#17 Please provide gutter spread calculations with next submittal

2024

STORMWATER & EROSION CONTROL REPORT

CHASE BANK – WALLBROOK
ROLESVILLE, NC

NEC of Virginia Water Dr and Wallbrook Dr
Rolesville, NC 28504
Wake County

Bohler Project #: NCB230114
1st Submittal July 1, 2024

Oliver Kaija, PE

BOHLER
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1. STORMWATER ANALYSIS

1.1 PROJECT NARRATIVE

The subject site is located at the northeast corner of Virginia Water Dr and proposed Wallbrook Dr in Rolesville, NC, PIN #1758-56-3963. The existing site is currently serving as an erosion control sediment basin for the NCDOT improvements along US 401, which is also S Main St. The TIP for the project is U-6241. The following stormwater management report is for a proposed bank facility with approximately ±1.47 acres of improvements that will include, but is not limited to, the construction of an above ground 1-story building, underground stormwater piping routing to an overall development pond, additional sanitary and water utilities, grading activities, and drive aisles. Site access will be obtained from a proposed shared driveway that connected to Wallbrook Dr.

Figure 1: Aerial View of Site

1.2 STORMWATER SUMMARY

The site is subject to the analysis of pre and post-development drainage areas as well as an allotted built upon area. Additionally, the 10-yr, 25-yr, and 50-yr storms were analyzed within the stormwater conveyance system to ensure that the HGL would not exceed the limits of the pipes or NCDOT 840.02 curb inlets. The existing site is split into 3 drainage areas, two of which drain to offsite curb inlets on and around Wallbrook Dr and Virginia Water Dr. Per the overal developers design, the majority of the site will drain to the drop inlet on the southern side of the outparcel, which connects to the drainage system within Wallbrook Dr. The pre- and post-drainage maps can be found in Appendix B. In the existing condition, the site is approximately ±93% pervious with primary land covers to comprise of grass and brush. The impervious area is due to existing curbing and pedestrian areas.

In the post-development condition, ±0.57 acres of impervious area will be directed to curb inlets that tie into the southern drop inlet. The plan southern portion of the site will maintain its flow path and pervious land cover. From the provided drainage maps found in Appendix B and site data table on sheets C-101 and C-301, the site complies to the 85% allotted built upon area. The stormwater pipes were all sized conservatively to ensure that the storm events could be managed within the pipes. The runs of pipes can be found in Appendix C. For an added factor of safety, the outfall, representing the southern drop inlet was modeled with a tailwater of 374.72', assuming the downstream pipe was flowing 100% full. Additionally, the rational method was used to obtain flow rate values, where the runoff coefficient in the parking lot, open space, and landscape areas varied between 0.93 and 0.95 and the plan southern portion was modeled with a runoff coefficient of 0.25.

	Pre-Development	Post-Development
	Area (AC)	Area (AC)
A-1	0.48	0.81
A-2	1.07	
A-3	0.08	0.07
A-2A		0.18
A-2A.1		0.05
A-2B		0.02
A-2C		0.05
A-2C.1		0.02
A-2C.2		0.01
A-2D		0.42
A-2E		0.36

2. EROSION CONTROL ANALYSIS

2.1 EXISTING CONDITIONS

The subject site is located at the northeast corner of Wallbrook Dr and Virgina Water Dr in Rolesville, NC, PIN #1758-56-3963. The existing site is ±1.63 acres and currently vacant while being used as a sedimentation basin for the current NCDOT improvements from U-6241. There are to be existing stormwater conveyance systems and utilities located on and around the suject site.

2.2 PHASE I EROSION & SEDIMENT CONTROL

Stage 1 will commence with ceremonial staking of the limits of disturbance, installation of the construction entrance, perimeter construction fence, and perimeter best management practices (BMPs). The site is subject to BMPs including inlet protection, silt fence oulets, construction entrances, concrete washout pits, and a sediment trap. Once the BMPs are placed and secure, further clearing and grubbing that was not necessary to install BMPs may begin. The majority of stormwater will be routed through the sediment trap and riprap, following its natural path of travel. Additional runoff that is not directed to the basin will be controlled by silt fence outlets, silt fence, Silt Soxx, and inlet protections. Once the site is inspected by the NCDEQ inspector, phase II can begin.

2.3 PHASE II EROSION & SEDIMENT CONTROL

Stage 2 will continue clearing, stripping, and grubbing while also adjusting and adding BMPs as necessary and depicted by sheet C-802. Throughout construction, temporarily stabilize any disturbed areas that are likely to remain inactive. During phase 2, install storm pipes, sanitary sewer, and remaining permanent utilities as seen on the site development plans. After utlities are placed and buried, continue grading for proposed conditions and installation of permanent stabilization over all areas. Any additional BMPs shown on C-802 are to be placed.

2.4 PHASE III EROSION & SEDIMENT CONTROL

Pending Wake County inspection and approval to continue, the site may be paved. Concurrence must be obtained from the owner that the site has been fully stabilized, sediment has been removed from all storm inlets, and construction has been completed. Before demobilizing, the contractor must have all remaining temporary erosion and sediment control BMPs removed and stockpiles and any disturbed areas must be stabilized. Contractor may only demobilize once the site has been fully stabilized according to Wake County requirements.

APPENDIX A | SUPPORTING DOCUMENTS

BOHLER

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NOAA Atlas 14, Volume 2, Version 3
Location name: Rolesville, North Carolina, USA*
Latitude: 35.9105°, Longitude: -78.4758°
Elevation: 380 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_&_aerials

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** (0.369-0.441)	**0.468** (0.430-0.512)	**0.534** (0.490-0.583)	**0.599** (0.548-0.654)	**0.665** (0.606-0.725)	**0.717** (0.650-0.781)	**0.763** (0.688-0.831)	**0.803** (0.720-0.877)	**0.849** (0.754-0.927)	**0.889** (0.783-0.972)
10-min	**0.644** (0.590-0.704)	**0.749** (0.687-0.818)	**0.855** (0.784-0.934)	**0.959** (0.877-1.05)	**1.06** (0.965-1.16)	**1.14** (1.04-1.24)	**1.21** (1.09-1.32)	**1.27** (1.14-1.39)	**1.34** (1.19-1.47)	**1.40** (1.23-1.53)
15-min	**0.805** (0.738-0.880)	**0.942** (0.864-1.03)	**1.08** (0.992-1.18)	**1.21** (1.11-1.32)	**1.34** (1.22-1.46)	**1.44** (1.31-1.58)	**1.53** (1.38-1.67)	**1.61** (1.44-1.75)	**1.69** (1.50-1.84)	**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** (1.97-2.37)	**2.35** (2.12-2.56)	**2.50** (2.24-2.73)	**2.69** (2.39-2.94)	**2.84** (2.51-3.11)
60-min	**1.38** (1.26-1.50)	**1.63** (1.50-1.78)	**1.97** (1.81-2.15)	**2.29** (2.09-2.50)	**2.65** (2.41-2.89)	**2.95** (2.68-3.21)	**3.23** (2.91-3.52)	**3.51** (3.14-3.83)	**3.86** (3.43-4.21)	**4.15** (3.66-4.54)
2-hr	**1.61** (1.46-1.77)	**1.92** (1.75-2.10)	**2.34** (2.13-2.57)	**2.74** (2.49-3.01)	**3.22** (2.90-3.53)	**3.64** (3.27-3.98)	**4.04** (3.61-4.42)	**4.46** (3.95-4.87)	**4.99** (4.38-5.46)	**5.46** (4.75-5.98)
3-hr	**1.70** (1.55-1.89)	**2.03** (1.85-2.24)	**2.49** (2.26-2.74)	**2.94** (2.67-3.23)	**3.49** (3.14-3.83)	**3.98** (3.56-4.37)	**4.46** (3.96-4.89)	**4.97** (4.38-5.44)	**5.64** (4.92-6.18)	**6.25** (5.39-6.87)
6-hr	**2.04** (1.87-2.26)	**2.44** (2.23-2.68)	**2.99** (2.73-3.28)	**3.53** (3.22-3.88)	**4.21** (3.81-4.61)	**4.82** (4.33-5.27)	**5.43** (4.84-5.93)	**6.08** (5.36-6.62)	**6.94** (6.05-7.57)	**7.74** (6.65-8.45)
12-hr	**2.41** (2.21-2.66)	**2.88** (2.64-3.15)	**3.54** (3.24-3.88)	**4.21** (3.84-4.61)	**5.06** (4.58-5.52)	**5.83** (5.24-6.34)	**6.61** (5.88-7.18)	**7.45** (6.55-8.08)	**8.60** (7.45-9.33)	**9.66** (8.24-10.5)
24-hr	**2.86** (2.66-3.08)	**3.46** (3.22-3.72)	**4.34** (4.04-4.68)	**5.04** (4.68-5.42)	**6.00** (5.55-6.45)	**6.76** (6.24-7.27)	**7.54** (6.94-8.12)	**8.35** (7.66-9.00)	**9.47** (8.64-10.2)	**10.3** (9.40-11.2)
2-day	**3.32** (3.09-3.57)	**3.99** (3.72-4.30)	**4.98** (4.63-5.36)	**5.75** (5.35-6.19)	**6.81** (6.30-7.33)	**7.64** (7.06-8.23)	**8.50** (7.83-9.15)	**9.38** (8.61-10.1)	**10.6** (9.66-11.4)	**11.6** (10.5-12.5)
3-day	**3.52** (3.28-3.77)	**4.23** (3.94-4.53)	**5.24** (4.89-5.62)	**6.04** (5.63-6.48)	**7.14** (6.62-7.66)	**8.01** (7.41-8.59)	**8.90** (8.21-9.55)	**9.82** (9.02-10.6)	**11.1** (10.1-11.9)	**12.1** (11.0-13.0)
4-day	**3.72** (3.48-3.97)	**4.46** (4.17-4.77)	**5.51** (5.15-5.88)	**6.34** (5.91-6.77)	**7.47** (6.94-7.98)	**8.38** (7.76-8.96)	**9.30** (8.59-9.96)	**10.3** (9.44-11.0)	**11.6** (10.6-12.4)	**12.6** (11.5-13.5)
7-day	**4.31** (4.04-4.60)	**5.15** (4.82-5.49)	**6.28** (5.88-6.70)	**7.17** (6.70-7.65)	**8.40** (7.83-8.97)	**9.38** (8.72-10.0)	**10.4** (9.62-11.1)	**11.4** (10.5-12.2)	**12.8** (11.8-13.8)	**13.9** (12.7-15.0)
10-day	**4.91** (4.60-5.23)	**5.84** (5.48-6.22)	**7.03** (6.59-7.49)	**7.96** (7.45-8.48)	**9.23** (8.61-9.83)	**10.2** (9.52-10.9)	**11.2** (10.4-12.0)	**12.2** (11.3-13.1)	**13.6** (12.6-14.6)	**14.7** (13.5-15.8)
20-day	**6.58** (6.20-7.01)	**7.78** (7.32-8.28)	**9.20** (8.65-9.79)	**10.3** (9.70-11.0)	**11.9** (11.1-12.6)	**13.1** (12.2-13.9)	**14.3** (13.3-15.2)	**15.5** (14.4-16.5)	**17.2** (15.9-18.4)	**18.5** (17.0-19.8)
30-day	**8.18** (7.72-8.68)	**9.62** (9.07-10.2)	**11.2** (10.6-11.9)	**12.4** (11.7-13.2)	**14.1** (13.2-14.9)	**15.3** (14.3-16.3)	**16.5** (15.5-17.6)	**17.8** (16.6-19.0)	**19.4** (18.0-20.7)	**20.7** (19.2-22.1)
45-day	**10.4** (9.88-11.0)	**12.2** (11.6-12.9)	**14.0** (13.3-14.7)	**15.4** (14.6-16.2)	**17.1** (16.2-18.1)	**18.5** (17.5-19.5)	**19.8** (18.7-20.9)	**21.1** (19.9-22.3)	**22.9** (21.4-24.2)	**24.2** (22.6-25.6)
60-day	**12.5** (11.9-13.1)	**14.6** (13.9-15.3)	**16.5** (15.7-17.4)	**18.0** (17.1-18.9)	**19.9** (18.9-21.0)	**21.4** (20.2-22.5)	**22.8** (21.5-24.0)	**24.1** (22.7-25.4)	**25.9** (24.3-27.4)	**27.2** (25.5-28.8)

