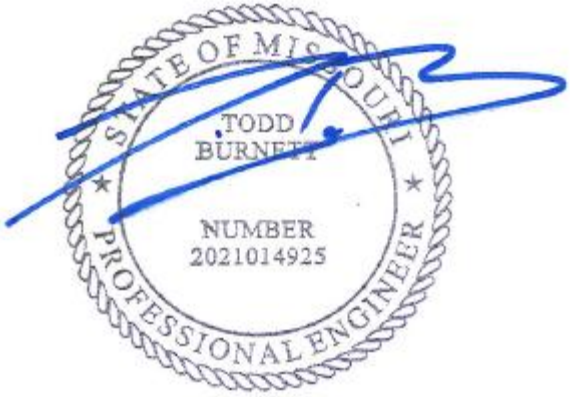
STORMWATER MANAGEMENT REPORT

Caliber Collision
710 SE 7th Terrace
Lee's Summit, Missouri 64063



Original Submittal: 07/23/2021
Revised 02/09/2022

Prepared by
Freeland and Kauffman, Inc.
Engineers – Landscape Architects
209 West Stone Avenue
Greenville, SC 29609
864-233-5497

INDEX

I. PROJECT DESCRIPTION

The following is the stormwater management report for the proposed Caliber Collision at 710 SE 7th Terrace in Lee's Summit, Missouri This site is approximately 1.38 acres . Development will consist of the construction of a 11,500 square foot Caliber Collision automotive collision repair facility, all associated utilities, vehicle storage area, parking areas, grading, landscaping, and stormwater management facilities. As there is not enough surface area available due to site restraints and landscape requirements, a StormTech Underground Detention System is proposed for the developed site's stormwater runoff requirements. This underground detention system consists of 60" high MC-4500 Chambers with 9" of stone below the chambers and 12 "of stone above the chambers with a total storage height of 81" from elev. 2006.0 to elev. 2012.75. After running through the outlet control structure an 18" stormwater pipe will tie to a proposed manhole which will tie to an existing storm sewer structure located within the existing drainage easement at the northeast corner of the site in Lot 3 Chapman Plaza II. All of the runoff from the developed site (approximately 1.1 acres in total) is captured by/treated by the underground detention system. A storm sewer system is provided along the north side of site to by-pass the runoff from future development to the west of the site. The construction activities for the Caliber Collision discussed above will disturb approximately 1.30 acres.

The property is bordered by SE 7th Terrace to the north, SE Blue Parkway to the south, Calvert's Express Auto Service & Tire to the east, and Classic paint & Collision, Inc. to the west.

As previously stated, *all* discharge from the site is ultimately routed to an offsite storm structure located in Lot 3, Chapman Plaza II which will be connected to storm system at SE 7th Terrace and ultimately directed to a tributary of the E. Fork Little Blue River.

Executive Summary

This hydraulic study will show the proposed site will be developed to meet all City of Lee's Summit Stormwater Management requirements. The on-site storm system has been designed to meet the requirements in Section 5608.4.C1 Comprehensive Control as outlined in APWA Section 5600 "Storm Drainage Systems & Facilities", which requires the design to "limit the two-year rate less than or equal to 0.5 cfs per site acre, ten-year rate less than or equal to 2.0 cfs per site acre, 100-yr rate less than or equal to 3.0 cfs per site acre and 40-hour extended detention of 1.37"/24 hour rainfall. The existing site has Hydrologic Soil group "C" soil. As previously mentioned, various site constraints prevent a traditional stormwater pond design. The provided system's designs primary method of attenuating the requirements will be via underground storage.

Flow Rate Summary Table

Developed Site Area Acre	Storm Event (24-hour duration)	Allowable Development Peak Flow Rate (cfs)	Post-Development Peak Flow Rates (cfs)
1.1	2-year	0.55	0.37
1.1	10-year	2.2	0.60
1.1	100-year	3.3	3.28

II. PRE-DEVELOPMENT CONDITIONS:

The proposed development is situated on an approximately 1.38-acre tract of land located at 710 SE 7th Terrace. The site is legally described as Lot 2, Chapman Plaza II.
Per topographic survey by Heideman Associates Inc. dated 05-04-21, the property was covered with gravel and grass and elevations varied from 2014 t0 2018. The site generally slopes downward in direction from south side of the site to north side. The runoff from the site is collected and conveyed by the existing storm drain system at SE 7th Terrace. As the required stormwater Management does not take account of the existing condition, this report has not analyzed the existing hydrology parameters.
:

III. POST-DEVELOPMENT CONDITIONS:

An underground chamber detention system is proposed to be located at the north and east of the site within the open space and parking lot. The proposed underground detention system is a MC-4500 StormTech Chamber System, an open bottomed chamber. Reference the Site Development Plans for Caliber Collision for additional information of the underground detention system. Outflow from the detention system will be routed through an outlet riser structure and conveyed through a proposed storm pipe system to an existing catch basin storm structure located within the existing drainage easement at the northeast of the site in Lot 3 Chapman Plaza II. The outflow from detention system will be connected to the by-pass line from Lot 1 before connecting it to the existing catch basin structure. This piped system drains eventually to the tributary of E. Fork Little Blue River through the storm drain system at SE 7th Terrace.

The detention system is designed to store and release the majority of runoff generated by the proposed development.

The area analyzed in the Post-Development condition comprises of 1.1 acres of developed site from total of 1.38 acres. Visual representations of these areas and their layout configuration have been provided in Appendix A of this report and is titled the “Post Development Map”. This area contains the majority of the proposed Caliber Collision development including the building all the paved parking and curbed areas. Utilizing

proposed curb and gutters, roof leaders, inlets, vegetated swales and the proposed storm sewer system by Caliber Collision, Post-Development Area will be routed to the proposed underground detention system.

Runoff Calculations:

Runoff calculations are performed for Post-Development drainage area as per SCS unit Hydrograph method using Hydraflow and TR-55.

A. Runoff Curve Number:

Land use curve number is used based upon Section 5602.3, Table 5602-3 APWA "Storm Drainage Systems & Facilities ".

Post-Development Area

Business: Neighborhood Areas Hydrologic Soil Group C
CN = 94

Total Land Area = 1.1 Acres
Weighted Runoff Curve Number = 94

B. Time of Concentration:

Shortest time of concentration of 0.10 hour is assumed.

C. Rainfall:

The 24-hour precipitation amounts for the site as provided by SCS Tr-55 for Jackson County are as follows:

2-year storm event:	3.8 inches
10-year storm event:	5.5 inches
100-year storm event:	8.3 inches

D. Rate of Runoff:

Above curve numbers and times of concentration were used to determine rate of runoff using the SCS hydrograph method. A hydrograph for the post-development conditions of the site under study can be generated showing rate of flow versus time. These hydrographs are included in Appendix B. Following are the computed peak rates of runoff for the drainage basins:

Post-Development Area (to Underground Detention System)

Storm Event (24-hour duration)	Peak Flow Rate, Q (cfs)
2-year	5.34
10-year	7.97
100-year	12.26

Post-Development Area (Out of the Underground Detention System)

Storm Event (24-hour duration)	Peak Flow Rate, Q (cfs)	WS elev (Top of Storage el. 2014.0)
2-year	0.37	1008.34
10-year	0.60	1009.43
100-year	3.28	1010.99

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1.1	10-year	2.2	0.60
1.1	100-year	3.3	3.28

As can be seen in the table above, the underground detention system acts to reduce the developed peak discharges from the 2-year, 10-year, and 100-year, 24-hour storm events. This is aided by the by the open bottomed design of the MC-3500 StormTech Chamber System proposed for this development.

IV. WATER QUALITY DESIGN AND CALCULATIONS:

Water Quality for the project was designed per the City of Lee's Summit's ordinances which requires the 40-hour extended detention of 1.37"/24 hour rainfall.

The Water Quality Volume (WQ_V) that is to be detained for 40 hour is calculated as per APWA/MARC-BMP Manual, 6.2:

- WQ_V = P x Rv x (43560/12) where:
  - P = Rainfall event in inches = 1.37"
  - Rv = Volumetric runoff coefficient = 0.05 +0.009 (I)
  - I = Percent Site Impervious
    I = 85%
    Rv = .05 +.009 x 85 = 0.815

- WQ_V = (1.37) x (0.815) x (43560/12)
  = 4053 Cu. Ft
  Use storage at elev. 1007.55, Storage available = 4091 Cu. Ft
  Release it in 40 hours

- Release rate :4091 cu ft x (1/40x 3600 sec) = 0.028 cf/sec
- Using a 1.0" Orifice
- $Q_{Release} = C_d A_o (SQRT(2*G*H)$
  =0.6*0.055*SQRT(2*32.2*1.33/2)
  =0.022 cf/sec < 0.028 cf/sec, therefore orifice meets 40 hour minimum

Water Quality Storage is provided from elev. 1006.0 to elev. 1007.55 and is released by 1" orifice at elev. 1006.0.
Next opening is 4" orifice at 1007.55

V. PIPE SIZING CALCULATIONS:

Included in this report in Appendix C are the pipe sizing calculations for the on-site pipes and catch basins. These are generated by the rational method, and are based on the 100-year intensity for all storm drain structures flowing to the detention system. These calculations show the total flow for each pipe section, velocity, hydraulic grade elevations, and spreads at each inlet. Reference the Inlet Area Map in Appendix A for clarification of the drainage areas discharging to each inlet and pipe.

Drainage areas for each structure were delineated (see Inlet Area Map in Appendix A) and flow to each catch basin was determined. The drainage to each structure was determined using the Rational Method form of storm analysis where weighted Runoff Coefficients were determined based on each area's coverage. In addition to each structure's added

stormwater from their respective drainage area, the discharge from the underground detention system was added to the pipe's directly "downstream" of the underground detention system.

An analysis of the proposed storm system along SE Blue Parkway was performed to ensure the discharge to the proposed pipe under the proposed driveway is adequately sized when combined with the discharge from the upstream pipes. Also, a storm sewer stub is proposed from the adjacent property to the west of the Caliber Collision property. Inlet "1B" in the plans is proposed to provide connection to an existing storm structure for the adjacent site should it be developed in the future. Per the City of Lee's Summit Code, the maximum allowed discharge form a developed site is 3 cfs per developed acre. Assuming the 1.70 acres delineated in the Inlet Area Map (in Appendix A) is developed, the maximum discharge allowed from the adjacent site would be approximately 5.1 cfs. This runoff value is less than the existing conditions site runoff calculated the Rational Method. Reference should once again be made to the Inlet Area Map provided in Appendix A for calculations and delineations of the drainage areas. To be conservative in the design, the runoff values generated from the existing conditions (the higher value) are used for adequately sizing the storm sewer pipe for the adjacent property's connection to Inlet 1B, and ultimately to the existing storm structure connection point.

Storm profiles of the storm sewer pipe network were created and the Hydraulic Grade Lines resulting from the 100-year, 24-hour storm event discharge was mapped to each pipe. Having each pipe's HGL remain within the pipe proves that each storm pipe is sufficiently sized to accommodate the storm runoff from each structure and development. In the analysis performed for this project, each pipe's 100-year storm event HGL remained within their respective pipes. Reference the Storm Profiles Sheets within the Site Development Plans prepared by Freeland and Kauffman, Inc.

Appendix A

July 20, 2021

Tax Parcels

Selected Parcel

Addresses

Addresses

Nearmap

Red: Band_1

Green: Band_2

Blue: Band_3

1:2,257

0 0.01 0.03 0.06 mi

0 0.02 0.04 0.09 km

City of Lees Summit, Jackson County, MO, Missouri Dept. of Conservation,

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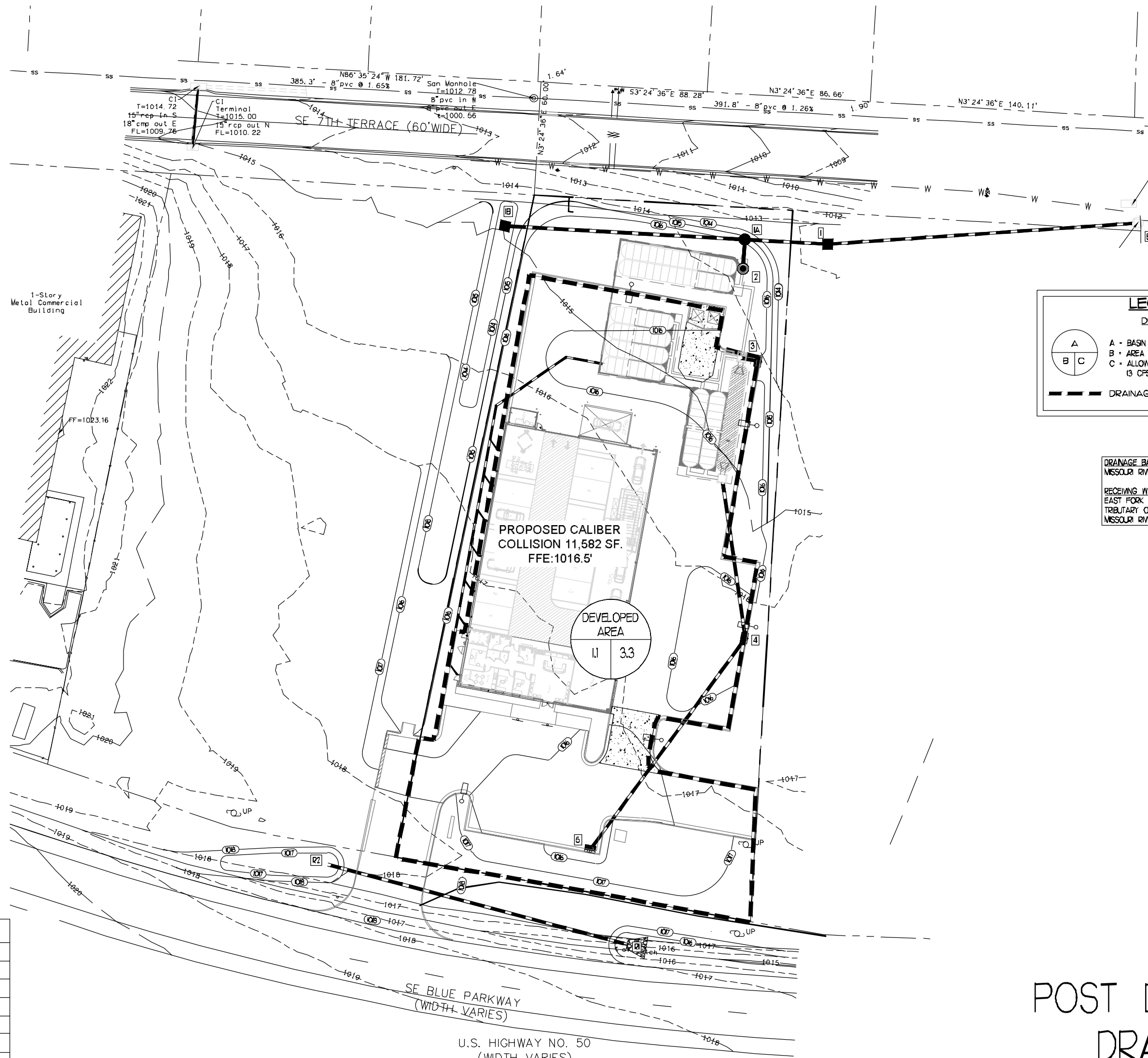
710 SE 7TH TERRACE
LEE'S SUMMIT, MO 64063

USGS QUAD MAP

POST DEVELOPMENT DRAINAGE AREA



LEGEND

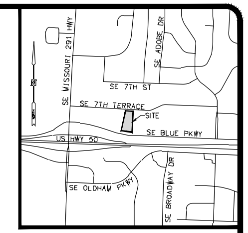
DESCRIPTION

A - BASIN DESIGNATION
B - AREA IN ACRES
C - ALLOWABLE DISCHARG IN CFS (3 CFS PER 1 ACRE FOR 100 YEAR)

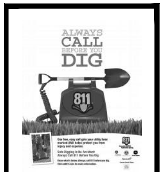
DRAINAGE BASIN BOUNDARY

DRAINAGE BASIN:
MISSOURI RIVER WATERSHED

RECEIVING WATERS:
EAST FORK LITTLE BLUE RIVER, TRIBUTARY OF THE BLUE RIVER - MISSOURI RIVER WATERSHED



ACREAGE SUMMARY (IN ACRES)	
TOTAL PARCEL AREA	1.38
ON-SITE DISTURBED AREA	1.38
OFF-SITE DISTURBED AREA	0.55
TOTAL DISTURBED AREA	1.93
IMPERVIOUS AREA PRE-CONSTRUCTION (ON-SITE ONLY & INCLUDES GRAVEL)	0.48
PERVIOUS AREA PRE-CONSTRUCTION (ON-SITE ONLY)	0.90
IMPERVIOUS AREA POST-CONSTRUCTION (ON-SITE ONLY)	0.90
PERVIOUS AREA POST-CONSTRUCTION (ON-SITE ONLY)	0.48
IMPERVIOUS AREA INCREASE (PRE VS POST) (ON-SITE ONLY)	0.42
IMPERVIOUS PERCENTAGE (AT POST-CONSTRUCTION STAGE)	65.2%



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SCALE 1" = 30'

REVISIONS	BY

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STATE OF MISSOURI — TODD BURNETT — NUMBER 2021014925 — PROFESSIONAL ENGINEER
02/08/2022

CALIBER COLLISION
710 SE BLUE PARKWAY
LEE'S SUMMIT, MO 64063

CROSS DEVELOPMENT, CC LEE'S SUMMIT, LLC
4336 MARSH RIDGE ROAD
CARROLLTON, TX 75010
TEL: (214) 614-8252

DRAWN BAC
CHECKED TMB
DATE 11/17/2021
SCALE

DRAWING
1 of 1

STORM DRAIN NOTES

1. ALL HYDRALLIC DATA FOR THE STORM DRAINAGE PIPES ARE BASED ON THE 100-YEAR DESIGN STORM.
2. ALL MANHOLE DIAMETERS AND ALL INLET DIMENSIONS SHALL HAVE A MINIMUM INSIDE DIMENSION OF 4' DIAMETER (CIRCULAR) OR 4'x4' (SQUARE). STRUCTURES SHALL BE UPSIZED AS NEEDED TO ACCOMMODATE THE CONNECTING PIPE SIZES/ ANGLES.
3. STORM DRAIN PIPE SHALL BE CLASS III, WALL "B" RCP IN ACCORDANCE WITH ASTM C-76, UNLESS NOTED OTHERWISE.
4. HIGH DENSITY POLYETHYLENE PIPE (HDPE) MAY BE USED AS AN ALTERNATE. ALL HDPE PIPE, JOINTS, AND FITTINGS SHALL MEET THE REQUIREMENTS OF AASHTO DESIGNATIONS M252 AND M294 TYPE S.
5. PIPE LENGTHS ARE BASED ON HORIZONTAL DISTANCE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE AND USED FOR DESIGN ONLY. CONTRACTOR TO FIELD VERIFY ACTUAL PIPE LENGTHS NEEDED FOR CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR COMPARING THE STORM DRAIN WITH THE PROFILES FOR THE STORM DRAIN LINES AND INFORMING THE ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.
7. STORM DRAIN PIPE SHALL HAVE WATER TIGHT JOINTS IN ACCORDANCE WITH ASTM C 361, C443, AND D3212.

