Storm Water & Erosion Control
Design Calculations

January 10, 2023

Tractor Supply
Old US Highway 264
Zebulon, NC
Wake County

Prepared for:
Primax Properties, LLC
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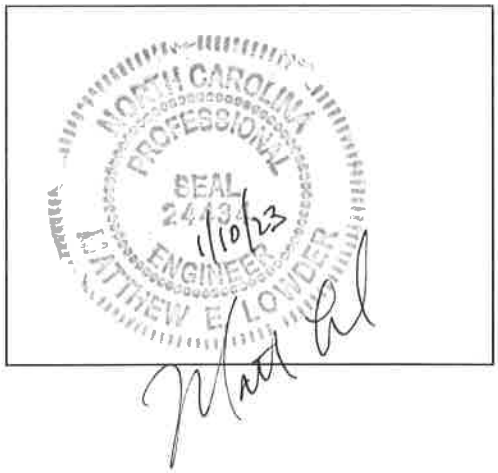

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FIRM# F-1445

Bowman

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OVERVIEW

Background

This report contains the storm water management and erosion control calculations for the proposed Tractor Supply retail site. The project site is located on Old US Highway 264, Zebulon in Wake County and is undeveloped open and wooded area. The proposed project site consists of 3.766 acres and approximately 5.69 acres will be disturbed as part of this project for the construction of the site improvements.

The development of the site will result in an impervious area of 109,774sf (2.52 ac – 66.91% impervious).

The proposed parcel is not located within a FEMA designated flood zone as shown on FEMA FIRM Panel 3720270500K with an effective date of July 19, 2022

There are no wetland features on the proposed property.

There are proposed storm water management facilities (wet pond and level spreader–filter strip) on site. The design includes the Tractor Supply site (164,059 sf–3.766 ac) and the 2.52 ac parcel to the west and assumes 80% impervious (87,863 sf–2.02 ac). The SCM outlined in this report has been designed for post–development peak attenuation and water quality. The SCM is designed to capture a drainage area of 5.57 ac with an impervious area of 4.55 ac. A level spreader will be used as a secondary SCM receiving the 1.0" storm from the stormwater wetland pond. The level spreader is designed to treat a 0.75" storm event. The site grading and storm drainage systems are designed to convey stormwater runoff from the impervious areas of the site to the stormwater wetland pond and level spreader–filter strip. The site is not located within a coastal county, therefore the design storm for water quality is a 1.0" storm event. The SCMs are designed per the Town of Zebulon stormwater UDO.

The site must also meet Neuse Watershed Nutrient requirements. The TN export for the pre–developed conditions is 4.52 lbs/yr which is a rate of 1.20 lbs/ac/yr for the project area. The increase in impervious area will result in a TN export rate of 54.92 lbs/yr which is at a rate of 14.58 lbs/ac/yr. Since the rate is above the 3.6 lbs/ac/yr threshold, a stormwater SCM system will be required to reduce the TN export from the site. A wet pond and level spreader filter strip is proposed for the project to capture the runoff from the developed areas of the property and treat it for water quality and water quantity control. The TN export rate for the site after the SCM will be 33.893 lbs/yr which is a rate of 9.00 lbs/ac/yr. The property owner will need to participate in the buy–down process to mitigate the additional

nitrogen load because the 3.6lbs/ac/yr threshold established as part of the Neuse River requirements has been exceed.

A downstream impact analysis is included per the 10% rule. The analysis point has a drainage area of approximately 50.2 acres, a little less than 10% of the proposed development drainage area. The Pre-Developed flow for the 10-year storm event is 15.39 cfs. The Post-Developed to Pond flow for the 10-year storm event incorporating the SCM is 14.126 cfs. The difference in flow is 1.264 cfs, which incorporates the proposed development. This will be subtracted to the 64.8 cfs from StreamStats calculated 10-year peak flood flow equaling 63.536 cfs. There will be no impacts downstream.

Erosion Control

Erosion control measures have been designed in accordance with Wake County and NCDEQ erosion control standards and regulations to minimize sediment laden runoff from exiting the site. Silt fence will be installed along the low sides of the site prior to construction. The construction entrance will be installed prior to construction commencing. A skimmer basin will be used to treat stormwater runoff prior to leaving the site. Accumulated sediment within the project site will need to be removed and the pond constructed to final design conditions prior to final acceptance of the project.

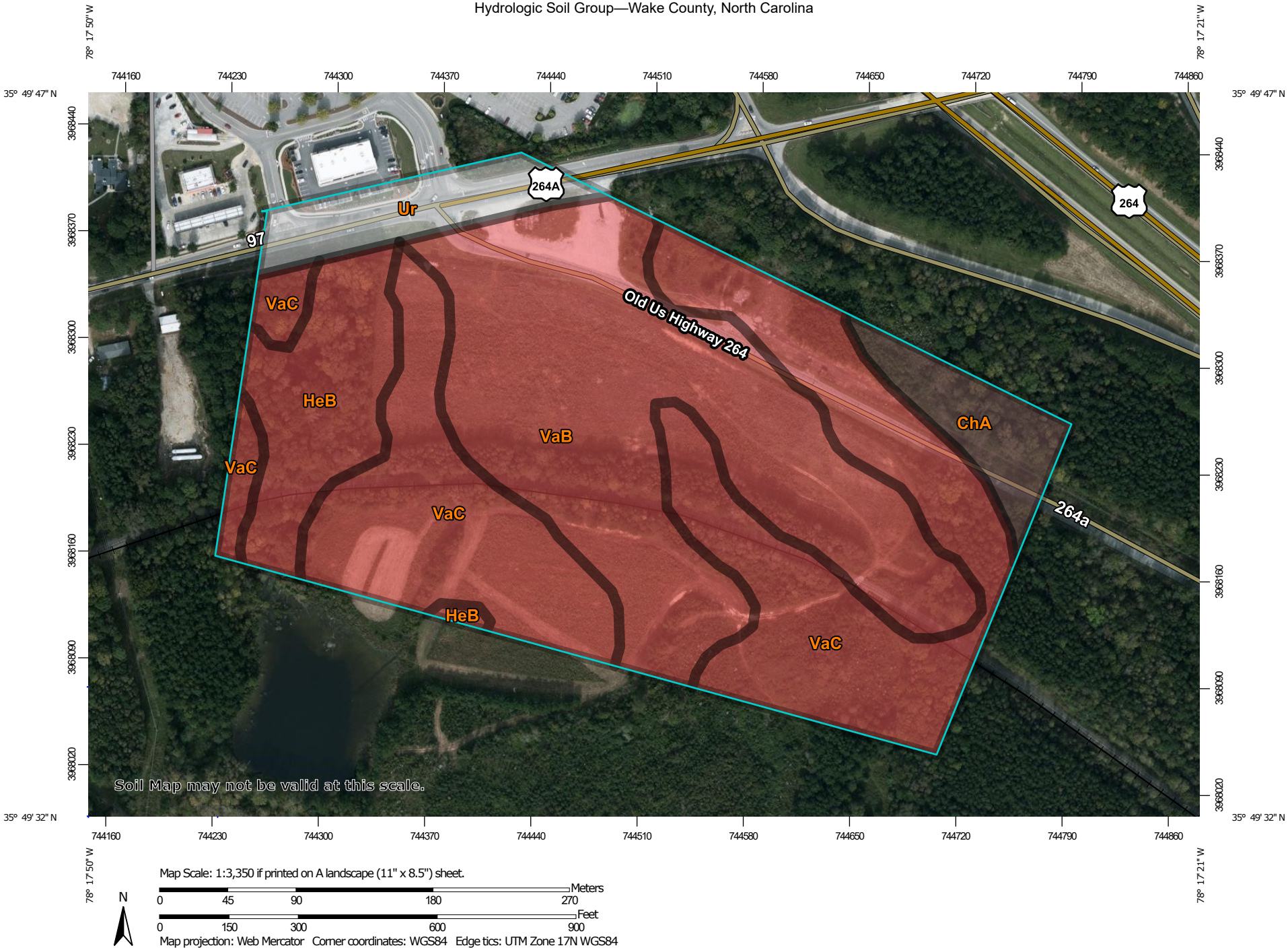
Soils

The County Soils Survey indicates that Vance and Helena Sandy Loam soils are present on the site.

Site Stabilization

After final grading is completed, permanent vegetation shall be applied in accordance with the seeding requirements and landscape plan for this site.

FIGURES



Map Scale: 1:3,350 if printed on A landscape (11" x 8.5") 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 22, Jan 21, 2022

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

Date(s) aerial images were photographed: Oct 22, 2018—Oct 25, 2018

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
ChA	Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded	B/D	1.8	5.2%
HeB	Helena sandy loam, 2 to 6 percent slopes	D	3.5	10.0%
Ur	Urban land		2.0	5.7%
VaB	Vance sandy loam, 2 to 6 percent slopes	D	13.2	37.7%
VaC	Vance sandy loam, 6 to 10 percent slopes	D	14.5	41.5%
Totals for Area of Interest			**35.1**	**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

WAKE COUNTY, NORTH CAROLINA — SHEET NUMBER 44

N

Scale 1:15840

1 Mile 5000 Feet

(Joins sheet 34)

(Joins sheet 43)

(Joins sheet 54)

Beaver Chapel

Wakefield Ch

Shepard School

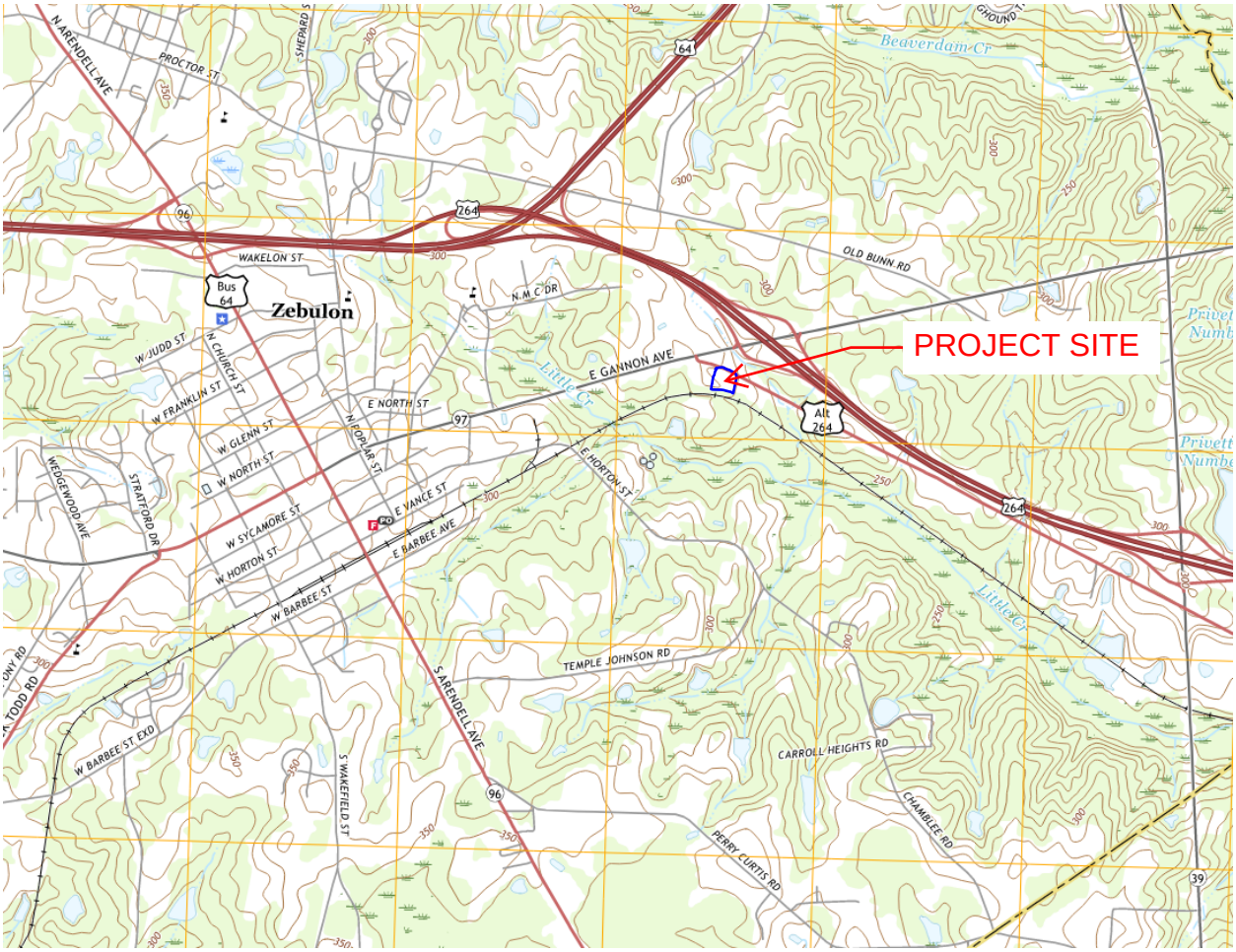
ZEBULON

Beaverdam Creek

Wyrick Creek

Franklin County

PROJECT SITE


PROJECT SITE
Zebulon
E GANNON AVE
OLD BUNN RD
WAKELON ST
N ARENDELL AVE
PROCTOR ST
SHEPARD ST
N CHURCH ST
W JUDD ST
W FRANKLIN ST
W GLENN ST
W NORTH ST
E NORTH ST
N POPLAR ST
WEDGEWOOD AVE
STRATFORD DR
W SYCAMORE ST
W HORTON ST
W BARBEE ST
E VANCE ST
E BARBEE AVE
E HORTON ST
W BARBEE ST EXD
S WAKEFIELD ST
S ARENDELL AVE
TEMPLE JOHNSON RD
CARROLL HEIGHTS RD
CHAMBLEE RD
PERRY CURTIS RD
Beaverdam Cr
Little Cr
Bus 64
Alt 264
64
264
96
97
39

National Flood Hazard Layer FIRMette

FEMA

78°17'58"W 35°49'57"N

78°17'20"W 35°49'28"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 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*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

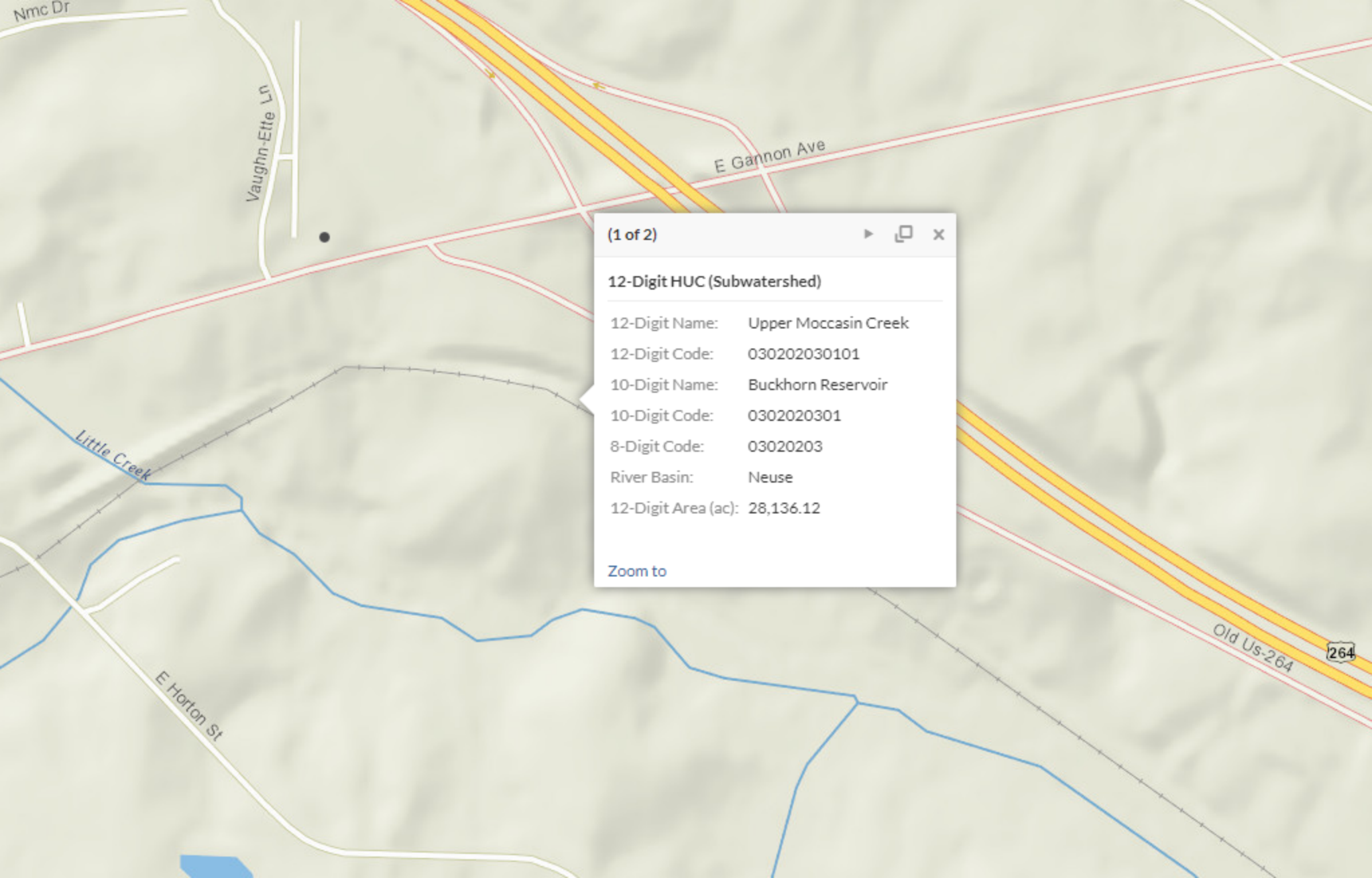
N

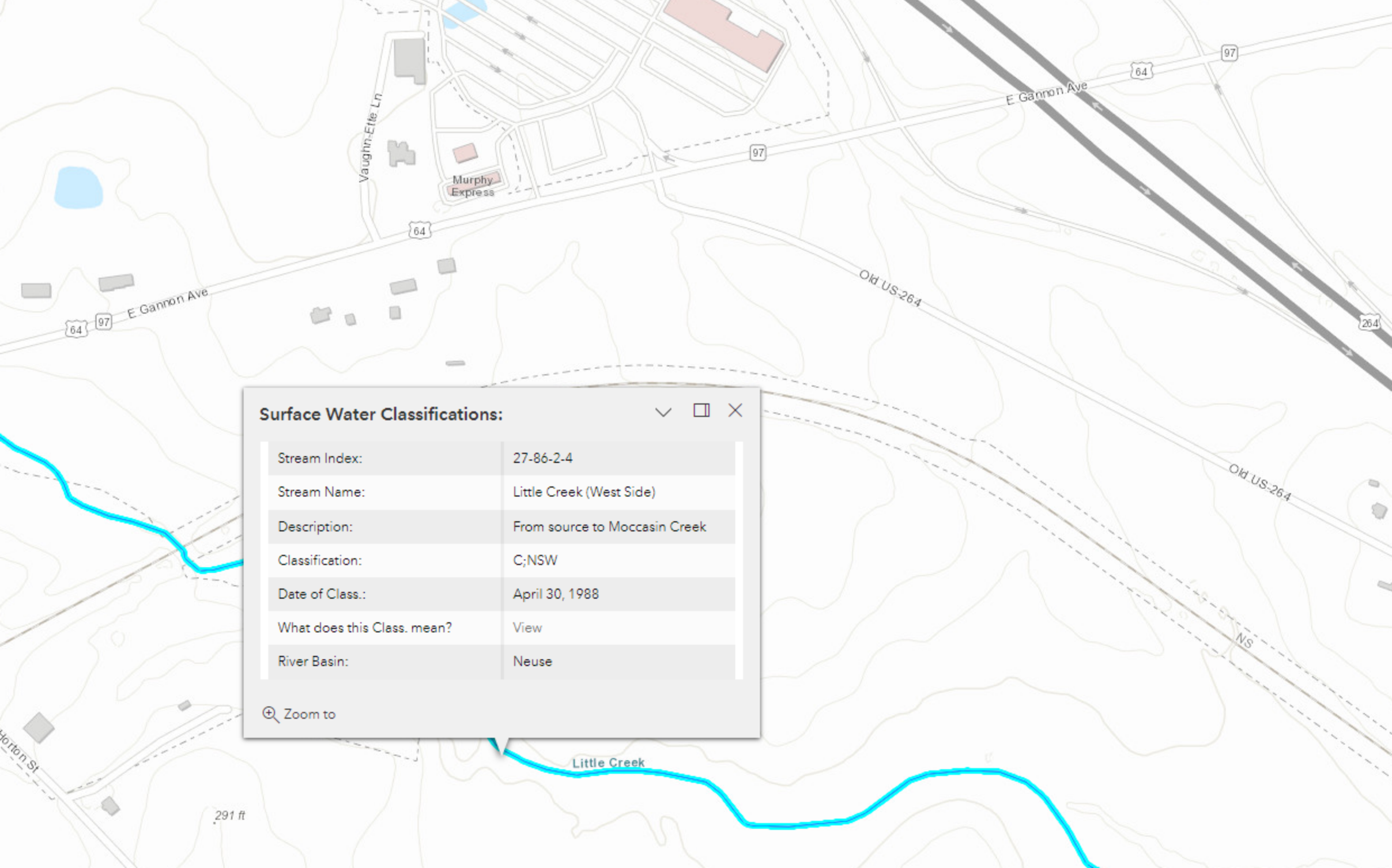
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/5/2023 at 12:57 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.


Nmc Dr
Vaughn-Ette Ln
E Gannon Ave
(1 of 2)
12-Digit HUC (Subwatershed)
12-Digit Name: Upper Moccasin Creek
12-Digit Code: 030202030101
10-Digit Name: Buckhorn Reservoir
10-Digit Code: 0302020301
8-Digit Code: 03020203
River Basin: Neuse
12-Digit Area (ac): 28,136.12
Zoom to
Little Creek
E Horton St
Old Us-264
264


Surface Water Classifications:
Stream Index: 27-86-2-4
Stream Name: Little Creek (West Side)
Description: From source to Moccasin Creek
Classification: C;NSW
Date of Class.: April 30, 1988
What does this Class. mean? View
River Basin: Neuse
Zoom to
E Gannon Ave
Old US-264
Vaughn-Ette Ln
Murphy Express
Little Creek
291 ft
64
97
264

NOAA Atlas 14, Volume 2, Version 3
Location name: Zebulon, North Carolina, USA*
Latitude: 35.8183°, Longitude: -78.3283°
Elevation: 326.74 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	**0.406** (0.370-0.445)	**0.469** (0.429-0.513)	**0.532** (0.487-0.582)	**0.602** (0.549-0.658)	**0.672** (0.610-0.733)	**0.729** (0.660-0.797)	**0.781** (0.702-0.852)	**0.828** (0.740-0.905)	**0.881** (0.781-0.964)	**0.932** (0.819-1.02)
10-min	**0.648** (0.591-0.711)	**0.750** (0.686-0.821)	**0.852** (0.779-0.932)	**0.963** (0.879-1.05)	**1.07** (0.972-1.17)	**1.16** (1.05-1.27)	**1.24** (1.12-1.35)	**1.31** (1.17-1.44)	**1.39** (1.24-1.53)	**1.47** (1.29-1.61)
15-min	**0.810** (0.739-0.889)	**0.943** (0.863-1.03)	**1.08** (0.986-1.18)	**1.22** (1.11-1.33)	**1.36** (1.23-1.48)	**1.47** (1.33-1.61)	**1.57** (1.41-1.71)	**1.66** (1.48-1.81)	**1.75** (1.56-1.92)	**1.84** (1.62-2.02)
30-min	**1.11** (1.01-1.22)	**1.30** (1.19-1.43)	**1.53** (1.40-1.68)	**1.77** (1.61-1.93)	**2.01** (1.83-2.19)	**2.22** (2.00-2.42)	**2.40** (2.16-2.62)	**2.58** (2.30-2.82)	**2.79** (2.48-3.06)	**2.98** (2.62-3.27)
60-min	**1.38** (1.26-1.52)	**1.63** (1.50-1.79)	**1.96** (1.80-2.15)	**2.30** (2.10-2.51)	**2.68** (2.43-2.92)	**3.00** (2.72-3.28)	**3.31** (2.98-3.61)	**3.62** (3.23-3.95)	**4.01** (3.55-4.38)	**4.35** (3.83-4.78)
2-hr	**1.62** (1.47-1.79)	**1.92** (1.75-2.11)	**2.33** (2.12-2.57)	**2.77** (2.51-3.04)	**3.28** (2.95-3.60)	**3.75** (3.36-4.11)	**4.20** (3.74-4.60)	**4.67** (4.13-5.12)	**5.30** (4.64-5.80)	**5.87** (5.10-6.44)
3-hr	**1.71** (1.55-1.91)	**2.03** (1.85-2.25)	**2.48** (2.26-2.75)	**2.97** (2.69-3.27)	**3.55** (3.20-3.91)	**4.09** (3.66-4.50)	**4.63** (4.11-5.09)	**5.21** (4.58-5.72)	**5.98** (5.21-6.58)	**6.72** (5.78-7.40)
6-hr	**2.05** (1.87-2.27)	**2.44** (2.23-2.69)	**2.98** (2.71-3.28)	**3.56** (3.24-3.92)	**4.28** (3.86-4.69)	**4.95** (4.44-5.42)	**5.63** (5.00-6.16)	**6.35** (5.59-6.94)	**7.35** (6.38-8.02)	**8.29** (7.10-9.08)
12-hr	**2.42** (2.21-2.67)	**2.87** (2.63-3.15)	**3.52** (3.22-3.87)	**4.24** (3.85-4.65)	**5.13** (4.63-5.61)	**5.97** (5.35-6.51)	**6.83** (6.06-7.44)	**7.77** (6.81-8.45)	**9.07** (7.83-9.87)	**10.3** (8.77-11.2)
24-hr	**2.86** (2.65-3.09)	**3.46** (3.21-3.75)	**4.39** (4.07-4.75)	**5.15** (4.76-5.57)	**6.21** (5.71-6.71)	**7.08** (6.49-7.66)	**8.01** (7.30-8.66)	**9.00** (8.15-9.74)	**10.4** (9.34-11.3)	**11.6** (10.3-12.6)
2-day	**3.31** (3.07-3.57)	**3.99** (3.71-4.31)	**5.02** (4.66-5.43)	**5.86** (5.43-6.33)	**7.03** (6.48-7.59)	**7.99** (7.33-8.62)	**9.00** (8.21-9.73)	**10.1** (9.14-10.9)	**11.6** (10.4-12.6)	**12.9** (11.4-14.0)
3-day	**3.51** (3.27-3.78)	**4.23** (3.94-4.55)	**5.30** (4.93-5.70)	**6.15** (5.71-6.62)	**7.36** (6.80-7.91)	**8.34** (7.67-8.97)	**9.37** (8.57-10.1)	**10.5** (9.51-11.3)	**12.0** (10.8-13.0)	**13.3** (11.9-14.4)
4-day	**3.72** (3.47-3.99)	**4.47** (4.17-4.79)	**5.57** (5.19-5.97)	**6.45** (6.00-6.91)	**7.68** (7.11-8.23)	**8.69** (8.01-9.32)	**9.74** (8.93-10.5)	**10.8** (9.89-11.7)	**12.4** (11.2-13.4)	**13.7** (12.3-14.8)
7-day	**4.32** (4.04-4.62)	**5.17** (4.83-5.53)	**6.36** (5.94-6.81)	**7.32** (6.82-7.83)	**8.65** (8.04-9.26)	**9.72** (8.99-10.4)	**10.8** (9.98-11.6)	**12.0** (11.0-12.9)	**13.6** (12.4-14.7)	**15.0** (13.5-16.2)
10-day	**4.93** (4.62-5.26)	**5.88** (5.51-6.27)	**7.13** (6.68-7.60)	**8.12** (7.59-8.65)	**9.48** (8.84-10.1)	**10.6** (9.82-11.3)	**11.7** (10.8-12.5)	**12.8** (11.8-13.7)	**14.4** (13.2-15.5)	**15.7** (14.3-16.9)
20-day	**6.61** (6.22-7.04)	**7.83** (7.37-8.34)	**9.34** (8.78-9.94)	**10.5** (9.89-11.2)	**12.2** (11.4-13.0)	**13.5** (12.6-14.4)	**14.8** (13.8-15.8)	**16.2** (15.0-17.3)	**18.0** (16.6-19.3)	**19.5** (17.8-20.9)
30-day	**8.21** (7.75-8.72)	**9.68** (9.14-10.3)	**11.4** (10.7-12.1)	**12.7** (11.9-13.5)	**14.4** (13.5-15.3)	**15.8** (14.8-16.8)	**17.2** (16.0-18.2)	**18.5** (17.2-19.7)	**20.4** (18.9-21.8)	**21.8** (20.1-23.3)
45-day	**10.4** (9.91-11.0)	**12.3** (11.6-13.0)	**14.2** (13.4-15.0)	**15.6** (14.8-16.5)	**17.6** (16.6-18.6)	**19.1** (18.0-20.1)	**20.5** (19.3-21.7)	**22.0** (20.6-23.3)	**23.9** (22.3-25.4)	**25.4** (23.6-27.0)
60-day	**12.5** (11.9-13.2)	**14.7** (13.9-15.4)	**16.8** (15.9-17.6)	**18.4** (17.4-19.4)	**20.5** (19.4-21.6)	**22.1** (20.8-23.3)	**23.6** (22.2-24.9)	**25.1** (23.6-26.6)	**27.1** (25.4-28.8)	**28.6** (26.7-30.4)

[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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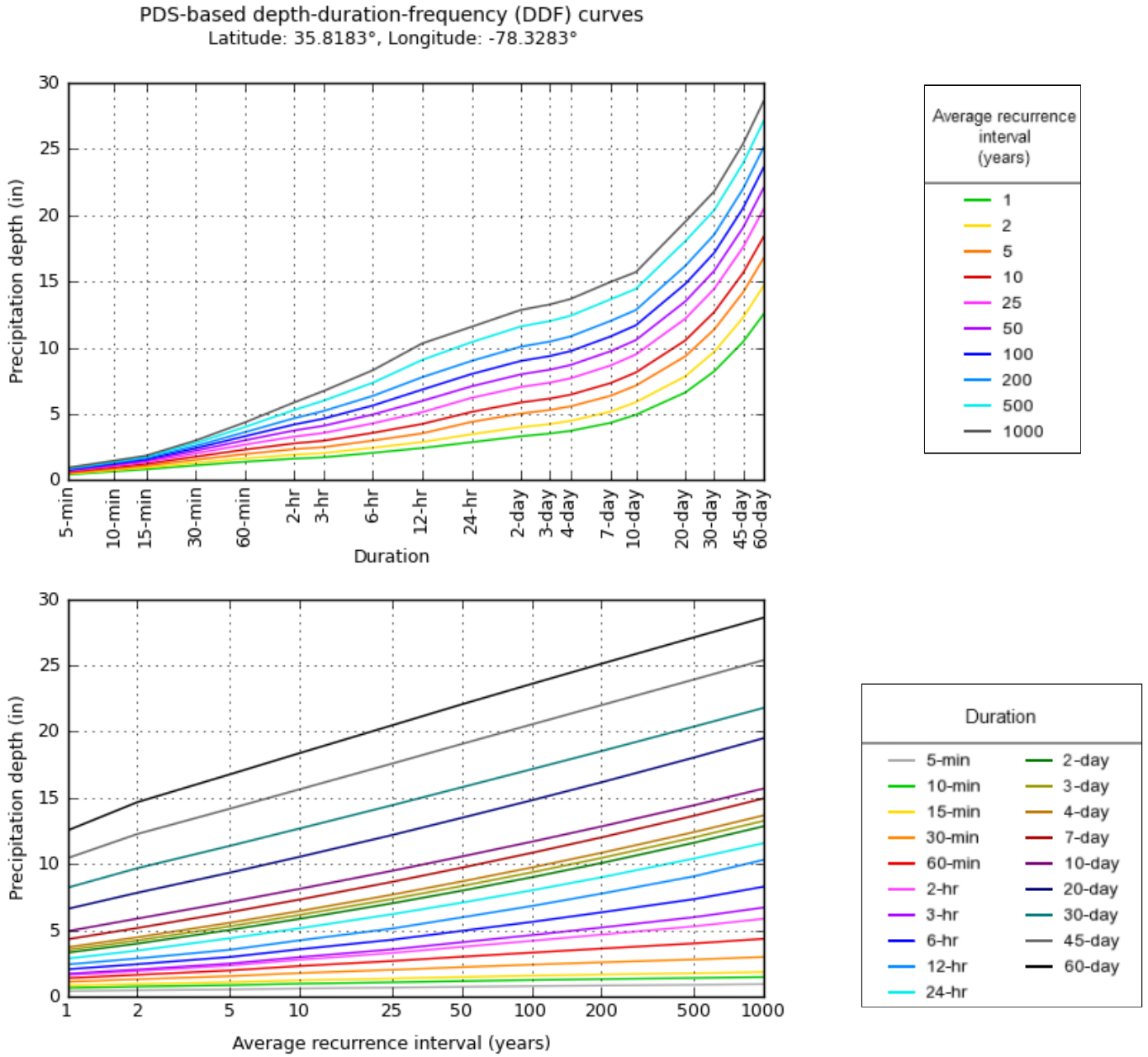
PF graphical



