

FINAL STORM WATER DRAINAGE REPORT

HT SOLUTIONS-PHASE 2

LOT 292

NEWBERRY LANDINGS, 1ST PLAT

LEE'S SUMMIT, MISSOURI

1440 SE BROADWAY DRIVE

PREPARED FOR

HT SOLUTIONS

PREPARED BY

HG CONSULT, INC.

APRIL 25, 2019

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3. Project Overview

The proposed project is a building addition to an existing building (Phase 1) and parking lot on the south side of the lot. The new building addition will be contained in a 31,150 square foot building footprint. This entire project is contained on 3.59 acre site. The site is construction ready. No improvement or modification is proposed for the existing detention pond, completed in 2017 with and for Phase1.

The topography of the site is a gentle slope west to the east. The existing storm sewer detention system for Phase 1 is in place on the east side of the site on the east side of the Phase 1 building. An additional amount of detention will be required to accommodate the additional building area (Phase 2) which is provided with this project.

4. Drainage Assessment of the Project Site –Phase 2

Due to the slope of the site and the need for a flat slab, the bench and fill grading method was used for the site along with the need to have positive drainage away from the building, drainage areas directing storm water into new storm sewer catchments that forces storm water into the detention pond. The remainder of the site grading directs pervious areas and impervious areas away from the building and drainage to the proposed detention pond. Design requirements call for a piping system with a minimum capacity for the 10 year event, with the 100 year storm event being routed overland in an above grade manner such as swales and gutters. To insure that higher frequency storms would not cause any ponding problems or inundation of parked vehicles, the structures and piping system have been designed to the 100 year event flows. With the relatively small drainage areas, these flows are low and pipe sizes are 15 inch used to capture the grass area between the building and SE Hamblen Road inch draining to the detention pond.

5. Design and Methodology

The method for evaluating HT Solutions was the use of a PondPack Model. Both Pre-Development and Post-Development conditions were considered:

- PondPack V8i
 - TR-55 Unit Hydrograph Method
 - 2-year, 10-year and 100-year Return Frequency storms
 - AMC II Soil Moisture conditions
 - 24-Hour SCS Type II Rainfall Distribution
 - SCS Runoff Curve Numbers per APWA 5600 (Table 5602-3)

Curve number calculations were calculated based on APWA 5600 for the Kansas City area. The pre-development curve number is 74. The calculations for the post-development curve number are located below.

Table 5.1 –Curve Number Calculations

Type	Area (ac)	CN
Undeveloped	0.28	74
Undeveloped	0.32	74
Impervious	1.01	98
Total	1.61	89

Time of concentration was considered using TR-55; however, due to the small size of the drainage basin and the amount of impervious area on the site that will just be conveying sheet flow, a time of concentration of 5 minutes was assumed. This is the minimum time of concentration per APWA 5600.

Per APWA Section 5608.4 and City of Lee’s Summit criteria, the post-development discharge rates from the site shall not exceed those indicated below:

- 50% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

The existing and proposed drainage area is 1.61 acres and flows to the same single point of interest where the proposed detention pond is located. Therefore, no off-site drainage will be bypassing the detention pond. The table below states the discharges for the allowable discharge rates per APWA 5600 and pre-development and post-development discharge rates.

Table 5.2 –Discharge Rates

	2-year	10-year	100-year
APWA Allowable Discharge Rates	0.81	3.22	4.83
Pre-Development Discharge Rates	2.04	4.45	7.99
Post-Development Discharge Rates	0.73	3.03	4.50

APWA 5608.4 also requires a 40-hour extended release of the water quality storm event (1.37”/24-hour rainfall) per Section 8.10 of the BMP Manual. The detention facility will release the water quality event over a 40-hour period. The perforated riser structure contains a 1” opening at the base elevation of 985.50 and another 1” opening at elevation 987.00 to achieve the 40-hour extended detention. The Time vs. Volume graph is located in the Design Calculations Section.

The existing detention pond (Phase 1) serves the existing building and parking lot. It was also designed to accommodate some of the Phase 2 building and the new parking lot on the south side of the lot, per the storm drainage report for the Phase 1 project, constructed in 2016-2017. No new drainage has been designed to go to the existing pond and no modifications are anticipated.

To meet the APWA allowable peak flow requirements stated above in Table 5.2, the concrete riser box was designed with 2-3" orifices at elevation 987.30 and 6"x10" opening at elevation 989.30. The 6"x10" opening will be fitted with #4 rebar at a spacing of 5" to catch debris. This will allow the structure to meet the APWA allowable peak flow rates stated above in Table 5.2. For more information, Pondpack calculations can be seen in the Design Calculations Section.

6. Emergency Spillway Design

APWA 5600 also requires an emergency spillway in the detention pond sized for the 100-year event, assuming 100% clogging of the primary outlet works and zero available storage in the detention pond. The 100-year water surface elevation is 991.77. The emergency spillway was set at an elevation of 992.30 and was sized to provide 1-foot of freeboard. The emergency spillway will be 10-feet in length. Emergency spillway calculations can be found in the Design Calculations Section.

7. Rip Rap Design

The downstream channel riprap was designed using the guidance from USACE Hydraulic Design Criteria, Sheet 712-1, Stone Stability, and Velocity vs. Stone Diameter. The riprap layer thickness, length, and width were designed in accordance with the MoDOT Design Standard 609.70C. The calculated gradation for the 165 pcf stone is as follows for the riprap channel:

	Avg. Stone Diameter (inches)	Stone Weight (lbs)
D ₁₀₀	24	691
D ₅₀	15	205
D ₁₅	10	102

Refer to the Design Calculations Section and design plans for additional details and calculations regarding the riprap protection.

8. Temporary Erosion and Sediment Control

During construction and prior to paving, it will be necessary to control erosion and sediment from the site during storms with in the construction timeframe. To insure that sediment does not enter the existing storm system or runs off to the existing street, perimeter containment is controlled by silt fence installation, inlet protection and an engineered detention release structure. To keep construction traffic from tracking mud onto the adjacent city street, a stabilized rock construction entrance will need to be installed. These erosion control devices, and their maintenance throughout the construction timeframe,

are required by ordinance and the details for them are referenced by the City's Design and Construction Manual and shown on Detail Sheets 7 and 8.

Post development water quality will be addressed through the use of water quality detention release structure within the detention pond. The owner will need to have a routine maintenance policy for the cleaning, repair and replacement of the detention release structure.

9. Conclusion

The proposed project is a building addition to an existing building (Phase 1) and parking lot on the south side of the lot. The report has been prepared to evaluate the stormwater discharge at the site to ensure the requirements of APWA 5600 are met. The detention pond and release structure was designed to not increase peak discharges from existing conditions as well as meeting the maximum releases from APWA 5600. It is not anticipated that the HT Solutions Development will have any downstream impacts.

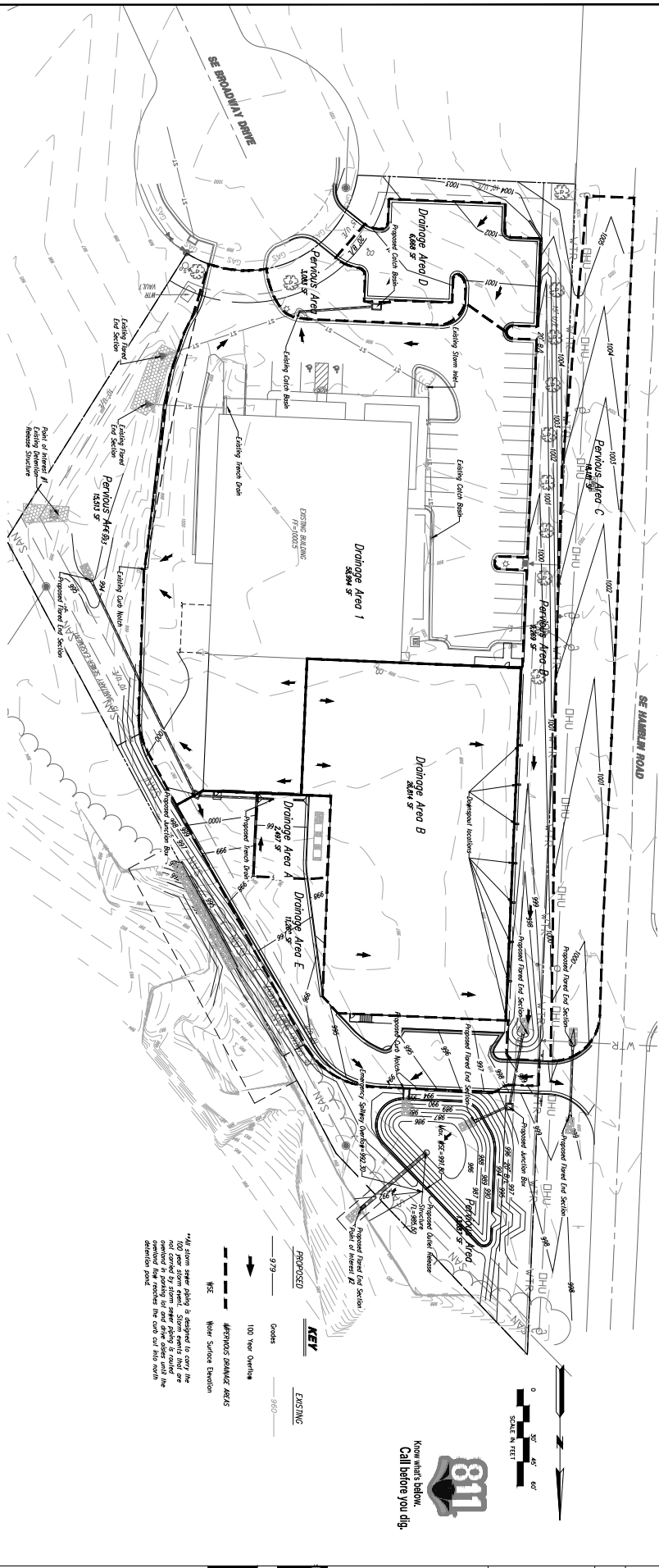
10. Design Calculations and Exhibits

See the attached for drainage area calculations, flows, pipe sizing, inlet sizing and water quality calculations for Phase 2. In addition, the report for Phase 1 is included.

DRAINAGE AREA MAPS

STORM SEWER CALCULATIONS

STORM SEWER NO.	FROM STRUCTURE NO.	TO STRUCTURE	TRIBUTARY AREA (AC.)	AREA DESIGNATION	TOTAL ACRES	COMPOSITE COEFFICIENT	TIME OF FLOW			10 YEAR DESIGN INTENSITY						100 YEAR DESIGN INTENSITY						CURB INLET			PIPE DESIGN									
							T ₁	T ₂	T _c	INTENSITY (in/hr)	AREA UPSTREAM (q10)	In Pipe By Pass (cfs)	Total (cfs)	INTENSITY (in/hr)	AREA UPSTREAM (q10)	In Pipe By Pass (cfs)	Total (cfs)	UPSTREAM (cfs)	By Pass (cfs)	TOTAL (cfs)	In Pipe Downstream (cfs)	By Pass (cfs)	Pipe Size (in)	Pipe Slope (%)	Pipe Type	Rough Coeff (MANNING)	Design Velocity (fps)	Depth (ft)	Full Velocity (ft/s)	Full Flow (cfs)				
							TI	TI	TI	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10	q10		
LINE 1	TRENCH DRAIN	JB	A	0.05	0.05	0.90	5.0	0.0	5.0	7.35	0.3	0.3	0.0	0.3	10.32	0.6	0.0	0.6	0.6	0.6	0.6	0.0	0.6	0.6	12	0.80	HDE	0.011	2.94	7.9	4.8	3.7		
LINE 1	JB	FES	B	0.00	0.05	0.00	0.0	0.0	0.0	7.35	0.0	0.0	0.0	0.3	10.32	0.0	0.0	0.0	0.6	0.6	0.6	0.0	0.6	0.6	12	0.88	HDE	0.011	3.26	6.5	5.3	4.2		
LINE 2	JB	FES	B	0.83	0.88	0.72	5.0	0.0	5.0	7.35	4.4	0.3	0.0	4.7	10.32	7.7	0.0	8.3	8.3	8.3	0.0	15	2.00	HDE	0.011	8.39	6.0	8.8	10.8					
LINE 2	JB	FES	C	0.00	0.88	0.00	0.0	0.0	0.0	7.35	0.0	0.0	0.0	0.0	10.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15	9.40	HDE	0.011	8.4	7.0	9.6	11.9		
LINE 3	FES	FES	C	0.40	1.28	0.00	5.0	0.0	5.0	7.35	0.8	0.0	0.0	0.8	10.32	1.1	0.0	1.1	1.1	1.1	0.0	15	1.00	HDE	0.011	5.4	2.4	6.0	7.6					
LINE 5	CB	EX CB	D	0.15	1.44	0.90	5.0	0.0	5.0	7.35	1.0	0.6	0.0	1.6	10.32	1.7	0.0	2.6	2.6	2.6	0.0	12	6.26	HDE	0.011	5.4	6.0	4.2	5.4					
LINE 5	CB	EX CB	E	0.26	1.70	0.90	5.0	0.0	5.0	7.35	1.7	1.7	0.0	3.4	10.32	2.7	0.0	3.4	3.4	3.4	0.0	12	6.26	HDE	0.011	5.4	6.0	4.2	5.4					



PROJECT BENCHMARK:
 1" = 50' (VERTICAL)
 1" = 100' (HORIZONTAL)
 10/21/2019

DETENTION POND DETAILS:

Flowline	Flow (cfs)	Surf Area (sq-ft)	Grass Store (cu-ft)
LINE 1	360.000	1,146.80	292.56
LINE 2	888.000	2,823.16	717.84
LINE 3	888.000	2,823.16	717.84
LINE 4	991.000	3,167.70	798.18
LINE 5	991.000	3,167.70	798.18
TOTAL	3,618.000	11,128.52	2,904.66

KEY:
 - - - - - PROPOSED
 ——— EXISTING
 --- 100 Year Overlay
 --- Wet Surface Elevation
 --- WETPOND DIMENSIONS MARKS

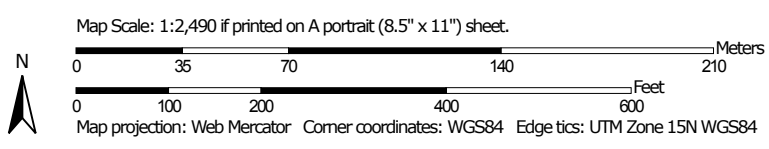
Notes:
 1. All storm sewer piping is designed to carry the 100 year storm event. Storm events that are greater than 100 year storm events are not shown in this plan. Storm events that are less than 100 year storm events are shown in parking lot and drive areas with the detention pond. Storm events that are less than 100 year storm events are shown in parking lot and drive areas with the detention pond.

SOIL CLASSIFICATIONS












































































AASHTO Group Classification (Surface)—Jackson County, Missouri



Soil Map may not be valid at this scale.



MAP LEGEND

	Area of Interest (AOI)		A-2-4		A-7
	Area of Interest (AOI)		A-2-5		A-7-5
Soils					
Soil Rating Polygons					
	A-1		A-2-6		A-7-6
	A-1-a		A-2-7		A-8
	A-1-b		A-3		Not rated or not available
	A-2		A-4		Streams and Canals
	A-2-4		A-5		Interstate Highways
	A-2-5		A-6		Rails
	A-2-6		A-7		US Routes
	A-2-7		A-7-5		Major Roads
	A-3		A-7-6		Local Roads
	A-4		A-8		Background
	A-5		Not rated or not available		Aerial Photography
	A-6		A-1		A-1
	A-7		A-1-a		A-1-a
	A-7-5		A-1-b		A-1-b
	A-7-6		A-2		A-2
	A-8		A-2-4		A-2-4
	Not rated or not available		A-2-5		A-2-5
	Not rated or not available		A-2-6		A-2-6
Soil Rating Lines					
	A-1		A-2-7		A-2-7
	A-1-a		A-3		A-3
	A-1-b		A-4		A-4
	A-2		A-5		A-5
	A-2		A-6		A-6

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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:

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: Jackson County, Missouri
 Survey Area Data: Version 19, Sep 13, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2017—Sep 22, 2017

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.

