

EROSION CONTROL & STORMWATER REPORT & CALCULATIONS

For

Harris Creek Farms

Town of Rolesville, Wake County, NC

Original: 30 May 2025



Bryan Harris

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Narrative:

This project, Harris Creek Farms, is located in the Town of Rolesville, Wake County, North Carolina, directly south of the intersection of Universal Drive and Gideon Drive. The existing site consists of 94.99 acres of mostly wooded areas and open fields. There are two (2) streams within the site, Harris Creek runs from east to west, and an unnamed tributary runs from north to south and feeds into Harris Creek. There are existing FEMA flood plains on this site per FEMA panel 3720175700K, with an effective date of 7/19/2022. The site is located outside of any current High Quality Water (HQW) zones delineated by NCDEQ.

As the site is being developed, the stormwater runoff will be routed through diversion ditches into four (4) sediment basins designed to Wake County standards. Once the site has been stabilized, two (2) of the sediment basins will be converted into permanent wet ponds designed to NCDEQ standards, and will receive stormwater runoff through a series of stormwater pipes and inlets.

The peak flow analysis for the site was performed by analyzing the on-site area that drains to a downstream analysis point on Harris Creek. The results from this analysis are shown in the table below:

Peak Flow Analysis				
Site Condition	Storm Event (cfs)			
	1-year (cfs)	2-year (cfs)	10-year (cfs)	100-year (cfs)
Total Pre-Development	97.19	140.47	268.72	485.73
Post-Development Pond Inflow (to SCM 1)	29.62	40.98	73.59	126.80
Post-Development Pond Inflow (to SCM 2)	18.20	25.18	45.22	77.92
Post-Development Pond Outflow (SCM 1)	0.50	0.59	14.27	89.74
Post-Development Pond Outflow (SCM 2)	2.40	10.91	40.00	75.92
Post-Development Untreated (Bypass)	85.43	121.90	229.22	408.08
Total Post-Development	85.93	132.88	264.21	553.73

Conclusion:

The results of the analysis shows that the proposed development decreases the peak stormwater flows for the 1-year, 2-year, and 10-year storm events. Based on the results, the development is not anticipated to have any adverse downstream impacts.

RAINFALL DATA



NOAA Atlas 14, Volume 2, Version 3
Location name: Wake Forest, North Carolina, USA*
Latitude: 35.8857°, Longitude: -78.4794°
Elevation: 234 ft**
 * source: ESRI Maps
 ** source: USGS



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 & aerals](#)

PF tabular

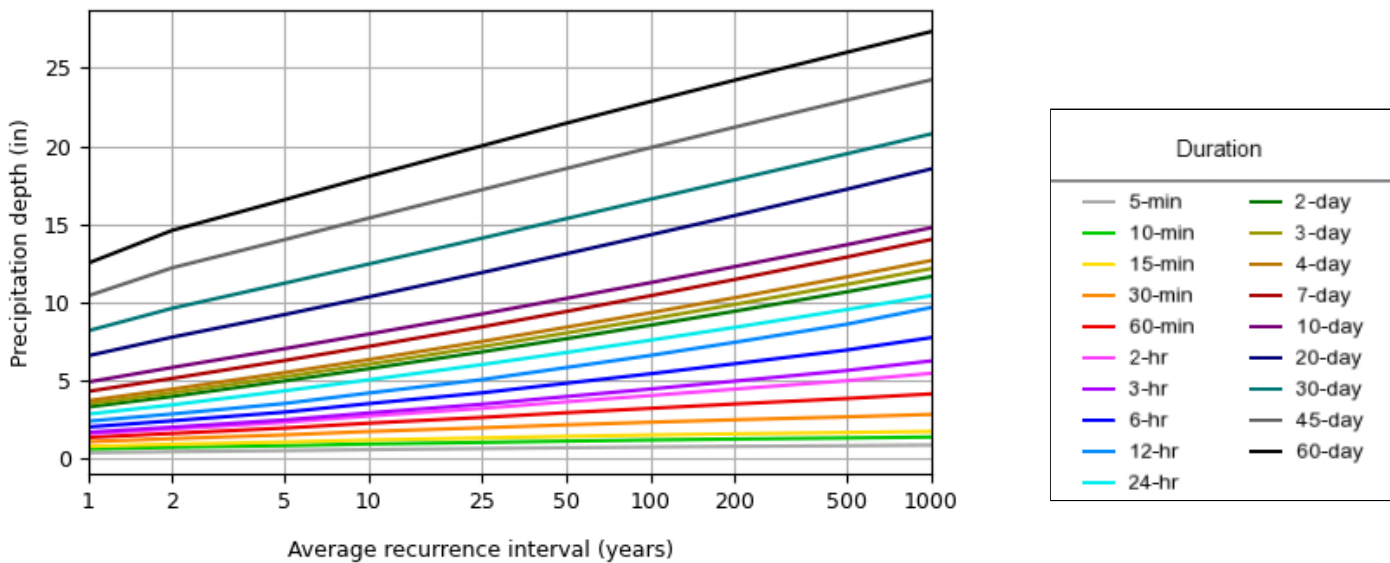
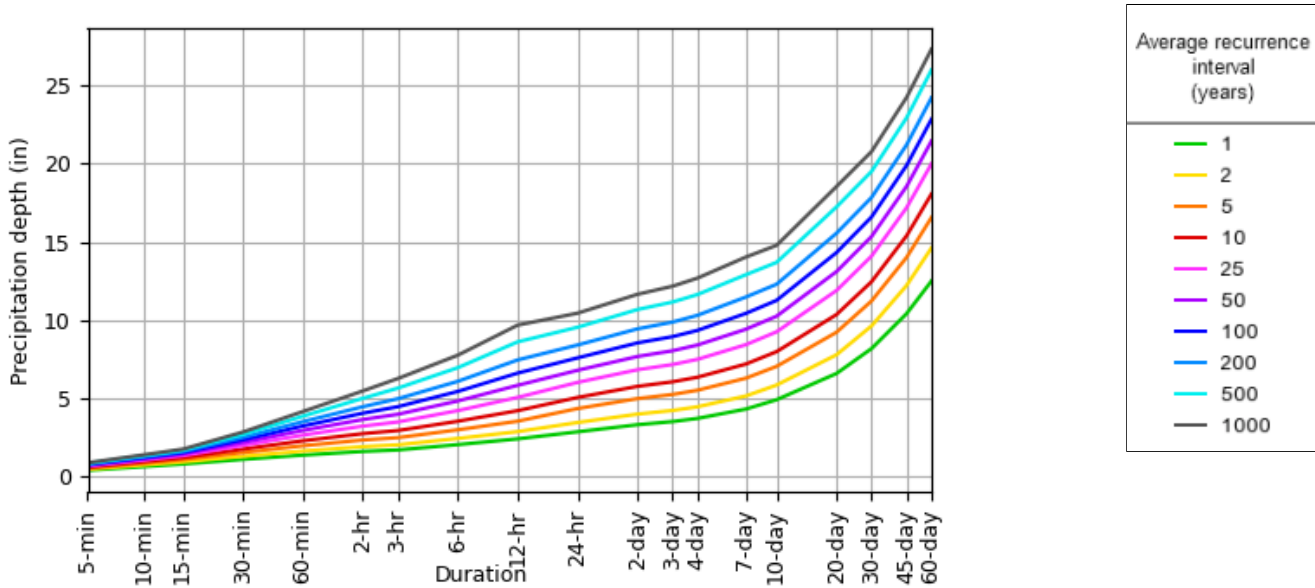
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.403 (0.369-0.442)	0.469 (0.430-0.513)	0.535 (0.490-0.584)	0.600 (0.549-0.655)	0.666 (0.606-0.726)	0.718 (0.651-0.782)	0.764 (0.689-0.832)	0.805 (0.721-0.878)	0.850 (0.756-0.928)	0.890 (0.785-0.974)
10-min	0.644 (0.590-0.705)	0.750 (0.688-0.820)	0.857 (0.785-0.935)	0.960 (0.878-1.05)	1.06 (0.966-1.16)	1.14 (1.04-1.25)	1.21 (1.09-1.32)	1.28 (1.14-1.39)	1.34 (1.20-1.47)	1.40 (1.24-1.53)
15-min	0.806 (0.738-0.882)	0.943 (0.864-1.03)	1.08 (0.993-1.18)	1.21 (1.11-1.32)	1.34 (1.22-1.47)	1.45 (1.31-1.58)	1.53 (1.38-1.67)	1.61 (1.44-1.76)	1.69 (1.50-1.85)	1.76 (1.55-1.92)
30-min	1.10 (1.01-1.21)	1.30 (1.19-1.42)	1.54 (1.41-1.68)	1.76 (1.61-1.92)	1.99 (1.81-2.17)	2.18 (1.98-2.38)	2.35 (2.12-2.56)	2.51 (2.25-2.73)	2.69 (2.39-2.94)	2.85 (2.51-3.12)
60-min	1.38 (1.26-1.51)	1.63 (1.50-1.79)	1.97 (1.81-2.15)	2.29 (2.10-2.50)	2.65 (2.42-2.89)	2.95 (2.68-3.22)	3.24 (2.92-3.53)	3.52 (3.15-3.83)	3.86 (3.44-4.22)	4.16 (3.67-4.55)
2-hr	1.61 (1.46-1.78)	1.92 (1.75-2.10)	2.34 (2.13-2.57)	2.75 (2.49-3.01)	3.23 (2.91-3.54)	3.65 (3.28-3.99)	4.05 (3.61-4.43)	4.47 (3.96-4.88)	5.00 (4.39-5.47)	5.48 (4.76-6.00)
3-hr	1.71 (1.55-1.89)	2.03 (1.86-2.24)	2.49 (2.27-2.75)	2.94 (2.67-3.24)	3.50 (3.15-3.84)	3.98 (3.57-4.37)	4.47 (3.97-4.90)	4.98 (4.39-5.45)	5.65 (4.93-6.20)	6.27 (5.41-6.88)
6-hr	2.05 (1.87-2.26)	2.44 (2.23-2.68)	2.99 (2.73-3.29)	3.54 (3.22-3.88)	4.22 (3.82-4.62)	4.83 (4.34-5.28)	5.44 (4.85-5.94)	6.09 (5.37-6.64)	6.96 (6.06-7.58)	7.76 (6.67-8.47)
12-hr	2.41 (2.21-2.66)	2.88 (2.64-3.16)	3.54 (3.25-3.89)	4.22 (3.84-4.62)	5.06 (4.59-5.53)	5.84 (5.24-6.35)	6.62 (5.89-7.19)	7.46 (6.56-8.10)	8.61 (7.46-9.35)	9.68 (8.25-10.5)
24-hr	2.87 (2.66-3.09)	3.46 (3.22-3.73)	4.35 (4.05-4.69)	5.06 (4.69-5.45)	6.02 (5.57-6.49)	6.80 (6.26-7.32)	7.59 (6.97-8.17)	8.41 (7.70-9.06)	9.54 (8.69-10.3)	10.4 (9.47-11.3)
2-day	3.32 (3.09-3.57)	4.00 (3.72-4.30)	4.99 (4.64-5.37)	5.77 (5.36-6.21)	6.83 (6.32-7.36)	7.68 (7.08-8.27)	8.55 (7.86-9.21)	9.44 (8.65-10.2)	10.7 (9.73-11.5)	11.6 (10.6-12.6)
3-day	3.52 (3.28-3.78)	4.23 (3.95-4.54)	5.25 (4.90-5.63)	6.06 (5.64-6.50)	7.16 (6.64-7.68)	8.04 (7.44-8.63)	8.94 (8.24-9.60)	9.87 (9.06-10.6)	11.2 (10.2-12.0)	12.2 (11.1-13.1)
4-day	3.72 (3.48-3.98)	4.46 (4.17-4.77)	5.52 (5.15-5.90)	6.35 (5.92-6.78)	7.50 (6.96-8.01)	8.41 (7.79-8.99)	9.34 (8.62-10.0)	10.3 (9.48-11.0)	11.6 (10.6-12.5)	12.7 (11.5-13.6)
7-day	4.32 (4.04-4.61)	5.15 (4.82-5.50)	6.29 (5.88-6.71)	7.19 (6.72-7.67)	8.43 (7.85-9.00)	9.42 (8.74-10.1)	10.4 (9.65-11.1)	11.5 (10.6-12.3)	12.9 (11.8-13.8)	14.0 (12.8-15.1)
10-day	4.91 (4.61-5.24)	5.85 (5.49-6.23)	7.05 (6.60-7.50)	7.99 (7.47-8.50)	9.25 (8.64-9.86)	10.3 (9.55-10.9)	11.3 (10.5-12.0)	12.3 (11.4-13.1)	13.7 (12.6-14.7)	14.8 (13.6-15.8)
20-day	6.59 (6.20-7.02)	7.79 (7.32-8.29)	9.22 (8.67-9.81)	10.4 (9.72-11.0)	11.9 (11.1-12.7)	13.1 (12.2-13.9)	14.3 (13.3-15.3)	15.6 (14.4-16.6)	17.2 (15.9-18.4)	18.5 (17.1-19.9)
30-day	8.18 (7.72-8.69)	9.63 (9.08-10.2)	11.2 (10.6-11.9)	12.5 (11.7-13.2)	14.1 (13.2-15.0)	15.3 (14.4-16.3)	16.6 (15.5-17.7)	17.8 (16.6-19.0)	19.5 (18.1-20.8)	20.8 (19.2-22.2)
45-day	10.4 (9.89-11.0)	12.2 (11.6-12.9)	14.0 (13.3-14.8)	15.4 (14.6-16.2)	17.2 (16.2-18.1)	18.5 (17.5-19.6)	19.9 (18.7-21.0)	21.2 (19.9-22.4)	22.9 (21.5-24.3)	24.2 (22.6-25.7)
60-day	12.5 (11.9-13.1)	14.6 (13.9-15.4)	16.6 (15.7-17.4)	18.1 (17.1-19.0)	20.0 (18.9-21.0)	21.4 (20.3-22.6)	22.8 (21.6-24.1)	24.2 (22.8-25.6)	26.0 (24.4-27.5)	27.3 (25.6-28.9)

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.

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PF graphical

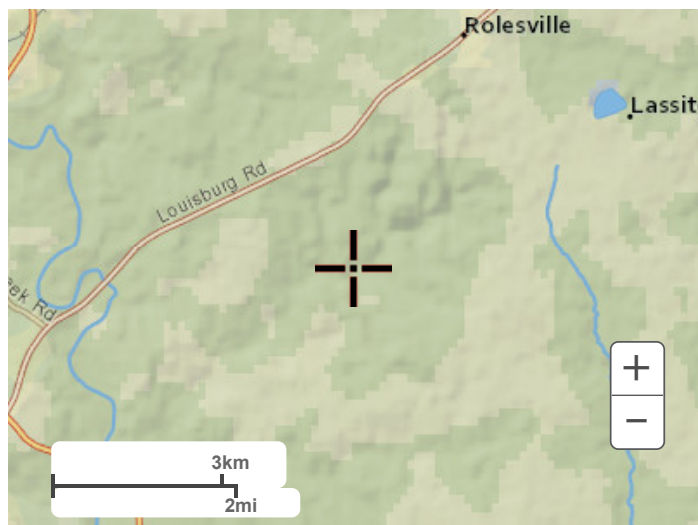
PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.8857°, Longitude: -78.4794°



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Maps & aerials

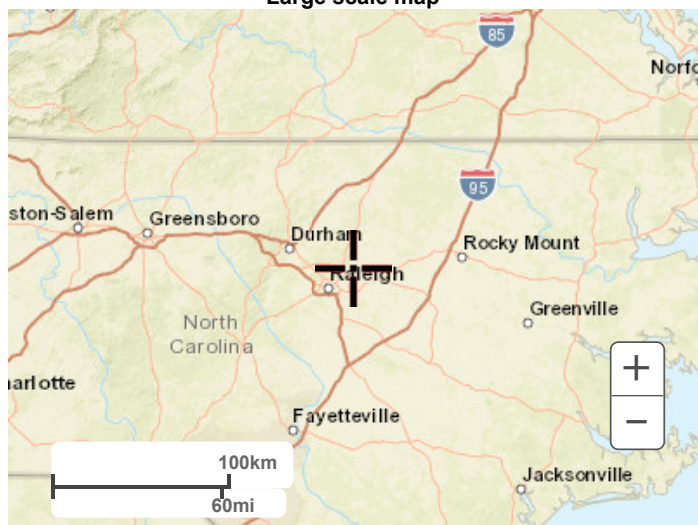
Small scale terrain



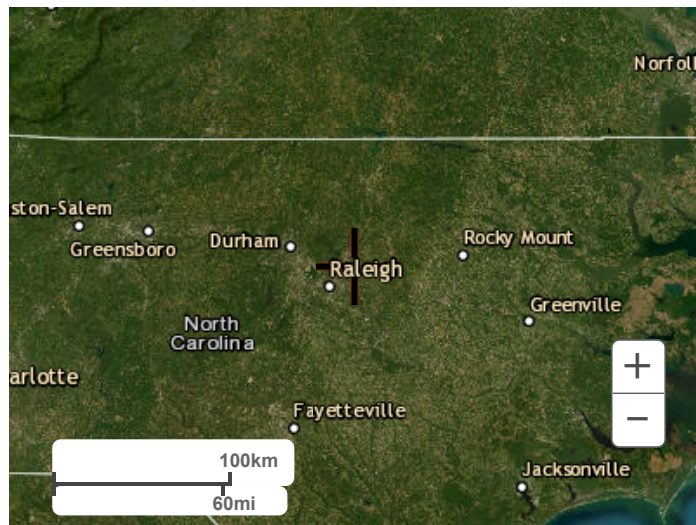
Large scale terrain



Large scale map



Large scale aerial



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NOAA Atlas 14, Volume 2, Version 3
Location name: Wake Forest, North Carolina, USA*
Latitude: 35.8857°, Longitude: -78.4794°
Elevation: 234 ft**
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NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

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	4.84 (4.43-5.30)	5.63 (5.16-6.16)	6.42 (5.88-7.01)	7.20 (6.59-7.86)	7.99 (7.27-8.71)	8.62 (7.81-9.38)	9.17 (8.27-9.98)	9.66 (8.65-10.5)	10.2 (9.07-11.1)	10.7 (9.42-11.7)
10-min	3.86 (3.54-4.23)	4.50 (4.13-4.92)	5.14 (4.71-5.61)	5.76 (5.27-6.28)	6.37 (5.80-6.94)	6.86 (6.22-7.48)	7.28 (6.56-7.93)	7.66 (6.86-8.35)	8.07 (7.17-8.81)	8.41 (7.42-9.20)
15-min	3.22 (2.95-3.53)	3.77 (3.46-4.12)	4.34 (3.97-4.73)	4.86 (4.44-5.30)	5.38 (4.90-5.86)	5.79 (5.25-6.31)	6.14 (5.53-6.68)	6.44 (5.77-7.02)	6.77 (6.02-7.39)	7.04 (6.21-7.70)
30-min	2.21 (2.02-2.42)	2.60 (2.39-2.85)	3.08 (2.82-3.36)	3.52 (3.22-3.84)	3.98 (3.63-4.34)	4.36 (3.95-4.75)	4.70 (4.24-5.12)	5.01 (4.49-5.47)	5.39 (4.79-5.88)	5.70 (5.03-6.24)
60-min	1.38 (1.26-1.51)	1.63 (1.50-1.79)	1.97 (1.81-2.15)	2.29 (2.10-2.50)	2.65 (2.42-2.89)	2.95 (2.68-3.22)	3.24 (2.92-3.53)	3.52 (3.15-3.83)	3.86 (3.44-4.22)	4.16 (3.67-4.55)
2-hr	0.805 (0.731-0.889)	0.958 (0.875-1.05)	1.17 (1.06-1.28)	1.37 (1.25-1.51)	1.61 (1.46-1.77)	1.82 (1.64-2.00)	2.03 (1.81-2.22)	2.23 (1.98-2.44)	2.50 (2.20-2.74)	2.74 (2.38-3.00)
3-hr	0.568 (0.516-0.629)	0.676 (0.618-0.746)	0.829 (0.754-0.915)	0.980 (0.889-1.08)	1.16 (1.05-1.28)	1.33 (1.19-1.46)	1.49 (1.32-1.63)	1.66 (1.46-1.82)	1.88 (1.64-2.06)	2.09 (1.80-2.29)
6-hr	0.341 (0.312-0.377)	0.407 (0.373-0.448)	0.499 (0.456-0.549)	0.591 (0.538-0.648)	0.704 (0.637-0.771)	0.807 (0.724-0.881)	0.909 (0.809-0.992)	1.02 (0.896-1.11)	1.16 (1.01-1.27)	1.30 (1.11-1.41)
12-hr	0.200 (0.183-0.220)	0.238 (0.219-0.261)	0.294 (0.269-0.322)	0.349 (0.319-0.383)	0.420 (0.380-0.458)	0.484 (0.435-0.526)	0.549 (0.488-0.596)	0.618 (0.544-0.671)	0.714 (0.618-0.775)	0.803 (0.685-0.872)
24-hr	0.119 (0.111-0.128)	0.144 (0.134-0.155)	0.181 (0.168-0.195)	0.210 (0.195-0.226)	0.250 (0.232-0.270)	0.283 (0.261-0.304)	0.316 (0.290-0.340)	0.350 (0.320-0.377)	0.397 (0.362-0.429)	0.435 (0.394-0.470)
2-day	0.069 (0.064-0.074)	0.083 (0.077-0.089)	0.103 (0.096-0.111)	0.120 (0.111-0.129)	0.142 (0.131-0.153)	0.159 (0.147-0.172)	0.178 (0.163-0.191)	0.196 (0.180-0.212)	0.222 (0.202-0.240)	0.242 (0.220-0.262)
3-day	0.048 (0.045-0.052)	0.058 (0.054-0.063)	0.072 (0.068-0.078)	0.084 (0.078-0.090)	0.099 (0.092-0.106)	0.111 (0.103-0.119)	0.124 (0.114-0.133)	0.137 (0.125-0.147)	0.154 (0.141-0.166)	0.168 (0.153-0.182)
4-day	0.038 (0.036-0.041)	0.046 (0.043-0.049)	0.057 (0.053-0.061)	0.066 (0.061-0.070)	0.078 (0.072-0.083)	0.087 (0.081-0.093)	0.097 (0.089-0.104)	0.107 (0.098-0.115)	0.121 (0.110-0.130)	0.132 (0.120-0.142)
7-day	0.025 (0.024-0.027)	0.030 (0.028-0.032)	0.037 (0.035-0.039)	0.042 (0.039-0.045)	0.050 (0.046-0.053)	0.056 (0.052-0.059)	0.062 (0.057-0.066)	0.068 (0.062-0.073)	0.076 (0.070-0.082)	0.083 (0.076-0.089)
10-day	0.020 (0.019-0.021)	0.024 (0.022-0.025)	0.029 (0.027-0.031)	0.033 (0.031-0.035)	0.038 (0.035-0.041)	0.042 (0.039-0.045)	0.046 (0.043-0.050)	0.051 (0.047-0.054)	0.057 (0.052-0.061)	0.061 (0.056-0.066)
20-day	0.013 (0.012-0.014)	0.016 (0.015-0.017)	0.019 (0.018-0.020)	0.021 (0.020-0.022)	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 (0.010-0.012)	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.017 (0.016-0.018)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	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	0.009 (0.009-0.010)	0.011 (0.010-0.011)	0.012 (0.012-0.013)	0.014 (0.013-0.015)	0.015 (0.015-0.016)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	0.022 (0.020-0.023)
60-day	0.008 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.013-0.014)	0.014 (0.014-0.015)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.018 (0.016-0.019)	0.018 (0.017-0.020)

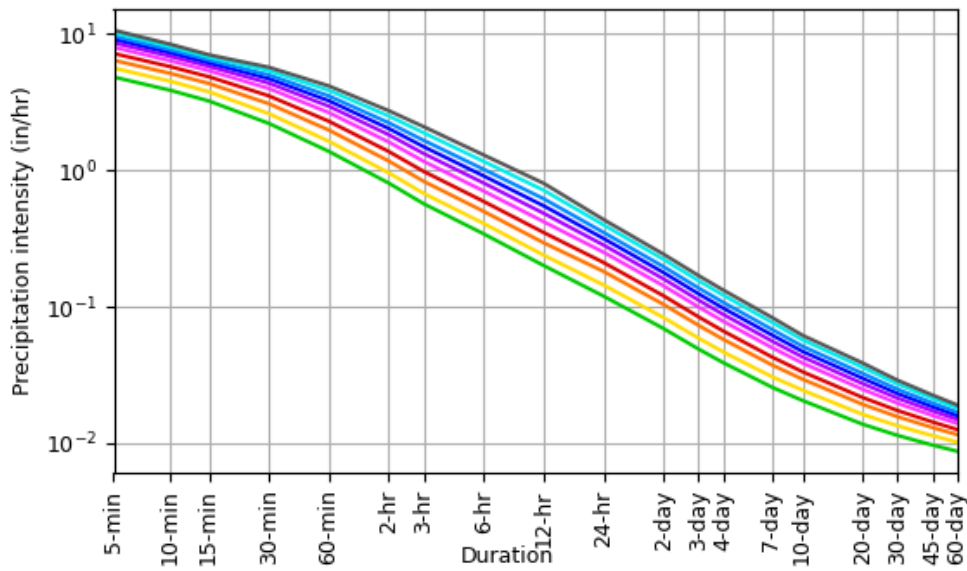
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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.

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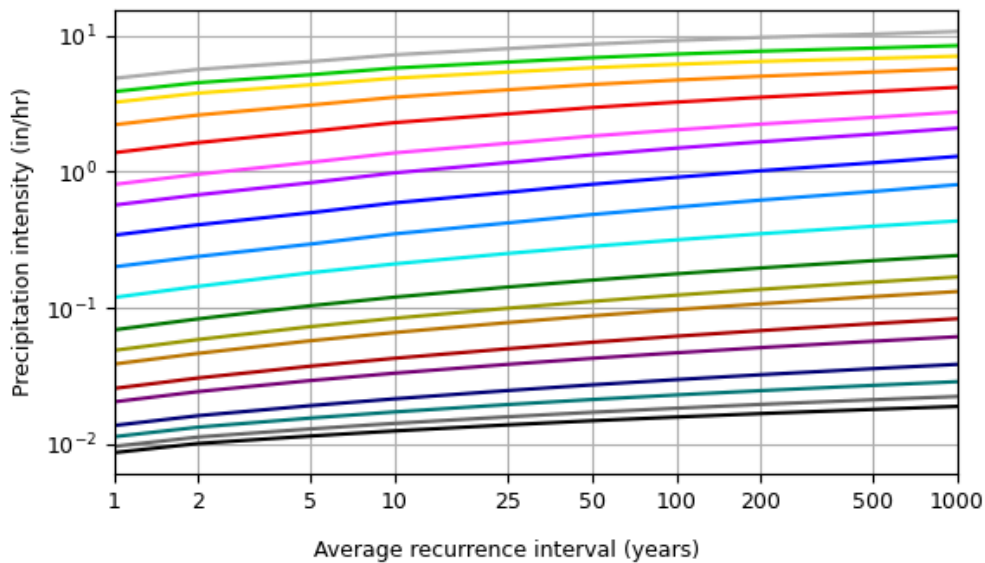
PF graphical

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

Latitude: 35.8857°, Longitude: -78.4794°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

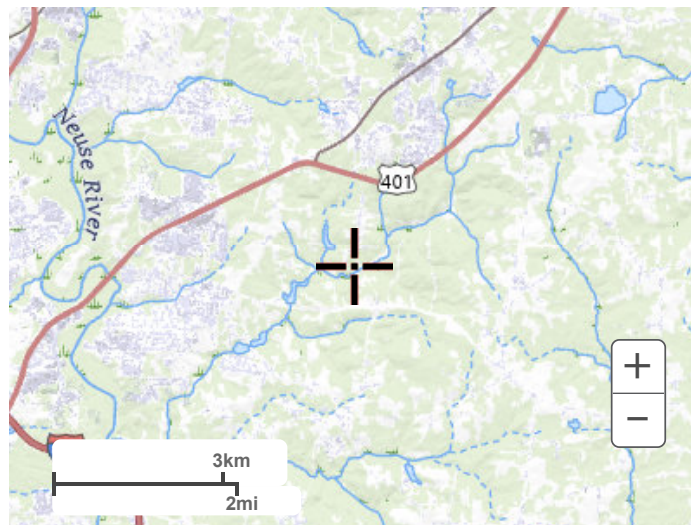


Duration
5-min
10-min
15-min
30-min
60-min
2-hr
3-hr
6-hr
12-hr
24-hr
2-day
3-day
4-day
7-day
10-day
20-day
30-day
45-day
60-day

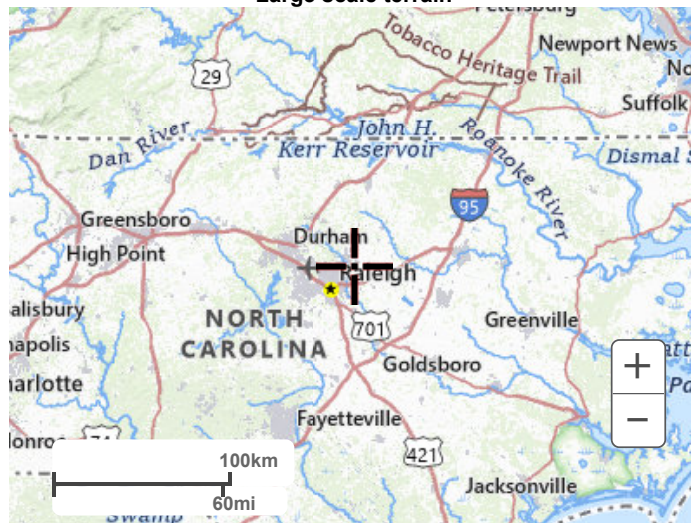
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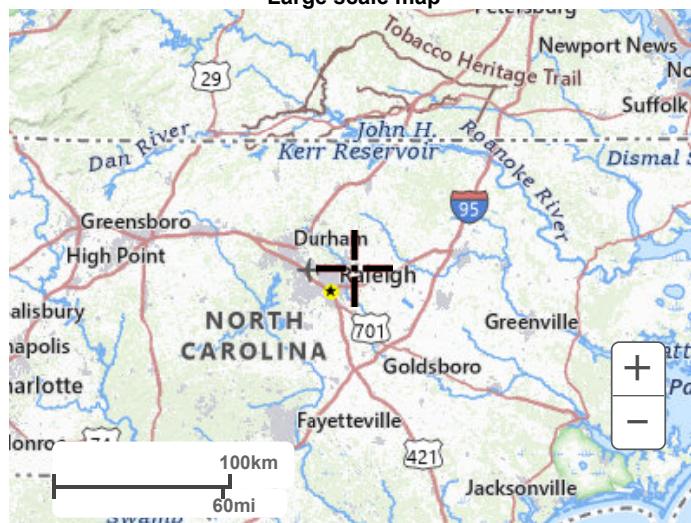
[Back to Top](#)**Maps & aerials****Small scale terrain**



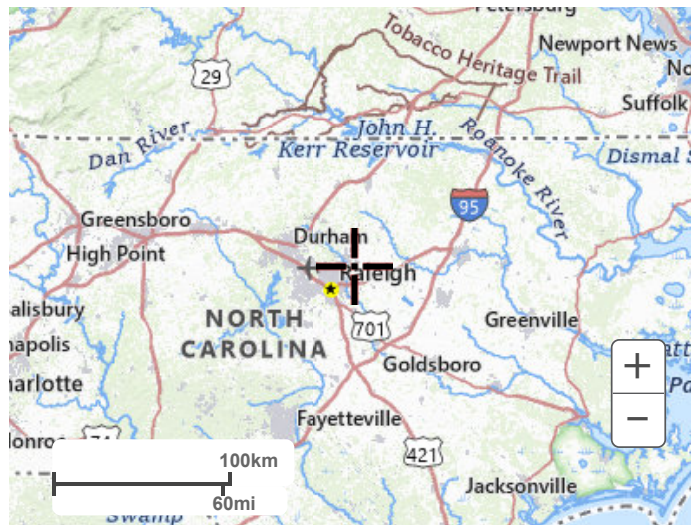
Large scale terrain



Large scale map



Large scale aerial



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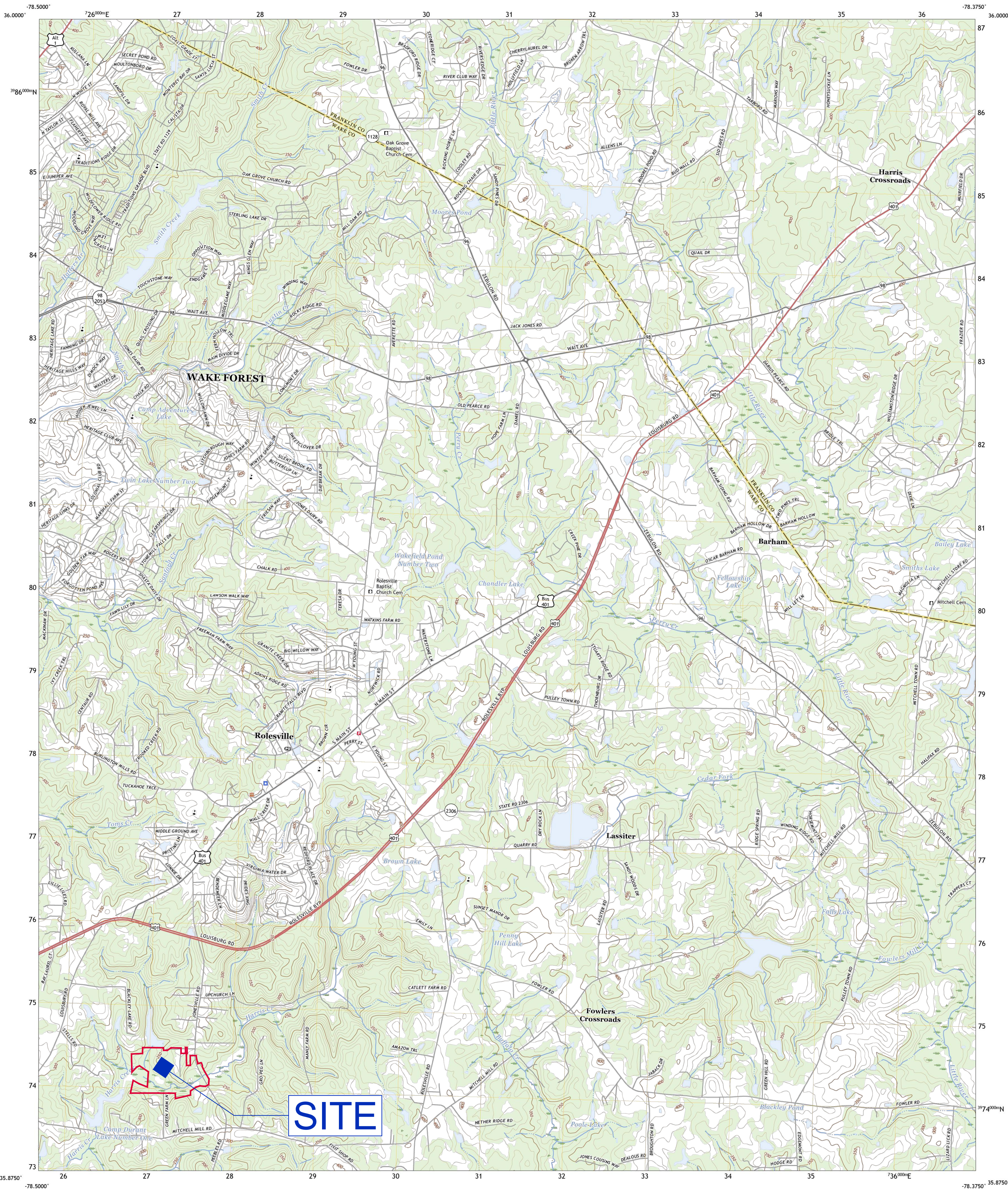
USGS MAP



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



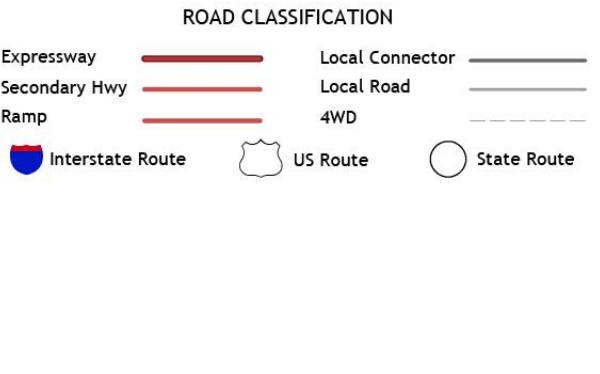
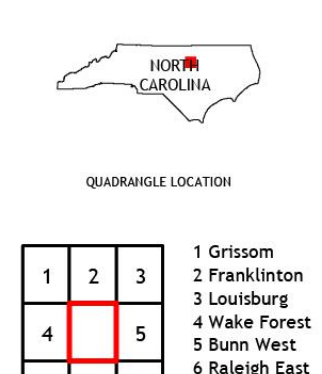
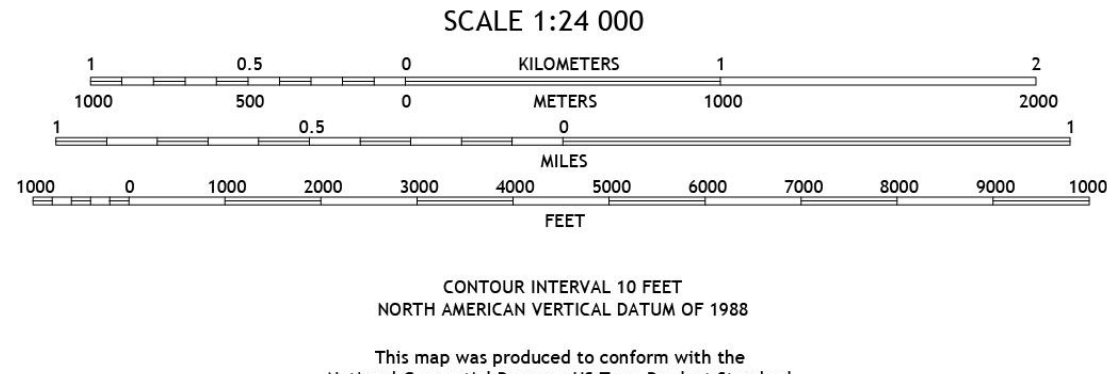
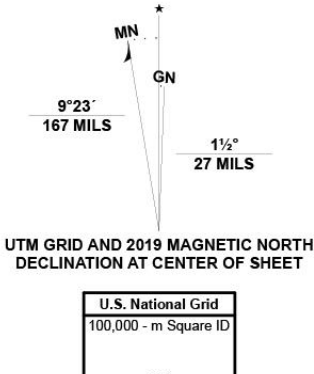
ROLESVILLE QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 17S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, July 2020 - July 2020
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1980 - 2022
Hydrography.....National Hydrography Dataset, 2001 - 2021
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 2019 - 2021
Wetlands.....FWS National Wetlands Inventory Not Available

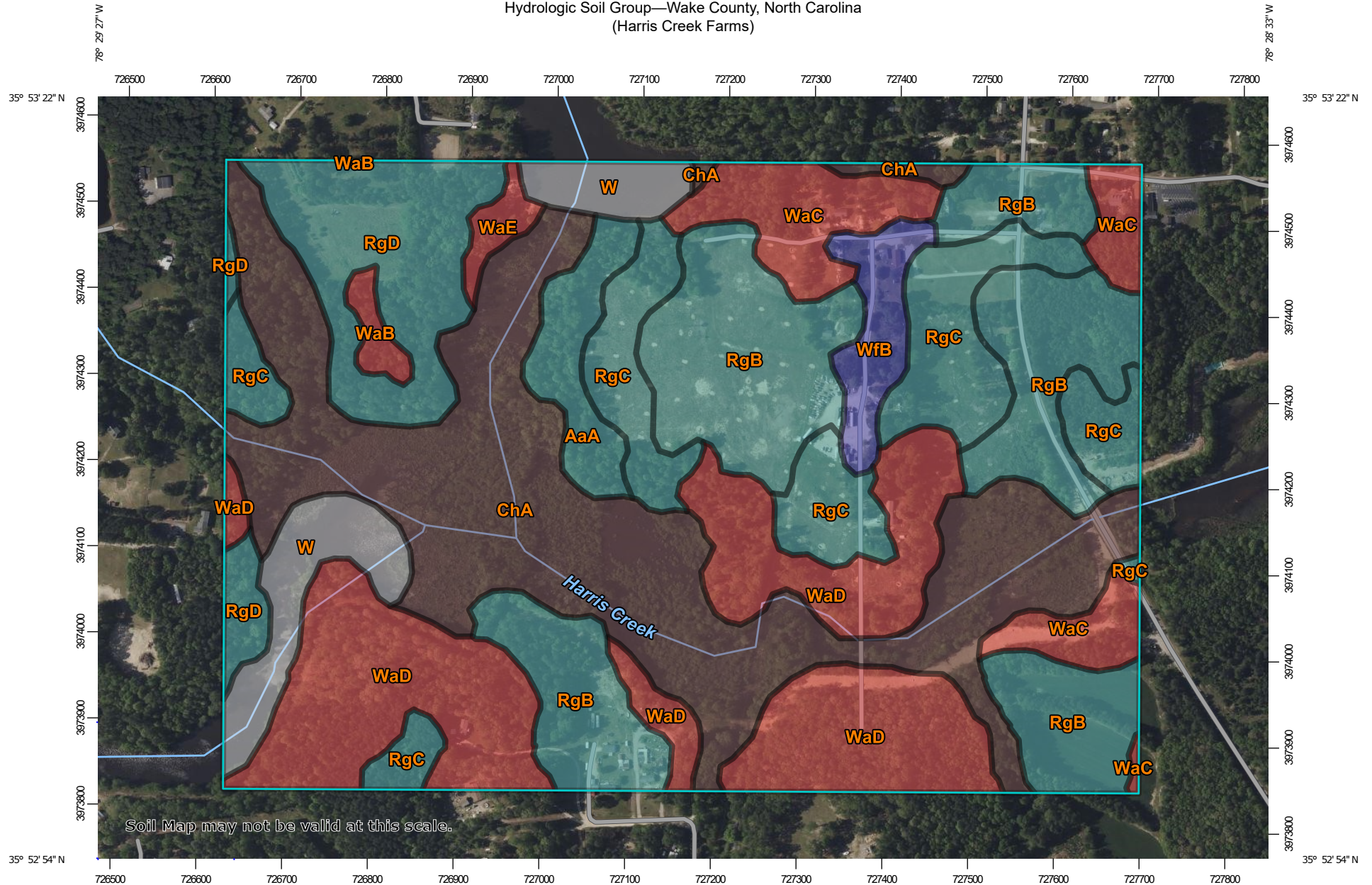


WAKE COUNTY SOILS MAP



NRCS SOILS MAP

Hydrologic Soil Group—Wake County, North Carolina (Harris Creek Farms)



Soil Map may not be valid at this scale.

Map Scale: 1:6,240 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 300 600 1200 1800 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

5/26/2025
Page 1 of 4

Hydrologic Soil Group—Wake County, North Carolina (Harris Creek Farms)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wake County, North Carolina
 Survey Area Data: Version 26, Sep 9, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 24, 2022—May 9, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AaA	Altavista fine sandy loam, 0 to 4 percent slopes, rarely flooded	C	5.1	2.6%
ChA	Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded	B/D	49.9	25.8%
RgB	Rawlings-Rion complex, 2 to 6 percent slopes	C	38.2	19.7%
RgC	Rawlings-Rion complex, 6 to 10 percent slopes	C	21.8	11.3%
RgD	Rawlings-Rion complex, 10 to 15 percent slopes	C	15.1	7.8%
W	Water		8.9	4.6%
WaB	Wake-Rolesville complex, 2 to 6 percent slopes, very rocky	D	1.2	0.6%
WaC	Wake-Rolesville complex, 6 to 10 percent slopes, very rocky	D	11.6	6.0%
WaD	Wake-Rolesville complex, 10 to 15 percent slopes, very rocky	D	35.8	18.5%
WaE	Wake-Rolesville complex, 15 to 25 percent slopes, very rocky	D	1.4	0.7%
WfB	Wedowee-Saw complex, 2 to 6 percent slopes	B	4.4	2.3%
Totals for Area of Interest			193.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FEMA FLOOD MAP



This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://FRIS.NC.GOV/FRIS](https://fris.nc.gov/fris) [HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS

OTHER AREAS OF FLOOD HAZARD

OTHER AREAS

GENERAL STRUCTURES

OTHER FEATURES

Without Base Flood Elevation (BFE) Zone A,V, A99

With BFE or Depth Zone AE, AO, AH, VE, AR

Regulatory Floodway

0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile Zone X

Future Conditions 1% Annual Chance Flood Hazard Zone X

Area with Reduced Flood Risk due to Levee See Notes Zone X

Areas Determined to be Outside the 0.2% Annual Chance Floodplain Zone X

Channel, Culvert, or Storm Sewer

Levee, Dike, or Floodwall

Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)

Coastal Transect

Coastal Transect Baseline

Profile Baseline

Hydrographic Feature

Limit of Study

Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <https://msc.fema.gov>. An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at <https://flood.nc.gov/flood>, or contact the FEMA Map Service Center.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Flood Insurance Study (FIS) means an examination, evaluation, and determination of flood hazards, corresponding water surface elevations, flood hazard risk zones, and other flood data in a community issued by the North Carolina Floodplain Mapping Program (NCFMP). The Flood Insurance Study (FIS) is comprised of the following products used together: the Digital Flood Hazard Database, the Water Surface Elevation Raster, the digitally derived, autogenrated Flood Insurance Rate Map and the Flood Insurance Survey Report. A Flood Insurance Survey is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. This report contains detailed flood elevation data, data tables and FIRM indices. When a flood study is completed for the NFIP, the digital information, reports and maps are assembled into an FIS. Information shown on this FIRM is provided in digital format by the NCFMP. Base map information shown on this FIRM was provided in digital format by the NCFMP. The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEEVE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <https://www.fema.gov/national-flood-insurance-program>.

PROVISIONALLY ACCREDITED LEEVE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <https://www.fema.gov/national-flood-insurance-program>.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LIMWA). The LIMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LIMWA (or between the shoreline and the LIMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Limit of Moderate Wave Action (LIMWA)

SCALE

PANEL LOCATOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

National Flood Insurance Program

Little Creek

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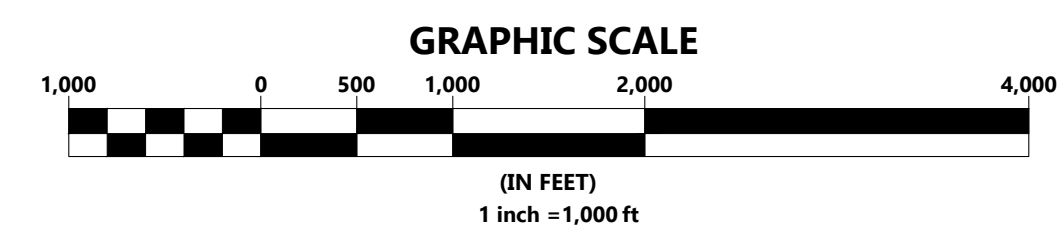
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DRAINAGE AREA MAPS

DISCHARGE
POINT

SITE



Page 10 of 10



10030 Green Level Church Rd, Suite 802 #149: Cary, NC 27519

m # F-1517

(919) 996-9455



www.batemancivilsurvey.com



-24-05

File Name: Drainage Area Maps.dwg

Drawn by: TAN

ID-25-??

PRELIMINARY PLANS
DO NOT USE FOR
CONSTRUCTION

No.	Date	Description
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PRF-

DEVELOPMENT

DA MAP

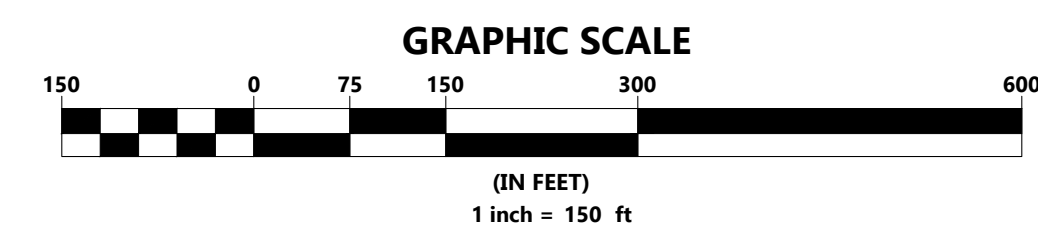
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**3 DAYS BEFORE DIGGING CALL
TOLL FREE 811 or (800)632-4949**

A ONE CALL SYSTEM FOR COMMUNITY AND JOB SAFETY

(IN FEET)
1 inch = 150 ft

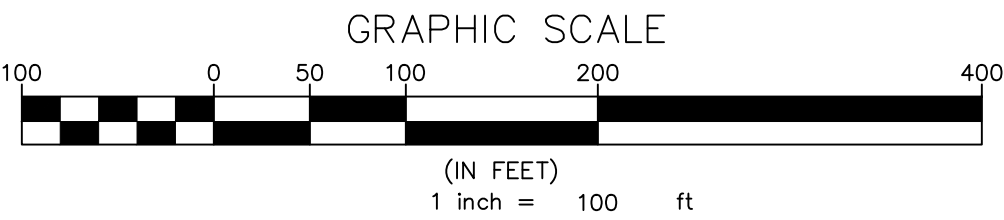
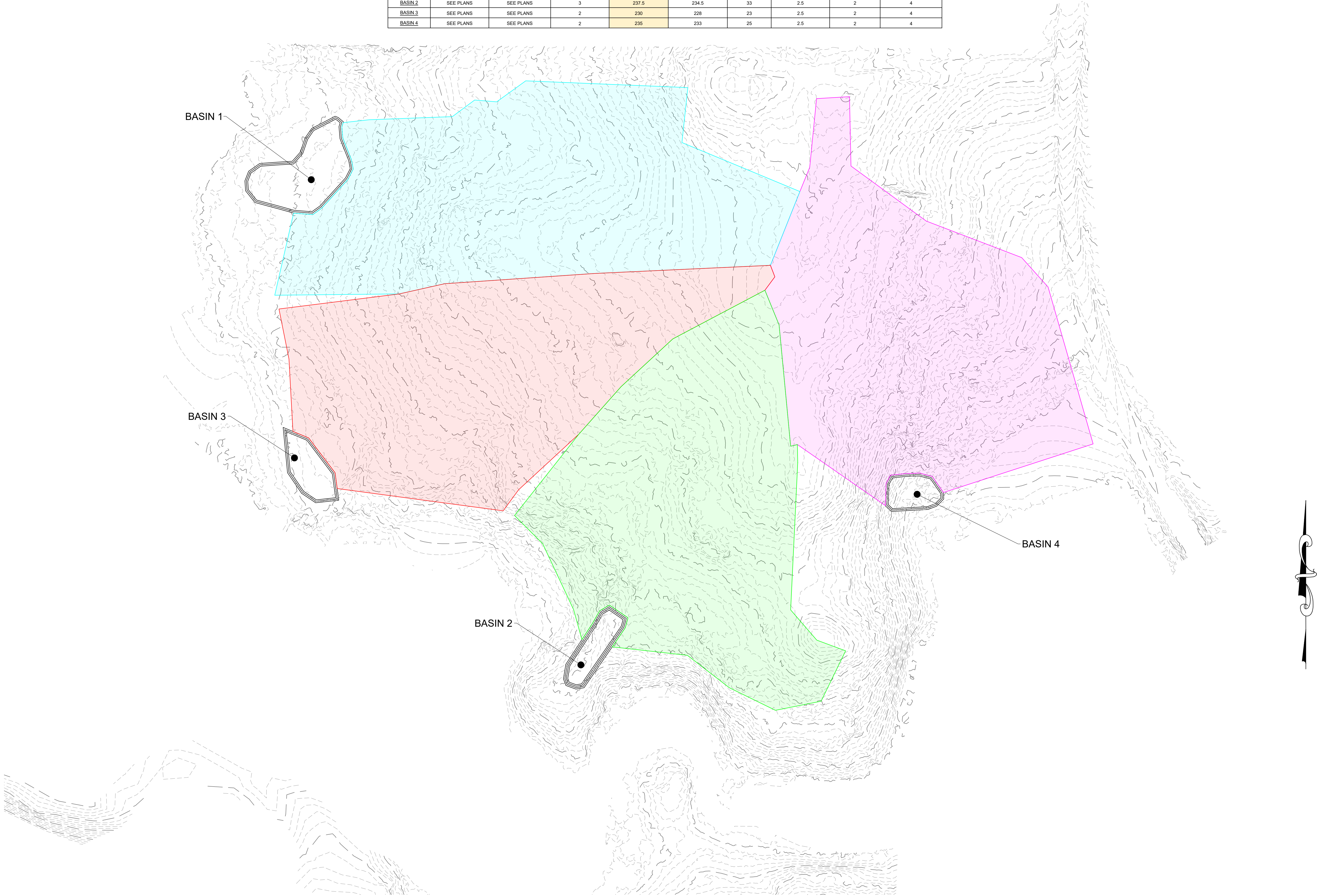


UNTREATED DRAINAGE AREA

POST

File Location: C:\Users\jthodge\OneDrive\Quantech\Quantech Engineering - Documents\Harris Creek Farm - Jonesville\Engineering\ DWG\Bases Files\X-Relief\Harris Creek DAs.dwg

HARRIS CREEK									
SKIMMER BASIN TABLE									
Skimmer Basin #	Width (ft)	Length (ft)	Depth (ft)	Top Elevation	Outlet Elevation	Weir (ft)	Skimmer (in)	Orifice (in)	Dewatering Time (days)
BASIN 1	SEE PLANS	SEE PLANS	2	237	235	50	2.5	2.5	4
BASIN 2	SEE PLANS	SEE PLANS	3	237.5	234.5	33	2.5	2	4
BASIN 3	SEE PLANS	SEE PLANS	2	230	228	23	2.5	2	4
BASIN 4	SEE PLANS	SEE PLANS	2	235	233	25	2.5	2	4



Developer



10030 Green Level Church Rd, Suite 802 #149: Cary, NC 27519

Engineer



QUANTECH ENGINEERING
INNOVATIVE SOLUTIONS | ENGINEERING THE FUTURE

Firm # F-1517

15000 Weston Parkway
Cary, N.C. 27513
(919) 996-9455

Surveyor



Bateman Civil Survey Company
2524 Reliance Avenue
Apex, NC 27539
919-557-1080 ext 109
www.batemancivilsurvey.com

Jurisdiction / Municipality

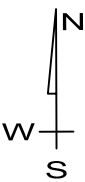


Town of Rolesville
502 Southtown Cir
Rolesville, NC 27571
Phone: 919-554-6517

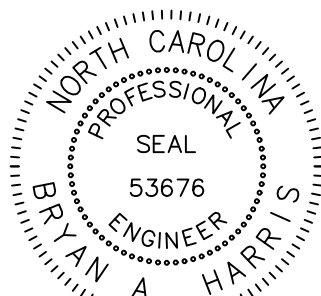
PSP-24-05

Other Consultants

Sheet map:



Seal:



FINAL DRAWING - FOR
REVIEW PURPOSES ONLY

Issued / Print Date: 2025-May-29 (11:42)
File Name: Harris Creek DAs.dwg

Last Saved by: jthodge
Drawn by: TAN

Project:

HARRIS CREEK
FARMS

CID-25-??

