

MAPLE HAVEN AREA DRAINAGE UPGRADE PROJECT

AREA 2 DESIGN REPORT (9/27/11 draft)

City of Portsmouth, NH



Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

Maple Haven Area Drainage Upgrade Project

AREA 2 - DESIGN REPORT

Project #7136

PORTSMOUTH, NH

September 27, 2011



Prepared By:

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Portsmouth, NH 03801

1.0 INTRODUCTION

As a part of the Maple Haven Area Drainage Upgrade Project, this draft report presents the preliminary results of the Area 2 drainage study. As a coastal community in southeastern New Hampshire, stormwater runoff originating in Portsmouth flows to the tidal waters of the Piscataqua River and Great Bay. The headwaters of Pickering Brook are in the southerly portion of Portsmouth. Pickering Brook flows northerly through the Great Bog, under Interstate 95 to the Town of Greenland before emptying into Great Bay. The southeasterly edge of Great Bog is bordered by Banfield Road and a currently unused railroad line known as the "Hampton Branch". Several culverts under the Banfield Road and railroad periodically flood. Banfield Road has been overtopped during significant storm events which required closing of the road as recently as March 2010. Low lying portions of residential properties along Banfield Road are subject to nuisance flooding even during relatively low flow periods, mostly due to beaver activity blocking culverts.

The Portsmouth Department of Public Works seeks to take a proactive approach towards operating, maintaining and upgrading stormwater infrastructure. To address drainage problems in the study area, the City of Portsmouth engaged Altus Engineering, Inc. to undertake a drainage analysis of the watershed, identify deficiencies and to develop a plan for upgrading stormwater drainage infrastructure. The Area 2 Design Report is being prepared as a task under the consultant's contract for the Maple Haven Area Drainage Upgrade Project. Drainage upgrades were previously identified for the Maple Haven neighborhood (Area 1). These upgrades are currently under construction and are scheduled to be complete this fall.

Culverts specifically identified in the Request for Proposal and scope of services for analysis in the Area 2 drainage study are as follows:

- a) Under the railroad, 750' south of Banfield Road
- b) Under the railroad, 480' north of Banfield Road
- c) Under the railroad, 3,280' north of Banfield Road
- d) Under Banfield Road, 960' south of Heritage Avenue
- e) Under Banfield Road, 670' south of Constitution Avenue
- f) Under Banfield Road, 1,500' north of Constitution Avenue

However, during reconnaissance and research it was noted that several additional culverts exist under the railroad and Banfield Road and are included in analysis.

This report presents the data, analysis, findings and recommendations developed for drainage upgrades. The report will be finalized after review of this draft edition by City officials.

2.0 METHODOLOGY

In preparing this study, Altus Engineering, Inc. conducted several reconnaissance visits to the watershed to verify drainage patterns and infrastructure, identify drainage problems, note deficiencies and observe beaver activity. Altus also performed the following research:

- Field reconnaissance of Area 2 during dry and wet conditions
- Met with City staff Discussed to review site conditions
- Obtained GIS mapping from City staff
- Obtained infrastructure data on file at City Hall
- Researched existing surveys in the project area
- Located "Railroad Valuation Maps"
- Researched FEMA files and obtained data from a Letter of Map Revision (LOMR) at the Great Bog
- Participated in a public information meeting for the Maple Haven area residents organized by City staff
- Identified state permit requirements

Computerized mapping was developed for the project using the City's GIS mapping as a base. Data from the various sources listed above was incorporated into mapping effort. Zoning was reviewed and areas of potential future development were identified to assess possible land use changes in the watershed (see Figure 1, Zoning Map).

This Design Report includes a computerized drainage analysis of the existing culverts in the area of study. The general topography, geologic conditions and urban development in the watershed represents a very complex hydrologic system. Fortunately in recent years, advances in computer technology have made hydrologic modeling of such watersheds possible. Such modeling and analysis are vital to the development. HydroCAD stormwater modeling software was used for the hydraulic analysis for each area.

Analytical Procedures

The modeling effort for Area 2 focuses on the 25-year storm event for analysis of the existing culverts. The effects of the 50 and 100-year events area also examined. From the modeling effort of the existing culverts, evaluation and recommendations were developed for drainage system improvements by modeling potential upgrades to the culverts. The 25-year event was selected based on recommended culvert sizing criteria from the New Hampshire Department of Transportation, *Manual on Drainage Design for Highways*.

The drainage study was completed using HydroCAD which generates runoff hydrographs for specified storm distributions, and performs reservoir routing using the storage indication method.

The following modeling assumptions were incorporated into the analysis:

- Soil Hydrology from Natural Resources Conservation Services (see Figure 2, Hydrological Soil group Plan)
- Routing technique is Dynamic Storage-Indication method
- City GIS mapping with two foot contours with detailed survey at the culverts provides sufficient data for modeling the Area 2 culverts.
- Upon review of the topography and flood studies of the Great Bog, modeling flood levels in the Great Bog itself was not necessary. The tailwater elevations of the Great Bog do not appear to be a key element of the Banfield Road and B&M Railroad culverts. This large storage volume in the Great Bog serves to buffer the minor influences in the watershed.
- A limited amount of future development can be expected in the Gateway and Industrial zones within the watershed. These areas were modeled as being build out.
- Storm and flooding events during the study period have not rivaled events of March 2010 or earlier events when Banfield Road was inundated. Therefore a field validation of the hydraulic modeling has not been possible and the projected flood levels in this report rely solely on the hydrologic modeling effort.

Stormwater Modeling Limitations

Computer modeling of complex watersheds is not an exact science and projected flows can vary significantly depending on the accuracy of input data and the level of detail in defining sub-watersheds. The model data presented in this report is based on Altus's best judgment on appropriate input data, consistent with the scope of the study, and careful review of output data to assure its reasonableness. Stormwater modeling is limited in its capacity to precisely predict peak flow rates and flood elevations and results should not be considered absolute, due to the number of variables and assumptions involved in the modeling effort. Surface roughness coefficients (n), entrance loss coefficients (k_e), velocity factors (k_v), time of concentration (T_c), and tail water conditions are based on subjective field observations and engineering judgment. Higher flood elevations than predicted by modeling can occur if drainage channels and culverts are not maintained and become blocked by debris before or during storm events. Siltation, blockage or damage to culverts or storm drains will impact flow capacity of the structures. Structures should be re-evaluated if future changes occur within drainage basins.

Appendix A of this report presents a detailed summary of the computer modeling effort. The results are discussed in the Section 4.0 Findings below.

Culvert Evaluation Criteria:

Performance of existing culverts needs to be evaluated on several criteria. Water levels at a culvert inlet can exceed the top of the culvert during the peak of a storm event, however

roadways should not be overtopped and the headwater (water level above the invert of the culvert entrance) should not be excessive since vortexing can occur. The maximum permissible depth of flow immediately upstream from a culvert needs to take into consideration:

- Damage to adjacent property.
- Damage to the culvert and roadway
- Traffic interruption
- Hazard to human life
- Damage to stream and floodplain environment
- Hydraulics (headwater, tailwater, entrance losses and velocity)

The New Hampshire Department of Transportation, *Manual on Drainage Design for Highways* provides the following guidance regarding allowable headwater:

<u>Pipe Size</u>	<u>Allowable Headwater</u>
12-30 inch	2 times pipe diameter
36-48 inch	1.5 times pipe diameter
54 inch – up	1 time pipe diameter

In addition, Altus recommends that one foot 12” of freeboard be provided from the peak headwater elevation to the roadway crown.

As previously noted, the 25-year event was selected for evaluations based on recommended culvert sizing criteria from the New Hampshire Department of Transportation, *Manual on Drainage Design for Highways*. City of Portsmouth Subdivision Rules and Regulations require new subdivisions to have stormwater infrastructure at minor brook crossing to accommodate the 15-year storm event.

Minimum culvert size = 12 inches (per The City of Portsmouth Subdivision regulations require that culverts be a minimum diameter of 12 inches. NHDOT requires a minimum of 15 inches.

3.0 WATERSHED DESCRIPTIONS

The Area 2 Design Report focuses on the upper Pickering Brook watershed bordered to the northwest by the Great Bog, to the southwest by Ocean Road, to the southeast by Lafayette Road and to the northeast by a topographic ridge east Continental Avenue. The area contains 542 acres of residential development, commercial development, woodlands and wetlands.

For the purpose of the report, the area of study was delineated by five subwatersheds draining to the Great Bog. Subwatersheds A through E are delineated on Figure 3, Area Plan. Each of these subwatershed drains to the culvert identified below

Subwatershed	Drainage Area	Outlet Culvert
A	37.1 acres	Ban-1
B	222.1 acres	Ban-2
C	1.2 acres	Ban-3
D	139.7 acres	RR-2
E	143.2 acres	RR-4

Subwatershed A is bordered by Banfield Road, Ocean Road and the railroad line. It is mostly wooded with about 20 single family residences along the roadways. A large portion of the subwatershed is zoned Natural Resource Protection. Drainage crosses under Banfield Road at the culvert designated as Ban-1.

Subwatershed B is located east of Subwatershed B and north of Ocean Road and contains a mix of land uses. Industrial areas are located off Heritage Avenue. The northerly portion of the Maple Haven neighborhood and a portion of Patriots Park form a densely populated residential area. East of the railroad tracks is a large area of woodland and wetlands. The developed portions of Subwatershed B have complex systems of drainage pipes and other stormwater facilities. Wetland systems virtually surround the Post Office processing center. Large culverts under two (2) driveways at this facility drain to a box culvert (RR-1) under the railroad to another wetland. A culvert under Banfield Road (Ban-2) drains this wetland to the Great Bog.

Subwatershed C is a small (1.2 acre) area located west of railroad crossing at Banfield Road. An appropriately sized pipe (Ban-3) drains the area under Banfield Road to the Great Bog.

Subwatershed D is generally located between Heritage Avenue and Constitution Avenue. Several large commercial and industrial facilities are located within the area. A wooded area zoned Natural Resource Protection extends north from Heritage Avenue to Constitution

Avenue and Banfield Road. Adjacent to a pond on residential property, culvert Ban-5 drains a 114.5 acre area under Banfield Road. The culvert has a weir plate installed at its inlet which restricts the flow capacity of the culvert. Flow discharging from Ban-5 drains to an area that is often flooded due to beaver activity at the inlet of culvert RR-2 under the railroad.

Subwatershed E is located on each side of Banfield Road. From Constitution Avenue and a watershed divide west of a parking lot at the Water Country facility, stormwater drains to a wetland, then beneath Banfield Road at culvert Ban-8. South of Ban-8 along Banfield Road are culverts, Ban-6 and Ban-7, all of which drain to a large wetland between Banfield Road and the railroad. This wetland mapped in the 100 year floodplain by on FEMA FIRM Map Panel as shown on Figure 4, Flood Zone Map. A 4' by 4' box culvert (RR-4) drains the wetland under the railroad to the Great Bog. During the study period beavers have constructed a dam at the culvert inlet. A smaller second culvert (RR-3) may exist under the railroad at the south end of the wetland, but it could not be located in the field. If it does exist, it is not functioning at this time.

Beaver Activity

Beavers tend to preferentially built dams that interfere with road crossings over flowing water; they especially tend to plug up culverts. According to the research, the reason for this is that the designs for road crossings tend to constrict the flow which speeds up the water, and tends to make riffing sounds. The sounds of flowing water in addition to a velocity threshold compel beavers to build dams. A long term approach to this problem is to minimize constriction of streams by constructing box culverts or bridges which, if designed properly, are less constricting than single round culverts. Removing beaver dams usually only lowers the water level for a short time. Beavers can reconstruct the dams very quickly, sometimes within 24 hours. Beaver eradication is often used as an interim solution where roads and property are being inundated. Installation of "beaver pipes" at culverts has been used with some success. Clemson University has developed a refinement of the beaver pipe concept with their so called "Clemson Pond Leveler." This device is designed to quiet the sound of water and to reduce the directional velocity.

4.0 FINDINGS

The city has experienced nuisance flooding in the study area for many years. As development potential in the area reaches build-out, the existing stormwater infrastructure is reaching, or in some cases exceeded, its design capacity. The existing conditions have been analyzed through document research, field reconnaissance and hydraulic modeling. For this draft report, the following summary of findings is provided:

- Beavers are actively blocking culverts along the railroad with their dams upstream of the inlets or by directly placing tree cuttings in the culvert. This is causing ponding of water toward Banfield Road. Private property is being inundating when the beaver dams become high enough. This problem is especially prominent east of culvert RR-

2 in Subwatershed D where water frequently backs up to the Banfield Road.. The water level often submerges the outlet of culvert Ban-5 at Banfield Road and floods portions of a lawn at a private residence.

- Pan Am Railways currently owns the railroad right-of-way (ROW) within the study area. This ROW is part of the so called “Hampton Branch” originating in Portsmouth and running southerly toward Massachusetts. The line has not been used in recent years. It appears that the line is not being maintained. It has been reported that the owner is planning to abandon and discontinue service.
- Table 1, Existing Culvert Summary lists the culvert in the study area and certain hydraulic characteristics based on the 25-year storm event. Excessive headwater and lack of appropriate freeboard are identified undersized culverts
- Table 2, Proposed Culvert Upgrade Summary lists culverts targeted for upgrade and proposed new culvert size to convey the 25-year event within the parameters. Final design is required to determine headwall design or other inlet and outlet protection. Alternate culvert configurations should also be considered.
- Upstream of the culverts being evaluated in this report are several undersized culverts and drain systems that are creating de facto detention areas along the watercourses. This de facto detention is reducing the peak flow rates downstream. If these culverts were upgraded to carry higher flow and other control means were not installed, the peak flow arriving at the culverts being analyzed for this report could be increased significantly. Retaining the wetlands and preserving their nature detention capacity is an important consideration in the City’s overall stormwater management program.
- The tailwater effects of the Great Bog do not appear to adversely affect the function Banfield Road and B&M Railroad culverts. The Great Bog provides a large storage relative to the size of the overall watershed. This large storage volume in the Great Bog buffers the minor influences in the watershed.
- Minimal opportunity for water quality improvement with LID techniques at the point of construction, however the Area 1 outfalls upgrades corrected erosion problems and provide some treatment prior to discharging to the downgradient wetlands.
- Although beyond the scope of this study some improvement of aquatic fauna [habitat benefits] could possibly be achieved by using or open sided or buried inverts to provide a natural bottom. Installing oversized reduce velocity

5.0 RECOMMENDATIONS

It is understood that the City's areas of interest include optimizing the use of existing infrastructure and minimizing need for additional drainage easements. A remedial plan is recommended to address flooding that includes both structural upgrades and non-structural actions.

High priority projects:

- Replace existing culvert Ban-2 with a minimum of (3) 18-inch pipes or their equivalent capacity. Alternatively, consideration should be given to installing a concrete box culvert with a buried invert or 3-sided culvert
- Replace existing culvert Ban-5 with a minimum of (4) 18-inch pipes or their equivalent capacity pipes. Due to close proximity of pond and existing road grade, a special structure may be required.
- Seek authorization from the landowners and install "beaver pipes" at the inlets to culverts RR-2 and RR-4

Medium priority projects:

- Replace existing culvert Ban-1 with a 21-inch pipe or its equivalent
- Replace existing culvert Ban-8 with a 24-inch pipe or its equivalent. Downstream impact to a culvert under a private driveway would need to be addressed.

