Chelan County

Squilchuck Stormwater Outfall

Design Report

Prepared for Chelan County in Fulfillment of the Washington State Department of Ecology Stormwater Retrofit and LID Requirements

RH2 Engineering, Inc.

October 2014

90% Design

Chelan County
Squilchuck Stormwater Outfall
Design Report

The information contained in this report was prepared by and under the direct supervision of the undersigned.

Signed
X/XX/XXXX

Signed
X/XX/XXXX

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Principal

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RH2 Engineering, Inc.

October 2014

Creative Ideas
Innovative Solutions
Quality Service

Chelan County
Squilchuck Stormwater Outfall
Design Report
Table of Contents

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1. Introduction

The Chelan County (County) Squilchuck Outfall drains an approximately 100-acre residential-zoned basin in south Wenatchee, Washington. Two stormwater trunklines running to the west along Viewdale Street and Terminal Avenue (the upper basin) intersect a 36-inch line (48-inch line at the outfall) that runs to the south on South Wenatchee Avenue approximately 1,200 feet (the lower basin) before outfalling to Squilchuck Creek. **Appendix A** contains a vicinity map and a basin map.

The County is pursuing a combination hydrodynamic separator/subsurface infiltration facility for stormwater that currently enters the creek untreated. Because of the size of the Squilchuck basin and the goal of creating a project which has a competitive overall cost during the next grant cycle, the goal of this design is to detain and infiltrate the 6-month, short-duration storm. Larger events will still be directed through the pretreatment/infiltration system, but will be allowed to overflow to the creek; however, the first flush events, which are assumed to carry the highest concentrations of oil, grease, anti-icer, sediment, and other pollutants identified in the Washington State Department of Ecology (Ecology) *2004 Stormwater Management Manual for Eastern Washington* (SWMMEW), will likely be captured. Flows in excess of the hydrodynamic separator's rated capacity will bypass the pretreatment/infiltration system to avoid backwater and pressurization issues.

The low-impact development (LID) Best Management Practices (BMPs) outlined in the *Eastern Washington Low Impact Development Guidance Manual* were evaluated; however, due to high-density development, lack of right-of-way, and concern that any surface treatment BMPs may be prone to illegal dumping in this area, the County has requested investigation of subsurface treatment/infiltration methods. The project proposes to implement BMPs intended to meet local requirements and follow guidance provided by the Washington State Department of Transportation's (WSDOT) *Highway Runoff Manual* (HRM), November 2011, edition and Ecology's SWMMEW.

2. Basin Description

For the purposes of this report, the upper basin includes all of the area that drains to the trunklines in Viewdale Street and Terminal Avenue. The lower basin consists of the area along South Wenatchee Avenue from Viewdale Street to Squilchuck Creek.

The total size of the Squilchuck basin is approximately 100 acres (**Appendix A**). Much of the basin within the City of Wenatchee (City) is zoned as high-density residential with lots of approximately 0.15 acres in size. This zoning and lot size is similar into the County except on the steeper slopes.

The existing topography slopes generally to the east at around 3 percent with some steeper slopes up to 10 percent. There is approximately 200 feet of elevation difference between the top of the basin and the outfall into Squilchuck Creek. There is a ravine just north of Boodry Street that is approximately 200 feet wide at the mouth and runs approximately 500 feet to the west. It is assumed that this feature contributes to a groundwater flow in this area. A pothole investigation to the south of this ravine revealed that groundwater in this area will be an issue. Groundwater was confined below a clay layer at a depth of approximately 6 feet. Once ruptured, the groundwater stabilized within hours to approximately 3 feet below the surface. A borehole and another pothole are located at the south end of the site approximately 50 feet from the creek. This area had coarser soils and lower groundwater. The existing topography is shown in Figure 2 in **Appendix A.**

3. Site Description

Existing stormwater controls in the basin consist only of the conveyance system. This project proposes to pre-treat, detain, and infiltrate a portion of the stormwater in order to improve the quality of the water that ultimately flows into the creek.

The project site is considered to be mainly in the lower basin, as explained in the Design Alternatives and Analysis section of this report.

Critical areas within or immediately adjacent to the project boundaries consist of geologic hazards; risks for flooding, earthquakes, and liquefaction are known to be present (see geology report). The project area is located within Flood Zone X, which is at moderate to low risk with no base flood elevations or depths present in the zone. Figure 3 in **Appendix A** shows the flood maps for this area.

A geological field assessment has been completed as part of the 90-percent design; however, further investigation is needed before construction to ascertain the southern extent of the high groundwater. The average infiltration rate was found to be approximately 4.8 inches per hour near the proposed infiltration pipe.

The Natural Resources Conservation Service (NRCS) identifies most of the upper basin as Wenatchee silt loam with 0 to 3 percent slopes and Peshastin loam with 8 to 15 percent slopes. The lower basin is characterized as Peshastin stony loam with 25 to 45 percent slopes and Cashmont stony sandy loam with 0 to 25 percent slopes. The NRCS report is included in **Appendix E.**

Existing water and sanitary sewer lines run underneath the existing roadway. Overhead phone and power lines are also in the project vicinity. Existing businesses, homes, and driveways are located along the project boundaries, and will have little impact on the stormwater drainage improvements.

4. Design Alternatives and Analysis

The County has decided to proceed with infiltration facilities in the lower basin at this time, as the flatter slopes provide better constructability and the existing pipe in this section is severely degraded and is nearing the end of its service life.

Alternatives Considered

Options explored for the lower basin include the following.

1. Constructing a 48-inch perforated pipe running along South Wenatchee Avenue with level control structures to allow the pipe to act as an infiltration gallery. Additionally, an in-line pretreatment device upstream of the perforated pipe would provide oil/water separation and hydrodynamic separation and reduce the risk of clogging in the infiltration gallery.
   Conclusion: This option represents the most cost-effective solution.
2. Purchasing a 1/3-acre parcel that is currently for sale on the north side of Squilchuck Creek and west side of South Wenatchee Avenue and installing a perforated pipe grid to detain and infiltrate the entire 6-month, short-duration storm (SDS), as well as approximately 40 percent of the 2-year, long-duration storm (LDS).
   Conclusion: This option was deemed less cost effective at this time as preliminary estimates suggest costs upwards of $480,000. Also, there is a potential for illegal dumping to occur and become a maintenance problem.

3. Utilizing the extra capacity in the City's new stormwater pond near the intersection of South Wenatchee Avenue and Malaga-Alcoa Highway.
   Conclusion: This option is not viable because the City plans to route more water to the pond in the future.
4. Replacing the large 30-inch pipe in the lower basin that is currently nearing the end of its service life with a 36-inch corrugated polyethylene pipe.
   Conclusion: This option would provide a beneficial upgrade if done together with Option 1 to help minimize the risk of failure and clogging the proposed perforated pipe.

Options explored for the upper basin include:

5. Placing drywells in various locations.
   Conclusion: This option is more expensive than a horizontal perforated pipe per unit volume stored.
6. Investigating the viability of constructing a detention/infiltration pond or structure on Wenatchee School District's property between Terminal Avenue and S Wenatchee Avenue to detain and/or infiltrate a large portion of stormwater coming down the Terminal Avenue trunkline.
   Conclusion: This option represents a viable addition to the perforated pipe near the creek, but will require extensive planning, coordination, and negotiation with the school district.

Final Alternative

The most cost-effective solution for the lower basin appears to be option 1. The design includes approximately 75 linear feet of 48-inch perforated pipe beginning approximately 100 feet from Squilchuck Creek. This would allow flexibility for the County's future plan of moving the outfall if the bridge over Squilchuck Creek is replaced. The presence of a small un-named creek in the ravine north of Boodry Street precludes the recommendation of extending the perforated infiltration pipe to the north any farther due to concerns of adding to the flow of that underground spring. During the geotechnical investigations, the area immediately south of this ravine was found to have groundwater confined below a clay layer at about a 6-foot depth. Once the clay layer was punctured, the groundwater bubbled up and stabilized at about 3 feet from the surface. One other pothole and a borehole were excavated at the south end of the project near the creek. Groundwater at this location was observed to coincide approximately with the water level in the creek. An additional pothole is needed between the two exploration areas to ensure that the infiltration pipe is out of the high groundwater zone.

Since the project is more cost effective with more storage, the plans show a non-perforated section of pipe in the high groundwater zone. This will simply store pretreated water until it can infiltrate or overflow into the creek. The manhole at the end of the infiltration pipe will include a weir that will hold the water level 3 feet above the pipe invert. A valve is included near the pipe invert to allow the system to be drained if necessary.

A portion of option 4 will also be included in this project. Existing pipe along the lower section of this stormwater system that is deteriorating, but not being replaced by perforated pipe will be replaced up to the City limits. Much of this pipe is heavily degraded and is allowing soil to be eroded and carried to the creek.

Design and Modeling

Drainage Basin

The model was built in HydroCAD version 10.00. The catchment area is modeled as 98.3 acres of 1/8-acre lots in Hydrologic Soil Group (HSG) B and C and 65 percent impervious surface. The curve number (CN) is 85 or 90, depending on the HSG. The time of concentration calculation is broken out into segments that correspond with sheet flow, shallow concentrated flow and pipe flow as the stormwater travels approximately 4,500 feet from the farthest reach of the basin to the beginning of the proposed improvements. This yielded a time of concentration of 13.3 minutes.

Design Storms

Two main storms were used to analyze the system. The 24-hour SCS Type IA distribution was used to simulate longer regional storms, and the 3-hour, SDS which simulates thunderstorms. The following precipitation depths were used:

LDS Events	
Recurrence (yrs)	**Precip (in)**
100	2.50
50	2.40
25	2.20
10	1.80
2	1.24
0.5	0.818

SDS Events	
Recurrence (yrs)	**Precip (in)**
100	1.47
50	1.22
25	1.00
10	0.76
2	0.48
0.5	0.30

System Inlet Pipe

Since modeling every structure and its tributary area is out of the scope of this project, the collection system was simplified in the model. The basin drains directly to a 36-inch corrugated metal pipe (CMP) reach which is intended to limit system inflows to the maximum Manning open channel flow while neglecting entrance losses, which may result in conservative (high) flows. However, inspection of high water marks in the 48-inch lower basin pipes indicates that flow depths routinely reach half of the pipe depth. Assuming a slope of 2%, it is evident that the pipe regularly conveys flows of about 50 cfs. This is affirmed by the model—the 25-year SDS produces about 50 cubic feet per second (cfs) in this pipe. In larger storms, the inlet pipe detains some of the flow generated in the basin (compare generated and conveyed flows in **Table 4.1**), but eventually drains the whole amount of runoff. The amount of water represented by the difference in the basin-generated peak flow and the peak capacity of the pipe is neglected in this analysis because the model does not provide enough detail to confirm whether or not this amount of water would even enter the system. The 100-year SDS model indicates that approximately 20% of the total basin-generated volume was detained in the inlet pipe, and may never actually enter the system in reality.

Table 4.1: System Inflows Model Output

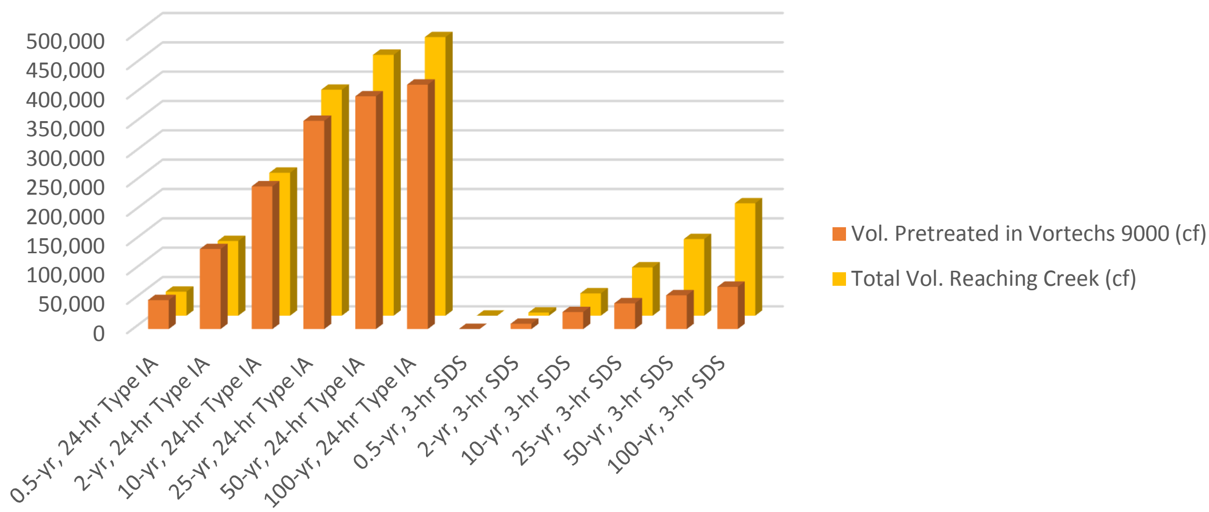
Storm	Basin-Generated Flow (cfs)	Inlet Pipe Conveyed Flow (cfs)	Vol. Detained by Inlet Pipe (cf)
0.5-yr, 24-hr Type IA	1.4	1.4	0
2-yr, 24-hr Type IA	7.15	7.14	0
10-yr, 24-hr Type IA	15.42	15.41	0
25-yr, 24-hr Type IA	25.75	25.74	0
50-yr, 24-hr Type IA	30.14	30.12	0
100-yr, 24-hr Type IA	32.37	32.35	0
0.5-yr, 3-hr SDS	0.06	0.06	0
2-yr, 3-hr SDS	5.77	5.75	0
10-yr, 3-hr SDS	25.35	25.31	0
25-yr, 3-hr SDS	53.04	53.01	0
50-yr, 3-hr SDS	83.72	70.72	6,725
100-yr, 3-hr SDS	122.63	69.33	36,899

SDS = short-duration storm; cf = cubic feet; cfs = cubic feet per second

Pretreatment and Subsurface Infiltration System

Downstream of the modeled system inlet pipe is the existing flow splitter structure, which was installed in the last few years to direct small flows out of the storm sewer and into a rock lined infiltration pond at the north end of the project site. The pipe between the flow splitter and the pond is 6 inches in diameter. The pond's overflow structure is connected back to the storm system. After this connection a proposed flow splitter structure directs smaller flows through a Contech Vortechs 9000 hydrodynamic separator for pretreatment. Flow into the Vortechs unit from the flow splitter is controlled with a 16-inch-diameter orifice to restrict flows greater than 14 cfs, which is Contech's rated maximum flow. Ecology's General Use Level Designation (GULD) for this unit allows a maximum flow of 5 cfs to satisfy pretreatment standards; however, it is assumed that a greater volume of mostly-pretreated water is more beneficial than a smaller volume of totally pretreated water. If Ecology prefers, the orifice can simply be downsized to restrict flows to 5 cfs and route the remaining 9 cfs to the bypass. The pretreatment volumes versus the total outfall to the creek are shown in **Figure 4.1**.

Figure 4.1: Total Volume Pretreated and Total Volume Reaching Creek



Stormwater exiting the Vortechs unit is directed into a 48-inch-diameter, 180-foot-long unperforated storage pipe set at zero slope that is meant to detain water until it can be infiltrated. A 48-inch-diameter, 75-foot-long perforated pipe comes after the storage pipe. Previous designs had the whole length as perforated pipe, but high groundwater at the north end of this section makes this impossible. The model includes a 3-foot-tall weir with a 3-inch-diameter orifice at the bottom between the storage and infiltration pipes even though the pipes have the same invert elevations and diameters. This is necessary in the model only to discourage flow oscillations between the two nodes that cause errors. These components will not be necessary in the constructed system.

The water level in the infiltration and storage pipes is controlled by a weir structure at the end of the infiltration pipe. The weir will hold the water level 3 feet above the invert of the pipe, allowing more water to infiltrate. The weir overflows to a small culvert in the structure that is routed to the system outfall into Squilchuck Creek.

Bypass System

The flow splitter above the Vortechs unit bypasses flows greater than 14 cfs around the pretreatment system to avoid inundating it and causing remobilization of sediment. The bypass joins the infiltration system overflow at the south end of the project side and outfalls to the creek.

A portion of the bypass pipe will be perforated to allow groundwater to enter and be carried to the creek.

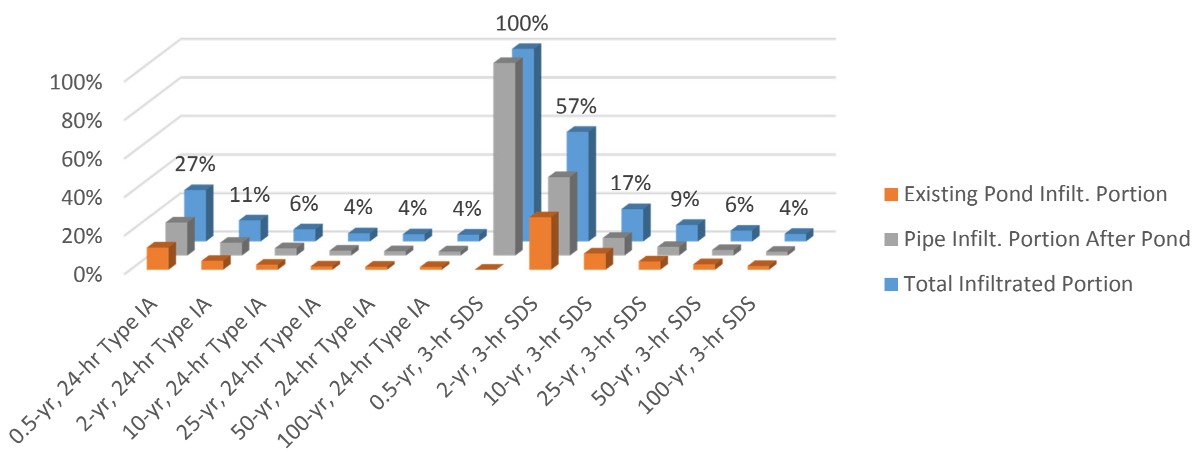
Proposed Water Quality and Flow Control Performance

Water quality is addressed by hydrodynamic and oil/water separation in the Vortechs 9000 unit and subsurface infiltration. The Vortechs unit meets pretreatment requirements for the more common storms and a bypass is provided for larger events. As shown in **Table 4.1**, the model indicates that peak flows are below the GULD-approved rate of 5 cfs in both the 6-month Type IA and SDS, meaning all of the runoff from most small storms will be fully pretreated. Furthermore, an appreciable portion of the other storms is pretreated as well, as shown in **Figure 4.1**.

Given the known depth to groundwater of approximately 12 feet, the coarse-grained soil, and assuming the runoff is moderately polluted, the infiltration system itself could not meet the presumptive approach requirements outlined in section 5.6.2 of the SMMEW. This, along with the desire for a long-lived system, necessitate pretreatment prior to subsurface infiltration.

The recently installed pond is included in the model as a comparison to the proposed system. Portions of the runoff retained and infiltrated in the proposed perforated pipe system and existing pond are displayed in **Figure 4.2**.

Figure 4.2: Portions of Runoff Infiltrating in Proposed and Existing Facilities



Flow control is improved by a weir structure at the lower end of the perforated pipe in order to detain stormwater in the pipes and allow greater infiltration. The system will help to delay runoff flows from entering the creek during lower intensity and shorter duration storms. This is especially true for the Type IA storms and the 6-month and 2-year thunderstorms, as these produce little or no flow that bypasses the treatment system (**Figure 4.1**).

Drawings

Preliminary plans and details are included in **Appendix B**.

HydroCAD Model

The HydroCAD model output is included in **Appendix D**.

5. Implementation Recommendation

RH2 Engineering, Inc., (RH2) recommends the system described in Section 4 of this report as it would provide a cost-effective and long-lasting option for improving water quality in Squilchuck Creek. Further geotechnical testing is recommended to fully characterize groundwater in this area prior to construction.

6. Cost Estimate

The preliminary cost estimates for the options presented in Section 4 are detailed in **Appendix C** and summarized as follows.

1. Installing 75 lineal feet of perforated pipe, 180 feet of storage pipe, and pretreatment system – $517,000
2. Perforated CMP grid on purchased creekside lot – $480,000
3. Using extra capacity in City's new stormwater pond – not a viable option, no cost estimate prepared
4. Replacing the 30-inch pipe with 36-inch corrugated polyethylene pipe in the lower basin – included in option 1 cost.
5. Placing drywells in the upper basin – approximately $30,000 per drywell
6. Placing a detention/infiltration facility on school district lot – unknown at this time, no cost estimate prepared

7. Proposed Schedule

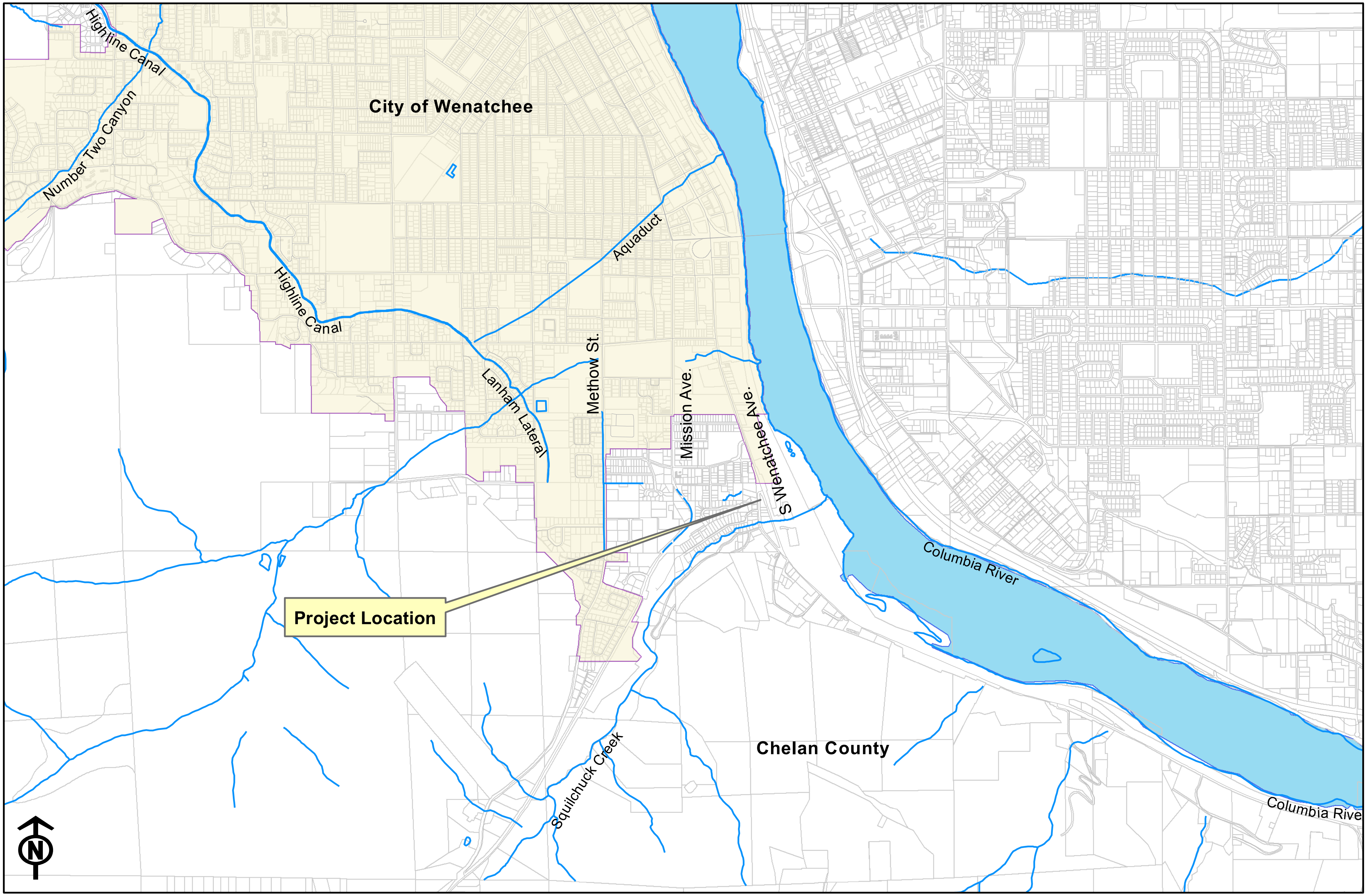
The geotechnical investigation and final design will commence if the project is able to procure funds by a competitive grant for construction in 2015.

8. Appendices

Appendix A – Basin Map
Appendix B – Plans and Details
Appendix C – Cost Estimate Details
Appendix D – Storm Simulation Output
Appendix E – Soils Analysis

Appendices

Appendix A
Basin Maps



Chelan County Public Works
Squilchuck Stormwater Outfall
Figure 1: Vicinity Map

0 1,250 2,500 5,000 Feet

Legend

- Roads
- Wenatchee City Limits
- Parcels
- Columbia River
- Streams

RH2

Disclaimer: Information contained in for planning purposes only. Accuracy of data of adjacent systems is from best information available.

file path: J:\data\WM\208-142\GIS\Figure_1.mxd
last modified by: MJV on 01/25/14

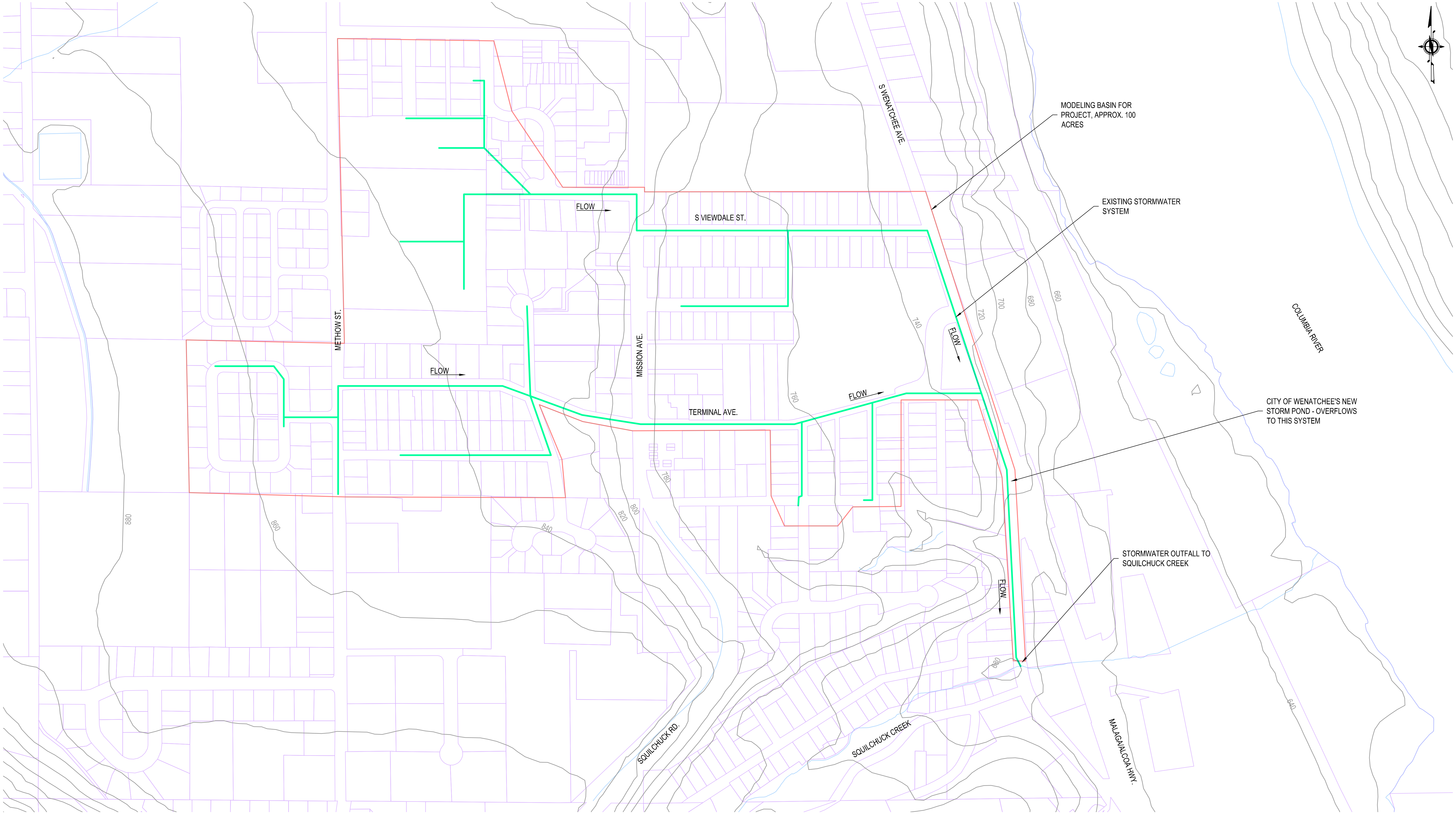
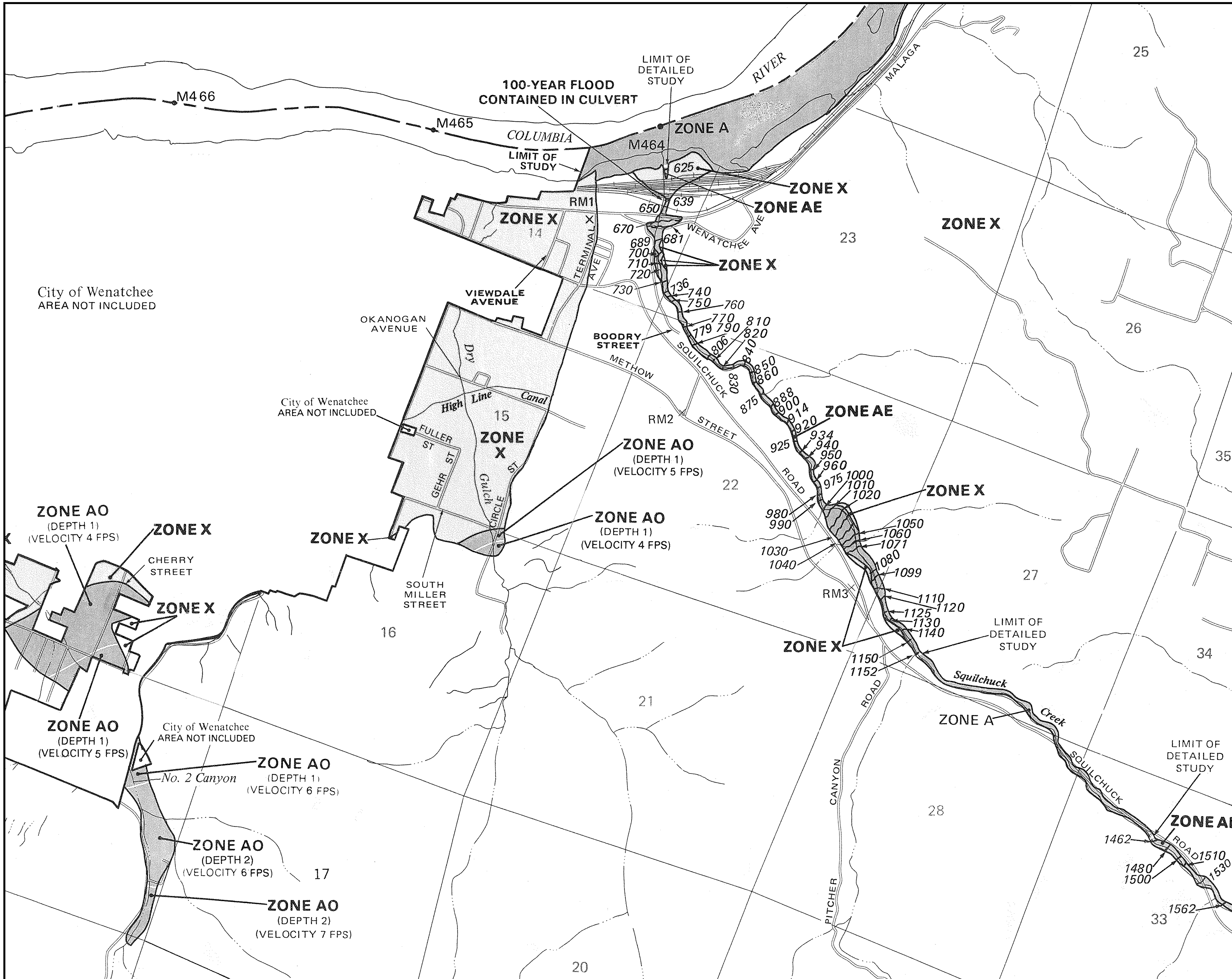


FIGURE 2: BASIN MAP
SQUILCHUCK STORMWATER OUTFALL

1" = 400'

DRAWING IS NOT TO SCALE IF BAR IS NOT 2" LONG
0 1" 2"

.LAYER



APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIGURE 3

FIRM

FLOOD INSURANCE RATE MAP

CHELAN COUNTY, WASHINGTON (UNINCORPORATED AREAS)

PANEL 625 OF 3150

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER

5300150625D

MAP REVISED:

SEPTEMBER 30, 2004

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIGURE 3

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
WENATCHEE,
WASHINGTON
CHELAN COUNTY

ONLY PANEL PRINTED

COMMUNITY–PANEL NUMBER
530020 0005 C

MAP REVISED:
JANUARY 6, 1994

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Emergency Management Agency

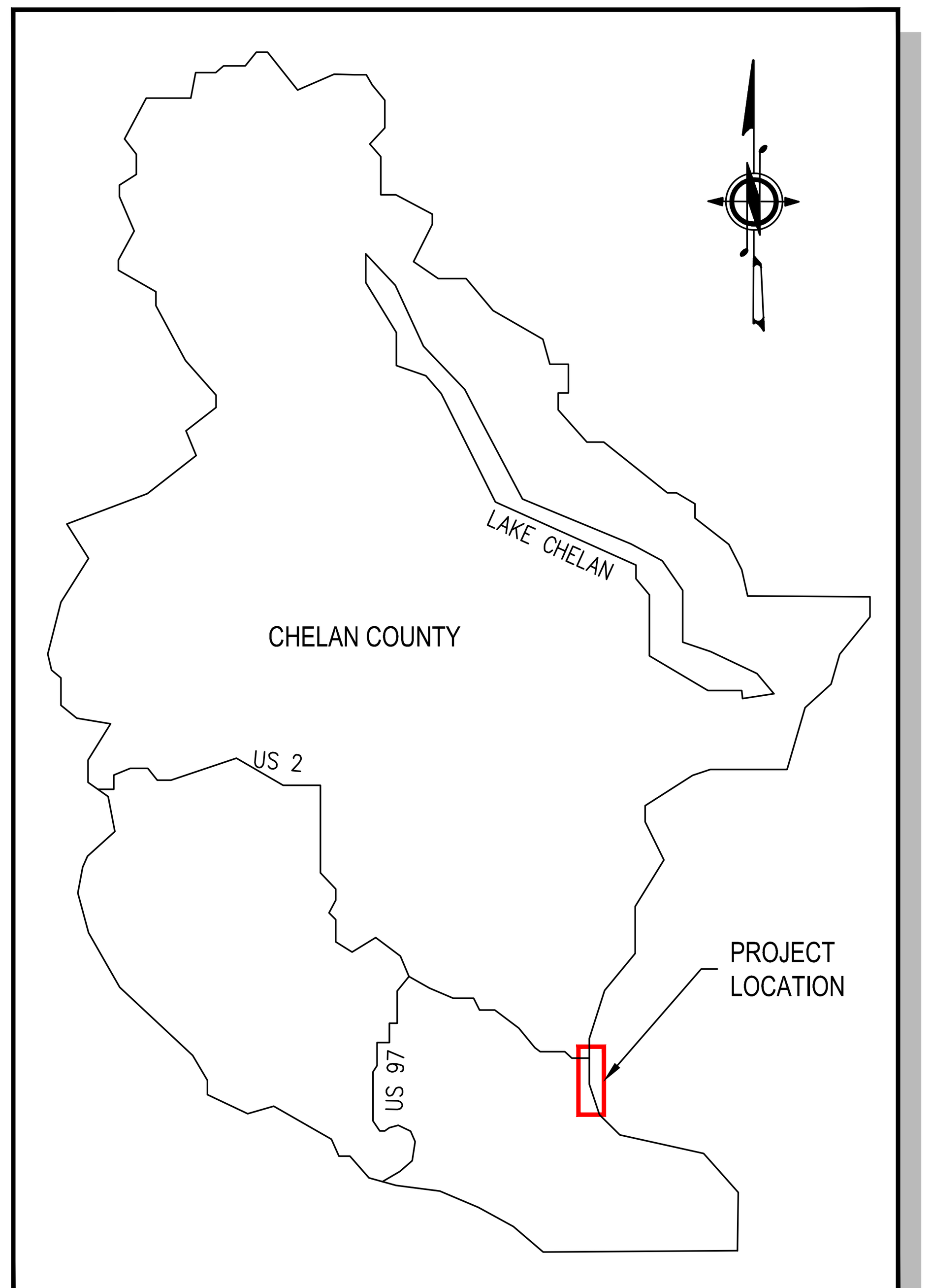
Appendix B
Preliminary Plans

CHELAN COUNTY PUBLIC WORKS

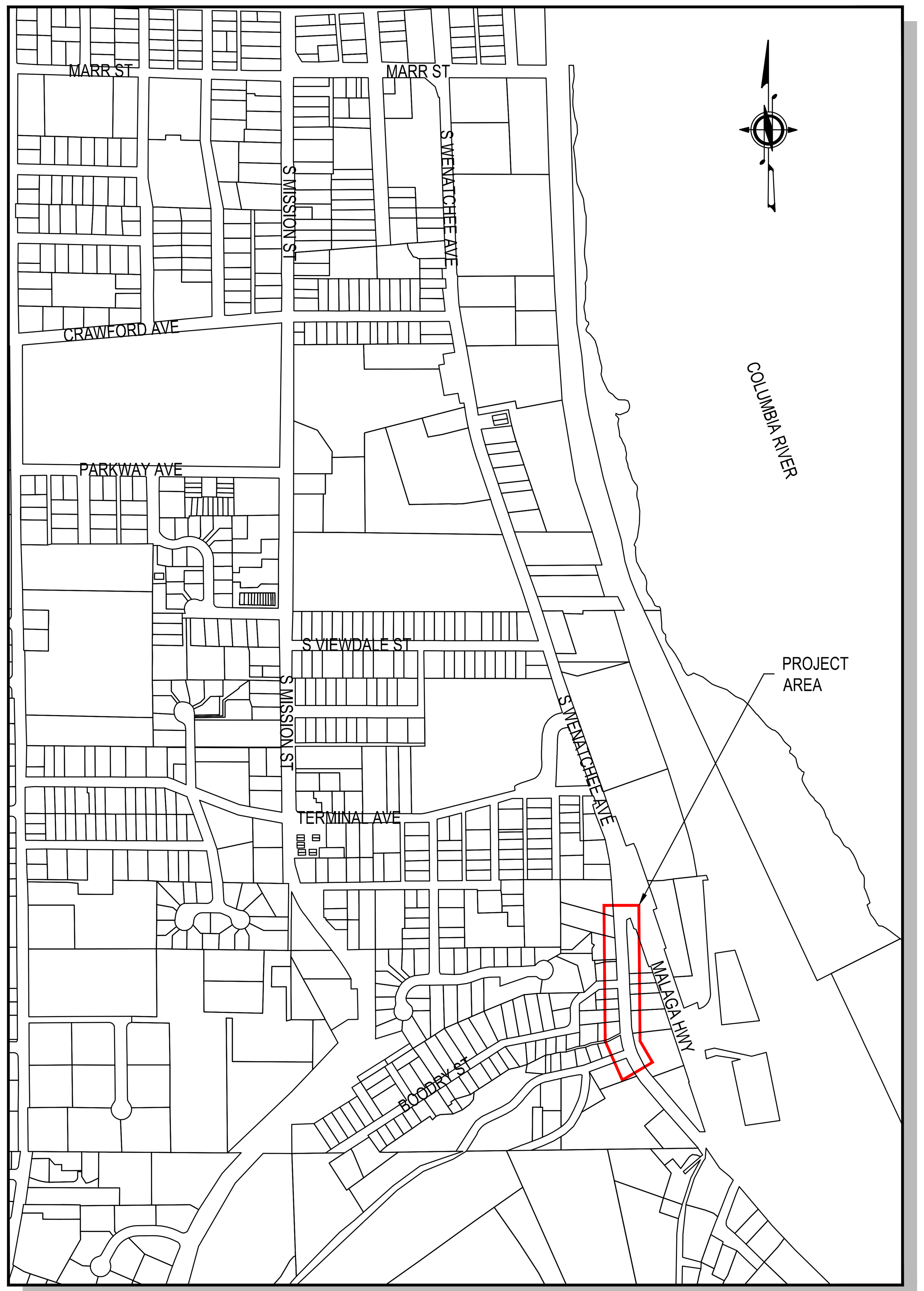
SQUILCHUCK OUTFALL

90% PLANS

VICINITY MAP



PROJECT LOCATION



DRAWING INDEX

Sheet Number	Sheet Title
1	COVER
2	SUMMARY OF QUANTITIES
3	STORMWATER PLAN
4	STORMWATER PLAN
5	STORMWATER DETAILS
6	VORTECHS 9000 DETAILS

CONTACT PERSONNEL

CONTACT	AGENCY	PHONE (509)
ANGI WALIGORSKI (PROJECT MANAGER)	RH2 ENGINEERING	509-886-6765
MICHAEL VOTH (STAFF ENGINEER)	RH2 ENGINEERING	509-886-6789

EXISTING LEGEND

- ELECTRICAL PEDESTAL
- TELEPHONE STRUCTURE
- TELEVISION STRUCTURE
- COMMUNICATION STRUCTURE
- WATER VALVE
- WATER METER
- WATER WELL
- STORM MANHOLE
- STORM DRAIN
- SEWER MANHOLE
- SIGN
- MAILBOX
- TREE
- RIGHT OF WAY
- RIGHT OF WAY CENTERLINE
- LOT LINE
- ROADWAY CENTERLINE
- MINOR TOPO
- MAJOR TOPO
- TOP OF SLOPE
- TOE OF SLOPE
- EDGE OF PAVEMENT
- EDGE OF CONCRETE
- UNDERGROUND TELEPHONE
- WATER LINE
- SEWER LINE
- STORM SEWER LINE
- IRRIGATION LINE
- GAS LINE
- GUARDRAIL
- FENCE

PROPOSED LEGEND

- PROPOSED STORM PIPE
- PROPOSED PERFORATED STORM PIPE
- EXISTING STORM PIPE
- TRENCH DAM
- PROPOSED STRUCTURE
- PROPOSED STRUCTURE WITH WATER TIGHT BOOT CONNECTIONS
- PROPOSED STRUCTURE WITH EXTENDED BASE
- MANHOLE WITH CHANNEL
- EXISTING STRUCTURE
- CONTECH VORTECH 9000

GENERAL NOTES

NO CONSTRUCTION RELATED ACTIVITY SHALL CONTRIBUTE TO THE DEGRADATION OF THE ENVIRONMENT, ALLOW MATERIAL TO ENTER SURFACE OR GROUND WATERS, OR ALLOW PARTICULATE EMISSIONS TO THE ATMOSPHERE, WHICH EXCEED STATE OR FEDERAL STANDARDS. ANY ACTIONS THAT POTENTIALLY ALLOW A DISCHARGE TO STATE WATERS MUST HAVE PRIOR APPROVAL OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY.

CALL 48 HOURS BEFORE YOU DIG
ONE CALL 811

REPORT ALL SPILLS
DEPT. OF ECOLOGY 1-800-258-5990

RH2 ENGINEERS PLANNERS SCIENTISTS

SUMMARY OF QUANTITIES

Item No.	Total Quantity	Unit	Description
			PREPARATION
1	1	L.S.	MOBILIZATION
2	1	L.S.	REMOVAL OF STRUCTURES AND OBSTRUCTIONS
			STORM SEWER
3	3	EACH	MANHOLE 72 IN. DIAM. TYPE 3
4	1	EACH	FLOW SPLITTER CATCH BASIN 84 IN. DIAM. TYPE 2 W/ ANTIFL. LIP
5	1	EACH	MANHOLE 72 IN. DIAM. TYPE 3 W/ ANTIFL. LIP
6	1	EACH	MANHOLE 84 IN. DIAM. TYPE 3
7	1	EACH	MANHOLE 84 IN. DIAM. TYPE 3 W/ ANTIFL. LIP
8	1	EACH	WEIR CATCH BASIN 84 IN. DIAM. TYPE 2
9	1	EACH	WYE CATCH BASIN 84 IN. DIAM. TYPE 2
10	1	EACH	VORTECH 9000 TREATMENT SYSTEM
11	1	EACH	INSERTA TEE 12 IN. DIAM. CONNECTOR
12	1	EACH	MANHOLE BOOT CONNECTION 12 IN. DIAM.
13	4	EACH	MANHOLE BOOT CONNECTION 18 IN. DIAM.
14	4	EACH	MANHOLE BOOT CONNECTION 36 IN. DIAM.
15	1	EACH	MANHOLE BOOT CONNECTION 48 IN. DIAM.
16	205	L.F.	PERFORATED CMP STORM SEWER PIPE 36 IN. DIAM
17	75	L.F.	PERFORATED CMP STORM SEWER PIPE 48 IN. DIAM
18	60	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 12 IN. DIAM.
19	65	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 18 IN. DIAM.
20	325	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 36 IN. DIAM.
21	180	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 48 IN. DIAM.
22	1	EACH	TRENCH DAM
			SURFACING
23	650	TON	CRUSHED SURFACING BASE COURSE
			HOT MIX ASPHALT
24	330	TON	HMA CL.1/2 IN. PG 64-28
			EROSION CONTROL AND PLANTING
25	5	DAY	ESC LEAD
26	10,000	DOL	EROSION/WATER POLLUTION CONTROL
27	10	EACH	INLET PROTECTION
			TRAFFIC
28	500	L.F.	PAINT LINE
29	1	L.S.	PROJECT TEMPORARY TRAFFIC CONTROL
			OTHER ITEMS
30	1	L.S.	DEWATERING
31	1	L.S.	SHORING OR EXTRA EXCAVATION CLASS B
32	5,000	EST	UNKNOWN UTILITY REPAIR
33	1	L.S.	ROADWAY SURVEYING
34	1	L.S.	SPCC PLAN

90% PLANS

RH2 ENGINEERING, INC.
www.rh2.com 1.800.720.8052
EAST WENATCHEE, WA
300 Simon Street, Suite 5

CHELAN COUNTY PUBLIC WORKS

SQUILCHUCK OUTFALL

SUMMARY OF QUANTITIES

PRELIMINARY

JOB NO.: 213-132
CLIENT: CCD
FILENAME: SQUI-P-COV.DWG
SAVE DATE: Oct 22, 2014
PLOT DATE: Oct 22, 2014
ENGINEER: MJV
REVIEWED: AMW

REVISIONS

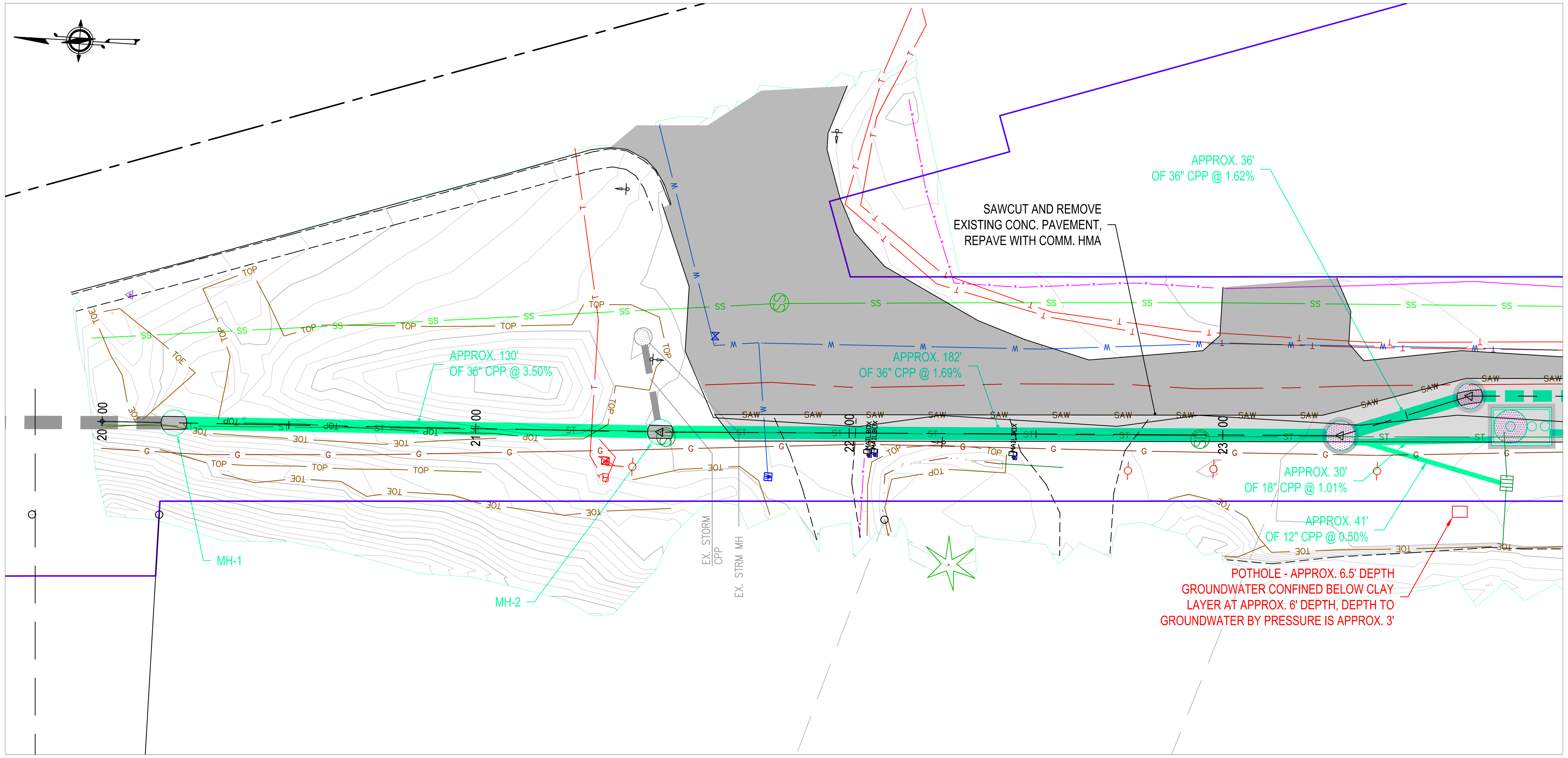
NO.	DATE	DESCRIPTION	BY	REVIEW

SCALE: SHOWN

DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

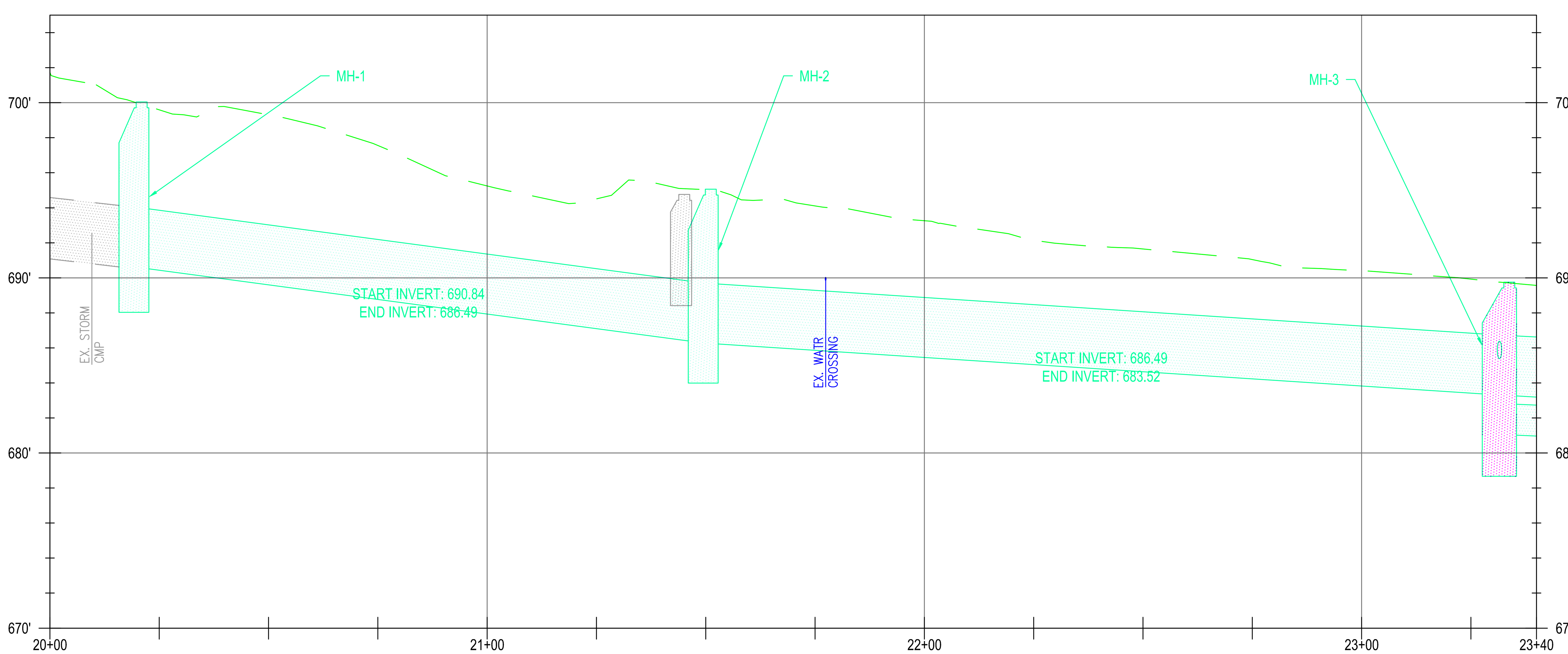
DWG NO.: G01

SHEET NO.: 2 of 6



SOUTH WENATCHEE AVENUE

1" = 20.0000



STORM PIPE PROFILE

H: 1" = 20', V: 1" = 5'

GENERAL NOTES

1) EXISTING 36" TO 48" CMP AND STORM STRUCTURES THAT CONFLICT WITH THE PROPOSED SHALL BE REMOVED BY THE CONTRACTOR.

2) STORM PIPE LEAKAGE TESTS SHALL BE IN ACCORDANCE WITH SANITARY SEWER LEAKAGE TESTS. SEE SPECIAL PROVISIONS.

STORM STRUCTURE TABLE

NAME	TYPE	STATION	RIM	PIPES IN
MH-1	72" TYPE 3 MH	20+19.2, 0.0	ELEV. 700.04	I.E. 690.84, S I.E. 690.53, N
MH-2	72" TYPE 3 MH	21+49.4, 0.0	ELEV. 695.06	I.E. 686.49, N I.E. 686.49, S I.E. 690.00, E

LEGEND:

- PROPOSED STORM PIPE
- PROPOSED PERFORATED STORM PIPE
- EXISTING STORM PIPE
- PROPOSED STRUCTURE
- PROPOSED STRUCTURE WITH WATER TIGHT BOOT CONNECTIONS
- PROPOSED STRUCTURE WITH EXTENDED BASE
- MANHOLE WITH CHANNEL

90% PLANS

RH2 ENGINEERS PLANNERS SCIENTISTS
RH2 ENGINEERING, INC.
www.rh2.com 1.800.720.8052
EAST WENATCHEE, WA
300 Simon Street, Suite 5

CHELAN COUNTY PUBLIC WORKS
SQUILCHUCK OUTFALL
PRELIMINARY
STORMWATER PLAN

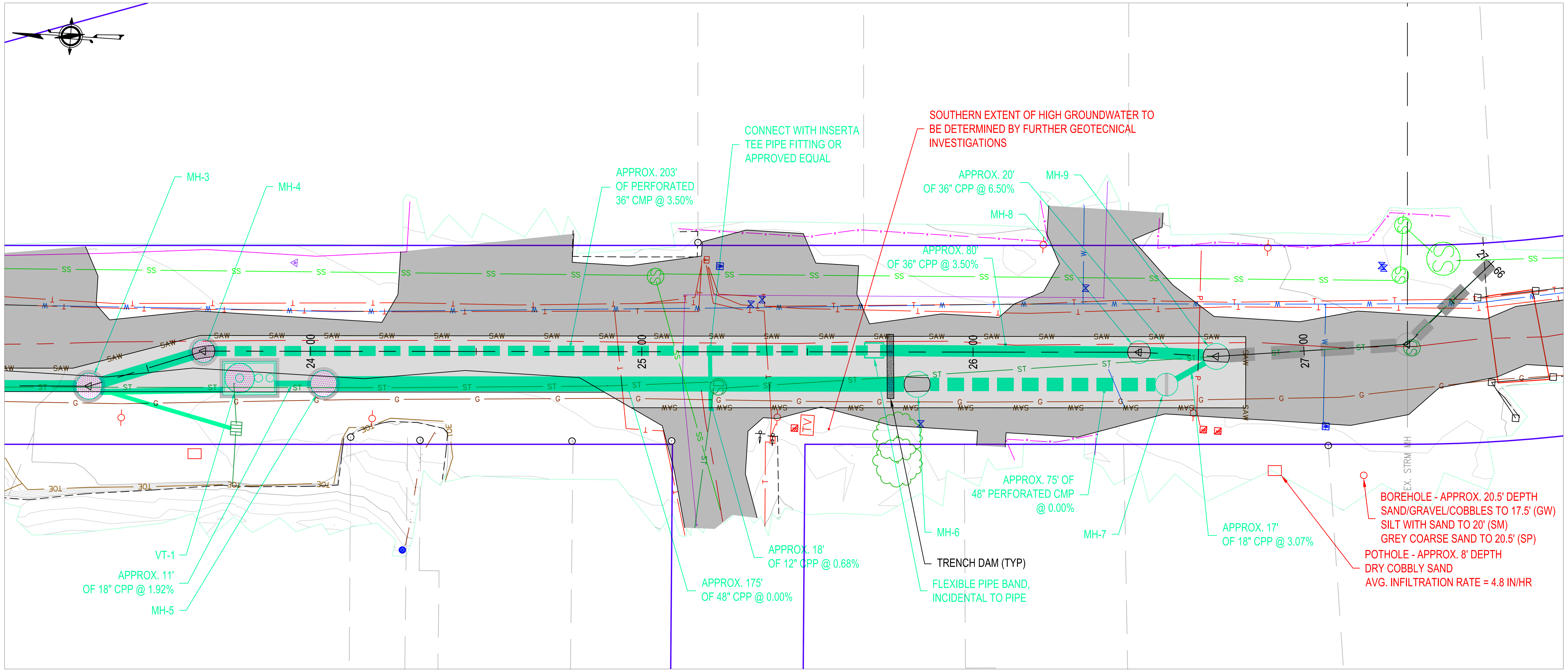
JOB NO.: 213-132	CLIENT: CCD	FILENAME: SQUI-P-CIV.DWG	SAVE DATE: Oct 22, 2014	PLOT DATE: Oct 22, 2014	ENGINEER: MJV	REVIEWED: AMW

REVISIONS

NO.	DATE	DESCRIPTION	BY	REVIEW

SCALE: SHOWN
0" 1" 2"
DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

DWG NO.: C01
SHEET NO.: 3 / 6



SOUTH WENATCHEE AVENUE

1" = 20.0000

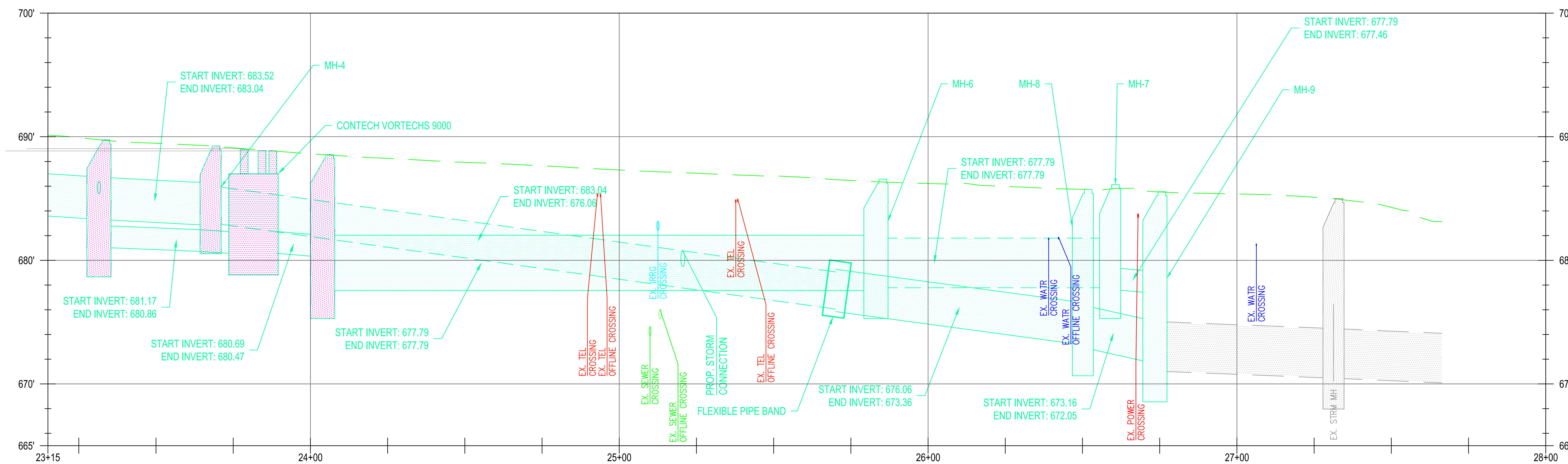
GENERAL NOTES

1) EXISTING 36" TO 48" CMP AND STORM STRUCTURES THAT CONFLICT WITH THE PROPOSED SHALL BE REMOVED BY THE CONTRACTOR.

2) STORM PIPE LEAKAGE TESTS SHALL BE IN ACCORDANCE WITH SANITARY SEWER LEAKAGE TESTS. SEE SPECIAL PROVISIONS.

STORM STRUCTURE TABLE

NAME	TYPE	STATION	RIM	PIPES IN
MH-3	84" TYPE 3 MH 12'6" MIN DIAM BASE	23+31.5, 0.0	ELEV. 689.75	I.E. 683.52, N I.E. 681.17, S I.E. 683.52, S I.E. 685.38, S
MH-4	72" TYPE 3 MH 9'10" MIN DIAM BASE	23+67.7, 0.0	ELEV. 689.25	I.E. 683.04, N I.E. 683.04, S
MH-5	84" TYPE 3 MH 13'0" MIN DIAM BASE	24+04.0, 9.8 R	ELEV. 688.56	I.E. 680.47, N I.E. 677.79, S
MH-6	84" TYPE 3 MH	25+83.1, 9.7 R	ELEV. 686.57	I.E. 677.79, N I.E. 677.79, S
MH-7	72" TYPE 3 MH	26+58.9, 9.3 R	ELEV. 686.13	I.E. 677.79, N I.E. 677.79, SE
MH-8	72" TYPE 3 MH	26+50.1, 0.0	ELEV. 685.75	I.E. 673.36, N I.E. 673.16, S
MH-9	84" TYPE 3 MH	26+73.4, 0.0	ELEV. 685.56	I.E. 672.05, N I.E. 677.46, NW I.E. 671.05, S
VT-1	Contech Vortechs 9000 2' BASE EXTENTION ALL SIDES	23+78.6, 8.1 R	ELEV. 688.95	I.E. 680.86, N I.E. 680.69, S



STORM PIPE PROFILE

H: 1" = 20', V: 1" = 5'

LEGEND:

- PROPOSED STORM PIPE
- PROPOSED PERFORATED STORM PIPE
- EXISTING STORM PIPE
- PROPOSED STRUCTURE
- PROPOSED STRUCTURE WITH WATER TIGHT BOOT CONNECTIONS
- PROPOSED STRUCTURE WITH EXTENDED BASE
- MANHOLE WITH CHANNEL

90% PLANS

CHELAN COUNTY PUBLIC WORKS

SQUILCHUCK OUTFALL

STORMWATER PLAN

PRELIMINARY

RH2 ENGINEERS SCIENTISTS

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EAST WENATCHEE, WA
300 Simon Street, Suite 5

REVISIONS

NO.	DATE	DESCRIPTION	BY	REVIEW

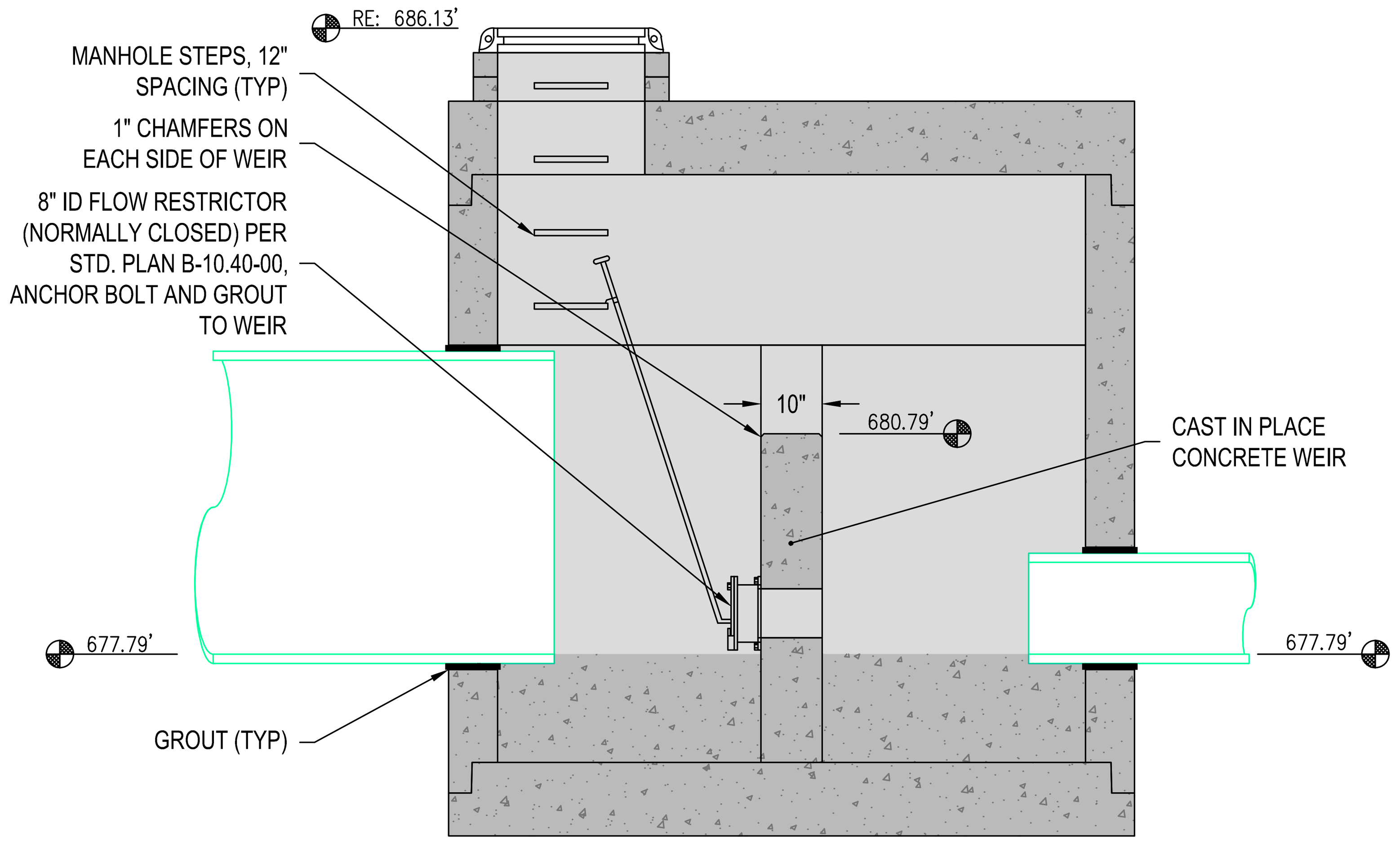
JOB NO.: 213-132
CLIENT: CCD
FILENAME: SQUI-P-CIV.DWG
SAVE DATE: Oct 22, 2014
PLOT DATE: Oct 22, 2014
ENGINEER: MJV
REVIEWED: AMW

SCALE: SHOWN

DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

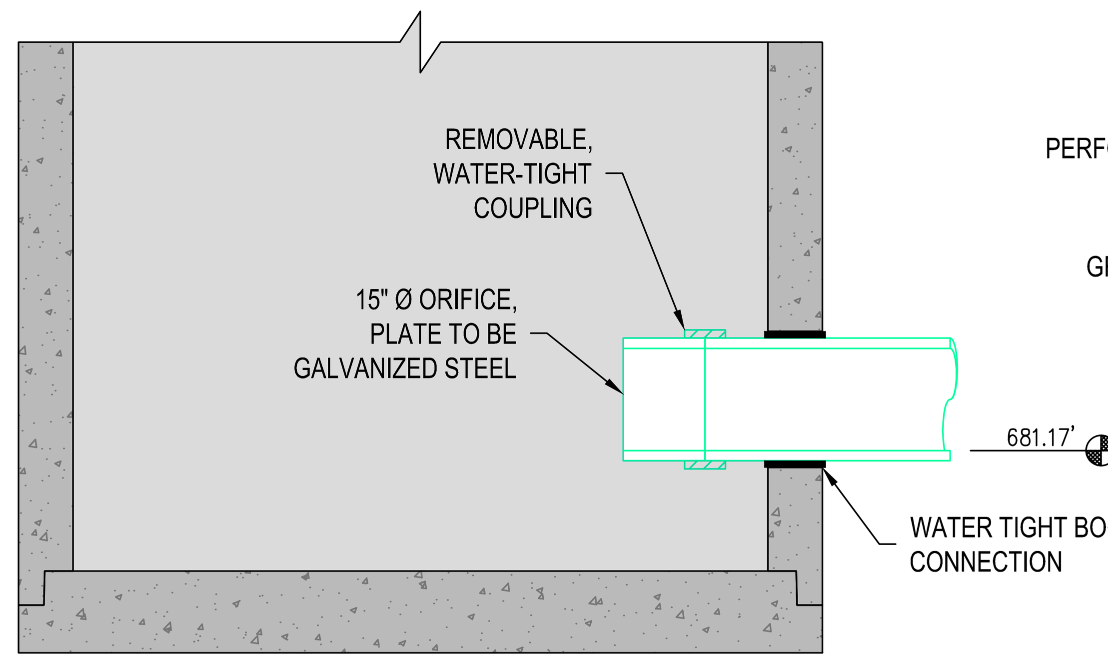
DWG NO.: C02

SHEET NO.: 4 / 6



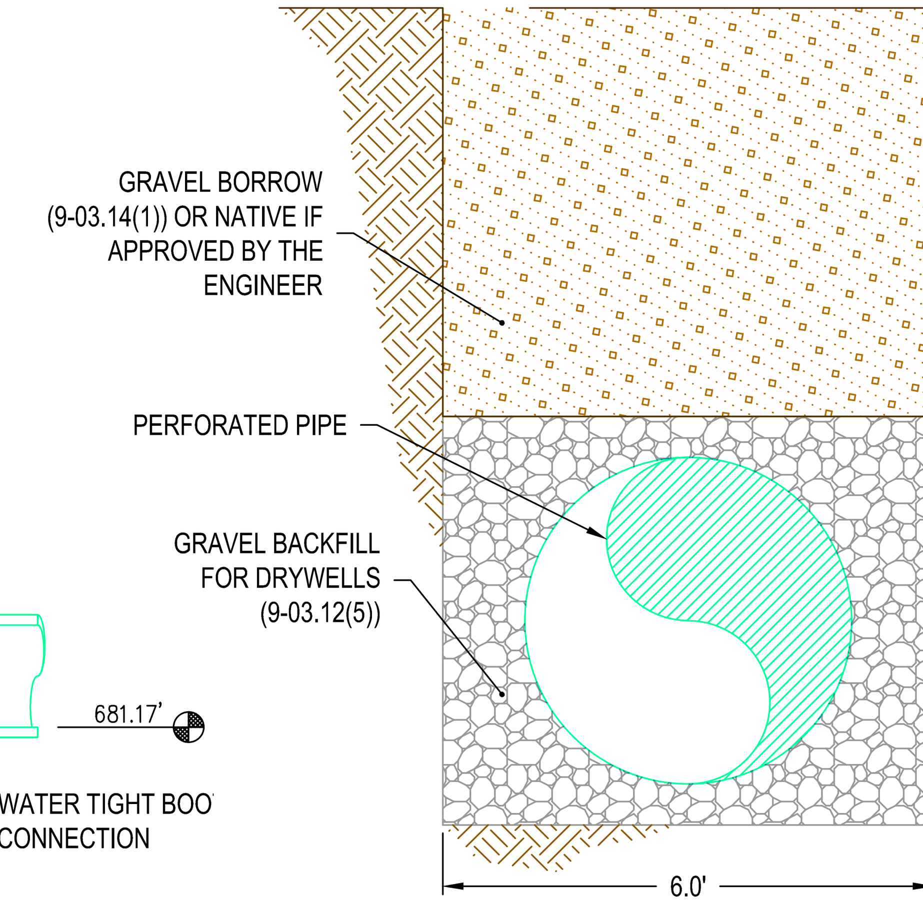
MH-6 DETAIL

NTS



MH-3 ORIFICE DETAIL

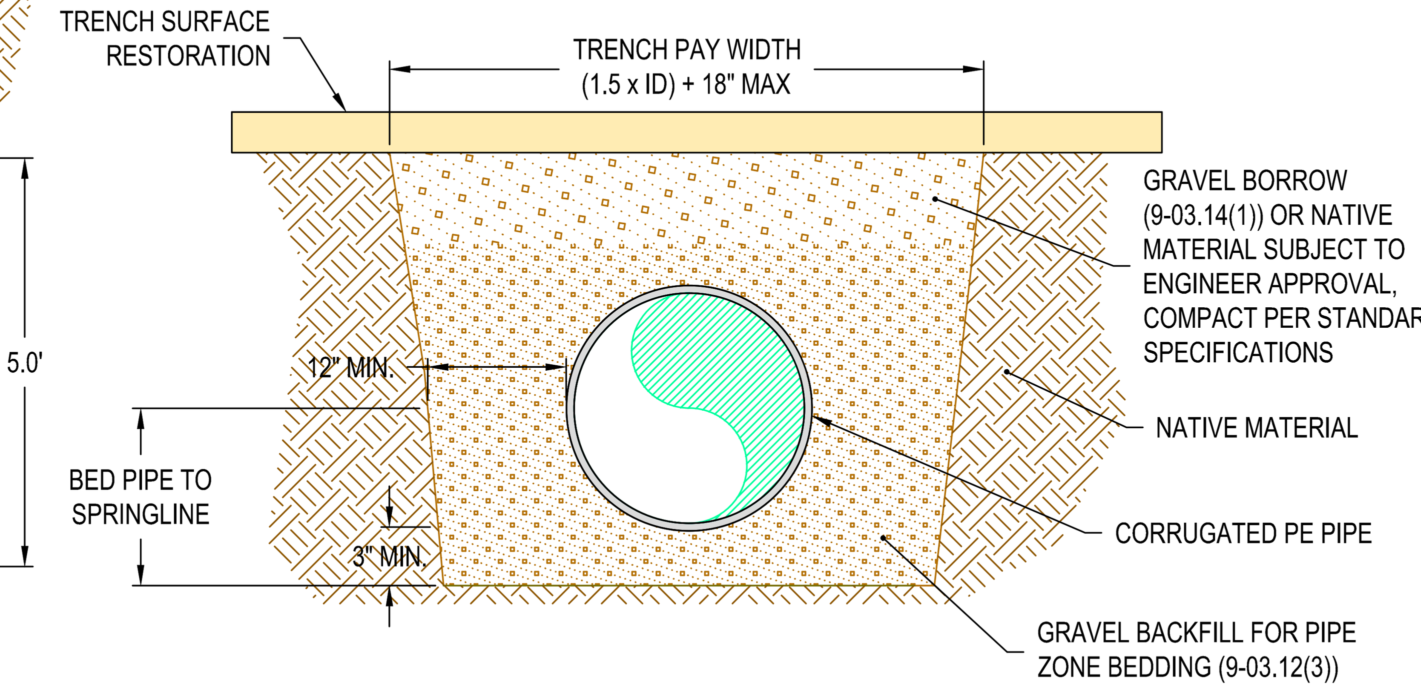
NTS



INFILTRATION PIPE DETAIL

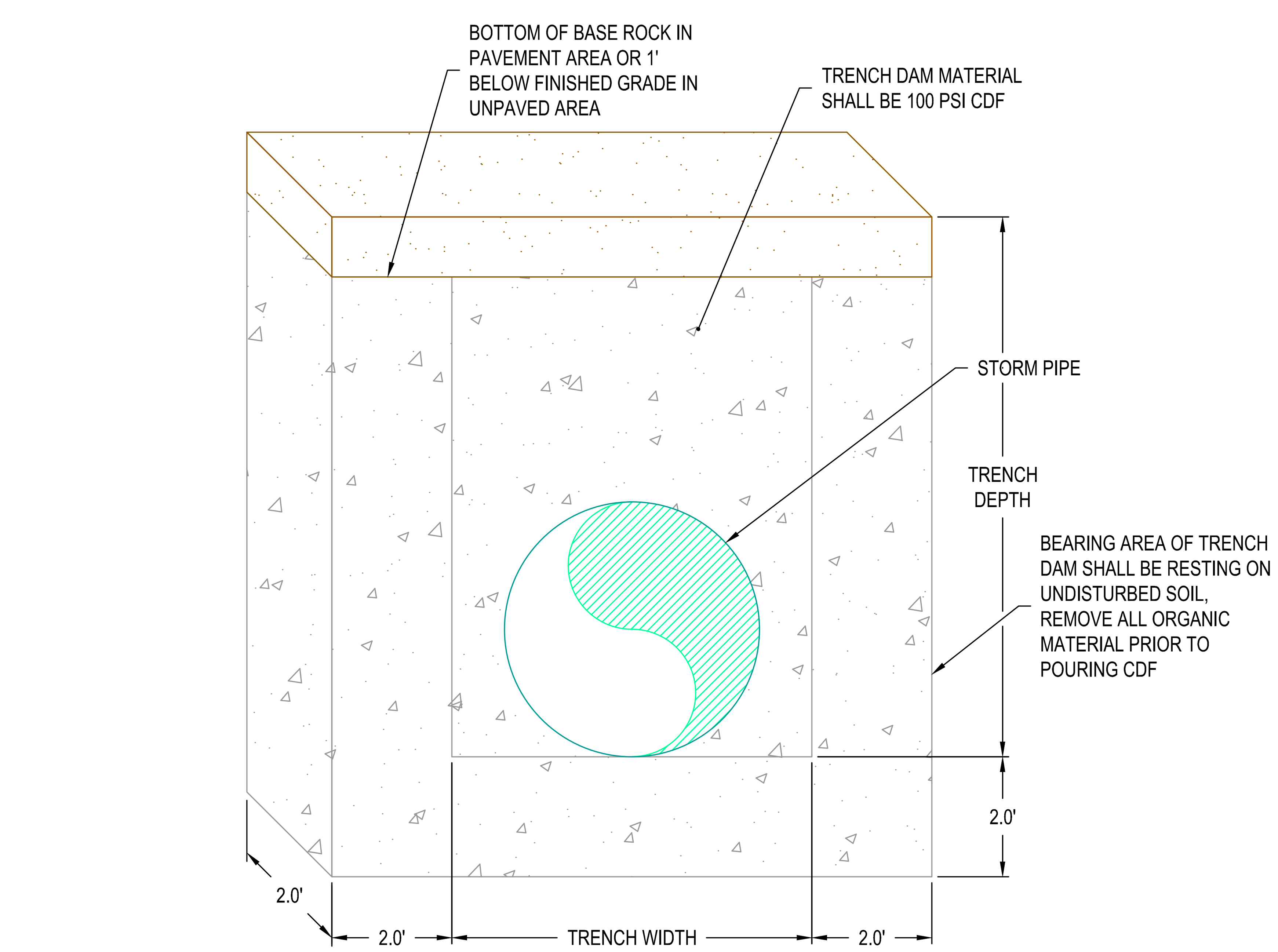
NTS

NOTE: THE CONTRACTOR SHALL PRESERVE AND PROTECT STORM SEWER PIPE AFTER INSTALLATION AND SHALL FOLLOW MANUFACTURER SPECIFICATIONS FOR MAINTAINING PIPE COVER DURING CONSTRUCTION.



PIPE TRENCH DETAIL GENERAL INSTALLATION

NTS



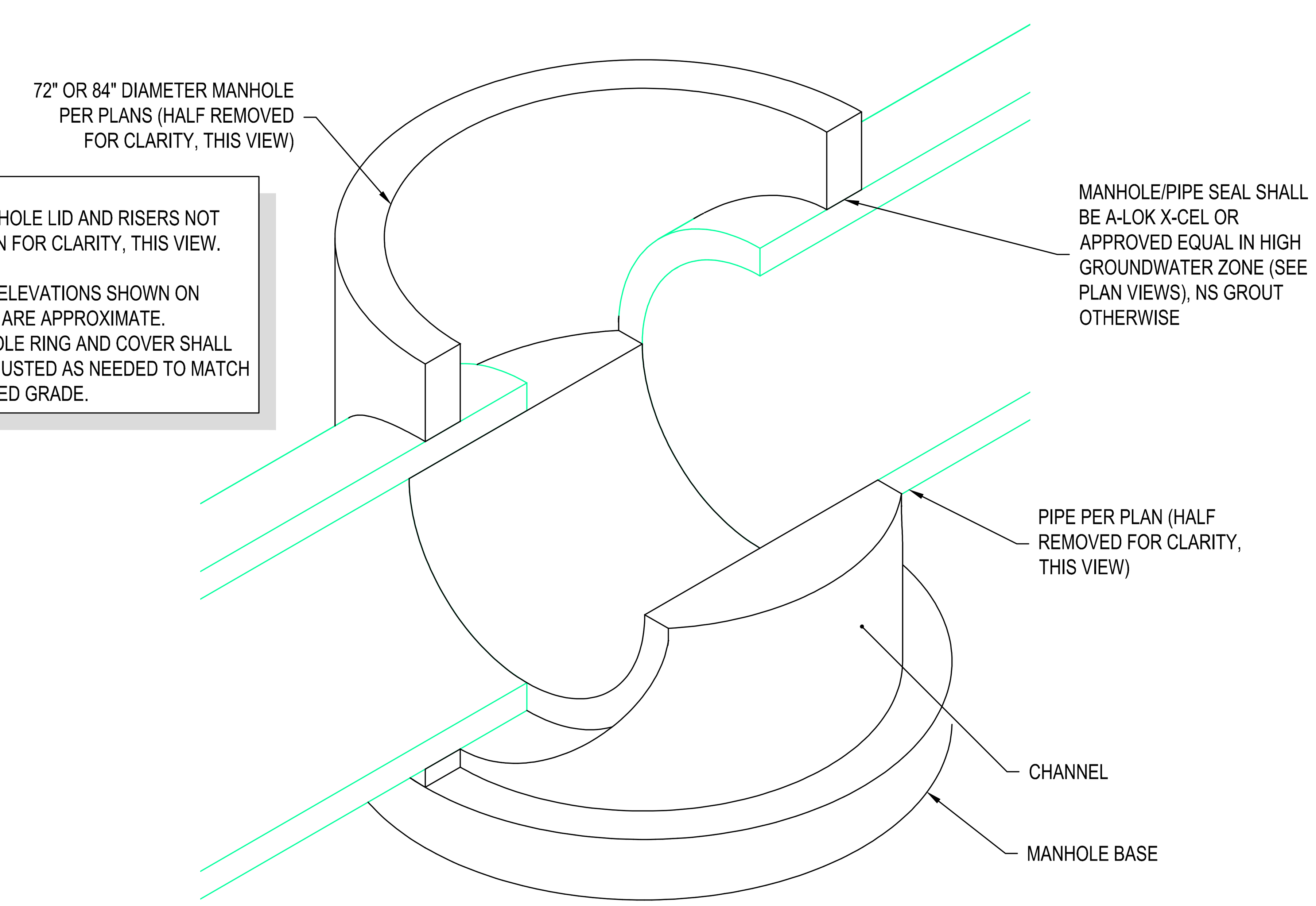
NOTE: NO FITTINGS OR JOINT FROM ANY UTILITY SHALL BE LOCATED WITHIN 5' OF TRENCH DAM

TRENCH DAM DETAIL

NTS

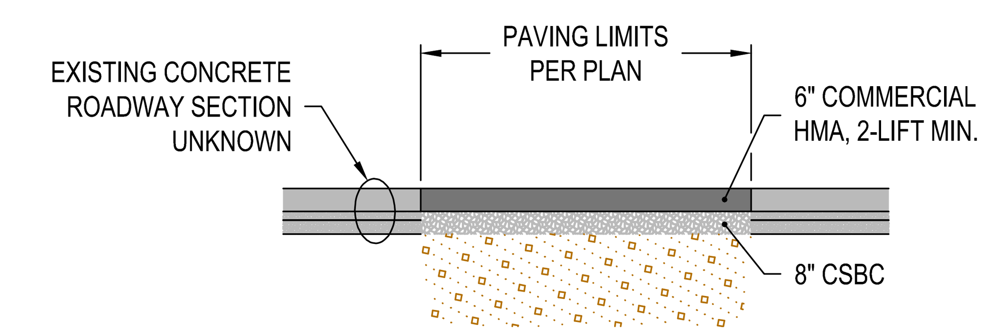
NOTE:
1. MANHOLE LID AND RISERS NOT SHOWN FOR CLARITY, THIS VIEW.

2. RIM ELEVATIONS SHOWN ON PLANS ARE APPROXIMATE. MANHOLE RING AND COVER SHALL BE ADJUSTED AS NEEDED TO MATCH FINISHED GRADE.



