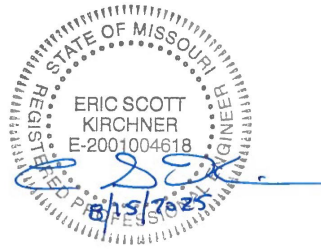


# Stormwater Management Facilities Report

## *SITE IMPROVEMENT PLANS CLUB CARWASH LEE'S SUMMIT, MISSOURI*



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August 15, 2025



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Architecture  
Civil Engineering  
Land Surveying  
Site Development  
Construction Inspection Testing

Cochran Project No. M24-8767A

Drainage Calculations  
Club Carwash  
Lee's Summit, Missouri

**Storm Water Calculations**

**Section**

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## **Section 1**

Design Summary

**DRAINAGE CALCULATIONS  
CLUB CARWASH  
LEE'S SUMMIT, MISSOURI  
PROJECT NO. M24-8767A**

The following drainage calculations have been performed for Club Carwash at 1021 Jefferson Crossing, Lee's Summit, Missouri. Said calculations were performed in accordance with the city of Lee's Summit standards. All hydraulic calculations were performed with the aid of AutoCAD Civil 3D Software. Existing and proposed hydrology for the 10-year storm are attached.

The existing conditions for the site is open space. The proposed land use for the site will be for a car wash. The project consists of on-site tributary areas. The work will be done on the 1.08-acre site in Lee's Summit. The site is tributary to Cedar Creek. All stormwater runoff shall be routed to the regional detention basin which will provide all detention and water quality requirements. Supporting calculations for the conveyance system are included in this report.

**CALCULATIONS SUMMARY:**

Existing flows were calculated using drainage area flows with current cover conditions. The existing condition flow using the 10-year storm event is 1.96 cfs. The proposed condition flow using the 10-year storm event is 5.49 cfs. The difference between the existing and proposed conditions is then a decrease of 3.53 cfs.

## **Section 2**

### Rational Method Hydrology

## Existing Rational Method (10 Year)

Drainage Area	Pervious (ac.)	Impervious (ac.)	Total (ac.)	C	Tc	Intensity (in/hr)	Q
1	1.085	0	1.085	0.30	10.29	6.02	1.96

Rational Method		E_DA 1		10 year design	
Tc	=	10.29	minutes		
Ti	=	9.68	minutes	0	minutes
	D =	100	ft	0	ft
	C =	0.3		0	
	S =	3.29	%	0	%
Tt	=	0.61	minutes		
I	=	6.02	in/hr		

Surface	Area			C	
Open	47242	s.f.	1.085	acres	0.3
Impervious	0	s.f.	0	acres	0.9

Total	1.085	acres
K	1.0	
Composite C	0.3	

$Q = KCIA = 1 * 0.3 * 6.02 * 1.085 =$	1.96	cfs
---------------------------------------	------	-----

Proposed Rational Method (10 Year)

Drainage Area	Pervious (ac.)	Impervious (ac.)	Total (ac.)	C	Tc	Intensity (in/hr)	Q
1	0.08	0.22	0.30	0.74	13.75	5.38	1.19
2	0.03	0	0.03	0.30	6.38	6.95	0.06
3	0.06	0	0.06	0.30	10.29	6.02	0.11
4	0.04	0.38	0.42	0.84	5	7.35	2.59
5	0.001	0.009	0.01	0.84	5	7.35	0.06
6	0	0.12	0.12	0.90	5	7.35	0.79
7	0.02	0.04	0.06	0.70	5	7.35	0.31
8	0.05	0.04	0.09	0.57	5	7.35	0.38



Rational Method		P_DA_1		10 year design	
Tc	=	13.75	minutes		
Ti	=	12.06	minutes	1.08	minutes
	D =	81	ft	19	ft
	C =	0.3		0.9	
	S =	1.24	%	3.1	%
Tt	=	0.61	minutes		
I	=	5.38	in/hr		

Surface	Area			C	
Open	3459	s.f.	0.08	acres	0.3
Impervious	9579	s.f.	0.22	acres	0.9

Total	0.3	acres
K	1.0	
Composite C	0.74	

$Q = KCIA = 1 * 0.74 * 5.38 * 0.3 =$	1.19	cfs
--------------------------------------	------	-----

Rational Method		P_DA_2		10 year design	
Tc	=	6.38	minutes		
Ti	=	6.38	minutes	0	minutes
	D =	27	ft	0	ft
	C =	0.3		0	
	S =	1.61	%	0	%
Tt	=	0	minutes		
I	=	6.95	in/hr		

Surface	Area			C	
Open	1129	s.f.	0.03	acres	0.3
Impervious	0	s.f.	0	acres	0.9

Total	0.03	acres
K	1.0	
Composite C	0.3	

$Q = KCIA = 1 * 0.3 * 6.95 * 0.03 =$	0.06	cfs
--------------------------------------	------	-----

Rational Method		P_DA_3		10 year design	
Tc	=	10.29	minutes		
Ti	=	10.29	minutes	0	minutes
	D =	73	ft	0	ft
	C =	0.3		0.9	
	S =	1.71	%	1.01	%
Tt	=	0	minutes		
I	=	6.02	in/hr		