AASHTO Group Classification (Surface)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	A-6	1.6	6.1%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	A-6	24.2	93.9%
Totals for Area of Interest			25.8	100.0%

Description

AASHTO group classification is a system that classifies soils specifically for geotechnical engineering purposes that are related to highway and airfield construction. It is based on particle-size distribution and Atterberg limits, such as liquid limit and plasticity index. This classification system is covered in AASHTO Standard No. M 145-82. The classification is based on that portion of the soil that is smaller than 3 inches in diameter.

The AASHTO classification system has two general classifications: (i) granular materials having 35 percent or less, by weight, particles smaller than 0.074 mm in diameter and (ii) silt-clay materials having more than 35 percent, by weight, particles smaller than 0.074 mm in diameter. These two divisions are further subdivided into seven main group classifications, plus eight subgroups, for a total of fifteen for mineral soils. Another class for organic soils is used.

For each soil horizon in the database one or more AASHTO Group Classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

PONDPACK OUTPUT

HT Solutions North Pond

Project Summary

Title	HT Solutions North Pond
Engineer	Kellen Huffman
Company	Hg Consult, Inc
Date	4/25/2019

Notes

HT Solutions North Pond

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Area 1	Pre-Development Water Quality	1	0.015	12.210	0.08
Area 1	Post-Development Water Quality	1	0.075	11.930	1.39
Area 1	Pre-Development 2 year	2	0.166	12.120	2.04
Area 1	Post-Development 2 year	2	0.316	11.920	5.89
Area 1	Pre-Development 10 year	10	0.350	12.080	4.45
Area 1	Post-Development 10 year	10	0.545	11.920	9.89
Area 1	Pre-Development 100 year	100	0.625	12.080	7.99
Area 1	Post-Development 100 year	100	0.858	11.920	15.17

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Outfall	Pre-Development Water Quality	1	0.015	12.210	0.08
Outfall	Post-Development Water Quality	1	0.075	15.610	0.04
Outfall	Pre-Development 2 year	2	0.166	12.120	2.04
Outfall	Post-Development 2 year	2	0.316	12.310	0.73
Outfall	Pre-Development 10 year	10	0.350	12.080	4.45
Outfall	Post-Development 10 year	10	0.545	12.080	3.03
Outfall	Pre-Development 100 year	100	0.625	12.080	7.99
Outfall	Post-Development 100 year	100	0.858	12.090	4.50

Pond Summary

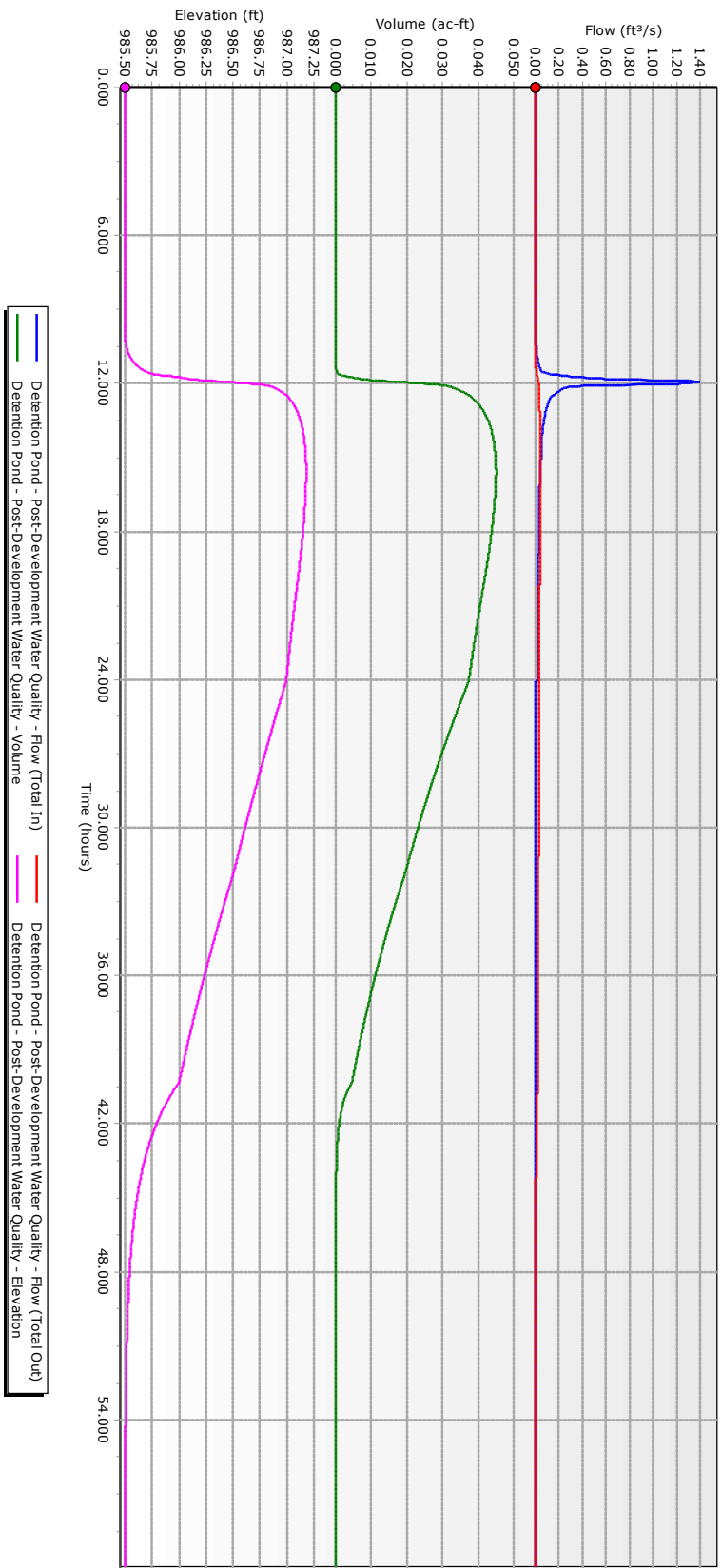
Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
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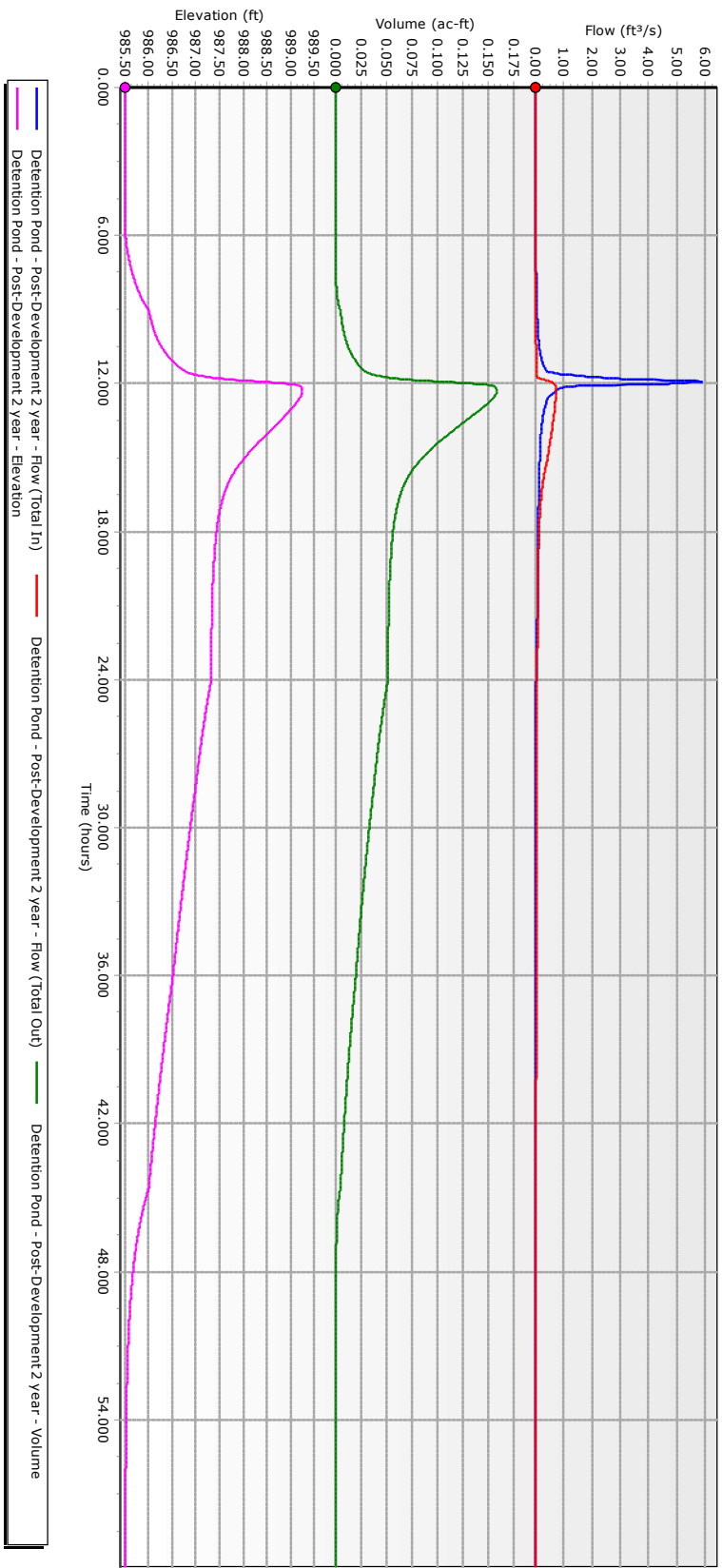
HT Solutions North Pond

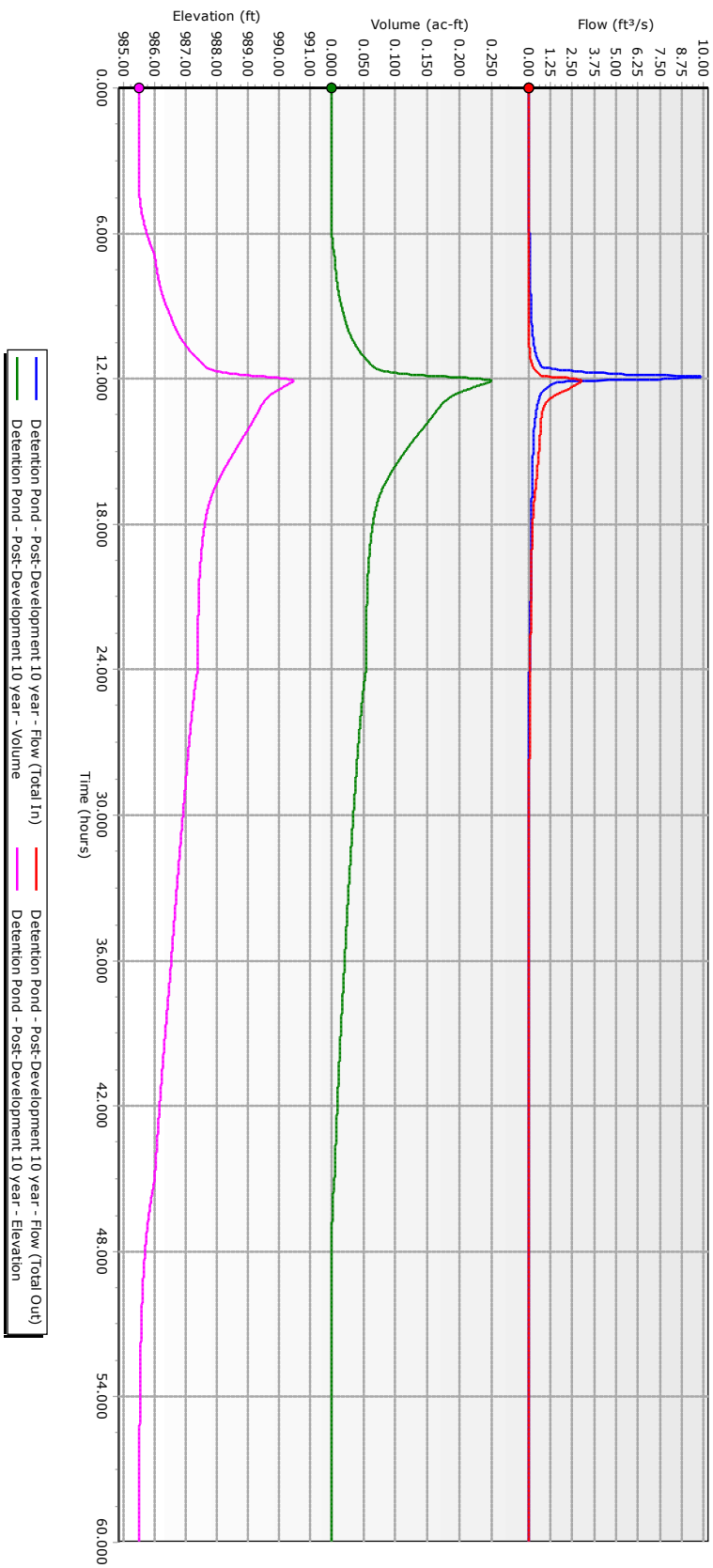
Subsection: Master Network Summary

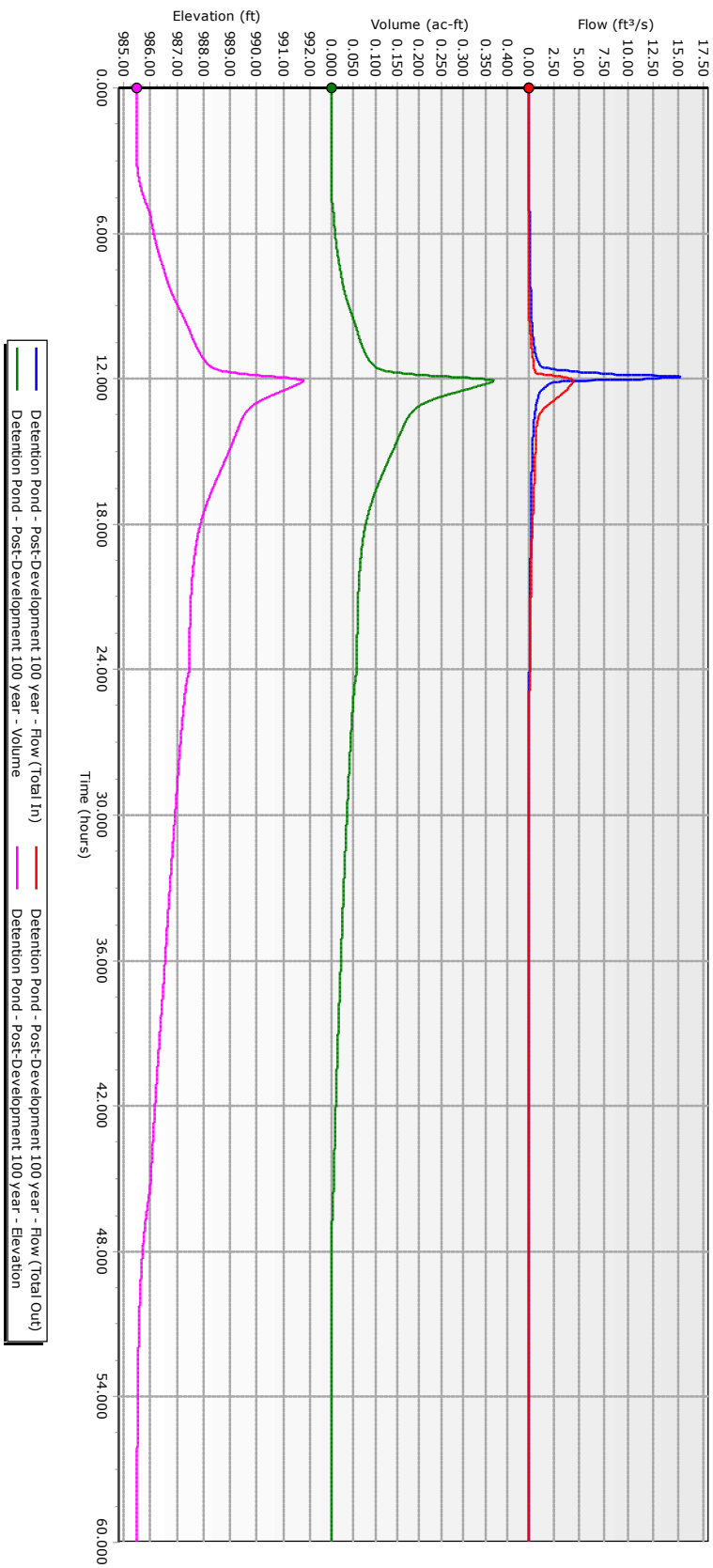
Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Detention Pond (IN)	Post-Development Water Quality	1	0.075	11.930	1.39	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development Water Quality	1	0.075	15.610	0.04	987.18	0.045
Detention Pond (IN)	Post-Development 2 year	2	0.316	11.920	5.89	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 2 year	2	0.316	12.310	0.73	989.25	0.158
Detention Pond (IN)	Post-Development 10 year	10	0.545	11.920	9.89	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 10 year	10	0.545	12.080	3.03	990.46	0.250
Detention Pond (IN)	Post-Development 100 year	100	0.858	11.920	15.17	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 100 year	100	0.858	12.090	4.50	991.77	0.369









