

Technical Memo

Date	January 26, 2026
From	Patrick Blake, P.E., Ishwrya Geetha (w/ Verdantas)
To	Mr. Chuck Hauber, P.E., P.S. (w/ Summit County Engineer)
Subject	Springfield Lake Watershed Study No. 2 Task: H&H Modeling and Existing Conditions Level of Service Cornell Creek (Site #8)
Project Number	220741

Background

Summit County Engineer's Office (SCE) has requested design and planning services from Verdantas (VDT) for the Cornell Creek (Site #8) Improvements depicted in a concept plan issued in April 2025 prepared by Verdantas as a part of the Springfield Lake Watershed Study No. 2.

This memo serves as a summary of our findings to provide an infrastructure condition assessment of the subject existing storm sewers, from the west side of Canton Road North to the Springfield Lake Outlet, North of US224 and provide an hydraulic analysis of the existing system to determine an approximate existing level service and basis of design for improvements to the area.

To begin the planning phase, existing condition data was collected from the area to support the assessment. This information includes:

1. A limited topographic survey to map known hardscape features, elevation, and observable buried utilities within the Cornell Creek Study Area.
2. A Subsurface Utility Exploration (SUE) by ground penetrating radar; to canvas and collect field observed buried infrastructure on private property and beyond available public records. A map of utilities gathered by Ground Penetrating Radar is attached (Exhibit A).
3. CCTV of the subject sewer to have a visualized record of structural conditions within the pipes. A copy of the full CCTV report has been included as an attachment to this memo.

This approach sets out to - (1) confirm existing hydraulics and their potential impact on flooding occurrences, (2) aims to preserve any adequate existing infrastructure to minimize capital spending, and (3) serves as basis of design for future infrastructure (confirming intended level of service will be met).

Existing Conditions and Field Investigation

Field survey was collected within the study area and base mapping was prepared in Autodesk Civil3D, for use in design planning. Subsurface utility information and ODOT record data supplied by SCE was utilized to understand the surrounding sewer routing and flows paths of the area towards the Springfield Lake Outlet and supplement the survey data.

A CCTV exploration was conducted along the existing storm sewer route to identify internal structural conditions within the pipes and help define and rank sewers based on observed conditions.

Defects varied amongst the barrels, from debris deposition to occasional holes in the pipe wall, and deformation of the top of the pipes near the outlet. Highlights of the most notable CCTV findings were extracted from the full report and plotted on a figure along with corresponding photos (Exhibit B).

In summary, sewers located south of US 224 appeared to change materials from CMP to RCP, and in some segments HDPE. RCP piping was most prominently located beneath the buildings. Piping through this area had noted structural defects including holes with visible soil, and most notably; penetration through both barrels approximately between the gas station and Wendy's was observed. In one photo the penetration appears to be a branch but in the other photo indicates it could be a small utility line. Review of the CCTV through the area supports SCEs desire to relocate this stretch of sewer from out underneath the buildings to mitigate risks associated with the sewers beneath the infrastructure with their given structural defects.

The box culvert beneath US 224 appears to be in good shape, with minor sediment deposits. The storm sewer from the box culvert towards the lake outlet had variable defects ranging from sediment deposits, holes with soil visible and consistent deformation in the top of the barrels near the lake outlet. CCTV showed that an access point at the bend of the sewer does not exist, and instead there are buried 45-degree bends in the sewer at that location. The CCTV shows deposits and debris near and around these bends. A third storm sewer barrel was verified to not be connected to the box culvert north of US 224. This sewer barrel instead picks up drainage in and around McDonalds and conveys flow to the lake outlet.

It is recommended the sewer north of the US 224 box culvert undergoes heavy cleaning to remove the large debris from the sewer to work towards improving the capacity and conveyance potential.

Modeling Overview and Level of Service Assessment

Summit County Engineer's Office (SCE) requested brief H&H analysis utilizing PCSWMM (EPA SWMM Engine) H&H Software. No recorded monitoring data (flow, depth gage, or rainfall) is available or utilized during the build. The uncalibrated deliverable supports planning level (15% design) decisions only. The following text summarizes the model build and results. The model build deliverables include existing conditions models for Cornell Creek.

The model indicates that the study area pipes have a 25-year Level of Service and meets the Summit County Drainage Manual for the highlighted section (HGL of 25-year to not exceed rim, window or grate of any drainage structure). However, it is worth noting that although the immediate study section meets the County's level of service requirements, the modeling has identified flood in the peripheral vicinity. The model results indicated the US 224 and Canton Rd intersection has multiple ponded nodes and overland flow paths activated in the model that are indicative of flooding along the roadway and private properties near the Southeast quadrant of the intersection.

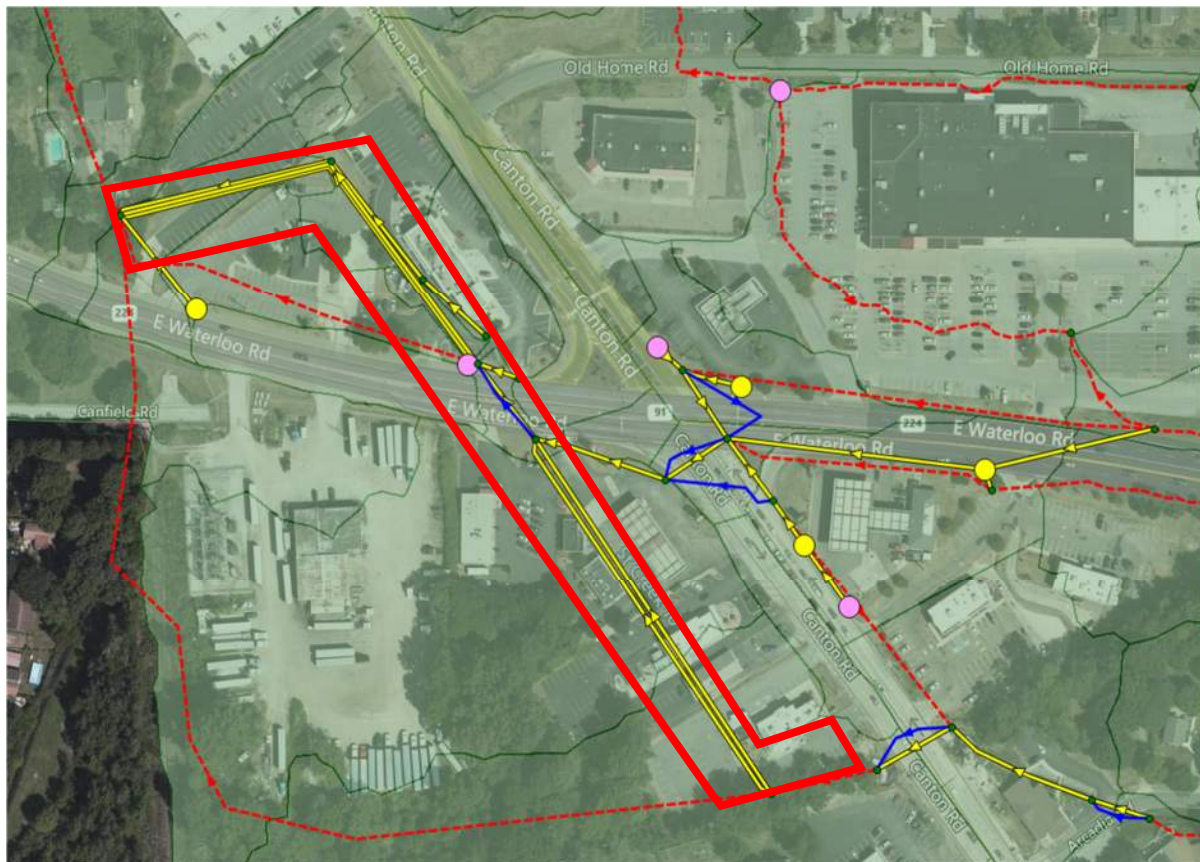


Figure 1: H&H Study Area (Courtesy of PCSWMM)

H&H model was analyzed for both 10-year 24-hour and 25-year 24-hour storms, and results have been summarized and attached to the report (Exhibit C). The results contain: profiles of the highlighted stretch, capacities of the roadway crossings, flooding volumes and peak flows of overland flow paths.

