



April 14, 2026

Ms. Jennie Turner
Currituck County Planning and Community Development
P.O. Box 73
Currituck, NC 27927

Re: Major Site Plan Application
1126 Corolla Village Rd
Corolla, Currituck County, North Carolina

Dear Ms. Turner,

On behalf of TFP, LLC, WithersRavenel hereby submit for your review the enclosed application package for 1126 Corolla Village Rd. Major Site Plan. Enclosed in this package, please find the following:

One (1) digital copy of each:

1. A Review Fee Check in the amount of \$571 (\$0.15 per 3,802 sqft of gross floor area, including covered porches) for Major Site Plan made payable to Currituck County;
2. A \$5,500 escrow fee for Stormwater review made payable to Currituck County;
3. Signed Major Site Plan Application Form and Checklist;
4. Signed Major Stormwater Forms SW-002 and SW-003;
5. Site Plan Narrative and supporting calculations;
6. DRAFT wastewater permit package;
7. Draft NCDOT Driveway Access Application and Encroachment Agreement;
8. Full Size Architectural Elevations;
9. Proposed Lighting Plan;
10. Full Size Major Site Plan Set;

Please review the attached application and do not hesitate to contact Nadeen Dashti at 252.491.8147 if you have any questions, comments or requests for additional information.

Sincerely,
WithersRavenel

Nadeen Dashti

8466 Caratoke Highway, Building 400 | Powells Point, NC 27966

t: 252-491-8147 | f: 919.467.6008 | www.withersravenel.com | License No. F-1479

Asheville | Cary | Charlotte | Greensboro | Pittsboro | Powells Point | Raleigh | Southern Pines | Wilmington



Major Stormwater Plan Form SW-002

Review Process

Contact Information

Currituck County
Planning and Inspections Department
153 Courthouse Road, Suite 110
Currituck, NC 27929

Phone: 252-232-3055

Website: <http://www.currituckcountync.gov/planning-zoning/>

Email: ccpz@currituckcountync.gov

General

Major stormwater plan approval is required for:

- Major subdivisions.
- Major site plans - development or expansion on a nonresidential, multi-family, or mixed use lot by 5,000 square feet or more of impervious coverage or resulting in 10% or more total impervious coverage.

Step 1: Application Submittal

The applicant must submit a complete application packet consisting of the following:

Submitted on a USB flash drive or a compact disc (CD):

- Completed Currituck County Major Stormwater Plan Form SW-002.
- Completed Rational Method Form SW-003 or NRCS Method Form SW-004.
- Stormwater management plan drawn to scale. The plan shall include the items listed in the major stormwater plan design standards checklist.
- Alternative stormwater runoff storage analysis and/or downstream drainage capacity analysis, if applicable.
- NCDENR permit applications, if applicable.
- Stormwater Review Fee (see fee schedule)

On receiving an application, staff shall determine whether the application is complete or incomplete. A complete application contains all the information and materials listed above and is in sufficient detail to evaluate and determine whether it complies with appropriate review standards. An application for major stormwater plan must be submitted and approved prior altering an existing drainage system, performing any land disturbing activity or, before construction documents are approved.

Step 2: Staff Review and Action

Once an application is determined complete staff shall approve, approve subject to conditions or disapprove the application.



Major Stormwater Plan Form SW-002

OFFICIAL USE ONLY:	
Permit Number:	_____
Date Filed:	_____
Date Approved:	_____

Contact Information

APPLICANT:		PROPERTY OWNER:	
Name:	TFP, LLC	Name:	same
Address:	PO Box 369	Address:	_____
	Corolla, NC 27929		_____
Telephone:	252.457.1177	Telephone:	_____
E-Mail Address:	dtwiddy@twiddy.com	E-Mail Address:	_____

Property Information

Physical Street Address: 1126 Corolla Village Road, Corolla, NC 27927

Parcel Identification Number(s): 011400000360000

FEMA Flood Zone Designation: X

Request

Project Description: Specialty Eating Establishment and Retail Building

Total land disturbance activity: 29,463 sf Calculated volume of BMPs: 2,902 sf

Maximum lot coverage: 25,277.8 sf Proposed lot coverage: 13,730 sf

TYPE OF REQUEST

- Major subdivision (10-year, 24-hour rate)
- Major site plan (5-year, 24-hour rate)

METHOD USED TO CALCULATE PEAK DISCHARGE

- Rational Method
- NRCS Method (TR-55 and TR-20)
- Simple volume calculation for small sites (less than 10 acres)
- Alternative stormwater runoff storage analysis
- Downstream drainage capacity analysis

I hereby authorize county officials to enter my property for the purpose of determining compliance. All information submitted and required as part of this process shall become public record.

Applicant

3-9-26
Date

Property Owner(s)

Date

***NOTE:** Form must be signed by the owner(s) of record, contract purchaser(s), or other person(s) having a recognized property interest. If there are multiple property owners/applicants a signature is required for each.

Major Stormwater Plan Design Standards Checklist

The table below depicts the design standards of the major stormwater plan application. Please make sure to include all applicable listed items to ensure all appropriate standards are reviewed.

Major Stormwater Plan Design Standards Checklist

Date Received: _____
 Project Name: 1126 Corolla Village Road
 Applicant/Property Owner: TFP, LLC

Minor Stormwater Plan Design Standards Checklist		
General		
1	Property owner name and address.	<input checked="" type="checkbox"/>
2	Site address and parcel identification number.	<input checked="" type="checkbox"/>
3	North arrow and scale to be 1" = 100' or larger.	<input checked="" type="checkbox"/>
Site Features		
4	Scaled drawing showing existing and proposed site features: Property lines with dimensions, acreage, streets, easements, structures (dimensions and square footage), fences, bulkheads, septic area (active and repair), utilities, vehicular use areas, driveways, and sidewalks.	<input checked="" type="checkbox"/>
5	Approximate location of all designated Areas of Environmental Concern (AEC) or other such areas which are environmentally sensitive on the property, such as Maritime Forest, CAMA, 404, or 401 wetlands as defined by the appropriate agency.	<input checked="" type="checkbox"/>
6	Existing and proposed ground elevations shown in one foot intervals. All elevation changes within the past six months shall be shown on the plan.	<input checked="" type="checkbox"/>
8	Limits of all proposed fill, including the toe of fill slope and purpose of fill.	N/A
9	Square footage of all existing and proposed impervious areas (structures, sidewalks, walkways, vehicular use areas regardless of surface material), including a description of surface materials.	<input checked="" type="checkbox"/>
10	Existing and proposed drainage patterns, including direction of flow.	<input checked="" type="checkbox"/>
11	Location, capacity, design plans (detention, retention, infiltration), and design discharge of existing and proposed stormwater management features.	<input checked="" type="checkbox"/>
12	Elevation of the seasonal high water level as determined by a licensed soil scientist.	<input checked="" type="checkbox"/>
13	Plant selection.	<input checked="" type="checkbox"/>
Permits and Other Documentation		
14	NCDENR stormwater permit application (if 10,000sf or more of built upon area).	<input checked="" type="checkbox"/>
15	NCDENR erosion and sedimentation control permit application (if one acre or more of land disturbance).	N/A
16	NCDENR coastal area management act permit application, if applicable.	N/A
17	Stormwater management narrative with supporting calculations.	<input checked="" type="checkbox"/>
18	Rational Method Form SW-003 or NRCS Method Form SW-004	N/A
19	Alternative stormwater runoff storage analysis and/or downstream drainage capacity analysis, if applicable	N/A
20	Design spreadsheets for all BMPs (<i>Appendix F – Currituck County Stormwater Manual</i>).	<input checked="" type="checkbox"/>
21	Detailed maintenance plan for all proposed BMPs.	<input checked="" type="checkbox"/>



Rational Method Peak Flow Form SW-003

Project Information

Project Location: 1126 Corolla Village Road

Parcel Identification Number(s): 9937-21-2768

Drainage area: _____ 0.89 ac

Average Slope: _____ 2.0 %

Maximum Slope Length: _____ 175 ft

Calculations

*The Rational Method may only be used where development will impact less than 10 acres

Time of Concentration (Tc) (Use additional sheets if necessary)			
	Pre-	Post-	
<u>Sheet Flow</u>			
Manning's roughness, n (Table 2-4)	0.2	0.57	
2-year, 24-hour Rainfall, P	4.0	6.0 5.0	in
Slope, S	0.013	0.015	ft/ft
Length of Sheet Flow, L (<=300 feet)	175	40	ft
Total Time for Sheet Flow	11.7	0.6	min
<u>Shallow Concentrated Flow</u>			
Surface Paved (P) or Unpaved (U)	n/a	n/a	
Length of flow, L	n/a	n/a	ft
Slope, S	n/a	n/a	ft/ft
Average Velocity, V (Table 2-3)	n/a	n/a	ft/min
Total Time for Shallow Concentrated Flow	0	0	min
<u>Channel Flow</u>			
Pipe (P) or Channel (C)	n/a	n/a	
If pipe: Diameter, D	n/a	n/a	in
If channel: Bottom Width, w	n/a	n/a	ft
If channel: side slope 1 (__:1)	n/a	n/a	
If channel: side slope 2 (__:1)	n/a	n/a	
Cross sectional flow area, A	n/a	n/a	sq ft
Wetted perimeter, Wp	n/a	n/a	ft
Hydraulic radius, R = A/Wp	n/a	n/a	ft

Time of Concentration (Tc) (Use additional sheets if necessary)			
	Pre-	Post-	
Channel slope, S	n/a	n/a	ft/ft
Manning's roughness, n (Table 2-4)	n/a	n/a	
Channel velocity	n/a	n/a	ft/sec
Length of Flow, L	n/a	n/a	ft/sec
Total Time for Channel Flow	0	0	min
Total Time of Concentration, Tc	11.7	5*	min

* Minimum Tc

Pre-development Conditions			
Land Use Description	C	Area (acres)	C*A
Woods	0.2	0.89	0.17
Total			

Intensity for 2-year, ~~24-hour storm~~ (Table 2-5) 4.57 in/hr
 24-hr n/a; 24-hr storm would be 4.0 from above calc; 2-yr at 11.7 Tc provided

Pre-development peak flow, Q = CiA 0.82 cfs

Post-development Conditions			
Land Use Description	CN	Area (acres)	C*A
IMPERVIOUS COVER	98	0.30	29.4
OPEN SPACE	49	0.59	28.9
Totals			58.31

Area-weighted C:N 64.5

Intensity for ~~10-year, 24-hour storm~~ (Table 2-5) 6.82 in/hr
 10-yr n/a; 24-hr n/a; 24-hr storm would be 5.0 from above calc; 5-yr at 5 Tc provided (Commercial site plan)

Post-development peak flow, Q = CiA 2.96 cfs

Minimum Storage Volume Required – Refer to Section 2.4.4 for Volume Calculations

Storage Volume, V_s 3,806 ft³



Applicant Agent

4/14/2026

Date



WithersRavenel

Our People. Your Success.