HT Solutions North Pond Emergency Spillway

Project Summary

Title	HT Solutions North Pond Emergency Spillway
Engineer	Kellen Huffman
Company	Hg Consult, Inc
Date	4/25/2019

Notes

HT Solutions North Pond Emergency Spillway

Subsection: Master Network Summary

Catchments Summary

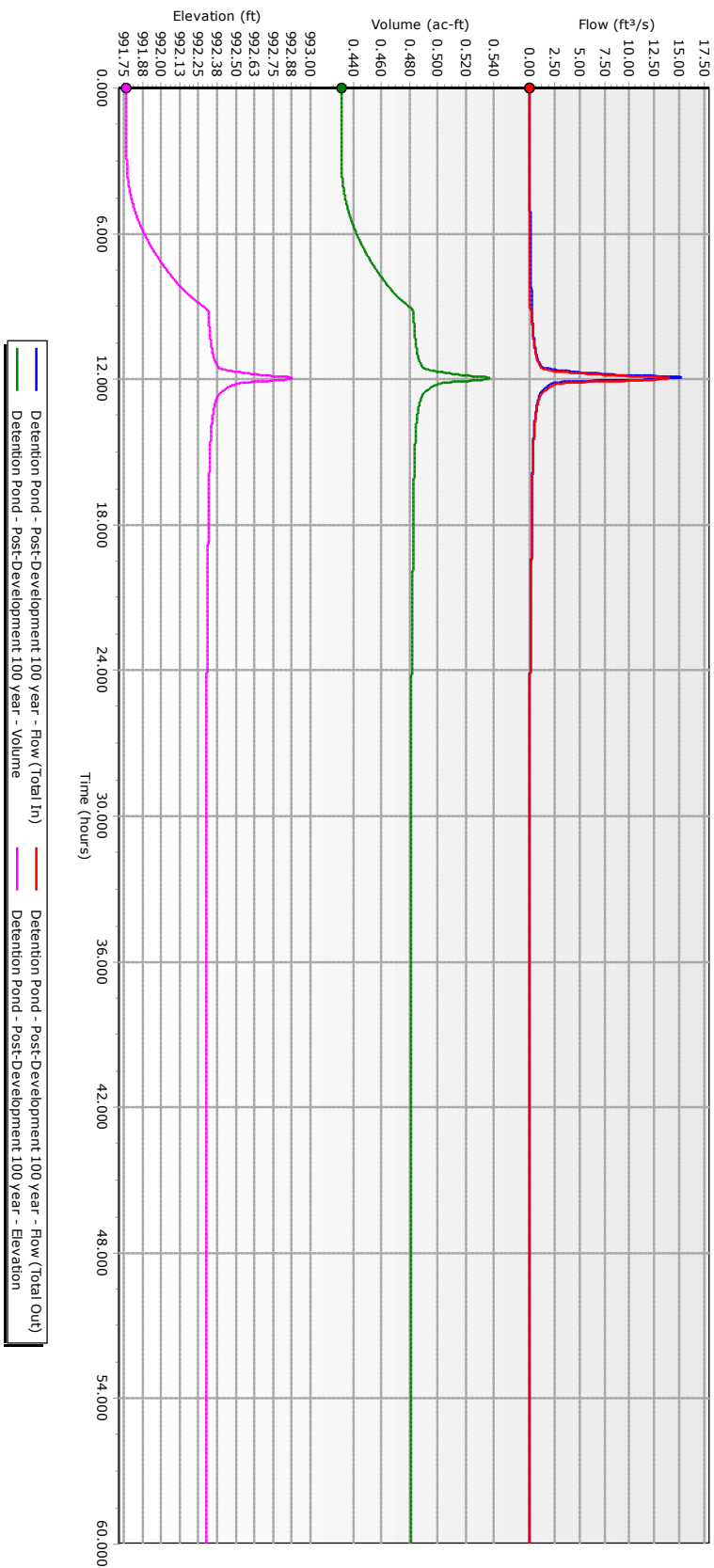
Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Area 1	Post-Development 100 year	100	0.858	11.920	15.17

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Outfall	Post-Development 100 year	100	0.808	11.950	14.07

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Detention Pond (IN)	Post-Development 100 year	100	0.858	11.920	15.17	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 100 year	100	0.808	11.950	14.07	992.88	0.537



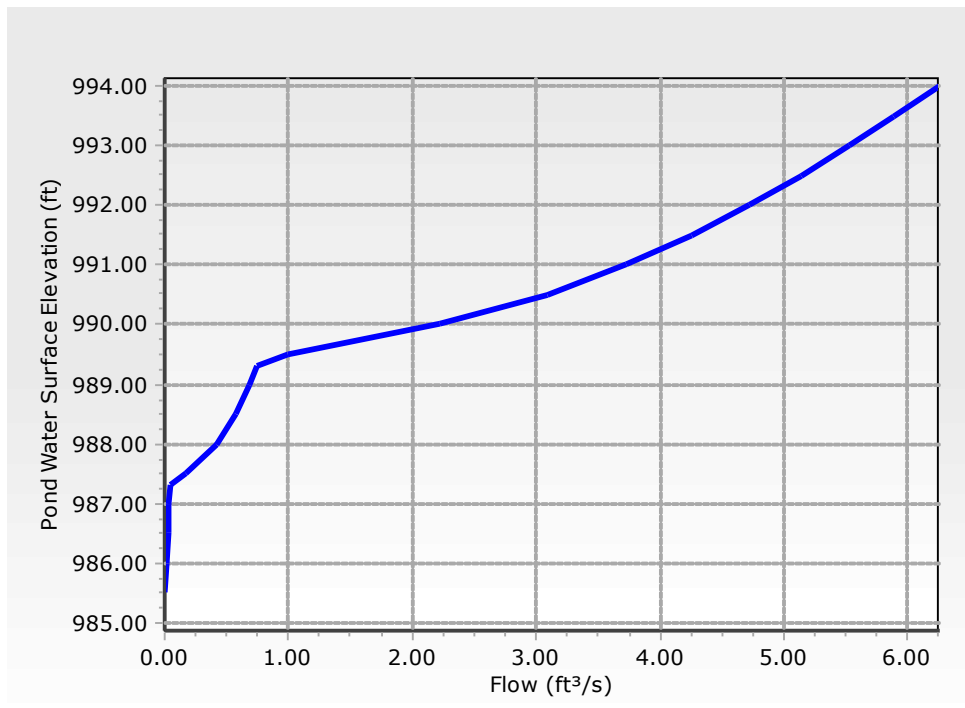
Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

Element Details			
Label	Composite Outlet Structure - 1	Notes	
Headwater Range			
Headwater Type	Use Pond for Headwater Range	Maximum (Headwater)	994.00 ft
Pond	Detention Pond	Increment (Headwater)	0.50 ft
Minimum (Headwater)	985.50 ft		
SpotElevation (ft)			
Tailwater Setup			
Tailwater Type	Free Outfall		
Tailwater Tolerances			
Maximum Iterations	30	Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.00 ft	Flow Tolerance (Minimum)	0.001 ft ³ /s
Headwater Tolerance (Maximum)	0.50 ft	Flow Tolerance (Maximum)	10.000 ft ³ /s
Tailwater Tolerance (Minimum)	0.01 ft		
Outlet Structure			
Outlet Structure Type	Culvert	Culvert Type	Circular
Outlet Structure (IDs and Direction)			
Outlet ID	Culvert - 1	Downstream ID	Tailwater
Flow Direction	Forward Flow Only	Notes	
Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft
Culvert Data			
Number of Barrels	1	Downstream Invert	985.22 ft
Length	57.00 ft	Diameter	24.0 in
Upstream Invert	985.50 ft		
Unsubmerged->Submerged			
Specify Transitions	False	Compute Inlet Control Only	False

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

Culvert Coefficients			
Inlet Description	Concrete - Groove end projecting	C	0.0317
Chart	Chart 1	Y	0.6900
Nomograph	Nomograph 3	Manning's n	0.011
Equation Form	Form 1	Ke	0.200
K	0.0045	Kr	0.000
M	2.0000	Slope Correction Factor	-0.500

Culvert (Advanced)			
Convergence Tolerance	0.00 ft	Specify Number of Backwater Sections	False



RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Culvert - 1 (Culvert-Circular)

 Mannings open channel maximum capacity: 20.16 ft³/s
 Upstream ID = Orifice - 1, Copy of Orifice - 1, Orifice - 2, 6"x10"
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft³/s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
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Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Culvert - 1 (Culvert-Circular)

 Mannings open channel maximum capacity: 20.16 ft³/s
 Upstream ID = Orifice - 1, Copy of Orifice - 1, Orifice - 2, 6"x10"
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
985.50	0.00	0.00	0.00	Free Outfall
986.00	0.02	985.56	Free Outfall	Free Outfall
986.50	0.03	985.58	Free Outfall	Free Outfall
987.00	0.03	985.58	Free Outfall	Free Outfall
987.30	0.05	985.60	Free Outfall	Free Outfall
987.50	0.16	985.69	Free Outfall	Free Outfall
988.00	0.42	985.81	Free Outfall	Free Outfall
988.50	0.57	985.86	Free Outfall	Free Outfall
989.00	0.68	985.90	Free Outfall	Free Outfall
989.30	0.74	985.92	Free Outfall	Free Outfall
989.50	0.99	985.99	Free Outfall	Free Outfall
990.00	2.23	986.24	Free Outfall	Free Outfall
990.50	3.09	986.38	Free Outfall	Free Outfall
991.00	3.73	986.47	Free Outfall	Free Outfall
991.50	4.25	986.54	Free Outfall	Free Outfall
992.00	4.72	986.60	Free Outfall	Free Outfall
992.50	5.14	986.66	Free Outfall	Free Outfall
993.00	5.53	986.71	Free Outfall	Free Outfall
993.50	5.89	986.75	Free Outfall	Free Outfall
994.00	6.26	986.79	Free Outfall	Free Outfall
Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Culvert - 1 (Culvert-Circular)

 Mannings open channel maximum capacity: 20.16 ft³/s
 Upstream ID = Orifice - 1, Copy of Orifice - 1, Orifice - 2, 6"x10"
 Downstream ID = Tailwater (Pond Outfall)

Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
0.00	0.00	(N/A)	0.00
0.00	0.00	(N/A)	0.00
0.00	0.00	(N/A)	0.00
0.00	0.00	(N/A)	0.00
0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.
 BACKWATER CONTROL.. Vh= .015ft
 hwDi= .046ft Lbw= 57.0ft Hev= .00ft
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 BACKWATER CONTROL.. Vh= .018ft
 hwDi= .062ft H.JUMP IN PIPE
 Hev= .00ft
 CRIT.DEPTH CONTROL Vh= .025ft
 Dcr= .074ft H.JUMP IN PIPE
 Hev= .00ft
 CRIT.DEPTH CONTROL Vh= .047ft
 Dcr= .138ft CRIT.DEPTH Hev= .00ft
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE
 CRIT.DEPTH CONTROL Vh= .184ft
 Dcr= .519ft CRIT.DEPTH Hev= .00ft
 FLOW PRECEDENCE SET TO
 UPSTREAM CONTROLLING
 STRUCTURE

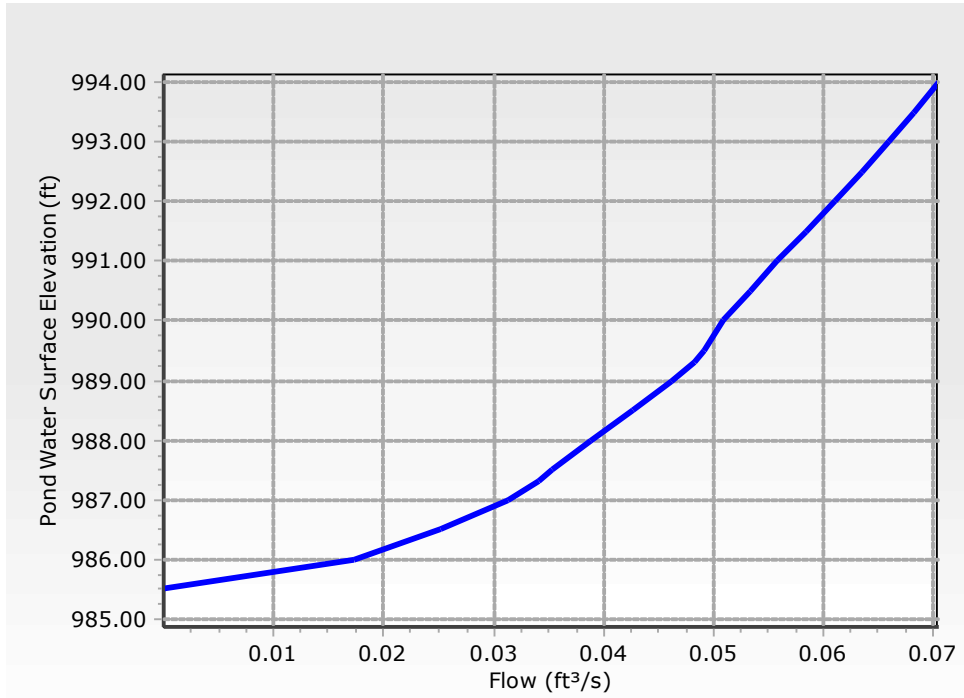
Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 20.16 ft³/s
Upstream ID = Orifice - 1, Copy of Orifice - 1, Orifice - 2, 6"x10"
Downstream ID = Tailwater (Pond Outfall)

