

Hydraulic Calculations

FOR

**Broadmoor Rolesville Offsite Improvements
WAKE, NORTH CAROLINA**

**SUBMITTAL
August 14, 2024**



Kimley»»Horn

300 S Main St., Suite 212
Holly Springs, NC 27540
NC LICENSE # F-0102

Storm Water System Design

The storm water systems are designed to meet North Carolina Department of Transportation (NCDOT) hydraulic design standards. The inlet spacing is based on limiting the spread at each inlet to 5.5' encroachment into the travel lane during 4 in/hr. The pipes were sized based on the 10-year event.

We have included the storm drain profile for this project and is attached separately.

Provide pre- & post-development drainage areas for the entire site with a discharge summary.

Appendix A - Drainage Calculations



Spread Analysis

Proposed Conditions: 4.00 in/hr Storm

Project Information

Project Name:	Rolesville Broadmoor		
KHA Project #:	019867004		
Designed by:	GTG	Date:	8/12/2024
Reviewed by:	BTV	Date:	8/12/2024

RAINFALL INTENSITY =	4.00 IN/HR
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PROJECT CALCULATIONS												
STRUCTURE	STATION	DRAINAGE AREA A (acres)	RUNOFF COEFF C	SURFACE "Q"		ROADWAY		INLET			BYPASS	
				SUB.	TOTAL	LONG.	TRANS.	SPREAD	"Q" INT.	DEPTH	Q _b	TO
				Q _S (cfs)	Q _T (cfs)	S _L (ft/ft)	S _T (ft/ft)	T (ft)	Q _{I(max)} (cfs)	D (ft)	(cfs)	STRUCTURE
0101	18+50.00	0.13	0.82	0.44	0.44	0.02	0.020	2.9	0.44	0.14	0.00	0102
0102	21+50.00	0.30	0.82	0.99	0.99	0.01	0.020	6.3	0.82	0.21	0.17	0103
0103	22+50.00	0.11	0.83	0.43	0.60	0.01	0.020	4.9	0.50	0.18	0.05	0104
0104	23+42.83	0.12	0.84	0.42	0.47	0.01	0.020	4.1	0.42	0.16	0.02	---
0105	24+45.71	0.08	0.90	0.28	0.30	0.01	0.020	3.0	0.30	0.14	0.00	0106
0106	26+90.00	0.25	0.82	0.96	0.96	0.01	0.020	5.8	0.72	0.20	0.12	0107
0107	29+50.00	0.25	0.82	0.97	1.09	0.01	0.020	5.9	0.80	0.20	0.15	0109
0111	32+00.00	0.12	0.82	0.44	0.58	0.01	0.020	4.1	0.42	0.16	0.02	0112
0112	32+85.00	0.08	0.82	0.28	0.30	0.02	0.020	2.3	0.30	0.11	0.00	0114
0114	34+50.00	0.17	0.82	0.60	0.60	0.01	0.020	5.2	0.50	0.19	0.05	0115
0116	37+00.00	0.06	0.82	0.20	0.25	0.00	0.020	3.5	0.25	0.15	0.00	0118
0118	38+00.00	0.11	0.83	0.40	0.40	0.00	0.020	4.4	0.36	0.17	0.02	0119
0119	38+89.51	0.11	0.83	0.39	0.41	0.01	0.020	3.2	0.39	0.14	0.01	---
0121	39+92.71	0.08	0.90	0.28	0.29	0.02	0.020	1.9	0.29	0.12	0.00	0122
0122	42+00.00	0.14	0.82	0.48	0.48	0.03	0.020	2.5	0.48	0.13	0.00	0123
0123	43+25.00	0.05	0.79	0.16	0.16	0.01	0.020	1.9	0.16	0.11	0.00	0124
0124	44+39.79	0.10	0.76	0.30	0.30	SAG	0.020	2.0	0.30	0.12	0.00	---
0125	45+50.00	0.03	0.78	0.09	0.09	0.01	0.020	1.5	0.10	0.09	0.00	0124
0201	48+33.86	0.13	0.84	0.43	0.43	0.01	0.020	3.1	0.42	0.14	0.01	0202
0202	48+10.77	0.05	0.88	0.16	0.16	0.02	0.020	1.7	0.16	0.09	0.00	0203
0203	47+11.35	0.21	0.82	0.69	0.69	0.02	0.020	4.0	0.66	0.16	0.04	

Storm Water System Design 25 Year Storm

The storm water systems were designed to meet North Carolina Department of Transportation (NCDOT) Stormwater Management Design Manual of Specifications, Standards, and Design hydraulic design standards. The pipes were sized based on the 10-year event and were checked with the 25-year event.

We have included the storm drain profile of the 25-year event for this project and is attached separately.



Where is this?

