

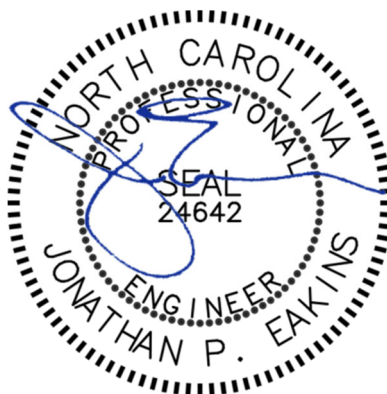
V3- Rcvd
2-3-23

Storm Drainage Calculations

PRESERVE AT JONES DAIRY SOUTH
Rolesville, North Carolina

October 11, 2022

Revised February 3, 2023



Prepared By:

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Storm Drainage Calculations

February 3, 2023

Preserve at Jones Dairy South

INTRODUCTION

This report presents the storm drainage design for revisions to a portion of the storm drainage that has been approved for the Preserve at Jones Dairy South project that is currently under construction.

BACKGROUND

The Preserve at Jones Dairy South project has been approved by the Town of Rolesville based on plans prepared by another engineer. The location of a pipe from the Jones Dairy Road widening that discharges into the Preserve at Jones Dairy South project has moved. The Town has requested updated calculations for the storm system that includes the relocated storm pipe.

These calculations reflect only the storm drainage that drains to the stormwater control measure behind lots 80-104. All other storm drainage that is part of the Preserve at Jones Dairy South project will not be changed. It should be noted that some inlets part of this revised system that were shown on the approved plans were relocated to avoid driveway conflicts or were removed because they weren't necessary.

METHODOLOGY

General

All calculations were performed in accordance with NCDOT requirements including those in the Guidelines for Drainage Studies (1999 Edition).

Runoff

Peak flow runoff rates were calculated using the Rational Formula. Rational runoff coefficients were determined for each inlet based on generalized land use conditions encountered for this project. A minimum time of concentration equal to 10 minutes was used for each inlet due to the relatively small drainage area for each inlet. Rainfall intensities were based on the time of concentration to the inlet.

Storm Drainage Piping

Storm sewer pipes were designed for the 10-year storm using Hydrology Studio/Stormwater Studio. The primary computational methodologies by the software are methods described in FHWA HEC-22. Runoff to each inlet was determined by the rational method. The minimum pipe size for this project is 15 inches.

Storm Drainage Calculations

February 3, 2023

Preserve at Jones Dairy South

Inlets and Gutter Spread

Gutter spread for this project was calculated by Hydrology Studio/Stormwater Studio which follows the methodology of FHWA HEC-22. The 4 inch per hour storm was used to calculate the runoff to each inlet. Inlet data used in the software was based on NCDOT frames/grates/hoods shown in NCDOT detail 840.03. The desirable gutter spread was limited to one half of a travel lane.

Pipe Hydraulic Grade Line

The hydraulic grade line (HGL) for this project was calculated by Hydrology Studio/Stormwater Studio which uses the energy-based Standard Step method. The storm systems were designed to maintain the HGL within the pipe for the 10-year storm.

APPENDICES

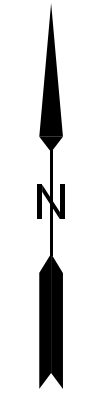
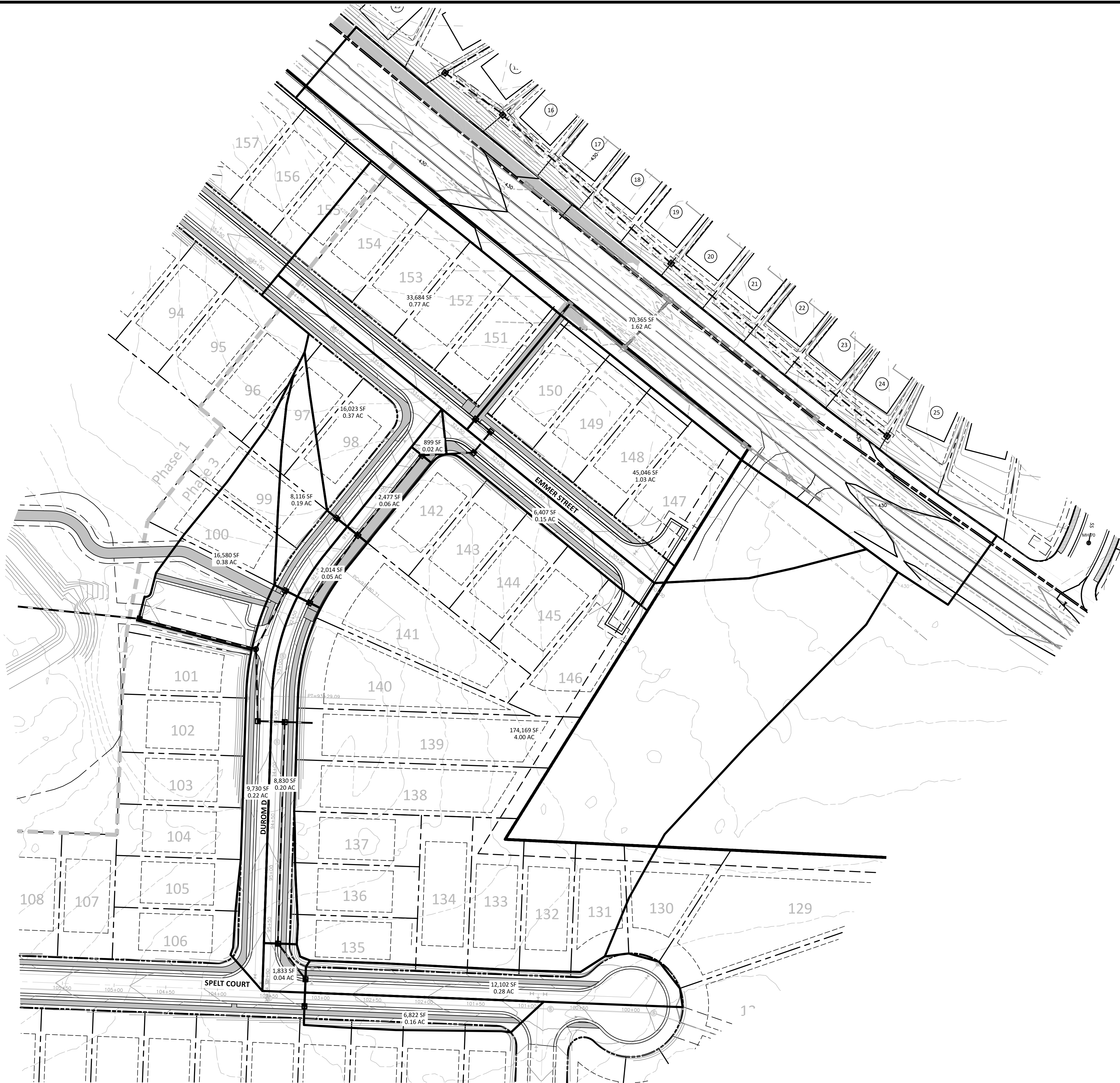
Appendix A – Drainage Area Map

Appendix B – Storm Sewer and Runoff Calculations

Appendix C – Storm Sewer HGL Calculations

Appendix D – Storm Sewer Gutter Spread Calculations

APPENDIX A – DRAINAGE AREA MAPS

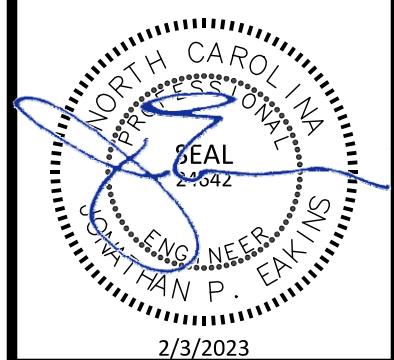


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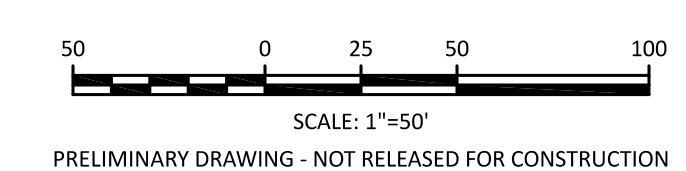
CLIENT:
 PRESERVE AT JONES DAIRY, LLC
 10534 ARNOLD PALMER DRIVE
 RALEIGH, NC 27617 919-491-0761

NO.	DATE	REVISIONS
1	2023-02-03	REVISIONS PER TOWN COMMENTS

**PRESERVE AT JONES DAIRY - SOUTH
 STORM DRAINAGE REVISIONS**
 ROLESVILLE, NC
STORM SEWER DRAINAGE AREAS



PROJECT NO: ---
 DESIGN BY: JPE
 DRAWN BY: JPE
 SCALE: 1"=50'
 DATE: 2022-10-11
 SHEET NO: **DA1.1**



APPENDIX B – STORM SEWER AND RUNOFF CALCULATIONS

APPENDIX C – STORM SEWER HGL CALCULATIONS

Storm Sewer Tabulation

Stormwater Studio 2022 v 3.0.0.29

Project Name: Enter Project Name...

02-03-2023

Line ID	Length (ft)		Drng Area (ac)		Rational (C)	C x A		Tc (min)		Intensity (in/hr)	Total Q (cfs)	Capacity (cfs)	Velocity (ft/s)	Line		Invert Elev (ft)		HGL Elev (ft)		Surface Elev (ft)		Line No
	Incr	Total	Incr	Total		Incr	Total	Inlet	Syst					Size (in)	Slope (%)	Up	Dn	Up	Dn	Up	Dn		Up	Dn
101 TO 77	0.380	9.541	0.60	5.92	0.23	5.92	5.0	6.44	6.60	39.08	70.99	8.92	3.00	30	402.54	399.00	404.63	401.09	411.00	410.00	1	
102 TO 101	0.001	9.161	0.90	5.69	0.00	5.69	5.0	6.24	6.66	37.91	40.93	8.77	1.00	30	405.06	403.90	407.12	405.96	411.81	411.00	2	
103 TO 102	0.190	4.260	0.60	2.93	0.11	2.93	5.0	5.72	6.81	19.94	45.24	7.21	4.00	24	408.36	405.83	409.94	407.55	413.07	411.81	3	
104 TO 103	0.050	4.070	0.85	2.81	0.04	2.81	5.0	5.66	6.83	19.21	22.62	6.93	1.00	24	408.72	408.46	410.28	410.23	413.07	413.07	4	
105 TO 104	0.060	4.020	0.85	2.77	0.05	2.77	5.0	5.53	6.87	19.03	32.03	6.96	2.01	24	410.43	408.82	411.98	410.54	416.21	413.07	5	
106 TO 105	0.020	3.590	0.85	2.50	0.02	2.50	5.0	5.41	6.91	17.25	44.12	6.97	3.81	24	415.73	411.96	417.20	413.43	420.08	416.21	6	
107 TO 106	0.150	3.570	0.85	2.48	0.13	2.48	5.0	5.31	6.94	17.22	23.07	6.57	1.04	24	416.35	415.83	417.82	417.49	421.39	420.08	7	
108 TO 107	1.030	3.420	0.50	2.35	0.52	2.35	5.0	5.25	6.96	16.37	22.62	6.26	1.00	24	416.71	416.45	418.15	418.15	421.39	421.39	8	
109 TO 108	0.770	2.390	0.60	1.84	0.46	1.84	5.0	5.21	6.97	12.82	22.61	4.67	1.00	24	417.00	416.81	418.54	418.55	421.43	421.39	9	
110 TO 109	1.620	1.620	0.85	1.38	1.38	1.38	5.0	5.00	7.04	9.69	45.85	4.51	4.11	24	423.00	417.10	424.10	418.72	428.71	421.43	10	
111 TO 105	0.370	0.370	0.60	0.22	0.22	0.22	5.0	5.00	7.04	1.56	6.46	3.41	1.00	15	412.71	412.45	413.21	412.95	416.21	416.21	11	
112 TO 102	0.220	4.900	0.85	2.77	0.19	2.77	5.0	6.09	6.70	18.53	22.65	6.85	1.00	24	406.64	405.94	408.16	407.64	411.10	411.81	12	
113 TO 112	0.200	4.680	0.85	2.58	0.17	2.58	5.0	6.04	6.72	17.31	22.62	6.95	1.00	24	407.00	406.74	408.47	408.23	411.10	411.10	13	
114 TO 113	0.040	0.480	0.85	0.41	0.03	0.41	5.0	5.23	6.96	2.84	8.79	2.82	0.70	18	409.36	407.86	410.00	409.18	413.36	411.10	14	
115 TO 114	0.280	0.440	0.85	0.37	0.24	0.37	5.0	5.11	7.00	2.62	8.91	4.08	1.91	15	410.44	409.61	411.09	410.26	414.55	413.36	15	
116 TO 115	0.160	0.160	0.85	0.14	0.14	0.14	5.0	5.00	7.04	0.96	6.46	1.60	1.00	15	410.80	410.54	411.31	411.32	414.55	414.55	16	
117 TO 113	4.000	4.000	0.50	2.00	2.00	2.00	5.0	5.00	7.04	14.07	14.29	8.25	1.85	18	408.00	407.50	409.38	408.88	411.10	411.10	17	

Notes: IDF File = RDU-Rainfall Intensity.idf, Return Period = 10-yrs.

