PHOENIX CONSULTING ENGINEERS, LTD
RISE TO SERVE

MEMORANDUM

RECEIVED
OCT 05 2016
CHAMPAIGN CO P & Z DEPARTMENT

To: Scott Blakeney	**Date:** September 26, 2016
CC: John Hall	**Project Title:** Lot 100 Rolling Hills Estate Subdivision
From: Eric Hewitt/Tom Overmyer	**Project ID:** 16SUR074
RE: Engineering analysis on earthen fill and drainage	

PROJECT SUMMARY:

Jamie Hitt, Zoning Officer of Champaign County, in a letter dated June 10, 2016, requested that Scott Blakeney have an engineering analysis done to determine if the earthen fill on his property has impacted storm water drainage. Specifically the county was concerned about possible obstruction of surface drainage and damage to adjacent properties by increased height of flood water or increase in velocity of storm water leaving the property. The county referred to the 2008 Lidar contours as the conditions which would be acceptable. Below and attached are the summary and calculations for the comparisons between conditions as shown by the 2008 Lidar contours and the current contours generated by the earthen fill added to the property.

Bentley CivilStorm was used to perform the hydraulic calculations. CivilStorm uses the TR-55 methodology in its calculations and the SCS Type II storm was used. Attached are the reports that were generated by CivilStorm. The 2008 Lidar contours were used to determine the size of the original basin. The original outlet of the basin was assumed to be 20 L.F. of 15" diameter CMP at 0.5% as labeled the construction plans from 1993.

SURFACE DRAINAGE:

The first concern the county has with the installation of drainage pipes and fill was the potential for obstruction of surface drainage. The original design for Rolling Hills Estate Subdivision V placed a low point of the cul-de-sac at the northeast corner of the cul-de-sac. Water would then flow down a drainage swale between Lots 99 and 100 where it would then enter the drainage basin area and ultimately leave the subdivision either through the basin outlet pipe at the southeast corner of Lot 100 or the basin overflow areas at the north and south ends of the basin.

Mr. Blakeney installed a 12" HDPE pipe along the lot line between Lots 99 and 100 and filled in the original drainage swale. This pipe has a capacity of 6.4 cfs. This is sufficient for smaller event storms but for the 100-Year storm 9.2 cfs needs to be sent to the detention basin through this line. A 6" (minimum) deep ditch with side slopes of 4 horizontal to 1 vertical would be enough to route the excess water to the basin. If Mr. Blakeney does not install a ditch along the property line excess ponding will likely occur in the cul-de-sac during larger event storms.

HEIGHT OF FLOOD WATER:

Another concern brought up by the County was the possibility of damage to neighboring properties due to increased height of flood waters. In reviewing the original construction plans for the subdivision and the 2008 Lidar Contours it appears that the over flow for the basin has been located at the northeast corner of Lot 100. The fill that has been added to Mr. Blakeney's property was added close to the house and did not change the existing elevations along the eastern and northern lot lines where the basin overflows. Actual high water levels for the 100

year event are listed in the table below and the attached drawing. Basin levels do not change significantly between the 2008 conditions, current conditions or the proposed conditions.

Table 1: High Water Elevations

STORM EVENT (years)	As Built 2008 Basin	Current Basin	Proposed Basin
50	726.54	726.53	726.55
100	726.55	726.55	726.57

STORM WATER VELOCITY:

The County's final concern was the velocity of storm water leaving the property. The original outlet for the basin was designed to be 20 L.F. of 15" Dia. CMP installed at a slope of 0.5%. Mr. Blakeney currently has installed 94 L.F. of 15" Dia. HDPE at a slope of 1.9%. The table below summarizes release flow and velocity through these pipes for the 50 and 100 year events. The velocity shown is the velocity at the downstream end of the pipes.

Table 2: Basin Outlet Summary

STORM EVENT (years)	As Built 2008 Basin Outlet Pipe Flow (cfs)	As Built 2008 Basin Outlet Pipe Vel. (ft/sec)	Current Basin Outlet Pipe Flow (cfs)	Current Basin Outlet Pipe Vel. (ft/sec)	Prop. Basin Outlet Pipe Flow (cfs)	Prop. Basin Outlet Pipe Vel. (ft/sec)
50	4.6	4.2	7.1	5.8	4.8	3.9
100	4.6	4.2	7.2	5.8	4.8	3.9

As can be seen, the current outlet pipe has increased the flow and velocity of water leaving the basin. If the opening of this outlet pipe is reduced to a 12" opening by installing a 15"x12" reducer the flow and velocity is decreased. The release rates for the proposed conditions are similar to the conditions that existed as part of the 2008 As Built design.

Additionally the impact on the drainage way from the basin outlet to the edge of the subdivision was reviewed. The flows and velocities of the water leaving the subdivision through the drainage way are summarized in Table 3. The proposed condition of reducing the opening of the outlet pipe also brings the flows and velocities of water exiting the subdivision back to the approximate values of the 2008 As Built conditions.

Table 3: Drainage Way Summary

STORM EVENT (years)	As Built 2008 Drainage Way Flow (cfs)	As Built 2008 Drainage Way Vel. (ft/sec)	Current Drainage Way Flow (cfs)	Current Drainage Way Vel. (ft/sec)	Proposed Drainage Way Flow (cfs)	Proposed Drainage Way Vel. (ft/sec)
50	4.6	3.2	7.1	3.1	4.8	3.3
100	4.6	4.2	7.2	3.6	4.8	3.3

MEMORANDUM

A final check on storm water leaving the basin was made by reviewing the flows exiting the subdivision by the spillway located on the northeast corner of the basin. The flows over the spillway are summarized in Table 4. Although the values increase slightly with the proposed revision to the outlet of the basin the impact of the increased flows will be neglible.

Table 4: Spillway Summary

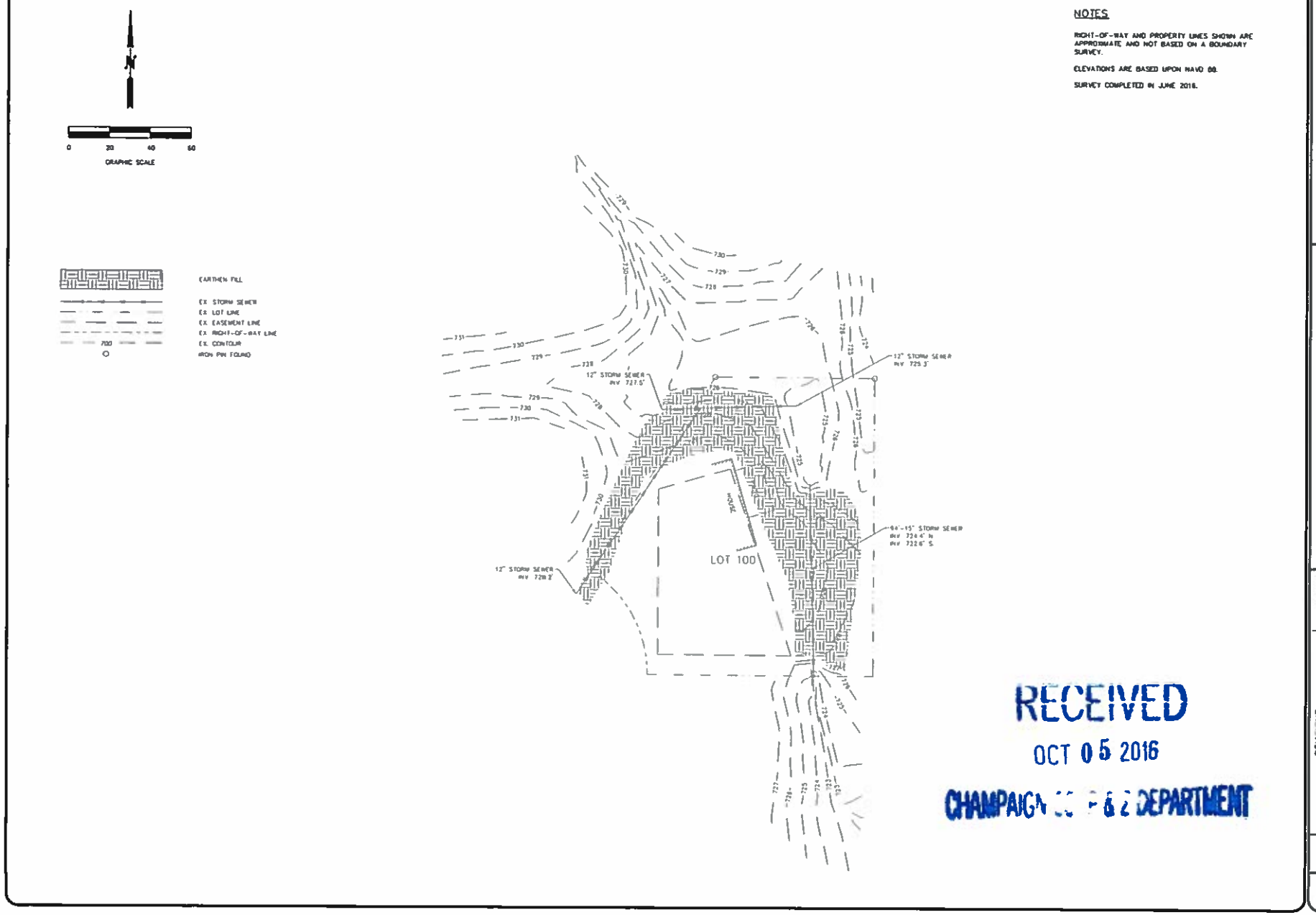
STORM EVENT (years)	As Built 2008 Spillway Flow (cfs)	Current Spillway Flow (cfs)	Proposed Spillway Flow (cfs)
50	17.6	16.6	18.8
100	22.2	18.8	21.0

SUMMARY:

The following three concerns raised by the County can be addressed as follows.

