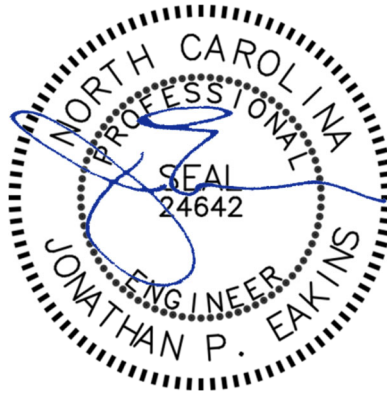# STORM DRAINAGE CALCULATIONS

401 WEST GANNON AVENUE
Zebulon, North Carolina

September 13, 2023

Prepared By:
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INTRODUCTION AND GENERAL INFORMATION

This report presents calculations inlet spacing for the proposed 401 West Gannon Avenue project located at the intersection of West Gannon Avenue and North Rotary Drive in Zebulon, North Carolina.

The proposed development is comprised of approximately 0.99 acres of land and is currently vacant. At full build out the project will consist of 11 condominium units with infrastructure to support the proposed development as well as one SCM to meet the Town's stormwater requirements.

The project is connecting to North Rotary Drive. The closest existing downgradient inlet to the site entrance is approximately 175 feet southeast of the site on the north side North Rotary Drive in the curb radius of North Rotary Drive and West Sycamore Street.

These calculations were prepared to demonstrate an inlet at the site entrance is not necessary.

REQUIREMENTS
Based on Section 2.0.8.J of the Zebulon Street and Storm Drainage Standards and Specifications Manual the Town has indicated that curb inlets are required at the site entrance unless gutter spread is less than 7 feet. The gutter spread of 7 is feet measured from the edge of pavement, or 9 feet measured from the face of curb.

METHODOLOGY

Gutter Spread
Gutter spread for this project was calculated by Hydrology Studio/Stormwater Studio which follows the methodology of FHWA HEC-22.

INPUT DATA

Drainage Areas, Rational C Values and Runoff
Drainage areas were delineated based on proposed and existing topography using CAD software. Land use types were measured using CAD software and Rational C values were applied to each land use type within the drainage area to calculate a weighted, composite Rational C.

The drainage area for these calculations was measured to the most downstream point along the North Rotary Drive property frontage which provides the maximum runoff along the property frontage.

The 4 inch per hour storm was used to calculate the runoff in accordance with Town standards. The rainfall intensity is not a function of the time of concentration for this design storm.

Road Cross Section and Gutter Slope

The road cross section used for the calculations was taken at the drainage area analysis point at the most downstream point along the property frontage and was estimated from field survey data. The gutter slope was estimated from field survey data at the drainage area analysis point at the most downstream point along the property frontage.

INPUT DATA SUMMARY

The table below summarizes the input data used for these calculations

Drainage area	0.44 acres
Composite Rational C	0.73
Rainfall intensity	4 inches/hour
Existing gutter cross slope	2%
Existing road cross slope	2.5%
Existing gutter longitudinal slope	4%

