



STORMWATER DRAINAGE REPORT

FAIRVIEW CROSSING NORTH SMITHVILLE, CLAY COUNTY, MISSOURI

Prepared for:

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KVE B20D4001

Initial Submittal: December 16, 2022

STORMWATER DRAINAGE REPORT

**1601 NORTH US HIGHWAY 169
SMITHVILLE, MISSOURI
Project No. B20D4001**

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INTRODUCTION

Kaw Valley Engineering, Inc. on behalf of our client, Kansas City Properties & Investments LLC, has prepared this Storm Drainage Report to evaluate the impact of a multipurpose commercial development on parcel #05917000700800 in Smithville, Clay County, Missouri. The proposed development is planned to consist of commercial buildings with approximately 39,000 SF of leasable space. The site is located southeast of the US-169 Commercial Avenue intersection. It is bound by South Commercial Street on the north, by residential property on the east, by commercial property to the south, and by US Highway 169 to the west. A project vicinity map is provided below in figure 1.



Figure 1: Project Vicinity Map

METHOD OF ANALYSIS

This report evaluates and compares the stormwater runoff for the existing and proposed conditions for proposed development. The analysis was performed in accordance with the requirements of the 2011 edition of APWA 5600, *Storm Drainage Systems & Facilities*. The storm runoff for the project site was analyzed for a 2-year, 10-year, and 100-year return events for existing and proposed conditions using PondPack software and the SCS Runoff Curve Number method. A Type II 24-hour rainfall distribution was applied to the site. Precipitation depths of 3.5 inches, 5.3 inches, and 7.8 inches were used for the 2-year, 10-year, and 100-year return storms, respectively.

SCS Curve Numbers for the drainage areas to be used in the calculations are identified within the data tables. This number was based upon the percentage of impervious and pervious surfaces as specified in section 5600 of APWA. It was assumed that pervious surfaces have a CN of 75 and impervious surfaces have a CN value of 98. Storm water detention within the detention ponds was modeled in PondPack V8i for SCS Type II storm events. Input data and calculated results for each storm event can be found in Exhibit I.

BMP Calculations were performed according to the October 2012 edition of APWA/MARC *Manual of Best Management Practices for Stormwater Quality*.

EXISTING CONDITION

The site is located within the Little Platte River watershed. Drainage across the site currently consists of overland flow draining to the south. Once offsite, drainage flows into Wilkerson Creek and is eventually conveyed into the Little Platte River. For this study, the total drainage area analyzed was approximately 9.6 acres and is shown in Exhibit A. For the purposes of analysis, the total drainage area was divided per direction of flow. Drainage areas are as follows in Table 1.

Existing onsite is approximately 7.28 acres, and most of the drainage area consist of undeveloped green space. A parking lot exists near the northwest corner of the area. It has a runoff coefficient of 0.39 and SCS Curve Number of 78. After delineating the watershed, the time of concentration was determined to be 9.2 minutes.

Existing offsite is approximately 2.338 acres, and its land use is categorized as Commercial. It has a runoff coefficient of 0.37 and SCS Curve Number of 78. After delineating the watershed, the time of concentration was determined to be 6.5 minutes.

Table 1: C & CN Values for Existing Drainage Areas

Existing Conditions						
Existing	Area (ft ²)	Acres	Pervious Area (ft ²)	Impervious Area (ft ²)	C	CN
Ex Onsite	316,885	7.275	269,271	47,614	0.39	78
Ex Offsite	101,847	2.338	89,693	12,154	0.37	78
Total	418,732	9.61	358,964	59,768	0.39	78

Table 2 below shows a listing of each drainage area and calculations for each corresponding time of concentration.

Table 2: Existing Time of Concentration Calculations

		Time of Concentration (Existing)								
		(T _i) Overland Flow Time			T _i =1.8(1.1-C)(D ^{0.5})/S ^{0.5} (1/3)			(T _r) Shallow Concentrated Flow (V from US SCS 1975b)		
		Runoff Coeff.	Distance	Slope	Travel Time	Flow Velocity (by Manning)		Channelized Length	Travel Time	Calc. Total Time
Drainage Area	Acres	C	D (<100')	S (%)	T _i (min)	V (ft/s)		L (ft)	T _r (min)	T _c (min)
Ex Onsite	7.27	0.39	100	4.2	7.92	10		760	1.27	9.19
Ex Offsite	0.93	0.37	100	13	5.59	10		530	0.88	6.47

Table 3 below shows an analysis of stormwater runoff generated in the existing condition.

Table 3: Existing Stormwater Calculations

Existing Conditions							
Existing	Acres	Pervious Area (ft ²)	Impervious Area (ft ²)	CN	Qmax(2yr) cfs	Qmax(10yr) cfs	Qmax(100yr) cfs
Ex Onsite	7.275	269,271	47,614	78	16.35	31.84	61.40
Ex Offsite	2.338	89,693	12,154	78	5.28	10.57	21.20
Total	9.61	358,964	59,768	78	21.63	42.41	82.60

The site lies outside of the 100 Year Flood Plain per the Flood Insurance Rate Map for Clay County, Missouri, as shown in Exhibit C.

The National Wetlands Inventory identifies several locations of riverine and freshwater pond locations in and around the site, some of which no longer exist. To the south, a pond once existed which emptied into a stream running east. Further south of the site, a stream drains from the west to the east. Current flows were delineated through the site using contours and aerial imagery and made a concerted effort to avoid these areas with development. See Exhibit E for complete mapping of the wetlands.

Soils as identified in the Custom Soil Resource Report for Clay County, Missouri for the site are presented in Exhibit D and includes the following in table 4:

Table 4: Hydrologic Soil Groups

Map unit symbol	Map unit name	Rating
10081	Macksburg silt loam, 5 to 9 percent slopes	C/D
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	C
10132	Sibley silt loam, 2 to 5 percent slopes	C
10142	Snead-Rock outcrop complex, 5 to 14 percent slopes	D

All soils within the site are of Hydrologic Soil Group C, D or C/D. Soil Group D contains soils that have a very slow infiltration rate and high runoff potential. Soil group C contains soils that have a slow infiltration rate when thoroughly wet.

PROPOSED CONDITION

Proposed improvements for the site will include 6 lots for mixed-use commercial buildings with associated parking. For the purposes of preliminary design, runoff coefficients and curve numbers for each proposed drainage area were obtained from classifications within USDA TR-55.

In the proposed condition all undisturbed areas reflect the same drainage areas characteristics as they were in the existing condition. Below is a listing of drainage areas within the area of disturbance that were modified by development.

Proposed On-Site Detained is approximately 6.66 acres, and its land use is categorized as Commercial. Per USDA TR-55, it has a runoff coefficient of 0.81 and SCS Curve Number of 95. After delineating the watershed, the minimum time of concentration of 5 minutes was used for calculations.

Proposed On-Site Bypass is approximately 0.62 acres, and its land use is categorized as Commercial. Per USDA TR-55, it has a runoff coefficient of 0.81 and SCS Curve Number of 95. After delineating the watershed, the minimum time of concentration of 5 minutes was used for calculations.

Proposed Off-Site Bypass is approximately 2.34 acres, and its land use is categorized as Commercial. Per USDA TR-55, it has a runoff coefficient of 0.41 and SCS Curve Number of 79. After delineating the watershed, the minimum time of concentration of 5 minutes was used for calculations.

Table 5 below shows a complete listing of all drainage areas analyzed in the proposed condition.

Table 5: C & CN Values for Proposed Drainage Areas

Proposed Conditions						
Proposed	Area (ft ²)	Acres	Pervious Area (ft ²)	Impervious Area (ft ²)	C	CN
Prop On-Site Det.	289,907	6.655	43,486	246,421	0.81	95
Prop On-Site Bypass	26,978	0.619	4,047	22,932	0.81	95
Prop Off-Site Bypass	101,847	2.338	82,979	18,868	0.41	79
Total	418,732	9.61	130,512	288,221	0.71	91

Comparing the difference in runoff coefficient and curve number values in both the existing and proposed condition shows an increase in both values. An increase in curve number leads to an increase in stormwater flow and volume. To mitigate this issue, KVE recommends the construction of a detention pond to reduce runoff to a level at or below predevelopment conditions. The pond will daylight downstream. Table 6 provides the addition time of concentration values that were used in proposed condition.

Table 6: Proposed Time of Concentration Calculations

Drainage Area	Acres	Time of Concentration [Proposed]							Calc. Total Time	Tc(min)
		(Ti) Overland Flow Time			(Ti) Shallow Concentrated Flow (V from US SCS 1975b)					
		Runoff Coeff.	Distance	Slope	Travel Time	Flow Velocity (by Manning)	Channelized Length	Travel Time		
	C	D (<100')	S (%)	Ti (min)	V (ft/s)	L (ft)	Ti (min)			
Prop On-Site Det.	6.66	0.81	100	1.8	4.29	10	115	0.19	4.48	4.5
Prop On-Site Bypass	0.62	0.81	35	22	1.10	10	0	0.00	1.10	1.1
Prop Off-Site Bypass	2.34	0.41	100	2	9.84	10	28	0.05	9.89	9.9

Detention

The pond shown in Exhibit B has been designed to provide the necessary detention and to serve as a BMP to improve stormwater quality. The pond will have a bottom elevation of 913.00 and a maximum elevation of 927.00. The primary outlet will consist of a 24" diameter standpipe with several orifices designed to control flows for the 2-Year, 10-Year, and 100-Year storms. Beginning at elevation 913.00, there will be one 2.5" diameter orifice, at elevation 917.50, there will be two 10" orifices, and at elevation 920.90 there will be two 15" orifices. The top of the standpipe will extend up to elevation 922.50. An emergency spillway will be constructed within the pond, incorporating a trapezoidal weir with a crest elevation of 924.33 which is 0.5' higher than the maximum 100-year water surface elevation as required by APWA 5600. From there, additional storage is provided in the event the primary outlet becomes clogged or a subsequent 100-year storm occurs before there is adequate time to drain. The maximum storm water elevation under this condition is 925.95 which provides 1.05' of additional freeboard before overtopping and conforms to emergency spillway criteria.

Storage elevations and volumes for all design storms are shown in Table 7.

Table 7: Detention Pond Water Surface Elevations

Detention Pond WSE (ft)			
	Storm Event		
	2-Year	10-Year	100-Year
Surface EL	920.94	922.44	923.83
Storage (cf)	32,246	44,632	58,461

The volume to be detained for WQv 90% Mean Annual Storm of 1.37" was determined to be 28,584 cf. The bottom orifice of the pond outlet structure can store and release runoff from the Mean Annual Storm within 40-72 hours.

Table 8 is an analysis of the proposed stormwater conditions.

Table 8: Proposed Stormwater Calculations

Proposed Conditions							
Proposed	Acres	Pervious Area (ft ²)	Impervious Area (ft ²)	CN	Qmax(2yr) cfs	Qmax(10yr) cfs	Qmax(100yr) cfs
Prop On-Site Det.	6.655	43,486	246,421	95	9.58	22.88	48.33
Prop On-Site Bypass	0.619	4,047	22,932	95	2.75	4.30	7.05
Prop Off-Site Bypass	2.338	82,979	18,868	79	5.96	11.60	22.39
Total	9.61	130,512	228,453	91	15.54	34.48	77.77

With construction of the detention pond and its release structures, stormwater flow leaving the site will be decreased as shown in Table 9.

Table 9: Comparison of Pre-development vs. Post-development Runoff

	CN	Qmax(2yr) cfs	Qmax(10yr) cfs	Qmax(100yr) cfs
Existing	78	21.63	42.41	82.60
Proposed	91	15.54	34.48	77.77
Difference	13	-6.09	-7.93	-4.83

BMP CALCULATIONS

Following the APWA/MARC BMP Manual as a previously developed site, the required level of service was found to be 5.9 with a minimum total value rating of 45. To meet this requirement, the proposed detention pond will be used to improve stormwater quality. Native vegetation inhabits the natural stream that exists directly downstream of the site. The detention pond and native vegetation will treatment train together to provide a value rating of 7. This leads to a total value rating of 46 which exceeds the requirement. BMP calculations can be found in Exhibit G.

SUMMARY AND RECOMMENDATION

This Storm Drainage Report addresses the storm water impacts from the development and meets the requirements of the City of Smithville. As outlined in this Storm Drainage Report KVE recommends the following:

- Construction of a dry detention basin to decrease stormwater rate leaving the site. It will also serve as a BMP mechanism to improve stormwater quality. Preserved native vegetation directly downstream of the site will treatment train with the basin to meet the required weighted Value Rating.

Respectfully Submitted,
Kaw Valley Engineering, Inc.

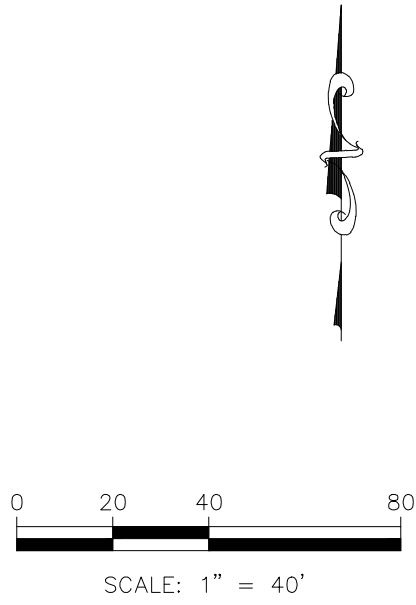


Aaron R. Moore, EIT
Staff Engineer

Matthew A. Cross, P.E.
Project Manager

Exhibit A

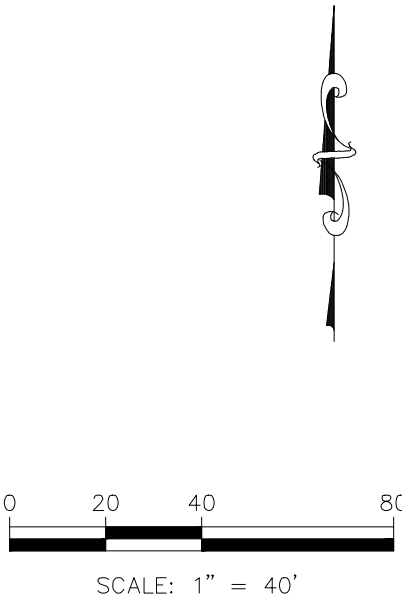
EXISTING CONDITIONS AND DRAINAGE AREA MAP



1601 N. US HIGHWAY 169 1601 N. US HIGHWAY 169 SMITHVILLE, MO		STORMWATER CALCULATIONS EXISTING DRAINAGE AREA MAP		REV	DATE	DESCRIPTION	DSN	DWN	CHK
B20D4001		B20D4001		INLET CALCS		SHEET		REV	
DESIGNER		DRAWN BY		CFN		SHEET		REV	
ARM		JAD		INLET CALCS		SHEET		REV	
EXISTING									
KAW VALLEY ENGINEERING		KAW VALLEY ENGINEERING		KAW VALLEY ENGINEERING, INC. IS AUTHORIZED TO OFFER ENGINEERING SERVICES BY MISSOURI STATE CERTIFICATE OF AUTHORITY # 000842.		KAW VALLEY ENGINEERING		KAW VALLEY ENGINEERING	
8040 N. OAK TRAILWAY KANSAS CITY, MISSOURI 64118 PH: (816) 451-1100 FAX: (816) 451-6651 kce@kvweng.com www.kvweng.com		MATTHEW A. CROSS ENGINEER MO # 2020008364							
© 2022 Microsoft Corporation © 2022 Maxar ©CNES (2022) Distribution Airbus DS									

Exhibit B

PROPOSED CONDITIONS AND DRAINAGE AREA MAP



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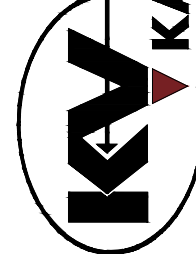
PROPOSED		REV	DATE	DESCRIPTION	DSN	DWN	CHK
STORMWATER CALCULATIONS PROPOSED DRAINAGE AREA MAP							
1601 N. US HIGHWAY 169 1601 N. US HIGHWAY 169 SMITHVILLE, MO		MATTHEW A. CROSS ENGINEER MO # 2020008364					
8040 N. OAK TRAFFICWAY KANSAS CITY, MISSOURI 64118 PH: (816) 488-1234 FAX: (816) 488-6651 lic@kvweng.com www.kvweng.com		 K&W VALLEY ENGINEERING K&W VALLEY ENGINEERING, INC. IS AUTHORIZED TO OFFER ENGINEERING SERVICES BY MISSOURI STATE CERTIFICATE OF AUTHORITY # 000842. EXPIRES 12/31/23					
PROJ. NO. B20D4001		DESIGNER ARM					
CFN		DRAWN BY JAD					
SHEET		INLET CALCS					
		REV					

Exhibit C

FEMA FIRMETTE

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 NAD 1983 State Plane Missouri West, zone 2403. The **Horizontal datum** was NAD 83, GRS1980 spheroid. Differences in datum, spheroid, or projection 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, NNGS12
National Geodetic Survey
SSMC-3, #5202
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 provided in digital format by the U.S. Farm Service Agency National Agriculture Imagery Program (NAIP), dated summer 2010, and by the U.S. Geological Survey Digital Orthophoto Quadrangles, dated 1993 and later, produced at a scale of 1:24000.

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 may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unreviewed streams may differ from what is shown on previous maps.

The "profile base lines" 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 base line," in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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.

Contact the **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FMIX) at 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp/>.

94° 35' 37.5"

39° 22' 30"

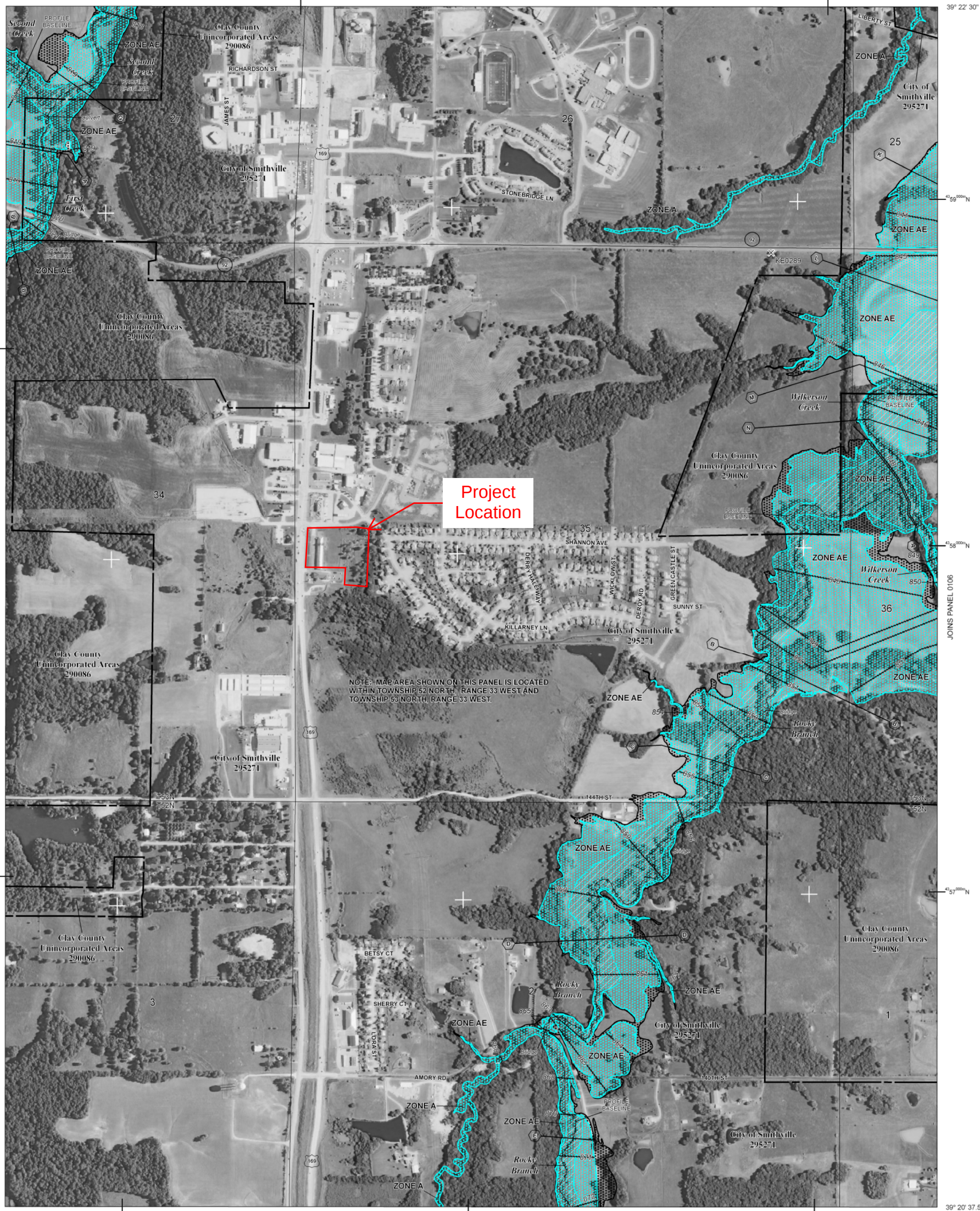
1165000 FT

JOINS PANEL 0101

1160000 FT

39° 20' 37.5"

94° 35' 37.5"



Project Location

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 52 NORTH, RANGE 33 WEST AND TOWNSHIP 53 NORTH, RANGE 33 WEST.

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, AP9, 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 Area 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 AP9 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 Y 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
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
CBRS and OPA boundary
International, State, or County boundary
Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
Area Not Included boundary
Military Reservation, Native American Lands boundary
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

MAP REPOSITORIES

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

August 3, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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

PANEL 0102E

FIRM

FLOOD INSURANCE RATE MAP

CLAY COUNTY, MISSOURI AND INCORPORATED AREAS

PANEL 102 OF 350
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLAY COUNTY	290086	0102	E
SMITHVILLE, CITY OF	295271	0102	E

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
29047C0102E

EFFECTIVE DATE
AUGUST 3, 2015

Exhibit D

USDA SOILS REPORT



United States
Department of
Agriculture

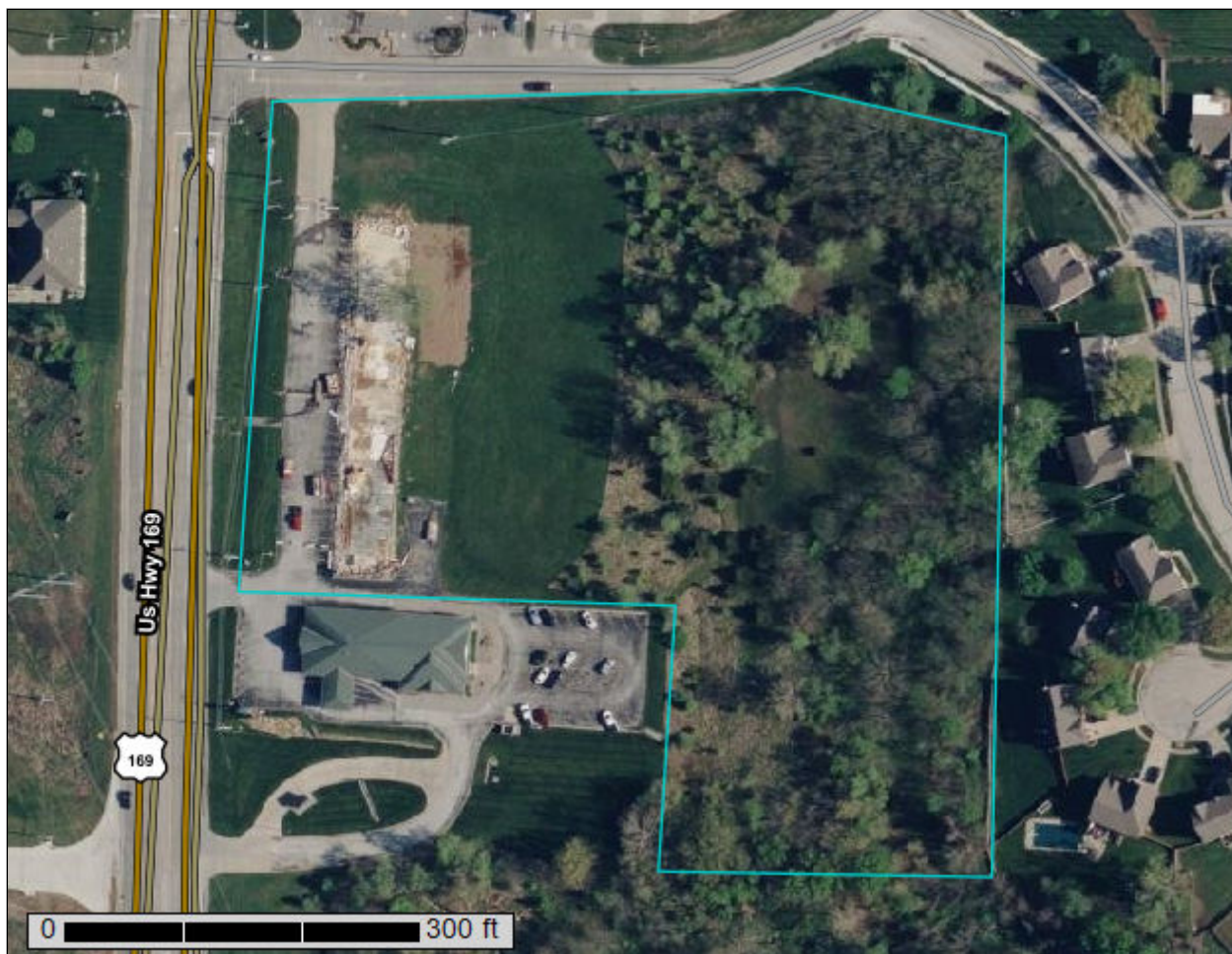
NRCS

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 **Clay County, Missouri**

1601 N US Highway 169



November 23, 2022

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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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

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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.