1. Surface drainage – replacing the original side yard swale with a culvert may cause increased ponding in the cul-de-sac during large event storms. To alleviate this possibility a drainage swale should be graded along the property line.
2. Height of flood water – the high water elevations do not drastically change in any scenario. This is largely due to the fact that the elevation of the spillway did not change.
3. Storm water velocity – the velocity of water released downstream has increased due to the slope and type of pipe for the outlet of the basin. Installing a 12"x15" reducer on the upstream end of the outlet pipe for the basin will bring the values back to the As Built conditions.

The following attachments are the data that was used as input for CivilStorm and the output generated by CivilStorm for the County to use in their review.



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Professional Design Firm No. 184.005835
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LIMITED TOPOGRAPHIC SURVEY

LOT 100 / STORM WATER BASIN
ROLLING HILLS ESTATES V SUBDIVISION
MAHOMET, CHAMPAIGN COUNTY, ILLINOIS

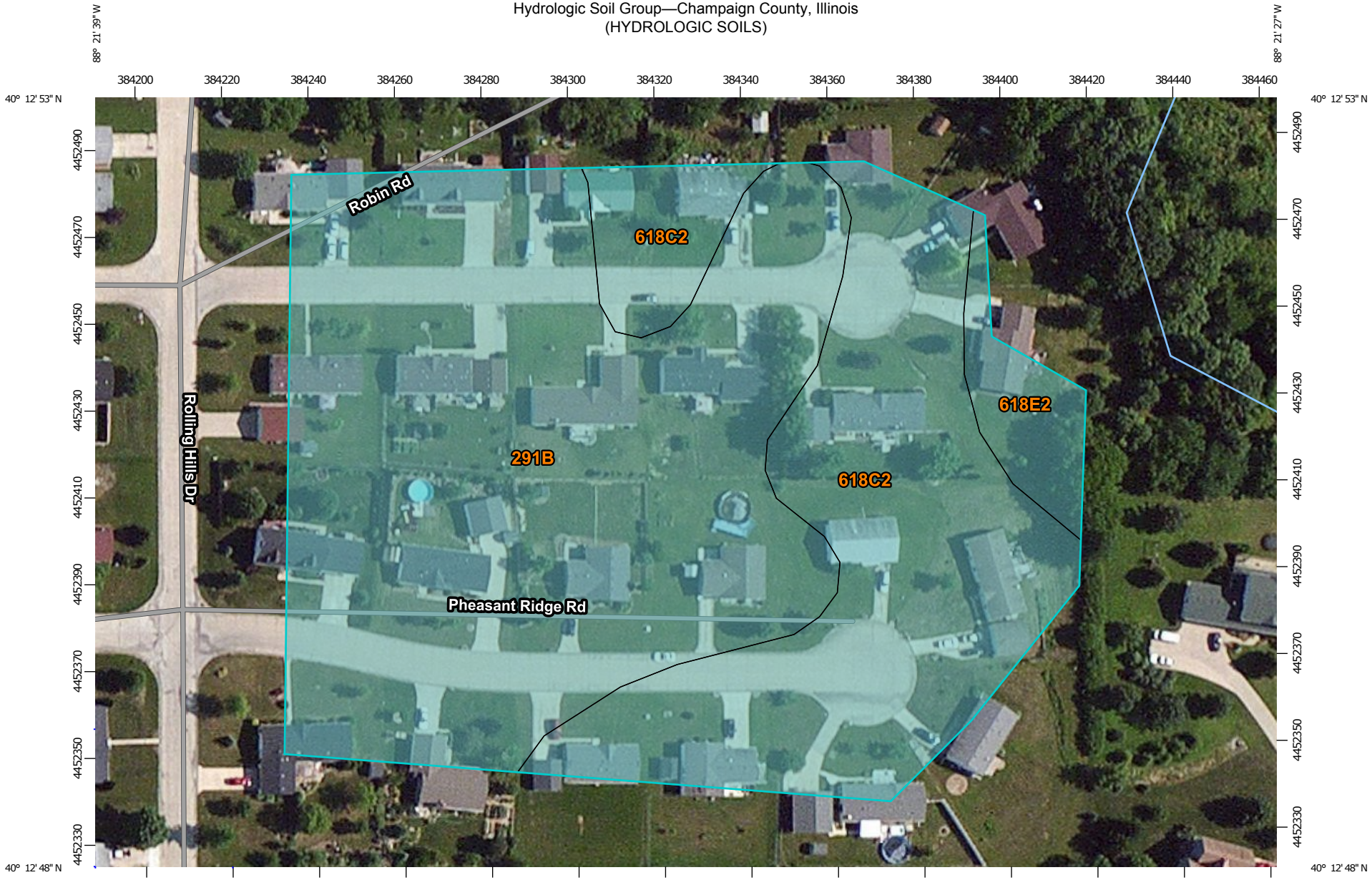
NO	DATE	BY	DESCRIPTION

DRAWN BY: EDH
DATE: 09/28/16
DESIGN BY:
DATE:
APPVD BY:
DATE:

PROJECT NO.
16SUR074

1
SHEET 1 OF 1

Hydrologic Soil Group—Champaign County, Illinois
(HYDROLOGIC SOILS)



Map Scale: 1:1,250 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

Hydrologic Soil Group—Champaign County, Illinois
(HYDROLOGIC SOILS)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:12,000.

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: Champaign County, Illinois
Survey Area Data: Version 10, Sep 25, 2015

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

Date(s) aerial images were photographed: Jun 16, 2011—Jul 9, 2011

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Champaign County, Illinois (IL019)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
291B	Xenia silt loam, Bloomington Ridged Plain, 2 to 5 percent slopes	C	3.6	59.9%
618C2	Senachwine silt loam, 5 to 10 percent slopes, eroded	C	2.1	36.1%
618E2	Senachwine silt loam, 18 to 25 percent slopes, eroded	C	0.2	3.9%
Totals for Area of Interest			**5.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

GIS Webmap Public Interface Champaign County, Illinois

NORTH

Date: Monday, July 18, 2016

2008 Drainage Area-50 Year Event

<General>			
ID	53	Notes	
Label	2008 Drainage Area-50 Year Event	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	317,410.659 ft²	Area (User Defined)	252,648.000 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,254.87	1,291,785.26
977,261.44	1,292,027.24
976,281.60	1,292,142.99
976,266.25	1,291,740.77

Active Topology	
Is Active?	True

Catchment	
Outflow Element	2008 Basin-50 year event

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.371 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.013 ft/ft

2008 Drainage Area-50 Year Event

TR-55 Sheet Flow			
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	665.0 ft	Slope	0.013 ft/ft
Is Paved?	True		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

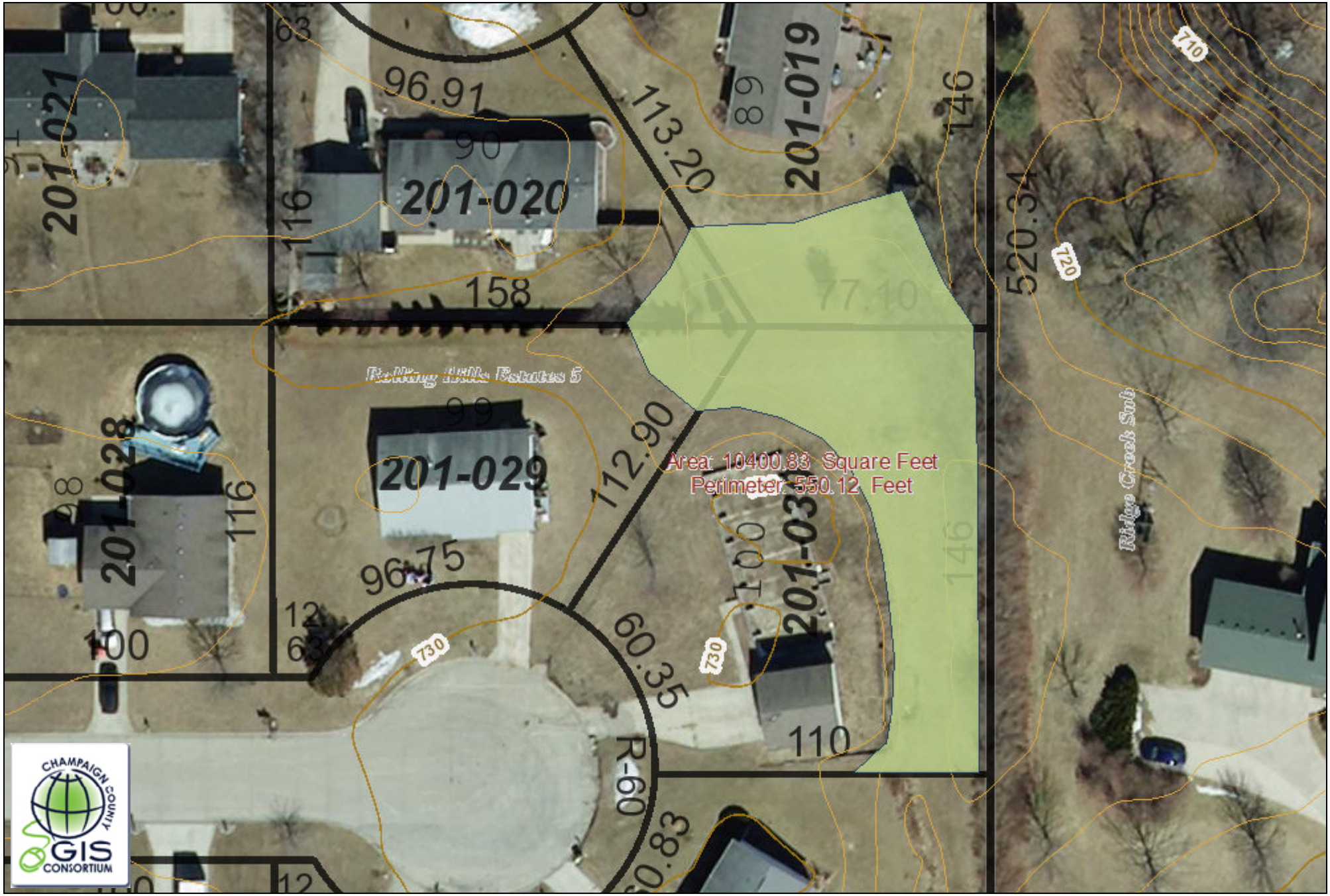
Results (Maximum Values)			
Flow (Maximum)	22.61 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	252,648.000 ft²	Volume (Total Runoff)	616,753.9 gal