INLET DRAINAGE AREAS

TYPE	INLET	AREA (AC.)	TC (MIN)	IMPERVIOUS COVERAGE (ACRE)	IMPERVIOUS RUNOFF COEFFICENT	PERVIOUS COVERAGE (ACRE)	PERVIOUS RUNOFF COEFFICENT	WEIGHTED RUNOFF COEFFICENT	"I"50	"I"100	Q50 (CFS)	Q100 (CFS)	PONDING DEPTH @ INLET PER 100-YR STORM (FT)
PROPOSED	1B *	1.70	5	0.04	0.90	1.66	0.35	0.36	11.30	12.60	6.97	7.77	0.30
	3	0.26	5	0.26	0.90	0.00	0.35	0.90	11.30	12.60	2.64	2.95	0.26
	4	0.15	5	0.15	0.90	0.00	0.35	0.90	11.30	12.60	1.53	1.70	0.20
	5	0.62	5	0.47	0.90	0.15	0.35	0.77	11.30	12.60	5.37	5.99	0.39
	R-2	0.94	5	0.29	0.90	0.65	0.35	0.52	11.30	12.60	5.52	6.16	** NOT CALCULATED
EXISTING	EX-1	0.08	5	0.02	0.90	0.06	0.35	0.49	11.30	12.60	0.44	0.49	** NOT CALCUALTED
	EX-2	0.47	5	0.08	0.90	0.39	0.35	0.44	11.30	12.60	2.36	2.63	** NOT CALCULATED
	1	0.30	5	0.05	0.90	0.25	0.35	0.44	11.30	12.60	1.50	1.67	** NOT CALCULATED

RUNOFF COEFFICIENTS USED TO CALCULATE THE WEIGHTED RUNOFF COEFFICIENT ARE LISTED BELOW
- LAWNS/GRASS: 0.35
- ROOFS/PAVEMENT: 0.90

RAINFALL DATA FROM NOAA ATLAS 14, VOLUME 8, VERSION 2, LEE'S SUMMIT, MISSOURI

* THE AREA SHOWN FOR INLET 1B ASSUMES THAT THE ADJACENT PROPERTY WILL BE DEVELOPED AND CONNECT IT'S STORM SEWER SYSTEM TO STRUCTURE 1B. PER THE CITY OF LEE'S SUMMIT CODE, THE MAXIMUM ALLOWED DISCHARGE FROM THE DEVELOPED SITE IS 3 CFS PER DEVELOPED ACRE. ASSUMING 1.70 ACRES OF DEVELOPED AREA, THE MAXIMUM DISCHARGE ALLOWED FROM THE ADJACENT SITE WOULD BE 5.1 CFS WHICH IS LESS THAN THE EXISTING SITE'S UNDEVELOPED CONDITION (WHICH RESULTS IN THE VALUE(S) SHOWN IN THE TABLE ABOVE). TO BE CONSERVATIVE, THE RELEASES FOR INLET 1B ABOVE ARE USED TO ADEQUATELY SIZE THE STORM SEWER PIPES PROPOSED BY THE CALIBER COLLISION DEVELOPMENT.

** THE PONDING DEPTHS FOR THESE INLETS WERE NOT CALCULATED AS THEY ARE A RESULT OF THE EXISTING CONDITIONS OF THE SURROUNDING PROPERTIES AND ADDITIONAL SURVEY INFORMATION WILL BE REQUIRED TO ACCURATELY CALCULATE. ADDITIONALLY, THESE "INLETS" ARE OPEN-ENDED PIPES AND NOT "STORM STRUCTURES". THEIR PONDING DEPTHS ARE NEGLECTED AS THEY CONTAIN CONDITIONS WHERE PONDING IS NOT AN ISSUE (I.E. CONTAINED WITHIN DITCHES)

RAINFALL DISTRIBUTION FOR LEE'S SUMMIT, MISSOURI

STORM EVENT	2-YR	10-YR	25-YR	50-YR	100-YR
RAINFALL (INCHES/HR)	5.81	8.35	9.98	11.30	12.60

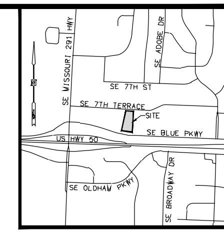
- THE RAINFALL FOR RAINFALL DISTRIBUTION DATA TAKEN FROM NOAA ATLAS 14, VOLUME 8, VERSION 2 FOR LEE'S SUMMIT, MISSOURI
- STORM DISTRIBUTION TYPE II
- 24-HOUR STORM DISTRIBUTION

LEGEND

DESCRIPTION

A - BASIN DESIGNATION
B - AREA IN ACRES
C - RUNOFF COEFFICENT

DRAINAGE BASIN BOUNDARY



LOCATION MAP
NOT TO SCALE

WATER TIGHT STORM PIPES:
CONTRACTOR TO ENSURE THAT ALL STORM PIPES ARE WATER TIGHT AND TESTED PER ASTM C902-02

CONTRACTOR TO ENSURE ALL STORM DRAIN PIPE SHALL HAVE WATER TIGHT JOINTS IN ACCORDANCE WITH ASTM C 361, C443 AND D3212.

DRAINAGE BASIN:
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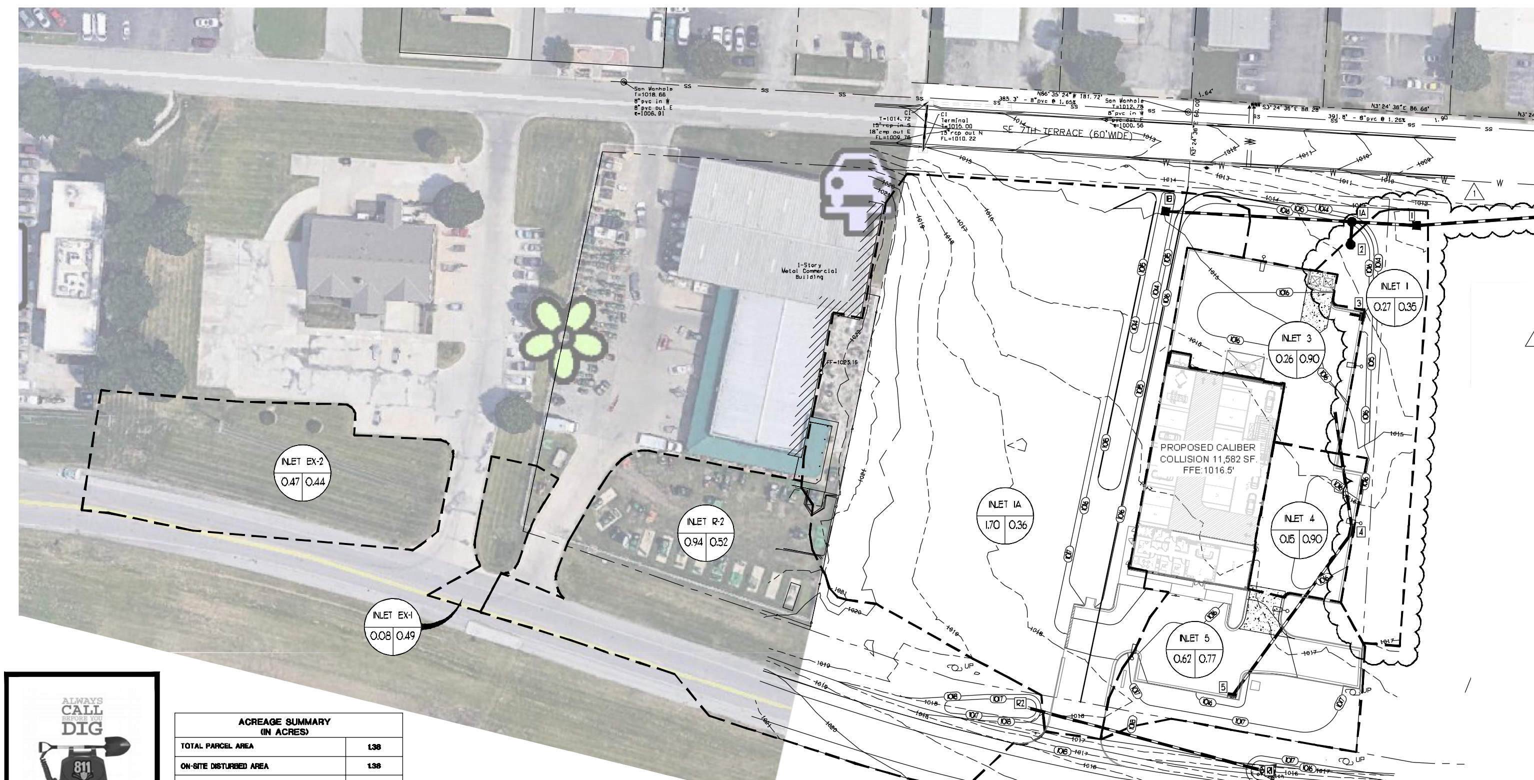

STORM DRAIN STRUCTURE TABLE

STR. #	TYPE	RIM/THROAT	INV. IN	INV. OUT
1	FIELD INLET	1012.00	1005.25 (1A)	1004.95 (EXJ)
1A	MANHOLE	1016.00	1005.90 (1B) 1005.70 (2)	1005.70 (1)
1B	FIELD INLET	1013.50		1007.20 (1A)
2	OUTLET CONTROL STRUCTURE	1016.20		1006.00 (1A)
3	COMBINATION INLET	1015.40		1007.90 (UGD1)
4	COMBINATION INLET	1015.60	1009.70 (5)	1009.50 (UGD2)
5	COMBINATION INLET	1015.00		1011.00 (4)
EXJ	EXISTING MANHOLE	1008.34	1003.30 (1)	
R1	OPEN END PIPE	1017.36	1015.15 (R2)	
R2	OPEN END PIPE	1018.21		1016.00 (R1)
UGD1	TO UGD	1015.60	1007.70 (3)	
UGD2	TO UGD	1011.41	1007.00 (4)	

STORM PIPE TABLE

STORMDRAIN PIPE	SIZE	LENGTH	SLOPE	INV. IN	INV. OUT
1 - EXJ	18"	164'	1.00%	1004.95'	1003.30'
1A - 1	18"	44'	1.02%	1005.70'	1005.25'
1B - 1A	18"	127'	1.02%	1007.20'	1005.90'
2 - 1A	18"	16'	1.94%	1006.00'	1005.70'
3 - UGD1	18"	10'	2.10%	1007.90'	1007.70'
4 - UGD2	18"	83'	3.02%	1009.60'	1007.00'
5 - 4	18"	139'	0.93%	1011.00'	1009.70'
R2 - R1	14" ELLIP.	164'	0.52%	1016.00'	1015.15'

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INLET AREA MAP

SCALE 1" = 30'

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STATE OF MISSOURI
TODD BURNEY
NUMBER 2021014925
PROFESSIONAL ENGINEER
02/08/2022

CALIBER COLLISION
710 SE BLUE PARKWAY
LEE'S SUMMIT, MO 64063

CROSS DEVELOPMENT, CC LEE'S SUMMIT, LLC
4336 MARSH RIDGE ROAD
CARROLLTON, TX 75010
TEL: (214) 614-8252

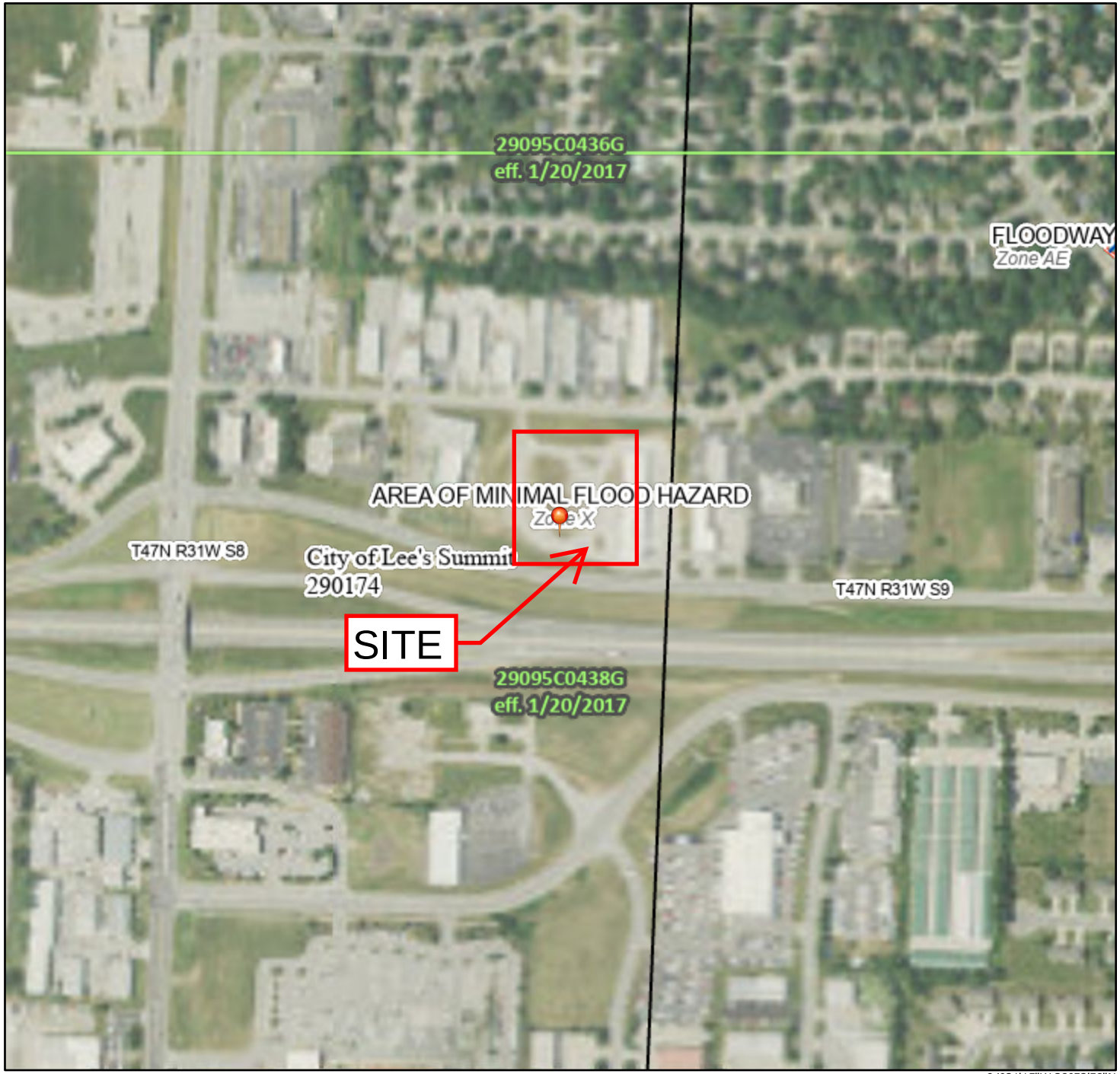
DRAWN: BAC
CHECKED: TMB
DATE: 11/17/2021
SCALE:

DRAWING
14

National Flood Hazard Layer FIRMette

FEMA

94°21'53"W 38°54'26"N



94°21'15"W 38°53'58"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

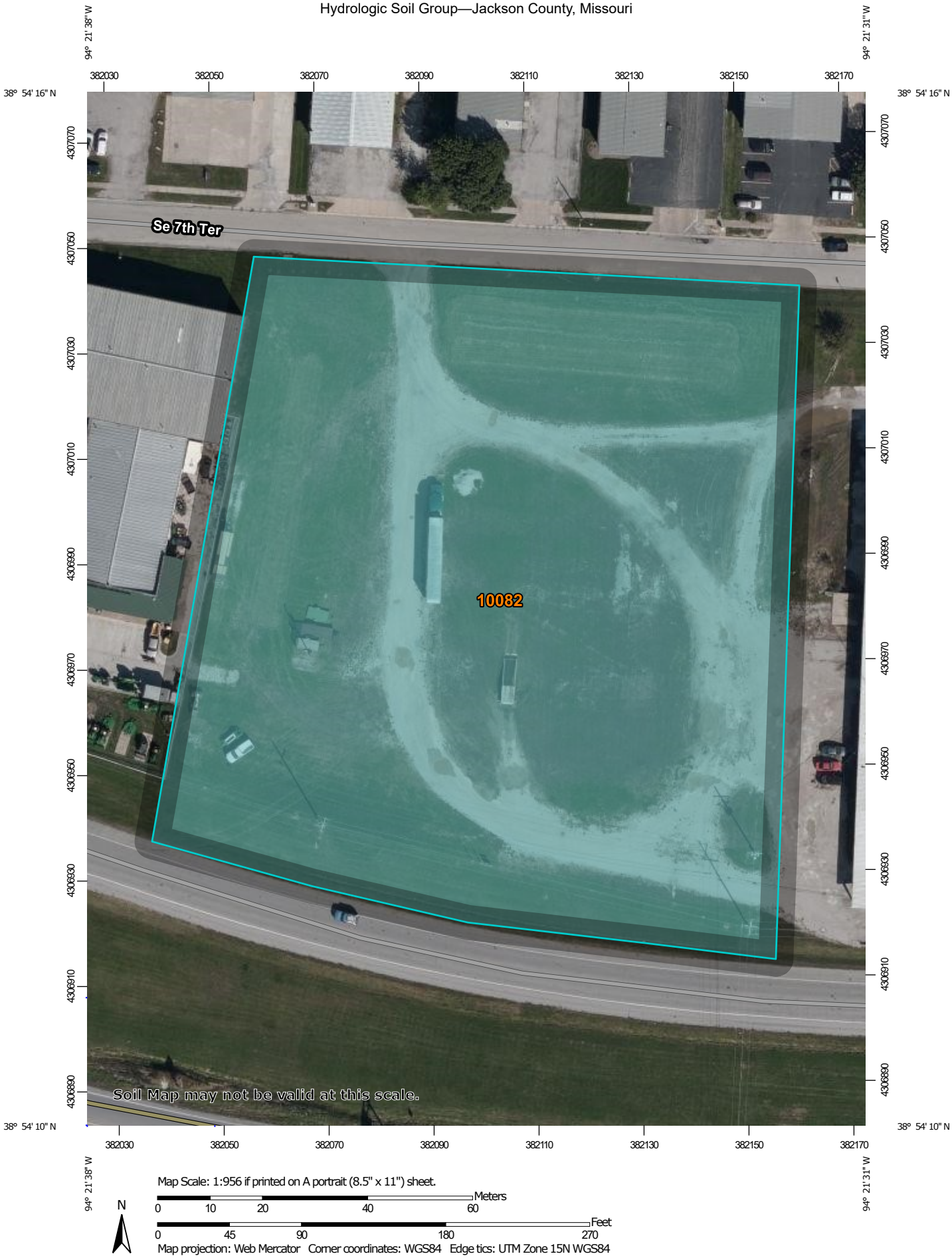
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/1/2021 at 11:23 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Map Scale: 1:956 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	C	3.4	100.0%
Totals for Area of Interest			**3.4**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA Atlas 14, Volume 8, Version 2
Location name: Lees Summit, Missouri, USA*
Latitude: 38.9038°, Longitude: -94.3595°
Elevation: 1016.38 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.97** (3.92-6.28)	**5.81** (4.57-7.33)	**7.19** (5.65-9.10)	**8.35** (6.53-10.6)	**9.98** (7.57-13.1)	**11.3** (8.36-14.9)	**12.6** (9.05-17.0)	**13.9** (9.64-19.3)	**15.7** (10.5-22.3)	**17.1** (11.2-24.6)
10-min	**3.64** (2.87-4.60)	**4.25** (3.35-5.37)	**5.26** (4.13-6.66)	**6.11** (4.78-7.77)	**7.31** (5.54-9.56)	**8.25** (6.13-10.9)	**9.20** (6.62-12.4)	**10.2** (7.05-14.1)	**11.5** (7.69-16.3)	**12.5** (8.17-18.0)
15-min	**2.96** (2.34-3.74)	**3.46** (2.72-4.36)	**4.28** (3.36-5.42)	**4.97** (3.89-6.32)	**5.94** (4.51-7.78)	**6.71** (4.98-8.88)	**7.48** (5.38-10.1)	**8.28** (5.73-11.5)	**9.36** (6.25-13.3)	**10.2** (6.64-14.6)
30-min	**2.05** (1.62-2.59)	**2.41** (1.90-3.04)	**2.99** (2.35-3.79)	**3.49** (2.73-4.43)	**4.18** (3.17-5.46)	**4.72** (3.50-6.24)	**5.26** (3.78-7.11)	**5.82** (4.03-8.06)	**6.57** (4.39-9.32)	**7.15** (4.66-10.3)
60-min	**1.34** (1.06-1.69)	**1.57** (1.24-1.99)	**1.96** (1.54-2.49)	**2.29** (1.79-2.92)	**2.76** (2.10-3.62)	**3.13** (2.33-4.15)	**3.51** (2.53-4.75)	**3.90** (2.70-5.41)	**4.43** (2.96-6.29)	**4.84** (3.16-6.96)
2-hr	**0.827** (0.657-1.04)	**0.972** (0.771-1.22)	**1.21** (0.960-1.53)	**1.42** (1.12-1.79)	**1.72** (1.31-2.24)	**1.95** (1.46-2.57)	**2.19** (1.59-2.95)	**2.44** (1.71-3.37)	**2.79** (1.88-3.94)	**3.06** (2.01-4.36)
3-hr	**0.623** (0.497-0.777)	**0.731** (0.583-0.913)	**0.916** (0.728-1.15)	**1.08** (0.850-1.35)	**1.31** (1.00-1.70)	**1.49** (1.12-1.96)	**1.68** (1.23-2.26)	**1.88** (1.32-2.59)	**2.16** (1.46-3.04)	**2.38** (1.57-3.39)
6-hr	**0.376** (0.302-0.466)	**0.444** (0.356-0.550)	**0.561** (0.449-0.697)	**0.664** (0.528-0.827)	**0.813** (0.631-1.05)	**0.934** (0.708-1.22)	**1.06** (0.780-1.42)	**1.20** (0.846-1.63)	**1.38** (0.944-1.94)	**1.53** (1.02-2.16)
12-hr	**0.220** (0.178-0.270)	**0.262** (0.212-0.323)	**0.335** (0.270-0.413)	**0.400** (0.320-0.494)	**0.493** (0.386-0.634)	**0.570** (0.435-0.740)	**0.650** (0.481-0.862)	**0.735** (0.524-0.998)	**0.853** (0.587-1.19)	**0.947** (0.635-1.33)
24-hr	**0.129** (0.105-0.158)	**0.154** (0.126-0.188)	**0.198** (0.160-0.242)	**0.236** (0.190-0.290)	**0.292** (0.230-0.372)	**0.337** (0.260-0.435)	**0.385** (0.287-0.507)	**0.436** (0.313-0.588)	**0.507** (0.352-0.701)	**0.563** (0.380-0.786)
2-day	**0.076** (0.062-0.092)	**0.090** (0.073-0.108)	**0.113** (0.092-0.137)	**0.134** (0.109-0.163)	**0.164** (0.130-0.208)	**0.189** (0.147-0.242)	**0.215** (0.162-0.282)	**0.243** (0.176-0.326)	**0.282** (0.197-0.388)	**0.313** (0.213-0.434)
3-day	**0.056** (0.046-0.068)	**0.065** (0.054-0.079)	**0.081** (0.066-0.098)	**0.095** (0.077-0.115)	**0.115** (0.092-0.145)	**0.132** (0.103-0.168)	**0.150** (0.113-0.195)	**0.169** (0.123-0.225)	**0.195** (0.137-0.267)	**0.217** (0.148-0.299)
4-day	**0.046** (0.038-0.055)	**0.052** (0.043-0.063)	**0.064** (0.053-0.077)	**0.075** (0.061-0.090)	**0.090** (0.072-0.113)	**0.102** (0.080-0.130)	**0.116** (0.088-0.150)	**0.130** (0.095-0.173)	**0.150** (0.105-0.204)	**0.165** (0.113-0.228)
7-day	**0.031** (0.026-0.037)	**0.035** (0.029-0.042)	**0.042** (0.035-0.050)	**0.048** (0.039-0.058)	**0.057** (0.045-0.070)	**0.064** (0.050-0.080)	**0.071** (0.054-0.091)	**0.079** (0.058-0.104)	**0.089** (0.063-0.121)	**0.098** (0.068-0.134)
10-day	**0.025** (0.020-0.029)	**0.028** (0.023-0.033)	**0.033** (0.027-0.039)	**0.037** (0.031-0.045)	**0.044** (0.035-0.054)	**0.049** (0.038-0.061)	**0.054** (0.041-0.069)	**0.059** (0.043-0.077)	**0.066** (0.047-0.089)	**0.072** (0.050-0.098)
20-day	**0.016** (0.014-0.019)	**0.018** (0.016-0.022)	**0.022** (0.018-0.026)	**0.025** (0.021-0.029)	**0.028** (0.023-0.035)	**0.031** (0.025-0.039)	**0.034** (0.026-0.043)	**0.037** (0.027-0.048)	**0.040** (0.029-0.054)	**0.043** (0.030-0.058)
30-day	**0.013** (0.011-0.015)	**0.015** (0.013-0.017)	**0.018** (0.015-0.021)	**0.020** (0.017-0.023)	**0.023** (0.018-0.027)	**0.025** (0.020-0.030)	**0.027** (0.021-0.034)	**0.029** (0.021-0.037)	**0.031** (0.022-0.041)	**0.033** (0.023-0.044)
45-day	**0.011** (0.009-0.013)	**0.012** (0.010-0.014)	**0.014** (0.012-0.017)	**0.016** (0.013-0.019)	**0.018** (0.015-0.022)	**0.020** (0.016-0.024)	**0.021** (0.016-0.026)	**0.023** (0.017-0.029)	**0.024** (0.017-0.032)	**0.025** (0.018-0.034)
60-day	**0.009** (0.008-0.011)	**0.010** (0.009-0.012)	**0.012** (0.010-0.014)	**0.014** (0.012-0.016)	**0.016** (0.013-0.019)	**0.017** (0.013-0.020)	**0.018** (0.014-0.022)	**0.019** (0.014-0.024)	**0.020** (0.015-0.027)	**0.021** (0.015-0.028)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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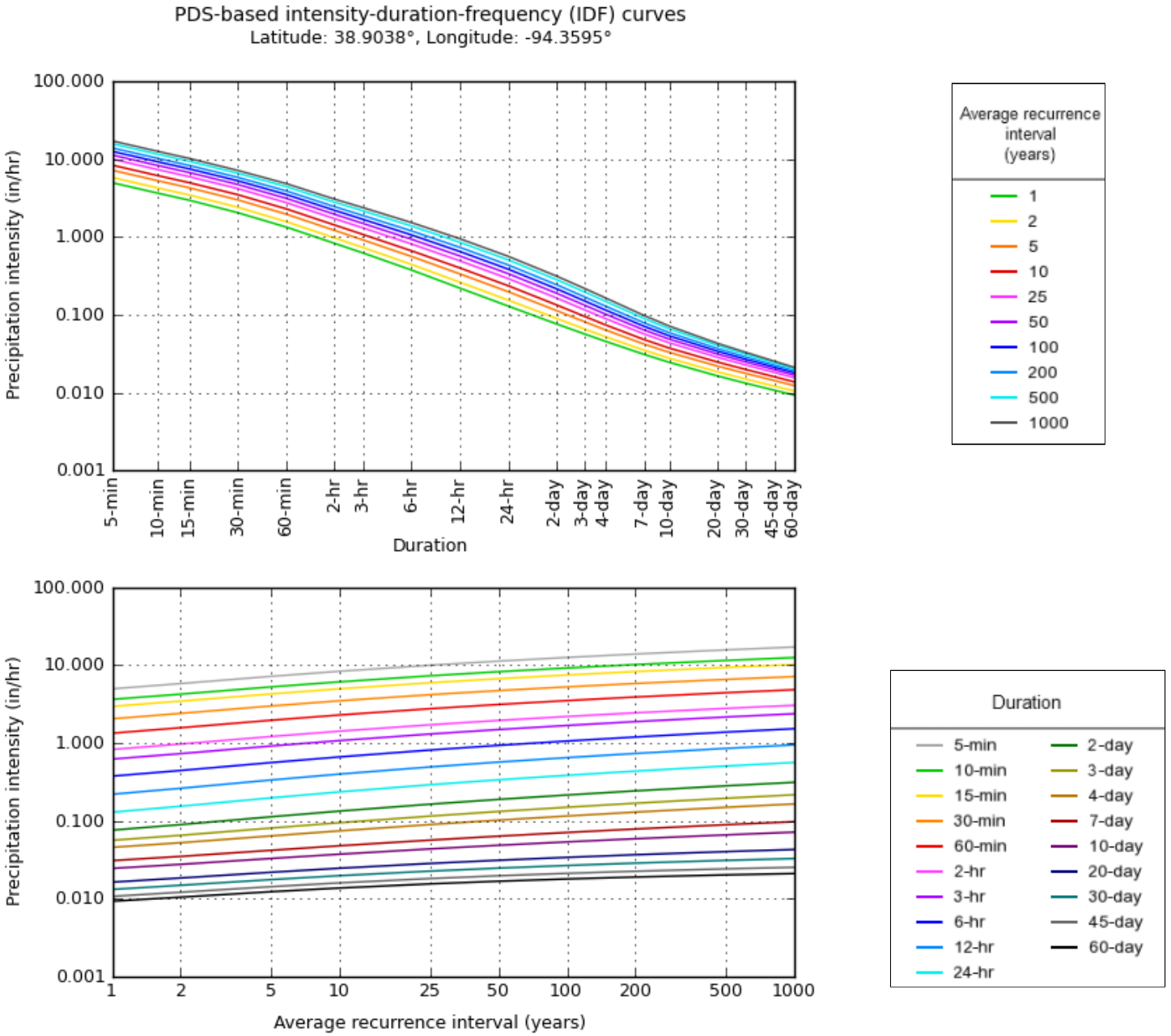
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Thu Jul 15 13:49:29 2021

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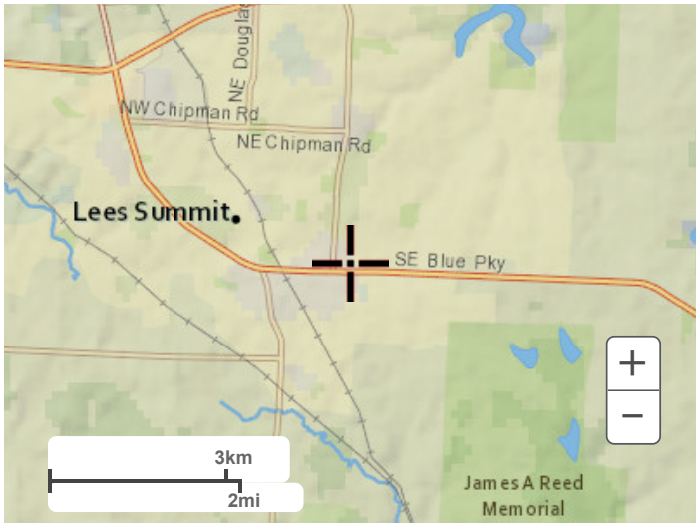
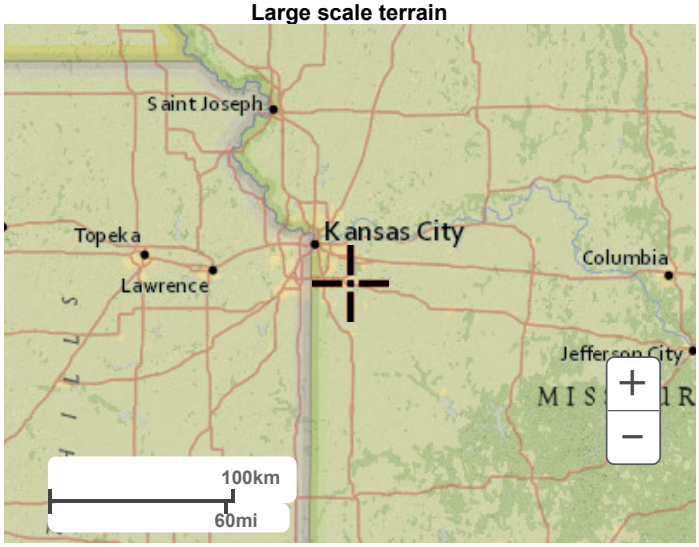
Maps & aerials

