

PRELIMINARY DRAINAGE REPORT

PROJECT:
Heritage South
Franklin, Indiana



DESIGN ENGINEER:

Brian D. Fisher, P.E.
The Schneider Corporation
8901 Otis Avenue
Indianapolis, IN 46216-1037
317-826-7145

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Historic Fort Harrison, 8901 Otis Avenue, Indianapolis, Indiana 46216
Phone - 317.826.7100 Fax - 317.826.7200
www.schneidercorp.com contact@schneidercorp.com

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DRAINAGE NARRATIVE

Project Background:

This is a preliminary drainage study for Heritage South Subdivision consisting of approximately 14.95 acres west of Hurricane Road and directly south of Heritage Section 2. The purpose of the study is to identify the existing and proposed drainage basins and provide preliminary sizing of the detention basin to serve the subdivision.

Terrain and existing ground condition:

The project area is agricultural and consists of four (4) predeveloped watersheds ranging from 1.57 acres to 6.94 acres in size and varying in elevation from 741 in the southwest corner to 750 near the center of the parcel along the east edge. One (1) predeveloped watershed outlets to the northeast. The remaining three (3) predeveloped watersheds outlet to the south. Two (2) small offsite drainage areas drain unto the site from the south. Offsite area 1 consists of 0.21 acres and offsite area 2 consists of 0.09 acres. A Drainage Basins – Predeveloped Exhibit is included in the Existing Conditions section of this report.

Adjoining land conditions:

North Parcel:

North:	Heritage Subdivision previous sections.
South:	Industrial Park
East:	Hurricane Road and Golf Course
West:	Agricultural

Soil types:

Soils maps from the United States Department of Agriculture, Soil Conservation Service identify Brookston, Miami, and Crosby soils on the subject site. Brookston soils (Br), are a part of hydrologic group B/D, while Crosby soils (CrA) (CsB2) are part of hydrologic group C/D. Miami soils (MmB2), (MtC3) are part of hydrologic group C.

Overall Drainage Design:

The City of Franklin Subdivision Control Ordinance has requirements regarding stormwater quantity and quality. The requirements for developed release rates are as follows:

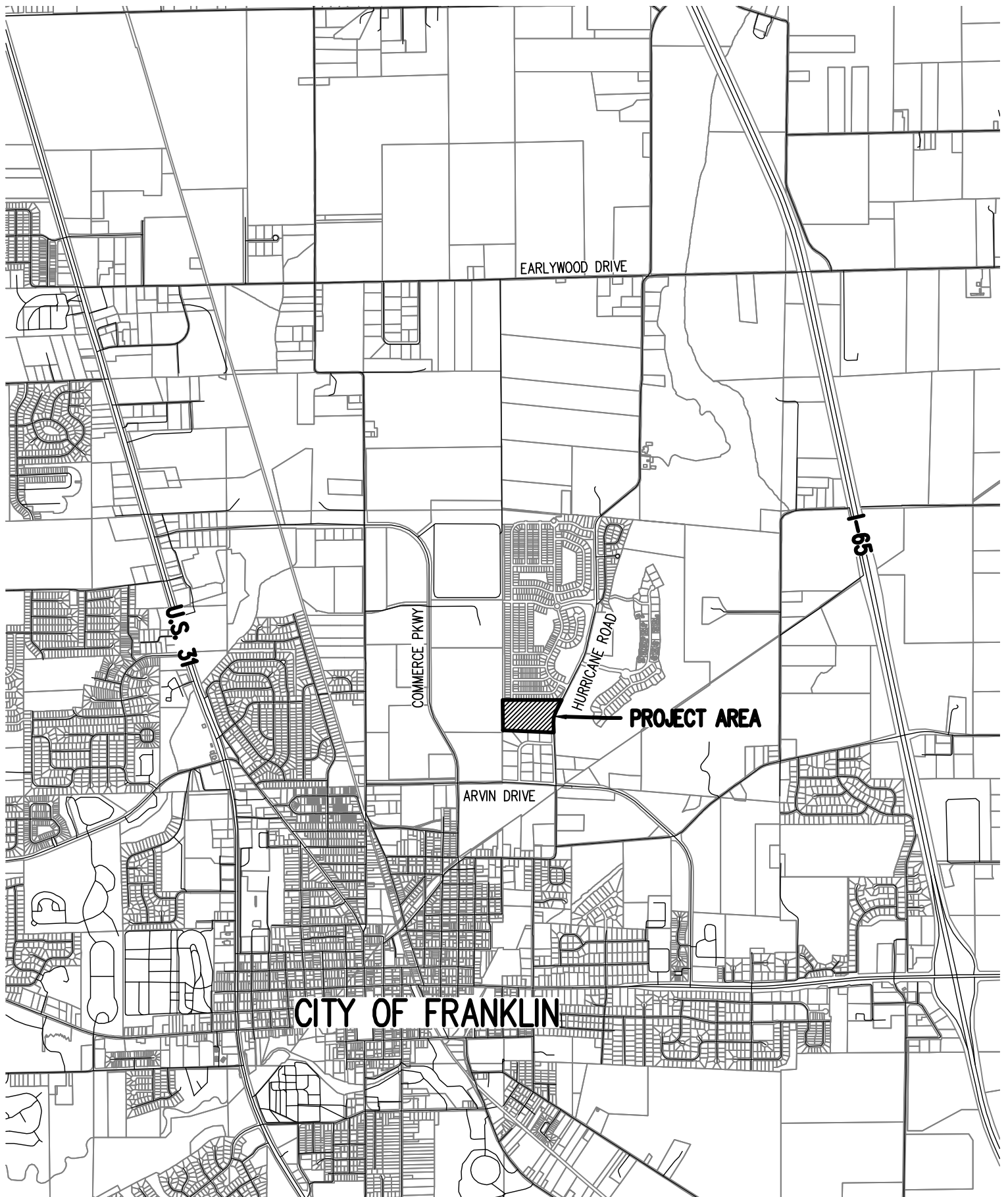
- The post-developed 10-year release rates shall not exceed the pre-developed 2-year release rates.
- The post developed 100-year release rates shall not exceed the pre-developed 10-year release rates.

The table below shows the allowable release rates for various storm events compared with proposed conditions.

PRE 4 Drainage Basin Runoff Release Summary			
	Pre-Development Peak Runoff	Allowable Release Rate	Proposed Release Rate
Event	Total Runoff	Total Runoff	Total Runoff
2-year	3.71 cfs	---	2.49 cfs
10-year	8.26 cfs	3.71 cfs	3.44 cfs
100-year	17.90 cfs	8.26 cfs	8.03 cfs

A 0.50 acre pond is proposed to accept runoff from the 14.95 acre site, in addition to offsite runoff, and reduce release rates to the requirements shown above. The preliminary detention basin is designed with a normal pool elevation of 739.00. The preliminary outlet is a 15" pipe, with a 2-Yr/10-Yr 8" diameter orifice at 739.00 and a 100-Yr 18" x 6.5" orifice at 742.55. The 100-year, 12 hour storm results in a release rate of 8.03 cfs with a 100 year HWL elevation of 744.08 feet.

SITE MAPS



AREA MAP

SCALE: 1"=2500'

Soil Map—Johnson County, Indiana (Heritage South)



Soil Map—Johnson County, Indiana
(Heritage South)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Johnson County, Indiana

Survey Area Data: Version 26, Sep 7, 2018

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

Date(s) aerial images were photographed: Sep 24, 2014—Mar 20, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Br	Brookston silty clay loam, 0 to 2 percent slopes	3.4	23.8%
CrA	Crosby silt loam, fine-loamy subsoil, 0 to 2 percent slopes	8.0	55.3%
CsB2	Crosby-Miami silt loams, 2 to 4 percent slopes, eroded	1.2	8.1%
MnB2	Miami silt loam, 2 to 6 percent slopes, eroded	0.4	2.6%
MtC3	Miami clay loam, 6 to 12 percent slopes, severely eroded	1.5	10.2%
Totals for Area of Interest		14.4	100.0%

Johnson County, Indiana

Br—Brookston silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t98n

Elevation: 600 to 1,260 feet

Mean annual precipitation: 37 to 46 inches

Mean annual air temperature: 48 to 55 degrees F

Frost-free period: 145 to 180 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Brookston and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brookston

Setting

Landform: Till plains, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Linear, concave

Across-slope shape: Concave

Parent material: Loess over loamy till

Typical profile

Ap - 0 to 16 inches: silty clay loam

Btg1 - 16 to 32 inches: silty clay loam

Btg2 - 32 to 44 inches: loam

C - 44 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high (0.20 to 0.60 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Calcium carbonate, maximum in profile: 40 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Crosby

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Johnson County, Indiana
Survey Area Data: Version 26, Sep 7, 2018

Johnson County, Indiana

CrA—Crosby silt loam, fine-loamy subsoil, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2thy4

Elevation: 600 to 1,000 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 49 to 54 degrees F

Frost-free period: 145 to 180 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Crosby and similar soils: 93 percent

Minor components: 7 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crosby

Setting

Landform: Recessional moraines, water-lain moraines, ground moraines

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Interfluve, rise

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 10 inches: silt loam

Btg - 10 to 17 inches: silty clay loam

2Bt - 17 to 29 inches: clay loam

2BCt - 29 to 36 inches: loam

2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Somewhat poorly drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)

Depth to water table: About 6 to 24 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 55 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C/D

Hydric soil rating: No

Minor Components

Williamstown, eroded

Percent of map unit: 5 percent

Landform: Water-lain moraines, ground moraines, recessional moraines

Landform position (two-dimensional): Backslope, shoulder, summit

Landform position (three-dimensional): Side slope, crest, head slope, nose slope, rise

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Hydric soil rating: No

Treaty, drained

Percent of map unit: 2 percent

Landform: Depressions, water-lain moraines, swales

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope, dip

Down-slope shape: Linear

Across-slope shape: Concave

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Johnson County, Indiana

Survey Area Data: Version 26, Sep 7, 2018

Johnson County, Indiana

CsB2—Crosby-Miami silt loams, 2 to 4 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2thyc

Elevation: 600 to 1,000 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 49 to 54 degrees F

Frost-free period: 145 to 180 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Crosby, eroded, and similar soils: 64 percent

Miami, eroded, and similar soils: 33 percent

Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crosby, Eroded

Setting

Landform: Water-lain moraines, ground moraines, recessional moraines

Landform position (two-dimensional): Footslope, backslope, summit

Landform position (three-dimensional): Interfluvium, rise

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 10 inches: silt loam

Btg - 10 to 17 inches: silty clay loam

2Bt - 17 to 29 inches: clay loam

2BCt - 29 to 36 inches: loam

2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 2 to 4 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Somewhat poorly drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)

Depth to water table: About 6 to 24 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 55 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C/D

Hydric soil rating: No

Description of Miami, Eroded

Setting

Landform: Water-lain moraines, ground moraines, recessional moraines

Landform position (two-dimensional): Summit, backslope, shoulder, footslope

Landform position (three-dimensional): Side slope, crest, head slope, nose slope, rise

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam

Bt1 - 8 to 13 inches: silty clay loam

2Bt2 - 13 to 31 inches: clay loam

2BCt - 31 to 36 inches: loam

2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 2 to 4 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)

Depth to water table: About 24 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 45 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

Minor Components

Treaty, drained

Percent of map unit: 3 percent

Landform: Depressions, water-lain moraines, swales
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Johnson County, Indiana
Survey Area Data: Version 26, Sep 7, 2018

Johnson County, Indiana

MnB2—Miami silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2rkb2

Elevation: 180 to 370 feet

Mean annual precipitation: 37 to 46 inches

Mean annual air temperature: 48 to 55 degrees F

Frost-free period: 145 to 180 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Miami, eroded, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Miami, Eroded

Setting

Landform: Till plains

Landform position (two-dimensional): Backslope, shoulder, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam

Bt - 8 to 13 inches: silty clay loam

2Bt - 13 to 31 inches: clay loam

2BCt - 31 to 36 inches: loam

2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)

Depth to water table: About 24 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 45 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

Minor Components**Williamstown**

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Backslope, shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

Treaty

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Hydric soil rating: Yes

Crosby

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Johnson County, Indiana

Survey Area Data: Version 26, Sep 7, 2018

Johnson County, Indiana

MtC3—Miami clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2rk9y

Elevation: 600 to 1,200 feet

Mean annual precipitation: 36 to 43 inches

Mean annual air temperature: 48 to 54 degrees F

Frost-free period: 145 to 180 days

Farmland classification: Not prime farmland

Map Unit Composition

Miami, severely eroded, and similar soils: 97 percent

Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Miami, Severely Eroded

Setting

Landform: Till plains

Landform position (two-dimensional): Backslope, shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Loamy till

Typical profile

Ap - 0 to 6 inches: clay loam

Bt - 6 to 29 inches: clay loam

BCt - 29 to 34 inches: loam

Cd - 34 to 80 inches: loam

Properties and qualities

Slope: 6 to 12 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)

Depth to water table: About 24 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 45 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

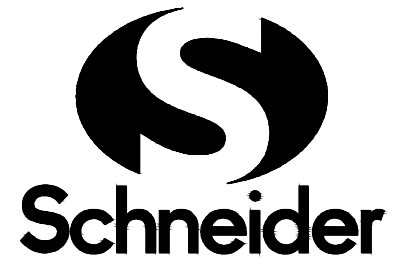
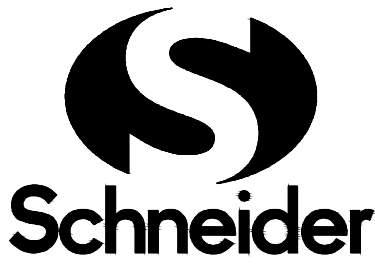
Crosby

Percent of map unit: 3 percent
Landform: Till plains
Landform position (three-dimensional): Interfluve
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

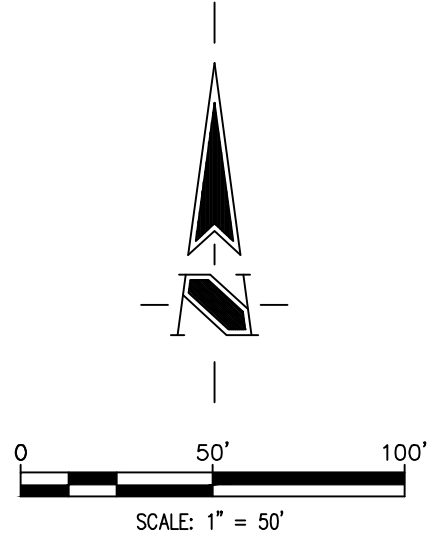
Data Source Information

Soil Survey Area: Johnson County, Indiana
Survey Area Data: Version 26, Sep 7, 2018

