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June 20, 2024
Revised: July 9, 2024

Final Stormwater Study

Client

Intrinsic Development
3622 Endeavor Ave, Ste. 101
Columbia, MO 65201

Project

Discovery Crossing
SW Corner of Douglas St and Colbern Rd
Lee's Summit, MO

P.N. 24KC10015

Report Prepared By:

OWN, Inc.
8455 College Boulevard
Overland Park, KS 66210
816.777.0400

WeAreOwn.com
866.866.2741
info@weareown.com

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Jeffrey Bartz, PE
MO#2012022594

Project Description and General Information

The proposed project is a 268 acre mixed use development located at the intersection of Colbern Road and Douglas Street in Lee's Summit, Missouri. The Village at Discovery Park is the first phase of the Discovery Park project.

The purpose of this report is to re-analyze the stormwater impacts of the proposed mixed use development and proposed changes to the previously approved regional basin design. The previous drainage study titled "Discovery Park Macro Stormwater Report", prepared by Olsson dated October 24, 2023, was referenced to establish the offsite catchment areas for the development. The plans titled "Public Storm Sewer Plans for The Village at Discovery Park Zone 1" prepared by Olsson dated September 8, 2023 were used to establish the conveyance network from offsite areas.

This report provides the analysis to show that the post-development condition with the proposed revisions still meets the regulations established by the City of Lee's Summit for the study area upstream of Point A4 as indicated in the Olsson study. The proposed improvements include revisions to the overflow weir for the original above ground detention basin. Supporting calculations for the entire basin design to collect, detain, and control the peak flows of the design storms have been provided.

The existing soil characteristics as published in the Soil Survey for Jackson County, Missouri are summarized in the table below. Additional information on the existing soil is provided in the Web Soil Survey located in the Appendix.

Table 1: Soil Classifications

Map Unit Symbol	Map Unit Name	Slopes	Hydrologic Soil Group
10117	Sampsel Silty Clay Loam	5 to 9%	C/D
10120	Sharpsburg Silty Loam	2 to 5%	C
10128	Sharpsburg-Urban Land Complex	2 to 5%	D
10180	Udarents-Urban Land-Sampsel Complex	2 to 5%	C
30080	Greenton Silty Clay Loam	5 to 9%	C/D
40107	Snead-Rock Outcrop Complex	5 to 14%	D
40108	Snead-Rock Outcrop Complex	14 to 30%	D

According to FEMA flood maps (FIRM Panel 29095C0409G and 29095C0430G), the site is located in zone X, an area of minimal flood hazard. No amendments or revisions to the map are being proposed.

Methodology

The Discovery Crossing site was analyzed in both the pre-development and post-development conditions. The analysis was conducted utilizing HydroCAD which uses an SCS Type-II 24 hr. rainfall distribution data in computing unit hydrographs for varying

conditions. Precipitation depths used in the analysis (outlined in Table 2 below) have been interpolated from the "Technical Paper No. 40 Rainfall Frequency Atlas of the United States" (TP-40).

Table 2: Rainfall Precipitation

Annual Exceedance Probability (AEP)	Rainfall Depth (inches)
90% (Water Quality Event)	1.37
50% (2 year)	3.50
10% (10 year)	5.34
1% (100 year)	7.71

The post-development rates were determined utilizing the APWA 5600 Comprehensive Protection Strategy in accordance with the City of Lee's Summit regulations. Under this strategy, peak runoff control is provided for the 1%, 10%, and 50% chance storms and volumetric and/or extended detention control (≥40 hr.) of the 90% mean annual event storm. The maximum allowable release rates for the design storm events are established for the 2-year (0.50 cfs/acre), 10-year (2.0 cfs/acre), 100-year (3.0 cfs/acre).

Existing Conditions Analysis

The site is located at the northwest corner of Douglas Street and Colbern Road in Lee's Summit, Missouri. The full site is bounded by Cobern Road to the south, Douglas Street to the east, and undeveloped land to the north and west. Phase 1 encompasses approximately 39.2 acres. The site generally drains north into an existing creek that ultimately drains into Unity Lake Number Two.

OWN concurs with the existing conditions as established in the previous study titled "Discovery Park Macro Stormwater Report", prepared by Olsson dated October 24, 2023. The existing conditions parameters are summarized in the table below.

Table 3: Existing Conditions Design Parameters from Olsson Study

Location ID	Onsite Area (ac)	Offsite Area (ac)	Total Area (ac)	Weighted NRCS CN
A4e	9.34	0.51	9.85	81
A4w	9.19	8.22	17.41	73
A5e	12.88	2.28	15.16	80
A5w	18.66	1.11	19.77	76
A6	9.21	4.24	13.45	83
A7	0	30.60	30.60	76
A8	0	21.56	21.56	81
A9	0	31.84	31.84	84
A10	0	12.23	12.23	94
Total	59.28	112.59	171.87	

The existing parameters were input into a new HydroCAD model and analyzed for the design storms. Times of concentration were then recalculated and utilized in the model. The results of the existing analysis are summarized in the table below.

Table 4: Existing Condition Model Results

Location ID	Time of Concentration (min)	Total Area (ac)	2 Year Peak Flow (cfs)	10 Year Peak Flow (cfs)	100 Year Peak Flow (cfs)
A4e	6	9.85	28.99	54.86	89.09
A4w	10.3	17.41	30.16	66.49	117.98
A5e	10.2	15.16	37.29	72.20	118.85
A5w/A6	15	19.77	66.36	131.86	220.19
A7	11.6	30.60	59.57	123.94	212.66
A8	14.4	21.56	48.22	92.37	151.10
A9	15.2	31.84	78.65	143.71	228.66
A10	13.3	12.23	44.50	70.80	104.25
Pt A4 Total		171.87	310.20	613.12	1,030.92

Proposed Conditions Analysis

The proposed development for this phase consists of The Village at Discovery Park which contains a mix of retail and restaurants buildings, apartments, and associated surface parking. Future phases include the Aria Apartments to the north and Discovery Crossing to the south. There are portions of Discovery Park that drain northwest and west into the proposed detention basin. For the purpose of this study, the current and future phases have been combined to reflect a full build out, hereafter referred to as “proposed”. Refer to the Post-

Development Plan in the Appendix. The proposed condition parameters are summarized in the table below.

Table 5: Proposed Condition Design Parameters

Location ID	Onsite Area (ac)	Offsite Area (ac)	Total Area (ac)	Weighted NRCS CN	Time of Concentration (min)
A4e	0.98	0.50	1.48	89	6
A4w	0.59	8.16	8.75	72	6
A5e	18.20	0.92	19.12	92	6
A5w	31.08	2.34	33.42	95	6
A6	9.88	3.54	13.42	94	6
A7	0	30.60	30.60	76	11.6
A8	0	21.56	21.56	81	14.4
A9	0	31.84	31.84	84	15.2
A10	0	12.23	12.23	94	13.3
Total	60.73	111.69	172.42		

The allowable release rates were determined using the Comprehensive Control Strategy as defined in APWA 5608.4. A summary of the allowable release rates is provided in the table below:

Table 6: Allowable Release Rates

Design Storm	Allowable Release Rate (cfs/acre)	Allowable Bypass Flows (cfs)	Allowable Onsite Discharge Rate (cfs)	Proposed Allowable Release Rate (cfs)
50% (2 year)	0.5	229.20	30.36	259.56
10% (10 year)	2.0	427.58	121.46	549.04
1% (100 year)	3.0	691.32	182.19	873.51

To mitigate the impact of the proposed increase in impervious area associated with the development and to satisfy the requirement for detention, an above ground regional detention basin has been designed to capture stormwater and release it at rates at or below the allowable release rates established above. The proposed basin will receive stormwater from enclosed pipe systems that collect water from the streets and parking lots. An outlet control structure with multiple stage release controls is proposed to provide controlled release of the 2-yr, 10-yr, and 100-yr design storms. The outlet control structure consists of a 9'x12' open top structure with two (2) 8' wide by 6.5" tall openings, two (2) 11' wide by 6.5" openings, and a 142 degree V-notch weir. The structure outlets into a 6'x5' concrete box culvert. Additional detail of the outlet control structure is provided in the appendix.

The peak release rates for the proposed development are summarized in the table below:

Table 7: Proposed Condition Model Results

Location ID	Total Area (ac)	2 Year Peak Flow (cfs)	10 Year Peak Flow (cfs)	100 Year Peak Flow (cfs)
A4e/A4w	10.23	21.99	46.48	81.05
A5e	19.12	82.11	133.24	198.19
A5w/A6	46.84	215.65	338.72	495.56
A7	30.60	59.57	123.94	212.66
A8	21.56	48.22	92.37	151.10
A9	31.84	78.65	143.71	228.66
A10	12.23	44.50	70.80	104.25
Detention Basin (Inflow)	N/A	454.20	787.41	1,225.95
Detention Basin (Outflow)	N/A	157.77	414.92	720.09
Pt A4 Total	172.42	161.23	423.67	767.60

The discharge at Pt A4 is below the existing and allowable release rates in the proposed condition as summarized in the table below.

Table 8: Existing vs Proposed Comparison at Point A4

	2 Year	10 Year	100 Year
Existing Peak Flow (cfs)	310.20	613.12	1,030.92
Allowable Release Rate (cfs)	259.56	549.04	873.51
Proposed Peak Flow (cfs)	161.23	423.67	767.60

An emergency overflow spillway has been provided and sized to pass the 100-year flow in accordance with APWA Section 5608.4.F. The original spillway design has been modified to reduce the overall height of the spillway and top of berm. The proposed design meets the required minimum freeboard for both APWA Section 5608.4.F and SCS TR-60. A summary of the previously designed and proposed spillway is in the table below.

Table 9: Spillway Design

	Previous Design	Proposed Design
100 year WSE	934.78	934.86
Top of Spillway Elevation (Min. 0.5' above 100-yr WSE per APWA 5608)	936.50	935.36
100-yr Clogged Peak Flow (cfs)	750.46	1,225.95
Broad Crested Weir Length (ft)	87.0	140.0
100 year Clogged WSE	938.52	937.40
Calculated Depth of 100-yr Clogged Flow (ft)	2.02	2.04
Top of Berm (Min. 1.0' above 100-yr Clogged WSE per APWA 5608)	941.00	938.40
Spillway Height (Min. 3.0' per TR-60)	4.50	3.04

The 100-year clogged flow from the previous study utilized the proposed 100-year peak outflow, which is inaccurate. The proposed design has been updated to use the 100-year peak inflow to the basin necessitating a wider spillway design. On the downstream side of the spillway, the grades have been revised to direct any emergency overflows around the RCB outlet. The grading plan has been updated to reflect this change and is included in the appendix.

The proposed basin also provides the water quality volume required for extended detention control (≥40 hr.) of the 90% mean annual event storm for the first phase of the development. The area in the first phase (The Village at Discovery Park) includes 33 acres which requires 2.75 acre-ft of volume to treat the water quality storm. The proposed basin provides 2.76 acre-ft of volume to meet this requirement. The full calculation for the water quality volume is provided in the appendix. The remainder of the project site which includes the south phase (Discovery Crossing) and the north phase (Aria Apartments) will be required to provide additional water quality treatment for their respective areas.

Summary and Recommendations

The existing site is undeveloped, consisting mostly of grass and farmland. The proposed development for this phase consists of a mix of retail and restaurants buildings, apartments, and associated surface parking. Future phases include the Aria Apartments to the north and Discovery Crossing to the south. To mitigate the increase in runoff release rates due to the increase in impervious area, an enclosed pipe network in conjunction with an above ground detention basin with an outlet control structure was designed. Peak runoff control is provided for the 1%, 10%, and 50% chance storms and volumetric and/or extended detention control (≥40 hr.) of the 90% mean annual event storm for The Village at Discovery Park. The future phases of Discovery Crossing and Aria Apartments will require additional water quality treatment. Post-development site conditions and detention basins were modeled and analyzed using HydroCAD. Detailed calculations are presented in the Appendix to support the presented release rate summaries, detention volumes, and maximum water surface elevations.

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Study/Report

Appendix

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Pre-Development Plan

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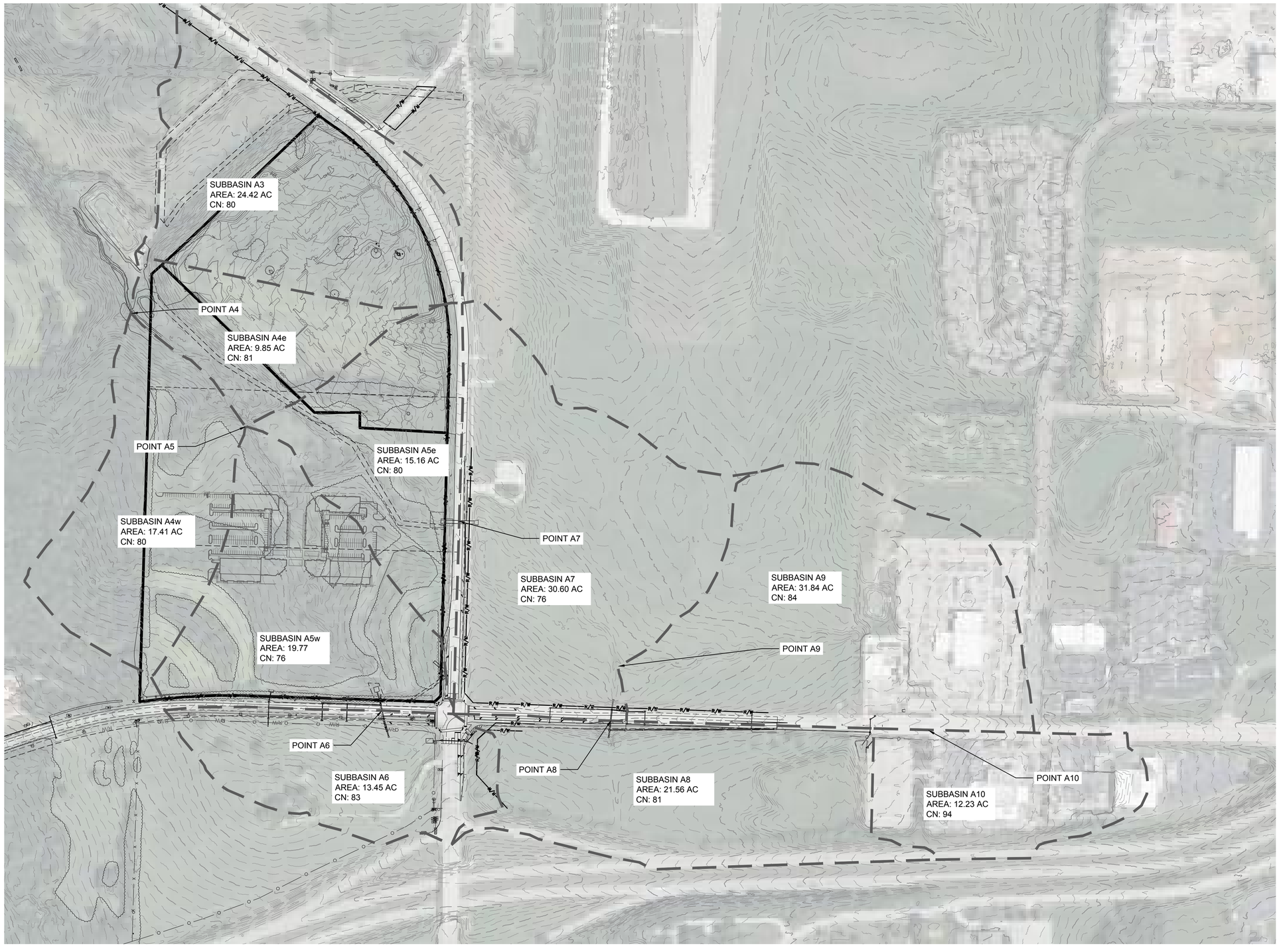

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8455 College Boulevard
Overland Park, KS 66210
816.777.0400
weareown.com

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DISOVERY CROSSING PRELIMINARY STORMWATER REPORT

SW CORNER OF DOUGLAS ST
AND COLBERN RD
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 06/20/2024
FIELD BOOK:

ISSUED BY:
LICENSE NO: ____

SHEET TITLE

PRE-DEVELOPMENT PLAN

SHEET NUMBER

1

1 OF 2

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Study/Report

Post-Development Plan

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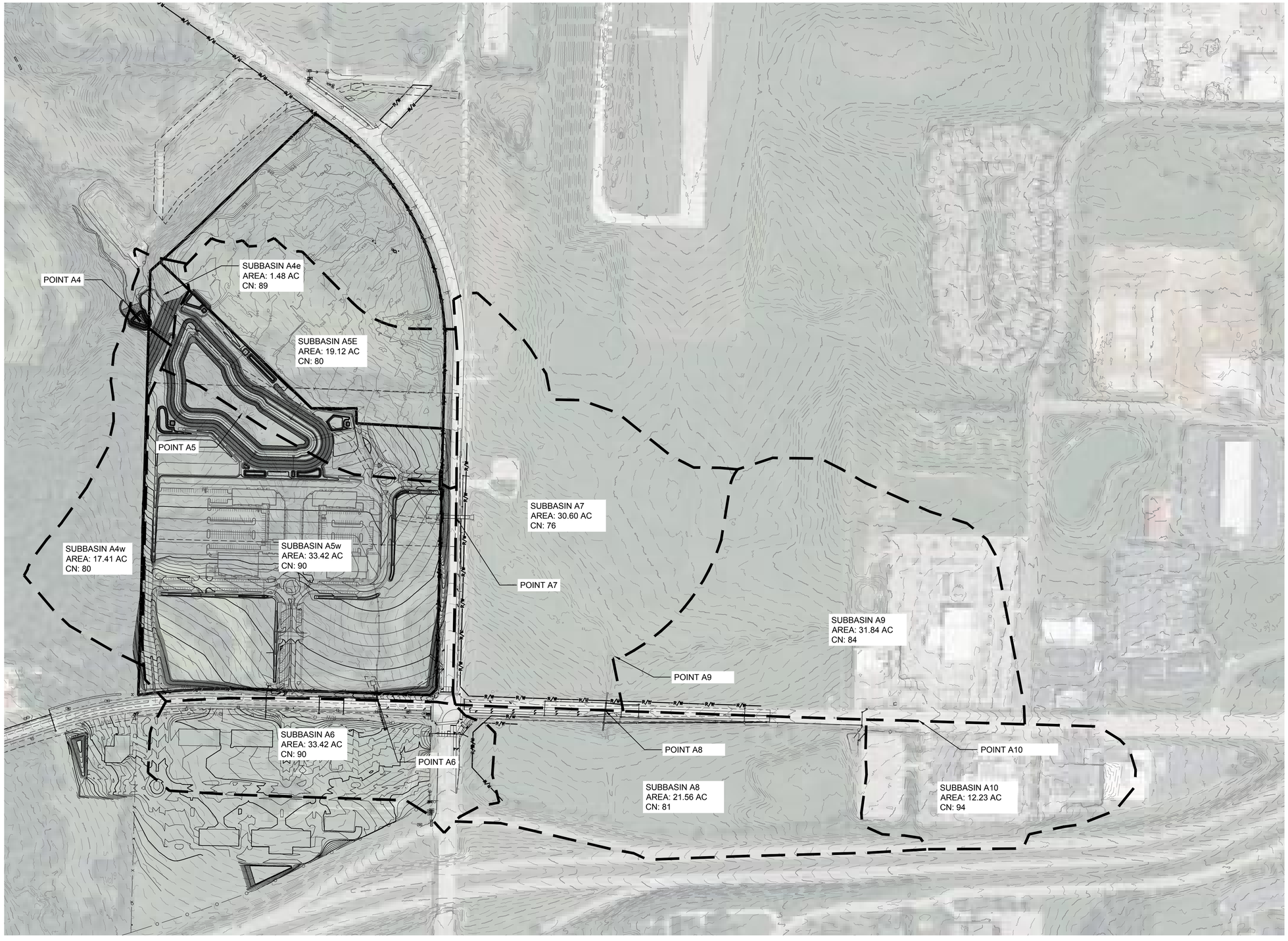

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DISOVERY CROSSING PRELIMINARY STORMWATER REPORT

SW CORNER OF DOUGLAS ST
AND COLBERN RD
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
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ISSUED BY:
LICENSE NO:

SHEET TITLE

POST-DEVELOPMENT PLAN

SHEET NUMBER

2

2 OF 2

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Study/Report

Soil Report

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United States Department of Agriculture

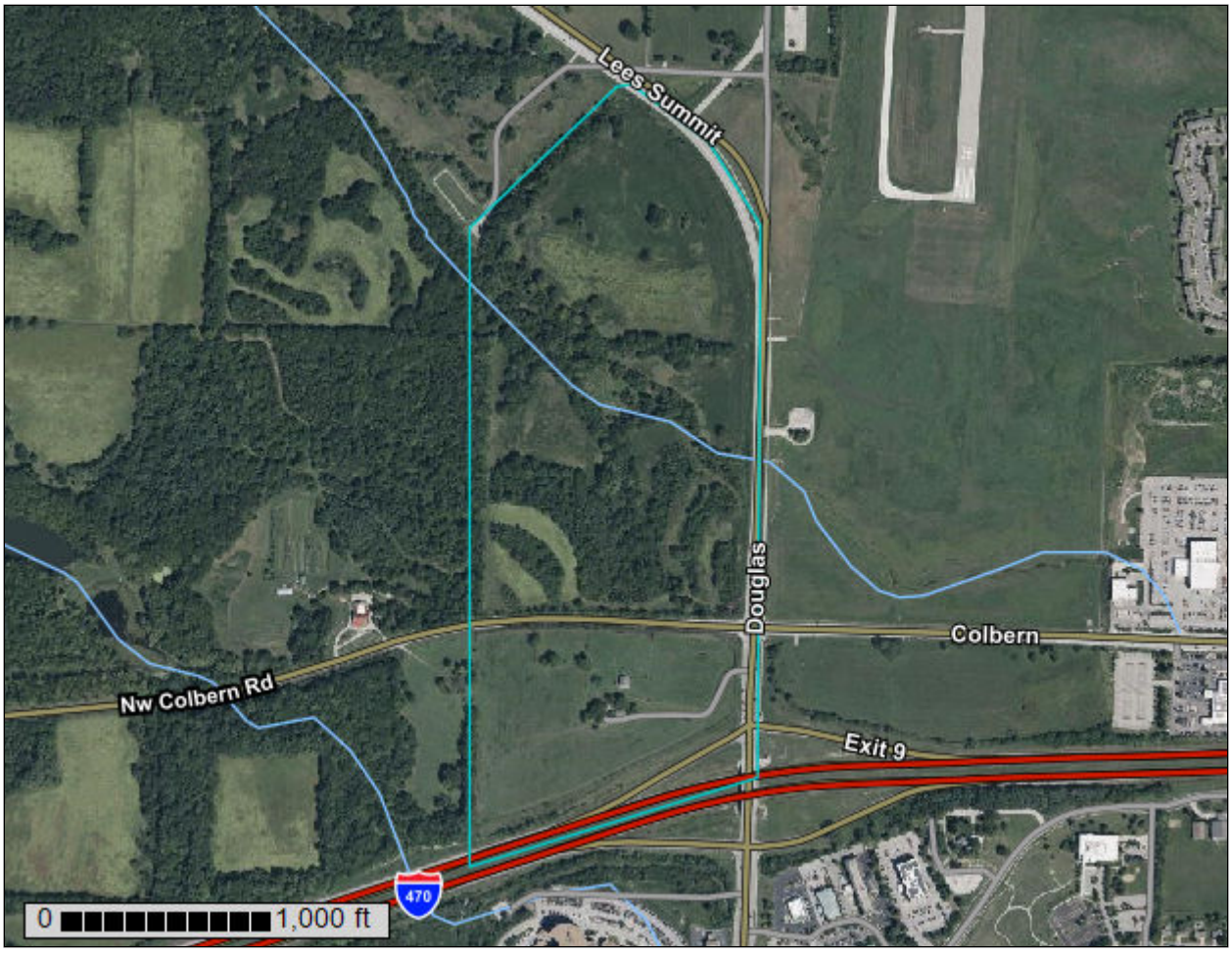
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jackson County, Missouri

Discovery Park



June 15, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

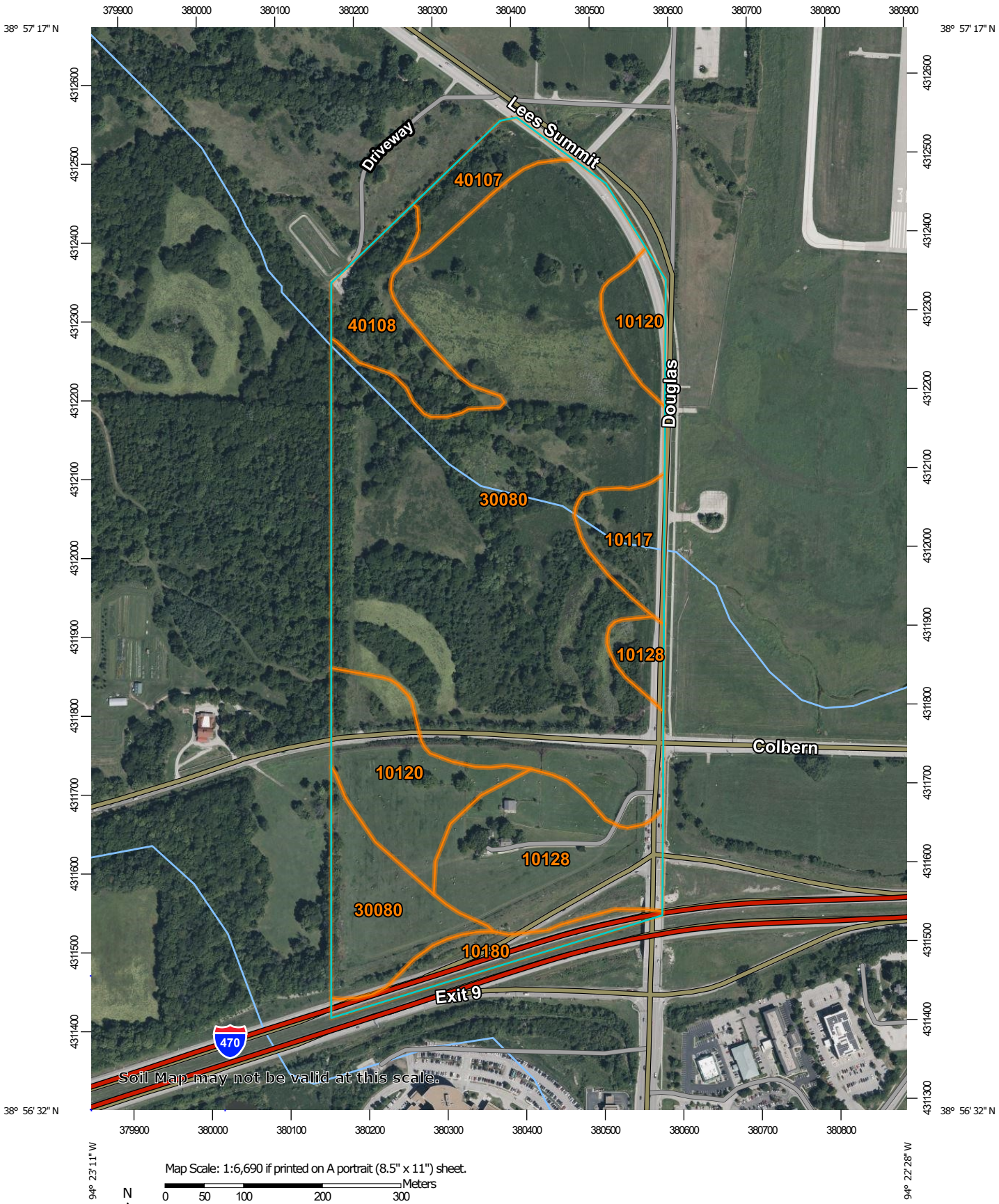
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:6,690 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 25, Aug 22, 2023

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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
10117	Sampsel silty clay loam, 5 to 9 percent slopes	3.4	3.3%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	10.3	9.9%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	12.2	11.7%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	3.2	3.1%
30080	Greenton silty clay loam, 5 to 9 percent slopes	66.2	63.9%
40107	Snead-Rock outcrop complex, warm, 5 to 14 percent slopes	3.1	3.0%
40108	Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	5.2	5.0%
Totals for Area of Interest		**103.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas

are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County, Missouri

10117—Sampsel silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qkzz
Elevation: 600 to 1,120 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sampsel and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex, concave
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

Minor Components

Greenton

Percent of map unit: 8 percent

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Snead

Percent of map unit: 7 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

10120—Sharpsburg silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2yy7v
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sharpsburg and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 16 inches: silty clay loam
Bt1 - 16 to 22 inches: silty clay loam
Bt2 - 22 to 46 inches: silty clay loam
BC - 46 to 58 inches: silty clay loam
C - 58 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 45 to 50 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Sibley

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Higginsville, eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ql09
Elevation: 1,000 to 1,320 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 155 to 220 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Sharpsburg and similar soils: 60 percent
Urban land: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

A - 0 to 17 inches: silt loam
Bt - 17 to 55 inches: silty clay loam
C - 55 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Macksburg

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XD860IA - Loess Upland Prairie
Hydric soil rating: No

10180—Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1n85h
Elevation: 600 to 900 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 175 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Udarents and similar soils: 46 percent
Urban land: 39 percent
Sampsel and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udarents

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil or earthy fill

Typical profile

C1 - 0 to 5 inches: silt loam
C2 - 5 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Across-slope shape: Convex

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

30080—Greenton silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2xjd9
Elevation: 640 to 1,120 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 209 days
Farmland classification: Not prime farmland

Map Unit Composition

Greenton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Greenton

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from limestone and shale

Typical profile

Ap - 0 to 12 inches: silty clay loam
Bt - 12 to 28 inches: silty clay
2Bt - 28 to 30 inches: silty clay
2C - 30 to 79 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Sampsel

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: Yes

40107—Snead-Rock outcrop complex, warm, 5 to 14 percent slopes

Map Unit Setting

National map unit symbol: 2zccr
Elevation: 660 to 1,130 feet
Mean annual precipitation: 39 to 43 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 185 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Snead, warm, and similar soils: 70 percent
Rock outcrop: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Snead, Warm

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and shale

Typical profile

A - 0 to 10 inches: silty clay loam
Bw - 10 to 20 inches: silty clay
BC - 20 to 24 inches: silty clay
C - 24 to 35 inches: silty clay
Cr - 35 to 45 inches: bedrock

Properties and qualities

Slope: 5 to 14 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 5 to 14 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Oska

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R106XY015KS - Loamy Upland (PE 30-37)
Hydric soil rating: No

Sampsel

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: Yes

Kennebec, occasionally flooded

Percent of map unit: 3 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY028MO - Loamy Upland Drainageway Savanna
Hydric soil rating: No

40108—Snead-Rock outcrop complex, warm, 14 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2zccp
Elevation: 670 to 1,130 feet
Mean annual precipitation: 39 to 43 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 185 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Snead, warm, and similar soils: 65 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Snead, Warm

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and shale

Typical profile

A - 0 to 10 inches: silty clay loam
Bw - 10 to 20 inches: silty clay
BC - 20 to 24 inches: silty clay
C - 24 to 35 inches: silty clay
Cr - 35 to 45 inches: bedrock

Properties and qualities

Slope: 14 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 14 to 30 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Norris

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Convex
Ecological site: F109XY025MO - Interbedded Sedimentary Exposed Backslope Woodland
Hydric soil rating: No

Sampsel

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: Yes

Oska

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R106XY015KS - Loamy Upland (PE 30-37)
Hydric soil rating: No

Kennebec, occasionally flooded

Percent of map unit: 2 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY028MO - Loamy Upland Drainageway Savanna
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Discovery Park)

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:

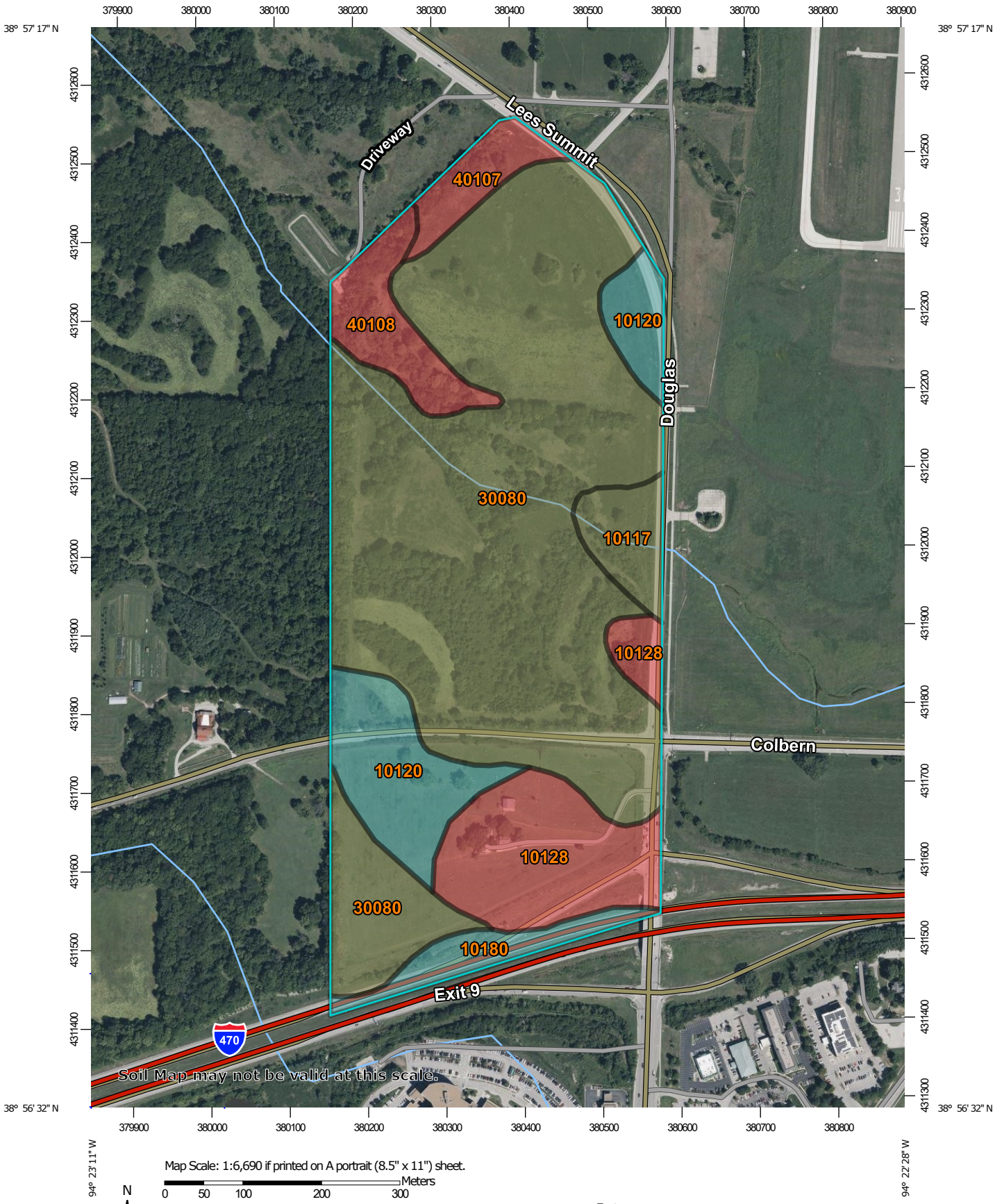
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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.



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 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 25, Aug 22, 2023

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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.

Table—Hydrologic Soil Group (Discovery Park)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10117	Sampsel silty clay loam, 5 to 9 percent slopes	C/D	3.4	3.3%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	C	10.3	9.9%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	12.2	11.7%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	C	3.2	3.1%
30080	Greenton silty clay loam, 5 to 9 percent slopes	C/D	66.2	63.9%
40107	Snead-Rock outcrop complex, warm, 5 to 14 percent slopes	D	3.1	3.0%
40108	Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	D	5.2	5.0%
Totals for Area of Interest			**103.6**	**100.0%**

Rating Options—Hydrologic Soil Group (Discovery Park)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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Accepted
Study/Report

FEMA Floodplain Map

OWN

Engineering beyond.™

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Missouri State Plane West Zone (FIPS zone 2403). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from the U.S.D.A Farm Service National Agriculture ImageryProgram (NAIP) dated 2014. Produced at scale of 1:24,000.

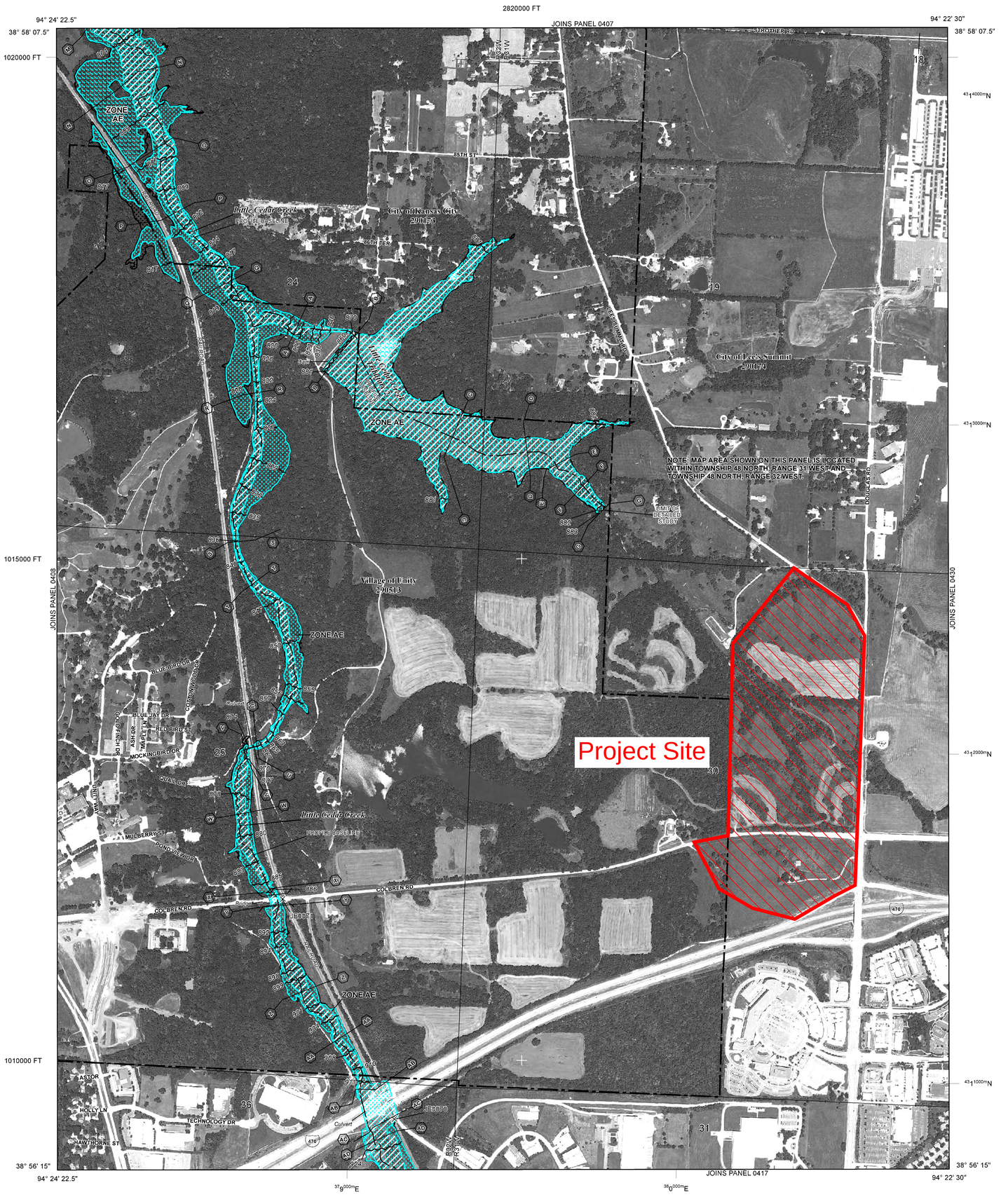
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT — 5000-foot ticks: Missouri State Plane West Zone (FIPS Zone 2403), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 29, 2006

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 20, 2017 - to change Special Flood Hazard Areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0409G

FIRM

FLOOD INSURANCE RATE MAP

JACKSON COUNTY, MISSOURI
AND INCORPORATED AREAS

PANEL 409 OF 625
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KANSAS CITY, CITY OF	290173	0409	G
LEE'S SUMMIT, CITY OF	290174	0409	G
UNITY, VILLAGE OF	290513	0409	G

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

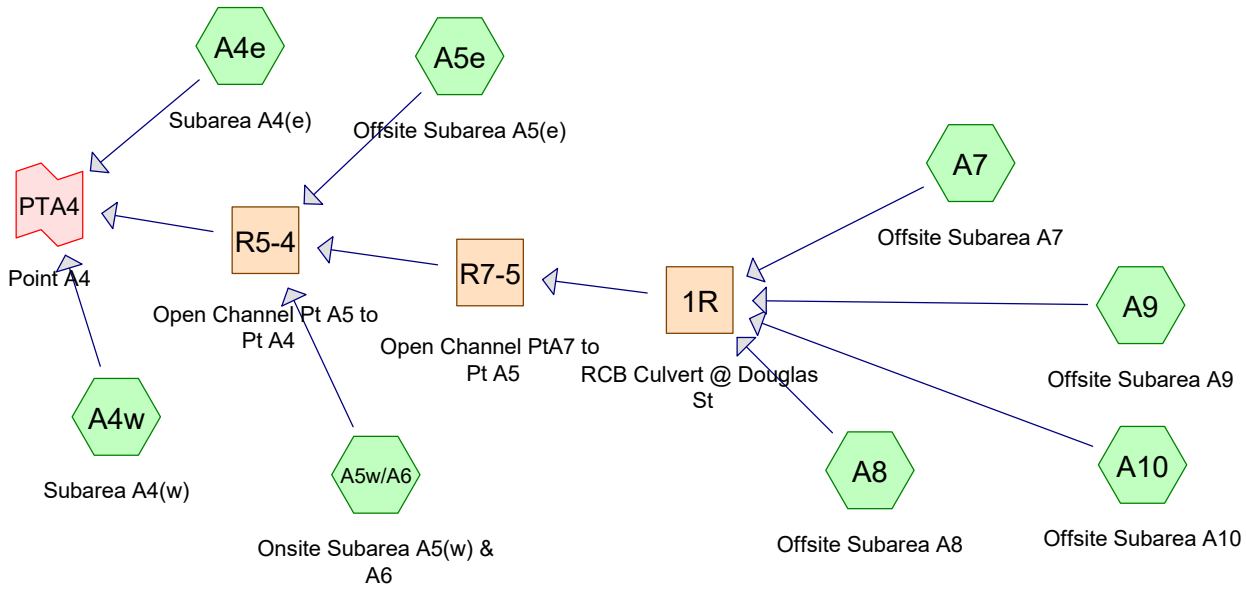
MAP NUMBER
29095C0409G
MAP REVISED
JANUARY 20, 2017

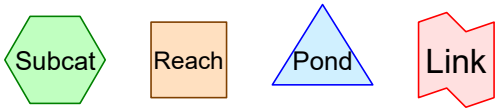
Federal Emergency Management Agency

Accepted
Study/Report

HydroCAD Report

Engineering beyond.™





Routing Diagram for Discovery Park Existing
Prepared by OWN Inc, Printed 6/19/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type II 24-hr		Default	24.00	1	3.50	2
2	10-Year	Type II 24-hr		Default	24.00	1	5.34	2
3	100-Year	Type II 24-hr		Default	24.00	1	7.71	2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=2.84"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=44.50 cfs 2.890 af

Subcatchment A4e: Subarea A4(e) Runoff Area=9.850 ac 0.00% Impervious Runoff Depth=1.71"
Tc=6.0 min CN=81 Runoff=28.99 cfs 1.402 af

Subcatchment A4w: Subarea A4(w) Runoff Area=17.410 ac 0.00% Impervious Runoff Depth=1.18"
Flow Length=1,800' Slope=0.0400 '/' Tc=10.3 min CN=73 Runoff=30.16 cfs 1.711 af

Subcatchment A5e: Offsite Subarea A5(e) Runoff Area=15.160 ac 0.00% Impervious Runoff Depth=1.64"
Flow Length=1,300' Slope=0.0250 '/' Tc=10.2 min CN=80 Runoff=37.29 cfs 2.067 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=33.220 ac 0.00% Impervious Runoff Depth=1.57"
Flow Length=2,450' Slope=0.0200 '/' Tc=15.0 min CN=79 Runoff=66.36 cfs 4.335 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=1.37"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=59.57 cfs 3.482 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=1.71"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=48.22 cfs 3.070 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=78.65 cfs 5.138 af

Reach 1R: RCB Culvert @ Douglas Avg. Flow Depth=0.85' Max Vel=20.84 fps Inflow=229.20 cfs 14.579 af
156.0" x 84.0" Box Pipe n=0.013 L=126.5' S=0.0490 '/' Capacity=3,983.41 cfs Outflow=228.43 cfs 14.579 af

Reach R5-4: Open Channel Pt A5 to Avg. Flow Depth=2.10' Max Vel=10.45 fps Inflow=295.35 cfs 20.982 af
n=0.030 L=732.0' S=0.0328 '/' Capacity=12,031.29 cfs Outflow=289.29 cfs 20.982 af

Reach R7-5: Open Channel PtA7 to Avg. Flow Depth=2.53' Max Vel=5.65 fps Inflow=228.43 cfs 14.579 af
n=0.030 L=1,038.0' S=0.0077 '/' Capacity=5,828.36 cfs Outflow=216.42 cfs 14.579 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=310.20 cfs 24.096 af
Primary=0.00 cfs 0.000 af Secondary=310.20 cfs 24.096 af

Total Runoff Area = 171.870 ac Runoff Volume = 24.096 af Average Runoff Depth = 1.68"
100.00% Pervious = 171.870 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

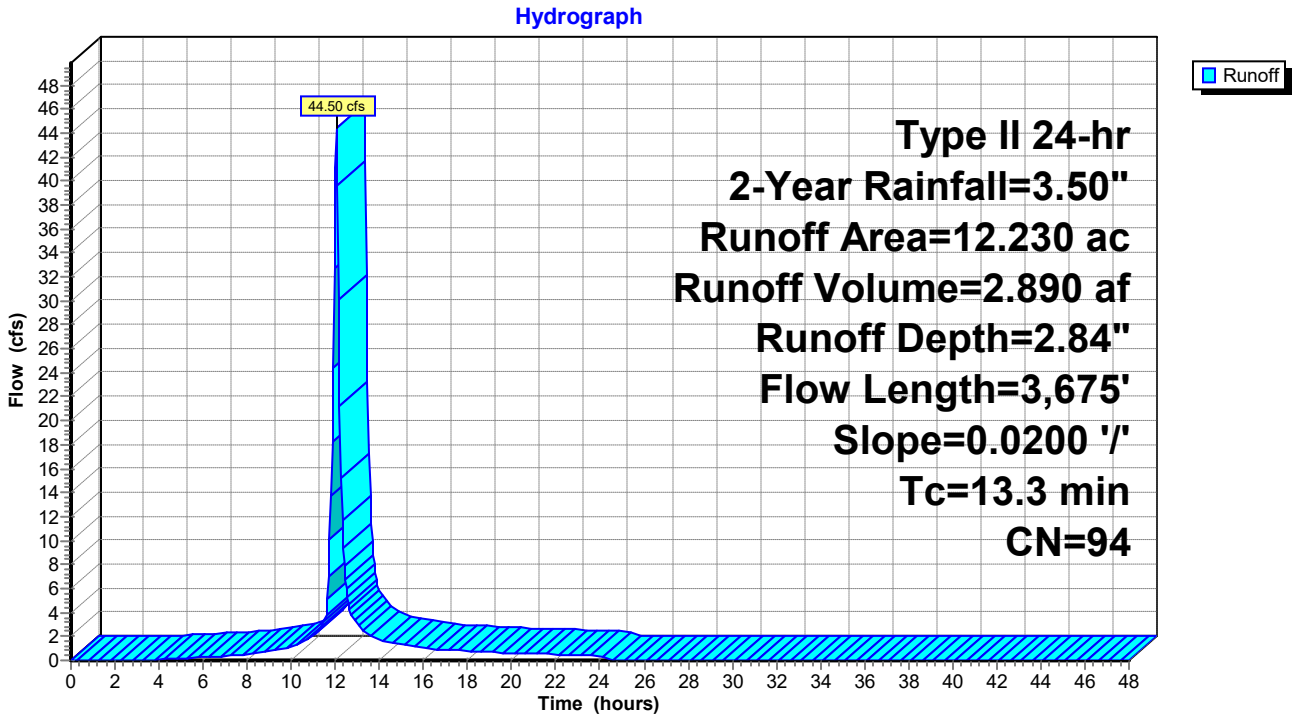
Runoff = 44.50 cfs @ 12.05 hrs, Volume= 2.890 af, Depth= 2.84"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Summary for Subcatchment A4e: Subarea A4(e)

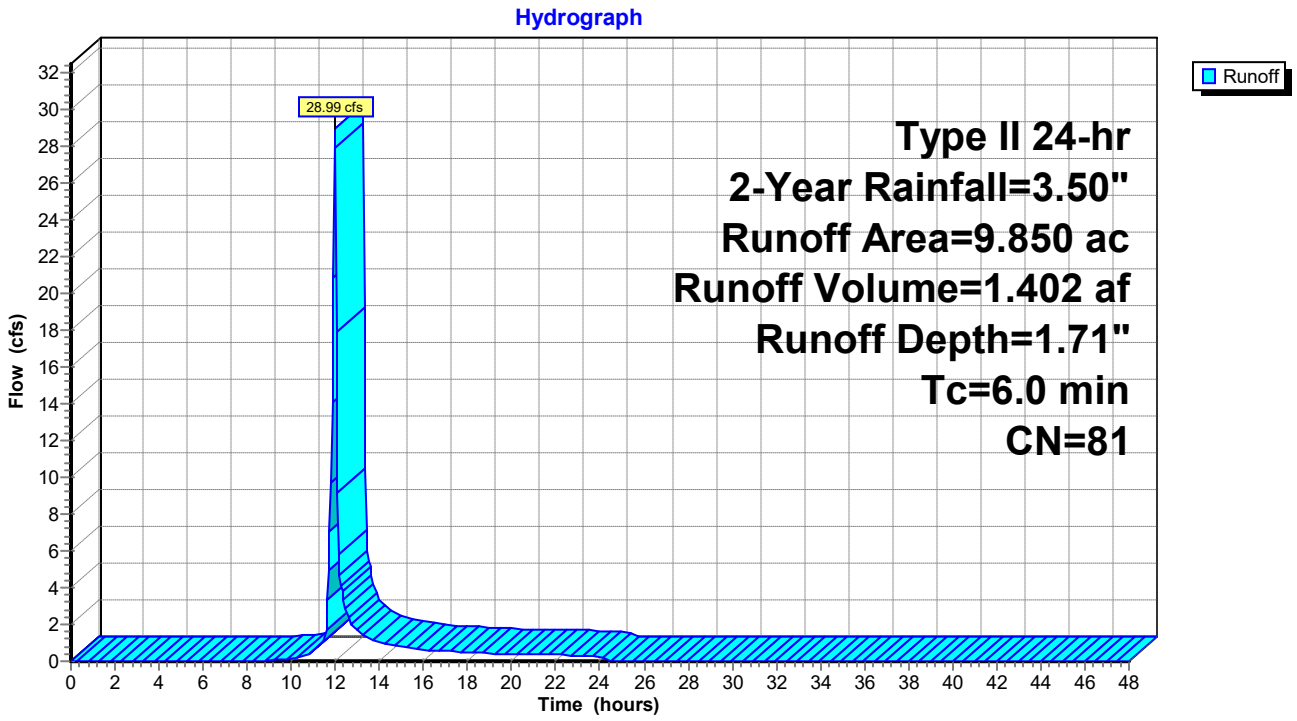
Runoff = 28.99 cfs @ 11.97 hrs, Volume= 1.402 af, Depth= 1.71"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	9.850	81	
	9.850		100.00% Pervious Area

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

Subcatchment A4e: Subarea A4(e)



Summary for Subcatchment A4w: Subarea A4(w)