Issued for: **PRELIMINARY PLANS**
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REVISIONS

No. Date Description

Sheet Title:

BASIN STAGE 1
DRAINAGE AREA

Sheet #:

File Location: C:\Users\jthodge\Quantech\Quantech Engineering - Documents\Harris Creek Farm - Jonesville\Engineering\ DWG\Bases Files\X-Relis\Harris Creek DAs.dwg

HARRIS CREEK									
SKIMMER BASIN TABLE									
Skimmer Basin #	Width (ft)	Length (ft)	Depth (ft)	Top Elevation	Outlet Elevation	Weir (ft)	Skimmer (in)	Office (in)	Dewatering Time (days)
BASIN 1	SEE PLANS	SEE PLANS	2	237	235	50	2.5	2.5	4
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BASIN 3	SEE PLANS	SEE PLANS	2	230	228	23	2.5	2	4
BASIN 4	SEE PLANS	SEE PLANS	2	235	233	25	2.5	2	4

BASIN 1

BASIN 2

Developer



10030 Green Level Church Rd, Suite 802 #149: Cary, NC 27519

Engineer



INNOVATIVE SOLUTIONS | ENGINEERING THE FUTURE

Firm # F-1517

15000 Weston Parkway
Cary, N.C. 27513
(919) 996-9455

Surveyor



Bateman Civil Survey Company
2524 Reliance Avenue
Apex, NC 27539
919-557-1080 ext 109
www.batemancivilsurvey.com

Jurisdiction / Municipality



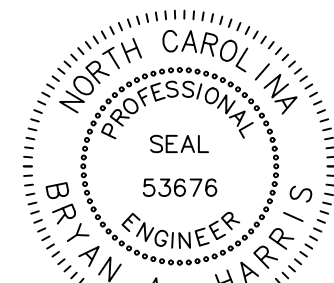
Town of Rolesville
502 Southtown Cir
Rolesville, NC 27571
Phone: 919-554-6517
PSP-24-05

Other Consultants

Sheet map:



Seal:



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Issued / Print Date: 2025-May-29 (11:42)
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Drawn by: TAN

Project:

HARRIS CREEK
FARMS

CID-25-??

Issued for: PRELIMINARY PLANS
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CONSTRUCTION

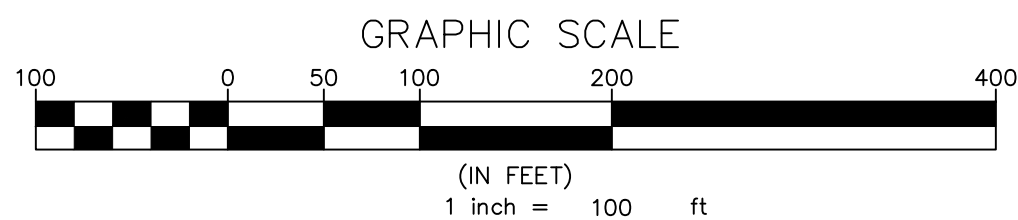
REVISIONS

No. Date Description

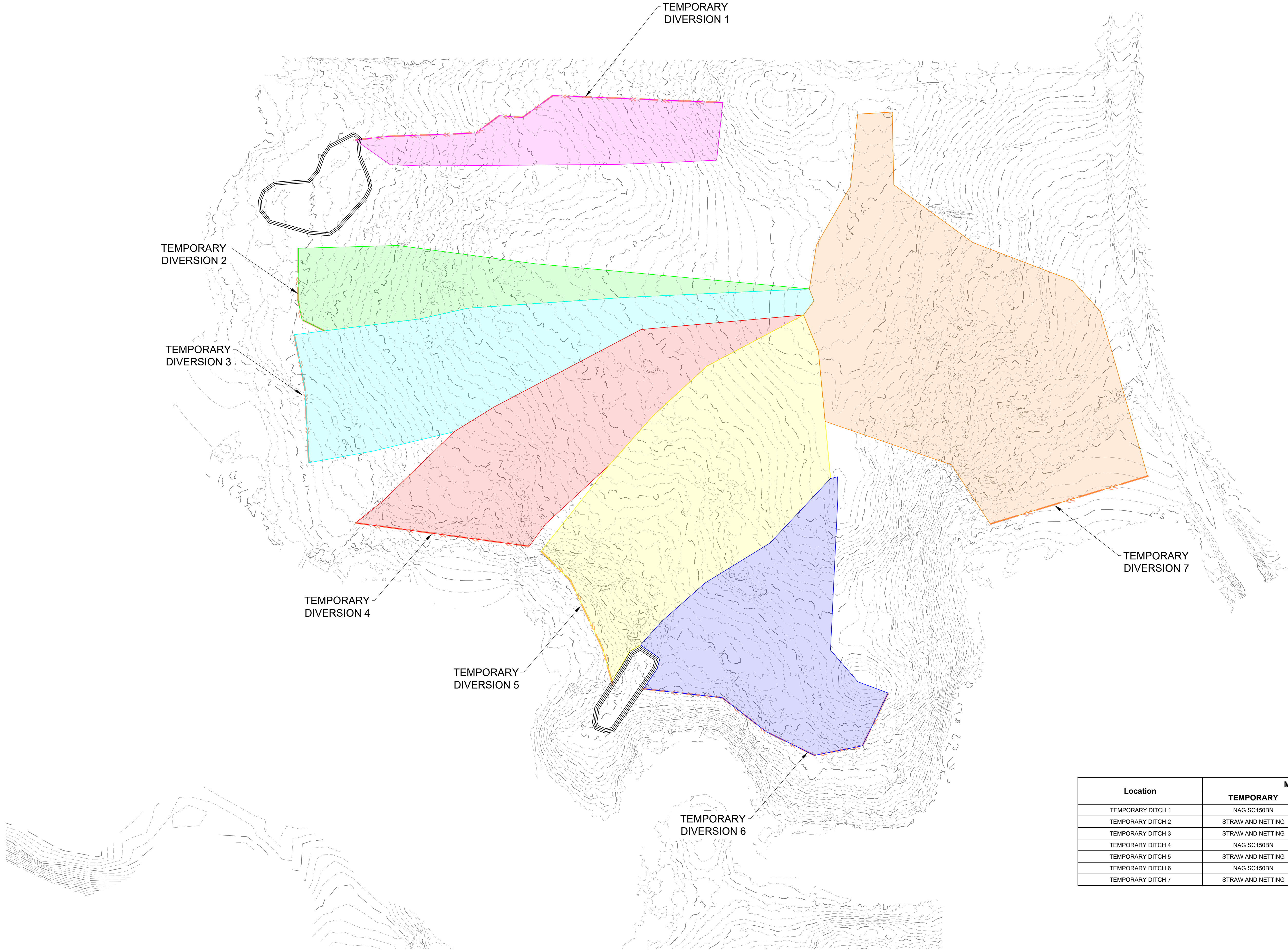
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BASIN STAGE 2
DRAINAGE AREA

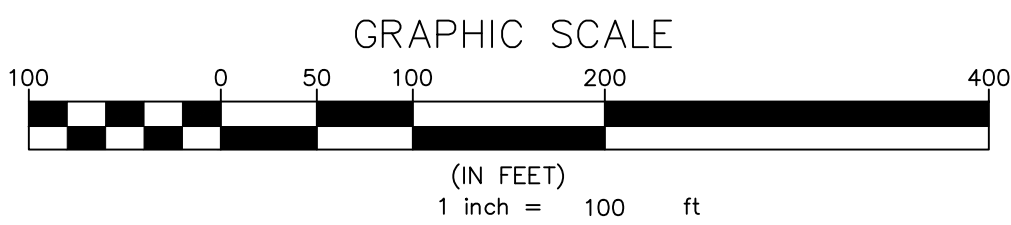
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Location	MATERIAL	
	TEMPORARY	PERMANENT
TEMPORARY DITCH 1	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 2	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 3	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 4	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 5	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 6	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 7	STRAW AND NETTING	STRAW AND NETTING



Developer



10030 Green Level Church Rd, Suite 802 #149: Cary, NC 27519

Engineer



Surveyor

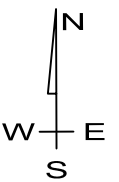


Jurisdiction / Municipality



Other Consultants

Sheet map:



Seal:



FINAL DRAWING - FOR REVIEW PURPOSES ONLY

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Drawn by: TAN

Project:

HARRIS CREEK FARMS

CID-25-??

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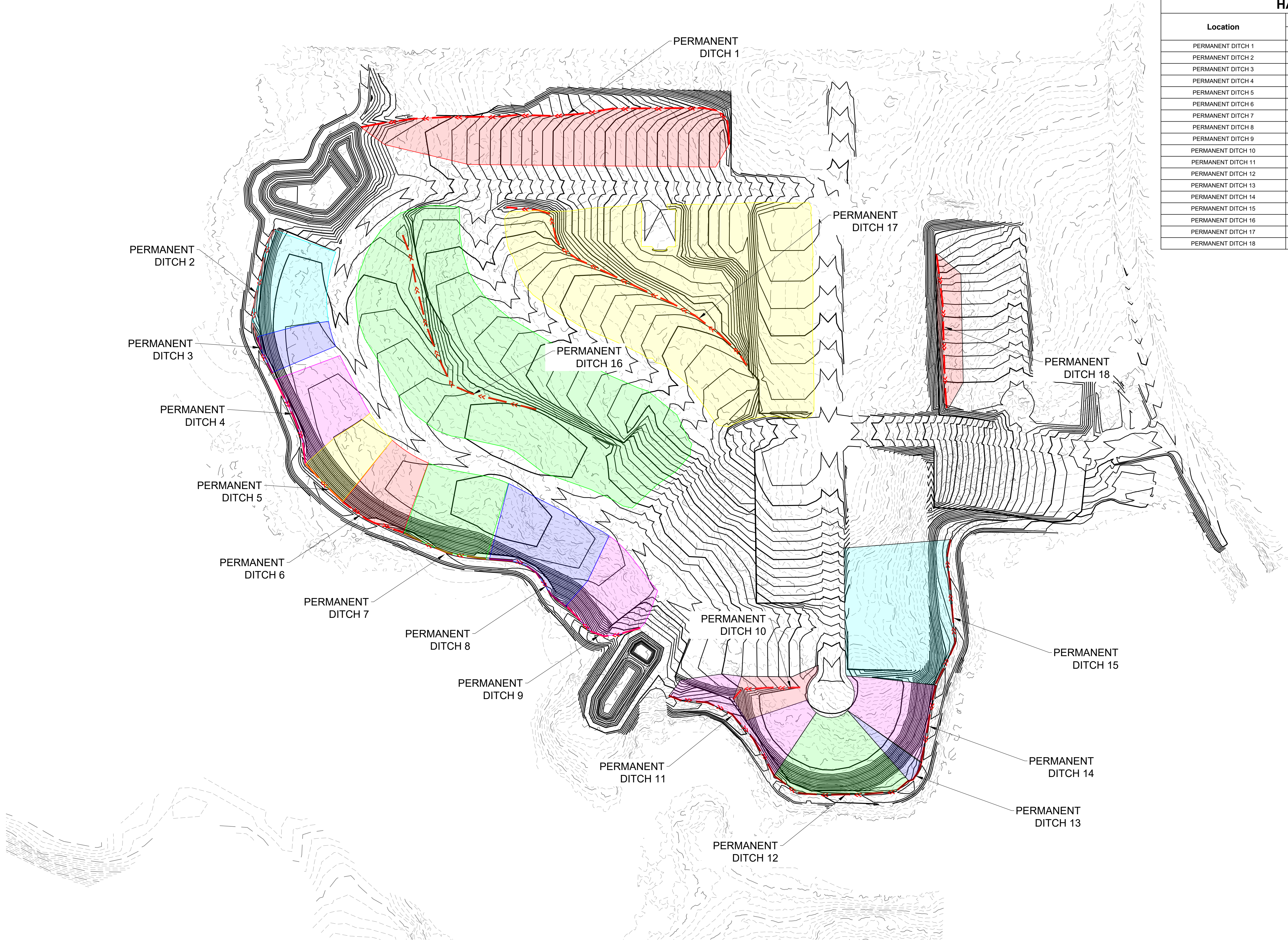
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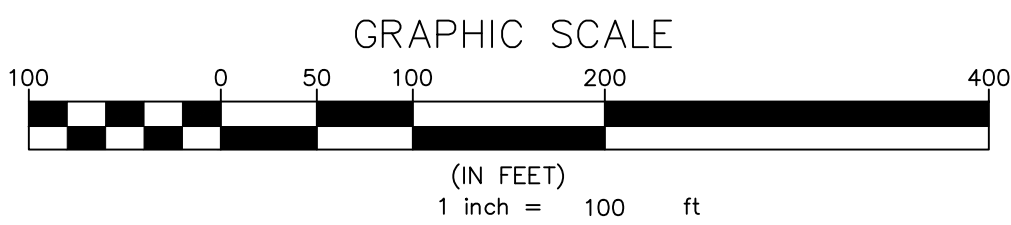
TEMPORARY DITCH DRAINAGE AREA

Sheet #:

File Location: C:\Users\jthodge\OneDrive\Quantech\Engineering - Documents\Harris Creek Farm - Jonesville\Engineering\ DWG\Bases Files\X-Relis\Harris Creek DAs.dwg



HARRIS CREEK		
Location	MATERIAL	
	TEMPORARY	PERMANENT
PERMANENT DITCH 1	NAG SC150BN	NAG SC150BN
PERMANENT DITCH 2	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 3	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 4	STRAW AND NETTING	GRASS
PERMANENT DITCH 5	STRAW AND NETTING	GRASS
PERMANENT DITCH 6	STRAW AND NETTING	GRASS
PERMANENT DITCH 7	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 8	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 9	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 10	STRAW AND NETTING	NAG SC150BN
PERMANENT DITCH 11	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 12	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 13	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 14	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 15	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 16	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 17	NAG SC150BN	NAG SC150BN
PERMANENT DITCH 18	STRAW AND NETTING	STRAW AND NETTING



Developer



10030 Green Level Church Rd, Suite 802 #149: Cary, NC 27519

Engineer



Surveyor

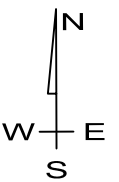


Jurisdiction / Municipality

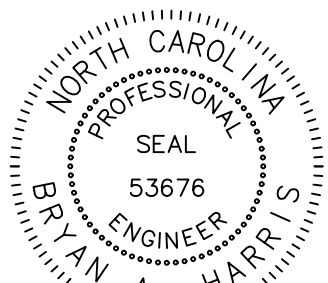


Other Consultants

Sheet map:



Seal:



FINAL DRAWING - FOR
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Issued / Print Date: 2025-May-29 (11:42)
File Name: Harris Creek DAs.dwg

Last Saved by: jthodge
Drawn by: TAN

Project:

HARRIS CREEK
FARMS

CID-25-??

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No. Date Description

Sheet Title:

PERMANENT DITCH
DRAINAGE AREA

Sheet #:

EROSION CONTROL CALCULATIONS

SEDIMENT BASIN CALCULATIONS

HARRIS CREEK

SKIMMER BASIN TABLE

[illegible]

Selection of Sediment Control Measure

PROJECT NAME : HARRIS CREEK
 STREET:
 STATION:

15.96 Total Drainage Area
 15.96 Disturbed Area (Acres)
 57.46 Peak Flow from 10-year Storm (cfs)
 $A_d = 15.96$ Disturbed Area (Acres)
 $A_u = 0.00$ AC [AREA UNDISTURBED]
 $A_t = 15.96$ Total Drainage Area
 $C = 0.50$ RUNOFF COEFFECIENT
 $I_2 = 5.63$ 2-YR RAINFALL INTENSITY
 $Q_2 = 44.93$ Peak Flow from 2-year Storm (cfs)
 $I_{10} = 7.2$ 10-YR RAINFALL INTENSITY
 $Q_{10} = 57.46$ Peak Flow from 10-year Storm (cfs)

Do Not Use Temporary Sediment Trap
 Do Not Use Rock Dam,
 Do Not Use Skimmer Sediment Basin
 Okay Temporary Sediment Basin

Sediment Basin

ID

BASIN 1

28728 Required Volume ft³
 24995 Required Surface Area ft²
 111.8 Suggested Width ft
 223.6 Suggested Length ft

	Area in sqft	Area in acres (A)	"C" value for area	A*C
	695,257	15.96	0.50	7.98
		0.00		0.00
		0.00		0.00
		0.00		0.00
		0.00		0.00
Total	695,257	15.96		7.98
Composite "C" value:				0.50

Trial Top Width at Spillway Invert ft
 Trial Top Length at Spillway Invert ft

3 Trial Side Slope Ratio Z:1

2 Trial Depth ft (2 to 3.5 feet above grade)

N/A Bottom Width ft

N/A Bottom Length ft

23,105 Bottom Area ft²

50,232 Actual Volume ft³

27,156 Actual Surface Area ft²

55 Trial Weir Length ft (min 4')

0.5 Trial Depth of Flow ft (max. 1/2')

58.3 Spillway Capacity cfs

2.5 Skimmer Size (inches)

0.208 Head on Skimmer (feet)

2.5 Orifice Size (0.1" increments)

4.36 Dewatering Time (days)

Suggest about 3 days

Okay

Okay

Okay

Okay

Skimmer Size
(Inches)

1.5

2

2.5

3

4

5

6

8

OVERALL BASIN 1 VOLUME

ELEV	AREA (sf)	AVERAGE AREA (sf)	VOLUME (cf)	ACC. VOLUME (cf) STORAGE (S)	STAGE (ft) Z	AREA (ac)	ELEV	ELEV STEP (ft) ΔZ
235.00	23,105	0	0	0	0	0.530	235.00	1
236.00	25,101	24,103	24,103	24,103	1	0.576	236.00	1
237.00	27,156	26,129	26,129	50,232	2	0.623	237.00	1
238.00		0	0	Overtopped	3	0.000	238.00	1
239.00		0	0	Overtopped	4	0.000	239.00	1
240.00		0	0	Overtopped	5	0.000	240.00	1
241.00		0	0	Overtopped	6	0.000	241.00	1
242.00		0	0	Overtopped	7	0.000	242.00	1
243.00		0	0	Overtopped	8	0.000	243.00	1
244.00		0	0	Overtopped	9	0.000	244.00	1
245.00		0	0	Overtopped	10	0.000	245.00	1
246.00		0	0	Overtopped	11	0.000	246.00	1
247.00		0	0	Overtopped	12	0.000	247.00	1
248.00		0	0	Overtopped	13	0.000	248.00	1
249.00		0	0	Overtopped	14	0.500	249.00	1
250.00		0	0	Overtopped	15	0.000	250.00	1
251.00		0	0	Overtopped	16	0.000	251.00	1
252.00		0	0	Overtopped	17	0.000	252.00	1
				50,232				

Selection of Sediment Control Measure

PROJECT NAME : HARRIS CREEK
 STREET:
 STATION:

9.76 Total Drainage Area 7.86 Disturbed Area (Acres) 37.08 Peak Flow from 10-year Storm (cfs) $A_d = 7.86$ Disturbed Area (Acres) $A_u = 1.90$ AC [AREA UNDISTURBED] $A_t = 9.76$ Total Drainage Area $C = 0.50$ RUNOFF COEFFECIENT $I_2 = 5.93$ 2-YR RAINFALL INTENSITY $Q_2 = 28.93$ Peak Flow from 2-year Storm (cfs) $I_{10} = 7.6$ 10-YR RAINFALL INTENSITY $Q_{10} = 37.08$ Peak Flow from 10-year Storm (cfs)	Do Not Use Temporary Sediment Trap Okay Rock Dam, Okay Skimmer Sediment Basin Okay Temporary Sediment Basin
--	---

Skimmer Basin

ID

BASIN 2

14148 Required Volume ft³
 16128 Required Surface Area ft²
 89.8 Suggested Width ft
 179.6 Suggested Length ft

	Area in sqft	Area in acres (A)	"C" value for area	A*C
	425,003	9.76	0.50	4.88
		0.00		0.00
		0.00		0.00
		0.00		0.00
		0.00		0.00
Total	425,003	9.76		4.88
Composite "C" value:				0.50

	Trial Top Width at Spillway Invert ft		
	Trial Top Length at Spillway Invert ft		
	3 Trial Side Slope Ratio Z:1		
	3 Trial Depth ft (2 to 3.5 feet above grade)		
N/A	Bottom Width ft		
N/A	Bottom Length ft		Skimmer Size
	7,283 Bottom Area ft ²		(Inches)
	32,985 Actual Volume ft ³	Okay	1.5
	16,143 Actual Surface Area ft ²	Okay	2
			2.5
	55 Trial Weir Length ft (min 4')		3
	0.5 Trial Depth of Flow ft (max. 1/2')		4
	58.3 Spillway Capacity cfs	Okay	5
			6
	2 Skimmer Size (inches)		8
	0.167 Head on Skimmer (feet)		
	2 Orifice Size (0.1" increments)		
	3.75 Dewatering Time (days)	Okay	
	Suggest about 3 days		

OVERALL BASIN 2 VOLUME

ELEV	AREA (sf)	AVERAGE AREA (sf)	VOLUME (cf)	ACC. VOLUME (cf) STORAGE (S)	STAGE (ft) Z	AREA (ac)	ELEV	ELEV STEP (ft) ΔZ
234.50	7,283	0	0	0	0	0.167	234.50	1
235.50	9,540	8,412	8,412	8,412	1	0.219	235.50	1
236.50	11,732	10,636	10,636	19,048	2	0.269	236.50	1
237.50	16,143	13,938	13,938	32,985	3	0.371	237.50	1
238.50		0	0	Overtopped	4	0.000	238.50	1
239.50		0	0	Overtopped	5	0.000	239.50	1
240.50		0	0	Overtopped	6	0.000	240.50	1
241.50		0	0	Overtopped	7	0.000	241.50	1
242.50		0	0	Overtopped	8	0.000	242.50	1
243.50		0	0	Overtopped	9	0.000	243.50	1
244.50		0	0	Overtopped	10	0.000	244.50	1
245.50		0	0	Overtopped	11	0.000	245.50	1
246.50		0	0	Overtopped	12	0.000	246.50	1
247.50		0	0	Overtopped	13	0.000	247.50	1
248.50		0	0	Overtopped	14	0.500	248.50	1
249.50		0	0	Overtopped	15	0.000	249.50	1
250.50		0	0	Overtopped	16	0.000	250.50	1
251.50		0	0		17	0.000	251.50	1
				32,985				

Selection of Sediment Control Measure

PROJECT NAME : HARRIS CREEK
 STREET:
 STATION:

7.47 Total Drainage Area 7.47 Disturbed Area (Acres) 26.90 Peak Flow from 10-year Storm (cfs) $A_d = 7.47$ Disturbed Area (Acres) $A_u = 0.00$ AC [AREA UNDISTURBED] $A_t = 7.47$ Total Drainage Area $C = 0.50$ RUNOFF COEFFECIENT $I_2 = 5.63$ 2-YR RAINFALL INTENSITY $Q_2 = 21.03$ Peak Flow from 2-year Storm (cfs) $I_{10} = 7.2$ 10-YR RAINFALL INTENSITY $Q_{10} = 26.90$ Peak Flow from 10-year Storm (cfs)	Do Not Use Temporary Sediment Trap Okay Rock Dam, Okay Skimmer Sediment Basin Okay Temporary Sediment Basin
--	---

Skimmer Basin

ID

BASIN 3

13446 Required Volume ft³
 11701 Required Surface Area ft²
 76.5 Suggested Width ft
 153.0 Suggested Length ft

	Area in sqft	Area in acres (A)	"C" value for area	A*C
	325,468	7.47	0.50	3.74
		0.00		0.00
		0.00		0.00
		0.00		0.00
		0.00		0.00
Total	325,468	7.47		3.74
Composite "C" value:				0.50

Trial Top Width at Spillway Invert ft

Trial Top Length at Spillway Invert ft

3 Trial Side Slope Ratio Z:1

2 Trial Depth ft (2 to 3.5 feet above grade)

N/A Bottom Width ft

N/A Bottom Length ft

8,764 Bottom Area ft²

33,726 Actual Volume ft³ **Okay**

16,143 Actual Surface Area ft² **Okay**

55 Trial Weir Length ft (min 4')

0.5 Trial Depth of Flow ft (max. 1/2')

58.3 Spillway Capacity cfs **Okay**

2 Skimmer Size (inches)

0.167 Head on Skimmer (feet)

2 Orifice Size (0.1" increments)

3.56 Dewatering Time (days) **Okay**

Suggest about 3 days

Skimmer Size
(Inches)

1.5

2

2.5

3

4

5

6

8

OVERALL BASIN 3 VOLUME

ELEV	AREA (sf)	AVERAGE AREA (sf)	VOLUME (cf)	ACC. VOLUME (cf) STORAGE (S)	STAGE (ft) Z	AREA (ac)	ELEV	ELEV STEP (ft) ΔZ
228.00	8,764	0	0	0	0	0.201	228.00	1
229.00	9,540	9,152	9,152	9,152	1	0.219	229.00	1
230.00	11,732	10,636	10,636	19,788	2	0.269	230.00	1
231.00	16,143	13,938	13,938	33,726	3	0.371	231.00	1
232.00		0	0	Overtopped	4	0.000	232.00	1
233.00		0	0	Overtopped	5	0.000	233.00	1
234.00		0	0	Overtopped	6	0.000	234.00	1
235.00		0	0	Overtopped	7	0.000	235.00	1
236.00		0	0	Overtopped	8	0.000	236.00	1
237.00		0	0	Overtopped	9	0.000	237.00	1
238.00		0	0	Overtopped	10	0.000	238.00	1
239.00		0	0	Overtopped	11	0.000	239.00	1
240.00		0	0	Overtopped	12	0.000	240.00	1
241.00		0	0	Overtopped	13	0.000	241.00	1
242.00		0	0	Overtopped	14	0.500	242.00	1
243.00		0	0	Overtopped	15	0.000	243.00	1
244.00		0	0	Overtopped	16	0.000	244.00	1
245.00		0	0	Overtopped	17	0.000	245.00	1
				33,726				

Selection of Sediment Control Measure

PROJECT NAME : HARRIS CREEK
 STREET:
 STATION:

7.99 Total Drainage Area 7.99 Disturbed Area (Acres) 28.75 Peak Flow from 10-year Storm (cfs) $A_d =$ 7.99 Disturbed Area (Acres) $A_u =$ 0.00 AC [AREA UNDISTURBED] $A_t =$ 7.99 Total Drainage Area $C =$ 0.50 RUNOFF COEFFECIENT $I_2 =$ 5.63 2-YR RAINFALL INTENSITY $Q_2 =$ 22.48 Peak Flow from 2-year Storm (cfs) $I_{10} =$ 7.2 10-YR RAINFALL INTENSITY $Q_{10} =$ 28.75 Peak Flow from 10-year Storm (cfs)	Do Not Use Temporary Sediment Trap Okay Rock Dam, Okay Skimmer Sediment Basin Okay Temporary Sediment Basin
--	--

Skimmer Basin

ID

BASIN 4

14382 Required Volume ft³
 12507 Required Surface Area ft²
 79.1 Suggested Width ft
 158.2 Suggested Length ft

	Area in sqft	Area in acres (A)	"C" value for area	A*C
	347,909	7.99	0.50	3.99
		0.00		0.00
		0.00		0.00
		0.00		0.00
		0.00		0.00
Total	347,909	7.99		3.99
Composite "C" value:				0.50

Trial Top Width at Spillway Invert ft
 Trial Top Length at Spillway Invert ft

3 Trial Side Slope Ratio Z:1

2 Trial Depth ft (2 to 3.5 feet above grade)

N/A Bottom Width ft

N/A Bottom Length ft

6,451 Bottom Area ft²

32,569 Actual Volume ft³

16,143 Actual Surface Area ft²

55 Trial Weir Length ft (min 4')

0.5 Trial Depth of Flow ft (max. 1/2')

58.3 Spillway Capacity cfs

2 Skimmer Size (inches)

0.167 Head on Skimmer (feet)

2 Orifice Size (0.1" increments)

3.81 Dewatering Time (days)

Suggest about 3 days

Okay

Okay

Okay

Okay

Skimmer Size
(Inches)

1.5

2

2.5

3

4

5

6

8

OVERALL BASIN 4 VOLUME

ELEV	AREA (sf)	AVERAGE AREA (sf)	VOLUME (cf)	ACC. VOLUME (cf) STORAGE (S)	STAGE (ft) Z	AREA (ac)	ELEV	ELEV STEP (ft) ΔZ
233.00	6,451	0	0	0	0	0.148	233.00	1
234.00	9,540	7,996	7,996	7,996	1	0.219	234.00	1
235.00	11,732	10,636	10,636	18,632	2	0.269	235.00	1
236.00	16,143	13,938	13,938	32,569	3	0.371	236.00	1
237.00		0	0	Overtopped	4	0.000	237.00	1
238.00		0	0	Overtopped	5	0.000	238.00	1
239.00		0	0	Overtopped	6	0.000	239.00	1
240.00		0	0	Overtopped	7	0.000	240.00	1
241.00		0	0	Overtopped	8	0.000	241.00	1
242.00		0	0	Overtopped	9	0.000	242.00	1
243.00		0	0	Overtopped	10	0.000	243.00	1
244.00		0	0	Overtopped	11	0.000	244.00	1
245.00		0	0	Overtopped	12	0.000	245.00	1
246.00		0	0	Overtopped	13	0.000	246.00	1
247.00		0	0	Overtopped	14	0.500	247.00	1
248.00		0	0	Overtopped	15	0.000	248.00	1
249.00		0	0	Overtopped	16	0.000	249.00	1
250.00		0	0	Overtopped	17	0.000	250.00	1
				32,569				

DITCH LINER CALCULATIONS

HARRIS CREEK		
Location	MATERIAL	
	TEMPORARY	PERMANENT
TEMPORARY DITCH 1	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 2	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 3	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 4	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 5	STRAW AND NETTING	STRAW AND NETTING
TEMPORARY DITCH 6	NAG SC150BN	NAG SC150BN
TEMPORARY DITCH 7	STRAW AND NETTING	STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 1
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 1.68 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 4.2 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 5.69% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.479	0.69	3.03	0.23	0.26	0.26	GOOD

VELOCITY IN CHANNEL	6.2 FPS
SHEAR STRESS	1.7 LB/SF

USE: NAG SC150BN

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 5.43 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 5.69% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.652	1.28	4.13	0.31	0.58	0.58	GOOD

VELOCITY IN CHANNEL	4.3 FPS
SHEAR STRESS	2.3 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 2
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 2.03 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 5.1 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 0.85% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.740	1.64	4.68	0.35	0.82	0.82	GOOD

VELOCITY IN CHANNEL	3.1 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 6.58 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 0.85% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.998	2.99	6.31	0.47	1.82	1.82	GOOD

VELOCITY IN CHANNEL	2.2 FPS
SHEAR STRESS	0.5 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 3
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 3.60 Drainage Area
C = 0.45 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 9.1 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.98% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.786	1.85	4.97	0.37	0.96	0.96	GOOD

VELOCITY IN CHANNEL	4.9 FPS
SHEAR STRESS	1.0 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 11.65 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.98% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.057	3.35	6.68	0.50	2.11	2.11	GOOD

VELOCITY IN CHANNEL	3.5 FPS
SHEAR STRESS	1.3 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 4
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 3.39 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 8.6 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 3.17% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.701	1.47	4.43	0.33	0.71	0.71	GOOD

VELOCITY IN CHANNEL	5.8 FPS
SHEAR STRESS	1.4 LB/SF

USE: NAG SC150BN

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 10.99 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 3.17% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.945	2.68	5.98	0.45	1.57	1.57	GOOD

VELOCITY IN CHANNEL	4.1 FPS
SHEAR STRESS	1.9 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 5
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 4.78 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 12.1 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 1.20% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.958	2.75	6.06	0.45	1.63	1.63	GOOD

VELOCITY IN CHANNEL	4.4 FPS
SHEAR STRESS	0.7 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 15.49 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 1.20% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.292	5.01	8.17	0.61	3.61	3.61	GOOD

VELOCITY IN CHANNEL	3.1 FPS
SHEAR STRESS	1.0 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 6
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 3.08 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 7.8 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 3.96% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.651	1.27	4.12	0.31	0.58	0.58	GOOD

VELOCITY IN CHANNEL	6.2 FPS
SHEAR STRESS	1.6 LB/SF

USE: NAG SC150BN

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 9.99 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 3.96% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.875	2.30	5.53	0.41	1.28	1.28	GOOD

VELOCITY IN CHANNEL	4.4 FPS
SHEAR STRESS	2.2 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION
FROM STATION

TEMPORARY DITCH 7
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 7.12 Drainage Area
 C = 0.45 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 18.0 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 1.00% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.152	3.98	7.29	0.55	2.66	2.66	GOOD

VELOCITY IN CHANNEL	4.5 FPS
SHEAR STRESS	0.7 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 23.05 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 1.00% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.550	7.21	9.81	0.74	5.88	5.88	GOOD

VELOCITY IN CHANNEL	3.2 FPS
SHEAR STRESS	1.0 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK		
Location	MATERIAL	
	TEMPORARY	PERMANENT
PERMANENT DITCH 1	NAG SC150BN	NAG SC150BN
PERMANENT DITCH 2	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 3	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 4	STRAW AND NETTING	GRASS
PERMANENT DITCH 5	STRAW AND NETTING	GRASS
PERMANENT DITCH 6	STRAW AND NETTING	GRASS
PERMANENT DITCH 7	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 8	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 9	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 10	STRAW AND NETTING	NAG SC150BN
PERMANENT DITCH 11	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 12	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 13	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 14	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 15	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 16	STRAW AND NETTING	STRAW AND NETTING
PERMANENT DITCH 17	NAG SC150BN	NAG SC150BN
PERMANENT DITCH 18	STRAW AND NETTING	STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 1
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 1.61 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 5.4 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 4.16% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.561	0.94	3.55	0.27	0.39	0.39	GOOD

VELOCITY IN CHANNEL	5.8 FPS
SHEAR STRESS	1.5 LB/SF

USE: NAG SC150BN

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 6.95 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 4.16% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.759	1.73	4.80	0.36	0.87	0.87	GOOD

VELOCITY IN CHANNEL	4.0 FPS
SHEAR STRESS	2.0 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 2
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.58 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 2.0 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 3.46% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.405	0.49	2.56	0.19	0.16	0.16	GOOD

VELOCITY IN CHANNEL	4.0 FPS
SHEAR STRESS	0.9 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 2.52 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 3.46% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.539	0.87	3.41	0.26	0.35	0.35	GOOD

VELOCITY IN CHANNEL	2.9 FPS
SHEAR STRESS	1.2 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 3
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.22 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 0.8 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 3.38% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.273	0.22	1.72	0.13	0.06	0.06	GOOD

VELOCITY IN CHANNEL	3.4 FPS
SHEAR STRESS	0.6 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 0.97 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 3.38% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.369	0.41	2.33	0.17	0.13	0.13	GOOD

VELOCITY IN CHANNEL	2.4 FPS
SHEAR STRESS	0.8 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 4
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.50 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 1.7 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 1.00% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.474	0.68	3.00	0.23	0.25	0.25	GOOD

VELOCITY IN CHANNEL	2.5 FPS
SHEAR STRESS	0.3 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 2.16 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 1.00% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.638	1.22	4.04	0.30	0.55	0.55	GOOD

VELOCITY IN CHANNEL	1.8 FPS
SHEAR STRESS	0.4 LB/SF

USE: GRASS

HARRIS CREEK

LOCATION PERMANENT DITCH 5 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.34 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 1.1 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.71% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.368	0.41	2.33	0.17	0.13	0.13	GOOD

VELOCITY IN CHANNEL	2.8 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 1.45 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.71% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.494	0.73	3.12	0.23	0.28	0.28	GOOD

VELOCITY IN CHANNEL	2.0 FPS
SHEAR STRESS	0.5 LB/SF

USE: GRASS

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 6
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.40 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 1.4 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 1.45% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.410	0.50	2.59	0.19	0.17	0.17	GOOD

VELOCITY IN CHANNEL	2.7 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 1.74 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 1.45% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.550	0.91	3.48	0.26	0.37	0.37	GOOD

VELOCITY IN CHANNEL	1.9 FPS
SHEAR STRESS	0.5 LB/SF

USE: GRASS

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 7
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.63 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 2.1 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 1.49% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.479	0.69	3.03	0.23	0.26	0.26	GOOD

VELOCITY IN CHANNEL	3.1 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 2.72 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 1.49% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.646	1.25	4.09	0.31	0.57	0.57	GOOD

VELOCITY IN CHANNEL	2.2 FPS
SHEAR STRESS	0.6 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION PERMANENT DITCH 8 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.72 Drainage Area
C = 0.60 Runoff Coefficient
I2= 5.63 in/hr
Q2 = 2.4 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.24% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 1.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.382	0.82	3.42	0.24	0.32	0.32	GOOD

VELOCITY IN CHANNEL	3.0 FPS
SHEAR STRESS	0.3 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10= 7.20 in/hr
Q10 = 3.10 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.24% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 1.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.557	1.49	4.52	0.33	0.71	0.71	GOOD

VELOCITY IN CHANNEL	2.1 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 9
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.49 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 1.7 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 5.91% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 1.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.217	0.36	2.37	0.15	0.10	0.10	GOOD

VELOCITY IN CHANNEL	4.6 FPS
SHEAR STRESS	0.8 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 2.13 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 5.91% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 1.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.323	0.64	3.04	0.21	0.22	0.22	GOOD

VELOCITY IN CHANNEL	3.4 FPS
SHEAR STRESS	1.2 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 10
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.24 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 0.8 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 8.76% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.234	0.16	1.48	0.11	0.04	0.04	GOOD

VELOCITY IN CHANNEL	5.0 FPS
SHEAR STRESS	1.3 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 1.05 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 8.76% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.321	0.31	2.03	0.15	0.09	0.09	GOOD

VELOCITY IN CHANNEL	3.4 FPS
SHEAR STRESS	1.8 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION PERMANENT DITCH 11 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.67 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 2.3 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 2.62% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.448	0.60	2.83	0.21	0.21	0.21	GOOD

VELOCITY IN CHANNEL	3.7 FPS
SHEAR STRESS	0.7 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 2.88 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 2.62% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.590	1.04	3.73	0.28	0.45	0.45	GOOD

VELOCITY IN CHANNEL	2.8 FPS
SHEAR STRESS	1.0 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION PERMANENT DITCH 12 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.67 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 2.3 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.98% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.467	0.66	2.96	0.22	0.24	0.24	GOOD

VELOCITY IN CHANNEL	3.5 FPS
SHEAR STRESS	0.6 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 2.91 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.98% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.630	1.19	3.98	0.30	0.53	0.53	GOOD

VELOCITY IN CHANNEL	2.4 FPS
SHEAR STRESS	0.8 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION PERMANENT DITCH 13 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.10 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 0.3 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 4.48% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.196	0.12	1.24	0.09	0.02	0.02	GOOD

VELOCITY IN CHANNEL	2.8 FPS
SHEAR STRESS	0.5 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 0.42 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 4.48% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.251	0.19	1.58	0.12	0.05	0.05	GOOD

VELOCITY IN CHANNEL	2.2 FPS
SHEAR STRESS	0.7 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION PERMANENT DITCH 14 Street Side
FROM STATION TO

TEMPORARY CHANNEL LININGS

DA = 0.43 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 1.5 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 2.06% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.390	0.46	2.46	0.18	0.15	0.15	GOOD

VELOCITY IN CHANNEL	3.2 FPS
SHEAR STRESS	0.5 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 1.87 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 2.06% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.527	0.83	3.33	0.25	0.33	0.33	GOOD

VELOCITY IN CHANNEL	2.2 FPS
SHEAR STRESS	0.7 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 15
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 1.35 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 4.6 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.00% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.688	1.42	4.35	0.33	0.67	0.67	GOOD

VELOCITY IN CHANNEL	3.2 FPS
SHEAR STRESS	0.4 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 5.82 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.00% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.925	2.57	5.85	0.44	1.48	1.48	GOOD

VELOCITY IN CHANNEL	2.3 FPS
SHEAR STRESS	0.6 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 16
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 4.32 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 14.6 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 1.50% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

There are 4 Drop inlets spread out evenly along the ditch so no one section is more than 4 acres

y	A	P	R	Zav	Zreq	REMARK
0.987	2.92	6.24	0.47	1.76	1.76	GOOD

VELOCITY IN CHANNEL	5.0 FPS
SHEAR STRESS	0.9 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 18.67 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 1.50% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.328	5.29	8.40	0.63	3.89	3.89	GOOD

VELOCITY IN CHANNEL	3.5 FPS
SHEAR STRESS	1.2 LB/SF

USE: STRAW AND NETTING

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 17
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 4.45 Drainage Area
C = 0.60 Runoff Coefficient
I2 = 5.63 in/hr
Q2 = 15.0 Design Discharge [cfs]
n = 0.022 Manning Roughness Coefficient
s = 2.50% Longitudinal Channel Slope
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

There are 4 Drop inlets spread out evenly along the ditch so no one section is more than 4 acres

y	A	P	R	Zav	Zreq	REMARK
0.906	2.46	5.73	0.43	1.40	1.40	GOOD

VELOCITY IN CHANNEL	6.1 FPS
SHEAR STRESS	1.4 LB/SF

USE: NAG SC150BN

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
Q10 = 19.22 Design Discharge [cfs]
n = 0.038 Manning Roughness Coefficient
s = 2.50% Longitudinal Channel Slope [ft/ft]
M = 3 3 Horizontal Component of Side Slope
B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
1.219	4.46	7.71	0.58	3.10	3.10	GOOD

VELOCITY IN CHANNEL	4.3 FPS
SHEAR STRESS	1.9 LB/SF

USE: NAG SC150BN

HARRIS CREEK

LOCATION
FROM STATION

PERMANENT DITCH 18
TO

Street Side

TEMPORARY CHANNEL LININGS

DA = 0.30 Drainage Area
 C = 0.60 Runoff Coefficient
 I2 = 5.63 in/hr
 Q2 = 1.0 Design Discharge [cfs]
 n = 0.022 Manning Roughness Coefficient
 s = 4.47% Longitudinal Channel Slope
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.296	0.26	1.87	0.14	0.07	0.07	GOOD

VELOCITY IN CHANNEL	3.8 FPS
SHEAR STRESS	0.8 LB/SF

USE: STRAW AND NETTING

PERMANENT CHANNEL LININGS

I10 = 7.20 in/hr
 Q10 = 1.30 Design Discharge [cfs]
 n = 0.038 Manning Roughness Coefficient
 s = 4.47% Longitudinal Channel Slope [ft/ft]
 M = 3 3 Horizontal Component of Side Slope
 B = 0.00 Bottom Width of Channel [ft]

y	A	P	R	Zav	Zreq	REMARK
0.403	0.49	2.55	0.19	0.16	0.16	GOOD

VELOCITY IN CHANNEL	2.7 FPS
SHEAR STRESS	1.1 LB/SF

USE: STRAW AND NETTING

RIP RAP CALCULATIONS

STORM 100 OUTFALL

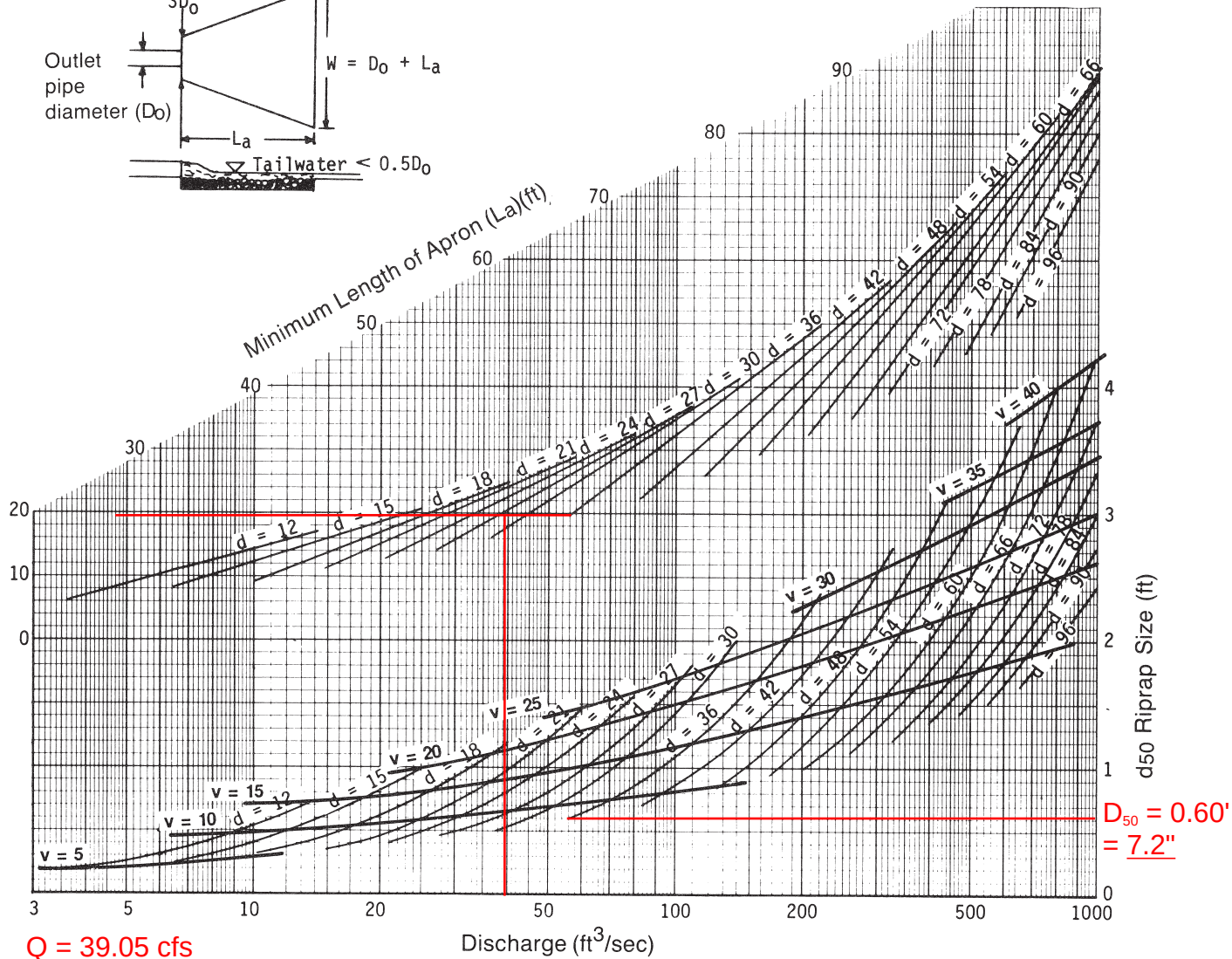
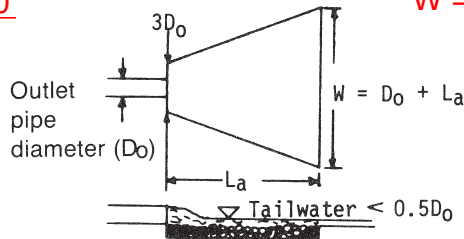
36" RCP

$Q = 39.05$ cfs

$D_o = 36" = 3.0'$

$3D_o = 9.0'$

$W = D_o + L_A = 23.0'$



Curves may not be extrapolated.

Figure 8.06a Design of outlet protection from a round pipe flowing full, minimum tailwater condition ($T_w < 0.5$ diameter).

$D_{max} = 1.5 * D_{50} = 10.8" \Rightarrow$ USE CLASS 'B' RIP RAP ($D_{max} = 12"$)

Apron Thickness = $1.5 * D_{max} = 18"$

TABLE 1042-1 ACCEPTANCE CRITERIA FOR RIP RAP AND STONE FOR EROSION CONTROL			
Class	Required Stone Sizes, inches		
	Minimum	Midrange	Maximum
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

STORM 200 OUTFALL

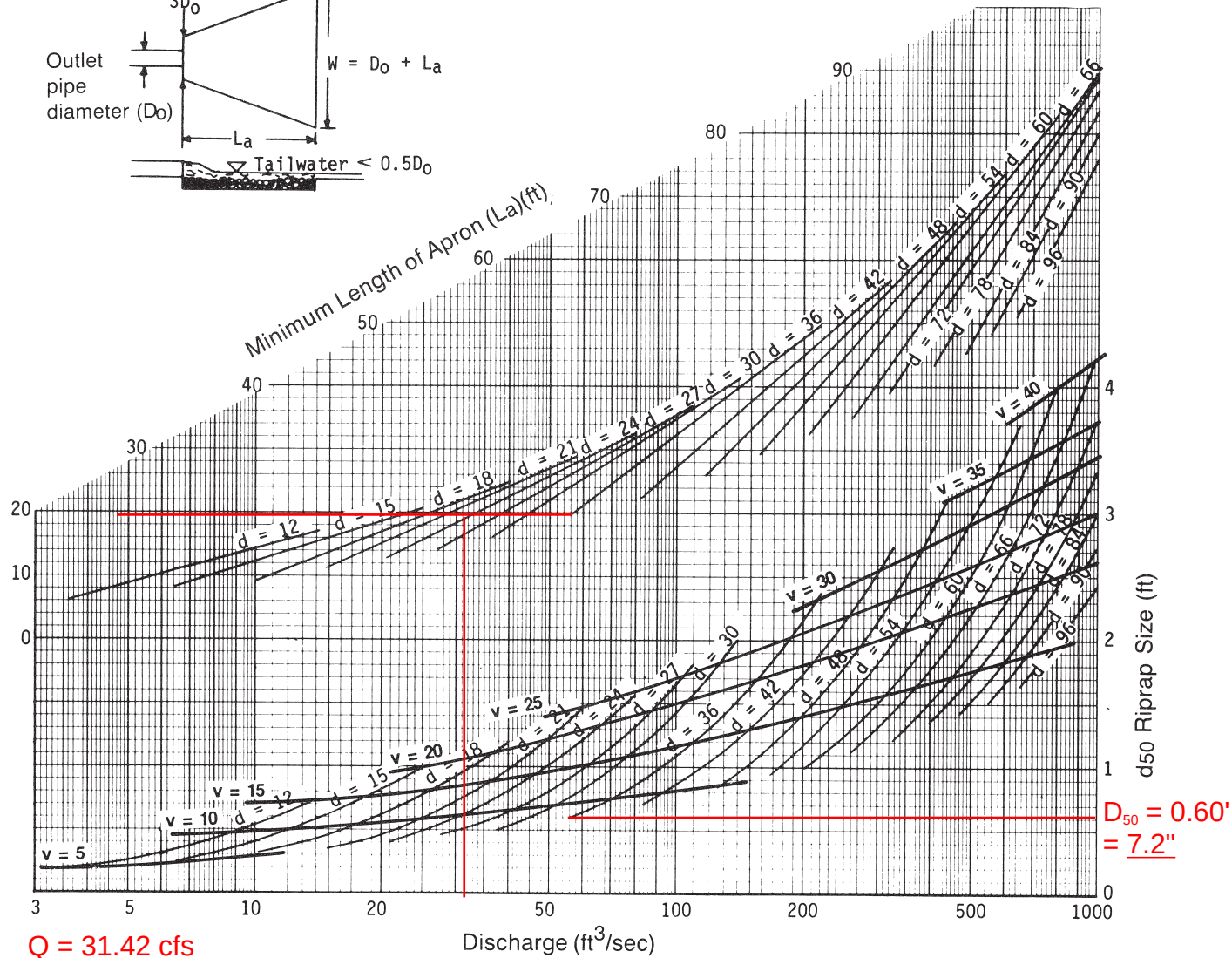
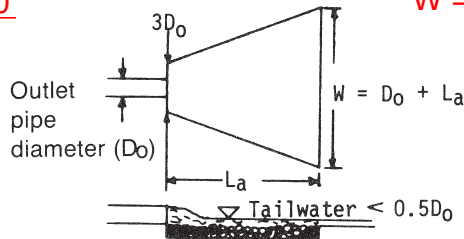
36" RCP

$Q = 31.42$ cfs

$D_o = 36" = 3.0'$

$3D_o = 9.0'$

$W = D_o + L_a = 23.0'$



Curves may not be extrapolated.

Figure 8.06a Design of outlet protection from a round pipe flowing full, minimum tailwater condition ($T_w < 0.5$ diameter).