Message			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
CRIT.DEPTH CONTROL Vh= .299ft Dcr= .799ft CRIT.DEPTH Hev= .00ft			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE			
Outlet Structure			
Outlet Structure Type		Orifice	
Outlet Structure (IDs and Direction)			
Outlet ID	Orifice - 1	Downstream ID	Culvert - 1
Flow Direction	Forward Flow Only	Notes	
Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft
Outlet Structure (Orifice)			
Orifice	Circular Orifice	Orifice Coefficient	0.600
Number of Openings	1	Orifice Diameter	1.0 in
Outlet Structure (Common)			
Elevation	985.50 ft		

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1



RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft³/s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
985.50	0.00	0.00	0.00	0.00
986.00	0.02	986.00	985.56	985.56
986.50	0.03	986.50	985.58	985.58
987.00	0.03	987.00	985.58	985.58
987.30	0.03	987.30	985.60	985.60
987.50	0.04	987.50	985.69	985.69
988.00	0.04	988.00	985.81	985.81
988.50	0.04	988.50	985.86	985.86
989.00	0.05	989.00	985.90	985.90
989.30	0.05	989.30	985.92	985.92
989.50	0.05	989.50	985.99	985.99
990.00	0.05	990.00	986.24	986.24
990.50	0.05	990.50	986.38	986.38
991.00	0.06	991.00	986.47	986.47
991.50	0.06	991.50	986.54	986.54
992.00	0.06	992.00	986.60	986.60

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
992.50	0.06	992.50	986.66	986.66
993.00	0.07	993.00	986.71	986.71
993.50	0.07	993.50	986.75	986.75
994.00	0.07	994.00	986.79	986.79
Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	

Message

WS below an invert; no flow.
 H =.44
 H =.92
 H =1.42
 H =1.70
 H =1.81
 H =2.19
 H =2.64
 H =3.10
 H =3.38
 H =3.51

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

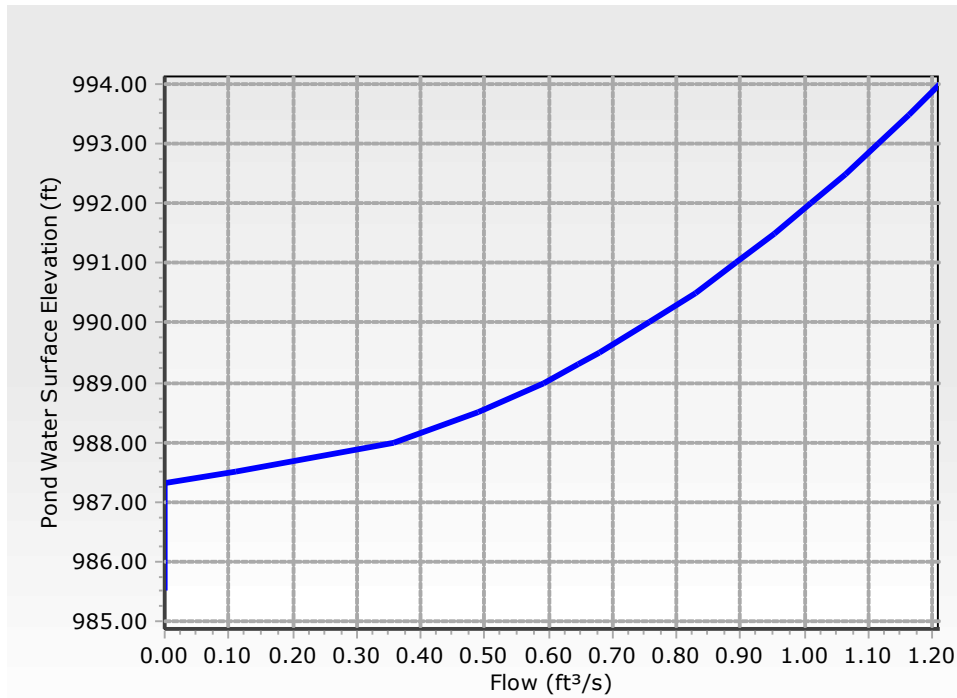
RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
 Downstream ID = Culvert - 1 (Culvert-Circular)

Message
H =3.76
H =4.12
H =4.53
H =4.96
H =5.40
H =5.84
H =6.29
H =6.75
H =7.21

Outlet Structure			
Outlet Structure Type	Orifice		
Outlet Structure (IDs and Direction)			
Outlet ID	Orifice - 2	Downstream ID	Culvert - 1
Flow Direction	Forward Flow Only	Notes	
Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft
Outlet Structure (Orifice)			
Orifice	Circular Orifice	Orifice Coefficient	0.600
Number of Openings	2	Orifice Diameter	3.0 in
Outlet Structure (Common)			
Elevation	987.30 ft		

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1



RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft³/s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
985.50	0.00	0.00	0.00	0.00
986.00	0.00	0.00	0.00	985.56
986.50	0.00	0.00	0.00	985.58
987.00	0.00	0.00	0.00	985.58
987.30	0.00	0.00	0.00	985.60
987.50	0.11	987.50	Free Outfall	985.69
988.00	0.36	988.00	Free Outfall	985.81
988.50	0.49	988.50	Free Outfall	985.86
989.00	0.59	989.00	Free Outfall	985.90
989.30	0.65	989.30	Free Outfall	985.92
989.50	0.68	989.50	Free Outfall	985.99
990.00	0.76	990.00	Free Outfall	986.24
990.50	0.83	990.50	Free Outfall	986.38
991.00	0.89	991.00	Free Outfall	986.47
991.50	0.95	991.50	Free Outfall	986.54
992.00	1.01	992.00	Free Outfall	986.60

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
992.50	1.06	992.50	Free Outfall	986.66
993.00	1.12	993.00	Free Outfall	986.71
993.50	1.16	993.50	Free Outfall	986.75
994.00	1.21	994.00	Free Outfall	986.79
Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	

Message

WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 CRIT.DEPTH CONTROL Vh= .059ft
 Dcr= .141ft CRIT.DEPTH Hev= .00ft
 H =.58
 H =1.08
 H =1.58
 H =1.88

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

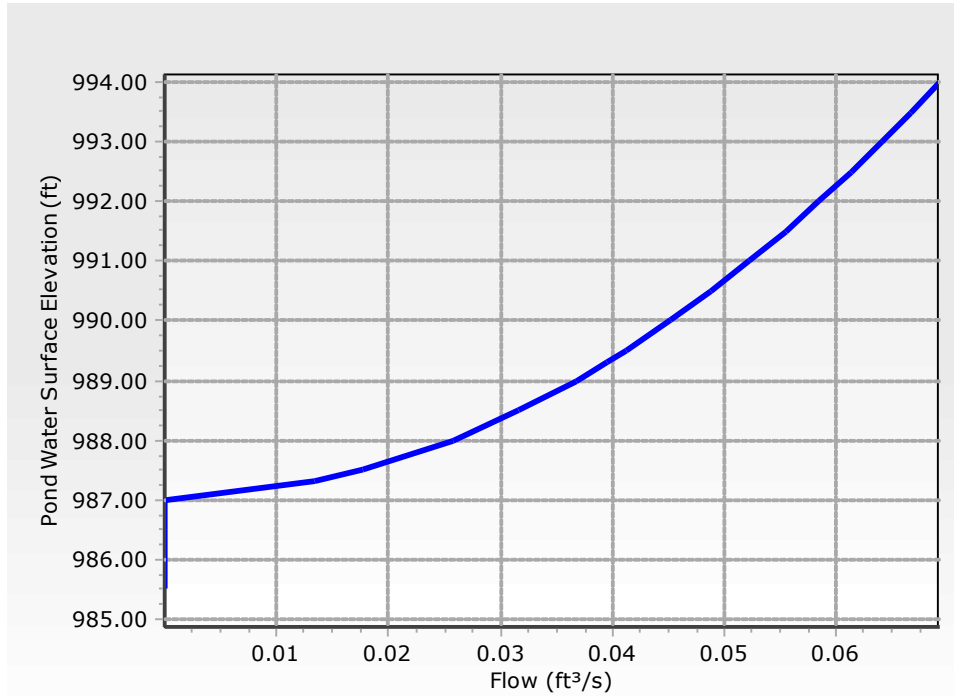
RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
 Downstream ID = Culvert - 1 (Culvert-Circular)

Message
H =2.08
H =2.58
H =3.08
H =3.58
H =4.08
H =4.58
H =5.08
H =5.58
H =6.08
H =6.58

Outlet Structure			
Outlet Structure Type		Orifice	
Outlet Structure (IDs and Direction)			
Outlet ID	Copy of Orifice - 1	Downstream ID	Culvert - 1
Flow Direction	Forward Flow Only	Notes	
Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft
Outlet Structure (Orifice)			
Orifice	Circular Orifice	Orifice Coefficient	0.600
Number of Openings	1	Orifice Diameter	1.0 in
Outlet Structure (Common)			
Elevation	987.00 ft		

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1



RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Copy of Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft³/s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
985.50	0.00	0.00	0.00	0.00
986.00	0.00	0.00	0.00	985.56
986.50	0.00	0.00	0.00	985.58
987.00	0.00	0.00	0.00	985.58
987.30	0.01	987.30	Free Outfall	985.60
987.50	0.02	987.50	Free Outfall	985.69
988.00	0.03	988.00	Free Outfall	985.81
988.50	0.03	988.50	Free Outfall	985.86
989.00	0.04	989.00	Free Outfall	985.90
989.30	0.04	989.30	Free Outfall	985.92
989.50	0.04	989.50	Free Outfall	985.99
990.00	0.05	990.00	Free Outfall	986.24
990.50	0.05	990.50	Free Outfall	986.38
991.00	0.05	991.00	Free Outfall	986.47
991.50	0.06	991.50	Free Outfall	986.54
992.00	0.06	992.00	Free Outfall	986.60

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Copy of Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
992.50	0.06	992.50	Free Outfall	986.66
993.00	0.06	993.00	Free Outfall	986.71
993.50	0.07	993.50	Free Outfall	986.75
994.00	0.07	994.00	Free Outfall	986.79
Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
H =.26
H =.46
H =.96
H =1.46
H =1.96
H =2.26
H =2.46

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Copy of Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

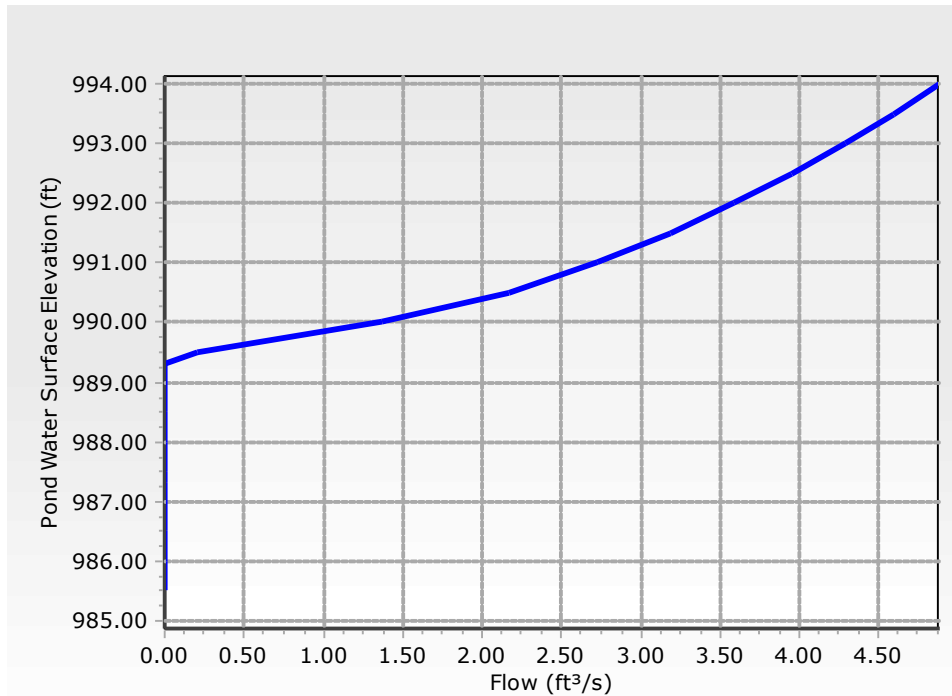
Downstream ID = Culvert - 1 (Culvert-Circular)

Message
H =2.96
H =3.46
H =3.96
H =4.46
H =4.96
H =5.46
H =5.96
H =6.46
H =6.96

Outlet Structure			
Outlet Structure Type	Culvert	Culvert Type	Box
Outlet Structure (IDs and Direction)			
Outlet ID	Top Outlet	Downstream ID	Culvert - 1
Flow Direction	Forward Flow Only	Notes	
Outlet Structure (Advanced)			
Elevation (On)	0.00 ft	Elevation (Off)	0.00 ft
Culvert Data			
Number of Barrels	1	Downstream Invert	989.30 ft
Length	0.50 ft	Width	0.83 ft
Upstream Invert	989.30 ft	Height	0.50 ft
Unsubmerged->Submerged			
Specify Transitions	False	Compute Inlet Control Only	False
Culvert Coefficients			
Inlet Description	Concrete - Groove end projecting	C	0.0317
Chart	Chart 1	Y	0.6900
Nomograph	Nomograph 3	Manning's n	0.013
Equation Form	Form 1	Ke	0.200
K	0.0045	Kr	0.000
M	2.0000	Slope Correction Factor	-0.500
Culvert (Advanced)			

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

Culvert (Advanced)			
Convergence Tolerance	0.00 ft	Specify Number of Backwater Sections	False



RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 6"x10" (Culvert-Box)

Mannings open channel maximum capacity: 0.00 ft³/s

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft³/s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
985.50	0.00	0.00	0.00	0.00
986.00	0.00	0.00	0.00	985.56
986.50	0.00	0.00	0.00	985.58
987.00	0.00	0.00	0.00	985.58
987.30	0.00	0.00	0.00	985.60
987.50	0.00	0.00	0.00	985.69
988.00	0.00	0.00	0.00	985.81
988.50	0.00	0.00	0.00	985.86
989.00	0.00	0.00	0.00	985.90
989.30	0.00	0.00	0.00	985.92

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 6"x10" (Culvert-Box)

Mannings open channel maximum capacity: 0.00 ft³/s

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)
989.50	0.21	989.50	Free Outfall	985.99
990.00	1.37	990.00	Free Outfall	986.24
990.50	2.16	990.50	Free Outfall	986.38
991.00	2.72	991.00	Free Outfall	986.47
991.50	3.19	991.50	Free Outfall	986.54
992.00	3.59	992.00	Free Outfall	986.60
992.50	3.95	992.50	Free Outfall	986.66
993.00	4.28	993.00	Free Outfall	986.71
993.50	4.59	993.50	Free Outfall	986.75
994.00	4.88	994.00	Free Outfall	986.79
Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	
0.00	0.00	(N/A)	0.00	

Message

WS below an invert; no flow.

WS below an invert; no flow.

WS below an invert; no flow.

WS below an invert; no flow.

