

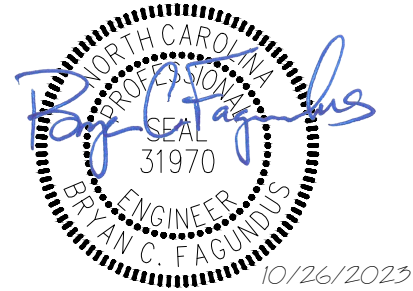
MEMORANDUM

Date: January, 31 2023
Rev. June 23, 2023
Rev. August 16, 2023
Rev. September 25, 2023
Rev. October 12, 2023

To: Wake County, NC; Town of Rolesville, NC

From: Bryan C. Fagundus, PE

Subject: Public Storm Sewer Pipe Network Design – Wallbrook Development – Rolesville, Wake County, NC

**Project Summary**

The purpose of this memorandum is to present the design calculations for the public storm sewer pipe network for Wallbrook Drive and Virginia Water Drive as part of the Wallbrook Development. The total development consists of approximately 64.39 acres with approximately 2.50 acres within the public rights-of-way of Virginia Water Drive and Wallbrook Drive. The site is located on the South side of Main Street (US 401) in Rolesville, NC. (Reference Wallbrook Preliminary Plat PR21-04 and Wallbrook Roadway Improvements CID23-01).

Lines 22 (211A-DI), 19 (213A-DI), and 15 (215A-DI) represent future drainage areas from Lot 5 as shown on PR 21-04 to the proposed public storm sewer system. Line 23 represents a known flow (Q) of 75.80 cfs during the 10-yr rain event that is routed into 203-CB of the proposed public storm sewer system from NCDOT's U-6241 project. Lines 25, 27, and 31 represent yard inlets to capture runoff around the proposed retaining wall and conveyed to the proposed public storm sewer system. Line 18 represents a drop inlet on Lot 6 (CD 22-02: Wallbrook Townhomes) to capture a small portion of runoff and conveyed through the proposed public storm sewer system. Lines 32 and 33 represent the outlet pipes from the proposed stormwater control measure.

Calculation Methodology & Constants

- A minimum time of concentration of 5 minutes was utilized
- A minimum rational C value of 0.85 was utilized
- RCP utilizes a Manning's n value of 0.013
- PVC pipes utilize a Manning's n value of 0.012
- The minimum size used for RCP is 15"
- Rainfall data was taken from NOAA Atlas 14 at the Neuse 2 NE station

Analysis

The pipe networks were modeled using Autodesk Civil 3D and the model data was exported to Hydraflow Storm Sewer software for analysis. The attached results show that the drainage network meets Wake County and Town of Rolesville regulations and standards as follows:

- The gutter spread for the 1-year, approximately 4 in/hr storm, does not encroach more than 10' into the adjacent driving lane for the public storm sewer system.
- The total flow (cfs) within the storm sewer system does not exceed the flow capacity (cfs) in the pipe network in the 10-year rain event for storm sewer system.
- The 10-yr rain event HGL is contained within the public storm sewer system.

Drainage Area Map and Supporting Documents



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.82 (4.42-5.28)	5.62 (5.15-6.13)	6.42 (5.89-7.01)	7.18 (6.56-7.82)	7.94 (7.24-8.66)	8.53 (7.74-9.30)	9.06 (8.16-9.86)	9.50 (8.53-10.4)	10.0 (8.90-10.9)	10.4 (9.20-11.4)
10-min	3.85 (3.53-4.21)	4.49 (4.12-4.91)	5.15 (4.72-5.62)	5.74 (5.25-6.26)	6.33 (5.77-6.90)	6.79 (6.16-7.40)	7.19 (6.49-7.84)	7.54 (6.76-8.23)	7.92 (7.04-8.64)	8.22 (7.25-8.99)
15-min	3.21 (2.94-3.51)	3.76 (3.45-4.11)	4.34 (3.98-4.74)	4.84 (4.43-5.28)	5.35 (4.87-5.83)	5.74 (5.20-6.25)	6.06 (5.47-6.60)	6.34 (5.68-6.92)	6.64 (5.91-7.25)	6.88 (6.06-7.52)
30-min	2.20 (2.02-2.41)	2.60 (2.38-2.84)	3.08 (2.83-3.36)	3.51 (3.21-3.82)	3.96 (3.61-4.32)	4.32 (3.92-4.71)	4.64 (4.19-5.06)	4.93 (4.42-5.38)	5.29 (4.70-5.77)	5.57 (4.91-6.09)
60-min	1.37 (1.26-1.50)	1.63 (1.50-1.78)	1.98 (1.81-2.16)	2.28 (2.09-2.49)	2.64 (2.40-2.88)	2.93 (2.65-3.19)	3.20 (2.88-3.48)	3.46 (3.10-3.78)	3.79 (3.37-4.14)	4.07 (3.59-4.44)
2-hr	0.800 (0.728-0.883)	0.956 (0.872-1.05)	1.17 (1.06-1.28)	1.36 (1.24-1.50)	1.60 (1.44-1.75)	1.80 (1.61-1.97)	1.99 (1.77-2.17)	2.18 (1.93-2.38)	2.43 (2.13-2.65)	2.64 (2.30-2.89)
3-hr	0.565 (0.514-0.625)	0.675 (0.616-0.744)	0.829 (0.755-0.913)	0.974 (0.884-1.07)	1.15 (1.04-1.26)	1.31 (1.17-1.43)	1.46 (1.30-1.60)	1.62 (1.43-1.77)	1.83 (1.60-2.00)	2.01 (1.74-2.21)
6-hr	0.340 (0.311-0.375)	0.407 (0.373-0.447)	0.500 (0.457-0.549)	0.588 (0.536-0.644)	0.699 (0.632-0.764)	0.796 (0.716-0.869)	0.893 (0.796-0.973)	0.994 (0.877-1.08)	1.13 (0.985-1.23)	1.25 (1.08-1.37)
12-hr	0.200 (0.183-0.220)	0.239 (0.220-0.261)	0.295 (0.270-0.323)	0.349 (0.318-0.381)	0.417 (0.378-0.455)	0.478 (0.431-0.519)	0.540 (0.481-0.586)	0.606 (0.534-0.657)	0.697 (0.604-0.754)	0.778 (0.664-0.843)
24-hr	0.119 (0.111-0.128)	0.144 (0.134-0.154)	0.180 (0.168-0.193)	0.209 (0.194-0.224)	0.248 (0.230-0.266)	0.279 (0.258-0.299)	0.310 (0.286-0.333)	0.343 (0.315-0.368)	0.387 (0.355-0.415)	0.422 (0.385-0.454)
2-day	0.069 (0.064-0.074)	0.083 (0.078-0.089)	0.103 (0.096-0.111)	0.119 (0.111-0.128)	0.141 (0.131-0.151)	0.158 (0.146-0.169)	0.175 (0.162-0.188)	0.192 (0.177-0.207)	0.217 (0.199-0.233)	0.235 (0.215-0.254)
3-day	0.049 (0.046-0.052)	0.059 (0.055-0.063)	0.073 (0.068-0.078)	0.083 (0.078-0.089)	0.098 (0.092-0.105)	0.110 (0.102-0.118)	0.122 (0.113-0.131)	0.134 (0.124-0.144)	0.151 (0.139-0.162)	0.165 (0.150-0.177)
4-day	0.039 (0.036-0.041)	0.046 (0.043-0.049)	0.057 (0.054-0.061)	0.066 (0.061-0.070)	0.077 (0.072-0.082)	0.086 (0.080-0.092)	0.096 (0.089-0.102)	0.105 (0.097-0.113)	0.119 (0.109-0.127)	0.129 (0.118-0.138)
7-day	0.026 (0.024-0.027)	0.031 (0.029-0.032)	0.037 (0.035-0.040)	0.042 (0.040-0.045)	0.050 (0.046-0.053)	0.055 (0.052-0.059)	0.061 (0.057-0.065)	0.067 (0.062-0.072)	0.075 (0.069-0.080)	0.082 (0.075-0.087)
10-day	0.020 (0.019-0.022)	0.024 (0.023-0.026)	0.029 (0.027-0.031)	0.033 (0.031-0.035)	0.038 (0.036-0.041)	0.042 (0.039-0.045)	0.046 (0.043-0.049)	0.050 (0.047-0.054)	0.056 (0.052-0.060)	0.060 (0.056-0.065)
20-day	0.014 (0.013-0.015)	0.016 (0.015-0.017)	0.019 (0.018-0.020)	0.021 (0.020-0.023)	0.024 (0.023-0.026)	0.027 (0.025-0.029)	0.029 (0.027-0.031)	0.032 (0.030-0.034)	0.035 (0.033-0.038)	0.038 (0.035-0.041)
30-day	0.011 (0.011-0.012)	0.013 (0.013-0.014)	0.015 (0.015-0.016)	0.017 (0.016-0.018)	0.019 (0.018-0.021)	0.021 (0.020-0.022)	0.023 (0.021-0.024)	0.024 (0.023-0.026)	0.027 (0.025-0.028)	0.028 (0.026-0.030)
45-day	0.010 (0.009-0.010)	0.011 (0.011-0.012)	0.013 (0.012-0.014)	0.014 (0.013-0.015)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.021 (0.020-0.022)	0.022 (0.021-0.023)
60-day	0.009 (0.008-0.009)	0.010 (0.010-0.011)	0.011 (0.011-0.012)	0.012 (0.012-0.013)	0.014 (0.013-0.014)	0.015 (0.014-0.015)	0.016 (0.015-0.016)	0.017 (0.016-0.017)	0.018 (0.017-0.019)	0.019 (0.018-0.020)

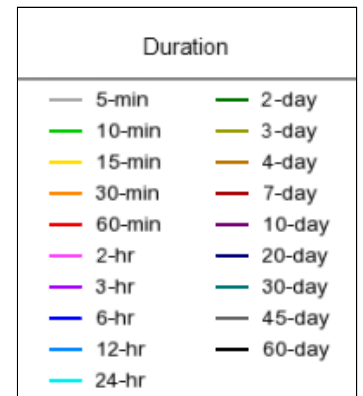
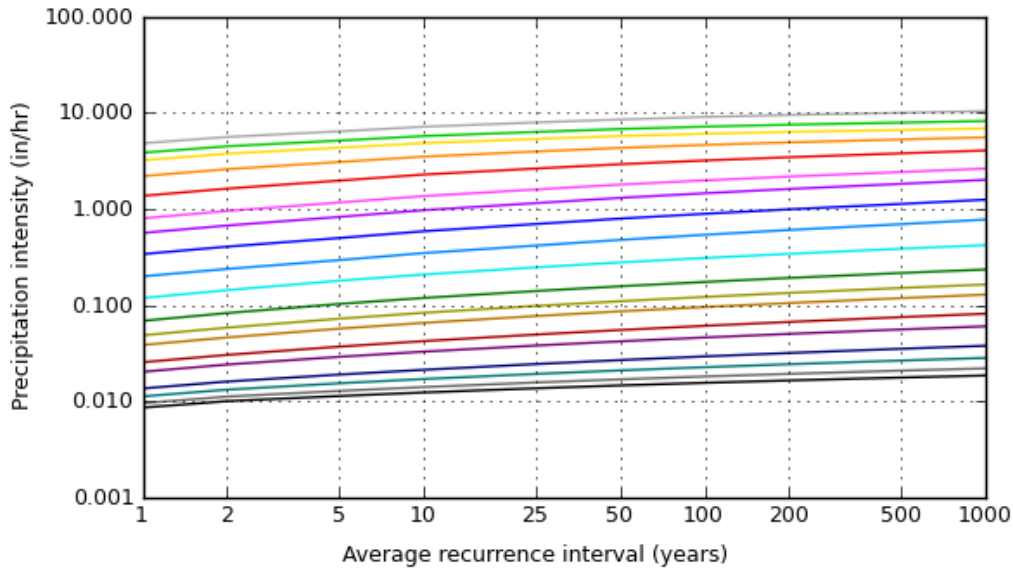
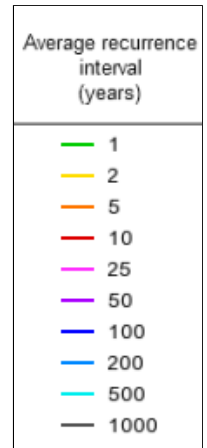
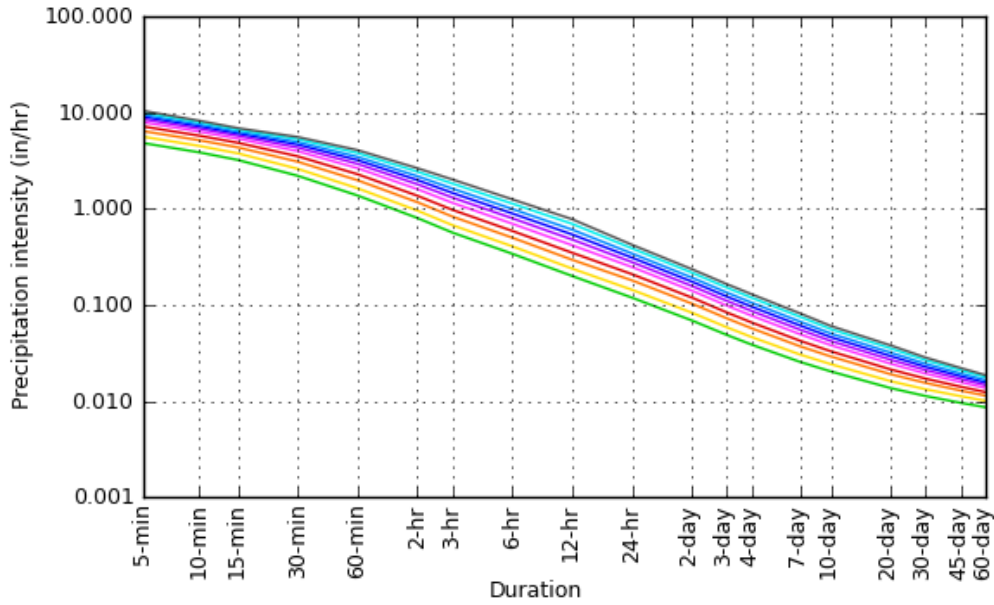
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based intensity-duration-frequency (IDF) curves