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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: Clay County, Missouri
Survey Area Data: Version 23, Aug 30, 2022

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

Date(s) aerial images were photographed: Apr 26, 2021—Apr 29, 2021

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
10081	Macksburg silt loam, 5 to 9 percent slopes	4.0	52.7%
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	2.8	37.0%
10132	Sibley silt loam, 2 to 5 percent slopes	0.2	2.7%
10142	Snead-Rock outcrop complex, 5 to 14 percent slopes	0.6	7.6%
Totals for Area of Interest		7.6	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.

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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.

Clay County, Missouri

10081—Macksburg silt loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qkz7

Elevation: 700 to 1,390 feet

Mean annual precipitation: 33 to 41 inches

Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 175 to 220 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Macksburg and similar soils: 90 percent

Minor components: 10 percent

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

Description of Macksburg

Setting

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Crest

Down-slope shape: Convex

Across-slope shape: Concave

Parent material: Loess

Typical profile

A - 0 to 19 inches: silt loam

Bt1 - 19 to 37 inches: silty clay loam

Bt2 - 37 to 60 inches: silty clay loam

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 18 to 24 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: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

Ecological site: R107XB007MO - Loess Upland Prairie

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

Minor Components

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: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

Sharpsburg

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: Linear
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

10122—Sharpsburg silt loam, 5 to 9 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2yy7x
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: Farmland of statewide importance

Map Unit Composition

Sharpsburg, eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg, Eroded

Setting

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

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 8 inches: silty clay loam

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Bt1 - 8 to 18 inches: silty clay loam
Bt2 - 18 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: 5 to 9 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): 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 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

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

10132—Sibley silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ql0d
Elevation: 760 to 1,440 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 49 to 55 degrees F
Frost-free period: 155 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sibley and similar soils: 95 percent
Minor components: 5 percent

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

Description of Sibley

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

Ap1 - 0 to 11 inches: silt loam
Ap2 - 11 to 18 inches: silt loam
Bt - 18 to 49 inches: silty clay loam
C - 49 to 72 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 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: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

Minor Components

Higginsville, eroded

Percent of map unit: 3 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

Macksburg

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear

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Across-slope shape: Linear
Ecological site: R108XD8601A - Loess Upland Prairie
Hydric soil rating: No

10142—Snead-Rock outcrop complex, 5 to 14 percent slopes

Map Unit Setting

National map unit symbol: 2zccq
Elevation: 720 to 1,120 feet
Mean annual precipitation: 37 to 41 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 175 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Snead 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

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: flaggy 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 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
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

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

Armster, eroded

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: Convex
Ecological site: R109XY046MO - Till Upland Savanna
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: No

Ladoga, eroded

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

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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 (1601 N US Highway 169)

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.

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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.

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Map—Hydrologic Soil Group (1601 N US Highway 169)



Custom Soil Resource Report

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)

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Soil Survey Area: Clay County, Missouri
Survey Area Data: Version 23, Aug 30, 2022

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Date(s) aerial images were photographed: Apr 26, 2021—Apr 29, 2021

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Table—Hydrologic Soil Group (1601 N US Highway 169)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10081	Macksburg silt loam, 5 to 9 percent slopes	C/D	4.0	52.7%
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	C	2.8	37.0%
10132	Sibley silt loam, 2 to 5 percent slopes	C	0.2	2.7%
10142	Snead-Rock outcrop complex, 5 to 14 percent slopes	D	0.6	7.6%
Totals for Area of Interest			7.6	100.0%

Rating Options—Hydrologic Soil Group (1601 N US Highway 169)*Aggregation Method: Dominant Condition**Component Percent Cutoff: None Specified**Tie-break Rule: Higher*

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Exhibit E

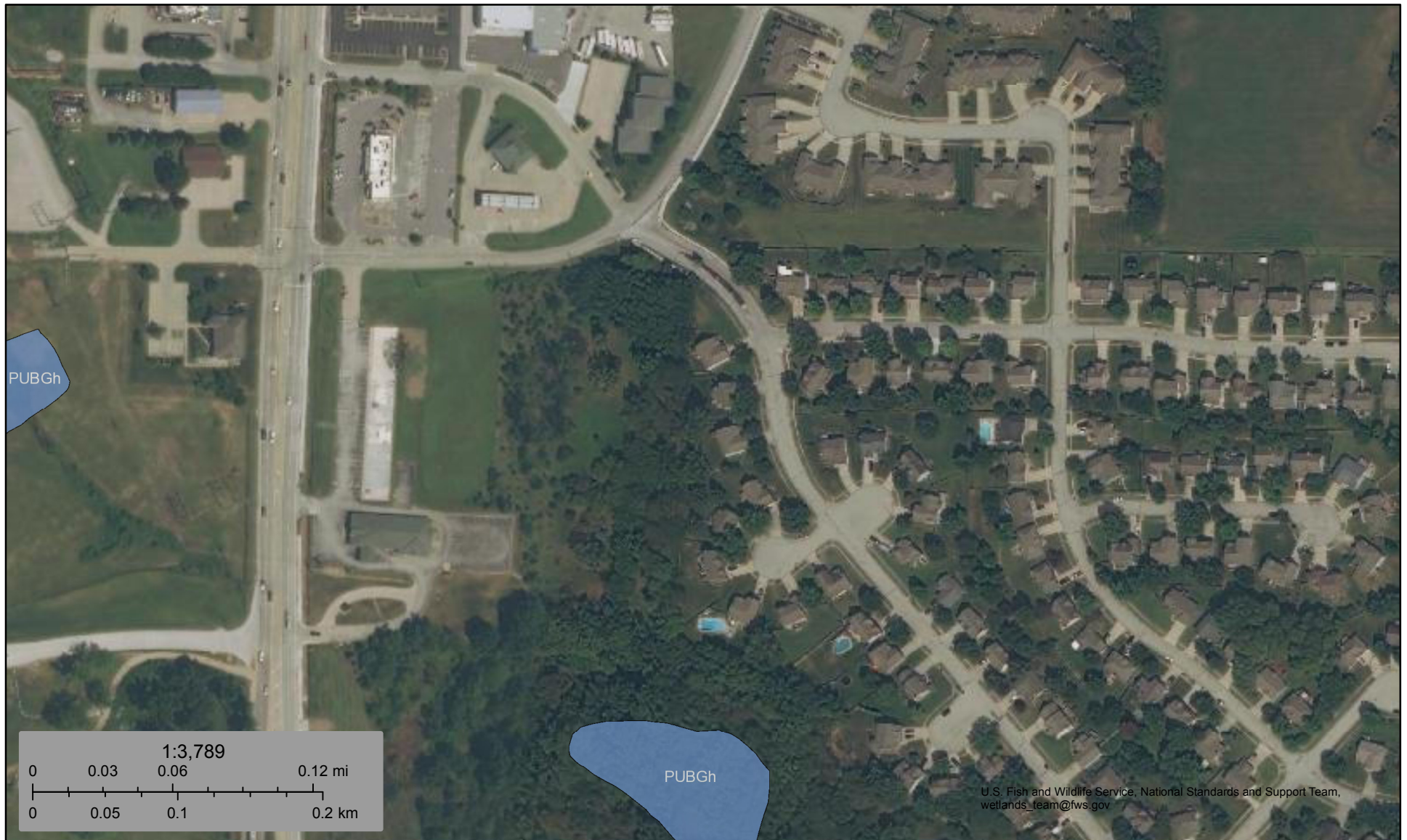
NATIONAL WETLANDS INVENTORY



U.S. Fish and Wildlife Service

National Wetlands Inventory

1601 N US Highway 169



November 23, 2022

Wetlands

	Estuarine and Marine Deepwater		Freshwater Emergent Wetland		Lake
	Estuarine and Marine Wetland		Freshwater Forested/Shrub Wetland		Other
			Freshwater Pond		Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Exhibit F

WATER QUALITY VOLUME CALCULATIONS

WQv Detention Calculations Utilizing TR55, Urban Hydrology for Small Watersheds - SCS Runoff Curve Number Method

Description	Variable	Quantity	Units	Formula	Reference
Disturbed Area	A	316,885	SF		delineated from site drawings
Impervious Area	Ai	269,353	SF		delineated from site drawings
Orifice Area	Ao	calc	in^2	$Qo / (Cd * (2 * g * hmax)^{0.5}) * 144$	hydraulics text
Pervious Area	Ap	47,533	SF		delineated from site drawings
Coefficient of Discharge	Cd	0.62			Hydraulics text. Sharp Edged Orifice
SCS Curve Number	CN	calc	-	$(Ai * 98 + Ap * 74) / (Ai + Ap)$	APWA Table 5602-3, weighted average
Orifice Diameter	d	calc	in	$2 * (A/pi)^{0.5}$	geometry text
Actual Retention after Runoff Begins	F	calc	in	$P - Q - Ia$	http://www.professorpatel.com/curve-number-introduction.html
Gravitational Constant	g	32.2	ft/s^2		physics text
Maximum Head for Detention System	hmax	3.48	ft.		Depth of head to detain quality storm
Initial Abstraction	Ia	calc	in	$0.2 * S$	TR-55. All losses before runoff begins
Rainfall. Potential maximum runoff	P	1.37	in		KCMO CSO Required Storm. TR-55
Actual Runoff from Rainfall	Q	calc	in	$(P - Ia)^2 / [(P - Ia) + S]$	TR-55
Required Flow Out of Detention Assuming a triangular rainfall hydrograph	Qo	calc	cfs	$2 * V / t$	hydrology text
Potential maximum retention after runoff begins	S	calc	in	$1000 / CN - 10$	TR-55
Actual detention time	T	calc	hours	$(2 * V / Q) / 3600$	
Minimum detention Time (40h)	tmin	144000	s		APWA
Volume of runoff from site	V	calc	cf	$(Q / 12) * A$	hydrology text

Step	Description	Variable	Formula	Value	units
1	Calculate composite Curve Number using 98 for 100% impervious and 74 per 100% impervious	CN=	$(Ai * 98 + Ap * 74) / (Ai + Ap)$	95	
2	Calculate potential maximum retention after runoff begins	S=	$1000 / CN - 10$	0.53	in
3	Calculate initial abstraction	Ia=	$0.2 * S$	0.11	in
4	Calculate runoff from the water quality storm	Q=	$(P - Ia)^2 / [(P - Ia) + S]$	0.89	in
5	Calculate actual retention after runoff begins. NOT USED ELSEWHERE IN CALCS.	F=	$P - Q - Ia$	0.37	in
6	Calculate volume of runoff from site	V=	$(Q / 12) * A$	23584	cf

WQV Orifice Sizing

40 h

Volume 26589 cf
time 144000 s
Cd 0.6
g 32.2 ft/s²
h 1.74 ft

$$2 \cdot V/t = C \cdot A \cdot (2 \cdot g \cdot h)^{0.5}$$

$$A = 0.058144 \text{ ft}^2 \quad 8.372742 \text{ in}^2$$

$$d = 3.265043 \text{ in}$$

*h=max head/2

72 h

Volume 26589 cf
time 259200 s
Cd 0.6
g 32.2 ft/s²
h 1.74 ft

$$V/t = C \cdot A \cdot (2 \cdot g \cdot h)^{0.5}$$

$$A = 0.032302 \text{ ft}^2$$

$$d = 2.433619 \text{ in}$$

Exhibit G

BMP CALCULATIONS

WORKSHEET 1A: REQUIRED LEVEL OF SERVICE - DEVELOPED SITE

Project: B20D4001

By: JED

Date: 12/14/2022

Location: Fairview Crossing North

Checked: ARM

Date: 12/15/2022

1. Required Treatment Area**A. Total Area Disturbed by Redevelopment Activity (ac.)**

Disturbed Area Description	Acres
Pervious Surface	5.58
Impervious Surface	1.37
Offsite Disturbed Pervious Surface	2.058
"1A" Total:	9.01

B. Existing Impervious Area Inside Disturbed Area (ac.)

Existing Impervious Area Description	Acres
Parking lot and drive	1.09
Bank drive	0.28
"1B" Total:	1.37

C. Required Treatment Area (ac.)

"1A" Total Less "1B" Total

"1C" 7.638**2. Percent Impervious in Postdevelopment Condition and Level of Service (LS)****A. Total Postdevelopment Impervious Area Inside Disturbed Area (ac.)**

Postdevelopment Impervious Area Description	Acres
Parking Lots, Buildings, and Streets	3.500
Bank Drive	0.28
"2A" Total:	3.780

B. Existing Impervious Area Inside Disturbed Area (ac.)**"1B" Total: 1.370****C. Net Increase in Impervious Area (ac.)**

"2A" Total Less "1B" Total

"2C" 2.410**D. Percent Impervious**

Net Increase in Impervious Area/Required Treatment Area

"2C"/"1C" x 100 31.55**(Round to Integer) 63****E. Level of Service**

Use Percent Impervious to Enter Table 4.3

LS = 5.9**3. Minimum Required Total Value Rating of BMP Package**

Total Value Rating = LS x Required Treatment Area

VR = 45

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

Project: B20D4001

By: JED

Date: 12/14/2022

Location: Fairview Crossing North

Checked: ARM

Date: 12/15/2022

Sheet 1 of 1**1. Required LS (New Development, Wksht 1) or Total VR (Redevelopment, Wksht 1A):****45**

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

2. Proposed BMP Option Package No. 1

Cover/BMP Description	Treatment Area	VR from Table 4.4 or 4.6 ¹	Product of VR x Area
Dry Det. Basin+Native Vegetation	6.6	7	46.2
			0
			0
			0
			0
			0
Total²	6.60	Totals:	46.2

Weighted VR: = total product/total A¹ VR calculated for final BMP only in Treatment Train² Total treatment area cannot exceed 100 percent of the actual site area.

* Blank in Redevelopment

Meets required LS (Yes/No)?

YES

(If No, or if additional options are being tested, proceed below)

2. Proposed BMP Option Package No. 2

Cover/BMP Description	Treatment Area	VR from Table 4.4 or 4.6 ¹	Product of VR x Area
			0
			0
			0
			0
			0
			0
Total²	0	Totals:	0

Weighted VR: **N/A** = total product/total A¹ VR calculated for final BMP only in Treatment Train² Total treatment area cannot exceed 100 percent of the actual site area.

* Blank in Redevelopment

Meets required LS (Yes/No)?

N/A

(If No, or if additional options are being tested, proceed below)

EXHIBIT H

RIP RAP CALCULATIONS

D50 Calculations $D50 = (0.02/TW)(Q/D)^{4/3}$								
Outlet Structure	Q100 (exit	TW (flow depth of pipe		D (pipe dia.)		D (median rock size) ca		d50 actual
	cfs	in	ft	in	ft	in	ft	in
D-1	55.8	16.17	1.35	24	2.00	15.07	1.26	14

Class	D50 (in)	D50 (mm)	Apron Length	Apron Depth
1	5	125	4D	3.5D50
2	6	150	4D	3.3D50
3	10	250	5D	2.4D50
4	14	350	6D	2.2D50
5	20	500	7D	2.0D50
6	22	550	8D	2.0D50

Shear Stress Calculations at Pipe Outlets

D1 Shear Stress = $\text{Gamma} * R * S$
Gamma = 62.4 #/cf
Hydraulic Radius R = 1.195 ft
S = Channel slope = 0.0821

Stress = 6.122033 psf

C1 Shear Stress = $\text{Gamma} * R * S$
Gamma = 62.4 #/cf
Hydraulic Radius R = 0.915 ft
S = Channel slope = 0.0462

Stress = 2.637835 psf

A1 Shear Stress = $\text{Gamma} * R * S$
Gamma = 62.4 #/cf
Hydraulic Radius R = 1.52 ft
S = Channel slope = 0.013

Stress = 1.233024 psf

All stresses are permissible for PP510GTR

EXHIBIT I

PONDPACK CALCULATIONS

1601 N US HWY 169, Smithville, MO

Project Summary

Title	1601 N US Highway 169, KCMO
Engineer	Matt Cross
Company	Kaw Valley Engineering
Date	12/9/2022

Notes

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1601 N US HWY 169, Smithville, MO

Subsection: User Notifications

User Notifications

Message Id	7
Scenario	Post-Development 100
Element Type	Catchment
Element Id	108
Label	Prop Off-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 2.8 % is greater than 1.5 %. Computed peak flow= 23.05 ft ³ /s Interp. peak flow= 22.39 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning
Message Id	7
Scenario	Post-Development 100
Element Type	Catchment
Element Id	107
Label	Prop On-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 1.6 % is greater than 1.5 %. Computed peak flow= 7.17 ft ³ /s Interp. peak flow= 7.05 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning
Message Id	7
Scenario	Post-Development 100
Element Type	Catchment
Element Id	95
Label	Prop On-Site Det.
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 1.6 % is greater than 1.5 %. Computed peak flow= 77.08 ft ³ /s Interp. peak flow= 75.83 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning
Message Id	7
Scenario	Post-Development 2
Element Type	Catchment
Element Id	108
Label	Prop Off-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 4.3 % is greater than 1.5 %. Computed peak flow= 6.22 ft ³ /s Interp. peak flow= 5.96 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning

1601 N US HWY 169, Smithville, MO

Subsection: User Notifications

User Notifications

Message Id	7
Scenario	Post-Development 2
Element Type	Catchment
Element Id	107
Label	Prop On-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 2.0 % is greater than 1.5 %. Computed peak flow= 2.80 ft ³ /s Interp. peak flow= 2.75 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning
Message Id	7
Scenario	Post-Development 2
Element Type	Catchment
Element Id	95
Label	Prop On-Site Det.
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 2.0 % is greater than 1.5 %. Computed peak flow= 30.14 ft ³ /s Interp. peak flow= 29.54 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning
Message Id	17
Scenario	Post-Development 2
Element Type	Composite Outlet Structure
Element Id	101
Label	Primary
Time	(N/A)
Message	Riser orifice equation controls at one or more headwater elevations for outlet structure.
Source	Information
Message Id	17
Scenario	Post-Development 10
Element Type	Composite Outlet Structure
Element Id	101
Label	Primary
Time	(N/A)
Message	Riser orifice equation controls at one or more headwater elevations for outlet structure.
Source	Information
Message Id	17
Scenario	Post-Development 100
Element Type	Composite Outlet Structure
Element Id	101
Label	Primary
Time	(N/A)
Message	Riser orifice equation controls at one or more headwater elevations for outlet structure.
Source	Information

1601 N US HWY 169, Smithville, MO

Subsection: User Notifications

User Notifications

Message Id	7
Scenario	Post-Development 10
Element Type	Catchment
Element Id	108
Label	Prop Off-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 3.9 % is greater than 1.5 %. Computed peak flow= 12.07 ft ³ /s Interp. peak flow= 11.60 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning

Message Id	7
Scenario	Post-Development 10
Element Type	Catchment
Element Id	107
Label	Prop On-Site Bypass
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 1.8 % is greater than 1.5 %. Computed peak flow= 4.37 ft ³ /s Interp. peak flow= 4.30 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning

Message Id	7
Scenario	Post-Development 10
Element Type	Catchment
Element Id	95
Label	Prop On-Site Det.
Time	(N/A)
Message	The difference between calculated peak flow and interpolated peak flow 1.8 % is greater than 1.5 %. Computed peak flow= 47.01 ft ³ /s Interp. peak flow= 46.18 ft ³ /s. Output increment for this catchment may be too large.
Source	Warning

1601 N US HWY 169, Smithville, MO

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Prop On-Site Det.	Post-Development 2	2	74,735.000	11.900	29.54
Prop On-Site Det.	Post-Development 10	10	119,840.000	11.900	46.18
Prop On-Site Det.	Post-Development 100	100	201,751.000	11.900	75.83
Ex On-Site	Pre-Development 2	2	42,677.000	12.000	16.35
Ex On-Site	Pre-Development 10	10	83,916.000	12.000	31.84
Ex On-Site	Pre-Development 100	100	165,651.000	11.950	61.40
Ex Off-Site	Pre-Development 2	2	13,725.000	11.950	5.57
Ex Off-Site	Pre-Development 10	10	26,986.000	11.950	10.98
Ex Off-Site	Pre-Development 100	100	53,268.000	11.950	21.20
Prop On-Site Bypass	Post-Development 2	2	6,951.000	11.900	2.75
Prop On-Site Bypass	Post-Development 10	10	11,147.000	11.900	4.30
Prop On-Site Bypass	Post-Development 100	100	18,765.000	11.900	7.05
Prop Off-Site Bypass	Post-Development 2	2	14,333.000	11.950	5.96
Prop Off-Site Bypass	Post-Development 10	10	27,809.000	11.900	11.60
Prop Off-Site Bypass	Post-Development 100	100	54,325.000	11.900	22.39

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (hours)	Peak Flow (ft ³ /s)
Proposed	Post-Development 2	2	84,399.000	11.950	16.84
Proposed	Post-Development 10	10	146,285.000	12.000	35.01
Proposed	Post-Development 100	100	261,560.000	12.000	72.19
Existing	Pre-Development 2	2	56,402.000	12.000	21.63
Existing	Pre-Development 10	10	110,903.000	11.950	42.41
Existing	Pre-Development 100	100	218,919.000	11.950	82.60

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft ³)
Detention Pond (IN)	Post-Development 2	2	74,735.000	11.900	29.54	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 2	2	63,114.000	12.100	9.58	920.94	32,246.000

1601 N US HWY 169, Smithville, MO

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft ³)
Detention Pond (IN)	Post-Development 10	10	119,840.000	11.900	46.18	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 10	10	107,329.000	12.050	22.88	922.44	44,632.000
Detention Pond (IN)	Post-Development 100	100	201,751.000	11.900	75.83	(N/A)	(N/A)
Detention Pond (OUT)	Post-Development 100	100	188,470.000	12.050	48.33	923.83	58,461.000

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Time-Depth Curve: 100-yr storm

Label	100-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.2	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.3	0.3	0.3	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.4
3.500	0.4	0.4	0.4	0.4	0.4
4.000	0.4	0.4	0.5	0.5	0.5
4.500	0.5	0.5	0.5	0.5	0.6
5.000	0.6	0.6	0.6	0.6	0.6
5.500	0.6	0.7	0.7	0.7	0.7
6.000	0.7	0.7	0.7	0.8	0.8
6.500	0.8	0.8	0.8	0.9	0.9
7.000	0.9	0.9	0.9	0.9	1.0
7.500	1.0	1.0	1.0	1.0	1.1
8.000	1.1	1.1	1.1	1.1	1.2
8.500	1.2	1.2	1.2	1.3	1.3
9.000	1.3	1.3	1.4	1.4	1.4
9.500	1.5	1.5	1.5	1.6	1.6
10.000	1.6	1.7	1.7	1.7	1.8
10.500	1.8	1.9	1.9	2.0	2.0
11.000	2.1	2.2	2.3	2.3	2.4
11.500	2.5	2.7	3.2	3.9	5.1
12.000	5.9	6.1	6.3	6.4	6.5
12.500	6.6	6.7	6.7	6.8	6.9
13.000	6.9	7.0	7.0	7.1	7.1
13.500	7.2	7.2	7.2	7.3	7.3
14.000	7.3	7.4	7.4	7.4	7.5
14.500	7.5	7.5	7.6	7.6	7.6
15.000	7.6	7.7	7.7	7.7	7.7
15.500	7.8	7.8	7.8	7.8	7.9
16.000	7.9	7.9	7.9	7.9	8.0
16.500	8.0	8.0	8.0	8.0	8.1