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 6"x10" (Culvert-Box)

Mannings open channel maximum capacity: 0.00 ft³/s

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
BACKWATER CONTROL.. Vh= .047ft hwDi= .143ft Lbw= .5ft Hev= .00ft
BACKWATER CONTROL.. Vh= .187ft hwDi= .475ft Lbw= .5ft Hev= .00ft
INLET CONTROL... Submerged: HW =1.20
INLET CONTROL... Submerged: HW =1.70
INLET CONTROL... Submerged: HW =2.20
INLET CONTROL... Submerged: HW =2.70
INLET CONTROL... Submerged: HW =3.20
INLET CONTROL... Submerged: HW =3.70
INLET CONTROL... Submerged: HW =4.20
INLET CONTROL... Submerged: HW =4.70

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

Composite Rating Table

Tailwater Elevation = Free Outfall (Composite Outlet Structure - 1)

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
985.50	0.00	(N/A)	0.00
986.00	0.02	(N/A)	0.00
986.50	0.03	(N/A)	0.00
987.00	0.03	(N/A)	0.00
987.30	0.05	(N/A)	0.00
987.50	0.16	(N/A)	0.00
988.00	0.42	(N/A)	0.00
988.50	0.56	(N/A)	0.00
989.00	0.68	(N/A)	0.00
989.30	0.73	(N/A)	0.00
989.50	0.98	(N/A)	0.00
990.00	2.23	(N/A)	0.00
990.50	3.09	(N/A)	0.00
991.00	3.73	(N/A)	0.00
991.50	4.25	(N/A)	0.00
992.00	4.72	(N/A)	0.00
992.50	5.14	(N/A)	0.00
993.00	5.53	(N/A)	0.00
993.50	5.89	(N/A)	0.00
994.00	6.23	(N/A)	0.00

Contributing Structures

(no Q: Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1)
 Orifice - 1,Culvert - 1
 (no Q: Copy of Orifice - 1,Orifice - 2,6"x10")
 Orifice - 1,Culvert - 1
 (no Q: Copy of Orifice - 1,Orifice - 2,6"x10")
 Orifice - 1,Culvert - 1
 (no Q: Copy of Orifice - 1,Orifice - 2,6"x10")
 Orifice - 1,Copy of Orifice - 1,Culvert - 1 (no Q: Orifice - 2,6"x10")
 Orifice - 1,Copy of Orifice - 1,Orifice - 2,Culvert - 1 (no Q: 6"x10")
 Orifice - 1,Copy of Orifice - 1,Orifice - 2,Culvert - 1 (no Q: 6"x10")
 Orifice - 1,Copy of Orifice - 1,Orifice - 2,Culvert - 1 (no Q: 6"x10")

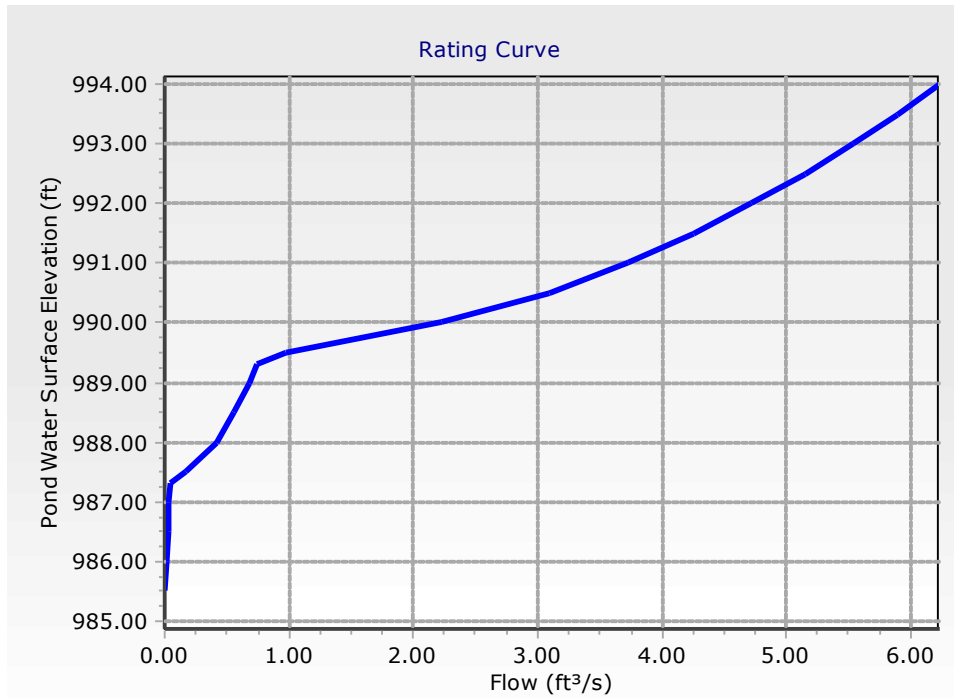
Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1

Composite Rating Table

Tailwater Elevation = Free Outfall (Composite Outlet Structure - 1)

Contributing Structures
Orifice - 1,Copy of Orifice - 1,Orifice - 2,Culvert - 1 (no Q: 6"x10")
Orifice - 1,Copy of Orifice - 1,Orifice - 2,Culvert - 1 (no Q: 6"x10")
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1
Orifice - 1,Copy of Orifice - 1,Orifice - 2,6"x10",Culvert - 1

Composite Outlet Structure Detailed Report: Composite Outlet Structure - 1



PHASE 1 DESIGN

MICRO STORM WATER DRAINAGE STUDY

For:
HT SOLUTIONS
ON Lot 292 of "Newburry Landing"
Lee's Summit, Jackson County, Missouri

Water Shed:
An Un named Tributary of Big Creek

March, 2016



-2016-036-

RECEIVED

MAR 09 2016

Planning & Codes Admin

PREPARED BY:
Quist Engineering Inc.
821 NE Columbus St.
Lee's Summit, MO 64063
Phone: (816) 550-5675



Robert Walquist, PE

TABLE OF CONTENTS

- 1. Report Cover Sheet**
- 2. Table of Contents**
- 3. General Information & Site Conditions**
- 4. Overview of the Proposed Design**
- 5. Methodology & Proposed Detention Design**
- 6. Proposed BMP Analysis for the Site**
- 7. Conclusions & Recommendations**
- 8. Exhibits**

3. GENERAL INFORMATION AND SITE CONDITIONS.

This study is to evaluate the proposed development of commercial development on 3.59 acres of land in Lee's Summit, Jackson County, Missouri.

The site currently has no trees with slopes ranging from 2% to 6%. The land generally drains to the east to an existing creek located off site running along the east property line. There is no off site land the drains across this property

The development does not have a 100yr flood plain with in it.

4. OVERVIEW OF THE PROPOSED DESIGN

The storm drainage study was preformed to evaluate the storm water run of from the proposed development.

The proposed Phase 1 and phase 2 buildings and parking lots will increase the impervious surface of the site which in turn will increase the storm water runoff of the site. The total developed area evaluated for this study is the is lot 292 of Newburry Landing on a 3.59 acre peace of property. We have proposed to route all of the proposed impervious area into a proposed extended dry detention basin located with in the existing low point of the property.

We have proposed to utilize open vegetative strips and an extended dry detention basin to satisfy the BMP requirements for this project.

We have proposed that 1.25 acres of un developed portion of the lot will be un-detained and flow off the property at the east. The basin has been evaluated to achieve post development runoff equal to or less than the post development runoff.

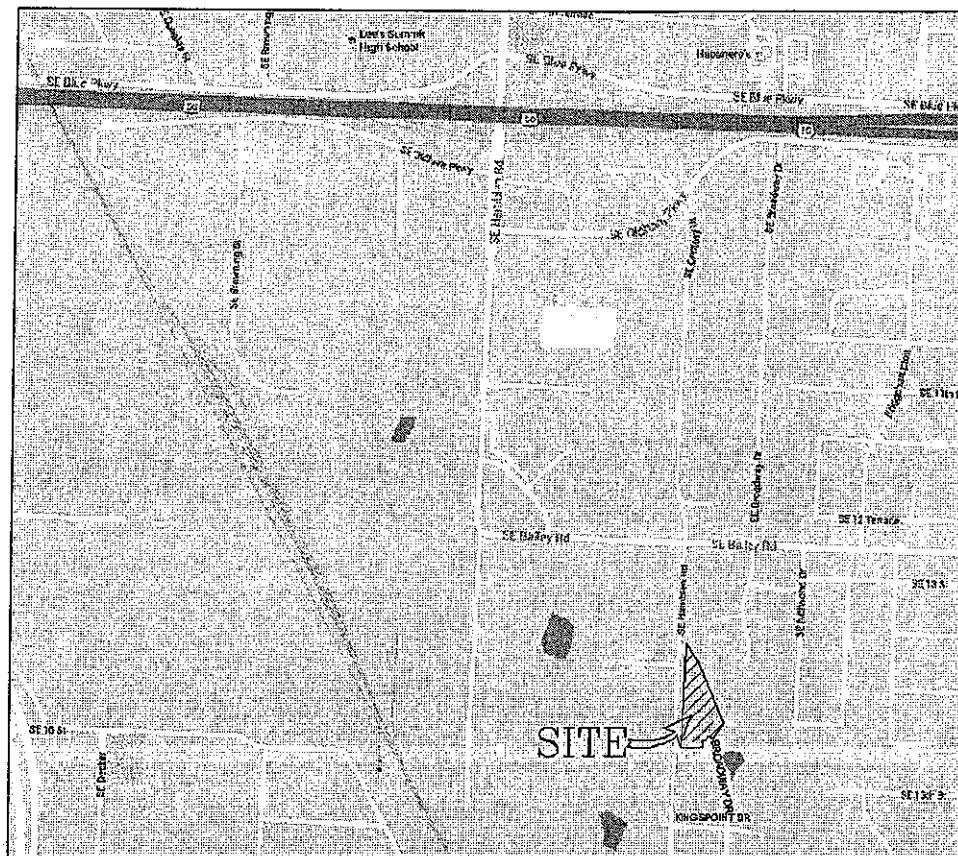
5. METHODOLOGY & PROPOSED DETENTION DESIGN

We have proposed to route 2.34 of the proposed development (all of the phase 1 and phase 2 impervious areas) into the proposed basin. This basin has outflow restricted thru a proposed small diameter pipe and a rectangular weir consisting of 24" concrete piers set closed together. (See The Drainage area map.)

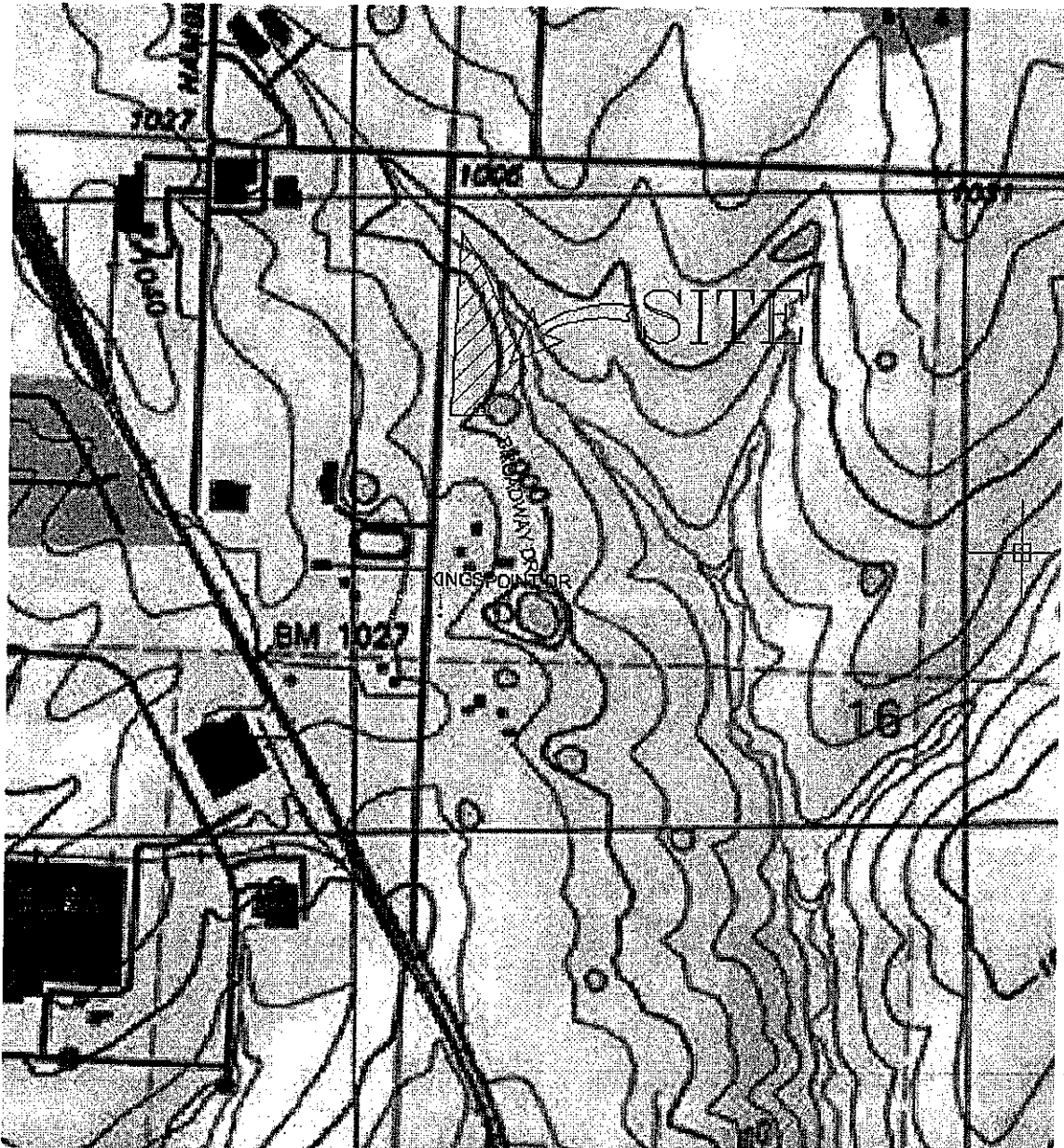
All calculation for the detention basin was done using the Software Hydra flow. This program utilized the Rational Method to model the different storm events. The following "C" values where used:

On Site	C
Pre Development	0.30
Post Development	0.85

SITE LOCATION MAP



USGS MAP



AERIAL VIEW



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0313F

FIRM

FLOOD INSURANCE RATE MAP
**JACKSON COUNTY,
 MISSOURI
 AND INCORPORATED AREAS**

PANEL 313 OF 480

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE'S SUMMIT, CITY OF	290174	0313	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