Model Limitations

All H&H models should simulate within a range of expected accuracy. Even well calibrated models typically carry accuracy ranges of +25% to -15% (CIWEM, 2021). Uncalibrated, “desktop,” or “academic” based planning models are less certain than calibrated models.

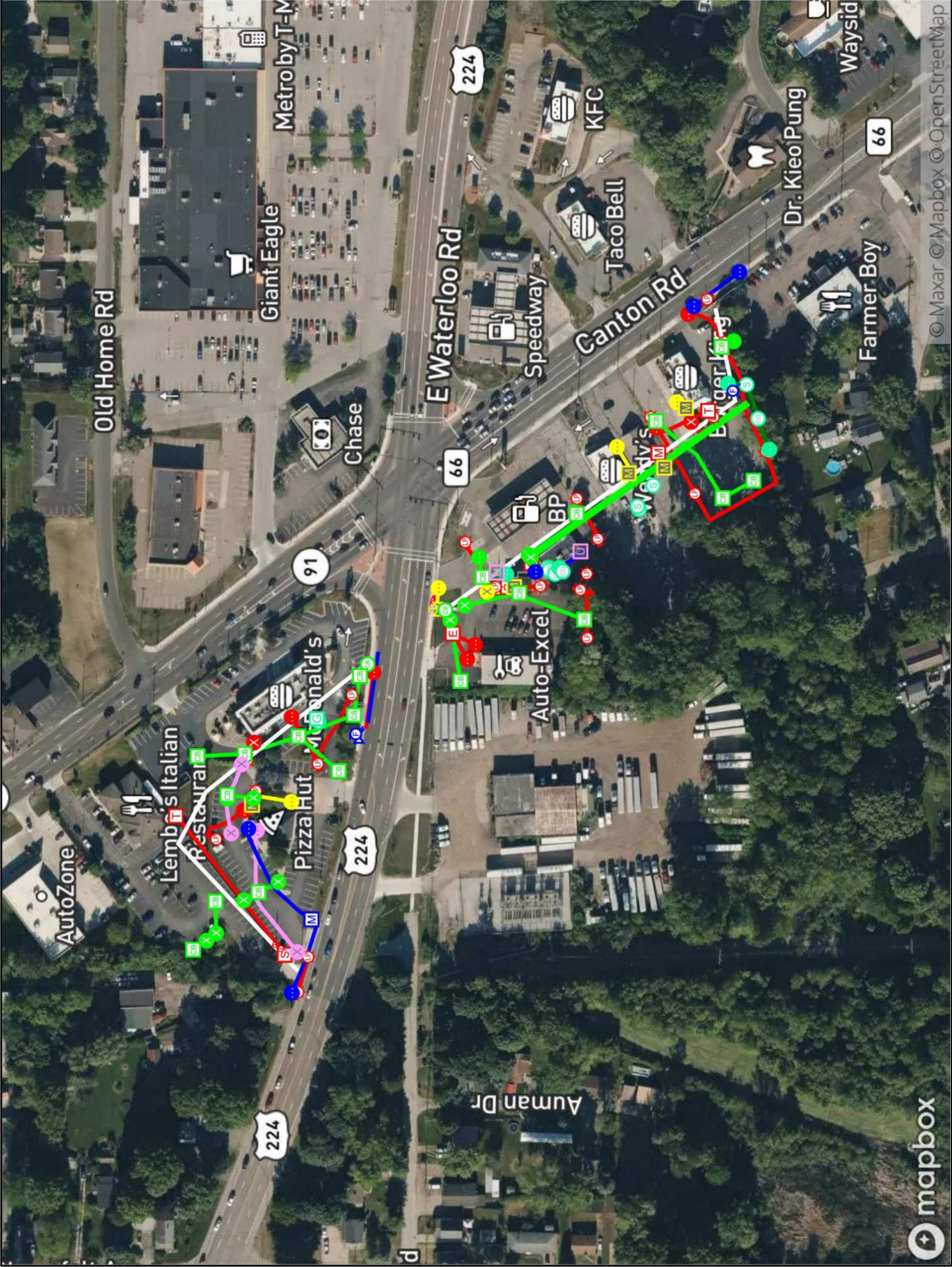
The project model extends to all tributary areas based upon the points of analysis. However, the model is not refined in all tributary areas. This ensures hydrologic flows convey, but the model does not include buried infrastructure representation in model areas outside of the concept plan area.

The County requested field study at limited locations prior to model build. The study was not comprehensive throughout the model watershed. Additional field study and model updates may improve model accuracy.

EXHIBIT A:

Ground Penetrating Radar (GPRS) Results





MAP NOTES

1. SATELLITE IMAGERY IS OFTEN SHIFTED AND MAY NOT LINE UP WITH LINE AND POINT FEATURES COLLECTED. GPRS USES RTK WHEN POSSIBLE TO CORRECT GPS DATA WITH THE HIGHEST LEVEL OF ACCURACY. MARKINGS IN THE FIELD ONLY AS A REFERENCE. DO NOT DIG, EXCAVATE, ETC BASED SOLELY ON THIS MAP.

2. THIS MAP REPRESENTS GPRS FINDINGS FROM THE DISPLAYED WORK ORDER NUMBER. FOR A LIST OF ALL LIMITATIONS AND EXPLANATIONS FROM THIS JOB, PLEASE CONSULT THE JOB SUMMARY REPORT OR OTHER DOCUMENTS THAT ACCOMPANY THIS JOB. JOB AND AGE SUBJECT TO THESE TERMS: <https://gpr.com/terms-conditions>

LEGEND

- ELECTRICAL
- FUEL/GAS/OIL
- SANITARY
- STORM
- UNKNOWN
- WATER
- - - - - SCAN LIMIT



0' 75' 150' 225' 300'

GPRS UTILITY FINDINGS MAP (NOT SURVEY GRADE)

PREPARED FOR: VERDANTAS LLC - MENTOR OH
LOCATION: 2836 EAST WATERLOO ROAD 2836 EAST WATERLOO ROAD AKRON, OH
PROJECT MANAGER: JOSH MCCUTCHEON JOSH.MCCUTCHEON@GPRSINC.COM
DATE: 2025 OCT 09
DRAWING NO. 1 REV. 0



WO# 833362

© Maxar © Mapbox © OpenStreetMap



MAP NOTES

1. SATELLITE IMAGERY IS OBTAINED FROM GPRSS AND MAY NOT BE LINE UP WITH LINE AND POINT FEATURES COLLECTED. GPRSS USES RTK WHEN POSSIBLE TO CORRECT GPS DATA WITH THE HIGHEST LEVEL OF ACCURACY. IMPROVING IN THE FIELD WITH A REFERENCE TO A KNOWN POINT OR POINTS IS NOT NECESSARY. THIS MAP ONLY AS A REFERENCE. DO NOT DIG, EXCAVATE, ETC BASED SOLELY ON THIS MAP.

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LEGEND

- █ ELECTRICAL
- █ FUEL/GAS/OIL
- █ SANITARY
- █ STORM
- █ UNKNOWN
- █ WATER
- █ SCAN LIMIT



GPRS UTILITY FINDINGS MAP (NOT SURVEY GRADE)