Project File: P-JD SOUTH - REVISED STORM LAYOUT.sws

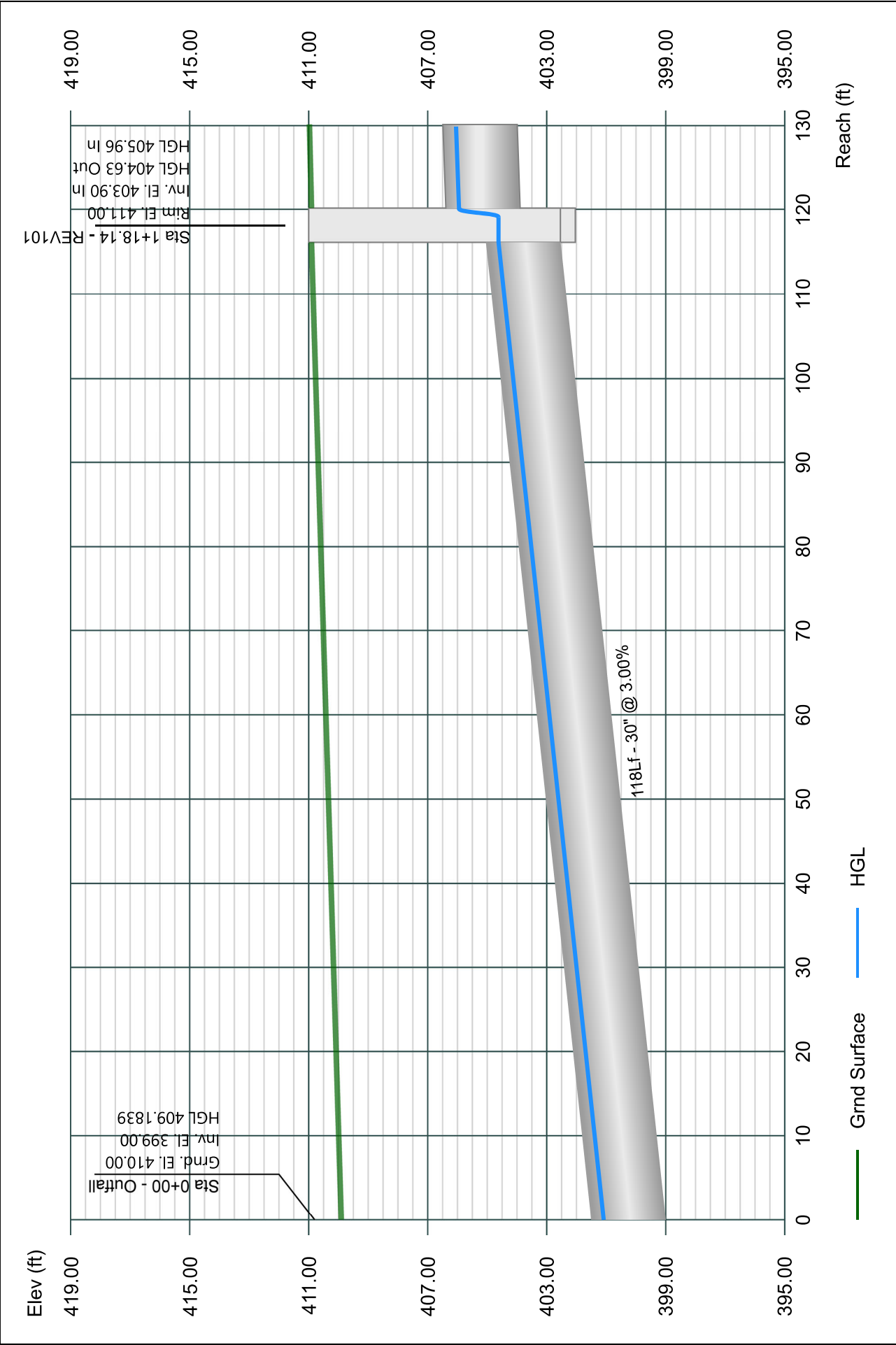
10-YEAR HGL

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02-03-2023

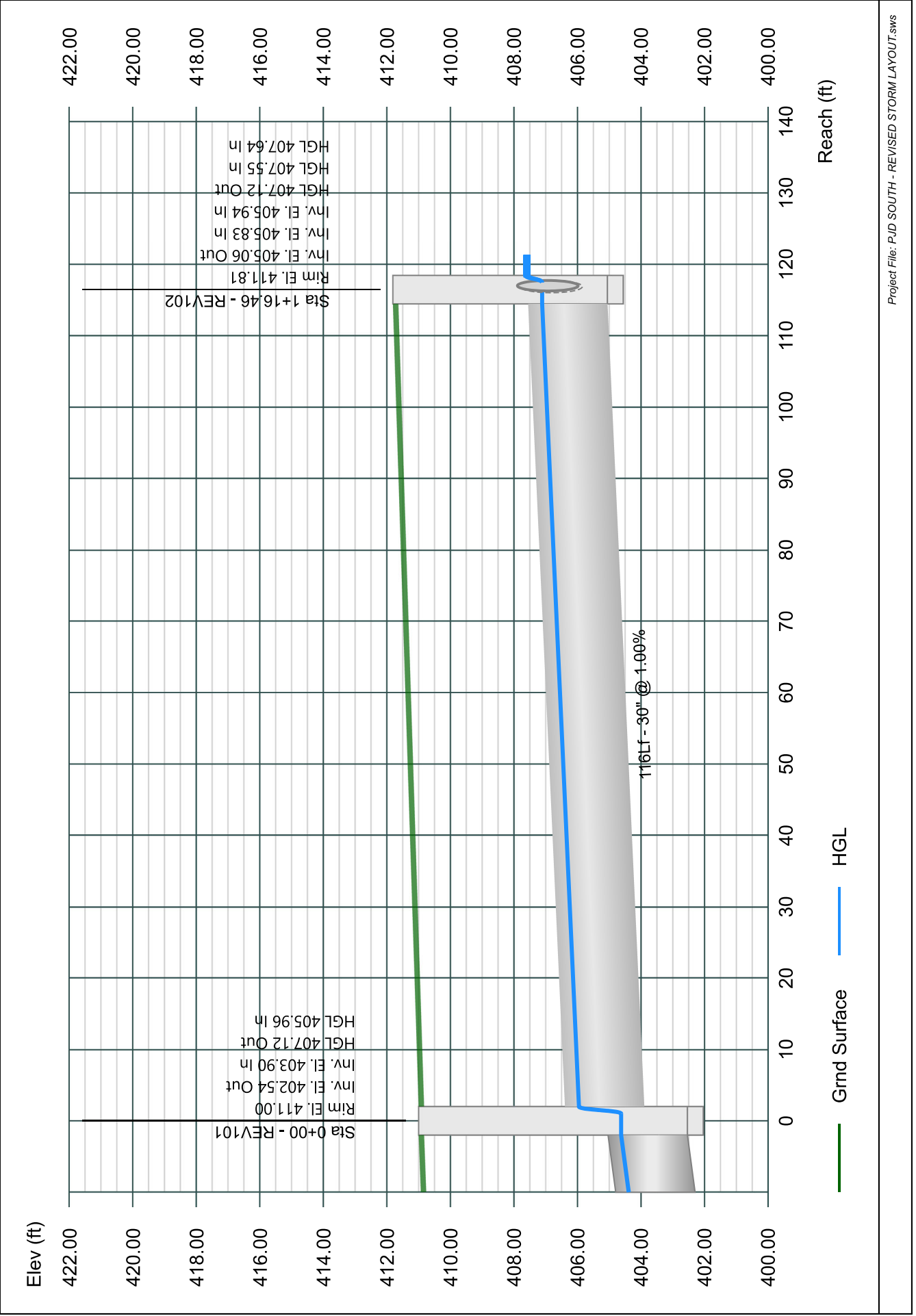


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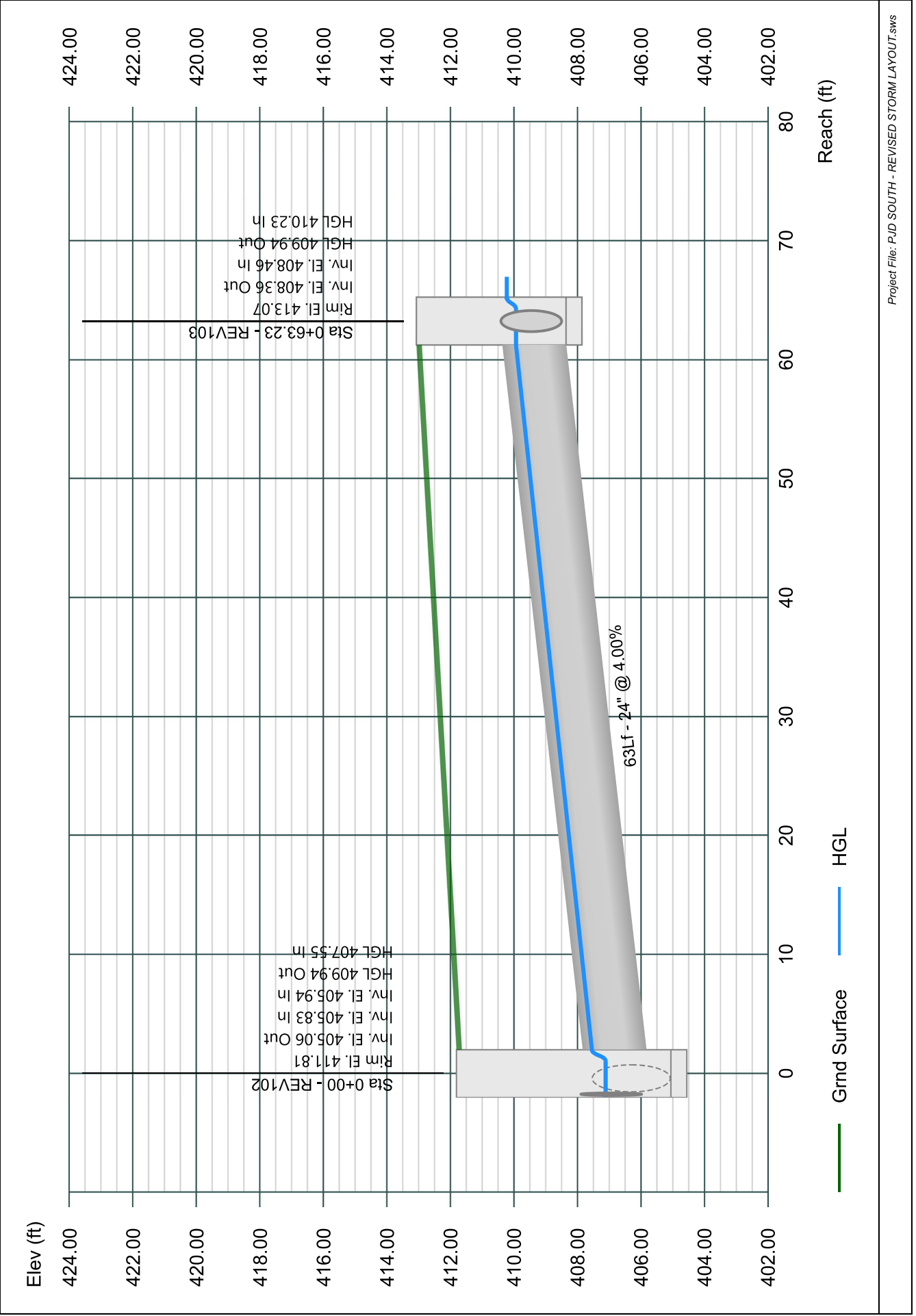


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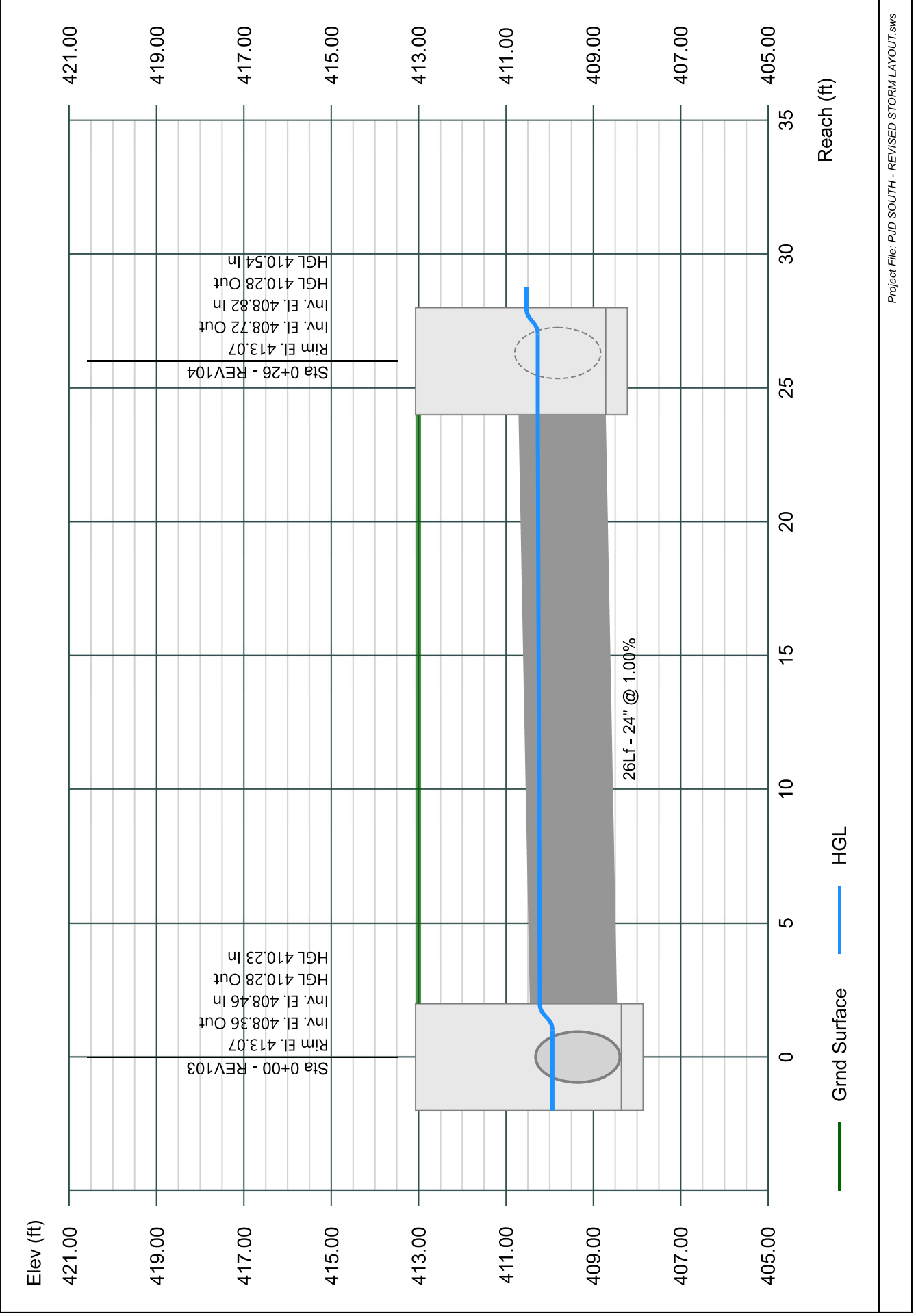


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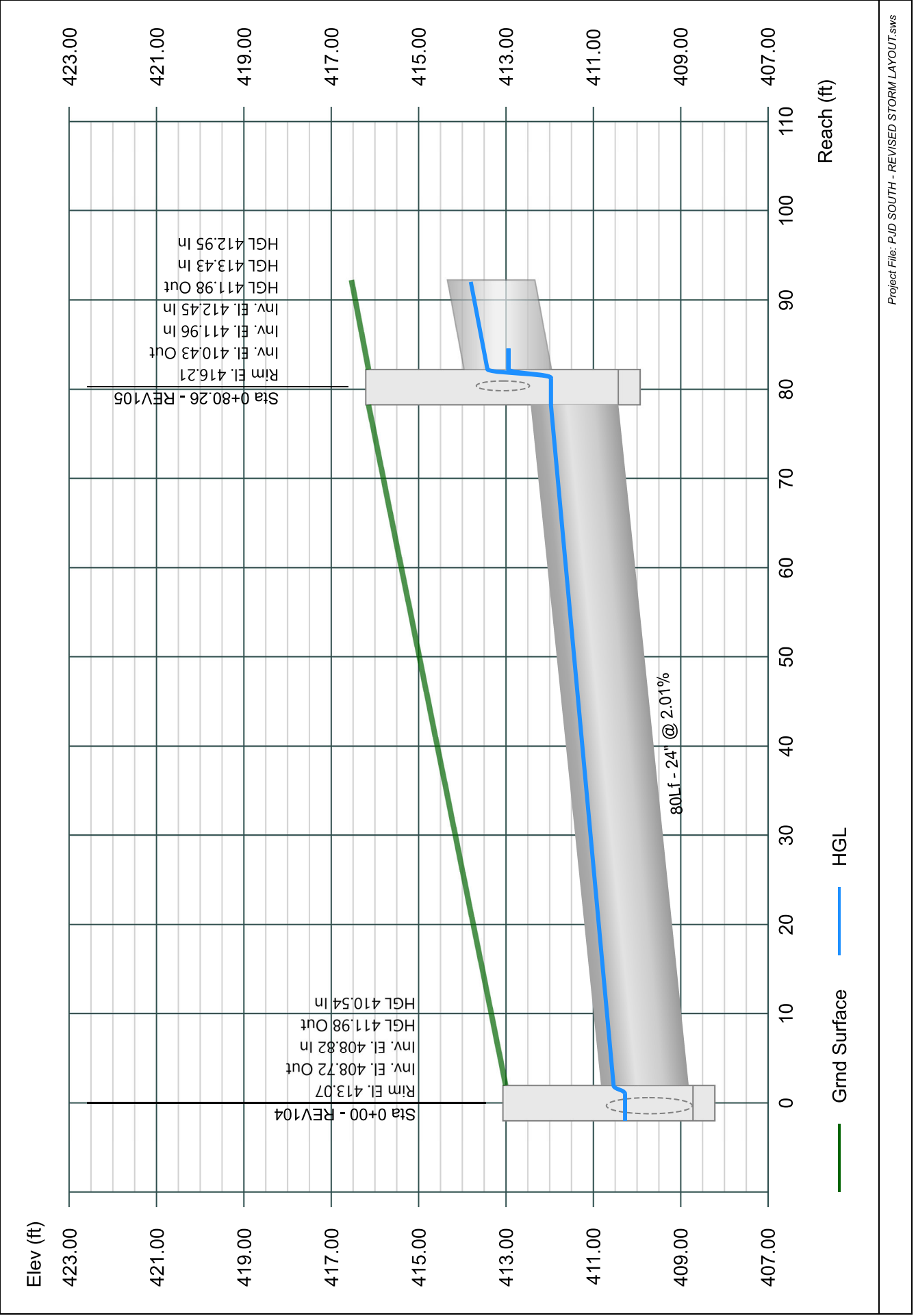


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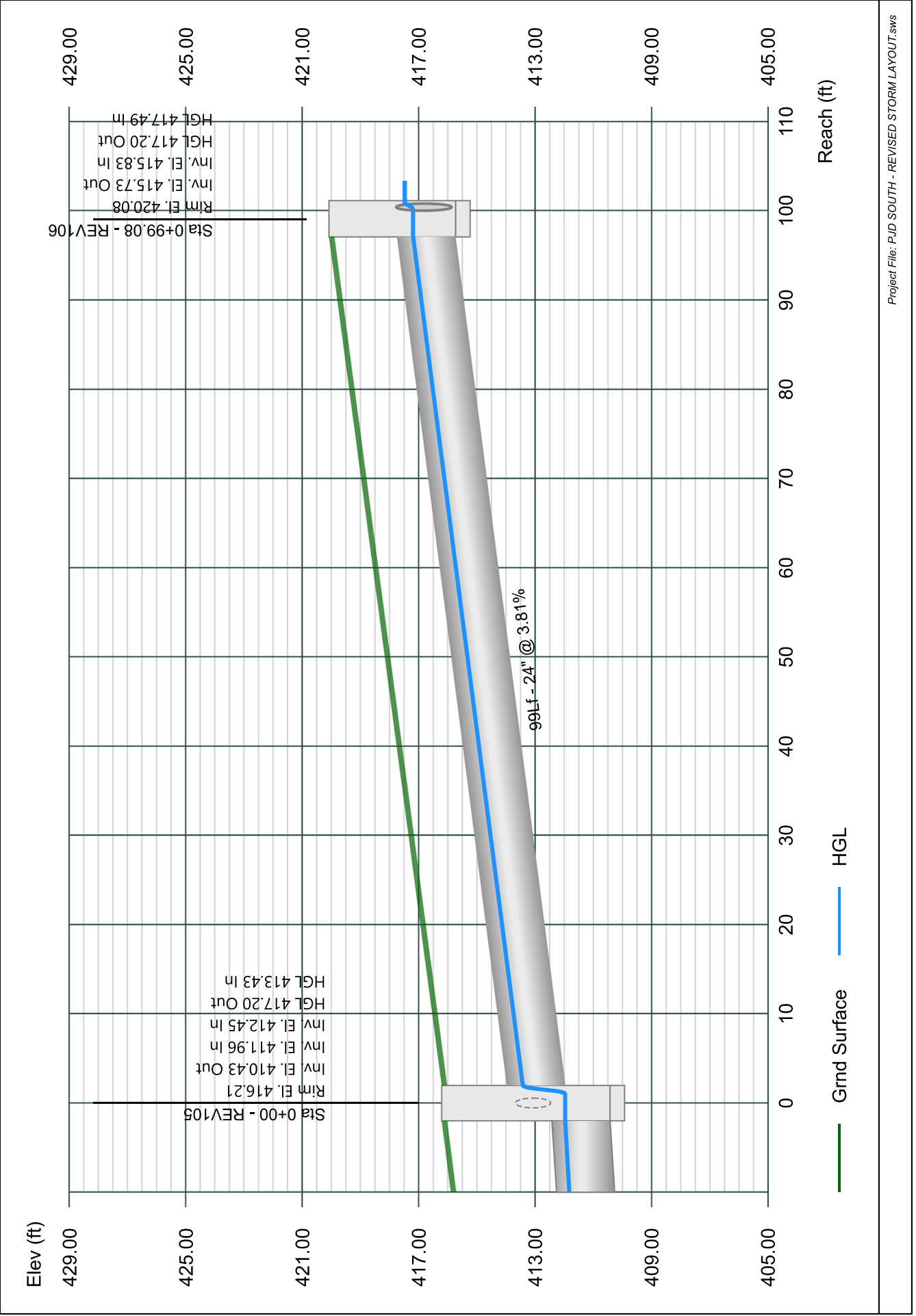