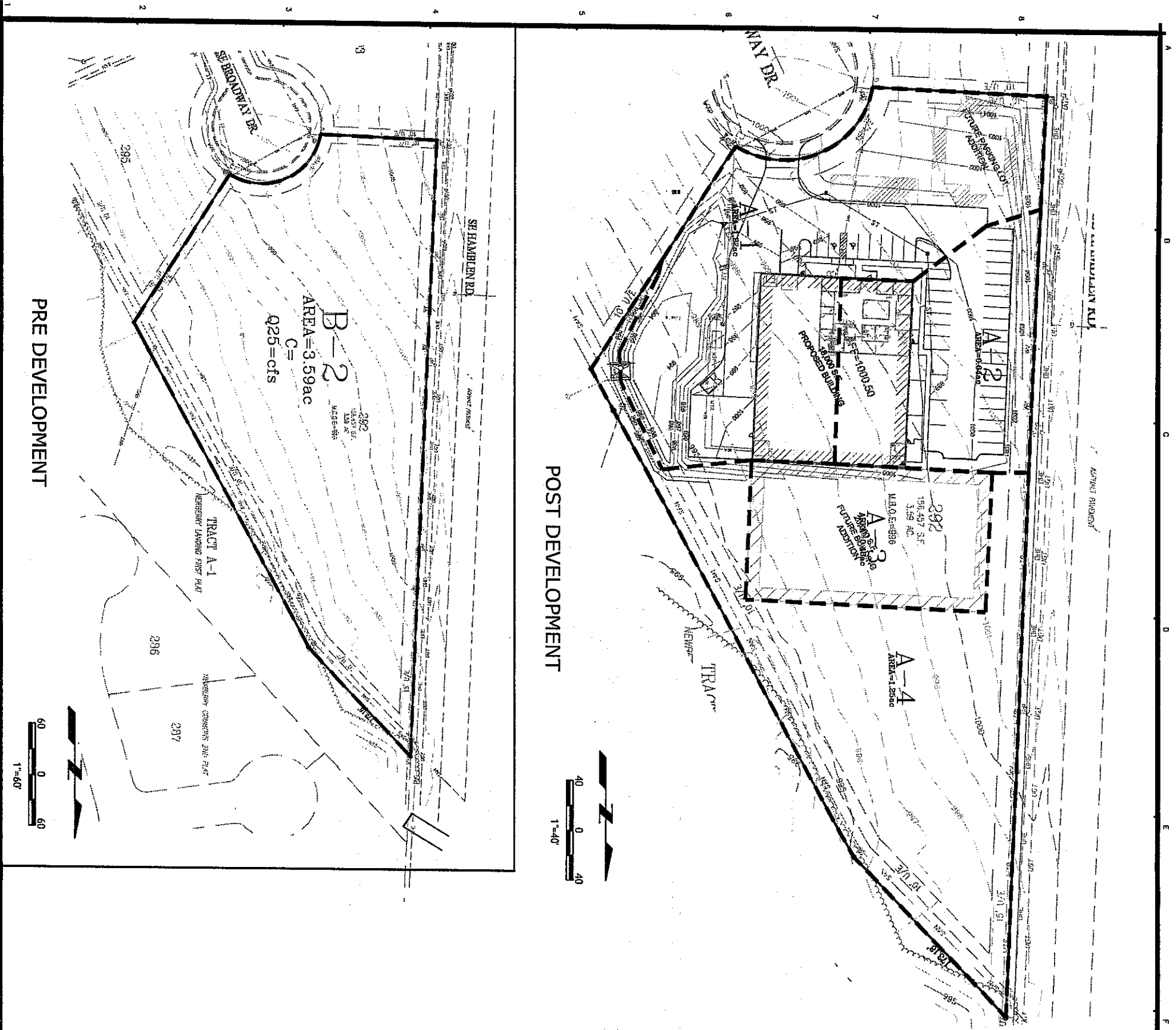


**MAP NUMBER
 29095C0313F**

**EFFECTIVE DATE
 SEPTEMBER 29, 2006**

Federal Emergency Management Agency

STORM DRAINAGE MAP & BASIN DESIGN



RATIONAL METHOD	A-1	A-2
C _f FLOWLENGTH	S-SLOPE	S-SLOPE
0.88	90	2.0
0.88	90	2.0
TI = 3.20 min	TI = 2.67 min	TI = 2.67 min
TC = 1.80 min	TC = 2.47 min	TC = 2.47 min
FLOW AREA (ac) INTENSITY (in/hr)	FLOW AREA (ac) INTENSITY (in/hr)	FLOW AREA (ac) INTENSITY (in/hr)
K = A = 1.00 100 50 25 12.5 6.25	K = A = 1.00 100 50 25 12.5 6.25	K = A = 1.00 100 50 25 12.5 6.25
Q100 = 13.38 cfs	Q100 = 7.02 cfs	Q100 = 7.02 cfs
Q50 = 11.68 cfs	Q50 = 6.13 cfs	Q50 = 6.13 cfs
Q25 = 9.73 cfs	Q25 = 5.10 cfs	Q25 = 5.10 cfs
Q10 = 7.93 cfs	Q10 = 4.00 cfs	Q10 = 4.00 cfs
Q2 = 5.19 cfs	Q2 = 2.72 cfs	Q2 = 2.72 cfs

RATIONAL METHOD	A-3	A-4
C _f FLOWLENGTH	S-SLOPE	S-SLOPE
0.85	50	4.0
0.85	50	4.0
TI = 2.01 min	TI = 2.01 min	TI = 2.01 min
TC = 2.99 min	TC = 2.88 min	TC = 2.88 min
FLOW AREA (ac) INTENSITY (in/hr)	FLOW AREA (ac) INTENSITY (in/hr)	FLOW AREA (ac) INTENSITY (in/hr)
K = A = 1.00 100 50 25 12.5 6.25	K = A = 1.00 100 50 25 12.5 6.25	K = A = 1.00 100 50 25 12.5 6.25
Q100 = 5.28 cfs	Q100 = 13.71 cfs	Q100 = 13.71 cfs
Q50 = 4.80 cfs	Q50 = 11.98 cfs	Q50 = 11.98 cfs
Q25 = 3.83 cfs	Q25 = 9.97 cfs	Q25 = 9.97 cfs
Q10 = 3.00 cfs	Q10 = 7.81 cfs	Q10 = 7.81 cfs
Q2 = 2.04 cfs	Q2 = 5.31 cfs	Q2 = 5.31 cfs

RATIONAL METHOD	B-1
C _f FLOWLENGTH	S-SLOPE
0.30	290
0.30	290
TI = 15.70 min	TI = 15.70 min
TC = 0.73 min	TC = 0.73 min
FLOW AREA (ac) INTENSITY (in/hr)	FLOW AREA (ac) INTENSITY (in/hr)
K = A = 1.00 100 50 25 12.5 6.25	K = A = 1.00 100 50 25 12.5 6.25
Q100 = 8.90 cfs	Q100 = 8.90 cfs
Q50 = 8.05 cfs	Q50 = 8.05 cfs
Q25 = 7.12 cfs	Q25 = 7.12 cfs
Q10 = 6.58 cfs	Q10 = 6.58 cfs
Q2 = 3.79 cfs	Q2 = 3.79 cfs

Flow through a pipe L-1
 Using Manning's Equation
 FROM= JB-1-1 Elim 996.65
 TO= JB-1-2 Elout 996.00
 L (ft) = 93.74

Flow through a pipe L-2
 Using Manning's Equation
 FROM= JB-1-1 Elin 995.40
 TO= FES-1-1 Elout 994.65
 L (ft) = 65.34

Flow through a pipe L-1
 Using Manning's Equation
 FROM= JB-1-2 Elin 996.00
 TO= JB-1-1 Elout 995.40
 L (ft) = 92.78

Flow through a pipe L-2
 Using Manning's Equation
 FROM= JB-1-1 Elin 995.40
 TO= FES-1-1 Elout 994.65
 L (ft) = 65.34

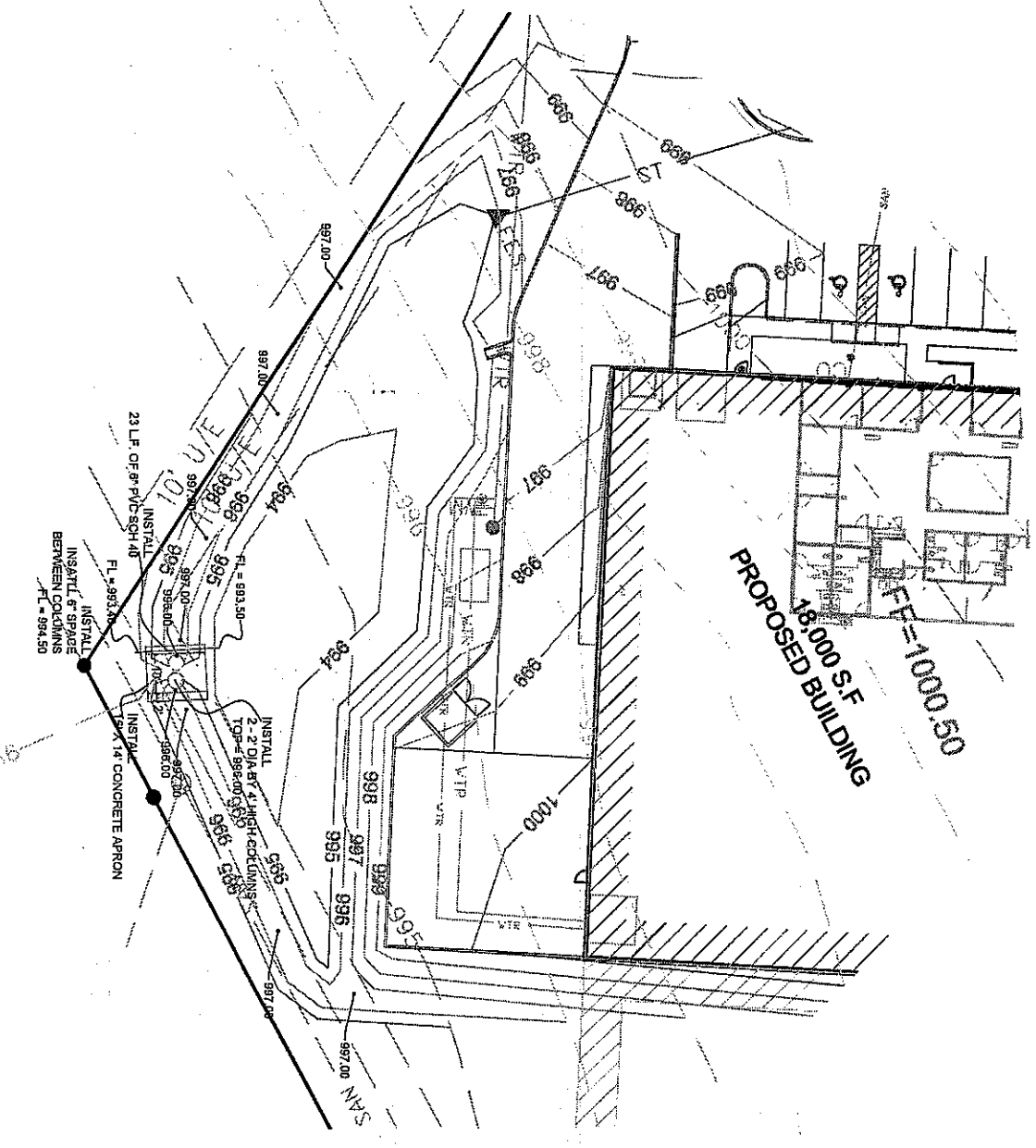
CONSTRUCTION OF:
 HT SOLUTIONS
 BUILDING
 ON
 LOT 292 OF
 "NEWBURY LANDING"
 LEE SUMMIT MO.
 JACKSON COUNTY

DATE: 02-20-2016
 REVISION DATE:
 DESIGN/
 DRAWN:
 APPROVED:
 SHEET TITLE:
 SITE STORM DRAINAGE PLAN

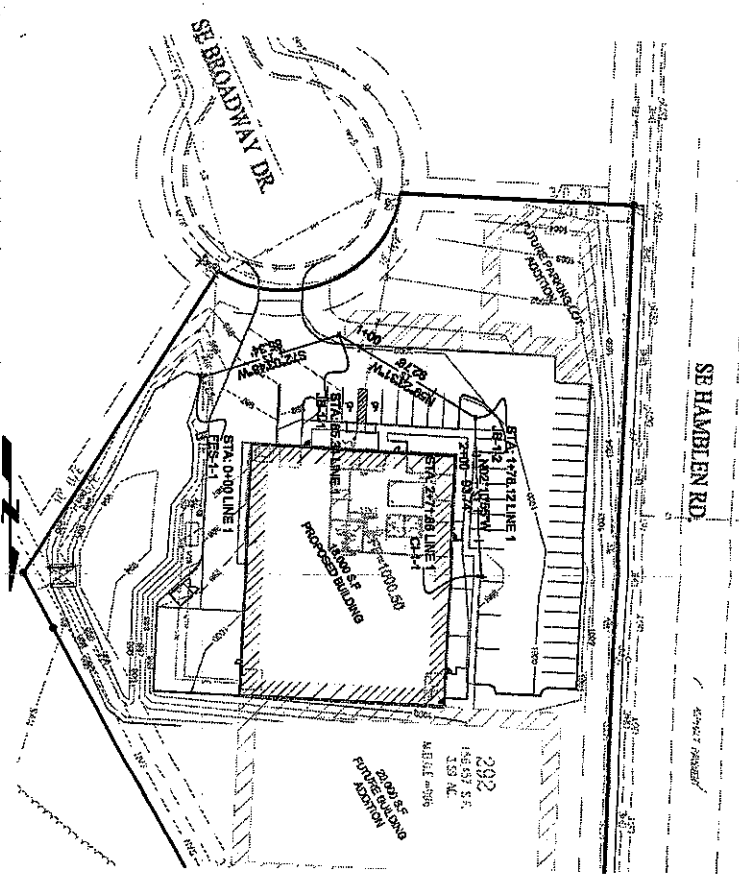
CONSULTANTS:
 M.E.P.:
 CIVIL:
 Qrist Engineering, Inc.
 Civil Engineering for Residential
 991 W. Columbia St.
 2nd Floor, Jackson, Missouri 64405
 Phone: (816) 524-5575

PROJECT:
 SHEET NUMBER:
 C400
 PROJECT NO.: 201423





BASIN DETAILED PLAN



SITE STORM LINES 1 & BASIN PLAN

Station	Notes	Structure
1000.0	FL OUT=995.09	ST. FLARED END SECTION
1000.4	FL OUT=995.52	ST. 18" NYOPLAST JUNCTION BOX
1000.7	FL OUT=996.04	ST. 18" NYOPLAST JUNCTION BOX
1001.2	FL OUT=996.55	ST. 18" NYOPLAST SURF INLET



CONSULTANTS:
M.E.P.:

CIVIL:

Quiet Engineering, Inc
Civil Engineering/Residential
Commercial Site Development
821 NE Columbia St.
Lee's Summit, Missouri 64065
Phone: (816) 500-8875

CONSTRUCTION OF:

HT SOLUTIONS
BUILDING
ON
LOT 292 OF
"NEWBURY LANDING"

LEE SUMMIT MO
JACKSON COUNTY

DATE: 02-20-2016
REVISION DATE:

DESIGN/
DRAWN:
APPROVED:

SHEET TITLE:
SITE STORM LINE 1
BASIN PLAN

SHEET NUMBER:
C401

PROJECT NO.: 201423

BMP LEVEL OF SERVICE WORKSHEETS 1

WORKSHEET 1: REQUIRED LEVEL OF SERVICE - UNDEVELOPED SITE

Project:
Location:

By:
Checked:

Date:
Date:

1. Runoff Curve Number

A. Predevelopment CN

Cover Description	Soil HSG	CN from Table 1	Area (ac.)	Product of CN x Area
Pasture Peds	C	77	3.59	276
Totals:			3.59	276

Area-Weighted CN = total product/total area = 77 (Round to integer)

B. Postdevelopment CN

Cover Description	Soil HSG ¹	CN from Table 1	Area (ac.)	Product of CN x Area
A-1, A-2, A-3, Newback		85	2.34	198.9
A-4 Peds	C	77	1.25	96.25
Totals:			3.59	295.15

¹ Postdevelopment CN is one HSG higher for all cover types except preserved vegetation, absent documentation showing how postdevelopment soil structure will be preserved.

Area-Weighted CN = total product/total area = 82 (Round to integer)

C. Level of Service (LS) Calculation

		Change in CN	LS
Predevelopment CN:	77	17+	8
Postdevelopment CN:	82	7 to 16	7
Difference:	5	4 to 6	6
LS Required (see scale at right):	6	1 to 3	5
		0	4
		-7 to -1	3
		-8 to -17	2
		-18 to -21	1
		-22 -	0

WORKSHEET 2: DEVELOP MITIGATION PACKAGE(S) THAT MEET THE REQUIRED LS

Project:
 Location:
 Sheet ___ of ___

By:
 Checked:

Date:
 Date:

1. Required LS (New Development, Wksht 1) or Total VR (Redevelopment, Wksht 1A): 6

Note: Various BMPs may alter CN of proposed development, and LS; recalculate both if applicable.