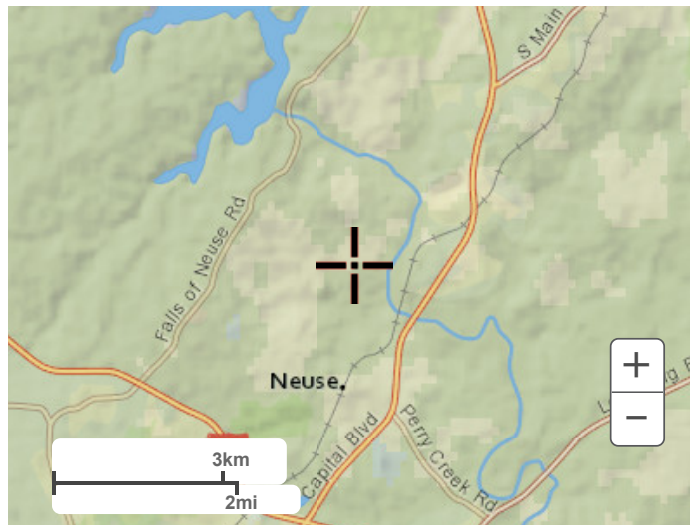
Latitude: 35.9167°, Longitude: -78.5667°



[Back to Top](#)

Maps & aerials

Small scale terrain



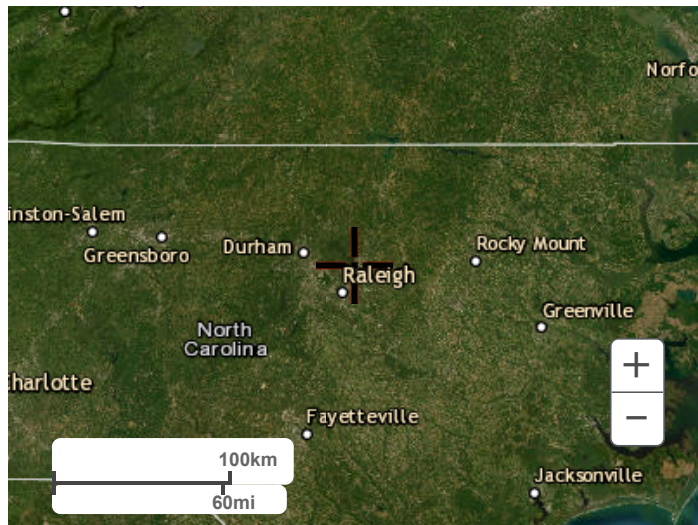
Large scale terrain



Large scale map



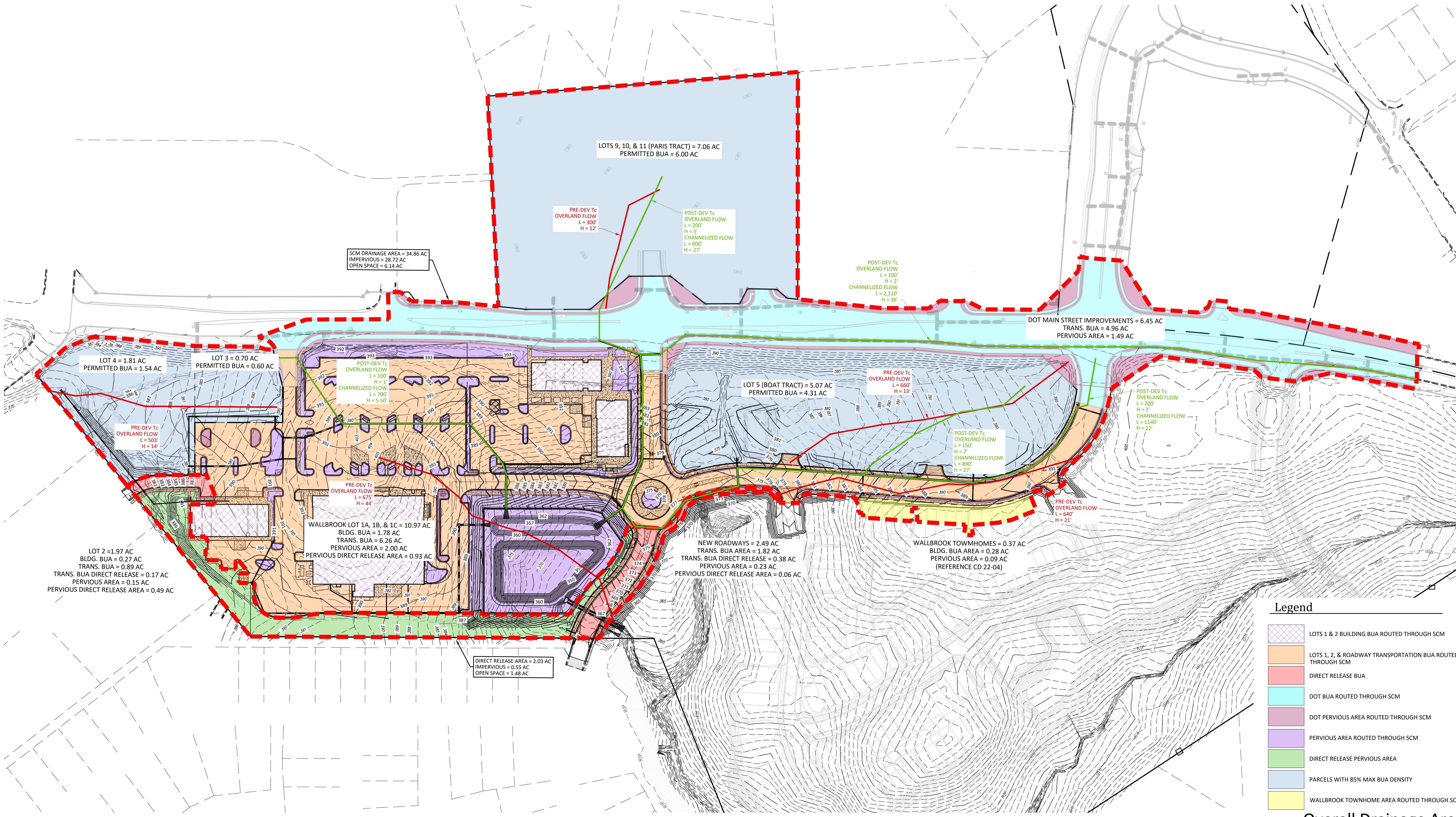
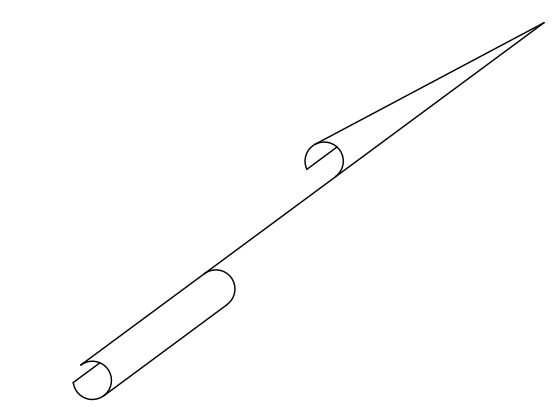
Large scale aerial



[Back to Top](#)

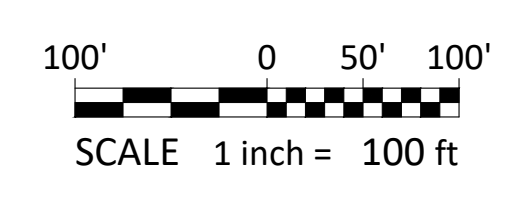
[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

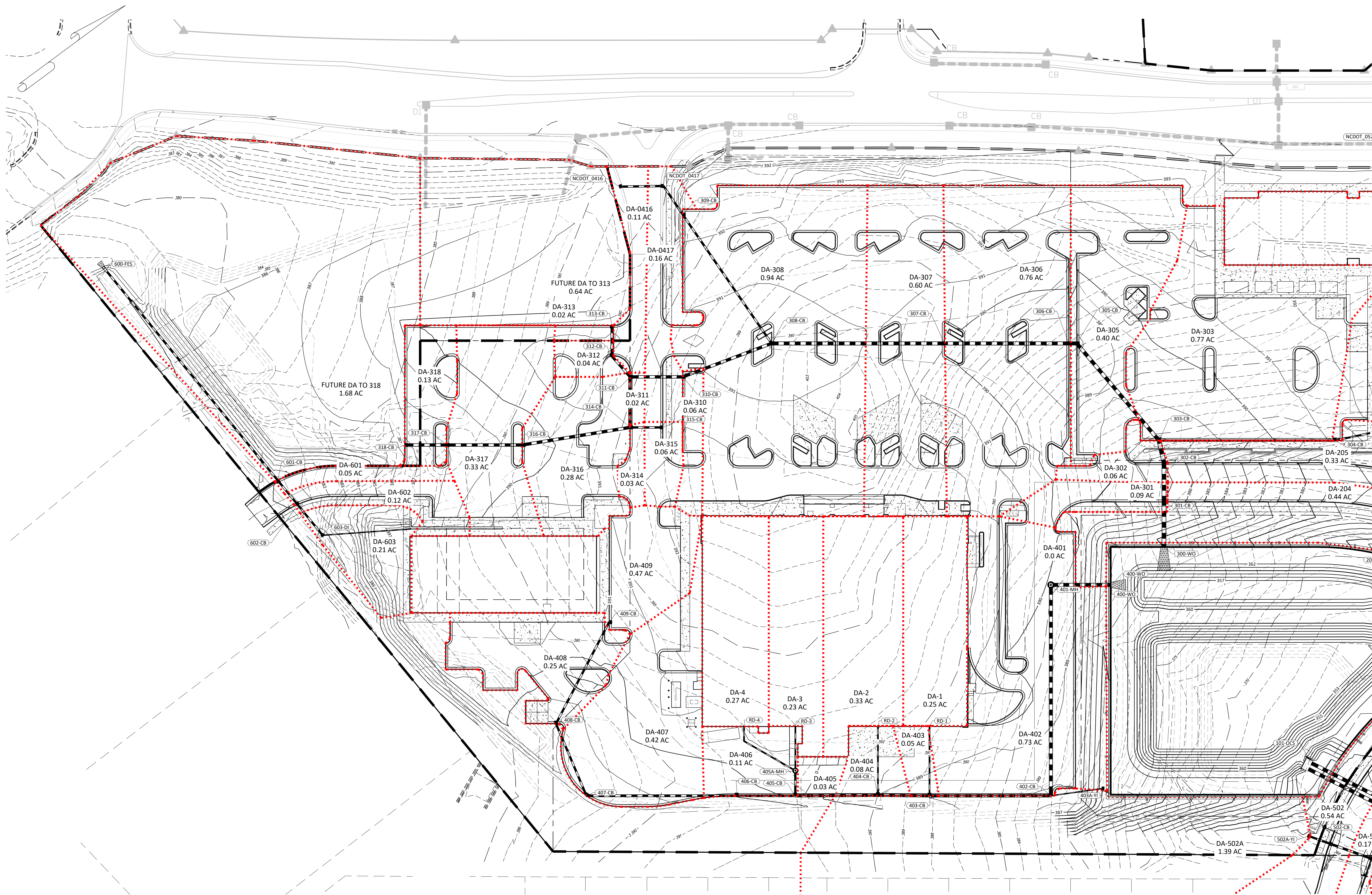


October 12, 2023

2755-B Charles Blvd.
Greenville, NC 27858
(252) 558-0888
www.arkconsultinggroup.com

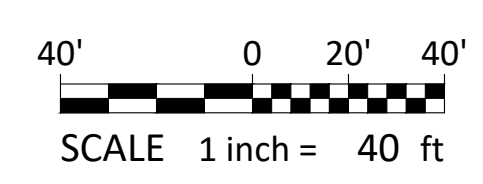


Overall Drainage Area Map



October 12, 2023

2755-B Charles Blvd.
 Greenville, NC 27858
 (252) 558-0888
 www.arkconsultinggroup.com