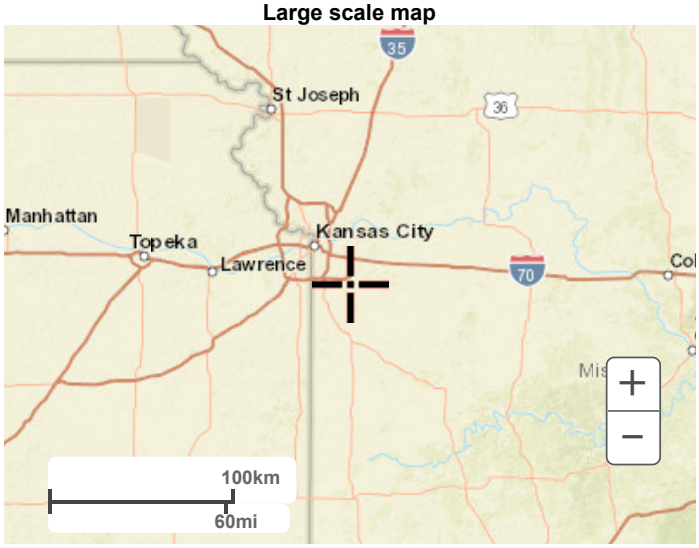
Small scale terrain



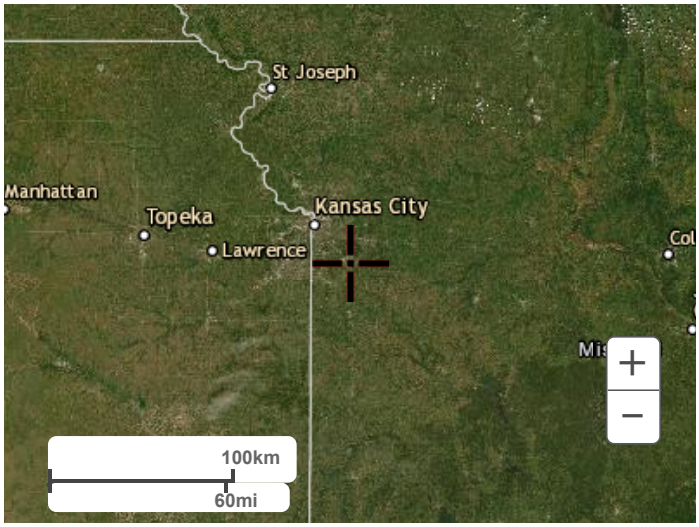
Large scale terrain



Large scale map



Large scale aerial



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Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 8, Version 2
Location name: Lees Summit, Missouri, USA*
Latitude: 38.9038°, Longitude: -94.3595°
Elevation: 1016.38 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.414** (0.327-0.523)	**0.484** (0.381-0.611)	**0.599** (0.471-0.758)	**0.696** (0.544-0.885)	**0.832** (0.631-1.09)	**0.939** (0.697-1.24)	**1.05** (0.754-1.42)	**1.16** (0.803-1.61)	**1.31** (0.875-1.86)	**1.43** (0.930-2.05)
10-min	**0.607** (0.479-0.766)	**0.708** (0.558-0.895)	**0.877** (0.689-1.11)	**1.02** (0.797-1.30)	**1.22** (0.924-1.59)	**1.38** (1.02-1.82)	**1.53** (1.10-2.07)	**1.70** (1.18-2.35)	**1.92** (1.28-2.72)	**2.09** (1.36-3.00)
15-min	**0.740** (0.584-0.934)	**0.864** (0.681-1.09)	**1.07** (0.840-1.35)	**1.24** (0.972-1.58)	**1.49** (1.13-1.94)	**1.68** (1.25-2.22)	**1.87** (1.35-2.53)	**2.07** (1.43-2.87)	**2.34** (1.56-3.32)	**2.55** (1.66-3.66)
30-min	**1.02** (0.808-1.29)	**1.20** (0.948-1.52)	**1.50** (1.18-1.90)	**1.75** (1.36-2.22)	**2.09** (1.58-2.73)	**2.36** (1.75-3.12)	**2.63** (1.89-3.56)	**2.91** (2.02-4.03)	**3.29** (2.19-4.66)	**3.57** (2.33-5.14)
60-min	**1.34** (1.06-1.69)	**1.57** (1.24-1.99)	**1.96** (1.54-2.49)	**2.29** (1.79-2.92)	**2.76** (2.10-3.62)	**3.13** (2.33-4.15)	**3.51** (2.53-4.75)	**3.90** (2.70-5.41)	**4.43** (2.96-6.29)	**4.84** (3.16-6.96)
2-hr	**1.65** (1.31-2.07)	**1.94** (1.54-2.44)	**2.43** (1.92-3.05)	**2.84** (2.24-3.59)	**3.43** (2.63-4.47)	**3.90** (2.92-5.14)	**4.39** (3.18-5.90)	**4.89** (3.41-6.74)	**5.58** (3.76-7.87)	**6.11** (4.01-8.73)
3-hr	**1.87** (1.49-2.33)	**2.20** (1.75-2.74)	**2.75** (2.19-3.44)	**3.23** (2.55-4.06)	**3.92** (3.02-5.10)	**4.48** (3.37-5.88)	**5.05** (3.68-6.78)	**5.66** (3.97-7.77)	**6.49** (4.39-9.14)	**7.14** (4.71-10.2)
6-hr	**2.25** (1.81-2.79)	**2.66** (2.13-3.30)	**3.36** (2.69-4.17)	**3.98** (3.16-4.95)	**4.87** (3.78-6.30)	**5.60** (4.24-7.31)	**6.36** (4.67-8.48)	**7.16** (5.07-9.79)	**8.28** (5.65-11.6)	**9.16** (6.09-12.9)
12-hr	**2.65** (2.14-3.26)	**3.16** (2.55-3.89)	**4.04** (3.26-4.98)	**4.82** (3.86-5.96)	**5.94** (4.65-7.64)	**6.87** (5.24-8.91)	**7.83** (5.80-10.4)	**8.86** (6.32-12.0)	**10.3** (7.08-14.3)	**11.4** (7.65-16.0)
24-hr	**3.10** (2.53-3.78)	**3.71** (3.01-4.52)	**4.75** (3.85-5.80)	**5.66** (4.57-6.95)	**7.00** (5.51-8.93)	**8.10** (6.23-10.4)	**9.24** (6.90-12.2)	**10.5** (7.52-14.1)	**12.2** (8.44-16.8)	**13.5** (9.13-18.9)
2-day	**3.66** (3.00-4.42)	**4.30** (3.53-5.21)	**5.43** (4.43-6.58)	**6.42** (5.22-7.82)	**7.88** (6.25-9.98)	**9.07** (7.04-11.6)	**10.3** (7.77-13.5)	**11.7** (8.46-15.6)	**13.5** (9.47-18.6)	**15.0** (10.2-20.8)
3-day	**4.06** (3.34-4.89)	**4.71** (3.87-5.67)	**5.83** (4.78-7.04)	**6.83** (5.57-8.28)	**8.30** (6.62-10.5)	**9.51** (7.41-12.1)	**10.8** (8.15-14.1)	**12.2** (8.85-16.2)	**14.1** (9.89-19.2)	**15.6** (10.7-21.5)
4-day	**4.39** (3.63-5.27)	**5.04** (4.16-6.05)	**6.16** (5.07-7.41)	**7.16** (5.85-8.65)	**8.62** (6.89-10.8)	**9.83** (7.68-12.5)	**11.1** (8.41-14.4)	**12.5** (9.10-16.6)	**14.4** (10.1-19.6)	**15.9** (10.9-21.9)
7-day	**5.20** (4.32-6.20)	**5.88** (4.88-7.02)	**7.05** (5.83-8.43)	**8.06** (6.63-9.68)	**9.52** (7.64-11.8)	**10.7** (8.40-13.5)	**11.9** (9.09-15.4)	**13.2** (9.71-17.5)	**15.0** (10.6-20.3)	**16.4** (11.3-22.5)
10-day	**5.89** (4.91-7.00)	**6.65** (5.53-7.90)	**7.90** (6.56-9.41)	**8.97** (7.41-10.7)	**10.5** (8.43-12.9)	**11.7** (9.19-14.6)	**12.9** (9.85-16.5)	**14.2** (10.4-18.6)	**15.9** (11.3-21.4)	**17.2** (11.9-23.5)
20-day	**7.86** (6.60-9.25)	**8.88** (7.45-10.5)	**10.5** (8.80-12.4)	**11.9** (9.86-14.1)	**13.7** (11.0-16.6)	**15.0** (11.9-18.5)	**16.3** (12.5-20.6)	**17.7** (13.1-22.9)	**19.4** (13.8-25.8)	**20.6** (14.4-28.0)
30-day	**9.50** (8.01-11.1)	**10.7** (9.05-12.6)	**12.7** (10.7-14.9)	**14.3** (11.9-16.9)	**16.3** (13.2-19.7)	**17.9** (14.1-21.9)	**19.3** (14.8-24.2)	**20.7** (15.4-26.6)	**22.4** (16.1-29.7)	**23.7** (16.6-32.0)
45-day	**11.6** (9.82-13.5)	**13.1** (11.1-15.3)	**15.5** (13.0-18.1)	**17.3** (14.5-20.3)	**19.7** (15.9-23.5)	**21.3** (17.0-26.0)	**22.9** (17.7-28.5)	**24.4** (18.2-31.2)	**26.2** (18.8-34.4)	**27.4** (19.3-36.8)
60-day	**13.4** (11.4-15.6)	**15.1** (12.8-17.6)	**17.8** (15.0-20.7)	**19.8** (16.7-23.2)	**22.4** (18.2-26.7)	**24.2** (19.3-29.3)	**25.9** (20.0-32.1)	**27.4** (20.5-34.9)	**29.2** (21.1-38.2)	**30.4** (21.5-40.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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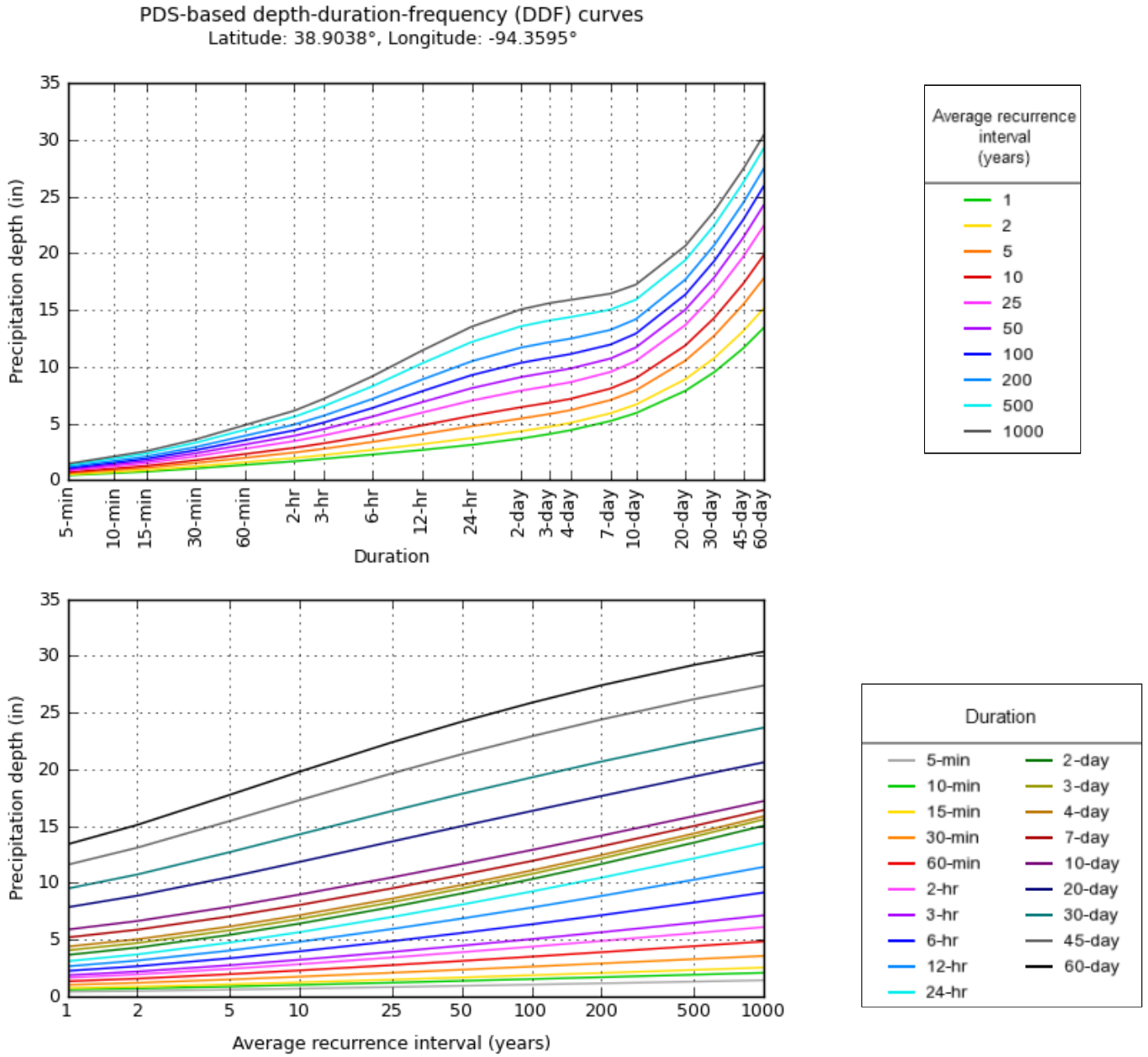
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Thu Jul 15 13:48:55 2021

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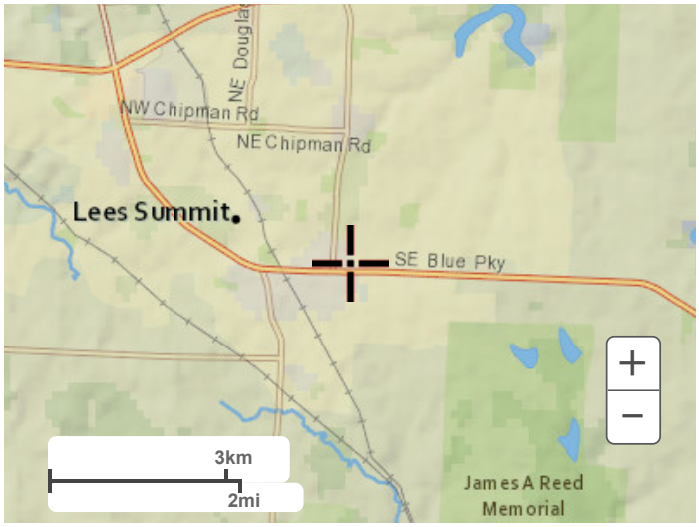
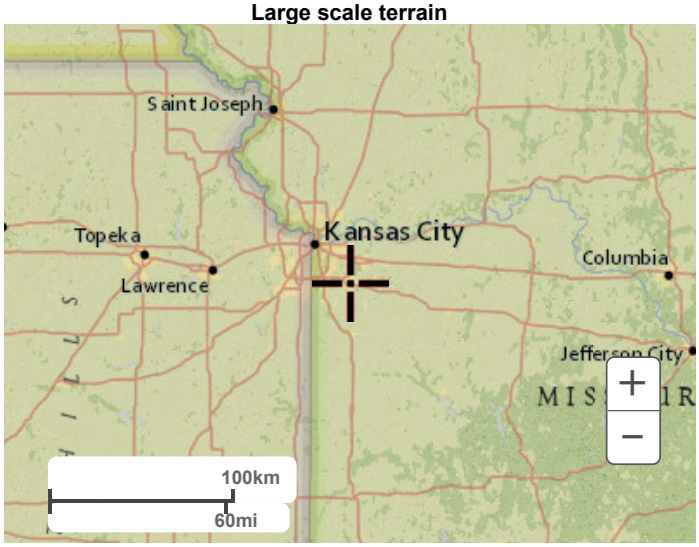
Maps & aerials

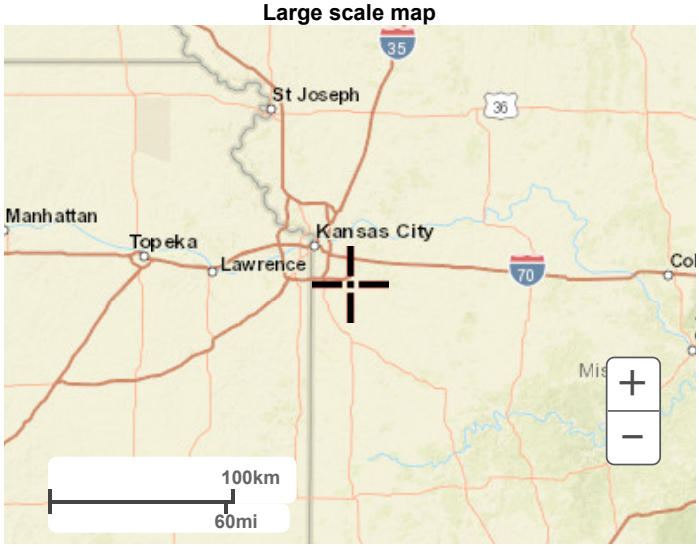
Small scale terrain



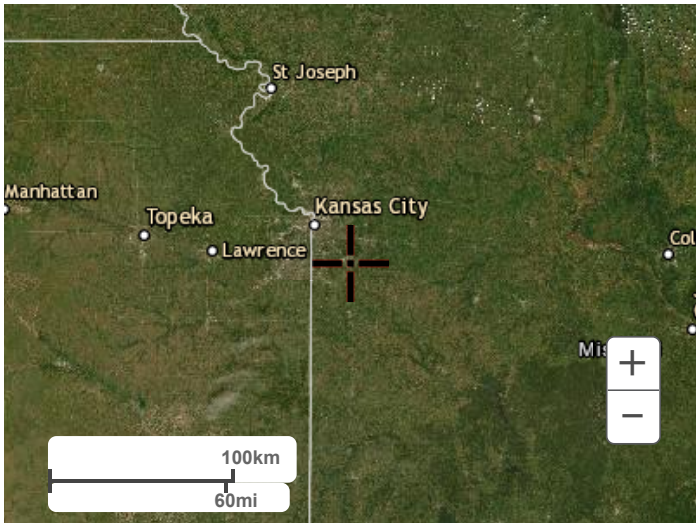
Large scale terrain



Large scale map



Large scale aerial



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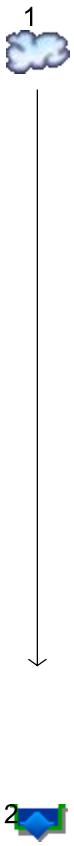
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix B