Non-Structural Actions:

- Public easements should be acquired from private landowners adjacent to culverts and along significant cross country watercourses to allow the City to maintain drainage systems.. Secure fifty feet where possible, 20-foot minimum. These easements should give the City full right of access any time
- Develop a policy and program for beaver control.

Opinions of Cost

[to be included in Final Report]

Environmental Permitting

[discussion to be included in the final report]

REFERENCES

1. New Hampshire Department of Transportation, *Manual on Drainage Design for Highways*, Revision Date: April 1998. {some portions are 2002}
2. New Hampshire Department of Transportation, *Highway Design Manual*, Revision Date: July 2007
3. Millette Sprague Colwell, *Flood Plain Analysis for Ocean Road Development Corp., Heather Lane, Portsmouth, NH*, dated February 22, 1999
4. HydroCAD Software Solution, LLC, *HydroCAD Stormwater Modeling System Owner's Manual, Version 9*, dated 2009

**TABLE 1
EXISTING CULVERT SUMMARY**

Culvert	Culvert Size	Drainage Area	HydroCAD Pond #	25-Yr Storm Event		Headwater	Freeboard
				Inflow	Outflow		
BAN-1	(1) - 15"	37.1 ac.	1P	13.16 cfs	13.13 cfs	2.6 x dia	Overtops 5.62 cfs
BAN-2	(1) - 18"	222.1 ac.	6P	46.27 cfs	37.72 cfs	2.5 x dia	Overtops 22.85 cfs
BAN-3	(1) - 15"	1.2 ac.	7P	0.85 cfs	0.52 cfs	0.3 x dia	4.9 ft.
BAN-4	(3) - 12"	16.2 ac.	8P	21.86 cfs	10.34 cfs	1.9 x dia	3.1 ft.
BAN-5	(1) - 15"	114.5 ac.	9P	27.22 cfs	27.2 cfs	2.2 x dia	Overtops 20.44 cfs
BAN-6	CB w/15"	5.1 ac.	11P	13.54 cfs	13.54 cfs	2.9 x dia	Overtops 10.17 cfs
BAN-7	(1) - 12"	2.1 ac.	12P	6.68 cfs	1.62 cfs	0.9 x dia	2.1 ft.
BAN-8	(1) - 12"	41.0 ac.	13P	82.37 cfs	5.57 cfs	2.8 x dia	0.7 ft.
RR-1	20"x36" Box	207.3 ac.	5P	68.85 cfs	36.97 cfs	4.9 x dia	0.5 ft.
RR-2	(1) - 24"	139.7 ac.	10P	28.18 cfs	20.91 cfs	2.0 x dia	3.4 ft.
RR-3	(1) - 14"	culvert not found		-	-	-	-
RR-4	4'x4' Box	143.2 ac.	14P	263.40 cfs	11.58 cfs	0.4 x dia	6.6 ft.

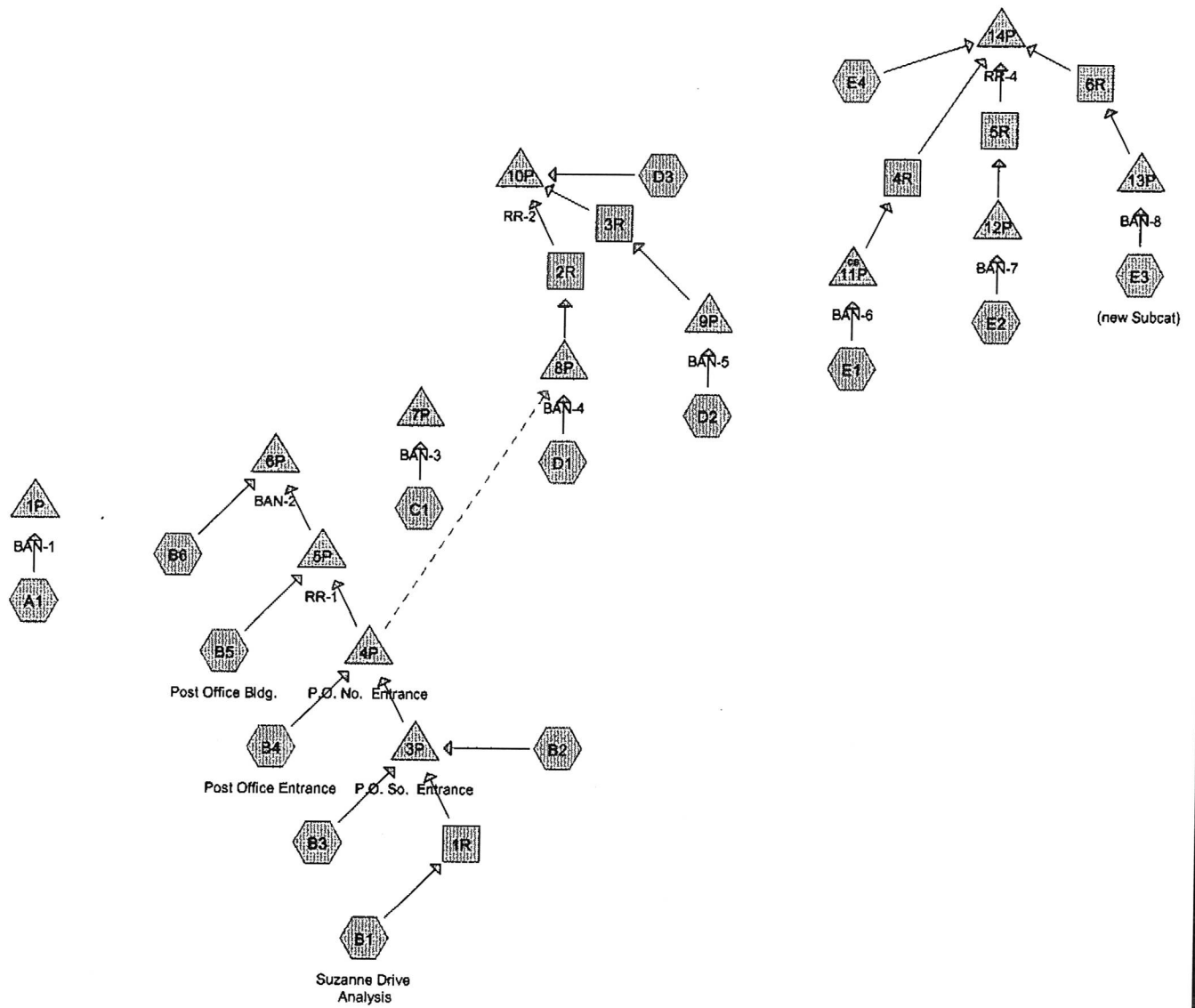
**TABLE 2
PROPOSED CULVERT UPGRADE SUMMARY**

Culvert	New Culvert Size	Drainage Area	HydroCAD Pond #	25-Yr Storm Event		Headwater	Freeboard
				Inflow	Outflow		
BAN-1	(1) - 21"	37.1 ac.	1P	13.16 cfs	13.14 cfs	1.4 x dia	0.8 ft.
BAN-2	(3) - 18"	222.1 ac.	6P	48.66 cfs	39.25 cfs	2.1 x dia	1.5 ft.
BAN-5	(4) - 18"	114.5 ac.	9P	27.22 cfs	26.58 cfs	1.1 x dia	0.9 ft.
BAN-6	CB w/18"	5.1 ac.	11P	13.54 cfs	13.54 cfs	2.2 x dia	0.2 ft.
BAN-8	(1) - 24"	41.0 ac.	13P	82.37 cfs	13.71 cfs	1.2 x dia	1.0 ft.

APPENDIX A

**MAPLE HAVEN AREA DRAINAGE
UPGRADE PROJECT**

**DRAINAGE ANALYSIS
OF
EXISTING CULVERTS**



Drainage Diagram for 4149.Banfield.Rd (Existing)
 Prepared by Altus Engineering, Inc., Printed 9/27/2011
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4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

Prepared by Altus Engineering, Inc.

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Summary for Subcatchment A1:

Runoff = 13.16 cfs @ 14.39 hrs, Volume= 5.060 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
20.150	55	Woods, Good, HSG B
9.690	73	Woods, Fair, HSG C
1.600	83	1/4 acre lots, 38% imp, HSG C
4.740	70	1/2 acre lots, 25% imp, HSG B
0.910	80	1/2 acre lots, 25% imp, HSG C
37.090	63	Weighted Average
35.070		94.55% Pervious Area
2.020		5.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
164.0	1,740	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment B1: Suzanne Drive Analysis

Runoff = 55.47 cfs @ 12.11 hrs, Volume= 4.160 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
* 22.000	71	
22.000		100.00% Pervious Area

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

Summary for Subcatchment B2:

Runoff = 170.83 cfs @ 12.32 hrs, Volume= 19.927 af, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
10.670	89	Urban commercial, 85% imp, HSG A
43.830	92	Urban commercial, 85% imp, HSG B
1.000	30	Woods, Good, HSG A
2.530	70	Woods, Good, HSG C
2.300	79	Woods, Fair, HSG D
60.330	89	Weighted Average
14.005		23.21% Pervious Area
46.325		76.79% Impervious Area

4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	1,800	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment B3:

Runoff = 53.14 cfs @ 14.93 hrs, Volume= 22.921 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
17.850	92	Urban commercial, 85% imp, HSG B
21.500	70	1/2 acre lots, 25% imp, HSG B
2.880	85	1/2 acre lots, 25% imp, HSG D
22.730	55	Woods, Good, HSG B
1.850	70	Woods, Good, HSG C
42.130	79	Woods, Fair, HSG D
108.940	74	Weighted Average
87.673		80.48% Pervious Area
21.267		19.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
213.3	3,200	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment B4: Post Office Entrance

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

Runoff = 9.28 cfs @ 12.00 hrs, Volume= 0.546 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.450	98	Paved parking, HSG B
0.850	55	Woods, Good, HSG B
1.700	70	Woods, Good, HSG C
3.000	70	Weighted Average
2.550		85.00% Pervious Area
0.450		15.00% Impervious Area

Summary for Subcatchment B5: Post Office Bldg.

Runoff = 46.26 cfs @ 12.14 hrs, Volume= 3.849 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Area (ac)	CN	Description
6.800	98	Roofs, HSG B
2.800	60	Woods, Fair, HSG B
3.400	79	Woods, Fair, HSG D
13.000	85	Weighted Average
6.200		47.69% Pervious Area
6.800		52.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	700	0.0500	1.12		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment B6:

Runoff = 18.78 cfs @ 12.54 hrs, Volume= 2.705 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
4.230	70	1/2 acre lots, 25% imp, HSG B
3.090	55	Woods, Good, HSG B
7.530	77	Woods, Good, HSG D
14.850	70	Weighted Average
13.793		92.88% Pervious Area
1.057		7.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.5	1,000	0.0300	0.43		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment C1:

Runoff = 0.85 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.350	39	>75% Grass cover, Good, HSG A
0.350	30	Woods, Good, HSG A
0.350	70	Woods, Good, HSG C
1.180	52	Weighted Average
1.050		88.98% Pervious Area
0.130		11.02% Impervious Area

4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	335	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment D1:

Runoff = 21.86 cfs @ 12.32 hrs, Volume= 2.517 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
3.850	30	Woods, Good, HSG A
1.660	55	Woods, Good, HSG B
1.180	70	Woods, Good, HSG C
8.300	81	Urban industrial, 72% imp, HSG A
0.760	88	Urban industrial, 72% imp, HSG B
0.440	93	Urban industrial, 72% imp, HSG D
16.190	66	Weighted Average
9.350		57.75% Pervious Area
6.840		42.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	950	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment D2:

Runoff = 27.22 cfs @ 21.31 hrs, Volume= 27.186 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
6.180	30	Woods, Good, HSG A
14.600	55	Woods, Good, HSG B
18.160	70	Woods, Good, HSG C
2.240	77	Woods, Good, HSG D
23.160	89	Urban commercial, 85% imp, HSG A
26.000	92	Urban commercial, 85% imp, HSG B
0.300	94	Urban commercial, 85% imp, HSG C
0.100	95	Urban commercial, 85% imp, HSG D
* 13.600	89	Future Urban commercial, 85% imp, HSG A
* 10.200	92	Future Urban commercial, 85% imp, HSG B
114.540	79	Weighted Average
52.184		45.56% Pervious Area
62.356		54.44% Impervious Area

4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.8	925	0.0060	0.39		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
645.1	3,060	0.0010	0.08		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
684.9	3,985	Total			

Summary for Subcatchment D3:

Runoff = 4.55 cfs @ 12.40 hrs, Volume= 0.669 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.450	98	Paved parking, HSG B
4.650	30	Woods, Good, HSG A
3.000	70	Woods, Good, HSG C
0.880	79	Woods, Fair, HSG D
8.980	52	Weighted Average
8.530		94.99% Pervious Area
0.450		5.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	750	0.0500	0.56		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment E1:

Runoff = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
3.240	55	Woods, Good, HSG B
0.300	74	>75% Grass cover, Good, HSG C
1.510	98	Paved parking, HSG B
5.050	69	Weighted Average
3.540		70.10% Pervious Area
1.510		29.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	175	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	600	0.0500	9.51	19.03	Channel Flow, Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.022 Earth, clean & straight
3.2	775	Total			

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Summary for Subcatchment E2:

Runoff = 6.68 cfs @ 12.08 hrs, Volume= 0.464 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.240	74	>75% Grass cover, Good, HSG C
1.010	55	Woods, Good, HSG B
0.880	98	Paved parking, HSG B
2.130	75	Weighted Average
1.250		58.69% Pervious Area
0.880		41.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	300	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment E3: (new Subcat)

Runoff = 82.37 cfs @ 12.53 hrs, Volume= 12.129 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
11.220	92	Urban commercial, 85% imp, HSG B
2.020	94	Urban commercial, 85% imp, HSG C
4.110	55	Woods, Good, HSG B
4.590	70	Woods, Good, HSG C
4.020	77	Woods, Good, HSG D
* 2.500	94	Future Urban commercial, 85% imp, HSG C
* 12.500	92	Future Urban commercial, 85% imp, HSG B
40.960	85	Weighted Average
16.956		41.40% Pervious Area
24.004		58.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.0	1,650	0.0180	0.67		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment E4:

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

Runoff = 257.70 cfs @ 12.00 hrs, Volume= 15.403 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Area (ac)	CN	Description
5.000	68	1 acre lots, 20% imp, HSG B
40.230	55	Woods, Good, HSG B
17.070	70	Woods, Good, HSG C
32.800	79	Woods, Fair, HSG D
95.100	67	Weighted Average
94.100		98.95% Pervious Area
1.000		1.05% Impervious Area

Summary for Reach 1R:

[91] Warning: Storage range exceeded by 0.47'