Surface	Area			C	
Open	2459	s.f.	0.06	acres	0.3
Impervious	0	s.f.	0	acres	0.9

Total	0.06	acres
K	1.0	
Composite C	0.3	

$Q = KCIA = 1 * 0.3 * 6.02 * 0.06 =$	0.11	cfs
--------------------------------------	------	-----

Rational Method		P_DA_4		10 year design	
Tc	=	5	minutes		
Ti	=	3.03	minutes	0	minutes
	D =	100	ft	0	ft
	C =	0.9		0	
	S =	1.67	%	0	%
Tt	=	0.56	minutes		
I	=	7.35	in/hr		

Surface	Area			C	
Open	1612	s.f.	0.04	acres	0.3
Impervious	16768	s.f.	0.38	acres	0.9

Total	0.42	acres
K	1.0	
Composite C	0.84	

$Q = KCIA = 1 * 0.84 * 7.35 * 0.42 =$	2.59	cfs
---------------------------------------	------	-----

Rational Method		P_DA_5		10 year design	
Tc	=	5	minutes		
Ti	=	1.22	minutes	0	minutes
	D =	22	ft	0	ft
	C =	0.9		0	
	S =	2.68	%	0	%
Tt	=	0	minutes		
I	=	7.35	in/hr		

Surface	Area			C	
Open	49	s.f.	0.001	acres	0.3
Impervious	377	s.f.	0.009	acres	0.9

Total	0.01	acres
K	1.0	
Composite C	0.84	

$Q = KCIA = 1 * 0.84 * 7.35 * 0.01 =$	0.06	cfs
---------------------------------------	------	-----

Rational Method		P_DA_6		10 year design	
Tc	=	5	minutes		
Ti	=	2.16	minutes	0	minutes
	D =	36	ft	0	ft
	C =	0.9		0	
	S =	1	%	0	%
Tt	=	0.62	minutes		
I	=	7.35	in/hr		

Surface	Area		C
Open	0	s.f.	0.3
Impervious	5163	s.f.	0.9

Total	0.12	acres
K	1.0	
Composite C	0.9	

$Q = KCIA = 1 * 0.9 * 7.35 * 0.12 =$	0.79	cfs
--------------------------------------	------	-----

Rational Method		P_DA_7		10 year design	
Tc	=	5	minutes		
Ti	=	2.3	minutes	0	minutes
	D =	56	ft	0	ft
	C =	0.9		0	
	S =	1.61	%	0	%
Tt	=	0	minutes		
I	=	7.35	in/hr		

Surface	Area			C	
Open	996	s.f.	0.02	acres	0.3
Impervious	1709	s.f.	0.04	acres	0.9

Total	0.06	acres
K	1.0	
Composite C	0.7	

$Q = KCIA = 1 * 0.7 * 7.35 * 0.06 =$	0.31	cfs
--------------------------------------	------	-----

Rational Method		P_DA_8		10 year design	
Tc	=	5	minutes		
Ti	=	1.45	minutes	0	minutes
	D =	64	ft	0	ft
	C =	0.9		0	
	S =	7.85	%	0	%
Tt	=	0	minutes		
I	=	7.35	in/hr		

Surface	Area			C	
Open	2098	s.f.	0.05	acres	0.3
Impervious	1834	s.f.	0.04	acres	0.9

Total	0.09	acres
K	1.0	
Composite C	0.57	

$Q = KCIA = 1 * 0.57 * 7.35 * 0.09 =$	0.38	cfs
---------------------------------------	------	-----