2. Proposed BMP Option Package No. ___

Cover/BMP Description	Treatment Area	VR from Table 4.4 or 4.6 ¹	Product of VR x Area
A-4 1/4 in. Strip	1.25	5	6.25
A-7 Thru 3' Vgln. Str + Exposed Avg. Dbs	2.34	8	18.72
Total:	3.59	Total:	25.05
		*Weighted VR:	6.9

= total product/total a

- ¹ VR calculated for final BMP only in Treatment Train.
- ² Total treatment area cannot exceed 100 percent of the actual site area.
- * Blank In Redevelopment

Meets required LS (Yes/No)? Yes (If No, or if additional options are being tested, proceed below.)

3. Proposed BMP Option Package No. ___

Cover/BMP Description	Treatment Area	VR from Table 4.4 or 4.6 ¹	Product of VR x Area
Total:		Total:	
		*Weighted VR:	

= total product/total a

- ¹ VR calculated for final BMP only in Treatment Train.
- ² Total treatment area cannot exceed 100 percent of the actual site area.
- * Blank In Redevelopment

Meets required LS (Yes/No)? (If No, or if additional options are being tested, move to next sheet.)

HYDROLOGIC MODEL

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	---	---	4.75	---	---	6.54	---	---	11.57	PRE DEVELOPMENT
2	Rational	---	---	1.65	---	---	2.28	---	---	4.03	UNDETAINED
3	Rational	---	---	8.77	---	---	12.09	---	---	21.36	INTO BASIN
4	Reservoir	3	---	2.15	---	---	2.83	---	---	4.74	BASIN-1

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	4.75	1	10	2,848	---	---	---	PRE DEVELOPMENT
2	Rational	1.65	1	10	992	---	---	---	UNDETAINED
3	Rational	8.77	1	10	5,260	---	---	---	INTO BASIN
4	Reservoir	2.15	1	18	4,999	3	994.90	3,908	BASIN-1

Proj. file: E16-302.gpw

Return Period: 2 yr

Run date: 03-09-2016

Hydrograph Report

Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type	= Rational	Peak discharge	= 4.75 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 3.6 ac	Runoff coeff.	= 0.3
Intensity	= 4.407 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 2,848 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.47
0.05	1.42
0.08	2.37
0.12	3.32
0.15	4.27
0.18	4.27
0.22	3.32
0.25	2.37
0.28	1.42
0.32	0.47

...End

Hydrograph Report

Hyd. No. 2

UNDETAINED

Hydrograph type	= Rational	Peak discharge	= 1.65 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 1.3 ac	Runoff coeff.	= 0.3
Intensity	= 4.407 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 992 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.17
0.05	0.50
0.08	0.83
0.12	1.16
0.15	1.49
0.18	1.49
0.22	1.16
0.25	0.83
0.28	0.50
0.32	0.17

...End

Hydrograph Report

Hyd. No. 3

INTO BASIN

Hydrograph type	= Rational	Peak discharge	= 8.77 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 2.3 ac	Runoff coeff.	= 0.85
Intensity	= 4.407 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 5,260 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.88
0.05	2.63
0.08	4.38
0.12	6.14
0.15	7.89
0.18	7.89
0.22	6.14
0.25	4.38
0.28	2.63
0.32	0.88

...End

Hydrograph Report

Hyd. No. 4

BASIN-1

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 994.90 ft

Peak discharge = 2.15 cfs
 Time interval = 1 min
 Reservoir name = BASIN-1
 Max. Storage = 3,908 cuft

Storage Indication method used.

Outflow hydrograph volume = 4,999 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.07	3.51	993.80	0.28	---	---	---	---	---	---	---	---	0.28
0.10	5.26	994.09	0.85	---	---	---	---	---	---	---	---	0.85
0.13	7.01	994.26	1.09	---	---	---	---	---	---	---	---	1.09
0.17	8.77 <<	994.47	1.34	---	---	---	---	---	---	---	---	1.34
0.20	7.01	994.67	1.54	---	---	---	0.12	---	---	---	---	1.66
0.23	5.26	994.81	1.66	---	---	---	0.29	---	---	---	---	1.95
0.27	3.51	994.88	1.72	---	---	---	0.40	---	---	---	---	2.12
0.30	1.75	994.90 <<	1.73	---	---	---	0.42	---	---	---	---	2.15 <<
0.33	0.00	994.86	1.70	---	---	---	0.36	---	---	---	---	2.06
0.37	0.00	994.80	1.65	---	---	---	0.27	---	---	---	---	1.92
0.40	0.00	994.74	1.60	---	---	---	0.20	---	---	---	---	1.79
0.43	0.00	994.68	1.55	---	---	---	0.13	---	---	---	---	1.68
0.47	0.00	994.63	1.50	---	---	---	0.08	---	---	---	---	1.58
0.50	0.00	994.58	1.45	---	---	---	0.04	---	---	---	---	1.50
0.53	0.00	994.53	1.41	---	---	---	0.02	---	---	---	---	1.42
0.57	0.00	994.49	1.36	---	---	---	---	---	---	---	---	1.36
0.60	0.00	994.45	1.32	---	---	---	---	---	---	---	---	1.32
0.63	0.00	994.41	1.27	---	---	---	---	---	---	---	---	1.27
0.67	0.00	994.37	1.23	---	---	---	---	---	---	---	---	1.23
0.70	0.00	994.33	1.18	---	---	---	---	---	---	---	---	1.18
0.73	0.00	994.29	1.14	---	---	---	---	---	---	---	---	1.14
0.77	0.00	994.26	1.09	---	---	---	---	---	---	---	---	1.09
0.80	0.00	994.22	1.05	---	---	---	---	---	---	---	---	1.05
0.83	0.00	994.19	1.00	---	---	---	---	---	---	---	---	1.00
0.87	0.00	994.16	0.96	---	---	---	---	---	---	---	---	0.96
0.90	0.00	994.13	0.91	---	---	---	---	---	---	---	---	0.91
0.93	0.00	994.10	0.87	---	---	---	---	---	---	---	---	0.87
0.97	0.00	994.07	0.82	---	---	---	---	---	---	---	---	0.82
1.00	0.00	994.05	0.77	---	---	---	---	---	---	---	---	0.77
1.03	0.00	994.02	0.72	---	---	---	---	---	---	---	---	0.72
1.07	0.00	994.00	0.68	---	---	---	---	---	---	---	---	0.68
1.10	0.00	993.88	0.44	---	---	---	---	---	---	---	---	0.44
1.13	0.00	993.80	0.29	---	---	---	---	---	---	---	---	0.29
1.17	0.00	993.74	0.20	---	---	---	---	---	---	---	---	0.20
1.20	0.00	993.71	0.14	---	---	---	---	---	---	---	---	0.14
1.23	0.00	993.68	0.11	---	---	---	---	---	---	---	---	0.11

...End

Reservoir Report

Reservoir No. 1 - BASIN-1

Hydraflow Hydrographs by Intellisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	993.00	20	0	0
1.00	994.00	1,016	518	518
2.00	995.00	6,526	3,771	4,289
3.00	996.00	7,902	7,214	11,503
4.00	997.00	8,200	8,051	19,554

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 8.0	0.0	0.0	0.0
Span in	= 8.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 993.50	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.50	10.00	0.00	0.00
Crest El. ft	= 994.50	996.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Rect	Broad	--	--
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Stage / Storage / Discharge Table

Note: All outflows have been analyzed under inlet and outlet control.

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	993.00	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.10	52	993.10	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.20	104	993.20	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.30	155	993.30	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.40	207	993.40	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.50	259	993.50	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.60	311	993.60	0.04	--	--	--	0.00	0.00	--	--	--	0.04
0.70	363	993.70	0.13	--	--	--	0.00	0.00	--	--	--	0.13
0.80	414	993.80	0.28	--	--	--	0.00	0.00	--	--	--	0.28
0.90	466	993.90	0.47	--	--	--	0.00	0.00	--	--	--	0.47
1.00	518	994.00	0.68	--	--	--	0.00	0.00	--	--	--	0.68
1.10	895	994.10	0.87	--	--	--	0.00	0.00	--	--	--	0.87
1.20	1,272	994.20	1.02	--	--	--	0.00	0.00	--	--	--	1.02
1.30	1,649	994.30	1.15	--	--	--	0.00	0.00	--	--	--	1.15
1.40	2,026	994.40	1.26	--	--	--	0.00	0.00	--	--	--	1.26
1.50	2,404	994.50	1.37	--	--	--	0.00	0.00	--	--	--	1.37
1.60	2,781	994.60	1.47	--	--	--	0.05	0.00	--	--	--	1.52
1.70	3,158	994.70	1.56	--	--	--	0.15	0.00	--	--	--	1.71
1.80	3,535	994.80	1.65	--	--	--	0.27	0.00	--	--	--	1.93
1.90	3,912	994.90	1.74	--	--	--	0.42	0.00	--	--	--	2.16
2.00	4,289	995.00	1.82	--	--	--	0.59	0.00	--	--	--	2.40
2.10	5,010	995.10	1.89	--	--	--	0.77	0.00	--	--	--	2.67
2.20	5,732	995.20	1.96	--	--	--	0.98	0.00	--	--	--	2.94
2.30	6,453	995.30	2.04	--	--	--	1.19	0.00	--	--	--	3.23
2.40	7,175	995.40	2.10	--	--	--	1.42	0.00	--	--	--	3.52
2.50	7,896	995.50	2.17	--	--	--	1.66	0.00	--	--	--	3.83
2.60	8,617	995.60	2.23	--	--	--	1.92	0.00	--	--	--	4.15
2.70	9,339	995.70	2.30	--	--	--	2.19	0.00	--	--	--	4.48
2.80	10,060	995.80	2.36	--	--	--	2.47	0.00	--	--	--	4.82
2.90	10,782	995.90	2.42	--	--	--	2.76	0.00	--	--	--	5.17
3.00	11,503	996.00	2.47	--	--	--	3.06	0.00	--	--	--	5.53
3.10	12,308	996.10	2.53	--	--	--	3.37	0.82	--	--	--	6.72
3.20	13,113	996.20	2.59	--	--	--	3.69	2.32	--	--	--	8.60

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.30	13,918	996.30	2.64	---	---	---	4.02	4.27	---	---	---	10.93
3.40	14,723	996.40	2.69	---	---	---	4.36	6.58	---	---	---	13.63
3.50	15,529	996.50	2.74	---	---	---	4.71	9.19	---	---	---	16.64
3.60	16,334	996.60	2.80	---	---	---	5.07	12.08	---	---	---	19.94
3.70	17,139	996.70	2.85	---	---	---	5.43	15.22	---	---	---	23.50
3.80	17,944	996.80	2.89	---	---	---	5.81	18.60	---	---	---	27.30
3.90	18,749	996.90	2.94	---	---	---	6.19	22.19	---	---	---	31.32
4.00	19,554	997.00	2.99	---	---	---	6.58	26.00	---	---	---	35.57

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	6.54	1	10	3,927	---	---	---	PRE DEVELOPMENT
2	Rational	2.28	1	10	1,367	---	---	---	UNDETAINED
3	Rational	12.09	1	10	7,252	---	---	---	INTO BASIN
4	Reservoir	2.83	1	18	6,991	3	995.16	5,453	BASIN-1

Proj. file: E16-302.gpw

Return Period: 10_{yr}

Run date: 03-09-2016

Hydrograph Report

Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type	= Rational	Peak discharge	= 6.54 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 3.6 ac	Runoff coeff.	= 0.3
Intensity	= 6.076 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 3,927 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

0.02	0.65
0.05	1.96
0.08	3.27
0.12	4.58
0.15	5.89
0.18	5.89
0.22	4.58
0.25	3.27
0.28	1.96
0.32	0.65

...End

Hydrograph Report

Hyd. No. 2

UNDETAINED

Hydrograph type	= Rational	Peak discharge	= 2.28 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 1.3 ac	Runoff coeff.	= 0.3
Intensity	= 6.076 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 1,367 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.23
0.05	0.68
0.08	1.14
0.12	1.60
0.15	2.05
0.18	2.05
0.22	1.60
0.25	1.14
0.28	0.68
0.32	0.23

...End

Hydrograph Report

Hyd. No. 3

INTO BASIN

Hydrograph type	= Rational	Peak discharge	= 12.09 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 2.3 ac	Runoff coeff.	= 0.85
Intensity	= 6.076 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 7,252 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

0.02	1.21
0.05	3.63
0.08	6.04
0.12	8.46
0.15	10.88
0.18	10.88
0.22	8.46
0.25	6.04
0.28	3.63
0.32	1.21

...End

Hydrograph Report

Hyd. No. 4

BASIN-1

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 995.16 ft

Peak discharge = 2.83 cfs
 Time interval = 1 min
 Reservoir name = BASIN-1
 Max. Storage = 5,453 cuft

Storage Indication method used.

Outflow hydrograph volume = 6,991 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.07	4.83	994.01	0.70	---	---	---	---	---	---	---	---	0.70
0.10	7.25	994.18	0.98	---	---	---	---	---	---	---	---	0.98
0.13	9.67	994.41	1.27	---	---	---	---	---	---	---	---	1.27
0.17	12.09 <<	994.71	1.57	---	---	---	0.16	---	---	---	---	1.73
0.20	9.67	994.99	1.81	---	---	---	0.57	---	---	---	---	2.38
0.23	7.25	995.09	1.89	---	---	---	0.76	---	---	---	---	2.65
0.27	4.83	995.15	1.93	---	---	---	0.87	---	---	---	---	2.80
0.30	2.42	995.16 <<	1.94	---	---	---	0.90	---	---	---	---	2.83 <<
0.33	0.00	995.13	1.92	---	---	---	0.84	---	---	---	---	2.76
0.37	0.00	995.09	1.88	---	---	---	0.76	---	---	---	---	2.64
0.40	0.00	995.05	1.85	---	---	---	0.68	---	---	---	---	2.53
0.43	0.00	995.01	1.82	---	---	---	0.60	---	---	---	---	2.42
0.47	0.00	994.94	1.76	---	---	---	0.48	---	---	---	---	2.25
0.50	0.00	994.87	1.71	---	---	---	0.37	---	---	---	---	2.08
0.53	0.00	994.80	1.66	---	---	---	0.28	---	---	---	---	1.93
0.57	0.00	994.74	1.60	---	---	---	0.20	---	---	---	---	1.81
0.60	0.00	994.69	1.55	---	---	---	0.14	---	---	---	---	1.69
0.63	0.00	994.64	1.51	---	---	---	0.09	---	---	---	---	1.59
0.67	0.00	994.59	1.46	---	---	---	0.05	---	---	---	---	1.50
0.70	0.00	994.54	1.41	---	---	---	0.02	---	---	---	---	1.43
0.73	0.00	994.50	1.37	---	---	---	---	---	---	---	---	1.37
0.77	0.00	994.45	1.32	---	---	---	---	---	---	---	---	1.32
0.80	0.00	994.41	1.28	---	---	---	---	---	---	---	---	1.28
0.83	0.00	994.37	1.23	---	---	---	---	---	---	---	---	1.23
0.87	0.00	994.33	1.19	---	---	---	---	---	---	---	---	1.19
0.90	0.00	994.30	1.14	---	---	---	---	---	---	---	---	1.14
0.93	0.00	994.26	1.10	---	---	---	---	---	---	---	---	1.10
0.97	0.00	994.23	1.05	---	---	---	---	---	---	---	---	1.05
1.00	0.00	994.19	1.01	---	---	---	---	---	---	---	---	1.01
1.03	0.00	994.16	0.96	---	---	---	---	---	---	---	---	0.96
1.07	0.00	994.13	0.92	---	---	---	---	---	---	---	---	0.92
1.10	0.00	994.10	0.88	---	---	---	---	---	---	---	---	0.88
1.13	0.00	994.08	0.83	---	---	---	---	---	---	---	---	0.83
1.17	0.00	994.05	0.78	---	---	---	---	---	---	---	---	0.78
1.20	0.00	994.03	0.73	---	---	---	---	---	---	---	---	0.73
1.23	0.00	994.00	0.69	---	---	---	---	---	---	---	---	0.69
1.27	0.00	993.90	0.47	---	---	---	---	---	---	---	---	0.47
1.30	0.00	993.81	0.30	---	---	---	---	---	---	---	---	0.30