[55] Hint: Peak inflow is 289% of Manning's capacity

Inflow Area = 22.000 ac, 0.00% Impervious, Inflow Depth = 2.27" for 25-yr storm event
 Inflow = 55.47 cfs @ 12.11 hrs, Volume= 4.160 af
 Outflow = 38.42 cfs @ 12.20 hrs, Volume= 4.159 af, Atten= 31%, Lag= 5.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 3.38 fps, Min. Travel Time= 10.8 min
 Avg. Velocity = 0.92 fps, Avg. Travel Time= 39.9 min

Peak Storage= 24,982 cf @ 12.20 hrs, Average Depth at Peak Storage= 1.47'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.040
 Length= 2,200.0' Slope= 0.0106 '/'
 Inlet Invert= 54.40', Outlet Invert= 31.00'

Summary for Reach 2R:

Inflow Area = 16.190 ac, 42.25% Impervious, Inflow Depth > 1.86" for 25-yr storm event
 Inflow = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af
 Outflow = 10.31 cfs @ 12.77 hrs, Volume= 2.512 af, Atten= 0%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 1.58 fps, Min. Travel Time= 4.2 min
 Avg. Velocity = 0.60 fps, Avg. Travel Time= 11.2 min

Peak Storage= 2,603 cf @ 12.77 hrs, Average Depth at Peak Storage= 1.24'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 28.43 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
 Length= 400.0' Slope= 0.0102 '/'
 Inlet Invert= 33.10', Outlet Invert= 29.03'

Summary for Reach 3R:

[91] Warning: Storage range exceeded by 0.61'

[55] Hint: Peak inflow is 164% of Manning's capacity

Inflow Area = 114.540 ac, 54.44% Impervious, Inflow Depth > 2.60" for 25-yr storm event
 Inflow = 27.20 cfs @ 21.35 hrs, Volume= 24.817 af
 Outflow = 27.20 cfs @ 21.40 hrs, Volume= 24.756 af, Atten= 0%, Lag= 3.2 min

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.40 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 6.1 min

Peak Storage= 7,753 cf @ 21.40 hrs, Average Depth at Peak Storage= 2.61'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 16.62 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 400.0' Slope= 0.0035 '/
Inlet Invert= 30.42', Outlet Invert= 29.03'

Summary for Reach 4R:

[55] Hint: Peak inflow is 107% of Manning's capacity

Inflow Area = 5.050 ac, 29.90% Impervious, Inflow Depth = 2.10" for 25-yr storm event
Inflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af
Outflow = 5.96 cfs @ 12.23 hrs, Volume= 0.885 af, Atten= 56%, Lag= 10.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.56 fps, Min. Travel Time= 23.5 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 73.0 min

Peak Storage= 8,401 cf @ 12.23 hrs, Average Depth at Peak Storage= 1.38'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 12.71 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
Length= 2,200.0' Slope= 0.0026 '/
Inlet Invert= 36.80', Outlet Invert= 31.00'

Summary for Reach 5R:

Inflow Area = 2.130 ac, 41.31% Impervious, Inflow Depth > 2.56" for 25-yr storm event
Inflow = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af
Outflow = 1.35 cfs @ 12.96 hrs, Volume= 0.452 af, Atten= 17%, Lag= 28.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.25 fps, Min. Travel Time= 26.7 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 57.1 min

Peak Storage= 2,159 cf @ 12.96 hrs, Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 16.61 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
Length= 2,000.0' Slope= 0.0045 '/
Inlet Invert= 40.00', Outlet Invert= 31.00'

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Summary for Reach 6R:

Inflow Area = 40.960 ac, 58.60% Impervious, Inflow Depth > 3.12" for 25-yr storm event
 Inflow = 5.57 cfs @ 16.38 hrs, Volume= 10.666 af
 Outflow = 5.57 cfs @ 16.77 hrs, Volume= 10.497 af, Atten= 0%, Lag= 23.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 1.09 fps, Min. Travel Time= 28.9 min
 Avg. Velocity = 0.98 fps, Avg. Travel Time= 32.4 min

Peak Storage= 9,673 cf @ 16.77 hrs, Average Depth at Peak Storage= 1.67'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 8.03 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
 Length= 1,900.0' Slope= 0.0011 '/
 Inlet Invert= 33.00', Outlet Invert= 31.00'

Summary for Pond 1P: BAN-1

Inflow Area = 37.090 ac, 5.45% Impervious, Inflow Depth = 1.64" for 25-yr storm event
 Inflow = 13.16 cfs @ 14.39 hrs, Volume= 5.060 af
 Outflow = 13.13 cfs @ 14.42 hrs, Volume= 5.060 af, Atten= 0%, Lag= 1.5 min
 Primary = 13.13 cfs @ 14.42 hrs, Volume= 5.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.36' @ 14.42 hrs Surf.Area= 0.260 ac Storage= 0.080 af

Plug-Flow detention time= 3.3 min calculated for 5.060 af (100% of inflow)
 Center-of-Mass det. time= 3.3 min (1,013.5 - 1,010.2)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	0.378 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
40.00	0.001	0.000	0.000
41.00	0.005	0.003	0.003
42.00	0.009	0.007	0.010
43.00	0.028	0.019	0.029
44.00	0.670	0.349	0.378

Device	Routing	Invert	Outlet Devices
#1	Primary	40.14'	15.0" Round MSC PS7 L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 40.09' S= 0.0016 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	43.24'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.13 cfs @ 14.42 hrs HW=43.36' (Free Discharge)

1=MSC PS7 (Inlet Controls 7.52 cfs @ 6.12 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 5.62 cfs @ 0.93 fps)

Summary for Pond 3P: P.O. So. Entrance

[62] Warning: Exceeded Reach 1R OUTLET depth by 15.07' @ 16.49 hrs

Inflow Area = 191.270 ac, 35.34% Impervious, Inflow Depth = 2.95" for 25-yr storm event
 Inflow = 209.48 cfs @ 12.30 hrs, Volume= 47.008 af
 Outflow = 52.27 cfs @ 16.12 hrs, Volume= 46.972 af, Atten= 75%, Lag= 229.2 min
 Primary = 52.27 cfs @ 16.12 hrs, Volume= 46.972 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 46.45' @ 16.12 hrs Surf.Area= 552,231 sf Storage= 655,173 cf

Plug-Flow detention time= 185.1 min calculated for 46.959 af (100% of inflow)
 Center-of-Mass det. time= 184.4 min (1,105.3 - 920.9)

Volume	Invert	Avail.Storage	Storage Description
#1	44.20'	1,605,340 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.20	1,000	0	0
44.50	30,500	4,725	4,725
46.00	518,000	411,375	416,100
48.00	671,240	1,189,240	1,605,340

Device	Routing	Invert	Outlet Devices
#1	Primary	44.37'	58.0" W x 36.0" H, R=30.0"/64.0" Arch Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.17' S= 0.0031 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	44.20'	36.0" W x 24.0" H, R=19.0"/51.0" Arch Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.12' S= 0.0012 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Primary	49.50'	40.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=52.27 cfs @ 16.12 hrs HW=46.45' TW=39.81' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 32.48 cfs @ 5.01 fps)
- 2=Culvert (Barrel Controls 19.79 cfs @ 4.55 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 4P: P.O. No. Entrance

Inflow Area = 194.270 ac, 35.02% Impervious, Inflow Depth > 2.94" for 25-yr storm event
 Inflow = 52.56 cfs @ 16.11 hrs, Volume= 47.519 af
 Outflow = 52.12 cfs @ 16.11 hrs, Volume= 47.518 af, Atten= 1%, Lag= 0.0 min
 Primary = 52.12 cfs @ 16.11 hrs, Volume= 47.518 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 40.94' @ 19.93 hrs Surf.Area= 4,492 sf Storage= 6,323 cf

Plug-Flow detention time= 1.4 min calculated for 47.505 af (100% of inflow)

Center-of-Mass det. time= 1.4 min (1,103.7 - 1,102.3)

Volume	Invert	Avail.Storage	Storage Description
#1	37.44'	29,402 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.44	100	0	0
38.00	300	112	112
40.00	2,580	2,880	2,992
42.00	6,640	9,220	12,212
44.00	10,550	17,190	29,402

Device	Routing	Invert	Outlet Devices
#1	Primary	37.44'	24.0" Round Culvert X 6.00 L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 37.12' S= 0.0049 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	43.00'	40.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=52.12 cfs @ 16.11 hrs HW=39.80' TW=39.27' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 52.12 cfs @ 2.77 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.44' TW=33.30' (Dynamic Tailwater)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: RR-1

Inflow Area = 207.270 ac, 36.11% Impervious, Inflow Depth > 2.97" for 25-yr storm event
 Inflow = 68.85 cfs @ 12.15 hrs, Volume= 51.368 af
 Outflow = 36.97 cfs @ 20.41 hrs, Volume= 51.364 af, Atten= 46%, Lag= 495.8 min
 Primary = 36.97 cfs @ 20.41 hrs, Volume= 51.364 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 40.67' @ 20.42 hrs Surf.Area= 137,332 sf Storage= 507,283 cf

Plug-Flow detention time= 155.8 min calculated for 51.364 af (100% of inflow)
 Center-of-Mass det. time= 155.8 min (1,237.5 - 1,081.7)

Volume	Invert	Avail.Storage	Storage Description
#1	30.97'	698,288 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
30.97	50	0	0
32.00	55	54	54
33.00	60	58	112
35.00	70	130	242
35.53	16,414	4,368	4,610
36.00	72,909	20,991	25,601
38.00	99,247	172,156	197,757
40.00	123,177	222,424	420,181
41.00	144,344	133,761	553,941
42.00	144,350	144,347	698,288

Device	Routing	Invert	Outlet Devices
#1	Primary	30.97'	24.0" W x 24.0" H Box MSC Reservoir #8 L= 53.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Outlet Invert= 30.93' S= 0.0008 '/ Cc= 0.900 n= 0.025 Rubble masonry, cemented
#2	Primary	41.20'	100.0' long x 16.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.97 cfs @ 20.41 hrs HW=40.67' TW=35.17' (Dynamic Tailwater)

1=MSC Reservoir #8 (Outlet Controls 36.97 cfs @ 9.24 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 6P: BAN-2

[80] Warning: Exceeded Pond 5P by 0.40' @ 0.00 hrs (0.62 cfs 0.274 af)

Inflow Area = 222.120 ac, 34.17% Impervious, Inflow Depth > 2.92" for 25-yr storm event
 Inflow = 46.27 cfs @ 12.54 hrs, Volume= 54.069 af
 Outflow = 37.72 cfs @ 20.54 hrs, Volume= 50.040 af, Atten= 18%, Lag= 479.7 min
 Primary = 37.72 cfs @ 20.54 hrs, Volume= 50.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.17' @ 20.54 hrs Surf.Area= 198,331 sf Storage= 419,858 cf

Plug-Flow detention time= 210.4 min calculated for 50.040 af (93% of inflow)
 Center-of-Mass det. time= 163.5 min (1,382.9 - 1,219.4)

Volume	Invert	Avail.Storage	Storage Description
#1	31.37'	590,013 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
31.37	40	0	0
33.70	131,700	153,477	153,477
34.00	176,740	46,266	199,743
36.00	213,530	390,270	590,013

Device	Routing	Invert	Outlet Devices
#1	Primary	31.37'	18.0" Round MSC Reservoir #9 L= 32.0' CPP, square edge headwall, Ke= 0.500

Outlet Invert= 30.05' S= 0.0413 '/' Cc= 0.900
 n= 0.013 Corrugated PE, smooth interior
 #2 Primary 34.98' **100.0' long x 20.0' breadth Broad-Crested Rectangular Weir**
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=37.72 cfs @ 20.54 hrs HW=35.17' (Free Discharge)
 1=MSC Reservoir #9 (Inlet Controls 14.87 cfs @ 8.41 fps)
 2=Broad-Crested Rectangular Weir (Weir Controls 22.85 cfs @ 1.18 fps)

Summary for Pond 7P: BAN-3

Inflow Area = 1.180 ac, 11.02% Impervious, Inflow Depth = 0.89" for 25-yr storm event
 Inflow = 0.85 cfs @ 12.14 hrs, Volume= 0.088 af
 Outflow = 0.52 cfs @ 12.40 hrs, Volume= 0.088 af, Atten= 39%, Lag= 15.5 min
 Primary = 0.52 cfs @ 12.40 hrs, Volume= 0.088 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.39' @ 12.40 hrs Surf.Area= 1,647 sf Storage= 514 cf

Plug-Flow detention time= 33.7 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 32.5 min (935.1 - 902.6)

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	33,500 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	1,000	0	0
36.00	6,000	10,500	10,500
38.00	17,000	23,000	33,500

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	15.0" Round Culvert L= 36.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 32.80' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	38.25'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.52 cfs @ 12.40 hrs HW=33.39' (Free Discharge)
 1=Culvert (Barrel Controls 0.52 cfs @ 2.39 fps)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 8P: BAN-4

Inflow Area = 16.190 ac, 42.25% Impervious, Inflow Depth = 1.87" for 25-yr storm event
 Inflow = 21.86 cfs @ 12.32 hrs, Volume= 2.517 af
 Outflow = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af, Atten= 53%, Lag= 23.8 min
 Primary = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

4149.Banfield.Rd (Existing)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Peak Elev= 35.17' @ 12.73 hrs Surf.Area= 20,628 sf Storage= 26,345 cf

Plug-Flow detention time= 45.9 min calculated for 2.512 af (100% of inflow)
Center-of-Mass det. time= 44.9 min (915.9 - 871.0)

Volume #1	Invert 33.30'	Avail.Storage 108,005 cf	Storage Description
Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.30	7,866	0	0
34.00	12,203	7,024	7,024
35.00	19,608	15,906	22,930
36.00	25,613	22,611	45,540
38.00	36,852	62,465	108,005

Device #1	Routing Primary	Invert 33.30'	Outlet Devices
12.0" Round MSC Reservoir #12 X 3.00 L= 36.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 33.10' S= 0.0056 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior			
#2	Primary	38.25'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.34 cfs @ 12.72 hrs HW=35.17' TW=34.34' (Dynamic Tailwater)

1=MSC Reservoir #12 (Inlet Controls 10.34 cfs @ 4.39 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 9P: BAN-5

Inflow Area = 114.540 ac, 54.44% Impervious, Inflow Depth > 2.85" for 25-yr storm event
 Inflow = 27.22 cfs @ 21.31 hrs, Volume= 27.186 af
 Outflow = 27.20 cfs @ 21.35 hrs, Volume= 24.817 af, Atten= 0%, Lag= 2.5 min
 Primary = 27.20 cfs @ 21.35 hrs, Volume= 24.817 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.31' @ 21.35 hrs Surf.Area= 106,834 sf Storage= 135,748 cf

Plug-Flow detention time= 121.8 min calculated for 24.810 af (91% of inflow)
 Center-of-Mass det. time= 66.4 min (1,469.5 - 1,403.1)

Volume #1	Invert 33.59'	Avail.Storage 381,776 cf	Storage Description		
Custom Stage Data (Irregular) Listed below (Recalc)					
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
33.59	8,500	400.0	0	0	8,500
34.00	16,010	528.0	4,944	4,944	17,954
36.00	94,168	1,940.0	99,337	104,281	295,278
38.00	188,753	2,578.0	277,495	381,776	524,704

