximately 40-feet high. The dike ties into a bedrock ridge along the eastern side of the basin. A slurry wall was subsequently installed in the perimeter dike except in the bedrock ridge area. Basin 1 is divided into Subbasins A, B, and C by internal dikes referred to as the Median Dike and the Splitter Dike, respectively. Refer to Figure 2 – Site Plan in Appendix A for the site features.

The CCR disposed in Basin 1 have historically included fly ash (ceased in 1982), bottom ash (presently managed elsewhere), Stabil-Fil (lime-amended fly ash placed as beneficial use), and mill rejects. Bottom ash and mill rejects are currently sluiced in separate pipes to concrete-lined sluice troughs located in Subbasin B. The bottom ash and mill rejects are separated from the sluice water in the troughs and the water is discharged into Subbasin B which functions as a settling and cooling basin. The bottom ash is processed into different gradations and beneficially used in accordance with Pennsylvania Residual Waste Regulations, Chapter 290 (Beneficial Use

of Coal Ash) of the Pennsylvania Code. A small quantity of bottom ash fines is conveyed with the sluice water into Subbasin B. The mill rejects are transported off-site for disposal.

From Subbasin B, the water is decanted by culverts through the splitter dike into Subbasin C. Water is discharged from Subbasin C through a riser and outlet pipe to the on-site Detention Basin before discharging to Chillisquaque Creek where it is monitored under NPDES Permit No. PA0008443.

In preparing for eventual basin closure, Montour submitted a Major Permit Modification (MPM) Application to PADEP in November 2014 which PADEP approved by a permit modification dated June 18, 2015. The MPM Application proposed the following:

- Placement of Conditioned Fly Ash (fly ash conditioned with moisture) as a beneficial use to increase final waste grades to promote surface water run-off and decrease the potential for long-term ponding of water on the final cover.
- Installation of a surface water management system designed in accordance with PADEP regulations.
- Placement of an alternative final cover system consisting of a geomembrane, geotextile cushion/drainage layer, and final cover soil.

In accordance with the MPM, Montour has been placing Conditioned Fly Ash (CFA) in Basin 1 as structural fill to increase the final grades in preparation for basin closure. The placement of fly ash is considered beneficial use of coal ash as structural fill per Chapter 290.102 of the Pennsylvania Code.

3.0 §257.82(a) INFLOW DESIGN FLOOD

The applicable sections of §257.82(a) are reprinted below in bold, italic font. The responses follow each section of the rule and are provided in normal font.

§257.82(a) states:

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(a)(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(a)(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(a)(3) The inflow design flood is:

(a)(3)(i) For a high hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the probable maximum flood;

As defined in §257.53, a high hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life. A significant hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

There are residences on the south side of Basin 1 along Strawberry Ridge Road. Stabil-Fil (lime-amended fly ash placed as beneficial use) was placed in that area (Subbasin A) and ponded water has been eliminated. A breach of the dike in this area would result in a release of CCR which could possibly flow in a way that would threaten a loss of human life; therefore, the basin is

being evaluated as a high hazard potential CCR surface impoundment with a corresponding design storm event of the probable maximum flood (PMF).

4.0 §257.82(b) SURFACE WATER REQUIREMENTS

§257.82(b) is reprinted below in bold, italic font. The responses follow in normal font.

§257.82(b) states:

(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under §257.3-3.

In accordance with §257.3-3, discharges from the Site are authorized by and in compliance with PADEP under NPDES Permit No. PA0008443. Dredged material or fill material is not discharged from the Site to waters of the United States in violation of the requirements under Section 404 of the Clean Water Act. Site operations have not caused non-point source pollution to waters of the United States in violation of the requirements under Section 208 of the Clean Water Act.

5.0 §257.82(c) INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

The applicable sections of §257.82(c) are reprinted below in bold, italic font. The responses follow each section of the rule and are provided in normal font.

§257.82(c) states:

(c) Inflow design flood control system plan

(c)(1) Content of the plan. The owner or operator must prepare initial and periodic inflow design flood 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 inflow design flood control system has been designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

This Initial Inflow Design Flood Control System Plan documents how the inflow design flood control system at Basin 1 has been designed and will be constructed to meet the requirements of this section.

The MPM Application approved by PADEP in June 2015 included a surface water management system consisting of perimeter channels, box culverts, diversion berms, and a sedimentation pond within Basin 1. The proposed surface water control structures were designed in accordance with both the Residual Waste Regulations for Disposal Impoundments and Dam Safety Requirements. Based on the Dam Safety Requirements, the surface water management system was designed using the upper bound of the 90 percent confidence interval for the 100-year, 24-hour storm event. The design storm event used in the MPM Application was 7.46 inches over a 24-hour duration.

Perimeter channels have been installed which collect surface water runoff from the entire basin area and convey the runoff to the proposed sedimentation pond in Subbasin B and C. A box culvert has been constructed to allow run-off to be conveyed beneath a site access road. A diversion berm will be constructed upgradient of the perimeter channel during the active Conditioned Fly Ash Placement (CFA) to reduce the surface runoff to the perimeter channels.

The existing spillway structure in Subbasin C discharges to the Detention Basin located at the MSES. Design drawings from the MPM Application are provided in Appendix A and include Sheet No. 5 – Surface Water Management Plan, Sheet 10 – Final Cover System Details, Sheet 11 – Surface Water Management Details (Sheet 1), Sheet 12 – Surface Water Management Details (Sheet 2) and Sheet 13 – E&S Control Details. The design drawings present channel and culvert dimensions and slopes and the design of the Subbasin C outlet structure.

As stated in Section 3.0, because Basin 1 is conservatively classified as a high hazard potential CCR surface impoundment; the design storm is the PMF. §257.73(d)(v) and §257.82(a) require that the inflow design flood control system manage the peak discharge resulting from the design storm for flow into and out of the CCR unit. Run-on from areas surrounding Basin 1 is diverted into existing waterways and does not enter Basin 1. The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a PMF.

5.1 HYDROLOGIC EVALUATION

The Soil Conservation Service (SCS) Technical Release No. 20 (TR-20) methodology within HydroCAD computer program was used to determine the peak surface water runoff rates from the PMF. The rate of runoff is based on the relationships between the amount of rainfall, soil type, infiltration, land cover, travel time, and the size of the drainage area. The land cover in each drainage area was assumed to be vegetated with grass cover. Based on the use of local soils as the soil component of the final cover system, the runoff curve number (CN) of 74 was used for the basin area to represent good grass cover. The runoff curve number of 89, 96 and 100 were used to represent gravel roads, channel segments, and pool areas, respectively.

The SCS TR-55 Segmental Approach methodology within HydroCAD was used to calculate the time of concentration and peak discharge in each drainage area delineated in Basin No. 1. The Final Conditions Drainage Area Map is provided in Appendix A.

CEC determined the rainfall values for the probable maximum precipitation (PMP) by referencing Hydrometeorological Report No. 51 which is included in Appendix C. The rainfall values used in the evaluation of the PMF event are:

PMP Rainfall Distribution (hr)	Rainfall Value (in)
6	26.0
12	30.0
24	32.5

5.2 HYDRAULIC EVALUATION

CEC used HydroCAD software to model the current and future site conditions of the surface water management system presented in the MPM Application using the PMF. The evaluation of the PMF rainfall event concluded the following:

- The perimeter channels, culverts, and diversion berms designed as part of the MPM Application are able to manage the peak discharge from the PMF rainfall event.
- The existing discharge structures and storage capacity of Subbasins B and C cannot manage the peak discharge from the PMF rainfall event.

Subsequently, we modified the design in the MPM Application for final conditions so that the inflow design flood control system could manage the peak discharge resulting from the design storm for flow into and out of the CCR unit. Specific changes to the permitted design include revising the outlet structures of existing Sediment Basins in Subbasin A and adding an auxiliary spillway in Subbasin C. As presented in Appendix B, the inflow flood control system is designed to provide a minimum 1.0 feet of freeboard in Subbasin C and 0.5 feet of freeboard in upgradient surface water management controls for the PMF rainfall event. The CCR Rules do not specify a minimum freeboard requirement; therefore, the freeboard values used in this analysis are based on our professional judgment and standard engineering practice.

There are five sediment basins in Subbasin A each with HDPE discharge culverts. The discharge culverts from each are currently plugged in accordance with the design in the MPM Application to eliminate discharge during CFA placement. A riser pipe will be installed at the inlet to each pipe so that they discharge for rainfall events greater than the 25-year, 24-hour storm event. The discharge structures cannot be modified until the appropriate permits are obtained and intermediate cover is placed over the CFA.

The installation of an auxiliary spillway in Subbasin C is proposed to maintain the water surface elevation below the crest of the embankment. The proposed auxiliary spillway is approximately 22-feet wide, 4-feet deep with 6H:1V side slopes. The water surface elevation in the Subbasin C is approximately 562.7 feet with approximately 505 cfs discharging through the auxiliary spillway. The water surface elevation in Sub-Basin C is approximately 1.3 feet below the crest of the embankment. The HydroCAD Model files are provided in Appendix B. The Proposed Final Conditions Map depicts the approximate locations of the proposed auxiliary spillway in Subbasin C and the discharge structures in Subbasin A.

Note that during the Initial Annual Inspection performed by HDR, the spillway in Subbasin C was inspected with a remotely operated vehicle (ROV). The ROV encountered an obstruction approximately 45 feet downstream of the Subbasin C spillway riser. The obstruction appears to be blocking approximately 80 to 90 percent of the spillway culvert opening. Based on the pool level measurements provided by Talen, the normal pool in Subbasin C does not appear to have been affected by the obstruction under normal operating conditions. Talen is currently taking measures to investigate the removal of the obstruction.

(c)(2) Amendment of the plan. The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(4). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

Montour will amend the Inflow Design Flood Control System Plan as needed and place it in the operating record.

(c)(3) Timeframes for preparing the initial plan-(i) Existing CCR surface impoundments. The owner or operator of the CCR unit must prepare the initial inflow design flood control system plan no later than October 17, 2016.

The Inflow Design Flood Control System Plan will be placed in the operating record no later than October 17, 2016.

(c)(4) Frequency for revising the plan. The owner or operator must prepare periodic inflow design flood 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 periodic 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 an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

Periodic Inflow Design Flood Control System Plans will be prepared and added to the operating record by this date at minimum every five years. The Periodic Inflow Design Flood Control System Plan will be considered complete once placed in the operating record within a reasonable amount of time.

(c)(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.

The certification statement provided by a qualified professional engineer states that this Initial Inflow Design Flood Control System Plan meets the requirements stated in §257.82(c).

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our evaluation, CEC concludes that Inflow Design Flood Control System as designed for Basin 1 meets the criteria outlined in §257.82. The following items must be performed to maintain and modify the system:

- Remove the obstruction in the spillway discharge culvert leading from Subbasin C to the Detention Basin to increase the flow capacity of the spillway. Investigate the cause of the spillway obstruction and implement measures to reduce the chances of future obstructions.
- Obtain the necessary permits from PADEP to implement the design changes.
- Install the designed auxiliary spillway in Subbasin C to increase the capacity to convey the CCR Rule design storm.
- Modify the discharge structures in the five Sediment Basins in Subbasin A to allow them to discharge starting at the 25 year/24 hour storm event.

7.0 CERTIFICATION

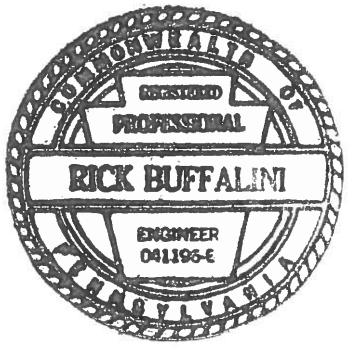
I, Rick J. Buffalini, P.E., a registered professional engineer in the state of Pennsylvania certify that Montour Ash Basin No. 1 fulfills the Initial Inflow Design Flood Control System Plan requirements of §257.82(c). This certification is based on my review of the Initial Inflow Design Flood Control System Plan. This Initial Inflow Design Flood Control System Plan will be placed in the operating record by October 17, 2016.

Rick J. Buffalini, P.E.
Printed Name of Professional Engineer

Signature

041196-E	Pennsylvania	10-11-16
Registration No.	Registration State	Date

Stamp/Seal:



8.0 REFERENCES

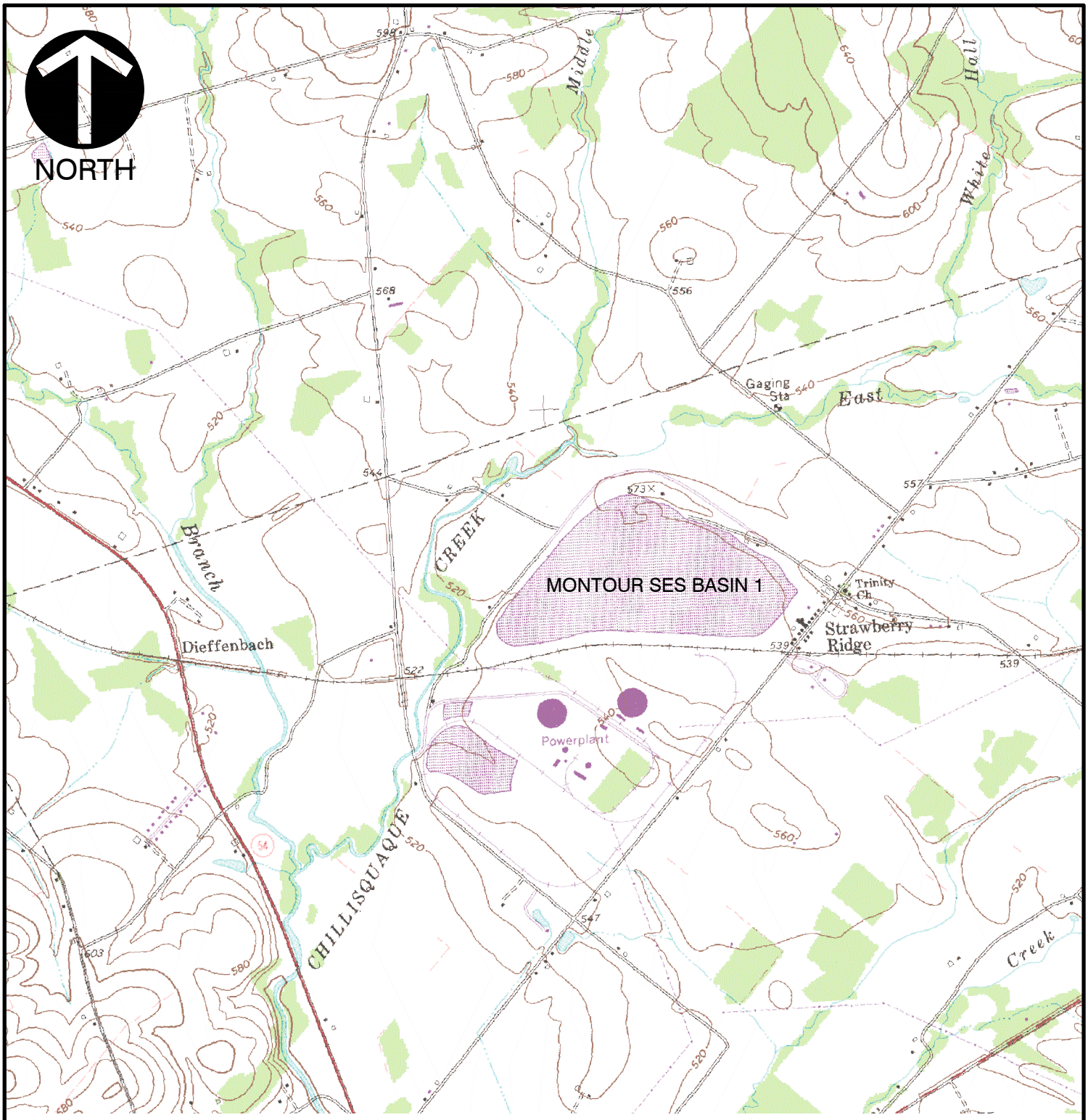
1. Major Permit Modification Application for Design Changes, November 2014, Civil & Environmental Consultants, Inc.

2. HydroCAD Stormwater Modeling 10.0, HydroCAD Software Solutions, LLC., 2011.

3. Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates, United States East of the l05th Meridian, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, U.S. Department of the Army, Corps of Engineers, June 1978.

APPENDIX A

FIGURES



REFERENCE

1. U.S.G.S. 7.5' TOPOGRAPHIC MAP, WASHINGTONVILLE QUADRANGLE, PA DATED: 1969, PHOTOREVISED: 1977. PHOTOINSPECTED: 1983.

SCALE IN FEET

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*HAND SIGNATURE ON FILE

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MONTOUR, LLC.
INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MONTOUR STEAM ELECTRIC STATION
WASHINGTONVILLE, PENNSYLVANIA

SITE LOCATION MAP

DRAWN BY:	DWD	CHECKED BY:	DMD	APPROVED BY:	*RJB	FIGURE NO.:	1
DATE:	10/3/2016	DWG SCALE:	1"=2000'	PROJECT NO:	150-989.0006		

P:\2015\150-989\-CADD\Dwg\SW02-Task 0006\150989-SW02-SITE LOCATION MAP.dwg[FIGURE NO.1] LS:(10/10/2016 - ddiable) - LP: 10/10/2016 1:37 PM

PLANT NORTH

EXISTING SEEPAGE INTERCEPTOR

EXISTING SLURRY WALL

SUBBASIN B

SPLITTER DIKE (DIVIDES SUBBASINS B AND C)

SUBBASIN C

MEDIAN DIKE (DIVIDES SUBBASINS A AND B)

SUBBASIN A

PROPERTY LINE (TYP.)

STRAWBERRY RIDGE ROAD

SCALE IN FEET

0 400 800

REFERENCES

1. BACKGROUND IMAGERY PROVIDED TO CEC BY TALEN IN JUNE 2016.
2. EXISTING TOPOGRAPHY BASED ON 2016 TOPOGRAPHIC MAPPING FOR 2015 OPERATION REPORT, DRAWING NO. E376172 BY CDI L.R. KIMBALL.
3. A SITE SPECIFIC COORDINATE SYSTEM IS SHOWN. MONTOUR S.E.S. USES A NGVD 1929 VERTICAL DATUM INSIDE BASIN 1.
4. EXISTING CONTOURS TO SOUTH OF BASIN 1 WERE DERIVED FROM THE PAMAP PROGRAM 3.2 FT DIGITAL ELEVATION MODEL OF PENNSYLVANIA; DEVELOPED BY PAMAP PROGRAM, PA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY; DATED 2008.
5. PROPERTY BOUNDARIES AND OWNERS HAVE BEEN PROVIDED BY PPL THROUGH A GIS DATA RELEASE AGREEMENT, DATED SEPTEMBER 4, 2014. COPYRIGHT 2011, ALL RIGHTS RESERVED. THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF THE CONTRIBUTOR SUPPLIED UNDER LICENSE AND MAY NOT BE REPRODUCED EXCEPT AS LICENSED BY DIGITAL MAP PRODUCTS.

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SITE PLAN

DRAWN BY:	DWD	CHECKED BY:	DMD	APPROVED BY:	*RJB	FIGURE NO.:
DATE:	10/3/2016	DWG SCALE:	1"=2000'	PROJECT NO:	150-989.0006	2

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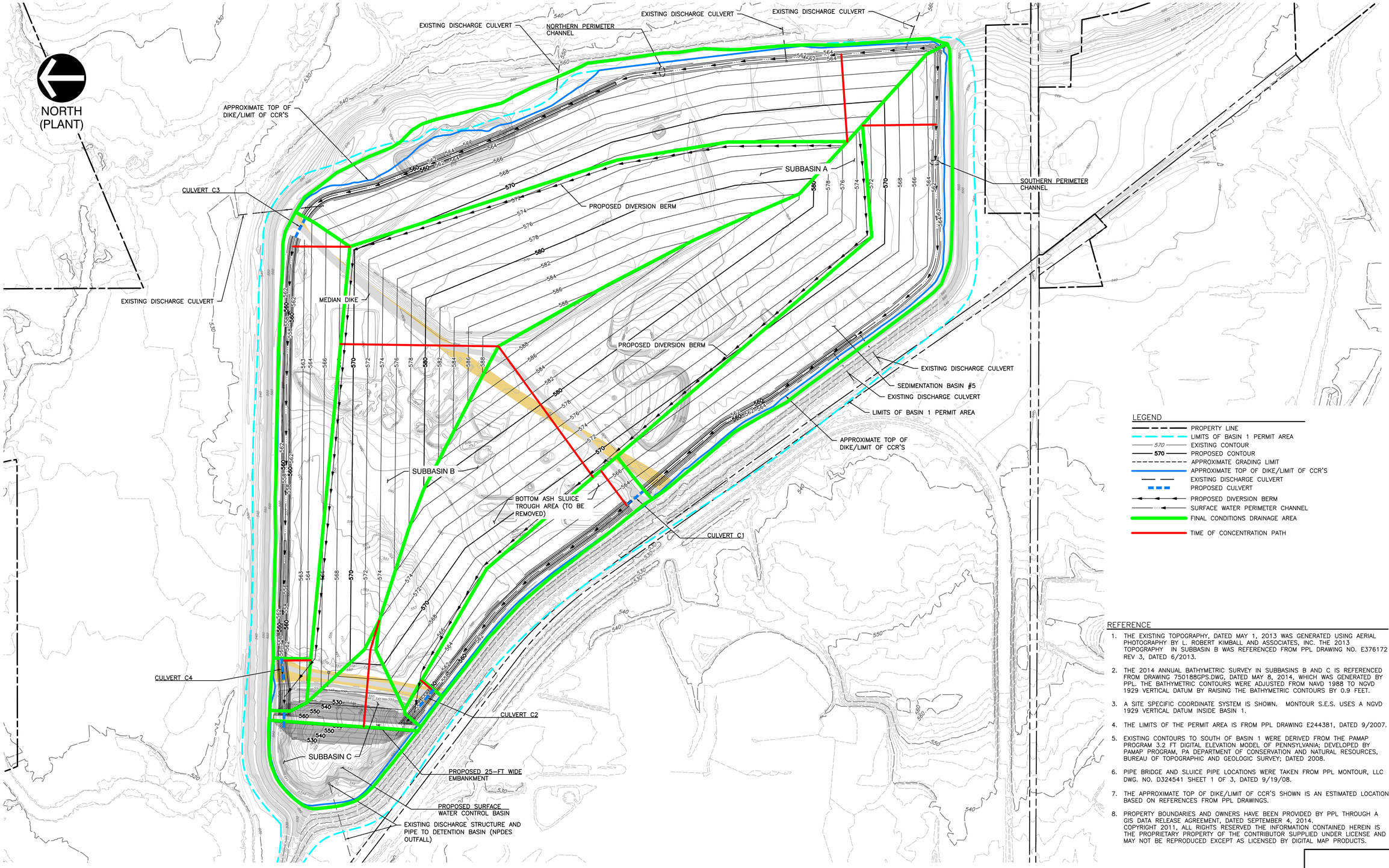

LEGEND

- PROPERTY LINE
- LIMITS OF BASIN 1 PERMIT AREA
- 570 EXISTING CONTOUR
- 570 PROPOSED CONTOUR
- APPROXIMATE GRADING LIMIT
- APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S
- EXISTING DISCHARGE CULVERT
- PROPOSED CULVERT
- PROPOSED DIVERSION BERM
- SURFACE WATER PERIMETER CHANNEL
- FINAL CONDITIONS DRAINAGE AREA
- TIME OF CONCENTRATION PATH

REFERENCE

1. THE EXISTING TOPOGRAPHY, DATED MAY 1, 2013 WAS GENERATED USING AERIAL PHOTOGRAPHY BY L. ROBERT KIMBALL AND ASSOCIATES, INC. THE 2013 TOPOGRAPHY IN SUBBASIN B WAS REFERENCED FROM PPL DRAWING NO. E376172 REV 3, DATED 6/2013.
2. THE 2014 ANNUAL BATHYMETRIC SURVEY IN SUBBASINS B AND C IS REFERENCED FROM DRAWING 750188GPS.DWG, DATED MAY 8, 2014, WHICH WAS GENERATED BY PPL. THE BATHYMETRIC CONTOURS WERE ADJUSTED FROM NAVD 1988 TO NGVD 1929 VERTICAL DATUM BY RAISING THE BATHYMETRIC CONTOURS BY 0.9 FEET.
3. A SITE SPECIFIC COORDINATE SYSTEM IS SHOWN. MONTOUR S.E.S. USES A NGVD 1929 VERTICAL DATUM INSIDE BASIN 1.
4. THE LIMITS OF THE PERMIT AREA IS FROM PPL DRAWING E244381, DATED 9/2007.
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6. PIPE BRIDGE AND SLUICE PIPE LOCATIONS WERE TAKEN FROM PPL MONTOUR, LLC DWG. NO. D324541 SHEET 1 OF 3, DATED 9/19/08.
7. THE APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S SHOWN IS AN ESTIMATED LOCATION BASED ON REFERENCES FROM PPL DRAWINGS.
8. PROPERTY BOUNDARIES AND OWNERS HAVE BEEN PROVIDED BY PPL THROUGH A GIS DATA RELEASE AGREEMENT, DATED SEPTEMBER 4, 2014.