PREPARED FOR:
VERDANTAS LLC - MENTOR OH

LOCATION:
2836 EAST WATERLOO ROAD
2836 EAST WATERLOO ROAD
AKRON, OH

PROJECT MANAGER:
JOSH MCCUTCHEON
JOSH.MCCUTCHEON@GPRSS.COM

DATE: 2025 OCT 09
DRAWING NO. 2 REV. 0

AIR RISER	FIRE VALVE	OIL RISER	CATCH BASIN	WTR VALVE
AIR PUMP	P.I. VALVE	OIL PUMP	CATCH BASIN	HYDRANT
AIR MISC	FIRE RISER	OIL MISC	ENDPIPE	WTR MANHOLE
AIR VALVE	FIRE MISC	OIL MANHOLE	CURBINLET	WELLHEAD
AIR MANHOLE	FIRE METER	OIL TANK	YARDBASIN	P.I. VALVE
AIR COMPRESSOR	FIRE MANHOLE	OIL VENT	STRM VENT	BACKFLOW PREV
CHEM VALVE	HYDRANT	OIL VAULT	STRM MISC	WTR VAULT
CHEM TANK	BACKFLOW PREV	OIL VALVE	STRM LIFTSTATION	WTR RISER
CHEM AST	FUEL VENT	OIL UST	STRM MANHOLE	WTR MISC
CHEM MISC	FUEL VAULT	SAN MANHOLE	STRM VAULT	WTR METER
CHEM PUMP	FUEL VALVE	SAN CLEANOUT	STRM UST	LD VALVE LEAK
CHEM MANHOLE	FUEL UST	SAN VENT	TRENCHDRAIN	LD SERVICE LEAK
COMM BOX	FUEL AST	SEPTICTANK	ROOFDRAIN	LD MAIN BREAK
COMM PEDESTAL	FUEL RISER	SAN VAULT	STRM CLEANOUT	LD HYDRANT LEAK
COMM VAULT	FUEL PUMP	SAN MISC	TRAF SIGNAL	POINT
COMM HANDHOLE	FUEL MISC	SAN MARKER	TRAF SIGN	MAILBOX
COMM MISC	FUEL MANHOLE	SAN LIFTSTATION	PARKINGMETER	SOIL BORING
COMM MANHOLE	GAS RISER	SAN LATERAL	TRAF MISC	SOIL BORING
COMM POLE	GAS PUMP	SAN INVERT	TRAF MANHOLE	SIGN
COMM CAMERA	GAS MISC	SAN GREASETRAP	TRAF CABINET	SATELLITE
COMM CONDUIT	GAS METER	SEWER TRAP	TRAF BOX	FLAGPOLE
COMM LOOP	GAS MANHOLE	SEWER BASIN	TRAF PEDESTAL	BUILDING CORNER
COMM SPLICE	GAS AST	SEWER CLEANOUT	TRAF STREETLIGHT	BOULDER
ELEC BOX	GAS VENT	GREASETRAP	UNKN VALVE	BOLLARD
ELEC CABINET	GAS VAULT	STEAM MISC	UNKN MANHOLE	HEADSTONE NO GRAVE
ELEC METER	GAS VALVE	STEAM MANHOLE	UNKN MISC	GRAVE WITHOUT HEADSTONE
ELEC PANEL	GAS UST	STEAM VALVE		GRAVE WITH HEADSTONE
ELEC RISER	IRR SPRINKLER	IRR RISER		TREE DECIDUOUS
TRANSFORMER	IRR RISER	IRR MISC		TREE CONIFEROUS
ELEC MANHOLE	IRR MISC	BACKFLOW PREV		MAILBOX
UTILITYPOLE	BACKFLOW PREV	IRR CNTRL VALVE		
POWERPOLE				
ELEC EQUIPMENT				
ELEC SIGN				
ELEC VAULT				
ELEC MISC				
LANDSCAPE LIGHT				
RUNWAY LIGHT				
SITE LIGHT				



JOB SUMMARY REPORT

Order Number:	Work Order #833362	Job Date:	Oct 9, 2025 11:12:00 AM
Customer:	154432 [CTN] VERDANTAS LLC : VERDANTAS LLC - MENTOR OH	Billing Address:	VERDANTAS LLC 8150 Sterling Ct Mentor OH 44060 United States

JOB DETAILS

Jobsite Location	2836 East Waterloo Road, Akron, Ohio, 44312
Work Order Number	Work Order #833362
Job Number	
PO Number	

GPRS Project Manager: Josh McCutcheon

Thank you for using GPRS on your project. We appreciate the opportunity to work with you. If you have questions regarding the results of this scanning, please contact the lead GPRS project manager on this project.

EQUIPMENT USED

The following equipment was used on this project:

- **Underground GPR Antenna:** This GPR Antenna uses frequencies ranging from 250 MHz to 450 MHz and is mounted in a stroller frame that rolls over the surface. Data is displayed on a screen and marked in the field in real time. The surface needs to be reasonably smooth and unobstructed to obtain readable scans. Obstructions such as curbs, landscaping, and vegetation will limit the efficacy of GPR. The total effective scan depth can be as much as 8' or more with this antenna but can vary widely depending on the soil conditions and composition. Some soil types, such as clay, may limit maximum depths to 3' or less. As depth increases, targets must be larger to be detected, and non-metallic targets can be challenging to locate. The depths provided should always be treated as estimates as their accuracy can be affected by multiple factors. For more information, please visit: [Link](#)
- **EM Pipe Locator:** Electromagnetic Pipe and Cable Locator. Detects electromagnetic fields. Used to actively trace conductive pipes and tracer wires, or passively detect power and radio signals traveling along conductive pipes and utilities. For more information, please visit: [Link](#)
- **GPS:** This handheld unit offers accuracy down to 4 inches; however, the accuracy achieved will depend on the satellite environment at the time of collection and is not considered survey-grade. Features can be collected as points, lines, or areas and then exported as a KML/KMZ or overlaid on a CAD drawing. For more information, please visit: [Link](#)



JOB SUMMARY REPORT

WORK PERFORMED

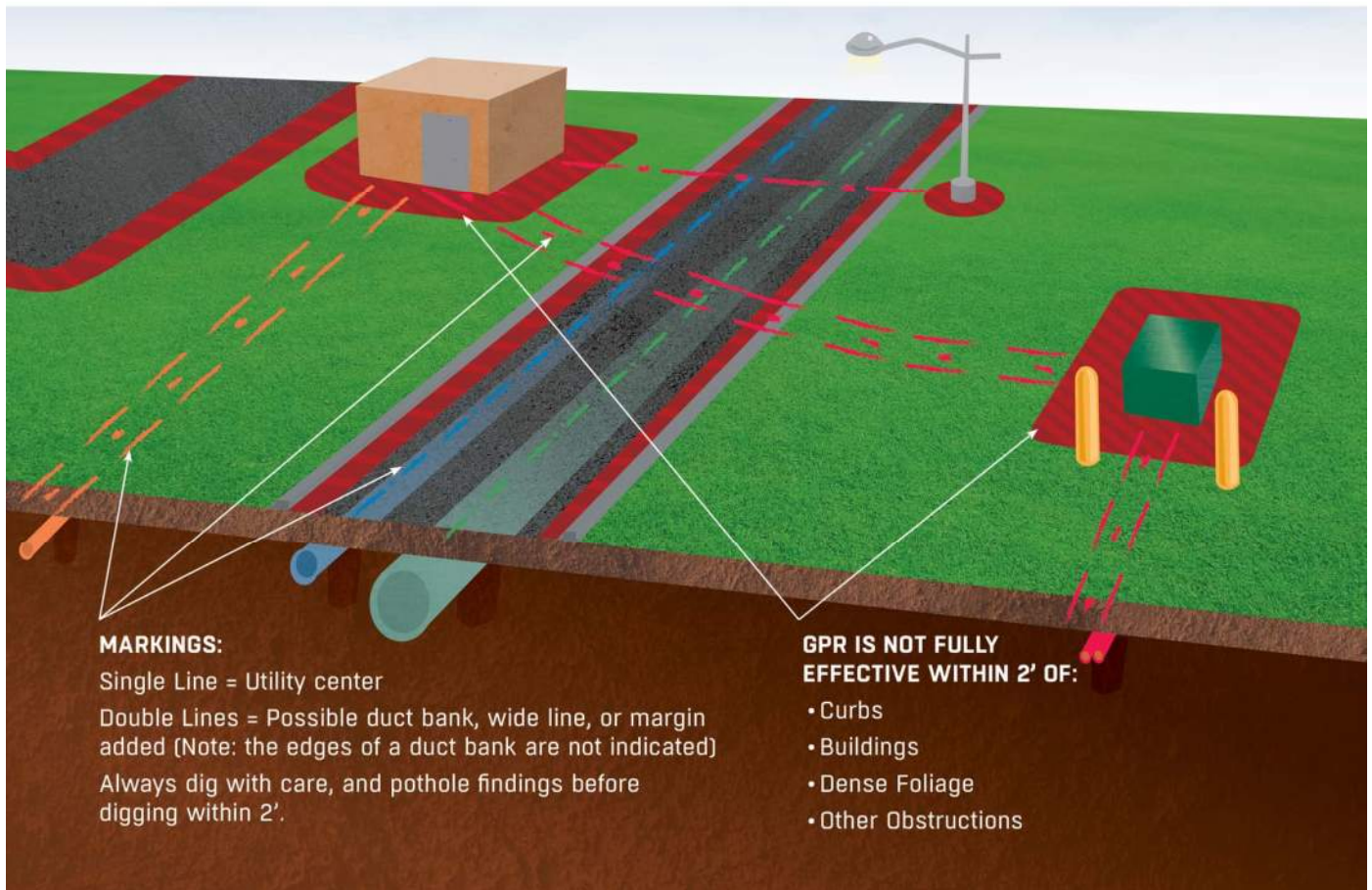
UNDERGROUND UTILITY	
Client Provided Drawings	No
Client completed 811 locate request	No
Scope of Work	MSP; exterior UL for a 3.7 acre area. client is very concerned with locate 48" storm drain culvert, estimated 2-3' deep/ Can see box culverts at surface, they will remove and fill in. client realized their boundaries were a little off, want to ensure we do 3.7 acres but may change boundaries to ensure the culvert is located
Approximate GPR Effective Depth (ft)	2
Utilities Located	<ul style="list-style-type: none">- Electric- Communication- Natural Gas- Water- Storm Sewer- Sanitary Sewer- Unknown
Marking Medium	<ul style="list-style-type: none">- Spray Paint- Flags
Results Notes	Tasked to locate 2 48" storm pipes. Was able to locate pipes to the gas station before losing the with GPR. Mapped in the two storm catch basins where I could visually see them. Recommended many times to the client to use our VPI service to locate the pipes was unable to locate near the road and in the road due to not having traffic control all other utilities marked with proper color/flagged and marked with approximate depths. Advised client to stay off all marked lines 1-2'.