Site Plan Narrative

1126 Corolla Village Road.

Currituck County

Specialty Eating Establishment & Retail Building

Prepared For:

TFP, LLC

c/o Doug Twiddy

1181 Duck Road

Duck, NC 27949

Prepared By:

WithersRavenel

115 MacKenan Drive

Cary, NC 27511

(919) 469-3340

License No.: F-1479

WithersRavenel Project No. 24-1038

April 14, 2026

Table of Contents

Project Description..... 2

Access..... 2

Parking..... 2

Utilities 2

Buffers and Site Vegetation..... 3

Summary of Existing Stormwater Conditions 3

Summary of Proposed Stormwater Conditions 3

 Interconnected Infiltration Basin 3

 Permeable Pavement..... 4

Calculations..... 5

Summary and Conclusions 5

Appendices

Appendix 1: Stormwater Calculations

Appendix 2: On-site Soils Map and Data

Appendix 3: NOAA Precipitation Intensity (Currituck County)

Project Description

TFP, LLC (Owner) is proposing to construct a specialty eating establishment with a proposed retail building and decking located at 1126 Corolla Village Road, Corolla, Currituck County. The proposed construction will include the addition of thirteen (13) parking spaces, installation of an interconnected stormwater infiltration basin, connection to the County's water system, and onsite wastewater system. As the site disturbance is less than 1 acre, a NCDEQ State soil erosion and sediment control permit is not required. Additionally, the site proposes more than 10,000 sf of impervious coverage, therefore it is required to obtain an NCDEQ stormwater permit.

The following narrative will detail the site details and stormwater management plan for the proposed site improvements for 1126 Corolla Village Rd in Corolla, Currituck County, NC.

Access

Access to the site is available from Corolla Village Road (SR 1185). A 20' wide all-weather asphalt drive aisle capable of supporting 75,000 pounds is proposed to allow for fire access. A loading zone has been provided, per Currituck County Unified Development Ordinance UDO 5.1.8 requirements.

Parking

The proposed project will install thirteen (13) additional parking spaces. Calculations for the parking count are based on the current ordinance using 1 space per 200 sf of enclosed specialty eating establishment and 1 space per 300 sf of proposed retail space. The eating establishment requires 8.4 parking spaces and the proposed retail building requires 5.4 parking spaces.

Therefore, 13 total parking spaces are required and 13 parking spaces on site have been provided (including 1 ADA accessible parking space).

Utilities

The existing water supply is provided by Currituck County. The water service and associated appurtenances are proposed from the existing main within Corolla Village Road to the buildings. The water service lines will include a double check valve with backflow prevention device for each line.

There is also an existing fire hydrant within the Corolla Village Road right-of-way. The buildings are not designed to be sprinkler protected. This proposed fire hydrant will allow the hose length to come within 400' of all portions of all buildings. Based on the North Carolina Public Water Supply (PWS) Engineering, Planning, and Development Guidance Document (2013), PWS review and permitting are not required unless the Currituck County public water system requires additional review. At this time, a PWS review and permitting is not proposed for the services.

The proposed on-site wastewater is proposed to handle 989 gallons per day. This anticipated amount is 989 gallons per day based on 50 gpd/100 sq. ft. for specialty eating and 100 gpd/1,000 sq.ft. for retail space. An onsite evaluation has been conducted with Albemarle Regional Health Services to determine acceptable site characteristics.

Buffers and Site Vegetation

The Currituck County UDO defines a heritage tree as any live oak greater than 12" diameter at breast height and trees or other tree species greater than 24" diameter at breast height. The site was reviewed for heritage trees and there are two substantial trees (approx. 18") but these are not live oaks and do not qualify as a heritage tree per Currituck County UDO. Heritage trees are not present within this site and site clearing does not propose removal of any heritage trees.

The commercial building use proposed requires 2 ACI of Canopy trees per acre and 1 shrub per every 5 ft of building façade facing a street. As such, two (2) canopy trees and nine (9) shrubs have been proposed between the building and the adjacent street to meet site landscaping requirements. Canopy trees and shrubs have also been proposed within the parking area for vehicular landscaping.

The site is zoned GB and has GB to the North, South, and East. A buffer is not required adjacent to this zoning. Property to the west is vacant, but zoned single family residential (SFO). This requires a Type B buffer requirement at 25' wide, 8 ACI of canopy trees, 10 ACI of understory trees, and 15 shrubs per 100 lf. The existing vegetation on site is proposed to be maintained to meet screening requirements adjacent to this property.

Summary of Existing Stormwater Conditions

The property is in the coastal plain of North Carolina. The existing property is currently open space with natural vegetated areas. Wetlands are on the property and have been delineated by WithersRavenel personnel. Ground elevations range between 2' and 5.5' with an average surface slope of 1.0%. Existing stormwater runoff is via sheet flow to the existing wetlands to the West, some of which is conveyed from an existing drainage ditch to the wetlands, which eventually flows into the Albemarle Sound.

Summary of Proposed Stormwater Conditions

Interconnected Infiltration Basin

Stormwater management for the proposed site improvements includes an interconnected infiltration basin system designed to meet Currituck County local stormwater requirements and NCDEQ high-density stormwater requirements. The total drainage area for the site is 38,889 square feet (0.89 acres). Post-development impervious coverage is approximately 13,133 square feet, including reduced impervious credit for permeable pavers. The reduced impervious credit was taken based on Currituck County Stormwater manual allows for 40% of the permeable pavers to be treated as managed turf based on Section B.2.7.

The interconnected infiltration basin system is located adjacent to and on either side of the proposed parking area and is hydraulically connected to function as a single stormwater control measure. The system provides above-grade storage for attenuation and treatment of runoff generated from post-developed conditions. Based on routing calculations, the proposed stormwater management system is designed to retain the post-development 5-year storm event and release flows at or below the pre-development 2-year peak discharge, in accordance with

Currituck County standards. The post-development 5-year peak discharge is calculated at 2.96 cfs, while the pre-development 2-year peak discharge is 0.82 cfs.

Impervious coverage calculations for Currituck County stormwater storage requirements account for permeable pavers with reduced impervious credit. Using the NCDEQ simplified method for the 1.5-inch storm event, the total runoff volume generated is approximately 1,716 cubic feet, which was rounded to a proposed required 1,720 cubic feet of NCDEQ treatment storage. Currituck County routing calculations require approximately 3,806 cubic feet of storage volume for attenuation.

A summary of all storage provided to meet Currituck County stormwater requirements is shown in Table 1 below. The interconnected infiltration basin system provides approximately 4,239 cubic feet of above-grade storage, which exceeds both the County and State stormwater storage requirements.

Table 1: Currituck County Stormwater Storage Summary			
Elev (Ft.)	Area (Sf)	Avg Area (Sf)	Volume (Cf)
3.00	2,054		
		2,562	2,562
4.00	3,069		
		3,355	1,677
4.50	3,640		4,239 (Vg)

The interconnected infiltration basins provide a maximum storage depth of approximately 18 inches, with basin bottom elevations set above the seasonal high-water table to maintain the required vertical separation. The seasonal high-water table is anticipated near elevation ± 2.0 feet, based on geotechnical data. The basin configuration allows for full capture and treatment of the 1.5-inch storm event, in addition to providing the required attenuation volume.

Based on an anticipated soil hydraulic conductivity of approximately 9 inches per hour, the interconnected infiltration basin system is expected to fully drain within approximately 2.0 hours (0.08 days) following the design storm. This drawdown time complies with stormwater design criteria.

Permeable Pavement

Permeable pavers are proposed within the parking areas to provide supplementary infiltration and runoff reduction. The permeable pavement areas contribute reduced impervious area credit but are not solely relied upon to meet stormwater storage requirements. Reduced impervious credit has been applied to permeable pavement areas in accordance with Currituck County guidance. All parking areas will be installed using Belgard® ADA approved permeable pavers or approved equal. A cross section for these pavers is provided with the associated plan set.

These stormwater management facilities will provide an adequate system to meet local requirements for stormwater storage. The interconnected infiltration basin will be designed and permitted through Currituck County. A high-density stormwater permit is required by NC DEQ for the interconnected infiltration basins.

Soils

The USDA NRCS Soil Survey lists the soil in the vicinity of the stormwater infiltration basins as described below. The seasonal high-water table is approximately at elevation 1.9. A copy of on-site soils analysis is provided within **Appendix 2**. On-site soils analysis and testing were completed by WithersRavenel, and a summary memo, dated July 11, 2025, is included within this package.

- Os – Osier fine sand

This soil typically has 0 to 2 percent slopes. Osier fine sand typically has a very high runoff rate and is poorly drained. This soil is categorized in Hydrologic Soil Group: A/D

- OuB—Ousley fine sand

This soil typically has 0 to 6 percent slope. Ousley fine sand typically has a very low runoff class and is moderately well drained. This soil is categorized in Hydrologic Soil Group: A.

Calculations

A copy of the Drainage Calculations for State and County requirements are provided in **Appendix 1** of this narrative.

Summary and Conclusions

The proposed stormwater management plan for this site provides stormwater treatment in excess of the State required 1.5 inch rainfall event for all proposed impervious surfaces. In addition, the site provides onsite storage of the County required 2-yr, 24 hour predeveloped wooded condition routing. The proposed system will offer preliminary and primary methods of treatment as well as an alternate method of disposal should the capacity be exceeded. This proposed design will adequately serve the stormwater management requirements of the site.