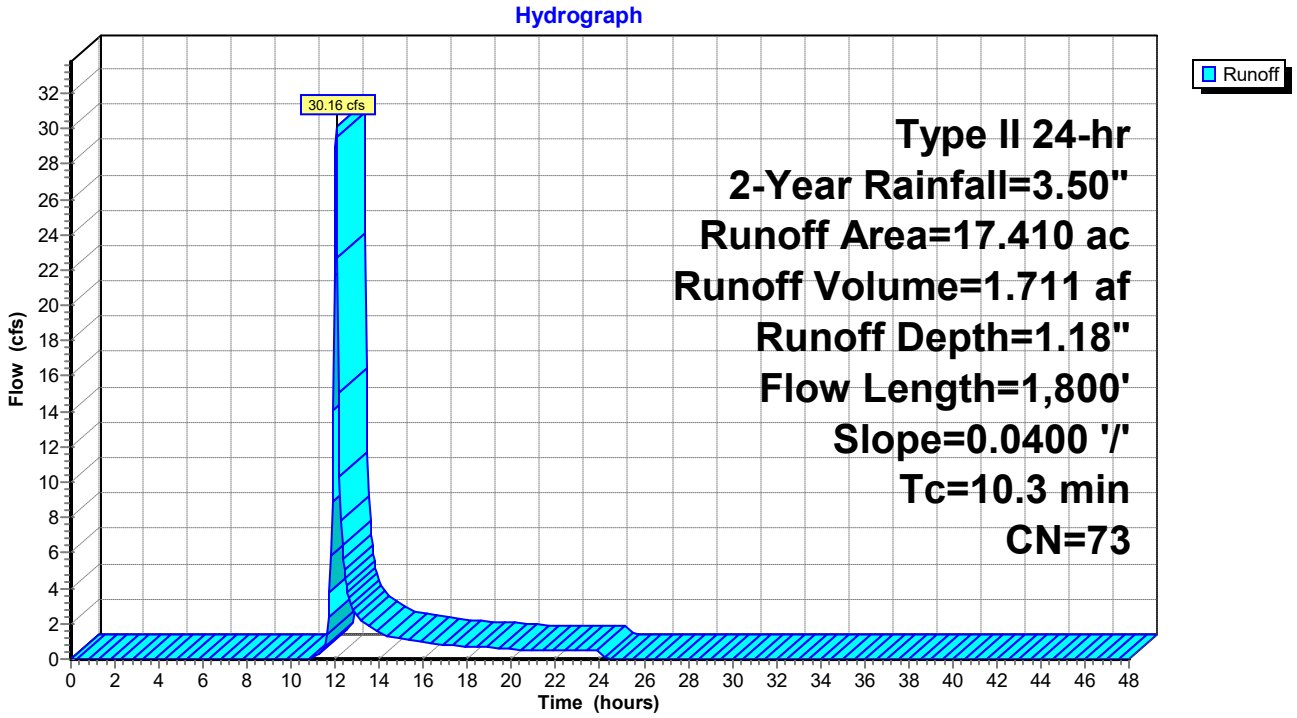
Runoff = 30.16 cfs @ 12.03 hrs, Volume= 1.711 af, Depth= 1.18"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	17.410	73	
	17.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0400	0.26		**Sheet Flow,** Range n= 0.130 P2= 3.50"
4.0	1,700		7.00		**Direct Entry,**
10.3	1,800	Total			

Subcatchment A4w: Subarea A4(w)



Summary for Subcatchment A5e: Offsite Subarea A5(e)

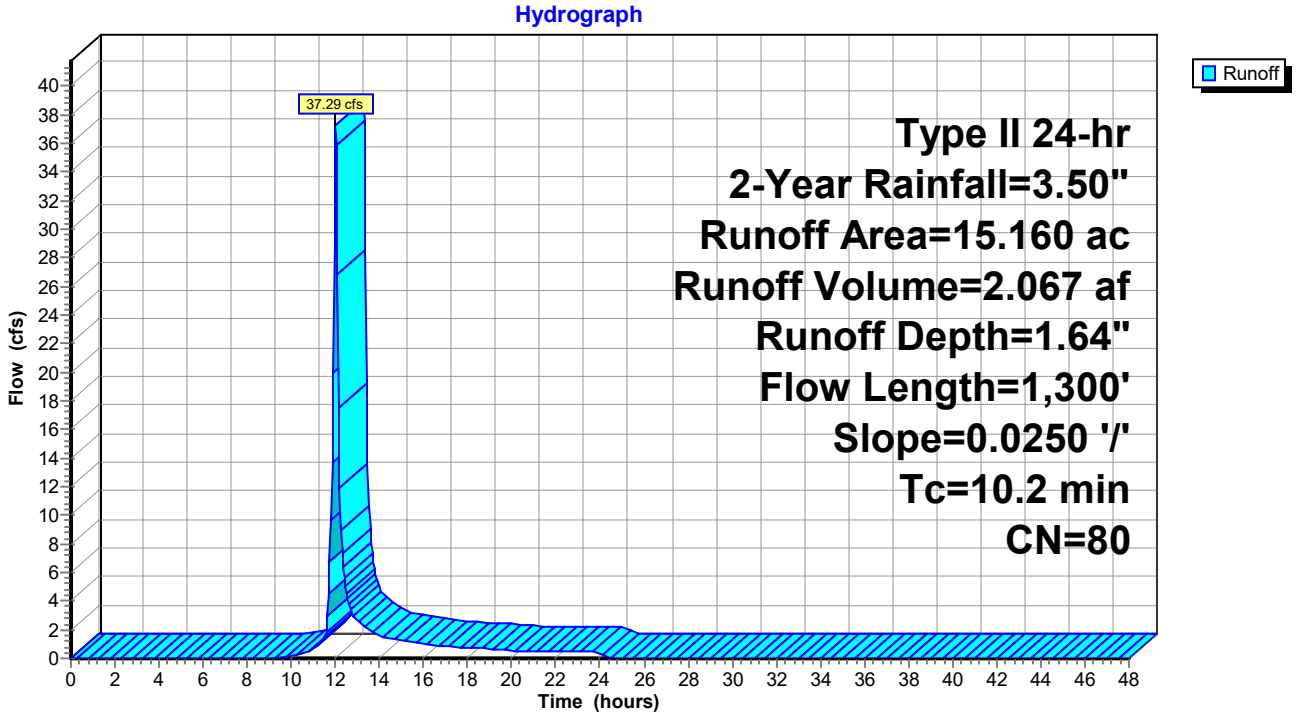
Runoff = 37.29 cfs @ 12.02 hrs, Volume= 2.067 af, Depth= 1.64"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	15.160	80	Subarea A5(e)
	15.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0250	0.22		**Sheet Flow,** Range n= 0.130 P2= 3.50"
0.5	300		10.00		**Direct Entry,**
2.1	900		7.00		**Direct Entry,**
10.2	1,300	Total			

Subcatchment A5e: Offsite Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

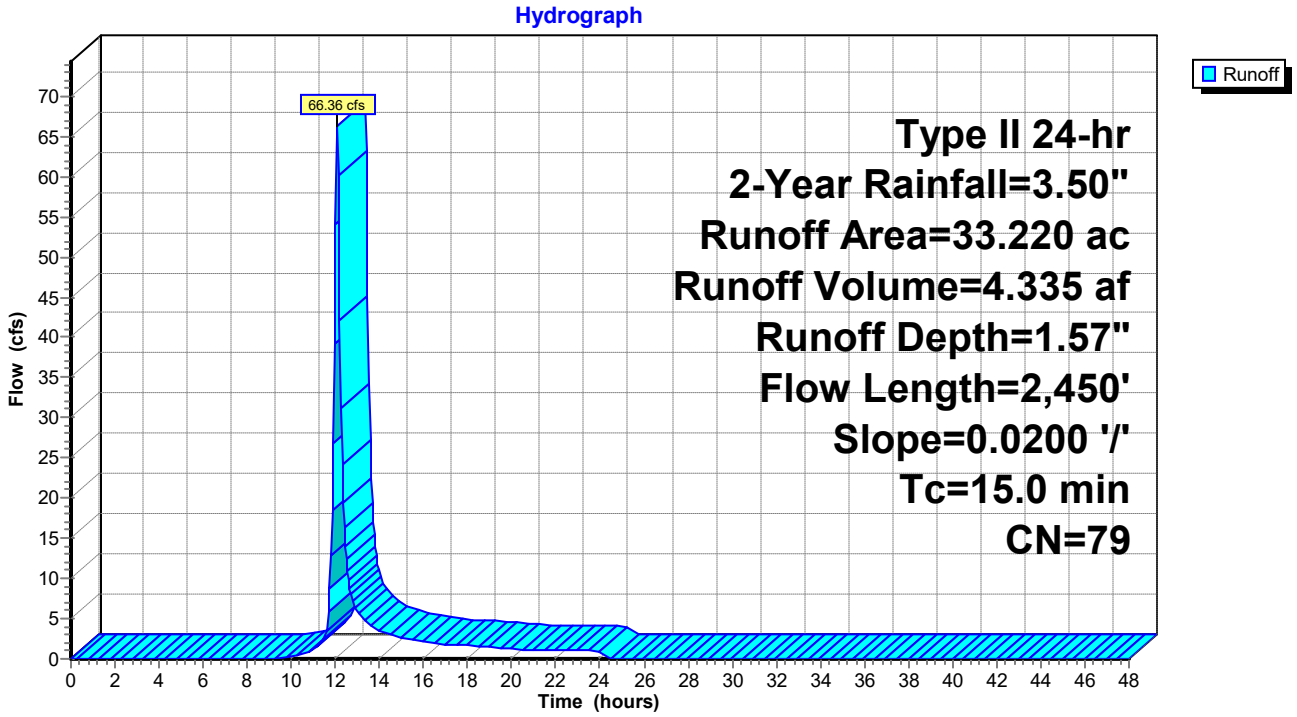
Runoff = 66.36 cfs @ 12.08 hrs, Volume= 4.335 af, Depth= 1.57"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	13.450	83	Subarea A6
*	19.770	76	Subarea A5(w)
	33.220	79	Weighted Average
	33.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.6	2,350		7.00		**Direct Entry,**
15.0	2,450	Total			

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

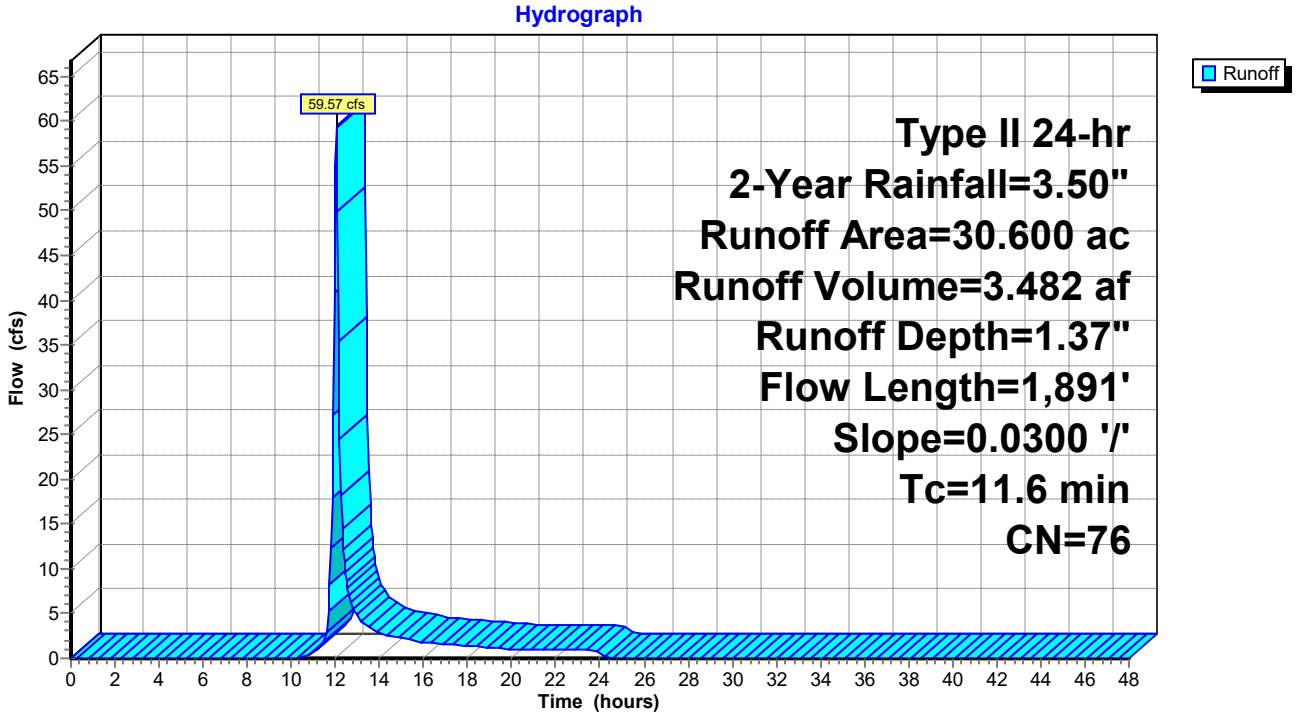
Runoff = 59.57 cfs @ 12.04 hrs, Volume= 3.482 af, Depth= 1.37"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

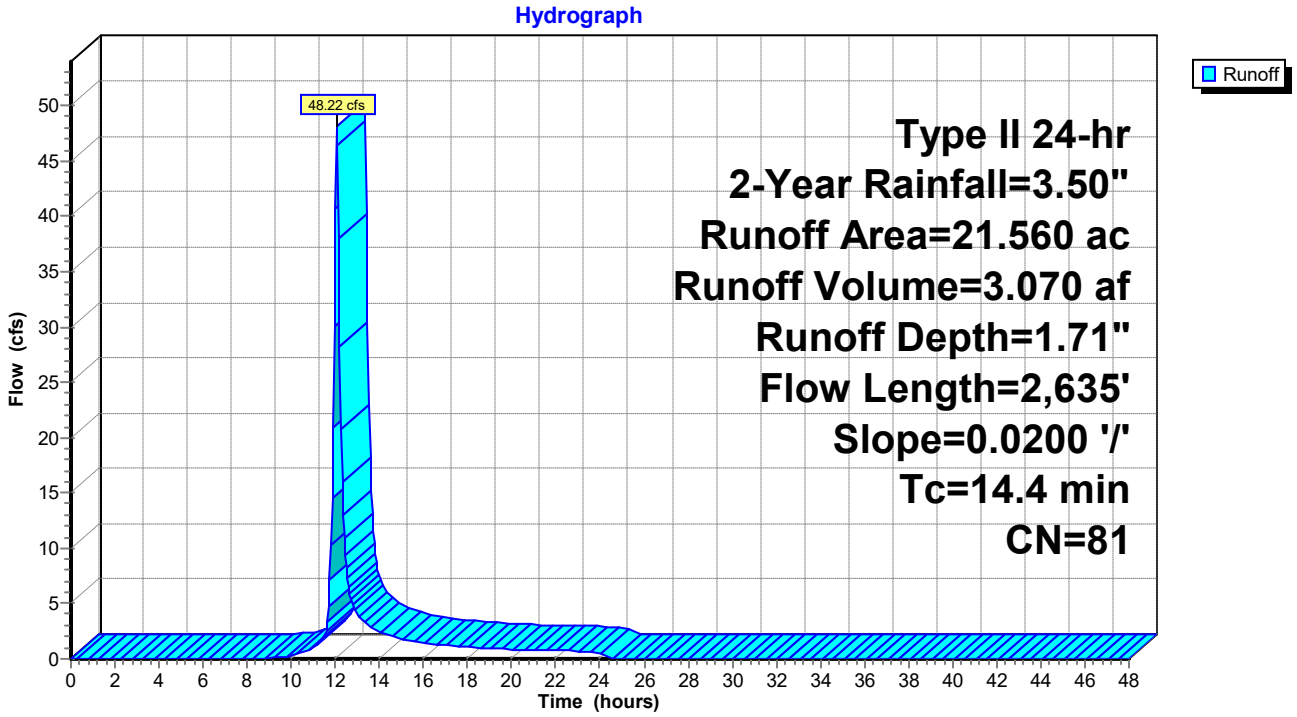
Runoff = 48.22 cfs @ 12.07 hrs, Volume= 3.070 af, Depth= 1.71"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



Summary for Subcatchment A9: Offsite Subarea A9

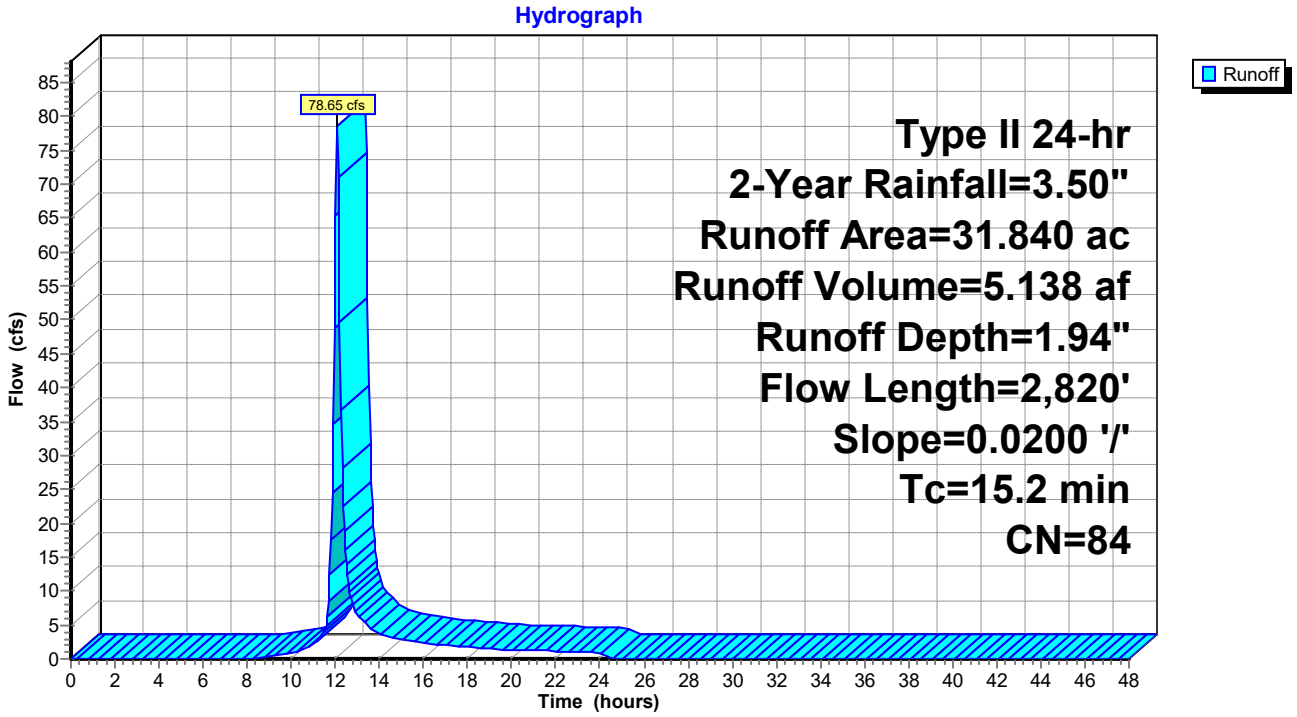
Runoff = 78.65 cfs @ 12.07 hrs, Volume= 5.138 af, Depth= 1.94"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



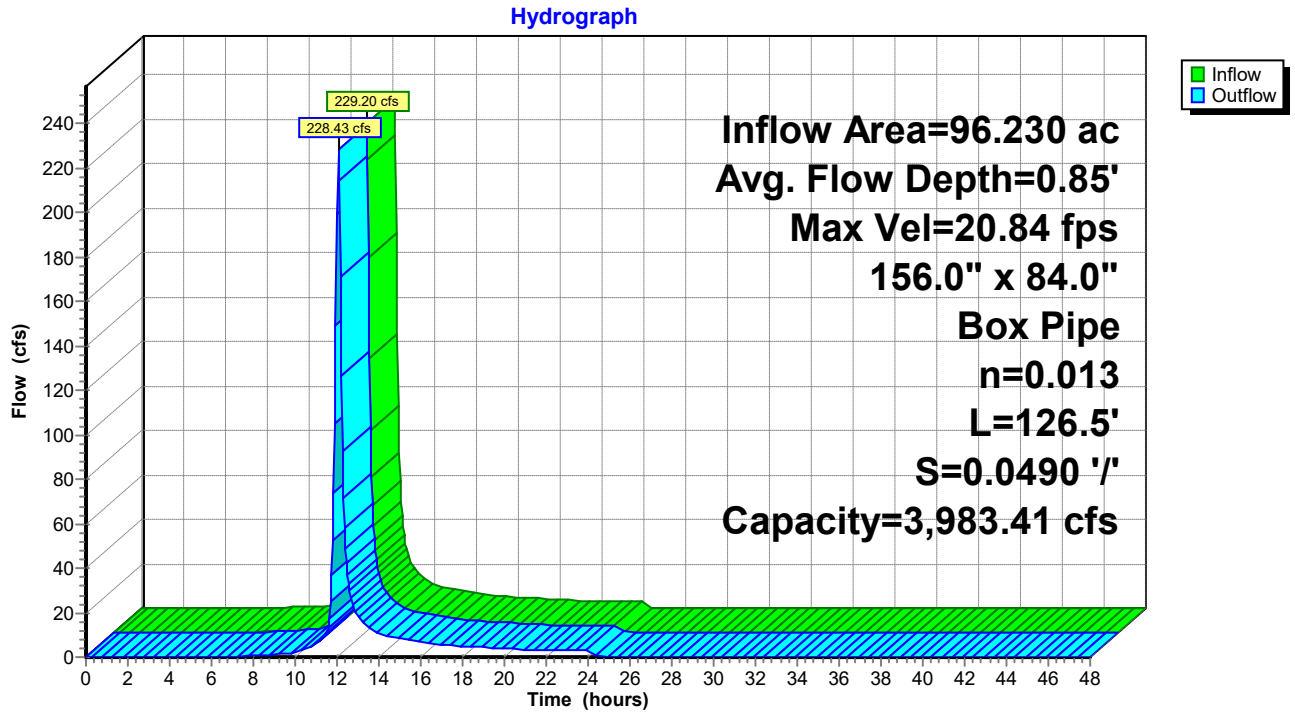
Summary for Reach 1R: RCB Culvert @ Douglas St

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 1.82" for 2-Year event
Inflow = 229.20 cfs @ 12.06 hrs, Volume= 14.579 af
Outflow = 228.43 cfs @ 12.06 hrs, Volume= 14.579 af, Atten= 0%, Lag= 0.2 min
Routed to Reach R7-5 : Open Channel PtA7 to Pt A5

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 20.84 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.24 fps, Avg. Travel Time= 0.4 min

Peak Storage= 1,390 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.85' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 3,983.41 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 126.5' Slope= 0.0490 '/'
Inlet Invert= 944.62', Outlet Invert= 938.42'



Stage-Area-Storage for Reach 1R: RCB Culvert @ Douglas St

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	164
944.82	2.6	329
944.92	3.9	493
945.02	5.2	658
945.12	6.5	822
945.22	7.8	987
945.32	9.1	1,151
945.42	10.4	1,316
945.52	11.7	1,480
945.62	13.0	1,645
945.72	14.3	1,809
945.82	15.6	1,973
945.92	16.9	2,138
946.02	18.2	2,302
946.12	19.5	2,467
946.22	20.8	2,631
946.32	22.1	2,796
946.42	23.4	2,960
946.52	24.7	3,125
946.62	26.0	3,289
946.72	27.3	3,453
946.82	28.6	3,618
946.92	29.9	3,782
947.02	31.2	3,947
947.12	32.5	4,111
947.22	33.8	4,276
947.32	35.1	4,440
947.42	36.4	4,605
947.52	37.7	4,769
947.62	39.0	4,934
947.72	40.3	5,098
947.82	41.6	5,262
947.92	42.9	5,427
948.02	44.2	5,591
948.12	45.5	5,756
948.22	46.8	5,920
948.32	48.1	6,085
948.42	49.4	6,249
948.52	50.7	6,414
948.62	52.0	6,578
948.72	53.3	6,742
948.82	54.6	6,907
948.92	55.9	7,071
949.02	57.2	7,236
949.12	58.5	7,400
949.22	59.8	7,565
949.32	61.1	7,729
949.42	62.4	7,894
949.52	63.7	8,058
949.62	65.0	8,223
949.72	66.3	8,387
949.82	67.6	8,551
949.92	68.9	8,716
950.02	70.2	8,880
950.12	71.5	9,045
950.22	72.8	9,209
950.32	74.1	9,374
950.42	75.4	9,538
950.52	76.7	9,703
950.62	78.0	9,867
950.72	79.3	10,031
950.82	80.6	10,196
950.92	81.9	10,360
951.02	83.2	10,525
951.12	84.5	10,689
951.22	85.8	10,854
951.32	87.1	11,018
951.42	88.4	11,183
951.52	89.7	11,347
951.62	**91.0**	**11,511**

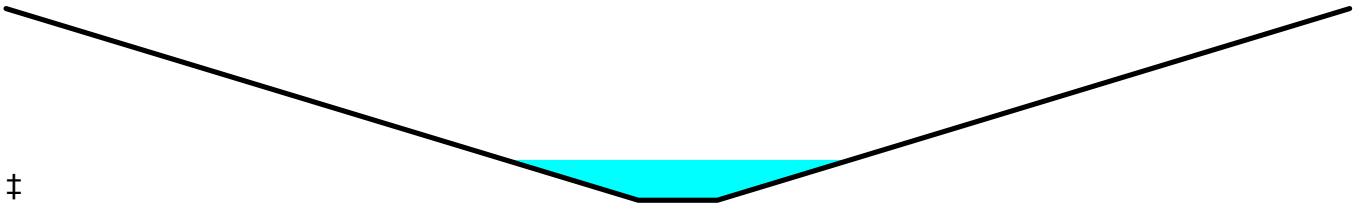
Summary for Reach R5-4: Open Channel Pt A5 to Pt A4

Inflow Area = 144.610 ac, 0.00% Impervious, Inflow Depth = 1.74" for 2-Year event
Inflow = 295.35 cfs @ 12.12 hrs, Volume= 20.982 af
Outflow = 289.29 cfs @ 12.16 hrs, Volume= 20.982 af, Atten= 2%, Lag= 2.1 min
Routed to Link PTA4 : Point A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.45 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 3.20 fps, Avg. Travel Time= 3.8 min

Peak Storage= 20,546 cf @ 12.14 hrs
Average Depth at Peak Storage= 2.10' , Surface Width= 21.77'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 12,031.29 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 732.0' Slope= 0.0328 '/'
Inlet Invert= 930.43', Outlet Invert= 906.42'



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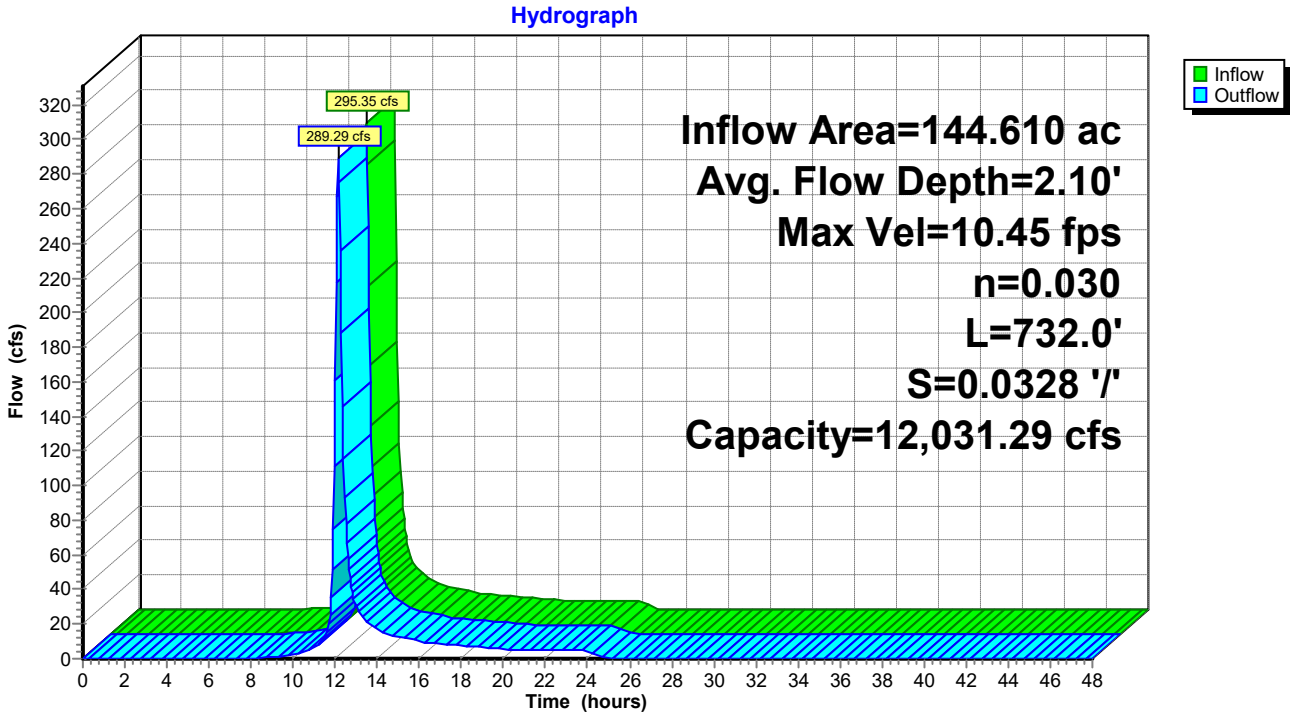
Reach R5-4: Open Channel Pt A5 to Pt A4



Stage-Area-Storage for Reach R5-4: Open Channel Pt A5 to Pt A4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
930.43	0.0	0	935.53	129.5	94,823
930.53	0.5	395	935.63	134.2	98,205
930.63	1.2	849	935.73	138.9	101,646
930.73	1.9	1,362	935.83	143.6	105,144
930.83	2.6	1,932	935.93	148.5	108,702
930.93	3.5	2,562	936.03	153.4	112,318
931.03	4.4	3,250	936.13	158.5	115,993
931.13	5.5	3,997	936.23	163.6	119,726
931.23	6.6	4,802	936.33	168.7	123,518
931.33	7.7	5,666	936.43	174.0	127,368
931.43	9.0	6,588	936.53	179.3	131,277
931.53	10.3	7,569	936.63	184.8	135,244
931.63	11.8	8,608	936.73	190.3	139,270
931.73	13.3	9,706	936.83	195.8	143,355
931.83	14.8	10,863	936.93	201.5	147,498
931.93	16.5	12,078	937.03	207.2	151,700
932.03	18.2	13,352	937.13	213.1	155,960
932.13	20.1	14,684	937.23	219.0	160,279
932.23	22.0	16,075	937.33	224.9	164,656
932.33	23.9	17,524	937.43	231.0	169,092
932.43	26.0	19,032	937.53	237.1	173,586
932.53	28.1	20,598	937.63	243.4	178,140
932.63	30.4	22,224	937.73	249.7	182,751
932.73	32.7	23,907	937.83	256.0	187,421
932.83	35.0	25,649	937.93	262.5	192,150
932.93	37.5	27,450	938.03	269.0	196,937
933.03	40.0	29,309	938.13	275.7	201,783
933.13	42.7	31,227	938.23	282.4	206,688
933.23	45.4	33,204	938.33	289.1	211,650
933.33	48.1	35,238	938.43	296.0	216,672
933.43	51.0	37,332	938.53	302.9	221,752
933.53	53.9	39,484	938.63	310.0	226,891
933.63	57.0	41,695	938.73	317.1	232,088
933.73	60.1	43,964	938.83	324.2	237,344
933.83	63.2	46,292	938.93	331.5	242,658
933.93	66.5	48,678	939.03	338.8	248,031
934.03	69.8	51,123	939.13	346.3	253,462
934.13	73.3	53,626	939.23	353.8	258,952
934.23	76.8	56,188	939.33	361.3	264,501
934.33	80.3	58,809	939.43	369.0	270,108
934.43	84.0	61,488	939.53	376.7	275,774
934.53	87.7	64,226	939.63	384.6	281,498
934.63	91.6	67,022	939.73	392.5	287,281
934.73	95.5	69,877	939.83	400.4	293,122
934.83	99.4	72,790	939.93	408.5	299,022
934.93	103.5	75,762	940.03	416.6	304,980
935.03	107.6	78,792	940.13	424.9	310,998
935.13	111.9	81,882	940.23	433.2	317,073
935.23	116.2	85,029	940.33	441.5	323,207
935.33	120.5	88,235	940.43	**450.0**	**329,400**
935.43	125.0	91,500			

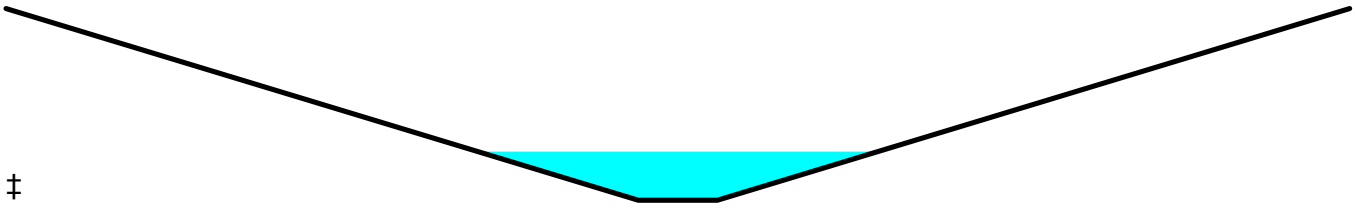
Summary for Reach R7-5: Open Channel PtA7 to Pt A5

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 1.82" for 2-Year event
Inflow = 228.43 cfs @ 12.06 hrs, Volume= 14.579 af
Outflow = 216.42 cfs @ 12.15 hrs, Volume= 14.579 af, Atten= 5%, Lag= 5.4 min
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.65 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 1.70 fps, Avg. Travel Time= 10.2 min

Peak Storage= 39,832 cf @ 12.10 hrs
Average Depth at Peak Storage= 2.53' , Surface Width= 25.28'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 5,828.36 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 1,038.0' Slope= 0.0077 '/'
Inlet Invert= 938.42', Outlet Invert= 930.43'



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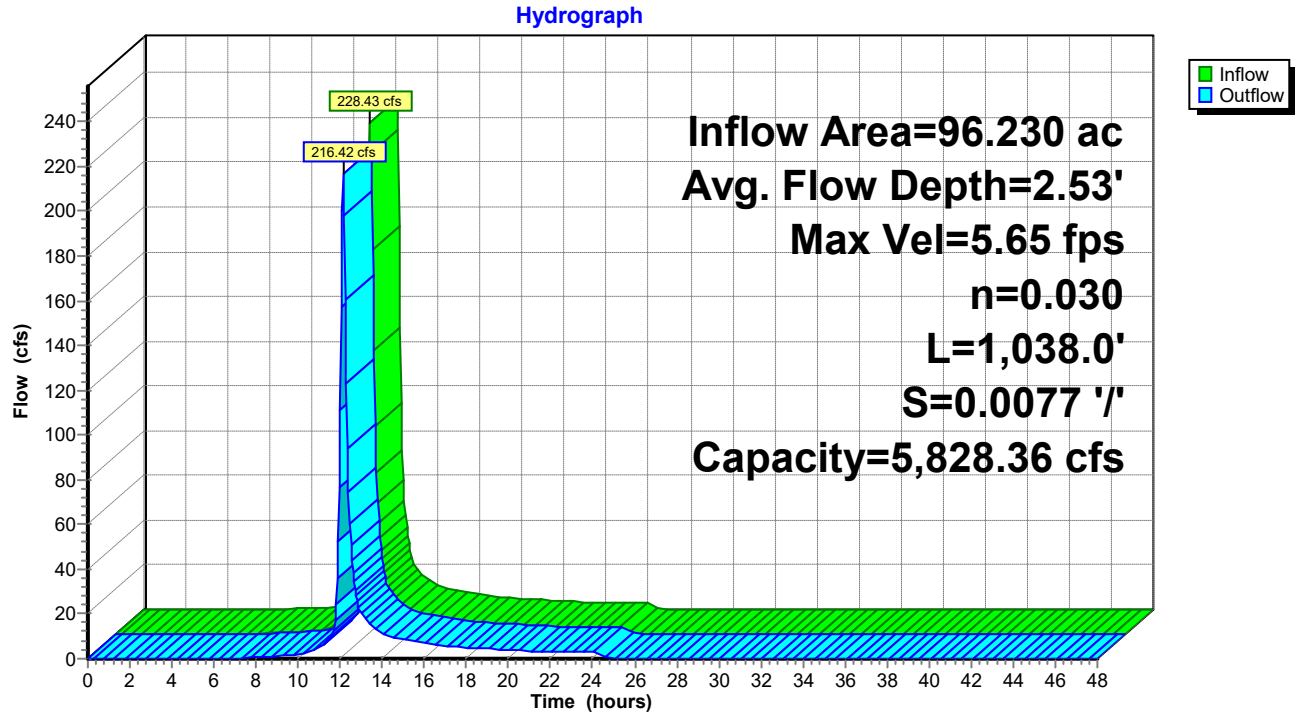
Reach R7-5: Open Channel PtA7 to Pt A5



Stage-Area-Storage for Reach R7-5: Open Channel PtA7 to Pt A5

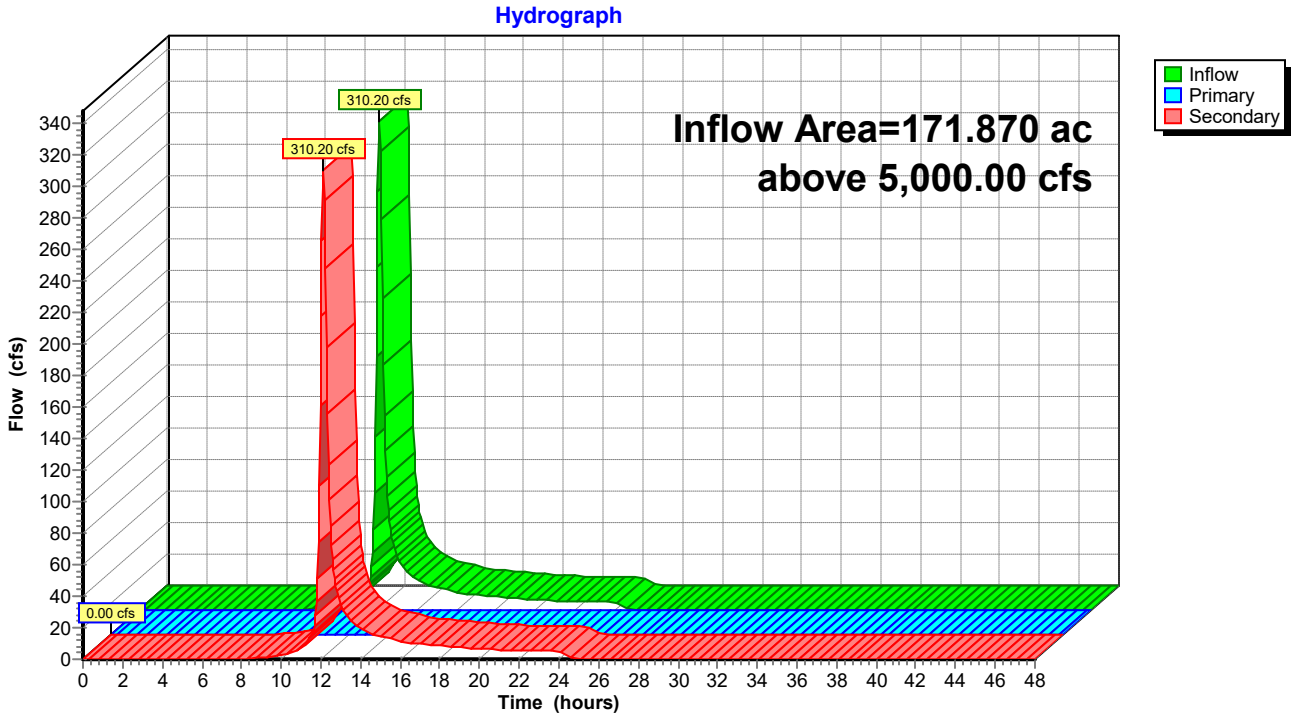
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
938.42	0.0	0	943.52	129.5	134,463
938.52	0.5	561	943.62	134.2	139,258
938.62	1.2	1,204	943.72	138.9	144,137
938.72	1.9	1,931	943.82	143.6	149,098
938.82	2.6	2,740	943.92	148.5	154,143
938.92	3.5	3,633	944.02	153.4	159,271
939.02	4.4	4,609	944.12	158.5	164,481
939.12	5.5	5,667	944.22	163.6	169,775
939.22	6.6	6,809	944.32	168.7	175,152
939.32	7.7	8,034	944.42	174.0	180,612
939.42	9.0	9,342	944.52	179.3	186,155
939.52	10.3	10,733	944.62	184.8	191,781
939.62	11.8	12,207	944.72	190.3	197,490
939.72	13.3	13,764	944.82	195.8	203,282
939.82	14.8	15,404	944.92	201.5	209,157
939.92	16.5	17,127	945.02	207.2	215,115
940.02	18.2	18,933	945.12	213.1	221,156
940.12	20.1	20,822	945.22	219.0	227,280
940.22	22.0	22,794	945.32	224.9	233,488
940.32	23.9	24,850	945.42	231.0	239,778
940.42	26.0	26,988	945.52	237.1	246,151
940.52	28.1	29,209	945.62	243.4	252,608
940.62	30.4	31,514	945.72	249.7	259,147
940.72	32.7	33,901	945.82	256.0	265,770
940.82	35.0	36,372	945.92	262.5	272,475
940.92	37.5	38,925	946.02	269.0	279,264
941.02	40.0	41,562	946.12	275.7	286,135
941.12	42.7	44,281	946.22	282.4	293,090
941.22	45.4	47,084	946.32	289.1	300,127
941.32	48.1	49,969	946.42	296.0	307,248
941.42	51.0	52,938	946.52	302.9	314,452
941.52	53.9	55,990	946.62	310.0	321,738
941.62	57.0	59,124	946.72	317.1	329,108
941.72	60.1	62,342	946.82	324.2	336,561
941.82	63.2	65,643	946.92	331.5	344,097
941.92	66.5	69,027	947.02	338.8	351,716
942.02	69.8	72,494	947.12	346.3	359,418
942.12	73.3	76,044	947.22	353.8	367,203
942.22	76.8	79,677	947.32	361.3	375,071
942.32	80.3	83,393	947.42	369.0	383,022
942.42	84.0	87,192	947.52	376.7	391,056
942.52	87.7	91,074	947.62	384.6	399,173
942.62	91.6	95,039	947.72	392.5	407,373
942.72	95.5	99,087	947.82	400.4	415,657
942.82	99.4	103,219	947.92	408.5	424,023
942.92	103.5	107,433	948.02	416.6	432,472
943.02	107.6	111,730	948.12	424.9	441,005
943.12	111.9	116,111	948.22	433.2	449,620
943.22	116.2	120,574	948.32	441.5	458,319
943.32	120.5	125,121	948.42	**450.0**	**467,100**
943.42	125.0	129,750			

Summary for Link PTA4: Point A4

Inflow Area = 171.870 ac, 0.00% Impervious, Inflow Depth = 1.68" for 2-Year event
Inflow = 310.20 cfs @ 12.14 hrs, Volume= 24.096 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 310.20 cfs @ 12.14 hrs, Volume= 24.096 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=4.64"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=70.80 cfs 4.733 af

Subcatchment A4e: Subarea A4(e) Runoff Area=9.850 ac 0.00% Impervious Runoff Depth=3.29"
Tc=6.0 min CN=81 Runoff=54.86 cfs 2.699 af

Subcatchment A4w: Subarea A4(w) Runoff Area=17.410 ac 0.00% Impervious Runoff Depth=2.55"
Flow Length=1,800' Slope=0.0400 '/' Tc=10.3 min CN=73 Runoff=66.49 cfs 3.700 af

Subcatchment A5e: Offsite Subarea A5(e) Runoff Area=15.160 ac 0.00% Impervious Runoff Depth=3.19"
Flow Length=1,300' Slope=0.0250 '/' Tc=10.2 min CN=80 Runoff=72.20 cfs 4.032 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=33.220 ac 0.00% Impervious Runoff Depth=3.10"
Flow Length=2,450' Slope=0.0200 '/' Tc=15.0 min CN=79 Runoff=131.86 cfs 8.572 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=123.94 cfs 7.187 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=3.29"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=92.37 cfs 5.907 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=3.58"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=143.71 cfs 9.507 af

Reach 1R: RCB Culvert @ Douglas Avg. Flow Depth=1.26' Max Vel=26.18 fps Inflow=427.58 cfs 27.333 af
156.0" x 84.0" Box Pipe n=0.013 L=126.5' S=0.0490 '/' Capacity=3,983.41 cfs Outflow=426.52 cfs 27.333 af

Reach R5-4: Open Channel Pt A5 to Avg. Flow Depth=2.82' Max Vel=12.38 fps Inflow=572.82 cfs 39.937 af
n=0.030 L=732.0' S=0.0328 '/' Capacity=12,031.29 cfs Outflow=561.14 cfs 39.937 af

Reach R7-5: Open Channel PtA7 to Avg. Flow Depth=3.35' Max Vel=6.64 fps Inflow=426.52 cfs 27.333 af
n=0.030 L=1,038.0' S=0.0077 '/' Capacity=5,828.36 cfs Outflow=405.45 cfs 27.333 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=613.12 cfs 46.335 af
Primary=0.00 cfs 0.000 af Secondary=613.12 cfs 46.335 af

Total Runoff Area = 171.870 ac Runoff Volume = 46.335 af Average Runoff Depth = 3.24"
100.00% Pervious = 171.870 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

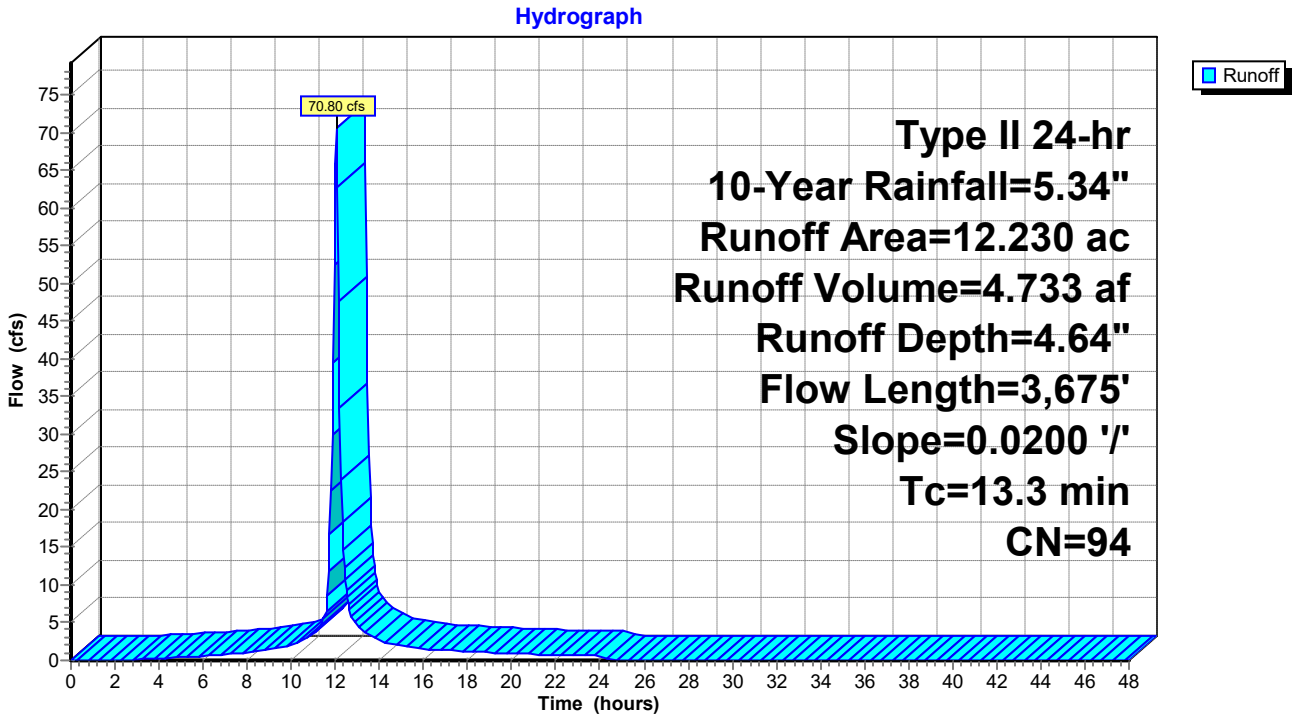
Runoff = 70.80 cfs @ 12.04 hrs, Volume= 4.733 af, Depth= 4.64"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Discovery Park Existing
Prepared by OWN Inc

Summary for Subcatchment A4e: Subarea A4(e)

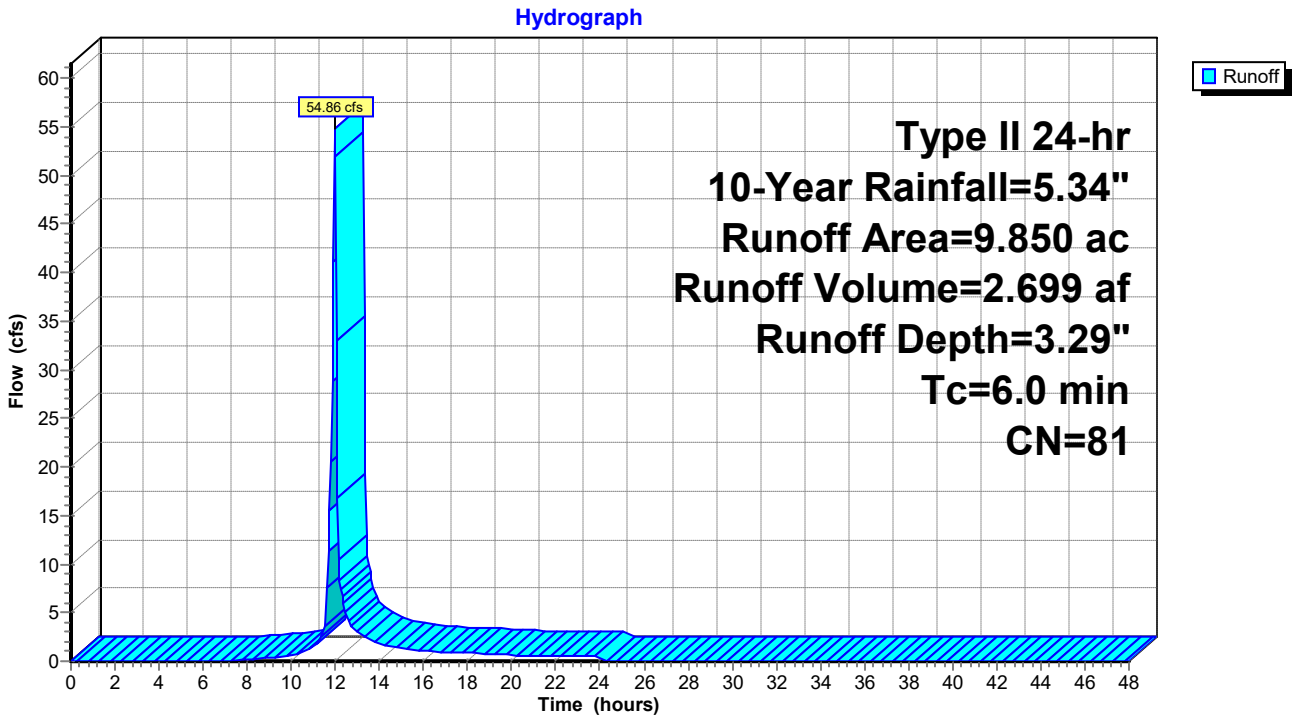
Runoff = 54.86 cfs @ 11.97 hrs, Volume= 2.699 af, Depth= 3.29"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	9.850	81	
	9.850		100.00% Pervious Area

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

Subcatchment A4e: Subarea A4(e)



Summary for Subcatchment A4w: Subarea A4(w)