[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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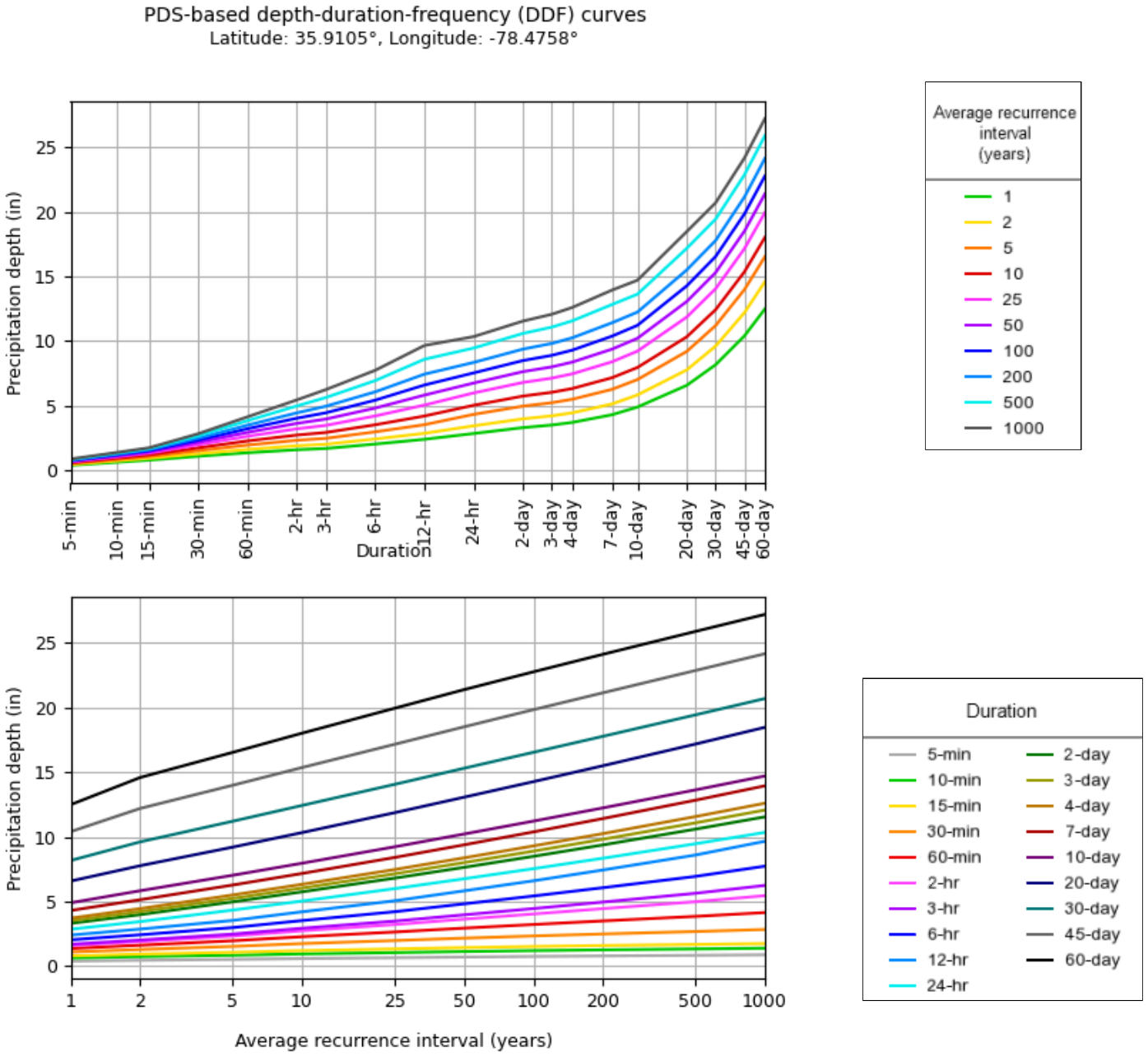
PF graphical



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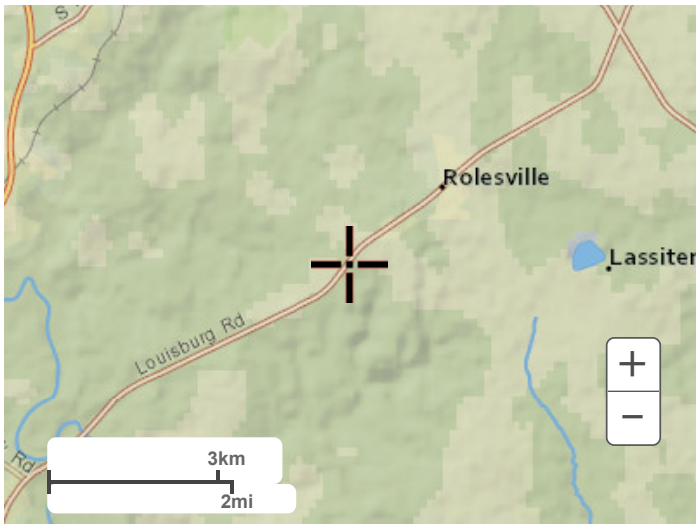
Maps & aerials

Small scale terrain



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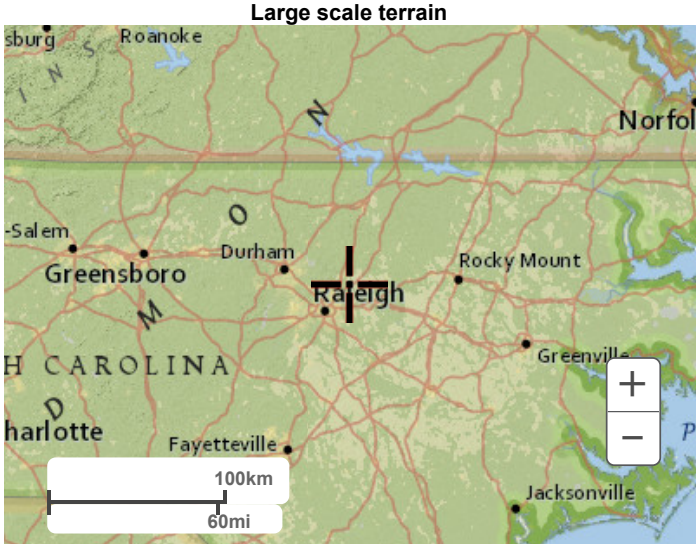

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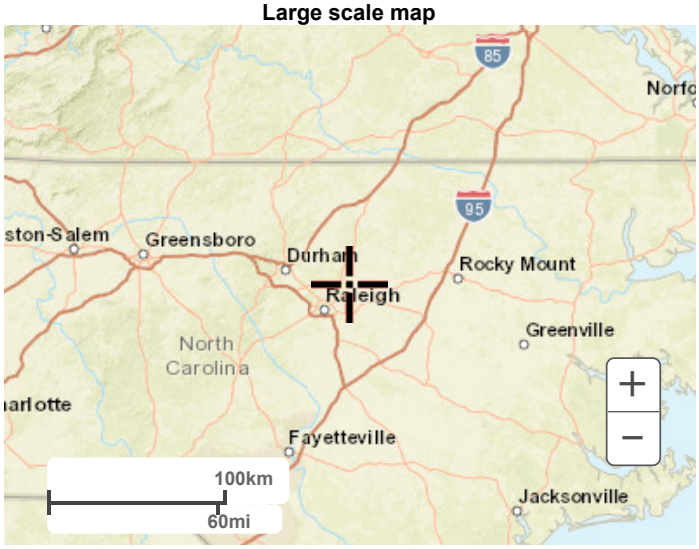

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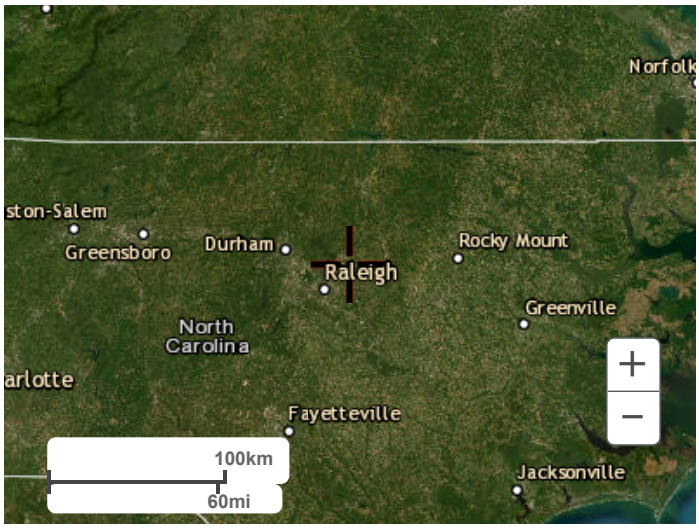