Appendix A - Drainage Calculations



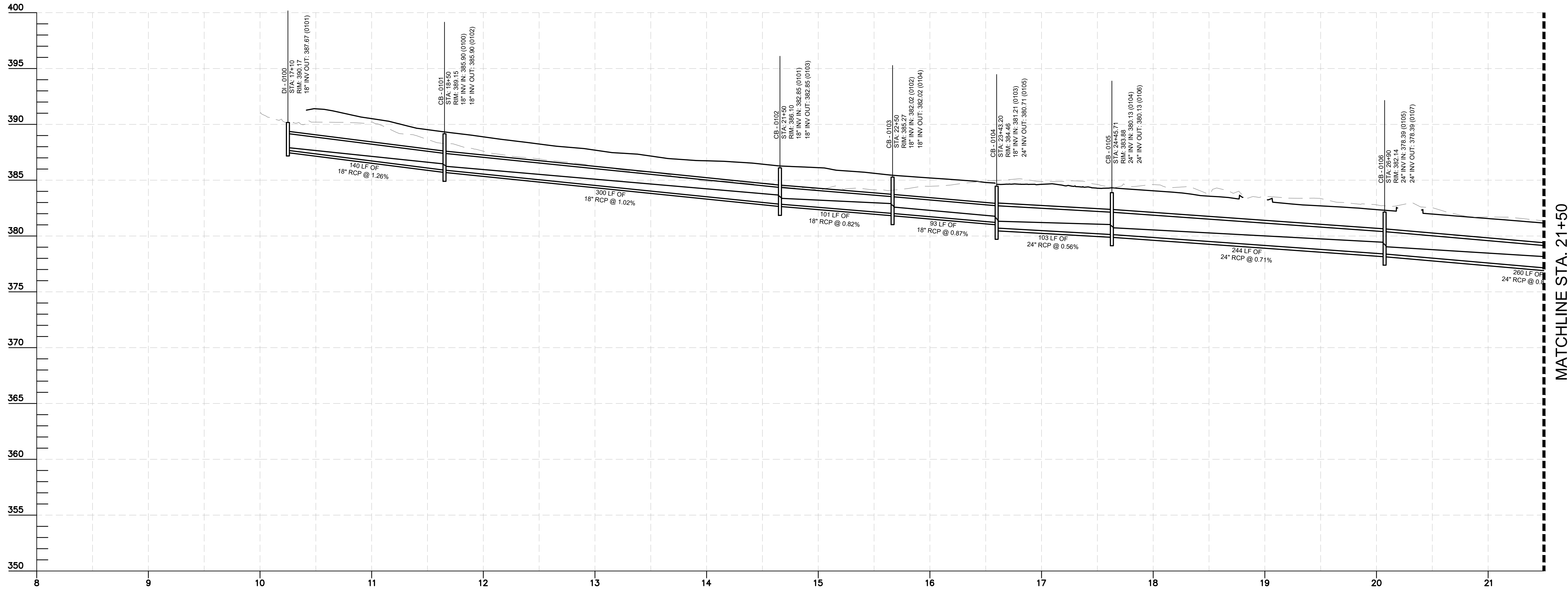
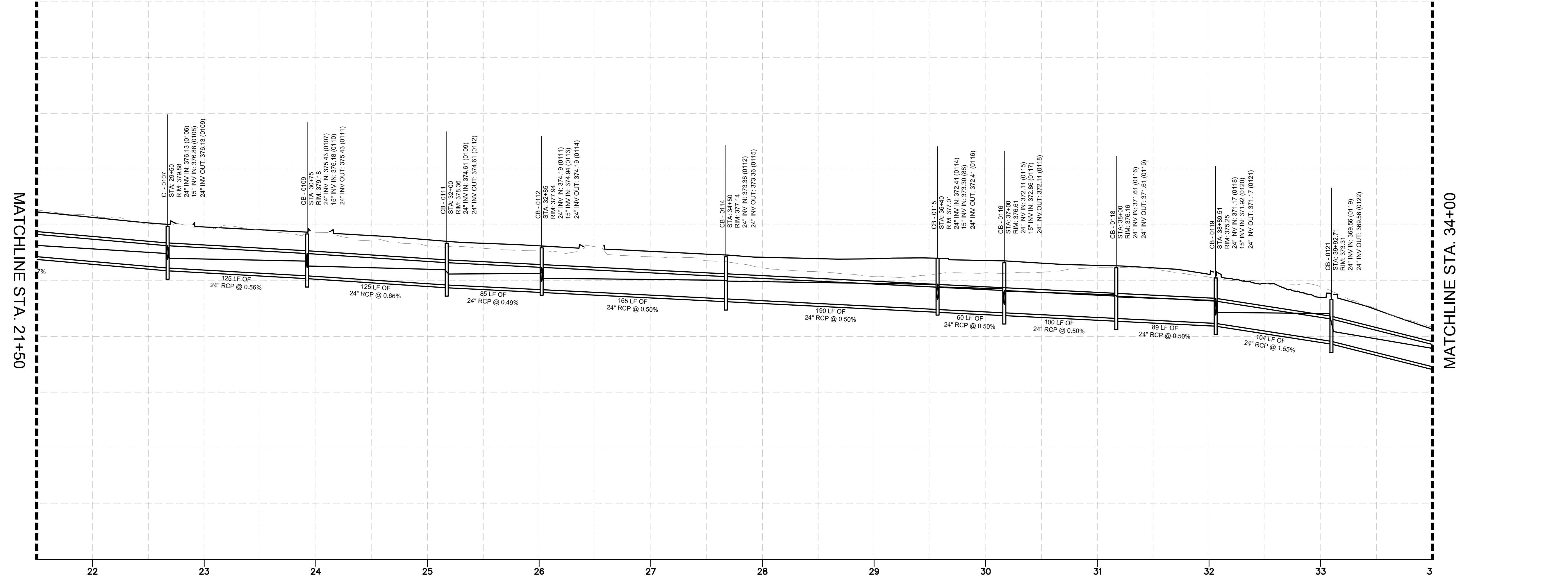
**Stormwater Network Calculations
Design Summary: Conduits (10-YR Storm)**

Project Information

Project Name: Broadmoor Rolesville Offsite Roadway Improvements
 KHA Project #: 019867004
 Designed by: GTG Date: 8/14/2024
 Reviewed by: BTV Date: 8/14/2024