$D_{max} = 1.5 * D_{50} = 10.8" \Rightarrow$ USE CLASS 'B' RIP RAP ($D_{max} = 12"$)

Apron Thickness = $1.5 * D_{max} = 18"$

TABLE 1042-1 ACCEPTANCE CRITERIA FOR RIP RAP AND STONE FOR EROSION CONTROL			
Class	Required Stone Sizes, inches		
	Minimum	Midrange	Maximum
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

STORM 300 OUTFALL

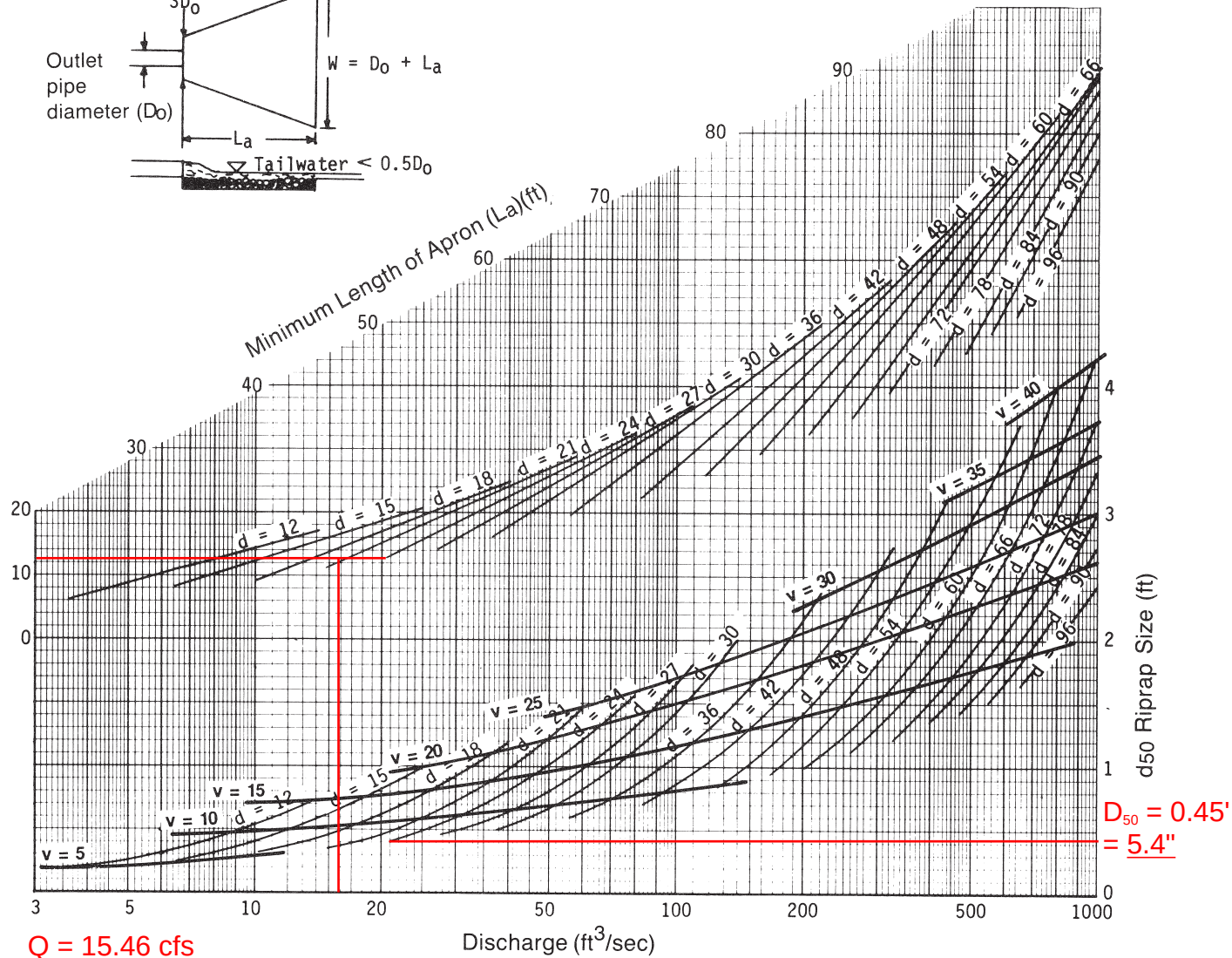
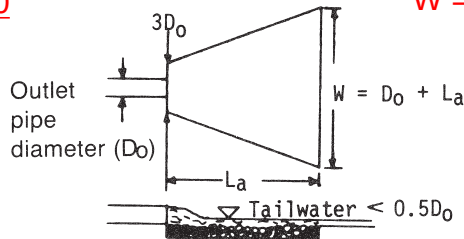
24" RCP

$Q = 15.46$ cfs

$D_o = 24" = 2.0'$

$3D_o = 6.0'$

$W = D_o + L_a = 15.0'$



Curves may not be extrapolated.

Figure 8.06a Design of outlet protection from a round pipe flowing full, minimum tailwater condition ($T_w < 0.5$ diameter).

$D_{max} = 1.5 * D_{50} = 8.1" \Rightarrow$ USE CLASS 'B' RIP RAP ($D_{max} = 12"$)

Apron Thickness = $1.5 * D_{max} = 18"$

TABLE 1042-1 ACCEPTANCE CRITERIA FOR RIP RAP AND STONE FOR EROSION CONTROL			
Class	Required Stone Sizes, inches		
	Minimum	Midrange	Maximum
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

STORM 300 OUTFALL

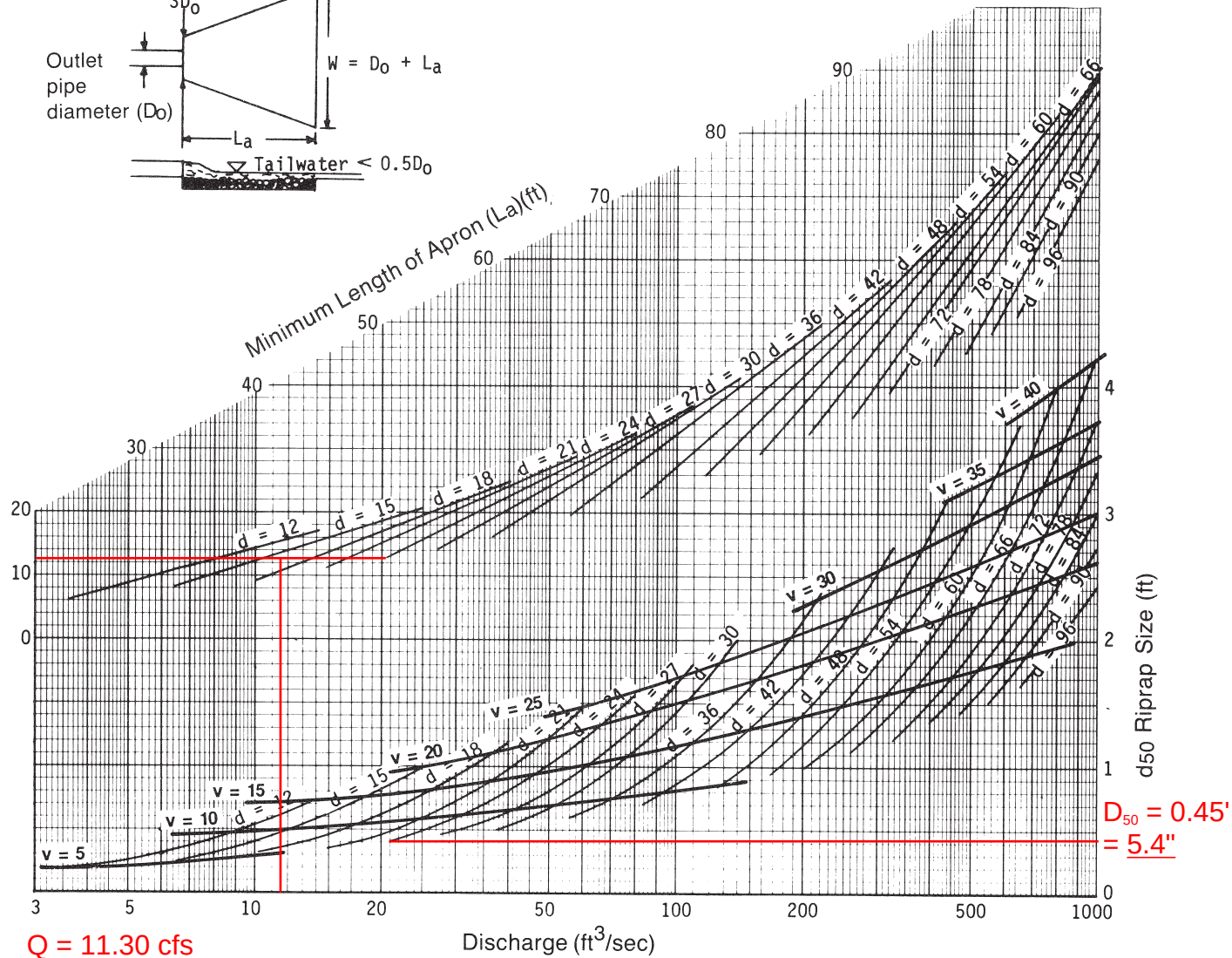
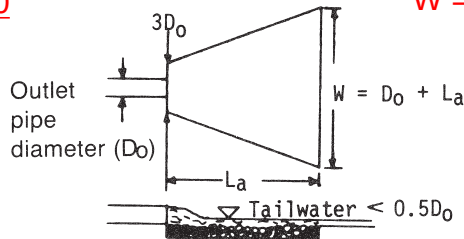
24" RCP

Q = 11.30 cfs

$D_o = 24" = 2.0'$

$3D_o = 6.0'$

$W = D_o + L_a = 15.0'$



Curves may not be extrapolated.

Figure 8.06a Design of outlet protection from a round pipe flowing full, minimum tailwater condition ($T_w < 0.5$ diameter).

$D_{max} = 1.5 * D_{50} = 8.1" \Rightarrow$ USE CLASS 'B' RIP RAP ($D_{max} = 12"$)

Apron Thickness = $1.5 * D_{max} = 18"$

TABLE 1042-1 ACCEPTANCE CRITERIA FOR RIP RAP AND STONE FOR EROSION CONTROL			
Class	Required Stone Sizes, inches		
	Minimum	Midrange	Maximum
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

DESIGN OF RIPRAP OUTLET PROTECTION

New York DOT Dissipator Method For Use in Defined Channels

(Source: "Bank and channel lining procedures", New York Department of Transportation, Division of Design and Construction, 1971.)

Guide to Color Key:	User Input Data	Calculated Value	Reference Data
Project Name:	Bourdan Woods	Company:	Quantech Eng, LLP
Site Location (City/Town):	Durham	Designed By:	JAC
Date:	29-May-2025	Culvert Id.	SCM 2 Outfall

Estimation of Stone Size and Dimensions For Culvert Aprons

Step 1) Compute flow velocity V_o at culvert or paved channel outlet.

Step 2) For pipe culverts D_o is diameter.

For pipe arch, arch and box culverts, and paved channel outlets,
 $D_o = A_o$ where A_o = cross-sectional area of flow at outlet.

For multiple culverts, use $D_o = 1.25 \times D_o$ of single culvert.

Velocity (ft/s)	8.15
Opening type	Pipe Culvert
Single or multiple openings?	Single
Outlet pipe diameter, D_o (ft)	2.5

NOTE 1: If opening type is anything other than "Pipe Culvert", $D_o = A_o$ (Cross-sectional area of flow at outlet).

NOTE 2: If multiple openings, $D_o = 1.25 \times D_o$ of single culvert.

Step 3) For apron grades of 10% or steeper, use recommendations
 For next higher zone. (Zones 1 through 6).

Zone	2
Will apron have $\geq 10\%$ grade?	No

[Figure 8.06c](#)

NOTE: For apron slopes equal to or greater than 10%, use next higher Zone in Figure 8.06d to determine apron length.

Apron length (ft)	7.5 min 15 max
Say apron length (ft)	10
Minimum Apron width (ft)	7.5
Use Rip Rap	Class B

[Figure 8.06d](#)

Max. stone size (in.)	12
D_{50} of Stone size (in.)	8
Minimum Stone size (in.)	5
Min. depth of Dissipator (in.)	18

[Figure 8.06e](#)

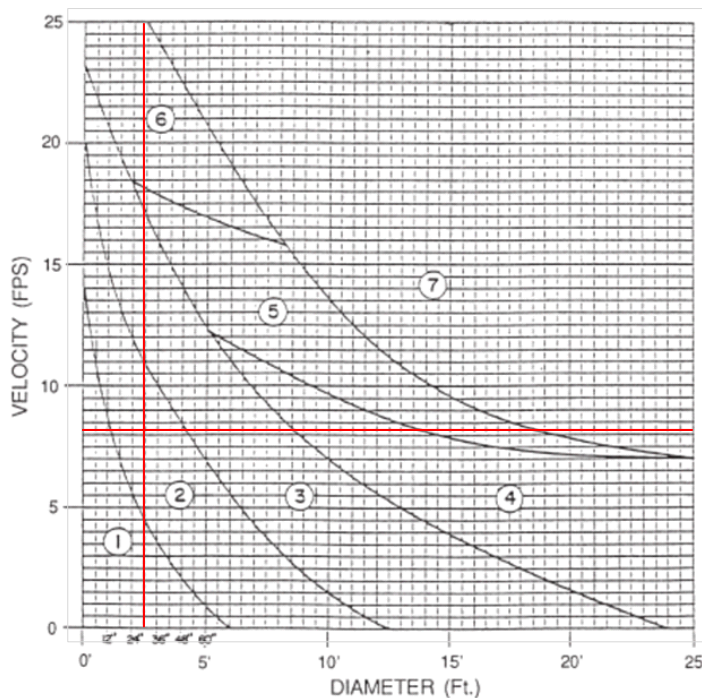


Figure 8.06c

STORM DRAINAGE CALCULATIONS

STORM SYSTEM 100

Date: 5/30/2025

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	62.363	0.69	13.57	0.70	0.48	8.05	5.0	16.0	4.8	39.05	151.1	6.91	36	5.13	233.00	236.20	235.52	238.23	236.52	242.81	101
2	1	56.823	0.08	2.33	0.70	0.05	1.63	5.0	7.8	6.4	10.38	42.14	4.21	30	1.06	236.70	237.30	238.23	238.38	242.81	243.19	102
3	2	73.788	0.24	2.25	0.70	0.17	1.58	5.0	7.4	6.5	10.19	23.55	6.36	24	1.08	237.80	238.60	238.72	239.74	243.19	243.88	103
4	3	33.985	0.13	2.01	0.70	0.09	1.41	5.0	7.3	6.5	9.18	24.54	5.12	24	1.18	238.60	239.00	239.74	240.08	243.88	243.79	104
5	4	82.819	0.19	1.88	0.70	0.13	1.32	5.0	7.0	6.6	8.68	10.95	6.45	18	1.09	239.50	240.40	240.51	241.54	243.79	244.96	105
6	5	111.027	0.16	1.43	0.70	0.11	1.00	5.0	6.5	6.7	6.73	10.92	5.02	18	1.08	240.40	241.60	241.54	242.60	244.96	246.12	106
7	6	92.859	0.12	0.94	0.70	0.08	0.66	5.0	5.9	6.9	4.53	10.90	4.11	18	1.08	241.60	242.60	242.60	243.42	246.12	247.07	107
8	7	72.589	0.39	0.82	0.70	0.27	0.57	5.0	5.4	7.1	4.05	11.02	4.28	18	1.10	242.60	243.40	243.42	244.17	247.07	247.58	108
9	8	28.308	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.2	2.18	15.29	3.02	18	2.12	243.40	244.00	244.17	244.56	247.58	247.61	109
10	5	28.579	0.26	0.26	0.70	0.18	0.18	5.0	5.0	7.2	1.32	15.22	2.14	18	2.10	240.60	241.20	241.54	241.63	244.96	245.02	110
11	6	30.107	0.34	0.34	0.70	0.23	0.23	5.0	5.0	7.2	1.69	16.01	2.36	18	2.33	241.60	242.30	242.60	242.79	246.12	245.96	111
12	1	28.138	0.30	10.56	0.70	0.21	5.94	5.0	16.0	4.9	28.86	41.01	8.27	30	1.00	237.28	237.57	238.83	239.40	242.81	242.69	112
13	12	53.597	0.20	1.85	0.50	0.10	0.92	5.0	7.1	6.6	6.06	10.51	4.40	18	1.00	238.07	238.60	239.40	239.55	242.69	242.05	113
14	13	114.868	0.53	1.65	0.50	0.26	0.83	5.0	6.5	6.7	5.55	10.50	4.84	18	1.00	238.60	239.75	239.55	240.66	242.05	243.02	114
15	14	85.346	0.32	1.12	0.50	0.16	0.56	5.0	5.9	6.9	3.88	10.50	3.92	18	1.00	239.75	240.60	240.66	241.36	243.02	244.12	115
16	15	85.356	0.80	0.80	0.50	0.40	0.40	5.0	5.0	7.2	2.87	10.54	3.59	18	1.01	240.60	241.46	241.36	242.10	244.12	246.25	116
17	12	83.692	0.09	8.41	0.70	0.06	4.80	5.0	15.8	4.9	23.44	22.62	8.17	24	1.00	238.57	239.40	240.28	241.12	242.69	243.59	117
18	17	67.426	0.06	8.32	0.70	0.04	4.74	5.0	15.7	4.9	23.24	22.66	8.10	24	1.00	239.40	240.08	241.12	241.79	243.59	245.46	118
19	18	45.039	0.38	8.26	0.70	0.27	4.70	5.0	15.6	4.9	23.11	22.56	8.08	24	0.99	240.08	240.53	241.79	242.24	245.46	247.71	119
20	19	28.077	0.20	7.88	0.70	0.14	4.44	5.0	15.5	4.9	21.83	22.62	7.72	24	1.00	240.53	240.81	242.24	242.48	247.71	247.71	120
21	20	88.873	0.13	1.11	0.70	0.09	0.77	5.0	8.3	6.2	4.84	15.75	4.35	18	2.25	241.50	243.50	242.48	244.34	247.71	249.66	121
22	21	78.221	0.09	0.97	0.70	0.06	0.68	5.0	7.8	6.4	4.34	14.54	4.39	18	1.92	243.50	245.00	244.34	245.80	249.66	251.49	122
Project File: Storm 100.stm																Number of lines: 48				Run Date: 5/30/2025		
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

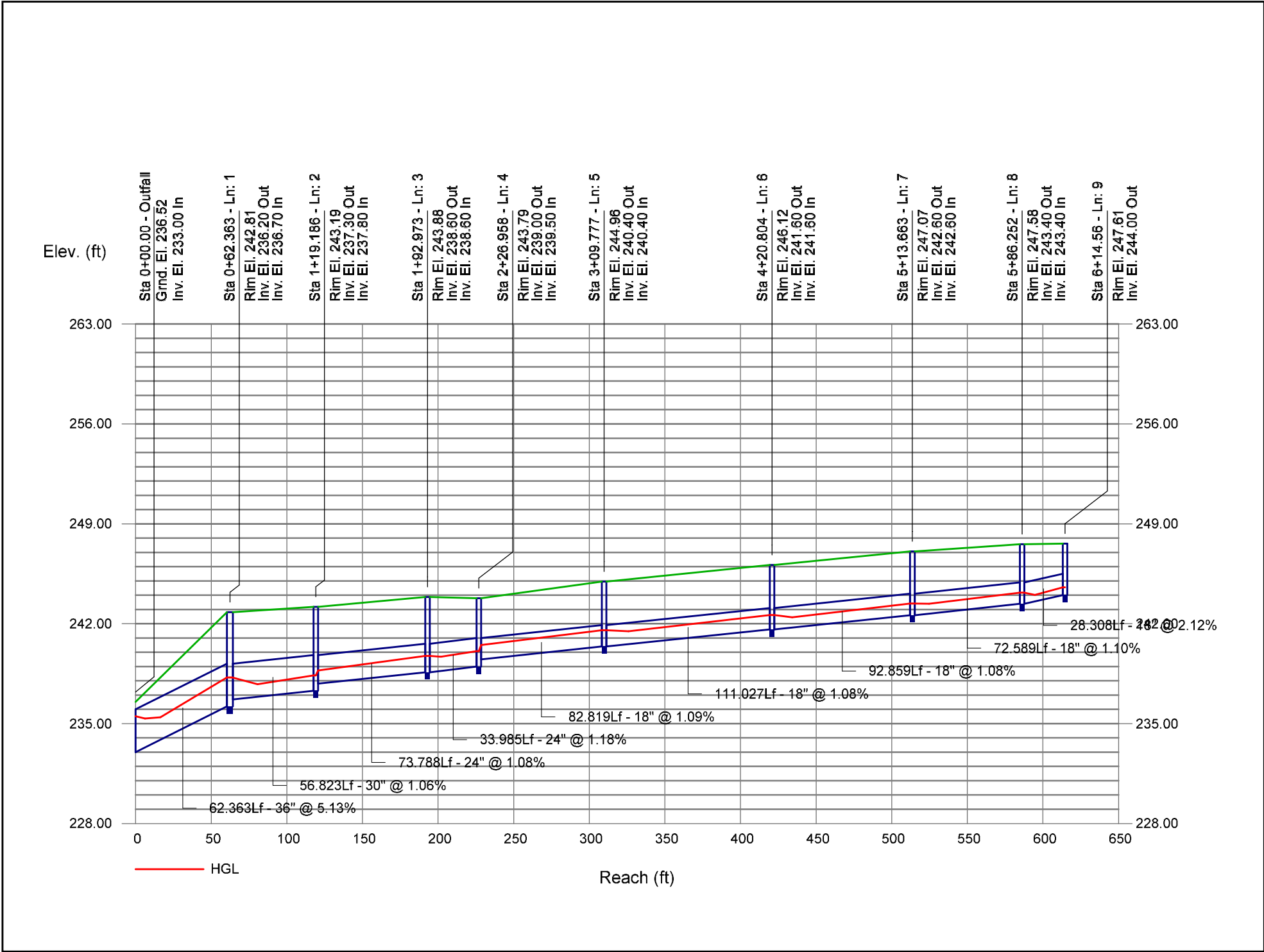
Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (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 (min)	Total (min)	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	55.737	0.16	0.56	0.70	0.11	0.39	5.0	7.2	6.5	2.57	14.07	3.26	18	1.79	245.00	246.00	245.80	246.61	251.49	252.79	123
24	23	95.963	0.19	0.40	0.70	0.14	0.28	5.0	5.8	6.9	1.94	20.05	3.21	18	3.65	246.00	249.50	246.61	250.02	252.79	254.69	124
25	24	29.230	0.21	0.21	0.70	0.14	0.14	5.0	5.0	7.2	1.04	23.79	2.42	18	5.13	249.50	251.00	250.02	251.38	254.69	254.86	125
26	22	28.632	0.32	0.32	0.70	0.22	0.22	5.0	5.0	7.2	1.61	16.42	4.62	18	2.44	246.80	247.50	247.12	247.98	251.49	251.25	126
27	20	40.676	0.13	6.57	0.50	0.06	3.52	5.0	15.4	4.9	17.38	22.62	6.54	24	1.00	240.81	241.21	242.48	242.72	247.71	245.60	127
28	27	81.330	0.24	2.33	0.50	0.12	1.17	5.0	7.4	6.5	7.56	16.47	7.36	18	2.46	242.00	244.00	242.72	245.06	245.60	248.03	128
29	28	87.167	0.47	2.09	0.50	0.24	1.05	5.0	7.0	6.6	6.90	16.87	5.28	18	2.58	244.00	246.25	245.06	247.27	248.03	250.41	129
30	29	126.986	0.59	1.62	0.50	0.29	0.81	5.0	6.3	6.8	5.50	18.05	4.63	18	2.95	246.25	250.00	247.27	250.90	250.41	254.36	130
31	30	168.905	1.03	1.03	0.50	0.52	0.52	5.0	5.0	7.2	3.72	16.16	3.83	18	2.37	250.00	254.00	250.90	254.74	254.36	258.04	131
32	27	34.806	0.05	4.11	0.70	0.03	2.29	5.0	15.3	5.0	11.35	22.62	5.11	24	1.00	241.22	241.57	242.72	242.77	245.60	250.68	132
33	32	84.061	0.27	4.07	0.70	0.19	2.26	5.0	14.9	5.0	11.30	22.67	5.69	24	1.00	241.56	242.40	242.77	243.61	250.68	254.31	133
34	33	165.576	0.01	1.99	0.70	0.01	1.21	5.0	11.9	5.5	6.68	53.60	8.19	24	5.62	245.70	255.00	246.18	255.92	254.31	262.40	134
35	34	90.085	0.35	1.64	0.70	0.24	0.94	5.0	11.4	5.6	5.25	28.64	8.60	18	7.44	255.50	262.20	255.94	263.08	262.40	266.41	135
36	35	223.580	0.03	0.66	0.70	0.02	0.41	5.0	8.9	6.1	2.50	22.54	3.06	18	4.61	262.20	272.50	263.08	273.10	266.41	277.11	136
37	36	86.367	0.03	0.42	0.70	0.02	0.29	5.0	6.6	6.7	1.95	17.51	3.25	18	2.78	272.50	274.90	273.10	275.43	277.11	278.99	137
38	37	42.695	0.17	0.38	0.70	0.12	0.27	5.0	6.0	6.9	1.85	11.36	3.41	18	1.17	274.90	275.40	275.43	275.91	278.99	279.77	138
39	38	34.160	0.21	0.21	0.70	0.15	0.15	5.0	5.0	7.2	1.05	11.36	2.47	18	1.17	275.40	275.80	275.91	276.18	279.77	279.77	139
40	33	28.083	0.45	1.81	0.70	0.32	0.86	5.0	14.7	5.0	4.33	22.62	3.18	24	1.00	242.40	242.69	243.61	243.42	254.31	254.36	140
41	40	130.001	0.35	1.35	0.40	0.14	0.54	5.0	12.6	5.4	2.91	32.08	5.03	24	2.01	243.69	246.30	244.09	246.89	254.36	253.51	141
42	41	79.807	0.25	0.25	0.40	0.10	0.10	5.0	5.0	7.2	0.71	7.92	1.99	15	1.50	246.30	247.50	246.89	247.83	253.51	249.75	142
43	41	134.295	0.32	0.76	0.40	0.13	0.30	5.0	10.5	5.8	1.75	19.22	5.09	18	3.35	250.50	255.00	250.81	255.50	253.51	258.50	143
44	43	115.991	0.44	0.44	0.40	0.18	0.18	7.5	7.5	6.5	1.13	22.87	2.62	18	4.74	255.00	260.50	255.50	260.90	258.50	263.54	144
Project File: Storm 100.stm																Number of lines: 48				Run Date: 5/30/2025		
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

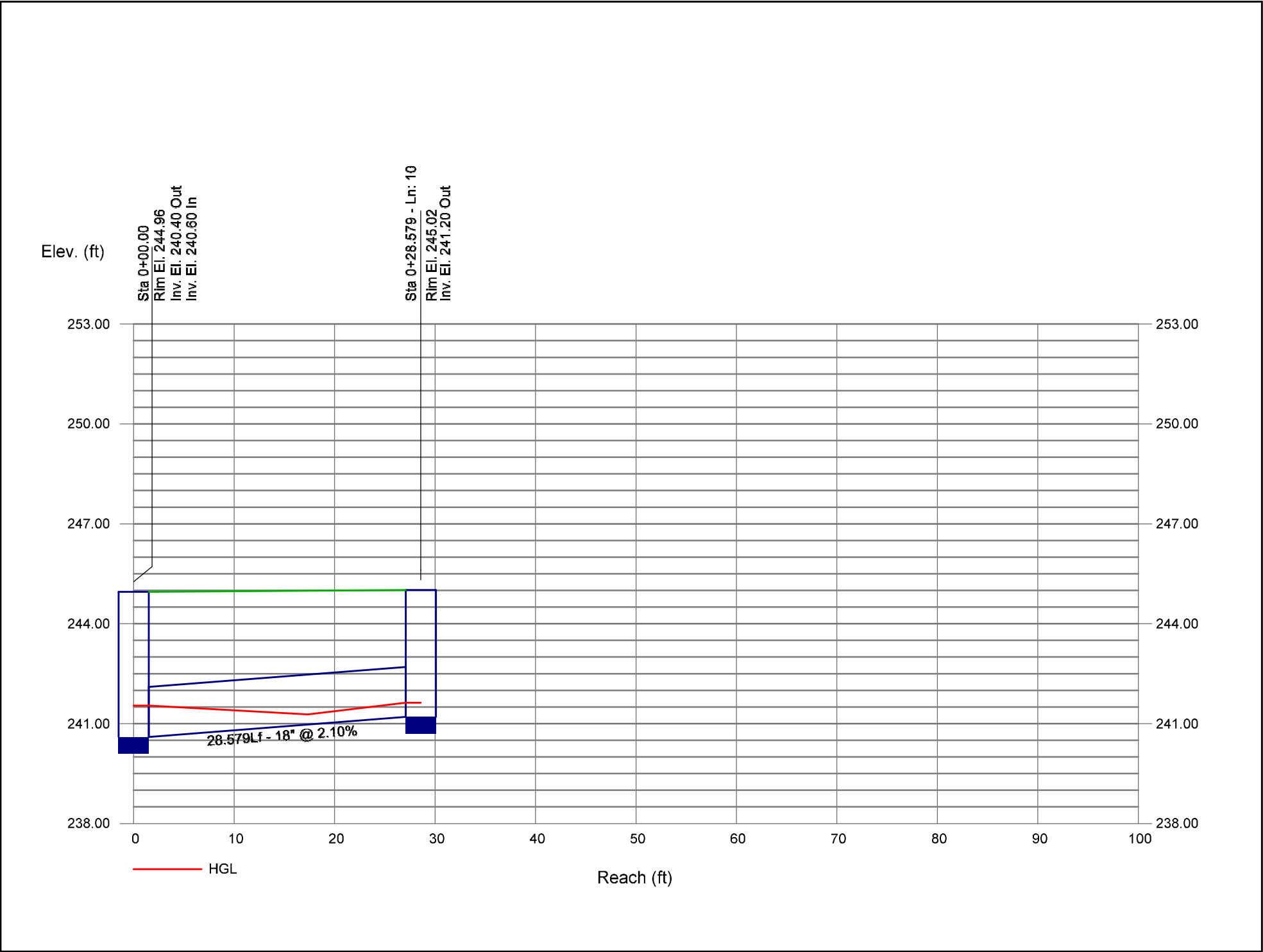
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID				
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up					
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)					
45	34	33.380	0.13	0.34	0.90	0.12	0.27	5.0	6.6	6.7	1.78	11.50	4.08	18	1.20	257.90	258.30	258.30	258.80	262.40	262.43	145				
46	45	57.800	0.21	0.21	0.70	0.14	0.14	5.0	5.0	7.2	1.04	10.70	2.48	18	1.04	258.30	258.90	258.80	259.28	262.43	262.50	146				
47	35	28.068	0.64	0.64	0.45	0.29	0.29	7.5	7.5	6.5	1.85	10.86	3.20	18	1.07	262.50	262.80	263.08	263.31	266.41	266.42	147				
48	36	28.605	0.21	0.21	0.45	0.09	0.09	7.5	7.5	6.5	0.60	10.75	2.48	18	1.05	272.80	273.10	273.10	273.39	277.11	277.12	148				

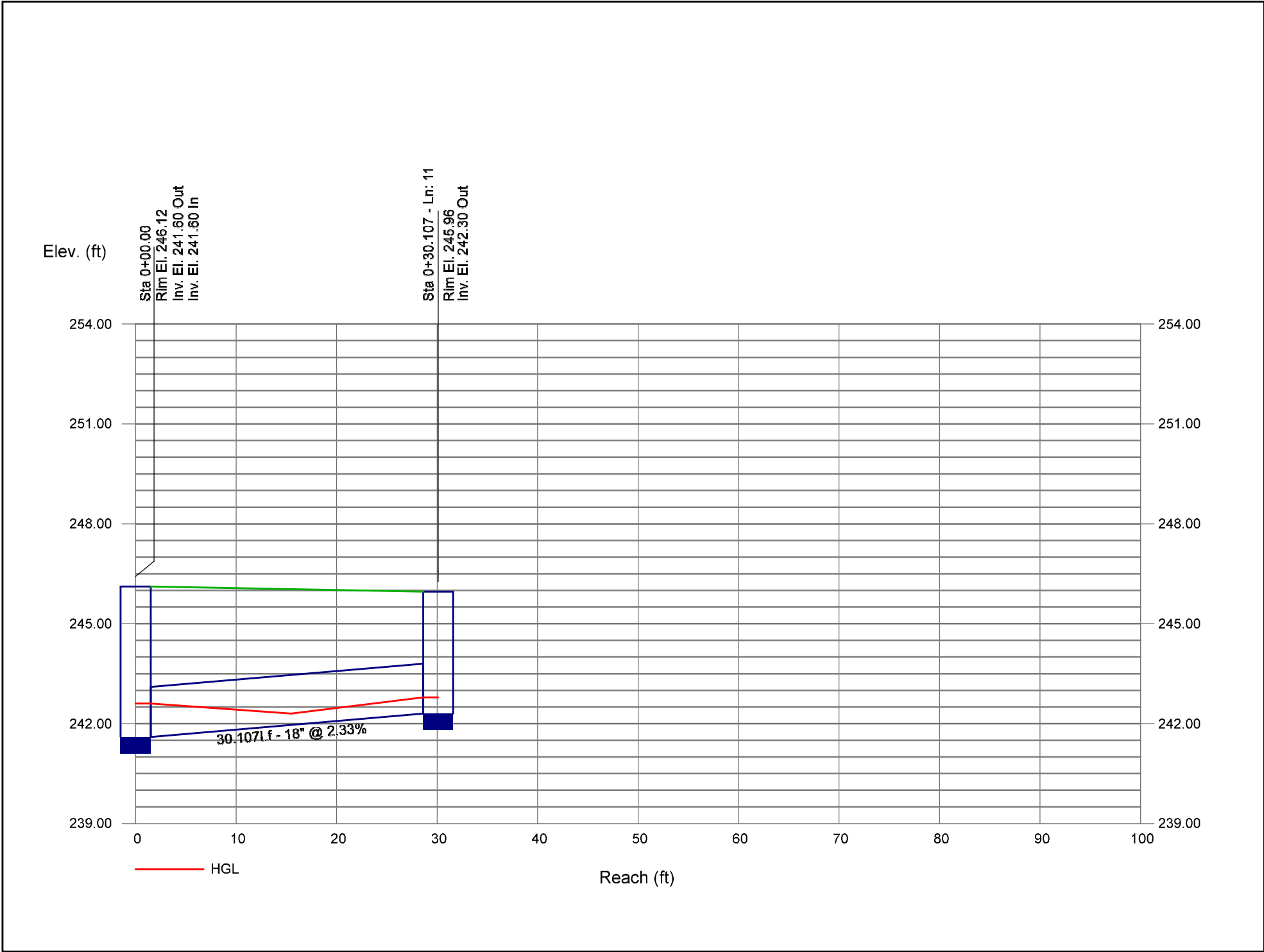
Storm Sewer Profile



Storm Sewer Profile

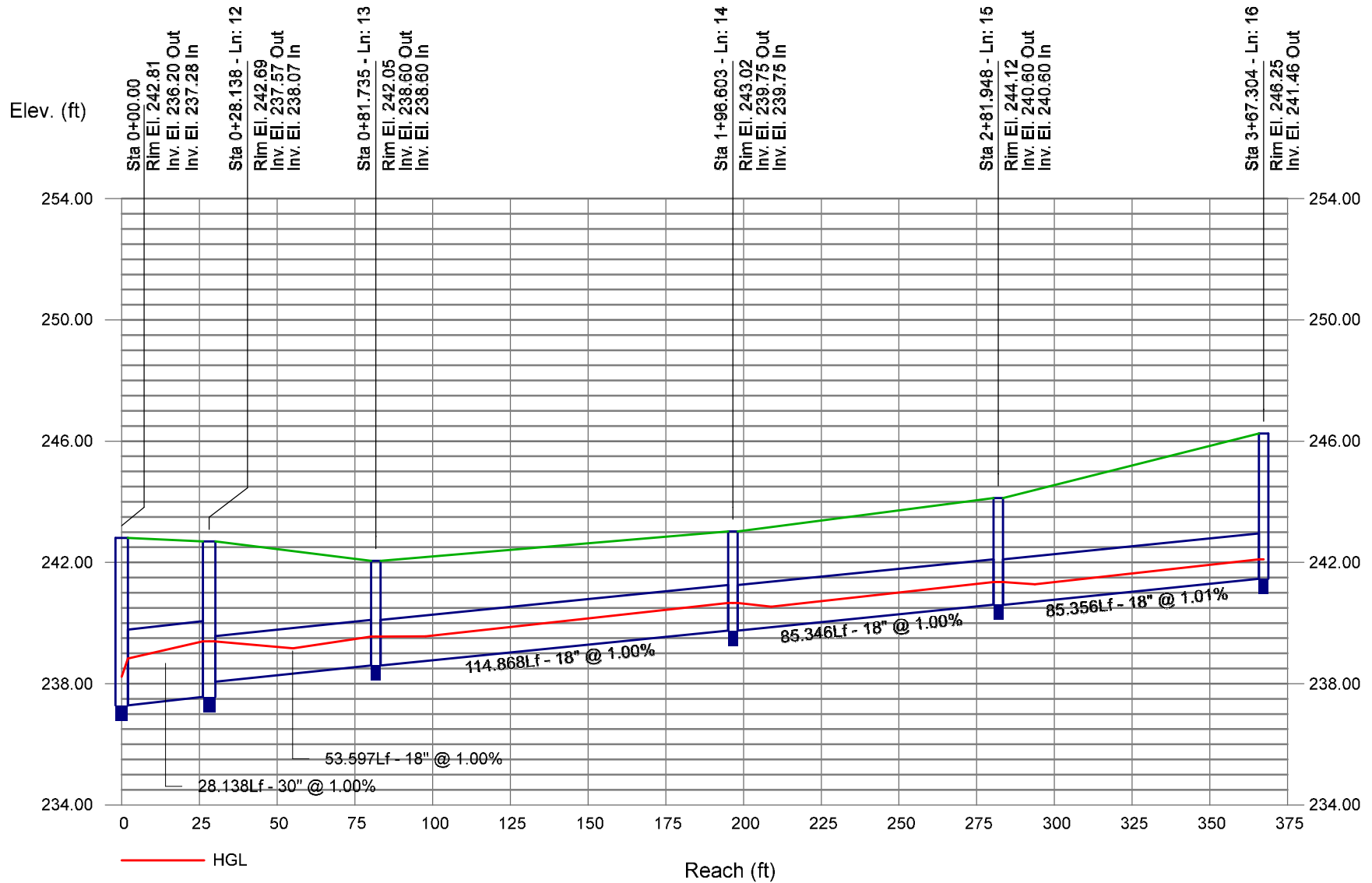


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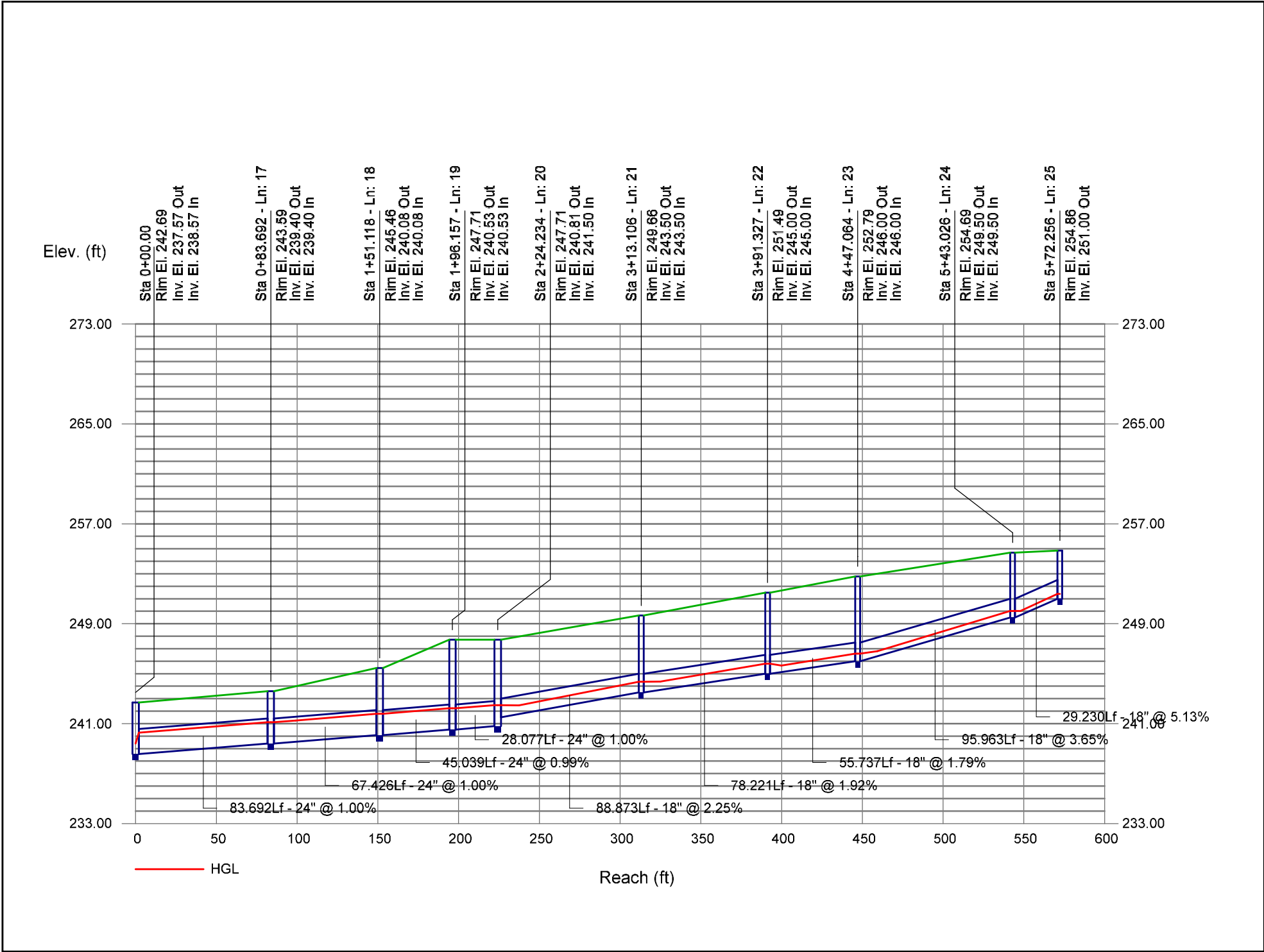


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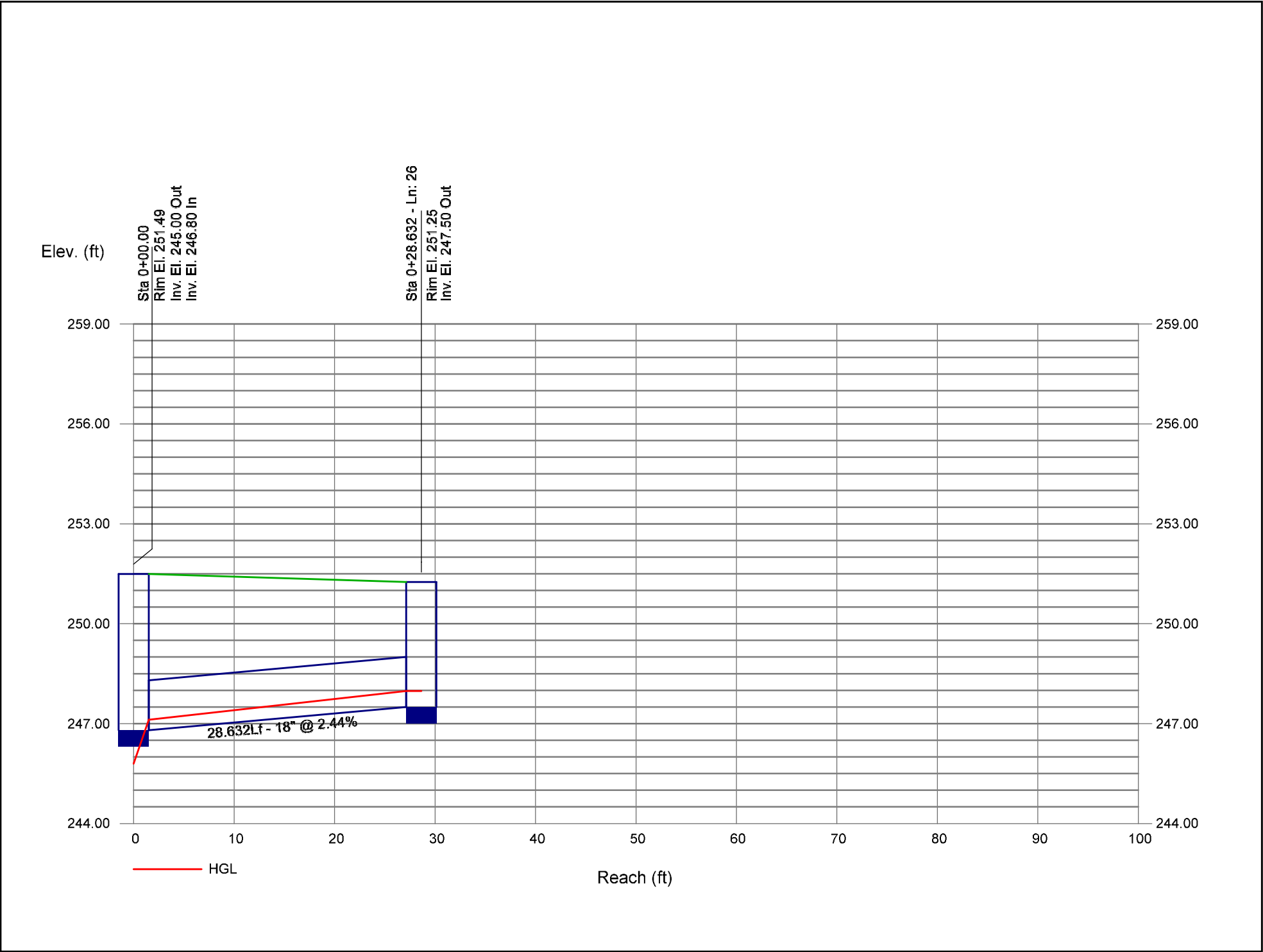
Proj. file: Storm 100.stm