Appendix 1: Stormwater Calculations

Currituck County & NCDEQ Calculations

Storage Calculations

	Infiltration Basin (A)	
	(sq.ft.)	(acre)
Drainage Area =	38,889	0.89
Open Space	25,756	0.59
Existing =	2,022	0.05
Building (No open deck) =	3,801	0.09
Asphalt/concrete/gravel =	6,138	0.14
Impervious =	11,961	0.27
Permeable Pavers=	1,954	0.04
<i>Reduced Permeable Pavers =</i>	<i>1,172</i>	<i>0.03</i>
Total Impervious (including permeable) =	13,133	0.30

Runoff generated by Rainfall Event (NCDEQ Simplified Method)

la = Impervious Percentage = Impervious Area/Drainage Area

Rv= Runoff Coefficient, 0.05+0.9la

Rd= Rain fall depth

V= Runoff Volume, 3630*Rd*Rv*A

	A (1.5")
la =	33.8%
Rv=	0.35
Rd (in.)=	1.5
A (ac.) =	0.89
V (cf.)=	1716

Total Storage Required by NCDEQ = 1,720.00 cf

Total Storage Required by Currituck County = 3,810.00 cf

Above Grade Storage Provided In Infiltration Basin (SHWT +/- 2.0')

A - Above Grade Storage				
Elev	Area (sf)	Avg area (sf)	Volume (cf)	Cum Vol. (cf)
3.00	2054			0
4.00	3069	2562	2562	2562
4.50	3640	3355	1677	4239 (Vg)

Above Grade Storage Provided =

4239 cf
3.7 in

Infiltration Basin Drawdown Calculations

Hydraulic Conductivity = 9 in/hr

Max Stored Depth = 18 in

Drawdown Time = Stored Depth / Hydraulic Conductivity

Drawdown Time = 2.00 hrs or 0.08 days

Project Name: 1126 Corolla Village Rd
 Quible Project Number: 24-1038
 Date: 4/2/2026

Currituck County Stormwater Calculations (In Lieu of Forms SW-002 and SW-003)

Step 1: Drainage Area	38,888.95	square feet
	0.89	acres

Step 2: Determine Runoff Coefficient
C = 0.20

Step 3: Determine Time of Concentration

Sheet Flow

$$T_{c1} = \frac{0.42(nL)^{0.8}}{p^{0.5}S^{0.4}}$$

n =	0.1	(woods)	Elev. Start =	4.5
L =	175	feet	Elev. End =	2.2
P =	4	inch		
S =	0.013	ft/ft		
T _{c1} =	11.7	mins		

Shallow Concentrated Flow

L =	0	feet
S =	0.01	ft/ft
		unpaved
V _{unpaved} =	134.64	fpm
T _{c2} =	0.0	mins

Channel Flow

(n/a)

$$T_c = T_{c1} + T_{c2}$$

T _c =	11.7	mins
------------------	------	------

Step 4: Determine Peak Rainfall Intensity

Time of Concentration

T (yrs)	5 mins	10 mins	15 mins	30 mins	1 hr	2 hr	3 hr
2	6.06	4.84	4.06	2.8	1.76	1.03	0.731
5	6.82	5.46	4.6	3.27	2.1	1.26	0.897
10	7.82	6.26	5.28	3.82	2.49	1.51	1.09

I = 4.57 in/hr

Interpolation Formula =

$$y_2 = \frac{(x_2 - x_1)(y_3 - y_1)}{(x_3 - x_1)} + y_1$$

X	Y
1	10 4.84
2	11.73
3	15 4.06

y₂ = 4.57

Step 5: Determine the 2-year Pre-Development peak discharge, Q

Q = CIA

Q₂ = 0.82 cfs

Step 6: Determine the weighted runoff coefficient, Cw for post-development

		C - Value
Impervious Area =	13,133.40 sq.ft.	0.95
Open Area =	25,755.55 sq.ft.	0.25
Total =	38,888.95 sq.ft.	
Cw =	0.49	

Step 7: Determine Time of Concentration for post-development

Sheet Flow

$$T_{c1} = \frac{0.42(nL)^{0.8}}{p^{0.5}S^{0.4}}$$

n =	0.013	(smooth pavement)
L =	40.00	feet
P =	5	inch (From NOAA Rainfall Depth Data)
S =	0.015	ft/ft

Tc₁ = 0.6 mins

Shallow Concentrated Flow

Tc ₂ =	L =	0.00	ft
		paved	
	Slope =	0.024	ft/ft

Paved Areas $V = 1302(S^{0.53})$

Unpaved Areas $V = 972(S^{0.53})$

V = 180.4 ft/min

Tc₂ = 0.0 mins

Channel Flow

(n/a)

Tc = Tc₁ + Tc₂

Tc = 5.0 mins *5 min minimum Tc (worst case scenario)

Step 8: Determine Peak Rainfall Intensity

T (yrs)	Time of Concentration						
	5 mins	10 mins	15 mins	30 mins	1 hr	2 hr	3 hr
2	6.06	4.84	4.06	2.8	1.76	1.03	0.731
5	<u>6.82</u>	5.46	4.6	3.27	2.1	1.26	0.897
10	7.82	6.26	5.28	3.82	2.49	1.51	1.09
I ₅ =	6.82						

Step 9: Determine the 5-year Post-Development peak discharge, Q

Q = CIA

Q₅ = 2.96 cfs

Step 10: Determine the weighted curve number, CN, for the post-development conditions.

Hydrologic Soil Type:		A	(From NRCS Soils Report)
Land Use	CN	Area	
Impervious Area	98	11,179.40	
Permeable Pavers	98	1,172.40	
Open Space	49	26,537.15	
Total =		38,888.95	
CN _w =		64.56	

Step 11: Determine the 5-year post-development runoff depth, Q

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)} \quad S = \frac{1000}{CN} - 10$$

P =	5 in
S =	5.49
Q =	1.62 in

Step 12: Determine the Runoff Volume, V_r

$$V_r = \frac{Q}{12} * A$$

Q =	1.62 in
A =	0.89 acres
V _r =	0.12 ac-ft

Step 13: Determine the Required Storage Volume, V_s

$$V_s = 1613.33 * V_r * \left(1 - \frac{Q_{2\text{-pre}}}{Q_{10\text{-post}}}\right)$$

V _r =	0.12 ac-ft
Q _{2-pre} =	0.82 cfs
Q _{5-post} =	2.96 cfs
V _s =	140.99 CY
	3,806.84 CF

To: Cathleen Saunders P.E.
From: Troy Murphy, Environmental Scientist III
Reviewed By: Brian Rubino, P.G.

Date: 07/11/2025

Re: 24-1038- Soil and Groundwater Investigation
 1126 Corolla Village Road, Corolla, NC

On Thursday July 10th, representatives from WithersRavenel visited the Site to conduct shallow soil borings in the location of potential future stormwater collection basins or infiltration areas. The purpose of our evaluation was to understand lithologic conditions, Season High Water Table (SHWT), depths and elevation and to measure infiltration rates for Stormwater Management System design.

Two soil borings and one infiltration test were conducted within the identified potential stormwater areas. A soil boring (SB-1) and infiltration test (T-1) on the southwestern side of the property, and a second soil boring (SB-2) was completed on the northeastern side of the property.

Soil characteristics for SB-1 are as follows:

- 0" – 3" bgs: Sandy topsoil (10 YR 4/3)
- 3" – 12" bgs: Fine-medium sand (2.5Y 5/4)
- 12" – 14" bgs: Fine-medium sand (2.5Y 5/3)
- 14" – 18" bgs: Fine-medium sand w/ organics (10YR 3/1)
- 18" – 24" bgs: Fine-medium sand (10YR 4/1)
- 24" – 48"+ bgs: Fine-medium sand (10YR 5/1)

Soil characteristics for SB-2 are as follows:

- 0" – 2" bgs: Sandy topsoil with root mat and fines (10 YR 3/3)
- 2" – 6" bgs: Fine-medium sand with trace fines (2.5Y 5/4)
- 6" – 12" bgs: Fine-medium sand with trace fines (10YR 4/2)
- 12" – 26" bgs: Fine-medium sand (10YR 5/1 with 10YR 4/1 & 10YR 5/6 Streaking)
- 26" – 48"+ bgs: Fine-medium sand (10YR 4/1)

A summary of elevation data collected and observed is as follows:

Soil Boring	Ground Elevation (ft); (NAVD 88)	Approx. Elevation of SHWT (ft): (NAVD88)
SB-1	3.38'	1.90'
SB-2	4.25'	2.10'

Infiltration rate field testing of the in-situ soils was conducted using the Modified Philip Dunne (MPD) method to test and calculate saturated hydraulic conductivity (Ksat) at the proposed stormwater collection and treatment location. This procedure measures the natural downward movement of water to the groundwater table which can be relied upon to design site stormwater collection, storage and treatment systems in the area tested. The infiltration test was done in the soil unit near the surface. The infiltration testing location is referred to as T-1; (see location on the attached report).

The measured infiltration rates were T-1 = 9.91 in/hr. Rapid infiltration such as this is expected for clean sands with no confining units. See accompanying MPD infiltration report.

Quible & Associates, P.C.

1126 Corolla Village Road - 24-1038 - Corolla, NC

K_{sat} best-fit site average: 249 mm/hr or 9.81 in/hr

GPS Infiltration Test Site Map



Map Pin #	Test #	Test Name	Date	Ksat (mm/hr)	Ksat (in/hr)	C (mm)	RMS Error of Regression (s)	Normalized RMS
1	29659	T1	07/10/2025 09:35:09	249	9.81	-286.0	0.1	0.03%

*** Site Average could not be calculated from only 1 viable test

1126 Corolla Village Road - 24-1038 - Corolla, NC

This report summarizes the results of a set of Modified Philip Dunne (MPD) Infiltrometer tests performed at the above referenced site. Quible & Associates, P.C. personnel performed the field tests. The software used to compute saturated hydraulic conductivity (K_{sat}) and generate this report assumes that the field personnel used infiltrmeters manufactured by Upstream Technologies Inc. and followed the procedures outlined in "Manual – Modified Philip - Dunne Infiltrometer" by Ahmed, Gulliver, and Nieber.

The following paragraphs describe the individual tests, input values used in the analysis, and methods used to compute the K_{sat} value.

After individual K_{sat} values were calculated, the method used to determine the overall site K_{sat} value ($K_{best-fit}$) is described in "Effective Saturated Hydraulic Conductivity of an Infiltration-Based Stormwater Control Measure" by Weiss and Gulliver 2015, "A relationship to more consistently and accurately predict the best-fit value of saturated hydraulic conductivity used a weighted sum of 0.32 times the arithmetic mean and 0.68 times the geometric mean."

METHOD USED TO COMPUTE K_{sat}

The MPD Infiltrometer software uses the following procedure described in "The Comparison of Infiltration Devices and Modification of the Philip-Dunne Permeameter for the Assessment of Rain Gardens" by Rebecca Nestigen, University of Minnesota, November 2007.