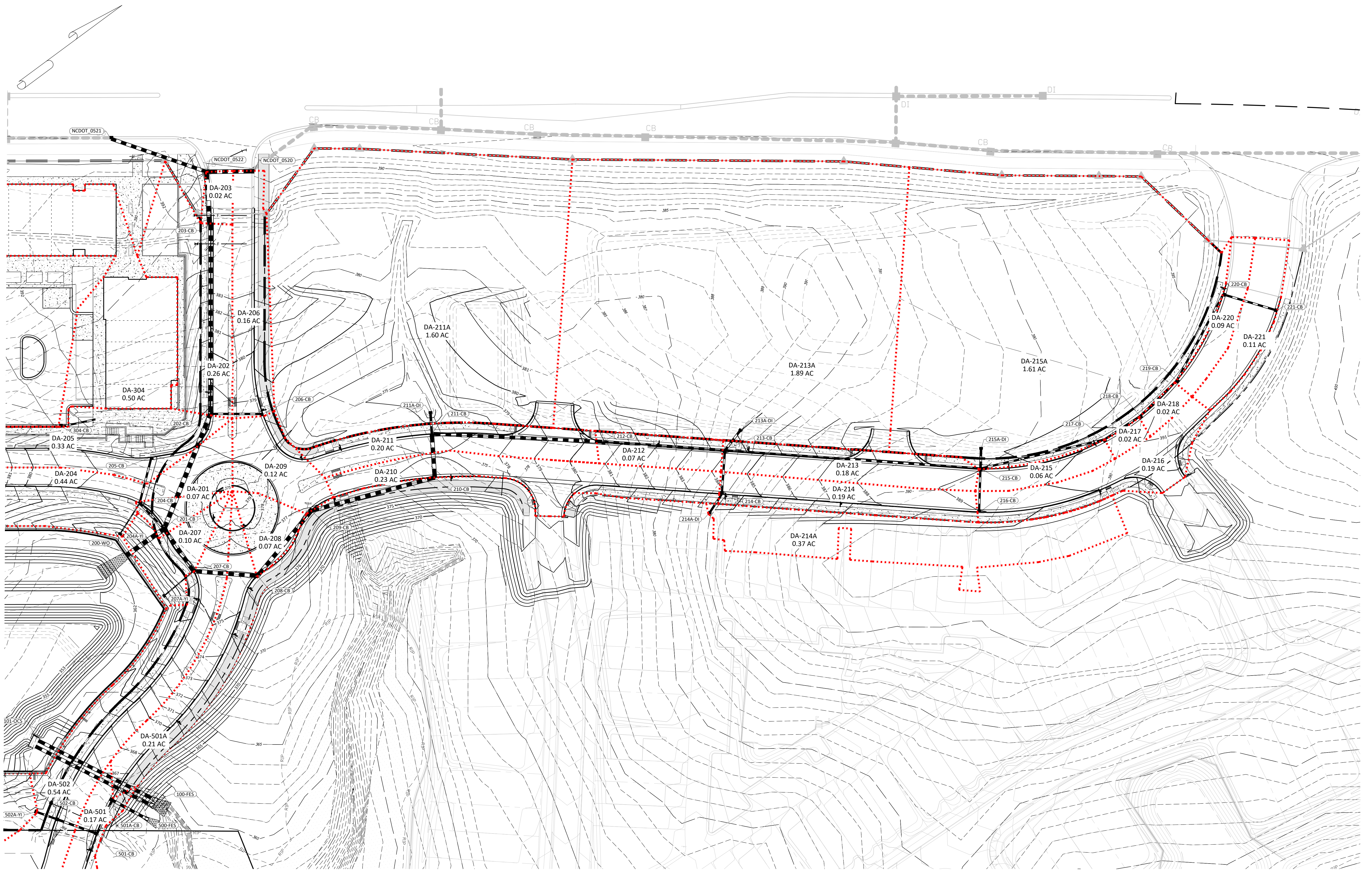


Inlets Drainage Area Map



US 401 / S. Main Street & Virginia Water Drive | Rolesville, NC

© 2023 ARK CONSULTING GROUP, PLLC. PROJECT: US 401 / S. Main Street & Virginia Water Drive. DATE: 10/12/2023. SHEET: 15 OF 18.



October 12, 2023

Inlets Drainage Area Map

2755-B Charles Blvd.
Greenville, NC 27858
(252) 558-0888
www.arkconsultinggroup.com

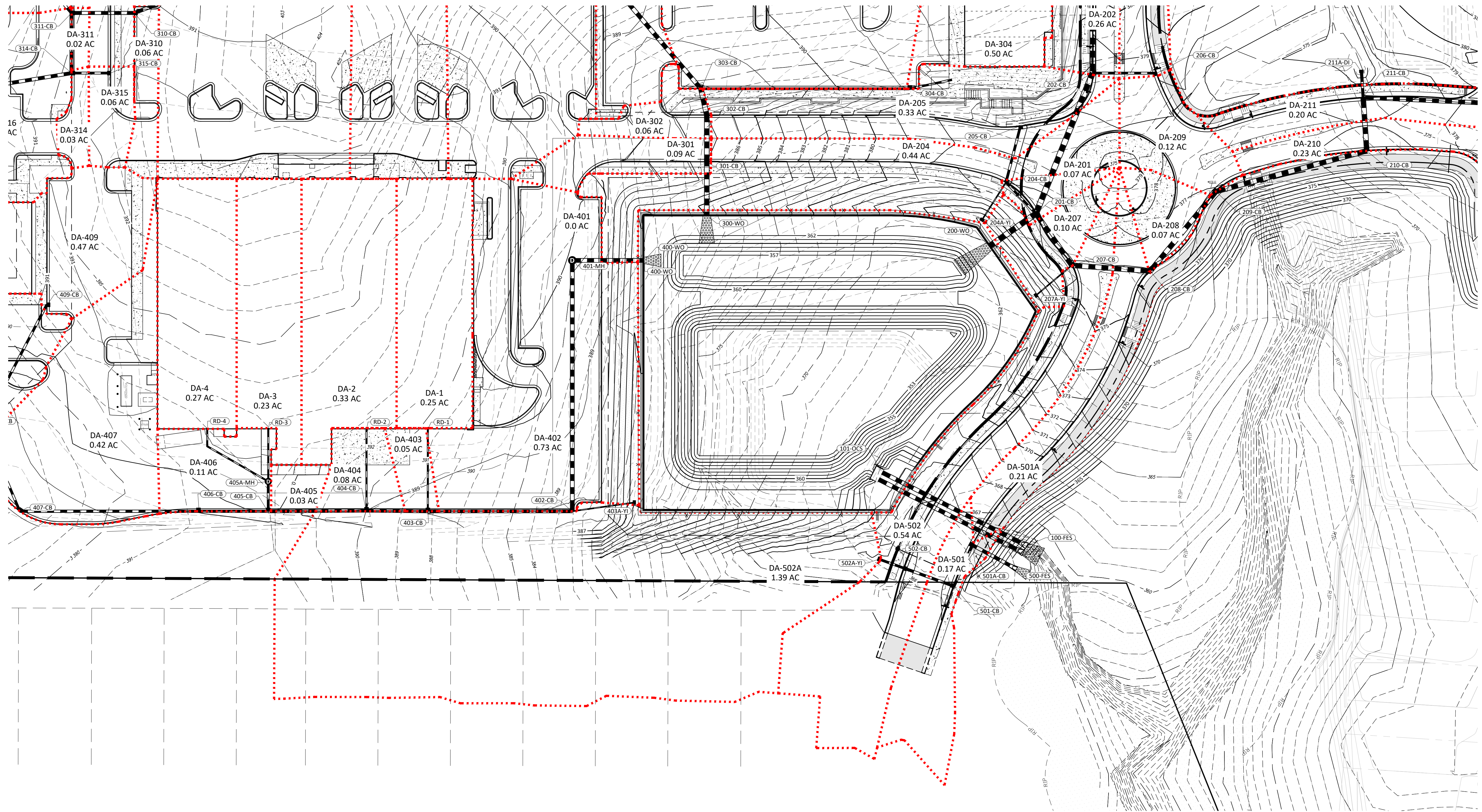
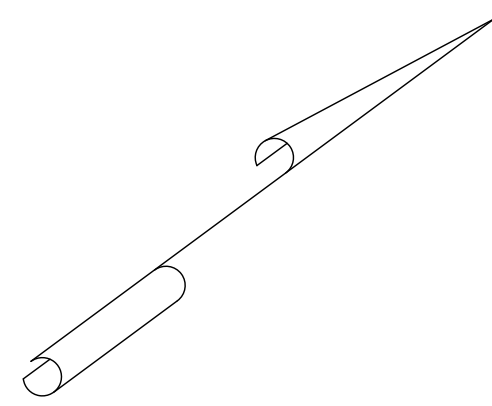
ARK CONSULTING GROUP, PLLC
ENGINEERS & PLANNERS
NC License: P-11199

40' 0 20' 40'
SCALE 1 inch = 40 ft

Wallbrook  **CROSLAND SOUTHEAST**

US 401 / S. Main Street & Virginia Water Drive | Rolesville, NC

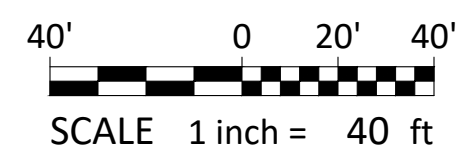
© 2023 WALLBROOK ENGINEERS & PLANNERS, PLLC. ALL RIGHTS RESERVED. PROJECT: 2023-001 - WALLBROOK SHOP CENTER - DWG: 2023-001-01 - FINAL_LAYOUT_DRAINAGE_MAP.DWG, DA Map (S), 10/12/2023 11:41 AM



October 12, 2023

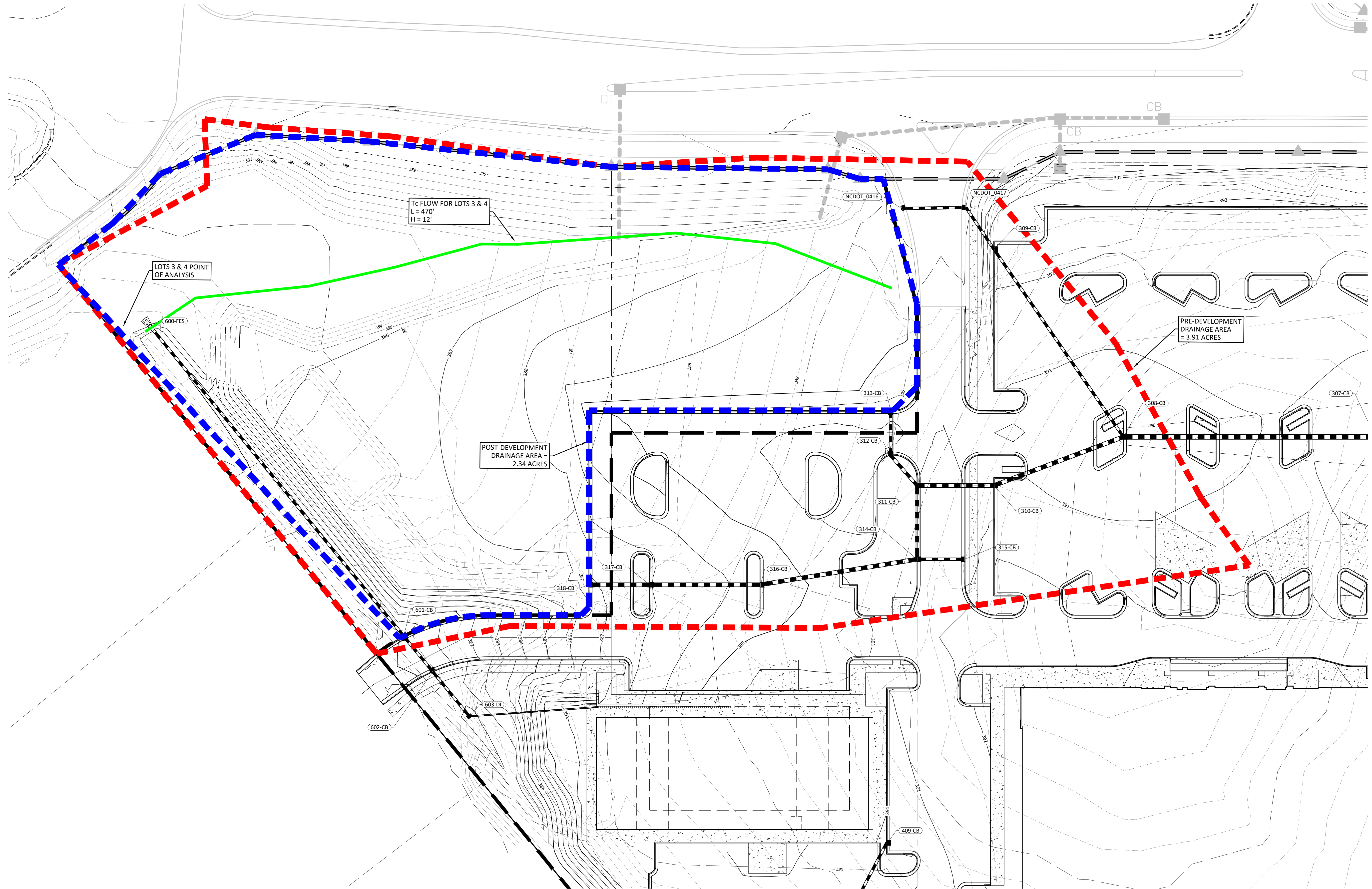
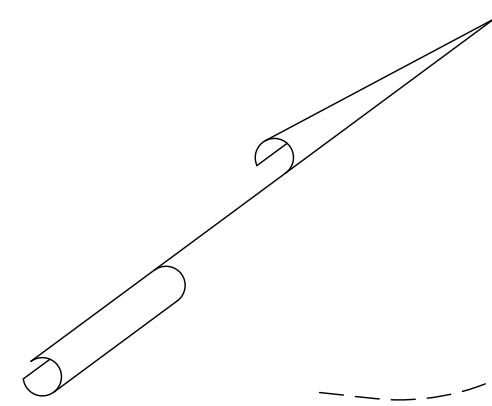
Virginia Water Drive - Direct Release Inlets Drainage Area Map

2755-B Charles Blvd.
Greenville, NC 27858
(252) 558-0888
www.arkconsultinggroup.com



Wallbrook  **CROSLAND SOUTHEAST**
US 401 / S. Main Street & Virginia Water Drive | Rolesville, NC

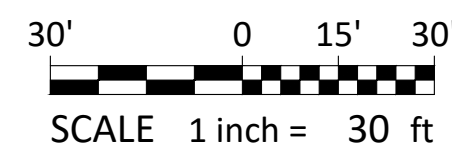
© 2023 ARK CONSULTING GROUP, PLLC. ALL RIGHTS RESERVED. PROJECT: VIRGINIA WATER DRIVE - DIRECT RELEASE INLETS DRAINAGE AREA MAP. DATE: OCTOBER 12, 2023. SHEET: 11 OF 11.