Calculation Messages

Time (hours)	Message

2008 Contours Approx 727 Basin Area



NORTH

As Built 2008 Basin-50 year event

<General>			
ID	54	Notes	
Label	As Built 2008 Basin-50 year event	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>	
Scaled Area	4,793.817 ft²

Geometry

X (ft)	Y (ft)
977,262.59	1,291,938.14
977,269.67	1,291,806.87
977,304.25	1,291,806.09
977,301.11	1,291,937.35

Active Topology	
Is Active?	True

Infiltration/Inflow & Seepage	
Pond Seepage Method	None

Inflow (Wet) Collection

Physical	
Volume Type	Elevation-Area

Elevation-Area

Elevation (ft)	Area (ft²)	Percent Void Space (%)
723.00	0.000	100.0
726.00	6,400.000	100.0
727.00	10,400.000	100.0

Simulation Initial Condition	
Initial Elevation Type	Invert

Results (Engine Parsing)	
Branch	1

Results (Extended Node)

As Built 2008 Basin-50 year event

Results (Extended Node)			
Volume	0.0 gal	Freeboard Height	4.0 ft
Depth (Flooding)	-4.00 ft		

Results (Flow)			
Flow (Total In)	0.00 cfs	Local Inflow?	False
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs

Results			
Is Overflowing?	False	Time to Maximum Outflow	12.150 hours
Is Ever Overflowing?	False	Time to Maximum Inflow	12.100 hours
Depth (Node)	0.00 ft	Flow (Out to Links Maximum)	21.89 cfs
Hydraulic Grade	723.00 ft	Flow (Total In Maximum)	22.22 cfs
Time to Maximum Hydraulic Grade	12.100 hours	Flow (Overflow)	0.00 cfs
Hydraulic Grade (Maximum)	726.55 ft	Time to Maximum Storage	12.100 hours
Time to Maximum Overflow	0.000 hours	Storage (Maximum)	102,418.3 gal
Flow (Overflow Maximum)	0.00 cfs	Flow (Seepage loss)	0.00 cfs

Calculation Messages

Time (hours)	Message

As Built 2008 Basin Outlet Pipe_50 Year Event

<General>			
ID	86	Hyperlinks	<Collection: 0 items>
Label	As Built 2008 Basin Outlet Pipe_50 Year Event	Start Node	POS-1
Notes		Stop Node	CS-9

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,259.67	1,291,784.79
977,256.92	1,291,750.78

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	723.00 ft
Material	CMP	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.90 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	20.0 ft
Roughness Type	Single Roughness	Length (Unified)	20.0 ft
Manning's n	0.024	Slope (Calculated)	0.005 ft/ft
Use Local Conduit Description?	False		

As Built 2008 Basin Outlet Pipe_50 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.55 cfs

Results (Hydraulic Summary)			
Velocity	4.37 ft/s	Froude Number (Middle)	0.760
Capacity (Full Flow)	2.47 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	4.55 cfs	Velocity (Maximum Calculated)	4.37 ft/s
Time (Maximum Flow)	12.200 hours	Depth (Maximum) / Rise	79.1 %
Time (Maximum Calculated Velocity)	12.200 hours		

Results (Profile)			
Depth (In)	1.05 ft	Hydraulic Grade	723.94 ft
Depth (Middle)	0.99 ft	Hydraulic Grade Line (Out)	723.94 ft
Depth (Out)	1.04 ft	Headloss	0.11 ft
Energy Grade Line (In)	724.32 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	724.24 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.21 ft	Cover (Average)	-0.70 ft
Hydraulic Grade Line (In)	724.05 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	False	Froude Number	0.760
Is Ever Surcharged?	False	Froude (Stop)	0.681

As Built 2008 Basin Outlet Pipe_50 Year Event

Results			
Time to Maximum Hydraulic Grade	12.200 hours	Flow-Area (Start)	1.1 ft²
Hydraulic Grade (Maximum)	724.05 ft	Flow-Area (Middle)	1.0 ft²
Depth/Rise	79.1 %	Flow-Area (Stop)	1.1 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	0.9 ft
Velocity (In)	4.13 ft/s	Flow-Width (Middle)	1.0 ft
Velocity (Middle)	4.37 ft/s	Flow-Width (Stop)	0.9 ft
Velocity (Out)	4.17 ft/s	Flow (Start)	4.55 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	4.55 cfs
Froude (Start)	0.662	Flow (Stop)	4.55 cfs

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	4.13	4.55	724.05
10.00	4.37	4.55	723.94
20.00	4.17	4.55	723.94

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
1.05	0.9	1.1	False
0.99	1.0	1.0	False
1.04	0.9	1.1	False

Section Froude Number
0.662
0.760
0.681

Subdivision Outlet Channel - 2008 Conditions - 50 Year Event

<General>			
ID	116	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - 2008 Conditions - 50 Year Event	Start Node	CS-11
Notes		Stop Node	CS-12

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,283.50	1,291,695.21
977,301.64	1,291,682.31

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.55 cfs

Results (Hydraulic Summary)			
Velocity	5.03 ft/s	Area (Full Flow)	(N/A) ft²

Subdivision Outlet Channel - 2008 Conditions - 50 Year Event

Results (Maximum Values)			
Flow (Maximum)	4.55 cfs	Velocity (Maximum Calculated)	5.03 ft/s
Time (Maximum Flow)	12.200 hours	Depth (Maximum) / Rise	7.5 %
Time (Maximum Calculated Velocity)	12.200 hours		

Results (Profile)			
Depth (In)	0.54 ft	Energy Grade Line (Out)	721.51 ft
Depth (Middle)	0.32 ft	Hydraulic Grade Line (In)	723.14 ft
Depth (Out)	0.35 ft	Hydraulic Grade	722.12 ft
Energy Grade Line (In)	723.59 ft	Hydraulic Grade Line (Out)	721.35 ft
Energy Grade Line (Middle)	722.52 ft	Headloss	1.79 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.200 hours	Flow-Area (Start)	0.8 ft²
Hydraulic Grade (Maximum)	723.14 ft	Flow-Area (Middle)	0.9 ft²
Depth/Rise	7.5 %	Flow-Area (Stop)	1.4 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.2 ft
Velocity (In)	5.37 ft/s	Flow-Width (Middle)	5.6 ft
Velocity (Middle)	5.03 ft/s	Flow-Width (Stop)	8.3 ft
Velocity (Out)	3.24 ft/s	Flow (Start)	4.55 cfs
Froude (Start)	1.824	Flow (Middle)	4.55 cfs
Froude Number	2.203	Flow (Stop)	4.55 cfs
Froude (Stop)	1.388		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	5.37	4.55	723.14
17.50	5.03	4.55	722.12
35.00	3.24	4.55	721.35

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.54	3.2	0.8	False
0.32	5.6	0.9	False

Subdivision Outlet Channel - 2008 Conditions - 50 Year Event

Sections Results

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.35	8.3	1.4	False

Section Froude Number
1.824
2.203
1.388

2008 Drainage Area-100 Year Event

<General>			
ID	53	Notes	
Label	2008 Drainage Area-100 Year Event	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	317,410.659 ft²	Area (User Defined)	252,648.000 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,254.87	1,291,785.26
977,261.44	1,292,027.24
976,281.60	1,292,142.99
976,266.25	1,291,740.77

Active Topology	
Is Active?	True

Catchment	
Outflow Element	2008 Basin-100 year event

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.371 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

TR-55 Sheet Flow

2008 Drainage Area-100 Year Event

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.013 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	665.0 ft	Slope	0.013 ft/ft
Is Paved?	True		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	26.66 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	252,648.000 ft²	Volume (Total Runoff)	730,809.3 gal

Calculation Messages

Time (hours)	Message

As Built 2008 Basin-100 year event

<General>			
ID	54	Notes	
Label	As Built 2008 Basin-100 year event	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>	
Scaled Area	4,793.817 ft²

Geometry

X (ft)	Y (ft)
977,262.59	1,291,938.14
977,269.67	1,291,806.87
977,304.25	1,291,806.09
977,301.11	1,291,937.35

Active Topology	
Is Active?	True

Infiltration/Inflow & Seepage	
Pond Seepage Method	None

Inflow (Wet) Collection

Physical	
Volume Type	Elevation-Area

Elevation-Area

Elevation (ft)	Area (ft²)	Percent Void Space (%)
723.00	0.000	100.0
726.00	6,400.000	100.0
727.00	10,400.000	100.0

Simulation Initial Condition	
Initial Elevation Type	Invert

Results (Engine Parsing)	
Branch	1

Results (Extended Node)

As Built 2008 Basin-100 year event

Results (Extended Node)			
Volume	0.0 gal	Freeboard Height	4.0 ft
Depth (Flooding)	-4.00 ft		

Results (Flow)			
Flow (Total In)	0.00 cfs	Local Inflow?	False
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs

Results			
Is Overflowing?	False	Time to Maximum Outflow	12.100 hours
Is Ever Overflowing?	False	Time to Maximum Inflow	12.100 hours
Depth (Node)	0.00 ft	Flow (Out to Links Maximum)	26.25 cfs
Hydraulic Grade	723.00 ft	Flow (Total In Maximum)	26.17 cfs
Time to Maximum Hydraulic Grade	12.050 hours	Flow (Overflow)	0.00 cfs
Hydraulic Grade (Maximum)	726.58 ft	Time to Maximum Storage	12.050 hours
Time to Maximum Overflow	0.000 hours	Storage (Maximum)	104,702.3 gal
Flow (Overflow Maximum)	0.00 cfs	Flow (Seepage loss)	0.00 cfs