The steps are as follows:

1. For each measurement of head, use the following equation to find the corresponding distance to the sharp wetting front.

$$[H_0 - H(t)]r_1^2 = \frac{\theta_1 - \theta_2}{3} [2[R(t)]^3 + 3[R(t)]^2 L_{max} - L_{max}^3 - 4r_0^3]$$

2. Estimate the change in head with respect to time and the change in wetting front distance with respect to time by using the backward difference for all values of $R(t)$ equal to or greater than the distance

$$\sqrt{r_1^2 + L_{max}^2}$$

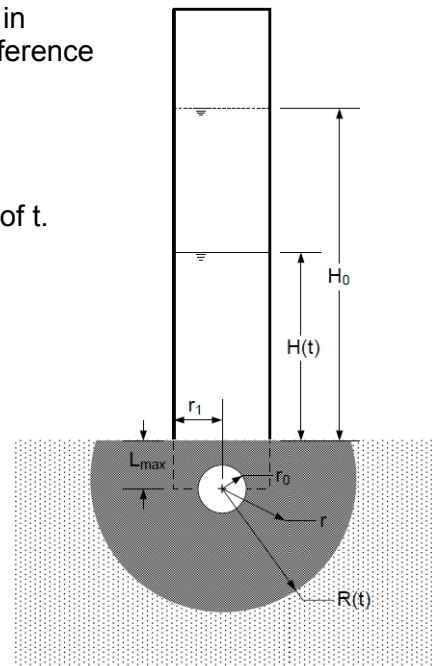
3. Make initial guesses for K and C .

4. Solve the following equations for $\Delta P(t)$ at each incremental value of t .

$$\Delta P(t) = \frac{\pi^2}{8} \left\{ \theta_1 - \theta_0 \frac{[R(t)]^2 + [R(t)]L_{max}}{K} \frac{dr}{dt} - 2r_0^2 \right\} \frac{\ln \left[\frac{R(t)[r_0 + L_{max}]}{r_0[R(t) + L_{max}]} \right]}{L_{max}}$$

$$\Delta P(t) = C - H(t) - L_{max} + \frac{L_{max}}{K} \frac{dh}{dt}$$

5. Minimize the absolute difference between the two solutions found in Step 4 by adjusting the values of K and C .



Parameters for Equations

Θ_0 = volumetric water content of soil before MPD test

Θ_1 = volumetric water content of soil after MPD test

Infiltration Report

Quible & Associates, P.C.

1126 Corolla Village Road - 24-1038 - Corolla, NC

T1

Date	7/10/2025
Time	9:35 AM
Latitude	36.379055
Longitude	-75.833143
Initial Volumetric Moisture	10.00 %
Final Volumetric Moisture	65.00 %
Cylinder Size	3 Liter

T1 Results

Map Pin #	1
Test Number	31285
Ksat - mm/hr	249
Ksat - in/hr	9.81
Capillary Pressure C mm	-286.0
RMS Error of Regression	0.1
Normalized RMS	0.03%

Readings

#	Time	Head	#	Time	Head	#	Time	Head	#	Time	Head
1	0 s	37.53 cm	26	125 s	29.23 cm	51	250 s	22.08 cm	76	375 s	15.93 cm
2	5 s	37.24 cm	27	130 s	28.92 cm	52	255 s	21.83 cm	77	380 s	15.69 cm
3	10 s	36.89 cm	28	135 s	28.61 cm	53	260 s	21.56 cm	78	385 s	15.47 cm
4	15 s	36.54 cm	29	140 s	28.3 cm	54	265 s	21.3 cm	79	390 s	15.25 cm
5	20 s	36.18 cm	30	145 s	28.01 cm	55	270 s	21.04 cm	80	395 s	15.01 cm
6	25 s	35.84 cm	31	150 s	27.71 cm	56	275 s	20.78 cm	81	400 s	14.79 cm
7	30 s	35.49 cm	32	155 s	27.41 cm	57	280 s	20.53 cm	82	405 s	14.57 cm
8	35 s	35.14 cm	33	160 s	27.12 cm	58	285 s	20.27 cm	83	410 s	14.35 cm
9	40 s	34.79 cm	34	165 s	26.82 cm	59	290 s	20.02 cm	84	415 s	14.13 cm
10	45 s	34.45 cm	35	170 s	26.53 cm	60	295 s	19.76 cm	85	420 s	13.91 cm
11	50 s	34.11 cm	36	175 s	26.24 cm	61	300 s	19.52 cm	86	425 s	13.69 cm
12	55 s	33.77 cm	37	180 s	25.95 cm	62	305 s	19.26 cm	87	430 s	13.48 cm
13	60 s	33.43 cm	38	185 s	25.66 cm	63	310 s	19.02 cm	88	435 s	13.26 cm
14	65 s	33.1 cm	39	190 s	25.38 cm	64	315 s	18.77 cm	89	440 s	13.04 cm
15	70 s	32.77 cm	40	195 s	25.1 cm	65	320 s	18.53 cm	90	445 s	12.83 cm
16	75 s	32.43 cm	41	200 s	24.81 cm	66	325 s	18.28 cm	91	450 s	12.62 cm
17	80 s	32.1 cm	42	205 s	24.53 cm	67	330 s	18.04 cm	92	455 s	12.41 cm
18	85 s	31.78 cm	43	210 s	24.26 cm	68	335 s	17.8 cm	93	460 s	12.2 cm
19	90 s	31.45 cm	44	215 s	23.98 cm	69	340 s	17.56 cm	94	465 s	11.99 cm
20	95 s	31.13 cm	45	220 s	23.7 cm	70	345 s	17.32 cm	95	470 s	11.79 cm
21	100 s	30.81 cm	46	225 s	23.43 cm	71	350 s	17.09 cm	96	475 s	11.57 cm
22	105 s	30.49 cm	47	230 s	23.16 cm	72	355 s	16.86 cm	97	480 s	11.37 cm
23	110 s	30.17 cm	48	235 s	22.88 cm	73	360 s	16.62 cm	98	485 s	11.17 cm
24	115 s	29.85 cm	49	240 s	22.62 cm	74	365 s	16.39 cm	99	490 s	10.97 cm
25	120 s	29.54 cm	50	245 s	22.35 cm	75	370 s	16.15 cm	100	495 s	10.76 cm

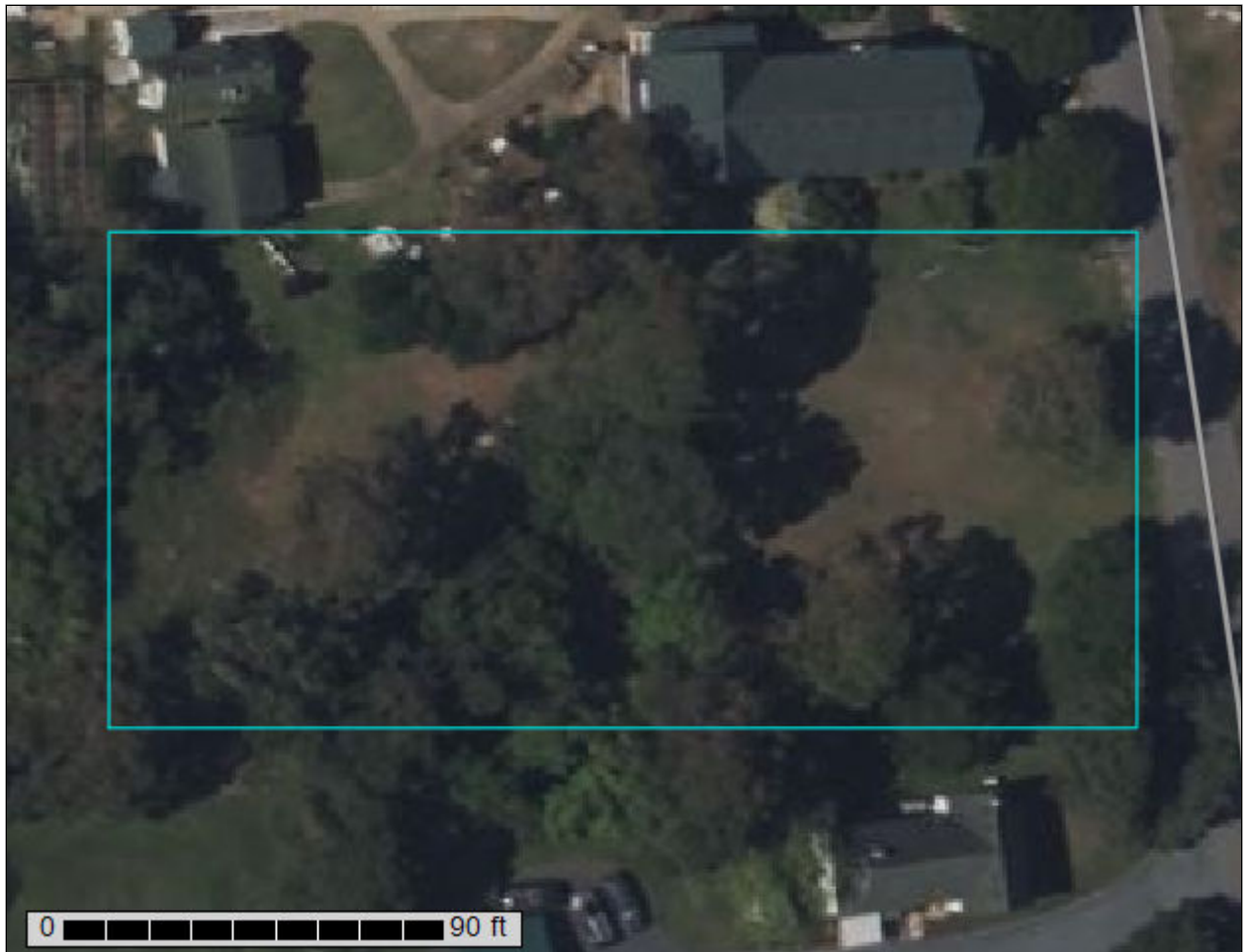
1126 Corolla Village Road - 24-1038 - Corolla, NC