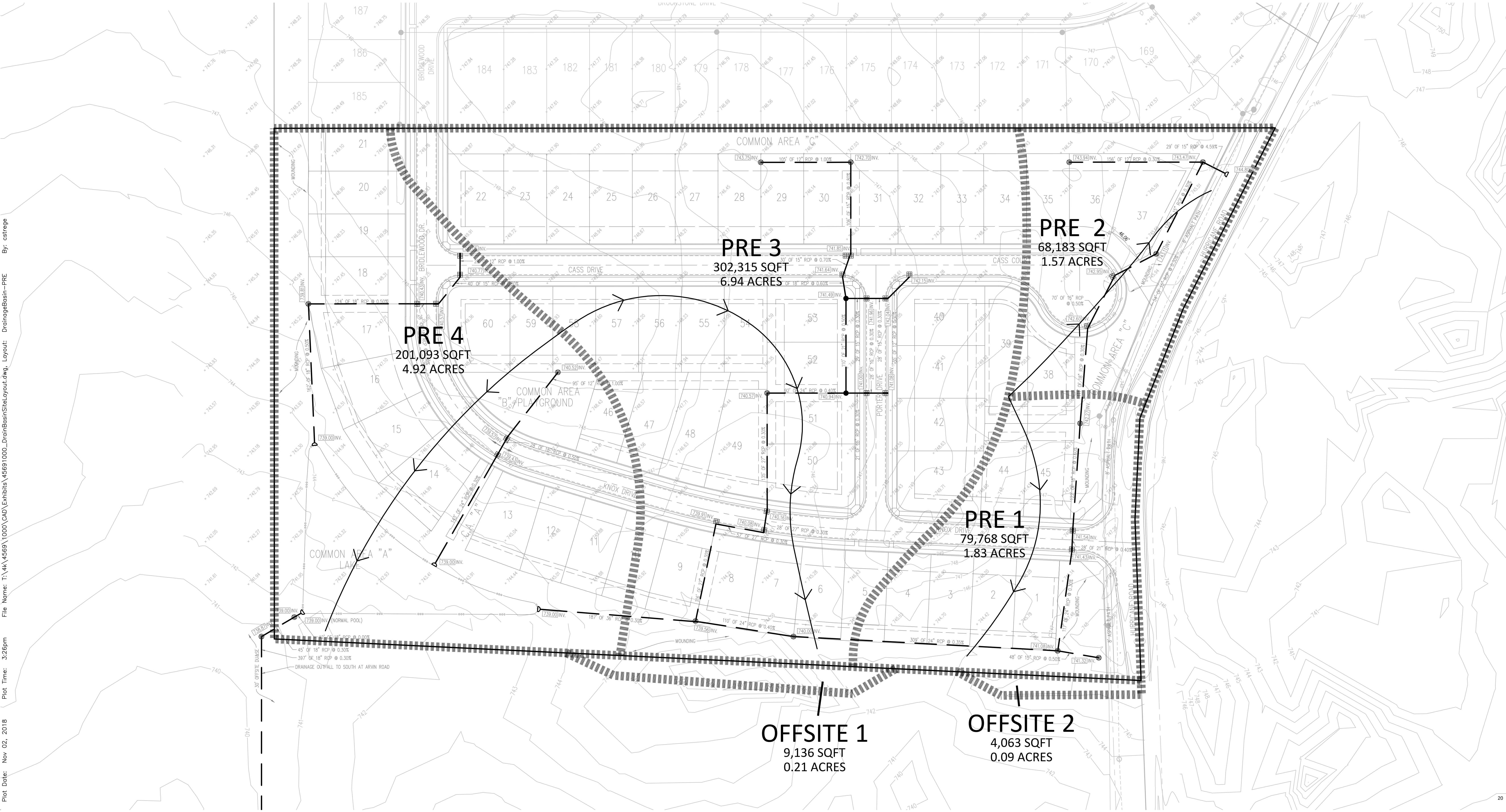
EXISTING CONDITIONS



HERITAGE SOUTH
JOHNSON COUNTY, INDIANA
DRAINAGE BASINS – PREDEVELOPED EXHIBIT



File Name: T:\44569\1000\CAO\Exhibits\45691000_DrainBasinStelLayout.dwg, Layout: DrainageBasin-PRE, By: cstregre, Plot Time: 3:26pm, Plot Date: Nov 02, 2018



Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment 1S: PRE 1

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	0.25	0.011	0.07
2 Yr, 12 Hr	0.97	0.071	0.47
2 Yr, 2 Hr	0.36	0.020	0.13
2 Yr, 24 Hr	1.33	0.109	0.71
2 Yr, 3 Hr	0.39	0.025	0.16
2 Yr, 6 Hr	0.62	0.044	0.29
10 Yr, 1 Hr	1.11	0.042	0.27
10 Yr, 12 Hr	2.69	0.165	1.08
10 Yr, 2 Hr	1.47	0.066	0.43
10 Yr, 24 Hr	2.98	0.223	1.46
10 Yr, 3 Hr	1.57	0.077	0.51
10 Yr, 6 Hr	2.20	0.119	0.78
100 Yr, 1 Hr	3.40	0.117	0.77
100 Yr, 12 Hr	6.44	0.366	2.40
100 Yr, 2 Hr	4.48	0.177	1.16
100 Yr, 24 Hr	5.94	0.431	2.83
100 Yr, 3 Hr	4.85	0.206	1.35
100 Yr, 6 Hr	6.21	0.298	1.95

Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Page 1

Summary for Subcatchment 1S: PRE 1

Runoff = 6.44 cfs @ 6.17 hrs, Volume= 0.366 af, Depth= 2.40"

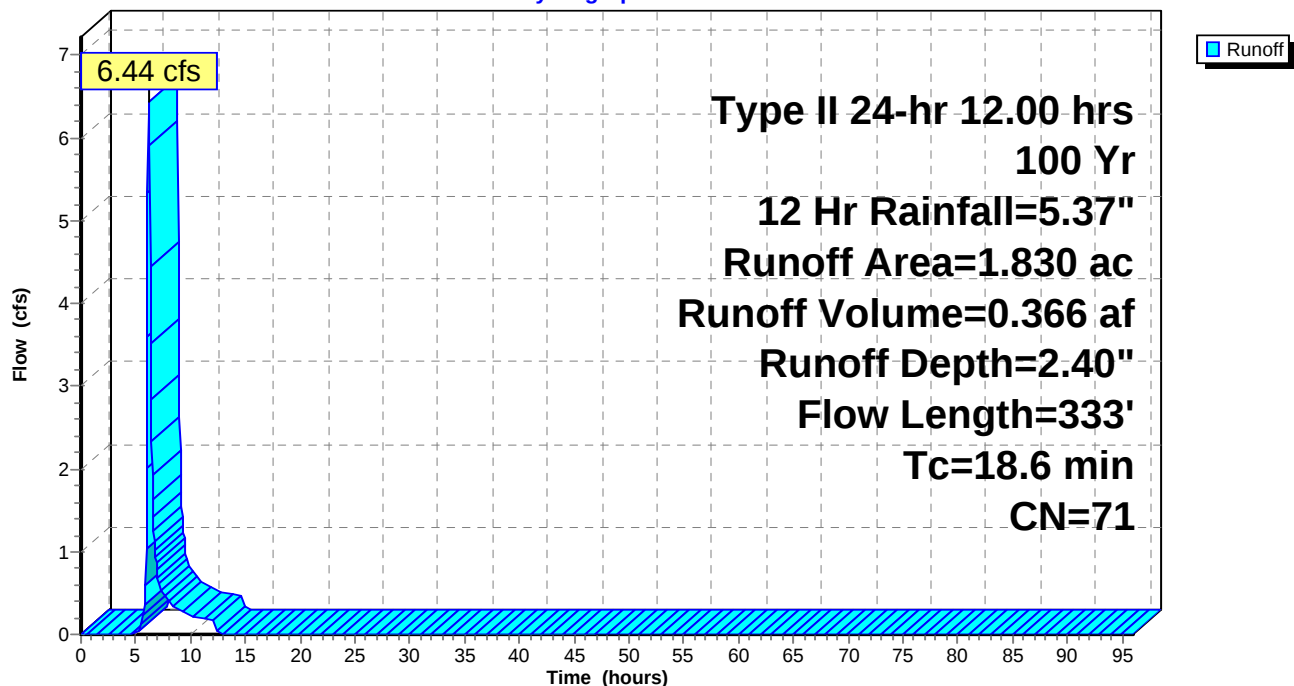
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

Area (ac)	CN	Description
0.436	61	Pasture/grassland/range, Good, HSG B
1.394	74	Pasture/grassland/range, Good, HSG C
1.830	71	Weighted Average
1.830		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0360	0.19		Sheet Flow, Sheet Flow
					Cultivated: Residue>20% n= 0.170 P2= 2.92"
9.6	233	0.0020	0.40		Shallow Concentrated Flow, Shallow Concentrated Flow
					Cultivated Straight Rows Kv= 9.0 fps
18.6	333	Total			

Subcatchment 1S: PRE 1

Hydrograph



Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Hydrograph for Subcatchment 1S: PRE 1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	5.37	2.40	0.00
1.00	0.12	0.00	0.00	54.00	5.37	2.40	0.00
2.00	0.26	0.00	0.00	55.00	5.37	2.40	0.00
3.00	0.43	0.00	0.00	56.00	5.37	2.40	0.00
4.00	0.64	0.00	0.00	57.00	5.37	2.40	0.00
5.00	0.97	0.01	0.02	58.00	5.37	2.40	0.00
6.00	3.56	1.10	2.00	59.00	5.37	2.40	0.00
7.00	4.40	1.68	0.71	60.00	5.37	2.40	0.00
8.00	4.73	1.91	0.39	61.00	5.37	2.40	0.00
9.00	4.95	2.08	0.29	62.00	5.37	2.40	0.00
10.00	5.11	2.20	0.22	63.00	5.37	2.40	0.00
11.00	5.25	2.30	0.19	64.00	5.37	2.40	0.00
12.00	5.37	2.40	0.17	65.00	5.37	2.40	0.00
13.00	5.37	2.40	0.00	66.00	5.37	2.40	0.00
14.00	5.37	2.40	0.00	67.00	5.37	2.40	0.00
15.00	5.37	2.40	0.00	68.00	5.37	2.40	0.00
16.00	5.37	2.40	0.00	69.00	5.37	2.40	0.00
17.00	5.37	2.40	0.00	70.00	5.37	2.40	0.00
18.00	5.37	2.40	0.00	71.00	5.37	2.40	0.00
19.00	5.37	2.40	0.00	72.00	5.37	2.40	0.00
20.00	5.37	2.40	0.00	73.00	5.37	2.40	0.00
21.00	5.37	2.40	0.00	74.00	5.37	2.40	0.00
22.00	5.37	2.40	0.00	75.00	5.37	2.40	0.00
23.00	5.37	2.40	0.00	76.00	5.37	2.40	0.00
24.00	5.37	2.40	0.00	77.00	5.37	2.40	0.00
25.00	5.37	2.40	0.00	78.00	5.37	2.40	0.00
26.00	5.37	2.40	0.00	79.00	5.37	2.40	0.00
27.00	5.37	2.40	0.00	80.00	5.37	2.40	0.00
28.00	5.37	2.40	0.00	81.00	5.37	2.40	0.00
29.00	5.37	2.40	0.00	82.00	5.37	2.40	0.00
30.00	5.37	2.40	0.00	83.00	5.37	2.40	0.00
31.00	5.37	2.40	0.00	84.00	5.37	2.40	0.00
32.00	5.37	2.40	0.00	85.00	5.37	2.40	0.00
33.00	5.37	2.40	0.00	86.00	5.37	2.40	0.00
34.00	5.37	2.40	0.00	87.00	5.37	2.40	0.00
35.00	5.37	2.40	0.00	88.00	5.37	2.40	0.00
36.00	5.37	2.40	0.00	89.00	5.37	2.40	0.00
37.00	5.37	2.40	0.00	90.00	5.37	2.40	0.00
38.00	5.37	2.40	0.00	91.00	5.37	2.40	0.00
39.00	5.37	2.40	0.00	92.00	5.37	2.40	0.00
40.00	5.37	2.40	0.00	93.00	5.37	2.40	0.00
41.00	5.37	2.40	0.00	94.00	5.37	2.40	0.00
42.00	5.37	2.40	0.00	95.00	5.37	2.40	0.00
43.00	5.37	2.40	0.00	96.00	5.37	2.40	0.00
44.00	5.37	2.40	0.00				
45.00	5.37	2.40	0.00				
46.00	5.37	2.40	0.00				
47.00	5.37	2.40	0.00				
48.00	5.37	2.40	0.00				
49.00	5.37	2.40	0.00				
50.00	5.37	2.40	0.00				
51.00	5.37	2.40	0.00				
52.00	5.37	2.40	0.00				

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment 2S: PRE 2

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	0.23	0.009	0.07
2 Yr, 12 Hr	0.99	0.061	0.47
2 Yr, 2 Hr	0.35	0.017	0.13
2 Yr, 24 Hr	1.33	0.094	0.71
2 Yr, 3 Hr	0.38	0.021	0.16
2 Yr, 6 Hr	0.63	0.037	0.29
10 Yr, 1 Hr	1.11	0.036	0.27
10 Yr, 12 Hr	2.75	0.142	1.08
10 Yr, 2 Hr	1.53	0.057	0.43
10 Yr, 24 Hr	2.95	0.191	1.46
10 Yr, 3 Hr	1.61	0.066	0.51
10 Yr, 6 Hr	2.31	0.103	0.78
100 Yr, 1 Hr	3.53	0.100	0.77
100 Yr, 12 Hr	6.58	0.314	2.40
100 Yr, 2 Hr	4.73	0.152	1.16
100 Yr, 24 Hr	5.83	0.370	2.83
100 Yr, 3 Hr	5.05	0.177	1.35
100 Yr, 6 Hr	6.47	0.255	1.95

Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Summary for Subcatchment 2S: PRE 2

Runoff = 6.58 cfs @ 6.12 hrs, Volume= 0.314 af, Depth= 2.40"