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Disclaimer

NOAA Atlas 14, Volume 2, Version 3
Location name: Rolesville, North Carolina, USA*
Latitude: 35.9105°, Longitude: -78.4758°
Elevation: 380 ft**
* source: ESRI Maps
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POINT PRECIPITATION FREQUENCY ESTIMATES

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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** (4.43-5.29)	**5.62** (5.16-6.14)	**6.41** (5.88-7.00)	**7.19** (6.58-7.85)	**7.98** (7.27-8.70)	**8.60** (7.80-9.37)	**9.16** (8.26-9.97)	**9.64** (8.64-10.5)	**10.2** (9.05-11.1)	**10.7** (9.40-11.7)
10-min	**3.86** (3.54-4.22)	**4.49** (4.12-4.91)	**5.13** (4.70-5.60)	**5.75** (5.26-6.28)	**6.36** (5.79-6.93)	**6.85** (6.21-7.46)	**7.27** (6.56-7.92)	**7.64** (6.85-8.34)	**8.05** (7.16-8.80)	**8.40** (7.40-9.19)
15-min	**3.22** (2.95-3.52)	**3.77** (3.46-4.12)	**4.33** (3.97-4.72)	**4.85** (4.44-5.29)	**5.37** (4.89-5.86)	**5.78** (5.24-6.30)	**6.13** (5.52-6.68)	**6.43** (5.76-7.02)	**6.76** (6.00-7.38)	**7.03** (6.20-7.69)
30-min	**2.21** (2.02-2.41)	**2.60** (2.39-2.84)	**3.07** (2.82-3.36)	**3.51** (3.21-3.83)	**3.98** (3.62-4.34)	**4.35** (3.95-4.74)	**4.69** (4.23-5.11)	**5.00** (4.48-5.46)	**5.38** (4.78-5.87)	**5.69** (5.02-6.23)
60-min	**1.38** (1.26-1.50)	**1.63** (1.50-1.78)	**1.97** (1.81-2.15)	**2.29** (2.09-2.50)	**2.65** (2.41-2.89)	**2.95** (2.68-3.21)	**3.23** (2.91-3.52)	**3.51** (3.14-3.83)	**3.86** (3.43-4.21)	**4.15** (3.66-4.54)
2-hr	**0.804** (0.731-0.887)	**0.957** (0.874-1.05)	**1.17** (1.06-1.28)	**1.37** (1.24-1.50)	**1.61** (1.45-1.76)	**1.82** (1.64-1.99)	**2.02** (1.80-2.21)	**2.23** (1.97-2.44)	**2.50** (2.19-2.73)	**2.73** (2.38-2.99)
3-hr	**0.567** (0.516-0.628)	**0.676** (0.617-0.746)	**0.828** (0.753-0.913)	**0.979** (0.888-1.08)	**1.16** (1.05-1.28)	**1.32** (1.19-1.45)	**1.48** (1.32-1.63)	**1.65** (1.46-1.81)	**1.88** (1.64-2.06)	**2.08** (1.80-2.29)
6-hr	**0.341** (0.311-0.377)	**0.406** (0.372-0.448)	**0.499** (0.455-0.548)	**0.590** (0.537-0.647)	**0.703** (0.636-0.770)	**0.805** (0.723-0.880)	**0.907** (0.808-0.990)	**1.01** (0.894-1.11)	**1.16** (1.01-1.26)	**1.29** (1.11-1.41)
12-hr	**0.200** (0.183-0.220)	**0.238** (0.219-0.261)	**0.293** (0.269-0.322)	**0.349** (0.318-0.382)	**0.419** (0.380-0.458)	**0.483** (0.434-0.525)	**0.548** (0.488-0.595)	**0.618** (0.543-0.670)	**0.713** (0.618-0.774)	**0.801** (0.684-0.871)
24-hr	**0.119** (0.110-0.128)	**0.143** (0.134-0.155)	**0.180** (0.168-0.194)	**0.210** (0.195-0.226)	**0.249** (0.231-0.268)	**0.281** (0.260-0.303)	**0.314** (0.289-0.338)	**0.348** (0.319-0.374)	**0.394** (0.359-0.425)	**0.431** (0.391-0.465)
2-day	**0.069** (0.064-0.074)	**0.083** (0.077-0.089)	**0.103** (0.096-0.111)	**0.119** (0.111-0.129)	**0.141** (0.131-0.152)	**0.159** (0.147-0.171)	**0.177** (0.163-0.190)	**0.195** (0.179-0.210)	**0.220** (0.201-0.238)	**0.240** (0.218-0.260)
3-day	**0.048** (0.045-0.052)	**0.058** (0.054-0.062)	**0.072** (0.067-0.078)	**0.083** (0.078-0.090)	**0.099** (0.091-0.106)	**0.111** (0.102-0.119)	**0.123** (0.114-0.132)	**0.136** (0.125-0.146)	**0.153** (0.140-0.165)	**0.167** (0.152-0.180)
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)	**0.077** (0.072-0.083)	**0.087** (0.080-0.093)	**0.096** (0.089-0.103)	**0.106** (0.098-0.114)	**0.120** (0.110-0.129)	**0.131** (0.119-0.141)
7-day	**0.025** (0.024-0.027)	**0.030** (0.028-0.032)	**0.037** (0.034-0.039)	**0.042** (0.039-0.045)	**0.050** (0.046-0.053)	**0.055** (0.051-0.059)	**0.061** (0.057-0.066)	**0.067** (0.062-0.072)	**0.076** (0.070-0.081)	**0.083** (0.075-0.089)
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** (0.035-0.040)	**0.042** (0.039-0.045)	**0.046** (0.043-0.049)	**0.051** (0.047-0.054)	**0.056** (0.052-0.060)	**0.061** (0.056-0.065)
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** (0.025-0.028)	**0.029** (0.027-0.031)	**0.032** (0.029-0.034)	**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)	**0.022** (0.021-0.024)	**0.024** (0.023-0.026)	**0.026** (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** (0.013-0.014)	**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)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)

[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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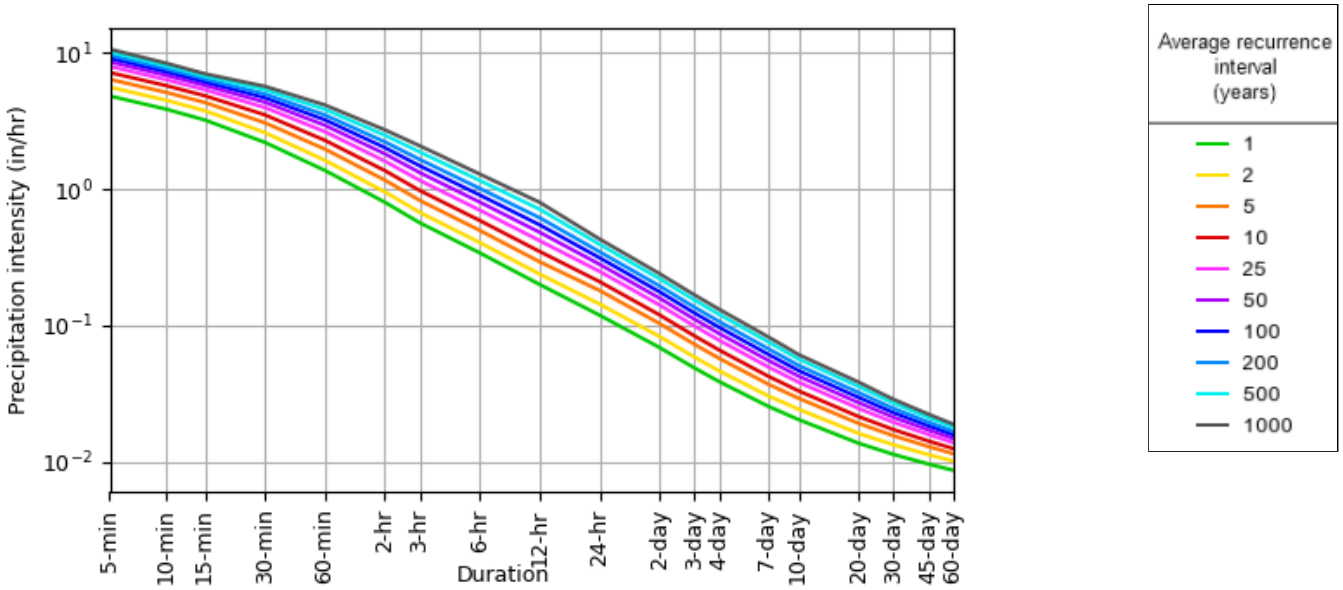
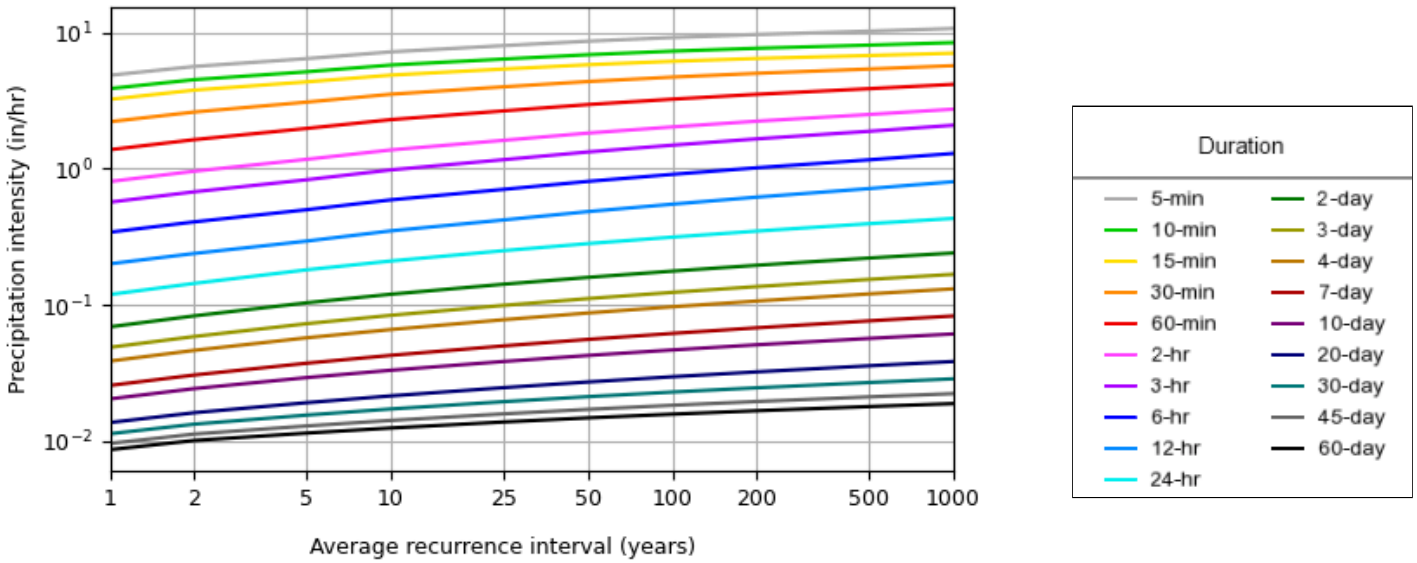
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 35.9105°, Longitude: -78.4758°