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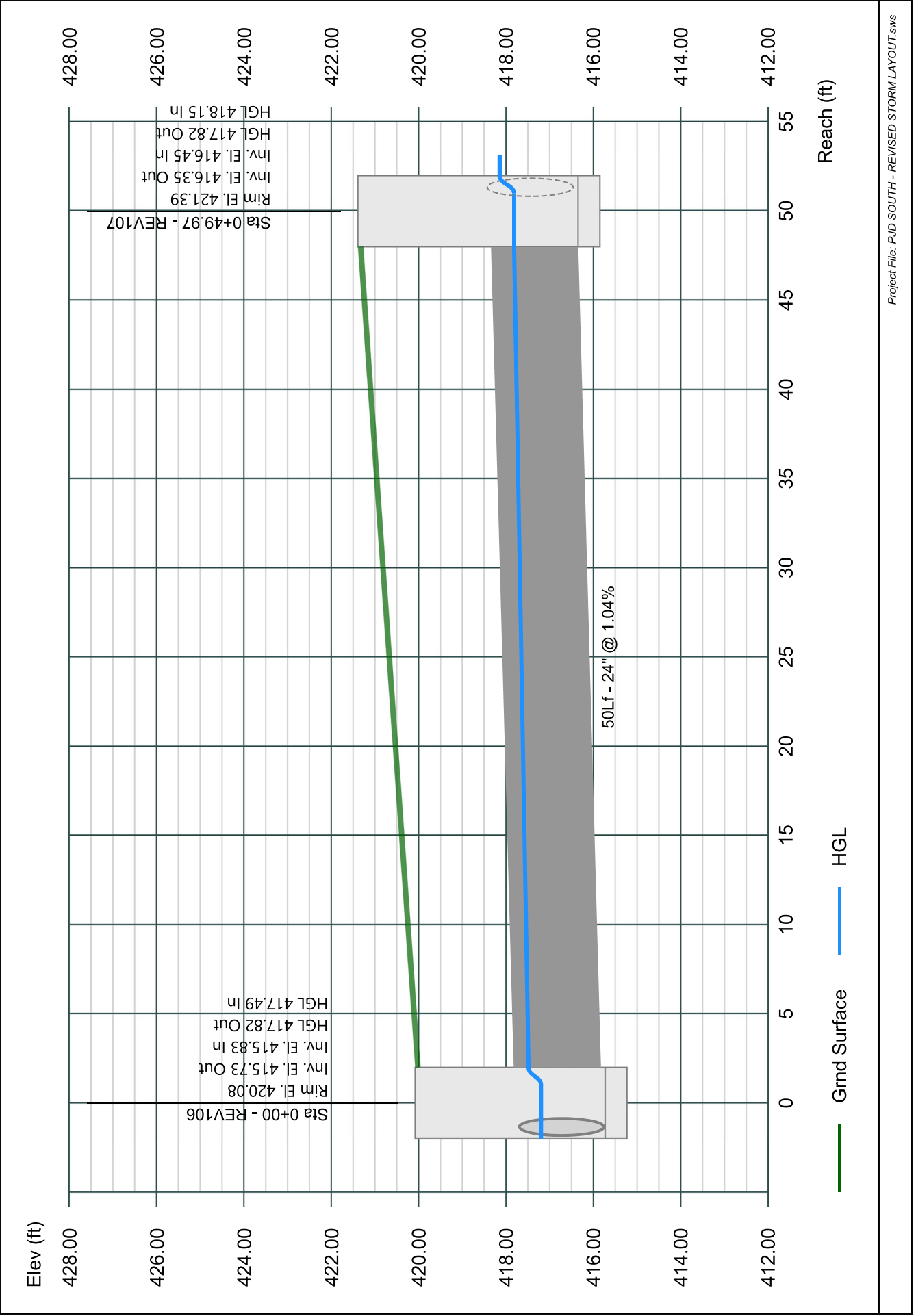


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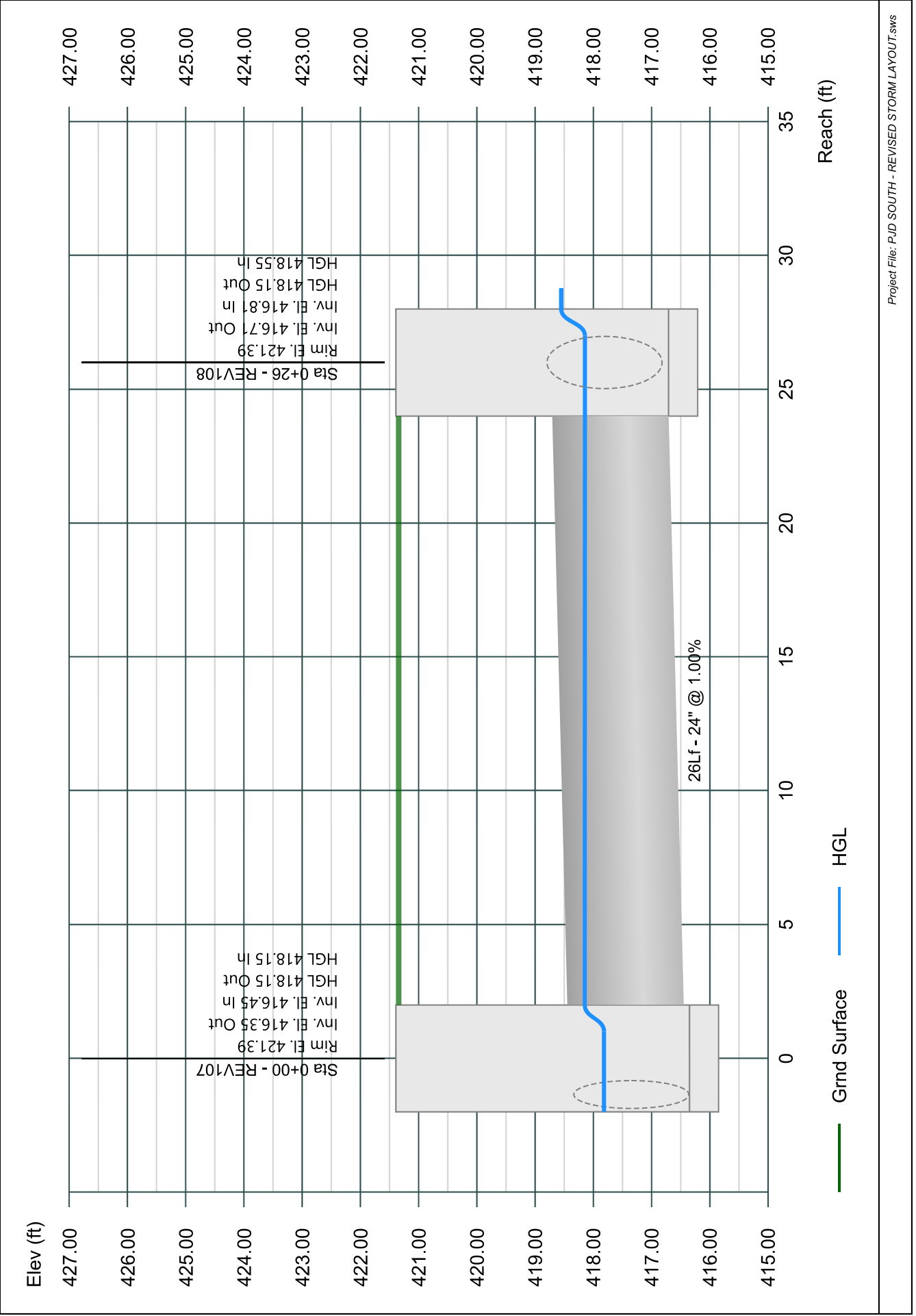


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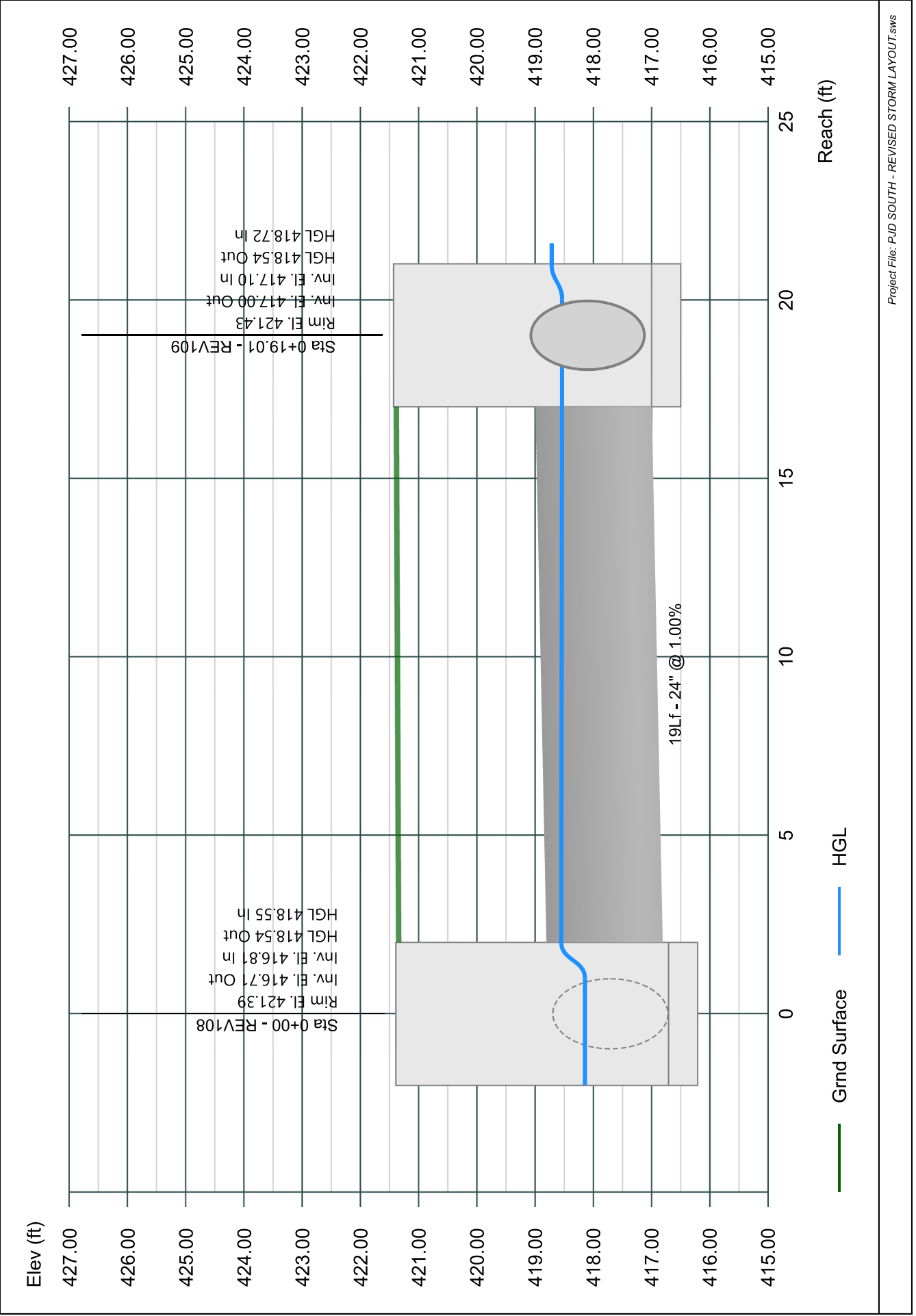


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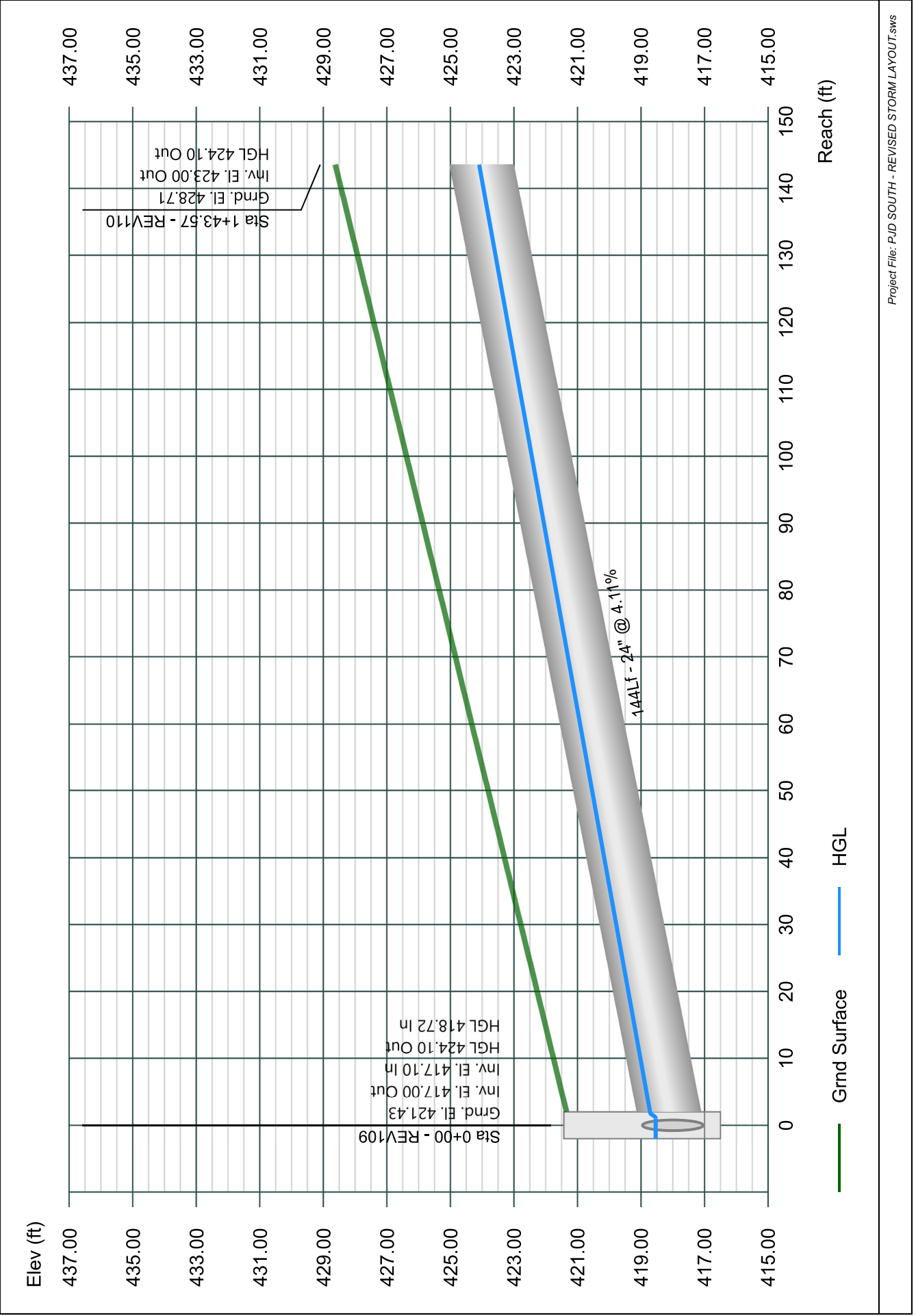


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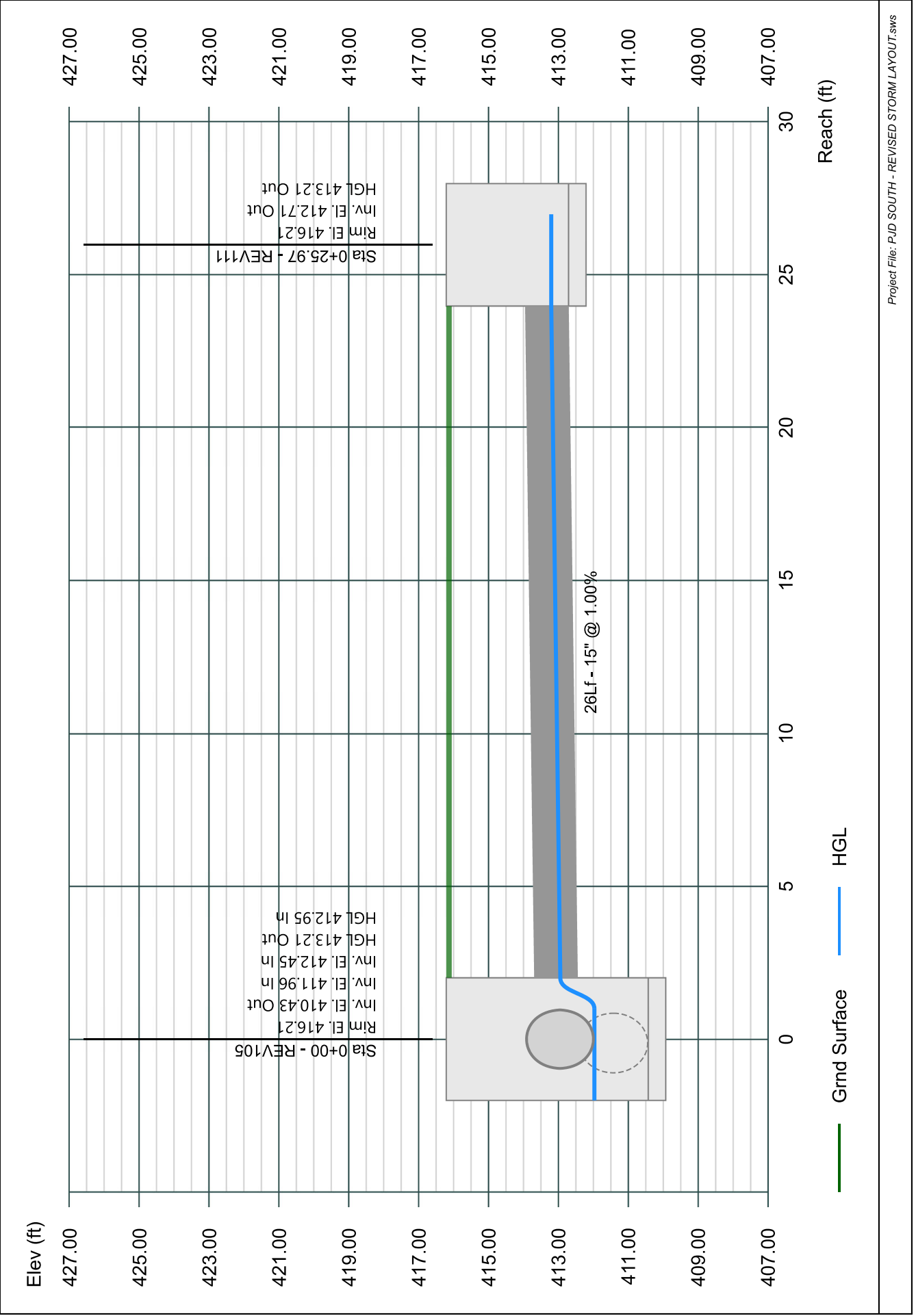