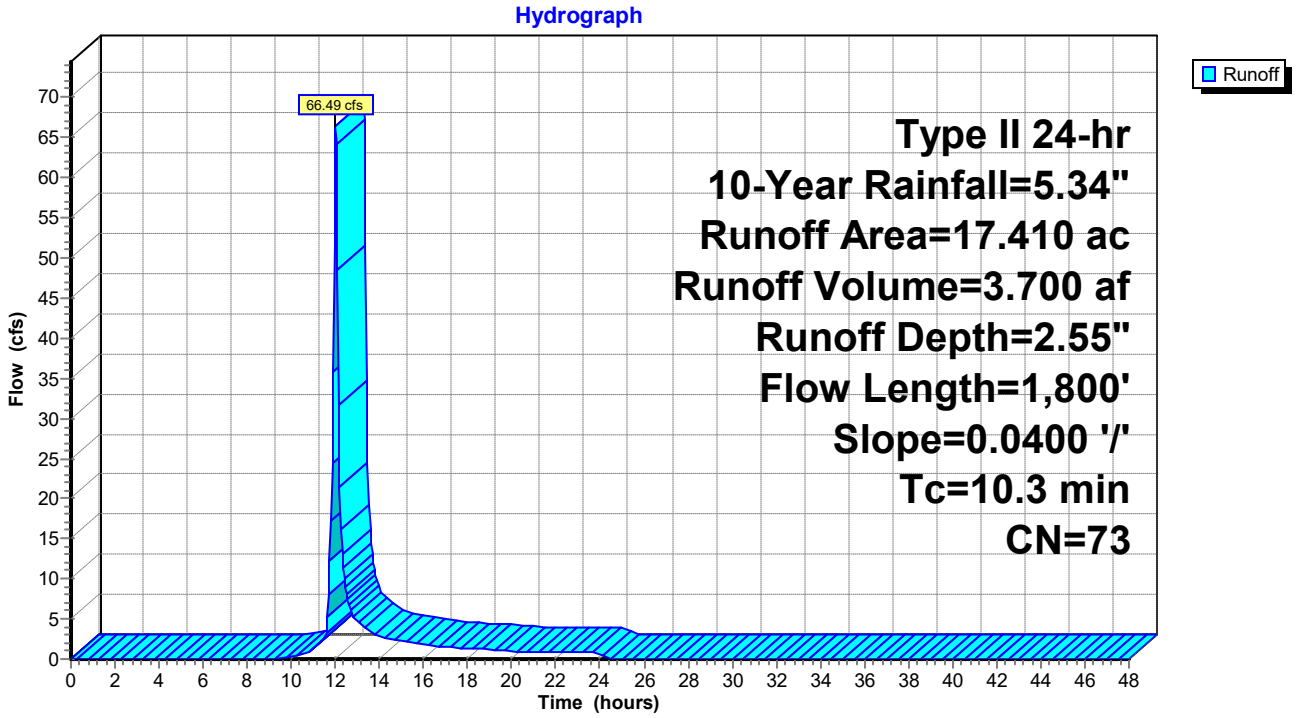
Runoff = 66.49 cfs @ 12.02 hrs, Volume= 3.700 af, Depth= 2.55"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	17.410	73	
	17.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0400	0.26		**Sheet Flow,** Range n= 0.130 P2= 3.50"
4.0	1,700		7.00		**Direct Entry,**
10.3	1,800	Total			

Subcatchment A4w: Subarea A4(w)



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Summary for Subcatchment A5e: Offsite Subarea A5(e)

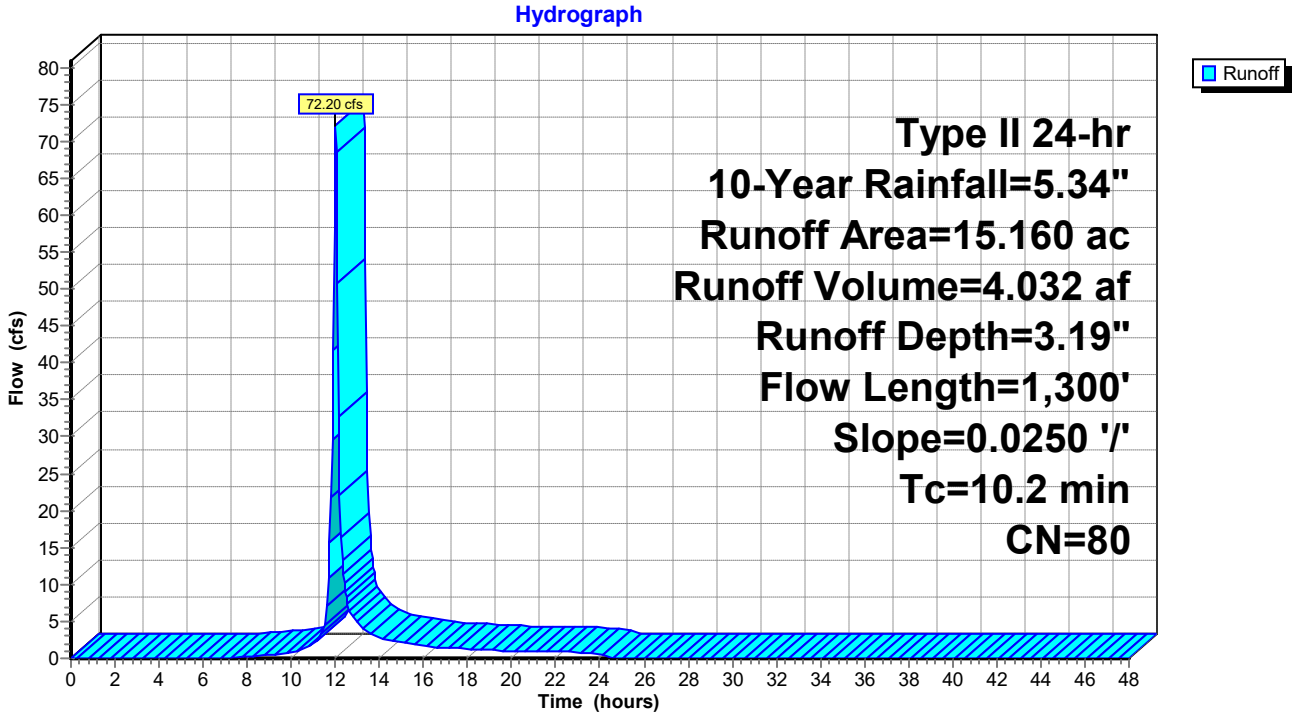
Runoff = 72.20 cfs @ 12.02 hrs, Volume= 4.032 af, Depth= 3.19"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	15.160	80	Subarea A5(e)
	15.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0250	0.22		**Sheet Flow,** Range n= 0.130 P2= 3.50"
0.5	300		10.00		**Direct Entry,**
2.1	900		7.00		**Direct Entry,**
10.2	1,300	Total			

Subcatchment A5e: Offsite Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

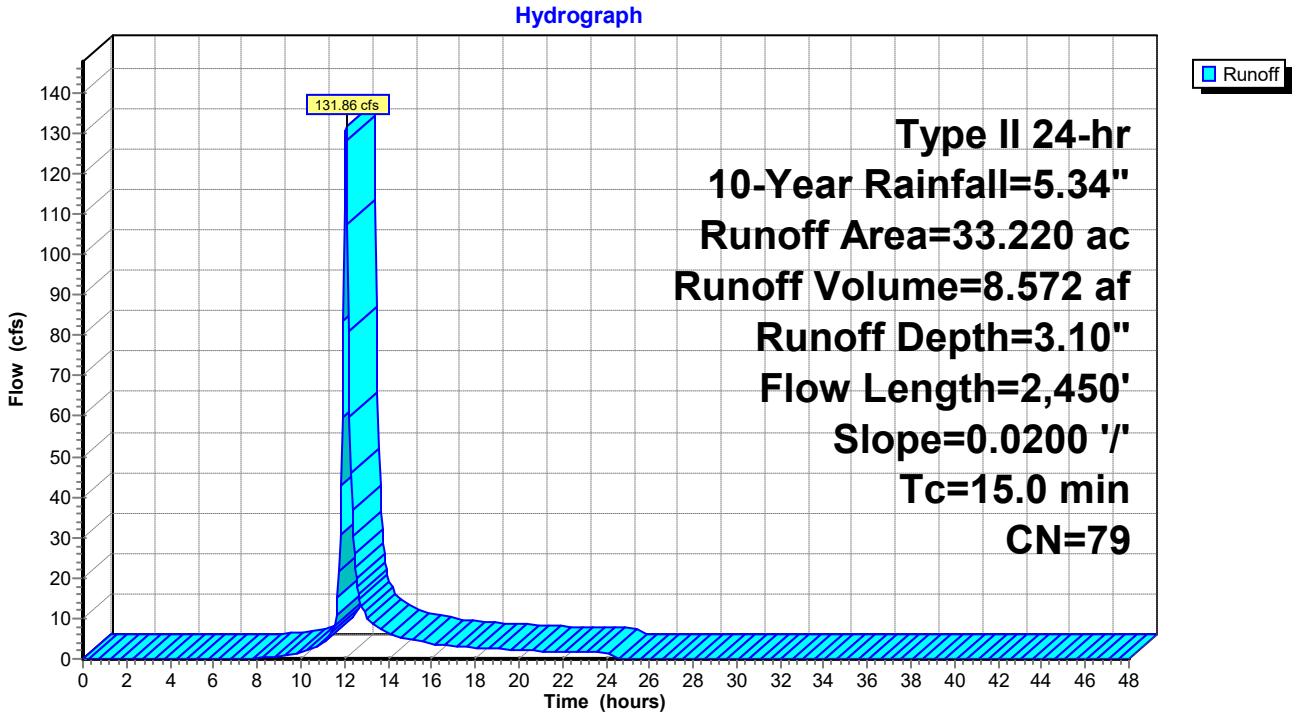
Runoff = 131.86 cfs @ 12.07 hrs, Volume= 8.572 af, Depth= 3.10"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	13.450	83	Subarea A6
*	19.770	76	Subarea A5(w)
	33.220	79	Weighted Average
	33.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.6	2,350		7.00		**Direct Entry,**
15.0	2,450	Total			

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

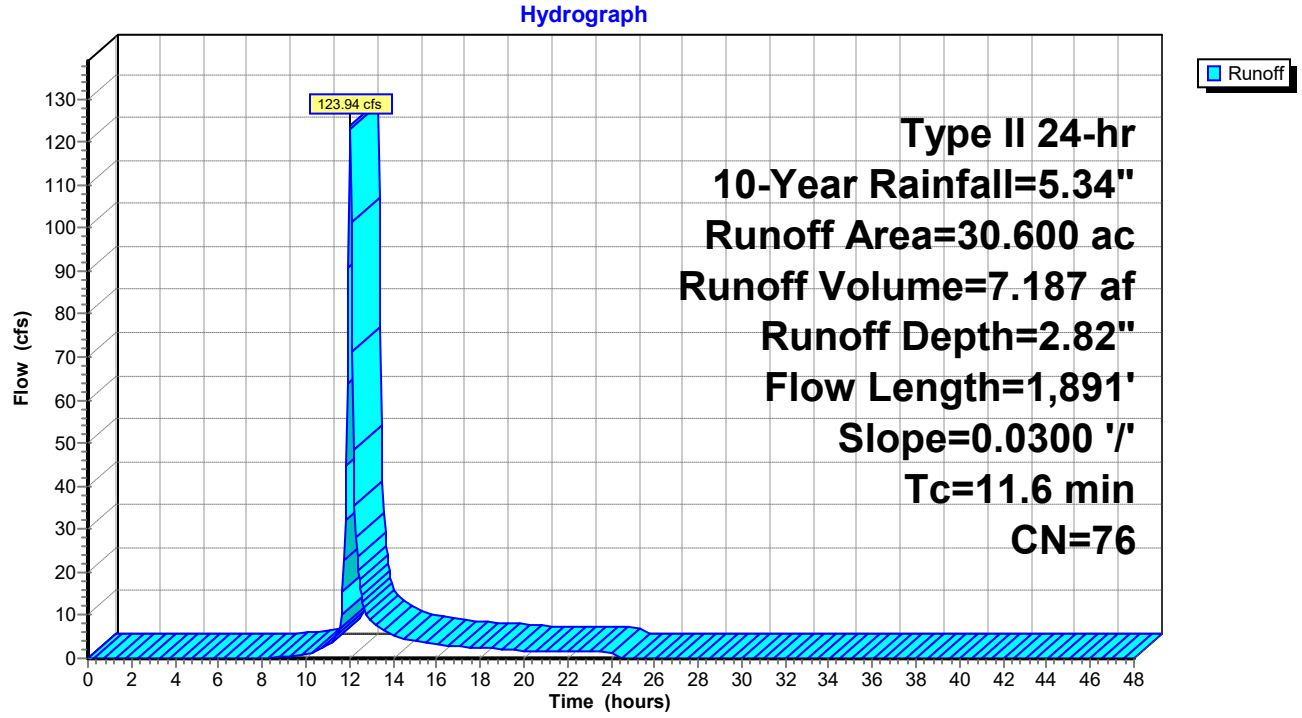
Runoff = 123.94 cfs @ 12.04 hrs, Volume= 7.187 af, Depth= 2.82"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

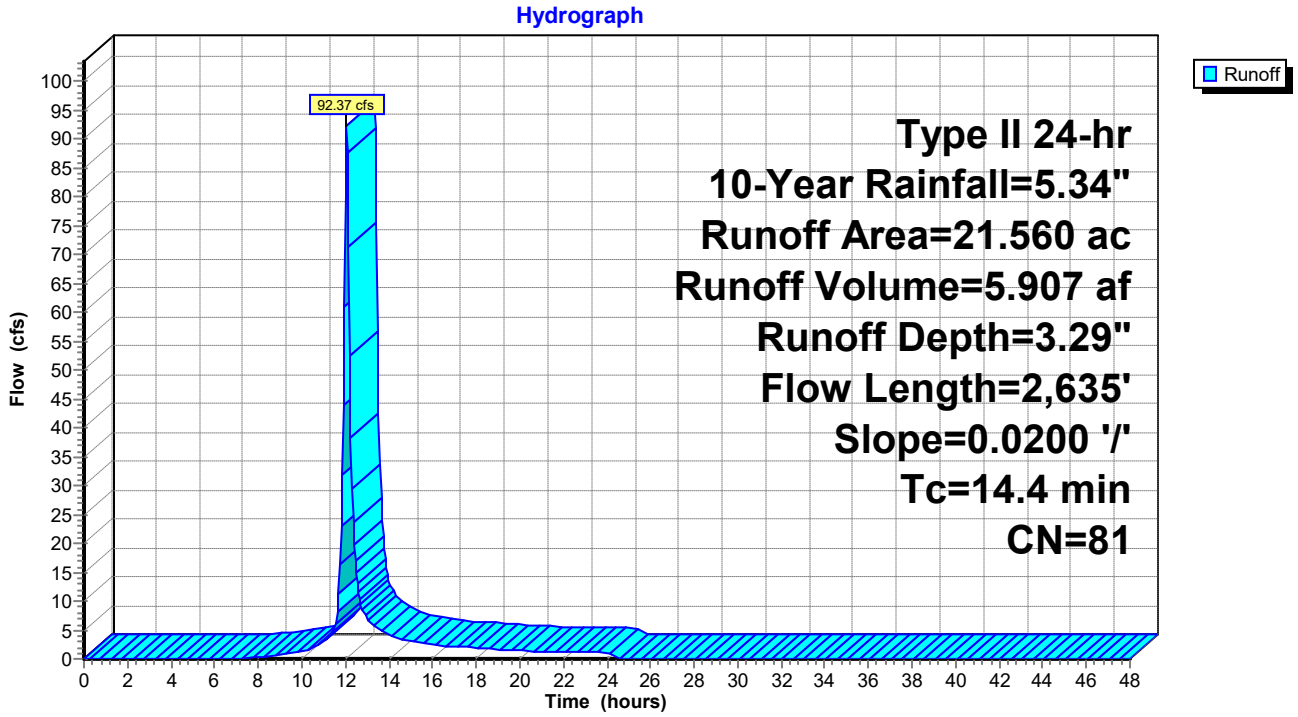
Runoff = 92.37 cfs @ 12.06 hrs, Volume= 5.907 af, Depth= 3.29"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



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Summary for Subcatchment A9: Offsite Subarea A9

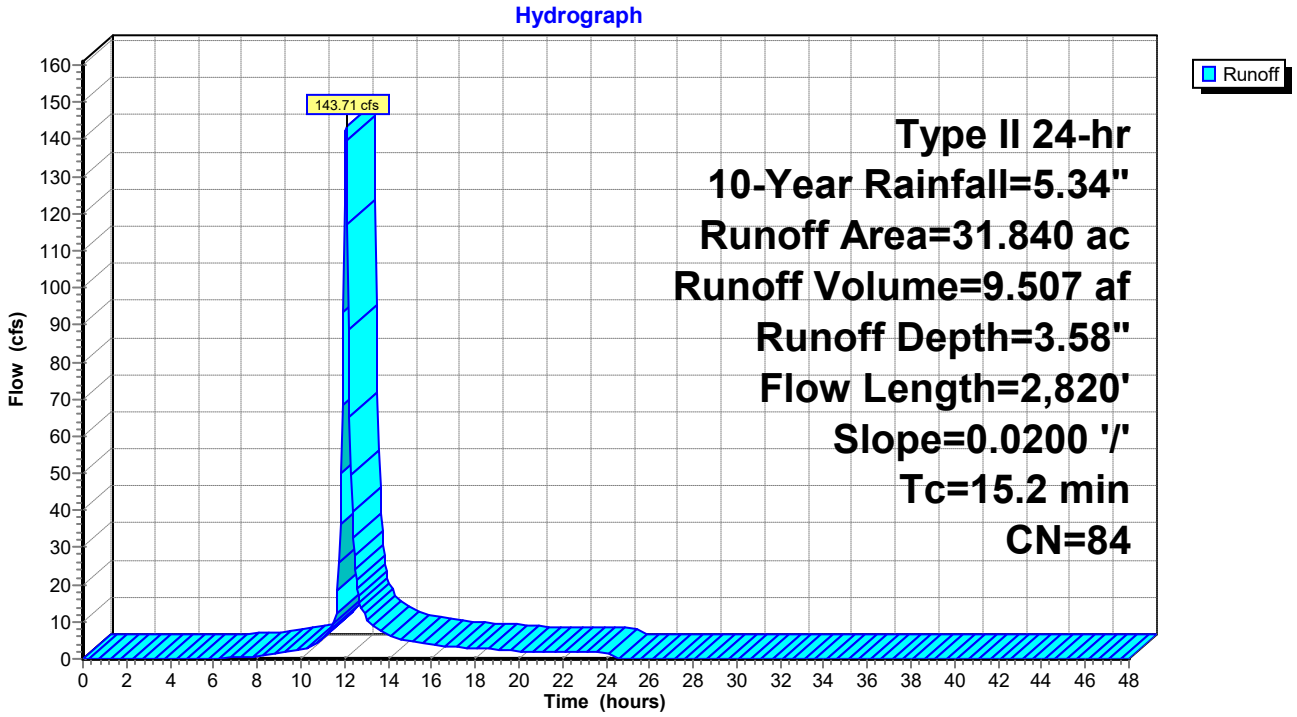
Runoff = 143.71 cfs @ 12.07 hrs, Volume= 9.507 af, Depth= 3.58"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



Summary for Reach 1R: RCB Culvert @ Douglas St

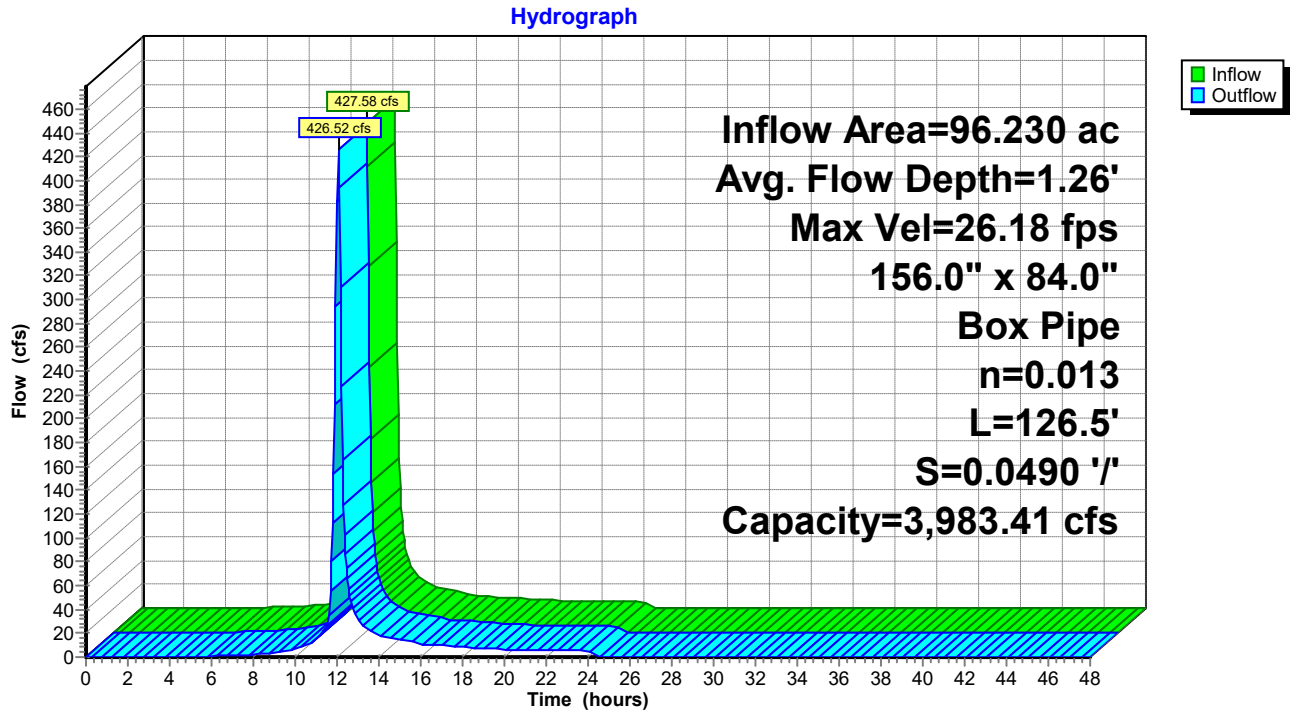
Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 3.41" for 10-Year event
Inflow = 427.58 cfs @ 12.05 hrs, Volume= 27.333 af
Outflow = 426.52 cfs @ 12.05 hrs, Volume= 27.333 af, Atten= 0%, Lag= 0.1 min
Routed to Reach R7-5 : Open Channel PtA7 to Pt A5

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 26.18 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.11 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2,065 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.26' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 3,983.41 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 126.5' Slope= 0.0490 '/'
Inlet Invert= 944.62', Outlet Invert= 938.42'

Reach 1R: RCB Culvert @ Douglas St



Stage-Area-Storage for Reach 1R: RCB Culvert @ Douglas St

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	164
944.82	2.6	329
944.92	3.9	493
945.02	5.2	658
945.12	6.5	822
945.22	7.8	987
945.32	9.1	1,151
945.42	10.4	1,316
945.52	11.7	1,480
945.62	13.0	1,645
945.72	14.3	1,809
945.82	15.6	1,973
945.92	16.9	2,138
946.02	18.2	2,302
946.12	19.5	2,467
946.22	20.8	2,631
946.32	22.1	2,796
946.42	23.4	2,960
946.52	24.7	3,125
946.62	26.0	3,289
946.72	27.3	3,453
946.82	28.6	3,618
946.92	29.9	3,782
947.02	31.2	3,947
947.12	32.5	4,111
947.22	33.8	4,276
947.32	35.1	4,440
947.42	36.4	4,605
947.52	37.7	4,769
947.62	39.0	4,934
947.72	40.3	5,098
947.82	41.6	5,262
947.92	42.9	5,427
948.02	44.2	5,591
948.12	45.5	5,756
948.22	46.8	5,920
948.32	48.1	6,085
948.42	49.4	6,249
948.52	50.7	6,414
948.62	52.0	6,578
948.72	53.3	6,742
948.82	54.6	6,907
948.92	55.9	7,071
949.02	57.2	7,236
949.12	58.5	7,400
949.22	59.8	7,565
949.32	61.1	7,729
949.42	62.4	7,894
949.52	63.7	8,058
949.62	65.0	8,223
949.72	66.3	8,387
949.82	67.6	8,551
949.92	68.9	8,716
950.02	70.2	8,880
950.12	71.5	9,045
950.22	72.8	9,209
950.32	74.1	9,374
950.42	75.4	9,538
950.52	76.7	9,703
950.62	78.0	9,867
950.72	79.3	10,031
950.82	80.6	10,196
950.92	81.9	10,360
951.02	83.2	10,525
951.12	84.5	10,689
951.22	85.8	10,854
951.32	87.1	11,018
951.42	88.4	11,183
951.52	89.7	11,347
951.62	**91.0**	**11,511**

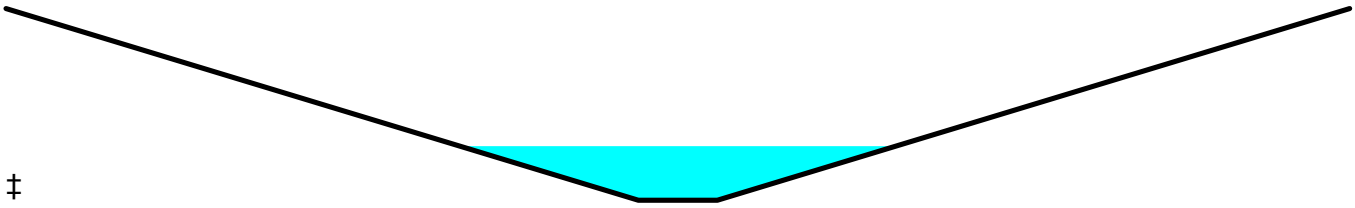
Summary for Reach R5-4: Open Channel Pt A5 to Pt A4

Inflow Area = 144.610 ac, 0.00% Impervious, Inflow Depth = 3.31" for 10-Year event
Inflow = 572.82 cfs @ 12.10 hrs, Volume= 39.937 af
Outflow = 561.14 cfs @ 12.13 hrs, Volume= 39.937 af, Atten= 2%, Lag= 1.8 min
Routed to Link PTA4 : Point A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.38 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 3.73 fps, Avg. Travel Time= 3.3 min

Peak Storage= 33,640 cf @ 12.12 hrs
Average Depth at Peak Storage= 2.82' , Surface Width= 27.58'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 12,031.29 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 732.0' Slope= 0.0328 '/'
Inlet Invert= 930.43', Outlet Invert= 906.42'



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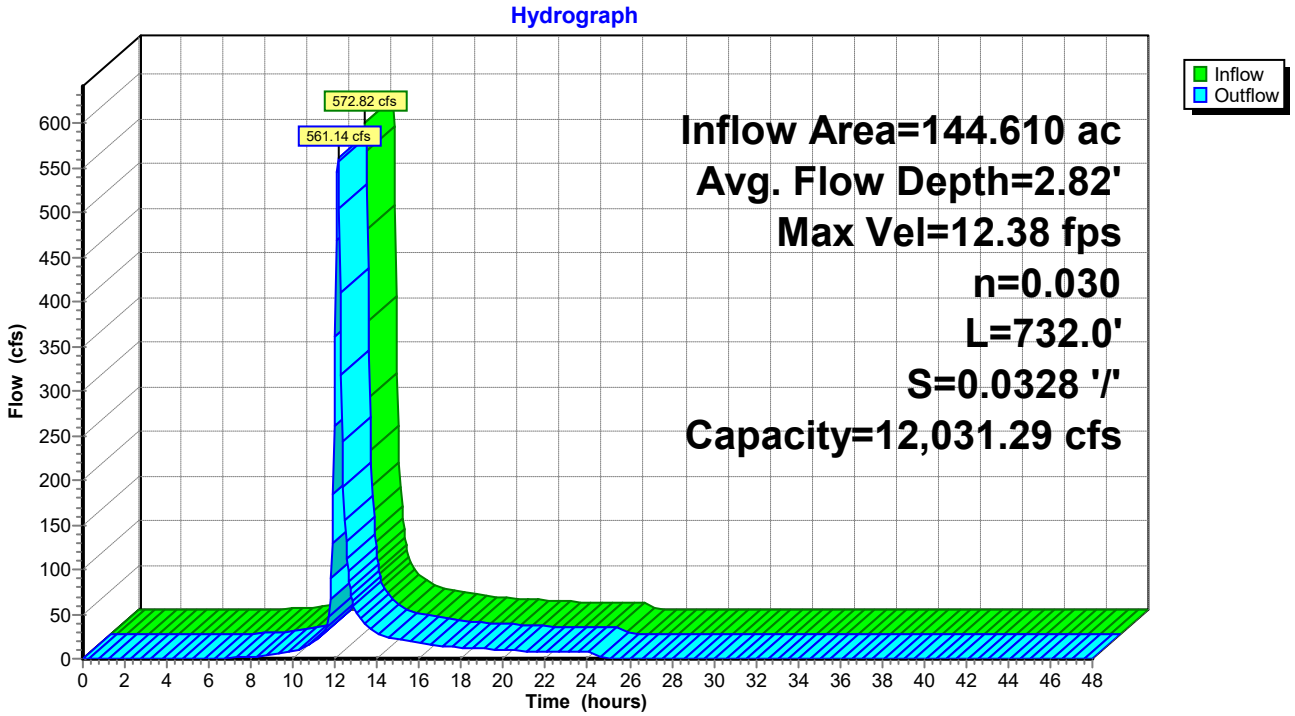
Reach R5-4: Open Channel Pt A5 to Pt A4



Stage-Area-Storage for Reach R5-4: Open Channel Pt A5 to Pt A4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
930.43	0.0	0
930.53	0.5	395
930.63	1.2	849
930.73	1.9	1,362
930.83	2.6	1,932
930.93	3.5	2,562
931.03	4.4	3,250
931.13	5.5	3,997
931.23	6.6	4,802
931.33	7.7	5,666
931.43	9.0	6,588
931.53	10.3	7,569
931.63	11.8	8,608
931.73	13.3	9,706
931.83	14.8	10,863
931.93	16.5	12,078
932.03	18.2	13,352
932.13	20.1	14,684
932.23	22.0	16,075
932.33	23.9	17,524
932.43	26.0	19,032
932.53	28.1	20,598
932.63	30.4	22,224
932.73	32.7	23,907
932.83	35.0	25,649
932.93	37.5	27,450
933.03	40.0	29,309
933.13	42.7	31,227
933.23	45.4	33,204
933.33	48.1	35,238
933.43	51.0	37,332
933.53	53.9	39,484
933.63	57.0	41,695
933.73	60.1	43,964
933.83	63.2	46,292
933.93	66.5	48,678
934.03	69.8	51,123
934.13	73.3	53,626
934.23	76.8	56,188
934.33	80.3	58,809
934.43	84.0	61,488
934.53	87.7	64,226
934.63	91.6	67,022
934.73	95.5	69,877
934.83	99.4	72,790
934.93	103.5	75,762
935.03	107.6	78,792
935.13	111.9	81,882
935.23	116.2	85,029
935.33	120.5	88,235
935.43	125.0	91,500
935.53	129.5	94,823
935.63	134.2	98,205
935.73	138.9	101,646
935.83	143.6	105,144
935.93	148.5	108,702
936.03	153.4	112,318
936.13	158.5	115,993
936.23	163.6	119,726
936.33	168.7	123,518
936.43	174.0	127,368
936.53	179.3	131,277
936.63	184.8	135,244
936.73	190.3	139,270
936.83	195.8	143,355
936.93	201.5	147,498
937.03	207.2	151,700
937.13	213.1	155,960
937.23	219.0	160,279
937.33	224.9	164,656
937.43	231.0	169,092
937.53	237.1	173,586
937.63	243.4	178,140
937.73	249.7	182,751
937.83	256.0	187,421
937.93	262.5	192,150
938.03	269.0	196,937
938.13	275.7	201,783
938.23	282.4	206,688
938.33	289.1	211,650
938.43	296.0	216,672
938.53	302.9	221,752
938.63	310.0	226,891
938.73	317.1	232,088
938.83	324.2	237,344
938.93	331.5	242,658
939.03	338.8	248,031
939.13	346.3	253,462
939.23	353.8	258,952
939.33	361.3	264,501
939.43	369.0	270,108
939.53	376.7	275,774
939.63	384.6	281,498
939.73	392.5	287,281
939.83	400.4	293,122
939.93	408.5	299,022
940.03	416.6	304,980
940.13	424.9	310,998
940.23	433.2	317,073
940.33	441.5	323,207
940.43	**450.0**	**329,400**

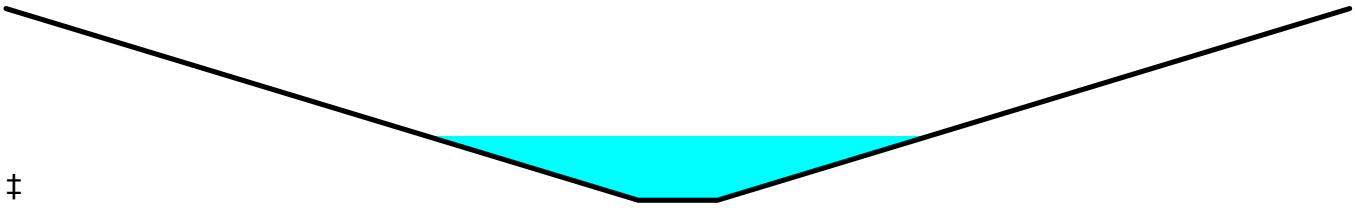
Summary for Reach R7-5: Open Channel PtA7 to Pt A5

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 3.41" for 10-Year event
Inflow = 426.52 cfs @ 12.05 hrs, Volume= 27.333 af
Outflow = 405.45 cfs @ 12.13 hrs, Volume= 27.333 af, Atten= 5%, Lag= 4.7 min
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.64 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 8.7 min

Peak Storage= 64,007 cf @ 12.09 hrs
Average Depth at Peak Storage= 3.35' , Surface Width= 31.81'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 5,828.36 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 1,038.0' Slope= 0.0077 '/'
Inlet Invert= 938.42', Outlet Invert= 930.43'



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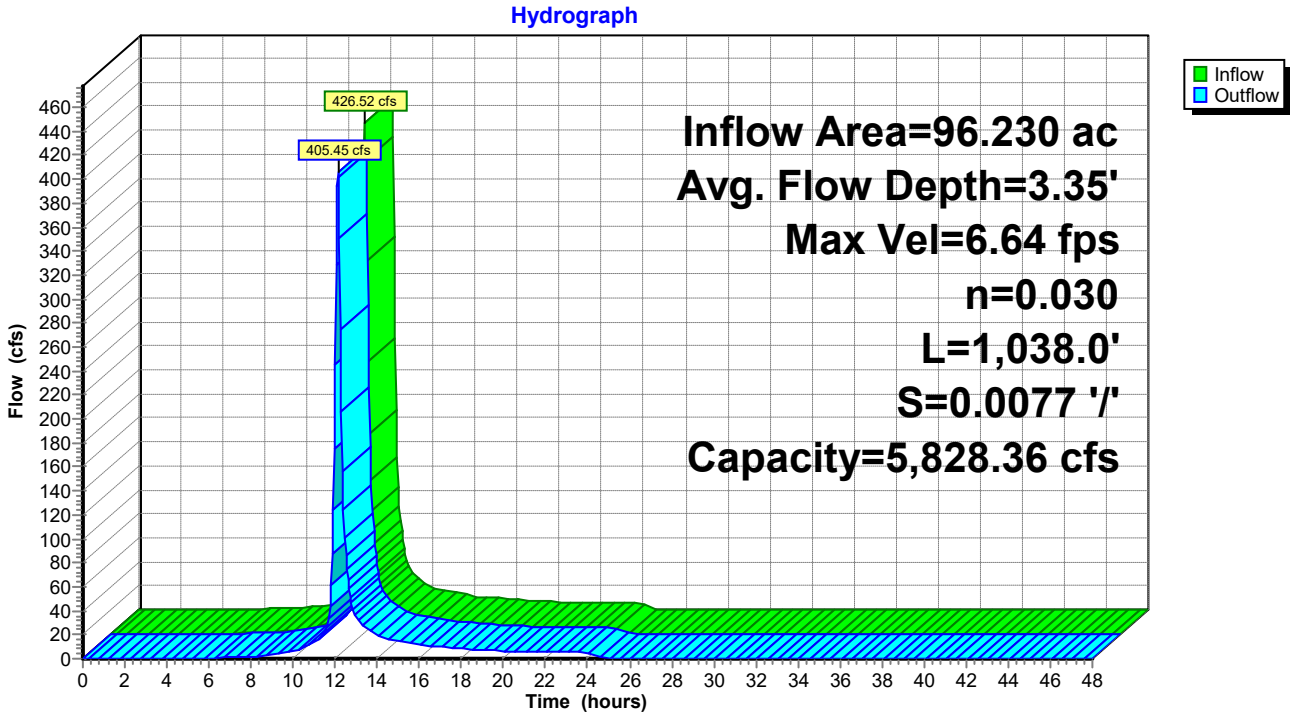
Reach R7-5: Open Channel PtA7 to Pt A5



Stage-Area-Storage for Reach R7-5: Open Channel PtA7 to Pt A5

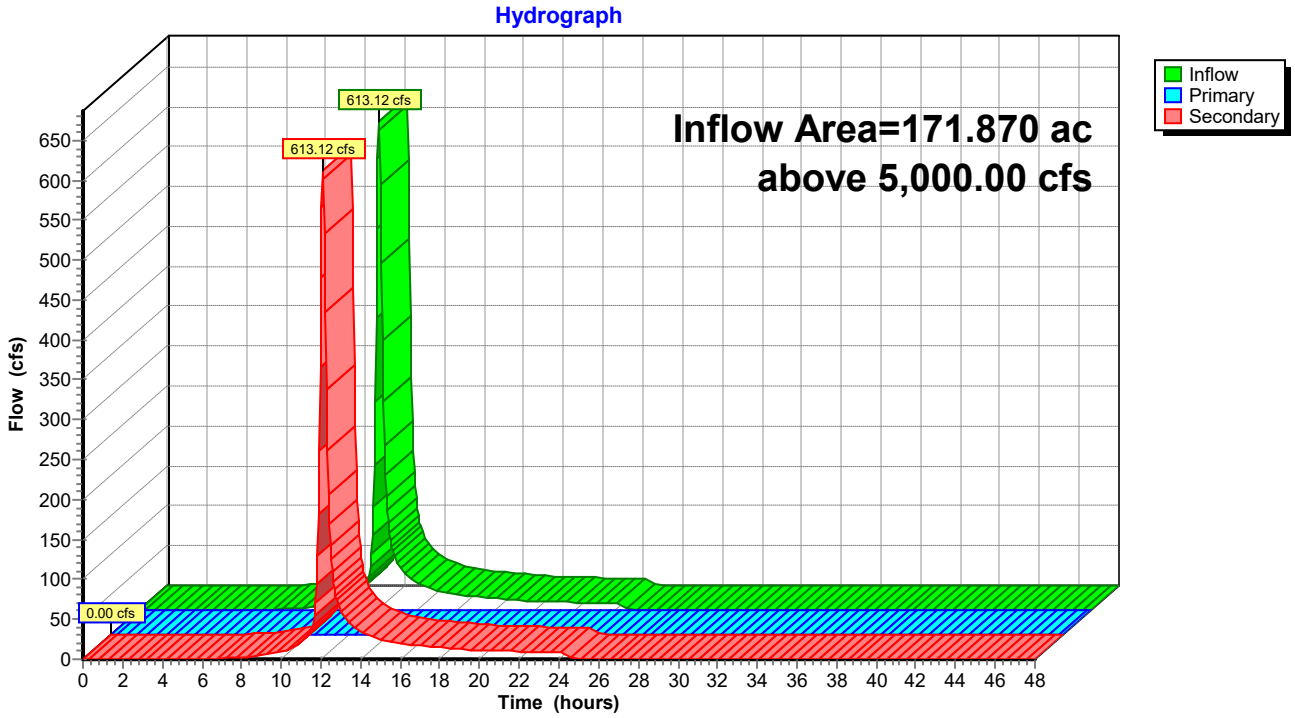
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
938.42	0.0	0	943.52	129.5	134,463
938.52	0.5	561	943.62	134.2	139,258
938.62	1.2	1,204	943.72	138.9	144,137
938.72	1.9	1,931	943.82	143.6	149,098
938.82	2.6	2,740	943.92	148.5	154,143
938.92	3.5	3,633	944.02	153.4	159,271
939.02	4.4	4,609	944.12	158.5	164,481
939.12	5.5	5,667	944.22	163.6	169,775
939.22	6.6	6,809	944.32	168.7	175,152
939.32	7.7	8,034	944.42	174.0	180,612
939.42	9.0	9,342	944.52	179.3	186,155
939.52	10.3	10,733	944.62	184.8	191,781
939.62	11.8	12,207	944.72	190.3	197,490
939.72	13.3	13,764	944.82	195.8	203,282
939.82	14.8	15,404	944.92	201.5	209,157
939.92	16.5	17,127	945.02	207.2	215,115
940.02	18.2	18,933	945.12	213.1	221,156
940.12	20.1	20,822	945.22	219.0	227,280
940.22	22.0	22,794	945.32	224.9	233,488
940.32	23.9	24,850	945.42	231.0	239,778
940.42	26.0	26,988	945.52	237.1	246,151
940.52	28.1	29,209	945.62	243.4	252,608
940.62	30.4	31,514	945.72	249.7	259,147
940.72	32.7	33,901	945.82	256.0	265,770
940.82	35.0	36,372	945.92	262.5	272,475
940.92	37.5	38,925	946.02	269.0	279,264
941.02	40.0	41,562	946.12	275.7	286,135
941.12	42.7	44,281	946.22	282.4	293,090
941.22	45.4	47,084	946.32	289.1	300,127
941.32	48.1	49,969	946.42	296.0	307,248
941.42	51.0	52,938	946.52	302.9	314,452
941.52	53.9	55,990	946.62	310.0	321,738
941.62	57.0	59,124	946.72	317.1	329,108
941.72	60.1	62,342	946.82	324.2	336,561
941.82	63.2	65,643	946.92	331.5	344,097
941.92	66.5	69,027	947.02	338.8	351,716
942.02	69.8	72,494	947.12	346.3	359,418
942.12	73.3	76,044	947.22	353.8	367,203
942.22	76.8	79,677	947.32	361.3	375,071
942.32	80.3	83,393	947.42	369.0	383,022
942.42	84.0	87,192	947.52	376.7	391,056
942.52	87.7	91,074	947.62	384.6	399,173
942.62	91.6	95,039	947.72	392.5	407,373
942.72	95.5	99,087	947.82	400.4	415,657
942.82	99.4	103,219	947.92	408.5	424,023
942.92	103.5	107,433	948.02	416.6	432,472
943.02	107.6	111,730	948.12	424.9	441,005
943.12	111.9	116,111	948.22	433.2	449,620
943.22	116.2	120,574	948.32	441.5	458,319
943.32	120.5	125,121	948.42	**450.0**	**467,100**
943.42	125.0	129,750			

Summary for Link PTA4: Point A4

Inflow Area = 171.870 ac, 0.00% Impervious, Inflow Depth = 3.24" for 10-Year event
Inflow = 613.12 cfs @ 12.12 hrs, Volume= 46.335 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 613.12 cfs @ 12.12 hrs, Volume= 46.335 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=6.99"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=104.25 cfs 7.128 af

Subcatchment A4e: Subarea A4(e) Runoff Area=9.850 ac 0.00% Impervious Runoff Depth=5.47"
Tc=6.0 min CN=81 Runoff=89.09 cfs 4.489 af

Subcatchment A4w: Subarea A4(w) Runoff Area=17.410 ac 0.00% Impervious Runoff Depth=4.55"
Flow Length=1,800' Slope=0.0400 '/' Tc=10.3 min CN=73 Runoff=117.98 cfs 6.607 af

Subcatchment A5e: Offsite Subarea A5(e) Runoff Area=15.160 ac 0.00% Impervious Runoff Depth=5.35"
Flow Length=1,300' Slope=0.0250 '/' Tc=10.2 min CN=80 Runoff=118.85 cfs 6.763 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=33.220 ac 0.00% Impervious Runoff Depth=5.24"
Flow Length=2,450' Slope=0.0200 '/' Tc=15.0 min CN=79 Runoff=220.19 cfs 14.502 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=4.89"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=212.66 cfs 12.482 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=151.10 cfs 9.826 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=5.82"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=228.66 cfs 15.435 af

Reach 1R: RCB Culvert @ Douglas Avg. Flow Depth=1.71' Max Vel=31.02 fps Inflow=691.32 cfs 44.870 af
156.0" x 84.0" Box Pipe n=0.013 L=126.5' S=0.0490 '/' Capacity=3,983.41 cfs Outflow=689.95 cfs 44.870 af

Reach R5-4: Open Channel Pt A5 to Avg. Flow Depth=3.51' Max Vel=14.10 fps Inflow=946.36 cfs 66.136 af
n=0.030 L=732.0' S=0.0328 '/' Capacity=12,031.29 cfs Outflow=928.99 cfs 66.136 af

Reach R7-5: Open Channel PtA7 to Avg. Flow Depth=4.13' Max Vel=7.49 fps Inflow=689.95 cfs 44.870 af
n=0.030 L=1,038.0' S=0.0077 '/' Capacity=5,828.36 cfs Outflow=657.80 cfs 44.870 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=1,030.92 cfs 77.232 af
Primary=0.00 cfs 0.000 af Secondary=1,030.92 cfs 77.232 af

Total Runoff Area = 171.870 ac Runoff Volume = 77.232 af Average Runoff Depth = 5.39"
100.00% Pervious = 171.870 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

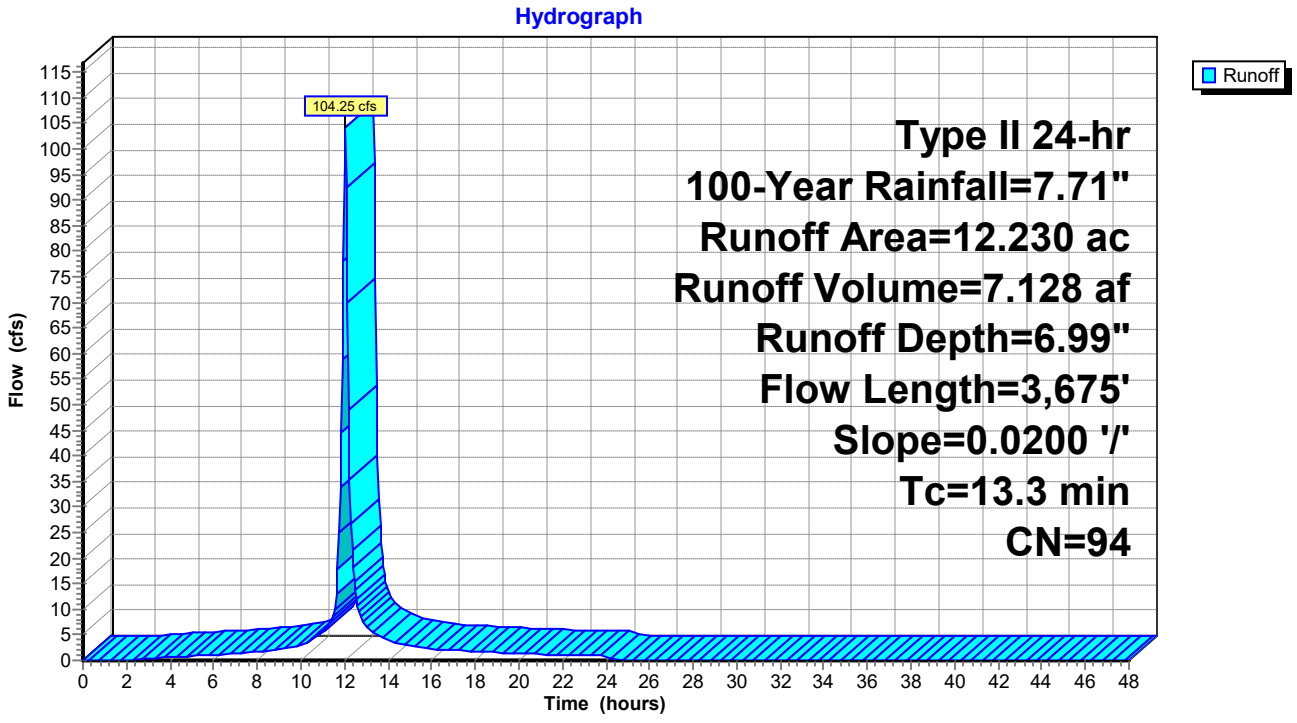
Runoff = 104.25 cfs @ 12.04 hrs, Volume= 7.128 af, Depth= 6.99"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Summary for Subcatchment A4e: Subarea A4(e)

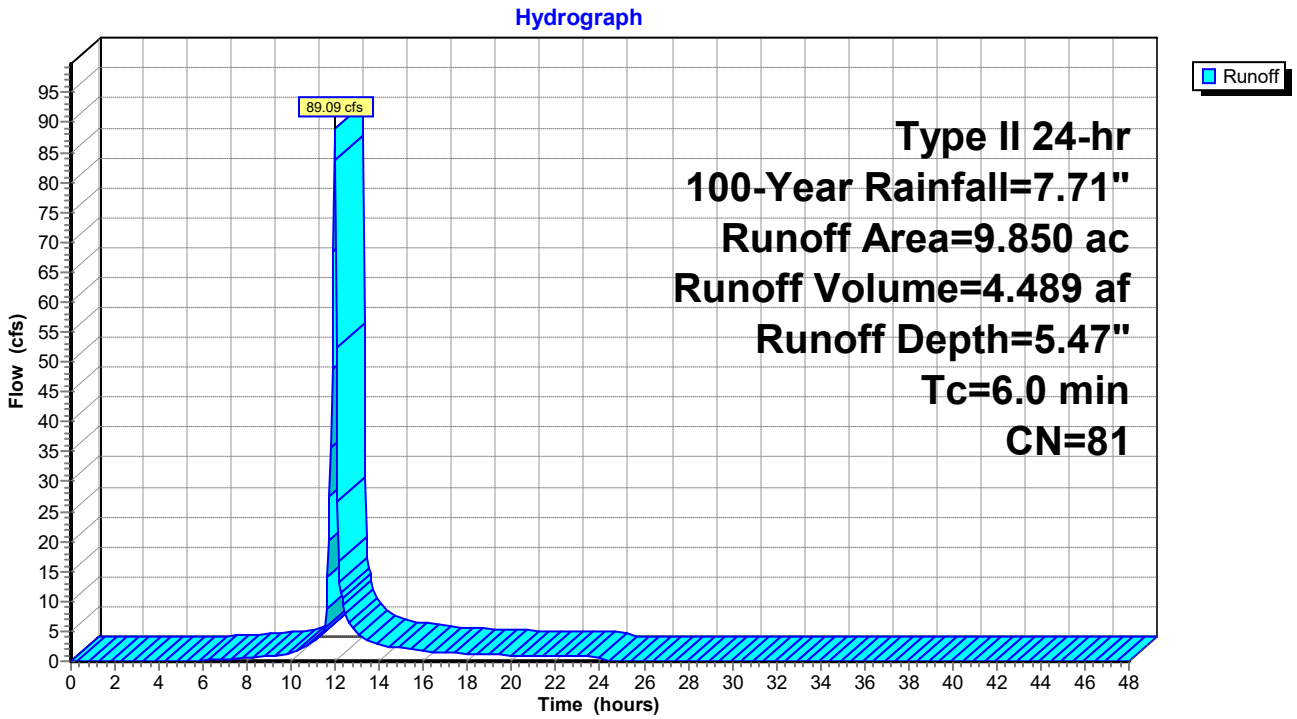
Runoff = 89.09 cfs @ 11.97 hrs, Volume= 4.489 af, Depth= 5.47"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	9.850	81	
	9.850		100.00% Pervious Area

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

Subcatchment A4e: Subarea A4(e)



Summary for Subcatchment A4w: Subarea A4(w)