RESULTS

The gutter spread calculated at the analysis point is 4 feet from the edge of pavement, which is 6 feet from the face of curb.
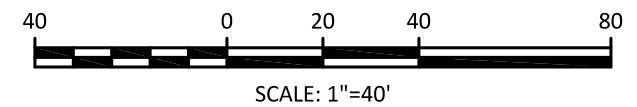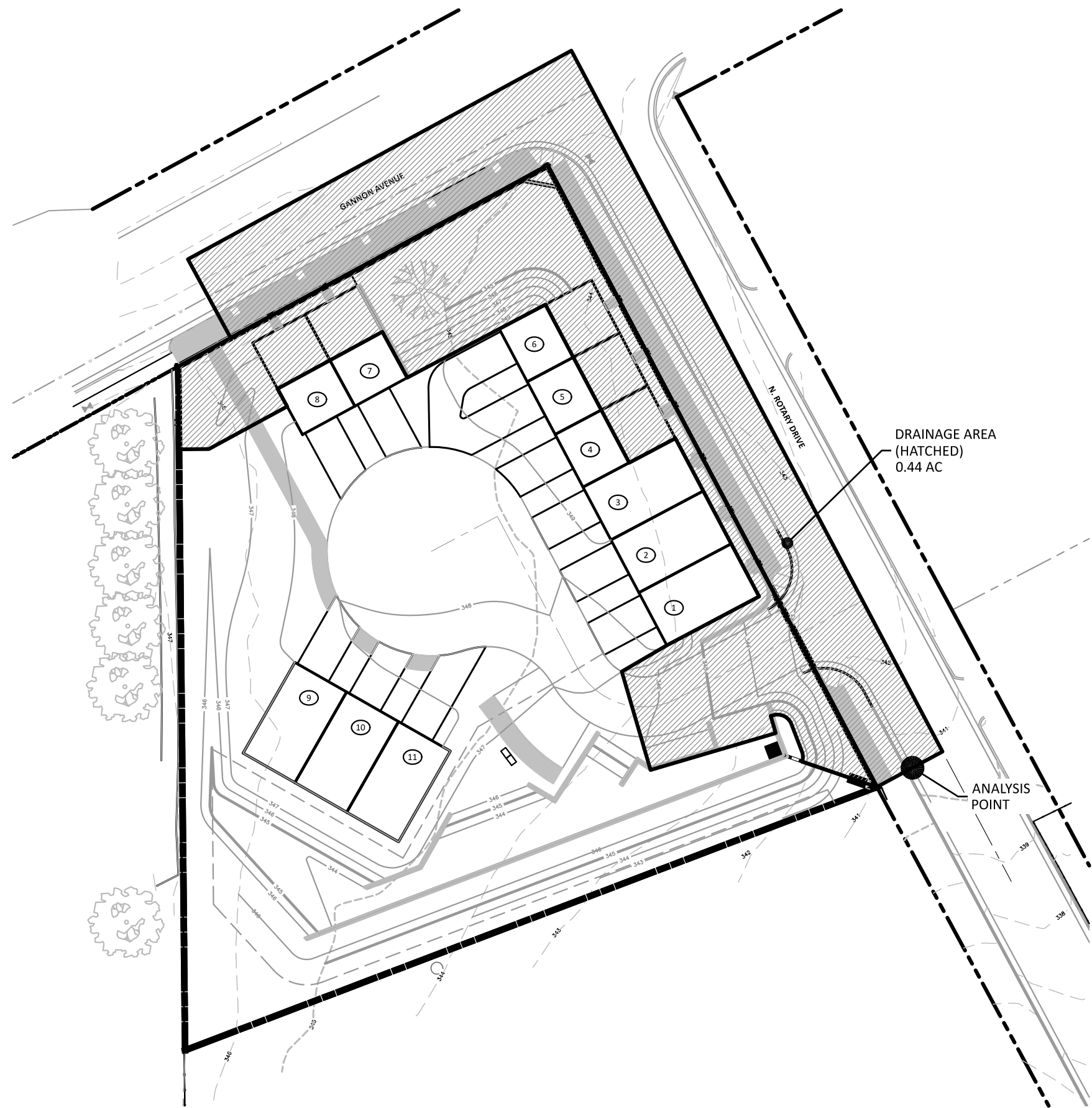
CONCLUSION

Based on the results of these calculations, we believe that inlets are not needed at the site entrance.

APPENDICES

APPENDIX A
DRAINAGE AREA MAPS

GANNON AVENUE

N. ROTARY DRIVE

DRAINAGE AREA
(HATCHED)
0.44 AC

ANALYSIS
POINT

CLIENT:

MERIDIAN PROPERTIES GROUP

401 GANNON AVE

ZEBULON, NC

DRAINAGE AREA FOR GUTTER SPREAD

PROJECT NO:

SCALE:
1"=40'

DATE:
2023-09-11

SHEET NO:
DA1.1

SCALE: 1"=40'

40   0   20   40   80

APPENDIX B
RUNOFF AND GUTTER SPREAD CALCULATIONS

Hydrograph Report

Studio Express by Hydrology Studio v 1.0.0.14

POST Q FOR GUTTER SPREAD

Hyd. No. 1

Hydrograph Type	= Rational		Peak Flow	= 1.285 cfs
Storm Frequency	= 2-yr		Time to Peak	= 5 min
Time Interval	= 1 min		Runoff Volume	= 385 cft
Drainage Area	= 0.44 ac		Runoff Coeff.	= 0.73*
Tc Method	= User-Defined		Time of Conc. (Tc)	= 5.0 min
IDF Curve	= Gutter Spread - 4 inches per hour.idf		Intensity	= 4.000 in/hr
Freq. Corr. Factor	= 1.00		Asc/Rec Limb Factors	= 1/1