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Tue Oct 26 15:49:44 2021

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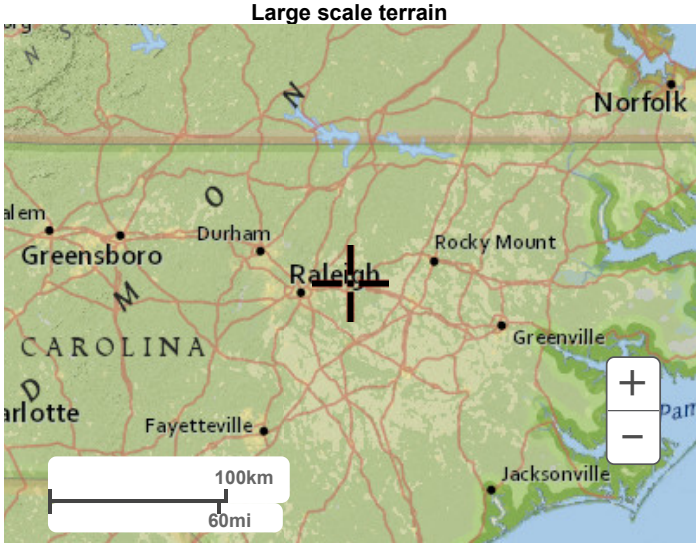
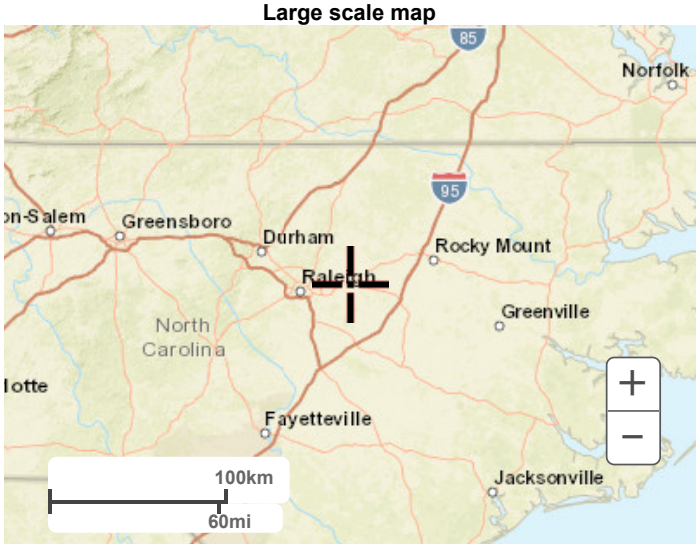
Maps & aerials

Small scale terrain

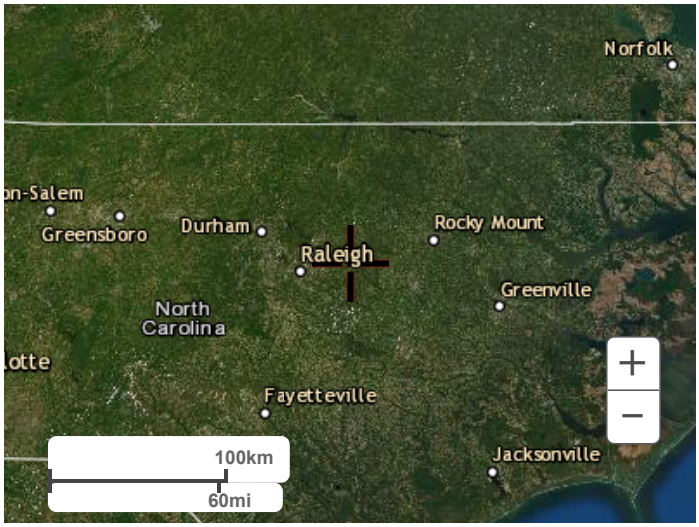
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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NOAA Atlas 14, Volume 2, Version 3
Location name: Zebulon, North Carolina, USA*
Latitude: 35.8183°, Longitude: -78.3283°
Elevation: 326.74 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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.87** (4.44-5.34)	**5.63** (5.15-6.16)	**6.38** (5.84-6.98)	**7.22** (6.59-7.90)	**8.06** (7.32-8.80)	**8.75** (7.92-9.56)	**9.37** (8.42-10.2)	**9.94** (8.88-10.9)	**10.6** (9.37-11.6)	**11.2** (9.83-12.3)
10-min	**3.89** (3.55-4.27)	**4.50** (4.12-4.93)	**5.11** (4.67-5.59)	**5.78** (5.27-6.32)	**6.42** (5.83-7.01)	**6.97** (6.31-7.61)	**7.45** (6.70-8.12)	**7.88** (7.04-8.61)	**8.36** (7.42-9.16)	**8.80** (7.74-9.65)
15-min	**3.24** (2.96-3.56)	**3.77** (3.45-4.13)	**4.31** (3.94-4.72)	**4.87** (4.44-5.33)	**5.43** (4.93-5.92)	**5.88** (5.32-6.43)	**6.27** (5.64-6.85)	**6.62** (5.92-7.24)	**7.02** (6.22-7.68)	**7.37** (6.48-8.08)
30-min	**2.22** (2.03-2.44)	**2.60** (2.38-2.85)	**3.06** (2.80-3.35)	**3.53** (3.22-3.86)	**4.02** (3.65-4.39)	**4.43** (4.01-4.84)	**4.80** (4.32-5.24)	**5.16** (4.61-5.64)	**5.58** (4.95-6.11)	**5.96** (5.24-6.54)
60-min	**1.38** (1.26-1.52)	**1.63** (1.50-1.79)	**1.96** (1.80-2.15)	**2.30** (2.10-2.51)	**2.68** (2.43-2.92)	**3.00** (2.72-3.28)	**3.31** (2.98-3.61)	**3.62** (3.23-3.95)	**4.01** (3.55-4.38)	**4.35** (3.83-4.78)
2-hr	**0.809** (0.733-0.896)	**0.958** (0.873-1.05)	**1.17** (1.06-1.28)	**1.39** (1.25-1.52)	**1.64** (1.48-1.80)	**1.87** (1.68-2.05)	**2.10** (1.87-2.30)	**2.34** (2.07-2.56)	**2.65** (2.32-2.90)	**2.93** (2.55-3.22)
3-hr	**0.571** (0.517-0.634)	**0.677** (0.617-0.749)	**0.827** (0.751-0.914)	**0.988** (0.895-1.09)	**1.18** (1.06-1.30)	**1.36** (1.22-1.50)	**1.54** (1.37-1.70)	**1.73** (1.53-1.91)	**1.99** (1.74-2.19)	**2.24** (1.93-2.47)
6-hr	**0.343** (0.312-0.380)	**0.407** (0.372-0.449)	**0.497** (0.453-0.548)	**0.595** (0.540-0.654)	**0.715** (0.645-0.784)	**0.827** (0.741-0.906)	**0.940** (0.835-1.03)	**1.06** (0.933-1.16)	**1.23** (1.07-1.34)	**1.38** (1.19-1.52)
12-hr	**0.201** (0.183-0.221)	**0.238** (0.218-0.262)	**0.292** (0.267-0.321)	**0.352** (0.320-0.386)	**0.425** (0.384-0.466)	**0.496** (0.444-0.540)	**0.567** (0.503-0.618)	**0.644** (0.565-0.702)	**0.753** (0.650-0.819)	**0.856** (0.728-0.933)
24-hr	**0.119** (0.111-0.129)	**0.144** (0.134-0.156)	**0.183** (0.170-0.198)	**0.214** (0.198-0.232)	**0.259** (0.238-0.280)	**0.295** (0.270-0.319)	**0.334** (0.304-0.361)	**0.375** (0.339-0.406)	**0.434** (0.389-0.471)	**0.482** (0.429-0.525)
2-day	**0.069** (0.064-0.074)	**0.083** (0.077-0.090)	**0.105** (0.097-0.113)	**0.122** (0.113-0.132)	**0.146** (0.135-0.158)	**0.166** (0.153-0.180)	**0.187** (0.171-0.203)	**0.210** (0.190-0.227)	**0.242** (0.217-0.263)	**0.268** (0.238-0.292)
3-day	**0.049** (0.045-0.052)	**0.059** (0.055-0.063)	**0.074** (0.068-0.079)	**0.085** (0.079-0.092)	**0.102** (0.094-0.110)	**0.116** (0.107-0.125)	**0.130** (0.119-0.140)	**0.145** (0.132-0.157)	**0.167** (0.150-0.181)	**0.184** (0.165-0.200)
4-day	**0.039** (0.036-0.042)	**0.047** (0.043-0.050)	**0.058** (0.054-0.062)	**0.067** (0.062-0.072)	**0.080** (0.074-0.086)	**0.090** (0.083-0.097)	**0.101** (0.093-0.109)	**0.113** (0.103-0.122)	**0.129** (0.117-0.139)	**0.142** (0.128-0.154)
7-day	**0.026** (0.024-0.028)	**0.031** (0.029-0.033)	**0.038** (0.035-0.041)	**0.044** (0.041-0.047)	**0.051** (0.048-0.055)	**0.058** (0.054-0.062)	**0.065** (0.059-0.069)	**0.071** (0.065-0.077)	**0.081** (0.074-0.088)	**0.089** (0.080-0.096)
10-day	**0.021** (0.019-0.022)	**0.024** (0.023-0.026)	**0.030** (0.028-0.032)	**0.034** (0.032-0.036)	**0.040** (0.037-0.042)	**0.044** (0.041-0.047)	**0.049** (0.045-0.052)	**0.054** (0.049-0.057)	**0.060** (0.055-0.065)	**0.065** (0.060-0.070)
20-day	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.019** (0.018-0.021)	**0.022** (0.021-0.023)	**0.025** (0.024-0.027)	**0.028** (0.026-0.030)	**0.031** (0.029-0.033)	**0.034** (0.031-0.036)	**0.038** (0.035-0.040)	**0.041** (0.037-0.044)
30-day	**0.011** (0.011-0.012)	**0.013** (0.013-0.014)	**0.016** (0.015-0.017)	**0.018** (0.017-0.019)	**0.020** (0.019-0.021)	**0.022** (0.021-0.023)	**0.024** (0.022-0.025)	**0.026** (0.024-0.027)	**0.028** (0.026-0.030)	**0.030** (0.028-0.032)
45-day	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.014)	**0.014** (0.014-0.015)	**0.016** (0.015-0.017)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.020** (0.019-0.022)	**0.022** (0.021-0.024)	**0.024** (0.022-0.025)
60-day	**0.009** (0.008-0.009)	**0.010** (0.010-0.011)	**0.012** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.020** (0.019-0.021)

[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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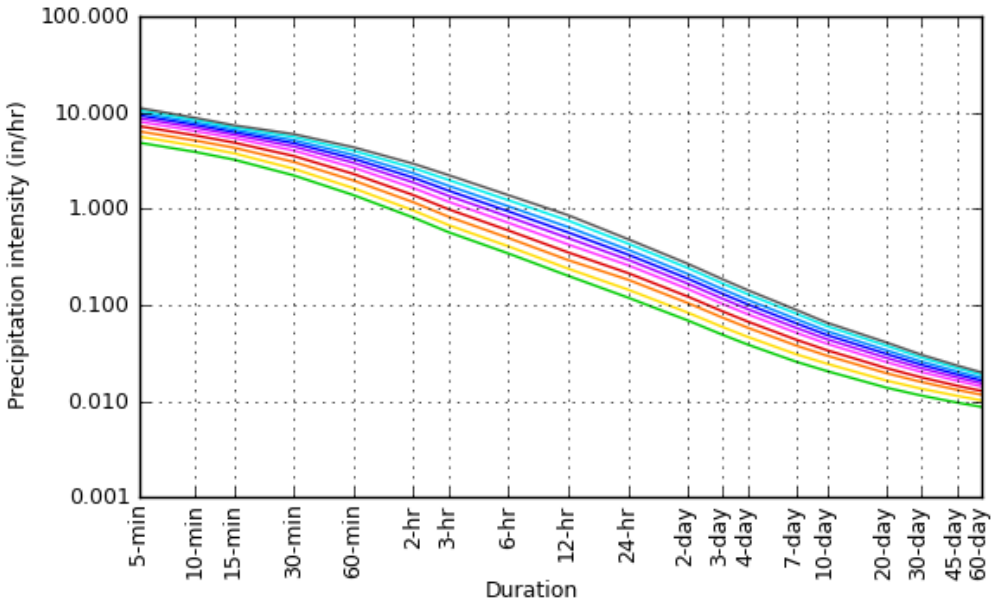
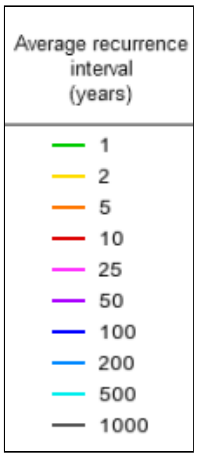
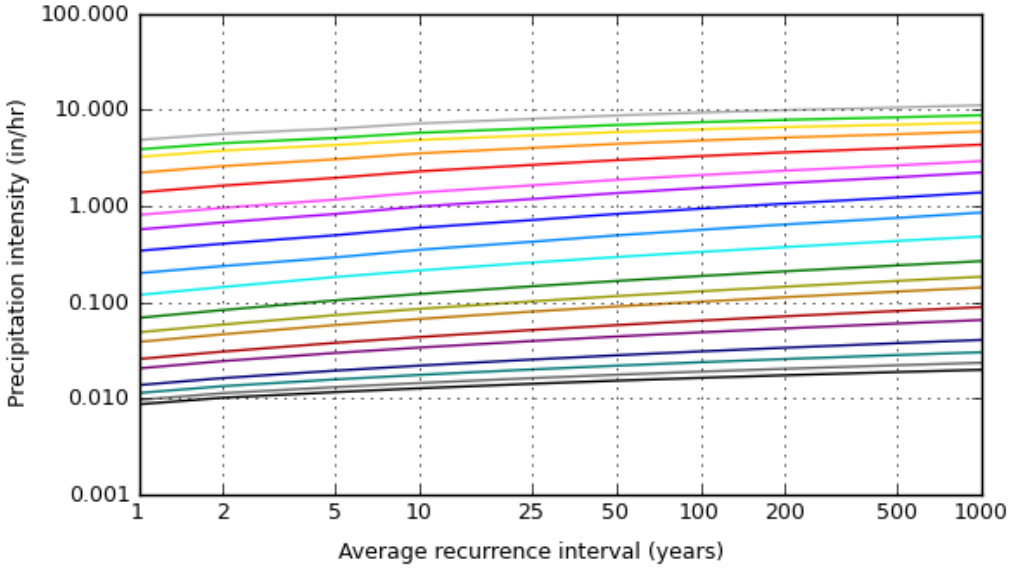
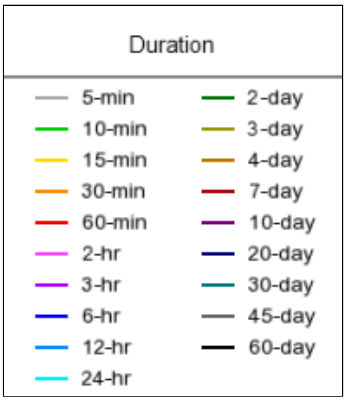
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 35.8183°, Longitude: -78.3283°









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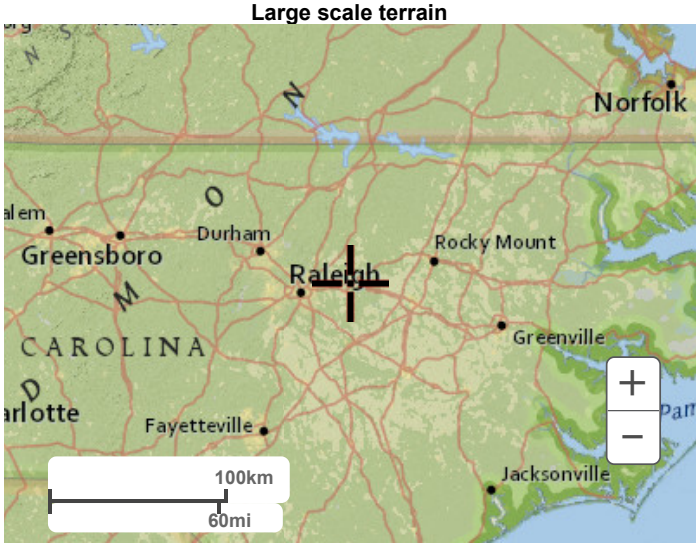
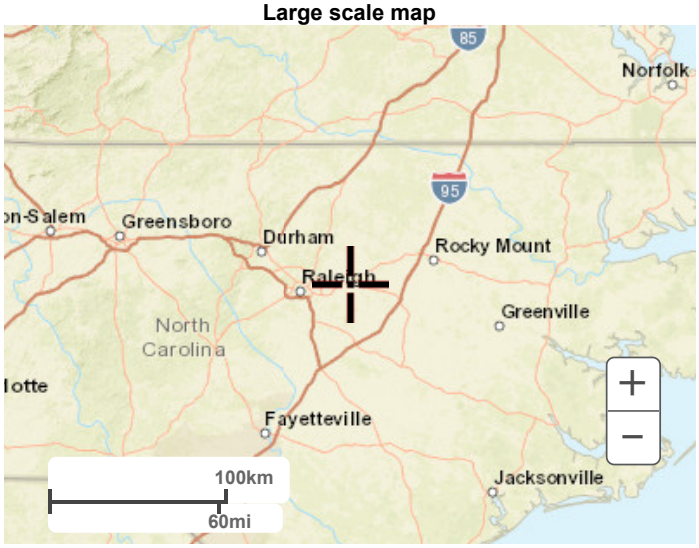
Maps & aerials

Small scale terrain

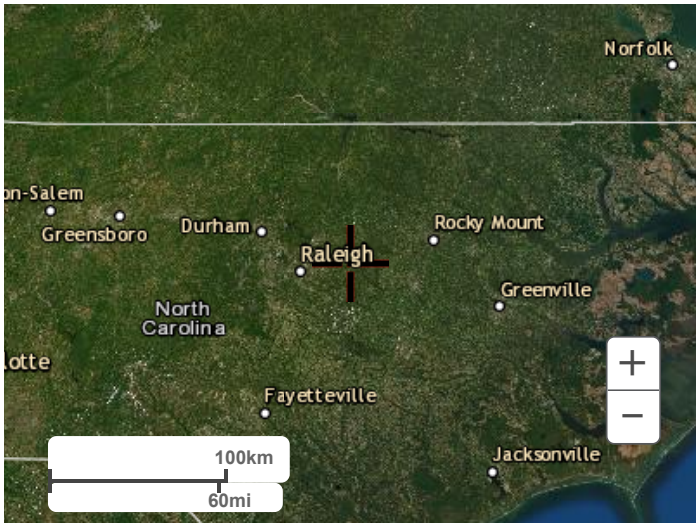
Large scale terrain



Large scale map



Large scale aerial



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WATER QUALITY/QUANTITY

SITE DATA

Project Information	
Project Name:	**Tractor Supply - Zebulon**
Applicant:	
Applicant Contact Name:	Primax Properties, LLC
Applicant Contact Number:	Adam Sellner
Contact Email:	704-954-7224
Municipal Jurisdiction (Select from dropdown menu):	asellner@primaxproperties.com
Last Updated:	Tuesday, January 10, 2023
Site Data:	
Total Site Area (Ac):	3.77 ac
Existing Lake/Pond Area (Ac):	
Proposed Disturbed Area (Ac):	5.69 ac
Impervious Surface Area (acre):	2.52 ac
Type of Development (Select from Dropdown menu):	Non-Residential
Percent Built Upon Area (BUA):	
Project Density:	
Is the proposed project a site expansion?	No
Number of Drainage Areas on Site:	2
NOAA — **1-Year, 24-Hour Storm (inches) (See NOAA Website):**	2.86
2-Year, 24-Hour Storm (inches) (See NOAA Website):	3.46
10-Year, 24-Hour Storm (inches) (See NOAA Website):	5.15
Lot Data (if applicable):	
Total Acreage in Lots:	
Number of Lots:	
Average Lot Size (SF):	
Total Impervious Surface Area on Lots (SF):	
Average Impervious Surface Area Per Lot (SF):	

Stormwater Narrative (limit to 1,200 characters - attach additional pages with submittal if necessary):

There are proposed storm water management facilities (wet pond and level spreader-filter strip) on site. The design includes the Tractor Supply site (164,059 sf-3.766 ac) and the 2.52 ac parcel to the west, and assumes 80% impervious (87,863 sf-2.02 ac). The SCM outlined in this report has been designed for post-development peak attenuation and water quality. The SCM is designed to capture a drainage area of 5.57 ac with an impervious area of 4.55 ac. A level spreader will be used as a secondary SCM receiving the 1.0" storm from the stormwater wetland pond. The level spreader is designed to treat a 0.75" storm event. The site grading and storm drainage systems are designed to convey stormwater runoff from the impervious areas of the site to the stormwater wetland pond and level spreader-filter strip. The site is not located within a coastal county, therefore the design storm for water quality is a 1.0" storm event. The SCMs are designed per the Town of Zebulon stormwater UDO.

Project Name: Tractor Supply - Zebulon

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	3.71				5.57			
Site Acreage within Drainage=	1.74				2.91			
One-year, 24-hour rainfall (in)=	2.86							
Two-year, 24-hour rainfall (in)=	3.46							
Ten-year, 24-hour storm (in)=	5.15							
Total Lake/Pond Area (Acres)=	-				-			
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition				0.54				
Open Space, Poor Condition								
Open Space, Fair condition				3.17				
Open Space, Good Condition								1.01
Reforestation (in dedicated OS)								
Connected Impervious								4.55
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	100.00				100.00			
Slope (ft/ft)=	0.025				0.010			
Surface Cover:	Woods				Paved, Gravel, or Bare Soil			
n-value=	0.400				0.011			
T_t (hrs)=	0.346				0.028			
Shallow Flow								
Length (ft)=	286.50							
Slope (ft/ft)=	0.041							
Surface Cover:	Unpaved							
Average Velocity (ft/sec)=	3.27							
T_t (hrs)=	0.02							
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=	#VALUE!				#VALUE!			
T_t (hrs)=	#VALUE!				#VALUE!			

Project Name: Tractor Supply - Zebulon

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=	#VALUE!	#VALUE!
T_t (hrs)=	#VALUE!	#VALUE!
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		#VALUE!
T_t (hrs)=		#VALUE!
Tc (hrs)=	#VALUE!	#VALUE!
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=		
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=		
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =		
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=		
Volume of runoff (ft^3) =		
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=		
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{2\text{-}year}$=		
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{10\text{-}year}$=		

Project Name: Tractor Supply - Zebulon

DA SITE SUMMARY
STORMWATER PRE-POST CALCULATIONS

SITE SUMMARY

DRAINAGE AREA SUMMARIES

DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in) = $Q_{pre,1\text{-}year}$ =										
Peak Flow (cfs)=$Q_{1\text{-}year}$ =										
Post-Development (1-year, 24-hour storm)										
Proposed Impervious Surface (acre) =	4.55									
Runoff (in)=$Q_{1\text{-}year}$ =										
Peak Flow (cfs)=$Q_{1\text{-}year}$ =										
Increase in volume per DA (ft^3)_1-yr storm=										
Minimum Volume to be Managed for DA HIGH DENSITY REQUIREMENT = (ft^3) =										

TARGET CURVE NUMBER (TCN)

Site Data

SITE \SOIL COMPOSITION

HYDROLOGIC SOIL GROUP	Site Area	%	Target CN
A	0.00	0%	N/A
B	0.00	0%	N/A
C	0.00	0%	N/A
D	5.56	100%	N/A

Total Site Area (acres) =	5.56
Percent BUA (Includes Existing Lakes/Pond Areas) =	82%
Project Density =	High
Target Curve Number (TCN) =	N/A
$CN_{adjusted\ (1\text{-}year)}$=	
Minimum Volume to be Managed (Total Site) Per TCN Requirement= ft^3 =	

Site Nitrogen Loading Data

HSG	TN export coefficient (lbs/ac/yr)	Site Acreage	N Export
Pasture	1.2	0.00	0.00
Woods, Poor Condition	1.6	0.00	0.00
Woods, Fair Condition	1.2	0.00	0.00
Woods, Good Condition	0.8	0.00	0.00
Open Space, Poor Condition	1.0	0.00	0.00
Open Space, Fair Condition	0.8	0.00	0.00
Open Space, Good Condition	0.6	1.01	0.61
Reforestation (in dedicated OS)	0.6	0.00	0.00
Impervious	21.2	4.55	96.46
SITE NITROGEN LOADING RATE (lbs/ac/yr)=		17.46	
Nitrogen Load (lbs/yr)=		97.07	
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)_Wendell Only=		77.05	

Site Nitrogen Loading Data For Expansions Only

	Existing	New
Impervious(acres)=	NA	NA
"Expansion Area" (acres=)		
Nitrogen Load (lbs/yr)=	NA	NA
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	NA	NA
Total Site loading rate (lbs/ac/yr)		
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)=	NA	

WAKE COUNTY
NORTH CAROLINA

Project Name: Tractor Supply - Zebulon

DRAINAGE AREA 1
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA1 Site Acreage=	2.91			
DA1 Off-Site Acreage=	2.66			
Total Required Storage Volume for Site TCN Requirement (ft^3)=				
Total Required Storage Volume for DA1 1" Rainfall for High Density (ft^3)=				
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA1(a) (Ac)		Sub-DA1(b) (Ac)		Sub-DA1(c) (Ac)		Sub-DA1(d) (Ac)		Sub-DA1(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	0.51	0.51								
Reforestation (in dedicated OS)										
Impervious	2.02	2.53								

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
Wet Pond	Wet Detention Basin	15,876	17,189	25%	97.07	24.27	48.33
Level Spreader-Filter Strip	Level Spreader, Filter Strip			0%	72.80	0.00	
				0%	72.80	0.00	
				0%	72.80	0.00	
				0%	72.80	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**72.80**					

Sub-DA1(b) BMP(s)

If Sub-DA1(b) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

Sub-DA1 (c) BMP(s)

If Sub-DA1(c) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

WAKE COUNTY
NORTH CAROLINA

Project Name: Tractor Supply - Zebulon

DRAINAGE AREA 1
BMP CALCULATIONS

Sub-DA1(d) BMP(s)							
If Sub-DA1(d) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

Sub-DA1(e) BMP(s)							
If Sub-DA1(e) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

DA1 BMP SUMMARY	
Total Volume Treated (ft^3)=	#VALUE!
Nitrogen Mitigated(lbs)=	24.27
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-year})}$=	
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	
Post BMP $CN_{(1\text{-year})}$=	
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	2.294
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-year})}$=	
Post BMP Runoff (inches) = $Q^*_{(2\text{-year})}$=	
Post BMP $CN_{(2\text{-year})}$=	
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-year})}$=	14.130
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-year})}$=	
Post BMP Runoff (inches) = $Q^*_{(10\text{-year})}$=	
Post BMP $CN_{(10\text{-year})}$=	
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$=	32.630

Project Name: Tractor Supply - Zebulon

DA SITE SUMMARY
BMP CALCULATIONS

BMP SUMMARY										
DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in)=$Q^*_{1\text{-year}}$ =										
Peak Flow (cfs)=$Q_{1\text{-year}}$ =										
Post-Development (1-year, 24-hour storm)										
Target Curve Number (TCN) =	NA									
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=										
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	2.294									
Post BMP $CN_{(1\text{-year})}$=										
Post-BMP Nitrogen Loading										
TOTAL SITE NITROGEN MITIGATED (lbs)=	24.27									
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	13.09									
TOTAL SITE NITROGEN LEFT TO MITIGATE_Wendell Only (lbs)=	**52.78**									

Nitrogen Calculations (on-site areas)

Item	*Proposed Site Information*	*On-Site Area*	*Off-Site Area*	*Total*
1	Total project acreage	3.766	0	3.766
2	Total proposed impervious area	2.52	0	2.52
3	Existing impervious area	0	0	0
4	New impervious area (Item 2-Item 3)	2.52	0	2.52
5	Permanently protected undisturbed open space	0	0	0
6	Permanently protected managed open space	1.246	0	1.246

Existing Conditions Loading (On-site areas)			
Type of Land Cover	*Area (acres)*	*TN export/coefficient (lbs/ac/yr)*	*TN export from use (lbs/yr)*
Permanently protected undisturbed open space	0	0	0.00
Permanently protected managed open space	3.766	1.2	4.52
Impervious surfaces	0	21.2	0.00
Total	3.766		4.52
	(Item 7)		(Item 8)
		Nitrogen Loading Rate (lbs/ac/yr)	1.20

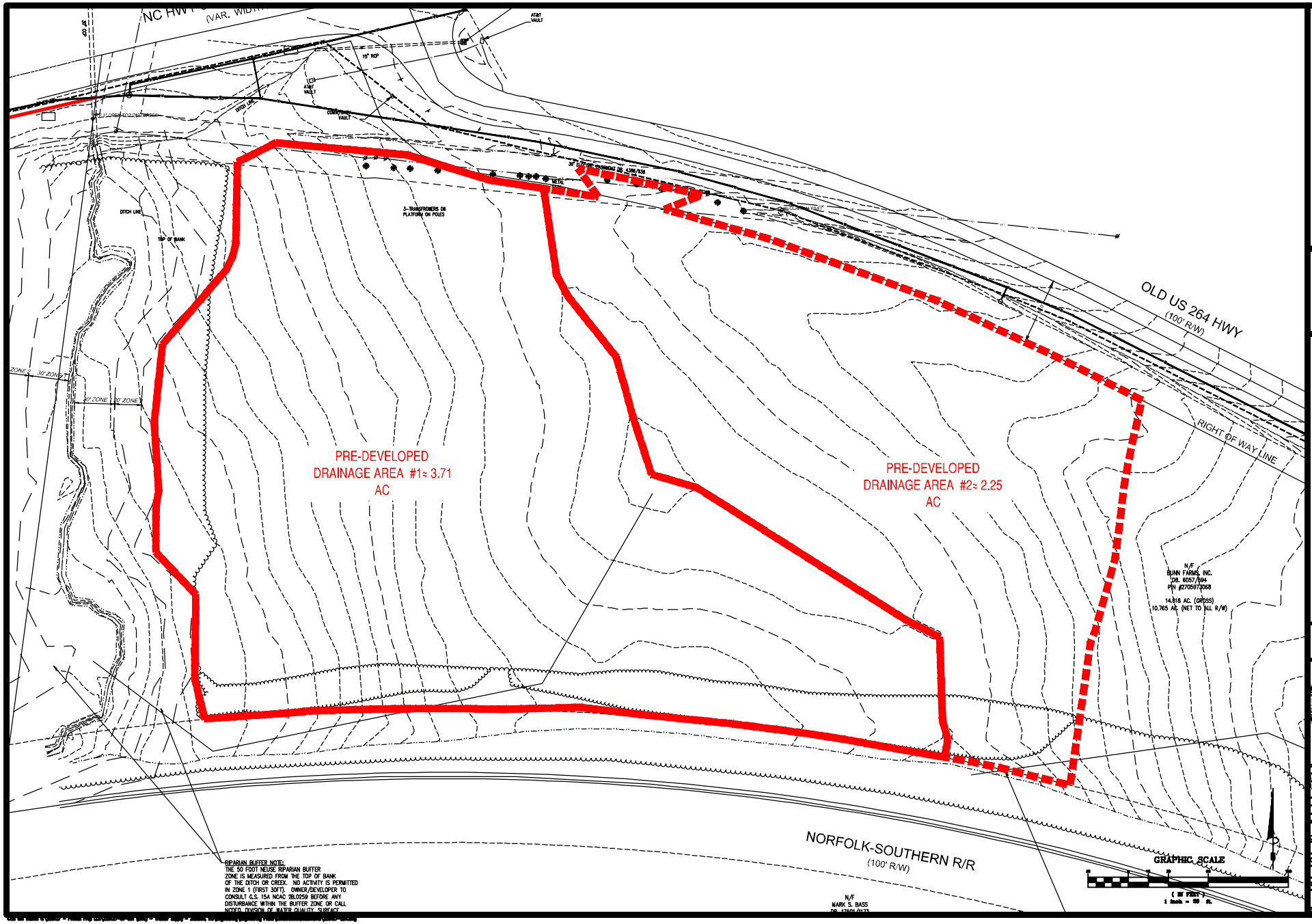
Proposed Development Areas (On-Site areas)			
Type of Land Cover	*Area (acres)*	*TN export/coefficient (lbs/ac/yr)*	*TN export from use (lbs/yr)*
Permanently protected undisturbed open space (Item 5)	0	0.6	0.00
Permanently protected managed open space* (Item 6)	1.246	1.2	1.50
Impervious surfaces * (Item 4)	2.520	21.2	53.42
Total	3.766		54.92
	(Item 7)		(Item 8*)
		Nitrogen Loading Rate (lbs/ac/yr)	14.58

Post-Development Loading after Offset Payments		
Item	Description	Pre-Developed + Post-Developed Loading
8	Total TN export (lb/yr)	33.89
Post-Development Loading after Offset Payments		
Item	Description	Nitrogen Loading Rate (lbs/ac/yr)
9	Post-Developed TN Load	9.00
10	Nitrogen load offset by payments (Item 9 - 3.6)	5.40

Amount of Offset (buy-down loading rate x apportioned site area)(lbs/yr):	20.34
30-Year Offset Amount (Pounds of Nitrogen x 30 Years)(lbs):	610.06
NCEEP Offset Payment Rate ($/lb)	$26.76
NCEEP Offset Payment Amount:	$16,325.29

Post-Development Loading after BMP

Type of Land Cover	Area (acres)	TN export coefficient (lbs/ac/yr)	TN export from use (lbs/yr)	BMP Type	TN Removal Rate	Reduced TN export coefficient (lbs/yr)
Permanently protected managed open space (grass, landscaping, etc.)	0.716	1.20	0.86	None		0.859
Impervious surfaces (roads, parking lots, driveways, roofs, paved storage areas, etc)	0.000	21.20	0.00	None		0.000
Permanently protected managed open space (grass, landscaping, etc.)	0.530	1.20	0.64	Wet Pond	0.30	0.445
Impervious surfaces (roads, parking lots, driveways, roofs, paved storage areas, etc)	2.520	21.20	53.42	Wet Pond (30%) & LS-FS (30% of 30%)	0.39	32.589
Total	3.766		54.92			33.893
Nitrogen Loading Rate (lbs/ac/yr) (Equals total area/reduced TN export coefficient)	9.000					



Bowman

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Bowman North Carolina Ltd.

