

# STORM WATER ADDENDUM



## STORM WATER ADDENDUM 2 TO THE FOX RUN DEVELOPMENT SWMP

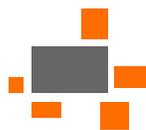
City of Waukesha, Waukesha County, Wisconsin  
*PEG Project Number: 2206.10-WI*

Prepared for:

Fox Run 3, LLC

11/18/2025

12/29/2025



**PINNACLE ENGINEERING GROUP**

20725 Watertown Road | Suite 100 | Brookfield, WI 53186

[www.pinnacle-engr.com](http://www.pinnacle-engr.com)

Fox Den Apartments II is a proposed apartment building project to be located on Lot 4 of Certified Survey Map No. 12027. The lot is 2.2 acres in size and is part of the Fox Run Redevelopment in the Southeast Quarter (SE 1/4) of Section 8 and the Southwest Quarter (SW 1/4) of Section 9, Town 6 North, Range 19 East, City of Waukesha, Waukesha County. As part of the overall Fox Run Redevelopment, Jahnke & Jahnke Associates LLC (Jahnke) completed a storm water management plan (SWMP) for the entire development. The approved SWMP was last revised June 5, 2020. Lot 4 is part of that SWMP. When preparing the SWMP, Jahnke & Jahnke included Lot 4 as a future development in Subcatchment P3 and made an assumption that P3 would be developed with 80% impervious area.

Now that there is a specific proposed plan on Lot 4, the actual impervious area of Subcatchment P3 has been calculated at 63.7% (73,521 sf /115,375 sf). Since there is less impervious area in Subcatchment P3 than was assumed, the Fox Den Apartments II project meets the intent of the original approved SWMP.

### Storm Sewer Design

Most of the proposed storm sewer for the Fox Den Apartments II project discharges to the existing Kohl's pond to the east. The storm sewer design and hydraulic grade lines were evaluated for 10-year and 100-year storm events, incorporating the corresponding tailwater elevations of the Kohl's pond. The 10-year (22.43) and 100-year (24.49) tailwater elevations for the Kohl's pond were taken from the Jahnke & Jahnke storm water management plan last revised on June 5, 2020.

There are two proposed pipes in the western portion of Fox Den Apartments II that connect to the existing storm sewer system from the original Fox Den Apartments project from 2021. The storm sewer system discharges to the existing bioretention pond to the southwest. The storm sewer design and hydraulic grade lines for this system were evaluated for 10-year and 100-year storm events, incorporating the corresponding tailwater elevations of the bioretention pond. The 10-year (26.79) and 100-year (28.64) tailwater elevations for the bioretention pond were taken from the PEG storm water addendum dated March 2, 2021.

These calculations correspond to the civil plan set dated December 29, 2025.

Attached to this addendum is the following:

- Attachment A: Storm Water Proposed Drainage Area Maps
- Attachment B: Storm Sewer C-Value Calculations
- Attachment C: Storm Sewer Computations
- Attachment D: Storm Sewer Drainage Map
- Attachment E: Hydraulic Grade Line Calculations
- Attachment F: Storm Sewer Manhole Sizing
- Attachment G: Storm Sewer Inlet Calculations

**Questions and comments can be directed to:**

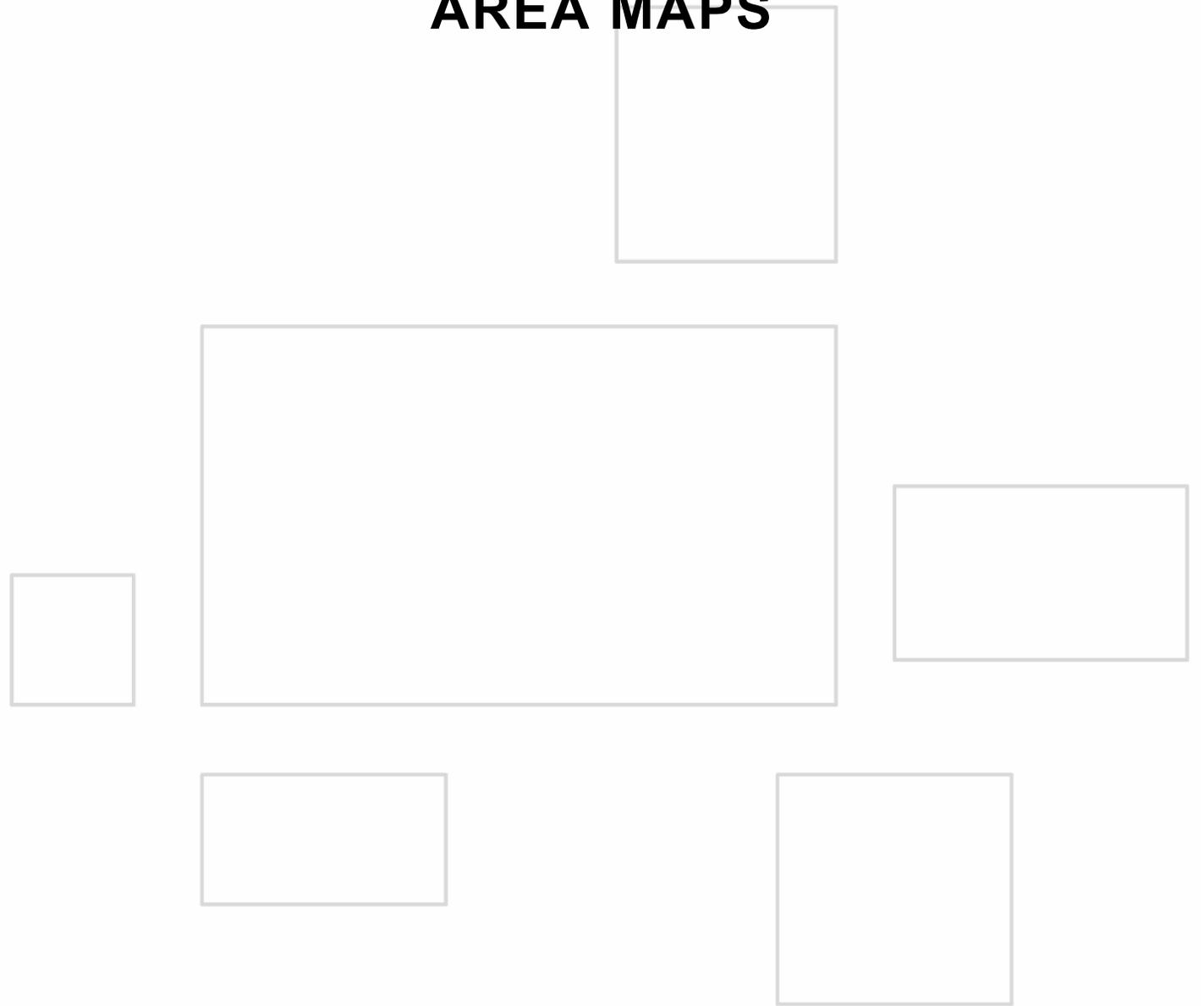
Eric J. Maki, P.E.  
 Project Engineer  
 Phone: 262.754.8888 | Fax: 262.754.8850  
 emaki@pinnacle-engr.com



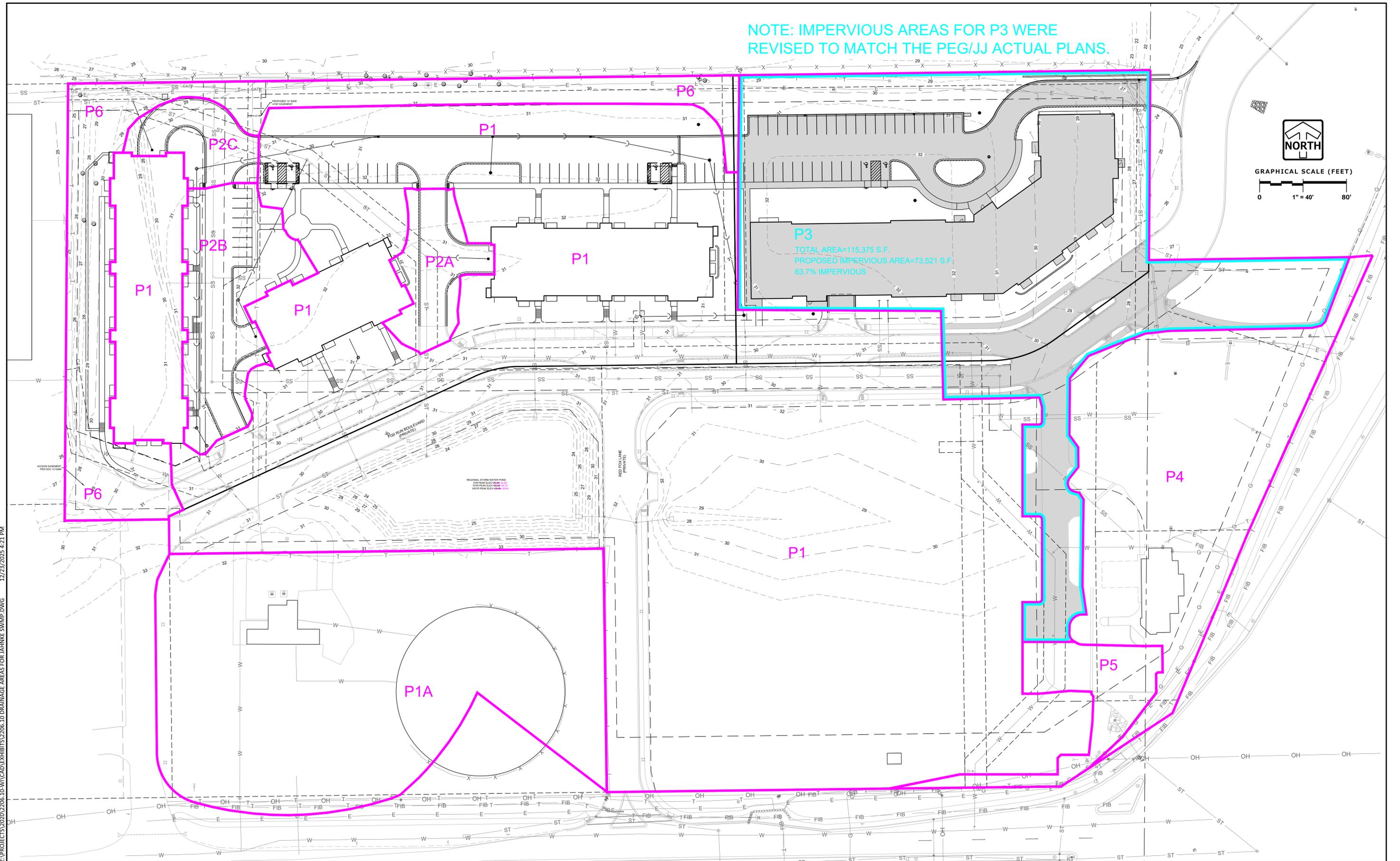
20725 Watertown Road | Suite 100  
 Brookfield, WI 53186  
 www.pinnacle-engr.com

# ATTACHMENT A

## STORM WATER PROPOSED DRAINAGE AREA MAPS



NOTE: IMPERVIOUS AREAS FOR P3 WERE REVISED TO MATCH THE PEG/JJ ACTUAL PLANS.



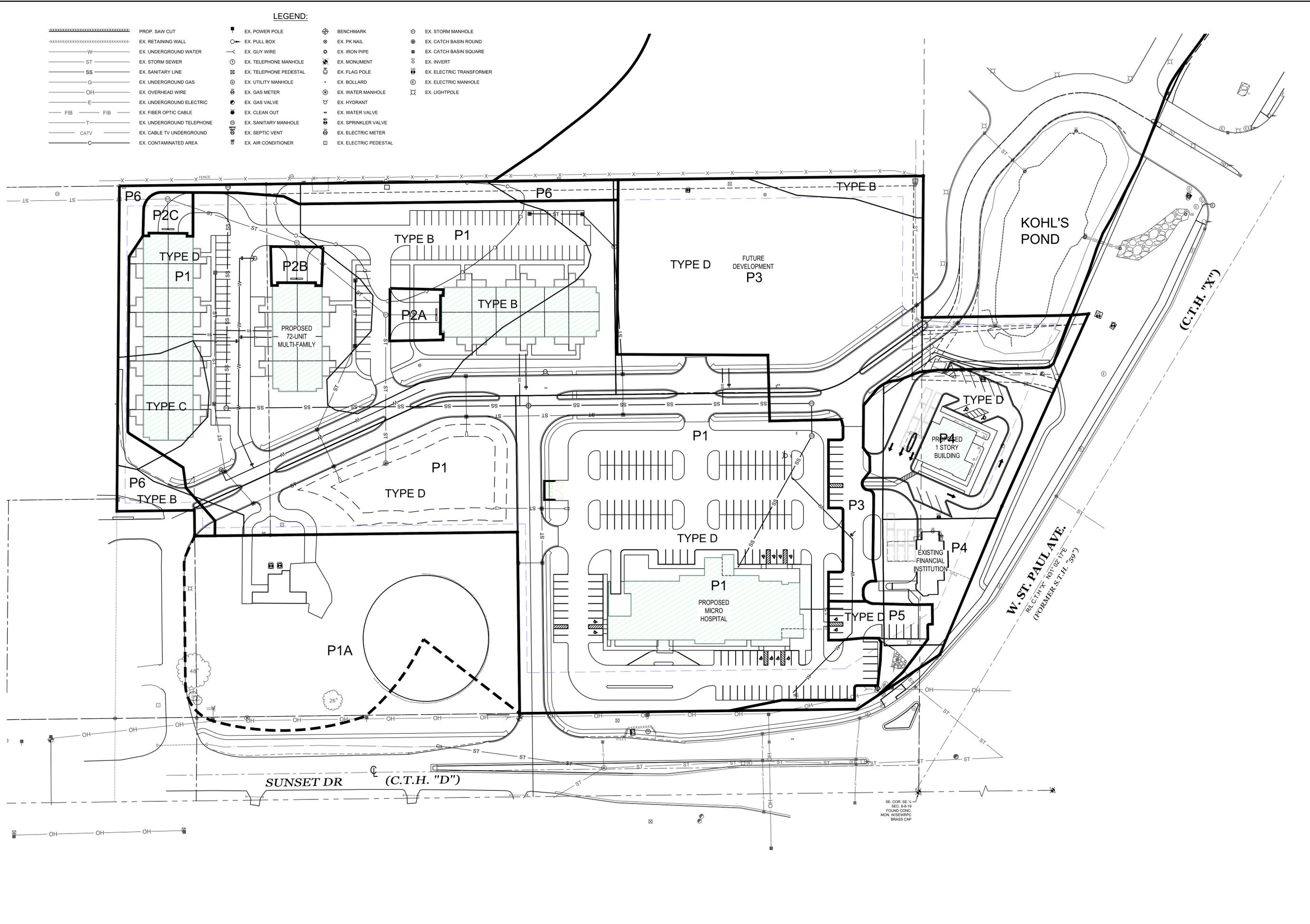
Z:\PROJECTS\2020\2206.10-WI\CAD\EXHIBITS\2206.10 DRAINAGE AREAS FOR JAHNKE SWMP.DWG 12/23/2025 4:21 PM

# STORM WATER PROPOSED DRAINAGE AREAS

12-29-25

**LEGEND:**

	PROP. SAW CUT		EX. POWER POLE		BENCHMARK		EX. STORM MANHOLE
	EX. RETAINING WALL		EX. PULL BOX		EX. PK NAIL		EX. CATCH BASIN ROUND
	EX. UNDERGROUND WATER		EX. GUY WIRE		EX. IRON PIPE		EX. CATCH BASIN SQUARE
	EX. STORM SEWER		EX. TELEPHONE MANHOLE		EX. MONUMENT		EX. INVERT
	EX. SANITARY LINE		EX. TELEPHONE PEDESTAL		EX. FLAG POLE		EX. ELECTRIC TRANSFORMER
	EX. UNDERGROUND GAS		EX. UTILITY MANHOLE		EX. BOLLARD		EX. ELECTRIC MANHOLE
	EX. OVERHEAD WIRE		EX. GAS METER		EX. WATER MANHOLE		EX. LIGHTPOLE
	EX. UNDERGROUND ELECTRIC		EX. GAS VALVE		EX. HYDRANT		
	FIB		EX. CLEAN OUT		EX. WATER VALVE		
	EX. FIBER OPTIC CABLE		EX. SANITARY MANHOLE		EX. SPRINKLER VALVE		
	EX. UNDERGROUND TELEPHONE		EX. SEPTIC VENT		EX. ELECTRIC METER		
	EX. CABLE TV UNDERGROUND		EX. AIR CONDITIONER		EX. ELECTRIC PEDESTAL		
	EX. CONTAMINATED AREA						



**REVISIONS**

3/17/2020 - REV. CURB ENTRY
3/25/2020 - REV. BASINS
4/21/2020 - REV. BASINS

FILE NAME: S:\projects\19-0043 (68660)\dwg\Storm and Storm Water Basins\19-0043\_Proposed Drainage Basins Revised.dwg

**03** OF **04**

**RE: VJS CONSTRUCTION SERVICES, INC.**

DRAWN BY: J.R.P. | CHECKED BY: P.L.J. | JOB NUMBER: 19-0043 | DATE: JANUARY 27, 2020  
 FILE NUMBER: XXXXXXXX XXXX | BOOK NUMBER: WAUK 191201 - PAGE NUMBER: 1-6  
 711 WEST MORELAND BOULEVARD, WAUKESHA, WISCONSIN 53188  
 PHONE #: (262) 542-5797 - EMAIL: SURVEY@JAHNKEANDJAHNKE.COM  
 WEBSITE: JAHNKEANDJAHNKE.COM

**JAHNKE & JAHNKE ASSOCIATES, LLC**  
 ENGINEERS - PLANNERS - SURVEYORS  
 ENGINEERING SOLUTIONS SINCE 1944

**PROPOSED DRAINAGE BASINS**  
 ADDRESS: 2300 WEST ST. PAUL AVENUE  
 PART OF THE SE 1/4 OF SECTION 8, T 6 N, R 19 E  
 & PART OF THE SW 1/4 OF SECTION 9, T 6 N, R 19 E  
 CITY OF WAUKESHA, WAUKESHA COUNTY, WISCONSIN.

# ATTACHMENT B

## STORM SEWER C-VALUE CALCULATIONS

The form consists of a large, light gray rectangular area. Inside this area, there are several smaller, empty rectangular boxes of various sizes and orientations, intended for calculations. The boxes are arranged as follows:

- A small square box on the left side.
- A large rectangular box in the center.
- A vertical rectangular box at the top center.
- A horizontal rectangular box on the right side.
- A horizontal rectangular box at the bottom left.
- A vertical rectangular box at the bottom right.

# Fox Den Apartments 2

Designed By **EJM**

Date **12/29/2025**

Waukesha

Checked By **EJM**

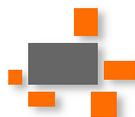
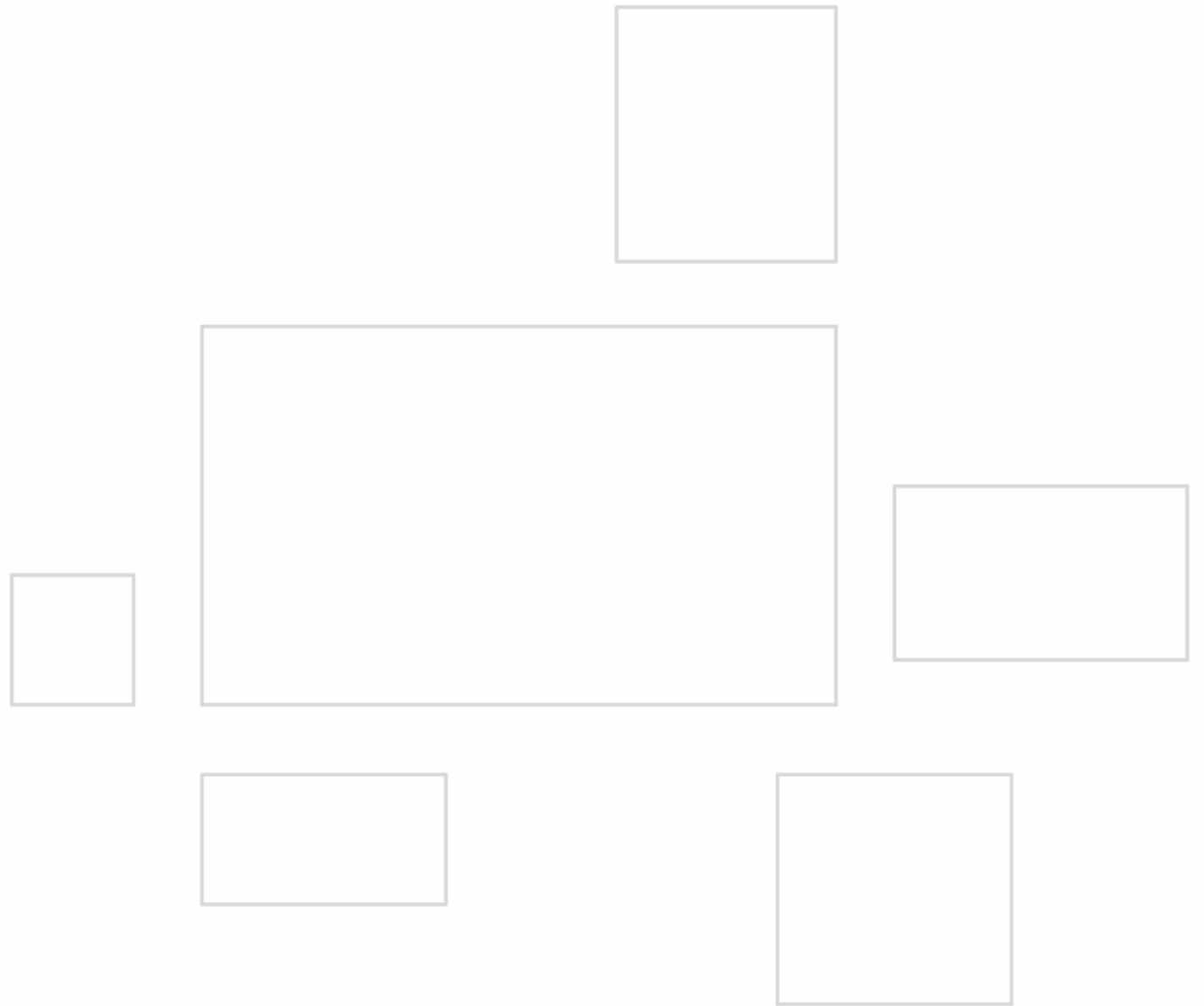
Project # **2206.10**

## C-VALUE CALCULATIONS

Area ID	Structure ID	Total		Greenspace		Impervious				Weighted c-value
				0.20		0.90				
		SF	AC	SF	AC	SF	AC	SF	AC	
EX MH IN 1.0	EX MH IN 1.0	3,985	0.09	3,626	0.08	359	0.01		-	0.26
EX CB 2.0	EX CB 2.0	6,747	0.15	3,195	0.07	3,552	0.08		-	0.57
EX CB 3.0	EX CB 3.0	11,392	0.26	4,750	0.11	6,642	0.15		-	0.61
CB 101.0	CB 101.0	13,121	0.30	3,316	0.08	9,805	0.23		-	0.72
MH IN 102.0	MH IN 102.0	1,162	0.03	1,102	0.03	60	0.00		-	0.24
MH IN 103.0	MH IN 103.0	9,894	0.23	2,669	0.06	7,225	0.17		-	0.71
MH IN 105.0	MH IN 105.0	608	0.01	589	0.01	19	0.00		-	0.22
ES 106.0	ES 106.0	80,653	1.85	80,367	1.85	286	0.01		-	0.20
MH IN 107.0	MH IN 107.0	7,391	0.17	2,052	0.05	5,339	0.12		-	0.71
MH IN 108.0	MH IN 108.0	968	0.02	270	0.01	698	0.02		-	0.70
MH IN 110.0	MH IN 110.0	4,202	0.10	4,202	0.10		-		-	0.20
MH IN 111.0	MH IN 111.0	694	0.02	502	0.01	192	0.00		-	0.39
EX INLET 5	EX INLET 5	12,004	0.28	5,031	0.12	6,973	0.16		-	0.61
EX INLET 6*	EX INLET 6*	13,329	0.31	3,223	0.07	10,106	0.23		-	0.73
EX INLET 7	EX INLET 7	21,118	0.48	12,049	0.28	9,069	0.21		-	0.50
EX INLET 8*	EX INLET 8*	6,839	0.16	1,307	0.03	5,532	0.13		-	0.77
EX BC 6.1	EX BC 6.1	13,179	0.30		-	13,179	0.30			0.90
BC 101.1	BC 101.1	5,745	0.13		-	5,745	0.13			0.90
BC 102.1	BC 102.1	10,844	0.25		-	10,844	0.25			0.90
BC 104.1	BC 104.1	6,922	0.16		-	6,922	0.16			0.90
BC 104.2	BC 104.2	3,526	0.08		-	3,526	0.08			0.90
					-		-			0
									-	0
<b>TOTAL</b>		<b>234,323</b>	<b>5.379</b>	<b>128,250</b>	<b>2.944</b>	<b>106,073</b>	<b>2.435</b>		-	<b>0.52</b>