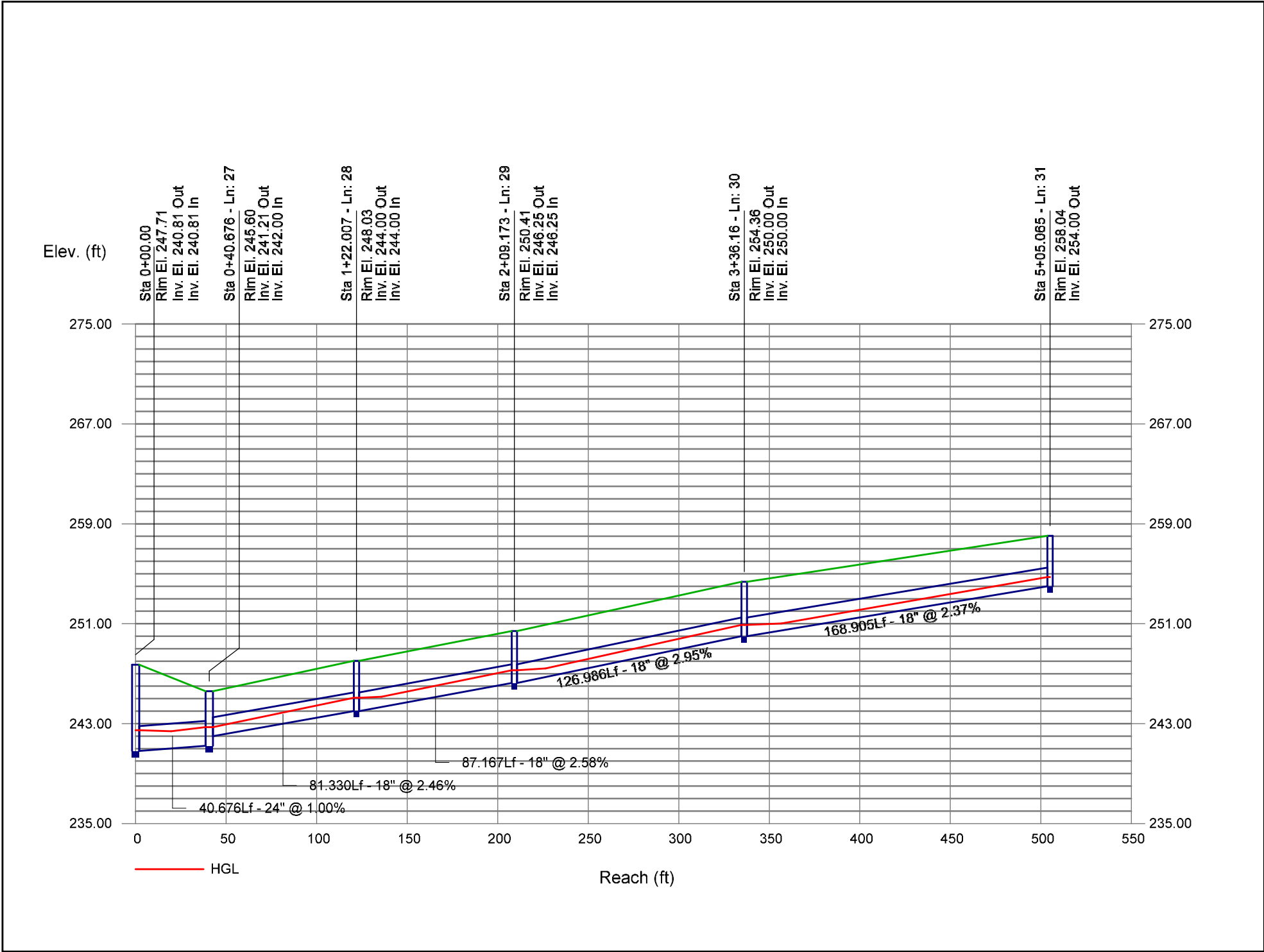
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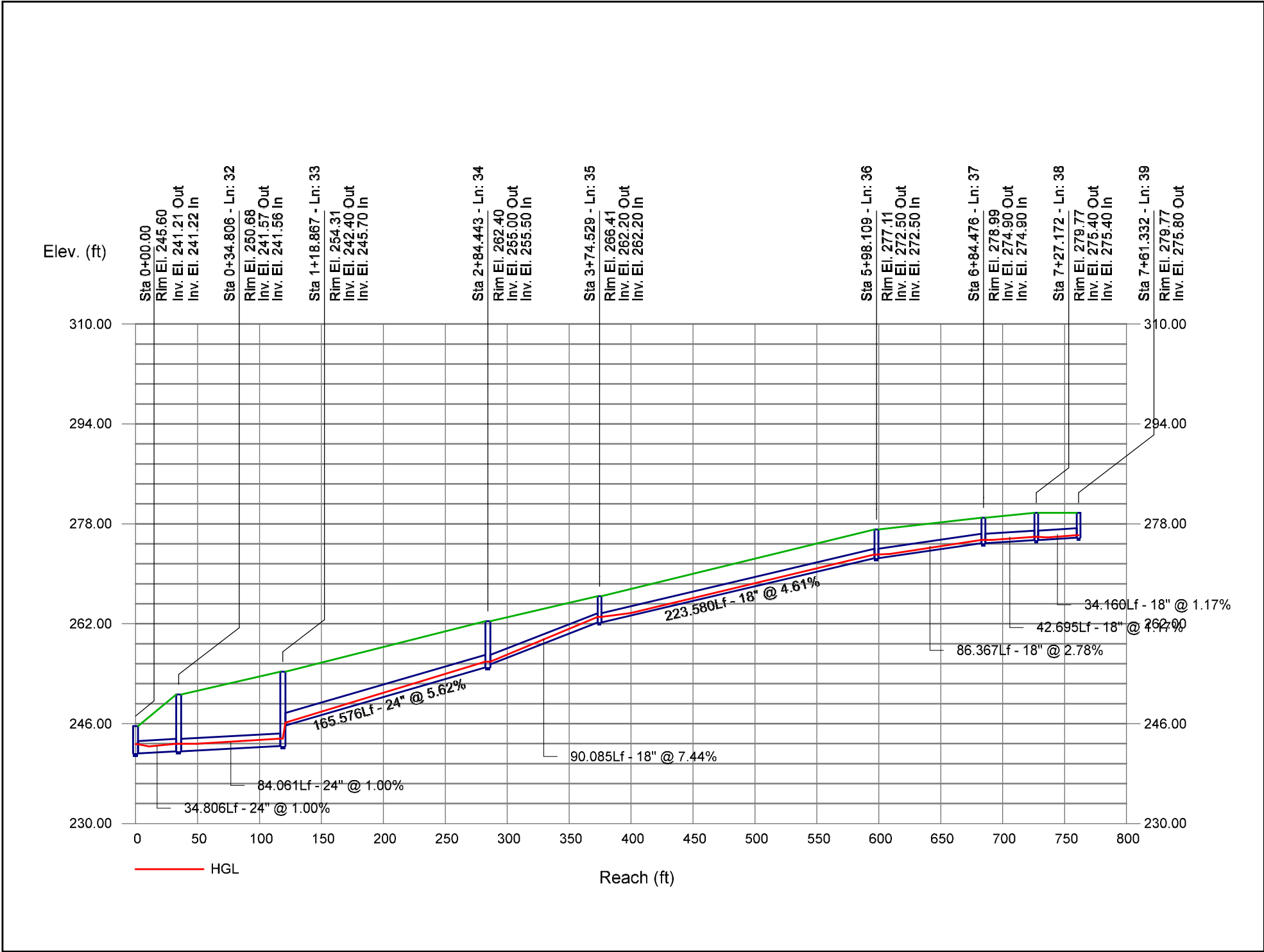
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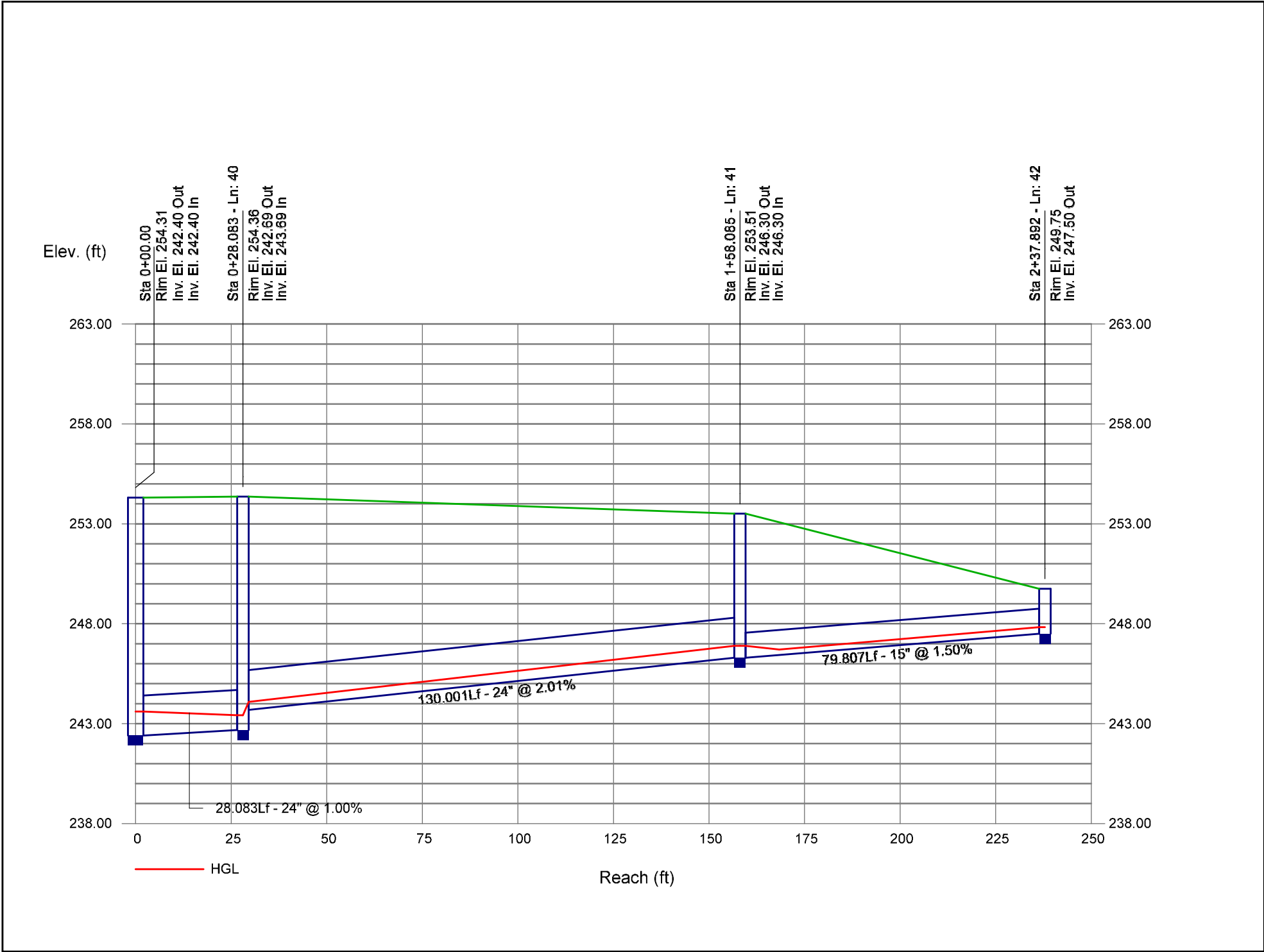
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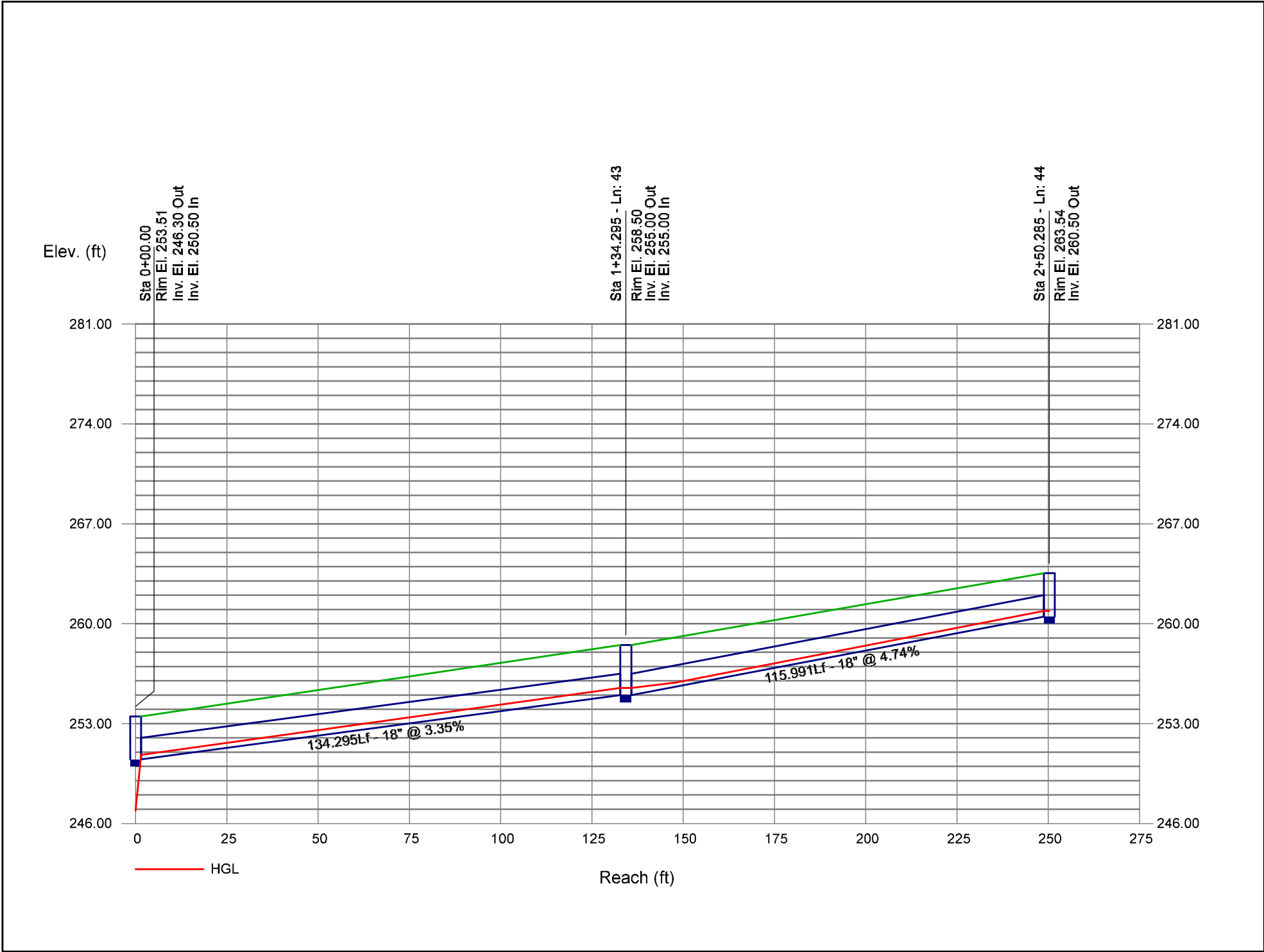
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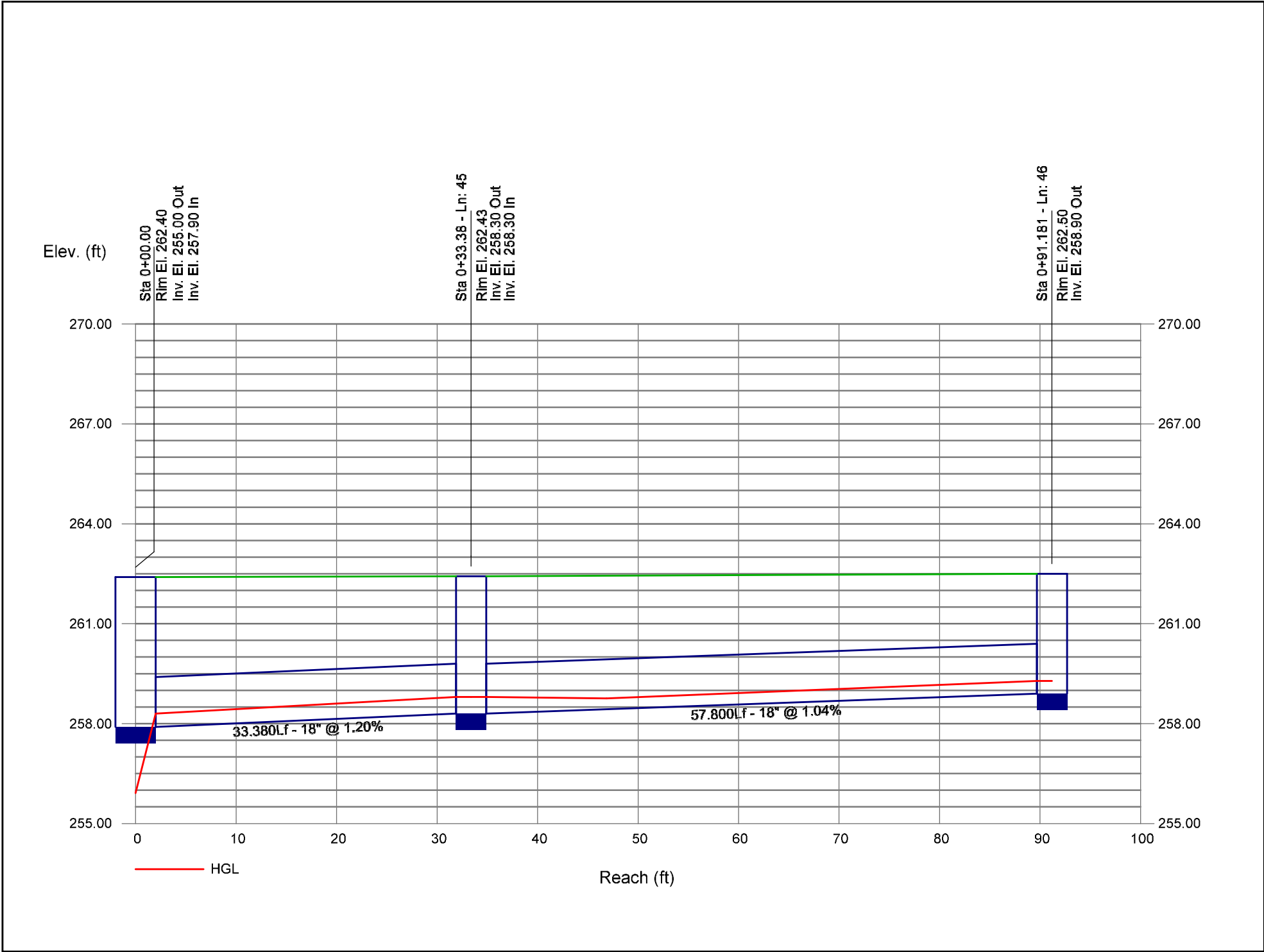
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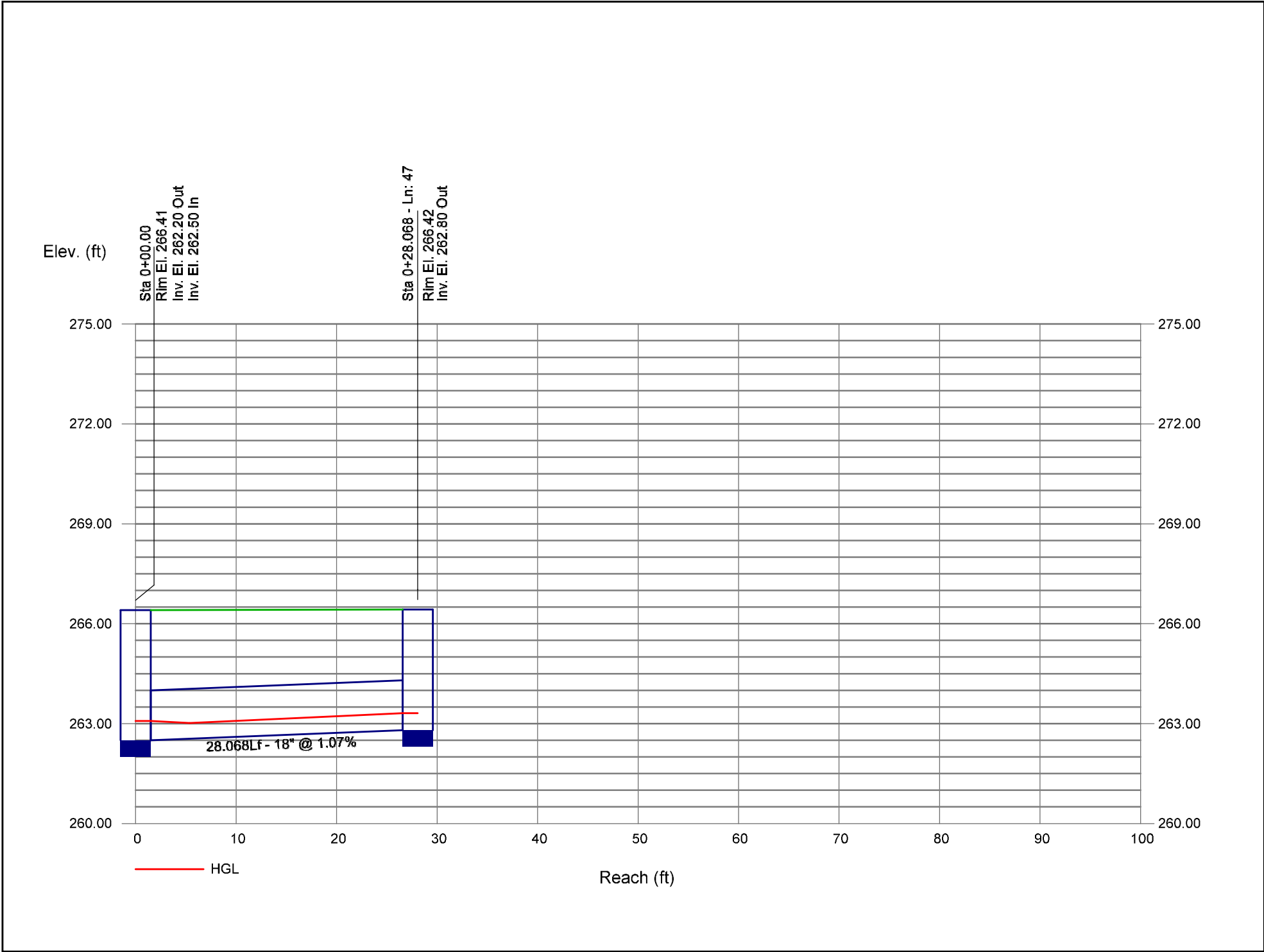
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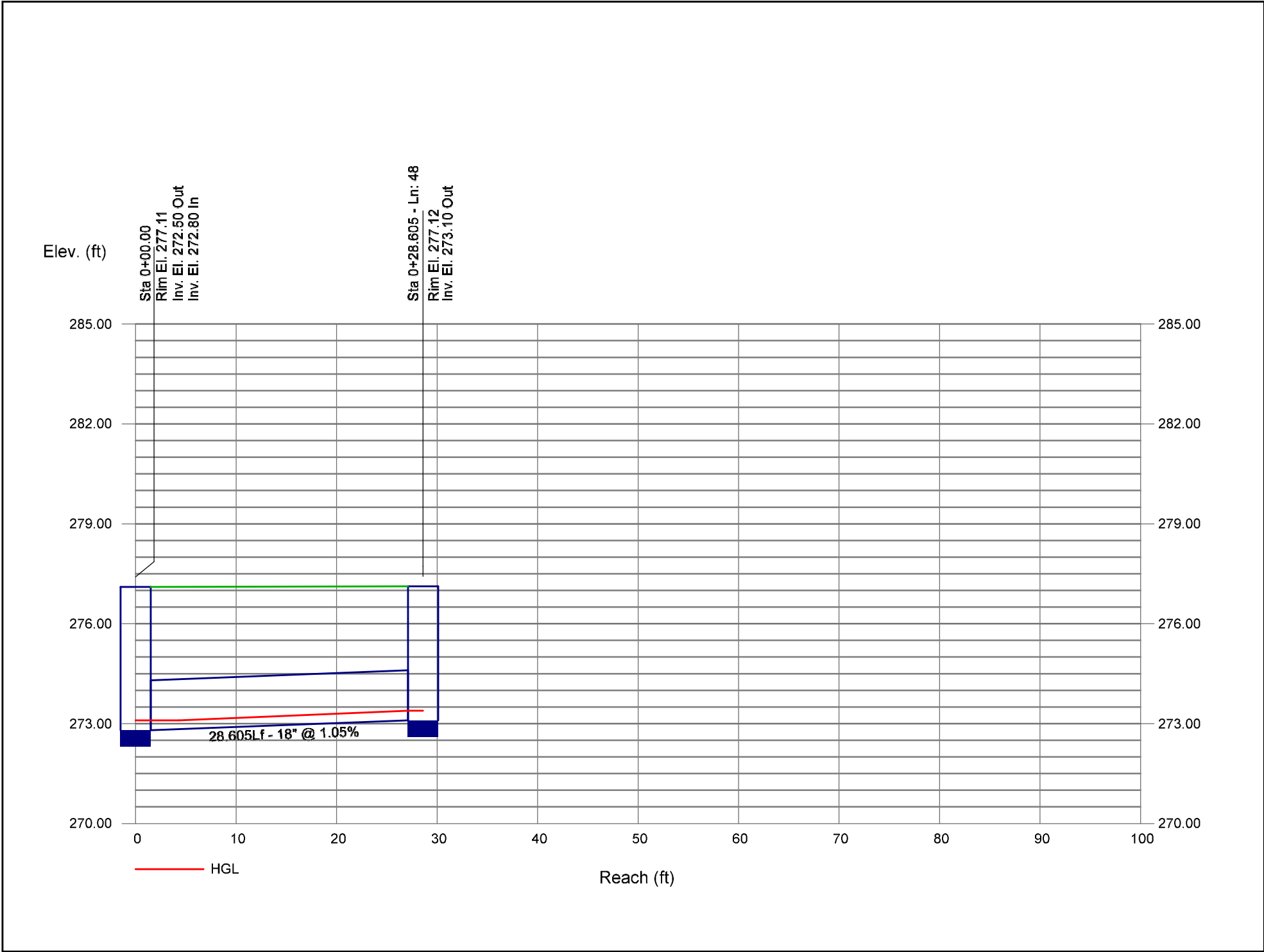
Storm Sewer Profile



Storm Sewer Profile

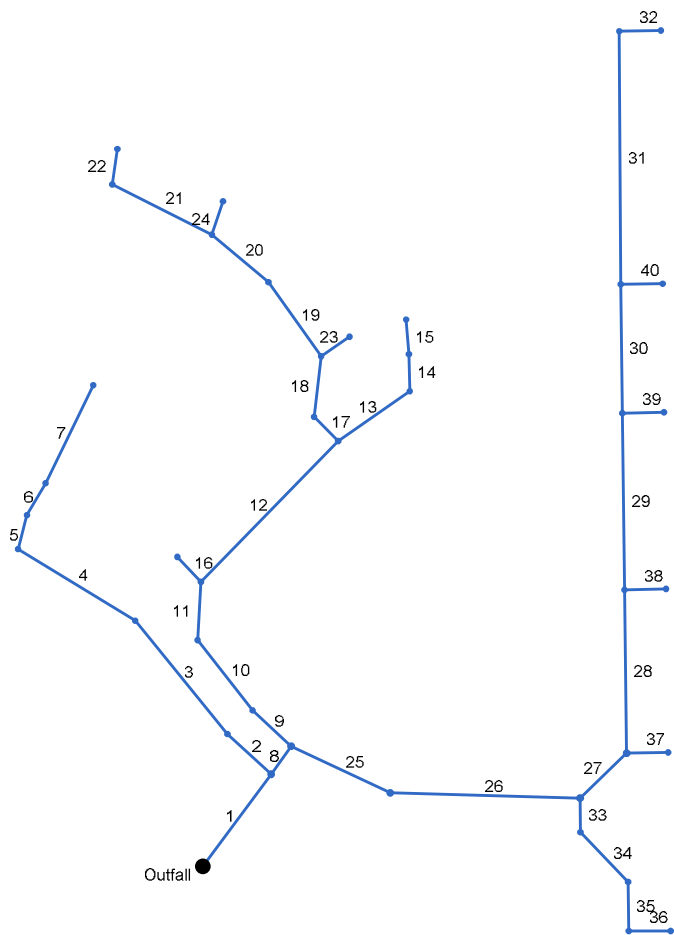


Storm Sewer Profile



STORM SYSTEM 200

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



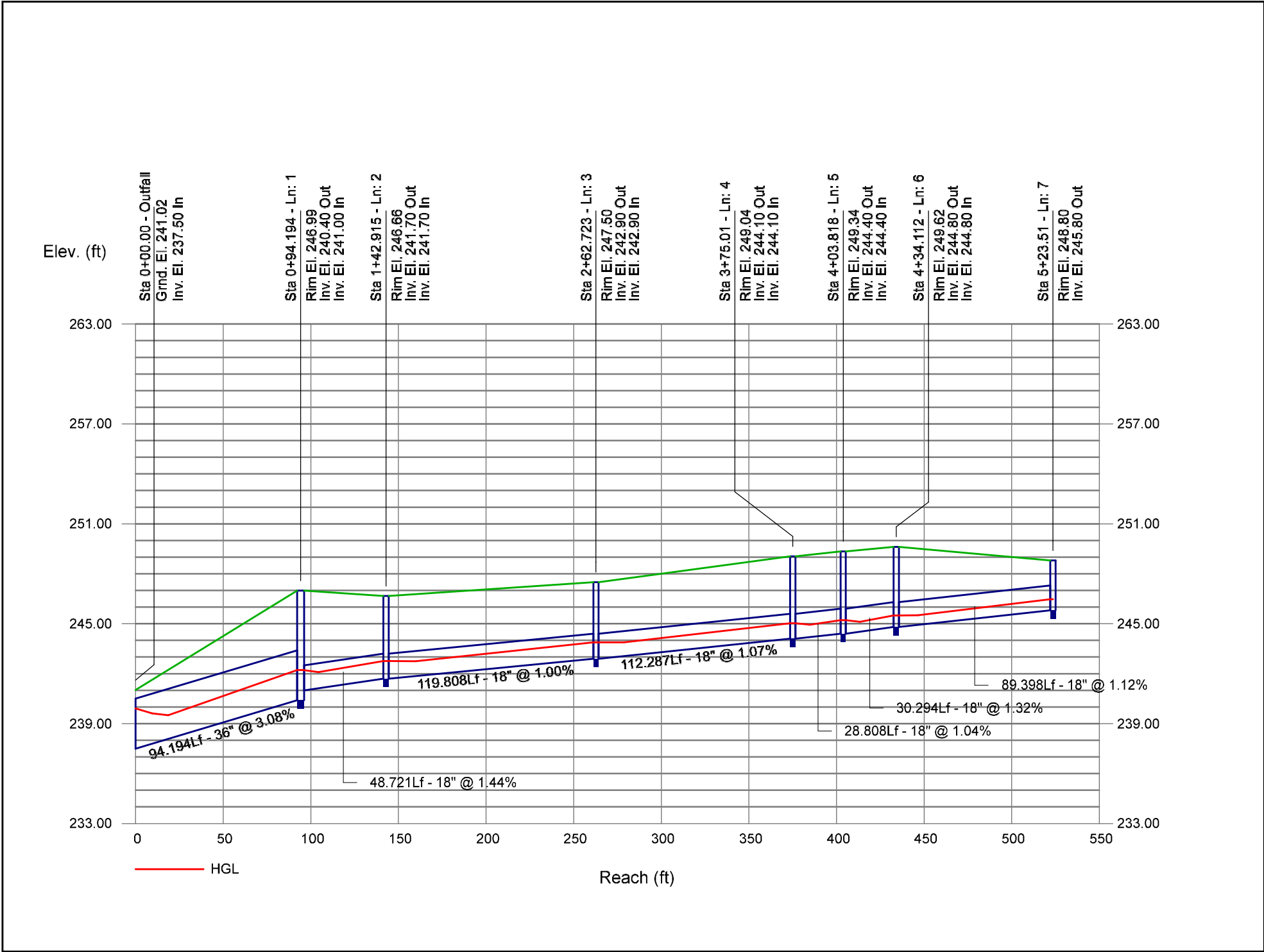
Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (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 (min)	Total (min)	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	94.194	0.46	9.15	0.70	0.32	5.88	5.0	12.8	5.3	31.42	117.0	6.10	36	3.08	237.50	240.40	239.91	242.22	241.02	246.99	201
2	1	48.721	0.27	1.93	0.70	0.19	1.16	5.0	7.4	6.5	7.52	12.59	5.26	18	1.44	241.00	241.70	242.22	242.76	246.99	246.66	202
3	2	119.808	0.18	1.66	0.70	0.13	0.97	5.0	6.9	6.6	6.45	10.51	5.04	18	1.00	241.70	242.90	242.76	243.88	246.66	247.50	203
4	3	112.287	0.26	1.48	0.70	0.18	0.85	5.0	6.3	6.8	5.74	10.86	4.85	18	1.07	242.90	244.10	243.88	245.02	247.50	249.04	204
5	4	28.808	0.26	1.22	0.70	0.19	0.66	5.0	6.1	6.8	4.52	10.72	4.28	18	1.04	244.10	244.40	245.02	245.22	249.04	249.34	205
6	5	30.294	0.09	0.95	0.50	0.04	0.48	5.0	5.8	6.9	3.29	12.07	3.75	18	1.32	244.40	244.80	245.22	245.49	249.34	249.62	206
7	6	89.398	0.87	0.87	0.50	0.43	0.43	5.0	5.0	7.2	3.11	11.11	3.99	18	1.12	244.80	245.80	245.49	246.47	249.62	248.80	207
8	1	28.140	0.25	6.77	0.50	0.13	4.41	5.0	12.7	5.4	23.59	42.35	7.85	30	1.07	240.90	241.20	242.23	242.85	246.99	246.96	208
9	8	43.069	0.54	2.79	0.50	0.27	1.80	5.0	12.5	5.4	9.68	24.37	4.84	24	1.16	241.50	242.00	242.85	243.11	246.96	246.67	209
10	9	73.220	0.23	2.25	0.70	0.16	1.53	5.0	12.1	5.5	8.34	25.08	4.89	24	1.23	242.00	242.90	243.11	243.93	246.67	247.22	210
11	10	47.888	0.29	2.02	0.70	0.21	1.37	5.0	11.9	5.5	7.53	37.27	4.79	24	2.71	242.90	244.20	243.93	245.17	247.22	248.98	211
12	11	161.146	0.10	1.43	0.70	0.07	0.95	5.0	10.5	5.8	5.50	37.80	6.53	24	2.79	244.70	249.20	245.22	250.03	248.98	260.22	212
13	12	71.363	0.19	0.56	0.70	0.13	0.34	5.0	6.3	6.8	2.34	14.71	4.91	18	1.96	256.50	257.90	256.90	258.48	260.22	265.98	213
14	13	30.459	0.14	0.37	0.70	0.10	0.21	5.0	5.7	7.0	1.47	12.03	2.80	18	1.31	257.90	258.30	258.48	258.75	265.98	266.70	214
15	14	28.453	0.23	0.23	0.50	0.12	0.12	5.0	5.0	7.2	0.83	6.63	3.28	15	1.05	258.60	258.90	258.90	259.26	266.70	262.22	215
16	11	28.110	0.29	0.29	0.70	0.21	0.21	5.0	5.0	7.2	1.48	23.37	2.03	24	1.07	244.20	244.50	245.17	244.92	248.98	249.03	216
17	12	28.063	0.02	0.77	0.70	0.02	0.54	5.0	10.3	5.8	3.14	10.86	4.70	18	1.07	249.70	250.00	250.25	250.67	260.22	260.22	217
18	17	50.070	0.02	0.75	0.70	0.01	0.53	5.0	9.9	5.9	3.10	10.49	4.04	18	1.00	250.00	250.50	250.67	251.17	260.22	262.56	218
19	18	74.603	0.04	0.70	0.70	0.03	0.49	5.0	8.0	6.3	3.09	10.87	4.06	18	1.07	250.50	251.30	251.17	251.97	262.56	261.12	219
20	19	60.462	0.03	0.66	0.70	0.02	0.46	5.0	7.5	6.5	2.97	11.30	3.96	18	1.16	251.30	252.00	251.97	252.65	261.12	259.61	220
21	20	91.300	0.15	0.34	0.70	0.10	0.24	5.0	5.9	6.9	1.66	10.99	2.80	18	1.10	252.00	253.00	252.65	253.48	259.61	257.90	221
22	21	29.454	0.20	0.20	0.70	0.14	0.14	5.0	5.0	7.2	0.99	12.24	2.46	18	1.36	253.00	253.40	253.48	253.77	257.90	257.71	222
Project File: Storm 200.stm																Number of lines: 40				Run Date: 5/30/2025		
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Tabulation

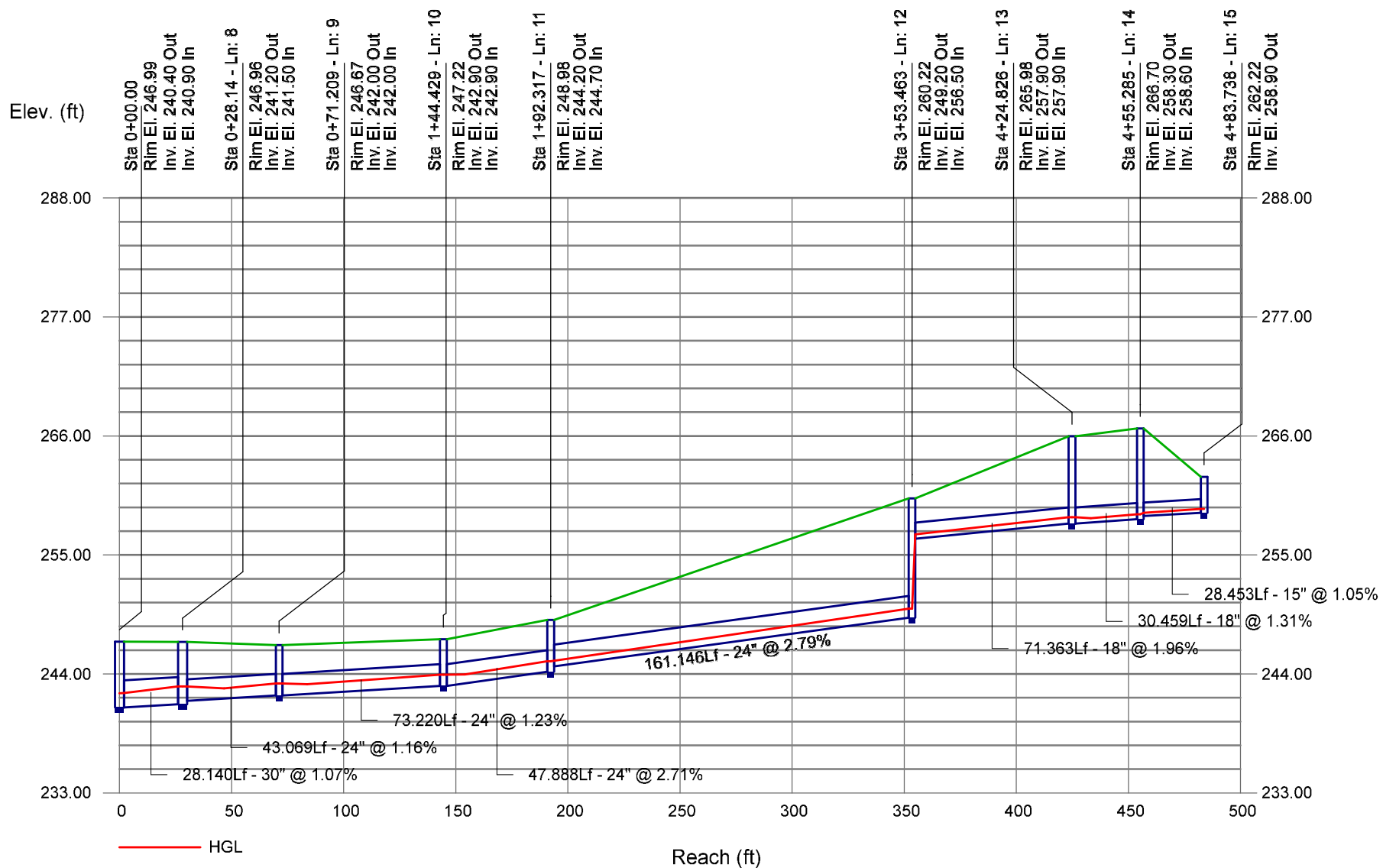
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
23	18	28.095	0.03	0.03	0.70	0.02	0.02	5.0	5.0	7.2	0.17	10.85	2.04	18	1.07	258.70	259.00	258.83	259.15	262.56	262.56	223
24	20	28.837	0.28	0.28	0.70	0.20	0.20	5.0	5.0	7.2	1.41	10.71	3.71	18	1.04	255.20	255.50	255.57	255.94	259.61	259.48	224
25	8	89.490	0.63	3.73	0.50	0.32	2.48	5.0	12.0	5.5	13.60	68.55	5.31	30	2.79	241.50	244.00	242.85	245.24	246.96	248.63	225
26	25	155.352	0.11	3.09	0.70	0.08	2.17	5.0	11.1	5.7	12.24	70.57	5.23	30	2.96	244.00	248.60	245.24	249.77	248.63	255.76	226
27	26	52.848	0.22	2.15	0.70	0.15	1.51	5.0	10.8	5.7	8.60	59.85	9.36	24	7.00	251.20	254.90	251.71	255.94	255.76	260.61	227
28	27	134.046	0.26	1.83	0.70	0.18	1.28	5.0	9.9	5.9	7.54	52.05	8.38	24	5.30	256.30	263.40	256.81	264.37	260.61	267.80	228
29	28	144.964	0.05	1.46	0.70	0.04	1.02	5.0	8.8	6.1	6.28	35.14	4.40	24	2.41	263.40	266.90	264.37	267.79	267.80	271.38	229
30	29	105.821	0.54	1.32	0.70	0.38	0.93	5.0	8.3	6.3	5.79	10.71	5.61	18	1.04	267.00	268.10	267.79	269.03	271.38	272.53	230
31	30	207.695	0.48	0.62	0.70	0.33	0.44	5.0	6.4	6.8	2.95	11.97	4.81	18	1.30	268.70	271.40	269.21	272.05	272.53	275.88	231
32	31	34.039	0.15	0.15	0.70	0.10	0.10	5.0	5.0	7.2	0.74	11.38	1.85	18	1.18	271.40	271.80	272.05	272.12	275.88	275.88	232
33	26	28.066	0.02	0.83	0.70	0.02	0.58	5.0	6.0	6.9	4.01	12.54	3.56	18	1.43	248.60	249.00	249.77	249.77	255.76	255.76	233
34	33	56.318	0.04	0.81	0.70	0.03	0.57	5.0	5.6	7.0	3.97	12.52	4.39	18	1.42	249.00	249.80	249.77	250.56	255.76	255.08	234
35	34	40.365	0.32	0.77	0.70	0.22	0.54	5.0	5.3	7.1	3.85	12.80	4.31	18	1.49	249.80	250.40	250.56	251.15	255.08	254.15	235
36	35	34.101	0.46	0.46	0.70	0.32	0.32	5.0	5.0	7.2	2.30	8.57	3.45	15	1.76	250.40	251.00	251.15	251.61	254.15	254.15	236
37	27	34.089	0.10	0.10	0.70	0.07	0.07	5.0	5.0	7.2	0.51	11.38	2.84	18	1.17	256.20	256.60	256.42	256.87	260.61	260.61	237
38	28	34.090	0.11	0.11	0.70	0.08	0.08	5.0	5.0	7.2	0.55	11.38	1.47	18	1.17	263.40	263.80	264.37	264.07	267.80	267.82	238
39	29	34.070	0.09	0.09	0.70	0.06	0.06	5.0	5.0	7.2	0.44	7.00	1.60	15	1.17	267.20	267.60	267.79	267.86	271.38	271.38	239
40	30	34.092	0.16	0.16	0.70	0.11	0.11	5.0	5.0	7.2	0.81	11.37	1.73	18	1.17	268.10	268.50	269.03	268.84	272.53	272.53	240
Project File: Storm 200.stm																Number of lines: 40				Run Date: 5/30/2025		
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Profile