STORMWATER CONVEYANCE NETWORK ANALYSIS (10-YR Discharge)																				
System Info		Runoff Data						Pipe Data						Invert Elevation		HGL ELEV		Upstream Structure Data		
Start Node	Stop Node	Cumulative Drainage Area (AC.)	Runoff Coeff.	Sum of C'A	Area TOC (hrs)	System TOC (hrs)	System Intensity (in/hr)	Pipe Description	Pipe Flow (cfs)	Length (ft)	Diameter (in)	Slope (ft/ft)	Design Capacity (cfs)	Velocity (ft/s)	Upstream (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Top Elevation	Box Depth
0124	2	7.66	0.76	5.82	0.167	0.313	4.52	RCP	18.35	8.36	24	2.55%	36.16	11.54	362.65	362.44	363.66	363.45	367.88	5.23
0123	0124	5.21	0.79	4.11	0.167	0.308	4.55	RCP	14.67	117.81	24	0.69%	18.85	6.63	363.47	362.65	366.02	365.53	367.79	4.33
0122	0123	5.16	0.82	4.23	0.167	0.303	4.58	RCP	14.58	126.23	24	0.69%	18.85	6.62	364.34	363.47	366.77	366.24	368.09	3.75
0121	0122	5.01	0.90	4.51	0.167	0.298	4.60	RCP	14.12	207.36	24	2.52%	35.93	10.74	369.56	364.34	370.43	366.98	373.31	3.75
0119	0121	4.94	0.83	4.10	0.167	0.295	4.62	RCP	13.85	103.72	24	1.55%	28.18	8.93	371.17	369.56	372.16	372.05	375.25	4.09
0118	0119	4.69	0.83	3.90	0.167	0.290	4.64	RCP	13.30	89.04	24	0.50%	16.01	5.70	371.61	371.17	373.54	373.23	376.16	4.55
0116	0118	4.58	0.82	3.76	0.167	0.285	4.67	RCP	12.93	100.27	24	0.50%	16.01	5.67	372.11	371.61	374.06	373.73	376.61	4.49
0115	0116	3.90	0.82	3.20	0.167	0.282	4.69	RCP	11.87	59.78	24	0.50%	16.01	5.58	372.41	372.11	374.43	374.27	377.01	4.60
0114	0115	2.98	0.82	2.44	0.167	0.272	4.74	RCP	8.88	189.62	24	0.50%	16.03	5.23	373.36	372.41	374.96	374.67	377.14	3.77
0112	0114	2.81	0.82	2.31	0.167	0.263	4.79	RCP	8.32	165.00	24	0.50%	16.03	5.15	374.19	373.36	375.21	375.03	377.94	3.75
0111	0112	2.52	0.82	2.07	0.167	0.259	4.81	RCP	7.72	85.00	24	0.49%	15.92	5.03	374.61	374.19	375.59	375.65	378.36	3.75
0109	0111	2.40	0.82	1.97	0.167	0.252	4.85	RCP	7.28	125.00	24	0.66%	18.34	5.50	375.43	374.61	376.31	375.98	379.18	3.75
0107	0109	2.16	0.82	1.77	0.167	0.246	4.91	RCP	6.69	125.00	24	0.56%	16.95	5.07	376.13	375.43	377.00	376.76	379.88	3.75
0106	0107	1.16	0.82	0.95	0.167	0.232	5.05	RCP	4.70	260.01	24	0.87%	21.11	5.41	378.39	376.13	379.03	377.44	382.14	3.75
0105	0106	0.91	0.90	0.82	0.167	0.218	5.21	RCP	3.75	244.30	24	0.71%	19.11	4.72	380.13	378.39	380.73	379.44	383.88	3.75
0104	0105	0.83	0.84	0.70	0.167	0.211	5.28	RCP	3.44	103.21	24	0.56%	16.98	4.23	380.71	380.13	381.32	381.03	384.46	3.75
0103	0104	0.71	0.83	0.59	0.167	0.206	5.34	RCP	2.94	93.20	18	0.87%	9.80	4.85	382.02	381.21	382.58	381.77	385.27	3.25
0102	0103	0.60	0.82	0.49	0.167	0.199	5.41	RCP	2.46	100.88	18	0.82%	9.54	4.52	382.85	382.02	383.37	382.91	386.10	3.25
0101	0102	0.30	0.82	0.25	0.167	0.178	5.63	RCP	1.17	300.48	18	1.02%	10.59	3.95	385.90	382.85	386.24	383.68	389.15	3.25
0100	0101	0.17	0.58	0.10	0.167	0.167	5.76	RCP	0.57	140.24	18	1.26%	11.81	3.44	387.67	385.90	387.89	386.47	390.17	2.50
0108	0107	0.75	0.30	0.22	0.167	0.167	5.76	RCP	1.30	21.15	15	1.80%	8.67	5.07	377.26	376.88	377.59	377.44	379.51	2.25
0113	0112	0.21	0.30	0.06	0.167	0.167	5.76	RCP	0.36	20.39	15	3.14%	11.46	4.24	375.58	374.94	375.73	375.73	377.83	2.25
88	0115	0.73	0.68	0.50	0.167	0.167	5.76	RCP	2.89	6.40	15	4.22%	13.28	8.65	373.57	373.30	374.70	374.69	375.28	1.25
0117	0116	0.62	0.30	0.19	0.167	0.167	5.76	RCP	1.07	22.54	15	3.32%	11.78	5.97	373.61	372.86	374.40	374.40	375.86	2.25
0120	0119	0.13	0.30	0.04	0.167	0.167	5.76	RCP	0.22	20.63	15	2.00%	9.14	3.13	372.33	371.92	373.40	373.40	375.33	3.00
0125	0124	2.35	0.78	1.83	0.167	0.179	5.63	RCP	4.26	113.11	24	0.58%	17.24	4.55	363.31	362.65	365.75	365.71	368.23	4.93
0127	0125	1.04	0.33	0.34	0.167	0.172	5.70	RCP	1.97	101.89	24	0.81%	20.38	4.10	364.13	363.31	365.80	365.80	367.13	3.00
0128	0127	0.87	0.33	0.29	0.167	0.167	5.76	RCP	1.67	100.78	24	2.45%	35.46	5.77	366.60	364.13	366.90	365.81	369.64	3.04
0126	0125	1.28	0.30	0.39	0.167	0.167	5.76	RCP	2.24	27.20	18	4.85%	23.16	8.29	365.12	363.81	365.80	365.78	366.83	---