# ATTACHMENT C

## STORM SEWER COMPUTATIONS



# Fox Den Apartments 2

Waukesha

Designed By **EJM** Date **12/29/2025**

Checked By **EJM** Project # **2206.10**



DESIGN DATA																		
County: <b>Waukesha</b>		Design Storm: <b>10</b> yr		Storm Duration: <b>5</b> min		DESIGN INTENSITY (I): <b>7.22</b> in/hr				Intensity from NOAA Atlas 14, Volume 8.								
STRUCTURE DATA			DRAINAGE AREA AND FLOW DATA				PIPE DATA				PIPE CAPACITY INFORMATION					ELEVATIONS		
			Flow is determined by Rational Method Q = CIA								Pipe capacity is determined by Manning's Equation Q = 1.486/n AR <sup>2.48</sup> S <sup>1/2</sup>							
Notes	Upstream Structure	Downstream Structure	Individual Acres A	Individual Coefficient C	Individual Flow Q (cfs)	Cumulative Flow (cfs)	Length (ft)	Diameter (in)	Slope (%)	Manning Coefficient	Required Drop (ft)	Actual Drop (ft)	Percent Full (%)	Actual Velocity (fps)	Max. Capacity (cfs)	Rim/Toc Up	Invert Up	Invert Down
	BC 101.1	CB 101.0	0.13	0.90	0.86	0.86	100.2	8	2.08	0.011	0.36	2.08	44%	5.63	2.22	36.60	30.93	28.85
	CB 101.0	MH IN 103.0	0.30	0.72	1.57	2.42	100.4	12	1.00	0.012	0.40	1.00	59%	5.19	4.15	32.74	28.52	27.52
	BC 102.1	MH IN 102.0	0.25	0.90	1.62	1.62	18.5	8	4.16	0.011	0.24	0.77	54%	8.56	3.13	36.60	30.93	30.16
	MH IN 102.0	MH IN 103.0	0.03	0.24	0.05	1.66	79.7	12	1.00	0.012	0.15	0.80	45%	4.73	4.15	34.50	29.83	29.03
	MH IN 103.0	MH IN 105.0	0.23	0.71	1.16	5.25	60.4	15	1.95	0.012	0.34	1.18	53%	8.11	10.51	32.66	27.27	26.09
	BC 104.1	MH 104.0	0.16	0.90	1.03	1.03	43.4	8	2.08	0.011	0.23	0.90	50%	5.90	2.22	36.60	30.93	30.03
	BC 104.2	MH 104.0	0.08	0.90	0.53	0.53	45.7	6	2.08	0.011	0.29	0.95	54%	4.99	1.03	36.60	31.10	30.15
	MH 104.0	MH IN 105.0	0.00	0.00	0.00	1.56	41.3	12	4.41	0.012	0.07	1.82	25%	7.97	8.72	34.70	29.65	27.83
	MH IN 105.0	MH IN 107.0	0.01	0.22	0.02	6.83	150.2	15	2.73	0.012	1.43	4.10	57%	9.81	12.44	31.00	26.09	21.99
	ES 106.0	MH IN 107.0	1.85	0.20	2.67	2.67	7.9	24	3.29	0.012	0.00	0.26	11%	7.79	47.82		22.50	22.24
	MH IN 107.0	MH IN 108.0	0.17	0.71	0.87	10.37	35.5	24	1.00	0.012	0.06	0.36	44%	7.48	26.36	26.78	21.24	20.89
	MH IN 108.0	ES 109.0	0.02	0.70	0.11	10.49	75.5	24	0.50	0.012	0.14	0.38	58%	5.78	18.64	25.11	20.38	20.00
	EX MH IN 1.0	EX CB 2.0	0.09	0.26	0.17	0.17	34.1	12	1.41	0.012	0.00	0.48	8%	2.79	4.93	33.09	29.89	29.41
	EX CB 2.0	EX CB 3.0	0.15	0.57	0.64	0.81	91.1	12	0.23	0.012	0.04	0.21	45%	2.28	1.99	32.36	29.34	29.13
	EX CB 3.0	EX MH IN 4.0	0.26	0.61	1.15	1.96	112.5	12	1.08	0.012	0.29	1.22	49%	5.08	4.31	32.36	29.13	27.92
	MH IN 110.0	EX MH IN 4.0	0.10	0.20	0.14	0.14	35.7	12	3.08	0.012	0.00	1.10	5%	3.45	7.29	32.00	29.00	27.90
	EX MH IN 4.0	EX MH IN 5.0	0.00	0.00	0.00	2.10	141.6	12	1.13	0.012	0.42	1.60	51%	5.26	4.41	34.22	27.90	26.30
	MH IN 111.0	EX MH IN 5.0	0.02	0.39	0.04	0.04	63.3	12	1.90	0.012	0.00	1.20	3%	2.07	5.72	30.50	27.50	26.30
	EX BC 6.1	EX MH 6.0	0.30	0.90	1.97	1.97	14.4	10	3.13	0.011	0.08	0.45	45%	8.07	4.92	36.60	30.56	30.11
	EX MH 6.0	EX MH IN 5.0	0.00	0.00	0.00	1.97	86.3	12	2.06	0.012	0.22	1.78	39%	6.45	5.96	33.08	28.08	26.30
	EX MH IN 5.0	EX INLET 7	0.00	0.00	0.00	4.11	22.7	15	0.53	0.013	0.09	0.12	78%	4.32	5.06	29.88	26.18	26.06
	EX INLET 7	EX INLET 8*	0.48	0.50	1.75	5.86	50.0	18	0.50	0.013	0.16	0.25	71%	4.66	7.99	29.65	25.81	25.56
	EX INLET 8*	EX INLET 6	0.16	0.77	0.87	6.73	194.3	18	0.50	0.013	0.80	0.97	80%	4.76	7.99	29.70	25.31	24.34
	EX INLET 5	EX INLET 6*	0.28	0.61	1.21	1.21	50.0	12	0.50	0.013	0.06	0.25	49%	3.18	2.71	30.31	27.31	27.06
	EX INLET 6*	EX OUTPIPE 2	0.31	0.73	1.61	9.56	17.0	21	0.50	0.013	0.06	0.09	76%	5.23	12.05	30.31	24.09	24.00

\* AREAS AND C-VALUES CALCULATED FROM THE JAHNKE & JAHNKE STORM SEWER COMPUTATIONS SPREADSHEET DATED 6-22-20.

# Fox Den Apartments 2

Waukesha

Designed By **EJM** Date **12/29/2025**  
 Checked By **EJM** Project # **2206.10**

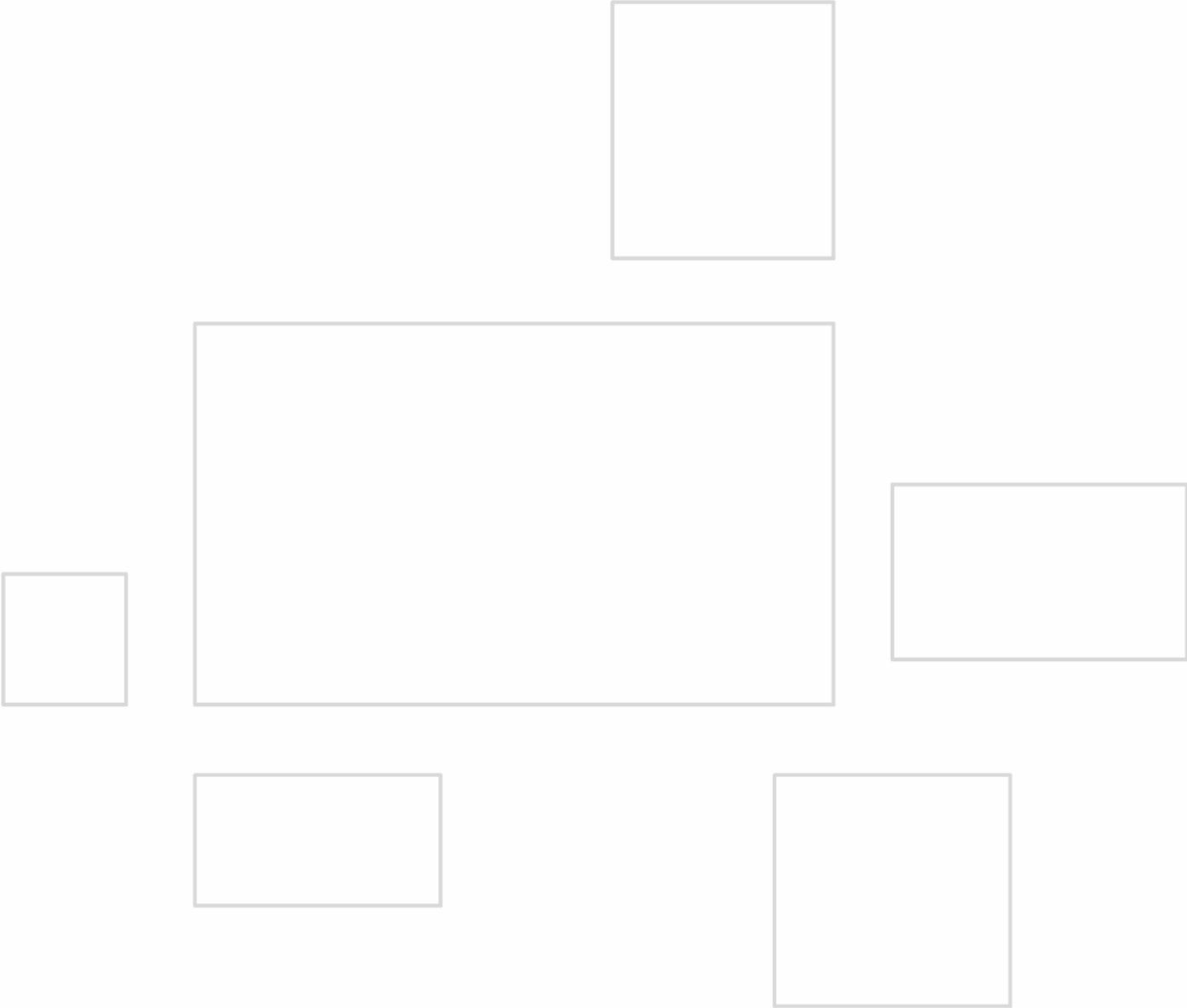


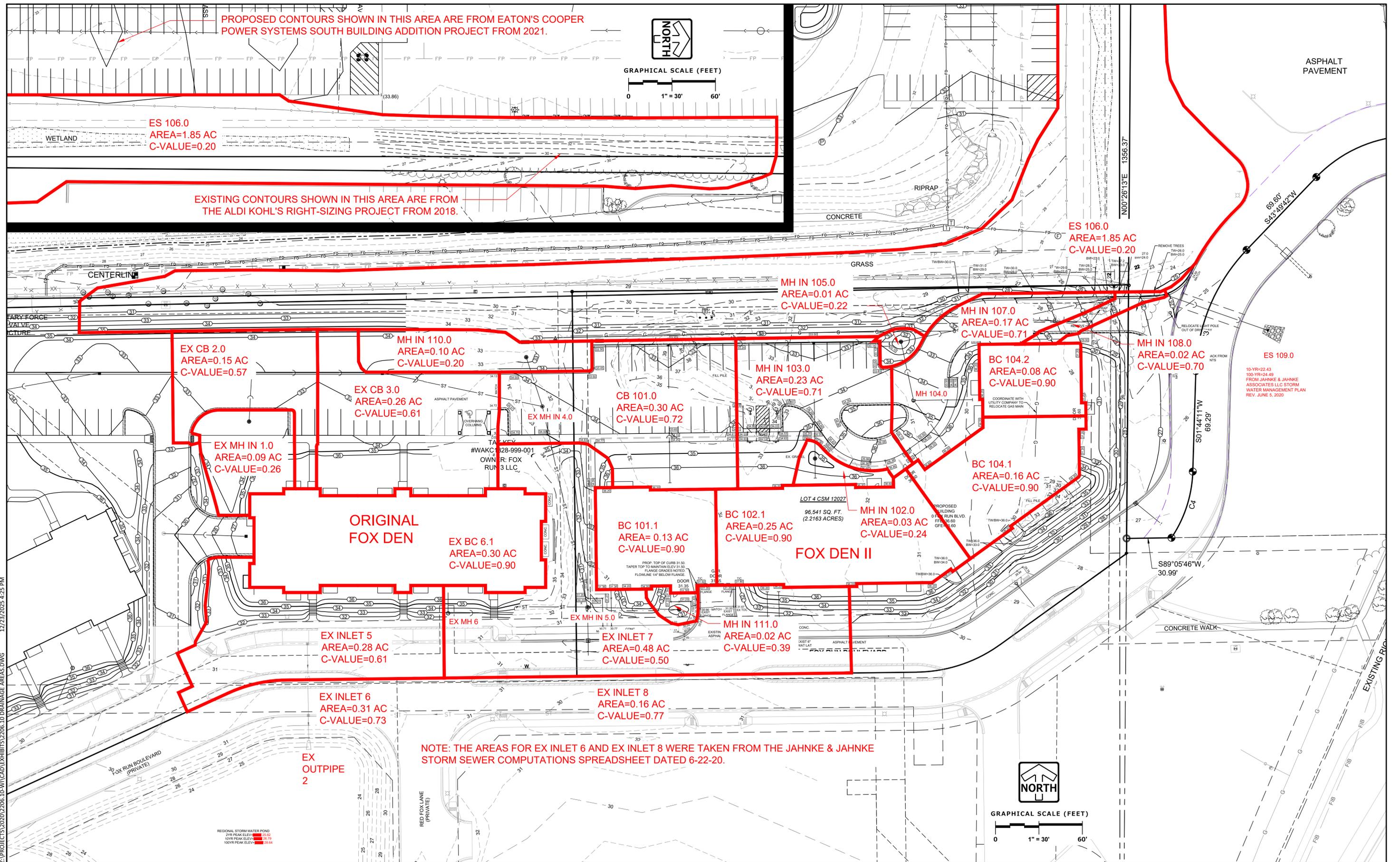
DESIGN DATA																		
County: <b>Waukesha</b>		Design Storm: <b>100</b> yr		Storm Duration: <b>5</b> min		DESIGN INTENSITY (I): <b>10.75</b> in/hr				Intensity from NOAA Atlas 14, Volume 8.								
STRUCTURE DATA			DRAINAGE AREA AND FLOW DATA				PIPE DATA				PIPE CAPACITY INFORMATION					ELEVATIONS		
			Flow is determined by Rational Method Q = CIA								Pipe capacity is determined by Manning's Equation Q = 1.486/n AR <sup>2.48</sup> S <sup>1/2</sup>							
Notes	Upstream Structure	Downstream Structure	Individual Acres A	Individual Coefficient C	Individual Flow Q (cfs)	Cumulative Flow (cfs)	Length (ft)	Diameter (in)	Slope (%)	Manning Coefficient	Required Drop (ft)	Actual Drop (ft)	Percent Full (%)	Actual Velocity (fps)	Max. Capacity (cfs)	Rim/Toc Up	Invert Up	Invert Down
	BC 101.1	CB 101.0	0.13	0.90	1.28	1.28	100.2	8	2.08	0.011	0.80	2.08	59%	6.21	2.22	36.60	30.93	28.85
	CB 101.0	MH IN 103.0	0.30	0.72	2.33	3.61	100.4	12	1.00	0.012	0.88	1.00	82%	5.58	4.15	32.74	28.52	27.52
	BC 102.1	MH IN 102.0	0.25	0.90	2.41	2.41	18.5	8	4.16	0.011	0.53	0.77	74%	9.32	3.13	36.60	30.93	30.16
	MH IN 102.0	MH IN 103.0	0.03	0.24	0.07	2.48	79.7	12	1.00	0.012	0.33	0.80	60%	5.22	4.15	34.50	29.83	29.03
	MH IN 103.0	MH IN 105.0	0.23	0.71	1.73	7.82	60.4	15	1.95	0.012	0.75	1.18	72%	8.84	10.51	32.66	27.27	26.09
	BC 104.1	MH 104.0	0.16	0.90	1.54	1.54	43.4	8	2.08	0.011	0.50	0.90	68%	6.47	2.22	36.60	30.93	30.03
	BC 104.2	MH 104.0	0.08	0.90	0.78	0.78	45.7	6	2.08	0.011	0.64	0.95	73%	5.43	1.03	36.60	31.10	30.15
	MH 104.0	MH IN 105.0	0.00	0.00	0.00	2.32	41.3	12	4.41	0.012	0.15	1.82	33%	8.90	8.72	34.70	29.65	27.83
	MH IN 105.0	MH IN 107.0	0.01	0.22	0.03	10.17	150.2	15	2.73	0.012	3.17	4.10	78%	10.63	12.44	31.00	26.09	21.99
	ES 106.0	MH IN 107.0	1.85	0.20	3.98	3.98	7.9	24	3.29	0.012	0.00	0.26	15%	8.80	47.82		22.50	22.24
	MH IN 107.0	MH IN 108.0	0.17	0.71	1.30	15.45	35.5	24	1.00	0.012	0.14	0.36	60%	8.25	26.36	26.78	21.24	20.89
	MH IN 108.0	ES 109.0	0.02	0.70	0.17	15.61	75.5	24	0.50	0.012	0.31	0.38	80%	6.25	18.64	25.11	20.38	20.00
	EX MH IN 1.0	EX CB 2.0	0.09	0.26	0.26	0.26	34.1	12	1.41	0.012	0.00	0.48	10%	3.14	4.93	33.09	29.89	29.41
	EX CB 2.0	EX CB 3.0	0.15	0.57	0.95	1.20	91.1	12	0.23	0.012	0.09	0.21	61%	2.51	1.99	32.36	29.34	29.13
	EX CB 3.0	EX MH IN 4.0	0.26	0.61	1.71	2.92	112.5	12	1.08	0.012	0.64	1.22	67%	5.57	4.31	32.36	29.13	27.92
	MH IN 110.0	EX MH IN 4.0	0.10	0.20	0.21	0.21	35.7	12	3.08	0.012	0.00	1.10	6%	3.66	7.29	32.00	29.00	27.90
	EX MH IN 4.0	EX MH IN 5.0	0.00	0.00	0.00	3.13	141.6	12	1.13	0.012	0.93	1.60	69%	5.74	4.41	34.22	27.90	26.30
	MH IN 111.0	EX MH IN 5.0	0.02	0.39	0.07	0.07	63.3	12	1.90	0.012	0.00	1.20	4%	2.33	5.72	30.50	27.50	26.30
	EX BC 6.1	EX MH 6.0	0.30	0.90	2.93	2.93	14.4	10	3.13	0.011	0.18	0.45	60%	8.90	4.92	36.60	30.56	30.11
	EX MH 6.0	EX MH IN 5.0	0.00	0.00	0.00	2.93	86.3	12	2.06	0.012	0.50	1.78	52%	7.15	5.96	33.08	28.08	26.30
A	EX MH IN 5.0	EX INLET 7	0.00	0.00	0.00	6.12	22.7	15	0.53	0.013	0.20	0.12	Surcharge	---	5.06	29.88	26.18	26.06
A	EX INLET 7	EX INLET 8*	0.48	0.50	2.61	8.73	50.0	18	0.50	0.013	0.35	0.25	Surcharge	---	7.99	29.65	25.81	25.56
A	EX INLET 8*	EX INLET 6	0.16	0.77	1.30	10.03	194.3	18	0.50	0.013	1.77	0.97	Surcharge	---	7.99	29.70	25.31	24.34
A	EX INLET 5	EX INLET 6*	0.28	0.61	1.81	1.81	50.0	12	0.50	0.013	0.13	0.25	66%	3.49	2.71	30.31	27.31	27.06
A	EX INLET 6*	EX OUTPIPE 2	0.31	0.73	2.40	14.23	17.0	21	0.50	0.013	0.14	0.09	Surcharge	---	12.05	30.31	24.09	24.00

A SURCHARGING EXISTING PIPES IN FOX RUN BOULEVARD WERE NOT SIZED FOR THE 100-YEAR STORM.  
 \* AREAS AND C-VALUES CALCULATED FROM THE JAHNKE & JAHNKE STORM SEWER COMPUTATIONS SPREADSHEET DATED 6-22-20.

**ATTACHMENT D**

**STORM SEWER DRAINAGE MAP**





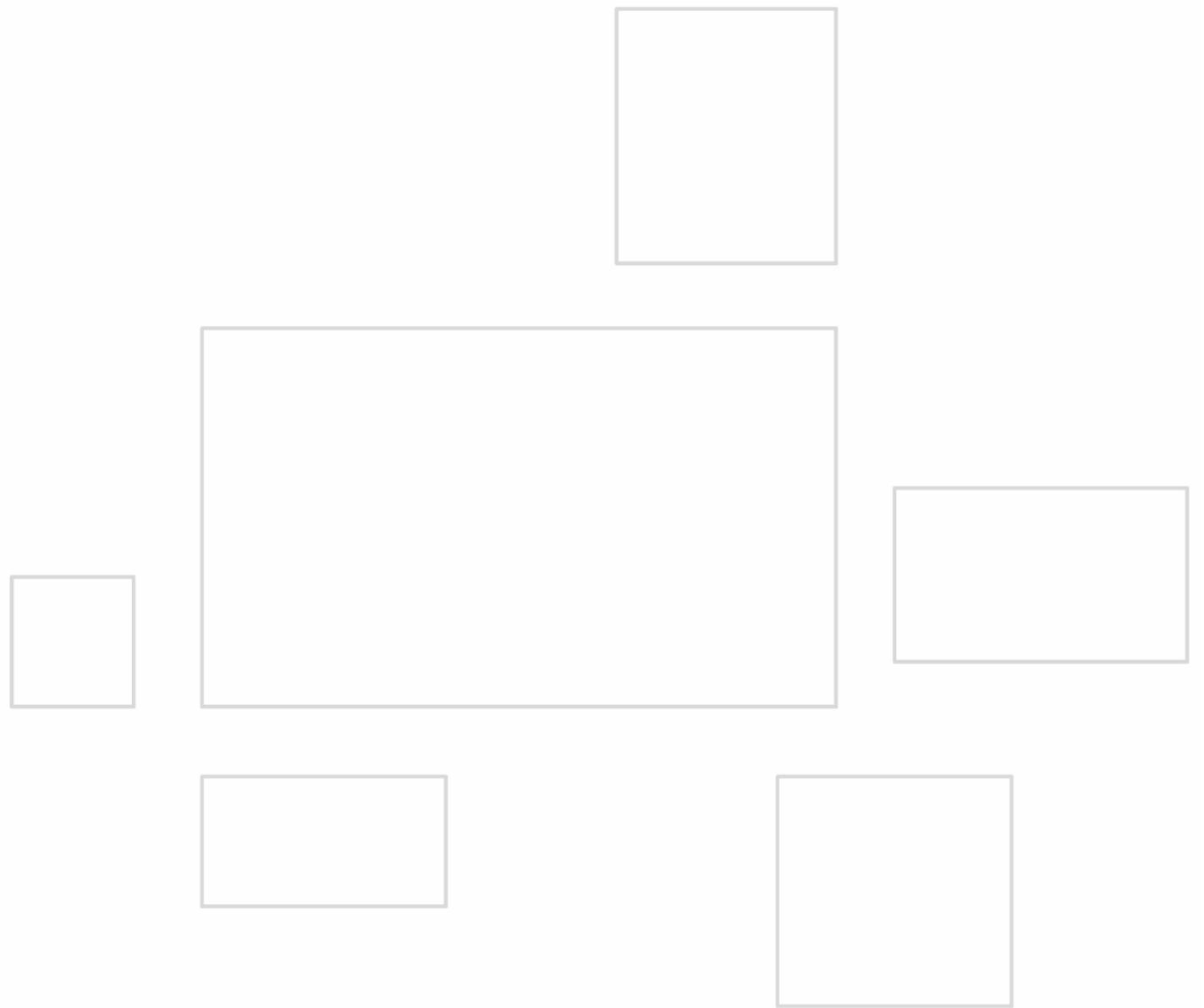
# STORM SEWER DRAINAGE AREAS - FOX DEN APARTMENTS II