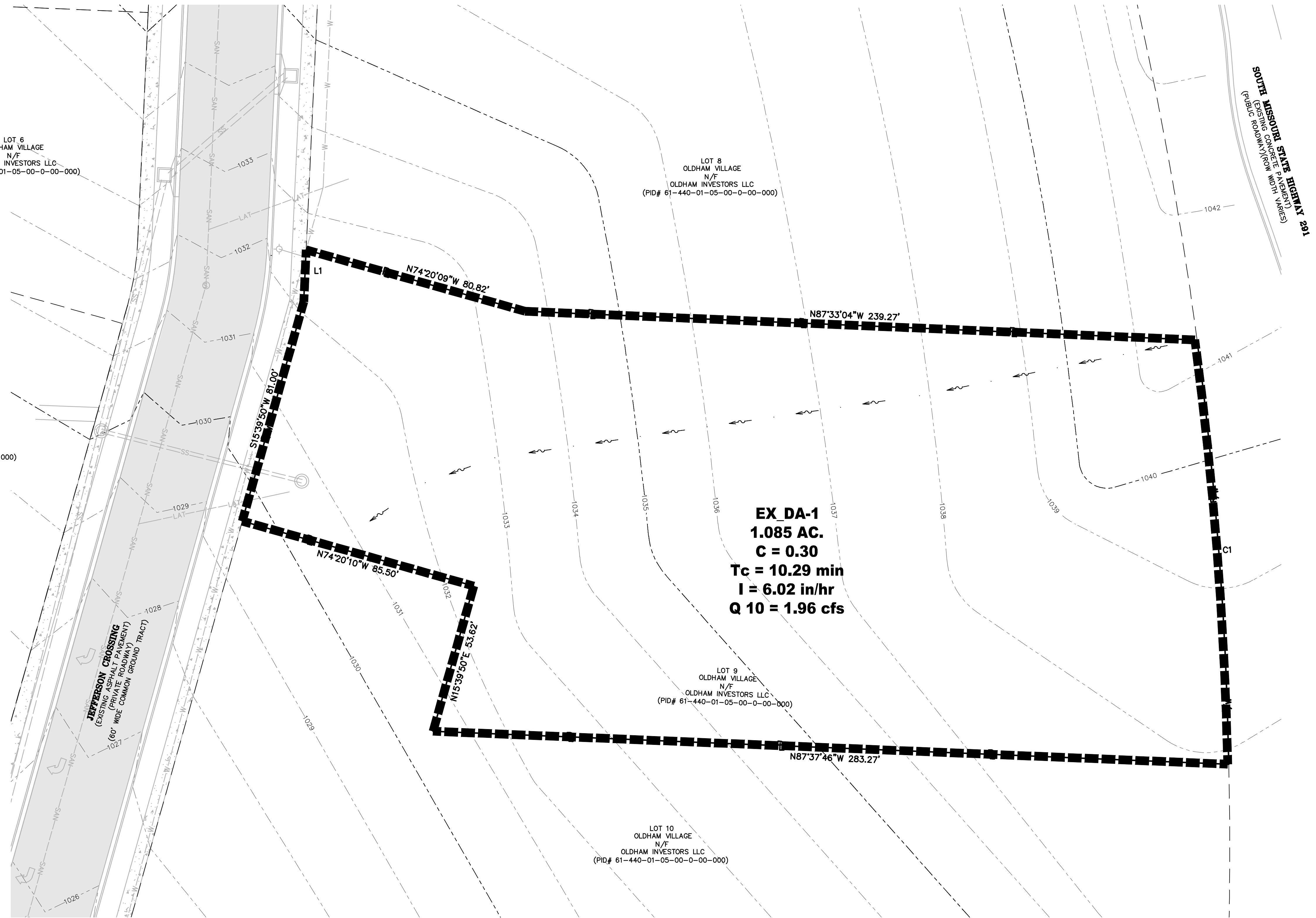
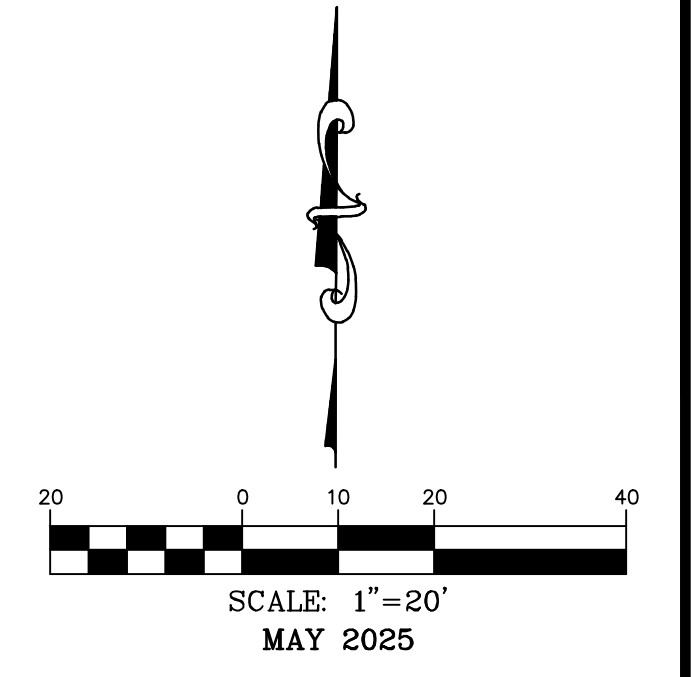


## **Section 3**

Drainage Area Maps and Details

# EXISTING DRAINAGE AREA MAP

L1  
S2°38'14"W 18.48'  
C1  
RADIUS=1352.39'  
ARC LENGTH=151.33'  
CHORD BEARING= S04°16'43"E  
CHORD LENGTH=151.25'



**EX DA-1**  
1.085 AC.  
C = 0.30  
Tc = 10.29 min  
I = 6.02 in/hr  
Q 10 = 1.96 cfs

NOTE:  
SITE IS LOCATED IN THE CEDAR CREEK WATERSHED.