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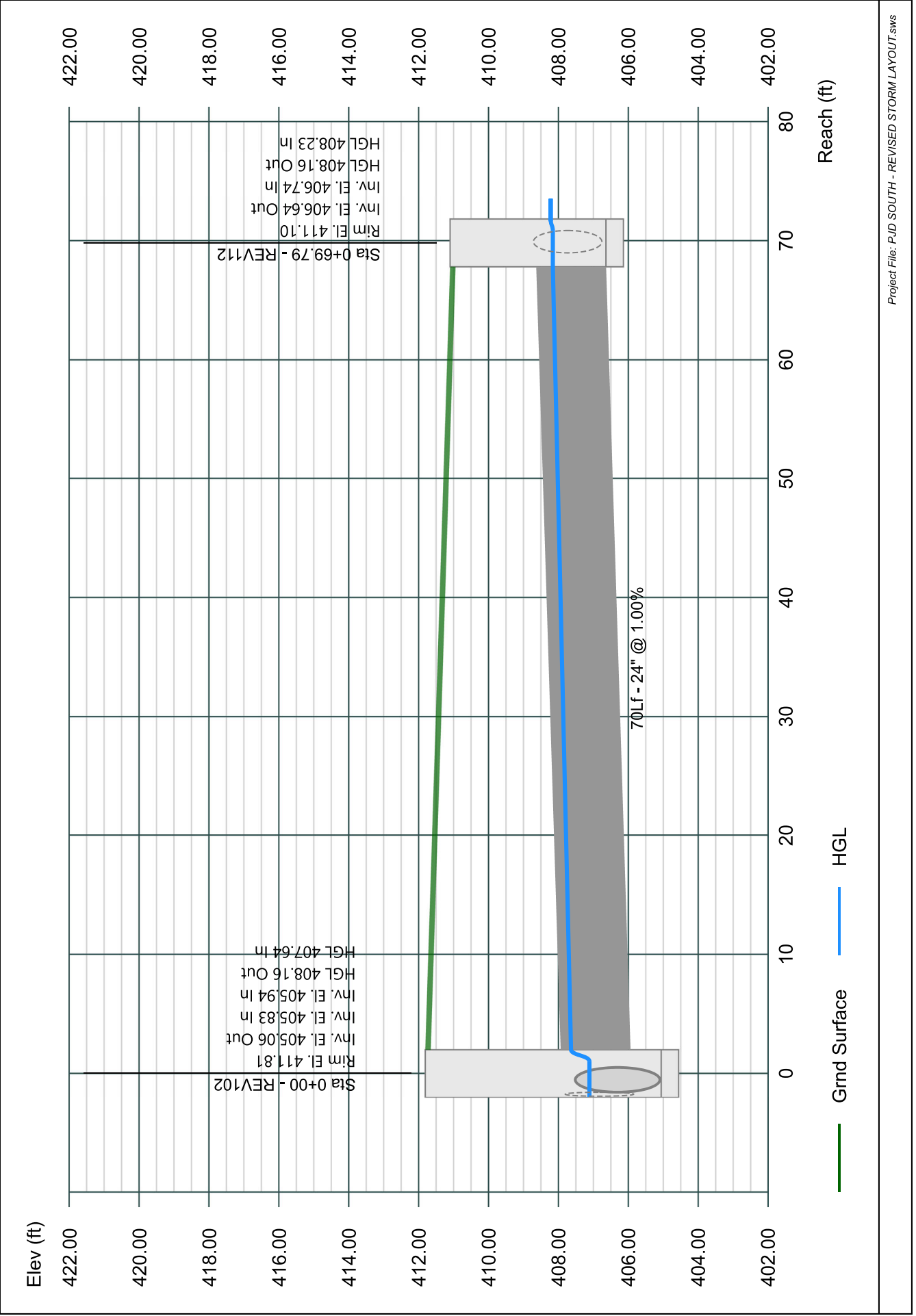


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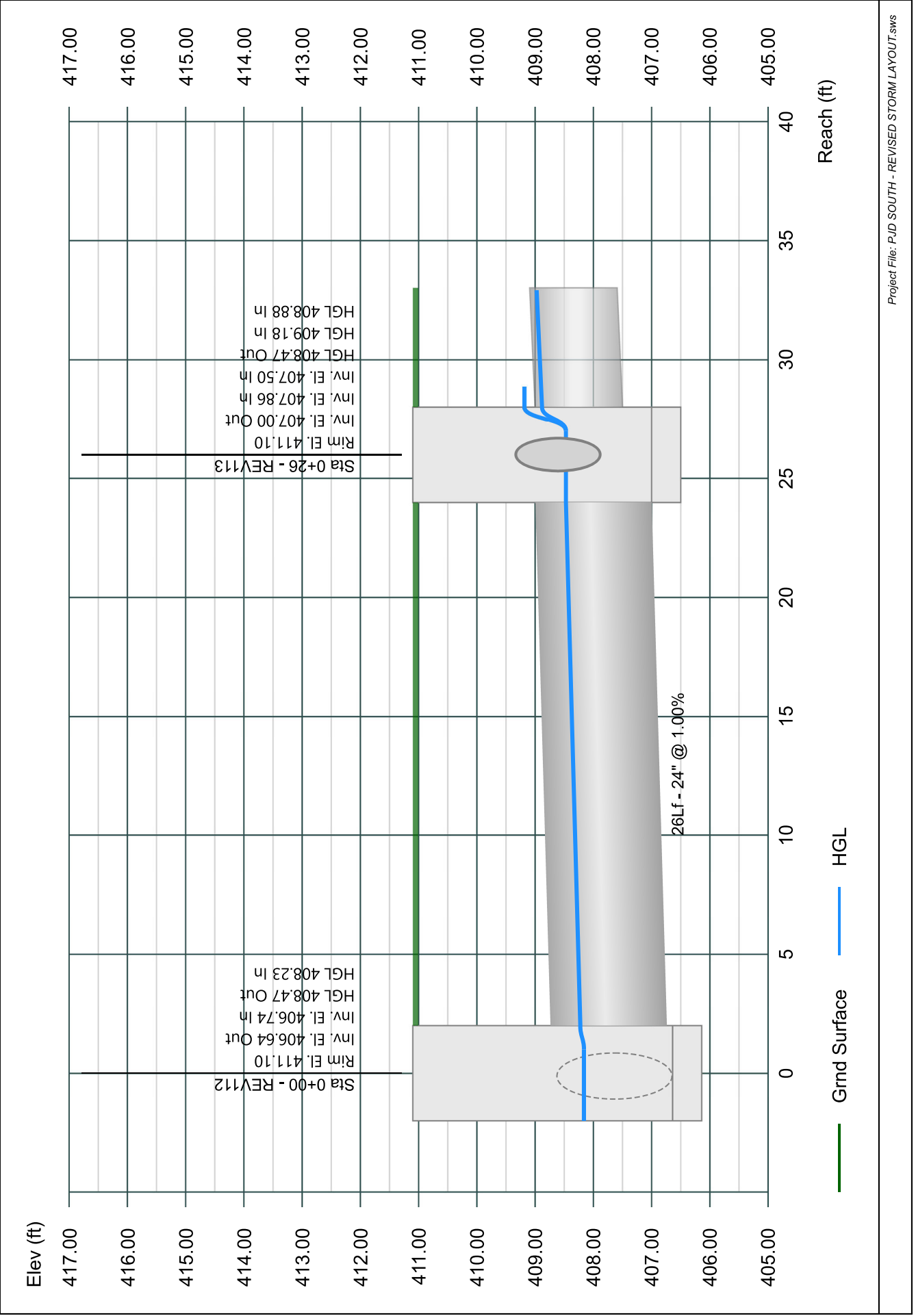


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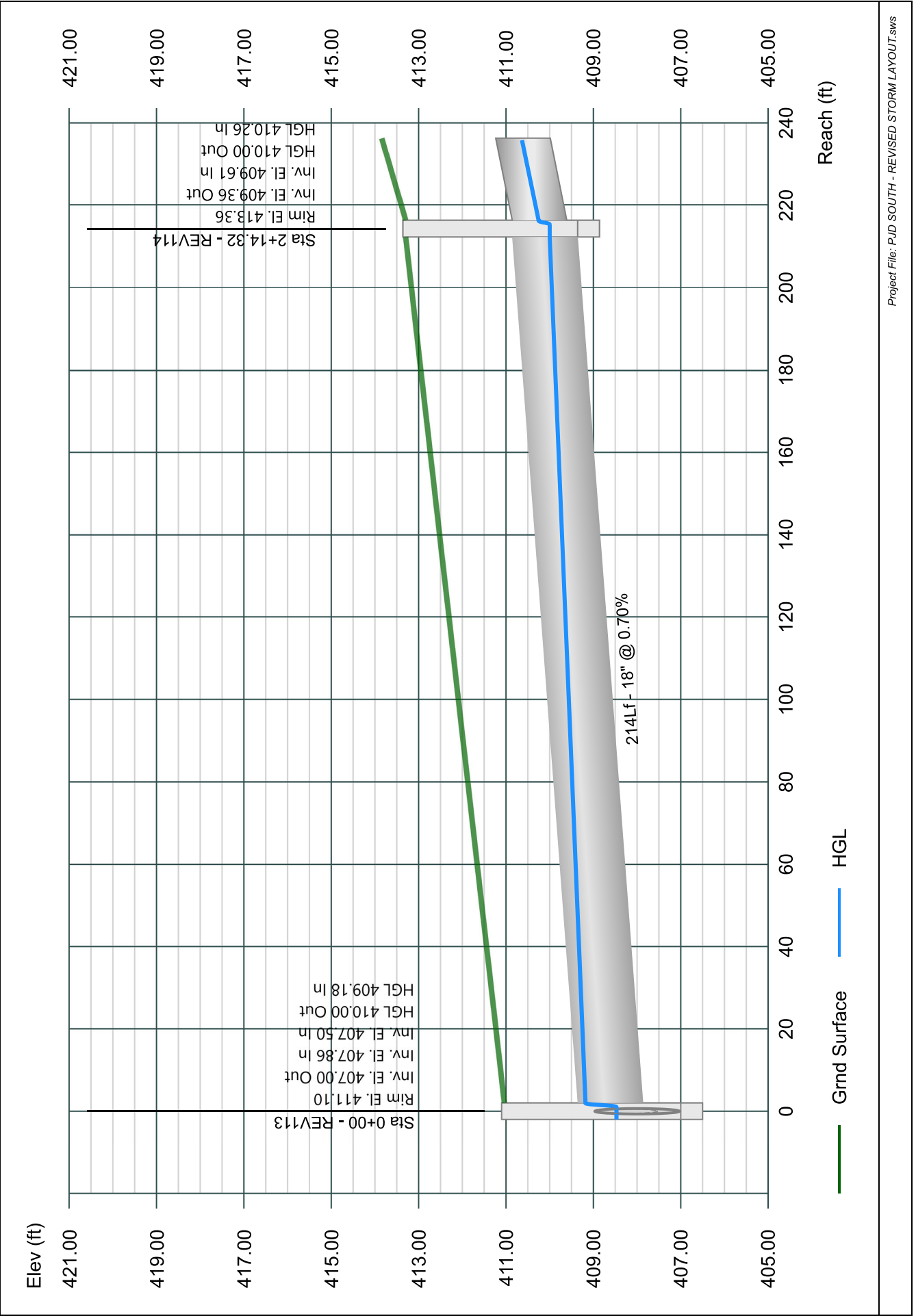


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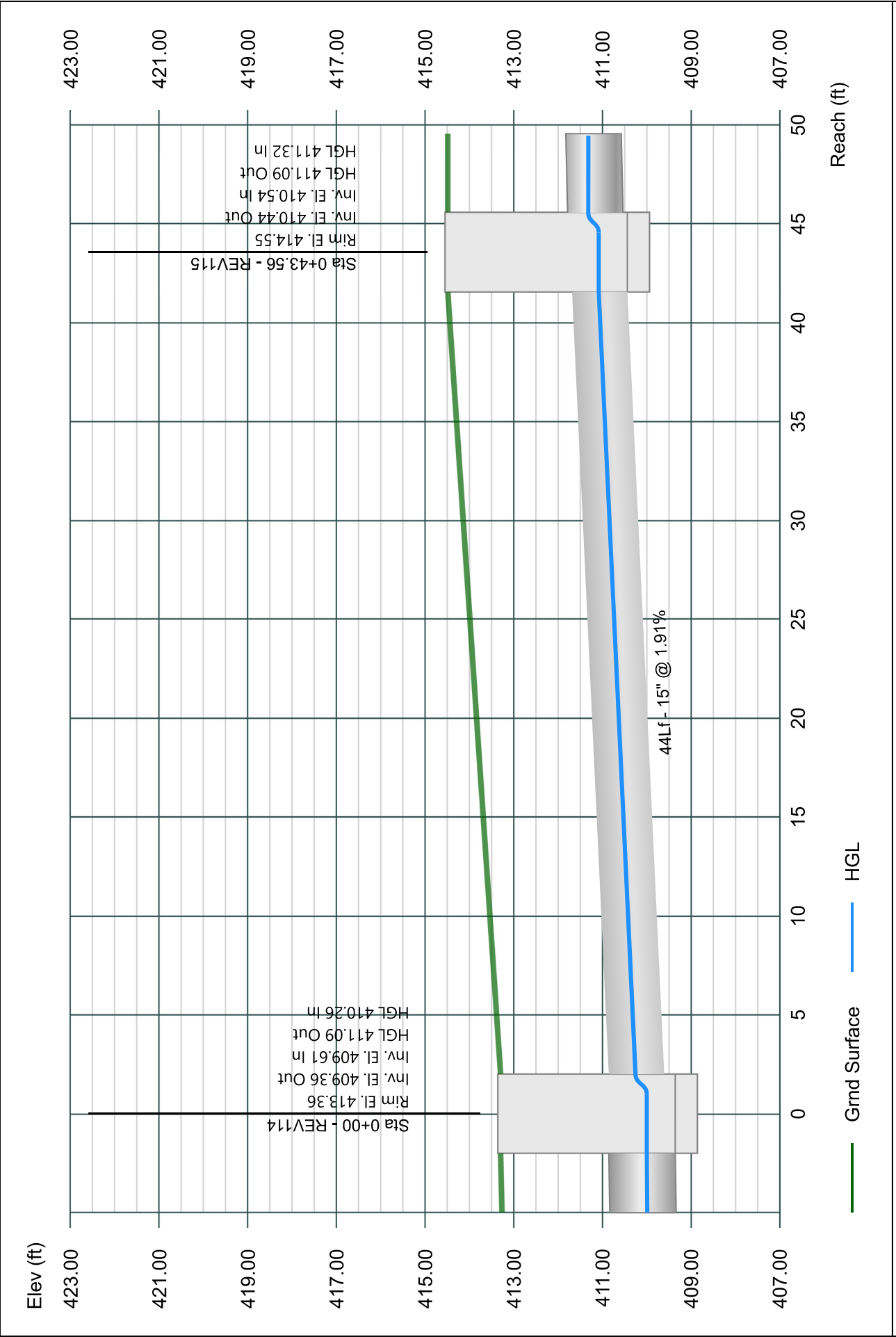


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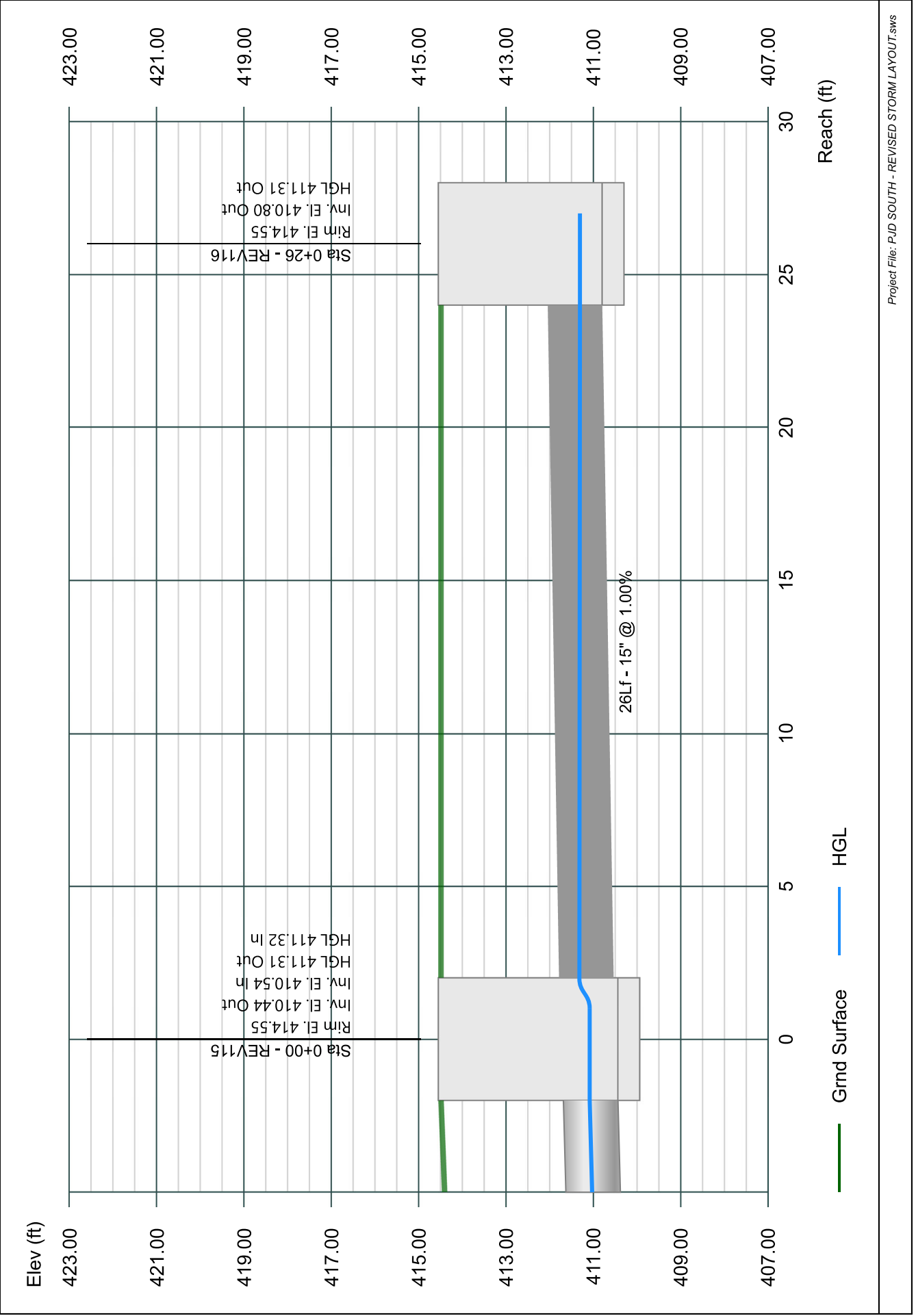