SUPPLEMENTAL INFORMATION

COMMON UTILITY LOCATING LIMITATIONS

There are many limitations to locating utilities, due to a variety of factors, with several more common examples illustrated here.





JOB SUMMARY REPORT

JOB SITE IMAGES



Jobsite Photo #1



Jobsite Photo #2



JOB SUMMARY REPORT



Jobsite Photo #3



Jobsite Photo #4



JOB SUMMARY REPORT



Jobsite Photo #5



Jobsite Photo #6



JOB SUMMARY REPORT



Jobsite Photo #7



Jobsite Photo #8



JOB SUMMARY REPORT



Jobsite Photo #9

CONTACT / SIGNATURE INFORMATION

SIGNATURE

APPROVED

Contact Information

Contact Name	Thomas Meeks	Email	tmeeks@verdantas.com
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TERMS & CONDITIONS

<http://www.gprsinc.com/termsandconditions.html>

EXHIBIT B:

CCTV Highlight Map



CCTV Highlight Map

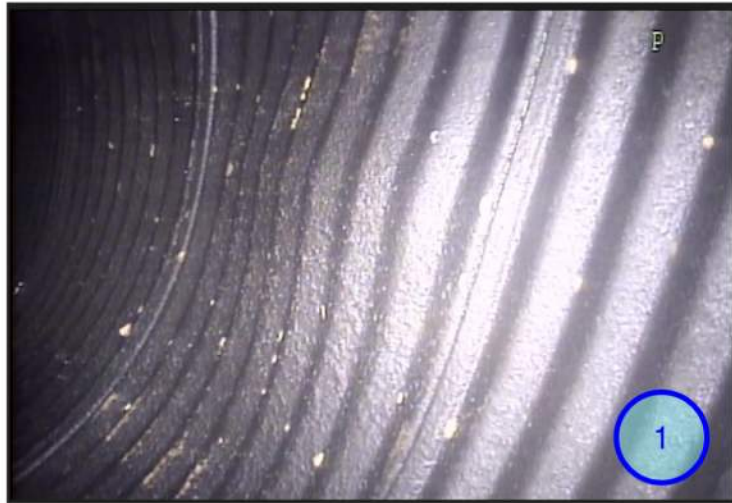


Note: Map is not to scale and is meant for general schematic locations of key defects. Line work shown in green is from C&K Industrial Services and represents storm sewer segments CCTV'd from exploration.

CCTV Photo Map (1 of 2)

LEGEND

1 Photo Key



CCTV Photo Map (2 of 2)

LEGEND

1 Photo Key

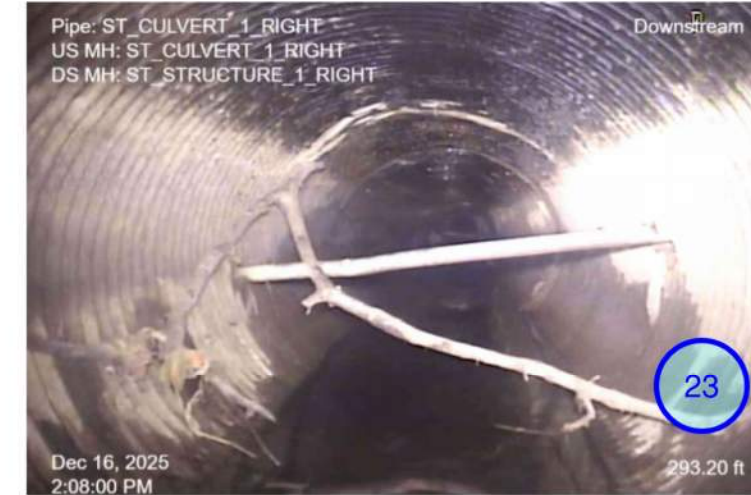
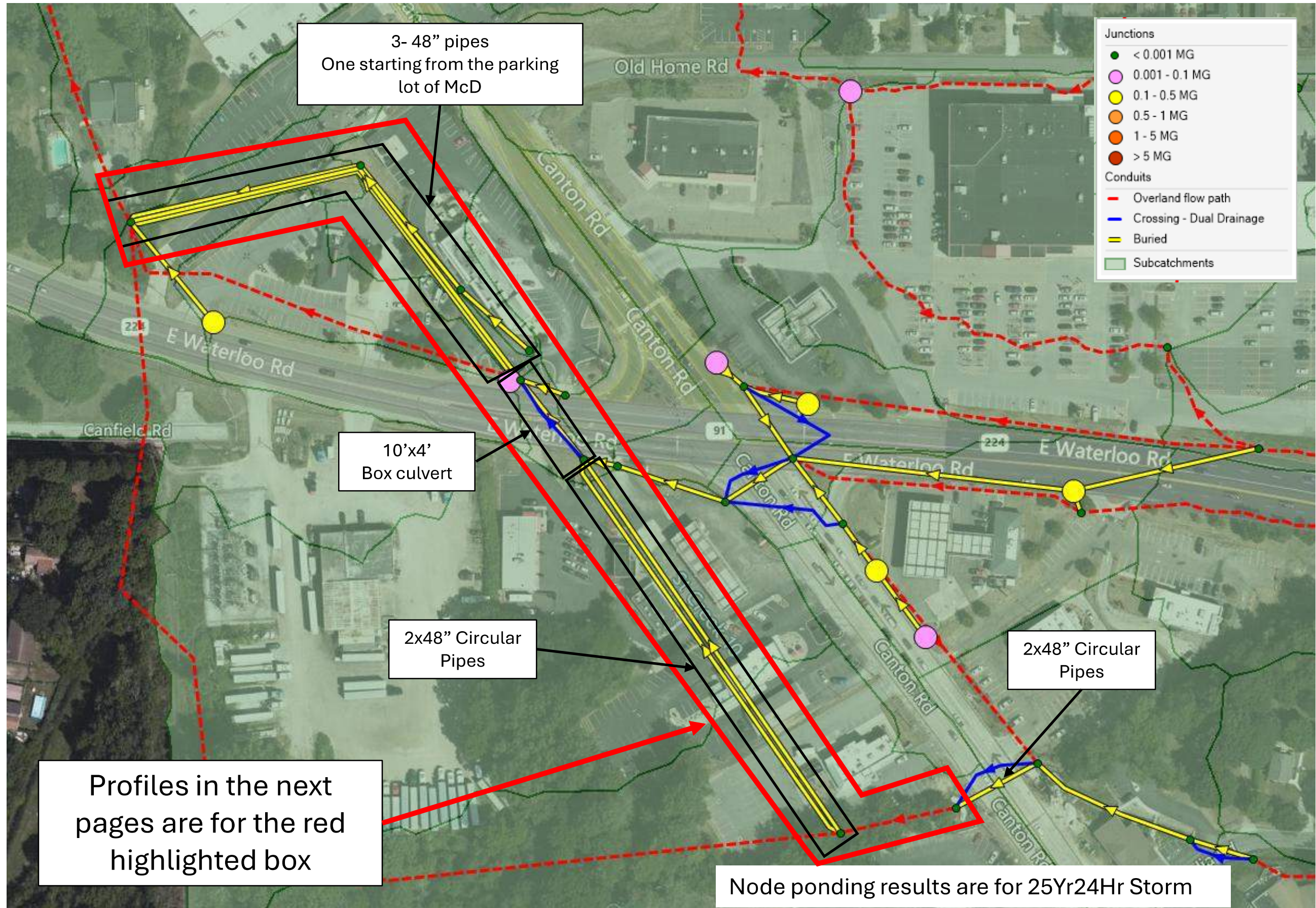