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Developed Area
2	Reservoir	Underground Detention

Hydraflow Table of Contents

Pond Revised 02-07-2022.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 9 / 2022

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	5.340	-------	-------	7.974	9.970	11.65	12.26	Developed Area
2	Reservoir	1	-------	0.371	-------	-------	0.595	1.018	2.521	3.284	Underground Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

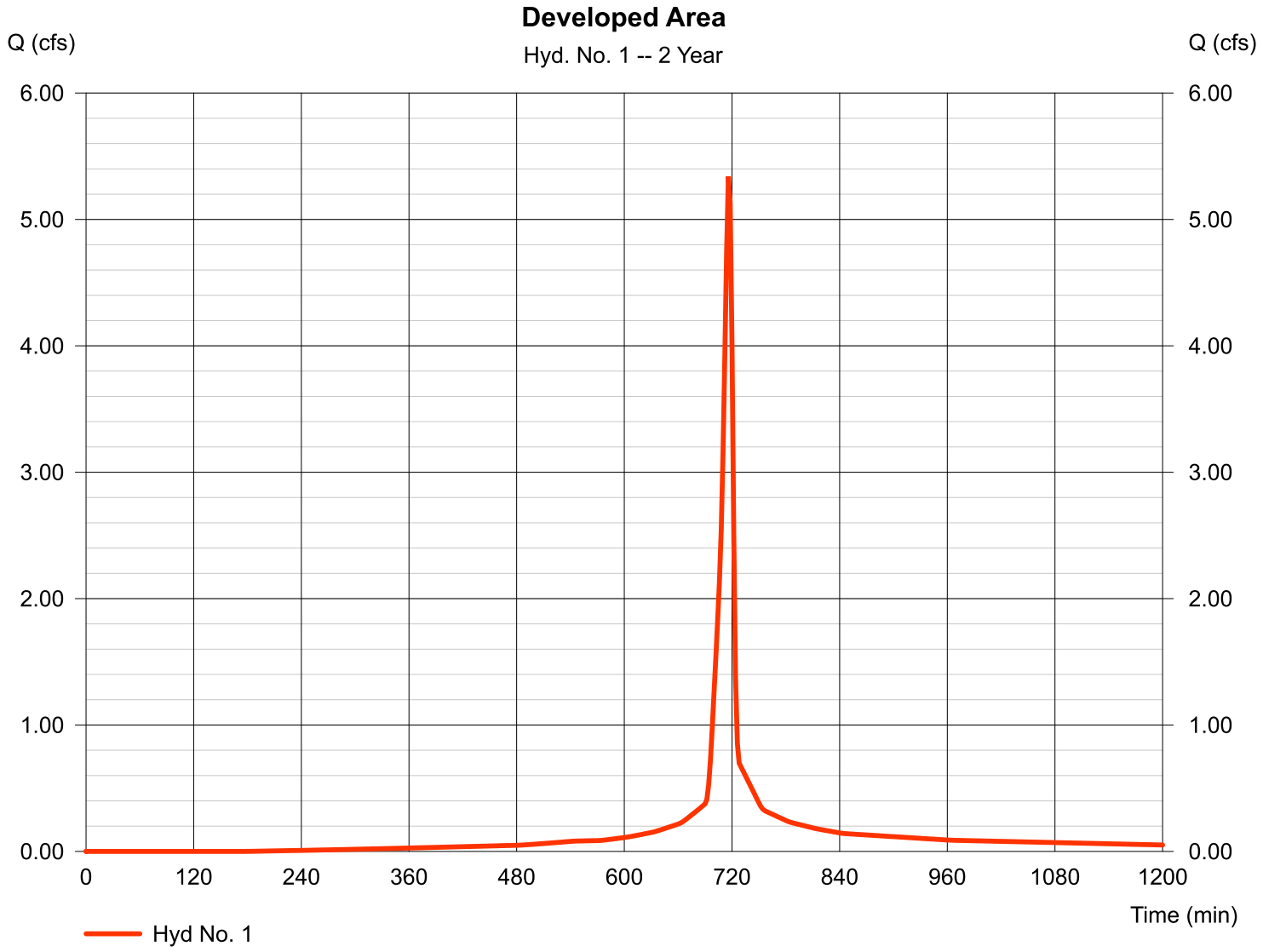
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.340	2	716	11,712	------	------	------	Developed Area
2	Reservoir	0.371	2	750	11,687	1	1008.34	6,938	Underground Detention

Hydrograph Report

Hyd. No. 1

Developed Area

Hydrograph type	= SCS Runoff	Peak discharge	= 5.340 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 11,712 cuft
Drainage area	= 1.100 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



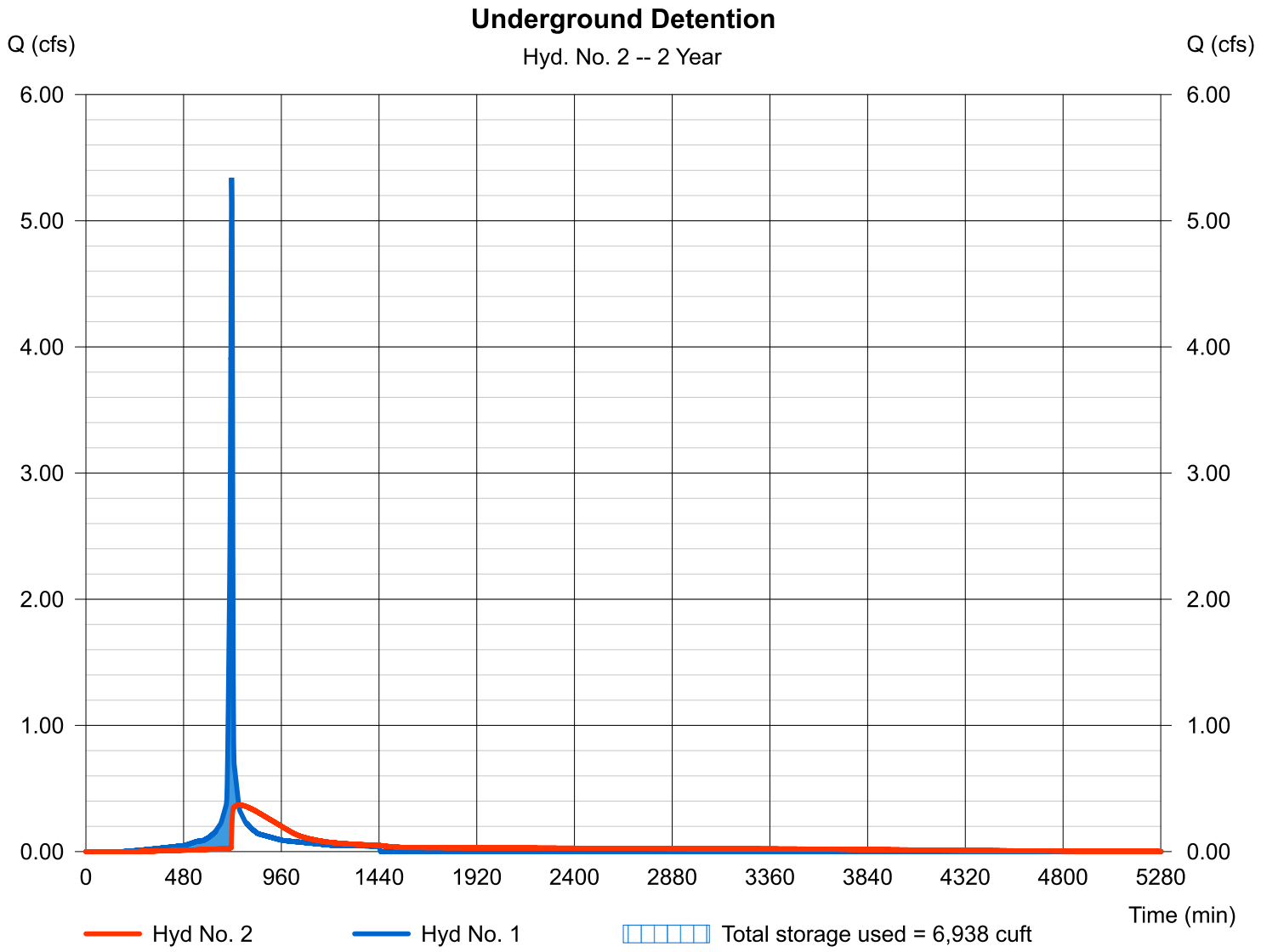
Hydrograph Report

Hyd. No. 2

Underground Detention

Hydrograph type	=	Reservoir	Peak discharge	=	0.371 cfs
Storm frequency	=	2 yrs	Time to peak	=	750 min
Time interval	=	2 min	Hyd. volume	=	11,687 cuft
Inflow hyd. No.	=	1 - Developed Area	Max. Elevation	=	1008.34 ft
Reservoir name	=	<New Pond>	Max. Storage	=	6,938 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

UG Chambers -Invert elev. = 1006.75 ft, Rise x Span = 5.00 x 8.33 ft, Barrel Len = 425.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 1006.00 ft, Width = 9.08 ft, Height = 6.75 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1006.00	n/a	0	0
0.68	1006.67	n/a	1,042	1,042
1.35	1007.35	n/a	2,314	3,356
2.03	1008.03	n/a	2,450	5,806
2.70	1008.70	n/a	2,398	8,204
3.38	1009.38	n/a	2,316	10,520
4.05	1010.05	n/a	2,195	12,715
4.72	1010.72	n/a	2,023	14,738
5.40	1011.40	n/a	1,759	16,497
6.08	1012.08	n/a	1,226	17,722
6.75	1012.75	n/a	1,042	18,765

Culvert / Orifice Structures

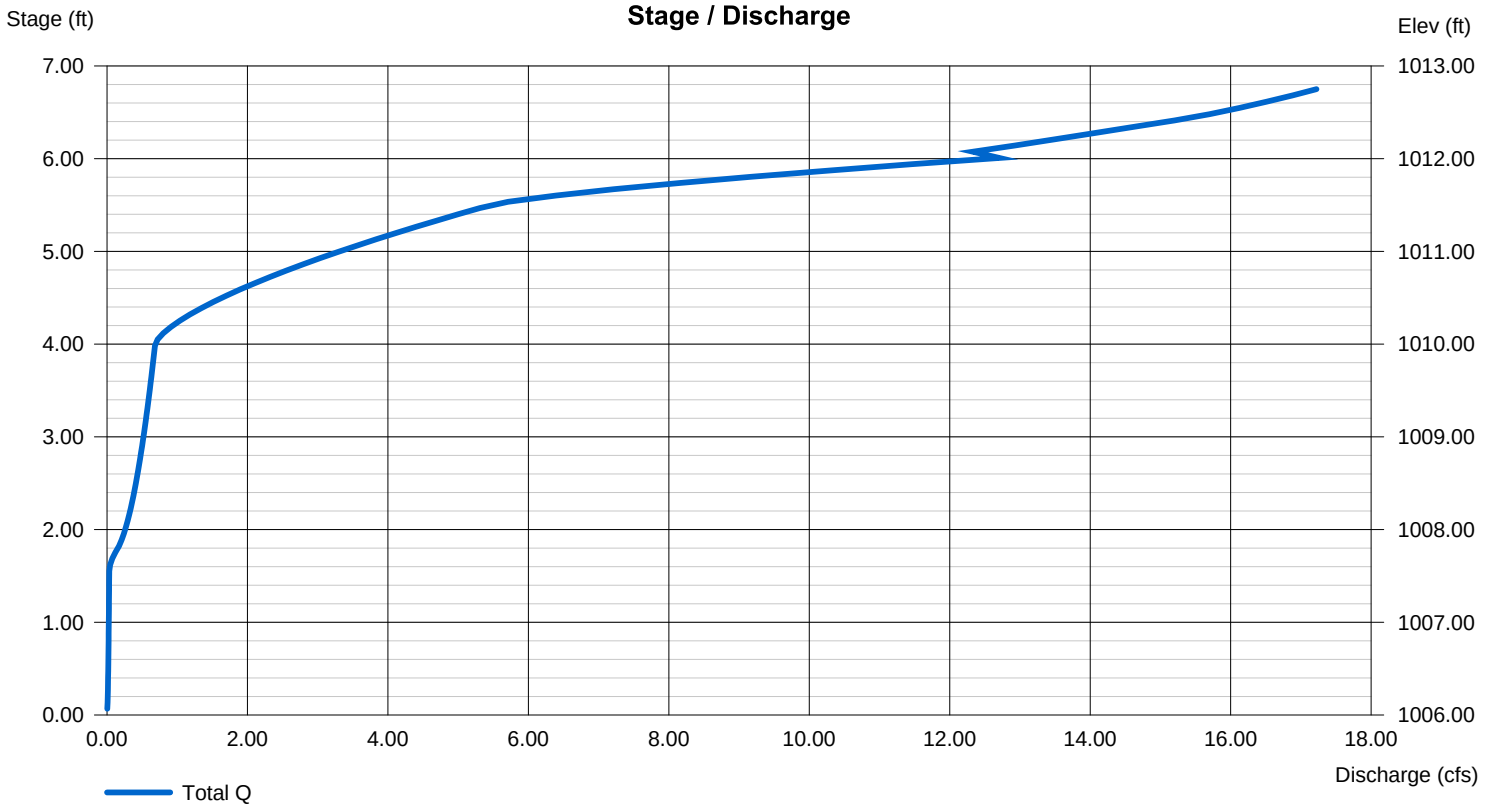
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.00	4.00	0.00
Span (in)	= 18.00	1.00	4.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1006.00	1006.00	1007.55	0.00
Length (ft)	= 16.00	0.00	0.00	0.00
Slope (%)	= 1.90	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.75	0.00	0.00
Crest El. (ft)	= 1011.50	1010.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

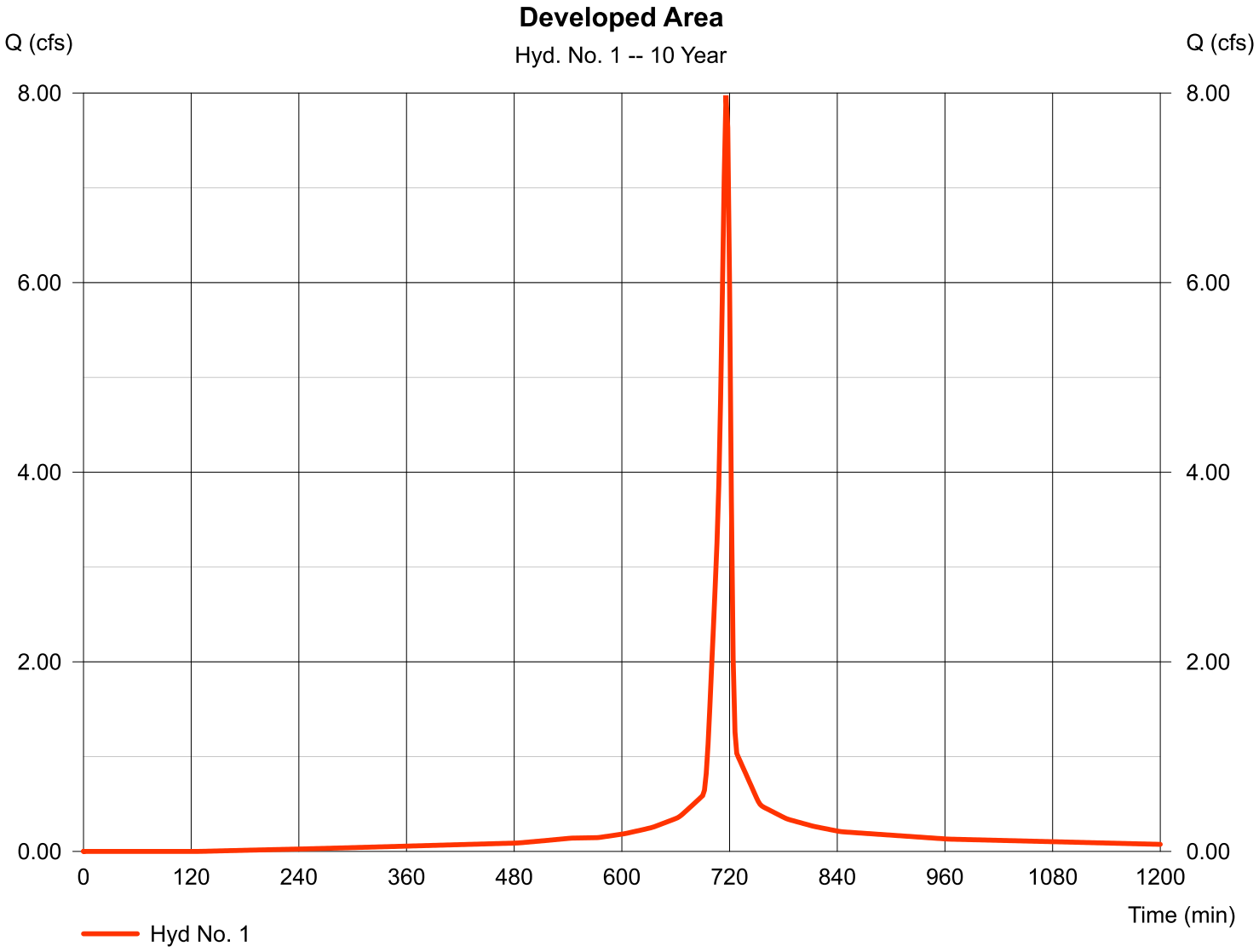
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.974	2	716	17,975	------	------	------	Developed Area
2	Reservoir	0.595	2	748	17,951	1	1009.43	10,681	Underground Detention