**OWNER:**  
OLDHAM INVESTORS LLC  
7200 W. 132ND ST. STE. 150  
OVERLAND PARK, KANSAS 66213

**DEVELOPER:**  
CLUB CARWASH OPERATING, LLC  
1591 E. PRATHERSVILLE RD.  
COLUMBIA, MO 65202

PROPOSED RATIONAL METHOD CALCULATIONS						
	PERVIOUS	IMPERVIOUS	TOTAL AREA	COMPOSITE C	Tc	10 YR. FLOW
1	1.085	0.00	1.085	0.30	10.29	6.02

ONSITE RATIONAL METHOD FLOW DIFFERENTIAL	
EXISTING 10 YR.	1.96
PROPOSED 10 YR.	5.45
DIFFERENCE	+3.49

RUNOFF COEFFICIENT	
EXISTING	0.30
PROPOSED	0.74

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Wentzville, Missouri 63385

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Missouri State Certificate of Authority Numbers:  
2010000046

We working days prior to the start of any excavation call 1-800-DIG-RITE for utility location information.

All OSHA rules & regulations construction required by these plans shall be strictly followed (ie. trenching, blasting, etc.)

ERIC SCOTT KIRCHNER  
E-2001004618  
6/23/2025

ERIC S. KIRCHNER  
E-2001004618

**FINAL DEVELOPMENT PLANS**  
**CLUB CARWASH**  
**LEE'S SUMMIT, MISSOURI**

DATE	BY	APPROVED BY
06/23/25	KAF	ESK

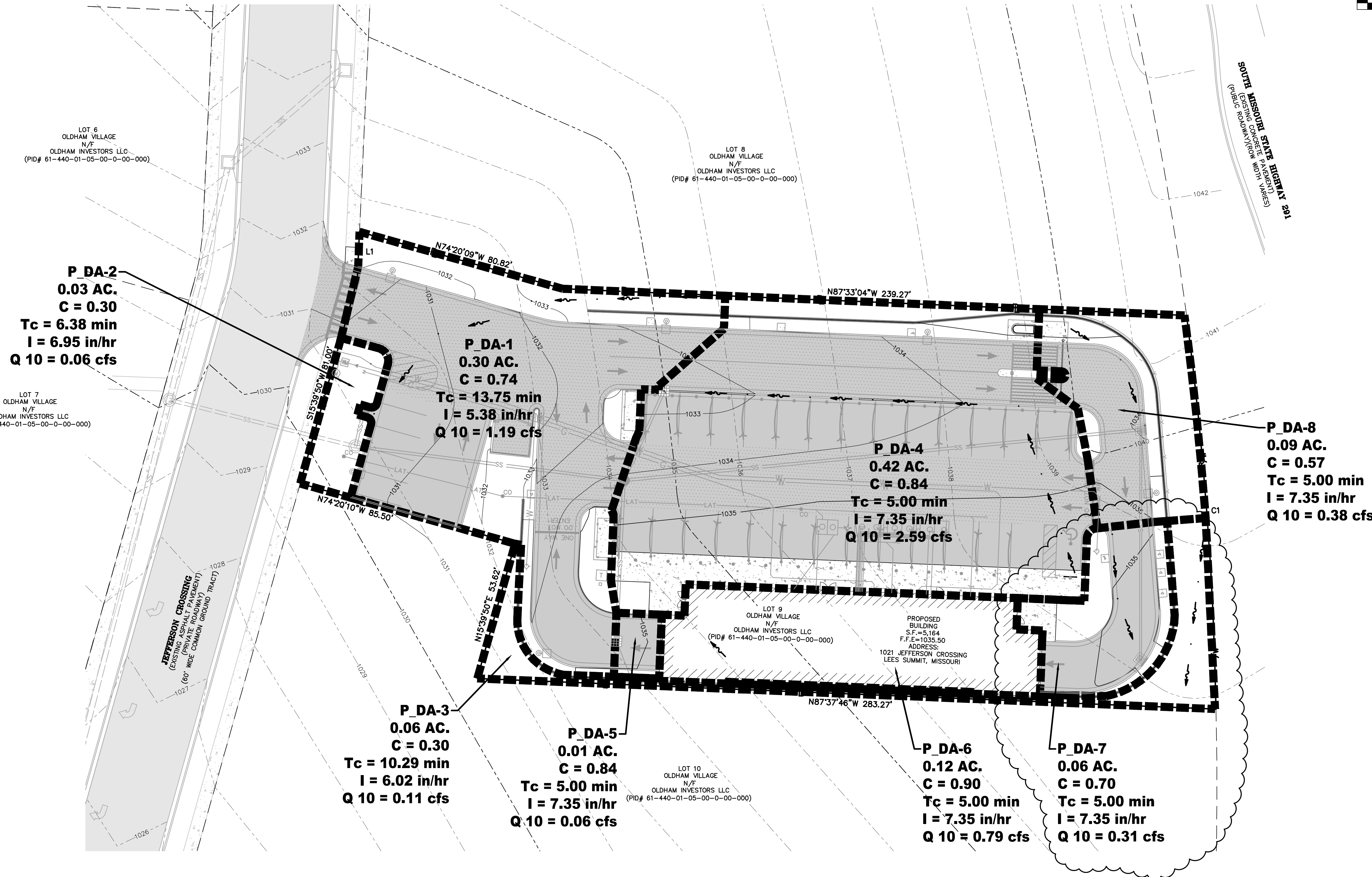
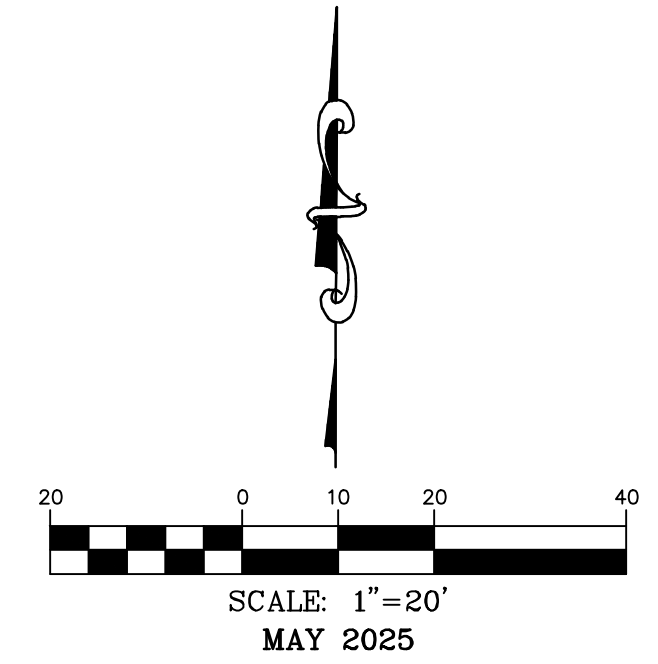
DATE: MAY 2025  
SCALE: 1:20  
PROJECT NO: M24-8767A  
DRAWING NO: C10