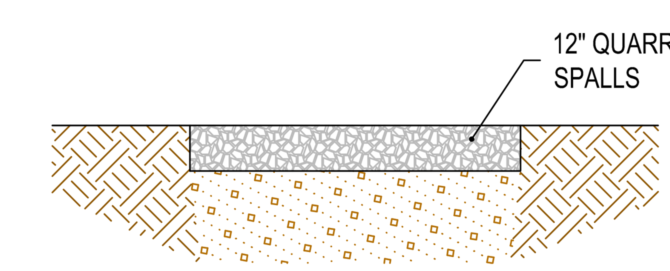
72" OR 84" THROUGH MANHOLE OBLIQUE

NTS



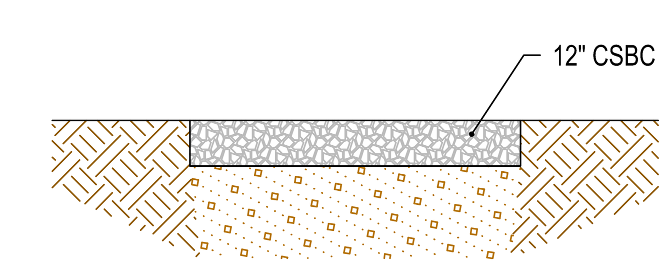
TRENCH SURFACE RESTORATION IN ROAD DETAIL

NTS



TRENCH SURFACE RESTORATION IN EXISTING POND DETAIL

NTS



TRENCH SURFACE RESTORATION IN SHOULDER DETAIL

NTS

90% PLANS

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EAST WENATCHEE, WA
300 Simon Street, Suite 5

CHELAN COUNTY PUBLIC WORKS
SQUILCHUCK OUTFALL
PRELIMINARY
STORMWATER DETAILS

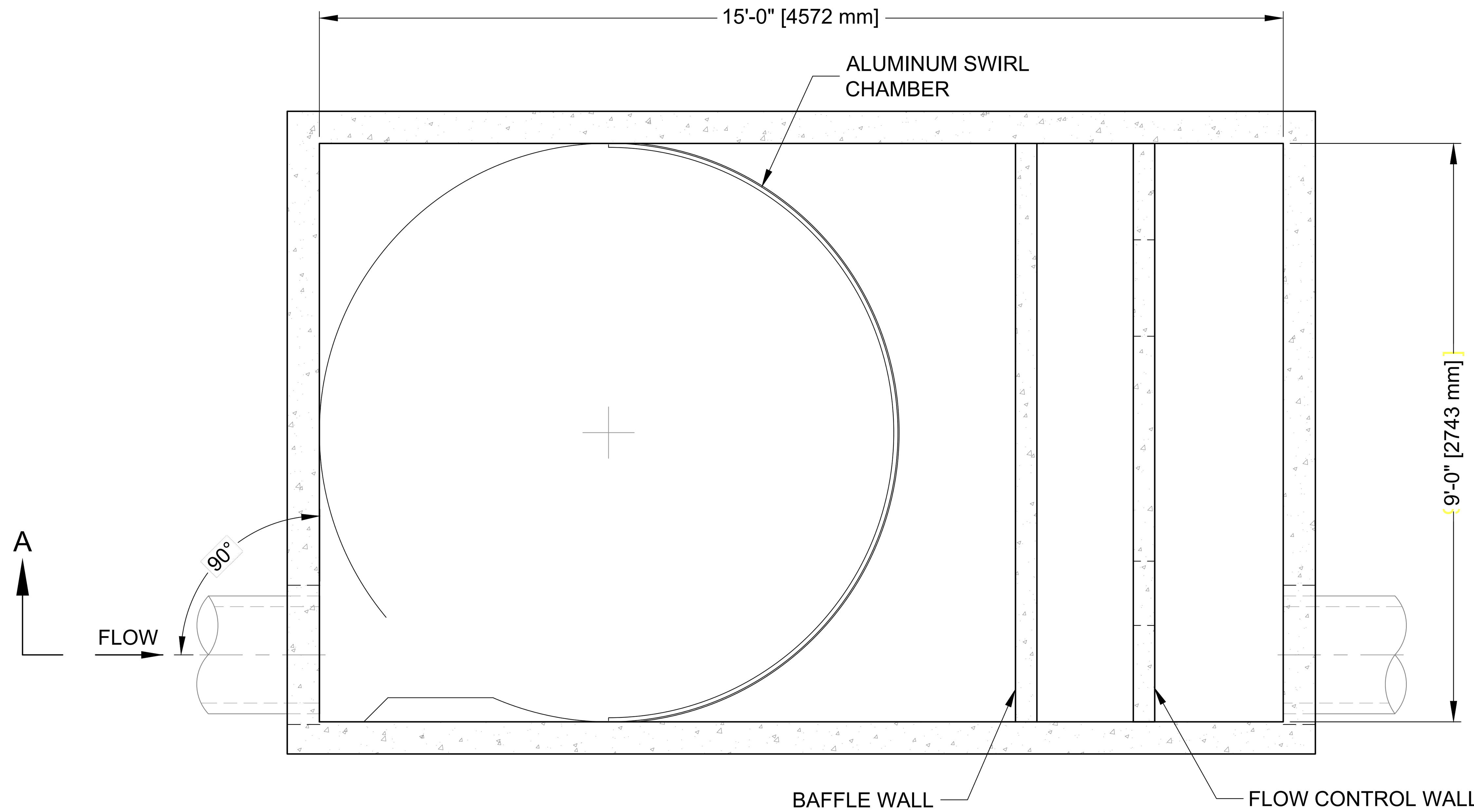
ENGINEER: MJV
REVIEWED: AMW
SAVE DATE: Oct 22, 2014
PLOT DATE: Oct 22, 2014
CLIENT: CCD
FILENAME: SQUI-D-DTLS.DWG
JOB NO.: 213-132

REVISIONS

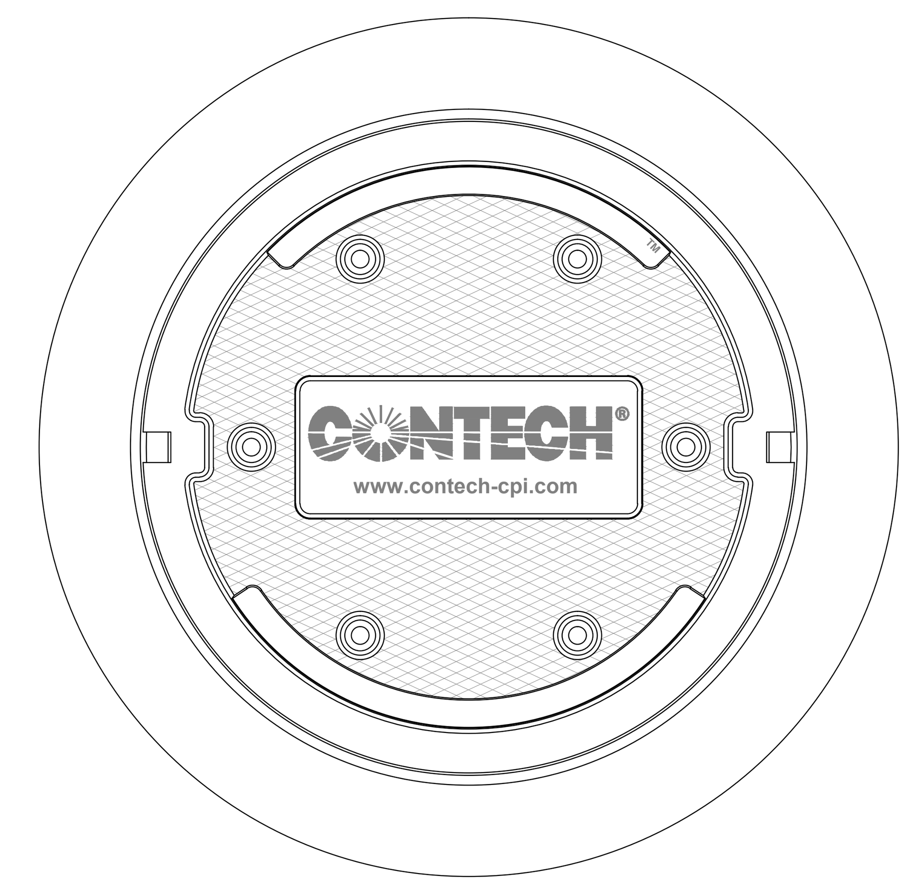
NO.	DATE	DESCRIPTION	BY	REVIEW

SCALE: SHOWN
DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

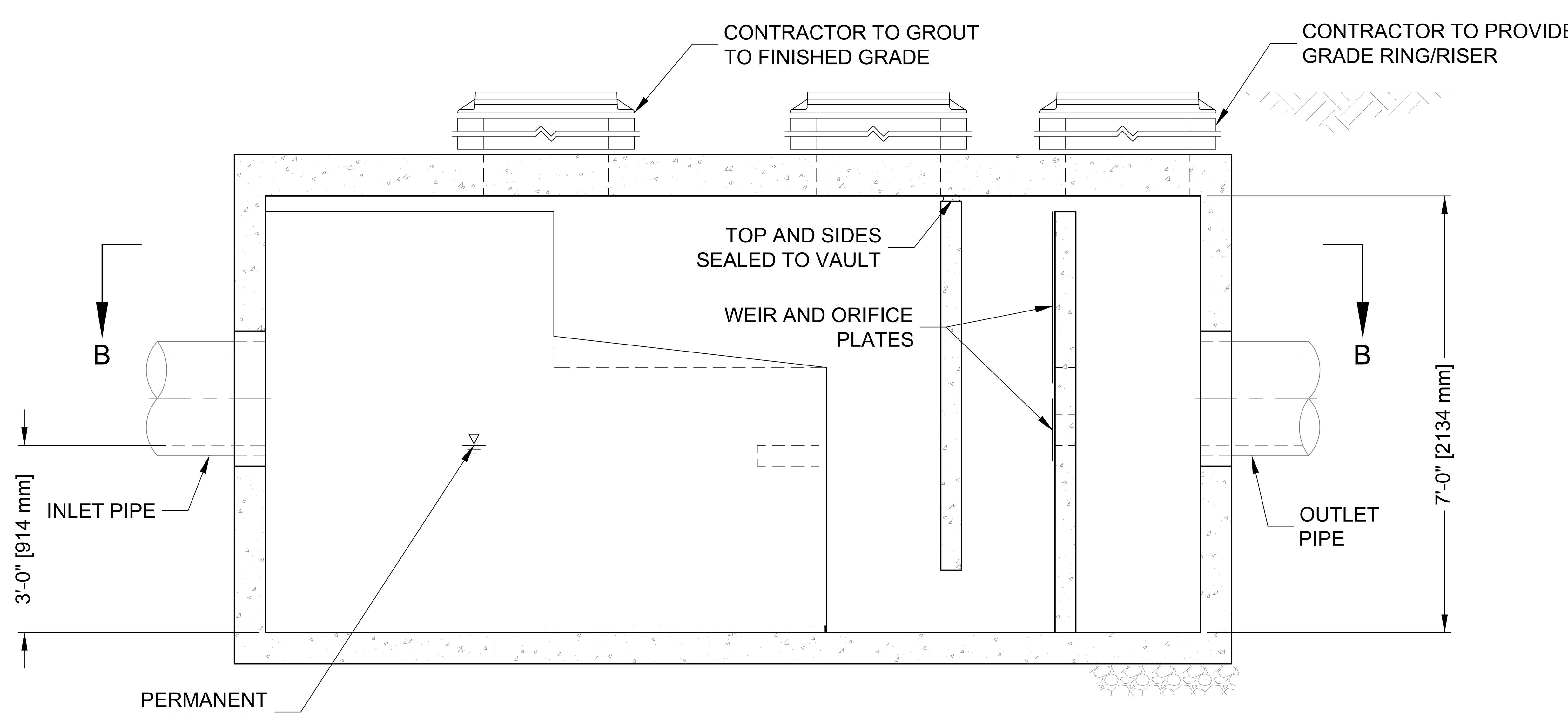
DWG NO.: D01
SHEET NO.: 5 / 6



SECTION B-B



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



SECTION A-A

VORTECHS 9000 DESIGN NOTES

VORTECHS 9000 RATED TREATMENT CAPACITY IS 5.0 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	VT-1
WATER QUALITY FLOW RATE (CFS)	0.35
PEAK FLOW RATE (CFS)	5.0
RETURN PERIOD OF PEAK FLOW (YRS)	2-5

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	680.86	CPEP	18"
INLET PIPE 2	-	-	-
OUTLET PIPE	680.69	CPEP	18

RIM ELEVATION		688.85
ANTI-FLOTATION BALLAST	TBD	TBD
	TBD	TBD

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com
4. VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. INLET PIPE(S) MUST BE PERPEDICULAR TO THE VAULT AND AT THE CORNER TO INTRODUCE THE FLOW TANGENTIALLY TO THE SWIRL CHAMBER. DUAL INLETS NOT TO HAVE OPPOSING TANGENTIAL FLOW DIRECTIONS.
7. OUTLET PIPE(S) MUST BE DOWN STREAM OF THE FLOW CONTROL BAFFLE AND MAY BE LOCATED ON THE SIDE OR END OF THE VAULT. THE FLOW CONTROL WALL MAY BE TURNED TO ACCOMODATE OUTLET PIPE KNOCKOUTS ON THE SIDE OF THE VAULT.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

Vortechs

90% PLANS

RH2 ENGINEERING, INC.
ENGINEERS PLANNERS SCIENTISTS
EAST WENATCHEE, WA
300 Simon Street, Suite 5

CHELAN COUNTY PUBLIC WORKS
SQUILCHUCK OUTFALL
VORTECHS 9000 DETAILS
PRELIMINARY

ENGINEER: MJV REVIEWED: AMW
SAVE DATE: Oct 2, 2014 PLOT DATE: Oct 22, 2014
CLIENT: CCD FILENAME: SQUI-D-VT1.DWG
JOB NO.: 213-132

REVISIONS

NO.	DATE	DESCRIPTION	BY	REVIEW

SCALE: SHOWN
DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

DWG NO.: D02
SHEET NO.: 6

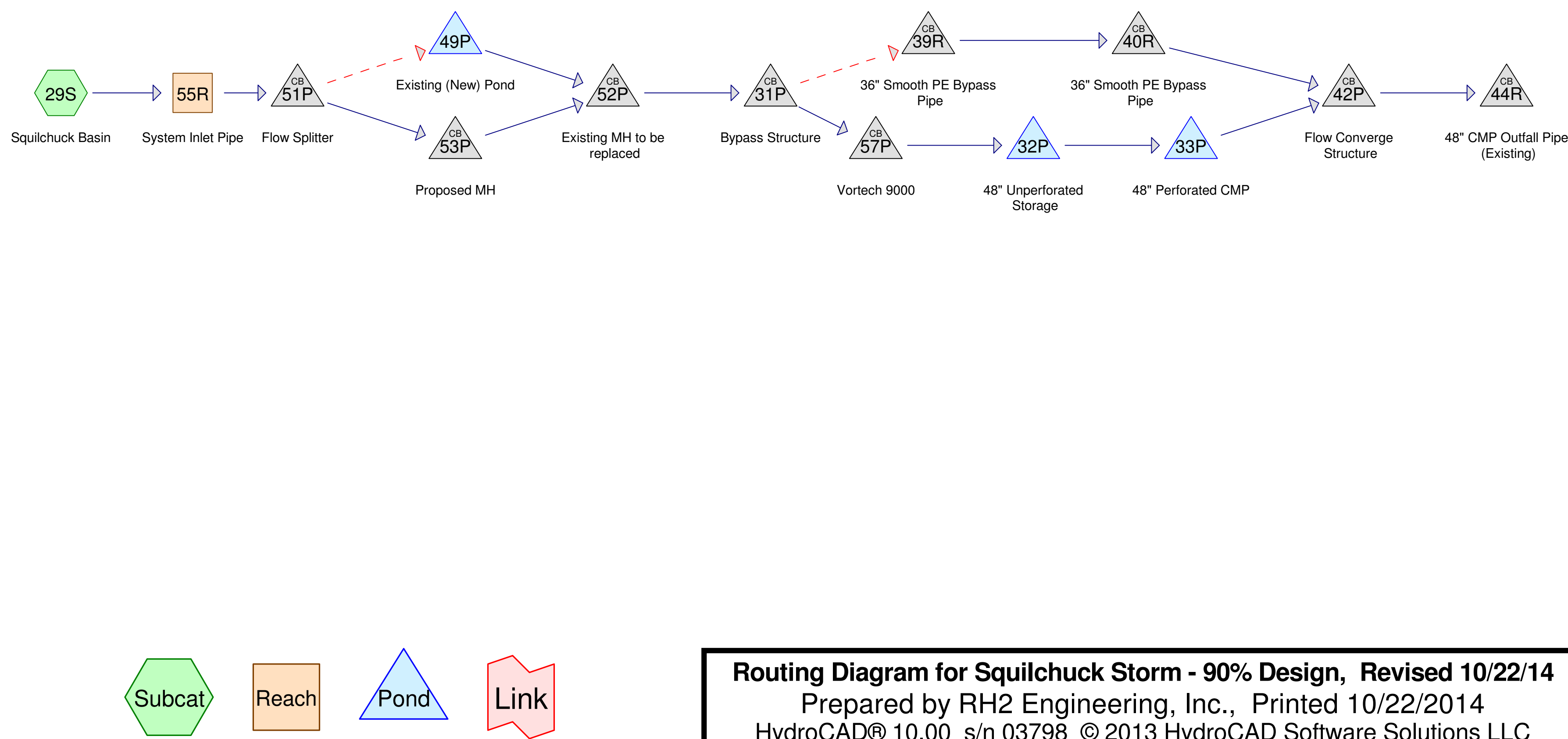
Appendix C
Cost Estimate Details

Chelan County Public Works
Squilchuck Stormwater Outfall

Engineer's Estimate - 90 percent
75' Perforated Pipe - 180' Storage Pipe - Subsurface Bypass

Item No.	Total Quantity	Unit	Description	Unit Price	Engr Est.
			PREPARATION		
1	1	L.S.	MOBILIZATION	$38,400.00	$38,400.00
2	1	L.S.	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	$20,000.00	$20,000.00
			STORM SEWER		
3	3	EACH	MANHOLE 72 IN. DIAM. TYPE 3	$6,000.00	$18,000.00
4	1	EACH	FLOW SPLITTER CATCH BASIN 84 IN. DIAM. TYPE 2 W/ ANTIFL. LIP	$12,500.00	$12,500.00
5	1	EACH	MANHOLE 72 IN. DIAM. TYPE 3 W/ ANTIFL. LIP	$6,500.00	$6,500.00
6	1	EACH	MANHOLE 84 IN. DIAM. TYPE 3	$7,000.00	$7,000.00
7	1	EACH	MANHOLE 84 IN. DIAM. TYPE 3 W/ ANTIFL. LIP	$7,500.00	$7,500.00
8	1	EACH	WEIR CATCH BASIN 84 IN. DIAM. TYPE 2	$10,000.00	$10,000.00
9	1	EACH	WYE CATCH BASIN 84 IN. DIAM. TYPE 2	$10,000.00	$10,000.00
10	1	EACH	VORTECH 9000 TREATMENT SYSTEM	$62,000.00	$62,000.00
11	1	EACH	INSERTA TEE 12 IN. DIAM. CONNECTOR	$500.00	$500.00
12	1	EACH	MANHOLE BOOT CONNECTION 12 IN. DIAM.	$200.00	$200.00
13	4	EACH	MANHOLE BOOT CONNECTION 18 IN. DIAM.	$200.00	$800.00
14	4	EACH	MANHOLE BOOT CONNECTION 36 IN. DIAM.	$500.00	$2,000.00
15	1	EACH	MANHOLE BOOT CONNECTION 48 IN. DIAM.	$1,000.00	$1,000.00
16	75	L.F.	PERFORATED CMP STORM SEWER PIPE 48 IN. DIAM	$120.00	$9,000.00
17	60	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 12 IN. DIAM.	$40.00	$2,400.00
18	65	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 18 IN. DIAM.	$50.00	$3,300.00
19	525	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 36 IN. DIAM.	$170.00	$89,300.00
20	180	L.F.	CORRUGATED POLYETHYLENE STORM SEWER PIPE 48 IN. DIAM.	$290.00	$52,200.00
21	9	EACH	TRENCH DAM	$550.00	$5,000.00
			SURFACING		
22	650	TON	CRUSHED SURFACING BASE COURSE	$30.00	$19,500.00
			HOT MIX ASPHALT		
23	330	TON	HMA CL.1/2 IN. PG 64-28	$100.00	$33,000.00
			EROSION CONTROL AND PLANTING		
24	5	DAY	ESC LEAD	$100.00	$500.00
25	10,000	DOL	EROSION/WATER POLLUTION CONTROL	$1.00	$10,000.00
26	10	EACH	INLET PROTECTION	$100.00	$1,000.00
			TRAFFIC		
27	500	L.F.	PAINT LINE	$0.50	$300.00
28	1	L.S.	PROJECT TEMPORARY TRAFFIC CONTROL	$10,000.00	$10,000.00
			OTHER ITEMS		
29	1	L.S.	DEWATERING	$50,000.00	$50,000.00
30	1	L.S.	SHORING OR EXTRA EXCAVATION CLASS B	$20,000.00	$20,000.00
31	5,000	EST	UNKNOWN UTILITY REPAIR	$1.00	$5,000.00
32	1	L.S.	ROADWAY SURVEYING	$10,000.00	$10,000.00
33	1	L.S.	SPCC PLAN	$500.00	$500.00
				Subtotal	**$ 517,400.00**
				Construction Contingencies (10%)	**$ 51,800.00**
				Construction Total	**$ 569,200.00**
				Design Engineering (15%)	**$ 85,400.00**
				Construction Engineering (15%)	**$ 85,400.00**
				Right of Way	**$ -**
				Total	**$ 740,000.00**

Appendix D
Storm Simulation Output



Routing Diagram for Squilchuck Storm - 90% Design, Revised 10/22/14

Prepared by RH2 Engineering, Inc., Printed 10/22/2014

Project Notes

Model matches plans at 90% submittal

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,812,096	85	1/8 acre lots, 65% imp, HSG B (29S)
2,465,496	90	1/8 acre lots, 65% imp, HSG C (29S)
4,277,592	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
1,812,096	HSG B	29S
2,465,496	HSG C	29S
0	HSG D	
0	Other	
4,277,592		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subca Numb
0	1,812,096	2,465,496	0	0	4,277,592	1/8 acre lots, 65% imp	
0	**1,812,096**	**2,465,496**	**0**	**0**	**4,277,592**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	29S	0.00	0.00	1,400.0	0.0300	0.025	18.0	0.0	0.0
2	29S	0.00	0.00	1,300.0	0.0600	0.025	24.0	0.0	0.0
3	29S	0.00	0.00	1,300.0	0.0250	0.025	36.0	0.0	0.0
4	55R	716.80	707.70	250.0	0.0364	0.025	36.0	0.0	0.0
5	31P	683.52	683.04	36.0	0.0133	0.013	36.0	0.0	0.0
6	31P	681.17	680.86	37.0	0.0084	0.013	18.0	0.0	0.0
7	33P	677.79	677.46	17.0	0.0194	0.013	18.0	0.0	0.0
8	39R	683.04	677.73	153.0	0.0347	0.013	36.0	0.0	0.0
9	40R	672.73	672.05	20.0	0.0340	0.013	36.0	0.0	0.0
10	42P	671.05	670.47	56.0	0.0104	0.013	48.0	0.0	0.0
11	44R	670.47	670.08	35.0	0.0111	0.025	48.0	0.0	0.0
12	49P	690.92	690.00	23.0	0.0400	0.025	18.0	0.0	0.0
13	51P	708.20	707.00	200.0	0.0060	0.013	6.0	0.0	0.0
14	51P	707.70	693.32	180.0	0.0799	0.025	36.0	0.0	0.0
15	52P	686.49	683.52	182.0	0.0163	0.013	36.0	0.0	0.0
16	53P	690.84	686.42	130.0	0.0340	0.013	36.0	0.0	0.0
17	57P	680.69	680.39	15.0	0.0200	0.013	18.0	0.0	0.0

Notes Listing (all nodes)

Line#	Node Number	Notes
1	Project	Model matches plans at 90% submittal
2	31P	Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.
3	32P	weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.00"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=0.06 cfs 191 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=0.07' Max Vel=1.45 fps Inflow=0.06 cfs 191 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=0.06 cfs 191 cf

Pond 31P: Bypass Structure Peak Elev=681.28' Inflow=0.06 cfs 191 cf
Primary=0.06 cfs 191 cf Secondary=0.00 cfs 0 cf Outflow=0.06 cfs 191 cf

Pond 32P: 48" Unperforated Storage Peak Elev=677.97' Storage=0.001 af Inflow=0.06 cfs 191 cf
Outflow=0.05 cfs 191 cf

Pond 33P: 48" Perforated CMP Peak Elev=677.60' Storage=0.001 af Inflow=0.05 cfs 191 cf
Discarded=0.03 cfs 191 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 191 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=683.04' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=0.00 cfs 0 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=672.73' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=0.00 cfs 0 cf

Pond 42P: Flow Converge Structure Peak Elev=671.05' Inflow=0.00 cfs 0 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=0.00 cfs 0 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=670.47' Inflow=0.00 cfs 0 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=0.00 cfs 0 cf

Pond 49P: Existing (New) Pond Peak Elev=689.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond 51P: Flow Splitter Peak Elev=707.86' Inflow=0.06 cfs 191 cf
Primary=0.06 cfs 191 cf Secondary=0.00 cfs 0 cf Outflow=0.06 cfs 191 cf

Pond 52P: Existing MH to be replaced Peak Elev=686.58' Inflow=0.06 cfs 191 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=0.06 cfs 191 cf

Pond 53P: Proposed MH Peak Elev=690.93' Inflow=0.06 cfs 191 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=0.06 cfs 191 cf

Pond 57P: Vortech 9000 Peak Elev=680.79' Inflow=0.06 cfs 191 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=0.06 cfs 191 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 191 cf Average Runoff Depth = 0.00"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

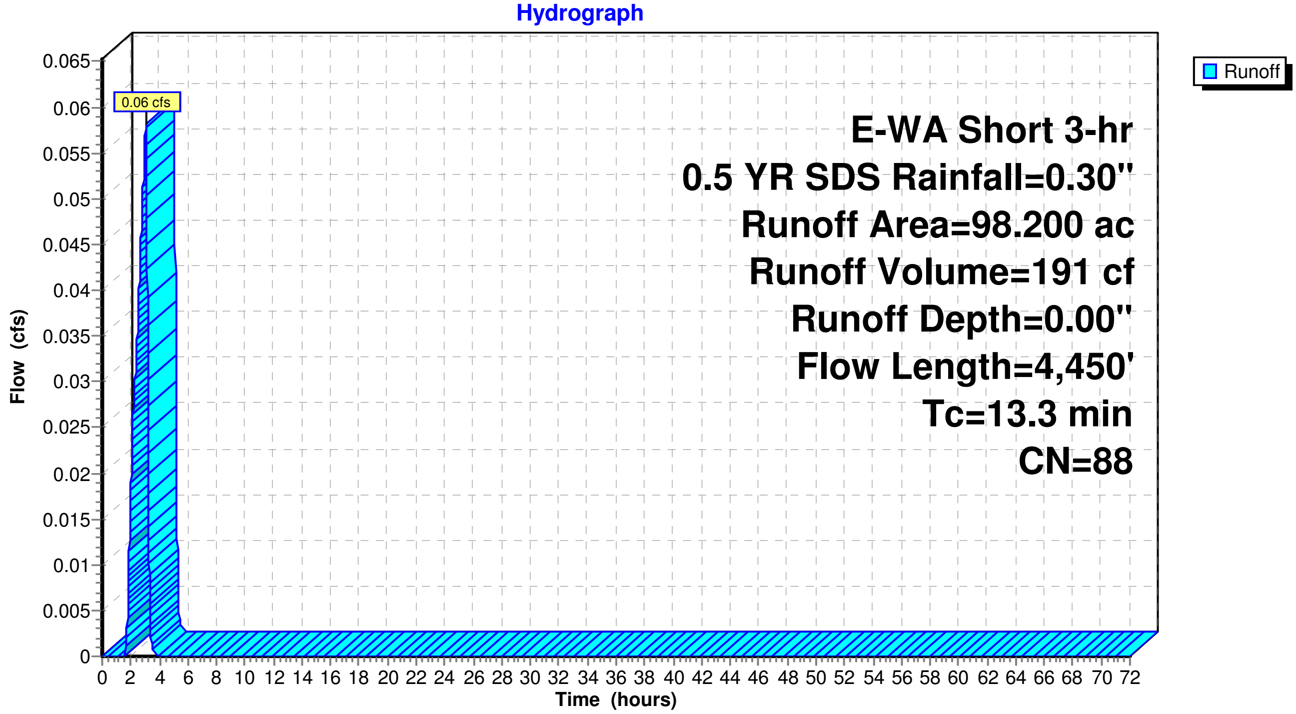
Runoff = 0.06 cfs @ 3.05 hrs, Volume= 191 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 0.5 YR SDS Rainfall=0.30"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

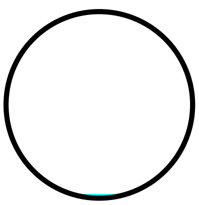
[52] Hint: Inlet/Outlet conditions not evaluated

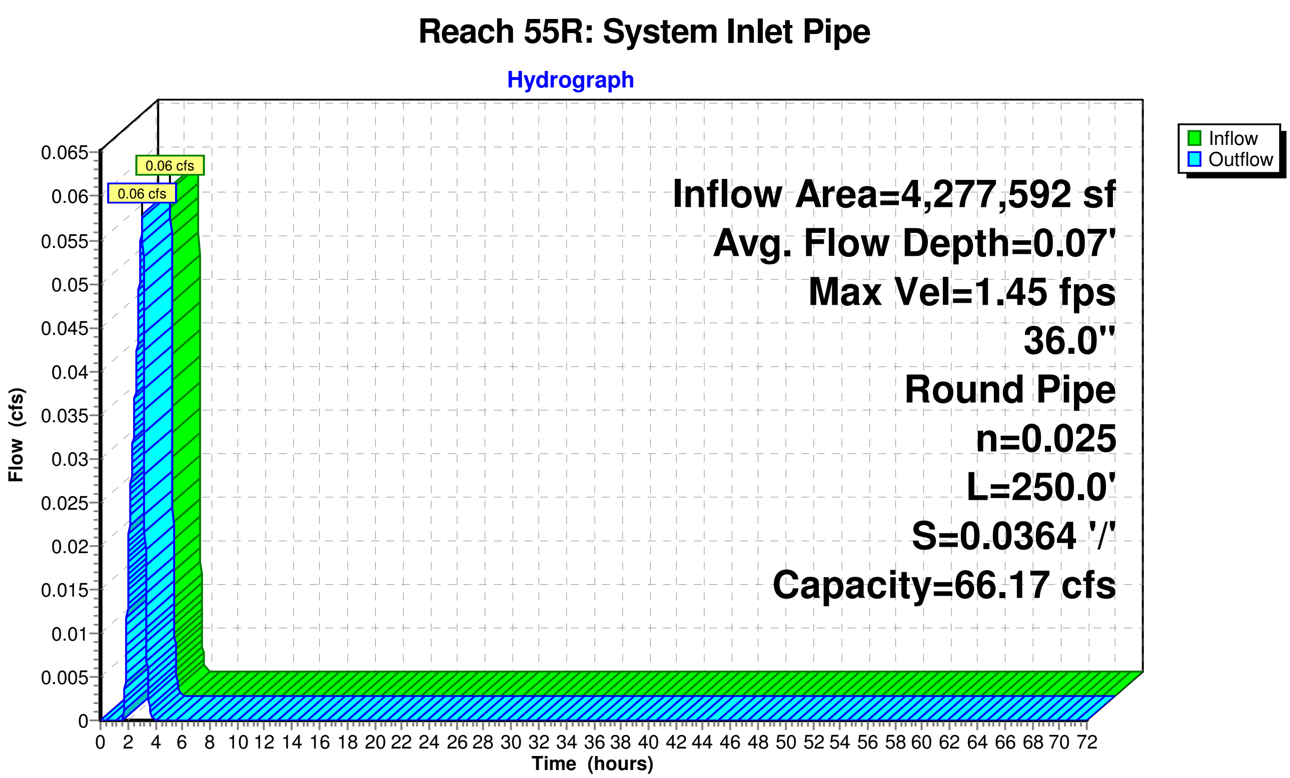
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.06 cfs @ 3.05 hrs, Volume= 191 cf
Outflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf, Atten= 1%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.45 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 3.8 min

Peak Storage= 10 cf @ 3.07 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Outflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

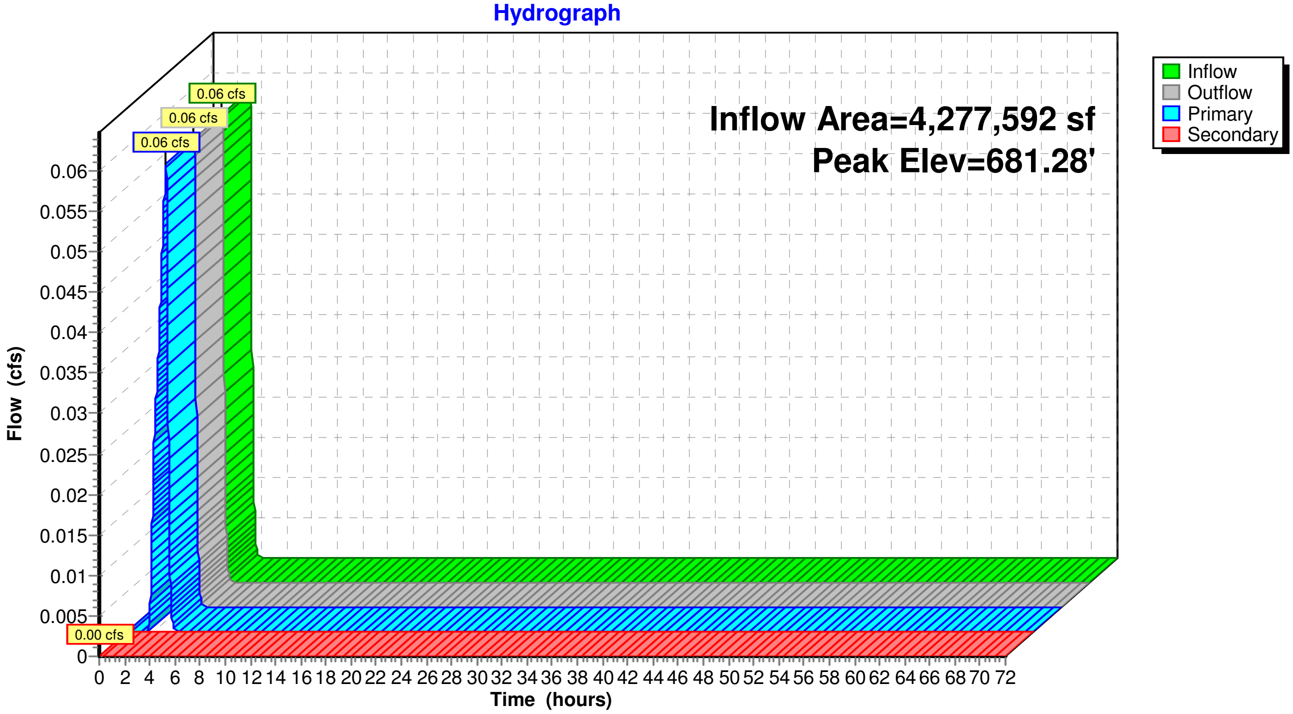
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.28' @ 3.07 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.06 cfs @ 3.07 hrs HW=681.28' TW=680.79' (Dynamic Tailwater)
└─**3=Culvert** (Barrel Controls 0.06 cfs @ 1.46 fps)
  └─**1=Orifice/Grate** (Passes 0.06 cfs of 0.07 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=681.17' TW=683.04' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Outflow = 0.05 cfs @ 3.13 hrs, Volume= 191 cf, Atten= 8%, Lag= 3.7 min
Primary = 0.05 cfs @ 3.13 hrs, Volume= 191 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 677.97' @ 3.13 hrs Surf.Area= 0.007 ac Storage= 0.001 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

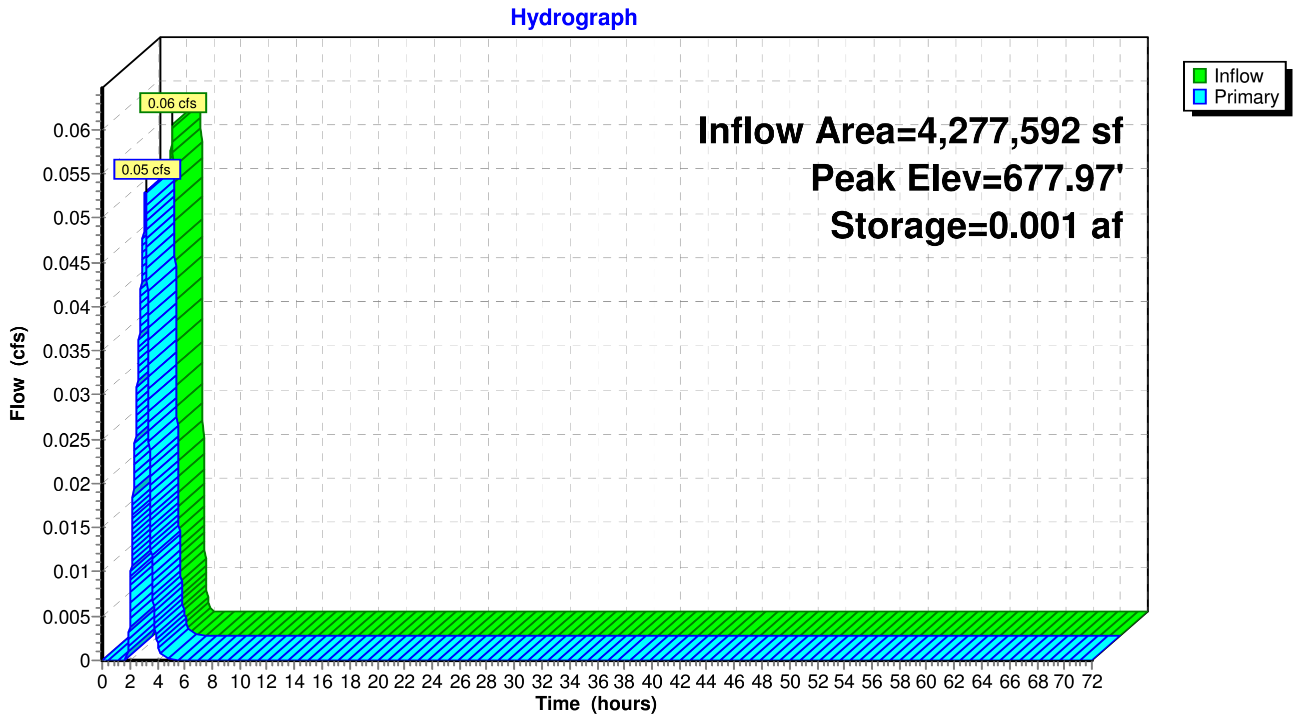
Plug-Flow detention time= 12.1 min calculated for 191 cf (100% of inflow)
Center-of-Mass det. time= 13.1 min (176.8 - 163.7)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.05 cfs @ 3.13 hrs HW=677.97' TW=677.53' (Dynamic Tailwater)
1=Orifice/Grate (Passes 0.05 cfs of 0.28 cfs potential flow)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
3=Orifice/Grate (Orifice Controls 0.05 cfs @ 1.43 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=52)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.05 cfs @ 3.13 hrs, Volume= 191 cf
Outflow = 0.03 cfs @ 3.38 hrs, Volume= 191 cf, Atten= 48%, Lag= 15.2 min
Discarded = 0.03 cfs @ 3.38 hrs, Volume= 191 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 677.60' @ 3.38 hrs Surf.Area= 0.011 ac Storage= 0.001 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.4 min (194.2 - 176.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.03 cfs @ 3.38 hrs HW=677.60' (Free Discharge)
2=Exfiltration (Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=677.29' TW=671.05' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

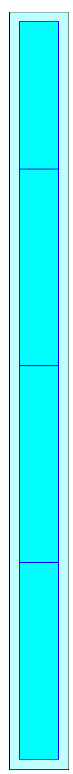
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

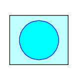
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

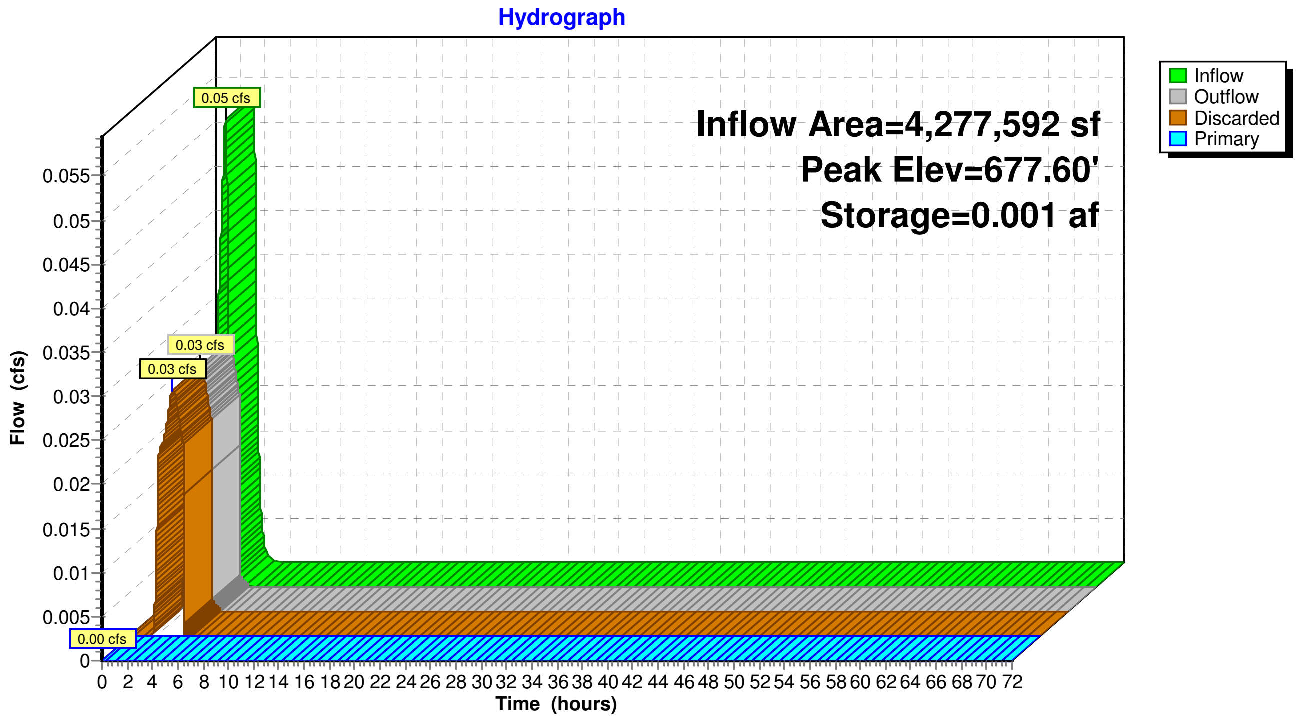
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

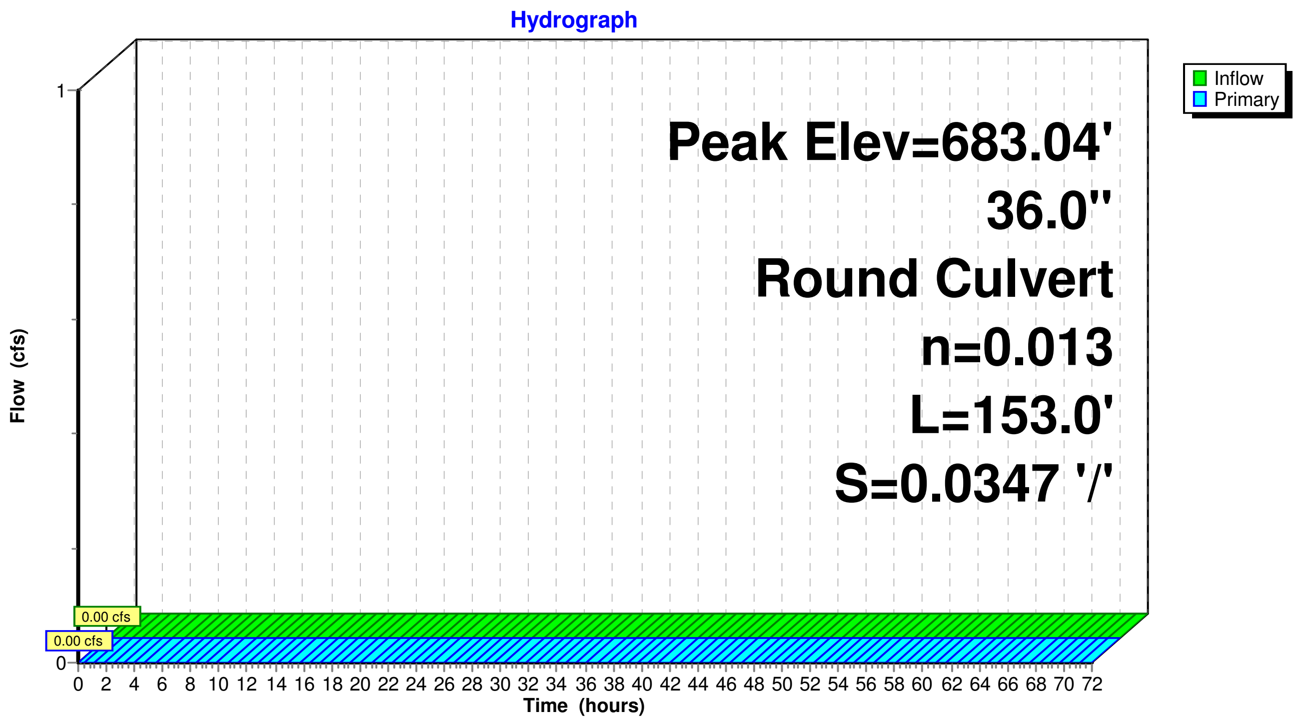
Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.04' @ 0.00 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=683.04' TW=672.73' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 39R: 36" Smooth PE Bypass Pipe



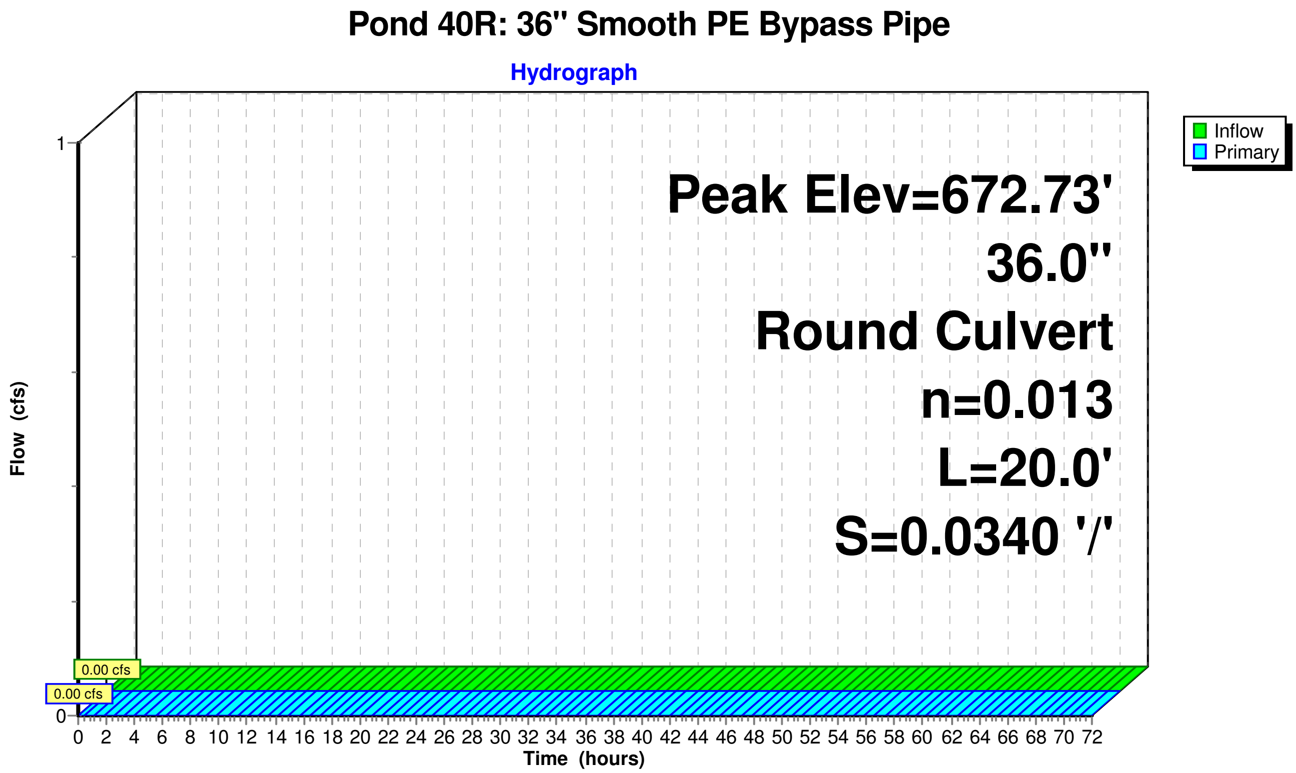
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.73' @ 0.00 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.73' TW=671.05' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond 42P: Flow Converge Structure

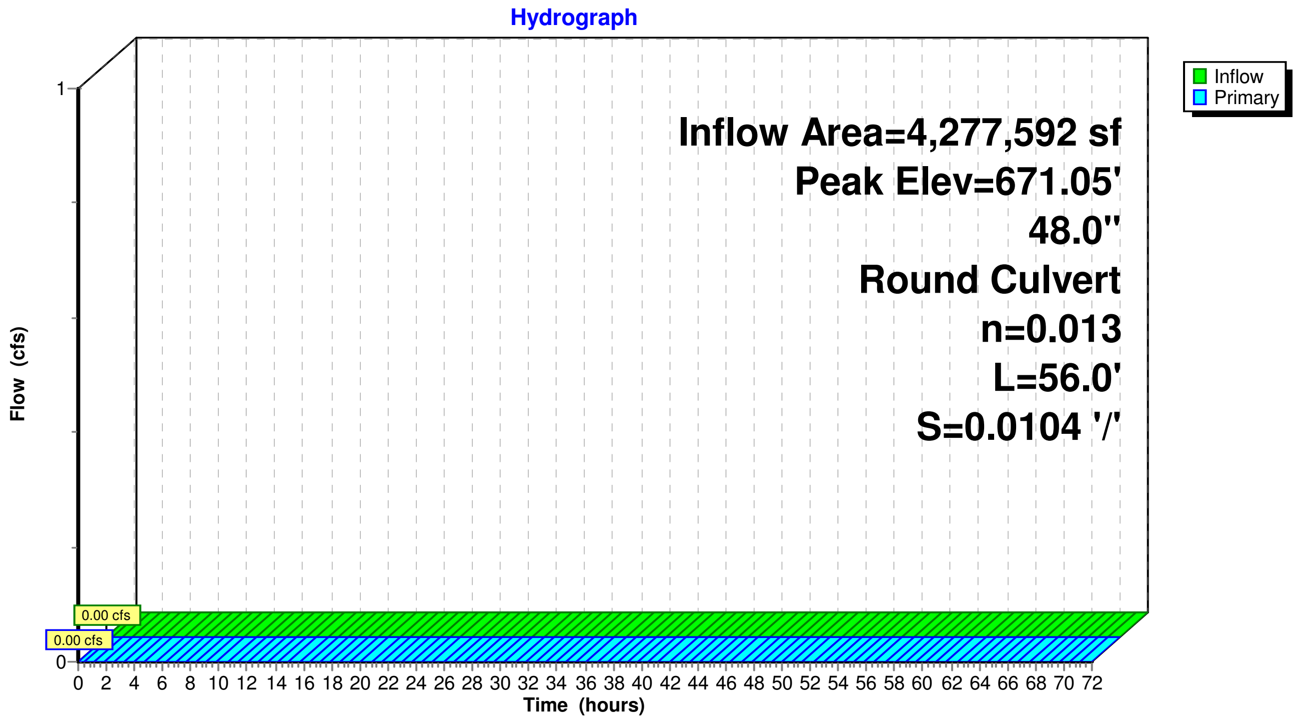
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 671.05' @ 0.00 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=671.05' TW=670.47' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

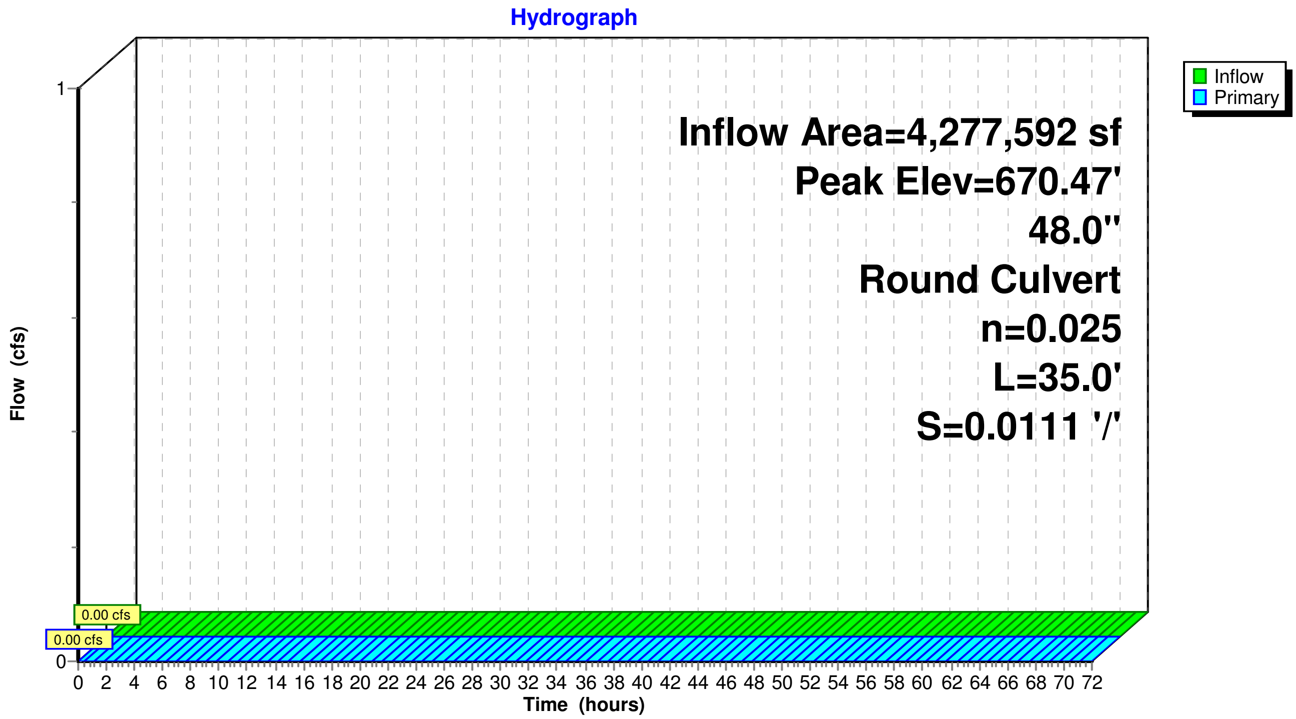
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 670.47' @ 0.00 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=670.47' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 689.00' @ 0.00 hrs Surf.Area= 44 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

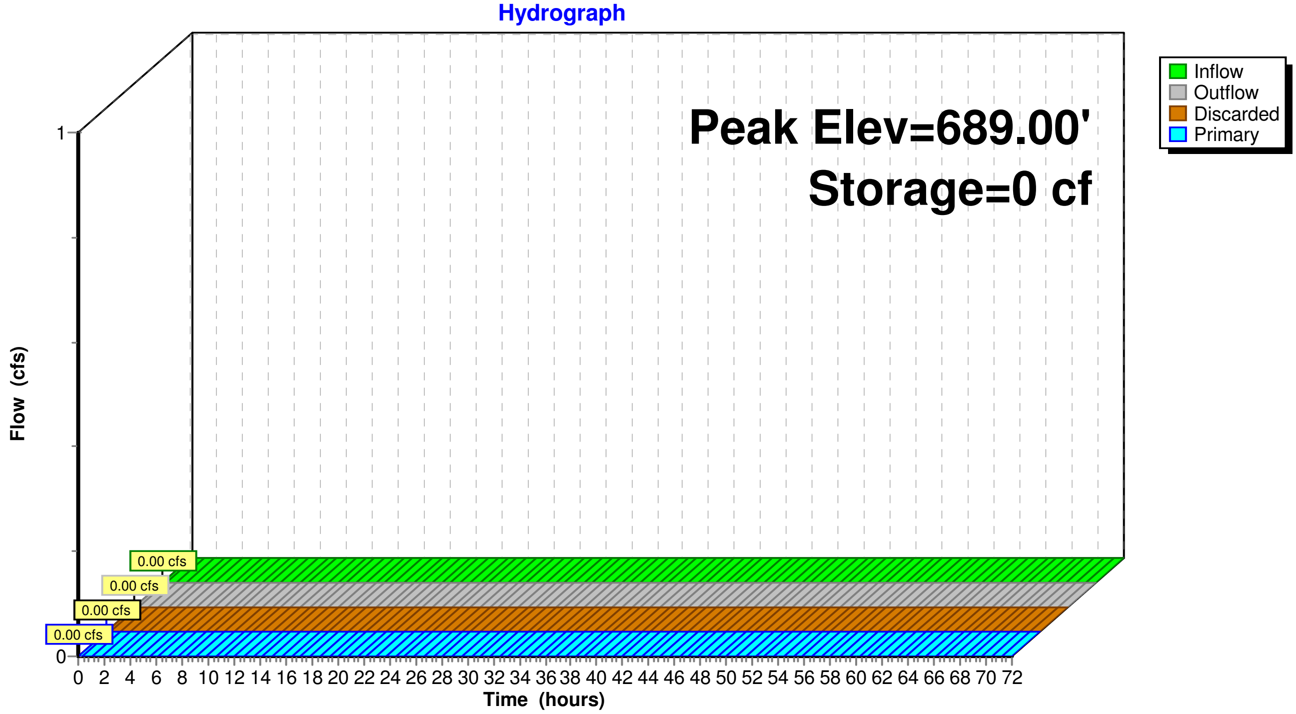
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=689.00' (Free Discharge)
└─**3=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=689.00' TW=686.49' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 707.86' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 0.10' @ 3.07 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Outflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

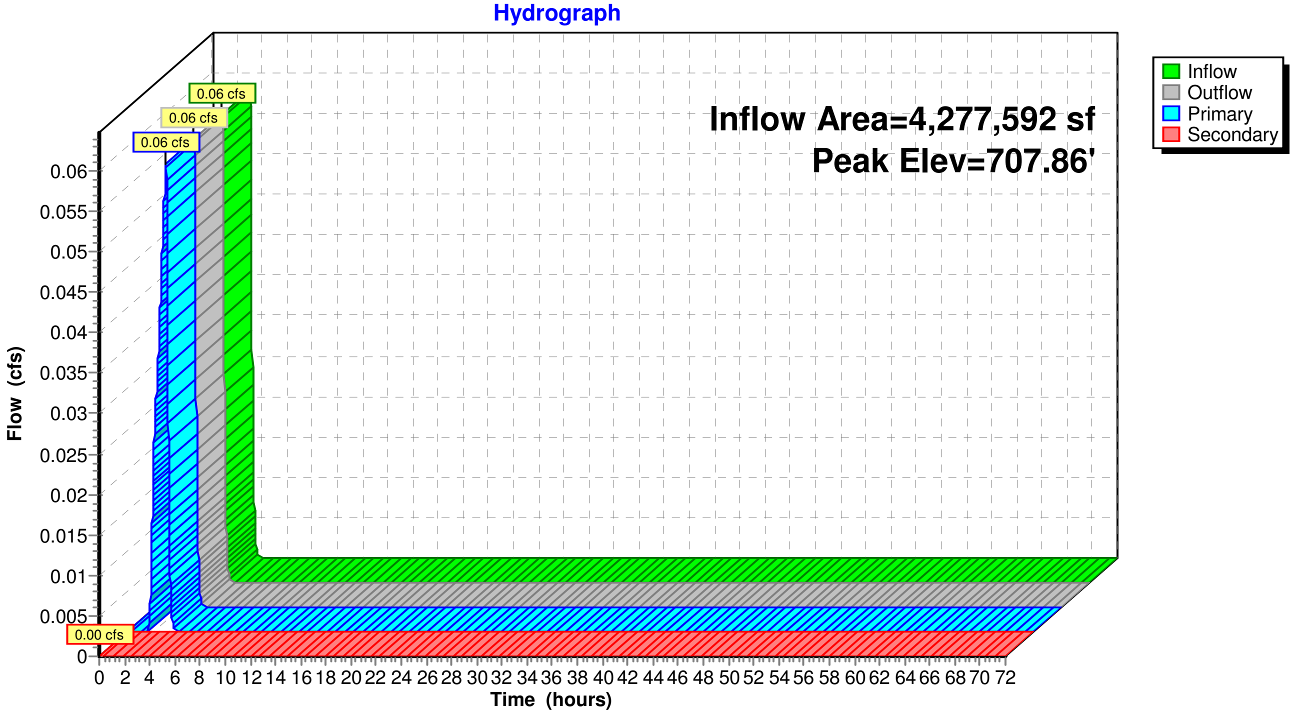
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 707.86' @ 3.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=0.06 cfs @ 3.07 hrs HW=707.86' TW=690.93' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.06 cfs of 0.20 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.06 cfs @ 1.37 fps)
  └─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=707.70' TW=689.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 686.58' (Flood elevation advised)

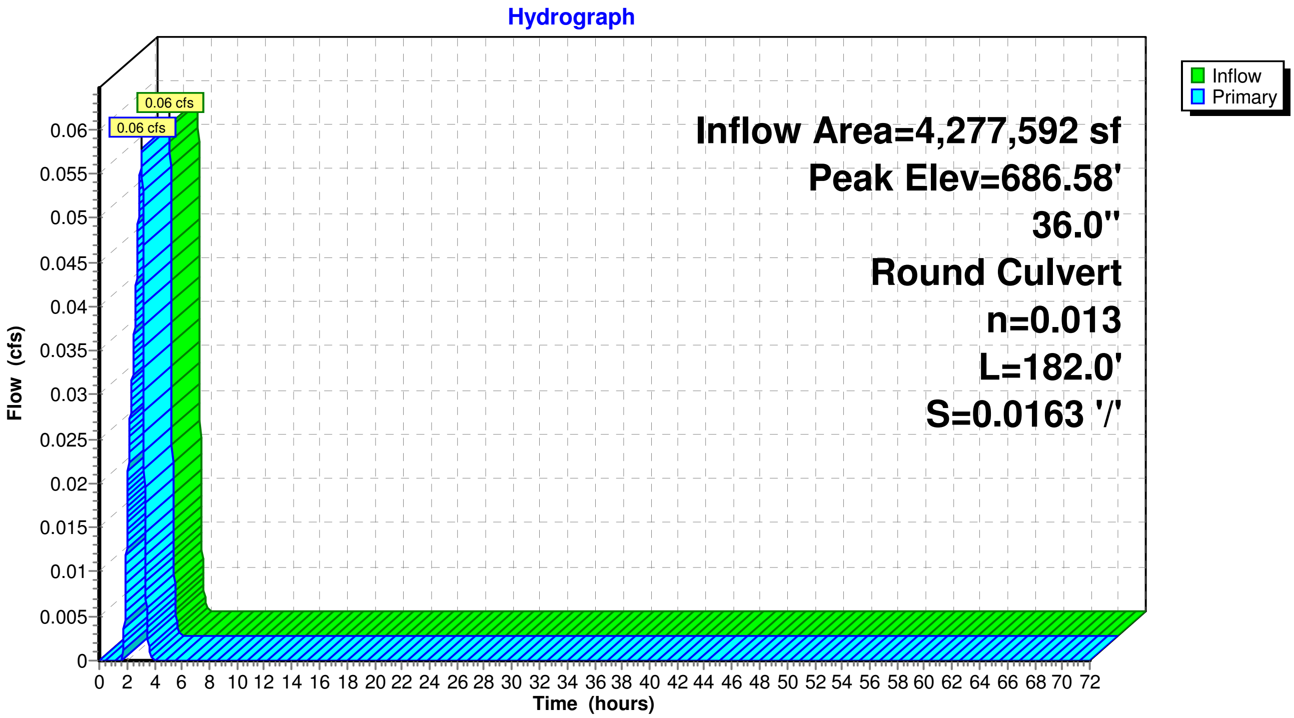
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.00"	for 0.5 YR SDS event
Inflow =	0.06 cfs @	3.07 hrs, Volume=	191 cf	
Outflow =	0.06 cfs @	3.07 hrs, Volume=	191 cf, Atten= 0%, Lag= 0.0 min	
Primary =	0.06 cfs @	3.07 hrs, Volume=	191 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 686.58' @ 3.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.06 cfs @ 3.07 hrs HW=686.58' TW=681.28' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.06 cfs @ 1.00 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 690.93' (Flood elevation advised)

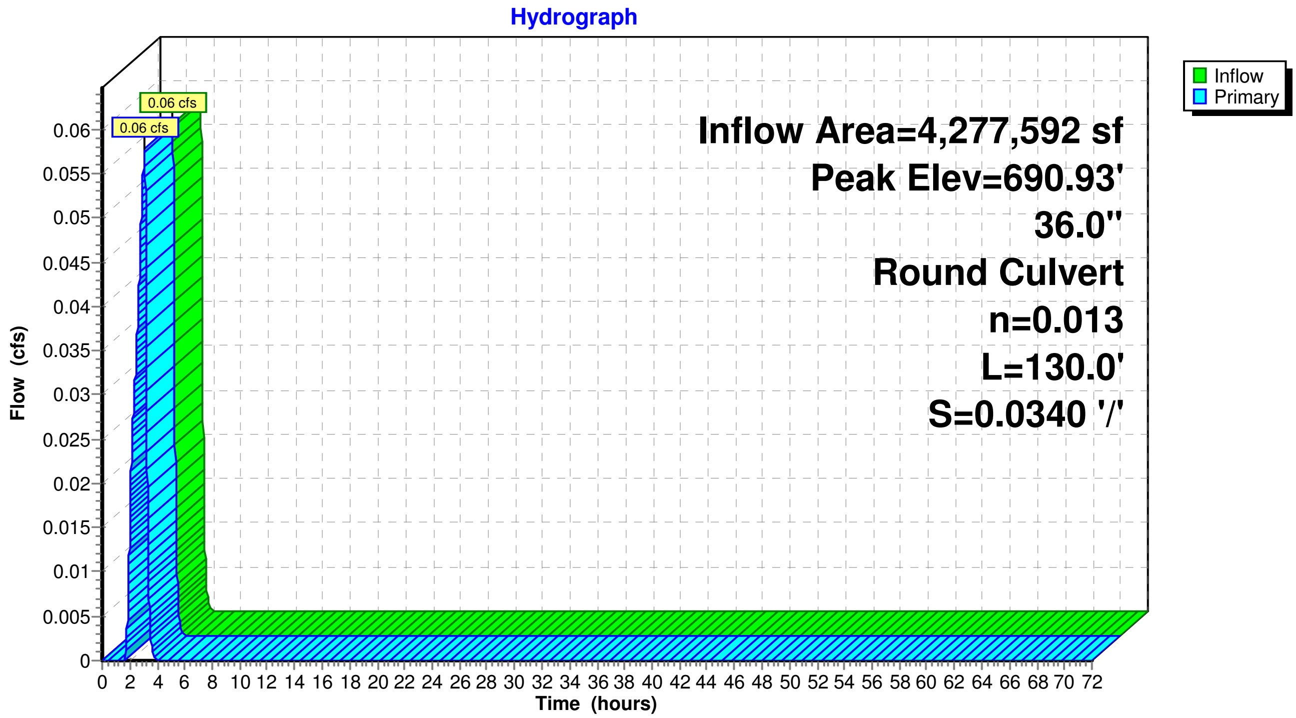
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.00"	for 0.5 YR SDS event
Inflow =	0.06 cfs @	3.07 hrs, Volume=	191 cf	
Outflow =	0.06 cfs @	3.07 hrs, Volume=	191 cf, Atten= 0%, Lag= 0.0 min	
Primary =	0.06 cfs @	3.07 hrs, Volume=	191 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 690.93' @ 3.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.06 cfs @ 3.07 hrs HW=690.93' TW=686.58' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.06 cfs @ 1.00 fps)

Pond 53P: Proposed MH



Summary for Pond 57P: Vortech 9000

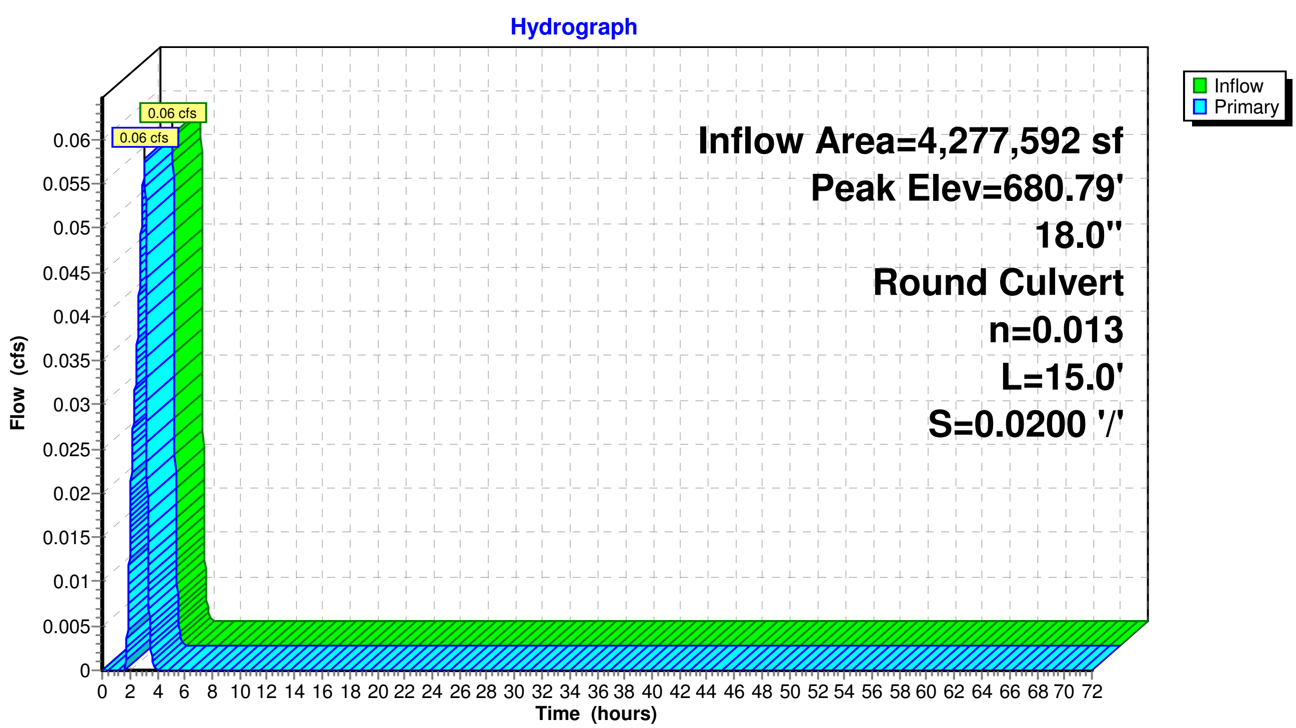
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.00" for 0.5 YR SDS event
Inflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf
Outflow = 0.06 cfs @ 3.07 hrs, Volume= 191 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 3.07 hrs, Volume= 191 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 680.79' @ 3.07 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.06 cfs @ 3.07 hrs HW=680.79' TW=677.96' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.06 cfs @ 1.09 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.16"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=1.40 cfs 55,871 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=0.30' Max Vel=3.77 fps Inflow=1.40 cfs 55,871 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=1.40 cfs 55,871 cf

Pond 31P: Bypass Structure Peak Elev=681.64' Inflow=0.95 cfs 49,441 cf
Primary=0.95 cfs 49,441 cf Secondary=0.00 cfs 0 cf Outflow=0.95 cfs 49,441 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.00' Storage=0.044 af Inflow=0.95 cfs 49,441 cf
Outflow=0.95 cfs 49,441 cf

Pond 33P: 48" Perforated CMP Peak Elev=680.95' Storage=0.026 af Inflow=0.95 cfs 49,441 cf
Discarded=0.10 cfs 8,482 cf Primary=0.85 cfs 40,959 cf Outflow=0.95 cfs 49,441 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=683.04' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=0.00 cfs 0 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=672.73' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=0.00 cfs 0 cf

Pond 42P: Flow Converge Structure Peak Elev=671.38' Inflow=0.85 cfs 40,959 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=0.85 cfs 40,959 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=670.86' Inflow=0.85 cfs 40,959 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=0.85 cfs 40,959 cf

Pond 49P: Existing (New) Pond Peak Elev=694.81' Storage=3,609 cf Inflow=0.51 cfs 27,741 cf
Discarded=0.05 cfs 6,401 cf Primary=0.44 cfs 21,311 cf Outflow=0.50 cfs 27,712 cf

Pond 51P: Flow Splitter Peak Elev=709.30' Inflow=1.40 cfs 55,871 cf
Primary=0.89 cfs 28,130 cf Secondary=0.51 cfs 27,741 cf Outflow=1.40 cfs 55,871 cf

Pond 52P: Existing MH to be replaced Peak Elev=686.84' Inflow=0.95 cfs 49,441 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=0.95 cfs 49,441 cf

Pond 53P: Proposed MH Peak Elev=691.18' Inflow=0.89 cfs 28,130 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=0.89 cfs 28,130 cf

Pond 57P: Vortech 9000 Peak Elev=681.21' Inflow=0.95 cfs 49,441 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=0.95 cfs 49,441 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 55,871 cf Average Runoff Depth = 0.16"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

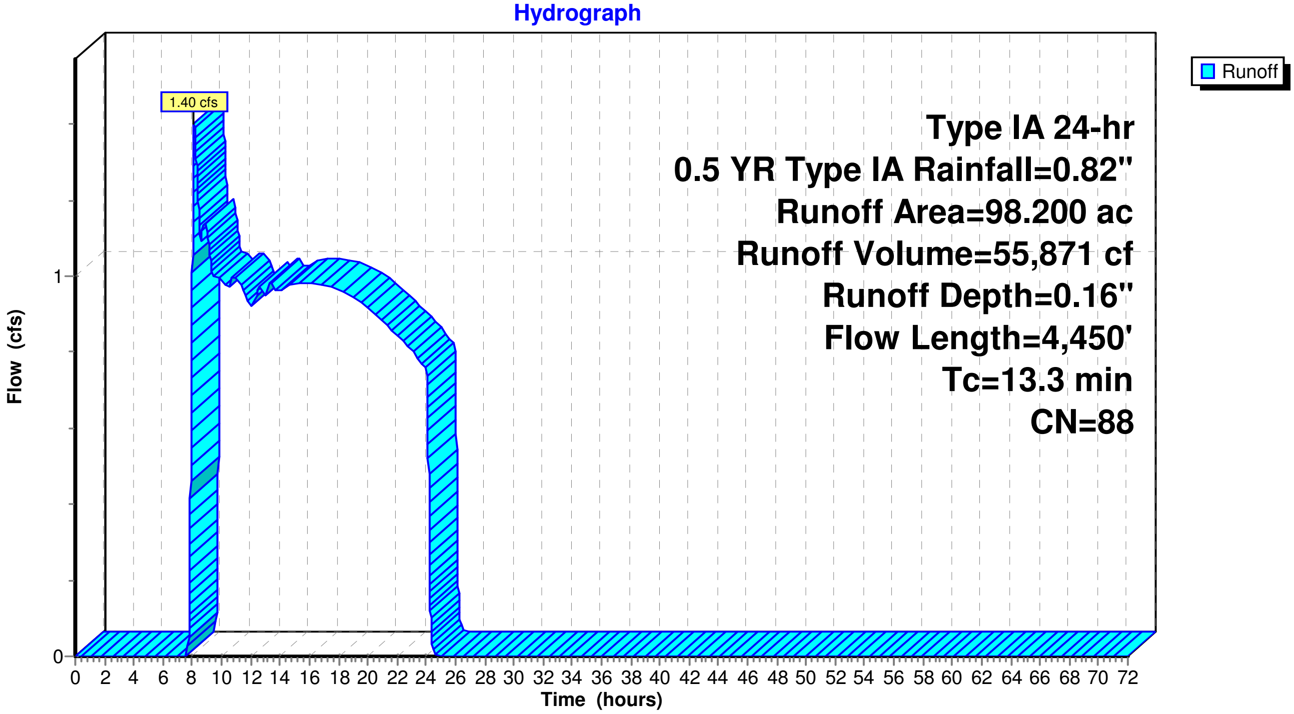
Runoff = 1.40 cfs @ 8.14 hrs, Volume= 55,871 cf, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 0.5 YR Type IA Rainfall=0.82"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

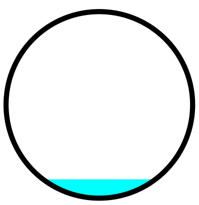
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.16" for 0.5 YR Type IA event
Inflow = 1.40 cfs @ 8.14 hrs, Volume= 55,871 cf
Outflow = 1.40 cfs @ 8.16 hrs, Volume= 55,871 cf, Atten= 0%, Lag= 0.9 min

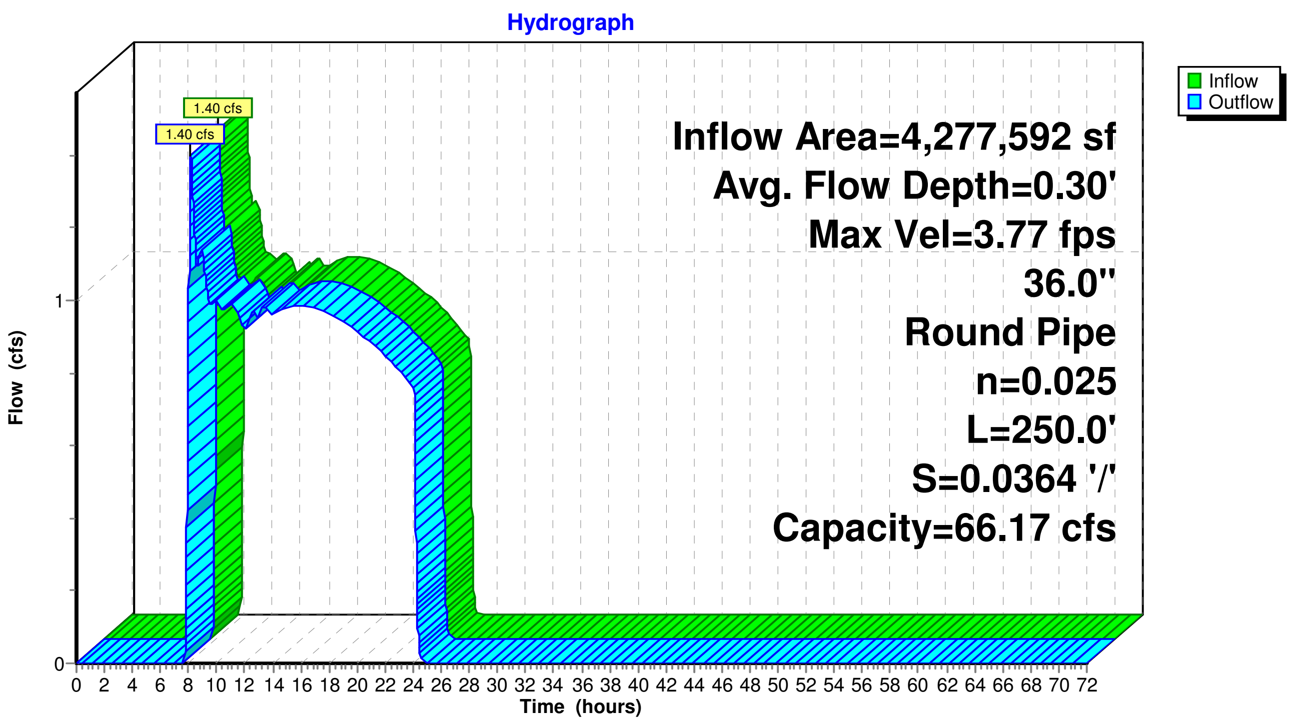
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.77 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 3.23 fps, Avg. Travel Time= 1.3 min

Peak Storage= 93 cf @ 8.16 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.14" for 0.5 YR Type IA event
Inflow = 0.95 cfs @ 10.87 hrs, Volume= 49,441 cf
Outflow = 0.95 cfs @ 10.87 hrs, Volume= 49,441 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 10.87 hrs, Volume= 49,441 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

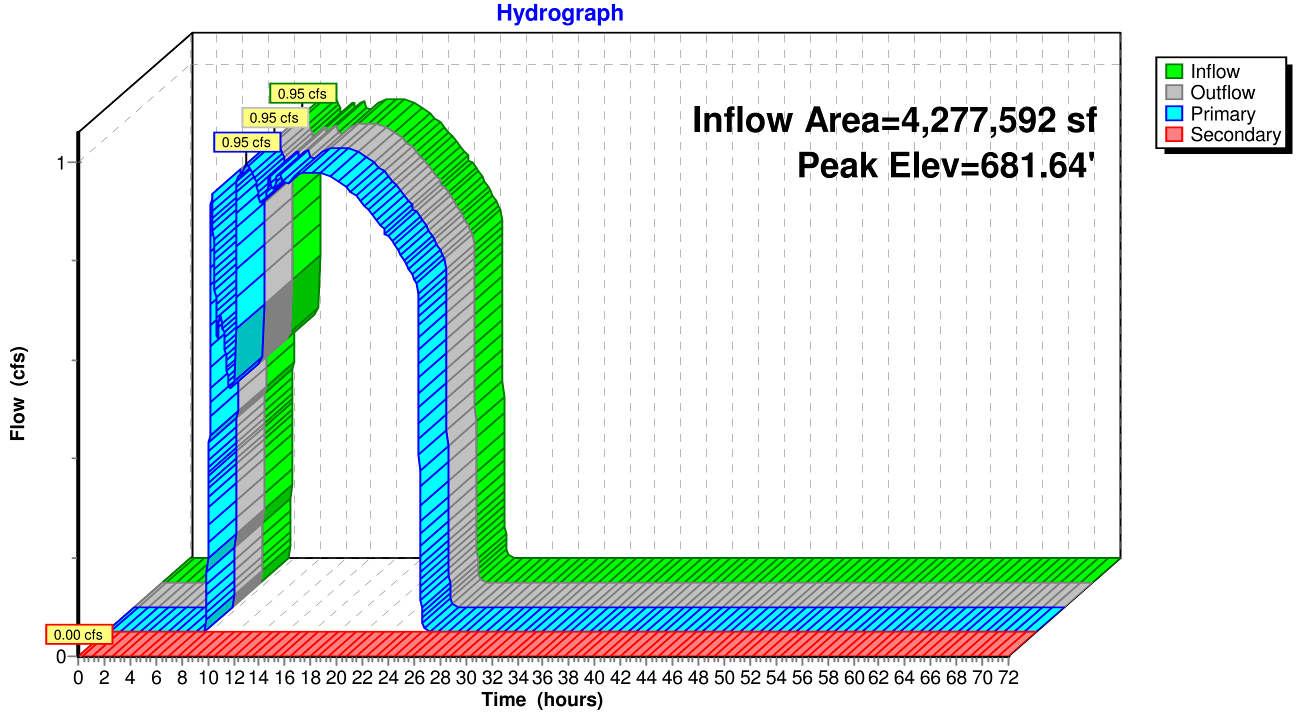
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.64' @ 10.87 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.95 cfs @ 10.87 hrs HW=681.64' TW=681.21' (Dynamic Tailwater)
↑ **3=Culvert** (Outlet Controls 0.95 cfs @ 3.02 fps)
  ↑ **1=Orifice/Grate** (Passes 0.95 cfs of 1.01 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=681.17' TW=683.04' (Dynamic Tailwater)
↑ **2=Culvert** (Controls 0.00 cfs)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.14" for 0.5 YR Type IA event
Inflow = 0.95 cfs @ 10.87 hrs, Volume= 49,441 cf
Outflow = 0.95 cfs @ 10.90 hrs, Volume= 49,441 cf, Atten= 0%, Lag= 1.9 min
Primary = 0.95 cfs @ 10.90 hrs, Volume= 49,441 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.00' @ 10.91 hrs Surf.Area= 0.013 ac Storage= 0.044 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

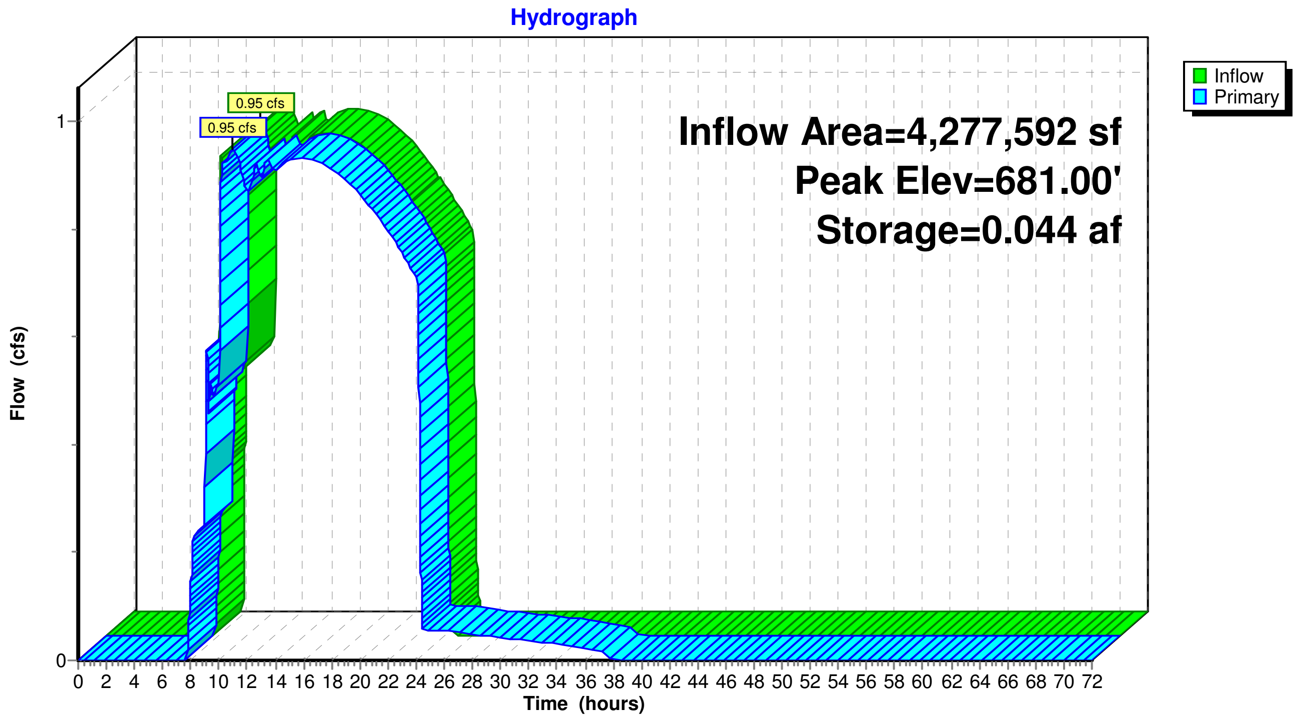
Plug-Flow detention time= 49.3 min calculated for 49,434 cf (100% of inflow)
Center-of-Mass det. time= 49.4 min (1,017.8 - 968.4)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.95 cfs @ 10.90 hrs HW=681.00' TW=680.95' (Dynamic Tailwater)
1=Orifice/Grate (Passes 0.95 cfs of 12.08 cfs potential flow)
2=Broad-Crested Rectangular Weir (Weir Controls 0.89 cfs @ 0.85 fps)
3=Orifice/Grate (Orifice Controls 0.05 cfs @ 1.12 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.14" for 0.5 YR Type IA event
Inflow = 0.95 cfs @ 10.90 hrs, Volume= 49,441 cf
Outflow = 0.95 cfs @ 10.91 hrs, Volume= 49,441 cf, Atten= 0%, Lag= 0.6 min
Discarded = 0.10 cfs @ 10.91 hrs, Volume= 8,482 cf
Primary = 0.85 cfs @ 10.91 hrs, Volume= 40,959 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 680.95' @ 10.91 hrs Surf.Area= 0.011 ac Storage= 0.026 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 30.5 min calculated for 49,434 cf (100% of inflow)
Center-of-Mass det. time= 30.5 min (1,048.3 - 1,017.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.10 cfs @ 10.91 hrs HW=680.95' (Free Discharge)
└─**2=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.85 cfs @ 10.91 hrs HW=680.95' TW=671.38' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.85 cfs of 13.20 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.85 cfs @ 1.09 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

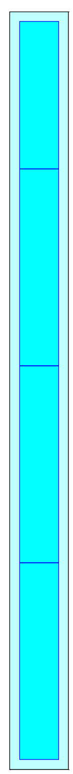
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

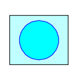
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

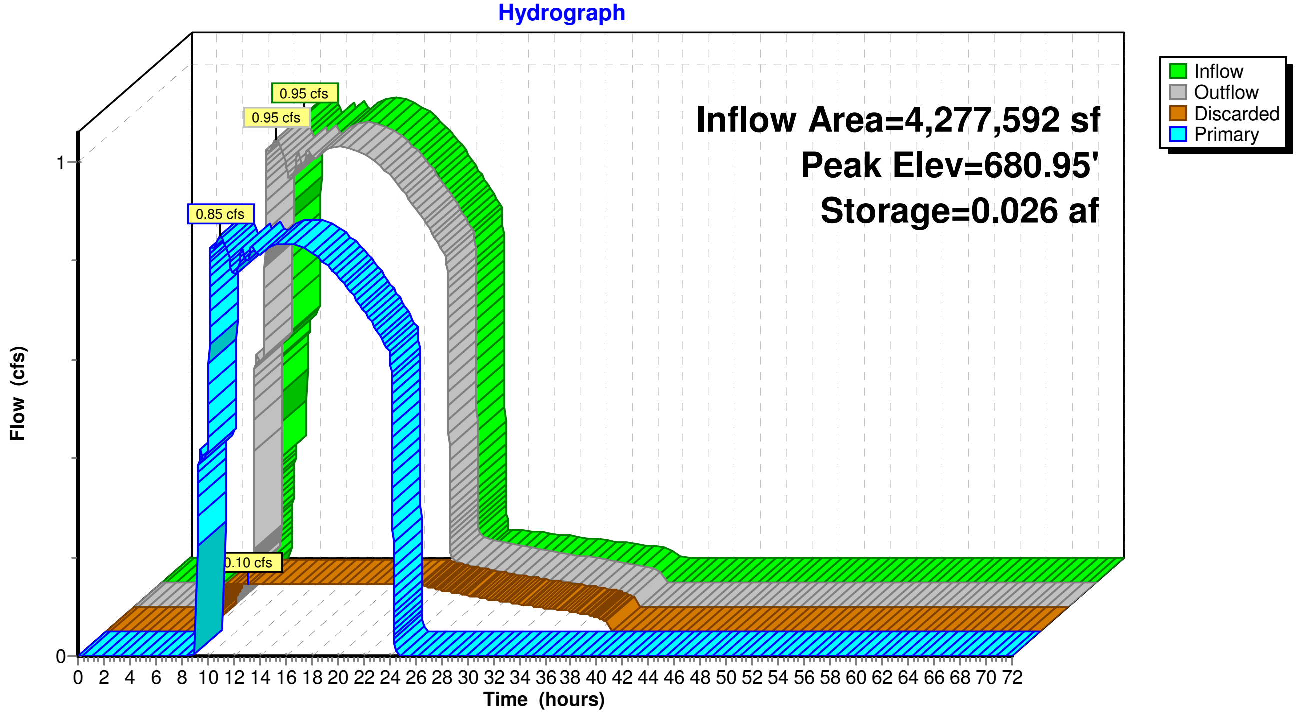
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



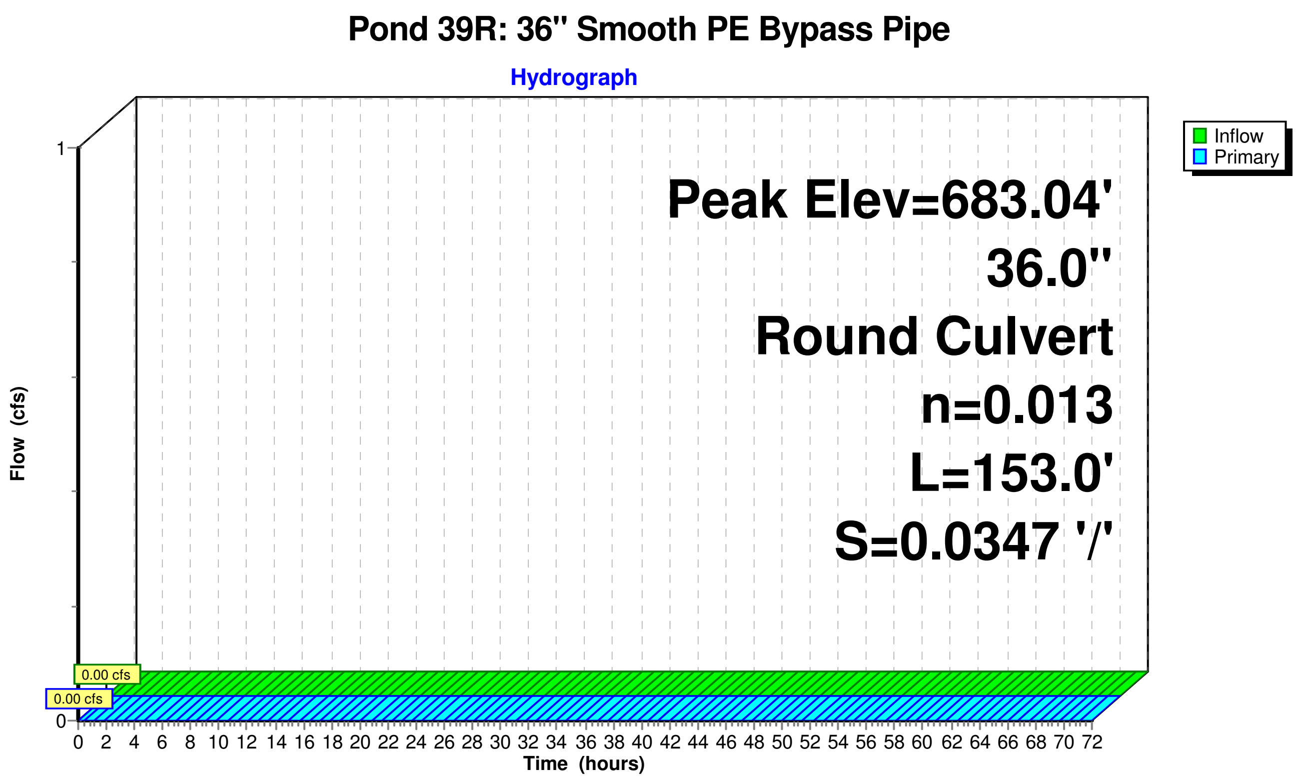
Summary for Pond 39R: 36" Smooth PE Bypass Pipe

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.04' @ 0.00 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=683.04' TW=672.73' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

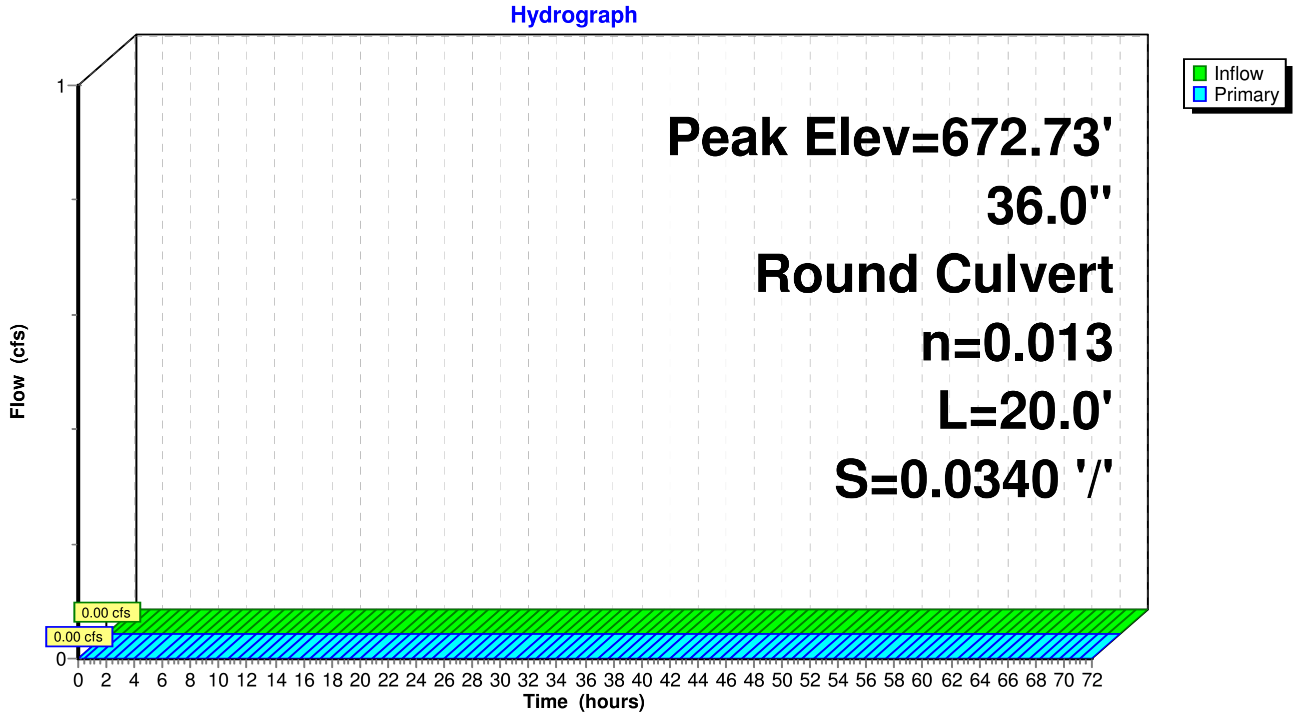
Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.73' @ 0.00 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.73' TW=671.05' (Dynamic Tailwater)
↑**1=Culvert** (Controls 0.00 cfs)