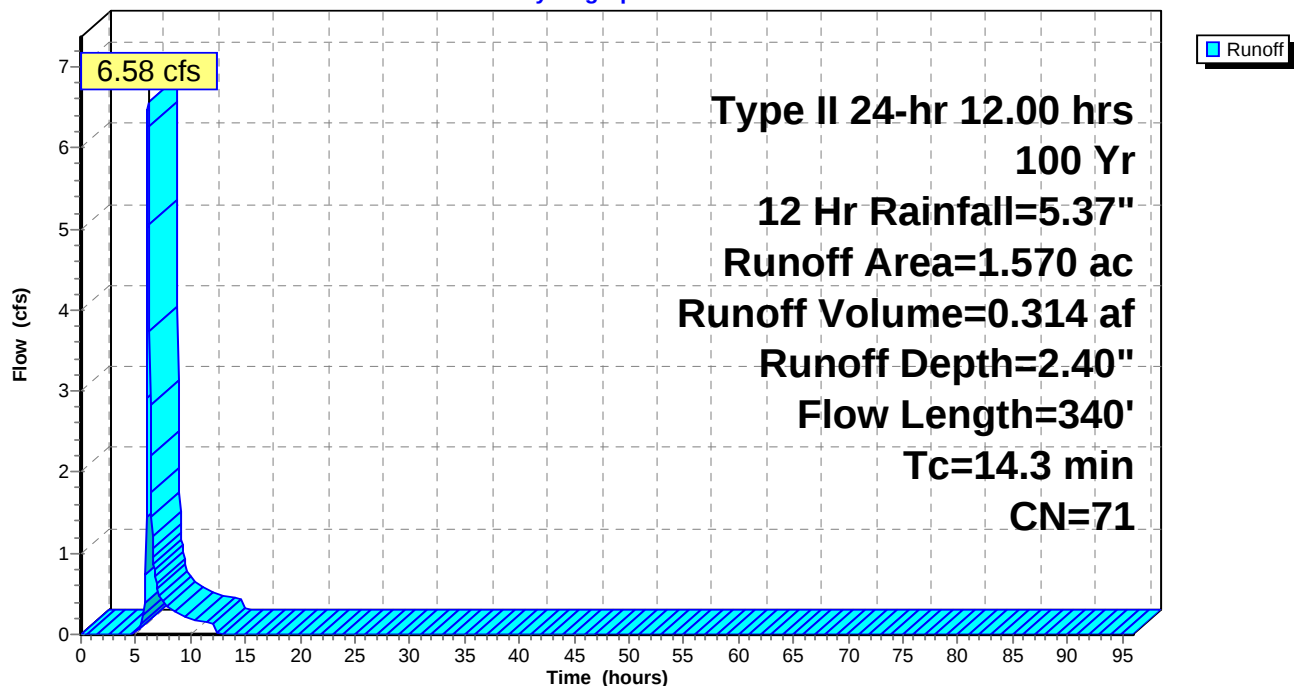
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

Area (ac)	CN	Description
0.374	61	Pasture/grassland/range, Good, HSG B
1.196	74	Pasture/grassland/range, Good, HSG C
1.570	71	Weighted Average
1.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0236	0.16		Sheet Flow, Sheet Flow
					Cultivated: Residue>20% n= 0.170 P2= 2.92"
3.7	240	0.0142	1.07		Shallow Concentrated Flow, Shallow Concentrated Flow
					Cultivated Straight Rows Kv= 9.0 fps
14.3	340	Total			

Subcatchment 2S: PRE 2

Hydrograph



Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Hydrograph for Subcatchment 2S: PRE 2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	5.37	2.40	0.00
1.00	0.12	0.00	0.00	54.00	5.37	2.40	0.00
2.00	0.26	0.00	0.00	55.00	5.37	2.40	0.00
3.00	0.43	0.00	0.00	56.00	5.37	2.40	0.00
4.00	0.64	0.00	0.00	57.00	5.37	2.40	0.00
5.00	0.97	0.01	0.02	58.00	5.37	2.40	0.00
6.00	3.56	1.10	2.91	59.00	5.37	2.40	0.00
7.00	4.40	1.68	0.56	60.00	5.37	2.40	0.00
8.00	4.73	1.91	0.33	61.00	5.37	2.40	0.00
9.00	4.95	2.08	0.24	62.00	5.37	2.40	0.00
10.00	5.11	2.20	0.18	63.00	5.37	2.40	0.00
11.00	5.25	2.30	0.16	64.00	5.37	2.40	0.00
12.00	5.37	2.40	0.15	65.00	5.37	2.40	0.00
13.00	5.37	2.40	0.00	66.00	5.37	2.40	0.00
14.00	5.37	2.40	0.00	67.00	5.37	2.40	0.00
15.00	5.37	2.40	0.00	68.00	5.37	2.40	0.00
16.00	5.37	2.40	0.00	69.00	5.37	2.40	0.00
17.00	5.37	2.40	0.00	70.00	5.37	2.40	0.00
18.00	5.37	2.40	0.00	71.00	5.37	2.40	0.00
19.00	5.37	2.40	0.00	72.00	5.37	2.40	0.00
20.00	5.37	2.40	0.00	73.00	5.37	2.40	0.00
21.00	5.37	2.40	0.00	74.00	5.37	2.40	0.00
22.00	5.37	2.40	0.00	75.00	5.37	2.40	0.00
23.00	5.37	2.40	0.00	76.00	5.37	2.40	0.00
24.00	5.37	2.40	0.00	77.00	5.37	2.40	0.00
25.00	5.37	2.40	0.00	78.00	5.37	2.40	0.00
26.00	5.37	2.40	0.00	79.00	5.37	2.40	0.00
27.00	5.37	2.40	0.00	80.00	5.37	2.40	0.00
28.00	5.37	2.40	0.00	81.00	5.37	2.40	0.00
29.00	5.37	2.40	0.00	82.00	5.37	2.40	0.00
30.00	5.37	2.40	0.00	83.00	5.37	2.40	0.00
31.00	5.37	2.40	0.00	84.00	5.37	2.40	0.00
32.00	5.37	2.40	0.00	85.00	5.37	2.40	0.00
33.00	5.37	2.40	0.00	86.00	5.37	2.40	0.00
34.00	5.37	2.40	0.00	87.00	5.37	2.40	0.00
35.00	5.37	2.40	0.00	88.00	5.37	2.40	0.00
36.00	5.37	2.40	0.00	89.00	5.37	2.40	0.00
37.00	5.37	2.40	0.00	90.00	5.37	2.40	0.00
38.00	5.37	2.40	0.00	91.00	5.37	2.40	0.00
39.00	5.37	2.40	0.00	92.00	5.37	2.40	0.00
40.00	5.37	2.40	0.00	93.00	5.37	2.40	0.00
41.00	5.37	2.40	0.00	94.00	5.37	2.40	0.00
42.00	5.37	2.40	0.00	95.00	5.37	2.40	0.00
43.00	5.37	2.40	0.00	96.00	5.37	2.40	0.00
44.00	5.37	2.40	0.00				
45.00	5.37	2.40	0.00				
46.00	5.37	2.40	0.00				
47.00	5.37	2.40	0.00				
48.00	5.37	2.40	0.00				
49.00	5.37	2.40	0.00				
50.00	5.37	2.40	0.00				
51.00	5.37	2.40	0.00				
52.00	5.37	2.40	0.00				

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment 3S: PRE 3

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	0.85	0.041	0.07
2 Yr, 12 Hr	2.97	0.270	0.47
2 Yr, 2 Hr	1.15	0.076	0.13
2 Yr, 24 Hr	4.18	0.413	0.71
2 Yr, 3 Hr	1.23	0.095	0.16
2 Yr, 6 Hr	1.92	0.165	0.29
10 Yr, 1 Hr	3.49	0.158	0.27
10 Yr, 12 Hr	8.29	0.626	1.08
10 Yr, 2 Hr	4.50	0.250	0.43
10 Yr, 24 Hr	9.45	0.846	1.46
10 Yr, 3 Hr	4.78	0.293	0.51
10 Yr, 6 Hr	6.73	0.453	0.78
100 Yr, 1 Hr	10.34	0.443	0.77
100 Yr, 12 Hr	19.84	1.388	2.40
100 Yr, 2 Hr	13.52	0.671	1.16
100 Yr, 24 Hr	18.93	1.635	2.83
100 Yr, 3 Hr	14.69	0.783	1.35
100 Yr, 6 Hr	18.87	1.129	1.95

Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Summary for Subcatchment 3S: PRE 3

Runoff = 19.84 cfs @ 6.26 hrs, Volume= 1.388 af, Depth= 2.40"

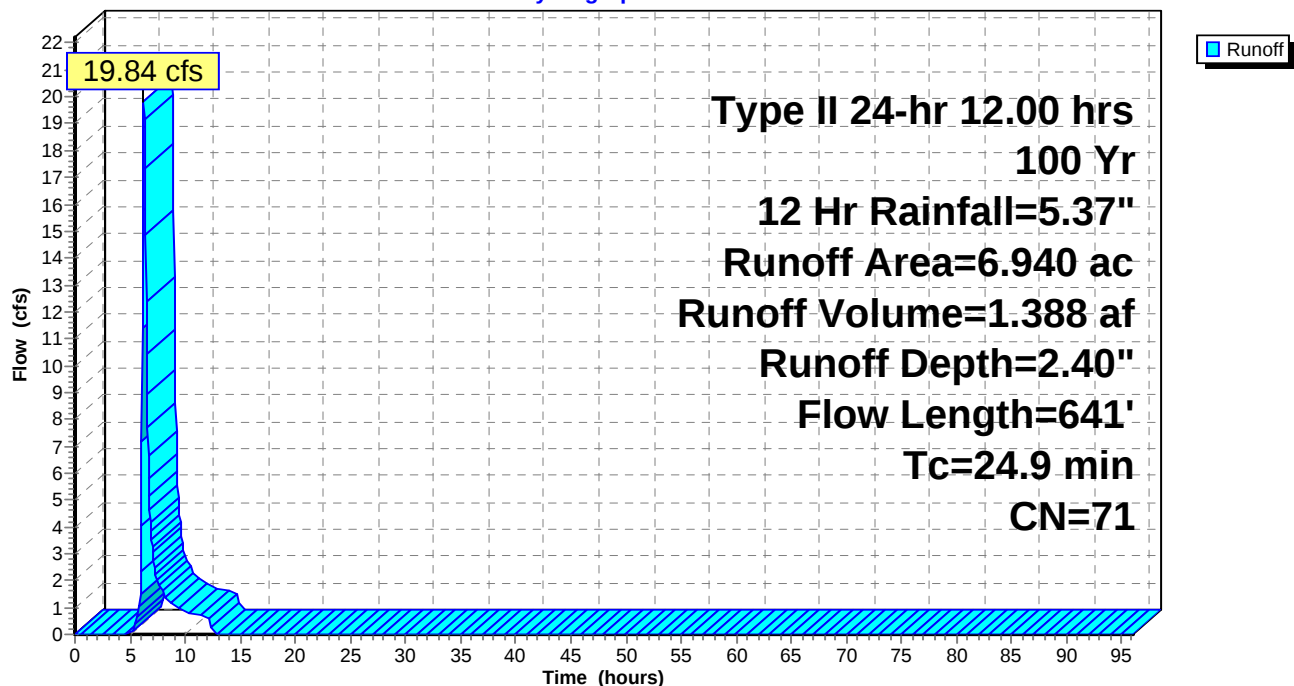
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

Area (ac)	CN	Description
1.652	61	Pasture/grassland/range, Good, HSG B
5.288	74	Pasture/grassland/range, Good, HSG C
6.940	71	Weighted Average
6.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0097	0.11		Sheet Flow, Sheet Flow
					Cultivated: Residue>20% n= 0.170 P2= 2.92"
9.8	541	0.0104	0.92		Shallow Concentrated Flow, Shallow Concentrated Flow
					Cultivated Straight Rows Kv= 9.0 fps
24.9	641	Total			

Subcatchment 3S: PRE 3

Hydrograph



Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Hydrograph for Subcatchment 3S: PRE 3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	5.37	2.40	0.00
1.00	0.12	0.00	0.00	54.00	5.37	2.40	0.00
2.00	0.26	0.00	0.00	55.00	5.37	2.40	0.00
3.00	0.43	0.00	0.00	56.00	5.37	2.40	0.00
4.00	0.64	0.00	0.00	57.00	5.37	2.40	0.00
5.00	0.97	0.01	0.04	58.00	5.37	2.40	0.00
6.00	3.56	1.10	4.06	59.00	5.37	2.40	0.00
7.00	4.40	1.68	3.26	60.00	5.37	2.40	0.00
8.00	4.73	1.91	1.56	61.00	5.37	2.40	0.00
9.00	4.95	2.08	1.12	62.00	5.37	2.40	0.00
10.00	5.11	2.20	0.85	63.00	5.37	2.40	0.00
11.00	5.25	2.30	0.71	64.00	5.37	2.40	0.00
12.00	5.37	2.40	0.66	65.00	5.37	2.40	0.00
13.00	5.37	2.40	0.01	66.00	5.37	2.40	0.00
14.00	5.37	2.40	0.00	67.00	5.37	2.40	0.00
15.00	5.37	2.40	0.00	68.00	5.37	2.40	0.00
16.00	5.37	2.40	0.00	69.00	5.37	2.40	0.00
17.00	5.37	2.40	0.00	70.00	5.37	2.40	0.00
18.00	5.37	2.40	0.00	71.00	5.37	2.40	0.00
19.00	5.37	2.40	0.00	72.00	5.37	2.40	0.00
20.00	5.37	2.40	0.00	73.00	5.37	2.40	0.00
21.00	5.37	2.40	0.00	74.00	5.37	2.40	0.00
22.00	5.37	2.40	0.00	75.00	5.37	2.40	0.00
23.00	5.37	2.40	0.00	76.00	5.37	2.40	0.00
24.00	5.37	2.40	0.00	77.00	5.37	2.40	0.00
25.00	5.37	2.40	0.00	78.00	5.37	2.40	0.00
26.00	5.37	2.40	0.00	79.00	5.37	2.40	0.00
27.00	5.37	2.40	0.00	80.00	5.37	2.40	0.00
28.00	5.37	2.40	0.00	81.00	5.37	2.40	0.00
29.00	5.37	2.40	0.00	82.00	5.37	2.40	0.00
30.00	5.37	2.40	0.00	83.00	5.37	2.40	0.00
31.00	5.37	2.40	0.00	84.00	5.37	2.40	0.00
32.00	5.37	2.40	0.00	85.00	5.37	2.40	0.00
33.00	5.37	2.40	0.00	86.00	5.37	2.40	0.00
34.00	5.37	2.40	0.00	87.00	5.37	2.40	0.00
35.00	5.37	2.40	0.00	88.00	5.37	2.40	0.00
36.00	5.37	2.40	0.00	89.00	5.37	2.40	0.00
37.00	5.37	2.40	0.00	90.00	5.37	2.40	0.00
38.00	5.37	2.40	0.00	91.00	5.37	2.40	0.00
39.00	5.37	2.40	0.00	92.00	5.37	2.40	0.00
40.00	5.37	2.40	0.00	93.00	5.37	2.40	0.00
41.00	5.37	2.40	0.00	94.00	5.37	2.40	0.00
42.00	5.37	2.40	0.00	95.00	5.37	2.40	0.00
43.00	5.37	2.40	0.00	96.00	5.37	2.40	0.00
44.00	5.37	2.40	0.00				
45.00	5.37	2.40	0.00				
46.00	5.37	2.40	0.00				
47.00	5.37	2.40	0.00				
48.00	5.37	2.40	0.00				
49.00	5.37	2.40	0.00				
50.00	5.37	2.40	0.00				
51.00	5.37	2.40	0.00				
52.00	5.37	2.40	0.00				