**EXISTING DRAINAGE AREA MAP**

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# PROPOSED DRAINAGE AREA MAP

L1  
S2°38'14"W 18.48'  
C1  
RADIUS=1352.39'  
ARC LENGTH=151.33'  
CHORD BEARING= S04°16'43"E  
CHORD LENGTH=151.25'



**P\_DA-2**  
0.03 AC.  
C = 0.30  
Tc = 6.38 min  
I = 6.95 in/hr  
Q 10 = 0.06 cfs

**P\_DA-1**  
0.30 AC.  
C = 0.74  
Tc = 13.75 min  
I = 5.38 in/hr  
Q 10 = 1.19 cfs

**P\_DA-4**  
0.42 AC.  
C = 0.84  
Tc = 5.00 min  
I = 7.35 in/hr  
Q 10 = 2.59 cfs

**P\_DA-8**  
0.09 AC.  
C = 0.57  
Tc = 5.00 min  
I = 7.35 in/hr  
Q 10 = 0.38 cfs

**P\_DA-3**  
0.06 AC.  
C = 0.30  
Tc = 10.29 min  
I = 6.02 in/hr  
Q 10 = 0.11 cfs

**P\_DA-5**  
0.01 AC.  
C = 0.84  
Tc = 5.00 min  
I = 7.35 in/hr  
Q 10 = 0.06 cfs

**P\_DA-6**  
0.12 AC.  
C = 0.90  
Tc = 5.00 min  
I = 7.35 in/hr  
Q 10 = 0.79 cfs

**P\_DA-7**  
0.06 AC.  
C = 0.70  
Tc = 5.00 min  
I = 7.35 in/hr  
Q 10 = 0.31 cfs

PROPOSED RATIONAL METHOD CALCULATIONS							
	PERVIOUS	IMPERVIOUS	TOTAL AREA	COMPOSITE C	Tc	INTENSITY	10 YR. FLOW
1	0.08	0.22	0.30	0.74	13.75	5.38	1.19
2	0.03	0	0.03	0.30	6.38	6.95	0.06
3	0.06	0	0.06	0.30	10.29	6.02	0.11
4	0.04	0.38	0.42	0.84	5.00	7.35	2.59
5	0.001	0.009	0.01	0.84	5.00	7.35	0.06
6	0	0.12	0.12	0.90	5.00	7.35	0.79
7	0.02	0.04	0.04	0.70	5.00	7.35	0.31
8	0.05	0.04	0.09	0.67	5.00	7.35	0.38

ONSITE RATIONAL METHOD FLOW DIFFERENTIAL		RUNOFF COEFFICIENT	
EXISTING 10 YR.	1.96	EXISTING	0.30
PROPOSED 10 YR.	5.49	PROPOSED	0.75
DIFFERENCE	+3.53		

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All OSHA rules & regulations in effect shall be strictly followed (ie. trenching, blasting, etc.)