Hydrograph Report

Hyd. No. 1

Developed Area

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.974 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	17,975 cuft
Drainage area	=	1.100 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



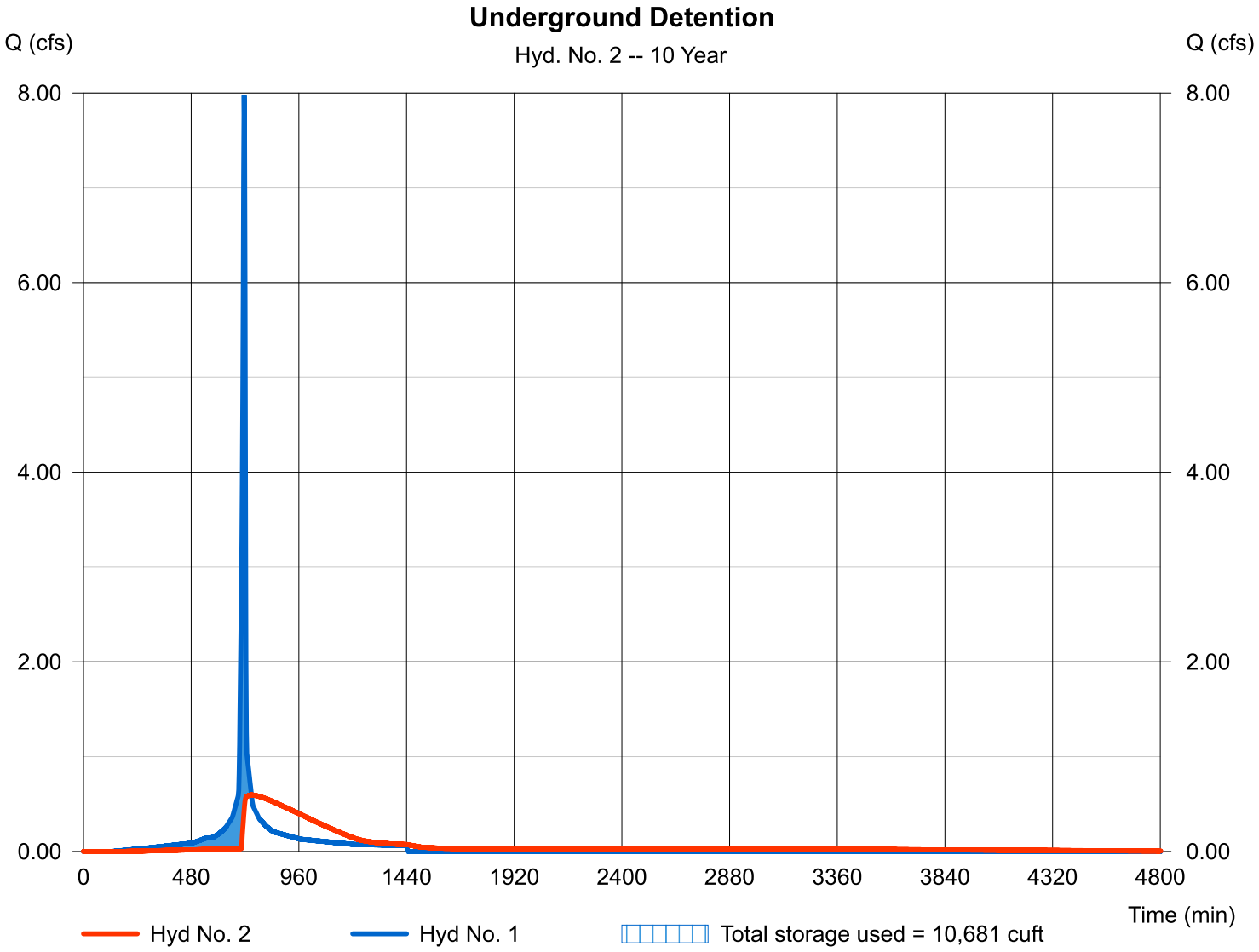
Hydrograph Report

Hyd. No. 2

Underground Detention

Hydrograph type	=	Reservoir	Peak discharge	=	0.595 cfs
Storm frequency	=	10 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	17,951 cuft
Inflow hyd. No.	=	1 - Developed Area	Max. Elevation	=	1009.43 ft
Reservoir name	=	<New Pond>	Max. Storage	=	10,681 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

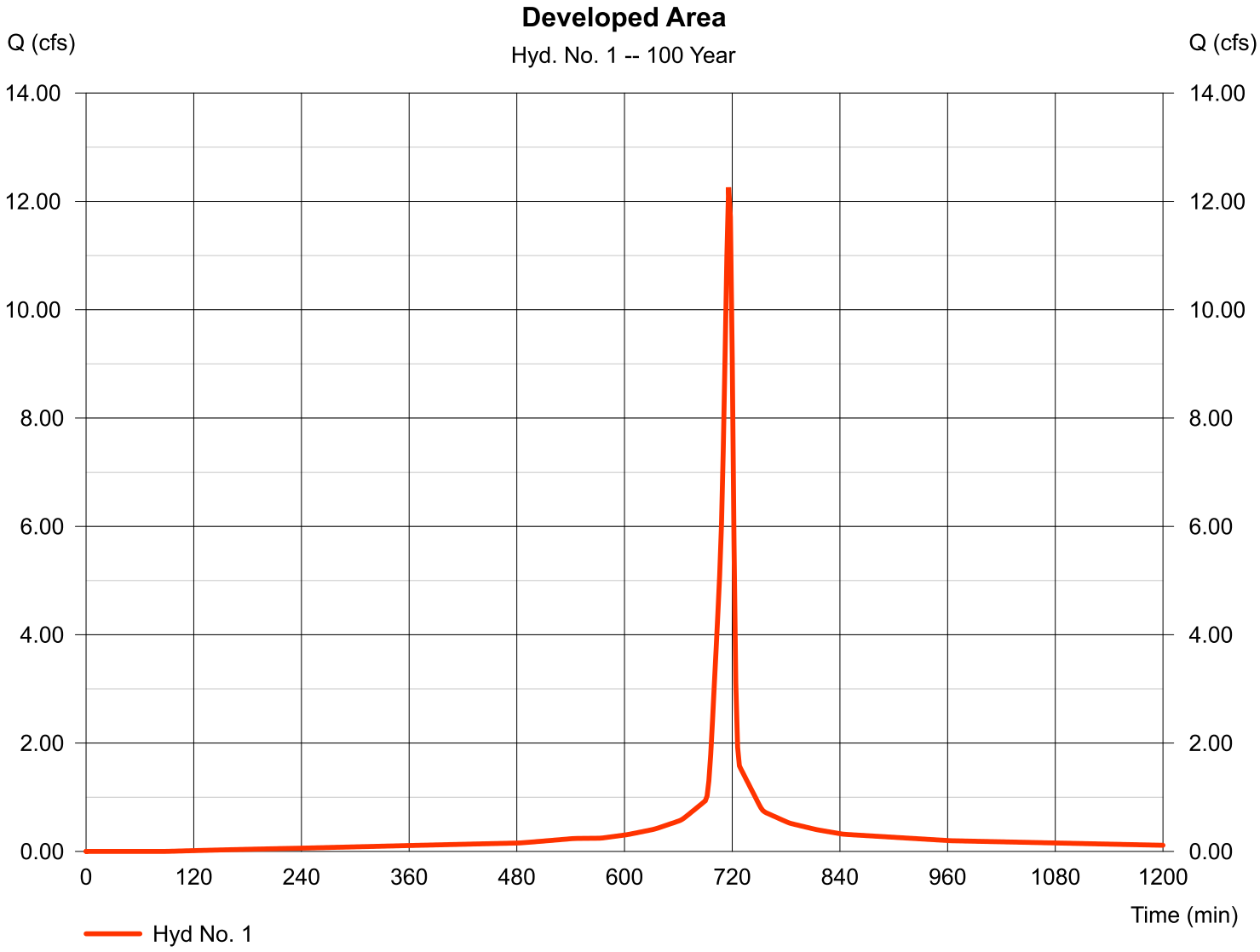
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	12.26	2	716	28,376	------	------	------	Developed Area
2	Reservoir	3.284	2	724	28,352	1	1010.99	15,435	Underground Detention

Hydrograph Report

Hyd. No. 1

Developed Area

Hydrograph type	= SCS Runoff	Peak discharge	= 12.26 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 28,376 cuft
Drainage area	= 1.100 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

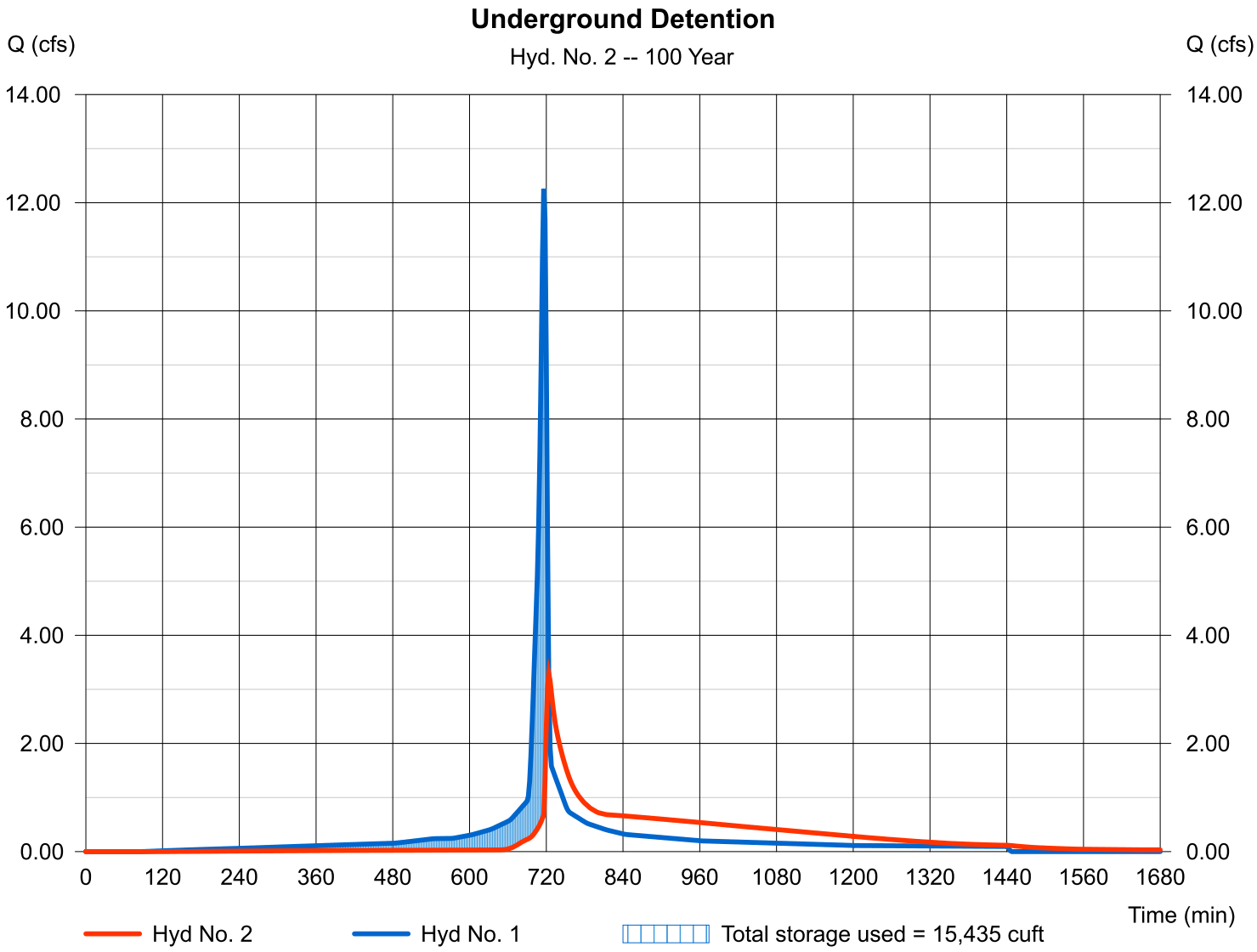
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Wednesday, 02 / 9 / 2022

Hyd. No. 2

Underground Detention

Hydrograph type	=	Reservoir	Peak discharge	=	3.284 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	28,352 cuft
Inflow hyd. No.	=	1 - Developed Area	Max. Elevation	=	1010.99 ft
Reservoir name	=	<New Pond>	Max. Storage	=	15,435 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	50.8539	10.2000	0.8092	--------
3	0.0000	0.0000	0.0000	--------
5	49.4655	10.1000	0.7494	--------
10	50.9302	10.1000	0.7248	--------
25	54.9506	10.2000	0.7037	--------
50	58.6163	10.3000	0.6923	--------
100	62.4218	10.4000	0.6834	--------

File name: Anderson, SC.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.62	4.47	3.73	3.23	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.47	5.22	4.42	3.86	3.44	3.11	2.85	2.63	2.45	2.30	2.16	2.05
10	7.12	5.79	4.93	4.32	3.86	3.51	3.22	2.98	2.79	2.62	2.47	2.34
25	8.10	6.63	5.67	4.99	4.48	4.08	3.76	3.49	3.27	3.07	2.91	2.76
50	8.87	7.29	6.26	5.53	4.97	4.54	4.18	3.89	3.64	3.43	3.25	3.09
100	9.63	7.95	6.84	6.05	5.45	4.98	4.60	4.28	4.02	3.79	3.59	3.41

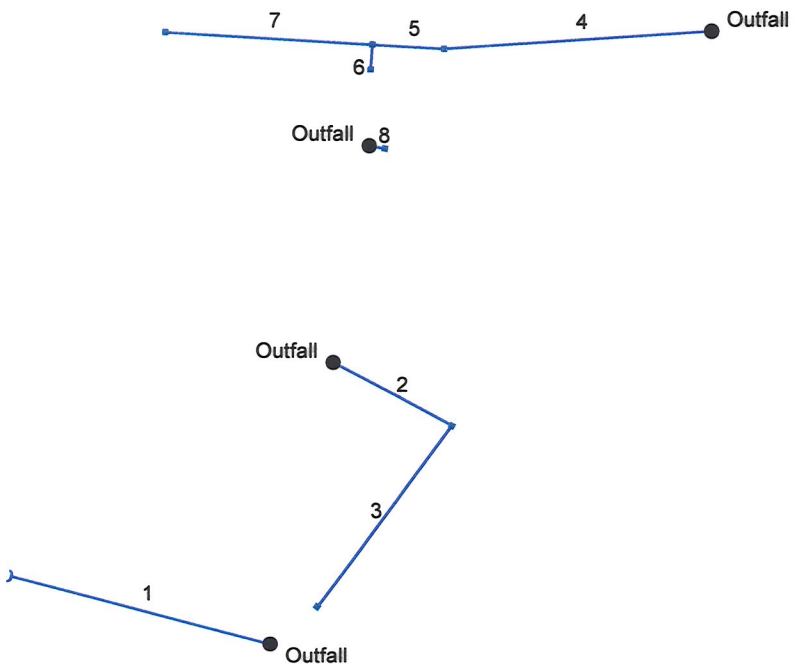
Tc = time in minutes. Values may exceed 60.