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment 4S: PRE 4

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	0.68	0.029	0.07
2 Yr, 12 Hr	2.68	0.191	0.47
2 Yr, 2 Hr	0.98	0.054	0.13
2 Yr, 24 Hr	3.71	0.293	0.71
2 Yr, 3 Hr	1.04	0.067	0.16
2 Yr, 6 Hr	1.71	0.117	0.29
10 Yr, 1 Hr	3.06	0.112	0.27
10 Yr, 12 Hr	7.52	0.444	1.08
10 Yr, 2 Hr	4.16	0.177	0.43
10 Yr, 24 Hr	8.26	0.600	1.46
10 Yr, 3 Hr	4.32	0.208	0.51
10 Yr, 6 Hr	6.18	0.321	0.78
100 Yr, 1 Hr	9.47	0.314	0.77
100 Yr, 12 Hr	17.90	0.984	2.40
100 Yr, 2 Hr	12.68	0.476	1.16
100 Yr, 24 Hr	16.42	1.159	2.83
100 Yr, 3 Hr	13.58	0.555	1.35
100 Yr, 6 Hr	17.33	0.800	1.95

Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Page 1

Summary for Subcatchment 4S: PRE 4

Runoff = 17.90 cfs @ 6.16 hrs, Volume= 0.984 af, Depth= 2.40"

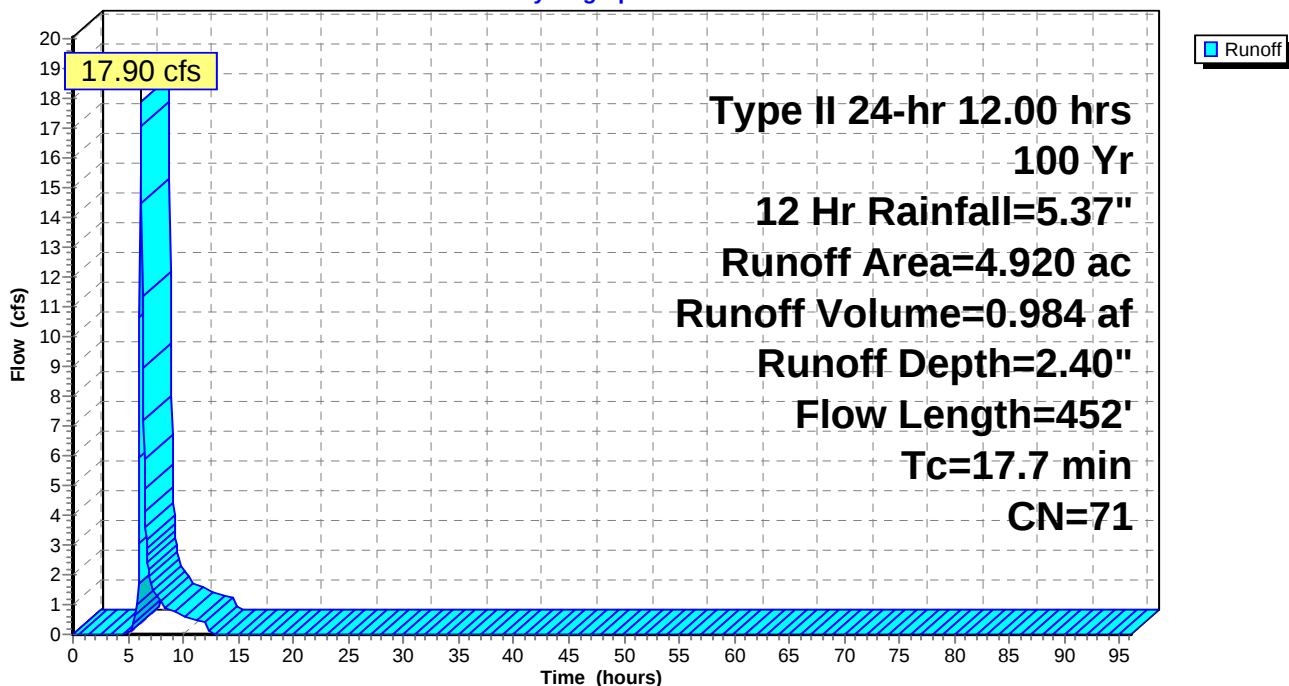
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

Area (ac)	CN	Description
1.171	61	Pasture/grassland/range, Good, HSG B
3.749	74	Pasture/grassland/range, Good, HSG C
4.920	71	Weighted Average
4.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0146	0.13		Sheet Flow, Sheet Flow
					Cultivated: Residue>20% n= 0.170 P2= 2.92"
4.8	352	0.0186	1.23		Shallow Concentrated Flow, Shallow Concentrated Flow
					Cultivated Straight Rows Kv= 9.0 fps
17.7	452	Total			

Subcatchment 4S: PRE 4

Hydrograph



Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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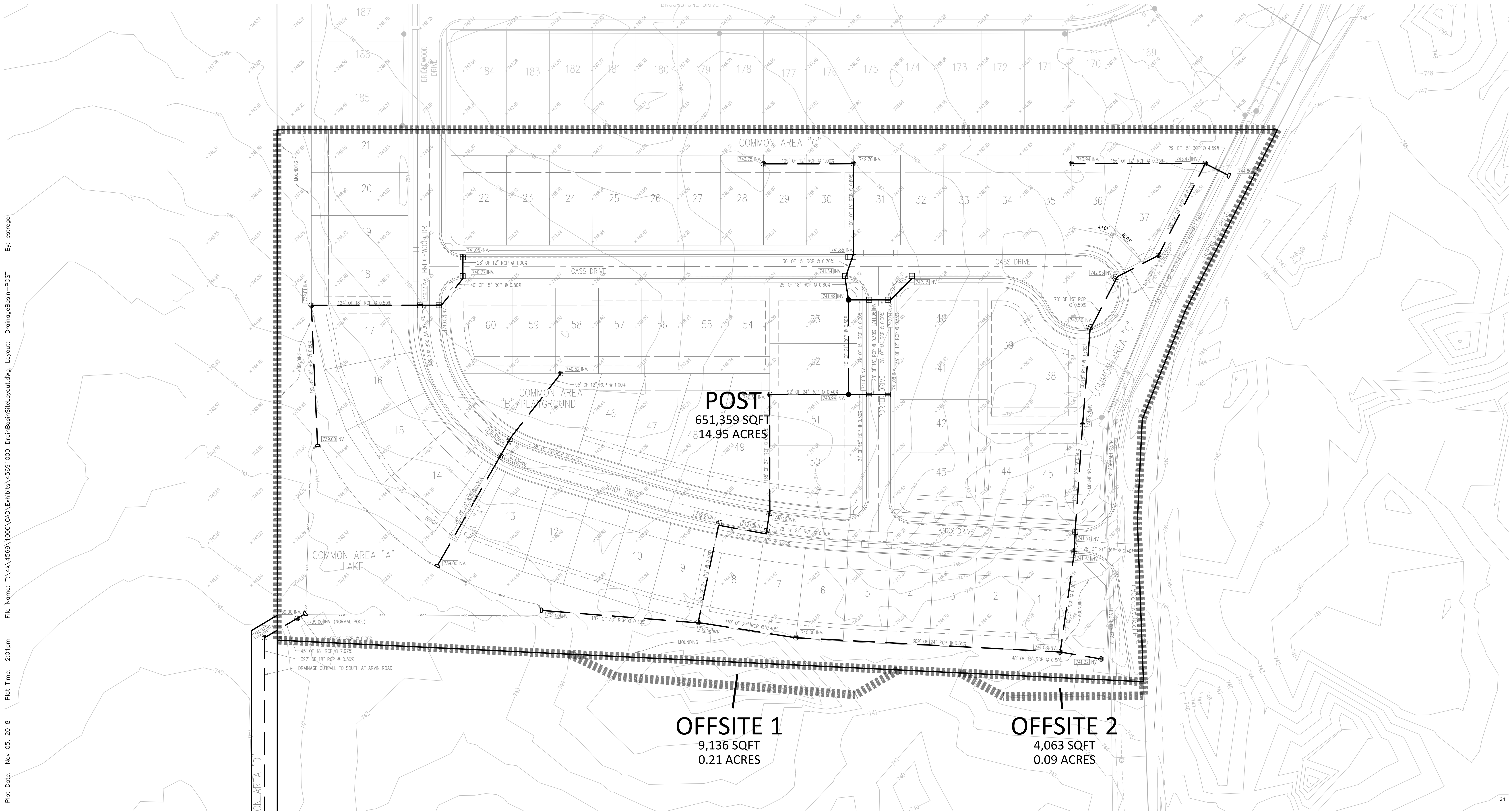
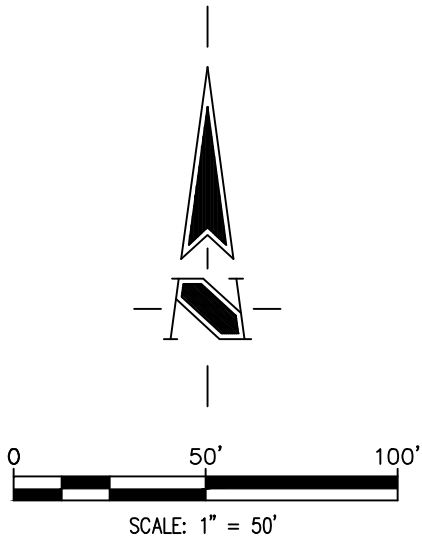
Page 2

Hydrograph for Subcatchment 4S: PRE 4

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	5.37	2.40	0.00
1.00	0.12	0.00	0.00	54.00	5.37	2.40	0.00
2.00	0.26	0.00	0.00	55.00	5.37	2.40	0.00
3.00	0.43	0.00	0.00	56.00	5.37	2.40	0.00
4.00	0.64	0.00	0.00	57.00	5.37	2.40	0.00
5.00	0.97	0.01	0.05	58.00	5.37	2.40	0.00
6.00	3.56	1.10	5.95	59.00	5.37	2.40	0.00
7.00	4.40	1.68	1.86	60.00	5.37	2.40	0.00
8.00	4.73	1.91	1.05	61.00	5.37	2.40	0.00
9.00	4.95	2.08	0.77	62.00	5.37	2.40	0.00
10.00	5.11	2.20	0.58	63.00	5.37	2.40	0.00
11.00	5.25	2.30	0.50	64.00	5.37	2.40	0.00
12.00	5.37	2.40	0.47	65.00	5.37	2.40	0.00
13.00	5.37	2.40	0.00	66.00	5.37	2.40	0.00
14.00	5.37	2.40	0.00	67.00	5.37	2.40	0.00
15.00	5.37	2.40	0.00	68.00	5.37	2.40	0.00
16.00	5.37	2.40	0.00	69.00	5.37	2.40	0.00
17.00	5.37	2.40	0.00	70.00	5.37	2.40	0.00
18.00	5.37	2.40	0.00	71.00	5.37	2.40	0.00
19.00	5.37	2.40	0.00	72.00	5.37	2.40	0.00
20.00	5.37	2.40	0.00	73.00	5.37	2.40	0.00
21.00	5.37	2.40	0.00	74.00	5.37	2.40	0.00
22.00	5.37	2.40	0.00	75.00	5.37	2.40	0.00
23.00	5.37	2.40	0.00	76.00	5.37	2.40	0.00
24.00	5.37	2.40	0.00	77.00	5.37	2.40	0.00
25.00	5.37	2.40	0.00	78.00	5.37	2.40	0.00
26.00	5.37	2.40	0.00	79.00	5.37	2.40	0.00
27.00	5.37	2.40	0.00	80.00	5.37	2.40	0.00
28.00	5.37	2.40	0.00	81.00	5.37	2.40	0.00
29.00	5.37	2.40	0.00	82.00	5.37	2.40	0.00
30.00	5.37	2.40	0.00	83.00	5.37	2.40	0.00
31.00	5.37	2.40	0.00	84.00	5.37	2.40	0.00
32.00	5.37	2.40	0.00	85.00	5.37	2.40	0.00
33.00	5.37	2.40	0.00	86.00	5.37	2.40	0.00
34.00	5.37	2.40	0.00	87.00	5.37	2.40	0.00
35.00	5.37	2.40	0.00	88.00	5.37	2.40	0.00
36.00	5.37	2.40	0.00	89.00	5.37	2.40	0.00
37.00	5.37	2.40	0.00	90.00	5.37	2.40	0.00
38.00	5.37	2.40	0.00	91.00	5.37	2.40	0.00
39.00	5.37	2.40	0.00	92.00	5.37	2.40	0.00
40.00	5.37	2.40	0.00	93.00	5.37	2.40	0.00
41.00	5.37	2.40	0.00	94.00	5.37	2.40	0.00
42.00	5.37	2.40	0.00	95.00	5.37	2.40	0.00
43.00	5.37	2.40	0.00	96.00	5.37	2.40	0.00
44.00	5.37	2.40	0.00				
45.00	5.37	2.40	0.00				
46.00	5.37	2.40	0.00				
47.00	5.37	2.40	0.00				
48.00	5.37	2.40	0.00				
49.00	5.37	2.40	0.00				
50.00	5.37	2.40	0.00				
51.00	5.37	2.40	0.00				
52.00	5.37	2.40	0.00				