PRE-DEVELOPED DRAINAGE AREA

Tractor Supply
Old US Highway 264
Zebulon, NC Wake County

PRIMAX PROPERTIES, LLC

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

DATE	DESCRIPTION
7/28/22	1ST SUBMISSION
8/1/22	PER TOWN & RALEIGH REVIEW

MEL	MEL	XXX
DESIGN	DRAWN	CHKD

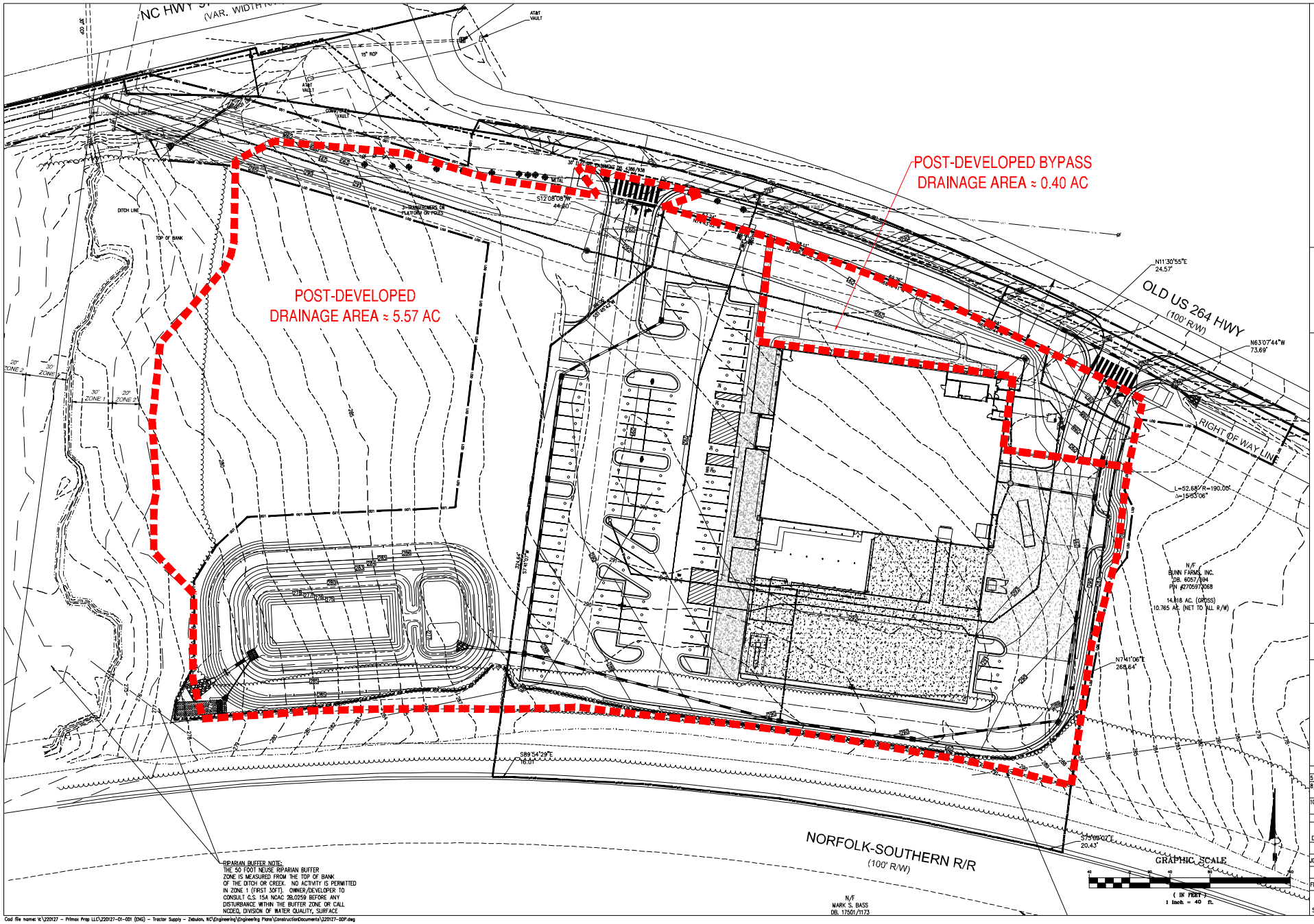
SCALE H: 1" = XXX
V: 1" = XXX

Bowman Job No. 220727-01-001

DATE May 26, 2022

FILE No. 220727-D-CP-001

SHEET ####



RIPARIAN BUFFER NOTE:
THE 50 FOOT NEUSE RIPARIAN BUFFER ZONE IS MEASURED FROM THE TOP OF BANK OF THE DITCH OR CREEK. NO ACTIVITY IS PERMITTED IN ZONE 1 (FIRST 30FT). OWNER/DEVELOPER TO CONSULT G.S. 15A NCAC 2B.0259 BEFORE ANY DISTURBANCE WITHIN THE BUFFER ZONE OR CALL NCDEQ, DIVISION OF WATER QUALITY, SURFACE

Cad file name: V:\220127 - Primax Prop LLC\220127-01-001 (ENG) - Tractor Supply - Zebulon, NC\Engineering\Engineering Plans\ConstructionDocuments\220127-DOP.dwg

Bowman

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Bowman North Carolina Ltd.

TSC
TRACTOR SUPPLY COMPANY

POST-DEVELOPED DRAINAGE AREA
Tractor Supply
Old US Highway 264
Zebulon, NC Wake County

PRIMAX PROPERTIES, LLC

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

PLAN STATUS	
5/26/22	1ST SUBMISSION
8/1/22	PER TOWN & RALEIGH REVIEW
10/13/22	PER TOWN & RALEIGH REVIEW
DATE	DESCRIPTION

MEL	MEL	XXX
DESIGN	DRAWN	CHKD

SCALE Hz:
Vt:

JOB No. 220127-01-001

DATE May 26, 2022

FILE No. 220127-D-CP-001

SHEET

Bowman North Carolina, Ltd.
Tractor Supply, Zebulon, NC

Curve Number Calculation (CN)

Pre-Developed Conditions #1

Drainage Area (acres): 3.71

Existing Soil Groups:

Soil Group	*Map Symbol*	*Soil Description*	*Acres*	*Percent of DA*
D	VaB, VaC, & HeB	Vance and Helena Sandy Loam	3.71	100%

Existing Land Uses:

Land Use Description	*Existing Soil Group*	*Acres*	*Curve #*	*Weighted CN*
Wooded - Good Stand	D	0.54	77	11.2
Open Space - Fair	D	3.17	84	71.8
			Cumulative Curve # =	83.0

Bowman North Carolina, Ltd.
Tractor Supply, Zebulon, NC

Curve Number Calculation (CN)

Pre-Developed Conditions #2

Drainage Area (acres): 2.25

Existing Soil Groups:

Soil Group	*Map Symbol*	*Soil Description*	*Acres*	*Percent of DA*
D	VaB, VaC, & HeB	Vance and Helena Sandy Loam	2.25	100%

Existing Land Uses:

Land Use Description	*Existing Soil Group*	*Acres*	*Curve #*	*Weighted CN*
Wooded - Good Stand	D	0.11	77	3.8
Open Space - Fair	D	2.14	84	79.9
			Cumulative Curve # =	83.7

Bowman North Carolina, Ltd.
Tractor Supply, Zebulon, NC

Curve Number Calculation (CN)

Post-Developed Conditions

Drainage Area (acres): 5.57

Existing Soil Groups:

Soil Group	*Map Symbol*	*Soil Description*	*Acres*	*Percent of DA*
D	VaB, VaC, & HeB	Vance and Helena Sandy Loam	5.57	100%

Proposed Land Uses:

Land Use Description	*Existing Soil Group*	*Acres*	*Curve #*	*Weighted CN*
Impervious	D	4.55	98	80.2
Open Space - Good Condition	D	1.01	80	14.6
			Cumulative Curve # =	94.7

Bowman North Carolina, Ltd.
Tractor Supply, Zebulon, NC

Curve Number Calculation (CN)

Post-Developed Conditions ByPass

Drainage Area (acres): 0.40

Existing Soil Groups:

Soil Group	*Map Symbol*	*Soil Description*	*Acres*	*Percent of DA*
D	VaB, VaC, & HeB	Vance and Helena Sandy Loam	0.40	100%

Proposed Land Uses:

Land Use Description	*Existing Soil Group*	*Acres*	*Curve #*	*Weighted CN*
Open Space - Good Condition	D	0.31	80	63.2
Impervious	D	0.08	98	20.5
			Cumulative Curve # =	83.8

Proposed Wet Pond

Project Information

Project Name: Tractor Supply (Zebulon)
Project #: 220127-01-001
Designed by: CEP Date: 1/10/2023
Revised by: Date:
Checked by: Date:

Site Information

Sub Area Location:	Drainage To Proposed Wet Pond			
Drainage Area (DA) =	5.57	Acres	242,500	sf
Impervious Area (IA) =	4.55	Acres	198,390	sf
Percent Impervious (I) =		%	81.81	%

Required Surface Area

Permament Pool Depth:	4.43	ft	Non-Coastal County
SA/DA =	2.31		
Min Req'd Surface Area =	5,593	sf (at Permanent Pool)	(Main Pond)

Required WQv Storage Volume

Design Storm =	1	inch	Non-Coastal County
Determine Rv Value =	0.05 + .009 (I) =	0.786	in/in
Storage Volume Required =	15,890	cf (above Permanent Pool)	

Elevations

Top of Pond Elevation =	285.00	ft
Temporary Pool Elevation =	281.70	ft
Permanent Pool Elevation =	280.00	ft
Shelf Begining Elevation =	280.50	ft
Forebay Weir =	279.00	ft
Shelf Ending Elevation =	279.50	ft
Bottom Elevation =	274.00	ft

Permanent Pool Area

Area @ Top of Permanent Pool =	6,335	sf					
Volume of Temporary Storage =	*17,189*	cf					
Is Permenant Pool Surface Area Sufficient (yes/no)?			Yes	(	6335	>	5593) sf
Volume of Storage for Design Storm =	*17,189*		Yes	(	17189	>	15890) cf

STORMWATER POND

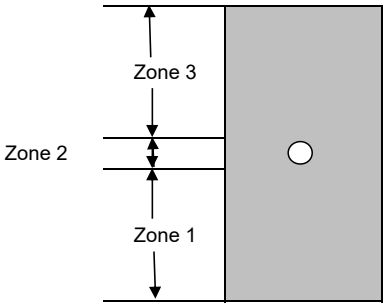
INCREMENTAL DRAWDOWN METHOD-Water Quality Volume

Project Information

Project Name: Tractor Supply (Zebulon)
Project #: 220127-01-001
Designed by: CEP Date: 1/10/2023
Checked by: Date:

Water Quality Orifice

* Incremental Determination of Water Quality Volume Drawdown Time



$Q_3 = 0.0437\ C_D * D^2\ (Z\text{-}D/24\text{-}Ei)^{\wedge(1/2)}$

$Q_2 = 0.372\ C_D * D*(Z\text{-}Ei)^{\wedge(3/2)}$

$Q_1 = 0$

Orifice Diameter (D) =	2 in		
Cd =	0.6		
Ei =	280	Orifice Inv.	
Zone 1 Range =	0.00	to	280
Zone 2 Range =	280	to	280.1
Zone 3 Range =	280.1	to	281

Incremental Drawdown Method

Countour	Contour Area	Incremental Volume	Stage, Z	Zone	Q	Drawdown Time
	sq ft	cu ft	ft		cfs	min
280.00	**8,385**	0	0.00	2.00	0.000	--
280.50	9635	4,505	0.50	3.00	0.068	1,109
281.00	10395	5,008	0.50	3.00	0.100	831
281.70	11535	7,676	0.70	3.00	0.133	959
Total	**--**	**17,189**	**--**	**--**	**--**	**2,900**

Drawdown Time = Incremental Volume / Q / 60sec/min

Summary

Total Volume =	**17,189**	**cf**	
Total Time =	**2,900**	**min**	
Total Time =	**2.01**	**days**	Between 2 & 5

Project: Pond #1 Date: 1/10/2023

Main-Pond Contours-Volumes

Elevation	Main-Pond	Incremental Vol.	Accumulated Vol.	Description
280	6,335	2,933	24,118	A2 (Perm_Pool)
279.5	5,395	2,623	21,185	A1 (Bottom_Shelf)
279	5,095	4,803	18,563	
278	4,510	4,230	13,760	
277	3,950	3,685	9,530	
276	3,420	3,168	5,845	
275	2,915	2,678	2,678	
274	2,440	0	0	A3 (Bottom_Pond)

Forebay Contours-Volumes

Elevation	FB1	FB2	FB3	Total-Areas	Incremental Vol.	Accumulated Vol.
280	1,965			1,965	941	4,143
279.5	1,800			1,800	859	3,201
279	1,635			1,635	1,485	2,343
278	1,335			1,335	858	858
277	380			380	0	0

Forebay Volume	17.2%	*Between 15% & 20%
Average Depth (Option 1)	3.93	*At least 3' average depth

Average Depth Calculation (Option 2)

Vpp	24,118
permeter of shelf	323
width of shelf	3
A1 (Bottom_Shelf):	5,395
Average Depth =	4.43

Proposed Wet Pond #1

Project Information

Project Name:	Tractor Supply (Zebulon)		
Project #:	220127-01-001		
Designed by:	CEP	Date:	1/10/2023
Revised by:		Date:	
Checked by:		Date:	

Site Information

Sub Area Location:	Drainage to Proposed Pond	
Drainage Area (DA) =	5.57	Acres
Impervious Area (IA) =	4.55	Acres
Percent Impervious (I) =	81.81	% (Drainage Area)

Orifice Sizing

Orifice Size =	*2.00*	in	(Diameter)
Drawdown Time =	*2.01*	days	(Incremental Draw Down Method)
less than 5 days (yes/no) ?	yes		
greater than 2 day (yes/no) ?	yes		

Anti-Flotation Device

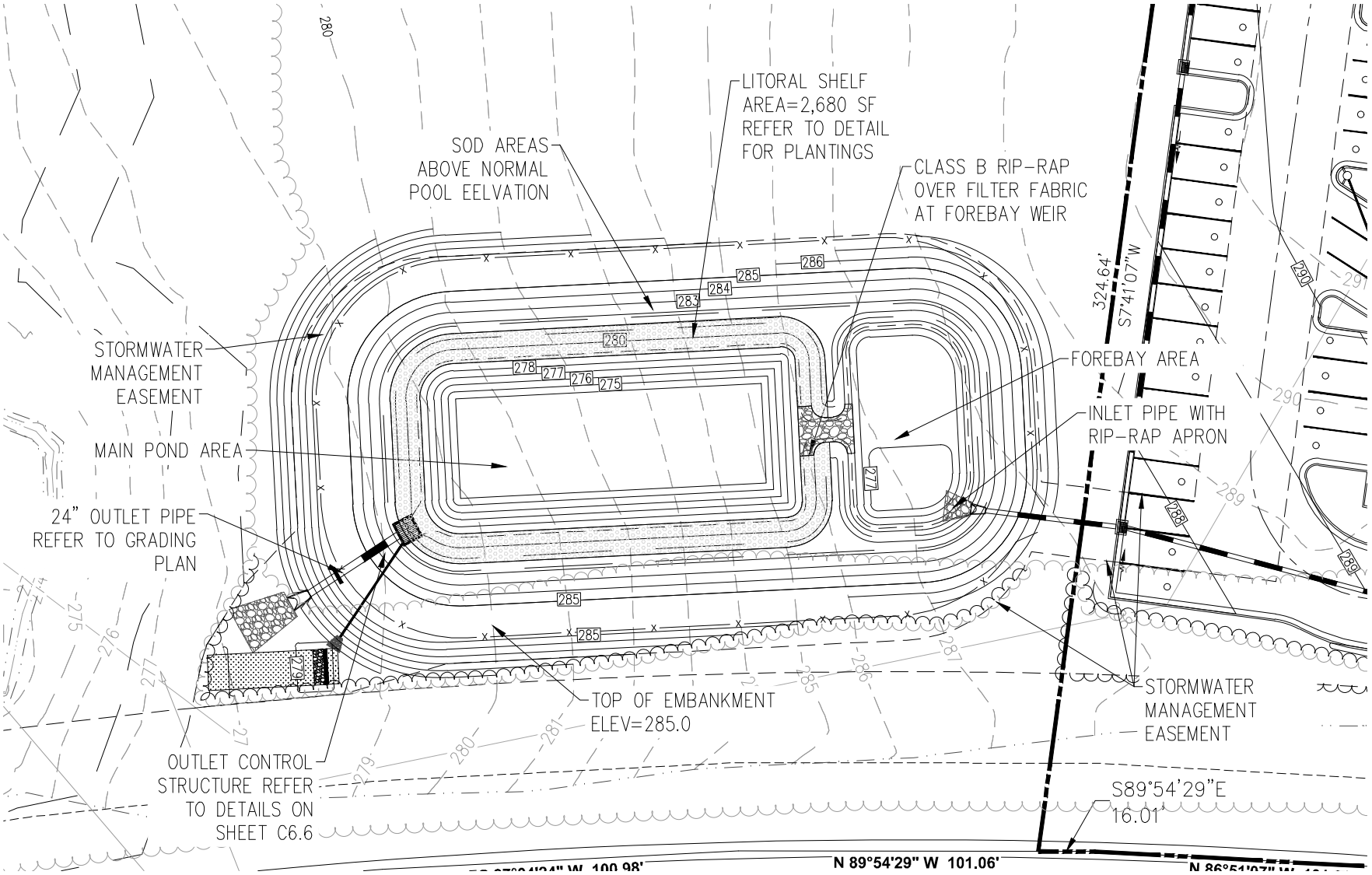
6' x 5' Outlet Structure

Area:	30.0	sf	
Volume:	330.0	cf	(Water Displaced - Top of Pond to Bottom of Pond)
Weight:	20592	lbs	
Factor of Safety	1.20		
WT Req'd of Anti-Flotation Device:	24,710	lbs	
Volume of Concrete Req'd:	164.7	cf	(Unit WT of Concrete = 150 pcf)
Volume Provided:	213.0	cf	(6'x5' riser x 5.0' =150.0cf, 7'x6' footing x 1.5' =63.0cf)

IMPERVIOUS SUMMARY TABLE

ON-SITE AREA = 164,059 SF (3.766 AC)
TOTAL DRAINAGE AREA = 242,500 SF (5.567 AC)

BUILDINGS	21,147 SF	0.49 ACRE(S)	12.91 % OF AREA
PAVEMENT	81,500 SF	1.87 ACRE(S)	49.68 % OF AREA
SIDEWALK	7,100 SF	0.16 ACRE(S)	4.33 % OF AREA
ON-SITE IMPERVIOUS AREA	109,774 SF	2.52 ACRE(S)	66.91 % OF AREA
OFF-SITE IMPERVIOUS AREA	10,051 SF	0.23 ACRE(S)	6.13 % OF AREA
GREEN/OPEN SPACE	54,285 SF	1.25 ACRE(S)	33.09 % OF AREA
EXISTING IMPERVIOUS AREA	0 SF	0 ACRE(S)	0.0 % OF AREA
INCREASE IN IMPERVIOUS AREA	119,825 SF	2.75 ACRE(S)	73.04 % OF AREA



GRAPHIC SCALE

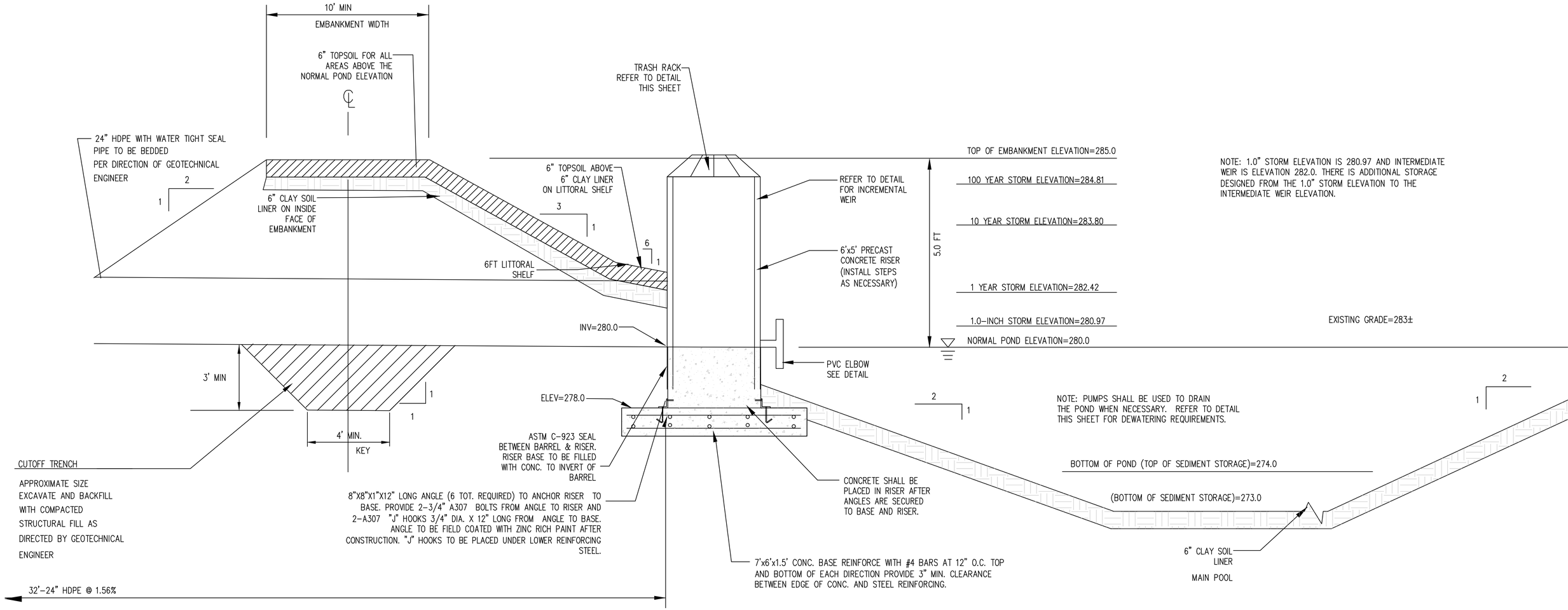
40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

PLAN VIEW

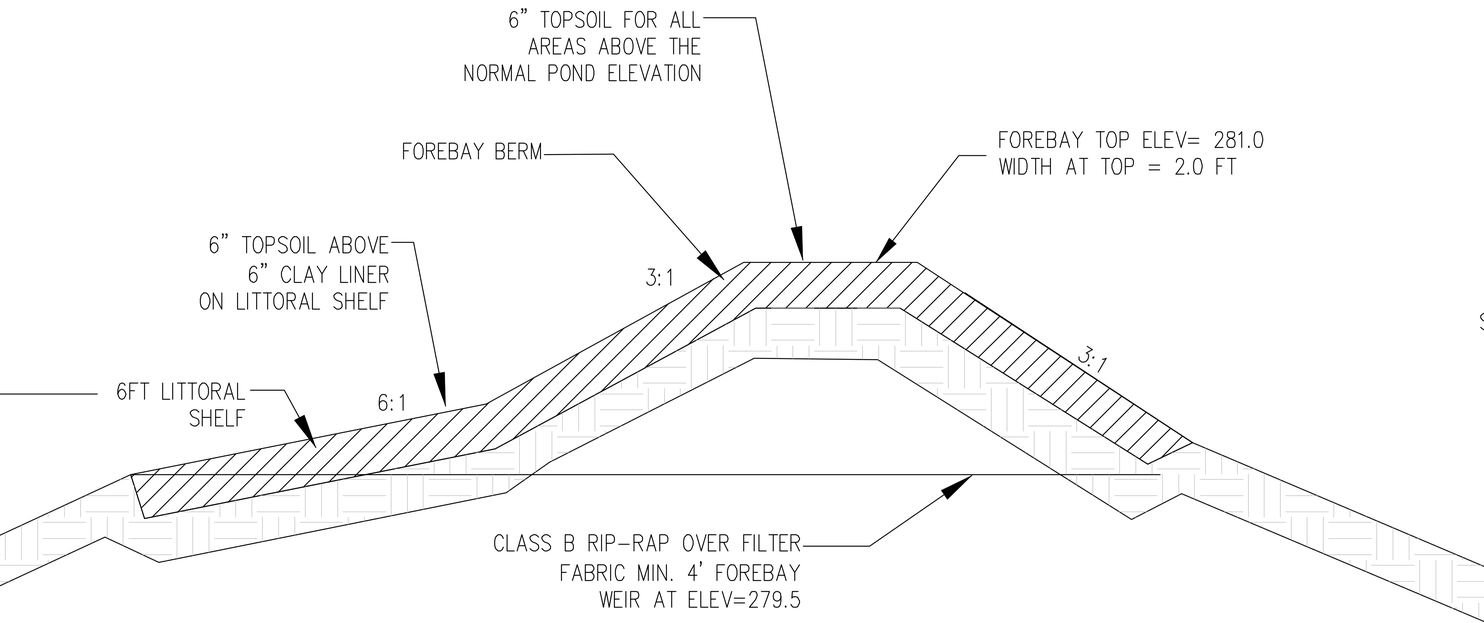
N



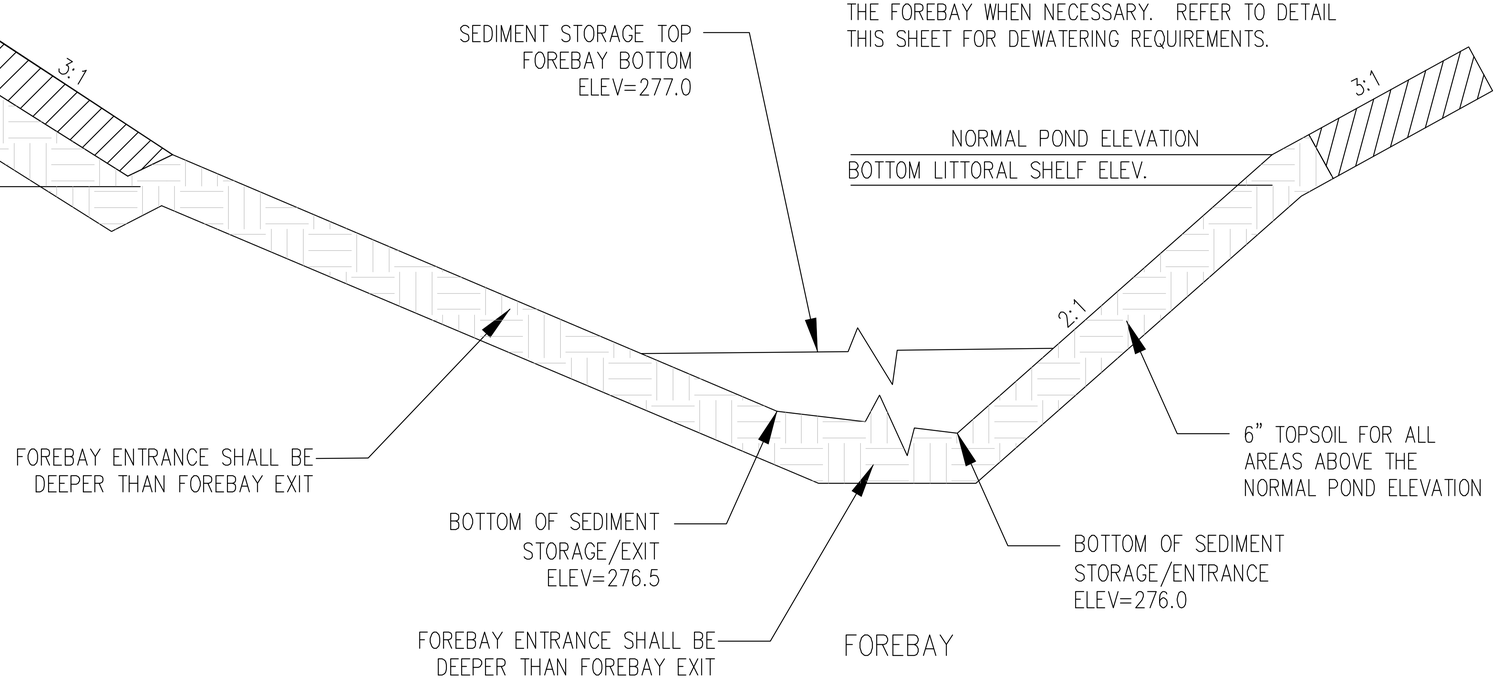
NOTE: 1.0" STORM ELEVATION IS 280.97 AND INTERMEDIATE WEIR IS ELEVATION 282.0. THERE IS ADDITIONAL STORAGE DESIGNED FROM THE 1.0" STORM ELEVATION TO THE INTERMEDIATE WEIR ELEVATION.

PROFILE OF WET POND DETENTION SYSTEM

SCALE: N.T.S.



NOTE: PUMPS SHALL BE USED TO DRAIN
THE FOREBAY WHEN NECESSARY. REFER TO DETAIL
THIS SHEET FOR DEWATERING REQUIREMENTS.