SCALE IN FEET
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REVISION RECORD

NO	DATE	DESCRIPTION

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MONTOUR, LLC
MONTOUR STEAM ELECTRIC STATION
INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MONTOUR ASH BASIN NO. 1
MONTOUR COUNTY, PA

FINAL CONDITIONS
DRAINAGE AREA PLAN

DRAWN BY:	JSC
CHECKED BY:	DMD
PROJECT NO:	150-989.0006
APPROVED BY:	RJB *
DWG SCALE:	1" = 200'
DATE:	

FIGURE NO.:
3

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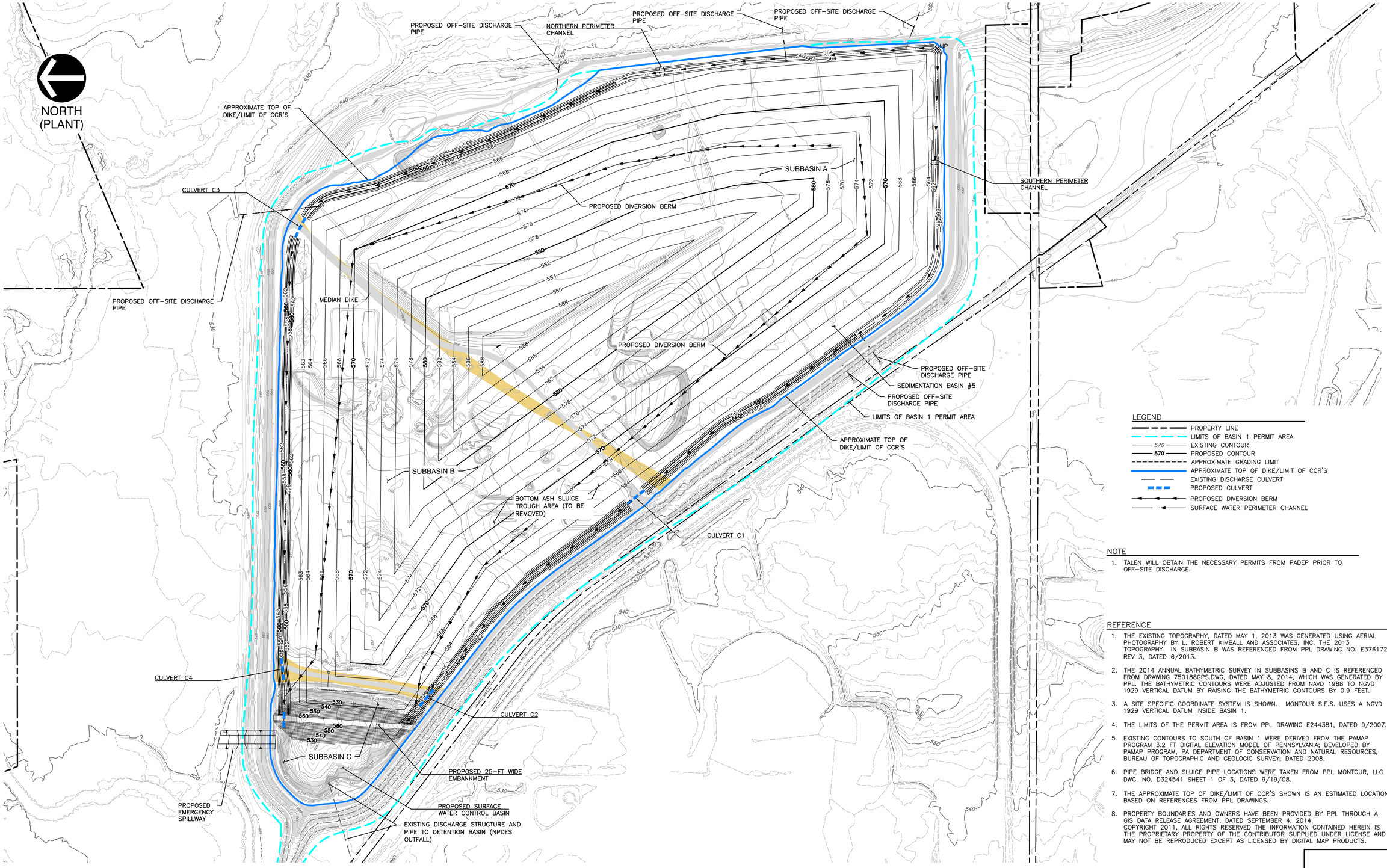

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- EXISTING DISCHARGE CULVERT
- PROPOSED CULVERT
- PROPOSED DIVERSION BERM
- SURFACE WATER PERIMETER CHANNEL

NOTE

1. TALEN WILL OBTAIN THE NECESSARY PERMITS FROM PADEP PRIOR TO OFF-SITE DISCHARGE.

REFERENCE

1. THE EXISTING TOPOGRAPHY, DATED MAY 1, 2013 WAS GENERATED USING AERIAL PHOTOGRAPHY BY L. ROBERT KIMBALL AND ASSOCIATES, INC. THE 2013 TOPOGRAPHY IN SUBBASIN B WAS REFERENCED FROM PPL DRAWING NO. E376172 REV 3, DATED 6/2013.
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INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MONTOUR ASH BASIN NO. 1
MONTOUR COUNTY, PA

PROPOSED FINAL CONDITIONS PLAN

DRAWN BY:	JSC
CHECKED BY:	DMD
DATE:	
DWG SCALE:	1" = 200'
PROJECT NO:	150-989.0006
APPROVED BY:	RJB *

FIGURE NO.: 4

NORTH (PLANT)

PERMANENT PERIMETER CHANNEL 7/10

NORTH SOIL STOCKPILE (SEE NOTE 2)

APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S

CHANNEL 8

CHANNEL 7

CHANNEL 1

CULVERT C3 10/10

CHANNEL 9

3% (MAX.)

7/10 PERMANENT PERIMETER CHANNEL

STRAWBERRY RIDGE ROAD

CHANNEL 2

ACCESS ROAD

19/13 SURFACE WATER DIVERSION BERM

LIMITS OF BASIN 1 PERMIT AREA

APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S

CHANNEL 3

CHANNEL 4

10/11 CULVERT C1

CHANNEL 10

CHANNEL 5

CHANNEL 11

INSTALL EROSION PROTECTION WHERE THE DIVERSION BERM ENTERS THE PERIMETER CHANNEL

CHANNEL 6

INSTALL EROSION PROTECTION WHERE THE DIVERSION BERM ENTERS THE PERIMETER CHANNEL

RELOCATED CULVERT C4 10/11

CULVERT OUTLET EROSION PROTECTION 11/11

10/11 RELOCATED CULVERT C2

11/11 CULVERT OUTLET EROSION PROTECTION

15/12 SEDIMENTATION POND EMBANKMENT

16/12 SUB-BASIN C DISCHARGE STRUCTURE MODIFICATIONS

EXISTING DISCHARGE STRUCTURE AND PIPE TO DETENTION BASIN (NPDES OUTFALL)

LEGEND

- PROPERTY LINE
- LIMITS OF BASIN 1 PERMIT AREA
- APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S
- 570 EXISTING CONTOUR
- 570 PROPOSED CONTOUR (TOP OF FINAL COVER)
- ACCESS ROAD
- PROPOSED CULVERT
- SEDIMENTATION POND EMBANKMENT
- SURFACE WATER PERIMETER CHANNEL
- SURFACE WATER DIVERSION BERM
- XX / XX DETAIL NO. / DRAWING NO. ON WHICH DETAIL IS CALLED OUT
- FS FILTER SOCK EROSION CONTROL

NOTE

1. THE EXISTING DISCHARGE CULVERTS IN THE SEDIMENT BASINS 2 THROUGH 5 WILL BE PLUGGED TO PREVENT OFF-SITE SURFACE WATER DISCHARGE. THE EXISTING PERIMETER DIKE WILL NOT BE IMPACTED.
2. THE NORTHERN PERIMETER CHANNEL MAY BE TEMPORARILY DIVERTED AROUND THE EXISTING NORTH SOIL STOCKPILE. ONCE THE EXISTING NORTH SOIL STOCKPILE IS RELOCATED, THE NORTHERN PERIMETER CHANNEL WILL BE CONSTRUCTED IN THE LOCATION SPECIFIED ON THIS DRAWING.
3. THE PERIMETER CHANNEL EXCAVATION SHALL NOT IMPACT THE EXISTING PERIMETER DIKE. THE PERIMETER CHANNEL SHALL BE TEMPORARY LINED WITH LOW PERMEABILITY GEOSYNTHETIC LINER.
4. CHANNEL SEGMENT IS INDICATED AT THE BEGINNING OF THE CHANNEL SEGMENT.

REFERENCE

1. THE EXISTING TOPOGRAPHY, DATED MAY 1, 2013 WAS GENERATED USING AERIAL PHOTOGRAPHY BY L. ROBERT KIMBALL AND ASSOCIATES, INC. THE 2013 TOPOGRAPHY IN SUBBASIN B WAS REFERENCED FROM PPL DRAWING NO. E376172 REV 3, DATED 6/2013.
2. THE 2014 ANNUAL BATHYMETRIC SURVEY IN SUBBASINS B AND C IS FROM DRAWING 750188GPS.DWG, DATED MAY 8, 2014, WHICH WAS GENERATED BY PPL.
3. A SITE SPECIFIC COORDINATE SYSTEM IS SHOWN. MONTOUR S.E.S. USES A NAVD 1929 VERTICAL DATUM INSIDE BASIN 1.
4. THE LIMITS OF THE PERMIT AREA IS FROM PPL DRAWING E244381, DATED 9/2007.
5. EXISTING CONTOURS TO SOUTH OF BASIN 1 WERE DERIVED FROM THE PAMAP PROGRAM 3.2 FT DIGITAL ELEVATION MODEL OF PENNSYLVANIA; DEVELOPED BY PAMAP PROGRAM, PA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY; DATED 2008.
6. PIPE BRIDGE AND SLUICE PIPE LOCATIONS WERE TAKEN FROM PPL MONTOUR, LLC DWG. NO. D324541 SHEET 1 OF 3, DATED 9/19/08.
7. THE APPROXIMATE TOP OF DIKE/LIMIT OF CCR'S SHOWN IS AN ESTIMATED LOCATION BASED ON REFERENCES FROM PPL DRAWINGS.
8. PROPERTY BOUNDARIES AND OWNERS HAVE BEEN PROVIDED BY PPL THROUGH A GIS DATA RELEASE AGREEMENT, DATED SEPTEMBER 4, 2014.

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — ANGELA M. RAMIREZ — ENGINEER — PE082317

Angela M. Ramirez

SCALE IN FEET 0 200 400

ppl

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ACCT– 103650
SCALE– 1"=200'
BY– MJI
REVIEWED: RJB

MONTOUR S.E.S.
ASH BASIN #1
MAJOR PERMIT MODIFICATION
SURFACE WATER MANAGEMENT PLAN

APPROVED: ANGELA M. RAMIREZ DATE: 10/29/14

PPL MONTOUR, LLC

PPL DRAWING NO. D377134 | SHEET NO. 5 | REV. 0

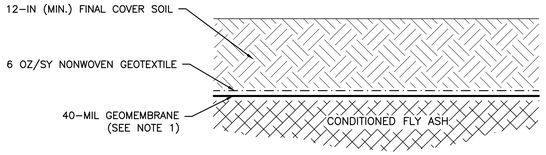
132-065-CV10-010 – SURFACE WATER MANAGEMENT PLAN.dwg

PPL CORP. FORM 41630 (4/00) Nov. 3, 2014 – 6:02 PM

REFERENCE TITLE | NUMBER | REFERENCE TITLE | NUMBER | NO. | DATE | ACCT. | REVISION | BY | REVIEWED | APPROVED | LOCATION CODES | SORTS

FRACTIONAL 0 1 2 DECIMAL 2 1 0

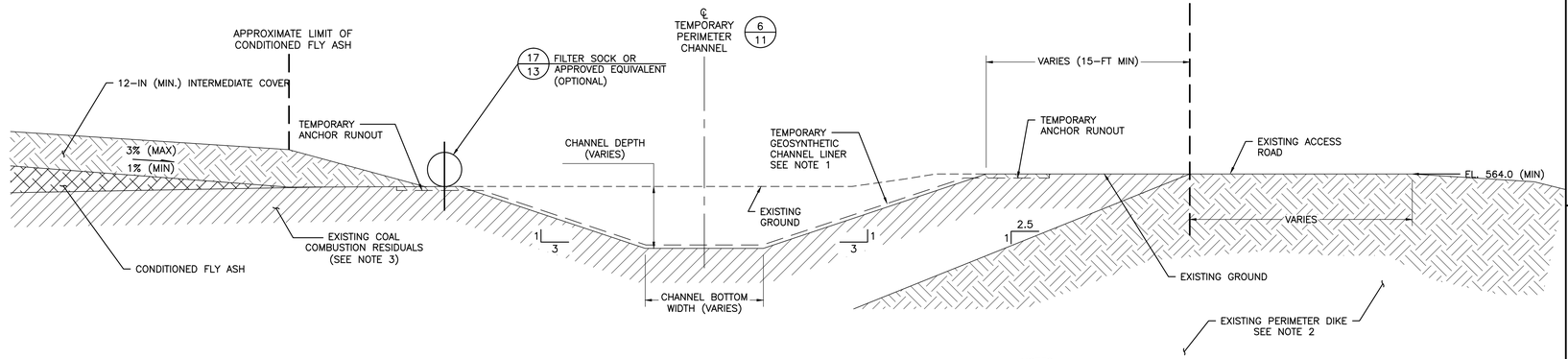
PC CAD



NOTES:

1. PRIOR TO INSTALLATION OF THE FINAL COVER SYSTEM, THE INTERMEDIATE COVER MAY BE STRIPPED AND STOCKPILED. THE GEOMEMBRANE WILL BE PLACED DIRECTLY ON THE CONDITIONED FLY ASH OR INTERMEDIATE COVER.

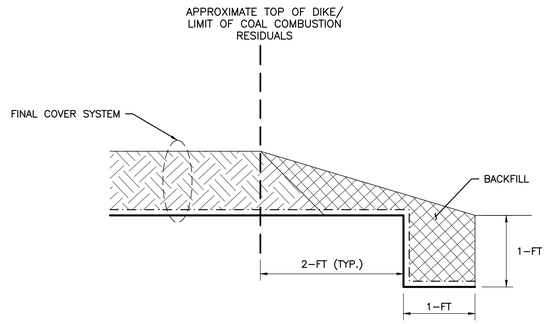
1/4,9 FINAL COVER SYSTEM
NOT TO SCALE



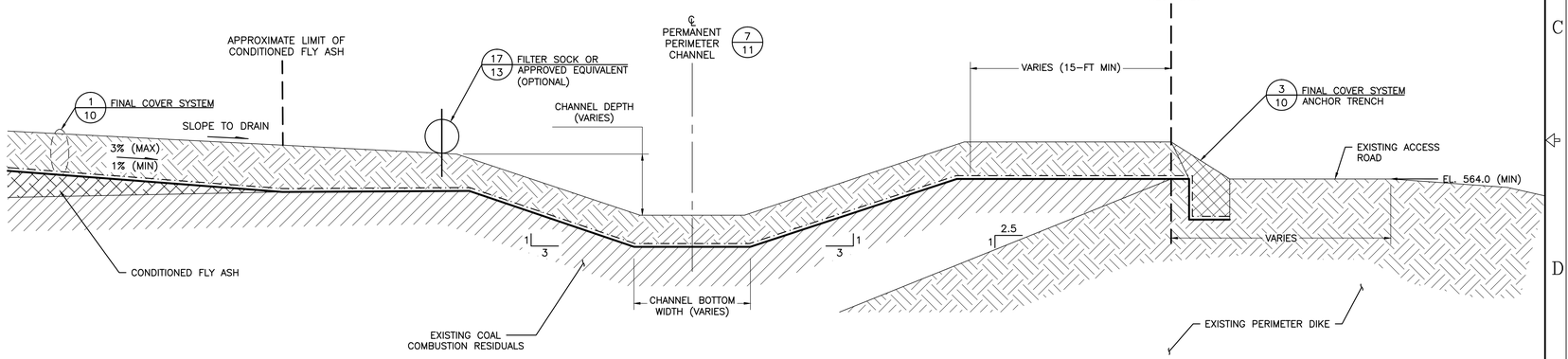
NOTES:

1. A LOW PERMEABLE GEOSYNTHETIC CHANNEL LINER WILL BE PLACED IN THE TEMPORARY CHANNELS.
2. THE PERIMETER CHANNEL CONSTRUCTION WILL NOT IMPACT THE EXISTING PERIMETER DIKE.
3. THE EXISTING COAL COMBUSTION RESIDUALS ARE COVERED WITH INTERMEDIATE COVER. THE INTERMEDIATE COVER WILL BE STRIPPED PRIOR TO PLACING CONDITIONED FLY ASH.

2/* TEMPORARY PERIMETER CHANNEL/PERIMETER DIKE/CONDITIONED FLY ASH SECTION
* 3,6,7,8
NOT TO SCALE

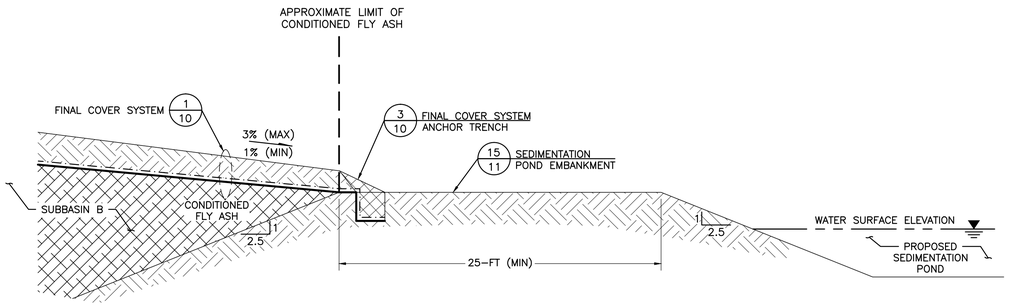


3/4,9 FINAL COVER SYSTEM ANCHOR TRENCH
NOT TO SCALE



NOTES:

1. THE FINAL COVER SYSTEM WILL BE INSTALLED THROUGH THE CHANNEL AFTER THE TEMPORARY PERIMETER CHANNEL IS REGRADED TO THE REQUIRED DIMENSIONS.



5/4,9 FINAL COVER SYSTEM TERMINATION AT SEDIMENTATION POND EMBANKMENT
NOT TO SCALE

4/4,5,9 PERMANENT PERIMETER CHANNEL/PERIMETER DIKE/CONDITIONED FLY ASH SECTION
NOT TO SCALE

LEGEND

XX/XX DETAIL NO. / DRAWING NO. ON WHICH DETAIL IS CALLED OUT

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ACCT– 103650	MONTOUR S.E.S.
SCALE– N.T.S.	ASH BASIN #1
BY– RJB	MAJOR PERMIT MODIFICATION
REVIEWED: RJB	FINAL COVER SYSTEM DETAILS
APPROVED: ANGELA M. RAMIREZ	DATE: 10/29/14
PPL DRAWING NO.: D377134	SHEET NO.: 10
	REV.: 0
	PPL MONTOUR, LLC.

132065-DETAIL SHEET 1.dwg

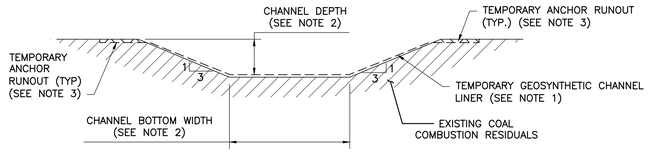
REFERENCE TITLE	NUMBER	REFERENCE TITLE	NUMBER

NO.	DATE	ACCT.	REVISION	BY	REVIEWED	APPROVED

LOCATION CODES | SORTS

FRACTIONAL 0 1 2 | DECIMAL 2 1 0

PPL CORP. FORM 41630 (4/00)
Nov. 3, 2014 – 6:04 PM
PC CAD

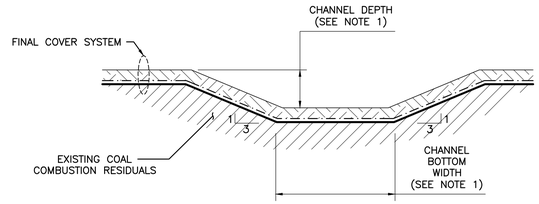


NOTES:

1. A LOW PERMEABLE GEOSYNTHETIC CHANNEL LINER WILL BE PLACED IN THE TEMPORARY CHANNELS.
2. SEE DETAIL 8 PERIMETER CHANNEL SCHEDULE OF REQUIRED DIMENSIONS.
3. ANCHOR THE TEMPORARY GEOSYNTHETIC CHANNEL LINER IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

6 / * **TEMPORARY PERIMETER CHANNEL**
NOT TO SCALE

* 3,4,5,6,7,8



NOTES:

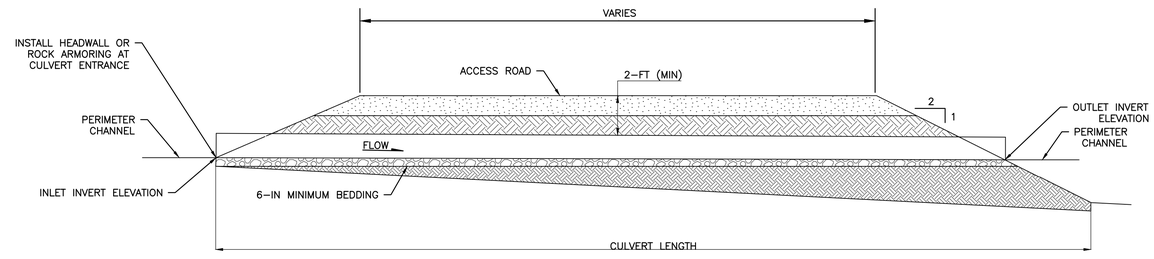
1. SEE DETAIL 8 PERIMETER CHANNEL SCHEDULE OF REQUIRED DIMENSIONS.

7 / 4,5,9 **PERMANENT PERIMETER CHANNEL**
NOT TO SCALE

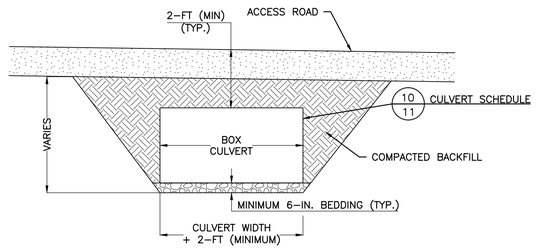
SOUTHERN PERIMETER CHANNEL							
CHANNEL	INLET ELEVATIONS		LENGTH (FT)	SLOPE (FT/FT)	DIMENSIONS		LINING
	INLET	OUTLET			BASE (FT)	DEPTH (FT)	
CH–1	561.5	560.5	1,020	0.001	12	2.5	Grass
CH–2	560.5	559.0	1,470	0.001	12	3.0	Grass
CH–3	559.0	558.8	230	0.001	12	3.5	Grass
CH–4	557.8	557.0	750	0.001	10	4.0	Grass
CH–5	557.0	556.5	510	0.001	10	4.5	Grass
CH–6	555.5	555.5	70	0.001	8	5.0	Grass

NORTHERN PERIMETER CHANNEL							
CHANNEL	INLET ELEVATIONS		LENGTH (FT)	SLOPE (FT/FT)	DIMENSIONS		LINING
	INLET	OUTLET			BASE (FT)	DEPTH (FT)	
CH–7	561.5	559.9	1,610	0.001	12	3.0	Grass
CH–8	559.9	558.4	1,480	0.001	12	3.5	Grass
CH–9	557.4	555.7	1,720	0.001	10	4.0	Grass
CH–10	555.7	555.5	240	0.001	8	4.5	Grass
CH–11	554.5	554.3	145	0.001	6	5.0	Grass

8 / 11 **PERIMETER CHANNEL SCHEDULE**
NOT TO SCALE



SECTION (TYP)



9 / * **CULVERT (TYP)**
NOT TO SCALE

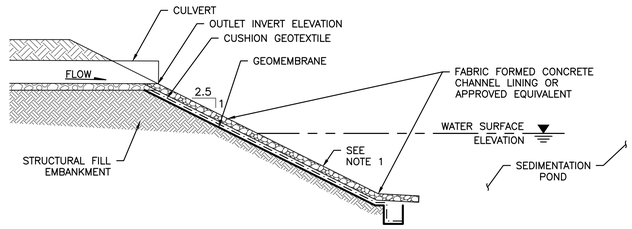
* 3,4,5,6,7,8,9

CULVERTS	INLET ELEVATIONS		LENGTH (FT)	SLOPE (FT/FT)	HEIGHT (FT)	WIDTH (FT)	QUANTITY
	INLET (FT)	OUTLET (FT)					
C1	558.8	557.8	100	0.01	3	12	1
C2	556.5	555.5	100	0.01	4	12	1
C3	558.4	557.4	100	0.01	3	12	1
C4	555.5	554.5	100	0.01	4	12	1

NOTES:

1. USE BOX CULVERT WITH DIMENSIONS PRESENTED IN SCHEDULE OR APPROVED EQUIVALENT.
2. SEE DETAIL 14 FOR THE PERMANENT CULVERT INSTALLATION DETAIL.

10 / 11 **CULVERT SCHEDULE**
NOT TO SCALE



NOTES:

1. FABRIC FORMED CONCRETE CHANNEL LINING SHALL BE CONSTRUCTED WITH A MINIMUM OF 1–FOOT DEPTH WITH 5H:1V SIDE SLOPES. LINED CHANNELS SHALL EXTEND A MINIMUM OF 10–FEET ON THE BOTTOM OF THE POND.

11 / 4,5,9 **CULVERT OUTLET EROSION PROTECTION**
NOT TO SCALE

REGISTERED PROFESSIONAL
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ENGINEER
PE082317
COMMONWEALTH OF PENNSYLVANIA

Angela M. Ramirez

LEGEND

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ACCT– 103650
SCALE– N.T.S.
BY– RJB
REVIEWED: RJB
APPROVED: ANGELA M. RAMIREZ DATE: 10/29/14

MONTOUR S.E.S.
ASH BASIN #1
MAJOR PERMIT MODIFICATION
SURFACE WATER MANAGEMENT DETAILS
SHEET 1

PPL MONTOUR, LLC.

PPL DRAWING NO. D377134 | SHEET NO. 11 | REV. 0

132065–DETAIL SHEET 2.dwg

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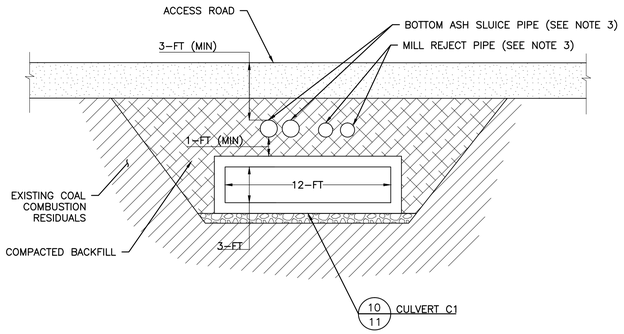
LOCATION CODES | SORTS

FRACTIONAL 0 1 2 | DECIMAL 2 1 0

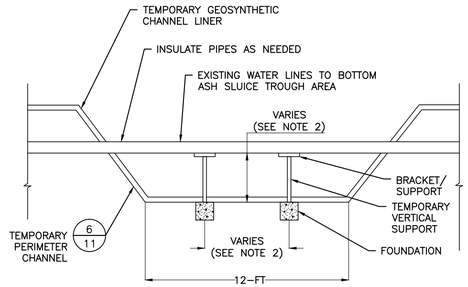


12/6,7,8 ROAD CROSSING ABOVE SLUICE PIPING AND CULVERT

NOT TO SCALE

NOTES:

1. EXISTING SLUICE PIPING SHALL BE PROTECTED THROUGHOUT CONSTRUCTION AND TEMPORARILY SUPPORTED AS NEEDED.
2. ADEQUATE COVER SHALL BE PLACED AND COMPLETED TO PROTECT THE EXISTING SLUICE PIPING.
3. THE BOTTOM ASH PIPES AND MILL REJECT PIPES ARE SHOWN SKEWED.