Precip. file name: G:\Projects\Steve Timmons & James Curtis\Foxhall Landing\Documents\SWM\Pickens.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.80	0.00	0.00	5.50	6.80	7.90	8.30
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix C

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: Lees Summit 2021-02-08.stm	Number of lines: 8	Date: 2/9/2022

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	R1-R2	9.26	18	Cir	164.400	1015.15	1016.00	0.517	1016.65*	1017.74*	0.43	1018.17	End	OpenHeadwall
2	UGD-4	7.33	18	Cir	82.860	1007.00	1009.50	3.017	1010.05	1010.55	n/a	1010.55 j	End	Combination
3	4-5	6.00	18	Cir	139.356	1009.70	1011.00	0.933	1010.55	1011.95	n/a	1011.95	2	Combination
4	EX.1-1	10.92	18	Cir	164.499	1003.30	1004.95	1.003	1004.48	1006.22	0.37	1006.22	End	DropCurb
5	1-1A	9.72	18	Cir	44.108	1005.25	1005.70	1.020	1006.31	1006.90	n/a	1006.90	4	Manhole
6	1A-2	2.30	18	Cir	15.501	1008.30	1008.50	1.290	1008.73	1009.07	n/a	1009.07	5	Manhole
7	1A-1B	7.69	18	Cir	127.189	1005.90	1007.20	1.022	1006.90	1008.27	n/a	1008.27	5	DropCurb
8	UGD-3	2.94	18	Cir	9.545	1007.80	1007.90	1.048	1008.31	1008.55	n/a	1008.55	End	Combination

Project File: Lees Summit 2021-02-08.stm | Number of lines: 8 | Run Date: 2/9/2022

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	164.400	0.94	0.94	0.52	0.49	0.49	5.0	5.0	12.6	9.26	8.18	5.24	18	0.52	1015.15	1016.00	1016.65	1017.74	1017.36	1018.21	R1-R2
2	End	82.860	0.15	0.77	0.90	0.14	0.61	5.0	5.7	12.0	7.33	19.76	4.85	18	3.02	1007.00	1009.50	1010.05	1010.55	1015.90	1015.60	UGD-4
3	2	139.356	0.62	0.62	0.77	0.48	0.48	5.0	5.0	12.6	6.00	10.99	5.47	18	0.93	1009.70	1011.00	1010.55	1011.95	1015.60	1015.00	4-5
4	End	164.499	0.30	2.00	0.35	0.11	0.72	5.0	5.6	12.0	10.92	11.39	7.09	18	1.00	1003.30	1004.95	1004.48	1006.22	1008.34	1012.00	EX.1-1
5	4	44.108	0.00	1.70	0.00	0.00	0.61	0.0	5.5	12.1	9.72	11.49	6.85	18	1.02	1005.25	1005.70	1006.31	1006.90	1012.00	1016.00	1-1A
6	5	15.501	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.30	12.92	4.61	18	1.29	1008.30	1008.50	1008.73	1009.07	1016.00	1016.20	1A-2
7	5	127.189	1.70	1.70	0.36	0.61	0.61	5.0	5.0	12.6	7.69	11.50	5.91	18	1.02	1005.90	1007.20	1006.90	1008.27	1016.00	1013.50	1A-1B
8	End	9.545	0.26	0.26	0.90	0.23	0.23	5.0	5.0	12.6	2.94	11.65	4.74	18	1.05	1007.80	1007.90	1008.31	1008.55	1015.60	1015.40	UGD-3

Project File: Lees Summit 2021-02-08.stm

Number of lines: 8

Run Date: 2/9/2022

NOTES:Intensity = 48.16 / (Inlet time + 3.40) ^ 0.63; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	R2	9.26*	0.00	9.26	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	4	1.70	0.00	1.70	0.00	Comb	6.0	3.58	3.09	2.98	2.00	Sag	2.00	0.050	0.020	0.000	0.20	6.93	0.20	6.93	0.0	Off
3	5	6.00	0.00	6.00	0.00	Comb	6.0	3.58	3.09	2.98	2.00	Sag	2.00	0.050	0.020	0.000	0.39	16.53	0.39	16.53	0.0	Off
4	1	1.32	0.00	1.32	0.00	DrCrb	6.0	15.35	0.00	0.00	0.00	Sag	0.00	0.020	0.020	0.000	0.09	4.68	0.09	4.68	0.0	Off
5	1A	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6	2	2.30*	0.00	0.00	2.30	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	1B	7.69	0.00	7.69	0.00	DrCrb	6.0	15.35	0.00	0.00	0.00	Sag	0.00	0.020	0.020	0.000	0.30	15.16	0.30	15.16	0.0	Off
8	3	2.94	0.00	2.94	0.00	Comb	6.0	3.58	3.09	2.98	2.00	Sag	2.00	0.050	0.020	0.000	0.26	10.15	0.26	10.15	0.0	Off

This 2.30 cfs of discharge added to the system is the discharge of the 100-year, 24-hour storm event from the underground detention system. This value was calculated utilizing HydroCAD and these calculation can be found in Appendix B of this report.

This 9.26 cfs of discharge added to the system is the sum of the runoff directed to inlet "R-2", the runoff directed to inlet "EX-1", and the runoff directed to inlet "EX-2". Reference the Inlet Area Map included in Appendix A of the report for clarification. This combined discharge represents the approximate total runoff discharged to inlet R-2 via the ditch on the north margin of the right-of-way of SE Blue Parkway.

Project File: Lees Summit 2021-02-08.stm | Number of lines: 8 | Run Date: 2/9/2022

NOTES: Inlet N-Values = 0.016; Intensity = 48.16 / (Inlet time + 3.40) ^ 0.63; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Appendix D

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	DIRK HUDSON 816-602-4201 DIRK.HUDSON@ADS-PIPE.COM
ADS SALES REP:	DUSTIN KETCHUM 316-201-7032 DUSTIN.KETCHUM@ADS-PIPE.COM
PROJECT NO:	S248764

Advanced Drainage Systems, Inc.

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CALIBER COLLISION

LEE'S SUMMIT, MO

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

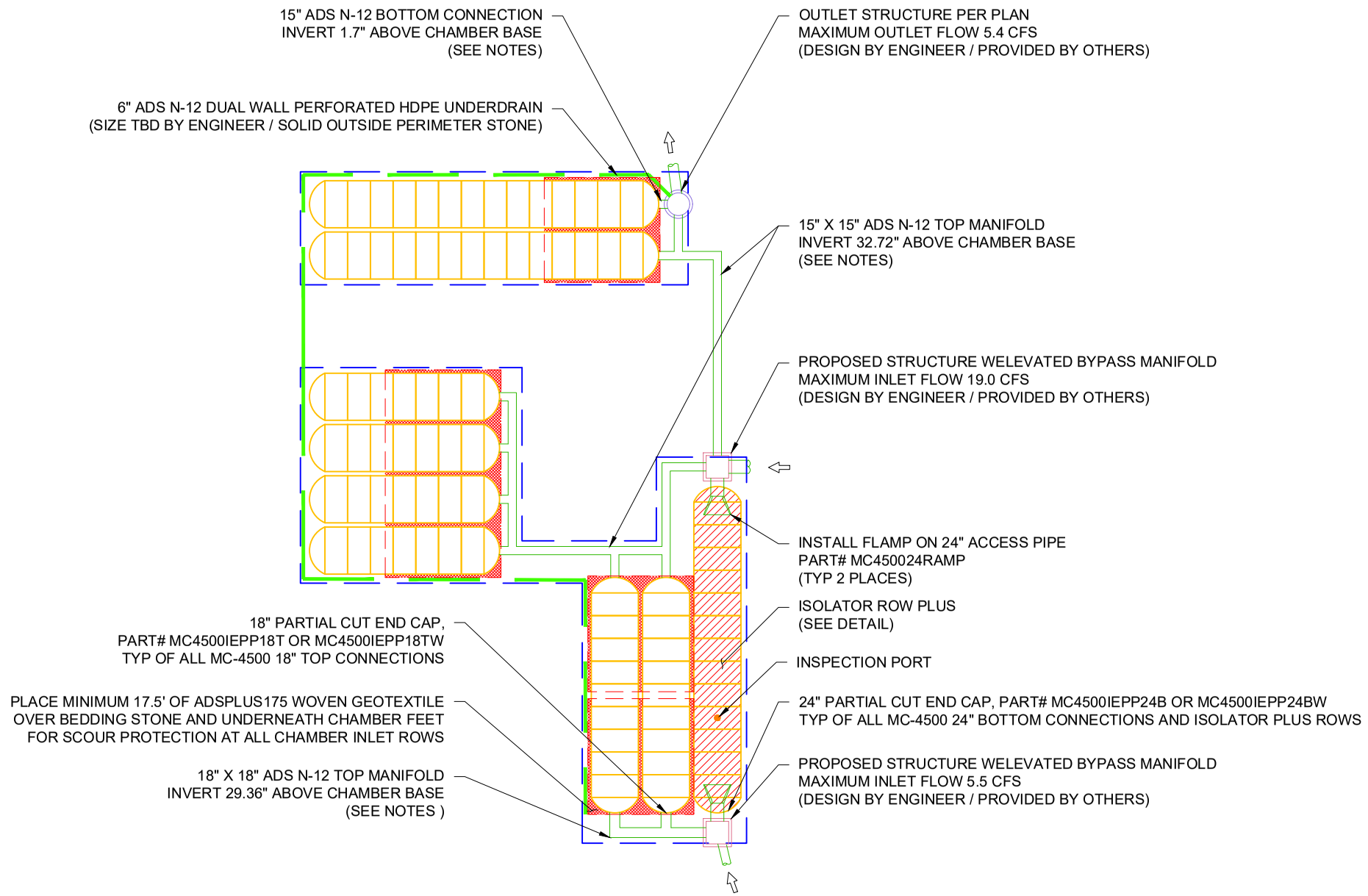
87	STORMTECH MC-4500 CHAMBERS
18	STORMTECH MC-4500 END CAPS
12	STONE ABOVE (in)
9	STONE BELOW (in)
40	% STONE VOID
18,806	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
4748	SYSTEM AREA (ft²)
177	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS

1018.75	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
1014.25	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
1013.75	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
1013.75	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
1013.75	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
1012.75	TOP OF STONE
1011.75	TOP OF MC-4500 CHAMBER
1009.48	15" TOP MANIFOLD INVERT
1009.20	18" TOP MANIFOLD INVERT
1006.94	24" ISOLATOR ROW PLUS CONNECTION INVERT
1006.89	15" BOTTOM CONNECTION INVERT
1006.75	BOTTOM OF MC-4500 CHAMBER
1006.00	UNDERDRAIN INVERT
1006.00	BOTTOM OF STONE

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



CALIBER COLLISION
LEE'S SUMMIT, MO
DATE: 07-16-21 | DRAWN: RSG
PROJECT #: S248764 | CHECKED: AGC

DATE	DRWN	CHKD	DESCRIPTION
02/03/2022	NAL	RWD	REVISE TO MC-4500
07-21-21	RSG	AGC	REMOVED SECOND WQ STRUCTURE

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

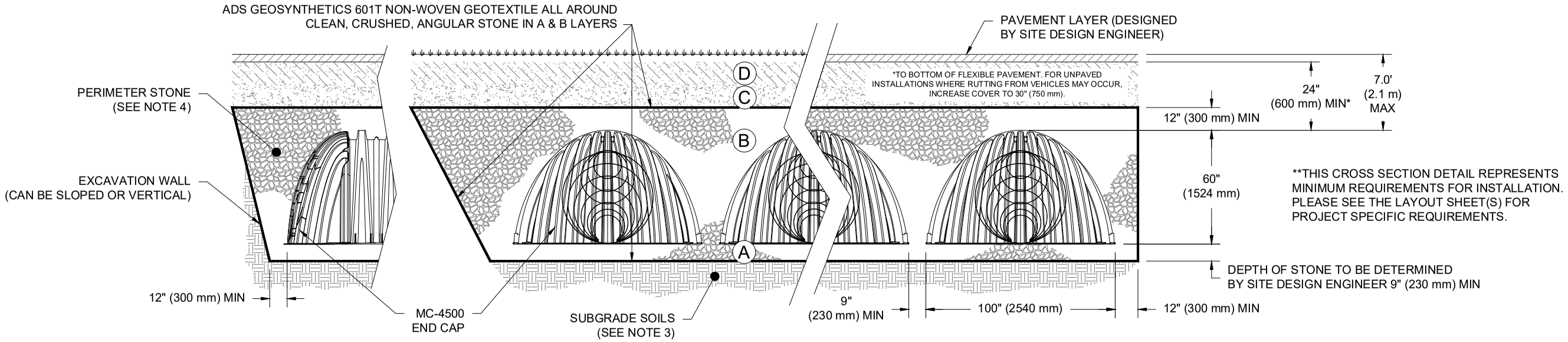
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

0 25' 50'

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

CALIBER COLLISION
LEE'S SUMMIT, MO
DATE: 07-16-21 | DRAWN: RSG
PROJECT #: S248764 | CHECKED: AGC

DATE	DRWN	CHKD	DESCRIPTION
02/03/2022	NAL	RWD	REVISE TO MC-4500
07-21-21	RSG	AGC	REMOVED SECOND WQ STRUCTURE

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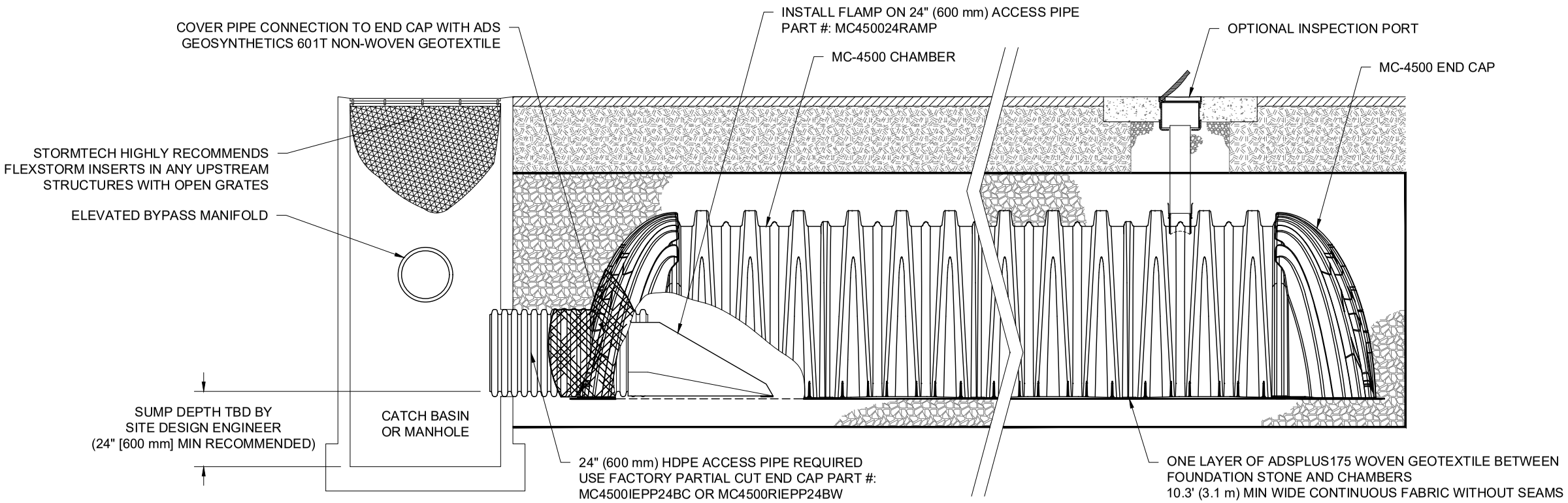


MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

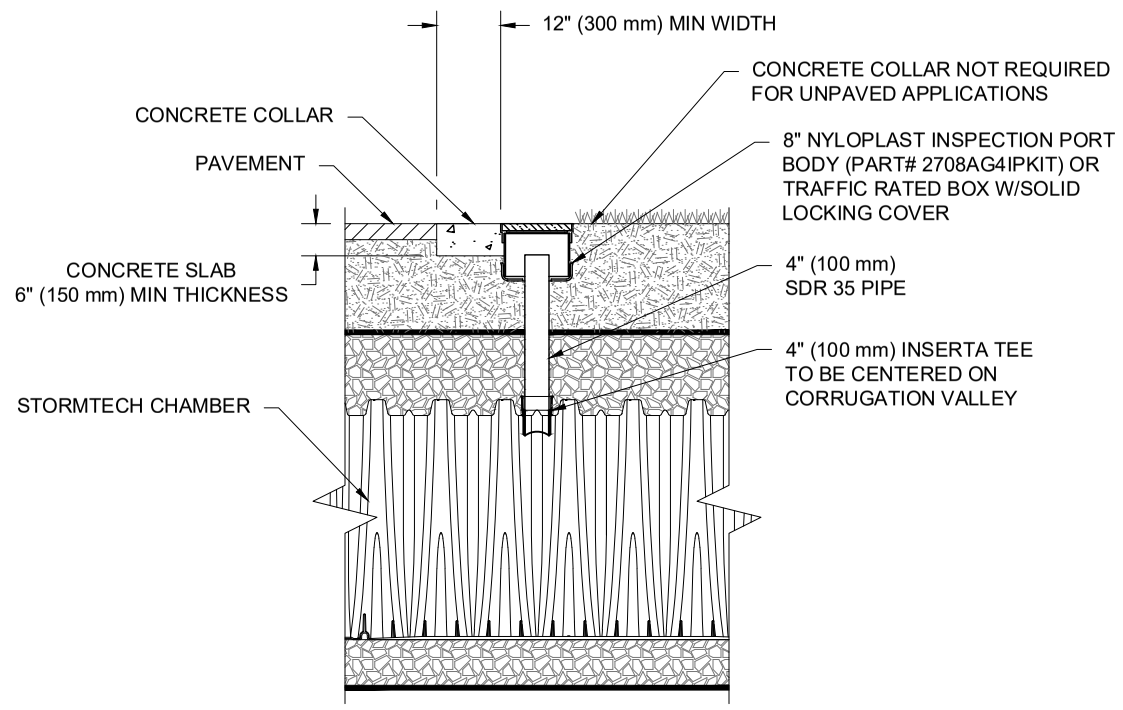
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)
NTS