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.1	8.1	8.1	8.1	8.2
17.500	8.2	8.2	8.2	8.2	8.2
18.000	8.3	8.3	8.3	8.3	8.3
18.500	8.3	8.3	8.4	8.4	8.4
19.000	8.4	8.4	8.4	8.4	8.5
19.500	8.5	8.5	8.5	8.5	8.5
20.000	8.5	8.5	8.6	8.6	8.6
20.500	8.6	8.6	8.6	8.6	8.6
21.000	8.6	8.7	8.7	8.7	8.7
21.500	8.7	8.7	8.7	8.7	8.7
22.000	8.8	8.8	8.8	8.8	8.8
22.500	8.8	8.8	8.8	8.8	8.8
23.000	8.9	8.9	8.9	8.9	8.9
23.500	8.9	8.9	8.9	8.9	9.0
24.000	9.0	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Time-Depth Curve: 100-yr storm

Label	100-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.2	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.3	0.3	0.3	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.4
3.500	0.4	0.4	0.4	0.4	0.4
4.000	0.4	0.4	0.5	0.5	0.5
4.500	0.5	0.5	0.5	0.5	0.6
5.000	0.6	0.6	0.6	0.6	0.6
5.500	0.6	0.7	0.7	0.7	0.7
6.000	0.7	0.7	0.7	0.8	0.8
6.500	0.8	0.8	0.8	0.9	0.9
7.000	0.9	0.9	0.9	0.9	1.0
7.500	1.0	1.0	1.0	1.0	1.1
8.000	1.1	1.1	1.1	1.1	1.2
8.500	1.2	1.2	1.2	1.3	1.3
9.000	1.3	1.3	1.4	1.4	1.4
9.500	1.5	1.5	1.5	1.6	1.6
10.000	1.6	1.7	1.7	1.7	1.8
10.500	1.8	1.9	1.9	2.0	2.0
11.000	2.1	2.2	2.3	2.3	2.4
11.500	2.5	2.7	3.2	3.9	5.1
12.000	5.9	6.1	6.3	6.4	6.5
12.500	6.6	6.7	6.7	6.8	6.9
13.000	6.9	7.0	7.0	7.1	7.1
13.500	7.2	7.2	7.2	7.3	7.3
14.000	7.3	7.4	7.4	7.4	7.5
14.500	7.5	7.5	7.6	7.6	7.6
15.000	7.6	7.7	7.7	7.7	7.7
15.500	7.8	7.8	7.8	7.8	7.9
16.000	7.9	7.9	7.9	7.9	8.0
16.500	8.0	8.0	8.0	8.0	8.1

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.1	8.1	8.1	8.1	8.2
17.500	8.2	8.2	8.2	8.2	8.2
18.000	8.3	8.3	8.3	8.3	8.3
18.500	8.3	8.3	8.4	8.4	8.4
19.000	8.4	8.4	8.4	8.4	8.5
19.500	8.5	8.5	8.5	8.5	8.5
20.000	8.5	8.5	8.6	8.6	8.6
20.500	8.6	8.6	8.6	8.6	8.6
21.000	8.6	8.7	8.7	8.7	8.7
21.500	8.7	8.7	8.7	8.7	8.7
22.000	8.8	8.8	8.8	8.8	8.8
22.500	8.8	8.8	8.8	8.8	8.8
23.000	8.9	8.9	8.9	8.9	8.9
23.500	8.9	8.9	8.9	8.9	9.0
24.000	9.0	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time-Depth Curve: 10-yr storm

Label	10-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.5	0.5
7.000	0.5	0.6	0.6	0.6	0.6
7.500	0.6	0.6	0.6	0.6	0.7
8.000	0.7	0.7	0.7	0.7	0.7
8.500	0.7	0.7	0.8	0.8	0.8
9.000	0.8	0.8	0.9	0.9	0.9
9.500	0.9	0.9	0.9	1.0	1.0
10.000	1.0	1.0	1.1	1.1	1.1
10.500	1.1	1.2	1.2	1.2	1.3
11.000	1.3	1.3	1.4	1.4	1.5
11.500	1.6	1.7	2.0	2.4	3.2
12.000	3.7	3.8	3.9	4.0	4.0
12.500	4.1	4.1	4.2	4.2	4.2
13.000	4.3	4.3	4.3	4.4	4.4
13.500	4.4	4.5	4.5	4.5	4.5
14.000	4.6	4.6	4.6	4.6	4.6
14.500	4.6	4.7	4.7	4.7	4.7
15.000	4.7	4.8	4.8	4.8	4.8
15.500	4.8	4.8	4.8	4.9	4.9
16.000	4.9	4.9	4.9	4.9	4.9
16.500	4.9	5.0	5.0	5.0	5.0

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	5.0	5.0	5.0	5.0	5.0
17.500	5.1	5.1	5.1	5.1	5.1
18.000	5.1	5.1	5.1	5.1	5.2
18.500	5.2	5.2	5.2	5.2	5.2
19.000	5.2	5.2	5.2	5.2	5.2
19.500	5.2	5.3	5.3	5.3	5.3
20.000	5.3	5.3	5.3	5.3	5.3
20.500	5.3	5.3	5.3	5.3	5.3
21.000	5.4	5.4	5.4	5.4	5.4
21.500	5.4	5.4	5.4	5.4	5.4
22.000	5.4	5.4	5.4	5.4	5.4
22.500	5.5	5.5	5.5	5.5	5.5
23.000	5.5	5.5	5.5	5.5	5.5
23.500	5.5	5.5	5.5	5.5	5.5
24.000	5.6	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time-Depth Curve: 10-yr storm

Label	10-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.5	0.5
7.000	0.5	0.6	0.6	0.6	0.6
7.500	0.6	0.6	0.6	0.6	0.7
8.000	0.7	0.7	0.7	0.7	0.7
8.500	0.7	0.7	0.8	0.8	0.8
9.000	0.8	0.8	0.9	0.9	0.9
9.500	0.9	0.9	0.9	1.0	1.0
10.000	1.0	1.0	1.1	1.1	1.1
10.500	1.1	1.2	1.2	1.2	1.3
11.000	1.3	1.3	1.4	1.4	1.5
11.500	1.6	1.7	2.0	2.4	3.2
12.000	3.7	3.8	3.9	4.0	4.0
12.500	4.1	4.1	4.2	4.2	4.2
13.000	4.3	4.3	4.3	4.4	4.4
13.500	4.4	4.5	4.5	4.5	4.5
14.000	4.6	4.6	4.6	4.6	4.6
14.500	4.6	4.7	4.7	4.7	4.7
15.000	4.7	4.8	4.8	4.8	4.8
15.500	4.8	4.8	4.8	4.9	4.9
16.000	4.9	4.9	4.9	4.9	4.9
16.500	4.9	5.0	5.0	5.0	5.0

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	5.0	5.0	5.0	5.0	5.0
17.500	5.1	5.1	5.1	5.1	5.1
18.000	5.1	5.1	5.1	5.1	5.2
18.500	5.2	5.2	5.2	5.2	5.2
19.000	5.2	5.2	5.2	5.2	5.2
19.500	5.2	5.3	5.3	5.3	5.3
20.000	5.3	5.3	5.3	5.3	5.3
20.500	5.3	5.3	5.3	5.3	5.3
21.000	5.4	5.4	5.4	5.4	5.4
21.500	5.4	5.4	5.4	5.4	5.4
22.000	5.4	5.4	5.4	5.4	5.4
22.500	5.5	5.5	5.5	5.5	5.5
23.000	5.5	5.5	5.5	5.5	5.5
23.500	5.5	5.5	5.5	5.5	5.5
24.000	5.6	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time-Depth Curve: 2-yr storm

Label	2-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.3
5.500	0.3	0.3	0.3	0.3	0.3
6.000	0.3	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.4
7.000	0.4	0.4	0.4	0.4	0.4
7.500	0.4	0.4	0.4	0.4	0.4
8.000	0.4	0.4	0.5	0.5	0.5
8.500	0.5	0.5	0.5	0.5	0.5
9.000	0.5	0.5	0.6	0.6	0.6
9.500	0.6	0.6	0.6	0.6	0.6
10.000	0.7	0.7	0.7	0.7	0.7
10.500	0.7	0.8	0.8	0.8	0.8
11.000	0.9	0.9	0.9	1.0	1.0
11.500	1.0	1.1	1.3	1.6	2.1
12.000	2.4	2.5	2.6	2.6	2.7
12.500	2.7	2.7	2.7	2.8	2.8
13.000	2.8	2.8	2.9	2.9	2.9
13.500	2.9	2.9	3.0	3.0	3.0
14.000	3.0	3.0	3.0	3.0	3.1
14.500	3.1	3.1	3.1	3.1	3.1
15.000	3.1	3.1	3.1	3.2	3.2
15.500	3.2	3.2	3.2	3.2	3.2
16.000	3.2	3.2	3.2	3.2	3.3
16.500	3.3	3.3	3.3	3.3	3.3

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.3	3.3	3.3	3.3	3.3
17.500	3.3	3.3	3.4	3.4	3.4
18.000	3.4	3.4	3.4	3.4	3.4
18.500	3.4	3.4	3.4	3.4	3.4
19.000	3.4	3.4	3.4	3.4	3.5
19.500	3.5	3.5	3.5	3.5	3.5
20.000	3.5	3.5	3.5	3.5	3.5
20.500	3.5	3.5	3.5	3.5	3.5
21.000	3.5	3.5	3.5	3.5	3.5
21.500	3.6	3.6	3.6	3.6	3.6
22.000	3.6	3.6	3.6	3.6	3.6
22.500	3.6	3.6	3.6	3.6	3.6
23.000	3.6	3.6	3.6	3.6	3.6
23.500	3.6	3.6	3.6	3.7	3.7
24.000	3.7	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time-Depth Curve: 2-yr storm

Label	2-yr storm
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.3
5.500	0.3	0.3	0.3	0.3	0.3
6.000	0.3	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.4
7.000	0.4	0.4	0.4	0.4	0.4
7.500	0.4	0.4	0.4	0.4	0.4
8.000	0.4	0.4	0.5	0.5	0.5
8.500	0.5	0.5	0.5	0.5	0.5
9.000	0.5	0.5	0.6	0.6	0.6
9.500	0.6	0.6	0.6	0.6	0.6
10.000	0.7	0.7	0.7	0.7	0.7
10.500	0.7	0.8	0.8	0.8	0.8
11.000	0.9	0.9	0.9	1.0	1.0
11.500	1.0	1.1	1.3	1.6	2.1
12.000	2.4	2.5	2.6	2.6	2.7
12.500	2.7	2.7	2.7	2.8	2.8
13.000	2.8	2.8	2.9	2.9	2.9
13.500	2.9	2.9	3.0	3.0	3.0
14.000	3.0	3.0	3.0	3.0	3.1
14.500	3.1	3.1	3.1	3.1	3.1
15.000	3.1	3.1	3.1	3.2	3.2
15.500	3.2	3.2	3.2	3.2	3.2
16.000	3.2	3.2	3.2	3.2	3.3
16.500	3.3	3.3	3.3	3.3	3.3

1601 N US HWY 169, Smithville, MO

Subsection: Time-Depth Curve

Label: kcmo scs typeII-24 hr

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.3	3.3	3.3	3.3	3.3
17.500	3.3	3.3	3.4	3.4	3.4
18.000	3.4	3.4	3.4	3.4	3.4
18.500	3.4	3.4	3.4	3.4	3.4
19.000	3.4	3.4	3.4	3.4	3.5
19.500	3.5	3.5	3.5	3.5	3.5
20.000	3.5	3.5	3.5	3.5	3.5
20.500	3.5	3.5	3.5	3.5	3.5
21.000	3.5	3.5	3.5	3.5	3.5
21.500	3.6	3.6	3.6	3.6	3.6
22.000	3.6	3.6	3.6	3.6	3.6
22.500	3.6	3.6	3.6	3.6	3.6
23.000	3.6	3.6	3.6	3.6	3.6
23.500	3.6	3.6	3.6	3.7	3.7
24.000	3.7	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method (Computational Notes)

Definition of Terms

At	Total area (acres): $At = Ai + Ap$
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^{-1})
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of $0.1333T_c$, r_{tm} , and t_h (Smallest dt is then adjusted to match up with T_p)
UDdt	User specified override computational main time increment (only used if UDdt is $\Rightarrow .1333T_c$)
D(t)	Point on distribution curve (fraction of P) for time step t
K	$2 / (1 + (T_r/T_p))$: default $K = 0.75$: (for $T_r/T_p = 1.67$)
Ks	Hydrograph shape factor = Unit Conversions * $K = ((1\text{hr}/3600\text{sec}) * (1\text{ft}/12\text{in}) * ((5280\text{ft})^2/\text{sq.mi})) * K$ Default $K_s = 645.333 * 0.75 = 484$
Lag	Lag time from center of excess runoff (dt) to T_p : $\text{Lag} = 0.6T_c$
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1 hr, for 1 sq.mi. = $(K_s * A * Q) / T_p$ (where $Q = 1\text{in. runoff}$, $A = \text{sq.mi.}$)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: $S_i = (1000/CN_i) - 10$
Sp	S for pervious area: $S_p = (1000/CN_p) - 10$
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: $T_b = T_p + T_r$
Tp	Time (hrs) to peak of a unit hydrograph: $T_p = (dt/2) + \text{Lag}$
Tr	Time (hrs) of receding limb of unit hydrograph: $T_r = \text{ratio of } T_p$

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method

Computational Notes

Precipitation

Column (1)	Time for time step t
Column (2)	$D(t)$ = Point on distribution curve for time step t
Column (3)	$P_i(t) = P_a(t) - P_a(t-1)$: Col.(4) - Preceding Col.(4)
Column (4)	$P_a(t) = D(t) \times P$: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	$Rap(t)$ = Accumulated pervious runoff for time step t If $(P_a(t))$ is $\leq 0.2Sp$ then use: $Rap(t) = 0.0$ If $(P_a(t))$ is $> 0.2Sp$ then use: $Rap(t) = (Col.(4) - 0.2Sp) \times 2 / (Col.(4) + 0.8Sp)$
Column (6)	$Rip(t)$ = Incremental pervious runoff for time step t $Rip(t) = Rap(t) - Rap(t-1)$ $Rip(t) = Col.(5)$ for current row - $Col.(5)$ for preceding row.

Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.
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Incremental Weighted Runoff

Column (9)	$R(t) = (A_p/A_t) \times Rip(t) + (A_i/A_t) \times Rii(t)$ $R(t) = (A_p/A_t) \times Col.(6) + (A_i/A_t) \times Col.(8)$
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SCS Unit Hydrograph Method

Column (10)	$Q(t)$ is computed with the SCS unit hydrograph method using $R(t)$ and $Qu(t)$.
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1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres
Computational Time Increment	0.015 hours
Time to Peak (Computed)	11.945 hours
Flow (Peak, Computed)	5.58 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	5.57 ft ³ /s
Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	13,749.075 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	13,725.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.115 hours
Computational Time Increment	0.015 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	23.04 ft ³ /s
Unit peak time, Tp	0.077 hours
Unit receding limb, Tr	0.307 hours
Total unit time, Tb	0.383 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.350	0.00	0.00	0.00	0.00	0.01
9.600	0.01	0.01	0.01	0.01	0.01
9.850	0.01	0.02	0.02	0.02	0.02
10.100	0.02	0.03	0.03	0.03	0.03
10.350	0.04	0.04	0.04	0.05	0.05
10.600	0.05	0.06	0.06	0.07	0.07
10.850	0.08	0.09	0.09	0.10	0.11
11.100	0.12	0.13	0.14	0.15	0.17
11.350	0.19	0.20	0.22	0.24	0.31
11.600	0.47	0.69	1.07	1.53	2.21
11.850	3.21	4.83	5.57	5.28	4.35
12.100	2.50	1.53	1.15	0.98	0.88
12.350	0.81	0.75	0.69	0.62	0.57
12.600	0.53	0.50	0.48	0.46	0.45
12.850	0.44	0.42	0.41	0.39	0.38
13.100	0.37	0.36	0.35	0.34	0.33
13.350	0.32	0.32	0.31	0.30	0.29
13.600	0.29	0.28	0.27	0.27	0.26
13.850	0.26	0.25	0.24	0.24	0.23
14.100	0.23	0.23	0.22	0.22	0.22
14.350	0.22	0.22	0.21	0.21	0.21
14.600	0.21	0.21	0.20	0.20	0.20
14.850	0.20	0.20	0.19	0.19	0.19
15.100	0.19	0.19	0.18	0.18	0.18
15.350	0.18	0.17	0.17	0.17	0.17
15.600	0.17	0.16	0.16	0.16	0.16
15.850	0.16	0.15	0.15	0.15	0.15
16.100	0.15	0.15	0.14	0.14	0.14
16.350	0.14	0.14	0.14	0.14	0.14
16.600	0.14	0.14	0.14	0.14	0.14
16.850	0.13	0.13	0.13	0.13	0.13
17.100	0.13	0.13	0.13	0.13	0.13
17.350	0.13	0.13	0.13	0.13	0.12

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
17.600	0.12	0.12	0.12	0.12	0.12
17.850	0.12	0.12	0.12	0.12	0.12
18.100	0.12	0.12	0.11	0.11	0.11
18.350	0.11	0.11	0.11	0.11	0.11
18.600	0.11	0.11	0.11	0.11	0.11
18.850	0.10	0.10	0.10	0.10	0.10
19.100	0.10	0.10	0.10	0.10	0.10
19.350	0.10	0.10	0.10	0.09	0.09
19.600	0.09	0.09	0.09	0.09	0.09
19.850	0.09	0.09	0.09	0.09	0.09
20.100	0.09	0.09	0.08	0.08	0.08
20.350	0.08	0.08	0.08	0.08	0.08
20.600	0.08	0.08	0.08	0.08	0.08
20.850	0.08	0.08	0.08	0.08	0.08
21.100	0.08	0.08	0.08	0.08	0.08
21.350	0.08	0.08	0.08	0.08	0.08
21.600	0.08	0.08	0.08	0.08	0.08
21.850	0.08	0.08	0.08	0.08	0.08
22.100	0.08	0.08	0.08	0.08	0.08
22.350	0.08	0.08	0.08	0.08	0.08
22.600	0.08	0.08	0.08	0.08	0.08
22.850	0.08	0.08	0.08	0.08	0.08
23.100	0.08	0.08	0.08	0.08	0.08
23.350	0.08	0.08	0.08	0.08	0.08
23.600	0.07	0.07	0.07	0.07	0.07
23.850	0.07	0.07	0.07	0.07	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres
Computational Time Increment	0.015 hours
Time to Peak (Computed)	11.945 hours
Flow (Peak, Computed)	11.03 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	10.98 ft ³ /s
Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.2 in
Runoff Volume (Pervious)	27,026.693 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	26,986.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.115 hours
Computational Time Increment	0.015 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	23.04 ft ³ /s
Unit peak time, Tp	0.077 hours
Unit receding limb, Tr	0.307 hours
Total unit time, Tb	0.383 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.01	0.01	0.01	0.01	0.01
7.750	0.01	0.01	0.01	0.02	0.02
8.000	0.02	0.02	0.02	0.02	0.02
8.250	0.03	0.03	0.03	0.03	0.03
8.500	0.04	0.04	0.04	0.04	0.04
8.750	0.05	0.05	0.05	0.05	0.06
9.000	0.06	0.06	0.07	0.07	0.07
9.250	0.07	0.07	0.08	0.08	0.08
9.500	0.08	0.08	0.09	0.09	0.09
9.750	0.10	0.10	0.11	0.11	0.12
10.000	0.12	0.13	0.13	0.14	0.15
10.250	0.15	0.16	0.17	0.18	0.18
10.500	0.19	0.20	0.21	0.22	0.24
10.750	0.25	0.26	0.28	0.29	0.31
11.000	0.32	0.34	0.36	0.39	0.42
11.250	0.45	0.49	0.52	0.56	0.60
11.500	0.64	0.82	1.19	1.72	2.58
11.750	3.54	4.91	6.81	9.84	10.98
12.000	10.13	8.20	4.67	2.83	2.11
12.250	1.80	1.61	1.48	1.35	1.25
12.500	1.12	1.03	0.95	0.90	0.86
12.750	0.83	0.80	0.78	0.75	0.73
13.000	0.70	0.68	0.65	0.64	0.62
13.250	0.61	0.59	0.58	0.56	0.55
13.500	0.53	0.52	0.51	0.49	0.48
13.750	0.47	0.46	0.45	0.44	0.43
14.000	0.42	0.41	0.40	0.40	0.39
14.250	0.39	0.39	0.38	0.38	0.38
14.500	0.37	0.37	0.36	0.36	0.36
14.750	0.35	0.35	0.35	0.34	0.34
15.000	0.34	0.33	0.33	0.32	0.32
15.250	0.32	0.31	0.31	0.31	0.30

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
15.500	0.30	0.30	0.29	0.29	0.28
15.750	0.28	0.28	0.27	0.27	0.27
16.000	0.26	0.26	0.25	0.25	0.25
16.250	0.25	0.25	0.25	0.25	0.24
16.500	0.24	0.24	0.24	0.24	0.24
16.750	0.24	0.24	0.23	0.23	0.23
17.000	0.23	0.23	0.23	0.23	0.22
17.250	0.22	0.22	0.22	0.22	0.22
17.500	0.22	0.22	0.21	0.21	0.21
17.750	0.21	0.21	0.21	0.21	0.20
18.000	0.20	0.20	0.20	0.20	0.20
18.250	0.20	0.20	0.19	0.19	0.19
18.500	0.19	0.19	0.19	0.19	0.18
18.750	0.18	0.18	0.18	0.18	0.18
19.000	0.18	0.17	0.17	0.17	0.17
19.250	0.17	0.17	0.17	0.17	0.16
19.500	0.16	0.16	0.16	0.16	0.16
19.750	0.16	0.15	0.15	0.15	0.15
20.000	0.15	0.15	0.15	0.15	0.15
20.250	0.15	0.15	0.15	0.14	0.14
20.500	0.14	0.14	0.14	0.14	0.14
20.750	0.14	0.14	0.14	0.14	0.14
21.000	0.14	0.14	0.14	0.14	0.14
21.250	0.14	0.14	0.14	0.14	0.14
21.500	0.14	0.14	0.14	0.14	0.14
21.750	0.14	0.14	0.14	0.14	0.14
22.000	0.14	0.14	0.14	0.14	0.14
22.250	0.13	0.13	0.13	0.13	0.13
22.500	0.13	0.13	0.13	0.13	0.13
22.750	0.13	0.13	0.13	0.13	0.13
23.000	0.13	0.13	0.13	0.13	0.13
23.250	0.13	0.13	0.13	0.13	0.13
23.500	0.13	0.13	0.13	0.13	0.13
23.750	0.13	0.13	0.13	0.13	0.13
24.000	0.13	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres

Computational Time Increment	0.015 hours
Time to Peak (Computed)	11.945 hours
Flow (Peak, Computed)	21.35 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	21.20 ft ³ /s

Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.3 in
Runoff Volume (Pervious)	53,338.071 ft ³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	53,268.000 ft ³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.115 hours
Computational Time Increment	0.015 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex Off-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	23.04 ft ³ /s
Unit peak time, Tp	0.077 hours
Unit receding limb, Tr	0.307 hours
Total unit time, Tb	0.383 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.115 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
5.100	0.00	0.00	0.00	0.01	0.01
5.350	0.01	0.01	0.01	0.01	0.02
5.600	0.02	0.02	0.02	0.02	0.03
5.850	0.03	0.03	0.03	0.03	0.04
6.100	0.04	0.04	0.04	0.04	0.05
6.350	0.05	0.05	0.05	0.06	0.06
6.600	0.06	0.06	0.06	0.07	0.07
6.850	0.07	0.07	0.08	0.08	0.08
7.100	0.08	0.09	0.09	0.09	0.09
7.350	0.09	0.10	0.10	0.10	0.10
7.600	0.11	0.11	0.11	0.11	0.12
7.850	0.12	0.12	0.12	0.13	0.13
8.100	0.13	0.14	0.14	0.15	0.15
8.350	0.16	0.16	0.17	0.18	0.18
8.600	0.19	0.19	0.20	0.21	0.21
8.850	0.22	0.23	0.23	0.24	0.25
9.100	0.25	0.26	0.26	0.27	0.27
9.350	0.27	0.27	0.28	0.28	0.29
9.600	0.29	0.30	0.31	0.32	0.33
9.850	0.34	0.35	0.36	0.38	0.39
10.100	0.40	0.42	0.43	0.45	0.47
10.350	0.49	0.50	0.52	0.54	0.56
10.600	0.58	0.61	0.64	0.67	0.70
10.850	0.73	0.76	0.79	0.83	0.86
11.100	0.92	0.97	1.04	1.11	1.19
11.350	1.26	1.34	1.42	1.51	1.90
11.600	2.73	3.88	5.69	7.63	10.30
11.850	13.87	19.45	21.20	19.20	15.34
12.100	8.68	5.22	3.87	3.28	2.93
12.350	2.69	2.46	2.26	2.03	1.87
12.600	1.71	1.62	1.55	1.50	1.45
12.850	1.40	1.35	1.31	1.25	1.21
13.100	1.17	1.14	1.11	1.09	1.06

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
13.350	1.03	1.00	0.98	0.95	0.93
13.600	0.90	0.88	0.86	0.84	0.82
13.850	0.81	0.79	0.77	0.75	0.73
14.100	0.72	0.71	0.70	0.69	0.69
14.350	0.68	0.67	0.67	0.66	0.65
14.600	0.65	0.64	0.63	0.63	0.62
14.850	0.61	0.61	0.60	0.59	0.59
15.100	0.58	0.58	0.57	0.56	0.55
15.350	0.55	0.54	0.53	0.53	0.52
15.600	0.51	0.51	0.50	0.49	0.49
15.850	0.48	0.47	0.47	0.46	0.45
16.100	0.45	0.45	0.44	0.44	0.44
16.350	0.44	0.43	0.43	0.43	0.43
16.600	0.42	0.42	0.42	0.42	0.41
16.850	0.41	0.41	0.41	0.40	0.40
17.100	0.40	0.40	0.40	0.39	0.39
17.350	0.39	0.39	0.38	0.38	0.38
17.600	0.38	0.37	0.37	0.37	0.37
17.850	0.36	0.36	0.36	0.36	0.35
18.100	0.35	0.35	0.35	0.35	0.34
18.350	0.34	0.34	0.34	0.33	0.33
18.600	0.33	0.33	0.32	0.32	0.32
18.850	0.32	0.31	0.31	0.31	0.31
19.100	0.30	0.30	0.30	0.30	0.29
19.350	0.29	0.29	0.29	0.28	0.28
19.600	0.28	0.28	0.27	0.27	0.27
19.850	0.27	0.27	0.26	0.26	0.26
20.100	0.26	0.26	0.25	0.25	0.25
20.350	0.25	0.25	0.25	0.25	0.25
20.600	0.25	0.25	0.25	0.25	0.25
20.850	0.25	0.25	0.25	0.25	0.25
21.100	0.25	0.25	0.25	0.24	0.24
21.350	0.24	0.24	0.24	0.24	0.24
21.600	0.24	0.24	0.24	0.24	0.24
21.850	0.24	0.24	0.24	0.24	0.24
22.100	0.24	0.24	0.24	0.24	0.24
22.350	0.23	0.23	0.23	0.23	0.23
22.600	0.23	0.23	0.23	0.23	0.23
22.850	0.23	0.23	0.23	0.23	0.23
23.100	0.23	0.23	0.23	0.23	0.23
23.350	0.23	0.22	0.22	0.22	0.22
23.600	0.22	0.22	0.22	0.22	0.22

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex Off-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
23.850	0.22	0.22	0.22	0.22	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres
Computational Time Increment	0.020 hours
Time to Peak (Computed)	11.998 hours
Flow (Peak, Computed)	16.37 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	16.35 ft ³ /s
Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	7.275 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	42,782.096 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	42,677.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	53.77 ft ³ /s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.300	0.00	0.00	0.00	0.01	0.01
9.550	0.01	0.02	0.02	0.03	0.03
9.800	0.04	0.04	0.05	0.05	0.06
10.050	0.06	0.07	0.08	0.08	0.09
10.300	0.10	0.11	0.12	0.13	0.14
10.550	0.15	0.16	0.17	0.19	0.20
10.800	0.22	0.24	0.26	0.28	0.30
11.050	0.32	0.35	0.38	0.42	0.46
11.300	0.50	0.55	0.60	0.65	0.71
11.550	0.86	1.22	1.78	2.74	3.99
11.800	5.76	8.30	12.36	15.70	16.35
12.050	14.72	10.52	6.66	4.65	3.66
12.300	3.11	2.75	2.49	2.27	2.06
12.550	1.88	1.73	1.61	1.54	1.48
12.800	1.43	1.38	1.33	1.29	1.24
13.050	1.20	1.16	1.13	1.10	1.07
13.300	1.05	1.02	1.00	0.97	0.95
13.550	0.92	0.90	0.88	0.86	0.84
13.800	0.82	0.81	0.79	0.77	0.75
14.050	0.74	0.72	0.71	0.70	0.69
14.300	0.69	0.68	0.67	0.67	0.66
14.550	0.66	0.65	0.64	0.64	0.63
14.800	0.62	0.62	0.61	0.61	0.60
15.050	0.59	0.59	0.58	0.57	0.57
15.300	0.56	0.56	0.55	0.54	0.54
15.550	0.53	0.52	0.52	0.51	0.50
15.800	0.50	0.49	0.48	0.48	0.47
16.050	0.46	0.46	0.45	0.45	0.45
16.300	0.45	0.44	0.44	0.44	0.44
16.550	0.43	0.43	0.43	0.43	0.43
16.800	0.42	0.42	0.42	0.42	0.41
17.050	0.41	0.41	0.41	0.40	0.40
17.300	0.40	0.40	0.40	0.39	0.39

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
17.550	0.39	0.39	0.38	0.38	0.38
17.800	0.38	0.37	0.37	0.37	0.37
18.050	0.37	0.36	0.36	0.36	0.36
18.300	0.35	0.35	0.35	0.35	0.34
18.550	0.34	0.34	0.34	0.33	0.33
18.800	0.33	0.33	0.32	0.32	0.32
19.050	0.32	0.31	0.31	0.31	0.31
19.300	0.31	0.30	0.30	0.30	0.30
19.550	0.29	0.29	0.29	0.29	0.28
19.800	0.28	0.28	0.28	0.27	0.27
20.050	0.27	0.27	0.27	0.26	0.26
20.300	0.26	0.26	0.26	0.26	0.26
20.550	0.26	0.26	0.26	0.26	0.26
20.800	0.26	0.26	0.26	0.26	0.26
21.050	0.26	0.26	0.26	0.26	0.25
21.300	0.25	0.25	0.25	0.25	0.25
21.550	0.25	0.25	0.25	0.25	0.25
21.800	0.25	0.25	0.25	0.25	0.25
22.050	0.25	0.25	0.25	0.25	0.25
22.300	0.25	0.24	0.24	0.24	0.24
22.550	0.24	0.24	0.24	0.24	0.24
22.800	0.24	0.24	0.24	0.24	0.24
23.050	0.24	0.24	0.24	0.24	0.24
23.300	0.24	0.24	0.23	0.23	0.23
23.550	0.23	0.23	0.23	0.23	0.23
23.800	0.23	0.23	0.23	0.23	0.23

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres
Computational Time Increment	0.020 hours
Time to Peak (Computed)	11.978 hours
Flow (Peak, Computed)	32.21 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	31.84 ft ³ /s
Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	7.275 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.2 in
Runoff Volume (Pervious)	84,097.196 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	83,916.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	53.77 ft ³ /s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
7.200	0.00	0.00	0.00	0.01	0.01
7.450	0.01	0.02	0.02	0.02	0.03
7.700	0.03	0.03	0.04	0.04	0.04
7.950	0.05	0.05	0.06	0.06	0.06
8.200	0.07	0.07	0.08	0.09	0.09
8.450	0.10	0.10	0.11	0.12	0.13
8.700	0.13	0.14	0.15	0.16	0.17
8.950	0.17	0.18	0.19	0.20	0.21
9.200	0.21	0.22	0.23	0.23	0.24
9.450	0.25	0.25	0.26	0.27	0.28
9.700	0.29	0.30	0.31	0.33	0.34
9.950	0.36	0.37	0.39	0.41	0.42
10.200	0.44	0.47	0.49	0.51	0.54
10.450	0.56	0.59	0.61	0.64	0.68
10.700	0.71	0.75	0.79	0.84	0.88
10.950	0.93	0.97	1.03	1.09	1.16
11.200	1.26	1.35	1.46	1.56	1.68
11.450	1.80	1.93	2.28	3.15	4.48
11.700	6.65	9.36	12.98	17.95	25.60
11.950	31.43	31.84	28.10	19.84	12.47
12.200	8.63	6.75	5.69	5.02	4.52
12.450	4.11	3.72	3.40	3.12	2.91
12.700	2.76	2.66	2.56	2.48	2.39
12.950	2.31	2.22	2.15	2.07	2.01
13.200	1.96	1.91	1.86	1.82	1.77
13.450	1.73	1.68	1.64	1.60	1.56
13.700	1.52	1.49	1.46	1.43	1.39
13.950	1.36	1.33	1.30	1.27	1.25
14.200	1.23	1.22	1.21	1.20	1.19
14.450	1.17	1.16	1.15	1.14	1.13
14.700	1.12	1.11	1.10	1.08	1.07
14.950	1.06	1.05	1.04	1.03	1.02
15.200	1.00	0.99	0.98	0.97	0.96

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
15.450	0.95	0.94	0.92	0.91	0.90
15.700	0.89	0.88	0.87	0.85	0.84
15.950	0.83	0.82	0.81	0.80	0.79
16.200	0.79	0.78	0.78	0.77	0.77
16.450	0.76	0.76	0.76	0.75	0.75
16.700	0.74	0.74	0.74	0.73	0.73
16.950	0.72	0.72	0.71	0.71	0.71
17.200	0.70	0.70	0.69	0.69	0.69
17.450	0.68	0.68	0.67	0.67	0.66
17.700	0.66	0.66	0.65	0.65	0.64
17.950	0.64	0.64	0.63	0.63	0.62
18.200	0.62	0.61	0.61	0.61	0.60
18.450	0.60	0.59	0.59	0.59	0.58
18.700	0.58	0.57	0.57	0.56	0.56
18.950	0.56	0.55	0.55	0.54	0.54
19.200	0.53	0.53	0.53	0.52	0.52
19.450	0.51	0.51	0.50	0.50	0.50
19.700	0.49	0.49	0.48	0.48	0.47
19.950	0.47	0.47	0.46	0.46	0.46
20.200	0.45	0.45	0.45	0.45	0.45
20.450	0.45	0.45	0.45	0.45	0.45
20.700	0.45	0.45	0.44	0.44	0.44
20.950	0.44	0.44	0.44	0.44	0.44
21.200	0.44	0.44	0.44	0.44	0.43
21.450	0.43	0.43	0.43	0.43	0.43
21.700	0.43	0.43	0.43	0.43	0.43
21.950	0.43	0.42	0.42	0.42	0.42
22.200	0.42	0.42	0.42	0.42	0.42
22.450	0.42	0.42	0.42	0.41	0.41
22.700	0.41	0.41	0.41	0.41	0.41
22.950	0.41	0.41	0.41	0.41	0.41
23.200	0.40	0.40	0.40	0.40	0.40
23.450	0.40	0.40	0.40	0.40	0.40
23.700	0.40	0.40	0.39	0.39	0.39
23.950	0.39	0.39	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres
Computational Time Increment	0.020 hours
Time to Peak (Computed)	11.978 hours
Flow (Peak, Computed)	62.23 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	61.40 ft ³ /s
Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	7.275 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.3 in
Runoff Volume (Pervious)	165,968.527 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	165,651.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Ex On-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	53.77 ft ³ /s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	7.275 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
5.050	0.00	0.00	0.01	0.01	0.01
5.300	0.02	0.03	0.03	0.04	0.04
5.550	0.05	0.05	0.06	0.07	0.07
5.800	0.08	0.08	0.09	0.10	0.10
6.050	0.11	0.12	0.12	0.13	0.14
6.300	0.14	0.15	0.16	0.16	0.17
6.550	0.18	0.18	0.19	0.20	0.20
6.800	0.21	0.22	0.22	0.23	0.24
7.050	0.25	0.25	0.26	0.27	0.28
7.300	0.28	0.29	0.30	0.31	0.31
7.550	0.32	0.33	0.34	0.34	0.35
7.800	0.36	0.37	0.37	0.38	0.39
8.050	0.40	0.41	0.42	0.44	0.45
8.300	0.47	0.48	0.50	0.52	0.54
8.550	0.56	0.57	0.59	0.61	0.63
8.800	0.65	0.67	0.70	0.72	0.74
9.050	0.76	0.78	0.79	0.81	0.82
9.300	0.83	0.84	0.85	0.86	0.87
9.550	0.88	0.90	0.92	0.95	0.98
9.800	1.01	1.04	1.08	1.11	1.15
10.050	1.19	1.23	1.27	1.32	1.37
10.300	1.42	1.48	1.53	1.59	1.65
10.550	1.71	1.78	1.85	1.93	2.02
10.800	2.11	2.21	2.31	2.40	2.50
11.050	2.62	2.76	2.92	3.12	3.33
11.300	3.56	3.79	4.03	4.27	4.55
11.550	5.31	7.24	10.15	14.78	20.35
11.800	27.52	36.99	51.23	61.40	60.99
12.050	53.04	37.14	23.20	15.95	12.40
12.300	10.41	9.16	8.22	7.46	6.75
12.550	6.15	5.64	5.26	4.99	4.79
12.800	4.62	4.46	4.30	4.15	4.00
13.050	3.86	3.73	3.61	3.51	3.43

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
13.300	3.34	3.26	3.18	3.10	3.01
13.550	2.93	2.86	2.79	2.72	2.66
13.800	2.60	2.54	2.48	2.43	2.37
14.050	2.31	2.27	2.23	2.20	2.17
14.300	2.15	2.13	2.11	2.09	2.07
14.550	2.05	2.03	2.01	1.99	1.97
14.800	1.94	1.92	1.90	1.88	1.86
15.050	1.84	1.82	1.80	1.78	1.76
15.300	1.74	1.72	1.70	1.67	1.65
15.550	1.64	1.61	1.59	1.57	1.55
15.800	1.53	1.51	1.49	1.47	1.45
16.050	1.43	1.41	1.40	1.39	1.38
16.300	1.37	1.36	1.35	1.35	1.34
16.550	1.33	1.32	1.32	1.31	1.30
16.800	1.29	1.29	1.28	1.27	1.26
17.050	1.26	1.25	1.24	1.24	1.23
17.300	1.22	1.21	1.21	1.20	1.19
17.550	1.18	1.18	1.17	1.16	1.15
17.800	1.15	1.14	1.13	1.12	1.12
18.050	1.11	1.10	1.09	1.09	1.08
18.300	1.07	1.06	1.06	1.05	1.04
18.550	1.03	1.03	1.02	1.01	1.00
18.800	1.00	0.99	0.98	0.97	0.97
19.050	0.96	0.95	0.94	0.94	0.93
19.300	0.92	0.91	0.91	0.90	0.89
19.550	0.88	0.87	0.87	0.86	0.85
19.800	0.84	0.84	0.83	0.82	0.81
20.050	0.81	0.80	0.80	0.79	0.79
20.300	0.79	0.79	0.79	0.79	0.78
20.550	0.78	0.78	0.78	0.78	0.78
20.800	0.78	0.77	0.77	0.77	0.77
21.050	0.77	0.77	0.77	0.76	0.76
21.300	0.76	0.76	0.76	0.76	0.76
21.550	0.75	0.75	0.75	0.75	0.75
21.800	0.75	0.74	0.74	0.74	0.74
22.050	0.74	0.74	0.74	0.73	0.73
22.300	0.73	0.73	0.73	0.73	0.73
22.550	0.72	0.72	0.72	0.72	0.72
22.800	0.72	0.71	0.71	0.71	0.71
23.050	0.71	0.71	0.71	0.70	0.70
23.300	0.70	0.70	0.70	0.70	0.70
23.550	0.69	0.69	0.69	0.69	0.69

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Ex On-Site

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
23.800	0.69	0.68	0.68	0.68	0.68

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	6.22 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	5.96 ft ³ /s
Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	14,353.842 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	14,333.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	31.79 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.050	0.00	0.00	0.00	0.00	0.01
9.300	0.01	0.01	0.01	0.01	0.01
9.550	0.01	0.01	0.02	0.02	0.02
9.800	0.02	0.02	0.02	0.03	0.03
10.050	0.03	0.03	0.04	0.04	0.04
10.300	0.05	0.05	0.05	0.06	0.06
10.550	0.06	0.07	0.07	0.08	0.09
10.800	0.09	0.10	0.10	0.11	0.12
11.050	0.13	0.14	0.15	0.17	0.18
11.300	0.20	0.22	0.24	0.26	0.28
11.550	0.41	0.59	0.93	1.36	1.96
11.800	2.69	4.09	5.89	5.96	5.38
12.050	3.75	1.73	1.19	1.02	0.93
12.300	0.87	0.80	0.74	0.68	0.61
12.550	0.56	0.52	0.50	0.48	0.47
12.800	0.45	0.44	0.42	0.41	0.39
13.050	0.38	0.37	0.36	0.35	0.35
13.300	0.34	0.33	0.32	0.31	0.30
13.550	0.30	0.29	0.28	0.28	0.27
13.800	0.27	0.26	0.25	0.25	0.24
14.050	0.24	0.23	0.23	0.23	0.23
14.300	0.22	0.22	0.22	0.22	0.22
14.550	0.21	0.21	0.21	0.21	0.21
14.800	0.20	0.20	0.20	0.20	0.20
15.050	0.19	0.19	0.19	0.19	0.18
15.300	0.18	0.18	0.18	0.18	0.17
15.550	0.17	0.17	0.17	0.17	0.16
15.800	0.16	0.16	0.16	0.15	0.15
16.050	0.15	0.15	0.15	0.15	0.15
16.300	0.15	0.15	0.14	0.14	0.14
16.550	0.14	0.14	0.14	0.14	0.14
16.800	0.14	0.14	0.14	0.14	0.14
17.050	0.13	0.13	0.13	0.13	0.13

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
17.300	0.13	0.13	0.13	0.13	0.13
17.550	0.13	0.13	0.13	0.12	0.12
17.800	0.12	0.12	0.12	0.12	0.12
18.050	0.12	0.12	0.12	0.12	0.12
18.300	0.12	0.11	0.11	0.11	0.11
18.550	0.11	0.11	0.11	0.11	0.11
18.800	0.11	0.11	0.11	0.11	0.10
19.050	0.10	0.10	0.10	0.10	0.10
19.300	0.10	0.10	0.10	0.10	0.10
19.550	0.10	0.09	0.09	0.09	0.09
19.800	0.09	0.09	0.09	0.09	0.09
20.050	0.09	0.09	0.09	0.09	0.09
20.300	0.09	0.09	0.09	0.09	0.09
20.550	0.09	0.09	0.09	0.09	0.09
20.800	0.08	0.08	0.08	0.08	0.08
21.050	0.08	0.08	0.08	0.08	0.08
21.300	0.08	0.08	0.08	0.08	0.08
21.550	0.08	0.08	0.08	0.08	0.08
21.800	0.08	0.08	0.08	0.08	0.08
22.050	0.08	0.08	0.08	0.08	0.08
22.300	0.08	0.08	0.08	0.08	0.08
22.550	0.08	0.08	0.08	0.08	0.08
22.800	0.08	0.08	0.08	0.08	0.08
23.050	0.08	0.08	0.08	0.08	0.08
23.300	0.08	0.08	0.08	0.08	0.08
23.550	0.08	0.08	0.08	0.08	0.08
23.800	0.08	0.08	0.08	0.08	0.08

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	12.07 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	11.60 ft ³ /s
Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	27,842.763 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	27,809.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	31.79 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
6.950	0.00	0.00	0.00	0.00	0.01
7.200	0.01	0.01	0.01	0.01	0.01
7.450	0.01	0.01	0.01	0.02	0.02
7.700	0.02	0.02	0.02	0.02	0.02
7.950	0.02	0.03	0.03	0.03	0.03
8.200	0.03	0.03	0.04	0.04	0.04
8.450	0.04	0.05	0.05	0.05	0.05
8.700	0.06	0.06	0.06	0.06	0.07
8.950	0.07	0.07	0.08	0.08	0.08
9.200	0.08	0.08	0.09	0.09	0.09
9.450	0.09	0.09	0.10	0.10	0.10
9.700	0.11	0.11	0.12	0.12	0.13
9.950	0.13	0.14	0.14	0.15	0.16
10.200	0.17	0.17	0.18	0.19	0.20
10.450	0.21	0.22	0.23	0.24	0.25
10.700	0.26	0.28	0.29	0.31	0.32
10.950	0.34	0.35	0.38	0.40	0.43
11.200	0.47	0.50	0.54	0.58	0.62
11.450	0.66	0.70	1.02	1.43	2.19
11.700	3.12	4.34	5.74	8.38	11.60
11.950	11.38	10.03	6.90	3.16	2.16
12.200	1.84	1.68	1.56	1.44	1.32
12.450	1.21	1.09	1.00	0.93	0.89
12.700	0.86	0.83	0.81	0.78	0.75
12.950	0.72	0.70	0.67	0.65	0.64
13.200	0.62	0.61	0.59	0.58	0.56
13.450	0.55	0.53	0.52	0.51	0.50
13.700	0.49	0.48	0.46	0.45	0.44
13.950	0.43	0.42	0.41	0.41	0.40
14.200	0.40	0.39	0.39	0.39	0.38
14.450	0.38	0.38	0.37	0.37	0.36
14.700	0.36	0.36	0.35	0.35	0.35
14.950	0.34	0.34	0.33	0.33	0.33

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
15.200	0.32	0.32	0.32	0.31	0.31
15.450	0.30	0.30	0.30	0.29	0.29
15.700	0.29	0.28	0.28	0.27	0.27
15.950	0.27	0.26	0.26	0.26	0.26
16.200	0.25	0.25	0.25	0.25	0.25
16.450	0.25	0.25	0.24	0.24	0.24
16.700	0.24	0.24	0.24	0.24	0.24
16.950	0.23	0.23	0.23	0.23	0.23
17.200	0.23	0.23	0.22	0.22	0.22
17.450	0.22	0.22	0.22	0.22	0.22
17.700	0.21	0.21	0.21	0.21	0.21
17.950	0.21	0.21	0.20	0.20	0.20
18.200	0.20	0.20	0.20	0.20	0.19
18.450	0.19	0.19	0.19	0.19	0.19
18.700	0.19	0.18	0.18	0.18	0.18
18.950	0.18	0.18	0.18	0.18	0.17
19.200	0.17	0.17	0.17	0.17	0.17
19.450	0.17	0.16	0.16	0.16	0.16
19.700	0.16	0.16	0.16	0.15	0.15
19.950	0.15	0.15	0.15	0.15	0.15
20.200	0.15	0.15	0.15	0.15	0.15
20.450	0.15	0.15	0.15	0.15	0.15
20.700	0.15	0.14	0.14	0.14	0.14
20.950	0.14	0.14	0.14	0.14	0.14
21.200	0.14	0.14	0.14	0.14	0.14
21.450	0.14	0.14	0.14	0.14	0.14
21.700	0.14	0.14	0.14	0.14	0.14
21.950	0.14	0.14	0.14	0.14	0.14
22.200	0.14	0.14	0.14	0.14	0.14
22.450	0.14	0.14	0.13	0.13	0.13
22.700	0.13	0.13	0.13	0.13	0.13
22.950	0.13	0.13	0.13	0.13	0.13
23.200	0.13	0.13	0.13	0.13	0.13
23.450	0.13	0.13	0.13	0.13	0.13
23.700	0.13	0.13	0.13	0.13	0.13
23.950	0.13	0.13	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	23.05 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	22.39 ft ³ /s
Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	2.338 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.4 in
Runoff Volume (Pervious)	54,380.689 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	54,325.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop Off-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	31.79 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.338 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
4.850	0.00	0.00	0.00	0.01	0.01
5.100	0.01	0.01	0.01	0.01	0.02
5.350	0.02	0.02	0.02	0.02	0.03
5.600	0.03	0.03	0.03	0.03	0.04
5.850	0.04	0.04	0.04	0.05	0.05
6.100	0.05	0.05	0.05	0.06	0.06
6.350	0.06	0.06	0.06	0.07	0.07
6.600	0.07	0.07	0.08	0.08	0.08
6.850	0.08	0.09	0.09	0.09	0.09
7.100	0.10	0.10	0.10	0.10	0.11
7.350	0.11	0.11	0.11	0.12	0.12
7.600	0.12	0.12	0.13	0.13	0.13
7.850	0.13	0.14	0.14	0.14	0.14
8.100	0.15	0.15	0.16	0.16	0.17
8.350	0.18	0.18	0.19	0.19	0.20
8.600	0.21	0.21	0.22	0.23	0.23
8.850	0.24	0.25	0.26	0.26	0.27
9.100	0.27	0.28	0.28	0.29	0.29
9.350	0.29	0.29	0.30	0.30	0.31
9.600	0.31	0.32	0.33	0.35	0.36
9.850	0.37	0.38	0.39	0.40	0.42
10.100	0.43	0.45	0.47	0.48	0.50
10.350	0.52	0.54	0.56	0.58	0.60
10.600	0.62	0.65	0.68	0.71	0.74
10.850	0.78	0.81	0.84	0.88	0.92
11.100	0.98	1.04	1.12	1.19	1.27
11.350	1.35	1.43	1.51	1.60	2.30
11.600	3.19	4.80	6.69	9.07	11.72
11.850	16.62	22.39	21.49	18.61	12.67
12.100	5.77	3.92	3.32	3.03	2.81
12.350	2.60	2.38	2.17	1.95	1.80
12.600	1.66	1.59	1.54	1.49	1.44
12.850	1.39	1.34	1.29	1.24	1.20