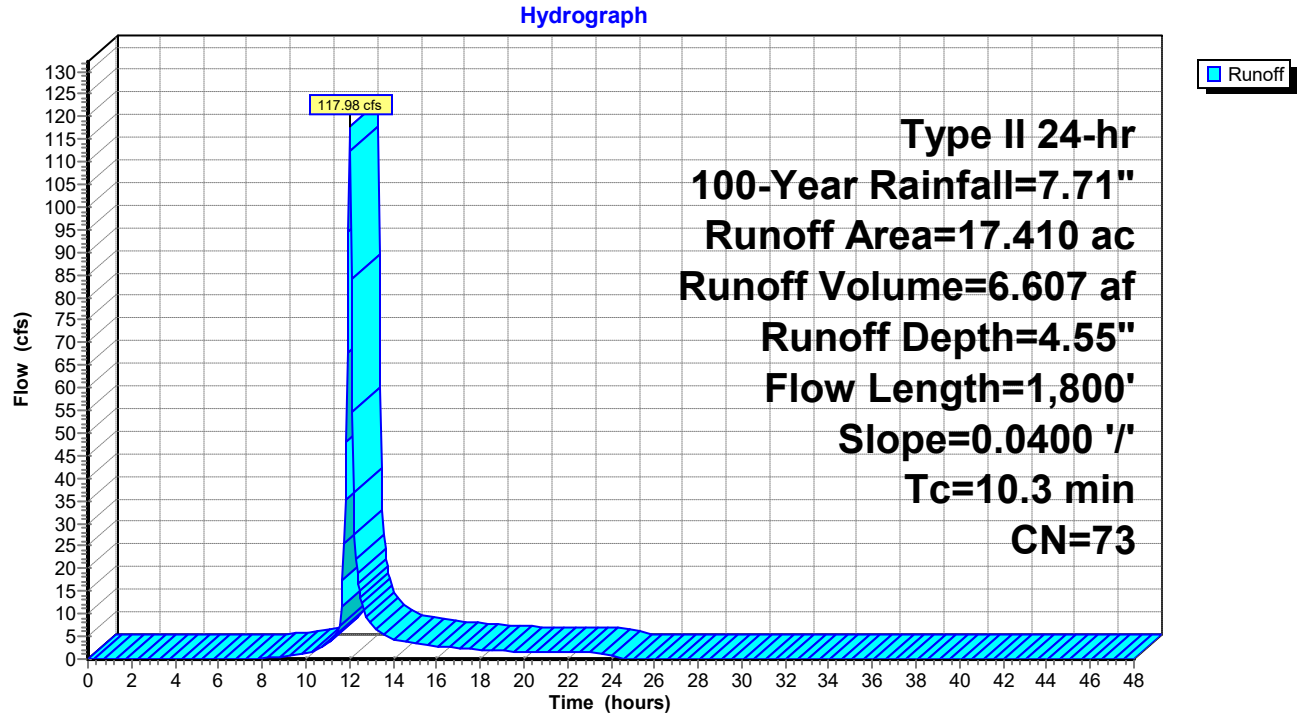
Runoff = 117.98 cfs @ 12.02 hrs, Volume= 6.607 af, Depth= 4.55"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	17.410	73	
	17.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0400	0.26		**Sheet Flow,** Range n= 0.130 P2= 3.50"
4.0	1,700		7.00		**Direct Entry,**
10.3	1,800	Total			

Subcatchment A4w: Subarea A4(w)



Summary for Subcatchment A5e: Offsite Subarea A5(e)

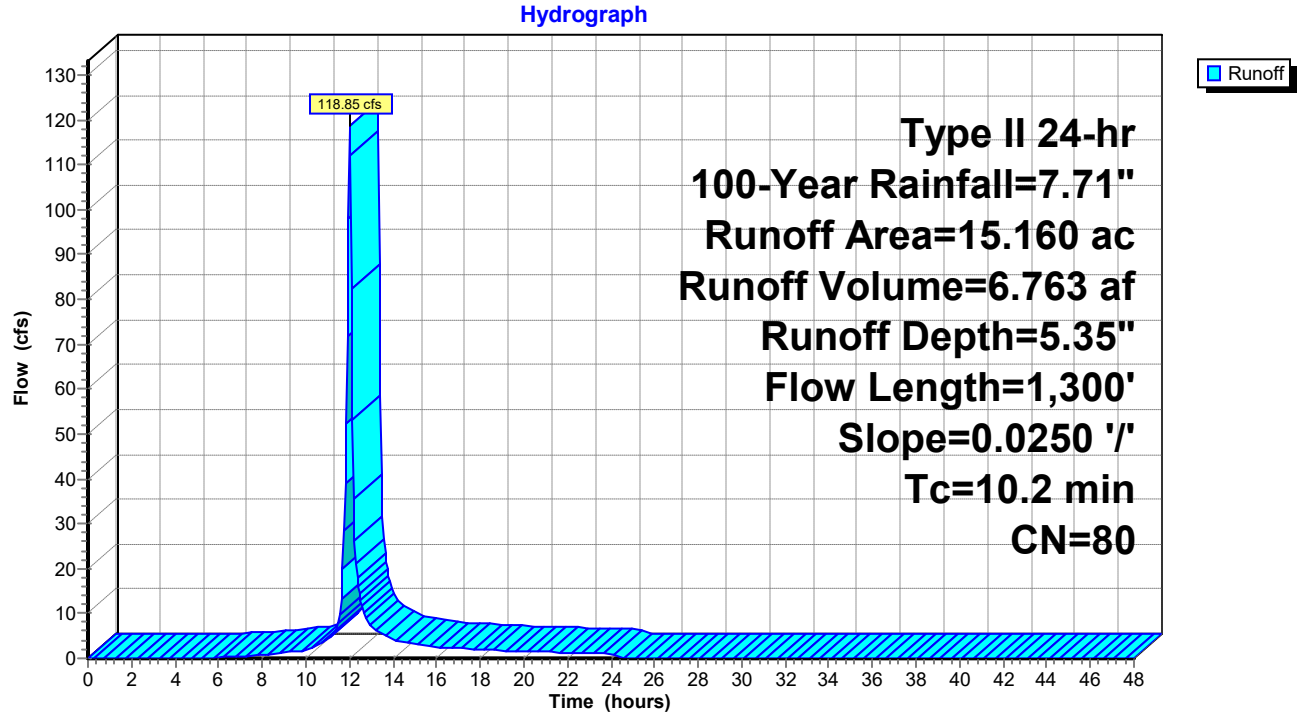
Runoff = 118.85 cfs @ 12.01 hrs, Volume= 6.763 af, Depth= 5.35"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	15.160	80	Subarea A5(e)
	15.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0250	0.22		**Sheet Flow,** Range n= 0.130 P2= 3.50"
0.5	300		10.00		**Direct Entry,**
2.1	900		7.00		**Direct Entry,**
10.2	1,300	Total			

Subcatchment A5e: Offsite Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

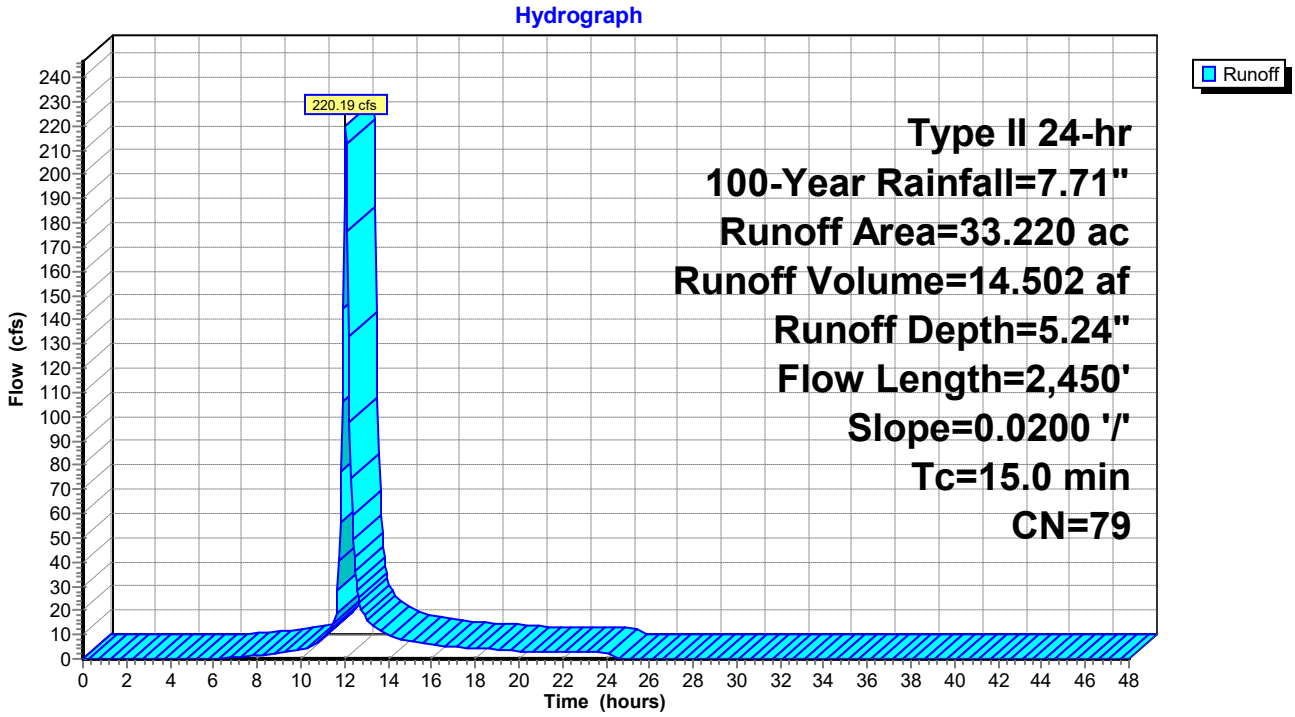
Runoff = 220.19 cfs @ 12.07 hrs, Volume= 14.502 af, Depth= 5.24"
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	13.450	83	Subarea A6
*	19.770	76	Subarea A5(w)
	33.220	79	Weighted Average
	33.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.6	2,350		7.00		**Direct Entry,**
15.0	2,450	Total			

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

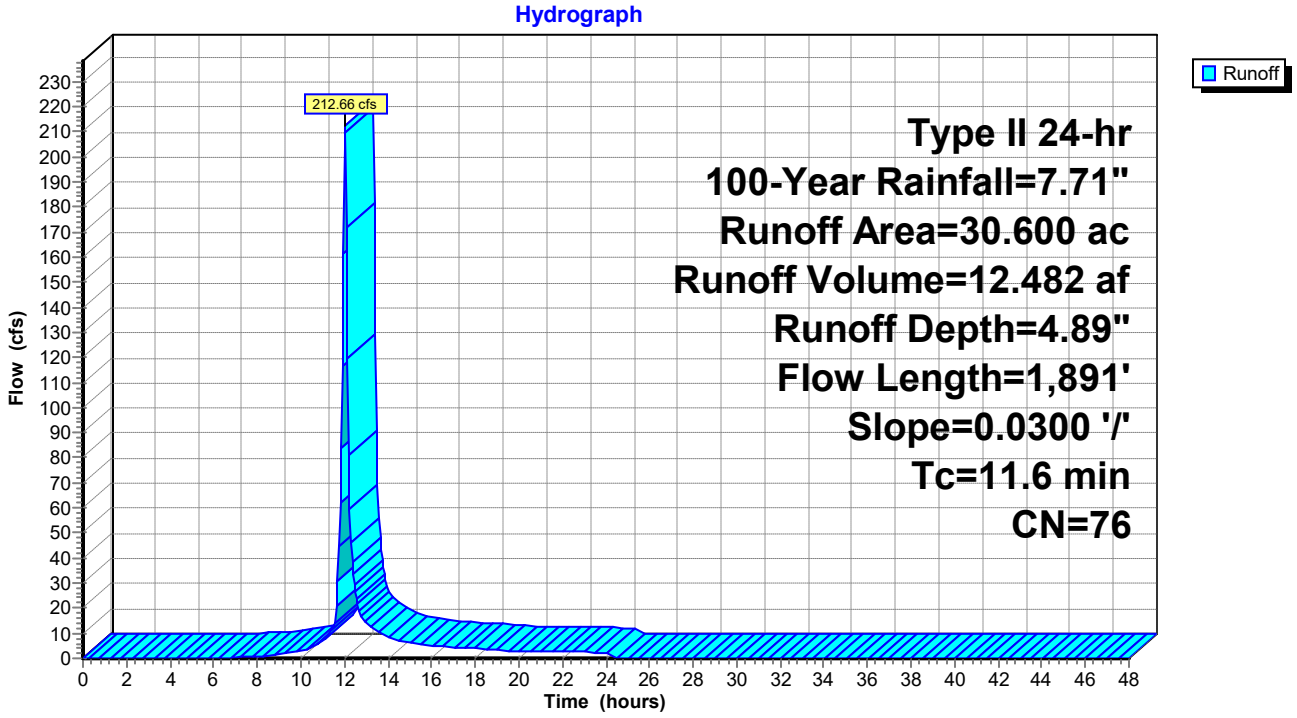
Runoff = 212.66 cfs @ 12.03 hrs, Volume= 12.482 af, Depth= 4.89"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

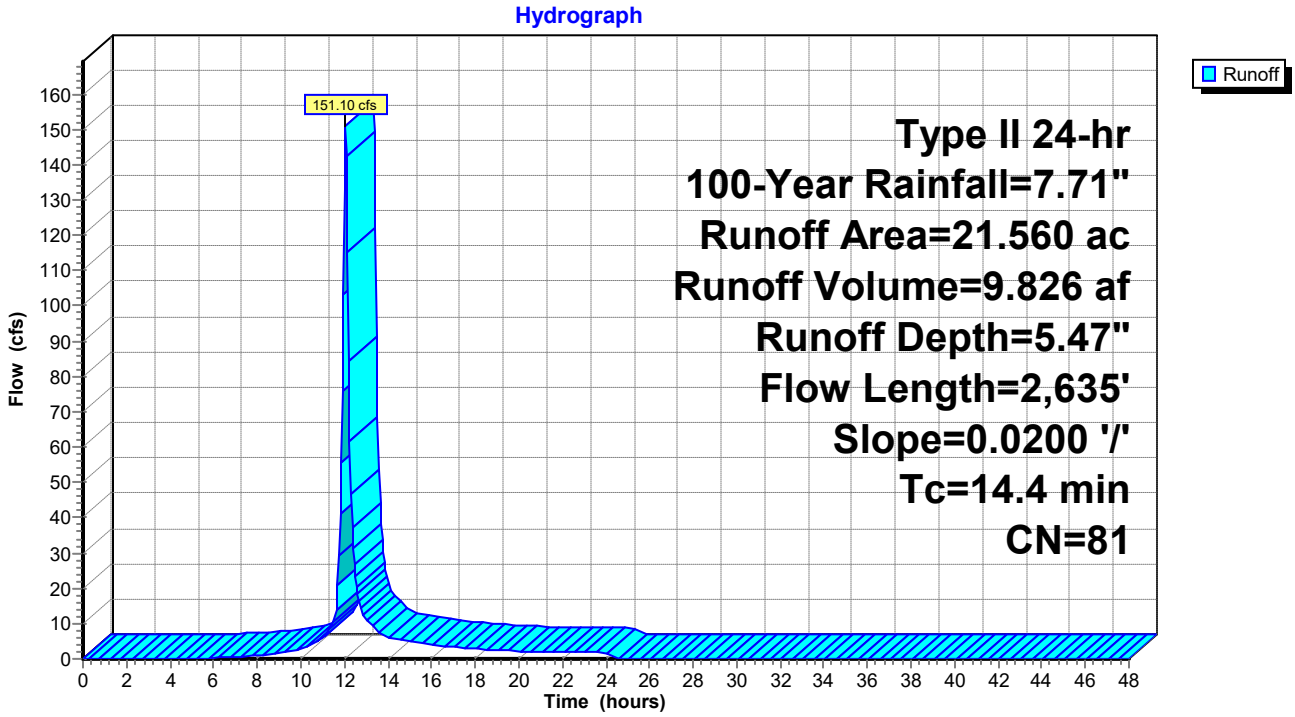
Runoff = 151.10 cfs @ 12.06 hrs, Volume= 9.826 af, Depth= 5.47"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



Summary for Subcatchment A9: Offsite Subarea A9

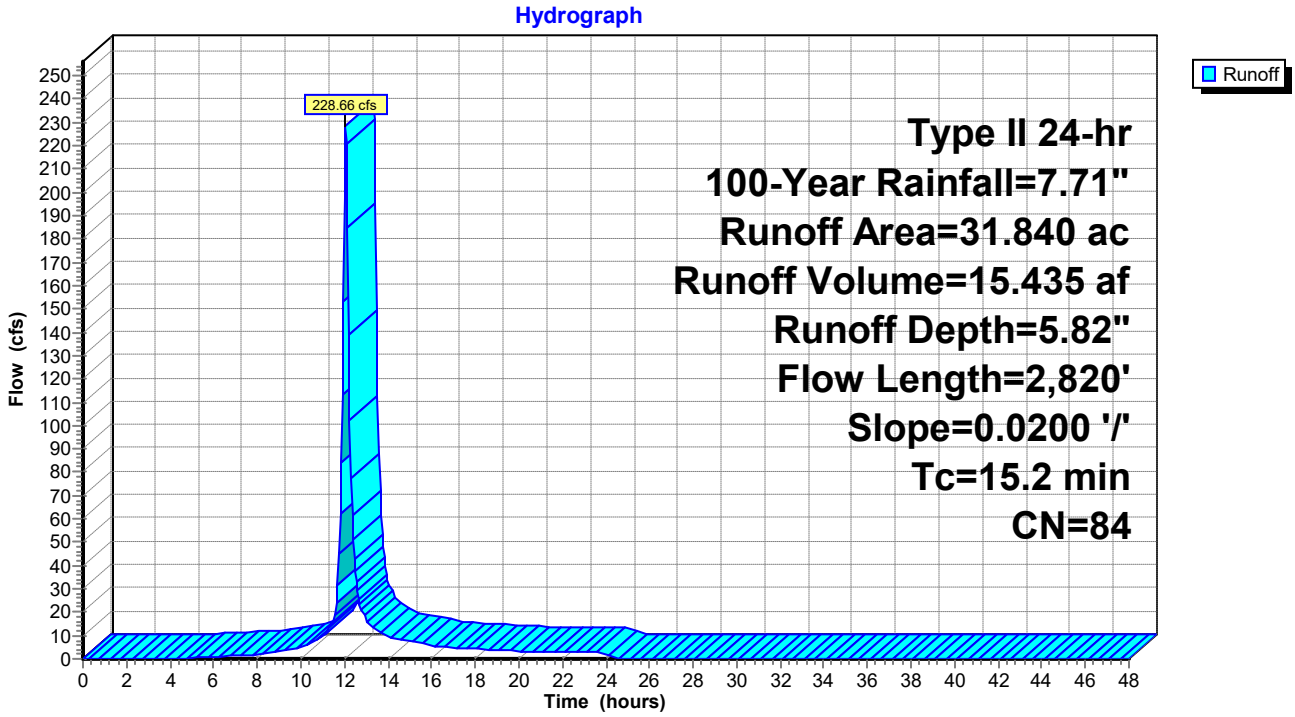
Runoff = 228.66 cfs @ 12.07 hrs, Volume= 15.435 af, Depth= 5.82"
Routed to Reach 1R : RCB Culvert @ Douglas St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



Summary for Reach 1R: RCB Culvert @ Douglas St

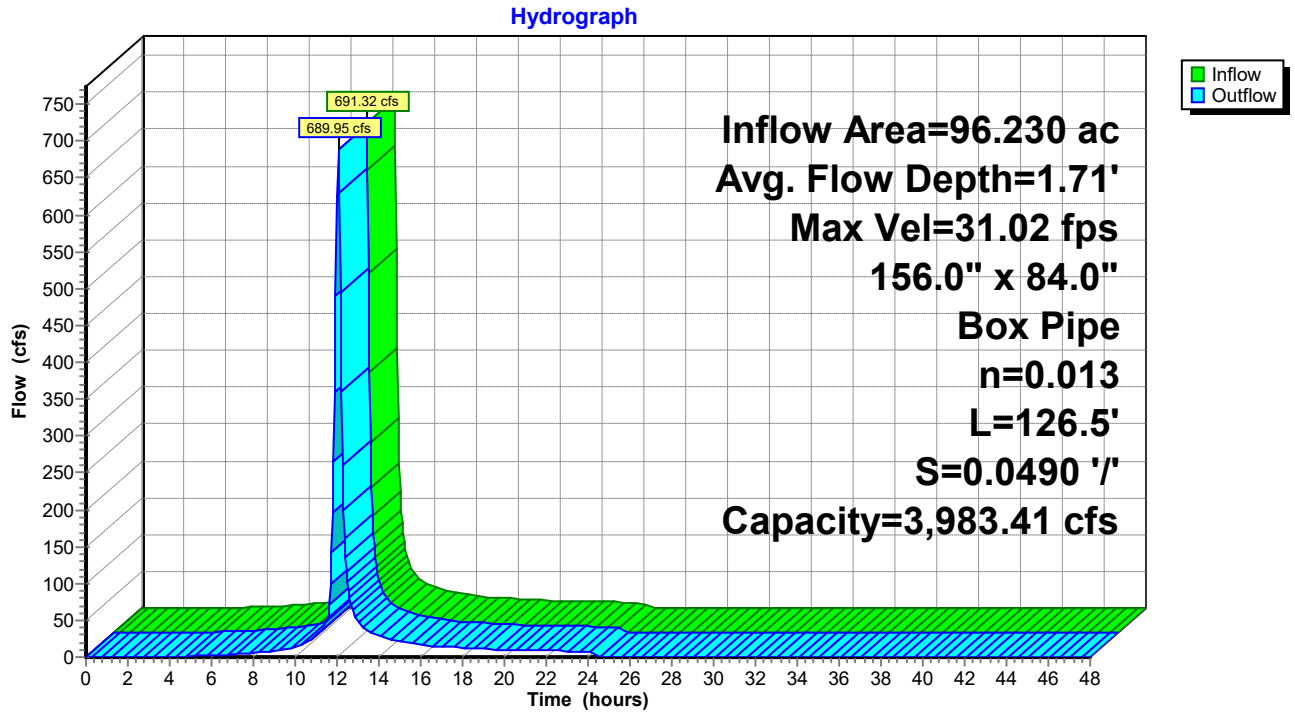
Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 5.60" for 100-Year event
Inflow = 691.32 cfs @ 12.05 hrs, Volume= 44.870 af
Outflow = 689.95 cfs @ 12.05 hrs, Volume= 44.870 af, Atten= 0%, Lag= 0.1 min
Routed to Reach R7-5 : Open Channel PtA7 to Pt A5

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 31.02 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.03 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2,820 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.71' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 3,983.41 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 126.5' Slope= 0.0490 '/'
Inlet Invert= 944.62', Outlet Invert= 938.42'

Reach 1R: RCB Culvert @ Douglas St



Stage-Area-Storage for Reach 1R: RCB Culvert @ Douglas St

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	164
944.82	2.6	329
944.92	3.9	493
945.02	5.2	658
945.12	6.5	822
945.22	7.8	987
945.32	9.1	1,151
945.42	10.4	1,316
945.52	11.7	1,480
945.62	13.0	1,645
945.72	14.3	1,809
945.82	15.6	1,973
945.92	16.9	2,138
946.02	18.2	2,302
946.12	19.5	2,467
946.22	20.8	2,631
946.32	22.1	2,796
946.42	23.4	2,960
946.52	24.7	3,125
946.62	26.0	3,289
946.72	27.3	3,453
946.82	28.6	3,618
946.92	29.9	3,782
947.02	31.2	3,947
947.12	32.5	4,111
947.22	33.8	4,276
947.32	35.1	4,440
947.42	36.4	4,605
947.52	37.7	4,769
947.62	39.0	4,934
947.72	40.3	5,098
947.82	41.6	5,262
947.92	42.9	5,427
948.02	44.2	5,591
948.12	45.5	5,756
948.22	46.8	5,920
948.32	48.1	6,085
948.42	49.4	6,249
948.52	50.7	6,414
948.62	52.0	6,578
948.72	53.3	6,742
948.82	54.6	6,907
948.92	55.9	7,071
949.02	57.2	7,236
949.12	58.5	7,400
949.22	59.8	7,565
949.32	61.1	7,729
949.42	62.4	7,894
949.52	63.7	8,058
949.62	65.0	8,223
949.72	66.3	8,387
949.82	67.6	8,551
949.92	68.9	8,716
950.02	70.2	8,880
950.12	71.5	9,045
950.22	72.8	9,209
950.32	74.1	9,374
950.42	75.4	9,538
950.52	76.7	9,703
950.62	78.0	9,867
950.72	79.3	10,031
950.82	80.6	10,196
950.92	81.9	10,360
951.02	83.2	10,525
951.12	84.5	10,689
951.22	85.8	10,854
951.32	87.1	11,018
951.42	88.4	11,183
951.52	89.7	11,347
951.62	**91.0**	**11,511**

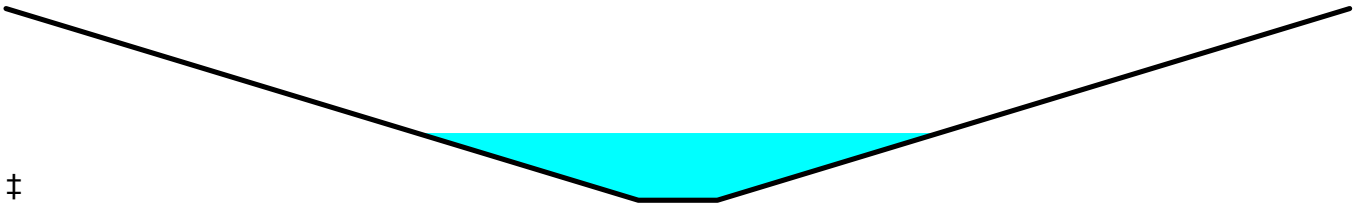
Summary for Reach R5-4: Open Channel Pt A5 to Pt A4

Inflow Area = 144.610 ac, 0.00% Impervious, Inflow Depth = 5.49" for 100-Year event
Inflow = 946.36 cfs @ 12.09 hrs, Volume= 66.136 af
Outflow = 928.99 cfs @ 12.12 hrs, Volume= 66.136 af, Atten= 2%, Lag= 1.5 min
Routed to Link PTA4 : Point A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.10 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.27 fps, Avg. Travel Time= 2.9 min

Peak Storage= 48,977 cf @ 12.11 hrs
Average Depth at Peak Storage= 3.51' , Surface Width= 33.10'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 12,031.29 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 732.0' Slope= 0.0328 '/'
Inlet Invert= 930.43', Outlet Invert= 906.42'



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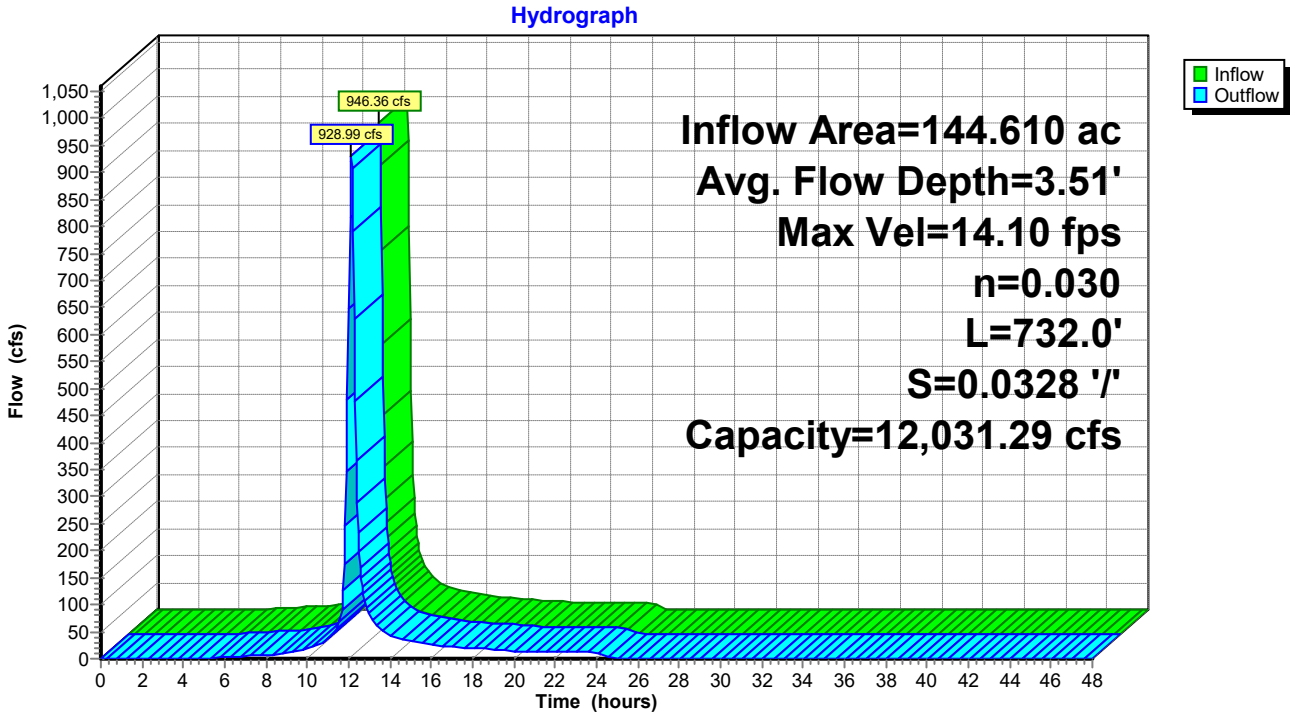
Reach R5-4: Open Channel Pt A5 to Pt A4



Stage-Area-Storage for Reach R5-4: Open Channel Pt A5 to Pt A4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
930.43	0.0	0	935.53	129.5	94,823
930.53	0.5	395	935.63	134.2	98,205
930.63	1.2	849	935.73	138.9	101,646
930.73	1.9	1,362	935.83	143.6	105,144
930.83	2.6	1,932	935.93	148.5	108,702
930.93	3.5	2,562	936.03	153.4	112,318
931.03	4.4	3,250	936.13	158.5	115,993
931.13	5.5	3,997	936.23	163.6	119,726
931.23	6.6	4,802	936.33	168.7	123,518
931.33	7.7	5,666	936.43	174.0	127,368
931.43	9.0	6,588	936.53	179.3	131,277
931.53	10.3	7,569	936.63	184.8	135,244
931.63	11.8	8,608	936.73	190.3	139,270
931.73	13.3	9,706	936.83	195.8	143,355
931.83	14.8	10,863	936.93	201.5	147,498
931.93	16.5	12,078	937.03	207.2	151,700
932.03	18.2	13,352	937.13	213.1	155,960
932.13	20.1	14,684	937.23	219.0	160,279
932.23	22.0	16,075	937.33	224.9	164,656
932.33	23.9	17,524	937.43	231.0	169,092
932.43	26.0	19,032	937.53	237.1	173,586
932.53	28.1	20,598	937.63	243.4	178,140
932.63	30.4	22,224	937.73	249.7	182,751
932.73	32.7	23,907	937.83	256.0	187,421
932.83	35.0	25,649	937.93	262.5	192,150
932.93	37.5	27,450	938.03	269.0	196,937
933.03	40.0	29,309	938.13	275.7	201,783
933.13	42.7	31,227	938.23	282.4	206,688
933.23	45.4	33,204	938.33	289.1	211,650
933.33	48.1	35,238	938.43	296.0	216,672
933.43	51.0	37,332	938.53	302.9	221,752
933.53	53.9	39,484	938.63	310.0	226,891
933.63	57.0	41,695	938.73	317.1	232,088
933.73	60.1	43,964	938.83	324.2	237,344
933.83	63.2	46,292	938.93	331.5	242,658
933.93	66.5	48,678	939.03	338.8	248,031
934.03	69.8	51,123	939.13	346.3	253,462
934.13	73.3	53,626	939.23	353.8	258,952
934.23	76.8	56,188	939.33	361.3	264,501
934.33	80.3	58,809	939.43	369.0	270,108
934.43	84.0	61,488	939.53	376.7	275,774
934.53	87.7	64,226	939.63	384.6	281,498
934.63	91.6	67,022	939.73	392.5	287,281
934.73	95.5	69,877	939.83	400.4	293,122
934.83	99.4	72,790	939.93	408.5	299,022
934.93	103.5	75,762	940.03	416.6	304,980
935.03	107.6	78,792	940.13	424.9	310,998
935.13	111.9	81,882	940.23	433.2	317,073
935.23	116.2	85,029	940.33	441.5	323,207
935.33	120.5	88,235	940.43	**450.0**	**329,400**
935.43	125.0	91,500			

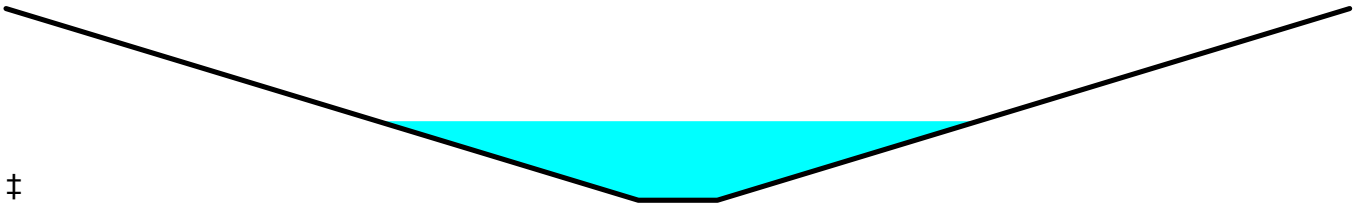
Summary for Reach R7-5: Open Channel PtA7 to Pt A5

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 5.60" for 100-Year event
Inflow = 689.95 cfs @ 12.05 hrs, Volume= 44.870 af
Outflow = 657.80 cfs @ 12.12 hrs, Volume= 44.870 af, Atten= 5%, Lag= 4.1 min
Routed to Reach R5-4 : Open Channel Pt A5 to Pt A4

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.49 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.27 fps, Avg. Travel Time= 7.6 min

Peak Storage= 92,154 cf @ 12.08 hrs
Average Depth at Peak Storage= 4.13' , Surface Width= 38.03'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 5,828.36 cfs

5.00' x 10.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 1,038.0' Slope= 0.0077 '/'
Inlet Invert= 938.42', Outlet Invert= 930.43'



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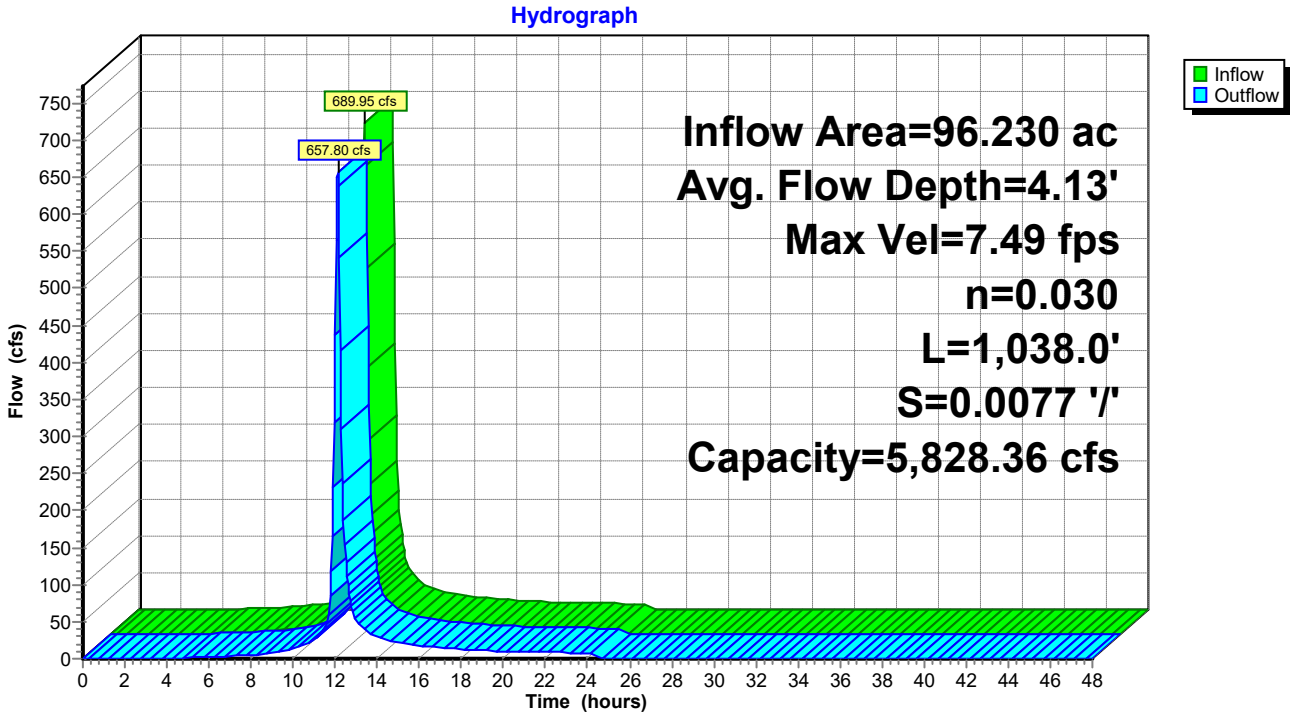
Reach R7-5: Open Channel PtA7 to Pt A5



Stage-Area-Storage for Reach R7-5: Open Channel PtA7 to Pt A5

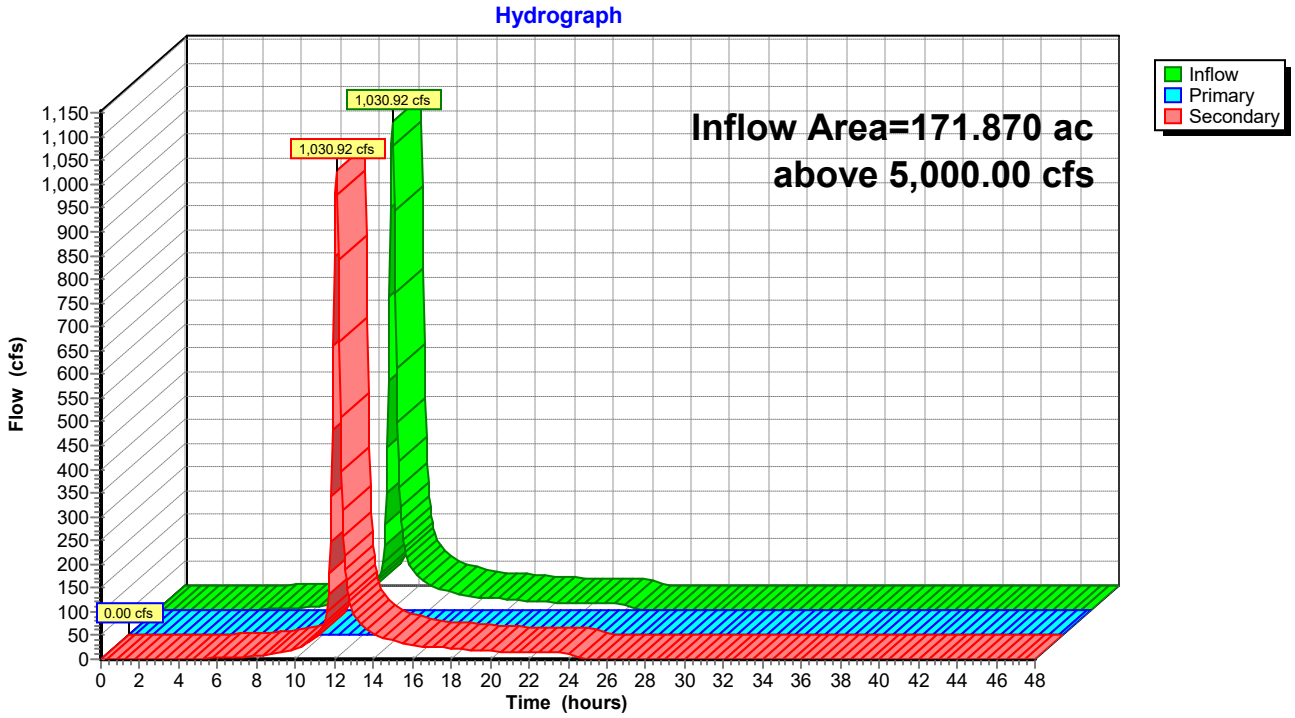
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
938.42	0.0	0	943.52	129.5	134,463
938.52	0.5	561	943.62	134.2	139,258
938.62	1.2	1,204	943.72	138.9	144,137
938.72	1.9	1,931	943.82	143.6	149,098
938.82	2.6	2,740	943.92	148.5	154,143
938.92	3.5	3,633	944.02	153.4	159,271
939.02	4.4	4,609	944.12	158.5	164,481
939.12	5.5	5,667	944.22	163.6	169,775
939.22	6.6	6,809	944.32	168.7	175,152
939.32	7.7	8,034	944.42	174.0	180,612
939.42	9.0	9,342	944.52	179.3	186,155
939.52	10.3	10,733	944.62	184.8	191,781
939.62	11.8	12,207	944.72	190.3	197,490
939.72	13.3	13,764	944.82	195.8	203,282
939.82	14.8	15,404	944.92	201.5	209,157
939.92	16.5	17,127	945.02	207.2	215,115
940.02	18.2	18,933	945.12	213.1	221,156
940.12	20.1	20,822	945.22	219.0	227,280
940.22	22.0	22,794	945.32	224.9	233,488
940.32	23.9	24,850	945.42	231.0	239,778
940.42	26.0	26,988	945.52	237.1	246,151
940.52	28.1	29,209	945.62	243.4	252,608
940.62	30.4	31,514	945.72	249.7	259,147
940.72	32.7	33,901	945.82	256.0	265,770
940.82	35.0	36,372	945.92	262.5	272,475
940.92	37.5	38,925	946.02	269.0	279,264
941.02	40.0	41,562	946.12	275.7	286,135
941.12	42.7	44,281	946.22	282.4	293,090
941.22	45.4	47,084	946.32	289.1	300,127
941.32	48.1	49,969	946.42	296.0	307,248
941.42	51.0	52,938	946.52	302.9	314,452
941.52	53.9	55,990	946.62	310.0	321,738
941.62	57.0	59,124	946.72	317.1	329,108
941.72	60.1	62,342	946.82	324.2	336,561
941.82	63.2	65,643	946.92	331.5	344,097
941.92	66.5	69,027	947.02	338.8	351,716
942.02	69.8	72,494	947.12	346.3	359,418
942.12	73.3	76,044	947.22	353.8	367,203
942.22	76.8	79,677	947.32	361.3	375,071
942.32	80.3	83,393	947.42	369.0	383,022
942.42	84.0	87,192	947.52	376.7	391,056
942.52	87.7	91,074	947.62	384.6	399,173
942.62	91.6	95,039	947.72	392.5	407,373
942.72	95.5	99,087	947.82	400.4	415,657
942.82	99.4	103,219	947.92	408.5	424,023
942.92	103.5	107,433	948.02	416.6	432,472
943.02	107.6	111,730	948.12	424.9	441,005
943.12	111.9	116,111	948.22	433.2	449,620
943.22	116.2	120,574	948.32	441.5	458,319
943.32	120.5	125,121	948.42	**450.0**	**467,100**
943.42	125.0	129,750			

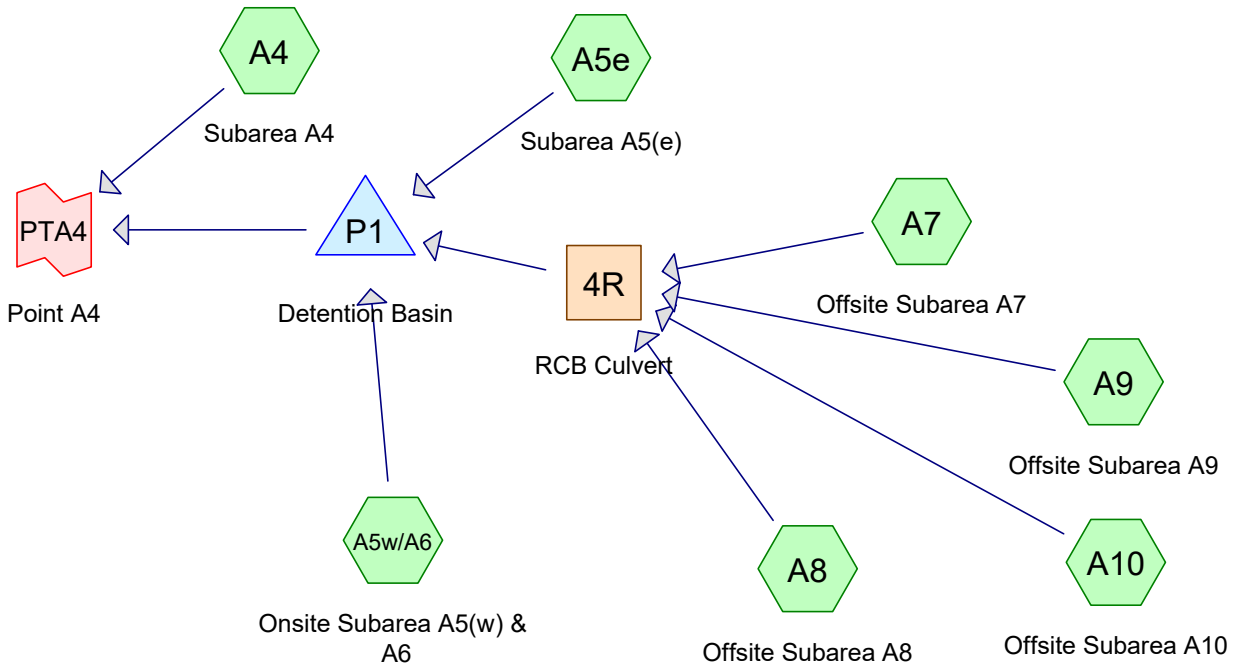
Summary for Link PTA4: Point A4

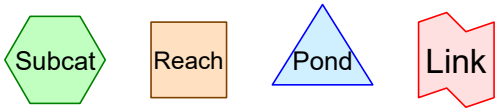
Inflow Area = 171.870 ac, 0.00% Impervious, Inflow Depth = 5.39" for 100-Year event
Inflow = 1,030.92 cfs @ 12.10 hrs, Volume= 77.232 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 1,030.92 cfs @ 12.10 hrs, Volume= 77.232 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4







Routing Diagram for Discovery Park Zone 1 Basin
Prepared by OWN Inc, Printed 6/19/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type II 24-hr		Default	24.00	1	3.50	2
2	10-Year	Type II 24-hr		Default	24.00	1	5.34	2
3	100-Year	Type II 24-hr		Default	24.00	1	7.71	2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=2.84"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=44.50 cfs 2.890 af

Subcatchment A4: Subarea A4 Runoff Area=10.230 ac 0.00% Impervious Runoff Depth=1.24"
Tc=6.0 min CN=74 Runoff=21.99 cfs 1.057 af

Subcatchment A5e: Subarea A5(e) Runoff Area=19.120 ac 0.00% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=92 Runoff=82.11 cfs 4.201 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=46.840 ac 0.00% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=95 Runoff=215.65 cfs 11.472 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=1.37"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=59.57 cfs 3.482 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=1.71"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=48.22 cfs 3.070 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=78.65 cfs 5.138 af

Reach 4R: RCB Culvert Avg. Flow Depth=1.14' Max Vel=15.36 fps Inflow=229.20 cfs 14.579 af
156.0" x 84.0" Box Pipe n=0.013 L=854.8' S=0.0190 '/' Capacity=2,478.55 cfs Outflow=222.90 cfs 14.579 af

Pond P1: Detention Basin Peak Elev=932.17' Storage=1,339,896 cf Inflow=454.20 cfs 30.253 af
Outflow=157.77 cfs 29.513 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=161.23 cfs 30.570 af
Primary=0.00 cfs 0.000 af Secondary=161.23 cfs 30.570 af

Total Runoff Area = 172.420 ac Runoff Volume = 31.310 af Average Runoff Depth = 2.18"
100.00% Pervious = 172.420 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

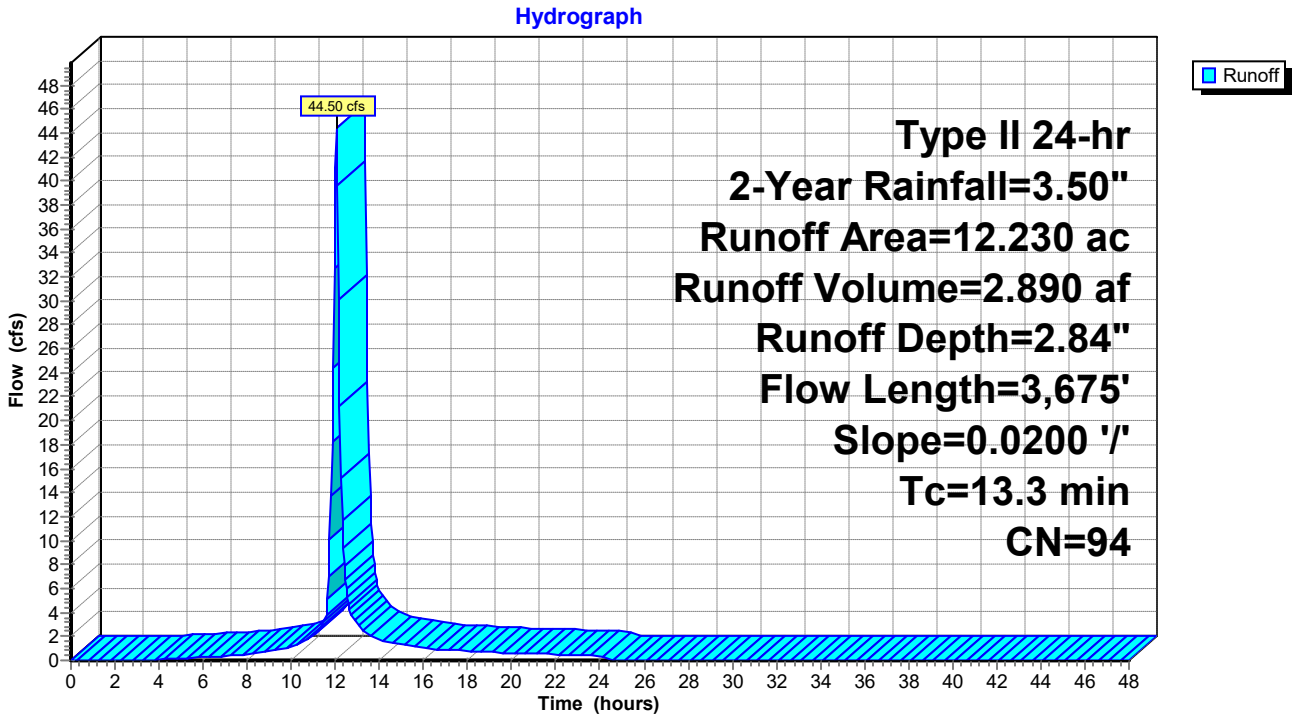
Runoff = 44.50 cfs @ 12.05 hrs, Volume= 2.890 af, Depth= 2.84"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Summary for Subcatchment A4: Subarea A4

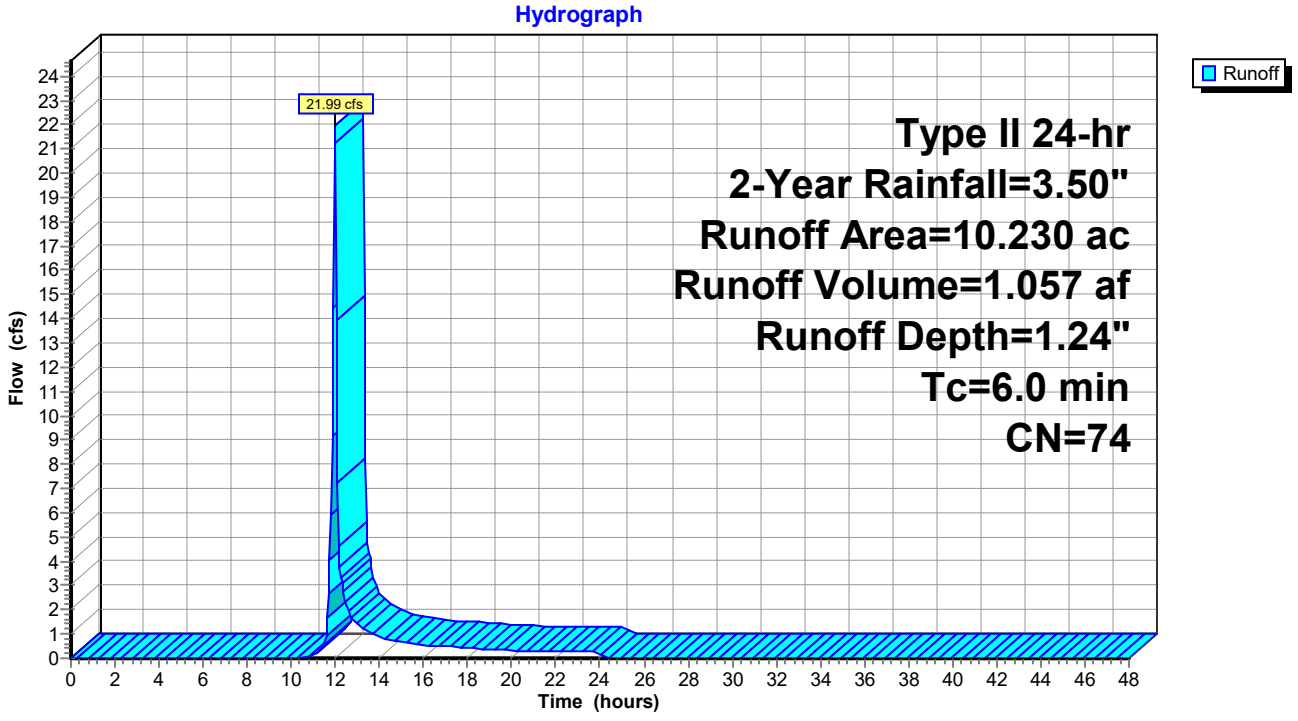
Runoff = 21.99 cfs @ 11.98 hrs, Volume= 1.057 af, Depth= 1.24"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	1.480	89	
*	8.750	72	
	10.230	74	Weighted Average
	10.230		100.00% Pervious Area