CALIBER COLLISION
LEE'S SUMMIT, MO
DATE: 07-16-21 | DRAWN: RSG
PROJECT #: S248764 | CHECKED: AGC

DATE	DRWN	CHKD	DESCRIPTION
02/03/2022	NAL	RWD	REVISE TO MC-4500
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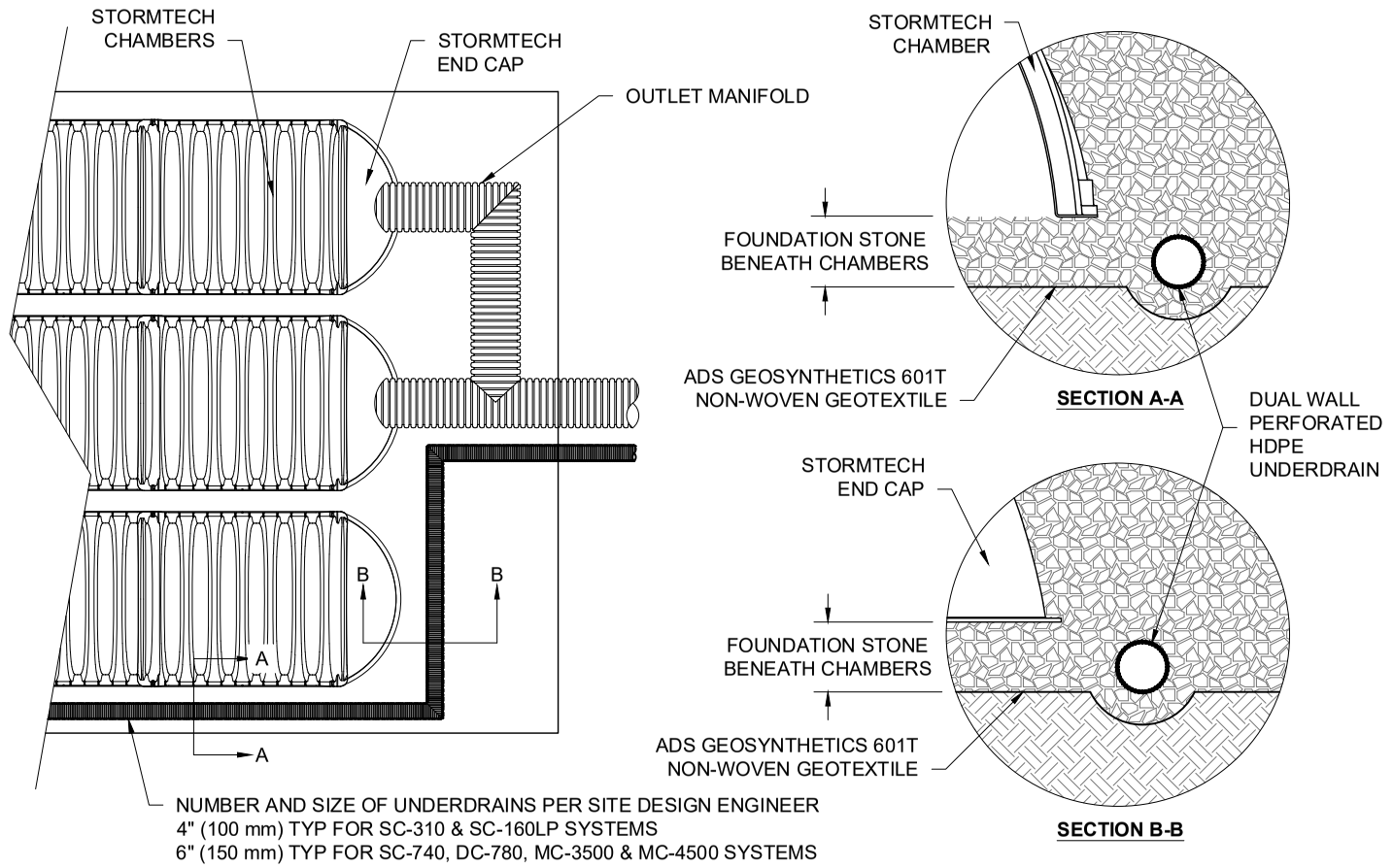
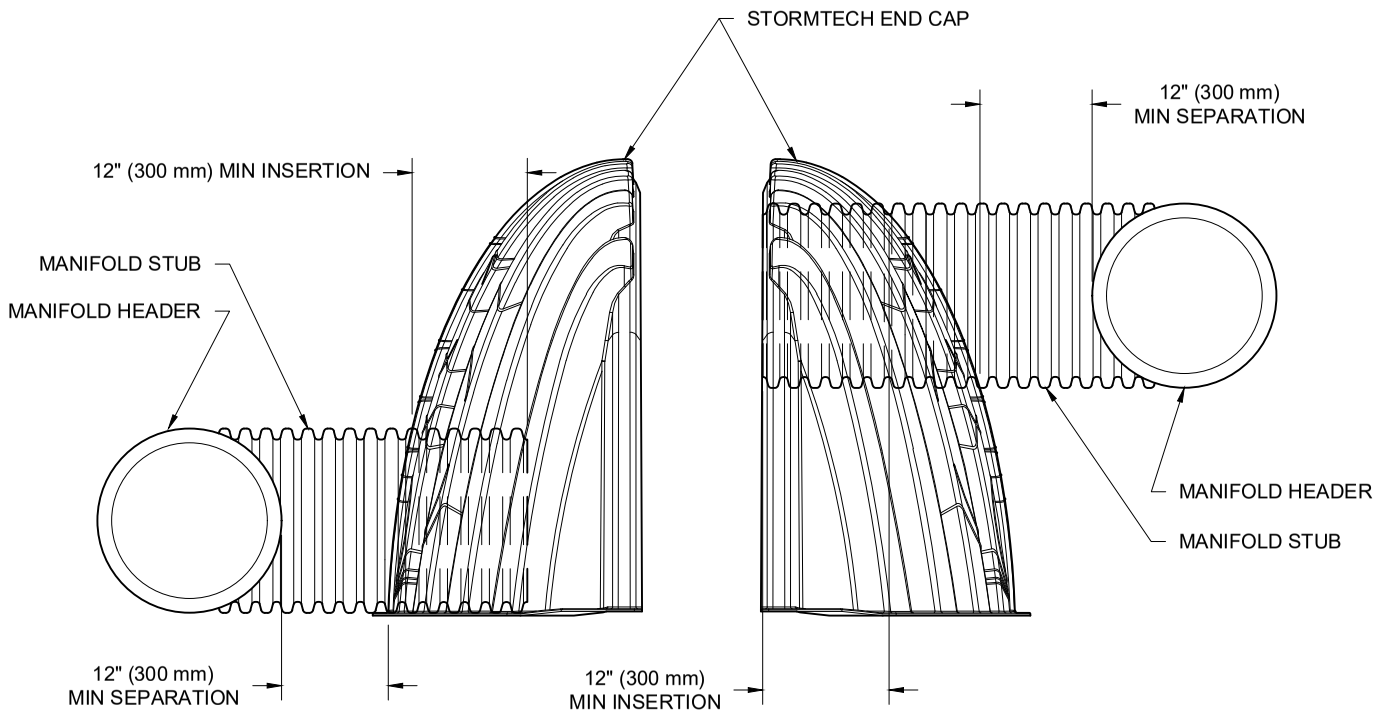
UNDERDRAIN DETAIL

NTS



MC-SERIES END CAP INSERTION DETAIL

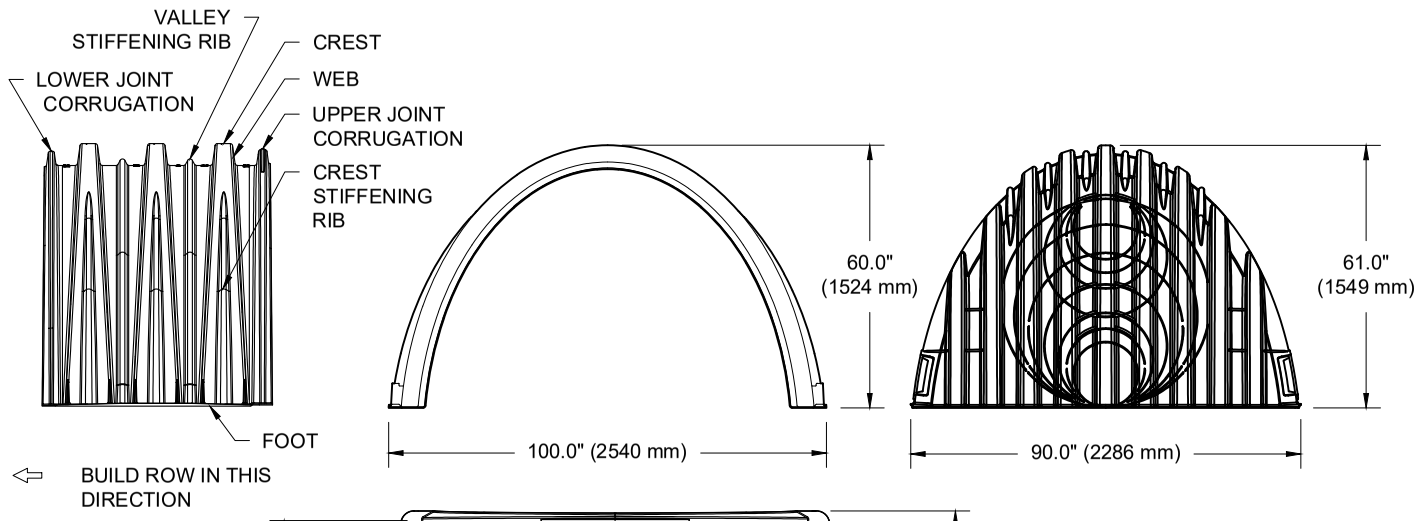
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

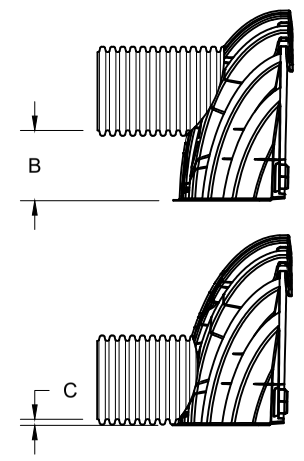
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

CALIBER COLLISION
LEE'S SUMMIT, MO
DATE: 07-16-21 DRAWN: RSG
PROJECT #: S248764 CHECKED: AGC

DATE	DRWN	CHKD	DESCRIPTION
02/03/2022	NAL	RWD	REVISE TO MC-4500
07-21-21	RSG	AGC	REMOVED SECOND WQ STRUCTURE

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

N86° 35' 24"W 181.72'
8" pvc @ 1.65%
San Manhole
T=1012.78
8" pvc in W
8" pvc out E
t=1000.56
7TH TERRACE (60'WIDE)
SAWCUT
DAYLIGHT 1.5' PVC TO DITCH AT PROPERTY LINE EL. 1014.5
8 LF. OF 1.5' PVC @ 1.3% SLOPE
MC-3500 STORMTECH CHAMBER UNDERGROUND DETENTION SYSTEM PER ADS DETAILS AND SPECIFICATIONS INCLUDED IN THIS PLAN SET
S86° 35' 24"E 184.87' (R&S)
S86° 35' 24"E 192.60' (R&S)
1.5' INVERT OUT OF FIRE VAULT EL. 1015.0
1.5' INVERT AT SUMP PUMP EL. 1007.67
Building Line
Inv. out can now be 1006.0 instead of 1008.5
TAPER CURB FROM 0" TO 6" OVER 18 FEET
INV=13.6
INV=13.35
INV=13.2
PROPOSED CALIBER COLLISION 11,582 SF.
FFE:1016.5'
RIDGE
10' Bldg. Setback
Parking Setback
S30°E 358.67'(R&S)

Project: **Caliber Collision**

StormTech
Detention • Retention • Water Quality
A division of CDS

Chamber Model -	MC-4500	
Units -	Imperial	Click Here for Metric
Number of Chambers -	87	
Number of End Caps -	18	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	1006.00	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in

☑ Include Perimeter Stone in Calculations

Area of system - 4748 sf Min. Area - 3791 sf min. area

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Single End Cap (cubic feet)	Incremental Chambers (cubic feet)	Incremental End Cap (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch, EC and Stone (cubic feet)	Cumulative System (cubic feet)	Elevation (feet)
81	0.00	0.00	0.00	0.00	158.27	158.27	18806.32	1012.75
80	0.00	0.00	0.00	0.00	158.27	158.27	18648.05	1012.67
79	0.00	0.00	0.00	0.00	158.27	158.27	18489.79	1012.58
78	0.00	0.00	0.00	0.00	158.27	158.27	18331.52	1012.50
77	0.00	0.00	0.00	0.00	158.27	158.27	18173.25	1012.42
76	0.00	0.00	0.00	0.00	158.27	158.27	18014.99	1012.33
75	0.00	0.00	0.00	0.00	158.27	158.27	17856.72	1012.25
74	0.00	0.00	0.00	0.00	158.27	158.27	17698.45	1012.17
73	0.00	0.00	0.00	0.00	158.27	158.27	17540.19	1012.08
72	0.00	0.00	0.00	0.00	158.27	158.27	17381.92	1012.00
71	0.00	0.00	0.00	0.00	158.27	158.27	17223.65	1011.92
70	0.00	0.00	0.00	0.00	158.27	158.27	17065.39	1011.83
69	0.04	0.01	3.56	0.23	156.75	160.55	16907.12	1011.75
68	0.12	0.03	10.10	0.61	153.98	164.69	16746.58	1011.67
67	0.16	0.05	14.33	0.93	152.16	167.42	16581.88	1011.58
66	0.21	0.07	18.16	1.19	150.53	169.87	16414.46	1011.50
65	0.27	0.08	23.35	1.50	148.33	173.17	16244.58	1011.42
64	0.45	0.11	39.39	1.90	141.75	183.04	16071.41	1011.33
63	0.67	0.13	57.88	2.38	134.16	194.42	15888.37	1011.25
62	0.80	0.16	69.51	2.90	129.30	201.71	15693.95	1011.17
61	0.91	0.19	79.01	3.40	125.31	207.71	15492.23	1011.08
60	1.00	0.22	87.25	3.93	121.79	212.98	15284.53	1011.00
59	1.09	0.25	94.60	4.44	118.65	217.69	15071.55	1010.92
58	1.16	0.28	101.22	4.96	115.80	221.97	14853.85	1010.83
57	1.23	0.30	107.36	5.43	113.15	225.94	14631.88	1010.75
56	1.30	0.33	113.07	5.90	110.68	229.65	14405.94	1010.67
55	1.36	0.35	118.41	6.38	108.35	233.14	14176.29	1010.58
54	1.42	0.38	123.43	6.91	106.13	236.47	13943.15	1010.50
53	1.47	0.41	128.18	7.37	104.05	239.59	13706.68	1010.42
52	1.53	0.44	132.69	7.94	102.02	242.64	13467.09	1010.33
51	1.57	0.47	136.98	8.44	100.10	245.52	13224.45	1010.25
50	1.62	0.50	141.06	8.91	98.28	248.25	12978.93	1010.17
49	1.67	0.52	144.96	9.37	96.53	250.87	12730.68	1010.08
48	1.71	0.54	148.69	9.80	94.87	253.36	12479.81	1010.00
47	1.75	0.57	152.26	10.20	93.28	255.74	12226.45	1009.92
46	1.79	0.59	155.67	10.59	91.76	258.02	11970.71	1009.83
45	1.83	0.61	158.97	10.98	90.29	260.23	11712.68	1009.75
44	1.86	0.63	162.12	11.38	88.87	262.37	11452.45	1009.67
43	1.90	0.64	165.15	11.58	87.57	264.30	11190.08	1009.58
42	1.93	0.68	168.07	12.19	86.16	266.42	10925.78	1009.50
41	1.96	0.70	170.88	12.60	84.88	268.35	10659.36	1009.42
40	2.00	0.72	173.58	13.00	83.64	270.21	10391.01	1009.33
39	2.03	0.74	176.18	13.39	82.44	272.00	10120.79	1009.25
38	2.05	0.76	178.68	13.76	81.29	273.73	9848.79	1009.17
37	2.08	0.79	181.09	14.14	80.17	275.40	9575.06	1009.08
36	2.11	0.80	183.40	14.45	79.13	276.98	9299.65	1009.00
35	2.13	0.82	185.64	14.76	78.11	278.51	9022.68	1008.92
34	2.16	0.84	187.80	15.09	77.11	280.01	8744.17	1008.83
33	2.18	0.85	189.88	15.32	76.19	281.39	8464.16	1008.75
32	2.21	0.86	191.88	15.47	75.33	282.68	8182.77	1008.67
31	2.23	0.89	193.81	16.01	74.34	284.16	7900.09	1008.58
30	2.25	0.90	195.65	16.28	73.50	285.42	7615.94	1008.50
29	2.27	0.92	197.43	16.51	72.69	286.63	7330.51	1008.42
28	2.29	0.92	199.14	16.56	71.99	287.69	7043.88	1008.33
27	2.31	0.94	200.78	16.98	71.16	288.93	6756.20	1008.25
26	2.33	0.96	202.36	17.21	70.44	290.01	6467.27	1008.17
25	2.34	0.97	203.87	17.44	69.75	291.05	6177.26	1008.08
24	2.36	0.98	205.31	17.66	69.08	292.05	5886.21	1008.00
23	2.38	0.97	206.69	17.48	68.60	292.77	5594.16	1007.92
22	2.39	1.00	208.02	18.06	67.84	293.91	5301.39	1007.83
21	2.41	1.01	209.28	18.20	67.28	294.75	5007.48	1007.75
20	2.42	1.02	210.48	18.37	66.73	295.57	4712.73	1007.67
19	2.43	1.03	211.62	18.55	66.20	296.36	4417.15	1007.58
18	2.44	1.04	212.70	18.70	65.71	297.11	4120.79	1007.50
17	2.46	1.05	213.73	18.83	65.24	297.80	3823.68	1007.42
16	2.47	1.05	214.70	18.97	64.80	298.47	3525.88	1007.33
15	2.48	1.05	215.61	18.91	64.46	298.98	3227.41	1007.25
14	2.49	1.06	216.48	19.02	64.07	299.57	2928.43	1007.17
13	2.50	1.08	217.30	19.36	63.60	300.26	2628.87	1007.08
12	2.51	1.08	218.07	19.49	63.24	300.80	2328.61	1007.00
11	2.51	1.09	218.78	19.59	62.92	301.29	2027.81	1006.92
10	2.53	1.11	219.84	19.91	62.36	302.12	1726.52	1006.83
9	0.00	0.00	0.00	0.00	158.27	158.27	1424.40	1006.75
8	0.00	0.00	0.00	0.00	158.27	158.27	1266.13	1006.67
7	0.00	0.00	0.00	0.00	158.27	158.27	1107.87	1006.58
6	0.00	0.00	0.00	0.00	158.27	158.27	949.60	1006.50
5	0.00	0.00	0.00	0.00	158.27	158.27	791.33	1006.42
4	0.00	0.00	0.00	0.00	158.27	158.27	633.07	1006.33
3	0.00	0.00	0.00	0.00	158.27	158.27	474.80	1006.25
2	0.00	0.00	0.00	0.00	158.27	158.27	316.53	1006.17
1	0.00	0.00	0.00	0.00	158.27	158.27	158.27	1006.08