EXHIBIT C:

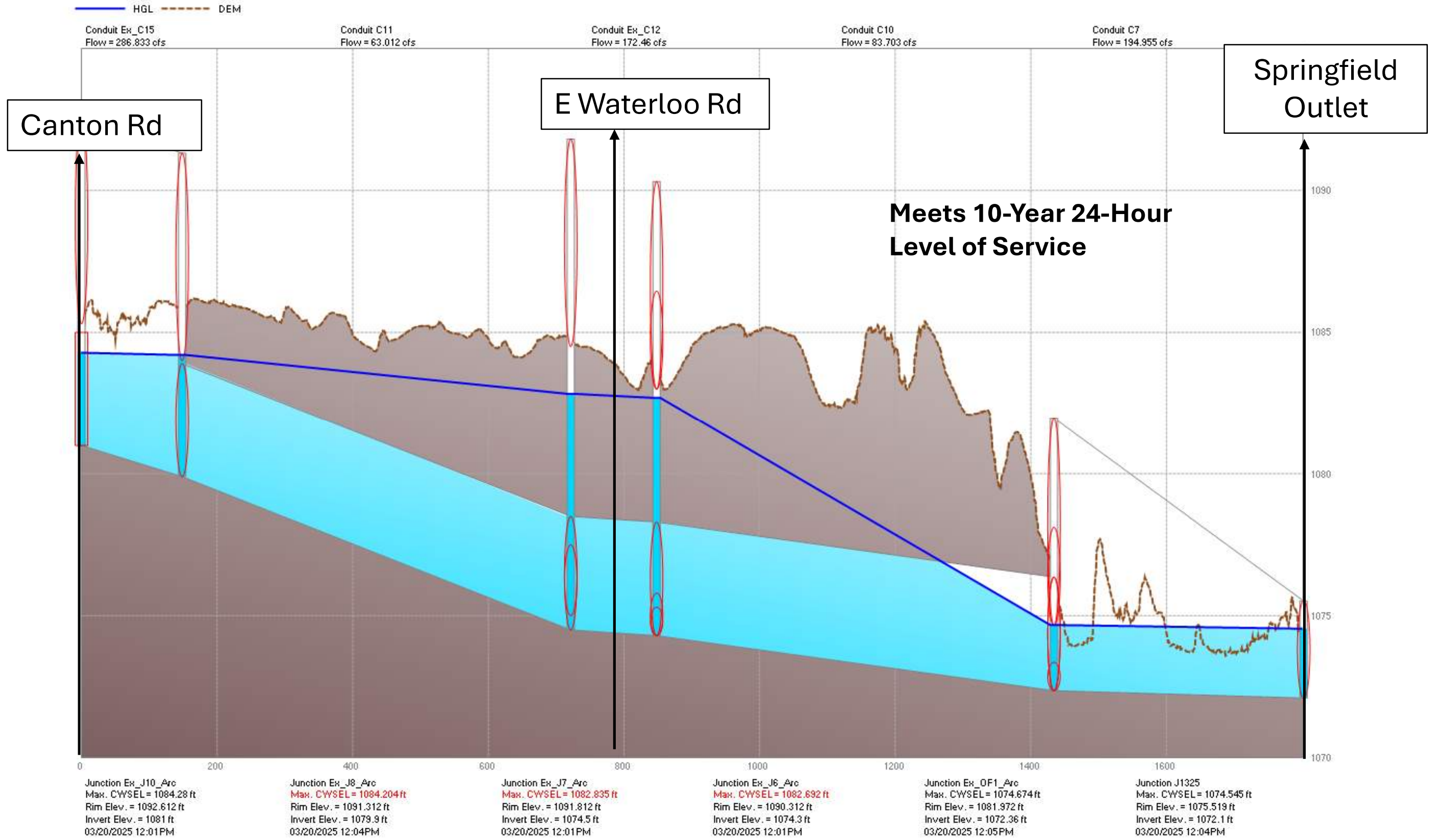
Hydraulic Modeling Summary





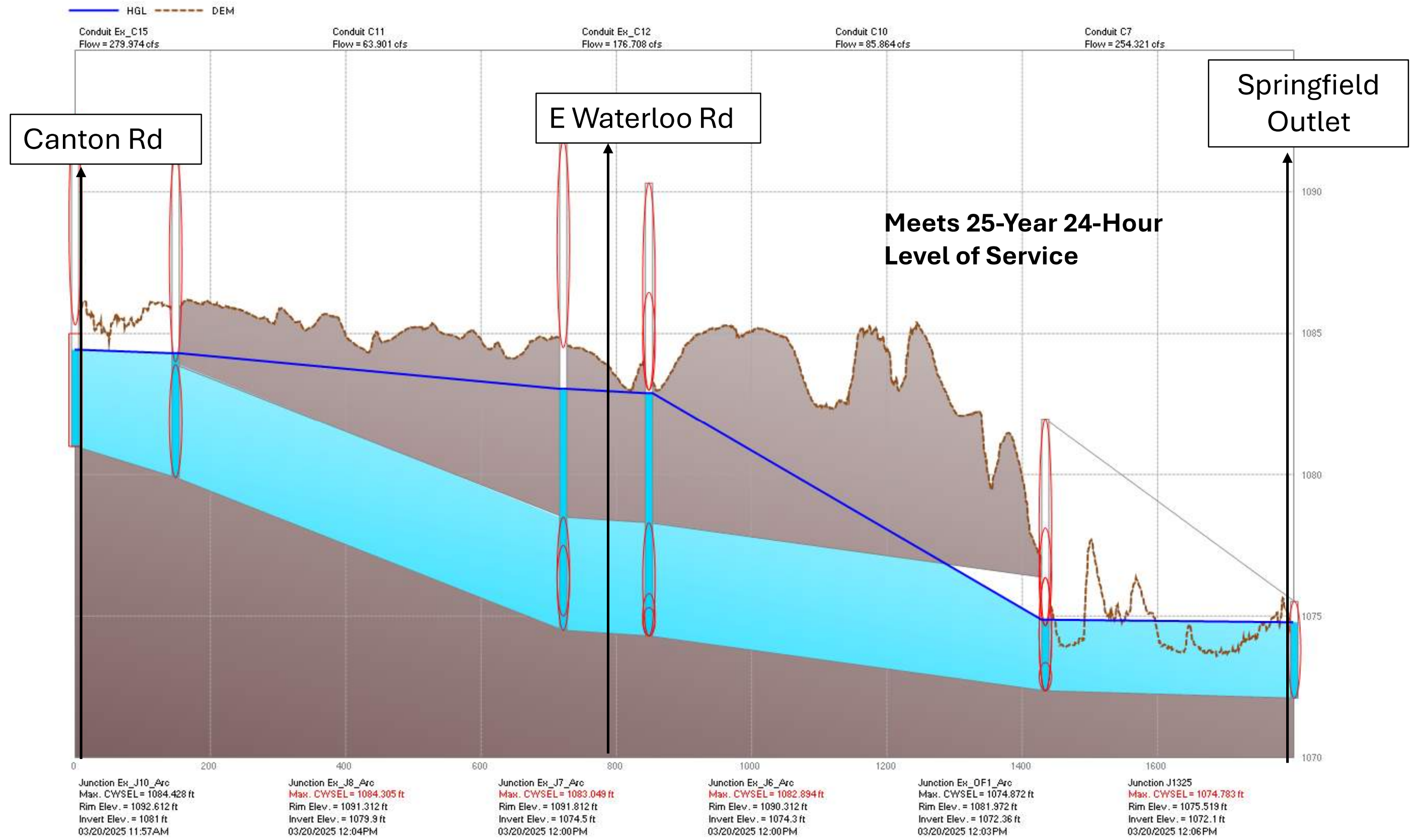
10Yr 24Hr Storm

Peak values

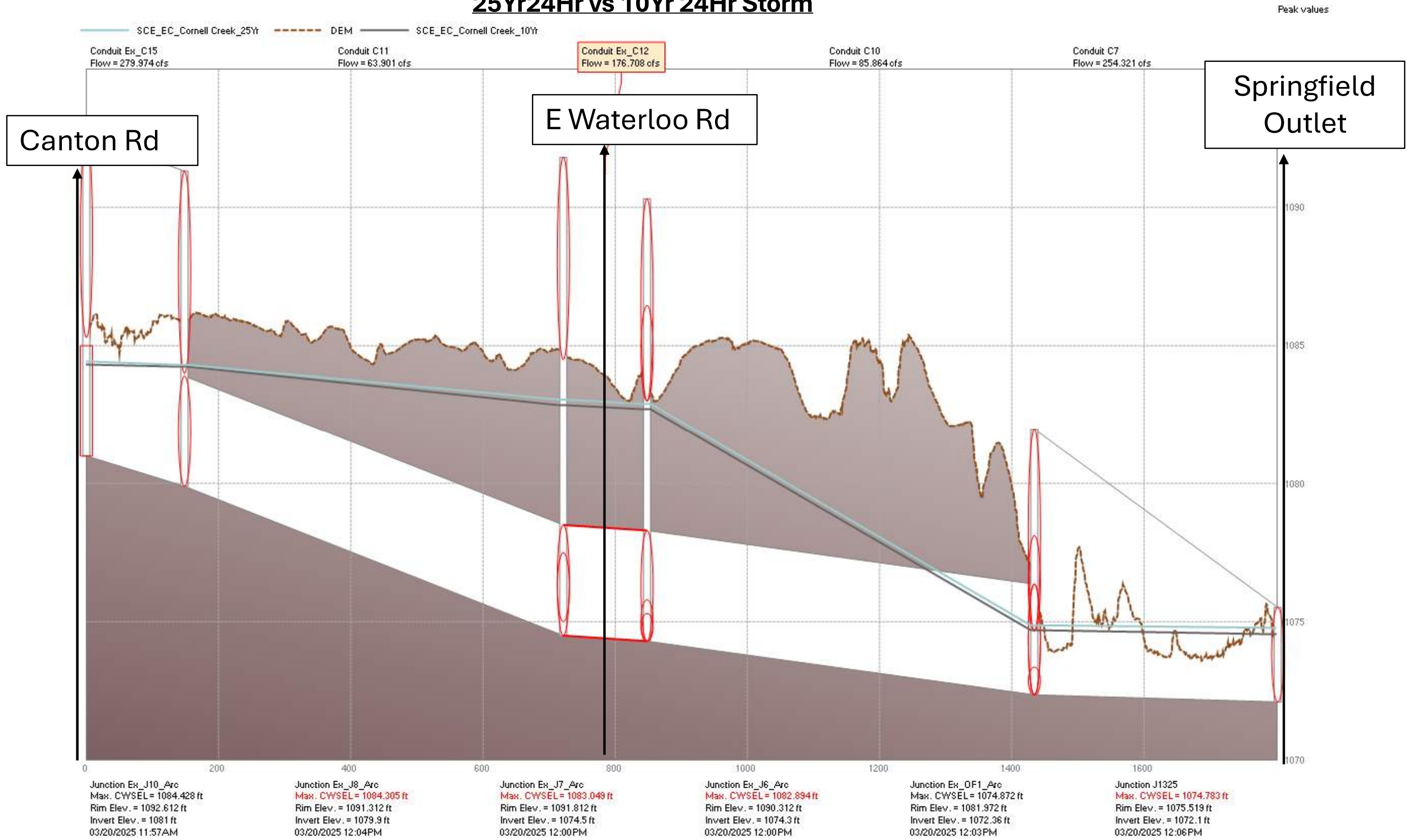


25Yr 24Hr Storm

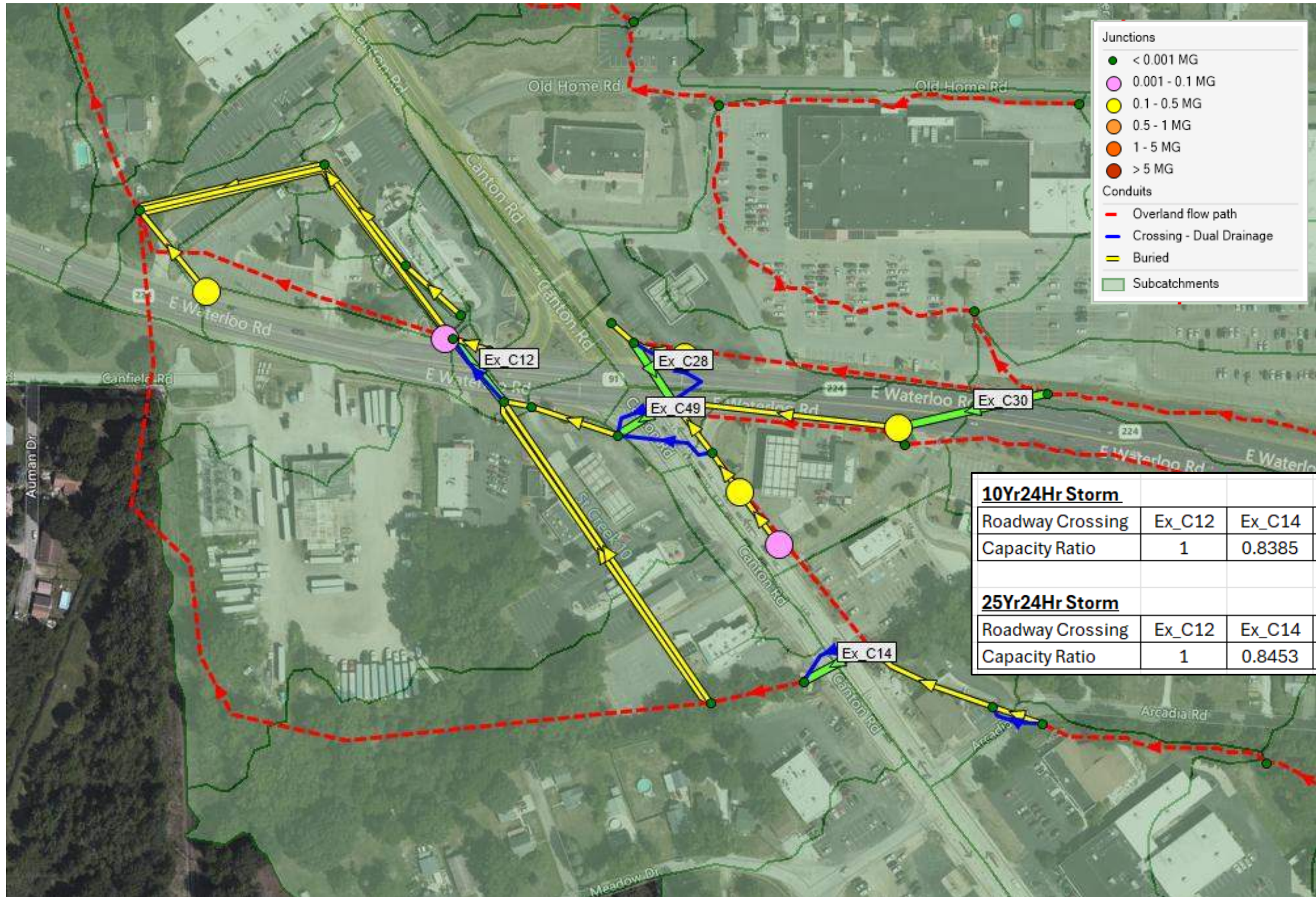
Peak values