Calculation Messages

Time (hours)	Message

As Built 2008 Basin Outlet Pipe_100 Year Event

<General>			
ID	86	Hyperlinks	<Collection: 0 items>
Label	As Built 2008 Basin Outlet Pipe_100 Year Event	Start Node	POS-1
Notes		Stop Node	CS-9

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,259.67	1,291,784.79
977,256.92	1,291,750.78

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	723.00 ft
Material	CMP	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.90 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	20.0 ft
Roughness Type	Single Roughness	Length (Unified)	20.0 ft
Manning's n	0.024	Slope (Calculated)	0.005 ft/ft
Use Local Conduit Description?	False		

As Built 2008 Basin Outlet Pipe_100 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.55 cfs

Results (Hydraulic Summary)			
Velocity	4.37 ft/s	Froude Number (Middle)	0.760
Capacity (Full Flow)	2.47 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	4.55 cfs	Velocity (Maximum Calculated)	4.37 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	79.1 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	1.05 ft	Hydraulic Grade	723.94 ft
Depth (Middle)	0.99 ft	Hydraulic Grade Line (Out)	723.94 ft
Depth (Out)	1.04 ft	Headloss	0.11 ft
Energy Grade Line (In)	724.32 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	724.24 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.21 ft	Cover (Average)	-0.70 ft
Hydraulic Grade Line (In)	724.05 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	False	Froude Number	0.760
Is Ever Surcharged?	False	Froude (Stop)	0.681

As Built 2008 Basin Outlet Pipe_100 Year Event

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	1.1 ft²
Hydraulic Grade (Maximum)	724.05 ft	Flow-Area (Middle)	1.0 ft²
Depth/Rise	79.1 %	Flow-Area (Stop)	1.1 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	0.9 ft
Velocity (In)	4.13 ft/s	Flow-Width (Middle)	1.0 ft
Velocity (Middle)	4.37 ft/s	Flow-Width (Stop)	0.9 ft
Velocity (Out)	4.17 ft/s	Flow (Start)	4.55 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	4.55 cfs
Froude (Start)	0.662	Flow (Stop)	4.55 cfs

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	4.13	4.55	724.05
10.00	4.37	4.55	723.94
20.00	4.17	4.55	723.94

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
1.05	0.9	1.1	False
0.99	1.0	1.0	False
1.04	0.9	1.1	False

Section Froude Number
0.662
0.760
0.681

Subdivision Outlet Channel - 2008 Conditions - 100 Year Event

<General>			
ID	116	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - 2008 Conditions - 100 Year Event	Start Node	CS-11
Notes		Stop Node	CS-12

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,283.50	1,291,695.21
977,301.64	1,291,682.31

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.55 cfs

Results (Hydraulic Summary)			
Velocity	5.03 ft/s	Area (Full Flow)	(N/A) ft²

Subdivision Outlet Channel - 2008 Conditions - 100 Year Event

Results (Maximum Values)			
Flow (Maximum)	4.55 cfs	Velocity (Maximum Calculated)	5.03 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	7.5 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.54 ft	Energy Grade Line (Out)	721.51 ft
Depth (Middle)	0.32 ft	Hydraulic Grade Line (In)	723.14 ft
Depth (Out)	0.35 ft	Hydraulic Grade	722.12 ft
Energy Grade Line (In)	723.59 ft	Hydraulic Grade Line (Out)	721.35 ft
Energy Grade Line (Middle)	722.52 ft	Headloss	1.79 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.8 ft²
Hydraulic Grade (Maximum)	723.14 ft	Flow-Area (Middle)	0.9 ft²
Depth/Rise	7.5 %	Flow-Area (Stop)	1.4 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.2 ft
Velocity (In)	5.37 ft/s	Flow-Width (Middle)	5.6 ft
Velocity (Middle)	5.03 ft/s	Flow-Width (Stop)	8.3 ft
Velocity (Out)	3.24 ft/s	Flow (Start)	4.55 cfs
Froude (Start)	1.824	Flow (Middle)	4.55 cfs
Froude Number	2.203	Flow (Stop)	4.55 cfs
Froude (Stop)	1.388		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	5.37	4.55	723.14
17.50	5.03	4.55	722.12
35.00	3.24	4.55	721.35

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.54	3.2	0.8	False
0.32	5.6	0.9	False

Subdivision Outlet Channel - 2008 Conditions - 100 Year Event

Sections Results

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.35	8.3	1.4	False

Section Froude Number
1.824
2.203
1.388

GIS Webmap Public Interface Champaign County, Illinois

NORTH

Date: Tuesday, July 26, 2016

CURRENT NORTH DRAINAGE AREA_50 YEAR EVENT

<General>

ID	61	Notes	
Label	CURRENT NORTH DRAINAGE AREA_50 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>

Scaled Area	129,180.675 ft²	Area (User Defined)	83,591.640 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,135.46	1,291,948.42
977,226.56	1,292,020.11
977,219.10	1,292,169.46
976,491.74	1,292,262.06
976,505.18	1,292,135.11
976,535.05	1,292,129.14

Active Topology

Is Active?	True

Catchment

Outflow Element	CURRENT BASIN

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	False

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.402 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

CURRENT NORTH DRAINAGE AREA_50 YEAR EVENT

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.011 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	526.0 ft	Slope	0.011 ft/ft
Is Paved?	True		

TR-55 Shallow Concentrated Flow			
Hydraulic Length	115.0 ft	Slope	0.011 ft/ft
Is Paved?	False		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	7.18 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	83,591.640 ft²	Volume (Total Runoff)	203,948.9 gal

Calculation Messages

Time (hours)	Message

CURRENT CENTRAL DRAINAGE AREA_ 50 YEAR EVENT

<General>

ID	62	Notes	
Label	CURRENT CENTRAL DRAINAGE AREA_ 50 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>

Scaled Area	104,726.679 ft²	Area (User Defined)	62,682.840 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,151.89	1,291,942.44
976,499.20	1,292,129.14
976,496.22	1,291,863.28
977,153.38	1,291,888.67
977,153.38	1,291,893.16

Active Topology

Is Active?	True

Catchment

Outflow Element	MH-2

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	False

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.385 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

TR-55 Sheet Flow

CURRENT CENTRAL DRAINAGE AREA_ 50 YEAR EVENT

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.012 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	555.0 ft	Slope	0.012 ft/ft
Is Paved?	False		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	5.49 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	62,682.840 ft²	Volume (Total Runoff)	152,954.2 gal

Calculation Messages

Time (hours)	Message

CURRENT SOUTH DRAINAGE AREA - 50 YEAR EVENT WITH PROPOSED SWALE

<General>			
ID	63	Notes	
Label	CURRENT SOUTH DRAINAGE AREA - 50 YEAR EVENT WITH PROPOSED SWALE	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	187,222.250 ft²	Area (User Defined)	86,423.040 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
976,494.72	1,291,851.34
976,493.23	1,291,579.51
977,193.71	1,291,624.32
977,190.72	1,291,888.67

Active Topology	
Is Active?	True

Catchment	
Outflow Element	H-1

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.374 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

CURRENT SOUTH DRAINAGE AREA - 50 YEAR EVENT WITH PROPOSED SWALE

Tc Data Collection

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.011 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	455.0 ft	Slope	0.011 ft/ft
Is Paved?	True		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	7.81 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	86,423.040 ft²	Volume (Total Runoff)	210,980.6 gal

Calculation Messages

Time (hours)	Message

CURRENT BACK YARD DA_ 50 YEAR EVENT

<General>			
ID	64	Notes	
Label	CURRENT BACK YARD DA_ 50 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	53,418.459 ft²	Area (User Defined)	25,351.920 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,222.08	1,292,136.60
977,231.04	1,292,005.17
977,157.86	1,291,945.43
977,160.85	1,291,900.62
977,202.67	1,291,900.62
977,204.16	1,291,622.82
977,322.15	1,291,640.75
977,296.76	1,292,142.58

Active Topology	
Is Active?	True

Catchment	
Outflow Element	CURRENT BASIN

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.360 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

CURRENT BACK YARD DA_ 50 YEAR EVENT

Tc Data Collection

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.009 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	123.0 ft	Slope	0.009 ft/ft
Is Paved?	False		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	2.32 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	25,351.920 ft²	Volume (Total Runoff)	61,923.7 gal

Calculation Messages

Time (hours)	Message

CURRENT PIPE FROM CUL-DE-SAC - 50 YEAR EVENT

<General>			
ID	73	Hyperlinks	<Collection: 0 items>
Label	CURRENT PIPE FROM CUL-DE-SAC - 50 YEAR EVENT	Start Node	H-1
Notes		Stop Node	MH-2

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,140.96	1,291,815.23
977,200.37	1,291,906.52

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 12.0 in
Size (Display)	(N/A)	Set Invert to Start?	True
Section Type	Circle	Invert (Start)	728.24 ft
Material	PVC	Set Invert to Stop?	True
Diameter	12.0 in	Invert (Stop)	726.03 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	109.0 ft
Roughness Type	Single Roughness	Length (Unified)	109.0 ft
Manning's n	0.010	Slope (Calculated)	0.020 ft/ft
Use Local Conduit Description?	False		

CURRENT PIPE FROM CUL-DE-SAC - 50 YEAR EVENT

Physical

Physical (Control Structure)

Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)

Is Culvert?	False

Tractive Stress

Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)

Branch	1

Results (Flow)

Flow	0.00 cfs

Results (Hydraulic Summary)

Velocity	0.00 ft/s	Froude Number (Middle)	0.000
Capacity (Full Flow)	6.59 cfs	Area (Full Flow)	0.8 ft²

Results (Maximum Values)

Flow (Maximum)	4.09 cfs	Velocity (Maximum Calculated)	8.78 ft/s
Time (Maximum Flow)	12.050 hours	Depth (Maximum) / Rise	57.3 %
Time (Maximum Calculated Velocity)	12.050 hours		