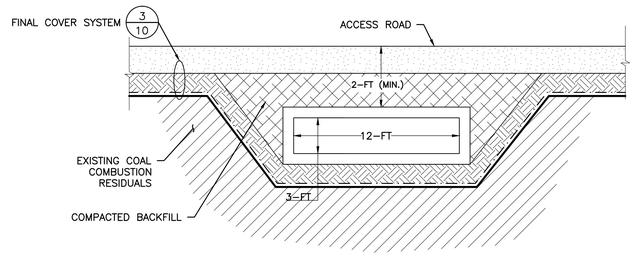


13/6,7,8 TEMPORARY WATER LINE SUPPORT AT CHANNEL CROSSING

NOT TO SCALE

NOTES:

1. TWO WATER LINES CROSS THE CHANNEL AS SHOWN IN PLAN AND MUST BE ADEQUATELY SUPPORTED.
2. THE NUMBER OF TEMPORARY VERTICAL SUPPORTS REQUIRED WILL BE DETERMINED PRIOR TO INSTALLATION.

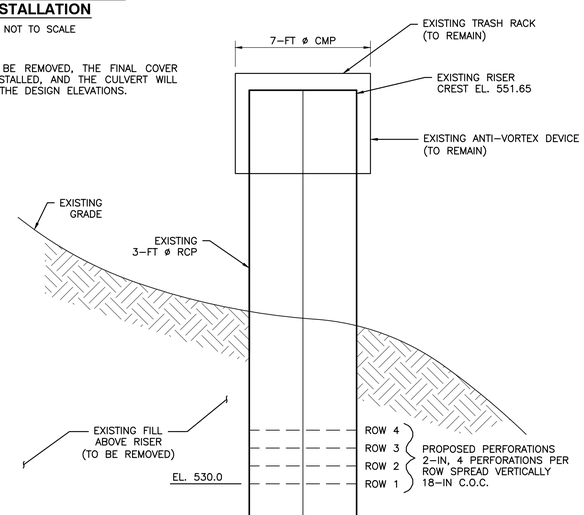


14/12 PERMANENT CULVERT INSTALLATION

NOT TO SCALE

NOTES:

1. THE CULVERT WILL BE REMOVED, THE FINAL COVER SYSTEM WILL BE INSTALLED, AND THE CULVERT WILL BE REINSTALLED AT THE DESIGN ELEVATIONS.



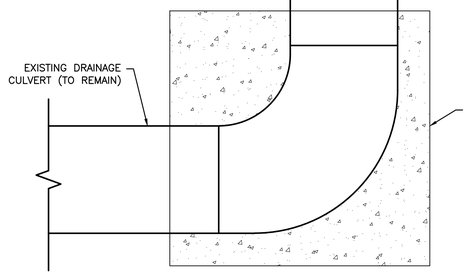
NOTES:

1. PRIOR TO STRUCTURAL FILL PLACEMENT, SUB–BASIN C WILL BE TEMPORARILY DEWATERED AND COAL COMBUSTION RESIDUALS WITHIN THE LIMITS OF THE PROPOSED SEDIMENTATION POND WILL BE REMOVED AND PLACED TO THE NORTH OF THE EMBANKMENT.
2. THE STRUCTURAL FILL WILL BE CONSTRUCTED WITH SOIL, CONDITIONED FLY ASH OR SOIL/BOTTOM ASH FINES. IF CONDITIONED FLY ASH OR SOIL/BOTTOM ASH FINES ARE USED, A GEOMEMBRANE WILL BE PLACED OVER THE EMBANKMENT.

15/* SEDIMENTATION POND EMBANKMENT

NOT TO SCALE

* 3,4,5,8,9



16/* SUBBASIN C DISCHARGE STRUCTURE MODIFICATIONS

NOT TO SCALE

* 3,4,5,8,9

LEGEND

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Angela M. Ramirez

ACCT– 103650	MONTOUR S.E.S.
SCALE– N.T.S.	ASH BASIN #1
BY– RJB	MAJOR PERMIT MODIFICATION
REVIEWED: RJB	SURFACE WATER MANAGEMENT DETAILS
	SHEET 2
APPROVED: ANGELA M. RAMIREZ DATE: 10/29/14	PPL MONTOUR, LLC
PPL DRAWING NO.: D377134	SHEET NO.: 12 REV.: 0

REFERENCE TITLE	NUMBER	REFERENCE TITLE	NUMBER	NO.	DATE	ACCT.	REVISION	BY	REVIEWED	APPROVED

LOCATION CODES — SORTS

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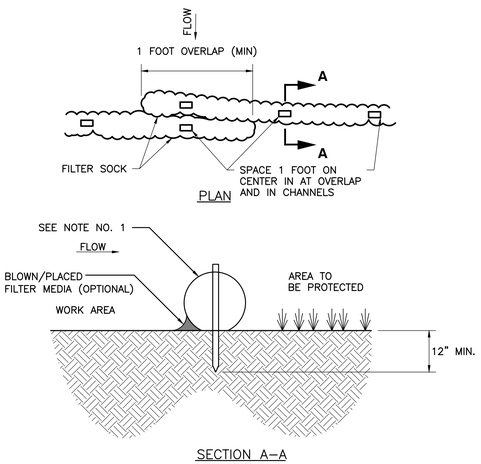
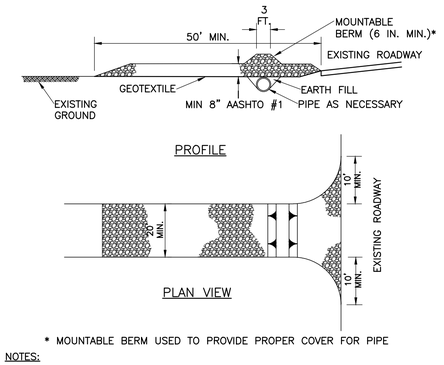


NOTES:

1. 24" COMPOST FILTER SOCK TO BE FILTREXX SILTSOXX OR APPROVED EQUIVALENT.
2. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF WHEN IT REACHES ½ THE ABOVE GROUND HEIGHT OF THE COMPOST FILTER SOCK.
3. COMPOST FILTER SOCK SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED COMPOST FILTER SOCK SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

17 / 3,4,9 FILTER SOCK EROSION CONTROL (TYP.)
NOT TO SCALE

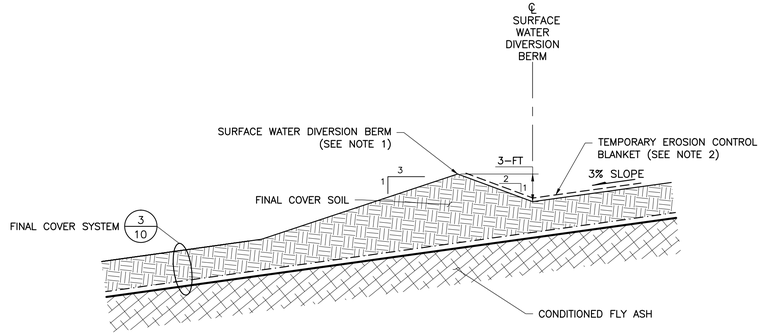


* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

NOTES:

1. REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.
2. RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.
3. MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.
4. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

18 / 9 ROCK CONSTRUCTION ENTRANCE
NOT TO SCALE



19 / 5,9 SURFACE WATER DIVERSION BERM
NOT TO SCALE

NOTES:

1. THE SURFACE WATER DIVERSION BERM SHALL BE SLOPED TO DRAIN AT A MINIMUM 0.25% SLOPE.
2. TEMPORARY EROSION CONTROL BLANKET OR APPROVED EQUIVALENT MAY BE INSTALLED IN EACH SEGMENT OF THE SURFACE WATER DIVERSION BERM. TEMPORARY EROSION CONTROL BLANKET SHALL BE INSTALLED AND ANCHORED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

LEGEND

XX / XX DETAIL NO. / DRAWING NO. ON WHICH DETAIL IS CALLED OUT

COMMONWEALTH OF PENNSYLVANIA
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ACCT– 103650	MONTOUR S.E.S.
SCALE– N.T.S.	ASH BASIN #1
BY– RJB	MAJOR PERMIT MODIFICATION
REVIEWED: RJB	E & S CONTROL DETAILS
APPROVED: ANGELA M. RAMIREZ	DATE: 10/29/14
PPL DRAWING NO.: D377134	SHEET NO.: 13
REV.: 0	PPL MONTOUR, LLC.

REFERENCE TITLE	NUMBER	REFERENCE TITLE	NUMBER

NO.	DATE	ACCT.	REVISION	BY	REVIEWED	APPROVED

LOCATION CODES | SORTS

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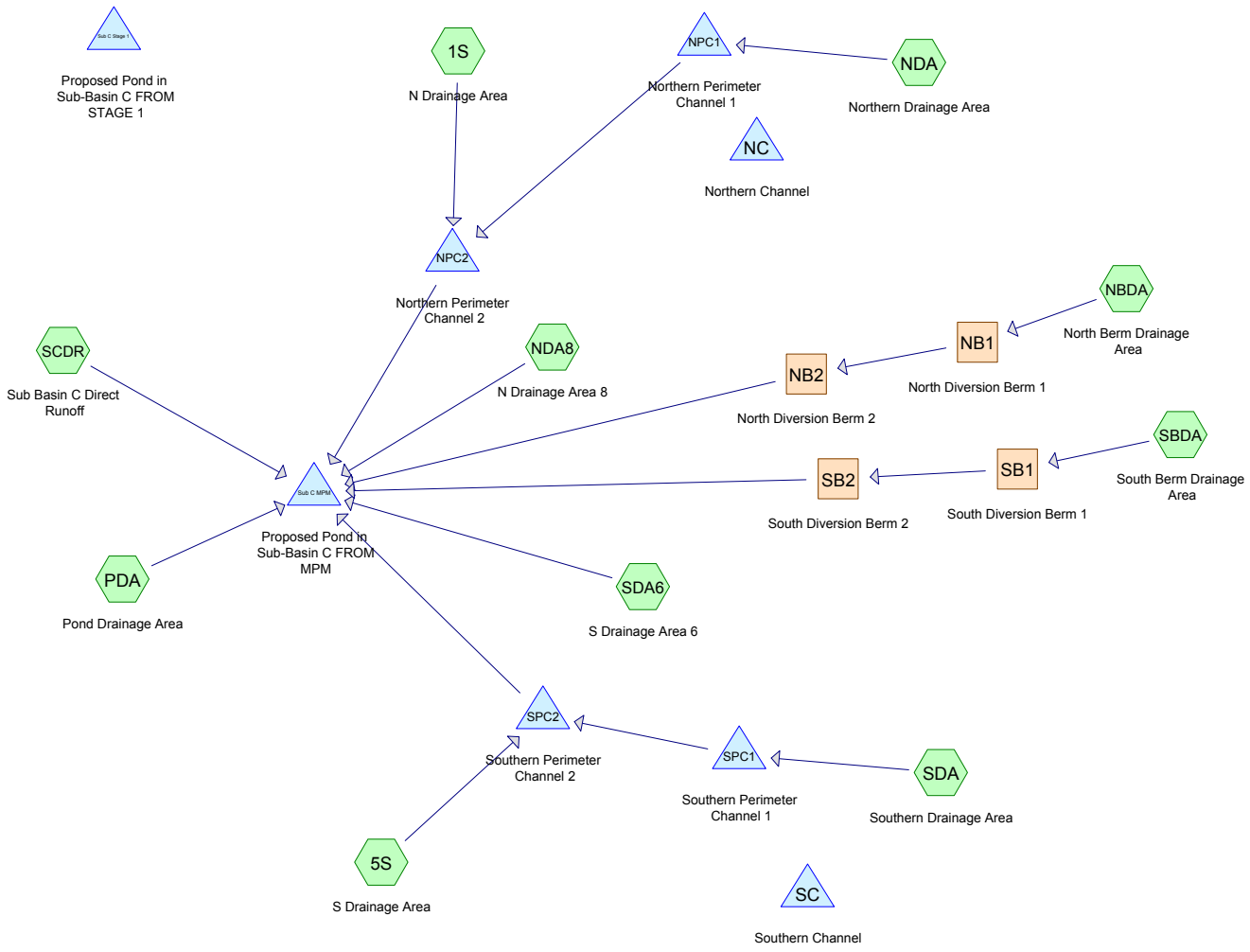
APPENDIX B

HYDROCAD MODEL



Routing Diagram for Inflow Flood Control Plan - Final Conditions
Prepared by Microsoft, Printed 10/3/2016

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.539	89	(5S)
2.974	96	(5S, NDA)
6.980	100	(SCDR)
136.958	74	>75% Grass cover, Good, HSG C (1S, 5S, NBDA, NDA, NDA8, PDA, SBDA, SDA, SDA6)
5.468	89	Gravel roads, HSG C (1S, NDA, NDA8, SDA, SDA6)
3.193	96	Gravel surface, HSG C (1S, NDA8, PDA, SDA, SDA6)
156.112	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
145.619	HSG C	1S, 5S, NBDA, NDA, NDA8, PDA, SBDA, SDA, SDA6
0.000	HSG D	
10.493	Other	5S, NDA, SCDR
156.112		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	10.493	10.493		5S, NDA, SCDR
0.000	0.000	136.958	0.000	0.000	136.958	>75% Grass cover, Good	1S, 5S, NBDA, NDA, NDA8, PDA, SBDA, SDA, SDA6
0.000	0.000	5.468	0.000	0.000	5.468	Gravel roads	1S, NDA, NDA8, SDA, SDA6
0.000	0.000	3.193	0.000	0.000	3.193	Gravel surface	1S, NDA8, PDA, SDA, SDA6
0.000	**0.000**	**145.619**	**0.000**	**10.493**	**156.112**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	NC	558.41	557.41	100.0	0.0100	0.013	144.0	36.0	0.0
2	NPC1	558.41	557.41	100.0	0.0100	0.013	144.0	36.0	0.0
3	NPC1	558.22	556.06	108.0	0.0200	0.013	15.0	0.0	0.0
4	NPC1	558.49	558.22	54.0	0.0050	0.013	15.0	0.0	0.0
5	NPC1	558.59	558.49	10.0	0.0100	0.013	15.0	0.0	0.0
6	NPC1	557.00	556.03	97.0	0.0100	0.013	24.0	0.0	0.0
7	NPC1	558.98	557.00	46.0	0.0430	0.013	24.0	0.0	0.0
8	NPC1	559.08	558.98	10.0	0.0100	0.013	24.0	0.0	0.0
9	NPC1	557.74	554.88	136.0	0.0210	0.013	24.0	0.0	0.0
10	NPC1	561.00	560.90	10.0	0.0100	0.013	24.0	0.0	0.0
11	NPC1	529.56	528.67	111.0	0.0080	0.013	24.0	0.0	0.0
12	NPC1	533.48	529.56	40.0	0.0980	0.013	24.0	0.0	0.0
13	NPC1	555.00	533.48	75.0	0.2869	0.013	24.0	0.0	0.0
14	NPC1	555.44	555.00	87.0	0.0051	0.013	24.0	0.0	0.0
15	NPC1	557.62	555.44	66.0	0.0330	0.013	24.0	0.0	0.0
16	NPC1	557.71	557.62	16.0	0.0056	0.013	24.0	0.0	0.0
17	NPC2	555.45	554.45	100.0	0.0100	0.013	144.0	48.0	0.0
18	SC	558.78	557.78	100.0	0.0100	0.013	144.0	36.0	0.0
19	SPC1	558.78	557.78	100.0	0.0100	0.013	144.0	36.0	0.0
20	SPC1	562.79	562.69	10.0	0.0100	0.013	24.0	0.0	0.0
21	SPC1	562.69	560.59	60.0	0.0350	0.013	24.0	0.0	0.0
22	SPC1	560.59	534.20	58.0	0.4550	0.013	24.0	0.0	0.0
23	SPC1	534.20	533.40	23.0	0.0348	0.013	24.0	0.0	0.0
24	SPC2	556.52	555.52	100.0	0.0100	0.013	144.0	48.0	0.0
25	Sub C MPM	513.75	509.00	500.0	0.0095	0.015	36.0	0.0	0.0
26	Sub C MPM	515.17	513.75	480.0	0.0030	0.015	36.0	0.0	0.0
27	Sub C MPM	516.50	515.17	400.0	0.0033	0.015	36.0	0.0	0.0
28	Sub C Stage 1	513.75	509.00	500.0	0.0095	0.015	36.0	0.0	0.0
29	Sub C Stage 1	515.17	513.75	480.0	0.0030	0.015	36.0	0.0	0.0
30	Sub C Stage 1	516.50	515.17	400.0	0.0033	0.015	36.0	0.0	0.0

Time span=0.05-24.00 hrs, dt=0.05 hrs, 480 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: N Drainage Area Runoff Area=11.510 ac 0.00% Impervious Runoff Depth>28.96"
Flow Length=264' Slope=0.0300 '/' Tc=14.0 min CN=76 Runoff=49.59 cfs 27.773 af

Subcatchment5S: S Drainage Area Runoff Area=6.490 ac 0.00% Impervious Runoff Depth>29.13"
Flow Length=197' Slope=0.0300 '/' Tc=13.6 min CN=77 Runoff=28.00 cfs 15.756 af

SubcatchmentNBDA: North Berm Runoff Area=41.760 ac 0.00% Impervious Runoff Depth>28.58"
Flow Length=732' Slope=0.0300 '/' Tc=16.8 min CN=74 Runoff=179.36 cfs 99.474 af

SubcatchmentNDA: Northern Drainage Runoff Area=27.267 ac 0.00% Impervious Runoff Depth>29.13"
Flow Length=405' Slope=0.0300 '/' Tc=14.8 min CN=77 Runoff=117.63 cfs 66.188 af

SubcatchmentNDA8: N Drainage Area 8 Runoff Area=0.624 ac 0.00% Impervious Runoff Depth>29.31"
Flow Length=134' Slope=0.0300 '/' Tc=13.2 min CN=78 Runoff=2.70 cfs 1.524 af

SubcatchmentPDA: Pond Drainage Area Runoff Area=2.920 ac 0.00% Impervious Runoff Depth>28.77"
Flow Length=500' Slope=0.0300 '/' Tc=15.4 min CN=75 Runoff=12.56 cfs 7.001 af

SubcatchmentSBDA: South Berm Runoff Area=38.550 ac 0.00% Impervious Runoff Depth>28.58"
Flow Length=749' Slope=0.0300 '/' Tc=16.9 min CN=74 Runoff=165.58 cfs 91.827 af

SubcatchmentSCDR: Sub Basin C Runoff Area=6.980 ac 100.00% Impervious Runoff Depth>32.39"
Flow Length=1' Tc=0.0 min CN=100 Runoff=30.55 cfs 18.841 af

SubcatchmentSDA: Southern Drainage Runoff Area=19.561 ac 0.00% Impervious Runoff Depth>29.30"
Flow Length=340' Slope=0.0300 '/' Tc=14.4 min CN=78 Runoff=84.49 cfs 47.766 af

SubcatchmentSDA6: S Drainage Area 6 Runoff Area=0.450 ac 0.00% Impervious Runoff Depth>29.65"
Flow Length=71' Slope=0.0300 '/' Tc=9.9 min CN=80 Runoff=1.95 cfs 1.112 af

Reach NB1: North Diversion Berm 1 Avg. Flow Depth=2.02' Max Vel=2.48 fps Inflow=179.36 cfs 99.474 af
n=0.030 L=4,332.0' S=0.0025 '/' Capacity=513.09 cfs Outflow=179.03 cfs 98.731 af

Reach NB2: North Diversion Berm 2 Avg. Flow Depth=1.19' Max Vel=7.17 fps Inflow=179.03 cfs 98.731 af
n=0.030 L=193.0' S=0.0423 '/' Capacity=2,111.35 cfs Outflow=179.03 cfs 98.719 af

Reach SB1: South Diversion Berm 1 Avg. Flow Depth=1.96' Max Vel=2.43 fps Inflow=165.58 cfs 91.827 af
n=0.030 L=3,507.0' S=0.0025 '/' Capacity=513.17 cfs Outflow=165.33 cfs 91.260 af

Reach SB2: South Diversion Berm 2 Avg. Flow Depth=1.07' Max Vel=8.11 fps Inflow=165.33 cfs 91.260 af
n=0.030 L=133.0' S=0.0619 '/' Capacity=2,552.71 cfs Outflow=165.33 cfs 91.253 af

Pond NC: Northern Channel Peak Elev=0.00' Storage=0 cf
144.0" x 36.0" Box Culvert n=0.013 L=100.0' S=0.0100 '/' Primary=0.00 cfs 0.000 af

Pond NPC1: Northern Perimeter Peak Elev=563.04' Storage=207,341 cf Inflow=117.63 cfs 66.188 af
Primary=101.85 cfs 42.309 af Secondary=66.03 cfs 23.880 af Outflow=117.71 cfs 66.190 af

Pond NPC2: Northern Perimeter Channel Peak Elev=562.93' Storage=9.998 af Inflow=148.59 cfs 70.082 af
144.0" x 48.0" Box Culvert n=0.013 L=100.0' S=0.0100 '/' Outflow=144.93 cfs 69.982 af

Pond SC: Southern Channel Peak Elev=0.00' Storage=0 cf
144.0" x 36.0" Box Culvert n=0.013 L=100.0' S=0.0100 '/' Primary=0.00 cfs 0.000 af

Pond SPC1: Southern Perimeter Peak Elev=563.27' Storage=186,542 cf Inflow=84.49 cfs 47.766 af
Primary=82.72 cfs 47.479 af Secondary=1.92 cfs 0.286 af Outflow=84.61 cfs 47.765 af

Pond SPC2: Southern Perimeter Channel Peak Elev=562.98' Storage=5.710 af Inflow=110.03 cfs 63.235 af
144.0" x 48.0" Box Culvert n=0.013 L=100.0' S=0.0100 '/' Outflow=112.83 cfs 63.125 af

Pond Sub C MPM: Proposed Pond in Peak Elev=562.69' Storage=82.301 af Inflow=601.62 cfs 352.768 af
Primary=95.97 cfs 137.823 af Secondary=505.06 cfs 163.803 af Outflow=601.03 cfs 301.626 af

Pond Sub C Stage 1: Proposed Pond in Sub-Basin C FROM STAGE 1 Peak Elev=0.00' Storage=0.000 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af

Total Runoff Area = 156.112 ac Runoff Volume = 377.263 af Average Runoff Depth = 29.00"
95.53% Pervious = 149.132 ac 4.47% Impervious = 6.980 ac

Summary for Subcatchment 1S: N Drainage Area

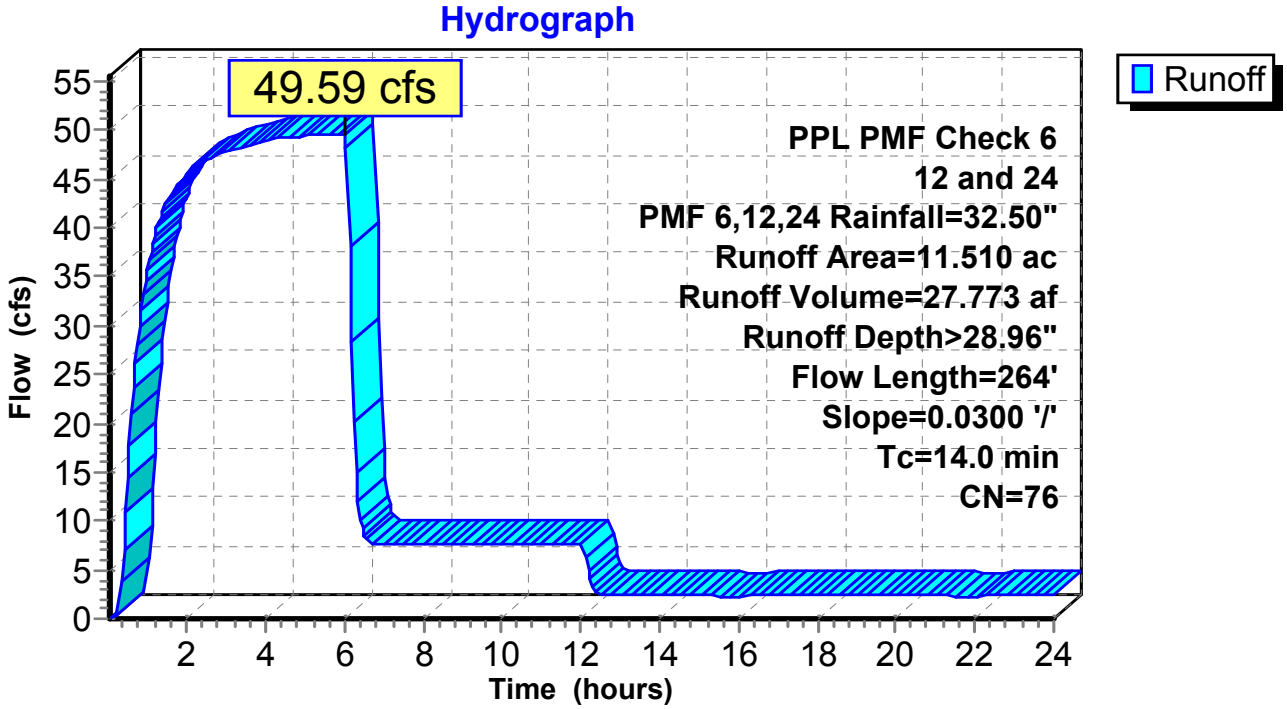
Runoff = 49.59 cfs @ 6.00 hrs, Volume= 27.773 af, Depth>28.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
0.699	89	Gravel roads, HSG C
0.699	96	Gravel surface, HSG C
10.112	74	>75% Grass cover, Good, HSG C
11.510	76	Weighted Average
11.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
1.0	164	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	264	Total			

Subcatchment 1S: N Drainage Area



Summary for Subcatchment 5S: S Drainage Area

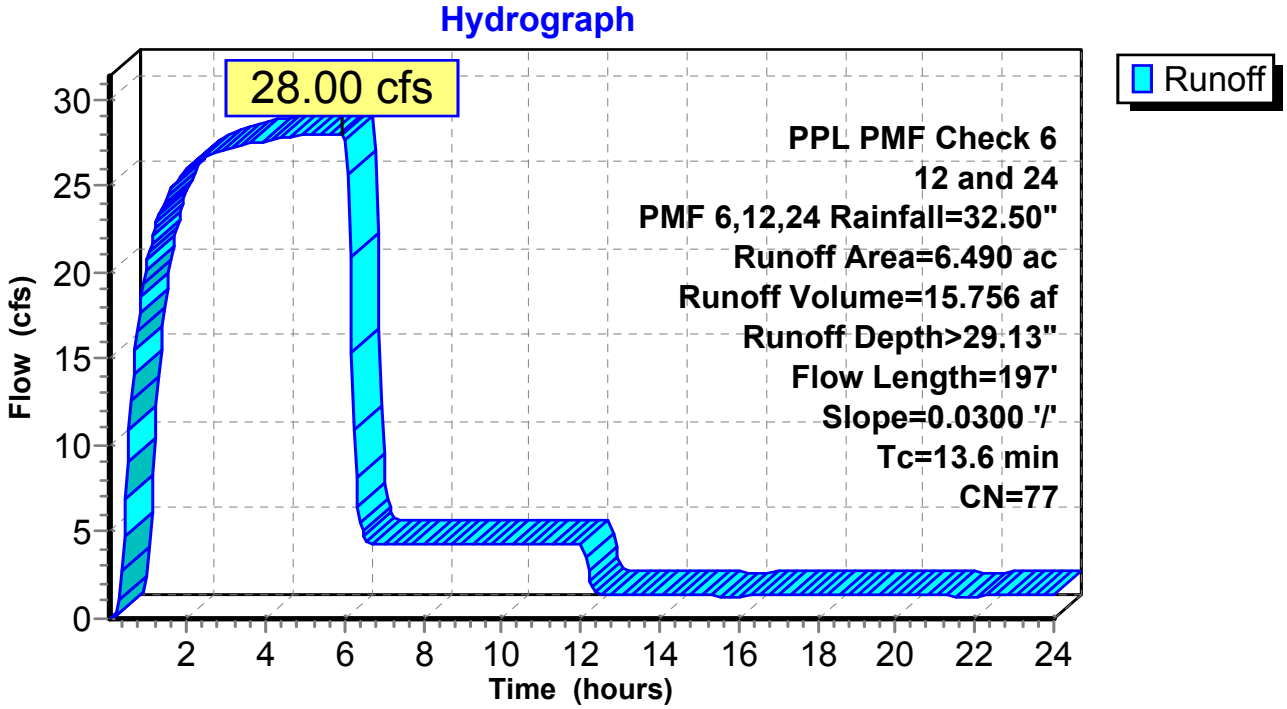
Runoff = 28.00 cfs @ 5.96 hrs, Volume= 15.756 af, Depth>29.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