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BROADMOOR ROLESVILLE
PREPARED FOR
PULTE GROUP

KHA PROJECT
019867004
DATE
8/13/2024
SCALE AS SHOWN
DESIGNED BY GTG
DRAWN BY GTG
CHECKED BY BTY

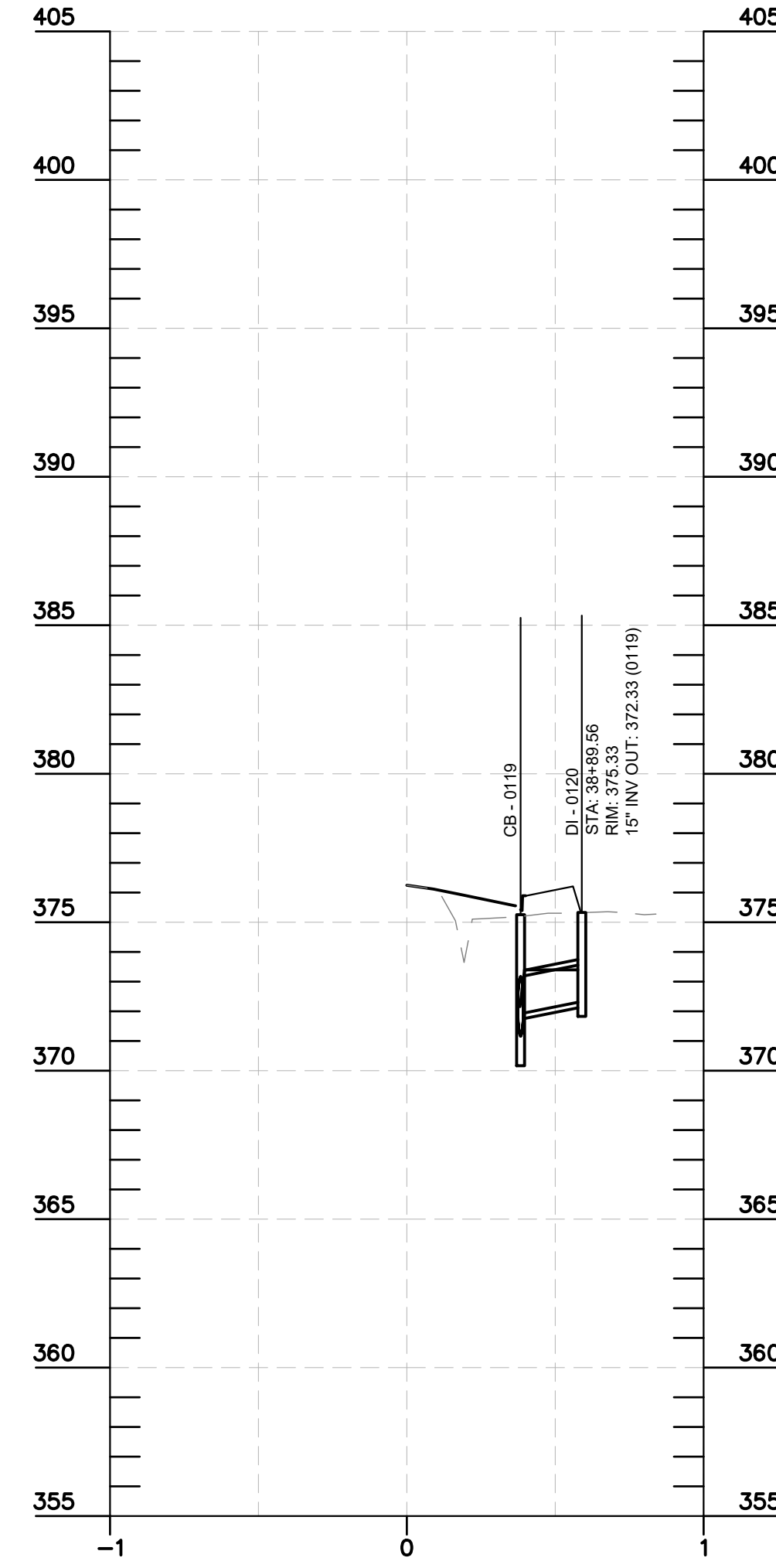