Pond 40R: 36" Smooth PE Bypass Pipe



Summary for Pond 42P: Flow Converge Structure

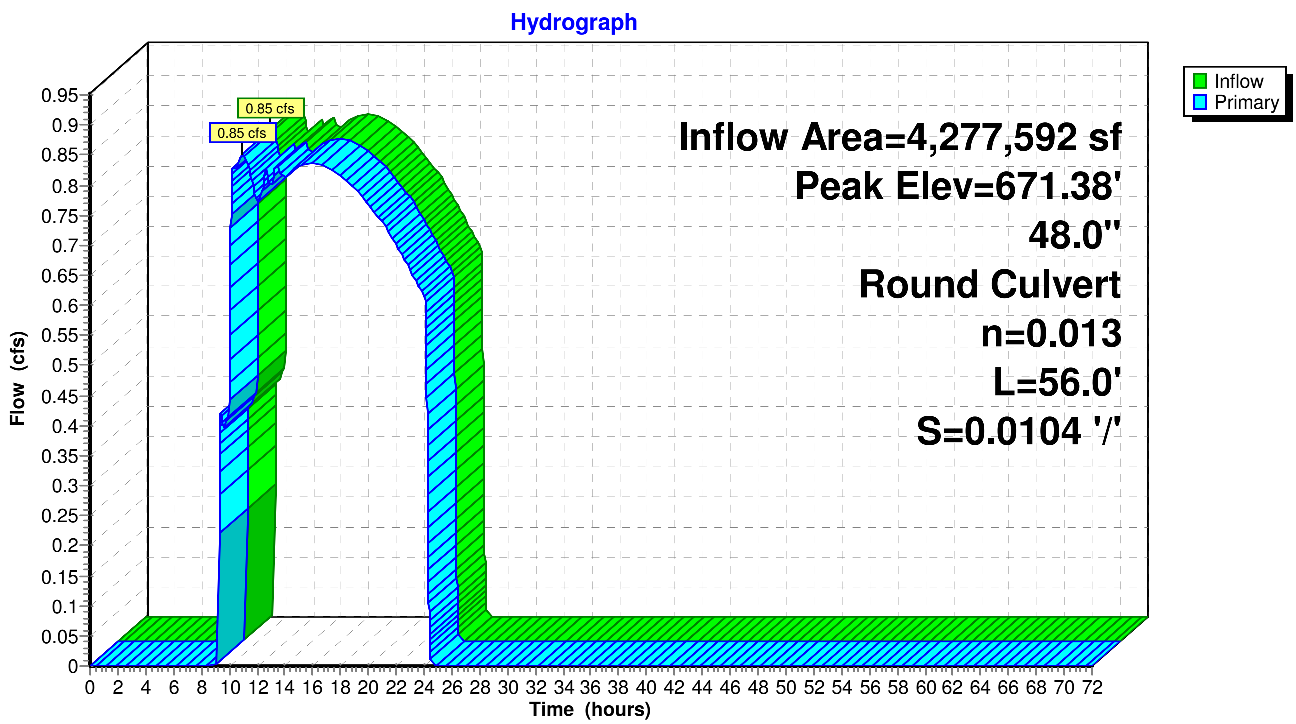
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.11" for 0.5 YR Type IA event
Inflow = 0.85 cfs @ 10.91 hrs, Volume= 40,959 cf
Outflow = 0.85 cfs @ 10.91 hrs, Volume= 40,959 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 10.91 hrs, Volume= 40,959 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 671.38' @ 10.91 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=0.85 cfs @ 10.91 hrs HW=671.38' TW=670.86' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.85 cfs @ 2.66 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

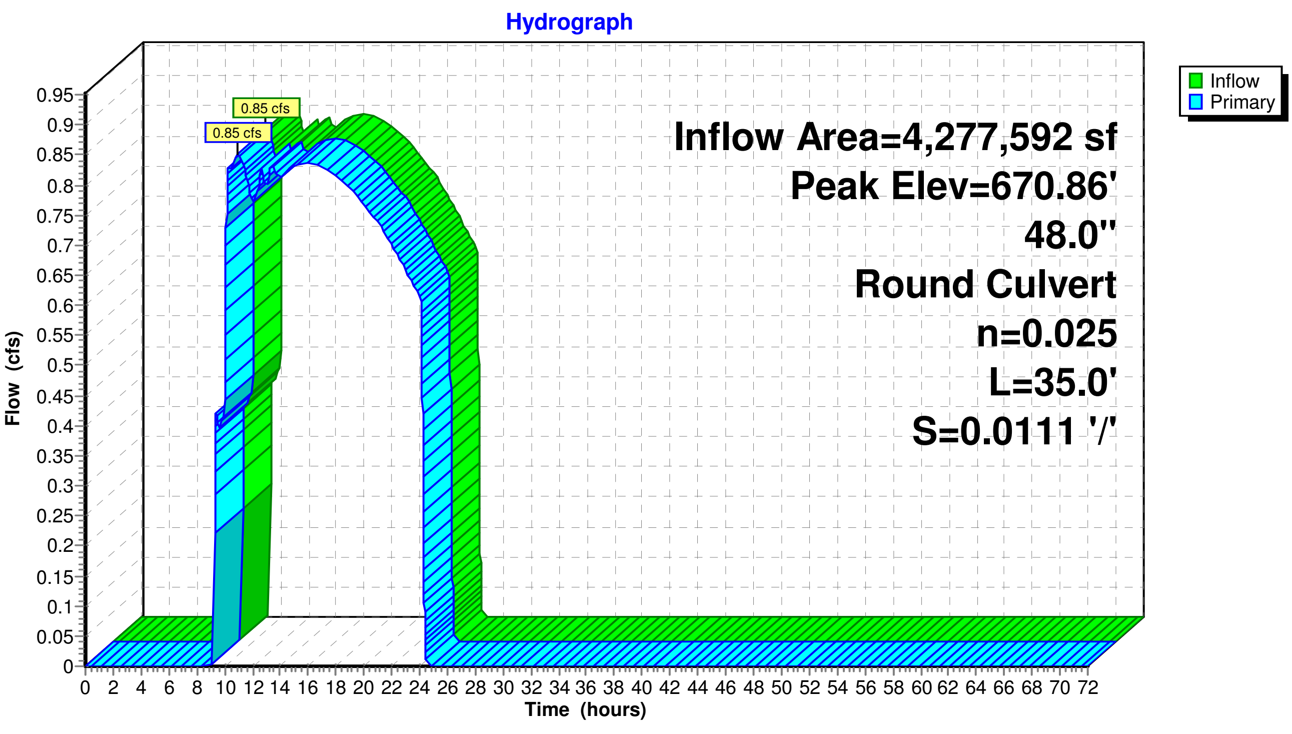
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.11"	for 0.5 YR Type IA event	
Inflow =	0.85 cfs @	10.91 hrs,	Volume=	40,959 cf	
Outflow =	0.85 cfs @	10.91 hrs,	Volume=	40,959 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.85 cfs @	10.91 hrs,	Volume=	40,959 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 670.86' @ 10.91 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=0.85 cfs @ 10.91 hrs HW=670.86' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.85 cfs @ 2.06 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow =	0.51 cfs @	8.16 hrs,	Volume=	27,741 cf
Outflow =	0.50 cfs @	10.91 hrs,	Volume=	27,712 cf, Atten= 2%, Lag= 164.9 min
Discarded =	0.05 cfs @	10.91 hrs,	Volume=	6,401 cf
Primary =	0.44 cfs @	10.91 hrs,	Volume=	21,311 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.81' @ 10.91 hrs Surf.Area= 1,494 sf Storage= 3,609 cf

Plug-Flow detention time= 230.8 min calculated for 27,712 cf (100% of inflow)
Center-of-Mass det. time= 230.3 min (1,179.4 - 949.1)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

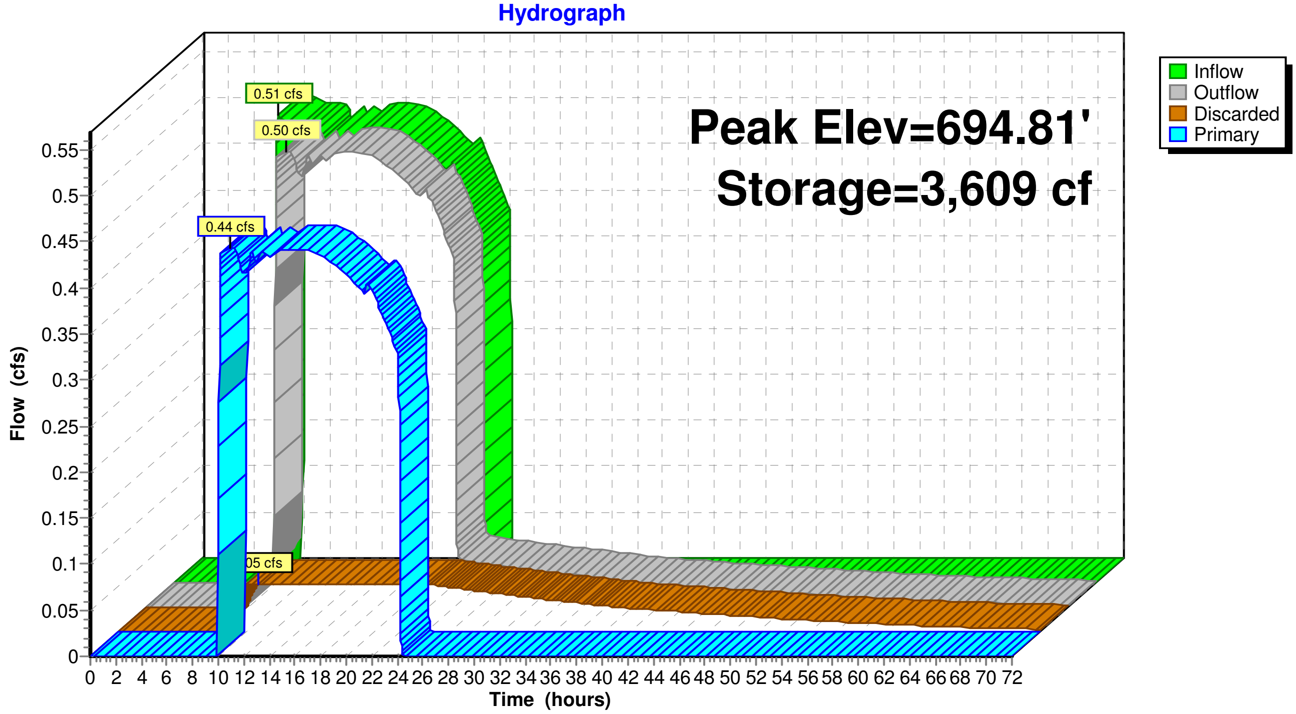
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 10.91 hrs HW=694.81' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.44 cfs @ 10.91 hrs HW=694.81' TW=686.84' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.44 cfs of 14.77 cfs potential flow)
　└─**2=Orifice/Grate** (Weir Controls 0.44 cfs @ 0.76 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 709.30' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.30' @ 8.16 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.16" for 0.5 YR Type IA event
Inflow = 1.40 cfs @ 8.16 hrs, Volume= 55,871 cf
Outflow = 1.40 cfs @ 8.16 hrs, Volume= 55,871 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.89 cfs @ 8.16 hrs, Volume= 28,130 cf
Secondary = 0.51 cfs @ 8.16 hrs, Volume= 27,741 cf

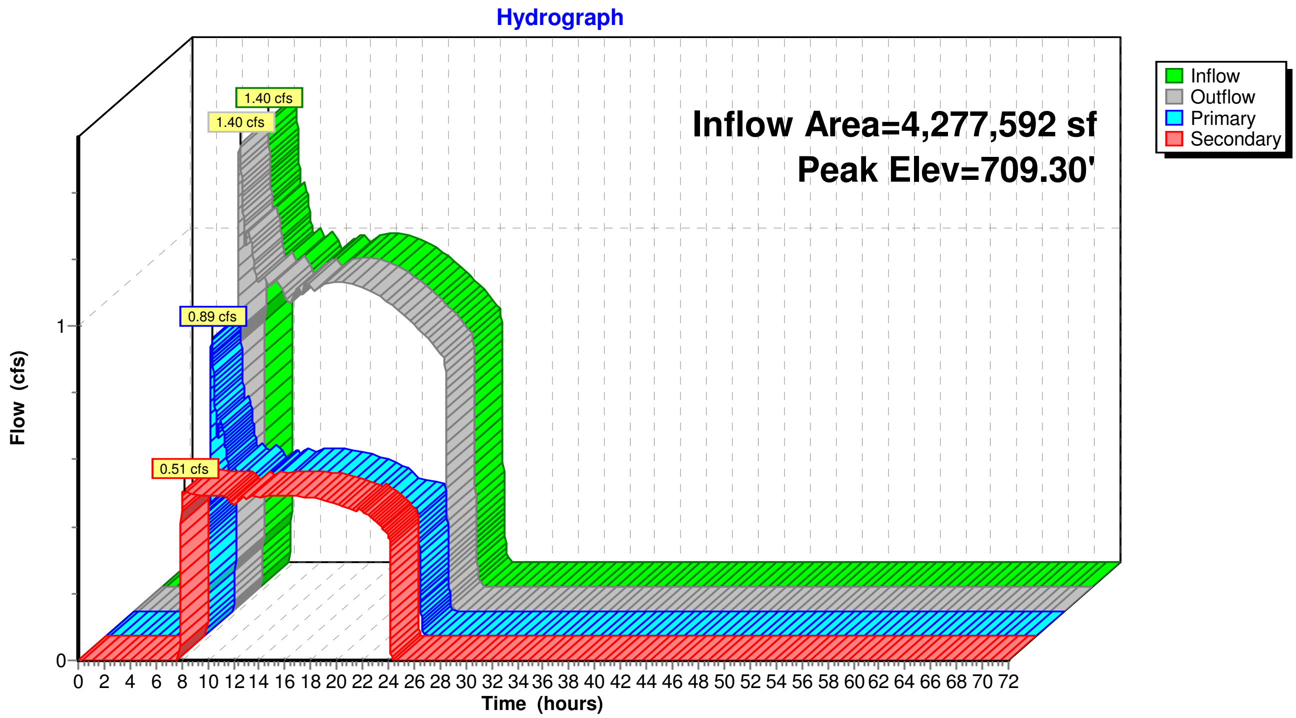
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.30' @ 8.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=0.89 cfs @ 8.16 hrs HW=709.30' TW=691.18' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.89 cfs of 16.51 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.50 cfs @ 5.76 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.87 fps)

Secondary OutFlow Max=0.51 cfs @ 8.16 hrs HW=709.30' TW=691.08' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.51 cfs @ 2.59 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 686.84' (Flood elevation advised)

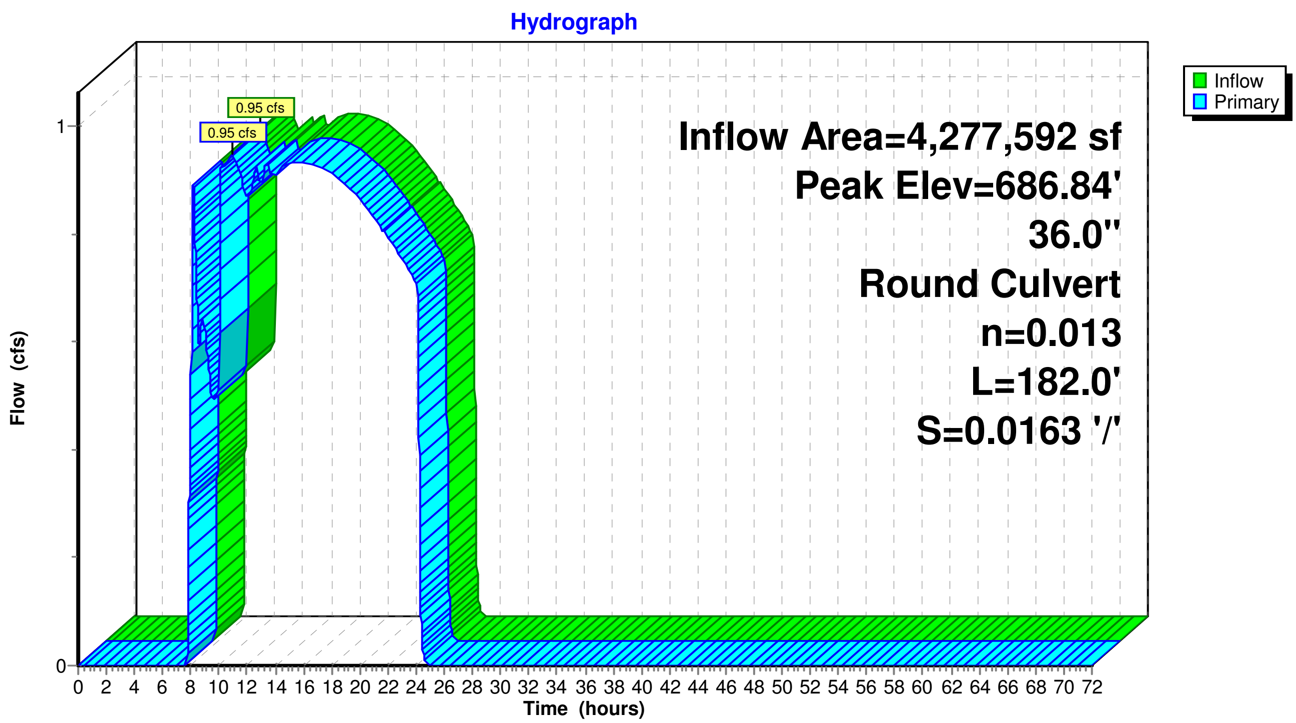
Inflow Area =	4,277,592 sf, 65.00% Impervious,	Inflow Depth = 0.14"	for 0.5 YR Type IA event
Inflow =	0.95 cfs @ 10.87 hrs, Volume=	49,441 cf	
Outflow =	0.95 cfs @ 10.87 hrs, Volume=	49,441 cf, Atten= 0%, Lag= 0.0 min	
Primary =	0.95 cfs @ 10.87 hrs, Volume=	49,441 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 686.84' @ 10.87 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.95 cfs @ 10.87 hrs HW=686.84' TW=681.64' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.95 cfs @ 2.02 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

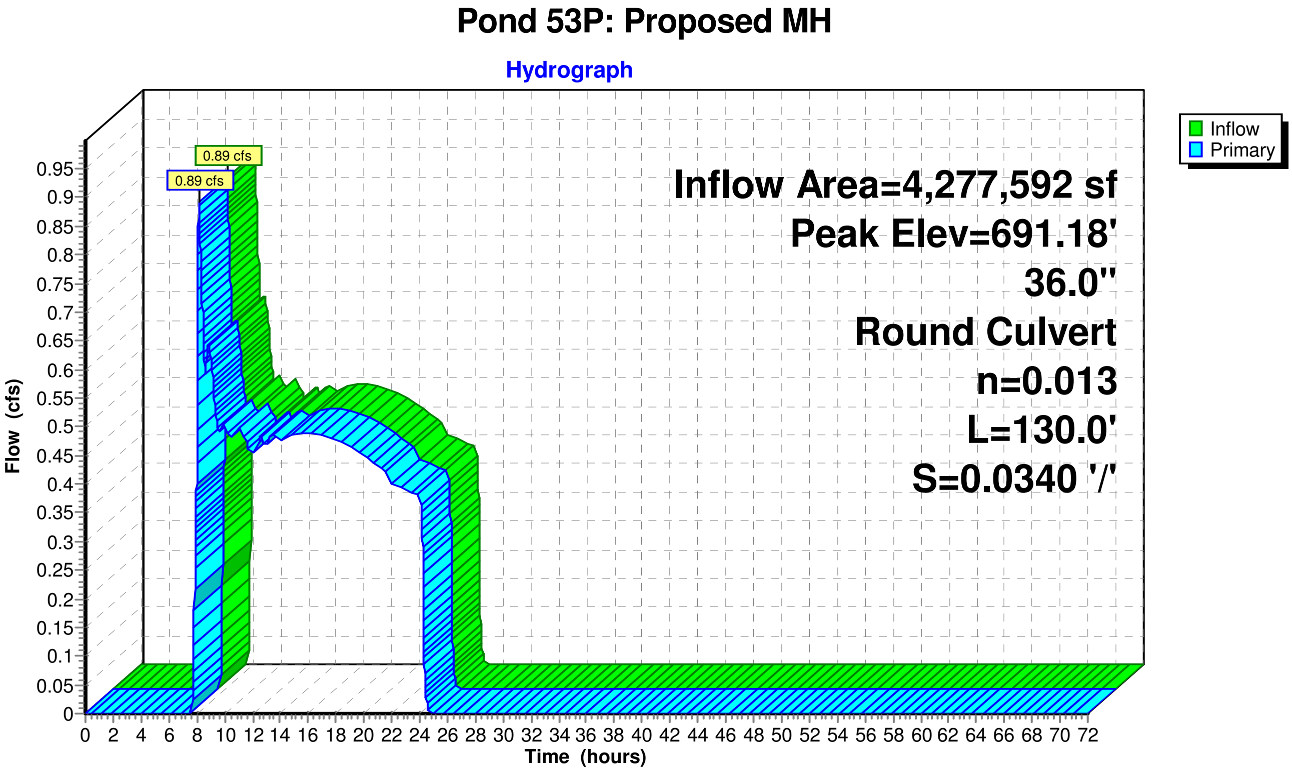
[57] Hint: Peaked at 691.18' (Flood elevation advised)

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.08"	for 0.5 YR Type IA event
Inflow =	0.89 cfs @	8.16 hrs, Volume=	28,130 cf	
Outflow =	0.89 cfs @	8.16 hrs, Volume=	28,130 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.89 cfs @	8.16 hrs, Volume=	28,130 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 691.18' @ 8.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.89 cfs @ 8.16 hrs HW=691.18' TW=686.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.89 cfs @ 1.99 fps)



Summary for Pond 57P: Vortech 9000

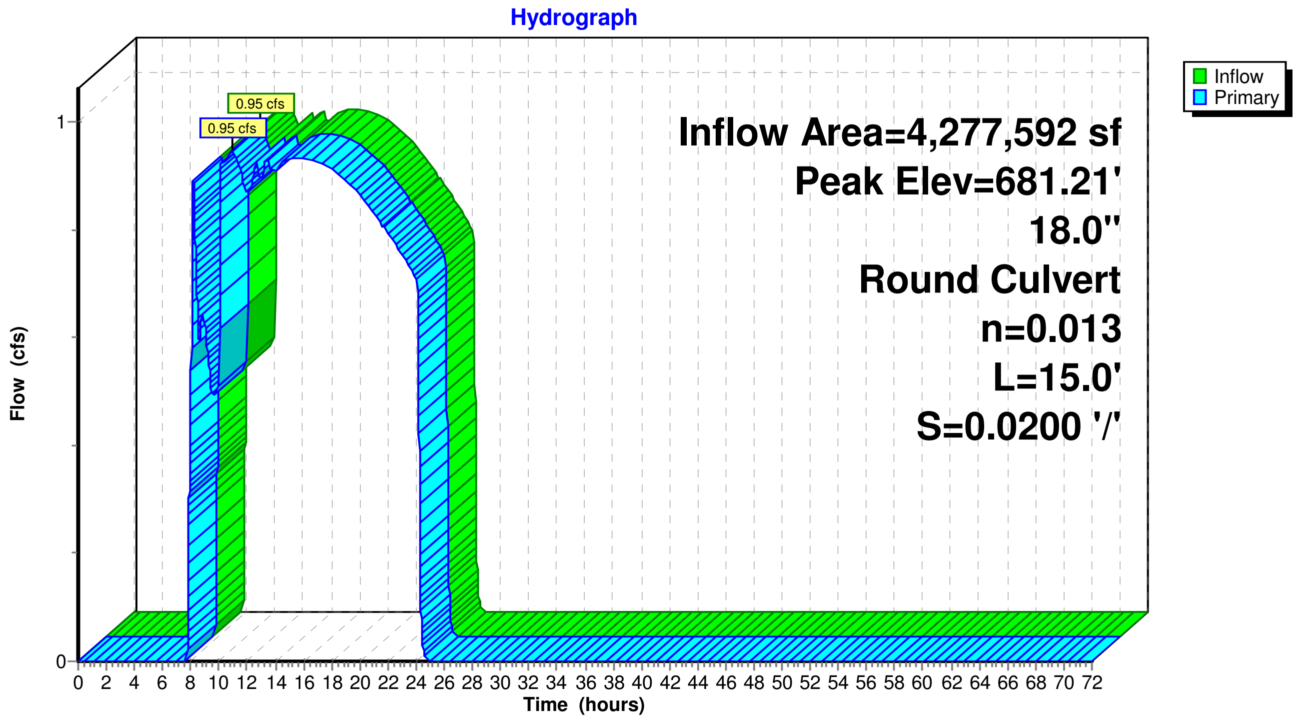
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.14"	for 0.5 YR Type IA event
Inflow =	0.95 cfs @	10.87 hrs, Volume=	49,441 cf	
Outflow =	0.95 cfs @	10.87 hrs, Volume=	49,441 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.95 cfs @	10.87 hrs, Volume=	49,441 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.21' @ 10.87 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.95 cfs @ 10.87 hrs HW=681.21' TW=681.00' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.95 cfs @ 2.59 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.03"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=4.27 cfs 9,749 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=0.52' Max Vel=5.26 fps Inflow=4.27 cfs 9,749 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=4.27 cfs 9,749 cf

Pond 31P: Bypass Structure Peak Elev=682.20' Inflow=3.72 cfs 6,863 cf
Primary=3.72 cfs 6,863 cf Secondary=0.00 cfs 0 cf Outflow=3.72 cfs 6,863 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.15' Storage=0.046 af Inflow=3.72 cfs 6,863 cf
Outflow=3.22 cfs 6,863 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.06' Storage=0.027 af Inflow=3.22 cfs 6,863 cf
Discarded=0.10 cfs 3,689 cf Primary=1.98 cfs 3,174 cf Outflow=2.08 cfs 6,863 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=683.04' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=0.00 cfs 0 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=672.73' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=0.00 cfs 0 cf

Pond 42P: Flow Converge Structure Peak Elev=671.57' Inflow=1.98 cfs 3,174 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=1.98 cfs 3,174 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=671.06' Inflow=1.98 cfs 3,174 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=1.98 cfs 3,174 cf

Pond 49P: Existing (New) Pond Peak Elev=694.12' Storage=2,669 cf Inflow=0.55 cfs 2,886 cf
Discarded=0.04 cfs 2,886 cf Primary=0.00 cfs 0 cf Outflow=0.04 cfs 2,886 cf

Pond 51P: Flow Splitter Peak Elev=709.60' Inflow=4.27 cfs 9,749 cf
Primary=3.72 cfs 6,863 cf Secondary=0.55 cfs 2,886 cf Outflow=4.27 cfs 9,749 cf

Pond 52P: Existing MH to be replaced Peak Elev=687.20' Inflow=3.72 cfs 6,863 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=3.72 cfs 6,863 cf

Pond 53P: Proposed MH Peak Elev=691.55' Inflow=3.72 cfs 6,863 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=3.72 cfs 6,863 cf

Pond 57P: Vortech 9000 Peak Elev=681.65' Inflow=3.72 cfs 6,863 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=3.72 cfs 6,863 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 9,749 cf Average Runoff Depth = 0.03"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

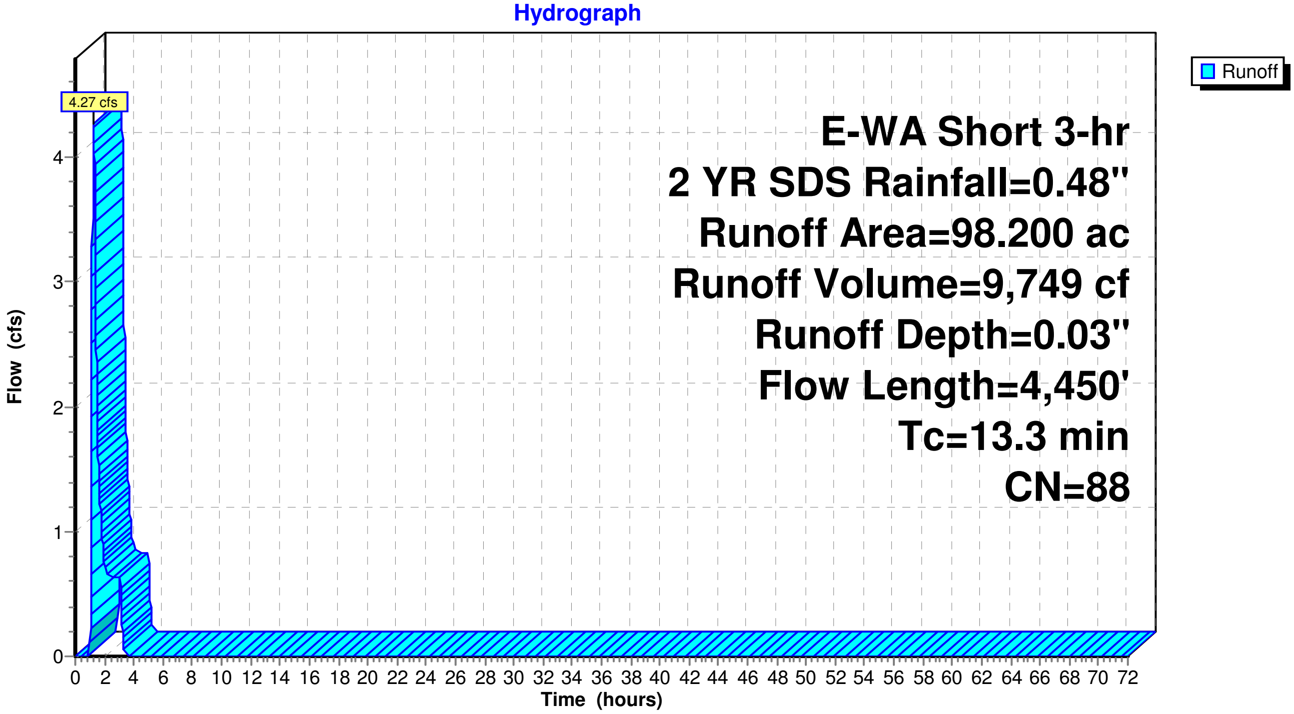
Runoff = 4.27 cfs @ 1.25 hrs, Volume= 9,749 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 2 YR SDS Rainfall=0.48"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

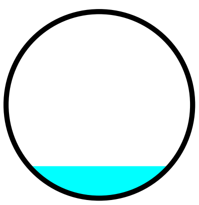
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.03" for 2 YR SDS event
Inflow = 4.27 cfs @ 1.25 hrs, Volume= 9,749 cf
Outflow = 4.27 cfs @ 1.26 hrs, Volume= 9,749 cf, Atten= 0%, Lag= 0.5 min

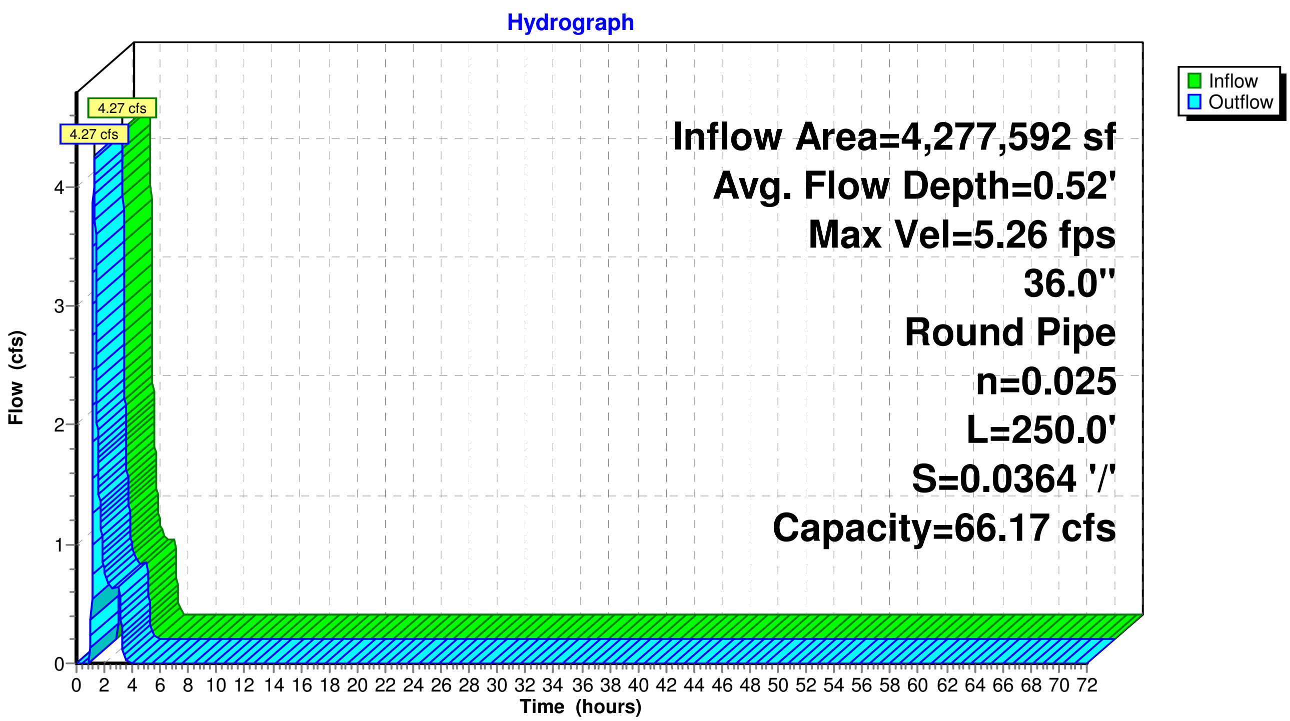
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.26 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 1.5 min

Peak Storage= 203 cf @ 1.26 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.02"	for 2 YR SDS event
Inflow =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf	
Outflow =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf,	Atten= 0%, Lag= 0.0 min
Primary =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

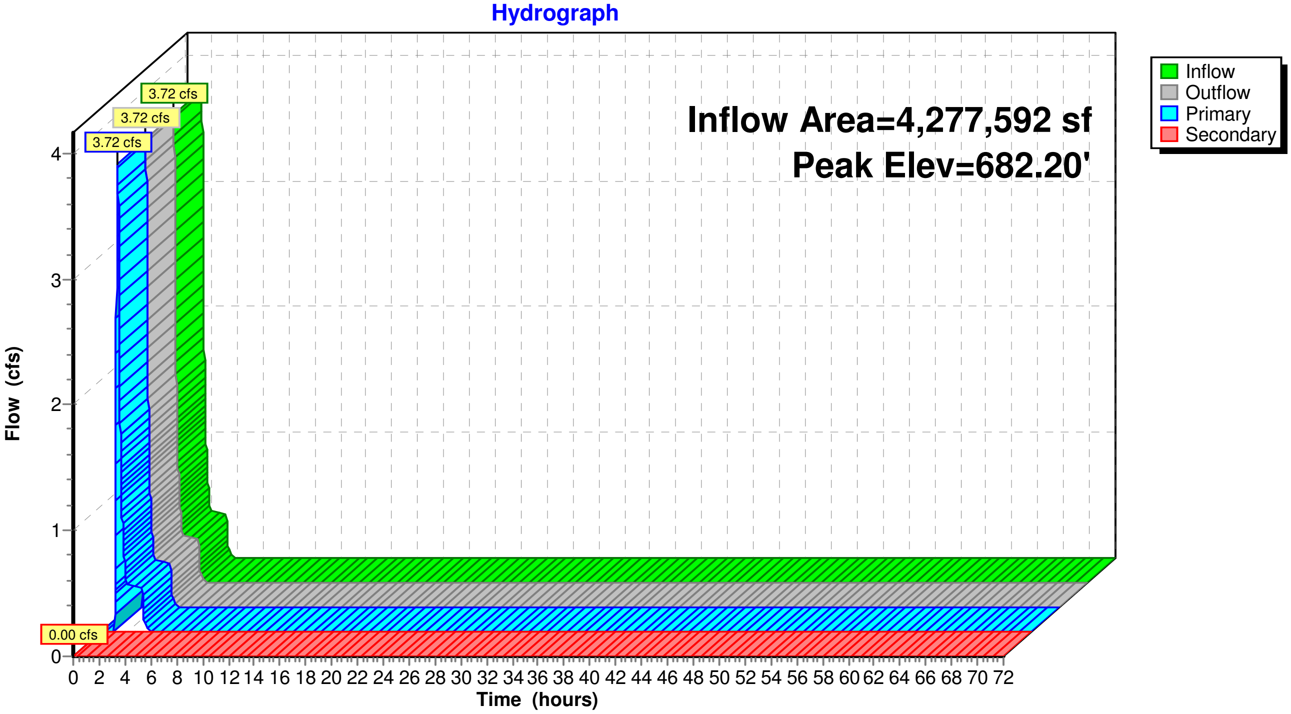
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 682.20' @ 1.26 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.72 cfs @ 1.26 hrs HW=682.20' TW=681.65' (Dynamic Tailwater)
└─**3=Culvert** (Outlet Controls 3.72 cfs @ 4.05 fps)
  └─**1=Orifice/Grate** (Passes 3.72 cfs of 4.01 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=681.17' TW=683.04' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.02" for 2 YR SDS event
Inflow = 3.72 cfs @ 1.26 hrs, Volume= 6,863 cf
Outflow = 3.22 cfs @ 1.33 hrs, Volume= 6,863 cf, Atten= 13%, Lag= 4.6 min
Primary = 3.22 cfs @ 1.33 hrs, Volume= 6,863 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.15' @ 1.43 hrs Surf.Area= 0.012 ac Storage= 0.046 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

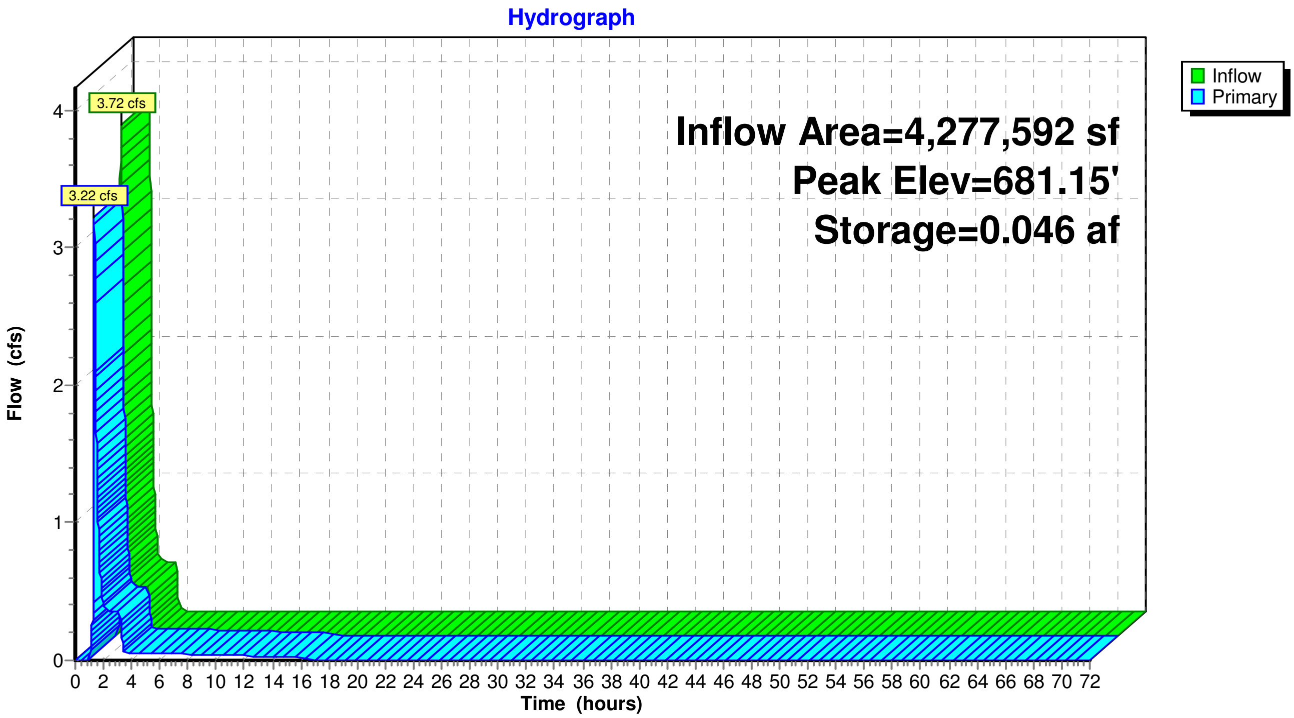
Plug-Flow detention time= 123.3 min calculated for 6,862 cf (100% of inflow)
Center-of-Mass det. time= 123.4 min (225.0 - 101.6)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.20 cfs @ 1.33 hrs HW=681.14' TW=679.25' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 3.20 cfs of 70.06 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.88 cfs @ 1.64 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.33 cfs @ 6.63 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.02"	for 2 YR SDS event
Inflow =	3.22 cfs @	1.33 hrs, Volume=	6,863 cf	
Outflow =	2.08 cfs @	1.43 hrs, Volume=	6,863 cf,	Atten= 35%, Lag= 5.9 min
Discarded =	0.10 cfs @	1.43 hrs, Volume=	3,689 cf	
Primary =	1.98 cfs @	1.43 hrs, Volume=	3,174 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.06' @ 1.43 hrs Surf.Area= 0.011 ac Storage= 0.027 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 82.4 min calculated for 6,862 cf (100% of inflow)
Center-of-Mass det. time= 82.4 min (307.4 - 225.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.10 cfs @ 1.43 hrs HW=681.06' (Free Discharge)
└─**2=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=1.97 cfs @ 1.43 hrs HW=681.06' TW=671.57' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.97 cfs of 13.52 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.97 cfs @ 1.44 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

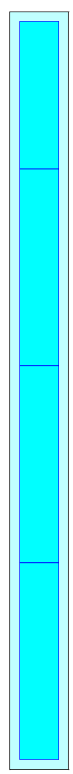
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

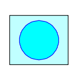
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

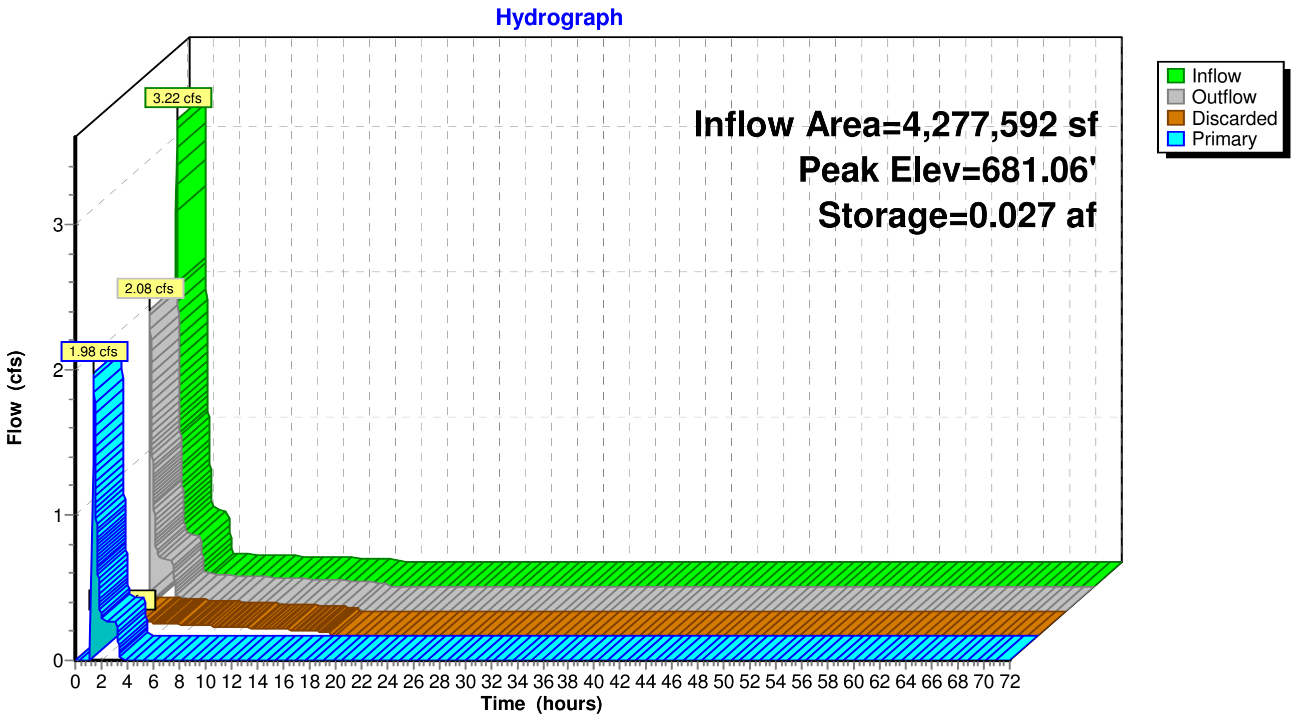
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

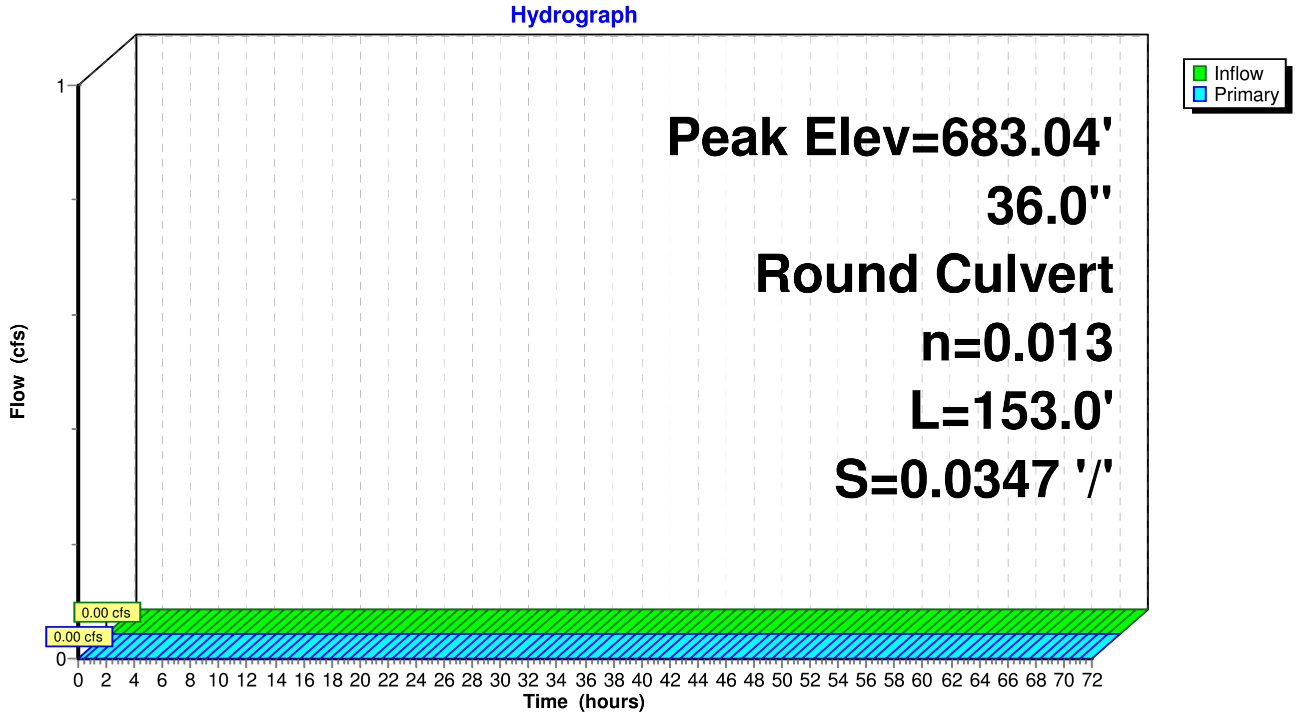
Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.04' @ 0.00 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=683.04' TW=672.73' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 39R: 36" Smooth PE Bypass Pipe



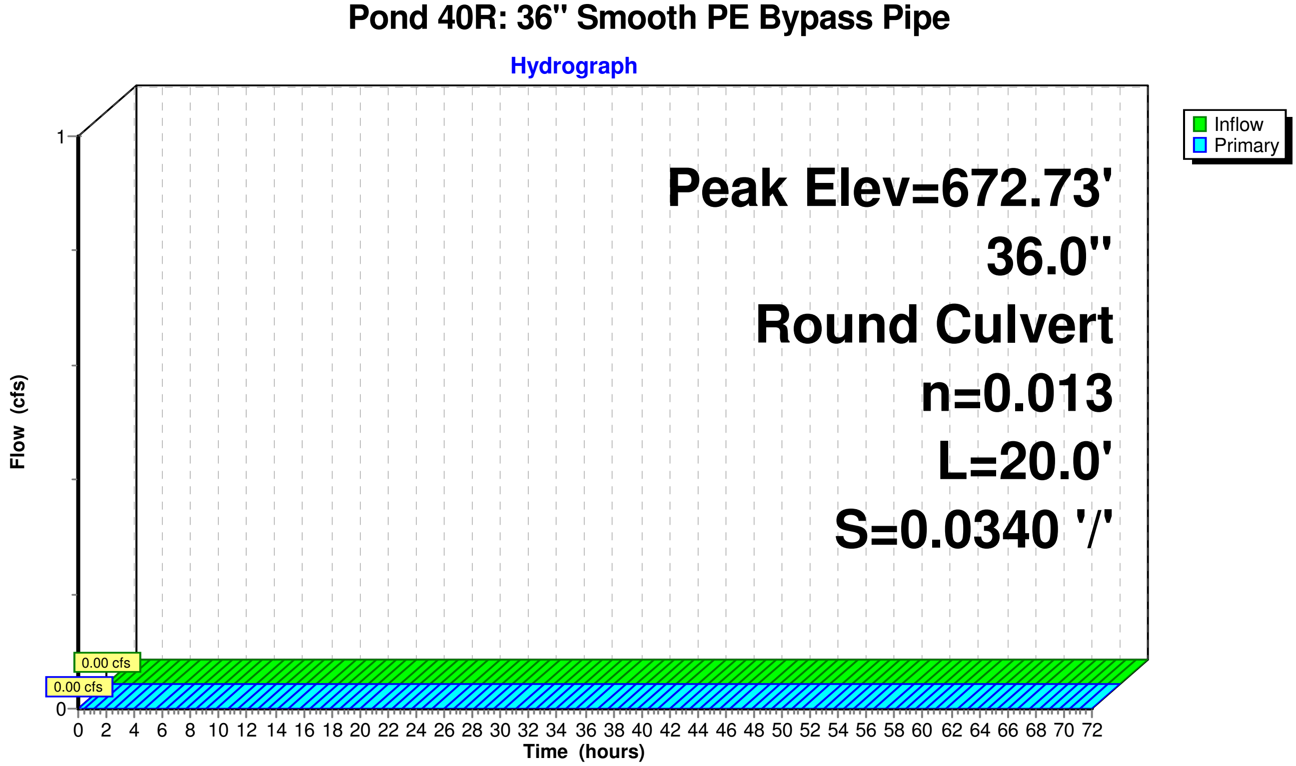
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.73' @ 0.00 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.73' TW=671.05' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



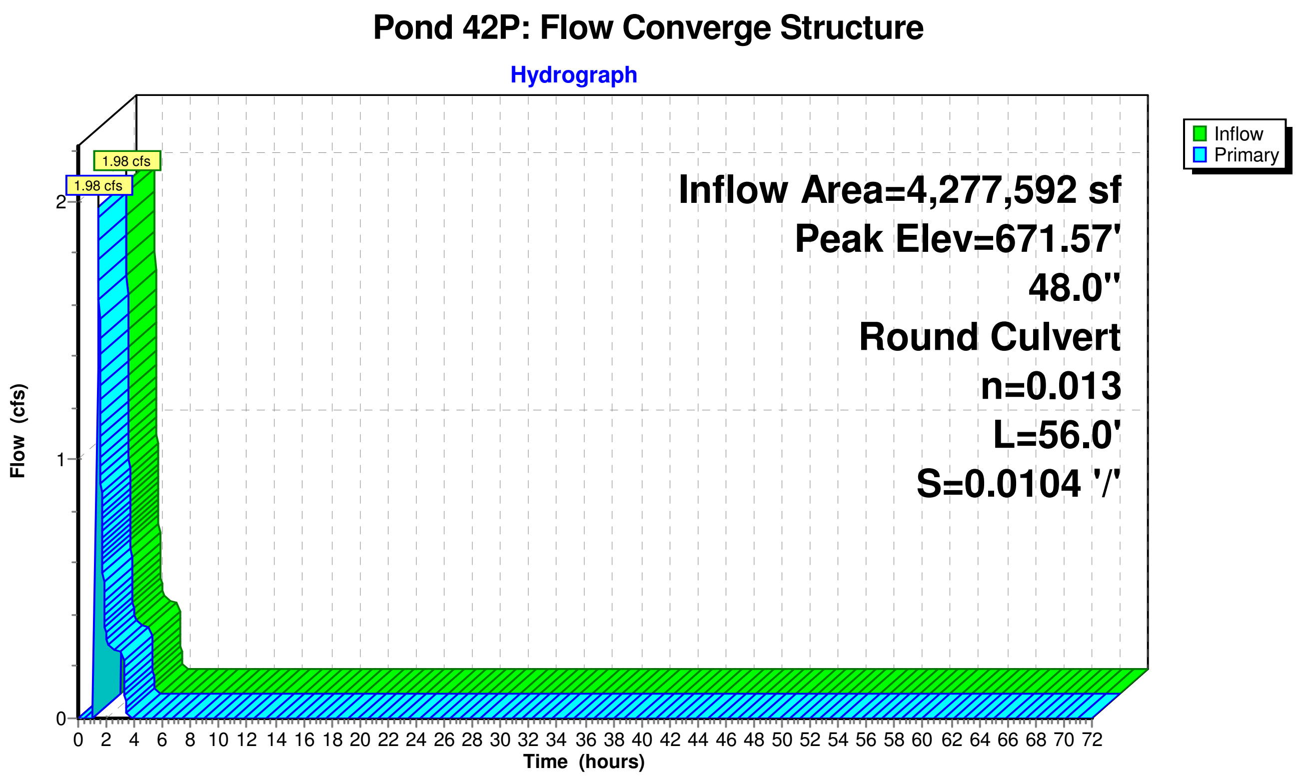
Summary for Pond 42P: Flow Converge Structure

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.01" for 2 YR SDS event
Inflow = 1.98 cfs @ 1.43 hrs, Volume= 3,174 cf
Outflow = 1.98 cfs @ 1.43 hrs, Volume= 3,174 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 1.43 hrs, Volume= 3,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 671.57' @ 1.43 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=1.97 cfs @ 1.43 hrs HW=671.57' TW=671.06' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.97 cfs @ 3.16 fps)



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

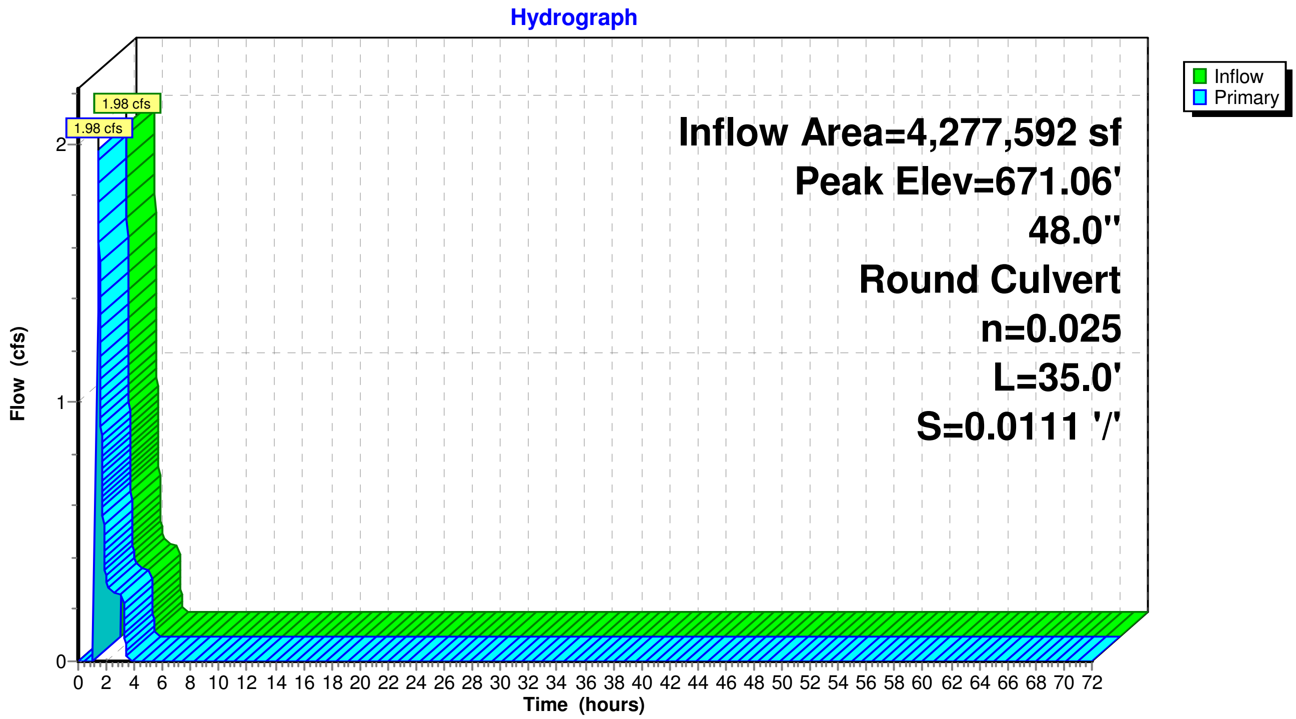
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.01"	for 2 YR SDS event
Inflow =	1.98 cfs @	1.43 hrs, Volume=	3,174 cf	
Outflow =	1.98 cfs @	1.43 hrs, Volume=	3,174 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.98 cfs @	1.43 hrs, Volume=	3,174 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 671.06' @ 1.43 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=1.97 cfs @ 1.43 hrs HW=671.06' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.97 cfs @ 2.62 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.55 cfs @	1.26 hrs,	Volume=	2,886 cf
Outflow	=	0.04 cfs @	3.21 hrs,	Volume=	2,886 cf, Atten= 92%, Lag= 116.9 min
Discarded	=	0.04 cfs @	3.21 hrs,	Volume=	2,886 cf
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.12' @ 3.21 hrs Surf.Area= 1,222 sf Storage= 2,669 cf

Plug-Flow detention time= 837.3 min calculated for 2,886 cf (100% of inflow)
Center-of-Mass det. time= 837.5 min (954.7 - 117.2)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

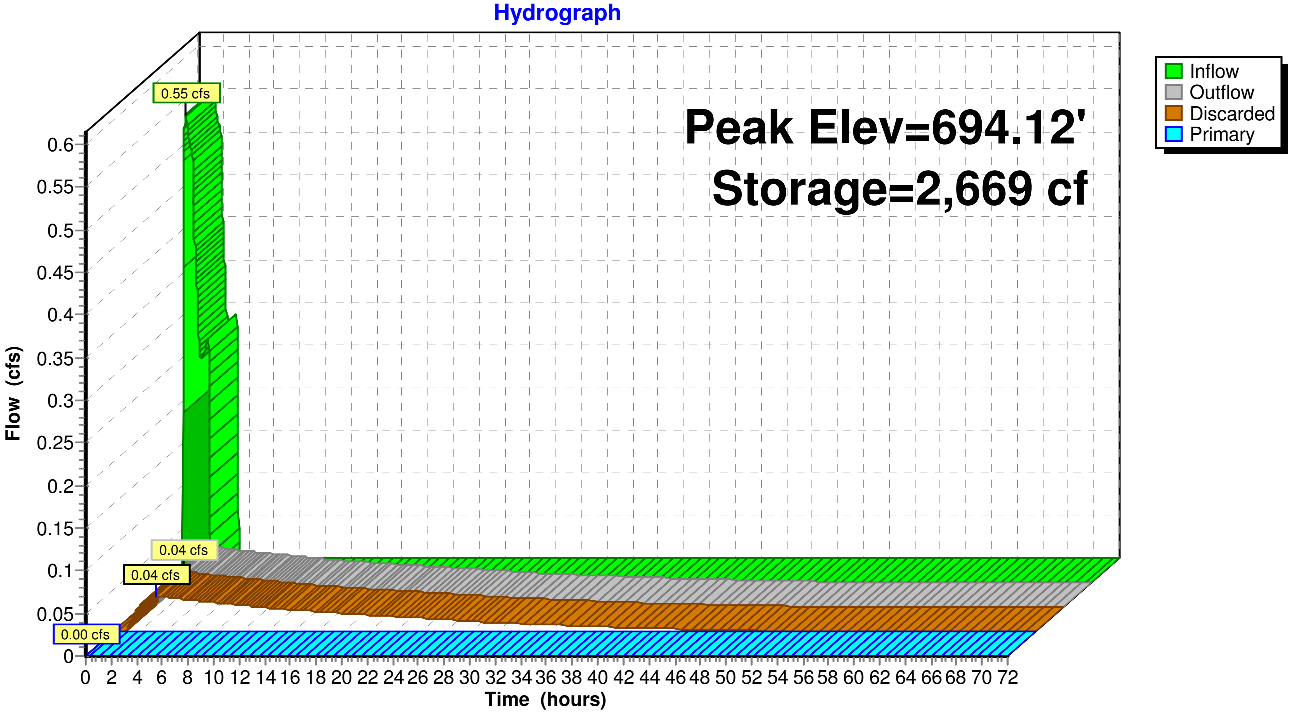
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.04 cfs @ 3.21 hrs HW=694.12' (Free Discharge)
└─**3=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=689.00' TW=686.49' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 709.60' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.38' @ 1.26 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.03" for 2 YR SDS event
Inflow = 4.27 cfs @ 1.26 hrs, Volume= 9,749 cf
Outflow = 4.27 cfs @ 1.26 hrs, Volume= 9,749 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.72 cfs @ 1.26 hrs, Volume= 6,863 cf
Secondary = 0.55 cfs @ 1.26 hrs, Volume= 2,886 cf

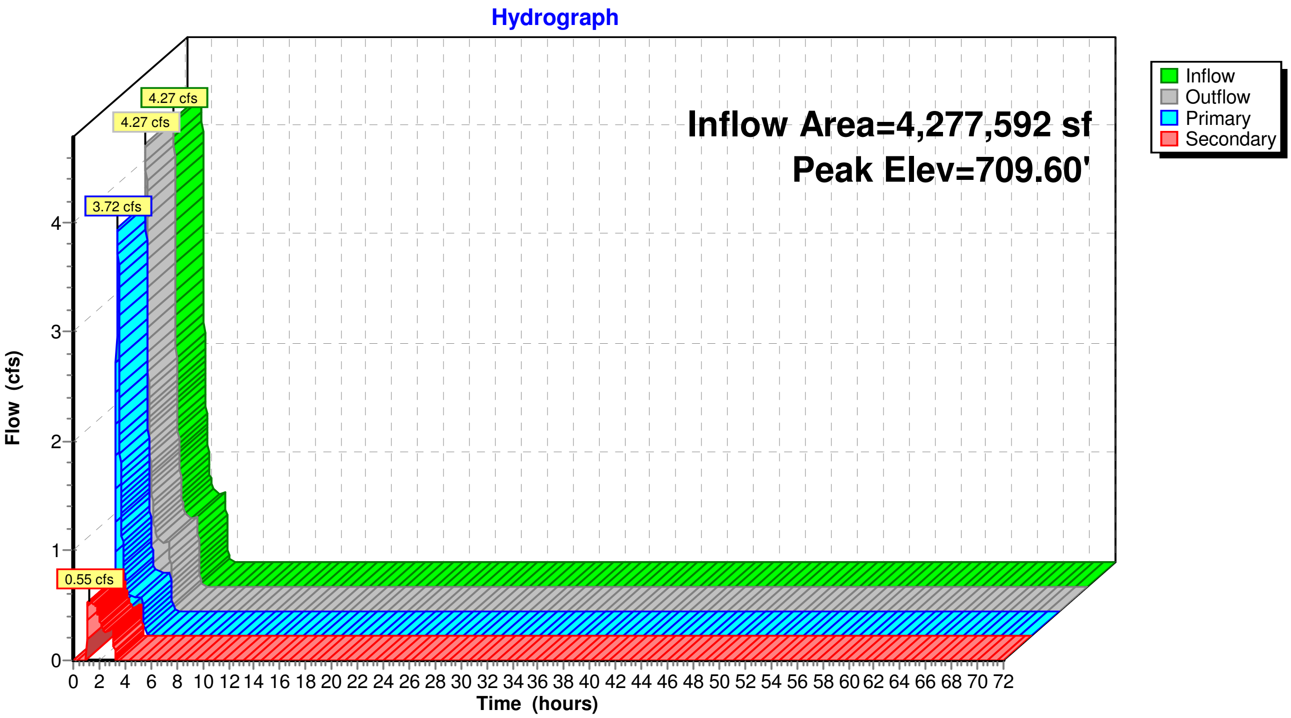
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.60' @ 1.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=3.72 cfs @ 1.26 hrs HW=709.60' TW=691.55' (Dynamic Tailwater)
└─**2=Culvert** (Passes 3.72 cfs of 22.15 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.55 cfs @ 6.34 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 3.16 cfs @ 1.76 fps)

Secondary OutFlow Max=0.55 cfs @ 1.26 hrs HW=709.60' TW=690.91' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.55 cfs @ 2.79 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 687.20' (Flood elevation advised)

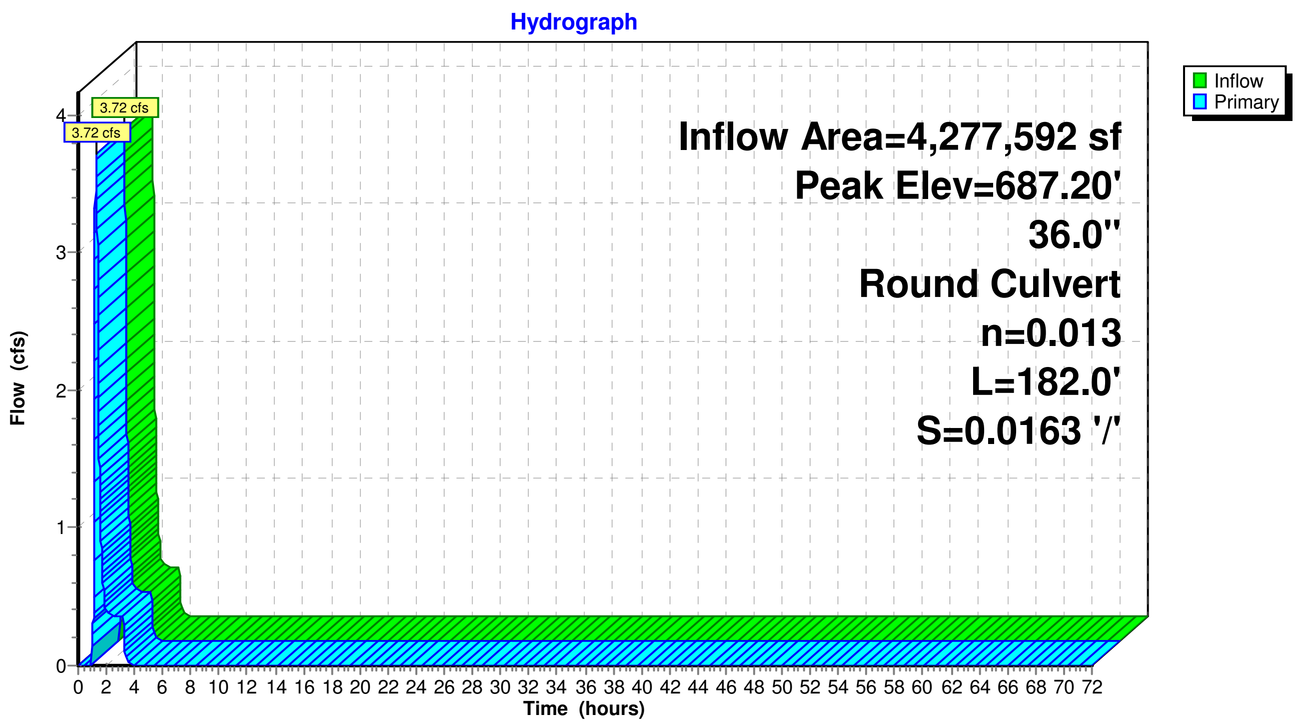
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.02"	for 2 YR SDS event
Inflow =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf	
Outflow =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf,	Atten= 0%, Lag= 0.0 min
Primary =	3.72 cfs @	1.26 hrs, Volume=	6,863 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 687.20' @ 1.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=3.72 cfs @ 1.26 hrs HW=687.20' TW=682.20' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.72 cfs @ 2.88 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 691.55' (Flood elevation advised)

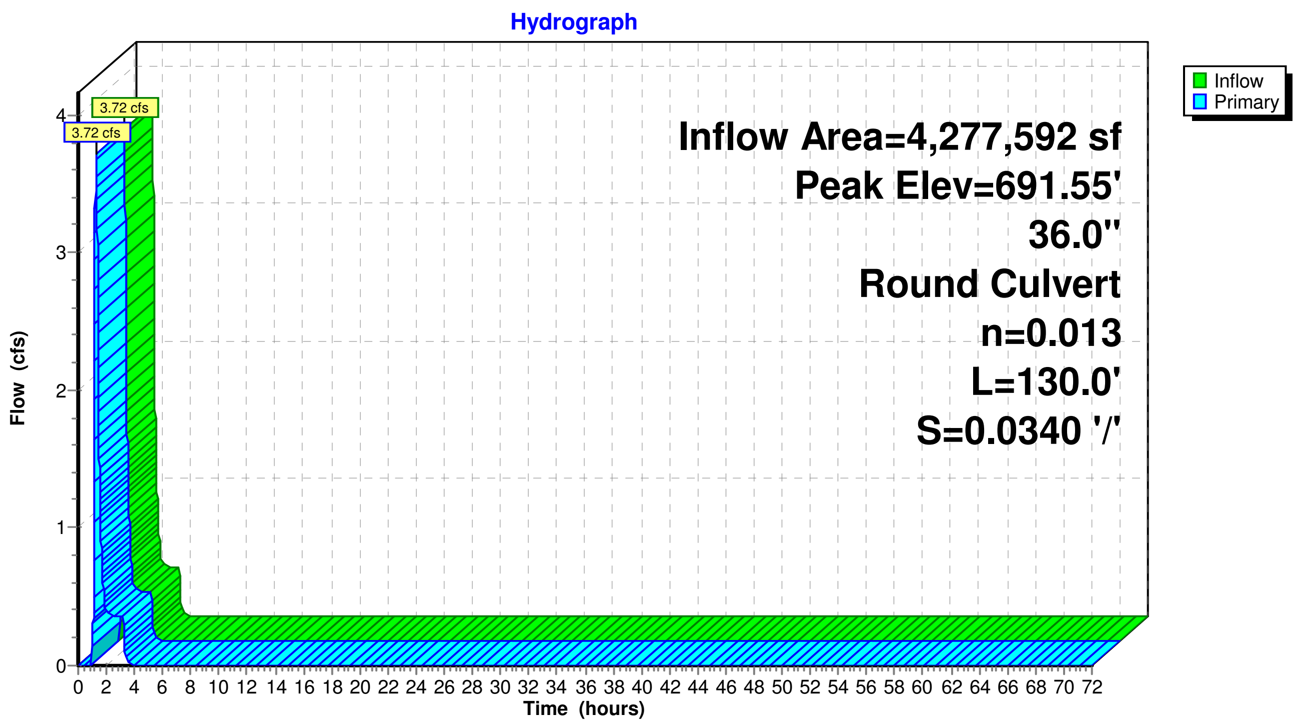
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.02"	for 2 YR SDS event	
Inflow =	3.72 cfs @	1.26 hrs,	Volume=	6,863 cf	
Outflow =	3.72 cfs @	1.26 hrs,	Volume=	6,863 cf,	Atten= 0%, Lag= 0.0 min
Primary =	3.72 cfs @	1.26 hrs,	Volume=	6,863 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 691.55' @ 1.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=3.72 cfs @ 1.26 hrs HW=691.55' TW=687.20' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.72 cfs @ 2.88 fps)

Pond 53P: Proposed MH



Summary for Pond 57P: Vortech 9000

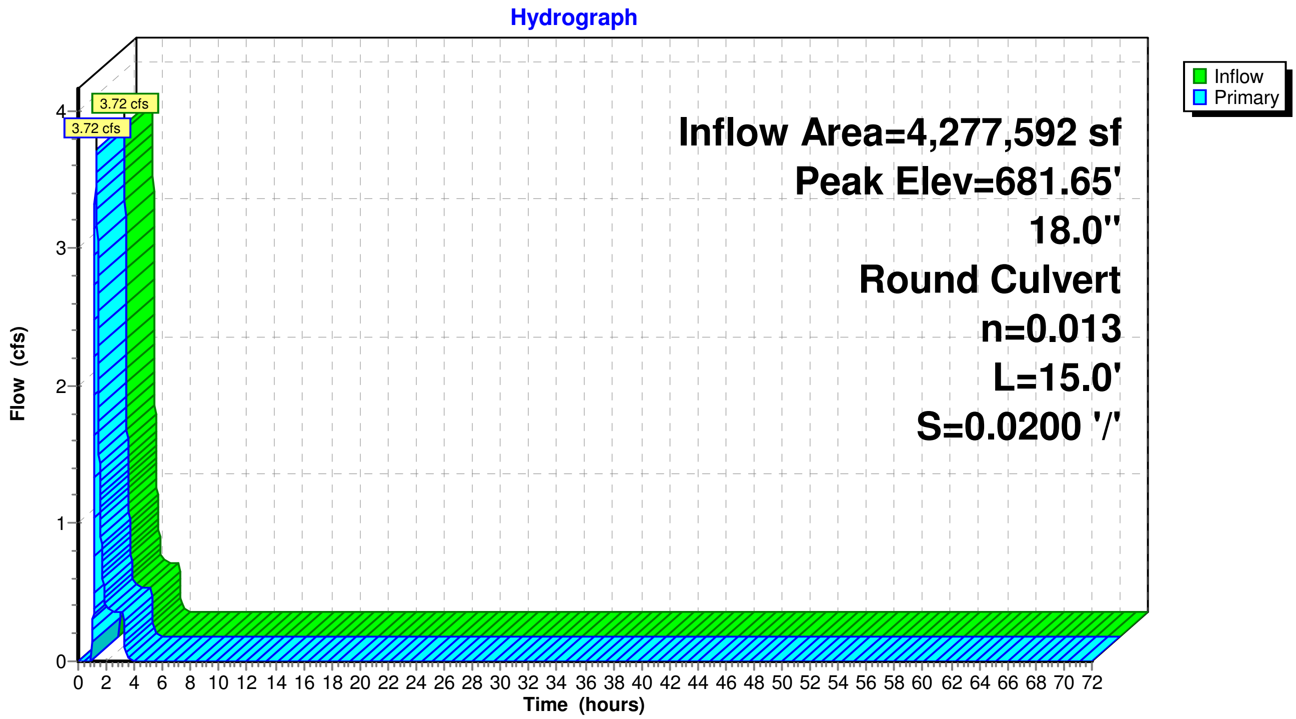
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.02" for 2 YR SDS event
Inflow = 3.72 cfs @ 1.26 hrs, Volume= 6,863 cf
Outflow = 3.72 cfs @ 1.26 hrs, Volume= 6,863 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.72 cfs @ 1.26 hrs, Volume= 6,863 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.65' @ 1.26 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.72 cfs @ 1.26 hrs HW=681.65' TW=680.27' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.72 cfs @ 4.42 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.40"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=7.15 cfs 143,084 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=0.67' Max Vel=6.12 fps Inflow=7.15 cfs 143,084 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=7.14 cfs 143,084 cf

Pond 31P: Bypass Structure Peak Elev=683.11' Inflow=6.57 cfs 136,474 cf
Primary=6.57 cfs 136,474 cf Secondary=0.00 cfs 0 cf Outflow=6.57 cfs 136,474 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.56' Storage=0.050 af Inflow=6.57 cfs 136,474 cf
Outflow=6.56 cfs 136,474 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.38' Storage=0.030 af Inflow=6.56 cfs 136,474 cf
Discarded=0.11 cfs 9,090 cf Primary=6.45 cfs 127,383 cf Outflow=6.56 cfs 136,474 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=683.04' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=0.00 cfs 0 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=672.73' Inflow=0.00 cfs 0 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=0.00 cfs 0 cf

Pond 42P: Flow Converge Structure Peak Elev=672.06' Inflow=6.45 cfs 127,383 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=6.45 cfs 127,383 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=671.53' Inflow=6.45 cfs 127,383 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=6.45 cfs 127,383 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,614 cf Inflow=0.57 cfs 32,234 cf
Discarded=0.05 cfs 6,581 cf Primary=0.48 cfs 25,624 cf Outflow=0.54 cfs 32,204 cf

Pond 51P: Flow Splitter Peak Elev=709.80' Inflow=7.14 cfs 143,084 cf
Primary=6.57 cfs 110,850 cf Secondary=0.57 cfs 32,234 cf Outflow=7.14 cfs 143,084 cf

Pond 52P: Existing MH to be replaced Peak Elev=687.45' Inflow=6.57 cfs 136,474 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=6.57 cfs 136,474 cf

Pond 53P: Proposed MH Peak Elev=691.80' Inflow=6.57 cfs 110,850 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=6.57 cfs 110,850 cf

Pond 57P: Vortech 9000 Peak Elev=682.16' Inflow=6.57 cfs 136,474 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=6.57 cfs 136,474 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 143,084 cf Average Runoff Depth = 0.40"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

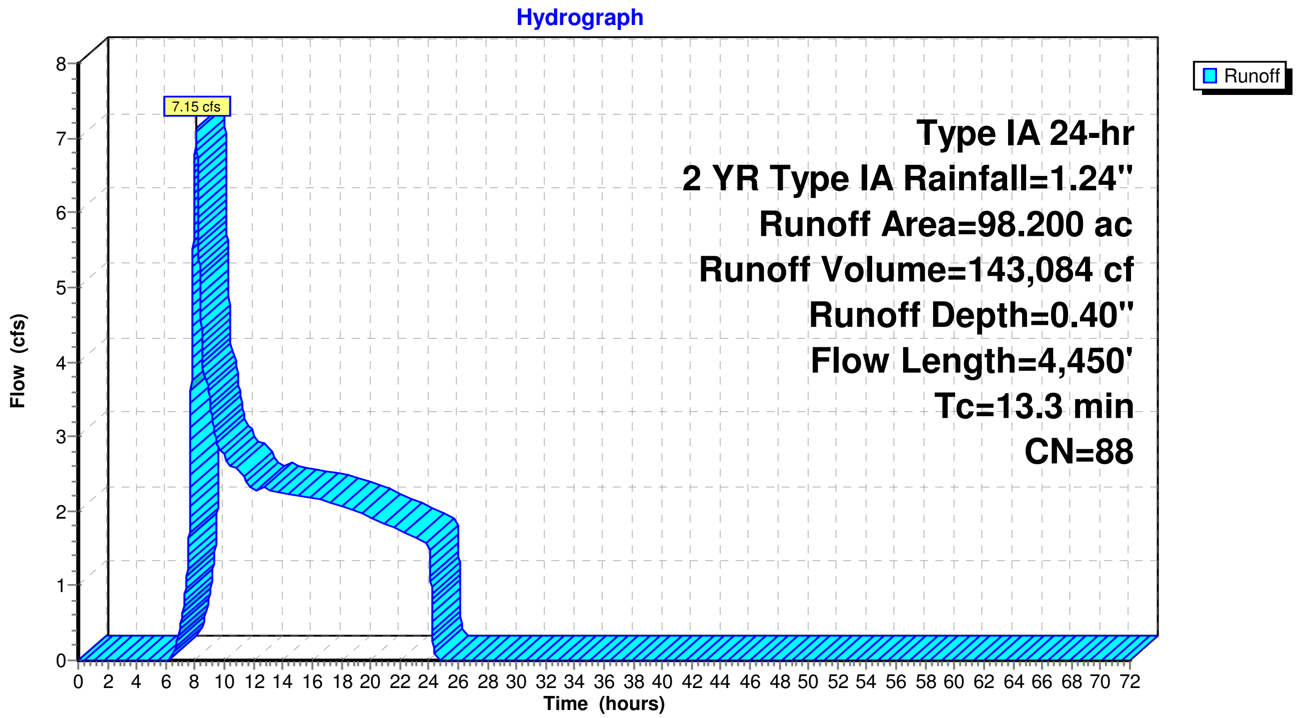
Runoff = 7.15 cfs @ 8.08 hrs, Volume= 143,084 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2 YR Type IA Rainfall=1.24"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

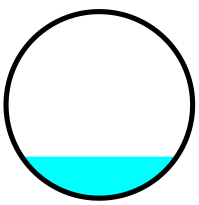
[52] Hint: Inlet/Outlet conditions not evaluated

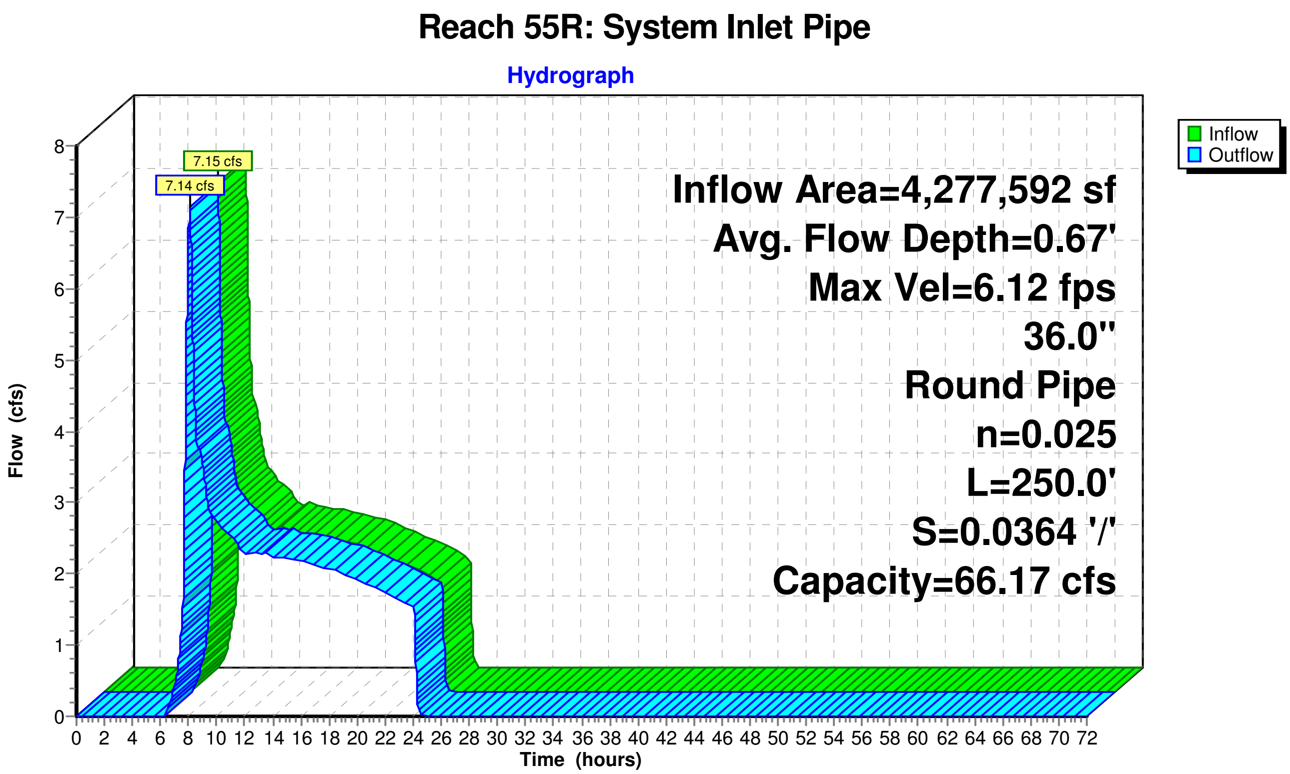
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.40" for 2 YR Type IA event
Inflow = 7.15 cfs @ 8.08 hrs, Volume= 143,084 cf
Outflow = 7.14 cfs @ 8.09 hrs, Volume= 143,084 cf, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 6.12 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 4.09 fps, Avg. Travel Time= 1.0 min

Peak Storage= 292 cf @ 8.09 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.38" for 2 YR Type IA event
Inflow = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf
Outflow = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

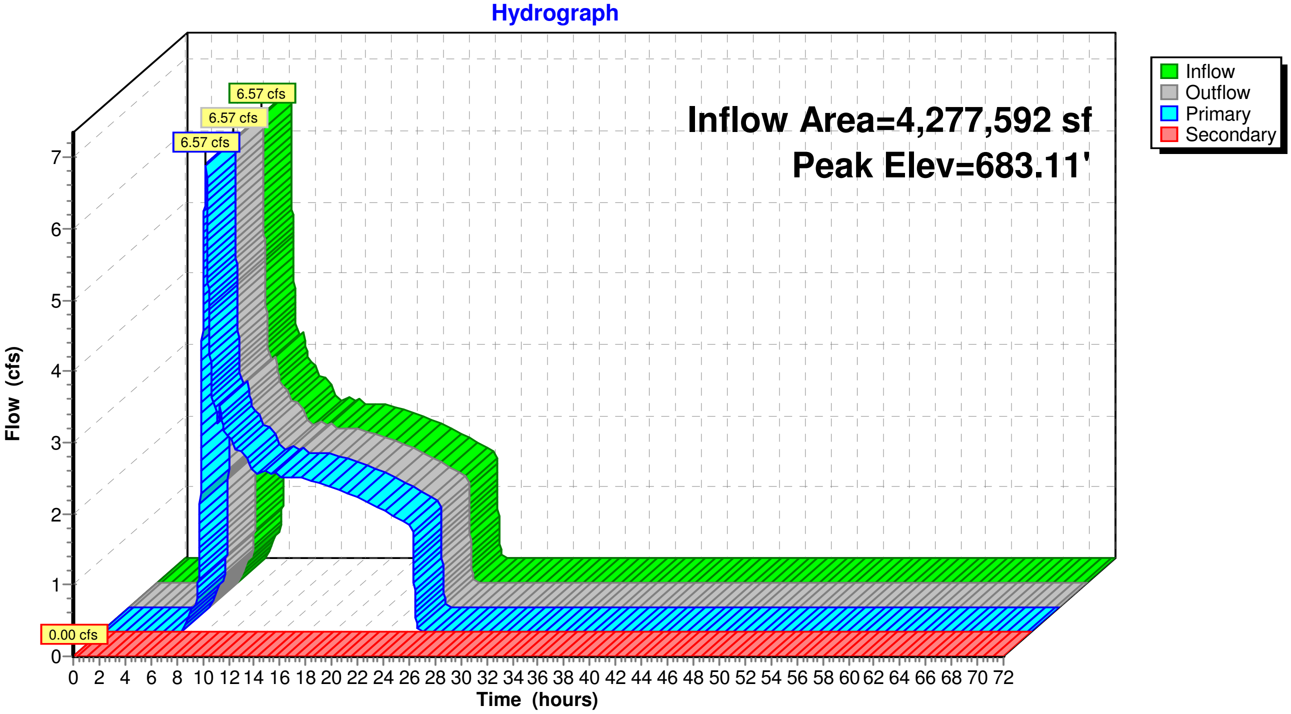
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.11' @ 8.09 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.56 cfs @ 8.09 hrs HW=683.11' TW=682.16' (Dynamic Tailwater)
└─**3=Culvert** (Passes 6.56 cfs of 8.31 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 6.56 cfs @ 4.70 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=681.17' TW=683.04' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.38" for 2 YR Type IA event
Inflow = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf
Outflow = 6.56 cfs @ 8.09 hrs, Volume= 136,474 cf, Atten= 0%, Lag= 0.4 min
Primary = 6.56 cfs @ 8.09 hrs, Volume= 136,474 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.56' @ 8.09 hrs Surf.Area= 0.008 ac Storage= 0.050 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

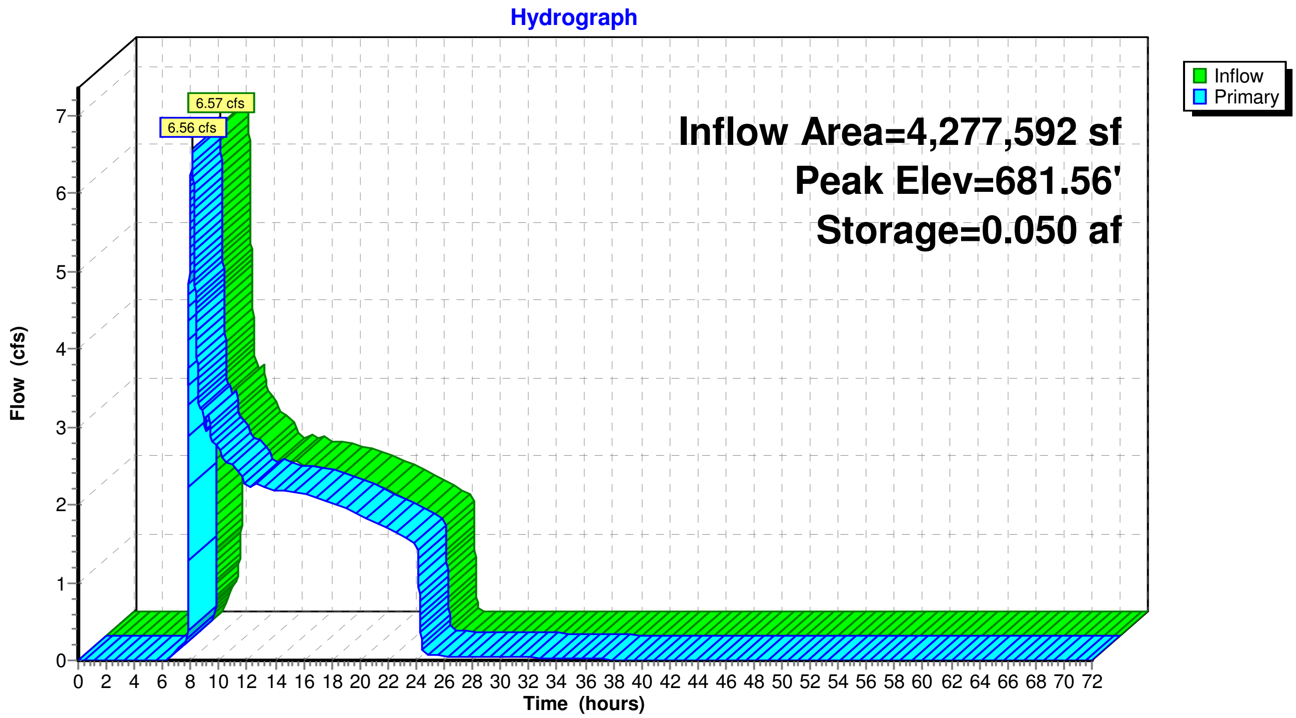
Plug-Flow detention time= 19.4 min calculated for 136,455 cf (100% of inflow)
Center-of-Mass det. time= 19.5 min (899.2 - 879.7)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.56 cfs @ 8.09 hrs HW=681.56' TW=681.38' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 6.56 cfs of 24.81 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.46 cfs @ 1.69 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 2.02 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.38" for 2 YR Type IA event
Inflow = 6.56 cfs @ 8.09 hrs, Volume= 136,474 cf
Outflow = 6.56 cfs @ 8.10 hrs, Volume= 136,474 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.11 cfs @ 8.10 hrs, Volume= 9,090 cf
Primary = 6.45 cfs @ 8.10 hrs, Volume= 127,383 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.38' @ 8.10 hrs Surf.Area= 0.011 ac Storage= 0.030 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 12.0 min calculated for 136,455 cf (100% of inflow)
Center-of-Mass det. time= 12.0 min (911.2 - 899.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 8.10 hrs HW=681.38' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=6.45 cfs @ 8.10 hrs HW=681.38' TW=672.06' (Dynamic Tailwater)
└─**1=Culvert** (Passes 6.45 cfs of 14.34 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 6.45 cfs @ 2.19 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

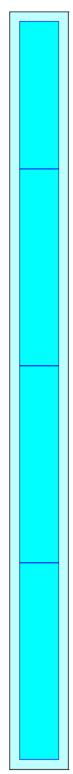
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

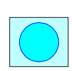
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