* Composite C Worksheet

AREA (ac)	C	DESCRIPTION
0.29	0.95	Impervious
0.15	0.30	Grass
0.44	**0.73**	

2-Yr, Qp = 1.28 cfs

POST Q FOR GUTTER SPREAD
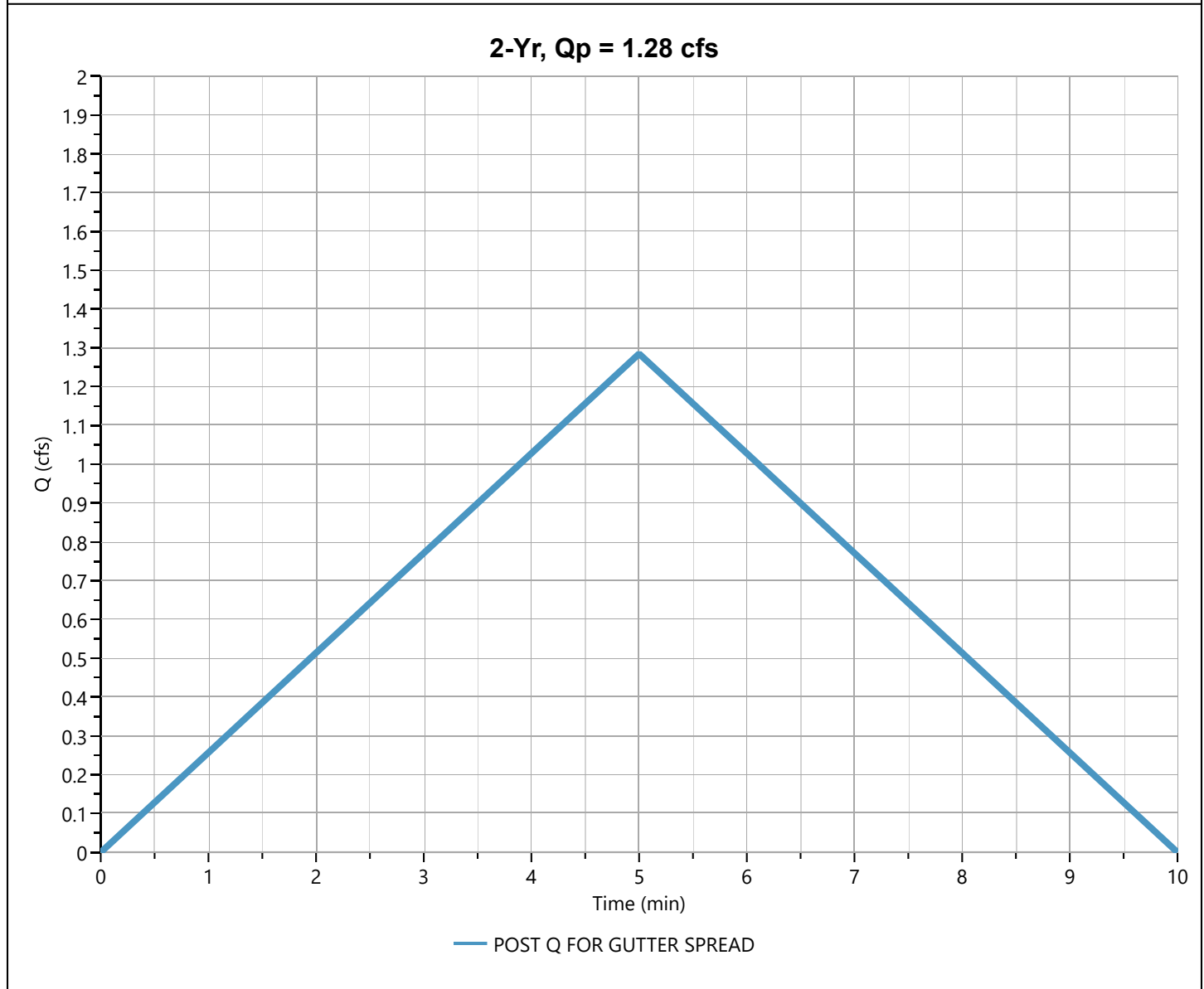
POST DEVELOPMENT GUTTER SPREAD

Channel 1

USER-DEFINED

Total Depth	= 1.00 ft
Invert Elevation	= 99.00 ft
Channel Slope	= 2.000 %
Manning's n	= Composite

DISCHARGE

Method	= Known Q
Known Q	= 1.30 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)	Composite	(ft)	(ft)	(ft)	(lb/sqft)	(ft)
1.30	0.18	0.48	2.71	6.18	0.013	0.22	99.18	99.29	0.22	6.00

POST DEVELOPMENT GUTTER SPREAD - Section