	Area (ac)	CN	Description
	5.412	74	>75% Grass cover, Good, HSG C
*	0.539	89	
*	0.539	96	
	6.490	77	Weighted Average
	6.490		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
0.6	97	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	197	Total			

Subcatchment 5S: S Drainage Area



Summary for Subcatchment NBDA: North Berm Drainage Area

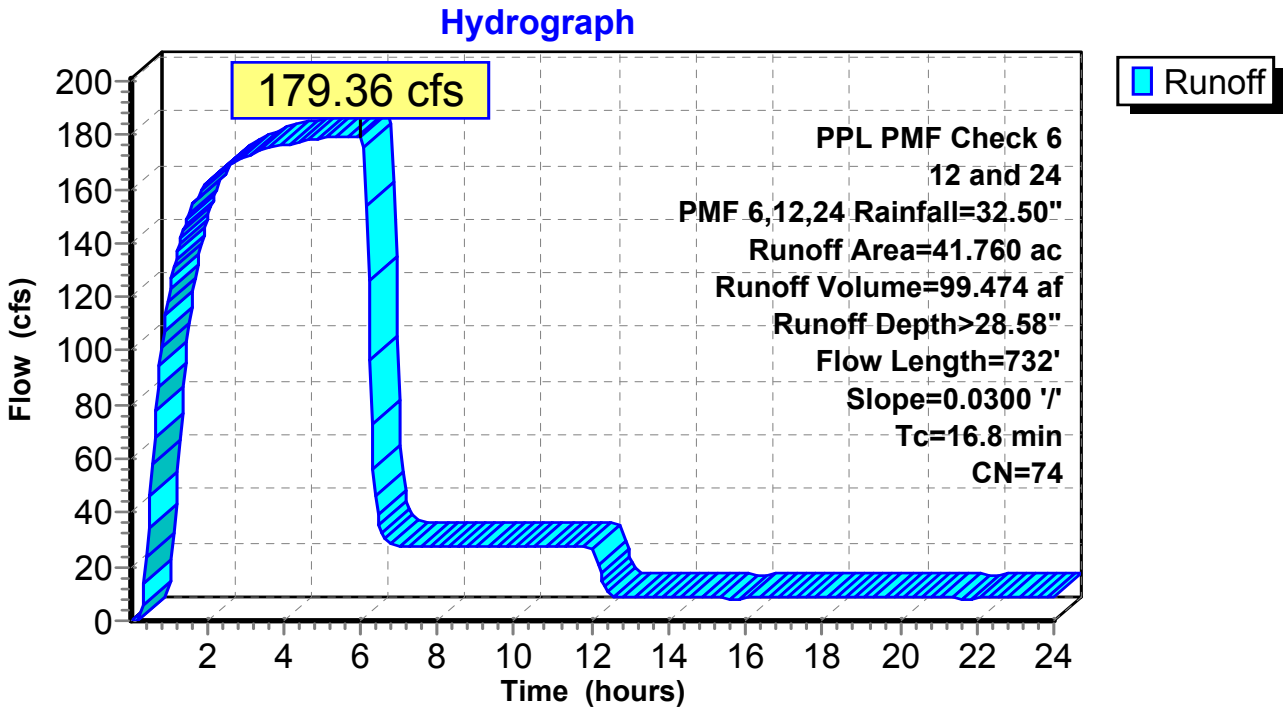
Runoff = 179.36 cfs @ 6.00 hrs, Volume= 99.474 af, Depth>28.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
41.760	74	>75% Grass cover, Good, HSG C
41.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.80"
3.8	632	0.0300	2.79		**Shallow Concentrated Flow, Shallow Flow** Unpaved Kv= 16.1 fps
16.8	732	Total			

Subcatchment NBDA: North Berm Drainage Area



Summary for Subcatchment NDA: Northern Drainage Area

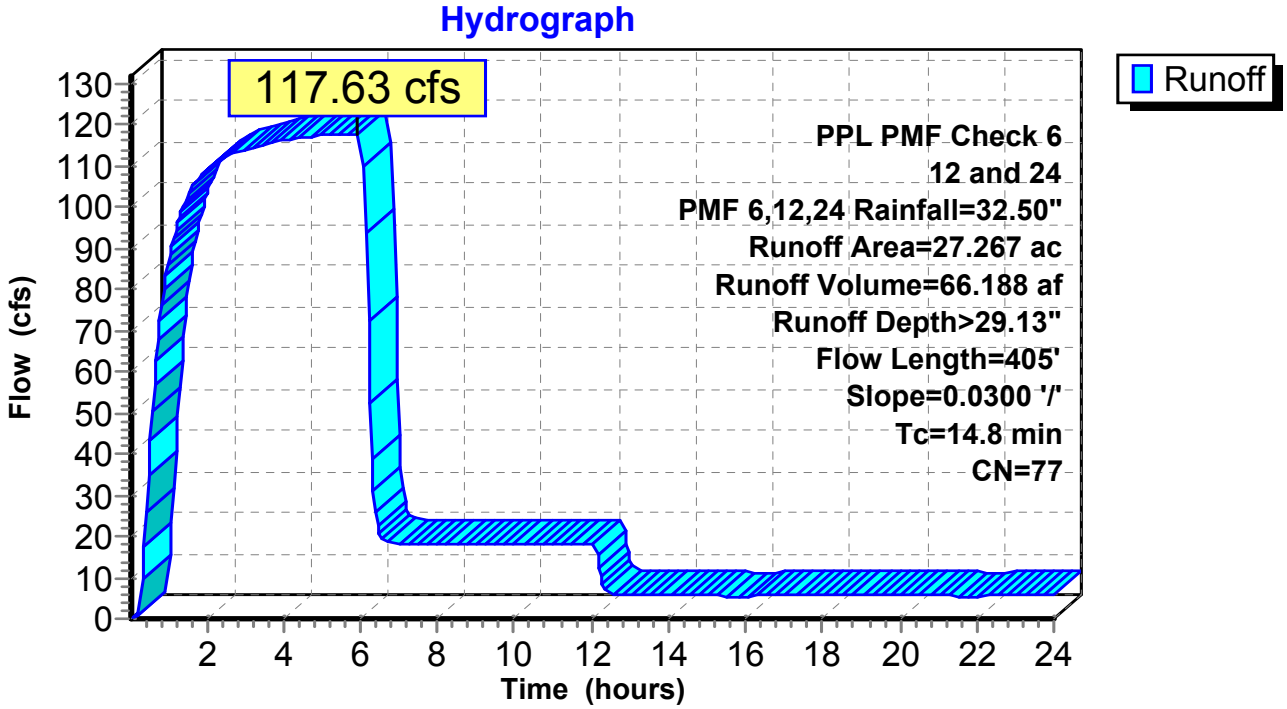
Runoff = 117.63 cfs @ 5.95 hrs, Volume= 66.188 af, Depth>29.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

	Area (ac)	CN	Description
	2.435	89	Gravel roads, HSG C
	22.397	74	>75% Grass cover, Good, HSG C
*	2.435	96	
	27.267	77	Weighted Average
	27.267		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
1.8	305	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.8	405	Total			

Subcatchment NDA: Northern Drainage Area



Summary for Subcatchment NDA8: N Drainage Area 8

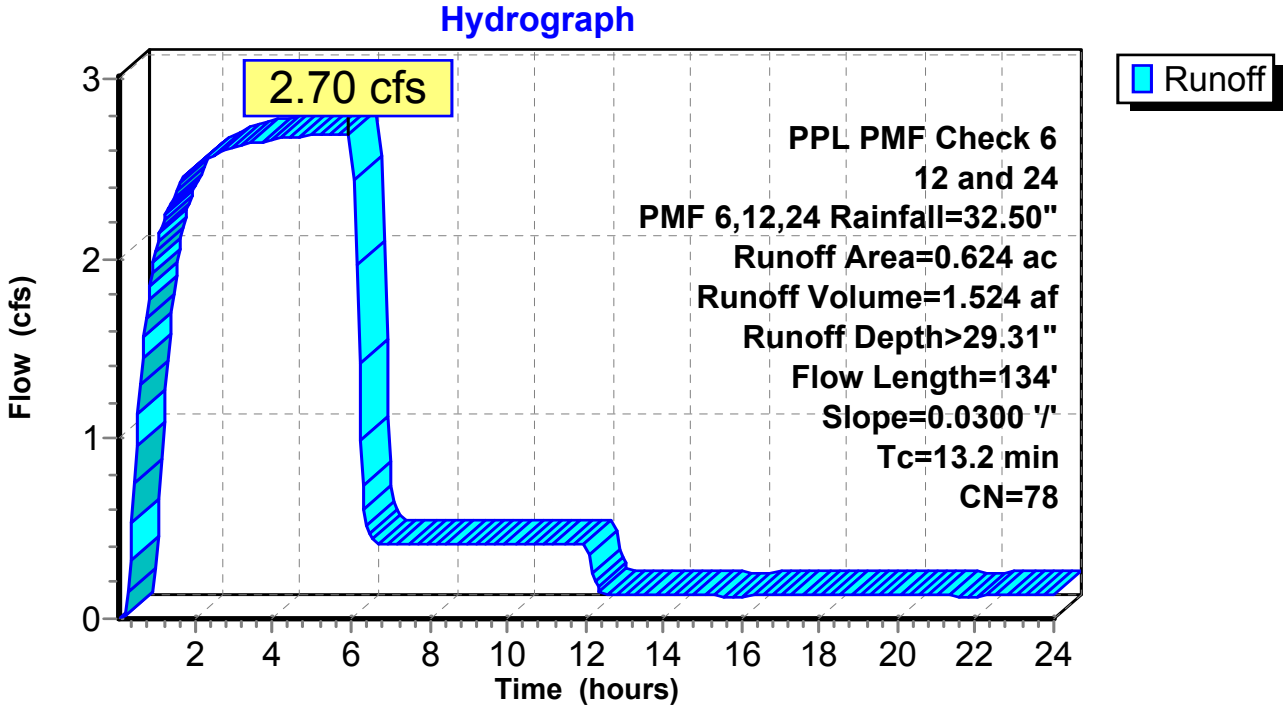
Runoff = 2.70 cfs @ 5.95 hrs, Volume= 1.524 af, Depth>29.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
0.486	74	>75% Grass cover, Good, HSG C
0.069	96	Gravel surface, HSG C
0.069	89	Gravel roads, HSG C
0.624	78	Weighted Average
0.624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
0.2	34	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.2	134	Total			

Subcatchment NDA8: N Drainage Area 8



Summary for Subcatchment PDA: Pond Drainage Area

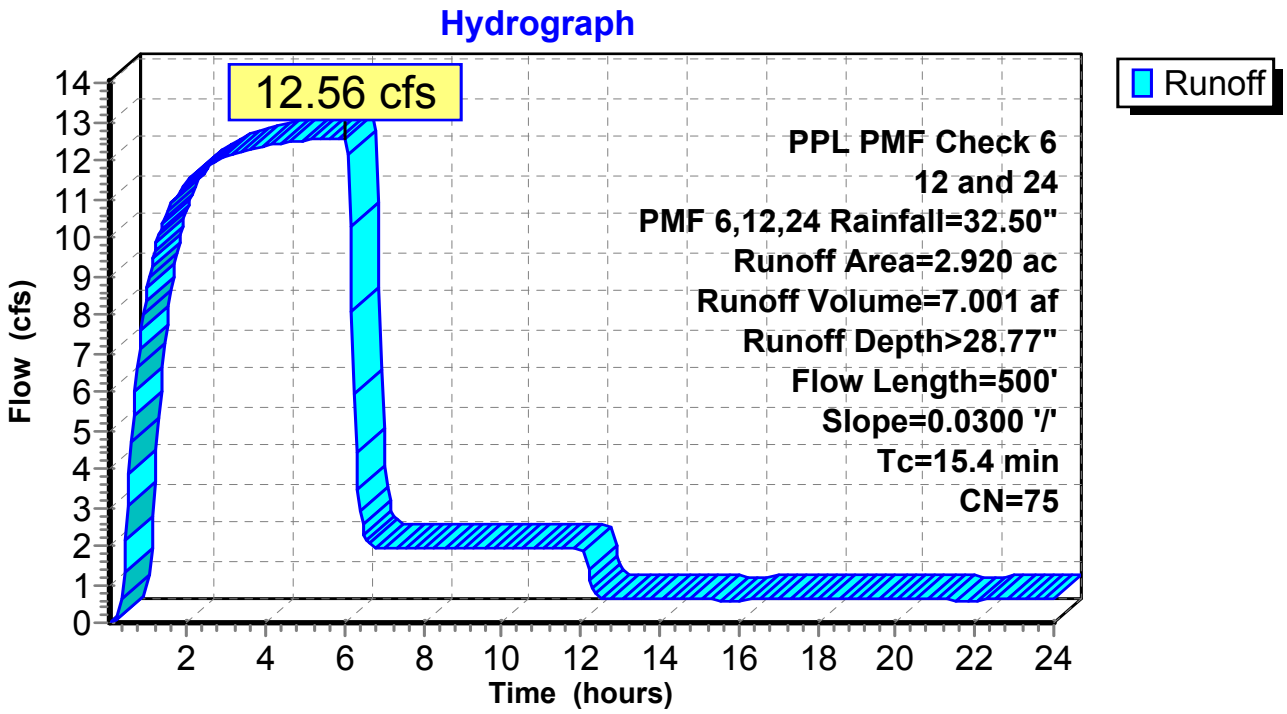
Runoff = 12.56 cfs @ 6.00 hrs, Volume= 7.001 af, Depth>28.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
2.760	74	>75% Grass cover, Good, HSG C
0.160	96	Gravel surface, HSG C
2.920	75	Weighted Average
2.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
2.4	400	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.4	500	Total			

Subcatchment PDA: Pond Drainage Area



Summary for Subcatchment SBDA: South Berm Drainage Area

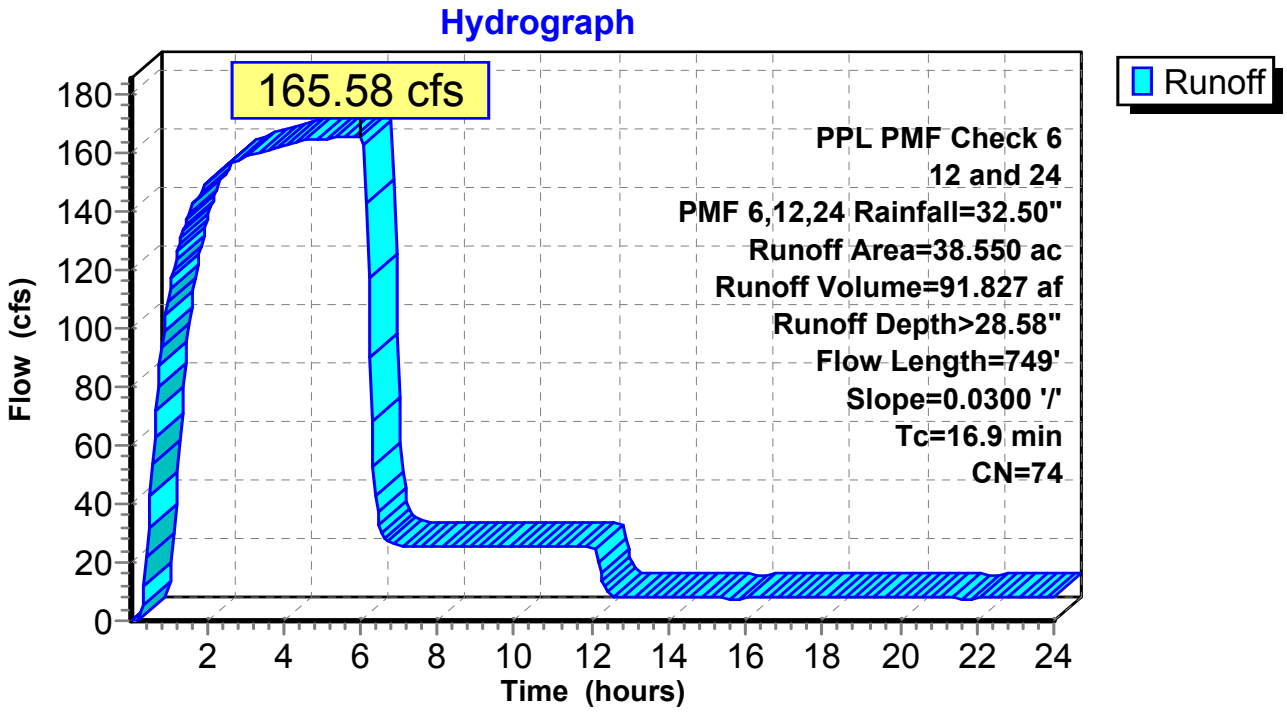
Runoff = 165.58 cfs @ 6.00 hrs, Volume= 91.827 af, Depth>28.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
38.550	74	>75% Grass cover, Good, HSG C
38.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 2.80"
3.9	649	0.0300	2.79		**Shallow Concentrated Flow, Shallow Flow** Unpaved Kv= 16.1 fps
16.9	749	Total			

Subcatchment SBDA: South Berm Drainage Area



Summary for Subcatchment SCDR: Sub Basin C Direct Runoff

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

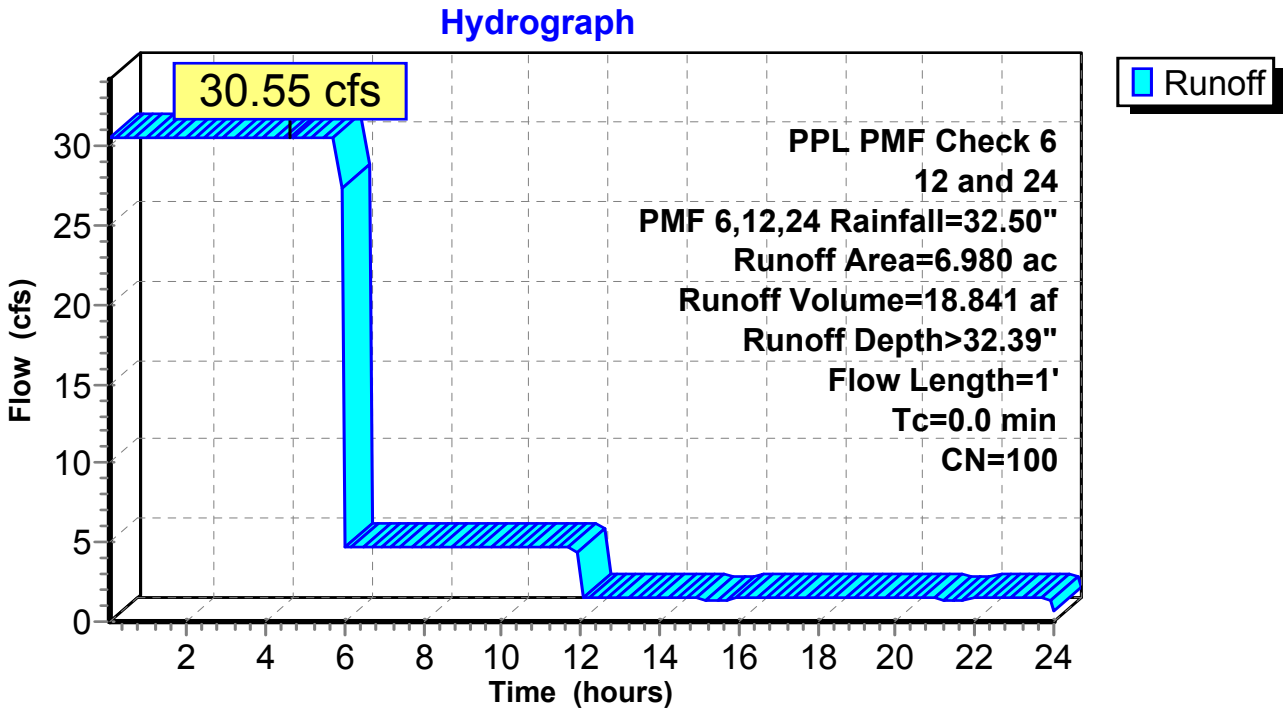
Runoff = 30.55 cfs @ 4.60 hrs, Volume= 18.841 af, Depth>32.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

	Area (ac)	CN	Description
*	6.980	100	
	6.980		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	1		5.67		**Lake or Reservoir,** Mean Depth= 1.00'

Subcatchment SCDR: Sub Basin C Direct Runoff



Summary for Subcatchment SDA: Southern Drainage Area

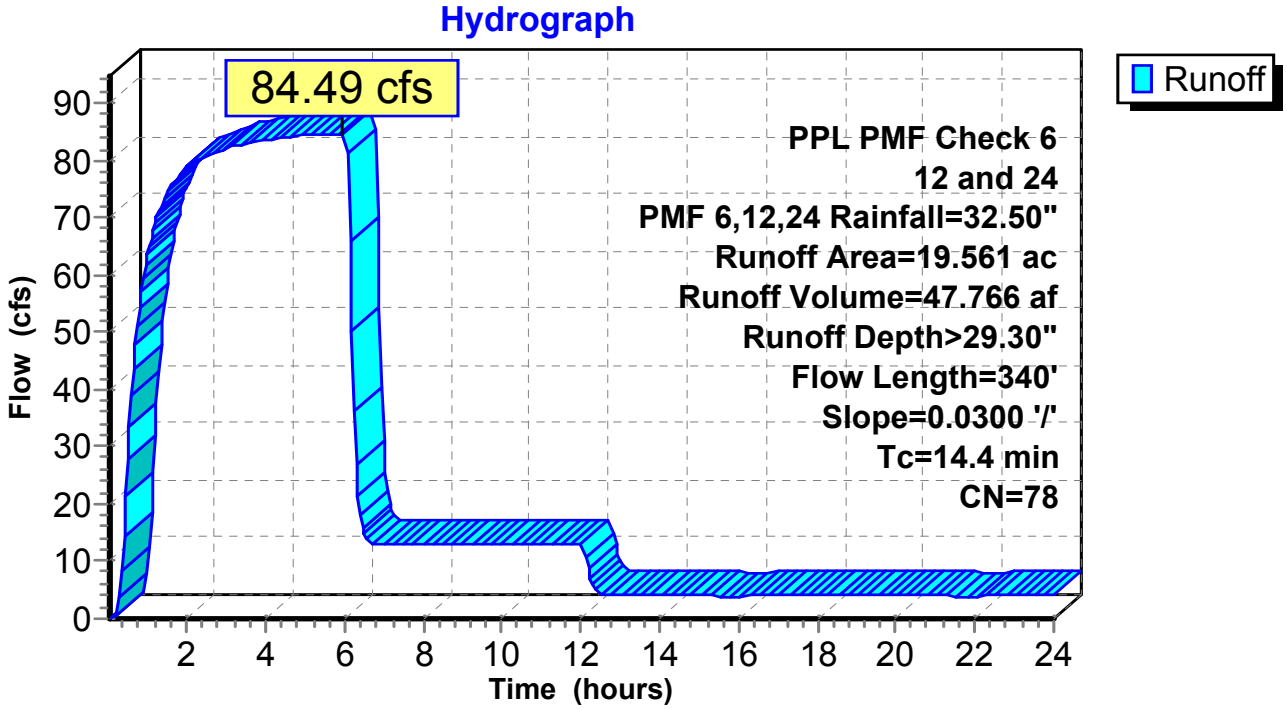
Runoff = 84.49 cfs @ 5.95 hrs, Volume= 47.766 af, Depth>29.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
15.187	74	>75% Grass cover, Good, HSG C
2.187	89	Gravel roads, HSG C
2.187	96	Gravel surface, HSG C
19.561	78	Weighted Average
19.561		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0300	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
1.4	240	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	340	Total			

Subcatchment SDA: Southern Drainage Area



Summary for Subcatchment SDA6: S Drainage Area 6

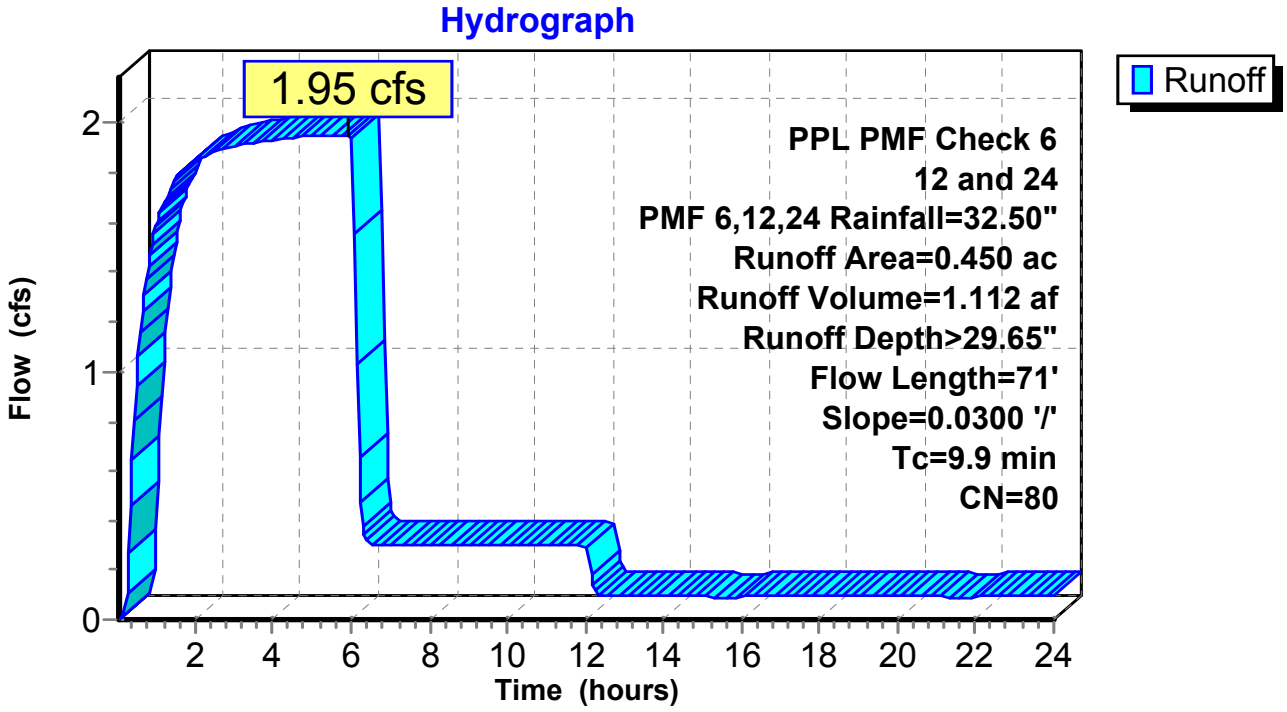
Runoff = 1.95 cfs @ 5.95 hrs, Volume= 1.112 af, Depth>29.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs
PPL PMF Check 6, 12 and 24 PMF 6,12,24 Rainfall=32.50"