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

Subcatchment A4: Subarea A4



Discovery Park Zone 1 Basin
Prepared by OWN Inc

Summary for Subcatchment A5e: Subarea A5(e)

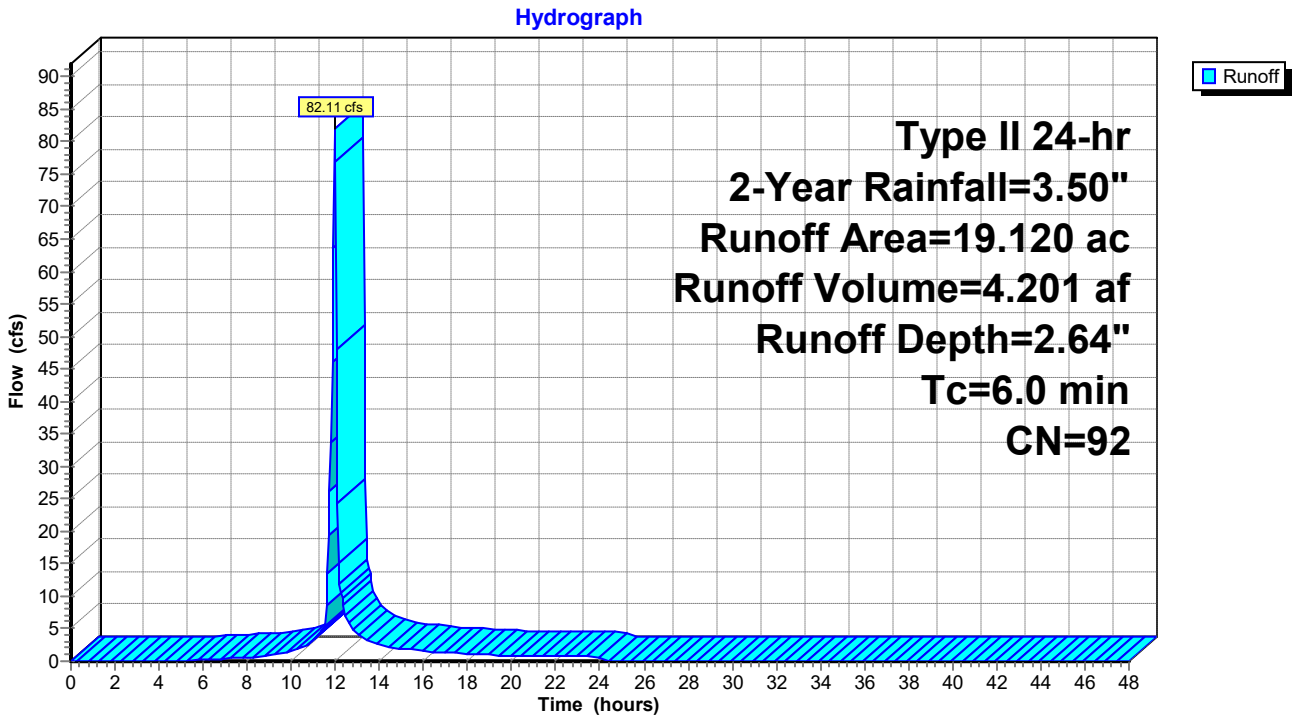
Runoff = 82.11 cfs @ 11.96 hrs, Volume= 4.201 af, Depth= 2.64"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	19.120	92	Subarea A5(e)
	19.120		100.00% Pervious Area

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

Subcatchment A5e: Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

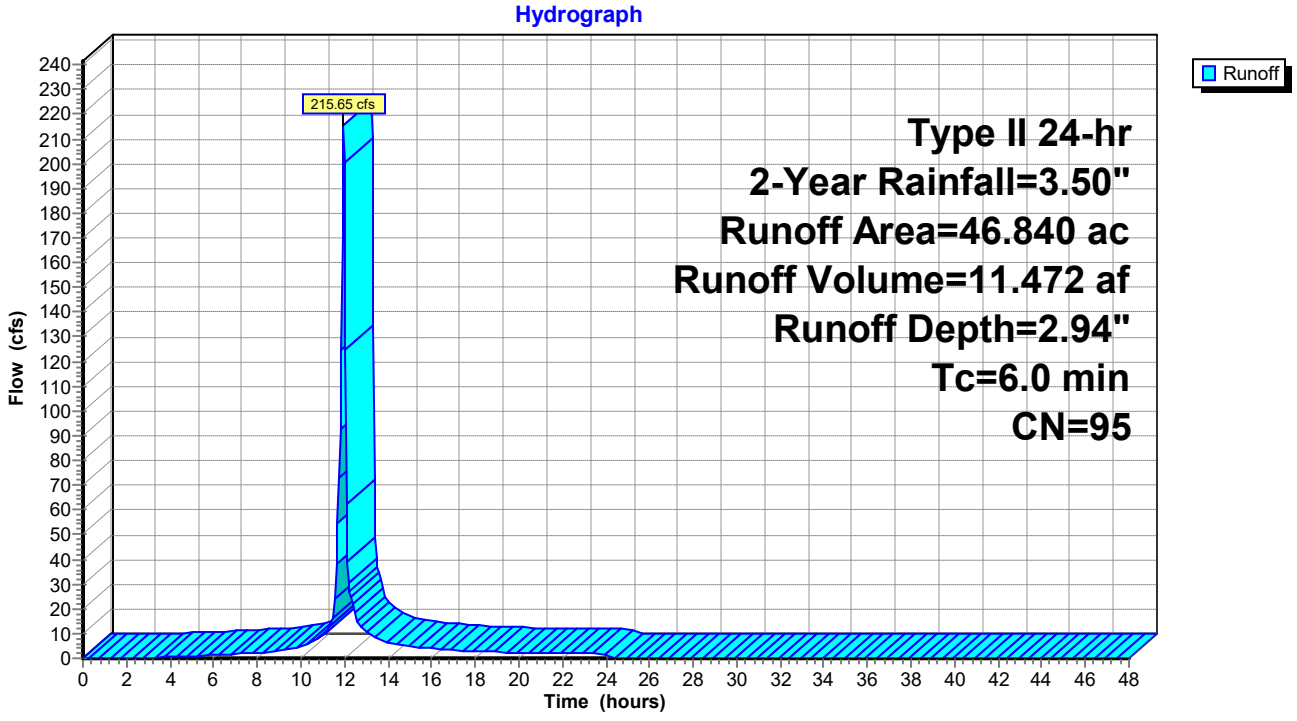
Runoff = 215.65 cfs @ 11.96 hrs, Volume= 11.472 af, Depth= 2.94"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	13.420	94	Subarea A6
*	33.420	95	Subarea A5(w)
	46.840	95	Weighted Average
	46.840		100.00% Pervious Area

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

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

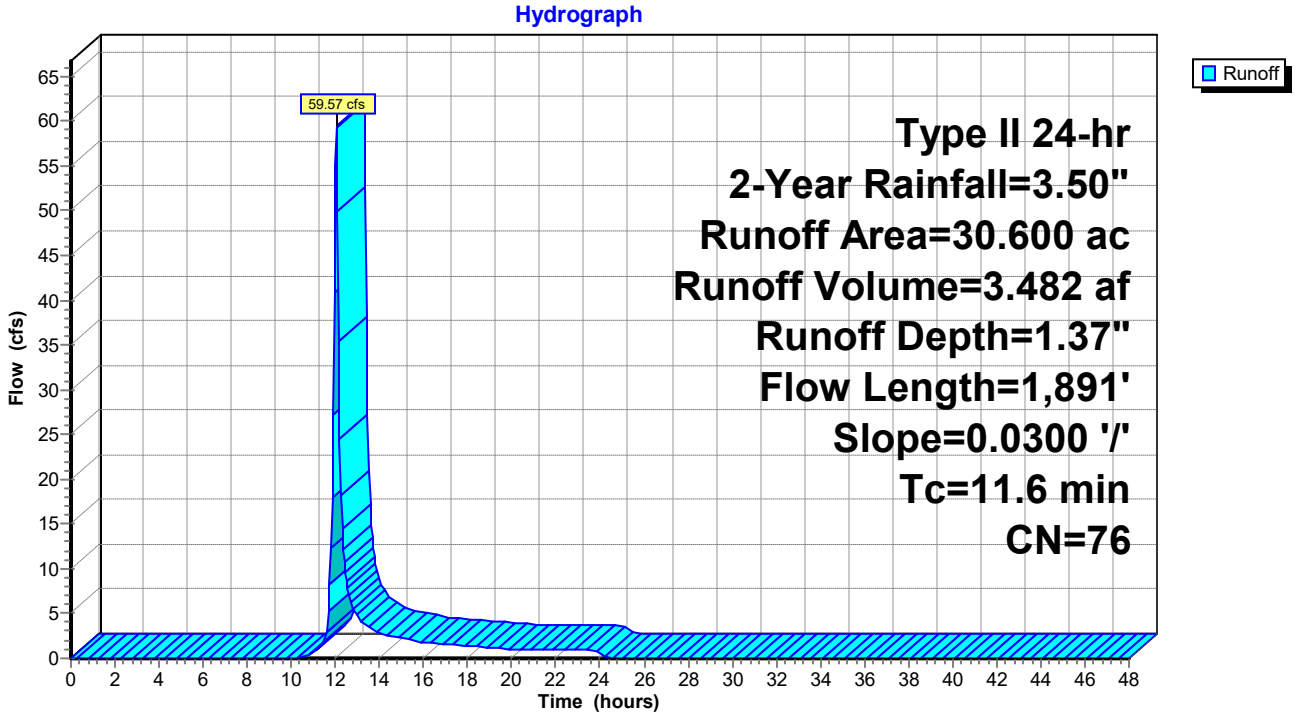
Runoff = 59.57 cfs @ 12.04 hrs, Volume= 3.482 af, Depth= 1.37"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

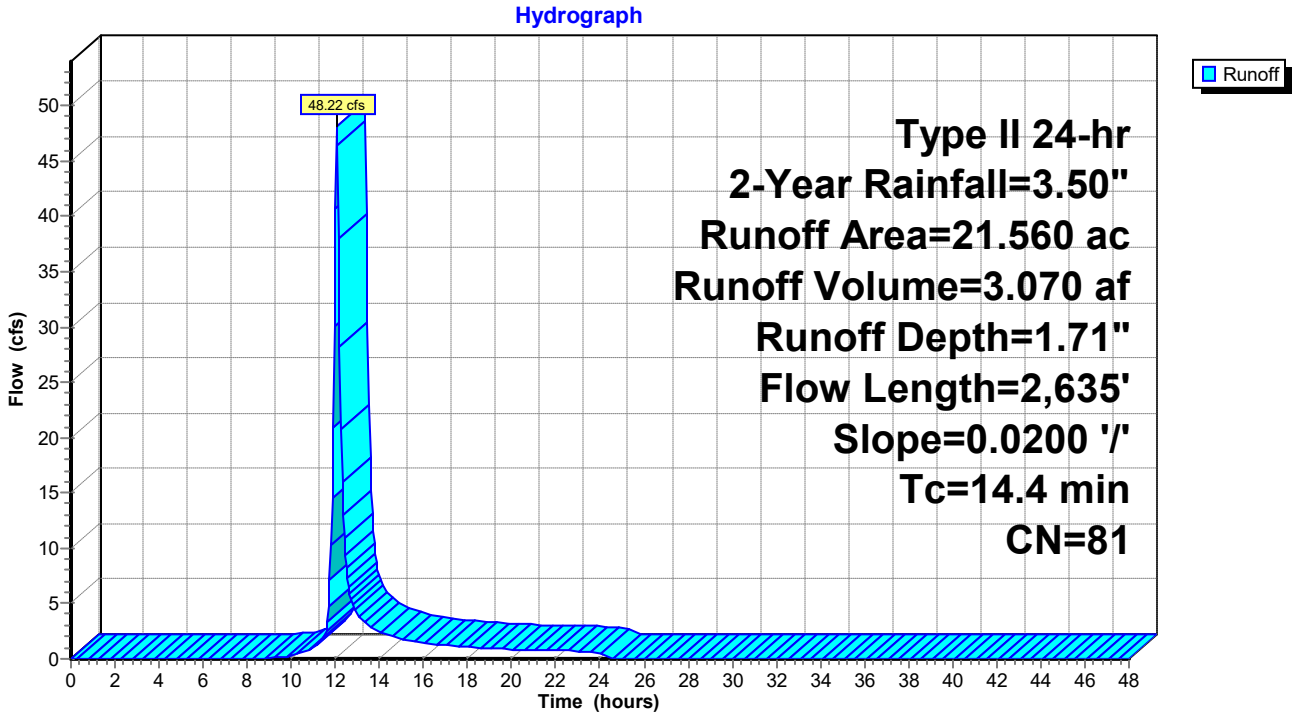
Runoff = 48.22 cfs @ 12.07 hrs, Volume= 3.070 af, Depth= 1.71"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



Summary for Subcatchment A9: Offsite Subarea A9

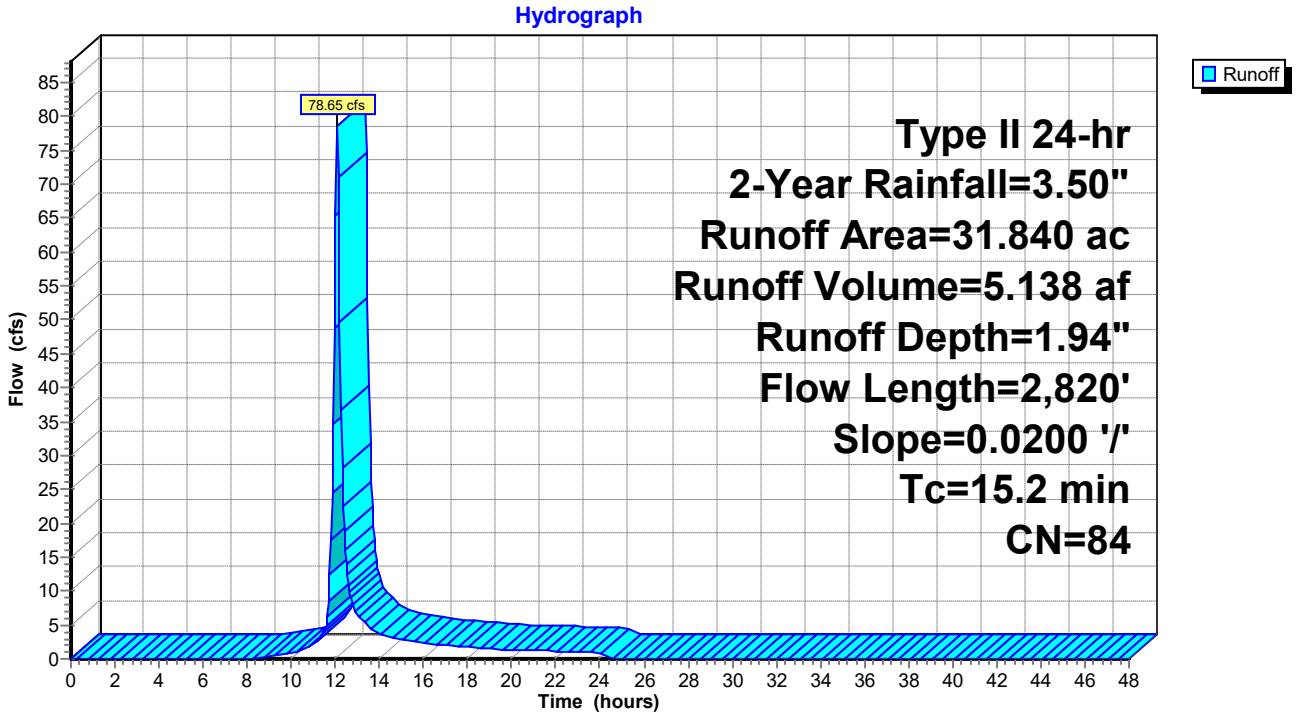
Runoff = 78.65 cfs @ 12.07 hrs, Volume= 5.138 af, Depth= 1.94"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



Summary for Reach 4R: RCB Culvert

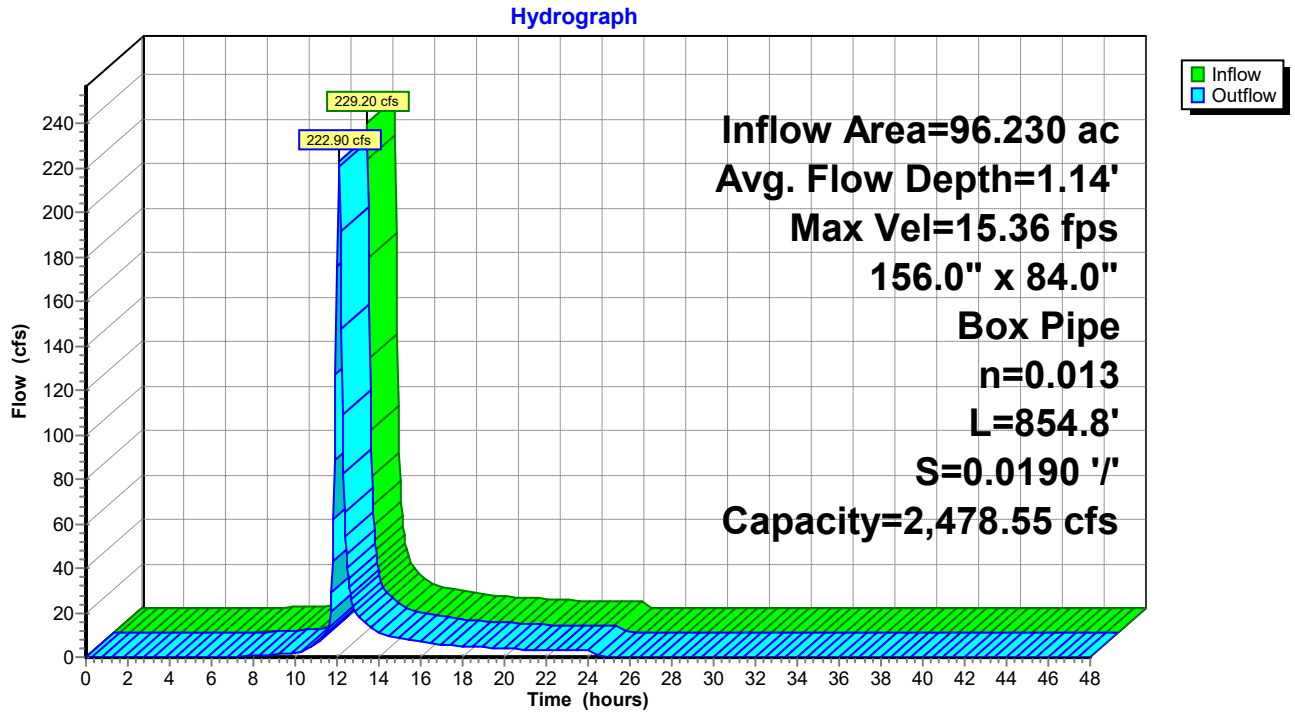
Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 1.82" for 2-Year event
Inflow = 229.20 cfs @ 12.06 hrs, Volume= 14.579 af
Outflow = 222.90 cfs @ 12.08 hrs, Volume= 14.579 af, Atten= 3%, Lag= 1.6 min
Routed to Pond P1 : Detention Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 15.36 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 3.69 fps, Avg. Travel Time= 3.9 min

Peak Storage= 12,644 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.14' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 2,478.55 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 854.8' Slope= 0.0190 '/'
Inlet Invert= 944.62', Outlet Invert= 928.40'

Reach 4R: RCB Culvert



Stage-Area-Storage for Reach 4R: RCB Culvert

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	1,111
944.82	2.6	2,222
944.92	3.9	3,334
945.02	5.2	4,445
945.12	6.5	5,556
945.22	7.8	6,667
945.32	9.1	7,779
945.42	10.4	8,890
945.52	11.7	10,001
945.62	13.0	11,112
945.72	14.3	12,224
945.82	15.6	13,335
945.92	16.9	14,446
946.02	18.2	15,557
946.12	19.5	16,669
946.22	20.8	17,780
946.32	22.1	18,891
946.42	23.4	20,002
946.52	24.7	21,114
946.62	26.0	22,225
946.72	27.3	23,336
946.82	28.6	24,447
946.92	29.9	25,559
947.02	31.2	26,670
947.12	32.5	27,781
947.22	33.8	28,892
947.32	35.1	30,003
947.42	36.4	31,115
947.52	37.7	32,226
947.62	39.0	33,337
947.72	40.3	34,448
947.82	41.6	35,560
947.92	42.9	36,671
948.02	44.2	37,782
948.12	45.5	38,893
948.22	46.8	40,005
948.32	48.1	41,116
948.42	49.4	42,227
948.52	50.7	43,338
948.62	52.0	44,450
948.72	53.3	45,561
948.82	54.6	46,672
948.92	55.9	47,783
949.02	57.2	48,895
949.12	58.5	50,006
949.22	59.8	51,117
949.32	61.1	52,228
949.42	62.4	53,340
949.52	63.7	54,451
949.62	65.0	55,562
949.72	66.3	56,673
949.82	67.6	57,784
949.92	68.9	58,896
950.02	70.2	60,007
950.12	71.5	61,118
950.22	72.8	62,229
950.32	74.1	63,341
950.42	75.4	64,452
950.52	76.7	65,563
950.62	78.0	66,674
950.72	79.3	67,786
950.82	80.6	68,897
950.92	81.9	70,008
951.02	83.2	71,119
951.12	84.5	72,231
951.22	85.8	73,342
951.32	87.1	74,453
951.42	88.4	75,564
951.52	89.7	76,676
951.62	**91.0**	**77,787**

Summary for Pond P1: Detention Basin

Inflow Area = 162.190 ac, 0.00% Impervious, Inflow Depth = 2.24" for 2-Year event
Inflow = 454.20 cfs @ 11.99 hrs, Volume= 30.253 af
Outflow = 157.77 cfs @ 12.24 hrs, Volume= 29.513 af, Atten= 65%, Lag= 14.9 min
Primary = 157.77 cfs @ 12.24 hrs, Volume= 29.513 af
Routed to Link PTA4 : Point A4

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 929.00' Surf.Area= 133,771 sf Storage= 852,960 cf
Peak Elev= 932.17' @ 12.24 hrs Surf.Area= 165,097 sf Storage= 1,339,896 cf (486,936 cf above start)

Plug-Flow detention time= 584.6 min calculated for 9.931 af (33% of inflow)
Center-of-Mass det. time= 120.0 min (924.9 - 805.0)

Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2,839,155 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

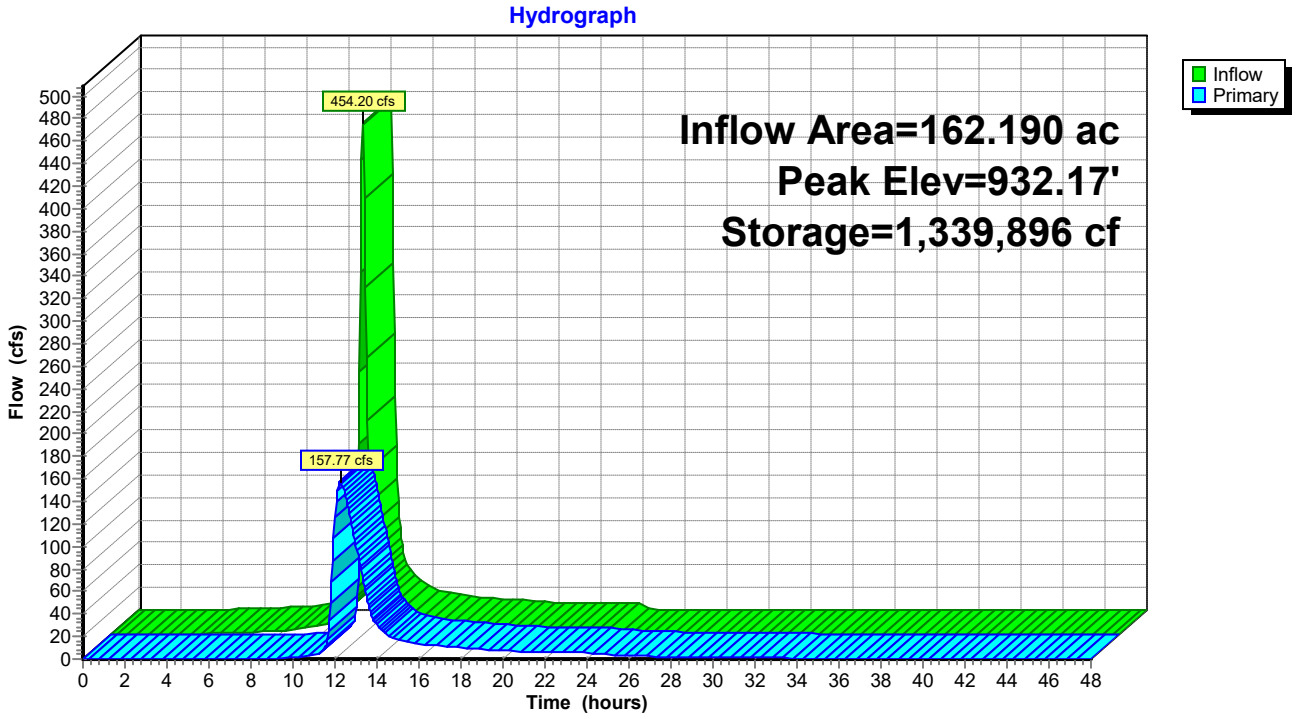
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
920.00	71,722	0	0	71,722
921.00	76,302	74,000	74,000	76,402
922.00	80,949	78,614	152,614	81,155
923.00	85,667	83,297	235,911	85,982
924.00	90,455	88,050	323,961	90,884
925.00	95,316	92,875	416,836	95,864
926.00	100,249	97,772	514,608	100,920
927.00	105,253	102,741	617,349	106,051
928.00	116,247	110,704	728,054	117,108
929.00	133,771	124,907	852,960	134,677
930.00	152,128	142,851	995,811	153,083
931.00	157,702	154,907	1,150,718	158,829
932.00	163,377	160,531	1,311,249	164,679
933.00	173,358	168,343	1,479,592	174,765
934.00	179,284	176,313	1,655,905	180,875
935.00	185,185	182,227	1,838,131	186,967
936.00	191,129	188,149	2,026,280	193,107
937.00	197,128	194,121	2,220,401	199,306
938.00	203,184	200,148	2,420,550	205,566
939.00	209,296	206,232	2,626,782	211,887
940.00	215,465	212,373	2,839,155	218,268

Device	Routing	Invert	Outlet Devices
#1	Primary	912.20'	**72.0" W x 60.0" H Box Culvert** L= 161.8' Ke= 0.350 Inlet / Outlet Invert= 912.20' / 906.34' S= 0.0362 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 30.00 sf
#2	Device 1	929.00'	**142.0 deg x 0.85' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)
#3	Device 1	929.85'	**96.0" W x 6.5" H Vert. Orifice/Grate (NE&SW) X 2.00** C= 0.600 Limited to weir flow at low heads

#4	Device 1	929.85'	**132.0" W x 6.5" H Vert. Orifice/Grate (NW&SE) X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	932.20'	**108.0" x 144.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=157.67 cfs @ 12.24 hrs HW=932.17' (Free Discharge)
└─**1=Culvert** (Passes 157.67 cfs of 670.29 cfs potential flow)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 15.86 cfs @ 7.56 fps)
  ├─**3=Orifice/Grate (NE&SW)** (Orifice Controls 59.71 cfs @ 6.89 fps)
  ├─**4=Orifice/Grate (NW&SE)** (Orifice Controls 82.10 cfs @ 6.89 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond P1: Detention Basin



Stage-Area-Storage for Pond P1: Detention Basin

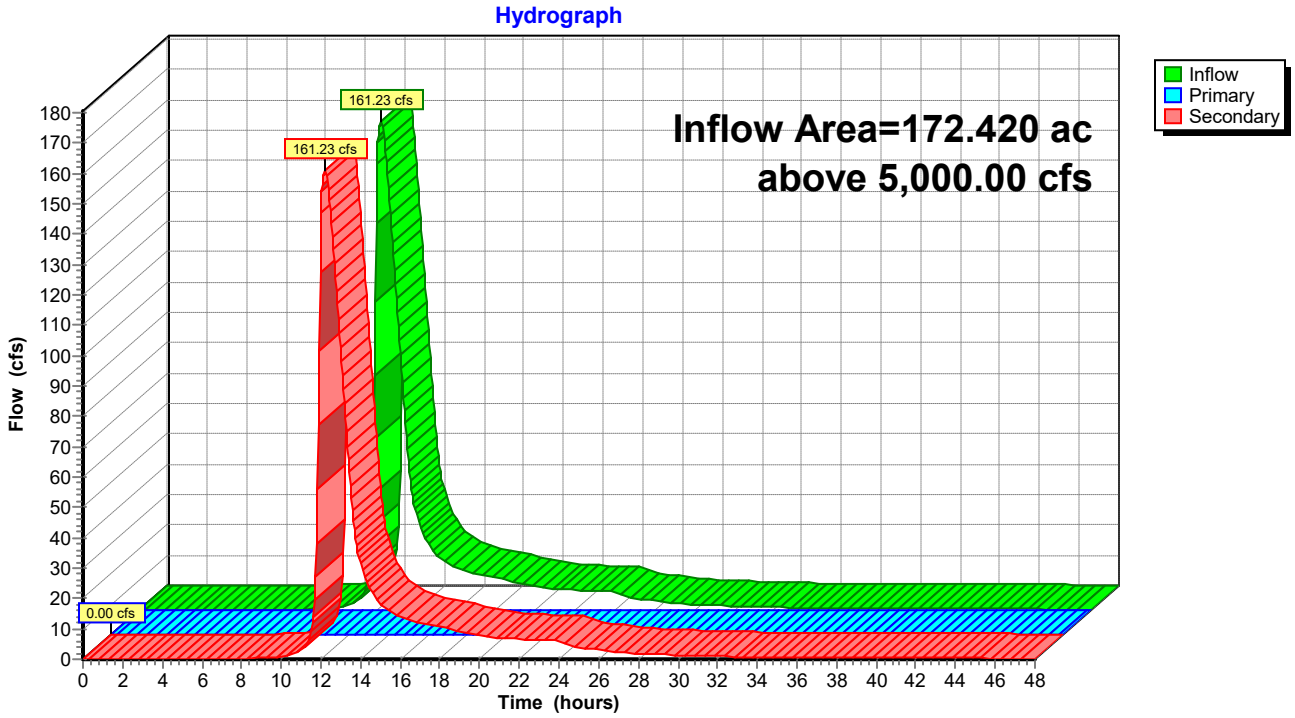
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
920.00	71,722	0
920.20	72,627	14,435
920.40	73,537	29,051
920.60	74,453	43,850
920.80	75,375	58,833
921.00	76,302	74,000
921.20	77,220	89,352
921.40	78,144	104,889
921.60	79,074	120,610
921.80	80,009	136,519
922.00	80,949	152,614
922.20	81,882	168,897
922.40	82,820	185,367
922.60	83,764	202,026
922.80	84,713	218,873
923.00	85,667	235,911
923.20	86,614	253,139
923.40	87,567	270,557
923.60	88,524	288,166
923.80	89,487	305,967
924.00	90,455	323,961
924.20	91,417	342,148
924.40	92,384	360,528
924.60	93,356	379,102
924.80	94,334	397,871
925.00	95,316	416,836
925.20	96,293	435,997
925.40	97,274	455,354
925.60	98,261	474,907
925.80	99,252	494,658
926.00	100,249	514,608
926.20	101,240	534,757
926.40	102,236	555,105
926.60	103,237	575,652
926.80	104,242	596,400
927.00	105,253	617,349
927.20	107,408	638,615
927.40	109,585	660,314
927.60	111,784	682,450
927.80	114,005	705,029
928.00	116,247	728,054
928.20	119,653	751,643
928.40	123,109	775,918
928.60	126,614	800,890
928.80	130,168	826,567
929.00	133,771	852,960
929.20	137,348	880,071
929.40	140,972	907,902
929.60	144,644	936,463
929.80	148,362	965,763
930.00	152,128	995,811
930.20	153,235	1,026,348
930.40	154,346	1,057,106
930.60	155,460	1,088,086
930.80	156,579	1,119,290
931.00	157,702	1,150,718
931.20	158,829	1,182,371
931.40	159,960	1,214,250
931.60	161,095	1,246,355
931.80	162,234	1,278,688
932.00	163,377	1,311,249
932.20	165,350	1,344,122
932.40	167,334	1,377,390
932.60	169,330	1,411,056
932.80	171,338	1,445,123
933.00	173,358	1,479,592
933.20	174,535	1,514,381
933.40	175,716	1,549,406
933.60	176,902	1,584,668
933.80	178,091	1,620,167
934.00	179,284	1,655,905
934.20	180,457	1,691,879
934.40	181,633	1,728,088
934.60	182,813	1,764,532
934.80	183,997	1,801,213
935.00	185,185	1,838,131
935.20	186,366	1,875,286
935.40	187,551	1,912,678
935.60	188,740	1,950,307
935.80	189,933	1,988,174
936.00	191,129	2,026,280
936.20	192,321	2,064,625
936.40	193,517	2,103,209
936.60	194,717	2,142,033
936.80	195,921	2,181,096
937.00	197,128	2,220,401
937.20	198,332	2,259,947
937.40	199,539	2,299,734
937.60	200,751	2,339,763
937.80	201,965	2,380,035
938.00	203,184	2,420,550
938.20	204,399	2,461,308
938.40	205,618	2,502,309
938.60	206,840	2,543,555
938.80	208,066	2,585,046
939.00	209,296	2,626,782
939.20	210,523	2,668,764
939.40	211,753	2,710,991
939.60	212,987	2,753,465
939.80	214,224	2,796,186
940.00	**215,465**	**2,839,155**

Summary for Link PTA4: Point A4

Inflow Area = 172.420 ac, 0.00% Impervious, Inflow Depth > 2.13" for 2-Year event
Inflow = 161.23 cfs @ 12.23 hrs, Volume= 30.570 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 161.23 cfs @ 12.23 hrs, Volume= 30.570 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=4.64"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=70.80 cfs 4.733 af

Subcatchment A4: Subarea A4 Runoff Area=10.230 ac 0.00% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=74 Runoff=46.48 cfs 2.249 af

Subcatchment A5e: Subarea A5(e) Runoff Area=19.120 ac 0.00% Impervious Runoff Depth=4.42"
Tc=6.0 min CN=92 Runoff=133.24 cfs 7.045 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=46.840 ac 0.00% Impervious Runoff Depth=4.76"
Tc=6.0 min CN=95 Runoff=338.72 cfs 18.566 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=2.82"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=123.94 cfs 7.187 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=3.29"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=92.37 cfs 5.907 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=3.58"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=143.71 cfs 9.507 af

Reach 4R: RCB Culvert Avg. Flow Depth=1.70' Max Vel=19.21 fps Inflow=427.58 cfs 27.333 af
156.0" x 84.0" Box Pipe n=0.013 L=854.8' S=0.0190 '/' Capacity=2,478.55 cfs Outflow=417.77 cfs 27.333 af

Pond P1: Detention Basin Peak Elev=933.54' Storage=1,573,206 cf Inflow=787.41 cfs 52.944 af
Outflow=414.92 cfs 52.197 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=423.67 cfs 54.446 af
Primary=0.00 cfs 0.000 af Secondary=423.67 cfs 54.446 af

Total Runoff Area = 172.420 ac Runoff Volume = 55.193 af Average Runoff Depth = 3.84"
100.00% Pervious = 172.420 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

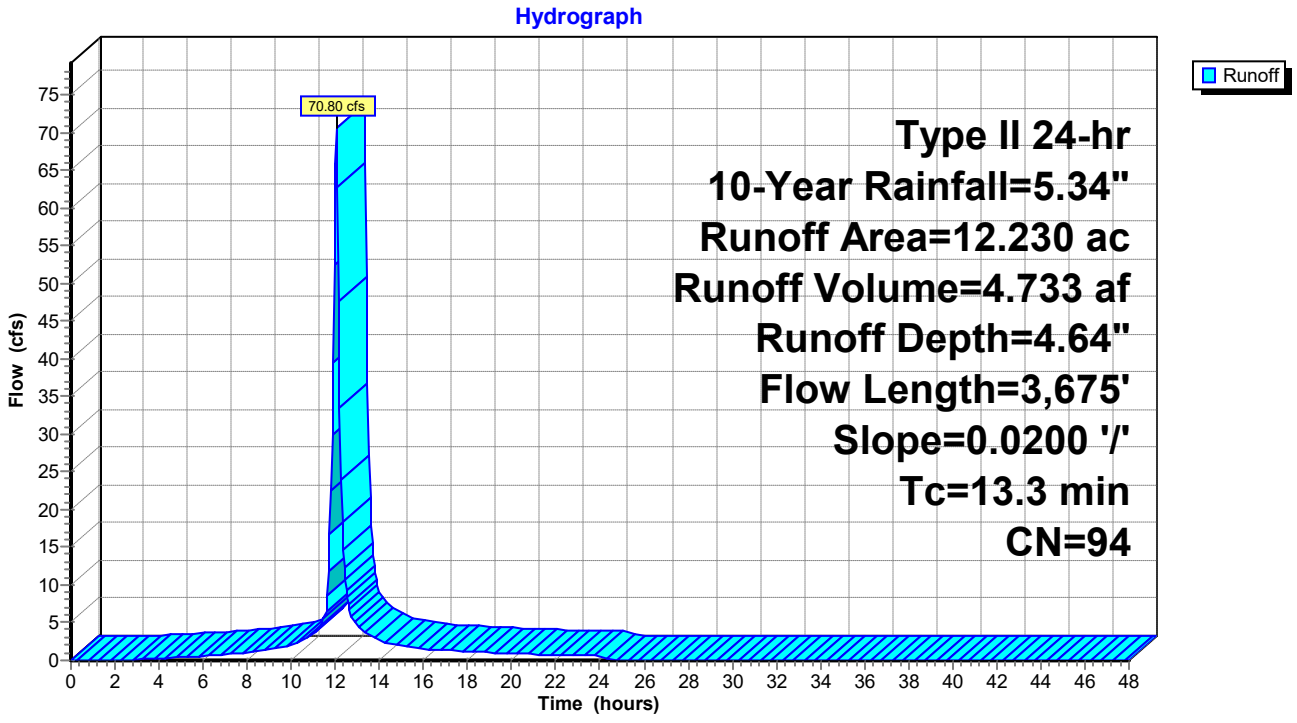
Runoff = 70.80 cfs @ 12.04 hrs, Volume= 4.733 af, Depth= 4.64"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Summary for Subcatchment A4: Subarea A4

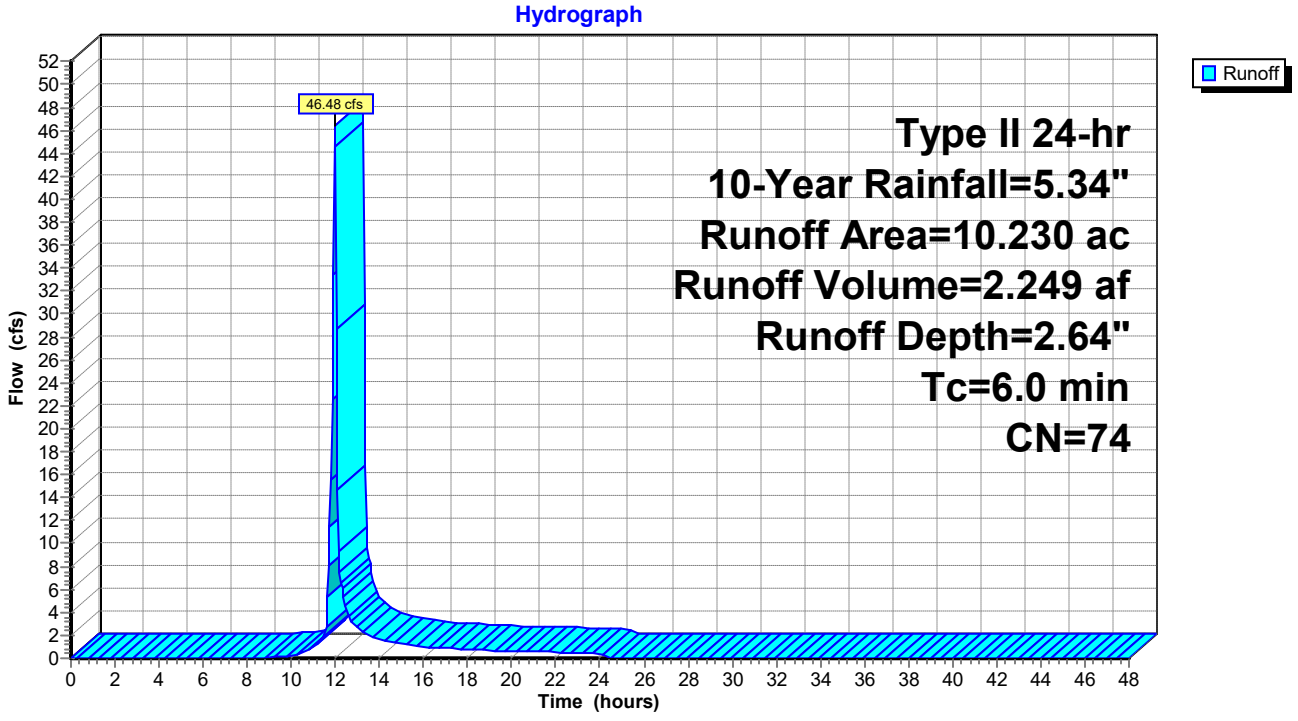
Runoff = 46.48 cfs @ 11.97 hrs, Volume= 2.249 af, Depth= 2.64"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	1.480	89	
*	8.750	72	
	10.230	74	Weighted Average
	10.230		100.00% Pervious Area

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

Subcatchment A4: Subarea A4



Summary for Subcatchment A5e: Subarea A5(e)

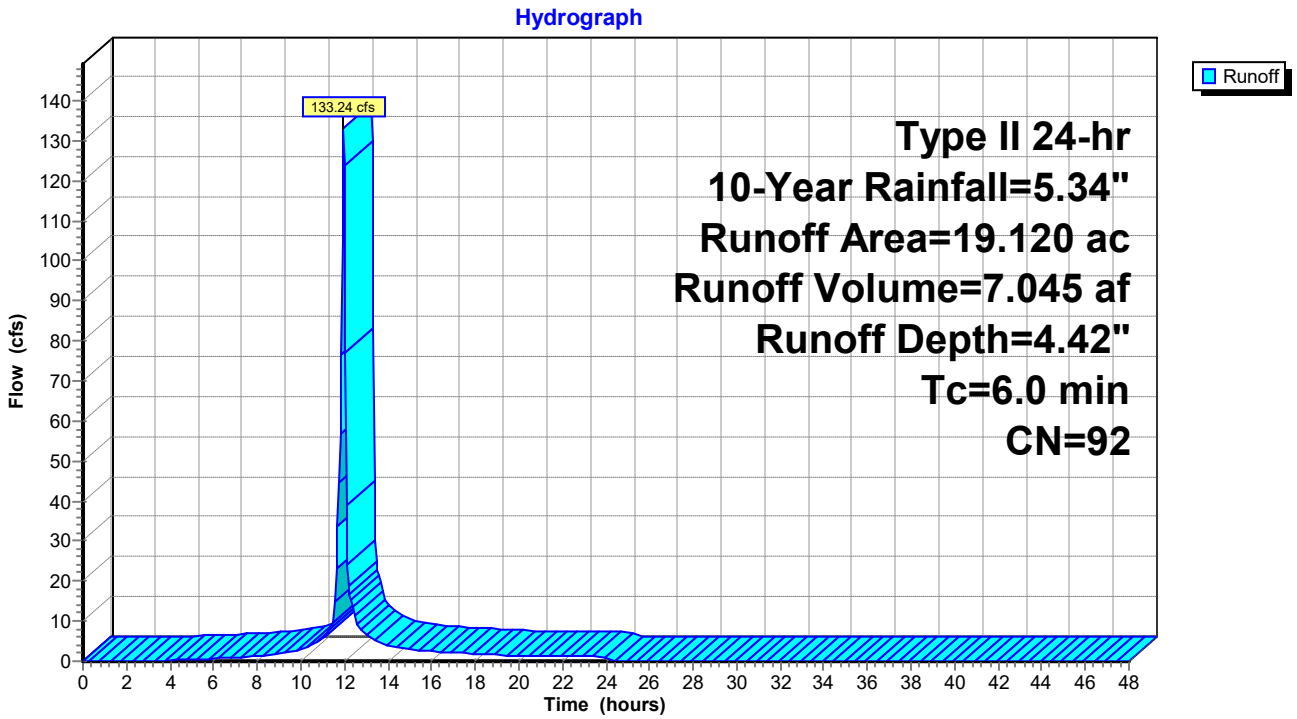
Runoff = 133.24 cfs @ 11.96 hrs, Volume= 7.045 af, Depth= 4.42"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	19.120	92	Subarea A5(e)
	19.120		100.00% Pervious Area

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

Subcatchment A5e: Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

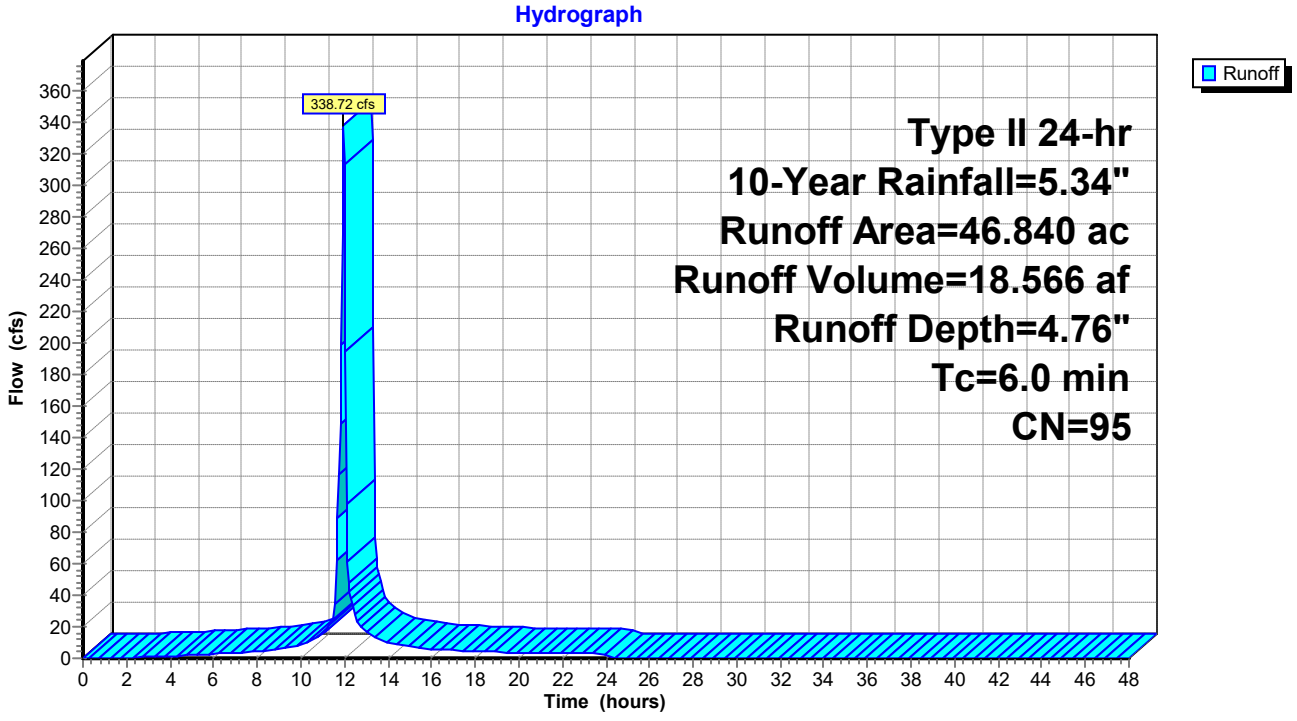
Runoff = 338.72 cfs @ 11.96 hrs, Volume= 18.566 af, Depth= 4.76"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	13.420	94	Subarea A6
*	33.420	95	Subarea A5(w)
	46.840	95	Weighted Average
	46.840		100.00% Pervious Area

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

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

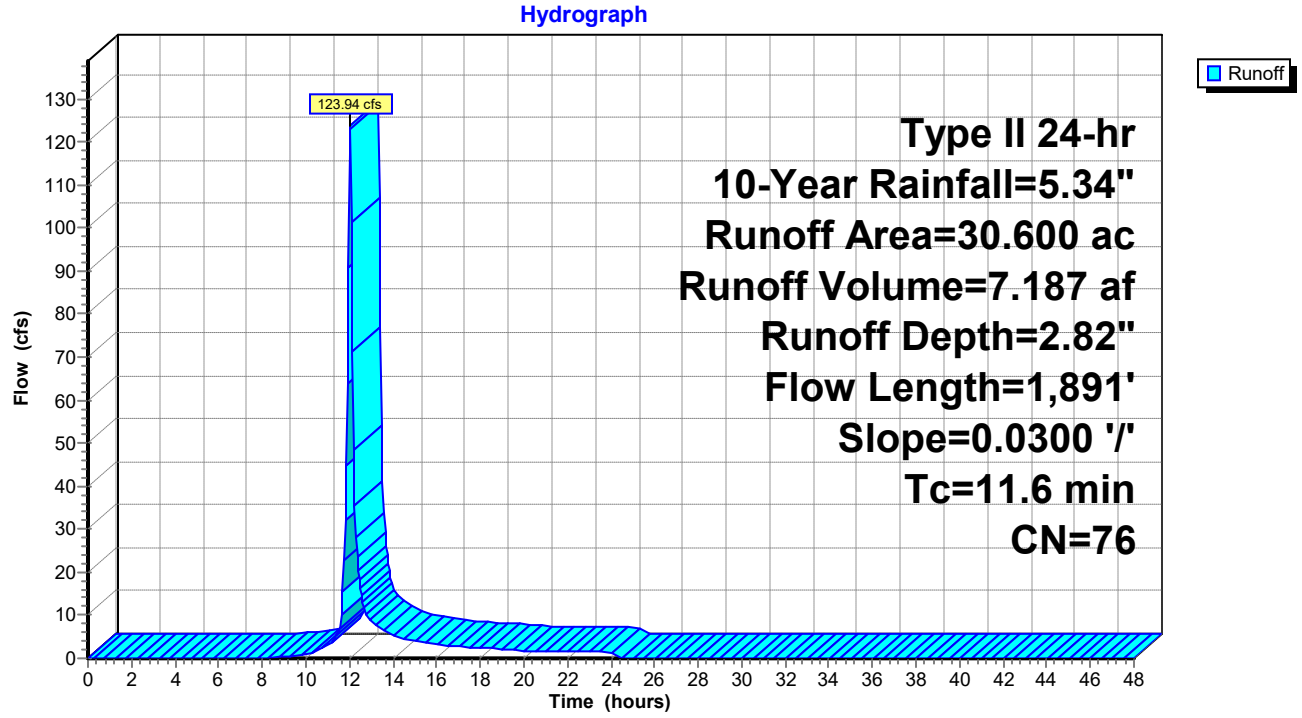
Runoff = 123.94 cfs @ 12.04 hrs, Volume= 7.187 af, Depth= 2.82"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