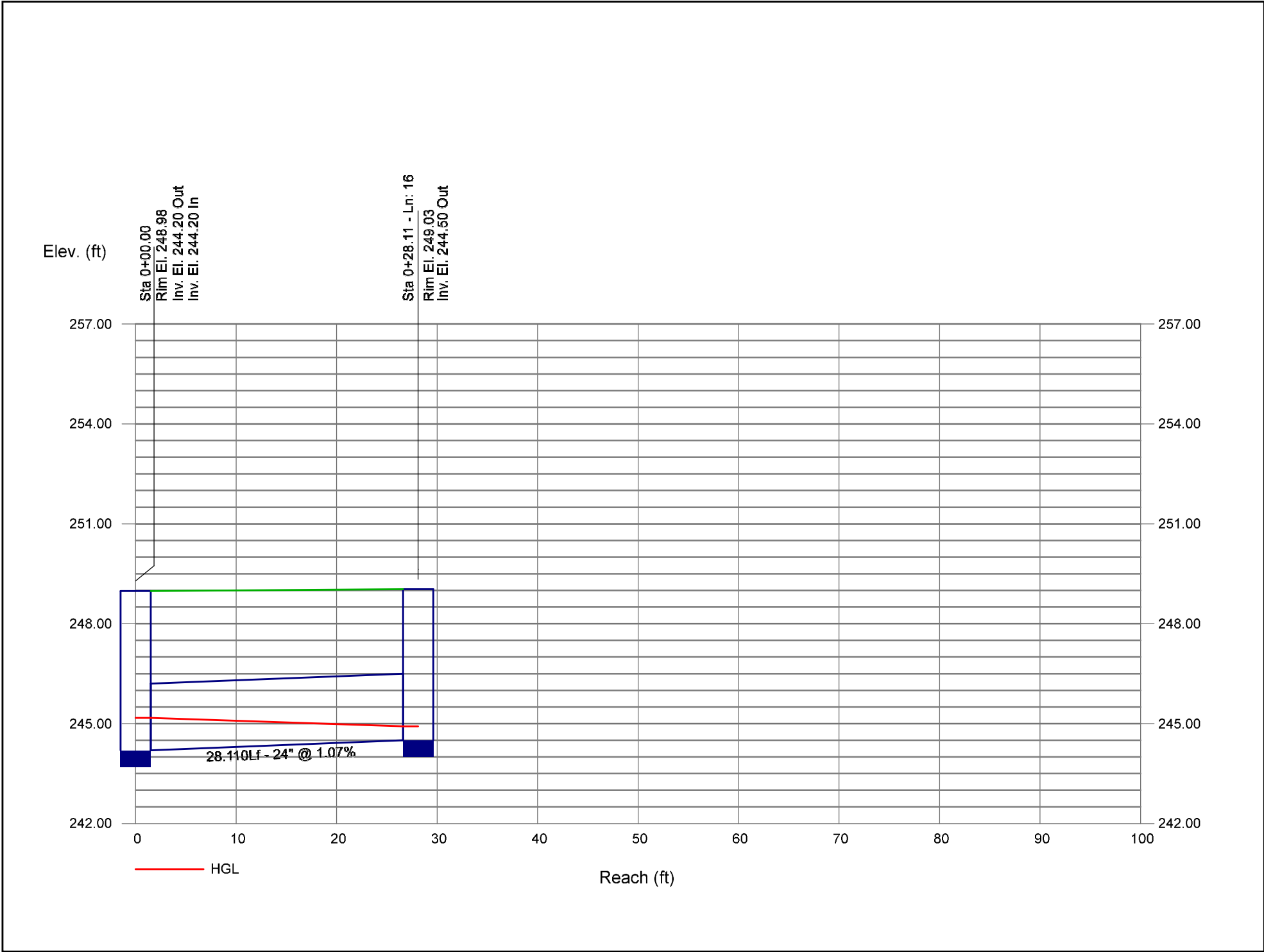


Storm Sewer Profile

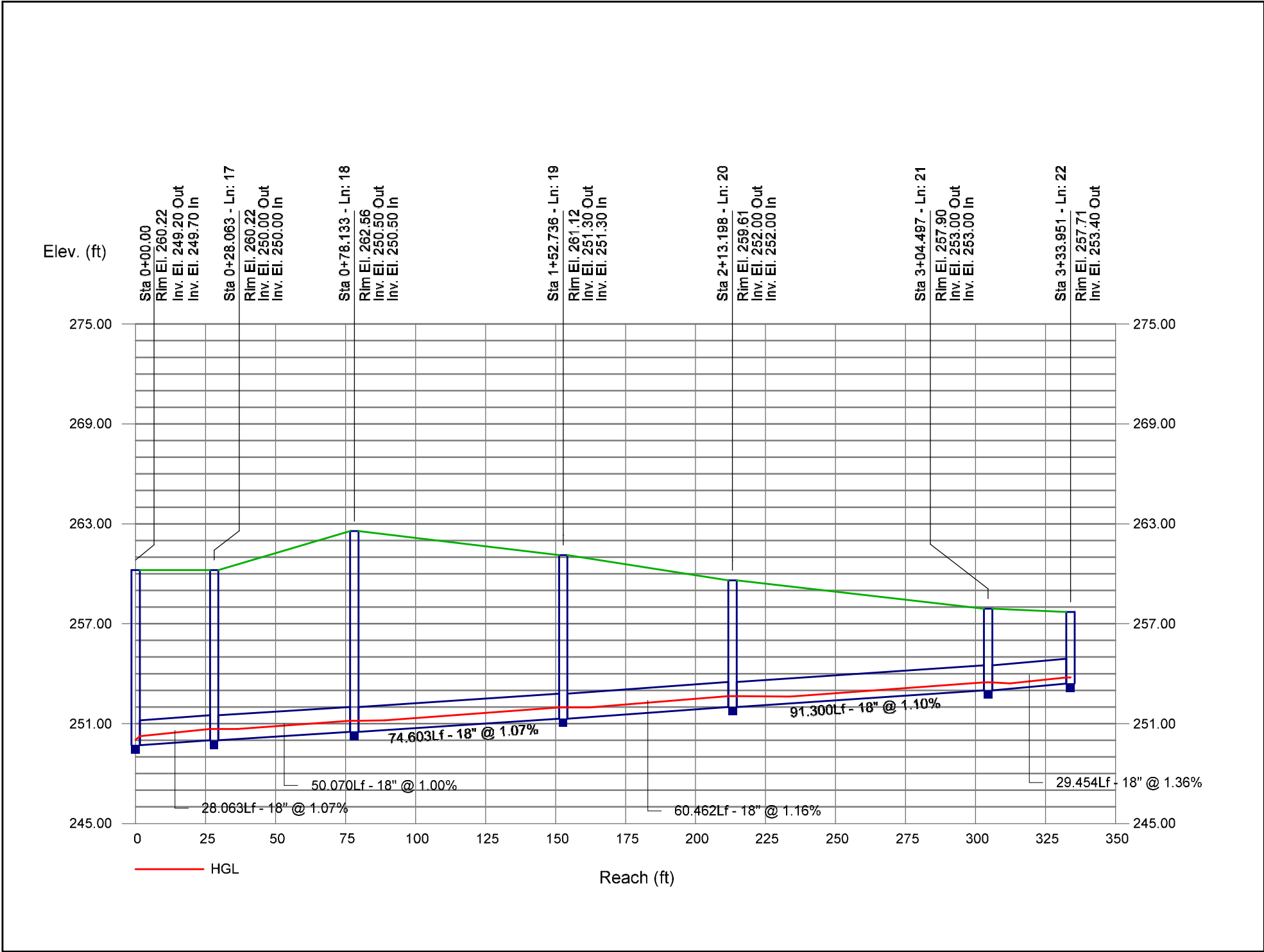
Proj. file: Storm 200.stm



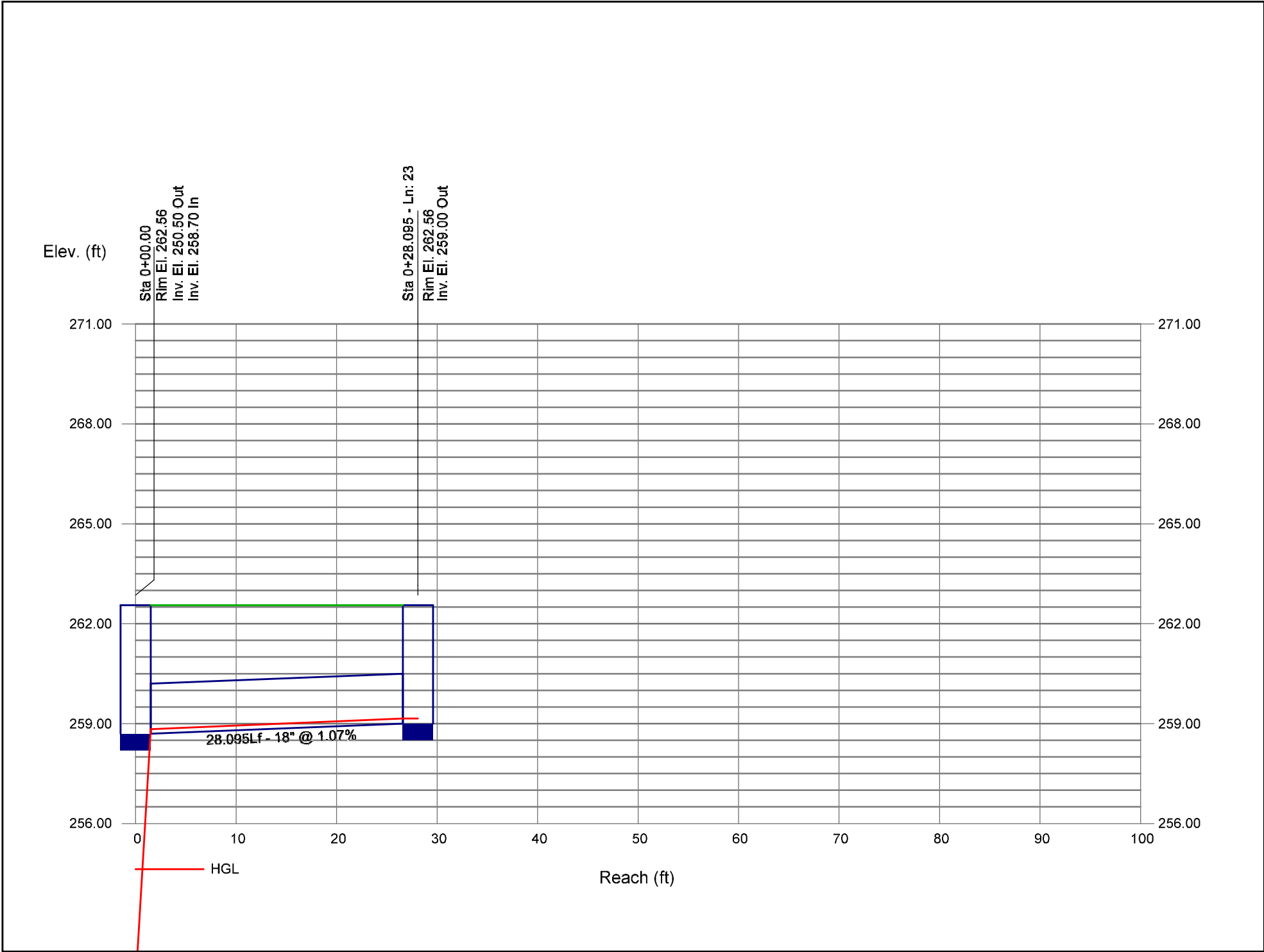
Storm Sewer Profile



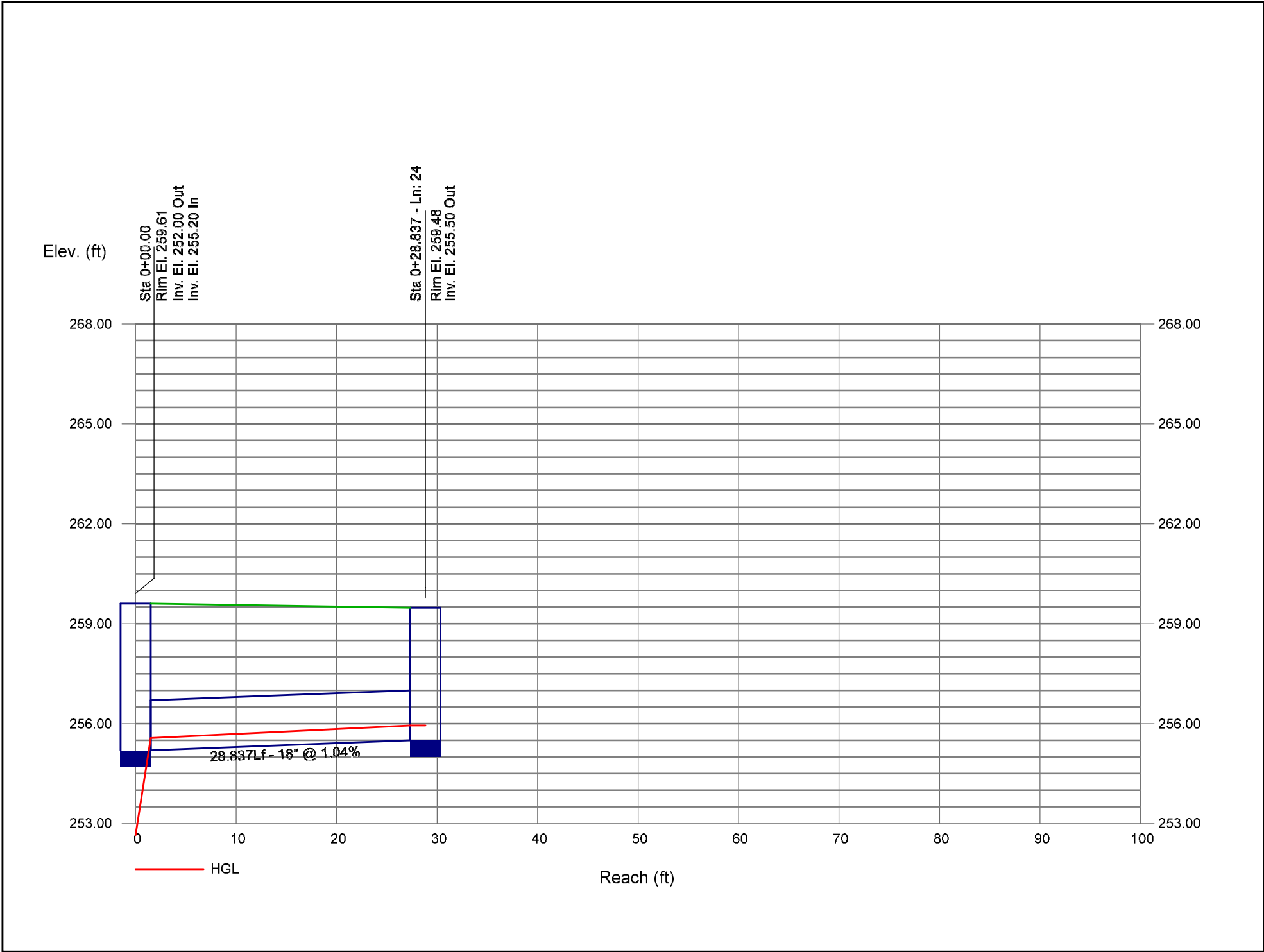
Storm Sewer Profile



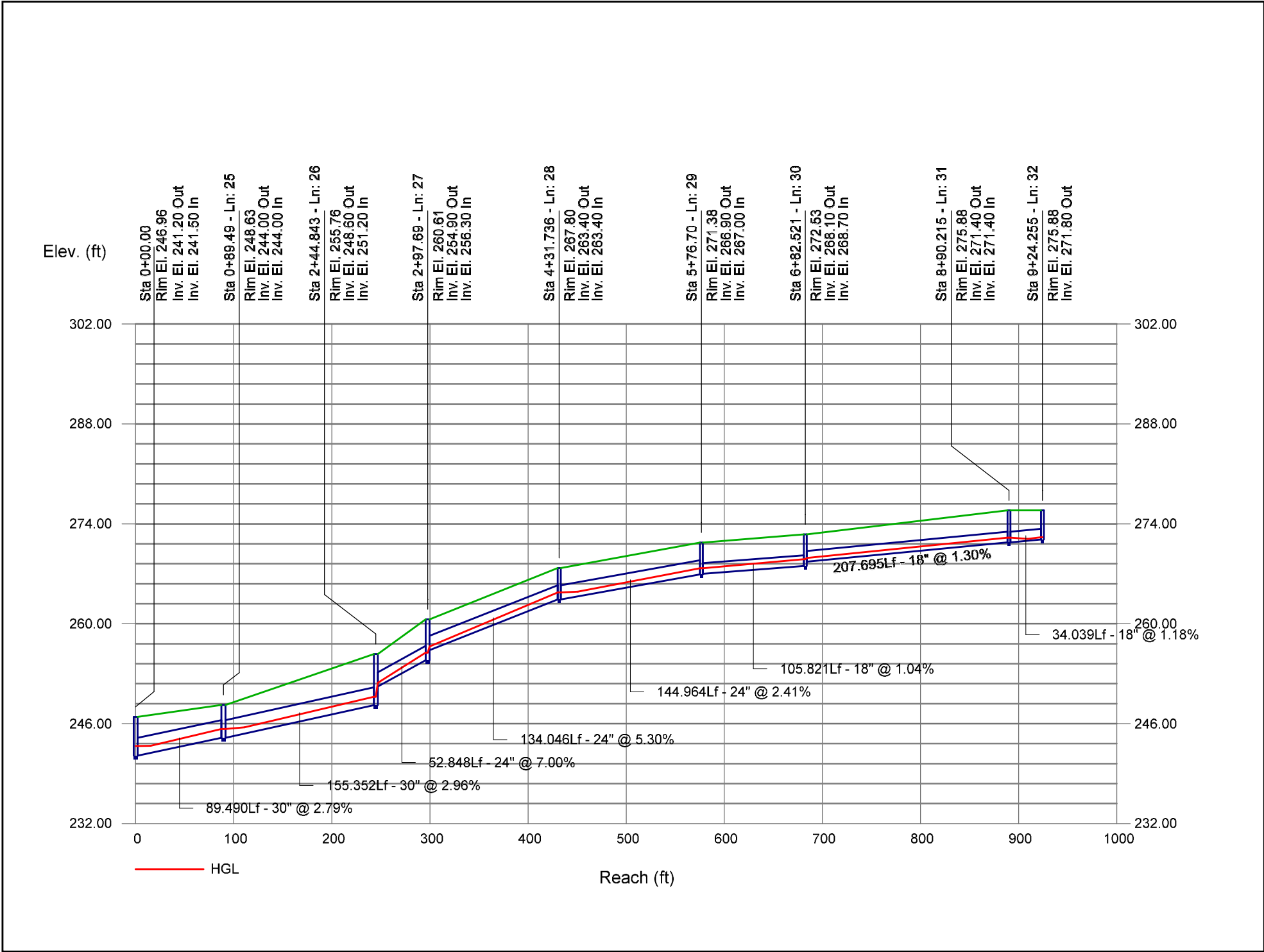
Storm Sewer Profile



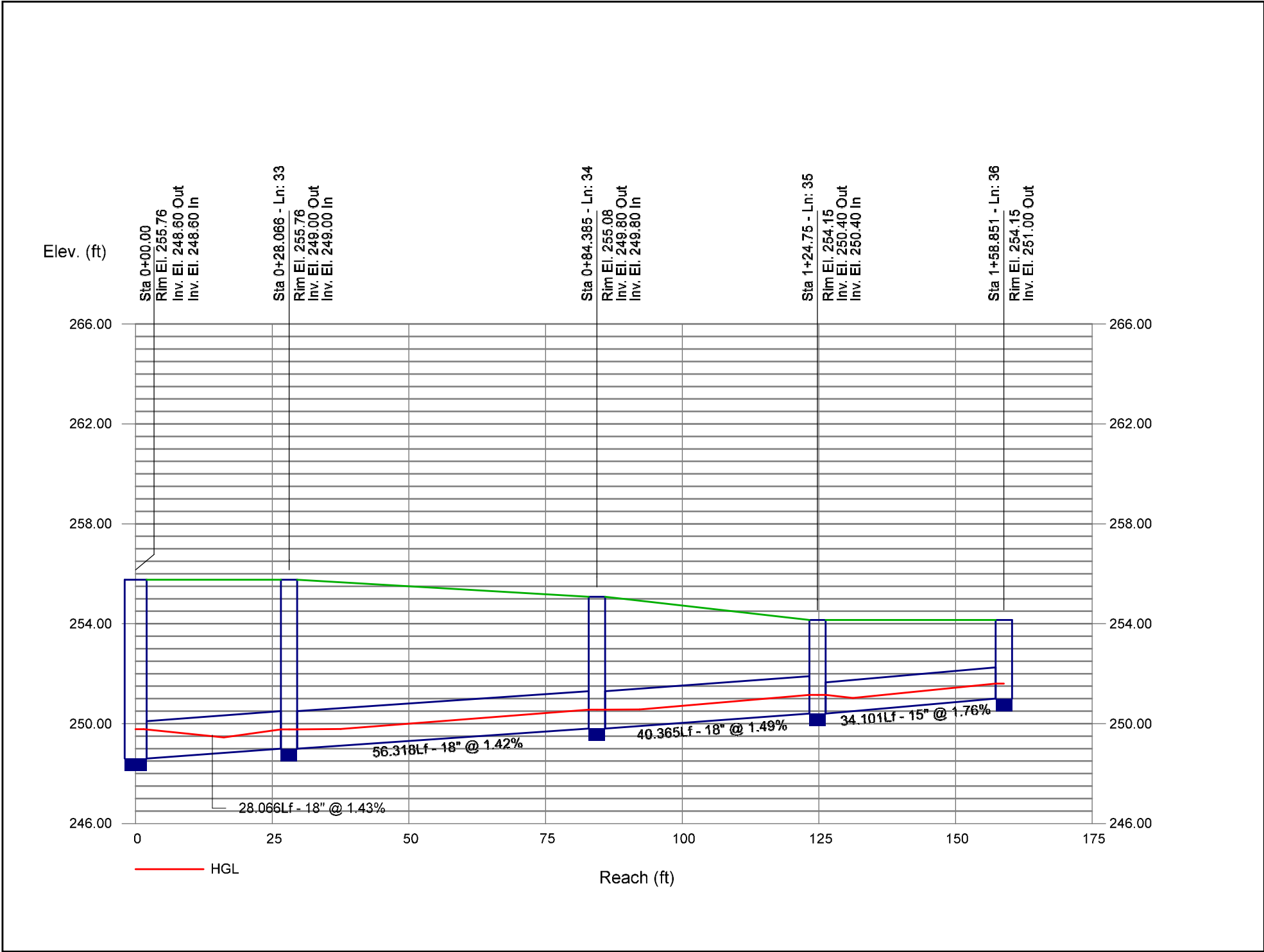
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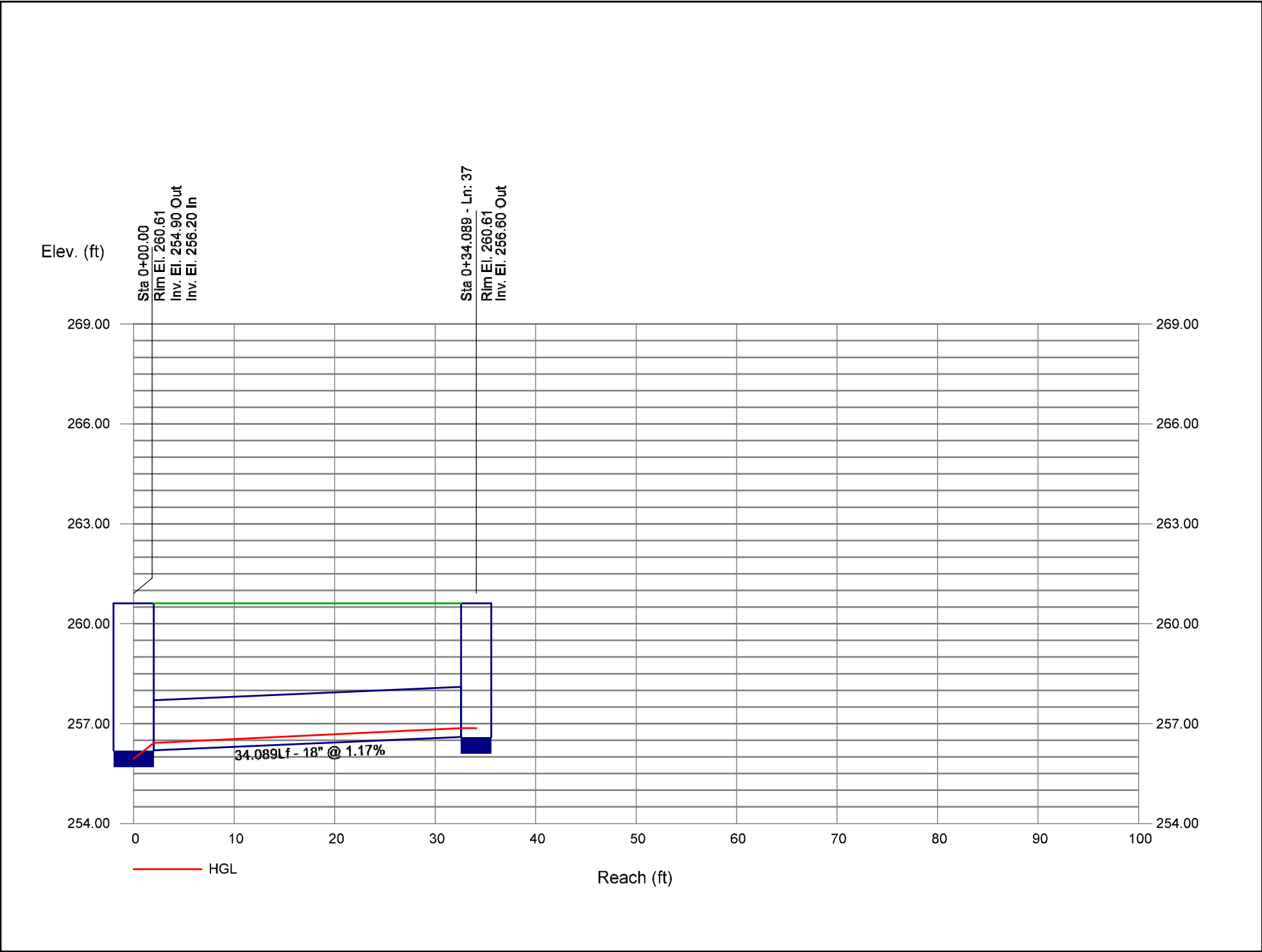
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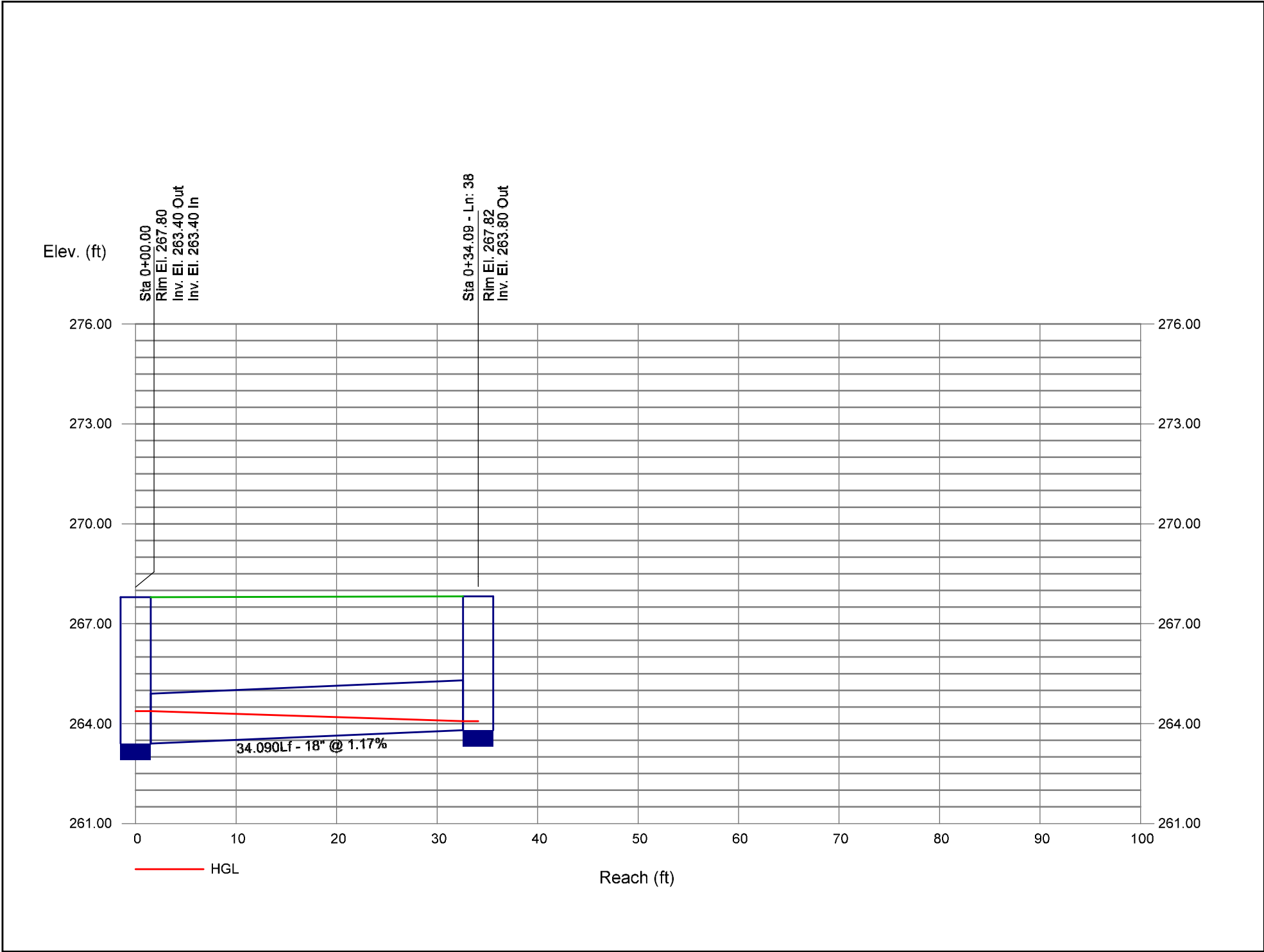
Storm Sewer Profile



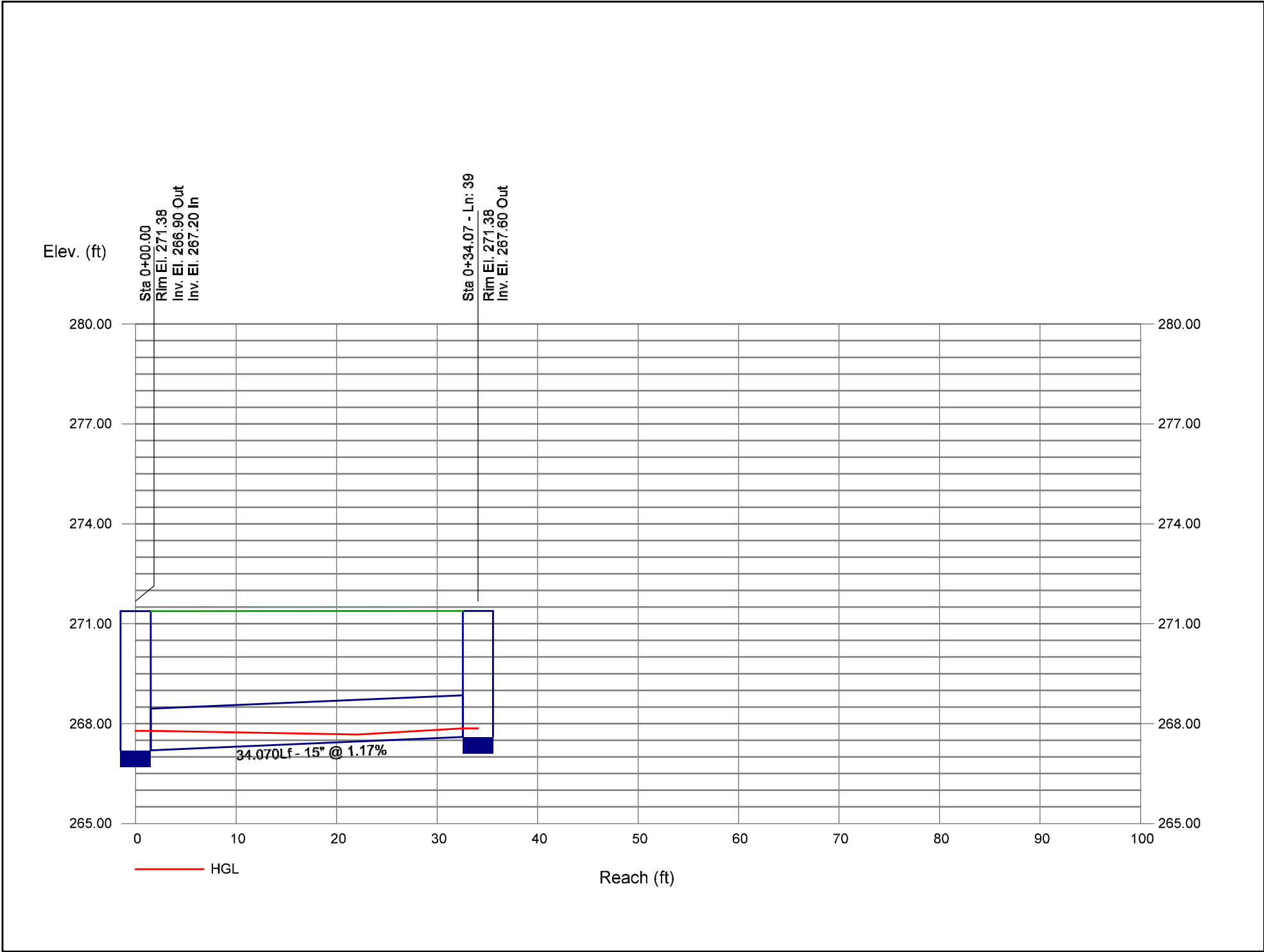
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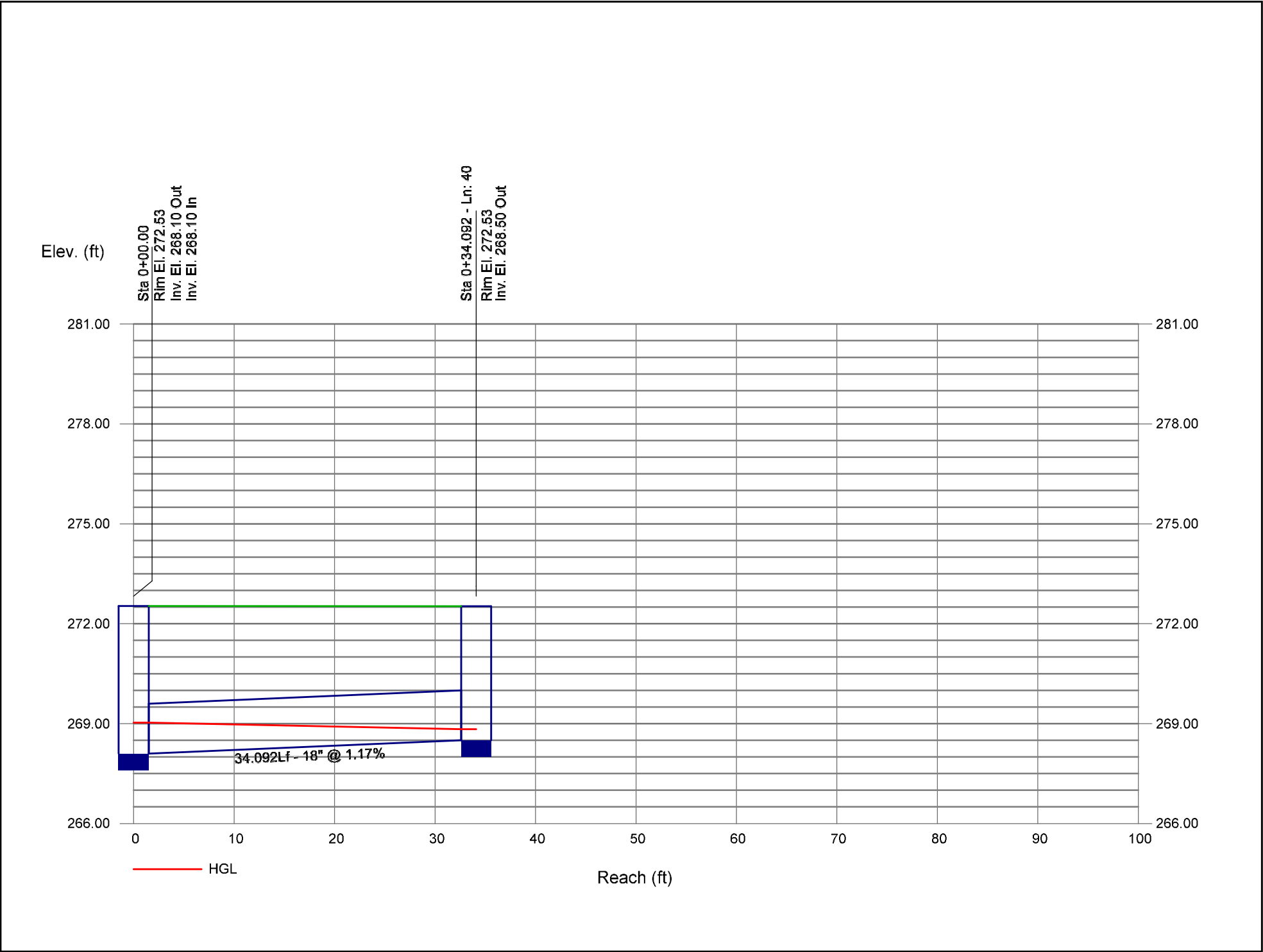
Storm Sewer Profile



Storm Sewer Profile

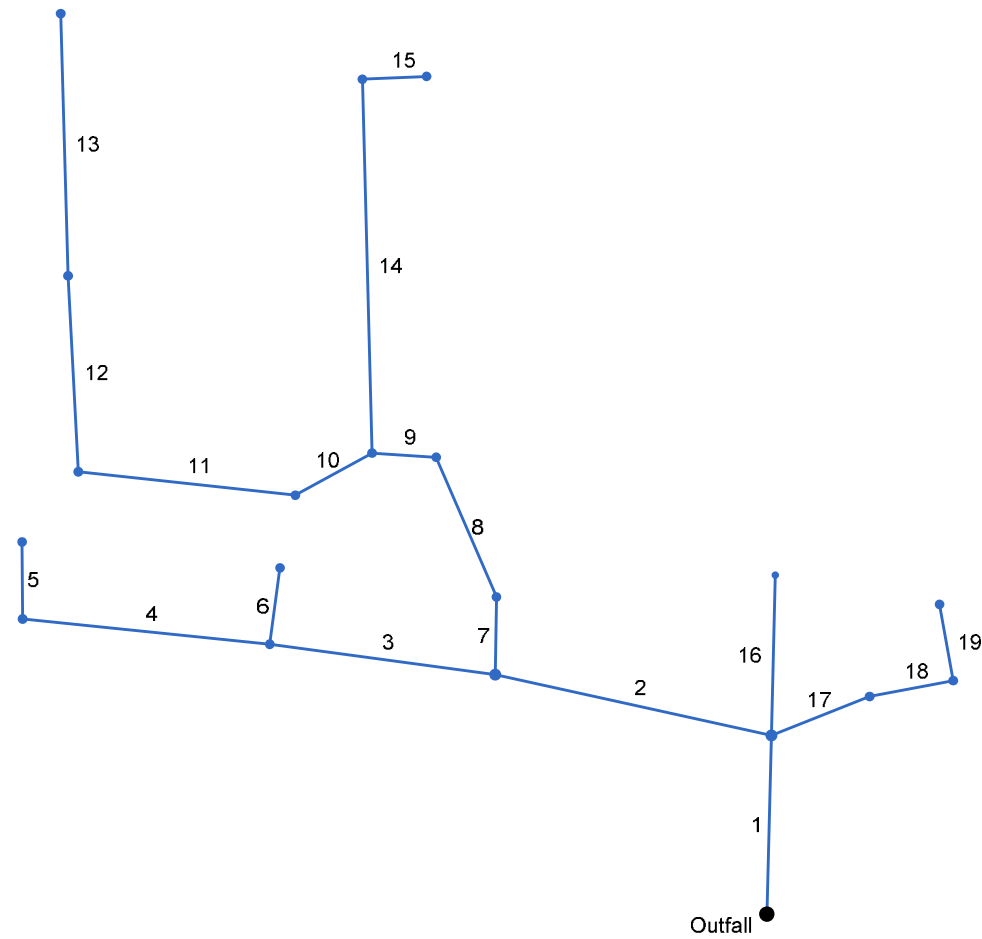


Storm Sewer Profile



STORM SYSTEM 300

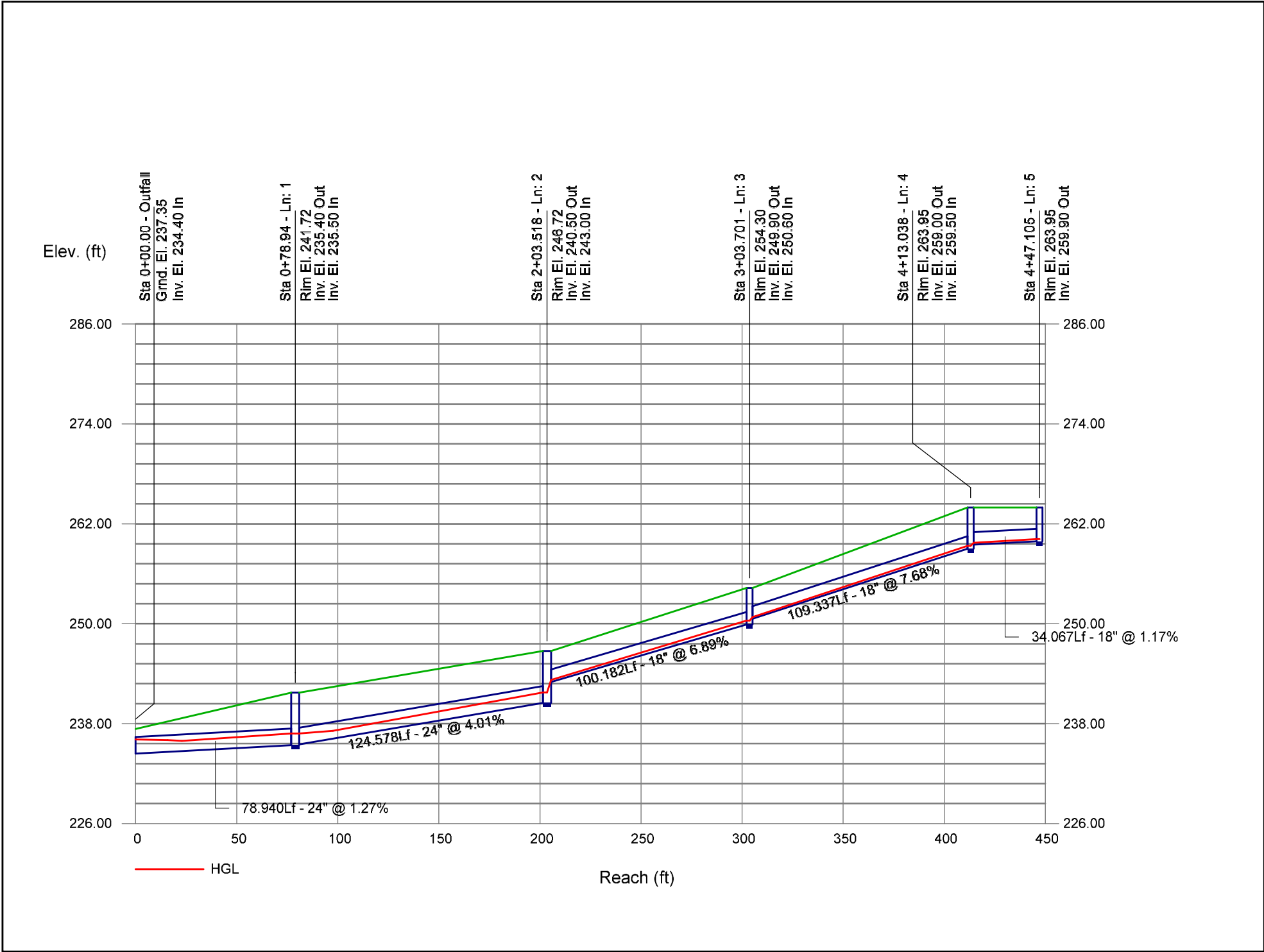
Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



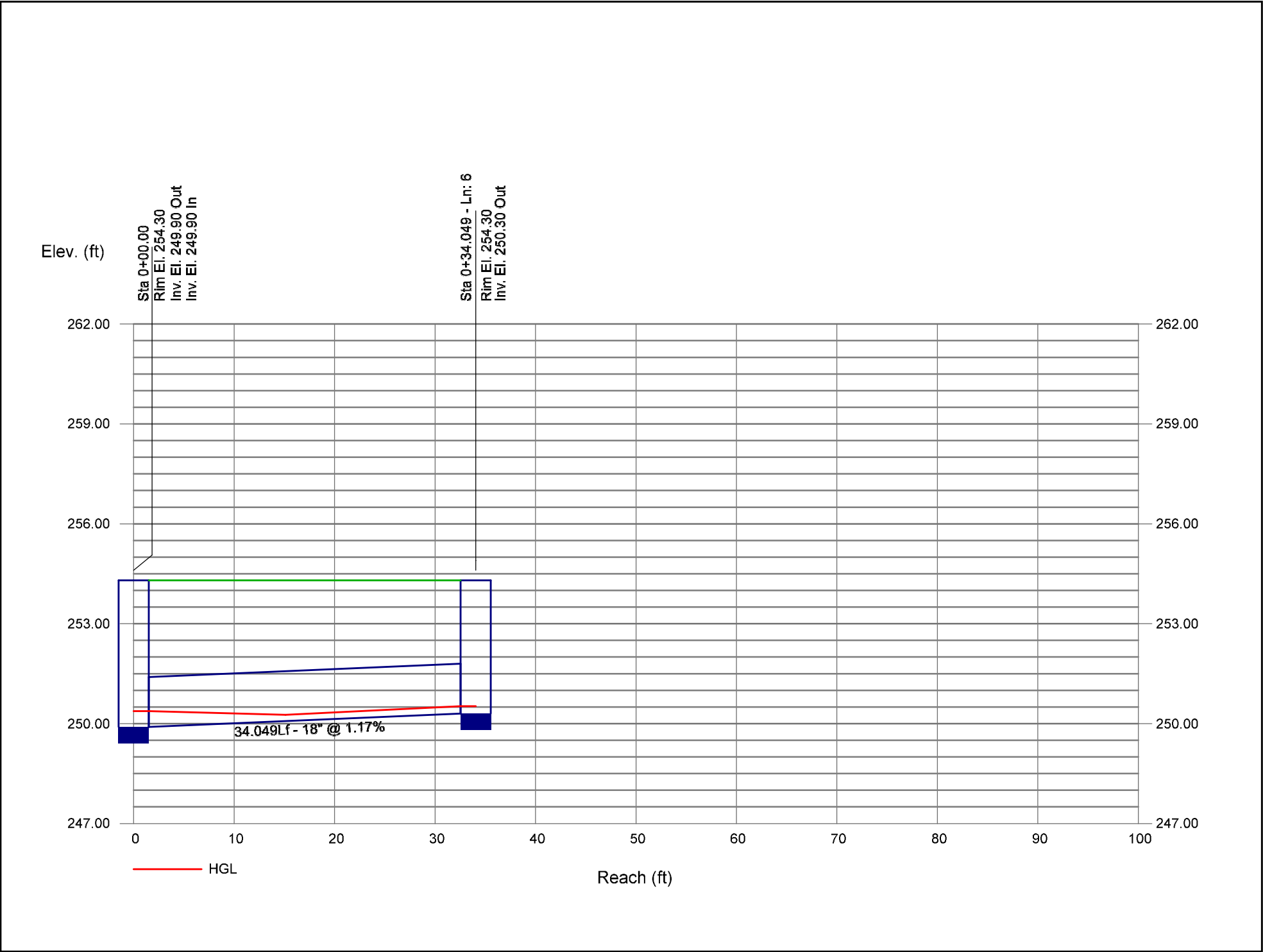
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID	
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up		
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		
1	End	78.940	0.33	5.81	0.70	0.23	3.02	5.0	14.2	5.1	15.46	25.46	5.96	24	1.27	234.40	235.40	236.11	236.82	237.35	241.72	301	
2	1	124.578	0.18	4.65	0.70	0.13	2.28	5.0	13.6	5.2	11.88	45.31	5.62	24	4.01	235.50	240.50	236.82	241.74	241.72	246.72	302	
3	2	100.182	0.12	0.39	0.70	0.08	0.27	5.0	10.2	5.8	1.59	27.56	5.90	18	6.89	243.00	249.90	243.24	250.37	246.72	254.30	303	
4	3	109.337	0.10	0.20	0.70	0.07	0.14	5.0	7.0	6.6	0.93	29.11	5.18	18	7.68	250.60	259.00	250.78	259.36	254.30	263.95	304	
5	4	34.067	0.10	0.10	0.70	0.07	0.07	5.0	5.0	7.2	0.51	11.38	2.83	18	1.17	259.50	259.90	259.72	260.16	263.95	263.95	305	
6	3	34.049	0.07	0.07	0.70	0.05	0.05	5.0	5.0	7.2	0.37	11.38	1.50	18	1.17	249.90	250.30	250.37	250.52	254.30	254.30	306	
7	2	34.271	0.03	4.08	0.70	0.02	1.88	5.0	13.5	5.2	9.85	42.32	5.13	24	3.50	240.50	241.70	241.74	242.82	246.72	247.01	307	
8	7	67.270	0.29	4.05	0.70	0.21	1.86	5.0	13.1	5.3	9.85	31.44	5.43	24	1.93	241.70	243.00	242.82	244.12	247.01	248.23	308	
9	8	28.207	0.42	3.76	0.70	0.30	1.66	5.0	12.9	5.3	8.80	30.11	5.04	24	1.77	243.00	243.50	244.12	244.56	248.23	248.23	309	
10	9	38.633	0.06	2.81	0.50	0.03	0.99	5.0	12.6	5.4	5.35	25.73	3.81	24	1.29	243.50	244.00	244.56	244.82	248.23	247.61	310	
11	10	96.002	0.79	2.76	0.35	0.27	0.96	10.0	12.1	5.5	5.28	10.72	5.46	18	1.04	244.50	245.50	245.24	246.38	247.61	249.21	311	
12	11	86.703	0.80	1.97	0.35	0.28	0.69	10.0	11.4	5.6	3.86	16.73	3.96	18	2.54	245.50	247.70	246.38	248.45	249.21	251.33	312	
13	12	115.891	1.17	1.17	0.35	0.41	0.41	10.0	10.0	5.9	2.41	20.46	3.25	18	3.80	247.70	252.10	248.45	252.69	251.33	255.68	313	
14	9	165.242	0.31	0.52	0.70	0.21	0.37	5.0	5.8	6.9	2.54	18.09	5.52	18	2.97	244.20	249.10	244.58	249.70	248.23	253.54	314	
15	14	28.156	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.2	1.09	17.69	2.32	18	2.84	249.10	249.90	249.70	250.29	253.54	253.56	315	
16	1	70.901	0.35	0.35	0.50	0.18	0.18	5.0	5.0	7.2	1.27	10.43	3.56	18	0.99	236.50	237.20	236.85	237.62	241.72	240.26	316	
17	1	46.520	0.01	0.47	0.70	0.01	0.33	5.0	6.0	6.9	2.27	12.88	2.50	18	1.50	235.40	236.10	236.82	236.67	241.72	241.13	317	
18	17	37.444	0.09	0.46	0.70	0.06	0.32	5.0	5.5	7.0	2.25	10.85	3.68	18	1.07	236.10	236.50	236.67	237.07	241.13	240.78	318	
19	18	34.196	0.37	0.37	0.70	0.26	0.26	5.0	5.0	7.2	1.87	11.36	3.27	18	1.17	236.50	236.90	237.07	237.41	240.78	240.78	319	
Project File: Storm 300.stm																Number of lines: 19				Run Date: 5/30/2025			
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																							

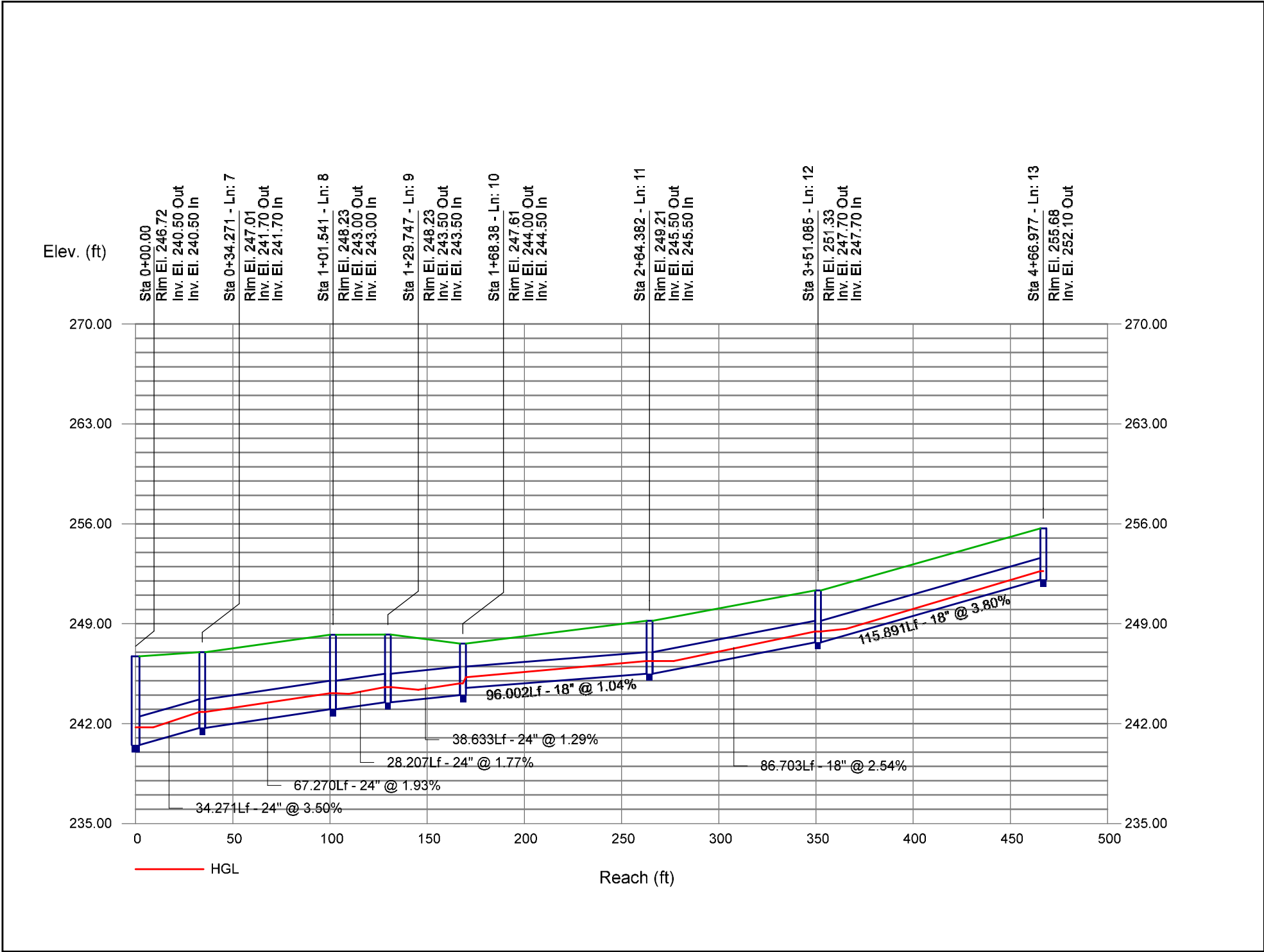
Storm Sewer Profile



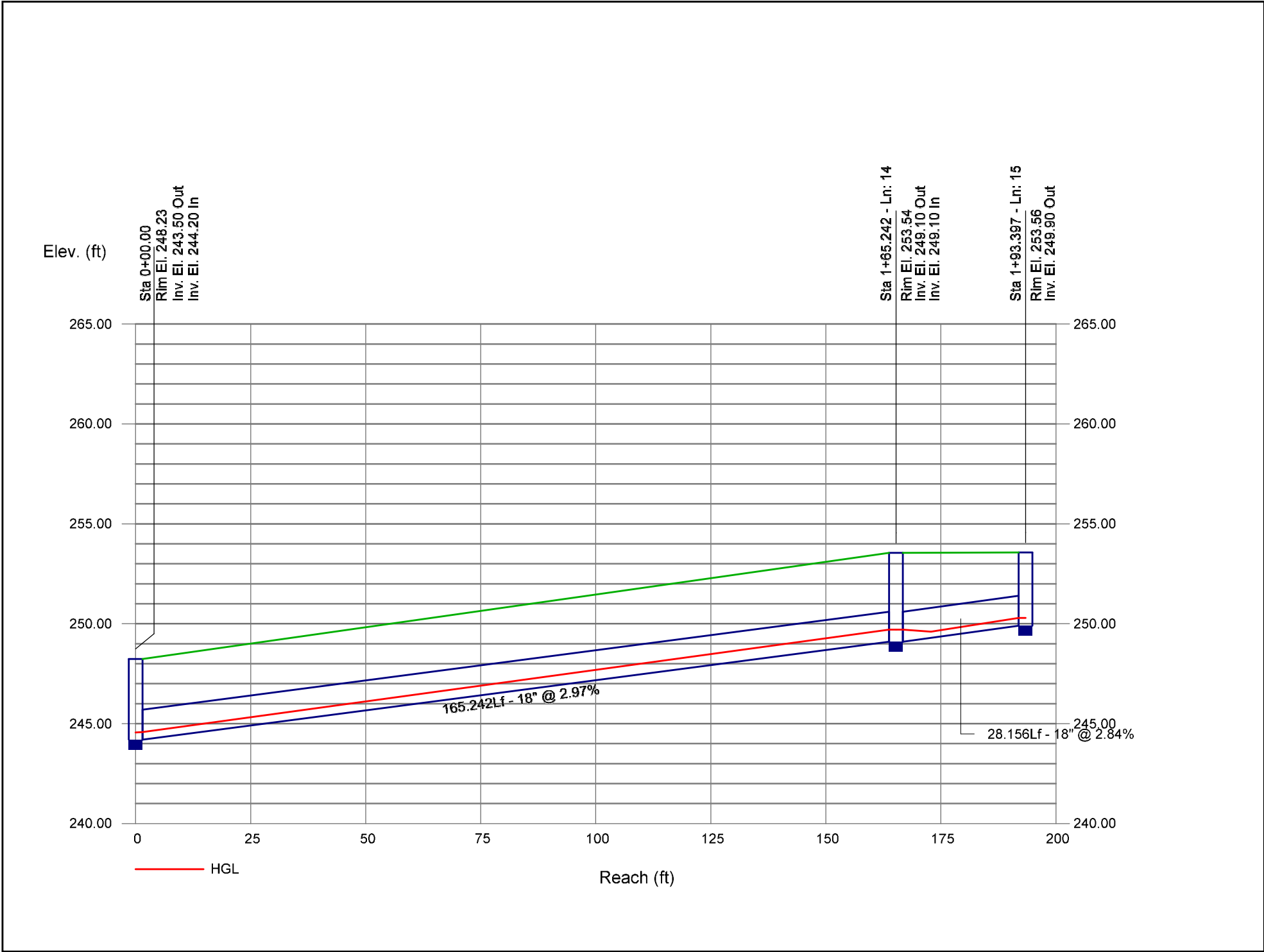
Storm Sewer Profile



Storm Sewer Profile

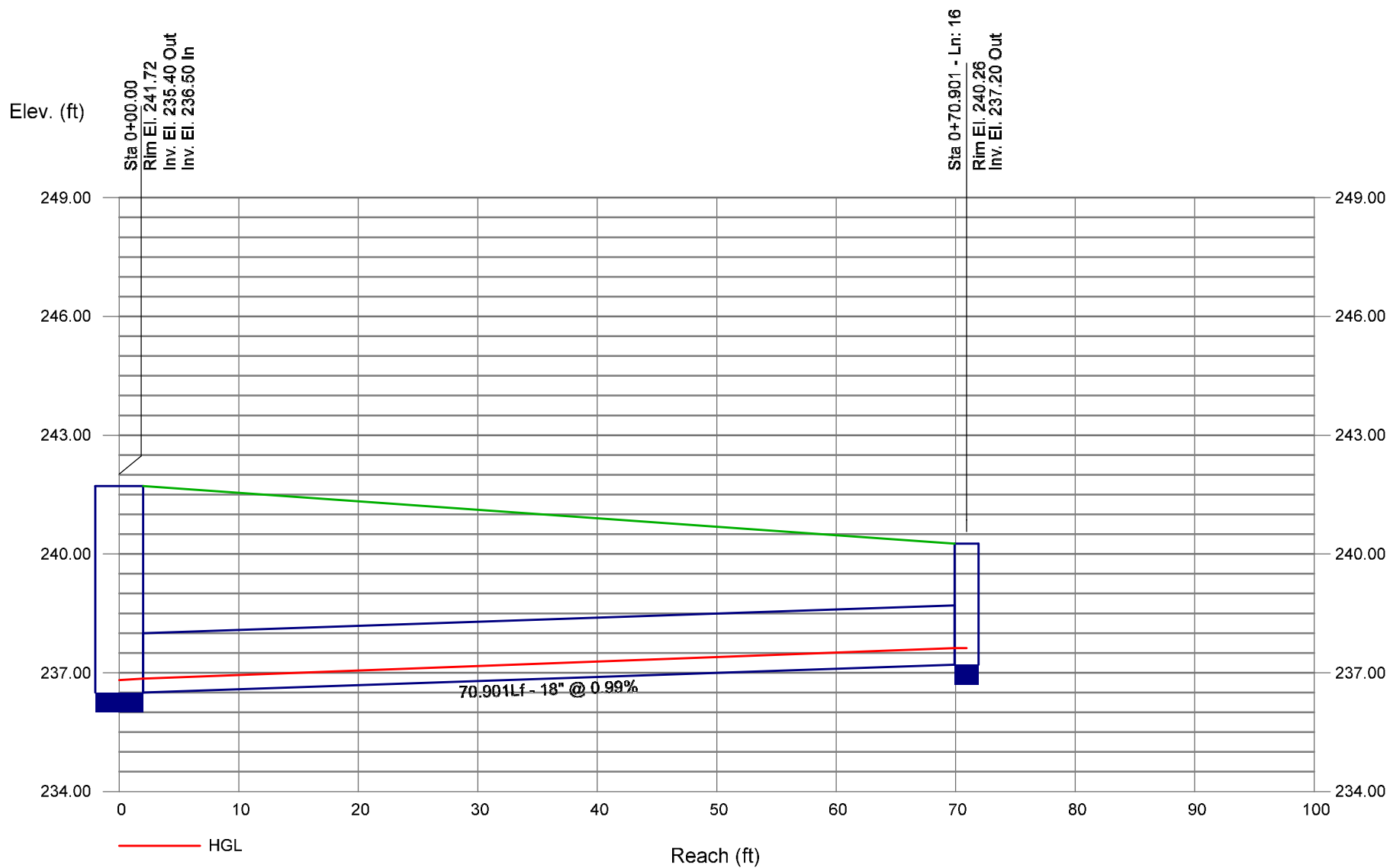


Storm Sewer Profile

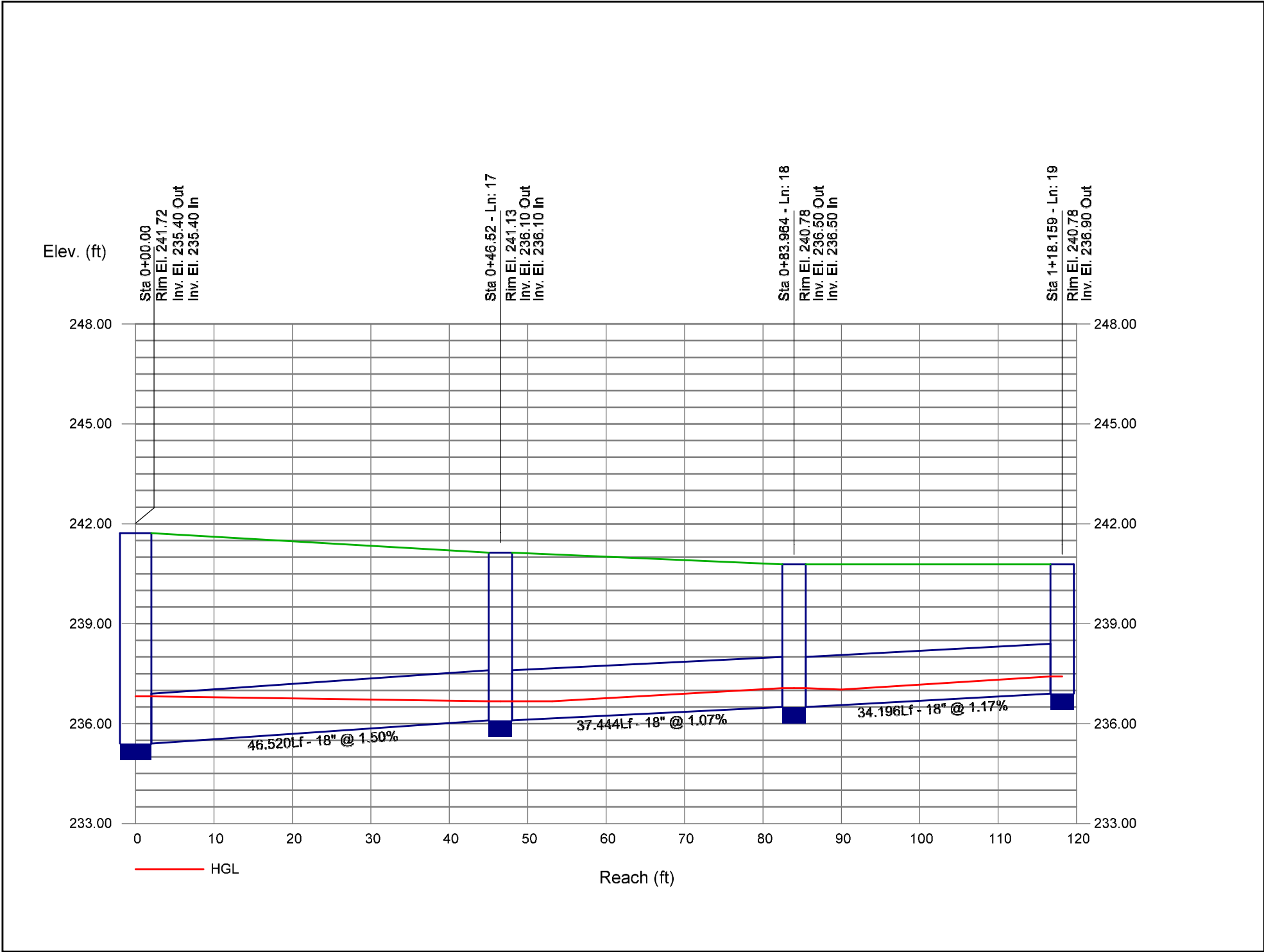


Storm Sewer Profile

Proj. file: Storm 300.stm

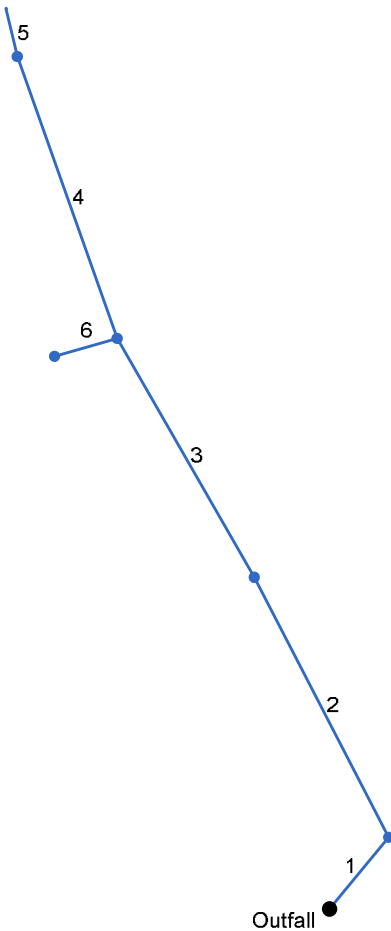


Storm Sewer Profile



STORM SYSTEM 400

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

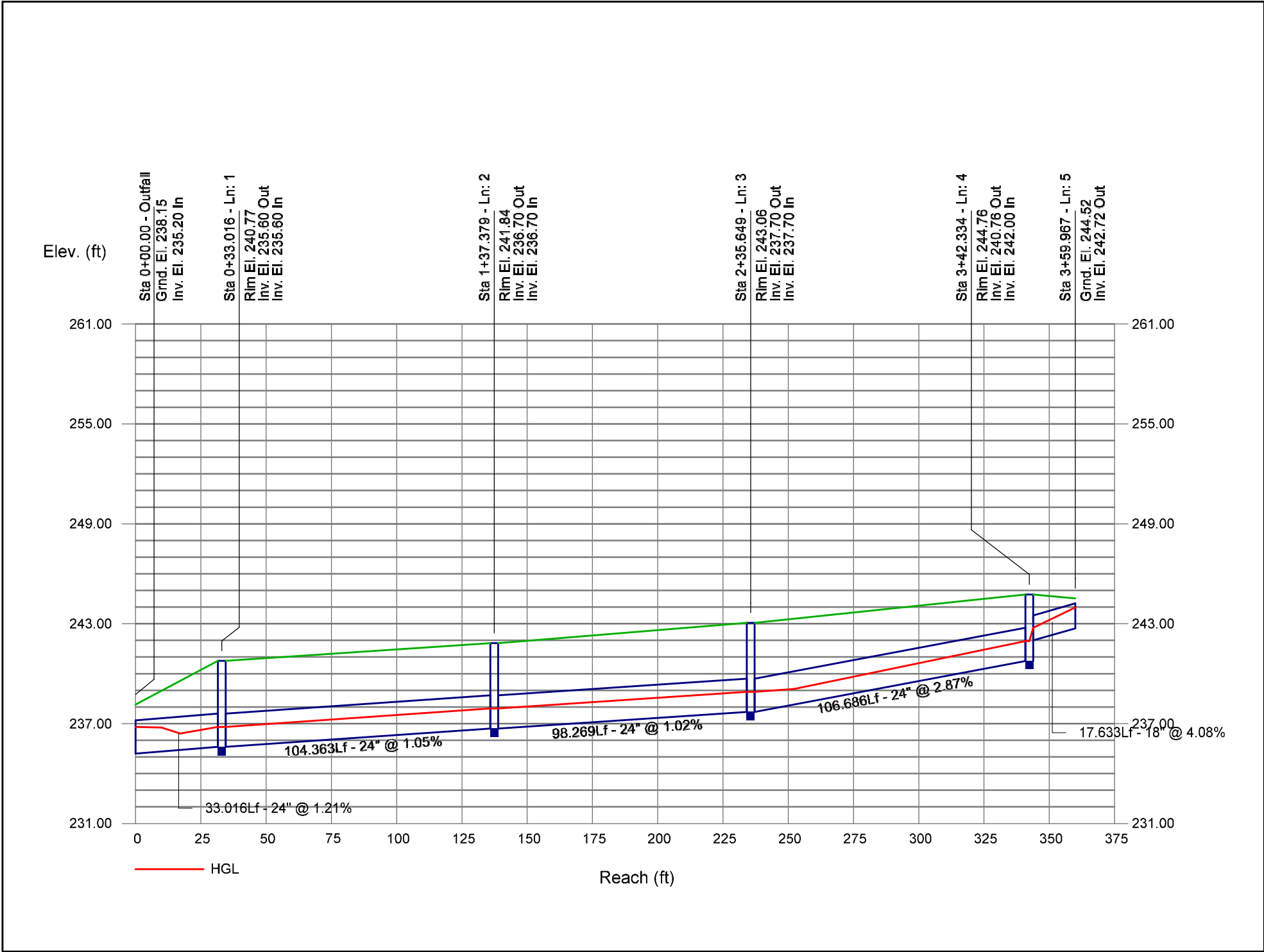


Project File: Storm 400.stm	Number of lines: 6	Date: 5/30/2025
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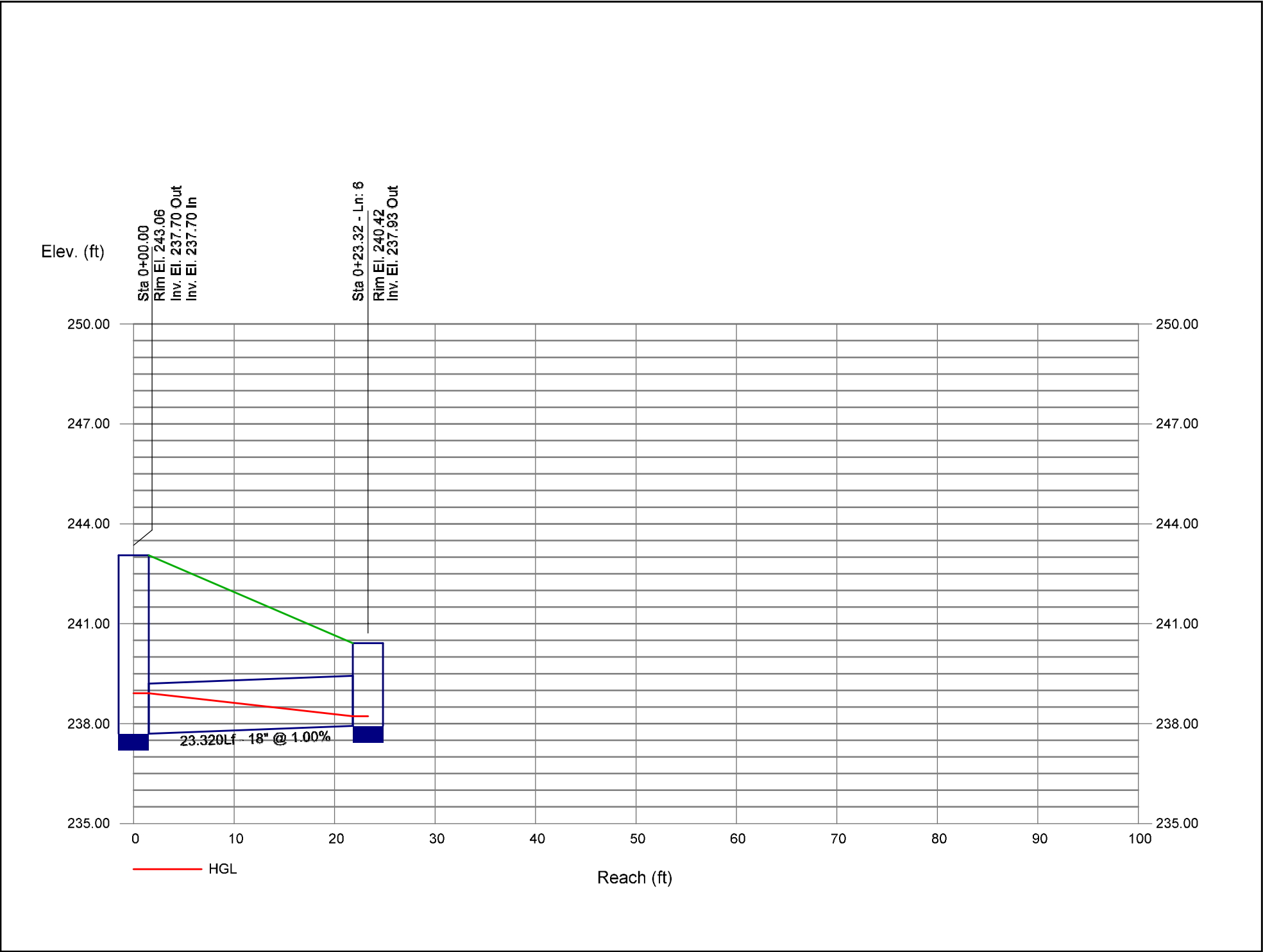
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	33.016	0.04	5.79	0.70	0.03	2.06	5.0	12.1	5.5	11.30	24.90	4.95	24	1.21	235.20	235.60	236.80	236.81	238.15	240.77	401
2	1	104.363	0.01	5.75	0.70	0.01	2.03	5.0	11.6	5.6	11.32	23.22	5.73	24	1.05	235.60	236.70	236.81	237.91	240.77	241.84	402
3	2	98.269	0.05	5.73	0.70	0.04	2.03	5.0	11.1	5.6	11.43	22.82	5.75	24	1.02	236.70	237.70	237.91	238.91	241.84	243.06	403
4	3	106.686	0.10	5.38	0.35	0.04	1.88	5.0	10.0	5.9	11.05	38.31	5.60	24	2.87	237.70	240.76	238.91	241.95	243.06	244.76	404
5	4	17.633	5.28	5.28	0.35	1.85	1.85	10.0	10.0	5.9	10.85	21.22	9.46	18	4.08	242.00	242.72	242.76	243.98	244.76	244.52	405
6	3	23.320	0.30	0.30	0.35	0.10	0.10	10.0	10.0	5.9	0.61	10.50	1.47	18	1.00	237.70	237.93	238.91	238.22	243.06	240.42	406
Project File: Storm 400.stm																Number of lines: 6				Run Date: 5/30/2025		
NOTES:Intensity = 72.00 / (Inlet time + 12.50) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Profile