STAGE/STORAGE TABLE

STAGE (FT)	ELEVATION (FT)	CONTOUR AREA (SF)	INCREMENTAL STORAGE (CF)	TOTAL STORAGE (CF)
0.0	280.0	8385	0	0
0.5	280.5	9635	4505	4505
1.0	281.0	10395	5008	9513
1.7	281.7	11535	7676	17188 (WQV)
2.0	282.0	11940	3521	20709
3.0	283.0	13325	12633	33342
4.0	284.0	14765	14045	47387
5.0	285.0	16265	15515	62902

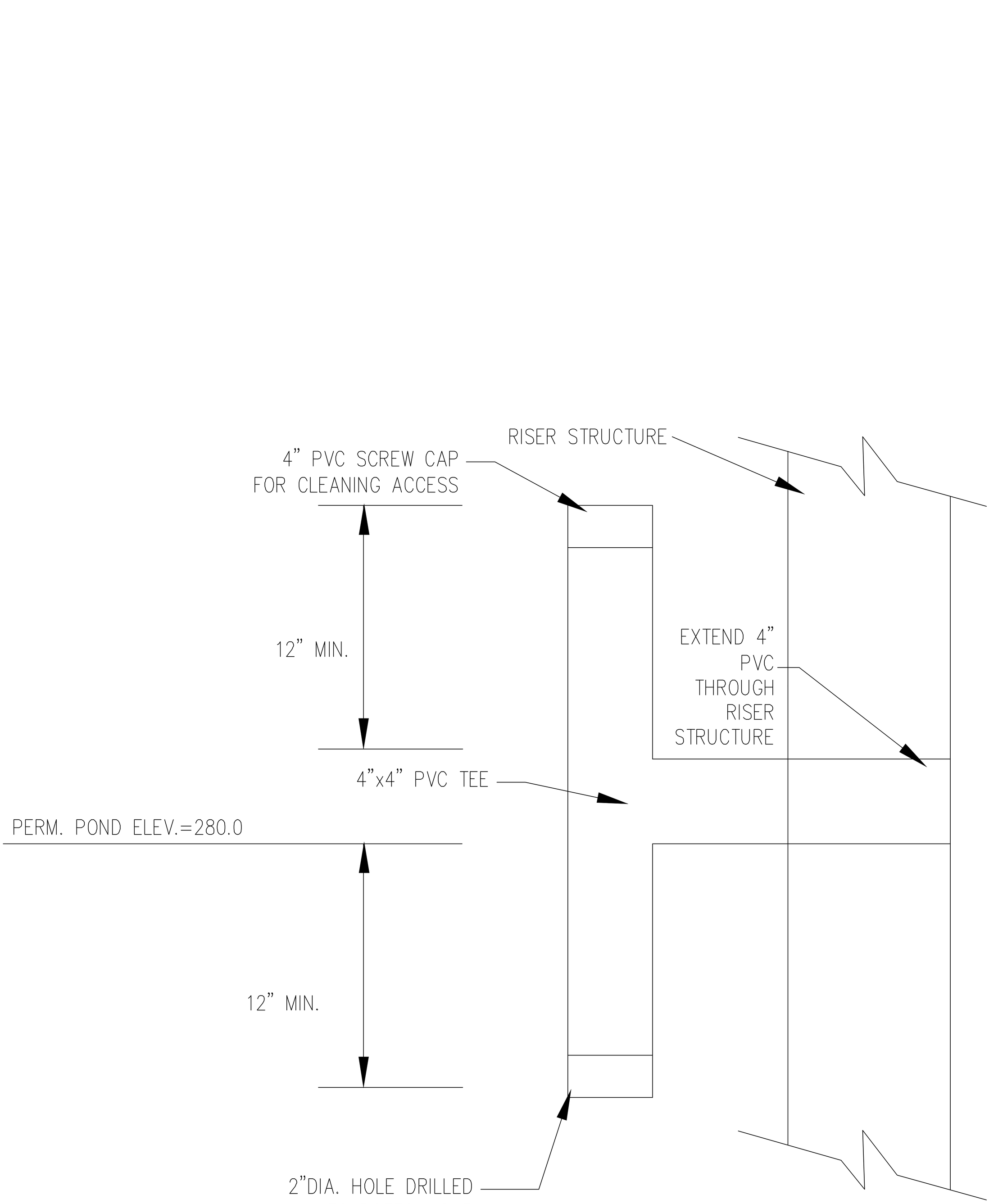
STORMWATER MANAGEMENT DESIGN WET DETENTION POND:

RIVER BASIN: NEUSE
RECEIVING STREAM: LITTLE CREEK (WEST SIDE)
STREAM INDEX: 27-86-2-4
STREAM CLASS: C;NSW
HUC: 03020203
PROJECT COORDINATES: 35.828782°N, -78.293752°W

POND DESIGN SUMMARY

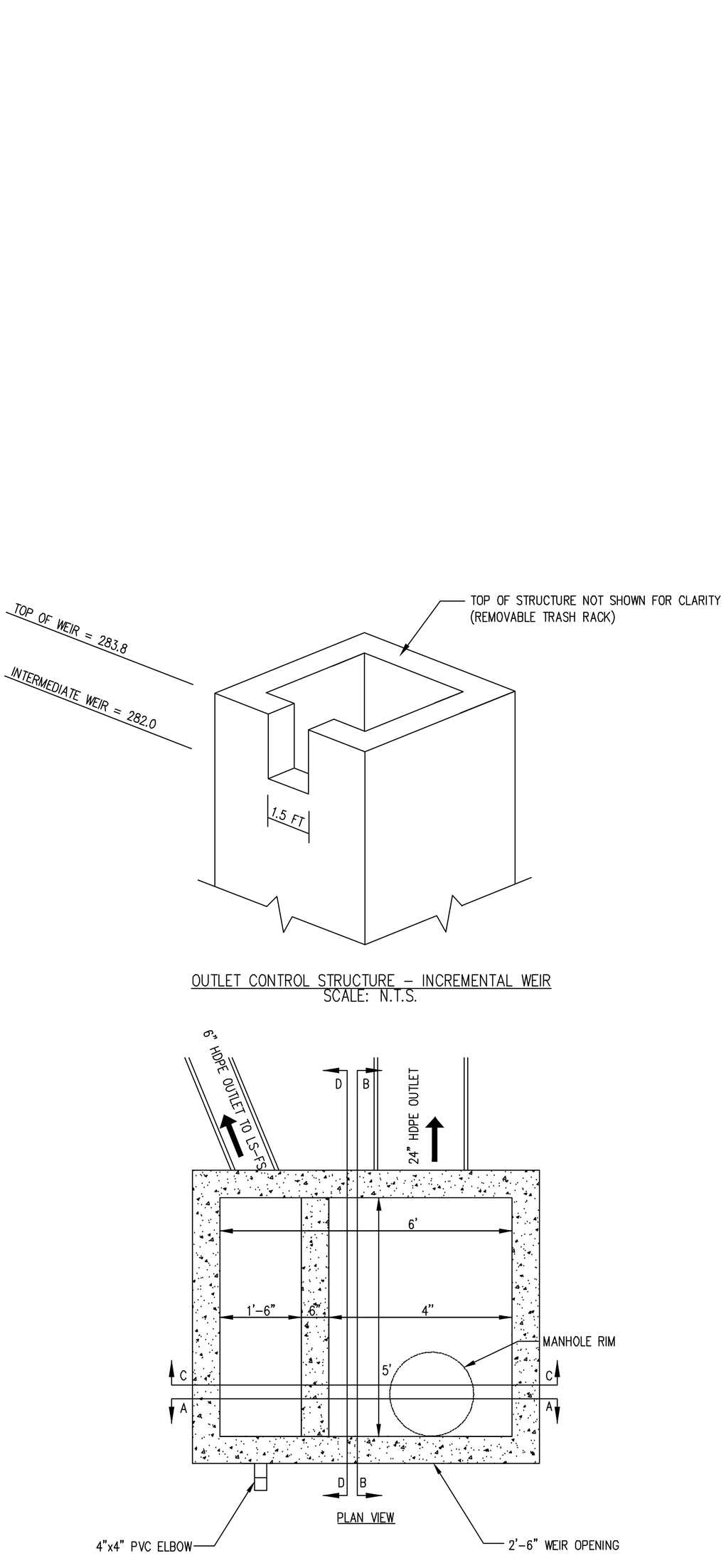
DRAINAGE AREA TO POND:	5.57ACRES
SITE IMPERVIOUS AREA TO POND:	2.53 ACRES
OFF-SITE DESIGN IMPERVIOUS AREA TO POND:	2.02 ACRES
TOTAL DESIGN IMPERVIOUS AREA TO POND:	4.55 ACRES

	PRE-DEVELOPED TO POND	POST-DEVELOPED TO POND	POST-DEVELOPED THROUGH POND	POST-DEVELOPED BYPASS	POST-DEVELOPED TOTAL
DRAINAGE AREA:	3.71 AC	5.57 AC		0.40 AC	
CURVE NUMBER:	83.0	94.7		83.8	
TIME OF CONCENTRATION:	14.0 MIN	5 MIN		10 MIN	
1.0" STORM EVENT:		2.599 CFS	0.096 CFS		
1-YEAR STORM EVENT:	6.225 CFS	19.97 CFS	1.494 CFS	0.800 CFS	2.294 CFS
10-YEAR STORM EVENT:	15.39 CFS	37.96 CFS	12.19 CFS	1.936 CFS	14.13 CFS
100-YEAR STORM EVENT:	27.21 CFS	60.08 CFS	29.24 CFS	3.389 CFS	32.63 CFS

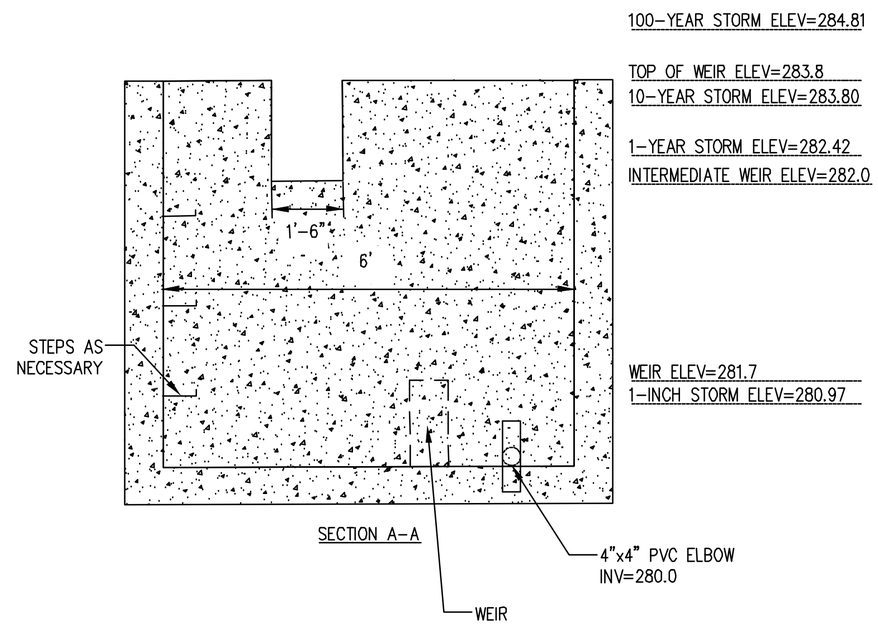


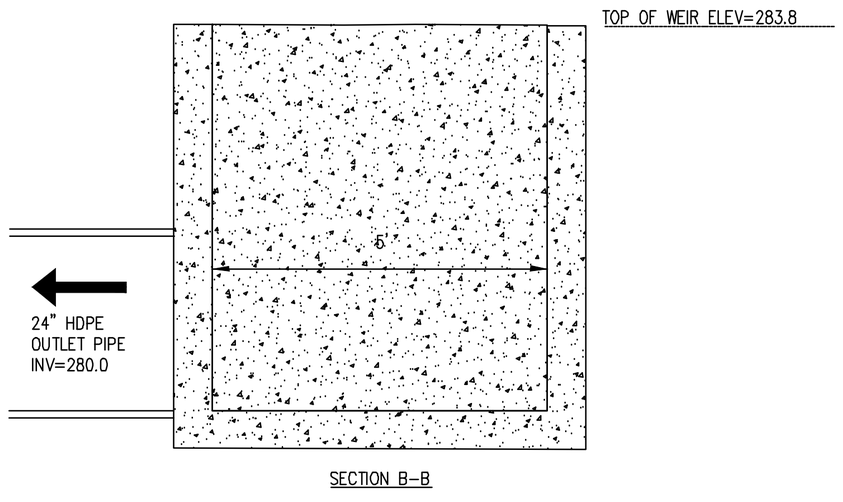
PVC DRAIN OUTLET

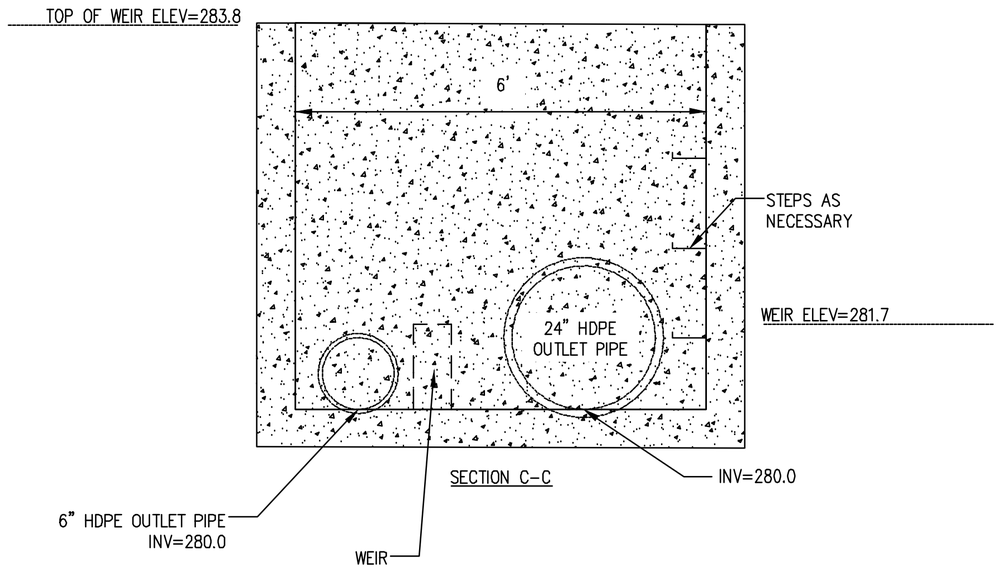
SCALE: N.T.S.

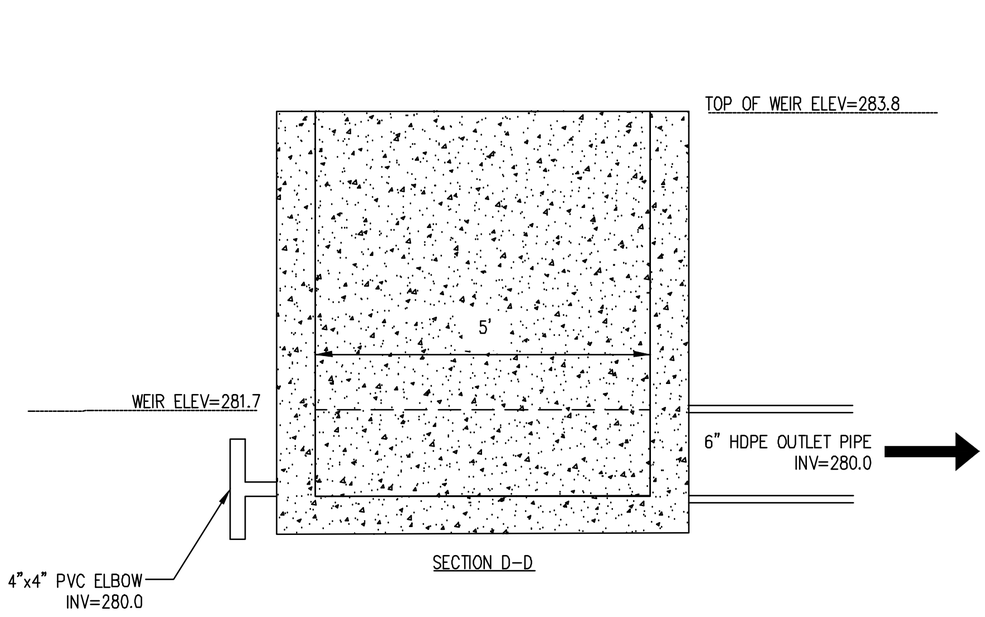


OUTLET CONTROL STRUCTURE – INCREMENTAL WEIR
SCALE: N.T.S.









Level Spreader Design

Site Information

Sub Area Location:	Drainage To Proposed LSFS			
Drainage Area (DA) =	5.57	Acres	242,500	sf
Impervious Area (IA) =	4.55	Acres	198,390	sf
Percent Impervious (I) =		%	81.81	%

Required Water Quality Volume

Design Storm =	1	inch		
Determine Rv Value =	0.05 + .009 (I) =		0.79	in/in
Water Quality Volume =	0.365	ac-ft		
Water Quality Volume =	15,890	cf		
Water Quality Volume =	0.786	inches of runoff		

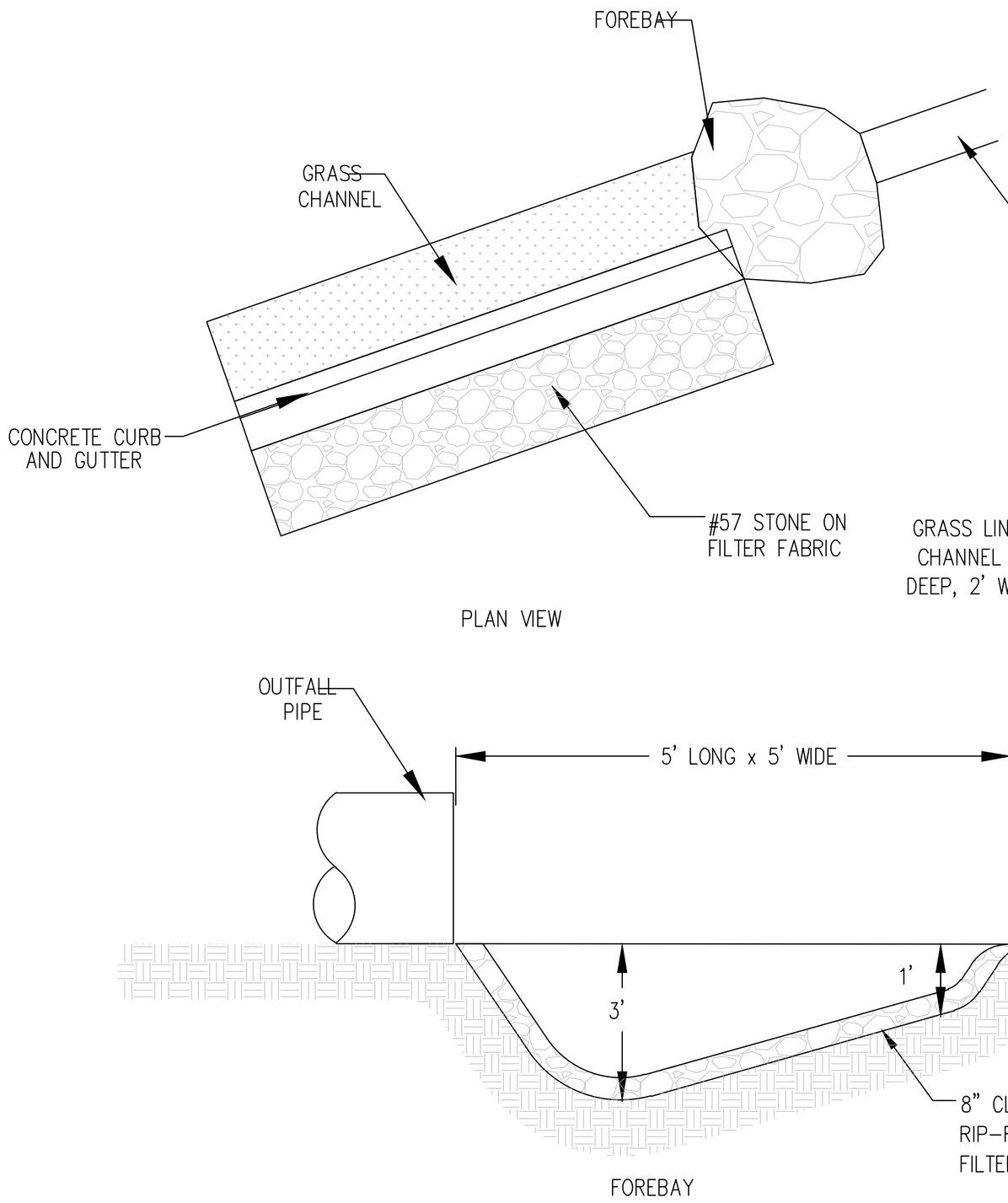
Level Spreader Design Storm

I =	0.75	in/hr	
$Q_{1.0"storm}$ =	0.096	cfs	through pond
$Q_{0.75"storm}$ =	0.096	cfs	

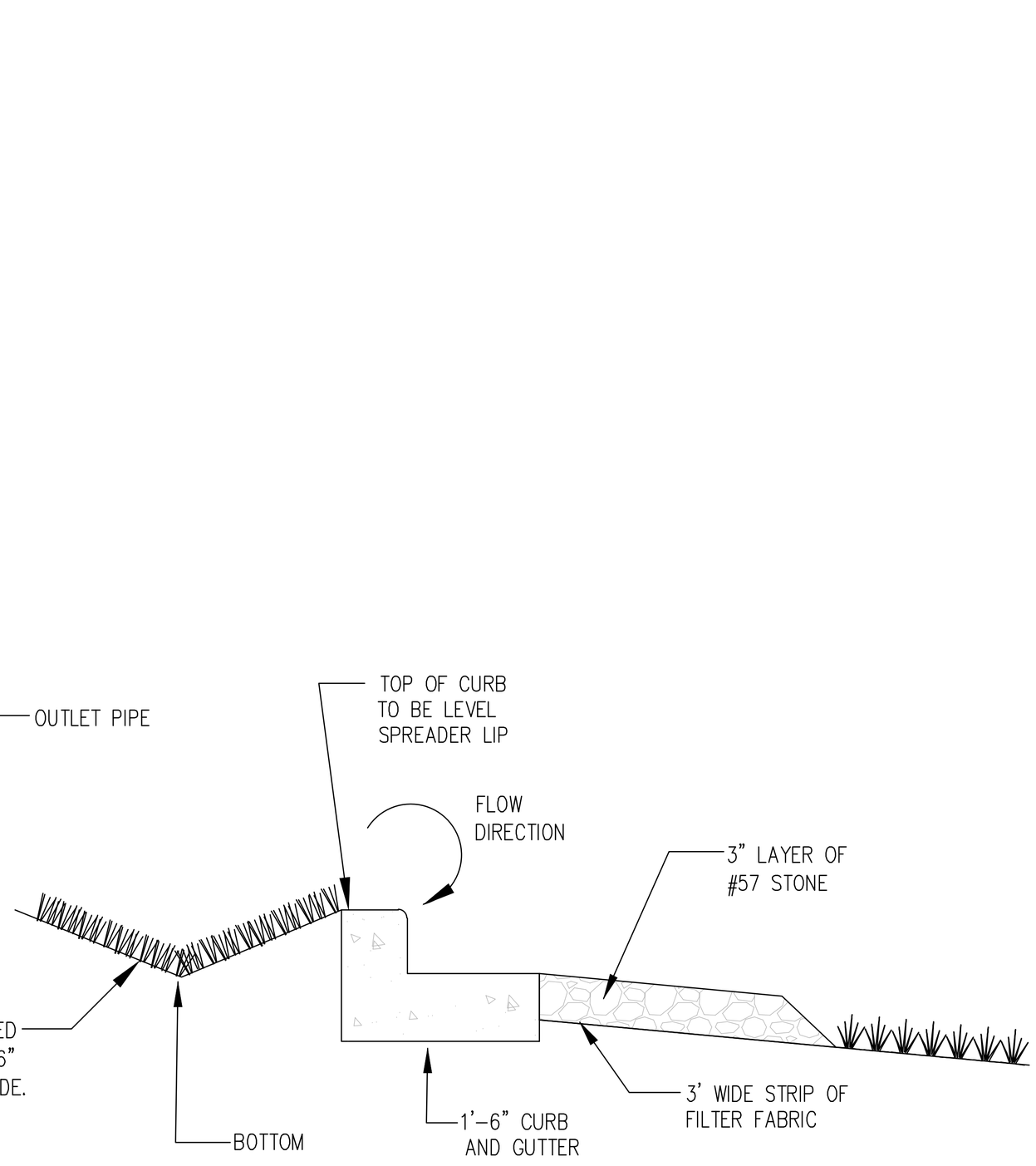
Level Spreader Length

Level Spreader Length: 10 ft/cfs x $Q_{1.0in\text{-}storm}$

$L_{required}$ =	1.0	ft
L_{min} =	10.0	ft
$L_{provided}$ =	10.0	ft



PLAN VIEW



CROSS SECTION

STANDARD LEVEL SPREADER
SCALE: N.T.S.

CONSTRUCTION SPECIFICATIONS

1. THE MATTING SHOULD BE A MINIMUM OF 4 FEET WIDE EXTENDING 6 INCHES OVER THE LIP AND BURIED 6 INCHES DEEP IN A VERTICAL TRENCH ON THE LOWER EDGE. THE UPPER EDGE SHOULD BUTT AGAINST SMOOTHLY CUT SOD AND BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY DUTY WIRE STAPLES AT LEAST 12 INCHES LONG.

2. ENSURE THAT THE SPREADER IS LEVEL, FOR UNIFORM SPREADING OF STORM RUNOFF.

3. CONSTRUCT THE LEVEL SPREADER ON UNDISTURBED SOIL. (NOT ON FILL)

4. CONSTRUCT A 20 FOOT TRANSITION SECTION FROM THE DIVERSION CHANNEL TO BLEND SMOOTHLY WITH THE WIDTH AND DEPTH OF THE LEVEL SPREADER.

5. DISPERSE RUNOFF FROM THE SPREADER ACROSS A PROPERLY STABILIZED SLOPE, NOT TO EXCEED 10%, MAKE SURE THAT THE SLOPE IS SUFFICIENTLY SMOOTH TO KEEP THE FLOW FROM CONCENTRATING.

6. IMMEDIATELY AFTER IT'S CONSTRUCTION, APPROPRIATELY SEED AND MULCH THE ENTIRE DISTURBED AREA OF THE LEVEL SPREADER.

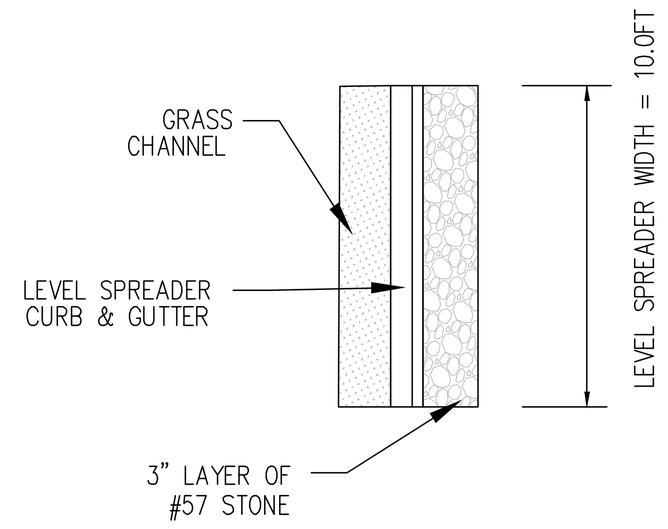
MAINTENANCE

VEGETATE ALL DISTURBED AREAS

INSPECT THE LEVEL SPREADER AFTER EVERY RAINFALL UNTIL VEGETATION IS ESTABLISHED AND PROPERLY MAKE ANY NEEDED REPAIRS. AFTER THE AREA HAS BEEN STABILIZED, MAKE PERIODIC INSPECTIONS AND KEEP VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

SPREADER LIP- CONSTRUCT THE LEVEL LIP ON UNDISTURBED SOIL TO UNIFORM HEIGHT AND ZERO GRADE OVER THE LENGTH OF THE SPREADER. PROTECT IT WITH AN EROSION RESISTANT MATERIAL SUCH AS SURGE STONE TO PREVENT EROSION, TO BECOME ESTABLISHED.

OUTLET AREA- THE OUTLET DISPOSAL AREA MUST BE GENERALLY SMOOTH AND WELL VEGETATED WITH A MAXIMUM SLOPE OF 10%.



LEVEL SPREADER

SCALE: N.T.S.

VEGETATIVE FILTER STRIP – SOIL MIXTURE

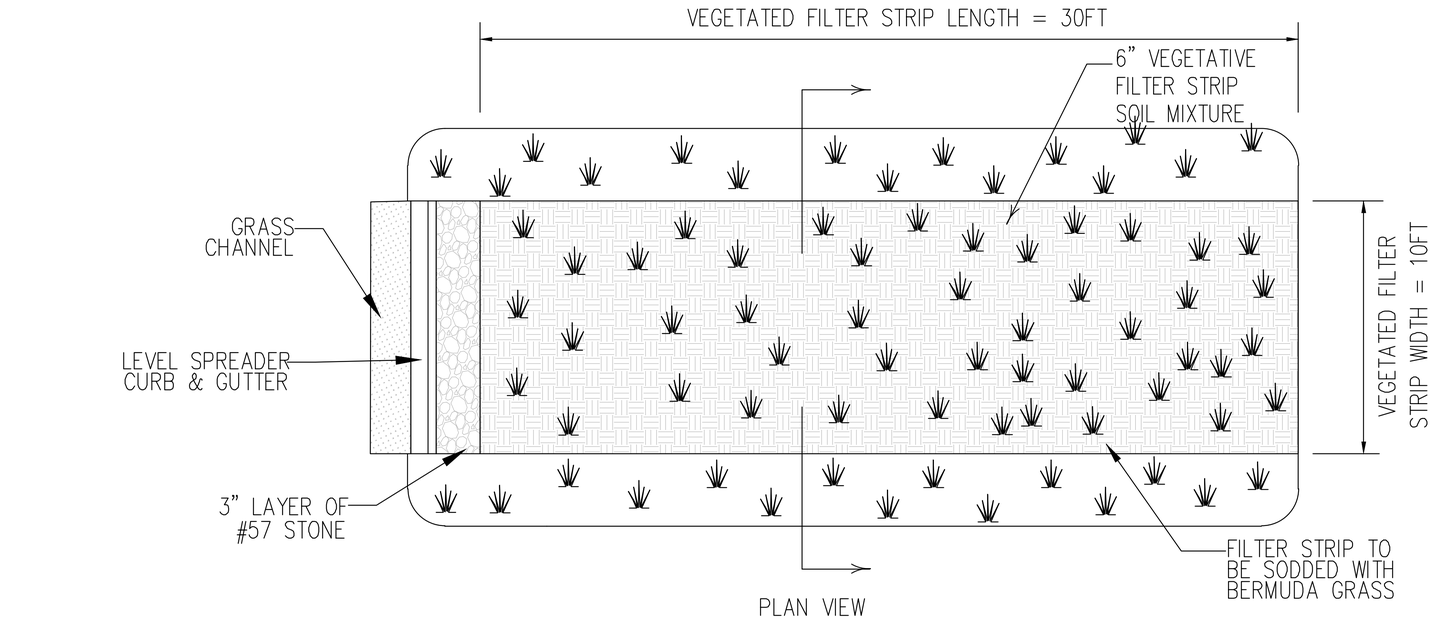
SOIL MIXTURE

ITEM	PERCENT BY WEIGHT	MATERIAL
SAND	85–88%	CONSTRUCTION SAND
FINES	8%–12%	SILT
ORGANIC MATTER	3%–5%	COMPOST/PEAT MOSS

SOIL MIXTURE: SHALL BE PLACED AND GRADED USING LOW GROUND–CONTACT PRESSURE EQUIPMENT OR BY EXCAVATORS AND/OR BACKHOES OPERATING ON THE GROUND ADJACENT TO THE VEGETATIVE FILTER STRIP FACILITY. NO HEAVY EQUIPMENT SHALL BE USED WITHIN THE PERIMETER OF THE VEGETATIVE FILTER STRIP FACILITY BEFORE, DURING, OR AFTER THE PLACEMENT OF THE SOIL MIXTURE. THE SOIL MIXTURE SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED 4 INCHES FOR THE ENTIRE AREA OF THE VEGETATIVE FILTER STRIP FACILITY. IF THE SOIL MIXTURE BECOMES CONTAMINATED DURING THE CONSTRUCTION OF THE VEGETATIVE FILTER STRIP FACILITY, THE CONTAMINATED MATERIAL SHALL BE REMOVED AND REPLACED WITH UNCONTAMINATED MATERIAL AT NO ADDITIONAL COST. FINAL GRADING OF THE VEGETATIVE FILTER STRIP SHALL BE PERFORMED AFTER A 24–HOUR SETTLING PERIOD. FINAL ELEVATIONS SHALL BE WITHIN 2 INCHES OF ELEVATIONS SHOWN ON THE CONTRACT PLANS.

THE SOIL MIXTURE SHALL BE A UNIFORM MIX, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES EXCLUDING MULCH. NO OTHER MATERIALS OR SUBSTANCES SHALL BE MIXED OR DUMPED WITHIN THE VEGETATIVE FILTER STRIP AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS.

PRIOR TO PLACING THE SOIL MIXTURE, THE BOTTOM OF THE EXCAVATION SHALL BE ROTO–TILLED TO A MINIMUM DEPTH OF 6 INCHES TO ALLEVIATE ANY COMPACTION OF THE FACILITY BOTTOM. ANY SUBSTITUTE METHOD FOR ROTO–TILLING MUST BE APPROVED BY THE ENGINEER PRIOR TO USE. ANY PONDED WATER SHALL BE REMOVED FROM THE BOTTOM OF THE FACILITY AND THE SOIL SHALL BE FRIABLE BEFORE ROTO–TILLING.



VEGETATIVE FILTER STRIP

SCALE: N.T.S.