DEVELOPED CONDITIONS

HERITAGE SOUTH
JOHNSON COUNTY, INDIANA
DRAINAGE BASINS – POST DEVELOPED EXHIBIT





NOAA Atlas 14, Volume 2, Version 3
 Location name: Franklin, Indiana, USA*
 Latitude: 39.4838°, Longitude: -86.0642°
 Elevation: 742.03 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.373 (0.332-0.422)	0.444 (0.395-0.501)	0.532 (0.472-0.600)	0.601 (0.532-0.678)	0.692 (0.608-0.781)	0.764 (0.666-0.863)	0.833 (0.720-0.944)	0.906 (0.775-1.03)	1.00 (0.844-1.15)	1.08 (0.892-1.24)
10-min	0.579 (0.517-0.655)	0.693 (0.617-0.782)	0.827 (0.734-0.933)	0.928 (0.822-1.05)	1.06 (0.930-1.20)	1.16 (1.01-1.31)	1.25 (1.08-1.42)	1.35 (1.16-1.54)	1.48 (1.24-1.69)	1.57 (1.30-1.81)
15-min	0.710 (0.633-0.803)	0.848 (0.755-0.957)	1.01 (0.902-1.15)	1.14 (1.01-1.29)	1.31 (1.15-1.48)	1.43 (1.25-1.62)	1.56 (1.35-1.77)	1.68 (1.44-1.92)	1.84 (1.55-2.11)	1.96 (1.62-2.26)
30-min	0.939 (0.838-1.06)	1.13 (1.01-1.28)	1.39 (1.24-1.57)	1.59 (1.40-1.79)	1.85 (1.62-2.09)	2.05 (1.79-2.31)	2.25 (1.94-2.55)	2.45 (2.10-2.80)	2.73 (2.30-3.13)	2.93 (2.43-3.39)
60-min	1.15 (1.02-1.30)	1.39 (1.24-1.57)	1.74 (1.55-1.97)	2.02 (1.79-2.28)	2.40 (2.11-2.70)	2.70 (2.35-3.05)	3.01 (2.60-3.41)	3.33 (2.85-3.79)	3.77 (3.17-4.32)	4.12 (3.42-4.76)
2-hr	1.34 (1.20-1.52)	1.62 (1.45-1.84)	2.04 (1.82-2.31)	2.38 (2.10-2.69)	2.85 (2.50-3.22)	3.24 (2.82-3.65)	3.65 (3.14-4.12)	4.08 (3.46-4.61)	4.68 (3.90-5.34)	5.18 (4.23-5.95)
3-hr	1.42 (1.27-1.62)	1.72 (1.53-1.95)	2.17 (1.93-2.46)	2.53 (2.24-2.87)	3.05 (2.67-3.45)	3.48 (3.01-3.93)	3.94 (3.37-4.46)	4.42 (3.73-5.03)	5.12 (4.22-5.86)	5.69 (4.59-6.55)
6-hr	1.70 (1.51-1.95)	2.05 (1.83-2.35)	2.60 (2.30-2.96)	3.04 (2.68-3.46)	3.67 (3.20-4.17)	4.20 (3.63-4.77)	4.78 (4.07-5.42)	5.39 (4.51-6.14)	6.28 (5.13-7.18)	7.01 (5.61-8.07)
12-hr	2.04 (1.82-2.30)	2.45 (2.19-2.77)	3.04 (2.72-3.45)	3.53 (3.14-3.99)	4.22 (3.72-4.74)	4.78 (4.18-5.37)	5.37 (4.64-6.04)	6.00 (5.10-6.77)	6.88 (5.74-7.82)	7.59 (6.23-8.68)
24-hr	2.44 (2.25-2.66)	2.92 (2.69-3.19)	3.58 (3.30-3.90)	4.10 (3.76-4.46)	4.79 (4.38-5.23)	5.35 (4.87-5.83)	5.91 (5.36-6.45)	6.48 (5.85-7.09)	7.26 (6.49-7.97)	7.87 (6.98-8.77)
2-day	2.86 (2.64-3.09)	3.42 (3.16-3.70)	4.17 (3.85-4.52)	4.76 (4.38-5.15)	5.54 (5.08-6.00)	6.16 (5.62-6.68)	6.78 (6.16-7.36)	7.41 (6.70-8.07)	8.26 (7.40-9.02)	8.92 (7.94-9.78)
3-day	3.06 (2.85-3.29)	3.66 (3.41-3.93)	4.44 (4.13-4.77)	5.04 (4.68-5.42)	5.86 (5.42-6.29)	6.49 (5.99-6.98)	7.14 (6.55-7.68)	7.79 (7.12-8.39)	8.66 (7.87-9.35)	9.34 (8.43-10.1)
4-day	3.27 (3.06-3.50)	3.90 (3.65-4.16)	4.70 (4.41-5.03)	5.33 (4.98-5.69)	6.17 (5.76-6.58)	6.83 (6.36-7.28)	7.50 (6.95-7.99)	8.17 (7.54-8.71)	9.07 (8.33-9.68)	9.75 (8.91-10.4)
7-day	3.88 (3.62-4.15)	4.61 (4.30-4.94)	5.53 (5.16-5.92)	6.26 (5.83-6.70)	7.25 (6.74-7.75)	8.04 (7.45-8.59)	8.83 (8.16-9.44)	9.64 (8.87-10.3)	10.7 (9.83-11.5)	11.6 (10.6-12.4)
10-day	4.42 (4.14-4.72)	5.25 (4.93-5.61)	6.28 (5.89-6.71)	7.10 (6.64-7.57)	8.20 (7.66-8.74)	9.07 (8.45-9.66)	9.95 (9.24-10.6)	10.8 (10.0-11.5)	12.0 (11.1-12.8)	13.0 (11.9-13.8)
20-day	6.07 (5.71-6.45)	7.18 (6.76-7.63)	8.46 (7.96-9.00)	9.46 (8.89-10.1)	10.8 (10.1-11.5)	11.8 (11.0-12.5)	12.8 (12.0-13.6)	13.8 (12.9-14.7)	15.1 (14.0-16.1)	16.1 (14.9-17.2)
30-day	7.47 (7.05-7.91)	8.79 (8.30-9.31)	10.2 (9.64-10.8)	11.3 (10.7-12.0)	12.8 (12.0-13.5)	13.9 (13.0-14.7)	15.0 (14.0-15.9)	16.0 (15.0-17.0)	17.4 (16.2-18.5)	18.5 (17.1-19.6)
45-day	9.47 (8.92-10.0)	11.1 (10.5-11.8)	12.8 (12.1-13.6)	14.1 (13.3-14.9)	15.8 (14.8-16.7)	17.0 (16.0-18.0)	18.3 (17.1-19.3)	19.4 (18.1-20.5)	20.9 (19.4-22.1)	21.9 (20.4-23.3)
60-day	11.3 (10.7-12.0)	13.2 (12.5-14.0)	15.2 (14.3-16.1)	16.7 (15.7-17.7)	18.6 (17.5-19.7)	20.0 (18.8-21.2)	21.4 (20.0-22.7)	22.7 (21.2-24.1)	24.4 (22.7-25.8)	25.6 (23.8-27.2)

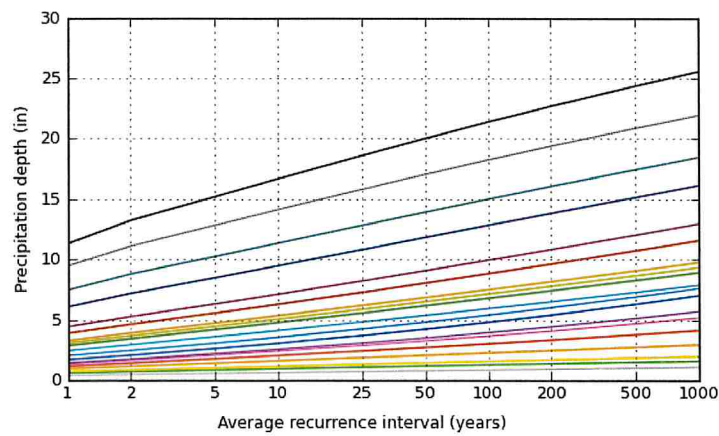
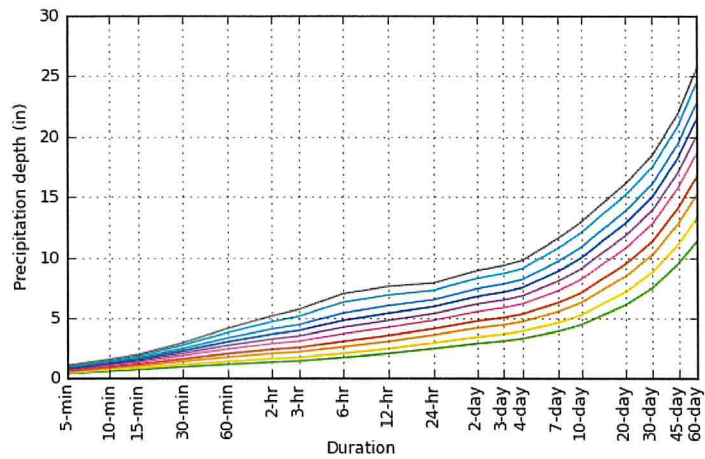
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 39.4838°, Longitude: -86.0642°



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Oct 8 18:56:25 2018

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Maps & aerals

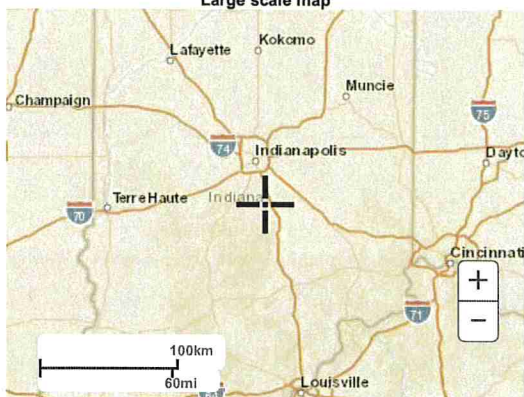
Small scale terrain



Large scale terrain



Large scale map

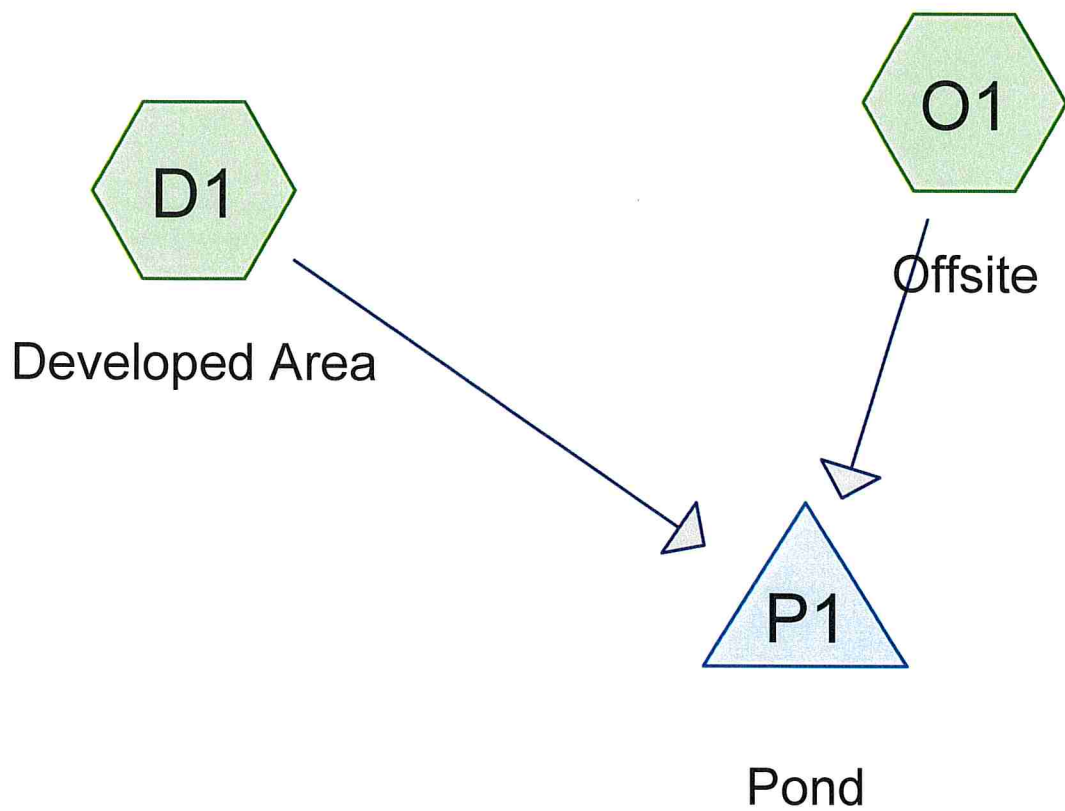


Large scale aerial

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[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Routing Diagram for Heritage Section 10 Subdivision
Prepared by {enter your company name here}, Printed 10/11/2018
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Heritage Section 10 Subdivision

Prepared by The Schneider Corporation

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Printed 11/2/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.300	91	Cultivated Land (O1)
3.633	61	Pasture/grassland/range, Good, HSG B (1S, 2S, 3S, 4S)
11.627	74	Pasture/grassland/range, Good, HSG C (1S, 2S, 3S, 4S)
14.950	92	Residential, 1/8 acre lots (D1)
30.510	81	TOTAL AREA

Heritage Section 10 Subdivision

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.633	HSG B	1S, 2S, 3S, 4S
11.627	HSG C	1S, 2S, 3S, 4S
0.000	HSG D	
15.250	Other	D1, O1
30.510		TOTAL AREA

Heritage Section 10 Subdivision

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.300	0.300	Cultivated Land	O1
0.000	3.633	11.627	0.000	0.000	15.260	Pasture/grassland/range, Good	1S, 2S, 3S, 4S
0.000	0.000	0.000	0.000	14.950	14.950	Residential, 1/8 acre lots	D1
0.000	3.633	11.627	0.000	15.250	30.510	TOTAL AREA	

Heritage Section 10 Subdivision

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	D1	0.00	0.00	160.0	0.0030	0.012	12.0	0.0	1.0
2	D1	0.00	0.00	180.0	0.0300	0.012	15.0	0.0	0.0
3	D1	0.00	0.00	70.0	0.0050	0.012	15.0	0.0	0.0
4	D1	0.00	0.00	30.0	0.0030	0.012	18.0	0.0	0.0
5	D1	0.00	0.00	225.0	0.0060	0.012	18.0	0.0	0.0
6	D1	0.00	0.00	30.0	0.0040	0.012	21.0	0.0	0.0
7	D1	0.00	0.00	120.0	0.0030	0.012	24.0	0.0	0.0
8	D1	0.00	0.00	310.0	0.0035	0.012	24.0	0.0	0.0
9	D1	0.00	0.00	120.0	0.0040	0.012	24.0	0.0	0.0
10	D1	0.00	0.00	85.0	0.0030	0.012	36.0	0.0	0.0
11	O1	0.00	0.00	310.0	0.0035	0.012	24.0	0.0	0.0
12	O1	0.00	0.00	120.0	0.0040	0.012	24.0	0.0	0.0
13	O1	0.00	0.00	85.0	0.0030	0.012	36.0	0.0	0.0

Heritage Section 10 Subdivision*Type II 24-hr 2.00 hrs 100 Yr, 2 Hr Rainfall=3.65"*