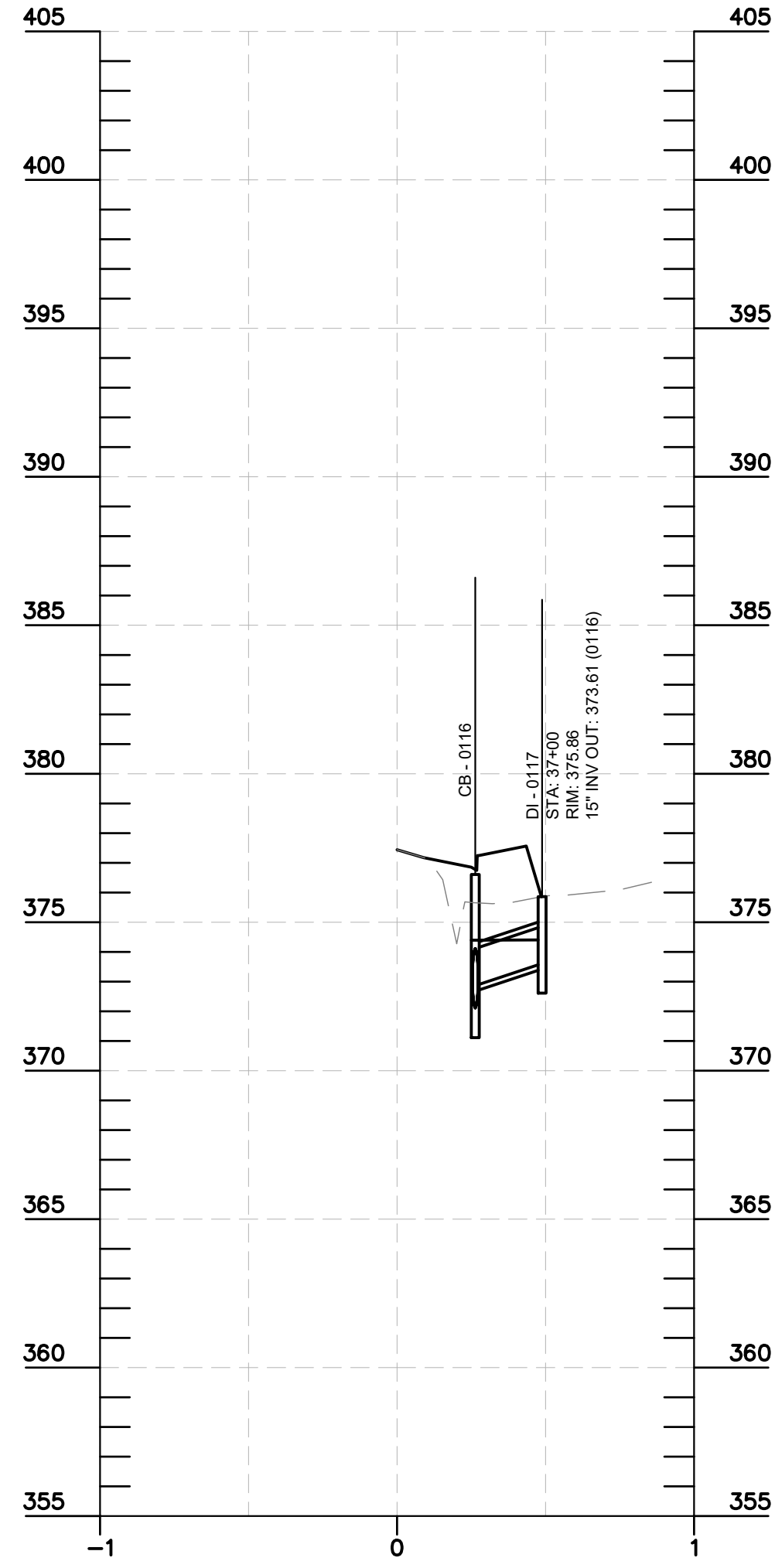
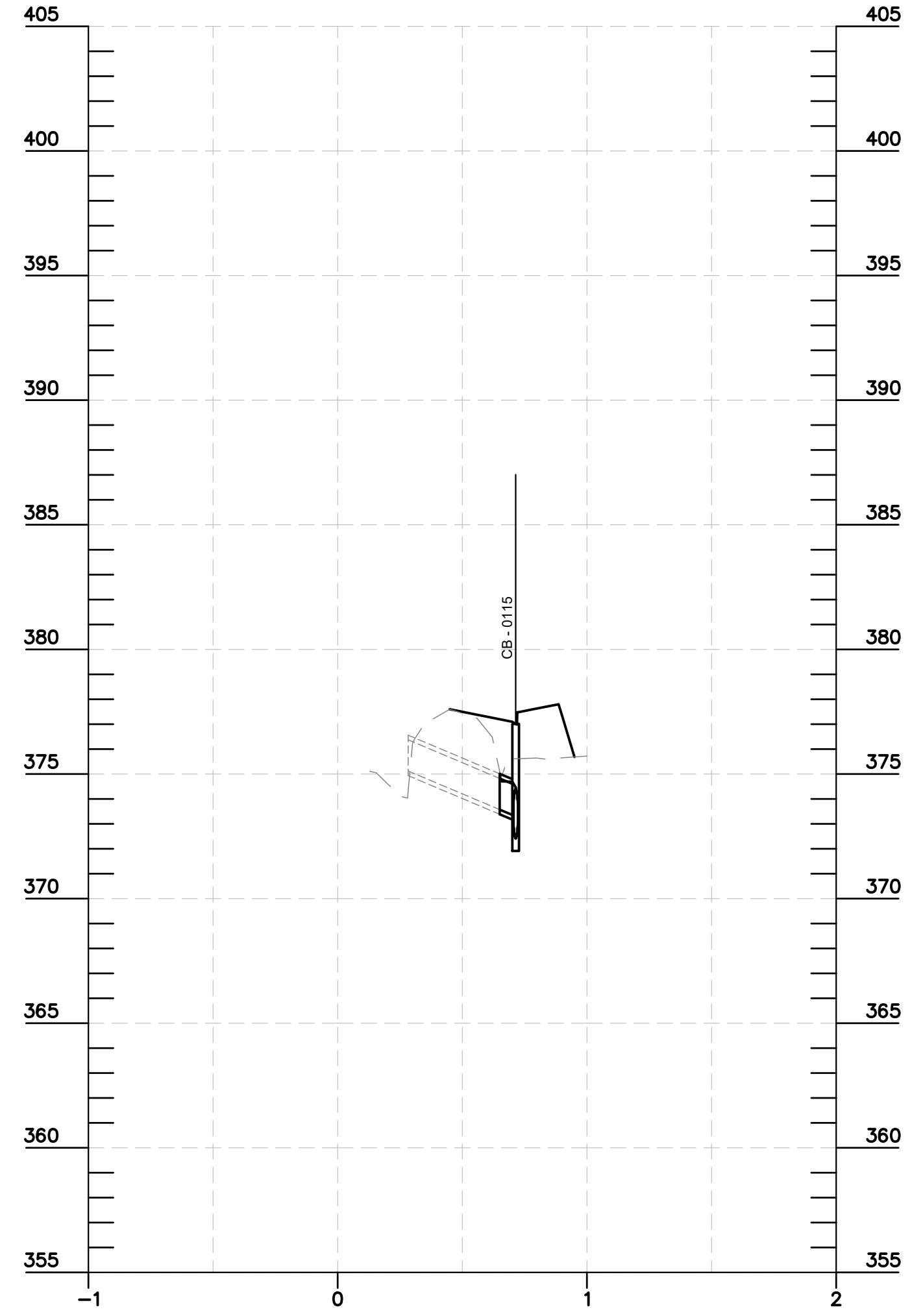
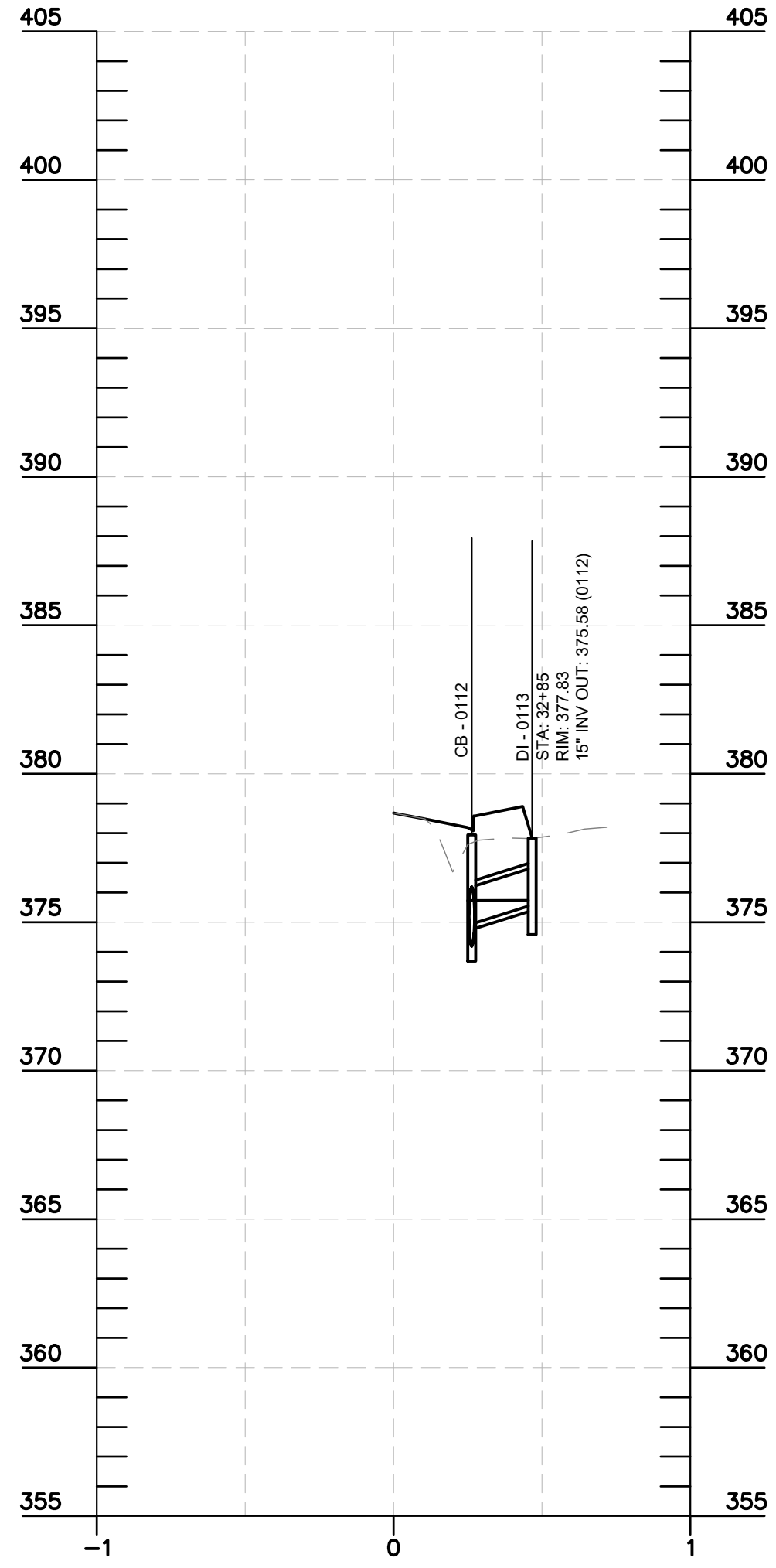