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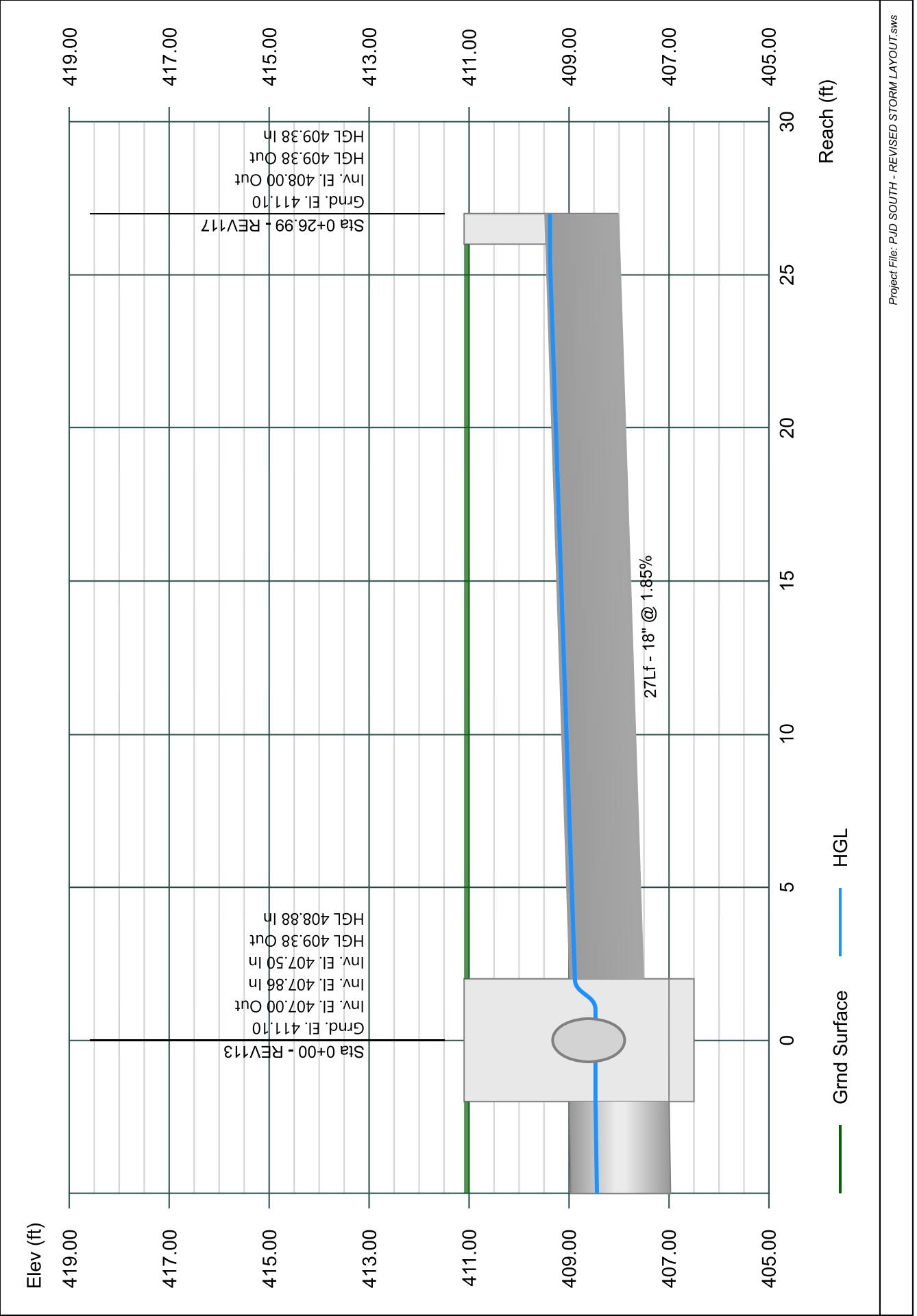


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02-03-2023



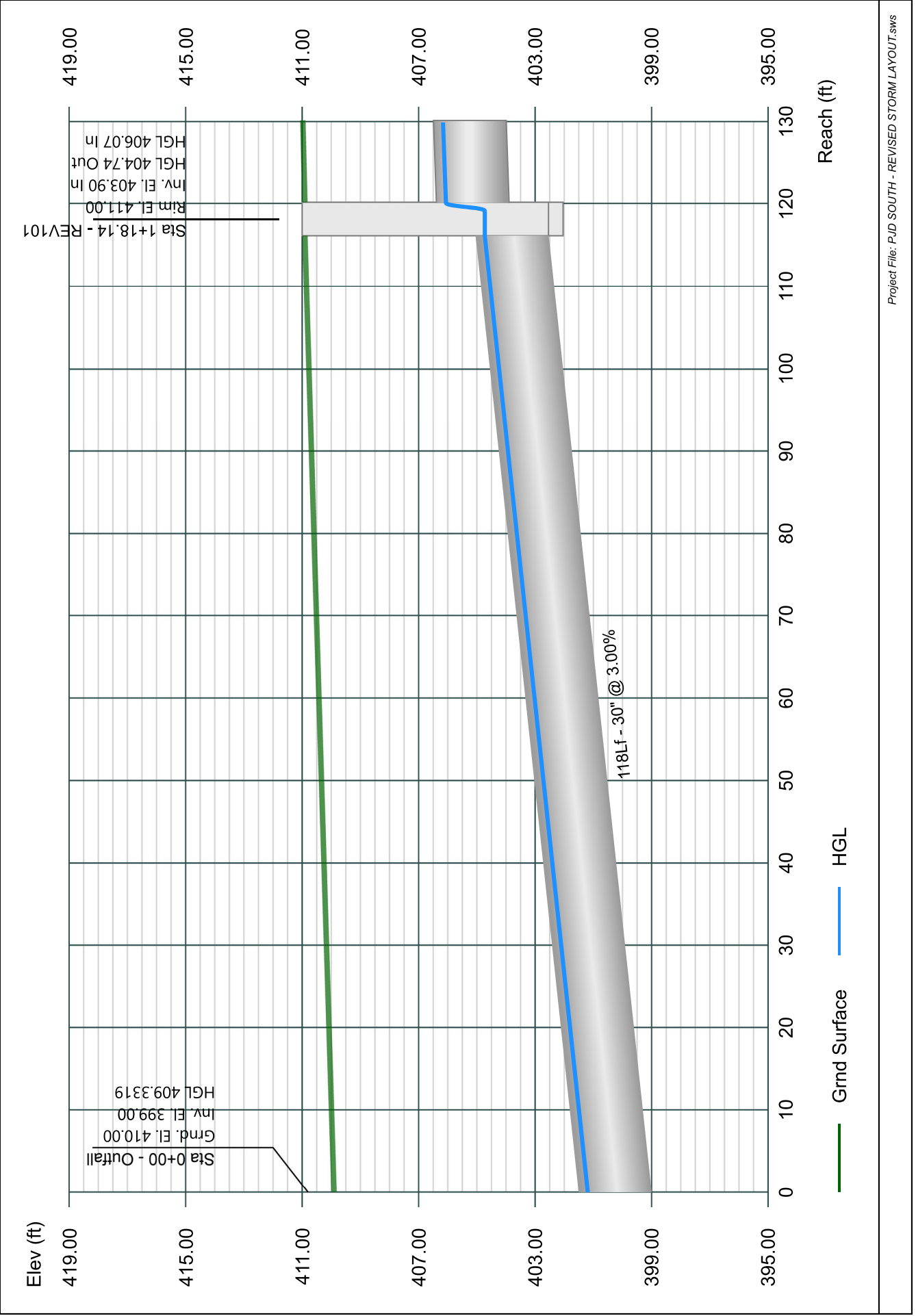
25-YEAR HGL

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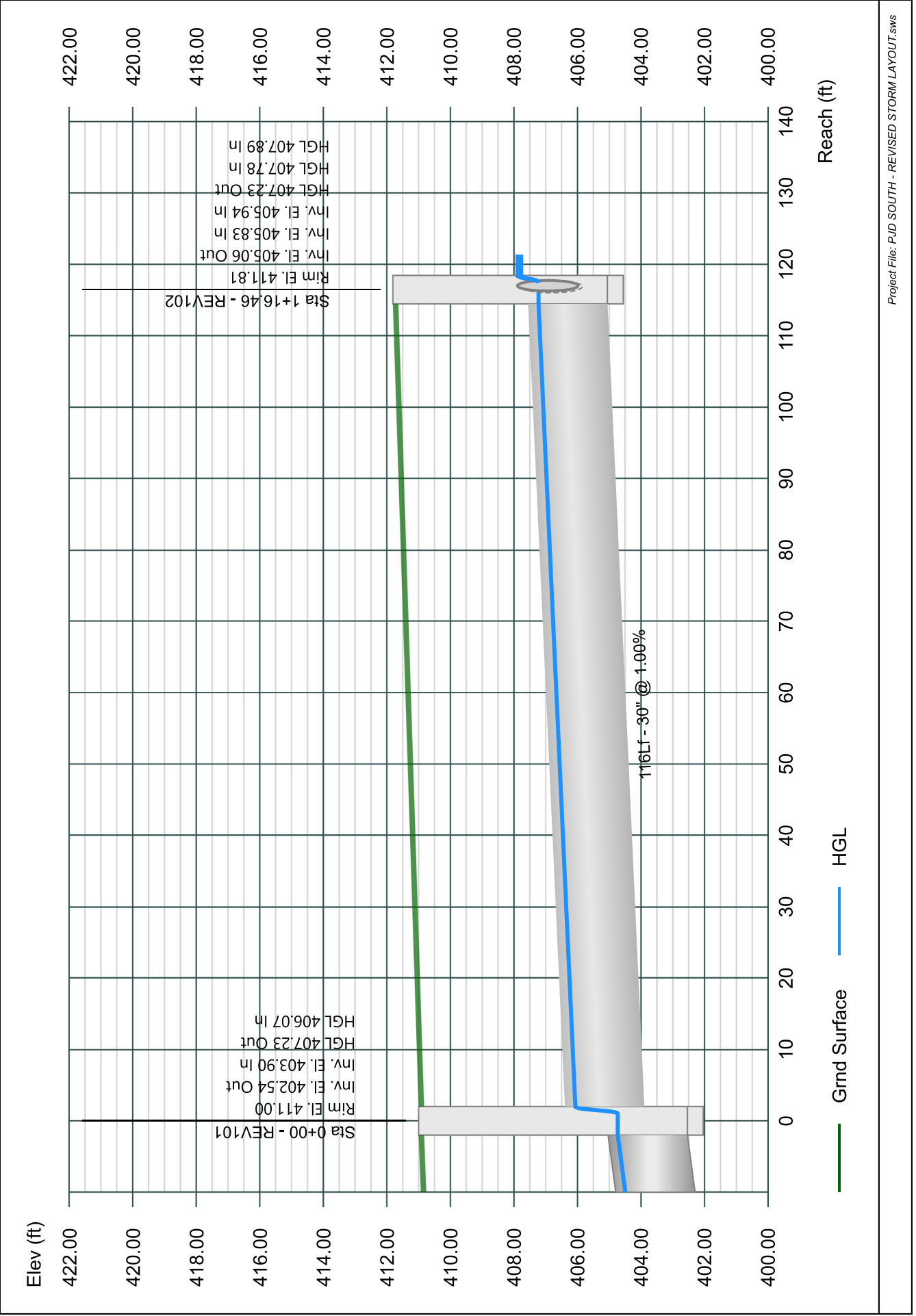


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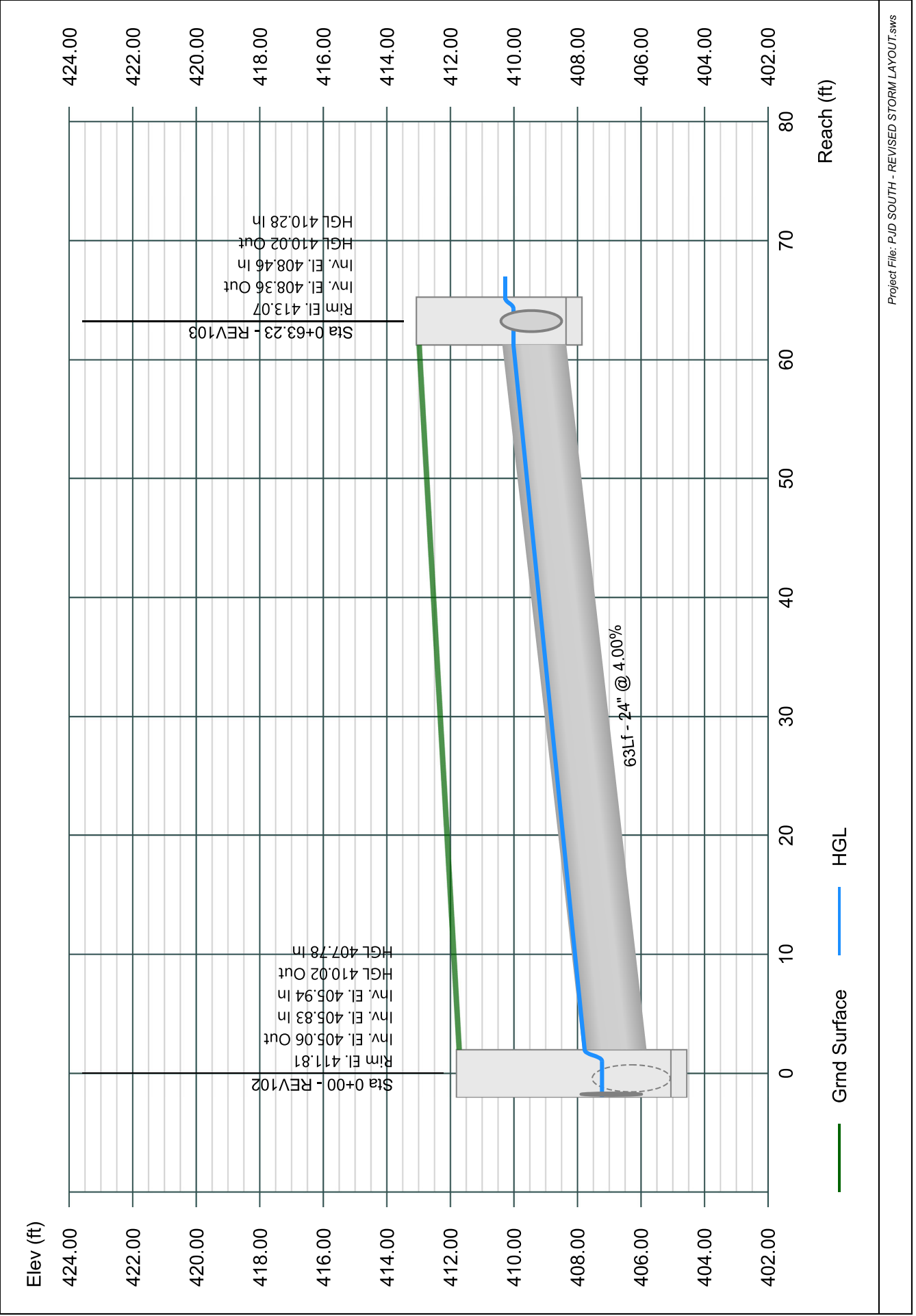