Profile comparison 25Yr24Hr vs 10Yr 24Hr Storm



Roadway Crossing Capacities



Junctions

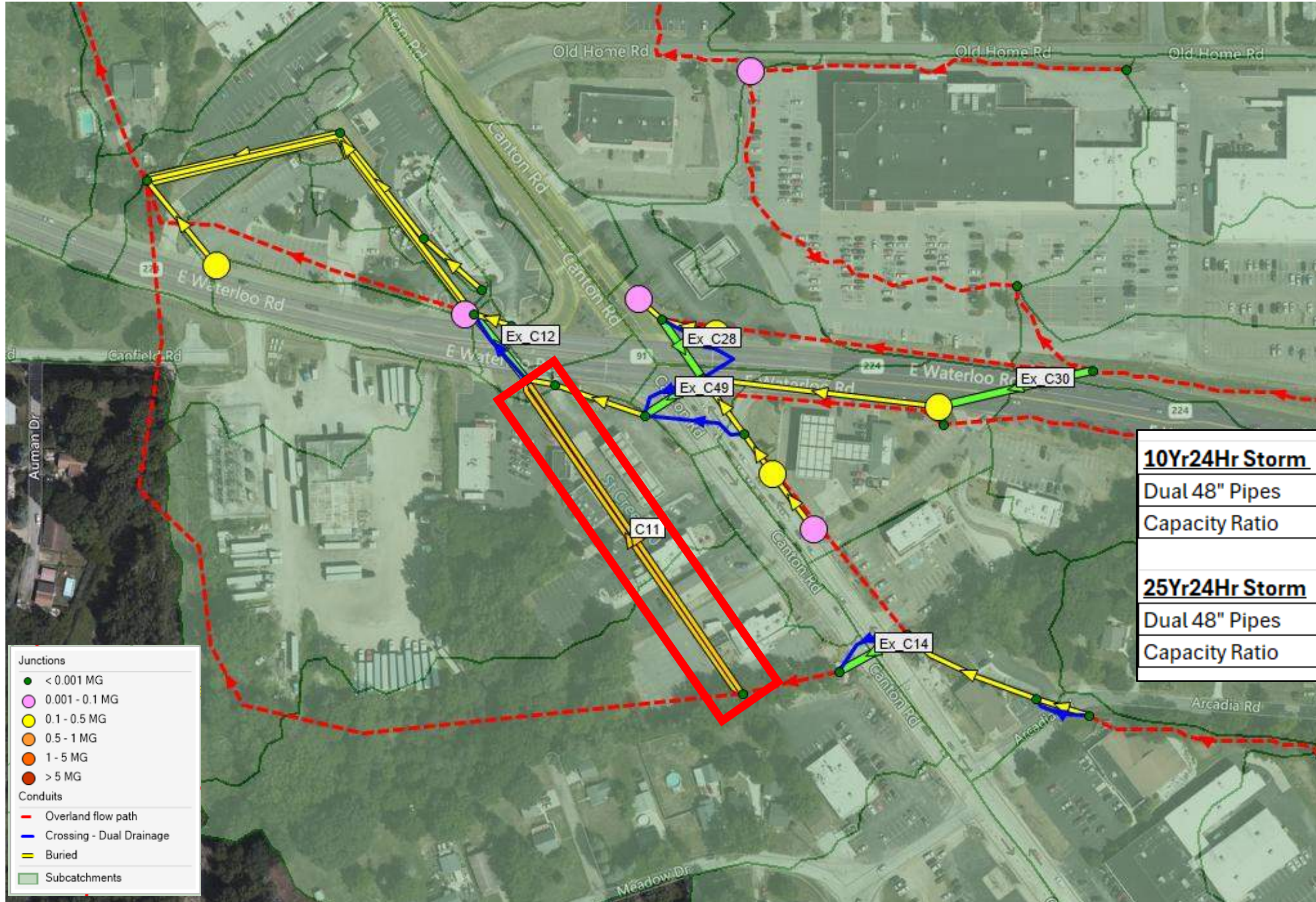
- < 0.001 MG
- 0.001 - 0.1 MG
- 0.1 - 0.5 MG
- 0.5 - 1 MG
- 1 - 5 MG
- > 5 MG

Conduits

- Overland flow path
- Crossing - Dual Drainage