Pond Report

Pond No. 1 - Wet Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 280.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	280.00	8,385	0	0
0.50	280.50	9,635	4,505	4,505
1.00	281.00	10,395	5,008	9,513
1.70	281.70	11,535	7,676	17,188
2.00	282.00	11,940	3,521	20,709
3.00	283.00	13,325	12,633	33,342
4.00	284.00	14,765	14,045	47,387
5.00	285.00	16,265	15,515	62,902

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	Inactive	Inactive
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 280.00	280.00	0.00	0.00
Length (ft)	= 32.00	0.50	0.00	0.00
Slope (%)	= 1.56	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

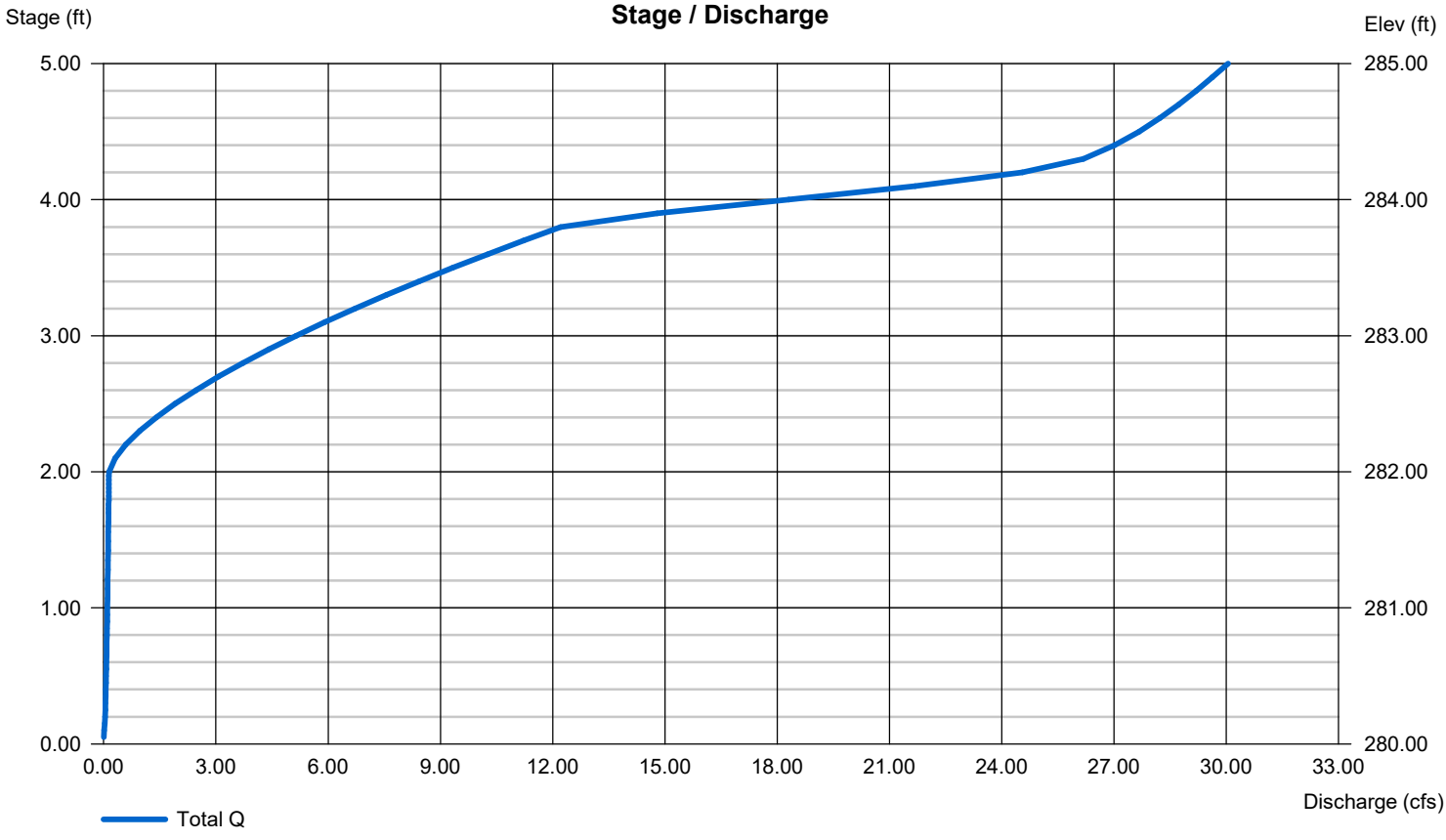
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	20.50	Inactive	Inactive
Crest El. (ft)	= 282.00	283.80	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

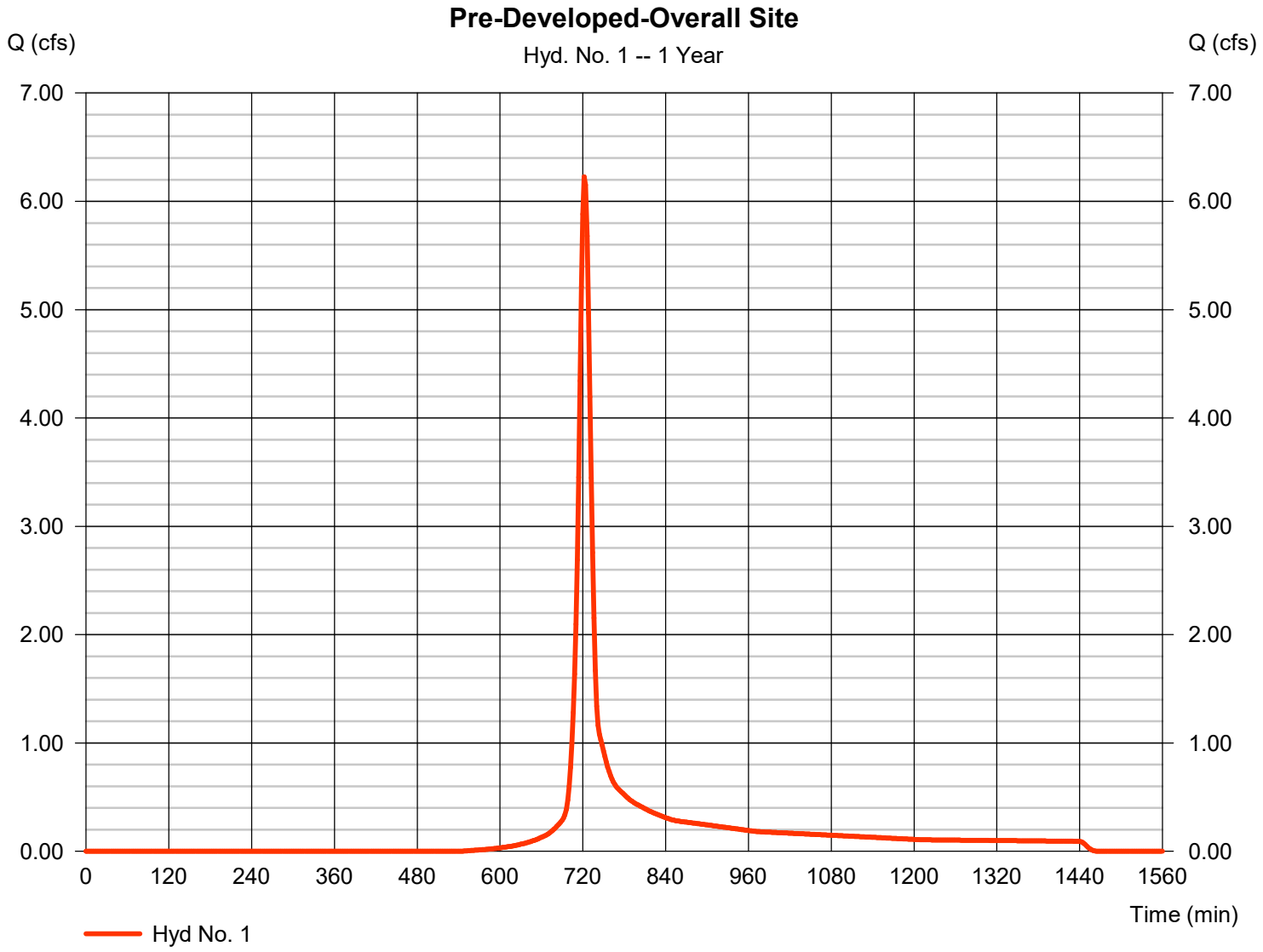
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.225	2	722	17,526	------	------	------	Pre-Developed-Overall Site
2	SCS Runoff	19.97	2	716	43,277	------	------	------	Post Developed to Pond
3	Reservoir	1.494	2	750	42,556	2	282.42	25,975	Post Through Pond
4	SCS Runoff	0.800	2	720	2,079	------	------	------	Post Developed Bypass
6	SCS Runoff	2.599	2	144	10,326	------	------	------	1.0 Post-Developed to Pond
7	Reservoir	0.096	2	364	10,185	6	280.97	9,170	1.0inPost Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Developed-Overall Site

Hydrograph type	= SCS Runoff	Peak discharge	= 6.225 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 17,526 cuft
Drainage area	= 3.710 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 2.86 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

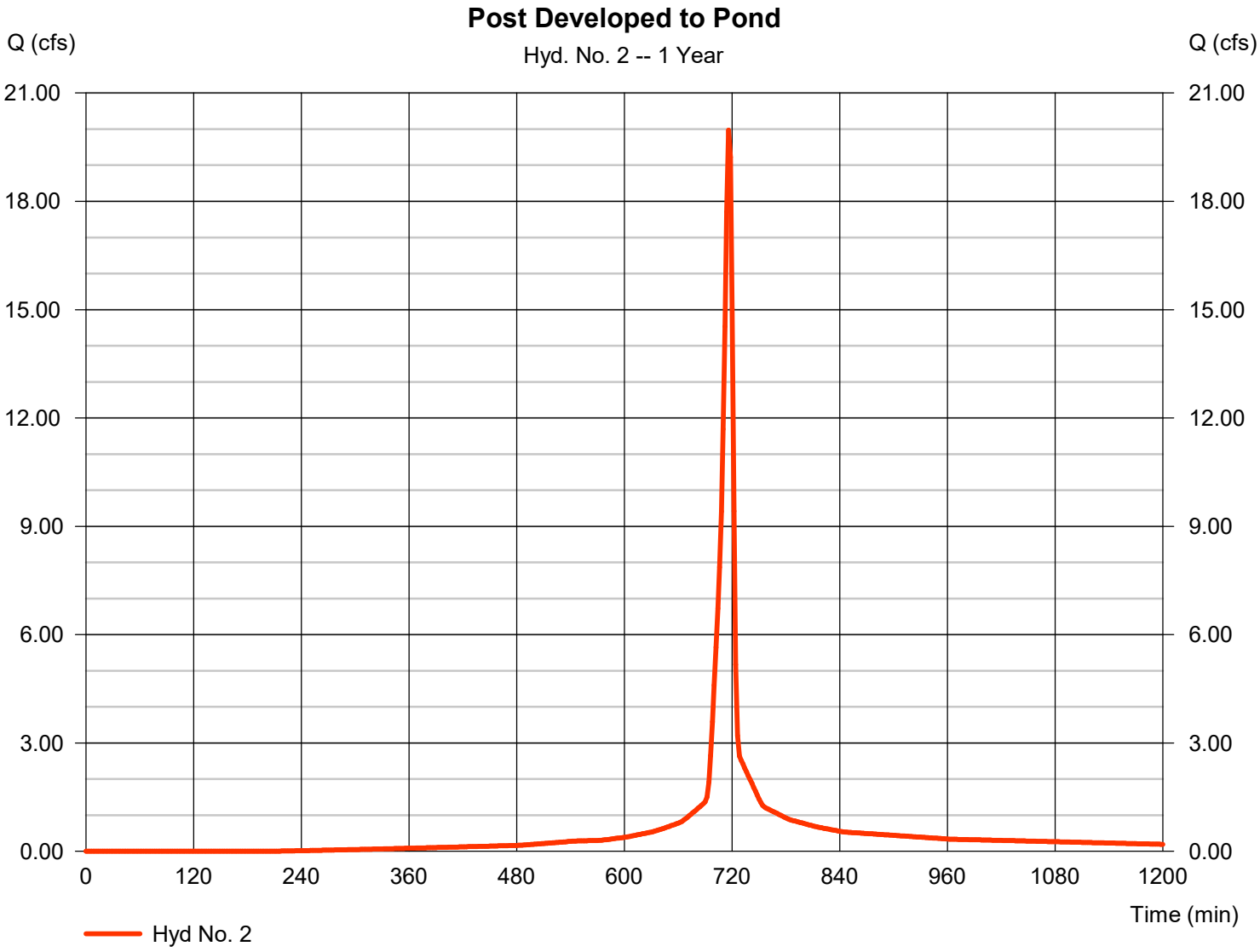


Hydrograph Report

Hyd. No. 2

Post Developed to Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.97 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	43,277 cuft
Drainage area	=	5.570 ac	Curve number	=	94.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.86 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



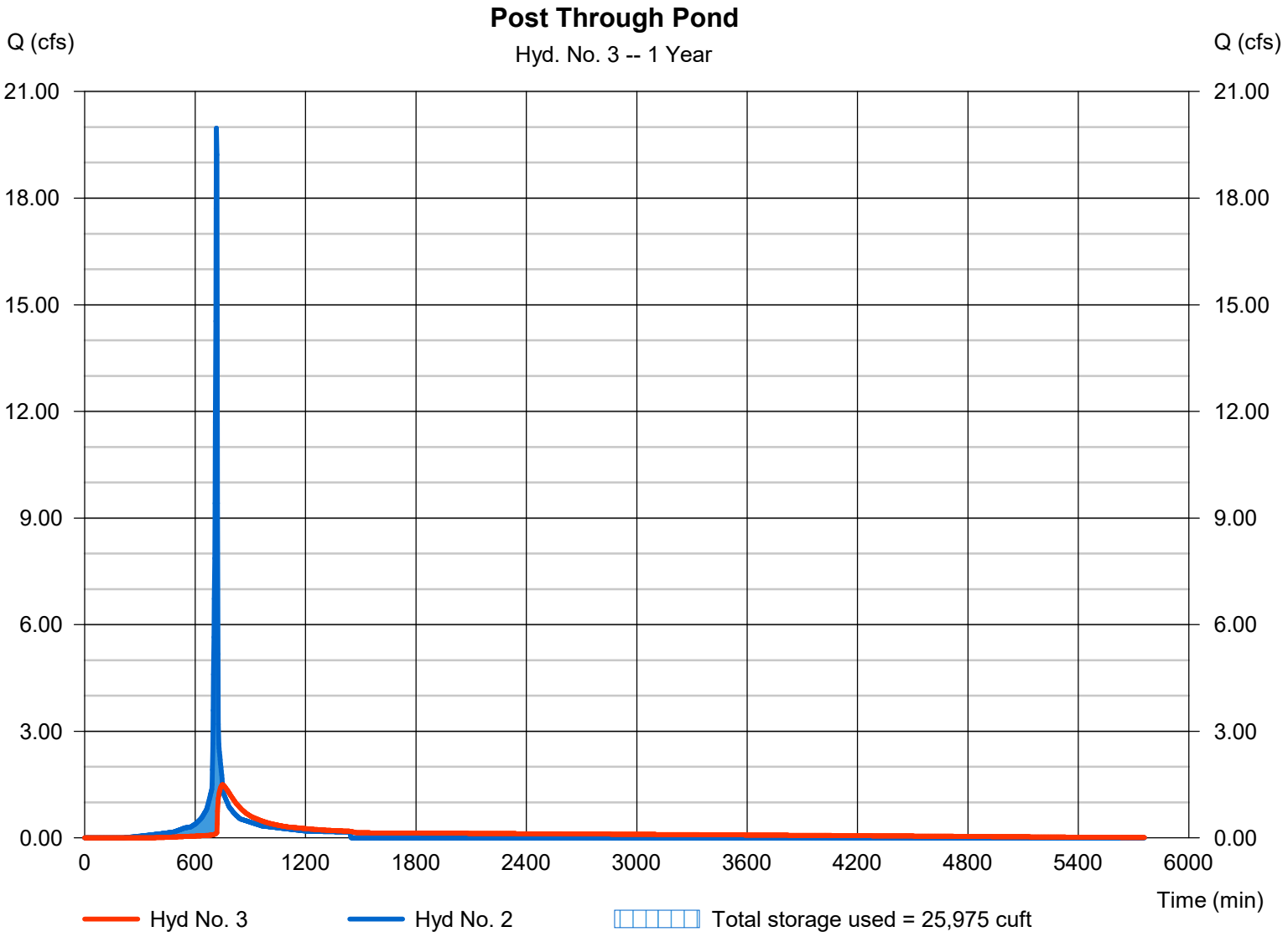
Hydrograph Report

Hyd. No. 3

Post Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	1.494 cfs
Storm frequency	=	1 yrs	Time to peak	=	750 min
Time interval	=	2 min	Hyd. volume	=	42,556 cuft
Inflow hyd. No.	=	2 - Post Developed to Pond	Max. Elevation	=	282.42 ft
Reservoir name	=	Wet Pond	Max. Storage	=	25,975 cuft

Storage Indication method used.

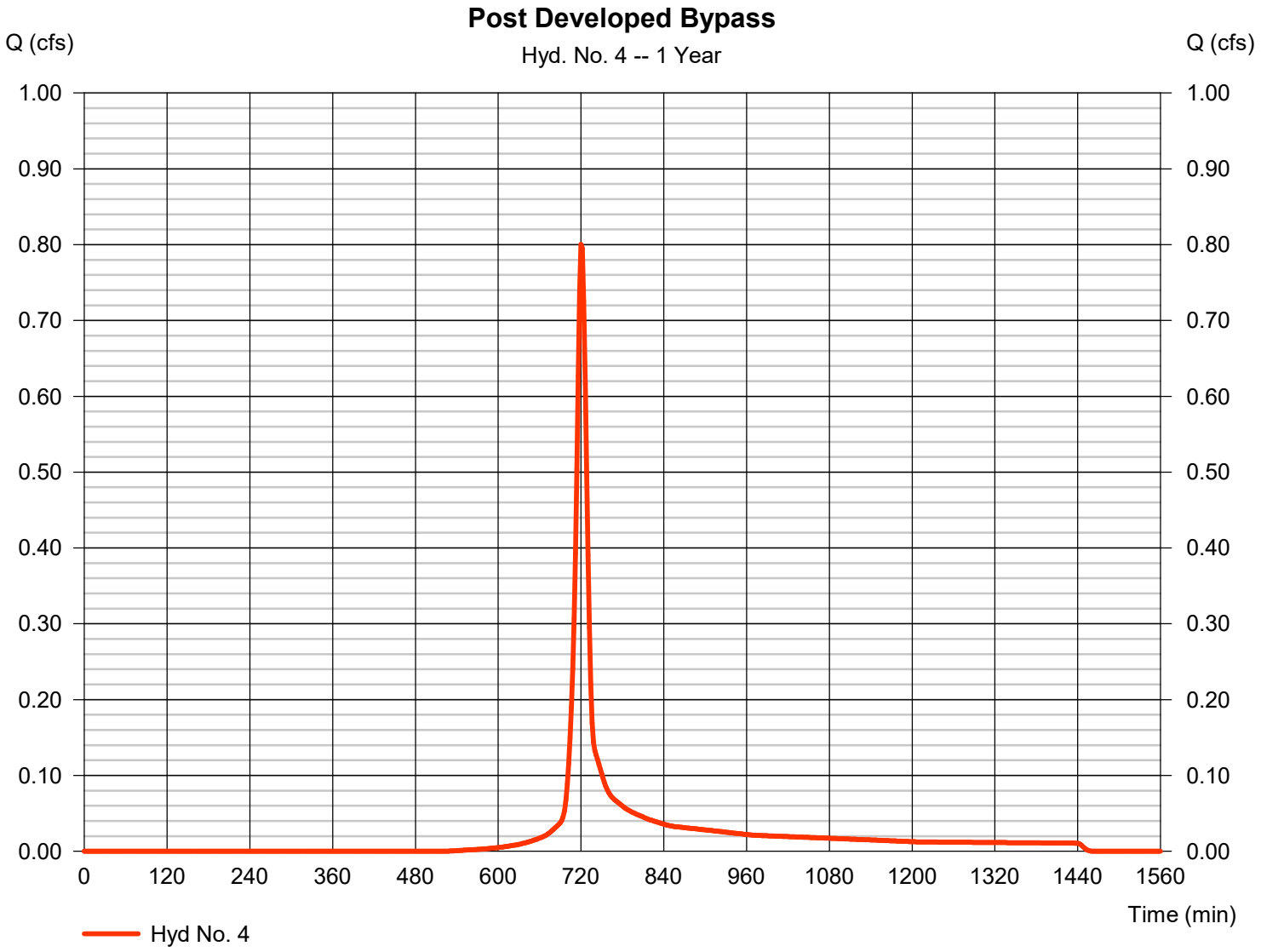


Hydrograph Report

Hyd. No. 4

Post Developed Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.800 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	2,079 cuft
Drainage area	=	0.400 ac	Curve number	=	83.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.86 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

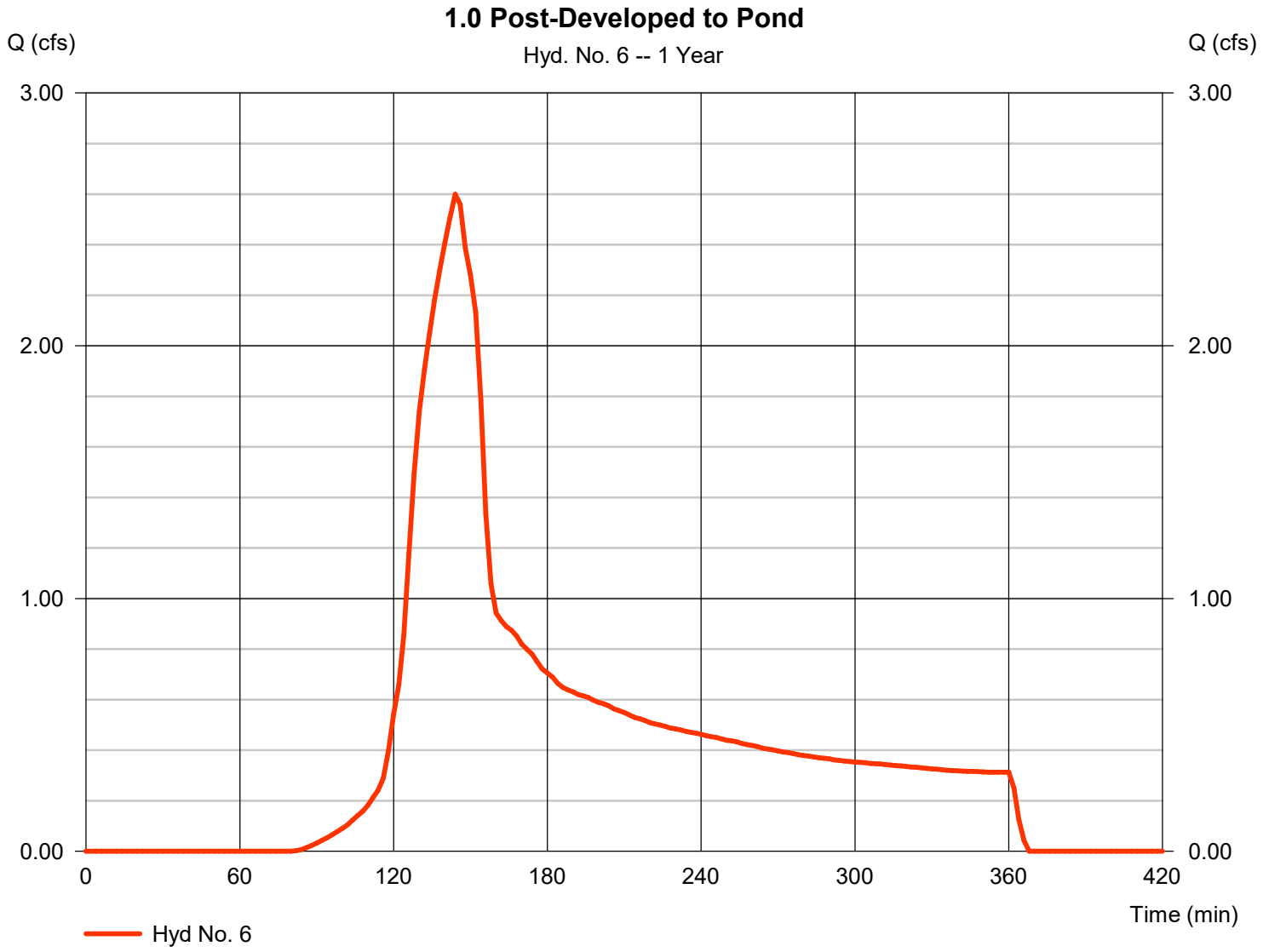


Hydrograph Report

Hyd. No. 6

1.0 Post-Developed to Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.599 cfs
Storm frequency	=	1 yrs	Time to peak	=	144 min
Time interval	=	2 min	Hyd. volume	=	10,326 cuft
Drainage area	=	5.570 ac	Curve number	=	94.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	1.00 in	Distribution	=	SCS 6-Hr
Storm duration	=	6.00 hrs	Shape factor	=	484



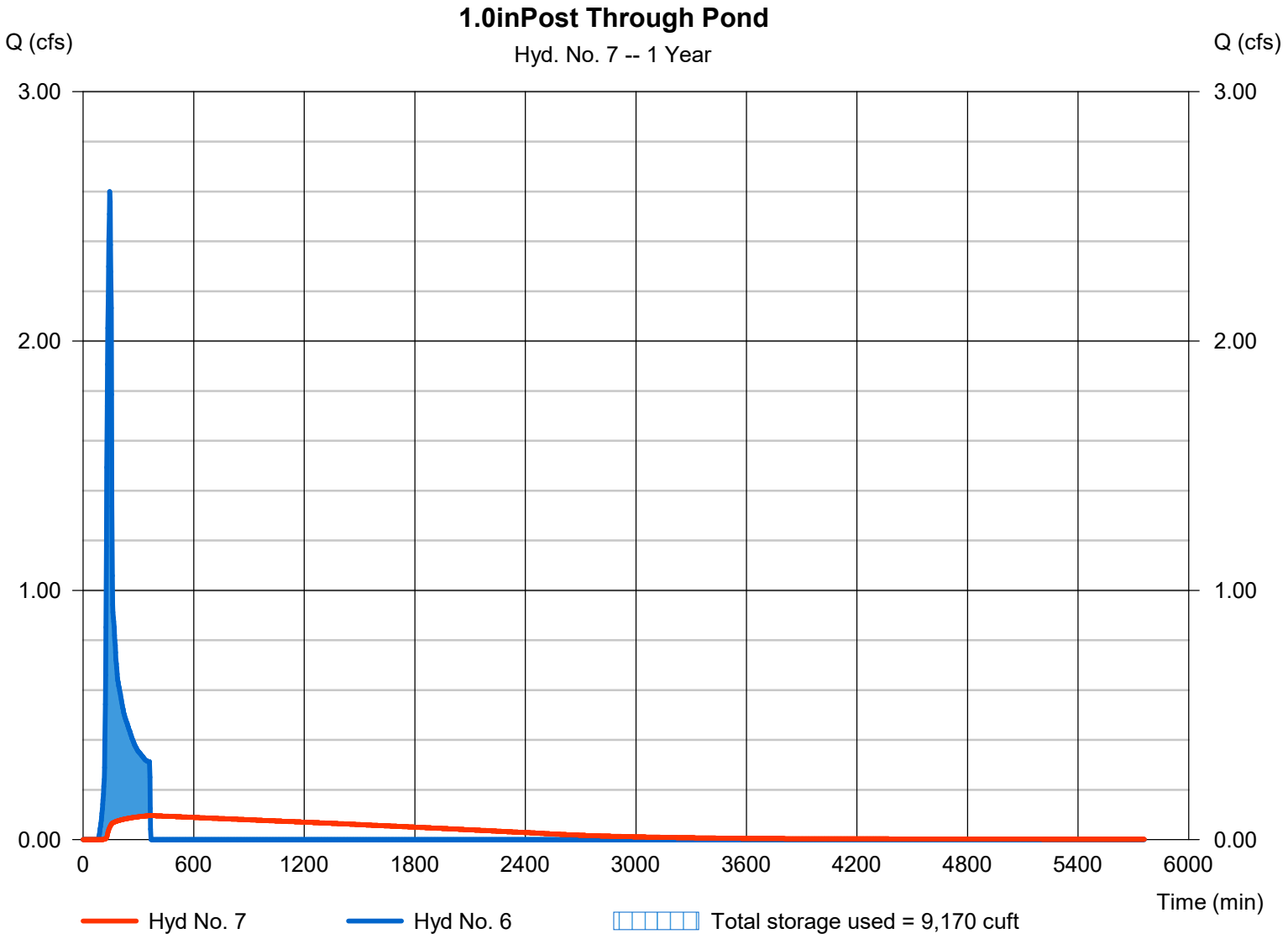
Hydrograph Report

Hyd. No. 7

1.0inPost Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.096 cfs
Storm frequency	=	1 yrs	Time to peak	=	364 min
Time interval	=	2 min	Hyd. volume	=	10,185 cuft
Inflow hyd. No.	=	6 - 1.0 Post-Developed to Pond	Max. Elevation	=	280.97 ft
Reservoir name	=	Wet Pond	Max. Storage	=	9,170 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

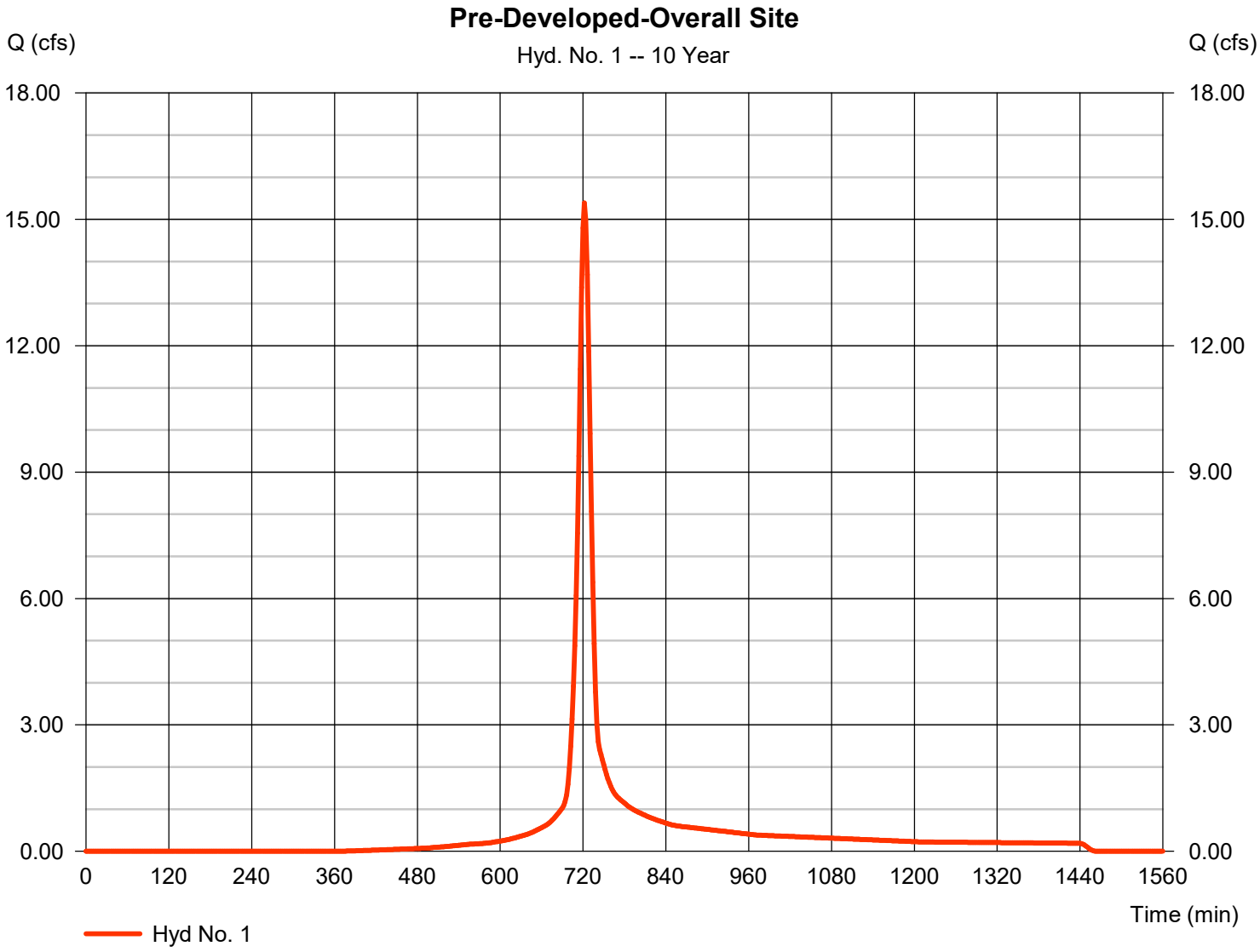
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.39	2	722	43,464	------	------	------	Pre-Developed-Overall Site
2	SCS Runoff	37.96	2	716	85,951	------	------	------	Post Developed to Pond
3	Reservoir	12.19	2	724	85,185	2	283.80	44,550	Post Through Pond
4	SCS Runoff	1.936	2	720	5,074	------	------	------	Post Developed Bypass
6	SCS Runoff	0.000	2	n/a	0	------	------	------	1.0 Post-Developed to Pond
7	Reservoir	0.000	2	n/a	0	6	280.00	0.000	1.0inPost Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Developed-Overall Site