NOAA Atlas 14, Volume 2, Version 3 Created (GMT): Tue Jun 25 20:00:57 2024

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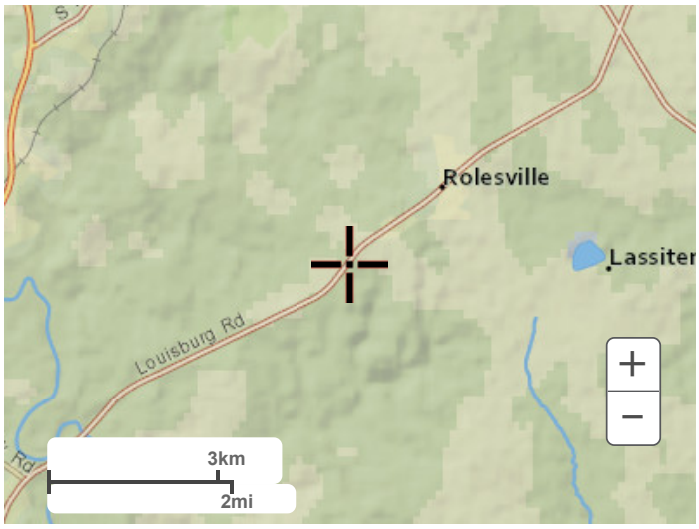
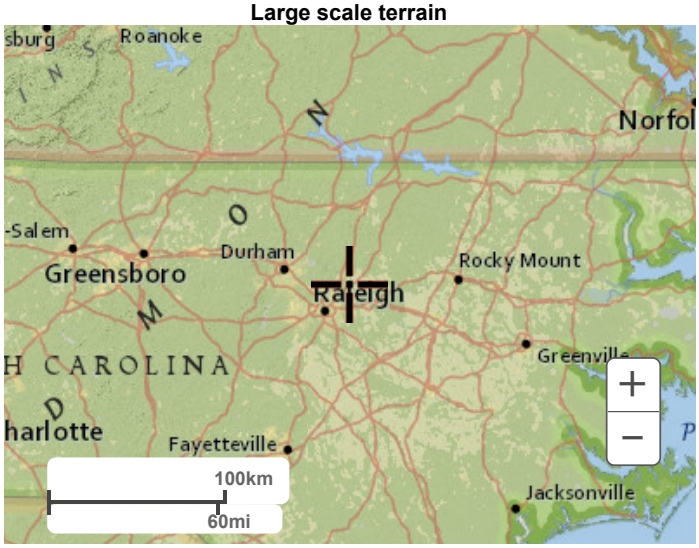
Maps & aerials

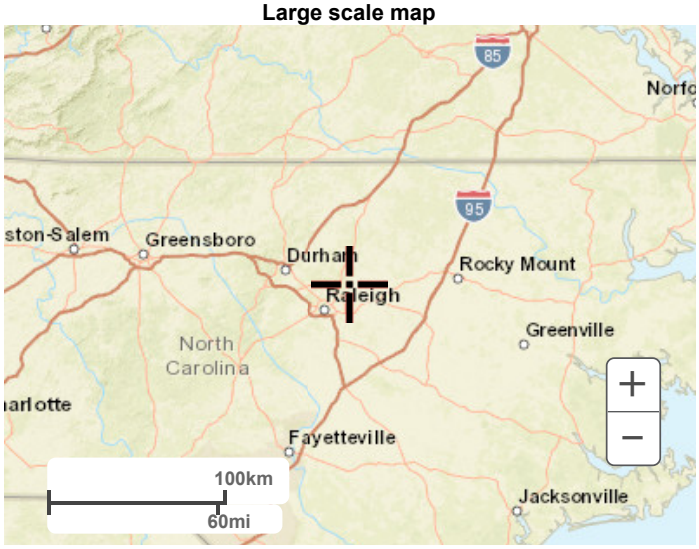
Small scale terrain



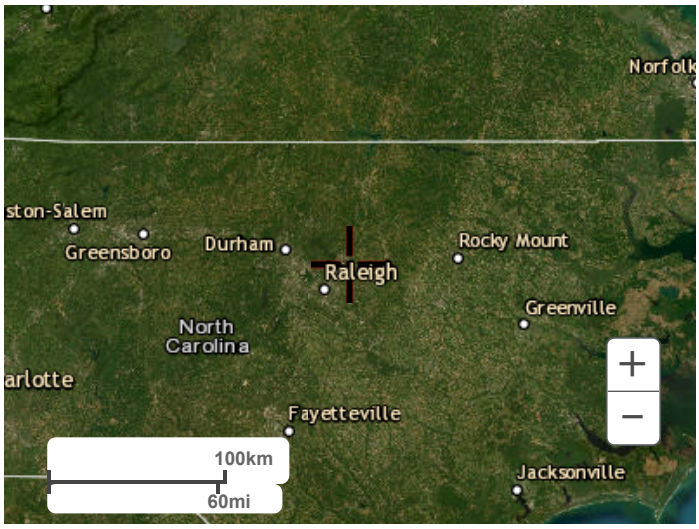
Large scale terrain



Large scale map



Large scale aerial



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

Disclaimer

APPENDIX B | STORMWATER DRAINAGE MAPS

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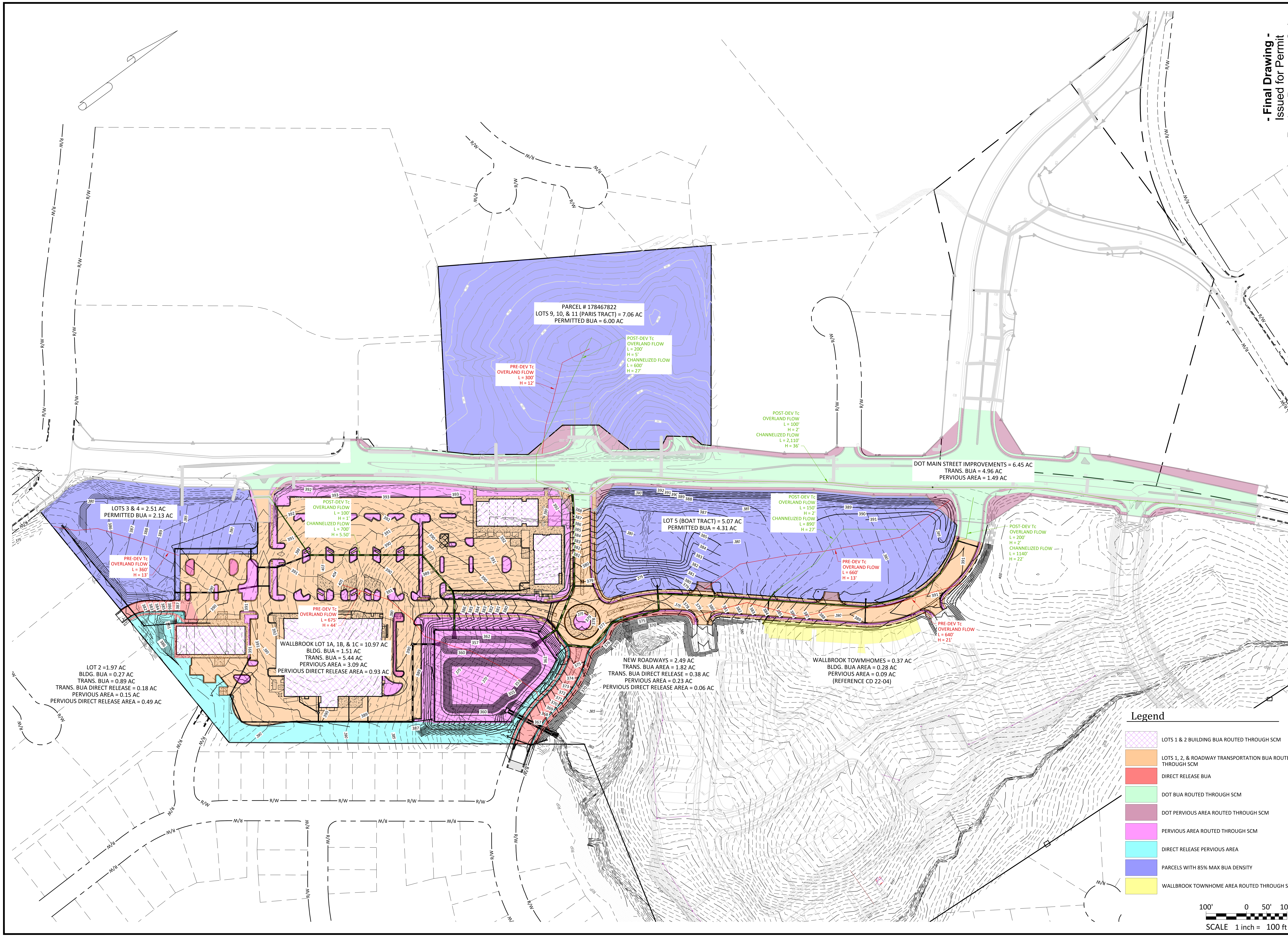