T1 Readings continued

#	Time	Head
101	500 s	10.56 cm
102	505 s	10.36 cm
103	510 s	10.16 cm
104	515 s	9.96 cm
105	520 s	9.76 cm
106	525 s	9.57 cm
107	530 s	9.37 cm
108	535 s	9.18 cm
109	540 s	8.98 cm
110	545 s	8.79 cm
111	550 s	8.6 cm
112	555 s	8.42 cm
113	560 s	8.23 cm
114	565 s	8.04 cm
115	570 s	7.86 cm
116	575 s	7.67 cm
117	580 s	7.48 cm
118	585 s	7.3 cm
119	590 s	7.11 cm
120	595 s	6.93 cm
121	600 s	6.75 cm
122	605 s	6.57 cm
123	610 s	6.39 cm
124	615 s	6.21 cm
125	620 s	6.03 cm
126	625 s	5.86 cm
127	630 s	5.68 cm
128	635 s	5.51 cm
129	640 s	5.34 cm
130	645 s	5.17 cm

Appendix 2: On-site Soils Map and Data

Custom Soil Resource Report for Currituck County, North Carolina



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Currituck County, North Carolina.....	13
Os—Osier fine sand.....	13
OuB—Ousley fine sand, 0 to 6 percent slopes.....	14
References	17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

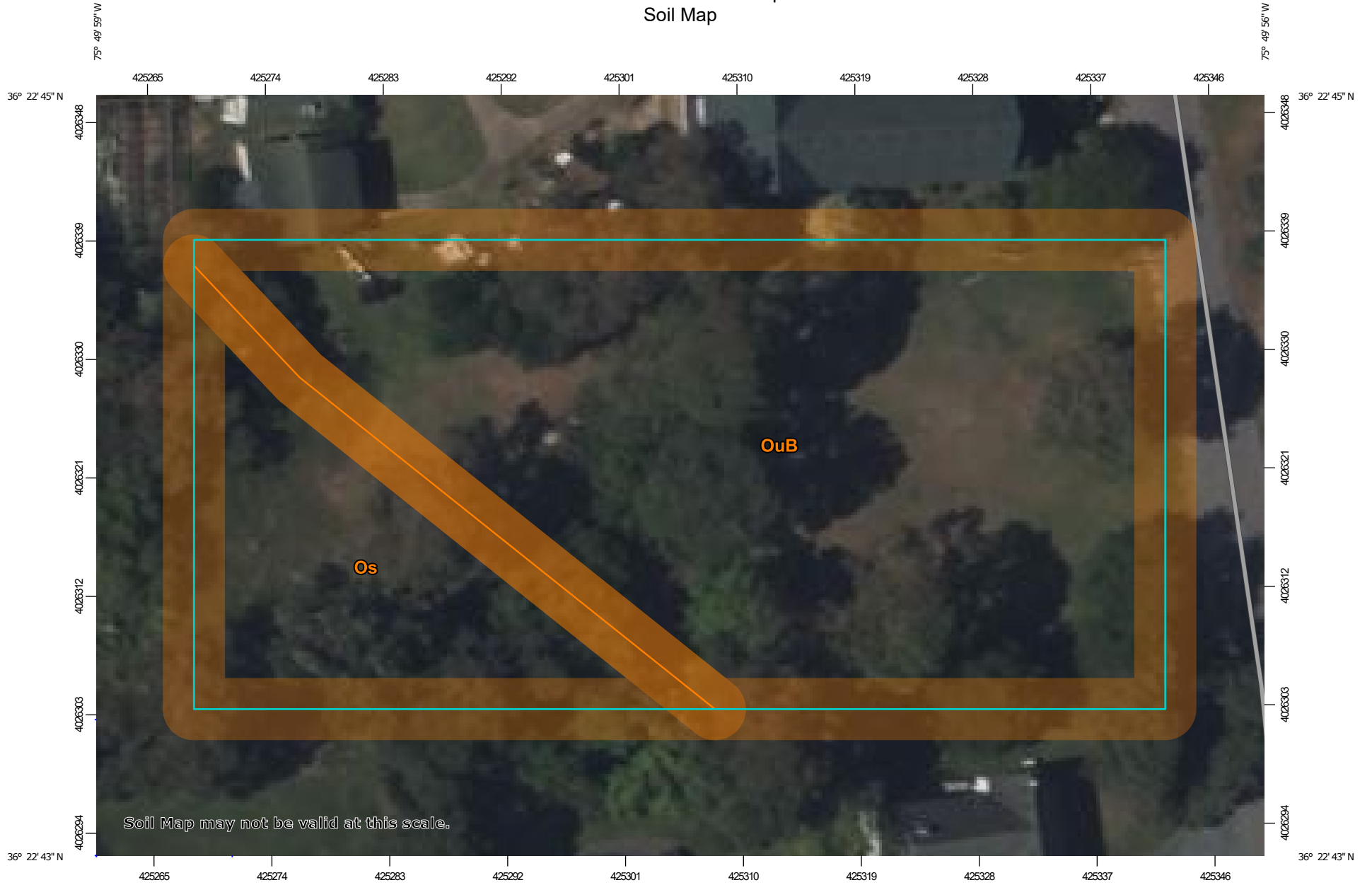
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

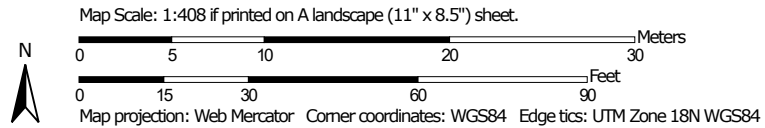
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole

 Slide or Slip


 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

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 1:20,000.

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: Currituck County, North Carolina
 Survey Area Data: Version 25, Sep 2, 2025

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

Date(s) aerial images were photographed: May 18, 2022—May 31, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Os	Osier fine sand	0.2	24.1%
OuB	Ousley fine sand, 0 to 6 percent slopes	0.5	75.9%
Totals for Area of Interest		0.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Custom Soil Resource Report

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Currituck County, North Carolina

Os—Osier fine sand

Map Unit Setting

National map unit symbol: 3rnw
Landscape: Barrier islands
Elevation: 0 to 20 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Osier, undrained, and similar soils: 80 percent
Osier, drained, and similar soils: 10 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osier, Undrained

Setting

Landscape: Barrier islands
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Eolian sands and/or beach sand

Typical profile

A - 0 to 3 inches: fine sand
Cg - 3 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: R153BY120NC - Wet Dune Slack
Hydric soil rating: Yes

Description of Osier, Drained

Setting

Landscape: Barrier islands
Landform: Depressions

Custom Soil Resource Report

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Eolian sands and/or beach sand

Typical profile

A - 0 to 3 inches: fine sand
Cg - 3 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Ecological site: R153BY120NC - Wet Dune Slack
Hydric soil rating: Yes

Minor Components

Conaby, undrained

Percent of map unit: 5 percent
Landscape: Barrier islands
Landform: Pocosins, Depressions
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F153BY060NC - Wet Loamy Flats and Depressions
Hydric soil rating: Yes

OuB—Ousley fine sand, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3rnx
Landscape: Barrier islands
Elevation: 0 to 20 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 190 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Ousley and similar soils: 85 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ousley

Setting

Landscape: Barrier islands

Landform: Troughs on dunes

Landform position (two-dimensional): Backslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Eolian sands and/or beach sand

Typical profile

A - 0 to 3 inches: fine sand

C - 3 to 43 inches: fine sand

Cg - 43 to 82 inches: fine sand

Properties and qualities

Slope: 0 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: Rare

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A

Ecological site: R153BY110NC - Coastal Strand, Beaches, and Dunes

Hydric soil rating: No

Minor Components

Conaby, undrained

Percent of map unit: 3 percent

Landscape: Coastal plains

Landform: Depressions, Pocosins

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: F153BY060NC - Wet Loamy Flats and Depressions

Hydric soil rating: Yes

Duckston

Percent of map unit: 2 percent

Landscape: Barrier islands

Landform: Depressions

Down-slope shape: Concave

Custom Soil Resource Report

Across-slope shape: Concave

Ecological site: R153BY120NC - Wet Dune Slack

Hydric soil rating: Yes

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix 3: NOAA Precipitation Intensity (Currituck County)