STATE OF MISSOURI

ERIC SCOTT KIRCHNER  
E-2001004618

ERIC S. KIRCHNER  
E-2001004618

FINAL DEVELOPMENT PLANS  
CLUB CARWASH  
LEE'S SUMMIT, MISSOURI

PROPOSED DRAINAGE AREA MAP

DATE:	APPROVED BY:
06/23/25	ESK
08/15/25	ESK
08/15/25	PER CITY COMMENTS
08/15/25	PER CLIENT REQUEST

DATE: MAY 2025

SCALE: 1:20

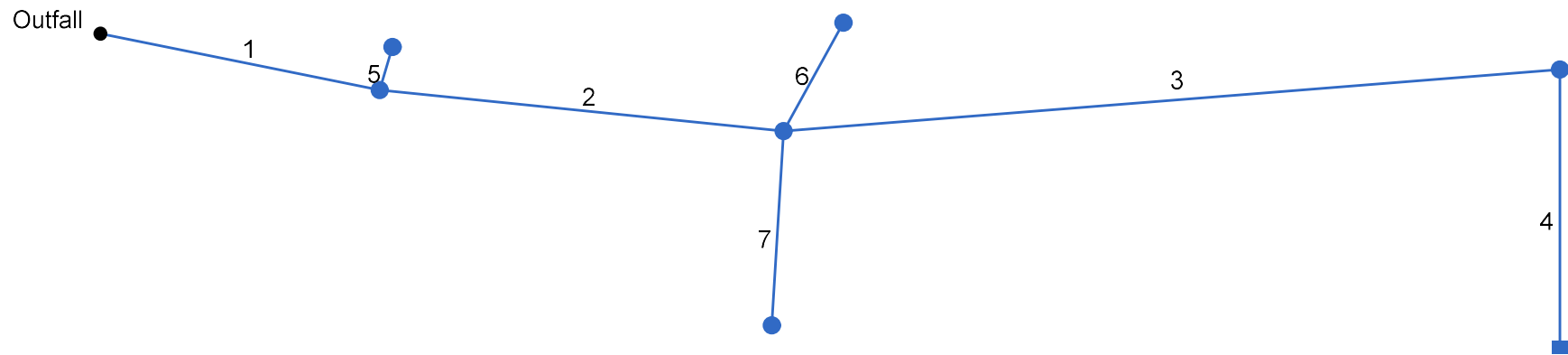
PROJECT NO: M24-8767A

DWG NO: C11

## **Section 4**

### Storm Sewer Hydraulics

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



# HGL Calc

Line No.	Line ID	DnStm Ln No	Invert Dn (ft)	Invert Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	Capac Full (cfs)	Known Q (cfs)	Flow Rate (cfs)	HGL Dn (ft)	HGL Up (ft)	Vel Ave (ft/s)	Rim-Hw (ft)
1	EXISTING PIPE	Outfall	1023.83	1024.57	73.524	1.01	15	7.02	0.00	5.32	1024.64	1025.50	5.85	5.40
2	EX MH - MH 1	1	1024.77	1026.06	103.747	1.24	12	3.97	0.00	4.13	1025.63	1026.92	5.74	6.70
3	MH 1 - GCI 2	2	1026.26	1028.78	198.973	1.27	12	4.01	0.38	0.69	1027.43	1029.13 j	1.87	5.27
4	GCI 2 - GCI 3	3	1028.98	1029.89	88.120	1.03	12	3.62	0.31	0.31	1029.18	1030.12	2.55	4.74
5	EX MH - CI 4	1	1026.54	1026.68	14.005	1.00	12	3.56	1.19	1.19	1026.94	1027.14	3.73	3.54
6	MH 1 - GI 5	2	1026.26	1027.89	37.560	4.34	12	7.42	2.59	2.59	1027.43	1028.58 j	3.89	3.97
7	MH 1 - GI 6	2	1029.26	1029.94	61.637	1.10	12	3.74	0.85	0.85	1029.58	1030.33	3.45	4.48