Area (ac)	CN	Description
0.294	74	>75% Grass cover, Good, HSG C
0.078	96	Gravel surface, HSG C
0.078	89	Gravel roads, HSG C
0.450	80	Weighted Average
0.450		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	71	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"

Subcatchment SDA6: S Drainage Area 6



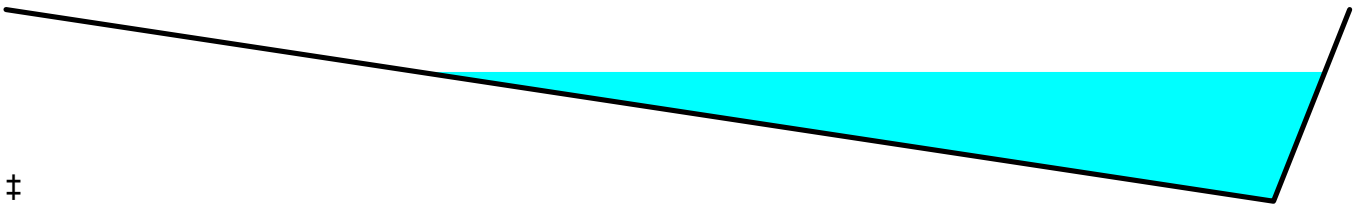
Summary for Reach NB1: North Diversion Berm 1

Inflow Area = 41.760 ac, 0.00% Impervious, Inflow Depth > 28.58" for PMF 6,12,24 event
Inflow = 179.36 cfs @ 6.00 hrs, Volume= 99.474 af
Outflow = 179.03 cfs @ 6.01 hrs, Volume= 98.731 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 2.48 fps, Min. Travel Time= 29.1 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 46.0 min

Peak Storage= 312,397 cf @ 6.01 hrs
Average Depth at Peak Storage= 2.02'
Bank-Full Depth= 3.00' Flow Area= 158.8 sf, Capacity= 513.09 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 33.3 2.0 '/' Top Width= 105.90'
Length= 4,332.0' Slope= 0.0025 '/'
Inlet Invert= 575.00', Outlet Invert= 564.17'



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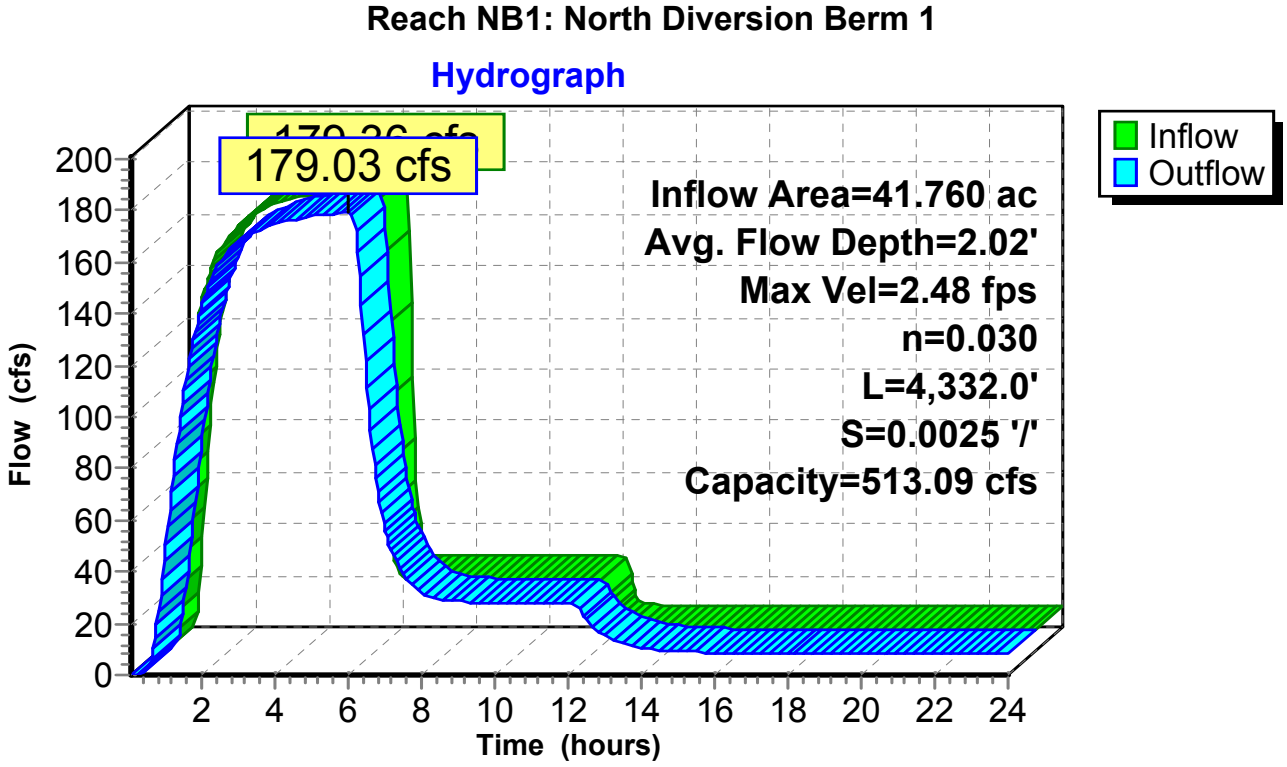
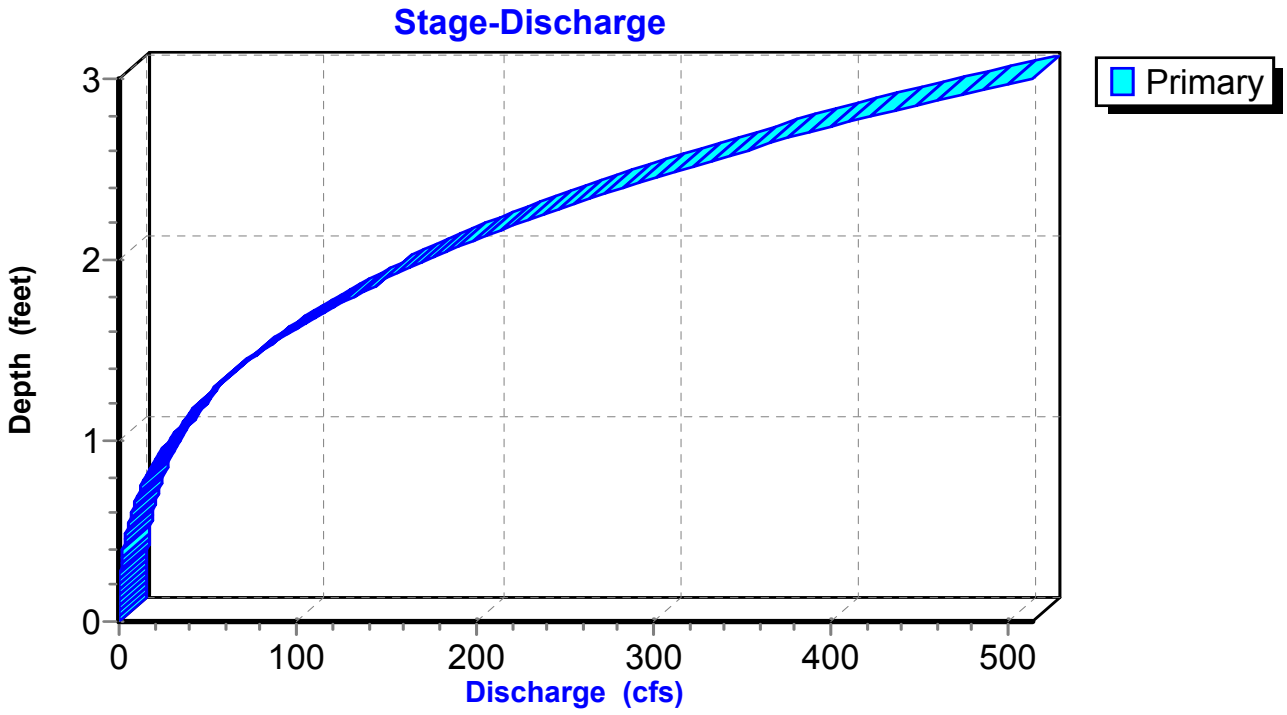


Reach NB1: North Diversion Berm 1



Summary for Reach NB2: North Diversion Berm 2

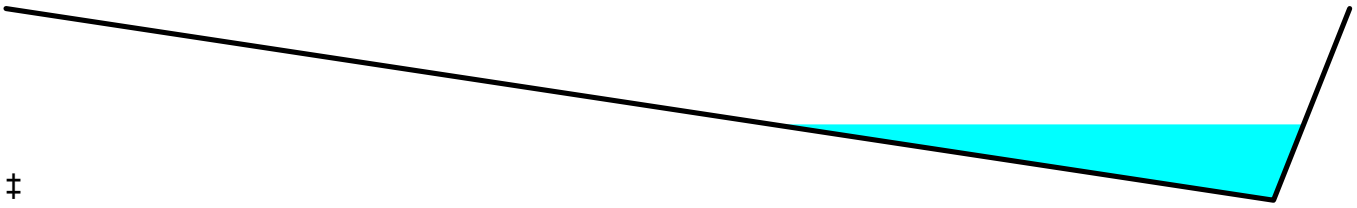
[61] Hint: Exceeded Reach NB1 outlet invert by 1.19' @ 6.00 hrs

Inflow Area = 41.760 ac, 0.00% Impervious, Inflow Depth > 28.37" for PMF 6,12,24 event
Inflow = 179.03 cfs @ 6.01 hrs, Volume= 98.731 af
Outflow = 179.03 cfs @ 6.02 hrs, Volume= 98.719 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.17 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 4.54 fps, Avg. Travel Time= 0.7 min

Peak Storage= 4,817 cf @ 6.02 hrs
Average Depth at Peak Storage= 1.19'
Bank-Full Depth= 3.00' Flow Area= 158.8 sf, Capacity= 2,111.35 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 33.3 2.0 '/' Top Width= 105.90'
Length= 193.0' Slope= 0.0423 '/'
Inlet Invert= 564.17', Outlet Invert= 556.00'



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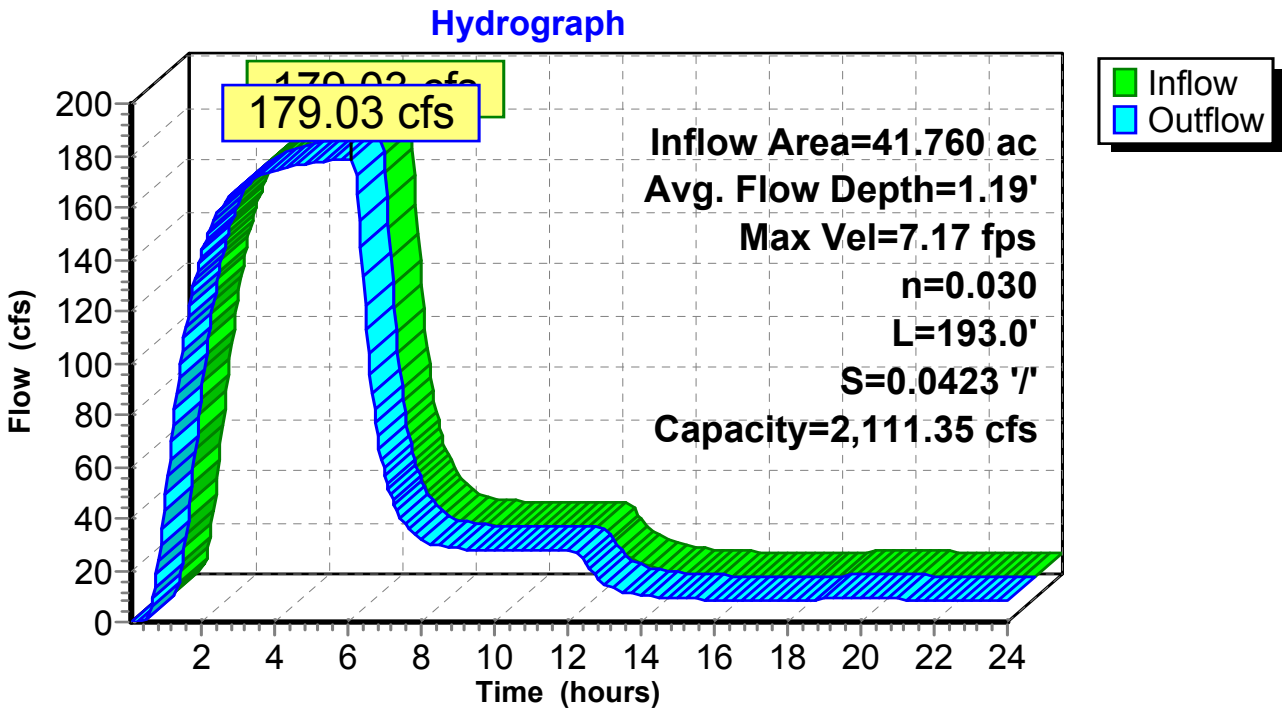
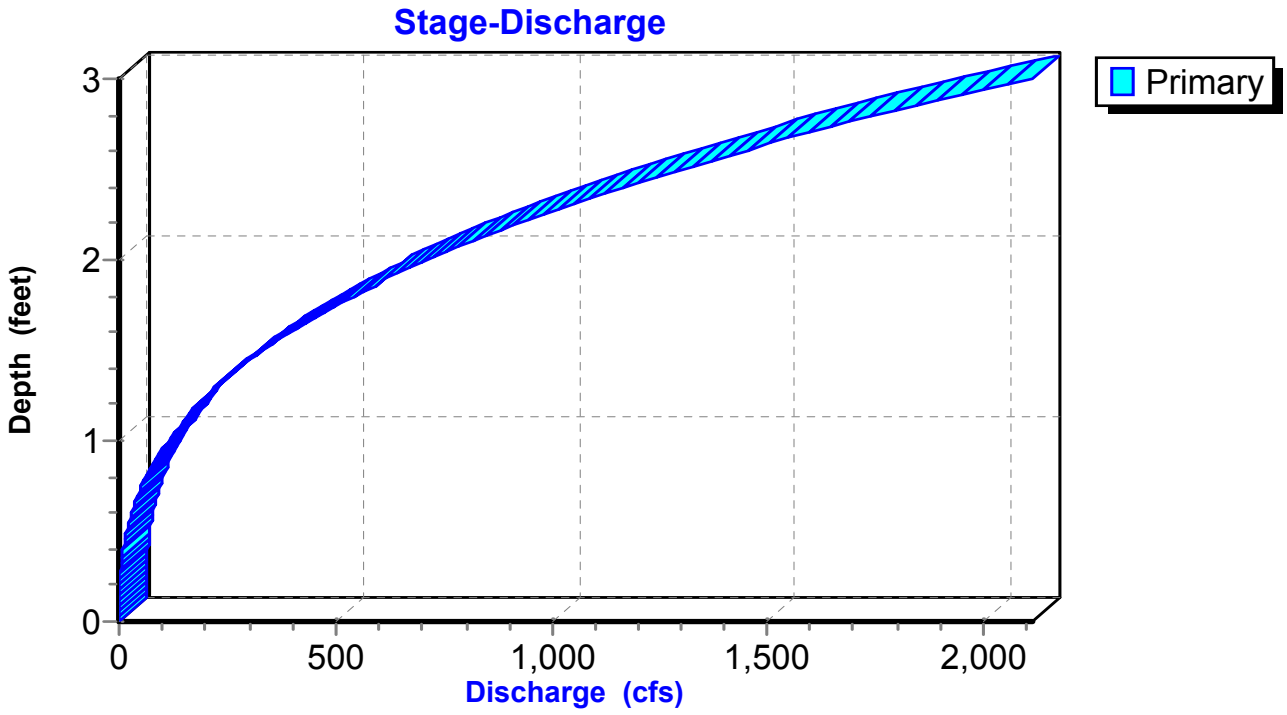


Reach NB2: North Diversion Berm 2



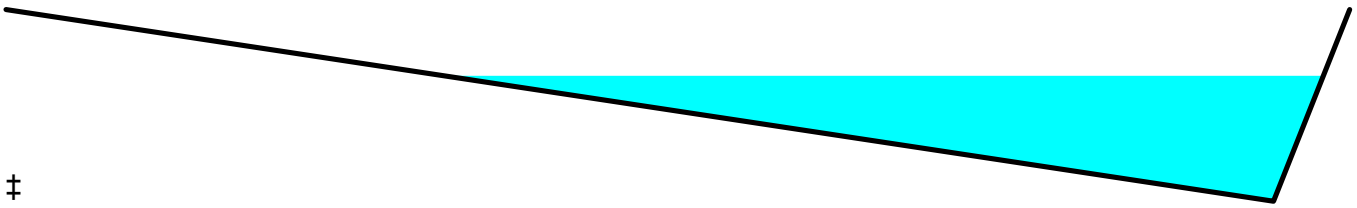
Summary for Reach SB1: South Diversion Berm 1

Inflow Area = 38.550 ac, 0.00% Impervious, Inflow Depth > 28.58" for PMF 6,12,24 event
Inflow = 165.58 cfs @ 6.00 hrs, Volume= 91.827 af
Outflow = 165.33 cfs @ 6.01 hrs, Volume= 91.260 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 2.43 fps, Min. Travel Time= 24.0 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 38.1 min

Peak Storage= 238,219 cf @ 6.01 hrs
Average Depth at Peak Storage= 1.96'
Bank-Full Depth= 3.00' Flow Area= 158.8 sf, Capacity= 513.17 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 33.3 2.0 '/' Top Width= 105.90'
Length= 3,507.0' Slope= 0.0025 '/'
Inlet Invert= 573.00', Outlet Invert= 564.23'



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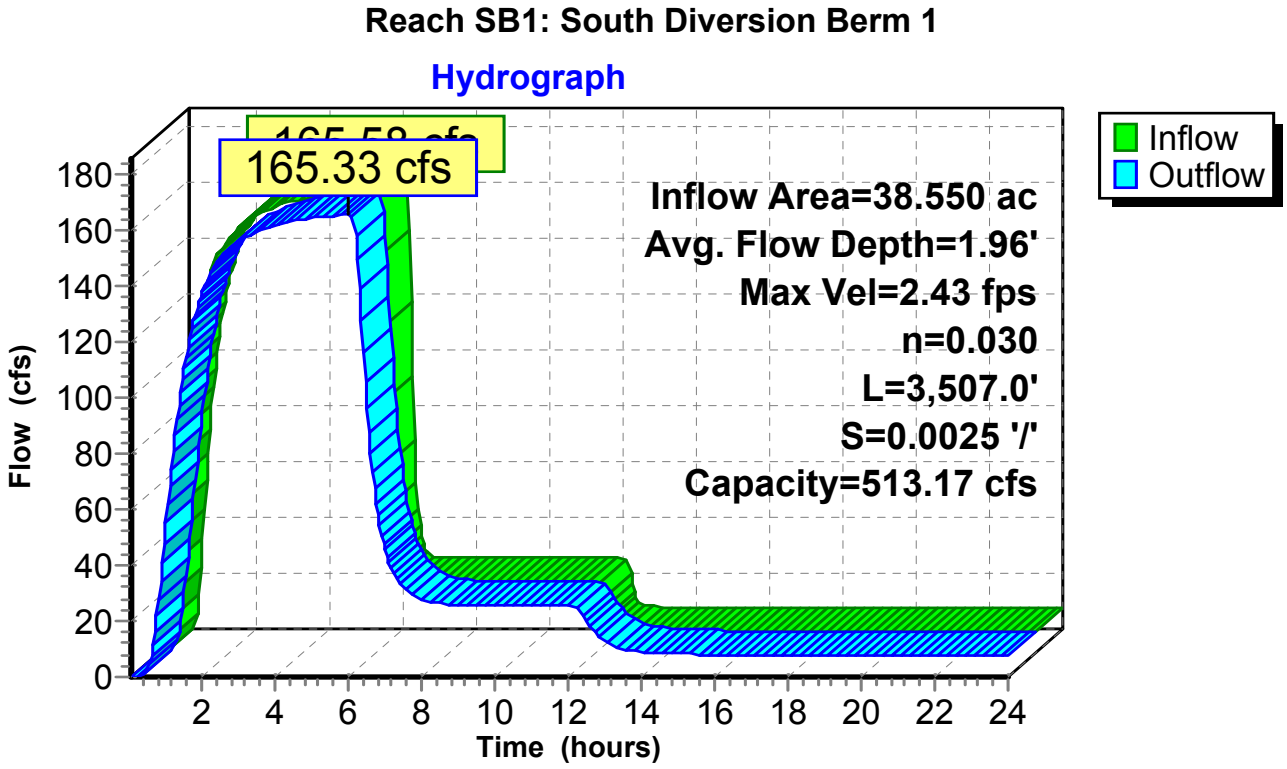
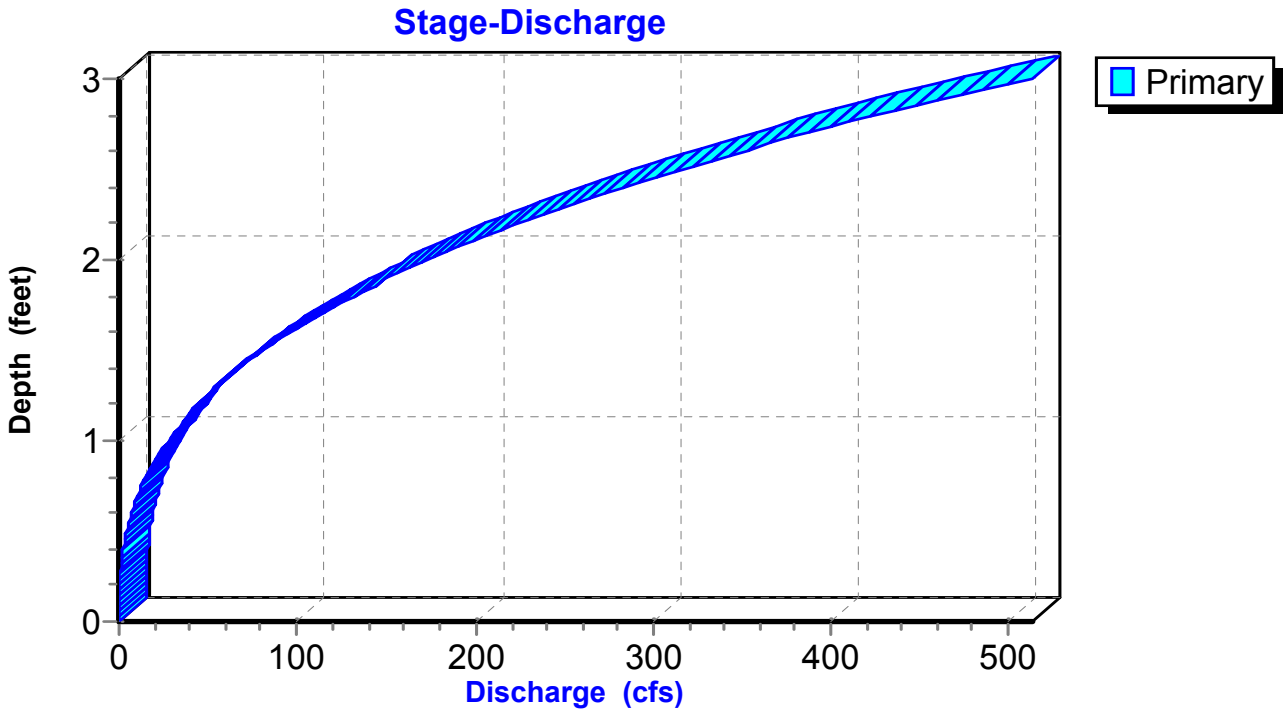


Reach SB1: South Diversion Berm 1



Summary for Reach SB2: South Diversion Berm 2

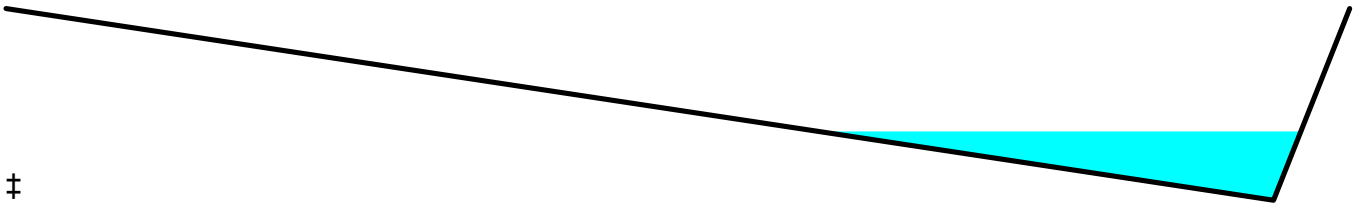
[61] Hint: Exceeded Reach SB1 outlet invert by 1.07' @ 6.00 hrs

Inflow Area = 38.550 ac, 0.00% Impervious, Inflow Depth > 28.41" for PMF 6,12,24 event
Inflow = 165.33 cfs @ 6.01 hrs, Volume= 91.260 af
Outflow = 165.33 cfs @ 6.01 hrs, Volume= 91.253 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 8.11 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 5.12 fps, Avg. Travel Time= 0.4 min

Peak Storage= 2,712 cf @ 6.01 hrs
Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 3.00' Flow Area= 158.8 sf, Capacity= 2,552.71 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 33.3 2.0 '/' Top Width= 105.90'
Length= 133.0' Slope= 0.0619 '/'
Inlet Invert= 564.23', Outlet Invert= 556.00'