PARCEL # 178467822
LOTS 9, 10, & 11 (PARIS TRACT) = 7.06 AC
PERMITTED BUA = 6.00 AC
PRE-DEV Tc OVERLAND FLOW L = 300' H = 12'
POST-DEV Tc OVERLAND FLOW L = 200' H = 5' CHANNELIZED FLOW L = 600' H = 27'
POST-DEV Tc OVERLAND FLOW L = 100' H = 2' CHANNELIZED FLOW L = 2,110' H = 36'
DOT MAIN STREET IMPROVEMENTS = 6.45 AC
TRANS. BUA = 4.96 AC
PERVIOUS AREA = 1.49 AC
LOTS 3 & 4 = 2.51 AC
PERMITTED BUA = 2.13 AC
PRE-DEV Tc OVERLAND FLOW L = 360' H = 13'
POST-DEV Tc OVERLAND FLOW L = 100' H = 1' CHANNELIZED FLOW L = 700' H = 5.50'
LOT 5 (BOAT TRACT) = 5.07 AC
PERMITTED BUA = 4.31 AC
POST-DEV Tc OVERLAND FLOW L = 150' H = 2' CHANNELIZED FLOW L = 890' H = 27'
PRE-DEV Tc OVERLAND FLOW L = 660' H = 13'
POST-DEV Tc OVERLAND FLOW L = 200' H = 2' CHANNELIZED FLOW L = 1140' H = 22'
PRE-DEV Tc OVERLAND FLOW L = 675' H = 44'
PRE-DEV Tc OVERLAND FLOW L = 640' H = 21'
WALLBROOK LOT 1A, 1B, & 1C = 10.97 AC
BLDG. BUA = 1.51 AC
TRANS. BUA = 5.44 AC
PERVIOUS AREA = 3.09 AC
PERVIOUS DIRECT RELEASE AREA = 0.93 AC
LOT 2 =1.97 AC
BLDG. BUA = 0.27 AC
TRANS. BUA = 0.89 AC
TRANS. BUA DIRECT RELEASE = 0.18 AC
PERVIOUS AREA = 0.15 AC
PERVIOUS DIRECT RELEASE AREA = 0.49 AC
NEW ROADWAYS = 2.49 AC
TRANS. BUA AREA = 1.82 AC
TRANS. BUA DIRECT RELEASE = 0.38 AC
PERVIOUS AREA = 0.23 AC
PERVIOUS DIRECT RELEASE AREA = 0.06 AC
WALLBROOK TOWNHOMES = 0.37 AC
BLDG. BUA AREA = 0.28 AC
PERVIOUS AREA = 0.09 AC
(REFERENCE CD 22-04)
Legend
LOTS 1 & 2 BUILDING BUA ROUTED THROUGH SCM
LOTS 1, 2, & ROADWAY TRANSPORTATION BUA ROUTED THROUGH SCM
DIRECT RELEASE BUA
DOT BUA ROUTED THROUGH SCM
DOT PERVIOUS AREA ROUTED THROUGH SCM
PERVIOUS AREA ROUTED THROUGH SCM
DIRECT RELEASE PERVIOUS AREA
PARCELS WITH 85% MAX BUA DENSITY
WALLBROOK TOWNHOME AREA ROUTED THROUGH SCM
100' 0 50' 100'
SCALE 1 inch = 100 ft

- Final Drawing -
Issued for Permit
Review Puroposes Only

REVISIONS:

#	DATE	DESCRIPTION
6	18-AUG-23	REVISED PER REVIEW COMMENTS - SDP SUBMITTAL #2
5	19-JUL-23	CART CORRAL DETAIL REVISED
4	29-JUN-23	REVISED PER REVIEW COMMENTS
3	23-JUN-23	REVISED PER REVIEW COMMENTS SDP PERMIT REVIEW SUBMITTAL #1
2	24-APR-23	REVISED PER REVIEW COMMENTS
1	10-FEB-23	SHIFTED BUILDING LOCATION PER OWNER REQUEST CID PERMIT REVIEW SUBMITTAL #1

CROSLAND SOUTHEAST

DRAINAGE AREA MAP

PUBLIX AT WALLBROOK

S Main St. / US 401 and Virginia Water Drive
Rolesville, Wake County, North Carolina

NC License: P-1199
ARK CONSULTING GROUP, PLLC
ENGINEERS & PLANNERS
2755-B Charles Blvd.
Greenville, NC 27858
(252) 558-0888
www.arkconsultinggroup.com

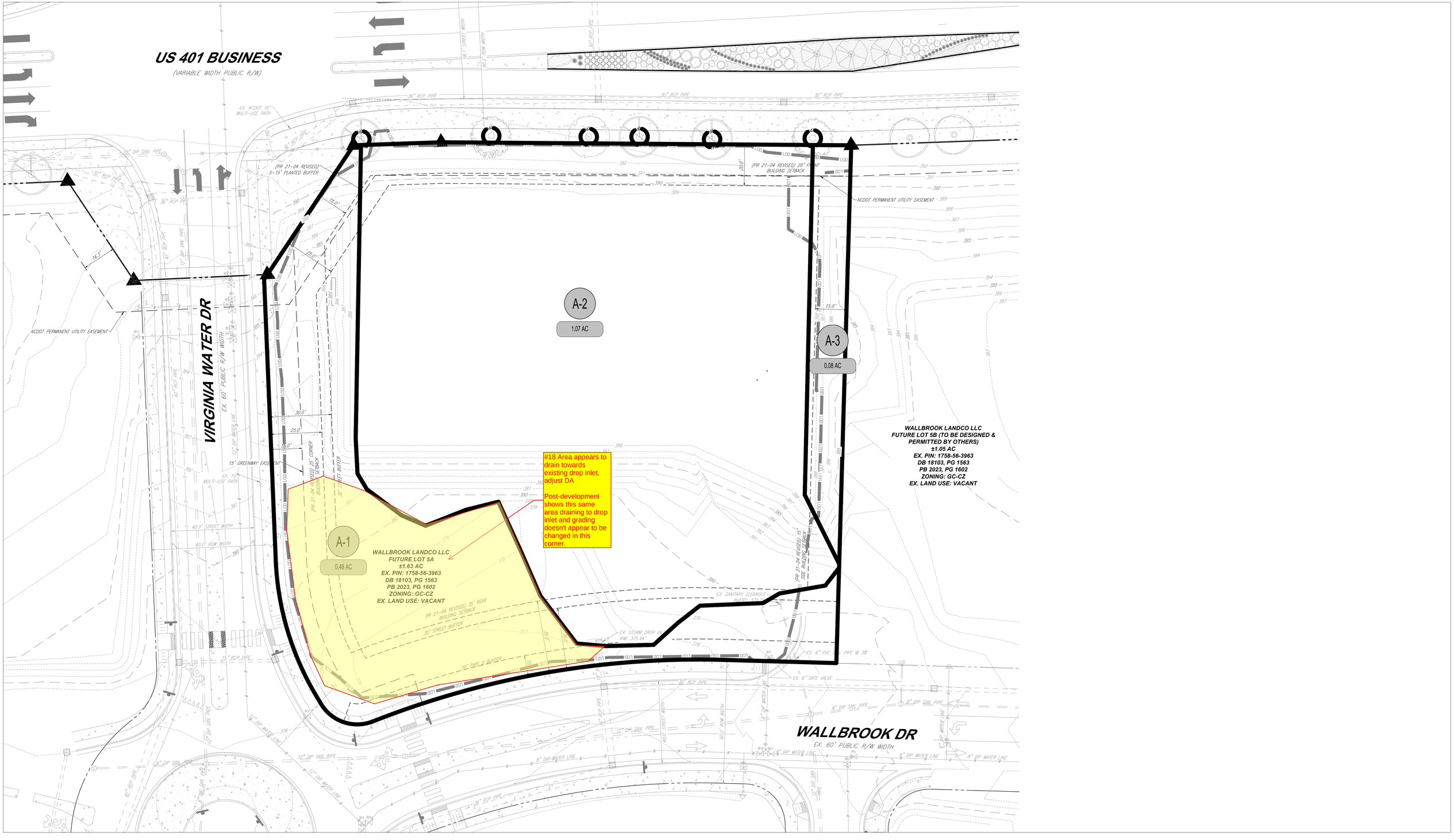
NORTH CAROLINA PROFESSIONAL SEAL 31970 ENGINEER BRYAN C. FAGUNDUS
PRELIMINARY Do Not Use for Construction
8/18/2023

Project Manager:	BCF
Drawn By:	DLC
Checked By:	STA
Project Number:	22012
Drawing Number:	D-1219-CD

DA-1

Date: February 10, 2023

D:\ARK DROPBOX\01 - PROJECTS\ACTIVE\CROSLAND SE\21089 - WALLBROOK SHOP CTR\D - DWG\03 - FINAL_XREF\DA_MAP.DWG, DA Map (1), Tim Nifong, Wed, Aug 16, 2023 @ 12:55 PM



C:\PROGRAMDATA_BOHLER\C3D2024\1\TEMP\ACPUBLISH_26224\P-EXST-DRN-NCB230114.00----3-LAYOUT C-001 DRIN

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BOHLER ENGINEERING NC, PLLC
NCBELS P-1132
4130 PARKLAKE AVENUE, SUITE 200
RALEIGH, NC 27612
Phone: (919) 578-9000
NC@BohlerEng.com

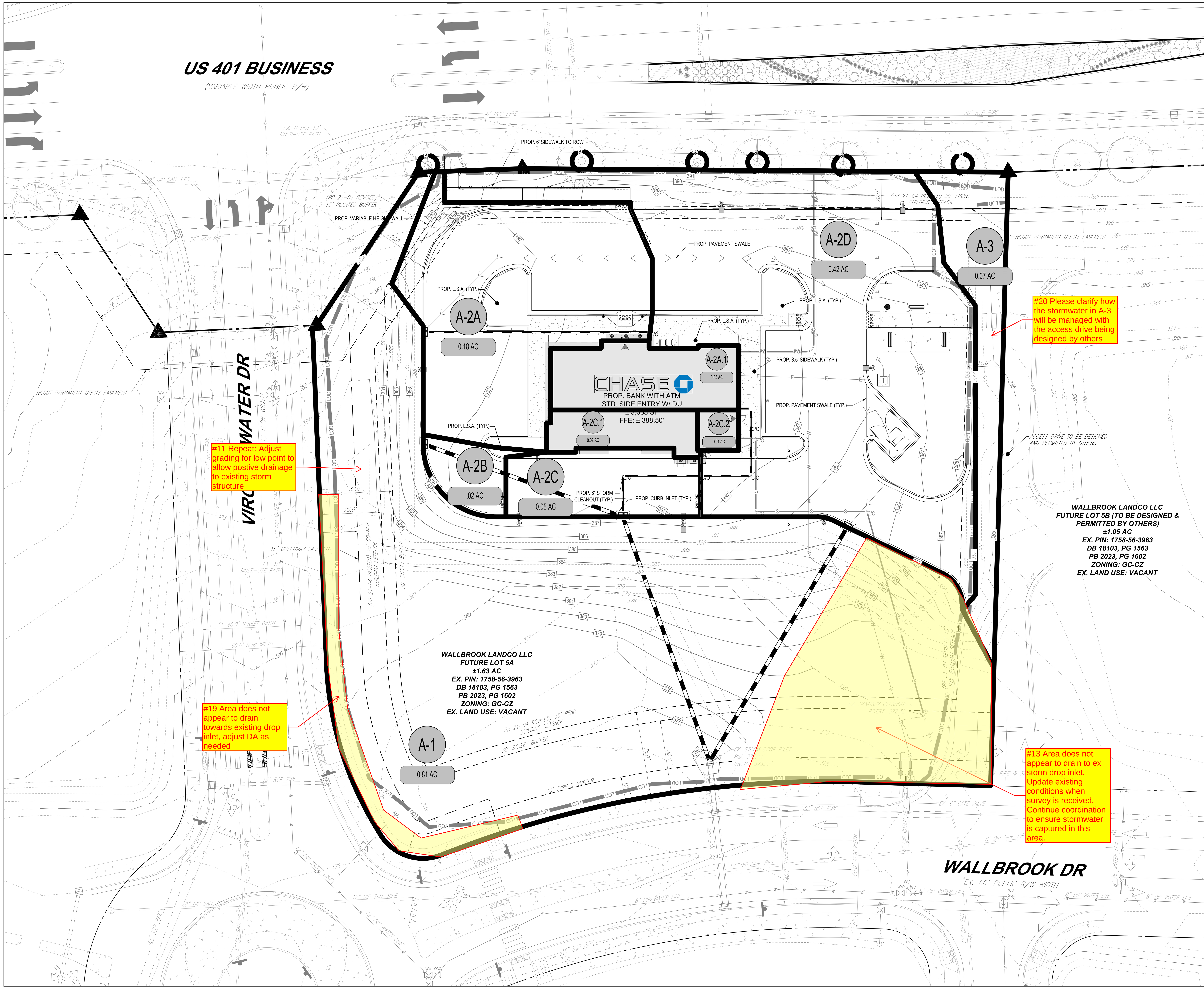
WALLBROOK CHASE PREDEVELOPMENT DRAINAGE MAP