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: PRE 1Runoff Area=1.830 ac 0.00% Impervious Runoff Depth=1.16"
Flow Length=333' Tc=18.6 min CN=71 Runoff=4.48 cfs 0.177 af**Subcatchment2S: PRE 2**Runoff Area=1.570 ac 0.00% Impervious Runoff Depth=1.16"
Flow Length=340' Tc=14.3 min CN=71 Runoff=4.73 cfs 0.152 af**Subcatchment3S: PRE 3**Runoff Area=6.940 ac 0.00% Impervious Runoff Depth=1.16"
Flow Length=641' Tc=24.9 min CN=71 Runoff=13.52 cfs 0.671 af**Subcatchment4S: PRE 4**Runoff Area=4.920 ac 0.00% Impervious Runoff Depth=1.16"
Flow Length=452' Tc=17.7 min CN=71 Runoff=12.68 cfs 0.476 af**SubcatchmentD1: Developed Area**Runoff Area=14.950 ac 0.00% Impervious Runoff Depth=2.78"
Flow Length=1,630' Tc=37.5 min CN=92 Runoff=55.83 cfs 3.464 af**SubcatchmentO1: Offsite**Runoff Area=0.300 ac 0.00% Impervious Runoff Depth=2.68"
Flow Length=570' Tc=9.1 min CN=91 Runoff=3.20 cfs 0.067 af**Pond P1: Pond**Peak Elev=743.16' Storage=120,667 cf Inflow=56.17 cfs 3.531 af
Outflow=7.23 cfs 3.529 af**Link 1L: PRE SUM**Inflow=33.20 cfs 1.476 af
Primary=33.20 cfs 1.476 af**Total Runoff Area = 30.510 ac Runoff Volume = 5.007 af Average Runoff Depth = 1.97"**
100.00% Pervious = 30.510 ac 0.00% Impervious = 0.000 ac

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment D1: Developed Area

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	15.90	0.883	0.71
2 Yr, 12 Hr	22.30	2.052	1.65
2 Yr, 2 Hr	17.84	1.125	0.90
2 Yr, 24 Hr	23.13	2.598	2.09
2 Yr, 3 Hr	18.14	1.233	0.99
2 Yr, 6 Hr	20.49	1.597	1.28
10 Yr, 1 Hr	28.42	1.563	1.25
10 Yr, 12 Hr	35.78	3.321	2.67
10 Yr, 2 Hr	31.68	1.971	1.58
10 Yr, 24 Hr	35.14	4.004	3.21
10 Yr, 3 Hr	31.87	2.144	1.72
10 Yr, 6 Hr	35.12	2.740	2.20
100 Yr, 1 Hr	49.55	2.704	2.17
100 Yr, 12 Hr	58.68	5.545	4.45
100 Yr, 2 Hr	55.83	3.464	2.78
100 Yr, 24 Hr	53.41	6.205	4.98
100 Yr, 3 Hr	56.57	3.812	3.06
100 Yr, 6 Hr	61.11	4.827	3.87

Heritage Section 10 Subdivision

Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"

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Summary for Subcatchment D1: Developed Area

Runoff = 61.11 cfs @ 3.43 hrs, Volume= 4.827 af, Depth= 3.87"

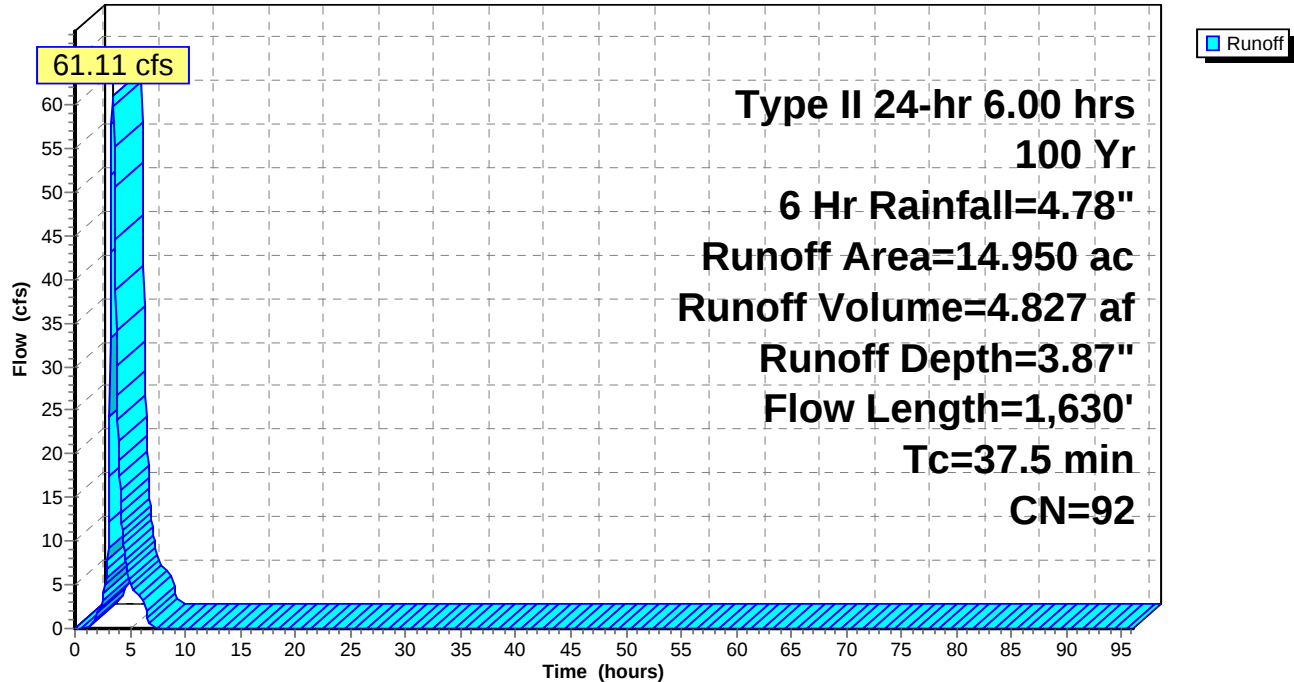
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"

Area (ac)	CN	Description
* 14.950	92	Residential, 1/8 acre lots
14.950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.6	300	0.0100	0.15		Sheet Flow, Lawn Grass: Short n= 0.150 P2= 2.92"
1.0	160	0.0030	2.64	1.99	Pipe Channel, RCP_Round 12" 12.0" Round w/ 1.0" inside fill Area= 0.8 sf Perim= 3.1' r= 0.24' n= 0.012 Concrete pipe, finished
0.3	180	0.0300	9.88	12.12	Pipe Channel, RCP_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.3	70	0.0050	4.03	4.95	Pipe Channel, RCP_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.1	30	0.0030	3.53	6.23	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	225	0.0060	4.99	8.81	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.1	30	0.0040	4.51	10.86	Pipe Channel, RCP_Round 21" 21.0" Round Area= 2.4 sf Perim= 5.5' r= 0.44' n= 0.012 Concrete pipe, finished
0.5	120	0.0030	4.27	13.42	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
1.1	310	0.0035	4.62	14.50	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.4	120	0.0040	4.93	15.50	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	85	0.0030	5.60	39.58	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
37.5	1,630	Total			

Subcatchment D1: Developed Area

Hydrograph



Heritage Section 10 Subdivision

Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"

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Hydrograph for Subcatchment D1: Developed Area

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	4.78	3.87	0.00
1.00	0.23	0.00	0.00	54.00	4.78	3.87	0.00
2.00	0.57	0.13	1.63	55.00	4.78	3.87	0.00
3.00	3.17	2.32	9.21	56.00	4.78	3.87	0.00
4.00	4.21	3.32	19.23	57.00	4.78	3.87	0.00
5.00	4.55	3.65	5.47	58.00	4.78	3.87	0.00
6.00	4.78	3.87	3.45	59.00	4.78	3.87	0.00
7.00	4.78	3.87	0.25	60.00	4.78	3.87	0.00
8.00	4.78	3.87	0.00	61.00	4.78	3.87	0.00
9.00	4.78	3.87	0.00	62.00	4.78	3.87	0.00
10.00	4.78	3.87	0.00	63.00	4.78	3.87	0.00
11.00	4.78	3.87	0.00	64.00	4.78	3.87	0.00
12.00	4.78	3.87	0.00	65.00	4.78	3.87	0.00
13.00	4.78	3.87	0.00	66.00	4.78	3.87	0.00
14.00	4.78	3.87	0.00	67.00	4.78	3.87	0.00
15.00	4.78	3.87	0.00	68.00	4.78	3.87	0.00
16.00	4.78	3.87	0.00	69.00	4.78	3.87	0.00
17.00	4.78	3.87	0.00	70.00	4.78	3.87	0.00
18.00	4.78	3.87	0.00	71.00	4.78	3.87	0.00
19.00	4.78	3.87	0.00	72.00	4.78	3.87	0.00
20.00	4.78	3.87	0.00	73.00	4.78	3.87	0.00
21.00	4.78	3.87	0.00	74.00	4.78	3.87	0.00
22.00	4.78	3.87	0.00	75.00	4.78	3.87	0.00
23.00	4.78	3.87	0.00	76.00	4.78	3.87	0.00
24.00	4.78	3.87	0.00	77.00	4.78	3.87	0.00
25.00	4.78	3.87	0.00	78.00	4.78	3.87	0.00
26.00	4.78	3.87	0.00	79.00	4.78	3.87	0.00
27.00	4.78	3.87	0.00	80.00	4.78	3.87	0.00
28.00	4.78	3.87	0.00	81.00	4.78	3.87	0.00
29.00	4.78	3.87	0.00	82.00	4.78	3.87	0.00
30.00	4.78	3.87	0.00	83.00	4.78	3.87	0.00
31.00	4.78	3.87	0.00	84.00	4.78	3.87	0.00
32.00	4.78	3.87	0.00	85.00	4.78	3.87	0.00
33.00	4.78	3.87	0.00	86.00	4.78	3.87	0.00
34.00	4.78	3.87	0.00	87.00	4.78	3.87	0.00
35.00	4.78	3.87	0.00	88.00	4.78	3.87	0.00
36.00	4.78	3.87	0.00	89.00	4.78	3.87	0.00
37.00	4.78	3.87	0.00	90.00	4.78	3.87	0.00
38.00	4.78	3.87	0.00	91.00	4.78	3.87	0.00
39.00	4.78	3.87	0.00	92.00	4.78	3.87	0.00
40.00	4.78	3.87	0.00	93.00	4.78	3.87	0.00
41.00	4.78	3.87	0.00	94.00	4.78	3.87	0.00
42.00	4.78	3.87	0.00	95.00	4.78	3.87	0.00
43.00	4.78	3.87	0.00	96.00	4.78	3.87	0.00
44.00	4.78	3.87	0.00				
45.00	4.78	3.87	0.00				
46.00	4.78	3.87	0.00				
47.00	4.78	3.87	0.00				
48.00	4.78	3.87	0.00				
49.00	4.78	3.87	0.00				
50.00	4.78	3.87	0.00				
51.00	4.78	3.87	0.00				
52.00	4.78	3.87	0.00				

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Subcatchment O1: Offsite

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2 Yr, 1 Hr	0.89	0.016	0.65
2 Yr, 12 Hr	1.07	0.039	1.56
2 Yr, 2 Hr	0.99	0.021	0.84
2 Yr, 24 Hr	0.92	0.050	2.00
2 Yr, 3 Hr	1.00	0.023	0.92
2 Yr, 6 Hr	1.05	0.030	1.21
10 Yr, 1 Hr	1.66	0.030	1.18
10 Yr, 12 Hr	1.73	0.064	2.57
10 Yr, 2 Hr	1.80	0.038	1.50
10 Yr, 24 Hr	1.39	0.078	3.11
10 Yr, 3 Hr	1.78	0.041	1.64
10 Yr, 6 Hr	1.82	0.053	2.11
100 Yr, 1 Hr	2.93	0.052	2.08
100 Yr, 12 Hr	2.85	0.109	4.34
100 Yr, 2 Hr	3.20	0.067	2.68
100 Yr, 24 Hr	2.12	0.122	4.87
100 Yr, 3 Hr	3.18	0.074	2.96
100 Yr, 6 Hr	3.19	0.094	3.77

Heritage Section 10 Subdivision

Type II 24-hr 2.00 hrs 100 Yr, 2 Hr Rainfall=3.65"

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Summary for Subcatchment O1: Offsite

Runoff = 3.20 cfs @ 1.11 hrs, Volume= 0.067 af, Depth= 2.68"

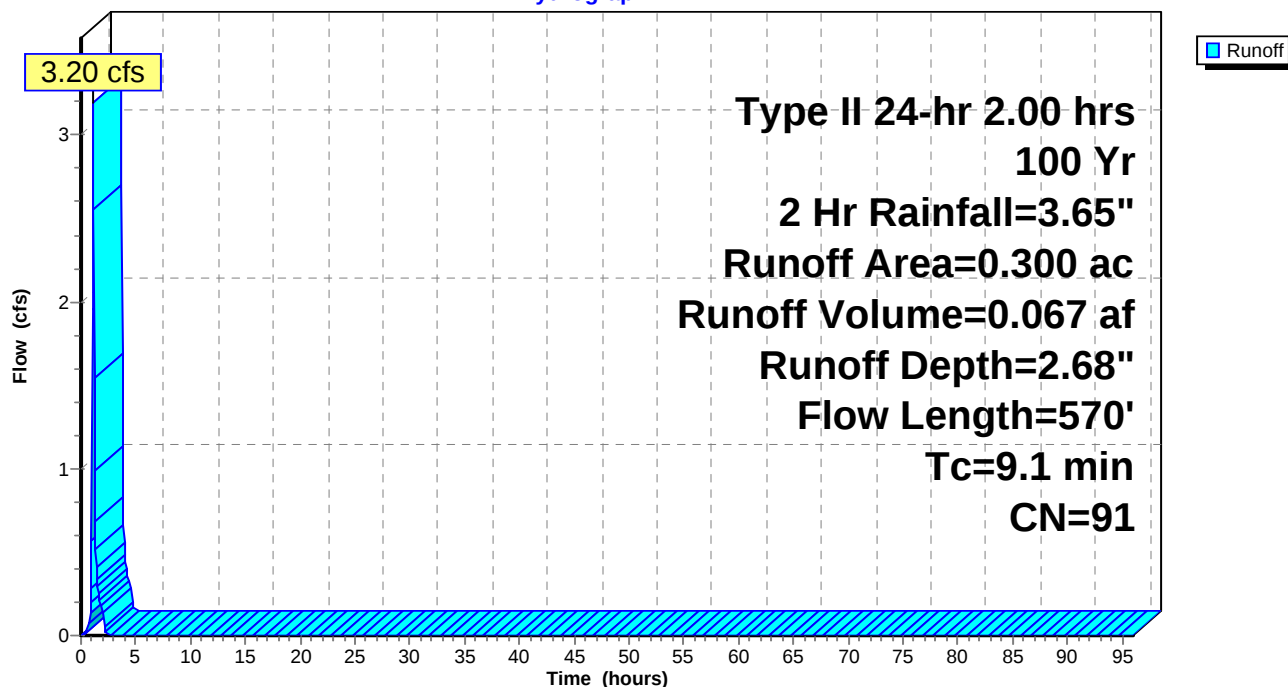
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2.00 hrs 100 Yr, 2 Hr Rainfall=3.65"