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
13.100	1.16	1.13	1.11	1.08	1.05
13.350	1.03	1.00	0.97	0.95	0.92
13.600	0.90	0.88	0.86	0.84	0.82
13.850	0.80	0.78	0.76	0.75	0.73
14.100	0.72	0.71	0.70	0.70	0.69
14.350	0.68	0.68	0.67	0.66	0.66
14.600	0.65	0.64	0.64	0.63	0.62
14.850	0.62	0.61	0.60	0.59	0.59
15.100	0.58	0.58	0.57	0.56	0.56
15.350	0.55	0.54	0.53	0.53	0.52
15.600	0.51	0.51	0.50	0.49	0.49
15.850	0.48	0.47	0.47	0.46	0.46
16.100	0.45	0.45	0.44	0.44	0.44
16.350	0.44	0.44	0.43	0.43	0.43
16.600	0.43	0.42	0.42	0.42	0.42
16.850	0.41	0.41	0.41	0.41	0.40
17.100	0.40	0.40	0.40	0.39	0.39
17.350	0.39	0.39	0.39	0.38	0.38
17.600	0.38	0.38	0.37	0.37	0.37
17.850	0.37	0.36	0.36	0.36	0.36
18.100	0.35	0.35	0.35	0.35	0.34
18.350	0.34	0.34	0.34	0.33	0.33
18.600	0.33	0.33	0.32	0.32	0.32
18.850	0.32	0.31	0.31	0.31	0.31
19.100	0.31	0.30	0.30	0.30	0.30
19.350	0.29	0.29	0.29	0.29	0.28
19.600	0.28	0.28	0.28	0.27	0.27
19.850	0.27	0.27	0.26	0.26	0.26
20.100	0.26	0.26	0.26	0.26	0.26
20.350	0.25	0.25	0.25	0.25	0.25
20.600	0.25	0.25	0.25	0.25	0.25
20.850	0.25	0.25	0.25	0.25	0.25
21.100	0.25	0.25	0.25	0.25	0.25
21.350	0.25	0.24	0.24	0.24	0.24
21.600	0.24	0.24	0.24	0.24	0.24
21.850	0.24	0.24	0.24	0.24	0.24
22.100	0.24	0.24	0.24	0.24	0.24
22.350	0.24	0.23	0.23	0.23	0.23
22.600	0.23	0.23	0.23	0.23	0.23
22.850	0.23	0.23	0.23	0.23	0.23
23.100	0.23	0.23	0.23	0.23	0.23
23.350	0.23	0.23	0.22	0.22	0.22

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop Off-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
23.600	0.22	0.22	0.22	0.22	0.22
23.850	0.22	0.22	0.22	0.22	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.80 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.75 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	0.619 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	6,957.367 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,951.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	8.42 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
2.800	0.00	0.00	0.00	0.00	0.00
3.050	0.00	0.00	0.00	0.00	0.00
3.300	0.00	0.00	0.00	0.00	0.00
3.550	0.00	0.00	0.01	0.01	0.01
3.800	0.01	0.01	0.01	0.01	0.01
4.050	0.01	0.01	0.01	0.01	0.01
4.300	0.01	0.01	0.01	0.01	0.01
4.550	0.01	0.01	0.01	0.01	0.01
4.800	0.01	0.01	0.01	0.01	0.01
5.050	0.01	0.01	0.01	0.01	0.01
5.300	0.01	0.01	0.01	0.01	0.02
5.550	0.02	0.02	0.02	0.02	0.02
5.800	0.02	0.02	0.02	0.02	0.02
6.050	0.02	0.02	0.02	0.02	0.02
6.300	0.02	0.02	0.02	0.02	0.02
6.550	0.02	0.02	0.02	0.02	0.02
6.800	0.02	0.02	0.02	0.02	0.02
7.050	0.02	0.03	0.03	0.03	0.03
7.300	0.03	0.03	0.03	0.03	0.03
7.550	0.03	0.03	0.03	0.03	0.03
7.800	0.03	0.03	0.03	0.03	0.03
8.050	0.03	0.03	0.03	0.03	0.03
8.300	0.04	0.04	0.04	0.04	0.04
8.550	0.04	0.04	0.04	0.04	0.04
8.800	0.05	0.05	0.05	0.05	0.05
9.050	0.05	0.05	0.05	0.05	0.05
9.300	0.05	0.05	0.05	0.05	0.05
9.550	0.05	0.05	0.06	0.06	0.06
9.800	0.06	0.06	0.06	0.07	0.07
10.050	0.07	0.07	0.07	0.08	0.08
10.300	0.08	0.08	0.09	0.09	0.09
10.550	0.09	0.10	0.10	0.11	0.11
10.800	0.11	0.12	0.12	0.13	0.13

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
11.050	0.14	0.14	0.15	0.16	0.17
11.300	0.18	0.19	0.20	0.21	0.22
11.550	0.32	0.44	0.65	0.90	1.19
11.800	1.51	2.08	2.75	2.59	2.21
12.050	1.49	0.68	0.46	0.39	0.35
12.300	0.33	0.30	0.28	0.25	0.23
12.550	0.21	0.19	0.18	0.18	0.17
12.800	0.17	0.16	0.15	0.15	0.14
13.050	0.14	0.13	0.13	0.13	0.12
13.300	0.12	0.12	0.12	0.11	0.11
13.550	0.11	0.10	0.10	0.10	0.10
13.800	0.09	0.09	0.09	0.09	0.09
14.050	0.08	0.08	0.08	0.08	0.08
14.300	0.08	0.08	0.08	0.08	0.08
14.550	0.08	0.07	0.07	0.07	0.07
14.800	0.07	0.07	0.07	0.07	0.07
15.050	0.07	0.07	0.07	0.06	0.06
15.300	0.06	0.06	0.06	0.06	0.06
15.550	0.06	0.06	0.06	0.06	0.06
15.800	0.06	0.05	0.05	0.05	0.05
16.050	0.05	0.05	0.05	0.05	0.05
16.300	0.05	0.05	0.05	0.05	0.05
16.550	0.05	0.05	0.05	0.05	0.05
16.800	0.05	0.05	0.05	0.05	0.05
17.050	0.05	0.05	0.05	0.05	0.04
17.300	0.04	0.04	0.04	0.04	0.04
17.550	0.04	0.04	0.04	0.04	0.04
17.800	0.04	0.04	0.04	0.04	0.04
18.050	0.04	0.04	0.04	0.04	0.04
18.300	0.04	0.04	0.04	0.04	0.04
18.550	0.04	0.04	0.04	0.04	0.04
18.800	0.04	0.04	0.04	0.04	0.04
19.050	0.03	0.03	0.03	0.03	0.03
19.300	0.03	0.03	0.03	0.03	0.03
19.550	0.03	0.03	0.03	0.03	0.03
19.800	0.03	0.03	0.03	0.03	0.03
20.050	0.03	0.03	0.03	0.03	0.03
20.300	0.03	0.03	0.03	0.03	0.03
20.550	0.03	0.03	0.03	0.03	0.03
20.800	0.03	0.03	0.03	0.03	0.03
21.050	0.03	0.03	0.03	0.03	0.03
21.300	0.03	0.03	0.03	0.03	0.03

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
21.550	0.03	0.03	0.03	0.03	0.03
21.800	0.03	0.03	0.03	0.03	0.03
22.050	0.03	0.03	0.03	0.03	0.03
22.300	0.03	0.03	0.03	0.03	0.03
22.550	0.03	0.03	0.03	0.03	0.03
22.800	0.03	0.03	0.03	0.03	0.03
23.050	0.03	0.03	0.03	0.03	0.03
23.300	0.03	0.03	0.03	0.03	0.03
23.550	0.03	0.03	0.03	0.03	0.03
23.800	0.02	0.02	0.02	0.02	0.02

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	4.37 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.30 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	0.619 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	11,155.910 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	11,147.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	8.42 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1.900	0.00	0.00	0.00	0.00	0.00
2.150	0.00	0.00	0.00	0.00	0.01
2.400	0.01	0.01	0.01	0.01	0.01
2.650	0.01	0.01	0.01	0.01	0.01
2.900	0.01	0.01	0.01	0.01	0.01
3.150	0.01	0.01	0.01	0.01	0.01
3.400	0.01	0.02	0.02	0.02	0.02
3.650	0.02	0.02	0.02	0.02	0.02
3.900	0.02	0.02	0.02	0.02	0.02
4.150	0.02	0.02	0.02	0.02	0.02
4.400	0.02	0.02	0.02	0.02	0.03
4.650	0.03	0.03	0.03	0.03	0.03
4.900	0.03	0.03	0.03	0.03	0.03
5.150	0.03	0.03	0.03	0.03	0.03
5.400	0.03	0.03	0.03	0.03	0.03
5.650	0.04	0.04	0.04	0.04	0.04
5.900	0.04	0.04	0.04	0.04	0.04
6.150	0.04	0.04	0.04	0.04	0.04
6.400	0.04	0.04	0.04	0.04	0.04
6.650	0.04	0.05	0.05	0.05	0.05
6.900	0.05	0.05	0.05	0.05	0.05
7.150	0.05	0.05	0.05	0.05	0.05
7.400	0.05	0.05	0.05	0.05	0.05
7.650	0.05	0.05	0.06	0.06	0.06
7.900	0.06	0.06	0.06	0.06	0.06
8.150	0.06	0.06	0.06	0.07	0.07
8.400	0.07	0.07	0.07	0.07	0.08
8.650	0.08	0.08	0.08	0.08	0.08
8.900	0.09	0.09	0.09	0.09	0.09
9.150	0.09	0.09	0.09	0.09	0.09
9.400	0.09	0.09	0.09	0.09	0.10
9.650	0.10	0.10	0.10	0.11	0.11
9.900	0.11	0.11	0.12	0.12	0.12

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
10.150	0.13	0.13	0.13	0.14	0.14
10.400	0.15	0.15	0.15	0.16	0.16
10.650	0.17	0.18	0.18	0.19	0.20
10.900	0.20	0.21	0.22	0.23	0.24
11.150	0.25	0.27	0.28	0.30	0.32
11.400	0.33	0.35	0.37	0.52	0.71
11.650	1.05	1.43	1.90	2.38	3.28
11.900	4.30	4.03	3.43	2.31	1.05
12.150	0.71	0.60	0.54	0.50	0.47
12.400	0.43	0.39	0.35	0.32	0.30
12.650	0.28	0.27	0.26	0.26	0.25
12.900	0.24	0.23	0.22	0.21	0.21
13.150	0.20	0.20	0.19	0.19	0.18
13.400	0.18	0.17	0.17	0.16	0.16
13.650	0.16	0.15	0.15	0.14	0.14
13.900	0.14	0.13	0.13	0.13	0.13
14.150	0.12	0.12	0.12	0.12	0.12
14.400	0.12	0.12	0.12	0.12	0.11
14.650	0.11	0.11	0.11	0.11	0.11
14.900	0.11	0.11	0.10	0.10	0.10
15.150	0.10	0.10	0.10	0.10	0.10
15.400	0.09	0.09	0.09	0.09	0.09
15.650	0.09	0.09	0.09	0.09	0.08
15.900	0.08	0.08	0.08	0.08	0.08
16.150	0.08	0.08	0.08	0.08	0.08
16.400	0.08	0.08	0.08	0.07	0.07
16.650	0.07	0.07	0.07	0.07	0.07
16.900	0.07	0.07	0.07	0.07	0.07
17.150	0.07	0.07	0.07	0.07	0.07
17.400	0.07	0.07	0.07	0.07	0.07
17.650	0.07	0.06	0.06	0.06	0.06
17.900	0.06	0.06	0.06	0.06	0.06
18.150	0.06	0.06	0.06	0.06	0.06
18.400	0.06	0.06	0.06	0.06	0.06
18.650	0.06	0.06	0.06	0.06	0.06
18.900	0.05	0.05	0.05	0.05	0.05
19.150	0.05	0.05	0.05	0.05	0.05
19.400	0.05	0.05	0.05	0.05	0.05
19.650	0.05	0.05	0.05	0.05	0.05
19.900	0.05	0.05	0.05	0.04	0.04
20.150	0.04	0.04	0.04	0.04	0.04
20.400	0.04	0.04	0.04	0.04	0.04

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
20.650	0.04	0.04	0.04	0.04	0.04
20.900	0.04	0.04	0.04	0.04	0.04
21.150	0.04	0.04	0.04	0.04	0.04
21.400	0.04	0.04	0.04	0.04	0.04
21.650	0.04	0.04	0.04	0.04	0.04
21.900	0.04	0.04	0.04	0.04	0.04
22.150	0.04	0.04	0.04	0.04	0.04
22.400	0.04	0.04	0.04	0.04	0.04
22.650	0.04	0.04	0.04	0.04	0.04
22.900	0.04	0.04	0.04	0.04	0.04
23.150	0.04	0.04	0.04	0.04	0.04
23.400	0.04	0.04	0.04	0.04	0.04
23.650	0.04	0.04	0.04	0.04	0.04
23.900	0.04	0.04	0.04	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	7.17 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	7.05 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	0.619 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.4 in
Runoff Volume (Pervious)	18,780.263 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	18,765.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	8.42 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.619 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1.200	0.00	0.00	0.00	0.00	0.01
1.450	0.01	0.01	0.01	0.01	0.01
1.700	0.01	0.01	0.01	0.01	0.02
1.950	0.02	0.02	0.02	0.02	0.02
2.200	0.02	0.02	0.02	0.02	0.02
2.450	0.03	0.03	0.03	0.03	0.03
2.700	0.03	0.03	0.03	0.03	0.03
2.950	0.03	0.03	0.03	0.04	0.04
3.200	0.04	0.04	0.04	0.04	0.04
3.450	0.04	0.04	0.04	0.04	0.04
3.700	0.04	0.04	0.04	0.05	0.05
3.950	0.05	0.05	0.05	0.05	0.05
4.200	0.05	0.05	0.05	0.05	0.05
4.450	0.05	0.06	0.06	0.06	0.06
4.700	0.06	0.06	0.06	0.06	0.06
4.950	0.06	0.06	0.06	0.06	0.07
5.200	0.07	0.07	0.07	0.07	0.07
5.450	0.07	0.07	0.07	0.07	0.07
5.700	0.07	0.07	0.08	0.08	0.08
5.950	0.08	0.08	0.08	0.08	0.08
6.200	0.08	0.08	0.08	0.08	0.08
6.450	0.08	0.09	0.09	0.09	0.09
6.700	0.09	0.09	0.09	0.09	0.09
6.950	0.09	0.09	0.09	0.09	0.09
7.200	0.10	0.10	0.10	0.10	0.10
7.450	0.10	0.10	0.10	0.10	0.10
7.700	0.10	0.10	0.10	0.10	0.11
7.950	0.11	0.11	0.11	0.11	0.11
8.200	0.11	0.12	0.12	0.12	0.13
8.450	0.13	0.13	0.13	0.14	0.14
8.700	0.14	0.14	0.15	0.15	0.15
8.950	0.16	0.16	0.16	0.16	0.16
9.200	0.16	0.16	0.16	0.16	0.16

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.450	0.16	0.16	0.17	0.17	0.17
9.700	0.18	0.18	0.19	0.19	0.19
9.950	0.20	0.20	0.21	0.21	0.22
10.200	0.23	0.23	0.24	0.25	0.25
10.450	0.26	0.27	0.27	0.28	0.29
10.700	0.30	0.32	0.33	0.34	0.35
10.950	0.36	0.37	0.39	0.41	0.43
11.200	0.46	0.48	0.51	0.53	0.56
11.450	0.59	0.61	0.87	1.19	1.76
11.700	2.39	3.15	3.95	5.41	7.05
11.950	6.60	5.60	3.77	1.71	1.15
12.200	0.98	0.89	0.82	0.76	0.69
12.450	0.63	0.57	0.52	0.48	0.46
12.700	0.45	0.43	0.42	0.40	0.39
12.950	0.37	0.36	0.35	0.34	0.33
13.200	0.32	0.31	0.30	0.30	0.29
13.450	0.28	0.27	0.26	0.26	0.25
13.700	0.25	0.24	0.24	0.23	0.22
13.950	0.22	0.21	0.21	0.21	0.20
14.200	0.20	0.20	0.20	0.19	0.19
14.450	0.19	0.19	0.19	0.18	0.18
14.700	0.18	0.18	0.18	0.18	0.17
14.950	0.17	0.17	0.17	0.17	0.16
15.200	0.16	0.16	0.16	0.16	0.15
15.450	0.15	0.15	0.15	0.15	0.14
15.700	0.14	0.14	0.14	0.14	0.13
15.950	0.13	0.13	0.13	0.13	0.13
16.200	0.13	0.13	0.12	0.12	0.12
16.450	0.12	0.12	0.12	0.12	0.12
16.700	0.12	0.12	0.12	0.12	0.12
16.950	0.12	0.12	0.11	0.11	0.11
17.200	0.11	0.11	0.11	0.11	0.11
17.450	0.11	0.11	0.11	0.11	0.11
17.700	0.11	0.10	0.10	0.10	0.10
17.950	0.10	0.10	0.10	0.10	0.10
18.200	0.10	0.10	0.10	0.10	0.10
18.450	0.09	0.09	0.09	0.09	0.09
18.700	0.09	0.09	0.09	0.09	0.09
18.950	0.09	0.09	0.09	0.09	0.09
19.200	0.08	0.08	0.08	0.08	0.08
19.450	0.08	0.08	0.08	0.08	0.08
19.700	0.08	0.08	0.08	0.08	0.07

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Bypass

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
19.950	0.07	0.07	0.07	0.07	0.07
20.200	0.07	0.07	0.07	0.07	0.07
20.450	0.07	0.07	0.07	0.07	0.07
20.700	0.07	0.07	0.07	0.07	0.07
20.950	0.07	0.07	0.07	0.07	0.07
21.200	0.07	0.07	0.07	0.07	0.07
21.450	0.07	0.07	0.07	0.07	0.07
21.700	0.07	0.07	0.07	0.07	0.07
21.950	0.07	0.07	0.07	0.07	0.07
22.200	0.07	0.07	0.07	0.07	0.07
22.450	0.07	0.07	0.07	0.07	0.07
22.700	0.07	0.07	0.06	0.06	0.06
22.950	0.06	0.06	0.06	0.06	0.06
23.200	0.06	0.06	0.06	0.06	0.06
23.450	0.06	0.06	0.06	0.06	0.06
23.700	0.06	0.06	0.06	0.06	0.06
23.950	0.06	0.06	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	30.14 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	29.54 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	6.655 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	74,800.122 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	74,735.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	90.48 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Storm Event	2-yr storm
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
2.600	0.00	0.00	0.00	0.01	0.01
2.850	0.01	0.02	0.02	0.02	0.02
3.100	0.03	0.03	0.03	0.03	0.04
3.350	0.04	0.04	0.04	0.05	0.05
3.600	0.05	0.05	0.06	0.06	0.06
3.850	0.07	0.07	0.07	0.07	0.08
4.100	0.08	0.08	0.08	0.09	0.09
4.350	0.09	0.10	0.10	0.10	0.10
4.600	0.11	0.11	0.11	0.12	0.12
4.850	0.12	0.13	0.13	0.13	0.14
5.100	0.14	0.14	0.15	0.15	0.15
5.350	0.15	0.16	0.16	0.16	0.17
5.600	0.17	0.17	0.18	0.18	0.18
5.850	0.19	0.19	0.19	0.20	0.20
6.100	0.20	0.21	0.21	0.21	0.22
6.350	0.22	0.22	0.23	0.23	0.23
6.600	0.24	0.24	0.24	0.25	0.25
6.850	0.25	0.26	0.26	0.26	0.27
7.100	0.27	0.28	0.28	0.28	0.29
7.350	0.29	0.29	0.30	0.30	0.30
7.600	0.31	0.31	0.31	0.32	0.32
7.850	0.32	0.33	0.33	0.33	0.34
8.100	0.35	0.35	0.36	0.37	0.38
8.350	0.39	0.40	0.41	0.43	0.44
8.600	0.45	0.46	0.47	0.48	0.49
8.850	0.50	0.51	0.52	0.53	0.54
9.100	0.55	0.55	0.56	0.56	0.56
9.350	0.56	0.57	0.57	0.57	0.58
9.600	0.59	0.60	0.62	0.64	0.66
9.850	0.67	0.69	0.71	0.73	0.75
10.100	0.77	0.79	0.82	0.85	0.87
10.350	0.90	0.93	0.95	0.98	1.01
10.600	1.05	1.09	1.14	1.18	1.23

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
10.850	1.27	1.32	1.36	1.41	1.48
11.100	1.55	1.65	1.75	1.86	1.97
11.350	2.08	2.19	2.30	2.41	3.44
11.600	4.72	7.01	9.62	12.79	16.18
11.850	22.42	29.54	27.86	23.79	16.07
12.100	7.29	4.93	4.17	3.79	3.51
12.350	3.24	2.97	2.70	2.43	2.24
12.600	2.07	1.98	1.91	1.85	1.79
12.850	1.73	1.66	1.60	1.54	1.49
13.100	1.44	1.40	1.37	1.34	1.30
13.350	1.27	1.24	1.20	1.17	1.14
13.600	1.11	1.09	1.06	1.04	1.01
13.850	0.99	0.97	0.94	0.92	0.90
14.100	0.89	0.87	0.86	0.86	0.85
14.350	0.84	0.83	0.82	0.82	0.81
14.600	0.80	0.79	0.78	0.77	0.76
14.850	0.76	0.75	0.74	0.73	0.72
15.100	0.72	0.71	0.70	0.69	0.68
15.350	0.67	0.66	0.66	0.65	0.64
15.600	0.63	0.62	0.62	0.61	0.60
15.850	0.59	0.58	0.57	0.56	0.56
16.100	0.55	0.55	0.54	0.54	0.54
16.350	0.54	0.53	0.53	0.53	0.52
16.600	0.52	0.52	0.52	0.51	0.51
16.850	0.51	0.50	0.50	0.50	0.49
17.100	0.49	0.49	0.48	0.48	0.48
17.350	0.48	0.47	0.47	0.47	0.46
17.600	0.46	0.46	0.46	0.45	0.45
17.850	0.45	0.44	0.44	0.44	0.43
18.100	0.43	0.43	0.43	0.42	0.42
18.350	0.42	0.41	0.41	0.41	0.40
18.600	0.40	0.40	0.40	0.39	0.39
18.850	0.39	0.38	0.38	0.38	0.37
19.100	0.37	0.37	0.37	0.36	0.36
19.350	0.36	0.35	0.35	0.35	0.34
19.600	0.34	0.34	0.34	0.33	0.33
19.850	0.33	0.32	0.32	0.32	0.32
20.100	0.31	0.31	0.31	0.31	0.31
20.350	0.31	0.31	0.31	0.31	0.31
20.600	0.31	0.31	0.31	0.31	0.30
20.850	0.30	0.30	0.30	0.30	0.30
21.100	0.30	0.30	0.30	0.30	0.30