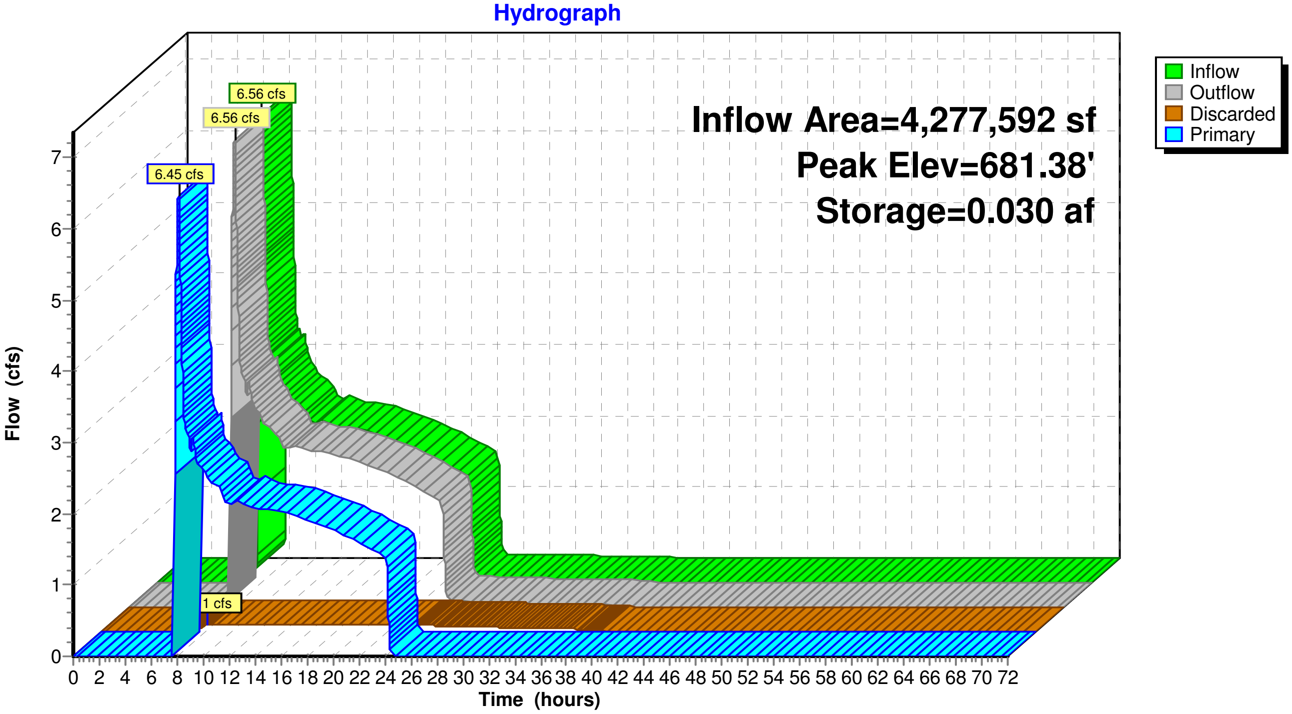
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

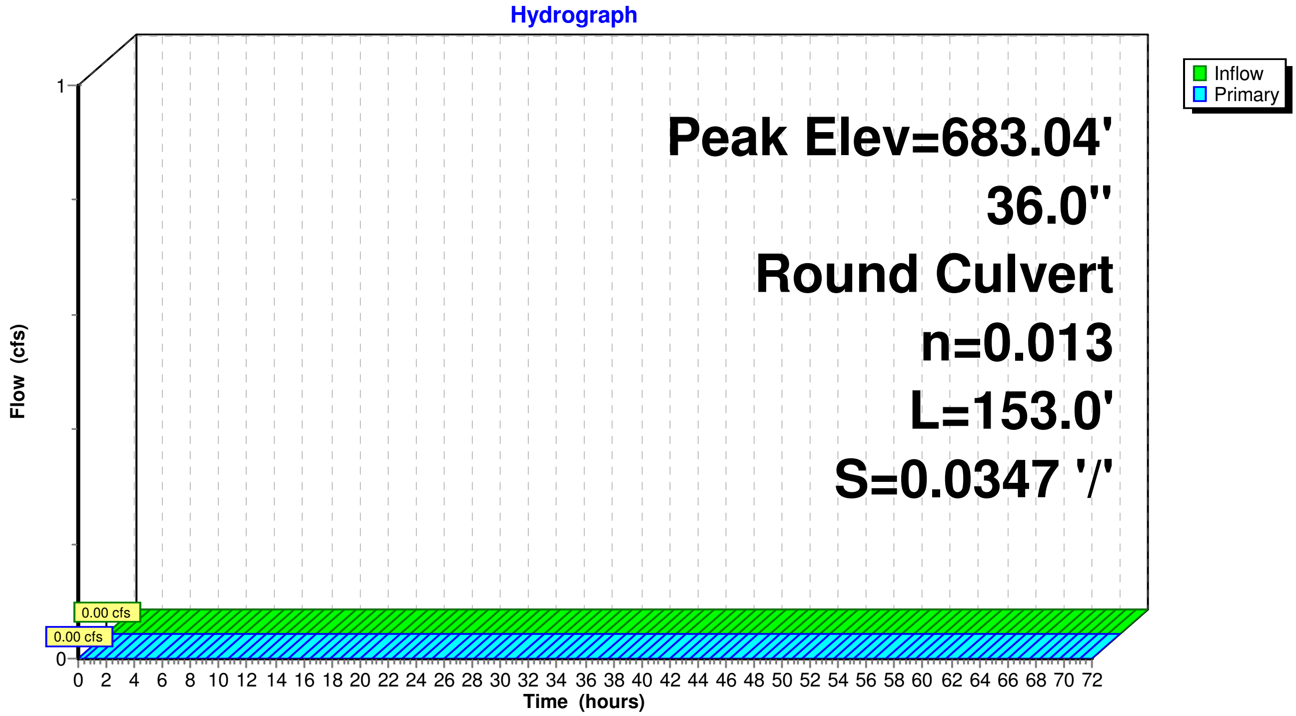
Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.04' @ 0.00 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=683.04' TW=672.73' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 39R: 36" Smooth PE Bypass Pipe



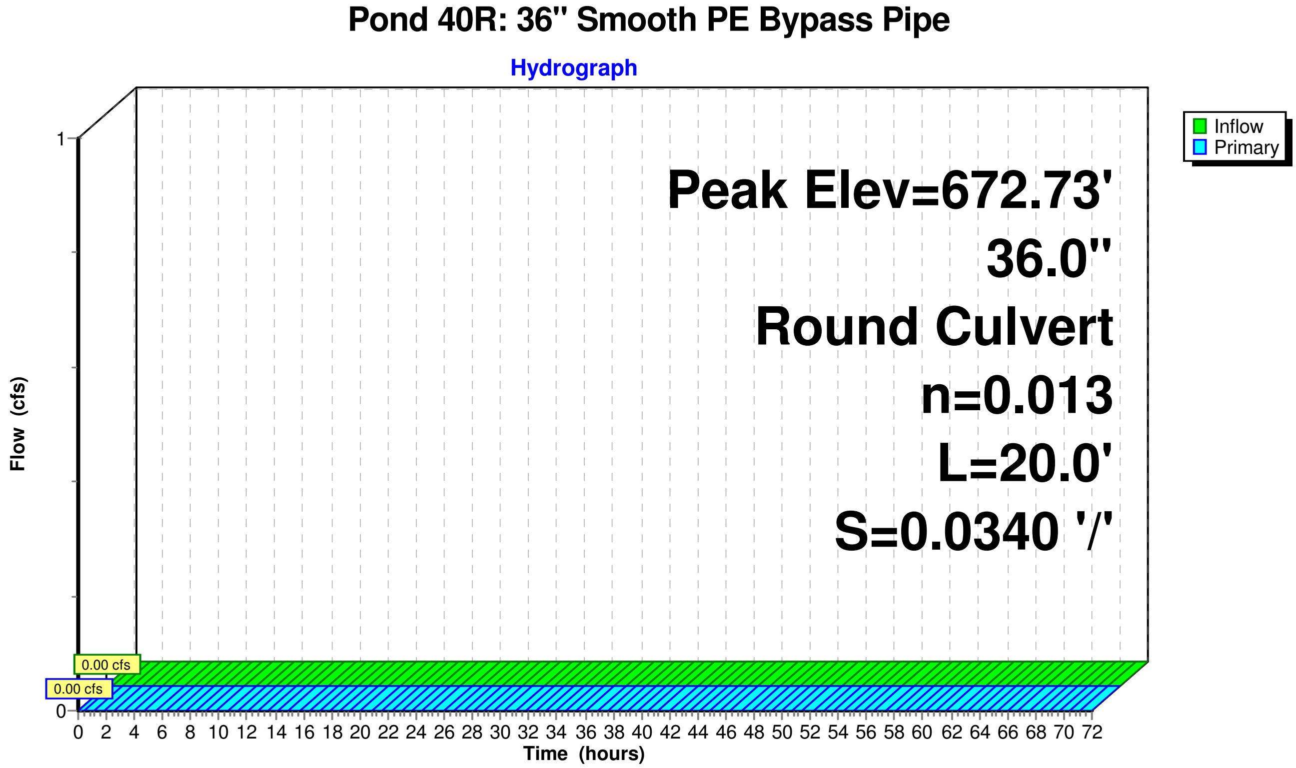
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.73' @ 0.00 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.73' TW=671.05' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)



Summary for Pond 42P: Flow Converge Structure

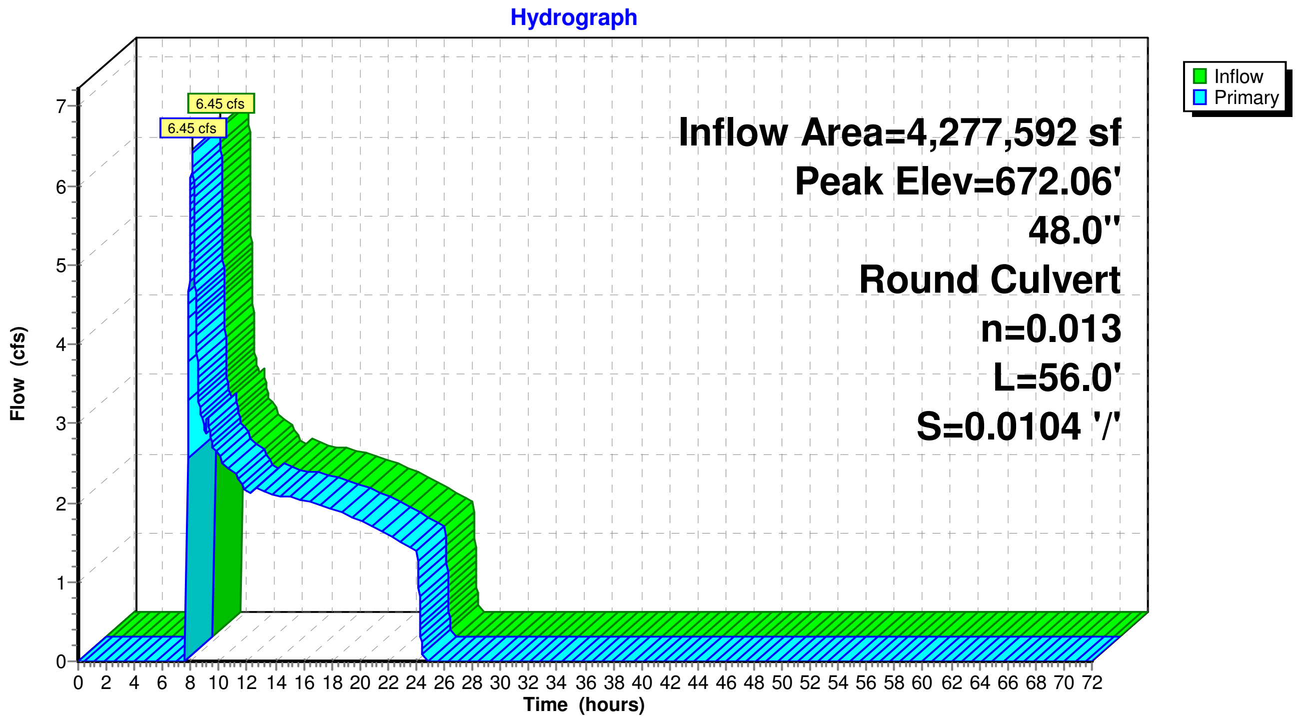
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.36"	for 2 YR Type IA event	
Inflow =	6.45 cfs @	8.10 hrs,	Volume=	127,383 cf	
Outflow =	6.45 cfs @	8.10 hrs,	Volume=	127,383 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.45 cfs @	8.10 hrs,	Volume=	127,383 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.06' @ 8.10 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=6.45 cfs @ 8.10 hrs HW=672.06' TW=671.53' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 6.45 cfs @ 3.88 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

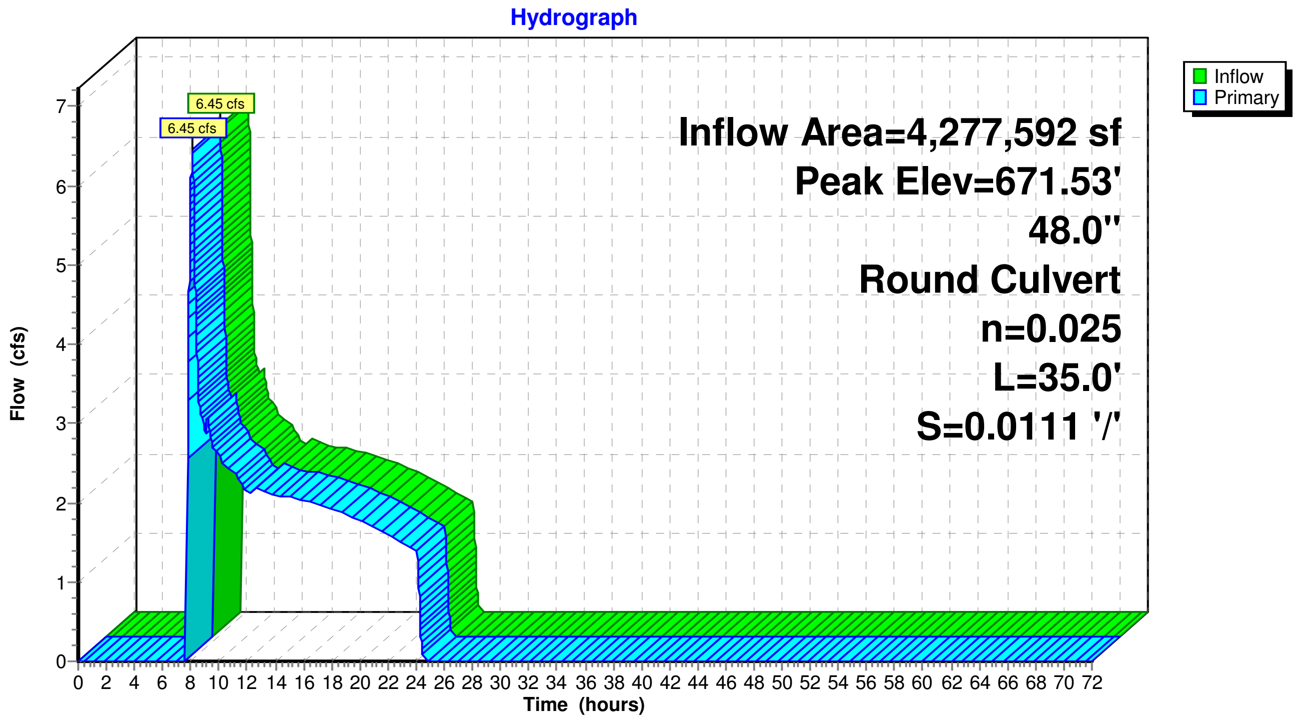
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.36" for 2 YR Type IA event
Inflow = 6.45 cfs @ 8.10 hrs, Volume= 127,383 cf
Outflow = 6.45 cfs @ 8.10 hrs, Volume= 127,383 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.45 cfs @ 8.10 hrs, Volume= 127,383 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 671.53' @ 8.10 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=6.45 cfs @ 8.10 hrs HW=671.53' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 6.45 cfs @ 3.63 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.57 cfs @	8.09 hrs, Volume=	32,234 cf
Outflow	=	0.54 cfs @	9.29 hrs, Volume=	32,204 cf, Atten= 7%, Lag= 72.3 min
Discarded	=	0.05 cfs @	9.29 hrs, Volume=	6,581 cf
Primary	=	0.48 cfs @	9.29 hrs, Volume=	25,624 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 9.29 hrs Surf.Area= 1,496 sf Storage= 3,614 cf

Plug-Flow detention time= 205.1 min calculated for 32,204 cf (100% of inflow)
Center-of-Mass det. time= 204.6 min (1,141.1 - 936.5)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

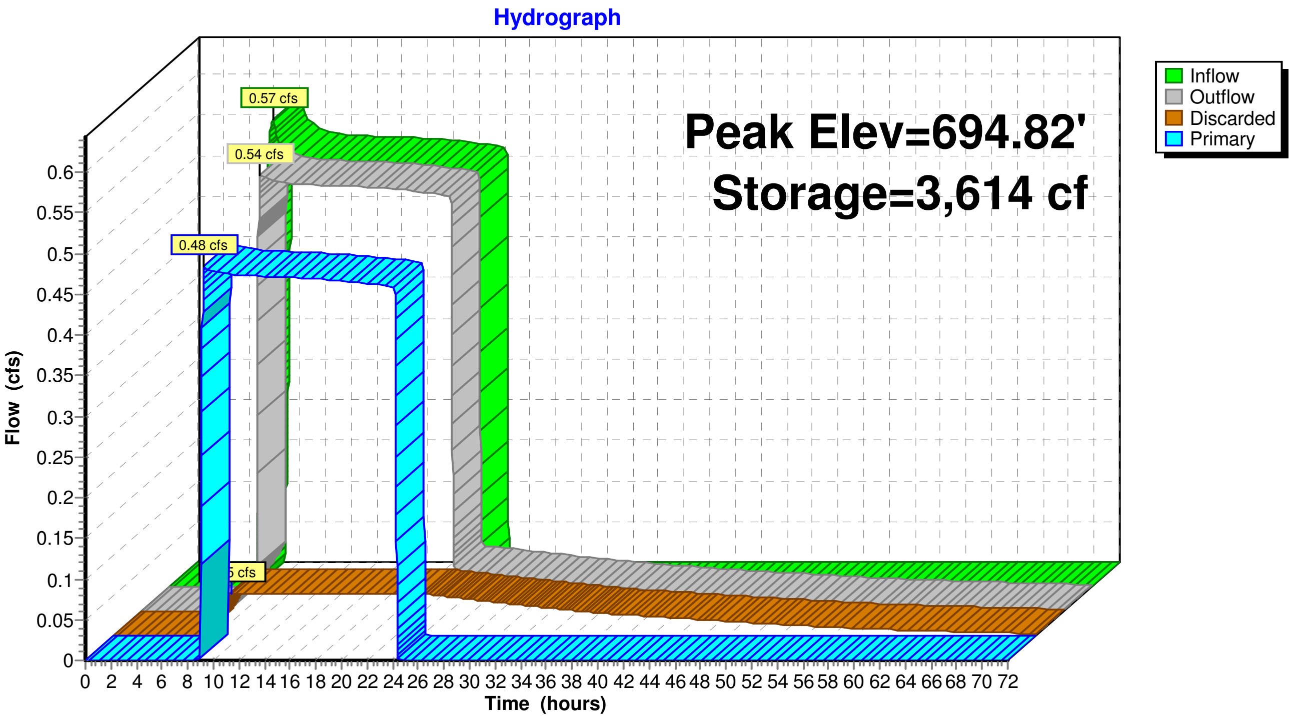
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 9.29 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.48 cfs @ 9.29 hrs HW=694.82' TW=687.13' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.48 cfs of 14.77 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.48 cfs @ 0.78 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 709.80' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.43' @ 8.09 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.40" for 2 YR Type IA event
Inflow = 7.14 cfs @ 8.09 hrs, Volume= 143,084 cf
Outflow = 7.14 cfs @ 8.09 hrs, Volume= 143,084 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 8.09 hrs, Volume= 110,850 cf
Secondary = 0.57 cfs @ 8.09 hrs, Volume= 32,234 cf

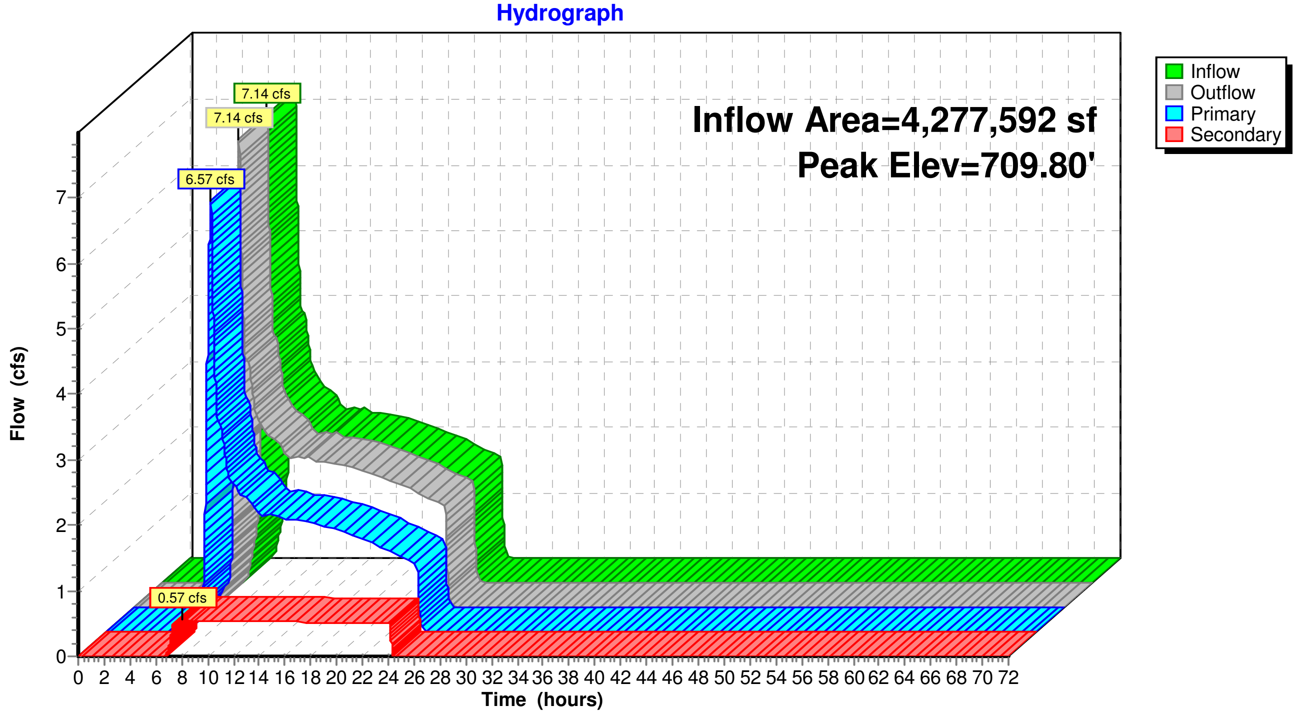
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.80' @ 8.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=6.57 cfs @ 8.09 hrs HW=709.80' TW=691.80' (Dynamic Tailwater)
└─**2=Culvert** (Passes 6.57 cfs of 26.08 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.58 cfs @ 6.69 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 5.98 cfs @ 2.22 fps)

Secondary OutFlow Max=0.57 cfs @ 8.09 hrs HW=709.80' TW=693.27' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.57 cfs @ 2.92 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 687.45' (Flood elevation advised)

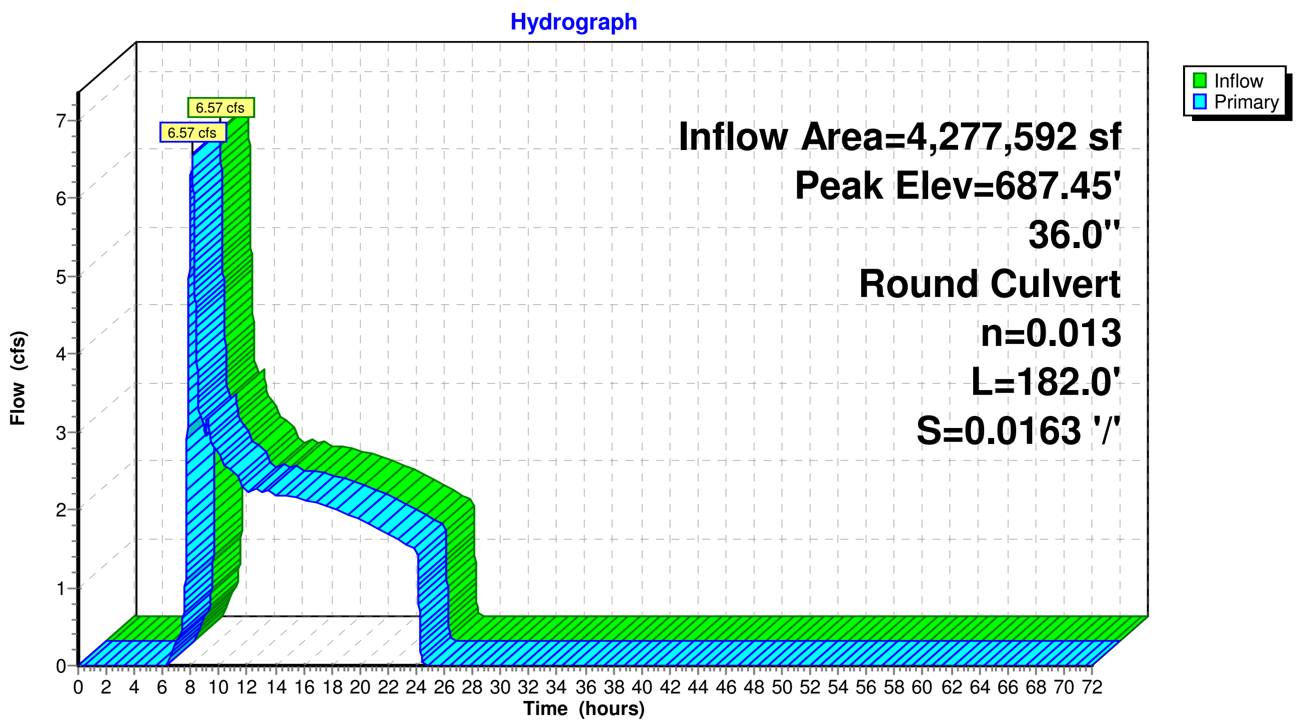
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.38"	for 2 YR Type IA event
Inflow =	6.57 cfs @	8.09 hrs, Volume=	136,474 cf	
Outflow =	6.57 cfs @	8.09 hrs, Volume=	136,474 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.57 cfs @	8.09 hrs, Volume=	136,474 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 687.45' @ 8.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=6.57 cfs @ 8.09 hrs HW=687.45' TW=683.11' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.57 cfs @ 3.34 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

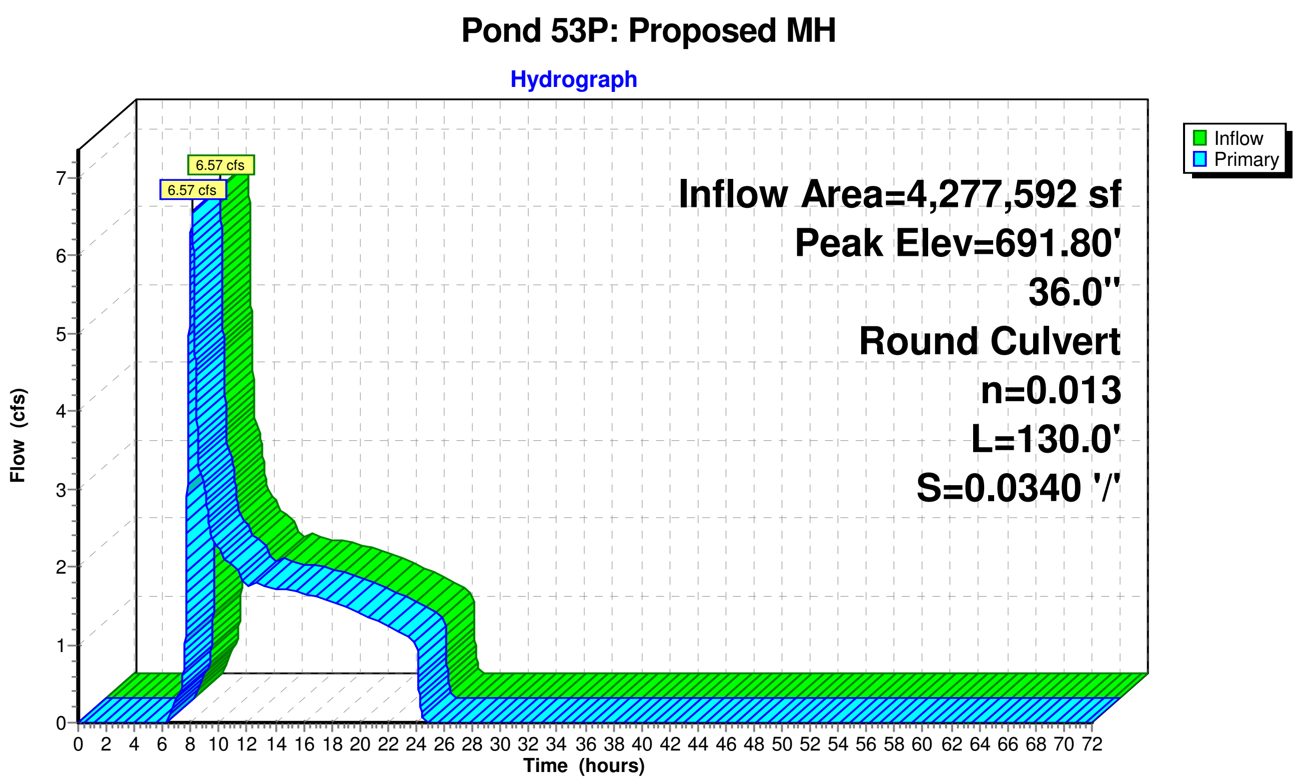
[57] Hint: Peaked at 691.80' (Flood elevation advised)

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.31"	for 2 YR Type IA event
Inflow =	6.57 cfs @	8.09 hrs, Volume=	110,850 cf	
Outflow =	6.57 cfs @	8.09 hrs, Volume=	110,850 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.57 cfs @	8.09 hrs, Volume=	110,850 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 691.80' @ 8.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=6.57 cfs @ 8.09 hrs HW=691.80' TW=687.45' (Dynamic Tailwater)
↑—1=Culvert (Inlet Controls 6.57 cfs @ 3.34 fps)



Summary for Pond 57P: Vortech 9000

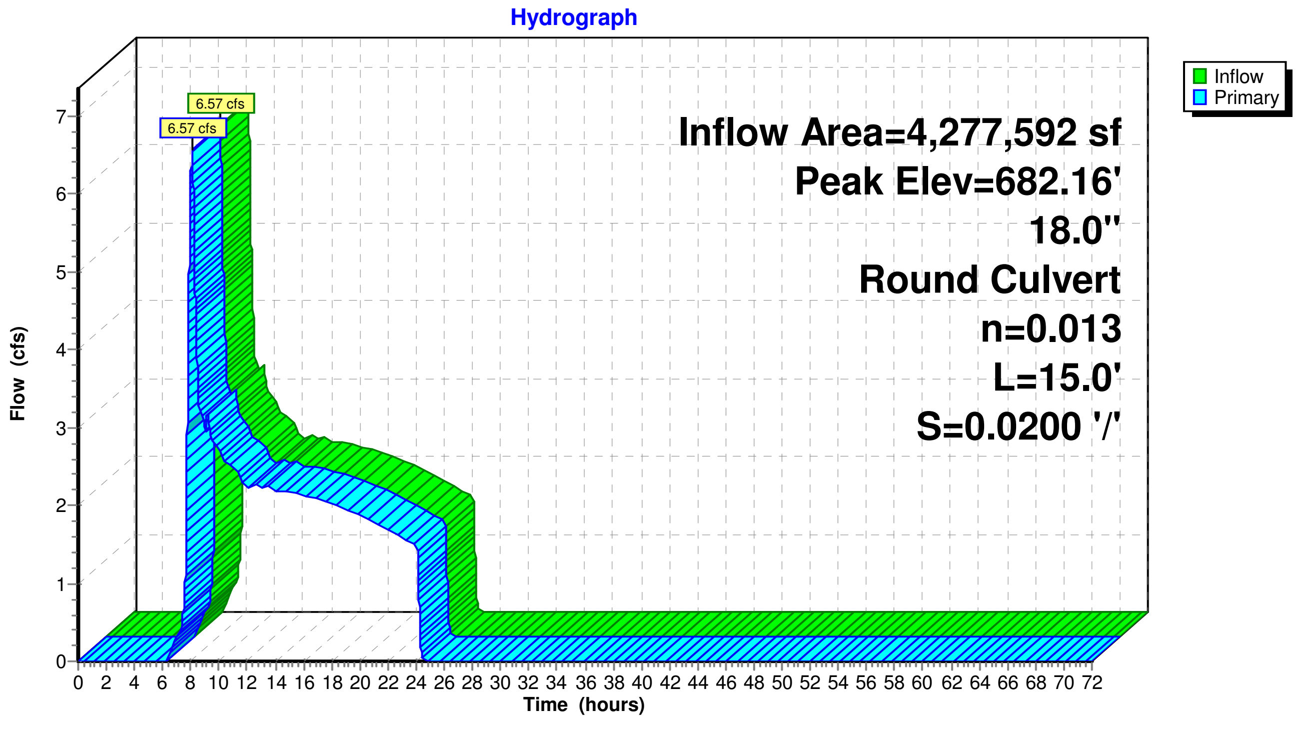
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.38" for 2 YR Type IA event
Inflow = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf
Outflow = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 8.09 hrs, Volume= 136,474 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 682.16' @ 8.09 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.57 cfs @ 8.09 hrs HW=682.16' TW=681.55' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.57 cfs @ 3.74 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.13"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=25.35 cfs 45,727 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=1.29' Max Vel=8.74 fps Inflow=25.35 cfs 45,727 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=25.31 cfs 45,727 cf

Pond 31P: Bypass Structure Peak Elev=685.25' Inflow=24.64 cfs 41,879 cf
Primary=9.86 cfs 29,106 cf Secondary=14.82 cfs 12,773 cf Outflow=24.64 cfs 41,879 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.77' Storage=0.052 af Inflow=9.86 cfs 29,106 cf
Outflow=10.15 cfs 29,106 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.55' Storage=0.031 af Inflow=10.15 cfs 29,106 cf
Discarded=0.11 cfs 3,831 cf Primary=9.76 cfs 25,276 cf Outflow=9.87 cfs 29,106 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=684.54' Inflow=14.82 cfs 12,773 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=14.82 cfs 12,773 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=674.25' Inflow=14.82 cfs 12,773 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=14.82 cfs 12,773 cf

Pond 42P: Flow Converge Structure Peak Elev=673.30' Inflow=24.54 cfs 38,049 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=24.54 cfs 38,049 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=672.63' Inflow=24.54 cfs 38,049 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=24.54 cfs 38,049 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,612 cf Inflow=0.67 cfs 4,519 cf
Discarded=0.05 cfs 3,848 cf Primary=0.47 cfs 670 cf Outflow=0.52 cfs 4,519 cf

Pond 51P: Flow Splitter Peak Elev=710.59' Inflow=25.31 cfs 45,727 cf
Primary=24.64 cfs 41,209 cf Secondary=0.67 cfs 4,519 cf Outflow=25.31 cfs 45,727 cf

Pond 52P: Existing MH to be replaced Peak Elev=688.52' Inflow=24.64 cfs 41,879 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=24.64 cfs 41,879 cf

Pond 53P: Proposed MH Peak Elev=692.87' Inflow=24.64 cfs 41,209 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=24.64 cfs 41,209 cf

Pond 57P: Vortech 9000 Peak Elev=683.11' Inflow=9.86 cfs 29,106 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=9.86 cfs 29,106 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 45,727 cf Average Runoff Depth = 0.13"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

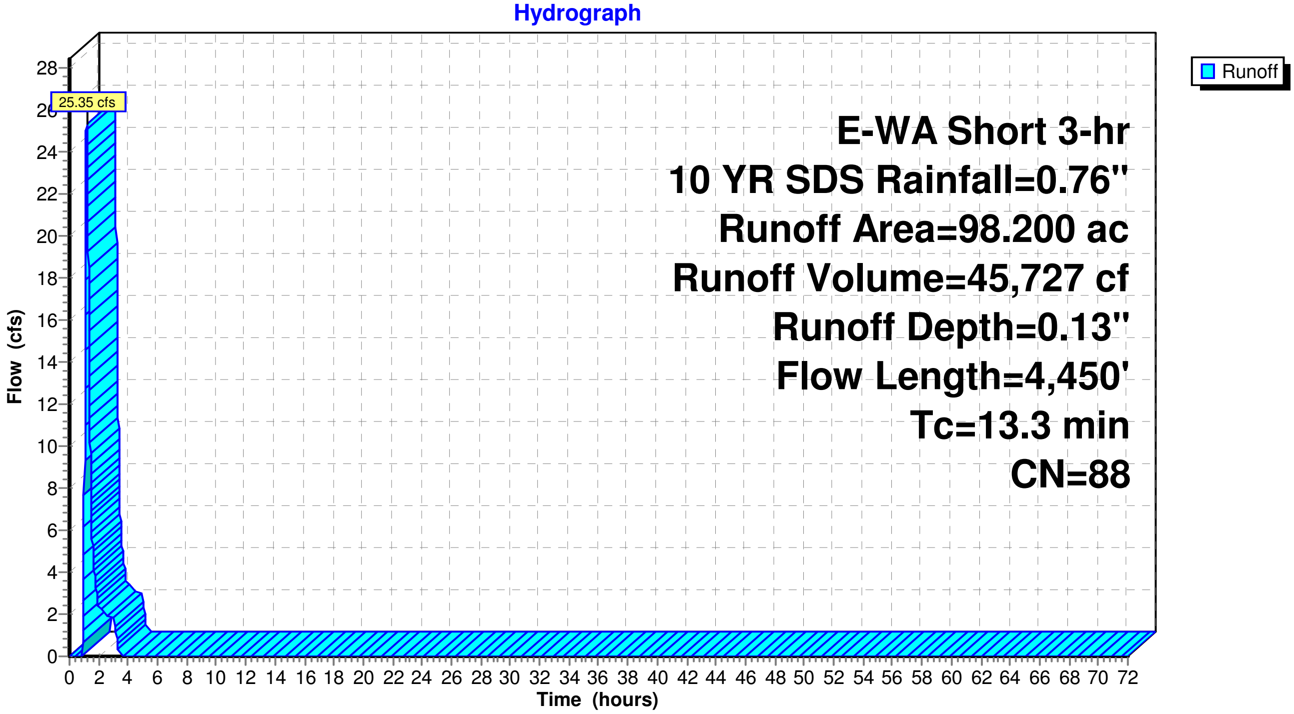
Runoff = 25.35 cfs @ 1.17 hrs, Volume= 45,727 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 10 YR SDS Rainfall=0.76"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

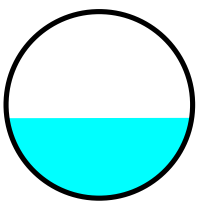
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.13" for 10 YR SDS event
Inflow = 25.35 cfs @ 1.17 hrs, Volume= 45,727 cf
Outflow = 25.31 cfs @ 1.18 hrs, Volume= 45,727 cf, Atten= 0%, Lag= 0.4 min

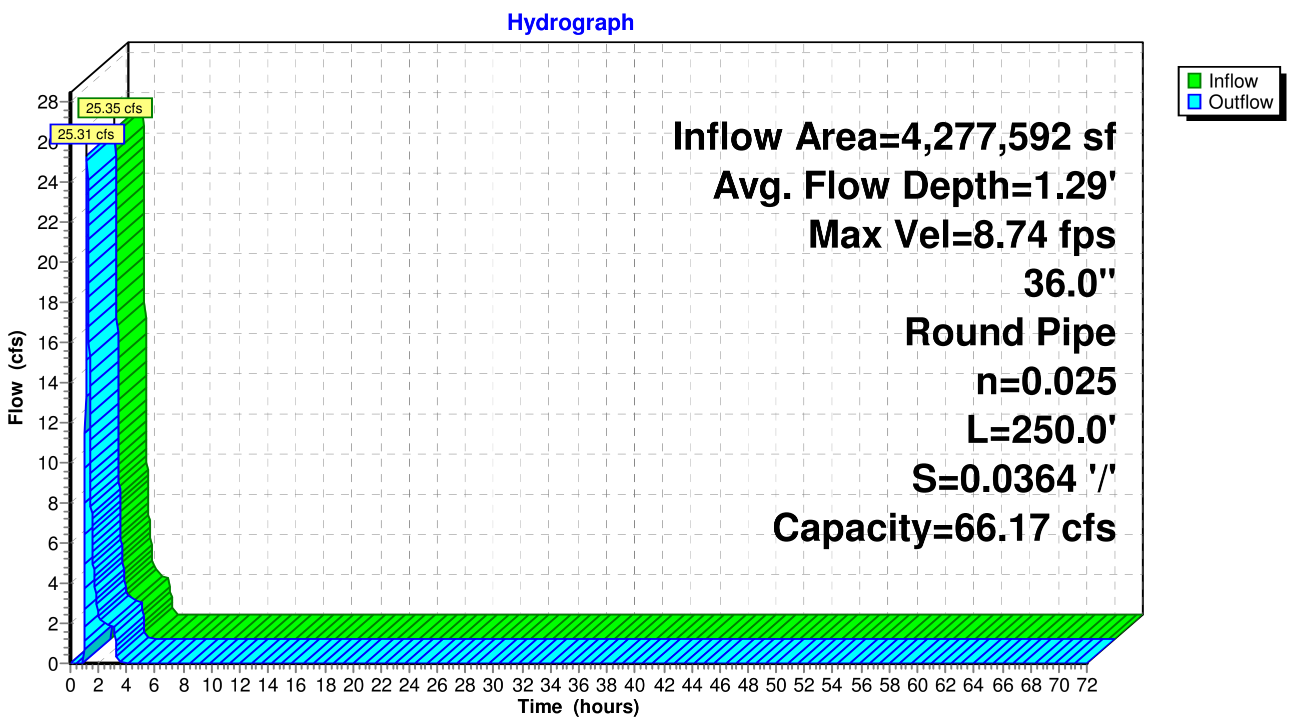
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 8.74 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 4.02 fps, Avg. Travel Time= 1.0 min

Peak Storage= 724 cf @ 1.18 hrs
Average Depth at Peak Storage= 1.29'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.12" for 10 YR SDS event
Inflow = 24.64 cfs @ 1.18 hrs, Volume= 41,879 cf
Outflow = 24.64 cfs @ 1.18 hrs, Volume= 41,879 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.86 cfs @ 1.18 hrs, Volume= 29,106 cf
Secondary = 14.82 cfs @ 1.17 hrs, Volume= 12,773 cf

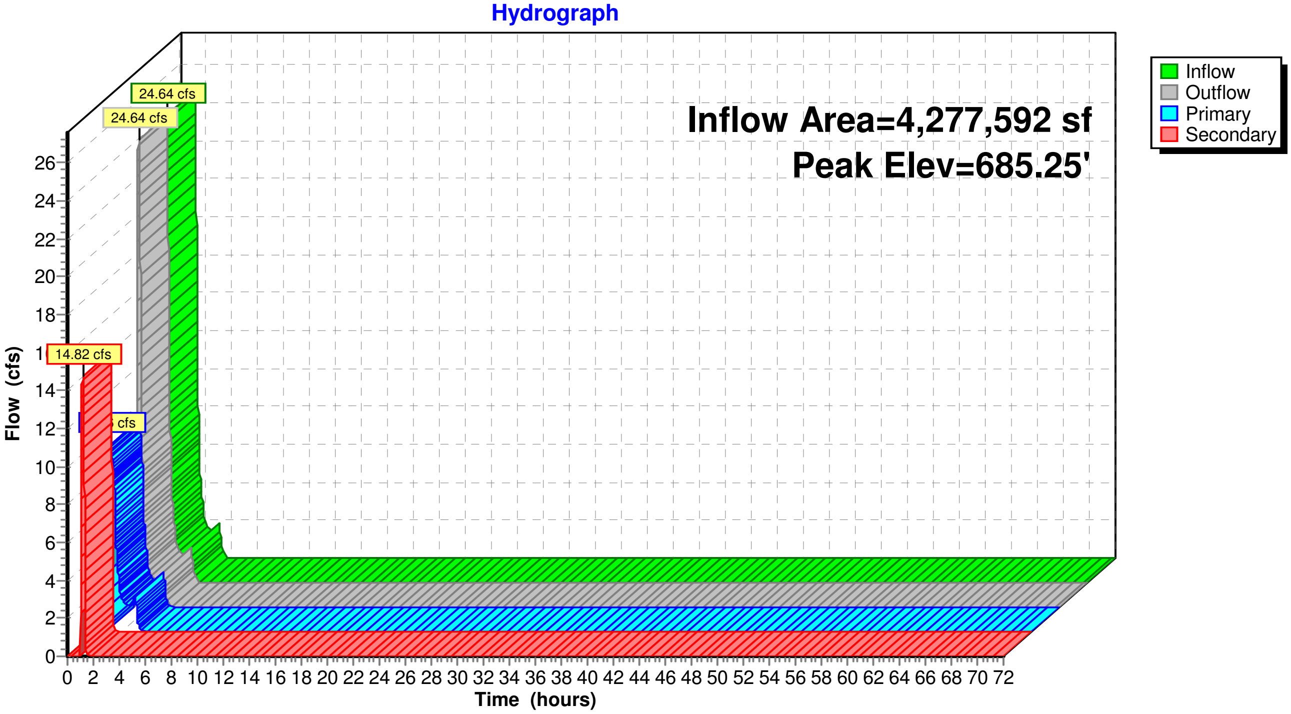
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.25' @ 1.17 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.84 cfs @ 1.18 hrs HW=685.25' TW=683.11' (Dynamic Tailwater)
└─**3=Culvert** (Passes 9.84 cfs of 12.46 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 9.84 cfs @ 7.05 fps)

Secondary OutFlow Max=14.78 cfs @ 1.17 hrs HW=685.25' TW=684.54' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 14.78 cfs @ 5.04 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.08" for 10 YR SDS event
Inflow = 9.86 cfs @ 1.18 hrs, Volume= 29,106 cf
Outflow = 10.15 cfs @ 1.13 hrs, Volume= 29,106 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.15 cfs @ 1.13 hrs, Volume= 29,106 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.77' @ 1.17 hrs Surf.Area= 0.002 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

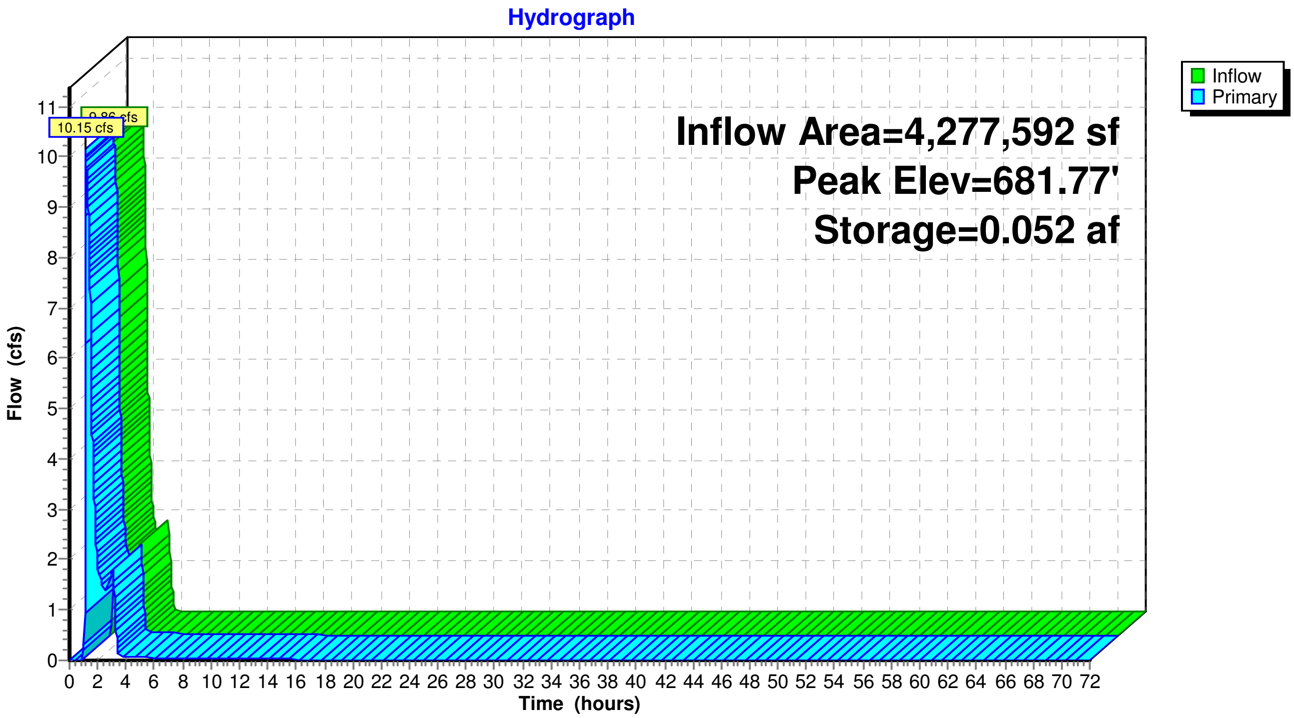
Plug-Flow detention time= 30.8 min calculated for 29,102 cf (100% of inflow)
Center-of-Mass det. time= 30.9 min (131.4 - 100.5)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=9.99 cfs @ 1.13 hrs HW=681.76' TW=681.52' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 9.99 cfs of 29.56 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.87 cfs @ 2.03 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 2.35 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.08" for 10 YR SDS event
Inflow = 10.15 cfs @ 1.13 hrs, Volume= 29,106 cf
Outflow = 9.87 cfs @ 1.18 hrs, Volume= 29,106 cf, Atten= 3%, Lag= 2.9 min
Discarded = 0.11 cfs @ 1.18 hrs, Volume= 3,831 cf
Primary = 9.76 cfs @ 1.18 hrs, Volume= 25,276 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.55' @ 1.18 hrs Surf.Area= 0.011 ac Storage= 0.031 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 20.6 min calculated for 29,102 cf (100% of inflow)
Center-of-Mass det. time= 20.6 min (152.0 - 131.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 1.18 hrs HW=681.55' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=9.76 cfs @ 1.18 hrs HW=681.55' TW=673.30' (Dynamic Tailwater)
└─**1=Culvert** (Passes 9.76 cfs of 14.75 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 9.76 cfs @ 2.58 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

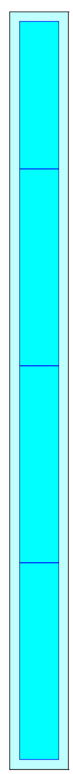
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

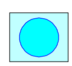
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

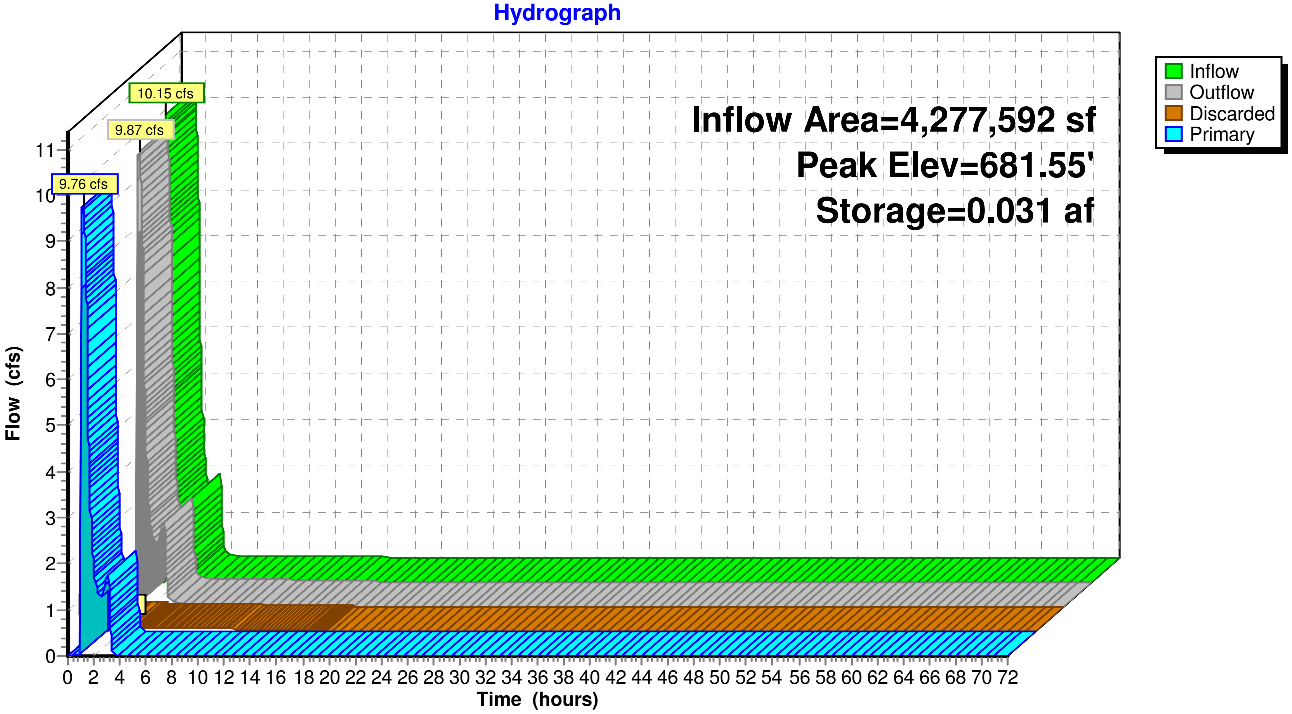
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

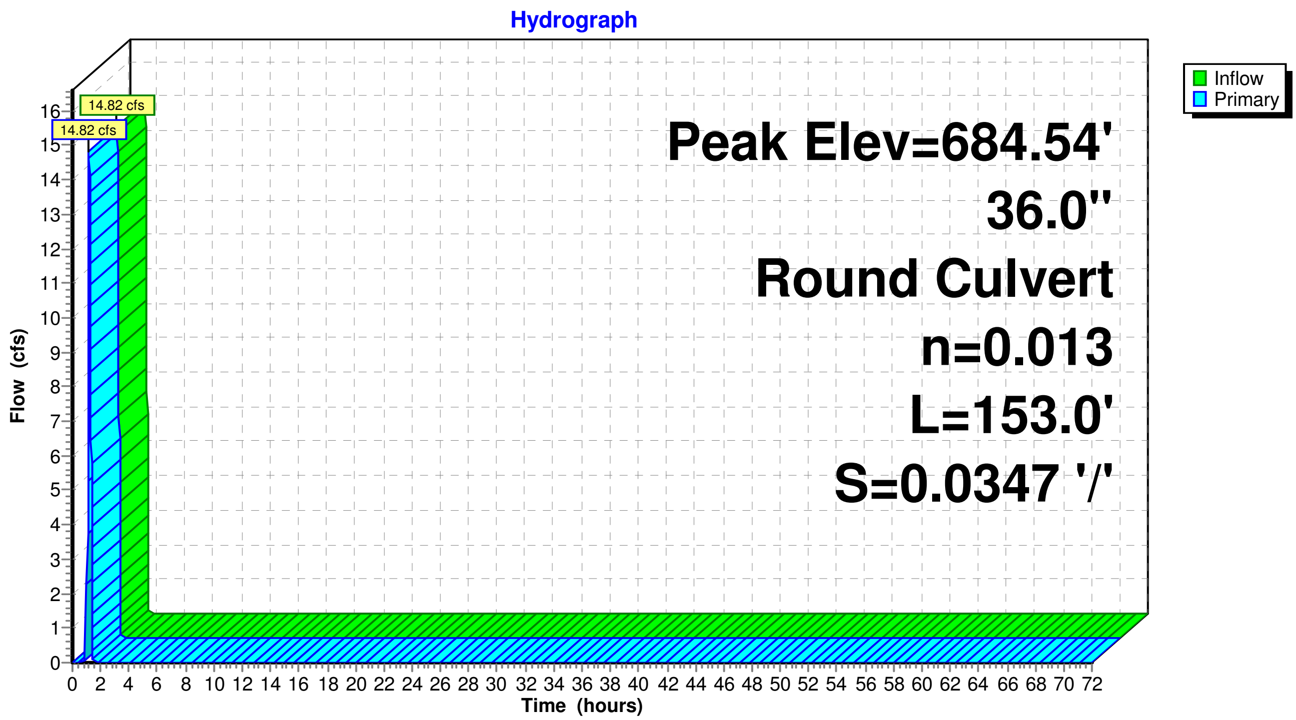
Inflow	=	14.82 cfs @	1.17 hrs, Volume=	12,773 cf
Outflow	=	14.82 cfs @	1.17 hrs, Volume=	12,773 cf, Atten= 0%, Lag= 0.0 min
Primary	=	14.82 cfs @	1.17 hrs, Volume=	12,773 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.54' @ 1.17 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=14.79 cfs @ 1.17 hrs HW=684.54' TW=674.25' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 14.79 cfs @ 4.17 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

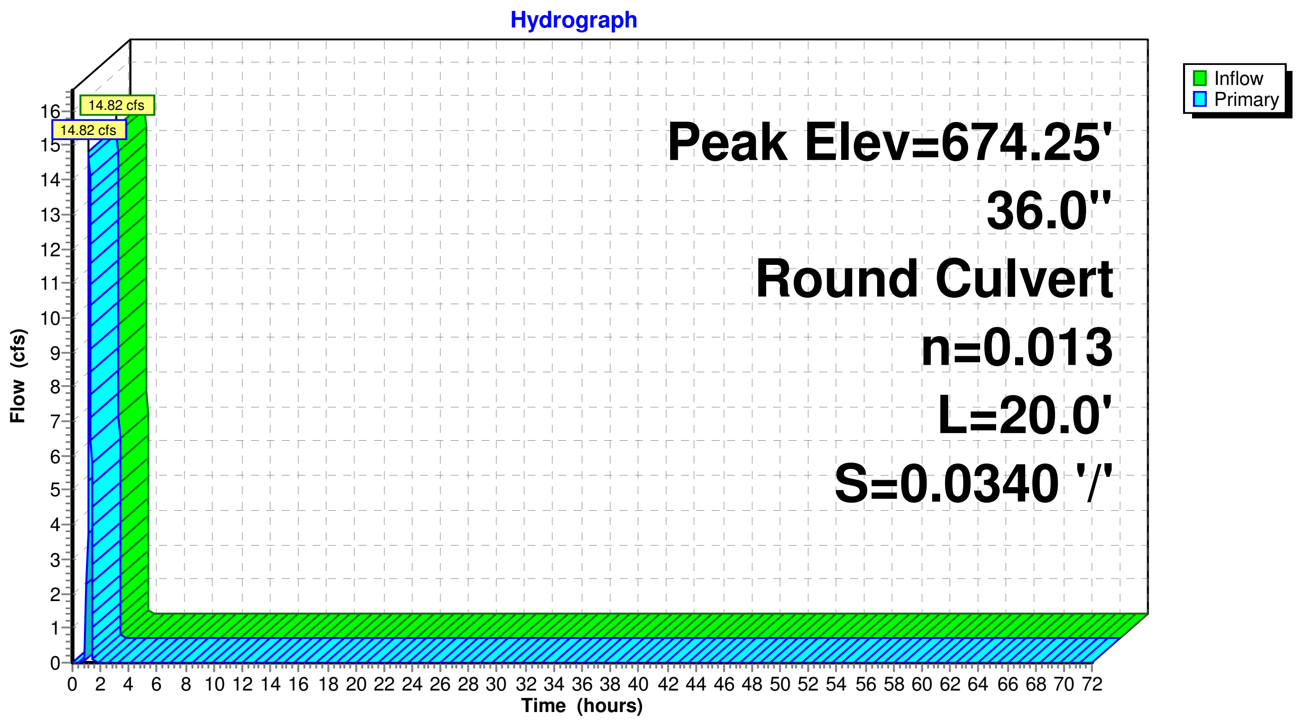
Inflow	=	14.82 cfs @	1.17 hrs,	Volume=	12,773 cf
Outflow	=	14.82 cfs @	1.17 hrs,	Volume=	12,773 cf, Atten= 0%, Lag= 0.0 min
Primary	=	14.82 cfs @	1.17 hrs,	Volume=	12,773 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.25' @ 1.18 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=14.79 cfs @ 1.17 hrs HW=674.25' TW=673.30' (Dynamic Tailwater)
1=Culvert (Outlet Controls 14.79 cfs @ 6.01 fps)

Pond 40R: 36" Smooth PE Bypass Pipe



Summary for Pond 42P: Flow Converge Structure

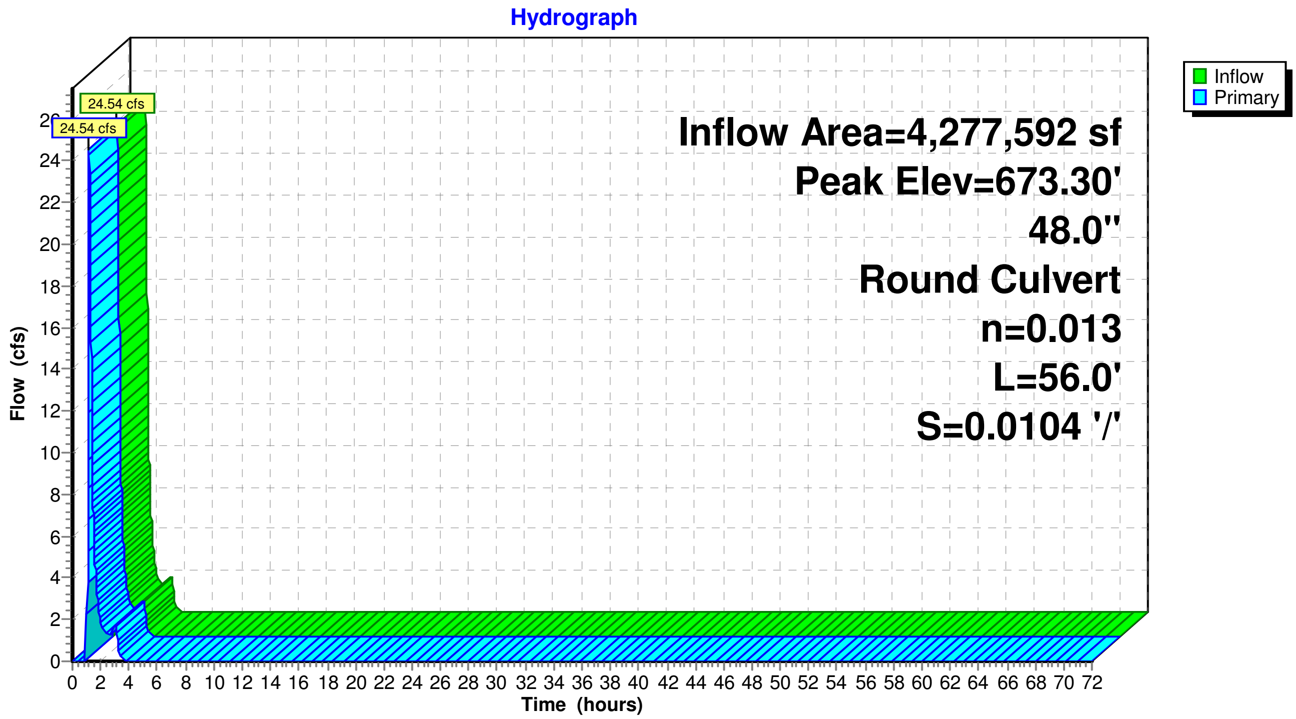
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.11" for 10 YR SDS event
Inflow = 24.54 cfs @ 1.18 hrs, Volume= 38,049 cf
Outflow = 24.54 cfs @ 1.18 hrs, Volume= 38,049 cf, Atten= 0%, Lag= 0.0 min
Primary = 24.54 cfs @ 1.18 hrs, Volume= 38,049 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.30' @ 1.18 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=24.52 cfs @ 1.18 hrs HW=673.30' TW=672.63' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 24.52 cfs @ 4.86 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

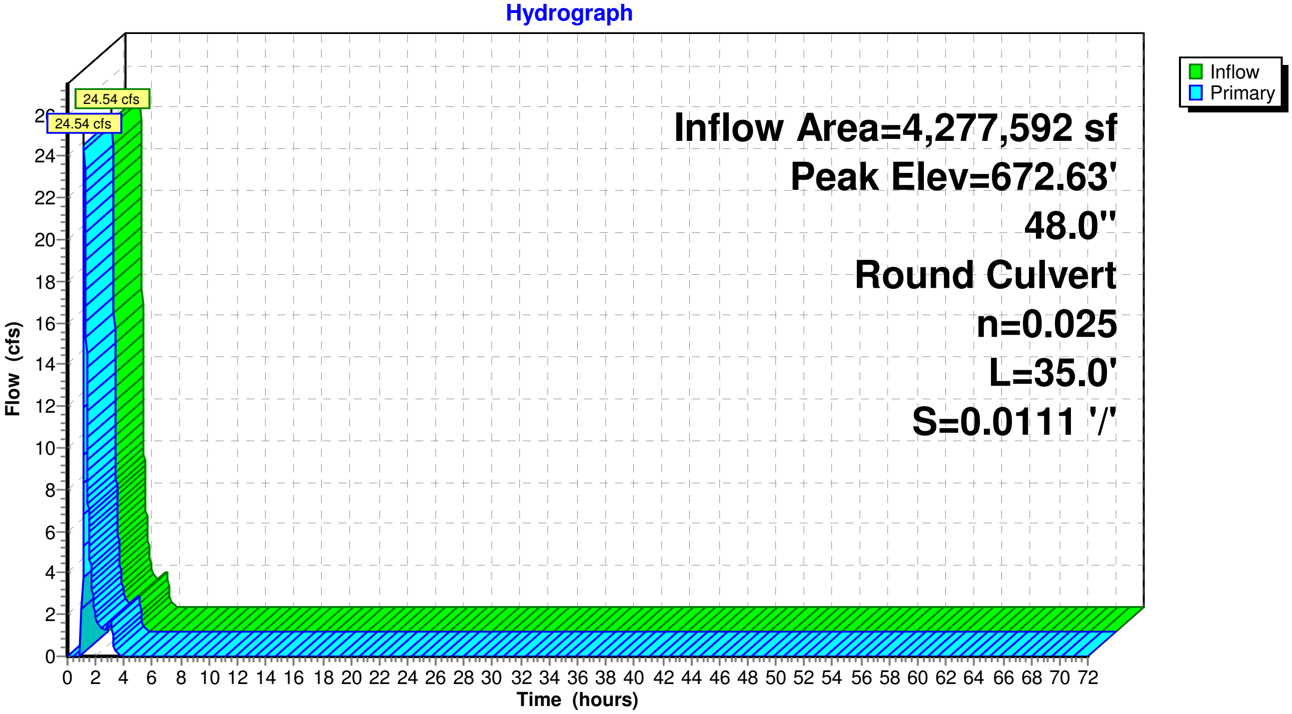
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.11"	for 10 YR SDS event	
Inflow =	24.54 cfs @	1.18 hrs,	Volume=	38,049 cf	
Outflow =	24.54 cfs @	1.18 hrs,	Volume=	38,049 cf,	Atten= 0%, Lag= 0.0 min
Primary =	24.54 cfs @	1.18 hrs,	Volume=	38,049 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.63' @ 1.18 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=24.52 cfs @ 1.18 hrs HW=672.63' (Free Discharge)
└─**1=Culvert** (Barrel Controls 24.52 cfs @ 5.13 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.67 cfs @	1.18 hrs,	Volume=	4,519 cf
Outflow	=	0.52 cfs @	3.08 hrs,	Volume=	4,519 cf, Atten= 22%, Lag= 114.0 min
Discarded	=	0.05 cfs @	3.08 hrs,	Volume=	3,848 cf
Primary	=	0.47 cfs @	3.08 hrs,	Volume=	670 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 3.08 hrs Surf.Area= 1,495 sf Storage= 3,612 cf

Plug-Flow detention time= 773.9 min calculated for 4,518 cf (100% of inflow)
Center-of-Mass det. time= 774.3 min (898.0 - 123.8)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

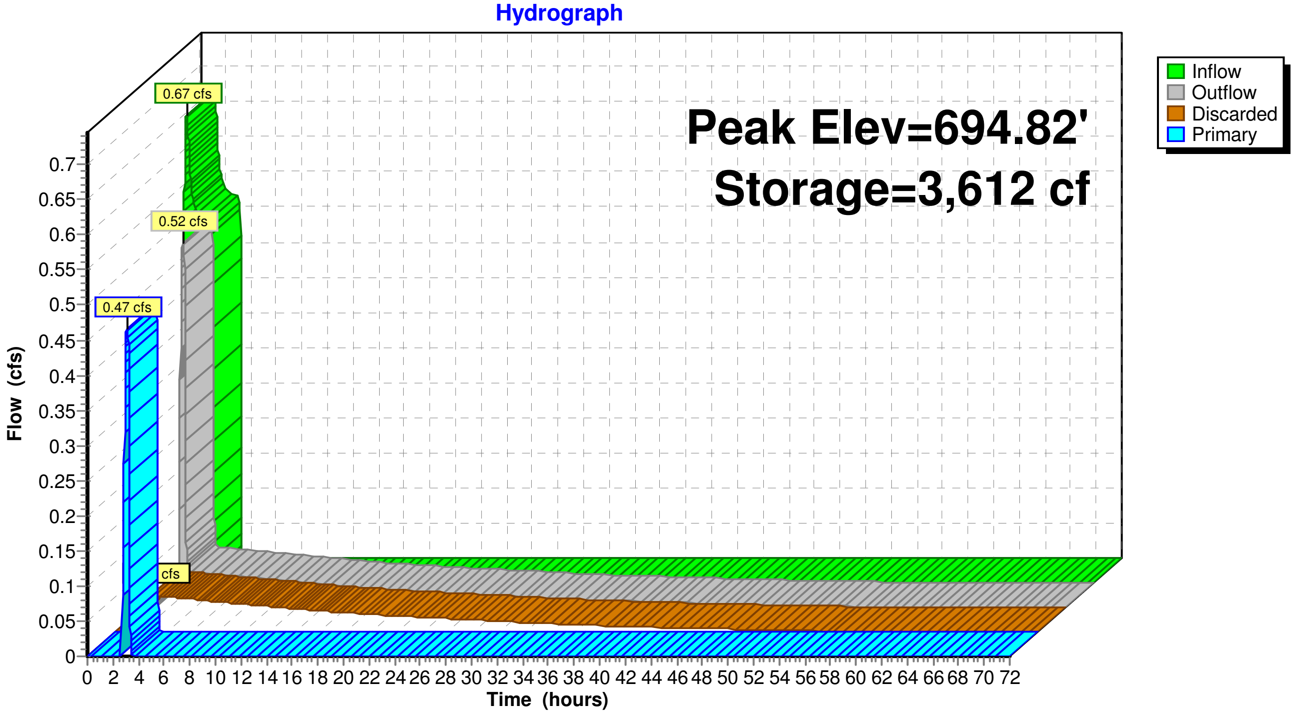
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 3.08 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.47 cfs @ 3.08 hrs HW=694.82' TW=686.98' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.47 cfs of 14.77 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.47 cfs @ 0.77 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 710.59' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.60' @ 1.18 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.13" for 10 YR SDS event
Inflow = 25.31 cfs @ 1.18 hrs, Volume= 45,727 cf
Outflow = 25.31 cfs @ 1.18 hrs, Volume= 45,727 cf, Atten= 0%, Lag= 0.0 min
Primary = 24.64 cfs @ 1.18 hrs, Volume= 41,209 cf
Secondary = 0.67 cfs @ 1.18 hrs, Volume= 4,519 cf

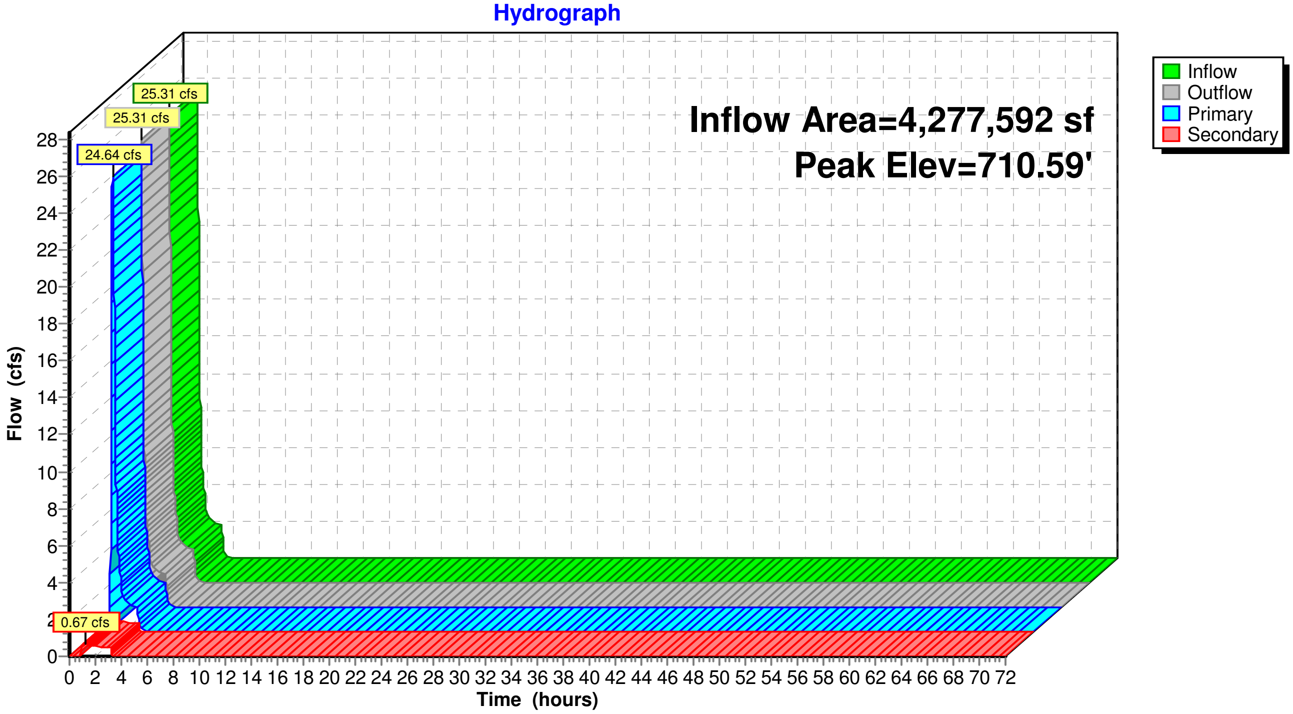
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.59' @ 1.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=24.63 cfs @ 1.18 hrs HW=710.59' TW=692.87' (Dynamic Tailwater)
└─**2=Culvert** (Passes 24.63 cfs of 40.43 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.69 cfs @ 7.95 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 23.93 cfs @ 3.83 fps)

Secondary OutFlow Max=0.67 cfs @ 1.18 hrs HW=710.59' TW=691.24' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.67 cfs @ 3.39 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 688.52' (Flood elevation advised)

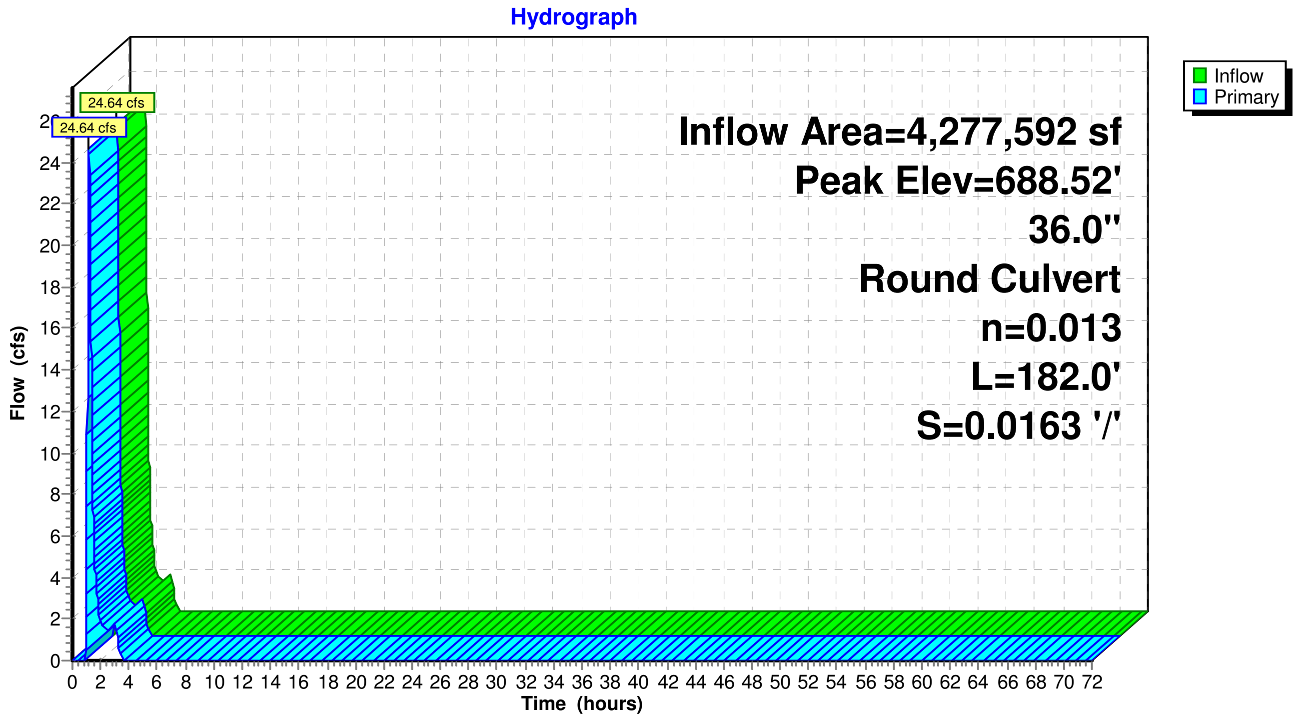
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.12"	for 10 YR SDS event
Inflow =	24.64 cfs @	1.18 hrs, Volume=	41,879 cf	
Outflow =	24.64 cfs @	1.18 hrs, Volume=	41,879 cf,	Atten= 0%, Lag= 0.0 min
Primary =	24.64 cfs @	1.18 hrs, Volume=	41,879 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 688.52' @ 1.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=24.63 cfs @ 1.18 hrs HW=688.52' TW=685.25' (Dynamic Tailwater)
1=Culvert (Inlet Controls 24.63 cfs @ 4.85 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 692.87' (Flood elevation advised)

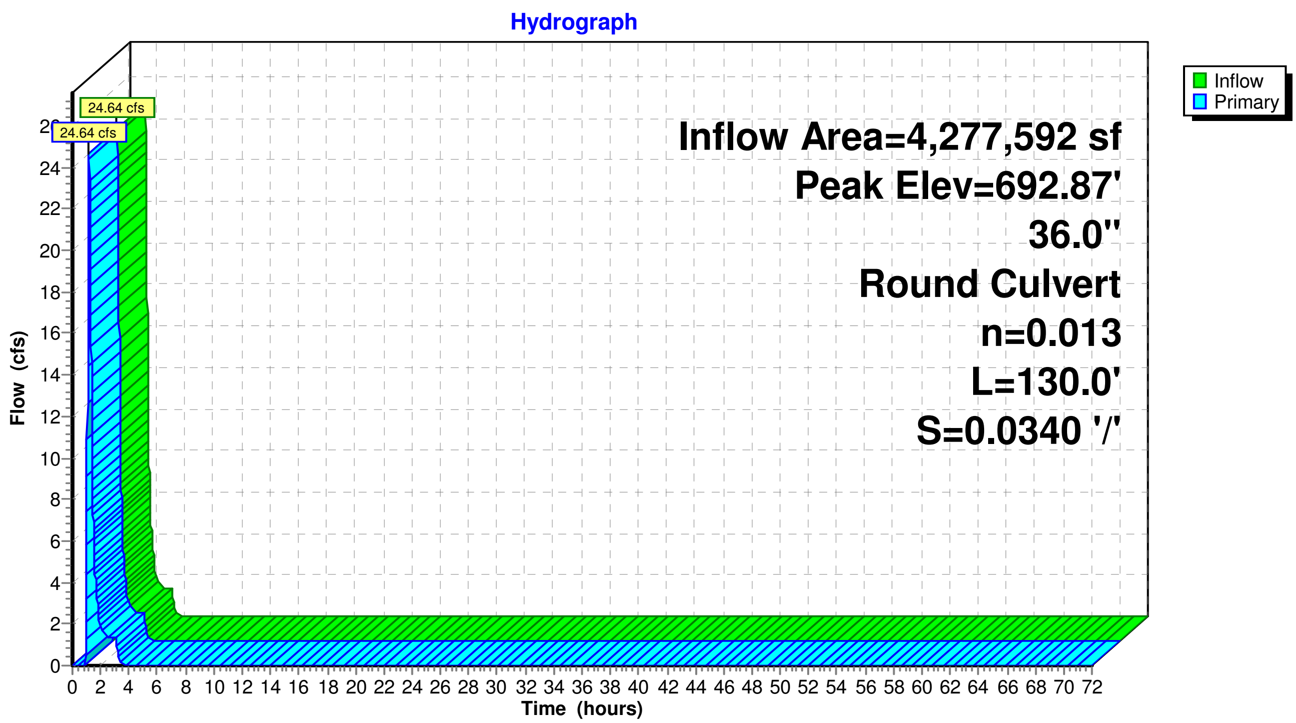
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.12"	for 10 YR SDS event
Inflow =	24.64 cfs @	1.18 hrs, Volume=	41,209 cf	
Outflow =	24.64 cfs @	1.18 hrs, Volume=	41,209 cf,	Atten= 0%, Lag= 0.0 min
Primary =	24.64 cfs @	1.18 hrs, Volume=	41,209 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 692.87' @ 1.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=24.63 cfs @ 1.18 hrs HW=692.87' TW=688.52' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 24.63 cfs @ 4.85 fps)

Pond 53P: Proposed MH



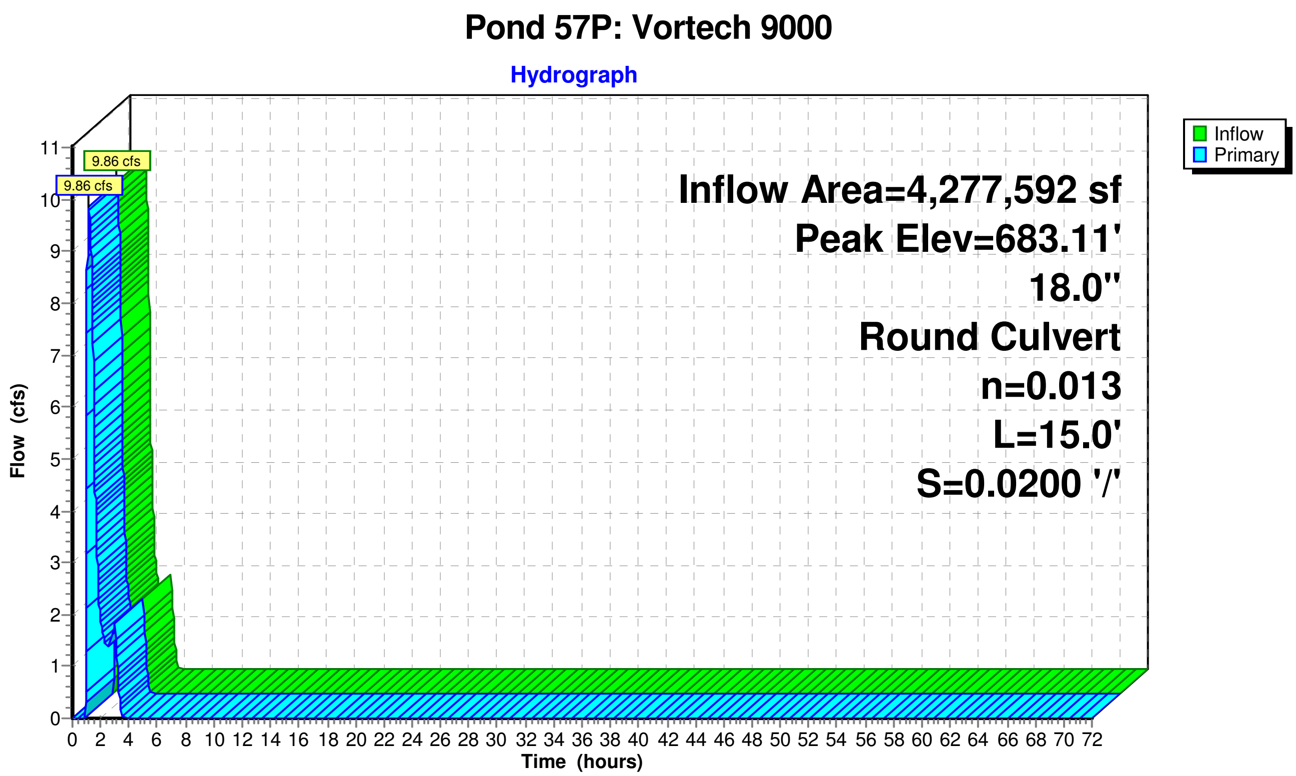
Summary for Pond 57P: Vortech 9000

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.08" for 10 YR SDS event
Inflow = 9.86 cfs @ 1.18 hrs, Volume= 29,106 cf
Outflow = 9.86 cfs @ 1.18 hrs, Volume= 29,106 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.86 cfs @ 1.18 hrs, Volume= 29,106 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.11' @ 1.18 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.86 cfs @ 1.18 hrs HW=683.11' TW=681.77' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 9.86 cfs @ 5.58 fps)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.81"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=17.40 cfs 287,619 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=1.05' Max Vel=7.89 fps Inflow=17.40 cfs 287,619 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=17.39 cfs 287,619 cf

Pond 31P: Bypass Structure Peak Elev=684.74' Inflow=17.34 cfs 280,736 cf
Primary=9.15 cfs 265,909 cf Secondary=8.19 cfs 14,827 cf Outflow=17.34 cfs 280,736 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.73' Storage=0.051 af Inflow=9.15 cfs 265,909 cf
Outflow=9.15 cfs 265,909 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.51' Storage=0.030 af Inflow=9.15 cfs 265,909 cf
Discarded=0.11 cfs 9,754 cf Primary=9.04 cfs 256,156 cf Outflow=9.15 cfs 265,910 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=684.13' Inflow=8.19 cfs 14,827 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=8.19 cfs 14,827 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=673.82' Inflow=8.19 cfs 14,827 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=8.19 cfs 14,827 cf

Pond 42P: Flow Converge Structure Peak Elev=672.87' Inflow=17.23 cfs 270,982 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=17.23 cfs 270,982 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=672.25' Inflow=17.23 cfs 270,982 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=17.23 cfs 270,982 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,625 cf Inflow=0.63 cfs 36,526 cf
Discarded=0.05 cfs 6,852 cf Primary=0.58 cfs 29,644 cf Outflow=0.63 cfs 36,496 cf

Pond 51P: Flow Splitter Peak Elev=710.29' Inflow=17.39 cfs 287,619 cf
Primary=16.76 cfs 251,092 cf Secondary=0.63 cfs 36,526 cf Outflow=17.39 cfs 287,619 cf

Pond 52P: Existing MH to be replaced Peak Elev=688.14' Inflow=17.34 cfs 280,736 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=17.34 cfs 280,736 cf

Pond 53P: Proposed MH Peak Elev=692.45' Inflow=16.76 cfs 251,092 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=16.76 cfs 251,092 cf

Pond 57P: Vortech 9000 Peak Elev=682.88' Inflow=9.15 cfs 265,909 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=9.15 cfs 265,909 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 287,619 cf Average Runoff Depth = 0.81"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

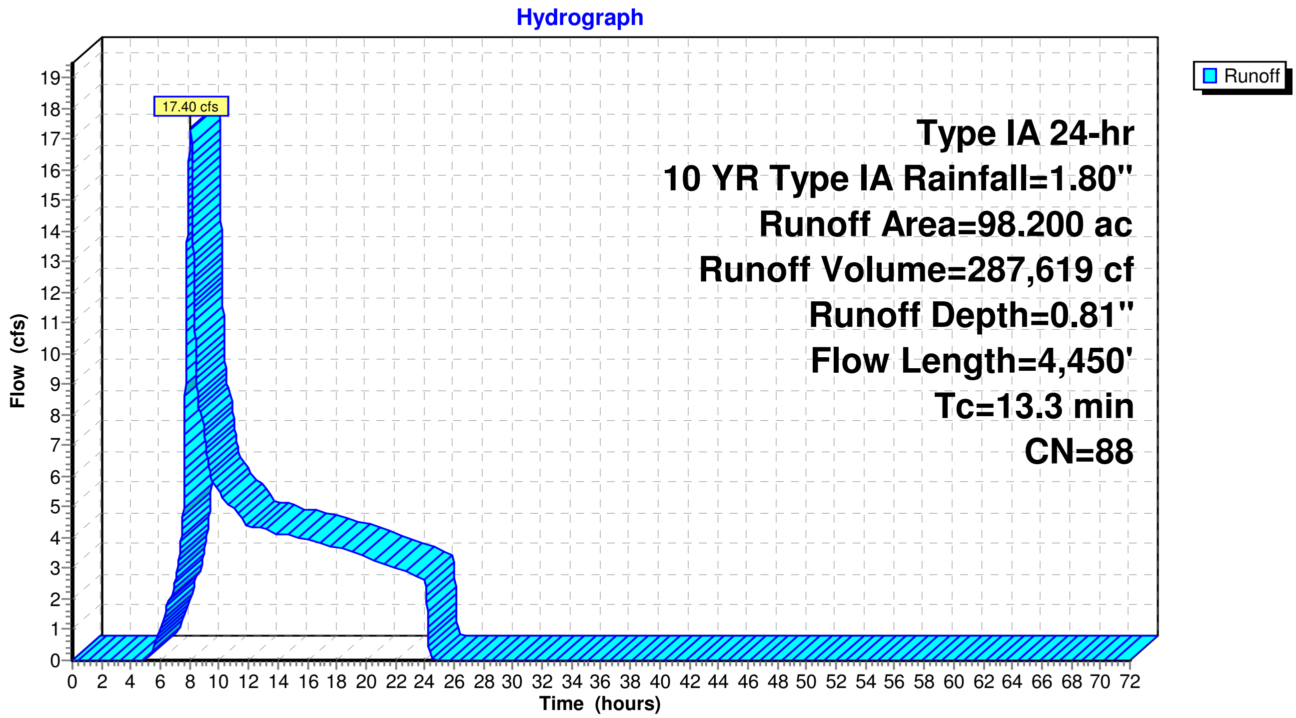
Runoff = 17.40 cfs @ 8.06 hrs, Volume= 287,619 cf, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10 YR Type IA Rainfall=1.80"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

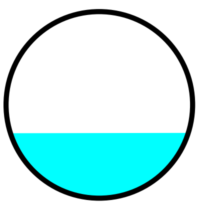
[52] Hint: Inlet/Outlet conditions not evaluated

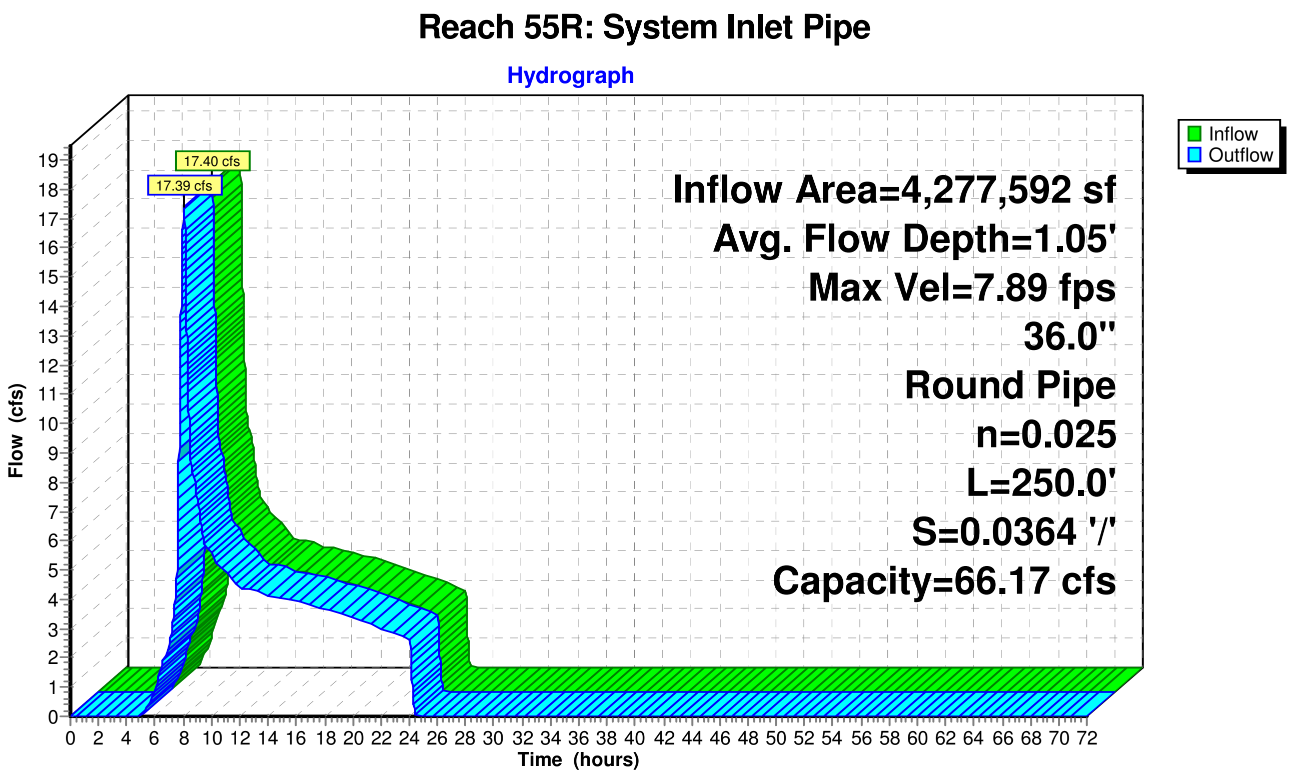
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.81" for 10 YR Type IA event
Inflow = 17.40 cfs @ 8.06 hrs, Volume= 287,619 cf
Outflow = 17.39 cfs @ 8.06 hrs, Volume= 287,619 cf, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 7.89 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 4.87 fps, Avg. Travel Time= 0.9 min