- Buried
- Subcatchments

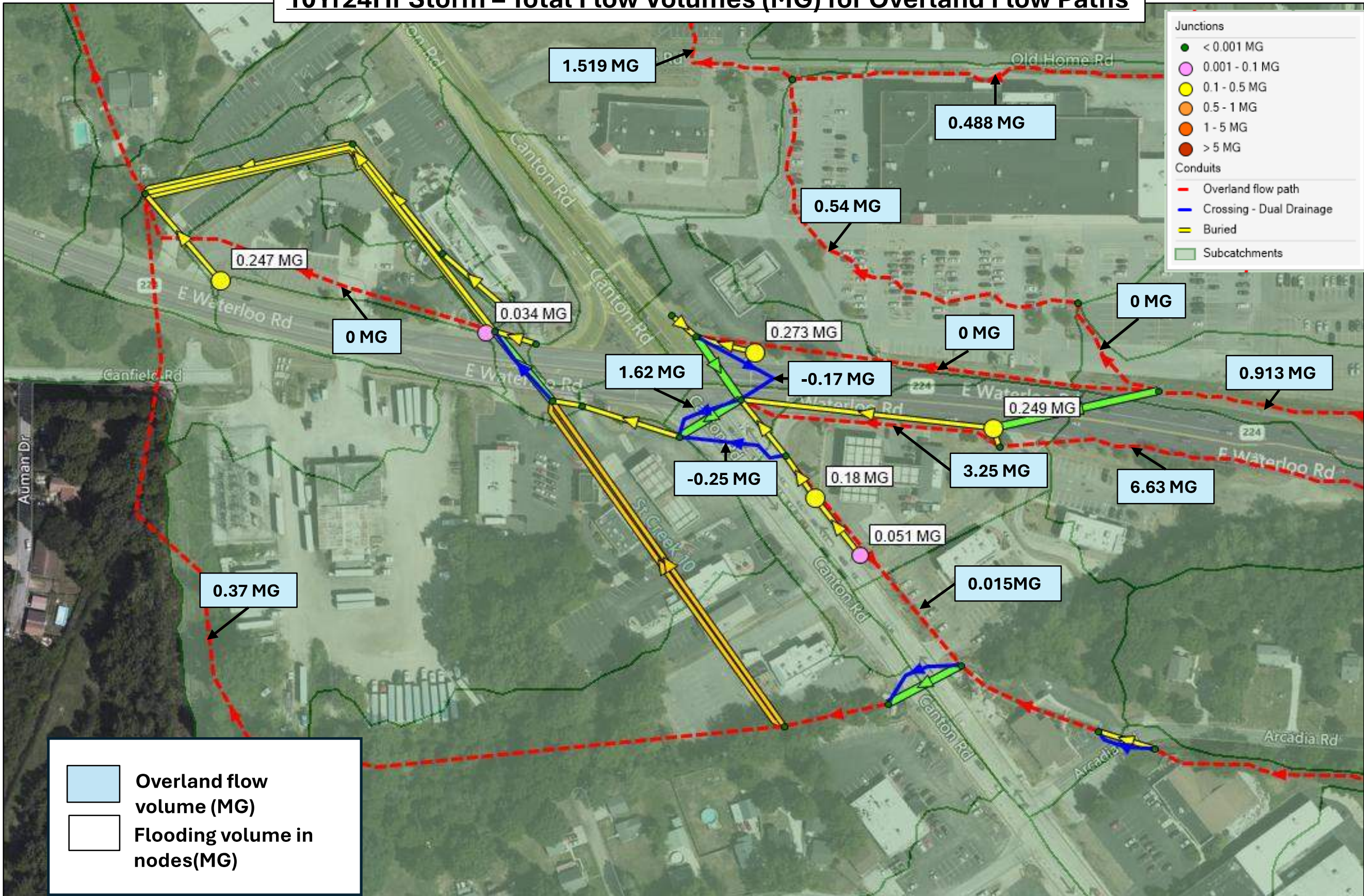
10Yr24Hr Storm					
Roadway Crossing	Ex_C12	Ex_C14	Ex_C28	Ex_C30	Ex_C49
Capacity Ratio	1	0.8385	1	1	1
25Yr24Hr Storm					
Roadway Crossing	Ex_C12	Ex_C14	Ex_C28	Ex_C30	Ex_C49
Capacity Ratio	1	0.8453	1	1	1