Results (Profile)

Depth (In)	0.00 ft	Hydraulic Grade	727.14 ft
Depth (Middle)	0.00 ft	Hydraulic Grade Line (Out)	726.03 ft
Depth (Out)	0.00 ft	Headloss	2.21 ft
Energy Grade Line (In)	728.24 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	727.14 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	726.03 ft	Cover (Average)	0.16 ft
Hydraulic Grade Line (In)	728.24 ft		

Results (Tractive Stress)

Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results

Is Surcharged?	False	Froude Number	0.000

CURRENT PIPE FROM CUL-DE-SAC - 50 YEAR EVENT

Results

Is Ever Surcharged?	False	Froude (Stop)	0.000
Time to Maximum Hydraulic Grade	12.050 hours	Flow-Area (Start)	0.0 ft²
Hydraulic Grade (Maximum)	728.81 ft	Flow-Area (Middle)	0.0 ft²
Depth/Rise	0.0 %	Flow-Area (Stop)	0.0 ft²
Rise (Unified)	1.00 ft	Flow-Width (Start)	0.2 ft
Velocity (In)	0.00 ft/s	Flow-Width (Middle)	0.2 ft
Velocity (Middle)	0.00 ft/s	Flow-Width (Stop)	0.2 ft
Velocity (Out)	0.00 ft/s	Flow (Start)	0.00 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	0.00 cfs
Froude (Start)	0.000	Flow (Stop)	0.00 cfs

Calculation Messages

Time (hours)	Message
(N/A)	The upstream connected headwall's culvert coefficients data is ignored because the conduit link is not set as a culvert.
0.000	A supercritical to subcritical transition is occuring for this element.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	0.00	0.00	728.24
54.50	0.00	0.00	727.14
109.00	0.00	0.00	726.03

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.00	0.2	0.0	False
0.00	0.2	0.0	False
0.00	0.2	0.0	False

Section Froude Number
0.000
0.000
0.000

PROPOSED SWALE - 50 YEAR EVENT

<General>			
ID	91	Hyperlinks	<Collection: 0 items>
Label	PROPOSED SWALE - 50 YEAR EVENT	Start Node	CS-3
Notes		Stop Node	O-6

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,169.16	1,291,862.37
977,205.91	1,291,919.84

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	726.92 ft	Length (User Defined)	65.0 ft
Set Invert to Stop?	True	Length (Unified)	65.0 ft
Invert (Stop)	725.60 ft	Slope (Calculated)	0.020 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	3

Results (Flow)	
Flow	0.00 cfs

Results (Hydraulic Summary)			
Velocity	0.00 ft/s	Area (Full Flow)	(N/A) ft²

Results (Maximum Values)			
Flow (Maximum)	3.81 cfs	Velocity (Maximum Calculated)	2.93 ft/s
Time (Maximum Flow)	12.100 hours	Depth (Maximum) / Rise	114.1 %
Time (Maximum Calculated Velocity)	12.100 hours		

PROPOSED SWALE - 50 YEAR EVENT

Results (Maximum Values)

Results (Profile)

Depth (In)	0.00 ft	Energy Grade Line (Out)	725.60 ft
Depth (Middle)	0.00 ft	Hydraulic Grade Line (In)	726.92 ft
Depth (Out)	0.00 ft	Hydraulic Grade	726.26 ft
Energy Grade Line (In)	726.92 ft	Hydraulic Grade Line (Out)	725.60 ft
Energy Grade Line (Middle)	726.26 ft	Headloss	1.32 ft

Results (Tractive Stress)

Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results

Time to Maximum Hydraulic Grade	12.100 hours	Flow-Area (Start)	0.0 ft²
Hydraulic Grade (Maximum)	727.49 ft	Flow-Area (Middle)	0.0 ft²
Depth/Rise	0.0 %	Flow-Area (Stop)	0.0 ft²
Rise (Unified)	0.50 ft	Flow-Width (Start)	0.1 ft
Velocity (In)	0.00 ft/s	Flow-Width (Middle)	0.1 ft
Velocity (Middle)	0.00 ft/s	Flow-Width (Stop)	0.1 ft
Velocity (Out)	0.00 ft/s	Flow (Start)	0.00 cfs
Froude (Start)	0.000	Flow (Middle)	0.00 cfs
Froude Number	0.000	Flow (Stop)	0.00 cfs
Froude (Stop)	0.000		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	0.00	0.00	726.92
32.50	0.00	0.00	726.26
65.00	0.00	0.00	725.60

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.00	0.1	0.0	False
0.00	0.1	0.0	False
0.00	0.1	0.0	False

Section Froude Number
0.000
0.000
0.000

CURRENT BASIN - 50 YEAR EVENT

<General>			
ID	65	Notes	
Label	CURRENT BASIN - 50 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>	
Scaled Area	26,345.626 ft²

Geometry

X (ft)	Y (ft)
977,305.72	1,291,967.83
977,317.67	1,291,727.37
977,455.08	1,291,754.26
977,387.87	1,291,979.78

Active Topology	
Is Active?	True

Infiltration/Inflow & Seepage	
Pond Seepage Method	None

Inflow (Wet) Collection

Physical	
Volume Type	Elevation-Area

Elevation-Area

Elevation (ft)	Area (ft²)	Percent Void Space (%)
724.40	0.000	100.0
725.00	629.020	100.0
726.00	3,371.780	100.0
726.30	4,158.200	100.0
727.00	6,660.000	100.0

Simulation Initial Condition	
Initial Elevation Type	Invert

Results (Engine Parsing)	
Branch	1

CURRENT BASIN - 50 YEAR EVENT

Results (Engine Parsing)			

Results (Extended Node)			
Volume	0.0 gal	Freeboard Height	2.6 ft
Depth (Flooding)	-2.60 ft		

Results (Flow)			
Flow (Total In)	0.04 cfs	Local Inflow?	False
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs

Results			
Is Overflowing?	False	Time to Maximum Outflow	12.150 hours
Is Ever Overflowing?	False	Time to Maximum Inflow	12.100 hours
Depth (Node)	0.00 ft	Flow (Out to Links Maximum)	22.25 cfs
Hydraulic Grade	724.40 ft	Flow (Total In Maximum)	21.99 cfs
Time to Maximum Hydraulic Grade	12.100 hours	Flow (Overflow)	0.00 cfs
Hydraulic Grade (Maximum)	726.53 ft	Time to Maximum Storage	12.100 hours
Time to Maximum Overflow	0.000 hours	Storage (Maximum)	32,510.3 gal
Flow (Overflow Maximum)	0.00 cfs	Flow (Seepage loss)	0.00 cfs

Calculation Messages

Time (hours)	Message

Current Basin Outlet Pipe - 50 Year Event

<General>			
ID	123	Hyperlinks	<Collection: 0 items>
Label	Current Basin Outlet Pipe - 50 Year Event	Start Node	POS-2
Notes		Stop Node	CS-5

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,384.87	1,291,750.09
977,392.32	1,291,578.65

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	724.40 ft
Material	PVC	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.62 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	94.0 ft
Roughness Type	Single Roughness	Length (Unified)	94.0 ft
Manning's n	0.010	Slope (Calculated)	0.019 ft/ft
Use Local Conduit Description?	False		

Current Basin Outlet Pipe - 50 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	7.10 cfs

Results (Hydraulic Summary)			
Velocity	9.86 ft/s	Froude Number (Middle)	2.279
Capacity (Full Flow)	11.56 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	7.10 cfs	Velocity (Maximum Calculated)	9.86 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	56.8 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.71 ft	Hydraulic Grade	724.22 ft
Depth (Middle)	0.71 ft	Hydraulic Grade Line (Out)	724.05 ft
Depth (Out)	1.25 ft	Headloss	1.06 ft
Energy Grade Line (In)	726.62 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	725.73 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.57 ft	Cover (Average)	-1.25 ft
Hydraulic Grade Line (In)	725.11 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	True	Froude Number	2.279
Is Ever Surcharged?	True	Froude (Stop)	(N/A)

Current Basin Outlet Pipe - 50 Year Event

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.7 ft²
Hydraulic Grade (Maximum)	725.11 ft	Flow-Area (Middle)	0.7 ft²
Depth/Rise	56.8 %	Flow-Area (Stop)	1.2 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	1.2 ft
Velocity (In)	9.86 ft/s	Flow-Width (Middle)	1.2 ft
Velocity (Middle)	9.86 ft/s	Flow-Width (Stop)	0.0 ft
Velocity (Out)	5.78 ft/s	Flow (Start)	7.10 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	7.10 cfs
Froude (Start)	2.279	Flow (Stop)	7.10 cfs

Calculation Messages

Time (hours)	Message
11.800	Conduit is operating under pressure.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	9.86	7.10	725.11
47.00	9.86	7.10	724.22
94.00	5.78	7.10	724.05

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.71	1.2	0.7	False
0.71	1.2	0.7	False
1.25	0.0	1.2	True

Section Froude Number
2.279
2.279
(N/A)

Proposed Basin Outlet Pipe - 50 Year Event

<General>			
ID	123	Hyperlinks	<Collection: 0 items>
Label	Proposed Basin Outlet Pipe - 50 Year Event	Start Node	POS-2
Notes		Stop Node	CS-5

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,384.87	1,291,750.09
977,392.32	1,291,578.65

Active Topology			
Is Active?	True		

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output			
Output Options	Summary Results		

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	724.40 ft
Material	PVC	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.62 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	94.0 ft
Roughness Type	Single Roughness	Length (Unified)	94.0 ft
Manning's n	0.010	Slope (Calculated)	0.019 ft/ft
Use Local Conduit Description?	False		

Proposed Basin Outlet Pipe - 50 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.77 cfs