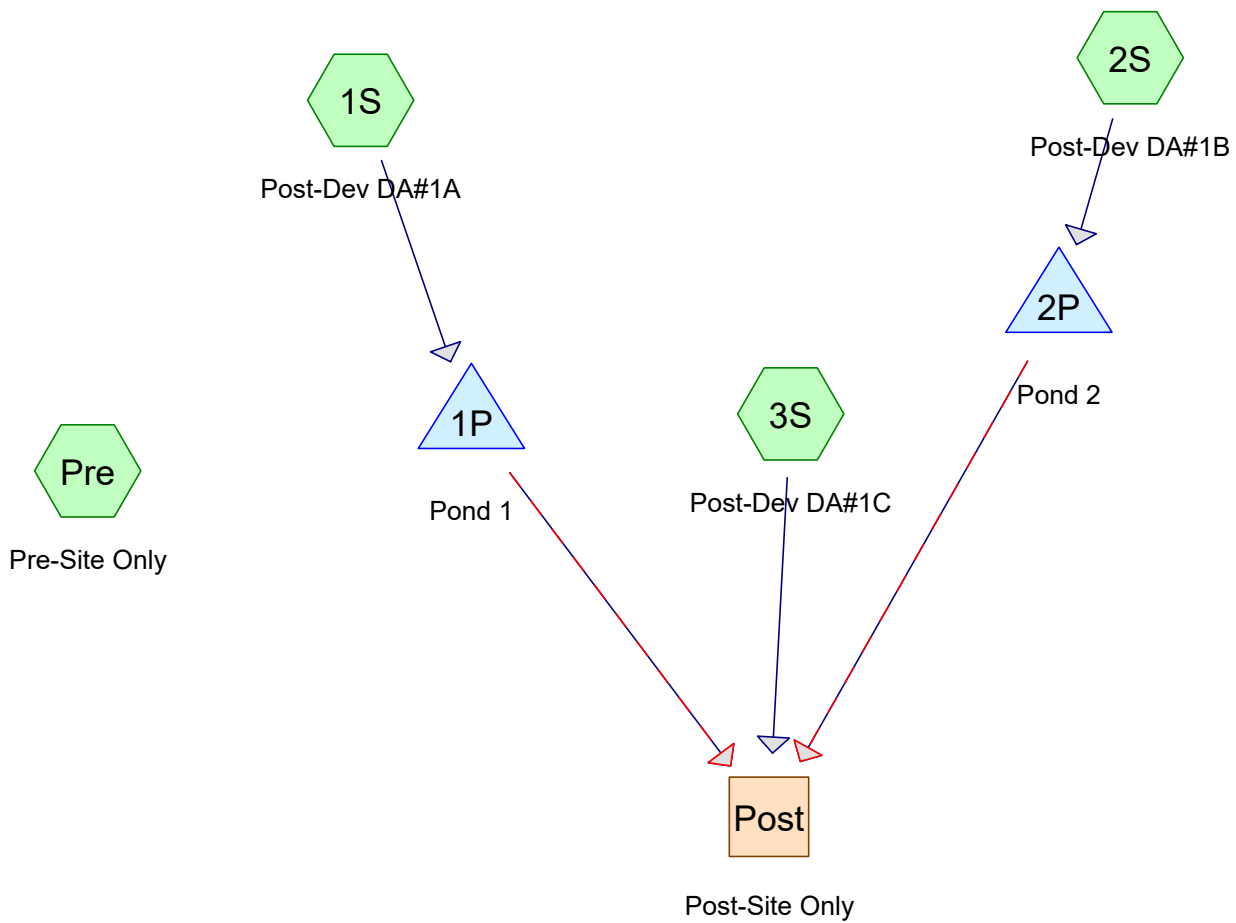


Storm Sewer Profile



PEAK FLOW ANALYSIS

Routing Diagram



Routing Diagram for Harris Creek(Current)

Prepared by Quantech Engineering, Printed 5/29/2025
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PEAK FLOW ANALYSIS

Pre-Development Flows

Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 1yr 24h Rainfall=2.87"

Printed 5/29/2025

Page 1

Summary for Subcatchment Pre: Pre-Site Only

[47] Hint: Peak is 259% of capacity of segment #3

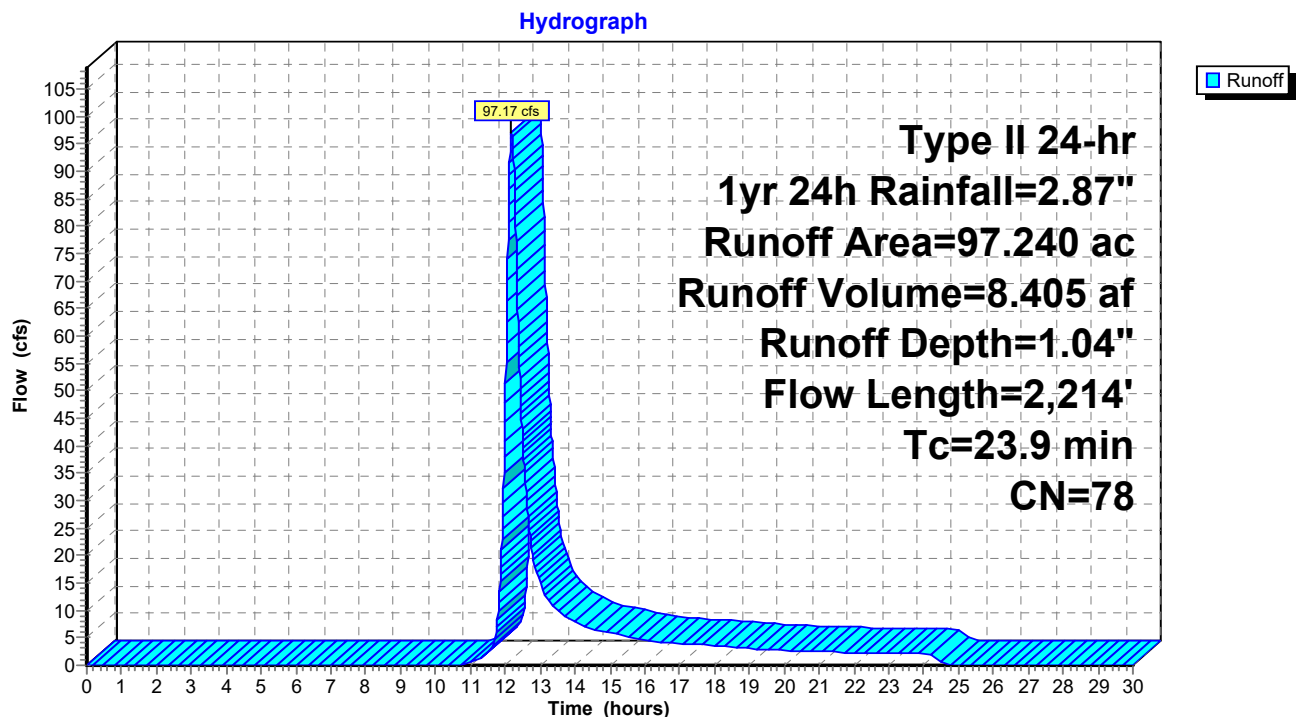
Runoff = 97.17 cfs @ 12.19 hrs, Volume= 8.405 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1yr 24h Rainfall=2.87"

Area (ac)	CN	Description
* 97.240	78	Pre-Dev CN Value (see Stormwater Tool)
97.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
5.2	1,023	0.0420	3.30		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
11.6	1,091	0.0070	1.57	37.50	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
23.9	2,214	Total			

Subcatchment Pre: Pre-Site Only



Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Page 2

Summary for Subcatchment Pre: Pre-Site Only

[47] Hint: Peak is 375% of capacity of segment #3

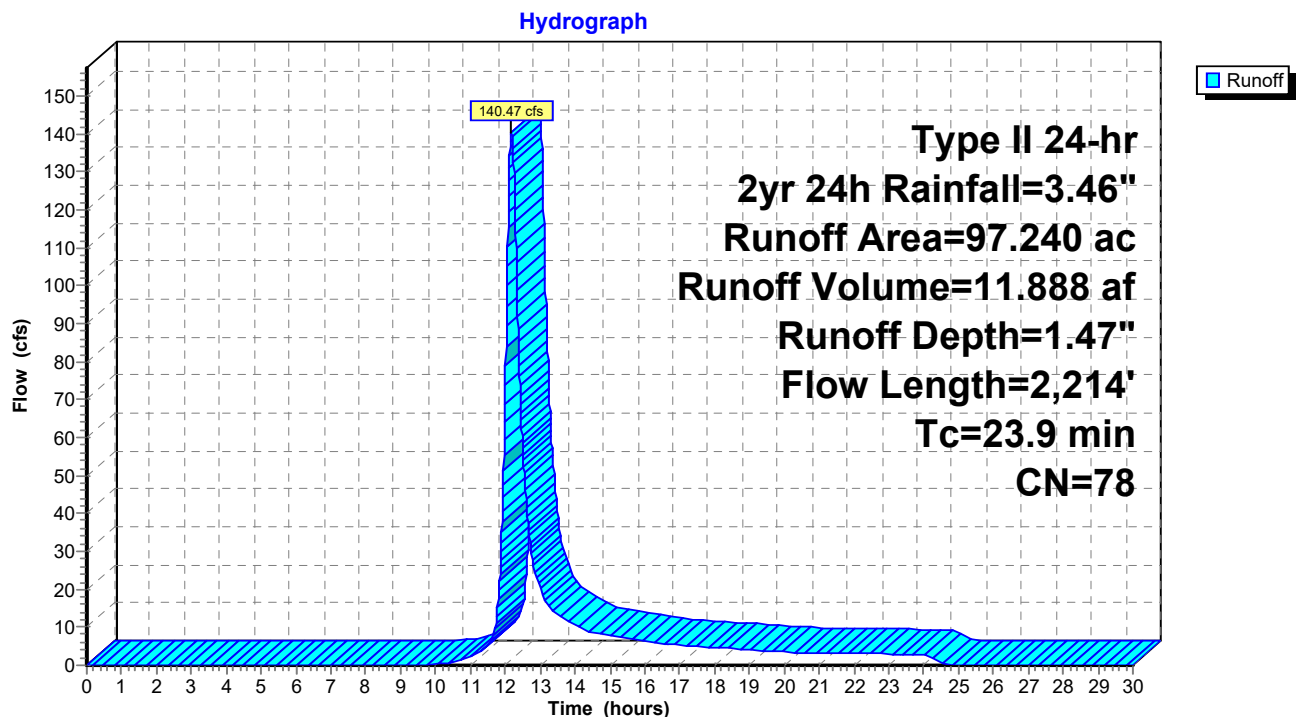
Runoff = 140.47 cfs @ 12.19 hrs, Volume= 11.888 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 2yr 24h Rainfall=3.46"

Area (ac)	CN	Description
* 97.240	78	Pre-Dev CN Value (see Stormwater Tool)
97.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
5.2	1,023	0.0420	3.30		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
11.6	1,091	0.0070	1.57	37.50	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
23.9	2,214	Total			

Subcatchment Pre: Pre-Site Only



Harris Creek(Current)

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Page 3

Summary for Subcatchment Pre: Pre-Site Only

[47] Hint: Peak is 717% of capacity of segment #3

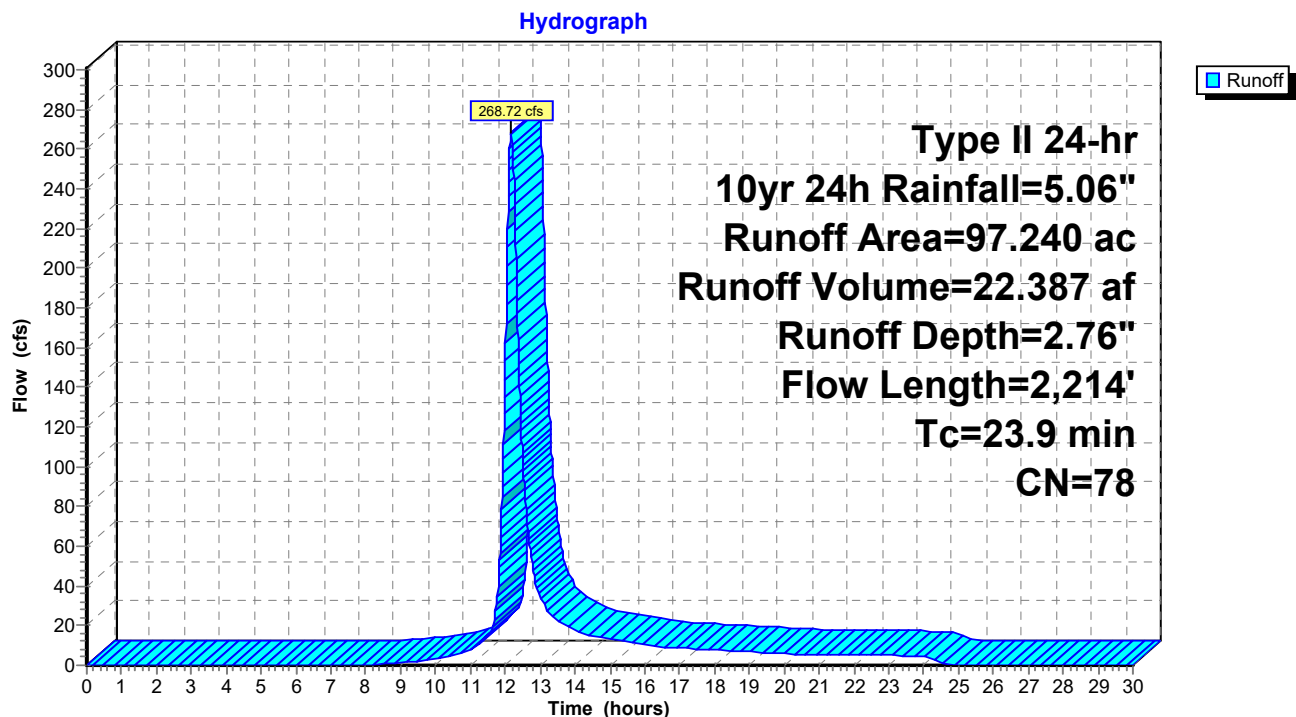
Runoff = 268.72 cfs @ 12.17 hrs, Volume= 22.387 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 10yr 24h Rainfall=5.06"

Area (ac)	CN	Description
* 97.240	78	Pre-Dev CN Value (see Stormwater Tool)
97.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
5.2	1,023	0.0420	3.30		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
11.6	1,091	0.0070	1.57	37.50	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
23.9	2,214	Total			

Subcatchment Pre: Pre-Site Only



Harris Creek(Current)

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Type II 24-hr 100yr 24h Rainfall=7.59"

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Page 4

Summary for Subcatchment Pre: Pre-Site Only

[47] Hint: Peak is 1295% of capacity of segment #3

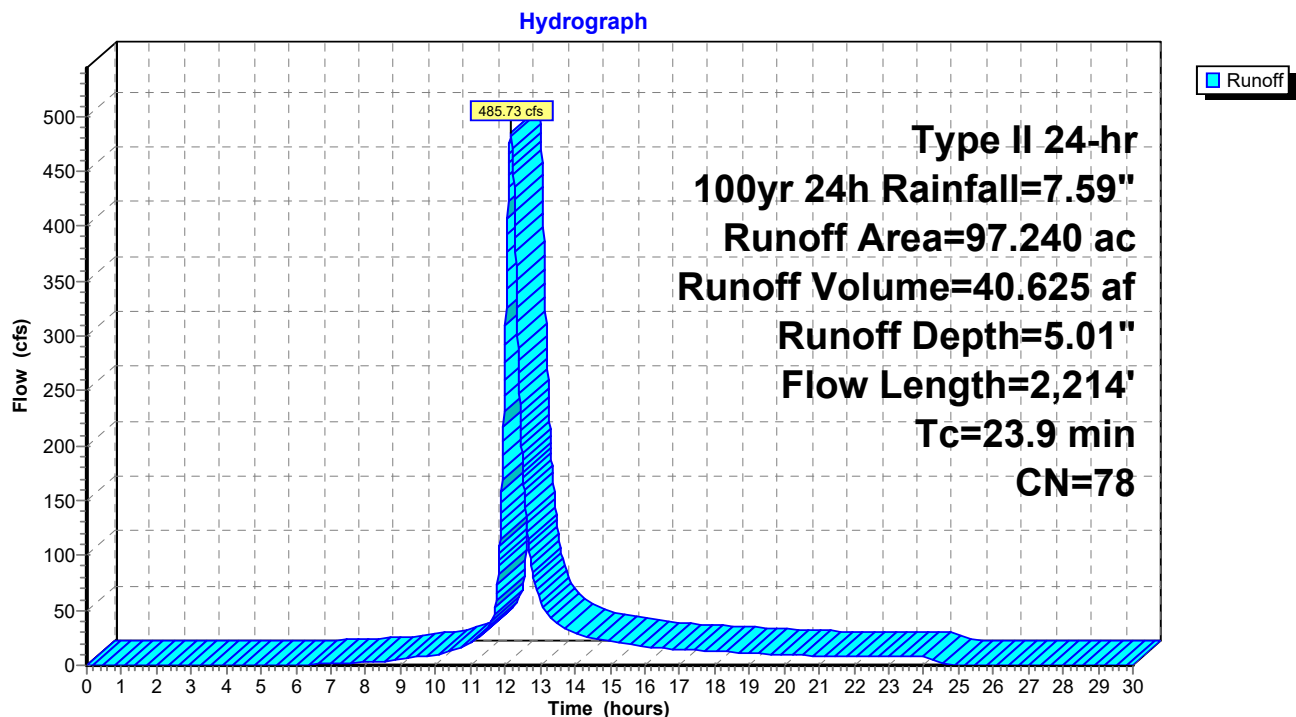
Runoff = 485.73 cfs @ 12.16 hrs, Volume= 40.625 af, Depth= 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr 24h Rainfall=7.59"

Area (ac)	CN	Description
* 97.240	78	Pre-Dev CN Value (see Stormwater Tool)
97.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
5.2	1,023	0.0420	3.30		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
11.6	1,091	0.0070	1.57	37.50	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
23.9	2,214	Total			

Subcatchment Pre: Pre-Site Only



PEAK FLOW ANALYSIS

Post-Development DA#1A

Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 1

Summary for Subcatchment 1S: Post-Dev DA#1A

Runoff = 29.62 cfs @ 12.02 hrs, Volume= 1.604 af, Depth= 1.21"
Routed to Pond 1P : Pond 1

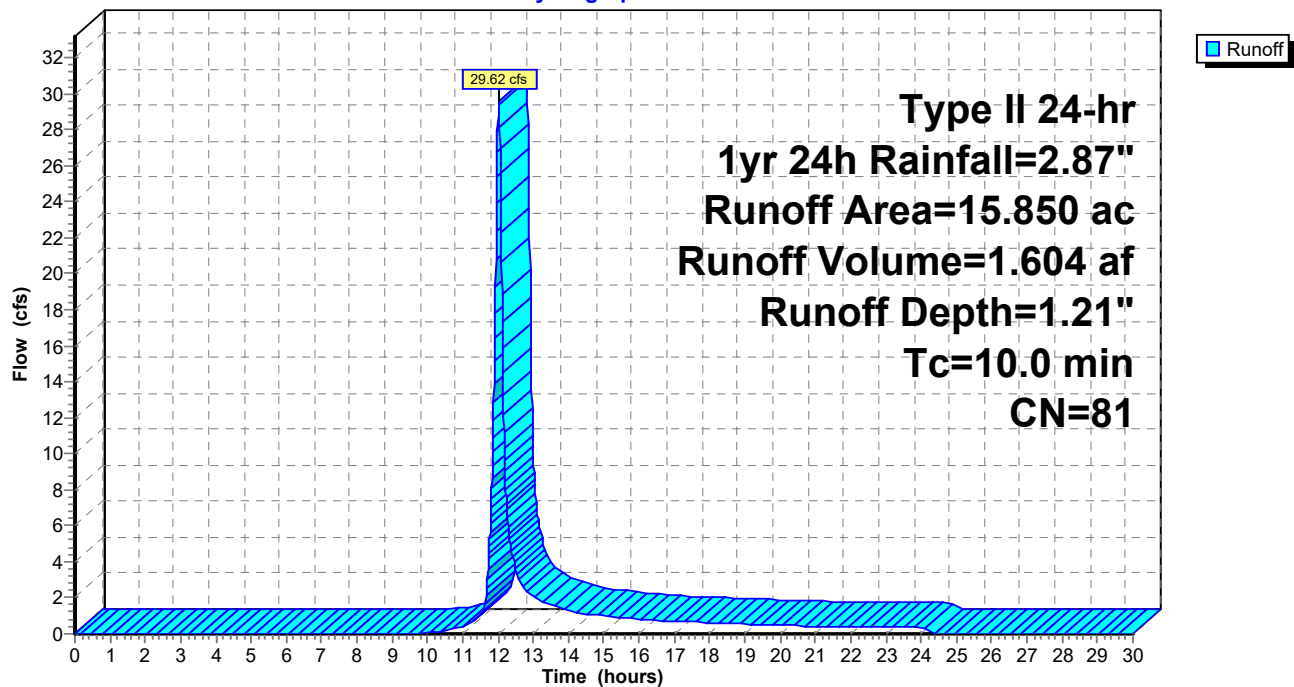
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1yr 24h Rainfall=2.87"

Area (ac)	CN	Description
* 15.850	81	Post-Dev CN Value (see Stormwater Tool)
15.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1S: Post-Dev DA#1A

Hydrograph



Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Page 2

Summary for Subcatchment 1S: Post-Dev DA#1A

Runoff = 40.98 cfs @ 12.02 hrs, Volume= 2.214 af, Depth= 1.68"
Routed to Pond 1P : Pond 1

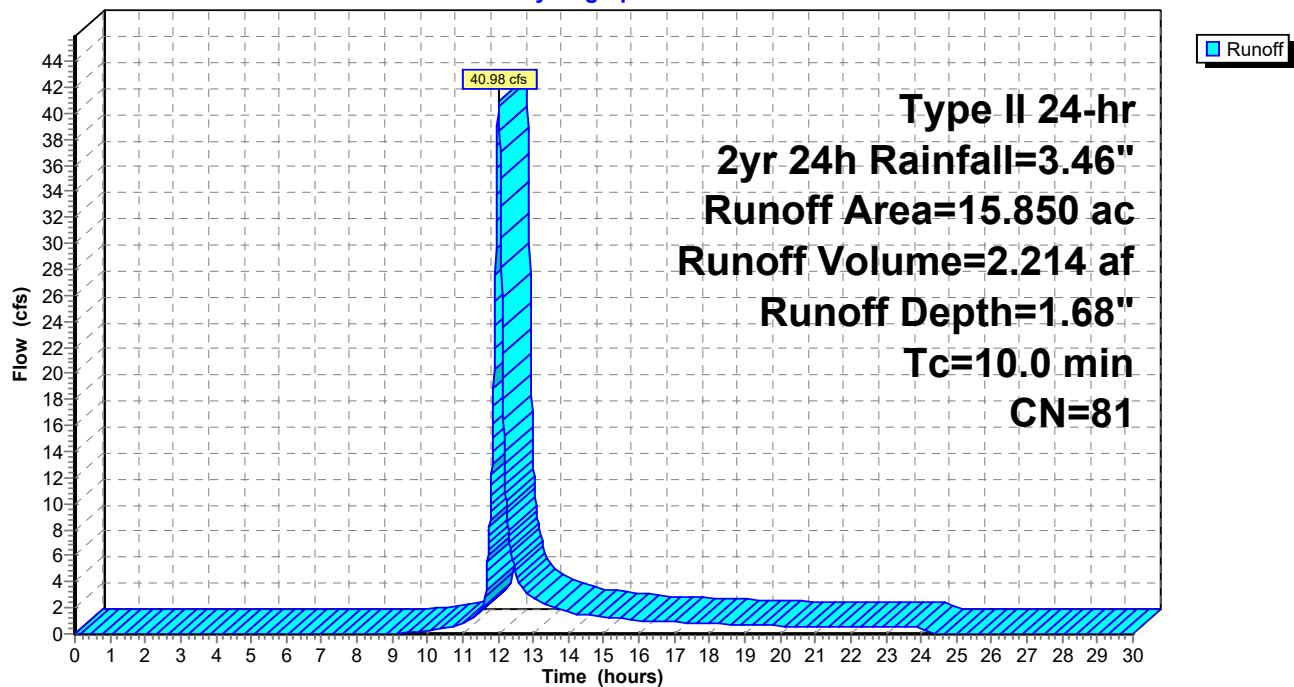
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 2yr 24h Rainfall=3.46"

Area (ac)	CN	Description
* 15.850	81	Post-Dev CN Value (see Stormwater Tool)
15.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1S: Post-Dev DA#1A

Hydrograph



Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Page 3

Summary for Subcatchment 1S: Post-Dev DA#1A

Runoff = 73.59 cfs @ 12.01 hrs, Volume= 4.013 af, Depth= 3.04"
Routed to Pond 1P : Pond 1

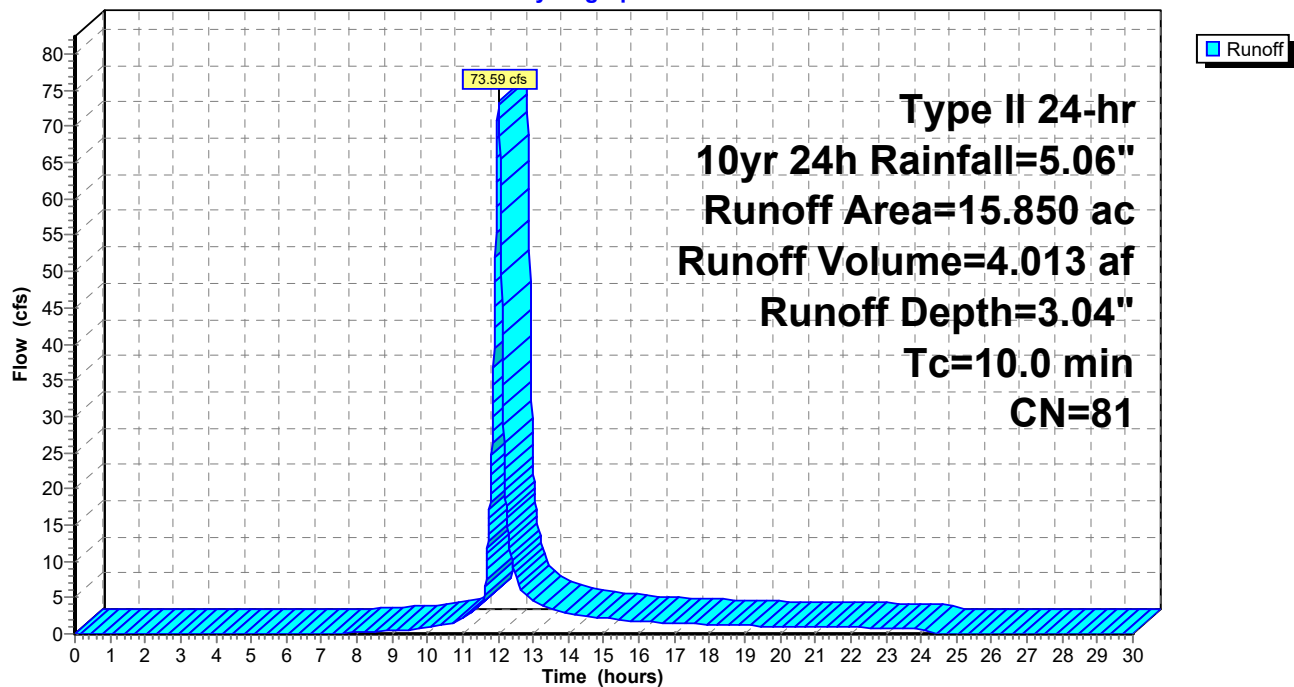
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 10yr 24h Rainfall=5.06"

Area (ac)	CN	Description
* 15.850	81	Post-Dev CN Value (see Stormwater Tool)
15.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1S: Post-Dev DA#1A

Hydrograph



Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 100yr 24h Rainfall=7.59"

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Page 4

Summary for Subcatchment 1S: Post-Dev DA#1A

Runoff = 126.80 cfs @ 12.01 hrs, Volume= 7.075 af, Depth= 5.36"
Routed to Pond 1P : Pond 1

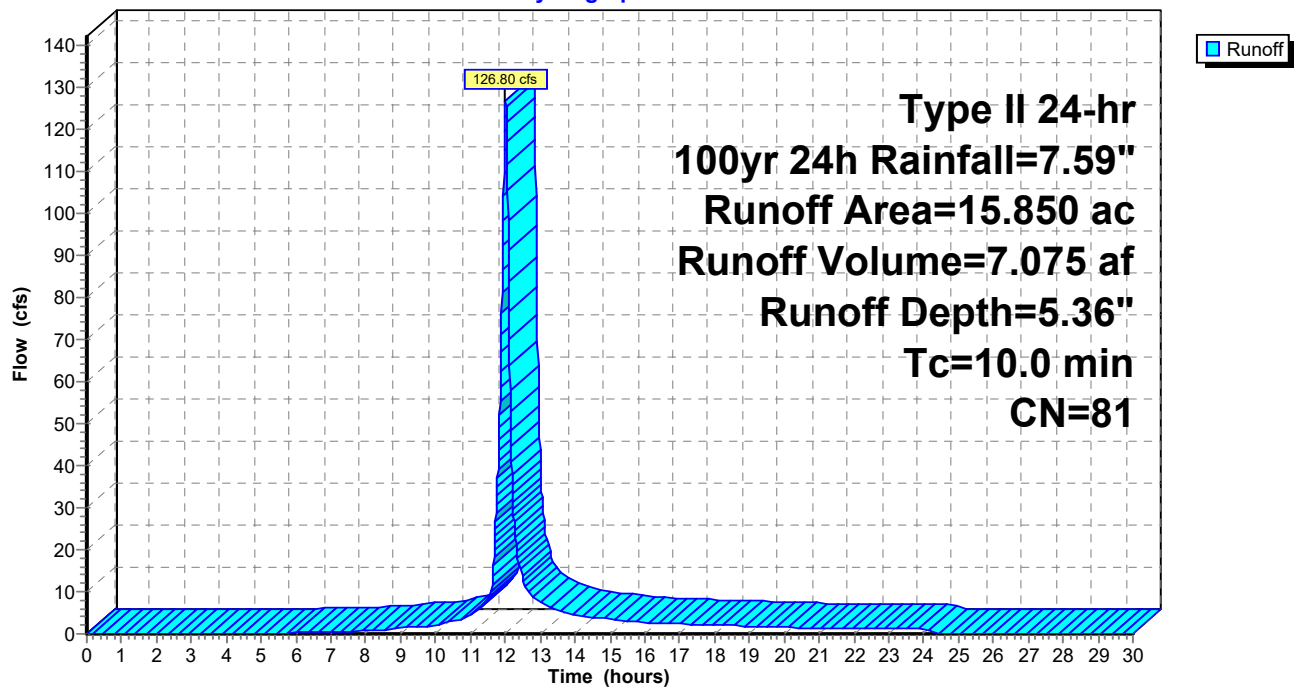
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr 24h Rainfall=7.59"

Area (ac)	CN	Description
* 15.850	81	Post-Dev CN Value (see Stormwater Tool)
15.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1S: Post-Dev DA#1A

Hydrograph



PEAK FLOW ANALYSIS

Wet Pond #1 Routing

Harris Creek(Current)

Prepared by Quantech Engineering

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Type II 24-hr 1yr 24h Rainfall=2.87"

Printed 5/29/2025

Page 1

Summary for Pond 1P: Pond 1

Inflow Area = 15.850 ac, 0.00% Impervious, Inflow Depth = 1.21" for 1yr 24h event
 Inflow = 29.62 cfs @ 12.02 hrs, Volume= 1.604 af
 Outflow = 0.50 cfs @ 19.48 hrs, Volume= 0.715 af, Atten= 98%, Lag= 447.7 min
 Primary = 0.50 cfs @ 19.48 hrs, Volume= 0.715 af
 Routed to Reach Post : Post-Site Only
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 234.53' @ 19.48 hrs Surf.Area= 22,196 sf Storage= 49,772 cf

Plug-Flow detention time= 540.5 min calculated for 0.715 af (45% of inflow)
 Center-of-Mass det. time= 410.3 min (1,255.8 - 845.5)

Volume	Invert	Avail.Storage	Storage Description
#1	232.00'	118,842 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
232.00	16,160	0	0
232.50	18,354	8,629	8,629
233.00	19,290	9,411	18,040
234.00	21,168	20,229	38,269
235.00	23,105	22,137	60,405
236.00	25,101	24,103	84,508
237.00	27,156	26,129	110,637
237.30	27,550	8,206	118,842

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	30.0" Round RCP_Round 30" L= 59.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.67' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	232.00'	3.5" Vert. Perm pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	235.80'	60.0" x 60.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	236.75'	40.0' long + 10.0 ' SideZ x 16.4' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.50 cfs @ 19.48 hrs HW=234.53' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 0.50 cfs of 23.08 cfs potential flow)

↑ **2=Perm pool Orifice** (Orifice Controls 0.50 cfs @ 7.44 fps)

↑ **3=Top of Riser** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=232.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Harris Creek(Current)

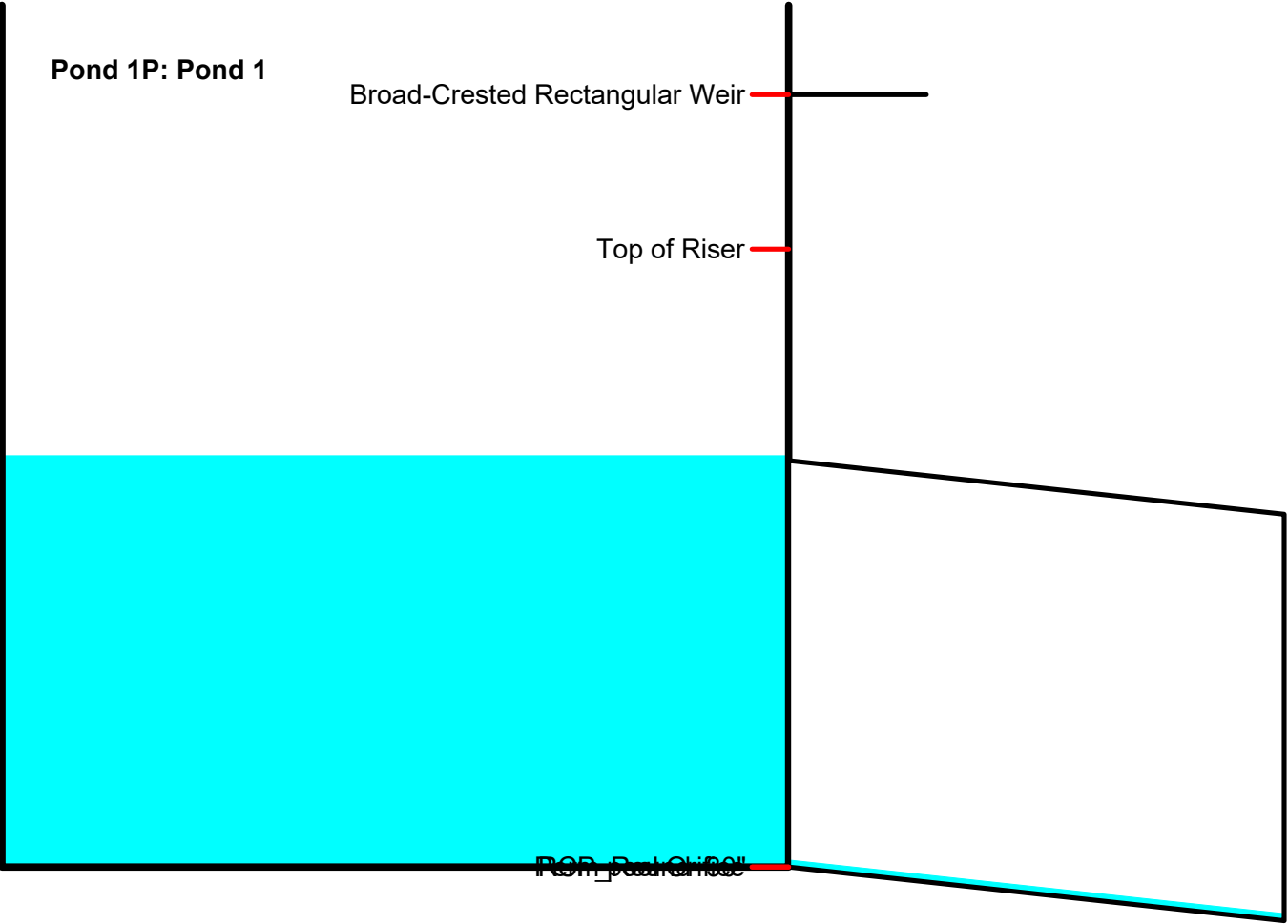
Prepared by Quantech Engineering

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Type II 24-hr 1yr 24h Rainfall=2.87"

Printed 5/29/2025

Page 2



Harris Creek(Current)

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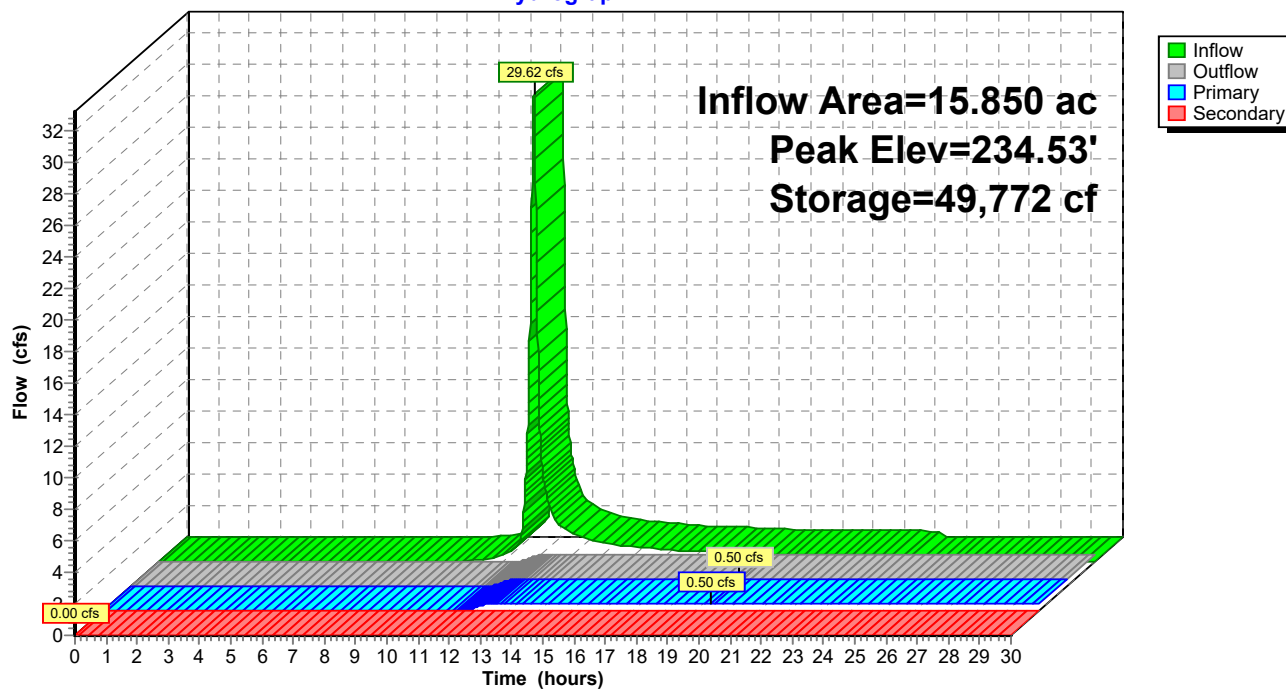
Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 3

Pond 1P: Pond 1

Hydrograph



Harris Creek(Current)

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Page 4

Summary for Pond 1P: Pond 1

Inflow Area = 15.850 ac, 0.00% Impervious, Inflow Depth = 1.68" for 2yr 24h event
 Inflow = 40.98 cfs @ 12.02 hrs, Volume= 2.214 af
 Outflow = 0.59 cfs @ 20.00 hrs, Volume= 0.857 af, Atten= 99%, Lag= 478.9 min
 Primary = 0.59 cfs @ 20.00 hrs, Volume= 0.857 af
 Routed to Reach Post : Post-Site Only
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 235.48' @ 20.00 hrs Surf.Area= 24,065 sf Storage= 71,744 cf

Plug-Flow detention time= 546.2 min calculated for 0.857 af (39% of inflow)
 Center-of-Mass det. time= 418.6 min (1,254.8 - 836.2)

Volume	Invert	Avail.Storage	Storage Description
#1	232.00'	118,842 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
232.00	16,160	0	0
232.50	18,354	8,629	8,629
233.00	19,290	9,411	18,040
234.00	21,168	20,229	38,269
235.00	23,105	22,137	60,405
236.00	25,101	24,103	84,508
237.00	27,156	26,129	110,637
237.30	27,550	8,206	118,842

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	30.0" Round RCP_Round 30" L= 59.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.67' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	232.00'	3.5" Vert. Perm pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	235.80'	60.0" x 60.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	236.75'	40.0' long + 10.0 ' SideZ x 16.4' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.59 cfs @ 20.00 hrs HW=235.48' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 0.59 cfs of 32.17 cfs potential flow)

↑ **2=Perm pool Orifice** (Orifice Controls 0.59 cfs @ 8.79 fps)

↑ **3=Top of Riser** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=232.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Harris Creek(Current)

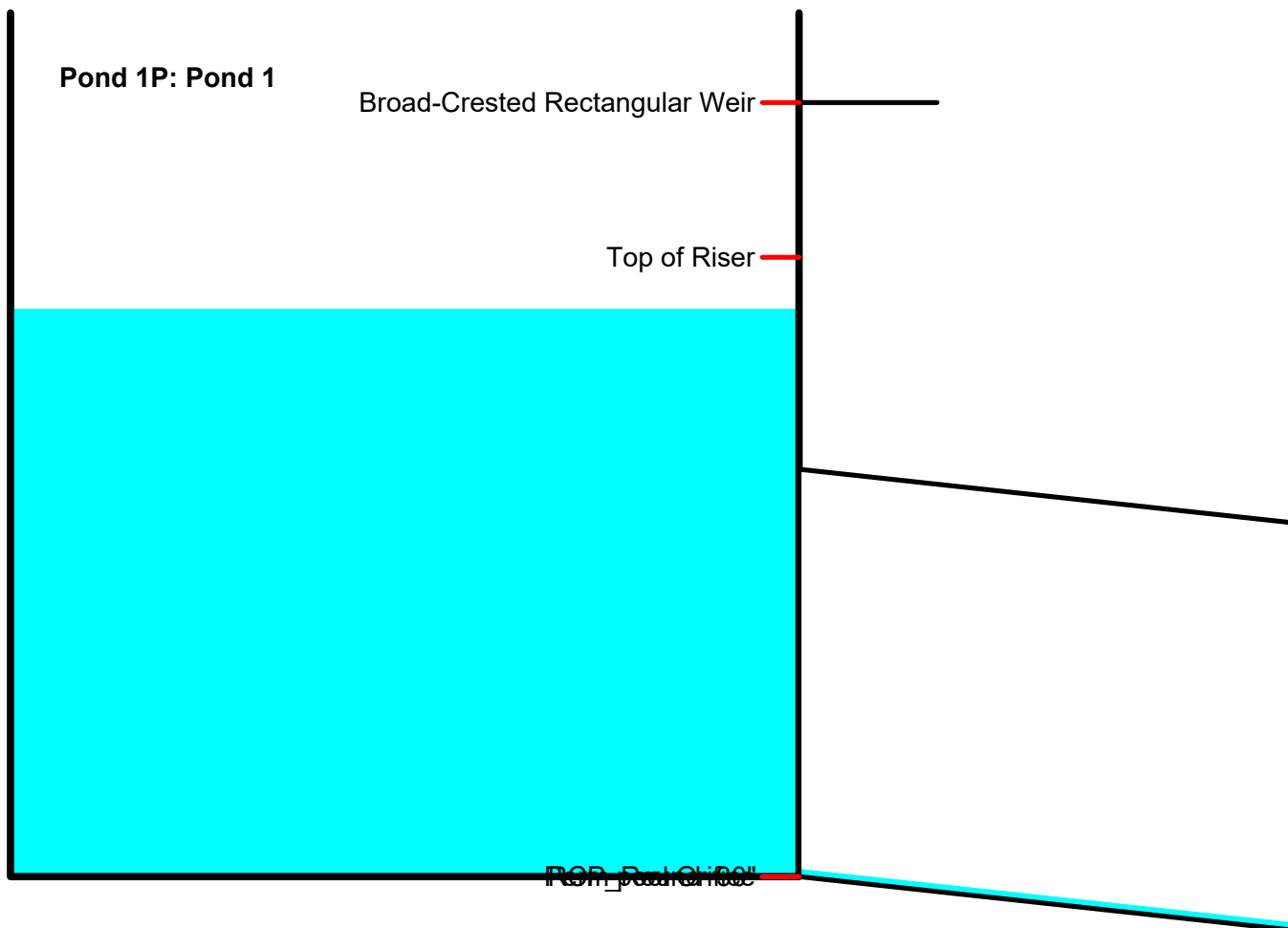
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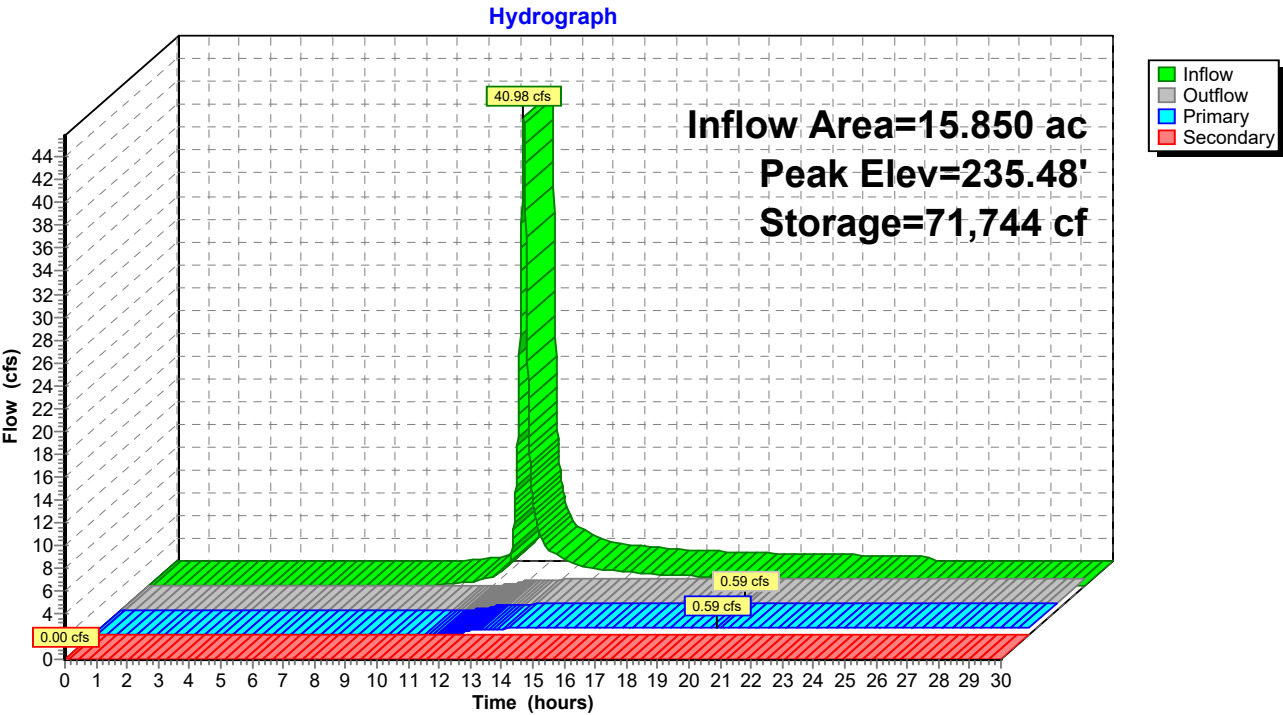
Type II 24-hr 2yr 24h Rainfall=3.46"

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Pond 1P: Pond 1



Harris Creek(Current)

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Summary for Pond 1P: Pond 1

Inflow Area = 15.850 ac, 0.00% Impervious, Inflow Depth = 3.04" for 10yr 24h event
 Inflow = 73.59 cfs @ 12.01 hrs, Volume= 4.013 af
 Outflow = 14.27 cfs @ 12.27 hrs, Volume= 2.465 af, Atten= 81%, Lag= 15.6 min
 Primary = 14.27 cfs @ 12.27 hrs, Volume= 2.465 af
 Routed to Reach Post : Post-Site Only
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 236.15' @ 12.27 hrs Surf.Area= 25,411 sf Storage= 88,323 cf

Plug-Flow detention time= 298.7 min calculated for 2.465 af (61% of inflow)
 Center-of-Mass det. time= 189.3 min (1,008.5 - 819.2)

Volume	Invert	Avail.Storage	Storage Description
#1	232.00'	118,842 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
232.00	16,160	0	0
232.50	18,354	8,629	8,629
233.00	19,290	9,411	18,040
234.00	21,168	20,229	38,269
235.00	23,105	22,137	60,405
236.00	25,101	24,103	84,508
237.00	27,156	26,129	110,637
237.30	27,550	8,206	118,842

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	30.0" Round RCP_Round 30" L= 59.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.67' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	232.00'	3.5" Vert. Perm pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	235.80'	60.0" x 60.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	236.75'	40.0' long + 10.0 '/' SideZ x 16.4' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.24 cfs @ 12.27 hrs HW=236.15' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 14.24 cfs of 39.55 cfs potential flow)

↑ **2=Perm pool Orifice** (Orifice Controls 0.64 cfs @ 9.64 fps)

↑ **3=Top of Riser** (Weir Controls 13.60 cfs @ 1.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=232.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Harris Creek(Current)