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
21.350	0.30	0.30	0.30	0.30	0.30
21.600	0.29	0.29	0.29	0.29	0.29
21.850	0.29	0.29	0.29	0.29	0.29
22.100	0.29	0.29	0.29	0.29	0.29
22.350	0.29	0.29	0.28	0.28	0.28
22.600	0.28	0.28	0.28	0.28	0.28
22.850	0.28	0.28	0.28	0.28	0.28
23.100	0.28	0.28	0.28	0.28	0.28
23.350	0.27	0.27	0.27	0.27	0.27
23.600	0.27	0.27	0.27	0.27	0.27
23.850	0.27	0.27	0.27	0.27	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	47.01 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	46.18 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	6.655 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	119,939.545 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	119,840.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	90.48 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Storm Event	10-yr storm
Return Event	10 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1.800	0.00	0.00	0.01	0.02	0.02
2.050	0.03	0.03	0.04	0.04	0.05
2.300	0.05	0.06	0.06	0.07	0.07
2.550	0.08	0.08	0.09	0.09	0.10
2.800	0.10	0.11	0.11	0.12	0.12
3.050	0.13	0.13	0.13	0.14	0.14
3.300	0.15	0.15	0.16	0.16	0.17
3.550	0.17	0.17	0.18	0.18	0.19
3.800	0.19	0.20	0.20	0.21	0.21
4.050	0.21	0.22	0.22	0.23	0.23
4.300	0.24	0.24	0.25	0.25	0.26
4.550	0.26	0.27	0.28	0.28	0.29
4.800	0.29	0.30	0.30	0.31	0.31
5.050	0.32	0.32	0.33	0.33	0.34
5.300	0.34	0.35	0.35	0.36	0.36
5.550	0.37	0.37	0.38	0.38	0.39
5.800	0.39	0.40	0.40	0.41	0.42
6.050	0.42	0.43	0.43	0.44	0.44
6.300	0.45	0.45	0.46	0.46	0.47
6.550	0.47	0.48	0.48	0.49	0.49
6.800	0.50	0.50	0.51	0.51	0.52
7.050	0.52	0.53	0.53	0.54	0.54
7.300	0.55	0.55	0.56	0.57	0.57
7.550	0.58	0.58	0.59	0.59	0.60
7.800	0.60	0.61	0.61	0.62	0.62
8.050	0.63	0.64	0.66	0.67	0.69
8.300	0.71	0.72	0.74	0.76	0.77
8.550	0.79	0.81	0.83	0.84	0.86
8.800	0.88	0.90	0.92	0.93	0.95
9.050	0.96	0.98	0.98	0.98	0.99
9.300	0.99	0.99	1.00	1.00	1.00
9.550	1.01	1.03	1.05	1.08	1.11
9.800	1.13	1.16	1.19	1.22	1.25

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
10.050	1.28	1.32	1.36	1.40	1.44
10.300	1.48	1.53	1.57	1.61	1.66
10.550	1.71	1.77	1.83	1.90	1.97
10.800	2.05	2.12	2.19	2.26	2.34
11.050	2.44	2.56	2.72	2.89	3.06
11.300	3.23	3.40	3.58	3.75	3.93
11.550	5.58	7.64	11.29	15.42	20.37
11.800	25.63	35.26	46.18	43.34	36.87
12.050	24.86	11.27	7.60	6.43	5.85
12.300	5.42	5.00	4.58	4.17	3.75
12.550	3.45	3.18	3.05	2.94	2.85
12.800	2.75	2.66	2.56	2.46	2.37
13.050	2.29	2.22	2.16	2.11	2.05
13.300	2.00	1.95	1.90	1.85	1.80
13.550	1.75	1.71	1.67	1.63	1.59
13.800	1.56	1.52	1.48	1.45	1.41
14.050	1.38	1.36	1.34	1.33	1.32
14.300	1.30	1.29	1.28	1.26	1.25
14.550	1.24	1.22	1.21	1.20	1.19
14.800	1.17	1.16	1.15	1.14	1.12
15.050	1.11	1.10	1.08	1.07	1.06
15.300	1.05	1.03	1.02	1.01	1.00
15.550	0.98	0.97	0.95	0.94	0.93
15.800	0.92	0.90	0.89	0.88	0.86
16.050	0.85	0.85	0.84	0.84	0.83
16.300	0.83	0.82	0.82	0.81	0.81
16.550	0.80	0.80	0.79	0.79	0.79
16.800	0.78	0.78	0.77	0.77	0.76
17.050	0.76	0.75	0.75	0.74	0.74
17.300	0.74	0.73	0.72	0.72	0.72
17.550	0.71	0.71	0.70	0.70	0.69
17.800	0.69	0.68	0.68	0.68	0.67
18.050	0.67	0.66	0.66	0.65	0.65
18.300	0.64	0.64	0.63	0.63	0.62
18.550	0.62	0.61	0.61	0.61	0.60
18.800	0.60	0.59	0.59	0.58	0.58
19.050	0.57	0.57	0.56	0.56	0.56
19.300	0.55	0.55	0.54	0.54	0.53
19.550	0.53	0.52	0.52	0.51	0.51
19.800	0.50	0.50	0.50	0.49	0.49
20.050	0.48	0.48	0.48	0.48	0.48
20.300	0.48	0.47	0.47	0.47	0.47

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
20.550	0.47	0.47	0.47	0.47	0.47
20.800	0.47	0.47	0.47	0.46	0.46
21.050	0.46	0.46	0.46	0.46	0.46
21.300	0.46	0.46	0.45	0.45	0.45
21.550	0.45	0.45	0.45	0.45	0.45
21.800	0.45	0.45	0.45	0.45	0.44
22.050	0.44	0.44	0.44	0.44	0.44
22.300	0.44	0.44	0.44	0.44	0.44
22.550	0.43	0.43	0.43	0.43	0.43
22.800	0.43	0.43	0.43	0.43	0.43
23.050	0.43	0.42	0.42	0.42	0.42
23.300	0.42	0.42	0.42	0.42	0.42
23.550	0.42	0.41	0.41	0.41	0.41
23.800	0.41	0.41	0.41	0.41	0.41

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	77.08 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	75.83 ft ³ /s
Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	6.655 acres
Maximum Retention (Pervious)	0.5 in
Maximum Retention (Pervious, 20 percent)	0.1 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.4 in
Runoff Volume (Pervious)	201,910.580 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	201,751.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph Summary

Label: Prop On-Site Det.

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

SCS Unit Hydrograph Parameters

Unit peak, qp	90.48 ft ³ /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Storm Event	100-yr storm
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	6.655 acres

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1.150	0.00	0.01	0.02	0.03	0.04
1.400	0.05	0.07	0.08	0.09	0.10
1.650	0.11	0.12	0.13	0.14	0.15
1.900	0.17	0.18	0.18	0.20	0.21
2.150	0.22	0.22	0.23	0.24	0.25
2.400	0.26	0.27	0.28	0.29	0.30
2.650	0.31	0.32	0.32	0.33	0.34
2.900	0.35	0.36	0.36	0.37	0.38
3.150	0.39	0.40	0.40	0.41	0.42
3.400	0.43	0.43	0.44	0.45	0.45
3.650	0.46	0.47	0.48	0.48	0.49
3.900	0.50	0.50	0.51	0.52	0.53
4.150	0.53	0.54	0.55	0.56	0.57
4.400	0.58	0.58	0.59	0.60	0.61
4.650	0.62	0.63	0.64	0.64	0.65
4.900	0.66	0.67	0.68	0.68	0.69
5.150	0.70	0.71	0.72	0.73	0.73
5.400	0.74	0.75	0.76	0.77	0.78
5.650	0.78	0.79	0.80	0.81	0.82
5.900	0.82	0.83	0.84	0.85	0.86
6.150	0.86	0.87	0.88	0.89	0.90
6.400	0.90	0.91	0.92	0.93	0.94
6.650	0.94	0.95	0.96	0.97	0.97
6.900	0.98	0.99	1.00	1.01	1.01
7.150	1.02	1.03	1.04	1.04	1.05
7.400	1.06	1.07	1.07	1.08	1.09
7.650	1.10	1.10	1.11	1.12	1.13
7.900	1.13	1.14	1.15	1.16	1.18
8.150	1.21	1.24	1.26	1.29	1.32
8.400	1.35	1.38	1.41	1.44	1.47
8.650	1.50	1.53	1.56	1.59	1.62
8.900	1.65	1.68	1.71	1.73	1.75
9.150	1.75	1.75	1.76	1.76	1.76

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Prop On-Site Det.

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.400	1.77	1.77	1.77	1.79	1.81
9.650	1.85	1.90	1.95	1.99	2.04
9.900	2.09	2.13	2.18	2.24	2.30
10.150	2.36	2.43	2.50	2.58	2.65
10.400	2.72	2.79	2.86	2.95	3.04
10.650	3.15	3.27	3.39	3.51	3.63
10.900	3.75	3.86	3.98	4.16	4.36
11.150	4.62	4.90	5.18	5.47	5.75
11.400	6.04	6.32	6.61	9.38	12.81
11.650	18.88	25.71	33.84	42.42	58.11
11.900	75.83	70.97	60.25	40.57	18.37
12.150	12.39	10.48	9.53	8.82	8.14
12.400	7.46	6.78	6.10	5.62	5.18
12.650	4.96	4.79	4.63	4.47	4.32
12.900	4.16	4.01	3.85	3.73	3.60
13.150	3.51	3.42	3.34	3.26	3.17
13.400	3.09	3.01	2.92	2.85	2.78
13.650	2.71	2.65	2.59	2.53	2.47
13.900	2.41	2.35	2.29	2.25	2.21
14.150	2.18	2.16	2.14	2.12	2.10
14.400	2.07	2.05	2.03	2.01	1.99
14.650	1.97	1.95	1.93	1.91	1.89
14.900	1.87	1.85	1.82	1.80	1.78
15.150	1.76	1.74	1.72	1.70	1.68
15.400	1.65	1.63	1.62	1.59	1.57
15.650	1.55	1.53	1.51	1.49	1.47
15.900	1.45	1.43	1.40	1.39	1.38
16.150	1.37	1.36	1.35	1.34	1.34
16.400	1.33	1.32	1.31	1.31	1.30
16.650	1.29	1.28	1.28	1.27	1.26
16.900	1.25	1.25	1.24	1.23	1.22
17.150	1.22	1.21	1.20	1.19	1.19
17.400	1.18	1.17	1.16	1.16	1.15
17.650	1.14	1.13	1.13	1.12	1.11
17.900	1.10	1.10	1.09	1.08	1.07
18.150	1.07	1.06	1.05	1.04	1.04
18.400	1.03	1.02	1.01	1.01	1.00
18.650	0.99	0.98	0.98	0.97	0.96
18.900	0.95	0.95	0.94	0.93	0.92
19.150	0.92	0.91	0.90	0.89	0.89
19.400	0.88	0.87	0.86	0.86	0.85
19.650	0.84	0.83	0.83	0.82	0.81

1601 N US HWY 169, Smithville, MO

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: Prop On-Site Det.

Storm Event: 100-yr storm

Scenario: Post-Development 100

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
19.900	0.80	0.80	0.79	0.78	0.78
20.150	0.78	0.77	0.77	0.77	0.77
20.400	0.77	0.77	0.77	0.76	0.76
20.650	0.76	0.76	0.76	0.76	0.76
20.900	0.76	0.75	0.75	0.75	0.75
21.150	0.75	0.74	0.74	0.74	0.74
21.400	0.74	0.74	0.74	0.73	0.73
21.650	0.73	0.73	0.73	0.73	0.73
21.900	0.73	0.72	0.72	0.72	0.72
22.150	0.72	0.71	0.71	0.71	0.71
22.400	0.71	0.71	0.71	0.70	0.70
22.650	0.70	0.70	0.70	0.70	0.70
22.900	0.70	0.69	0.69	0.69	0.69
23.150	0.69	0.68	0.68	0.68	0.68
23.400	0.68	0.68	0.68	0.68	0.67
23.650	0.67	0.67	0.67	0.67	0.67
23.900	0.67	0.67	0.67	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Existing

Scenario: Pre-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Summary for Hydrograph Addition at 'Existing'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Ex Off-Site
<Catchment to Outflow Node>	Ex On-Site

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Ex Off-Site	13,725.134	11.950	5.57
Flow (From)	Ex On-Site	42,677.362	12.000	16.35
Flow (In)	Existing	56,402.495	12.000	21.63

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Existing

Scenario: Pre-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Summary for Hydrograph Addition at 'Existing'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Ex Off-Site
<Catchment to Outflow Node>	Ex On-Site

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Ex Off-Site	26,986.155	11.950	10.98
Flow (From)	Ex On-Site	83,916.452	12.000	31.84
Flow (In)	Existing	110,902.607	11.950	42.41

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Existing

Scenario: Pre-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Summary for Hydrograph Addition at 'Existing'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Ex Off-Site
<Catchment to Outflow Node>	Ex On-Site

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Ex Off-Site	53,268.040	11.950	21.20
Flow (From)	Ex On-Site	165,650.976	11.950	61.40
Flow (In)	Existing	218,919.015	11.950	82.60

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Proposed

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Summary for Hydrograph Addition at 'Proposed'

Upstream Link	Upstream Node
Outlet-1	Detention Pond
<Catchment to Outflow Node>	Prop On-Site Bypass
<Catchment to Outflow Node>	Prop Off-Site Bypass

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	63,114.282	12.100	9.58
Flow (From)	Prop On-Site Bypass	6,951.268	11.900	2.75
Flow (From)	Prop Off-Site Bypass	14,333.467	11.950	5.96
Flow (In)	Proposed	84,399.016	11.950	16.84

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Proposed

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Summary for Hydrograph Addition at 'Proposed'

Upstream Link	Upstream Node
Outlet-1	Detention Pond
<Catchment to Outflow Node>	Prop On-Site Bypass
<Catchment to Outflow Node>	Prop Off-Site Bypass

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	107,329.461	12.050	22.88
Flow (From)	Prop On-Site Bypass	11,146.681	11.900	4.30
Flow (From)	Prop Off-Site Bypass	27,809.346	11.900	11.60
Flow (In)	Proposed	146,285.489	12.000	35.01

1601 N US HWY 169, Smithville, MO

Subsection: Addition Summary

Label: Proposed

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Summary for Hydrograph Addition at 'Proposed'

Upstream Link	Upstream Node
Outlet-1	Detention Pond
<Catchment to Outflow Node>	Prop On-Site Bypass
<Catchment to Outflow Node>	Prop Off-Site Bypass

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	188,469.981	12.050	48.33
Flow (From)	Prop On-Site Bypass	18,765.409	11.900	7.05
Flow (From)	Prop Off-Site Bypass	54,324.732	11.900	22.39
Flow (In)	Proposed	261,560.122	12.000	72.19

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	913.00	913.00	913.00	913.00	913.00
0.250	913.00	913.00	913.00	913.00	913.00
0.500	913.00	913.00	913.00	913.00	913.00
0.750	913.00	913.00	913.00	913.00	913.00
1.000	913.00	913.00	913.00	913.00	913.00
1.250	913.00	913.00	913.00	913.00	913.00
1.500	913.00	913.00	913.00	913.00	913.00
1.750	913.00	913.00	913.00	913.00	913.00
2.000	913.00	913.00	913.00	913.00	913.00
2.250	913.00	913.00	913.00	913.00	913.00
2.500	913.00	913.00	913.00	913.00	913.00
2.750	913.00	913.00	913.00	913.01	913.01
3.000	913.01	913.01	913.01	913.02	913.02
3.250	913.02	913.03	913.03	913.03	913.04
3.500	913.04	913.05	913.05	913.06	913.06
3.750	913.07	913.07	913.08	913.08	913.09
4.000	913.10	913.10	913.11	913.11	913.12
4.250	913.13	913.13	913.14	913.15	913.16
4.500	913.16	913.17	913.18	913.19	913.19
4.750	913.20	913.21	913.22	913.23	913.24
5.000	913.24	913.25	913.26	913.27	913.28
5.250	913.29	913.30	913.31	913.32	913.33
5.500	913.34	913.35	913.36	913.37	913.38
5.750	913.39	913.40	913.41	913.42	913.43
6.000	913.45	913.46	913.47	913.48	913.50
6.250	913.51	913.52	913.53	913.55	913.56
6.500	913.57	913.58	913.60	913.61	913.62
6.750	913.64	913.65	913.67	913.68	913.70
7.000	913.71	913.73	913.74	913.76	913.77
7.250	913.78	913.80	913.81	913.83	913.85
7.500	913.86	913.88	913.89	913.91	913.93
7.750	913.94	913.96	913.98	913.99	914.01
8.000	914.03	914.04	914.06	914.08	914.10
8.250	914.12	914.13	914.16	914.18	914.20
8.500	914.22	914.24	914.27	914.29	914.31
8.750	914.34	914.36	914.39	914.42	914.45
9.000	914.48	914.51	914.53	914.56	914.59
9.250	914.62	914.65	914.68	914.71	914.74
9.500	914.76	914.79	914.82	914.85	914.88
9.750	914.91	914.94	914.97	915.01	915.04

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.000	915.07	915.11	915.15	915.18	915.22
10.250	915.26	915.31	915.35	915.39	915.44
10.500	915.48	915.53	915.58	915.63	915.68
10.750	915.74	915.79	915.85	915.91	915.97
11.000	916.04	916.10	916.17	916.24	916.32
11.250	916.40	916.48	916.57	916.66	916.76
11.500	916.86	916.98	917.15	917.40	917.72
11.750	918.10	918.51	918.99	919.59	920.18
12.000	920.63	920.89	920.94	920.86	920.74
12.250	920.61	920.48	920.34	920.20	920.06
12.500	919.91	919.76	919.60	919.46	919.31
12.750	919.17	919.03	918.90	918.78	918.67
13.000	918.56	918.46	918.37	918.29	918.23
13.250	918.17	918.13	918.09	918.06	918.03
13.500	918.01	917.99	917.97	917.95	917.93
13.750	917.92	917.91	917.90	917.88	917.87
14.000	917.86	917.85	917.85	917.84	917.83
14.250	917.83	917.82	917.81	917.81	917.81
14.500	917.80	917.80	917.79	917.79	917.79
14.750	917.78	917.78	917.78	917.78	917.77
15.000	917.77	917.77	917.77	917.76	917.76
15.250	917.76	917.76	917.75	917.75	917.75
15.500	917.75	917.75	917.74	917.74	917.74
15.750	917.73	917.73	917.73	917.72	917.72
16.000	917.71	917.71	917.71	917.70	917.70
16.250	917.70	917.69	917.69	917.68	917.68
16.500	917.68	917.67	917.67	917.67	917.67
16.750	917.66	917.66	917.66	917.65	917.65
17.000	917.65	917.65	917.64	917.64	917.64
17.250	917.64	917.63	917.63	917.63	917.63
17.500	917.62	917.62	917.62	917.62	917.61
17.750	917.61	917.61	917.61	917.60	917.60
18.000	917.60	917.60	917.60	917.59	917.59
18.250	917.59	917.59	917.59	917.58	917.58
18.500	917.58	917.58	917.57	917.57	917.57
18.750	917.57	917.57	917.56	917.56	917.56
19.000	917.56	917.56	917.55	917.55	917.55
19.250	917.55	917.55	917.54	917.54	917.54
19.500	917.54	917.53	917.53	917.53	917.53
19.750	917.53	917.52	917.52	917.52	917.52
20.000	917.52	917.51	917.51	917.51	917.51

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.250	917.51	917.51	917.50	917.50	917.50
20.500	917.50	917.50	917.50	917.49	917.49
20.750	917.49	917.49	917.49	917.49	917.48
21.000	917.48	917.48	917.48	917.48	917.48
21.250	917.47	917.47	917.47	917.47	917.47
21.500	917.46	917.46	917.46	917.46	917.46
21.750	917.45	917.45	917.45	917.45	917.45
22.000	917.44	917.44	917.44	917.44	917.44
22.250	917.43	917.43	917.43	917.43	917.42
22.500	917.42	917.42	917.42	917.41	917.41
22.750	917.41	917.41	917.41	917.40	917.40
23.000	917.40	917.40	917.39	917.39	917.39
23.250	917.38	917.38	917.38	917.38	917.37
23.500	917.37	917.37	917.37	917.36	917.36
23.750	917.36	917.35	917.35	917.35	917.35
24.000	917.34	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	913.00	913.00	913.00	913.00	913.00
0.250	913.00	913.00	913.00	913.00	913.00
0.500	913.00	913.00	913.00	913.00	913.00
0.750	913.00	913.00	913.00	913.00	913.00
1.000	913.00	913.00	913.00	913.00	913.00
1.250	913.00	913.00	913.00	913.00	913.00
1.500	913.00	913.00	913.00	913.00	913.00
1.750	913.00	913.00	913.00	913.00	913.00
2.000	913.00	913.01	913.01	913.01	913.02
2.250	913.02	913.03	913.03	913.04	913.05
2.500	913.05	913.06	913.07	913.08	913.08
2.750	913.09	913.10	913.11	913.12	913.13
3.000	913.14	913.15	913.16	913.17	913.19
3.250	913.20	913.21	913.22	913.23	913.24
3.500	913.26	913.27	913.28	913.29	913.31
3.750	913.32	913.33	913.35	913.36	913.37
4.000	913.39	913.40	913.42	913.43	913.45
4.250	913.46	913.48	913.50	913.51	913.53
4.500	913.54	913.56	913.58	913.59	913.61
4.750	913.63	913.65	913.66	913.68	913.70
5.000	913.72	913.74	913.76	913.78	913.80
5.250	913.82	913.84	913.86	913.88	913.90
5.500	913.92	913.94	913.97	913.99	914.01
5.750	914.03	914.05	914.07	914.10	914.12
6.000	914.14	914.16	914.19	914.21	914.23
6.250	914.26	914.28	914.30	914.33	914.35
6.500	914.37	914.40	914.42	914.45	914.47
6.750	914.50	914.52	914.55	914.57	914.60
7.000	914.63	914.65	914.68	914.70	914.73
7.250	914.76	914.78	914.81	914.83	914.86
7.500	914.89	914.91	914.94	914.97	914.99
7.750	915.02	915.05	915.07	915.10	915.12
8.000	915.15	915.18	915.21	915.23	915.26
8.250	915.29	915.32	915.35	915.38	915.42
8.500	915.45	915.49	915.52	915.56	915.59
8.750	915.63	915.67	915.71	915.75	915.79
9.000	915.83	915.87	915.91	915.95	915.99
9.250	916.03	916.07	916.11	916.15	916.19
9.500	916.23	916.27	916.31	916.35	916.39
9.750	916.43	916.47	916.52	916.56	916.61

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.000	916.65	916.70	916.75	916.80	916.85
10.250	916.90	916.96	917.01	917.07	917.13
10.500	917.19	917.25	917.31	917.37	917.44
10.750	917.51	917.57	917.64	917.70	917.76
11.000	917.82	917.87	917.92	917.96	918.01
11.250	918.05	918.09	918.13	918.16	918.20
11.500	918.23	918.29	918.40	918.58	918.87
11.750	919.25	919.73	920.35	921.12	921.83
12.000	922.27	922.44	922.35	922.12	921.88
12.250	921.67	921.50	921.34	921.19	921.05
12.500	920.91	920.77	920.63	920.48	920.33
12.750	920.18	920.04	919.89	919.75	919.61
13.000	919.47	919.34	919.21	919.08	918.96
13.250	918.85	918.74	918.64	918.54	918.46
13.500	918.38	918.31	918.26	918.21	918.17
13.750	918.13	918.10	918.08	918.06	918.04
14.000	918.02	918.01	917.99	917.98	917.97
14.250	917.96	917.95	917.95	917.94	917.93
14.500	917.93	917.92	917.91	917.91	917.90
14.750	917.90	917.89	917.89	917.89	917.88
15.000	917.88	917.87	917.87	917.87	917.86
15.250	917.86	917.86	917.85	917.85	917.85
15.500	917.84	917.84	917.84	917.83	917.83
15.750	917.83	917.82	917.82	917.82	917.81
16.000	917.81	917.81	917.80	917.80	917.80
16.250	917.80	917.79	917.79	917.79	917.79
16.500	917.79	917.78	917.78	917.78	917.78
16.750	917.78	917.78	917.77	917.77	917.77
17.000	917.77	917.77	917.77	917.77	917.77
17.250	917.76	917.76	917.76	917.76	917.76
17.500	917.76	917.76	917.76	917.76	917.75
17.750	917.75	917.75	917.75	917.75	917.75
18.000	917.75	917.74	917.74	917.74	917.74
18.250	917.74	917.74	917.73	917.73	917.73
18.500	917.73	917.72	917.72	917.72	917.72
18.750	917.72	917.71	917.71	917.71	917.71
19.000	917.70	917.70	917.70	917.69	917.69
19.250	917.69	917.69	917.68	917.68	917.68
19.500	917.67	917.67	917.67	917.67	917.66
19.750	917.66	917.66	917.65	917.65	917.65
20.000	917.65	917.64	917.64	917.64	917.63