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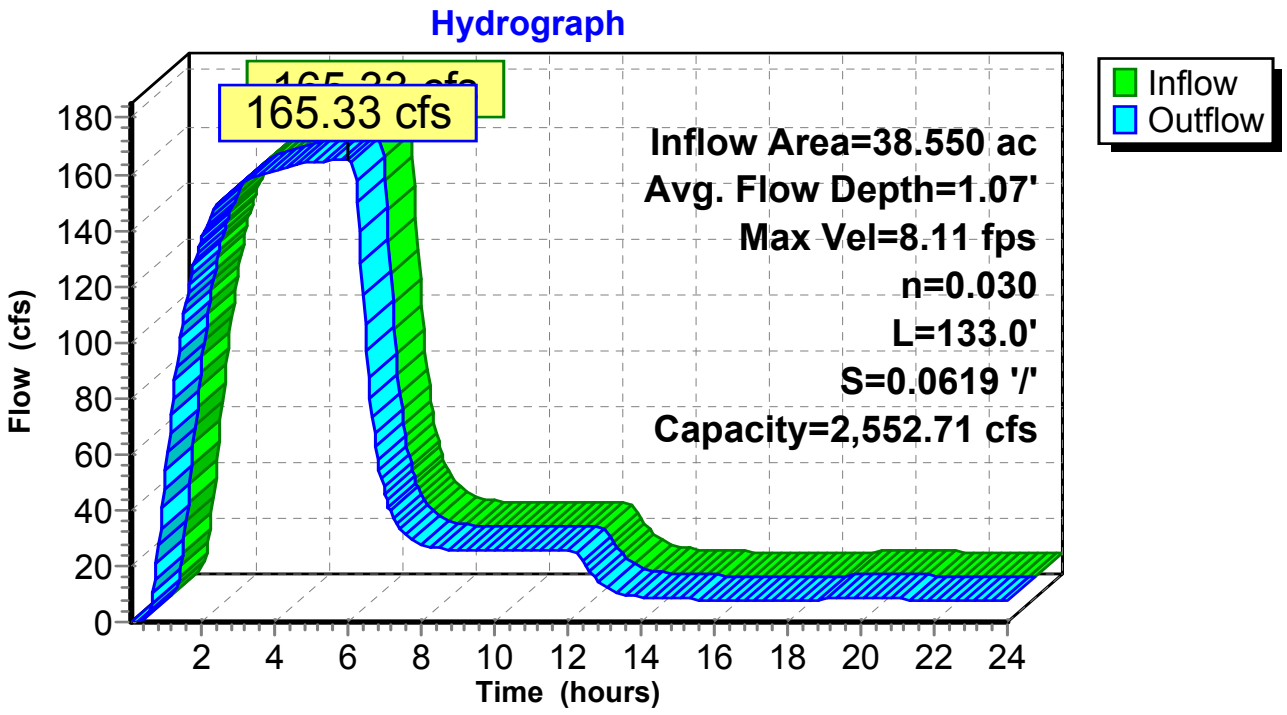
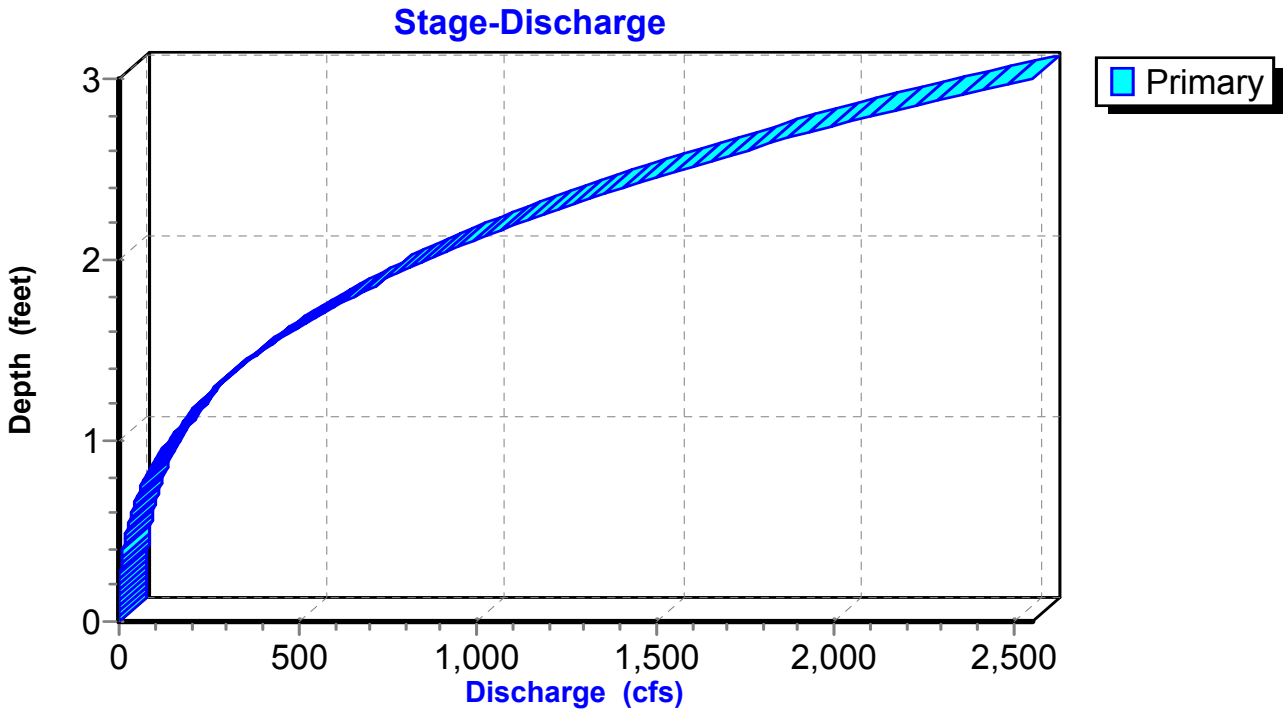


Reach SB2: South Diversion Berm 2



Summary for Pond NC: Northern Channel

[43] Hint: Has no inflow (Outflow=Zero)

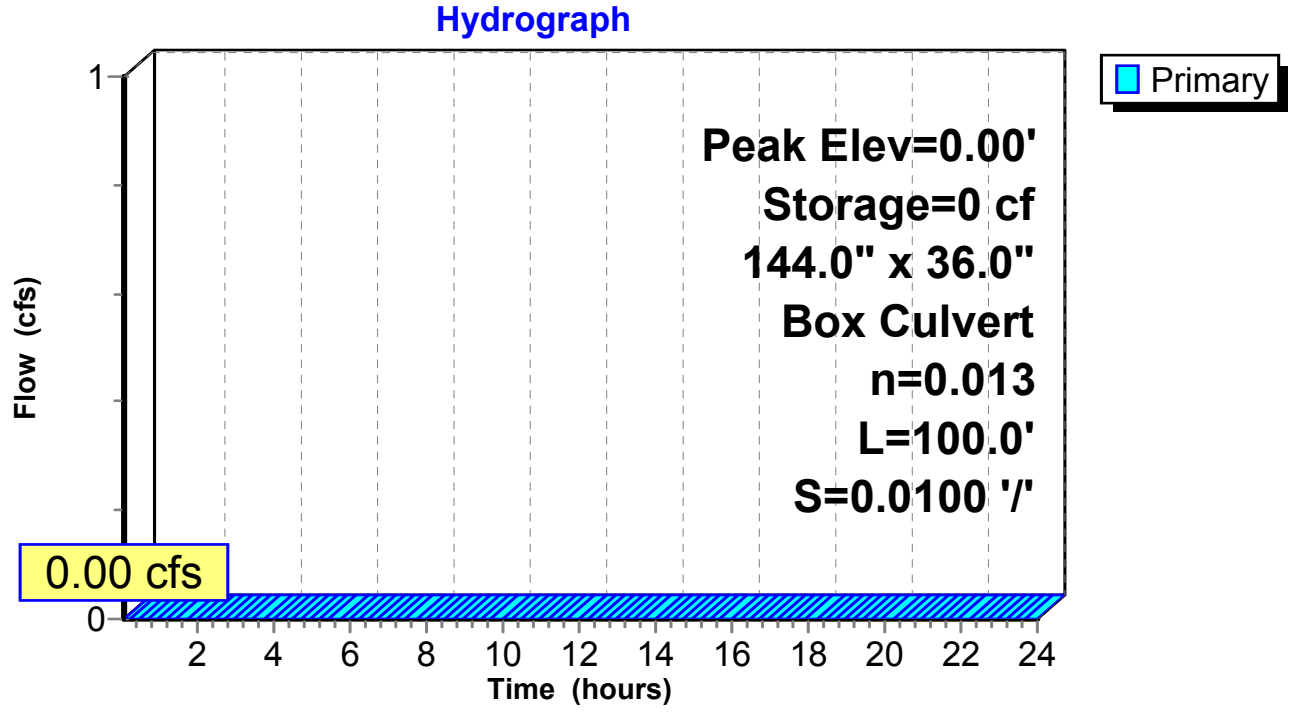
Volume	Invert	Avail.Storage	Storage Description
#1	559.00'	305,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
559.00	8,044	0	0
560.00	26,557	17,301	17,301
561.00	51,068	38,813	56,113
562.00	74,828	62,948	119,061
563.00	93,363	84,096	203,157
564.00	111,846	102,605	305,761

Device	Routing	Invert	Outlet Devices
#1	Primary	558.41'	**144.0" W x 36.0" H Box Box Culvert** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 558.41' / 557.41' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 36.00 sf

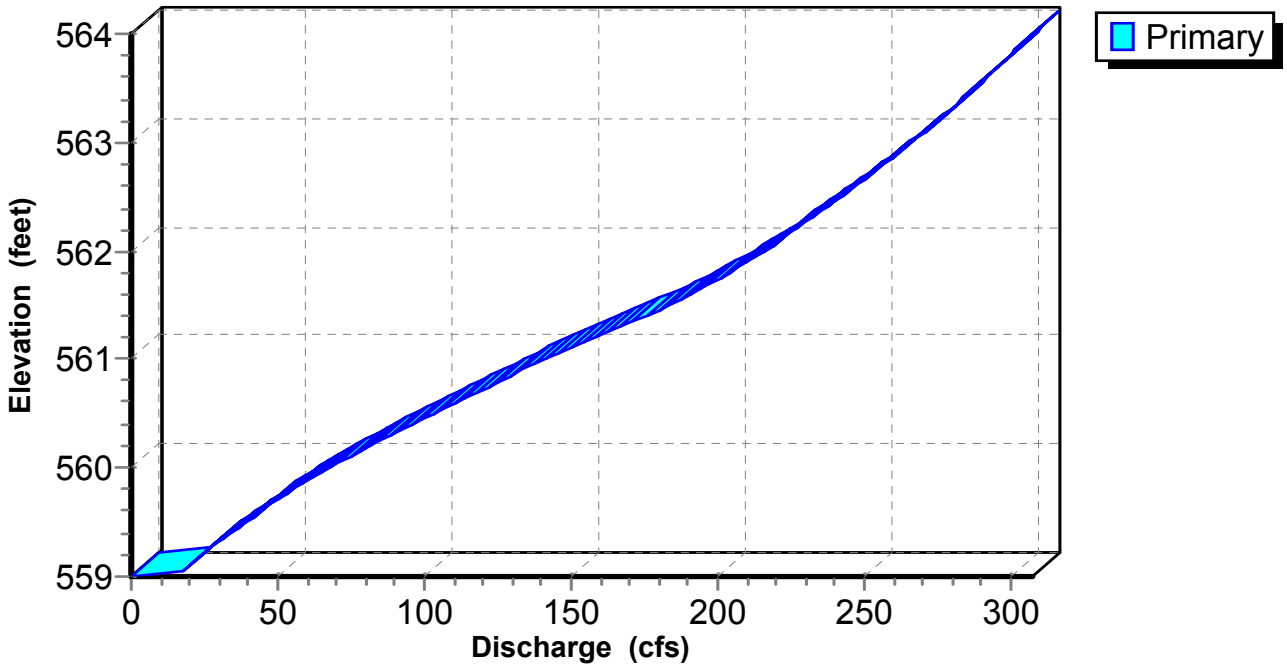
Primary OutFlow Max=0.00 cfs @ 0.05 hrs HW=0.00' (Free Discharge)
↑—**1=Box Culvert** (Controls 0.00 cfs)

Pond NC: Northern Channel



Pond NC: Northern Channel

Stage-Discharge



Summary for Pond NPC1: Northern Perimeter Channel 1

[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=92)

Inflow Area = 27.267 ac, 0.00% Impervious, Inflow Depth > 29.13" for PMF 6,12,24 event
Inflow = 117.63 cfs @ 5.95 hrs, Volume= 66.188 af
Outflow = 117.71 cfs @ 6.08 hrs, Volume= 66.190 af, Atten= 0%, Lag= 7.6 min
Primary = 101.85 cfs @ 2.39 hrs, Volume= 42.309 af
Secondary = 66.03 cfs @ 6.02 hrs, Volume= 23.880 af

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 563.04' @ 6.02 hrs Surf.Area= 94,188 sf Storage= 207,341 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.5 min (352.6 - 331.1)

Volume	Invert	Avail.Storage	Storage Description
#1	559.00'	305,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
559.00	8,044	0	0
560.00	26,557	17,301	17,301
561.00	51,068	38,813	56,113
562.00	74,828	62,948	119,061
563.00	93,363	84,096	203,157
564.00	111,846	102,605	305,761

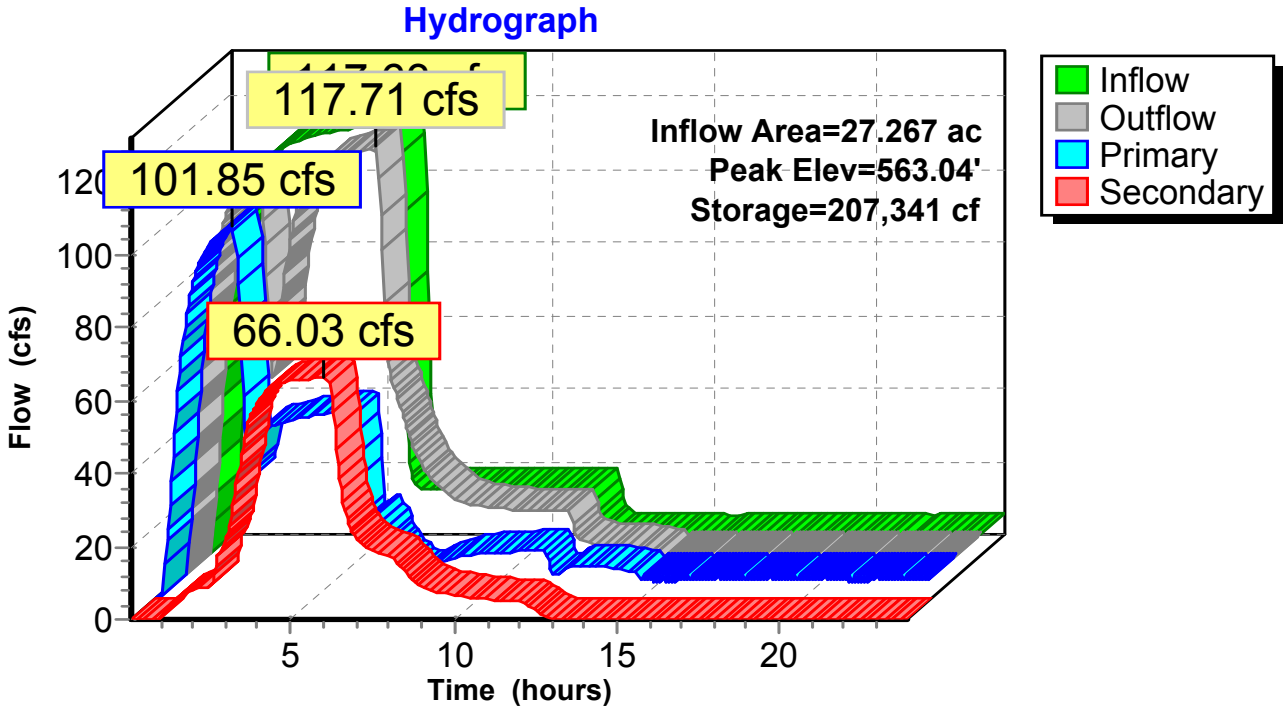
Device	Routing	Invert	Outlet Devices
#1	Primary	558.41'	**144.0" W x 36.0" H Box Box Culvert** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 558.41' / 557.41' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 36.00 sf
#2	Device 5	562.53'	**36.0" Horiz. Sed Trap** C= 0.600 Limited to weir flow at low heads
#3	Secondary	558.22'	**15.0" Round Culvert** L= 108.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 558.22' / 556.06' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#4	Device 3	558.49'	**15.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 558.49' / 558.22' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#5	Device 4	558.59'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 558.59' / 558.49' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#6	Device 9	561.97'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Secondary	557.00'	**24.0" Round Culvert** L= 97.0' CPP, projecting, no headwall, Ke= 0.900

			Inlet / Outlet Invert= 557.00' / 556.03' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#8	Device 7	558.98'	**24.0" Round Culvert** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 558.98' / 557.00' S= 0.0430 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#9	Device 8	559.08'	**24.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 559.08' / 558.98' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#10	Device 12	561.26'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#11	Secondary	557.74'	**24.0" Round Culvert** L= 136.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 557.74' / 554.88' S= 0.0210 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#12	Device 11	561.00'	**24.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 561.00' / 560.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#13	Device 19	560.05'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#14	Secondary	529.56'	**24.0" Round Culvert** L= 111.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 529.56' / 528.67' S= 0.0080 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#15	Device 14	533.48'	**24.0" Round Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 533.48' / 529.56' S= 0.0980 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#16	Device 15	555.00'	**24.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 555.00' / 533.48' S= 0.2869 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#17	Device 16	555.44'	**24.0" Round Culvert** L= 87.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 555.44' / 555.00' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#18	Device 17	557.62'	**24.0" Round Culvert** L= 66.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 557.62' / 555.44' S= 0.0330 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#19	Device 18	557.71'	**24.0" Round Culvert** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 557.71' / 557.62' S= 0.0056 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

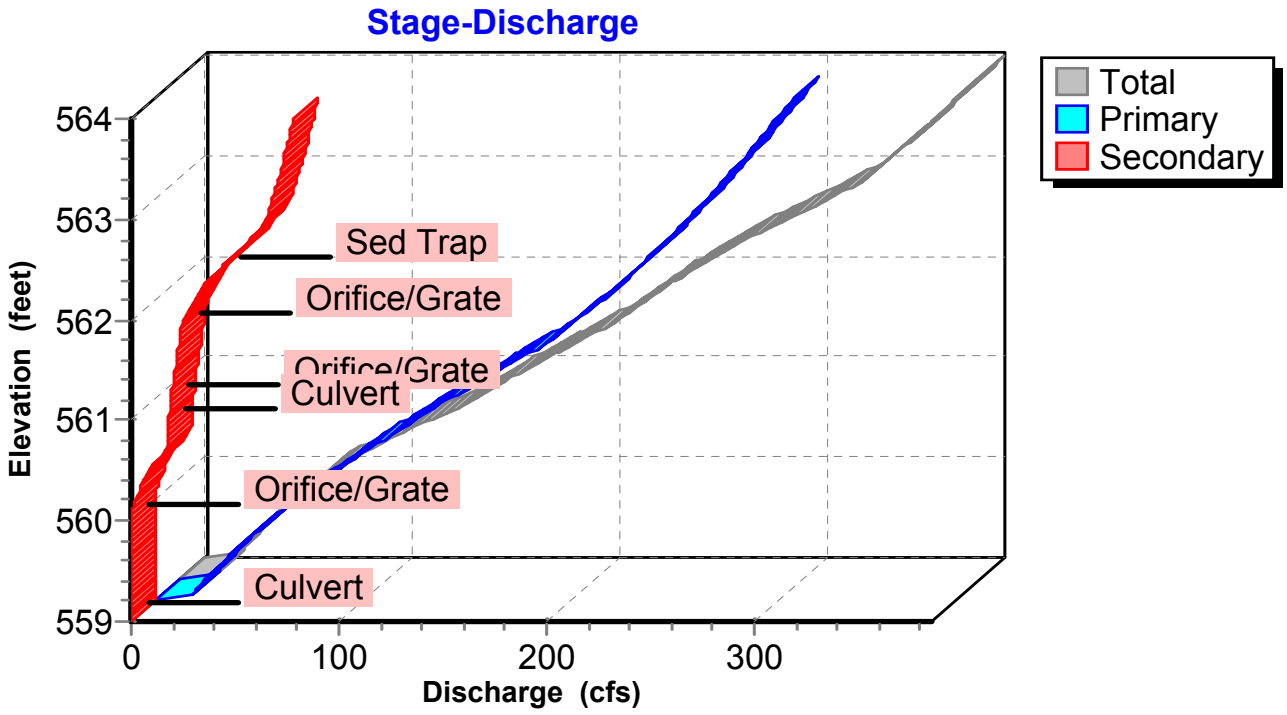
Primary OutFlow Max=101.74 cfs @ 2.39 hrs HW=560.49' TW=558.49' (Dynamic Tailwater)
└─**1=Box Culvert** (Inlet Controls 101.74 cfs @ 4.08 fps)

Secondary OutFlow Max=66.03 cfs @ 6.02 hrs HW=563.04' (Free Discharge)
- **3=Culvert** (Passes 9.13 cfs of 9.56 cfs potential flow)
  - **4=Culvert** (Passes 9.13 cfs of 9.25 cfs potential flow)
    - **5=Culvert** (Inlet Controls 9.13 cfs @ 7.44 fps)
      - **2=Sed Trap** (Passes 9.13 cfs of 11.37 cfs potential flow)
- **7=Culvert** (Passes 20.56 cfs of 26.82 cfs potential flow)
  - **8=Culvert** (Passes 20.56 cfs of 20.91 cfs potential flow)
    - **9=Culvert** (Inlet Controls 20.56 cfs @ 6.54 fps)
      - **6=Orifice/Grate** (Passes 20.56 cfs of 34.33 cfs potential flow)
- **11=Culvert** (Passes 11.47 cfs of 24.78 cfs potential flow)
  - **12=Culvert** (Barrel Controls 11.47 cfs @ 4.44 fps)
    - **10=Orifice/Grate** (Passes 11.47 cfs of 45.47 cfs potential flow)
- **14=Culvert** (Passes 24.86 cfs of 68.06 cfs potential flow)
  - **15=Culvert** (Passes 24.86 cfs of 63.83 cfs potential flow)
    - **16=Culvert** (Passes 24.86 cfs of 31.70 cfs potential flow)
      - **17=Culvert** (Passes 24.86 cfs of 30.69 cfs potential flow)
        - **18=Culvert** (Passes 24.86 cfs of 25.12 cfs potential flow)
          - **19=Culvert** (Inlet Controls 24.86 cfs @ 7.91 fps)
            - **13=Orifice/Grate** (Passes 24.86 cfs of 58.90 cfs potential flow)

Pond NPC1: Northern Perimeter Channel 1



Pond NPC1: Northern Perimeter Channel 1



Summary for Pond NPC2: Northern Perimeter Channel 2

Inflow Area = 38.777 ac, 0.00% Impervious, Inflow Depth > 21.69" for PMF 6,12,24 event
Inflow = 148.59 cfs @ 2.39 hrs, Volume= 70.082 af
Outflow = 144.93 cfs @ 2.14 hrs, Volume= 69.982 af, Atten= 2%, Lag= 0.0 min
Primary = 144.93 cfs @ 2.14 hrs, Volume= 71.192 af

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 562.93' @ 5.98 hrs Surf.Area= 2.296 ac Storage= 9.998 af

Plug-Flow detention time= 71.4 min calculated for 69.836 af (100% of inflow)
Center-of-Mass det. time= 69.7 min (420.5 - 350.7)

Volume	Invert	Avail.Storage	Storage Description
#1	555.00'	12.479 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

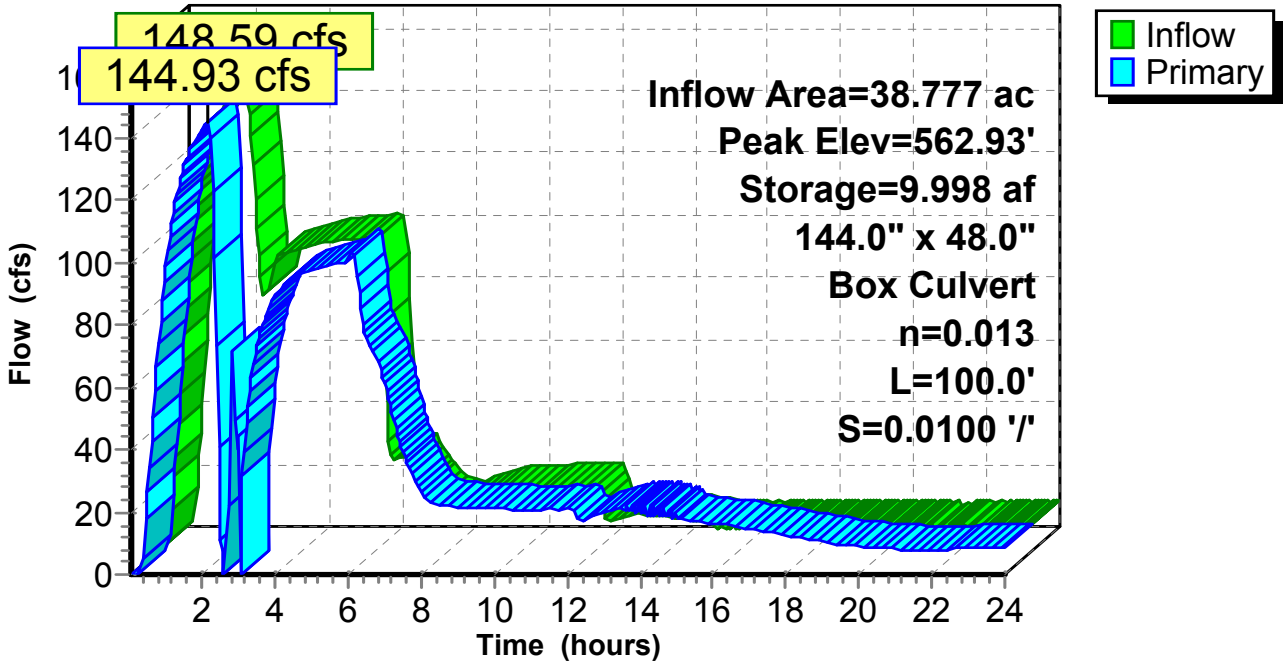
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
555.00	0.049	0.000	0.000
556.00	0.215	0.132	0.132
558.00	1.014	1.229	1.361
560.00	1.629	2.643	4.004
562.00	2.247	3.876	7.880
564.00	2.352	4.599	12.479

Device	Routing	Invert	Outlet Devices
#1	Primary	555.45'	**144.0" W x 48.0" H Box Culvert** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 555.45' / 554.45' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 48.00 sf

Primary OutFlow Max=144.83 cfs @ 2.14 hrs HW=558.08' TW=555.17' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 144.83 cfs @ 4.59 fps)