October 12, 2023

Drainage Area Map - Lots 3 & 4

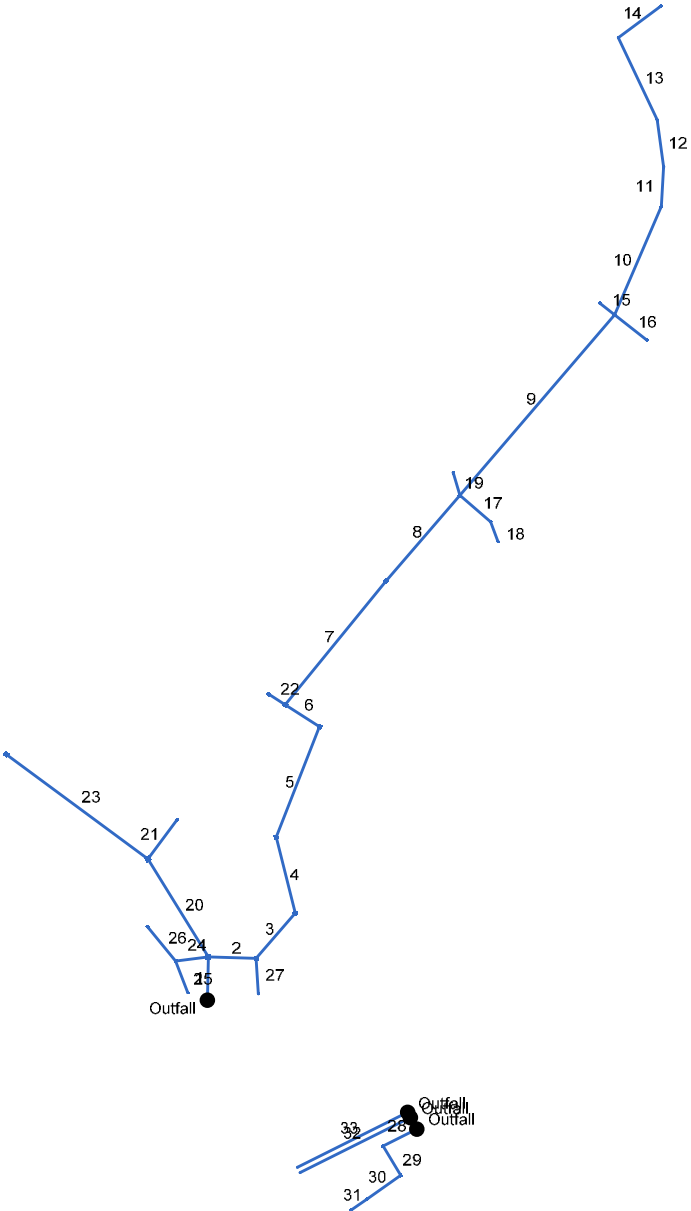
2755-B Charles Blvd.
Greenville, NC 27858
(252) 558-0888
www.arkconsultinggroup.com



US 401 / S. Main Street & Virginia Water Drive | Rolesville, NC

© 2023 ARK CONSULTING GROUP, PLLC. PROJECT: US 401 / S. Main Street & Virginia Water Drive. DATE: 10/12/2023. 11:41 AM

Wallbrook Roadway Improvements



1-Year Rain Event Results for Gutter Spread

Inlets

Line No.	Inlet ID	Drng Area (ac)	Inlet Time (min)	i Inlet (in/hr)	Runoff Coeff (C)	Flow Rate (cfs)	Line Type	Grate Area (sqft)	Cross SI, Sw (ft/ft)	Cross SI, Sx (ft/ft)	Local Depr (in)	Gutter Spread (ft)	Gutter Depth (ft)
1	201-CB	0.07	5.0	4.82	0.90	97.28	Cir	....	0.056	0.020	2.0	1.97	0.11
2	207-CB	0.10	5.0	4.82	0.90	18.27	Cir	....	0.056	0.020	2.0	1.74	0.10
3	208-CB	0.07	5.0	4.82	0.90	18.16	Cir	....	0.056	0.020	2.0	1.52	0.09
4	209-CB	0.12	5.0	4.82	0.90	18.22	Cir	....	0.056	0.020	2.0	1.86	0.10
5	210-CB	0.23	5.0	4.82	0.90	18.28	Cir	3.10	0.056	0.020	2.0	2.50	0.14
6	211-CB	0.20	5.0	4.82	0.90	17.77	Cir	3.10	0.056	0.020	2.0	2.33	0.12
7	212-CB	0.07	5.0	4.82	0.90	13.33	Cir	....	0.056	0.020	2.0	1.52	0.09
8	213-CB	0.18	5.0	4.82	0.90	13.30	Cir	....	0.056	0.020	2.0	2.16	0.12
9	215-CB	0.06	5.0	4.82	0.90	6.11	Cir	....	0.056	0.020	2.0	1.43	0.08
10	217-CB	0.02	5.0	4.82	0.90	0.82	Cir	....	0.056	0.020	2.0	0.95	0.05
11	218-CB	0.02	5.0	4.82	0.90	0.78	Cir	....	0.056	0.020	2.0	0.95	0.05
12	219-CB	0.01	5.0	4.82	0.90	0.75	Cir	....	0.056	0.020	2.0	0.73	0.04
13	220-CB	0.09	5.0	4.82	0.90	0.78	Cir	3.10	0.056	0.020	2.0	1.38	0.03
14	221-CB	0.11	5.0	4.82	0.90	0.48	Cir	3.10	0.056	0.020	2.0	1.54	0.05
15	215A-DI	1.61	10.0	3.86	0.85	5.28	Cir	3.10	0.056	0.020	2.0	14.95	0.37
16	216-CB	0.19	5.0	4.82	0.90	0.82	Cir	....	0.056	0.020	2.0	2.21	0.12
17	214-CB	0.19	5.0	4.82	0.90	2.40	Cir	....	0.056	0.020	2.0	2.21	0.12
18	214A-DI	0.37	5.0	4.82	0.90	1.60	Cir	3.00	0.050	0.020	2.0	5.30	0.17
19	213A-DI	1.89	10.0	3.86	0.85	6.20	Cir	3.10	0.056	0.020	2.0	17.20	0.42
20	202-CB	0.26	5.0	4.82	0.90	77.50	Cir	....	0.056	0.020	2.0	2.48	0.14
21	206-CB	0.16	5.0	4.82	0.90	0.69	Cir	....	0.056	0.020	2.0	2.07	0.12
22	211A-DI	1.60	10.0	3.86	0.85	5.25	Cir	3.10	0.056	0.020	2.0	14.87	0.37
23	203-CB	0.00	0.0	0.00	0.00	75.80	Cir	....	0.056	0.020	2.0	24.75	0.57

Wallbrook Roadway Improvements	Number of lines: 33	Date: 10/12/2023
---------------------------------------	---------------------	------------------

NOTES: Intensity = 62.18 / (Inlet time + 12.70) ^ 0.89 – Return period = 1 Yrs. ; ** Critical depth

Inlets

Line No.	Inlet ID	Drng Area (ac)	Inlet Time (min)	i Inlet (in/hr)	Runoff Coeff (C)	Flow Rate (cfs)	Line Type	Grate Area (sqft)	Cross SI, Sw (ft/ft)	Cross SI, Sx (ft/ft)	Local Depr (in)	Gutter Spread (ft)	Gutter Depth (ft)
24	204-CB	0.44	5.0	4.82	0.90	2.76	Cir	....	0.056	0.020	2.0	3.92	0.17
25	204A-YI	0.01	5.0	4.82	0.90	0.04	Cir	3.00	0.056	0.020	2.0	0.26	-0.13
26	205-CB	0.33	5.0	4.82	0.90	1.43	Cir	....	0.056	0.020	2.0	3.10	0.15
27	207A-YI	0.01	5.0	4.82	0.90	0.04	Cir	3.00	0.050	0.020	2.0	0.27	-0.13
28	501A-CB	0.21	5.0	4.82	0.90	9.52	Cir	....	0.056	0.020	2.0	3.20	0.15
29	501-CB	0.17	5.0	4.82	0.90	8.67	Cir	3.10	0.056	0.020	2.0	2.15	0.10
30	502-CB	0.54	5.0	4.82	0.90	8.00	Cir	3.10	0.056	0.020	2.0	5.43	0.20
31	502A-DI	1.39	5.0	4.82	0.85	5.69	Cir	3.00	0.056	0.020	2.0	18.23	0.44
32	101A-OCS	0.00	0.0	0.00	0.00	40.16	Cir	....	....	....	....	....	....
33	101-OCS	0.00	0.0	0.00	0.00	40.16	Cir	....	....	....	....	....	....

Wallbrook Roadway Improvements	Number of lines: 33	Date: 10/12/2023
---------------------------------------	---------------------	------------------

NOTES: Intensity = 62.18 / (Inlet time + 12.70) ^ 0.89 – Return period = 1 Yrs. ; ** Critical depth

10-Year Rain Event Results

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	43.749	0.07	8.41	0.90	0.06	7.31	5.0	13.7	5.2	113.7	123.6	12.16	42	1.51	362.60	363.26	365.95	366.46	366.69	375.94	201
2	1	48.198	0.10	7.14	0.90	0.09	6.17	5.0	13.6	5.2	32.14	81.51	8.96	36	1.49	366.31	367.03	367.62	368.87	375.94	374.99	207
3	2	60.188	0.07	7.03	0.90	0.06	6.07	5.0	13.3	5.2	31.85	82.01	7.04	36	1.51	367.03	367.94	368.87	369.77	374.99	376.38	208
4	3	79.094	0.12	6.96	0.90	0.11	6.01	5.0	13.0	5.3	31.81	81.46	7.05	36	1.49	367.94	369.12	369.77	370.95	376.38	377.39	209
5	4	119.620	0.23	6.84	0.90	0.21	5.90	5.0	12.6	5.4	31.70	81.81	7.04	36	1.50	369.12	370.92	370.95	372.74	377.39	377.08	210
6	5	41.000	0.20	6.61	0.90	0.18	5.69	5.0	12.4	5.4	30.74	81.35	6.90	36	1.49	370.92	371.53	372.74	373.33	377.08	377.08	211
7	6	160.910	0.07	4.81	0.90	0.06	4.15	5.0	11.8	5.5	22.86	50.30	7.83	30	1.50	372.03	374.45	373.33	376.08	377.08	380.96	212
8	7	113.947	0.18	4.74	0.90	0.16	4.09	5.0	11.6	5.6	22.71	27.63	8.90	24	1.49	374.95	376.65	376.33	378.35	380.96	384.38	213
9	8	239.809	0.06	2.11	0.90	0.05	1.82	5.0	10.9	5.7	10.32	12.87	6.73	18	1.50	377.15	380.75	378.35	381.99	384.38	389.44	215
10	9	119.111	0.02	0.25	0.90	0.02	0.23	5.0	9.3	6.0	1.35	9.13	2.31	15	2.00	381.00	383.38	381.99	383.84	389.44	390.75	217
11	10	40.000	0.02	0.23	0.90	0.02	0.21	5.0	8.7	6.1	1.27	9.13	3.18	15	2.00	383.38	384.18	383.84	384.62	390.75	391.18	218
12	11	47.945	0.01	0.21	0.90	0.01	0.19	5.0	8.0	6.3	1.19	9.14	3.12	15	2.00	384.18	385.14	384.62	385.57	391.18	391.62	219
13	12	91.498	0.09	0.20	0.90	0.08	0.18	5.0	6.5	6.7	1.21	8.18	3.21	15	1.61	385.14	386.61	385.57	387.04	391.62	391.04	220
14	13	52.883	0.11	0.11	0.90	0.10	0.10	5.0	5.0	7.2	0.71	8.14	2.32	15	1.59	386.61	387.45	387.04	387.78	391.04	390.80	221
15	9	19.000	1.61	1.61	0.85	1.37	1.37	10.0	10.0	5.9	8.02	12.97	5.48	18	1.53	380.75	381.04	381.99	382.14	389.44	389.62	215A
16	9	41.000	0.19	0.19	0.90	0.17	0.17	5.0	5.0	7.2	1.23	9.13	2.20	15	2.00	381.00	381.82	381.99	382.26	389.44	389.44	216
17	8	41.000	0.19	0.56	0.90	0.17	0.50	5.0	5.2	7.1	3.59	9.13	4.08	15	2.00	377.40	378.22	378.35	378.98	384.38	384.38	214
18	17	20.902	0.37	0.37	0.90	0.33	0.33	5.0	5.0	7.2	2.39	9.15	3.50	15	2.01	378.22	378.64	378.98	379.26	384.38	384.76	D-214A
19	8	23.916	1.89	1.89	0.85	1.61	1.61	10.0	10.0	5.9	9.42	12.88	6.26	18	1.51	377.15	377.51	378.35	378.69	384.38	384.94	213A
20	1	116.039	0.26	0.42	0.90	0.23	0.38	5.0	6.0	6.9	78.40	135.0	12.08	42	1.80	369.44	371.53	371.36	374.30	375.94	378.41	202
21	20	49.136	0.16	0.16	0.90	0.14	0.14	5.0	5.0	7.2	1.03	9.12	2.61	15	1.99	373.78	374.76	374.30	375.16	378.41	378.49	206
22	6	20.000	1.60	1.60	0.85	1.36	1.36	10.0	10.0	5.9	7.97	10.24	6.09	18	0.95	373.03	373.22	374.03	374.31	377.08	376.40	211A