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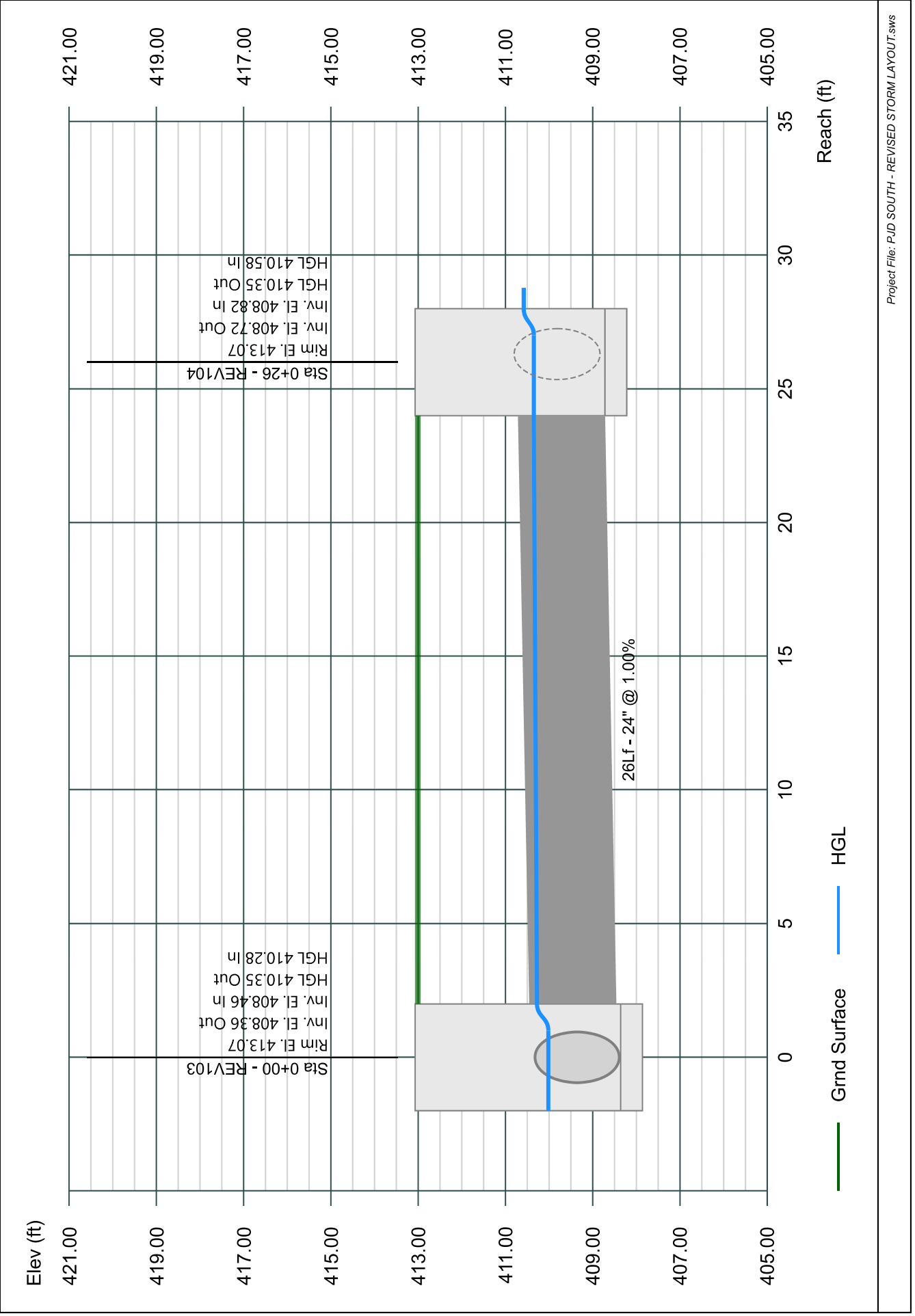


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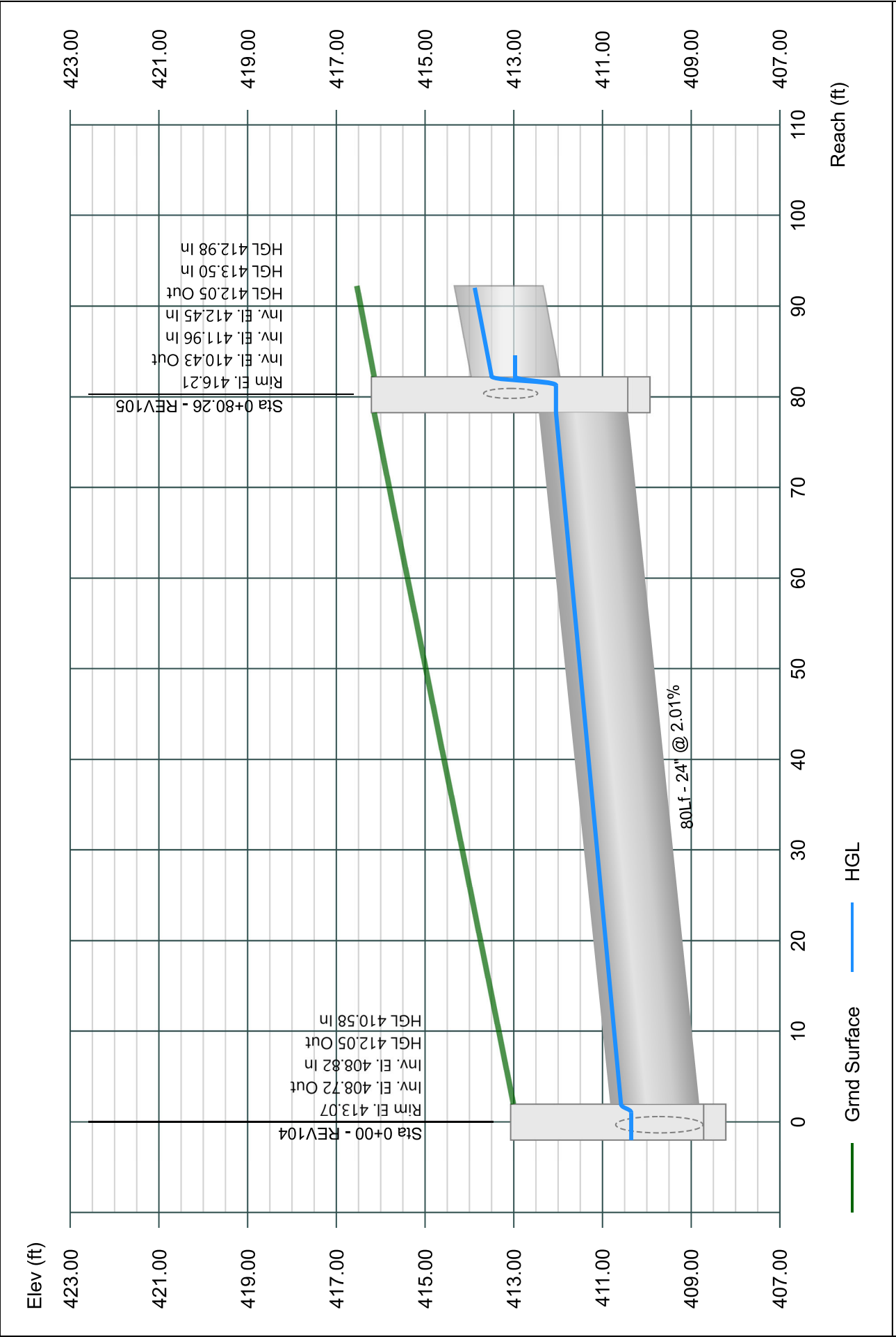


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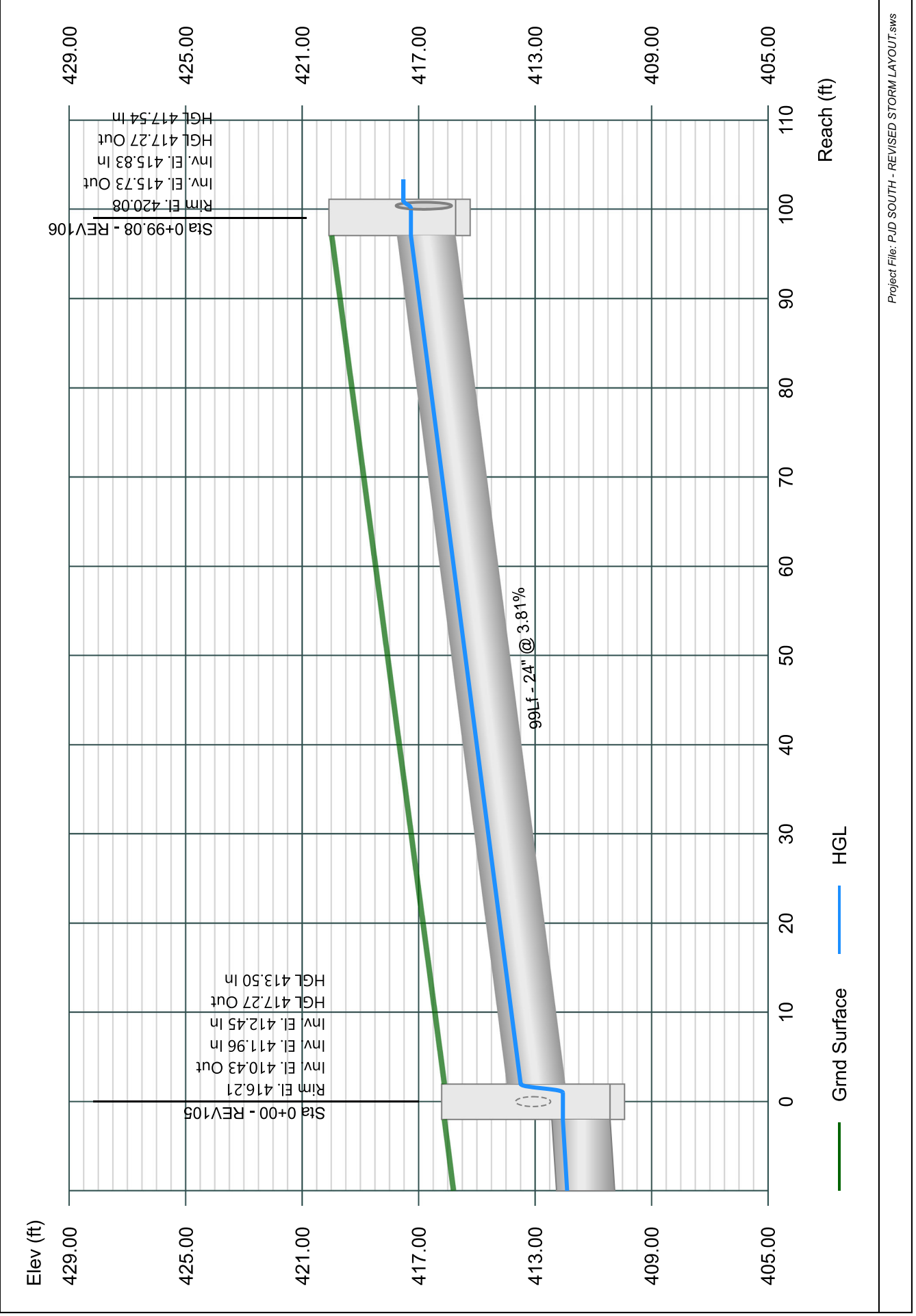


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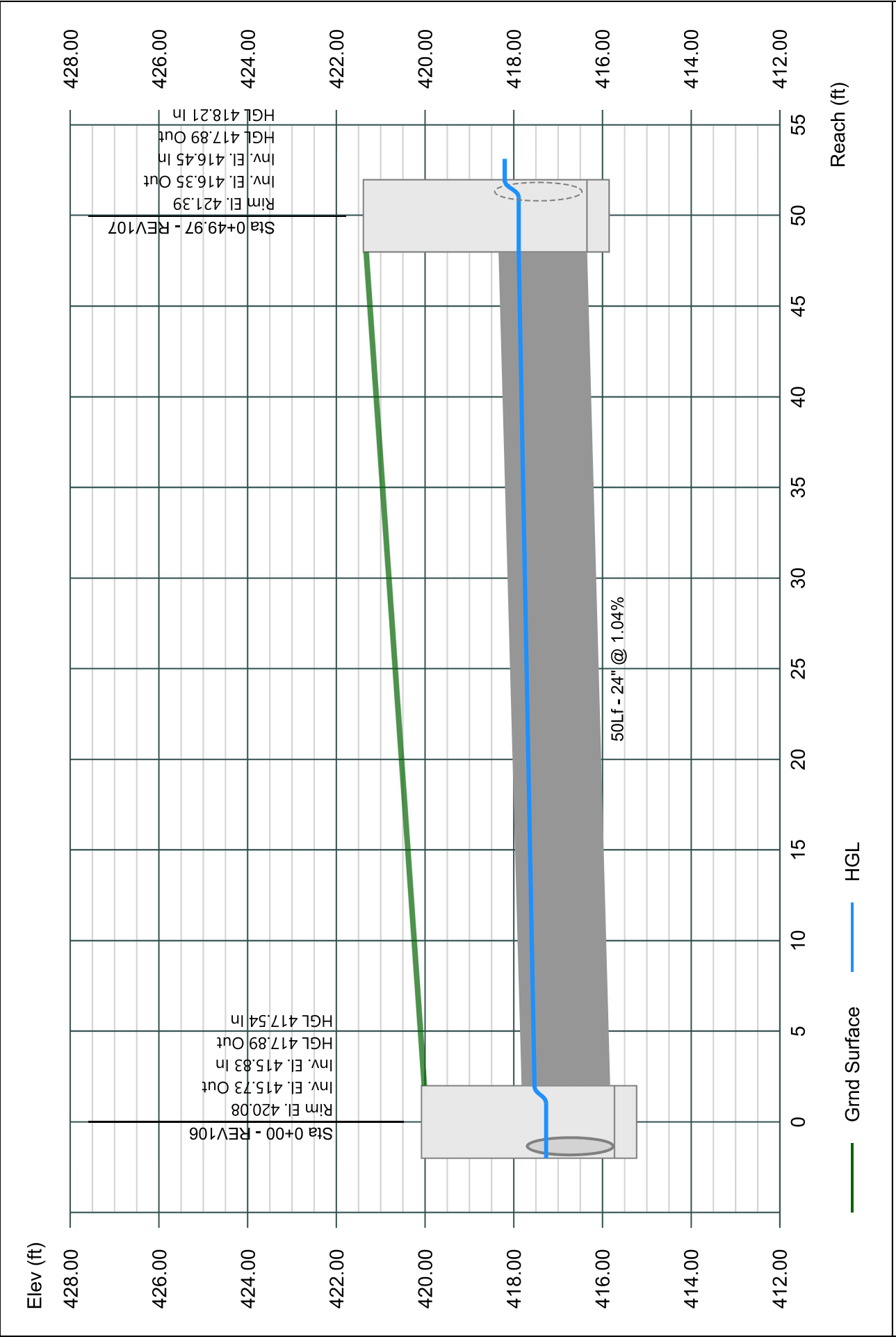


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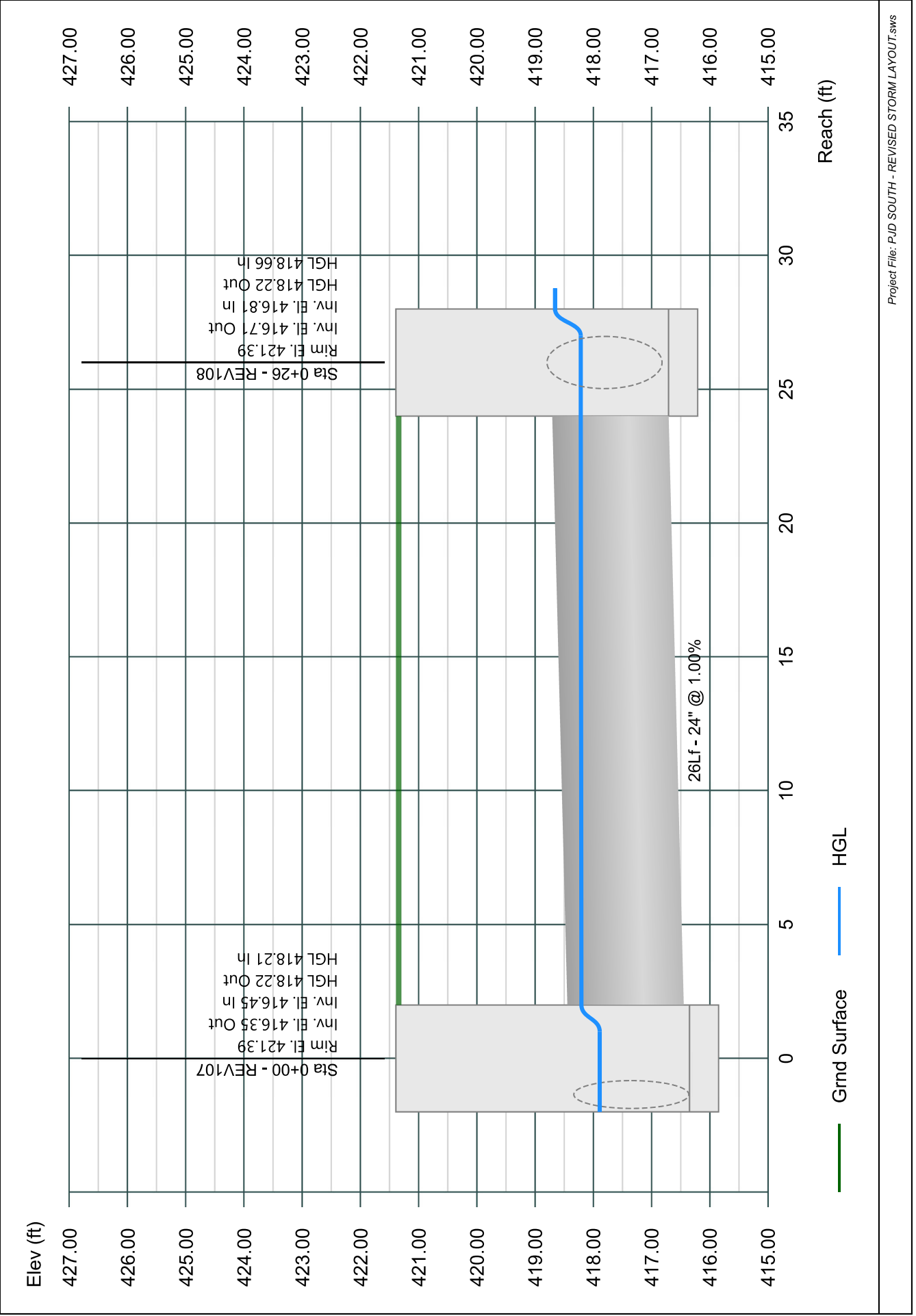