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Device	Routing	Invert	Outlet Devices
#1	Primary	33.59'	15.0" Round MSC Reservoir #11 L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 30.42' S= 0.0991 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	34.21'	1.3' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.6' Crest Height
#3	Primary	36.20'	200.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=27.20 cfs @ 21.35 hrs HW=36.31' TW=33.03' (Dynamic Tailwater)

- 1=MSC Reservoir #11 (Inlet Controls 6.76 cfs @ 5.51 fps)
- 2=Sharp-Crested Rectangular Weir (Passes 6.76 cfs of 12.53 cfs potential flow)
- 3=Broad-Crested Rectangular Weir (Weir Controls 20.44 cfs @ 0.90 fps)

Summary for Pond 10P: RR-2

[62] Warning: Exceeded Reach 2R OUTLET depth by 3.93' @ 25.95 hrs

[63] Warning: Exceeded Reach 3R INLET depth by 0.64' @ 27.14 hrs

Inflow Area = 139.710 ac, 49.85% Impervious, Inflow Depth > 2.40" for 25-yr storm event
 Inflow = 28.18 cfs @ 21.37 hrs, Volume= 27.936 af
 Outflow = 20.91 cfs @ 25.16 hrs, Volume= 27.870 af, Atten= 26%, Lag= 227.4 min
 Primary = 20.91 cfs @ 25.16 hrs, Volume= 27.870 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.15' @ 25.16 hrs Surf.Area= 138,194 sf Storage= 184,485 cf

Plug-Flow detention time= 85.7 min calculated for 27.862 af (100% of inflow)
 Center-of-Mass det. time= 83.9 min (1,494.2 - 1,410.3)

Volume	Invert	Avail.Storage	Storage Description
#1	29.08'	321,732 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.08	436	0	0
30.00	1,395	842	842
31.00	20,838	11,117	11,959
32.00	77,189	49,014	60,972
34.00	183,571	260,760	321,732

Device	Routing	Invert	Outlet Devices
#1	Primary	29.08'	24.0" Round MSC Reservoir #13 L= 53.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 28.74' S= 0.0064 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	36.50'	100.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Handwritten notes:
 36.2 Elev Banfield
 35.2
 33.12
 30.50

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Primary OutFlow Max=20.91 cfs @ 25.16 hrs HW=33.15' (Free Discharge)

1=MSC Reservoir #13 (Inlet Controls 20.91 cfs @ 6.66 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 11P: BAN-6

[57] Hint: Peaked at 41.09' (Flood elevation advised)

Inflow Area = 5.050 ac, 29.90% Impervious, Inflow Depth = 2.10" for 25-yr storm event
 Inflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af
 Outflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af, Atten= 0%, Lag= 0.0 min
 Primary = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.09' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	15.0" Round Culvert L= 28.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 37.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	41.00'	50.0' long x 24.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.51 cfs @ 12.05 hrs HW=41.09' TW=37.92' (Dynamic Tailwater)

1=Culvert (Inlet Controls 10.17 cfs @ 8.28 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 3.35 cfs @ 0.78 fps)

Summary for Pond 12P: BAN-7

Inflow Area = 2.130 ac, 41.31% Impervious, Inflow Depth = 2.61" for 25-yr storm event
 Inflow = 6.68 cfs @ 12.08 hrs, Volume= 0.464 af
 Outflow = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af, Atten= 76%, Lag= 24.4 min
 Primary = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 42.93' @ 12.49 hrs Surf.Area= 10,144 sf Storage= 7,808 cf

Plug-Flow detention time= 129.3 min calculated for 0.454 af (98% of inflow)
 Center-of-Mass det. time= 116.7 min (949.0 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	42.00'	20,800 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.00	6,600	0	0
44.00	14,200	20,800	20,800

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Device	Routing	Invert	Outlet Devices
#1	Primary	42.00'	18.0" Round Culvert L= 28.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 41.75' S= 0.0089 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	42.01'	18.0" Round Culvert L= 1.5' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.00' S= 0.0067 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	42.02'	12.0" Round Culvert L= 1.5' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.01' S= 0.0067 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Primary	45.00'	50.0' long x 24.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.62 cfs @ 12.49 hrs HW=42.93' TW=40.51' (Dynamic Tailwater)

- 1=Culvert (Passes 1.62 cfs of 3.41 cfs potential flow)
- 2=Culvert (Passes 1.62 cfs of 2.26 cfs potential flow)
- 3=Culvert (Barrel Controls 1.62 cfs @ 2.82 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 13P: BAN-8

Inflow Area = 40.960 ac, 58.60% Impervious, Inflow Depth = 3.55" for 25-yr storm event
 Inflow = 82.37 cfs @ 12.53 hrs, Volume= 12.129 af
 Outflow = 5.57 cfs @ 16.38 hrs, Volume= 10.666 af, Atten= 93%, Lag= 230.5 min
 Primary = 5.57 cfs @ 16.38 hrs, Volume= 10.666 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.84' @ 16.44 hrs Surf.Area= 279,711 sf Storage= 325,600 cf

Plug-Flow detention time= 564.8 min calculated for 10.663 af (88% of inflow)
 Center-of-Mass det. time= 509.3 min (1,347.8 - 838.5)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	693,250 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	400	0	0
35.00	1,000	700	700
36.00	223,900	112,450	113,150
38.00	356,200	580,100	693,250

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	12.0" Round Culvert L= 32.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 33.84' S= 0.0050 '/' Cc= 0.900 n= 0.013 Cast iron, coated
#2	Primary	37.50'	100.0' long x 32.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.57 cfs @ 16.38 hrs HW=36.84' TW=34.67' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 5.57 cfs @ 7.10 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 14P: RR-4

Inflow Area = 143.240 ac, 19.12% Impervious, Inflow Depth > 2.28" for 25-yr storm event
 Inflow = 263.40 cfs @ 12.00 hrs, Volume= 27.238 af
 Outflow = 11.58 cfs @ 18.11 hrs, Volume= 20.367 af, Atten= 96%, Lag= 366.3 min
 Primary = 11.58 cfs @ 18.11 hrs, Volume= 20.367 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 30.89' @ 18.11 hrs Surf.Area= 898,850 sf Storage= 530,175 cf

Plug-Flow detention time= 548.6 min calculated for 20.367 af (75% of inflow)
 Center-of-Mass det. time= 349.3 min (1,399.7 - 1,050.4)

Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	14,433,550 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.50	1,000	0	0
30.00	186,000	46,750	46,750
32.00	1,785,700	1,971,700	2,018,450
34.00	2,018,400	3,804,100	5,822,550
36.00	2,168,300	4,186,700	10,009,250
38.00	2,256,000	4,424,300	14,433,550

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	48.0" W x 48.0" H Box Culvert L= 40.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet Invert= 29.50' S= 0.0000 ' Cc= 0.900 n= 0.025 Rubble masonry, cemented
#2	Primary	37.50'	100.0' long x 16.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=11.58 cfs @ 18.11 hrs HW=30.89' (Free Discharge)

- 1=Culvert (Barrel Controls 11.58 cfs @ 2.77 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr 50-yr storm Rainfall=5.80"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: Runoff Area=37.090 ac 5.45% Impervious Runoff Depth=2.04"
Flow Length=1,740' Slope=0.0050 '/' Tc=164.0 min CN=63 Runoff=16.71 cfs 6.299 af

Subcatchment B1: Suzanne Drive Analysis Runoff Area=22.000 ac 0.00% Impervious Runoff Depth=2.74"
Tc=7.2 min CN=71 Runoff=67.38 cfs 5.021 af

Subcatchment B2: Runoff Area=60.330 ac 76.79% Impervious Runoff Depth=4.54"
Flow Length=1,800' Slope=0.0070 '/' Tc=23.9 min CN=89 Runoff=194.54 cfs 22.834 af

Subcatchment B3: Runoff Area=108.940 ac 19.52% Impervious Runoff Depth=3.02"
Flow Length=3,200' Slope=0.0100 '/' Tc=213.3 min CN=74 Runoff=63.88 cfs 27.393 af

Subcatchment B4: Post Office Entrance Runoff Area=3.000 ac 15.00% Impervious Runoff Depth=2.65"
Tc=0.0 min CN=70 Runoff=11.33 cfs 0.662 af

Subcatchment B5: Post Office Bldg. Runoff Area=13.000 ac 52.31% Impervious Runoff Depth=4.11"
Flow Length=700' Slope=0.0500 '/' Tc=10.4 min CN=85 Runoff=53.29 cfs 4.457 af

Subcatchment B6: Runoff Area=14.850 ac 7.12% Impervious Runoff Depth=2.65"
Flow Length=1,000' Slope=0.0300 '/' Tc=38.5 min CN=70 Runoff=22.95 cfs 3.276 af

Subcatchment C1: Runoff Area=1.180 ac 11.02% Impervious Runoff Depth=1.19"
Flow Length=335' Slope=0.0200 '/' Tc=7.9 min CN=52 Runoff=1.25 cfs 0.117 af

Subcatchment D1: Runoff Area=16.190 ac 42.25% Impervious Runoff Depth=2.29"
Flow Length=950' Slope=0.0200 '/' Tc=22.4 min CN=66 Runoff=27.29 cfs 3.094 af

Subcatchment D2: Runoff Area=114.540 ac 54.44% Impervious Runoff Depth>3.36"
Flow Length=3,985' Tc=684.9 min CN=79 Runoff=32.10 cfs 32.027 af

Subcatchment D3: Runoff Area=8.980 ac 5.01% Impervious Runoff Depth=1.19"
Flow Length=750' Slope=0.0500 '/' Tc=22.4 min CN=52 Runoff=6.56 cfs 0.887 af

Subcatchment E1: Runoff Area=5.050 ac 29.90% Impervious Runoff Depth=2.56"
Flow Length=775' Tc=3.2 min CN=69 Runoff=16.61 cfs 1.076 af

Subcatchment E2: Runoff Area=2.130 ac 41.31% Impervious Runoff Depth=3.11"
Flow Length=300' Slope=0.0350 '/' Tc=5.3 min CN=75 Runoff=7.97 cfs 0.552 af

Subcatchment E3: (new Subcat) Runoff Area=40.960 ac 58.60% Impervious Runoff Depth=4.11"
Flow Length=1,650' Slope=0.0180 '/' Tc=41.0 min CN=85 Runoff=95.00 cfs 14.043 af

Subcatchment E4: Runoff Area=95.100 ac 1.05% Impervious Runoff Depth=2.38"
Tc=0.0 min CN=67 Runoff=319.53 cfs 18.863 af

Reach 1R: Avg. Depth=1.68' Max Vel=3.50 fps Inflow=67.38 cfs 5.021 af
n=0.040 L=2,200.0' S=0.0106 '/' Capacity=19.16 cfs Outflow=47.02 cfs 5.020 af

Reach 2R: Avg. Depth=1.33' Max Vel=1.66 fps Inflow=11.99 cfs 3.089 af
n=0.080 L=400.0' S=0.0102 '/' Capacity=28.43 cfs Outflow=11.96 cfs 3.089 af

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Type III 24-hr 50-yr storm Rainfall=5.80"

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Reach 3R: Avg. Depth=2.89' Max Vel=1.45 fps Inflow=32.09 cfs 29.494 af
n=0.080 L=400.0' S=0.0035 '/' Capacity=16.62 cfs Outflow=32.09 cfs 29.432 af

Reach 4R: Avg. Depth=1.55' Max Vel=1.67 fps Inflow=16.61 cfs 1.076 af
n=0.040 L=2,200.0' S=0.0026 '/' Capacity=12.71 cfs Outflow=7.60 cfs 1.076 af

Reach 5R: Avg. Depth=0.66' Max Vel=1.34 fps Inflow=2.00 cfs 0.542 af
n=0.040 L=2,000.0' S=0.0045 '/' Capacity=16.61 cfs Outflow=1.70 cfs 0.541 af

Reach 6R: Avg. Depth=1.71' Max Vel=1.11 fps Inflow=5.81 cfs 11.423 af
n=0.040 L=1,900.0' S=0.0011 '/' Capacity=8.03 cfs Outflow=5.81 cfs 11.238 af

Pond 1P: BAN-1 Peak Elev=43.41' Storage=0.093 af Inflow=16.71 cfs 6.299 af
Outflow=16.69 cfs 6.299 af

Pond 3P: P.O. So. Entrance Peak Elev=46.69' Storage=793,701 cf Inflow=242.31 cfs 55.248 af
Outflow=60.36 cfs 55.205 af

Pond 4P: P.O. No. Entrance Peak Elev=41.87' Storage=11,373 cf Inflow=60.69 cfs 55.867 af
Primary=59.80 cfs 55.867 af Secondary=0.00 cfs 0.000 af Outflow=59.80 cfs 55.867 af

Pond 5P: RR-1 Peak Elev=41.34' Storage=602,440 cf Inflow=79.79 cfs 60.324 af
Outflow=52.37 cfs 60.319 af

Pond 6P: BAN-2 Peak Elev=35.25' Storage=434,839 cf Inflow=53.41 cfs 63.596 af
Outflow=52.54 cfs 58.490 af

Pond 7P: BAN-3 Peak Elev=33.48' Storage=676 cf Inflow=1.25 cfs 0.117 af
Outflow=0.78 cfs 0.116 af

Pond 8P: BAN-4 Peak Elev=35.55' Storage=34,519 cf Inflow=27.29 cfs 3.094 af
Outflow=11.99 cfs 3.089 af

Pond 9P: BAN-5 Peak Elev=36.33' Storage=137,604 cf Inflow=32.10 cfs 32.027 af
Outflow=32.09 cfs 29.494 af

Pond 10P: RR-2 Peak Elev=33.74' Storage=276,261 cf Inflow=33.26 cfs 33.408 af
Outflow=22.86 cfs 33.279 af

Pond 11P: BAN-6 Peak Elev=41.13' Inflow=16.61 cfs 1.076 af
Outflow=16.61 cfs 1.076 af

Pond 12P: BAN-7 Peak Elev=43.07' Storage=9,233 cf Inflow=7.97 cfs 0.552 af
Outflow=2.00 cfs 0.542 af

Pond 13P: BAN-8 Peak Elev=37.07' Storage=389,429 cf Inflow=95.00 cfs 14.043 af
Outflow=5.81 cfs 11.423 af

Pond 14P: RR-4 Peak Elev=31.01' Storage=645,226 cf Inflow=326.43 cfs 31.718 af
Outflow=13.32 cfs 23.421 af

Total Runoff Area = 543.340 ac Runoff Volume = 140.601 af Average Runoff Depth = 3.11"
67.78% Pervious = 368.250 ac 32.22% Impervious = 175.091 ac

4149.Banfield.Rd (Existing)

Type III 24-hr 100-yr storm Rainfall=6.50"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: Runoff Area=37.090 ac 5.45% Impervious Runoff Depth=2.53"
Flow Length=1,740' Slope=0.0050 '/' Tc=164.0 min CN=63 Runoff=21.09 cfs 7.827 af