Peak Storage= 551 cf @ 8.06 hrs
Average Depth at Peak Storage= 1.05'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.79" for 10 YR Type IA event
Inflow = 17.34 cfs @ 8.06 hrs, Volume= 280,736 cf
Outflow = 17.34 cfs @ 8.06 hrs, Volume= 280,736 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.15 cfs @ 8.06 hrs, Volume= 265,909 cf
Secondary = 8.19 cfs @ 8.06 hrs, Volume= 14,827 cf

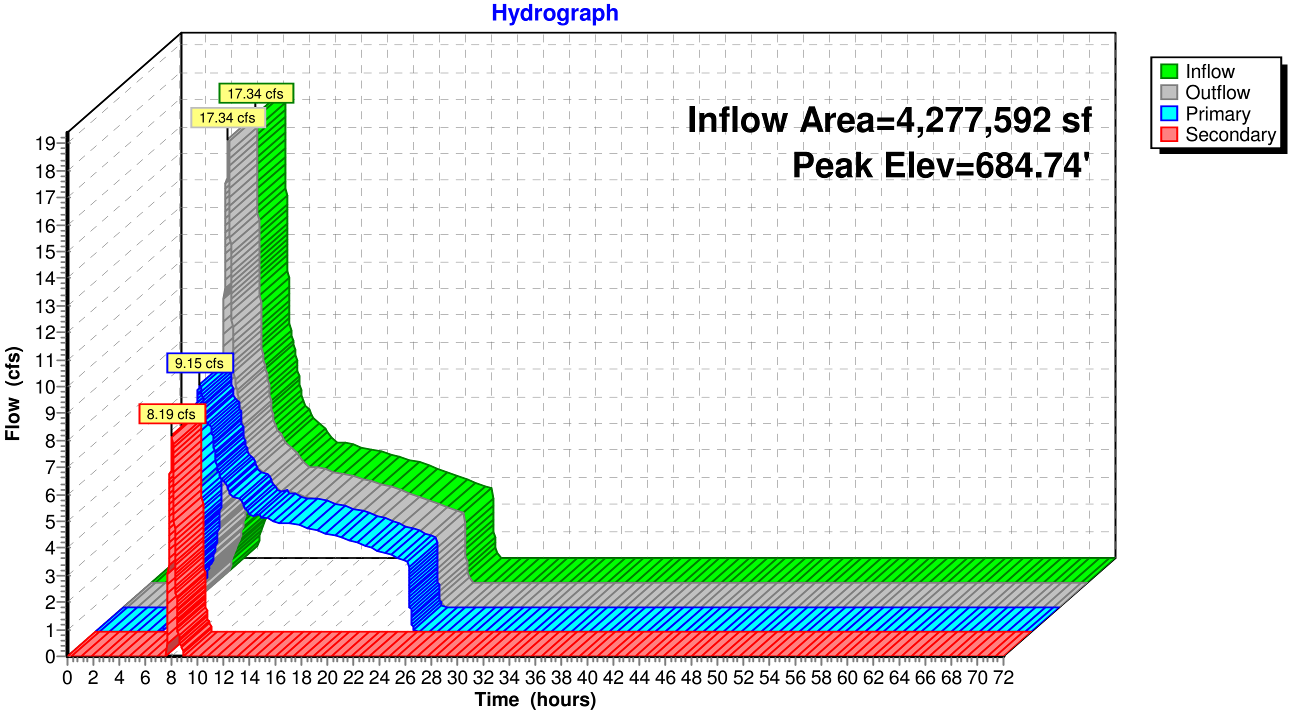
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.74' @ 8.06 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.15 cfs @ 8.06 hrs HW=684.73' TW=682.88' (Dynamic Tailwater)
└─**3=Culvert** (Passes 9.15 cfs of 11.58 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 9.15 cfs @ 6.55 fps)

Secondary OutFlow Max=8.18 cfs @ 8.06 hrs HW=684.73' TW=684.13' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 8.18 cfs @ 4.51 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.75" for 10 YR Type IA event
Inflow = 9.15 cfs @ 8.06 hrs, Volume= 265,909 cf
Outflow = 9.15 cfs @ 8.07 hrs, Volume= 265,909 cf, Atten= 0%, Lag= 0.2 min
Primary = 9.15 cfs @ 8.07 hrs, Volume= 265,909 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.73' @ 8.07 hrs Surf.Area= 0.004 ac Storage= 0.051 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

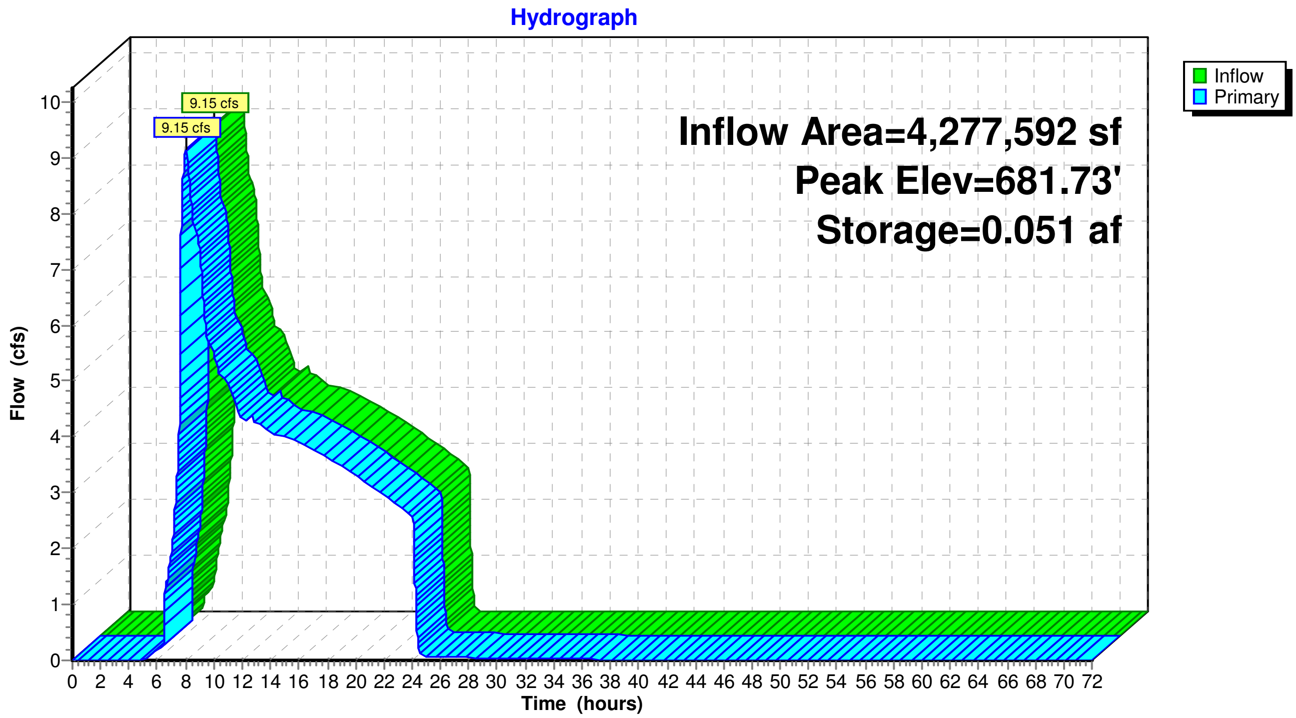
Plug-Flow detention time= 10.9 min calculated for 265,872 cf (100% of inflow)
Center-of-Mass det. time= 11.0 min (859.8 - 848.8)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=9.15 cfs @ 8.07 hrs HW=681.73' TW=681.51' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 9.15 cfs of 27.97 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.04 cfs @ 1.93 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 2.23 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.75" for 10 YR Type IA event
Inflow = 9.15 cfs @ 8.07 hrs, Volume= 265,909 cf
Outflow = 9.15 cfs @ 8.07 hrs, Volume= 265,910 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.11 cfs @ 8.07 hrs, Volume= 9,754 cf
Primary = 9.04 cfs @ 8.07 hrs, Volume= 256,156 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.51' @ 8.07 hrs Surf.Area= 0.011 ac Storage= 0.030 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 6.7 min calculated for 265,873 cf (100% of inflow)
Center-of-Mass det. time= 6.7 min (866.4 - 859.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 8.07 hrs HW=681.51' (Free Discharge)
2=Exfiltration (Controls 0.11 cfs)

Primary OutFlow Max=9.04 cfs @ 8.07 hrs HW=681.51' TW=672.87' (Dynamic Tailwater)
1=Culvert (Passes 9.04 cfs of 14.67 cfs potential flow)
3=Broad-Crested Rectangular Weir (Weir Controls 9.04 cfs @ 2.50 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

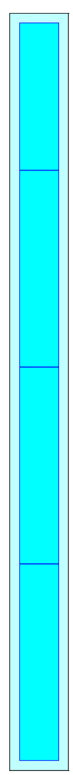
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

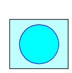
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

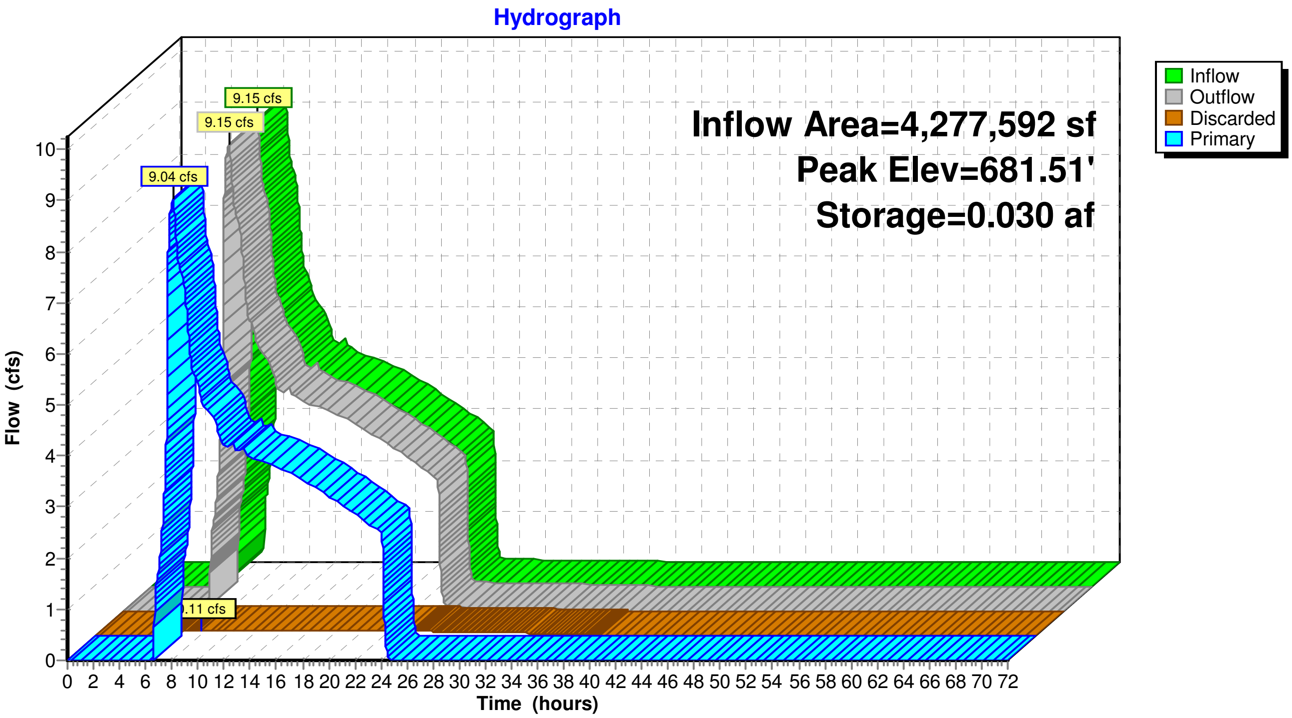
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

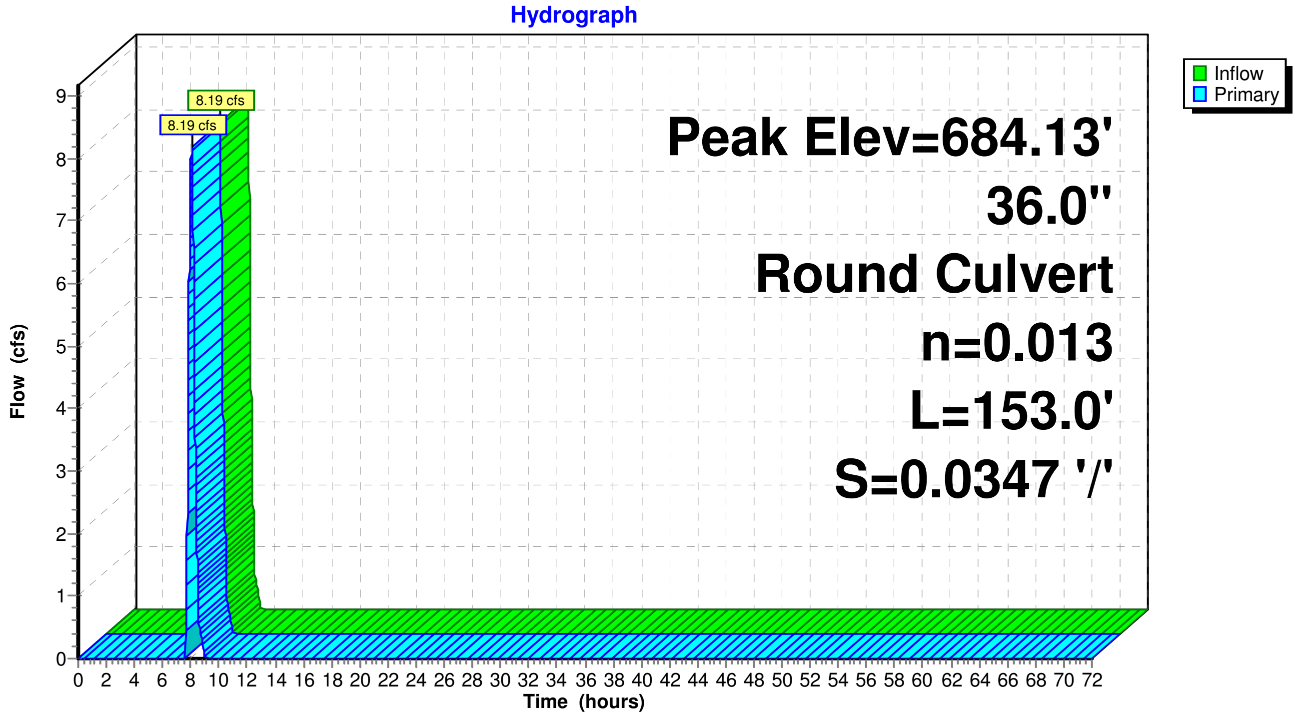
Inflow	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf
Outflow	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf, Atten= 0%, Lag= 0.0 min
Primary	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.13' @ 8.06 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=8.18 cfs @ 8.06 hrs HW=684.13' TW=673.82' (Dynamic Tailwater)
1=Culvert (Inlet Controls 8.18 cfs @ 3.55 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



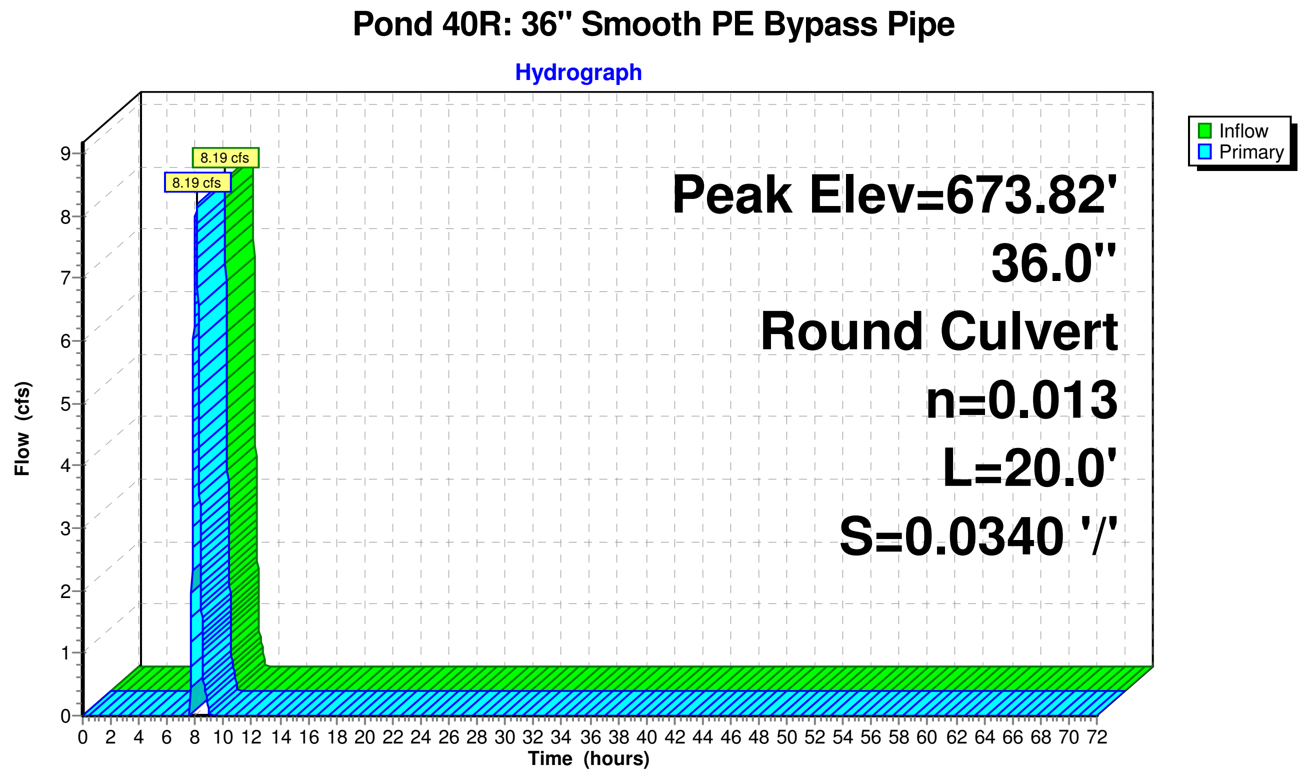
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf
Outflow	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf, Atten= 0%, Lag= 0.0 min
Primary	=	8.19 cfs @	8.06 hrs,	Volume=	14,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.82' @ 8.06 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=8.18 cfs @ 8.06 hrs HW=673.82' TW=672.87' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 8.18 cfs @ 3.55 fps)



Summary for Pond 42P: Flow Converge Structure

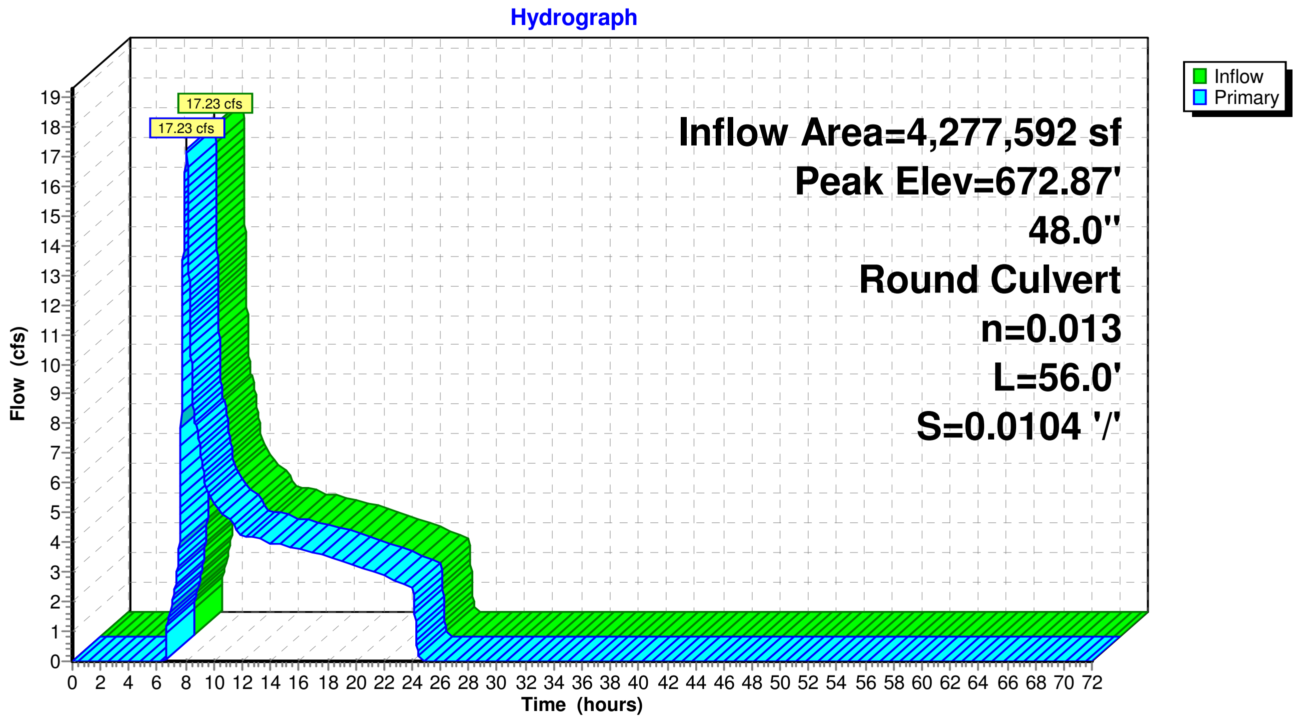
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.76" for 10 YR Type IA event
Inflow = 17.23 cfs @ 8.06 hrs, Volume= 270,982 cf
Outflow = 17.23 cfs @ 8.06 hrs, Volume= 270,982 cf, Atten= 0%, Lag= 0.0 min
Primary = 17.23 cfs @ 8.06 hrs, Volume= 270,982 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.87' @ 8.06 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=17.22 cfs @ 8.06 hrs HW=672.87' TW=672.25' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 17.22 cfs @ 4.56 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

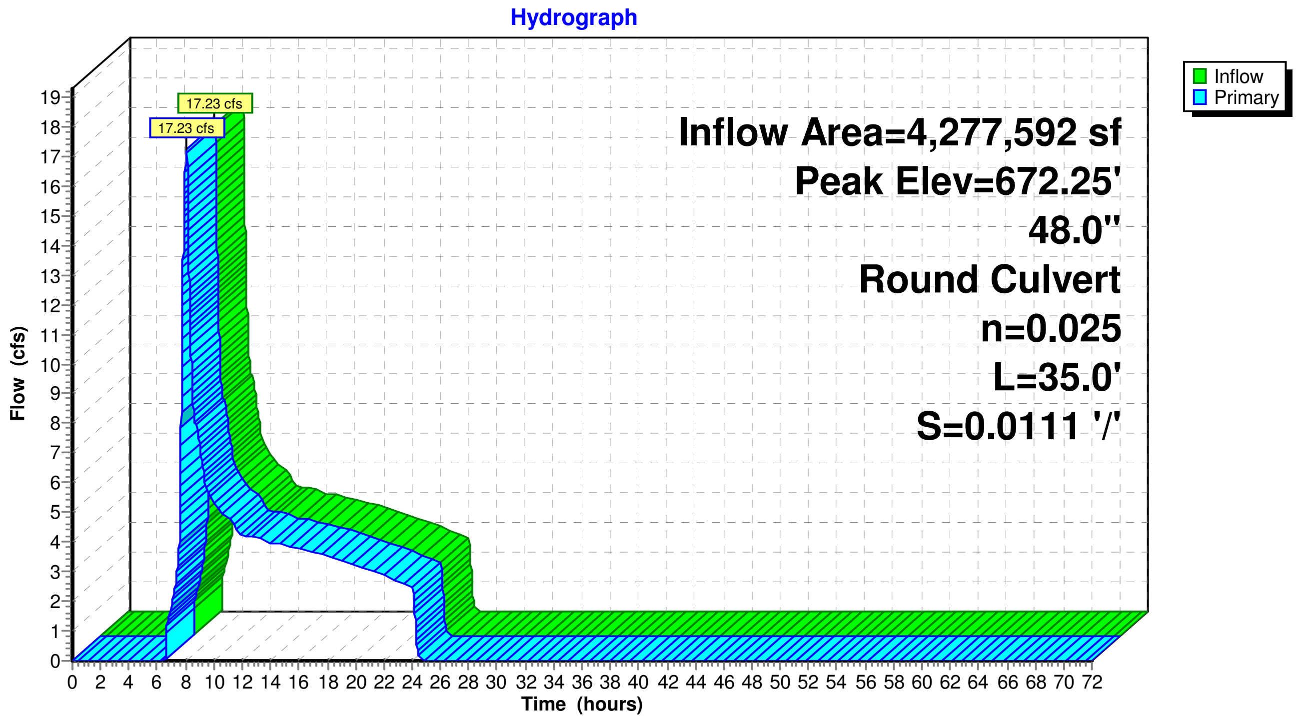
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.76"	for 10 YR Type IA event	
Inflow =	17.23 cfs @	8.06 hrs,	Volume=	270,982 cf	
Outflow =	17.23 cfs @	8.06 hrs,	Volume=	270,982 cf,	Atten= 0%, Lag= 0.0 min
Primary =	17.23 cfs @	8.06 hrs,	Volume=	270,982 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.25' @ 8.06 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=17.22 cfs @ 8.06 hrs HW=672.25' (Free Discharge)
└─**1=Culvert** (Barrel Controls 17.22 cfs @ 4.69 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.63 cfs @	8.06 hrs, Volume=	36,526 cf	
Outflow	=	0.63 cfs @	8.09 hrs, Volume=	36,496 cf,	Atten= 0%, Lag= 1.6 min
Discarded	=	0.05 cfs @	8.09 hrs, Volume=	6,852 cf	
Primary	=	0.58 cfs @	8.09 hrs, Volume=	29,644 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 8.09 hrs Surf.Area= 1,499 sf Storage= 3,625 cf

Plug-Flow detention time= 189.2 min calculated for 36,491 cf (100% of inflow)
Center-of-Mass det. time= 189.1 min (1,083.9 - 894.8)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

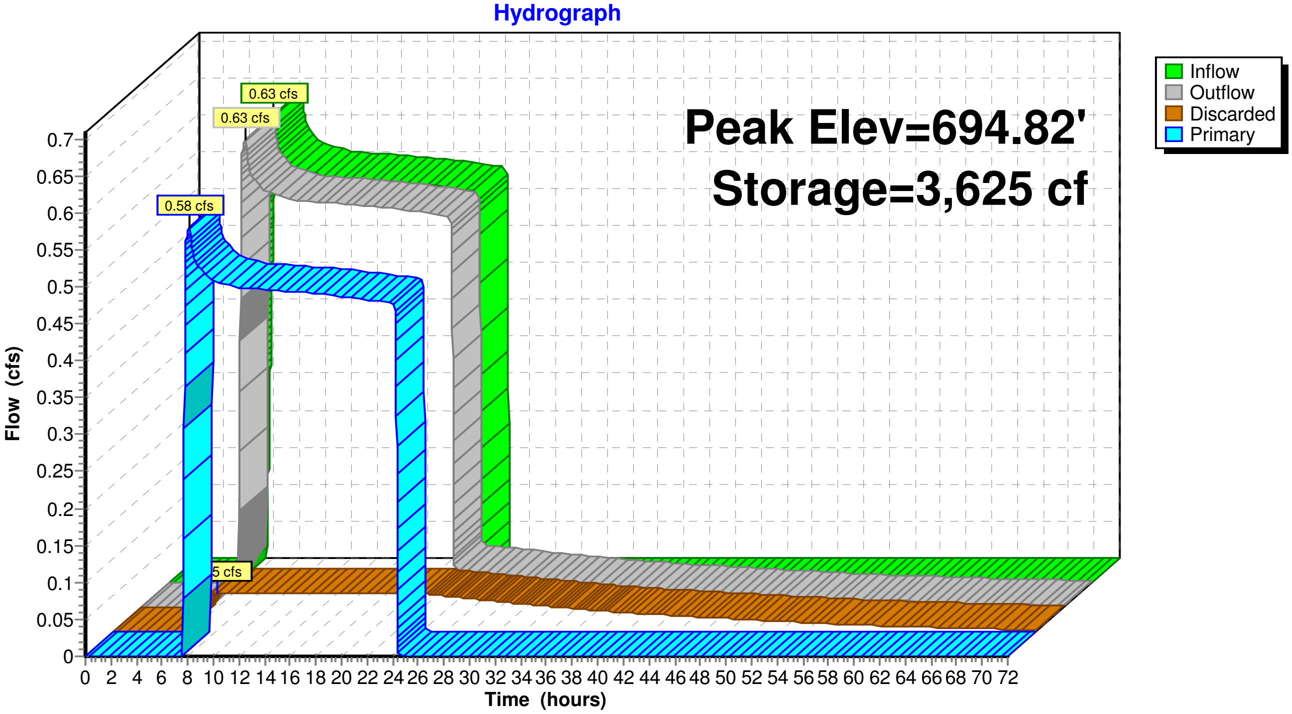
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 8.09 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.58 cfs @ 8.09 hrs HW=694.82' TW=688.13' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.58 cfs of 14.79 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.58 cfs @ 0.83 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 710.29' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.54' @ 8.06 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.81" for 10 YR Type IA event
Inflow = 17.39 cfs @ 8.06 hrs, Volume= 287,619 cf
Outflow = 17.39 cfs @ 8.06 hrs, Volume= 287,619 cf, Atten= 0%, Lag= 0.0 min
Primary = 16.76 cfs @ 8.06 hrs, Volume= 251,092 cf
Secondary = 0.63 cfs @ 8.06 hrs, Volume= 36,526 cf

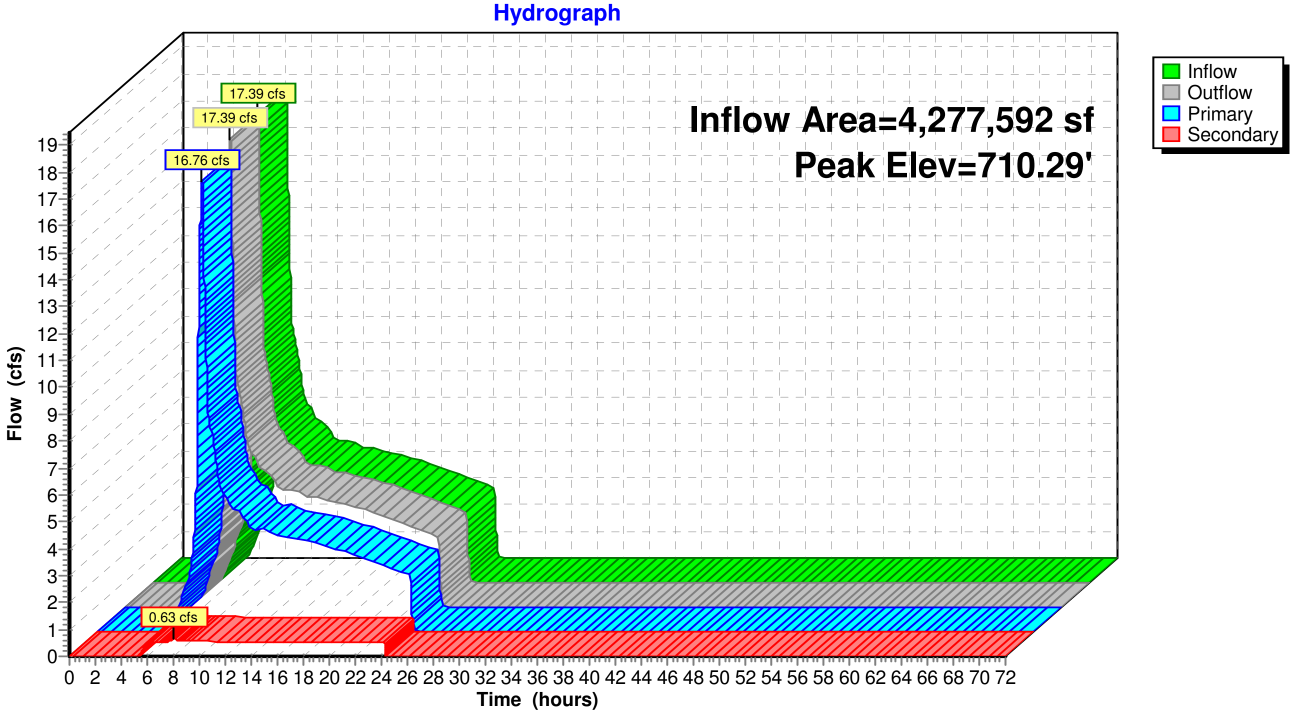
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.29' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=16.75 cfs @ 8.06 hrs HW=710.29' TW=692.45' (Dynamic Tailwater)
└─**2=Culvert** (Passes 16.75 cfs of 35.56 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.65 cfs @ 7.50 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 16.10 cfs @ 3.28 fps)

Secondary OutFlow Max=0.63 cfs @ 8.06 hrs HW=710.29' TW=694.82' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.63 cfs @ 3.22 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 688.14' (Flood elevation advised)

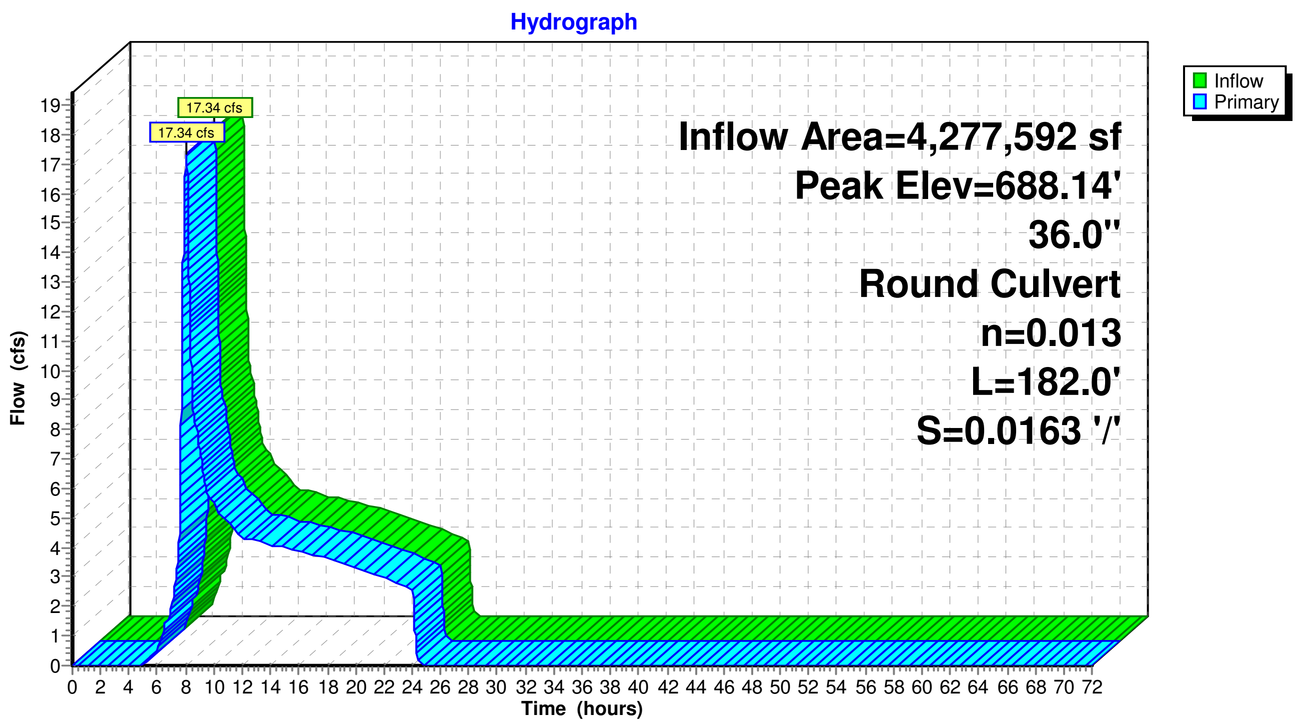
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.79"	for 10 YR Type IA event	
Inflow =	17.34 cfs @	8.06 hrs,	Volume=	280,736 cf	
Outflow =	17.34 cfs @	8.06 hrs,	Volume=	280,736 cf,	Atten= 0%, Lag= 0.0 min
Primary =	17.34 cfs @	8.06 hrs,	Volume=	280,736 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 688.14' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=17.33 cfs @ 8.06 hrs HW=688.14' TW=684.73' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 17.33 cfs @ 4.37 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

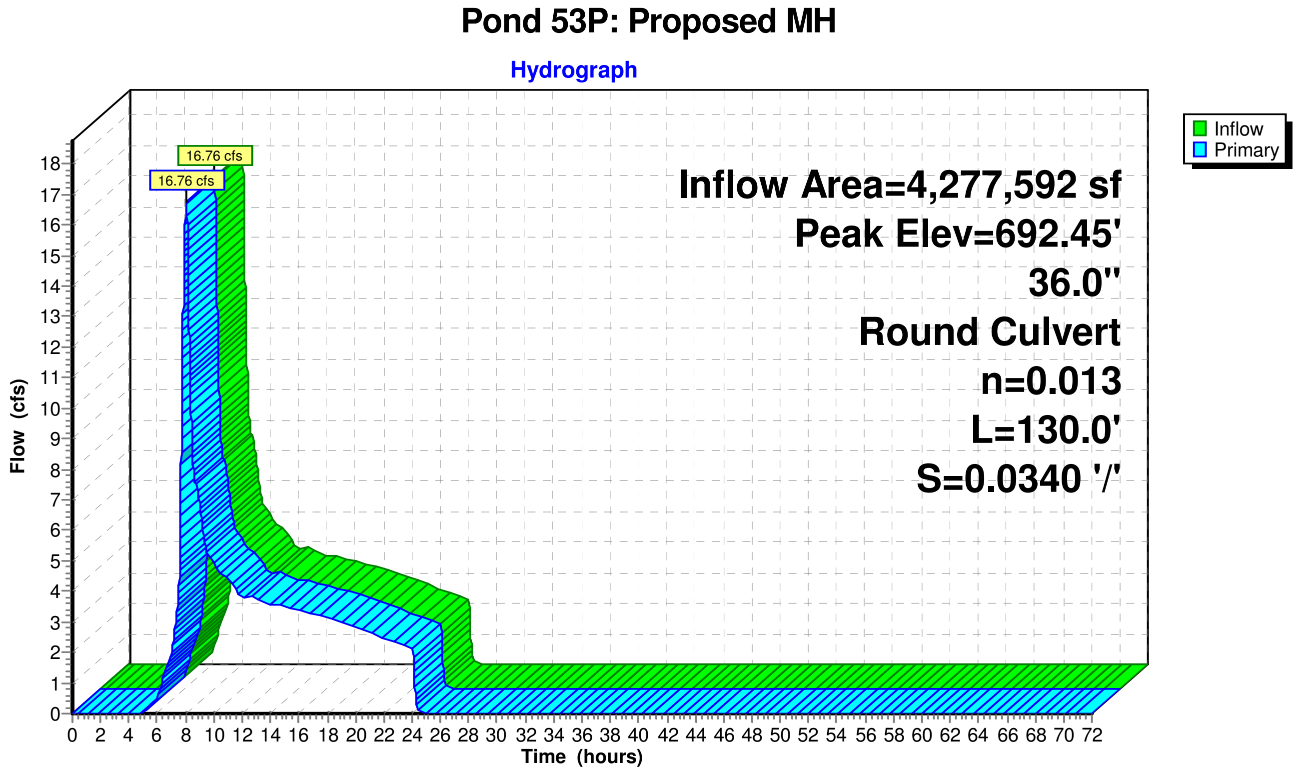
[57] Hint: Peaked at 692.45' (Flood elevation advised)

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.70"	for 10 YR Type IA event
Inflow =	16.76 cfs @	8.06 hrs, Volume=	251,092 cf	
Outflow =	16.76 cfs @	8.06 hrs, Volume=	251,092 cf,	Atten= 0%, Lag= 0.0 min
Primary =	16.76 cfs @	8.06 hrs, Volume=	251,092 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 692.45' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=16.75 cfs @ 8.06 hrs HW=692.45' TW=688.14' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 16.75 cfs @ 4.32 fps)



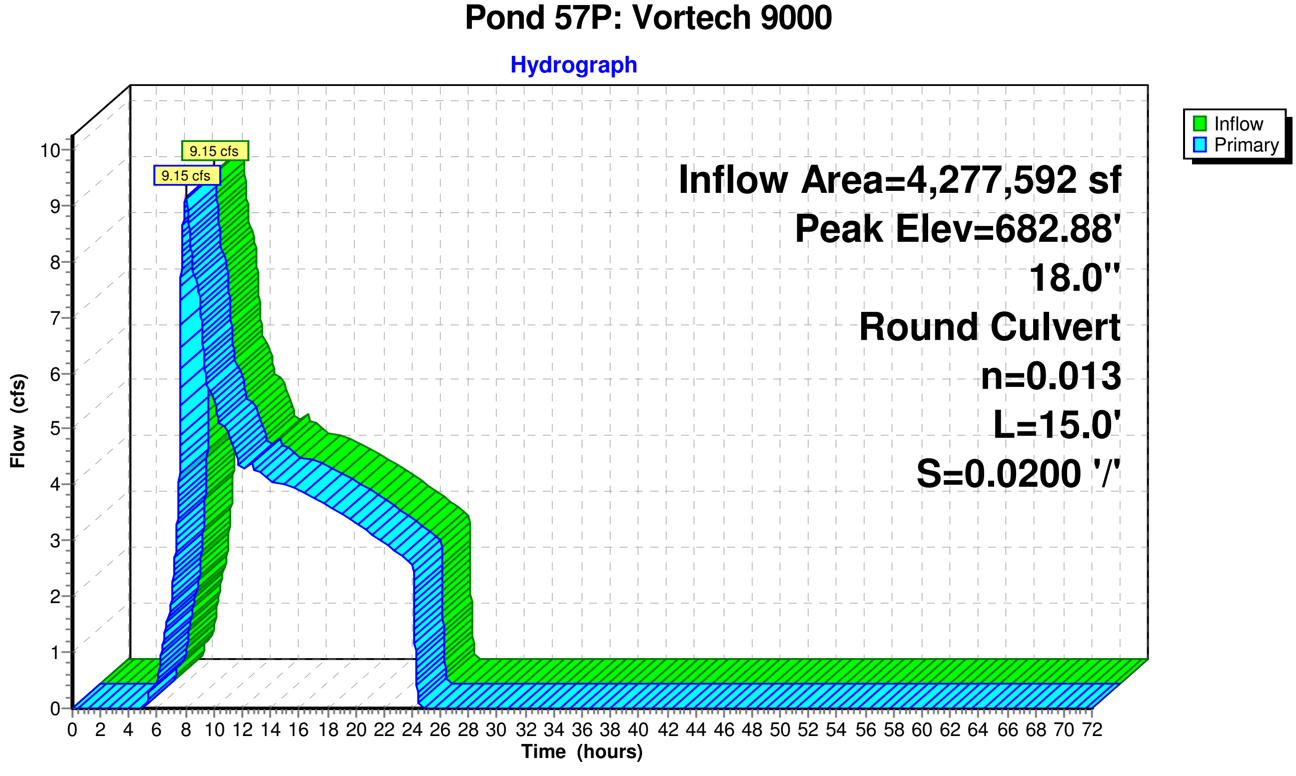
Summary for Pond 57P: Vortech 9000

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.75" for 10 YR Type IA event
Inflow = 9.15 cfs @ 8.06 hrs, Volume= 265,909 cf
Outflow = 9.15 cfs @ 8.06 hrs, Volume= 265,909 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.15 cfs @ 8.06 hrs, Volume= 265,909 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 682.88' @ 8.06 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.15 cfs @ 8.06 hrs HW=682.88' TW=681.73' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.15 cfs @ 5.18 fps)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.25"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=53.04 cfs 90,173 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=2.03' Max Vel=10.40 fps Inflow=53.04 cfs 90,173 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=53.01 cfs 90,173 cf

Pond 31P: Bypass Structure Peak Elev=687.28' Inflow=52.25 cfs 86,296 cf
Primary=12.24 cfs 43,999 cf Secondary=40.04 cfs 42,298 cf Outflow=52.25 cfs 86,296 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.92' Storage=0.052 af Inflow=12.24 cfs 43,999 cf
Outflow=12.46 cfs 43,999 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.65' Storage=0.031 af Inflow=12.46 cfs 43,999 cf
Discarded=0.11 cfs 3,885 cf Primary=12.11 cfs 40,114 cf Outflow=12.22 cfs 43,999 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=685.90' Inflow=40.04 cfs 42,298 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=40.04 cfs 42,298 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=676.09' Inflow=40.04 cfs 42,298 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=40.04 cfs 42,298 cf

Pond 42P: Flow Converge Structure Peak Elev=674.70' Inflow=52.15 cfs 82,412 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=52.15 cfs 82,412 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=673.84' Inflow=52.15 cfs 82,412 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=52.15 cfs 82,412 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,614 cf Inflow=0.76 cfs 4,948 cf
Discarded=0.05 cfs 3,877 cf Primary=0.48 cfs 1,071 cf Outflow=0.54 cfs 4,948 cf

Pond 51P: Flow Splitter Peak Elev=711.56' Inflow=53.01 cfs 90,173 cf
Primary=52.25 cfs 85,225 cf Secondary=0.76 cfs 4,948 cf Outflow=53.01 cfs 90,173 cf

Pond 52P: Existing MH to be replaced Peak Elev=690.35' Inflow=52.25 cfs 86,296 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=52.25 cfs 86,296 cf

Pond 53P: Proposed MH Peak Elev=694.70' Inflow=52.25 cfs 85,225 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=52.25 cfs 85,225 cf

Pond 57P: Vortech 9000 Peak Elev=683.98' Inflow=12.24 cfs 43,999 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=12.24 cfs 43,999 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 90,173 cf Average Runoff Depth = 0.25"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

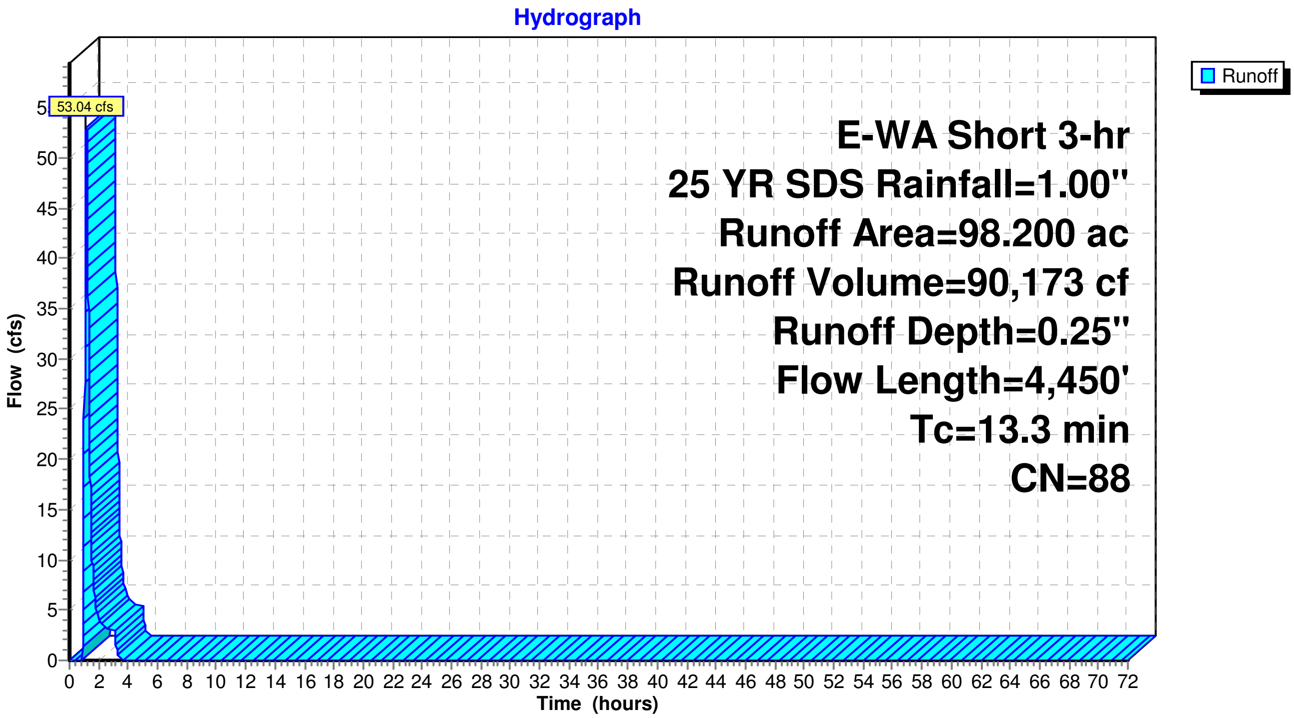
Runoff = 53.04 cfs @ 1.15 hrs, Volume= 90,173 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 25 YR SDS Rainfall=1.00"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

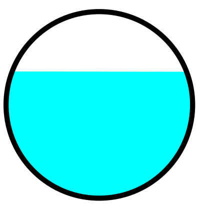
[52] Hint: Inlet/Outlet conditions not evaluated

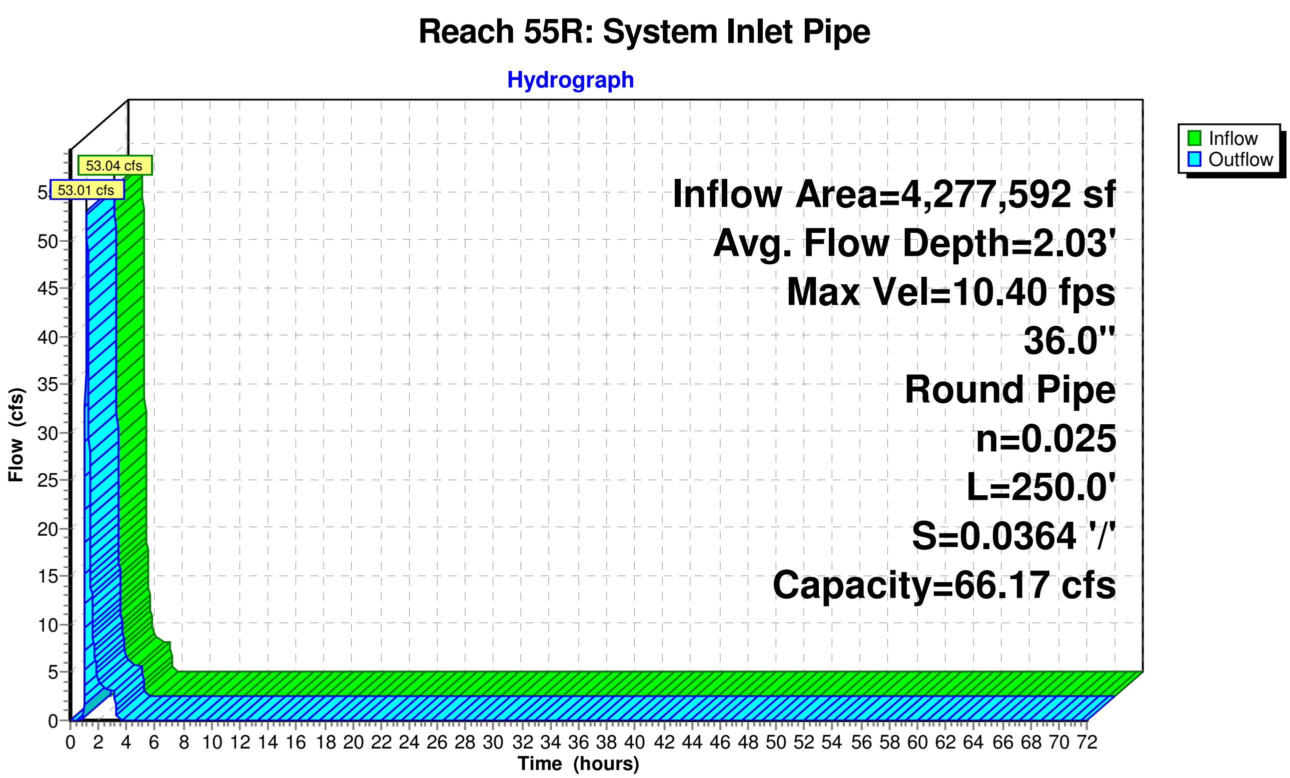
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.25" for 25 YR SDS event
Inflow = 53.04 cfs @ 1.15 hrs, Volume= 90,173 cf
Outflow = 53.01 cfs @ 1.15 hrs, Volume= 90,173 cf, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 10.40 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 4.70 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,274 cf @ 1.15 hrs
Average Depth at Peak Storage= 2.03'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.24" for 25 YR SDS event
Inflow = 52.25 cfs @ 1.15 hrs, Volume= 86,296 cf
Outflow = 52.25 cfs @ 1.15 hrs, Volume= 86,296 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.24 cfs @ 1.16 hrs, Volume= 43,999 cf
Secondary = 40.04 cfs @ 1.15 hrs, Volume= 42,298 cf

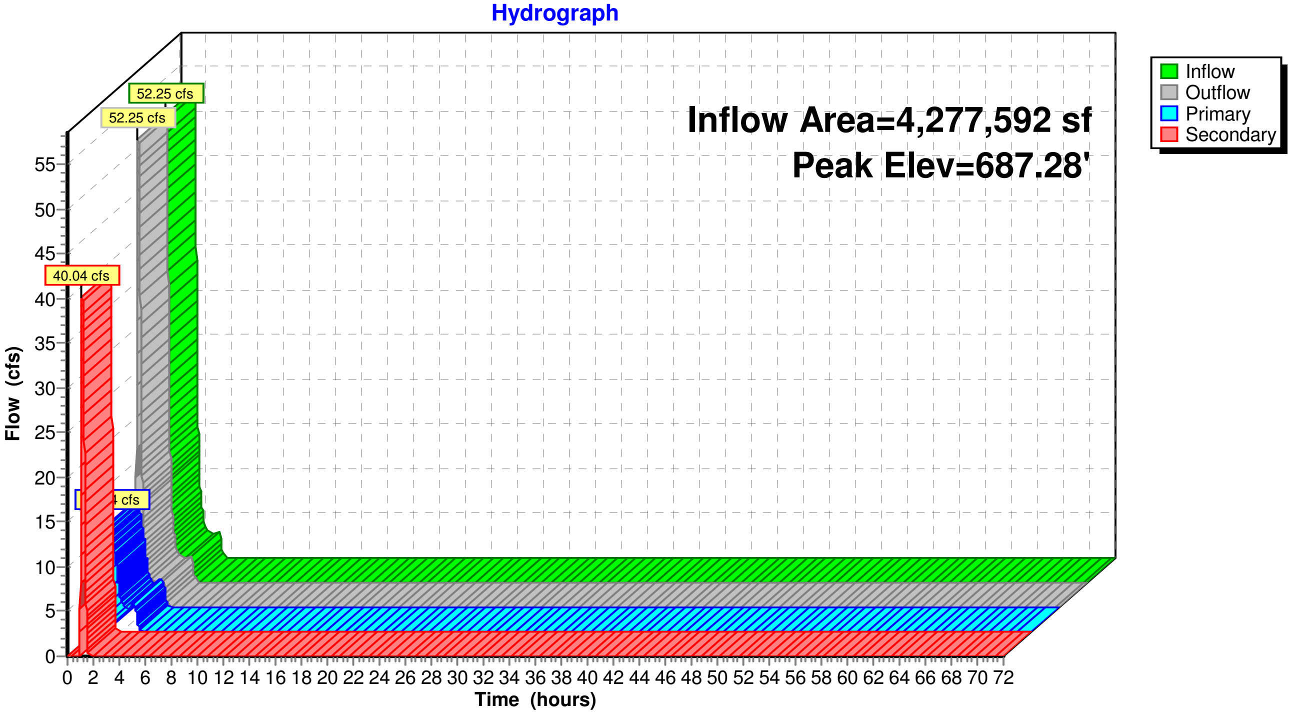
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 687.28' @ 1.15 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=12.22 cfs @ 1.16 hrs HW=687.27' TW=683.97' (Dynamic Tailwater)
└─**3=Culvert** (Passes 12.22 cfs of 15.47 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 12.22 cfs @ 8.75 fps)

Secondary OutFlow Max=39.97 cfs @ 1.15 hrs HW=687.28' TW=685.90' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 39.97 cfs @ 5.65 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[93] Warning: Storage range exceeded by 0.13'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=14)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.12" for 25 YR SDS event
Inflow = 12.24 cfs @ 1.16 hrs, Volume= 43,999 cf
Outflow = 12.46 cfs @ 1.15 hrs, Volume= 43,999 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.46 cfs @ 1.15 hrs, Volume= 43,999 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.92' @ 1.15 hrs Surf.Area= 0.000 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

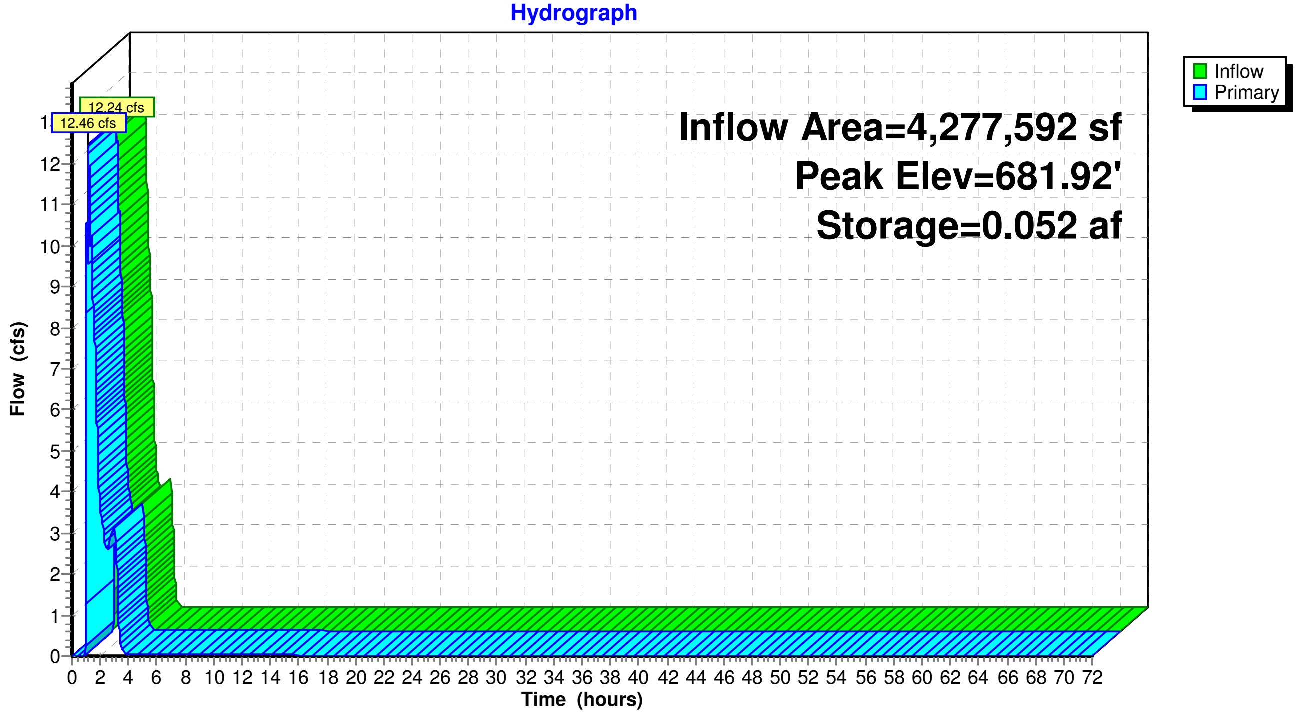
Plug-Flow detention time= 20.8 min calculated for 43,993 cf (100% of inflow)
Center-of-Mass det. time= 20.9 min (126.1 - 105.2)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=12.47 cfs @ 1.15 hrs HW=681.92' TW=681.65' (Dynamic Tailwater)
1=Orifice/Grate (Passes 12.47 cfs of 31.22 cfs potential flow)
2=Broad-Crested Rectangular Weir (Weir Controls 12.34 cfs @ 2.19 fps)
3=Orifice/Grate (Orifice Controls 0.12 cfs @ 2.48 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.12" for 25 YR SDS event
Inflow = 12.46 cfs @ 1.15 hrs, Volume= 43,999 cf
Outflow = 12.22 cfs @ 1.16 hrs, Volume= 43,999 cf, Atten= 2%, Lag= 0.4 min
Discarded = 0.11 cfs @ 1.16 hrs, Volume= 3,885 cf
Primary = 12.11 cfs @ 1.16 hrs, Volume= 40,114 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.65' @ 1.16 hrs Surf.Area= 0.011 ac Storage= 0.031 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 13.9 min calculated for 43,993 cf (100% of inflow)
Center-of-Mass det. time= 13.9 min (139.9 - 126.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 1.16 hrs HW=681.65' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=12.11 cfs @ 1.16 hrs HW=681.65' TW=674.70' (Dynamic Tailwater)
└─**1=Culvert** (Passes 12.11 cfs of 15.01 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 12.11 cfs @ 2.81 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

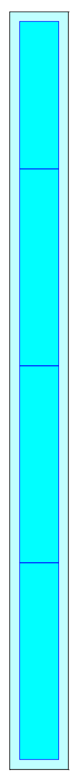
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

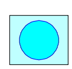
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

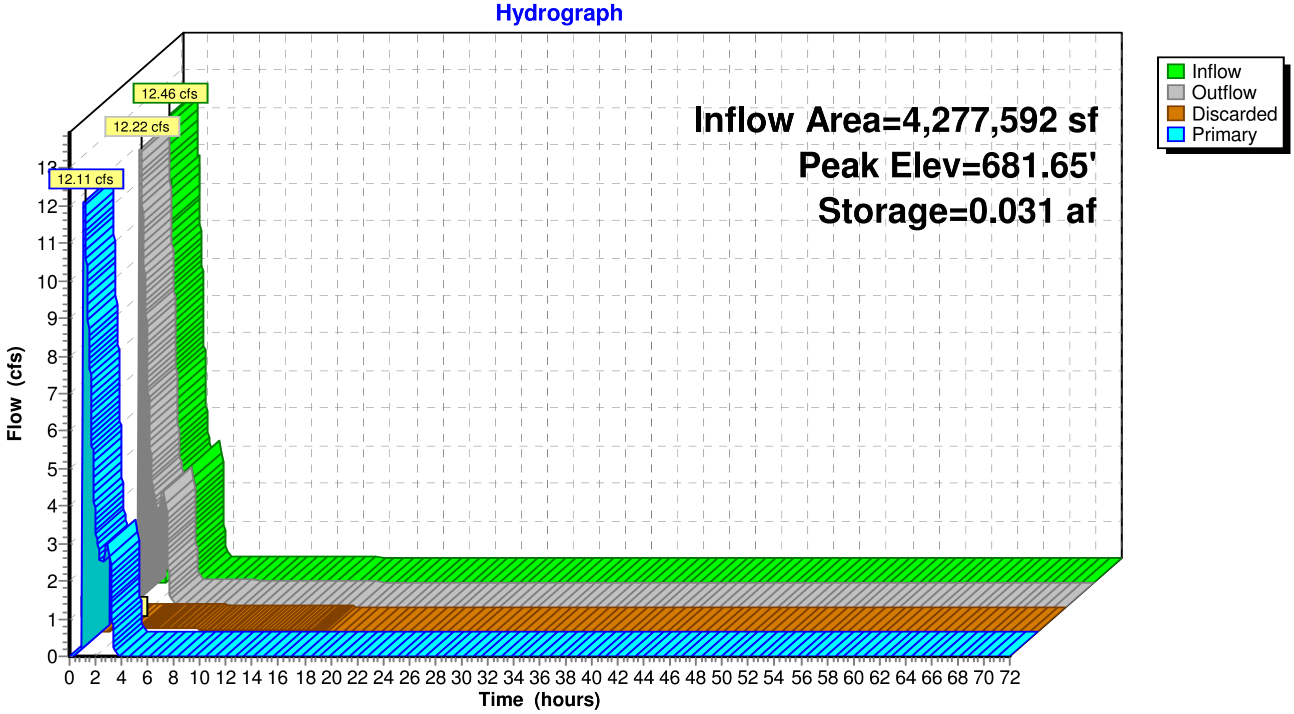
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

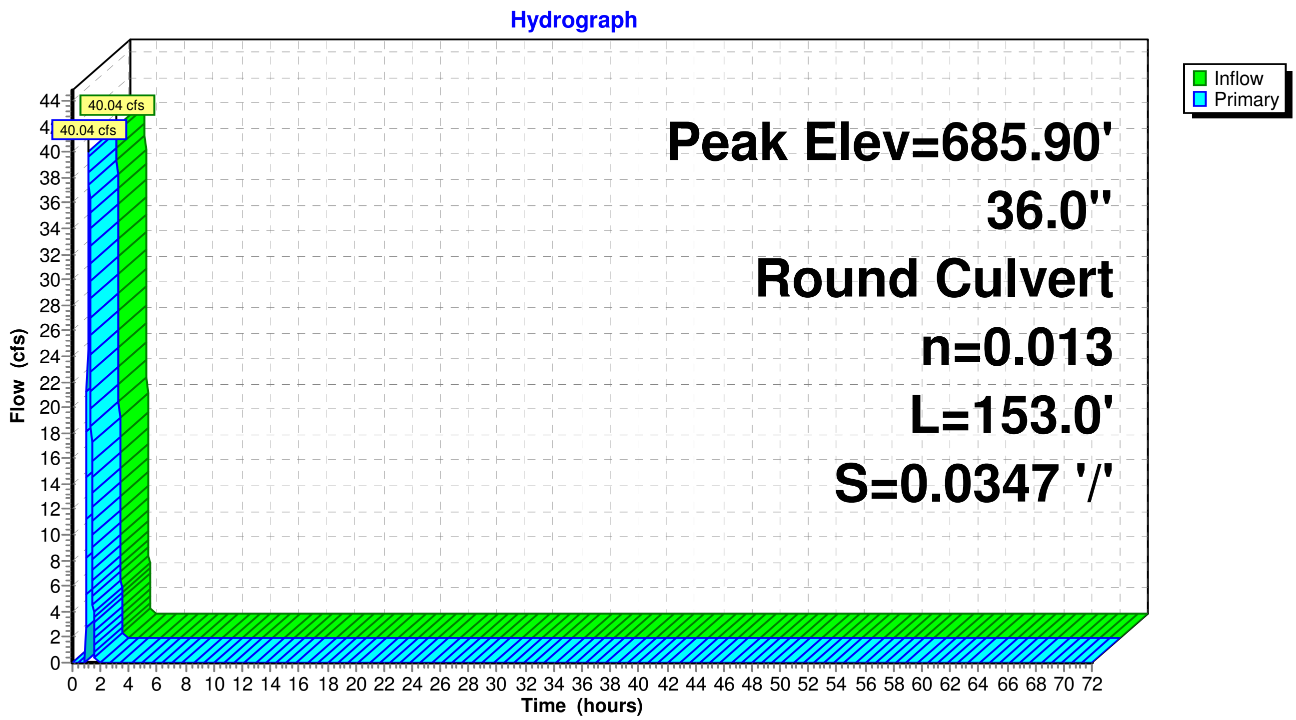
Inflow	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf
Outflow	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf, Atten= 0%, Lag= 0.0 min
Primary	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.90' @ 1.15 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=39.99 cfs @ 1.15 hrs HW=685.90' TW=676.08' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 39.99 cfs @ 5.76 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

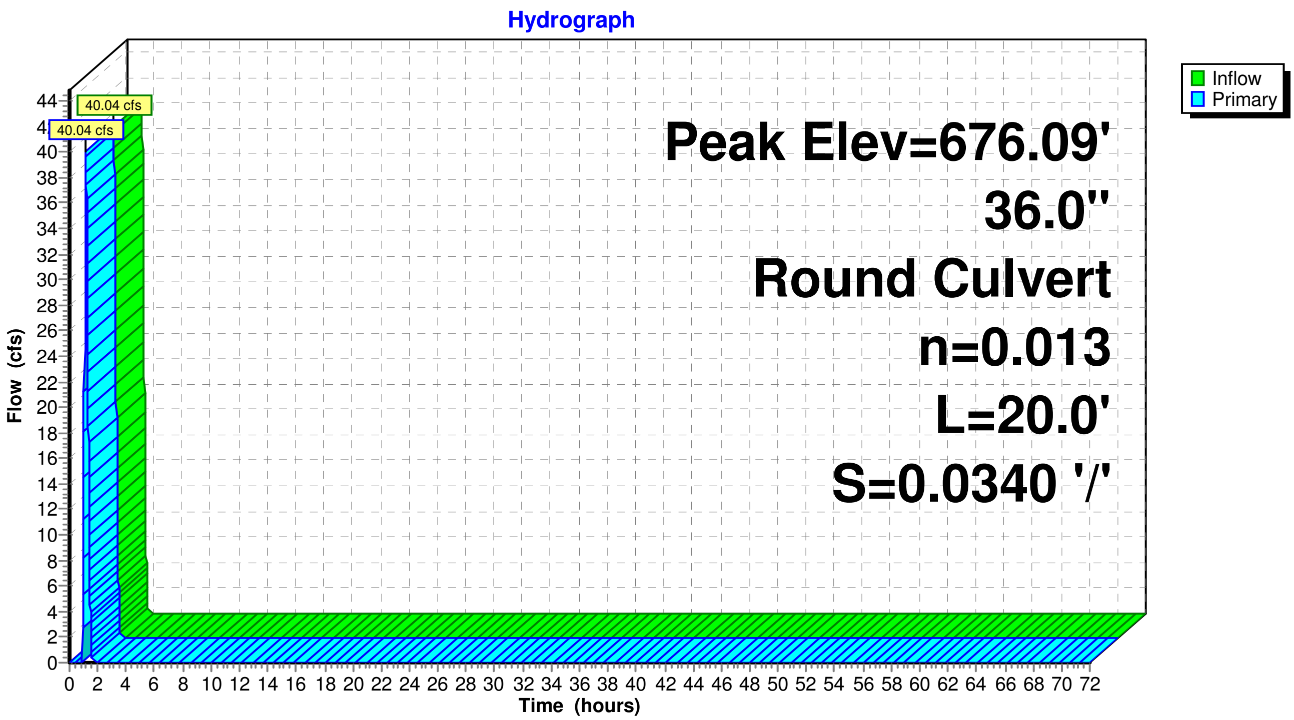
Inflow	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf
Outflow	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf, Atten= 0%, Lag= 0.0 min
Primary	=	40.04 cfs @	1.15 hrs,	Volume=	42,298 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 676.09' @ 1.15 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=39.99 cfs @ 1.15 hrs HW=676.08' TW=674.70' (Dynamic Tailwater)
1=Culvert (Inlet Controls 39.99 cfs @ 5.66 fps)

Pond 40R: 36" Smooth PE Bypass Pipe



Summary for Pond 42P: Flow Converge Structure

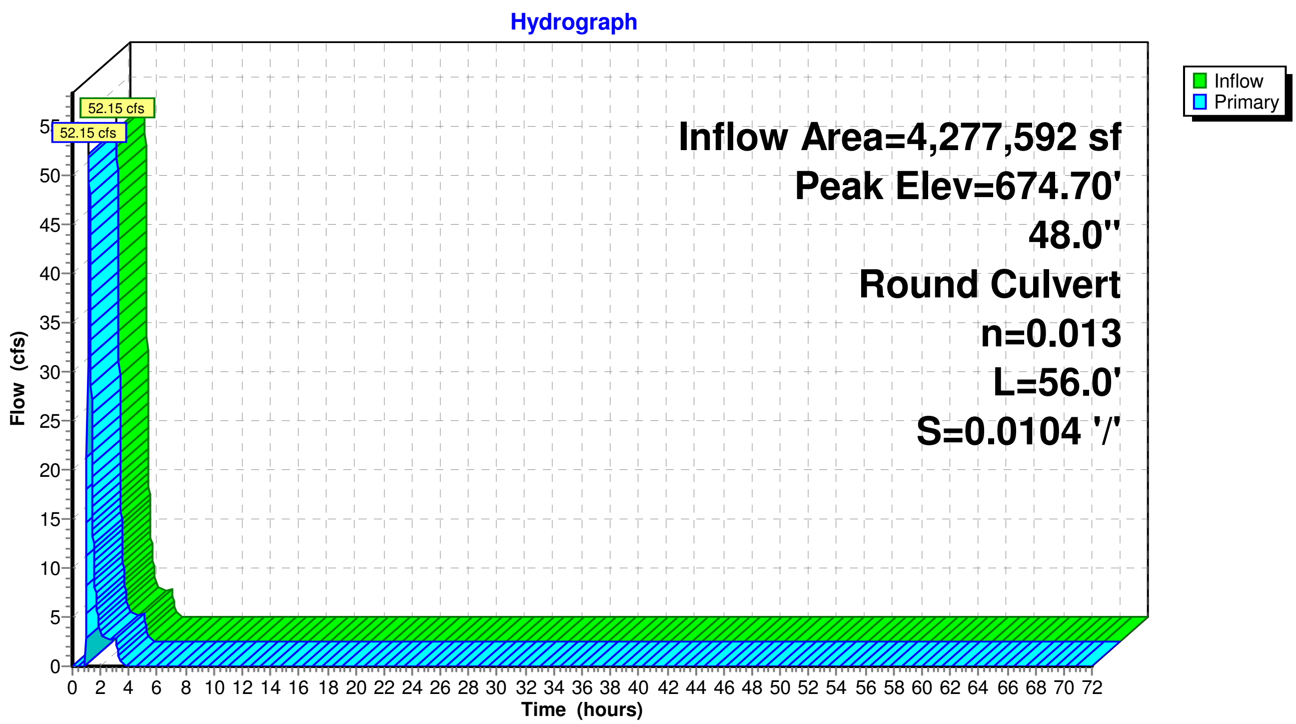
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.23" for 25 YR SDS event
Inflow = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf
Outflow = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf, Atten= 0%, Lag= 0.0 min
Primary = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.70' @ 1.15 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=52.09 cfs @ 1.15 hrs HW=674.70' TW=673.84' (Dynamic Tailwater)
1=Culvert (Outlet Controls 52.09 cfs @ 5.68 fps)

Pond 42P: Flow Converge Structure



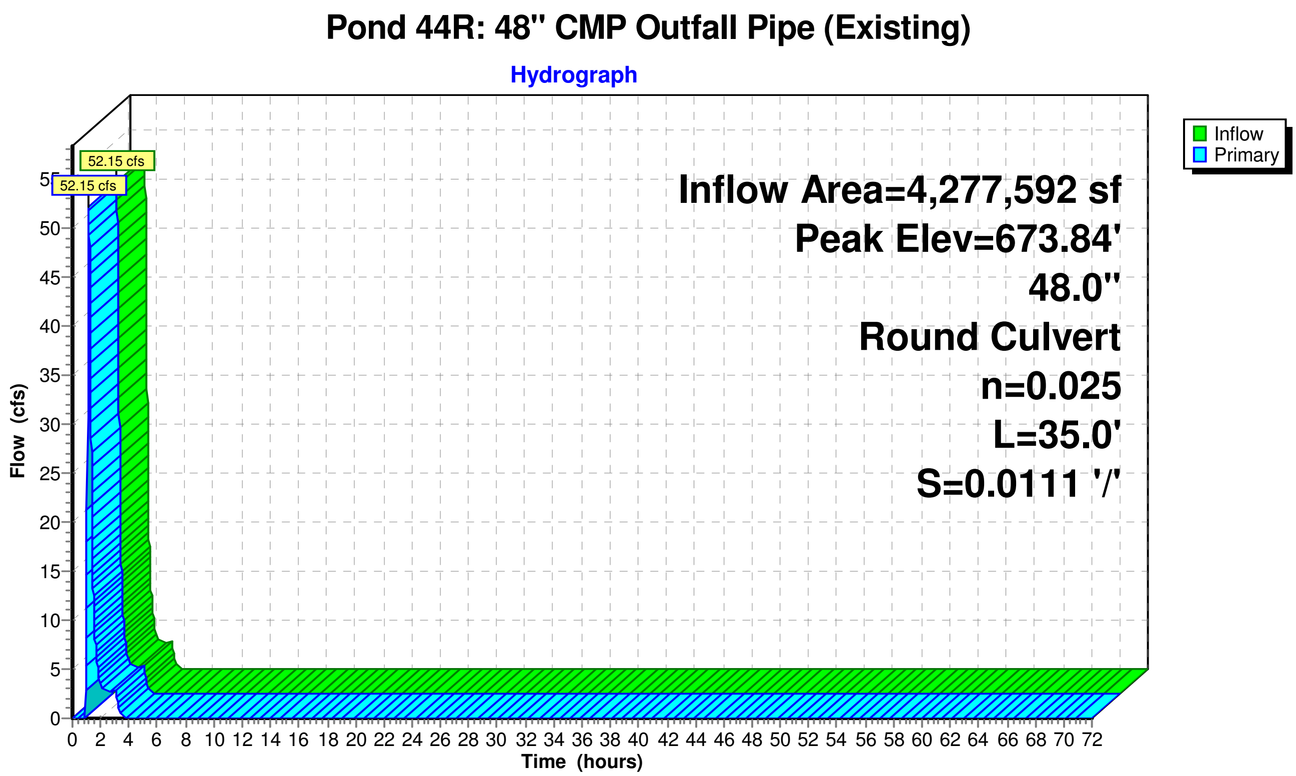
Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.23" for 25 YR SDS event
Inflow = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf
Outflow = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf, Atten= 0%, Lag= 0.0 min
Primary = 52.15 cfs @ 1.15 hrs, Volume= 82,412 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.84' @ 1.15 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=52.09 cfs @ 1.15 hrs HW=673.84' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 52.09 cfs @ 6.24 fps)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.76 cfs @	1.15 hrs,	Volume=	4,948 cf
Outflow	=	0.54 cfs @	3.03 hrs,	Volume=	4,948 cf, Atten= 30%, Lag= 112.8 min
Discarded	=	0.05 cfs @	3.03 hrs,	Volume=	3,877 cf
Primary	=	0.48 cfs @	3.03 hrs,	Volume=	1,071 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 3.03 hrs Surf.Area= 1,496 sf Storage= 3,614 cf

Plug-Flow detention time= 713.9 min calculated for 4,947 cf (100% of inflow)
Center-of-Mass det. time= 714.3 min (837.0 - 122.7)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

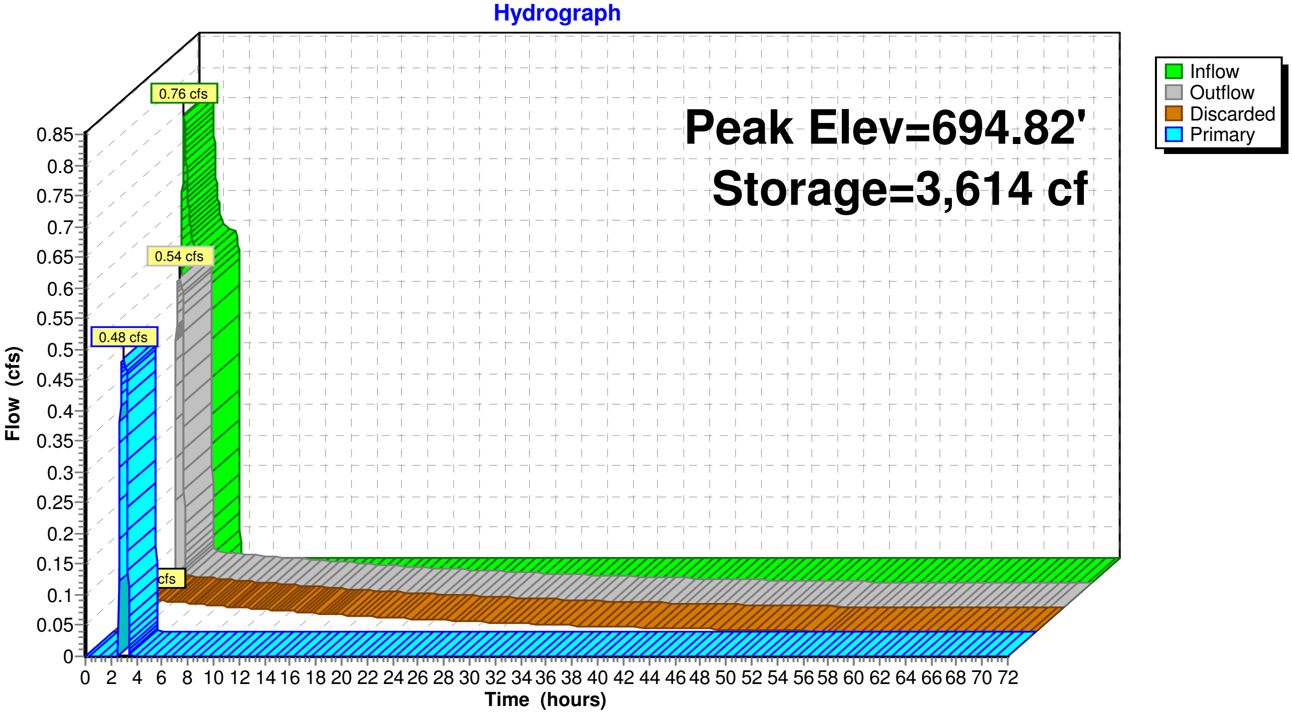
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 3.03 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.48 cfs @ 3.03 hrs HW=694.82' TW=687.14' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.48 cfs of 14.77 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.48 cfs @ 0.78 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 711.56' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.82' @ 1.15 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.25" for 25 YR SDS event
Inflow = 53.01 cfs @ 1.15 hrs, Volume= 90,173 cf
Outflow = 53.01 cfs @ 1.15 hrs, Volume= 90,173 cf, Atten= 0%, Lag= 0.0 min
Primary = 52.25 cfs @ 1.15 hrs, Volume= 85,225 cf
Secondary = 0.76 cfs @ 1.15 hrs, Volume= 4,948 cf

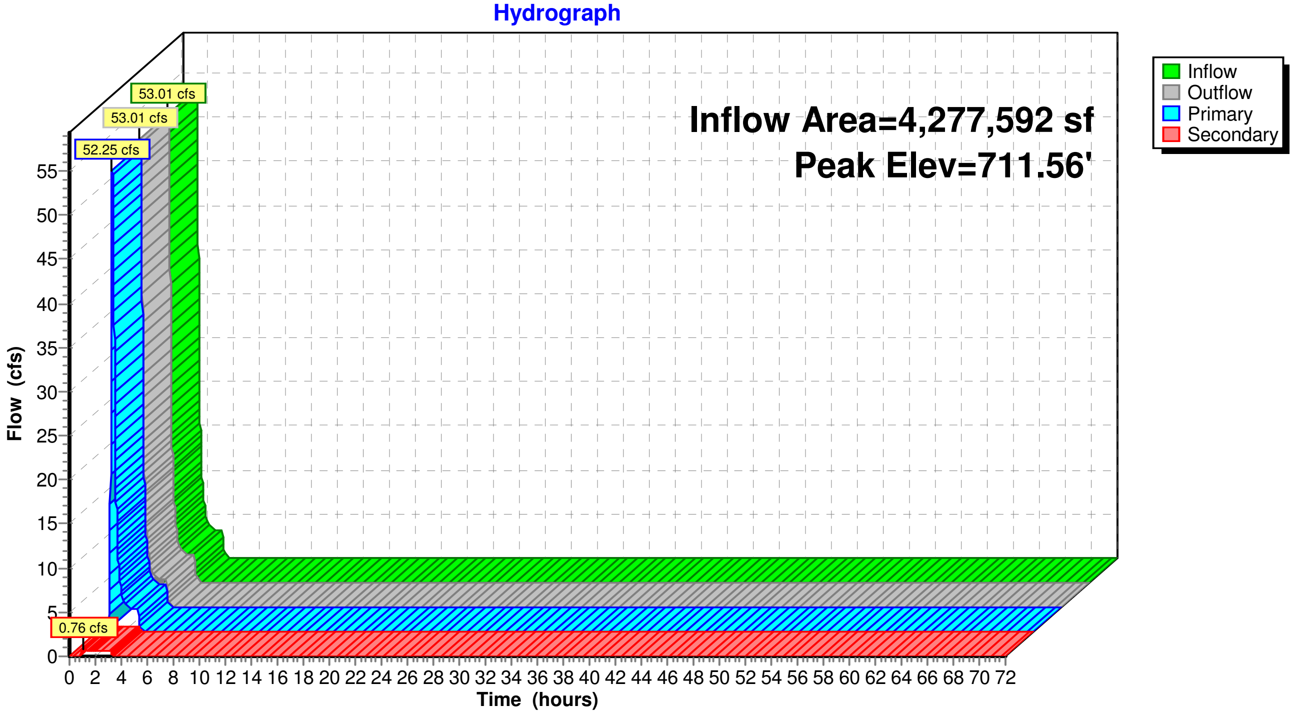
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 711.56' @ 1.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=52.20 cfs @ 1.15 hrs HW=711.55' TW=694.69' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 52.20 cfs @ 7.38 fps)
  ├─**3=Orifice/Grate** (Passes < 0.81 cfs potential flow)
  └─**4=Broad-Crested Rectangular Weir** (Passes < 53.86 cfs potential flow)

Secondary OutFlow Max=0.76 cfs @ 1.15 hrs HW=711.55' TW=691.45' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.76 cfs @ 3.88 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 690.35' (Flood elevation advised)

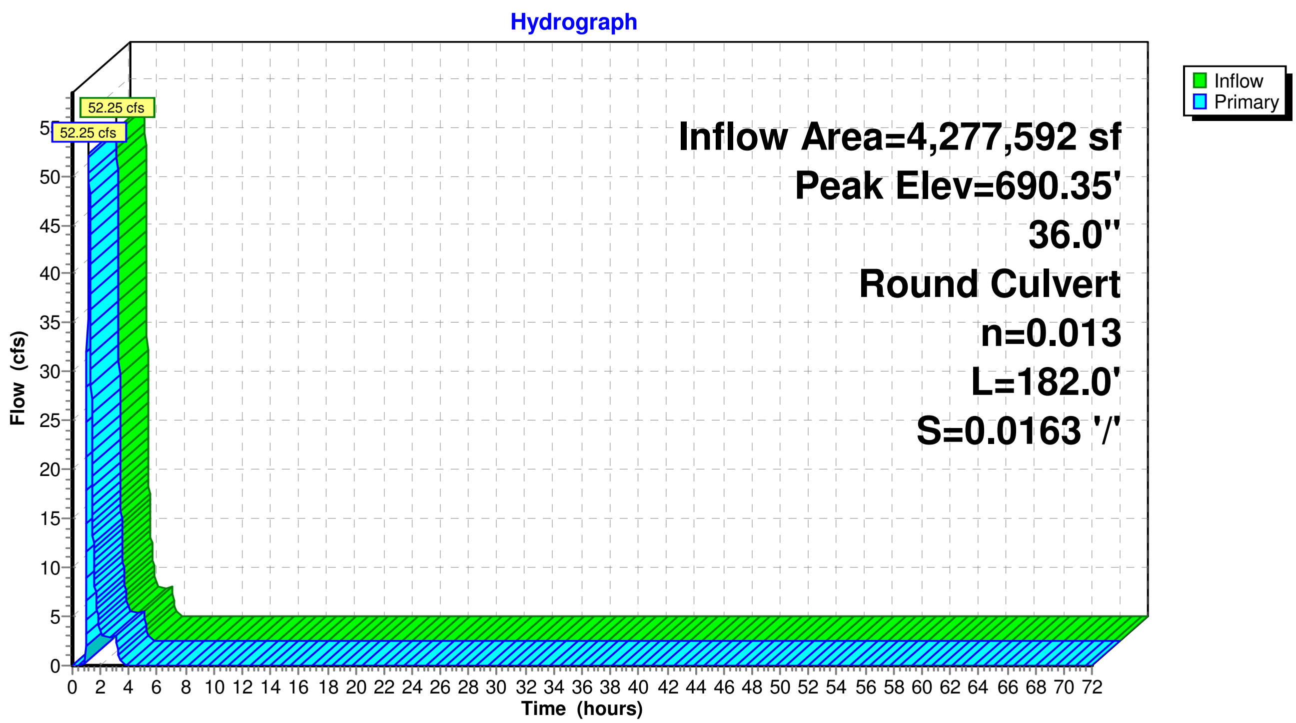
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.24"	for 25 YR SDS event
Inflow =	52.25 cfs @	1.15 hrs, Volume=	86,296 cf	
Outflow =	52.25 cfs @	1.15 hrs, Volume=	86,296 cf,	Atten= 0%, Lag= 0.0 min
Primary =	52.25 cfs @	1.15 hrs, Volume=	86,296 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 690.35' @ 1.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=52.20 cfs @ 1.15 hrs HW=690.34' TW=687.28' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 52.20 cfs @ 7.38 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 694.70' (Flood elevation advised)

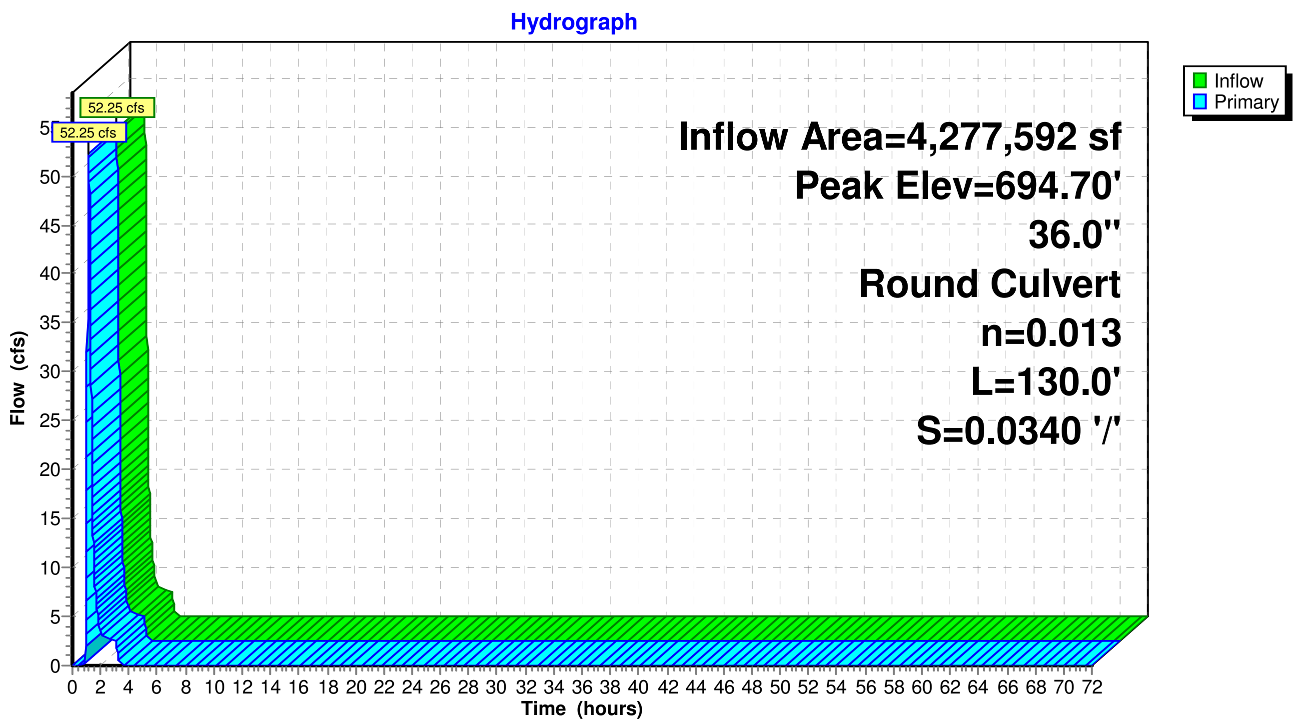
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.24"	for 25 YR SDS event	
Inflow =	52.25 cfs @	1.15 hrs,	Volume=	85,225 cf	
Outflow =	52.25 cfs @	1.15 hrs,	Volume=	85,225 cf,	Atten= 0%, Lag= 0.0 min
Primary =	52.25 cfs @	1.15 hrs,	Volume=	85,225 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.70' @ 1.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=52.20 cfs @ 1.15 hrs HW=694.69' TW=690.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 52.20 cfs @ 7.38 fps)