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

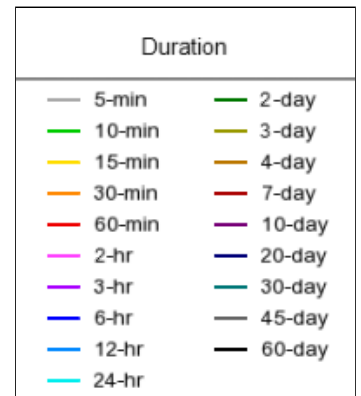
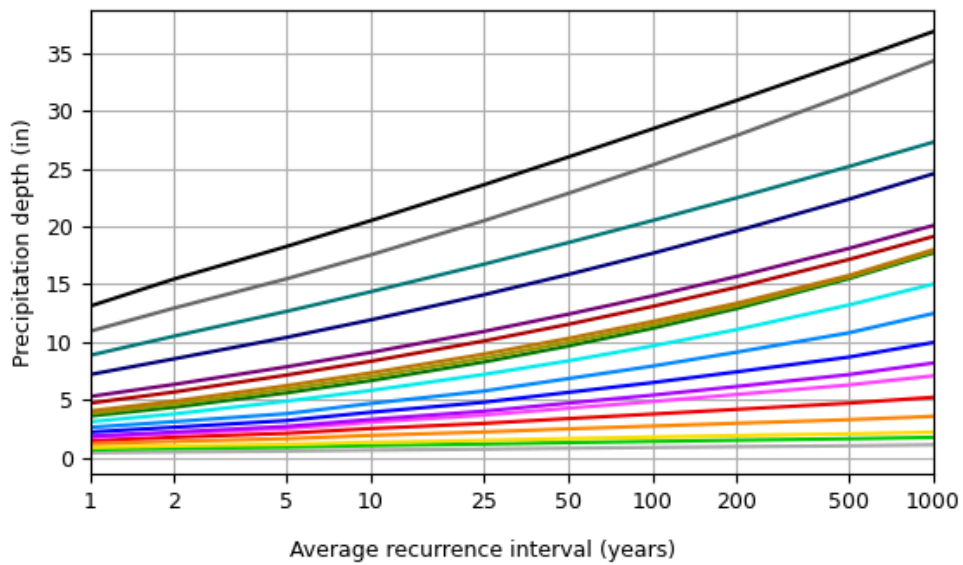
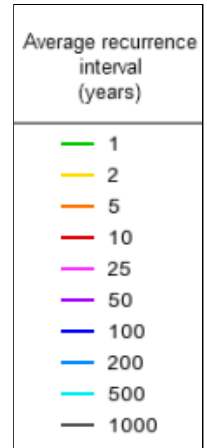
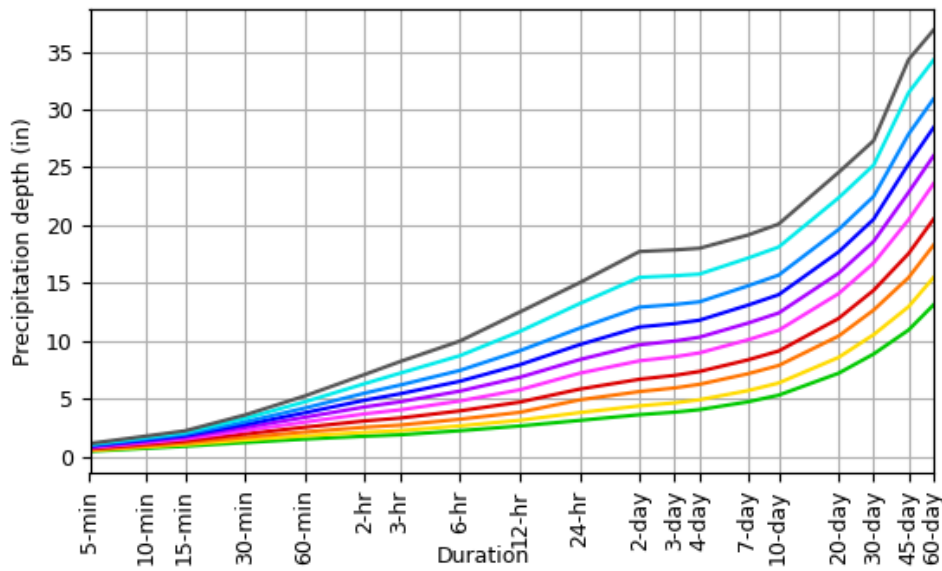
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.439 (0.398-0.485)	0.511 (0.463-0.565)	0.573 (0.520-0.633)	0.662 (0.598-0.731)	0.745 (0.670-0.822)	0.823 (0.738-0.907)	0.891 (0.797-0.984)	0.959 (0.852-1.06)	1.04 (0.915-1.15)	1.12 (0.979-1.24)
10-min	0.702 (0.636-0.774)	0.817 (0.741-0.903)	0.918 (0.833-1.01)	1.06 (0.956-1.17)	1.19 (1.07-1.31)	1.31 (1.18-1.44)	1.42 (1.27-1.56)	1.52 (1.35-1.68)	1.64 (1.45-1.82)	1.76 (1.54-1.95)
15-min	0.877 (0.795-0.968)	1.03 (0.931-1.14)	1.16 (1.05-1.28)	1.34 (1.21-1.48)	1.50 (1.35-1.66)	1.66 (1.49-1.83)	1.79 (1.60-1.98)	1.92 (1.70-2.12)	2.07 (1.82-2.29)	2.21 (1.94-2.45)
30-min	1.20 (1.09-1.33)	1.42 (1.29-1.57)	1.65 (1.50-1.82)	1.94 (1.75-2.14)	2.23 (2.01-2.46)	2.50 (2.24-2.76)	2.74 (2.45-3.03)	2.98 (2.65-3.29)	3.29 (2.90-3.64)	3.58 (3.13-3.97)
60-min	1.50 (1.36-1.65)	1.78 (1.61-1.97)	2.12 (1.92-2.34)	2.53 (2.28-2.79)	2.97 (2.67-3.28)	3.38 (3.04-3.73)	3.78 (3.38-4.17)	4.19 (3.72-4.62)	4.72 (4.16-5.22)	5.23 (4.57-5.80)
2-hr	1.75 (1.58-1.95)	2.09 (1.88-2.32)	2.52 (2.27-2.80)	3.07 (2.76-3.40)	3.68 (3.30-4.07)	4.28 (3.81-4.73)	4.86 (4.30-5.37)	5.47 (4.82-6.05)	6.30 (5.49-6.96)	7.09 (6.13-7.84)
3-hr	1.87 (1.68-2.10)	2.23 (2.00-2.50)	2.71 (2.43-3.03)	3.31 (2.97-3.70)	4.02 (3.58-4.48)	4.72 (4.18-5.24)	5.41 (4.76-6.01)	6.16 (5.38-6.83)	7.19 (6.21-7.97)	8.19 (7.01-9.09)
6-hr	2.22 (2.00-2.49)	2.64 (2.37-2.96)	3.21 (2.88-3.60)	3.94 (3.52-4.40)	4.79 (4.26-5.34)	5.65 (4.99-6.27)	6.50 (5.71-7.20)	7.43 (6.47-8.22)	8.70 (7.50-9.64)	9.97 (8.49-11.0)
12-hr	2.63 (2.36-2.96)	3.12 (2.79-3.52)	3.81 (3.41-4.29)	4.69 (4.18-5.28)	5.76 (5.09-6.44)	6.84 (6.00-7.63)	7.92 (6.90-8.83)	9.13 (7.87-10.2)	10.8 (9.18-12.0)	12.5 (10.5-13.9)
24-hr	3.11 (2.86-3.41)	3.79 (3.48-4.15)	4.89 (4.48-5.36)	5.82 (5.32-6.36)	7.19 (6.52-7.84)	8.37 (7.53-9.12)	9.66 (8.61-10.5)	11.1 (9.78-12.1)	13.2 (11.4-14.4)	15.0 (12.8-16.5)
2-day	3.61 (3.31-3.96)	4.37 (4.01-4.79)	5.61 (5.14-6.14)	6.67 (6.10-7.30)	8.27 (7.49-9.01)	9.65 (8.67-10.5)	11.2 (9.94-12.2)	12.9 (11.3-14.1)	15.5 (13.3-17.0)	17.7 (15.0-19.5)
3-day	3.83 (3.53-4.18)	4.63 (4.27-5.06)	5.92 (5.45-6.46)	7.01 (6.42-7.63)	8.61 (7.83-9.36)	9.98 (9.01-10.8)	11.5 (10.3-12.5)	13.1 (11.6-14.3)	15.6 (13.6-17.1)	17.9 (15.3-19.7)
4-day	4.04 (3.74-4.40)	4.90 (4.53-5.34)	6.23 (5.76-6.78)	7.34 (6.76-7.97)	8.95 (8.18-9.71)	10.3 (9.35-11.2)	11.8 (10.6-12.8)	13.4 (11.9-14.5)	15.8 (13.8-17.2)	18.0 (15.5-19.8)
7-day	4.72 (4.38-5.12)	5.69 (5.28-6.18)	7.14 (6.61-7.74)	8.34 (7.70-9.03)	10.1 (9.25-10.9)	11.5 (10.5-12.5)	13.1 (11.8-14.1)	14.7 (13.2-16.0)	17.1 (15.1-18.7)	19.1 (16.6-21.0)
10-day	5.29 (4.95-5.69)	6.35 (5.92-6.82)	7.86 (7.33-8.44)	9.11 (8.47-9.78)	10.9 (10.1-11.7)	12.4 (11.4-13.3)	14.0 (12.7-15.0)	15.7 (14.1-16.9)	18.1 (16.1-19.6)	20.1 (17.6-21.9)
20-day	7.19 (6.75-7.68)	8.56 (8.04-9.15)	10.4 (9.76-11.1)	11.9 (11.1-12.7)	14.1 (13.1-15.0)	15.8 (14.6-16.9)	17.7 (16.2-18.9)	19.6 (17.8-21.0)	22.4 (20.0-24.1)	24.6 (21.8-26.6)
30-day	8.85 (8.35-9.42)	10.5 (9.92-11.2)	12.7 (11.9-13.4)	14.4 (13.5-15.3)	16.7 (15.6-17.8)	18.6 (17.3-19.8)	20.5 (19.0-21.9)	22.5 (20.7-24.0)	25.2 (22.9-27.1)	27.3 (24.6-29.5)
45-day	10.9 (10.3-11.6)	12.9 (12.2-13.8)	15.5 (14.6-16.5)	17.5 (16.5-18.7)	20.5 (19.1-21.8)	22.8 (21.2-24.3)	25.3 (23.4-26.9)	27.9 (25.6-29.7)	31.5 (28.5-33.7)	34.3 (30.8-36.9)
60-day	13.1 (12.4-13.9)	15.5 (14.6-16.4)	18.3 (17.3-19.3)	20.5 (19.4-21.7)	23.6 (22.2-24.9)	26.0 (24.3-27.5)	28.4 (26.5-30.2)	30.9 (28.6-32.9)	34.3 (31.4-36.7)	36.9 (33.5-39.6)

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.

[Back to Top](#)

PF graphical

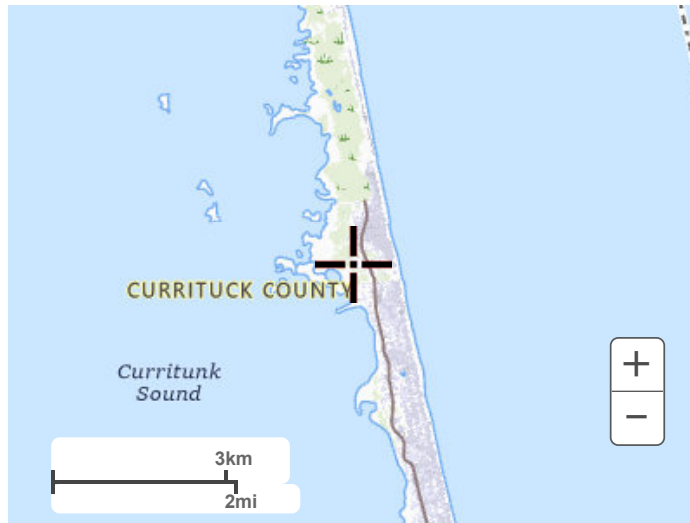
PDS-based depth-duration-frequency (DDF) curves
 Latitude: 36.3791°, Longitude: -75.8328°