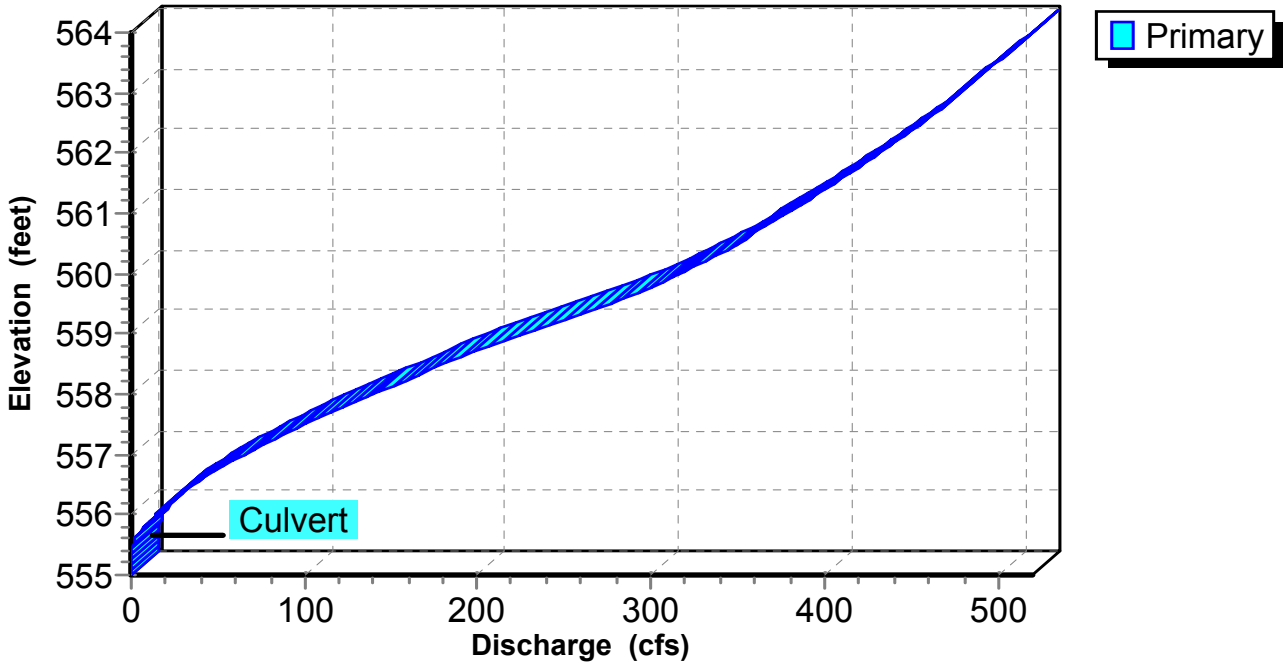
Pond NPC2: Northern Perimeter Channel 2

Hydrograph



Pond NPC2: Northern Perimeter Channel 2

Stage-Discharge



Summary for Pond SC: Southern Channel

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	559.00'	252,048 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

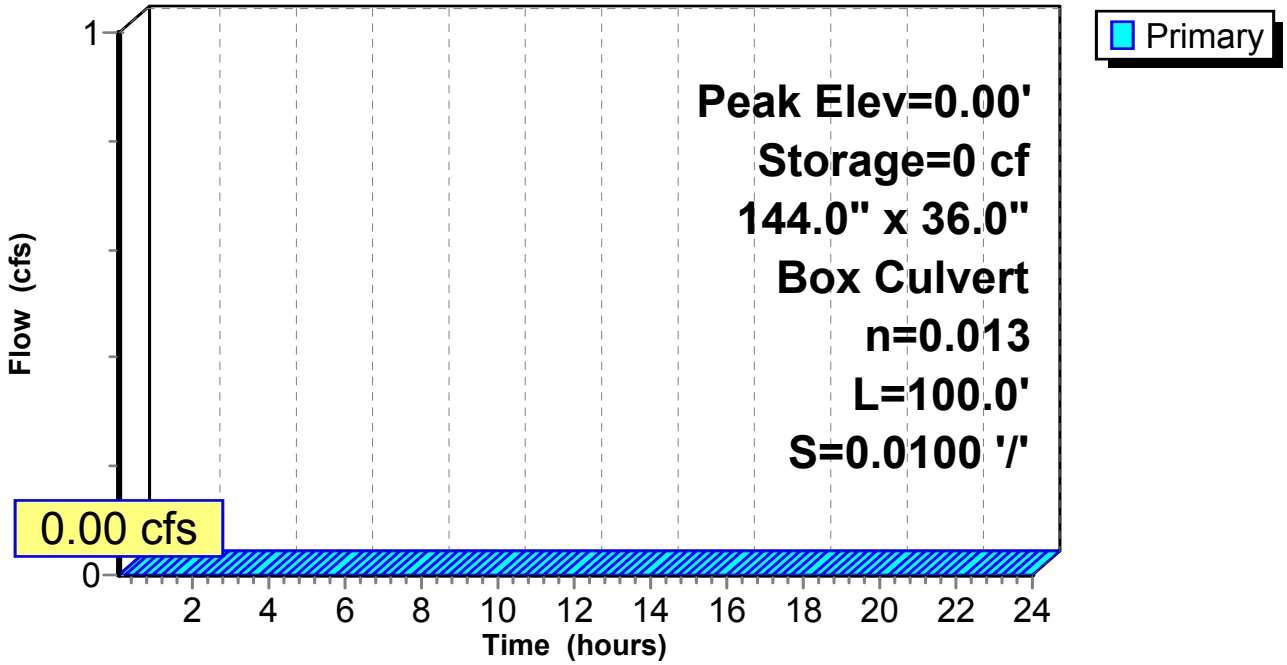
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
559.00	2,790	0	0
560.00	19,112	10,951	10,951
561.00	41,428	30,270	41,221
562.00	62,991	52,210	93,431
563.00	79,309	71,150	164,581
564.00	95,626	87,468	252,048

Device	Routing	Invert	Outlet Devices
#1	Primary	558.78'	**144.0" W x 36.0" H Box Culvert** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 558.78' / 557.78' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 36.00 sf

Primary OutFlow Max=0.00 cfs @ 0.05 hrs HW=0.00' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)

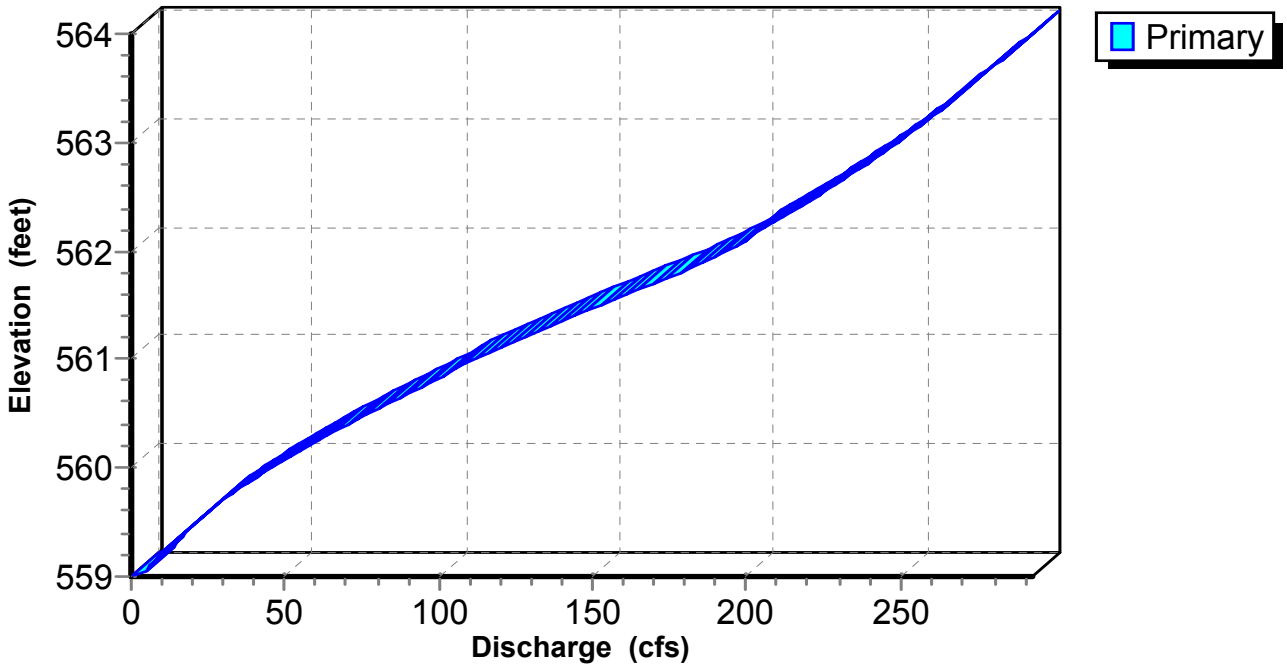
Pond SC: Southern Channel

Hydrograph



Pond SC: Southern Channel

Stage-Discharge



Summary for Pond SPC1: Southern Perimeter Channel 1

[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=10)

Inflow Area = 19.561 ac, 0.00% Impervious, Inflow Depth > 29.30" for PMF 6,12,24 event
Inflow = 84.49 cfs @ 5.95 hrs, Volume= 47.766 af
Outflow = 84.61 cfs @ 6.09 hrs, Volume= 47.765 af, Atten= 0%, Lag= 8.2 min
Primary = 82.72 cfs @ 6.09 hrs, Volume= 47.479 af
Secondary = 1.92 cfs @ 6.02 hrs, Volume= 0.286 af

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 563.27' @ 6.02 hrs Surf.Area= 83,705 sf Storage= 186,542 cf

Plug-Flow detention time= 24.8 min calculated for 47.765 af (100% of inflow)
Center-of-Mass det. time= 24.7 min (354.3 - 329.6)

Volume	Invert	Avail.Storage	Storage Description
#1	559.00'	252,048 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
559.00	2,790	0	0
560.00	19,112	10,951	10,951
561.00	41,428	30,270	41,221
562.00	62,991	52,210	93,431
563.00	79,309	71,150	164,581
564.00	95,626	87,468	252,048

Device	Routing	Invert	Outlet Devices
#1	Primary	558.78'	**144.0" W x 36.0" H Box Culvert** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 558.78' / 557.78' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 36.00 sf
#2	Device 3	562.79'	**36.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 4	562.79'	**24.0" Round Culvert X 2.00** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 562.79' / 562.69' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#4	Device 5	562.69'	**24.0" Round Culvert X 2.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 562.69' / 560.59' S= 0.0350 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#5	Device 6	560.59'	**24.0" Round Culvert X 2.00** L= 58.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 560.59' / 534.20' S= 0.4550 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#6	Secondary	534.20'	**24.0" Round Culvert X 2.00** L= 23.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 534.20' / 533.40' S= 0.0348 '/' Cc= 0.900

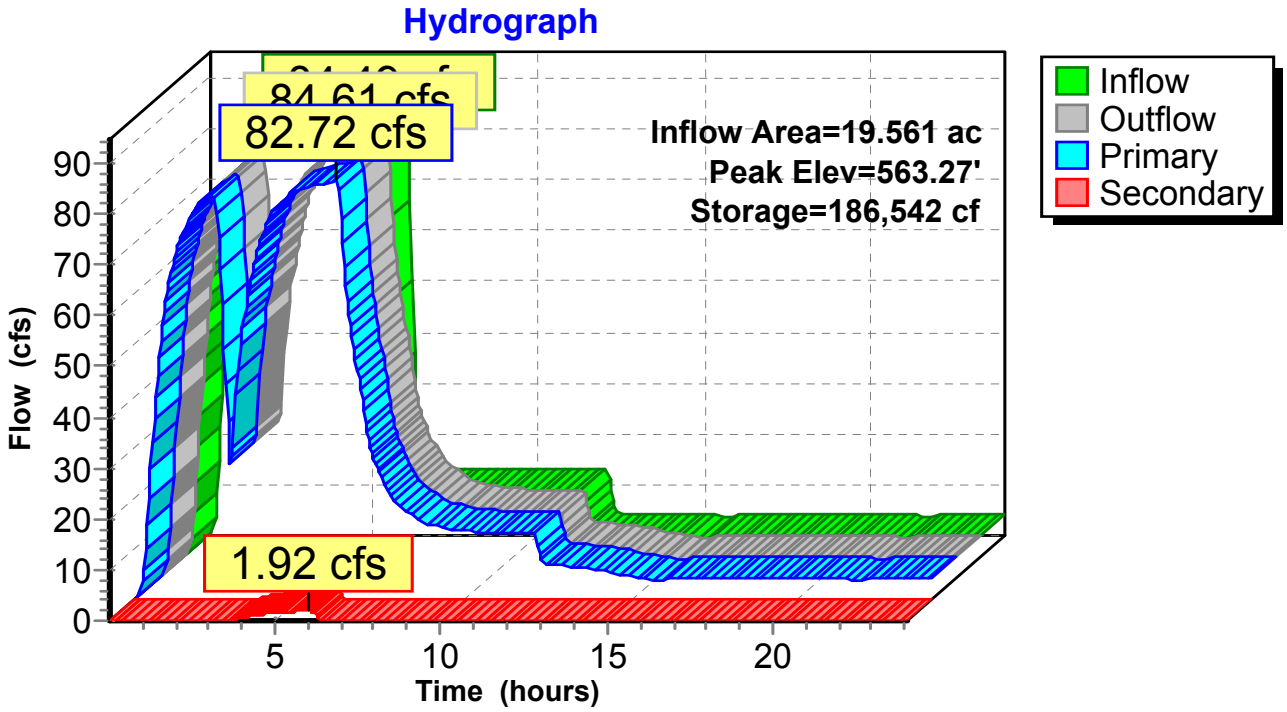
n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=82.92 cfs @ 6.09 hrs HW=563.26' TW=562.97' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 82.92 cfs @ 2.30 fps)

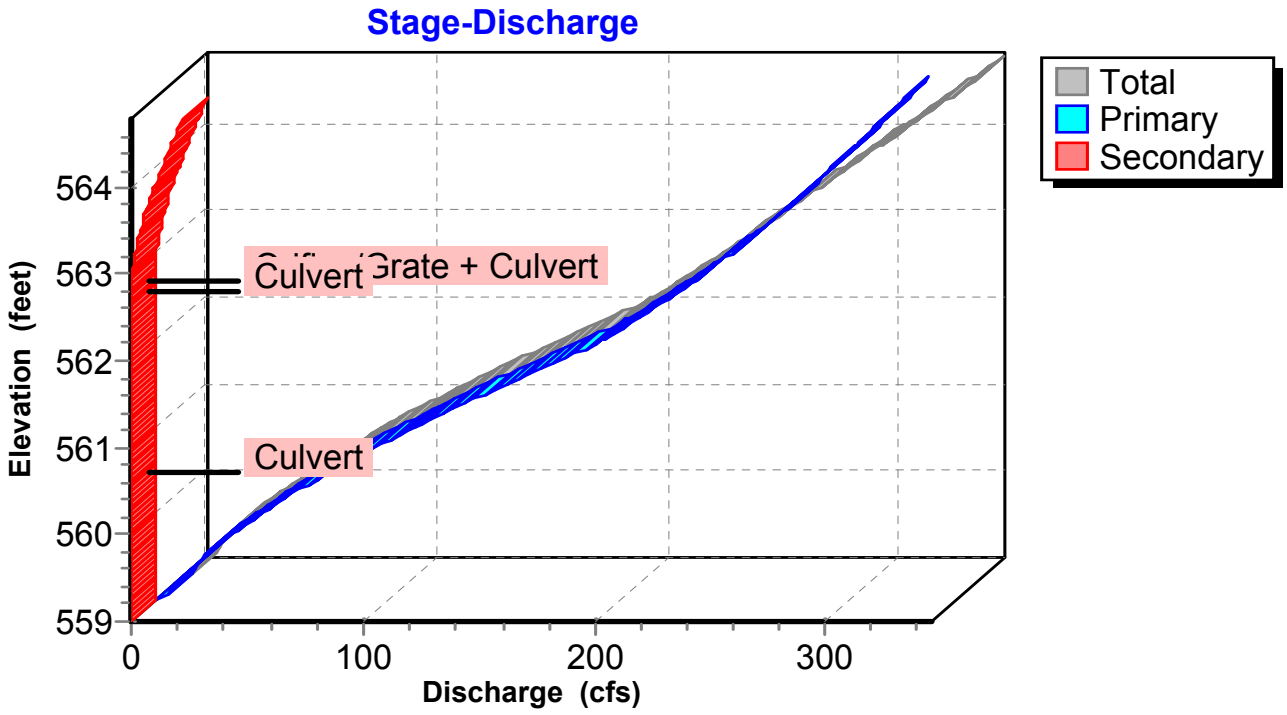
Secondary OutFlow Max=1.91 cfs @ 6.02 hrs HW=563.27' (Free Discharge)
└─**6=Culvert** (Passes 1.91 cfs of 126.54 cfs potential flow)
└─**5=Culvert** (Passes 1.91 cfs of 30.95 cfs potential flow)
└─**4=Culvert** (Passes 1.91 cfs of 3.09 cfs potential flow)
└─**3=Culvert** (Barrel Controls 1.91 cfs @ 2.49 fps)
└─**2=Orifice/Grate** (Passes 1.91 cfs of 20.45 cfs potential flow)

Pond SPC1: Southern Perimeter Channel 1

Hydrograph



Pond SPC1: Southern Perimeter Channel 1



Summary for Pond SPC2: Southern Perimeter Channel 2

[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=15)
[80] Warning: Exceeded Pond SPC1 by 0.04' @ 2.90 hrs (27.65 cfs 0.351 af)

Inflow Area = 26.051 ac, 0.00% Impervious, Inflow Depth > 29.13" for PMF 6,12,24 event
Inflow = 110.03 cfs @ 6.00 hrs, Volume= 63.235 af
Outflow = 112.83 cfs @ 6.09 hrs, Volume= 63.125 af, Atten= 0%, Lag= 5.7 min
Primary = 112.83 cfs @ 6.09 hrs, Volume= 63.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 562.98' @ 5.97 hrs Surf.Area= 1.513 ac Storage= 5.710 af

Plug-Flow detention time= 42.6 min calculated for 63.125 af (100% of inflow)
Center-of-Mass det. time= 40.8 min (389.2 - 348.4)

Volume	Invert	Avail.Storage	Storage Description
#1	556.00'	7.341 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

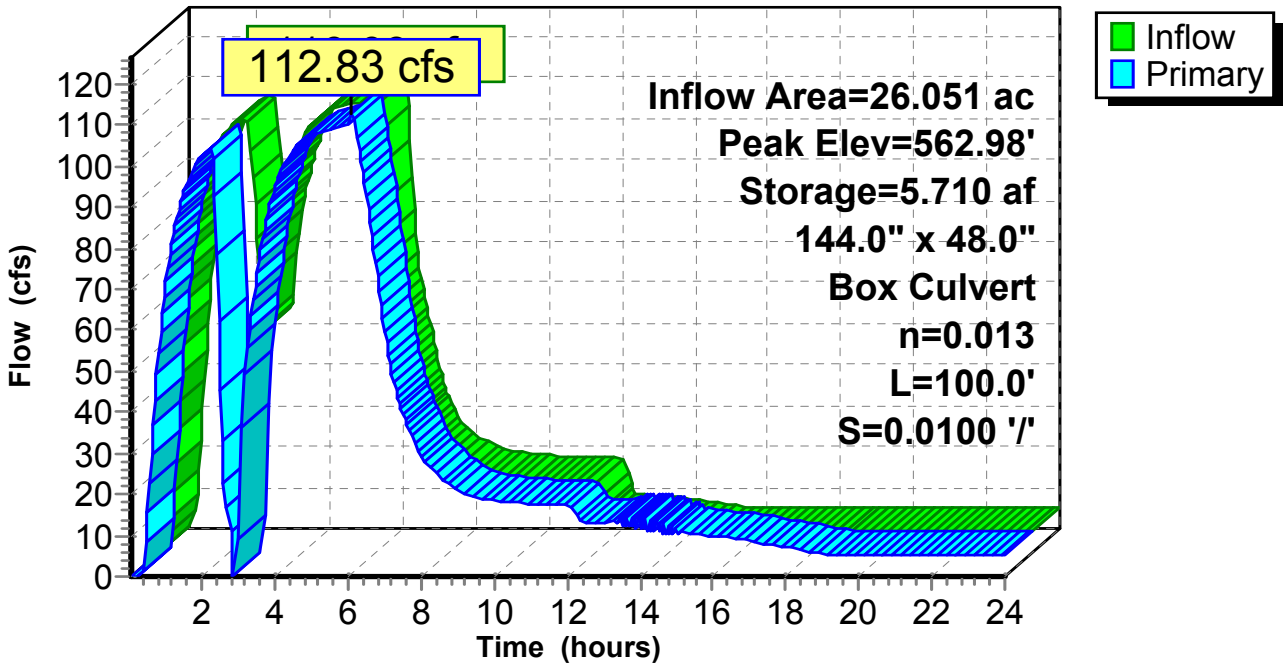
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
556.00	0.033	0.000	0.000
558.00	0.530	0.563	0.563
560.00	0.936	1.466	2.029
562.00	1.344	2.280	4.309
564.00	1.688	3.032	7.341

Device	Routing	Invert	Outlet Devices
#1	Primary	556.52'	**144.0" W x 48.0" H Box Box Culvert C2** L= 100.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 556.52' / 555.52' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 48.00 sf

Primary OutFlow Max=112.37 cfs @ 6.09 hrs HW=562.97' TW=562.67' (Dynamic Tailwater)
↑—**1=Box Culvert C2** (Inlet Controls 112.37 cfs @ 2.34 fps)

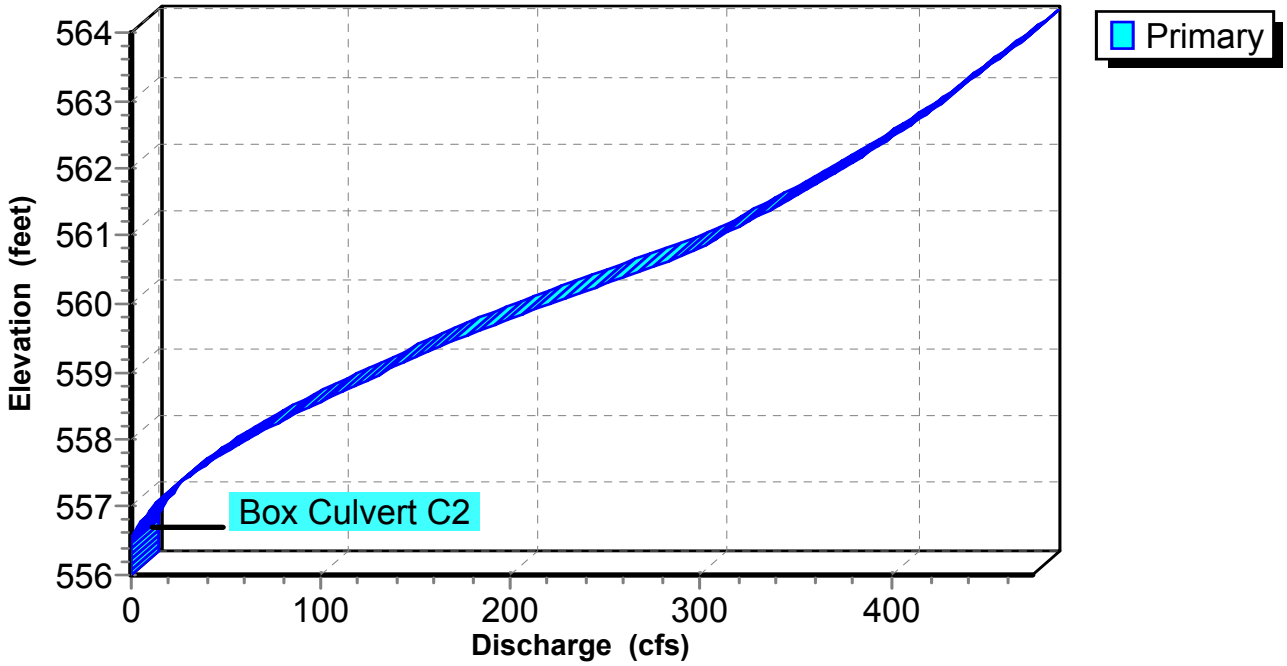
Pond SPC2: Southern Perimeter Channel 2

Hydrograph



Pond SPC2: Southern Perimeter Channel 2

Stage-Discharge



Summary for Pond Sub C MPM: Proposed Pond in Sub-Basin C FROM MPM

[82] Warning: Early inflow requires earlier time span
[62] Hint: Exceeded Reach NB2 OUTLET depth by 5.50' @ 5.95 hrs
[62] Hint: Exceeded Reach SB2 OUTLET depth by 5.62' @ 5.95 hrs
[80] Warning: Exceeded Pond NPC2 by 0.11' @ 2.90 hrs (68.22 cfs 6.459 af)
[80] Warning: Exceeded Pond SPC2 by 0.01' @ 13.05 hrs (20.56 cfs 4.671 af)

Inflow Area = 156.112 ac, 4.47% Impervious, Inflow Depth > 27.12" for PMF 6,12,24 event
Inflow = 601.62 cfs @ 5.95 hrs, Volume= 352.768 af
Outflow = 601.03 cfs @ 5.93 hrs, Volume= 301.626 af, Atten= 0%, Lag= 0.0 min
Primary = 95.97 cfs @ 5.93 hrs, Volume= 137.823 af
Secondary = 505.06 cfs @ 5.93 hrs, Volume= 163.803 af

Routing by Dyn-Stor-Ind method, Time Span= 0.05-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 562.69' @ 5.93 hrs Surf.Area= 4.118 ac Storage= 82.301 af

Plug-Flow detention time= 224.4 min calculated for 301.563 af (85% of inflow)
Center-of-Mass det. time= 122.7 min (495.8 - 373.0)

Volume	Invert	Avail.Storage	Storage Description
#1	530.00'	87.756 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
530.00	0.716	0.000	0.000
532.00	1.100	1.816	1.816
534.00	1.360	2.460	4.276
536.00	1.560	2.920	7.196
538.00	1.760	3.320	10.516
540.00	1.950	3.710	14.226
542.00	2.130	4.080	18.306
544.00	2.540	4.670	22.976
546.00	2.490	5.030	28.006
548.00	2.660	5.150	33.156
550.00	2.840	5.500	38.656
552.00	3.030	5.870	44.526
554.00	3.220	6.250	50.776
556.00	3.400	6.620	57.396
558.00	3.550	6.950	64.346
560.00	3.760	7.310	71.656
562.00	4.000	7.760	79.416
564.00	4.340	8.340	87.756