Pond 53P: Proposed MH



Summary for Pond 57P: Vortech 9000

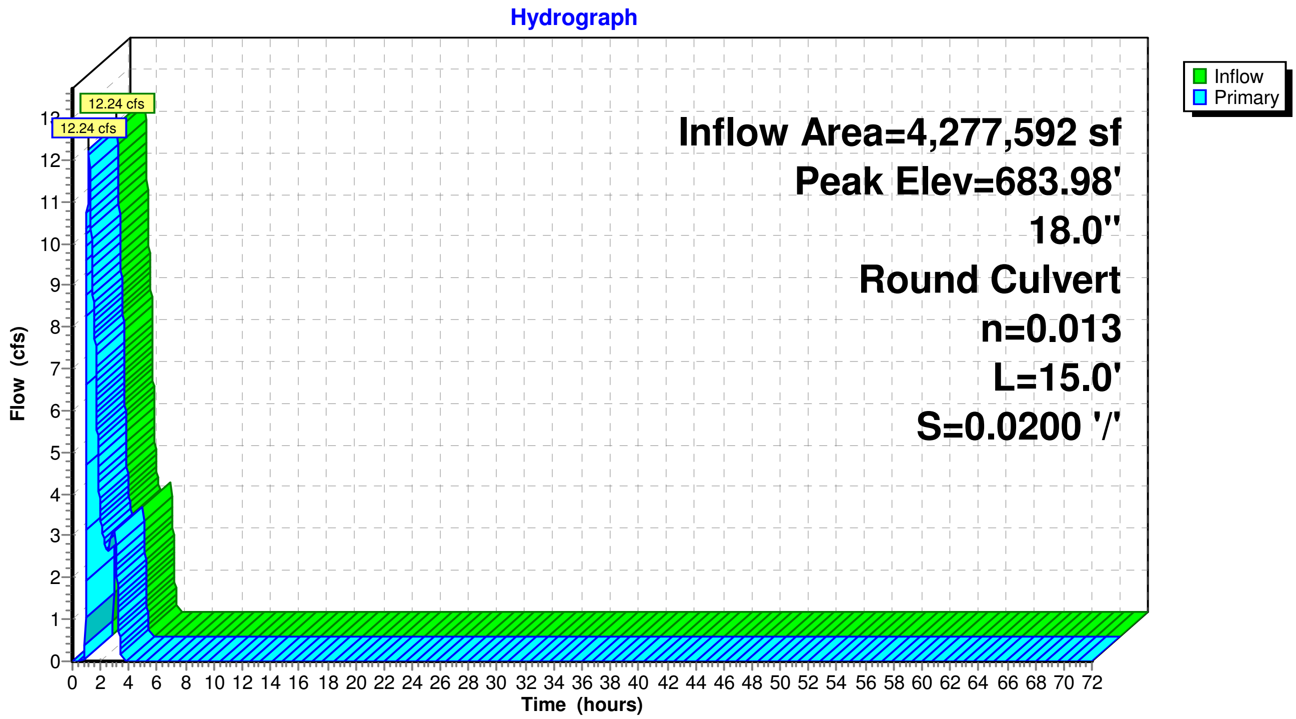
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.12" for 25 YR SDS event
Inflow = 12.24 cfs @ 1.16 hrs, Volume= 43,999 cf
Outflow = 12.24 cfs @ 1.16 hrs, Volume= 43,999 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.24 cfs @ 1.16 hrs, Volume= 43,999 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.98' @ 1.15 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=12.23 cfs @ 1.16 hrs HW=683.97' TW=681.90' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.23 cfs @ 6.92 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=1.13"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=25.75 cfs 402,336 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=1.30' Max Vel=8.78 fps Inflow=25.75 cfs 402,336 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=25.74 cfs 402,336 cf

Pond 31P: Bypass Structure Peak Elev=685.32' Inflow=25.69 cfs 395,312 cf
Primary=9.93 cfs 355,029 cf Secondary=15.76 cfs 40,284 cf Outflow=25.69 cfs 395,312 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.78' Storage=0.052 af Inflow=9.93 cfs 355,029 cf
Outflow=9.93 cfs 355,029 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.55' Storage=0.031 af Inflow=9.93 cfs 355,029 cf
Discarded=0.11 cfs 10,129 cf Primary=9.82 cfs 344,901 cf Outflow=9.93 cfs 355,029 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=684.60' Inflow=15.76 cfs 40,284 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=15.76 cfs 40,284 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=674.31' Inflow=15.76 cfs 40,284 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=15.76 cfs 40,284 cf

Pond 42P: Flow Converge Structure Peak Elev=673.36' Inflow=25.58 cfs 385,184 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=25.58 cfs 385,184 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=672.68' Inflow=25.58 cfs 385,184 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=25.58 cfs 385,184 cf

Pond 49P: Existing (New) Pond Peak Elev=694.83' Storage=3,629 cf Inflow=0.67 cfs 38,895 cf
Discarded=0.05 cfs 6,993 cf Primary=0.61 cfs 31,872 cf Outflow=0.67 cfs 38,864 cf

Pond 51P: Flow Splitter Peak Elev=710.61' Inflow=25.74 cfs 402,336 cf
Primary=25.08 cfs 363,441 cf Secondary=0.67 cfs 38,895 cf Outflow=25.74 cfs 402,336 cf

Pond 52P: Existing MH to be replaced Peak Elev=688.57' Inflow=25.69 cfs 395,312 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=25.69 cfs 395,312 cf

Pond 53P: Proposed MH Peak Elev=692.89' Inflow=25.08 cfs 363,441 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=25.08 cfs 363,441 cf

Pond 57P: Vortech 9000 Peak Elev=683.14' Inflow=9.93 cfs 355,029 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=9.93 cfs 355,029 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 402,336 cf Average Runoff Depth = 1.13"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

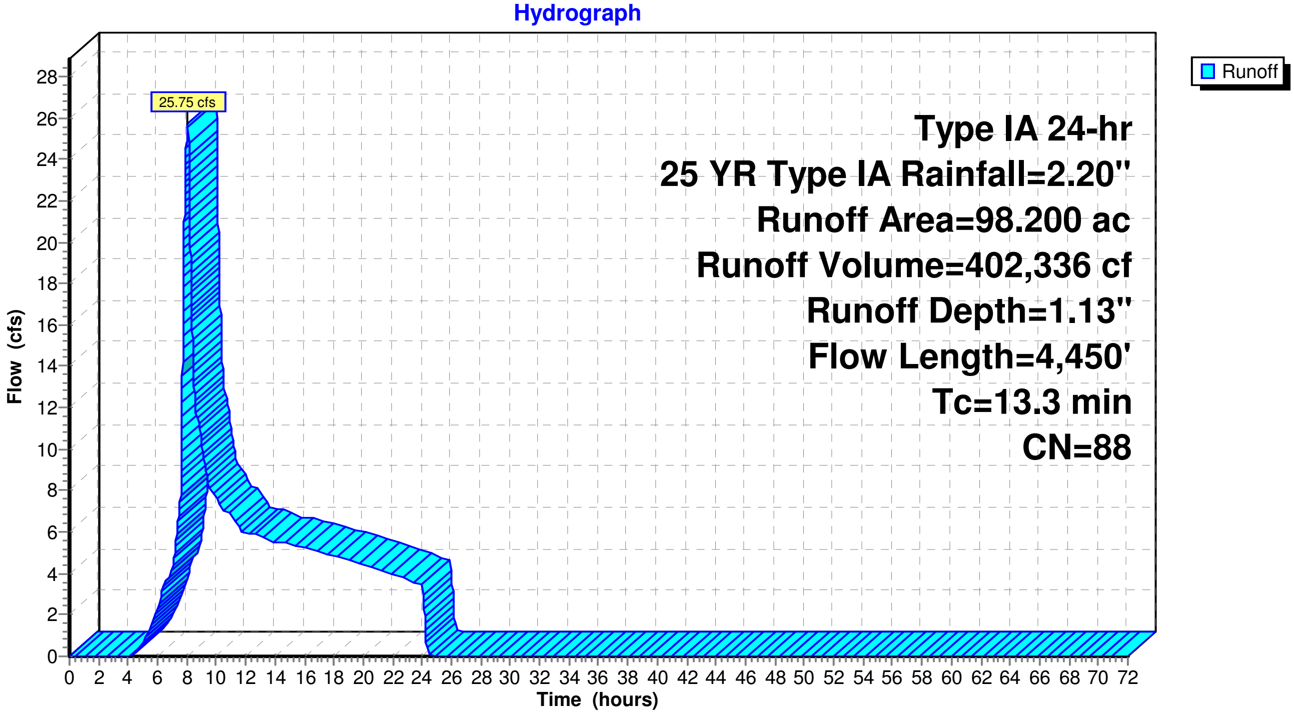
Runoff = 25.75 cfs @ 8.05 hrs, Volume= 402,336 cf, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25 YR Type IA Rainfall=2.20"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

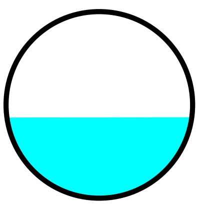
[52] Hint: Inlet/Outlet conditions not evaluated

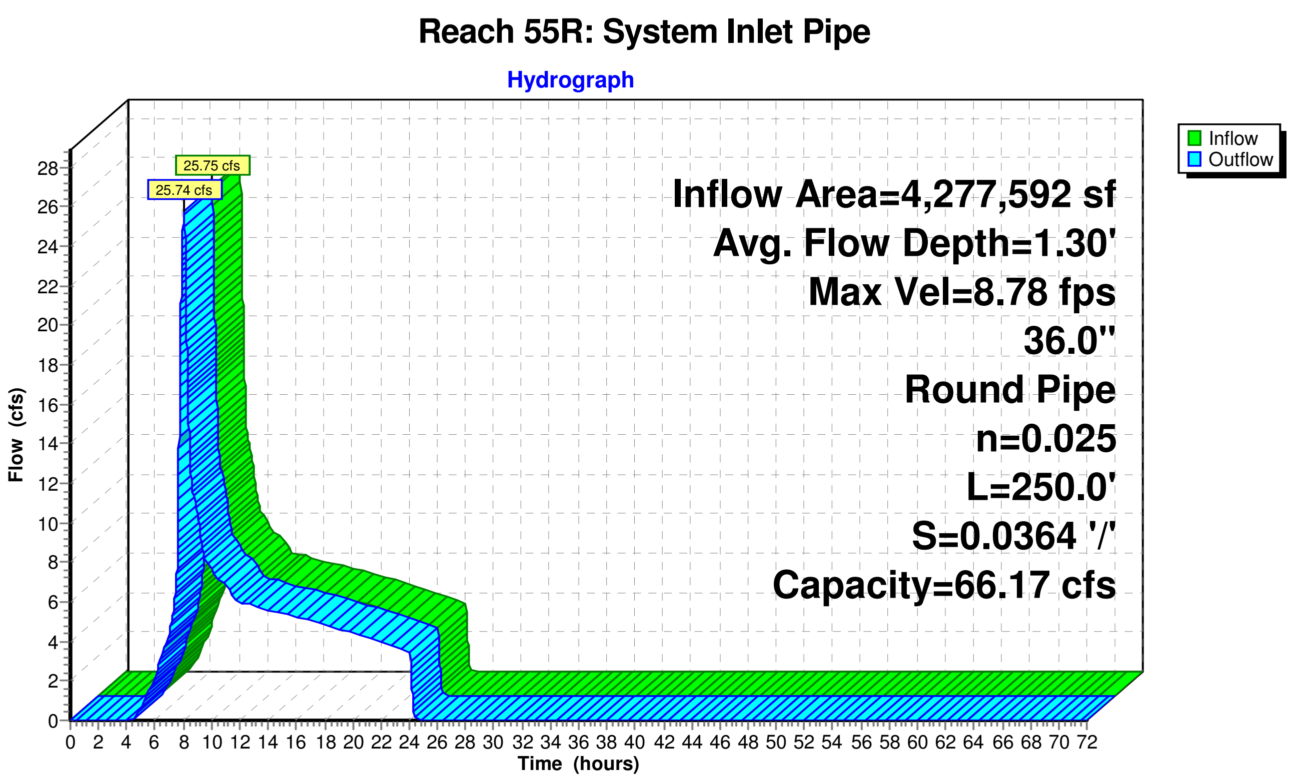
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.13" for 25 YR Type IA event
Inflow = 25.75 cfs @ 8.05 hrs, Volume= 402,336 cf
Outflow = 25.74 cfs @ 8.06 hrs, Volume= 402,336 cf, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 8.78 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 5.30 fps, Avg. Travel Time= 0.8 min

Peak Storage= 733 cf @ 8.06 hrs
Average Depth at Peak Storage= 1.30'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.11"	for 25 YR Type IA event	
Inflow =	25.69 cfs @	8.06 hrs,	Volume=	395,312 cf	
Outflow =	25.69 cfs @	8.06 hrs,	Volume=	395,312 cf,	Atten= 0%, Lag= 0.0 min
Primary =	9.93 cfs @	8.06 hrs,	Volume=	355,029 cf	
Secondary =	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf	

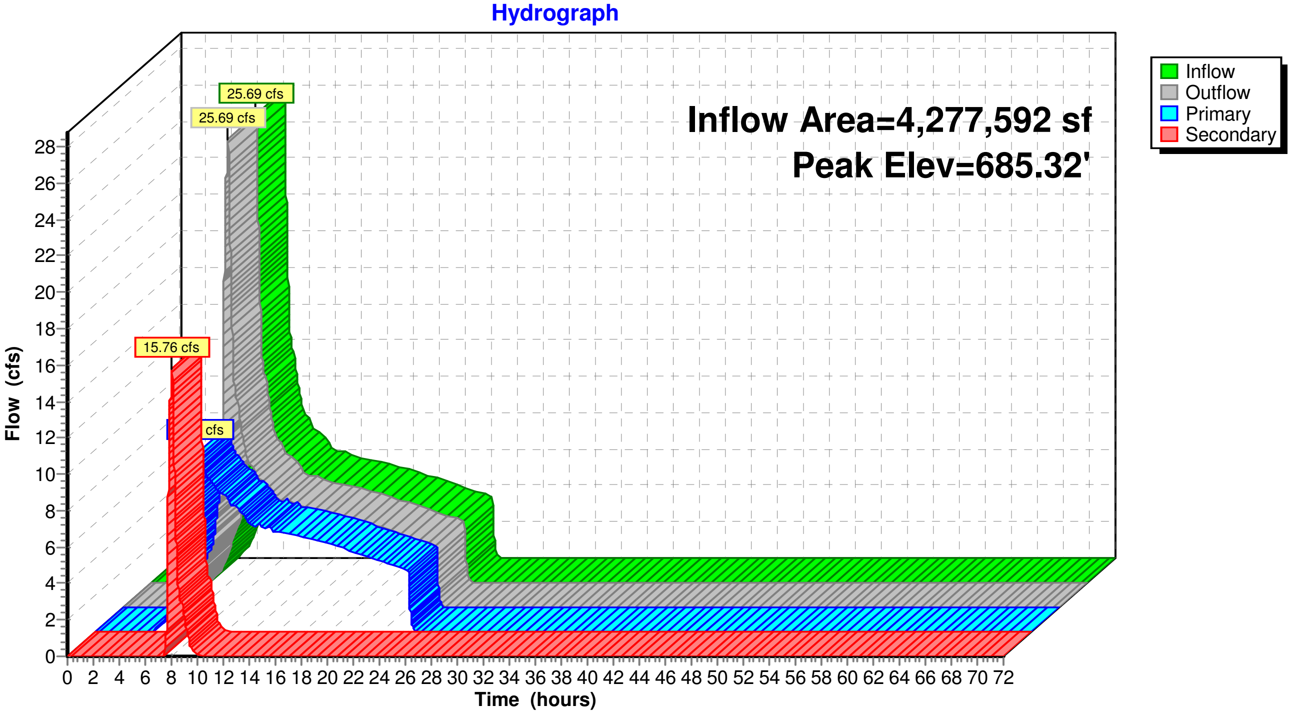
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.32' @ 8.06 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.93 cfs @ 8.06 hrs HW=685.32' TW=683.14' (Dynamic Tailwater)
└─**3=Culvert** (Passes 9.93 cfs of 12.57 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 9.93 cfs @ 7.11 fps)

Secondary OutFlow Max=15.75 cfs @ 8.06 hrs HW=685.32' TW=684.60' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 15.75 cfs @ 5.10 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.00" for 25 YR Type IA event
Inflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf
Outflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf, Atten= 0%, Lag= 0.1 min
Primary = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.78' @ 8.06 hrs Surf.Area= 0.002 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

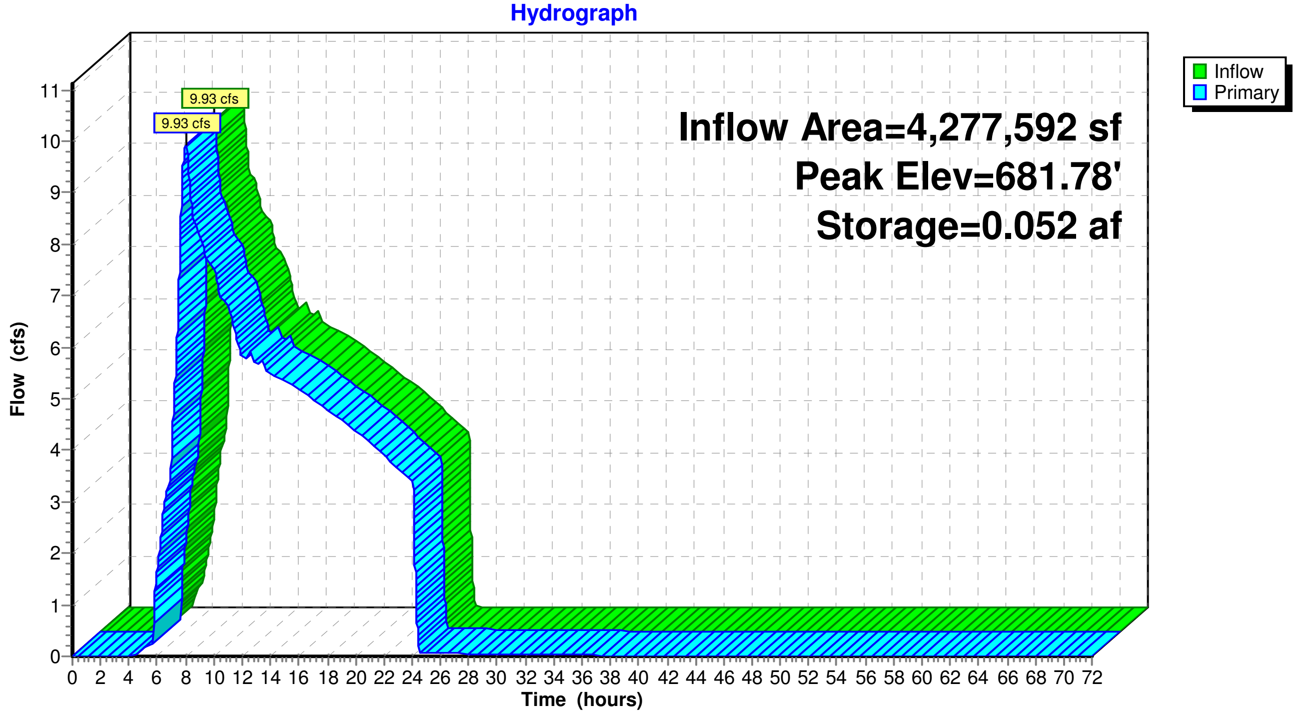
Plug-Flow detention time= 8.5 min calculated for 354,980 cf (100% of inflow)
Center-of-Mass det. time= 8.6 min (851.9 - 843.2)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=9.93 cfs @ 8.06 hrs HW=681.78' TW=681.55' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 9.93 cfs of 28.76 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.82 cfs @ 1.99 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 2.29 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.00" for 25 YR Type IA event
Inflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf
Outflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.11 cfs @ 8.06 hrs, Volume= 10,129 cf
Primary = 9.82 cfs @ 8.06 hrs, Volume= 344,901 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.55' @ 8.06 hrs Surf.Area= 0.011 ac Storage= 0.031 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 5.2 min calculated for 354,980 cf (100% of inflow)
Center-of-Mass det. time= 5.2 min (857.1 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 8.06 hrs HW=681.55' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=9.82 cfs @ 8.06 hrs HW=681.55' TW=673.36' (Dynamic Tailwater)
└─**1=Culvert** (Passes 9.82 cfs of 14.76 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 9.82 cfs @ 2.59 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

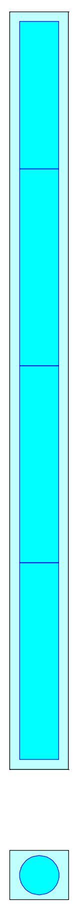
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

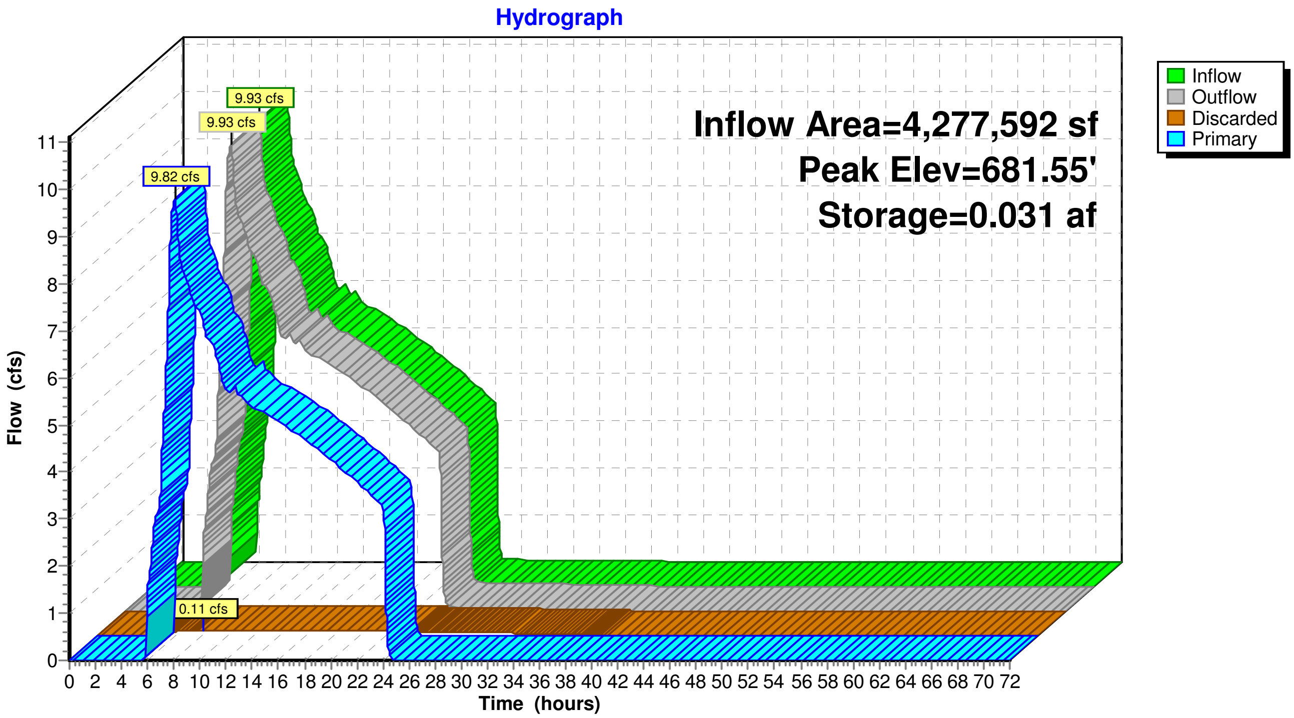
2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone



Pond 33P: 48" Perforated CMP



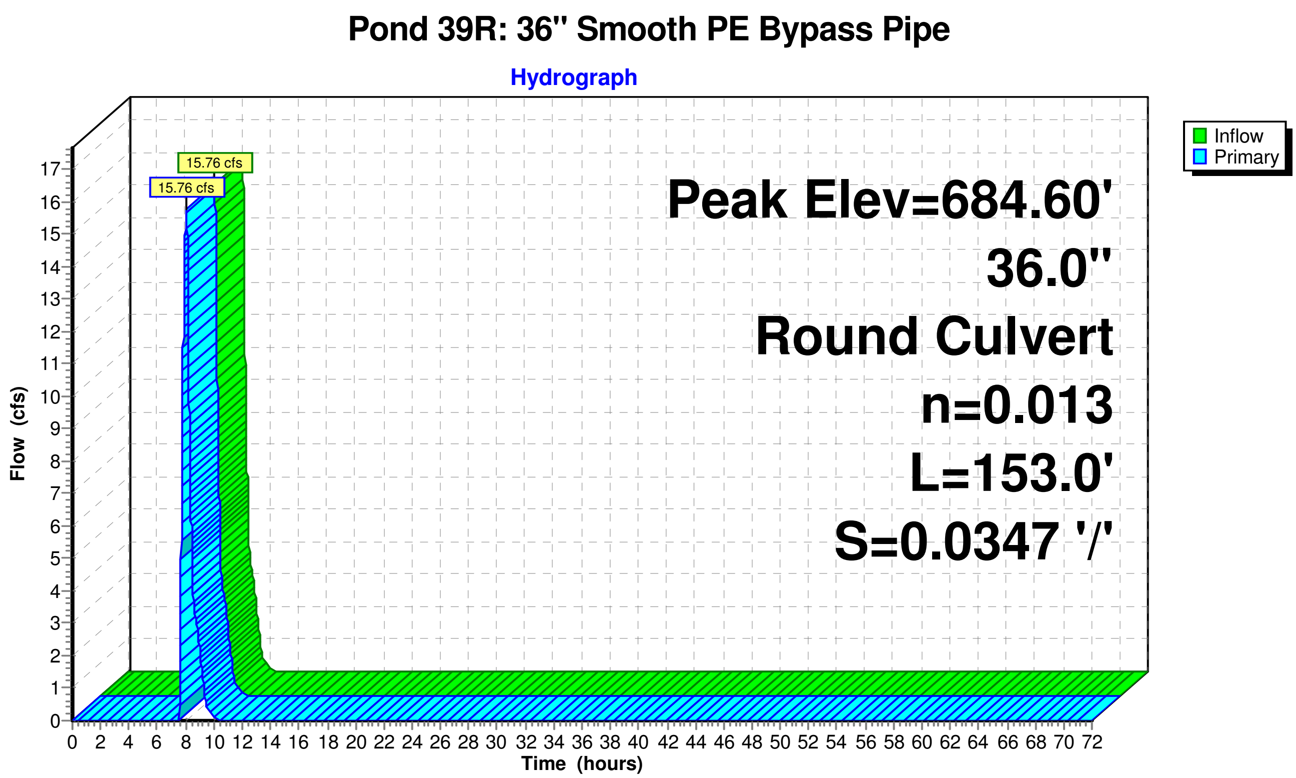
Summary for Pond 39R: 36" Smooth PE Bypass Pipe

Inflow	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf
Outflow	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf, Atten= 0%, Lag= 0.0 min
Primary	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.60' @ 8.06 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=15.75 cfs @ 8.06 hrs HW=684.60' TW=674.31' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 15.75 cfs @ 4.25 fps)



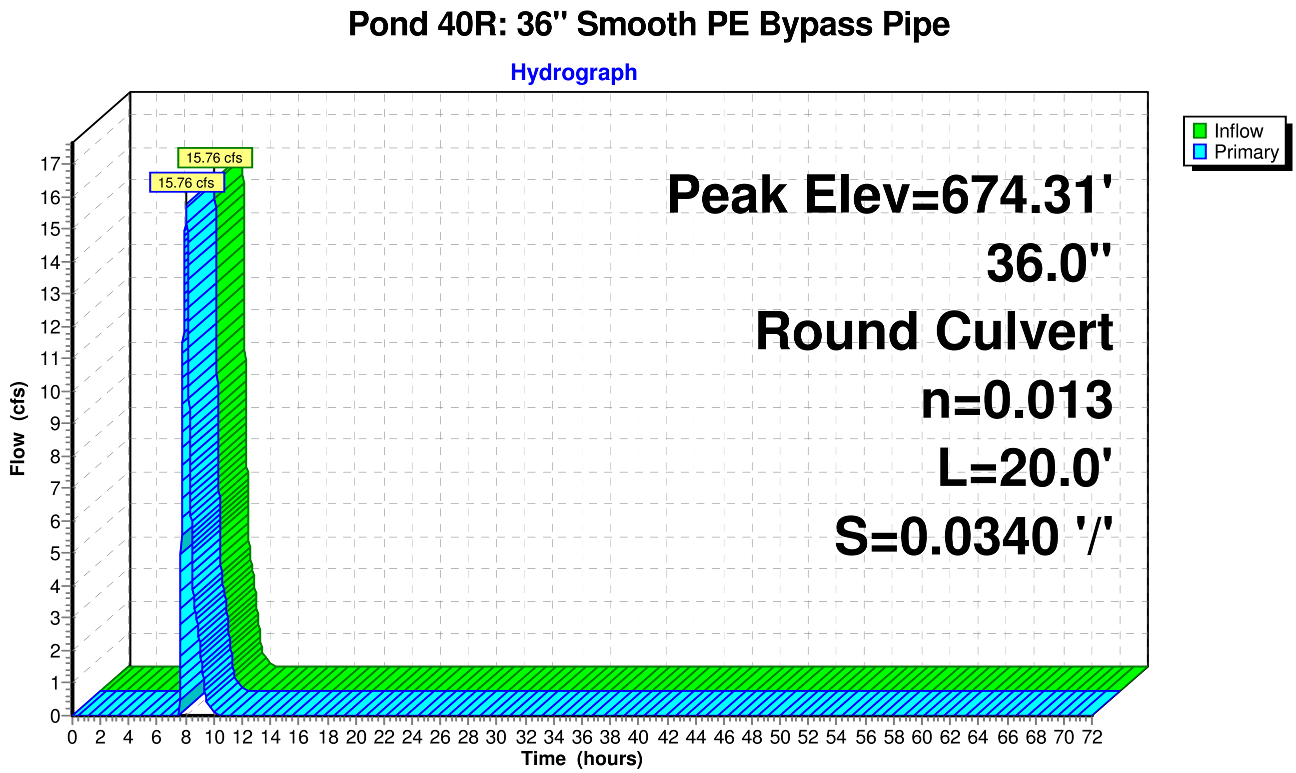
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf
Outflow	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf, Atten= 0%, Lag= 0.0 min
Primary	=	15.76 cfs @	8.06 hrs,	Volume=	40,284 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.31' @ 8.06 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=15.75 cfs @ 8.06 hrs HW=674.31' TW=673.36' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 15.75 cfs @ 6.05 fps)



Summary for Pond 42P: Flow Converge Structure

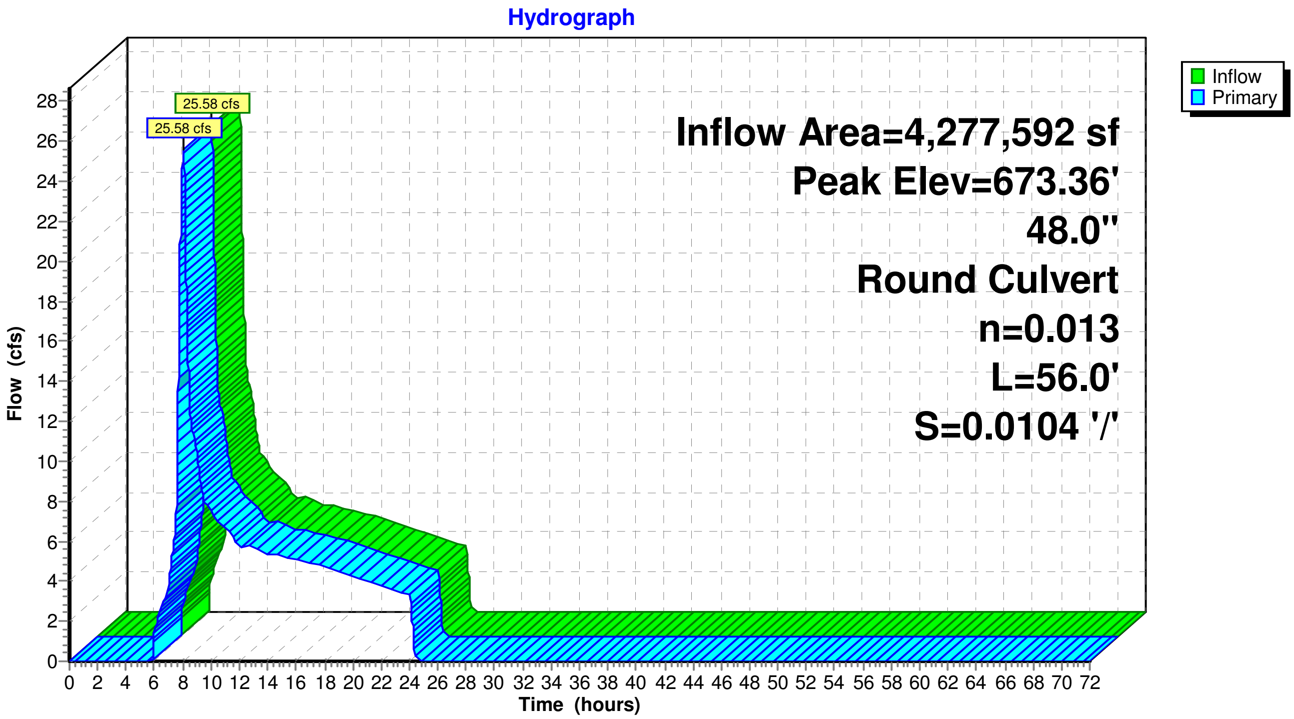
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.08" for 25 YR Type IA event
Inflow = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf
Outflow = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.36' @ 8.06 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=25.57 cfs @ 8.06 hrs HW=673.36' TW=672.68' (Dynamic Tailwater)
1=Culvert (Outlet Controls 25.57 cfs @ 4.90 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

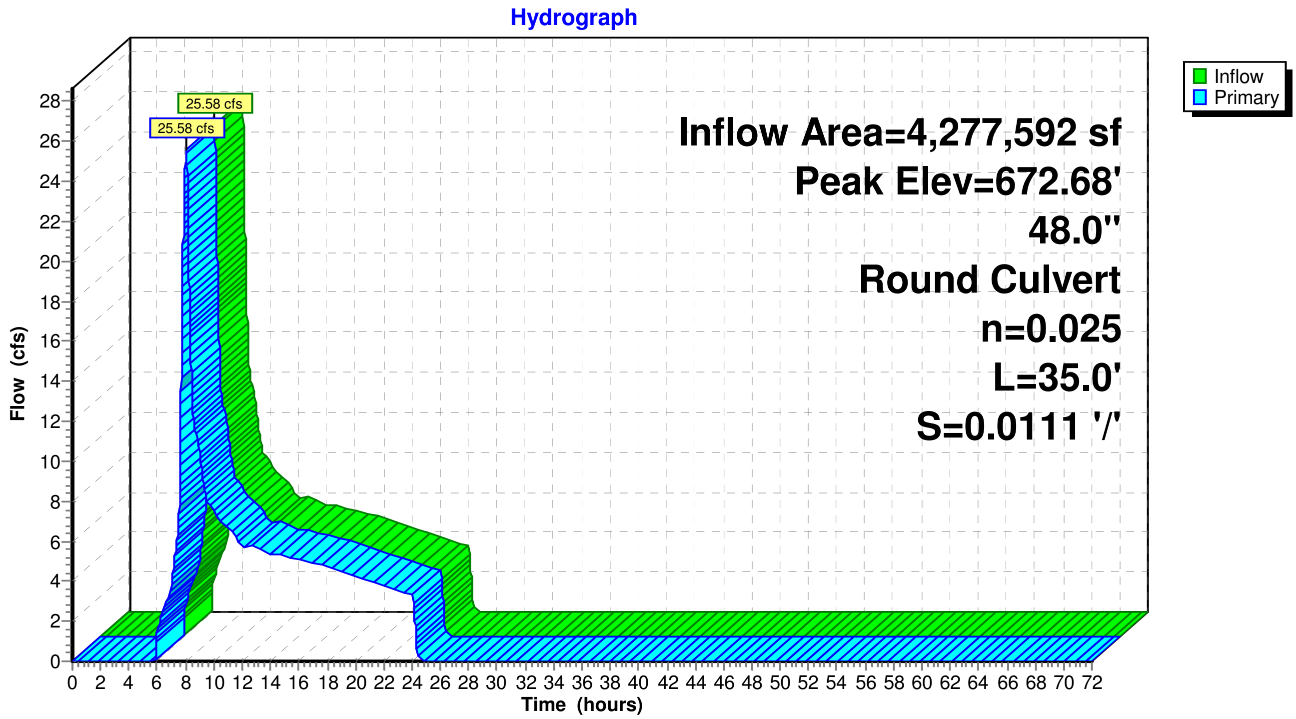
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.08" for 25 YR Type IA event
Inflow = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf
Outflow = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 25.58 cfs @ 8.06 hrs, Volume= 385,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.68' @ 8.06 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=25.57 cfs @ 8.06 hrs HW=672.68' (Free Discharge)
└─**1=Culvert** (Barrel Controls 25.57 cfs @ 5.19 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.67 cfs @	8.06 hrs,	Volume=	38,895 cf
Outflow	=	0.67 cfs @	8.08 hrs,	Volume=	38,864 cf, Atten= 0%, Lag= 1.4 min
Discarded	=	0.05 cfs @	8.08 hrs,	Volume=	6,993 cf
Primary	=	0.61 cfs @	8.08 hrs,	Volume=	31,872 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.83' @ 8.08 hrs Surf.Area= 1,500 sf Storage= 3,629 cf

Plug-Flow detention time= 182.2 min calculated for 38,864 cf (100% of inflow)
Center-of-Mass det. time= 181.8 min (1,055.5 - 873.7)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

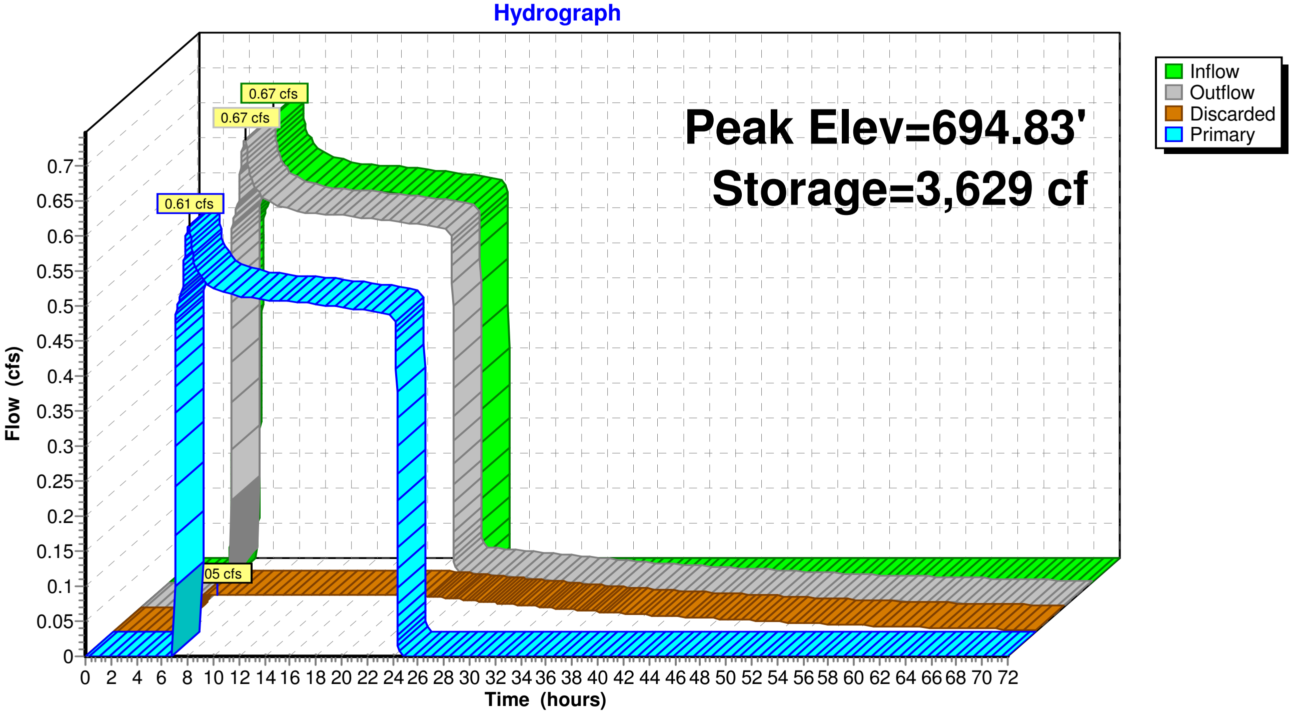
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 8.08 hrs HW=694.83' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.61 cfs @ 8.08 hrs HW=694.83' TW=688.56' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.61 cfs of 14.80 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.61 cfs @ 0.84 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 710.61' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.61' @ 8.06 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.13" for 25 YR Type IA event
Inflow = 25.74 cfs @ 8.06 hrs, Volume= 402,336 cf
Outflow = 25.74 cfs @ 8.06 hrs, Volume= 402,336 cf, Atten= 0%, Lag= 0.0 min
Primary = 25.08 cfs @ 8.06 hrs, Volume= 363,441 cf
Secondary = 0.67 cfs @ 8.06 hrs, Volume= 38,895 cf

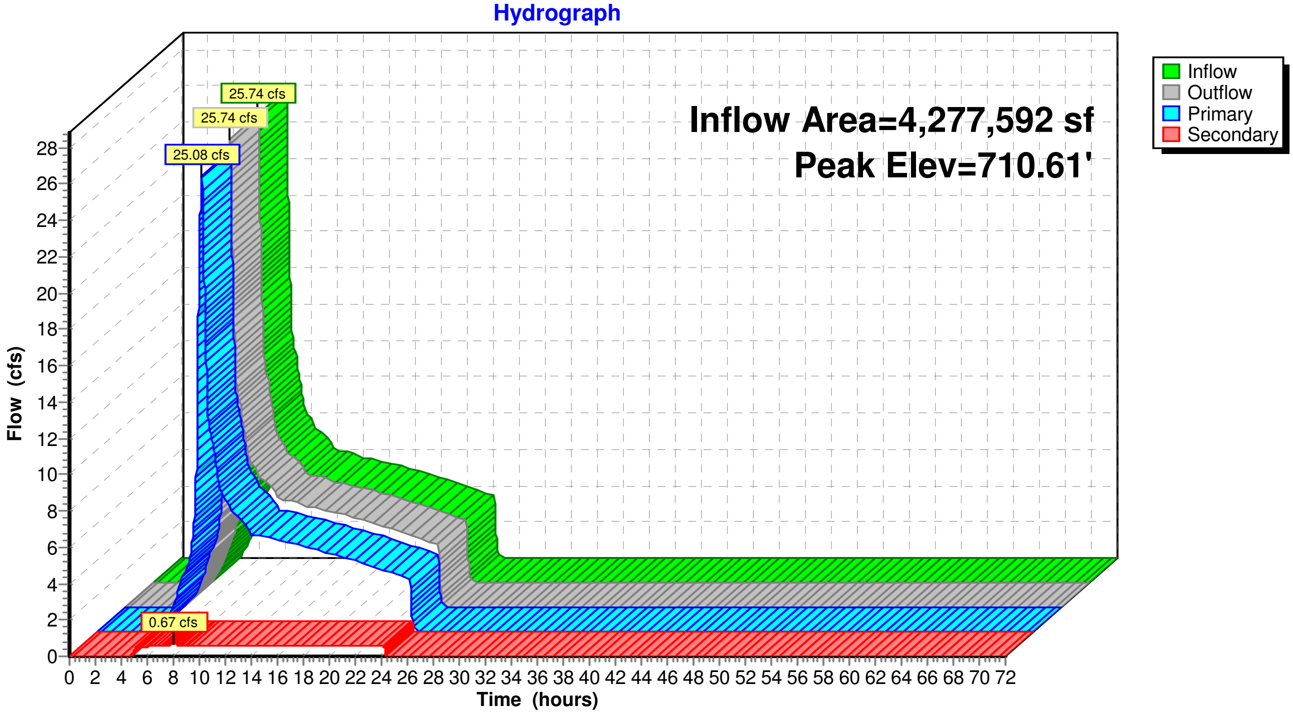
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.61' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=25.07 cfs @ 8.06 hrs HW=710.61' TW=692.89' (Dynamic Tailwater)
└─**2=Culvert** (Passes 25.07 cfs of 40.63 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.70 cfs @ 7.97 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 24.37 cfs @ 3.85 fps)

Secondary OutFlow Max=0.67 cfs @ 8.06 hrs HW=710.61' TW=694.83' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.67 cfs @ 3.40 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 688.57' (Flood elevation advised)

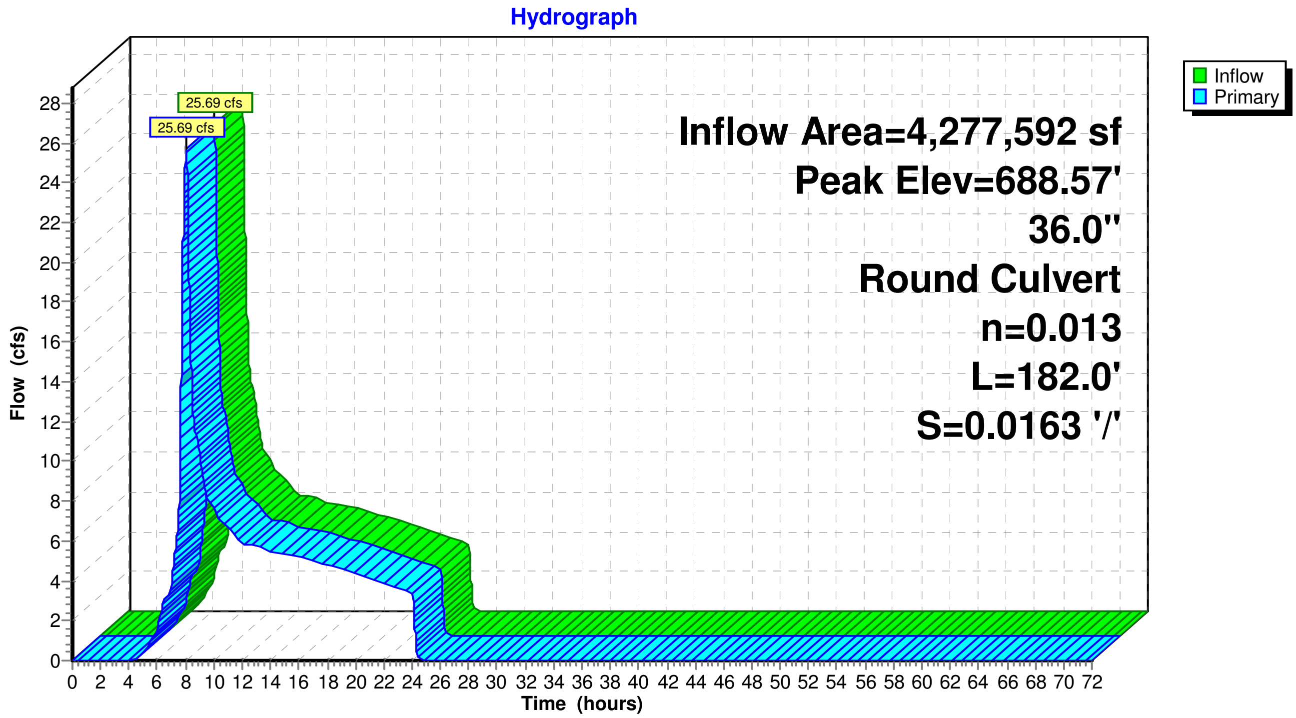
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.11"	for 25 YR Type IA event
Inflow =	25.69 cfs @	8.06 hrs, Volume=	395,312 cf	
Outflow =	25.69 cfs @	8.06 hrs, Volume=	395,312 cf,	Atten= 0%, Lag= 0.0 min
Primary =	25.69 cfs @	8.06 hrs, Volume=	395,312 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 688.57' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=25.68 cfs @ 8.06 hrs HW=688.57' TW=685.32' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 25.68 cfs @ 4.91 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

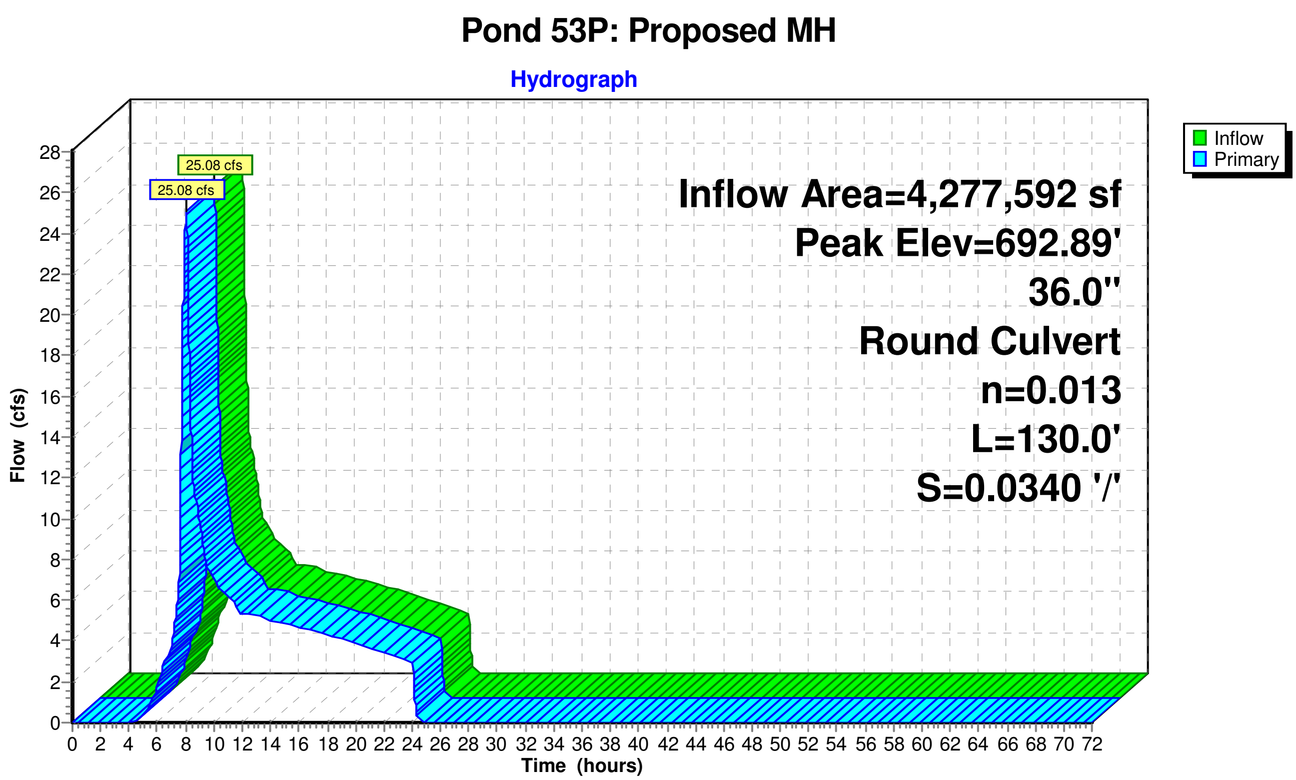
[57] Hint: Peaked at 692.89' (Flood elevation advised)

Inflow Area =	4,277,592 sf, 65.00% Impervious,	Inflow Depth = 1.02"	for 25 YR Type IA event
Inflow =	25.08 cfs @ 8.06 hrs,	Volume=	363,441 cf
Outflow =	25.08 cfs @ 8.06 hrs,	Volume=	363,441 cf, Atten= 0%, Lag= 0.0 min
Primary =	25.08 cfs @ 8.06 hrs,	Volume=	363,441 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 692.89' @ 8.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=25.07 cfs @ 8.06 hrs HW=692.89' TW=688.57' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 25.07 cfs @ 4.87 fps)



Summary for Pond 57P: Vortech 9000

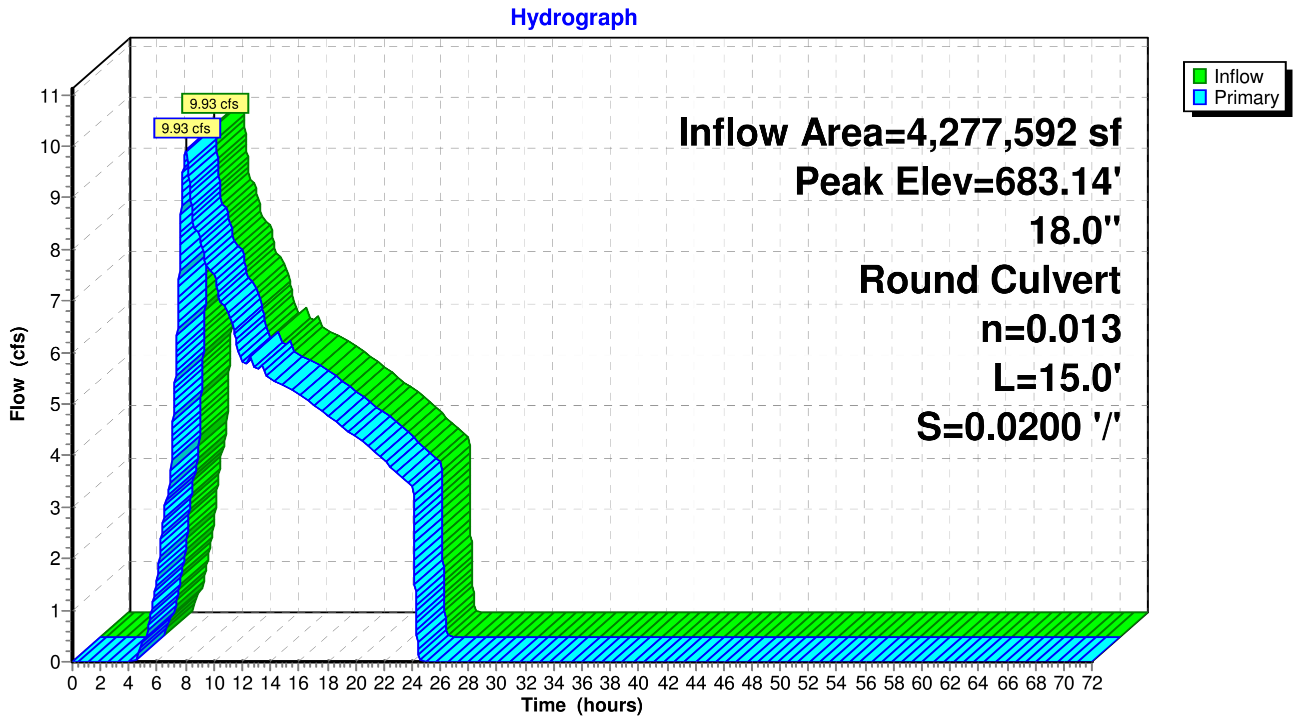
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.00" for 25 YR Type IA event
Inflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf
Outflow = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.93 cfs @ 8.06 hrs, Volume= 355,029 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.14' @ 8.06 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=9.93 cfs @ 8.06 hrs HW=683.14' TW=681.78' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.93 cfs @ 5.62 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.39"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=83.72 cfs 138,416 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=3.00' Max Vel=10.66 fps Inflow=83.72 cfs 138,416 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=70.72 cfs 138,416 cf

Pond 31P: Bypass Structure Peak Elev=689.78' Inflow=69.80 cfs 134,514 cf
Primary=14.55 cfs 57,608 cf Secondary=55.25 cfs 76,905 cf Outflow=69.80 cfs 134,514 cf

Pond 32P: 48" Unperforated Storage Peak Elev=682.09' Storage=0.052 af Inflow=14.55 cfs 57,608 cf
Outflow=16.09 cfs 57,608 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.75' Storage=0.032 af Inflow=16.09 cfs 57,608 cf
Discarded=0.11 cfs 3,922 cf Primary=14.45 cfs 53,687 cf Outflow=14.56 cfs 57,608 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=687.18' Inflow=55.25 cfs 76,905 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=55.25 cfs 76,905 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=678.51' Inflow=55.25 cfs 76,905 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=55.25 cfs 76,905 cf

Pond 42P: Flow Converge Structure Peak Elev=675.88' Inflow=69.68 cfs 130,592 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=69.68 cfs 130,592 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=674.55' Inflow=69.68 cfs 130,592 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=69.68 cfs 130,592 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,616 cf Inflow=0.92 cfs 5,377 cf
Discarded=0.05 cfs 3,902 cf Primary=0.50 cfs 1,475 cf Outflow=0.55 cfs 5,377 cf

Pond 51P: Flow Splitter Peak Elev=713.41' Inflow=70.72 cfs 138,416 cf
Primary=69.80 cfs 133,039 cf Secondary=0.92 cfs 5,377 cf Outflow=70.72 cfs 138,416 cf

Pond 52P: Existing MH to be replaced Peak Elev=694.05' Inflow=69.80 cfs 134,514 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=69.80 cfs 134,514 cf

Pond 53P: Proposed MH Peak Elev=697.98' Inflow=69.80 cfs 133,039 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=69.80 cfs 133,039 cf

Pond 57P: Vortech 9000 Peak Elev=685.01' Inflow=14.55 cfs 57,608 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=14.55 cfs 57,608 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 138,416 cf Average Runoff Depth = 0.39"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

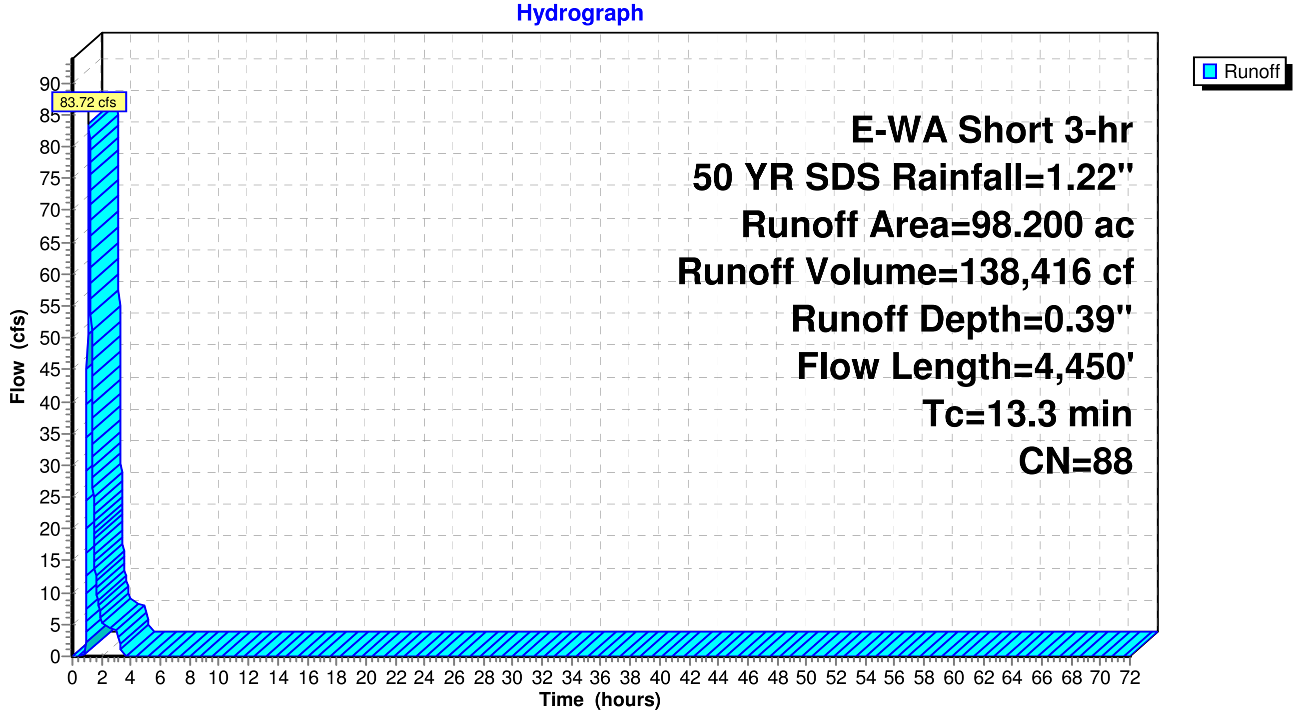
Runoff = 83.72 cfs @ 1.14 hrs, Volume= 138,416 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 50 YR SDS Rainfall=1.22"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

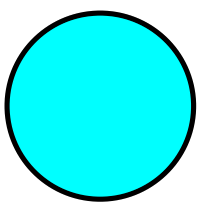
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 127% of Manning's capacity
[76] Warning: Detained 6,725 cf (Pond w/culvert advised)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.39" for 50 YR SDS event
Inflow = 83.72 cfs @ 1.14 hrs, Volume= 138,416 cf
Outflow = 70.72 cfs @ 1.08 hrs, Volume= 138,416 cf, Atten= 16%, Lag= 0.0 min

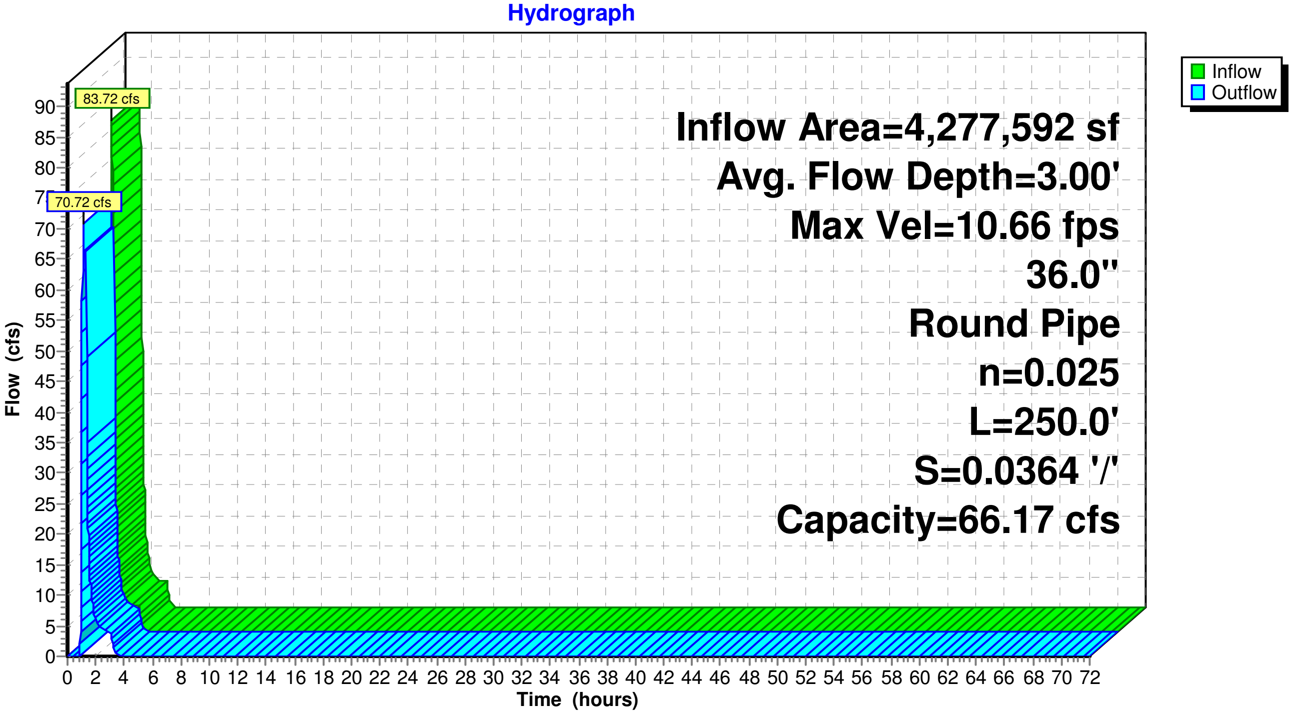
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 10.66 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 5.05 fps, Avg. Travel Time= 0.8 min

Peak Storage= 1,767 cf @ 1.09 hrs
Average Depth at Peak Storage= 3.00'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

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[58] Hint: Peaked 2.44' above defined flood level

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.38" for 50 YR SDS event
Inflow = 69.80 cfs @ 1.08 hrs, Volume= 134,514 cf
Outflow = 69.80 cfs @ 1.08 hrs, Volume= 134,514 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.55 cfs @ 1.08 hrs, Volume= 57,608 cf
Secondary = 55.25 cfs @ 1.08 hrs, Volume= 76,905 cf

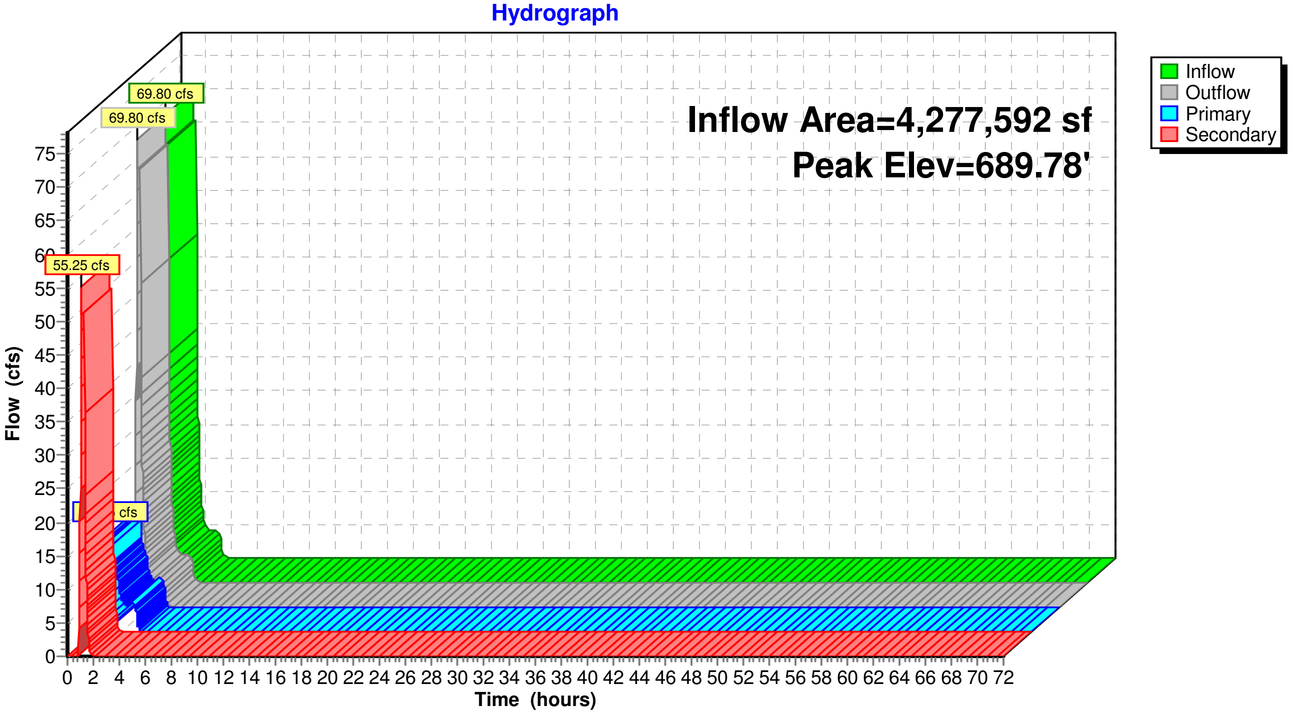
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 689.78' @ 1.08 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=14.66 cfs @ 1.08 hrs HW=689.75' TW=685.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 14.66 cfs of 18.55 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 14.66 cfs @ 10.50 fps)

Secondary OutFlow Max=54.78 cfs @ 1.08 hrs HW=689.74' TW=687.15' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 54.78 cfs @ 7.75 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[93] Warning: Storage range exceeded by 0.30'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=6)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.16" for 50 YR SDS event
Inflow = 14.55 cfs @ 1.08 hrs, Volume= 57,608 cf
Outflow = 16.09 cfs @ 1.08 hrs, Volume= 57,608 cf, Atten= 0%, Lag= 0.0 min
Primary = 16.09 cfs @ 1.08 hrs, Volume= 57,608 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 682.09' @ 1.08 hrs Surf.Area= 0.000 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

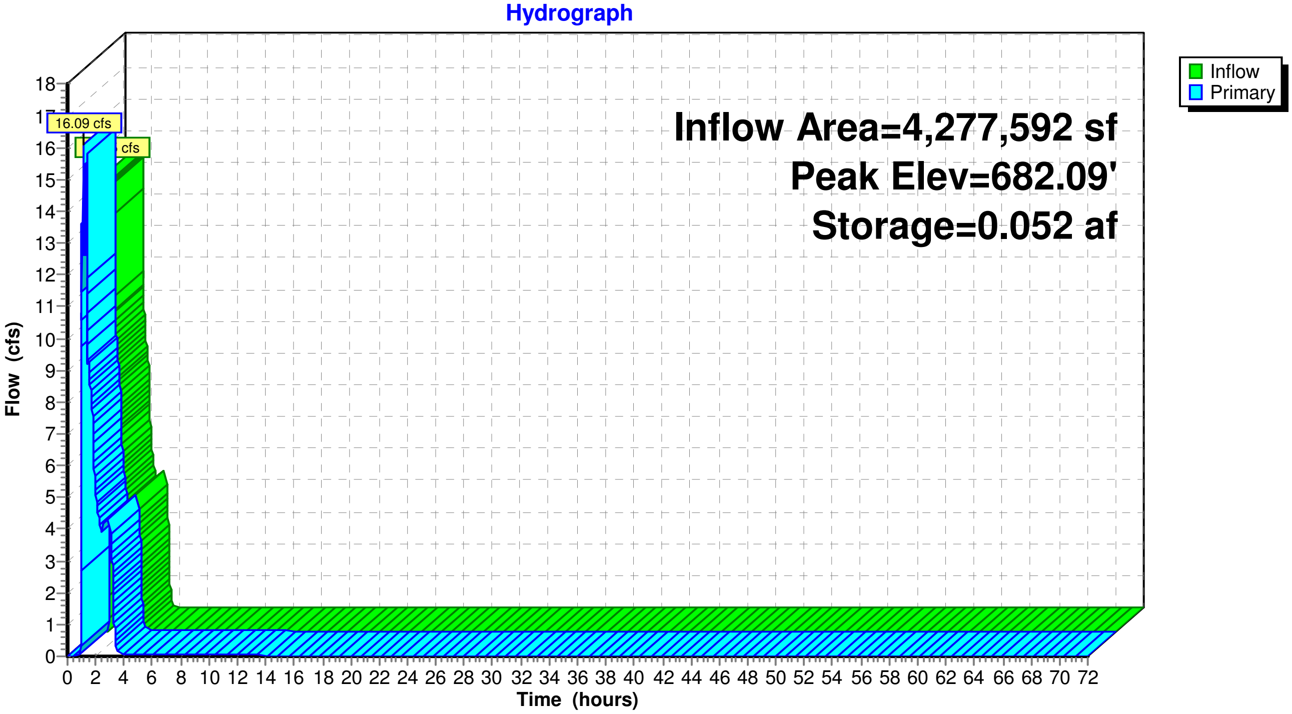
Plug-Flow detention time= 16.1 min calculated for 57,600 cf (100% of inflow)
Center-of-Mass det. time= 16.2 min (123.6 - 107.4)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=16.19 cfs @ 1.08 hrs HW=682.08' TW=681.75' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 16.19 cfs of 35.19 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 16.06 cfs @ 2.48 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 2.80 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

[58] Hint: Peaked 0.03' above defined flood level

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.16"	for 50 YR SDS event
Inflow =	16.09 cfs @	1.08 hrs, Volume=	57,608 cf	
Outflow =	14.56 cfs @	1.08 hrs, Volume=	57,608 cf,	Atten= 9%, Lag= 0.1 min
Discarded =	0.11 cfs @	1.08 hrs, Volume=	3,922 cf	
Primary =	14.45 cfs @	1.08 hrs, Volume=	53,687 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.75' @ 1.08 hrs Surf.Area= 0.011 ac Storage= 0.032 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 10.7 min calculated for 57,600 cf (100% of inflow)
Center-of-Mass det. time= 10.7 min (134.3 - 123.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 1.08 hrs HW=681.74' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=14.39 cfs @ 1.08 hrs HW=681.74' TW=675.81' (Dynamic Tailwater)
└─**1=Culvert** (Passes 14.39 cfs of 15.23 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 14.39 cfs @ 3.01 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

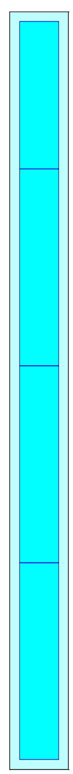
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

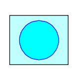
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

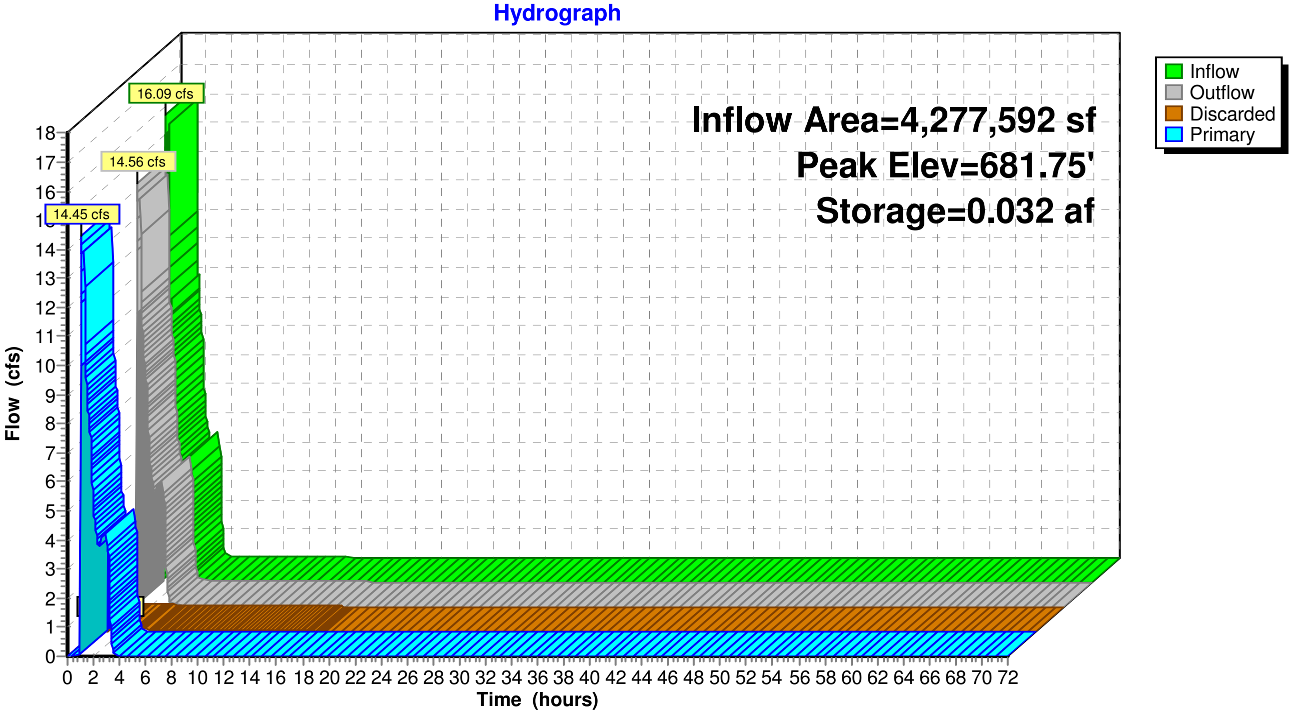
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

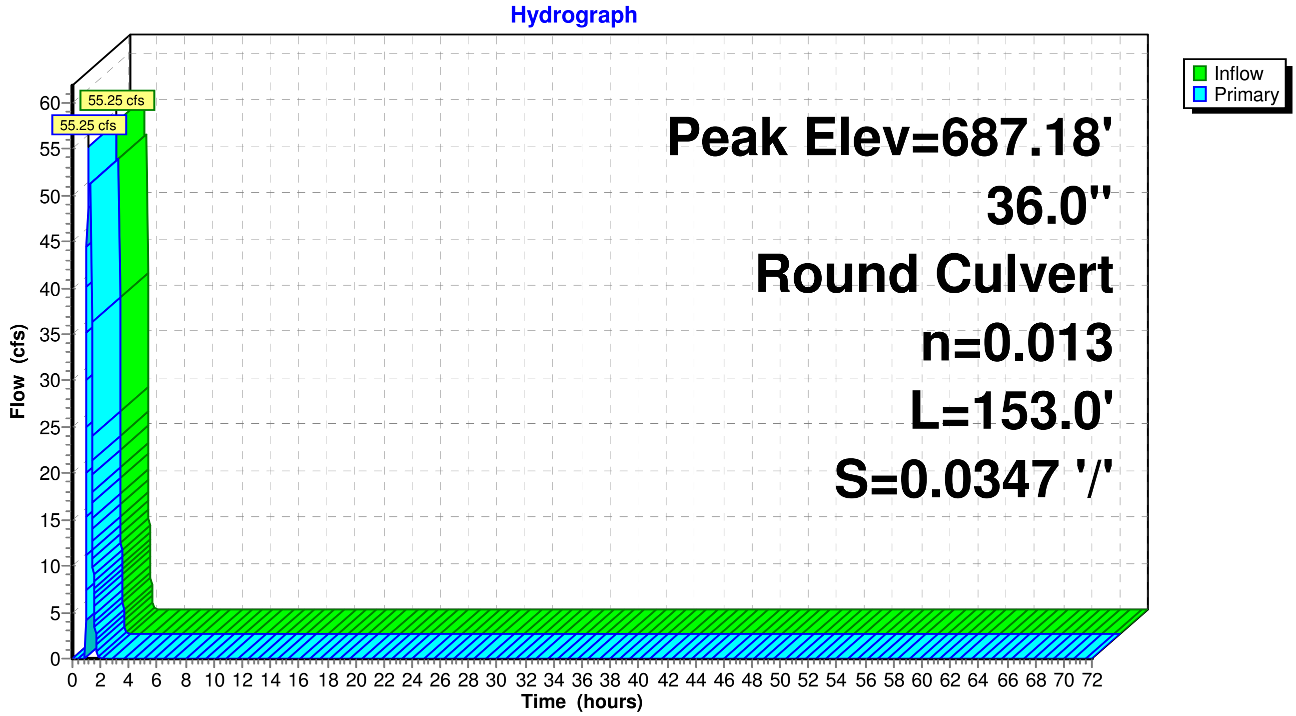
Inflow	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf
Outflow	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf, Atten= 0%, Lag= 0.0 min
Primary	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 687.18' @ 1.08 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=55.02 cfs @ 1.08 hrs HW=687.15' TW=678.47' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 55.02 cfs @ 7.78 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

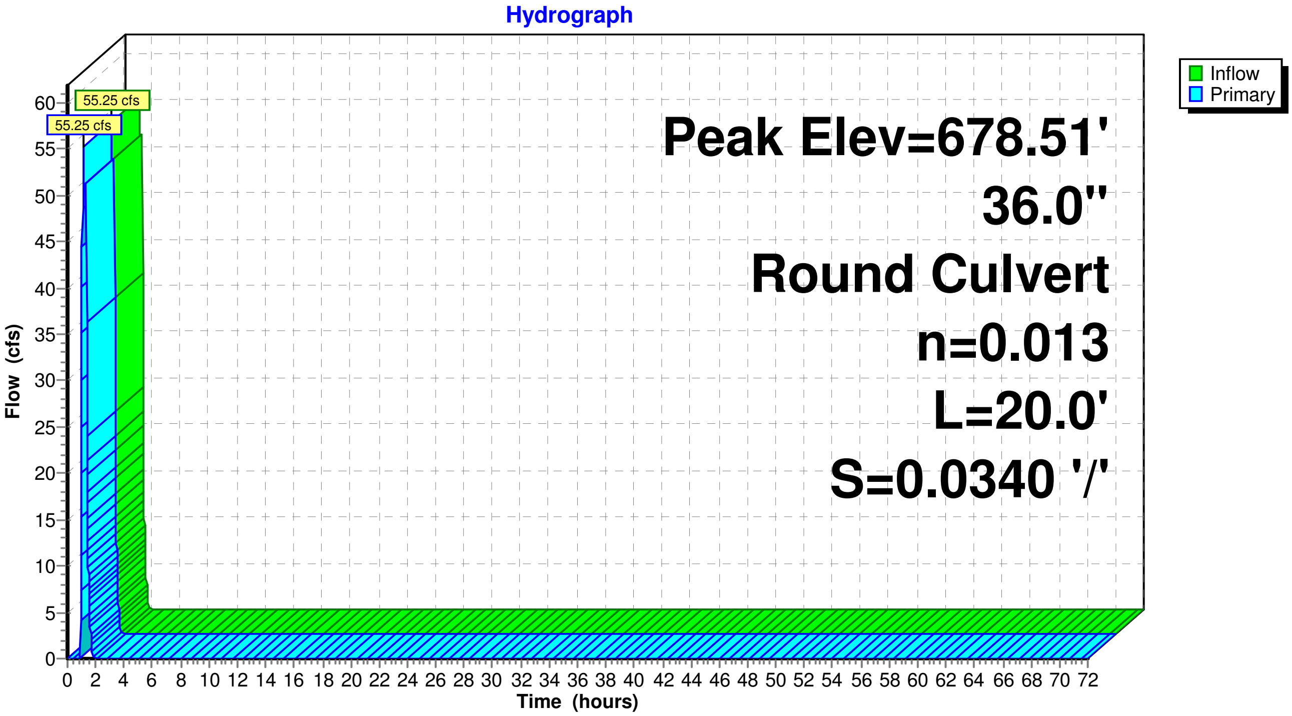
Inflow	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf
Outflow	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf, Atten= 0%, Lag= 0.0 min
Primary	=	55.25 cfs @	1.08 hrs,	Volume=	76,905 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 678.51' @ 1.08 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=55.02 cfs @ 1.08 hrs HW=678.47' TW=675.86' (Dynamic Tailwater)
1=Culvert (Inlet Controls 55.02 cfs @ 7.78 fps)

Pond 40R: 36" Smooth PE Bypass Pipe



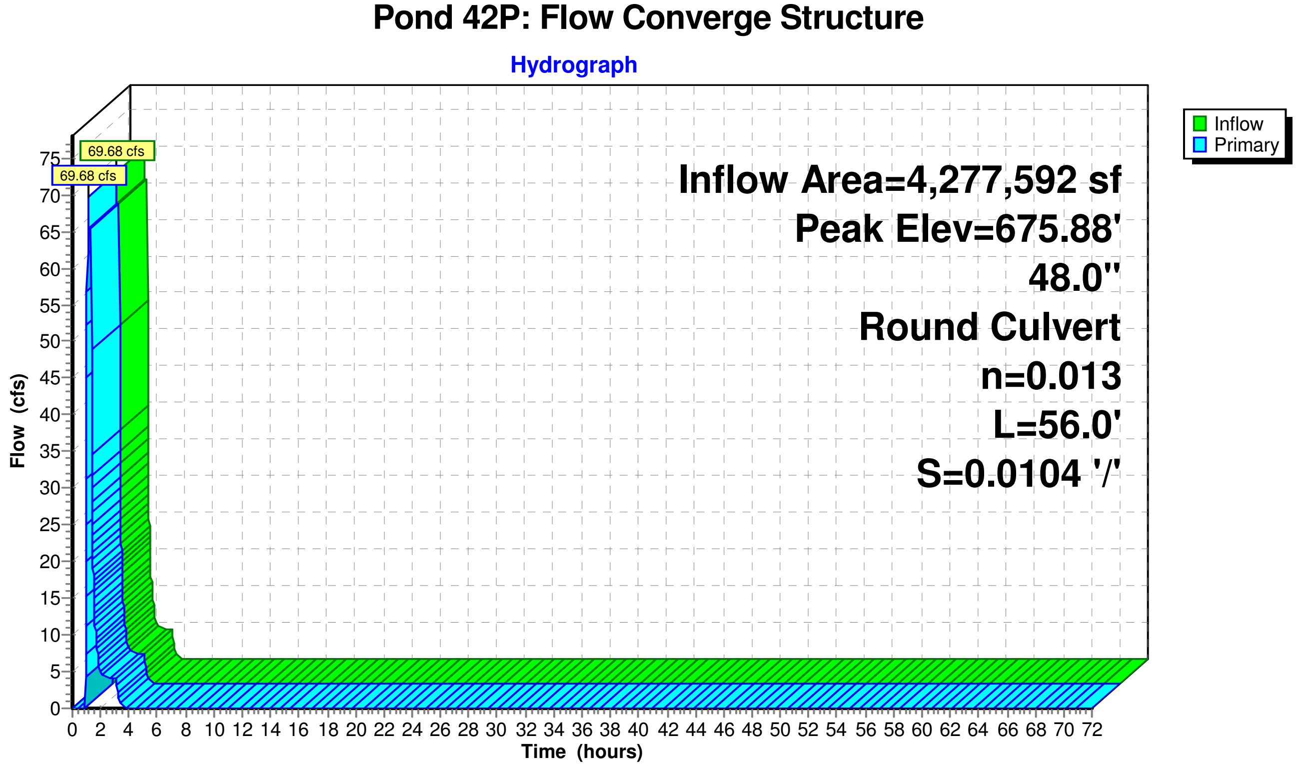
Summary for Pond 42P: Flow Converge Structure

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.37" for 50 YR SDS event
Inflow = 69.68 cfs @ 1.08 hrs, Volume= 130,592 cf
Outflow = 69.68 cfs @ 1.08 hrs, Volume= 130,592 cf, Atten= 0%, Lag= 0.0 min
Primary = 69.68 cfs @ 1.08 hrs, Volume= 130,592 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 675.88' @ 1.08 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=69.43 cfs @ 1.08 hrs HW=675.86' TW=674.55' (Dynamic Tailwater)
1=Culvert (Inlet Controls 69.43 cfs @ 5.52 fps)



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

[58] Hint: Peaked 0.08' above defined flood level

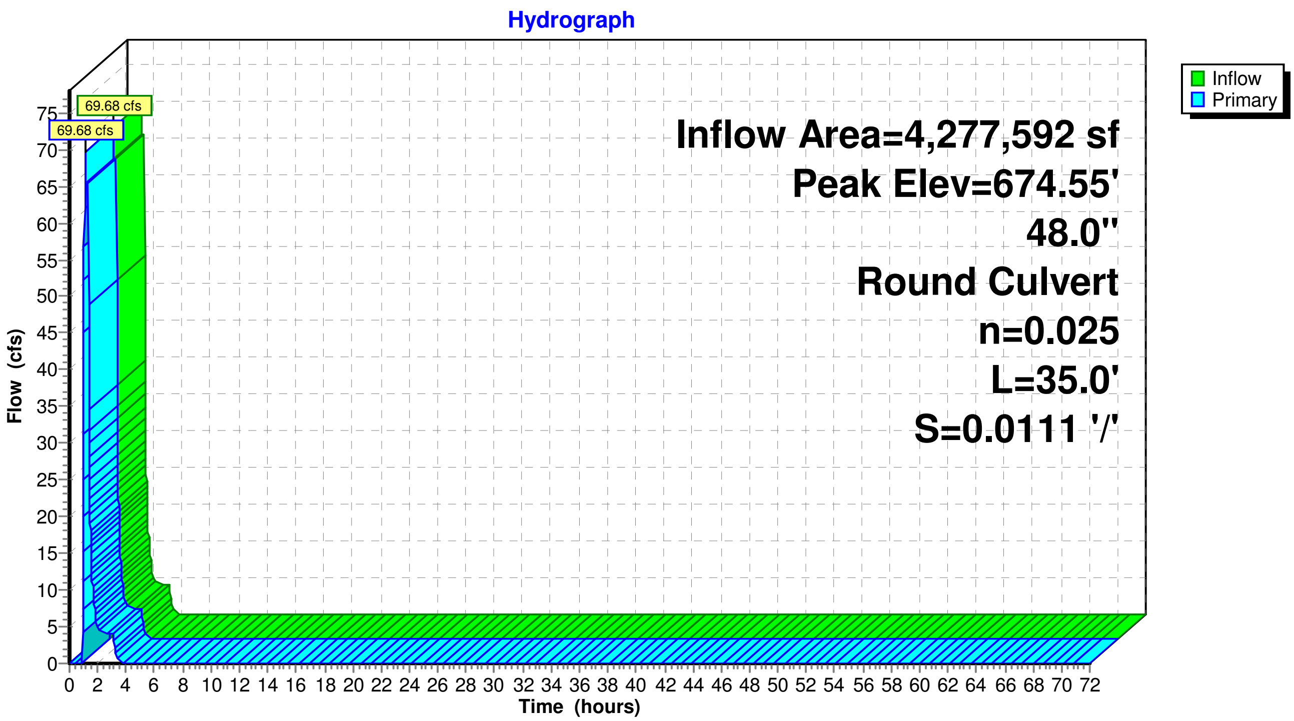
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.37"	for 50 YR SDS event	
Inflow =	69.68 cfs @	1.08 hrs,	Volume=	130,592 cf	
Outflow =	69.68 cfs @	1.08 hrs,	Volume=	130,592 cf,	Atten= 0%, Lag= 0.0 min
Primary =	69.68 cfs @	1.08 hrs,	Volume=	130,592 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.55' @ 1.08 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=69.51 cfs @ 1.08 hrs HW=674.55' (Free Discharge)
1=Culvert (Barrel Controls 69.51 cfs @ 6.74 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.92 cfs @	1.08 hrs,	Volume=	5,377 cf
Outflow	=	0.55 cfs @	3.03 hrs,	Volume=	5,377 cf, Atten= 40%, Lag= 116.9 min
Discarded	=	0.05 cfs @	3.03 hrs,	Volume=	3,902 cf
Primary	=	0.50 cfs @	3.03 hrs,	Volume=	1,475 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 3.03 hrs Surf.Area= 1,496 sf Storage= 3,616 cf

Plug-Flow detention time= 663.0 min calculated for 5,376 cf (100% of inflow)
Center-of-Mass det. time= 663.3 min (784.3 - 120.9)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

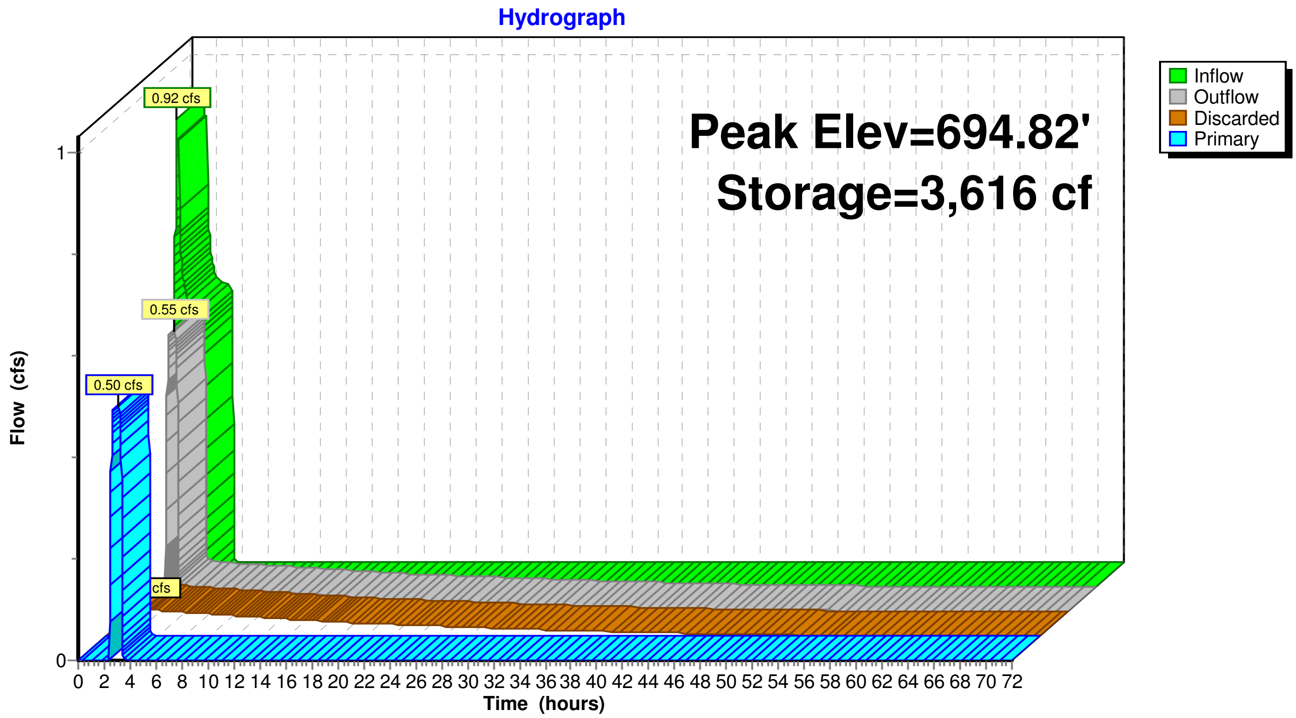
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 3.03 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.50 cfs @ 3.03 hrs HW=694.82' TW=687.27' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.50 cfs of 14.78 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.50 cfs @ 0.79 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 713.41' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 2.99' @ 1.08 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.39" for 50 YR SDS event
Inflow = 70.72 cfs @ 1.08 hrs, Volume= 138,416 cf
Outflow = 70.72 cfs @ 1.08 hrs, Volume= 138,416 cf, Atten= 0%, Lag= 0.0 min
Primary = 69.80 cfs @ 1.08 hrs, Volume= 133,039 cf
Secondary = 0.92 cfs @ 1.08 hrs, Volume= 5,377 cf