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Label: Detention Pond (OUT)

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.250	917.63	917.63	917.63	917.62	917.62
20.500	917.62	917.62	917.62	917.61	917.61
20.750	917.61	917.61	917.61	917.61	917.61
21.000	917.60	917.60	917.60	917.60	917.60
21.250	917.60	917.60	917.60	917.59	917.59
21.500	917.59	917.59	917.59	917.59	917.59
21.750	917.59	917.59	917.59	917.58	917.58
22.000	917.58	917.58	917.58	917.58	917.58
22.250	917.58	917.58	917.58	917.58	917.58
22.500	917.57	917.57	917.57	917.57	917.57
22.750	917.57	917.57	917.57	917.57	917.57
23.000	917.57	917.57	917.57	917.57	917.56
23.250	917.56	917.56	917.56	917.56	917.56
23.500	917.56	917.56	917.56	917.56	917.56
23.750	917.56	917.56	917.56	917.56	917.55
24.000	917.55	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Return Event: 100 years

Label: Detention Pond (OUT)

Storm Event: 100-yr storm

Scenario: Post-Development 100

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	913.00	913.00	913.00	913.00	913.00
0.250	913.00	913.00	913.00	913.00	913.00
0.500	913.00	913.00	913.00	913.00	913.00
0.750	913.00	913.00	913.00	913.00	913.00
1.000	913.00	913.00	913.00	913.00	913.00
1.250	913.00	913.00	913.01	913.01	913.02
1.500	913.03	913.04	913.05	913.06	913.07
1.750	913.08	913.10	913.11	913.13	913.15
2.000	913.16	913.18	913.20	913.22	913.24
2.250	913.26	913.28	913.30	913.32	913.34
2.500	913.36	913.39	913.41	913.43	913.46
2.750	913.48	913.51	913.53	913.56	913.58
3.000	913.61	913.64	913.66	913.69	913.72
3.250	913.75	913.78	913.80	913.83	913.86
3.500	913.89	913.92	913.95	913.98	914.01
3.750	914.04	914.07	914.10	914.13	914.16
4.000	914.19	914.22	914.25	914.28	914.31
4.250	914.34	914.37	914.41	914.44	914.47
4.500	914.51	914.54	914.57	914.60	914.64
4.750	914.67	914.71	914.74	914.78	914.81
5.000	914.84	914.88	914.91	914.95	914.99
5.250	915.02	915.06	915.09	915.13	915.16
5.500	915.20	915.24	915.27	915.31	915.34
5.750	915.38	915.41	915.45	915.49	915.53
6.000	915.56	915.60	915.63	915.67	915.71
6.250	915.75	915.78	915.82	915.86	915.90
6.500	915.93	915.97	916.01	916.05	916.09
6.750	916.12	916.16	916.20	916.24	916.28
7.000	916.31	916.35	916.39	916.43	916.46
7.250	916.50	916.54	916.58	916.62	916.65
7.500	916.69	916.73	916.77	916.81	916.84
7.750	916.88	916.92	916.96	917.00	917.03
8.000	917.07	917.11	917.15	917.19	917.23
8.250	917.27	917.31	917.35	917.40	917.44
8.500	917.48	917.53	917.57	917.61	917.65
8.750	917.69	917.73	917.77	917.80	917.82
9.000	917.85	917.87	917.89	917.91	917.92
9.250	917.94	917.95	917.96	917.97	917.97
9.500	917.98	917.99	917.99	918.00	918.00
9.750	918.01	918.02	918.03	918.03	918.04

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Return Event: 100 years

Label: Detention Pond (OUT)

Storm Event: 100-yr storm

Scenario: Post-Development 100

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.000	918.05	918.06	918.07	918.07	918.08
10.250	918.09	918.10	918.12	918.13	918.14
10.500	918.15	918.16	918.17	918.19	918.20
10.750	918.22	918.24	918.25	918.27	918.29
11.000	918.31	918.33	918.36	918.39	918.42
11.250	918.45	918.49	918.54	918.58	918.63
11.500	918.69	918.79	918.97	919.28	919.74
11.750	920.34	921.06	921.88	922.77	923.45
12.000	923.79	923.83	923.54	923.09	922.72
12.250	922.43	922.18	921.96	921.77	921.60
12.500	921.45	921.32	921.19	921.06	920.95
12.750	920.83	920.71	920.60	920.48	920.36
13.000	920.24	920.11	919.99	919.87	919.76
13.250	919.64	919.53	919.42	919.31	919.20
13.500	919.10	919.00	918.91	918.82	918.73
13.750	918.65	918.58	918.51	918.45	918.39
14.000	918.34	918.30	918.26	918.23	918.20
14.250	918.18	918.16	918.14	918.13	918.11
14.500	918.10	918.10	918.09	918.08	918.07
14.750	918.07	918.06	918.06	918.05	918.05
15.000	918.04	918.04	918.03	918.03	918.03
15.250	918.02	918.02	918.01	918.01	918.01
15.500	918.00	918.00	918.00	917.99	917.99
15.750	917.98	917.98	917.97	917.97	917.96
16.000	917.96	917.95	917.95	917.94	917.94
16.250	917.94	917.93	917.93	917.93	917.92
16.500	917.92	917.92	917.91	917.91	917.91
16.750	917.91	917.91	917.90	917.90	917.90
17.000	917.90	917.89	917.89	917.89	917.89
17.250	917.89	917.88	917.88	917.88	917.88
17.500	917.88	917.87	917.87	917.87	917.87
17.750	917.87	917.87	917.86	917.86	917.86
18.000	917.86	917.86	917.85	917.85	917.85
18.250	917.85	917.85	917.84	917.84	917.84
18.500	917.84	917.84	917.83	917.83	917.83
18.750	917.83	917.83	917.83	917.82	917.82
19.000	917.82	917.82	917.82	917.81	917.81
19.250	917.81	917.81	917.81	917.80	917.80
19.500	917.80	917.80	917.80	917.79	917.79
19.750	917.79	917.79	917.79	917.79	917.78
20.000	917.78	917.78	917.78	917.78	917.77

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Elevation

Return Event: 100 years

Label: Detention Pond (OUT)

Storm Event: 100-yr storm

Scenario: Post-Development 100

Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.250	917.77	917.77	917.77	917.77	917.77
20.500	917.77	917.77	917.77	917.77	917.77
20.750	917.77	917.76	917.76	917.76	917.76
21.000	917.76	917.76	917.76	917.76	917.76
21.250	917.76	917.76	917.76	917.76	917.76
21.500	917.76	917.76	917.76	917.76	917.76
21.750	917.76	917.76	917.76	917.76	917.76
22.000	917.75	917.75	917.75	917.75	917.75
22.250	917.75	917.75	917.75	917.75	917.75
22.500	917.75	917.75	917.75	917.75	917.75
22.750	917.75	917.75	917.75	917.75	917.75
23.000	917.75	917.75	917.74	917.74	917.74
23.250	917.74	917.74	917.74	917.74	917.74
23.500	917.74	917.74	917.74	917.74	917.74
23.750	917.73	917.73	917.73	917.73	917.73
24.000	917.73	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	0.000	0.000	0.000
2.000	0.000	0.000	0.000	0.000	0.000
2.250	0.000	0.000	0.000	0.000	0.000
2.500	0.000	0.000	0.000	0.000	1.000
2.750	2.000	3.000	5.000	7.000	10.000
3.000	13.000	16.000	20.000	24.000	28.000
3.250	33.000	38.000	44.000	49.000	55.000
3.500	62.000	68.000	75.000	82.000	89.000
3.750	97.000	105.000	113.000	121.000	130.000
4.000	139.000	147.000	157.000	166.000	176.000
4.250	186.000	196.000	206.000	217.000	228.000
4.500	239.000	251.000	262.000	274.000	286.000
4.750	299.000	311.000	324.000	337.000	351.000
5.000	364.000	378.000	391.000	404.000	418.000
5.250	432.000	446.000	461.000	477.000	492.000
5.500	508.000	525.000	541.000	558.000	576.000
5.750	593.000	612.000	630.000	649.000	668.000
6.000	688.000	708.000	728.000	749.000	770.000
6.250	790.000	810.000	831.000	852.000	874.000
6.500	896.000	918.000	941.000	964.000	988.000
6.750	1,012.000	1,036.000	1,061.000	1,087.000	1,113.000
7.000	1,139.000	1,166.000	1,193.000	1,220.000	1,246.000
7.250	1,273.000	1,300.000	1,328.000	1,356.000	1,385.000
7.500	1,414.000	1,443.000	1,473.000	1,504.000	1,535.000
7.750	1,567.000	1,599.000	1,632.000	1,665.000	1,697.000
8.000	1,729.000	1,761.000	1,795.000	1,829.000	1,865.000
8.250	1,903.000	1,943.000	1,983.000	2,026.000	2,071.000
8.500	2,117.000	2,165.000	2,212.000	2,261.000	2,311.000
8.750	2,364.000	2,419.000	2,475.000	2,535.000	2,596.000
9.000	2,659.000	2,724.000	2,787.000	2,852.000	2,917.000
9.250	2,982.000	3,048.000	3,115.000	3,182.000	3,250.000
9.500	3,316.000	3,381.000	3,448.000	3,517.000	3,589.000
9.750	3,665.000	3,743.000	3,825.000	3,910.000	3,993.000

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
10.000	4,081.000	4,171.000	4,266.000	4,366.000	4,471.000
10.250	4,578.000	4,687.000	4,802.000	4,922.000	5,048.000
10.500	5,180.000	5,313.000	5,451.000	5,597.000	5,752.000
10.750	5,917.000	6,084.000	6,259.000	6,444.000	6,640.000
11.000	6,840.000	7,048.000	7,271.000	7,512.000	7,763.000
11.250	8,035.000	8,331.000	8,639.000	8,969.000	9,323.000
11.500	9,687.000	10,162.000	10,835.000	11,832.000	13,242.000
11.750	14,990.000	17,004.000	19,563.000	23,069.000	26,845.000
12.000	29,930.000	31,859.000	32,246.000	31,635.000	30,776.000
12.250	29,842.000	28,900.000	27,938.000	26,979.000	26,013.000
12.500	25,046.000	24,097.000	23,157.000	22,258.000	21,398.000
12.750	20,583.000	19,820.000	19,101.000	18,439.000	17,821.000
13.000	17,258.000	16,749.000	16,302.000	15,927.000	15,609.000
13.250	15,337.000	15,115.000	14,931.000	14,778.000	14,650.000
13.500	14,542.000	14,445.000	14,357.000	14,278.000	14,206.000
13.750	14,140.000	14,080.000	14,025.000	13,974.000	13,926.000
14.000	13,881.000	13,839.000	13,801.000	13,766.000	13,734.000
14.250	13,705.000	13,679.000	13,656.000	13,635.000	13,615.000
14.500	13,597.000	13,580.000	13,564.000	13,549.000	13,535.000
14.750	13,521.000	13,508.000	13,496.000	13,484.000	13,472.000
15.000	13,461.000	13,450.000	13,439.000	13,428.000	13,418.000
15.250	13,407.000	13,397.000	13,387.000	13,377.000	13,367.000
15.500	13,356.000	13,345.000	13,332.000	13,319.000	13,305.000
15.750	13,291.000	13,275.000	13,259.000	13,243.000	13,226.000
16.000	13,209.000	13,191.000	13,174.000	13,156.000	13,139.000
16.250	13,123.000	13,107.000	13,091.000	13,076.000	13,061.000
16.500	13,046.000	13,032.000	13,018.000	13,005.000	12,992.000
16.750	12,979.000	12,966.000	12,953.000	12,941.000	12,929.000
17.000	12,917.000	12,905.000	12,894.000	12,882.000	12,871.000
17.250	12,860.000	12,849.000	12,838.000	12,828.000	12,817.000
17.500	12,807.000	12,796.000	12,786.000	12,776.000	12,766.000
17.750	12,756.000	12,746.000	12,736.000	12,726.000	12,716.000
18.000	12,706.000	12,697.000	12,687.000	12,678.000	12,668.000
18.250	12,659.000	12,649.000	12,640.000	12,630.000	12,621.000
18.500	12,612.000	12,603.000	12,593.000	12,584.000	12,575.000
18.750	12,566.000	12,557.000	12,548.000	12,539.000	12,530.000
19.000	12,521.000	12,512.000	12,503.000	12,494.000	12,485.000
19.250	12,476.000	12,467.000	12,458.000	12,449.000	12,440.000
19.500	12,431.000	12,422.000	12,413.000	12,404.000	12,396.000
19.750	12,387.000	12,378.000	12,369.000	12,360.000	12,352.000
20.000	12,343.000	12,334.000	12,326.000	12,317.000	12,309.000

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
20.250	12,302.000	12,295.000	12,288.000	12,281.000	12,275.000
20.500	12,268.000	12,262.000	12,255.000	12,249.000	12,242.000
20.750	12,235.000	12,228.000	12,221.000	12,214.000	12,207.000
21.000	12,200.000	12,192.000	12,185.000	12,177.000	12,170.000
21.250	12,162.000	12,154.000	12,146.000	12,138.000	12,130.000
21.500	12,122.000	12,114.000	12,106.000	12,097.000	12,089.000
21.750	12,080.000	12,071.000	12,063.000	12,054.000	12,045.000
22.000	12,036.000	12,027.000	12,018.000	12,009.000	11,999.000
22.250	11,990.000	11,981.000	11,971.000	11,961.000	11,952.000
22.500	11,942.000	11,932.000	11,922.000	11,912.000	11,902.000
22.750	11,892.000	11,882.000	11,871.000	11,861.000	11,851.000
23.000	11,840.000	11,829.000	11,819.000	11,808.000	11,797.000
23.250	11,786.000	11,775.000	11,764.000	11,753.000	11,742.000
23.500	11,731.000	11,719.000	11,708.000	11,696.000	11,685.000
23.750	11,673.000	11,662.000	11,650.000	11,638.000	11,626.000
24.000	11,614.000	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	1.000	2.000	4.000
2.000	7.000	10.000	15.000	20.000	26.000
2.250	33.000	41.000	49.000	57.000	67.000
2.500	77.000	88.000	99.000	111.000	123.000
2.750	136.000	149.000	163.000	177.000	192.000
3.000	208.000	223.000	240.000	256.000	273.000
3.250	291.000	309.000	327.000	346.000	364.000
3.500	383.000	402.000	420.000	440.000	460.000
3.750	481.000	502.000	523.000	545.000	568.000
4.000	591.000	614.000	638.000	663.000	688.000
4.250	714.000	741.000	768.000	794.000	821.000
4.500	848.000	876.000	905.000	934.000	964.000
4.750	995.000	1,027.000	1,059.000	1,092.000	1,126.000
5.000	1,160.000	1,196.000	1,230.000	1,265.000	1,300.000
5.250	1,336.000	1,373.000	1,410.000	1,449.000	1,488.000
5.500	1,528.000	1,569.000	1,611.000	1,654.000	1,696.000
5.750	1,737.000	1,780.000	1,823.000	1,866.000	1,911.000
6.000	1,956.000	2,002.000	2,049.000	2,097.000	2,146.000
6.250	2,194.000	2,241.000	2,289.000	2,339.000	2,389.000
6.500	2,440.000	2,493.000	2,546.000	2,601.000	2,657.000
6.750	2,713.000	2,768.000	2,823.000	2,879.000	2,936.000
7.000	2,994.000	3,053.000	3,113.000	3,174.000	3,236.000
7.250	3,298.000	3,358.000	3,419.000	3,481.000	3,544.000
7.500	3,608.000	3,673.000	3,739.000	3,806.000	3,874.000
7.750	3,940.000	4,006.000	4,073.000	4,140.000	4,209.000
8.000	4,279.000	4,350.000	4,423.000	4,499.000	4,575.000
8.250	4,652.000	4,733.000	4,817.000	4,904.000	4,995.000
8.500	5,089.000	5,187.000	5,285.000	5,385.000	5,488.000
8.750	5,595.000	5,706.000	5,821.000	5,940.000	6,057.000
9.000	6,177.000	6,301.000	6,428.000	6,558.000	6,689.000
9.250	6,816.000	6,943.000	7,071.000	7,200.000	7,330.000
9.500	7,462.000	7,592.000	7,722.000	7,856.000	7,995.000
9.750	8,140.000	8,292.000	8,446.000	8,602.000	8,764.000

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
10.000	8,932.000	9,108.000	9,291.000	9,473.000	9,664.000
10.250	9,864.000	10,074.000	10,290.000	10,507.000	10,735.000
10.500	10,972.000	11,221.000	11,470.000	11,733.000	12,010.000
10.750	12,301.000	12,586.000	12,870.000	13,153.000	13,429.000
11.000	13,681.000	13,914.000	14,135.000	14,348.000	14,557.000
11.250	14,752.000	14,938.000	15,117.000	15,291.000	15,461.000
11.500	15,628.000	15,911.000	16,452.000	17,393.000	18,889.000
11.750	21,047.000	23,936.000	27,968.000	33,598.000	39,262.000
12.000	43,080.000	44,632.000	43,824.000	41,744.000	39,705.000
12.250	37,974.000	36,528.000	35,263.000	34,129.000	33,064.000
12.500	32,028.000	30,984.000	29,925.000	28,884.000	27,856.000
12.750	26,861.000	25,897.000	24,957.000	24,061.000	23,185.000
13.000	22,355.000	21,552.000	20,794.000	20,075.000	19,406.000
13.250	18,778.000	18,203.000	17,664.000	17,179.000	16,740.000
13.500	16,354.000	16,027.000	15,749.000	15,507.000	15,304.000
13.750	15,136.000	14,995.000	14,876.000	14,774.000	14,686.000
14.000	14,609.000	14,543.000	14,483.000	14,428.000	14,378.000
14.250	14,333.000	14,293.000	14,256.000	14,223.000	14,192.000
14.500	14,163.000	14,137.000	14,112.000	14,088.000	14,066.000
14.750	14,045.000	14,024.000	14,005.000	13,986.000	13,968.000
15.000	13,950.000	13,933.000	13,916.000	13,899.000	13,883.000
15.250	13,866.000	13,850.000	13,835.000	13,819.000	13,803.000
15.500	13,788.000	13,773.000	13,757.000	13,742.000	13,727.000
15.750	13,712.000	13,697.000	13,682.000	13,667.000	13,652.000
16.000	13,637.000	13,622.000	13,608.000	13,595.000	13,583.000
16.250	13,571.000	13,561.000	13,552.000	13,543.000	13,534.000
16.500	13,526.000	13,519.000	13,511.000	13,504.000	13,498.000
16.750	13,491.000	13,485.000	13,479.000	13,473.000	13,467.000
17.000	13,461.000	13,455.000	13,449.000	13,444.000	13,438.000
17.250	13,433.000	13,427.000	13,422.000	13,417.000	13,411.000
17.500	13,406.000	13,401.000	13,395.000	13,390.000	13,385.000
17.750	13,379.000	13,374.000	13,369.000	13,363.000	13,357.000
18.000	13,351.000	13,344.000	13,336.000	13,329.000	13,320.000
18.250	13,312.000	13,303.000	13,294.000	13,285.000	13,275.000
18.500	13,265.000	13,255.000	13,245.000	13,234.000	13,224.000
18.750	13,213.000	13,202.000	13,190.000	13,179.000	13,167.000
19.000	13,156.000	13,144.000	13,132.000	13,120.000	13,108.000
19.250	13,096.000	13,083.000	13,071.000	13,059.000	13,046.000
19.500	13,034.000	13,021.000	13,008.000	12,995.000	12,983.000
19.750	12,970.000	12,957.000	12,944.000	12,931.000	12,918.000
20.000	12,905.000	12,892.000	12,879.000	12,867.000	12,855.000

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
20.250	12,843.000	12,833.000	12,822.000	12,813.000	12,803.000
20.500	12,794.000	12,785.000	12,777.000	12,769.000	12,761.000
20.750	12,754.000	12,747.000	12,740.000	12,734.000	12,727.000
21.000	12,721.000	12,715.000	12,709.000	12,704.000	12,698.000
21.250	12,693.000	12,688.000	12,683.000	12,678.000	12,674.000
21.500	12,669.000	12,665.000	12,660.000	12,656.000	12,652.000
21.750	12,648.000	12,644.000	12,640.000	12,636.000	12,632.000
22.000	12,629.000	12,625.000	12,621.000	12,618.000	12,614.000
22.250	12,611.000	12,607.000	12,604.000	12,601.000	12,597.000
22.500	12,594.000	12,591.000	12,588.000	12,585.000	12,582.000
22.750	12,579.000	12,575.000	12,572.000	12,569.000	12,566.000
23.000	12,563.000	12,560.000	12,557.000	12,554.000	12,551.000
23.250	12,548.000	12,546.000	12,543.000	12,540.000	12,537.000
23.500	12,534.000	12,531.000	12,528.000	12,526.000	12,523.000
23.750	12,520.000	12,517.000	12,514.000	12,512.000	12,509.000
24.000	12,507.000	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Return Event: 100 years

Label: Detention Pond

Storm Event: 100-yr storm

Scenario: Post-Development 100

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	1.000
1.250	3.000	7.000	13.000	21.000	30.000
1.500	42.000	55.000	70.000	86.000	104.000
1.750	123.000	144.000	166.000	189.000	214.000
2.000	240.000	267.000	295.000	325.000	355.000
2.250	386.000	416.000	448.000	481.000	516.000
2.500	551.000	588.000	627.000	666.000	707.000
2.750	749.000	791.000	832.000	874.000	918.000
3.000	963.000	1,009.000	1,057.000	1,106.000	1,156.000
3.250	1,207.000	1,257.000	1,307.000	1,359.000	1,411.000
3.500	1,466.000	1,521.000	1,578.000	1,636.000	1,694.000
3.750	1,751.000	1,809.000	1,867.000	1,928.000	1,989.000
4.000	2,051.000	2,115.000	2,179.000	2,242.000	2,306.000
4.250	2,371.000	2,439.000	2,508.000	2,579.000	2,653.000
4.500	2,727.000	2,799.000	2,873.000	2,948.000	3,025.000
4.750	3,104.000	3,185.000	3,267.000	3,347.000	3,428.000
5.000	3,510.000	3,595.000	3,681.000	3,768.000	3,858.000
5.250	3,946.000	4,034.000	4,123.000	4,215.000	4,308.000
5.500	4,403.000	4,499.000	4,594.000	4,689.000	4,786.000
5.750	4,885.000	4,986.000	5,089.000	5,194.000	5,296.000
6.000	5,399.000	5,504.000	5,612.000	5,721.000	5,832.000
6.250	5,945.000	6,055.000	6,166.000	6,279.000	6,395.000
6.500	6,513.000	6,633.000	6,753.000	6,871.000	6,991.000
6.750	7,112.000	7,236.000	7,362.000	7,490.000	7,615.000
7.000	7,740.000	7,867.000	7,997.000	8,128.000	8,262.000
7.250	8,397.000	8,528.000	8,662.000	8,797.000	8,935.000
7.500	9,075.000	9,217.000	9,358.000	9,497.000	9,639.000
7.750	9,782.000	9,927.000	10,075.000	10,225.000	10,370.000
8.000	10,516.000	10,666.000	10,819.000	10,977.000	11,141.000
8.250	11,307.000	11,475.000	11,649.000	11,829.000	12,016.000
8.500	12,209.000	12,399.000	12,583.000	12,762.000	12,938.000
8.750	13,109.000	13,277.000	13,435.000	13,576.000	13,703.000
9.000	13,817.000	13,919.000	14,010.000	14,090.000	14,159.000
9.250	14,220.000	14,272.000	14,317.000	14,356.000	14,390.000
9.500	14,420.000	14,447.000	14,474.000	14,502.000	14,533.000
9.750	14,564.000	14,598.000	14,632.000	14,667.000	14,703.000