12-29-25

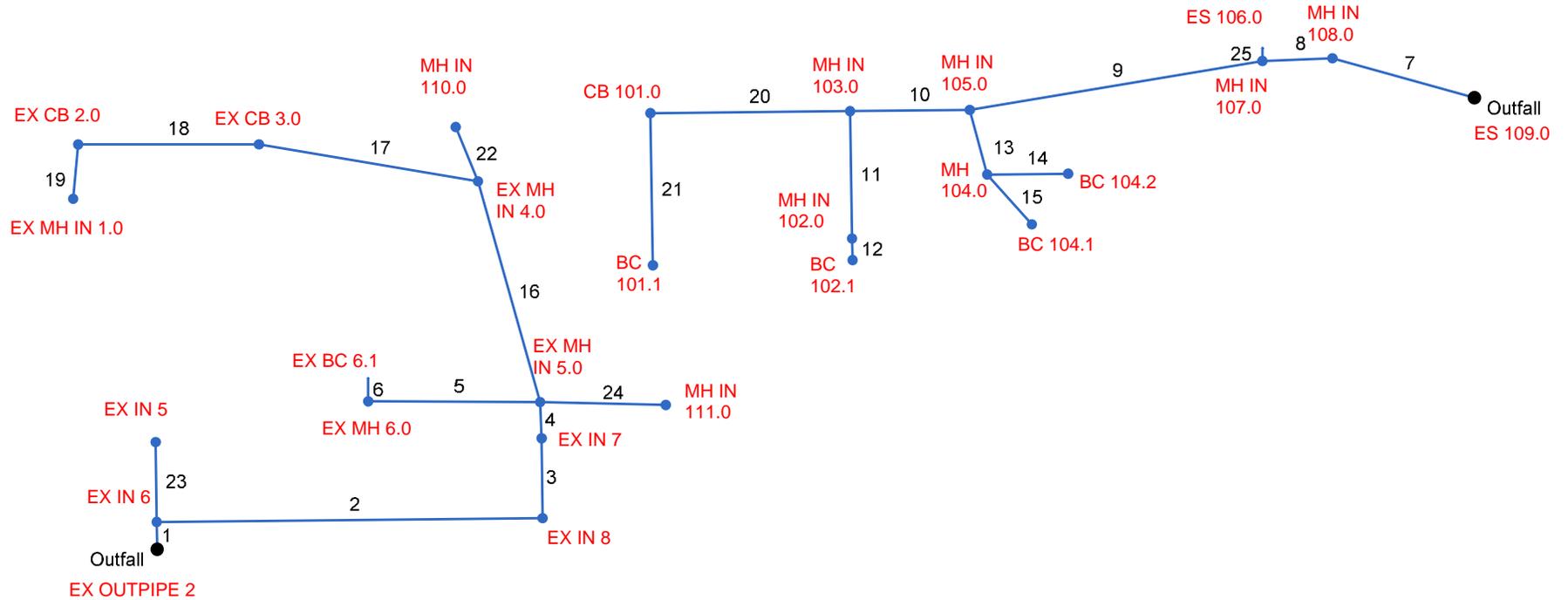
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# ATTACHMENT E

## HYDRAULIC GRADE LINE CALCULATIONS



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



# Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	17.040	-90.707	MH	1.61	0.00	0.00	0.0	24.00	0.53	24.09	21	Cir	0.012	1.00	30.31	Pipe - (509)
2	1	194.270	90.000	MH	0.87	0.00	0.00	0.0	24.34	0.50	25.31	18	Cir	0.012	1.00	29.70	Pipe - (511)
3	2	50.000	-90.000	MH	1.75	0.00	0.00	0.0	25.56	0.50	25.81	18	Cir	0.012	0.15	29.65	Pipe - (512)
4	3	22.640	-1.391	MH	0.00	0.00	0.00	0.0	26.06	0.53	26.18	15	Cir	0.012	1.00	29.88	Pipe - (513)
5	4	86.269	-87.585	MH	0.00	0.00	0.00	0.0	26.30	2.06	28.08	12	Cir	0.012	1.00	33.08	Pipe - (517)
6	5	14.409	89.683	None	1.97	0.00	0.00	0.0	30.11	3.12	30.56	10	Cir	0.012	1.00	36.60	Pipe - (516)
7	End	75.452	-160.884	MH	0.11	0.00	0.00	0.0	20.00	0.50	20.38	24	Cir	0.012	0.43	25.11	Pipe - (564)
8	7	35.520	-21.888	MH	0.87	0.00	0.00	0.0	20.88	1.01	21.24	24	Cir	0.012	1.00	26.78	Pipe - (563)
9	8	150.187	-9.007	MH	0.02	0.00	0.00	0.0	21.99	2.73	26.09	15	Cir	0.012	1.00	31.00	Pipe - (562)
10	9	60.357	11.072	MH	1.16	0.00	0.00	0.0	26.09	1.96	27.27	15	Cir	0.012	1.00	32.66	Pipe - (561)
11	10	79.681	-90.000	MH	0.05	0.00	0.00	0.0	29.03	1.00	29.83	12	Cir	0.012	0.15	34.50	Pipe - (566)
12	11	13.500	0.000	MH	1.62	0.00	0.00	0.0	30.16	4.15	30.72	8	Cir	0.012	1.00	36.60	Pipe - (565)
13	9	41.312	-90.365	MH	0.00	0.00	0.00	0.0	27.83	4.41	29.65	12	Cir	0.012	0.98	34.70	Pipe - (568)
14	13	40.691	-78.564	MH	0.53	0.00	0.00	0.0	30.15	2.09	31.00	6	Cir	0.012	1.00	36.60	Pipe - (569)
15	13	38.412	-23.564	MH	1.03	0.00	0.00	0.0	30.03	2.08	30.83	8	Cir	0.012	1.00	36.60	Pipe - (567)
16	4	141.640	-10.628	MH	0.00	0.00	0.00	0.0	26.30	1.13	27.90	12	Cir	0.012	0.93	34.22	Pipe - (514)
17	16	112.524	-65.427	MH	1.15	0.00	0.00	0.0	27.91	1.08	29.13	12	Cir	0.012	0.25	32.36	Pipe - (556)
18	17	91.117	-11.884	MH	0.64	0.00	0.00	0.0	29.13	0.23	29.34	12	Cir	0.012	1.00	32.36	Pipe - (515)
19	18	34.089	-85.839	MH	0.17	0.00	0.00	0.0	29.41	1.41	29.89	12	Cir	0.012	1.00	33.09	Pipe - (555)
20	10	100.417	0.000	MH	1.57	0.00	0.00	0.0	27.52	1.00	28.52	12	Cir	0.012	1.00	32.74	Pipe - (560)
21	20	95.181	-90.000	MH	0.86	0.00	0.00	0.0	28.85	2.08	30.83	8	Cir	0.012	1.00	36.60	Pipe - (559)
22	16	35.734	-5.427	MH	0.14	0.00	0.00	0.0	27.90	1.01	28.26	12	Cir	0.012	1.00	32.00	Pipe - (558)
23	1	50.000	0.000	MH	1.21	0.00	0.00	0.0	27.06	0.50	27.31	12	Cir	0.012	1.00	30.31	Pipe - (520)

Project File: 2206.10 Fox Den Apartments II 10-year.stm

Number of lines: 25

Date: 12/23/2025

# Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data							Line ID	
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)		Inlet/ Rim El (ft)
24	4	63.342	93.705	MH	0.04	0.00	0.00	0.0	26.30	1.89	27.50	12	Cir	0.012	1.00	30.50	Pipe - (557)
25	8	7.919	93.301	MH	2.67	0.00	0.00	0.0	22.24	3.28	22.50	24	Cir	0.012	1.00	24.83	Pipe - (570)
Project File: 2206.10 Fox Den Apartments II 10-year.stm												Number of lines: 25			Date: 12/23/2025		

# Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	EX INLET 6	Manhole	30.31	Cir	4.00	4.00	21	Cir	24.09	18 12	Cir Cir	24.34 27.06
2	EX INLET 8	Manhole	29.70	Cir	4.00	4.00	18	Cir	25.31	18	Cir	25.56
3	EX INLET 7	Manhole	29.65	Cir	4.00	4.00	18	Cir	25.81	15	Cir	26.06
4	EX STORM MH IN 5	Manhole	29.88	Cir	4.00	4.00	15	Cir	26.18	12 12 12	Cir Cir Cir	26.30 26.30 26.30
5	EX STORM MH 6	Manhole	33.08	Cir	4.00	4.00	12	Cir	28.08	10	Cir	30.11
6	Null Structure	None	36.60	n/a	n/a	n/a	10	Cir	30.56			
7	MH IN 108.0	Manhole	25.11	Cir	4.00	4.00	24	Cir	20.38	24	Cir	20.88
8	MH IN 107.0	Manhole	26.78	Cir	4.00	4.00	24	Cir	21.24	15 24	Cir Cir	21.99 22.24
9	MH IN 105.0	Manhole	31.00	Cir	4.00	4.00	15	Cir	26.09	15 12	Cir Cir	26.09 27.83
10	PROP MH IN 103.0	Manhole	32.66	Cir	4.00	4.00	15	Cir	27.27	12 12	Cir Cir	29.03 27.52
11	MH IN 102.0	Manhole	34.50	Cir	4.00	4.00	12	Cir	29.83	8	Cir	30.16
12	BC 102.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.72			
13	MH IN 104.0	Manhole	34.70	Cir	4.00	4.00	12	Cir	29.65	6 8	Cir Cir	30.15 30.03
14	BC 104.2	Manhole	36.60	Cir	4.00	4.00	6	Cir	31.00			
15	BC 104.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.83			
16	EX STORM MH IN 4	Manhole	34.22	Cir	4.00	4.00	12	Cir	27.90	12 12	Cir Cir	27.91 27.90
17	EX STORM CB 3	Manhole	32.36	Cir	4.00	4.00	12	Cir	29.13	12	Cir	29.13
18	EX STORM CB 2	Manhole	32.36	Cir	4.00	4.00	12	Cir	29.34	12	Cir	29.41
19	EX STORM CB 1	Manhole	33.09	Cir	4.00	4.00	12	Cir	29.89			

# Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
20	PROP STORM CB 101.0	Manhole	32.74	Cir	4.00	4.00	12	Cir	28.52	8	Cir	28.85
21	BC 101.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.83			
22	PROP STORM MH IN 110.0	Manhole	32.00	Cir	4.00	4.00	12	Cir	28.26			
23	EX INLET 5	Manhole	30.31	Cir	4.00	4.00	12	Cir	27.31			
24	PROP STORM MH IN 111.0	Manhole	30.50	Cir	4.00	4.00	12	Cir	27.50			
25	ES 106.0	Manhole	24.83	Cir	0.00	0.00	24	Cir	22.50			

Project File: 2206.10 Fox Den Apartments II 10-year.stm

Number of Structures: 25

Run Date: 12/23/2025

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	21	9.55	24.00	26.79	1.75	2.40	3.97	0.25	27.04	0.310	17.040	24.09	26.84	1.75	2.41	3.97	0.25	27.09	0.310	0.310	0.053	1.00	0.25
2	18	6.73	24.34	27.09	1.50	1.77	3.81	0.23	27.31	0.350	194.270	25.31	27.77	1.50	1.77	3.81	0.23	27.99	0.350	0.350	0.680	1.00	0.23
3	18	5.86	25.56	27.99	1.50	1.77	3.32	0.17	28.16	0.265	50.000	25.81	28.13	1.50	1.77	3.32	0.17	28.30	0.265	0.265	0.133	0.15	0.03
4	15	4.11	26.06	28.15	1.25	1.23	3.35	0.17	28.33	0.345	22.640	26.18	28.23	1.25	1.23	3.35	0.17	28.40	0.345	0.345	0.078	1.00	0.17
5	12	1.97	26.30	28.40	1.00	0.49	2.51	0.10	28.50	0.261	86.269	28.08	28.68 j	0.60**	0.49	4.02	0.25	28.93	0.583	0.422	n/a	1.00	n/a
6	10	1.97	30.11	30.51	0.40*	0.26	7.56	0.31	30.82	0.000	14.409	30.56	31.19	0.63**	0.44	4.46	0.31	31.50	0.000	0.000	n/a	1.00	0.31
7	24	10.49	20.00	22.43	2.00	3.14	3.34	0.17	22.60	0.183	75.452	20.38	22.57	2.00	3.14	3.34	0.17	22.74	0.183	0.183	0.138	0.43	0.07
8	24	10.38	20.88	22.64	1.76	1.87	3.54	0.48	23.12	0.000	35.520	21.24	22.39	1.15**	1.87	5.54	0.48	22.87	0.000	0.000	n/a	1.00	n/a
9	15	6.84	21.99	22.68	0.69*	0.70	9.81	0.60	23.28	0.000	150.187	26.09	27.14	1.05**	1.10	6.22	0.60	27.74	0.000	0.000	n/a	1.00	0.60
10	15	5.26	26.09	27.14	1.05	0.98	4.78	0.45	27.59	0.000	60.357	27.27	28.20 j	0.93**	0.98	5.38	0.45	28.65	0.000	0.000	n/a	1.00	0.45
11	12	1.67	29.03	29.49	0.46*	0.35	4.74	0.22	29.71	0.000	79.681	29.83	30.38	0.55**	0.44	3.78	0.22	30.60	0.000	0.000	n/a	0.15	0.03
12	8	1.62	30.16	30.54	0.38*	0.20	8.00	0.38	30.92	0.000	13.500	30.72	31.31	0.59**	0.33	4.96	0.38	31.69	0.000	0.000	n/a	1.00	0.38
13	12	1.56	27.83	28.13	0.30*	0.20	7.96	0.21	28.34	0.000	41.312	29.65	30.18	0.53**	0.42	3.69	0.21	30.39	0.000	0.000	n/a	0.98	0.21
14	6	0.53	30.15	30.43	0.28*	0.11	4.68	0.18	30.61	0.000	40.691	31.00	31.37	0.37**	0.16	3.39	0.18	31.55	0.000	0.000	n/a	1.00	n/a
15	8	1.03	30.03	30.38	0.35*	0.19	5.52	0.23	30.61	0.000	38.412	30.83	31.31	0.48**	0.27	3.82	0.23	31.54	0.000	0.000	n/a	1.00	n/a
16	12	2.10	26.30	28.40	1.00	0.79	2.67	0.11	28.52	0.296	141.640	27.90	28.79	0.89	0.74	2.85	0.13	28.91	0.264	0.280	0.397	0.93	0.12
17	12	1.96	27.91	28.90	0.99	0.49	2.50	0.25	29.15	0.000	112.524	29.13	29.73 j	0.60**	0.49	4.01	0.25	29.98	0.000	0.000	n/a	0.25	n/a
18	12	0.81	29.13	29.73	0.60	0.49	1.66	0.04	29.77	0.099	91.117	29.34	29.83	0.49	0.38	2.12	0.07	29.90	0.189	0.144	0.131	1.00	0.07
19	12	0.17	29.41	29.90	0.49	0.09	0.44	0.06	29.96	0.000	34.089	29.89	30.06 j	0.17**	0.09	1.94	0.06	30.12	0.000	0.000	n/a	1.00	n/a
20	12	2.43	27.52	28.20	0.68	0.56	4.28	0.30	28.50	0.000	100.417	28.52	29.19 j	0.67**	0.56	4.37	0.30	29.48	0.000	0.000	n/a	1.00	0.30
21	8	0.86	28.85	29.19	0.34	0.18	4.86	0.19	29.38	0.000	95.181	30.83	31.27	0.44**	0.24	3.53	0.19	31.46	0.000	0.000	n/a	1.00	0.19
22	12	0.14	27.90	28.90	1.00	0.79	0.18	0.00	28.90	0.001	35.734	28.26	28.90	0.64	0.53	0.26	0.00	28.91	0.002	0.002	0.001	1.00	0.00

Project File: 2206.10 Fox Den Apartments II 10-year.stm

Number of lines: 25

Run Date: 12/23/2025

Notes: \* depth assumed; \*\* Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
23	12	1.21	27.06	27.53	0.47*	0.36	3.37	0.18	27.70	0.499	50.000	27.31	27.78	0.47**	0.36	3.37	0.18	27.95	0.501	0.500	0.250	1.00	0.18
24	12	0.04	26.30	28.40	1.00	0.79	0.05	0.00	28.40	0.000	63.342	27.50	28.40	0.90	0.75	0.05	0.00	28.40	0.000	0.000	0.000	1.00	0.00
25	24	2.67	22.24	22.57	0.33*	0.34	7.77	0.20	22.78	0.000	7.919	22.50	23.07	0.57**	0.74	3.63	0.20	23.27	0.000	0.000	n/a	1.00	0.20

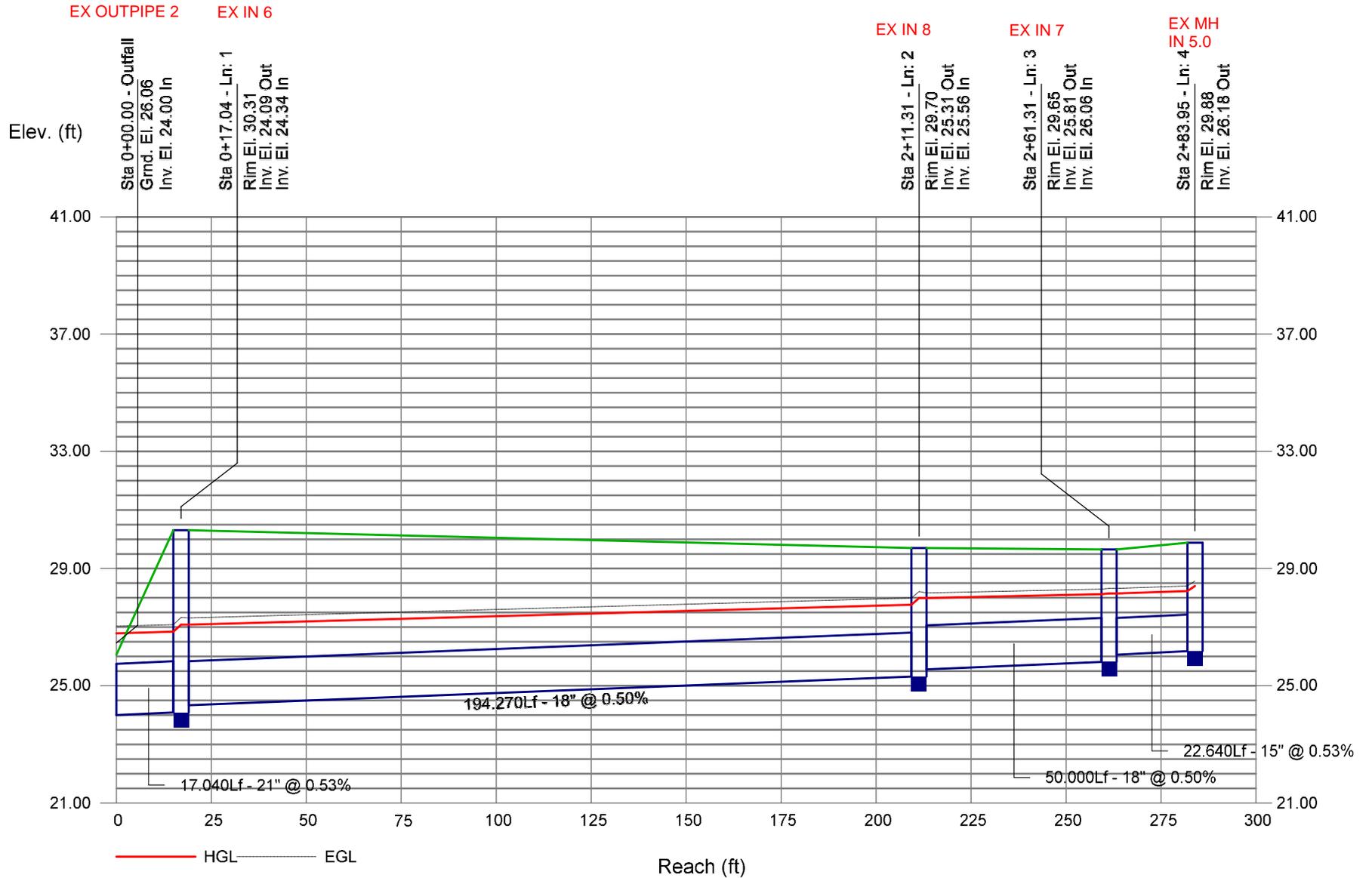
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Number of lines: 25

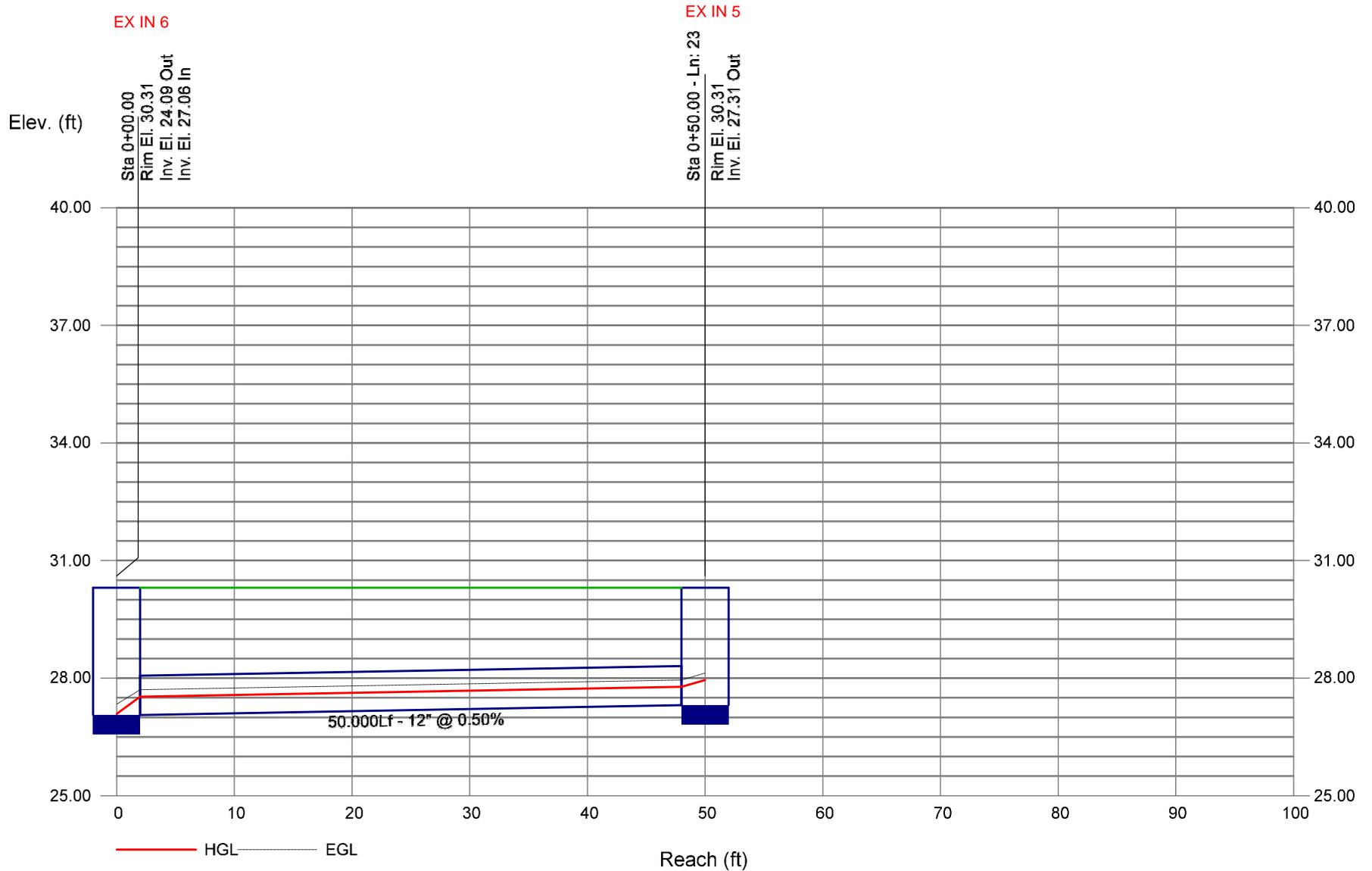
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Notes: \* depth assumed; \*\* Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