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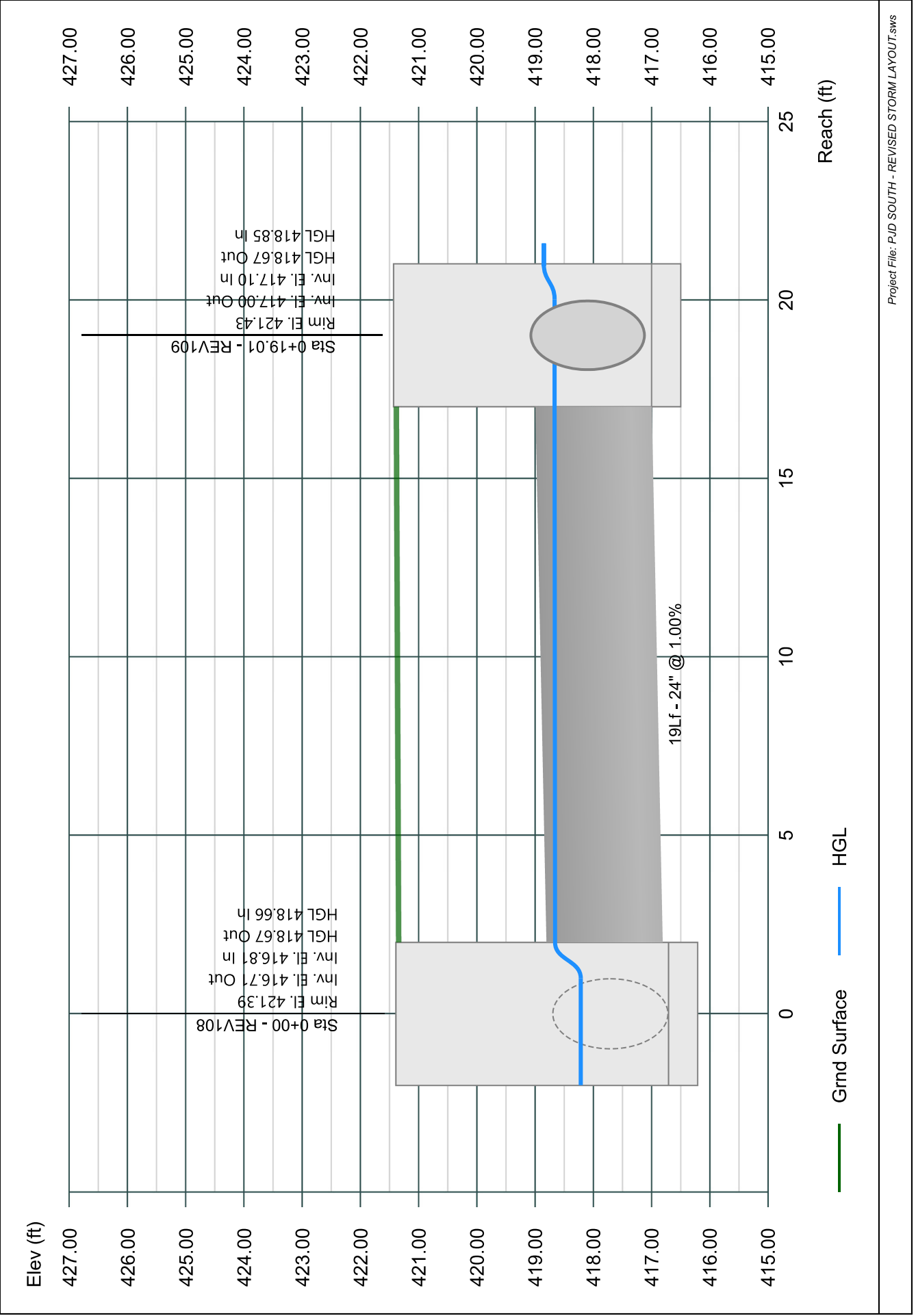


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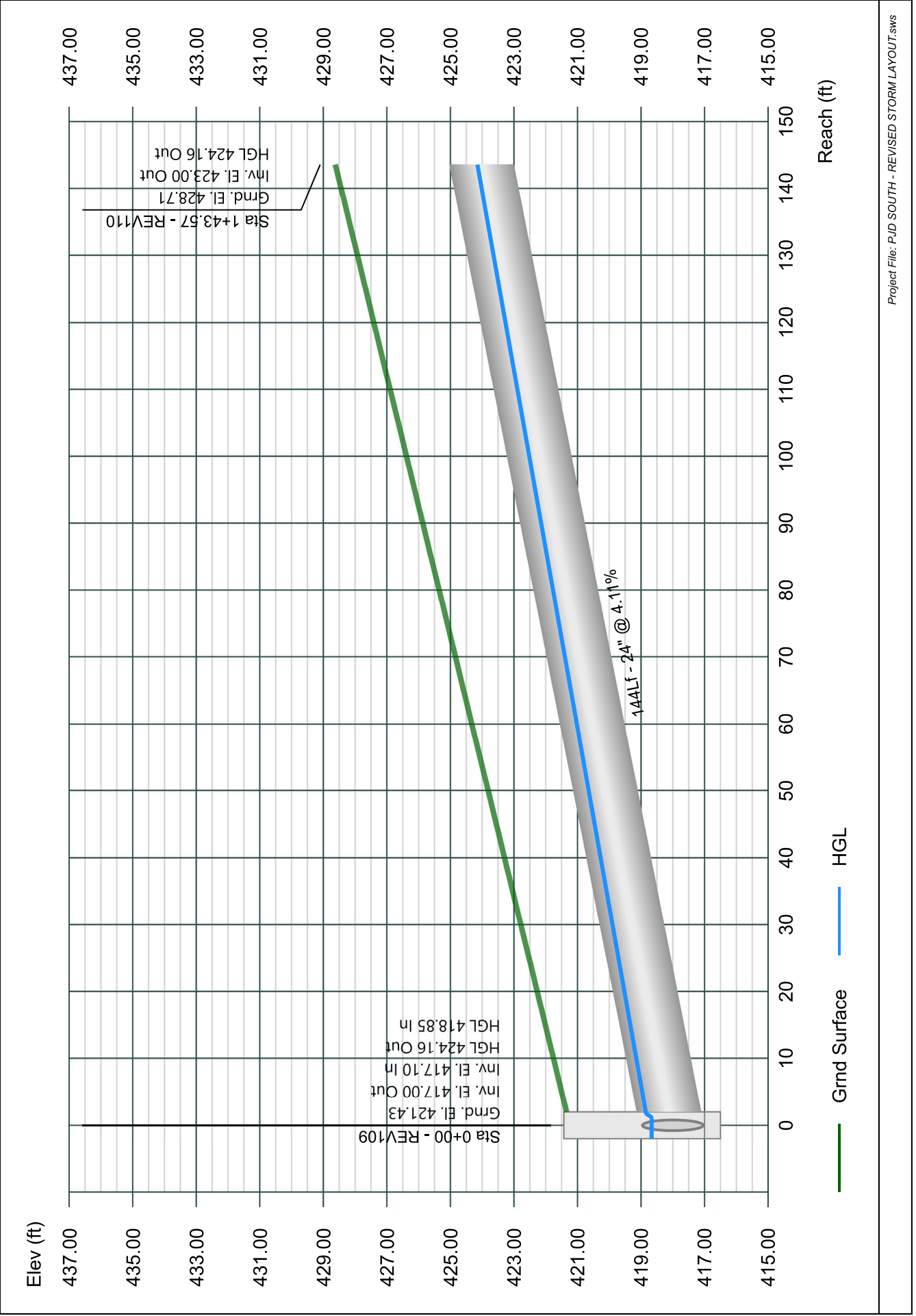


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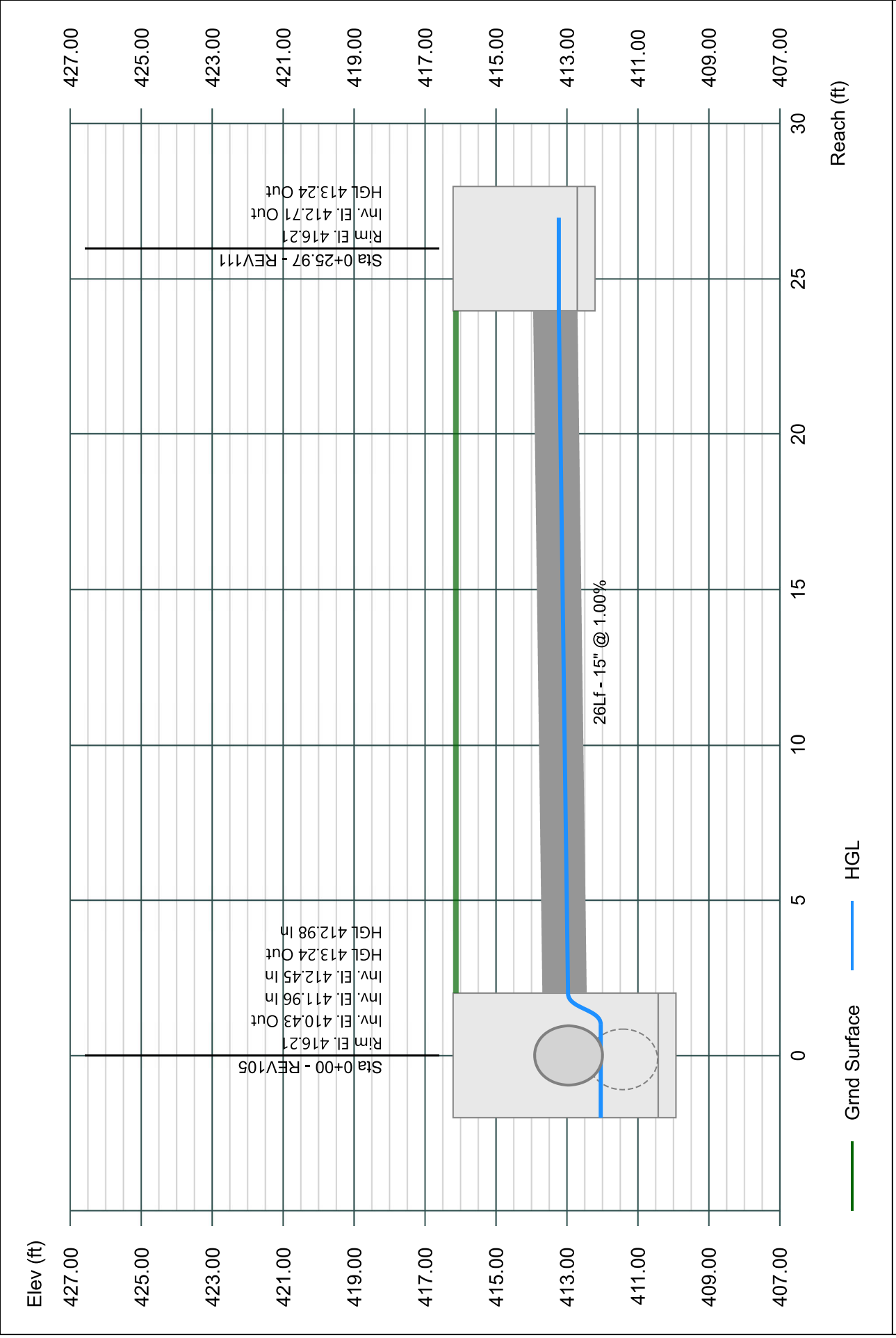


Line 11 - 111 TO 105

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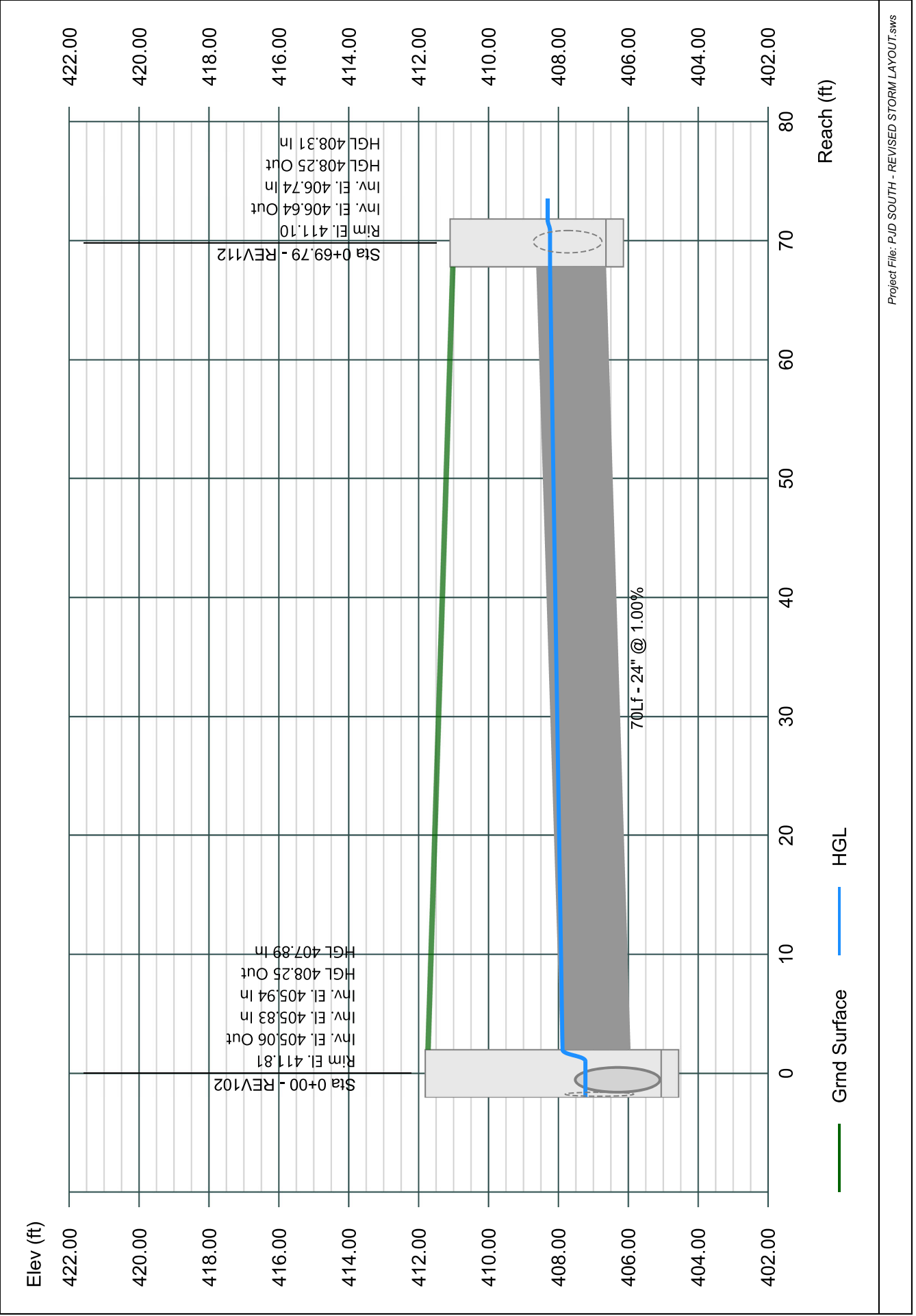


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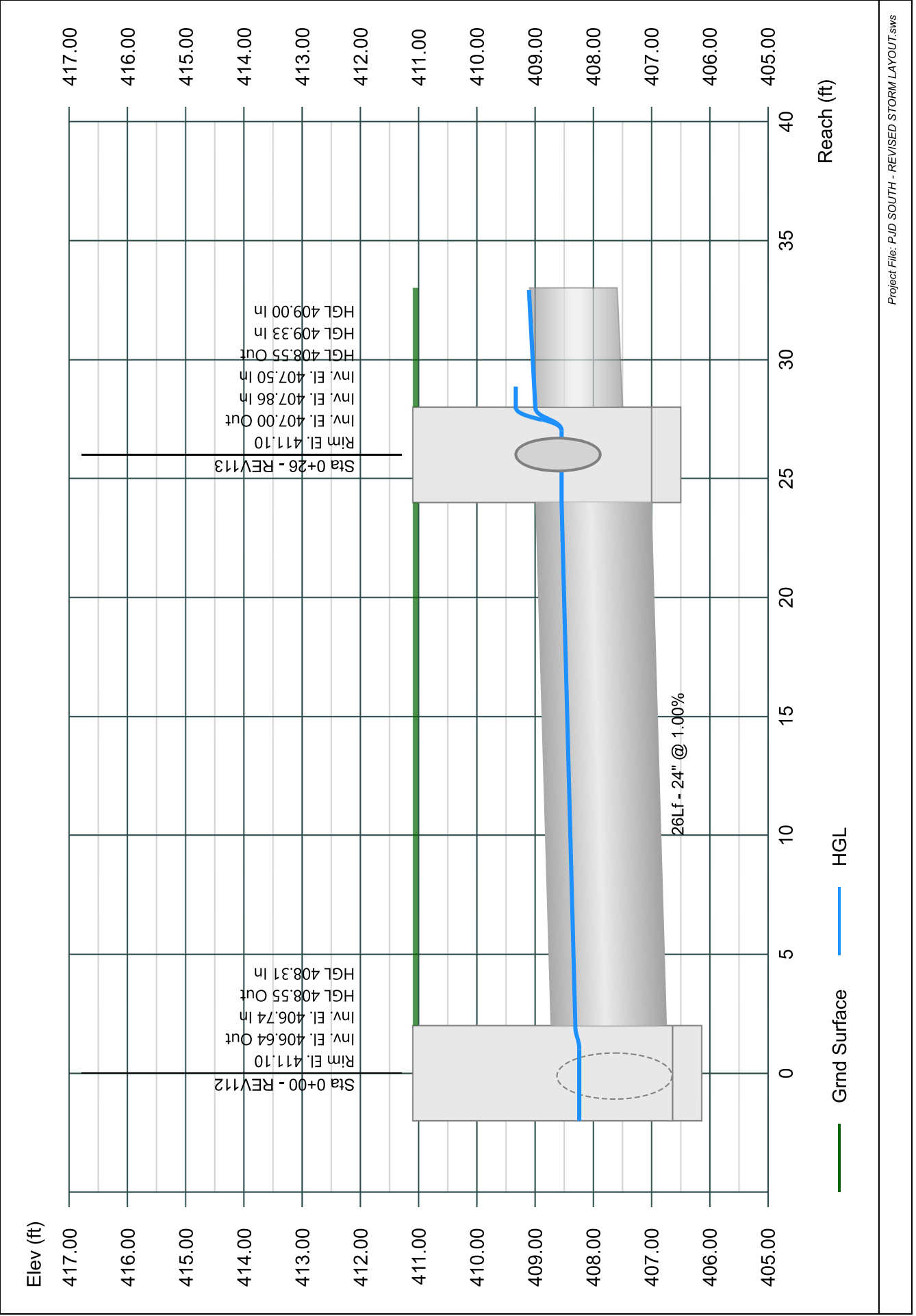