CHASE

ROLESVILLE, NC 27571

07-01-24 | CJAC | NCB230114.00

20 10 5 0 20
1"= 20'



07-01-24 | CJAC | NCB230114.00

WALLBROOK CHASE POST DEVELOPMENT DRAINAGE MAP

CHASE

ROLESVILLE, NC 27571

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RALEIGH, NC 27612
Phone: (919) 578-9000
NC@BohlerEng.com

1"= 20'

APPENDIX C | STORMWATER ROUTING

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10-yr Storm Event							
Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Diameter (in)
A-30	376.3	A-20	375.2	87.3	0.013	0.01	15
A-20	375	EX-10	373.5	106.7	0.014	0.01	15
A-40	378	A-30	376.5	45.9	0.033	0.01	15
A-10	377	EX-10	373.5	111.7	0.031	0.01	15

25-yr Storm Event							
Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Diameter (in)
A-30	376.3	A-20	375.2	87.3	0.013	0.01	15
A-20	375	EX-10	373.5	106.7	0.014	0.01	15
A-40	378	A-30	376.5	45.9	0.033	0.01	15
A-10	377	EX-10	373.5	111.7	0.031	0.01	15

50-yr Storm Event							
Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Diameter (in)
A-30	376.3	A-20	375.2	87.3	0.013	0.01	15
A-20	375	EX-10	373.5	106.7	0.014	0.01	15
A-40	378	A-30	376.5	45.9	0.033	0.01	15
A-10	377	EX-10	373.5	111.7	0.031	0.01	15

#21 Please indicate which pipes these refer to

10-yr Storm Event					
Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Depth (Normal) / Rise (%)	Material
0.2	3.12	0.13	9.42	10.2	PVC
0.26	3.49	1.22	9.96	11.2	PVC
0.19	4.25	0.1	15.19	7.9	PVC
0.28	4.71	1.22	14.87	9.5	PVC

25-yr Storm Event					
Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Depth (Normal) / Rise (%)	Material
0.24	3.28	0.14	9.42	11.1	PVC
0.31	3.69	1.22	9.96	12.1	PVC
0.23	4.49	0.11	15.19	8.5	PVC
0.33	4.94	1.22	14.87	10.3	PVC

50-yr Storm Event					
Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Depth (Normal) / Rise (%)	Material
0.28	3.41	0.15	9.42	11.8	PVC
0.36	3.83	1.22	9.96	12.9	PVC
0.26	4.66	0.11	15.19	9	PVC
0.37	5.14	1.22	14.87	10.9	PVC

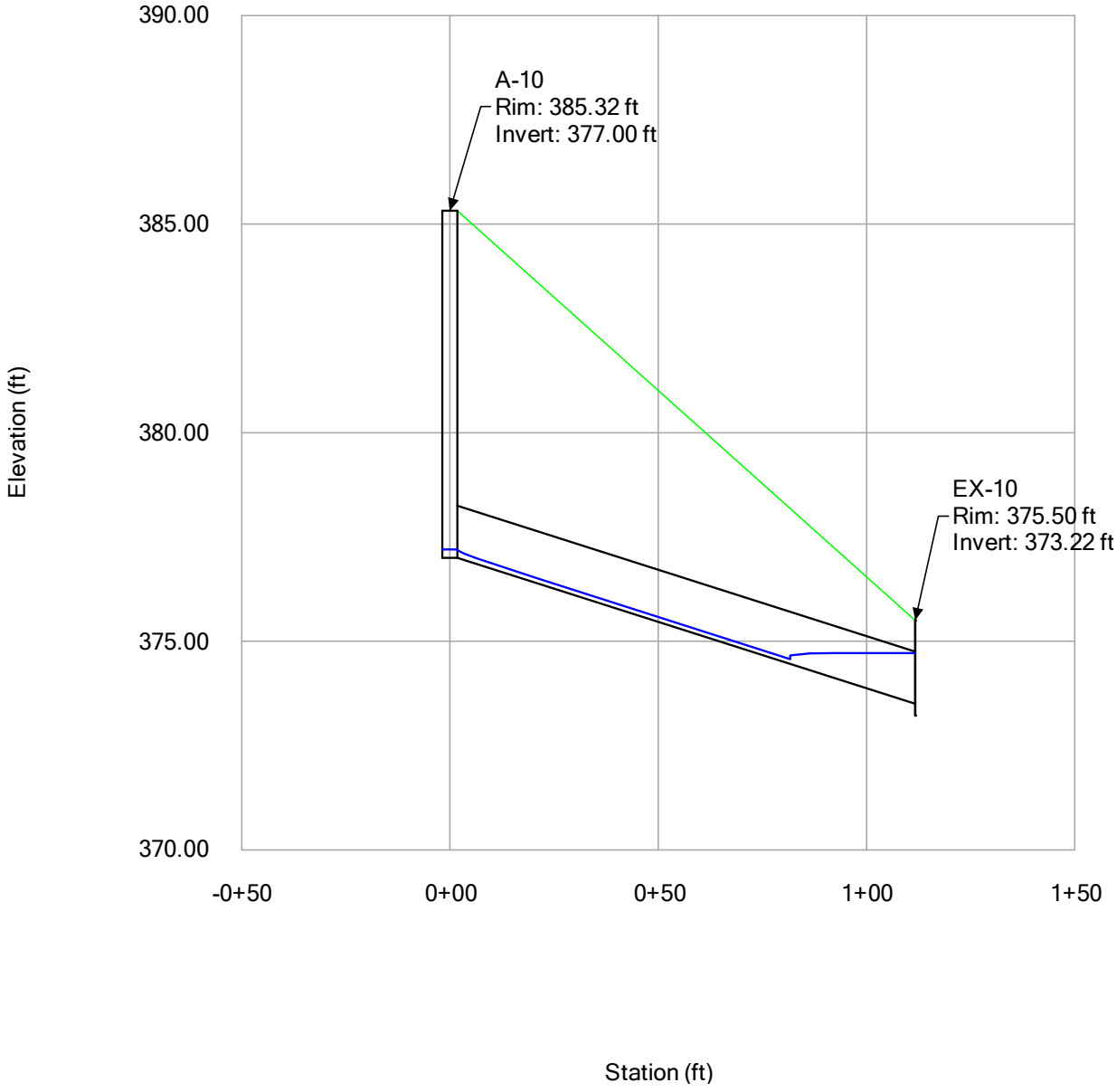
#21 Please indicate which pipes these refer to

10-yr Storm Event			
Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
376.54	375.48	376.48	375.33
375.27	374.72	375.2	374.72
378.23	376.88	378.17	376.6
377.27	374.72	377.2	374.72

25-yr Storm Event			
Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
376.56	375.51	376.49	375.34
375.29	374.72	375.22	374.72
378.25	376.92	378.18	376.61
377.3	374.72	377.22	374.72

50-yr Storm Event			
Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
376.57	375.53	376.5	375.35
375.31	374.72	375.23	374.72
378.26	376.95	378.2	376.61
377.32	374.72	377.24	374.72

Profile Report
Engineering Profile - Profile - 2 (240624 - NCB230114 - StormCAD.stsw)
10-Year



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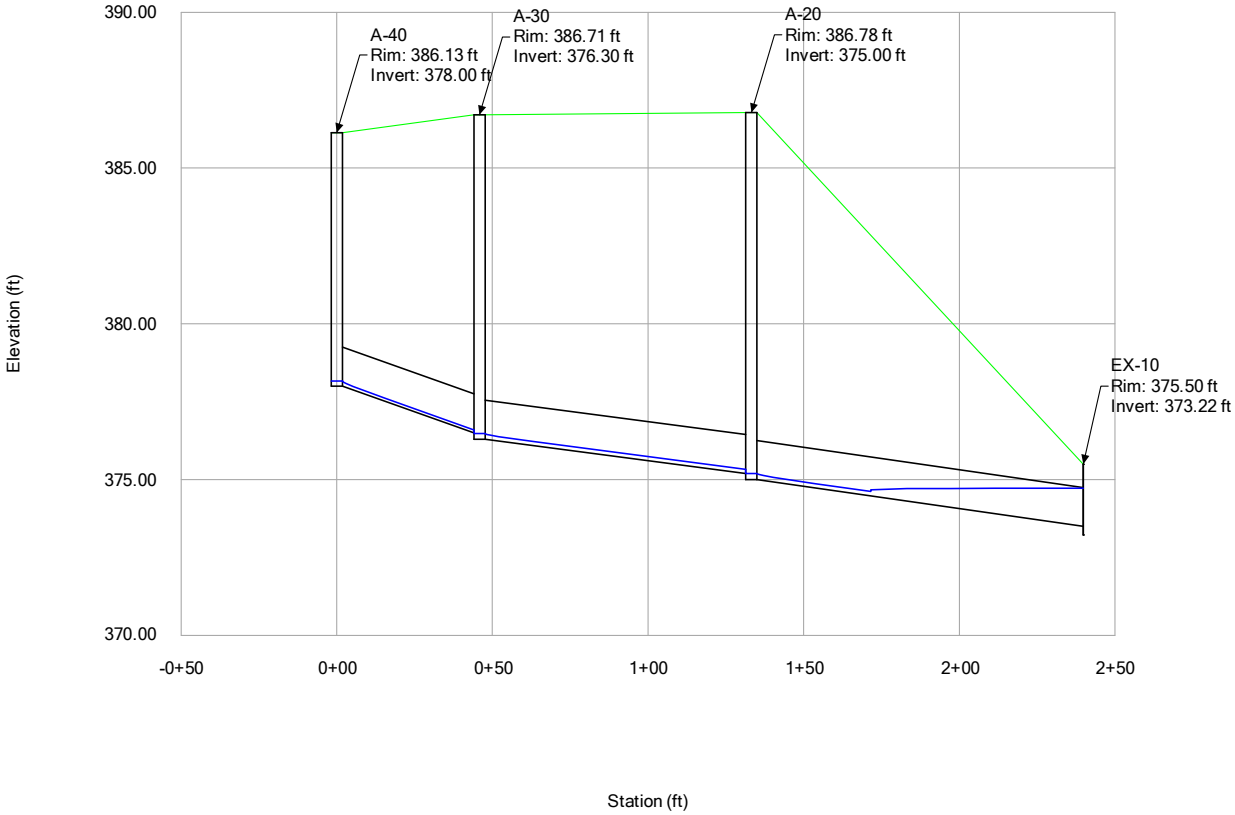
10-Year