Subcatchment B1: Suzanne Drive Analysis Runoff Area=22.000 ac 0.00% Impervious Runoff Depth=3.31"
Tc=7.2 min CN=71 Runoff=81.67 cfs 6.062 af

Subcatchment B2: Runoff Area=60.330 ac 76.79% Impervious Runoff Depth=5.22"
Flow Length=1,800' Slope=0.0070 '/' Tc=23.9 min CN=89 Runoff=222.12 cfs 26.248 af

Subcatchment B3: Runoff Area=108.940 ac 19.52% Impervious Runoff Depth=3.61"
Flow Length=3,200' Slope=0.0100 '/' Tc=213.3 min CN=74 Runoff=76.73 cfs 32.769 af

Subcatchment B4: Post Office Entrance Runoff Area=3.000 ac 15.00% Impervious Runoff Depth=3.21"
Tc=0.0 min CN=70 Runoff=13.79 cfs 0.802 af

Subcatchment B5: Post Office Bldg. Runoff Area=13.000 ac 52.31% Impervious Runoff Depth=4.78"
Flow Length=700' Slope=0.0500 '/' Tc=10.4 min CN=85 Runoff=61.50 cfs 5.174 af

Subcatchment B6: Runoff Area=14.850 ac 7.12% Impervious Runoff Depth=3.21"
Flow Length=1,000' Slope=0.0300 '/' Tc=38.5 min CN=70 Runoff=27.96 cfs 3.969 af

Subcatchment C1: Runoff Area=1.180 ac 11.02% Impervious Runoff Depth=1.56"
Flow Length=335' Slope=0.0200 '/' Tc=7.9 min CN=52 Runoff=1.75 cfs 0.153 af

Subcatchment D1: Runoff Area=16.190 ac 42.25% Impervious Runoff Depth=2.82"
Flow Length=950' Slope=0.0200 '/' Tc=22.4 min CN=66 Runoff=33.91 cfs 3.800 af

Subcatchment D2: Runoff Area=114.540 ac 54.44% Impervious Runoff Depth>3.96"
Flow Length=3,985' Tc=684.9 min CN=79 Runoff=37.90 cfs 37.796 af

Subcatchment D3: Runoff Area=8.980 ac 5.01% Impervious Runoff Depth=1.56"
Flow Length=750' Slope=0.0500 '/' Tc=22.4 min CN=52 Runoff=9.17 cfs 1.167 af

Subcatchment E1: Runoff Area=5.050 ac 29.90% Impervious Runoff Depth=3.11"
Flow Length=775' Tc=3.2 min CN=69 Runoff=20.30 cfs 1.308 af

Subcatchment E2: Runoff Area=2.130 ac 41.31% Impervious Runoff Depth=3.71"
Flow Length=300' Slope=0.0350 '/' Tc=5.3 min CN=75 Runoff=9.51 cfs 0.659 af

Subcatchment E3: (new Subcat) Runoff Area=40.960 ac 58.60% Impervious Runoff Depth=4.78"
Flow Length=1,650' Slope=0.0180 '/' Tc=41.0 min CN=85 Runoff=109.76 cfs 16.302 af

Subcatchment E4: Runoff Area=95.100 ac 1.05% Impervious Runoff Depth=2.91"
Tc=0.0 min CN=67 Runoff=394.52 cfs 23.087 af

Reach 1R: Avg. Depth=1.93' Max Vel=3.59 fps Inflow=81.67 cfs 6.062 af
n=0.040 L=2,200.0' S=0.0106 '/' Capacity=19.16 cfs Outflow=57.30 cfs 6.062 af

Reach 2R: Avg. Depth=1.42' Max Vel=1.72 fps Inflow=13.74 cfs 3.796 af
n=0.080 L=400.0' S=0.0102 '/' Capacity=28.43 cfs Outflow=13.72 cfs 3.796 af

4149.Banfield.Rd (Existing)

Type III 24-hr 100-yr storm Rainfall=6.50"

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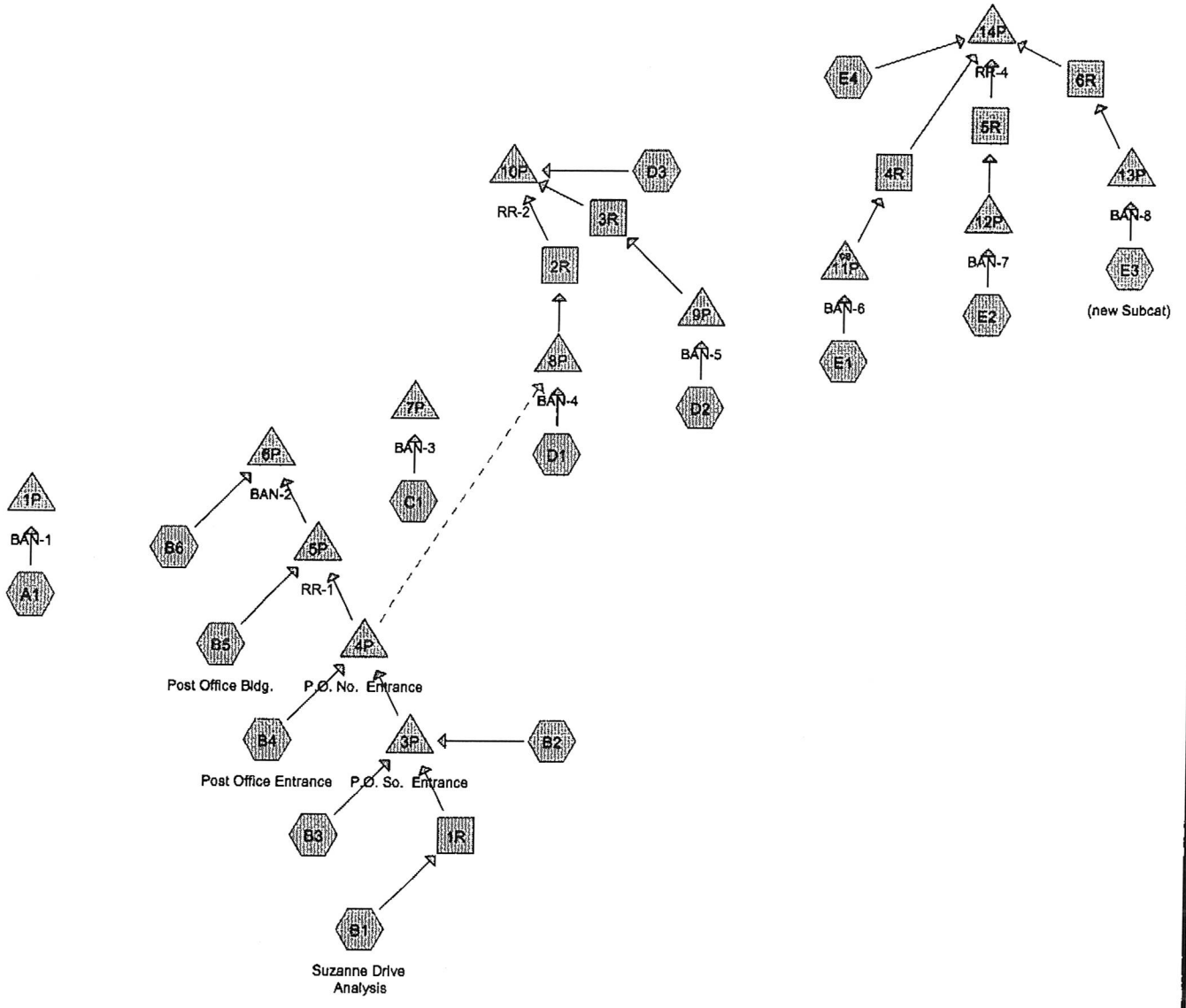
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Reach 3R:	Avg. Depth=3.22' Max Vel=1.49 fps Inflow=37.90 cfs 35.125 af n=0.080 L=400.0' S=0.0035 '/' Capacity=16.62 cfs Outflow=37.90 cfs 35.063 af
Reach 4R:	Avg. Depth=1.75' Max Vel=1.77 fps Inflow=20.30 cfs 1.308 af n=0.040 L=2,200.0' S=0.0026 '/' Capacity=12.71 cfs Outflow=9.66 cfs 1.308 af
Reach 5R:	Avg. Depth=0.74' Max Vel=1.42 fps Inflow=2.42 cfs 0.649 af n=0.040 L=2,000.0' S=0.0045 '/' Capacity=16.61 cfs Outflow=2.11 cfs 0.647 af
Reach 6R:	Avg. Depth=1.74' Max Vel=1.12 fps Inflow=6.07 cfs 12.206 af n=0.040 L=1,900.0' S=0.0011 '/' Capacity=8.03 cfs Outflow=6.07 cfs 12.006 af
Pond 1P: BAN-1	Peak Elev=43.46' Storage=0.108 af Inflow=21.09 cfs 7.827 af Outflow=21.08 cfs 7.827 af
Pond 3P: P.O. So. Entrance	Peak Elev=46.99' Storage=965,884 cf Inflow=280.96 cfs 65.079 af Outflow=69.84 cfs 65.026 af
Pond 4P: P.O. No. Entrance	Peak Elev=42.33' Storage=14,494 cf Inflow=70.22 cfs 65.828 af Primary=68.75 cfs 65.827 af Secondary=0.00 cfs 0.000 af Outflow=68.75 cfs 65.827 af
Pond 5P: RR-1	Peak Elev=41.43' Storage=616,064 cf Inflow=92.60 cfs 71.001 af Outflow=68.67 cfs 70.997 af
Pond 6P: BAN-2	Peak Elev=35.32' Storage=449,602 cf Inflow=70.35 cfs 74.966 af Outflow=69.27 cfs 69.035 af
Pond 7P: BAN-3	Peak Elev=33.59' Storage=887 cf Inflow=1.75 cfs 0.153 af Outflow=1.14 cfs 0.153 af
Pond 8P: BAN-4	Peak Elev=35.98' Storage=45,110 cf Inflow=33.91 cfs 3.800 af Outflow=13.74 cfs 3.796 af
Pond 9P: BAN-5	Peak Elev=36.35' Storage=139,677 cf Inflow=37.90 cfs 37.796 af Outflow=37.90 cfs 35.125 af
Pond 10P: RR-2	Peak Elev=36.63' Storage=321,732 cf Inflow=39.34 cfs 40.025 af Outflow=43.57 cfs 39.191 af
Pond 11P: BAN-6	Peak Elev=41.18' Inflow=20.30 cfs 1.308 af Outflow=20.30 cfs 1.308 af
Pond 12P: BAN-7	Peak Elev=43.23' Storage=10,953 cf Inflow=9.51 cfs 0.659 af Outflow=2.42 cfs 0.649 af
Pond 13P: BAN-8	Peak Elev=37.32' Storage=466,177 cf Inflow=109.76 cfs 16.302 af Outflow=6.07 cfs 12.206 af
Pond 14P: RR-4	Peak Elev=31.15' Storage=787,238 cf Inflow=402.91 cfs 37.048 af Outflow=15.36 cfs 27.003 af

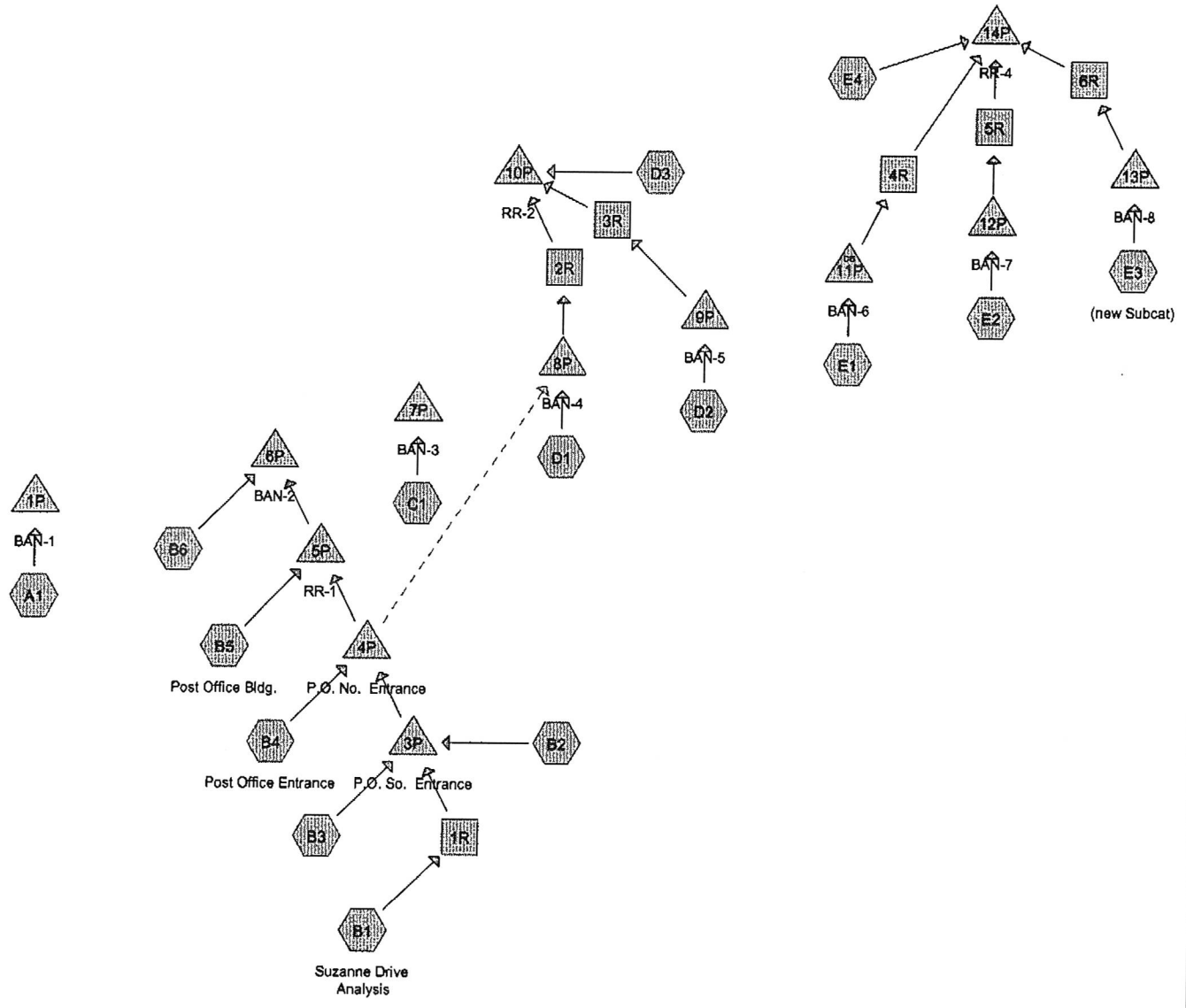
Total Runoff Area = 543.340 ac Runoff Volume = 167.124 af Average Runoff Depth = 3.69"
67.78% Pervious = 368.250 ac 32.22% Impervious = 175.091 ac