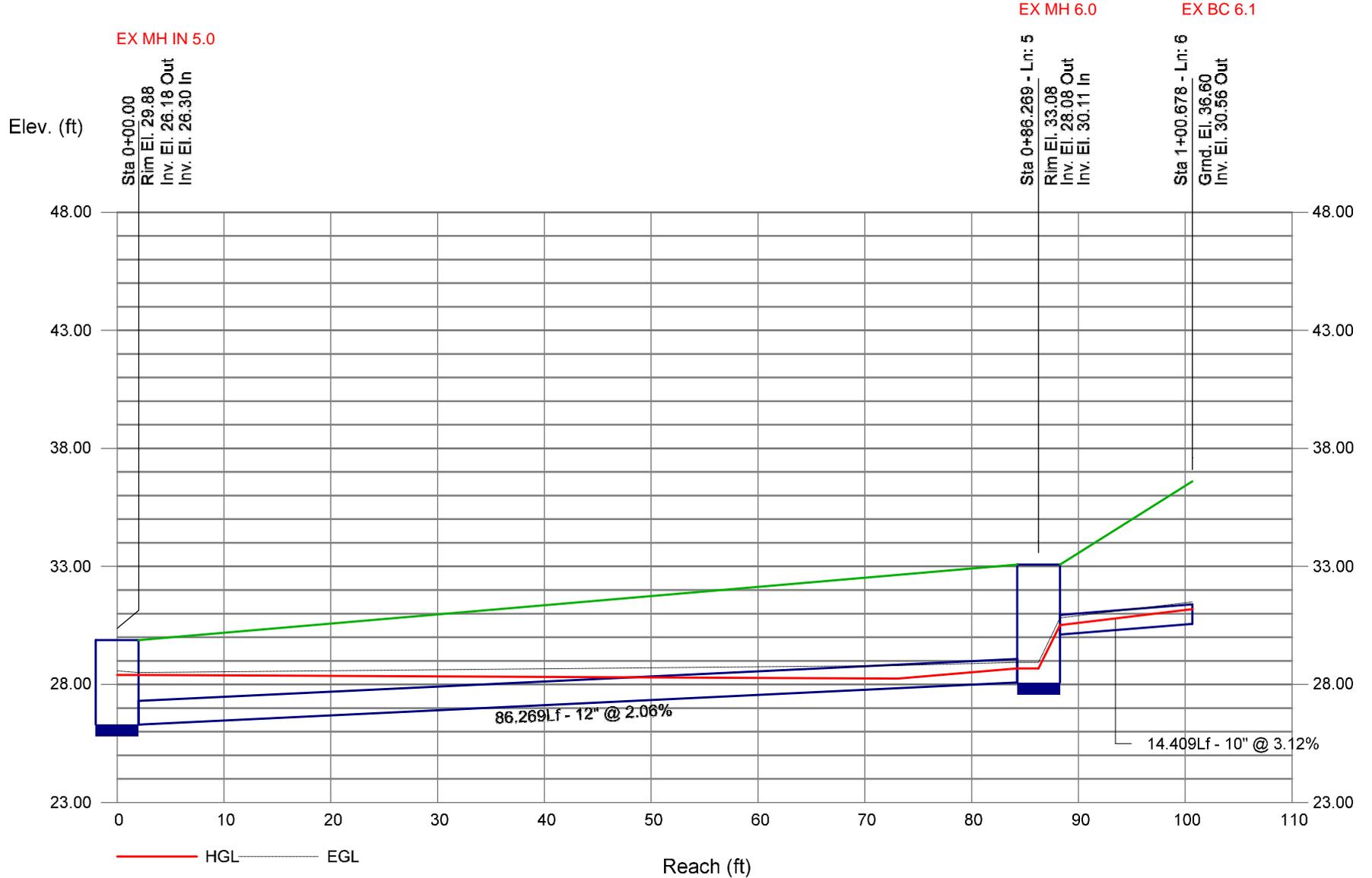
# Storm Sewer Profile



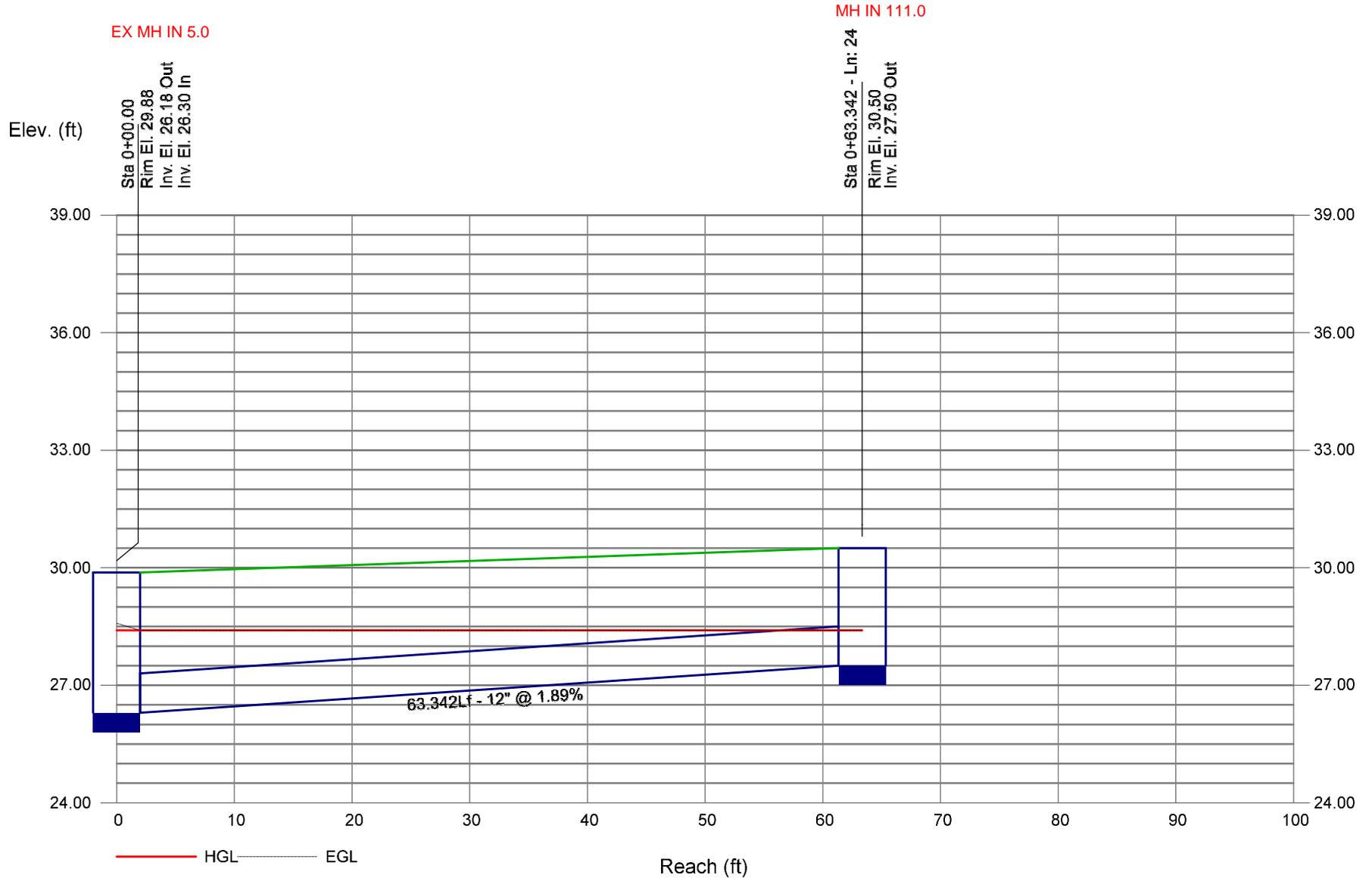
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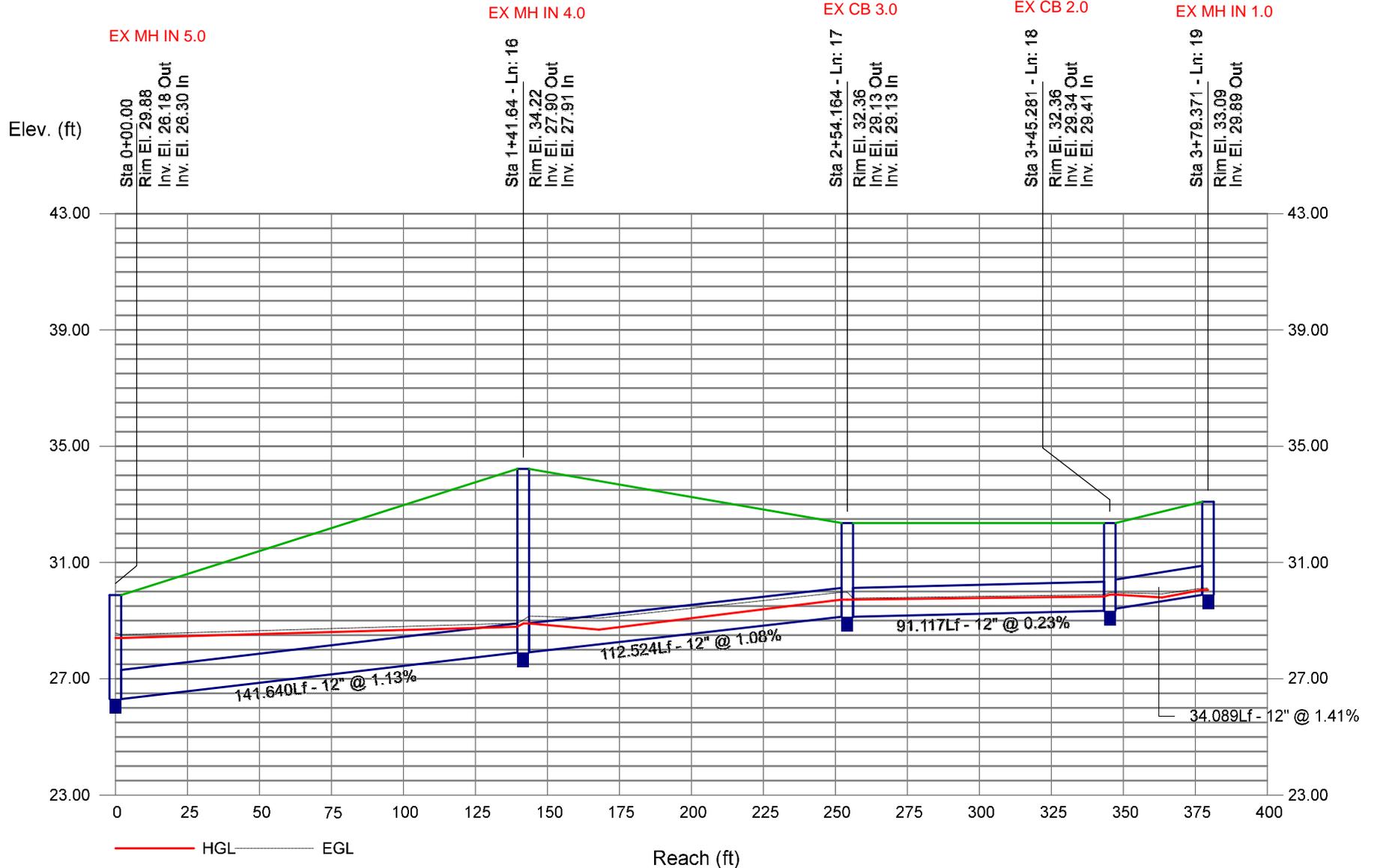
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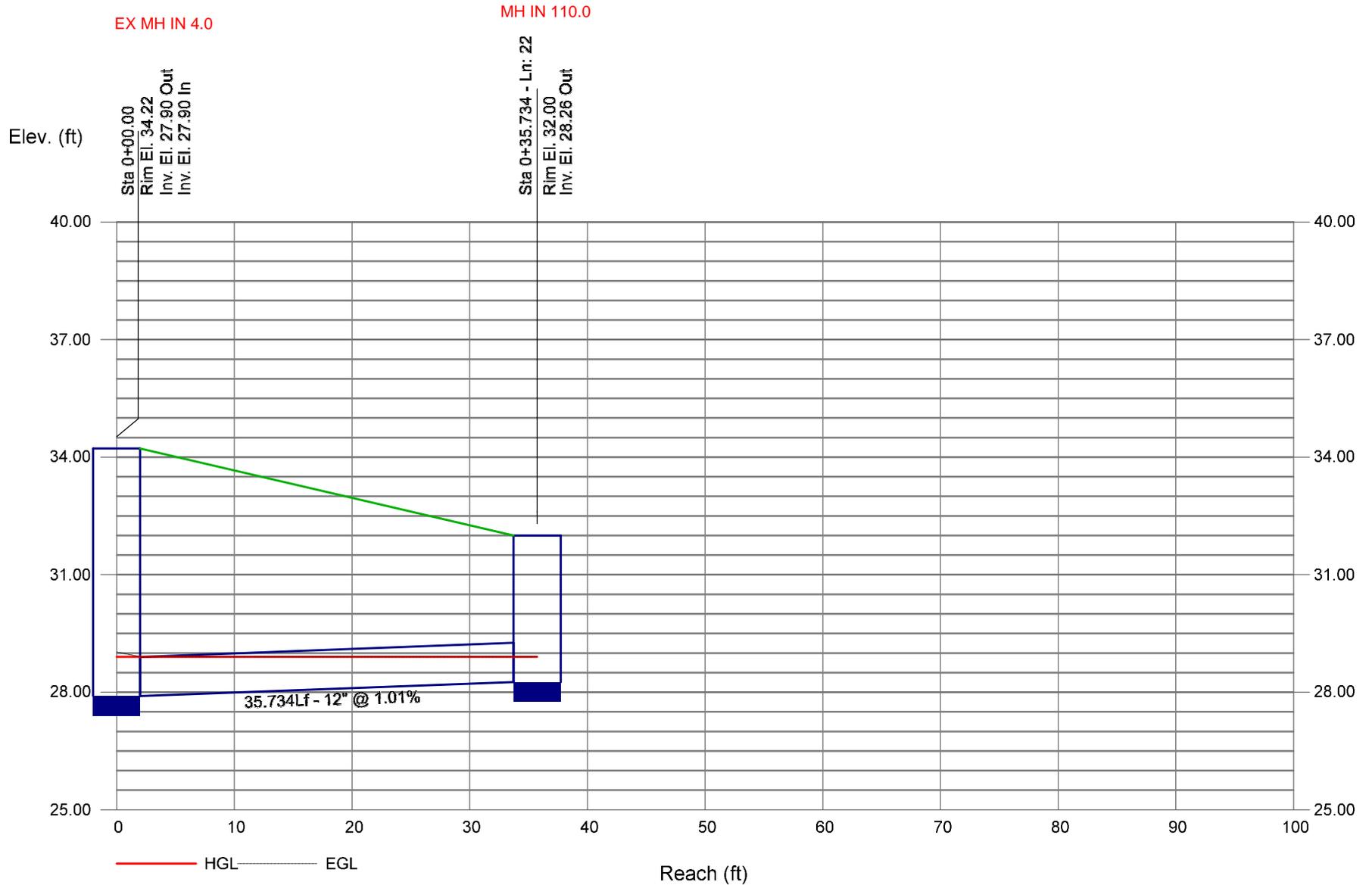
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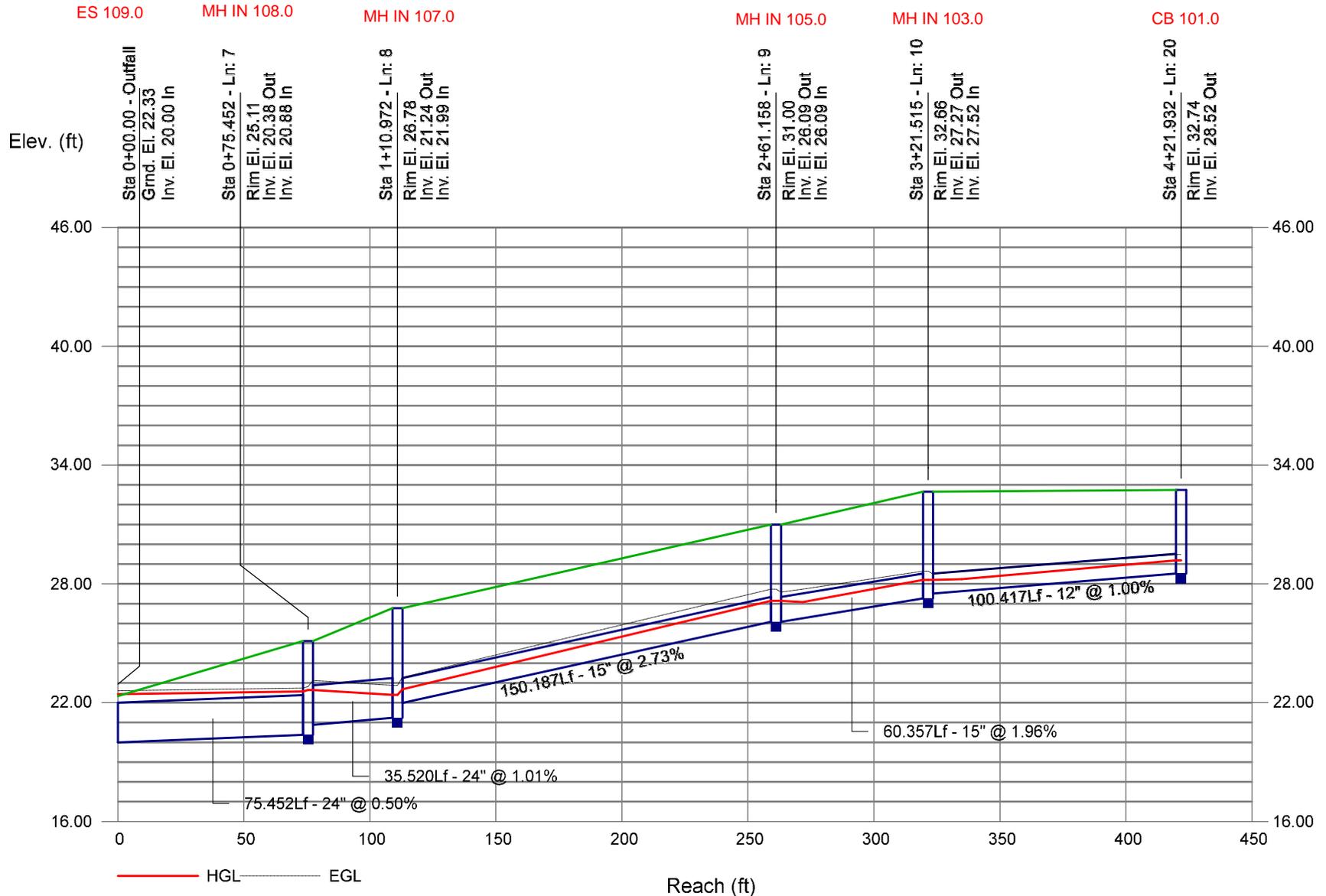
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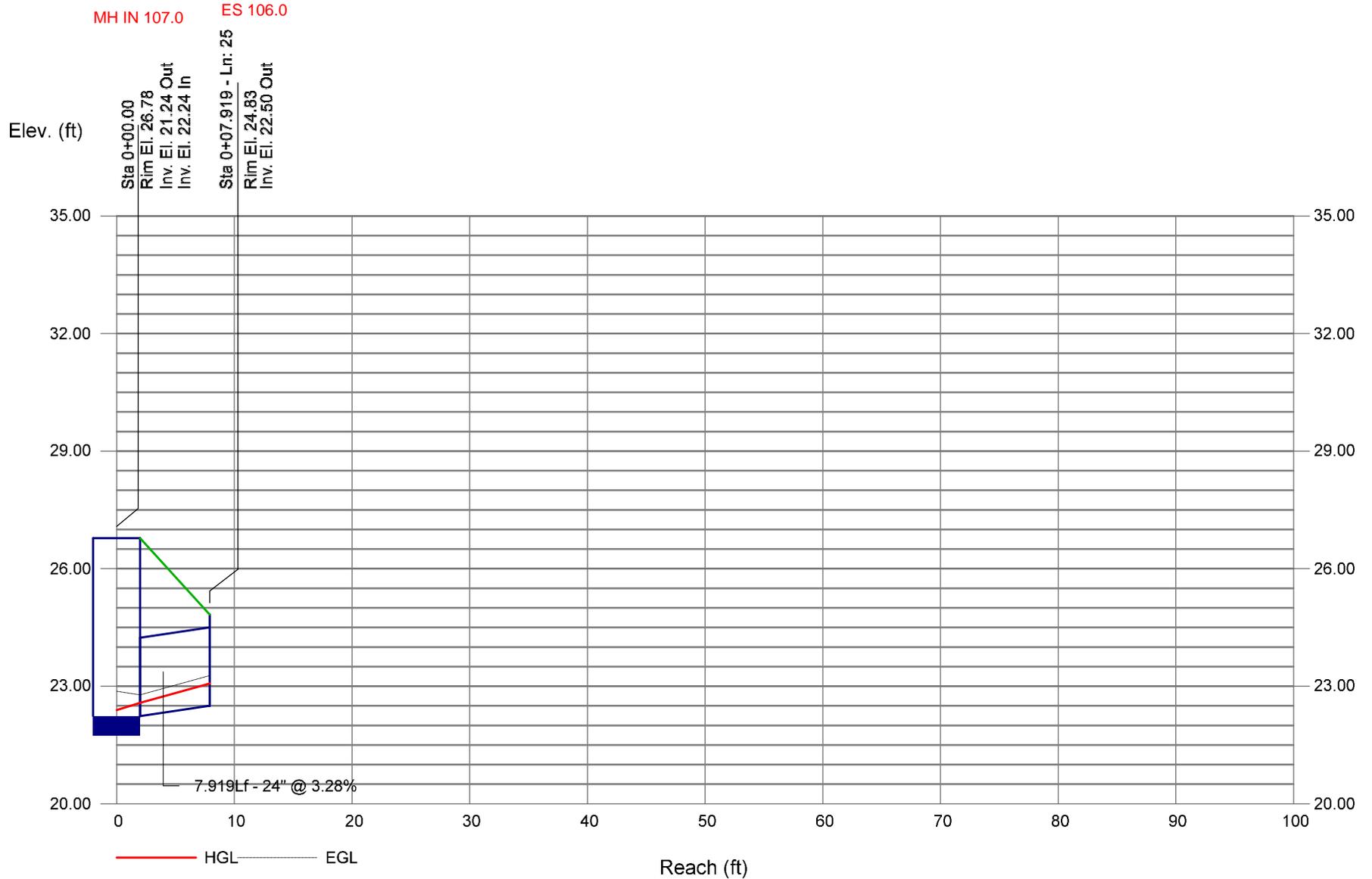
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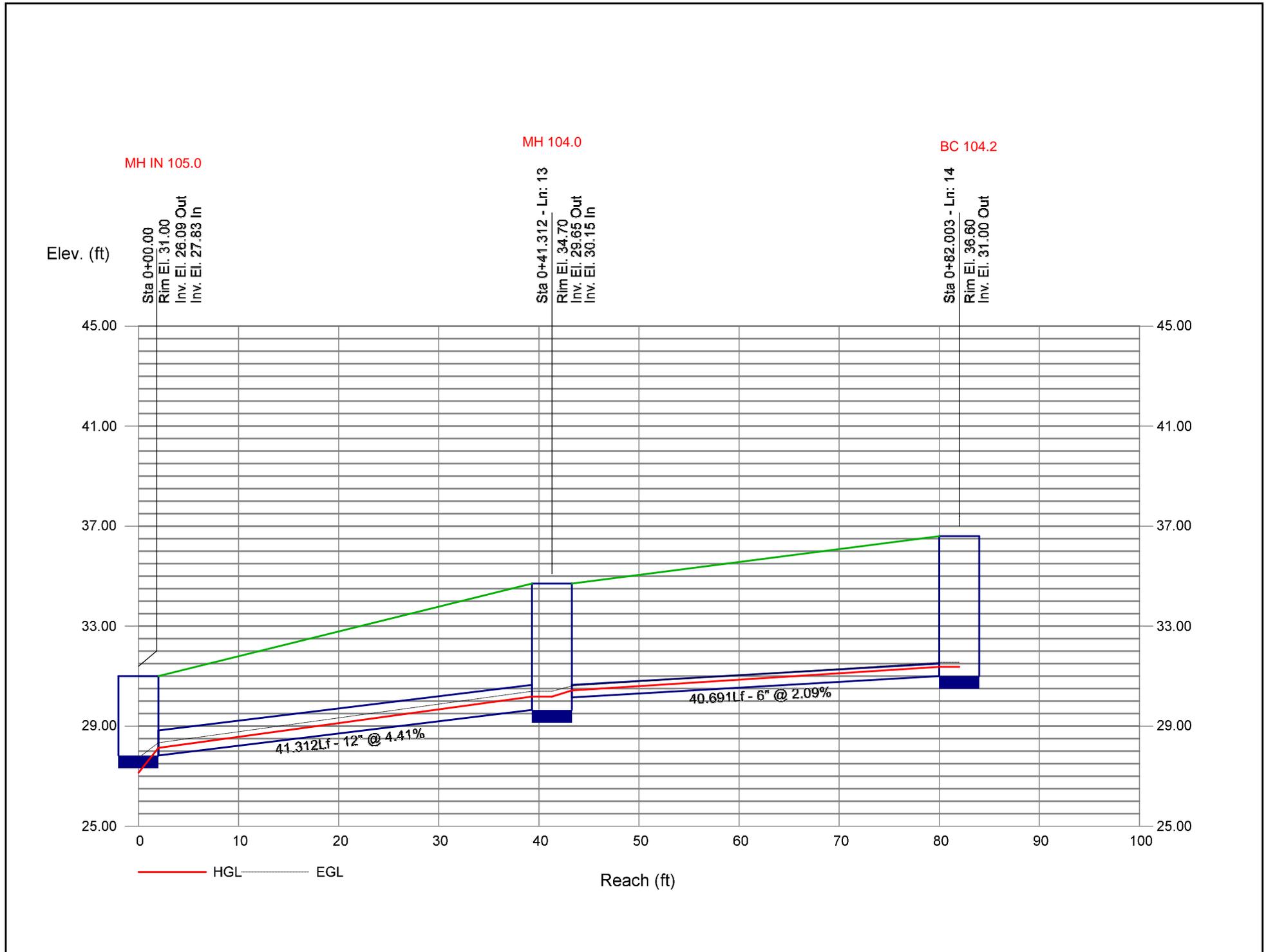
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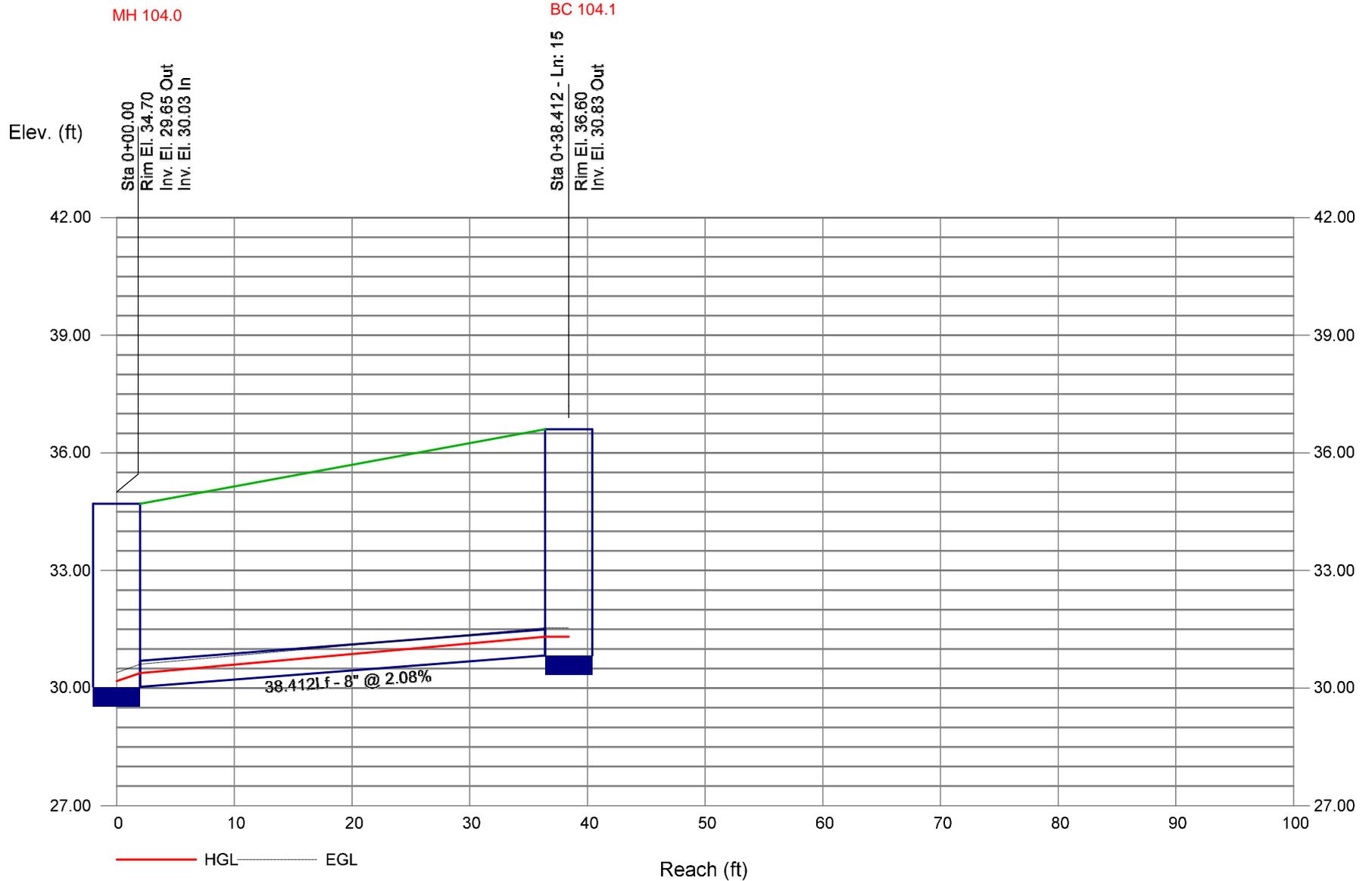
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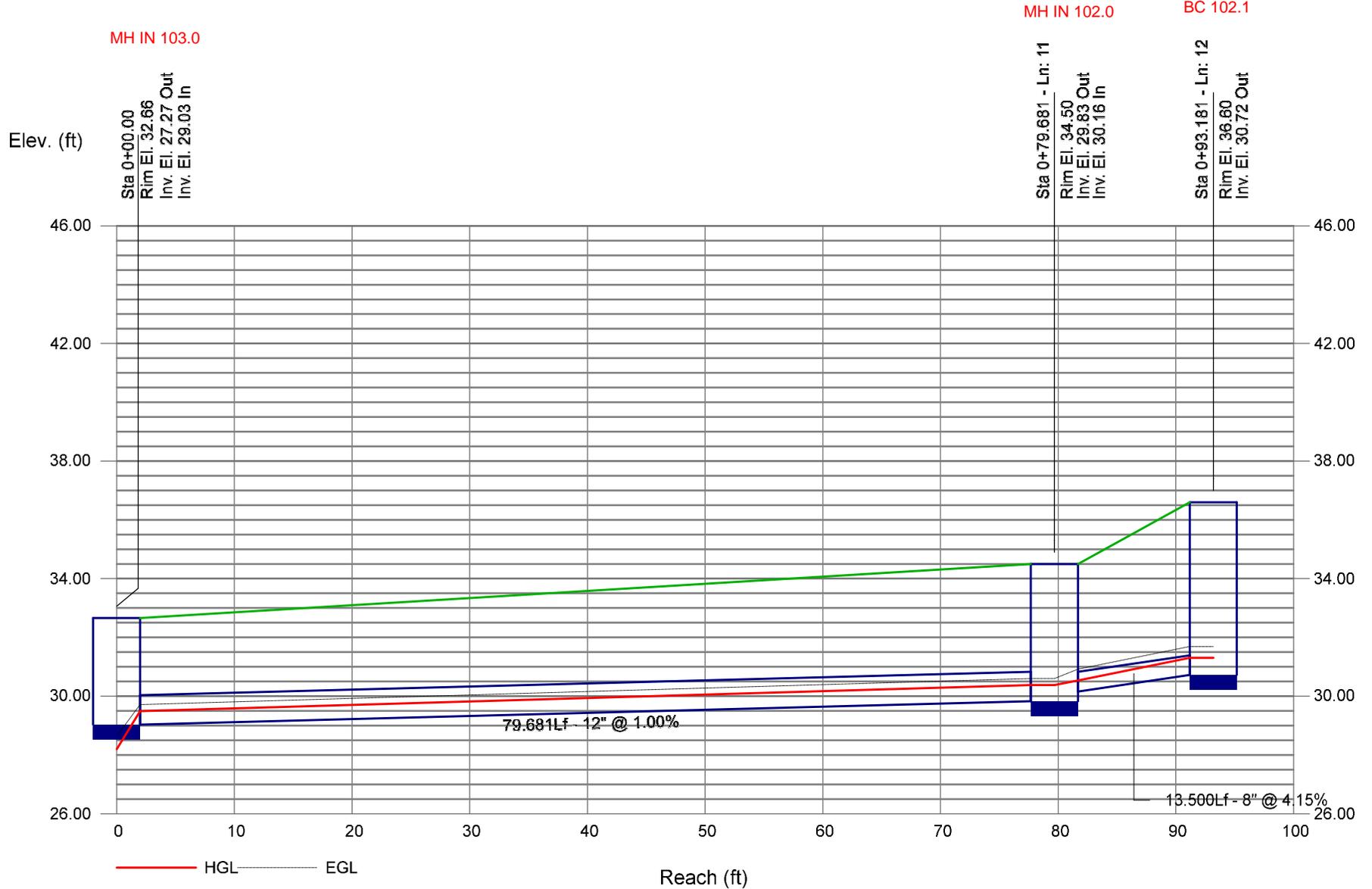
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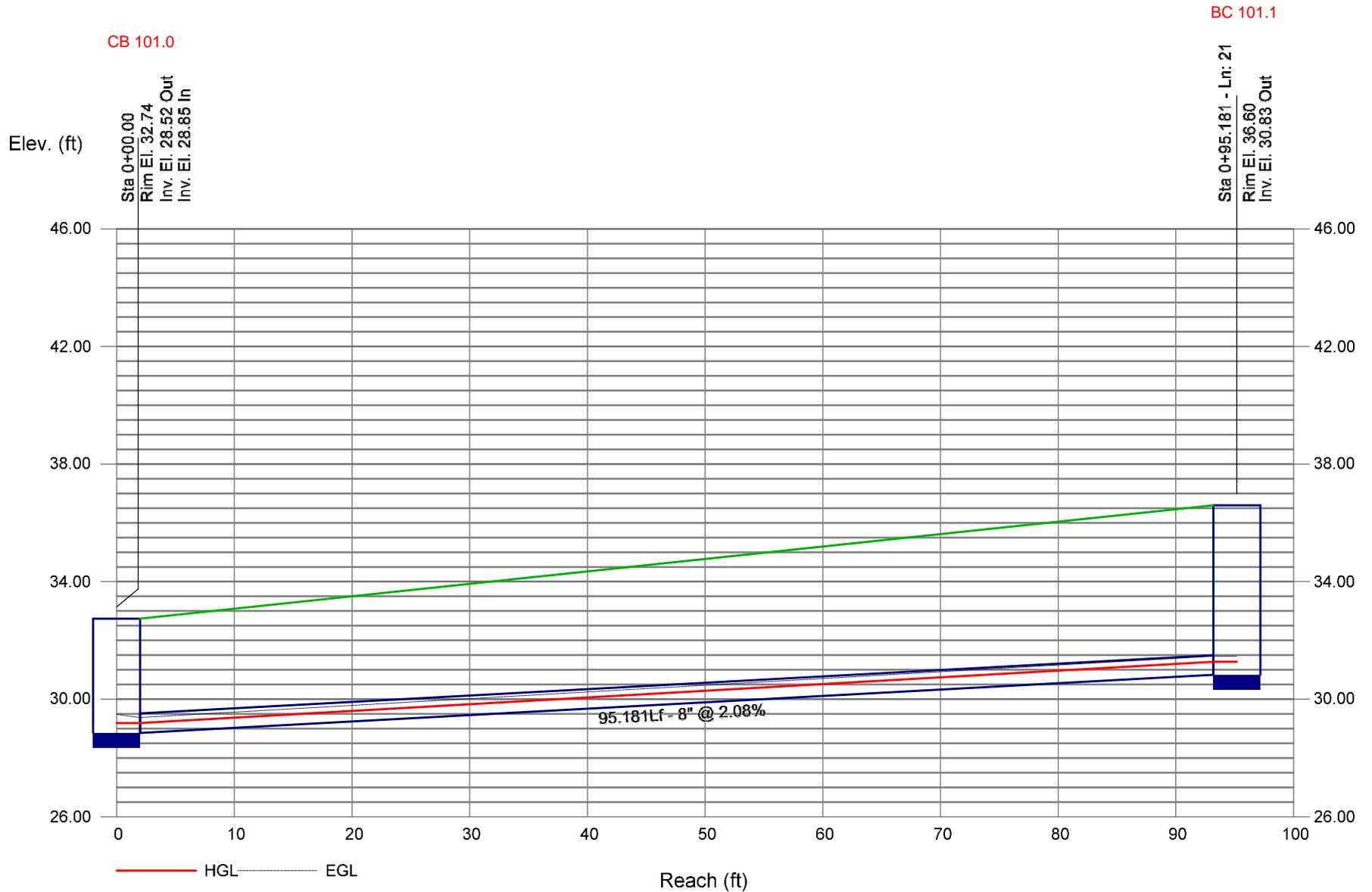
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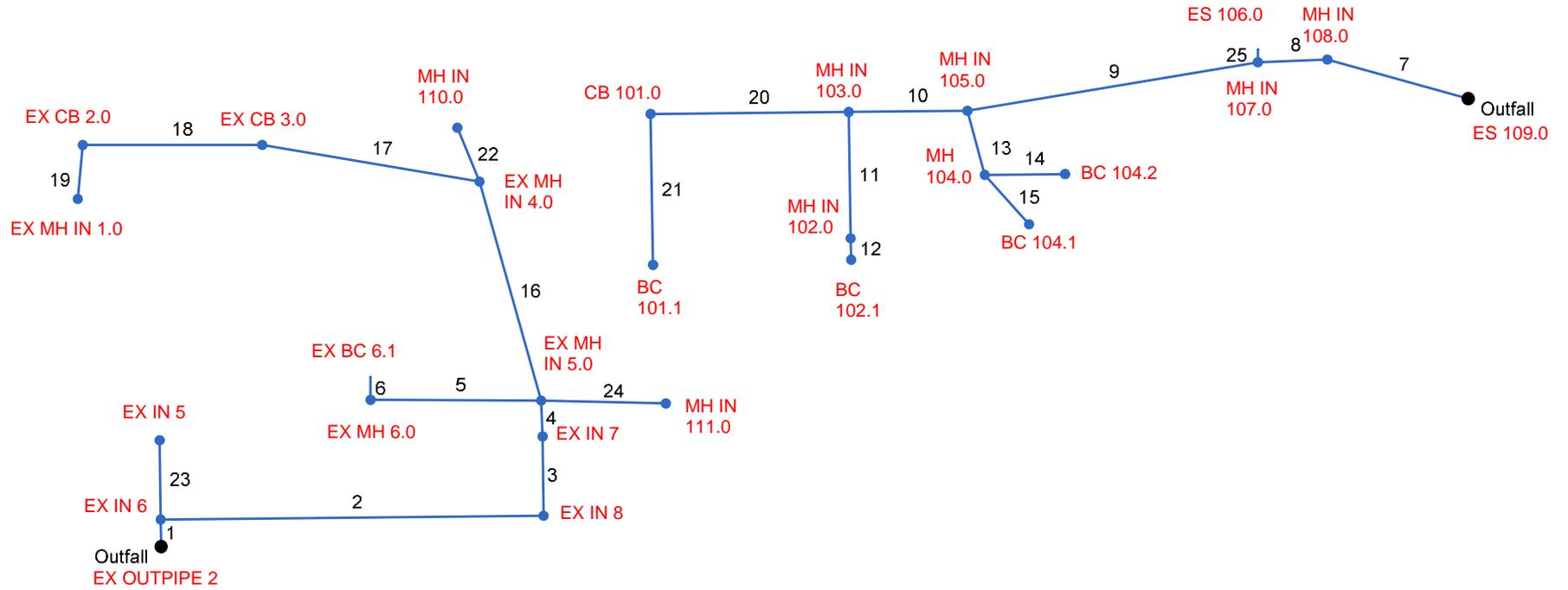
# Storm Sewer Profile