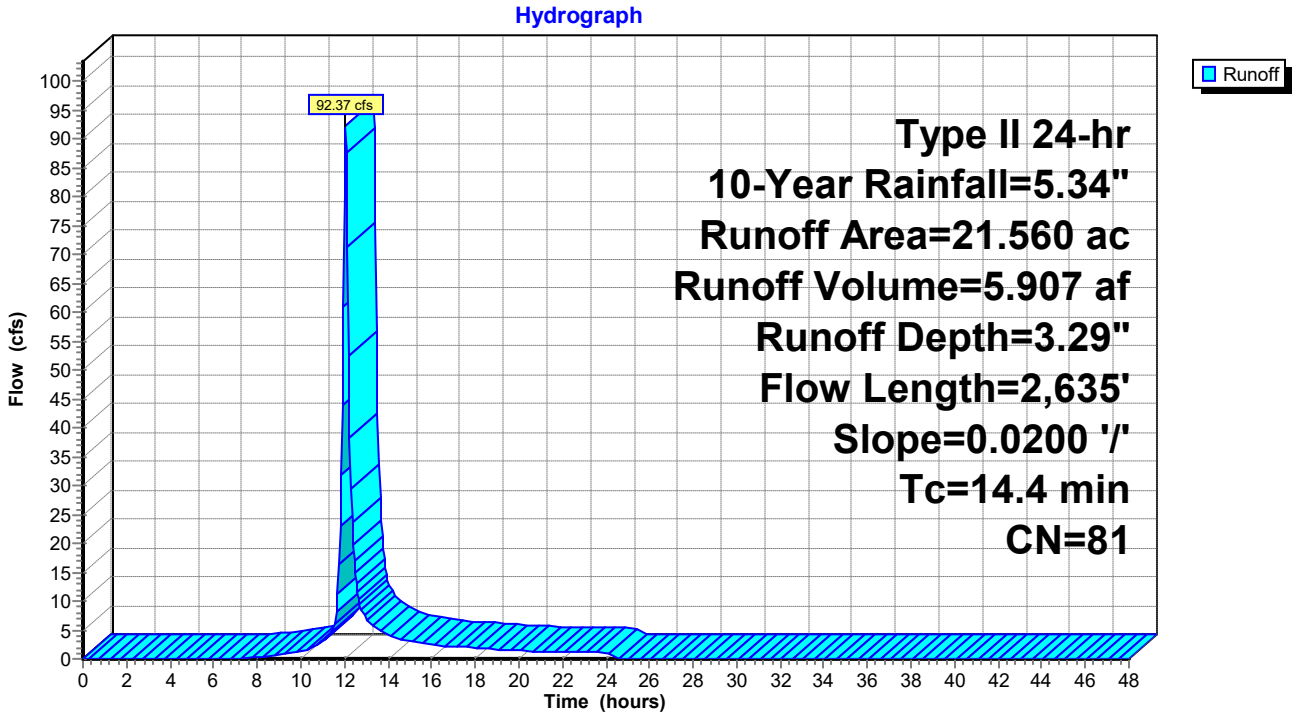
Runoff = 92.37 cfs @ 12.06 hrs, Volume= 5.907 af, Depth= 3.29"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



Summary for Subcatchment A9: Offsite Subarea A9

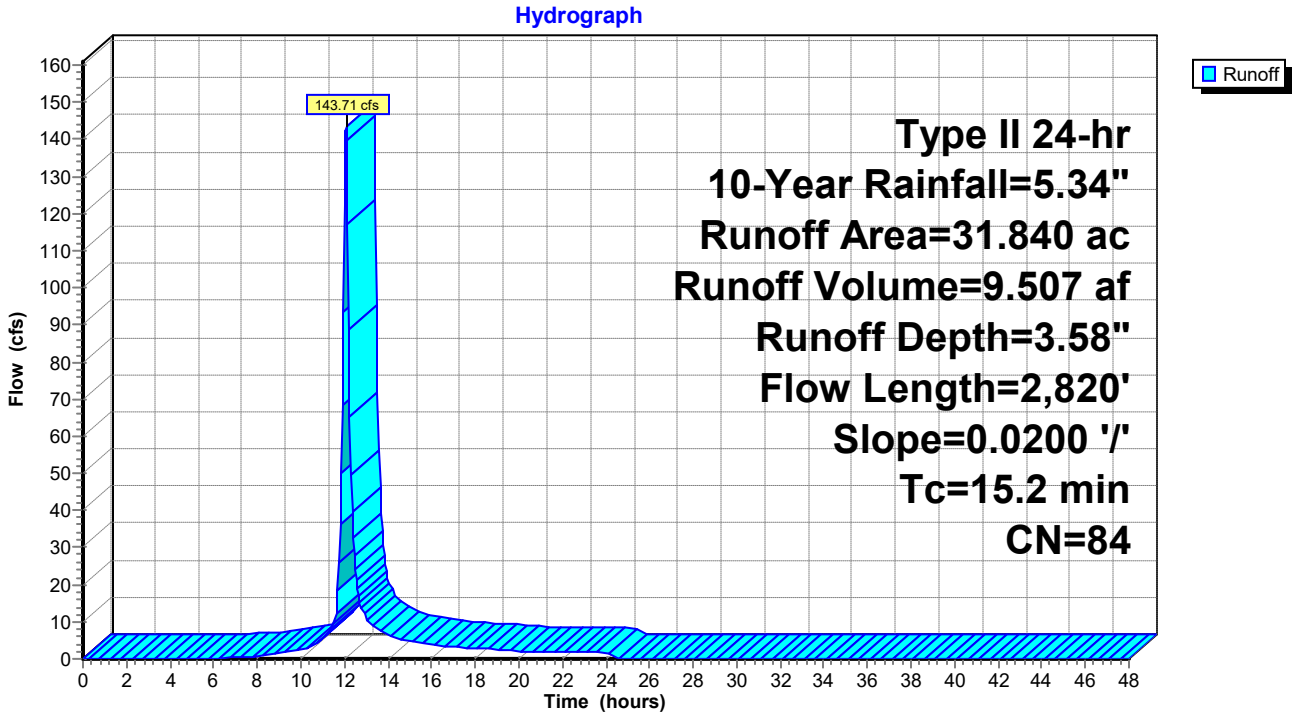
Runoff = 143.71 cfs @ 12.07 hrs, Volume= 9.507 af, Depth= 3.58"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.34"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



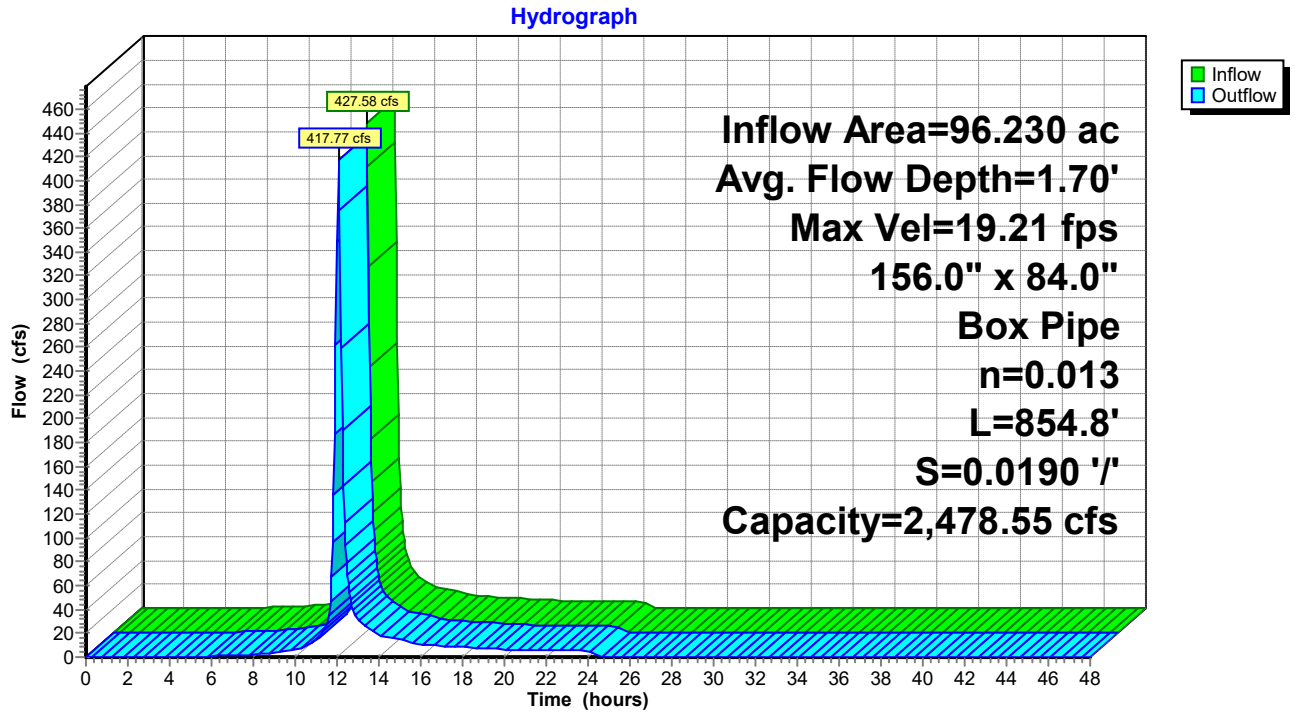
Summary for Reach 4R: RCB Culvert

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 3.41" for 10-Year event
Inflow = 427.58 cfs @ 12.05 hrs, Volume= 27.333 af
Outflow = 417.77 cfs @ 12.07 hrs, Volume= 27.333 af, Atten= 2%, Lag= 1.2 min
Routed to Pond P1 : Detention Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 19.21 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 4.36 fps, Avg. Travel Time= 3.3 min

Peak Storage= 18,936 cf @ 12.06 hrs
Average Depth at Peak Storage= 1.70' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 2,478.55 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 854.8' Slope= 0.0190 '/'
Inlet Invert= 944.62', Outlet Invert= 928.40'



Stage-Area-Storage for Reach 4R: RCB Culvert

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	1,111
944.82	2.6	2,222
944.92	3.9	3,334
945.02	5.2	4,445
945.12	6.5	5,556
945.22	7.8	6,667
945.32	9.1	7,779
945.42	10.4	8,890
945.52	11.7	10,001
945.62	13.0	11,112
945.72	14.3	12,224
945.82	15.6	13,335
945.92	16.9	14,446
946.02	18.2	15,557
946.12	19.5	16,669
946.22	20.8	17,780
946.32	22.1	18,891
946.42	23.4	20,002
946.52	24.7	21,114
946.62	26.0	22,225
946.72	27.3	23,336
946.82	28.6	24,447
946.92	29.9	25,559
947.02	31.2	26,670
947.12	32.5	27,781
947.22	33.8	28,892
947.32	35.1	30,003
947.42	36.4	31,115
947.52	37.7	32,226
947.62	39.0	33,337
947.72	40.3	34,448
947.82	41.6	35,560
947.92	42.9	36,671
948.02	44.2	37,782
948.12	45.5	38,893
948.22	46.8	40,005
948.32	48.1	41,116
948.42	49.4	42,227
948.52	50.7	43,338
948.62	52.0	44,450
948.72	53.3	45,561
948.82	54.6	46,672
948.92	55.9	47,783
949.02	57.2	48,895
949.12	58.5	50,006
949.22	59.8	51,117
949.32	61.1	52,228
949.42	62.4	53,340
949.52	63.7	54,451
949.62	65.0	55,562
949.72	66.3	56,673
949.82	67.6	57,784
949.92	68.9	58,896
950.02	70.2	60,007
950.12	71.5	61,118
950.22	72.8	62,229
950.32	74.1	63,341
950.42	75.4	64,452
950.52	76.7	65,563
950.62	78.0	66,674
950.72	79.3	67,786
950.82	80.6	68,897
950.92	81.9	70,008
951.02	83.2	71,119
951.12	84.5	72,231
951.22	85.8	73,342
951.32	87.1	74,453
951.42	88.4	75,564
951.52	89.7	76,676
951.62	**91.0**	**77,787**

Summary for Pond P1: Detention Basin

Inflow Area = 162.190 ac, 0.00% Impervious, Inflow Depth = 3.92" for 10-Year event
Inflow = 787.41 cfs @ 11.99 hrs, Volume= 52.944 af
Outflow = 414.92 cfs @ 12.16 hrs, Volume= 52.197 af, Atten= 47%, Lag= 10.1 min
Primary = 414.92 cfs @ 12.16 hrs, Volume= 52.197 af
Routed to Link PTA4 : Point A4

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 929.00' Surf.Area= 133,771 sf Storage= 852,960 cf
Peak Elev= 933.54' @ 12.16 hrs Surf.Area= 176,517 sf Storage= 1,573,206 cf (720,246 cf above start)

Plug-Flow detention time= 292.8 min calculated for 32.582 af (62% of inflow)
Center-of-Mass det. time= 86.7 min (878.7 - 792.1)

Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2,839,155 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

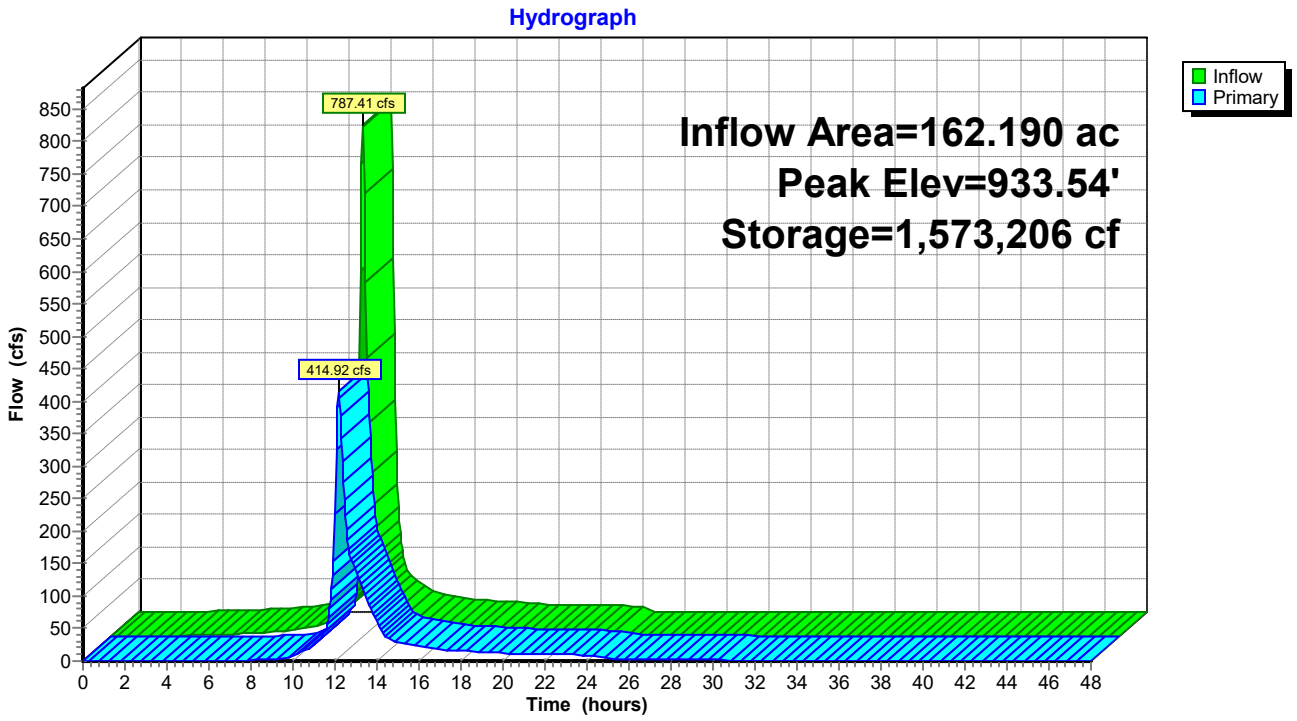
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
920.00	71,722	0	0	71,722
921.00	76,302	74,000	74,000	76,402
922.00	80,949	78,614	152,614	81,155
923.00	85,667	83,297	235,911	85,982
924.00	90,455	88,050	323,961	90,884
925.00	95,316	92,875	416,836	95,864
926.00	100,249	97,772	514,608	100,920
927.00	105,253	102,741	617,349	106,051
928.00	116,247	110,704	728,054	117,108
929.00	133,771	124,907	852,960	134,677
930.00	152,128	142,851	995,811	153,083
931.00	157,702	154,907	1,150,718	158,829
932.00	163,377	160,531	1,311,249	164,679
933.00	173,358	168,343	1,479,592	174,765
934.00	179,284	176,313	1,655,905	180,875
935.00	185,185	182,227	1,838,131	186,967
936.00	191,129	188,149	2,026,280	193,107
937.00	197,128	194,121	2,220,401	199,306
938.00	203,184	200,148	2,420,550	205,566
939.00	209,296	206,232	2,626,782	211,887
940.00	215,465	212,373	2,839,155	218,268

Device	Routing	Invert	Outlet Devices
#1	Primary	912.20'	**72.0" W x 60.0" H Box Culvert** L= 161.8' Ke= 0.350 Inlet / Outlet Invert= 912.20' / 906.34' S= 0.0362 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 30.00 sf
#2	Device 1	929.00'	**142.0 deg x 0.85' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)
#3	Device 1	929.85'	**96.0" W x 6.5" H Vert. Orifice/Grate (NE&SW) X 2.00** C= 0.600 Limited to weir flow at low heads

#4	Device 1	929.85'	**132.0" W x 6.5" H Vert. Orifice/Grate (NW&SE) X 2.00** Limited to weir flow at low heads	C= 0.600
#5	Device 1	932.20'	**108.0" x 144.0" Horiz. Orifice/Grate** Limited to weir flow at low heads	C= 0.600

Primary OutFlow Max=411.89 cfs @ 12.16 hrs HW=933.53' (Free Discharge)
└─**1=Culvert** (Passes 411.89 cfs of 695.86 cfs potential flow)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 19.56 cfs @ 9.32 fps)
  ├─**3=Orifice/Grate (NE&SW)** (Orifice Controls 76.97 cfs @ 8.88 fps)
  ├─**4=Orifice/Grate (NW&SE)** (Orifice Controls 105.84 cfs @ 8.88 fps)
  └─**5=Orifice/Grate** (Weir Controls 209.51 cfs @ 3.76 fps)

Pond P1: Detention Basin



Stage-Area-Storage for Pond P1: Detention Basin

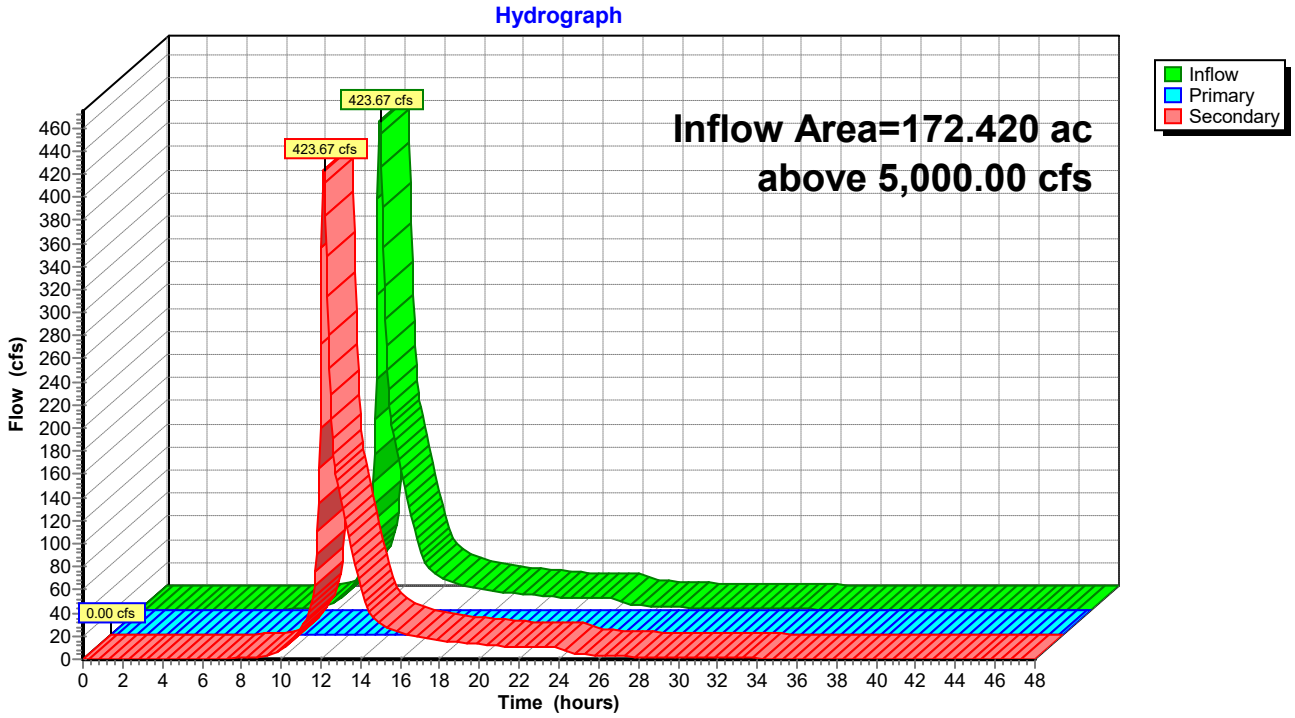
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
920.00	71,722	0
920.20	72,627	14,435
920.40	73,537	29,051
920.60	74,453	43,850
920.80	75,375	58,833
921.00	76,302	74,000
921.20	77,220	89,352
921.40	78,144	104,889
921.60	79,074	120,610
921.80	80,009	136,519
922.00	80,949	152,614
922.20	81,882	168,897
922.40	82,820	185,367
922.60	83,764	202,026
922.80	84,713	218,873
923.00	85,667	235,911
923.20	86,614	253,139
923.40	87,567	270,557
923.60	88,524	288,166
923.80	89,487	305,967
924.00	90,455	323,961
924.20	91,417	342,148
924.40	92,384	360,528
924.60	93,356	379,102
924.80	94,334	397,871
925.00	95,316	416,836
925.20	96,293	435,997
925.40	97,274	455,354
925.60	98,261	474,907
925.80	99,252	494,658
926.00	100,249	514,608
926.20	101,240	534,757
926.40	102,236	555,105
926.60	103,237	575,652
926.80	104,242	596,400
927.00	105,253	617,349
927.20	107,408	638,615
927.40	109,585	660,314
927.60	111,784	682,450
927.80	114,005	705,029
928.00	116,247	728,054
928.20	119,653	751,643
928.40	123,109	775,918
928.60	126,614	800,890
928.80	130,168	826,567
929.00	133,771	852,960
929.20	137,348	880,071
929.40	140,972	907,902
929.60	144,644	936,463
929.80	148,362	965,763
930.00	152,128	995,811
930.20	153,235	1,026,348
930.40	154,346	1,057,106
930.60	155,460	1,088,086
930.80	156,579	1,119,290
931.00	157,702	1,150,718
931.20	158,829	1,182,371
931.40	159,960	1,214,250
931.60	161,095	1,246,355
931.80	162,234	1,278,688
932.00	163,377	1,311,249
932.20	165,350	1,344,122
932.40	167,334	1,377,390
932.60	169,330	1,411,056
932.80	171,338	1,445,123
933.00	173,358	1,479,592
933.20	174,535	1,514,381
933.40	175,716	1,549,406
933.60	176,902	1,584,668
933.80	178,091	1,620,167
934.00	179,284	1,655,905
934.20	180,457	1,691,879
934.40	181,633	1,728,088
934.60	182,813	1,764,532
934.80	183,997	1,801,213
935.00	185,185	1,838,131
935.20	186,366	1,875,286
935.40	187,551	1,912,678
935.60	188,740	1,950,307
935.80	189,933	1,988,174
936.00	191,129	2,026,280
936.20	192,321	2,064,625
936.40	193,517	2,103,209
936.60	194,717	2,142,033
936.80	195,921	2,181,096
937.00	197,128	2,220,401
937.20	198,332	2,259,947
937.40	199,539	2,299,734
937.60	200,751	2,339,763
937.80	201,965	2,380,035
938.00	203,184	2,420,550
938.20	204,399	2,461,308
938.40	205,618	2,502,309
938.60	206,840	2,543,555
938.80	208,066	2,585,046
939.00	209,296	2,626,782
939.20	210,523	2,668,764
939.40	211,753	2,710,991
939.60	212,987	2,753,465
939.80	214,224	2,796,186
940.00	**215,465**	**2,839,155**

Summary for Link PTA4: Point A4

Inflow Area = 172.420 ac, 0.00% Impervious, Inflow Depth > 3.79" for 10-Year event
Inflow = 423.67 cfs @ 12.16 hrs, Volume= 54.446 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 423.67 cfs @ 12.16 hrs, Volume= 54.446 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A10: Offsite Subarea A10 Runoff Area=12.230 ac 0.00% Impervious Runoff Depth=6.99"
Flow Length=3,675' Slope=0.0200 '/' Tc=13.3 min CN=94 Runoff=104.25 cfs 7.128 af

Subcatchment A4: Subarea A4 Runoff Area=10.230 ac 0.00% Impervious Runoff Depth=4.67"
Tc=6.0 min CN=74 Runoff=81.05 cfs 3.979 af

Subcatchment A5e: Subarea A5(e) Runoff Area=19.120 ac 0.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=92 Runoff=198.19 cfs 10.765 af

Subcatchment A5w/A6: Onsite Subarea Runoff Area=46.840 ac 0.00% Impervious Runoff Depth=7.11"
Tc=6.0 min CN=95 Runoff=495.56 cfs 27.762 af

Subcatchment A7: Offsite Subarea A7 Runoff Area=30.600 ac 0.00% Impervious Runoff Depth=4.89"
Flow Length=1,891' Slope=0.0300 '/' Tc=11.6 min CN=76 Runoff=212.66 cfs 12.482 af

Subcatchment A8: Offsite Subarea A8 Runoff Area=21.560 ac 0.00% Impervious Runoff Depth=5.47"
Flow Length=2,635' Slope=0.0200 '/' Tc=14.4 min CN=81 Runoff=151.10 cfs 9.826 af

Subcatchment A9: Offsite Subarea A9 Runoff Area=31.840 ac 0.00% Impervious Runoff Depth=5.82"
Flow Length=2,820' Slope=0.0200 '/' Tc=15.2 min CN=84 Runoff=228.66 cfs 15.435 af

Reach 4R: RCB Culvert Avg. Flow Depth=2.34' Max Vel=22.62 fps Inflow=691.32 cfs 44.870 af
156.0" x 84.0" Box Pipe n=0.013 L=854.8' S=0.0190 '/' Capacity=2,478.55 cfs Outflow=678.09 cfs 44.870 af

Pond P1: Detention Basin Peak Elev=934.86' Storage=1,811,364 cf Inflow=1,225.95 cfs 83.398 af
Outflow=720.09 cfs 82.645 af

Link PTA4: Point A4 above 5,000.00 cfs Inflow=767.60 cfs 86.624 af
Primary=0.00 cfs 0.000 af Secondary=767.60 cfs 86.624 af

Total Runoff Area = 172.420 ac Runoff Volume = 87.377 af Average Runoff Depth = 6.08"
100.00% Pervious = 172.420 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A10: Offsite Subarea A10

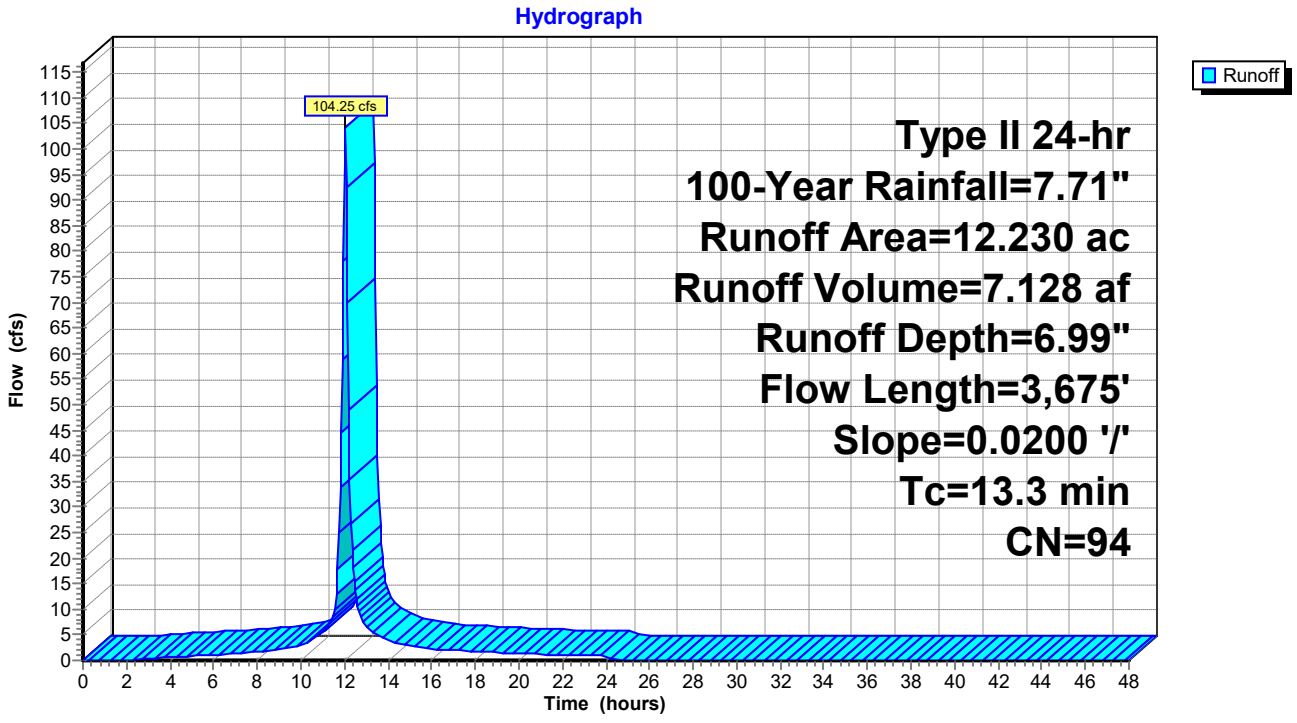
Runoff = 104.25 cfs @ 12.04 hrs, Volume= 7.128 af, Depth= 6.99"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	12.230	94	Subarea A10
	12.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.44		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
6.2	1,075	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	1,600		7.00		**Direct Entry, A10 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
13.3	3,675	Total			

Subcatchment A10: Offsite Subarea A10



Summary for Subcatchment A4: Subarea A4

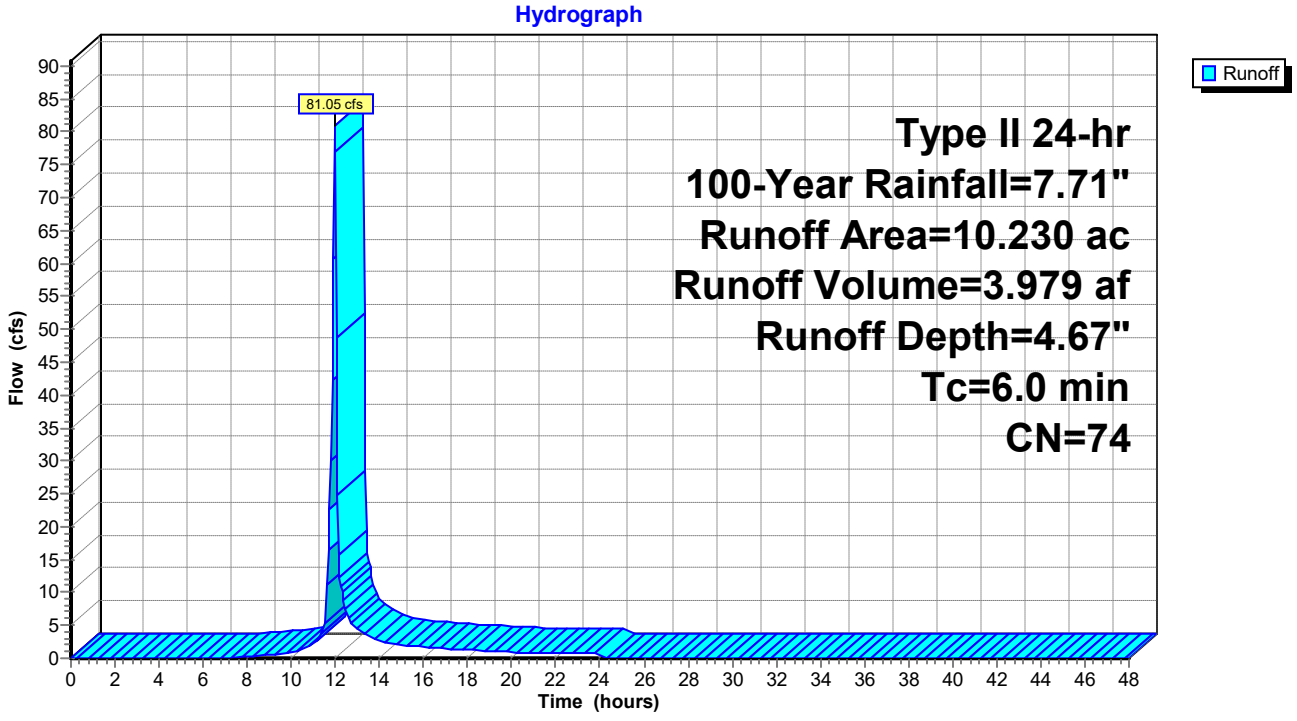
Runoff = 81.05 cfs @ 11.97 hrs, Volume= 3.979 af, Depth= 4.67"
Routed to Link PTA4 : Point A4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	1.480	89	
*	8.750	72	
	10.230	74	Weighted Average
	10.230		100.00% Pervious Area

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

Subcatchment A4: Subarea A4



Summary for Subcatchment A5e: Subarea A5(e)

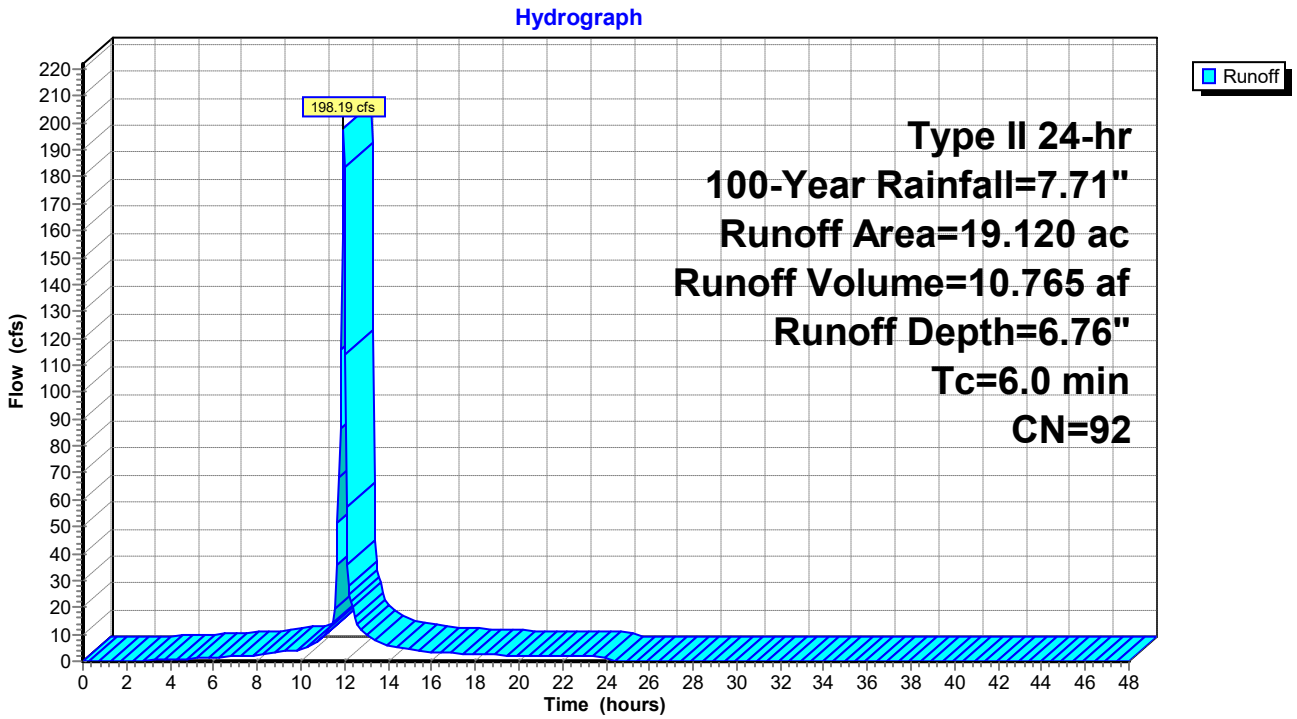
Runoff = 198.19 cfs @ 11.96 hrs, Volume= 10.765 af, Depth= 6.76"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	19.120	92	Subarea A5(e)
	19.120		100.00% Pervious Area

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

Subcatchment A5e: Subarea A5(e)



Summary for Subcatchment A5w/A6: Onsite Subarea A5(w) & A6

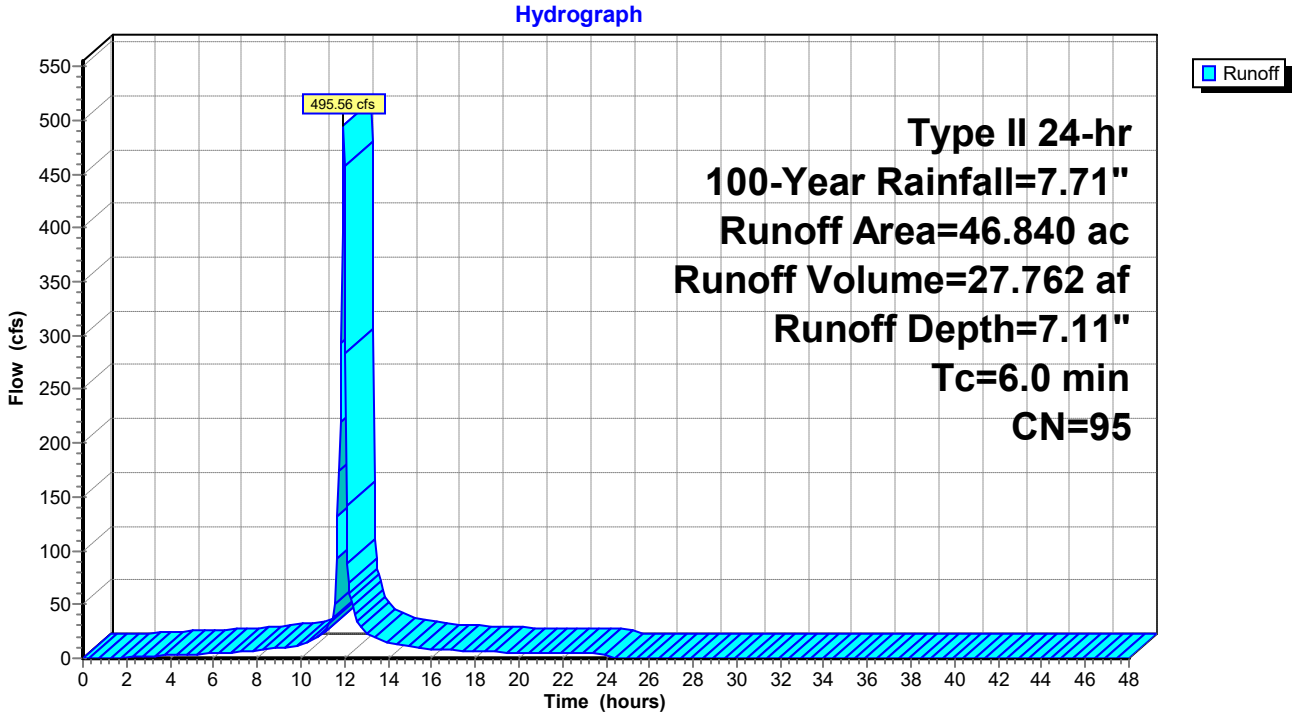
Runoff = 495.56 cfs @ 11.96 hrs, Volume= 27.762 af, Depth= 7.11"
Routed to Pond P1 : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	13.420	94	Subarea A6
*	33.420	95	Subarea A5(w)
	46.840	95	Weighted Average
	46.840		100.00% Pervious Area

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

Subcatchment A5w/A6: Onsite Subarea A5(w) & A6



Summary for Subcatchment A7: Offsite Subarea A7

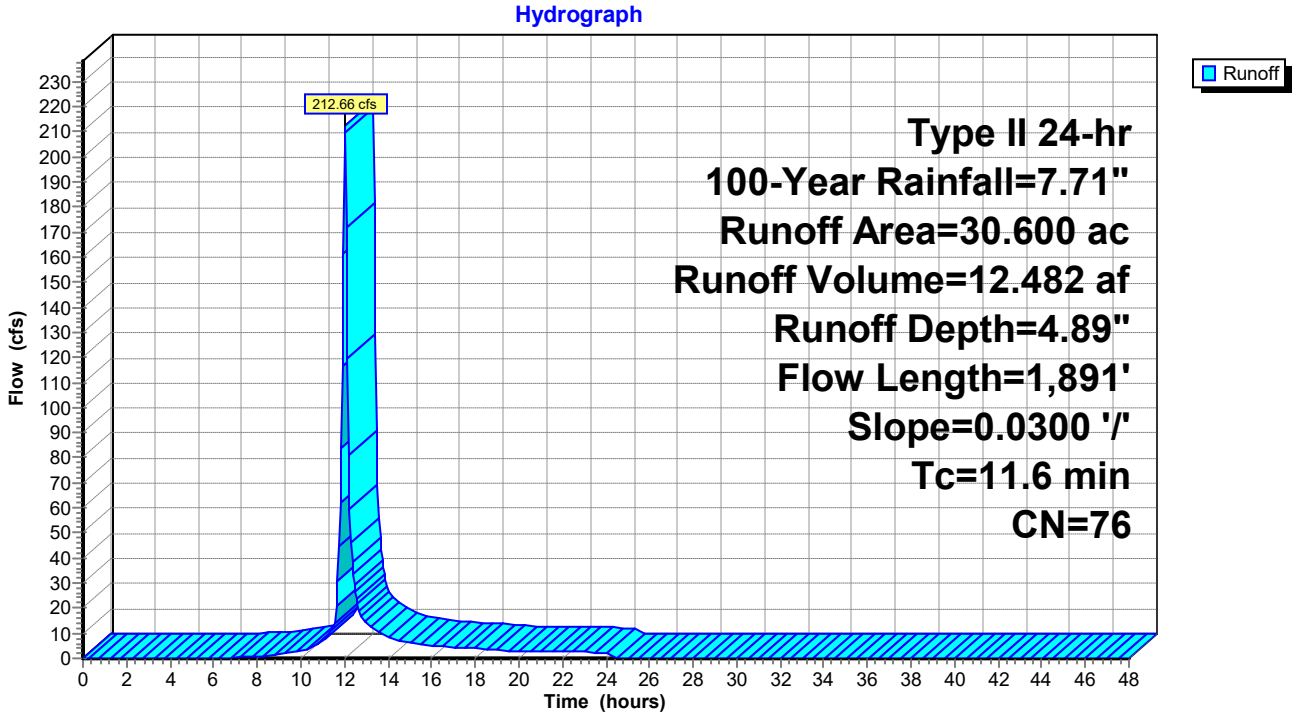
Runoff = 212.66 cfs @ 12.03 hrs, Volume= 12.482 af, Depth= 4.89"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	30.600	76	Subarea A7
	30.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.3	808		10.00		**Direct Entry, 10 ft/sec**
2.3	983		7.00		**Direct Entry, 7 ft/sec**
11.6	1,891	Total			

Subcatchment A7: Offsite Subarea A7



Summary for Subcatchment A8: Offsite Subarea A8

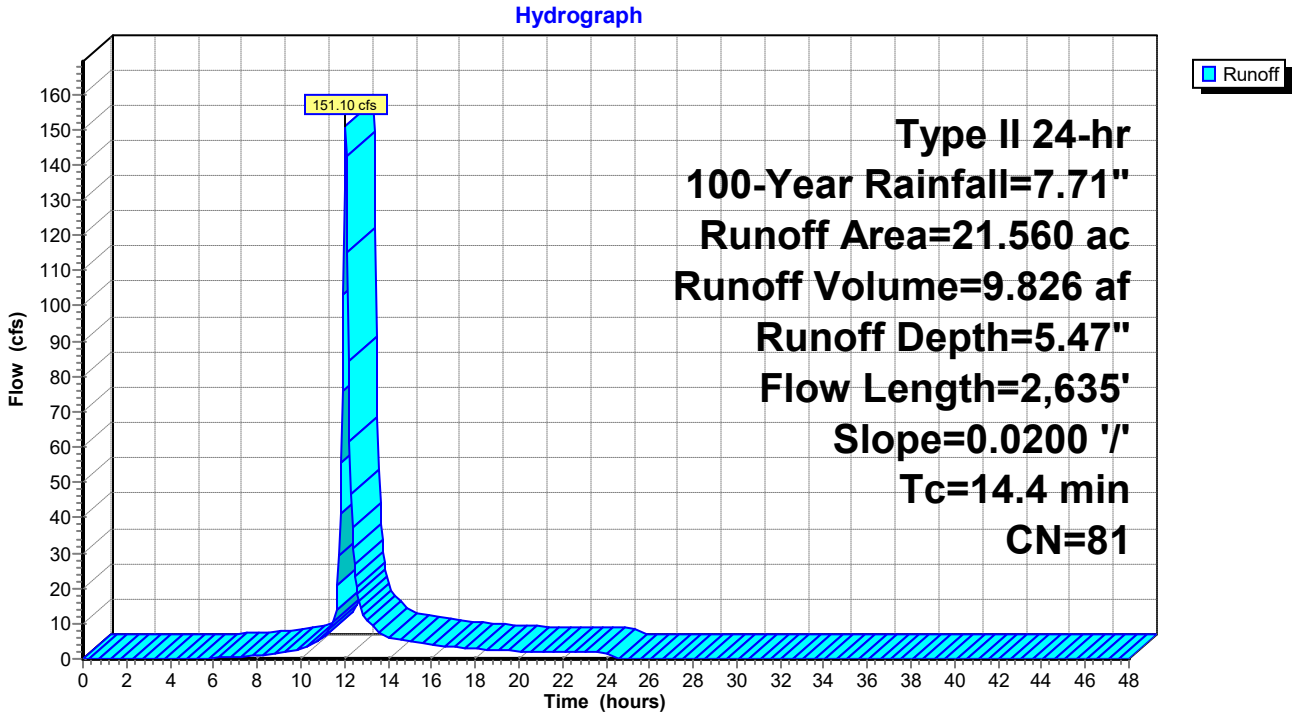
Runoff = 151.10 cfs @ 12.06 hrs, Volume= 9.826 af, Depth= 5.47"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	21.560	81	Subarea A8
	21.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
2.3	1,410		10.00		**Direct Entry, 10 ft/sec**
0.5	225		7.00		**Direct Entry, A8 to A9 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
14.4	2,635	Total			

Subcatchment A8: Offsite Subarea A8



Summary for Subcatchment A9: Offsite Subarea A9

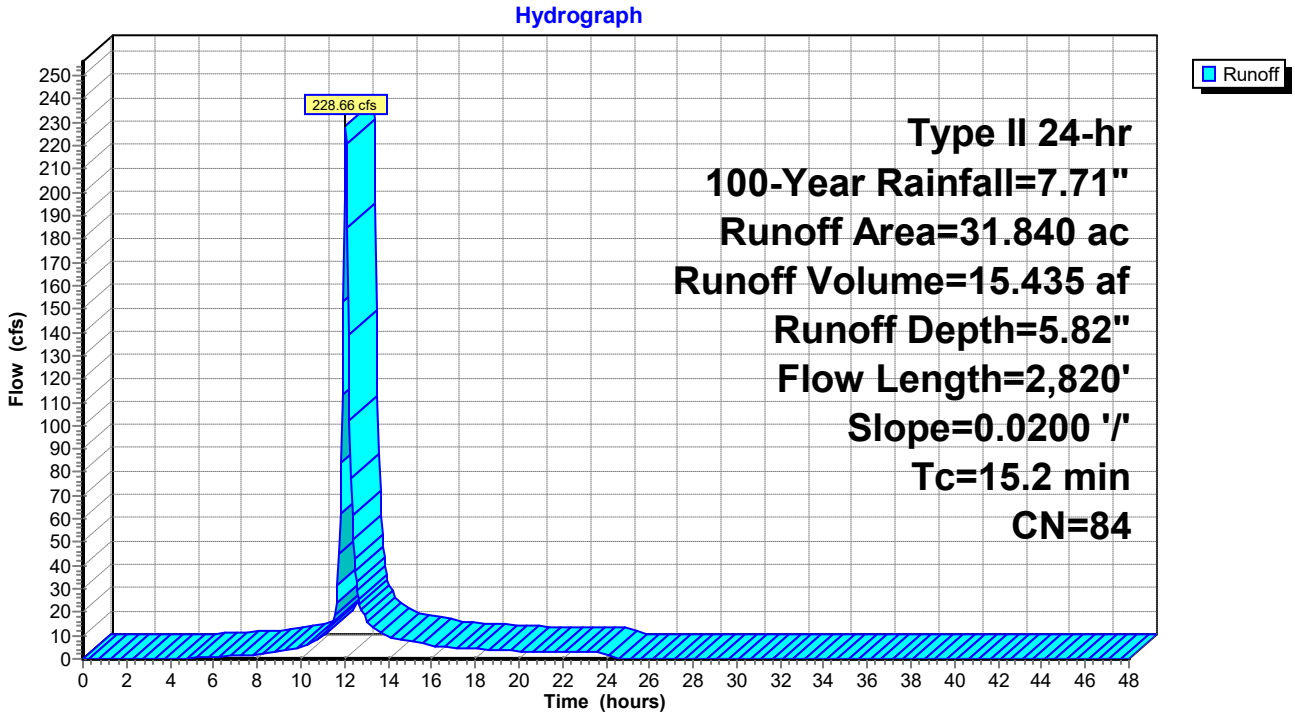
Runoff = 228.66 cfs @ 12.07 hrs, Volume= 15.435 af, Depth= 5.82"
Routed to Reach 4R : RCB Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.71"

	Area (ac)	CN	Description
*	31.840	84	Subarea A9
	31.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
1.5	900		10.00		**Direct Entry, 10 ft/sec**
2.2	920		7.00		**Direct Entry, 7 ft/sec**
2.1	900		7.00		**Direct Entry, A9 to A7 7 ft/sec**
15.2	2,820	Total			