**MAPLE HAVEN AREA DRAINAGE
UPGRADE PROJECT**

**DRAINAGE ANALYSIS
OF
NEW CULVERTS**



Drainage Diagram for 4149.Banfield.Rd (Proposed)
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Drainage Diagram for 4149.Banfield.Rd (Proposed)
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4149.Banfield.Rd (Proposed)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Summary for Subcatchment A1:

Runoff = 13.16 cfs @ 14.39 hrs, Volume= 5.060 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
20.150	55	Woods, Good, HSG B
9.690	73	Woods, Fair, HSG C
1.600	83	1/4 acre lots, 38% imp, HSG C
4.740	70	1/2 acre lots, 25% imp, HSG B
0.910	80	1/2 acre lots, 25% imp, HSG C
37.090	63	Weighted Average
35.070		94.55% Pervious Area
2.020		5.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
164.0	1,740	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment B1: Suzanne Drive Analysis

Runoff = 55.47 cfs @ 12.11 hrs, Volume= 4.160 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
* 22.000	71	
22.000		100.00% Pervious Area

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

Summary for Subcatchment B2:

Runoff = 170.83 cfs @ 12.32 hrs, Volume= 19.637 af, Depth> 3.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
10.670	89	Urban commercial, 85% imp, HSG A
43.830	92	Urban commercial, 85% imp, HSG B
1.000	30	Woods, Good, HSG A
2.530	70	Woods, Good, HSG C
2.300	79	Woods, Fair, HSG D
60.330	89	Weighted Average
14.005		23.21% Pervious Area
46.325		76.79% Impervious Area

4149.Banfield.Rd (Proposed)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	1,800	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment B3:

Runoff = 53.14 cfs @ 14.93 hrs, Volume= 22.921 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
17.850	92	Urban commercial, 85% imp, HSG B
21.500	70	1/2 acre lots, 25% imp, HSG B
2.880	85	1/2 acre lots, 25% imp, HSG D
22.730	55	Woods, Good, HSG B
1.850	70	Woods, Good, HSG C
42.130	79	Woods, Fair, HSG D
108.940	74	Weighted Average
87.673		80.48% Pervious Area
21.267		19.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
213.3	3,200	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment B4: Post Office Entrance

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

Runoff = 9.28 cfs @ 12.00 hrs, Volume= 0.546 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.450	98	Paved parking, HSG B
0.850	55	Woods, Good, HSG B
1.700	70	Woods, Good, HSG C
3.000	70	Weighted Average
2.550		85.00% Pervious Area
0.450		15.00% Impervious Area

Summary for Subcatchment B5: Post Office Bldg.

Runoff = 46.26 cfs @ 12.14 hrs, Volume= 3.823 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

4149.Banfield.Rd (Proposed)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Area (ac)	CN	Description
6.800	98	Roofs, HSG B
2.800	60	Woods, Fair, HSG B
3.400	79	Woods, Fair, HSG D
13.000	85	Weighted Average
6.200		47.69% Pervious Area
6.800		52.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	700	0.0500	1.12		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment B6:

Runoff = 18.78 cfs @ 12.54 hrs, Volume= 2.705 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
4.230	70	1/2 acre lots, 25% imp, HSG B
3.090	55	Woods, Good, HSG B
7.530	77	Woods, Good, HSG D
14.850	70	Weighted Average
13.793		92.88% Pervious Area
1.057		7.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.5	1,000	0.0300	0.43		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment C1:

Runoff = 0.85 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.350	39	>75% Grass cover, Good, HSG A
0.350	30	Woods, Good, HSG A
0.350	70	Woods, Good, HSG C
1.180	52	Weighted Average
1.050		88.98% Pervious Area
0.130		11.02% Impervious Area

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	335	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment D1:

Runoff = 21.86 cfs @ 12.32 hrs, Volume= 2.517 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
3.850	30	Woods, Good, HSG A
1.660	55	Woods, Good, HSG B
1.180	70	Woods, Good, HSG C
8.300	81	Urban industrial, 72% imp, HSG A
0.760	88	Urban industrial, 72% imp, HSG B
0.440	93	Urban industrial, 72% imp, HSG D
16.190	66	Weighted Average
9.350		57.75% Pervious Area
6.840		42.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	950	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment D2:

Runoff = 27.22 cfs @ 21.31 hrs, Volume= 27.186 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
6.180	30	Woods, Good, HSG A
14.600	55	Woods, Good, HSG B
18.160	70	Woods, Good, HSG C
2.240	77	Woods, Good, HSG D
23.160	89	Urban commercial, 85% imp, HSG A
26.000	92	Urban commercial, 85% imp, HSG B
0.300	94	Urban commercial, 85% imp, HSG C
0.100	95	Urban commercial, 85% imp, HSG D
* 13.600	89	Future Urban commercial, 85% imp, HSG A
* 10.200	92	Future Urban commercial, 85% imp, HSG B
114.540	79	Weighted Average
52.184		45.56% Pervious Area
62.356		54.44% Impervious Area

4149.Banfield.Rd (Proposed)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.8	925	0.0060	0.39		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
645.1	3,060	0.0010	0.08		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
684.9	3,985	Total			

Summary for Subcatchment D3:

Runoff = 4.55 cfs @ 12.40 hrs, Volume= 0.669 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.450	98	Paved parking, HSG B
4.650	30	Woods, Good, HSG A
3.000	70	Woods, Good, HSG C
0.880	79	Woods, Fair, HSG D
8.980	52	Weighted Average
8.530		94.99% Pervious Area
0.450		5.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	750	0.0500	0.56		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Summary for Subcatchment E1:

Runoff = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
3.240	55	Woods, Good, HSG B
0.300	74	>75% Grass cover, Good, HSG C
1.510	98	Paved parking, HSG B
5.050	69	Weighted Average
3.540		70.10% Pervious Area
1.510		29.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	175	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	600	0.0500	9.51	19.03	Channel Flow, Area= 2.0 sf Perim= 4.0' r= 0.50' n= 0.022 Earth, clean & straight
3.2	775	Total			

4149.Banfield.Rd (Proposed)

Type III 24-hr 25-yr storm Rainfall=5.20"

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Summary for Subcatchment E2:

Runoff = 6.68 cfs @ 12.08 hrs, Volume= 0.464 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
0.240	74	>75% Grass cover, Good, HSG C
1.010	55	Woods, Good, HSG B
0.880	98	Paved parking, HSG B
2.130	75	Weighted Average
1.250		58.69% Pervious Area
0.880		41.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	300	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment E3: (new Subcat)

Runoff = 82.37 cfs @ 12.53 hrs, Volume= 12.082 af, Depth> 3.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

Area (ac)	CN	Description
11.220	92	Urban commercial, 85% imp, HSG B
2.020	94	Urban commercial, 85% imp, HSG C
4.110	55	Woods, Good, HSG B
4.590	70	Woods, Good, HSG C
4.020	77	Woods, Good, HSG D
* 2.500	94	Future Urban commercial, 85% imp, HSG C
* 12.500	92	Future Urban commercial, 85% imp, HSG B
40.960	85	Weighted Average
16.956		41.40% Pervious Area
24.004		58.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.0	1,650	0.0180	0.67		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Summary for Subcatchment E4:

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

Runoff = 257.70 cfs @ 12.00 hrs, Volume= 15.403 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr storm Rainfall=5.20"

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Area (ac)	CN	Description
5.000	68	1 acre lots, 20% imp, HSG B
40.230	55	Woods, Good, HSG B
17.070	70	Woods, Good, HSG C
32.800	79	Woods, Fair, HSG D
95.100	67	Weighted Average
94.100		98.95% Pervious Area
1.000		1.05% Impervious Area

Summary for Reach 1R:

[91] Warning: Storage range exceeded by 0.47'

[55] Hint: Peak inflow is 289% of Manning's capacity

Inflow Area = 22.000 ac, 0.00% Impervious, Inflow Depth = 2.27" for 25-yr storm event
 Inflow = 55.47 cfs @ 12.11 hrs, Volume= 4.160 af
 Outflow = 38.42 cfs @ 12.20 hrs, Volume= 4.159 af, Atten= 31%, Lag= 5.8 min

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 3.38 fps, Min. Travel Time= 10.8 min
 Avg. Velocity = 0.92 fps, Avg. Travel Time= 39.9 min

Peak Storage= 24,982 cf @ 12.20 hrs, Average Depth at Peak Storage= 1.47'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.040
 Length= 2,200.0' Slope= 0.0106 '/'
 Inlet Invert= 54.40', Outlet Invert= 31.00'

Summary for Reach 2R:

Inflow Area = 16.190 ac, 42.25% Impervious, Inflow Depth > 1.86" for 25-yr storm event
 Inflow = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af
 Outflow = 10.31 cfs @ 12.77 hrs, Volume= 2.512 af, Atten= 0%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 1.58 fps, Min. Travel Time= 4.2 min
 Avg. Velocity = 0.60 fps, Avg. Travel Time= 11.2 min

Peak Storage= 2,603 cf @ 12.77 hrs, Average Depth at Peak Storage= 1.24'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 28.43 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
 Length= 400.0' Slope= 0.0102 '/'
 Inlet Invert= 33.10', Outlet Invert= 29.03'

Summary for Reach 3R:

[91] Warning: Storage range exceeded by 0.57'

[55] Hint: Peak inflow is 160% of Manning's capacity

Inflow Area = 114.540 ac, 54.44% Impervious, Inflow Depth > 2.83" for 25-yr storm event
 Inflow = 26.58 cfs @ 22.31 hrs, Volume= 27.049 af
 Outflow = 26.58 cfs @ 22.38 hrs, Volume= 27.008 af, Atten= 0%, Lag= 3.9 min

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.40 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 6.6 min

Peak Storage= 7,611 cf @ 22.38 hrs, Average Depth at Peak Storage= 2.57'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 16.62 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 400.0' Slope= 0.0035 '/
Inlet Invert= 30.42', Outlet Invert= 29.03'

Summary for Reach 4R:

[55] Hint: Peak inflow is 107% of Manning's capacity

Inflow Area = 5.050 ac, 29.90% Impervious, Inflow Depth = 2.10" for 25-yr storm event
Inflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af
Outflow = 5.96 cfs @ 12.23 hrs, Volume= 0.885 af, Atten= 56%, Lag= 10.9 min

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.56 fps, Min. Travel Time= 23.5 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 73.0 min

Peak Storage= 8,401 cf @ 12.23 hrs, Average Depth at Peak Storage= 1.38'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 12.71 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
Length= 2,200.0' Slope= 0.0026 '/
Inlet Invert= 36.80', Outlet Invert= 31.00'

Summary for Reach 5R:

Inflow Area = 2.130 ac, 41.31% Impervious, Inflow Depth > 2.56" for 25-yr storm event
Inflow = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af
Outflow = 1.35 cfs @ 12.96 hrs, Volume= 0.452 af, Atten= 17%, Lag= 28.3 min

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.25 fps, Min. Travel Time= 26.7 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 57.1 min

Peak Storage= 2,159 cf @ 12.96 hrs, Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 16.61 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
Length= 2,000.0' Slope= 0.0045 '/
Inlet Invert= 40.00', Outlet Invert= 31.00'

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Summary for Reach 6R:

[91] Warning: Storage range exceeded by 0.68'

[55] Hint: Peak inflow is 171% of Manning's capacity

Inflow Area = 40.960 ac, 58.60% Impervious, Inflow Depth > 3.54" for 25-yr storm event
 Inflow = 13.71 cfs @ 12.75 hrs, Volume= 12.082 af
 Outflow = 13.54 cfs @ 14.16 hrs, Volume= 12.081 af, Atten= 1%, Lag= 84.8 min

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Max. Velocity= 1.35 fps, Min. Travel Time= 23.5 min
 Avg. Velocity = 0.80 fps, Avg. Travel Time= 39.8 min

Peak Storage= 19,107 cf @ 14.16 hrs, Average Depth at Peak Storage= 2.68'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 8.03 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040
 Length= 1,900.0' Slope= 0.0011 '/
 Inlet Invert= 33.00', Outlet Invert= 31.00'

Summary for Pond 1P: BAN-1

Inflow Area = 37.090 ac, 5.45% Impervious, Inflow Depth = 1.64" for 25-yr storm event
 Inflow = 13.16 cfs @ 14.39 hrs, Volume= 5.060 af
 Outflow = 13.14 cfs @ 14.41 hrs, Volume= 5.060 af, Atten= 0%, Lag= 1.0 min
 Primary = 13.14 cfs @ 14.41 hrs, Volume= 5.060 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 42.42' @ 14.41 hrs Surf.Area= 737 sf Storage= 671 cf

Plug-Flow detention time= 0.6 min calculated for 5.058 af (100% of inflow)
 Center-of-Mass det. time= 0.6 min (1,010.8 - 1,010.2)

Volume	Invert	Avail.Storage	Storage Description
#1	40.00'	16,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.00	44	0	0
41.00	218	131	131
42.00	392	305	436
43.00	1,220	806	1,242
44.00	29,185	15,203	16,445

Device	Routing	Invert	Outlet Devices
#1	Primary	40.00'	21.0" Round Culvert L= 32.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 39.75' S= 0.0078 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	43.24'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

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Primary OutFlow Max=13.14 cfs @ 14.41 hrs HW=42.42' (Free Discharge)

- 1=Culvert (Barrel Controls 13.14 cfs @ 5.46 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: P.O. So. Entrance

[82] Warning: Early inflow requires earlier time span
 [62] Warning: Exceeded Reach 1R OUTLET depth by 15.07' @ 16.50 hrs

Inflow Area = 191.270 ac, 35.34% Impervious, Inflow Depth > 2.93" for 25-yr storm event
 Inflow = 209.48 cfs @ 12.30 hrs, Volume= 46.717 af
 Outflow = 52.24 cfs @ 16.12 hrs, Volume= 46.681 af, Atten= 75%, Lag= 229.3 min
 Primary = 52.24 cfs @ 16.12 hrs, Volume= 46.681 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 46.45' @ 16.12 hrs Surf.Area= 552,164 sf Storage= 654,689 cf

Plug-Flow detention time= 185.5 min calculated for 46.680 af (100% of inflow)
 Center-of-Mass det. time= 184.8 min (1,108.8 - 924.0)

Volume	Invert	Avail.Storage	Storage Description
#1	44.20'	1,605,340 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.20	1,000	0	0
44.50	30,500	4,725	4,725
46.00	518,000	411,375	416,100
48.00	671,240	1,189,240	1,605,340

Device	Routing	Invert	Outlet Devices
#1	Primary	44.37'	58.0" W x 36.0" H, R=30.0"/64.0" Arch Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.17' S= 0.0031 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	44.20'	36.0" W x 24.0" H, R=19.0"/51.0" Arch Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.12' S= 0.0012 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Primary	49.50'	40.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=52.24 cfs @ 16.12 hrs HW=46.45' TW=39.30' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 32.46 cfs @ 5.01 fps)
- 2=Culvert (Barrel Controls 19.78 cfs @ 4.55 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Summary for Pond 4P: P.O. No. Entrance