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1.33	0.00	993.75	0.21	----	----	----	----	----	----	----	----	0.21
1.37	0.00	993.71	0.15	----	----	----	----	----	----	----	----	0.15

...End

Reservoir Report

Reservoir No. 1 - BASIN-1

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	993.00	20	0	0
1.00	994.00	1,016	518	518
2.00	995.00	6,526	3,771	4,289
3.00	996.00	7,902	7,214	11,503
4.00	997.00	8,200	8,051	19,554

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 8.0	0.0	0.0	0.0
Span in	= 8.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 993.50	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.50	10.00	0.00	0.00
Crest El. ft	= 994.50	996.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Rect	Broad	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	993.00	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.10	52	993.10	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.20	104	993.20	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.30	155	993.30	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.40	207	993.40	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.50	259	993.50	0.00	---	---	---	0.00	0.00	---	---	---	0.00
0.60	311	993.60	0.04	---	---	---	0.00	0.00	---	---	---	0.04
0.70	363	993.70	0.13	---	---	---	0.00	0.00	---	---	---	0.13
0.80	414	993.80	0.28	---	---	---	0.00	0.00	---	---	---	0.28
0.90	466	993.90	0.47	---	---	---	0.00	0.00	---	---	---	0.47
1.00	518	994.00	0.68	---	---	---	0.00	0.00	---	---	---	0.68
1.10	895	994.10	0.87	---	---	---	0.00	0.00	---	---	---	0.87
1.20	1,272	994.20	1.02	---	---	---	0.00	0.00	---	---	---	1.02
1.30	1,649	994.30	1.15	---	---	---	0.00	0.00	---	---	---	1.15
1.40	2,026	994.40	1.26	---	---	---	0.00	0.00	---	---	---	1.26
1.50	2,404	994.50	1.37	---	---	---	0.00	0.00	---	---	---	1.37
1.60	2,781	994.60	1.47	---	---	---	0.05	0.00	---	---	---	1.52
1.70	3,158	994.70	1.56	---	---	---	0.15	0.00	---	---	---	1.71
1.80	3,535	994.80	1.65	---	---	---	0.27	0.00	---	---	---	1.93
1.90	3,912	994.90	1.74	---	---	---	0.42	0.00	---	---	---	2.16
2.00	4,289	995.00	1.82	---	---	---	0.59	0.00	---	---	---	2.40
2.10	5,010	995.10	1.89	---	---	---	0.77	0.00	---	---	---	2.67
2.20	5,732	995.20	1.96	---	---	---	0.98	0.00	---	---	---	2.94
2.30	6,453	995.30	2.04	---	---	---	1.19	0.00	---	---	---	3.23
2.40	7,175	995.40	2.10	---	---	---	1.42	0.00	---	---	---	3.52
2.50	7,896	995.50	2.17	---	---	---	1.66	0.00	---	---	---	3.83
2.60	8,617	995.60	2.23	---	---	---	1.92	0.00	---	---	---	4.15
2.70	9,339	995.70	2.30	---	---	---	2.19	0.00	---	---	---	4.48
2.80	10,060	995.80	2.36	---	---	---	2.47	0.00	---	---	---	4.82
2.90	10,782	995.90	2.42	---	---	---	2.76	0.00	---	---	---	5.17
3.00	11,503	996.00	2.47	---	---	---	3.06	0.00	---	---	---	5.53
3.10	12,308	996.10	2.53	---	---	---	3.37	0.82	---	---	---	6.72
3.20	13,113	996.20	2.59	---	---	---	3.69	2.32	---	---	---	8.60

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.30	13,918	996.30	2.64	—	—	—	4.02	4.27	—	—	—	10.93
3.40	14,723	996.40	2.69	—	—	—	4.36	6.58	—	—	—	13.63
3.50	15,529	996.50	2.74	—	—	—	4.71	9.19	—	—	—	16.64
3.60	16,334	996.60	2.80	—	—	—	5.07	12.08	—	—	—	19.94
3.70	17,139	996.70	2.85	—	—	—	5.43	15.22	—	—	—	23.50
3.80	17,944	996.80	2.89	—	—	—	5.81	18.60	—	—	—	27.30
3.90	18,749	996.90	2.94	—	—	—	6.19	22.19	—	—	—	31.32
4.00	19,554	997.00	2.99	—	—	—	6.58	26.00	—	—	—	35.57

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	11.57	1	10	6,939	—	—	—	PRE DEVELOPMENT
2	Rational	4.03	1	10	2,416	—	—	—	UNDETAINED
3	Rational	21.36	1	10	12,815	—	—	—	INTO BASIN
4	Reservoir	4.74	1	18	12,555	3	995.77	9,879	BASIN-1

Proj. file: E16-302.gpw

Return Period: 100 yr

Run date: 03-09-2016

Hydrograph Report

Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type	= Rational	Peak discharge	= 11.57 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 3.6 ac	Runoff coeff.	= 0.3
Intensity	= 10.738 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 6,939 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

0.02	1.16
0.05	3.47
0.08	5.78
0.12	8.10
0.15	10.41
0.18	10.41
0.22	8.10
0.25	5.78
0.28	3.47
0.32	1.16

...End

Hydrograph Report

Hyd. No. 2

UNDETAINED

Hydrograph type	= Rational	Peak discharge	= 4.03 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 1.3 ac	Runoff coeff.	= 0.3
Intensity	= 10.738 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 2,416 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.40
0.05	1.21
0.08	2.01
0.12	2.82
0.15	3.62
0.18	3.62
0.22	2.82
0.25	2.01
0.28	1.21
0.32	0.40

...End

Hydrograph Report

Hyd. No. 3

INTO BASIN

Hydrograph type	= Rational	Peak discharge	= 21.36 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 2.3 ac	Runoff coeff.	= 0.85
Intensity	= 10.738 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 12,815 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

0.02	2.14
0.05	6.41
0.08	10.68
0.12	14.95
0.15	19.22
0.18	19.22
0.22	14.95
0.25	10.68
0.28	6.41
0.32	2.14

...End

Hydrograph Report

Hyd. No. 4

BASIN-1

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 995.77 ft

Peak discharge = 4.74 cfs
 Time interval = 1 min
 Reservoir name = BASIN-1
 Max. Storage = 9,879 cuft

Storage Indication method used.

Outflow hydrograph volume = 12,555 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.07	8.54	994.12	0.90	---	---	---	---	---	---	---	---	0.90
0.10	12.82	994.42	1.29	---	---	---	---	---	---	---	---	1.29
0.13	17.09	994.85	1.69	---	---	---	0.34	---	---	---	---	2.03
0.17	21.36 <<	995.20	1.96	---	---	---	0.97	---	---	---	---	2.93
0.20	17.09	995.46	2.14	---	---	---	1.57	---	---	---	---	3.72
0.23	12.82	995.64	2.26	---	---	---	2.04	---	---	---	---	4.30
0.27	8.54	995.75	2.32	---	---	---	2.32	---	---	---	---	4.64
0.30	4.27	995.77 <<	2.34	---	---	---	2.40	---	---	---	---	4.74 <<
0.33	0.00	995.73	2.32	---	---	---	2.28	---	---	---	---	4.59
0.37	0.00	995.66	2.27	---	---	---	2.08	---	---	---	---	4.35
0.40	0.00	995.59	2.23	---	---	---	1.89	---	---	---	---	4.12
0.43	0.00	995.52	2.18	---	---	---	1.72	---	---	---	---	3.90
0.47	0.00	995.46	2.14	---	---	---	1.56	---	---	---	---	3.70
0.50	0.00	995.40	2.10	---	---	---	1.42	---	---	---	---	3.52
0.53	0.00	995.34	2.06	---	---	---	1.29	---	---	---	---	3.35
0.57	0.00	995.29	2.03	---	---	---	1.16	---	---	---	---	3.19
0.60	0.00	995.23	1.99	---	---	---	1.05	---	---	---	---	3.04
0.63	0.00	995.19	1.95	---	---	---	0.95	---	---	---	---	2.90
0.67	0.00	995.14	1.92	---	---	---	0.85	---	---	---	---	2.77
0.70	0.00	995.09	1.89	---	---	---	0.76	---	---	---	---	2.65
0.73	0.00	995.05	1.85	---	---	---	0.68	---	---	---	---	2.53
0.77	0.00	995.01	1.82	---	---	---	0.60	---	---	---	---	2.43
0.80	0.00	994.94	1.77	---	---	---	0.49	---	---	---	---	2.26
0.83	0.00	994.87	1.71	---	---	---	0.38	---	---	---	---	2.09
0.87	0.00	994.81	1.66	---	---	---	0.29	---	---	---	---	1.95
0.90	0.00	994.75	1.61	---	---	---	0.21	---	---	---	---	1.82
0.93	0.00	994.69	1.56	---	---	---	0.14	---	---	---	---	1.70
0.97	0.00	994.64	1.51	---	---	---	0.09	---	---	---	---	1.60
1.00	0.00	994.59	1.46	---	---	---	0.05	---	---	---	---	1.51
1.03	0.00	994.54	1.42	---	---	---	0.02	---	---	---	---	1.44
1.07	0.00	994.50	1.37	---	---	---	---	---	---	---	---	1.37
1.10	0.00	994.46	1.33	---	---	---	---	---	---	---	---	1.33
1.13	0.00	994.41	1.28	---	---	---	---	---	---	---	---	1.28
1.17	0.00	994.37	1.24	---	---	---	---	---	---	---	---	1.24
1.20	0.00	994.34	1.19	---	---	---	---	---	---	---	---	1.19
1.23	0.00	994.30	1.15	---	---	---	---	---	---	---	---	1.15
1.27	0.00	994.26	1.10	---	---	---	---	---	---	---	---	1.10
1.30	0.00	994.23	1.06	---	---	---	---	---	---	---	---	1.06

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1.33	0.00	994.20	1.01	----	----	----	----	----	----	----	----	1.01
1.37	0.00	994.16	0.97	----	----	----	----	----	----	----	----	0.97
1.40	0.00	994.13	0.92	----	----	----	----	----	----	----	----	0.92
1.43	0.00	994.11	0.88	----	----	----	----	----	----	----	----	0.88
1.47	0.00	994.08	0.83	----	----	----	----	----	----	----	----	0.83
1.50	0.00	994.05	0.78	----	----	----	----	----	----	----	----	0.78
1.53	0.00	994.03	0.73	----	----	----	----	----	----	----	----	0.73
1.57	0.00	994.01	0.69	----	----	----	----	----	----	----	----	0.69
1.60	0.00	993.91	0.48	----	----	----	----	----	----	----	----	0.48
1.63	0.00	993.82	0.31	----	----	----	----	----	----	----	----	0.31

...End

Reservoir Report

Reservoir No. 1 - BASIN-1

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	993.00	20	0	0
1.00	994.00	1,016	518	518
2.00	995.00	6,526	3,771	4,289
3.00	996.00	7,902	7,214	11,503
4.00	997.00	8,200	8,051	19,554

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 8.0	0.0	0.0	0.0
Span in	= 8.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 993.50	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.50	10.00	0.00	0.00
Crest El. ft	= 994.50	996.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Rect	Broad	--	--
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	993.00	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.10	52	993.10	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.20	104	993.20	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.30	155	993.30	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.40	207	993.40	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.50	259	993.50	0.00	--	--	--	0.00	0.00	--	--	--	0.00
0.60	311	993.60	0.04	--	--	--	0.00	0.00	--	--	--	0.04
0.70	363	993.70	0.13	--	--	--	0.00	0.00	--	--	--	0.13
0.80	414	993.80	0.28	--	--	--	0.00	0.00	--	--	--	0.28
0.90	466	993.90	0.47	--	--	--	0.00	0.00	--	--	--	0.47
1.00	518	994.00	0.68	--	--	--	0.00	0.00	--	--	--	0.68
1.10	895	994.10	0.87	--	--	--	0.00	0.00	--	--	--	0.87
1.20	1,272	994.20	1.02	--	--	--	0.00	0.00	--	--	--	1.02
1.30	1,649	994.30	1.15	--	--	--	0.00	0.00	--	--	--	1.15
1.40	2,026	994.40	1.26	--	--	--	0.00	0.00	--	--	--	1.26
1.50	2,404	994.50	1.37	--	--	--	0.00	0.00	--	--	--	1.37
1.60	2,781	994.60	1.47	--	--	--	0.05	0.00	--	--	--	1.52
1.70	3,158	994.70	1.56	--	--	--	0.15	0.00	--	--	--	1.71
1.80	3,535	994.80	1.65	--	--	--	0.27	0.00	--	--	--	1.93
1.90	3,912	994.90	1.74	--	--	--	0.42	0.00	--	--	--	2.16
2.00	4,289	995.00	1.82	--	--	--	0.59	0.00	--	--	--	2.40
2.10	5,010	995.10	1.89	--	--	--	0.77	0.00	--	--	--	2.67
2.20	5,732	995.20	1.96	--	--	--	0.98	0.00	--	--	--	2.94
2.30	6,453	995.30	2.04	--	--	--	1.19	0.00	--	--	--	3.23
2.40	7,175	995.40	2.10	--	--	--	1.42	0.00	--	--	--	3.52
2.50	7,896	995.50	2.17	--	--	--	1.66	0.00	--	--	--	3.83
2.60	8,617	995.60	2.23	--	--	--	1.92	0.00	--	--	--	4.15
2.70	9,339	995.70	2.30	--	--	--	2.19	0.00	--	--	--	4.48
2.80	10,060	995.80	2.36	--	--	--	2.47	0.00	--	--	--	4.82
2.90	10,782	995.90	2.42	--	--	--	2.76	0.00	--	--	--	5.17
3.00	11,503	996.00	2.47	--	--	--	3.06	0.00	--	--	--	5.53
3.10	12,308	996.10	2.53	--	--	--	3.37	0.82	--	--	--	6.72
3.20	13,113	996.20	2.59	--	--	--	3.69	2.32	--	--	--	8.60

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.30	13,918	996.30	2.64	—	—	—	4.02	4.27	—	—	—	10.93
3.40	14,723	996.40	2.69	—	—	—	4.36	6.58	—	—	—	13.63
3.50	15,529	996.50	2.74	—	—	—	4.71	9.19	—	—	—	16.64
3.60	16,334	996.60	2.80	—	—	—	5.07	12.08	—	—	—	19.94
3.70	17,139	996.70	2.85	—	—	—	5.43	15.22	—	—	—	23.50
3.80	17,944	996.80	2.89	—	—	—	5.81	18.60	—	—	—	27.30
3.90	18,749	996.90	2.94	—	—	—	6.19	22.19	—	—	—	31.32
4.00	19,554	997.00	2.99	—	—	—	6.58	26.00	—	—	—	35.57

...End