Wallbrook Roadway Improvements

Number of lines: 33

Run Date: 10/12/2023

NOTES: Intensity = $73.11 / (\text{Inlet time} + 12.60)^{0.81}$; Return period = Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	20	177.512	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	75.80	224.9	9.37	42	5.00	371.53	380.40	374.30	383.12	378.41	387.36	203
24	1	33.163	0.44	0.78	0.90	0.40	0.70	5.0	8.1	6.3	4.42	11.16	6.77	15	2.99	370.10	371.09	370.65	371.94	375.94	376.61	204
25	24	34.076	0.01	0.01	0.90	0.01	0.01	5.0	5.0	7.2	0.06	0.92	0.92	8	0.50	371.68	371.85	371.94	371.98	376.61	373.04	204A
26	24	44.730	0.33	0.33	0.90	0.30	0.30	5.0	5.0	7.2	2.13	11.22	3.10	15	3.02	371.09	372.44	371.94	373.02	376.61	376.87	205
27	2	35.886	0.01	0.01	0.90	0.01	0.01	5.0	5.0	7.2	0.06	0.93	1.53	8	0.50	369.37	369.55	369.49	369.67	374.99	371.74	207A
28	End	38.000	0.21	2.31	0.90	0.19	2.01	5.0	5.2	7.1	14.27	20.10	5.67	24	0.79	360.80	361.10	362.48	362.46	363.10	366.69	501A
29	28	34.500	0.17	2.10	0.90	0.15	1.82	5.0	5.1	7.1	12.98	14.85	8.61	18	2.00	361.50	362.19	362.59	363.54	366.69	366.30	501
30	29	41.000	0.54	1.93	0.90	0.49	1.67	5.0	5.0	7.2	11.94	12.91	7.21	18	1.51	362.19	362.81	363.54	364.12	366.30	366.30	502
31	30	20.000	1.39	1.39	0.85	1.18	1.18	5.0	5.0	7.2	8.48	10.61	7.28	15	2.30	363.00	363.46	364.12	364.60	366.30	366.80	502A
32	End	124.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	40.16	41.01	8.73	30	1.00	360.76	362.00	363.08	364.13	363.64	364.95	101A
33	End	124.004	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	40.16	41.01	8.73	30	1.00	360.76	362.00	363.08	364.13	363.64	364.95	101

Wallbrook Roadway Improvements

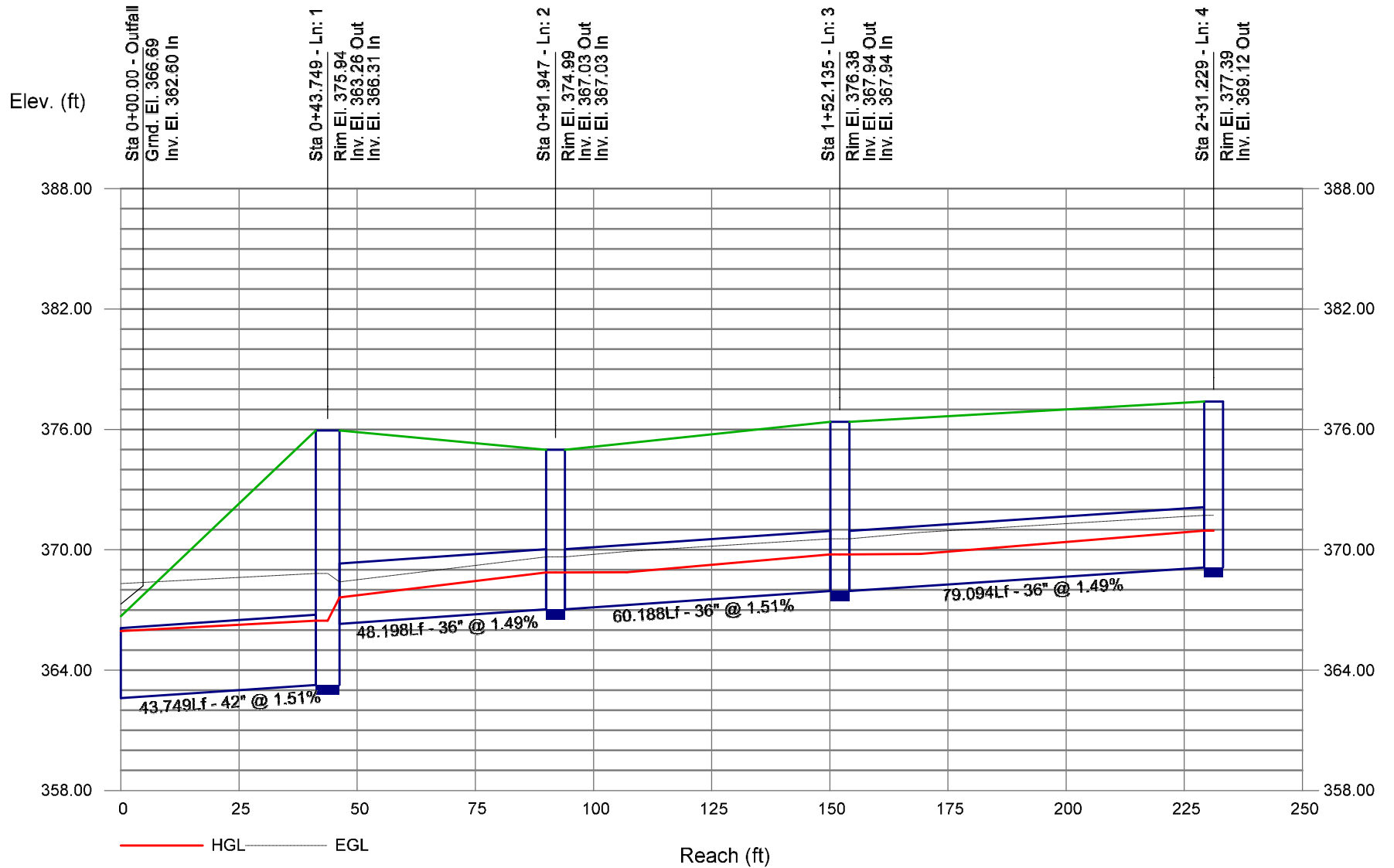
Number of lines: 33

Run Date: 10/12/2023

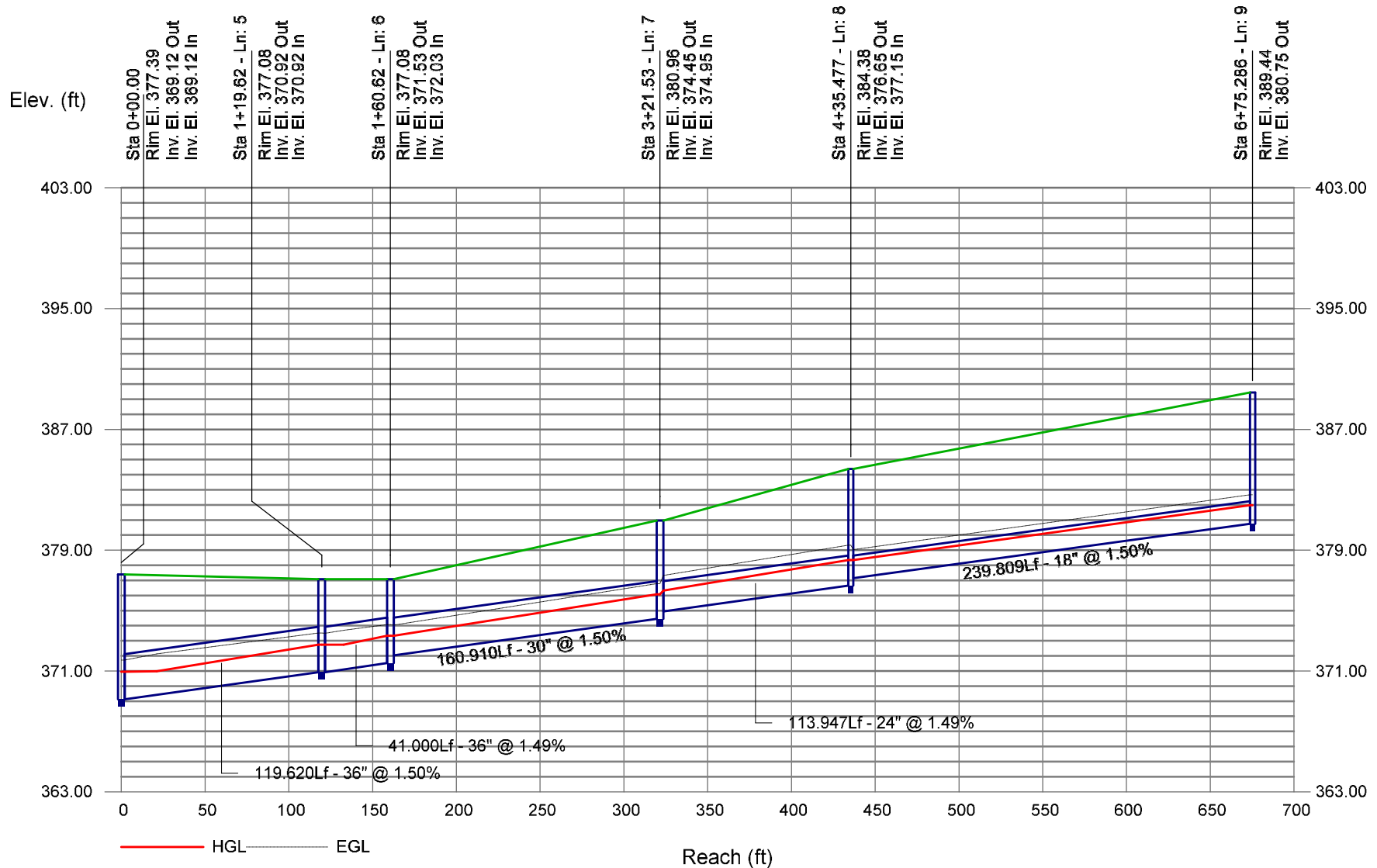
NOTES: Intensity = 73.11 / (Inlet time + 12.60) ^ 0.81; Return period = Yrs. 10 ; c = cir e = ellip b = box