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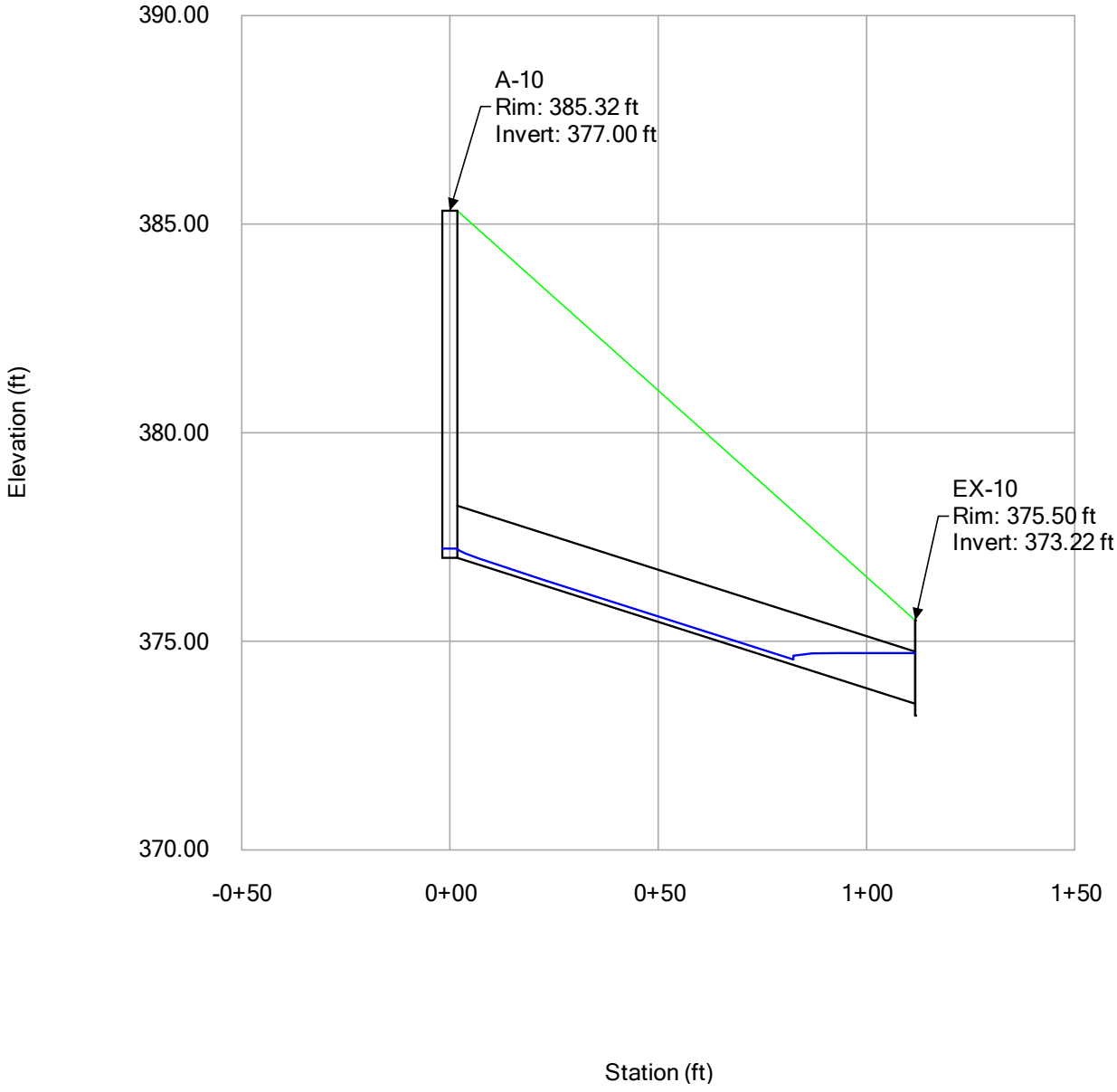
25-Year



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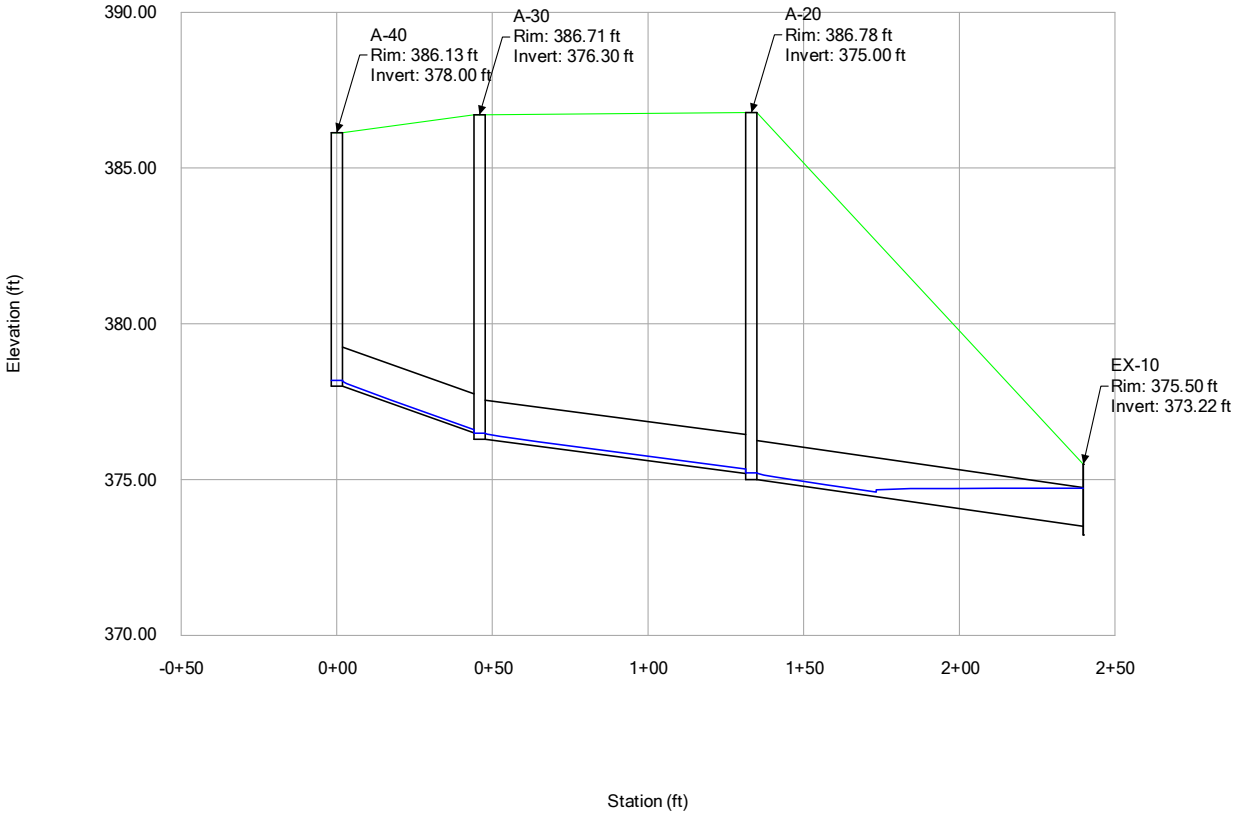
25-Year