Results (Hydraulic Summary)			
Velocity	9.04 ft/s	Froude Number (Middle)	2.445
Capacity (Full Flow)	11.56 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	4.77 cfs	Velocity (Maximum Calculated)	9.04 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	44.5 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.56 ft	Hydraulic Grade	724.07 ft
Depth (Middle)	0.56 ft	Hydraulic Grade Line (Out)	723.94 ft
Depth (Out)	1.25 ft	Headloss	1.02 ft
Energy Grade Line (In)	726.20 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	725.33 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.18 ft	Cover (Average)	-1.25 ft
Hydraulic Grade Line (In)	724.96 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	True	Froude Number	2.445
Is Ever Surcharged?	True	Froude (Stop)	(N/A)

Proposed Basin Outlet Pipe - 50 Year Event

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.5 ft²
Hydraulic Grade (Maximum)	724.96 ft	Flow-Area (Middle)	0.5 ft²
Depth/Rise	44.5 %	Flow-Area (Stop)	1.2 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	1.2 ft
Velocity (In)	8.92 ft/s	Flow-Width (Middle)	1.2 ft
Velocity (Middle)	9.04 ft/s	Flow-Width (Stop)	0.0 ft
Velocity (Out)	3.88 ft/s	Flow (Start)	4.77 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	4.77 cfs
Froude (Start)	2.398	Flow (Stop)	4.77 cfs

Calculation Messages

Time (hours)	Message
11.850	Conduit is operating under pressure.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	8.92	4.77	724.96
47.00	9.04	4.77	724.07
94.00	3.88	4.77	723.94

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.56	1.2	0.5	False
0.56	1.2	0.5	False
1.25	0.0	1.2	True

Section Froude Number
2.398
2.445
(N/A)

Subdivision Outlet Channel - Current Conditions - 50 Year Event

<General>			
ID	106	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - Current Conditions - 50 Year Event	Start Node	CS-7
Notes		Stop Node	CS-8

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,450.36	1,291,500.83
977,471.72	1,291,488.74

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	7.10 cfs

Results (Hydraulic Summary)			
Velocity	6.08 ft/s	Area (Full Flow)	(N/A) ft²

Subdivision Outlet Channel - Current Conditions - 50 Year Event

Results (Maximum Values)			
Flow (Maximum)	7.10 cfs	Velocity (Maximum Calculated)	6.08 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	8.6 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.62 ft	Energy Grade Line (Out)	721.62 ft
Depth (Middle)	0.37 ft	Hydraulic Grade Line (In)	723.22 ft
Depth (Out)	0.42 ft	Hydraulic Grade	722.17 ft
Energy Grade Line (In)	723.85 ft	Hydraulic Grade Line (Out)	721.42 ft
Energy Grade Line (Middle)	722.75 ft	Headloss	1.79 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	1.1 ft²
Hydraulic Grade (Maximum)	723.22 ft	Flow-Area (Middle)	1.2 ft²
Depth/Rise	8.6 %	Flow-Area (Stop)	2.0 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.6 ft
Velocity (In)	6.39 ft/s	Flow-Width (Middle)	6.3 ft
Velocity (Middle)	6.08 ft/s	Flow-Width (Stop)	10.1 ft
Velocity (Out)	3.60 ft/s	Flow (Start)	7.10 cfs
Froude (Start)	2.028	Flow (Middle)	7.10 cfs
Froude Number	2.486	Flow (Stop)	7.10 cfs
Froude (Stop)	1.434		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	6.39	7.10	723.22
17.50	6.08	7.10	722.17
35.00	3.60	7.10	721.42

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.62	3.6	1.1	False
0.37	6.3	1.2	False

Subdivision Outlet Channel - Current Conditions - 50 Year Event

Sections Results

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.42	10.1	2.0	False

Section Froude Number
2.028
2.486
1.434

Subdivision Outlet Channel - Proposed Conditions - 50 Year Event

<General>			
ID	106	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - Proposed Conditions - 50 Year Event	Start Node	CS-7
Notes		Stop Node	CS-8

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,450.36	1,291,500.83
977,471.72	1,291,488.74

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.77 cfs

Results (Hydraulic Summary)			
Velocity	5.21 ft/s	Area (Full Flow)	(N/A) ft²

Results (Maximum Values)			
Flow (Maximum)	4.77 cfs	Velocity (Maximum Calculated)	5.21 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	7.6 %

Subdivision Outlet Channel - Proposed Conditions - 50 Year Event

Results (Maximum Values)	
Time (Maximum Calculated Velocity)	12.150 hours

Results (Profile)			
Depth (In)	0.54 ft	Energy Grade Line (Out)	721.53 ft
Depth (Middle)	0.33 ft	Hydraulic Grade Line (In)	723.14 ft
Depth (Out)	0.36 ft	Hydraulic Grade	722.13 ft
Energy Grade Line (In)	723.61 ft	Hydraulic Grade Line (Out)	721.36 ft
Energy Grade Line (Middle)	722.55 ft	Headloss	1.78 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.9 ft²
Hydraulic Grade (Maximum)	723.14 ft	Flow-Area (Middle)	0.9 ft²
Depth/Rise	7.6 %	Flow-Area (Stop)	1.4 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.2 ft
Velocity (In)	5.50 ft/s	Flow-Width (Middle)	5.6 ft
Velocity (Middle)	5.21 ft/s	Flow-Width (Stop)	8.3 ft
Velocity (Out)	3.29 ft/s	Flow (Start)	4.77 cfs
Froude (Start)	1.861	Flow (Middle)	4.77 cfs
Froude Number	2.267	Flow (Stop)	4.77 cfs
Froude (Stop)	1.390		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	5.50	4.77	723.14
17.50	5.21	4.77	722.13
35.00	3.29	4.77	721.36

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.54	3.2	0.9	False
0.33	5.6	0.9	False
0.36	8.3	1.4	False

Section Froude Number
1.861
2.267
1.390

CURRENT NORTH DRAINAGE AREA_100 YEAR EVENT

<General>

ID	61	Notes	
Label	CURRENT NORTH DRAINAGE AREA_100 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>

Scaled Area	129,180.675 ft²	Area (User Defined)	83,591.640 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,135.46	1,291,948.42
977,226.56	1,292,020.11
977,219.10	1,292,169.46
976,491.74	1,292,262.06
976,505.18	1,292,135.11
976,535.05	1,292,129.14

Active Topology

Is Active?	True

Catchment

Outflow Element	PROP BASIN (LOWER OUTLET) - 100 YEAR EVENT

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	False

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.402 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear

CURRENT NORTH DRAINAGE AREA_100 YEAR EVENT

Runoff			
SCS CN (Composite)	83.000		
Tc Data Collection			
TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.011 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in
TR-55 Shallow Concentrated Flow			
Hydraulic Length	526.0 ft	Slope	0.011 ft/ft
Is Paved?	True		
TR-55 Shallow Concentrated Flow			
Hydraulic Length	115.0 ft	Slope	0.011 ft/ft
Is Paved?	False		
Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in
Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		
Results (Maximum Values)			
Flow (Maximum)	8.47 cfs	Time (Maximum Flow)	12.100 hours
Results			
Area (Unified)	83,591.640 ft²	Volume (Total Runoff)	241,673.1 gal

Calculation Messages

Time (hours)	Message

CURRENT CENTRAL DRAINAGE AREA_ 100 YEAR EVENT

<General>

ID	62	Notes	
Label	CURRENT CENTRAL DRAINAGE AREA_ 100 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>

Scaled Area	104,726.679 ft²	Area (User Defined)	62,682.840 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,151.89	1,291,942.44
976,499.20	1,292,129.14
976,496.22	1,291,863.28
977,153.38	1,291,888.67
977,153.38	1,291,893.16

Active Topology

Is Active?	True

Catchment

Outflow Element	MH-2

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	False

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.385 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

TR-55 Sheet Flow

CURRENT CENTRAL DRAINAGE AREA_ 100 YEAR EVENT

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.012 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	555.0 ft	Slope	0.012 ft/ft
Is Paved?	False		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	6.47 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	62,682.840 ft²	Volume (Total Runoff)	181,245.5 gal

Calculation Messages

Time (hours)	Message

CURRENT BACK YARD DA_100 YEAR EVENT

<General>

ID	64	Notes	
Label	CURRENT BACK YARD DA_100 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>

Scaled Area	53,418.459 ft²	Area (User Defined)	25,351.920 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
977,222.08	1,292,136.60
977,231.04	1,292,005.17
977,157.86	1,291,945.43
977,160.85	1,291,900.62
977,202.67	1,291,900.62
977,204.16	1,291,622.82
977,322.15	1,291,640.75
977,296.76	1,292,142.58

Active Topology

Is Active?	True

Catchment

Outflow Element	PROP BASIN (LOWER OUTLET) - 100 YEAR EVENT

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	False

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.360 hours

CURRENT BACK YARD DA_100 YEAR EVENT

Runoff			
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection			
TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.009 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in
TR-55 Shallow Concentrated Flow			
Hydraulic Length	123.0 ft	Slope	0.009 ft/ft
Is Paved?	False		
Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in
Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		
Results (Maximum Values)			
Flow (Maximum)	2.74 cfs	Time (Maximum Flow)	12.100 hours
Results			
Area (Unified)	25,351.920 ft²	Volume (Total Runoff)	73,376.4 gal

Calculation Messages

Time (hours)	Message

CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT

<General>			
ID	63	Notes	
Label	CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	187,222.250 ft²	Area (User Defined)	86,423.040 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
976,494.72	1,291,851.34
976,493.23	1,291,579.51
977,193.71	1,291,624.32
977,190.72	1,291,888.67

Active Topology	
Is Active?	True

Catchment	
Outflow Element	H-1

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.374 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

Tc Data Collection

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.011 ft/ft

CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT

TR-55 Sheet Flow			
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	455.0 ft	Slope	0.011 ft/ft
Is Paved?	True		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	9.21 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	86,423.040 ft²	Volume (Total Runoff)	249,991.5 gal

Calculation Messages

Time (hours)	Message

CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT WITH PROPOSED SWALE

<General>			
ID	63	Notes	
Label	CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT WITH PROPOSED SWALE	Hyperlinks	<Collection: 0 items>