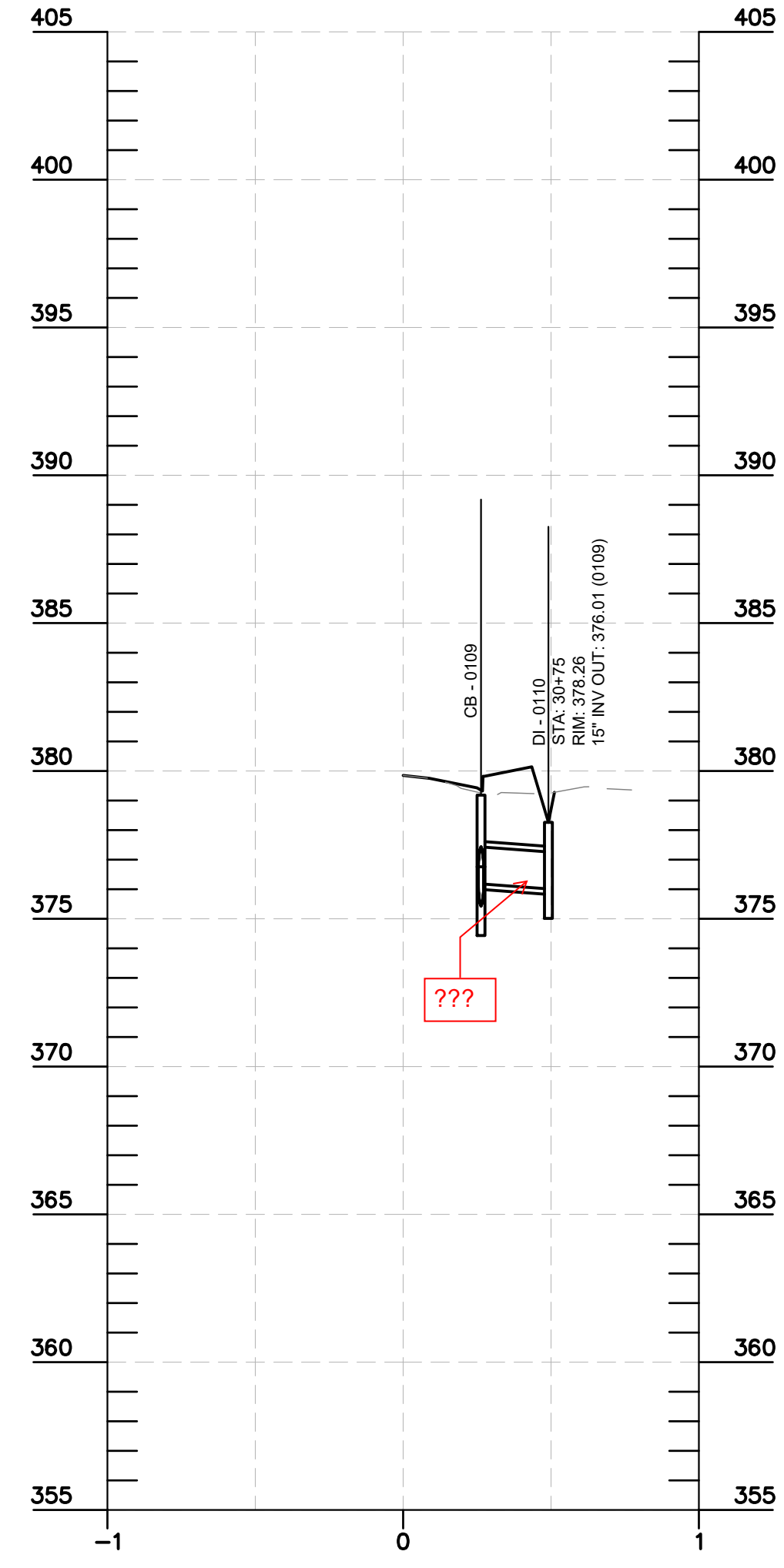
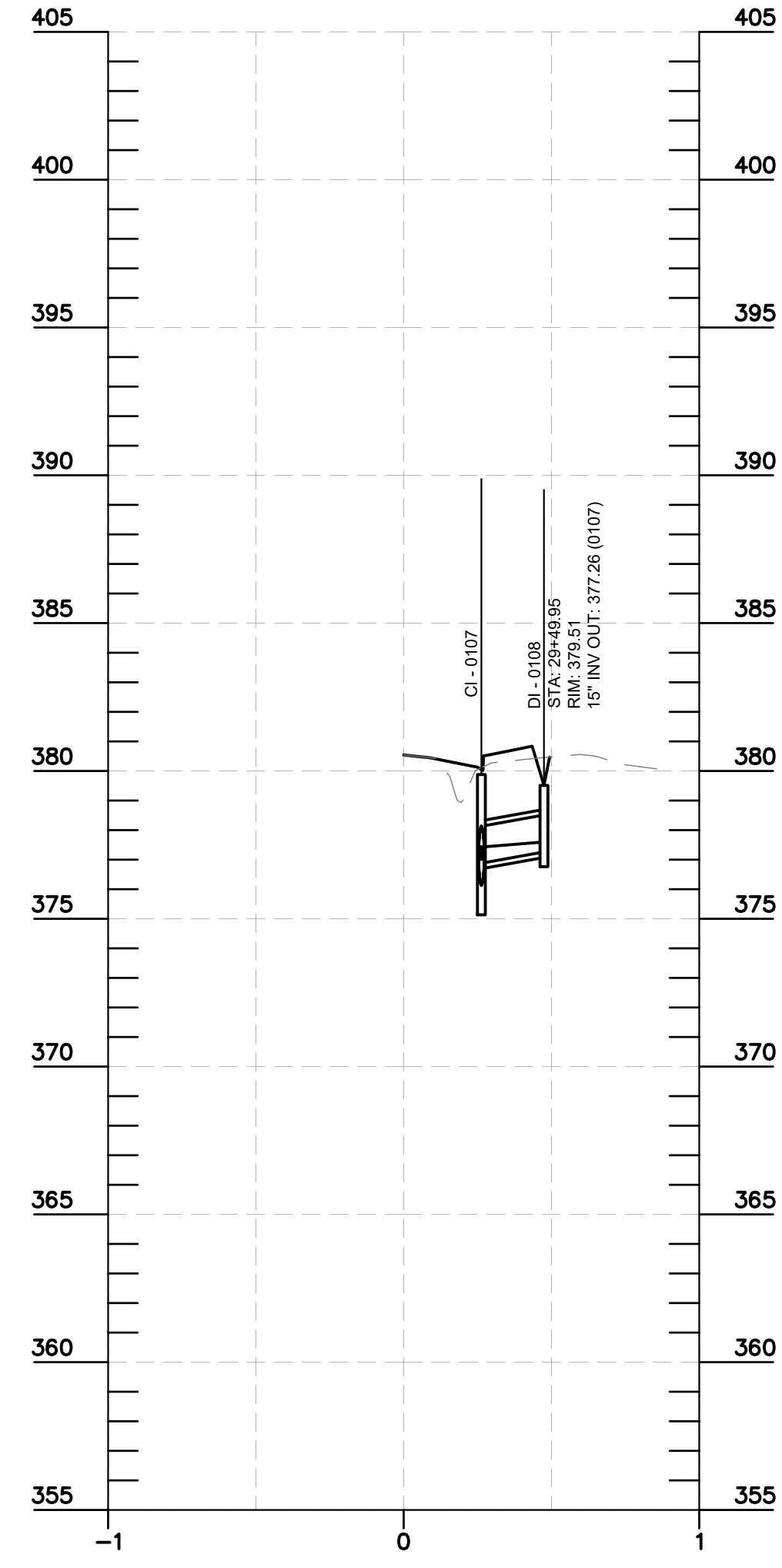
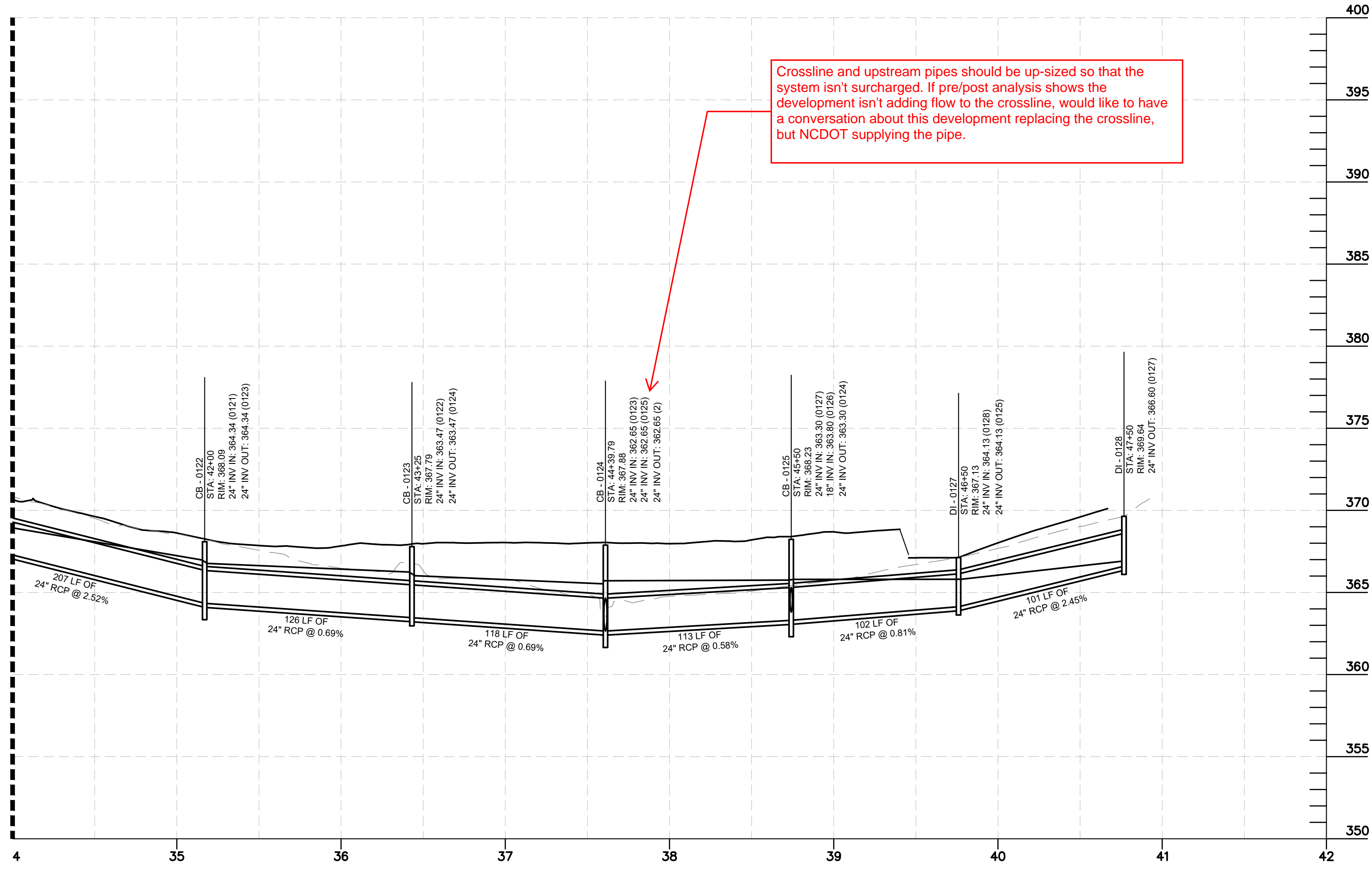