10-Year Hydraulic Grade Profiles

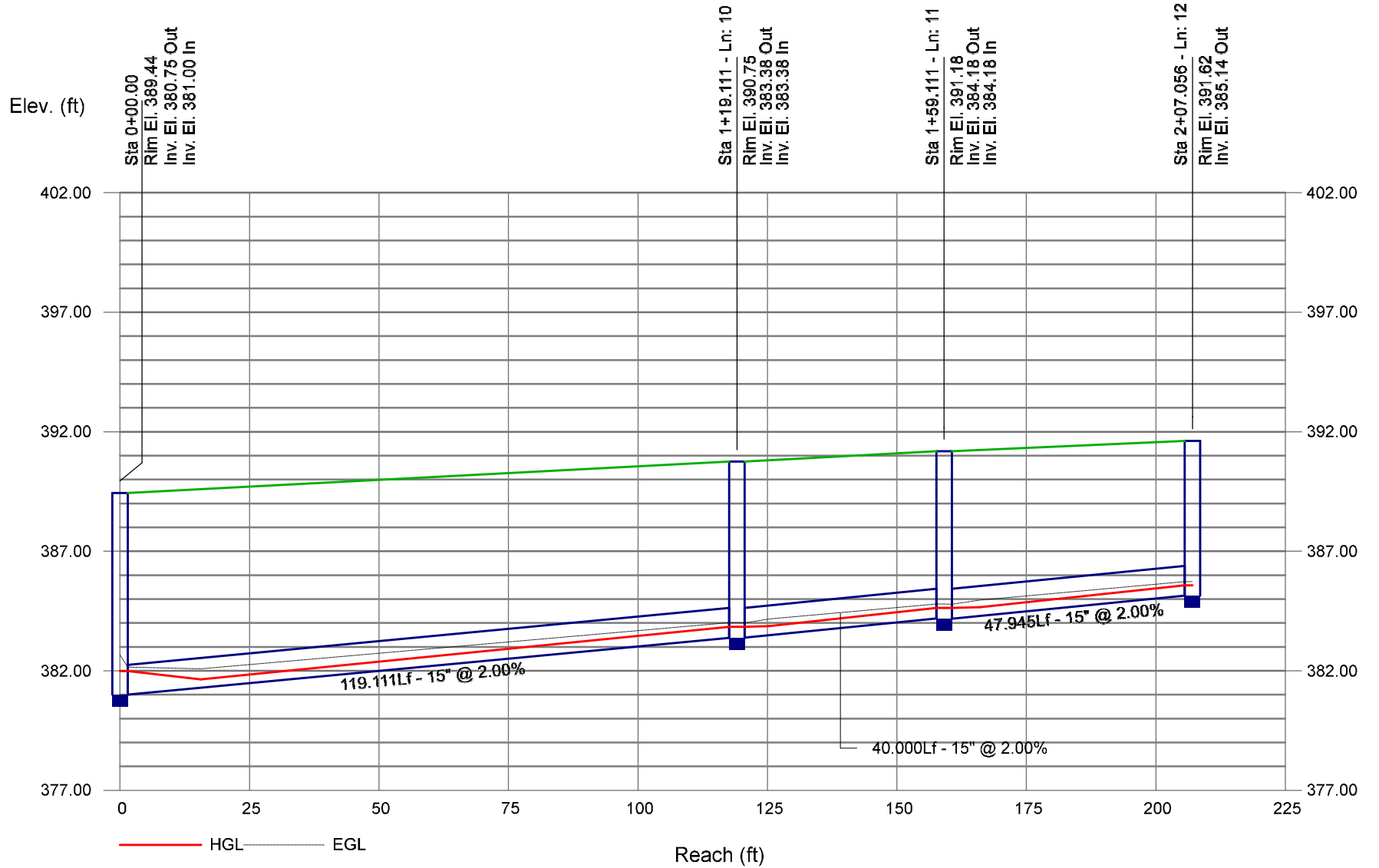
Storm Sewer Profile



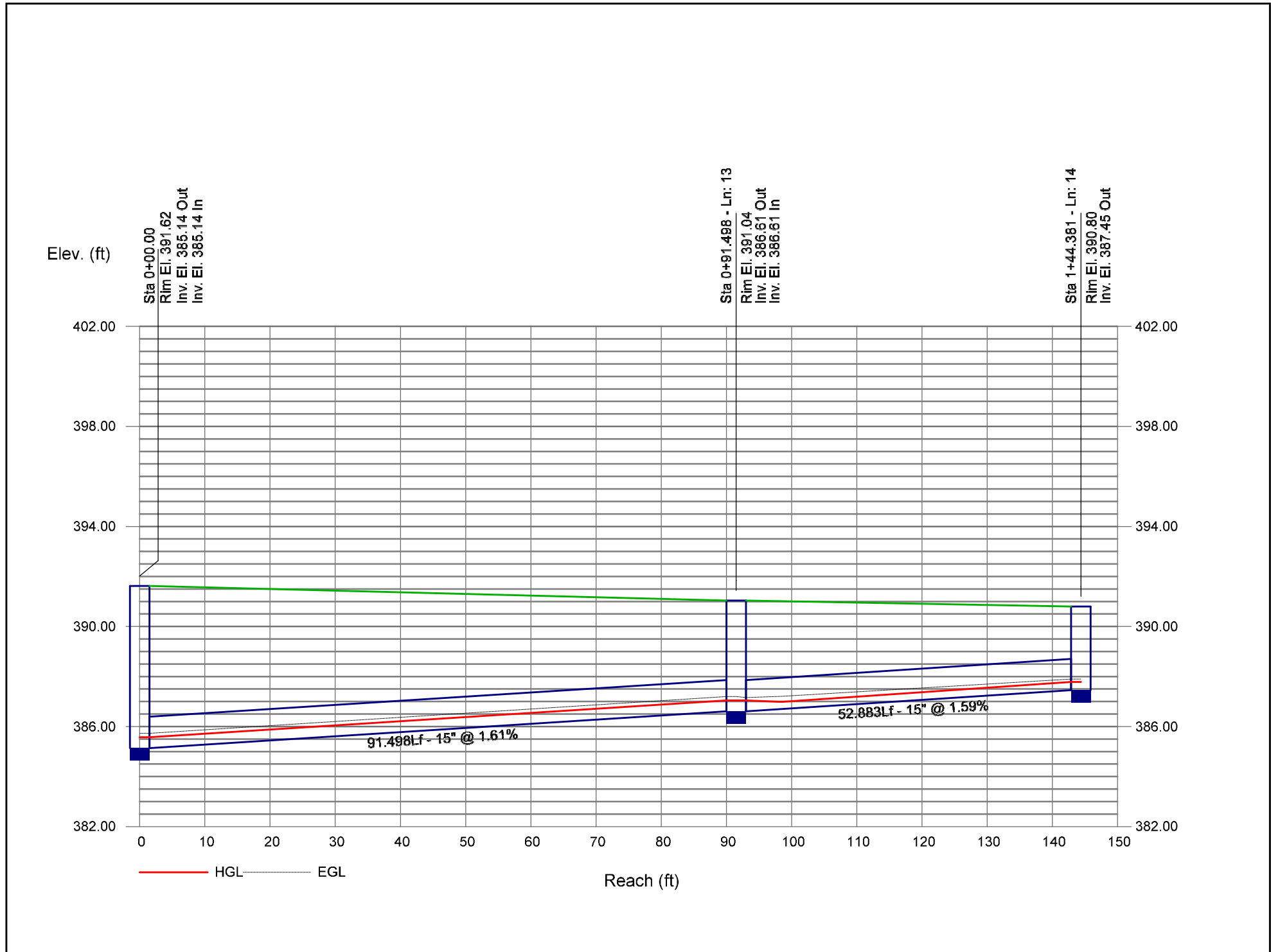
Storm Sewer Profile



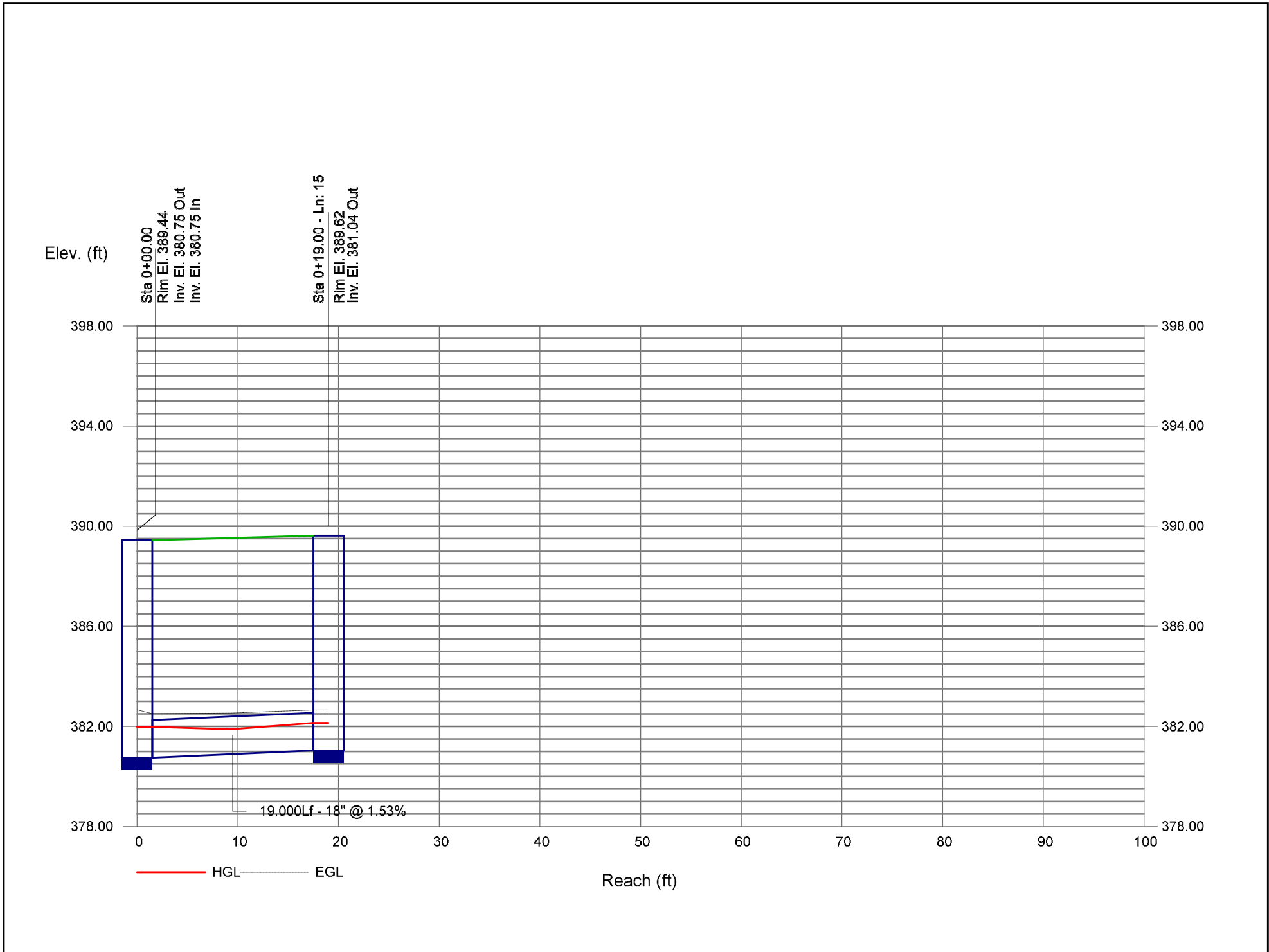
Storm Sewer Profile



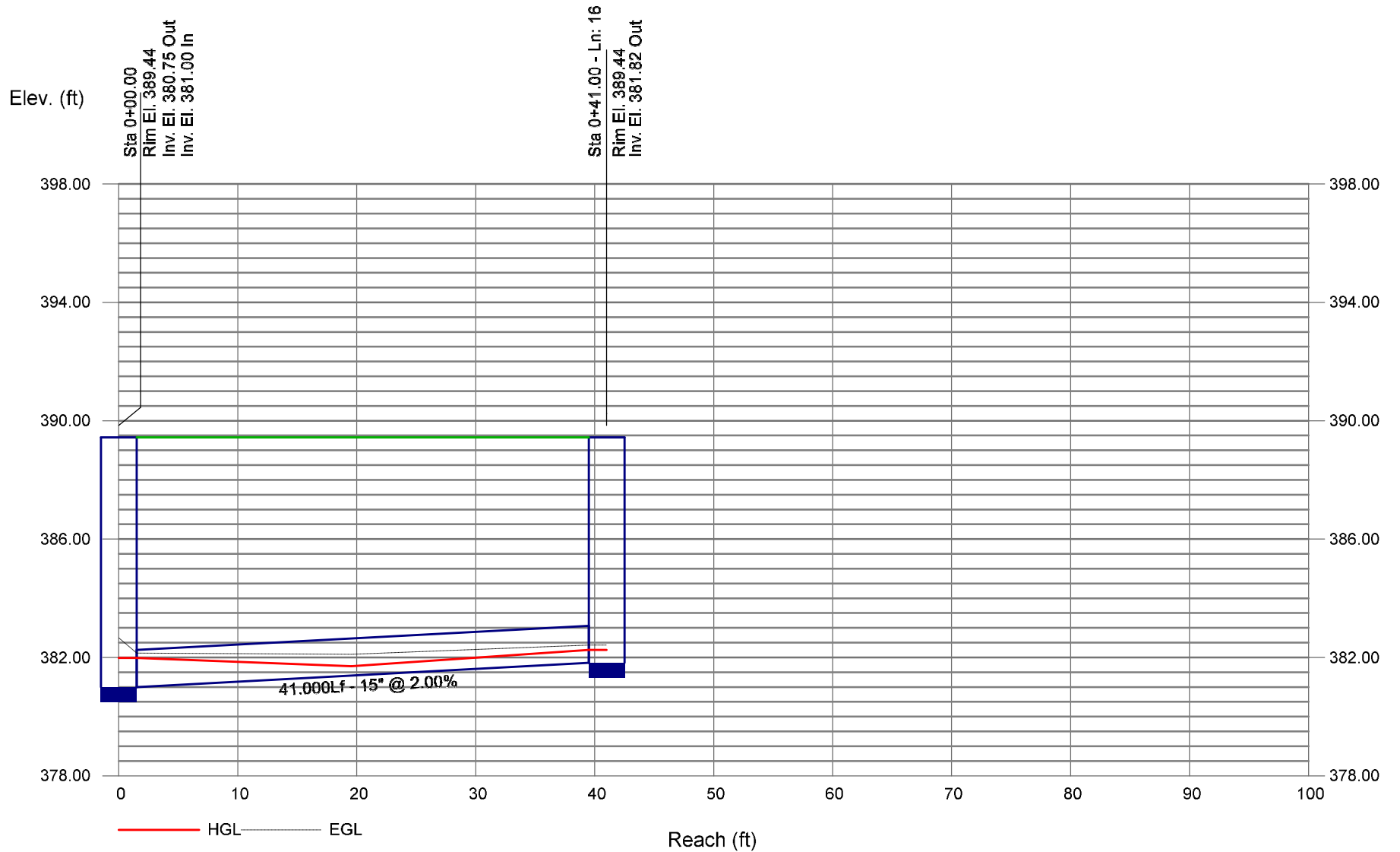
Storm Sewer Profile