# Storm Sewer Profile



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



# Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data							Line ID	
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)		Inlet/ Rim El (ft)
1	End	17.040	-90.707	MH	2.40	0.00	0.00	0.0	24.00	0.53	24.09	21	Cir	0.012	1.00	30.31	Pipe - (509)
2	1	194.270	90.000	MH	1.30	0.00	0.00	0.0	24.34	0.50	25.31	18	Cir	0.012	1.00	29.70	Pipe - (511)
3	2	50.000	-90.000	MH	2.61	0.00	0.00	0.0	25.56	0.50	25.81	18	Cir	0.012	0.15	29.65	Pipe - (512)
4	3	22.640	-1.391	MH	0.00	0.00	0.00	0.0	26.06	0.53	26.18	15	Cir	0.012	1.00	29.88	Pipe - (513)
5	4	86.269	-87.585	MH	0.00	0.00	0.00	0.0	26.30	2.06	28.08	12	Cir	0.012	1.00	33.08	Pipe - (517)
6	5	14.409	89.683	None	2.93	0.00	0.00	0.0	30.11	3.12	30.56	10	Cir	0.012	1.00	36.60	Pipe - (516)
7	End	75.452	-160.884	MH	0.17	0.00	0.00	0.0	20.00	0.50	20.38	24	Cir	0.012	0.43	25.11	Pipe - (564)
8	7	35.520	-21.888	MH	1.30	0.00	0.00	0.0	20.88	1.01	21.24	24	Cir	0.012	1.00	26.78	Pipe - (563)
9	8	150.187	-9.007	MH	0.03	0.00	0.00	0.0	21.99	2.73	26.09	15	Cir	0.012	1.00	31.00	Pipe - (562)
10	9	60.357	11.072	MH	1.73	0.00	0.00	0.0	26.09	1.96	27.27	15	Cir	0.012	1.00	32.66	Pipe - (561)
11	10	79.681	-90.000	MH	0.07	0.00	0.00	0.0	29.03	1.00	29.83	12	Cir	0.012	0.15	34.50	Pipe - (566)
12	11	13.500	0.000	MH	2.41	0.00	0.00	0.0	30.16	4.15	30.72	8	Cir	0.012	1.00	36.60	Pipe - (565)
13	9	41.312	-90.365	MH	0.00	0.00	0.00	0.0	27.83	4.41	29.65	12	Cir	0.012	0.98	34.70	Pipe - (568)
14	13	40.691	-78.564	MH	0.78	0.00	0.00	0.0	30.15	2.09	31.00	6	Cir	0.012	1.00	36.60	Pipe - (569)
15	13	38.412	-23.564	MH	1.54	0.00	0.00	0.0	30.03	2.08	30.83	8	Cir	0.012	1.00	36.60	Pipe - (567)
16	4	141.640	-10.628	MH	0.00	0.00	0.00	0.0	26.30	1.13	27.90	12	Cir	0.012	0.93	34.22	Pipe - (514)
17	16	112.524	-65.427	MH	1.71	0.00	0.00	0.0	27.91	1.08	29.13	12	Cir	0.012	0.25	32.36	Pipe - (556)
18	17	91.117	-11.884	MH	0.95	0.00	0.00	0.0	29.13	0.23	29.34	12	Cir	0.012	1.00	32.36	Pipe - (515)
19	18	34.089	-85.839	MH	0.26	0.00	0.00	0.0	29.41	1.41	29.89	12	Cir	0.012	1.00	33.09	Pipe - (555)
20	10	100.417	0.000	MH	2.33	0.00	0.00	0.0	27.52	1.00	28.52	12	Cir	0.012	1.00	32.74	Pipe - (560)
21	20	95.181	-90.000	MH	1.28	0.00	0.00	0.0	28.85	2.08	30.83	8	Cir	0.012	1.00	36.60	Pipe - (559)
22	16	35.734	-5.427	MH	0.21	0.00	0.00	0.0	27.90	1.01	28.26	12	Cir	0.012	1.00	32.00	Pipe - (558)
23	1	50.000	0.000	MH	1.81	0.00	0.00	0.0	27.06	0.50	27.31	12	Cir	0.012	1.00	30.31	Pipe - (520)

Project File: 2206.10 Fox Den Apartments II 100-year.stm

Number of lines: 25

Date: 12/23/2025

# Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data							Line ID	
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)		Inlet/ Rim El (ft)
24	4	63.342	93.705	MH	0.07	0.00	0.00	0.0	26.30	1.89	27.50	12	Cir	0.012	1.00	30.50	Pipe - (557)
25	8	7.919	93.301	MH	3.98	0.00	0.00	0.0	22.24	3.28	22.50	24	Cir	0.012	1.00	24.83	Pipe - (570)
Project File: 2206.10 Fox Den Apartments II 100-year.stm												Number of lines: 25			Date: 12/23/2025		

# Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	EX INLET 6	Manhole	30.31	Cir	4.00	4.00	21	Cir	24.09	18 12	Cir Cir	24.34 27.06
2	EX INLET 8	Manhole	29.70	Cir	4.00	4.00	18	Cir	25.31	18	Cir	25.56
3	EX INLET 7	Manhole	29.65	Cir	4.00	4.00	18	Cir	25.81	15	Cir	26.06
4	EX STORM MH IN 5	Manhole	29.88	Cir	4.00	4.00	15	Cir	26.18	12 12 12	Cir Cir Cir	26.30 26.30 26.30
5	EX STORM MH 6	Manhole	33.08	Cir	4.00	4.00	12	Cir	28.08	10	Cir	30.11
6	Null Structure	None	36.60	n/a	n/a	n/a	10	Cir	30.56			
7	MH IN 108.0	Manhole	25.11	Cir	4.00	4.00	24	Cir	20.38	24	Cir	20.88
8	MH IN 107.0	Manhole	26.78	Cir	4.00	4.00	24	Cir	21.24	15 24	Cir Cir	21.99 22.24
9	MH IN 105.0	Manhole	31.00	Cir	4.00	4.00	15	Cir	26.09	15 12	Cir Cir	26.09 27.83
10	PROP MH IN 103.0	Manhole	32.66	Cir	4.00	4.00	15	Cir	27.27	12 12	Cir Cir	29.03 27.52
11	MH IN 102.0	Manhole	34.50	Cir	4.00	4.00	12	Cir	29.83	8	Cir	30.16
12	BC 102.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.72			
13	MH IN 104.0	Manhole	34.70	Cir	4.00	4.00	12	Cir	29.65	6 8	Cir Cir	30.15 30.03
14	BC 104.2	Manhole	36.60	Cir	4.00	4.00	6	Cir	31.00			
15	BC 104.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.83			
16	EX STORM MH IN 4	Manhole	34.22	Cir	4.00	4.00	12	Cir	27.90	12 12	Cir Cir	27.91 27.90
17	EX STORM CB 3	Manhole	32.36	Cir	4.00	4.00	12	Cir	29.13	12	Cir	29.13
18	EX STORM CB 2	Manhole	32.36	Cir	4.00	4.00	12	Cir	29.34	12	Cir	29.41
19	EX STORM CB 1	Manhole	33.09	Cir	4.00	4.00	12	Cir	29.89			

# Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
20	PROP STORM CB 101.0	Manhole	32.74	Cir	4.00	4.00	12	Cir	28.52	8	Cir	28.85
21	BC 101.1	Manhole	36.60	Cir	4.00	4.00	8	Cir	30.83			
22	PROP STORM MH IN 110.0	Manhole	32.00	Cir	4.00	4.00	12	Cir	28.26			
23	EX INLET 5	Manhole	30.31	Cir	4.00	4.00	12	Cir	27.31			
24	PROP STORM MH IN 111.0	Manhole	30.50	Cir	4.00	4.00	12	Cir	27.50			
25	ES 106.0	Manhole	24.83	Cir	0.00	0.00	24	Cir	22.50			

Project File: 2206.10 Fox Den Apartments II 100-year.stm

Number of Structures: 25

Run Date: 12/23/2025

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	21	14.25	24.00	28.64	1.75	2.40	5.93	0.55	29.19	0.690	17.040	24.09	28.76	1.75	2.41	5.92	0.55	29.30	0.690	0.690	0.118	1.00	0.55
2	18	10.04	24.34	29.30	1.50	1.77	5.68	0.50	29.81	0.779	194.270	25.31	30.82	1.50	1.77	5.68	0.50	31.32	0.779	0.779	1.513	1.00	0.50
3	18	8.74	25.56	31.32	1.50	1.77	4.95	0.38	31.70	0.590	50.000	25.81	31.61	1.50	1.77	4.95	0.38	31.99	0.590	0.590	0.295	0.15	0.06
4	15	6.13	26.06	31.67	1.25	1.23	5.00	0.39	32.06	0.768	22.640	26.18	31.85	1.25	1.23	5.00	0.39	32.23	0.768	0.768	0.174	1.00	0.39
5	12	2.93	26.30	32.23	1.00	0.79	3.73	0.22	32.45	0.577	86.269	28.08	32.73	1.00	0.79	3.73	0.22	32.95	0.577	0.577	0.498	1.00	0.22
6	10	2.93	30.11	32.95	0.83	0.55	5.37	0.45	33.40	1.526	14.409	30.56	33.17	0.83	0.55	5.37	0.45	33.62	1.525	1.526	0.220	1.00	0.45
7	24	15.62	20.00	24.49	2.00	3.14	4.97	0.38	24.87	0.407	75.452	20.38	24.80	2.00	3.14	4.97	0.38	25.18	0.406	0.406	0.307	0.43	0.17
8	24	15.45	20.88	24.96	2.00	3.14	4.92	0.38	25.34	0.398	35.520	21.24	25.10	2.00	3.14	4.92	0.38	25.48	0.398	0.398	0.141	1.00	0.38
9	15	10.17	21.99	25.48	1.25	1.23	8.29	1.07	26.55	2.114	150.187	26.09	28.65	1.25	1.23	8.29	1.07	29.72	2.114	2.114	3.175	1.00	1.07
10	15	7.82	26.09	29.72	1.25	1.23	6.37	0.63	30.35	1.250	60.357	27.27	30.48	1.25	1.23	6.37	0.63	31.11	1.250	1.250	0.754	1.00	0.63
11	12	2.48	29.03	31.11	1.00	0.79	3.16	0.16	31.26	0.413	79.681	29.83	31.44	1.00	0.79	3.16	0.16	31.59	0.413	0.413	0.329	0.15	0.02
12	8	2.41	30.16	31.46	0.67	0.35	6.91	0.74	32.20	3.394	13.500	30.72	31.92	0.67	0.35	6.90	0.74	32.66	3.393	3.394	0.458	1.00	0.74
13	12	2.32	27.83	29.72	1.00	0.54	2.95	0.14	29.86	0.362	41.312	29.65	30.30 j	0.65**	0.54	4.28	0.29	30.59	0.629	0.495	n/a	0.98	0.28
14	6	0.78	30.15	30.52	0.37*	0.15	5.05	0.28	30.80	0.000	40.691	31.00	31.44	0.44**	0.18	4.26	0.28	31.72	0.000	0.000	n/a	1.00	0.28
15	8	1.54	30.03	30.49	0.46*	0.26	6.03	0.36	30.84	0.000	38.412	30.83	31.41	0.58**	0.32	4.79	0.36	31.76	0.000	0.000	n/a	1.00	0.36
16	12	3.13	26.30	32.23	1.00	0.79	3.99	0.25	32.48	0.658	141.640	27.90	33.17	1.00	0.79	3.99	0.25	33.41	0.658	0.658	0.933	0.93	0.23
17	12	2.92	27.91	33.40	1.00	0.79	3.72	0.21	33.61	0.573	112.524	29.13	34.04	1.00	0.79	3.72	0.21	34.26	0.573	0.573	0.645	0.25	0.05
18	12	1.21	29.13	34.09	1.00	0.79	1.54	0.04	34.13	0.098	91.117	29.34	34.18	1.00	0.79	1.54	0.04	34.22	0.098	0.098	0.090	1.00	0.04
19	12	0.26	29.41	34.22	1.00	0.79	0.33	0.00	34.22	0.005	34.089	29.89	34.22	1.00	0.79	0.33	0.00	34.22	0.005	0.005	0.002	1.00	0.00
20	12	3.61	27.52	31.11	1.00	0.79	4.60	0.33	31.44	0.876	100.417	28.52	31.99	1.00	0.79	4.60	0.33	32.32	0.876	0.876	0.879	1.00	0.33
21	8	1.28	28.85	32.32	0.67	0.35	3.67	0.21	32.53	0.958	95.181	30.83	33.23	0.67	0.35	3.67	0.21	33.44	0.957	0.957	0.911	1.00	0.21
22	12	0.21	27.90	33.40	1.00	0.79	0.27	0.00	33.40	0.003	35.734	28.26	33.40	1.00	0.79	0.27	0.00	33.40	0.003	0.003	0.001	1.00	0.00