Inflow Area = 194.270 ac, 35.02% Impervious, Inflow Depth > 2.92" for 25-yr storm event
 Inflow = 52.53 cfs @ 16.11 hrs, Volume= 47.228 af
 Outflow = 52.33 cfs @ 16.10 hrs, Volume= 47.228 af, Atten= 0%, Lag= 0.0 min
 Primary = 52.33 cfs @ 16.10 hrs, Volume= 47.228 af
 Secondary = 0.00 cfs @ 8.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 40.10' @ 19.30 hrs Surf.Area= 2,773 sf Storage= 3,247 cf

Plug-Flow detention time= 0.7 min calculated for 47.211 af (100% of inflow)
 Center-of-Mass det. time= 0.7 min (1,106.4 - 1,105.7)

Volume	Invert	Avail.Storage	Storage Description
#1	37.44'	29,402 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.44	100	0	0
38.00	300	112	112
40.00	2,580	2,880	2,992
42.00	6,640	9,220	12,212
44.00	10,550	17,190	29,402

Device	Routing	Invert	Outlet Devices
#1	Primary	37.44'	24.0" Round Culvert X 6.00 L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 37.12' S= 0.0049 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	43.00'	40.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=52.34 cfs @ 16.10 hrs HW=39.29' TW=38.72' (Dynamic Tailwater)
 1=Culvert (Inlet Controls 52.34 cfs @ 2.87 fps)

Secondary OutFlow Max=0.00 cfs @ 8.00 hrs HW=37.44' TW=33.30' (Dynamic Tailwater)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: RR-1

[82] Warning: Early inflow requires earlier time span

[87] Warning: Oscillations may require Finer Routing or smaller dt

Inflow Area = 207.270 ac, 36.11% Impervious, Inflow Depth > 2.96" for 25-yr storm event
 Inflow = 68.74 cfs @ 12.15 hrs, Volume= 51.051 af
 Outflow = 39.81 cfs @ 19.39 hrs, Volume= 51.051 af, Atten= 42%, Lag= 434.0 min
 Primary = 39.81 cfs @ 19.39 hrs, Volume= 51.051 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 39.78' @ 19.84 hrs Surf.Area= 120,557 sf Storage= 393,389 cf

Plug-Flow detention time= 106.9 min calculated for 51.051 af (100% of inflow)

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Center-of-Mass det. time= 106.8 min (1,191.2 - 1,084.4)

Volume	Invert	Avail.Storage	Storage Description
#1	30.97'	698,286 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
30.97	44	0	0
32.00	44	45	45
33.00	44	44	88
35.00	87	131	219
35.53	16,422	4,375	4,594
36.00	72,919	20,995	25,589
38.00	99,230	172,149	197,738
40.00	123,188	222,417	420,156
41.00	144,358	133,773	553,929
42.00	144,358	144,358	698,286

Device	Routing	Invert	Outlet Devices
#1	Primary	30.97'	24.0" W x 24.0" H Box MSC Reservoir #8 L= 53.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Outlet Invert= 30.93' S= 0.0008 '/ Cc= 0.900 n= 0.025 Rubble masonry, cemented
#2	Primary	41.20'	100.0' long x 16.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=39.81 cfs @ 19.39 hrs HW=39.77' TW=33.39' (Dynamic Tailwater)

1=MSC Reservoir #8 (Outlet Controls 39.81 cfs @ 9.95 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 6P: BAN-2

[82] Warning: Early inflow requires earlier time span

Inflow Area = 222.120 ac, 34.17% Impervious, Inflow Depth > 2.90" for 25-yr storm event
 Inflow = 48.65 cfs @ 12.58 hrs, Volume= 53.756 af
 Outflow = 39.24 cfs @ 22.02 hrs, Volume= 53.750 af, Atten= 19%, Lag= 566.3 min
 Primary = 39.24 cfs @ 22.02 hrs, Volume= 53.750 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.48' @ 22.02 hrs Surf.Area= 123,118 sf Storage= 191,724 cf

Plug-Flow detention time= 68.1 min calculated for 53.731 af (100% of inflow)
 Center-of-Mass det. time= 68.0 min (1,243.3 - 1,175.3)

Volume	Invert	Avail.Storage	Storage Description
#1	30.37'	655,839 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
30.37	44	0	0
33.70	131,682	219,324	219,324
34.00	176,723	46,261	265,585
36.00	213,531	390,254	655,839

Device	Routing	Invert	Outlet Devices
#1	Primary	30.37'	18.0" Round Culvert X 3.00 L= 32.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 30.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	34.98'	100.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=39.24 cfs @ 22.02 hrs HW=33.48' (Free Discharge)

- 1=Culvert (Inlet Controls 39.24 cfs @ 7.40 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 7P: BAN-3

Inflow Area = 1.180 ac, 11.02% Impervious, Inflow Depth = 0.89" for 25-yr storm event
 Inflow = 0.85 cfs @ 12.14 hrs, Volume= 0.088 af
 Outflow = 0.52 cfs @ 12.40 hrs, Volume= 0.088 af, Atten= 39%, Lag= 15.5 min
 Primary = 0.52 cfs @ 12.40 hrs, Volume= 0.088 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.39' @ 12.40 hrs Surf.Area= 1,647 sf Storage= 514 cf

Plug-Flow detention time= 33.4 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 32.5 min (935.1 - 902.6)

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	33,500 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	1,000	0	0
36.00	6,000	10,500	10,500
38.00	17,000	23,000	33,500

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	15.0" Round Culvert L= 36.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 32.80' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	38.25'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.52 cfs @ 12.40 hrs HW=33.39' (Free Discharge)

- 1=Culvert (Barrel Controls 0.52 cfs @ 2.39 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Summary for Pond 8P: BAN-4

Inflow Area = 16.190 ac, 42.25% Impervious, Inflow Depth = 1.87" for 25-yr storm event
 Inflow = 21.86 cfs @ 12.32 hrs, Volume= 2.517 af
 Outflow = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af, Atten= 53%, Lag= 23.8 min
 Primary = 10.34 cfs @ 12.72 hrs, Volume= 2.512 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.17' @ 12.73 hrs Surf.Area= 20,628 sf Storage= 26,345 cf

Plug-Flow detention time= 45.7 min calculated for 2.511 af (100% of inflow)
 Center-of-Mass det. time= 44.9 min (915.9 - 871.0)

Volume	Invert	Avail.Storage	Storage Description
#1	33.30'	108,005 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.30	7,866	0	0
34.00	12,203	7,024	7,024
35.00	19,608	15,906	22,930
36.00	25,613	22,611	45,540
38.00	36,852	62,465	108,005

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round MSC Reservoir #12 X 3.00 L= 36.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 33.10' S= 0.0056 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	38.25'	50.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.34 cfs @ 12.72 hrs HW=35.17' TW=34.34' (Dynamic Tailwater)

- 1=MSC Reservoir #12 (Inlet Controls 10.34 cfs @ 4.39 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 9P: BAN-5

Inflow Area = 114.540 ac, 54.44% Impervious, Inflow Depth > 2.85" for 25-yr storm event
 Inflow = 27.22 cfs @ 21.31 hrs, Volume= 27.186 af
 Outflow = 26.58 cfs @ 22.31 hrs, Volume= 27.049 af, Atten= 2%, Lag= 60.4 min
 Primary = 26.58 cfs @ 22.31 hrs, Volume= 27.049 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.32' @ 22.31 hrs Surf.Area= 60,224 sf Storage= 52,092 cf

Plug-Flow detention time= 27.4 min calculated for 27.049 af (99% of inflow)
 Center-of-Mass det. time= 23.7 min (1,426.8 - 1,403.1)

Volume	Invert	Avail.Storage	Storage Description
#1	33.59'	381,776 cf	Custom Stage Data (Irregular) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
33.59	8,500	400.0	0	0	8,500
34.00	16,010	528.0	4,944	4,944	17,954
36.00	94,168	1,940.0	99,337	104,281	295,278
38.00	188,753	2,578.0	277,495	381,776	524,704

Device	Routing	Invert	Outlet Devices
#1	Primary	33.59'	18.0" Round Culvert X 4.00 L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 30.42' S= 0.0991 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	36.20'	200.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=26.58 cfs @ 22.31 hrs HW=35.32' TW=32.99' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 26.58 cfs @ 3.76 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 10P: RR-2

[62] Warning: Exceeded Reach 2R OUTLET depth by 4.06' @ 26.27 hrs

[63] Warning: Exceeded Reach 3R INLET depth by 0.74' @ 27.62 hrs

Inflow Area = 139.710 ac, 49.85% Impervious, Inflow Depth > 2.59" for 25-yr storm event
 Inflow = 27.48 cfs @ 22.32 hrs, Volume= 30.189 af
 Outflow = 21.25 cfs @ 25.72 hrs, Volume= 30.168 af, Atten= 23%, Lag= 204.3 min
 Primary = 21.25 cfs @ 25.72 hrs, Volume= 30.168 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.25' @ 25.72 hrs Surf.Area= 3.293 ac Storage= 4.555 af

Plug-Flow detention time= 90.6 min calculated for 30.158 af (100% of inflow)
 Center-of-Mass det. time= 90.1 min (1,467.4 - 1,377.3)

Volume	Invert	Avail.Storage	Storage Description
#1	29.08'	7.385 af	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
29.08	0.010	0.000	0.000
30.00	0.032	0.019	0.019
31.00	0.478	0.255	0.274
32.00	1.772	1.125	1.399
34.00	4.214	5.986	7.385

Device	Routing	Invert	Outlet Devices
#1	Primary	29.08'	24.0" Round MSC Reservoir #13 L= 53.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 28.74' S= 0.0064 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	36.50'	100.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

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Type III 24-hr 25-yr storm Rainfall=5.20"

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Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.25 cfs @ 25.72 hrs HW=33.25' (Free Discharge)

- 1=MSC Reservoir #13 (Inlet Controls 21.25 cfs @ 6.76 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 11P: BAN-6

[57] Hint: Peaked at 40.78' (Flood elevation advised)

Inflow Area = 5.050 ac, 29.90% Impervious, Inflow Depth = 2.10" for 25-yr storm event
 Inflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af
 Outflow = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af, Atten= 0%, Lag= 0.0 min
 Primary = 13.54 cfs @ 12.05 hrs, Volume= 0.885 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 40.78' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	18.0" Round Culvert L= 28.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 37.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	41.00'	50.0' long x 24.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.51 cfs @ 12.05 hrs HW=40.77' TW=37.92' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 13.51 cfs @ 7.65 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 12P: BAN-7

Inflow Area = 2.130 ac, 41.31% Impervious, Inflow Depth = 2.61" for 25-yr storm event
 Inflow = 6.68 cfs @ 12.08 hrs, Volume= 0.464 af
 Outflow = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af, Atten= 76%, Lag= 24.4 min
 Primary = 1.62 cfs @ 12.49 hrs, Volume= 0.454 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 42.93' @ 12.49 hrs Surf.Area= 10,144 sf Storage= 7,808 cf

Plug-Flow detention time= 129.0 min calculated for 0.453 af (98% of inflow)
 Center-of-Mass det. time= 116.7 min (949.0 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	42.00'	20,800 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.00	6,600	0	0
44.00	14,200	20,800	20,800

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Device	Routing	Invert	Outlet Devices
#1	Primary	42.00'	18.0" Round Culvert L= 28.0' RCP, groove end projecting, Ke= 0.200 Outlet Invert= 41.75' S= 0.0089 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	42.01'	18.0" Round Culvert L= 1.5' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.00' S= 0.0067 '/ Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	42.02'	12.0" Round Culvert L= 1.5' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.01' S= 0.0067 '/ Cc= 0.900 n= 0.010 PVC, smooth interior
#4	Primary	45.00'	50.0' long x 24.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.62 cfs @ 12.49 hrs HW=42.93' TW=40.51' (Dynamic Tailwater)

1=Culvert (Passes 1.62 cfs of 3.41 cfs potential flow)

2=Culvert (Passes 1.62 cfs of 2.26 cfs potential flow)

3=Culvert (Barrel Controls 1.62 cfs @ 2.82 fps)

4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 13P: BAN-8

[82] Warning: Early inflow requires earlier time span

Inflow Area = 40.960 ac, 58.60% Impervious, Inflow Depth > 3.54" for 25-yr storm event
 Inflow = 82.37 cfs @ 12.53 hrs, Volume= 12.082 af
 Outflow = 13.71 cfs @ 12.75 hrs, Volume= 12.082 af, Atten= 83%, Lag= 13.0 min
 Primary = 13.71 cfs @ 12.75 hrs, Volume= 12.082 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.48' @ 13.97 hrs Surf.Area= 255,868 sf Storage= 229,076 cf

Plug-Flow detention time= 170.5 min calculated for 12.081 af (100% of inflow)
 Center-of-Mass det. time= 170.4 min (1,010.4 - 840.0)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	693,250 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	400	0	0
35.00	1,000	700	700
36.00	223,900	112,450	113,150
38.00	356,200	580,100	693,250

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	24.0" Round Culvert L= 32.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 33.84' S= 0.0050 '/ Cc= 0.900 n= 0.013 Cast iron, coated
#2	Primary	37.50'	100.0' long x 32.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.71 cfs @ 12.75 hrs HW=36.18' TW=35.36' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 13.71 cfs @ 4.36 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 14P: RR-4

- [61] Hint: Exceeded Reach 4R outlet invert by 0.06' @ 21.06 hrs
- [61] Hint: Exceeded Reach 5R outlet invert by 0.06' @ 21.06 hrs
- [61] Hint: Exceeded Reach 6R outlet invert by 0.06' @ 21.06 hrs

Inflow Area = 143.240 ac, 19.12% Impervious, Inflow Depth = 2.41" for 25-yr storm event
 Inflow = 266.34 cfs @ 12.00 hrs, Volume= 28.822 af
 Outflow = 14.06 cfs @ 21.06 hrs, Volume= 23.015 af, Atten= 95%, Lag= 543.2 min
 Primary = 14.06 cfs @ 21.06 hrs, Volume= 23.015 af

Routing by Dyn-Stor-Ind method, Time Span= 8.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 31.06' @ 21.06 hrs Surf.Area= 23.780 ac Storage= 15.975 af

Plug-Flow detention time= 547.5 min calculated for 23.015 af (80% of inflow)
 Center-of-Mass det. time= 455.3 min (1,385.1 - 929.8)

Volume	Invert	Avail.Storage	Storage Description
#1	29.50'	331.348 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
29.50	0.023	0.000	0.000
30.00	4.270	1.073	1.073
32.00	40.994	45.264	46.337
34.00	46.336	87.330	133.667
36.00	49.777	96.113	229.780
38.00	51.791	101.568	331.348

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	48.0" W x 48.0" H Box Culvert L= 40.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet Invert= 29.50' S= 0.0000 '/' Cc= 0.900 n= 0.025 Rubble masonry, cemented
#2	Primary	37.50'	100.0' long x 16.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.06 cfs @ 21.06 hrs HW=31.06' (Free Discharge)

- 1=Culvert (Barrel Controls 14.06 cfs @ 3.00 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Time span=8.00-36.00 hrs, dt=0.01 hrs, 2801 points x 2