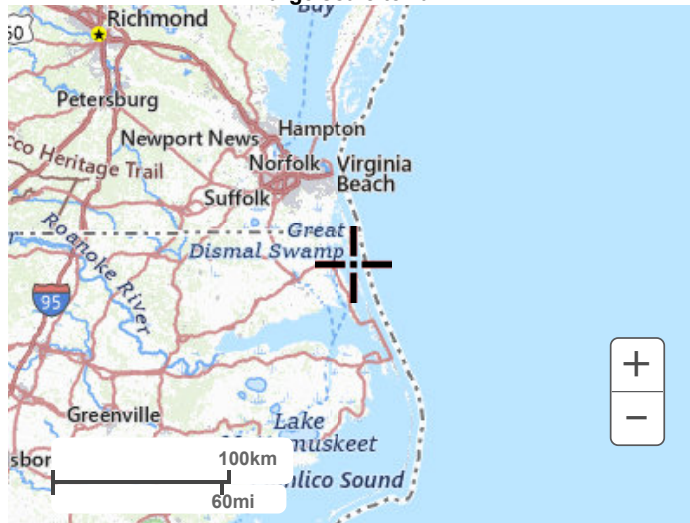
[Back to Top](#)

Maps & aerials

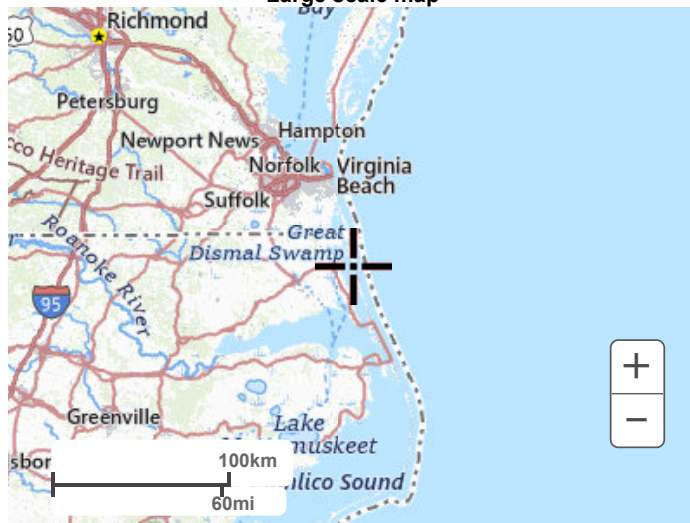
Small scale terrain



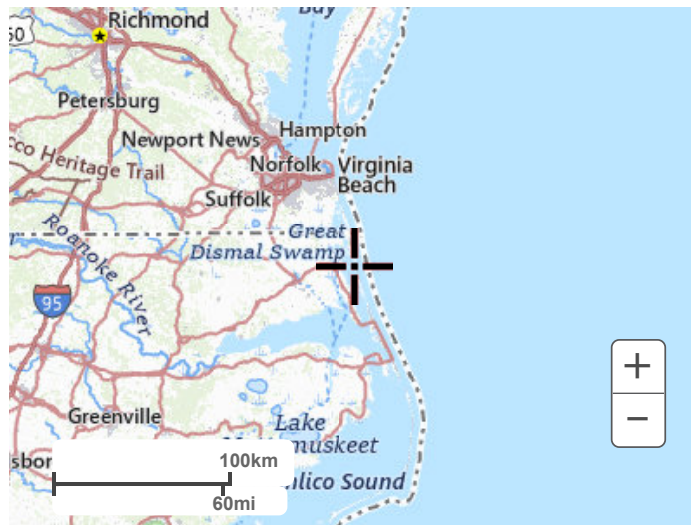
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

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

[Disclaimer](#)



April 1, 2026

Mr. Kevin Carver
Albemarle Regional Health Services
PO Box 189
Elizabeth City, NC 27907

Improvement Permit Application Package
1126 Corolla Village Rd
Corolla, Currituck County, North Carolina

Dear Mr. Carver;

On behalf TFP, LLC, WithersRavenel hereby submits an Improvement Permit Application for the above referenced project located at 1126 Corolla Village Road in Corolla, Currituck County. The application is for construction of a pretreatment wastewater system with an LPP disposal field for a proposed retail space and specialty eating establishment.

Please find the following enclosed items for your review and approval:

1. One (1) review fee check in the amount of \$1,323 made payable to ARHS;
2. One (1) copy of the Albemarle Regional Health Services Application for Environmental Services;
3. One (1) copy of the Licensed Soil Scientist Report;
4. One (1) copy of the E-Z Treat, Inc. Acceptance Letter;
5. One (1) copy of the Technical Specifications;
6. One (1) copy of the Wastewater System Site Plan.

Please do not hesitate to contact Nadeen Dashti at (252) 491-8147 or ndashti@withersravenel.com should you have any questions and/or concerns.

Sincerely,
WithersRavenel

Nadeen Dashti
Staff Professional III



ALBEMARLE REGIONAL HEALTH SERVICES
ON-SITE WASTEWATER SYSTEM APPLICATION

www.arhs-nc.org

County: _____

File# _____

Parcel Identification Number (Site Evaluations only): _____

Type of Service Requested	Fee
<input type="checkbox"/> Site Evaluation/ Improvement Permit for Wastewater System	\$ 331.00
<input type="checkbox"/> Existing Wastewater System Inspection	\$ 110.00
<input type="checkbox"/> Construction Authorization for Repair of Wastewater System	\$ 110.00
<input type="checkbox"/> Construction Authorization Permit *If Approved*	\$ 441.00- 496.00
<input checked="" type="checkbox"/> Construction Authorization Permit *If Approved* (5 BR+ fee varies based on system type)	\$ 606.00 +
<input type="checkbox"/> Permit Redraw	\$ 110.00
<input type="checkbox"/> Expansion *Permit Fee based off total number of bedrooms*	

Applicant Information
Name: WithersRavenel, Inc.
Mailing Address: P.O. Drawer 870
City/State/Zip: Kitty Hawk, NC 27949
Telephone Number: 252.491.8147
Email: ndashti@withersravenel.com

Property Owner Information	<input type="checkbox"/> Check if same as applicant
Name: TFP, LLC	
Mailing Address: PO Box 369	
City/State/Zip: Corolla, NC 27927	
Telephone Number: 252.202.3907	
Email: dtwiddy@twiddy.com	

Property Information	
Location	1126 Corolla Village Rd, Corolla NC 27927
Date property was originally deeded and recorded	05 / 12 / 2025
Size: (acres)	0.89
Water Supply	<input checked="" type="checkbox"/> Public supply <input type="checkbox"/> Private Well
Map submitted	<input type="checkbox"/> Survey Plat <input checked="" type="checkbox"/> Site Plan

Building Information	
Type of Facility	<input type="checkbox"/> Mobile Home <input type="checkbox"/> House <input checked="" type="checkbox"/> Business (domestic strength only) <input type="checkbox"/> Other _____
Number of Bedrooms	1 Specialty Eating building @ 807 GPD 1 Retail space @168
Number of Occupants	_____
For Repairs, please state the nature of problem	_____ _____ _____

For Existing System Inspection; List size/type of new construction:

(See Back)

The applicant shall notify ARHS upon submittal of this application if any of the following apply to the property in question. If "YES," the applicant must attach supporting documentation and show location(s) on the submitted site plan/plat.	YES	NO
Does the site contain any jurisdictional wetlands?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does the site contain any wastewater systems?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is any wastewater going to be generated on the site other than domestic sewage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are there any easements or right of ways on this property?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is this facility subject to approval by another public agency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are there any wells, springs, or existing water lines on this property?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

INITIAL

AS

1. THE APPLICANT SHALL MARK THE SITE AND MAKE THE SITE ACCESSIBLE FOR A SITE EVALUATION.

AS

2. A \$60.00 REVISIT FEE WILL BE CHARGED IF THE PROPERTY IS UNIDENTIFIABLE OR INACCESSIBLE DUE TO VEGETATIVE OVERGROWTH, LOCKED GATES, LOOSE DOGS, ETC.

AS

3. IF THE INFORMATION SUBMITTED BY THE APPLICANT IS FOUND TO BE INCORRECT, OR IF THE SITE AND SOIL CONDITIONS ARE ALTERED, ANY IMPROVEMENT PERMIT SHALL BECOME INVALID.

PLEASE ALLOW UP TO 2 WEEKS FOR COMPLETION.

I have read this application and certify that the information provided herein is true, complete, and correct. Authorized county and state officials are granted right of entry to the property to conduct the services requested.

Owner or Agent Signature: _____

AS

Date: 3-9-26

MAIL TO: ARHS Environmental Health; P.O. Box 189; Elizabeth City, NC 27909

Gates Co.

P: (252) 357-1380

F: (252) 357-2251

Pasquotank Co.

P: (252) 338-4490

F: (252) 337-7921

Bertie Co.

P: (252) 794-5322

F: (252) 794-5361

Camden Co.

P: (252) 338-4460

F: (252) 338-4475

Chowan Co.

P: (252) 482-1199

F: (252) 482-6020

Currituck Co.

P: (252) 232-6603

F: (252) 232-1912

Hertford Co.

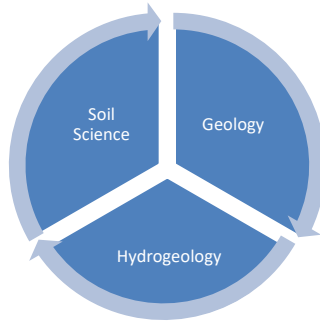
P: (252) 862-4054

F: (252) 862-4263

Perquimans Co.

P: (252) 426-2100

F: (252) 426-2104



4114 Laurel Ridge Drive
Raleigh, North Carolina 27612

Protocol Sampling Service, Inc.
"Experts in Environmental Compliance"

Protocolsampling@yahoo.com
Environmentalservicesnc.com

(919) 210-6547

August 19, 2025

Cathleen Saunders, P.E.
Senior Project Manager
Via email; csaunders@withersravenel.com

Re: **Soil Inspection**
1126 Corolla Village Road – 0.89 Acre
Corolla, Currituck County, North Carolina
Protocol Project No. 25-110

Dear Cathleen:

The 0.89-acre lot was inspected by Protocol Sampling Service, Inc., personnel on Thursday, August 7, 2025. Protocol personnel inspected the lot by advancing three (3) soil borings for lithologic descriptions, depth to the seasonal high-water table, if evident, and the depth to static water table in the rear, center and front of the lot that will be developed with a total daily waste water design flow of 975 gallons/day. The lot abuts wetlands on the western property line.