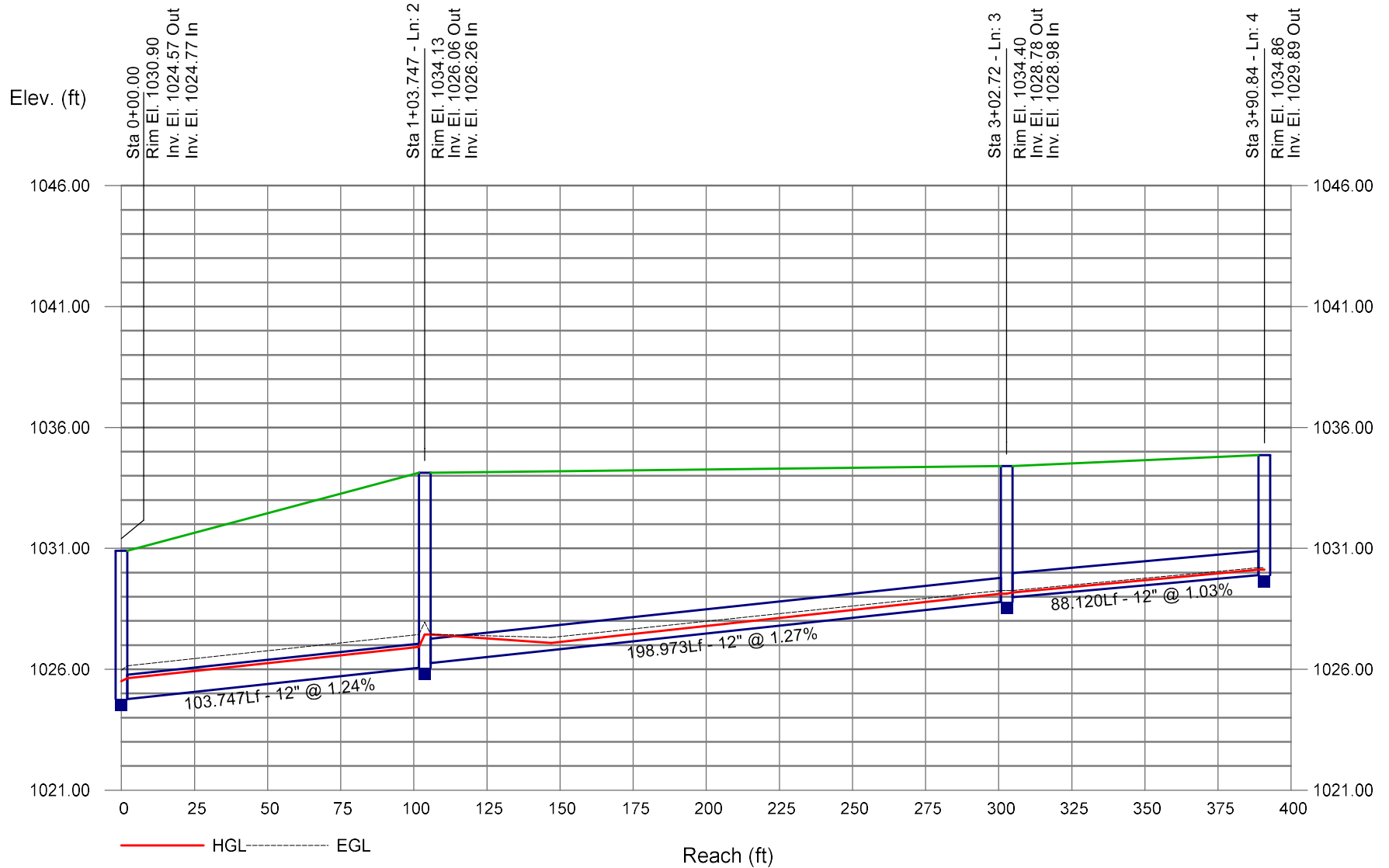
Project File: 2025-08-14\_10 Year Storm\_M24-8767A.stm