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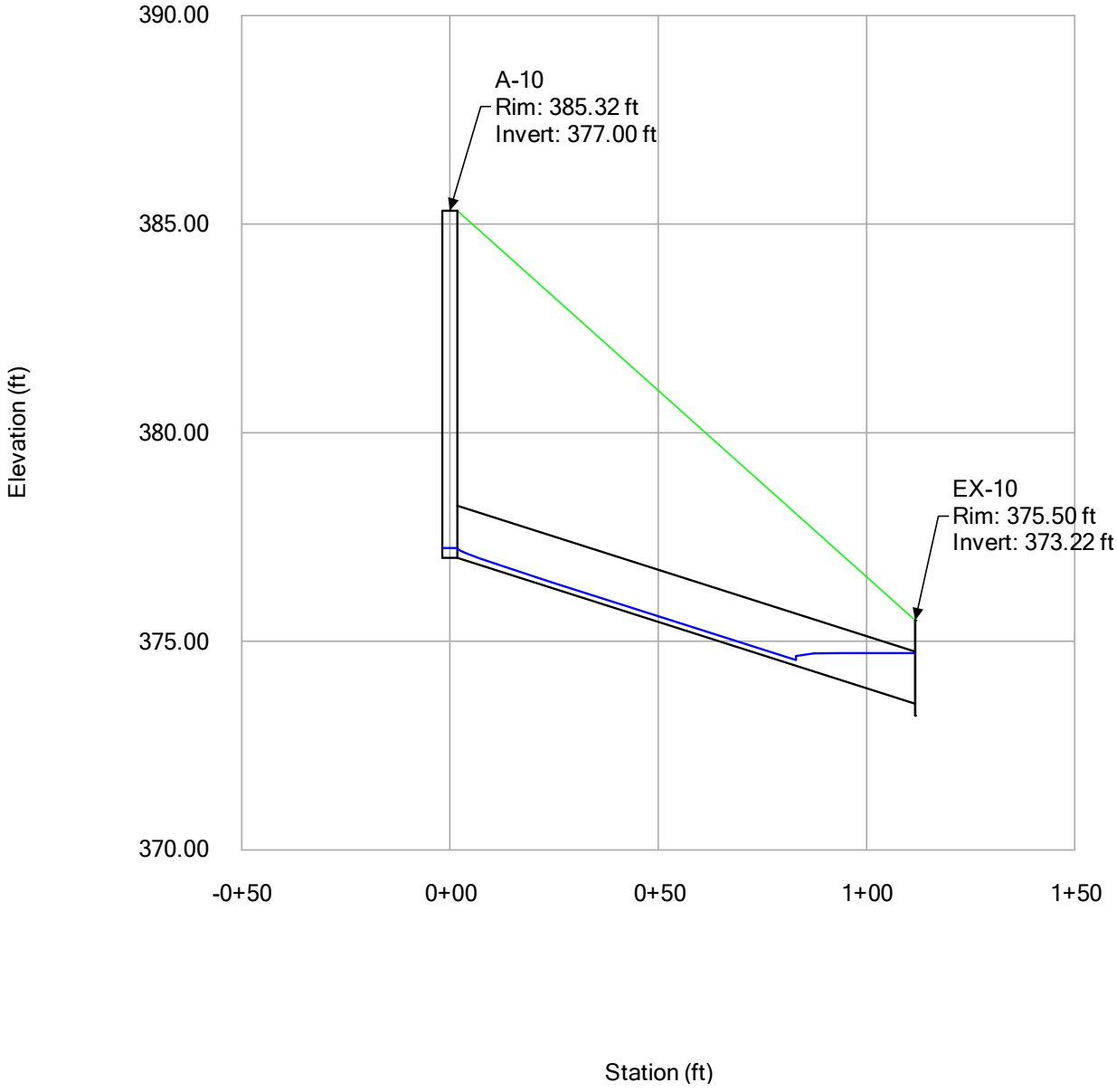
50-Year



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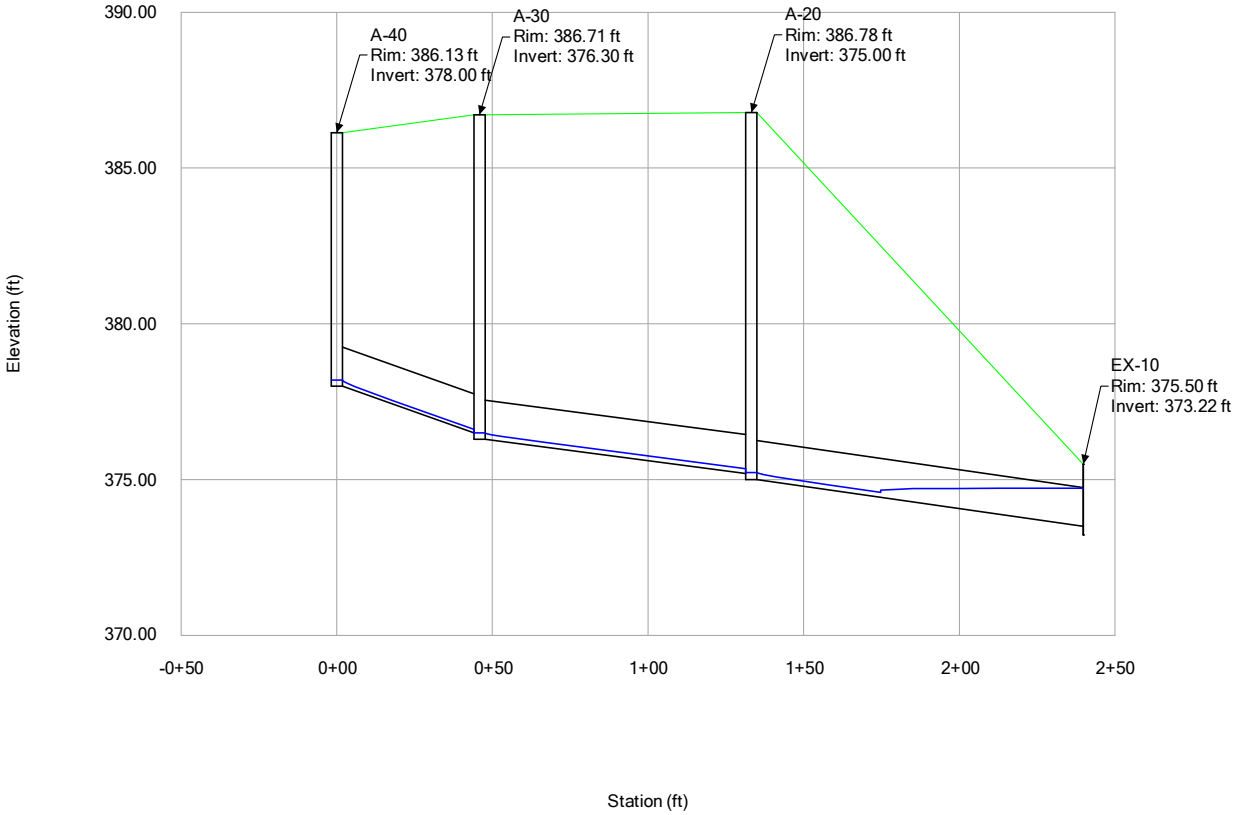
50-Year



APPENDIX D | USDA SOIL REPORT

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Hydrologic Soil Group—Wake County, North Carolina
(Wallbrook Boat Tract)

Map Scale: 1:3,090 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

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 25, Oct 2, 2023

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
RgB	Rawlings-Rion complex, 2 to 6 percent slopes	C	1.8	8.6%
RgC	Rawlings-Rion complex, 6 to 10 percent slopes	C	12.7	61.8%
RgD	Rawlings-Rion complex, 10 to 15 percent slopes	C	0.2	1.1%
Ur	Urban land		0.6	2.7%
WaE	Wake-Rolesville complex, 15 to 25 percent slopes, very rocky	D	1.5	7.3%
WfB	Wedowee-Saw complex, 2 to 6 percent slopes	B	2.2	10.7%
WgB	Wedowee-Urban land complex, 2 to 6 percent slopes	B	1.6	7.8%
Totals for Area of Interest			**20.6**	**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

APPENDIX E | EROSION CONTROL DESIGN CALCULATIONS

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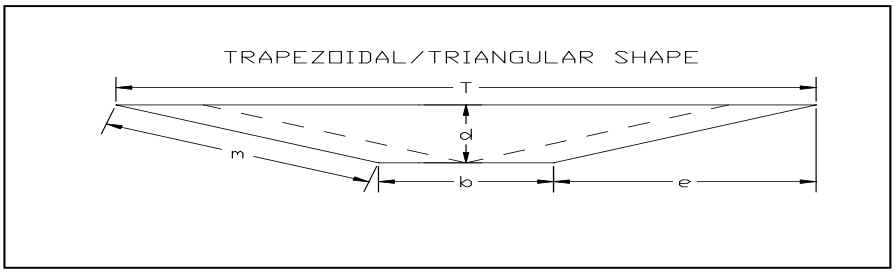
Channel Design



Channel Location: West Ditch

Estimate 10-yr Peak Runoff:

Rational C	0.50	
Intensity (in/hr) 10 yr/5 min	7.19	
Drainage Area	0.60	ac
Q10	2.16	cfs
Additional Flow	0.00	cfs
Q_{10} Total, Q_{design}	2.16	cfs

Channel Information:

Channel Bottom Width, b	0.0	ft
Side Slope (x:1)	3.0	
Channel Slope, S	0.016	ft/ft
Flow Depth, d	0.67	ft

Selected Channel Lining:

Selected Channel Lining	Straw with Net
Maximum Permissible Velocity {Vmax} (fps)	4
Permissible Shear Stress {tp} (psf)	1.45

Calculations:

e	2.0	ft
Side Slope Length, m	2.1	ft
Top Width, T	4.0	ft
Channel Area, A	1.35	sq ft
Wetted Perimeter, P_w	4.24	ft
Hydraulic Radius, Rh	0.32	ft
Mannings "n"	0.033	

Calculated Flow Rate, Q_{calc}	3.61	cfs
Calculated Velocity, V_{calc}	2.68	fps
Calculated Shear Stress, t_{calc}	0.68	psf

$Q_{calc} \geq Q_{design}$? yes
$V_{calc} \leq V_{max}$? yes
$t_{calc} \leq t_p$? yes

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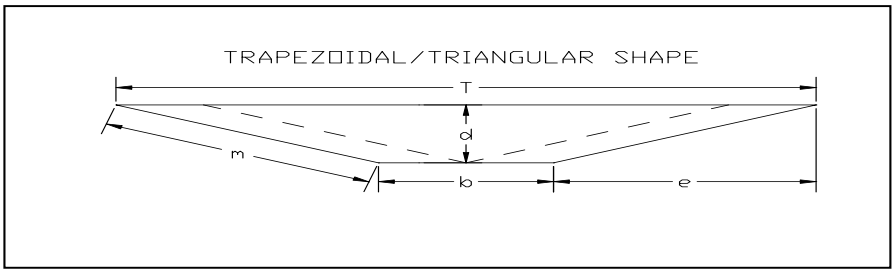
Channel Design



Channel Location: East Ditch

Estimate 10-yr Peak Runoff:

Rational C	0.50	
Intensity (in/hr) 10 yr/5 min	7.19	
Drainage Area	0.50	ac
Q10	1.80	cfs
Additional Flow	0.00	cfs
Q_{10} Total, Q_{design}	1.80	cfs

Channel Information:

Channel Bottom Width, b	0.0	ft
Side Slope (x:1)	3.0	
Channel Slope, S	0.038	ft/ft
Flow Depth, d	0.67	ft

Selected Channel Lining:

Selected Channel Lining	6-inch D50
Maximum Permissible Velocity {Vmax} (fps)	6
Permissible Shear Stress {tp} (psf)	2.00

Calculations:

e	2.0	ft
Side Slope Length, m	2.1	ft
Top Width, T	4.0	ft
Channel Area, A	1.35	sq ft
Wetted Perimeter, P_w	4.24	ft
Hydraulic Radius, Rh	0.32	ft
Mannings "n"	0.069	

Calculated Flow Rate, Q_{calc}	2.63	cfs
Calculated Velocity, V_{calc}	1.95	fps
Calculated Shear Stress, t_{calc}	1.57	psf

$Q_{calc} \geq Q_{design}$? yes
$V_{calc} \leq V_{max}$? yes
$t_{calc} \leq t_p$? yes