

**StorageMax**  
901 Proctor

**Zebulon, NC**  
**Wake County**

# **EROSION CONTROL CALCULATIONS**

**July 1, 2023**



**Prepared for:**

**Robert High Development, LLC**  
**324 Greenville Ave.**  
**Wilmington, NC 28403**

# StorageMax Erosion Control

**Project Name:** StorageMax

**Project Address:** 901 Proctor Ave.  
Zebulon, NC

**Pins:** 2706217463

**Latitude:** 35.840297  
**Longitude:** -78.315683

**Zoning:** Heavy Commercial (HC)

**River Basin:** Neuse

**Watershed:** Buckhorn

**HUC:** 03020203

**Developer:** Robert High Development, LLC  
324 Greenville Ave.  
Wilmington, NC 28403

**Telephone:** (919) 604-0505

**Email:** Storit@AOL.com

## Site Description

The project consists of a single parcel located at the intersection of Proctor Avenue and Shepard School Road near downtown Zebulon. The lot is approximately 6.50 acres (283,140 sq feet). The parcel is vacant with grassy vegetation and a woods along the property lines. There is 0 sq ft of existing impervious area on the site. The project will consist of a commercial building and the impervious area post development will be 3.64 acres, or approximately 56% of the gross site.

The site is in the Neuse River Basin, Buckhorn Watershed and subject to those rules regarding nutrient management and post storm water runoff.

The parcel is not located within a flood zone as noted per FEMA map 372020600J, Dated May 2, 2006.

Based on the Wake County SCS soils map (attached) the onsite soils are primarily Appling Series (ApB2), soil group B, throughout the tract. The Appling Series soil type is considered to have fair infiltration and surface runoff medium based on information in the Soil Survey.

## **2.0 Erosion Control**

Analysis for the skimmer basins used the Wake County Tool to size the skimmer basin.

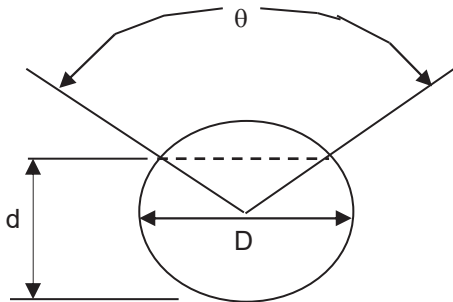
Total disturbance is approximately 5.93 acres.

The site does not have an area of wetlands and is not within a FEMA mapped flood plain. However, there is an intermittent stream located along the Southeast portion of the site. No grading activities or disturbance is planned within the 50' Neuse River Buffer.

# MANNING'S EQUATION FOR PIPE FLOW

Project: Zebulon StorageMax Location: A9 BMP  
 By: Date:  
 Chk. By: Date: mdo version 12.8.00

Clear Data  
Entry Cells



INPUT

D= 24 inches  
 d= 19.2 inches  
 n= 0.013 manning's coeff  
 theta= 106.3 degrees  
 S= 0.005 slope in/in

Mannings Formula

$$Q = (1.486/n) A R_h^{2/3} S^{1/2}$$

$$R = A/P$$

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

$$V = (1.49/n) R_h^{2/3} S^{1/2}$$

$$Q = V \times A$$

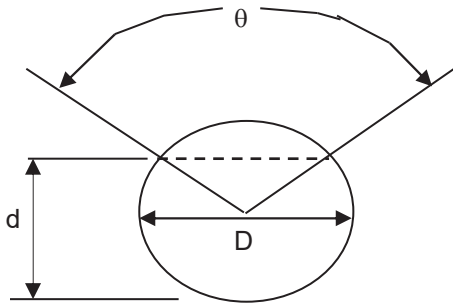
			Solution to Mannings Equation		Manning's n-values	
wetted Area,ft <sup>2</sup>	Perimeter, ft	Hydraulic Radius, ft	velocity ft/s	flow, cfs		
2.69	4.43	0.61	5.80	15.64	PVC	0.01
					PE (<9"dia)	0.015
					PE (>12"dia)	0.02
					PE(9-12"dia)	0.017
					CMP	0.025
					ADS N12	0.012
					HCMP	0.023
					Conc	0.013

Created by: Mike O'Shea

# MANNING'S EQUATION FOR PIPE FLOW

Project: Zebulon StorageMax Location: BMP Outlet  
 By: Date:  
 Chk. By: Date: mdo version 12.8.00

Clear Data  
Entry Cells



INPUT

D= 24 inches  
 d= 9 inches  
 n= 0.013 manning's coeff  
 theta= 151.0 degrees  
 S= 0.005 slope in/in