Project File: 2206.10 Fox Den Apartments II 100-year.stm

Number of lines: 25

Run Date: 12/23/2025

Notes: \* depth assumed; \*\* Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
23	12	1.81	27.06	29.30	1.00	0.79	2.30	0.08	29.39	0.220	50.000	27.31	29.41	1.00	0.79	2.30	0.08	29.50	0.220	0.220	0.110	1.00	0.08
24	12	0.07	26.30	32.23	1.00	0.79	0.09	0.00	32.23	0.000	63.342	27.50	32.23	1.00	0.79	0.09	0.00	32.23	0.000	0.000	0.000	1.00	0.00
25	24	3.98	22.24	25.48	2.00	3.14	1.27	0.02	25.50	0.026	7.919	22.50	25.48	2.00	3.14	1.27	0.02	25.51	0.026	0.026	0.002	1.00	0.02

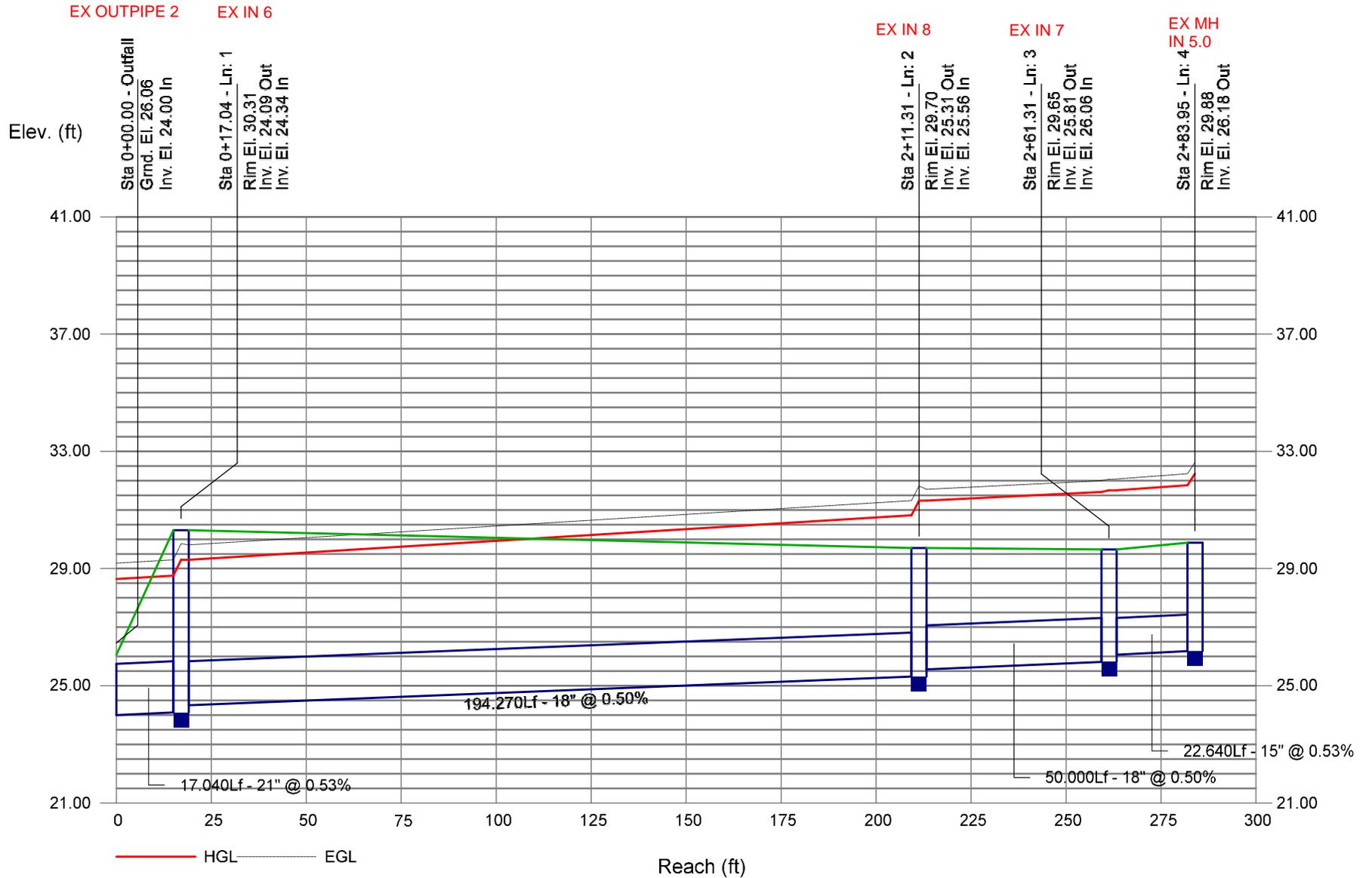
Project File: 2206.10 Fox Den Apartments II 100-year.stm

Number of lines: 25

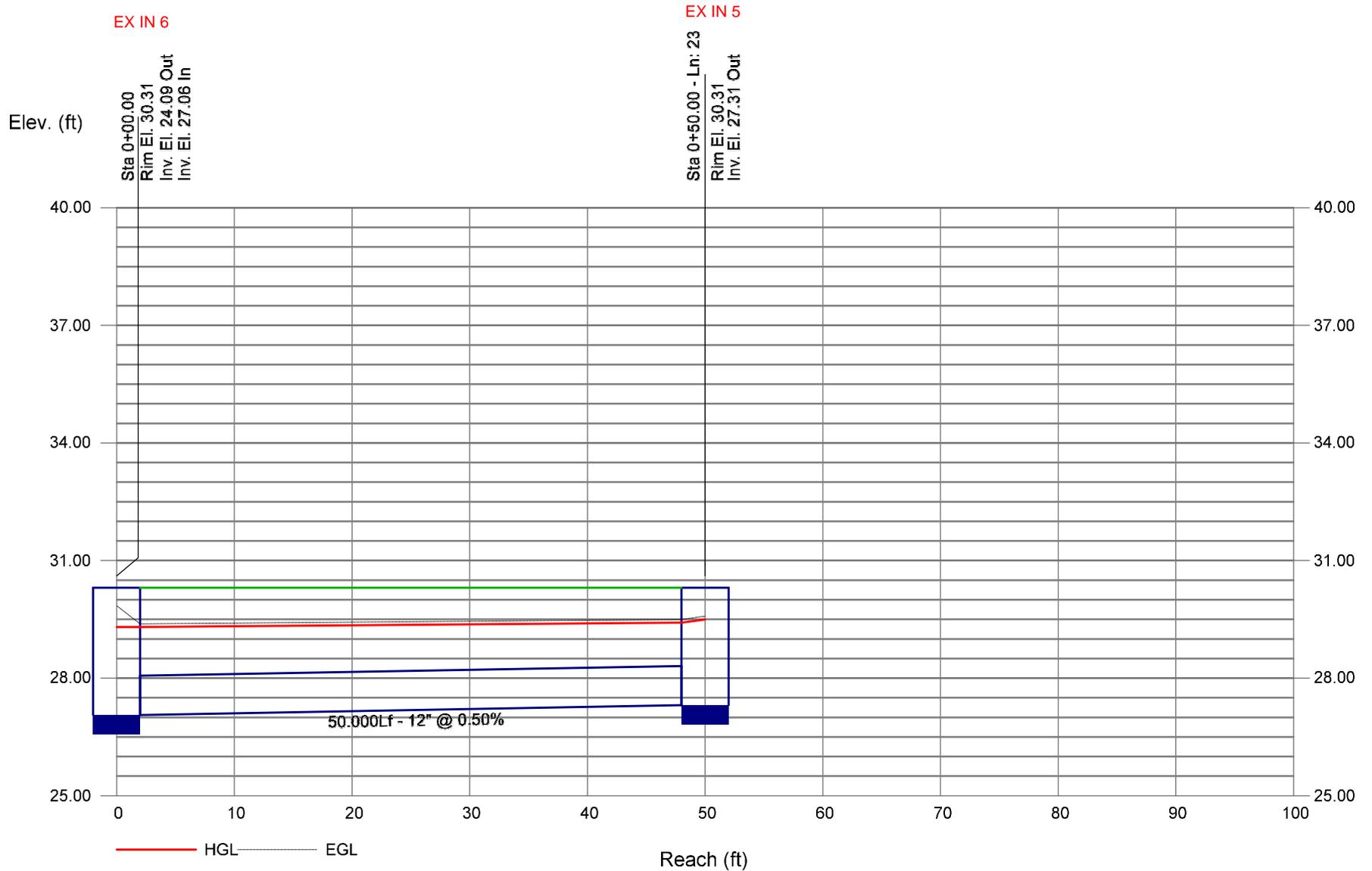
Run Date: 12/23/2025

Notes: \* depth assumed; \*\* Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