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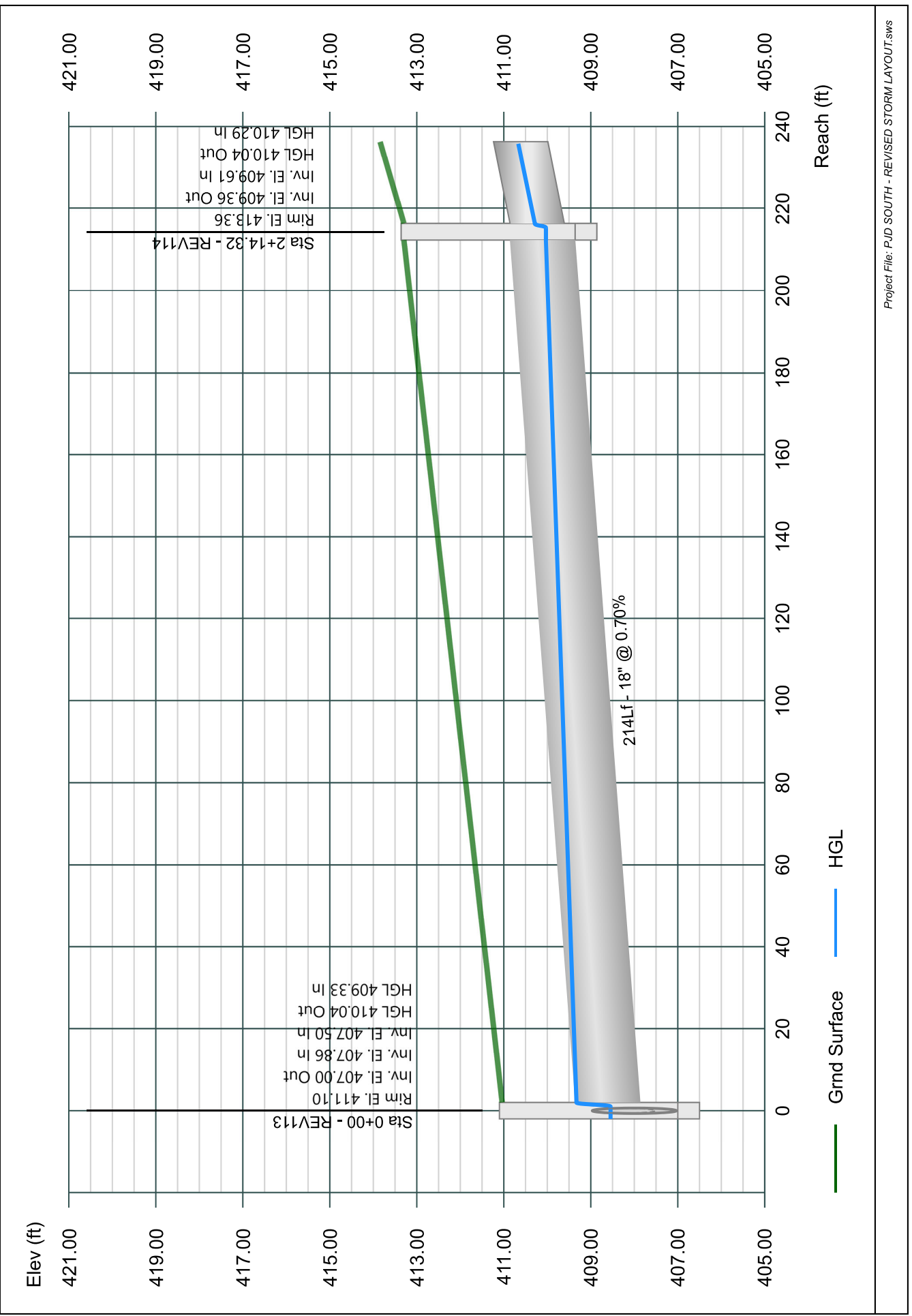


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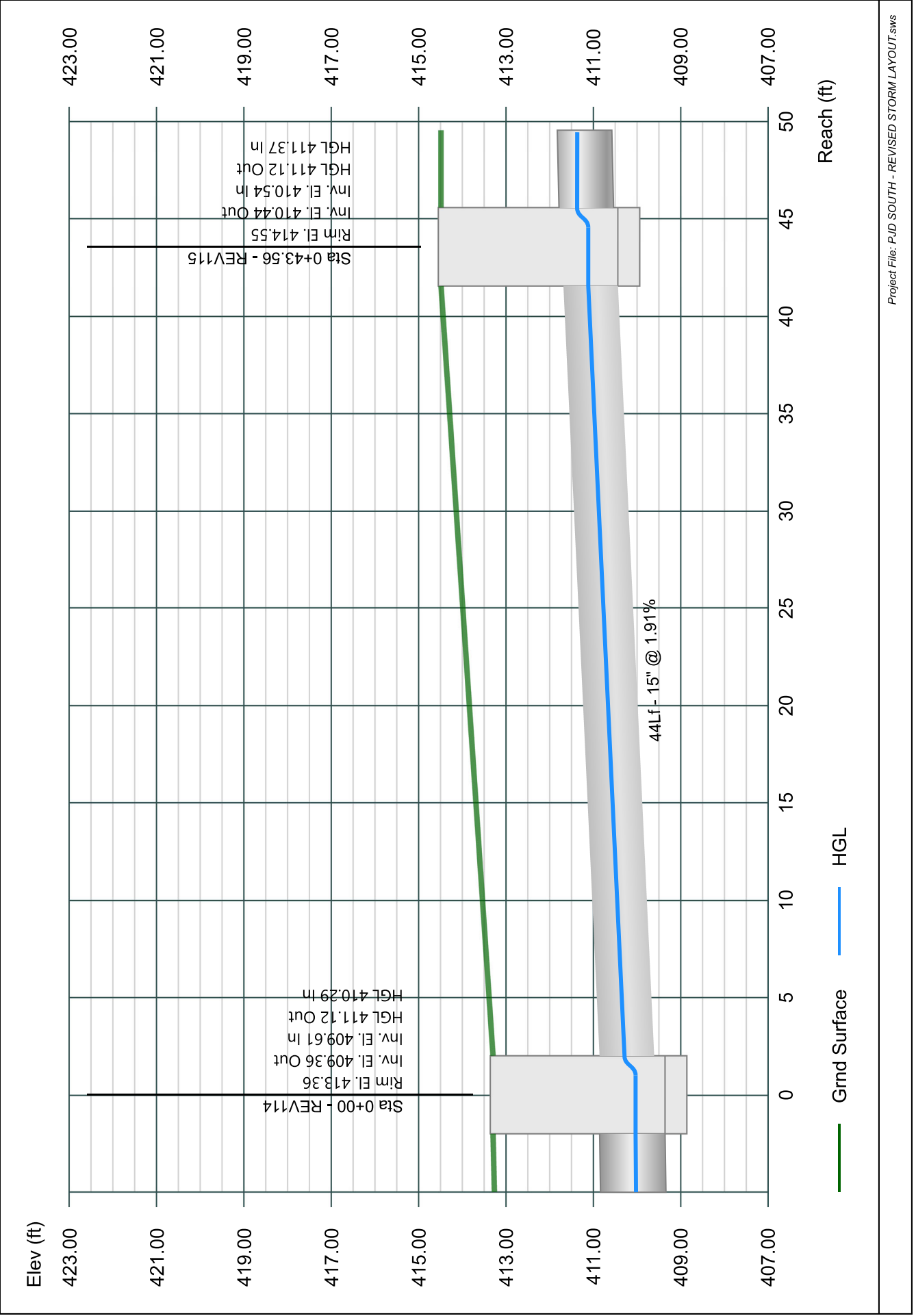


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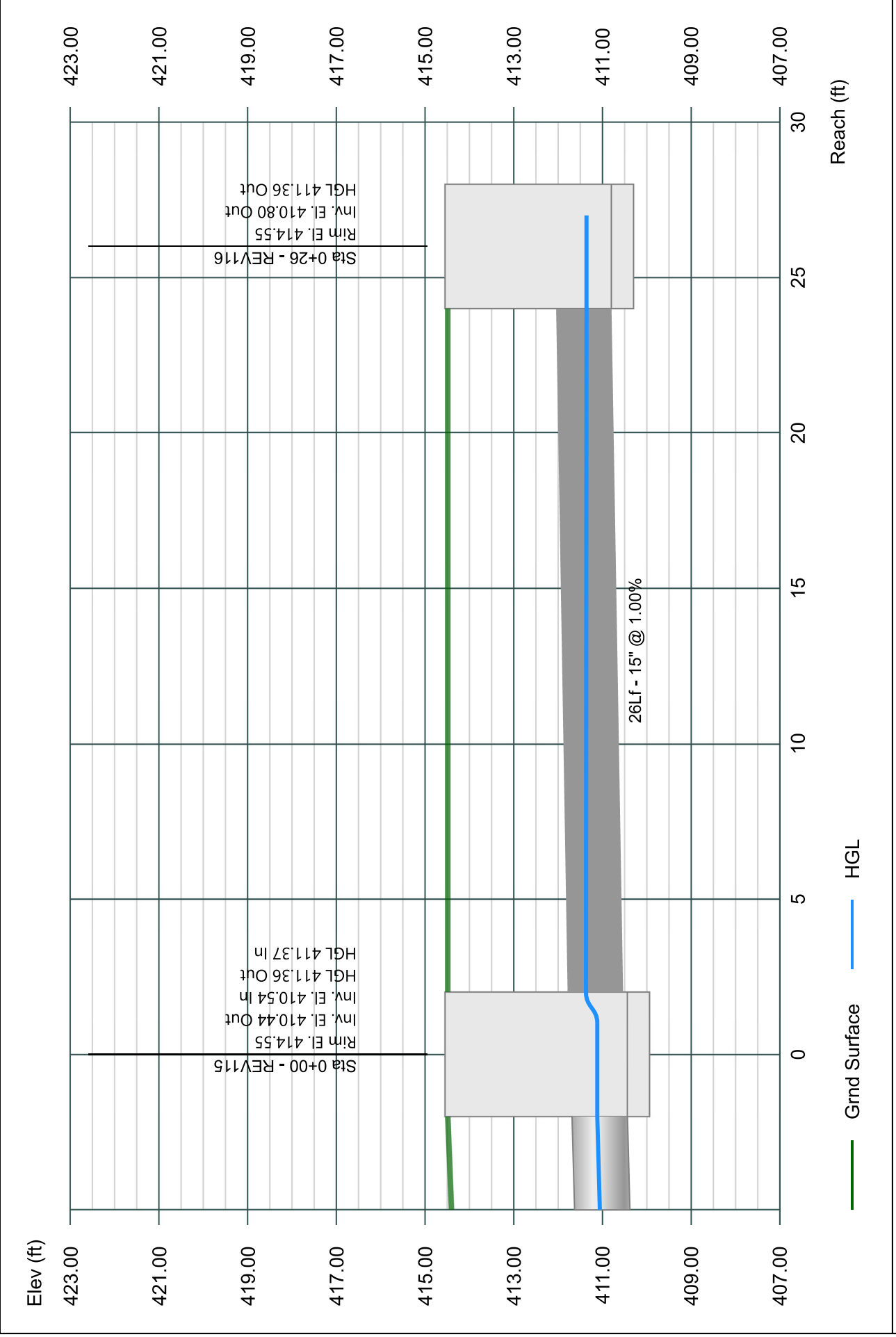


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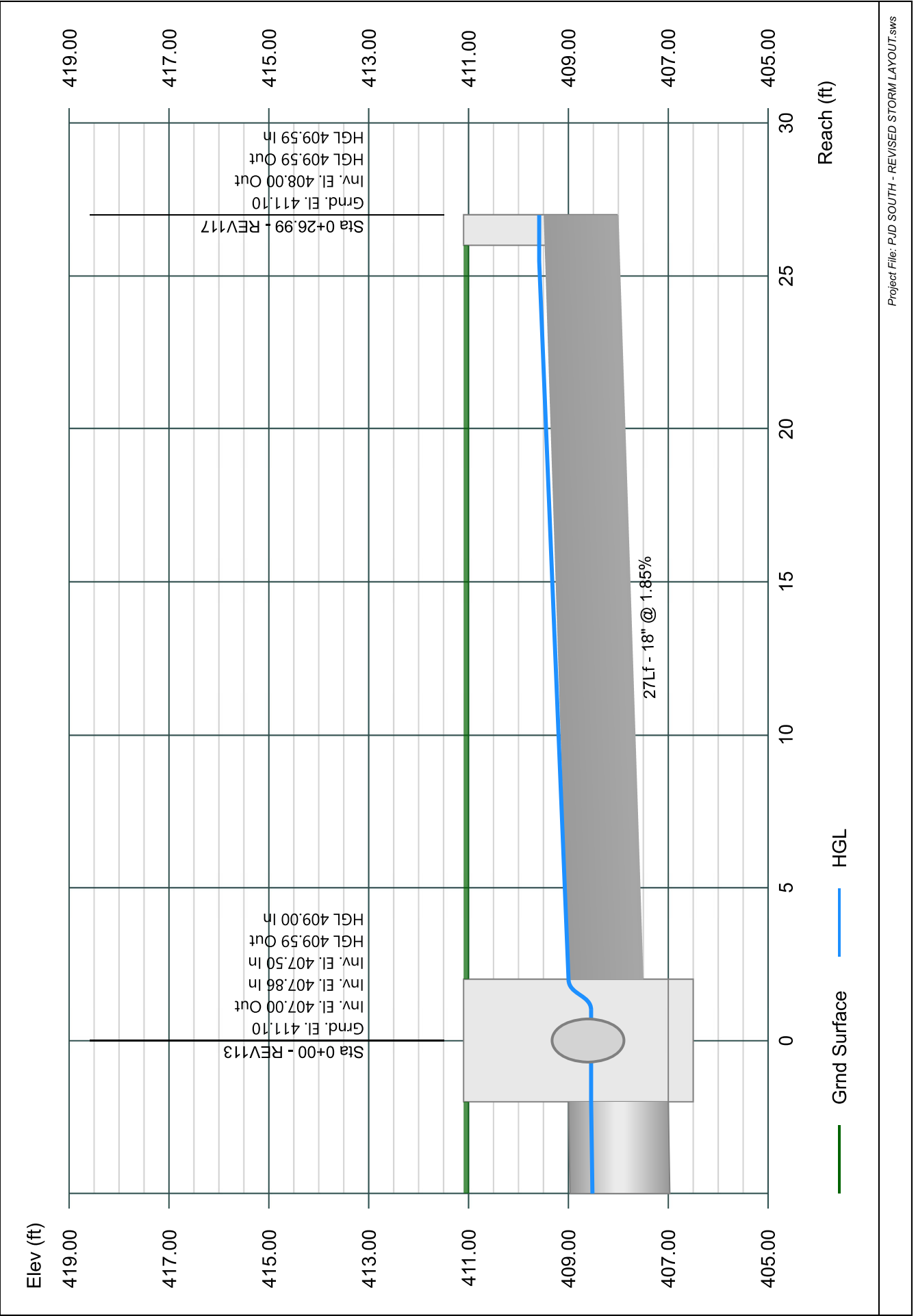


Line 17 - 117 TO 113

Stormwater Studio 2022 v 3.0.0.29

Project Name: Enter Project Name...

02-03-2023



APPENDIX D – STORM SEWER GUTTER SPREAD CALCULATIONS

Spread Report

Stormwater Studio 2022 v 3.0.0.29

Project Name: Enter Project Name...

02-03-2023

Line No.	Inlet ID	Area ID	Junct Type	Drain Area (ac)	Runoff Coeff (C)	i Inlet (in/hr)	Incr Q (cfs)	Q Carry (cfs)	Q Capt (cfs)	Q Bypass (cfs)	Gutter Spread (ft)	Inlet Spread (ft)
1	REV101	REV101	Generic	0.380	0.65	4.00	0.99	0.00	0.99	0.00	4.18	4.18
2	REV102	REV102	MH	0.001	0.90	4.00	0.00	...	...	...	...	...
3	REV103	REV103	Comb.	0.190	0.60	4.00	0.46	0.10	0.52	0.03	3.18	1.73
4	REV104	REV104	Comb.	0.050	0.85	4.00	0.17	0.00	0.17	0.00	2.35	1.10
5	REV105	REV105	Comb.	0.060	0.85	4.00	0.20	0.00	0.20	0.00	2.45	1.19
6	REV106	REV106	Comb.	0.020	0.85	4.00	0.07	0.00	0.07	0.00	1.90	0.78
7	REV107	REV107	Comb.	0.150	0.85	4.00	0.51	0.00	0.51	0.00	2.21	2.21
8	REV108	REV108	Comb.	1.030	0.50	4.00	2.06	0.45	2.51	0.00	6.21	6.21
9	REV109	REV109	Comb.	0.770	0.60	4.00	1.85	0.00	1.39	0.45	5.73	4.82
10	REV110	REV110	None	1.620	0.90	4.00	5.83	...	...	...	...	...
11	REV111	REV111	Comb.	0.370	0.60	4.00	0.89	0.00	0.79	0.10	3.63	2.12
12	REV112	REV112	Comb.	0.220	0.85	4.00	0.75	0.03	0.78	0.00	2.96	2.96
13	REV113	REV113	Comb.	0.200	0.85	4.00	0.68	0.01	0.69	0.00	2.71	2.71
14	REV114	REV114	Comb.	0.040	0.85	4.00	0.14	0.15	0.27	0.01	3.18	1.74
15	REV115	REV115	Comb.	0.280	0.85	4.00	0.95	0.00	0.80	0.15	4.60	3.44
16	REV116	REV116	Comb.	0.160	0.85	4.00	0.54	0.00	0.49	0.05	3.85	2.44
17	REV117	REV117	Hdwall	4.000	0.50	4.00	8.00	0.00	8.00	0.00	...	...

Notes: IDF File = Gutter Spread - 4 inches per hour.idf, Return Period = 2-yrs. Project File: PJD SOUTH - REVISED STORM LAYOUT.sws