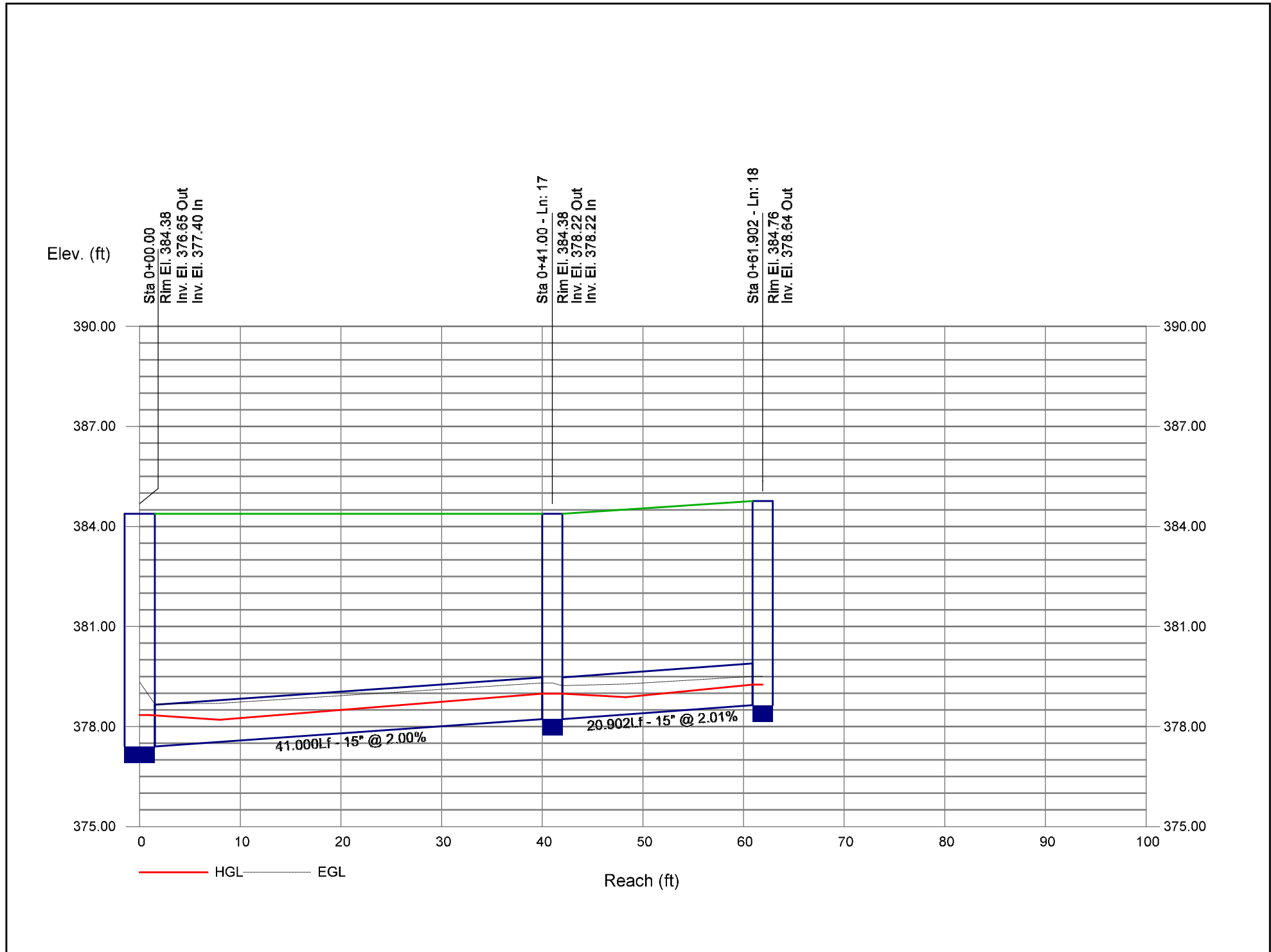
Storm Sewer Profile



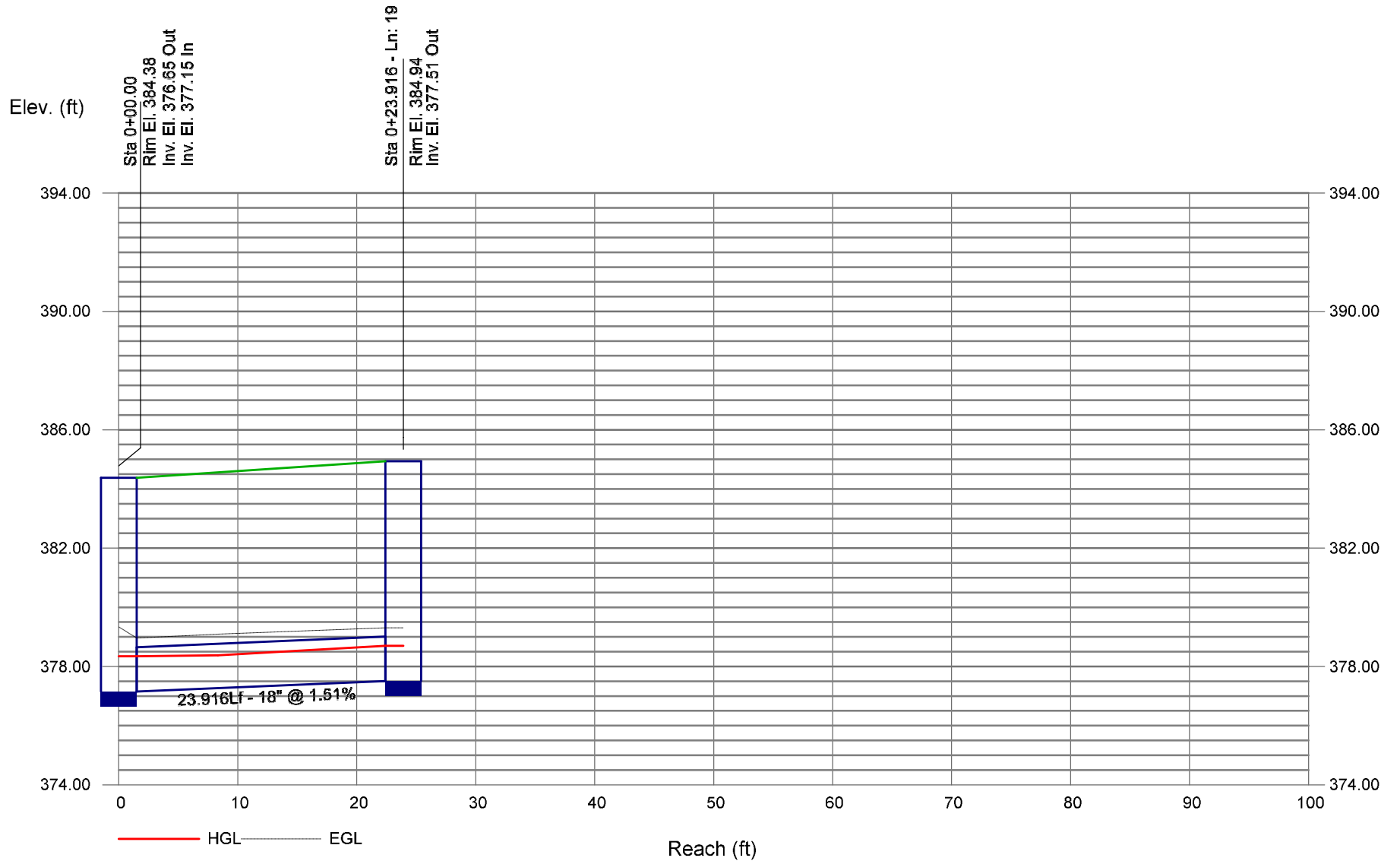
Storm Sewer Profile



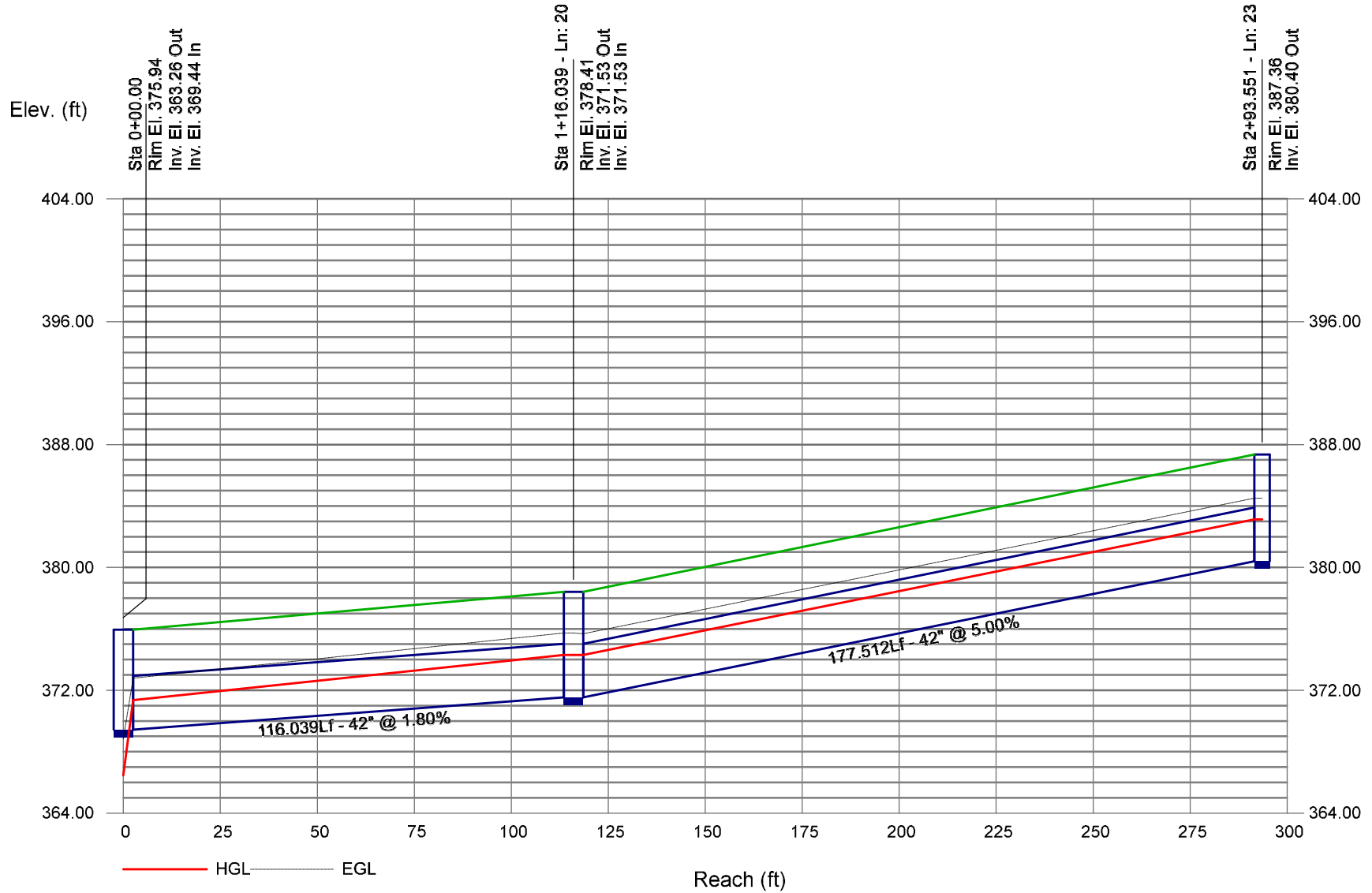
Storm Sewer Profile



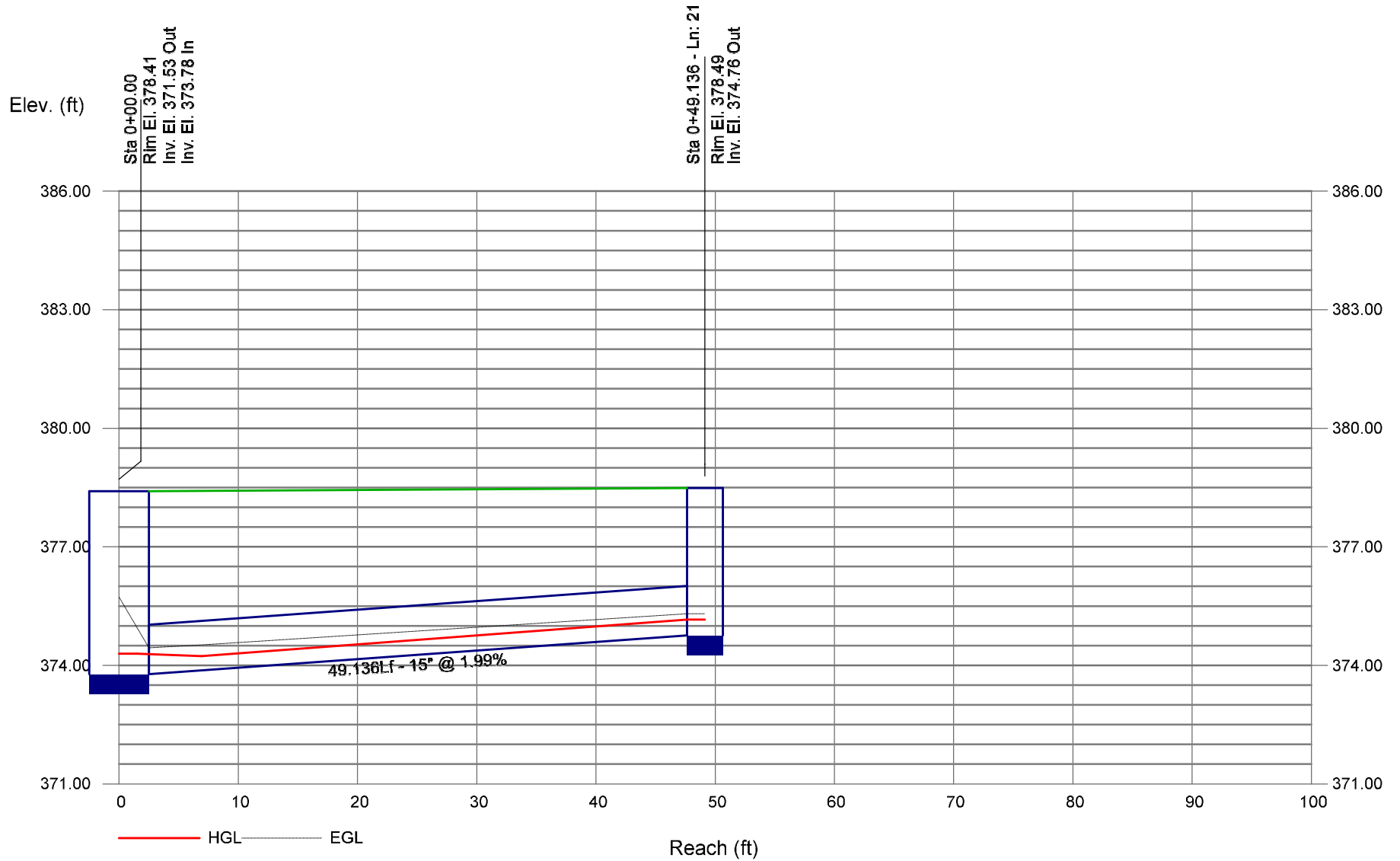
Storm Sewer Profile



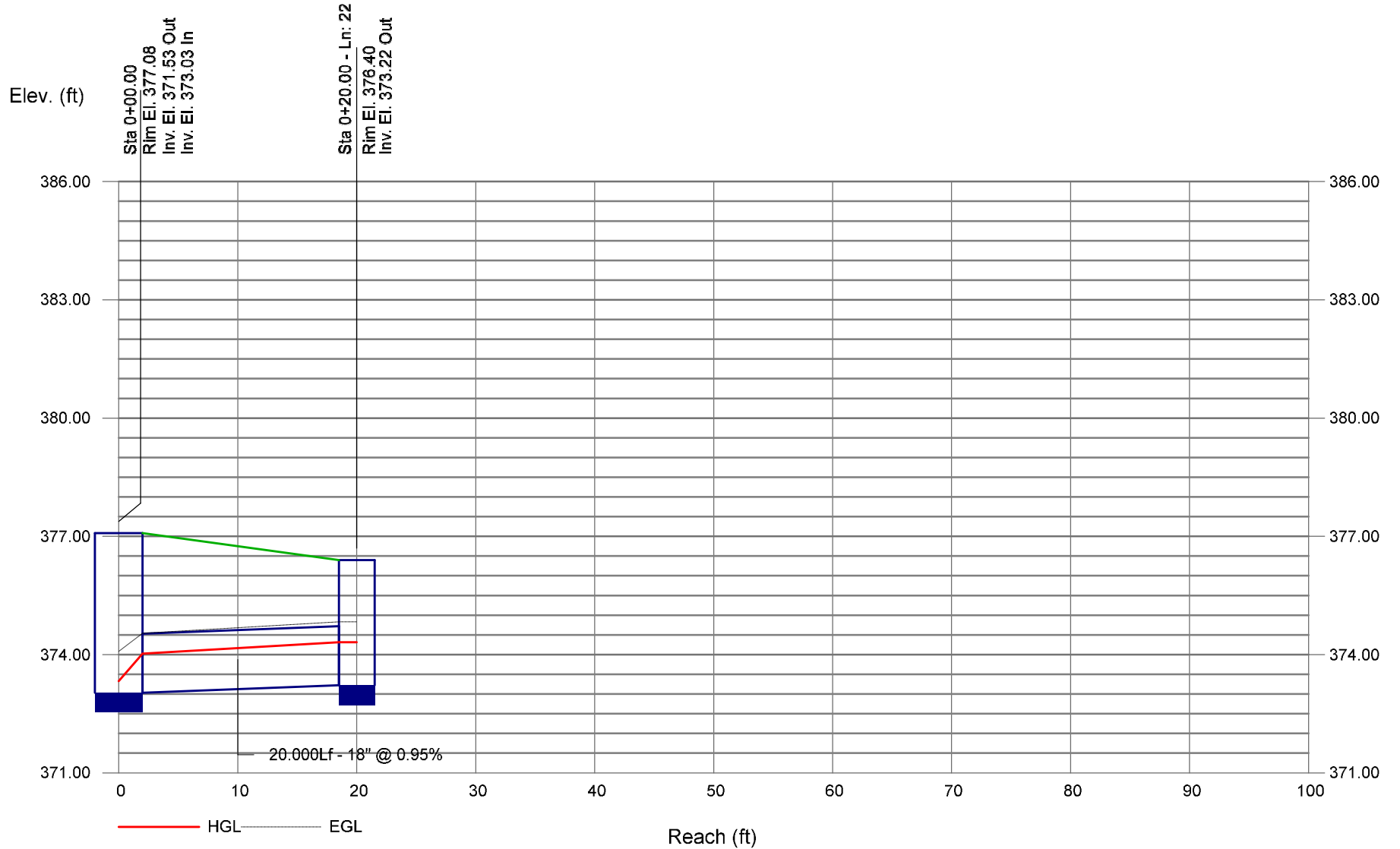