Number of lines: 7

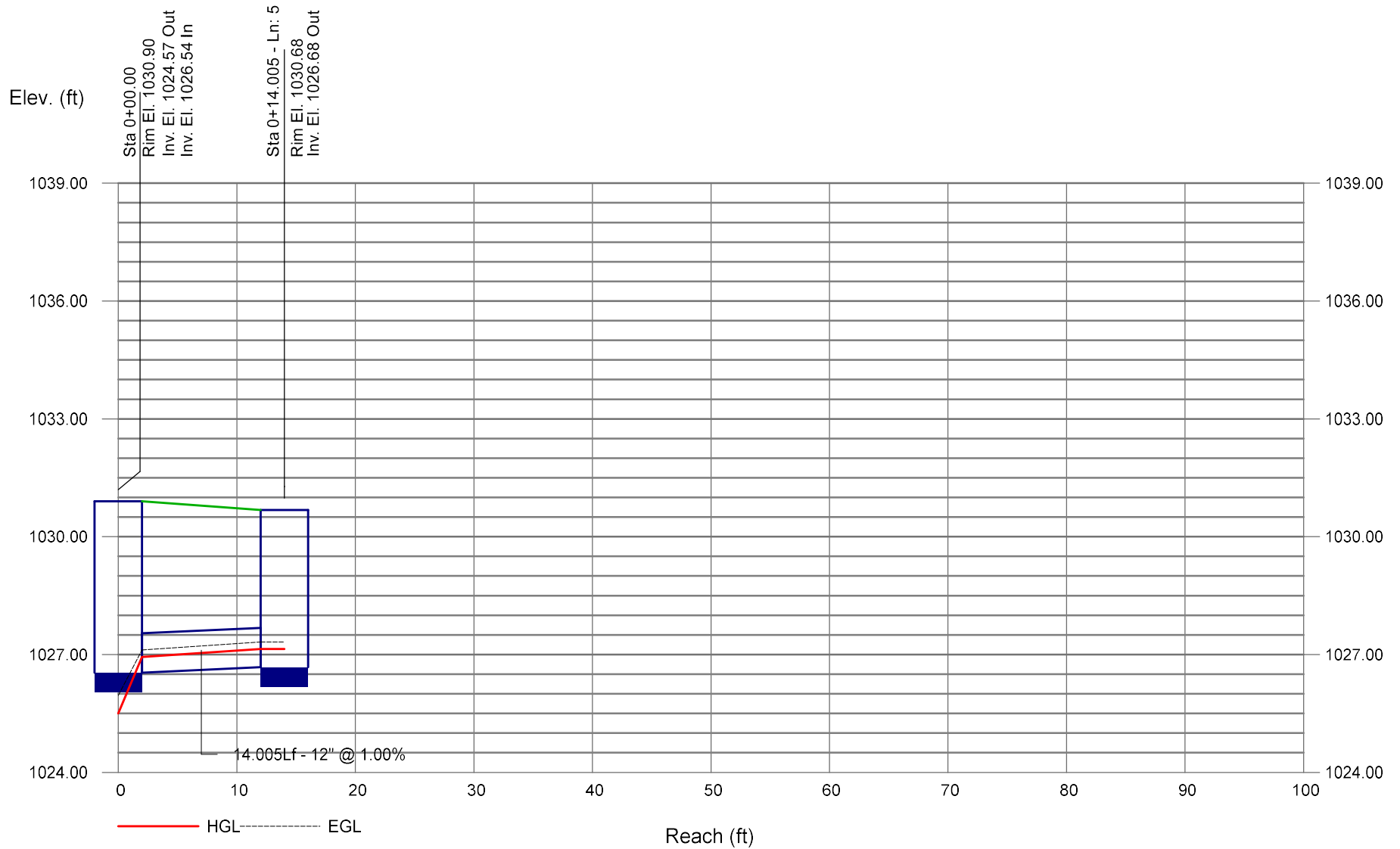
Date: 8/14/2025

NOTES: \*\* Critical depth

# Storm Sewer Profile

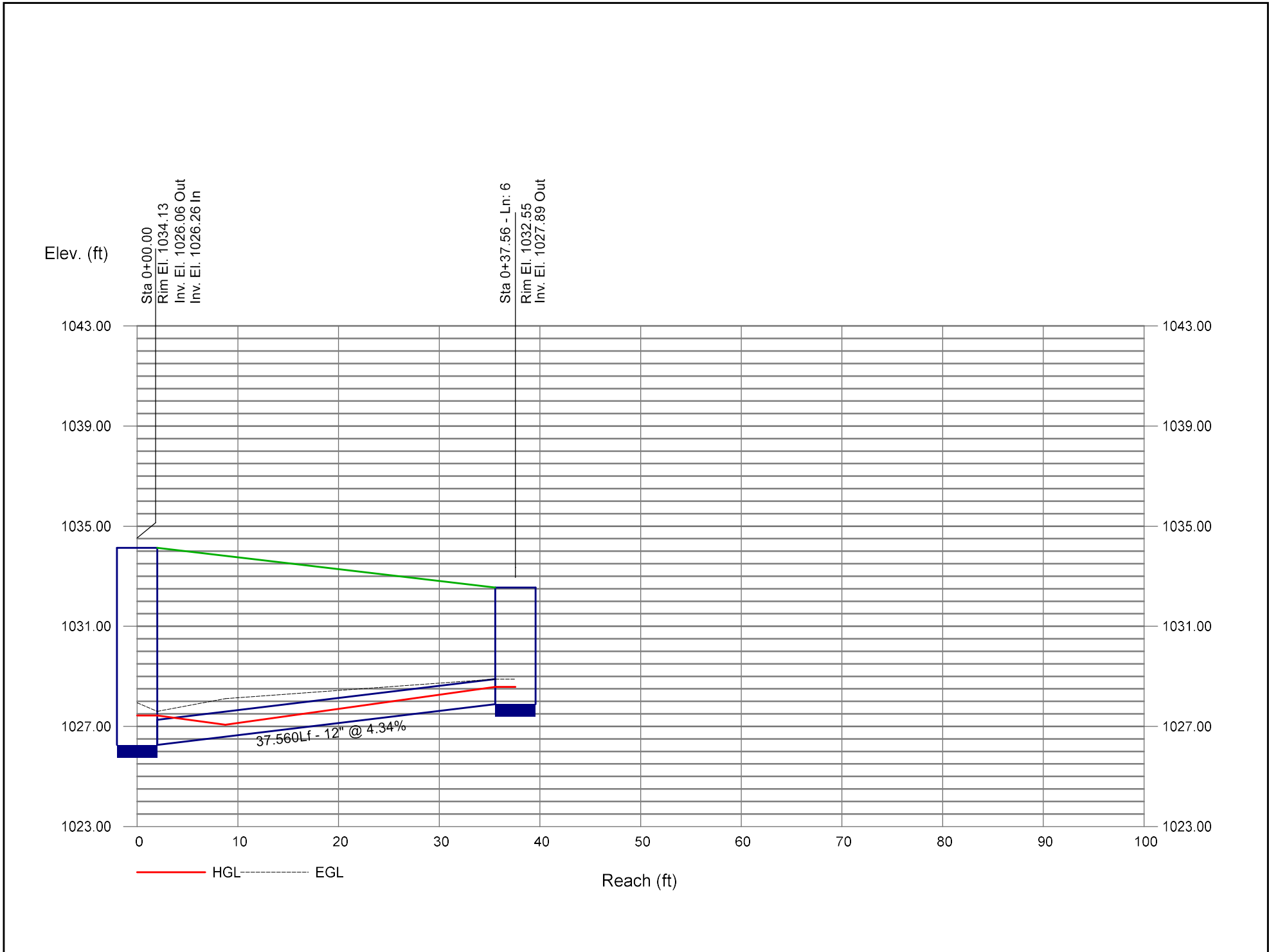


# Storm Sewer Profile





# Storm Sewer Profile



# Storm Sewer Profile