Study Area Conduit Capacities

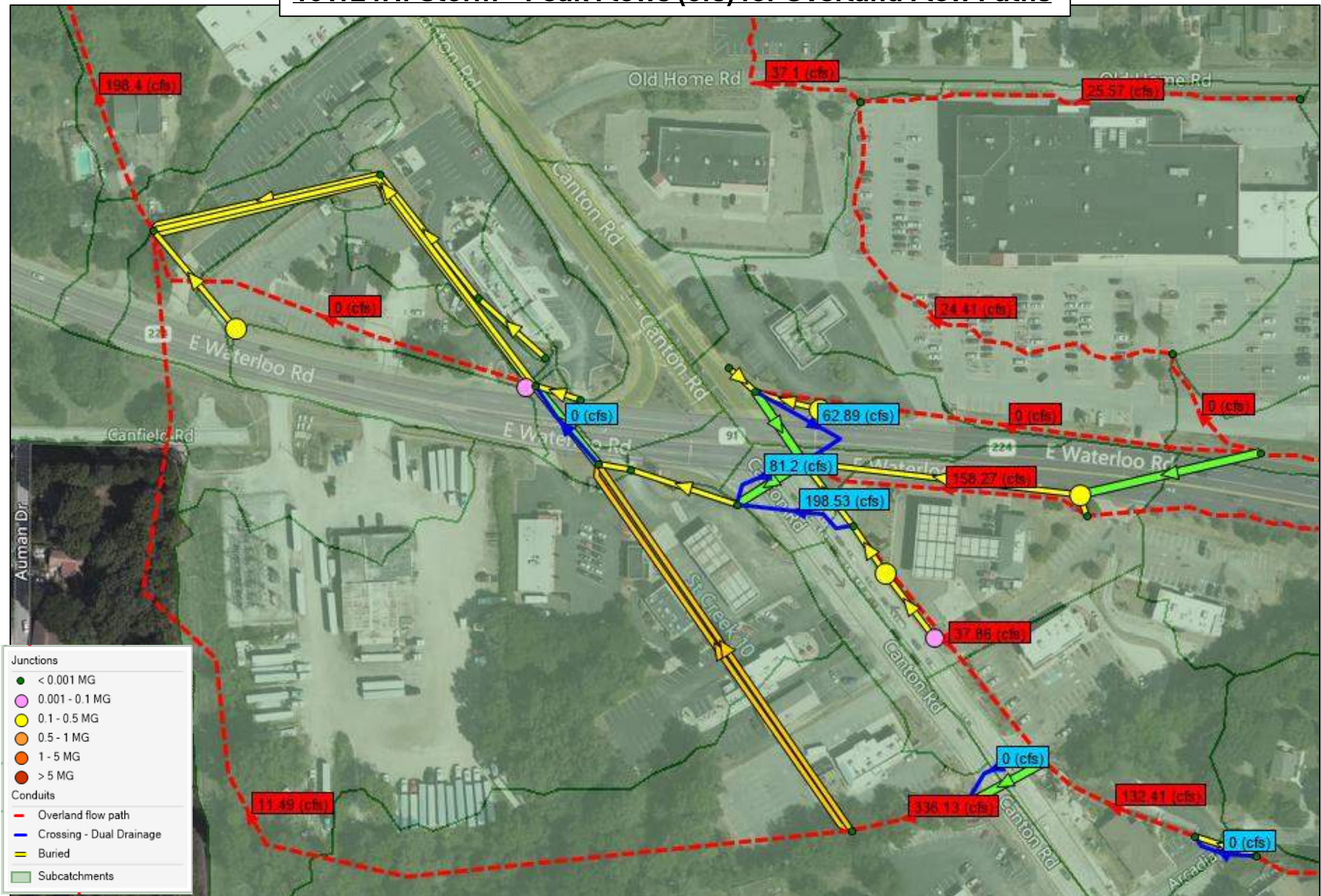


10Yr24Hr Storm		
Dual 48" Pipes	C11	Ex_C13_2
Capacity Ratio	1	1
25Yr24Hr Storm		
Dual 48" Pipes	C11	Ex_C13_2
Capacity Ratio	1	1

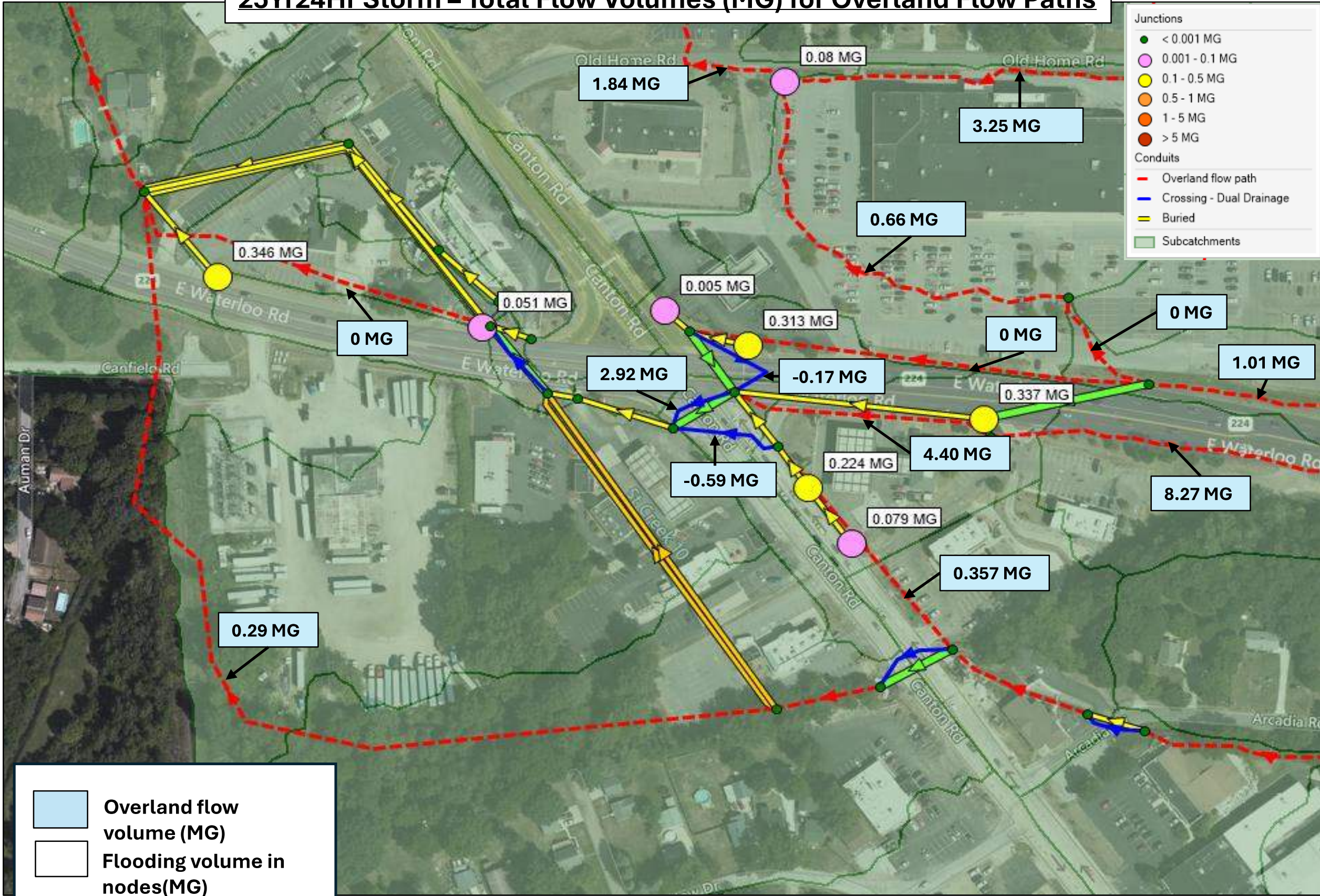
10Yr24Hr Storm – Total Flow Volumes (MG) for Overland Flow Paths



10Yr24Hr Storm – Peak Flows (cfs) for Overland Flow Paths



25Yr24Hr Storm – Total Flow Volumes (MG) for Overland Flow Paths



Overland flow volume (MG)
 Flooding volume in nodes(MG)

25Yr24Hr Storm – Peak Flow (cfs) for Overland Flow Paths