Storm Sewer Profile



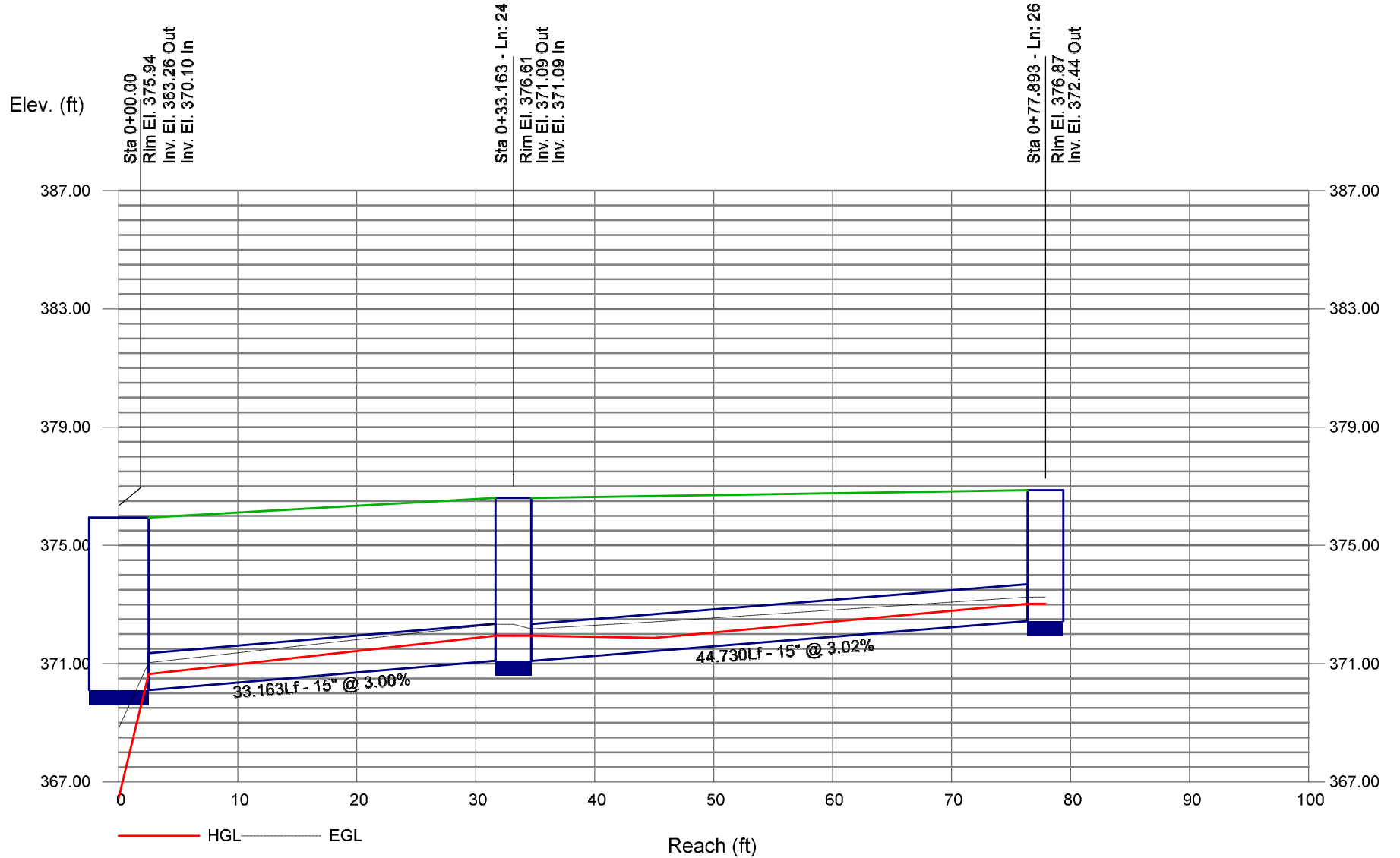
Storm Sewer Profile



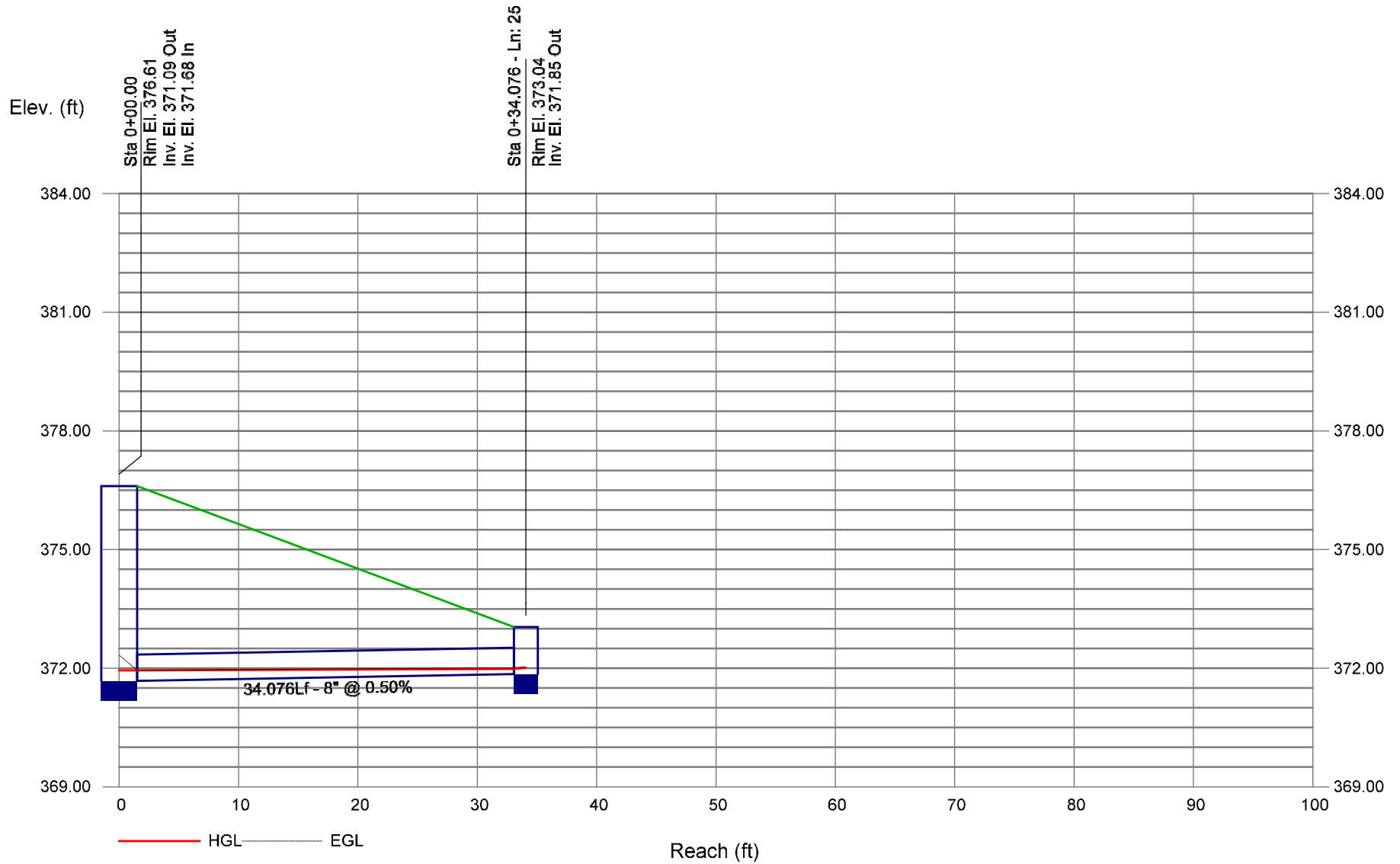
Storm Sewer Profile



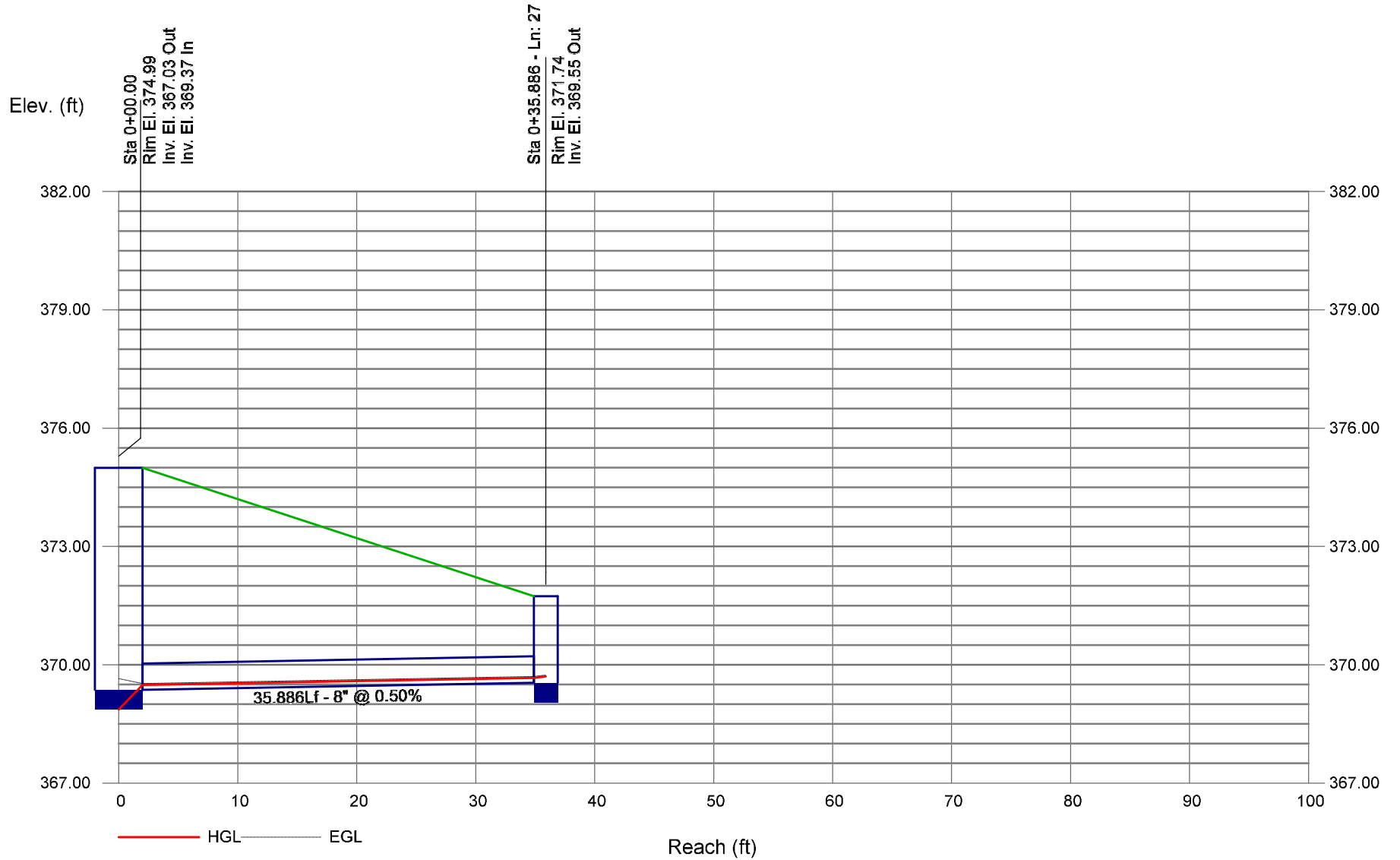
Storm Sewer Profile



Storm Sewer Profile



Storm Sewer Profile



Storm Sewer Profile