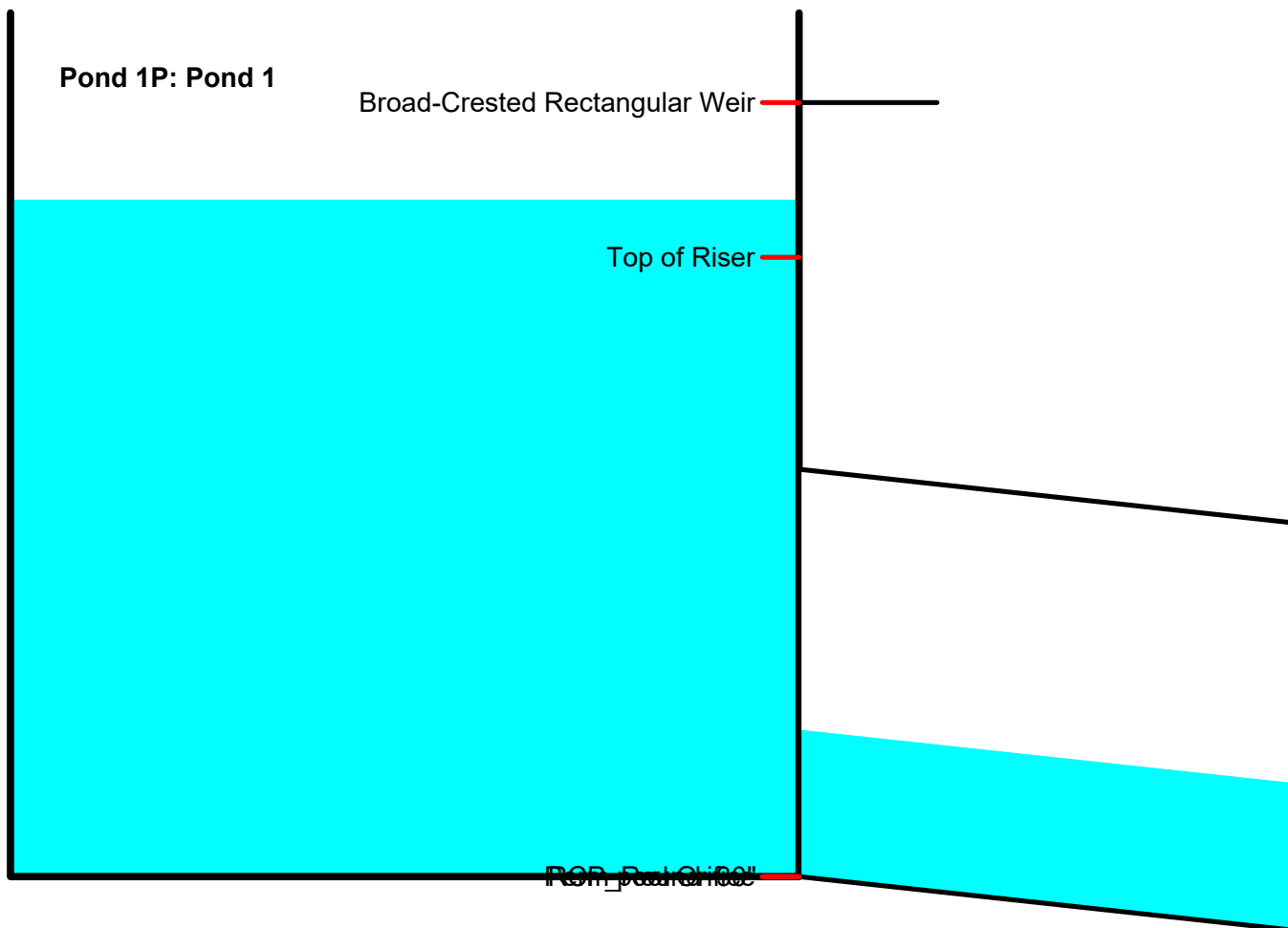
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Type II 24-hr 10yr 24h Rainfall=5.06"

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Harris Creek(Current)

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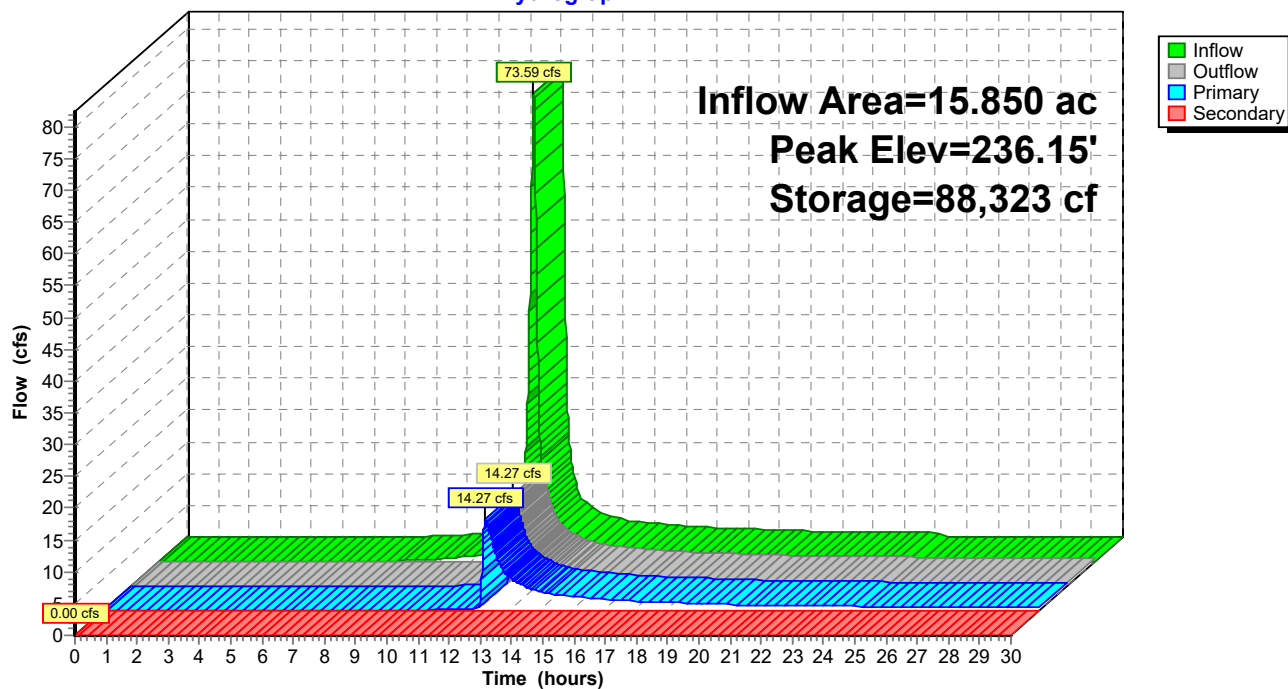
Type II 24-hr 10yr 24h Rainfall=5.06"

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Pond 1P: Pond 1

Hydrograph



Harris Creek(Current)

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Type II 24-hr 100yr 24h Rainfall=7.59"

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Summary for Pond 1P: Pond 1

Inflow Area = 15.850 ac, 0.00% Impervious, Inflow Depth = 5.36" for 100yr 24h event
 Inflow = 126.80 cfs @ 12.01 hrs, Volume= 7.075 af
 Outflow = 89.74 cfs @ 12.09 hrs, Volume= 5.519 af, Atten= 29%, Lag= 4.8 min
 Primary = 47.29 cfs @ 12.09 hrs, Volume= 5.039 af
 Routed to Reach Post : Post-Site Only
 Secondary = 42.45 cfs @ 12.09 hrs, Volume= 0.481 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 237.25' @ 12.09 hrs Surf.Area= 27,488 sf Storage= 117,554 cf

Plug-Flow detention time= 181.8 min calculated for 5.519 af (78% of inflow)
 Center-of-Mass det. time= 96.7 min (899.7 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	232.00'	118,842 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
232.00	16,160	0	0
232.50	18,354	8,629	8,629
233.00	19,290	9,411	18,040
234.00	21,168	20,229	38,269
235.00	23,105	22,137	60,405
236.00	25,101	24,103	84,508
237.00	27,156	26,129	110,637
237.30	27,550	8,206	118,842

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	30.0" Round RCP_Round 30" L= 59.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.67' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	232.00'	3.5" Vert. Perm pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	235.80'	60.0" x 60.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	236.75'	40.0' long + 10.0 ' SideZ x 16.4' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=47.28 cfs @ 12.09 hrs HW=237.25' (Free Discharge)

↑ **1=RCP_Round 30"** (Inlet Controls 47.28 cfs @ 9.63 fps)
 ↑ **2=Perm pool Orifice** (Passes < 0.73 cfs potential flow)
 ↑ **3=Top of Riser** (Passes < 114.46 cfs potential flow)

Secondary OutFlow Max=42.31 cfs @ 12.09 hrs HW=237.25' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 42.31 cfs @ 1.87 fps)

Harris Creek(Current)

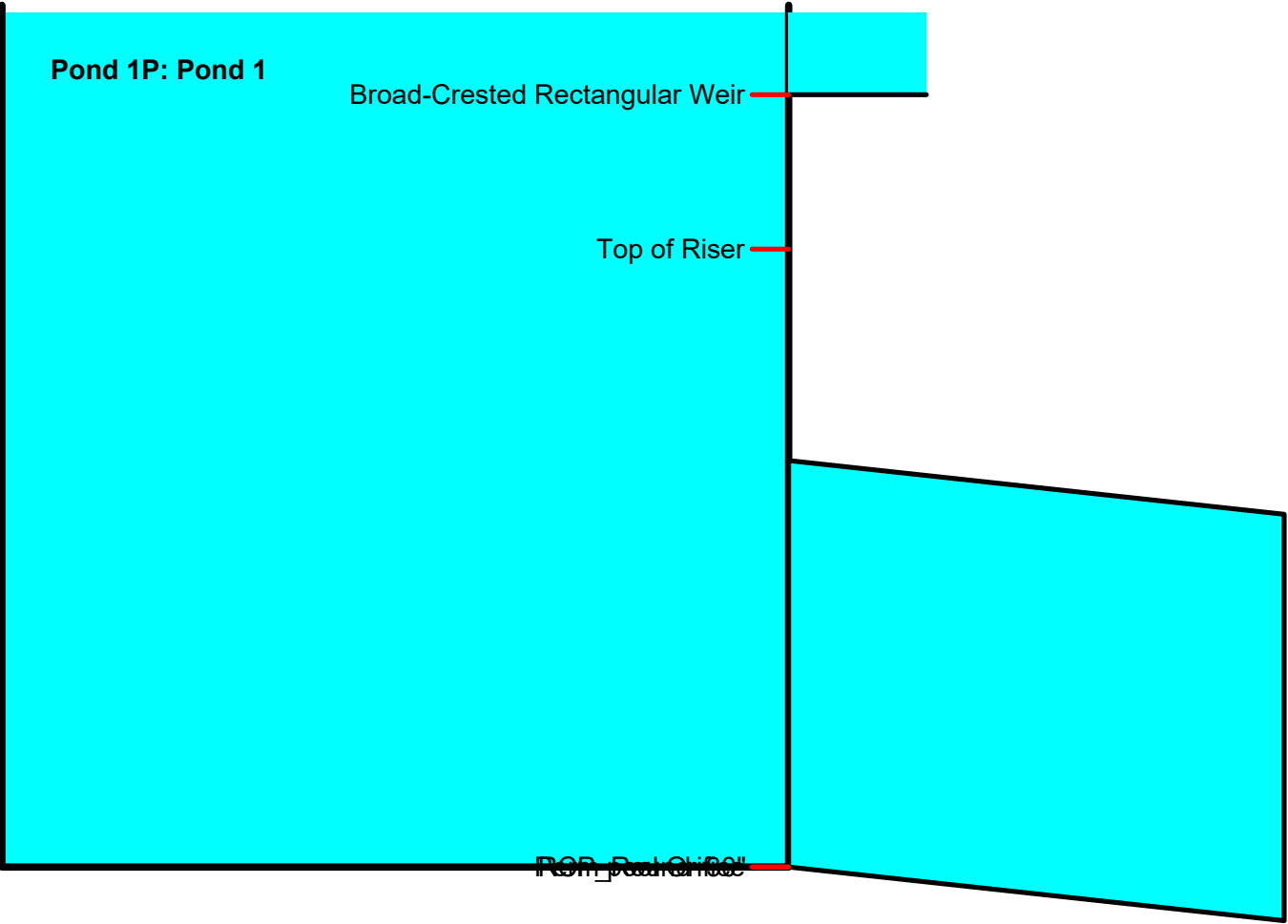
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Type II 24-hr 100yr 24h Rainfall=7.59"

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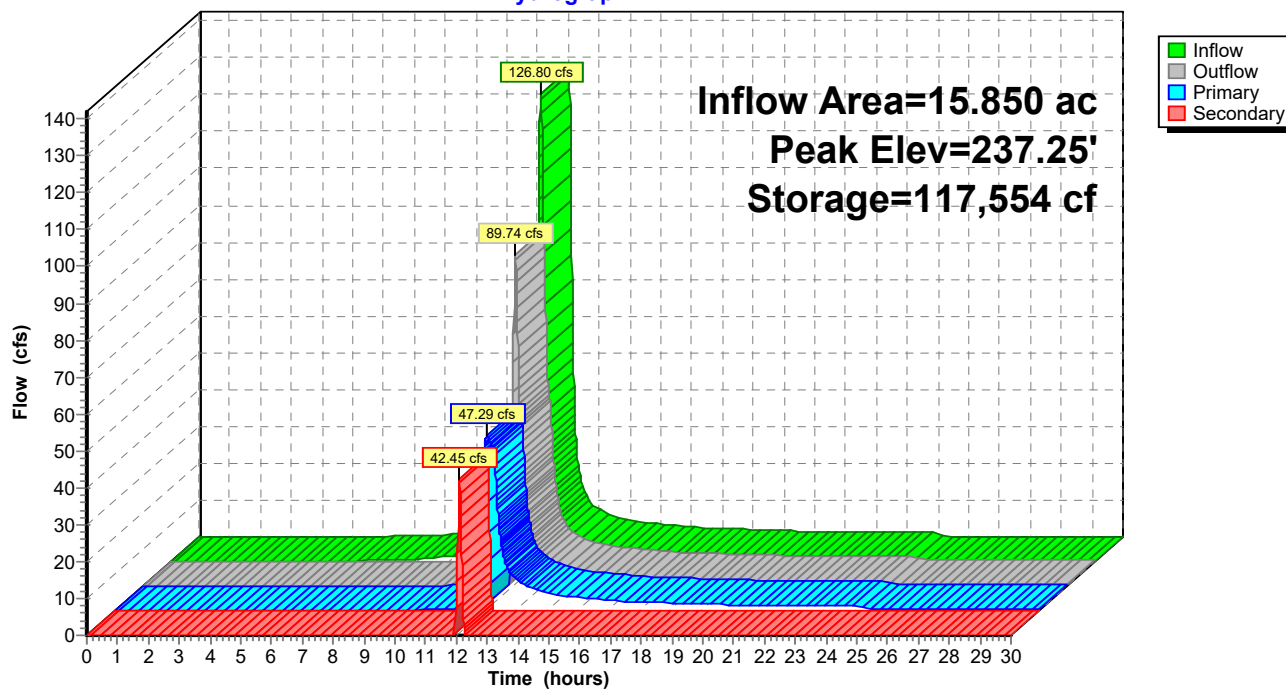
Type II 24-hr 100yr 24h Rainfall=7.59"

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Pond 1P: Pond 1

Hydrograph



PEAK FLOW ANALYSIS

Post-Development DA#1B

Harris Creek(Current)

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Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 1

Summary for Subcatchment 2S: Post-Dev DA#1B

Runoff = 18.20 cfs @ 12.02 hrs, Volume= 0.986 af, Depth= 1.21"
Routed to Pond 2P : Pond 2

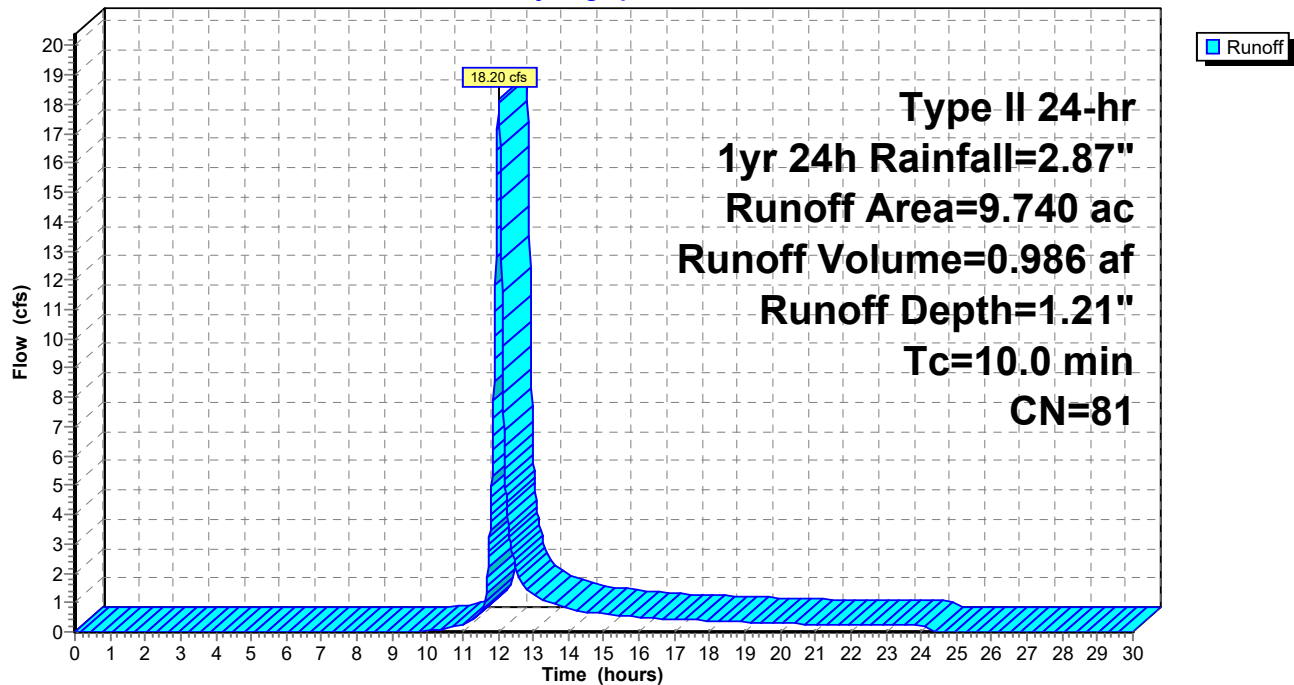
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1yr 24h Rainfall=2.87"

Area (ac)	CN	Description
* 9.740	81	Post-Dev CN Value (see Stormwater Tool)
9.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev DA#1B

Hydrograph



Harris Creek(Current)

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Page 2

Summary for Subcatchment 2S: Post-Dev DA#1B

Runoff = 25.18 cfs @ 12.02 hrs, Volume= 1.361 af, Depth= 1.68"
Routed to Pond 2P : Pond 2

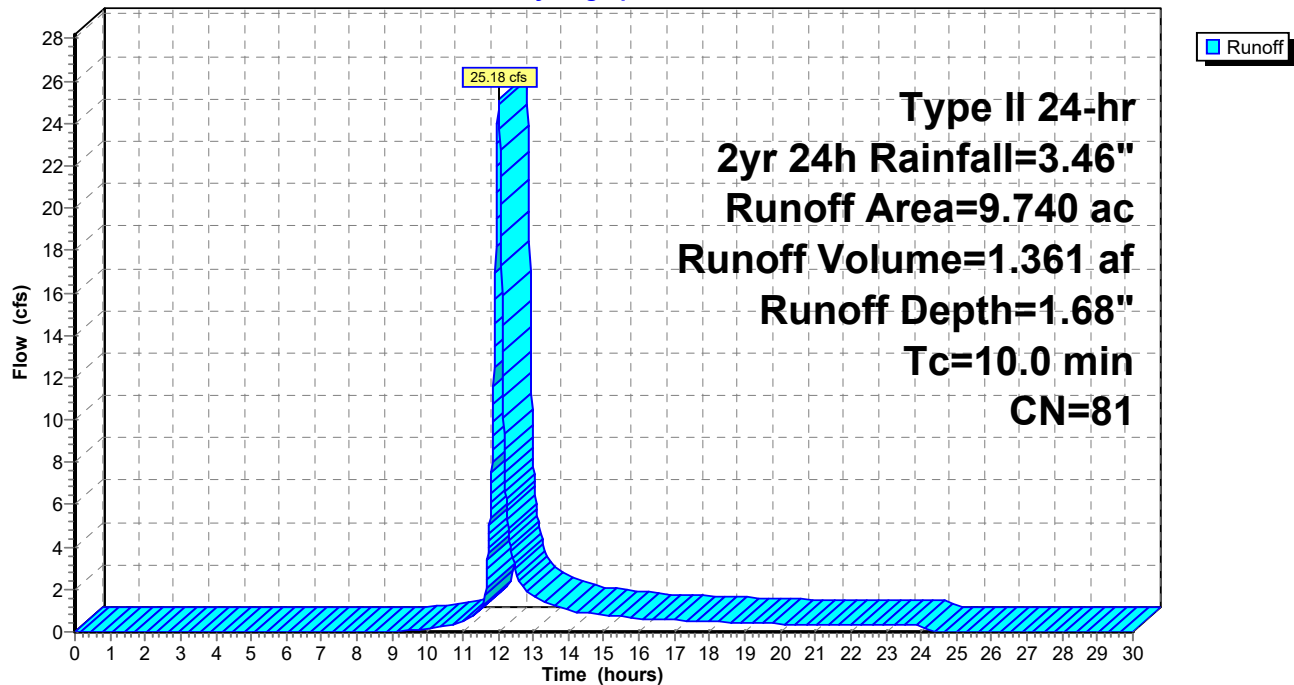
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 2yr 24h Rainfall=3.46"

Area (ac)	CN	Description
* 9.740	81	Post-Dev CN Value (see Stormwater Tool)
9.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev DA#1B

Hydrograph



Harris Creek(Current)

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Page 3

Summary for Subcatchment 2S: Post-Dev DA#1B

Runoff = 45.22 cfs @ 12.01 hrs, Volume= 2.466 af, Depth= 3.04"
Routed to Pond 2P : Pond 2

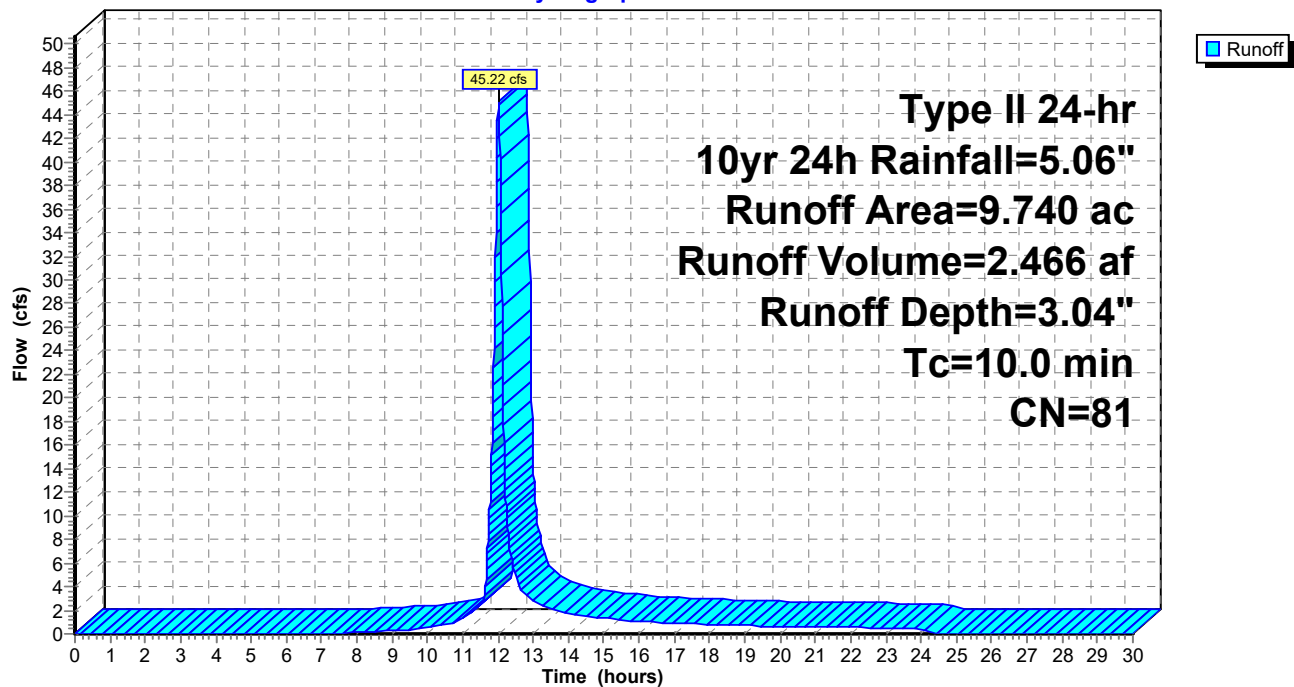
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 10yr 24h Rainfall=5.06"

Area (ac)	CN	Description
* 9.740	81	Post-Dev CN Value (see Stormwater Tool)
9.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev DA#1B

Hydrograph



Harris Creek(Current)

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Type II 24-hr 100yr 24h Rainfall=7.59"

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Summary for Subcatchment 2S: Post-Dev DA#1B

Runoff = 77.92 cfs @ 12.01 hrs, Volume= 4.348 af, Depth= 5.36"
Routed to Pond 2P : Pond 2

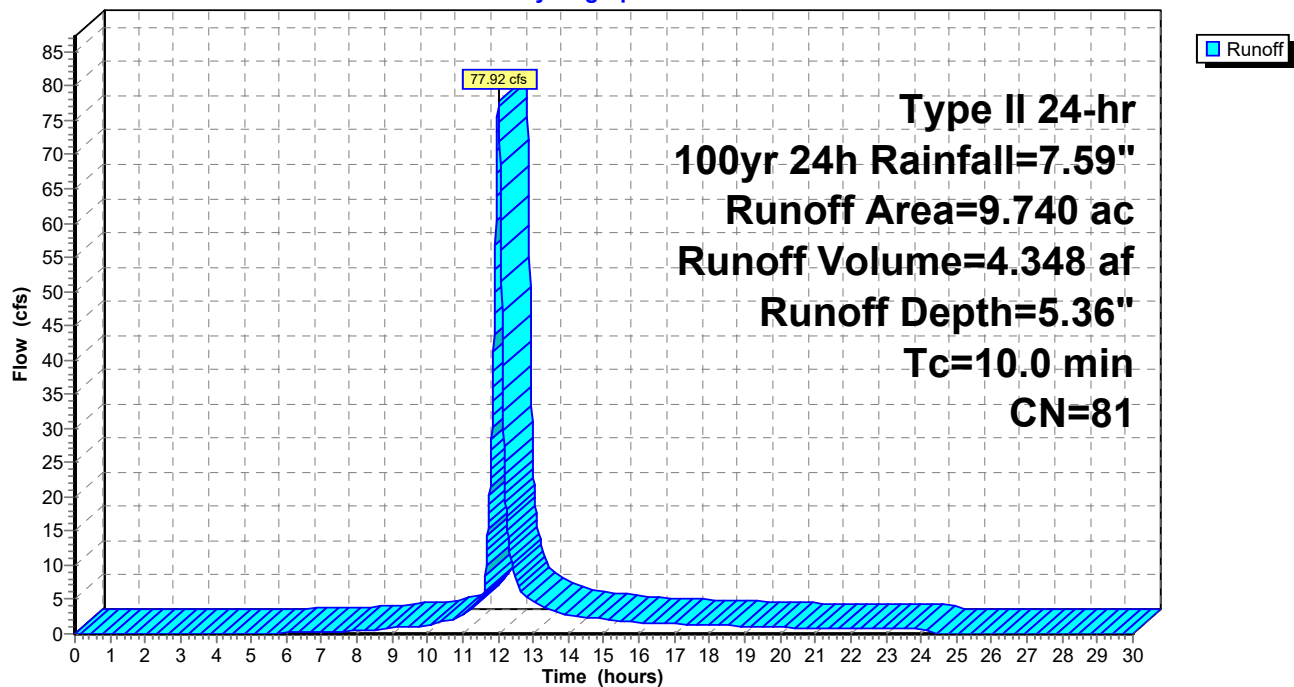
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr 24h Rainfall=7.59"

Area (ac)	CN	Description
* 9.740	81	Post-Dev CN Value (see Stormwater Tool)
9.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Dev DA#1B

Hydrograph



PEAK FLOW ANALYSIS

Wet Pond #2 Routing

Harris Creek(Current)

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Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 1

Summary for Pond 2P: Pond 2

Inflow Area = 9.740 ac, 0.00% Impervious, Inflow Depth = 1.21" for 1yr 24h event
 Inflow = 18.20 cfs @ 12.02 hrs, Volume= 0.986 af
 Outflow = 2.40 cfs @ 12.46 hrs, Volume= 0.605 af, Atten= 87%, Lag= 26.4 min
 Primary = 2.40 cfs @ 12.46 hrs, Volume= 0.605 af
 Routed to Reach Post : Post-Site Only
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 238.87' @ 12.46 hrs Surf.Area= 12,546 sf Storage= 20,718 cf

Plug-Flow detention time= 303.9 min calculated for 0.605 af (61% of inflow)
 Center-of-Mass det. time= 184.4 min (1,029.9 - 845.5)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	39,111 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
237.00	8,846	0	0
237.50	10,581	4,857	4,857
238.00	11,283	5,466	10,323
239.00	12,730	12,007	22,329
240.00	14,237	13,484	35,813
240.20	18,750	3,299	39,111

Device	Routing	Invert	Outlet Devices
#1	Primary	231.50'	30.0" Round RCP_Round 30" L= 47.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 231.50' / 231.10' S= 0.0084 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	237.00'	2.0" Vert. Perm Pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	238.75'	48.0" x 48.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	239.50'	40.0' long + 10.0 ' SideZ x 13.6' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.63 2.66 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=2.38 cfs @ 12.46 hrs HW=238.87' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 2.38 cfs of 58.48 cfs potential flow)

↑ **2=Perm Pool Orifice** (Orifice Controls 0.14 cfs @ 6.44 fps)

↑ **3=Top of Riser** (Weir Controls 2.24 cfs @ 1.14 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Harris Creek(Current)

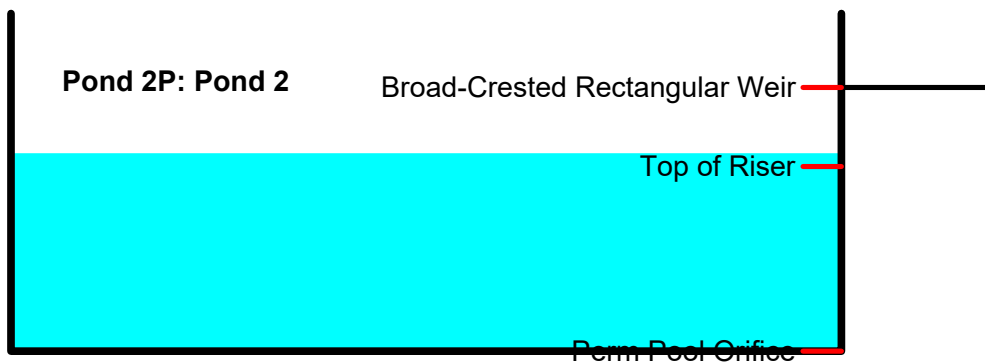
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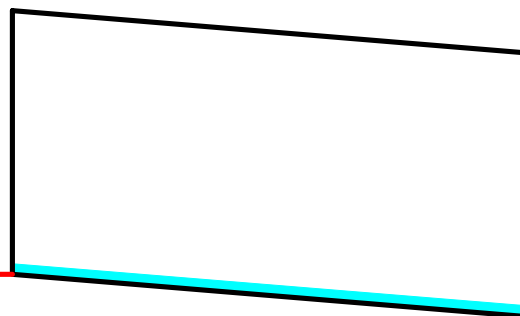
Type II 24-hr 1yr 24h Rainfall=2.87"

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RCP_Round 30"



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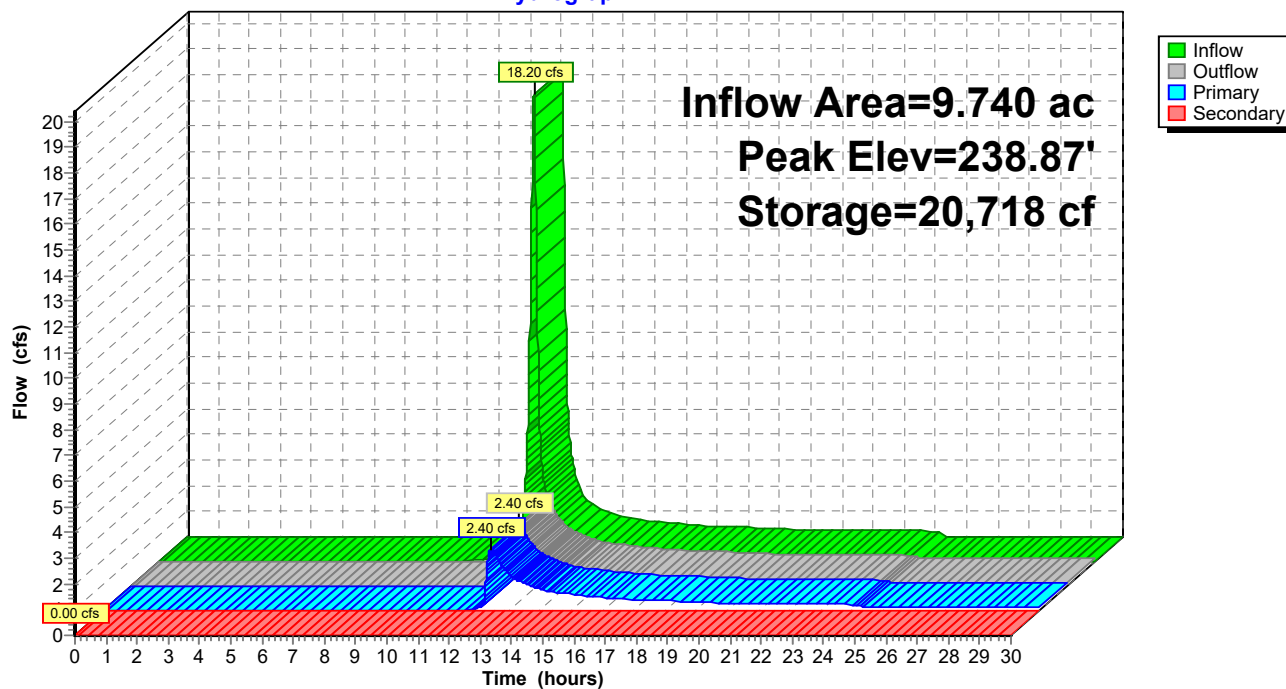
Type II 24-hr 1yr 24h Rainfall=2.87"

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Pond 2P: Pond 2

Hydrograph



Harris Creek(Current)

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Summary for Pond 2P: Pond 2

Inflow Area = 9.740 ac, 0.00% Impervious, Inflow Depth = 1.68" for 2yr 24h event
 Inflow = 25.18 cfs @ 12.02 hrs, Volume= 1.361 af
 Outflow = 10.91 cfs @ 12.15 hrs, Volume= 0.979 af, Atten= 57%, Lag= 8.0 min
 Primary = 10.91 cfs @ 12.15 hrs, Volume= 0.979 af
 Routed to Reach Post : Post-Site Only
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 239.10' @ 12.15 hrs Surf.Area= 12,878 sf Storage= 23,586 cf

Plug-Flow detention time= 219.4 min calculated for 0.979 af (72% of inflow)
 Center-of-Mass det. time= 117.7 min (953.8 - 836.2)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	39,111 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
237.00	8,846	0	0
237.50	10,581	4,857	4,857
238.00	11,283	5,466	10,323
239.00	12,730	12,007	22,329
240.00	14,237	13,484	35,813
240.20	18,750	3,299	39,111

Device	Routing	Invert	Outlet Devices
#1	Primary	231.50'	30.0" Round RCP_Round 30" L= 47.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 231.50' / 231.10' S= 0.0084 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	237.00'	2.0" Vert. Perm Pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	238.75'	48.0" x 48.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	239.50'	40.0' long + 10.0 ' SideZ x 13.6' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.63 2.66 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=10.89 cfs @ 12.15 hrs HW=239.10' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 10.89 cfs of 59.55 cfs potential flow)
 ↑ **2=Perm Pool Orifice** (Orifice Controls 0.15 cfs @ 6.83 fps)
 ↑ **3=Top of Riser** (Weir Controls 10.74 cfs @ 1.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Harris Creek(Current)

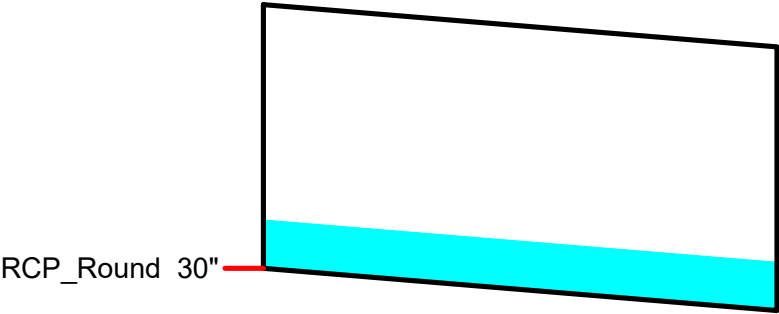
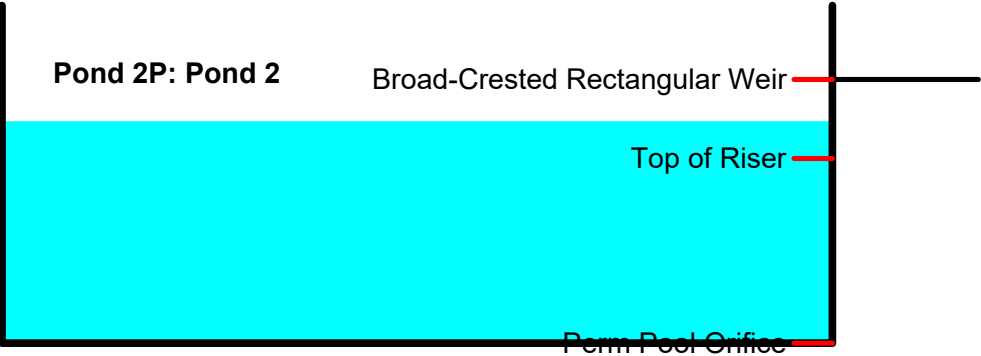
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Type II 24-hr 2yr 24h Rainfall=3.46"

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Harris Creek(Current)

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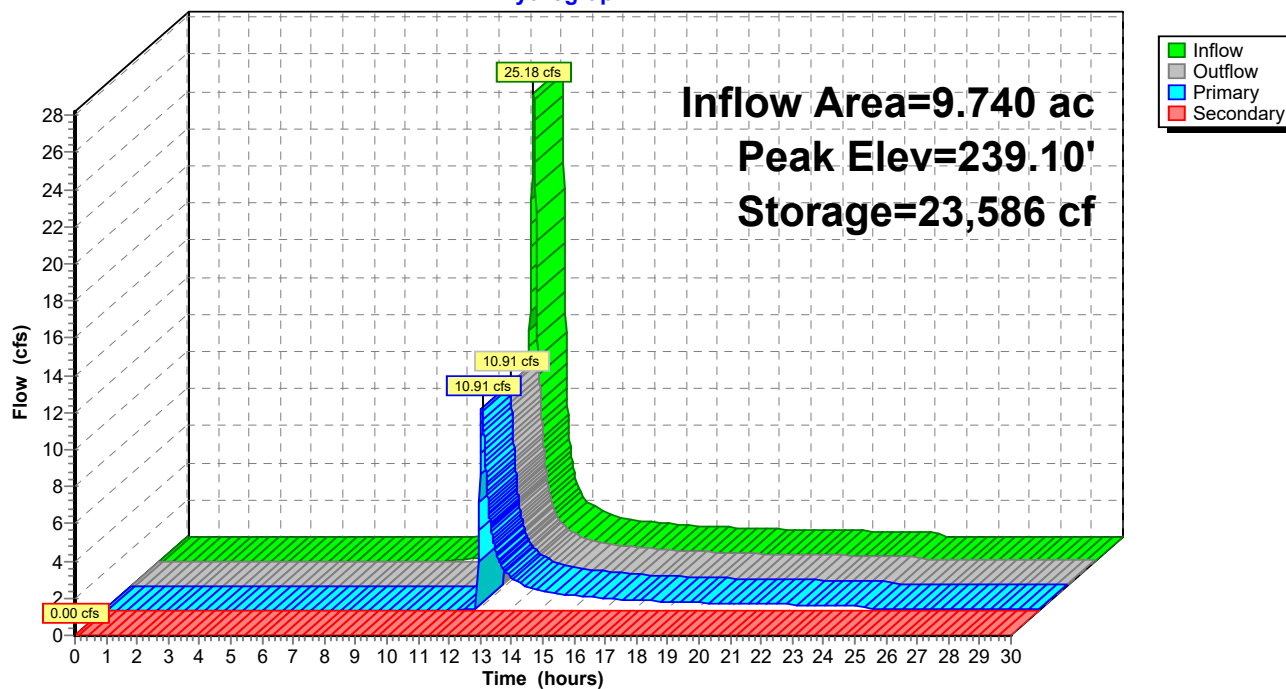
Type II 24-hr 2yr 24h Rainfall=3.46"

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Pond 2P: Pond 2

Hydrograph



Harris Creek(Current)

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Summary for Pond 2P: Pond 2

Inflow Area = 9.740 ac, 0.00% Impervious, Inflow Depth = 3.04" for 10yr 24h event
 Inflow = 45.22 cfs @ 12.01 hrs, Volume= 2.466 af
 Outflow = 40.00 cfs @ 12.06 hrs, Volume= 2.084 af, Atten= 12%, Lag= 2.8 min
 Primary = 38.39 cfs @ 12.06 hrs, Volume= 2.076 af
 Routed to Reach Post : Post-Site Only
 Secondary = 1.61 cfs @ 12.06 hrs, Volume= 0.008 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 239.56' @ 12.06 hrs Surf.Area= 13,576 sf Storage= 29,710 cf

Plug-Flow detention time= 132.8 min calculated for 2.084 af (84% of inflow)
 Center-of-Mass det. time= 62.4 min (881.6 - 819.2)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	39,111 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
237.00	8,846	0	0
237.50	10,581	4,857	4,857
238.00	11,283	5,466	10,323
239.00	12,730	12,007	22,329
240.00	14,237	13,484	35,813
240.20	18,750	3,299	39,111

Device	Routing	Invert	Outlet Devices
#1	Primary	231.50'	30.0" Round RCP_Round 30" L= 47.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 231.50' / 231.10' S= 0.0084 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	237.00'	2.0" Vert. Perm Pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	238.75'	48.0" x 48.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	239.50'	40.0' long + 10.0 ' SideZ x 13.6' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.63 2.66 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=38.36 cfs @ 12.06 hrs HW=239.56' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 38.36 cfs of 61.68 cfs potential flow)

↑ **2=Perm Pool Orifice** (Orifice Controls 0.17 cfs @ 7.58 fps)

↑ **3=Top of Riser** (Weir Controls 38.19 cfs @ 2.94 fps)

Secondary OutFlow Max=1.60 cfs @ 12.06 hrs HW=239.56' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 0.65 fps)

Harris Creek(Current)

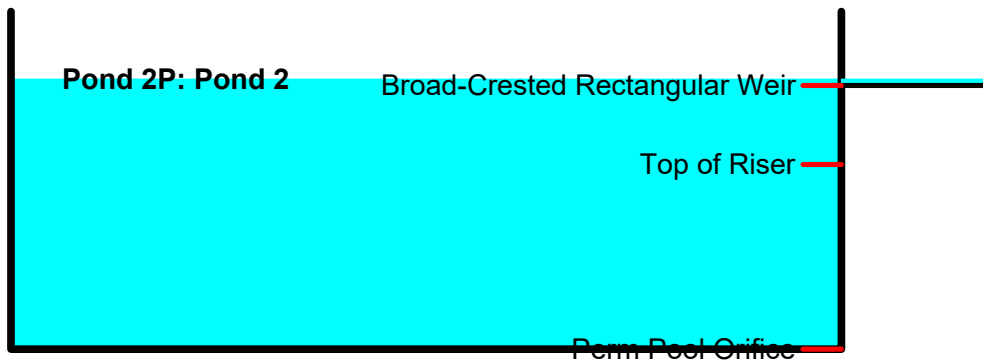
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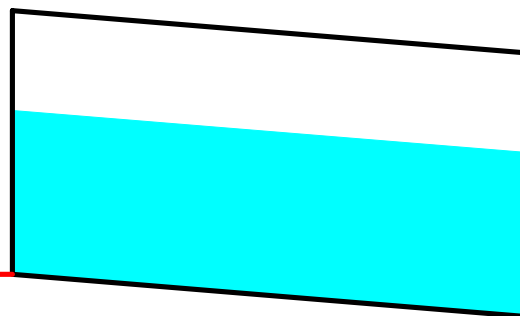
Type II 24-hr 10yr 24h Rainfall=5.06"

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RCP_Round 30"



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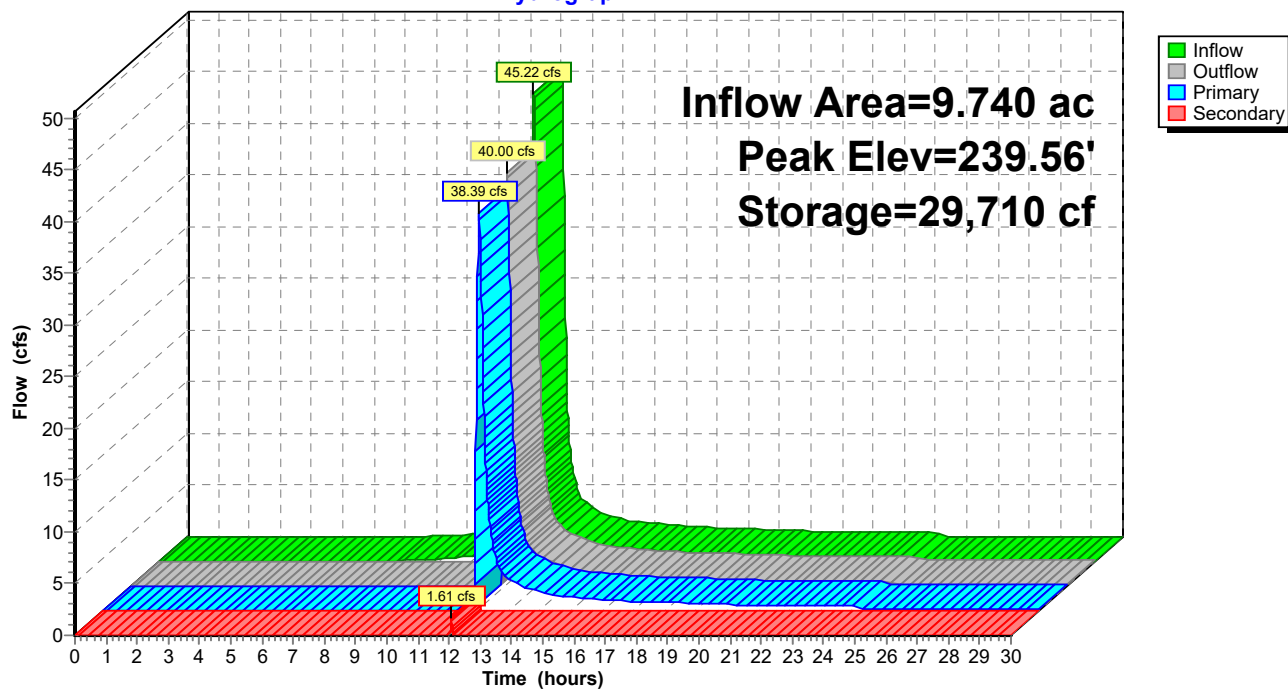
Type II 24-hr 10yr 24h Rainfall=5.06"

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Pond 2P: Pond 2

Hydrograph



Harris Creek(Current)

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Type II 24-hr 100yr 24h Rainfall=7.59"

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Summary for Pond 2P: Pond 2

Inflow Area = 9.740 ac, 0.00% Impervious, Inflow Depth = 5.36" for 100yr 24h event
 Inflow = 77.92 cfs @ 12.01 hrs, Volume= 4.348 af
 Outflow = 75.92 cfs @ 12.03 hrs, Volume= 3.964 af, Atten= 3%, Lag= 1.3 min
 Primary = 56.92 cfs @ 12.03 hrs, Volume= 3.735 af
 Routed to Reach Post : Post-Site Only
 Secondary = 19.00 cfs @ 12.03 hrs, Volume= 0.229 af
 Routed to Reach Post : Post-Site Only

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 239.81' @ 12.03 hrs Surf.Area= 13,944 sf Storage= 33,074 cf

Plug-Flow detention time= 88.5 min calculated for 3.964 af (91% of inflow)
 Center-of-Mass det. time= 42.1 min (845.2 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	39,111 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
237.00	8,846	0	0
237.50	10,581	4,857	4,857
238.00	11,283	5,466	10,323
239.00	12,730	12,007	22,329
240.00	14,237	13,484	35,813
240.20	18,750	3,299	39,111

Device	Routing	Invert	Outlet Devices
#1	Primary	231.50'	30.0" Round RCP_Round 30" L= 47.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 231.50' / 231.10' S= 0.0084 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	237.00'	2.0" Vert. Perm Pool Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	238.75'	48.0" x 48.0" Horiz. Top of Riser C= 0.600 Limited to weir flow at low heads
#4	Secondary	239.50'	40.0' long + 10.0 ' SideZ x 13.6' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.63 2.66 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=56.87 cfs @ 12.03 hrs HW=239.81' (Free Discharge)

↑ **1=RCP_Round 30"** (Passes 56.87 cfs of 62.78 cfs potential flow)

↑ **2=Perm Pool Orifice** (Orifice Controls 0.17 cfs @ 7.94 fps)

↑ **3=Top of Riser** (Weir Controls 56.70 cfs @ 3.36 fps)

Secondary OutFlow Max=18.92 cfs @ 12.03 hrs HW=239.81' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 18.92 cfs @ 1.44 fps)

Harris Creek(Current)

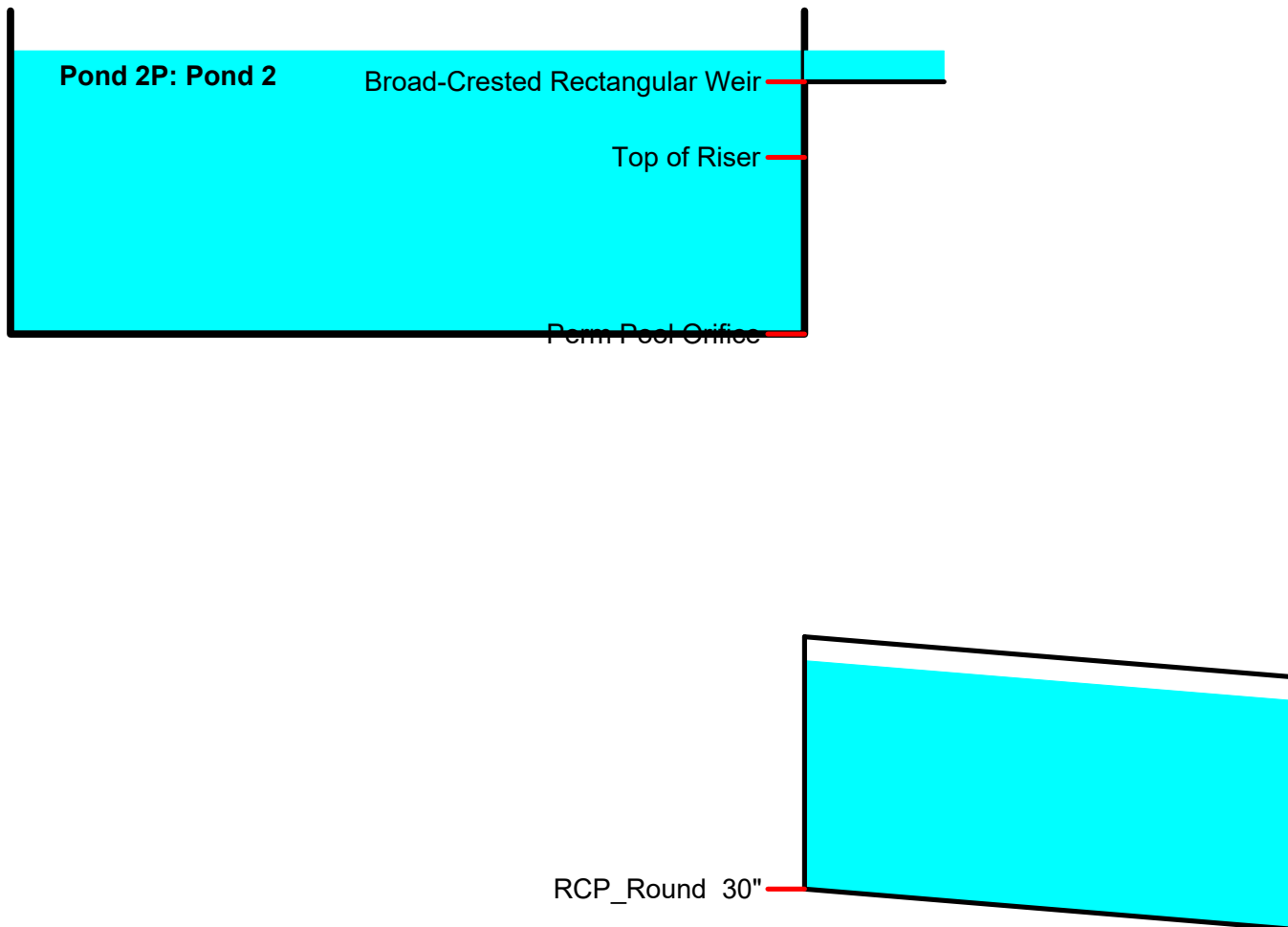
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Type II 24-hr 100yr 24h Rainfall=7.59"