Hydrograph type	= SCS Runoff	Peak discharge	= 15.39 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 43,464 cuft
Drainage area	= 3.710 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.15 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

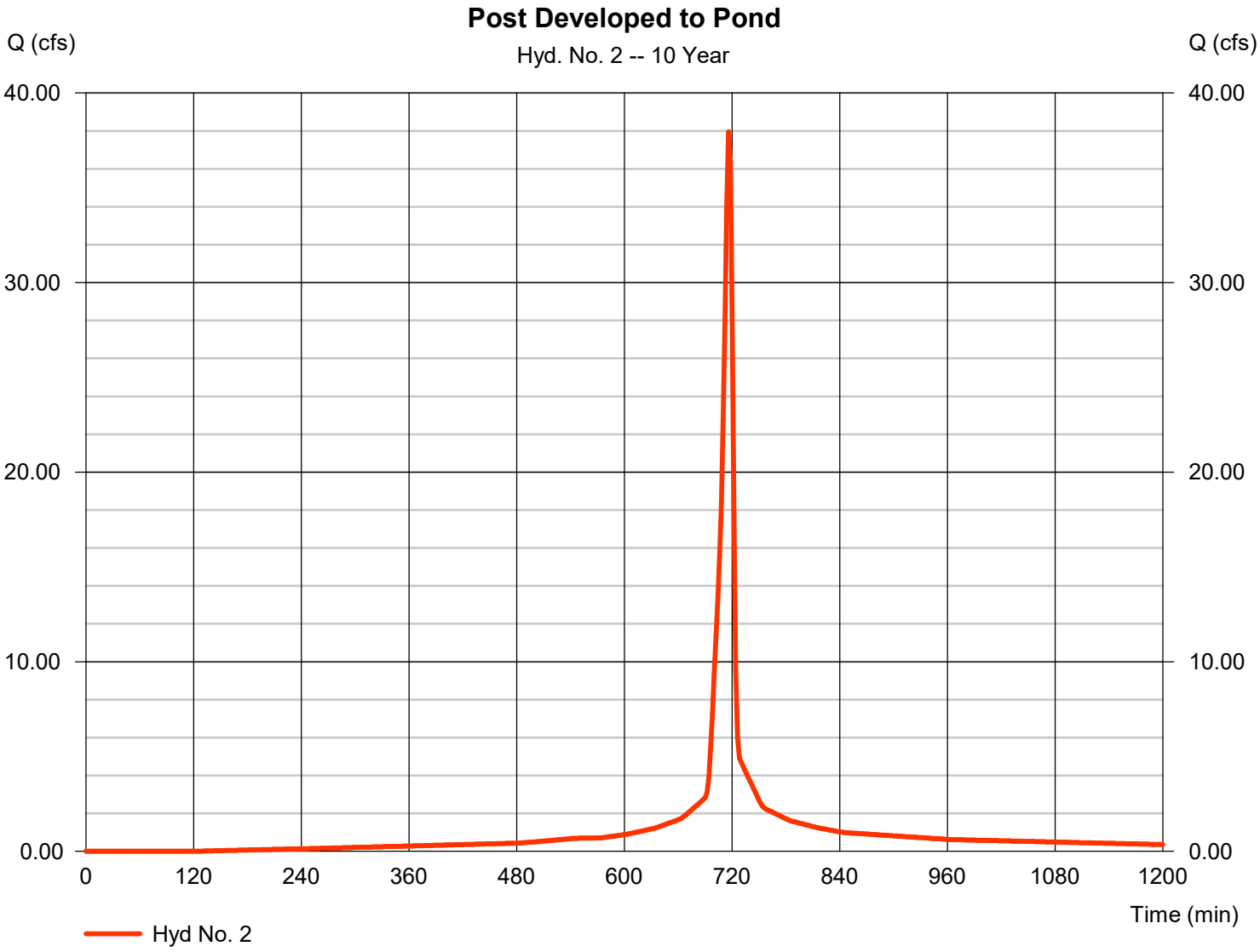


Hydrograph Report

Hyd. No. 2

Post Developed to Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	37.96 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	85,951 cuft
Drainage area	=	5.570 ac	Curve number	=	94.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.15 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



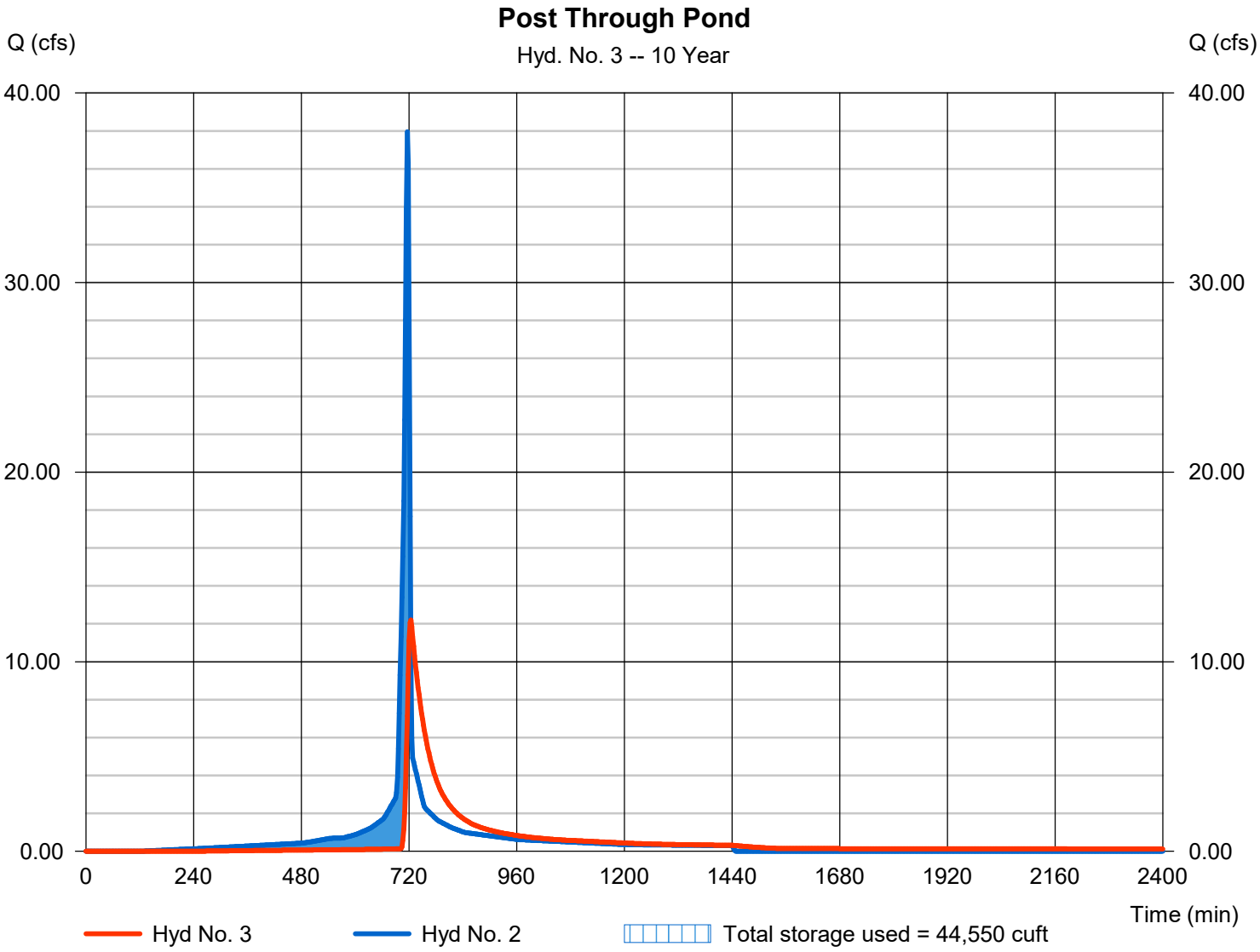
Hydrograph Report

Hyd. No. 3

Post Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	12.19 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	85,185 cuft
Inflow hyd. No.	=	2 - Post Developed to Pond	Max. Elevation	=	283.80 ft
Reservoir name	=	Wet Pond	Max. Storage	=	44,550 cuft

Storage Indication method used.

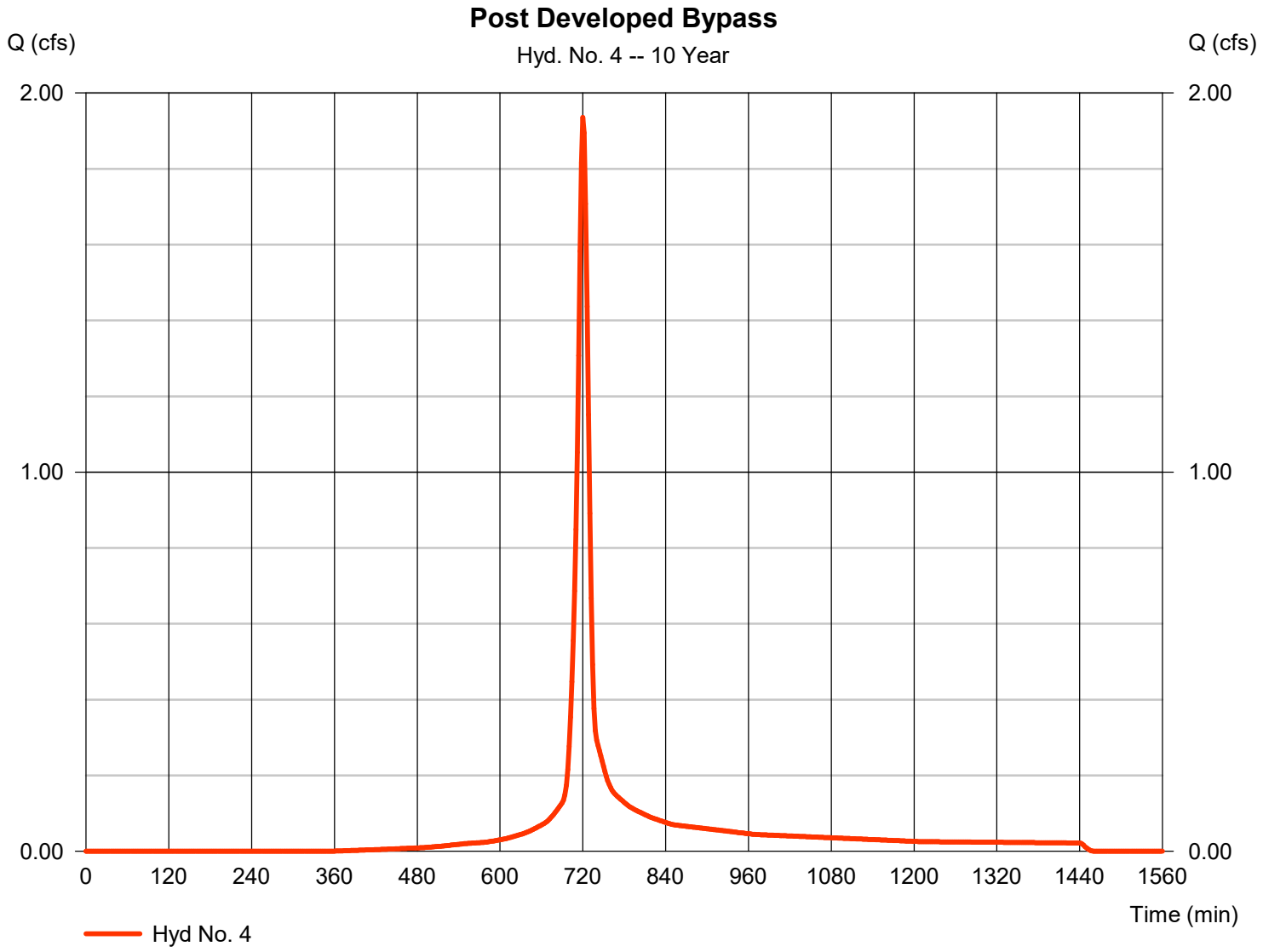


Hydrograph Report

Hyd. No. 4

Post Developed Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.936 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	5,074 cuft
Drainage area	=	0.400 ac	Curve number	=	83.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.15 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

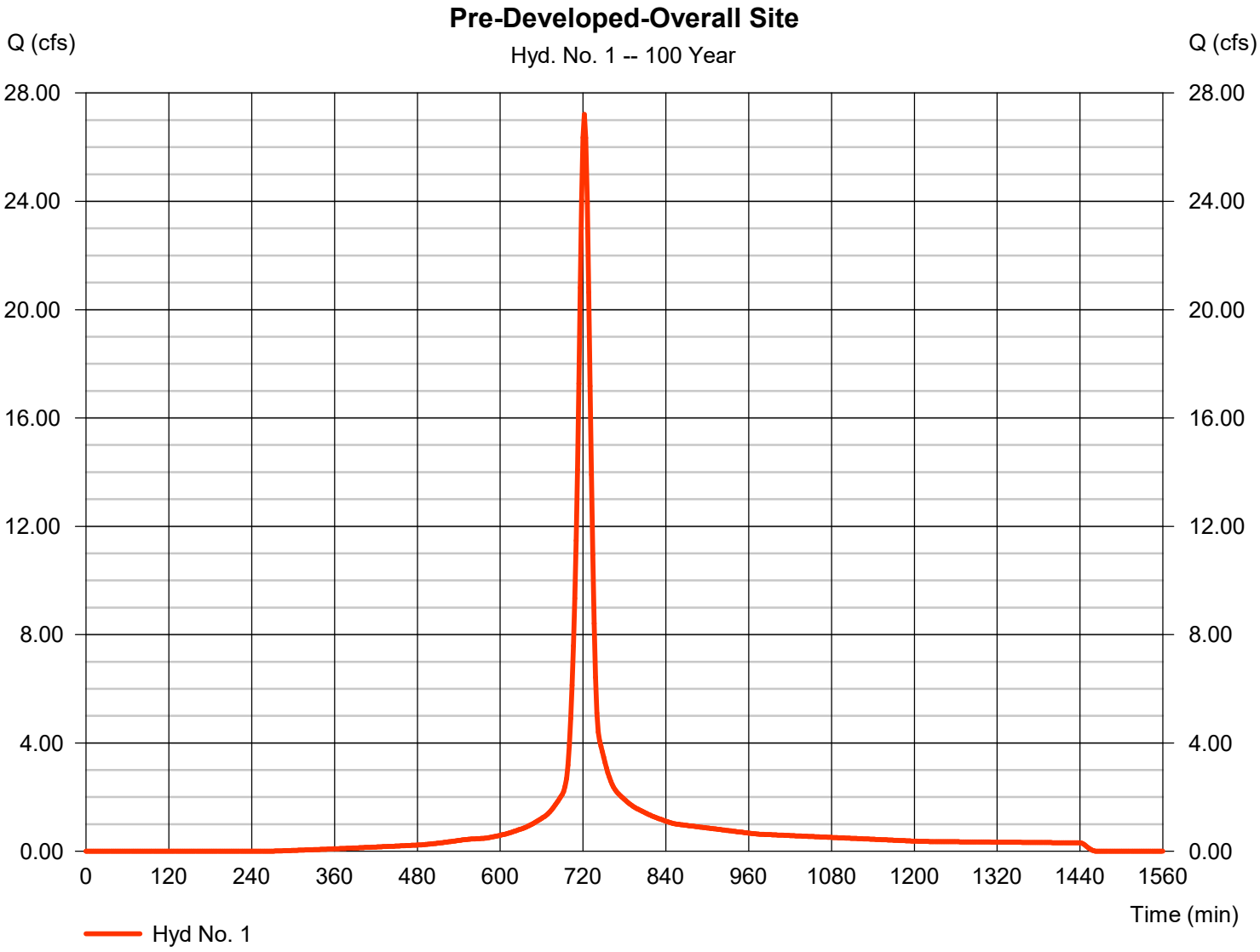
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	27.21	2	722	78,612	------	------	------	Pre-Developed-Overall Site
2	SCS Runoff	60.08	2	716	139,804	------	------	------	Post Developed to Pond
3	Reservoir	29.24	2	722	139,016	2	284.81	59,939	Post Through Pond
4	SCS Runoff	3.389	2	720	9,106	------	------	------	Post Developed Bypass
6	SCS Runoff	0.000	2	n/a	0	------	------	------	1.0 Post-Developed to Pond
7	Reservoir	0.000	2	n/a	0	6	280.00	0.000	1.0inPost Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Developed-Overall Site

Hydrograph type	= SCS Runoff	Peak discharge	= 27.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 78,612 cuft
Drainage area	= 3.710 ac	Curve number	= 83
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 8.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

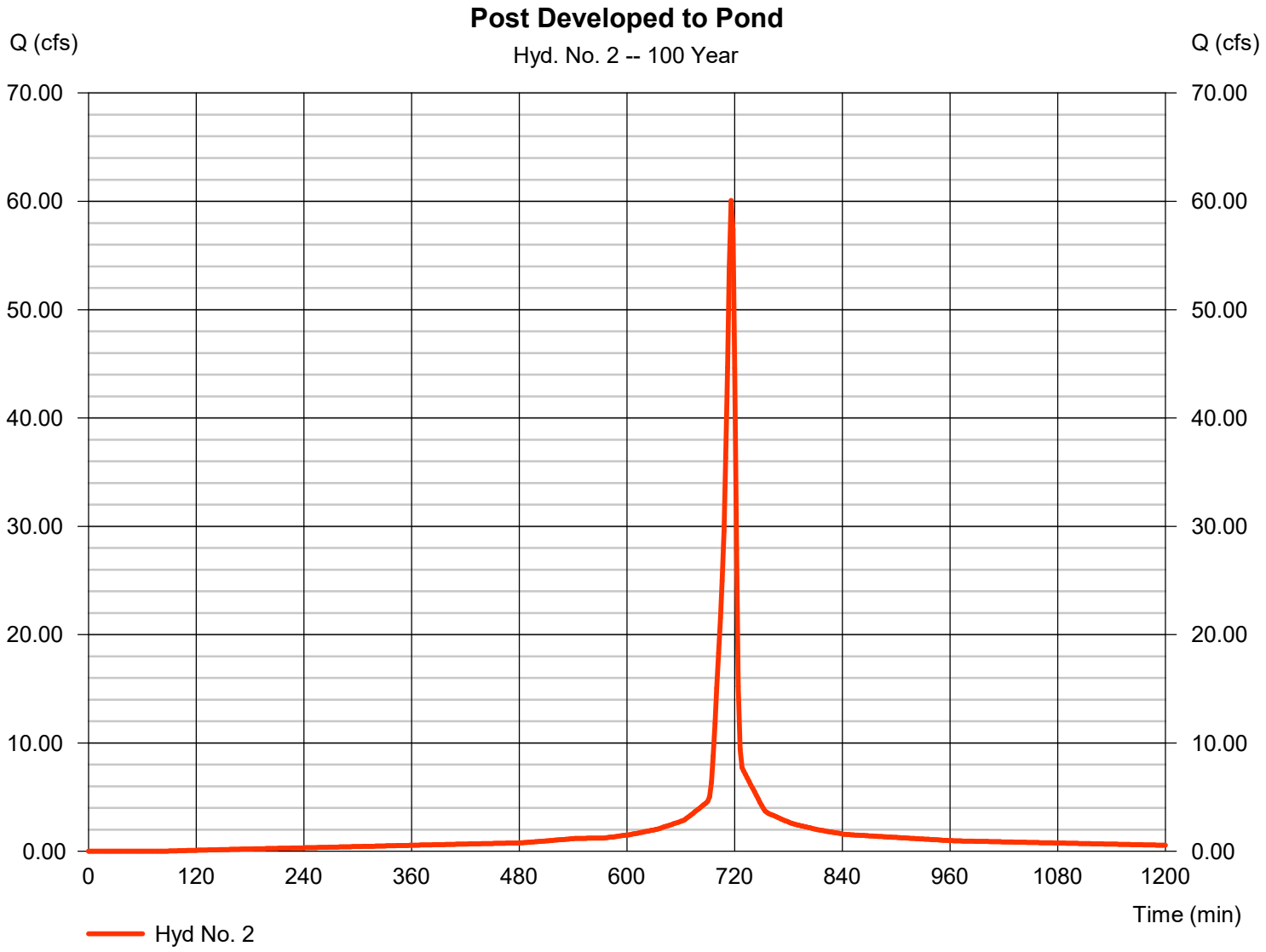


Hydrograph Report

Hyd. No. 2

Post Developed to Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	60.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	139,804 cuft
Drainage area	=	5.570 ac	Curve number	=	94.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.01 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



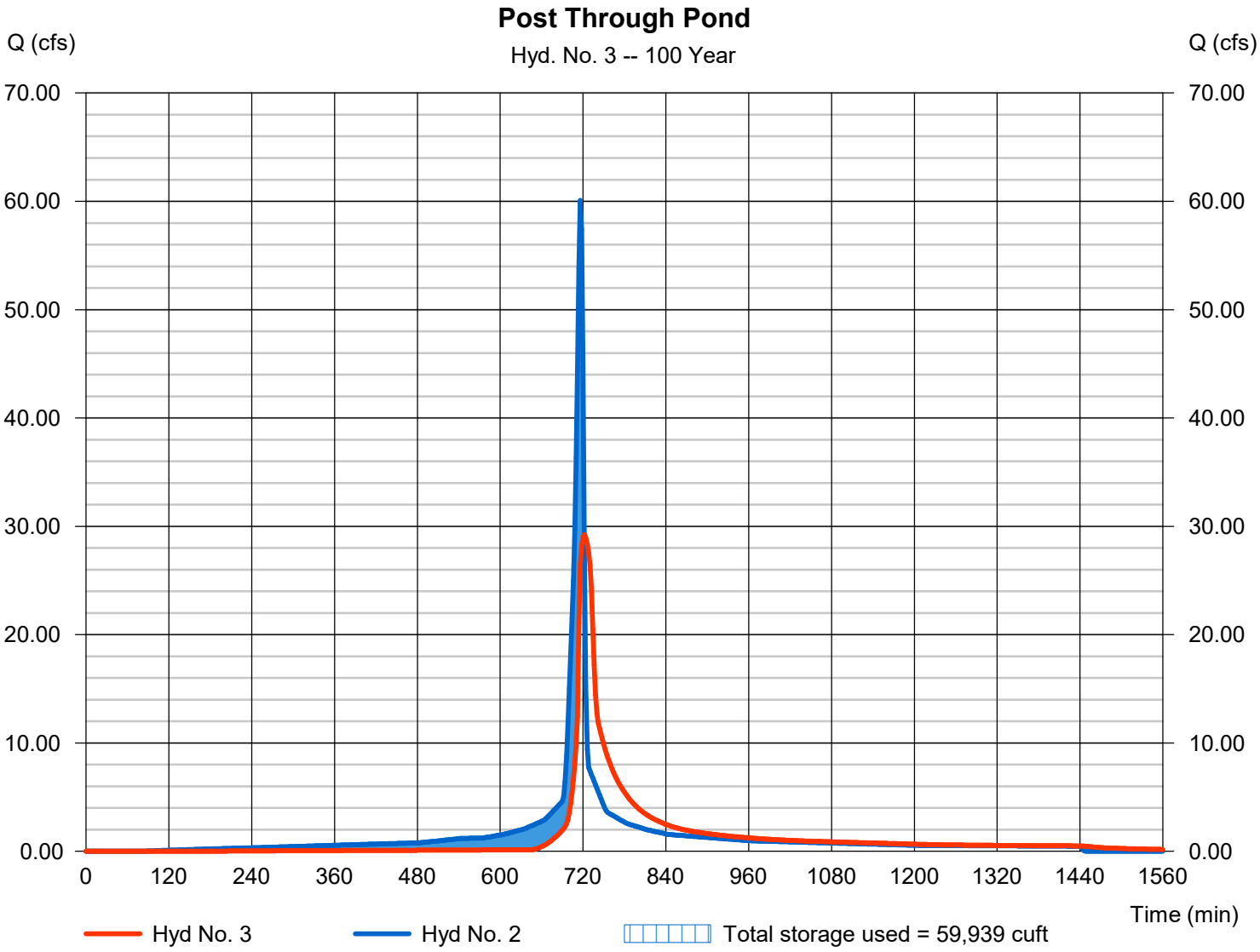
Hydrograph Report

Hyd. No. 3

Post Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	29.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	139,016 cuft
Inflow hyd. No.	=	2 - Post Developed to Pond	Max. Elevation	=	284.81 ft
Reservoir name	=	Wet Pond	Max. Storage	=	59,939 cuft

Storage Indication method used.

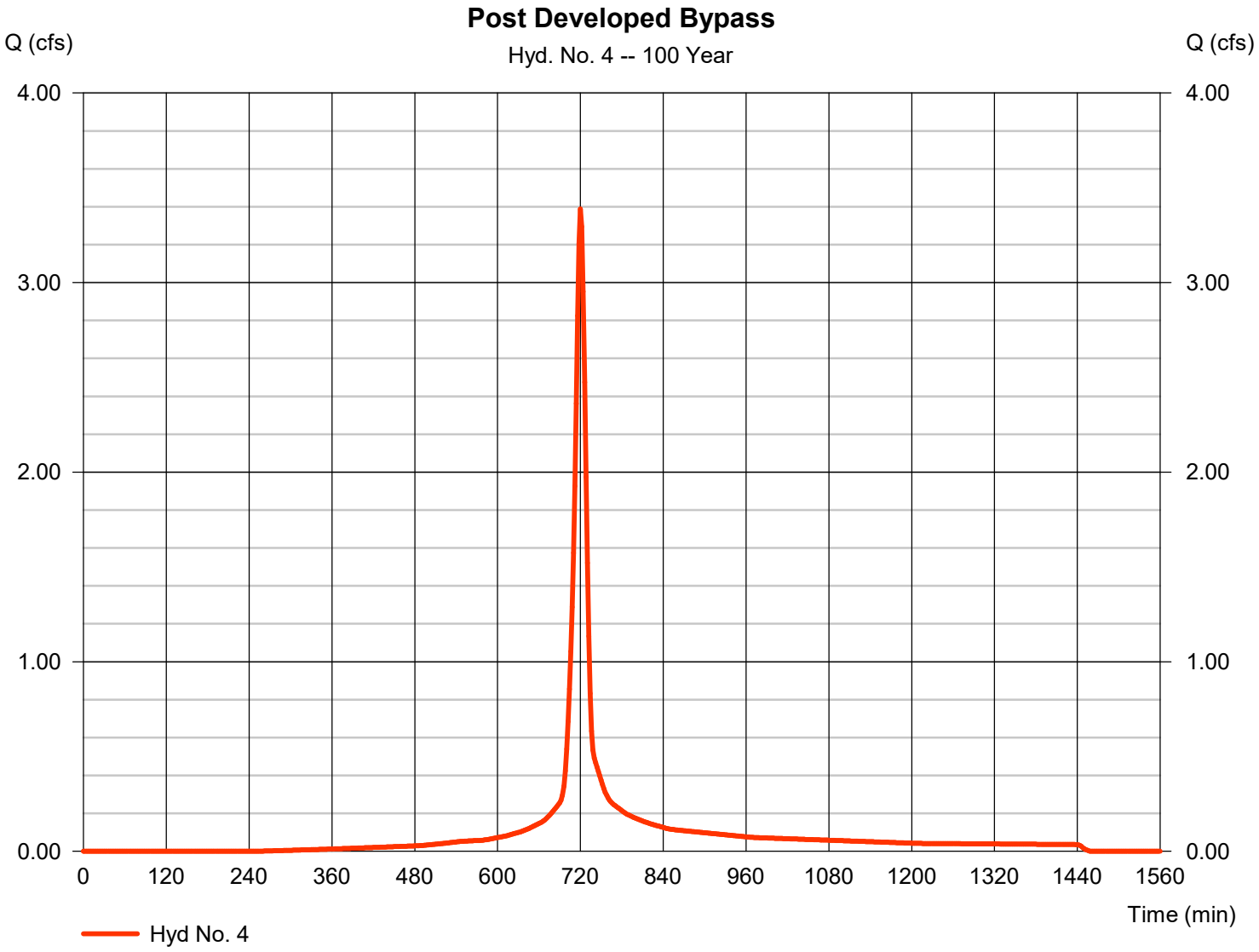


Hydrograph Report

Hyd. No. 4

Post Developed Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.389 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	9,106 cuft
Drainage area	=	0.400 ac	Curve number	=	83.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.01 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

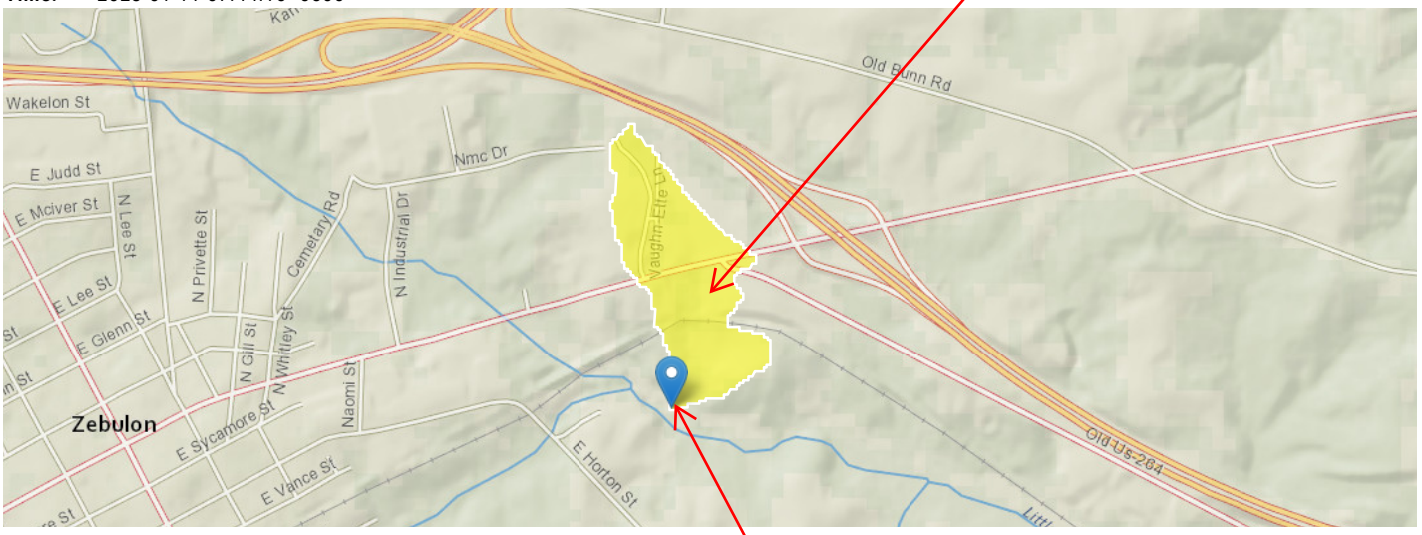


TIME OF CONCENTRATION
Existing Conditions
SCS Methodology

		SHEET FLOW: Tc = (0.007(nL)^0.8)/(P2^0.5)(s^0.4)							**SHALLOW CONC FLOW:** SEGMENT 1 Tc = L / 60*V							**OPEN CHANNEL FLOW:** SEGMENT 1 Manning's Equation: $V = 1.49R^{2/3}S^{1/2} / n$										**TOTAL**			
Basin	Comments	Length (ft)	Elev1	Elev2	Slope (ft/ft)	2-year/24-hr Rainfall Depth TP-40 (in)	Manning's "n"	T_{c1} (min)	Length (ft)	Elev2	Elev3	Slope (ft/ft)	Condition TR-55 Fig. 3-1	Vavg (ft/sec)	T_{c2} (min)	Cross Sectional Flow Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Length (ft)	Elev3	Elev4	Slope (ft/ft)	Manning's "n"	V (fps)	T_{c3} (min)	T_{cTOTAL} (min)	Tc(minimum) (10 min)	Tlag 0.6*Tc (hrs)	Basin
1	Stream	100	292.5	290.0	0.025	3.46	0.24	12.55	286.5	290.0	278.2	0.04119	Unpaved	3.20	1.49											14.04	14.04	0.14	1
2	Stream	100	290.7	289.5	0.012	3.46	0.24	16.83	389	289.5	283.2	0.01620	Unpaved	2.10	3.09											19.92	19.92	0.20	2