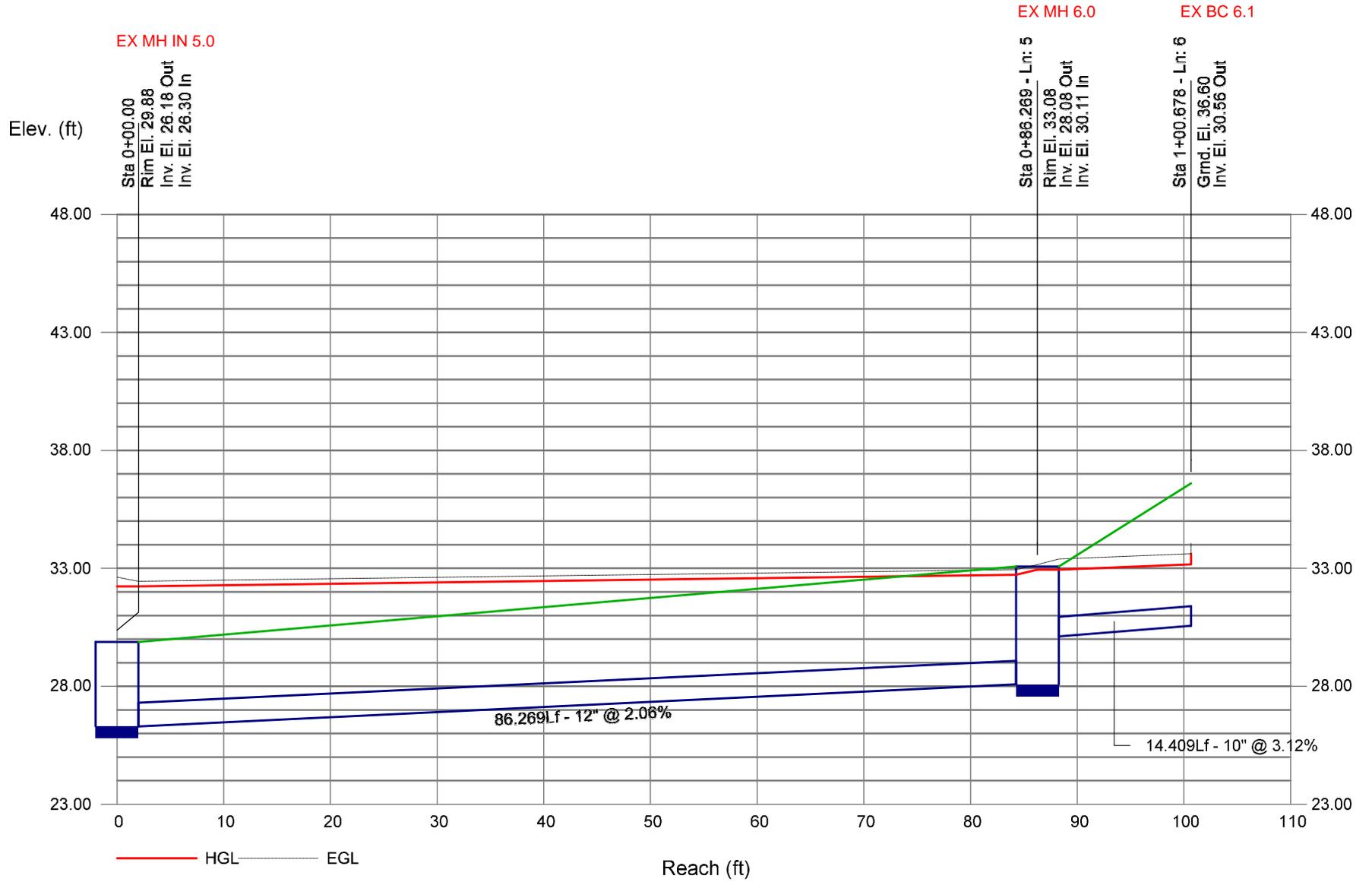
# Storm Sewer Profile



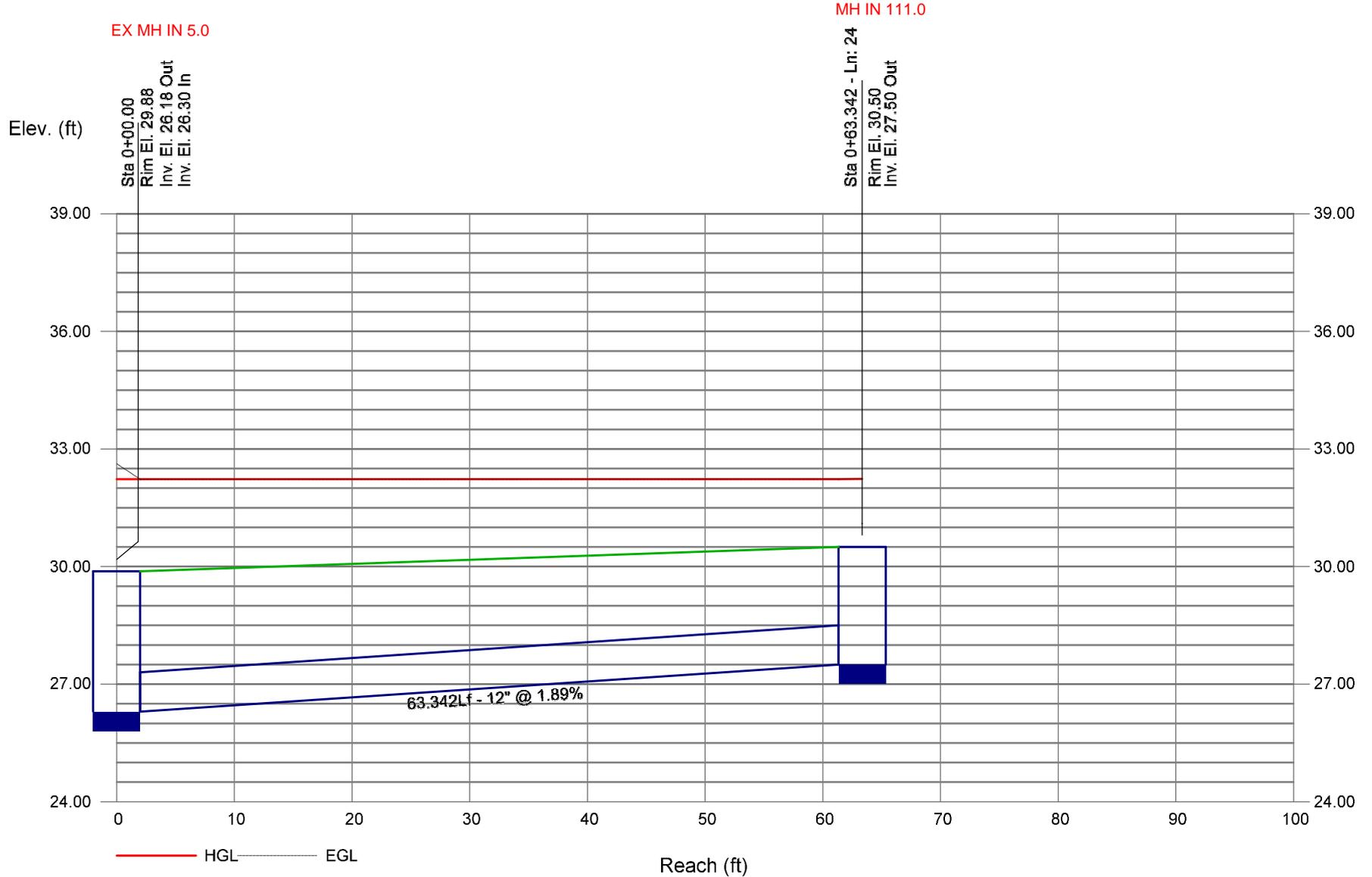
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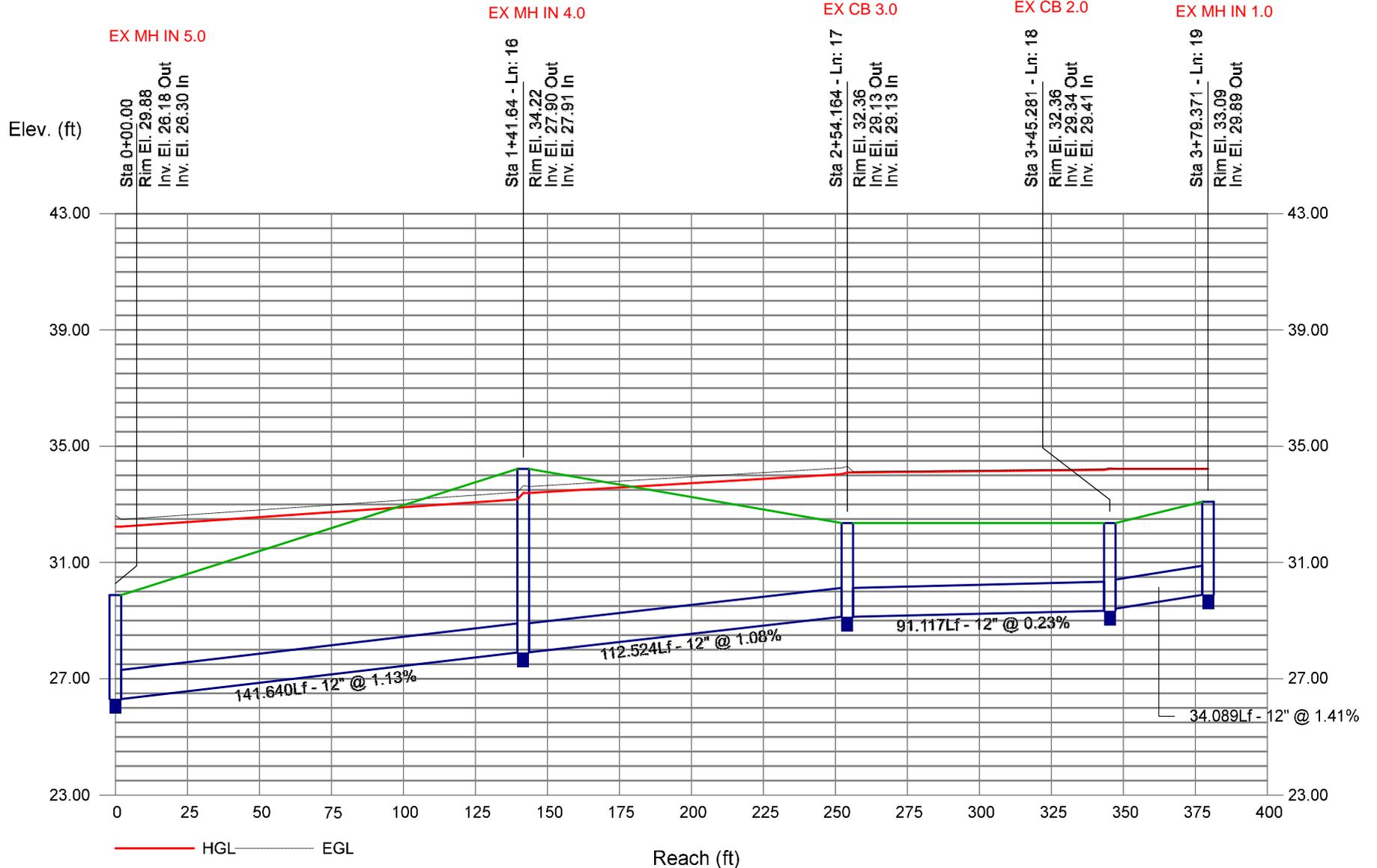
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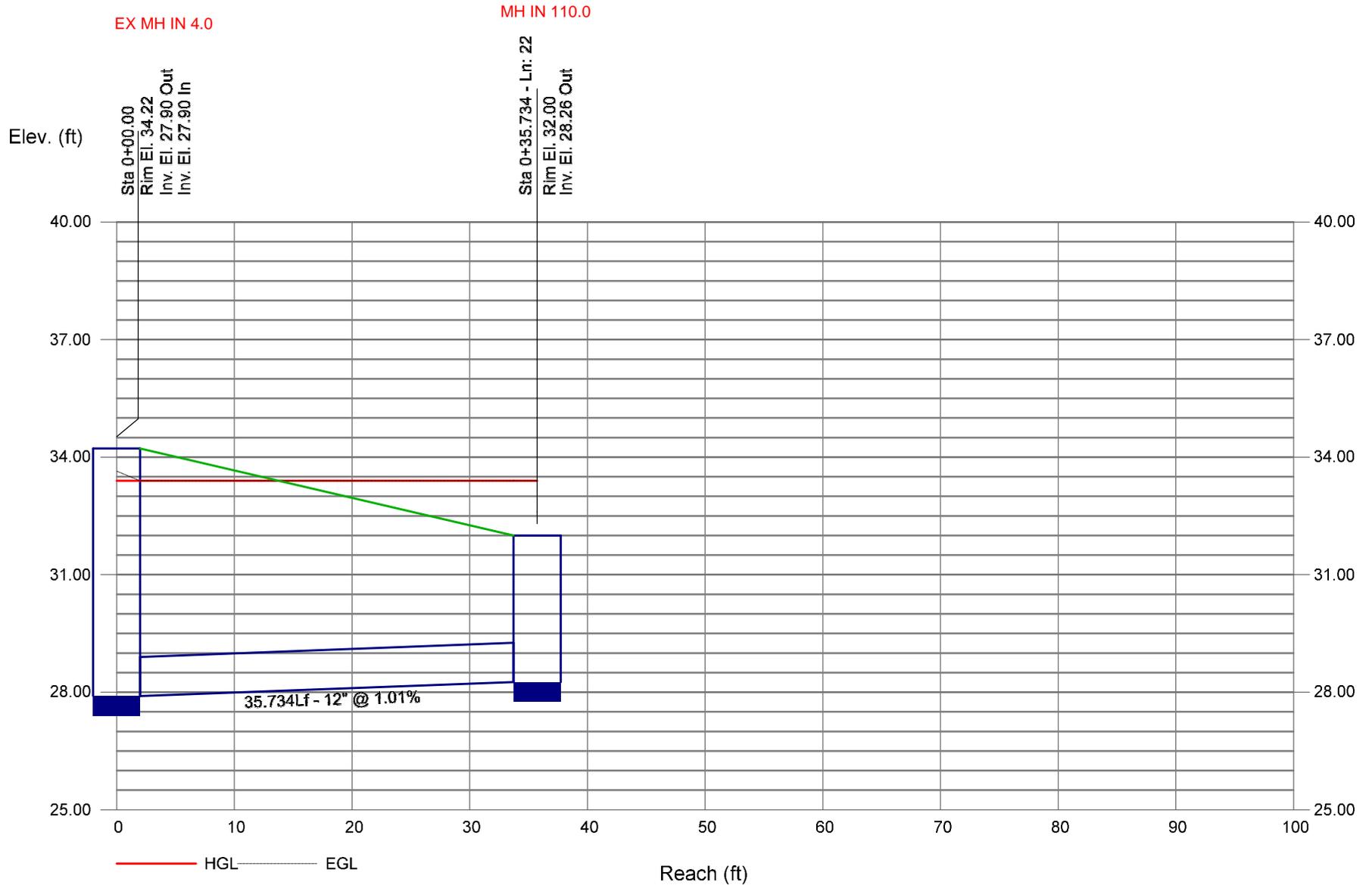
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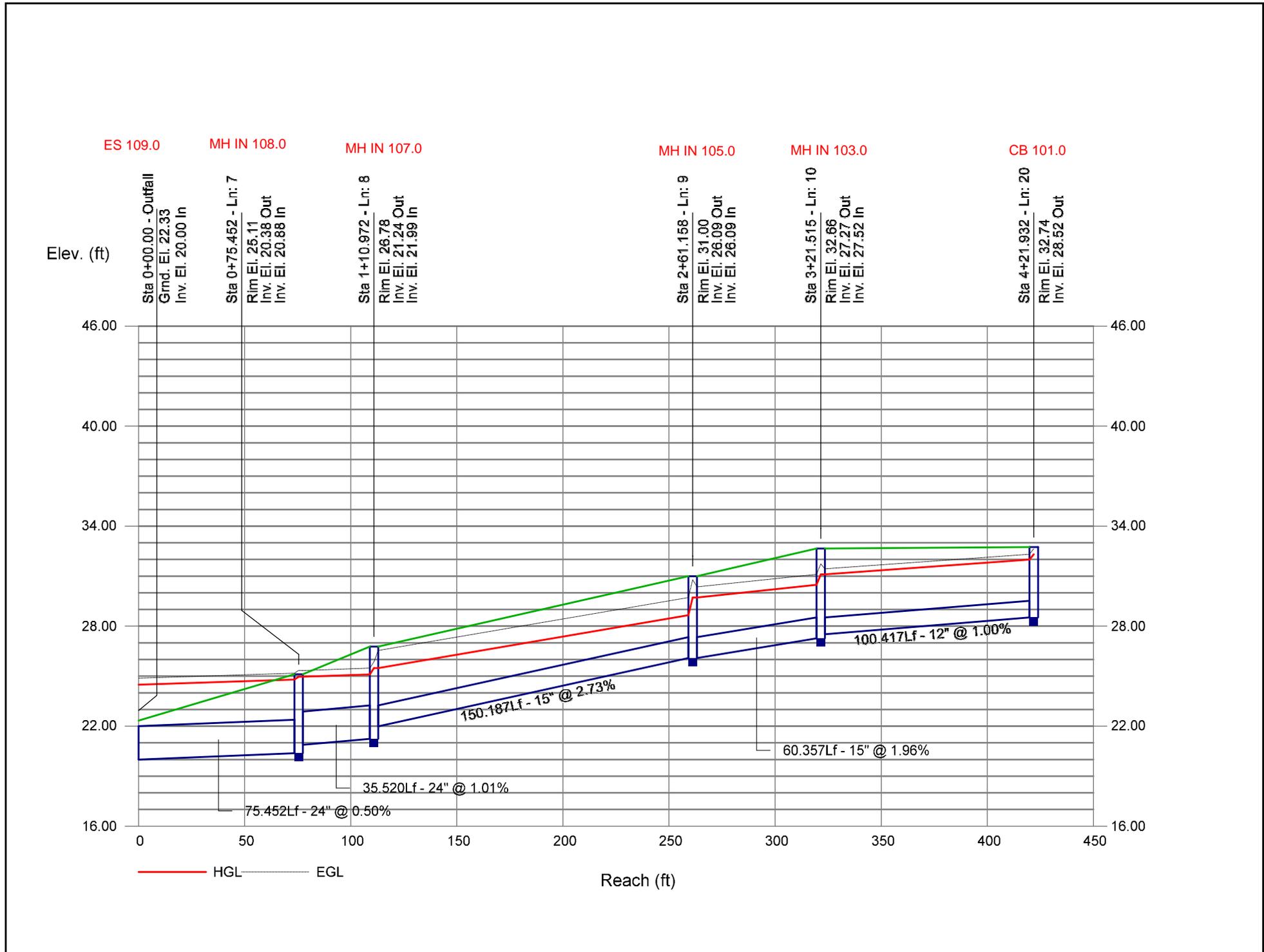
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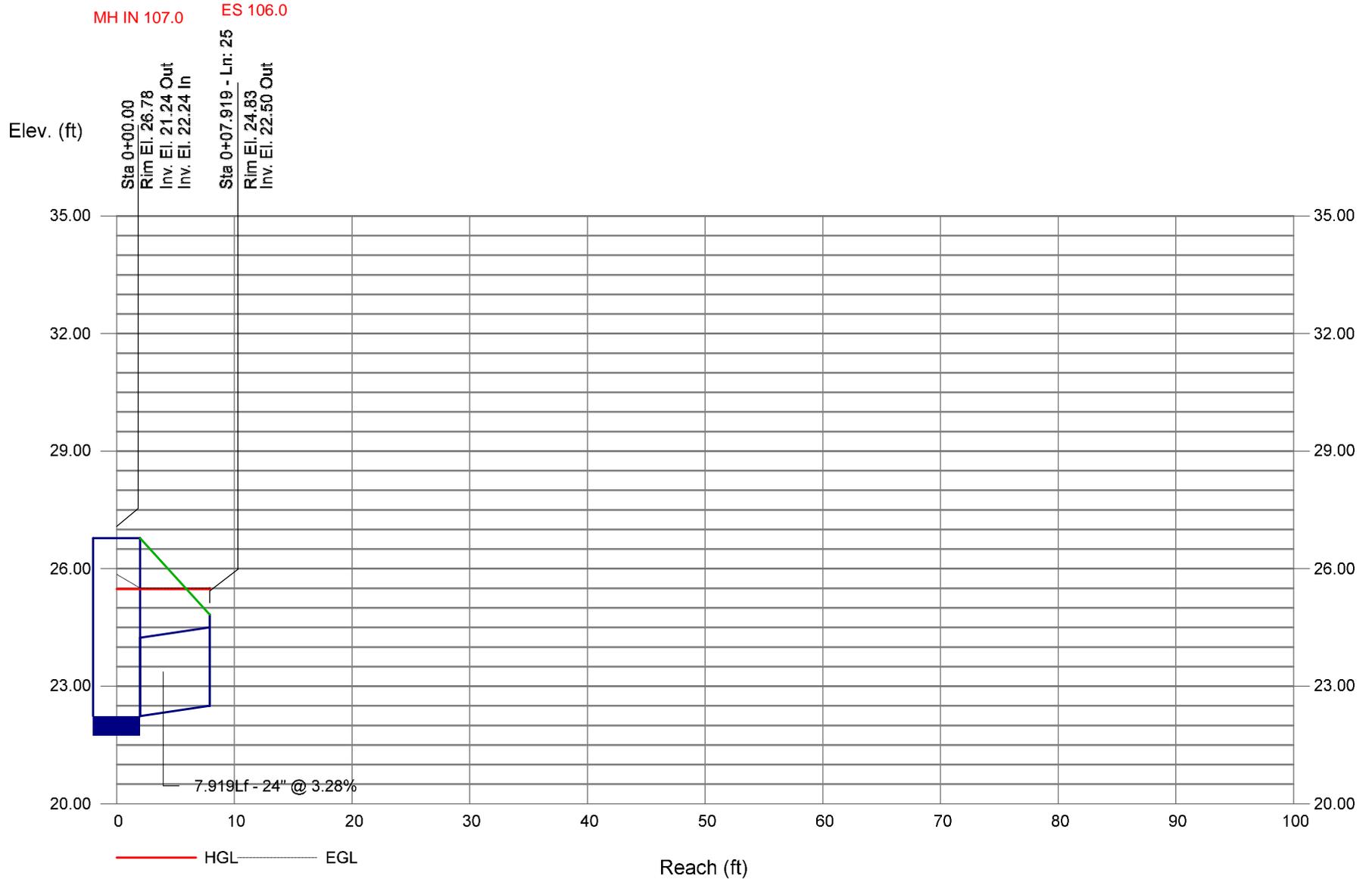
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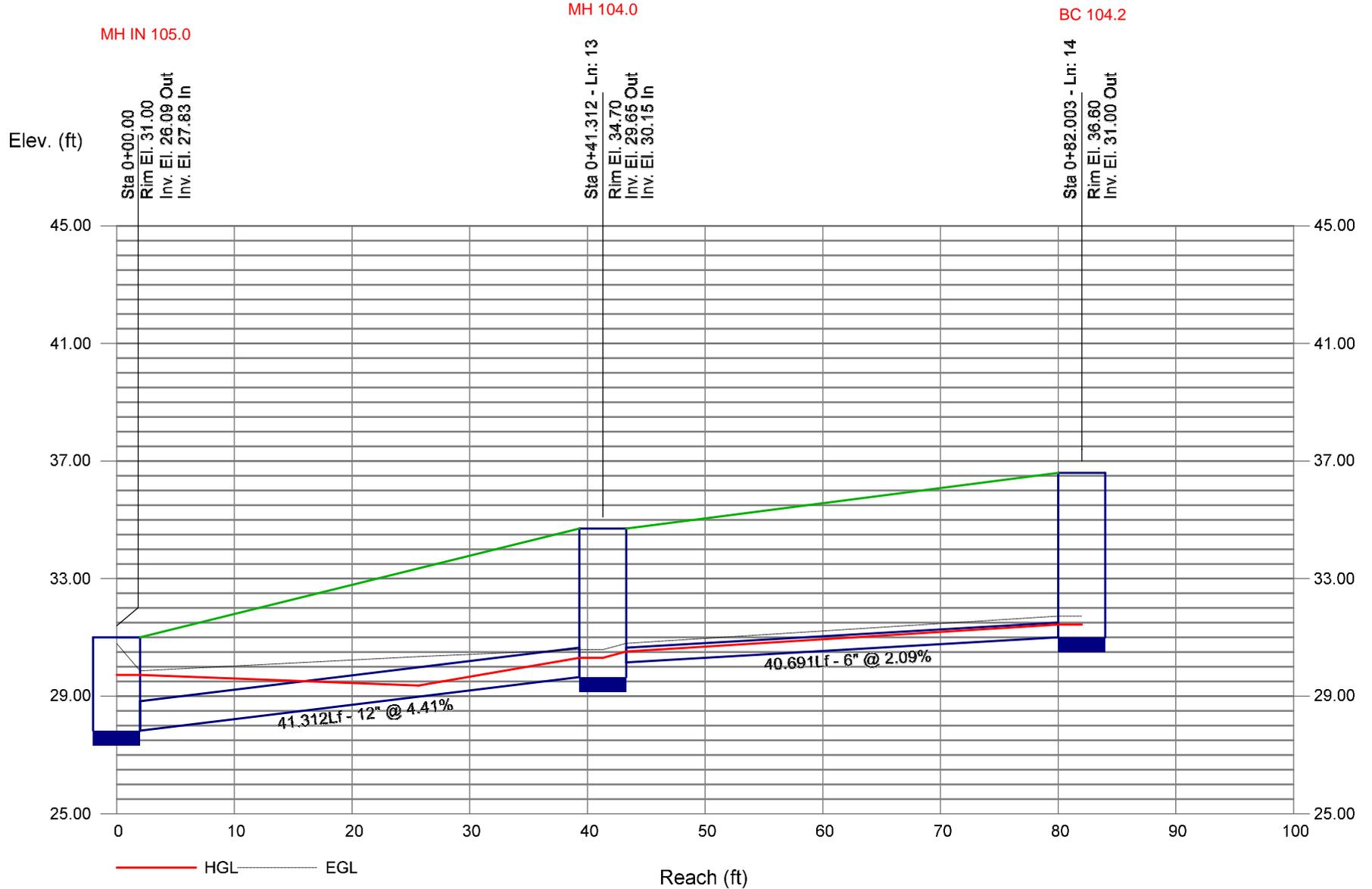
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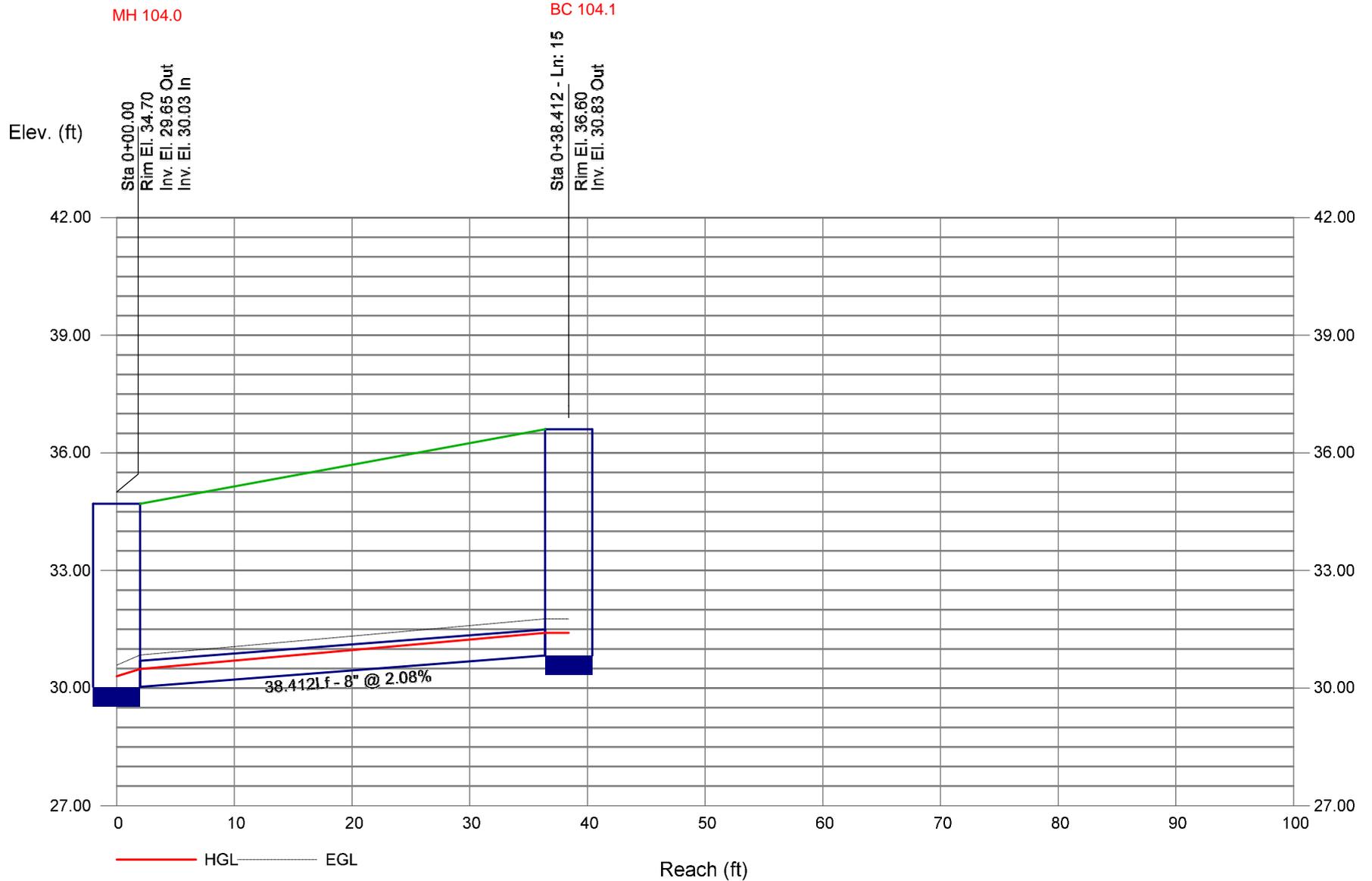
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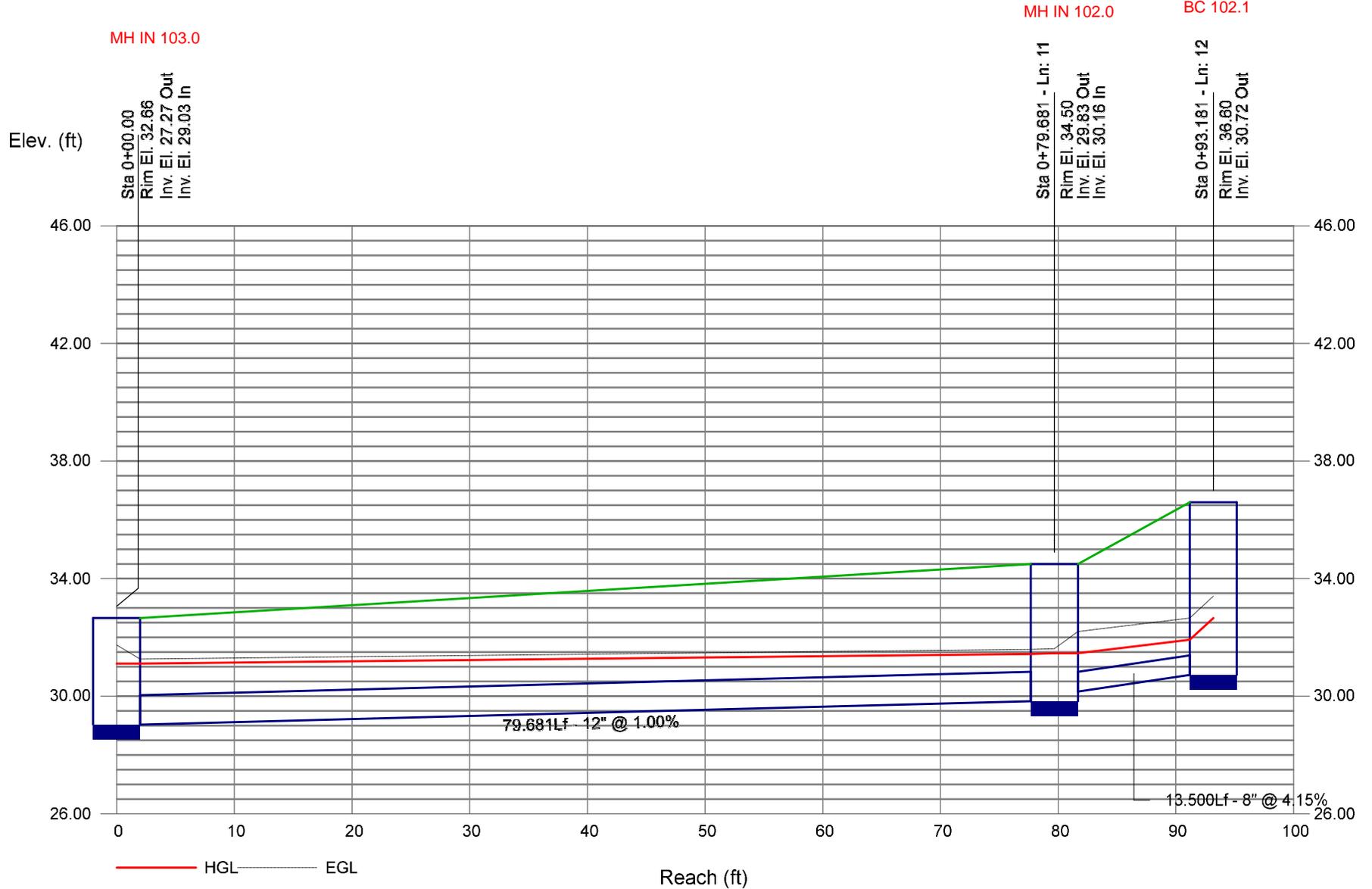
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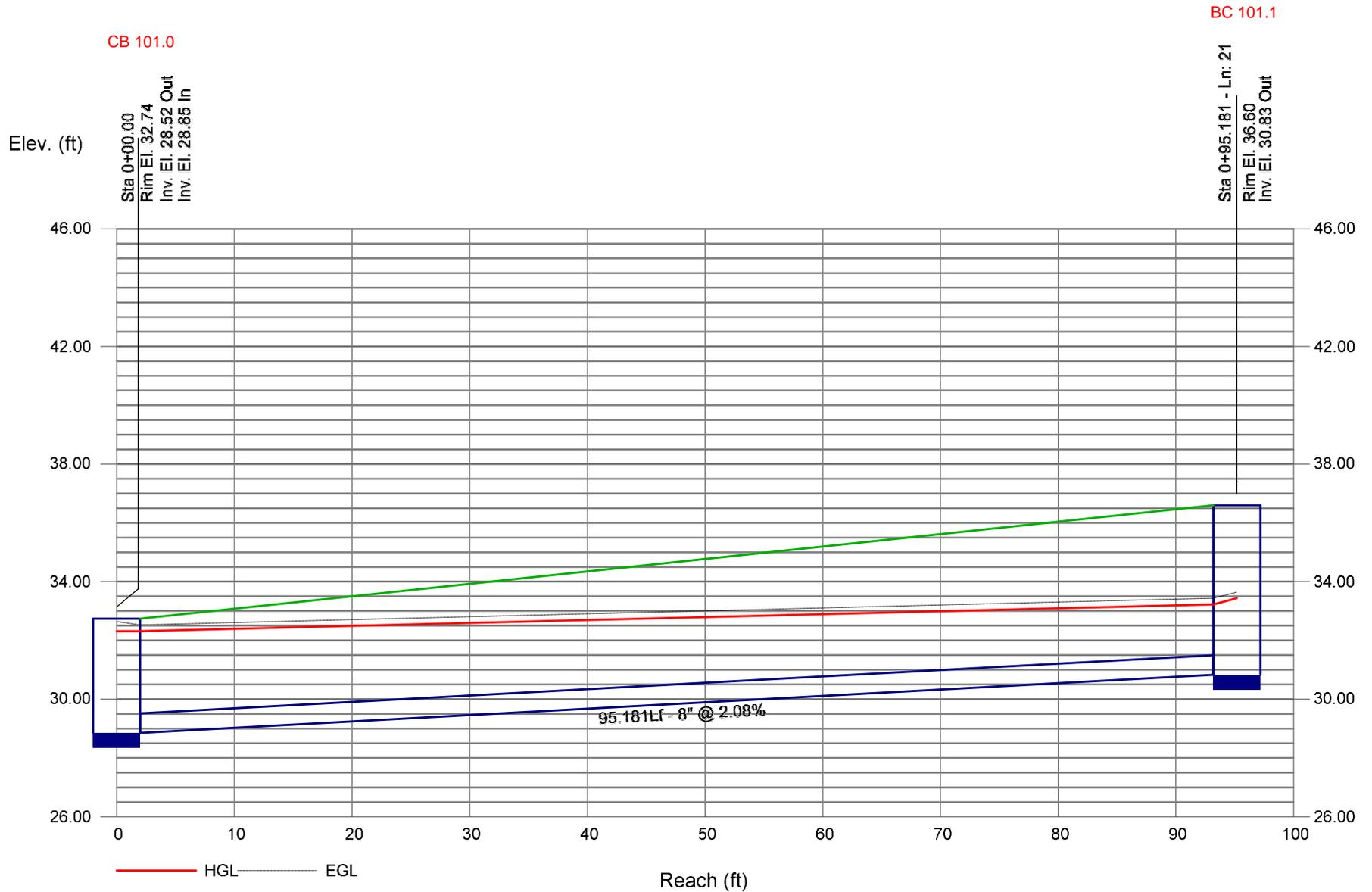
# Storm Sewer Profile