GIS-IDs

GIS-ID

<Geometry>			
Scaled Area	187,222.250 ft²	Area (User Defined)	86,423.040 ft²
Use Scaled Area?	False		

Geometry

X (ft)	Y (ft)
976,494.72	1,291,851.34
976,493.23	1,291,579.51
977,193.71	1,291,624.32
977,190.72	1,291,888.67

Active Topology	
Is Active?	True

Catchment	
Outflow Element	H-1

Inflow (Wet) Collection

Rainfall	
Use Local Rainfall?	False

Runoff			
Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	Composite Tc
Loss Method	SCS CN	Time of Concentration (Composite)	0.374 hours
SCS CN	83.000	SCS Unit Hydrograph Method	Default Curvilinear
SCS CN (Composite)	83.000		

CURRENT SOUTH DRAINAGE AREA - 100 YEAR EVENT WITH PROPOSED SWALE

Tc Data Collection

TR-55 Sheet Flow			
Hydraulic Length	100.0 ft	Slope	0.011 ft/ft
Manning's n	0.240	2 Year 24 Hour Depth	3.0 in

TR-55 Shallow Concentrated Flow			
Hydraulic Length	455.0 ft	Slope	0.011 ft/ft
Is Paved?	True		

Results (Extended Catchment)			
Precipitation (Cumulative)	0.0 in	Precipitation (Incremental)	0.0 in

Results (Flow)			
Flow (Total Out)	0.00 cfs	Flow (Local from Inflow Collection)	0.00 cfs
Local Inflow?	False		

Results (Maximum Values)			
Flow (Maximum)	9.21 cfs	Time (Maximum Flow)	12.100 hours

Results			
Area (Unified)	86,423.040 ft²	Volume (Total Runoff)	249,991.5 gal

Calculation Messages

Time (hours)	Message

CURRENT PIPE FROM CUL-DE-SAC - 100 YEAR EVENT

<General>			
ID	73	Hyperlinks	<Collection: 0 items>
Label	CURRENT PIPE FROM CUL-DE-SAC - 100 YEAR EVENT	Start Node	H-1
Notes		Stop Node	MH-2

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,140.96	1,291,815.23
977,200.37	1,291,906.52

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 12.0 in
Size (Display)	(N/A)	Set Invert to Start?	True
Section Type	Circle	Invert (Start)	728.24 ft
Material	PVC	Set Invert to Stop?	True
Diameter	12.0 in	Invert (Stop)	726.03 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	109.0 ft
Roughness Type	Single Roughness	Length (Unified)	109.0 ft
Manning's n	0.010	Slope (Calculated)	0.020 ft/ft
Use Local Conduit Description?	False		

CURRENT PIPE FROM CUL-DE-SAC - 100 YEAR EVENT

Physical

Physical (Control Structure)

Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)

Is Culvert?	False

Tractive Stress

Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)

Branch	1

Results (Flow)

Flow	0.00 cfs

Results (Hydraulic Summary)

Velocity	0.00 ft/s	Froude Number (Middle)	0.000
Capacity (Full Flow)	6.59 cfs	Area (Full Flow)	0.8 ft²

Results (Maximum Values)

Flow (Maximum)	4.62 cfs	Velocity (Maximum Calculated)	9.03 ft/s
Time (Maximum Flow)	12.050 hours	Depth (Maximum) / Rise	62.0 %
Time (Maximum Calculated Velocity)	12.050 hours		

Results (Profile)

Depth (In)	0.00 ft	Hydraulic Grade	727.14 ft
Depth (Middle)	0.00 ft	Hydraulic Grade Line (Out)	726.03 ft
Depth (Out)	0.00 ft	Headloss	2.21 ft
Energy Grade Line (In)	728.24 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	727.14 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	726.03 ft	Cover (Average)	0.16 ft
Hydraulic Grade Line (In)	728.24 ft		

Results (Tractive Stress)

Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results

Is Surcharged?	False	Froude Number	0.000

CURRENT PIPE FROM CUL-DE-SAC - 100 YEAR EVENT

Results

Is Ever Surcharged?	False	Froude (Stop)	0.000
Time to Maximum Hydraulic Grade	12.000 hours	Flow-Area (Start)	0.0 ft²
Hydraulic Grade (Maximum)	728.86 ft	Flow-Area (Middle)	0.0 ft²
Depth/Rise	0.0 %	Flow-Area (Stop)	0.0 ft²
Rise (Unified)	1.00 ft	Flow-Width (Start)	0.2 ft
Velocity (In)	0.00 ft/s	Flow-Width (Middle)	0.2 ft
Velocity (Middle)	0.00 ft/s	Flow-Width (Stop)	0.2 ft
Velocity (Out)	0.00 ft/s	Flow (Start)	0.00 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	0.00 cfs
Froude (Start)	0.000	Flow (Stop)	0.00 cfs

Calculation Messages

Time (hours)	Message
(N/A)	The upstream connected headwall's culvert coefficients data is ignored because the conduit link is not set as a culvert.
0.000	A supercritical to subcritical transition is occuring for this element.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	0.00	0.00	728.24
54.50	0.00	0.00	727.14
109.00	0.00	0.00	726.03

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.00	0.2	0.0	False
0.00	0.2	0.0	False
0.00	0.2	0.0	False

Section Froude Number
0.000
0.000
0.000

PROPOSED SWALE - 100 YEAR EVENT

<General>			
ID	91	Hyperlinks	<Collection: 0 items>
Label	PROPOSED SWALE - 100 YEAR EVENT	Start Node	CS-3
Notes		Stop Node	O-6

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,169.16	1,291,862.37
977,205.91	1,291,919.84

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	726.92 ft	Length (User Defined)	65.0 ft
Set Invert to Stop?	True	Length (Unified)	65.0 ft
Invert (Stop)	725.60 ft	Slope (Calculated)	0.020 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	3

Results (Flow)	
Flow	0.00 cfs

Results (Hydraulic Summary)			
Velocity	0.00 ft/s	Area (Full Flow)	(N/A) ft²

Results (Maximum Values)			
Flow (Maximum)	4.69 cfs	Velocity (Maximum Calculated)	3.12 ft/s
Time (Maximum Flow)	12.100 hours	Depth (Maximum) / Rise	122.7 %
Time (Maximum Calculated Velocity)	12.100 hours		

PROPOSED SWALE - 100 YEAR EVENT

Results (Profile)			
Depth (In)	0.00 ft	Energy Grade Line (Out)	725.60 ft
Depth (Middle)	0.00 ft	Hydraulic Grade Line (In)	726.92 ft
Depth (Out)	0.00 ft	Hydraulic Grade	726.26 ft
Energy Grade Line (In)	726.92 ft	Hydraulic Grade Line (Out)	725.60 ft
Energy Grade Line (Middle)	726.26 ft	Headloss	1.32 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.100 hours	Flow-Area (Start)	0.0 ft²
Hydraulic Grade (Maximum)	727.53 ft	Flow-Area (Middle)	0.0 ft²
Depth/Rise	0.0 %	Flow-Area (Stop)	0.0 ft²
Rise (Unified)	0.50 ft	Flow-Width (Start)	0.1 ft
Velocity (In)	0.00 ft/s	Flow-Width (Middle)	0.1 ft
Velocity (Middle)	0.00 ft/s	Flow-Width (Stop)	0.1 ft
Velocity (Out)	0.00 ft/s	Flow (Start)	0.00 cfs
Froude (Start)	0.000	Flow (Middle)	0.00 cfs
Froude Number	0.000	Flow (Stop)	0.00 cfs
Froude (Stop)	0.000		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	0.00	0.00	726.92
32.50	0.00	0.00	726.26
65.00	0.00	0.00	725.60

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.00	0.1	0.0	False
0.00	0.1	0.0	False
0.00	0.1	0.0	False

Section Froude Number
0.000
0.000
0.000

Current Basin Outlet Pipe - 100 Year Event

<General>			
ID	123	Hyperlinks	<Collection: 0 items>
Label	Current Basin Outlet Pipe - 100 Year Event	Start Node	POS-2
Notes		Stop Node	CS-5

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,384.87	1,291,750.09
977,392.32	1,291,578.65

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	724.40 ft
Material	PVC	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.62 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	94.0 ft
Roughness Type	Single Roughness	Length (Unified)	94.0 ft
Manning's n	0.010	Slope (Calculated)	0.019 ft/ft
Use Local Conduit Description?	False		

Current Basin Outlet Pipe - 100 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	7.15 cfs

Results (Hydraulic Summary)			
Velocity	9.87 ft/s	Froude Number (Middle)	2.276
Capacity (Full Flow)	11.56 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	7.15 cfs	Velocity (Maximum Calculated)	9.87 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	57.1 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.71 ft	Hydraulic Grade	724.22 ft
Depth (Middle)	0.71 ft	Hydraulic Grade Line (Out)	724.05 ft
Depth (Out)	1.25 ft	Headloss	1.06 ft
Energy Grade Line (In)	726.63 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	725.74 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.58 ft	Cover (Average)	-1.25 ft
Hydraulic Grade Line (In)	725.11 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	True	Froude Number	2.276
Is Ever Surcharged?	True	Froude (Stop)	(N/A)

Current Basin Outlet Pipe - 100 Year Event

Results			
Time to Maximum Hydraulic Grade	12.100 hours	Flow-Area (Start)	0.7 ft²
Hydraulic Grade (Maximum)	725.11 ft	Flow-Area (Middle)	0.7 ft²
Depth/Rise	57.1 %	Flow-Area (Stop)	1.2 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	1.2 ft
Velocity (In)	9.87 ft/s	Flow-Width (Middle)	1.2 ft
Velocity (Middle)	9.87 ft/s	Flow-Width (Stop)	0.0 ft
Velocity (Out)	5.82 ft/s	Flow (Start)	7.15 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	7.15 cfs
Froude (Start)	2.276	Flow (Stop)	7.15 cfs