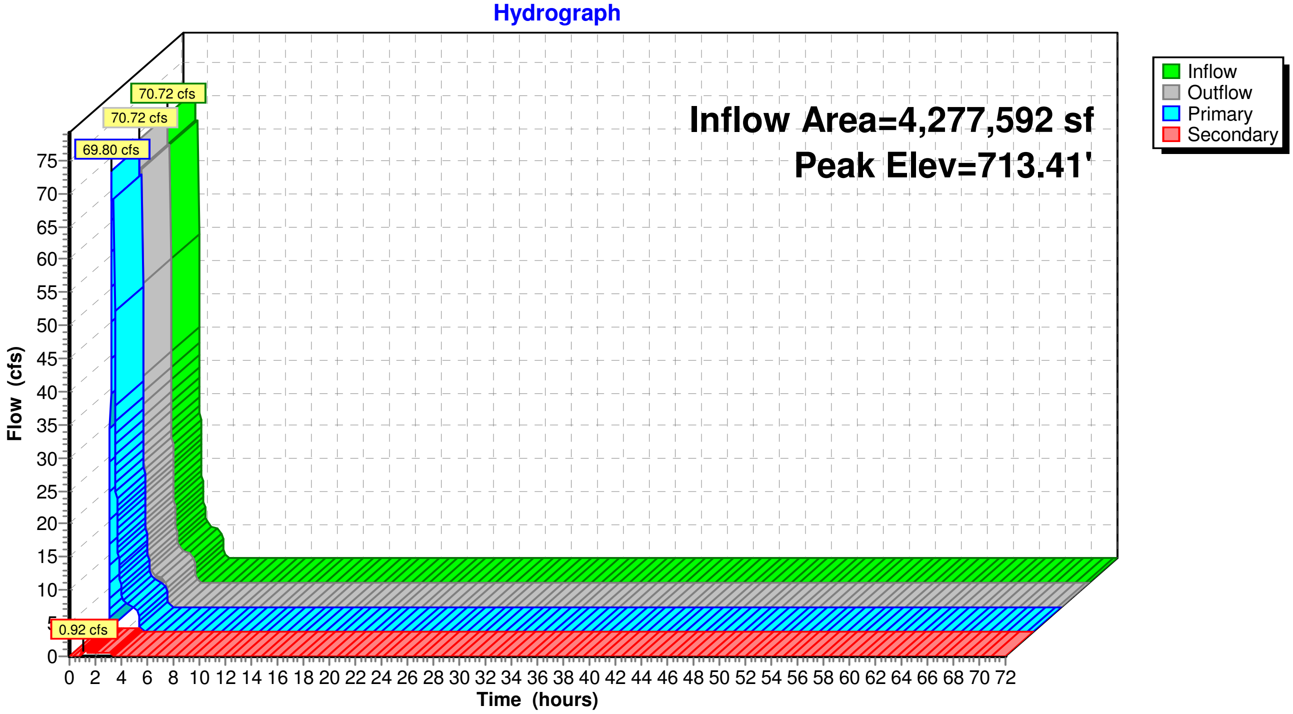
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 713.41' @ 1.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=69.55 cfs @ 1.08 hrs HW=713.38' TW=697.89' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 69.55 cfs @ 9.84 fps)
  ├─**3=Orifice/Grate** (Passes < 0.99 cfs potential flow)
  └─**4=Broad-Crested Rectangular Weir** (Passes < 127.50 cfs potential flow)

Secondary OutFlow Max=0.92 cfs @ 1.08 hrs HW=713.38' TW=691.23' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.92 cfs @ 4.67 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 694.05' (Flood elevation advised)

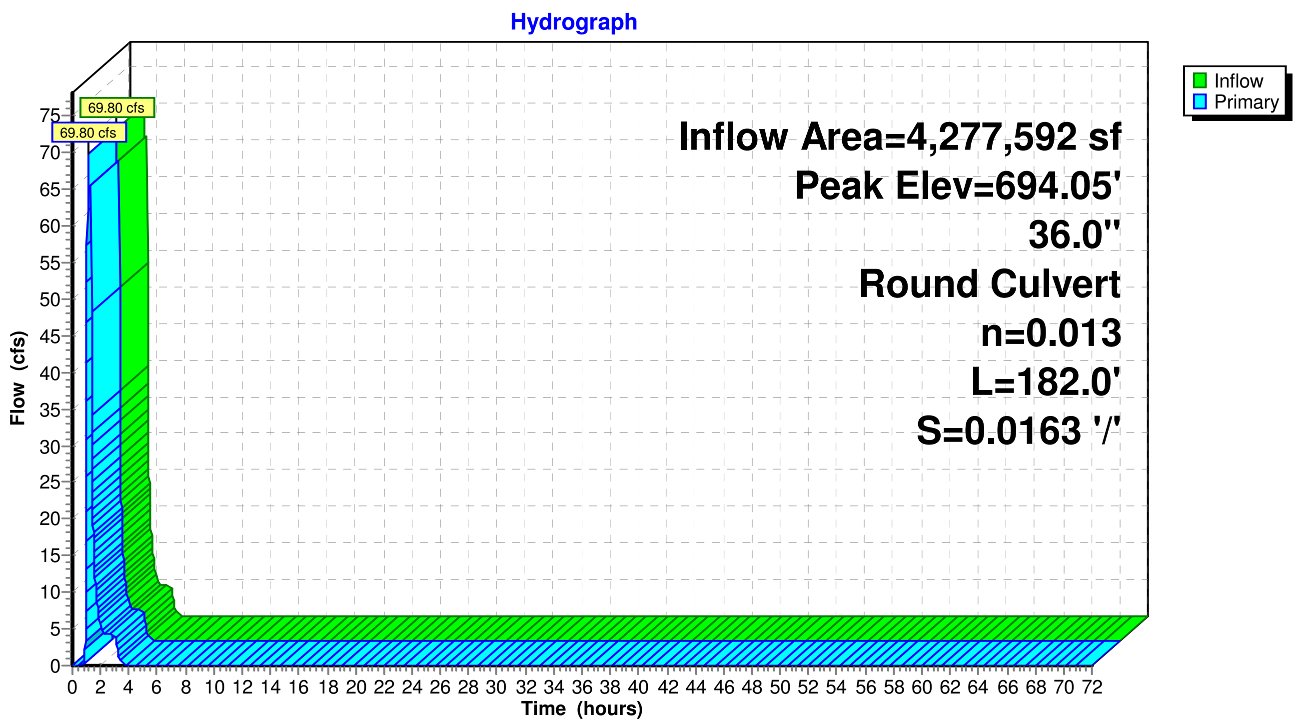
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.38"	for 50 YR SDS event
Inflow =	69.80 cfs @	1.08 hrs, Volume=	134,514 cf	
Outflow =	69.80 cfs @	1.08 hrs, Volume=	134,514 cf,	Atten= 0%, Lag= 0.0 min
Primary =	69.80 cfs @	1.08 hrs, Volume=	134,514 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.05' @ 1.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=69.50 cfs @ 1.08 hrs HW=693.98' TW=689.74' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 69.50 cfs @ 9.83 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 697.98' (Flood elevation advised)

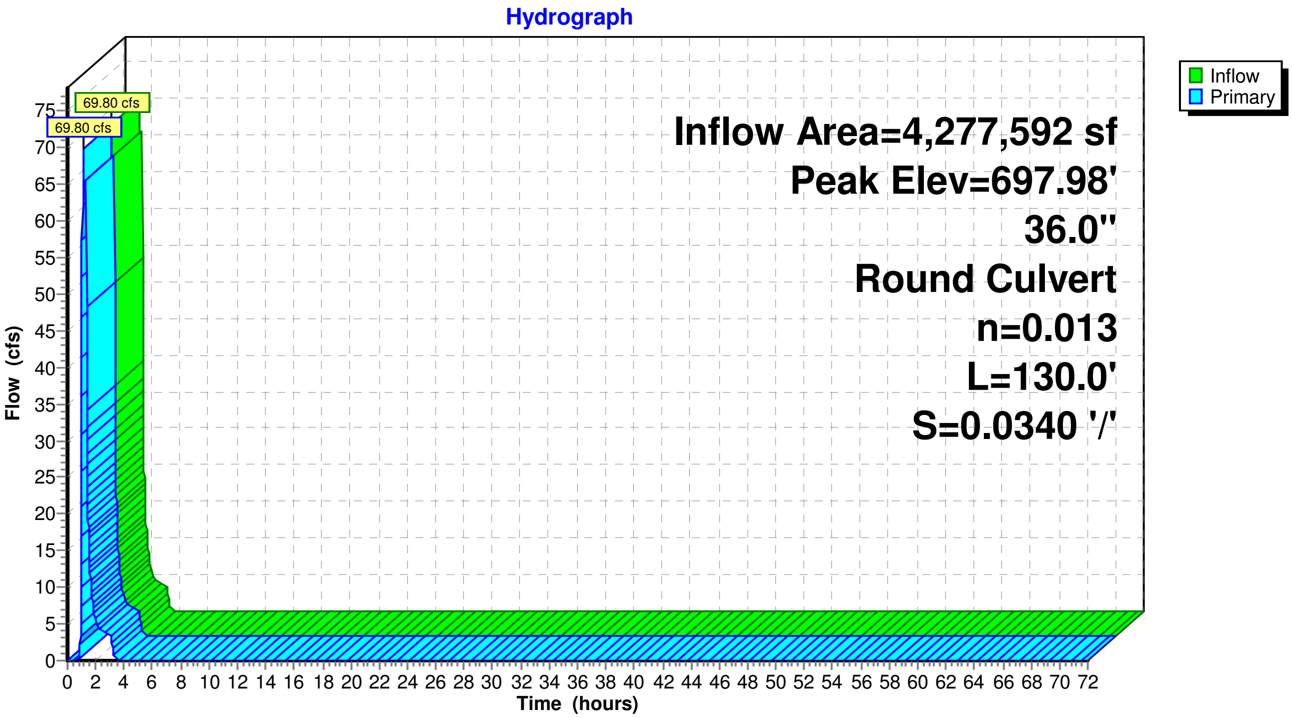
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.37"	for 50 YR SDS event	
Inflow =	69.80 cfs @	1.08 hrs,	Volume=	133,039 cf	
Outflow =	69.80 cfs @	1.08 hrs,	Volume=	133,039 cf,	Atten= 0%, Lag= 0.0 min
Primary =	69.80 cfs @	1.08 hrs,	Volume=	133,039 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 697.98' @ 1.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=67.29 cfs @ 1.08 hrs HW=697.89' TW=693.98' (Dynamic Tailwater)
1=Culvert (Inlet Controls 67.29 cfs @ 9.52 fps)

Pond 53P: Proposed MH



Summary for Pond 57P: Vortech 9000

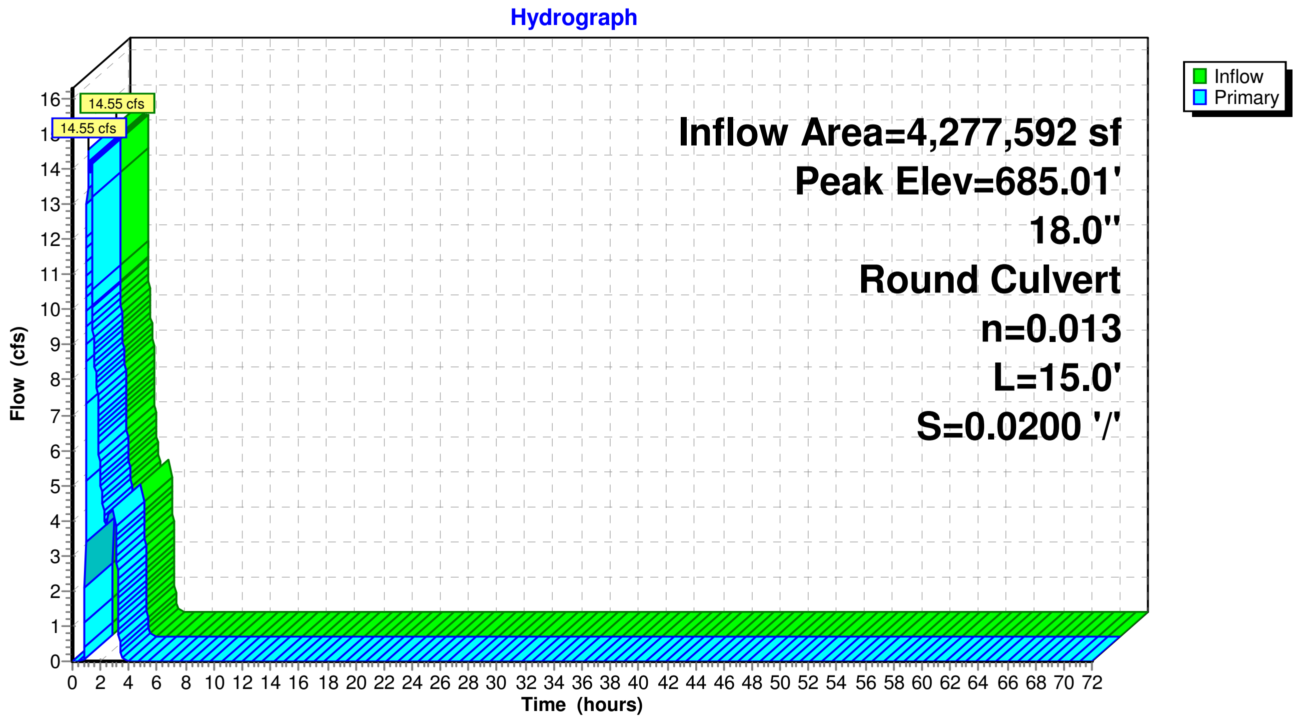
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.16"	for 50 YR SDS event
Inflow =	14.55 cfs @	1.08 hrs, Volume=	57,608 cf	
Outflow =	14.55 cfs @	1.08 hrs, Volume=	57,608 cf,	Atten= 0%, Lag= 0.0 min
Primary =	14.55 cfs @	1.08 hrs, Volume=	57,608 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.01' @ 1.08 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=14.54 cfs @ 1.08 hrs HW=685.00' TW=682.08' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 14.54 cfs @ 8.23 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=1.30"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=30.14 cfs 462,089 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=1.42' Max Vel=9.14 fps Inflow=30.14 cfs 462,089 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=30.12 cfs 462,089 cf

Pond 31P: Bypass Structure Peak Elev=685.59' Inflow=30.07 cfs 455,006 cf
Primary=10.28 cfs 396,833 cf Secondary=19.79 cfs 58,174 cf Outflow=30.07 cfs 455,006 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.80' Storage=0.052 af Inflow=10.28 cfs 396,833 cf
Outflow=10.28 cfs 396,833 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.56' Storage=0.031 af Inflow=10.28 cfs 396,833 cf
Discarded=0.11 cfs 10,290 cf Primary=10.17 cfs 386,543 cf Outflow=10.28 cfs 396,833 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=684.82' Inflow=19.79 cfs 58,174 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=19.79 cfs 58,174 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=674.58' Inflow=19.79 cfs 58,174 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=19.79 cfs 58,174 cf

Pond 42P: Flow Converge Structure Peak Elev=673.60' Inflow=29.96 cfs 444,717 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=29.96 cfs 444,717 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=672.89' Inflow=29.96 cfs 444,717 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=29.96 cfs 444,717 cf

Pond 49P: Existing (New) Pond Peak Elev=694.83' Storage=3,630 cf Inflow=0.68 cfs 39,940 cf
Discarded=0.05 cfs 7,052 cf Primary=0.63 cfs 32,857 cf Outflow=0.68 cfs 39,909 cf

Pond 51P: Flow Splitter Peak Elev=710.76' Inflow=30.12 cfs 462,089 cf
Primary=29.44 cfs 422,150 cf Secondary=0.68 cfs 39,940 cf Outflow=30.12 cfs 462,089 cf

Pond 52P: Existing MH to be replaced Peak Elev=688.79' Inflow=30.07 cfs 455,006 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=30.07 cfs 455,006 cf

Pond 53P: Proposed MH Peak Elev=693.11' Inflow=29.44 cfs 422,150 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=29.44 cfs 422,150 cf

Pond 57P: Vortech 9000 Peak Elev=683.26' Inflow=10.28 cfs 396,833 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=10.28 cfs 396,833 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 462,089 cf Average Runoff Depth = 1.30"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

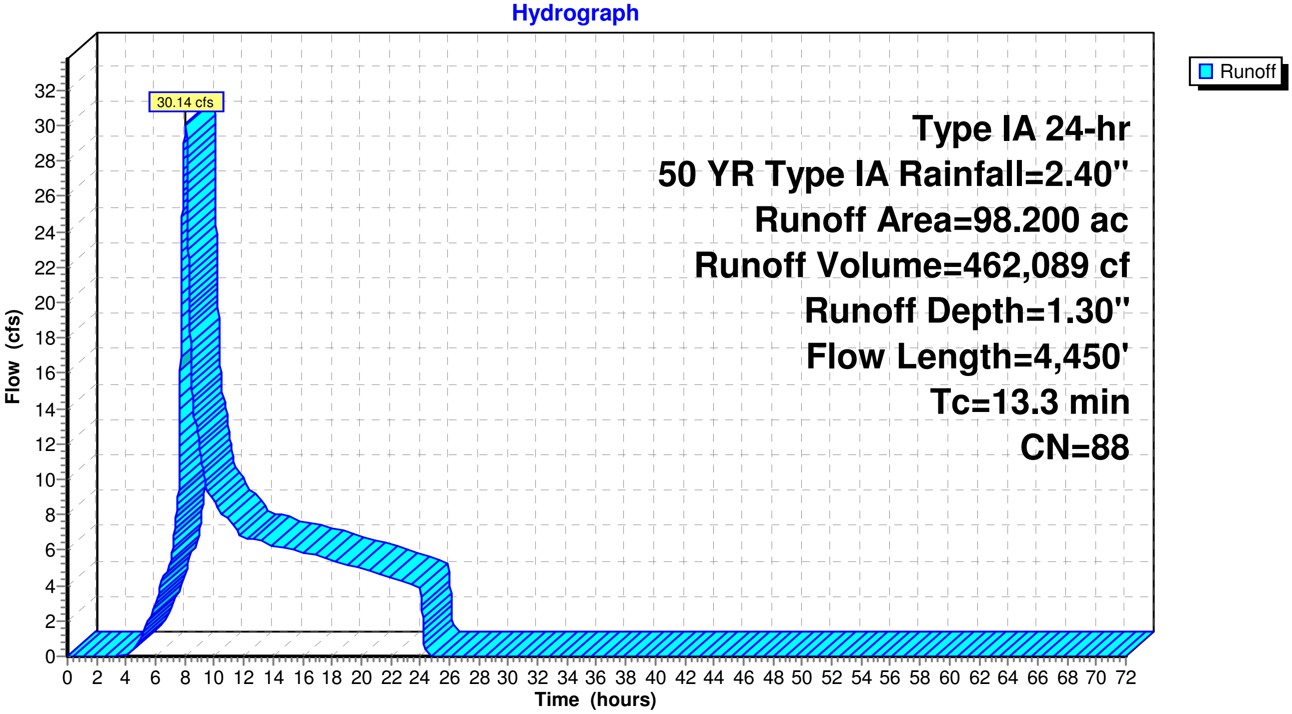
Runoff = 30.14 cfs @ 8.05 hrs, Volume= 462,089 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 50 YR Type IA Rainfall=2.40"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

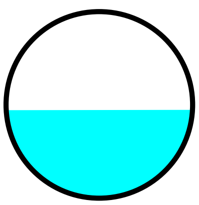
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.30"	for 50 YR Type IA event
Inflow =	30.14 cfs @	8.05 hrs, Volume=	462,089 cf	
Outflow =	30.12 cfs @	8.05 hrs, Volume=	462,089 cf,	Atten= 0%, Lag= 0.3 min

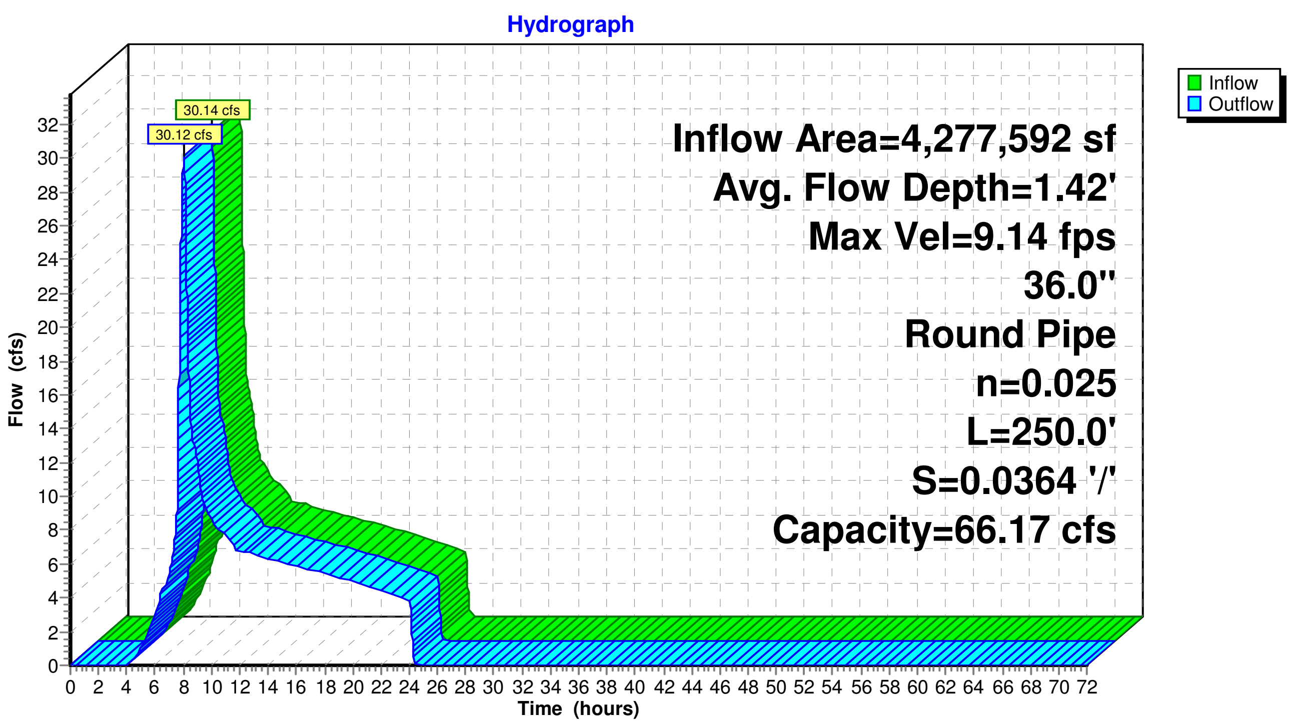
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 9.14 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 5.48 fps, Avg. Travel Time= 0.8 min

Peak Storage= 824 cf @ 8.05 hrs
Average Depth at Peak Storage= 1.42'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.28" for 50 YR Type IA event
Inflow = 30.07 cfs @ 8.05 hrs, Volume= 455,006 cf
Outflow = 30.07 cfs @ 8.05 hrs, Volume= 455,006 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf
Secondary = 19.79 cfs @ 8.05 hrs, Volume= 58,174 cf

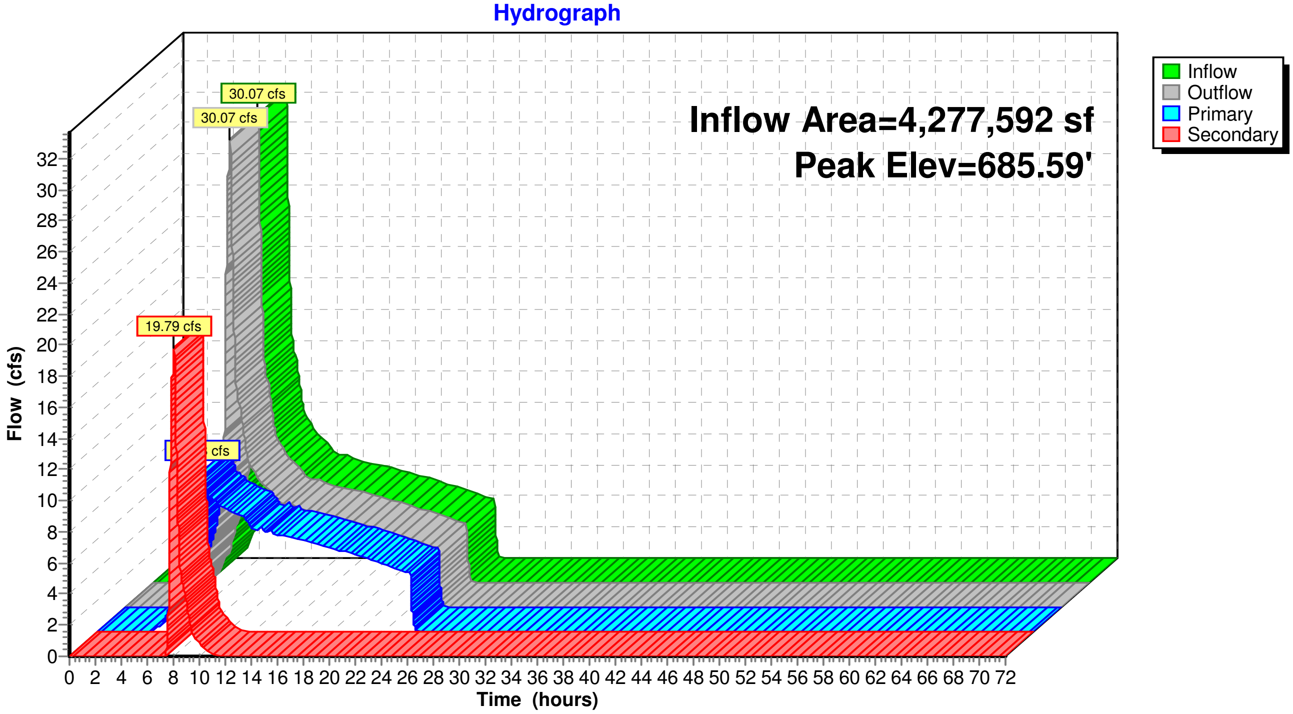
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.59' @ 8.05 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.28 cfs @ 8.05 hrs HW=685.59' TW=683.26' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 10.28 cfs of 13.01 cfs potential flow)
  ↑—**1=Orifice/Grate** (Orifice Controls 10.28 cfs @ 7.36 fps)

Secondary OutFlow Max=19.78 cfs @ 8.05 hrs HW=685.59' TW=684.82' (Dynamic Tailwater)
↑—**2=Culvert** (Outlet Controls 19.78 cfs @ 5.34 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[93] Warning: Storage range exceeded by 0.01'

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.11" for 50 YR Type IA event
Inflow = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf
Outflow = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf, Atten= 0%, Lag= 0.1 min
Primary = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.80' @ 8.06 hrs Surf.Area= 0.000 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

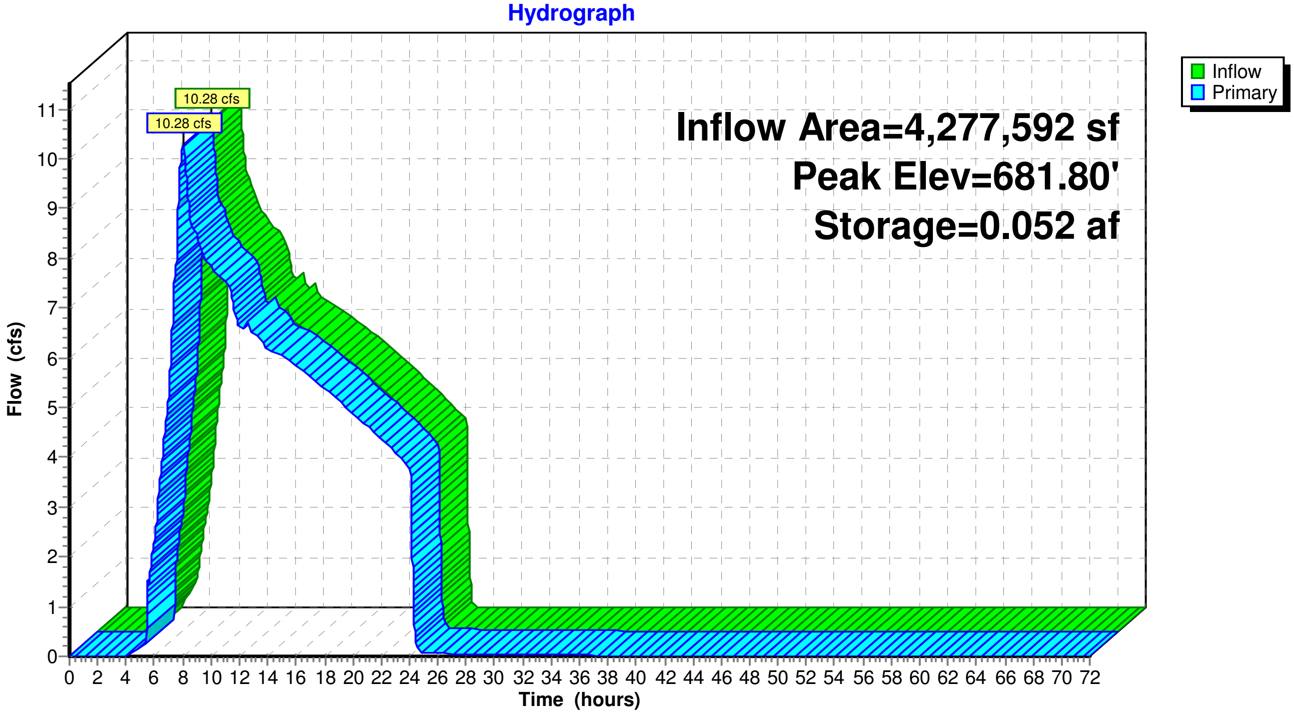
Plug-Flow detention time= 7.7 min calculated for 396,778 cf (100% of inflow)
Center-of-Mass det. time= 7.9 min (850.4 - 842.6)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.28 cfs @ 8.05 hrs HW=681.80' TW=681.56' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 10.28 cfs of 29.08 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 10.17 cfs @ 2.02 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 2.31 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.11" for 50 YR Type IA event
Inflow = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf
Outflow = 10.28 cfs @ 8.06 hrs, Volume= 396,833 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.11 cfs @ 8.06 hrs, Volume= 10,290 cf
Primary = 10.17 cfs @ 8.06 hrs, Volume= 386,543 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.56' @ 8.06 hrs Surf.Area= 0.011 ac Storage= 0.031 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 4.8 min calculated for 396,778 cf (100% of inflow)
Center-of-Mass det. time= 4.8 min (855.2 - 850.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 8.06 hrs HW=681.56' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=10.17 cfs @ 8.06 hrs HW=681.56' TW=673.60' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.17 cfs of 14.80 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 10.17 cfs @ 2.63 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

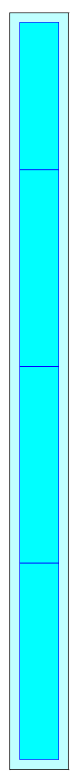
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

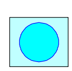
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

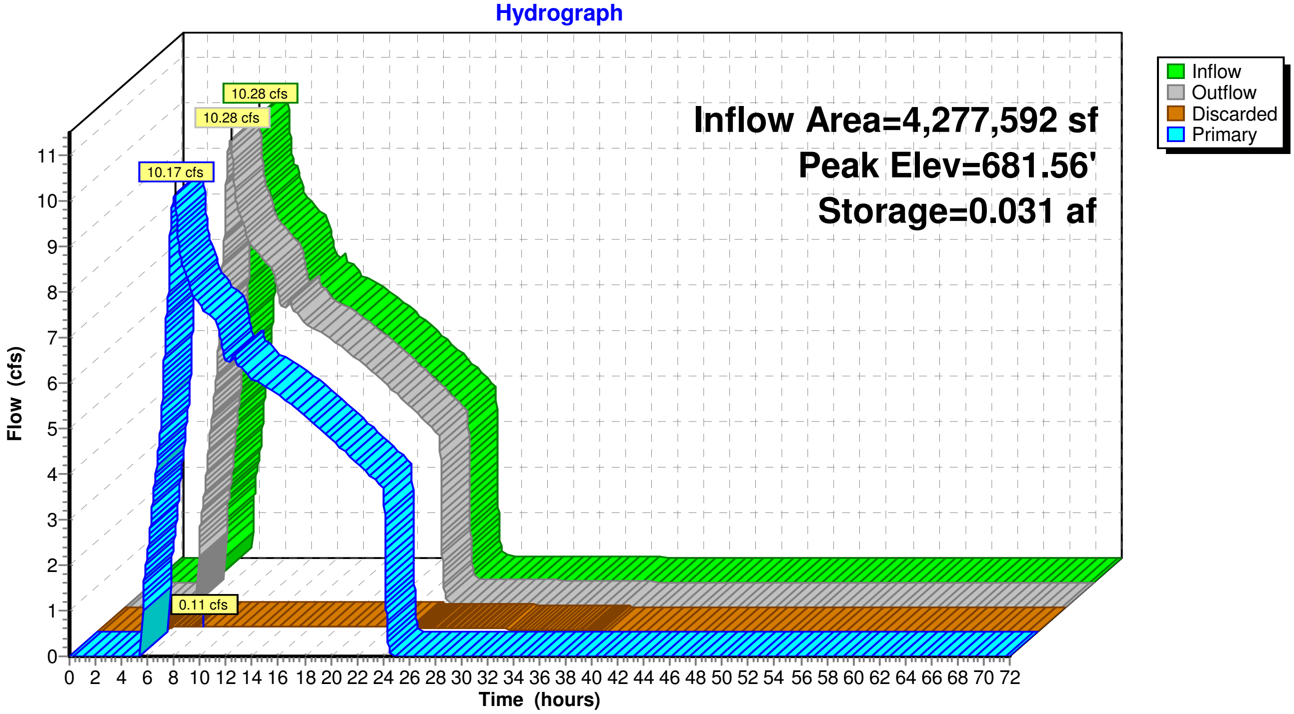
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

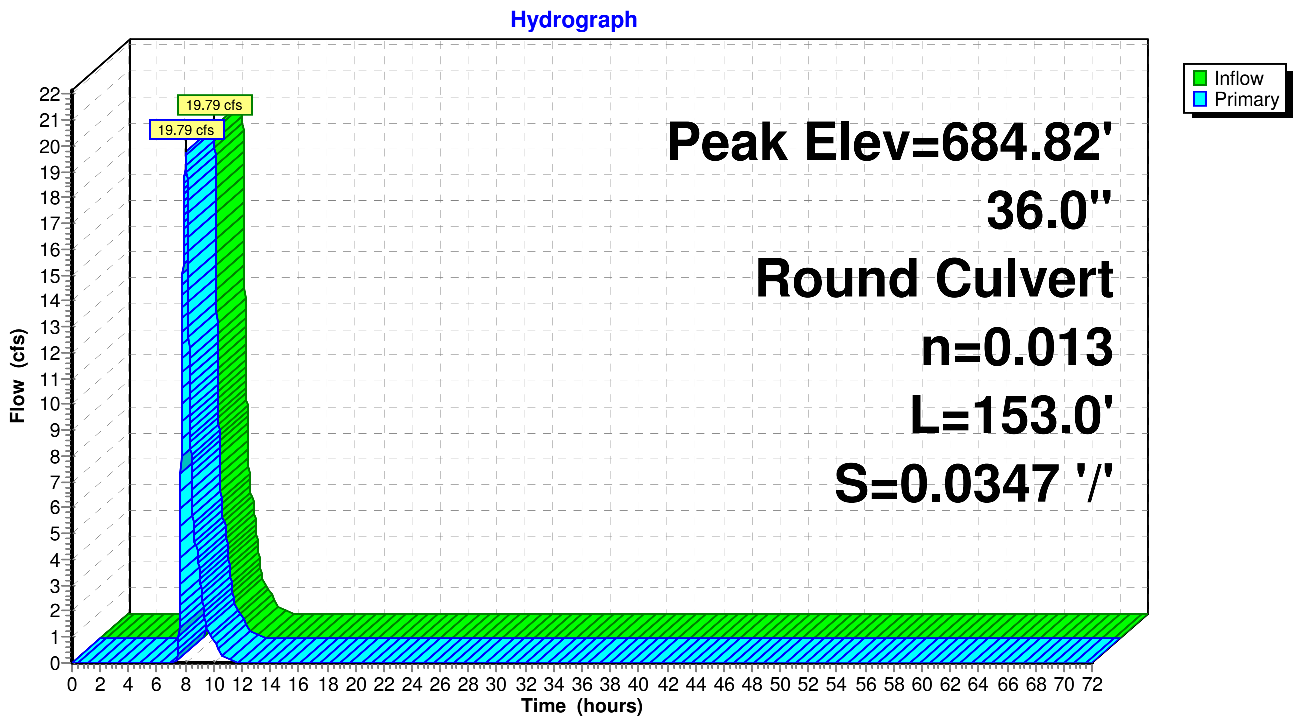
Inflow	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf
Outflow	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf, Atten= 0%, Lag= 0.0 min
Primary	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.82' @ 8.05 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=19.78 cfs @ 8.05 hrs HW=684.82' TW=674.58' (Dynamic Tailwater)
1=Culvert (Inlet Controls 19.78 cfs @ 4.54 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

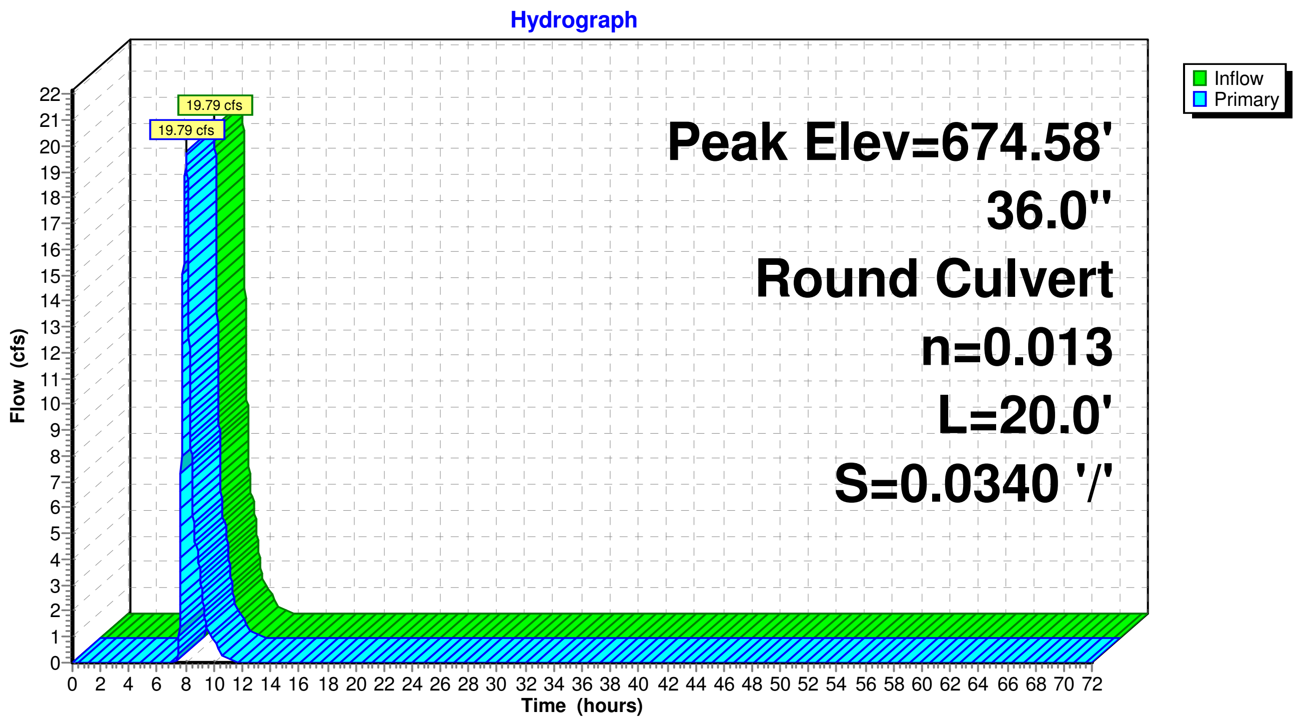
Inflow	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf
Outflow	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf, Atten= 0%, Lag= 0.0 min
Primary	=	19.79 cfs @	8.05 hrs,	Volume=	58,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.58' @ 8.05 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=19.78 cfs @ 8.05 hrs HW=674.58' TW=673.60' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 19.78 cfs @ 6.18 fps)

Pond 40R: 36" Smooth PE Bypass Pipe



Summary for Pond 42P: Flow Converge Structure

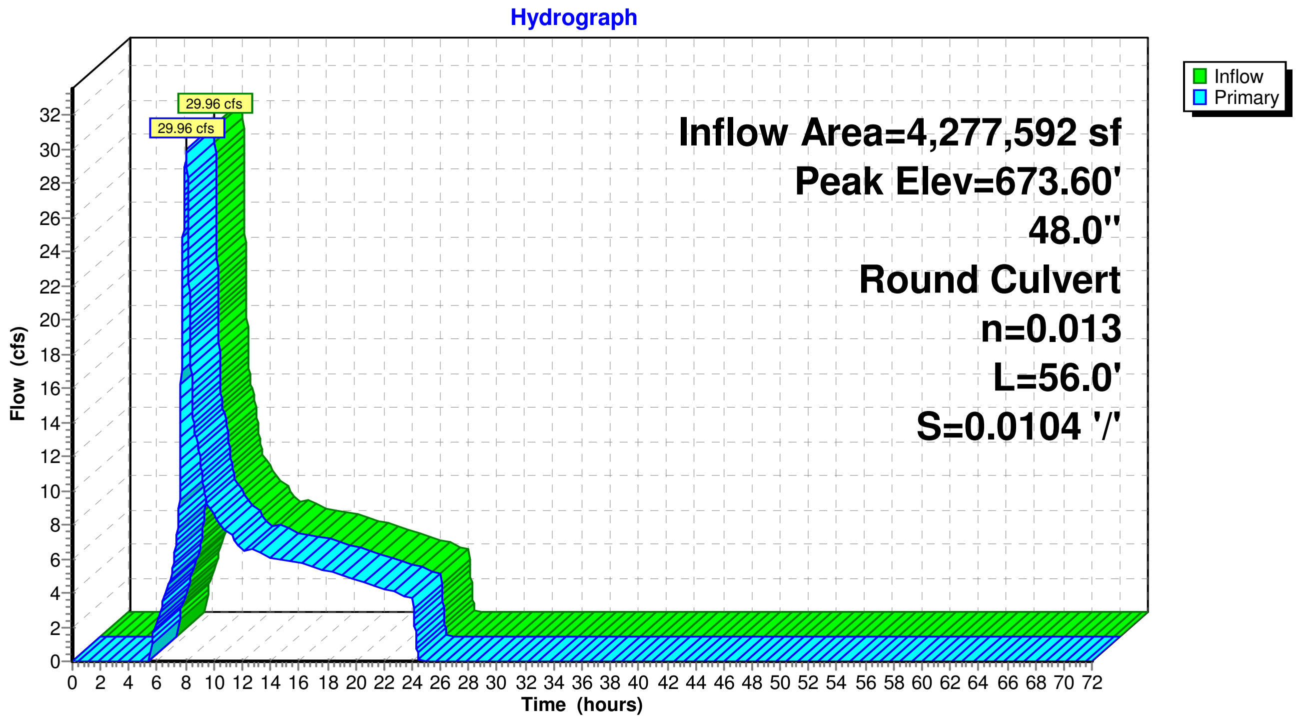
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.25" for 50 YR Type IA event
Inflow = 29.96 cfs @ 8.05 hrs, Volume= 444,717 cf
Outflow = 29.96 cfs @ 8.05 hrs, Volume= 444,717 cf, Atten= 0%, Lag= 0.0 min
Primary = 29.96 cfs @ 8.05 hrs, Volume= 444,717 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.60' @ 8.05 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=29.95 cfs @ 8.05 hrs HW=673.60' TW=672.89' (Dynamic Tailwater)
1=Culvert (Outlet Controls 29.95 cfs @ 5.05 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

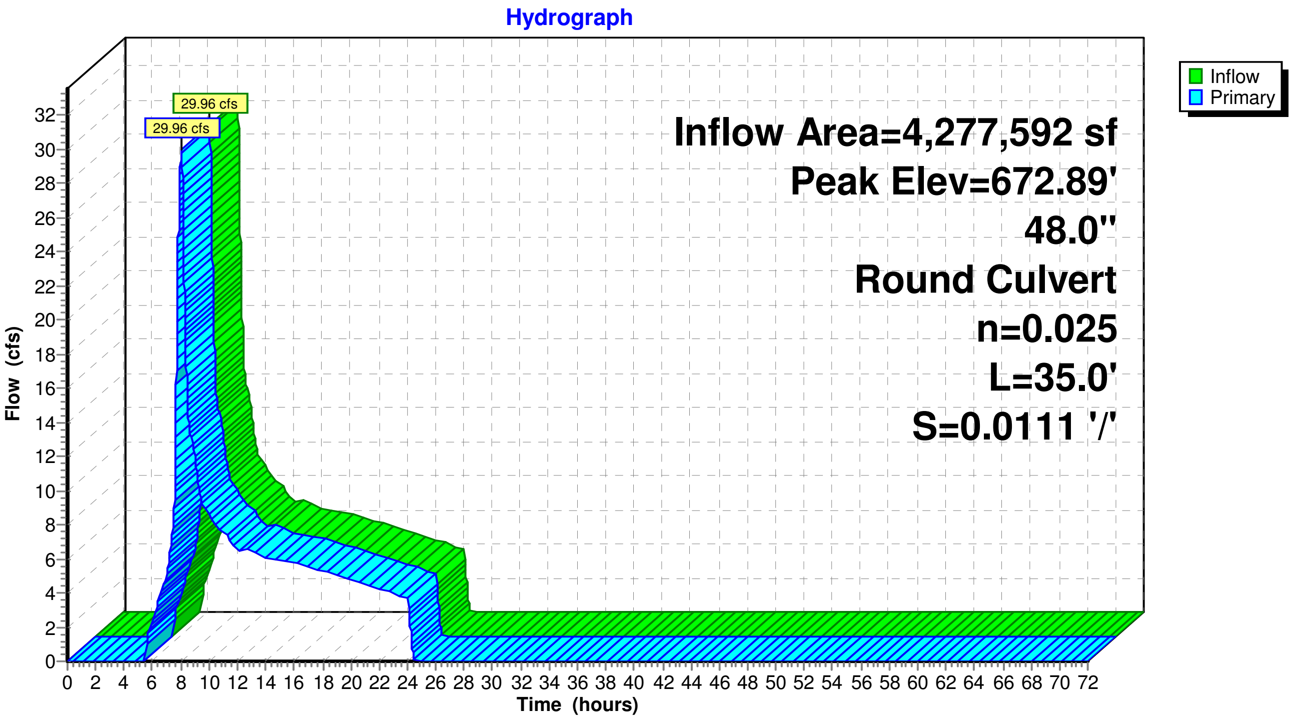
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.25"	for 50 YR Type IA event	
Inflow =	29.96 cfs @	8.05 hrs,	Volume=	444,717 cf	
Outflow =	29.96 cfs @	8.05 hrs,	Volume=	444,717 cf,	Atten= 0%, Lag= 0.0 min
Primary =	29.96 cfs @	8.05 hrs,	Volume=	444,717 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.89' @ 8.05 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=29.95 cfs @ 8.05 hrs HW=672.89' (Free Discharge)
└─**1=Culvert** (Barrel Controls 29.95 cfs @ 5.40 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.68 cfs @	8.05 hrs,	Volume=	39,940 cf
Outflow	=	0.68 cfs @	8.08 hrs,	Volume=	39,909 cf, Atten= 0%, Lag= 1.4 min
Discarded	=	0.05 cfs @	8.08 hrs,	Volume=	7,052 cf
Primary	=	0.63 cfs @	8.08 hrs,	Volume=	32,857 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.83' @ 8.08 hrs Surf.Area= 1,500 sf Storage= 3,630 cf

Plug-Flow detention time= 178.8 min calculated for 39,904 cf (100% of inflow)
Center-of-Mass det. time= 178.7 min (1,043.6 - 864.9)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

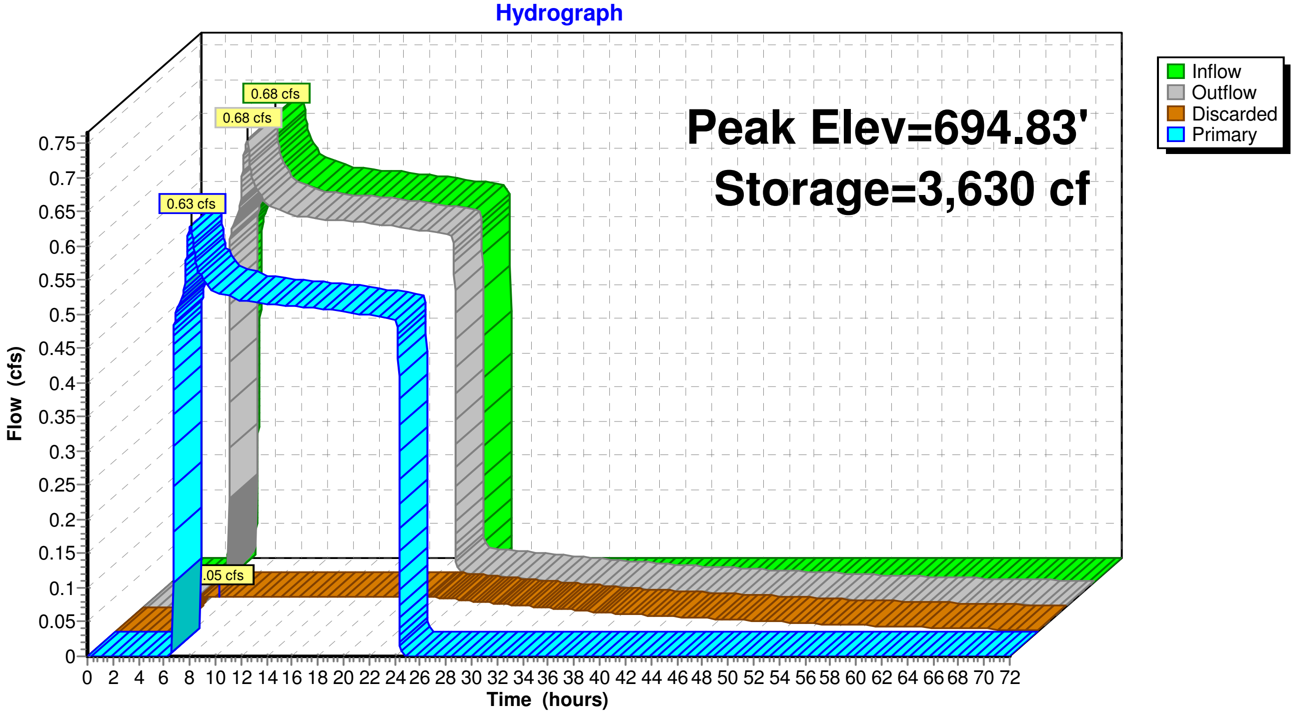
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 8.08 hrs HW=694.83' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.63 cfs @ 8.08 hrs HW=694.83' TW=688.78' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.63 cfs of 14.80 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.63 cfs @ 0.85 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 710.76' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.64' @ 8.05 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.30" for 50 YR Type IA event
Inflow = 30.12 cfs @ 8.05 hrs, Volume= 462,089 cf
Outflow = 30.12 cfs @ 8.05 hrs, Volume= 462,089 cf, Atten= 0%, Lag= 0.0 min
Primary = 29.44 cfs @ 8.05 hrs, Volume= 422,150 cf
Secondary = 0.68 cfs @ 8.05 hrs, Volume= 39,940 cf

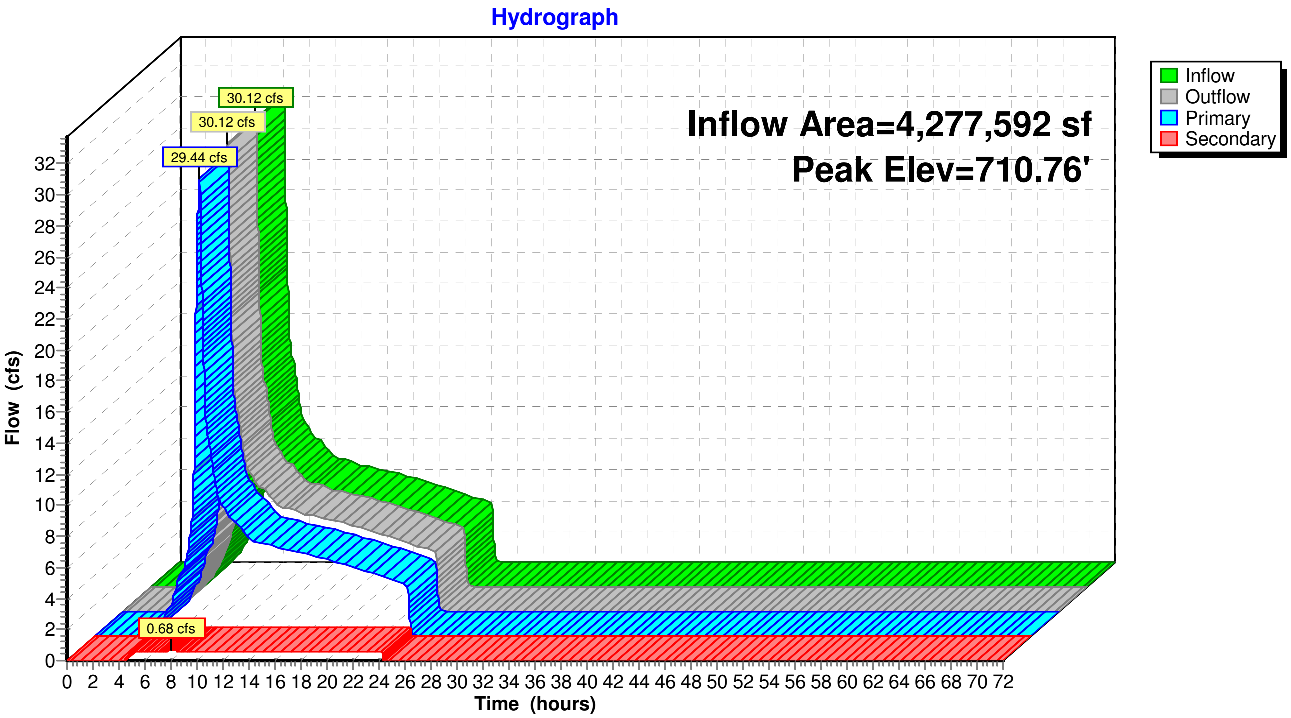
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.76' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=29.43 cfs @ 8.05 hrs HW=710.76' TW=693.11' (Dynamic Tailwater)
└─**2=Culvert** (Passes 29.43 cfs of 42.48 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.71 cfs @ 8.19 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 28.72 cfs @ 4.10 fps)

Secondary OutFlow Max=0.68 cfs @ 8.05 hrs HW=710.76' TW=694.83' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.68 cfs @ 3.48 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 688.79' (Flood elevation advised)

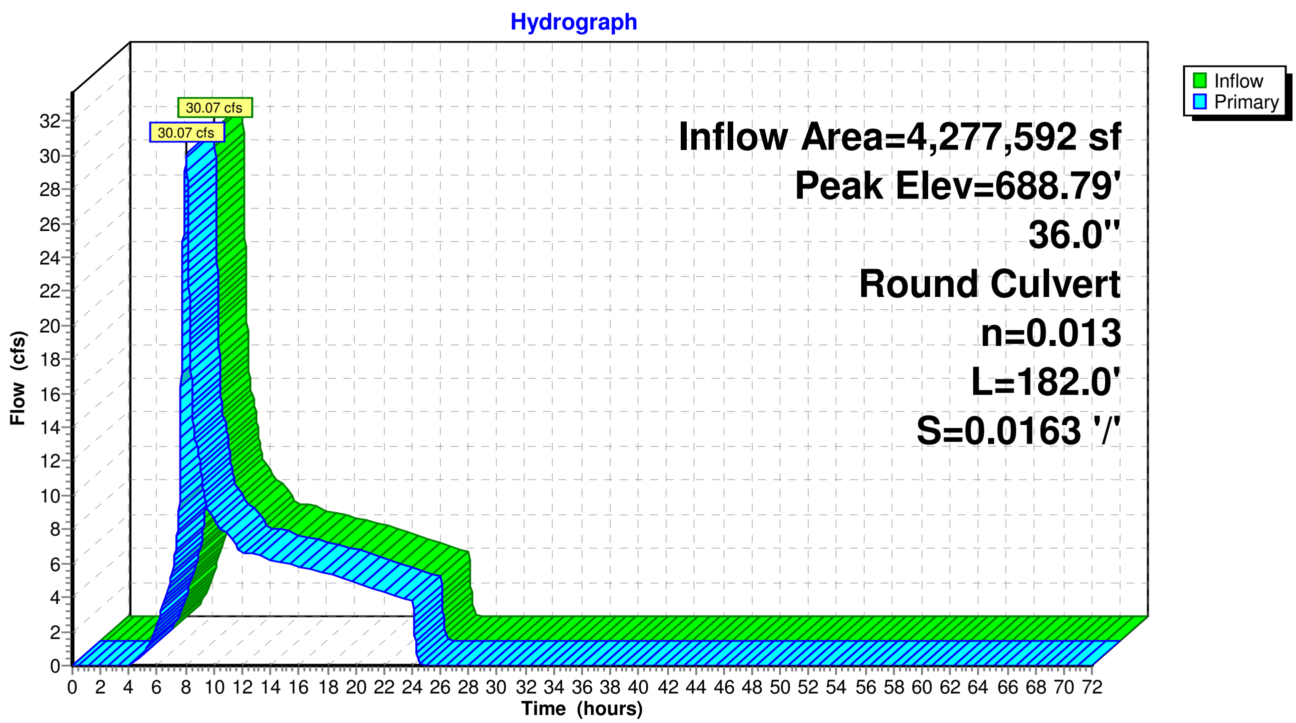
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.28" for 50 YR Type IA event
Inflow = 30.07 cfs @ 8.05 hrs, Volume= 455,006 cf
Outflow = 30.07 cfs @ 8.05 hrs, Volume= 455,006 cf, Atten= 0%, Lag= 0.0 min
Primary = 30.07 cfs @ 8.05 hrs, Volume= 455,006 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 688.79' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=30.06 cfs @ 8.05 hrs HW=688.79' TW=685.59' (Dynamic Tailwater)
└─1=Culvert (Inlet Controls 30.06 cfs @ 5.17 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 693.11' (Flood elevation advised)

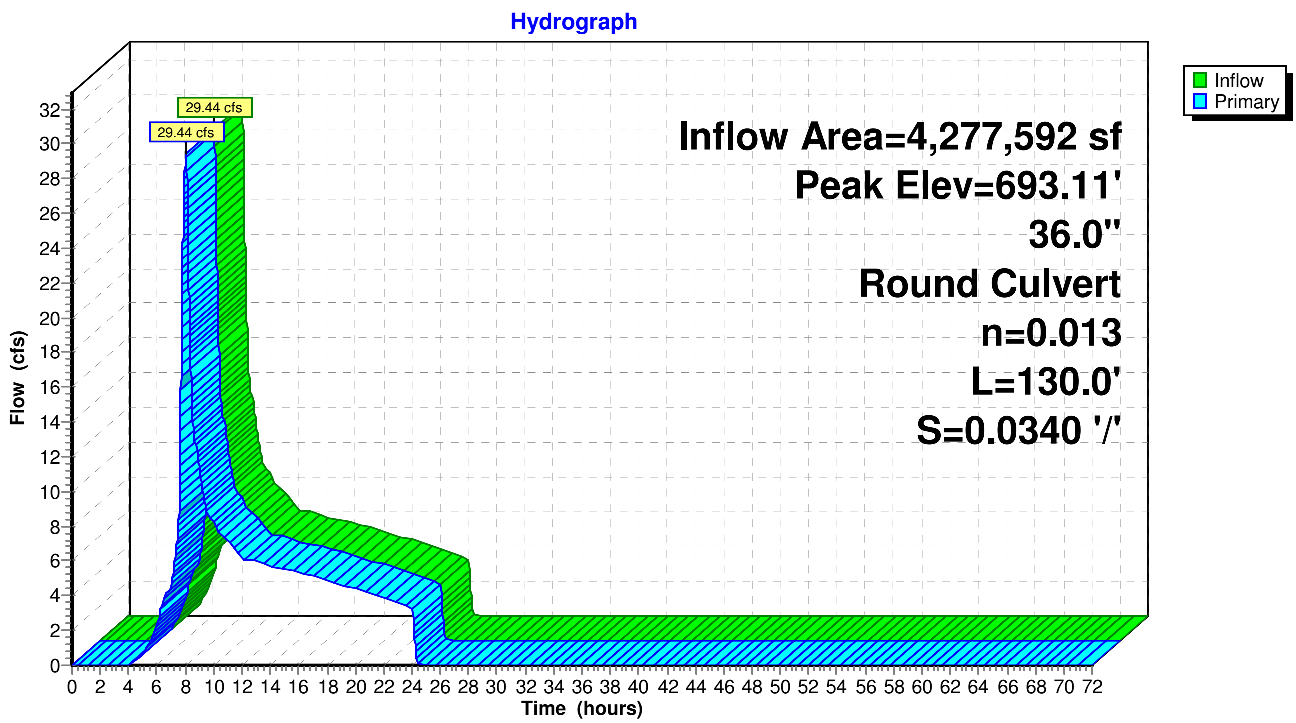
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.18"	for 50 YR Type IA event
Inflow =	29.44 cfs @	8.05 hrs, Volume=	422,150 cf	
Outflow =	29.44 cfs @	8.05 hrs, Volume=	422,150 cf, Atten= 0%, Lag= 0.0 min	
Primary =	29.44 cfs @	8.05 hrs, Volume=	422,150 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 693.11' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=29.43 cfs @ 8.05 hrs HW=693.11' TW=688.79' (Dynamic Tailwater)
└─1=Culvert (Inlet Controls 29.43 cfs @ 5.13 fps)

Pond 53P: Proposed MH



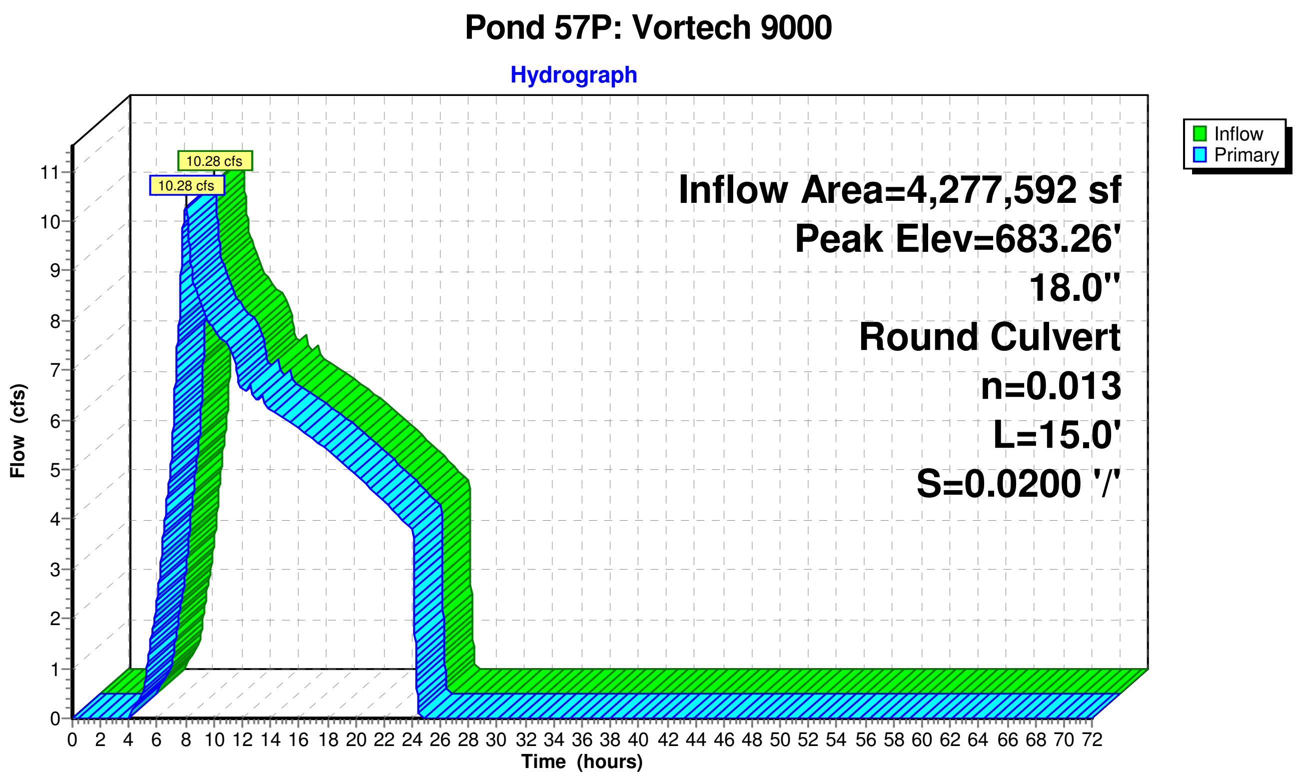
Summary for Pond 57P: Vortech 9000

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.11" for 50 YR Type IA event
Inflow = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf
Outflow = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.28 cfs @ 8.05 hrs, Volume= 396,833 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.26' @ 8.05 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.28 cfs @ 8.05 hrs HW=683.26' TW=681.80' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 10.28 cfs @ 5.82 fps)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=0.56"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=122.63 cfs 199,531 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=3.00' Max Vel=10.64 fps Inflow=122.63 cfs 199,531 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=69.33 cfs 199,531 cf

Pond 31P: Bypass Structure Peak Elev=689.55' Inflow=68.42 cfs 195,608 cf
Primary=14.52 cfs 72,085 cf Secondary=53.90 cfs 123,523 cf Outflow=68.42 cfs 195,608 cf

Pond 32P: 48" Unperforated Storage Peak Elev=682.05' Storage=0.052 af Inflow=14.52 cfs 72,085 cf
Outflow=15.34 cfs 72,085 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.74' Storage=0.032 af Inflow=15.34 cfs 72,085 cf
Discarded=0.11 cfs 3,956 cf Primary=14.20 cfs 68,129 cf Outflow=14.31 cfs 72,085 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=687.05' Inflow=53.90 cfs 123,523 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=53.90 cfs 123,523 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=678.24' Inflow=53.90 cfs 123,523 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=53.90 cfs 123,523 cf

Pond 42P: Flow Converge Structure Peak Elev=675.74' Inflow=67.88 cfs 191,652 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=67.88 cfs 191,652 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=674.48' Inflow=67.88 cfs 191,652 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=67.88 cfs 191,652 cf

Pond 49P: Existing (New) Pond Peak Elev=694.82' Storage=3,617 cf Inflow=0.91 cfs 5,824 cf
Discarded=0.05 cfs 3,923 cf Primary=0.51 cfs 1,901 cf Outflow=0.56 cfs 5,824 cf

Pond 51P: Flow Splitter Peak Elev=713.24' Inflow=69.33 cfs 199,531 cf
Primary=68.42 cfs 193,707 cf Secondary=0.91 cfs 5,824 cf Outflow=69.33 cfs 199,531 cf

Pond 52P: Existing MH to be replaced Peak Elev=693.66' Inflow=68.42 cfs 195,608 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=68.42 cfs 195,608 cf

Pond 53P: Proposed MH Peak Elev=697.20' Inflow=68.42 cfs 193,707 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=68.42 cfs 193,707 cf

Pond 57P: Vortech 9000 Peak Elev=684.90' Inflow=14.52 cfs 72,085 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=14.52 cfs 72,085 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 199,531 cf Average Runoff Depth = 0.56"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

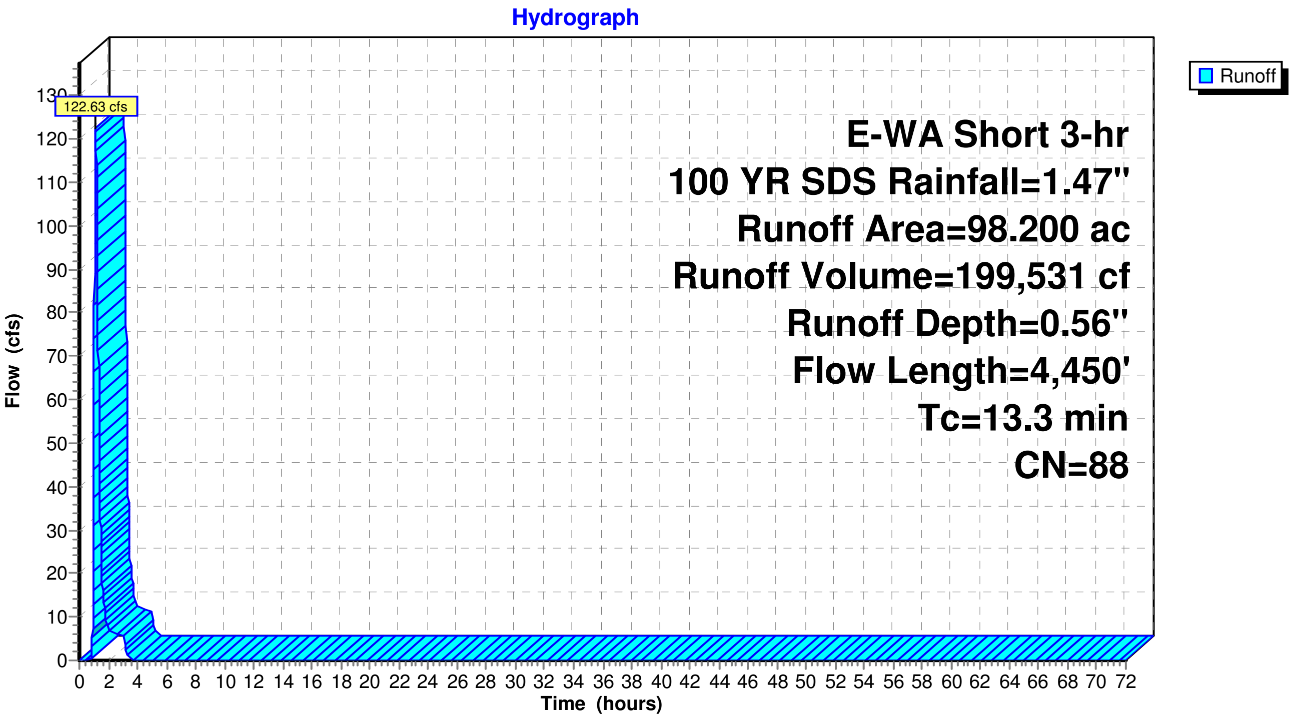
Runoff = 122.63 cfs @ 1.13 hrs, Volume= 199,531 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
E-WA Short 3-hr 100 YR SDS Rainfall=1.47"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

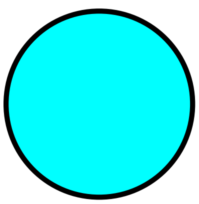
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 185% of Manning's capacity
[76] Warning: Detained 36,899 cf (Pond w/culvert advised)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.56" for 100 YR SDS event
Inflow = 122.63 cfs @ 1.13 hrs, Volume= 199,531 cf
Outflow = 69.33 cfs @ 1.02 hrs, Volume= 199,531 cf, Atten= 43%, Lag= 0.0 min

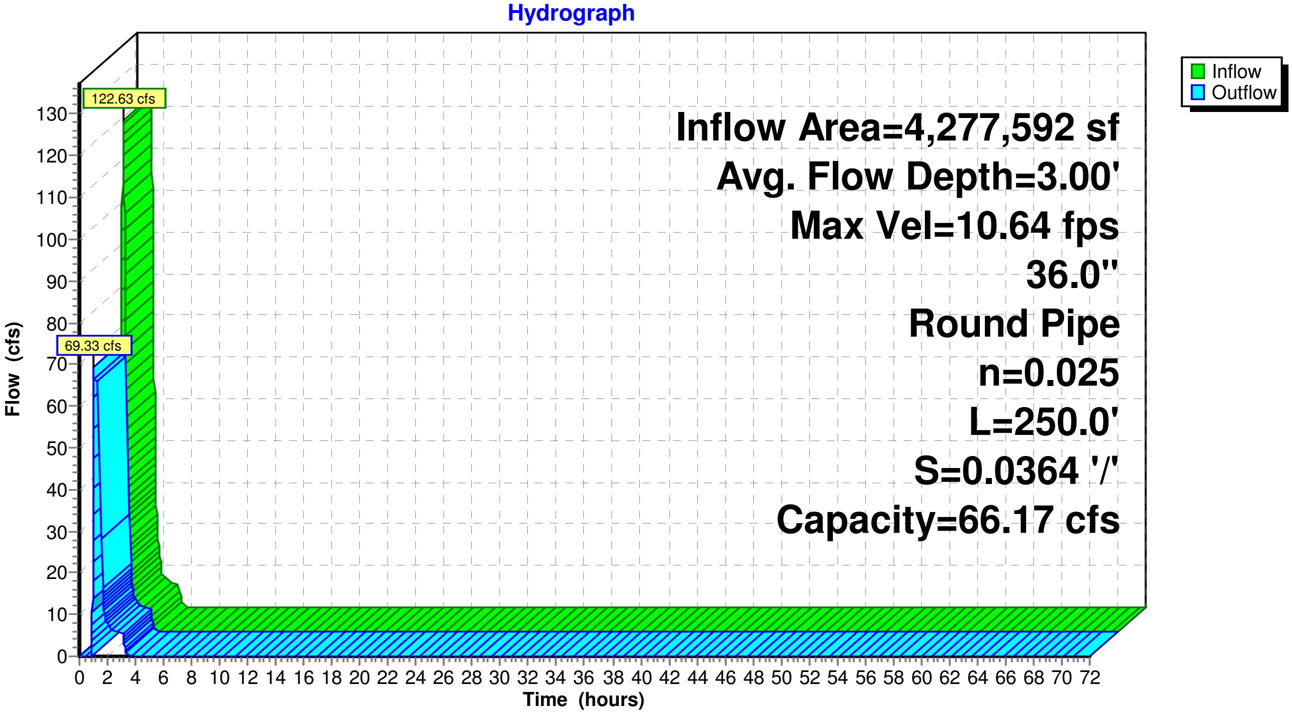
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 10.64 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 5.42 fps, Avg. Travel Time= 0.8 min

Peak Storage= 1,767 cf @ 1.03 hrs
Average Depth at Peak Storage= 3.00'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'



Reach 55R: System Inlet Pipe



Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

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[58] Hint: Peaked 2.21' above defined flood level

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.55" for 100 YR SDS event
Inflow = 68.42 cfs @ 1.02 hrs, Volume= 195,608 cf
Outflow = 68.42 cfs @ 1.02 hrs, Volume= 195,608 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.52 cfs @ 1.02 hrs, Volume= 72,085 cf
Secondary = 53.90 cfs @ 1.02 hrs, Volume= 123,523 cf

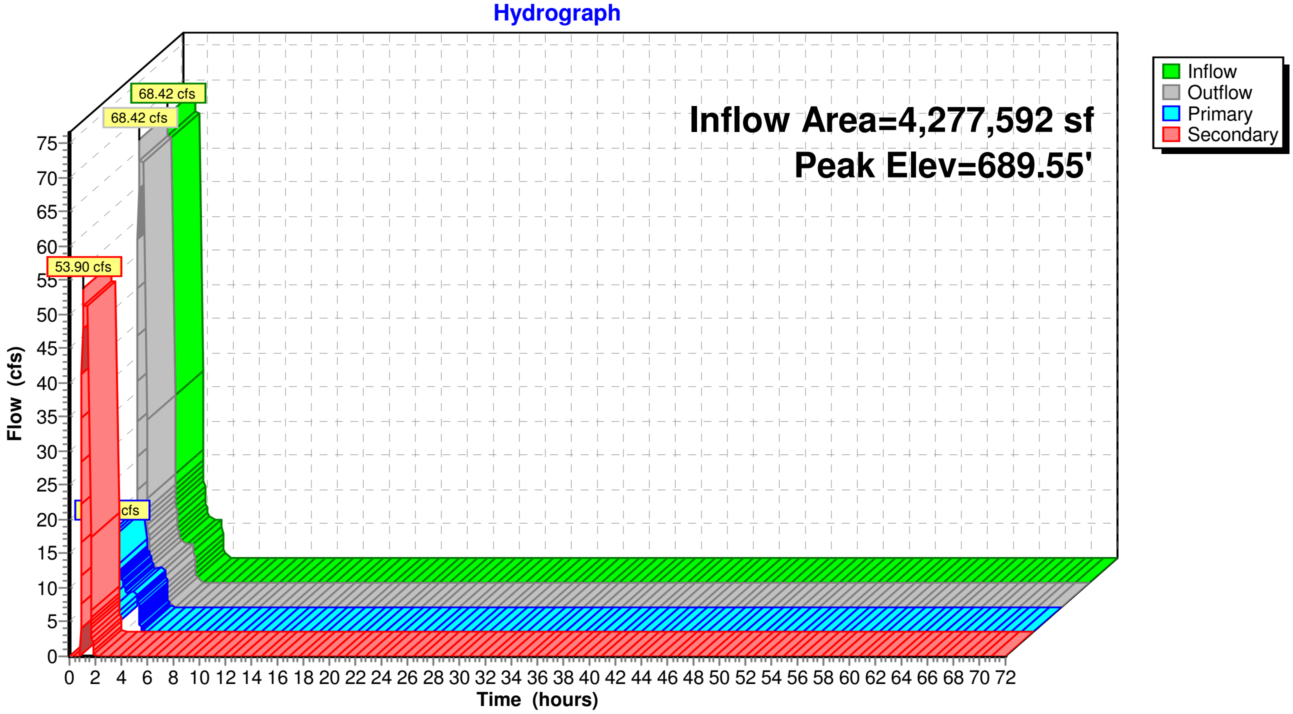
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 689.55' @ 1.02 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=14.38 cfs @ 1.02 hrs HW=689.43' TW=684.85' (Dynamic Tailwater)
└─**3=Culvert** (Passes 14.38 cfs of 18.20 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 14.38 cfs @ 10.30 fps)

Secondary OutFlow Max=53.20 cfs @ 1.02 hrs HW=689.43' TW=686.99' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 53.20 cfs @ 7.53 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[93] Warning: Storage range exceeded by 0.26'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=3)

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.20" for 100 YR SDS event
Inflow = 14.52 cfs @ 1.02 hrs, Volume= 72,085 cf
Outflow = 15.34 cfs @ 1.03 hrs, Volume= 72,085 cf, Atten= 0%, Lag= 0.5 min
Primary = 15.34 cfs @ 1.03 hrs, Volume= 72,085 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 682.05' @ 1.03 hrs Surf.Area= 0.000 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

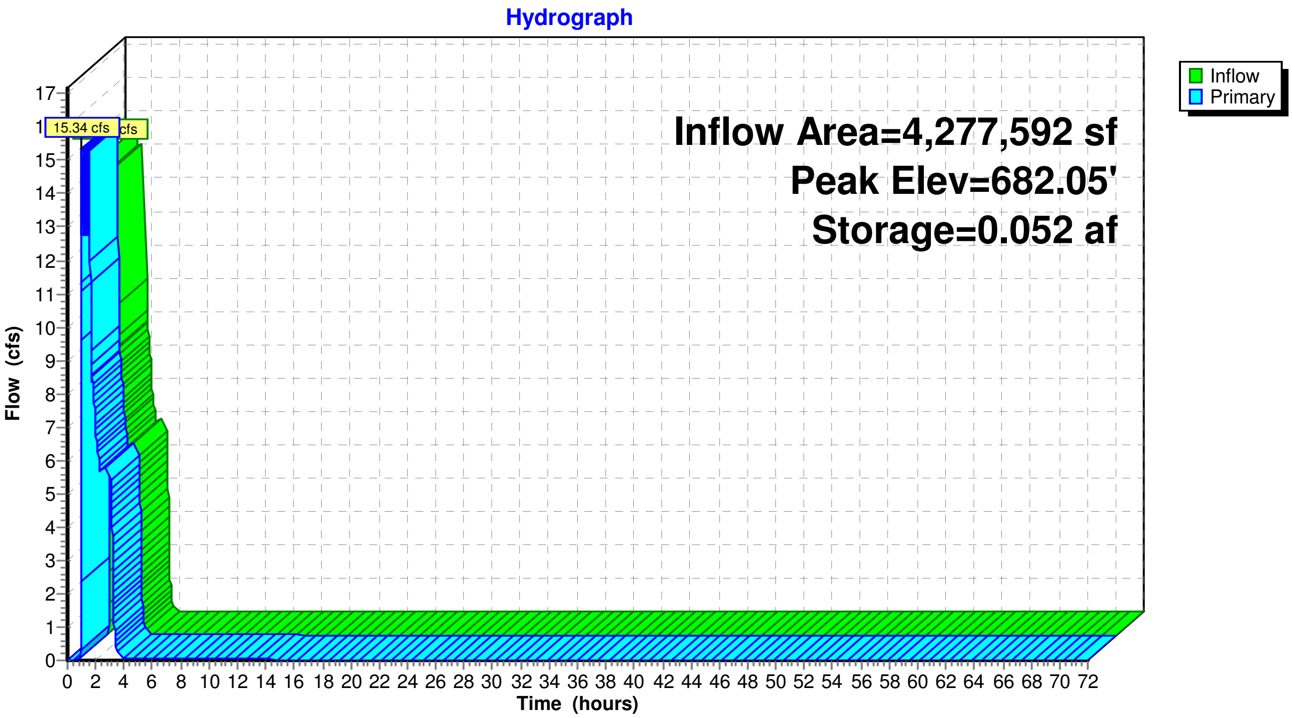
Plug-Flow detention time= 13.0 min calculated for 72,075 cf (100% of inflow)
Center-of-Mass det. time= 13.1 min (123.0 - 109.9)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=15.25 cfs @ 1.03 hrs HW=682.05' TW=681.74' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 15.25 cfs of 33.92 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 15.12 cfs @ 2.40 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 2.70 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

[58] Hint: Peaked 0.02' above defined flood level

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.20"	for 100 YR SDS event
Inflow =	15.34 cfs @	1.03 hrs, Volume=	72,085 cf	
Outflow =	14.31 cfs @	1.03 hrs, Volume=	72,085 cf,	Atten= 7%, Lag= 0.0 min
Discarded =	0.11 cfs @	1.03 hrs, Volume=	3,956 cf	
Primary =	14.20 cfs @	1.03 hrs, Volume=	68,129 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.74' @ 1.03 hrs Surf.Area= 0.011 ac Storage= 0.032 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 8.7 min calculated for 72,075 cf (100% of inflow)
Center-of-Mass det. time= 8.7 min (131.7 - 123.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 1.03 hrs HW=681.74' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=14.18 cfs @ 1.03 hrs HW=681.74' TW=675.56' (Dynamic Tailwater)
└─**1=Culvert** (Passes 14.18 cfs of 15.21 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 14.18 cfs @ 3.00 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

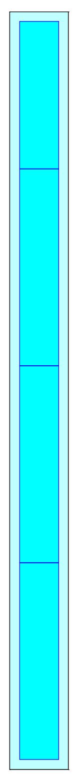
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

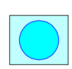
4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

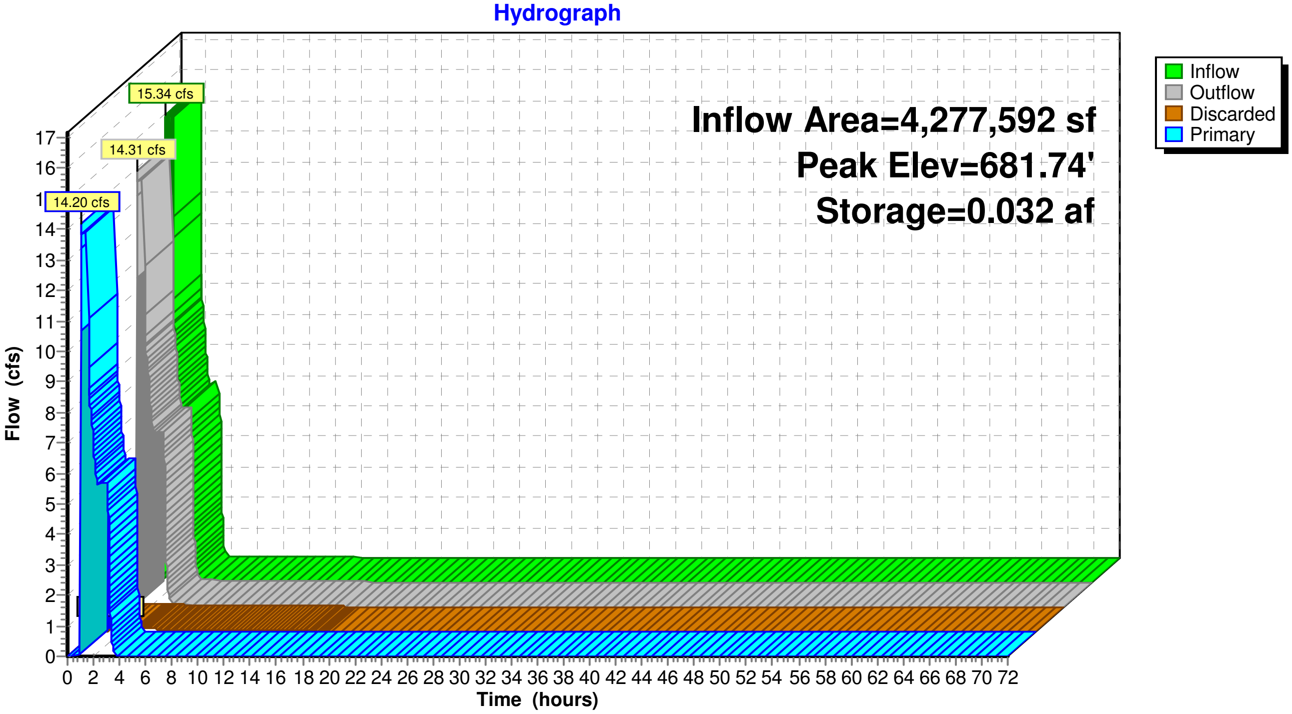
Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone





Pond 33P: 48" Perforated CMP



Summary for Pond 39R: 36" Smooth PE Bypass Pipe

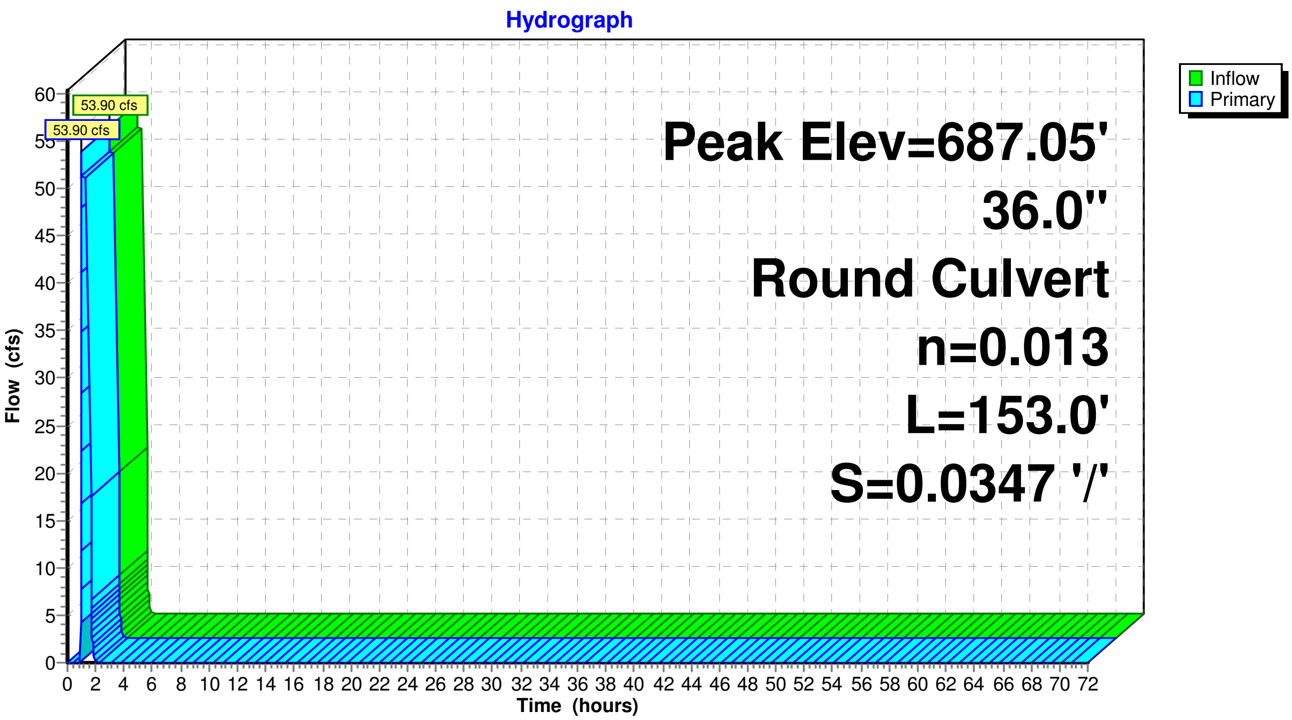
Inflow	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf
Outflow	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf, Atten= 0%, Lag= 0.0 min
Primary	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 687.05' @ 1.02 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=53.23 cfs @ 1.02 hrs HW=686.99' TW=678.13' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 53.23 cfs @ 7.53 fps)