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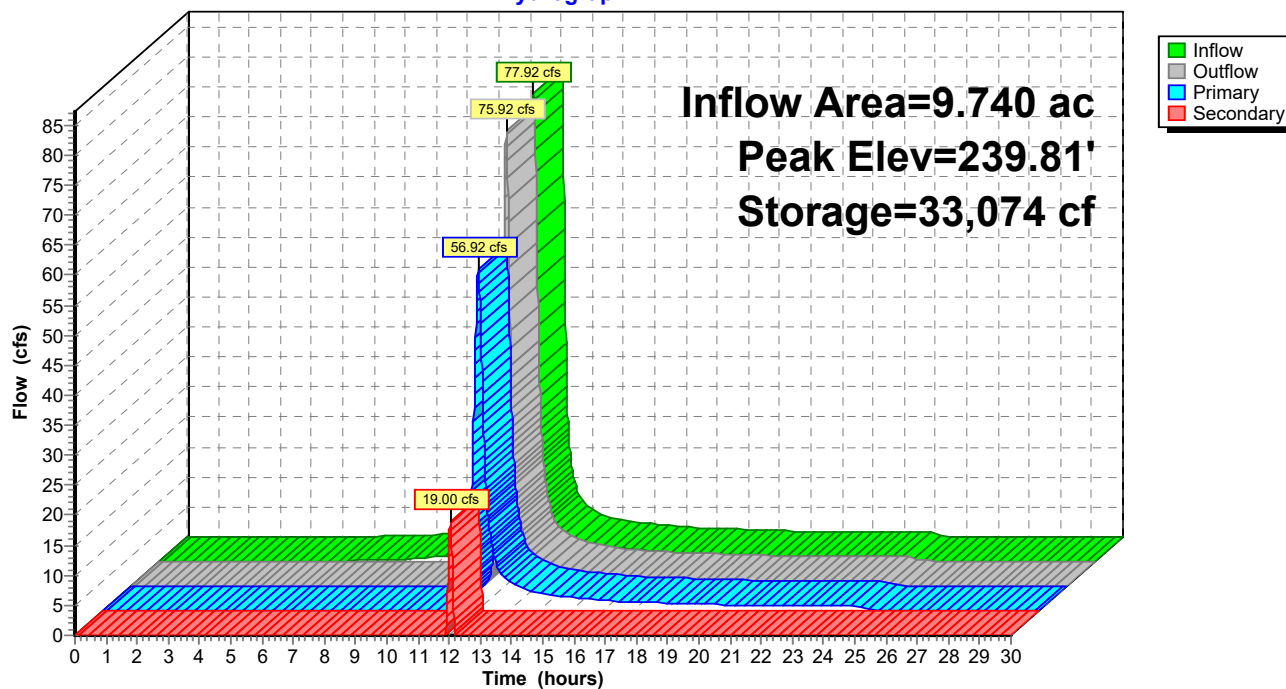
Type II 24-hr 100yr 24h Rainfall=7.59"

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Pond 2P: Pond 2

Hydrograph



PEAK FLOW ANALYSIS

Post-Development DA#1C

Harris Creek(Current)

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Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 1

Summary for Subcatchment 3S: Post-Dev DA#1C

[47] Hint: Peak is 201% of capacity of segment #3

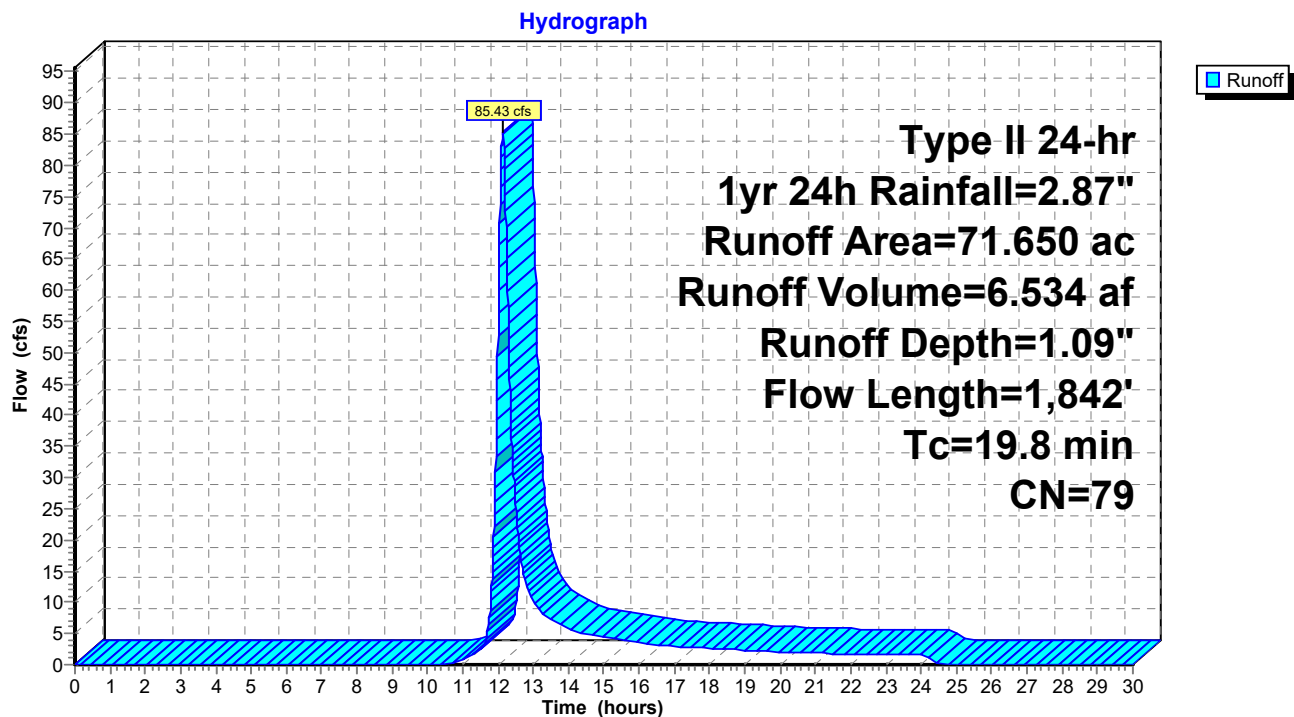
Runoff = 85.43 cfs @ 12.13 hrs, Volume= 6.534 af, Depth= 1.09"
Routed to Reach Post : Post-Site Only

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 1yr 24h Rainfall=2.87"

Area (ac)	CN	Description
* 71.650	79	
71.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
3.3	738	0.0550	3.78		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
9.4	1,004	0.0090	1.78	42.53	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
19.8	1,842	Total			

Subcatchment 3S: Post-Dev DA#1C



Harris Creek(Current)

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Summary for Subcatchment 3S: Post-Dev DA#1C

[47] Hint: Peak is 287% of capacity of segment #3

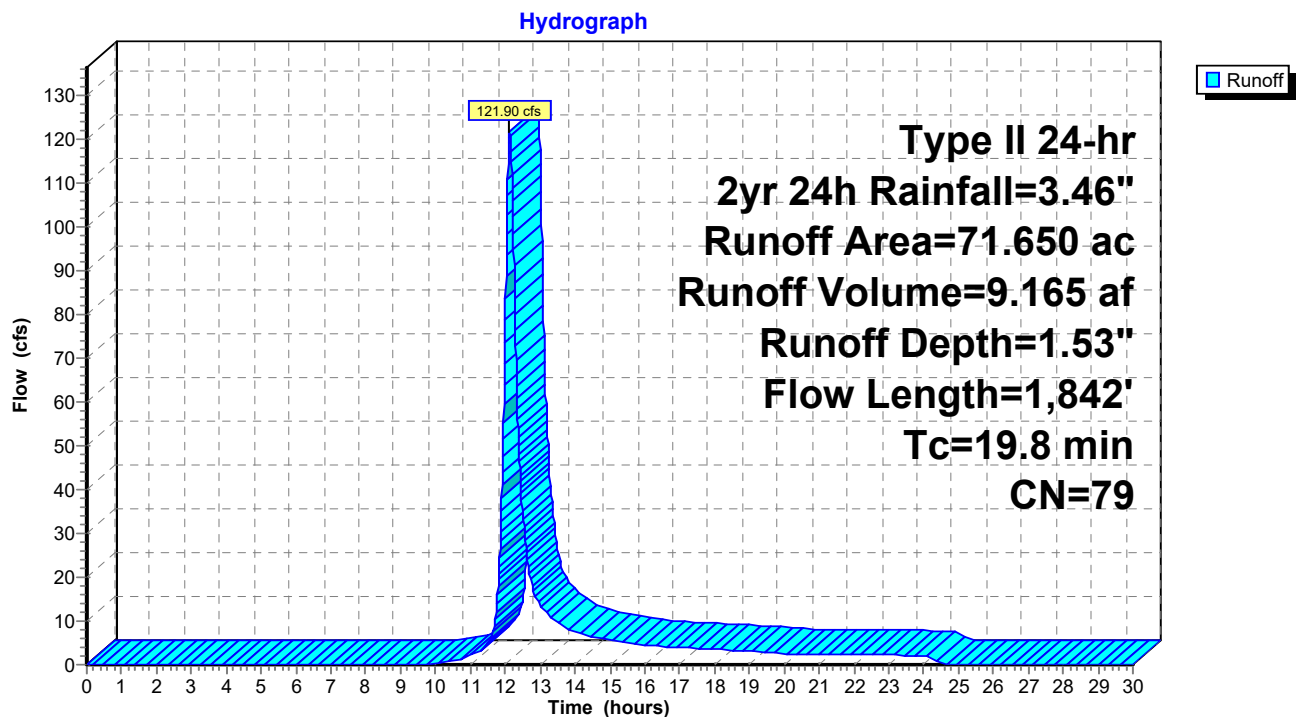
Runoff = 121.90 cfs @ 12.13 hrs, Volume= 9.165 af, Depth= 1.53"
Routed to Reach Post : Post-Site Only

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 2yr 24h Rainfall=3.46"

Area (ac)	CN	Description
* 71.650	79	
71.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
3.3	738	0.0550	3.78		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
9.4	1,004	0.0090	1.78	42.53	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
19.8	1,842	Total			

Subcatchment 3S: Post-Dev DA#1C



Harris Creek(Current)

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Type II 24-hr 10yr 24h Rainfall=5.06"

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Summary for Subcatchment 3S: Post-Dev DA#1C

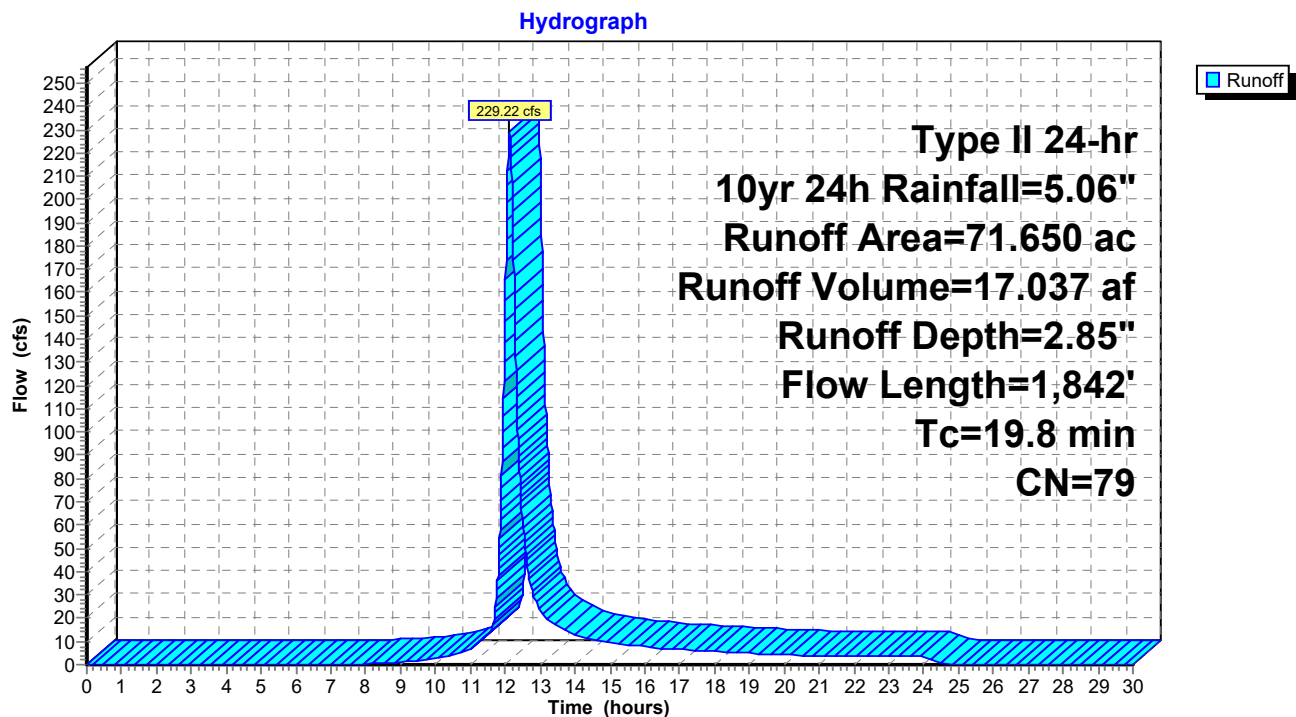
[47] Hint: Peak is 539% of capacity of segment #3

Runoff = 229.22 cfs @ 12.12 hrs, Volume= 17.037 af, Depth= 2.85"
Routed to Reach Post : Post-Site Only

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 10yr 24h Rainfall=5.06"

Area (ac)	CN	Description			
* 71.650	79				
71.650		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
3.3	738	0.0550	3.78		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
9.4	1,004	0.0090	1.78	42.53	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
19.8	1,842	Total			

Subcatchment 3S: Post-Dev DA#1C



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Type II 24-hr 100yr 24h Rainfall=7.59"

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Summary for Subcatchment 3S: Post-Dev DA#1C

[47] Hint: Peak is 960% of capacity of segment #3

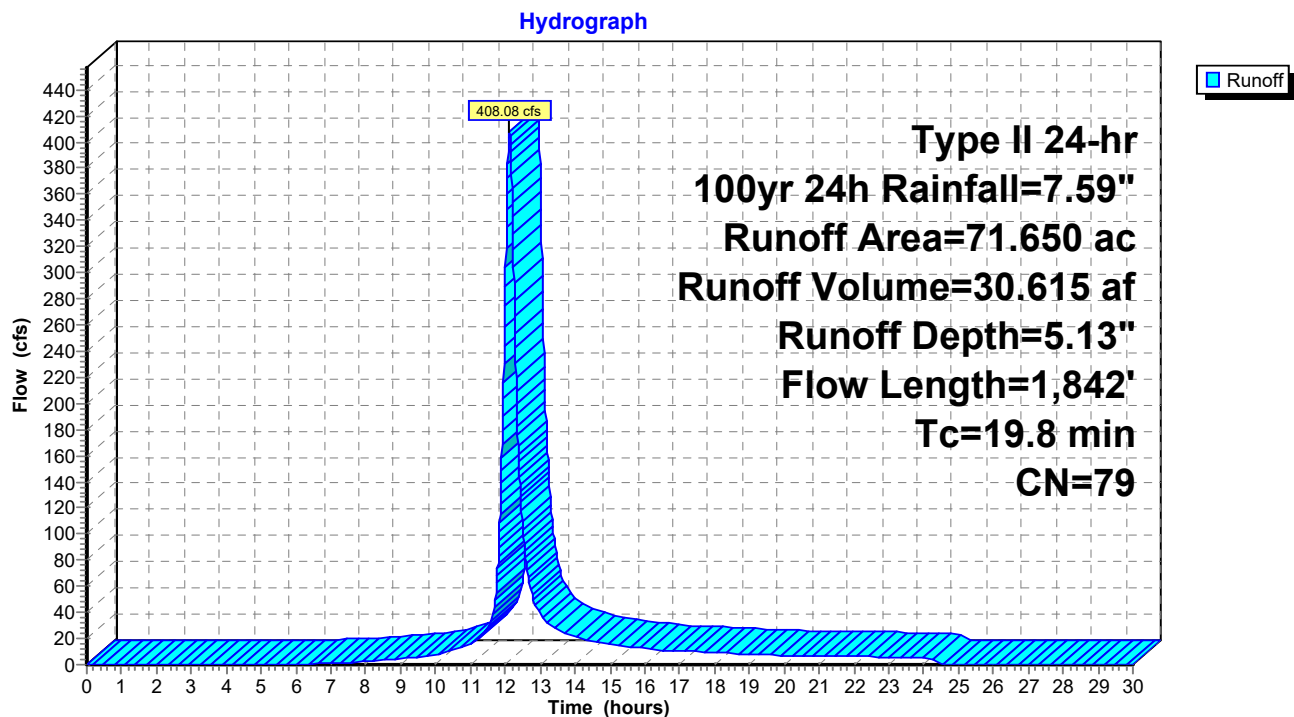
Runoff = 408.08 cfs @ 12.12 hrs, Volume= 30.615 af, Depth= 5.13"
Routed to Reach Post : Post-Site Only

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr 24h Rainfall=7.59"

Area (ac)	CN	Description
* 71.650	79	
71.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.1040	0.23		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.46"
3.3	738	0.0550	3.78		Shallow Concentrated Flow, Shallow Unpaved Kv= 16.1 fps
9.4	1,004	0.0090	1.78	42.53	Channel Flow, Channel Flow Area= 23.9 sf Perim= 81.4' r= 0.29' n= 0.035
19.8	1,842	Total			

Subcatchment 3S: Post-Dev DA#1C



PEAK FLOW ANALYSIS

Total Post-Development Flows

Harris Creek(Current)

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Type II 24-hr 1yr 24h Rainfall=2.87"

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Page 1

Summary for Reach Post: Post-Site Only

[40] Hint: Not Described (Outflow=Inflow)

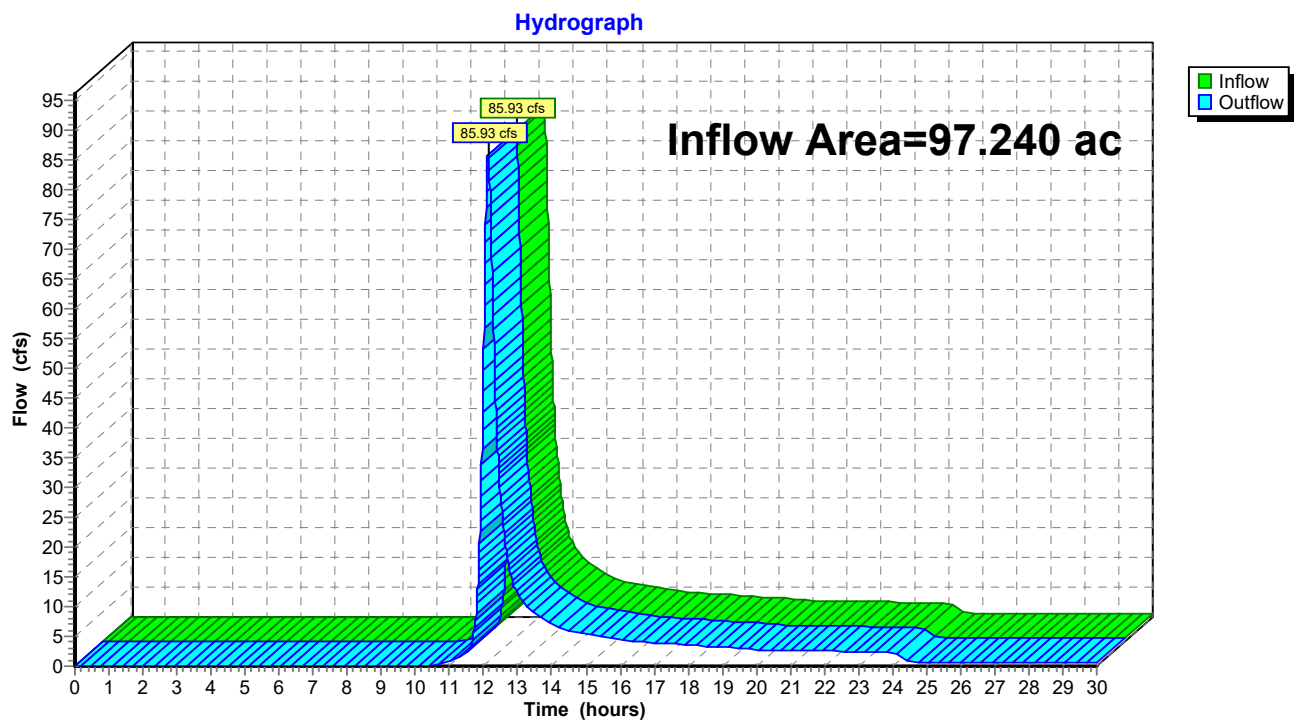
Inflow Area = 97.240 ac, 0.00% Impervious, Inflow Depth > 0.97" for 1yr 24h event

Inflow = 85.93 cfs @ 12.13 hrs, Volume= 7.855 af

Outflow = 85.93 cfs @ 12.13 hrs, Volume= 7.855 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach Post: Post-Site Only



Harris Creek(Current)

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Type II 24-hr 2yr 24h Rainfall=3.46"

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Summary for Reach Post: Post-Site Only

[40] Hint: Not Described (Outflow=Inflow)

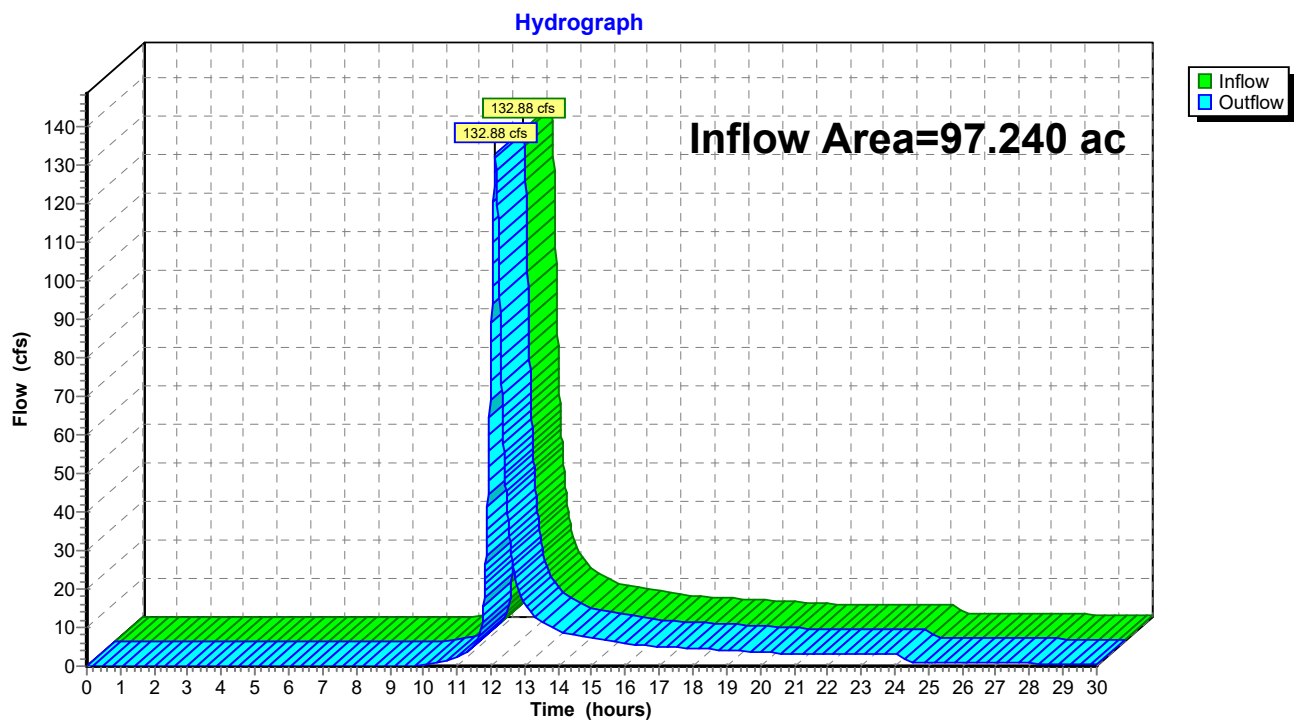
Inflow Area = 97.240 ac, 0.00% Impervious, Inflow Depth > 1.36" for 2yr 24h event

Inflow = 132.88 cfs @ 12.13 hrs, Volume= 11.001 af

Outflow = 132.88 cfs @ 12.13 hrs, Volume= 11.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach Post: Post-Site Only



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Type II 24-hr 10yr 24h Rainfall=5.06"

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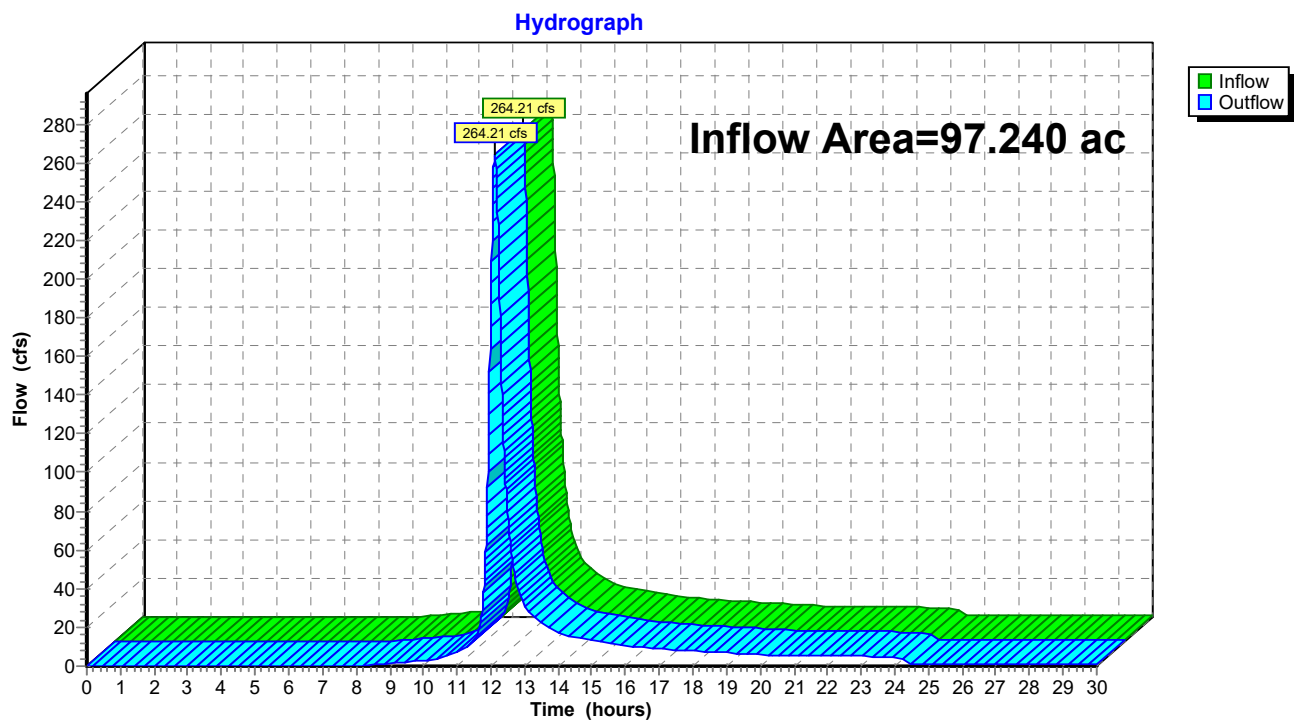
Summary for Reach Post: Post-Site Only

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 97.240 ac, 0.00% Impervious, Inflow Depth > 2.66" for 10yr 24h event
Inflow = 264.21 cfs @ 12.12 hrs, Volume= 21.586 af
Outflow = 264.21 cfs @ 12.12 hrs, Volume= 21.586 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach Post: Post-Site Only



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Type II 24-hr 100yr 24h Rainfall=7.59"

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Summary for Reach Post: Post-Site Only

[40] Hint: Not Described (Outflow=Inflow)

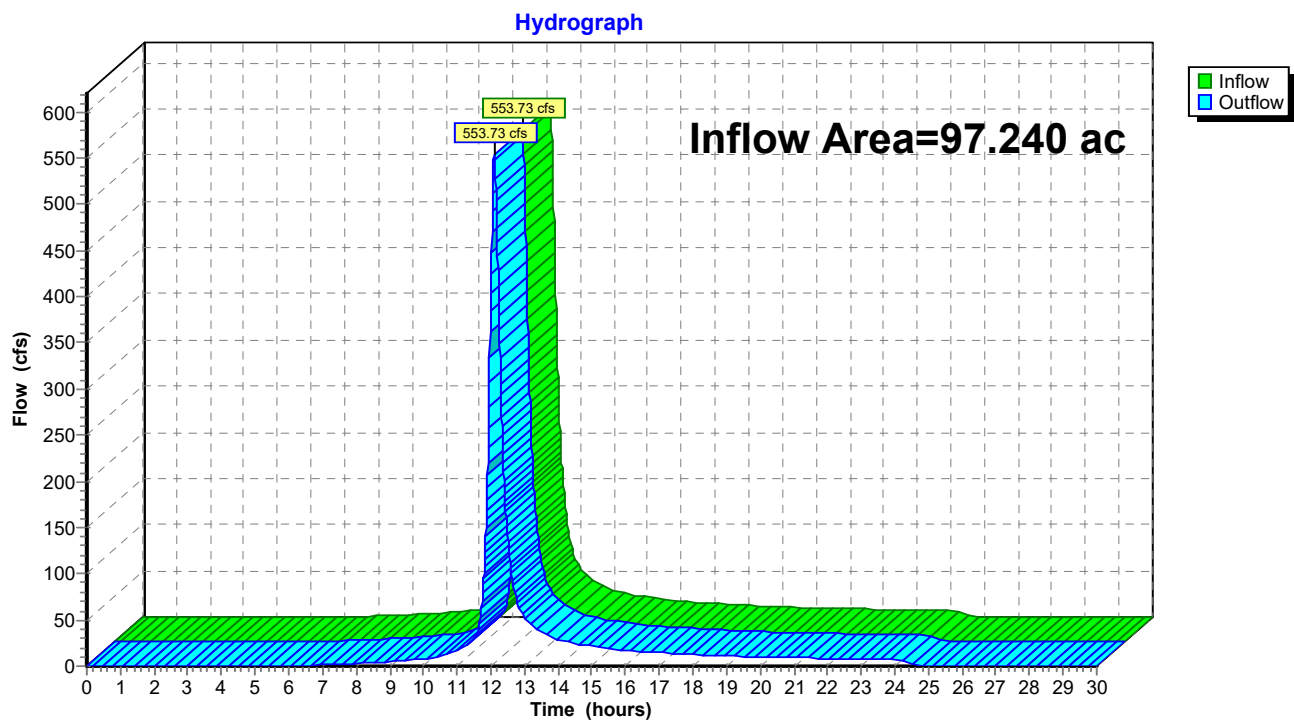
Inflow Area = 97.240 ac, 0.00% Impervious, Inflow Depth > 4.95" for 100yr 24h event

Inflow = 553.73 cfs @ 12.10 hrs, Volume= 40.098 af

Outflow = 553.73 cfs @ 12.10 hrs, Volume= 40.098 af, Atten= 0%, Lag= 0.0 min

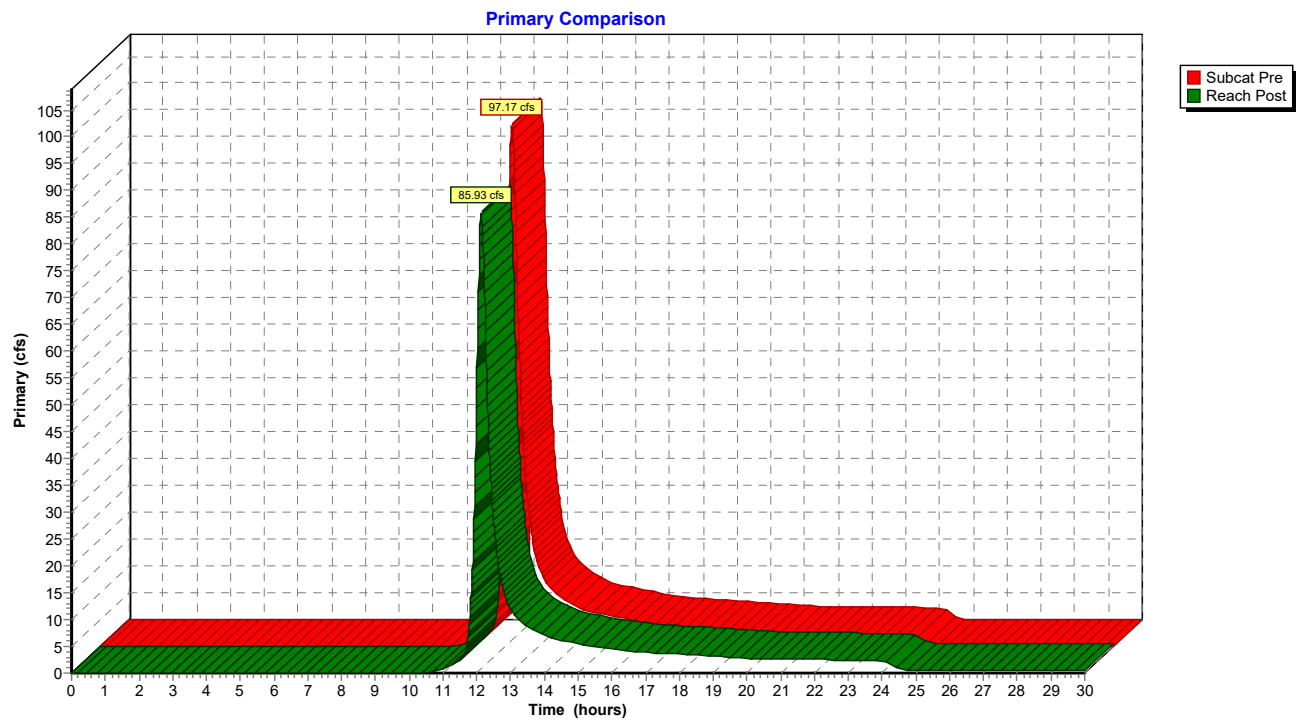
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach Post: Post-Site Only



PEAK FLOW ANALYSIS

Pre vs Post Comparison



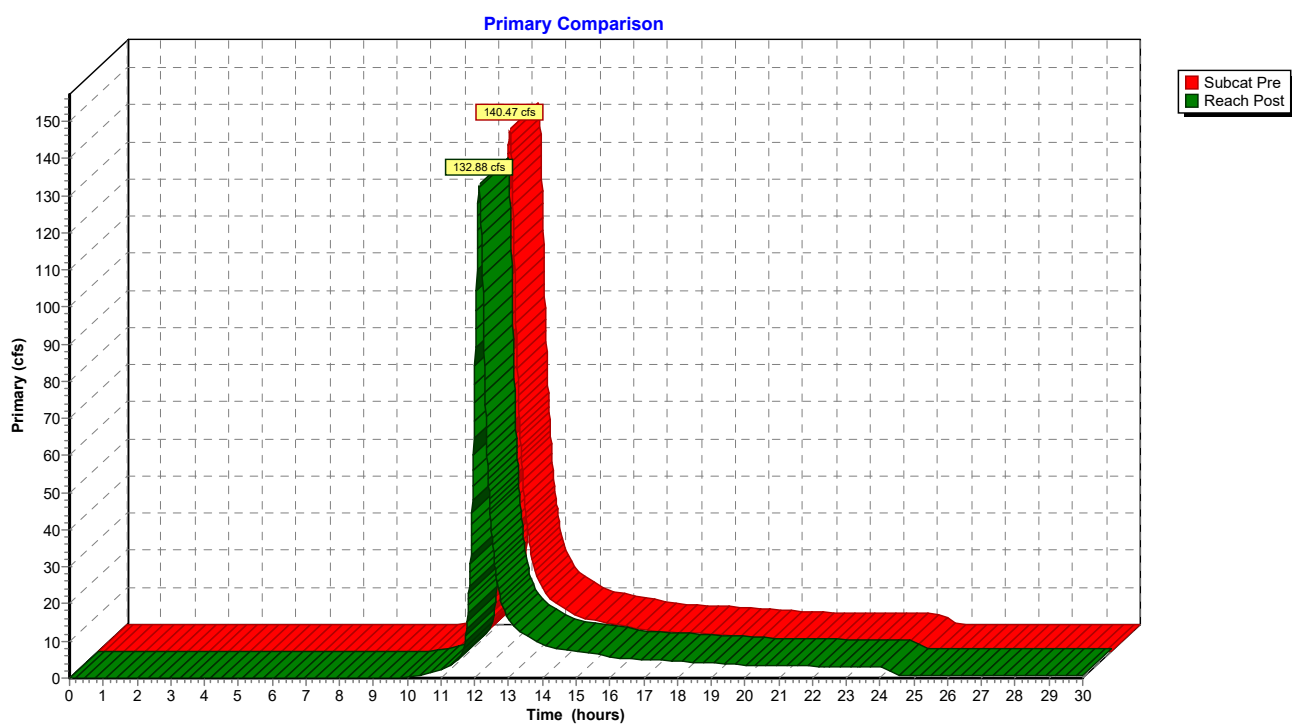
Harris Creek(Current)

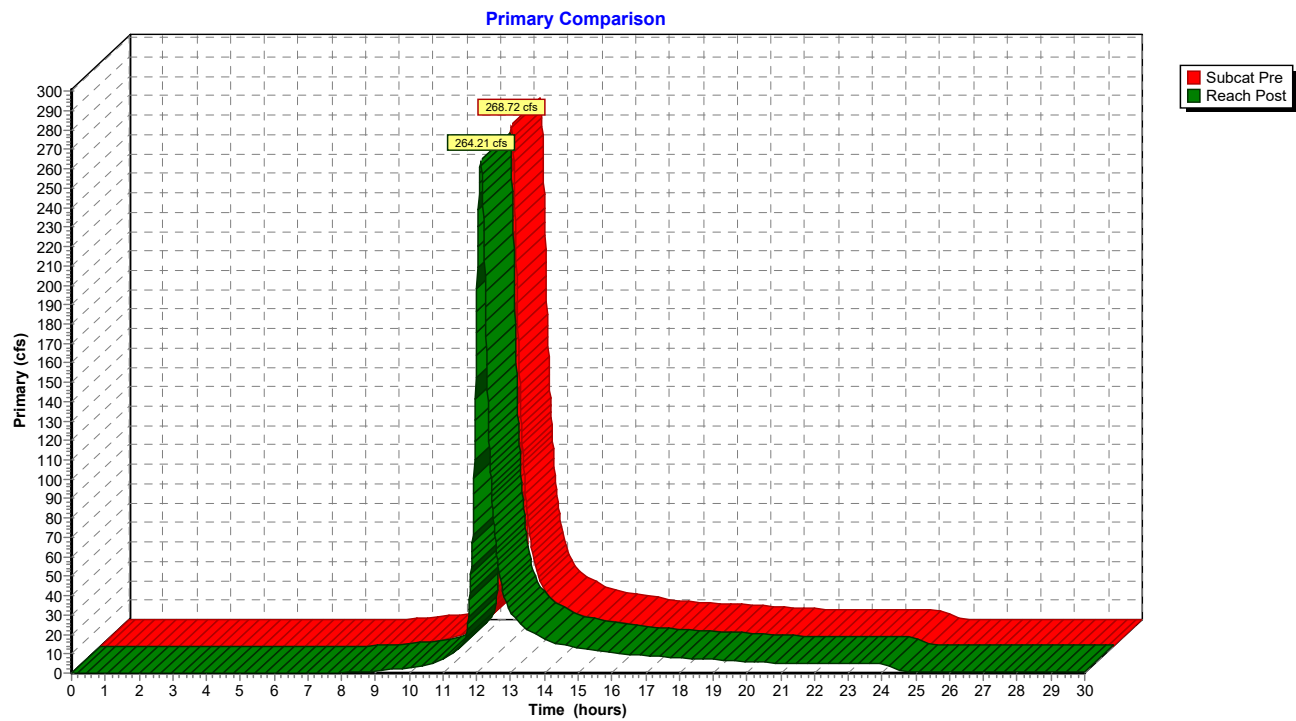
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Type II 24-hr 2yr 24h Rainfall=3.46"

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WATER QUALITY CALCULATIONS

WET POND 1

Determine Design Volume and Design Volume Elevation

Simple Method for Runoff Volume

$$R_v = 0.05 + 0.9 \cdot I_A$$

Where: R_v = Runoff coefficient (unitless)
 I_A = Impervious fraction (unitless)

$$DV = 3630 \cdot R_D \cdot R_v \cdot A$$

Where: DV = Design volume (cu ft)
 R_D = Design storm depth (in)
 A = Drainage area (ac)

Drainage Area:	695,257 sf	15.961 AC
Impervious Area:	317,573 sf	7.290 AC
Pervious Area:	377,684 sf	8.670 AC
% Impervious:	45.68%	
Rv:	0.46	
WQV (in)	1.0 in	
WQV (cf)	26,714.88 cf	
WQ Elevation	233.43	

STORAGE VOLUME ABOVE PERMANENT POOL				PERM. POOL ELEVATION
Elev (ft)	Area (sf)	Incremental Volume (cf)	Cumulative Volume (cf)	
232	16,302 sf	0 cf	0 cf	233.43
232.5	18,354 sf	8,664 cf	8,664 cf	
233	19,290 sf	9,411 cf	18,075 cf	
234	21,168 sf	20,229 cf	38,304 cf	
235	23,105 sf	22,137 cf	60,441 cf	
236	25,101 sf	24,103 cf	84,544 cf	
237	27,156 sf	26,129 cf	110,672 cf	
237.25	27,550 sf	6,838 cf	117,510 cf	

Size Water Quality Orifice

$$Q = C_D A (2 g H_o)^{0.5}$$

Where: Q = Discharge (cfs)
 C_D = Coefficient of discharge per Table 6 (unitless)
 A = Cross-sectional area of orifice entrance (sq ft)
 g = Acceleration of gravity (32.2 ft/sec²)
 H_o = Driving head from water surface to centroid orifice (ft) **usually use $H_o/3$ to compute drawdown through an orifice to reflect the fact that head is decreasing as drawdown occurs**

Temp. Pool Elev (ft)	235.75	<= Elev. of first opening above permanent pool orifice (min = 233.43)
Orifice Diameter (in)	3.5 in	
Temp. Pool Volume (cf)	78,518 cf	
Orifice Coefficient, CD	0.6	
Orifice Area, A (ft ²)	0.067 sf	
Gravity, g (ft/sec ²)	32.2 ft/s/s	
Driving Head, H (ft)	1.250 ft	
Discharge, Q (cfs)	0.360 cfs	
Drawdown Time (hrs)	60.64 hrs	GOOD

WET POND 1

Calculate Average Pool Depth

STORAGE VOLUME BELOW PERMANENT POOL							
Elev (ft)	Forebay Area (sf)	Forebay Incremental Volume (cf)	Forebay Cumulative Volume (cf)	Main Bay Area (sf)	Main Bay Incremental Volume (cf)	Main Bay Cumulative Volume (cf)	Total Volume (cf)
227	0 sf	0 cf	0 cf	1,146 sf	0 cf	0 cf	0 cf
228	899 sf	0 cf	0 cf	6,780 sf	3,963 cf	3,963 cf	3,963 cf
229	1,438 sf	1,169 cf	1,169 cf	7,956 sf	7,368 cf	11,331 cf	12,500 cf
230	2,057 sf	1,748 cf	2,916 cf	9,207 sf	8,582 cf	19,913 cf	22,829 cf
231	2,750 sf	2,404 cf	5,320 cf	10,532 sf	9,870 cf	29,782 cf	35,102 cf
231.5	3,124 sf	1,469 cf	6,788 cf	11,223 sf	5,439 cf	35,221 cf	42,009 cf
232	3,783 sf	1,727 cf	8,515 cf	12,519 sf	5,936 cf	41,156 cf	49,671 cf

Forebay %	17.14%
	GOOD

Is Littoral Shelf submerged?	=>	YES
Choose Average Depth Equation (Typ. Equation 2 if shelf is not submerged, Equation 3 if shelf is submerged)	=>	Equation 3

Equation 3. Average depth when the shelf is partially or fully submerged and the shelf is being excluded from the average depth calculation

$$D_{avg} = \frac{V_{pp} - V_{shelf}}{A_{bottom \text{ of shelf}}}$$

Where:

- D_{avg} = Average depth (feet)
- V_{pp} = Main pool volume at permanent pool elevation (feet³)
- V_{shelf} = Volume over the shelf only (feet³) – see below
- $A_{bottom \text{ of shelf}}$ = Area of main pool at the bottom of the shelf (feet²)

$$V_{shelf} = 0.5 * \text{Depth}_{\text{max over shelf}} * \text{Perimeter}_{\text{perm pool}} * \text{Width}_{\text{submerged part of shelf}}$$

Where:

- $\text{Depth}_{\text{max over shelf}}$ = Depth of water at the deep side of the shelf as measured from the permanent pool (feet)
- $\text{Perimeter}_{\text{perm pool}}$ = Perimeter of main pool at the bottom of the shelf (feet)
- $\text{Width}_{\text{submerged part of shelf}}$ = Width from the deep side to the dry side of the shelf as measured at permanent pool (feet)

Elev. @ Bottom of Pond (ft)	227.00
Elev. @ Bottom of Littoral Shelf (ft)	231.50
Permanent Pool Elevation (ft)	232.00
Permanent Pool Perimeter (ft)	824.00 ft
Width _{submerged part of shelf}	3.00 ft

Main Pool Volume (V_{pp})	41,156 cf
Surface Area at bottom of shelf (A_{bottom})	11,223 sf
Depth of water within shelf	0.50 ft
Volume over the Shelf (V_{shelf})	618 cf
Average Depth (Using Equation 3)	3.61 ft

GOOD

Check Minimum Surface Area

Piedmont or Coastal?	Piedmont
% Impervious	45.68%
Average Depth	3.61 ft
Minimum SA / DA Ratio	1.51
Minimum Permanent Pool Surface Area	10,498 sf
Provided Permanent Pool Surface Area	12,519 sf

GOOD

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

WET POND 2

Determine Design Volume and Design Volume Elevation

Simple Method for Runoff Volume

$$R_v = 0.05 + 0.9 \cdot I_A$$

Where: R_v = Runoff coefficient (unitless)
 I_A = Impervious fraction (unitless)

$$DV = 3630 \cdot R_D \cdot R_v \cdot A$$

Where: DV = Design volume (cu ft)
 R_D = Design storm depth (in)
 A = Drainage area (ac)

Drainage Area:	424,285 sf	9.740 AC
Impervious Area:	190,246 sf	4.367 AC
Pervious Area:	234,039 sf	5.373 AC
% Impervious:	44.84%	
Rv:	0.45	
WQV (in)	1.0 in	
WQV (cf)	16,036.30 cf	
WQ Elevation	238.48	

STORAGE VOLUME ABOVE PERMANENT POOL			
Elev (ft)	Area (sf)	Incremental Volume (cf)	Cumulative Volume (cf)
237	8,846 sf	0 cf	0 cf
237.5	10,581 sf	4,857 cf	4,857 cf
238	11,283 sf	5,466 cf	10,323 cf
239	12,730 sf	12,007 cf	22,329 cf
240	14,237 sf	13,484 cf	35,813 cf
240.2	18,750 sf	3,299 cf	39,111 cf

PERM. POOL ELEVATION

Size Water Quality Orifice

$$Q = C_D A (2 g H_o)^{0.5}$$

Where: Q = Discharge (cfs)
 C_D = Coefficient of discharge per Table 6 (unitless)
 A = Cross-sectional area of orifice entrance (sq ft)
 g = Acceleration of gravity (32.2 ft/sec²)
 H_o = Driving head from water surface to centroid orifice (ft) **usually use $H_o/3$ to compute drawdown through an orifice to reflect the fact that head is decreasing as drawdown occurs**

Temp. Pool Elev (ft)	238.75	<= Elev. of first opening above permanent pool orifice (min = 238.48)
Orifice Diameter (in)	2.0 in	
Temp. Pool Volume (cf)	19,328 cf	
Orifice Coefficient, CD	0.6	
Orifice Area, A (ft ²)	0.022 sf	
Gravity, g (ft/sec ²)	32.2 ft/s/s	
Driving Head, H (ft)	0.583 ft	
Discharge, Q (cfs)	0.080 cfs	
Drawdown Time (hrs)	66.92 hrs	GOOD

WET POND 2

Calculate Average Pool Depth

STORAGE VOLUME BELOW PERMANENT POOL							
Elev (ft)	Forebay Area (sf)	Forebay Incremental Volume (cf)	Forebay Cumulative Volume (cf)	Main Bay Area (sf)	Main Bay Incremental Volume (cf)	Main Bay Cumulative Volume (cf)	Total Volume (cf)
232	0 sf	0 cf	0 cf	1,885 sf	0 cf	0 cf	0 cf
233	0 sf	0 cf	0 cf	2,634 sf	2,260 cf	2,260 cf	2,260 cf
234	950 sf	0 cf	0 cf	3,441 sf	3,038 cf	5,297 cf	5,297 cf
235	1,204 sf	1,077 cf	1,077 cf	4,306 sf	3,874 cf	9,171 cf	10,248 cf
236	1,485 sf	1,345 cf	2,422 cf	5,228 sf	4,767 cf	13,938 cf	16,359 cf
236.5	1,636 sf	780 cf	3,202 cf	5,711 sf	2,735 cf	16,672 cf	19,874 cf
237	2,127 sf	941 cf	4,143 cf	6,719 sf	3,108 cf	19,780 cf	23,922 cf

Forebay %	17.32%
	GOOD

Is Littoral Shelf submerged?	=>	YES
Choose Average Depth Equation (Typ. Equation 2 if shelf is not submerged, Equation 3 if shelf is submerged)	=>	Equation 3

Equation 3. Average depth when the shelf is partially or fully submerged and the shelf is being excluded from the average depth calculation

$$D_{avg} = \frac{V_{pp} - V_{shelf}}{A_{bottom \text{ of shelf}}}$$

Where:

- D_{avg} = Average depth (feet)
- V_{pp} = Main pool volume at permanent pool elevation (feet³)
- V_{shelf} = Volume over the shelf only (feet³) – see below
- $A_{bottom \text{ of shelf}}$ = Area of main pool at the bottom of the shelf (feet²)

$$V_{shelf} = 0.5 * \text{Depth}_{\text{max over shelf}} * \text{Perimeter}_{\text{perm pool}} * \text{Width}_{\text{submerged part of shelf}}$$

Where:

- $\text{Depth}_{\text{max over shelf}}$ = Depth of water at the deep side of the shelf as measured from the permanent pool (feet)
- $\text{Perimeter}_{\text{perm pool}}$ = Perimeter of main pool at the bottom of the shelf (feet)
- $\text{Width}_{\text{submerged part of shelf}}$ = Width from the deep side to the dry side of the shelf as measured at permanent pool (feet)

Elev. @ Bottom of Pond (ft)	232.00
Elev. @ Bottom of Littoral Shelf (ft)	236.50
Permanent Pool Elevation (ft)	237.00
Permanent Pool Perimeter (ft)	2482.00 ft
Width _{submerged part of shelf}	3.00 ft

Main Pool Volume (V_{pp})	19,780 cf
Surface Area at bottom of shelf (A_{bottom})	5,711 sf
Depth of water within shelf	0.50 ft
Volume over the Shelf (V_{shelf})	1,862 cf
Average Depth (Using Equation 3)	3.14 ft

GOOD

Check Minimum Surface Area

Piedmont or Coastal?	Piedmont
% Impervious	44.84%
Average Depth	3.14 ft
Minimum SA / DA Ratio	1.51
Minimum Permanent Pool Surface Area	6,407 sf
Provided Permanent Pool Surface Area	6,719 sf

GOOD

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

RISER BUOYANCY CALCULATIONS

ANTI FLOATATION COMPUTATIONS

Project Name: Harris Creek Farms
Project Location: Wake County
Job Number:

Date: 5/29/2025
Designer: JAC
Plan Label: SCM No. 1

Riser Top Elevation	235.80
Riser Invert Out	232.00
Riser Bottom Elevation	227.00
Riser Length (ft)	5.0 ft
Riser Width (ft)	5.0 ft
Riser Thickness (ft)	0.5 ft
Riser Base Length (ft)	7.0 ft
Riser Base Width (ft)	7.0 ft
Riser Base Thickness (ft)	2.0 ft

References

Weight of Concrete per CF	=	145 lb
Weight of Water per CF	=	62.4 lb

1. Determine volume of concrete/riser

Concrete Base	Surface Area	Thickness	
	49 Sq Ft X	2.0 ft ft =	98 CF
Concrete Riser	Surface Area	Height	
	5.25 Sq Ft X	3.80 ft =	19.95 CF
Concrete Fill Inside Riser	Surface Area	Height	
	25 Sq Ft X	5.00 ft =	125 CF
Total Weight			242.95 CF X 145 lb = <u>35,227.8</u> lb

2. Determine volume of water displaced

Concrete Base	Surface Area	Thickness	
	49 Sq Ft X	2.0 ft ft =	98 CF
Concrete Riser	Surface Area	Height	
	30.25 Sq Ft X	8.80 ft =	266.2 CF
Total Weight			364.2 CF X 62.4 lb = <u>22,726.1</u> lb

3. Weight comparison

Total Weight of Structure (section 1) 35,227.75 lbs
Total Weight of Displaced Water (section 2) 22,726.08 lbs

Factor of Safety (Min. 1.15)  1.55

ANTI FLOATATION COMPUTATIONS

Project Name: Harris Creek Farms
Project Location: Wake County
Job Number:

Date: 5/29/2025
Designer: JAC
Plan Label: SCM No. 2

Riser Top Elevation	238.75
Riser Invert Out	231.50
Riser Bottom Elevation	230.50
Riser Length (ft)	4.0 ft
Riser Width (ft)	4.0 ft
Riser Thickness (ft)	0.5 ft
Riser Base Length (ft)	6.5 ft
Riser Base Width (ft)	6.5 ft
Riser Base Thickness (ft)	2.0 ft

1. Determine volume of concrete/riser

Concrete Base	Surface Area	Thickness	
	42.25 Sq Ft	2.0 ft	ft = 84.5 CF
Concrete Riser	Surface Area	Height	
	4.25 Sq Ft	7.25 ft	= 30.8125 CF
Concrete Fill Inside Riser	Surface Area	Height	
	16 Sq Ft	1.00 ft	= 16 CF

Total Weight 131.313 CF X 145 lb = **19,040.3** lb

References

Weight of Concrete per CF	=	145 lb
Weight of Water per CF	=	62.4 lb

2. Determine volume of water displaced

Concrete Base	Surface Area	Thickness	
	42.25 Sq Ft	2.0 ft	ft = 84.5 CF
Concrete Riser	Surface Area	Height	
	20.25 Sq Ft	8.25 ft	= 167.063 CF

Total Weight 251.563 CF X 62.4 lb = **15,697.5** lb

3. Weight comparison

Total Weight of Structure (section 1) 19,040.31 lbs
Total Weight of Displaced Water (section 2) 15,697.50 lbs

Factor of Safety (Min. 1.15)  **1.21**