# Storm Sewer Profile

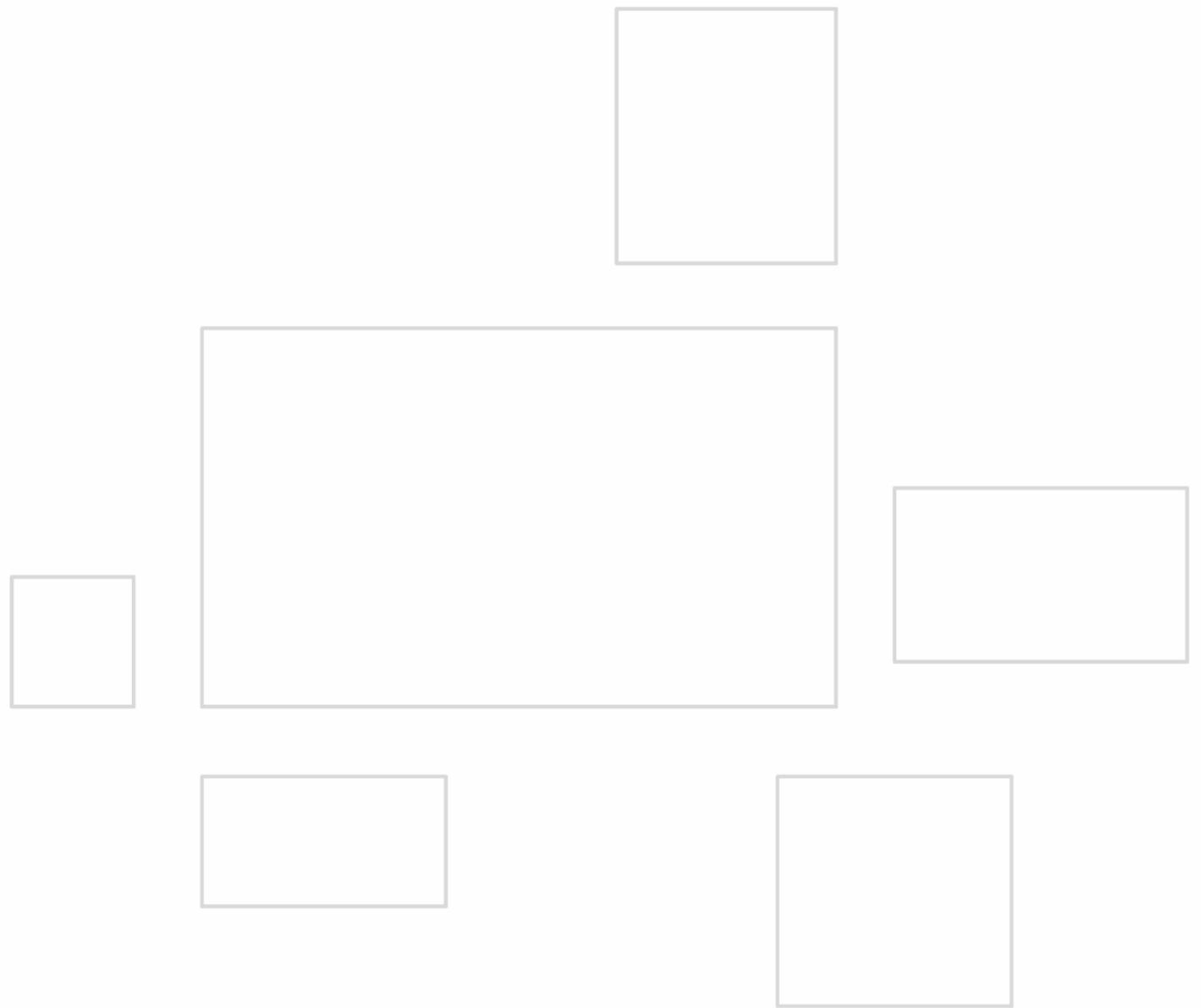


# Storm Sewer Profile



# ATTACHMENT F

## STORM SEWER MANHOLE SIZING

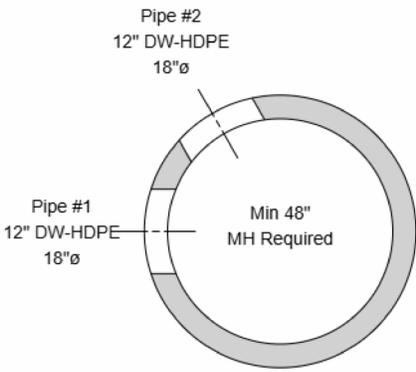
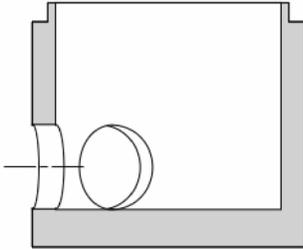


# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="27.91"/>	<input type="text" value="60"/>
Pipe #2	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="27.90"/>	

Plan View	Section View
 <p>Distance Between Openings: 6.7"</p>	

**Manhole Sizing Calculations Are Only Approximate Based On Limited Requirements. Please Contact Our Office For Further Sizing Considerations.**

# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="8"/>	<input type="text" value="PVC"/>	<input type="text" value="30.16"/>	<input type="text" value="180"/>
Pipe #2	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="29.83"/>	

Plan View	Section View
<p>Min 48" MH Required</p> <p>Distance Between Openings: 60.1"</p>	

**Manhole Sizing Calculations Are Only Approximate Based On Limited Requirements. Please Contact Our Office For Further Sizing Considerations.**

# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="29.03"/>	<input type="text" value="90"/>
Pipe #2	<input type="text" value="15"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="27.27"/>	

Plan View	Section View
<p>Pipe #2 15" DW-HDPE 22"ø</p> <p>Pipe #1 12" DW-HDPE 18"ø</p> <p>Min 48" MH Required</p> <p>Distance Between Openings: 22.2"</p>	

**Manhole Sizing Calculations Are Only Approximate Based On Limited Requirements. Please Contact Our Office For Further Sizing Considerations.**

# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="6"/>	<input type="text" value="PVC"/>	<input type="text" value="30.15"/>	<input type="text" value="55"/>
Pipe #2	<input type="text" value="8"/>	<input type="text" value="PVC"/>	<input type="text" value="30.03"/>	

Plan View	Section View
<p>Pipe #2 8" PVC 12"ø</p> <p>Pipe #1 6" PVC 10"ø</p> <p>Min 48" MH Required</p> <p>Distance Between Openings: 11.9"</p>	

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[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="6"/>	<input type="text" value="PVC"/>	<input type="text" value="30.15"/>	<input type="text" value="101"/>
Pipe #2	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="29.65"/>	

Plan View	Section View
<p>Distance Between Openings: 28.2"</p>	

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## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="12"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="27.83"/>	<input type="text" value="89"/>
Pipe #2	<input type="text" value="15"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="26.09"/>	

Plan View	Section View
<p>Distance Between Openings: 21.3"</p>	

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# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

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## Manhole Size Estimator

Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="24"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="22.24"/>	<input type="text" value="90"/>
Pipe #2	<input type="text" value="24"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="21.24"/>	

Plan View	Section View
<p>Pipe #2 24" DW-HDPE 30"ø</p> <p>Pipe #1 24" DW-HDPE 30"ø</p> <p>Min 48" MH Required</p> <p>Distance Between Openings: 7.4"</p>	

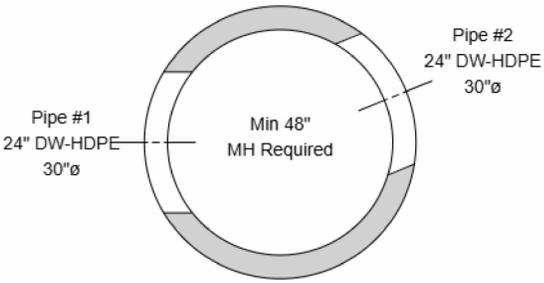
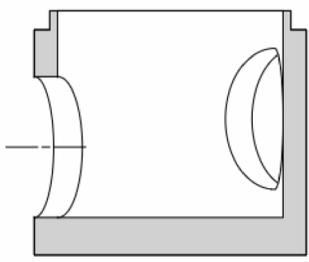
**Manhole Sizing Calculations Are Only Approximate Based On Limited Requirements. Please Contact Our Office For Further Sizing Considerations.**

# Northern Concrete Pipe, Inc. - Durable, Reliable, Infrastructure

[Home](#) / [Manholes](#) / Manhole Sizing

## Manhole Size Estimator

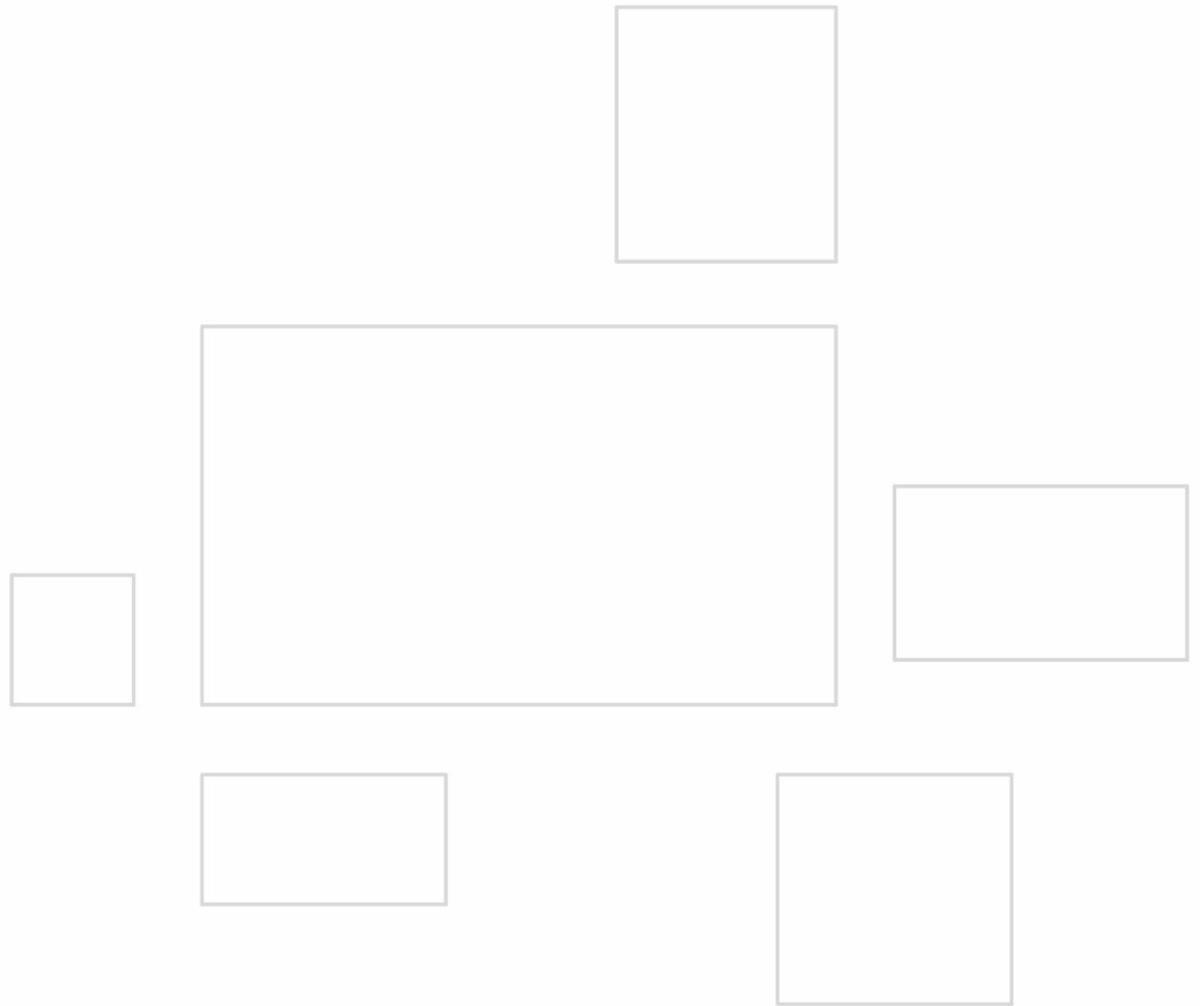
Connections				
	Size	Type	Invert	Angle
Pipe #1	<input type="text" value="24"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="20.38"/>	<input type="text" value="158"/>
Pipe #2	<input type="text" value="24"/>	<input type="text" value="DW-HDPE"/>	<input type="text" value="20.88"/>	

Plan View	Section View
 <p>Distance Between Openings: 34.1"</p>	

**Manhole Sizing Calculations Are Only Approximate Based On Limited Requirements. Please Contact Our Office For Further Sizing Considerations.**

# ATTACHMENT G

## STORM SEWER INLET CALCULATIONS





**Fox Den Apartments 2**



Location  
 Designed By **EJM** Checked By **EJM** Date **12/29/2025** Project # **2206.10**

Inlet No.	Inlet Type	Drainage Area No.	Runoff Coeff. C	Drainage Area A (acres)	Time of Conc. Tc (min)	10 year Intensity I (in/hr)	Area Peak Flow Qp (cfs)	Carryover From Upstream Inlet q (cfs)	Total Flow Q (cfs)	STRAIGHT CROWN SLOPES			FLOW ADJUSTED CALCULATIONS					INLET SIZING CALCULATIONS			Bypass Inlet No.	Comments	
										Cross Slope Sx (ft/ft)	Manning's Roughness Coefficient n	Street Slope S (ft/ft)	Clogging Factor Adj. Flow Qc (cfs)	Width of Spread T (ft)	Flow Depth d (ft)	Ratio of Frontal Flow to Total Gutter Flow Eo	Ratio of Intercepted Frontal Flow to Total Frontal Flow	Ratio of Intercepted Side Flow to Total Side Flow	Inlet Efficiency E	Flow Intercepted Qi (cfs)			Inlet Bypass q (cfs)
1	2	3	4	5	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
MH IN 107.0	R-3067-R	MH IN 107.0	0.71	0.17	5 min	7.22	0.87		0.87	0.020	0.016	0.0450	0.87	5.16	0.10	0.60	1.00	0.17	0.67	0.58	0.29	MH IN 108.0	
MH IN 108.0	R-3067-R	MH IN 108.0	0.70	0.02	5 min	7.22	0.11	0.29	0.40	0.020	0.016	0.0500	0.40	3.79	0.08	0.74	1.00	0.21	0.79	0.32	0.08		

Inlet Information						
Inlet Type	Inlet Length L (ft)	Width of Inlet and Depression (ft)	Type of Grate (1-7)	Splash-Over Velocity (ft/s)	Inlet Clogging Factor (%)	Comments
R-3067-R	3	1.50	3	7.6	100	

**Calculations and Equations are Based On:**  
 Drainage of Highway Pavements, HEC No. 22  
 By: Frank L. Johnson and Fred F.M. Chang  
 Prepared for: Federal Highway Administration  
 Report Date: June 2013

MAXIMUM WIDTH OF SPREAD (T)		
LOCATION	WIDTH	DESCRIPTION



**Fox Den Apartments 2**

Location  
 Designed By **EJM** Checked By **EJM** Date **12/29/2025** Project # **2206.10**



Inlet No.	Inlet Type	Drainage Area No.	Runoff Coeff. C	Drainage Area A (acres)	Time of Conc. Tc (min)	100 year Intensity I (in/hr)	Area Peak Flow Qp (cfs)	Carryover From Upstream Inlet q (cfs)	Total Flow Q (cfs)	STRAIGHT CROWN SLOPES			FLOW ADJUSTED CALCULATIONS					INLET SIZING CALCULATIONS			Bypass Inlet No.	Comments	
										Cross Slope Sx (ft/ft)	Manning's Roughness Coefficient n	Street Slope S (ft/ft)	Clogging Factor Adj. Flow Qc (cfs)	Width of Spread T (ft)	Flow Depth d (ft)	Ratio of Frontal Flow to Total Gutter Flow Eo	Ratio of Intercepted Frontal Flow to Total Frontal Flow	Ratio of Intercepted Side Flow to Total Side Flow	Inlet Efficiency E	Flow Intercepted Qi (cfs)			Inlet Bypass q (cfs)
1	2	3	4	5	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
MH IN 107.0	R-3067-R	MH IN 107.0	0.71	0.17	5 min	10.75	1.30		1.30	0.020	0.016	0.0450	1.30	5.99	0.12	0.54	1.00	0.14	0.60	0.78	0.51	MH IN 108.0	
MH IN 108.0	R-3067-R	MH IN 108.0	0.70	0.02	5 min	10.75	0.17	0.51	0.68	0.020	0.016	0.0500	0.68	4.62	0.09	0.65	1.00	0.17	0.71	0.48	0.20		

Inlet Information						
Inlet Type	Inlet Length L (ft)	Width of Inlet and Depression (ft)	Type of Grate (1-7)	Splash-Over Velocity (ft/s)	Inlet Clogging Factor (%)	Comments
R-3067-R	3	1.50	3	7.6	100	

**Calculations and Equations are Based On:**  
 Drainage of Highway Pavements, HEC No. 22  
 By: Frank L. Johnson and Fred F.M. Chang  
 Prepared for: Federal Highway Administration  
 Report Date: June 2013

MAXIMUM WIDTH OF SPREAD (T)		
LOCATION	WIDTH	DESCRIPTION

# INLET CAPACITY - SUMP CONDITION

## FOR

# FOX DEN APARTMENTS 2



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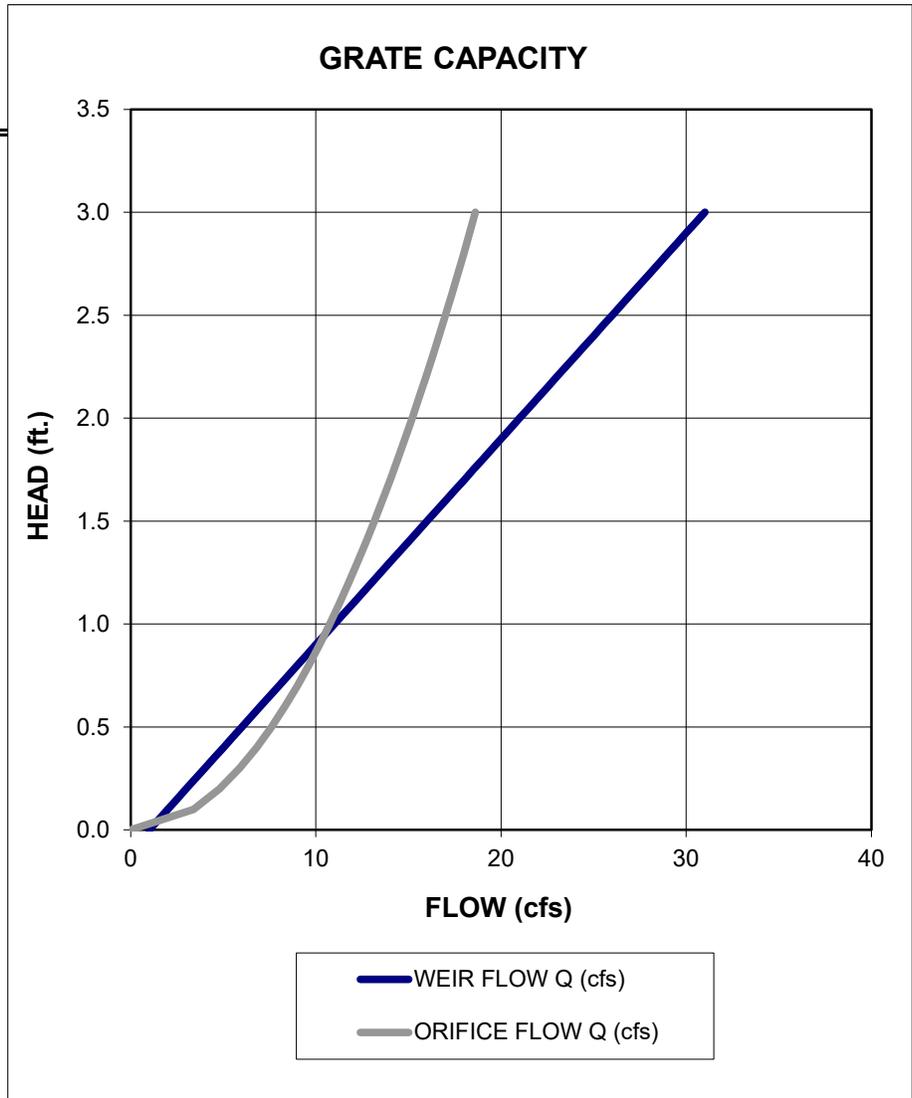
DESIGN BY: EJM

PROJECT NUMBER: 2206.10

DATE: 12/29/2025

NEENAH GRATE NUMBER: **R-3067-R**  
 INLET LENGTH OR PERIMETER: **5.8 ft.**  
 GRATE OPEN END AREA: **2.0 sf.**

HEAD H (ft.)	WEIR FLOW Q (cfs)	ORIFICE FLOW Q (cfs)
0.0	0.00	0.00
0.1	0.61	3.40
0.2	1.73	4.81
0.3	3.17	5.89
0.4	4.89	6.80
0.5	6.83	7.60
0.6	8.98	8.32
0.7	11.31	8.99
0.8	13.82	9.61
0.9	16.49	10.20
1.0	19.31	10.75
1.1	22.28	11.27
1.2	25.39	11.77
1.3	28.63	12.25
1.4	31.99	12.72
1.5	35.48	13.16
1.6	39.09	13.59
1.7	42.81	14.01
1.8	46.64	14.42
1.9	50.58	14.81
2.0	54.63	15.20
2.1	58.78	15.57
2.2	63.02	15.94
2.3	67.37	16.30
2.4	71.81	16.65
2.5	76.35	16.99
2.6	80.97	17.33
2.7	85.69	17.66
2.8	90.49	17.98
2.9	95.38	18.30
3.0	100.36	18.61



Weir flow controls until a head of 0.556 feet is reached, where orifice flow takes over and controls. The flow at this transition is less efficient than what is indicated by either the weir or orifice flow equations. A flow of 20% less than the equated flow is a conservative estimate.

# INLET CAPACITY - SUMP CONDITION

## FOR

# FOX DEN APARTMENTS 2



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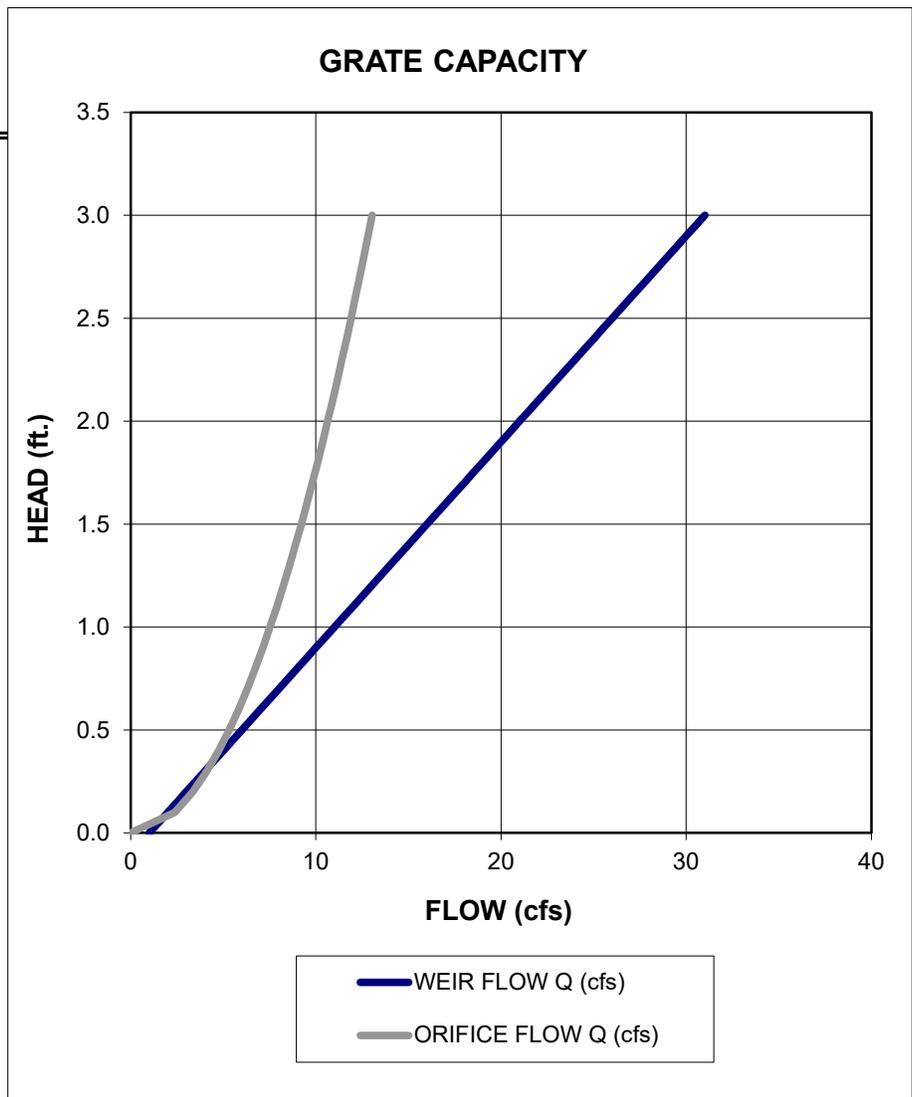
DESIGN BY: EJM

PROJECT NUMBER: 2206.10

DATE: 12/29/2025

NEENAH GRATE NUMBER: **R-2560-E1**  
 INLET LENGTH OR PERIMETER: **6.7 ft.**  
 GRATE OPEN END AREA: **1.4 sf.**

HEAD H (ft.)	WEIR FLOW Q (cfs)	ORIFICE FLOW Q (cfs)
0.0	0.00	0.00
0.1	0.71	2.38
0.2	2.00	3.36
0.3	3.67	4.12
0.4	5.64	4.76
0.5	7.89	5.32
0.6	10.37	5.83
0.7	13.07	6.29
0.8	15.96	6.73
0.9	19.05	7.14
1.0	22.31	7.52
1.1	25.74	7.89
1.2	29.33	8.24
1.3	33.07	8.58
1.4	36.96	8.90
1.5	40.99	9.21
1.6	45.15	9.52
1.7	49.45	9.81
1.8	53.88	10.09
1.9	58.43	10.37
2.0	63.11	10.64
2.1	67.90	10.90
2.2	72.80	11.16
2.3	77.82	11.41
2.4	82.95	11.65
2.5	88.19	11.89
2.6	93.54	12.13
2.7	98.98	12.36
2.8	104.53	12.59
2.9	110.18	12.81
3.0	115.93	13.03



Weir flow controls until a head of 0.337 feet is reached, where orifice flow takes over and controls. The flow at this transition is less efficient than what is indicated by either the weir or orifice flow equations. A flow of 20% less than the equated flow is a conservative estimate.