Calculation Messages

Time (hours)	Message
11.750	Conduit is operating under pressure.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	9.87	7.15	725.11
47.00	9.87	7.15	724.22
94.00	5.82	7.15	724.05

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.71	1.2	0.7	False
0.71	1.2	0.7	False
1.25	0.0	1.2	True

Section Froude Number
2.276
2.276
(N/A)

Proposed Basin Outlet Pipe - 100 Year Event

<General>			
ID	123	Hyperlinks	<Collection: 0 items>
Label	Proposed Basin Outlet Pipe - 100 Year Event	Start Node	POS-2
Notes		Stop Node	CS-5

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,384.87	1,291,750.09
977,392.32	1,291,578.65

Active Topology	
Is Active?	True

Headlosses			
Entrance Loss Coefficient	0.000	Contraction Loss Coefficient	0.000
Exit Loss Coefficient	0.000	Average Loss Coefficient	0.000
Expansion Loss Coefficient	0.000		

Infiltration/Inflow & Seepage			
Infiltration Load Type	None	Flow (Additional Infiltration)	0.00 cfs

Output	
Output Options	Summary Results

Physical			
Conduit Type	User Defined Conduit	Conduit Description	Circle - 15.0 in
Size (Display)	(N/A)	Set Invert to Start?	False
Section Type	Circle	Invert (Start)	724.40 ft
Material	PVC	Set Invert to Stop?	True
Diameter	15.0 in	Invert (Stop)	722.62 ft
Wall Thickness	0.3 in	Has User Defined Length?	True
Number of Barrels	1	Length (User Defined)	94.0 ft
Roughness Type	Single Roughness	Length (Unified)	94.0 ft
Manning's n	0.010	Slope (Calculated)	0.019 ft/ft
Use Local Conduit Description?	False		

Proposed Basin Outlet Pipe - 100 Year Event

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Physical (Culvert)	
Is Culvert?	False

Tractive Stress	
Use Local Minimum Tractive Stress?	False

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.80 cfs

Results (Hydraulic Summary)			
Velocity	9.04 ft/s	Froude Number (Middle)	2.441
Capacity (Full Flow)	11.56 cfs	Area (Full Flow)	1.2 ft²

Results (Maximum Values)			
Flow (Maximum)	4.80 cfs	Velocity (Maximum Calculated)	9.04 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	44.7 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.56 ft	Hydraulic Grade	724.07 ft
Depth (Middle)	0.56 ft	Hydraulic Grade Line (Out)	723.95 ft
Depth (Out)	1.25 ft	Headloss	1.02 ft
Energy Grade Line (In)	726.20 ft	Cover (Minimum)	(N/A) ft
Energy Grade Line (Middle)	725.34 ft	Minimum Cover Distance Along Pipe	(N/A) ft
Energy Grade Line (Out)	724.18 ft	Cover (Average)	-1.25 ft
Hydraulic Grade Line (In)	724.96 ft		

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Is Surcharged?	True	Froude Number	2.441
Is Ever Surcharged?	True	Froude (Stop)	(N/A)

Proposed Basin Outlet Pipe - 100 Year Event

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.5 ft²
Hydraulic Grade (Maximum)	724.96 ft	Flow-Area (Middle)	0.5 ft²
Depth/Rise	44.7 %	Flow-Area (Stop)	1.2 ft²
Rise (Unified)	1.25 ft	Flow-Width (Start)	1.2 ft
Velocity (In)	8.93 ft/s	Flow-Width (Middle)	1.2 ft
Velocity (Middle)	9.04 ft/s	Flow-Width (Stop)	0.0 ft
Velocity (Out)	3.91 ft/s	Flow (Start)	4.80 cfs
Flow (Roadway Overtopping)	(N/A) cfs	Flow (Middle)	4.80 cfs
Froude (Start)	2.397	Flow (Stop)	4.80 cfs

Calculation Messages

Time (hours)	Message
11.800	Conduit is operating under pressure.

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	8.93	4.80	724.96
47.00	9.04	4.80	724.07
94.00	3.91	4.80	723.95

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.56	1.2	0.5	False
0.56	1.2	0.5	False
1.25	0.0	1.2	True

Section Froude Number
2.397
2.441
(N/A)

Subdivision Outlet Channel - Current Conditions - 100 Year Event

<General>			
ID	106	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - Current Conditions - 100 Year Event	Start Node	CS-7
Notes		Stop Node	CS-8

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,450.36	1,291,500.83
977,471.72	1,291,488.74

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	7.15 cfs

Results (Hydraulic Summary)			
Velocity	6.09 ft/s	Area (Full Flow)	(N/A) ft²

Subdivision Outlet Channel - Current Conditions - 100 Year Event

Results (Maximum Values)			
Flow (Maximum)	7.15 cfs	Velocity (Maximum Calculated)	6.09 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	8.7 %
Time (Maximum Calculated Velocity)	12.150 hours		

Results (Profile)			
Depth (In)	0.62 ft	Energy Grade Line (Out)	721.62 ft
Depth (Middle)	0.37 ft	Hydraulic Grade Line (In)	723.22 ft
Depth (Out)	0.42 ft	Hydraulic Grade	722.17 ft
Energy Grade Line (In)	723.85 ft	Hydraulic Grade Line (Out)	721.42 ft
Energy Grade Line (Middle)	722.75 ft	Headloss	1.80 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	1.1 ft²
Hydraulic Grade (Maximum)	723.22 ft	Flow-Area (Middle)	1.2 ft²
Depth/Rise	8.7 %	Flow-Area (Stop)	2.0 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.6 ft
Velocity (In)	6.40 ft/s	Flow-Width (Middle)	6.3 ft
Velocity (Middle)	6.09 ft/s	Flow-Width (Stop)	10.1 ft
Velocity (Out)	3.61 ft/s	Flow (Start)	7.15 cfs
Froude (Start)	2.031	Flow (Middle)	7.15 cfs
Froude Number	2.489	Flow (Stop)	7.15 cfs
Froude (Stop)	1.436		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	6.40	7.15	723.22
17.50	6.09	7.15	722.17
35.00	3.61	7.15	721.42

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.62	3.6	1.1	False
0.37	6.3	1.2	False

Subdivision Outlet Channel - Current Conditions - 100 Year Event

Sections Results

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?	Section Froude Number
0.42	10.1	2.0	False	2.031
				2.489
				1.436

Subdivision Outlet Channel - Proposed Conditions - 100 Year Event

<General>			
ID	106	Hyperlinks	<Collection: 0 items>
Label	Subdivision Outlet Channel - Proposed Conditions - 100 Year Event	Start Node	CS-7
Notes		Stop Node	CS-8

GIS-IDs

GIS-ID

Geometry

X (ft)	Y (ft)
977,450.36	1,291,500.83
977,471.72	1,291,488.74

Active Topology	
Is Active?	True

Output	
Output Options	Summary Results

Physical			
Set Invert to Start?	True	Has User Defined Length?	True
Invert (Start)	722.60 ft	Length (User Defined)	35.0 ft
Set Invert to Stop?	True	Length (Unified)	35.0 ft
Invert (Stop)	721.00 ft	Slope (Calculated)	0.046 ft/ft

Physical (Control Structure)			
Flap Gate?	False	Has Stop Control Structure?	False
Has Start Control Structure?	False		

Results (Engine Parsing)	
Branch	2

Results (Flow)	
Flow	4.80 cfs

Results (Hydraulic Summary)			
Velocity	5.23 ft/s	Area (Full Flow)	(N/A) ft²

Results (Maximum Values)			
Flow (Maximum)	4.80 cfs	Velocity (Maximum Calculated)	5.23 ft/s
Time (Maximum Flow)	12.150 hours	Depth (Maximum) / Rise	7.7 %

Subdivision Outlet Channel - Proposed Conditions - 100 Year Event

Results (Maximum Values)	
Time (Maximum Calculated Velocity)	12.150 hours

Results (Profile)			
Depth (In)	0.54 ft	Energy Grade Line (Out)	721.53 ft
Depth (Middle)	0.33 ft	Hydraulic Grade Line (In)	723.14 ft
Depth (Out)	0.36 ft	Hydraulic Grade	722.13 ft
Energy Grade Line (In)	723.62 ft	Hydraulic Grade Line (Out)	721.36 ft
Energy Grade Line (Middle)	722.55 ft	Headloss	1.78 ft

Results (Tractive Stress)			
Hydraulic Radius (Normal)	0.0 ft	Is Tractive Stress Target Exceeded?	False
Is Tractive Stress Target Ever Exceeded?	False	Tractive Stress (Calculated)	0.000 lbs/ft²

Results			
Time to Maximum Hydraulic Grade	12.150 hours	Flow-Area (Start)	0.9 ft²
Hydraulic Grade (Maximum)	723.14 ft	Flow-Area (Middle)	0.9 ft²
Depth/Rise	7.7 %	Flow-Area (Stop)	1.5 ft²
Rise (Unified)	4.30 ft	Flow-Width (Start)	3.2 ft
Velocity (In)	5.52 ft/s	Flow-Width (Middle)	5.6 ft
Velocity (Middle)	5.23 ft/s	Flow-Width (Stop)	8.3 ft
Velocity (Out)	3.30 ft/s	Flow (Start)	4.80 cfs
Froude (Start)	1.864	Flow (Middle)	4.80 cfs
Froude Number	2.271	Flow (Stop)	4.80 cfs
Froude (Stop)	1.395		

Calculation Messages

Time (hours)	Message

Sections Results

Section Distance (ft)	Section Velocity (ft/s)	Section Flow (cfs)	Section Hydraulic Grade (ft)
0.00	5.52	4.80	723.14
17.50	5.23	4.80	722.13
35.00	3.30	4.80	721.36

Section Depth (ft)	Section Flow-Width (ft)	Section Flow-Area (ft²)	Section Is Overflowing?
0.54	3.2	0.9	False
0.33	5.6	0.9	False
0.36	8.3	1.5	False

Section Froude Number
1.864
2.271
1.395