StreamStats Report

Region ID: NC
Workspace ID: NC20230111124350202000
Clicked Point (Latitude, Longitude): 35.82526, -78.29649
Time: 2023-01-11 07:44:10 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.0784	square miles
LC06IMP	Percentage of impervious area determined from NLCD 2006 impervious dataset	8.42	percent
PCTREG1	Percentage of drainage area located in Region 1 - Piedmont / Ridge and Valley	100	percent
PCTREG2	Percentage of drainage area located in Region 2 - Blue Ridge	0	percent
PCTREG3	Percentage of drainage area located in Region 3 - Sandhills	0	percent
PCTREG4	Percentage of drainage area located in Region 4 - Coastal Plains	0	percent
PCTREG5	Percentage of drainage area located in Region 5 - Lower Tifton Uplands	0	percent

Peak-Flow Statistics

50.176 AC

Peak-Flow Statistics Parameters [Region 1 Piedmont rural under 1 sqmi 2014 5030]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0784	square miles	0.1	1
LC06IMP	Percent Impervious NLCD2006	8.42	percent	0	47.9

Peak-Flow Statistics Disclaimers [Region 1 Piedmont rural under 1 sqmi 2014 5030]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Region 1 Piedmont rural under 1 sqmi 2014 5030]

Statistic	Value	Unit
50-percent AEP flood	34.7	ft^3/s
20-percent AEP flood	52.6	ft^3/s
10-percent AEP flood	64.8	ft^3/s

Statistic	Value	Unit
4-percent AEP flood	79.8	ft^3/s
2-percent AEP flood	90.8	ft^3/s
1-percent AEP flood	102	ft^3/s
0.5-percent AEP flood	113	ft^3/s
0.2-percent AEP flood	131	ft^3/s

Peak-Flow Statistics Citations

Feaster, T.D., Gotvald, A.J., and Weaver, J.C.,2014, Methods for estimating the magnitude and frequency of floods for urban and small, rural streams in Georgia, South Carolina, and North Carolina, 2011 (ver. 1.1, March 2014): U.S. Geological Survey Scientific Investigations Report 2014–5030, 104 p. (http://pubs.usgs.gov/sir/2014/5030/)

Application Version: 4.11.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

N

0 400 800 1600 ft

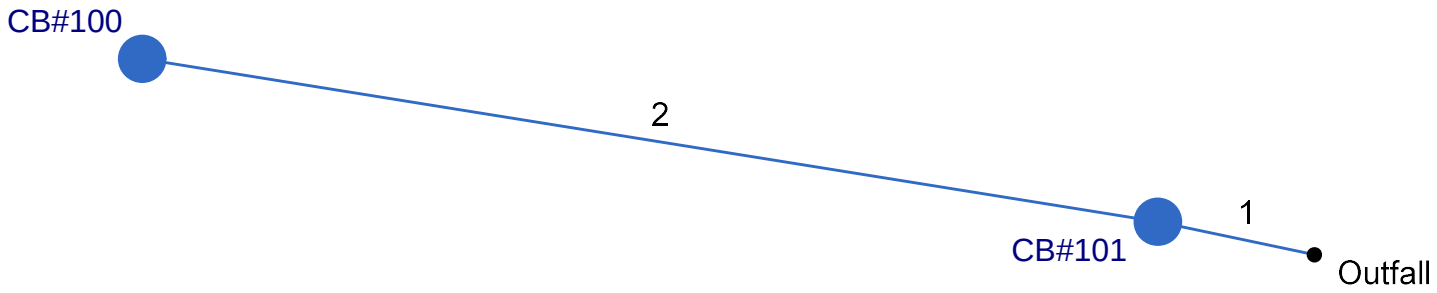
1 inch equals 800 feet

Disclaimer

*iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are **NOT** surveys. No warranties, expressed or implied ,are provided for the data therein, its use,or its interpretation.*

STORM DRAINAGE SYSTEM

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



Project File: 100 System.stm	Number of lines: 2	Date: 1/4/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	14.000	-168.063	Curb	1.41	0.00	0.00	0.0	281.20	1.43	281.40	15	Cir	0.013	0.50	283.90	
2	1	90.000	-2.783	Curb	4.51	0.00	0.00	0.0	281.40	2.89	284.00	15	Cir	0.013	1.00	286.50	

Project File: 100 System.stm

Number of lines: 2

Date: 1/4/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		5.92	15	Cir	14.000	281.20	281.40	1.428	282.02	282.38	n/a	282.38	End	Curb-Horiz
2		4.51	15	Cir	90.000	281.40	284.00	2.889	282.38	284.86	n/a	284.86 j	1	Curb-Horiz

Project File: 100 System.stm

Number of lines: 2

Run Date: 1/4/2023

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

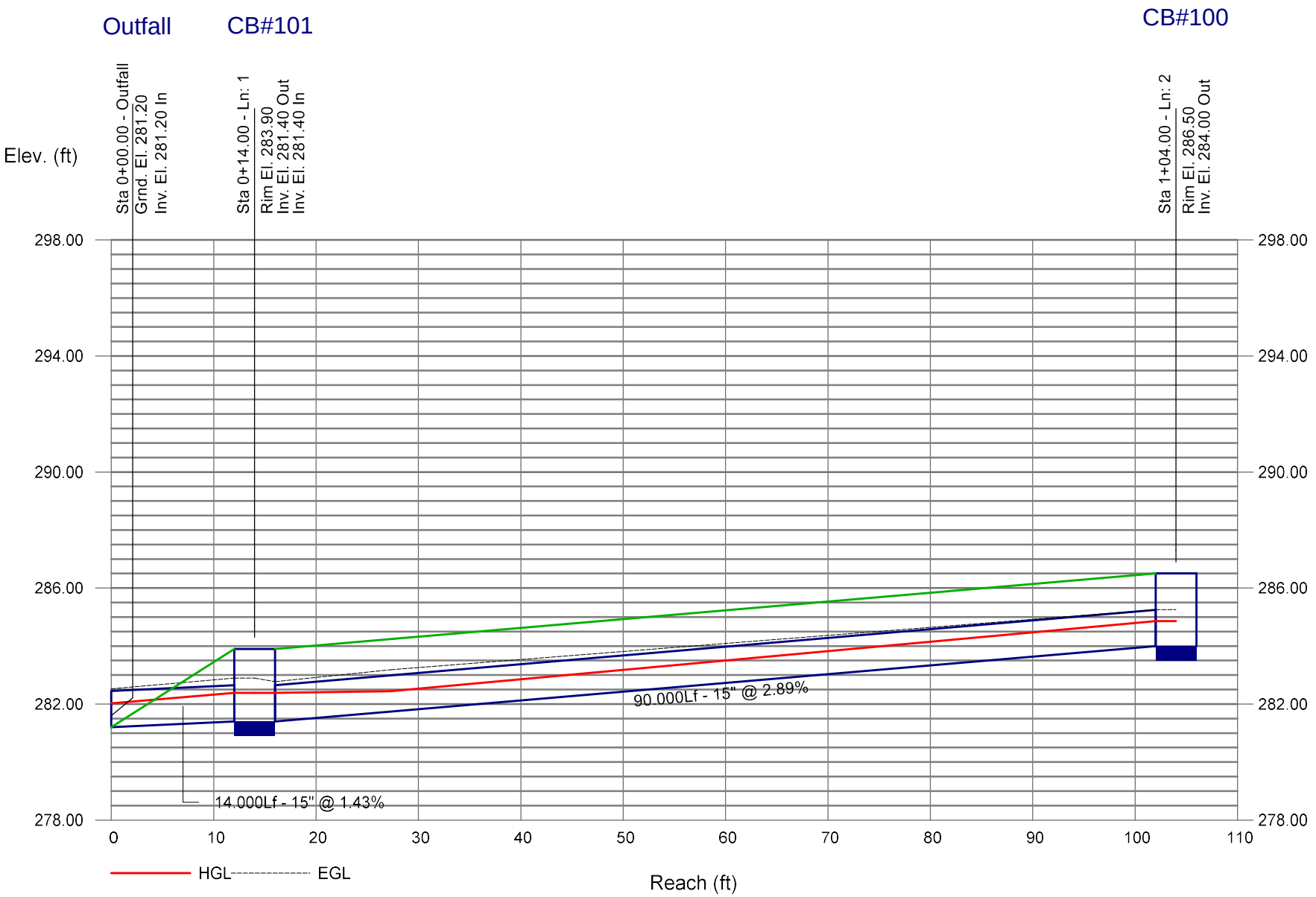
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	5.92	281.20	282.02	0.82	0.85	6.93	0.51	282.53	0.000	14.000	281.40	282.38	0.98**	1.04	5.72	0.51	282.89	0.000	0.000	n/a	0.50	n/a
2	15	4.51	281.40	282.38	0.98	0.90	4.35	0.39	282.77	0.000	90.000	284.00	284.86 j	0.86**	0.90	5.01	0.39	285.25	0.000	0.000	n/a	1.00	n/a

Project File: 100 System.stm | Number of lines: 2 | Run Date: 1/4/2023

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: 100 System.stm



Bowman North Carolina, Ltd.
Tractor Supply Co, Zebulon, NC

Rational Runoff Coefficient "C"

Catch Basin#100

Drainage Area (acres): 0.91

Proposed Land Uses:

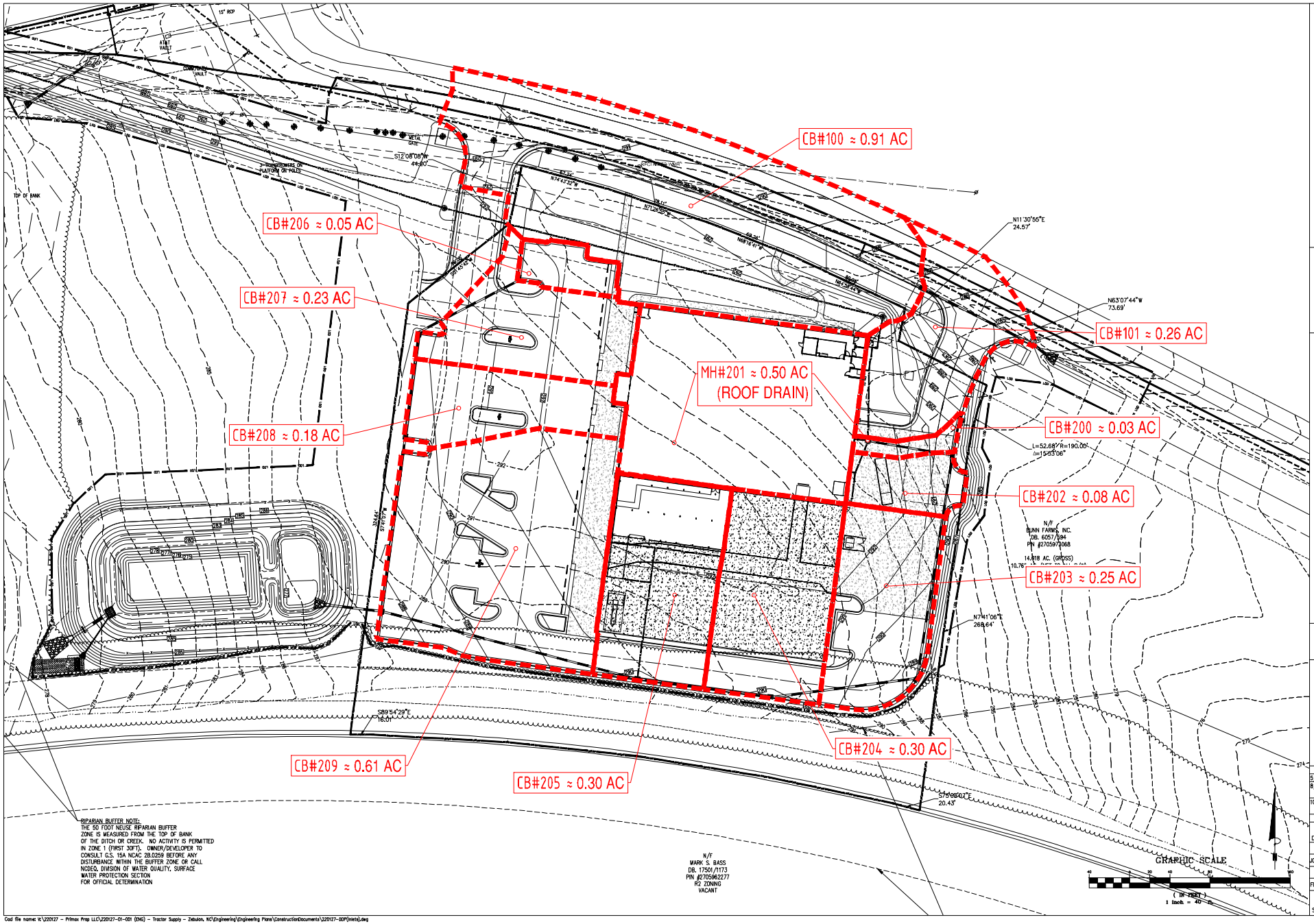
Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.54	60%	0.95	0.57
Lawn	0.36	40%	0.3	0.12
Wooded	0.00	0%	0.2	0.00
Total Area=	0.91	Cumulative "C" =		0.69
		i_{10}=		7.22
		Q_{10}=		4.51

Catch Basin#101

Drainage Area (acres): 0.26

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.18	68%	0.95	0.64
Lawn	0.09	32%	0.3	0.10
Wooded	0.00	0%	0.2	0.00
Total Area=	0.26	Cumulative "C" =		0.74
		i_{10}=		7.22
		Q_{10}=		1.41



Bowman

Bowman North Carolina Ltd.
4008 BARRETT DR
Suite 104
RALEIGH, NC 27609
Phone (919)553-5570
bowman.com
Bowman North Carolina Ltd.

TRACTOR SUPPLY COMPANY

POST-DEVELOPED DRAINAGE AREA TO INLETS

Tractor Supply
Old US Highway 264
Zebulon, NC Wake County

PRIMAX PROPERTIES, LLC

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

PLAN STATUS	
5/26/22	1ST SUBMISSION
8/1/22	PER TOWN & RALEIGH REVIEW
10/13/22	PER TOWN & RALEIGH REVIEW
DATE	DESCRIPTION

MEL	MEL	XXX
DESIGN	DRAWN	CHKD

SCALE H:
V:

JOB No. 220127-01-001

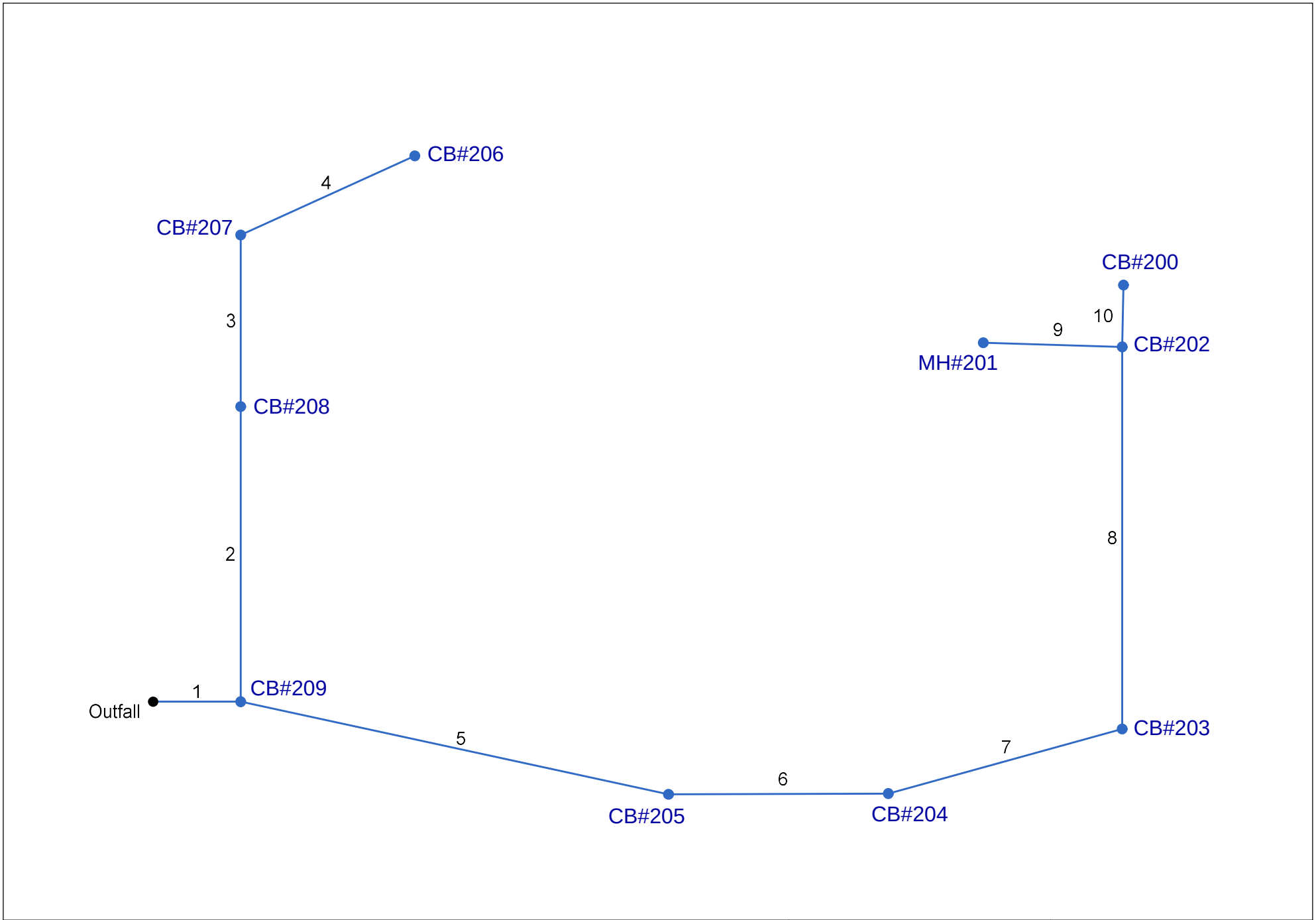
DATE May 26, 2022

FILE No. 220127-D-CP-001

SHEET

Cad file name: V:\220127 - Primax Prop LLC\220127-01-001 (ENG) - Tractor Supply - Zebulon, NC\Engineering\Engineering Plans\ConstructionDocuments\220127-EOP(Inlets).dwg

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



Project File: 200 System.stm	Number of lines: 10	Date: 1/4/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	39.000	0.000	Curb	4.03	0.00	0.00	5.0	280.00	4.36	281.70	18	Cir	0.013	1.89	287.50	
2	1	129.000	-90.000	Curb	1.16	0.00	0.00	5.0	285.00	1.09	286.40	15	Cir	0.013	0.50	289.00	
3	2	75.000	0.000	Curb	1.42	0.00	0.00	5.0	286.40	0.67	286.90	15	Cir	0.013	1.39	289.40	
4	3	85.000	65.995	Curb	0.36	0.00	0.00	5.0	286.90	2.59	289.10	15	Cir	0.013	1.00	291.60	
5	1	195.000	11.990	Curb	1.99	0.00	0.00	5.0	281.70	0.92	283.50	18	Cir	0.013	0.50	289.80	
6	5	98.000	-12.199	Curb	2.02	0.00	0.00	5.0	283.50	0.82	284.30	18	Cir	0.013	0.50	289.80	
7	6	108.000	-14.948	Curb	1.66	0.00	0.00	5.0	284.30	0.93	285.30	15	Cir	0.013	1.46	288.70	
8	7	167.000	-74.829	Curb	0.55	0.00	0.00	5.0	285.30	0.72	286.50	15	Cir	0.013	1.50	290.20	
9	8	62.000	-88.331	MH	3.45	0.00	0.00	0.0	286.50	5.65	290.00	15	Cir	0.013	1.00	292.80	
10	8	27.000	1.183	Curb	0.17	0.00	0.00	0.0	286.50	0.74	286.70	15	Cir	0.013	1.00	289.20	

Project File: 200 System.stm

Number of lines: 10

Date: 1/4/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		16.81	18	Cir	39.000	280.00	281.70	4.359	280.98	283.14	2.74	283.14	End	Curb-Horiz
2		2.94	15	Cir	129.000	285.00	286.40	1.085	285.58	287.09	0.14	287.09	1	Curb-Horiz
3		1.78	15	Cir	75.000	286.40	286.90	0.667	287.09	287.43	n/a	287.43 j	2	Curb-Horiz
4		0.36	15	Cir	85.000	286.90	289.10	2.588	287.43	289.33	n/a	289.33 j	3	Curb-Horiz
5		9.84	18	Cir	195.000	281.70	283.50	0.923	283.14	284.71	n/a	284.71	1	Curb-Horiz
6		7.85	18	Cir	98.000	283.50	284.30	0.816	284.71	285.38	0.26	285.38	5	Curb-Horiz
7		5.83	15	Cir	108.000	284.30	285.30	0.926	285.38	286.28	n/a	286.28 j	6	Curb-Horiz
8		4.17	15	Cir	167.000	285.30	286.50	0.719	286.28	287.33	n/a	287.33 j	7	Curb-Horiz
9		3.45	15	Cir	62.000	286.50	290.00	5.645	287.33	290.75	n/a	290.75 j	8	Manhole
10		0.17	15	Cir	27.000	286.50	286.70	0.741	287.33	286.86	n/a	286.86	8	Curb-Horiz

Project File: 200 System.stm | Number of lines: 10 | Run Date: 1/4/2023

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

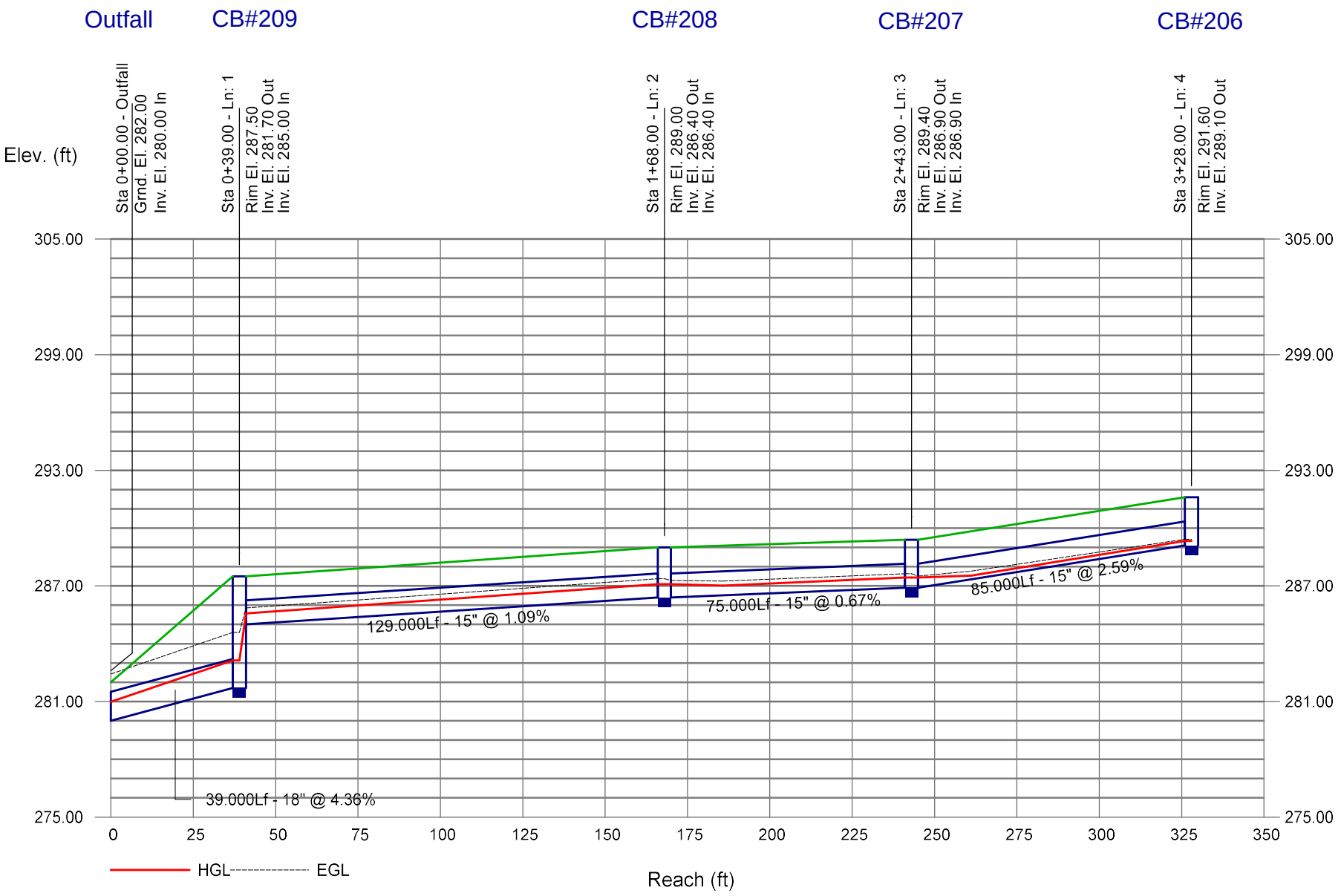
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	16.81	280.00	280.98	0.98	1.23	13.67	1.45	282.43	0.000	39.000	281.70	283.14	1.44**	1.74	9.65	1.45	284.59	0.000	0.000	n/a	1.89	2.74
2	15	2.94	285.00	285.58	0.58*	0.56	5.29	0.28	285.86	0.000	129.000	286.40	287.09	0.69**	0.69	4.24	0.28	287.37	0.000	0.000	n/a	0.50	0.14
3	15	1.78	286.40	287.09	0.69	0.49	2.57	0.20	287.29	0.000	75.000	286.90	287.43 j	0.53**	0.49	3.60	0.20	287.63	0.000	0.000	n/a	1.39	0.28
4	15	0.36	286.90	287.43	0.53	0.16	0.73	0.08	287.51	0.000	85.000	289.10	289.33 j	0.23**	0.16	2.28	0.08	289.41	0.000	0.000	n/a	1.00	0.08
5	18	9.84	281.70	283.14	1.44	1.53	5.65	0.65	283.78	0.000	195.000	283.50	284.71	1.21**	1.53	6.45	0.65	285.36	0.000	0.000	n/a	0.50	n/a
6	18	7.85	283.50	284.71	1.21	1.37	5.14	0.51	285.22	0.000	98.000	284.30	285.38	1.08**	1.37	5.74	0.51	285.90	0.000	0.000	n/a	0.50	0.26
7	15	5.83	284.30	285.38	1.08	1.03	5.16	0.50	285.88	0.000	108.000	285.30	286.28 j	0.98**	1.03	5.67	0.50	286.78	0.000	0.000	n/a	1.46	n/a
8	15	4.17	285.30	286.28	0.98	0.86	4.05	0.37	286.64	0.000	167.000	286.50	287.33 j	0.83**	0.86	4.85	0.37	287.69	0.000	0.000	n/a	1.50	0.55
9	15	3.45	286.50	287.33	0.83	0.77	4.01	0.31	287.64	0.000	62.000	290.00	290.75 j	0.75**	0.77	4.50	0.31	291.06	0.000	0.000	n/a	1.00	n/a
10	15	0.17	286.50	287.33	0.83	0.09	0.20	0.05	287.38	0.000	27.000	286.70	286.86	0.16**	0.09	1.87	0.05	286.91	0.000	0.000	n/a	1.00	n/a