Area (ac)	CN	Description
* 0.300	91	Cultivated Land
0.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0100	0.19		Sheet Flow, Cultivated: Residue<=20% n= 0.060 P2= 2.92"
5.2	30	0.0100	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 2.92"
1.1	310	0.0035	4.62	14.50	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.4	120	0.0040	4.93	15.50	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	85	0.0030	5.60	39.58	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
9.1	570	Total			

Subcatchment O1: Offsite

Hydrograph



Heritage Section 10 Subdivision*Type II 24-hr 2.00 hrs 100 Yr, 2 Hr Rainfall=3.65"*

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Hydrograph for Subcatchment O1: Offsite

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	53.00	3.65	2.68	0.00
1.00	2.42	1.54	0.57	54.00	3.65	2.68	0.00
2.00	3.65	2.68	0.15	55.00	3.65	2.68	0.00
3.00	3.65	2.68	0.00	56.00	3.65	2.68	0.00
4.00	3.65	2.68	0.00	57.00	3.65	2.68	0.00
5.00	3.65	2.68	0.00	58.00	3.65	2.68	0.00
6.00	3.65	2.68	0.00	59.00	3.65	2.68	0.00
7.00	3.65	2.68	0.00	60.00	3.65	2.68	0.00
8.00	3.65	2.68	0.00	61.00	3.65	2.68	0.00
9.00	3.65	2.68	0.00	62.00	3.65	2.68	0.00
10.00	3.65	2.68	0.00	63.00	3.65	2.68	0.00
11.00	3.65	2.68	0.00	64.00	3.65	2.68	0.00
12.00	3.65	2.68	0.00	65.00	3.65	2.68	0.00
13.00	3.65	2.68	0.00	66.00	3.65	2.68	0.00
14.00	3.65	2.68	0.00	67.00	3.65	2.68	0.00
15.00	3.65	2.68	0.00	68.00	3.65	2.68	0.00
16.00	3.65	2.68	0.00	69.00	3.65	2.68	0.00
17.00	3.65	2.68	0.00	70.00	3.65	2.68	0.00
18.00	3.65	2.68	0.00	71.00	3.65	2.68	0.00
19.00	3.65	2.68	0.00	72.00	3.65	2.68	0.00
20.00	3.65	2.68	0.00	73.00	3.65	2.68	0.00
21.00	3.65	2.68	0.00	74.00	3.65	2.68	0.00
22.00	3.65	2.68	0.00	75.00	3.65	2.68	0.00
23.00	3.65	2.68	0.00	76.00	3.65	2.68	0.00
24.00	3.65	2.68	0.00	77.00	3.65	2.68	0.00
25.00	3.65	2.68	0.00	78.00	3.65	2.68	0.00
26.00	3.65	2.68	0.00	79.00	3.65	2.68	0.00
27.00	3.65	2.68	0.00	80.00	3.65	2.68	0.00
28.00	3.65	2.68	0.00	81.00	3.65	2.68	0.00
29.00	3.65	2.68	0.00	82.00	3.65	2.68	0.00
30.00	3.65	2.68	0.00	83.00	3.65	2.68	0.00
31.00	3.65	2.68	0.00	84.00	3.65	2.68	0.00
32.00	3.65	2.68	0.00	85.00	3.65	2.68	0.00
33.00	3.65	2.68	0.00	86.00	3.65	2.68	0.00
34.00	3.65	2.68	0.00	87.00	3.65	2.68	0.00
35.00	3.65	2.68	0.00	88.00	3.65	2.68	0.00
36.00	3.65	2.68	0.00	89.00	3.65	2.68	0.00
37.00	3.65	2.68	0.00	90.00	3.65	2.68	0.00
38.00	3.65	2.68	0.00	91.00	3.65	2.68	0.00
39.00	3.65	2.68	0.00	92.00	3.65	2.68	0.00
40.00	3.65	2.68	0.00	93.00	3.65	2.68	0.00
41.00	3.65	2.68	0.00	94.00	3.65	2.68	0.00
42.00	3.65	2.68	0.00	95.00	3.65	2.68	0.00
43.00	3.65	2.68	0.00	96.00	3.65	2.68	0.00
44.00	3.65	2.68	0.00				
45.00	3.65	2.68	0.00				
46.00	3.65	2.68	0.00				
47.00	3.65	2.68	0.00				
48.00	3.65	2.68	0.00				
49.00	3.65	2.68	0.00				
50.00	3.65	2.68	0.00				
51.00	3.65	2.68	0.00				
52.00	3.65	2.68	0.00				

Heritage Section 10 Subdivision*Type II 24-hr 6.00 hrs 100 Yr, 6 Hr Rainfall=4.78"*

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Events for Pond P1: Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 Yr, 1 Hr	16.01	1.71	740.37	33,007
2 Yr, 12 Hr	22.43	2.33	741.26	58,058
2 Yr, 2 Hr	17.96	1.94	740.67	41,155
2 Yr, 24 Hr	23.26	2.49	741.53	66,140
2 Yr, 3 Hr	18.25	1.99	740.74	43,193
2 Yr, 6 Hr	20.61	2.16	740.99	50,189
10 Yr, 1 Hr	28.60	2.37	741.32	59,981
10 Yr, 12 Hr	35.97	3.01	742.54	99,011
10 Yr, 2 Hr	31.88	2.64	741.80	74,667
10 Yr, 24 Hr	35.34	3.44	742.72	105,193
10 Yr, 3 Hr	32.07	2.70	741.92	78,569
10 Yr, 6 Hr	35.32	2.90	742.31	91,235
100 Yr, 1 Hr	49.85	3.55	742.75	106,226
100 Yr, 12 Hr	58.99	8.03	744.08	155,440
100 Yr, 2 Hr	56.17	6.34	743.40	129,548
100 Yr, 24 Hr	53.71	7.93	744.03	153,515
100 Yr, 3 Hr	56.90	6.77	743.55	135,180
100 Yr, 6 Hr	61.45	7.83	743.98	151,790

Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Summary for Pond P1: Pond

Inflow Area = 15.250 ac, 0.00% Impervious, Inflow Depth = 4.45" for 100 Yr, 12 Hr event
 Inflow = 58.99 cfs @ 6.39 hrs, Volume= 5.654 af
 Outflow = 8.03 cfs @ 7.47 hrs, Volume= 5.648 af, Atten= 86%, Lag= 64.8 min
 Primary = 8.03 cfs @ 7.47 hrs, Volume= 5.648 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Peak Elev= 744.08' @ 7.47 hrs Surf.Area= 39,501 sf Storage= 155,438 cf

Plug-Flow detention time= 384.5 min calculated for 5.648 af (100% of inflow)
 Center-of-Mass det. time= 384.1 min (804.2 - 420.1)

Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	193,624 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
739.00	21,780	0	0
740.00	25,265	23,522	23,522
741.00	28,750	27,007	50,530
742.00	32,234	30,492	81,022
743.00	35,719	33,977	114,998
744.00	39,204	37,462	152,460
745.00	43,124	41,164	193,624

Device	Routing	Invert	Outlet Devices
#1	Primary	739.00'	15.0" Vert. Orifice/Grate C= 0.600
#2	Device 1	739.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	742.55'	18.0" W x 6.5" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=8.03 cfs @ 7.47 hrs HW=744.08' (Free Discharge)

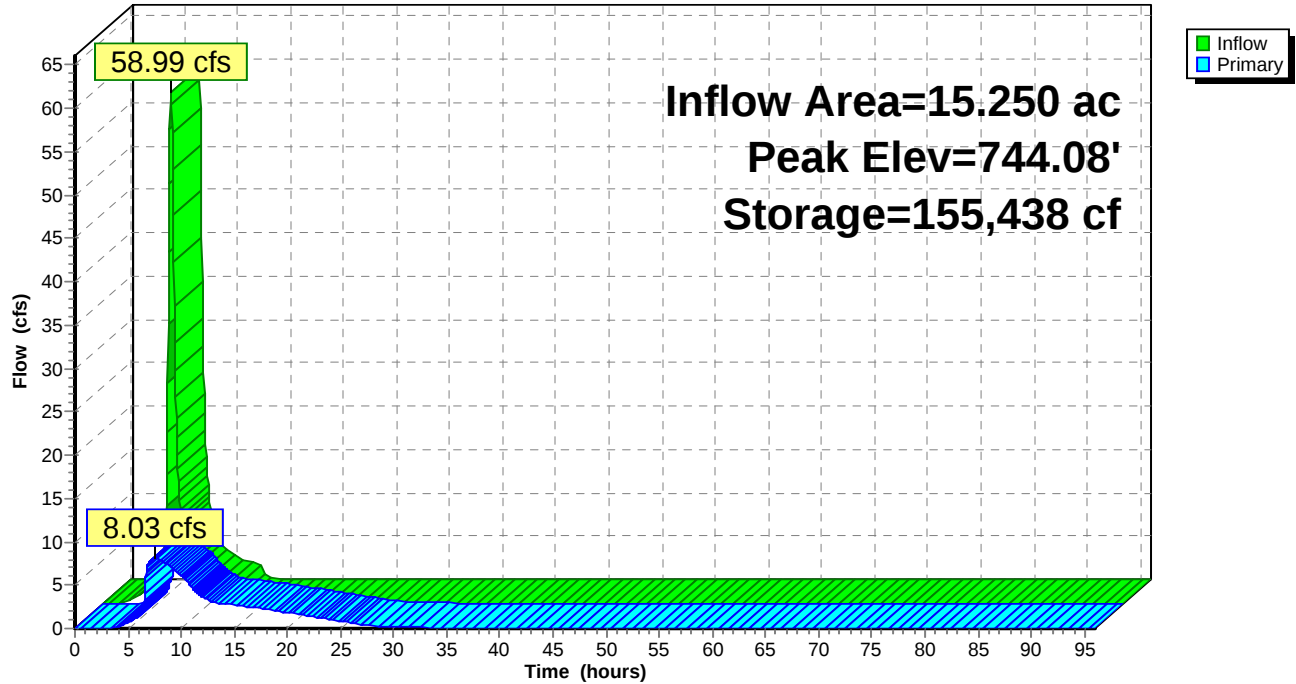
1=Orifice/Grate (Passes 8.03 cfs of 12.47 cfs potential flow)

2=Orifice/Grate (Orifice Controls 3.66 cfs @ 10.49 fps)

3=Orifice/Grate (Orifice Controls 4.37 cfs @ 5.38 fps)

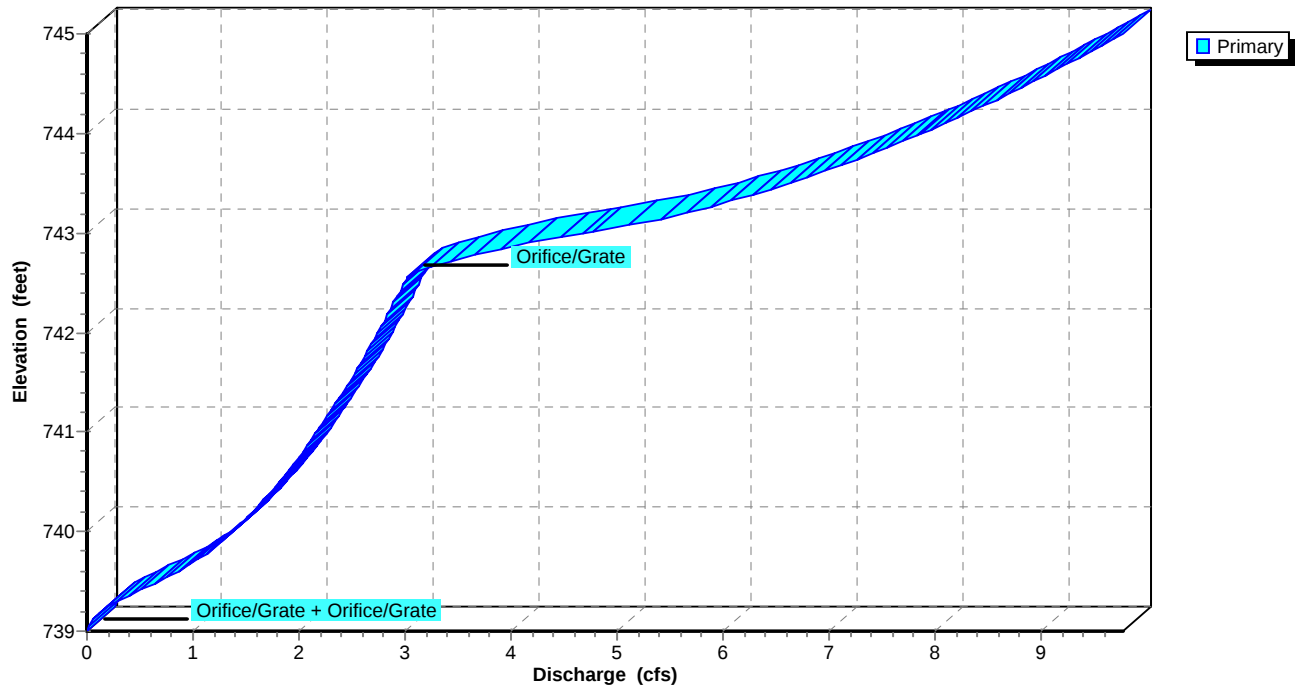
Pond P1: Pond

Hydrograph



Pond P1: Pond

Stage-Discharge



Heritage Section 10 Subdivision

Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"

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Hydrograph for Pond P1: Pond