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1:	Runoff Area=37.090 ac 5.45% Impervious Runoff Depth=2.04" Flow Length=1,740' Slope=0.0050 '/' Tc=164.0 min CN=63 Runoff=16.71 cfs 6.299 af
Subcatchment B1: Suzanne Drive Analysis	Runoff Area=22.000 ac 0.00% Impervious Runoff Depth=2.74" Tc=7.2 min CN=71 Runoff=67.38 cfs 5.021 af
Subcatchment B2:	Runoff Area=60.330 ac 76.79% Impervious Runoff Depth>4.46" Flow Length=1,800' Slope=0.0070 '/' Tc=23.9 min CN=89 Runoff=194.54 cfs 22.425 af
Subcatchment B3:	Runoff Area=108.940 ac 19.52% Impervious Runoff Depth=3.02" Flow Length=3,200' Slope=0.0100 '/' Tc=213.3 min CN=74 Runoff=63.88 cfs 27.393 af
Subcatchment B4: Post Office Entrance	Runoff Area=3.000 ac 15.00% Impervious Runoff Depth=2.65" Tc=0.0 min CN=70 Runoff=11.33 cfs 0.662 af
Subcatchment B5: Post Office Bldg.	Runoff Area=13.000 ac 52.31% Impervious Runoff Depth>4.07" Flow Length=700' Slope=0.0500 '/' Tc=10.4 min CN=85 Runoff=53.29 cfs 4.414 af
Subcatchment B6:	Runoff Area=14.850 ac 7.12% Impervious Runoff Depth=2.65" Flow Length=1,000' Slope=0.0300 '/' Tc=38.5 min CN=70 Runoff=22.95 cfs 3.276 af
Subcatchment C1:	Runoff Area=1.180 ac 11.02% Impervious Runoff Depth=1.19" Flow Length=335' Slope=0.0200 '/' Tc=7.9 min CN=52 Runoff=1.25 cfs 0.117 af
Subcatchment D1:	Runoff Area=16.190 ac 42.25% Impervious Runoff Depth=2.29" Flow Length=950' Slope=0.0200 '/' Tc=22.4 min CN=66 Runoff=27.29 cfs 3.094 af
Subcatchment D2:	Runoff Area=114.540 ac 54.44% Impervious Runoff Depth>3.36" Flow Length=3,985' Tc=684.9 min CN=79 Runoff=32.10 cfs 32.027 af
Subcatchment D3:	Runoff Area=8.980 ac 5.01% Impervious Runoff Depth=1.19" Flow Length=750' Slope=0.0500 '/' Tc=22.4 min CN=52 Runoff=6.56 cfs 0.887 af
Subcatchment E1:	Runoff Area=5.050 ac 29.90% Impervious Runoff Depth=2.56" Flow Length=775' Tc=3.2 min CN=69 Runoff=16.61 cfs 1.076 af
Subcatchment E2:	Runoff Area=2.130 ac 41.31% Impervious Runoff Depth=3.11" Flow Length=300' Slope=0.0350 '/' Tc=5.3 min CN=75 Runoff=7.97 cfs 0.552 af
Subcatchment E3: (new Subcat)	Runoff Area=40.960 ac 58.60% Impervious Runoff Depth>4.09" Flow Length=1,650' Slope=0.0180 '/' Tc=41.0 min CN=85 Runoff=95.00 cfs 13.958 af
Subcatchment E4:	Runoff Area=95.100 ac 1.05% Impervious Runoff Depth=2.38" Tc=0.0 min CN=67 Runoff=319.53 cfs 18.863 af
Reach 1R:	Avg. Depth=1.68' Max Vel=3.50 fps Inflow=67.38 cfs 5.021 af n=0.040 L=2,200.0' S=0.0106 '/' Capacity=19.16 cfs Outflow=47.02 cfs 5.020 af
Reach 2R:	Avg. Depth=1.33' Max Vel=1.66 fps Inflow=11.99 cfs 3.089 af n=0.080 L=400.0' S=0.0102 '/' Capacity=28.43 cfs Outflow=11.96 cfs 3.089 af

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Reach 3R:	Avg. Depth=2.81' Max Vel=1.44 fps Inflow=30.82 cfs 31.875 af n=0.080 L=400.0' S=0.0035 '/' Capacity=16.62 cfs Outflow=30.82 cfs 31.829 af
Reach 4R:	Avg. Depth=1.55' Max Vel=1.67 fps Inflow=16.61 cfs 1.076 af n=0.040 L=2,200.0' S=0.0026 '/' Capacity=12.71 cfs Outflow=7.60 cfs 1.076 af
Reach 5R:	Avg. Depth=0.66' Max Vel=1.34 fps Inflow=2.00 cfs 0.542 af n=0.040 L=2,000.0' S=0.0045 '/' Capacity=16.61 cfs Outflow=1.70 cfs 0.541 af
Reach 6R:	Avg. Depth=2.77' Max Vel=1.36 fps Inflow=14.34 cfs 13.958 af n=0.040 L=1,900.0' S=0.0011 '/' Capacity=8.03 cfs Outflow=14.29 cfs 13.957 af
Pond 1P: BAN-1	Peak Elev=42.98' Storage=1,212 cf Inflow=16.71 cfs 6.299 af Outflow=16.68 cfs 6.299 af
Pond 3P: P.O. So. Entrance	Peak Elev=46.69' Storage=792,977 cf Inflow=242.31 cfs 54.838 af Outflow=60.32 cfs 54.795 af
Pond 4P: P.O. No. Entrance	Peak Elev=41.41' Storage=8,673 cf Inflow=60.65 cfs 55.457 af Primary=60.05 cfs 55.457 af Secondary=0.00 cfs 0.000 af Outflow=60.05 cfs 55.457 af
Pond 5P: RR-1	Peak Elev=41.04' Storage=560,145 cf Inflow=79.65 cfs 59.871 af Outflow=42.71 cfs 59.872 af
Pond 6P: BAN-2	Peak Elev=33.81' Storage=234,469 cf Inflow=53.79 cfs 63.148 af Outflow=41.85 cfs 63.141 af
Pond 7P: BAN-3	Peak Elev=33.48' Storage=676 cf Inflow=1.25 cfs 0.117 af Outflow=0.78 cfs 0.116 af
Pond 8P: BAN-4	Peak Elev=35.55' Storage=34,519 cf Inflow=27.29 cfs 3.094 af Outflow=11.99 cfs 3.089 af
Pond 9P: BAN-5	Peak Elev=35.66' Storage=75,052 cf Inflow=32.10 cfs 32.027 af Outflow=30.82 cfs 31.875 af
Pond 10P: RR-2	Peak Elev=33.84' Storage=6.711 af Inflow=31.87 cfs 35.806 af Outflow=23.14 cfs 35.656 af
Pond 11P: BAN-6	Peak Elev=41.07' Inflow=16.61 cfs 1.076 af Outflow=16.61 cfs 1.076 af
Pond 12P: BAN-7	Peak Elev=43.07' Storage=9,233 cf Inflow=7.97 cfs 0.552 af Outflow=2.00 cfs 0.542 af
Pond 13P: BAN-8	Peak Elev=36.67' Storage=276,846 cf Inflow=95.00 cfs 13.958 af Outflow=14.34 cfs 13.958 af
Pond 14P: RR-4	Peak Elev=31.18' Storage=18.976 af Inflow=329.78 cfs 34.437 af Outflow=15.91 cfs 26.739 af

Total Runoff Area = 543.340 ac Runoff Volume = 140.064 af Average Runoff Depth = 3.09"
67.78% Pervious = 368.250 ac 32.22% Impervious = 175.091 ac

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Type III 24-hr 100-yr storm Rainfall=6.50"

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Time span=8.00-36.00 hrs, dt=0.01 hrs, 2801 points x 2

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1:	Runoff Area=37.090 ac 5.45% Impervious Runoff Depth=2.53" Flow Length=1,740' Slope=0.0050 '/' Tc=164.0 min CN=63 Runoff=21.09 cfs 7.827 af
Subcatchment B1: Suzanne Drive Analysis	Runoff Area=22.000 ac 0.00% Impervious Runoff Depth=3.31" Tc=7.2 min CN=71 Runoff=81.67 cfs 6.062 af
Subcatchment B2:	Runoff Area=60.330 ac 76.79% Impervious Runoff Depth>5.11" Flow Length=1,800' Slope=0.0070 '/' Tc=23.9 min CN=89 Runoff=222.12 cfs 25.681 af
Subcatchment B3:	Runoff Area=108.940 ac 19.52% Impervious Runoff Depth=3.61" Flow Length=3,200' Slope=0.0100 '/' Tc=213.3 min CN=74 Runoff=76.73 cfs 32.769 af
Subcatchment B4: Post Office Entrance	Runoff Area=3.000 ac 15.00% Impervious Runoff Depth=3.21" Tc=0.0 min CN=70 Runoff=13.79 cfs 0.802 af
Subcatchment B5: Post Office Bldg.	Runoff Area=13.000 ac 52.31% Impervious Runoff Depth>4.71" Flow Length=700' Slope=0.0500 '/' Tc=10.4 min CN=85 Runoff=61.50 cfs 5.108 af
Subcatchment B6:	Runoff Area=14.850 ac 7.12% Impervious Runoff Depth=3.21" Flow Length=1,000' Slope=0.0300 '/' Tc=38.5 min CN=70 Runoff=27.96 cfs 3.969 af
Subcatchment C1:	Runoff Area=1.180 ac 11.02% Impervious Runoff Depth=1.56" Flow Length=335' Slope=0.0200 '/' Tc=7.9 min CN=52 Runoff=1.75 cfs 0.153 af
Subcatchment D1:	Runoff Area=16.190 ac 42.25% Impervious Runoff Depth=2.82" Flow Length=950' Slope=0.0200 '/' Tc=22.4 min CN=66 Runoff=33.91 cfs 3.800 af
Subcatchment D2:	Runoff Area=114.540 ac 54.44% Impervious Runoff Depth>3.96" Flow Length=3,985' Tc=684.9 min CN=79 Runoff=37.90 cfs 37.796 af
Subcatchment D3:	Runoff Area=8.980 ac 5.01% Impervious Runoff Depth=1.56" Flow Length=750' Slope=0.0500 '/' Tc=22.4 min CN=52 Runoff=9.17 cfs 1.167 af
Subcatchment E1:	Runoff Area=5.050 ac 29.90% Impervious Runoff Depth=3.11" Flow Length=775' Tc=3.2 min CN=69 Runoff=20.30 cfs 1.308 af
Subcatchment E2:	Runoff Area=2.130 ac 41.31% Impervious Runoff Depth>3.71" Flow Length=300' Slope=0.0350 '/' Tc=5.3 min CN=75 Runoff=9.51 cfs 0.659 af
Subcatchment E3: (new Subcat)	Runoff Area=40.960 ac 58.60% Impervious Runoff Depth>4.73" Flow Length=1,650' Slope=0.0180 '/' Tc=41.0 min CN=85 Runoff=109.76 cfs 16.161 af
Subcatchment E4:	Runoff Area=95.100 ac 1.05% Impervious Runoff Depth=2.91" Tc=0.0 min CN=67 Runoff=394.52 cfs 23.087 af
Reach 1R:	Avg. Depth=1.93' Max Vel=3.59 fps Inflow=81.67 cfs 6.062 af n=0.040 L=2,200.0' S=0.0106 '/' Capacity=19.16 cfs Outflow=57.30 cfs 6.062 af
Reach 2R:	Avg. Depth=1.42' Max Vel=1.72 fps Inflow=13.74 cfs 3.796 af n=0.080 L=400.0' S=0.0102 '/' Capacity=28.43 cfs Outflow=13.72 cfs 3.796 af

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Reach 3R: Avg. Depth=3.08' Max Vel=1.47 fps Inflow=35.46 cfs 37.626 af
n=0.080 L=400.0' S=0.0035 '/ Capacity=16.62 cfs Outflow=35.46 cfs 37.575 af

Reach 4R: Avg. Depth=1.75' Max Vel=1.77 fps Inflow=20.30 cfs 1.308 af
n=0.040 L=2,200.0' S=0.0026 '/ Capacity=12.71 cfs Outflow=9.66 cfs 1.308 af

Reach 5R: Avg. Depth=0.73' Max Vel=1.42 fps Inflow=2.41 cfs 0.648 af
n=0.040 L=2,000.0' S=0.0045 '/ Capacity=16.61 cfs Outflow=2.11 cfs 0.647 af

Reach 6R: Avg. Depth=2.87' Max Vel=1.37 fps Inflow=15.16 cfs 16.161 af
n=0.040 L=1,900.0' S=0.0011 '/ Capacity=8.03 cfs Outflow=15.13 cfs 16.160 af

Pond 1P: BAN-1 Peak Elev=43.32' Storage=3,053 cf Inflow=21.09 cfs 7.827 af
Outflow=21.07 cfs 7.827 af

Pond 3P: P.O. So. Entrance Peak Elev=46.99' Storage=964,838 cf Inflow=280.96 cfs 64.512 af
Outflow=69.77 cfs 64.459 af

Pond 4P: P.O. No. Entrance Peak Elev=42.21' Storage=13,634 cf Inflow=70.16 cfs 65.261 af
Primary=68.95 cfs 65.261 af Secondary=0.00 cfs 0.000 af Outflow=68.95 cfs 65.261 af

Pond 5P: RR-1 Peak Elev=41.39' Storage=610,389 cf Inflow=92.40 cfs 70.368 af
Outflow=65.15 cfs 70.368 af

Pond 6P: BAN-2 Peak Elev=34.74' Storage=401,328 cf Inflow=66.57 cfs 74.337 af
Outflow=48.56 cfs 74.327 af

Pond 7P: BAN-3 Peak Elev=33.59' Storage=887 cf Inflow=1.75 cfs 0.153 af
Outflow=1.14 cfs 0.153 af

Pond 8P: BAN-4 Peak Elev=35.98' Storage=45,110 cf Inflow=33.91 cfs 3.800 af
Outflow=13.74 cfs 3.796 af

Pond 9P: BAN-5 Peak Elev=36.08' Storage=112,119 cf Inflow=37.90 cfs 37.796 af
Outflow=35.46 cfs 37.626 af

Pond 10P: RR-2 Peak Elev=36.61' Storage=7.385 af Inflow=36.67 cfs 42.538 af
Outflow=40.93 cfs 41.473 af

Pond 11P: BAN-6 Peak Elev=41.13' Inflow=20.30 cfs 1.308 af
Outflow=20.30 cfs 1.308 af

Pond 12P: BAN-7 Peak Elev=43.23' Storage=10,951 cf Inflow=9.51 cfs 0.659 af
Outflow=2.41 cfs 0.648 af

Pond 13P: BAN-8 Peak Elev=36.88' Storage=334,745 cf Inflow=109.76 cfs 16.161 af
Outflow=15.16 cfs 16.161 af

Pond 14P: RR-4 Peak Elev=31.31' Storage=22.556 af Inflow=406.75 cfs 41.202 af
Outflow=18.01 cfs 31.049 af

Total Runoff Area = 543.340 ac Runoff Volume = 166.350 af Average Runoff Depth = 3.67"
67.78% Pervious = 368.250 ac 32.22% Impervious = 175.091 ac