Subcatchment A9: Offsite Subarea A9



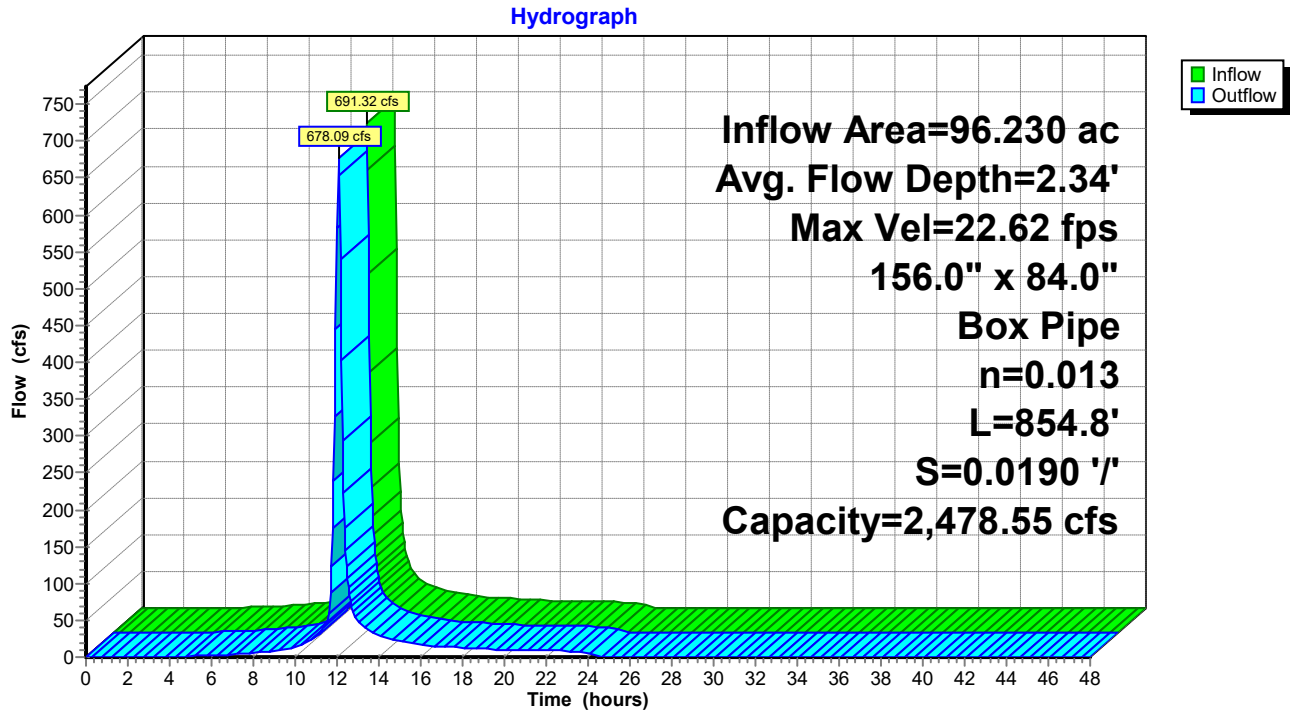
Summary for Reach 4R: RCB Culvert

Inflow Area = 96.230 ac, 0.00% Impervious, Inflow Depth = 5.60" for 100-Year event
Inflow = 691.32 cfs @ 12.05 hrs, Volume= 44.870 af
Outflow = 678.09 cfs @ 12.07 hrs, Volume= 44.870 af, Atten= 2%, Lag= 1.0 min
Routed to Pond P1 : Detention Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 22.62 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 5.06 fps, Avg. Travel Time= 2.8 min

Peak Storage= 26,049 cf @ 12.06 hrs
Average Depth at Peak Storage= 2.34' , Surface Width= 13.00'
Bank-Full Depth= 7.00' Flow Area= 91.0 sf, Capacity= 2,478.55 cfs

156.0" W x 84.0" H Box Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 854.8' Slope= 0.0190 '/'
Inlet Invert= 944.62', Outlet Invert= 928.40'



Stage-Area-Storage for Reach 4R: RCB Culvert

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.62	0.0	0
944.72	1.3	1,111
944.82	2.6	2,222
944.92	3.9	3,334
945.02	5.2	4,445
945.12	6.5	5,556
945.22	7.8	6,667
945.32	9.1	7,779
945.42	10.4	8,890
945.52	11.7	10,001
945.62	13.0	11,112
945.72	14.3	12,224
945.82	15.6	13,335
945.92	16.9	14,446
946.02	18.2	15,557
946.12	19.5	16,669
946.22	20.8	17,780
946.32	22.1	18,891
946.42	23.4	20,002
946.52	24.7	21,114
946.62	26.0	22,225
946.72	27.3	23,336
946.82	28.6	24,447
946.92	29.9	25,559
947.02	31.2	26,670
947.12	32.5	27,781
947.22	33.8	28,892
947.32	35.1	30,003
947.42	36.4	31,115
947.52	37.7	32,226
947.62	39.0	33,337
947.72	40.3	34,448
947.82	41.6	35,560
947.92	42.9	36,671
948.02	44.2	37,782
948.12	45.5	38,893
948.22	46.8	40,005
948.32	48.1	41,116
948.42	49.4	42,227
948.52	50.7	43,338
948.62	52.0	44,450
948.72	53.3	45,561
948.82	54.6	46,672
948.92	55.9	47,783
949.02	57.2	48,895
949.12	58.5	50,006
949.22	59.8	51,117
949.32	61.1	52,228
949.42	62.4	53,340
949.52	63.7	54,451
949.62	65.0	55,562
949.72	66.3	56,673
949.82	67.6	57,784
949.92	68.9	58,896
950.02	70.2	60,007
950.12	71.5	61,118
950.22	72.8	62,229
950.32	74.1	63,341
950.42	75.4	64,452
950.52	76.7	65,563
950.62	78.0	66,674
950.72	79.3	67,786
950.82	80.6	68,897
950.92	81.9	70,008
951.02	83.2	71,119
951.12	84.5	72,231
951.22	85.8	73,342
951.32	87.1	74,453
951.42	88.4	75,564
951.52	89.7	76,676
951.62	**91.0**	**77,787**

Summary for Pond P1: Detention Basin

Inflow Area = 162.190 ac, 0.00% Impervious, Inflow Depth = 6.17" for 100-Year event
Inflow = 1,225.95 cfs @ 11.99 hrs, Volume= 83.398 af
Outflow = 720.09 cfs @ 12.14 hrs, Volume= 82.645 af, Atten= 41%, Lag= 8.6 min
Primary = 720.09 cfs @ 12.14 hrs, Volume= 82.645 af
Routed to Link PTA4 : Point A4

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 929.00' Surf.Area= 133,771 sf Storage= 852,960 cf
Peak Elev= 934.86' @ 12.14 hrs Surf.Area= 184,324 sf Storage= 1,811,364 cf (958,404 cf above start)

Plug-Flow detention time= 210.0 min calculated for 62.999 af (76% of inflow)
Center-of-Mass det. time= 66.5 min (848.1 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2,839,155 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

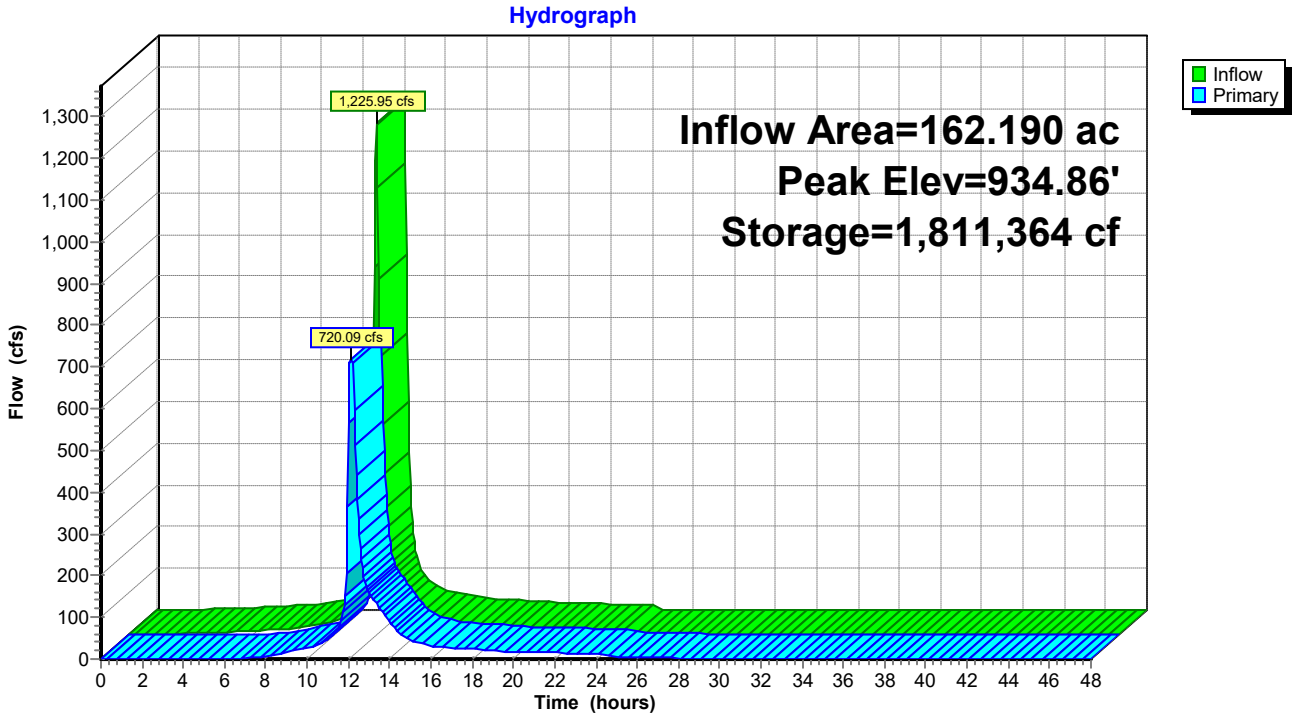
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
920.00	71,722	0	0	71,722
921.00	76,302	74,000	74,000	76,402
922.00	80,949	78,614	152,614	81,155
923.00	85,667	83,297	235,911	85,982
924.00	90,455	88,050	323,961	90,884
925.00	95,316	92,875	416,836	95,864
926.00	100,249	97,772	514,608	100,920
927.00	105,253	102,741	617,349	106,051
928.00	116,247	110,704	728,054	117,108
929.00	133,771	124,907	852,960	134,677
930.00	152,128	142,851	995,811	153,083
931.00	157,702	154,907	1,150,718	158,829
932.00	163,377	160,531	1,311,249	164,679
933.00	173,358	168,343	1,479,592	174,765
934.00	179,284	176,313	1,655,905	180,875
935.00	185,185	182,227	1,838,131	186,967
936.00	191,129	188,149	2,026,280	193,107
937.00	197,128	194,121	2,220,401	199,306
938.00	203,184	200,148	2,420,550	205,566
939.00	209,296	206,232	2,626,782	211,887
940.00	215,465	212,373	2,839,155	218,268

Device	Routing	Invert	Outlet Devices
#1	Primary	912.20'	**72.0" W x 60.0" H Box Culvert** L= 161.8' Ke= 0.350 Inlet / Outlet Invert= 912.20' / 906.34' S= 0.0362 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 30.00 sf
#2	Device 1	929.00'	**142.0 deg x 0.85' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)
#3	Device 1	929.85'	**96.0" W x 6.5" H Vert. Orifice/Grate (NE&SW) X 2.00** C= 0.600 Limited to weir flow at low heads

#4	Device 1	929.85'	**132.0" W x 6.5" H Vert. Orifice/Grate (NW&SE) X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	932.20'	**108.0" x 144.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=719.78 cfs @ 12.14 hrs HW=934.84' (Free Discharge)
└─**1=Culvert** (Inlet Controls 719.78 cfs @ 23.99 fps)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Passes < 22.58 cfs potential flow)
  ├─**3=Orifice/Grate (NE&SW)** (Passes < 90.62 cfs potential flow)
  ├─**4=Orifice/Grate (NW&SE)** (Passes < 124.60 cfs potential flow)
  └─**5=Orifice/Grate** (Passes < 588.38 cfs potential flow)

Pond P1: Detention Basin



Stage-Area-Storage for Pond P1: Detention Basin

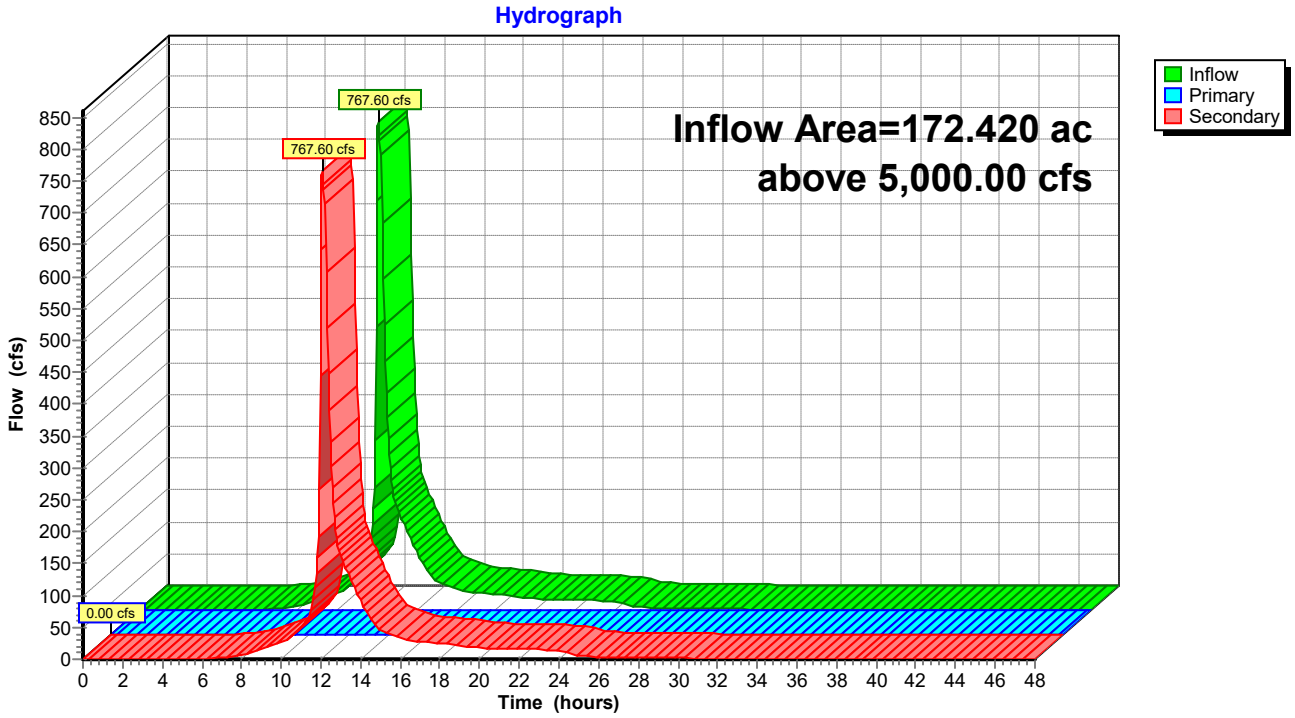
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
920.00	71,722	0
920.20	72,627	14,435
920.40	73,537	29,051
920.60	74,453	43,850
920.80	75,375	58,833
921.00	76,302	74,000
921.20	77,220	89,352
921.40	78,144	104,889
921.60	79,074	120,610
921.80	80,009	136,519
922.00	80,949	152,614
922.20	81,882	168,897
922.40	82,820	185,367
922.60	83,764	202,026
922.80	84,713	218,873
923.00	85,667	235,911
923.20	86,614	253,139
923.40	87,567	270,557
923.60	88,524	288,166
923.80	89,487	305,967
924.00	90,455	323,961
924.20	91,417	342,148
924.40	92,384	360,528
924.60	93,356	379,102
924.80	94,334	397,871
925.00	95,316	416,836
925.20	96,293	435,997
925.40	97,274	455,354
925.60	98,261	474,907
925.80	99,252	494,658
926.00	100,249	514,608
926.20	101,240	534,757
926.40	102,236	555,105
926.60	103,237	575,652
926.80	104,242	596,400
927.00	105,253	617,349
927.20	107,408	638,615
927.40	109,585	660,314
927.60	111,784	682,450
927.80	114,005	705,029
928.00	116,247	728,054
928.20	119,653	751,643
928.40	123,109	775,918
928.60	126,614	800,890
928.80	130,168	826,567
929.00	133,771	852,960
929.20	137,348	880,071
929.40	140,972	907,902
929.60	144,644	936,463
929.80	148,362	965,763
930.00	152,128	995,811
930.20	153,235	1,026,348
930.40	154,346	1,057,106
930.60	155,460	1,088,086
930.80	156,579	1,119,290
931.00	157,702	1,150,718
931.20	158,829	1,182,371
931.40	159,960	1,214,250
931.60	161,095	1,246,355
931.80	162,234	1,278,688
932.00	163,377	1,311,249
932.20	165,350	1,344,122
932.40	167,334	1,377,390
932.60	169,330	1,411,056
932.80	171,338	1,445,123
933.00	173,358	1,479,592
933.20	174,535	1,514,381
933.40	175,716	1,549,406
933.60	176,902	1,584,668
933.80	178,091	1,620,167
934.00	179,284	1,655,905
934.20	180,457	1,691,879
934.40	181,633	1,728,088
934.60	182,813	1,764,532
934.80	183,997	1,801,213
935.00	185,185	1,838,131
935.20	186,366	1,875,286
935.40	187,551	1,912,678
935.60	188,740	1,950,307
935.80	189,933	1,988,174
936.00	191,129	2,026,280
936.20	192,321	2,064,625
936.40	193,517	2,103,209
936.60	194,717	2,142,033
936.80	195,921	2,181,096
937.00	197,128	2,220,401
937.20	198,332	2,259,947
937.40	199,539	2,299,734
937.60	200,751	2,339,763
937.80	201,965	2,380,035
938.00	203,184	2,420,550
938.20	204,399	2,461,308
938.40	205,618	2,502,309
938.60	206,840	2,543,555
938.80	208,066	2,585,046
939.00	209,296	2,626,782
939.20	210,523	2,668,764
939.40	211,753	2,710,991
939.60	212,987	2,753,465
939.80	214,224	2,796,186
940.00	**215,465**	**2,839,155**

Summary for Link PTA4: Point A4

Inflow Area = 172.420 ac, 0.00% Impervious, Inflow Depth > 6.03" for 100-Year event
Inflow = 767.60 cfs @ 12.07 hrs, Volume= 86.624 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 767.60 cfs @ 12.07 hrs, Volume= 86.624 af

Primary outflow = Inflow above 5,000.00 cfs, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PTA4: Point A4



Accepted
Study/Report

Water Quality Computations

OWN

Engineering beyond.™

WORKSHEET: EXTENDED WET DETENTION BASIN (EWDB) DESIGN

Project: ***The Village at Discovery Park*** By: JWB 6/17/2024
Location: Lee's Summit, MO Checked:

Basin ID:	**EWDB-1**

Required Volume Calculation
*WQv = P * Rv * A / 12 (ac-ft)*
P = Water Quality Storm rainfall depth = 1.37 in.
A = Local Treatment Drainage Area (acres)
*Rv = Volumetric Runoff Coefficient = 0.05 + 0.009 * I*
I = Percent Site Imperviousness (%)

Drainage Area:	33.05 acres
% Impervious:	75.5 %

WQv (required): 2.75 ac-ft

Proposed Volume Calculation
Note : Incremental volume calculated by the Conic Method for Reservoir Volumes.
*Volume = (1/3) * (Elev2-Elev1) * (Area1 + Area2 + sq.rt.(Area1 * Area2))*

Normal Pool Elevation = 929.00
Dedicated WQv Elevation = 929.85

Elevation (ft)	Area (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
929.0	3.071	0.000	0.000
929.5	3.278	1.587	1.587
929.85	3.427	1.173	2.760

WQv (proposed): 2.76 ac-ft

Permanent Pool Volume Calculation
Note: Permanent Pool Volume consists of EWDB-1, Area = 3.07 ac @ Elev.=929.00

Method 1: *V1 = ((0.3 + 0.6 * I) * A * R14) / 12*
V1 = ((0.3 + 0.6 *0.755) * 33.05 * 2.2) / 12 = 4.56 ac-ft

Method 2: *V2 = (4 * Sd * Ai) / 12*
V2 = (4 * 0.6 * (33.05*0.755)) / 12 4.99 ac-ft

Permanent Pool Volume Required + 20% = 5.99 ac-ft

Bottom of Basin Elevation = 920.00
Normal Pool Elevation = 929.00

Elevation (ft)	Area (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
920.0	1.647	0.000	0.000
921.0	1.752	1.699	1.699
922.0	1.858	1.805	3.504
923.0	1.967	1.912	5.416
924.0	2.077	2.021	7.437
925.0	2.188	2.132	9.569
926.0	2.301	2.245	11.814
927.0	2.416	2.359	14.172
928.0	2.669	2.541	16.714
929.0	3.071	2.867	19.581

Permanent Pool Volume Proposed: 19.58 ac-ft

Water Quality Outlet, V-notch Weir

Step 1) Depth of water quality volume above permanent pool, Z_{WQ} (ft)

Z_{WQ}: 0.85 ft

Step 2) Average head of water quality volume over invert of v-notch, H_{WQ} (ft)

$H_{WQ} = 0.5 * Z_{WQ}$

H_{WQ}: 0.43 ft

Step 3) Average water quality outflow rate, Q_{WQ} (cfs)

$Q_{WQ} = (WQ_V * 43{,}560) / (40 * 3{,}600)$

Q_{WQ}: 0.83 ft

Step 4) V-notch weir coefficient, C_V

C_V: 2.5

Step 5) V-notch weir angle, θ (deg)

$\theta = 2 * (180 / \pi) * \arctan(Q_{WQ} / (C_V * H_{WQ}^{5/2}))$

θ: 142 deg

θ: 20 deg

V-notch angle should be at least 20 degrees. Set to 20 degrees if calculated angle is smaller.

Step 6) Top width of V-notch weir coefficient, W_V (ft)

$W_V = 2 * Z_{WQ} * \tan(\theta / 2)$

W_V: 4.9

40-Hour WQv Outlet

Outlet Elevation:	1001.50
Outlet Type:	V-Notch Weir
V-notch weir angle:	142 degrees
Outlet Protection:	Submerged Well-screen

Accepted
Study/Report

Basin Design Plans

OWN

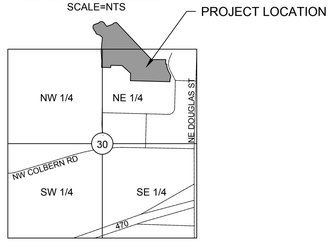
Engineering beyond.™

DETENTION BASIN PLANS FOR THE VILLAGE AT DISCOVERY PARK ZONE 1

LEE'S SUMMIT, JACKSON COUNTY, MO

SECTION 30, T48N, R31W

LOCATION MAP
SECTION 30, TOWNSHIP 48N, RANGE 31W
JACKSON COUNTY, MISSOURI
SCALE=NTS



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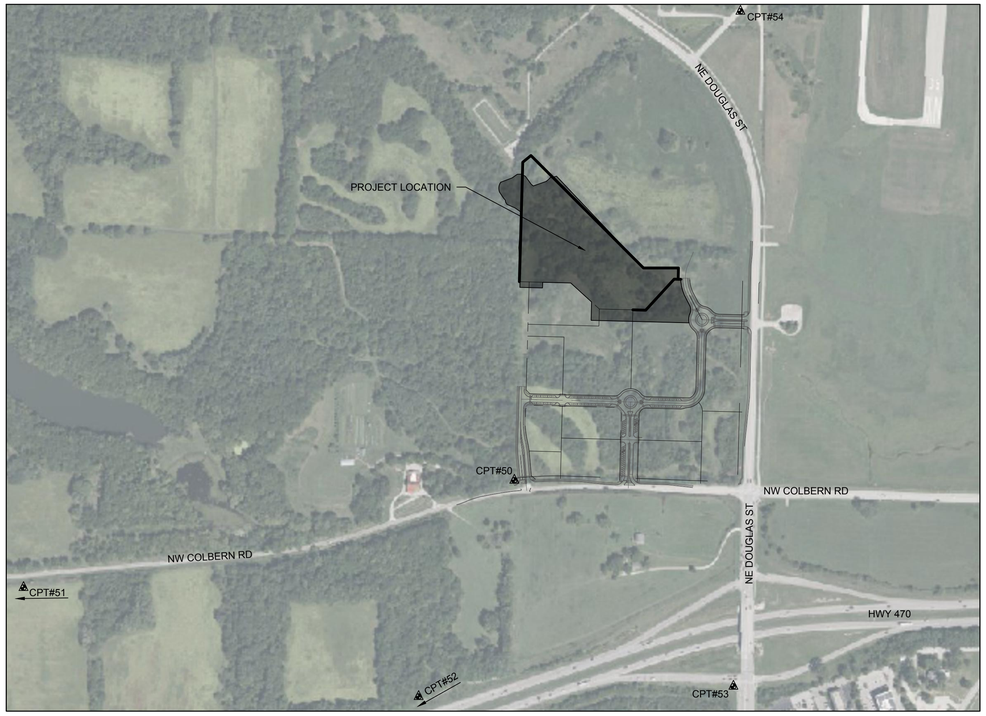
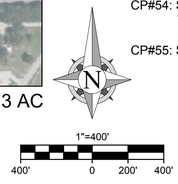


WATERSHED: LITTLE CEDAR CREEK - LITTLE BLUE RIVER

DISTURBED AREA: 10.13 AC



SHEET INDEX:

SURVEY CONTROL:

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	FULL DESCRIPTION
50	1012389.8190	2822108.7840	990.8100	CTL
51	1011606.5710	2817819.8520	933.2990	CTL
52	1009320.3430	2818811.2690	930.8920	CTL
53	1011007.3400	2823445.2840	988.4360	CTL
54	1014987.4060	2823402.9760	930.4780	CTL
55	1015699.8100	2821686.0380	935.0540	CTL

CP #50: 1/2" IB/CAP ON THE NORTH SIDE OF NW COLBERN ROAD. IT IS IN THE 1ST FIELD ENTRANCE WEST OF NE DOUGLAS STREET
CP#51: SET 1/2" IB/CAP ON THE SW CORNER OF COLBERN ROAD AND MAIN STREET
CP#52: SET 1/2" IB/CAP ON THE SOUTH SIDE OF MAIN STREET WHERE MAIN STREET TURNS EAST ON THE SOUTH SIDE OF I-470
CP#53: SET 1/2" IB/CAP ON THE EAST SIDE OF DOUGLAS JUST SOUTH OF THE I-470 INTERCHANGE. IN THE NW CORNER OF THE PARKING LOT TO THE OLD OUTBACK
CP#54: SET 1/2" IB/CAP ON THE SOUTH SIDE OF NE DOUGLAS ST. (OLD) WHERE IT BENDS BACK NORTH AT THE SE CORNER OF "THE CURE" CHURCH
CP#55: SET 1/2" IB/CAP ON THE EAST SIDE OF DOUGLAS AT DRIVEWAY FOR HOUSE 2545

LEGAL DESCRIPTION:

THE VILLAGE AT DISCOVERY PARK, TRACT A

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP - CALL BEFORE YOU DIG!

UTILITY CONTACTS:

SANITARY & WATER:
CITY OF LEE'S SUMMIT, MO
220 SE GREEN STREET
LEE'S SUMMIT, MO 64063
PHONE: (816) 969-1900

STORMWATER:
CITY OF LEE'S SUMMIT, MO
220 SE GREEN STREET
LEE'S SUMMIT, MO 64063
PHONE: (816) 969-1800

PUBLIC ROADWAY:
CITY OF LEE'S SUMMIT, MO
220 SE GREEN STREET
LEE'S SUMMIT, MO 64063
PHONE: (816) 969-1800

NATURAL GAS:
SPIRE GAS ENERGY
3025 SW CLOVER DRIVE
LEE'S SUMMIT, MO 64082
PHONE: (816) 985-8888

POWER:
EVERGY
1300 SE HAMBLEN RD
LEE'S SUMMIT, MO 64081
PHONE: (816) 347-4320

TELECOMMUNICATIONS:
AT&T
PHONE: 800-286-8313
SPECTRUM
PHONE: 877-772-2253
GOOGLE FIBER
PHONE: 877-454-6959

FEMA FLOOD INFORMATION:

THE ENTIRE SITE IS LOCATED WITHIN ZONE X, "AREAS OF 0.2% ANNUAL CHANGE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AS DEPICTED ON THE FEMA FLOOD INSURANCE RATE (FIRM) MAP NUMBER 29095C0409G, REVISION DATE JANUARY 20, 2017.

OIL/GAS WELLS:

NO OIL OR GAS WELLS ARE LOCATED WITHIN PROJECT LIMITS. INFORMATION OBTAINED FROM THE MISSOURI DEPARTMENT OF NATURAL RESOURCES, GEOLOGICAL SURVEY GEOSCIENCES TECHNICAL RESOURCE ASSESSMENT TOOL (GEOSTRAT).

GENERAL NOTES:

1. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS BY DETAILED INSPECTION PRIOR TO SUBMITTING BID AND STARTING CONSTRUCTION.
2. COORDINATE WORK WITH OTHER SITE RELATED DEVELOPMENT DRAWINGS.

PROJECT SPECIFICATIONS:

THE SPECIFICATIONS FOR THIS PROJECT SHALL BE THE FOLLOWING:

1. MOST CURRENT VERSION OF THE DESIGN AND CONSTRUCTION MANUAL OF THE CITY OF LEE'S SUMMIT, MO.
2. MOST CURRENT VERSION OF THE AMERICAN PUBLIC WORKS ASSOCIATION - KANSAS CITY METRO CHAPTER

THE STANDARD SPECIFICATIONS THROUGH AND INCLUDING THE LATEST AMENDMENTS SHALL BE PART OF THESE PROJECT DRAWINGS AND SPECIFICATIONS AND ARE HEREIN BY REFERENCE. THE MORE STRINGENT OF THESE STANDARD SPECIFICATIONS AND THOSE PREPARED BY THE ENGINEER PREPARING THESE PLANS SHALL GOVERN.

CIVIL ENGINEER:

OWN, INC.
8455 COLLEGE BLVD
OVERLAND PARK, KS 66210
EMAIL: JBARTZ@WEAREOWN.COM
PHONE: (816) 777-0400

DEVELOPER:

INTRINSIC DEVELOPMENT
3622 ENDEAVOR AVE., STE. 101
COLUMBIA, MO 65201
CONTACT: JOHN ODLE
PHONE: (573) 615-2252

PREPARED AND SUBMITTED BY:

JEFFREY W. BARTZ, P.E. DATE 06/20/2024
MISSOURI P.E. NO. 2012022594

OWN
Engineering beyond.™
8455 College Boulevard
Overland Park, KS 66210
816.777.0400
weareown.com
FORMERLY ANDERSON ENGINEERING

MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI JEFFREY W. BARTZ NUMBER PE-2012022594 06/20/2024 PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

SHEET TITLE

COVER SHEET

SHEET NUMBER

C100

1 OF 9

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE PLANS IN THEIR POSSESSION ARE THE MOST CURRENT REVISION ISSUES, ARE FULLY COORDINATED WITH ALL SUBCONTRACTORS, AND PRESENT ON SITE AT ALL TIMES. CURRENT PLANS PREPARED BY OWN, INC. MAY BE OBTAINED AT THE DIRECTION OF THE OWNER. DIRECT REQUESTS TO OWN, INC. MAY REQUIRE ADDITIONAL AUTHORIZATIONS, AGREEMENTS, AND/OR FEES. PLEASE CONTACT THE ENGINEER FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RESPONSIBLE FOR ANY DEVIATIONS FROM THESE PLANS UNLESS WRITTEN APPROVAL FROM ENGINEER, OWNER, AND DEVELOPER.
3. ALL WORK AND MATERIALS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE.
4. ALL ESTIMATES OF QUANTITIES ARE FOR INFORMATIONAL PURPOSED ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING QUANTITIES AND ITEMS OF WORK.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO COMPLETE THE WORK SHOWN IN THE PLANS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS, PAYING ALL FEES, AND FOR OTHERWISE COMPLYING WITH ALL APPLICABLE REGULATIONS GOVERNING THE WORK.
7. THE CONTRACTOR SHALL NOT ENGAGE IN ACTIVITIES THAT MAY ENCROACH ON WATERS OF THE U.S., INCLUDING WETLANDS, UNTIL ANY NECESSARY PERMITS MAY BE OBTAINED. THE CONTRACTOR SHALL REVIEW AND COMPLY WITH ALL CONDITIONS DESCRIBED IN THE PERMIT.
8. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, THE SAFETY OF ALL PERSONS INCLUDING VISITORS AND THE GENERAL PUBLIC, AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY THROUGHOUT THE PROJECT AND NOT BE LIMITED BY WORKING HOURS. ANY CONSTRUCTION OBSERVATION BY THE ENGINEER OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES.
9. PRIOR TO COMMENCEMENT OF WORK THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH ALL UTILITY COMPANIES AND OBTAIN ANY RELEVANT INFORMATION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL BOUNDARY CORNERS AND SECTION CORNERS. ANY BOUNDARY CORNER AND/OR SECTION CORNER DISTURBED OR DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE RESET BY A LAND SURVEYOR LICENSED IN THE STATE OF MISSOURI, AT THE CONTRACTOR'S EXPENSE.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ADJACENT PROPERTIES AND SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT DAMAGE DURING CONSTRUCTION. THE CONTRACTOR IS ALSO RESPONSIBLE FOR REPAIRING ANY DAMAGE RESULTING FROM CONSTRUCTION ACTIVITIES.
12. PRIOR TO MOVING OFF THE JOB THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER TO PERFORM A FINAL WALK-THROUGH OF THE CONSTRUCTION SITE.

REFERENCES:

1. UNLESS EXPLICITLY DESCRIBED OTHERWISE WITHIN THESE PLANS THE FOLLOWING SHALL APPLY;
   - A. ALL CONSTRUCTION, INCLUDING THOSE LISTED BELOW, SHALL CONFORM TO THE LATEST CODES AND ORDINANCES OF LEE'S SUMMIT, MISSOURI.
   - B. ALL CONSTRUCTION IN MODOT RIGHT-OF-WAY SHALL CONFORM TO THE LATEST SPECIFICATIONS ADOPTED BY THE U.S. DEPARTMENT OF TRANSPORTATION AND MODOT.
   - C. ALL TRAFFIC CONTROL SIGNAGE SHALL CONFORM WITH THE CURRENT EDITION OF THE MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
   - D. ALL UTILITY EXTENSIONS AND CONSTRUCTION SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS OF THE UTILITY COMPANIES.
   - E. ALL EXTERIOR PAVEMENT (PCC, ASPHALT, ETC.) SHALL BE IN CONFORMANCE WITH THE SPECIFICATIONS OF LEE'S SUMMIT, MISSOURI AND THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT.

EXISTING CONDITIONS:

1. THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS OF THE PROJECT AREA.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING THEIR OWN INVESTIGATIONS AND MAKING THEIR OWN ASSUMPTIONS REGARDING SITE SURFACE AND SUBSURFACE CONDITIONS. THIS INCLUDES THE LOCATION AND CONSISTENCY OF ANY EXISTING ROCK LAYERS UNDERLYING THE PROJECT SITE. CONTACT THE ENGINEER REGARDING ANY DISCREPANCIES THAT MAY AFFECT THE ABILITY TO CONSTRUCT FROM THESE PLANS AS DESIGNED.
3. EXISTING CONDITIONS WERE DETERMINED THROUGH A VARIETY OF METHODS THAT MAY INCLUDE SURVEY, AERIAL IMAGERY, AVAILABLE RECORDS, GIS DATA, ETC. SUBSURFACE CONDITIONS ARE APPROXIMATE AND MAY NOT INCLUDE ALL UTILITIES AND OTHER SITES IMPROVEMENTS PRESENT ON SITE. THE CONTRACTOR SHALL MAKE EXPLORATION EXCAVATIONS AND LOCATE EXISTING UNDERGROUND UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS WHEN CONFLICTS AND DISCREPANCIES ARE FOUND.

GENERAL EROSION & SEDIMENTATION NOTES:

- A. THE STORMWATER POLLUTION PREVENTION PLAN IS COMPRISED OF THIS DRAWING, THE STANDARD DETAILS, ATTACHMENTS INCLUDED IN SPECIFICATIONS, PLUS THE PERMIT AND ALL SUBSEQUENT REPORTS AND RELATED DOCUMENTS.
- B. ALL CONTRACTORS AND SUBCONTRACTORS INVOLVED WITH STORMWATER POLLUTION PREVENTION SHALL OBTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN AND THE STATE OR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT (NPDES PERMIT) AND BECOME FAMILIAR WITH THEIR CONTENTS.
- C. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES AS REQUIRED BY THE SWPPP. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DICTATED BY CONDITIONS AT NO ADDITIONAL COST OF OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.
- D. BEST MANAGEMENT PRACTICES (BMP'S) AND CONTROLS SHALL CONFORM TO FEDERAL, STATE, OR LOCAL REQUIREMENTS OR MANUAL OF PRACTICE, AS APPLICABLE. CONTRACTOR SHALL IMPLEMENT ADDITIONAL CONTROLS AS DIRECTED BY PERMITTING AGENCY OR OWNER.
- E. PERMITS FOR ANY CONSTRUCTION ACTIVITY IMPACTING STATE WATERS OR REGULATED WETLANDS MUST BE MAINTAINED ON SITE AT ALL TIMES.
- F. CONTRACTOR SHALL MINIMIZE CLEARING TO THE MAXIMUM EXTENT PRACTICAL OR AS REQUIRED BY THE GENERAL PERMIT.
- G. GENERAL CONTRACTOR SHALL DENOTE ON PLAN THE TEMPORARY PARKING AND STORAGE AREA WHICH SHALL ALSO BE USED AS THE EQUIPMENT MAINTENANCE AND CLEANING AREA, EMPLOYEE PARKING AREA, AND AREA FOR LOCATING PORTABLE FACILITIES, OFFICE TRAILERS, AND TOILET FACILITIES.
- H. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DETAINED AND PROPERLY TREATED OR DISPOSED.
- I. SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOTATION BOOMS SHALL BE MAINTAINED ON SITE OR READILY AVAILABLE TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS.
- J. DUST ON THE SITE SHALL BE CONTROLLED. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
- K. RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DEPOSITED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE PREMISES THROUGH THE ACTION OF WIND OR STORMWATER DISCHARGE INTO DRAINAGE DITCHES OR WATERS OF THE STATE.
- L. ALL STORM WATER POLLUTION PREVENTION MEASURES PRESENTED ON THIS SITE MAP, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE INITIATED AS SOON AS PRACTICABLE.
- M. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY WILL BE STOPPED FOR AT LEAST 7 DAYS, SHALL BE TEMPORARILY STABILIZED. THESE AREAS SHALL BE STABILIZED NO LATER THAN 14 DAYS FROM THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS.
- N. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS PERMANENTLY STOPPED SHALL BE STABILIZED. THESE AREAS SHALL BE STABILIZED NO LATER THAN 14 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS. REFER TO THE GRADING PLAN.
- O. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION ENTRANCES IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. IF WASHING IS USED, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IT IS CARRIED OFF THE SITE. ONLY USE INGRESS/EGRESS LOCATIONS AS PROVIDED.
- P. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
- Q. CONTRACTORS OR SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS IN CONJUNCTION WITH THE STABILIZATION OF THE SITE.
- R. ON-SITE & OFFSITE SOIL STOCKPILE AND BORROW AREAS SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION THROUGH IMPLEMENTATION OF BEST MANAGEMENT PRACTICES. STOCKPILE AND BORROW AREA LOCATIONS SHALL BE NOTED ON THE SITE MAP AND PERMITTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS.
- S. SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.
- T. DUE TO THE GRADE CHANGES DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE.

EROSION & SEDIMENTATION CONTROL MAINTENANCE

ALL MEASURES STATED ON THIS SITE MAP, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

1. INLET PROTECTION DEVICES AND BARRIERS SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING OR DETERIORATION.
2. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT FENCE.
3. THE CONSTRUCTION EXITS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE CONSTRUCTION EXITS AS CONDITIONS DEMAND.
4. THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AREA AS CONDITIONS DEMAND.

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8455 College Boulevard
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816.777.0400
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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri
Engineering Corporation
COA# 00062

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

C101

2 OF 9

Accepted
Study/Report

LEGEND

- 1335 — EXISTING GRADE LINES
- 1335 — PROPOSED NEW GRADE LINES
- PROPOSED STORM SEWER
- PROPOSED RIP RAP APRON
- FLEXAMAT PLUS
- EROSION CONTROL BLANKET

EMBANKMENT FILL AND COMPACTION REQUIREMENTS:

1. THIRD PARTY TESTING REQUIRED FOR CONSTRUCTION OF THE DETENTION BASIN.
2. REMOVE TOPSOIL AND ORGANIC DIRT FROM THE AREA.
3. PROOF ROLL TO CHECK THE SUBGRADE. REMOVE OR REPAIR ANY UNSTABLE AREA IN ACCORDANCE WITH THIRD PARTY TESTER.
4. ALL EMBANKMENT FILLS SHOULD CONSIST OF APPROVED MATERIALS:
   MAXIMUM ORGANIC CONTENT: 4%
   LIQUID LIMIT, LL: 30 < LL < 50
   MAXIMUM STANDARD PERMEABILITY, Ks: 1.5E-05 CM/SEC
5. AS DEFINED ABOVE, SUITABLE FILL MATERIALS SHOULD BE PLACED IN LOOSE LIFTS OF 8 INCHES OR LESS AND COMPACTED USING APPROPRIATELY SIZED AND TYPE EQUIPMENT. EMBANKMENT FILL SHOULD BE COMPACTED TO AT LEAST 95 PERCENT OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY AT A MOISTURE CONTENT BETWEEN ONE (1) PERCENT BELOW OPTIMUM MOISTURE CONTENT AND FOUR (4) PERCENT ABOVE OPTIMUM MOISTURE CONTENT.
6. WHERE REQUIRED, SLOPES SHOULD BE FLATTENED TO AT LEAST 3H:1V AND SUITABLY BENCHED PRIOR TO PLACEMENT OF NEW FILLS. IF CUTBACKS INTO EXISTING SLOPES ARE REQUIRED TO REMOVE DISTURBED OR OTHERWISE UNSUITABLE MATERIAL, THE BENCHES SHOULD BE CUT PARALLEL TO THE EXISTING SITE CONTOURS. THE BENCHES SHOULD HAVE MAXIMUM VERTICAL FACE HEIGHTS OF THREE (3) FEET AND MINIMUM VERTICAL FACE HEIGHTS OF ONE (1) FOOT.

GENERAL NOTES:

1. CONTRACTOR SHALL ADHERE TO THE "DESIGN AND CONSTRUCTION MANUAL" SECTION2100 AS ADOPTED BY THE CITY OF LEE'S SUMMIT (LATEST EDITION), FOR EXCAVATION AND EMBANKMENT WORK WITHIN THE PROPOSED RIGHT-OF-WAY.
2. AREAS OF CONSTRUCTION SHALL BE STRIPPED OF ALL VEGETATION, ORGANIC MATTER AND TOPSOIL TO A DEPTH AS RECOMMENDED BY GEOTECHNICAL ENGINEER AND OR TESTING AGENCY. SOILS REMOVED DURING SITE STRIPPING SHOULD BE EVALUATED TO DETERMINE OF PORTIONS OF THE TOPSOIL STRATUM MAY BE UTILIZED AS STRUCTURAL FILL WITHIN PAVEMENT AREAS. ANY MATERIAL NOT DEEMED AS SUITABLE FILL MATERIAL BY THE GEOTECHNICAL ENGINEER AS OR TESTING AGENCY SHALL BE REMOVED FROM THE JOB SITE BY THE CONTRACTOR AT HIS EXPENSE.
3. ALL EMBANKMENT OUTSIDE OF RIGHT-OF-WAY SHOULD BE PLACED IN CONTROLLED LIFTS HAVING A MAXIMUM LOOSE LIFT THICKNESS OF 8". EMBANKMENT SHOULD BE COMPACTED TO A MINIMUM OF 95% OF THE MATERIALS MAXIMUM DRY-DENSITY AS DETERMINED BY ASTM D-698 (STANDARD PROCTOR COMPACTION). MOISTURE CONTENT OF THE FILL AT THE TIME OF COMPACTION SHALL BE WITHIN A RANGE OF -0 TO +4 PERCENT OF OPTIMUM MOISTURE CONTENT.
4. PAVEMENT AND OTHER INFRASTRUCTURE IMPROVEMENT NOT EXPLICITLY DETAILED WITHIN THIS PLAN SET ARE SHOWN FOR REFERENCE ONLY AND WILL BE REVIEWED AND PERMITTED SEPARATELY.

NOTE:

1. DEVELOPER TO PROVIDE EMERGENCY DRAWDOWN FOR THE BASIN IF NECESSARY IN THE FUTURE BY MEANS OF PUMPING.
2. ALL STORM SEWER SHOWN IS FOR REFERENCE ONLY. REFER TO APPROVED MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS FOR THE VILLAGE AT DISCOVERY PARK ZONE 1 & ARIA APARTMENTS. (PL2023146, PRSUBD20232726)

INSTALL FLEXAMAT PLUS (OR APPROVED EQUAL) AND SEEDED WITH "DETENTION BASIN SEED MIX" BY PRAIRIE MOON NURSERY (OR APPROVED EQUAL)

EX. STORM LINE Q (BY OTHERS)

PROP. 8" PVC SSWR MAIN (BY OTHERS)

PROP. 140' SPILLWAY

RE: SHEET C201

PROPOSED DETENTION BASIN OUTLET

EX. STORM LINE R (BY OTHERS)

INSTALL EROSION CONTROL BLANKET PER APWA SECTION 2150 AND DESIGN GUIDANCE 5100.

PROPOSED GRADING (BY OTHERS) RE: APPROVED PLANS FOR ARIA APARTMENTS FOR MORE DETAIL.

PROP. 50' SSWR EASEMENT

EX. PROPERTY LINE

EX. 20' FORCE MAIN EASEMENT

EX. 20' WATERLINE EASEMENT

EX. 15' UTILITY EASEMENT

TRACT A-1
9.40 ACRES
2031 NE TRAILS EDGE BLVD

INSTALL FLEXAMAT PLUS (OR APPROVED EQUAL) AND SEEDED WITH "DETENTION BASIN SEED MIX" BY PRAIRIE MOON NURSERY (OR APPROVED EQUAL)

EX. PUBLIC RCB STORM (BY OTHERS)

EX. STORM LINE A (BY OTHERS)

EX. PROPERTY LINE

LOT 12 - THE VILLAGE AT DISCOVERY PARK
PROPOSED GRADING (BY OTHERS)
RE: APPROVED PLANS FOR DISCOVERY PARK - LOT 12 FOR MORE DETAIL.

INSTALL EROSION CONTROL BLANKET PER APWA SECTION 2150 AND DESIGN GUIDANCE 5100.