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	739.00	0.00
2.50	0.35	395	739.02	0.00
5.00	3.18	11,787	739.52	0.72
7.50	7.79	155,428	744.08	8.03
10.00	2.56	126,803	743.33	6.10
12.50	0.98	103,956	742.69	3.32
15.00	0.00	78,608	741.92	2.71
17.50	0.00	56,097	741.19	2.29
20.00	0.00	37,478	740.53	1.84
22.50	0.00	23,076	739.98	1.35
25.00	0.00	13,203	739.58	0.83
27.50	0.00	7,971	739.36	0.39
30.00	0.00	5,463	739.25	0.20
32.50	0.00	4,086	739.18	0.12
35.00	0.00	3,235	739.15	0.08
37.50	0.00	2,665	739.12	0.05
40.00	0.00	2,258	739.10	0.04
42.50	0.00	1,943	739.09	0.03
45.00	0.00	1,699	739.08	0.02
47.50	0.00	1,509	739.07	0.02
50.00	0.00	1,362	739.06	0.01
52.50	0.00	1,245	739.06	0.01
55.00	0.00	1,139	739.05	0.01
57.50	0.00	1,042	739.05	0.01
60.00	0.00	953	739.04	0.01
62.50	0.00	872	739.04	0.01
65.00	0.00	798	739.04	0.01
67.50	0.00	730	739.03	0.01
70.00	0.00	668	739.03	0.01
72.50	0.00	611	739.03	0.01
75.00	0.00	559	739.03	0.01
77.50	0.00	511	739.02	0.01
80.00	0.00	468	739.02	0.00
82.50	0.00	428	739.02	0.00
85.00	0.00	392	739.02	0.00
87.50	0.00	358	739.02	0.00
90.00	0.00	328	739.01	0.00
92.50	0.00	300	739.01	0.00
95.00	0.00	274	739.01	0.00

Heritage Section 10 Subdivision*Type II 24-hr 12.00 hrs 100 Yr, 12 Hr Rainfall=5.37"*

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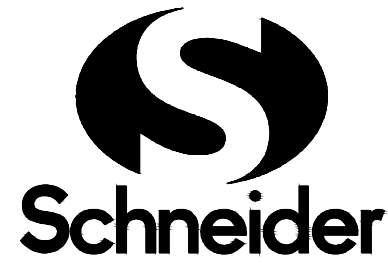
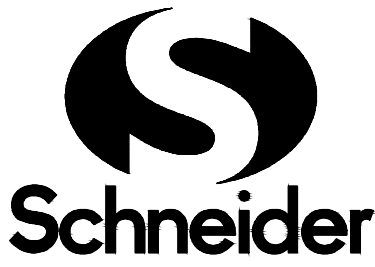
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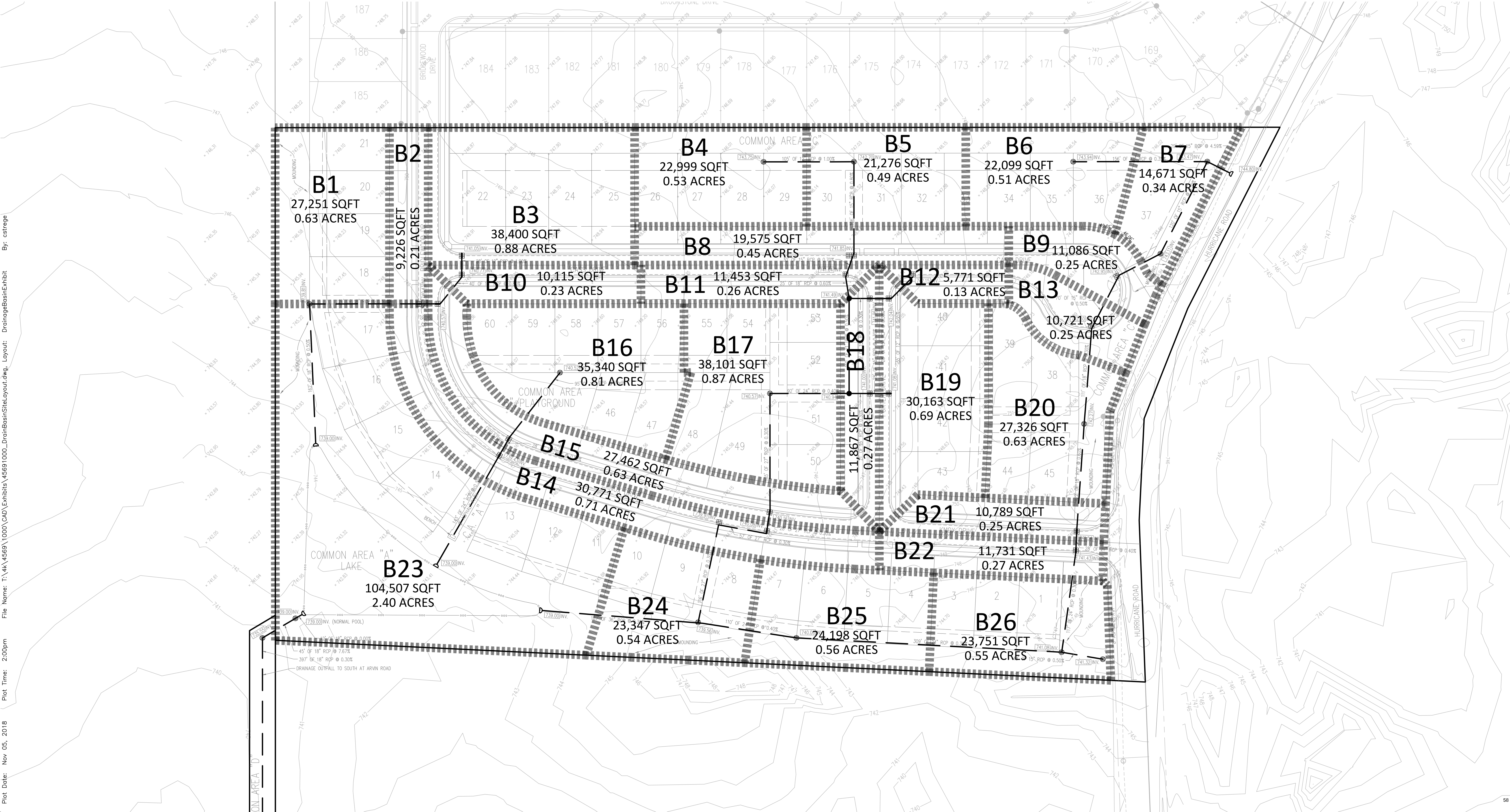
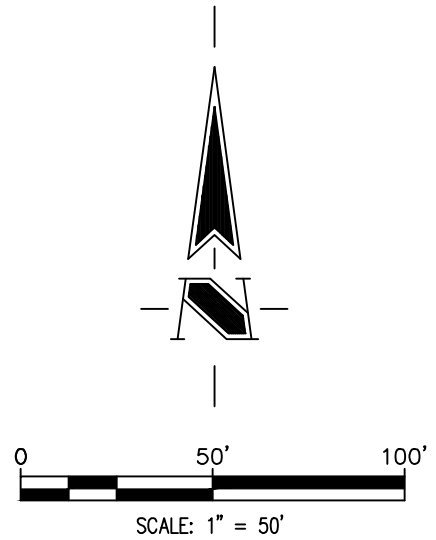
Stage-Discharge for Pond P1: Pond

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
739.00	0.00	741.12	2.25	743.24	5.81
739.04	0.01	741.16	2.27	743.28	5.95
739.08	0.02	741.20	2.30	743.32	6.08
739.12	0.05	741.24	2.32	743.36	6.21
739.16	0.09	741.28	2.35	743.40	6.34
739.20	0.13	741.32	2.37	743.44	6.46
739.24	0.19	741.36	2.39	743.48	6.58
739.28	0.25	741.40	2.42	743.52	6.69
739.32	0.32	741.44	2.44	743.56	6.80
739.36	0.39	741.48	2.46	743.60	6.91
739.40	0.47	741.52	2.49	743.64	7.01
739.44	0.55	741.56	2.51	743.68	7.12
739.48	0.63	741.60	2.53	743.72	7.22
739.52	0.72	741.64	2.55	743.76	7.31
739.56	0.80	741.68	2.57	743.80	7.41
739.60	0.87	741.72	2.60	743.84	7.51
739.64	0.94	741.76	2.62	743.88	7.60
739.68	0.99	741.80	2.64	743.92	7.69
739.72	1.05	741.84	2.66	743.96	7.78
739.76	1.10	741.88	2.68	744.00	7.87
739.80	1.15	741.92	2.70	744.04	7.96
739.84	1.20	741.96	2.72	744.08	8.04
739.88	1.24	742.00	2.74	744.12	8.13
739.92	1.29	742.04	2.77	744.16	8.21
739.96	1.33	742.08	2.79	744.20	8.29
740.00	1.37	742.12	2.81	744.24	8.38
740.04	1.41	742.16	2.83	744.28	8.46
740.08	1.45	742.20	2.85	744.32	8.54
740.12	1.49	742.24	2.87	744.36	8.62
740.16	1.53	742.28	2.89	744.40	8.69
740.20	1.56	742.32	2.90	744.44	8.77
740.24	1.60	742.36	2.92	744.48	8.85
740.28	1.64	742.40	2.94	744.52	8.92
740.32	1.67	742.44	2.96	744.56	9.00
740.36	1.70	742.48	2.98	744.60	9.07
740.40	1.74	742.52	3.00	744.64	9.14
740.44	1.77	742.56	3.02	744.68	9.22
740.48	1.80	742.60	3.09	744.72	9.29
740.52	1.83	742.64	3.19	744.76	9.36
740.56	1.86	742.68	3.30	744.80	9.43
740.60	1.89	742.72	3.43	744.84	9.50
740.64	1.92	742.76	3.57	744.88	9.57
740.68	1.95	742.80	3.73	744.92	9.64
740.72	1.98	742.84	3.90	744.96	9.70
740.76	2.01	742.88	4.08	745.00	9.77
740.80	2.04	742.92	4.27		
740.84	2.06	742.96	4.46		
740.88	2.09	743.00	4.67		
740.92	2.12	743.04	4.89		
740.96	2.14	743.08	5.11		
741.00	2.17	743.12	5.32		
741.04	2.20	743.16	5.50		
741.08	2.22	743.20	5.66		

STORM SEWER



HERITAGE SOUTH
JOHNSON COUNTY, INDIANA
DRAINAGE BASINS EXHIBIT



By: cstrage

File Name: T:\44569\1000\CAO\Exhibits\45691000_DrainBasinStelLayout.dwg, Layout: DrainageBasinExhibit

Plot Time: 2:00pm

Plot Date: Nov 05, 2018

Heritage South
DESIGN STORM: 10 YEAR
MANNINGS n: 0.013

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Upstream Area	Downstream Area	Pipe Length (ft.)	Runoff Coefficient "C"	Area "A" (acres)	"CA"	Cumulative "CA"	Time of Conc. For Structure (min.)	Longest Time (min.)	Inlet Rainfall Intensity (in./hr.)	Design Rainfall Intensity (in./hr.)	Inlet Flow (cfs)	Design Flow (cfs)	Pipe Diameter (inches)	Pipe Slope (%)	Pipe Capacity (cfs)	Velocity (ft./sec)	Travel Time (min)
B3		30	0.50	0.88	0.440		5.0	5.0	6.99	6.99	3.08	3.08	12	1.00	3.56	4.54	0.11
B10	B10		0.95	0.23	0.219	0.440	5.0	5.1	6.99	6.99	1.53	4.60	15	0.80	5.78	4.71	0.14
B2	B2	40	0.50	0.21	0.105	0.659	5.0	5.3	6.99	6.99	0.73	5.34	18	0.30	5.75	3.26	0.77
B1	B1	150	0.50	0.63	0.315	0.764	5.0	6.0	6.99	6.69	2.20	7.21	18	0.50	7.43	4.20	0.65
	Pond	165				1.079											
B16			0.50	0.81	0.405		5.0	5.0	6.99	6.99	2.83	2.83	12	1.00	3.56	4.54	0.37
B15	B15	100	0.95	0.63	0.599	0.405	5.0	5.4	6.99	6.99	4.18	7.01	18	0.50	7.43	4.20	0.12
B14	B14	30	0.95	0.71	0.675	1.004	5.0	5.5	6.99	6.99	4.71	11.73	24	0.30	12.39	3.94	0.63
	Pond	150				1.678											
B4			0.50	0.53	0.265		5.0	5.0	6.99	6.99	1.85	1.85	12	1.00	3.56	4.54	0.40
B5	B5	110	0.95	0.49	0.466	0.265	5.0	5.4	6.99	6.99	3.25	5.11	15	0.80	5.78	4.71	0.39
B8	B8	110	0.95	0.45	0.428	0.731	5.0	5.8	6.99	6.99	2.99	8.09	18	0.70	8.79	4.97	0.10
B11	B11	30	0.95	0.26	0.247	1.158	5.0	5.9	6.99	6.99	1.73	9.82	24	0.30	12.39	3.94	0.13
B12	B18	30	0.95	0.13	0.124	1.405	5.0	5.0	6.99	6.99	0.86	0.87	12	0.35	2.11	2.68	0.25
B19	B19	40	0.50	0.69	0.345	0.124	5.0	5.3	6.99	6.99	2.41	3.28	15	0.30	3.54	2.88	0.17
B18	B18	30	0.50	0.27	0.135	0.469	5.0	5.9	6.99	6.99	0.94	13.10	24	0.40	14.31	4.55	0.82
B17	B17	225	0.50	0.87	0.435	1.874	5.0	6.7	6.99	6.69	3.04	15.44	27	0.30	16.96	4.27	0.16
B15	B15	40	0.95	0.00	0.000	2.309	5.0	6.9	6.99	6.69	0.00	15.44	27	0.30	16.96	4.27	0.33
B14	B14	85	0.95	0.71	0.000	2.309	5.0	7.2	6.99	6.39	0.00	14.75	27	0.30	16.96	4.27	0.47
	B24	120				2.309											
B6			0.50	0.51	0.255		5.0	5.0	6.99	6.99	1.78	1.78	12	0.35	2.11	2.68	0.99
B7	B7	160	0.50	0.34	0.170	0.255	5.0	6.0	6.99	6.99	1.19	2.97	15	0.30	3.54	2.88	1.04
B9	B9	180	0.95	0.25	0.238	0.425	5.0	7.0	6.99	6.39	1.66	4.23	15	0.50	4.57	3.72	0.31
B13	B13	70	0.95	0.25	0.238	0.663	5.0	7.3	6.99	6.39	1.66	5.75	18	0.30	5.75	3.26	0.15
B20	B20	30	0.50	0.63	0.315	0.900	5.0	7.5	6.99	6.39	2.20	7.76	18	0.60	8.14	4.60	0.81
B21	B21	225	0.95	0.25	0.238	1.215	5.0	7.0	6.99	6.39	1.66	9.28	21	0.40	10.02	4.17	0.12
B22	B22	30	0.95	0.27	0.257	1.453	5.0	7.2	6.99	6.39	1.79	10.91	24	0.30	12.39	3.94	0.51
B26	B26	120	0.50	0.55	0.275	1.709	5.0	7.7	6.99	6.39	1.92	12.67	24	0.35	13.38	4.26	1.21
B25	B25	310	0.50	0.56	0.280	1.984	5.0		6.99	6.39	1.96						