Mannings Formula

$$Q = (1.486/n) A R_h^{2/3} S^{1/2}$$

R=A/P  
 A=cross sectional area  
 P=wetted perimeter  
 S=slope of channel  
 n=Manning's roughness coefficient

$$V = (1.49/n) R_h^{2/3} S^{1/2}$$

$$Q = V \times A$$

			Solution to Mannings Equation		Manning's n-values	
wetted Area,ft <sup>2</sup>	Perimeter, ft	Hydraulic Radius, ft	velocity ft/s	flow, cfs		
1.08	2.64	0.41	4.45	4.79	PVC	0.01
					PE (<9"dia)	0.015
					PE (>12"dia)	0.02
					PE(9-12"dia)	0.017
					CMP	0.025
					ADS N12	0.012
					HCMP	0.023
					Conc	0.013

Created by: Mike O'Shea



ZETSWON APRON DESIGN

**CHART 2: Precalculated Apron Sizes for Maximum TW Conditions**

Apron Sizing Based on NCDENR Charts for Sizing

ZONE 1 APRONS - Class A Erosion Control Stone

Pipe Diameter Inch	Inlet			Outlet		
	L ft	W ft	T Inch	L ft	W ft	T Inch
12	3	3	12	4	5	12
15	3.75	3.75	12	5	6.75	12
18	4.5	4.5	12	6	8	12
24	6	6	12	8	10	12
30	7.5	7.5	12	10	12.5	12
36	9	9	12	12	15	12
42	10.5	10.5	12	14	17.5	12
48	12	12	12	16	20	12
54	13.5	13.5	12	18	22.5	12
60	15	15	12	20	25	12

ZONE 3/4 APRONS - Class 1 Rip Rap

Pipe Diameter Inch	Inlet			Outlet		
	L ft	W ft	T Inch	L ft	W ft	T Inch
12	4	3	24	8	4.2	24
15	5	3.75	24	10	5.25	24
18	6	4.5	24	12	6.3	24
24	8	6	24	16	8.4	24
30	10	7.5	24	20	10.5	24
36	12	9	24	24	12.6	24
42	14	10.5	24	28	14.7	24
48	16	12	24	32	16.8	24
54	18	13.5	24	36	18.9	24
60	20	15	24	40	21	24

ZONE 2 APRONS - Class B Erosion Control Stone

Pipe Diameter Inch	Inlet			Outlet		
	L ft	W ft	T Inch	L ft	W ft	T Inch
12	6	3	18	6	3.4	18
15	6.75	3.75	18	7.5	4.25	18
18	7.5	4.5	18	9	5.1	18
24	10	6	18	12	6.8	18
30	13.5	7.5	18	15	9.5	18
36	17	9	18	18	12.2	18
42	20.5	10.5	18	21	15.9	18
48	24	12	18	24	19.6	18
54	27	13.5	18	27	23.3	18
60	30	15	18	30	27	18

ZONE 5 APRONS - Class 2 Rip Rap

Pipe Diameter Inch	Inlet			Outlet		
	L ft	W ft	T Inch	L ft	W ft	T Inch
12	5	3	36	10	1.5	36
15	6.25	3.75	36	12.5	1.875	36
18	7.5	4.5	36	15	2.25	36
24	10	6	36	20	3	36
30	12.5	7.5	36	25	3.75	36
36	15	9	36	30	4.5	36
42	17.5	10.5	36	35	5.25	36
48	20	12	36	40	6	36
54	22.5	13.5	36	45	6.75	36
60	25	15	36	50	7.5	36