1601 N US HWY 169, Smithville, MO

Subsection: Time vs. Volume

Label: Detention Pond

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Time vs. Volume (ft³)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)	Volume (ft ³)
20.250	13,472.000	13,467.000	13,463.000	13,458.000	13,454.000
20.500	13,450.000	13,447.000	13,444.000	13,441.000	13,438.000
20.750	13,436.000	13,433.000	13,431.000	13,428.000	13,426.000
21.000	13,424.000	13,422.000	13,420.000	13,418.000	13,416.000
21.250	13,414.000	13,412.000	13,411.000	13,409.000	13,407.000
21.500	13,405.000	13,404.000	13,402.000	13,400.000	13,398.000
21.750	13,397.000	13,395.000	13,393.000	13,391.000	13,390.000
22.000	13,388.000	13,386.000	13,384.000	13,383.000	13,381.000
22.250	13,379.000	13,378.000	13,376.000	13,374.000	13,372.000
22.500	13,371.000	13,369.000	13,367.000	13,365.000	13,364.000
22.750	13,362.000	13,359.000	13,357.000	13,354.000	13,352.000
23.000	13,349.000	13,346.000	13,343.000	13,340.000	13,337.000
23.250	13,333.000	13,330.000	13,327.000	13,324.000	13,320.000
23.500	13,316.000	13,313.000	13,309.000	13,305.000	13,302.000
23.750	13,298.000	13,294.000	13,290.000	13,286.000	13,282.000
24.000	13,279.000	(N/A)	(N/A)	(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =2.08
H =2.33
H =2.58
H =2.83
H =2.98
H =3.08
H =3.33
H =3.58
H =3.83
H =4.08
H =4.33
H =4.58
H =4.83
H =5.08
H =5.33
H =5.58
H =5.82
H =5.68
H =5.56
H =5.44
H =5.33
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
Weir: H =0.25ft
Weir: H =0.5ft
Weir: H =0.75ft
Orifice: H =1.00; Riser orifice equation controlling.
Orifice: H =1.25; Riser orifice equation controlling.
Orifice: H =1.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
Orifice: H =1.75; Riser orifice equation controlling.
Orifice: H =2.00; Riser orifice equation controlling.
Orifice: H =2.25; Riser orifice equation controlling.
Orifice: H =2.50; Riser orifice equation controlling.
Orifice: H =2.75; Riser orifice equation controlling.
Orifice: H =3.00; Riser orifice equation controlling.
Orifice: H =3.25; Riser orifice equation controlling.
Orifice: H =3.50; Riser orifice equation controlling.
Orifice: H =3.75; Riser orifice equation controlling.
Orifice: H =4.00; Riser orifice equation controlling.
Orifice: H =4.25; Riser orifice equation controlling.
Orifice: H =4.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .044ft Dcr= .131ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .048ft Dcr= .142ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .050ft Dcr= .146ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .052ft Dcr= .154ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .054ft Dcr= .161ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .057ft Dcr= .167ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .058ft Dcr= .171ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .059ft Dcr= .175ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .060ft Dcr= .177ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .062ft Dcr= .182ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .063ft Dcr= .185ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .064ft Dcr= .188ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .195ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .068ft Dcr= .200ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .100ft Dcr= .290ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .159ft Dcr= .451ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .223ft Dcr= .616ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .271ft Dcr= .733ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .299ft Dcr= .799ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .323ft Dcr= .852ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .344ft Dcr= .899ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .362ft Dcr= .937ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .379ft Dcr= .973ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .395ft Dcr= 1.005ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .410ft Dcr= 1.034ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .424ft Dcr= 1.061ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .437ft Dcr= 1.086ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .445ft Dcr= 1.100ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .450ft Dcr= 1.109ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .463ft Dcr= 1.132ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .475ft Dcr= 1.153ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .486ft Dcr= 1.174ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .497ft Dcr= 1.192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .508ft Dcr= 1.210ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .519ft Dcr= 1.228ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .613ft Dcr= 1.365ft
CRIT.DEPTH Hev= .00ft
H =1.57
H =2.68
H =3.41
H =3.93
H =4.32
H =4.69
H =5.06
H =5.42
H =5.76
H =6.10
H =6.44
H =6.77
H =7.10
H =7.42

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
H =7.73
H =8.06
H =8.37

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Tailwater (Pond Outfall)

Computation Messages

WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Tailwater (Pond Outfall)

Computation Messages

H =4.98

H =5.23

H =5.48

1601 N US HWY 169, Smithville, MO

Subsection: Composite Rating Curve

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
923.25	40.29	(N/A)	0.00
923.50	44.52	(N/A)	0.00
923.75	47.61	(N/A)	0.00
924.00	50.00	(N/A)	0.00
924.25	52.25	(N/A)	0.00
924.50	54.40	(N/A)	0.00
924.75	56.41	(N/A)	0.00
925.00	58.30	(N/A)	0.00
925.25	60.15	(N/A)	0.00
925.50	61.93	(N/A)	0.00
925.75	63.61	(N/A)	0.00
926.00	65.27	(N/A)	0.00
926.25	66.86	(N/A)	0.00
926.50	68.38	(N/A)	0.00
926.75	69.93	(N/A)	0.00
927.00	71.39	(N/A)	0.00

Contributing Structures

(no Q: Orifice - 2,Riser - 1,Orifice - 1,out,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
 Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)

1601 N US HWY 169, Smithville, MO

Subsection: Composite Rating Curve

Label: Primary

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Composite Outflow Summary

Contributing Structures
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)

1601 N US HWY 169, Smithville, MO

Subsection: Outlet Input Data

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Requested Pond Water Surface Elevations

Minimum (Headwater)	913.00 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	927.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	out	917.50	927.00
Stand Pipe	Riser - 1	Forward	out	922.50	927.00
Orifice-Circular	Orifice - 1	Forward	out	913.00	927.00
Orifice-Circular	out	Forward	TW	913.00	927.00
Orifice-Circular	Orifice - 3	Forward	TW	920.90	927.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Outlet Input Data

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Structure ID: Orifice - 1

Structure Type: Orifice-Circular

Number of Openings	1
Elevation	913.00 ft
Orifice Diameter	2.5 in
Orifice Coefficient	0.600

Structure ID: Orifice - 2

Structure Type: Orifice-Circular

Number of Openings	2
Elevation	917.50 ft
Orifice Diameter	10.0 in
Orifice Coefficient	0.600

Structure ID: Riser - 1

Structure Type: Stand Pipe

Number of Openings	1
Elevation	922.50 ft
Diameter	24.0 in
Orifice Area	3.1 ft ²
Orifice Coefficient	0.600
Weir Length	6.28 ft
Weir Coefficient	3.00 (ft ^{0.5})/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: out

Structure Type: Orifice-Circular

Number of Openings	1
Elevation	913.00 ft
Orifice Diameter	24.0 in
Orifice Coefficient	0.600

Structure ID: Orifice - 3

Structure Type: Orifice-Circular

Number of Openings	2
Elevation	920.90 ft
Orifice Diameter	15.0 in
Orifice Coefficient	0.600

1601 N US HWY 169, Smithville, MO

Subsection: Outlet Input Data

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =2.27
H =2.52
H =2.76
H =3.01
H =3.25
H =3.50
H =3.74
H =3.99
H =4.23
H =4.36
H =4.39
H =4.41
H =4.50
H =4.65
H =4.83
H =5.01
H =5.20
H =5.40
H =5.60
H =5.81
H =6.02
H =6.23
H =6.36
H =6.44
H =6.65
H =6.87
H =7.09
H =7.31
H =7.53
H =7.75
H =7.77
H =7.43
H =6.57
H =6.09
H =5.82
H =5.68
H =5.56
H =5.44
H =5.33

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
CRIT.DEPTH CONTROL Vh= .065ft Dcr= .185ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .137ft Dcr= .362ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .225ft Dcr= .525ft CRIT.DEPTH Hev= .00ft
H =.58
H =.83
H =1.08
H =1.33
H =1.58
H =1.83

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =2.08
H =2.33
H =2.58
H =2.83
H =2.98
H =3.08
H =3.33
H =3.58
H =3.83
H =4.08
H =4.33
H =4.58
H =4.83
H =5.08
H =5.33
H =5.58
H =5.82
H =5.68
H =5.56
H =5.44
H =5.33
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
921.50	0.00	0.00	0.00	914.63	0.00	0.00	(N/A)	0.00
921.75	0.00	0.00	0.00	914.66	0.00	0.00	(N/A)	0.00
922.00	0.00	0.00	0.00	914.69	0.00	0.00	(N/A)	0.00
922.25	0.00	0.00	0.00	914.72	0.00	0.00	(N/A)	0.00
922.50	0.00	0.00	0.00	914.75	0.00	0.00	(N/A)	0.00
922.75	2.36	922.75	Free Outfall	914.98	0.00	0.00	(N/A)	0.00
923.00	6.66	923.00	Free Outfall	915.57	0.00	0.00	(N/A)	0.00
923.25	12.24	923.25	Free Outfall	916.68	0.00	0.00	(N/A)	0.00
923.50	15.12	923.50	Free Outfall	917.41	0.00	0.00	(N/A)	0.00
923.75	16.91	923.75	Free Outfall	917.93	0.00	0.00	(N/A)	0.00
924.00	18.52	924.00	Free Outfall	918.32	0.00	0.00	(N/A)	0.00
924.25	20.00	924.25	Free Outfall	918.69	0.00	0.00	(N/A)	0.00
924.50	21.38	924.50	Free Outfall	919.06	0.00	0.00	(N/A)	0.00
924.75	22.68	924.75	Free Outfall	919.42	0.00	0.00	(N/A)	0.00
925.00	23.91	925.00	Free Outfall	919.76	0.00	0.00	(N/A)	0.00
925.25	25.07	925.25	Free Outfall	920.10	0.00	0.00	(N/A)	0.00
925.50	26.19	925.50	Free Outfall	920.44	0.00	0.00	(N/A)	0.00
925.75	27.26	925.75	Free Outfall	920.77	0.00	0.00	(N/A)	0.00
926.00	28.29	926.00	Free Outfall	921.10	0.00	0.00	(N/A)	0.00
926.25	29.28	926.25	Free Outfall	921.42	0.00	0.00	(N/A)	0.00
926.50	30.24	926.50	Free Outfall	921.73	0.00	0.00	(N/A)	0.00
926.75	31.17	926.75	Free Outfall	922.06	0.00	0.00	(N/A)	0.00
927.00	32.08	927.00	Free Outfall	922.37	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.
 WS below an invert; no flow.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
Weir: H =0.25ft
Weir: H =0.5ft
Weir: H =0.75ft
Orifice: H =1.00; Riser orifice equation controlling.
Orifice: H =1.25; Riser orifice equation controlling.
Orifice: H =1.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
Orifice: H =1.75; Riser orifice equation controlling.
Orifice: H =2.00; Riser orifice equation controlling.
Orifice: H =2.25; Riser orifice equation controlling.
Orifice: H =2.50; Riser orifice equation controlling.
Orifice: H =2.75; Riser orifice equation controlling.
Orifice: H =3.00; Riser orifice equation controlling.
Orifice: H =3.25; Riser orifice equation controlling.
Orifice: H =3.50; Riser orifice equation controlling.
Orifice: H =3.75; Riser orifice equation controlling.
Orifice: H =4.00; Riser orifice equation controlling.
Orifice: H =4.25; Riser orifice equation controlling.
Orifice: H =4.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
913.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
913.25	0.06	913.11	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
913.50	0.10	913.14	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
913.75	0.13	913.16	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
914.00	0.15	913.18	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
914.25	0.17	913.19	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
914.50	0.18	913.20	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
914.75	0.20	913.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
915.00	0.22	913.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
915.25	0.24	913.22	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
915.50	0.25	913.23	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
915.75	0.26	913.23	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
916.00	0.27	913.24	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
916.25	0.28	913.24	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
916.50	0.30	913.25	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
916.75	0.30	913.25	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
917.00	0.32	913.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
917.25	0.32	913.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
917.50	0.34	913.27	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
917.75	0.71	913.39	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
918.00	1.70	913.61	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
918.25	3.12	913.84	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
918.50	4.36	914.00	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
918.75	5.14	914.10	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
919.00	5.82	914.17	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
919.25	6.44	914.24	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
919.50	6.97	914.30	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
919.75	7.49	914.35	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
920.00	7.97	914.40	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
920.25	8.42	914.44	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
920.50	8.84	914.48	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
920.75	9.24	914.52	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
920.90	9.48	914.54	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
921.00	9.63	914.56	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
921.25	10.01	914.60	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft ³ /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft ³ /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
921.50	10.37	914.63	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
921.75	10.72	914.66	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
922.00	11.05	914.69	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
922.25	11.37	914.72	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
922.50	11.69	914.75	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
922.75	14.35	914.98	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
923.00	18.95	915.57	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
923.25	24.77	916.68	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
923.50	27.92	917.41	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
923.75	29.99	917.93	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00
924.00	31.42	918.32	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
924.25	32.75	918.69	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
924.50	34.03	919.06	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
924.75	35.20	919.42	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
925.00	36.28	919.76	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00
925.25	37.36	920.10	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
925.50	38.38	920.44	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
925.75	39.33	920.77	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
926.00	40.28	921.10	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
926.25	41.19	921.42	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
926.50	42.03	921.73	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00
926.75	42.93	922.06	Free Outfall	Free Outfall	0.00	0.04	(N/A)	0.00
927.00	43.75	922.37	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00

Message

WS below an invert; no flow.

CRIT.DEPTH CONTROL

Vh= .028ft Dcr= .084ft

CRIT.DEPTH Hev= .00ft

CRIT.DEPTH CONTROL

Vh= .036ft Dcr= .106ft

CRIT.DEPTH Hev= .00ft

CRIT.DEPTH CONTROL

Vh= .040ft Dcr= .121ft

CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .044ft Dcr= .131ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .048ft Dcr= .142ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .050ft Dcr= .146ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .052ft Dcr= .154ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .054ft Dcr= .161ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .057ft Dcr= .167ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .058ft Dcr= .171ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .059ft Dcr= .175ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .060ft Dcr= .177ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .062ft Dcr= .182ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .063ft Dcr= .185ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .064ft Dcr= .188ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .195ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .068ft Dcr= .200ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .100ft Dcr= .290ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .159ft Dcr= .451ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .223ft Dcr= .616ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .271ft Dcr= .733ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .299ft Dcr= .799ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .323ft Dcr= .852ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .344ft Dcr= .899ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .362ft Dcr= .937ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .379ft Dcr= .973ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .395ft Dcr= 1.005ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .410ft Dcr= 1.034ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .424ft Dcr= 1.061ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .437ft Dcr= 1.086ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .445ft Dcr= 1.100ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .450ft Dcr= 1.109ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .463ft Dcr= 1.132ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .475ft Dcr= 1.153ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .486ft Dcr= 1.174ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .497ft Dcr= 1.192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .508ft Dcr= 1.210ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .519ft Dcr= 1.228ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .613ft Dcr= 1.365ft
CRIT.DEPTH Hev= .00ft
H =1.57
H =2.68
H =3.41
H =3.93
H =4.32
H =4.69
H =5.06
H =5.42
H =5.76
H =6.10
H =6.44
H =6.77
H =7.10
H =7.42

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
H =7.73
H =8.06
H =8.37

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
913.00	0.00	(N/A)	0.00
913.25	0.00	(N/A)	0.00
913.50	0.00	(N/A)	0.00
913.75	0.00	(N/A)	0.00
914.00	0.00	(N/A)	0.00
914.25	0.00	(N/A)	0.00
914.50	0.00	(N/A)	0.00
914.75	0.00	(N/A)	0.00
915.00	0.00	(N/A)	0.00
915.25	0.00	(N/A)	0.00
915.50	0.00	(N/A)	0.00
915.75	0.00	(N/A)	0.00
916.00	0.00	(N/A)	0.00
916.25	0.00	(N/A)	0.00
916.50	0.00	(N/A)	0.00
916.75	0.00	(N/A)	0.00
917.00	0.00	(N/A)	0.00
917.25	0.00	(N/A)	0.00
917.50	0.00	(N/A)	0.00
917.75	0.00	(N/A)	0.00
918.00	0.00	(N/A)	0.00
918.25	0.00	(N/A)	0.00
918.50	0.00	(N/A)	0.00
918.75	0.00	(N/A)	0.00
919.00	0.00	(N/A)	0.00
919.25	0.00	(N/A)	0.00
919.50	0.00	(N/A)	0.00
919.75	0.00	(N/A)	0.00
920.00	0.00	(N/A)	0.00
920.25	0.00	(N/A)	0.00
920.50	0.00	(N/A)	0.00
920.75	0.00	(N/A)	0.00
920.90	0.00	(N/A)	0.00
921.00	0.08	(N/A)	0.00
921.25	0.89	(N/A)	0.00
921.50	2.48	(N/A)	0.00
921.75	4.67	(N/A)	0.00

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Tailwater (Pond Outfall)

Computation Messages

H =4.98

H =5.23

H =5.48

1601 N US HWY 169, Smithville, MO

Subsection: Composite Rating Curve

Label: Primary

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Composite Outflow Summary

Contributing Structures
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 1,out (no Q: Orifice - 2,Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)
Orifice - 2,Orifice - 1,out (no Q: Riser - 1,Orifice - 3)

1601 N US HWY 169, Smithville, MO

Subsection: Outlet Input Data

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Requested Pond Water Surface Elevations

Minimum (Headwater)	913.00 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	927.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	out	917.50	927.00
Stand Pipe	Riser - 1	Forward	out	922.50	927.00
Orifice-Circular	Orifice - 1	Forward	out	913.00	927.00
Orifice-Circular	out	Forward	TW	913.00	927.00
Orifice-Circular	Orifice - 3	Forward	TW	920.90	927.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

1601 N US HWY 169, Smithville, MO

Subsection: Outlet Input Data

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =2.27
H =2.52
H =2.76
H =3.01
H =3.25
H =3.50
H =3.74
H =3.99
H =4.23
H =4.36
H =4.39
H =4.41
H =4.50
H =4.65
H =4.83
H =5.01
H =5.20
H =5.40
H =5.60
H =5.81
H =6.02
H =6.23
H =6.36
H =6.44
H =6.65
H =6.87
H =7.09
H =7.31
H =7.53
H =7.75
H =7.77
H =7.43
H =6.57
H =6.09
H =5.82
H =5.68
H =5.56
H =5.44
H =5.33

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
CRIT.DEPTH CONTROL Vh= .065ft Dcr= .185ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .137ft Dcr= .362ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .225ft Dcr= .525ft CRIT.DEPTH Hev= .00ft
H =.58
H =.83
H =1.08
H =1.33
H =1.58
H =1.83

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
H =2.08
H =2.33
H =2.58
H =2.83
H =2.98
H =3.08
H =3.33
H =3.58
H =3.83
H =4.08
H =4.33
H =4.58
H =4.83
H =5.08
H =5.33
H =5.58
H =5.82
H =5.68
H =5.56
H =5.44
H =5.33
H =5.24
H =5.15
H =5.06
H =4.98
H =4.90
H =4.83
H =4.77
H =4.69
H =4.63

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
WS below an invert; no flow.
Weir: H =0.25ft
Weir: H =0.5ft
Weir: H =0.75ft
Orifice: H =1.00; Riser orifice equation controlling.
Orifice: H =1.25; Riser orifice equation controlling.
Orifice: H =1.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)

Downstream ID = out (Orifice-Circular)

Message
Orifice: H =1.75; Riser orifice equation controlling.
Orifice: H =2.00; Riser orifice equation controlling.
Orifice: H =2.25; Riser orifice equation controlling.
Orifice: H =2.50; Riser orifice equation controlling.
Orifice: H =2.75; Riser orifice equation controlling.
Orifice: H =3.00; Riser orifice equation controlling.
Orifice: H =3.25; Riser orifice equation controlling.
Orifice: H =3.50; Riser orifice equation controlling.
Orifice: H =3.75; Riser orifice equation controlling.
Orifice: H =4.00; Riser orifice equation controlling.
Orifice: H =4.25; Riser orifice equation controlling.
Orifice: H =4.50; Riser orifice equation controlling.

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .044ft Dcr= .131ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .048ft Dcr= .142ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .050ft Dcr= .146ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .052ft Dcr= .154ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .054ft Dcr= .161ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .057ft Dcr= .167ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .058ft Dcr= .171ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .059ft Dcr= .175ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .060ft Dcr= .177ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .062ft Dcr= .182ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .063ft Dcr= .185ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .064ft Dcr= .188ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .066ft Dcr= .195ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .068ft Dcr= .200ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .100ft Dcr= .290ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .159ft Dcr= .451ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .223ft Dcr= .616ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .271ft Dcr= .733ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .299ft Dcr= .799ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .323ft Dcr= .852ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .344ft Dcr= .899ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .362ft Dcr= .937ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .379ft Dcr= .973ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .395ft Dcr= 1.005ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .410ft Dcr= 1.034ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .424ft Dcr= 1.061ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .437ft Dcr= 1.086ft
CRIT.DEPTH Hev= .00ft

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
CRIT.DEPTH CONTROL
Vh= .445ft Dcr= 1.100ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .450ft Dcr= 1.109ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .463ft Dcr= 1.132ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .475ft Dcr= 1.153ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .486ft Dcr= 1.174ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .497ft Dcr= 1.192ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .508ft Dcr= 1.210ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .519ft Dcr= 1.228ft
CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL
Vh= .613ft Dcr= 1.365ft
CRIT.DEPTH Hev= .00ft
H =1.57
H =2.68
H =3.41
H =3.93
H =4.32
H =4.69
H =5.06
H =5.42
H =5.76
H =6.10
H =6.44
H =6.77
H =7.10
H =7.42

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = out (Orifice-Circular)

Upstream ID = Orifice - 2, Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message
H =7.73
H =8.06
H =8.37

1601 N US HWY 169, Smithville, MO

Subsection: Individual Outlet Curves

Label: Primary

Scenario: Post-Development 100

Return Event: 100 years

Storm Event: 100-yr storm

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)

Downstream ID = Tailwater (Pond Outfall)

Computation Messages

H =4.98

H =5.23

H =5.48

1601 N US HWY 169, Smithville, MO

Subsection: Level Pool Pond Routing Summary

Label: Detention Pond (IN)

Scenario: Post-Development 2

Return Event: 2 years

Storm Event: 2-yr storm

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)		913.00 ft	
Volume (Initial)		0.000 ft³	
Flow (Initial Outlet)		0.00 ft³/s	
Flow (Initial Infiltration)		0.00 ft³/s	
Flow (Initial, Total)		0.00 ft³/s	
Time Increment		0.050 hours	
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)		29.54 ft³/s	Time to Peak (Flow, In)
Flow (Peak Outlet)		9.58 ft³/s	Time to Peak (Flow, Outlet)
			11.900 hours
			12.100 hours
Elevation (Water Surface, Peak)		920.94 ft	
Volume (Peak)		32,246.370 ft³	
Mass Balance (ft³)			
Volume (Initial)		0.000 ft³	
Volume (Total Inflow)		74,735.000 ft³	
Volume (Total Infiltration)		0.000 ft³	
Volume (Total Outlet Outflow)		63,114.000 ft³	
Volume (Retained)		11,555.000 ft³	
Volume (Unrouted)		-65.000 ft³	
Error (Mass Balance)		0.1 %	

1601 N US HWY 169, Smithville, MO

Subsection: Level Pool Pond Routing Summary

Label: Detention Pond (IN)

Scenario: Post-Development 10

Return Event: 10 years

Storm Event: 10-yr storm

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)		913.00 ft	
Volume (Initial)		0.000 ft ³	
Flow (Initial Outlet)		0.00 ft ³ /s	
Flow (Initial Infiltration)		0.00 ft ³ /s	
Flow (Initial, Total)		0.00 ft ³ /s	
Time Increment		0.050 hours	
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)		46.18 ft ³ /s	Time to Peak (Flow, In)
Flow (Peak Outlet)		22.88 ft ³ /s	Time to Peak (Flow, Outlet)
			11.900 hours
			12.050 hours
Elevation (Water Surface, Peak)			
Elevation (Water Surface, Peak)		922.44 ft	
Volume (Peak)			
Volume (Peak)		44,631.902 ft ³	
Mass Balance (ft ³)			
Volume (Initial)		0.000 ft ³	
Volume (Total Inflow)		119,840.000 ft ³	
Volume (Total Infiltration)		0.000 ft ³	
Volume (Total Outlet Outflow)		107,329.000 ft ³	
Volume (Retained)		12,434.000 ft ³	
Volume (Unrouted)		-77.000 ft ³	
Error (Mass Balance)		0.1 %	

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