S27°23'21

EX. STORM LINE B (BY OTHERS)

EX. STORM LINE C (BY OTHERS)

N

1"=40'

40' 0 20' 40'

G:\Shared drives\KC10 - Land Development\Projects\2024\24KC10025-Discovery Park Z1p1-Dam Embankment Revisions\01 CIVIL\03-DWG\Sheet\Mass Grading Plans\24KC10025-GRAD001.dwg

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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

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1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
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FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

SHEET TITLE

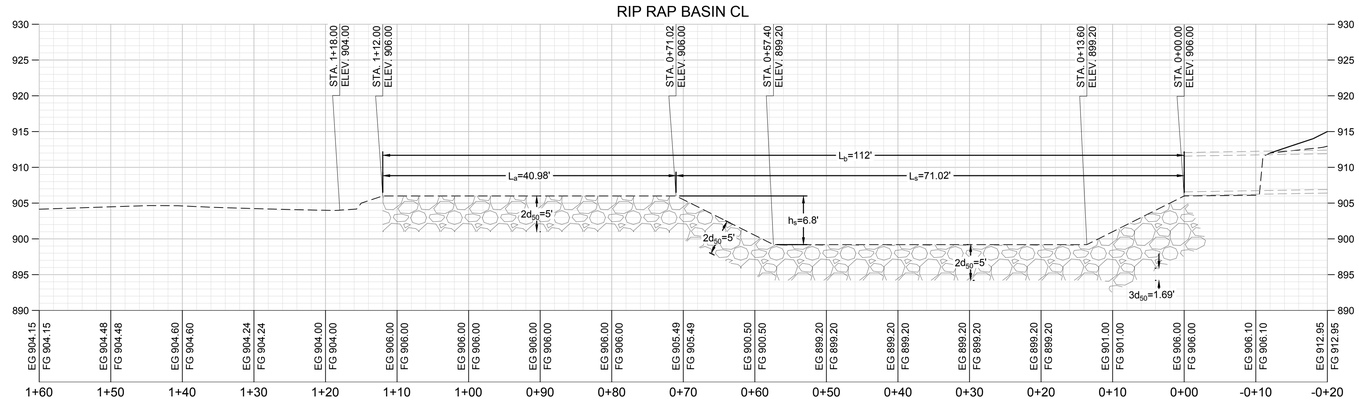
GRADING PLAN

SHEET NUMBER

C200

3 OF 9

Accepted
Study/Report



RIPRAP BASIN DESIGN PROCEDURE PER HEC-14, SECTION 10

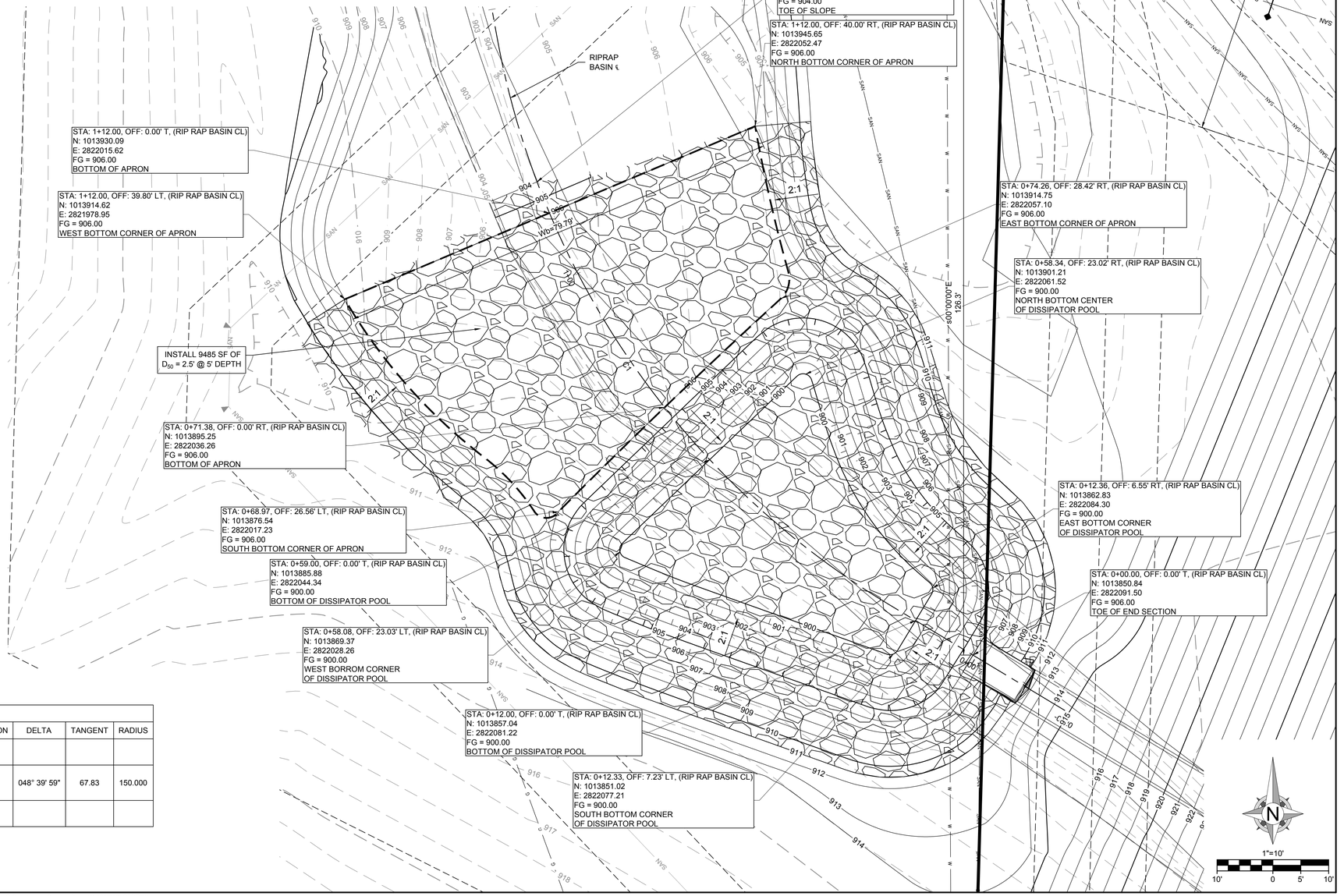
- Q_{100} = 936 cfs
- A = 30 sq. ft
- V = 31.20 fps
- y_0 = 4.78 ft

STEP 1:
Fr = 2.51 (<3.0) OK

STEP 2:
TRY D_{50} = 2.50'
D_{50}/y_e = 0.52
T_w/y_e = 0.34 (< 0.75) -> C_0= 1.4
h_s = 6.80 ft
h_s/y_e= 1.42 ft
h_s/D_{50} = 2.72 (> 2.0) OK

STEP 3:
L_s = 10*h_s = 68' (>L_s, min) OK
L_b = 15*h_s = 102' (>L_b, min) OK
W_b = 74'

STEP 4:
y_c = 1.60'
T_c = 79.79'
A_c = 152.70 sq. ft.
V_b = V_c = 6.10 fps (< 7.0 fps) OK



RIP RAP BASIN CL									
SEGMENT #		STATION	NORTHING	EASTING	LENGTH	LINE/CHORD DIRECTION	DELTA	TANGENT	RADIUS
L1		-0+20.00 0+17.64	1013840.5211 1013859.9486	2822108.6311 2822076.3914	37.64	N58° 55' 37.46"W			
C1	PC= PI= PT=	0+17.64	1013859.9486	2822076.3914	127.41	N34° 35' 37.58"W	048° 39' 59"	67.83	150.000
L2		1+45.05 1+60.00	1013961.7060 1013976.4183	2822006.2099 2822003.5467	14.95	N10° 15' 38.27"W			

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PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri
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COA# 00062

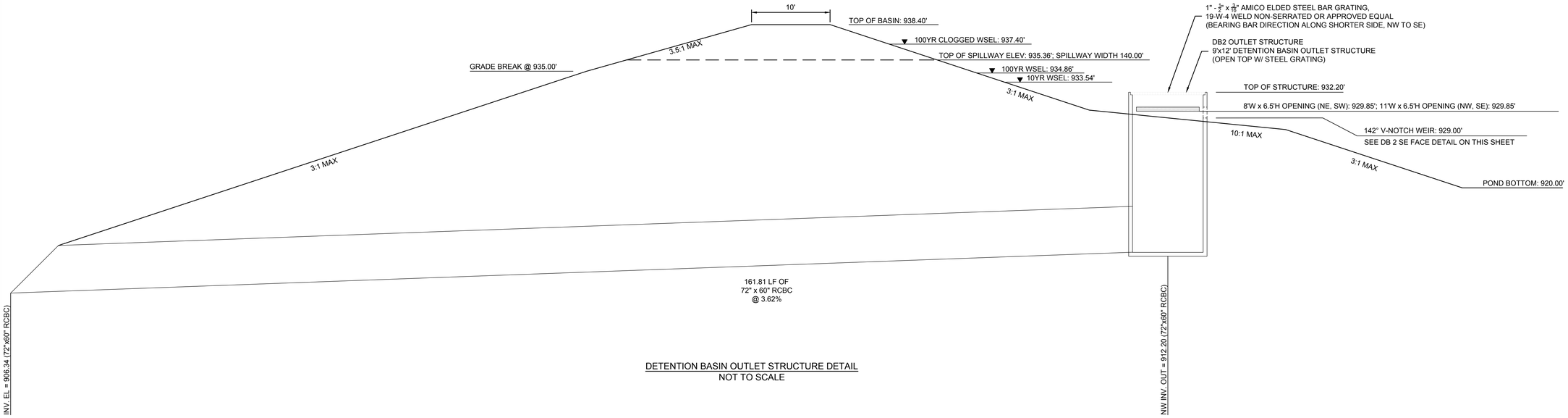
SHEET TITLE

SPILLWAY DETAIL PLAN

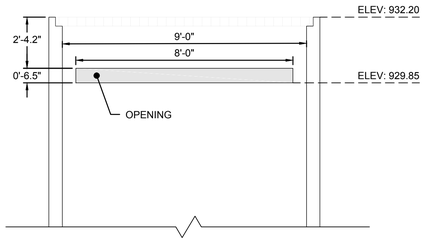
SHEET NUMBER

C201

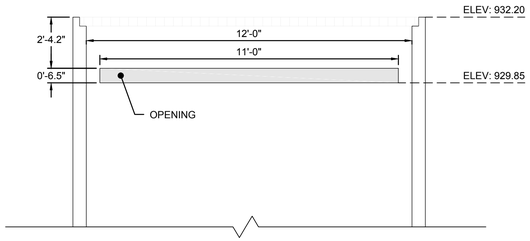
4 OF 9



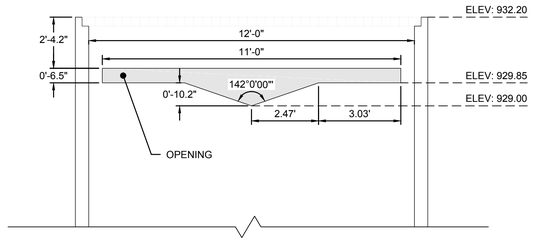
DETENTION BASIN OUTLET STRUCTURE DETAIL
NOT TO SCALE



DB2 NE & SW FACES DETAIL
NOT TO SCALE



DB2 NW FACE DETAIL
NOT TO SCALE



DB2 SE FACE DETAIL
NOT TO SCALE

BASIN DETAILS	
BASIN EMERGENCY SPILLWAY DETAILS	
TYPE	RECTANGULAR BROAD CRESTED WEIR
LENGTH	140.00'
WIDTH	42.70'
ELEVATION	935.36'
DEPTH	2.04'
TOP ELEVATION	938.40'
100-YR FLOW	1,225.95 CFS
100-YR CLOGGED FLOW	1,225.95 CFS
BASIN HYDROLOGIC DETAILS	
PERMANENT POOL ELEVATION	929.00'
10-YR FLOW, WSEL, DEPTH, STORAGE	414.92 CFS, 933.54', 4.54', 16.53 AC-FT
100-YR FLOW, WSEL, DEPTH, STORAGE	720.09 CFS, 943.86', 5.86', 22.00 AC-FT
100-YR CLOGGED FLOW, WSEL, DEPTH, STORAGE	1,225.95 CFS, 937.40', 8.40', 33.21 AC-FT

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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation
COA# 00062

SHEET TITLE

SPILLWAY DETAILS

SHEET NUMBER

C202

5 OF 9

GENERAL NOTES:

1. THE STORMWATER POLLUTION PREVENTION PLAN IS COMPRISED OF THIS DRAWING ("EROSION CONTROL"), THE STANDARD DETAILS, ATTACHMENTS INCLUDED IN SPECIFICATIONS ("SWPPP"), PLUS THE PERMIT AND ALL SUBSEQUENT REPORTS AND RELATED DOCUMENTS.
2. ALL CONTRACTORS AND SUBCONTRACTORS INVOLVED WITH STORMWATER POLLUTION PREVENTION SHALL OBTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN AND THE STATE OR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT (NPDES PERMIT) AND BECOME FAMILIAR WITH THEIR CONTENTS.
3. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES AS REQUIRED BY THE SWPPP. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DIRECTED BY CONDITIONS AT NO ADDITIONAL COST OF OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.
4. BEST MANAGEMENT PRACTICES (BMP'S) AND CONTROLS SHALL CONFORM TO FEDERAL, STATE, OR LOCAL REQUIREMENTS OR MANUAL OF PRACTICE, AS APPLICABLE. CONTRACTOR SHALL IMPLEMENT ADDITIONAL CONTROLS AS DIRECTED BY PERMITTING AGENCY OR OWNER.
5. SITE MAP MUST CLEARLY DELINEATE ALL STATE WATERS. PERMITS FOR ANY CONSTRUCTION ACTIVITY IMPACTING STATE WATER OR REGULATED WETLANDS MUST BE MAINTAINED ON SITE AT ALL TIMES.
6. CONTRACTOR SHALL MINIMIZE CLEARING TO THE MAXIMUM EXTENT PRACTICAL OR AS REQUIRED BY THE GENERAL PERMIT.
7. GENERAL CONTRACTOR SHALL DENOTE ON PLAN THE TEMPORARY PARKING AND STORAGE AREA WHICH SHALL ALSO BE USED AS THE EQUIPMENT MAINTENANCE AND CLEANING AREA, EMPLOYEE PARKING AREA, AND AREA FOR LOCATING PORTABLE FACILITIES, OFFICE TRAILERS, AND TOILET FACILITIES.
8. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DETAINED AND PROPERLY TREATED OF DISPOSED.
9. SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOATATION BOOMS SHALL BE MAINTAINED ON SITE OR READILY AVAILABLE TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS.
10. DUST ON SITE SHALL BE CONTROLLED. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
11. RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DEPOSITED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE PREMISES THROUGH THE ACTION OF WIND OR STORM WATER DISCHARGE INTO DRAINAGE DITCHES OR WATER OF THE STATE.
12. ALL STORM WATER POLLUTION PREVENTION MEASURED PRESENTED ON THIS SITE MAP, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE INITIATED AS SOON AS POSSIBLE.
13. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY WILL BE STOPPED FOR AT LEAST 14 DAYS, SHALL BE TEMPORARILY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 7 DAYS FROM THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS.
14. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS PERMANENTLY STOPPED SHALL BE STABILIZED. THESE AREAS SHALL BE STABILIZED NO LATER THAN 21 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS. STABILIZATION MAY CONSIST OF SEED, SOD, TOCK, PAVEMENT, STRUCTURE OR OTHER NON-ERODIBLE COVER.
15. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION ENTRANCES IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. IF WASHING IS USED, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IS IS CARRIED OFF THE SITE. ONLY USED INGRESS/EGRESS LOCATIONS AS PROVIDED.
16. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
17. CONTRACTORS OR SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING SEDIMENT IN THE DETENTION POND AND ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS IN CONJUNCTION WITH THE STABILIZATION OF THE SITE.
18. ON-SITE & OFFSITE SOIL STOCKPILE AND BORROW AREAS SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION THROUGH IMPLEMENTATION OF BEST MANAGEMENT PRACTICES. STOCKPILE AND BORROW AREA LOCATIONS SHALL BE NOTED ON THE SITE MAP AND PERMITTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS.
19. SLOPES CONSISTING OF TOPSOIL, CLAY, OR SILT SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.
20. DUE TO THE GRADE CHANGES DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE.
21. CONTR5ACTOR RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE. PONDING OF WATER WILL NOT BE ALLOWED ON SITE. IF NECESSARY, CONTRACTOR TO PROVIDE TEMPORARY SWALES OR PUMPING IN LOW POINT SUMP CONDITIONS UNTIL THE INSTALLATION OF STORM SEWER.

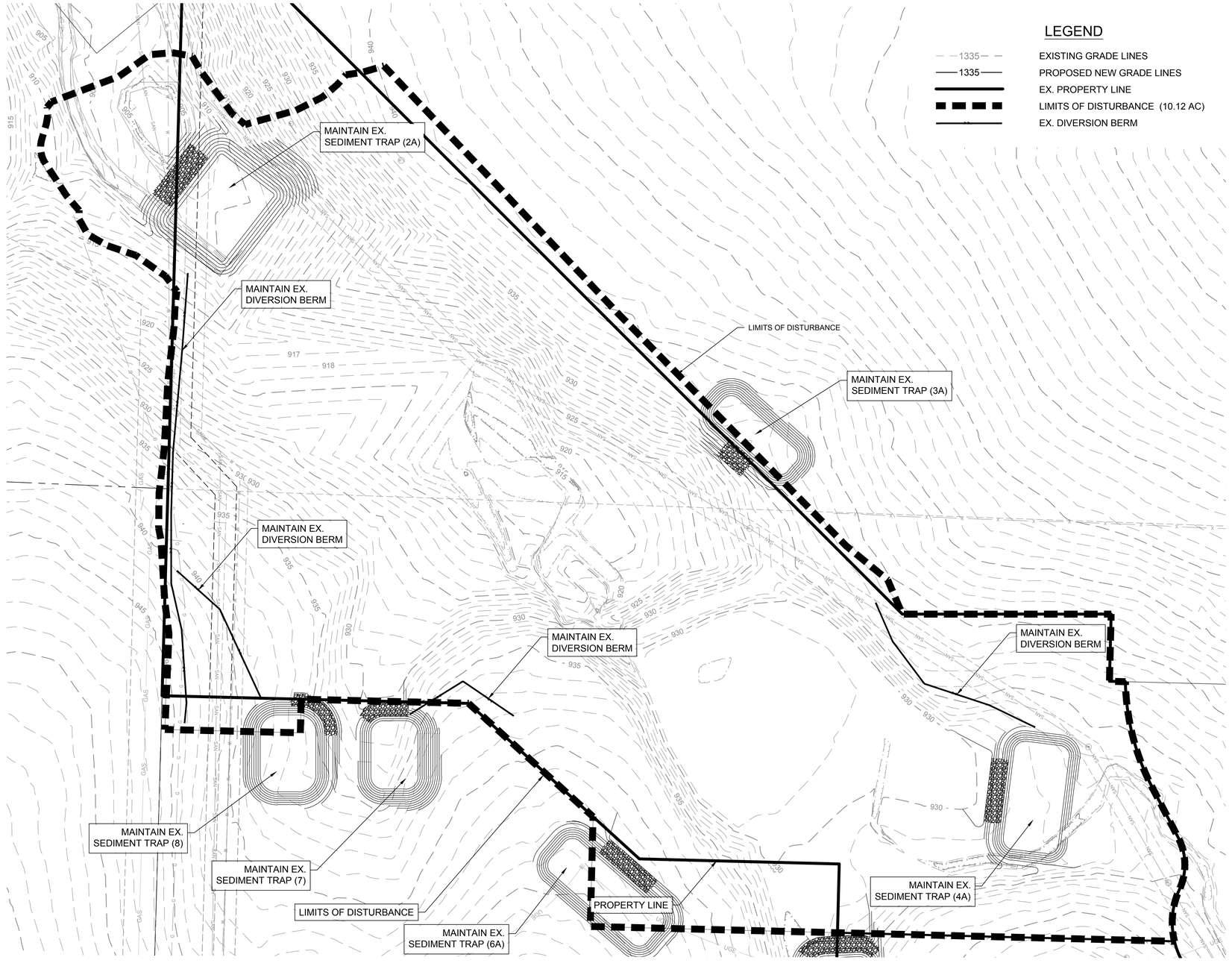
EROSION CONTROL & MAINTENANCE PLAN NOTES:

ALL MEASURES STATED ON THIS SITE MAP, AND IN THE STORMWATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

1. AT A MINIMUM, THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS FOR GOOD HOUSEKEEPING, SPILL CONTROL AND EROSION AND SEDIMENT CONTROL AS SPECIFIED IN THE KANSAS CITY METROPOLITAN CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION SECTION 2150.
2. INLET PROTECTION DEVISED AND BARRIERS SHALL BE REPAIRED OR REPLACED IN THEY SHOWN SIGNS OF UNDERMINING OR DETERIORATION.
3. ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED, AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
4. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHED ONE-THIRD THE HEIGHT OF THE SILT FENCE.
5. THE CONSTRUCTION EXITS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP D4RESSING OF THE CONSTRUCTION EXITS AS CONDITIONS DEMAND.
6. THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AREA AS CONDITIONS DEMAND.
7. DRAINAGE SWALES WITH SLOPES STEEPER THAN 15% SHALL BE INSPECTED AFTER EACH RAINFALL EVENT. THESE CHANNELS AND SLOPES SHOULD BE TREATED WITH EROSION CONTROL FABRIC. IF THE CHANNELS OR SLOPES SHOW ANY SIGNS OF FAILURE, COORDINATE WITH THE ENGINEER TO DEVELOP A PLAN TO RE-STABLIZE THE FAILED AREA.

GRADING NOTES:

1. ALL TREES OUTSIDE OF LIMITS OF DISTURBANCE SHALL REMAIN. ONLY THOSE TREES WITHIN LIMITS OF DISTURBANCE THAT AREA IN THE AREA TO BE GRADED SHALL BE REMOVED.
2. ALL TOPSOIL, VEGETATION, ROOT STRUCTURES, AND DELETERIOUS MATERIALS SHALL BE STRIPPED FROM THE GROUND SURFACE PRIOR TO THE PLACEMENT OF EMBANKMENTS. CONTRACTOR SHALL OBTAIN THE ON-SITE GEOTECHNICAL REPRESENTATIVE'S ACCEPTANCE OF THE EXISTING GROUND SURFACE MATERIALS AND THE PROPOSED FILL MATERIAL PRIOR TO THE PLACEMENT OF FILL.
3. ALL PROPOSED CONTOUR LINES AND SPOT ELEVATIONS SHOWN ARE FINISH GRADE ELEVATIONS. CONTRACTOR SHALL ACCOUNT FOR PAVEMENT DEPTHS, BUILDING PADS, TOPSOIL, ETC. WHEN GRADING THE SITE.
4. ALL DISTURBED AREAS THAT SHALL BE FINISH GRADED WITH A MINIMUM OF FOUR INCHES OF TOPSOIL.
5. FINISHED GRADES SHALL NOT BE STEEPER THAN 3:1.
6. ALL GRADING WORK SHALL BE CONSIDERED UNCLASSIFIED. NO ADDITIONAL PAYMENTS SHALL BE MADE FOR ROCK EXCAVATION. CONTRACTOR SHALL SATISFY HIMSELF AS TO ANY ROCK EXCAVATION REQUIRED TO ACCOMPLISH THE IMPROVEMENTS SHOWN HEREIN.



SEQUENCE OF CONSTRUCTION:

SITE IMPROVEMENTS CONSIST OF GRADING OPERATIONS, ALONG WITH RE-ACTIVATING OF AN EXISTING SEDIMENT TRAP. WORK SHALL BE CONDUCTED AS FOLLOWS:

1. MAINTAIN/RECONSTRUCT EXISTING SEDIMENT TRAPS AS DETAILED IN "MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS FOR THE VILLAGE AT DISCOVERY PARKING ZONE 1 & ARIA APARTMENTS." (CITY OF LEE'S SUMMIT, MO PROJECT NUMBER PRSUBD20232726)
2. MAINTAIN EXISTING CONSTRUCTION VEHICLE ENTRANCE LOCATED ALONG NW COLBERN RD.
3. INSTALL DIVERSION BERMS AS SHOWN ON PLANS. ENSURE PROPOSED DIVERSION BERM CAPTURE ALL SEDIMENTS INTENDED FOR PROPOSED SEDIMENT TRAPS. CONTRACTOR SHALL ADJUST AS NECESSARY.
4. CONTRACTOR TO CONSTRUCT/MAINTAIN STORMWATER MANAGEMENT FACILITIES, SPECIFICALLY THOSE FEATURES RELATED TO DETENTION, PRIOR TO ANY LAND DISTURBANCE OF THE SITE AND PRIOR TO THE CONSTRUCTION OF ANY OTHER SITE DEVELOPMENT WORK AS NOT TO EFFECT DOWNSTREAM NEIGHBORS WITH UNDETAINED STORMWATER DISCHARGE.
5. AS GRADING OPERATIONS ARE COMPLETED, AREAS TO REMAIN INACTIVE FOR MORE THAN 14 DAYS SHALL BE STABILIZED WITH SEED AND COMPOST MULCH AND/OR STEEP SLOPE PROTECTION. SEE INTERMEDIATE EROSION CONTROL PLAN.

REFERENCE APPROVED MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS FOR DISCOVERY PARK - ZONE 1 & ARIA APARTMENTS FOR EX. SEDIMENT BASINS AND TEMPORARY CONSTRUCTION ENTRANCE LOCATION ALONG NW COLBERN ROAD.

N

1"=50'

50' 0 25' 50'

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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

SHEET TITLE

ESC - PHASE I

SHEET NUMBER

C300

6 OF 9

GENERAL NOTES:

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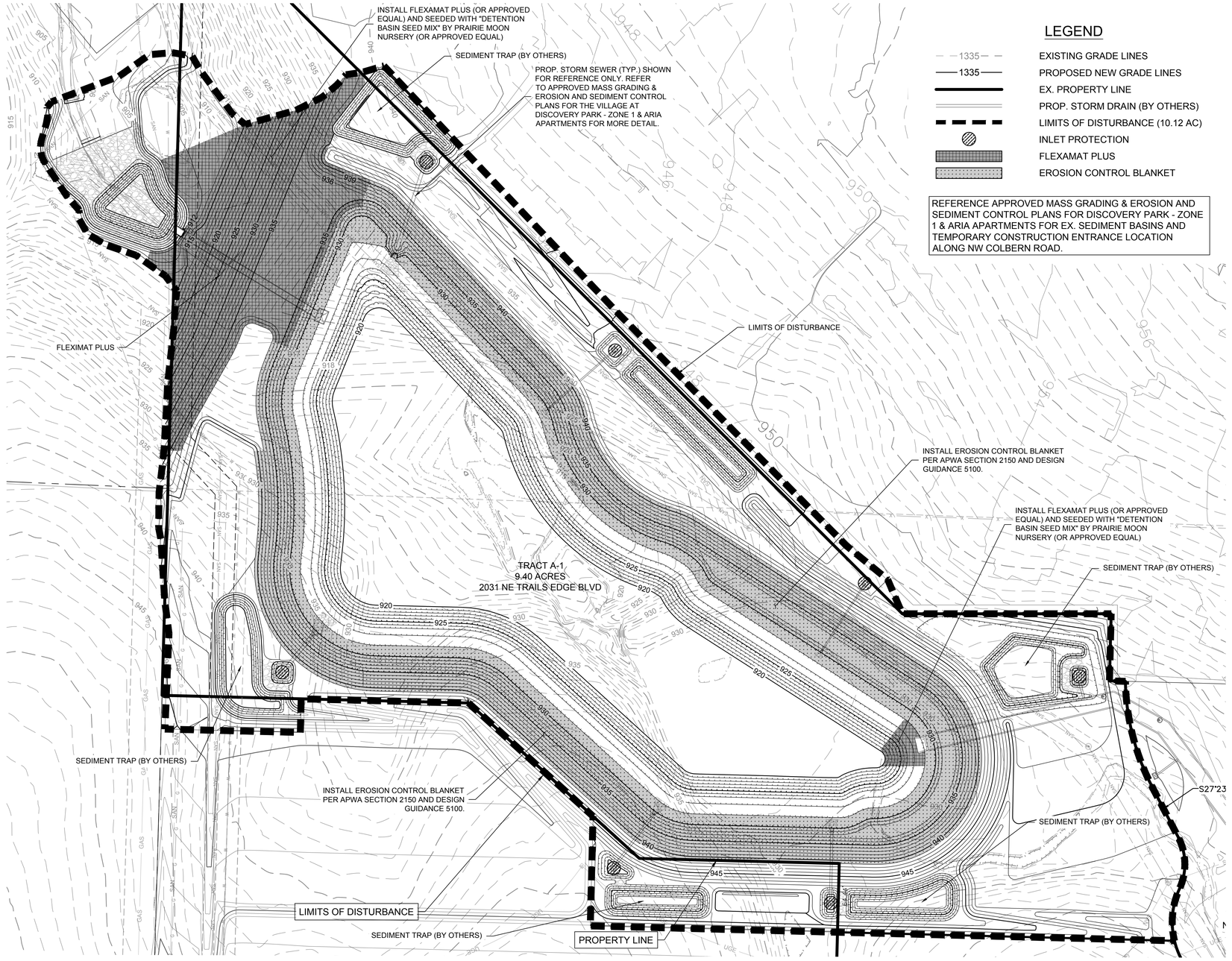
20. DUE TO THE GRADE CHANGES DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE.
21. CONTR5ACTOR RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE. PONDING OF WATER WILL NOT BE ALLOWED ON SITE. IF NECESSARY, CONTRACTOR TO PROVIDE TEMPORARY SWALES OR PUMPING IN LOW POINT SUMP CONDITIONS UNTIL THE INSTALLATION OF STORM SEWER.



LEGEND

- 1335 — EXISTING GRADE LINES
- 1335 — PROPOSED NEW GRADE LINES
- EX. PROPERTY LINE
- PROP. STORM DRAIN (BY OTHERS)
- LIMITS OF DISTURBANCE (10.12 AC)
- INLET PROTECTION
- FLEXAMAT PLUS
- EROSION CONTROL BLANKET

REFERENCE APPROVED MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS FOR DISCOVERY PARK - ZONE 1 & ARIA APARTMENTS FOR EX. SEDIMENT BASINS AND TEMPORARY CONSTRUCTION ENTRANCE LOCATION ALONG NW COLBERN ROAD.

EROSION CONTROL & MAINTENANCE PLAN NOTES:

ALL MEASURES STATED ON THIS SITE MAP, AND IN THE STORMWATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

1. AT A MINIMUM, THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS FOR GOOD HOUSEKEEPING, SPILL CONTROL AND EROSION AND SEDIMENT CONTROL AS SPECIFIED IN THE KANSAS CITY METROPOLITAN CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION SECTION 2150.
2. INLET PROTECTION DEVISED AND BARRIERS SHALL BE REPAIRED OR REPLACED IN THEY SHOWN SIGNS OF UNDERMINING OR DETERIORATION.
3. ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED, AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
4. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHED ONE-THIRD THE HEIGHT OF THE SILT FENCE.
5. THE CONSTRUCTION EXITS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP D4RESSING OF THE CONSTRUCTION EXITS AS CONDITIONS DEMAND.
6. THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AREA AS CONDITIONS DEMAND.
7. DRAINAGE SWALES WITH SLOPES STEEPER THAN 15% SHALL BE INSPECTED AFTER EACH RAINFALL EVENT. THESE CHANNELS AND SLOPES SHOULD BE TREATED WITH EROSION CONTROL FABRIC. IF THE CHANNELS OR SLOPES SHOW ANY SIGNS OF FAILURE, COORDINATE WITH THE ENGINEER TO DEVELOP A PLAN TO RE-STABLIZE THE FAILED AREA.

GRADING NOTES:

1. ALL TREES OUTSIDE OF LIMITS OF DISTURBANCE SHALL REMAIN. ONLY THOSE TREES WITHIN LIMITS OF DISTURBANCE THAT AREA IN THE AREA TO BE GRADED SHALL BE REMOVED.
2. ALL TOPSOIL, VEGETATION, ROOT STRUCTURES, AND DELETERIOUS MATERIALS SHALL BE STRIPPED FROM THE GROUND SURFACE PRIOR TO THE PLACEMENT OF EMBANKMENTS. CONTRACTOR SHALL OBTAIN THE ON-SITE GEOTECHNICAL REPRESENTATIVE'S ACCEPTANCE OF THE EXISTING GROUND SURFACE MATERIALS AND THE PROPOSED FILL MATERIAL PRIOR TO THE PLACEMENT OF FILL.
3. ALL PROPOSED CONTOUR LINES AND SPOT ELEVATIONS SHOWN ARE FINISH GRADE ELEVATIONS. CONTRACTOR SHALL ACCOUNT FOR PAVEMENT DEPTHS, BUILDING PADS, TOPSOIL, ETC. WHEN GRADING THE SITE.
4. ALL DISTURBED AREAS THAT SHALL BE FINISH GRADED WITH A MINIMUM OF FOUR INCHES OF TOPSOIL.
5. FINISHED GRADES SHALL NOT BE STEEPER THAN 3:1.
6. ALL GRADING WORK SHALL BE CONSIDERED UNCLASSIFIED. NO ADDITIONAL PAYMENTS SHALL BE MADE FOR ROCK EXCAVATION. CONTRACTOR SHALL SATISFY HIMSELF AS TO ANY ROCK EXCAVATION REQUIRED TO ACCOMPLISH THE IMPROVEMENTS SHOWN HEREIN.

SEQUENCE OF CONSTRUCTION:

SITE IMPROVEMENTS CONSIST OF FINISHING MASS GRADING ACTIVITIES, BUILDING CONSTRUCTION, PARKING LOT PAVING, PROPOSED SERVICE LINE UTILITY INSTALLATION, AND STORM SEWERS. WORK SHALL BE CONDUCTED AS FOLLOWS:

1. FINISH ANY MASS GRADING AND/OR STEEP SLOPE STABILIZATION ACTIVITIES THAT WERE NOT COMPLETED IN PHASE I.
2. BEGIN INSTALLING UNDERGROUND INFRASTRUCTURE STARTING WITH SANITARY SEWER, FOLLOWED BY STORM SEWER, THEN WATER LINE. INSTALL INLET PROTECTION AND SLOPE INTERRUPT SILT FENCE ONCE PIPE BACKFILLING HAS BEEN COMPLETED.
3. AS PIPE INSTALLATION OPERATIONS ARE COMPLETED, AREAS TO REMAIN INACTIVE FOR MORE THAN 14 DAYS SHALL BE STABILIZED WITH SEED AND COMPOST MULCH AND/OR STEEP SLOPE PROTECTION. SEE FINAL STABILIZATION PLAN.
4. AS STORM SEWER INFRASTRUCTURE IS COMPLETED, INLET PROTECTION SHALL BE INSTALLED TO PROTECT EXISTING STORM SEWER INFRASTRUCTURE FROM HIGHLY CONCENTRATED DISCHARGE FLOWS.
5. ALL PHASE I AND PHASE II EROSION CONTROL MEASURES SHALL CONTINUE BEING REGULARLY INSPECTED AND MAINTAINED UNTIL FINAL STABILIZATION OF AT LEAST 70% OF THE DISTURBED SURFACE HAS BEEN MET THROUGH TEMPORARY SEEDING.
6. INSTALL TEMPORARY AND PERMANENT EROSION CONTROL MATTING. SEED AREAS PER MANUFACTURER RECOMMENDATION.

N

1"=50'

50' 0 25' 50'

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FORMERLY ANDERSON ENGINEERING

MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

SHEET TITLE

ESC - PHASE II

SHEET NUMBER

C301

7 OF 9

GENERAL NOTES:

1. THE STORMWATER POLLUTION PREVENTION PLAN IS COMPRISED OF THIS DRAWING ("EROSION CONTROL"), THE STANDARD DETAILS, ATTACHMENTS INCLUDED IN SPECIFICATIONS ("SWPPP"), PLUS THE PERMIT AND ALL SUBSEQUENT REPORTS AND RELATED DOCUMENTS.
2. ALL CONTRACTORS AND SUBCONTRACTORS INVOLVED WITH STORMWATER POLLUTION PREVENTION SHALL OBTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN AND THE STATE OR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT (NPDES PERMIT) AND BECOME FAMILIAR WITH THEIR CONTENTS.
3. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES AS REQUIRED BY THE SWPPP. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DIRECTED BY CONDITIONS AT NO ADDITIONAL COST OF OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.
4. BEST MANAGEMENT PRACTICES (BMP'S) AND CONTROLS SHALL CONFORM TO FEDERAL, STATE, OR LOCAL REQUIREMENTS OR MANUAL OF PRACTICE, AS APPLICABLE. CONTRACTOR SHALL IMPLEMENT ADDITIONAL CONTROLS AS DIRECTED BY PERMITTING AGENCY OR OWNER.
5. SITE MAP MUST CLEARLY DELINEATE ALL STATE WATERS. PERMITS FOR ANY CONSTRUCTION ACTIVITY IMPACTING STATE WATER OR REGULATED WETLANDS MUST BE MAINTAINED ON SITE AT ALL TIMES.
6. CONTRACTOR SHALL MINIMIZE CLEARING TO THE MAXIMUM EXTENT PRACTICAL OR AS REQUIRED BY THE GENERAL PERMIT.
7. GENERAL CONTRACTOR SHALL DENOTE ON PLAN THE TEMPORARY PARKING AND STORAGE AREA WHICH SHALL ALSO BE USED AS THE EQUIPMENT MAINTENANCE AND CLEANING AREA, EMPLOYEE PARKING AREA, AND AREA FOR LOCATING PORTABLE FACILITIES, OFFICE TRAILERS, AND TOILET FACILITIES.
8. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DETAINED AND PROPERLY TREATED OF DISPOSED.
9. SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOATATION BOOMS SHALL BE MAINTAINED ON SITE OR READILY AVAILABLE TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS.
10. DUST ON SITE SHALL BE CONTROLLED. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
11. RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DEPOSITED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE PREMISES THROUGH THE ACTION OF WIND OR STORM WATER DISCHARGE INTO DRAINAGE DITCHES OR WATER OF THE STATE.
12. ALL STORM WATER POLLUTION PREVENTION MEASURED PRESENTED ON THIS SITE MAP, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE INITIATED AS SOON AS POSSIBLE.
13. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY WILL BE STOPPED FOR AT LEAST 14 DAYS, SHALL BE TEMPORARILY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 7 DAYS FROM THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS.
14. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS PERMANENTLY STOPPED SHALL BE STABILIZED. THESE AREAS SHALL BE STABILIZED NO LATER THAN 21 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS. STABILIZATION MAY CONSIST OF SEED, SOD, TOCK, PAVEMENT, STRUCTURE OR OTHER NON-ERODIBLE COVER.
15. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION ENTRANCES IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. IF WASHING IS USED, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IS IS CARRIED OFF THE SITE. ONLY USED INGRESS/EGRESS LOCATIONS AS PROVIDED.
16. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
17. CONTRACTORS OR SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING SEDIMENT IN THE DETENTION POND AND ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS IN CONJUNCTION WITH THE STABILIZATION OF THE SITE.
18. ON-SITE & OFFSITE SOIL STOCKPILE AND BORROW AREAS SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION THROUGH IMPLEMENTATION OF BEST MANAGEMENT PRACTICES. STOCKPILE AND BORROW AREA LOCATIONS SHALL BE NOTED ON THE SITE MAP AND PERMITTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS.
19. SLOPES CONSISTING OF TOPSOIL, CLAY, OR SILT SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.
20. DUE TO THE GRADE CHANGES DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION AND SEDIMENT CONTROL MEASURES (SILT FENCES, ETC.) TO PREVENT EROSION AND POLLUTANT DISCHARGE.
21. CONTR5ACTOR RESPONSIBLE FOR MAINTAINING POSITIVE DRAINAGE. PONDING OF WATER WILL NOT BE ALLOWED ON SITE. IF NECESSARY, CONTRACTOR TO PROVIDE TEMPORARY SWALES OR PUMPING IN LOW POINT SUMP CONDITIONS UNTIL THE INSTALLATION OF STORM SEWER.

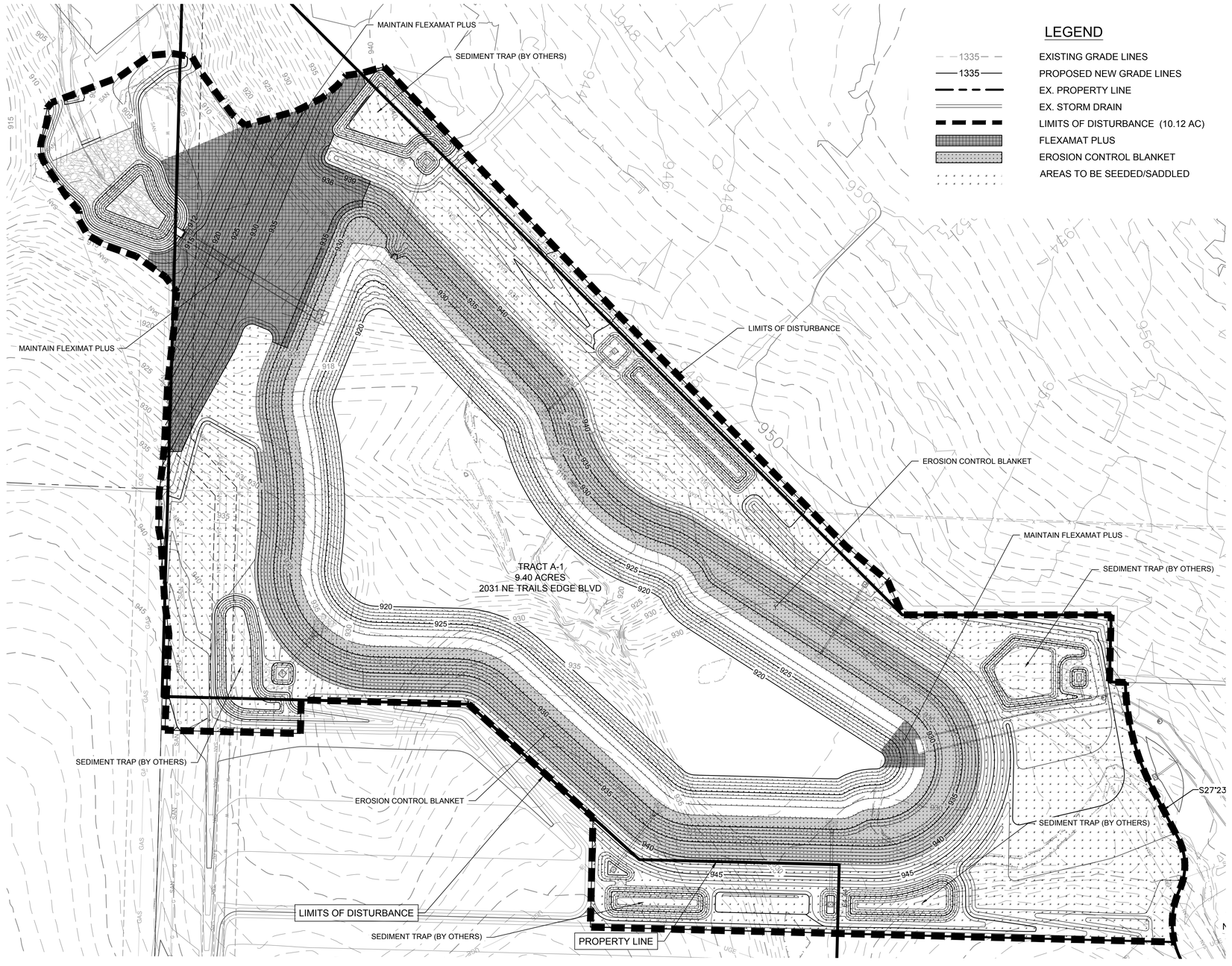
EROSION CONTROL & MAINTENANCE PLAN NOTES:

ALL MEASURES STATED ON THIS SITE MAP, AND IN THE STORMWATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

1. AT A MINIMUM, THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS FOR GOOD HOUSEKEEPING, SPILL CONTROL AND EROSION AND SEDIMENT CONTROL AS SPECIFIED IN THE KANSAS CITY METROPOLITAN CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION SECTION 2150.
2. INLET PROTECTION DEVISED AND BARRIERS SHALL BE REPAIRED OR REPLACED IN THEY SHOWN SIGNS OF UNDERMINING OR DETERIORATION.
3. ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED, AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
4. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHED ONE-THIRD THE HEIGHT OF THE SILT FENCE.
5. THE CONSTRUCTION EXITS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP D4RESSING OF THE CONSTRUCTION EXITS AS CONDITIONS DEMAND.
6. THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AREA AS CONDITIONS DEMAND.
7. DRAINAGE SWALES WITH SLOPES STEEPER THAN 15% SHALL BE INSPECTED AFTER EACH RAINFALL EVENT. THESE CHANNELS AND SLOPES SHOULD BE TREATED WITH EROSION CONTROL FABRIC. IF THE CHANNELS OR SLOPES SHOW ANY SIGNS OF FAILURE, COORDINATE WITH THE ENGINEER TO DEVELOP A PLAN TO RE-STABLIZE THE FAILED AREA.

GRADING NOTES:

1. ALL TREES OUTSIDE OF LIMITS OF DISTURBANCE SHALL REMAIN. ONLY THOSE TREES WITHIN LIMITS OF DISTURBANCE THAT AREA IN THE AREA TO BE GRADED SHALL BE REMOVED.
2. ALL TOPSOIL, VEGETATION, ROOT STRUCTURES, AND DELETERIOUS MATERIALS SHALL BE STRIPPED FROM THE GROUND SURFACE PRIOR TO THE PLACEMENT OF EMBANKMENTS. CONTRACTOR SHALL OBTAIN THE ON-SITE GEOTECHNICAL REPRESENTATIVE'S ACCEPTANCE OF THE EXISTING GROUND SURFACE MATERIALS AND THE PROPOSED FILL MATERIAL PRIOR TO THE PLACEMENT OF FILL.
3. ALL PROPOSED CONTOUR LINES AND SPOT ELEVATIONS SHOWN ARE FINISH GRADE ELEVATIONS. CONTRACTOR SHALL ACCOUNT FOR PAVEMENT DEPTHS, BUILDING PADS, TOPSOIL, ETC. WHEN GRADING THE SITE.
4. ALL DISTURBED AREAS THAT SHALL BE FINISH GRADED WITH A MINIMUM OF FOUR INCHES OF TOPSOIL.
5. FINISHED GRADES SHALL NOT BE STEEPER THAN 3:1.
6. ALL GRADING WORK SHALL BE CONSIDERED UNCLASSIFIED. NO ADDITIONAL PAYMENTS SHALL BE MADE FOR ROCK EXCAVATION. CONTRACTOR SHALL SATISFY HIMSELF AS TO ANY ROCK EXCAVATION REQUIRED TO ACCOMPLISH THE IMPROVEMENTS SHOWN HEREIN.



LEGEND

- EXISTING GRADE LINES
- PROPOSED NEW GRADE LINES
- EX. PROPERTY LINE
- EX. STORM DRAIN
- LIMITS OF DISTURBANCE (10.12 AC)
- FLEXAMAT PLUS
- EROSION CONTROL BLANKET
- AREAS TO BE SEEDED/SADDLED

SEQUENCE OF CONSTRUCTION:

SITE IMPROVEMENTS CONSIST OF GRADING OPERATIONS, ALONG WITH RE-ACTIVATING OF AN EXISTING SEDIMENT TRAP. WORK SHALL BE CONDUCTED AS FOLLOWS:

1. SEED AND/OR SOD ALL DISTURBED AREAS ONCE FINISHED GRADE HAS BEEN ACHIEVED. MAINTAIN SILT FENCE AND INLET PROTECTION UNTIL VEGETATIVE COVER HAS BEEN ESTABLISHED OVER 70% OF THE TOTAL DISTURBED AREA.
2. AS ALL DISTURBED AREAS ARE STABLIXED WITH VEGETATIVE COVER. STORM SEWER INLET PROTECTION, SILT FENCE, AND SEDIMENT TRAP CAN BE REMOVED UPON CITY INSPECTION AND APPROVAL. ENSURE ENTIRE SITE IS STABLIZED PRIOR TO DEACTIVATION ON EROSION CONTROL.

REFERENCE APPROVED MASS GRADING & EROSION AND SEDIMENT CONTROL PLANS FOR DISCOVERY PARK - ZONE 1 & ARIA APARTMENTS FOR EX. SEDIMENT BASINS AND TEMPORARY CONSTRUCTION ENTRANCE LOCATION ALONG NW COLBERN ROAD.

N

1"=50'

50' 0 25' 50'

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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

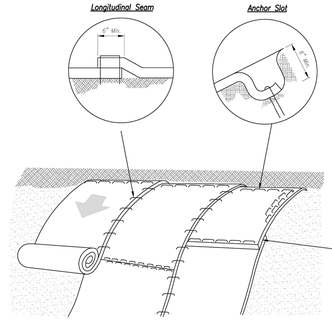
SHEET TITLE

ESC - PHASE III

SHEET NUMBER

C302

8 OF 9



Installation on Slopes

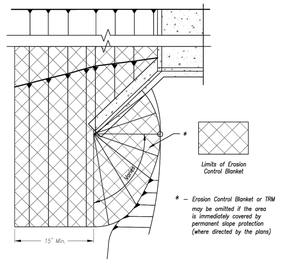
Splice Seam

General Notes:

1. APWA Specifications 2150 and Design Guidance 5100 shall be referenced to select type of blanket or mat to be used.
2. Typical anchors and pattern/spacing shall be installed according to the manufacturers instructions.
3. LONGITUDINAL SEAMS: The edges of the blanket or mat should overlap each other a minimum of 6 inches, with anchors catching the edges of both blankets.

Maintenance:

1. Torn or degraded product shall be repaired or replaced, unless such degradation is within the functional longevity specified by the manufacturer.
2. Edges or seams that are loose or frayed shall be secured.



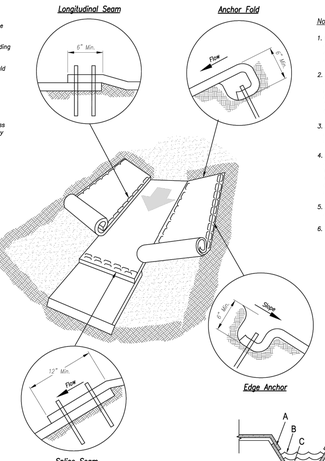
Partial Box Culvert Plan
Not to Scale

– Erosion Control Blanket or TRM may be omitted if the area is immediately covered by permanent slope protection (where directed by the plans)

Installation Around Culvert Slope

Notes for Installation on Slopes:

1. Erosion Control Blankets and TRMs shall be laid in the direction of the slope. In order for blanket to be in contact with the soil, lay blanket loosely, avoiding stretching.
2. ANCHOR SLOTS: The top of the blanket should be "slotted in" at the top of the slope and anchored in place with anchors 6 inches apart. The slots should be 6 inches wide x 6 inches deep with the blanket anchored in the bottom of the slot, then backfilled, tamped and seeded.
3. SPLICE SEAM: When splices are necessary, overlap end a minimum of 6 inches in direction of water flow. Stagger splice seams.
4. TERMINAL FOLD: The bottom edge of the blanket shall be turned under a minimum of 4 inches, then anchored in place with anchors 9 inches apart.



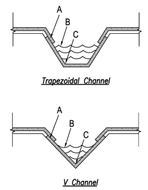
Splice Seam

Edge Anchor

Installation in Channels

Notes for Installation in Channels:

1. Erosion Control Blankets and TRMs shall be laid in the direction of the flow, with the first course at the centerline of channel, where applicable. In order for the mat to be in contact with the soil, lay the mat loosely, avoiding stretching.
2. ANCHOR FOLD: The top of the mat should be folded under, buried and secured with wood or other approved anchors placed 6 inches apart. The top edge of the mat should be buried in a slot 6 inches wide x 6 inches deep, anchored in the bottom of the slot, backfilled, and the mat folded over the top as shown in detail.
3. SPLICE SEAM: When splices are necessary, overlap end a minimum of 12 inches in direction of water flow. Stagger splice seams.
4. CHECK SLOTS: Establish check slots transverse to slope every 30 feet. The slots should be 6 inches wide x 6 inches deep. The mat shall be cut to a length 12 inches beyond the slot. The top of the downstream mat shall be slotted in, secured and buried similar to the edge anchor fold. The upstream mat shall then cover the slot and be anchored as shown.
5. EDGE ANCHORS: Lay outside edge of mat into trench at top of the slope and anchor.
6. TERMINUS: The bottom edge of the mat shall be anchored.



Trapezoidal Channel

V Channel

Critical Points:

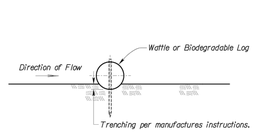
A – Overlaps and seams;

B – Projected water line;

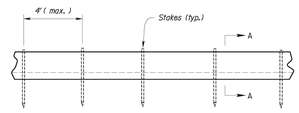
C – Channel bottom / side slope vertices;

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA American Public Works Association	KANSAS CITY METRO CHAPTER
EROSION CONTROL BLANKETS AND TURF REINFORMENT MATS	STANDARD DRAWING NUMBER ESC-02 ADOPTED: 10/24/2016



Section A–A



Typical Elevation

Notes for Wattles and Biodegradable Log Slope Protection:

1. The Slope barriers shall be placed along contour lines, with a short section turned upgrade at each end of the barrier. The maximum length of the slope barrier shall not exceed 250 feet, and the barrier ends need to be staggered.
2. Install wattles and biodegradable logs per manufacturer's instructions.
3. Spacing of stakes per manufacturer's instructions with 4' max. spacing. Length of stakes shall be a minimum of 2 times the diameter of the log with minimum of 24".

WATTLES AND BIODEGRADABLE LOG

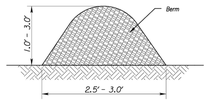


Figure 1
(Perimeter Control)

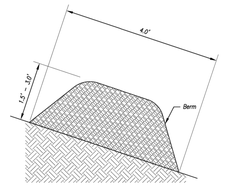


Figure 2
(Steep Slopes)

Notes for Mulch and Compost Filter Beam:

1. The sediment control berm shall be placed uncompacted in a windrow at locations shown on the plans or as directed by the engineer.
2. Parallel to the base of the slope, or around the perimeter of other affected areas, construct a 1 to 3 foot high by 2.5 to 3 foot wide berm (see Figure 1). For maximum water treatment ability or for steep slopes, construct a 1.5 to 3 foot high trapezoidal berm that is a minimum of 4 feet wide at the base (see Figure 2). In extreme conditions, or where specified by the engineer, a second berm shall be constructed at the top of the slope. Engineer will specify berm requirements.
3. If berm is to be left as permanent or part of the natural landscape, the compost berm may be seeded during application for permanent vegetation.
4. Do not use compost or wood mulch berms in any runoff channels or concentrated flow areas.
5. Wood mulch shall consist of tree and shrub debris resulting from clearing and grubbing and shall be ground by the mechanical means such as a chipper, hammermill, tub grinder or other approved method. Mulch sizing varies with a maximum width of 2" and a maximum length of 10".

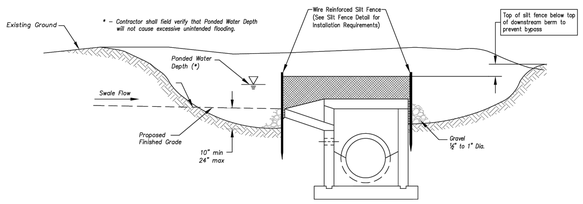
Maintenance for Mulch and Compost Filter Beam:

1. Berm shall be reshaped and material added as necessary to maintain function and dimensions.
2. Breaches in the berm shall be repaired promptly.

MULCH OR COMPOST FILTER BERMS

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA American Public Works Association	KANSAS CITY METRO CHAPTER
WATTLES/BIODEGRADABLE LOG AND MULCH/COMPOST FILTER BERM	STANDARD DRAWING NUMBER ESC-04 ADOPTED: 10/24/2016



Section A–A
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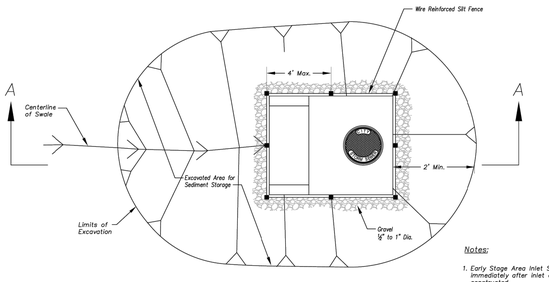
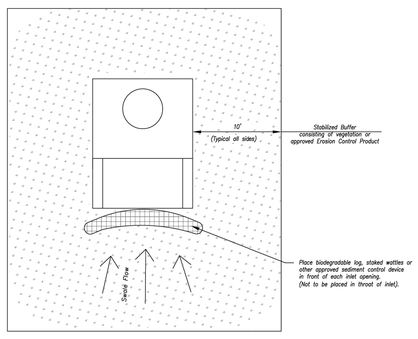
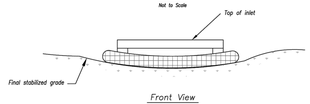


Plan
Not to Scale

EARLY STAGE AREA INLET
(All open boxes and inlets not at final grade)



Plan
Not to Scale



Front View

LATE STAGE AREA INLET
(Area inlets at final grade and existing inlets)

Notes:

1. Early Stage Area Inlet Sediment Barrier to be installed immediately after inlet or junction box is constructed.
2. Silt fence shall remain in place until excavated area is removed and Late Stage Area Inlet is being installed.
3. Backfill excavated area ONLY after final grading of the site. Stabilization of the site is to immediately follow.
4. Wire reinforced silt fence may be used in place of silt fence attached to wood frame.

Maintenance:

1. Remove deposited sediment from excavated storage areas when available storage has been reduced by 20%.
2. Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible.
3. Repair or replace as necessary to maintain function and integrity of installation.

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA American Public Works Association	KANSAS CITY METRO CHAPTER
AREA INLET AND JUNCTION BOX PROTECTION	STANDARD DRAWING NUMBER ESC-07 ADOPTED: 10/24/2016

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Overland Park, KS 66210
816.777.0400
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MASS GRADING & EROSION CONTROL PLANS - THE VILLAGE AT DISCOVERY PARK ZONE 1

NW COLBERN RD & NE DOUGLAS ST
LEE'S SUMMIT, MO

REVISIONS

NO.	DESCRIPTION	DATE
1	INITIAL SUBMISSION	06/20/2024

DRAWING INFORMATION

PROJECT NO: 24KC10025
DRAWN BY: JGD
CHECK BY: JWB
ISSUED DATE: 6/19/2024
FIELD BOOK:

STATE OF MISSOURI
JEFFREY W. BARTZ
NUMBER PE-2012022594
06/20/2024
PROFESSIONAL ENGINEER

ISSUED BY:
LICENSE NO:

A licensed Missouri Engineering Corporation COA# 00062

SHEET TITLE

ESC DETAILS - 1

SHEET NUMBER

C400

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