Pond 39R: 36" Smooth PE Bypass Pipe



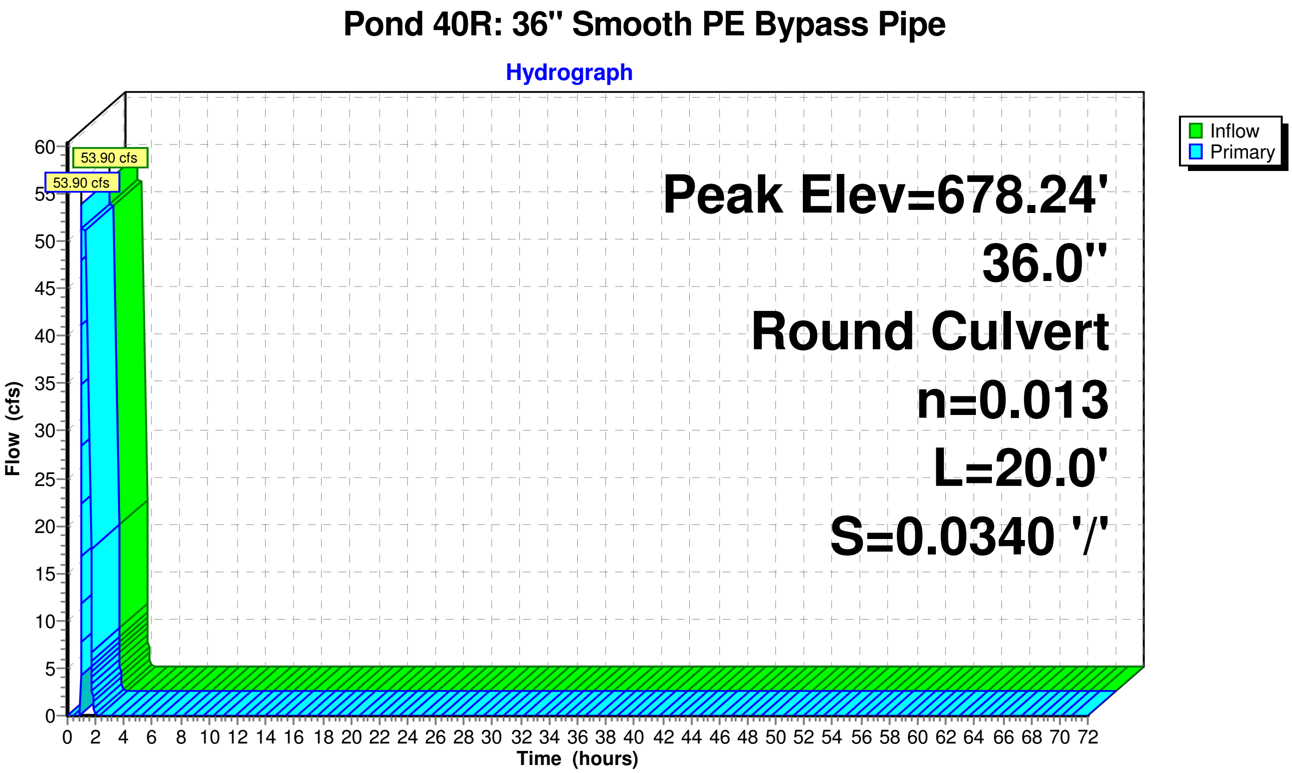
Summary for Pond 40R: 36" Smooth PE Bypass Pipe

Inflow	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf
Outflow	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf, Atten= 0%, Lag= 0.0 min
Primary	=	53.90 cfs @	1.02 hrs,	Volume=	123,523 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 678.24' @ 1.02 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=53.24 cfs @ 1.02 hrs HW=678.13' TW=675.68' (Dynamic Tailwater)
1=Culvert (Inlet Controls 53.24 cfs @ 7.53 fps)



Summary for Pond 42P: Flow Converge Structure

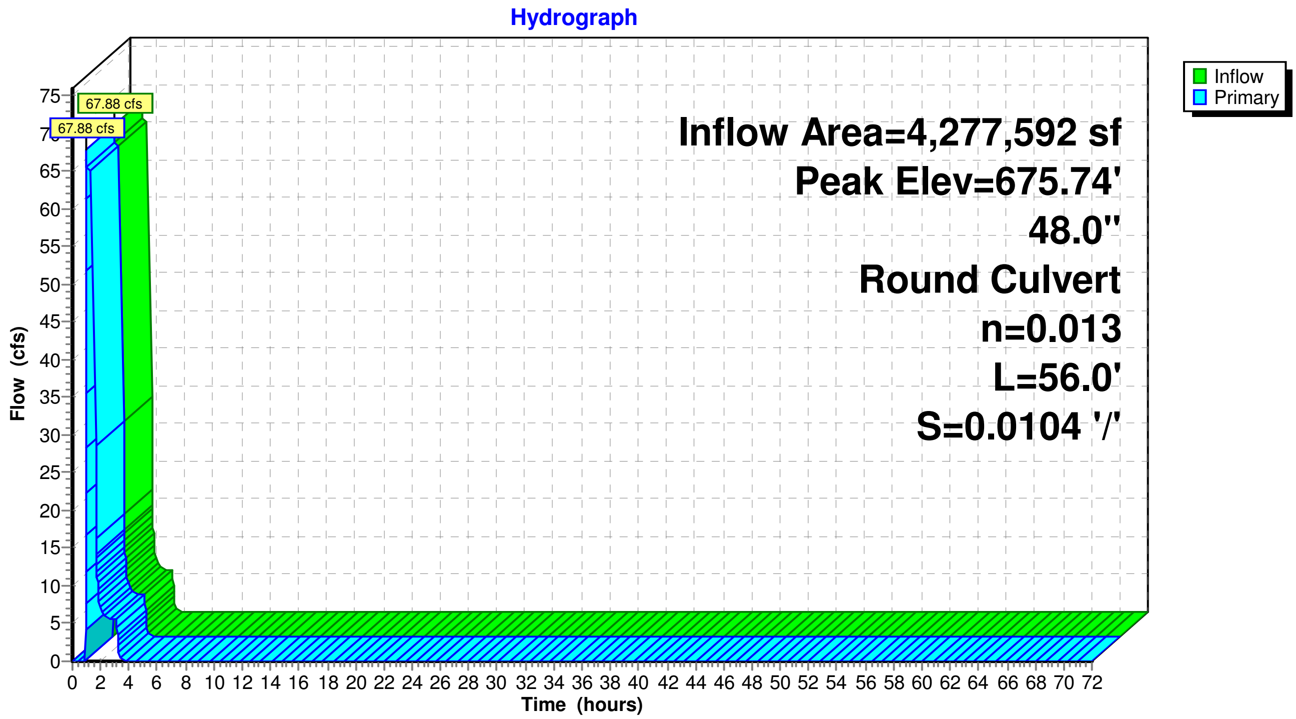
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.54" for 100 YR SDS event
Inflow = 67.88 cfs @ 1.02 hrs, Volume= 191,652 cf
Outflow = 67.88 cfs @ 1.02 hrs, Volume= 191,652 cf, Atten= 0%, Lag= 0.0 min
Primary = 67.88 cfs @ 1.02 hrs, Volume= 191,652 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 675.74' @ 1.02 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=67.09 cfs @ 1.02 hrs HW=675.68' TW=674.45' (Dynamic Tailwater)
1=Culvert (Inlet Controls 67.09 cfs @ 5.34 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

[58] Hint: Peaked 0.01' above defined flood level

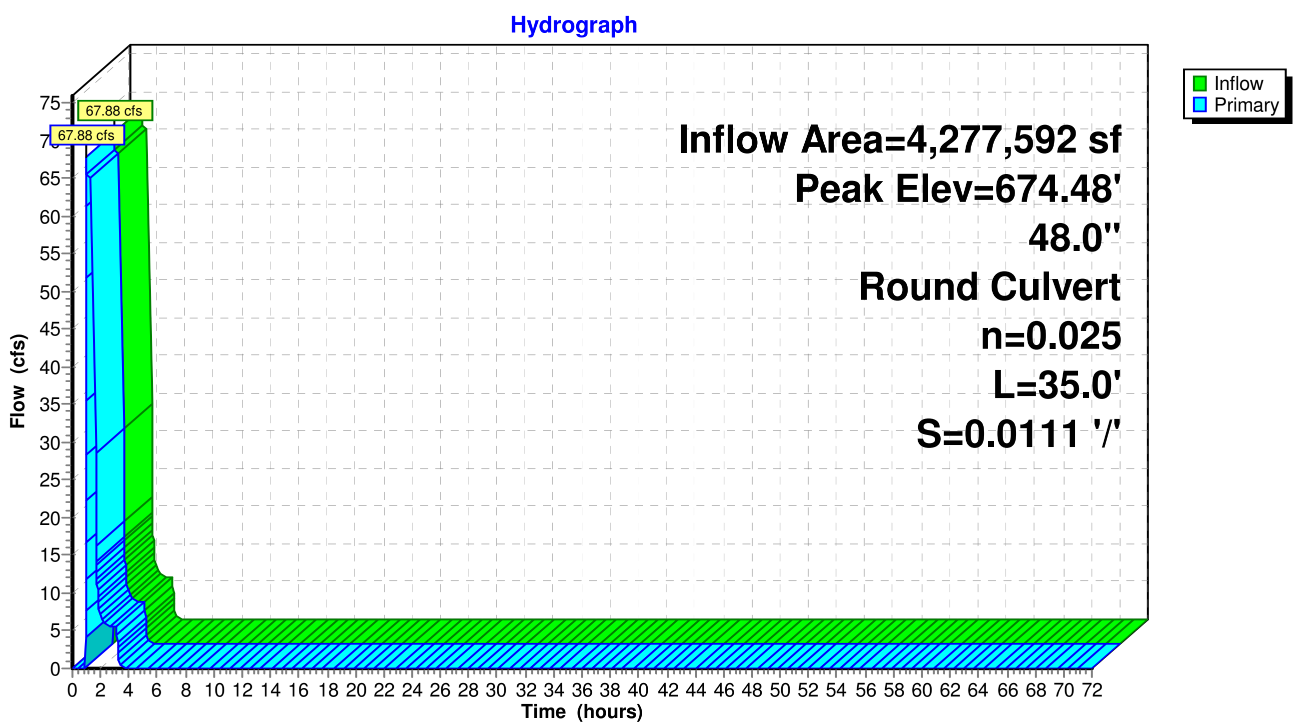
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.54"	for 100 YR SDS event	
Inflow =	67.88 cfs @	1.02 hrs,	Volume=	191,652 cf	
Outflow =	67.88 cfs @	1.02 hrs,	Volume=	191,652 cf,	Atten= 0%, Lag= 0.0 min
Primary =	67.88 cfs @	1.02 hrs,	Volume=	191,652 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.48' @ 1.02 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=67.09 cfs @ 1.02 hrs HW=674.45' (Free Discharge)
1=Culvert (Barrel Controls 67.09 cfs @ 6.68 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.91 cfs @	1.02 hrs, Volume=	5,824 cf
Outflow	=	0.56 cfs @	3.03 hrs, Volume=	5,824 cf, Atten= 38%, Lag= 120.2 min
Discarded	=	0.05 cfs @	3.03 hrs, Volume=	3,923 cf
Primary	=	0.51 cfs @	3.03 hrs, Volume=	1,901 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.82' @ 3.03 hrs Surf.Area= 1,497 sf Storage= 3,617 cf

Plug-Flow detention time= 616.7 min calculated for 5,823 cf (100% of inflow)
Center-of-Mass det. time= 617.0 min (736.7 - 119.6)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

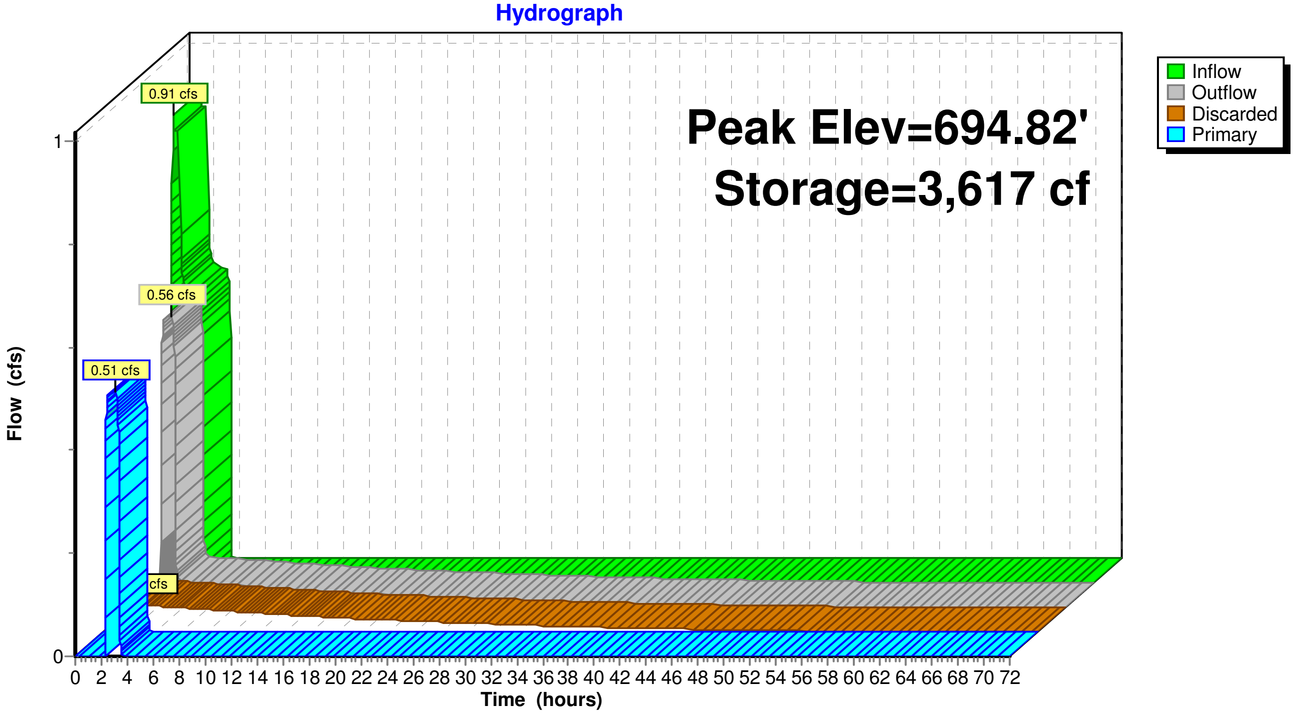
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 3.03 hrs HW=694.82' (Free Discharge)
└─**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.51 cfs @ 3.03 hrs HW=694.82' TW=687.39' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.51 cfs of 14.78 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.51 cfs @ 0.79 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 713.24' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 2.92' @ 1.02 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.56" for 100 YR SDS event
Inflow = 69.33 cfs @ 1.02 hrs, Volume= 199,531 cf
Outflow = 69.33 cfs @ 1.02 hrs, Volume= 199,531 cf, Atten= 0%, Lag= 0.0 min
Primary = 68.42 cfs @ 1.02 hrs, Volume= 193,707 cf
Secondary = 0.91 cfs @ 1.02 hrs, Volume= 5,824 cf

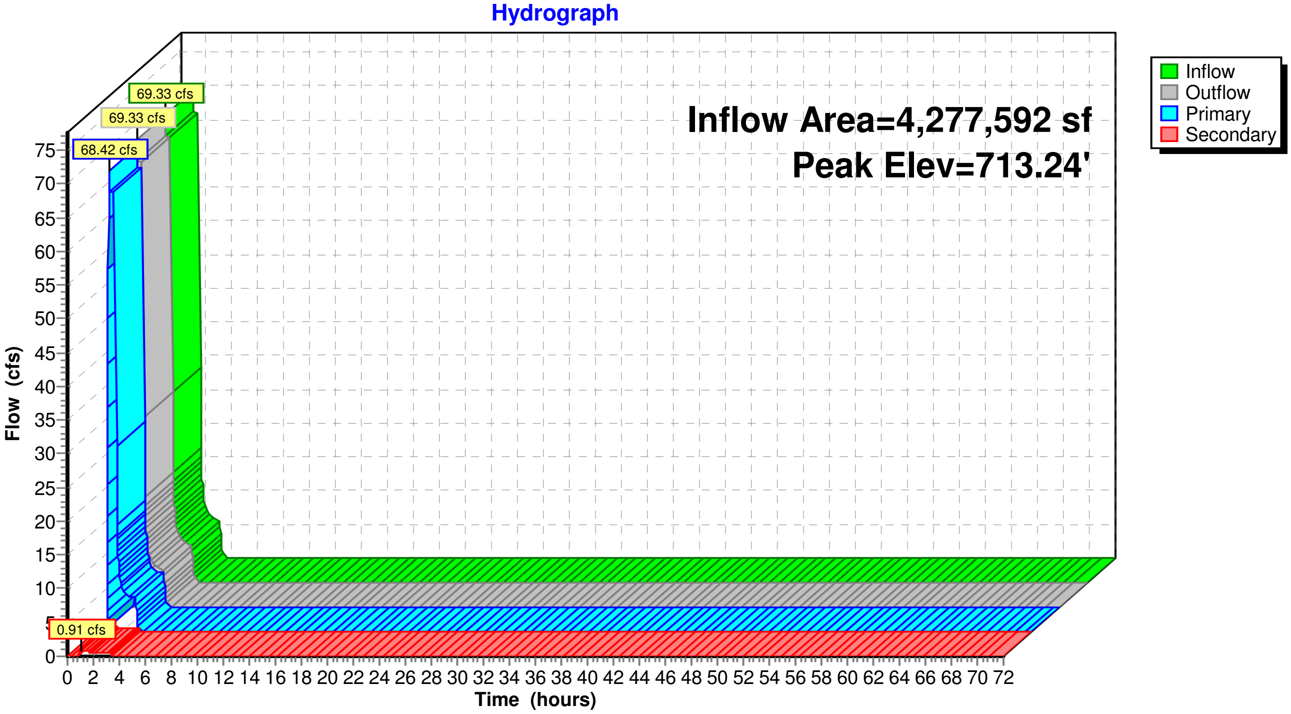
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 713.24' @ 1.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=67.62 cfs @ 1.02 hrs HW=713.15' TW=697.04' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 67.62 cfs @ 9.57 fps)
  ├─**3=Orifice/Grate** (Passes < 0.97 cfs potential flow)
  └─**4=Broad-Crested Rectangular Weir** (Passes < 117.16 cfs potential flow)

Secondary OutFlow Max=0.90 cfs @ 1.02 hrs HW=713.15' TW=691.02' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.90 cfs @ 4.58 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 693.66' (Flood elevation advised)

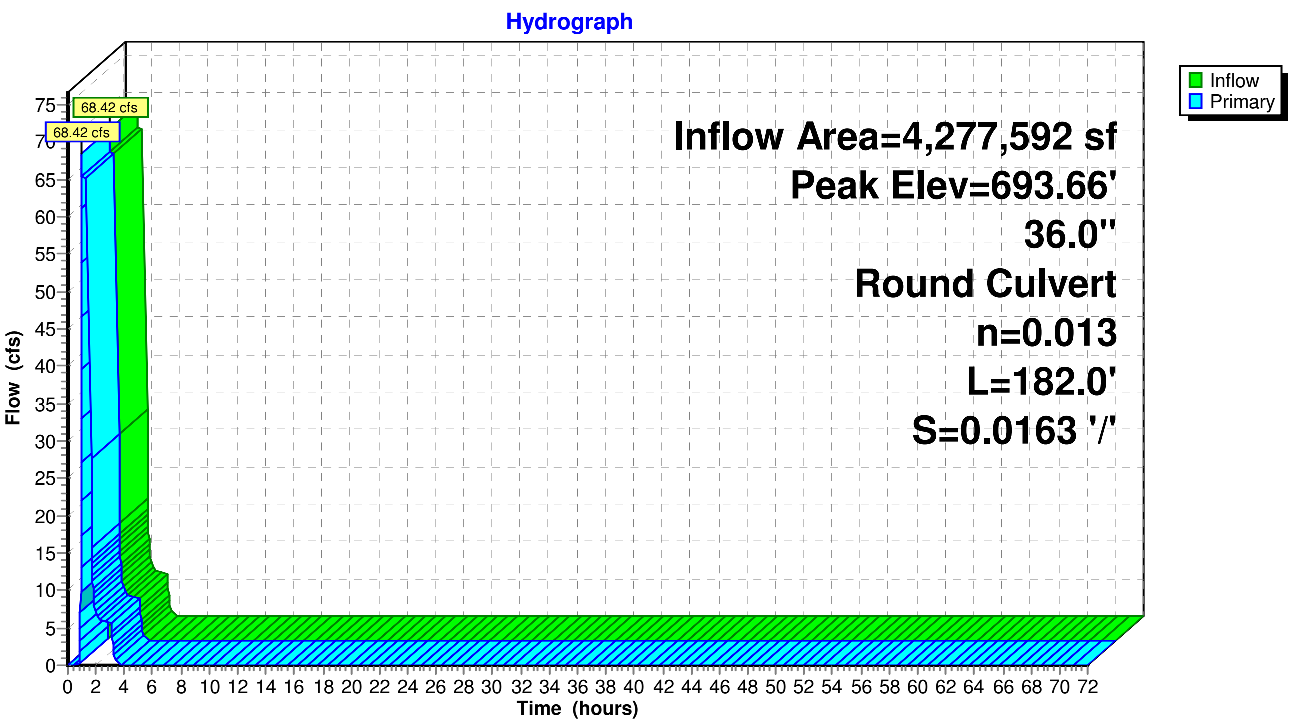
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 0.55" for 100 YR SDS event
Inflow = 68.42 cfs @ 1.02 hrs, Volume= 195,608 cf
Outflow = 68.42 cfs @ 1.02 hrs, Volume= 195,608 cf, Atten= 0%, Lag= 0.0 min
Primary = 68.42 cfs @ 1.02 hrs, Volume= 195,608 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 693.66' @ 1.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=67.68 cfs @ 1.02 hrs HW=693.45' TW=689.43' (Dynamic Tailwater)
1=Culvert (Outlet Controls 67.68 cfs @ 9.57 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

[57] Hint: Peaked at 697.20' (Flood elevation advised)

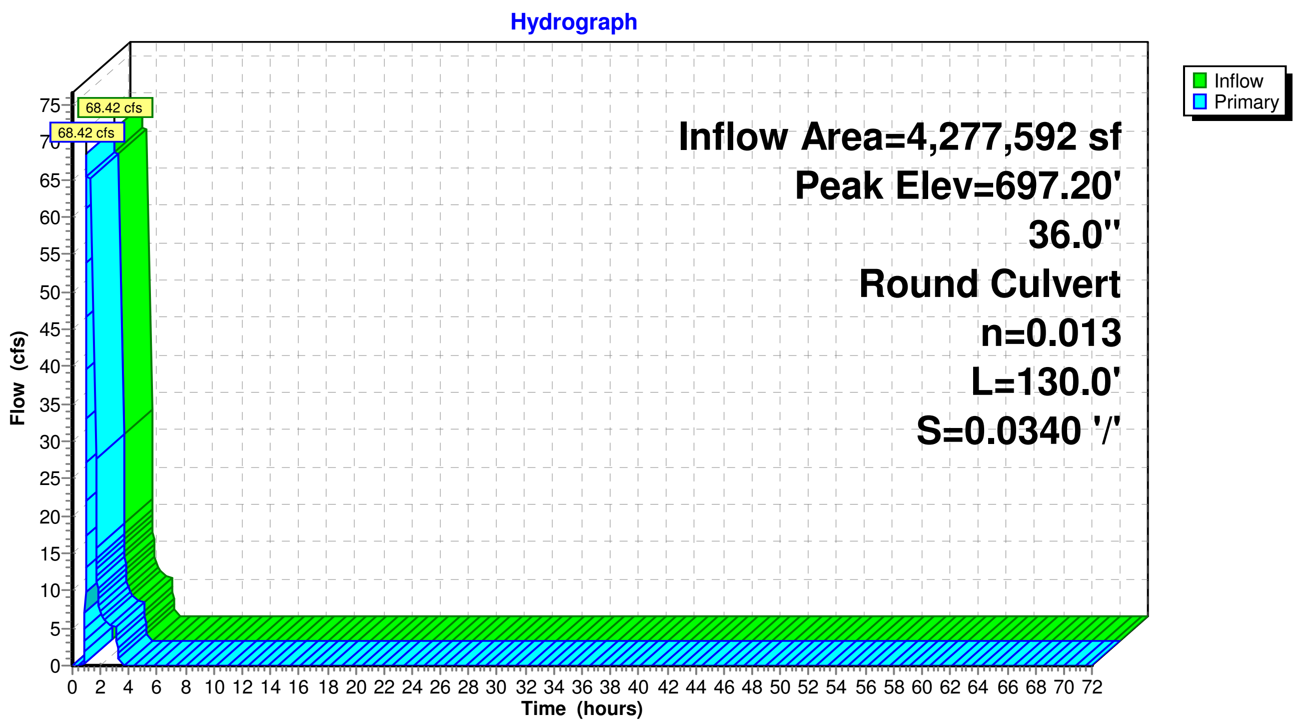
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.54"	for 100 YR SDS event
Inflow =	68.42 cfs @	1.02 hrs, Volume=	193,707 cf	
Outflow =	68.42 cfs @	1.02 hrs, Volume=	193,707 cf,	Atten= 0%, Lag= 0.0 min
Primary =	68.42 cfs @	1.02 hrs, Volume=	193,707 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 697.20' @ 1.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=64.49 cfs @ 1.02 hrs HW=697.04' TW=693.45' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 64.49 cfs @ 9.12 fps)

Pond 53P: Proposed MH



Summary for Pond 57P: Vortech 9000

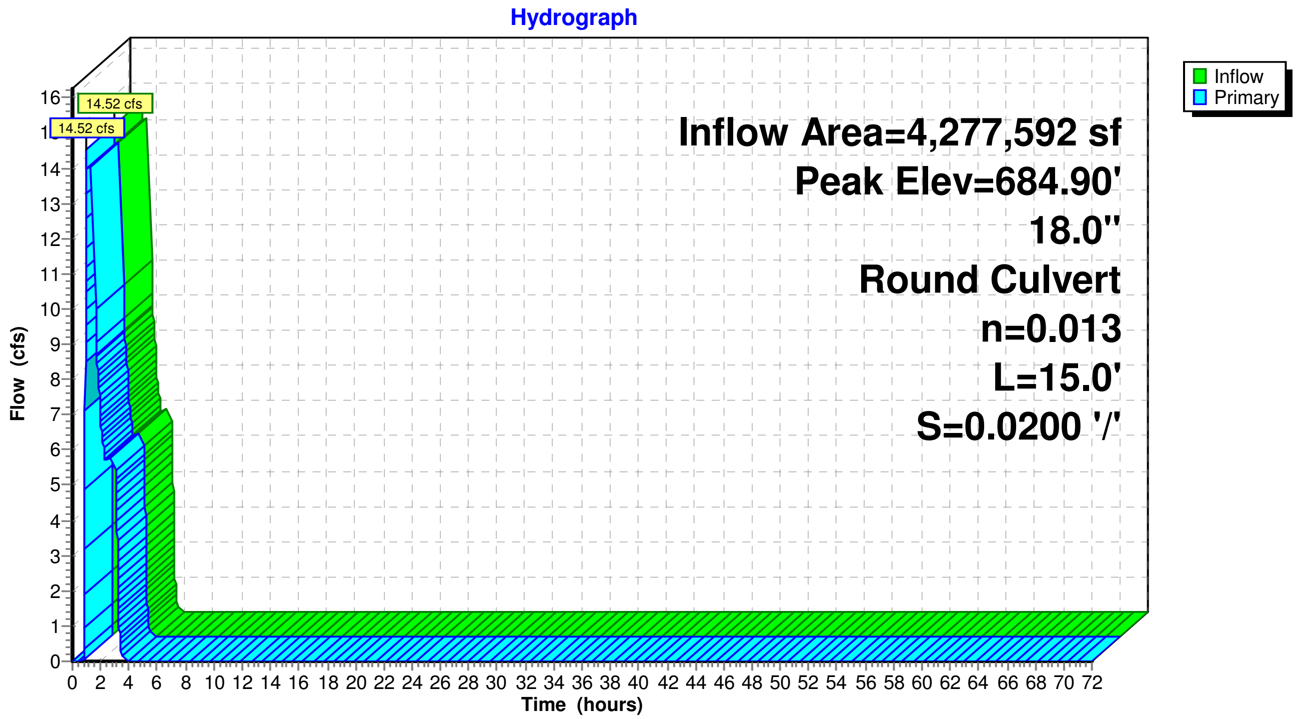
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 0.20"	for 100 YR SDS event	
Inflow =	14.52 cfs @	1.02 hrs,	Volume=	72,085 cf	
Outflow =	14.52 cfs @	1.02 hrs,	Volume=	72,085 cf,	Atten= 0%, Lag= 0.0 min
Primary =	14.52 cfs @	1.02 hrs,	Volume=	72,085 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.90' @ 1.02 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=14.38 cfs @ 1.02 hrs HW=684.85' TW=682.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 14.38 cfs @ 8.14 fps)

Pond 57P: Vortech 9000



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 29S: Squilchuck Basin Runoff Area=98.200 ac 65.00% Impervious Runoff Depth=1.38"
Flow Length=4,450' Tc=13.3 min CN=88 Runoff=32.37 cfs 492,448 cf

Reach 55R: System Inlet Pipe Avg. Flow Depth=1.48' Max Vel=9.31 fps Inflow=32.37 cfs 492,448 cf
36.0" Round Pipe n=0.025 L=250.0' S=0.0364 '/' Capacity=66.17 cfs Outflow=32.35 cfs 492,448 cf

Pond 31P: Bypass Structure Peak Elev=685.73' Inflow=32.30 cfs 485,337 cf
Primary=10.45 cfs 416,718 cf Secondary=21.85 cfs 68,619 cf Outflow=32.30 cfs 485,337 cf

Pond 32P: 48" Unperforated Storage Peak Elev=681.81' Storage=0.052 af Inflow=10.45 cfs 416,718 cf
Outflow=10.45 cfs 416,718 cf

Pond 33P: 48" Perforated CMP Peak Elev=681.57' Storage=0.031 af Inflow=10.45 cfs 416,718 cf
Discarded=0.11 cfs 10,363 cf Primary=10.34 cfs 406,355 cf Outflow=10.45 cfs 416,718 cf

Pond 39R: 36" Smooth PE Bypass Pipe Peak Elev=684.92' Inflow=21.85 cfs 68,619 cf
36.0" Round Culvert n=0.013 L=153.0' S=0.0347 '/' Outflow=21.85 cfs 68,619 cf

Pond 40R: 36" Smooth PE Bypass Pipe Peak Elev=674.71' Inflow=21.85 cfs 68,619 cf
36.0" Round Culvert n=0.013 L=20.0' S=0.0340 '/' Outflow=21.85 cfs 68,619 cf

Pond 42P: Flow Converge Structure Peak Elev=673.72' Inflow=32.19 cfs 474,974 cf
48.0" Round Culvert n=0.013 L=56.0' S=0.0104 '/' Outflow=32.19 cfs 474,974 cf

Pond 44R: 48" CMP Outfall Pipe (Existing) Peak Elev=672.99' Inflow=32.19 cfs 474,974 cf
48.0" Round Culvert n=0.025 L=35.0' S=0.0111 '/' Outflow=32.19 cfs 474,974 cf

Pond 49P: Existing (New) Pond Peak Elev=694.83' Storage=3,631 cf Inflow=0.69 cfs 40,436 cf
Discarded=0.05 cfs 7,080 cf Primary=0.64 cfs 33,325 cf Outflow=0.69 cfs 40,406 cf

Pond 51P: Flow Splitter Peak Elev=710.83' Inflow=32.35 cfs 492,448 cf
Primary=31.66 cfs 452,012 cf Secondary=0.69 cfs 40,436 cf Outflow=32.35 cfs 492,448 cf

Pond 52P: Existing MH to be replaced Peak Elev=688.91' Inflow=32.30 cfs 485,337 cf
36.0" Round Culvert n=0.013 L=182.0' S=0.0163 '/' Outflow=32.30 cfs 485,337 cf

Pond 53P: Proposed MH Peak Elev=693.22' Inflow=31.66 cfs 452,012 cf
36.0" Round Culvert n=0.013 L=130.0' S=0.0340 '/' Outflow=31.66 cfs 452,012 cf

Pond 57P: Vortech 9000 Peak Elev=683.31' Inflow=10.45 cfs 416,718 cf
18.0" Round Culvert n=0.013 L=15.0' S=0.0200 '/' Outflow=10.45 cfs 416,718 cf

Total Runoff Area = 4,277,592 sf Runoff Volume = 492,448 cf Average Runoff Depth = 1.38"
35.00% Pervious = 1,497,157 sf 65.00% Impervious = 2,780,435 sf

Summary for Subcatchment 29S: Squilchuck Basin

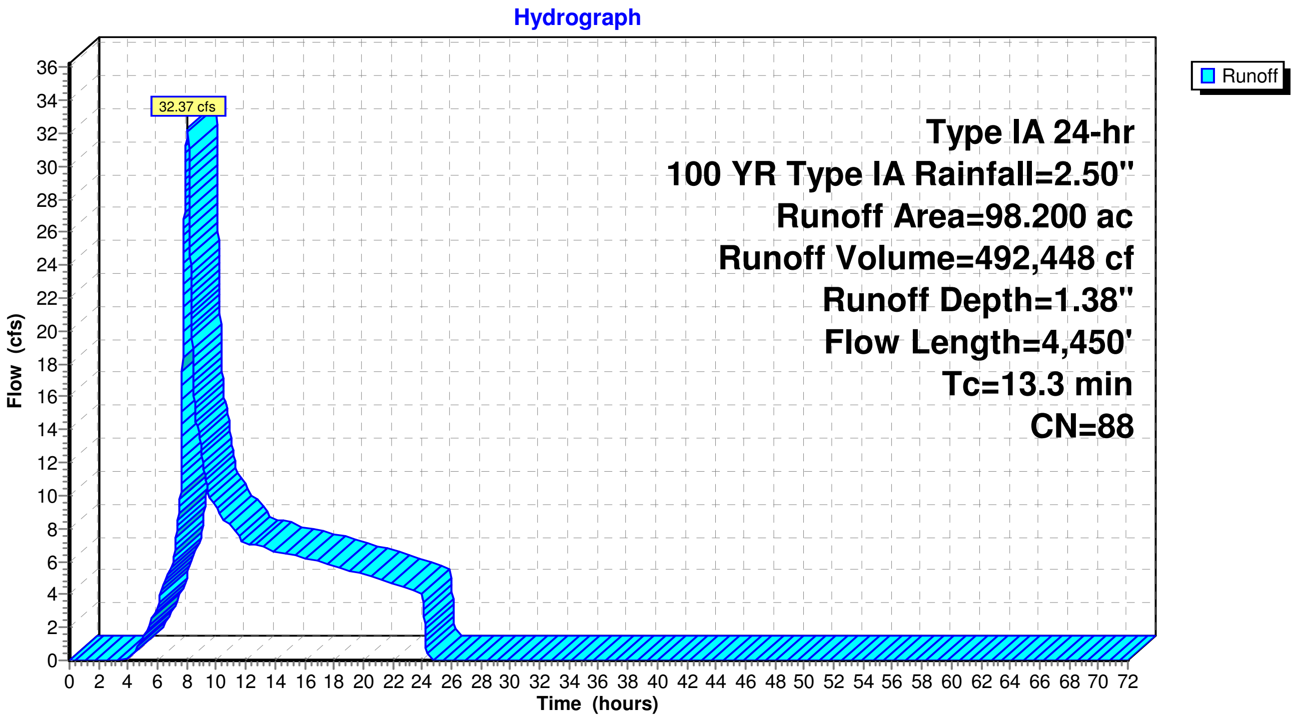
Runoff = 32.37 cfs @ 8.05 hrs, Volume= 492,448 cf, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100 YR Type IA Rainfall=2.50"

Area (ac)	CN	Description
1.900	85	1/8 acre lots, 65% imp, HSG B
39.400	85	1/8 acre lots, 65% imp, HSG B
0.300	85	1/8 acre lots, 65% imp, HSG B
56.600	90	1/8 acre lots, 65% imp, HSG C
98.200	88	Weighted Average
34.370		35.00% Pervious Area
63.830		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0300	1.07		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.20"
1.4	300	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	1,400	0.0300	5.35	9.46	**Pipe Channel, CMP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.025 Corrugated metal
2.4	1,300	0.0600	9.17	28.81	**Pipe Channel, CMP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
2.8	1,300	0.0250	7.76	54.84	**Pipe Channel, CMP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.025 Corrugated metal
13.3	4,450	Total			

Subcatchment 29S: Squilchuck Basin



Summary for Reach 55R: System Inlet Pipe

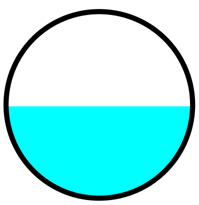
[52] Hint: Inlet/Outlet conditions not evaluated

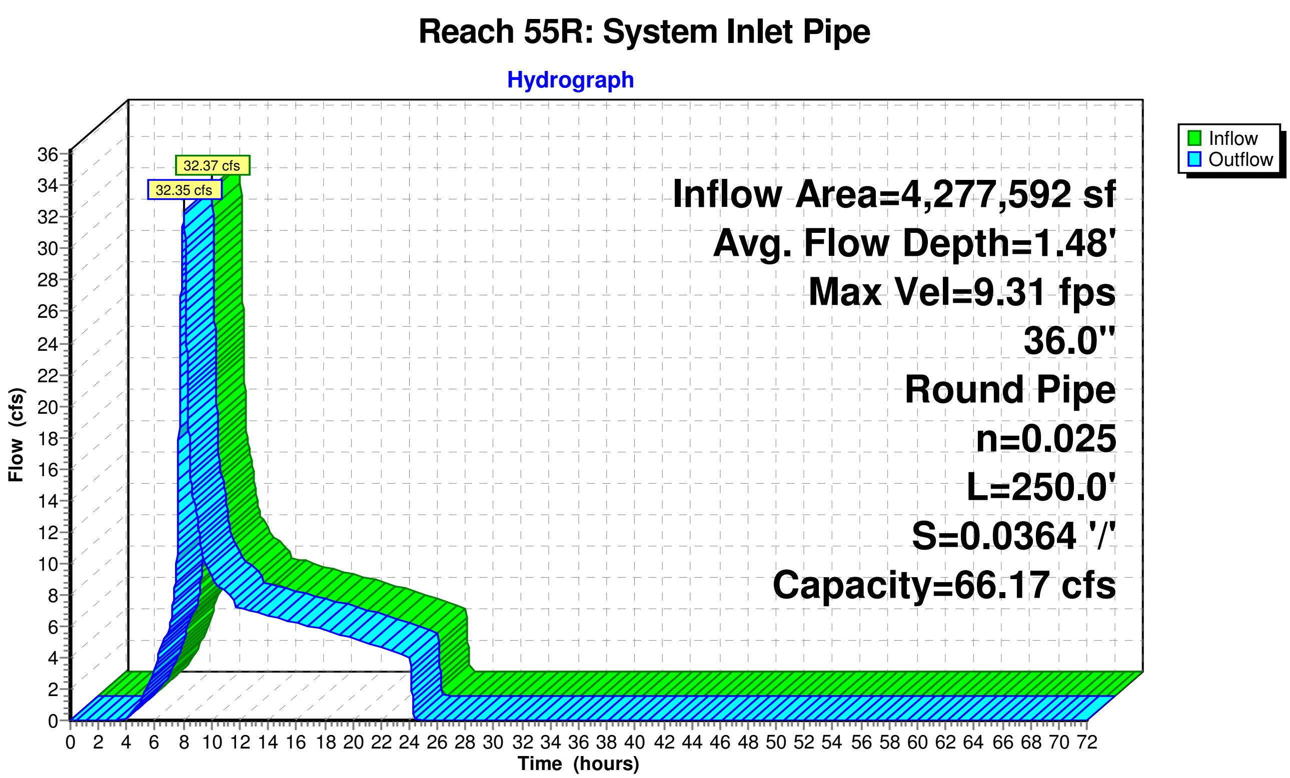
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.38" for 100 YR Type IA event
Inflow = 32.37 cfs @ 8.05 hrs, Volume= 492,448 cf
Outflow = 32.35 cfs @ 8.05 hrs, Volume= 492,448 cf, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 9.31 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 5.57 fps, Avg. Travel Time= 0.7 min

Peak Storage= 869 cf @ 8.05 hrs
Average Depth at Peak Storage= 1.48'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 66.17 cfs

36.0" Round Pipe
n= 0.025 Corrugated metal
Length= 250.0' Slope= 0.0364 '/'
Inlet Invert= 716.80', Outlet Invert= 707.70'





Summary for Pond 31P: Bypass Structure

Sized orifice at 16" to match Contech's documented peak capacity for the Vortech 9000 (14 cfs) in the 100-yr 3-hr SDS.

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.36" for 100 YR Type IA event
Inflow = 32.30 cfs @ 8.05 hrs, Volume= 485,337 cf
Outflow = 32.30 cfs @ 8.05 hrs, Volume= 485,337 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.45 cfs @ 8.05 hrs, Volume= 416,718 cf
Secondary = 21.85 cfs @ 8.05 hrs, Volume= 68,619 cf

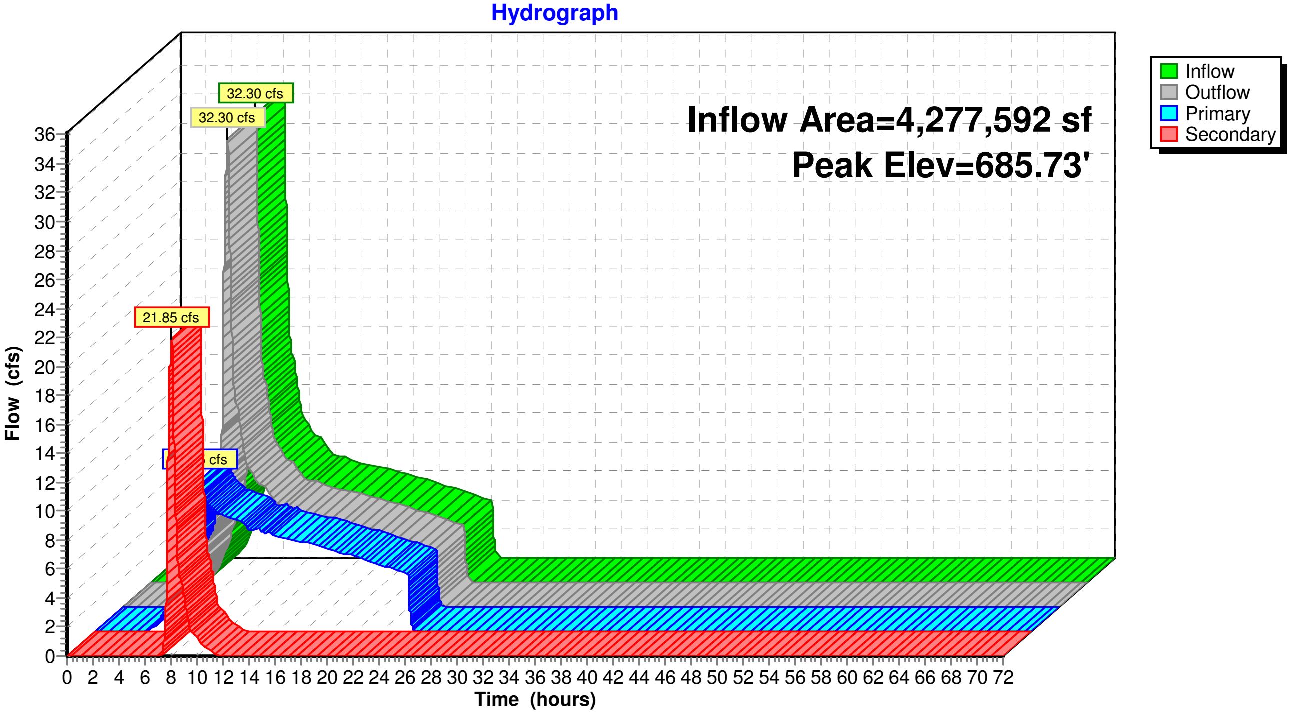
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 685.73' @ 8.05 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Device 3	681.17'	**16.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	683.52'	**36.0" Round Culvert** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.52' / 683.04' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#3	Primary	681.17'	**18.0" Round Culvert** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 681.17' / 680.86' S= 0.0084 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.45 cfs @ 8.05 hrs HW=685.73' TW=683.31' (Dynamic Tailwater)
└─**3=Culvert** (Passes 10.45 cfs of 13.22 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 10.45 cfs @ 7.48 fps)

Secondary OutFlow Max=21.85 cfs @ 8.05 hrs HW=685.73' TW=684.92' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 21.85 cfs @ 5.46 fps)

Pond 31P: Bypass Structure



Summary for Pond 32P: 48" Unperforated Storage

weir not necessary in reality - only used as a baffle to discourage excessive oscillations

[93] Warning: Storage range exceeded by 0.02'

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.17" for 100 YR Type IA event
Inflow = 10.45 cfs @ 8.05 hrs, Volume= 416,718 cf
Outflow = 10.45 cfs @ 8.05 hrs, Volume= 416,718 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.45 cfs @ 8.05 hrs, Volume= 416,718 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.81' @ 8.05 hrs Surf.Area= 0.000 ac Storage= 0.052 af
Flood Elev= 682.46' Surf.Area= 0.000 ac Storage= 0.052 af

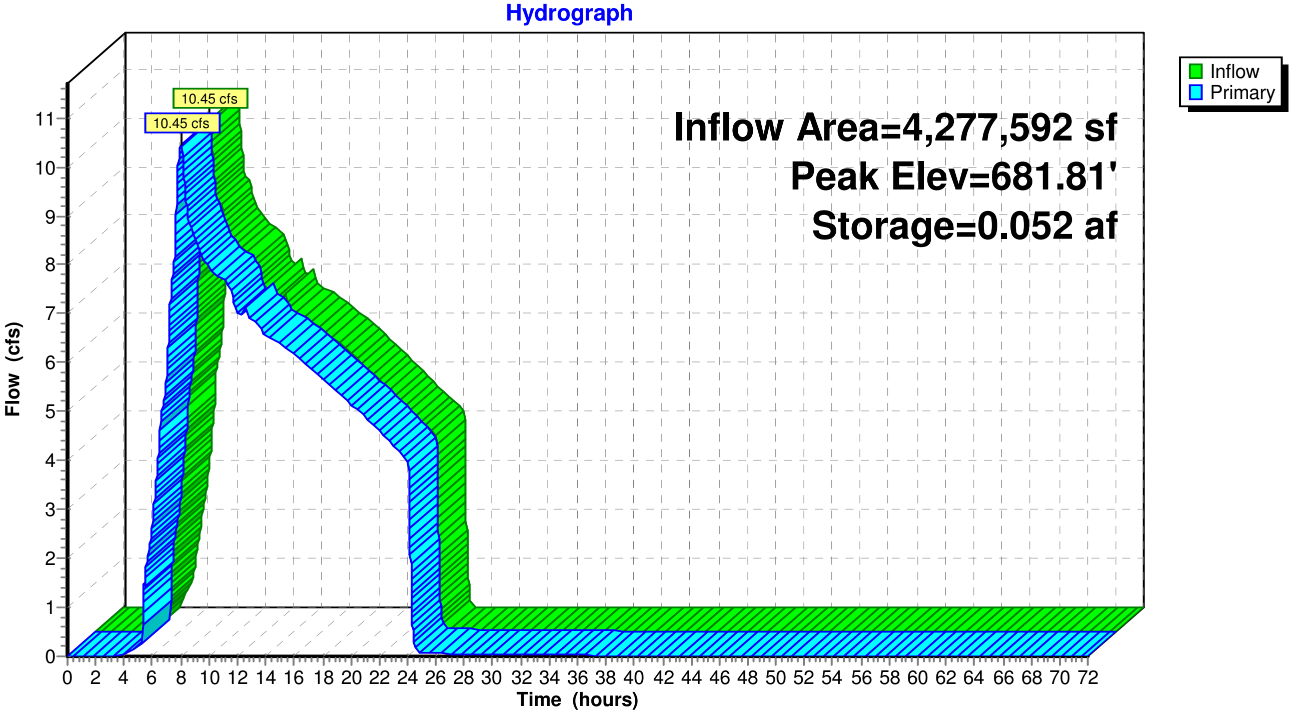
Plug-Flow detention time= 7.4 min calculated for 416,660 cf (100% of inflow)
Center-of-Mass det. time= 7.5 min (850.2 - 842.7)

Volume	Invert	Avail.Storage	Storage Description
#1	677.79'	0.052 af	**48.0" Round Pipe Storage** L= 179.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**48.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32
#3	Device 1	677.79'	**3.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.45 cfs @ 8.05 hrs HW=681.81' TW=681.57' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 10.45 cfs of 29.23 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 10.33 cfs @ 2.03 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 2.33 fps)

Pond 32P: 48" Unperforated Storage



Summary for Pond 33P: 48" Perforated CMP

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.17" for 100 YR Type IA event
Inflow = 10.45 cfs @ 8.05 hrs, Volume= 416,718 cf
Outflow = 10.45 cfs @ 8.06 hrs, Volume= 416,718 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.11 cfs @ 8.06 hrs, Volume= 10,363 cf
Primary = 10.34 cfs @ 8.06 hrs, Volume= 406,355 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 681.57' @ 8.06 hrs Surf.Area= 0.011 ac Storage= 0.031 af
Flood Elev= 681.72' Surf.Area= 0.011 ac Storage= 0.032 af

Plug-Flow detention time= 4.6 min calculated for 416,660 cf (100% of inflow)
Center-of-Mass det. time= 4.6 min (854.8 - 850.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.29'	0.013 af	**6.00'W x 77.00'L x 5.00'H Field A** 0.053 af Overall - 0.022 af Embedded = 0.031 af x 40.0% Voids
#2A	677.79'	0.022 af	**CMP_Round 48** x 4 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= -5.00' x 12.53 sf x 1 rows
		0.034 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	677.79'	**18.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 677.79' / 677.46' S= 0.0194 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	677.29'	**2.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 676.25'
#3	Device 1	680.79'	**5.0' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Discarded OutFlow Max=0.11 cfs @ 8.06 hrs HW=681.57' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=10.34 cfs @ 8.06 hrs HW=681.57' TW=673.72' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.34 cfs of 14.82 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 10.34 cfs @ 2.64 fps)

Pond 33P: 48" Perforated CMP - Chamber Wizard Field A

Chamber Model = CMP_Round 48 (Round Corrugated Metal Pipe)
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= -5.00' x 12.53 sf x 1 rows

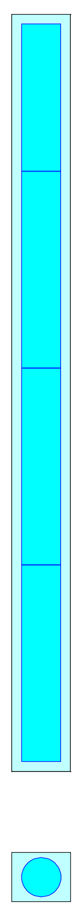
4 Chambers/Row x 20.00' Long -5.00' Row Adjustment = 75.00' Row Length +12.0" End Stone x 2 = 77.00' Base Length
1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width
6.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.00' Field Height

4 Chambers x 250.5 cf -5.00' Row Adjustment x 12.53 sf x 1 Rows = 939.5 cf Chamber Storage

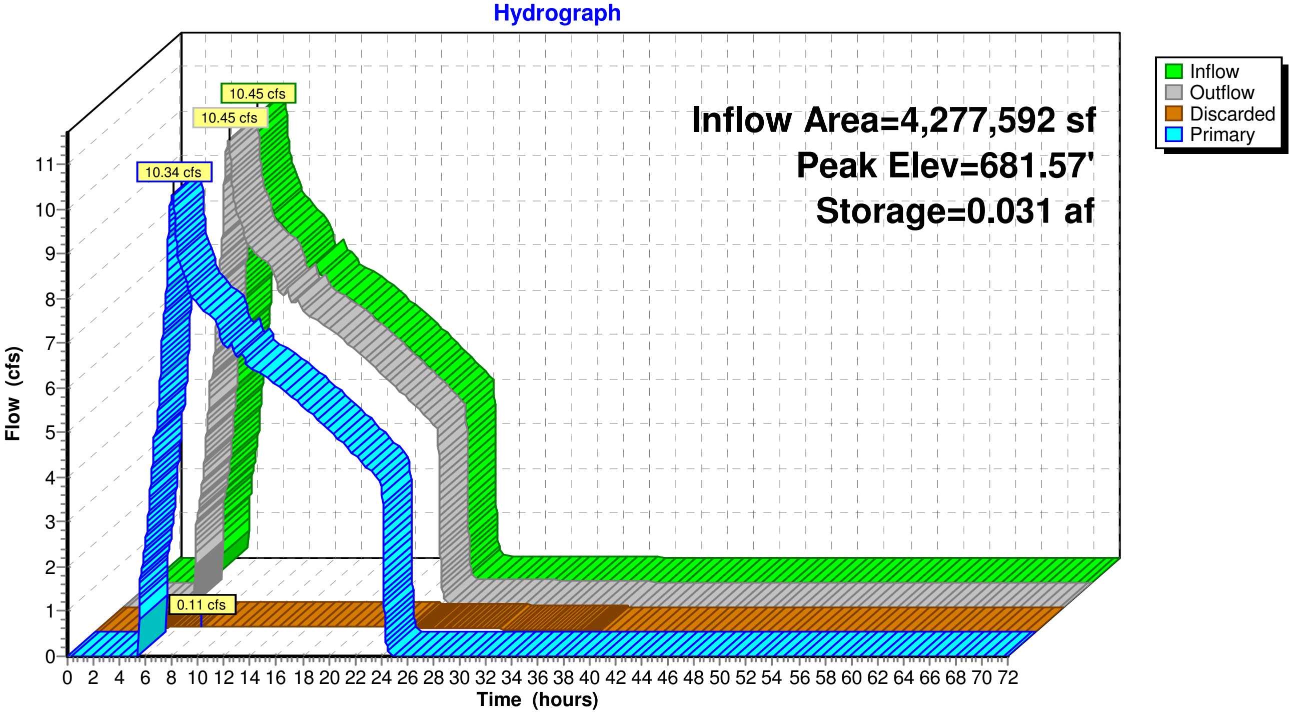
2,310.0 cf Field - 939.5 cf Chambers = 1,370.5 cf Stone x 40.0% Voids = 548.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,487.7 cf = 0.034 af
Overall Storage Efficiency = 64.4%

4 Chambers
85.6 cy Field
50.8 cy Stone



Pond 33P: 48" Perforated CMP



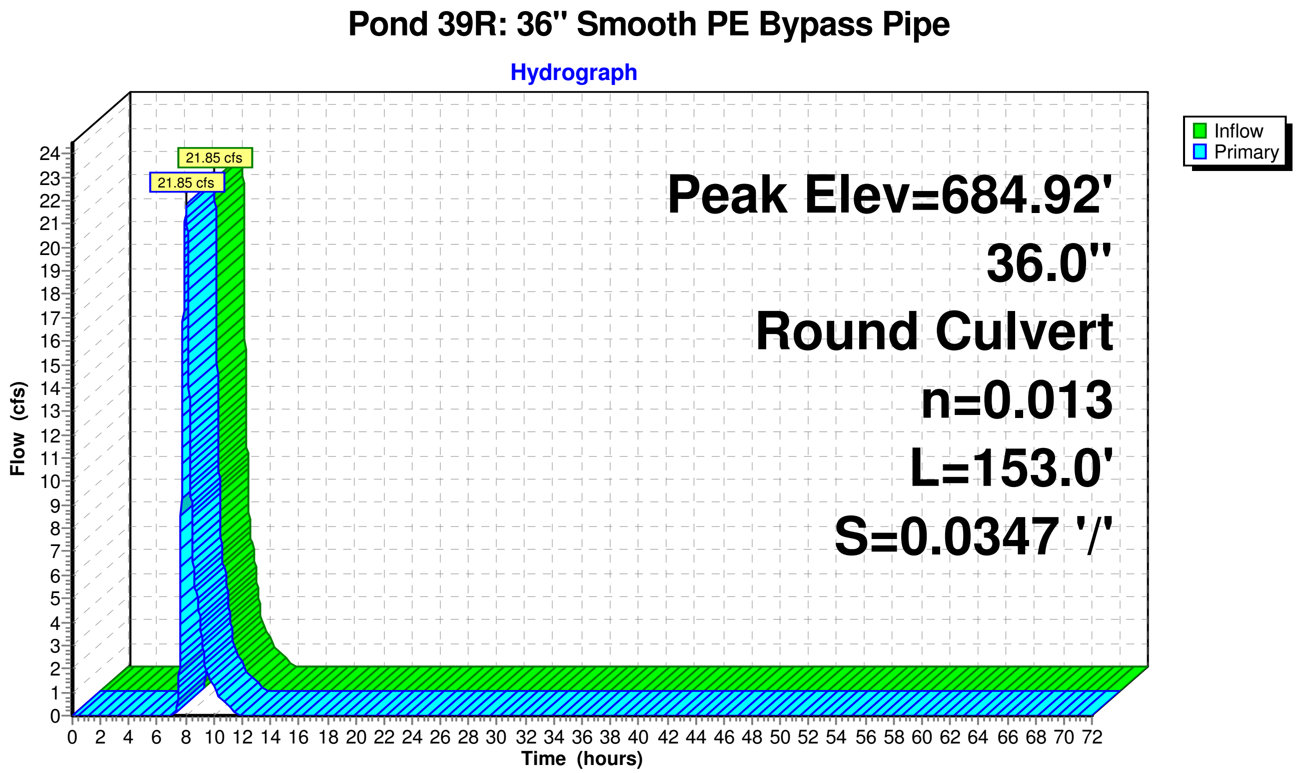
Summary for Pond 39R: 36" Smooth PE Bypass Pipe

Inflow	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf
Outflow	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf, Atten= 0%, Lag= 0.0 min
Primary	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 684.92' @ 8.05 hrs
Flood Elev= 687.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	683.04'	**36.0" Round Culvert** L= 153.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 683.04' / 677.73' S= 0.0347 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=21.85 cfs @ 8.05 hrs HW=684.92' TW=674.71' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 21.85 cfs @ 4.67 fps)



Summary for Pond 40R: 36" Smooth PE Bypass Pipe

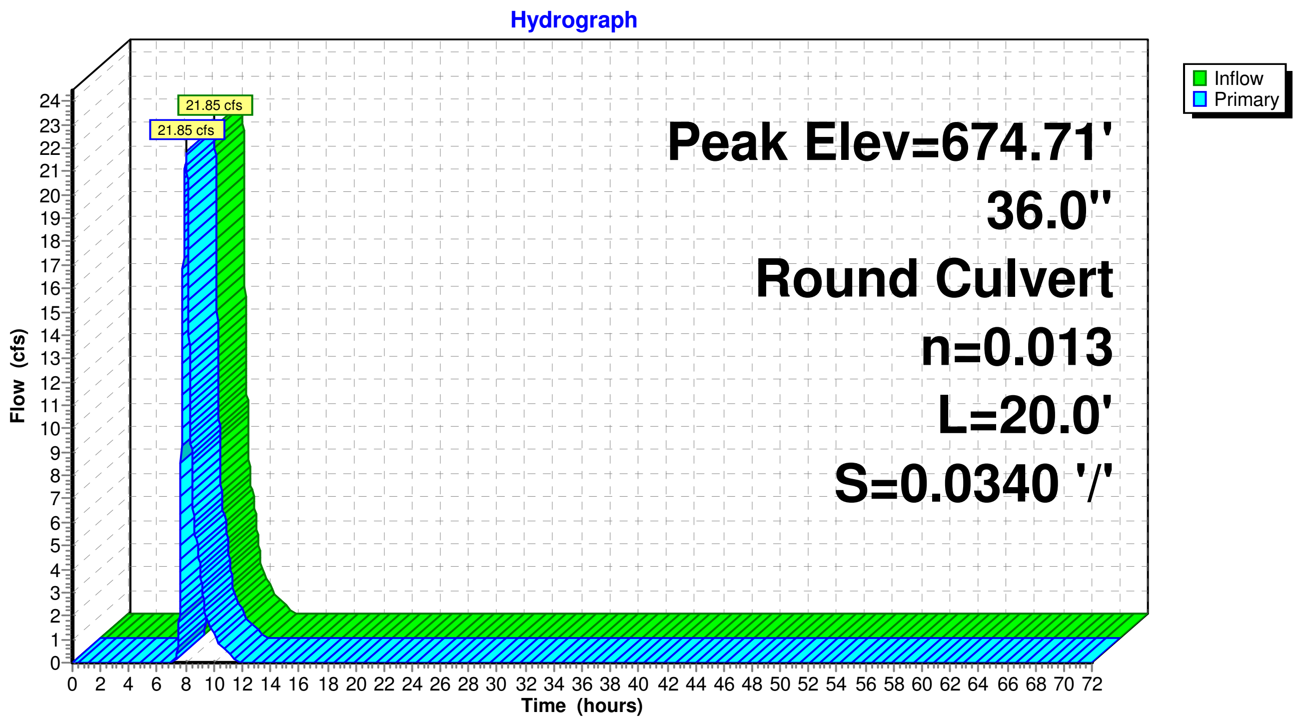
Inflow	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf
Outflow	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf, Atten= 0%, Lag= 0.0 min
Primary	=	21.85 cfs @	8.05 hrs,	Volume=	68,619 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 674.71' @ 8.05 hrs
Flood Elev= 687.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	672.73'	**36.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 672.73' / 672.05' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=21.85 cfs @ 8.05 hrs HW=674.71' TW=673.72' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 21.85 cfs @ 6.25 fps)

Pond 40R: 36" Smooth PE Bypass Pipe



Summary for Pond 42P: Flow Converge Structure

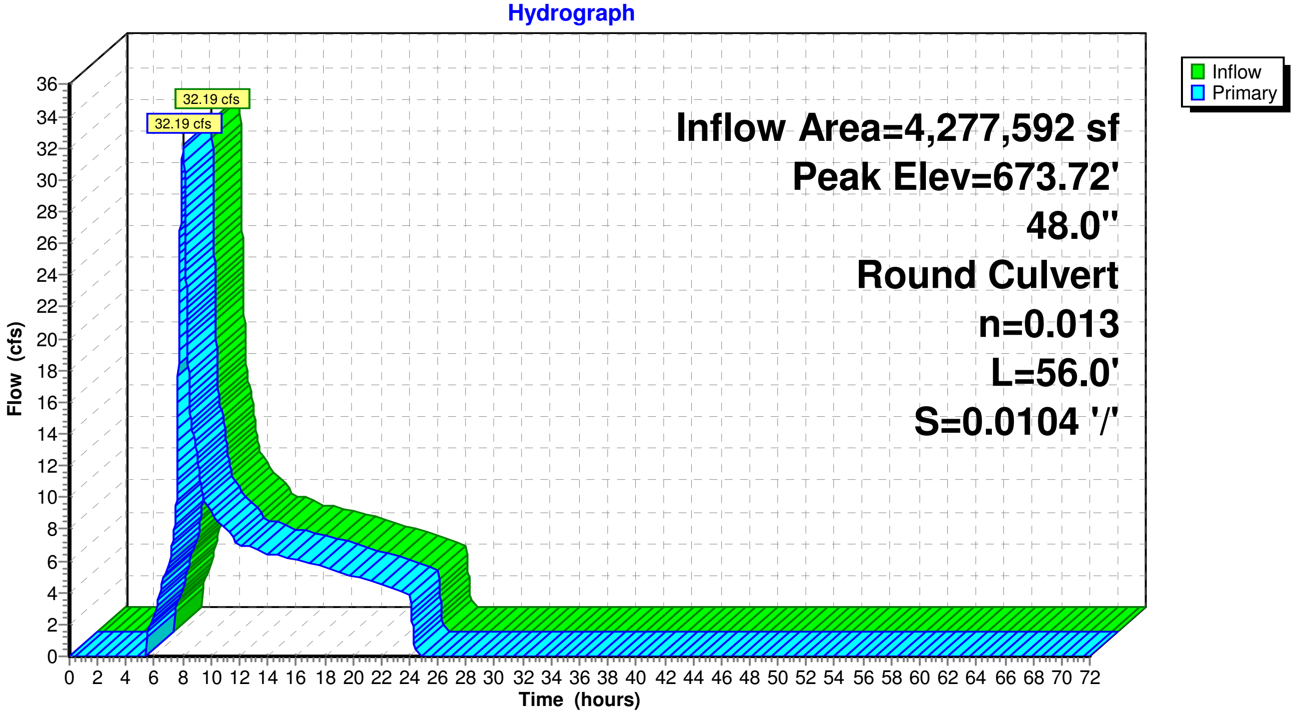
Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.33" for 100 YR Type IA event
Inflow = 32.19 cfs @ 8.05 hrs, Volume= 474,974 cf
Outflow = 32.19 cfs @ 8.05 hrs, Volume= 474,974 cf, Atten= 0%, Lag= 0.0 min
Primary = 32.19 cfs @ 8.05 hrs, Volume= 474,974 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 673.72' @ 8.05 hrs
Flood Elev= 682.09'

Device	Routing	Invert	Outlet Devices
#1	Primary	671.05'	**48.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.05' / 670.47' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 12.57 sf

Primary OutFlow Max=32.18 cfs @ 8.05 hrs HW=673.72' TW=672.99' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 32.18 cfs @ 5.12 fps)

Pond 42P: Flow Converge Structure



Summary for Pond 44R: 48" CMP Outfall Pipe (Existing)

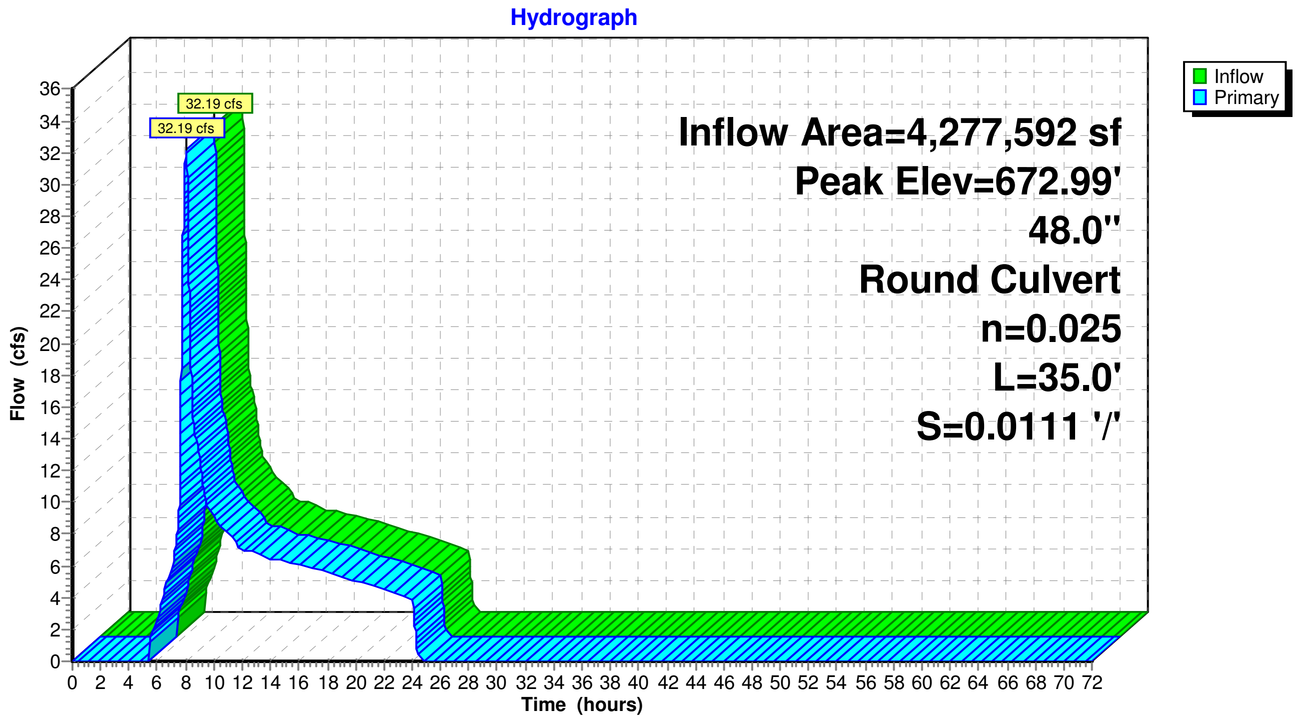
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.33"	for 100 YR Type IA event	
Inflow =	32.19 cfs @	8.05 hrs,	Volume=	474,974 cf	
Outflow =	32.19 cfs @	8.05 hrs,	Volume=	474,974 cf,	Atten= 0%, Lag= 0.0 min
Primary =	32.19 cfs @	8.05 hrs,	Volume=	474,974 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 672.99' @ 8.05 hrs
Flood Elev= 674.47'

Device	Routing	Invert	Outlet Devices
#1	Primary	670.47'	**48.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 670.47' / 670.08' S= 0.0111 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow Max=32.18 cfs @ 8.05 hrs HW=672.99' (Free Discharge)
└─**1=Culvert** (Barrel Controls 32.18 cfs @ 5.50 fps)

Pond 44R: 48" CMP Outfall Pipe (Existing)



Summary for Pond 49P: Existing (New) Pond

Inflow	=	0.69 cfs @	8.05 hrs,	Volume=	40,436 cf
Outflow	=	0.69 cfs @	8.07 hrs,	Volume=	40,406 cf, Atten= 0%, Lag= 1.4 min
Discarded	=	0.05 cfs @	8.07 hrs,	Volume=	7,080 cf
Primary	=	0.64 cfs @	8.07 hrs,	Volume=	33,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.83' @ 8.07 hrs Surf.Area= 1,500 sf Storage= 3,631 cf

Plug-Flow detention time= 177.4 min calculated for 40,400 cf (100% of inflow)
Center-of-Mass det. time= 177.3 min (1,038.1 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	689.00'	3,895 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

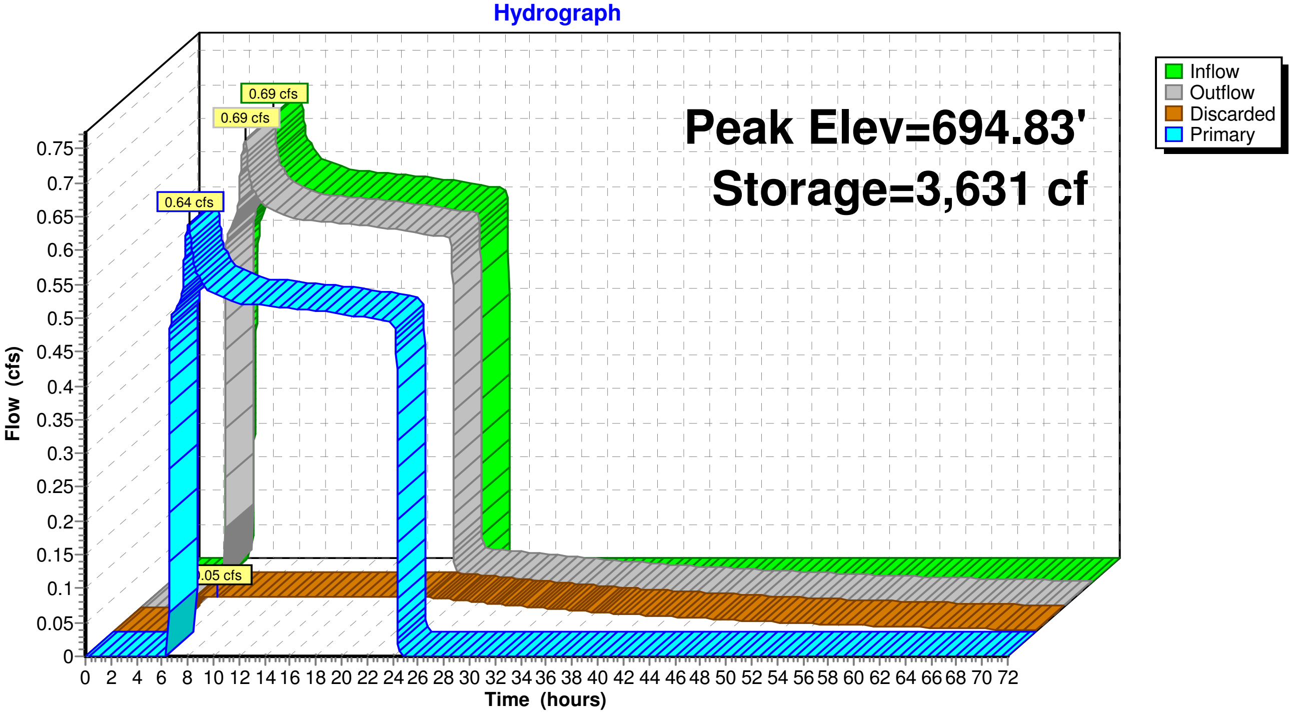
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
689.00	44	0	0
690.00	182	113	113
691.00	351	267	380
692.00	579	465	845
693.00	803	691	1,536
694.00	1,174	989	2,524
695.00	1,568	1,371	3,895

Device	Routing	Invert	Outlet Devices
#1	Primary	690.92'	**18.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.92' / 690.00' S= 0.0400 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Device 1	694.76'	**42.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	689.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 686.00'

Discarded OutFlow Max=0.05 cfs @ 8.07 hrs HW=694.83' (Free Discharge)
↑—**3=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.64 cfs @ 8.07 hrs HW=694.83' TW=688.90' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.64 cfs of 14.80 cfs potential flow)
  ↑—**2=Orifice/Grate** (Weir Controls 0.64 cfs @ 0.85 fps)

Pond 49P: Existing (New) Pond



Summary for Pond 51P: Flow Splitter

[57] Hint: Peaked at 710.83' (Flood elevation advised)
[62] Hint: Exceeded Reach 55R OUTLET depth by 1.65' @ 8.05 hrs

Inflow Area = 4,277,592 sf, 65.00% Impervious, Inflow Depth = 1.38" for 100 YR Type IA event
Inflow = 32.35 cfs @ 8.05 hrs, Volume= 492,448 cf
Outflow = 32.35 cfs @ 8.05 hrs, Volume= 492,448 cf, Atten= 0%, Lag= 0.0 min
Primary = 31.66 cfs @ 8.05 hrs, Volume= 452,012 cf
Secondary = 0.69 cfs @ 8.05 hrs, Volume= 40,436 cf

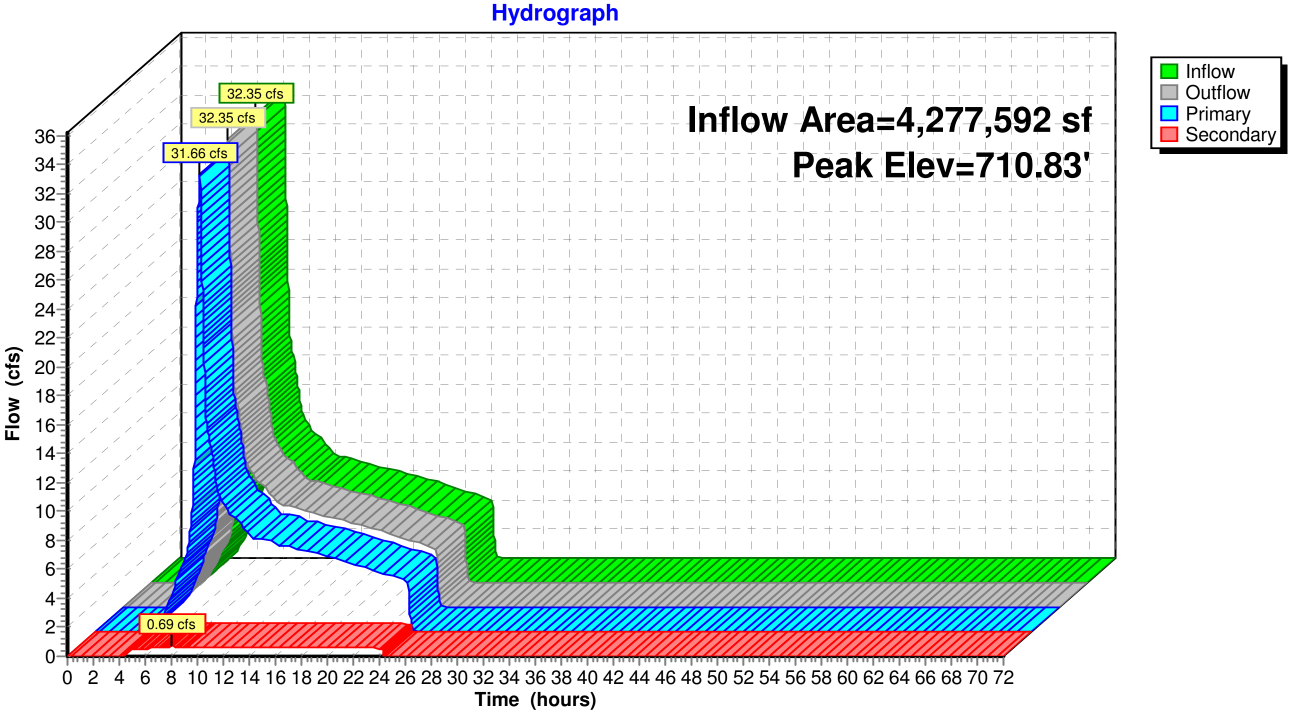
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.83' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	708.20'	**6.0" Round Culvert** L= 200.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 708.20' / 707.00' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	707.70'	**36.0" Round Culvert** L= 180.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 707.70' / 693.32' S= 0.0799 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#3	Device 2	707.70'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	709.20'	**4.5' long x 0.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.74 2.78 2.86 3.00 3.11 3.18 3.25 3.29 3.32 3.31 3.32

Primary OutFlow Max=31.66 cfs @ 8.05 hrs HW=710.83' TW=693.22' (Dynamic Tailwater)
└─**2=Culvert** (Passes 31.66 cfs of 43.49 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.72 cfs @ 8.29 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 30.93 cfs @ 4.21 fps)

Secondary OutFlow Max=0.69 cfs @ 8.05 hrs HW=710.83' TW=694.83' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.69 cfs @ 3.52 fps)

Pond 51P: Flow Splitter



Summary for Pond 52P: Existing MH to be replaced

[57] Hint: Peaked at 688.91' (Flood elevation advised)

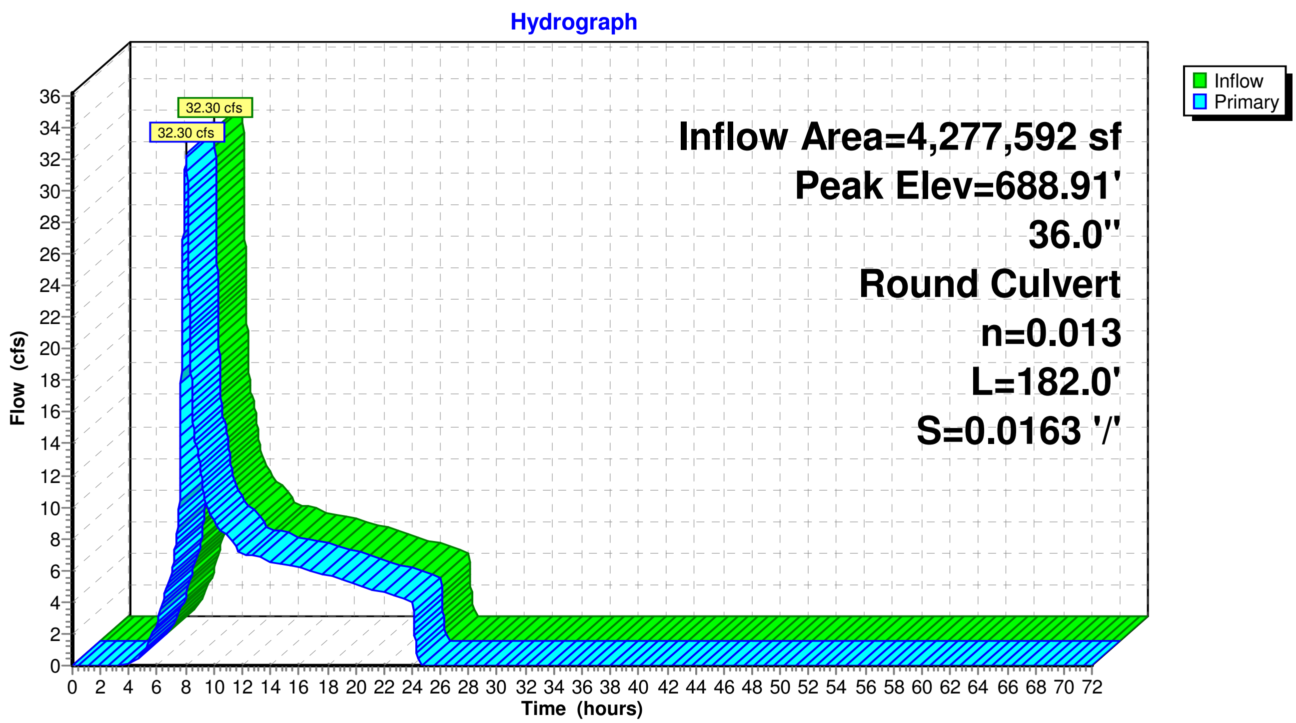
Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.36"	for 100 YR Type IA event
Inflow =	32.30 cfs @	8.05 hrs, Volume=	485,337 cf	
Outflow =	32.30 cfs @	8.05 hrs, Volume=	485,337 cf,	Atten= 0%, Lag= 0.0 min
Primary =	32.30 cfs @	8.05 hrs, Volume=	485,337 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 688.91' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	686.49'	**36.0" Round Culvert** L= 182.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 686.49' / 683.52' S= 0.0163 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=32.29 cfs @ 8.05 hrs HW=688.91' TW=685.73' (Dynamic Tailwater)
1=Culvert (Inlet Controls 32.29 cfs @ 5.29 fps)

Pond 52P: Existing MH to be replaced



Summary for Pond 53P: Proposed MH

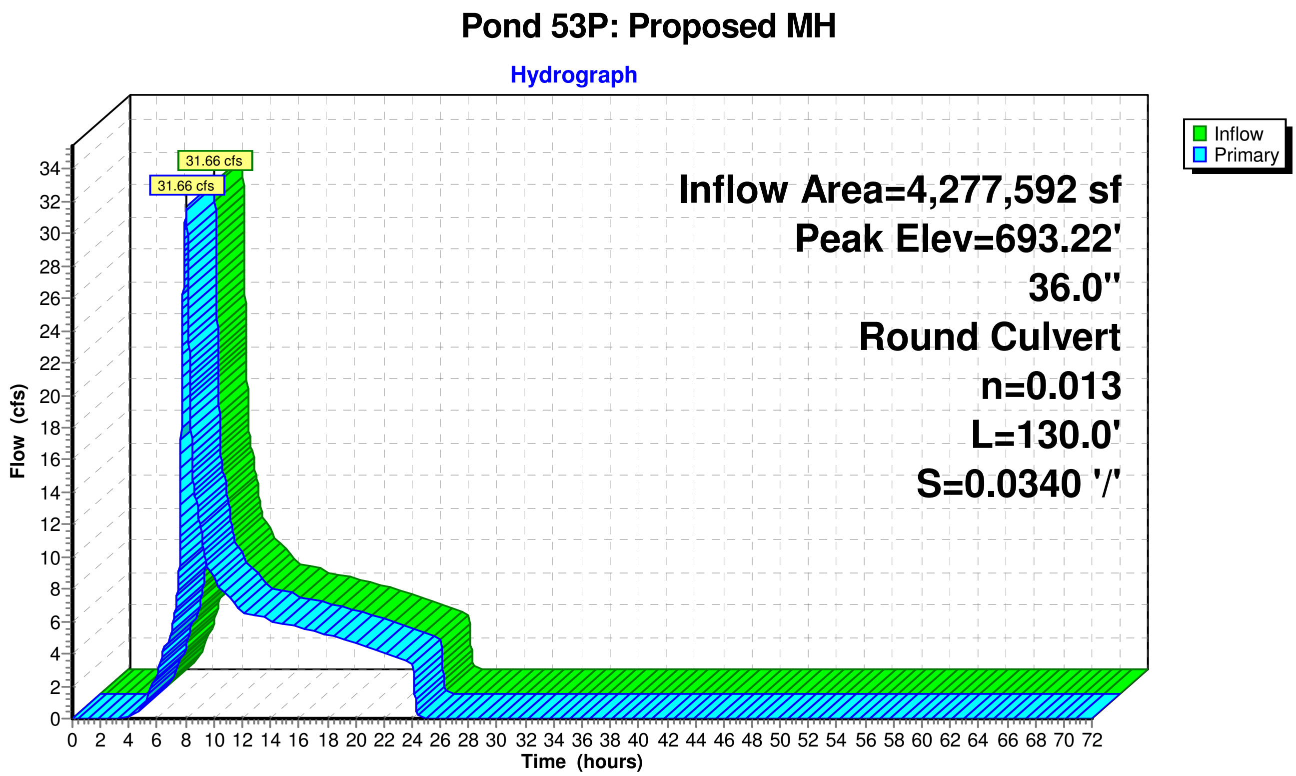
[57] Hint: Peaked at 693.22' (Flood elevation advised)

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.27" for 100 YR Type IA event
Inflow =	31.66 cfs @	8.05 hrs, Volume=	452,012 cf
Outflow =	31.66 cfs @	8.05 hrs, Volume=	452,012 cf, Atten= 0%, Lag= 0.0 min
Primary =	31.66 cfs @	8.05 hrs, Volume=	452,012 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 693.22' @ 8.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	690.84'	**36.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 690.84' / 686.42' S= 0.0340 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=31.66 cfs @ 8.05 hrs HW=693.22' TW=688.91' (Dynamic Tailwater)
1=Culvert (Inlet Controls 31.66 cfs @ 5.26 fps)



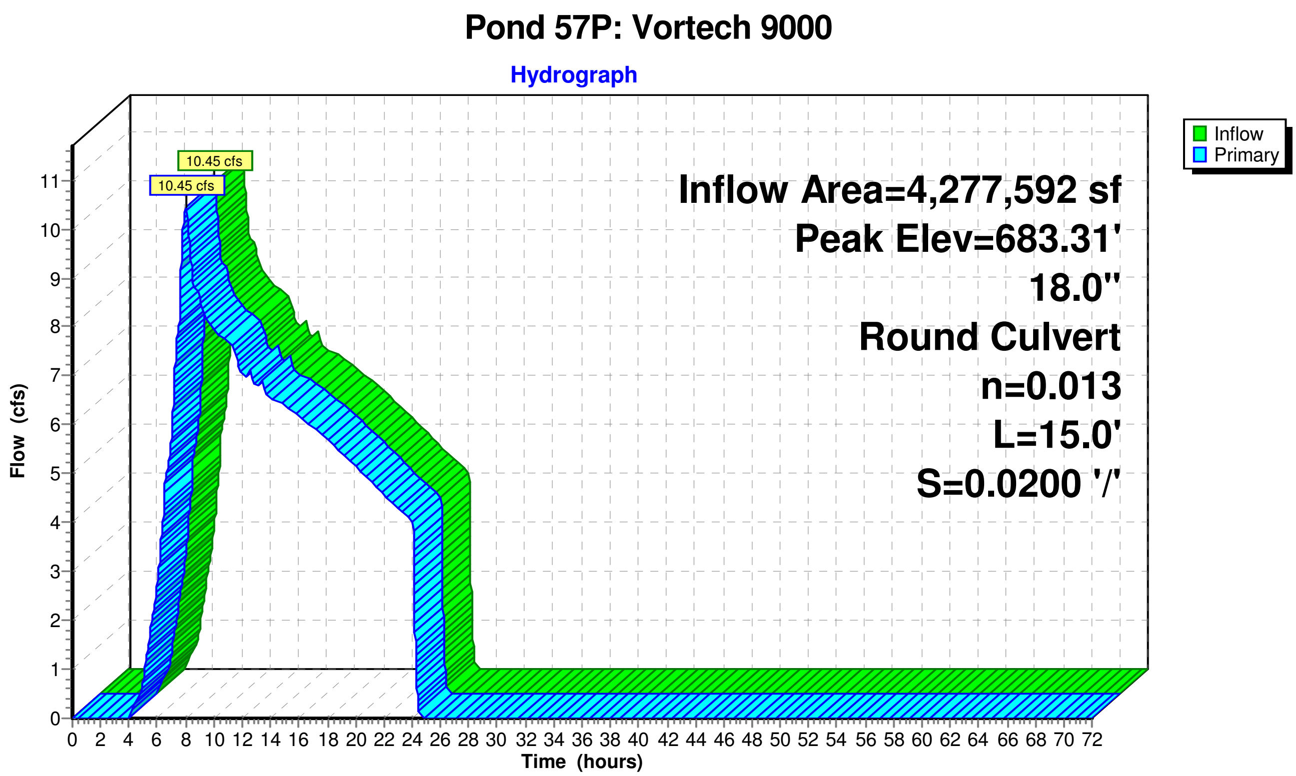
Summary for Pond 57P: Vortech 9000

Inflow Area =	4,277,592 sf,	65.00% Impervious,	Inflow Depth = 1.17"	for 100 YR Type IA event
Inflow =	10.45 cfs @	8.05 hrs, Volume=	416,718 cf	
Outflow =	10.45 cfs @	8.05 hrs, Volume=	416,718 cf,	Atten= 0%, Lag= 0.0 min
Primary =	10.45 cfs @	8.05 hrs, Volume=	416,718 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 683.31' @ 8.05 hrs
Flood Elev= 685.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	680.69'	**18.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 680.69' / 680.39' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.45 cfs @ 8.05 hrs HW=683.31' TW=681.81' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 10.45 cfs @ 5.91 fps)



Appendix E
Soils

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

Squilchuck Stormwater Outfall

January 13, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:7,830 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 350, 700, 1400, 2100

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 8, Jun 28, 2012

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2010—Oct 17, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties) (WA607)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CcB	Cashmont sandy loam, 3 to 8 percent slopes	1.0	0.4%
CeD	Cashmont stony sandy loam, 0 to 25 percent slopes	10.0	3.4%
PhB	Peshastin loam, 3 to 8 percent slopes	26.1	9.0%
PhC	Peshastin loam, 8 to 15 percent slopes	95.6	32.9%
PlE	Peshastin stony loam, 25 to 45 percent slopes	27.7	9.6%
W	Water	0.9	0.3%
WeA	Wenatchee silt loam, 0 to 3 percent slopes	122.1	42.1%
WeB	Wenatchee silt loam, 3 to 8 percent slopes	6.9	2.4%
Totals for Area of Interest		**290.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

CcB—Cashmont sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 140 to 180 days

Map Unit Composition

Cashmont and similar soils: 100 percent

Description of Cashmont

Setting

Landform: Hillslopes, alluvial fans, terraces
Landform position (two-dimensional): Footslope
Parent material: Alluvium, glaciofluvial deposits or ablation till

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 3e
Hydrologic Soil Group: A

Typical profile

0 to 8 inches: Sandy loam
8 to 21 inches: Gravelly sandy loam
21 to 60 inches: Gravelly sandy loam

CeD—Cashmont stony sandy loam, 0 to 25 percent slopes

Map Unit Setting

Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 140 to 180 days

Map Unit Composition

Cashmont and similar soils: 100 percent

Description of Cashmont

Setting

Landform: Hillslopes, alluvial fans, terraces
Landform position (two-dimensional): Footslope
Parent material: Alluvium, glaciofluvial deposits or ablation till

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Farmland classification: Farmland of unique importance
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile

0 to 21 inches: Stony sandy loam
21 to 60 inches: Gravelly sandy loam

PhB—Peshastin loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 700 to 2,400 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 175 to 190 days

Map Unit Composition

Peshastin and similar soils: 100 percent

Description of Peshastin

Setting

Landform: Terraces
Parent material: Till and outwash with a component of loess and volcanic ash in the surface

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: DRY LOAMY 10-16 PZ (R008XY101WA)

Typical profile
0 to 7 inches: Loam
7 to 18 inches: Loam
18 to 60 inches: Very cobbly sandy loam

PhC—Peshastin loam, 8 to 15 percent slopes

Map Unit Setting
Elevation: 700 to 2,400 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 175 to 190 days

Map Unit Composition
Peshastin and similar soils: 100 percent

Description of Peshastin

Setting
Landform: Terraces
Parent material: Till and outwash with a component of loess and volcanic ash in the surface

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups
Farmland classification: Farmland of unique importance
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 3e

Hydrologic Soil Group: B
Ecological site: DRY LOAMY 10-16 PZ (R008XY101WA)

Typical profile
0 to 7 inches: Loam
7 to 18 inches: Loam
18 to 60 inches: Very cobbly sandy loam

PIE—Peshastin stony loam, 25 to 45 percent slopes

Map Unit Setting
Elevation: 700 to 2,400 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 140 to 190 days

Map Unit Composition
Peshastin and similar soils: 100 percent

Description of Peshastin

Setting
Landform: Terraces
Parent material: Till and outwash with a component of loess and volcanic ash in the surface

Properties and qualities
Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.1 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: DRY STONY 10-16 PZ (R008XY201WA)

Typical profile
0 to 7 inches: Stony loam
7 to 18 inches: Loam
18 to 60 inches: Very cobbly sandy loam

W—Water

Map Unit Composition

Water: 100 percent

Description of Water

Setting

Landform: Alluvial cones

WeA—Wenatchee silt loam, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 150 to 185 days

Map Unit Composition

Wenatchee and similar soils: 100 percent

Description of Wenatchee

Setting

Landform: Terraces
Parent material: Alluvium with a minor amount of loess and volcanic ash in the surface

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.5 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 3s
Hydrologic Soil Group: C

Typical profile

0 to 8 inches: Silt loam
8 to 17 inches: Silt loam
17 to 60 inches: Sandy clay loam

WeB—Wenatchee silt loam, 3 to 8 percent slopes

Map Unit Setting

Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 150 to 185 days

Map Unit Composition

Wenatchee and similar soils: 100 percent

Description of Wenatchee

Setting

Landform: Terraces
Parent material: Alluvium with a minor amount of loess and volcanic ash in the surface

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.5 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 3e
Hydrologic Soil Group: C

Typical profile

0 to 8 inches: Silt loam
8 to 17 inches: Silt loam
17 to 60 inches: Sandy clay loam

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