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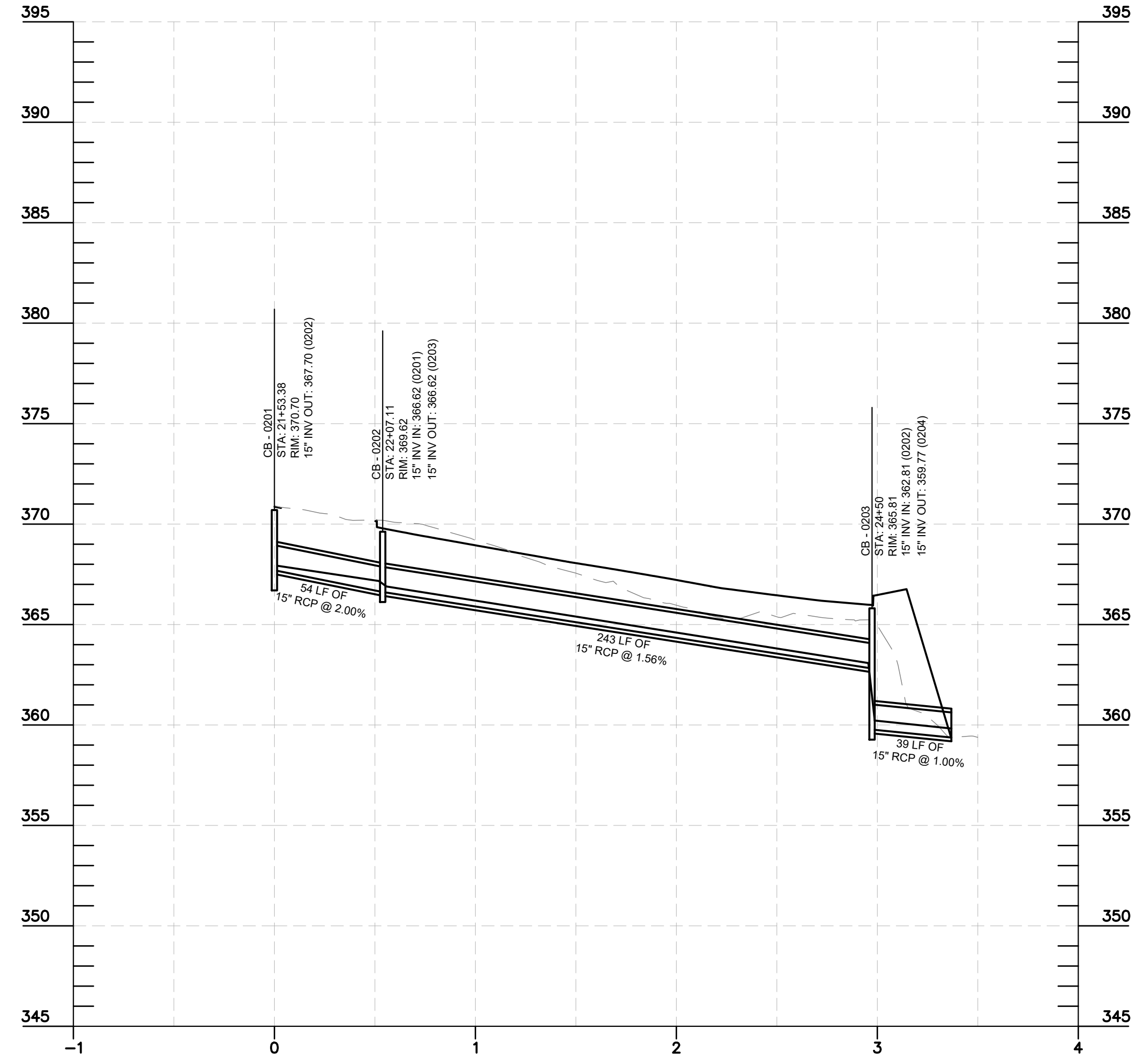
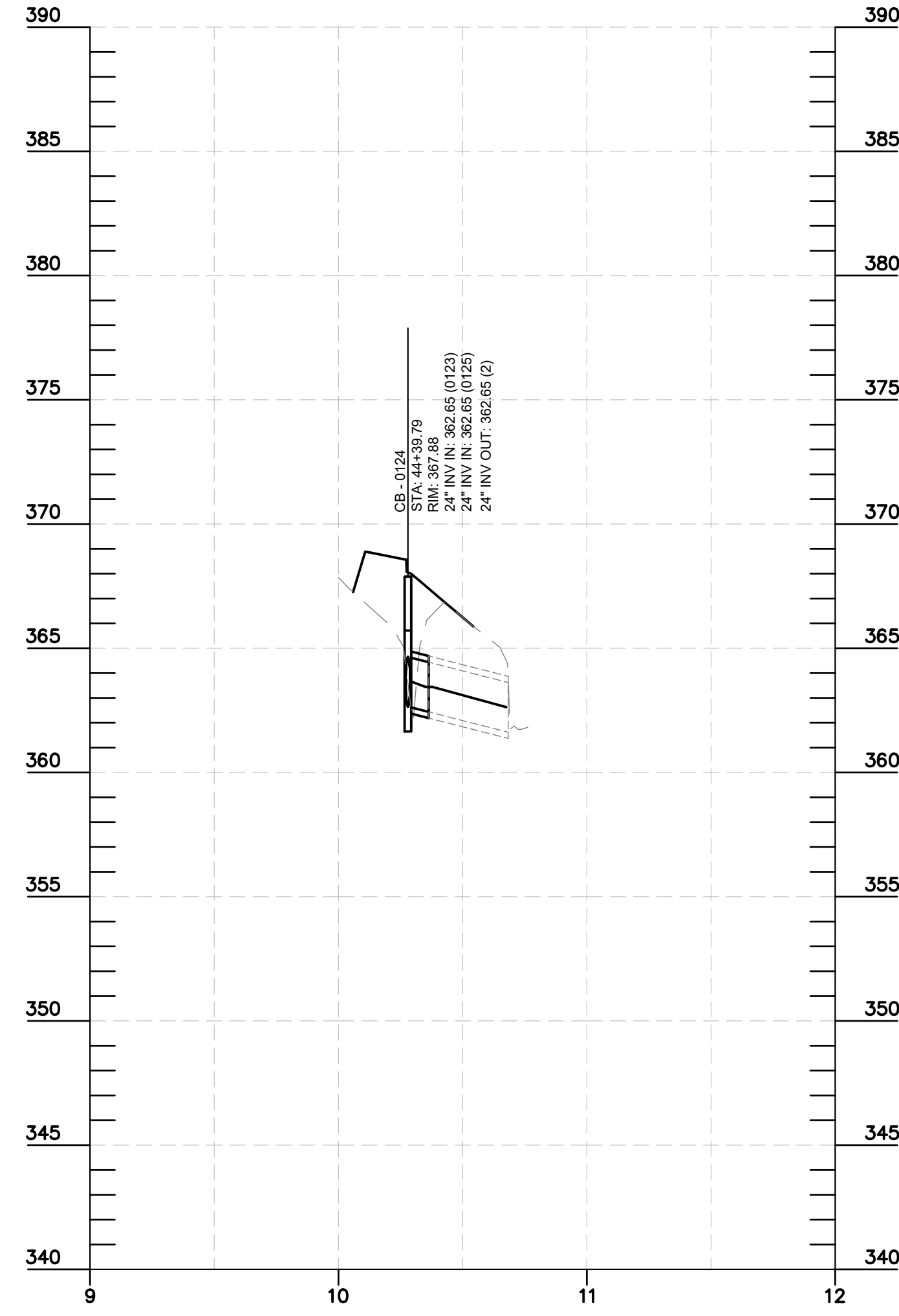
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KHA PROJECT 019867004	DATE 8/13/2024	SCALE AS SHOWN
DESIGNED BY GTG	DRAWN BY GTG	CHECKED BY BTY
SHEET NUMBER		WAKE NC
REVISIONS		DATE
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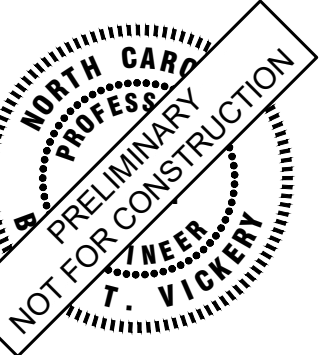


Provide calc for the extension of the crossline under Fowler.

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