Project File: 200 System.stm | Number of lines: 10 | Run Date: 1/4/2023

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

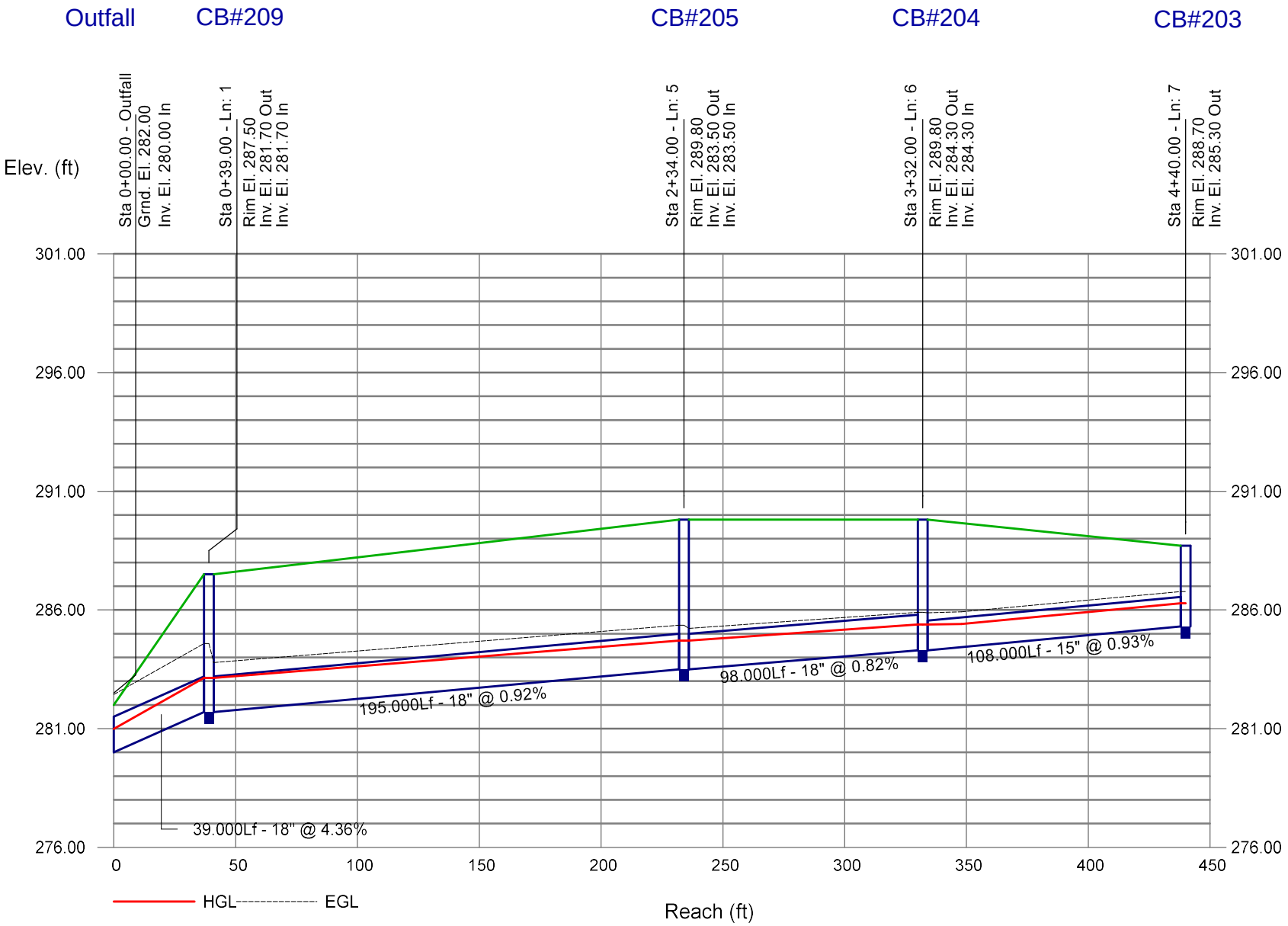
Storm Sewer Profile

Proj. file: 200 System.stm



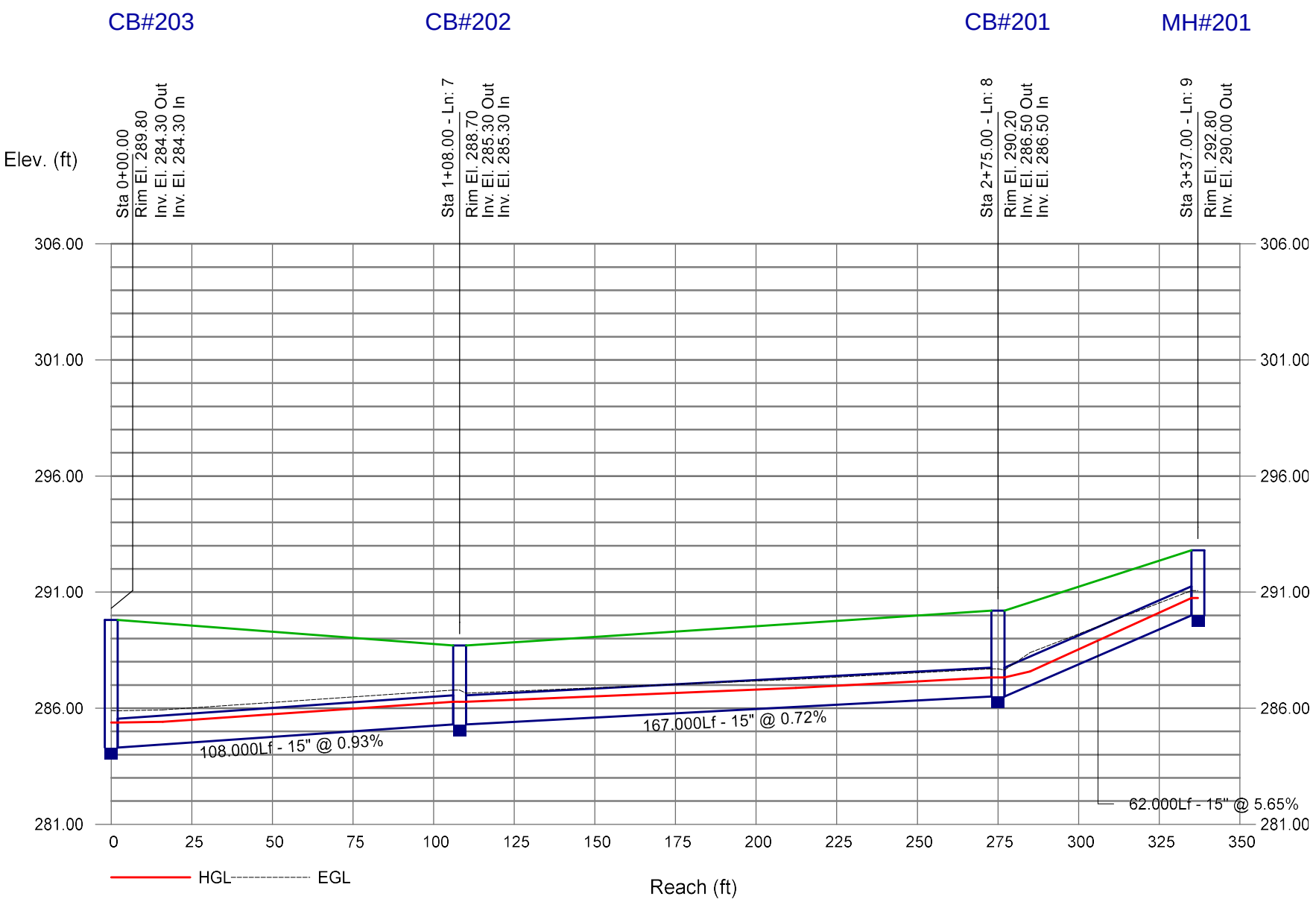
Storm Sewer Profile

Proj. file: 200 System.stm



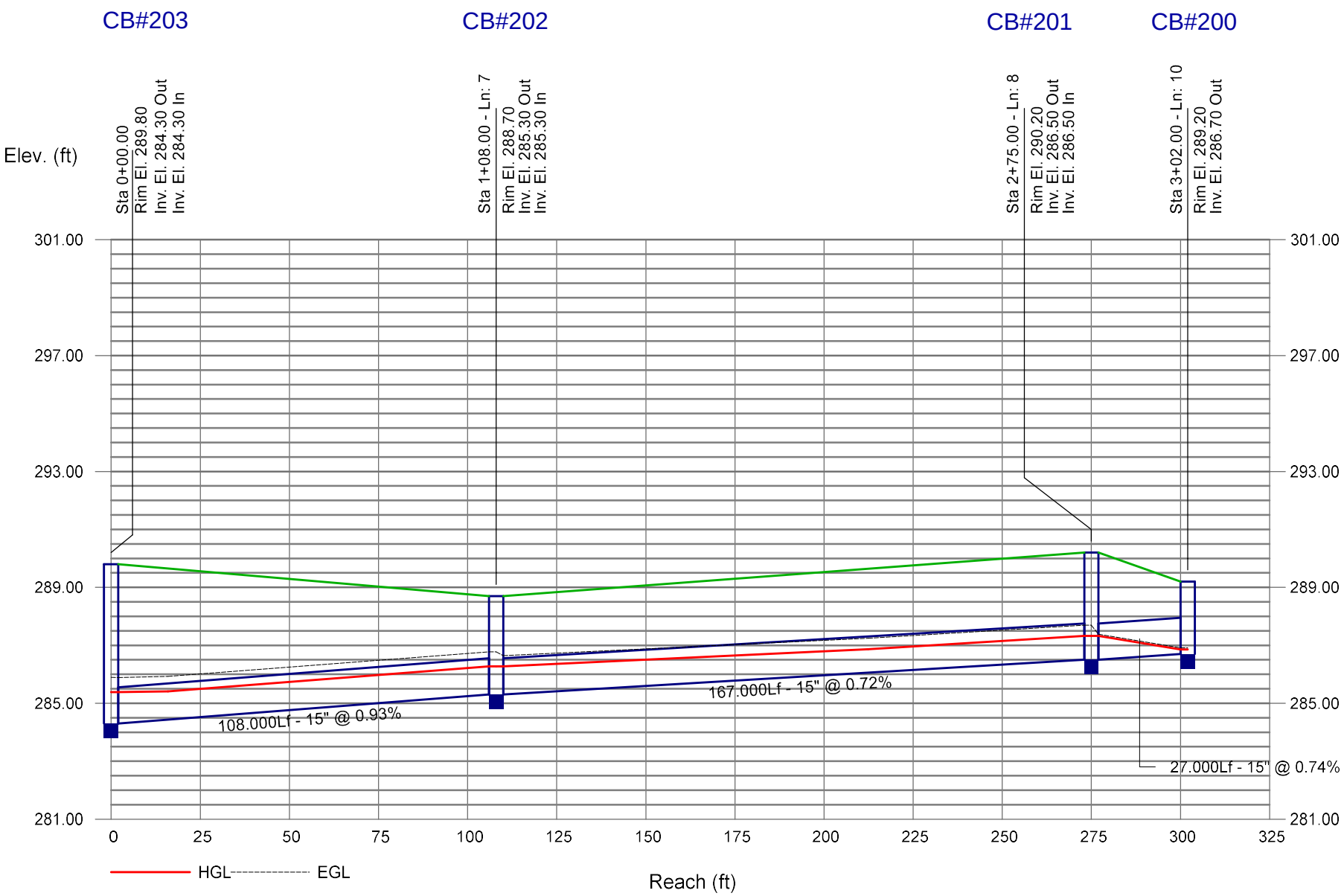
Storm Sewer Profile

Proj. file: 200 System.stm



Storm Sewer Profile

Proj. file: 200 System.stm



Bowman North Carolina, Ltd.
Tractor Supply Co, Zebulon, NC

Rational Runoff Coefficient "C"

Catch Basin#200

Drainage Area (acres): 0.03

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.03	100%	0.95	0.95
Lawn	0.00	0%	0.3	0.00
Wooded	0.00	0%	0.2	0.00
Total Area=	0.03	Cumulative "C" =		0.95
		i_{10}=		7.22
		Q_{10}=		0.17

Manhole#201

Drainage Area (acres): 0.50

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.50	100%	0.95	0.95
Asphalt/Concrete Pavement	0.00	0%	0.95	0.00
Lawn	0.00	0%	0.3	0.00
Wooded	0.00	0%	0.2	0.00
Total Area=	0.50	Cumulative "C" =		0.95
		i_{10}=		7.22
		Q_{10}=		3.45

Catch Basin#202

Drainage Area (acres): 0.08

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.08	100%	0.95	0.95
Lawn	0.00	0%	0.3	0.00
Wooded	0.00	0%	0.2	0.00
Total Area=	0.08	Cumulative "C" =		0.95
		i_{10}=		7.22
		Q_{10}=		0.55

Catch Basin#203

Drainage Area (acres): 0.25

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.24	96%	0.95	0.91
Lawn	0.01	4%	0.3	0.01
Wooded	0.00	0%	0.2	0.00
Total Area=	0.25	Cumulative "C" =		0.92
		i_{10}=		7.22
		Q_{10}=		1.66

Catch Basin#204

Drainage Area (acres): 0.30

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.29	98%	0.95	0.93
Lawn	0.01	2%	0.3	0.01
Wooded	0.00	0%	0.2	0.00
Total Area=	0.30	Cumulative "C" =		0.94
		i_{10}=		7.22
		Q_{10}=		2.02

Catch Basin#205

Drainage Area (acres): 0.30

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.10	34%	0.95	0.32
Asphalt/Concrete Pavement	0.19	64%	0.95	0.61
Lawn	0.01	2%	0.3	0.01
Wooded	0.00	0%	0.2	0.00
Total Area=	0.30	Cumulative "C" =		0.94
		i_{10}=		7.22
		Q_{10}=		1.99

Catch Basin#206

Drainage Area (acres): 0.05

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.05	97%	0.95	0.92
Lawn	0.00	3%	0.3	0.01
Wooded	0.00	0%	0.2	0.00
Total Area=	0.05	Cumulative "C" =		0.93
		i_{10}=		7.22
		Q_{10}=		0.36

Catch Basin#207

Drainage Area (acres): 0.23

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.20	88%	0.95	0.83
Lawn	0.03	12%	0.3	0.04
Wooded	0.00	0%	0.2	0.00
Total Area=	0.23	Cumulative "C" =		0.87
		i_{10}=		7.22
		Q_{10}=		1.42

Catch Basin#208

Drainage Area (acres): 0.18

Proposed Land Uses:

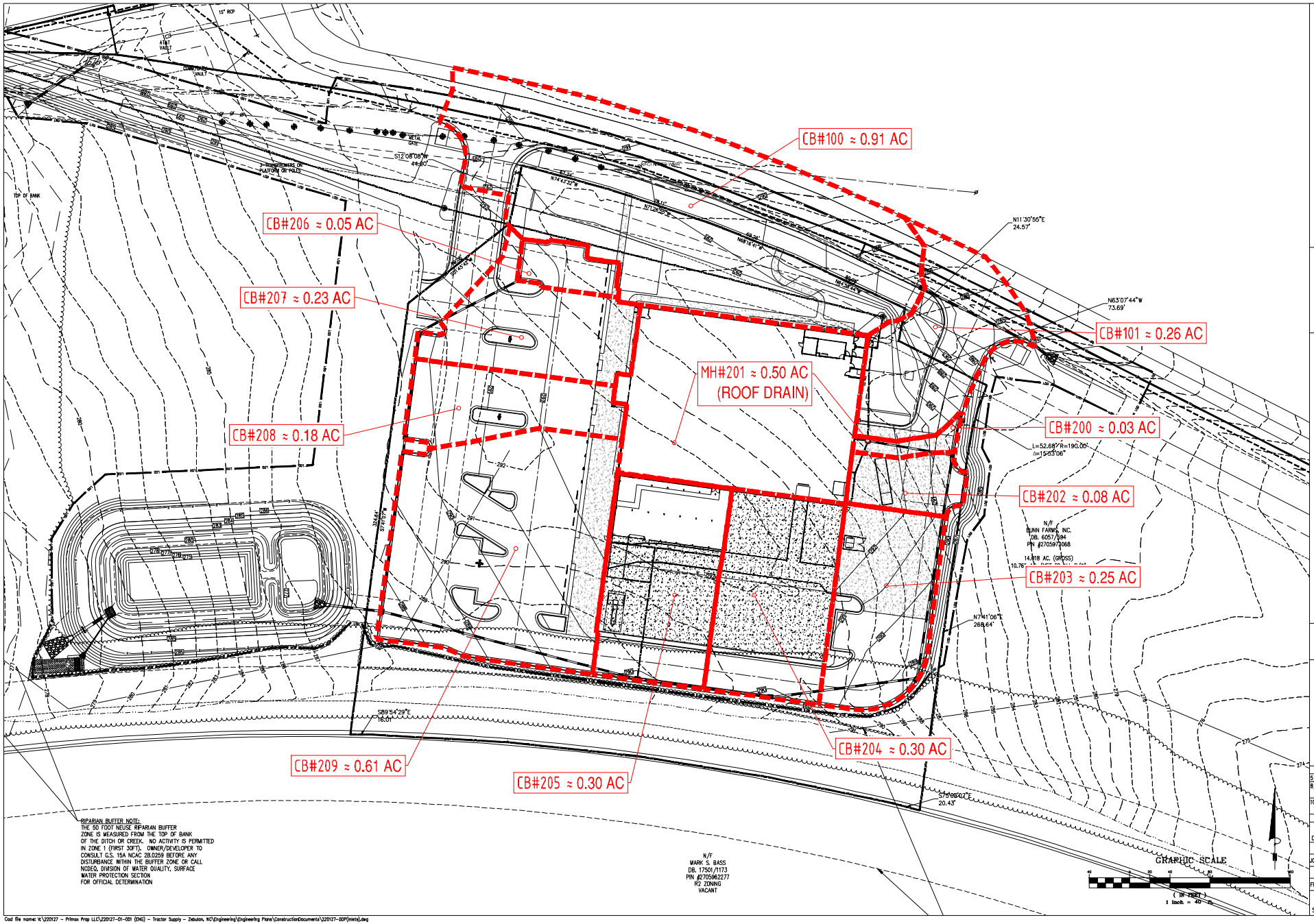
Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.17	95%	0.95	0.90
Lawn	0.01	5%	0.3	0.02
Wooded	0.00	0%	0.2	0.00
Total Area=	0.18	Cumulative "C" =		0.92
		i_{10}=		7.22
		Q_{10}=		1.16

Catch Basin#209

Drainage Area (acres): 0.61

Proposed Land Uses:

Land Use Description	*Acres*	*% Site*	*Runoff "C"*	*"C"*
Roofs	0.00	0%	0.95	0.00
Asphalt/Concrete Pavement	0.58	95%	0.95	0.90
Lawn	0.03	5%	0.3	0.02
Wooded	0.00	0%	0.2	0.00
Total Area=	0.61	Cumulative "C" =		0.91
		i_{10}=		7.22
		Q_{10}=		4.03



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TRACTOR SUPPLY COMPANY

POST-DEVELOPED DRAINAGE AREA TO INLETS

Tractor Supply
Old US Highway 264
Zebulon, NC Wake County

PRIMAX PROPERTIES, LLC

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

PLAN STATUS	
5/26/22	1ST SUBMISSION
8/1/22	PER TOWN & RALEIGH REVIEW
10/13/22	PER TOWN & RALEIGH REVIEW
DATE	DESCRIPTION

MEL	MEL	XXX
DESIGN	DRAWN	CHKD

SCALE H:
V:

JOB No. 220127-01-001

DATE May 26, 2022

FILE No. 220127-D-CP-001

SHEET

Cad file name: V:\220127 - Primax Prop LLC\220127-01-001 (ENG) - Tractor Supply - Zebulon, NC\Engineering\Engineering Plans\ConstructionDocuments\220127-EOP(Inlets).dwg

EROSION CONTROL CALCULATIONS

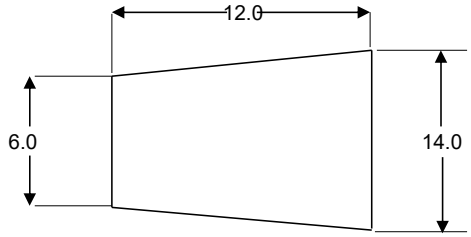
EROSION CONTROL CALCS (RIP-RAP CALCULATIONS)

Project Information

Project Name:	Tractor Supply - Zebulon		
Project #:	220127-01		
Designed by:	CB	Date:	8/11/2022
Revised by:		Date:	
Checked by:		Date:	

Rip-Rap Apron#1

Pipe Diameter	d=	24	
Pipe Slope	s=	1.56	%
Manning's number	n=	0.013	
Flow	Q=	12.19	cfs
Velocity	V =	13.26	ft/s
Dissipator Dimensions *	Zone =	2	
	Stone Filling Class =	B	
	Entry Width (3 X D_0) =	6.0	ft
	Length (6 X D_0) =	12.0	ft
	Width (La + D_0) =	14.0	ft
	Min. Thickness =	22	inches
	Min. Stone Diameter=	6	inches

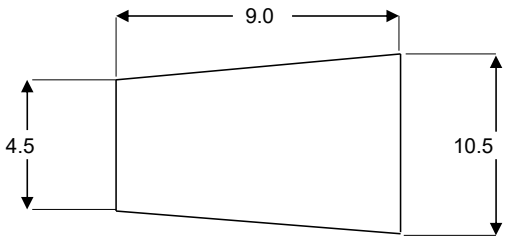


* All units are in feet

** Dissipator pad designed for full flow of pipe

Rip-Rap Apron#2

Pipe Diameter	d=	18	in
Pipe Slope	s=	4.36	%
Manning's number	n=	0.013	
Flow	Q=	16.81	cfs
Velocity	V =	13.67	ft/s
Dissipator Dimensions *	Zone =	2	
	Stone Filling Class =	B	
	Entry Width (3 X D_0) =	4.5	ft
	Length (6 X D_0) =	9.0	ft
	Width (La + D_0) =	10.5	ft
	Min. Thickness =	22	inches
	Min. Stone Diameter=	6	inches



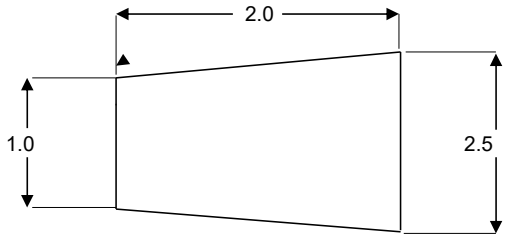
* All units are in feet

** Dissipator pad designed for full flow of pipe

Rip-Rap Apron#3

Pipe Diameter	d=	6	in
Pipe Slope	s=	3.03	%
Manning's number	n=	0.013	
Flow	Q=	0.1	cfs
Velocity	V =	3.48	ft/s

Dissipator Dimensions *	Zone =	1	
	Stone Filling Class =	A	
	Entry Width (2 X A_0) =	1.0	ft
	Length (4 X A_0) =	2.0	ft
	Width (La + A_0) =	2.5	ft
	Min. Thickness =	12	inches
	Min. Stone Diameter=	3	inches



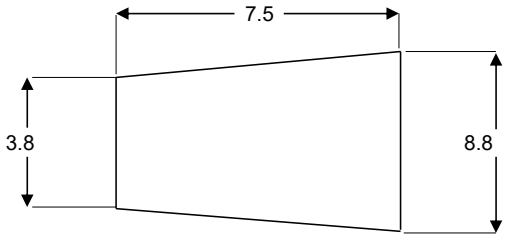
* All units are in feet

** Dissipator pad designed for full flow of pipe

Rip-Rap Apron#4

Pipe Diameter	d=	15	in
Pipe Slope	s=	1.43	%
Manning's number	n=	0.013	
Flow	Q=	5.92	cfs
Velocity	V =	6.93	ft/s

Dissipator Dimensions *	Zone =	2	
	Stone Filling Class =	B	
	Entry Width (3 X A_0) =	3.8	ft
	Length (6 X A_0) =	7.5	ft
	Width (La + A_0) =	8.8	ft
	Min. Thickness =	22	inches
	Min. Stone Diameter=	6	inches



* All units are in feet

** Dissipator pad designed for full flow of pipe

EROSION CONTROL CALCS (SKIMMER BASINS)

Project Information

Project Name: Tractor Supply - Zebulon
Project #: 220127-01
Designed by: CB Date: 1/6/2023
Revised by: Date:
Checked by: Date:

Skimmer Basin #1

Drainage Area
Total, A_T= 1.42 Ac
Disturbed, A_D= 1.42 Ac

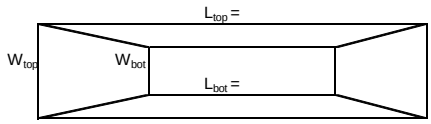
25-year Runoff (Q25)
C = 0.50
T_c = 5.00 min
I10 = 7.22 in/hr
Q10 = 5.1 cfs

Surface Area Required
SA = 435sf x Q10
SA = 2,236 sf

Volume Required
V_R = 1800 cf/Ac x A_D
V_R = 2,563 cf

Sediment Trap Dimensions
L = 80 ft (Spillway Length)
W = 30 ft (Spillway Width)
D = 2.0 ft (Depth of Storage)
Side Slopes = 2.0 :1

L_{top} = 88 ft
L_{bot} = 72 ft
W_{top} = 38 ft
W_{bot} = 22 ft



L/W Ratio= 2.7 :1 (must be 2:1 to 6:1)

Elevations

Description	*Elevation*	
Top of Berm	284.00	(allow 1ft freeboard above spillway flow height)
Emergency Spillway	282.50	
Sediment Storage	282.00	
Cleanout Mark	281.00	(half of storage height)
Bottom	280.00	

Provided
SA_P= 2,400 sf > 2,236
V_P = 3,984.0 cf > 2,563

Emergency Spillway - 10 Year Storm
I25 = 8.06 in/hr
Q25 = 5.74 cfs
h = 0.5 ft
C_w = 3
L_W = 10 ft

Calculate Skimmer Size

Basin Volume in Cubic Feet	3,984	Cu.Ft	**Skimmer Size**	**1.5**	Inch
Days to Drain*	3	Days	Orifice Radius	**0.7**	Inch[es]
			Orifice Diameter	**1.3**	Inch[es]

*In NC assume 3 days to drain

Estimate Volume of Basin

	Length	Width				
Top of water surface in feet	80	30	Feet	**VOLUME**	**3984**	**Cu. Ft.**
Bottom dimensions in feet	72	22	Feet			
Depth in feet	2		Feet			

EROSION CONTROL CALCS (SKIMMER BASINS)

Project Information

Project Name: Tractor Supply - Zebulon
Project #: 220127-01
Designed by: CB Date: 1/6/2023
Revised by: Date:
Checked by: Date:

Skimmer Basin #2

Drainage Area
Total, A_T= 2.36 Ac
Disturbed, A_D= 2.36 Ac

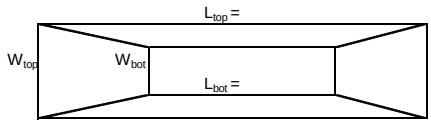
25-year Runoff (Q25)
C = 0.50
T_c = 5.00 min
I10 = 7.22 in/hr
Q10 = 8.5 cfs

Surface Area Required
SA = 435sf x Q10
SA = 3,706 sf

Volume Required
V_R = 1800 cf/Ac x A_D
V_R = 4,248 cf

Sediment Trap Dimensions
L = 95 ft (Spillway Length)
W = 40 ft (Spillway Width)
D = 2.0 ft (Depth of Storage)
Side Slopes = 2 :1

L_{top} = 103 ft
L_{bot} = 87 ft
W_{top} = 48 ft
W_{bot} = 32 ft



L/W Ratio= 2.4 :1 (must be 2:1 to 6:1)

Elevations

Description	*Elevation*	
Top of Berm	289.00	(allow 1ft freeboard above spillway flow height)
Emergency Spillway	287.50	
Sediment Storage	287.00	
Cleanout Mark	286.00	(half of storage height)
Bottom	285.00	

Provided
SA_P= 3,800 sf > 3,706
V_P = 6,584.0 cf > 4,248

Emergency Spillway - 10 Year Storm
I25 = 8.06 in/hr
Q25 = 9.51 cfs
h = 0.5 ft
C_w = 3
L_W = 10 ft

Calculate Skimmer Size

Basin Volume in Cubic Feet	6,584	Cu.Ft	**Skimmer Size**	**2.0**	Inch
Days to Drain*	3	Days	Orifice Radius	**0.8**	Inch[es]
			Orifice Diameter	**1.6**	Inch[es]

*In NC assume 3 days to drain

Estimate Volume of Basin

	Length	Width				
Top of water surface in feet	95	40	Feet	**VOLUME**	**6584**	**Cu. Ft.**
Bottom dimensions in feet	87	32	Feet			
Depth in feet	2		Feet			

EROSION CONTROL CALCS (SKIMMER BASINS)

Project Information

Project Name:	Tractor Supply - Zebulon		
Project #:	220127-01		
Designed by:	CB	Date:	8/10/2022
Revised by:		Date:	
Checked by:		Date:	

Anti-Flotation Device #1

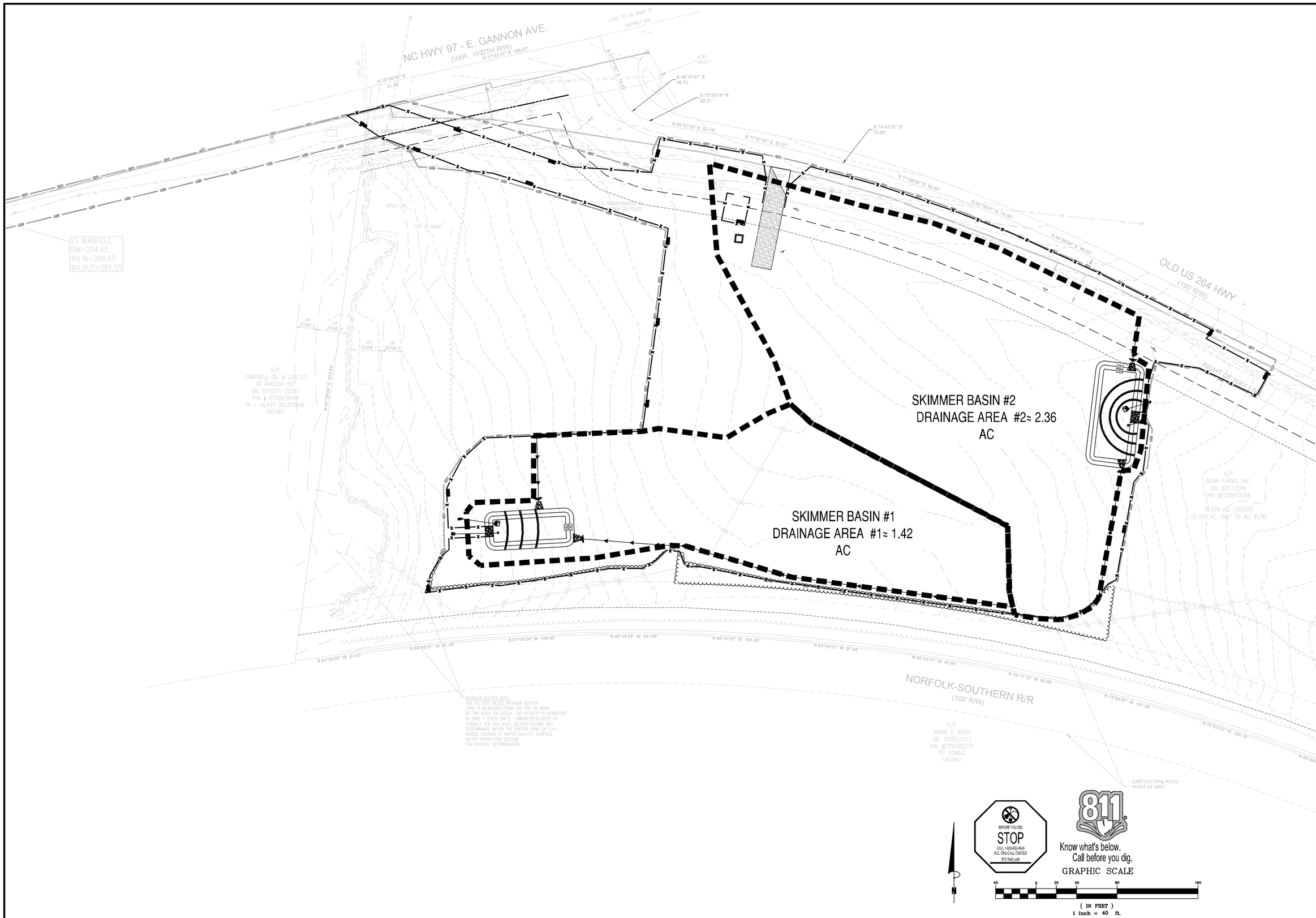
4' x 4' Outlet Structure

Area:	16.0	sf	
Top of Basin Elev.:	282.0		
Bottom of Basin Elev.:	280.0		
Volume:	32.0	cf	(Water Displaced - Top of Pond to Bottom of Pond)
Weight:	1997	lbs	
Factor of Safety	1.20		
WT Req'd of Anti-Flotation Device:	2,396	lbs	
Volume of Concrete Req'd:	16.0	cf	(Unit WT of Concrete = 150 pcf)
Volume Provided:	69.5	cf	(4'x4' riser x 2.0' = 32cf, 5'x5' footing x 1.5' =37.5cf)

Anti-Flotation Device #2

4' x 4' Outlet Structure

Area:	16.0	sf	
Top of Basin Elev.:	287.0		
Bottom of Basin Elev.:	285.0		
Volume:	32.0	cf	(Water Displaced - Top of Pond to Bottom of Pond)
Weight:	1997	lbs	
Factor of Safety	1.20		
WT Req'd of Anti-Flotation Device:	2,396	lbs	
Volume of Concrete Req'd:	16.0	cf	(Unit WT of Concrete = 150 pcf)
Volume Provided:	69.5	cf	(4'x4' riser x 2.0' = 32cf, 5'x5' footing x 1.5' =37.5cf)



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TSC
TRACTOR SUPPLY COMPANY

EROSION CONTROL PLAN - INITIAL

Tractor Supply
Old US Highway 264
Zebulon, NC Wake County

PRIMAX PROPERTIES, LLC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24434 MATTHEW E. ALDRIDGE

PLAN STATUS	
1/10/23	1ST CD SUBMISSION
DATE	DESCRIPTION

MEL DESIGN	MEL DRAWN	XXX CHKD
SCALE	H: 1" = 40' V: 1" = 40'	
JOB No.	220127-01-001	
DATE	January 10, 2023	
FILE No.	220127-D-CP-001	
SHEET	C2.1	

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EROSION CONTROL CALCS (TEMPORARY DITCH #1)

Project Information

Project Name: Tractor Supply - Zebulon
Project #: 220127-01
Designed by: CB Date: 1/6/2023
Revised by: Date:
Checked by: Date:

Temporary Ditch #1

Drainage Area	Total, A_T=	0.21	Ac
25-year Runoff (Q_{25})	C =	0.50	
	T_c =	5.00	min
	I_{25} =	7.22	in/hr
	Q_{25} =	**0.8**	**cfs**

Temporary Ditch #2

Drainage Area	Total, A_T=	0.96	Ac
25-year Runoff (Q_{25})	C =	0.50	
	T_c =	5.00	min
	I_{25} =	7.22	in/hr
	Q_{25} =	**3.5**	**cfs**

Temporary Ditch #3

Drainage Area	Total, A_T=	0.27	Ac
25-year Runoff (Q_{25})	C =	0.50	
	T_c =	5.00	min
	I_{25} =	7.22	in/hr
	Q_{25} =	**1.0**	**cfs**

Temporary Ditch #4

Drainage Area	Total, A_T=	0.04	Ac
25-year Runoff (Q_{25})	C =	0.50	
	T_c =	5.00	min
	I_{25} =	7.22	in/hr
	Q_{25} =	**0.1**	**cfs**

North American Green
5401 St. Wendel-Cynthiana Rd.
Poseyville, Indiana 47633
Tel. 800.772.2040
>Fax 812.867.0247
www.nagreen.com
ECMDS v7.0

CHANNEL ANALYSIS

> > > Temporary Ditch 1

Name	Temporary Ditch 1
Discharge	0.8
Channel Slope	0.0154
Channel Bottom Width	1
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	None
Vegetation Density	None
Soil Type	None

DS75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
DS75 Unvegetated	Straight	0.8 cfs	1.71 ft/s	0.29 ft	0.037	1.6 lbs/ft2	0.28 lbs/ft2	5.65	STABLE	D
Underlying Substrate	Straight	0.8 cfs	1.71 ft/s	0.29 ft	0.037	0.37 lbs/ft2	0.19 lbs/ft2	1.91	STABLE	D

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CHANNEL ANALYSIS

> > > Temporary Ditch 2

Name	Temporary Ditch 2
Discharge	3.5
Channel Slope	0.0161
Channel Bottom Width	1
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	None
Vegetation Density	None
Soil Type	None

DS75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
DS75 Unvegetated	Straight	3.5 cfs	2.73 ft/s	0.59 ft	0.034	1.6 lbs/ft2	0.59 lbs/ft2	2.71	STABLE	D
Underlying Substrate	Straight	3.5 cfs	2.73 ft/s	0.59 ft	0.034	0.37 lbs/ft2	0.35 lbs/ft2	1.05	STABLE	D

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CHANNEL ANALYSIS

> > > Temporary Ditch 3

Name	Temporary Ditch 3
Discharge	1
Channel Slope	0.0038
Channel Bottom Width	1
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	None
Vegetation Density	None
Soil Type	None

DS75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
DS75 Unvegetated	Straight	1 cfs	0.99 ft/s	0.5 ft	0.042	1.6 lbs/ft2	0.12 lbs/ft2	13.42	STABLE	D
Underlying Substrate	Straight	1 cfs	0.99 ft/s	0.5 ft	0.042	0.37 lbs/ft2	0.07 lbs/ft2	5.06	STABLE	D

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CHANNEL ANALYSIS

> > > Temporary Ditch #4

Name	Temporary Ditch #4
Discharge	0.1
Channel Slope	0.0213
Channel Bottom Width	1
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	None
Vegetation Density	None
Soil Type	None

DS75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
DS75 Unvegetated	Straight	0.1 cfs	0.95 ft/s	0.09 ft	0.041	1.6 lbs/ft2	0.12 lbs/ft2	13.58	STABLE	D
Underlying Substrate	Straight	0.1 cfs	0.95 ft/s	0.09 ft	0.041	0.37 lbs/ft2	0.1 lbs/ft2	3.75	STABLE	D