A9  
BMP



LEBVLON APRON DESIGN

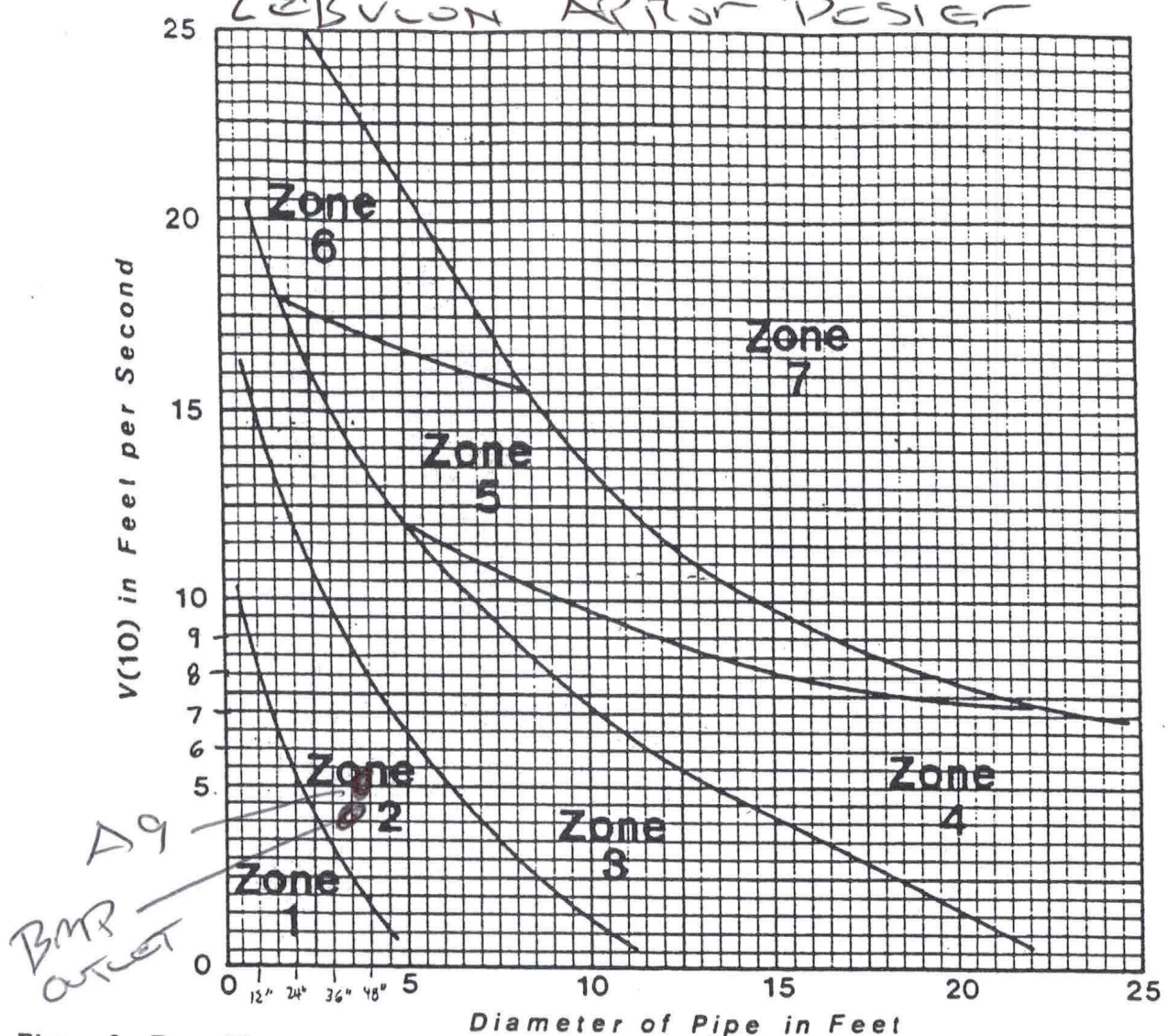


Figure 3: Zone Chart.

ZONE	APRON MATERIAL	CLASS OF STONE	SIZE OF STONE	LENGTH OF APRON	MINIMUM THICKNESS OF STONE
1	STONE	FINE	3"	4 X D	9"
2	STONE	LIGHT	6"	6 X D	12"
3	STONE	MEDIUM	13"	8 X D	18"
4	STONE	HEAVY	23"	8 X D	30"
5	STONE	HEAVY	23"	10 X D	30"
6	STONE	HEAVY	23"	12 X D	30"
7	REQUIRES LARGER STONE OR ANOTHER TYPE OF DEVICE, SUCH AS A STILLING BASIN, IMPACT STRUCTURE, ETC. DESIGN IS BEYOND THE SCOPE OF THIS PROCEDURE.				

Figure 4: Apron Dimensions

## Skimmer Basin

**Okay**

3.78 Disturbed Area (Acres)  
5.06 Peak Flow from 10-year Storm (cfs)

6804 Required Volume ft<sup>3</sup>  
1645 Required Surface Area ft<sup>2</sup>  
28.7 Suggested Width ft  
57.3 Suggested Length ft

82 Trial Top Width at Spillway Invert ft  
52 Trial Top Length at Spillway Invert ft  
2 Trial Side Slope Ratio Z:1  
2.5 Trial Depth ft (2 to 3.5 feet above grade)

72 Bottom Width ft  
42 Bottom Length ft

3024 Bottom Area ft<sup>2</sup>

9068 Actual Volume ft<sup>3</sup>

**Okay**

4264 Actual Surface Area ft<sup>2</sup>

**Okay**

10 Trial Weir Length ft

0.5 Trial Depth of Flow ft

10.6 Spillway Capacity cfs

**Okay**

1.5 Skimmer Size (inches)

0.125 Head on Skimmer (feet)

1 Orifice Size (1/4 inch increments)

8.33 Dewatering Time (days)

Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8



Channel	Drain Area, ac	Channel Length, ft	Channel Drop, ft	C	Q2 I, in/hr	Flow cfs	Channel Slope, ft/ft	n	Side Slope:1	Bottom Width, ft	Depth of Flow, ft	Velocity fps	Liner
TD1	0.89	196	6	0.55	5.76	2.8	0.0281	0.024	3.00	2.0	0.27	3.64	Jute Mesh
TD2	1.41	231	2	0.55	5.76	4.5	0.0065	0.020	3.00	2.0	0.47	2.81	Jute Mesh
TD3	0.94	209	3	0.55	5.76	3.0	0.0144	0.020	3.00	0.0	0.53	3.54	Jute Mesh