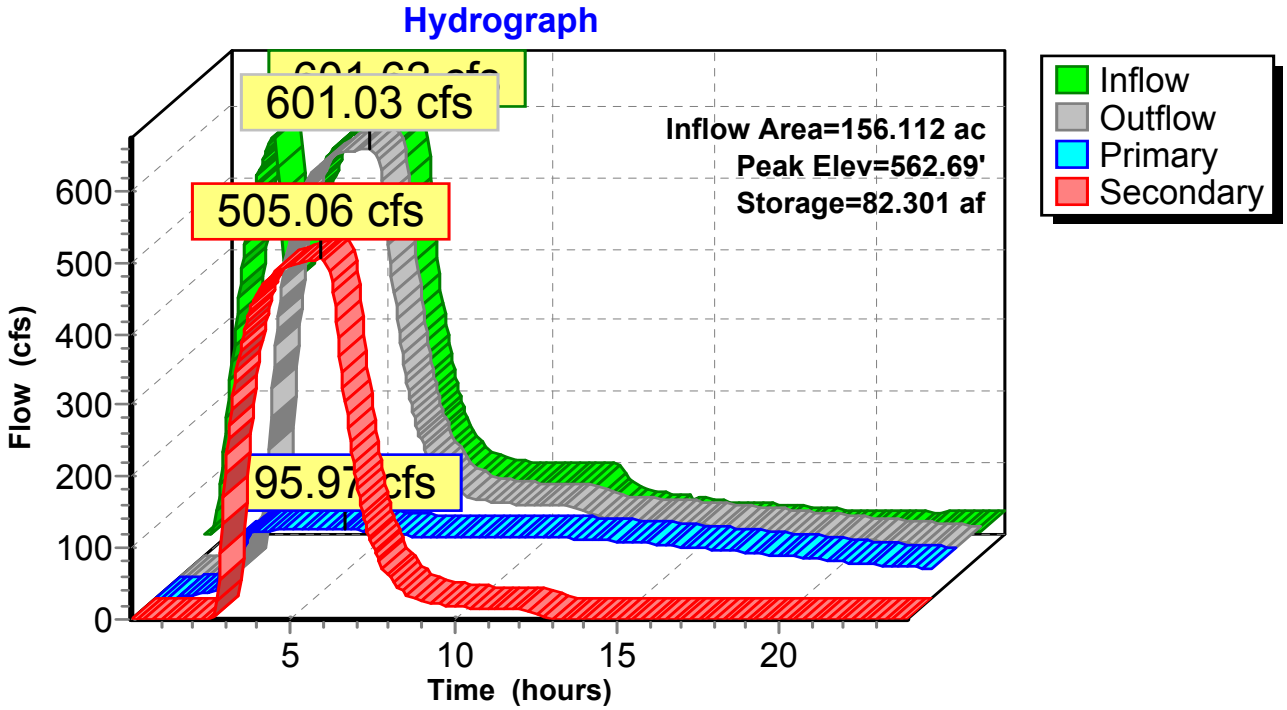
Device	Routing	Invert	Outlet Devices
#1	Primary	513.75'	**36.0" Round Culvert** L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 513.75' / 509.00' S= 0.0095 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#2	Device 1	515.17'	**36.0" Round Culvert** L= 480.0' RCP, groove end projecting, Ke= 0.200

			Inlet / Outlet Invert= 515.17' / 513.75' S= 0.0030 '/' Cc= 0.900
			n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#3	Device 2	516.50'	**36.0" Round Culvert**
			L= 400.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 516.50' / 515.17' S= 0.0033 '/' Cc= 0.900
			n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#4	Device 3	530.00'	**2.0" Vert. Orifice/Grate X 4.00 columns**
			X 4 rows with 18.0" cc spacing C= 0.600
#5	Device 3	552.55'	**36.0" Horiz. Orifice/Grate X 0.80** C= 0.600
			Limited to weir flow at low heads
#6	Secondary	560.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**
			Head (feet) 0.00 1.00 2.00 3.00 4.00
			Width (feet) 22.00 34.00 46.00 58.00 70.00

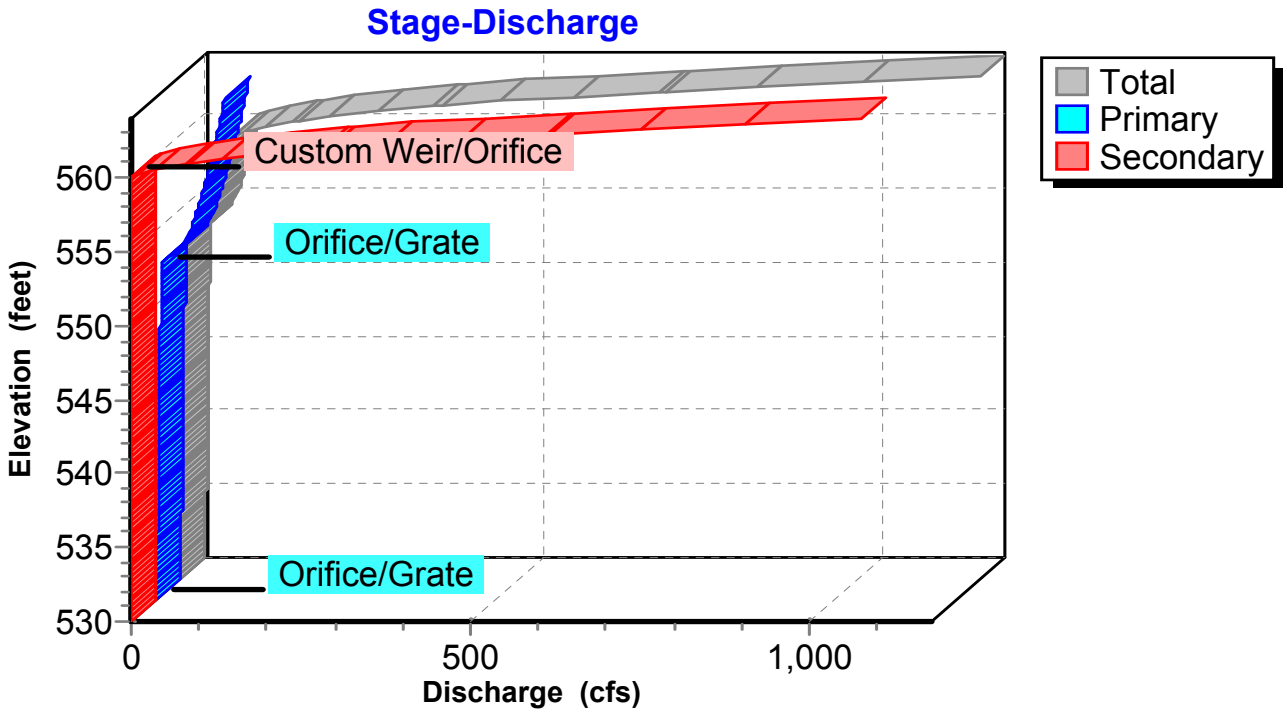
Primary OutFlow Max=95.97 cfs @ 5.93 hrs HW=562.69' (Free Discharge)
- **1=Culvert** (Passes 95.97 cfs of 164.44 cfs potential flow)
  - **2=Culvert** (Passes 95.97 cfs of 159.11 cfs potential flow)
    - **3=Culvert** (Passes 95.97 cfs of 168.16 cfs potential flow)
      - **4=Orifice/Grate** (Orifice Controls 9.26 cfs @ 26.52 fps)
      - **5=Orifice/Grate** (Orifice Controls 86.71 cfs @ 12.27 fps)

Secondary OutFlow Max=504.87 cfs @ 5.93 hrs HW=562.69' (Free Discharge)
- **6=Custom Weir/Orifice** (Weir Controls 504.87 cfs @ 4.92 fps)

Pond Sub C MPM: Proposed Pond in Sub-Basin C FROM MPM



Pond Sub C MPM: Proposed Pond in Sub-Basin C FROM MPM



Summary for Pond Sub C Stage 1: Proposed Pond in Sub-Basin C FROM STAGE 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	551.65'	77.377 af	**Custom Stage Data (Prismatic)** Listed below

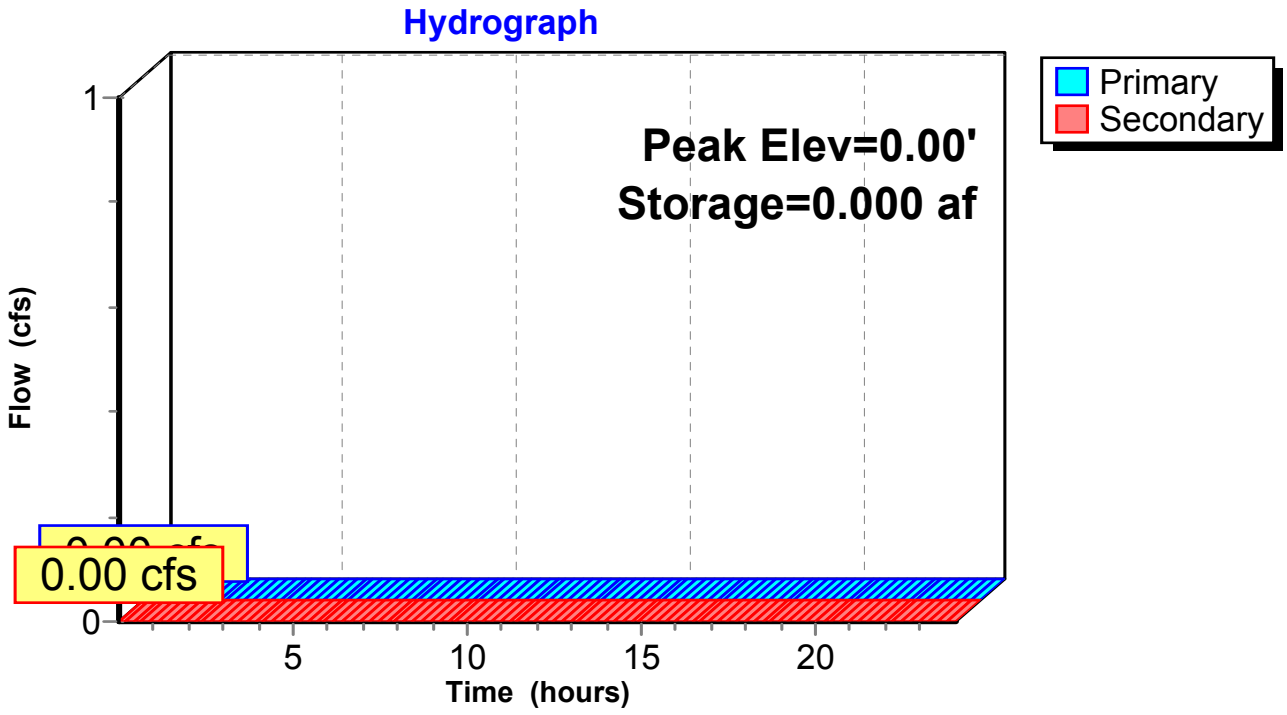
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
551.65	5.620	0.000	0.000
559.00	6.360	44.027	44.027
564.00	6.980	33.350	77.377

Device	Routing	Invert	Outlet Devices
#1	Primary	513.75'	**36.0" Round Culvert** L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 513.75' / 509.00' S= 0.0095 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#2	Device 1	515.17'	**36.0" Round Culvert** L= 480.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 515.17' / 513.75' S= 0.0030 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#3	Device 2	516.50'	**36.0" Round Culvert** L= 400.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 516.50' / 515.17' S= 0.0033 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.07 sf
#4	Device 3	530.00'	**2.0" Vert. Orifice/Grate X 4.00 columns** X 4 rows with 18.0" cc spacing C= 0.600
#5	Device 3	551.65'	**36.0" Horiz. Orifice/Grate** X 50 rows C= 0.600 in 2.0" x 2.0" Grate (1,272,345% open area) Limited to weir flow at low heads
#6	Secondary	559.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 2.00 3.00 4.00 5.00 Width (feet) 40.00 52.00 64.00 76.00 88.00 100.00

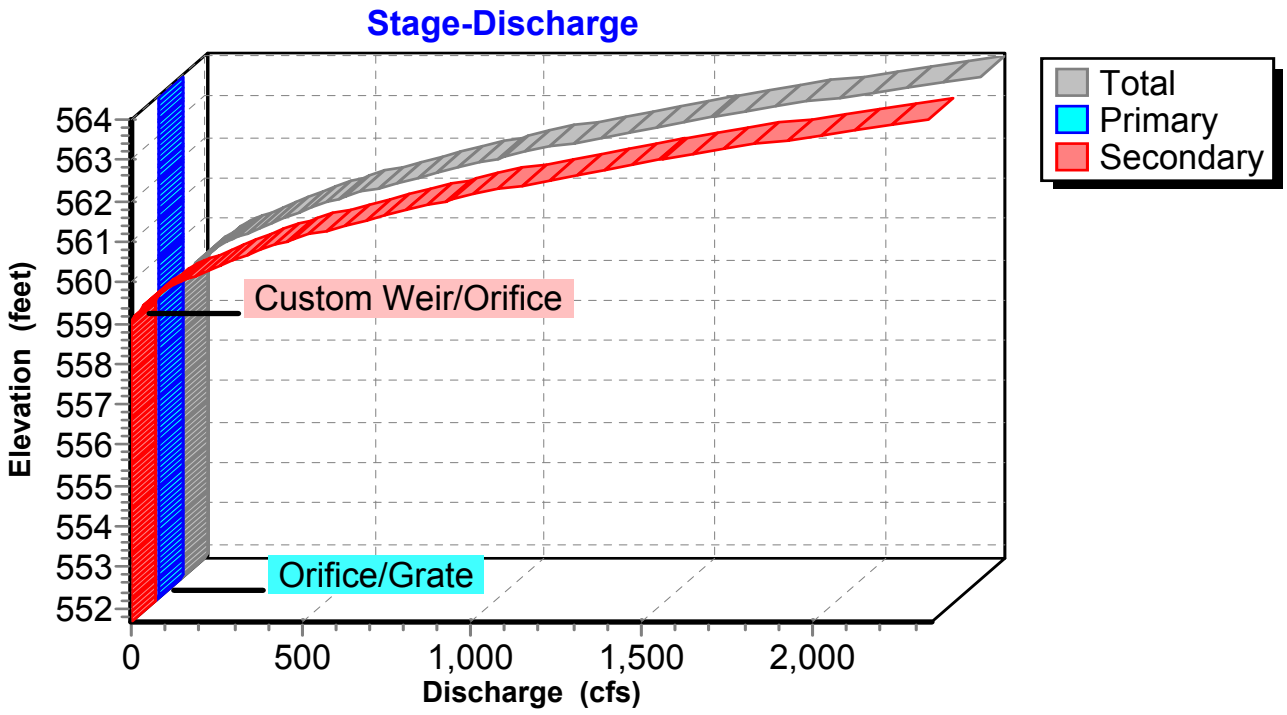
Primary OutFlow Max=0.00 cfs @ 0.05 hrs HW=0.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Culvert** (Controls 0.00 cfs)
    - **3=Culvert** (Controls 0.00 cfs)
      - **4=Orifice/Grate** (Controls 0.00 cfs)
      - **5=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.05 hrs HW=0.00' (Free Discharge)
- **6=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond Sub C Stage 1: Proposed Pond in Sub-Basin C FROM STAGE 1



Pond Sub C Stage 1: Proposed Pond in Sub-Basin C FROM STAGE 1



APPENDIX C

HYDROMETEOROLOGICAL REPORT NO. 51
PROBABLE MAXIMUM PRECIPITATION ESTIMATES

HYDROMETEOROLOGICAL REPORT NO. 51

Probable Maximum Precipitation Estimates, United States East of the 105th Meridian

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

Washington, D C
June 1978

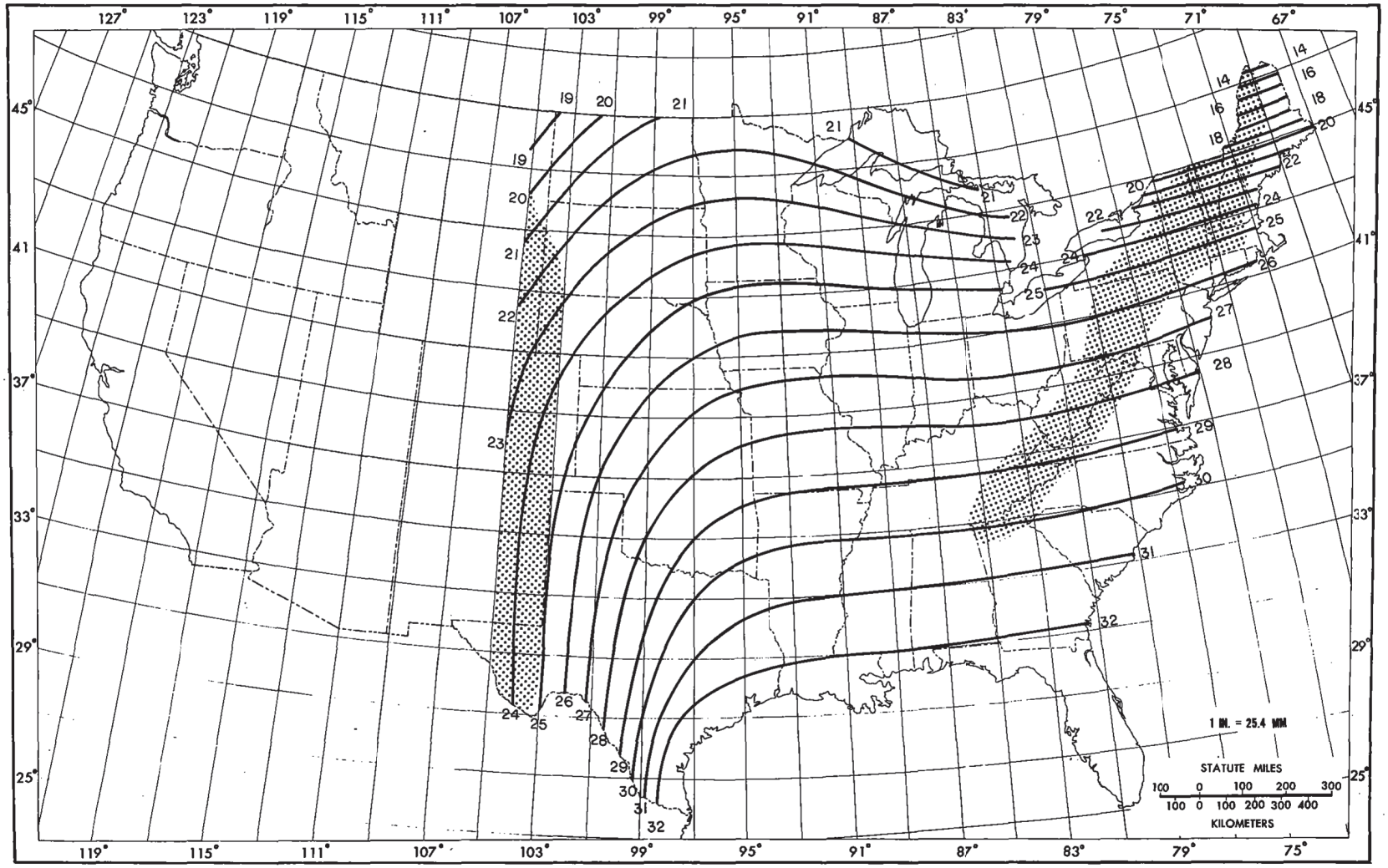


Figure 18.--All-season PMP (in.) for 6 hr 10 mi^2 (26 km^2).

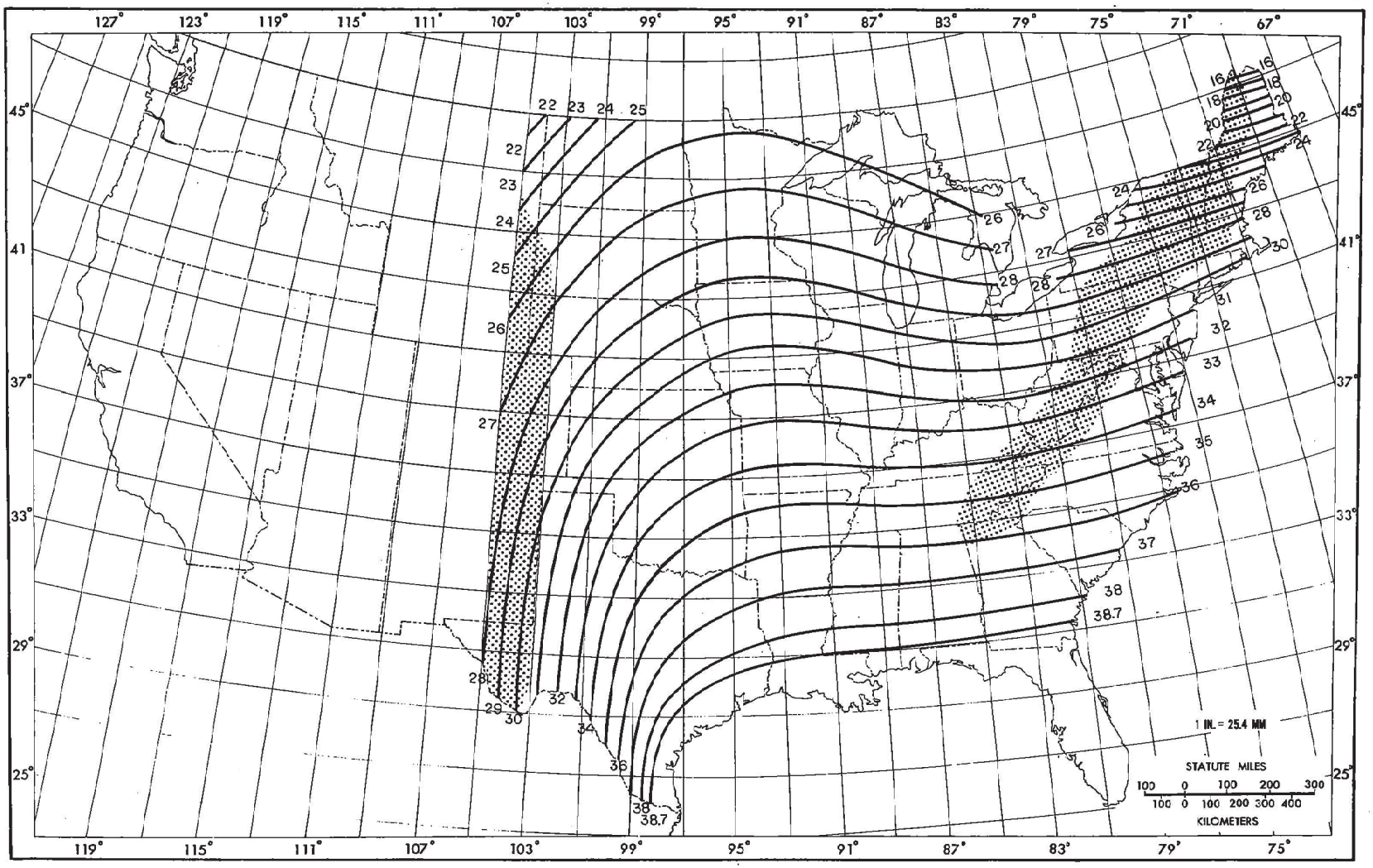


Figure 19.--All-season PMP (in.) for 12 hr 10 mi^2 (26 km^2).

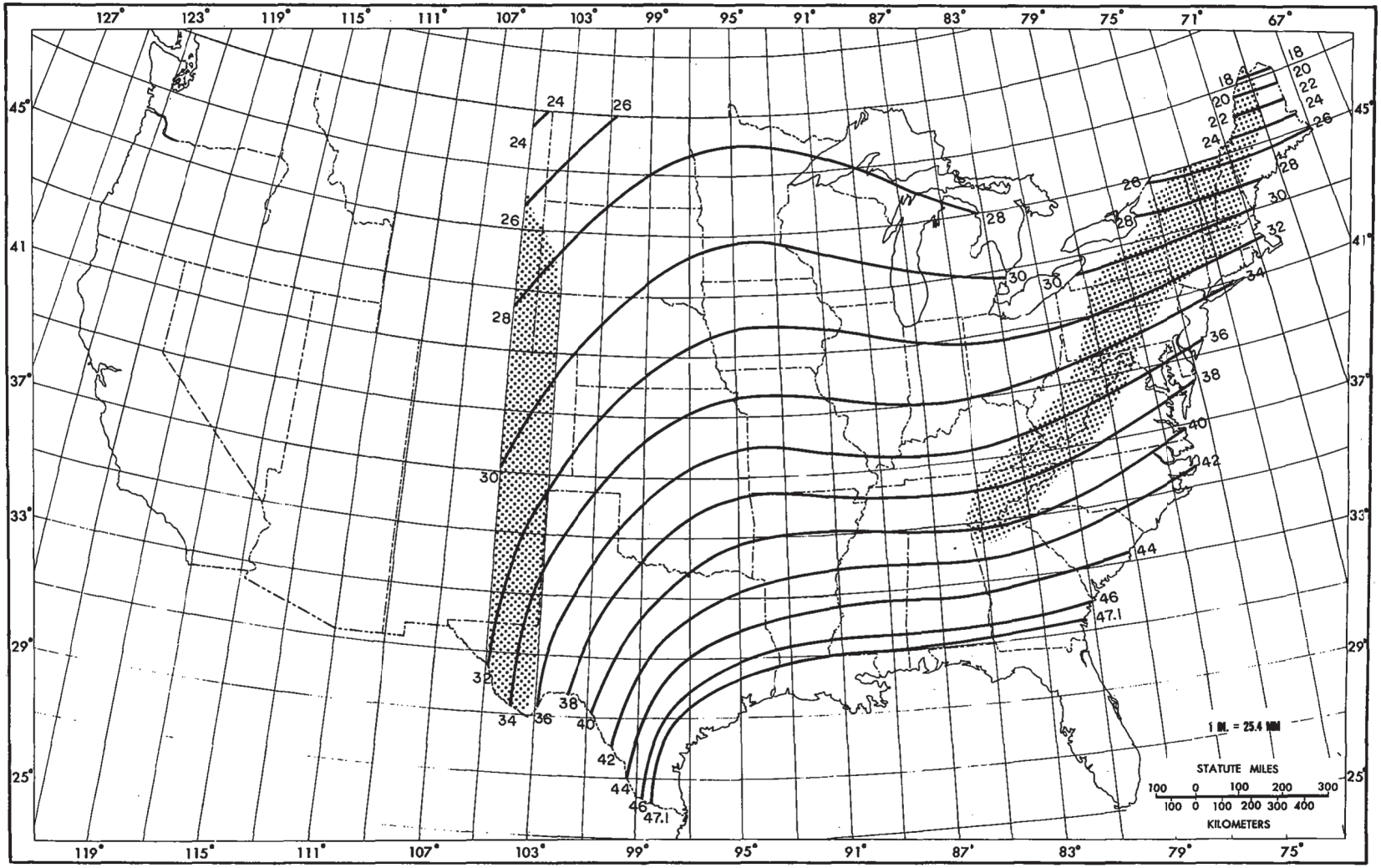


Figure 20.--All-season PMP (in.) for 24 hr 10 mi^2 (26 km^2).