The three (3) soil borings revealed a seasonal high-water table of 17-inches and static water table of 27-inches below land surface (bls) in the front (east end) of the lot, a seasonal high-water table of 17-inches and static water table of 25-inches below land surface (bls) in the center of the lot and a seasonal high-water table of 18-inches and static water table of 25-inches below land surface (bls) in the rear (west end) of the lot where sand fill has been placed over a former hydric soil. The soil profile under the vegetative matter exhibited excellent structure (single grained), consistence (loose) and texture (sand) and should be considered suitable for a TS-II LPP active systems with an LTAR not to exceed 1.0 gpd/ft². The existing 18-inches of fill along with any vegetative matter will need to be removed and replaced with clean sand fill to a finished height of two feet above grade in order to satisfy separation requirements. The soil porosity ranges from 20 to 25% with infiltration rates exceeding 20-inches/hour in the soil with a seasonal high-water table elevation of at least 18-inches below land surface.

The findings presented herein represent Protocol Sampling Service, Inc.'s professional opinion based on our site and soils evaluation and knowledge of the current laws and rules governing on-site wastewater systems in North Carolina. The Albemarle Regional Health Services must make final approval of the subsurface discharge system. Any concurrence with the findings of this report would be made at that time.

Please call me at (919) 210-6547 if you have any questions or comments.
Sincerely,



Protocol Sampling Service, Inc.
David E. Meyer, N.C.L.S.S.
President

Soil Profile Description
1126 Corolla Village Road

- A1 0 –18 inches; dark brown (10YR 3/3) fine sand fill; single grained; loose; many fine roots; common dark mineral grains.
- Oe 18 – 24 inches; dark grayish brown (10YR 4/2) fine sand with strong brown (7.5 YR 5/6) concentrations; many roots, vegetative material.
- C1 24 – 48 inches; gray (10YR 7/1) fine sand; single grained; loose

Soil Series: Ousley variant
Landscape: Coastal Plain
Landform: flat
Parent Material: Marine sediments
Drainage Class: moderately well
Particle Size Class: siliceous
Temperature Regime: thermic
Subgroup Classification: Aquic Quartzipsammaents
Examination Method: auger boring
Date: August 7, 2025
Weather: Sunny & hot; 75
Investigators: David Meyer
Shwt: 18”
Measured water table depth: 25”

E-Z TREAT, INC.

Withers Ravenel
8466 Caratoke Hwy
Powells Point, NC 27966
Atten: Michael Strader

RE: 1126 Corolla Village Rd

2-19-26

I have reviewed the proposed plans for the 2, Model 600, EZ TREAT pods wastewater treatment system as listed above. EZ TREAT, INC. certifies the equipment designed will meet the performance standard listed below. The system must be installed and maintained by an EZ TREAT, INC. certified installer. In addition, the system must be operated and maintained by an EZ TREAT, Inc. certified operator, within the Manufacturer's guidelines.

<u>Influent</u>		<u>Effluent TS II</u>	
BOD 5	<300 mg/l	CBOD5	<10 mg/l
TSS	<200 mg/l	TSS	<10 mg/l
TKN	<100 mg/l	NH3	<10 mg/l
		TN	<20 mg/l
		Fecal Coliform	<1,000 cfu

Design Flow: 998 gpd

Recommendation: Install a spoils tank for the Ice cream cleaning by separating the plumbing from the machine(s) to be cleaned and routing to the spoils tank for pumping and hauling the spoils.

The certification is in accordance with the parameters listed above. The system is designed for residential use and does not assume other environmental factors, such as but not limited to: FOG, cleaners, floor strippers, antibiotics, Chemotherapy agents, non-biodegradable substances, ETC. That may affect the system's performance. Alkalinity supplementation will be needed.

Sincerely,
Michael Stidham, VP
703-408-2916

TECHNICAL SPECIFICATIONS

for

1126 COROLLA VILLAGE ROAD CAROLLA, CURRITUCK COUNTY

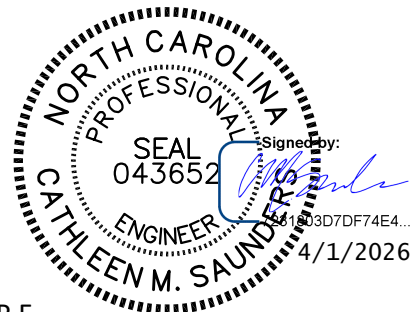
24-1038

April 1, 2026

Prepared for:
TFP, LLC
P.O. Box 369

Prepared by:

Cathleen M. Saunders, P.E.



WithersRavenel

8466 Caratoke Highway, Building 400 | Powells Point, NC 27966

Office: 252.491.8147 | Fax: 919.467.6008 | www.withersravenel.com | License No. F-1479

Asheville | Cary | Charlotte | Greensboro | Pittsboro | Raleigh | Southern Pines | Wilmington

TABLE OF CONTENTS

DIVISION 2 - SITE WORK	NUMBER OF PAGES
Section 02110ww - Site Clearing	2
Section 02200ww - Earthwork	7
Section 02270 - Erosion & Sedimentation Control	5
Section 02730ww - Gravity Sewers	2
Section 02733ww - Force Mains	5
Section 02740 - Precast Tanks	3
Section 02741 - Pumps & Controls	4
OPERATION AND MAINTENANCE REQUIREMENTS	
Schedule 'A'	2
TECHNICAL DATA:	
Design Calculations	4
Innovated Approval IWWS 2015-03-R5 7.8.2025	11
POLYLOK Submittal sheet	1
8115x Submittal Sheet	4
Myers ME3F Pump (Equalization Pumps)	4
STA-RITE STEP 50 Pump (Recirculation Pumps)	4
Myers ME 45 Dosing Pump	6
UV 101 Submittal Sheet	2
DRAWING INDEX	
Sheet 1 – Existing Conditions	
Sheet 2 – Site Plan	
Sheet 3 – Grading Plan	
Sheet 4 – Wastewater Details 1	
Sheet 5 – Wastewater Details 2	

DIVISION 2
SITE WORK

SECTION 02110ww - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- a. This Section includes, but is not limited to the following:

1. Protection of existing vegetation.
2. Removal of vegetation.
3. Topsoil stripping.
4. Clearing and grubbing.
5. Removing above-grade improvements.
6. Removing below-grade improvements.

1.3 PROJECT CONDITIONS

- A. Traffic:

1. Conduct site clearing operations to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the authorities having jurisdiction.

- B. Protection of Existing Improvements:

1. Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
2. Restore damaged improvements to their original condition, as acceptable to property owners.

- C. Protection of Existing Trees and Vegetation:

1. Protect existing vegetation outside the limits of grading, against unnecessary cutting, breaking or skinning of roots. Provide temporary guards to protect trees and vegetation to be left standing.
2. Repair or replace vegetation damaged by construction operations, in a manner acceptable to the Owner.

PART 2 - PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass and other vegetation, improvements, or other obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots.
- B. TOPSOIL
 1. Strip topsoil (soil layer within 6 inches of existing ground or as directed by Engineer) in a manner to prevent intermingling with underlying subsoil or other objectionable material.
 2. Remove heavy growths of grass or other vegetation from areas before stripping.
 3. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide positive drainage of on-site surface water. Cover storage piles or vegetate in accordance with SECTION 02270, EROSION & SEDIMENTATION CONTROL, to prevent wind erosion.
 4. Topsoil shall be used to "cap" drainfield areas.
- C. CLEARING & GRUBBING
 1. Clear site of trees, shrubs and other vegetation, except for those indicated to remain.
 2. Completely remove stumps, roots and other debris protruding through ground surface.
 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding six inches loose depth, and thoroughly compact to a density equal to original ground.
- D. REMOVAL OF IMPROVEMENTS
 1. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted on Owner's property.
- B. Remove waste materials from Owner's property and dispose of in a legal manner.

SECTION 02200_{ww} - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing of subgrade for septic and pump tanks.
 - 2. Excavating and backfilling of trenches for L.P.P. sewer lines & force mains.
 - 3. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.
- B. Final Grading.

1.3 DEFINITIONS

- A. Excavation: Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent stockpiling of materials removed in locations designated by Owner.
- B. Unauthorized Excavation: Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.
 - 1. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.
- C. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase at tanks, and ground absorption fields.
- D. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction and in accordance with permit conditions.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicted to remain in place, provide adequate means of support and protection

during earthwork operations. Call North Carolina One Call 1-800-632-4949.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.
 3. Provide minimum of 48-hour notice to Engineer and Owner and receive written notice to proceed before interrupting any utility.
 4. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
- B. Use of Explosives:
1. Use of explosives is not permitted.
- C. Protection of Persons and Property:
1. Barricade open excavations occurring as part of this work and post with warning lights.
 2. Operate warning lights as recommended by authorities having jurisdiction.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 4. Perform excavation by hand within dripline of large trees to remain. Protect root systems from damage or dryout to the greatest extent possible. Maintain most condition for root system and cover exposed roots with moistened burlap.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. L.P.P. System Fill Material: Fill material shall have such soil texture to be classified as sand or loamy sand (Soil Group I, as outlined in the NCDHHS Environmental Health Section, Section .1900 NCAC) up to the top of the nitrification trenches in the “active” field.
- B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.
- C. All Other Backfill and Fill Materials: Satisfactory excavated or borrow materials free of plastic clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation is unclassified and includes excavation of all muck, rock, and other materials required to obtain subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Earth excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

3.2 STABILITY OF EXCAVATIONS

- A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
- D. Provide permanent steel sheet piling or pressure-treated timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2 ft.-6-inches below final grade and leave permanently in place.

3.3 DEWATERING

- A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of excavation and foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrade and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey ground water, rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.4 STORAGE OF EXCAVATED MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.
 - 1. Locate and retain soil materials away from edge of excavations.

- B. Dispose of excess excavated soil material and materials not acceptable for use as backfill in legal disposal area.

3.5 EXCAVATION FOR SEPTIC & PUMP TANKS

- A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from bottom of tanks to permit placing and removal of gravel subbase, installation of services, and other construction and for inspection.
 - 1. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of gravel subbase, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

3.6 EXCAVATION FOR L.P.P. SYSTEM

- A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot. Comply with elevations and grades as indicated on Drawings.
- B. Excavation sequence shall be as follows:
 - 1. Contractor to coordinate with and arrange to have Health Department personnel on-site prior to earthwork activity in L.P.P. system area.
 - 2. Site shall be cleared and stripped in accordance with Section 02110ww - Site Clearing.
 - 3. Excavate and stockpile "suitable" material from entire LPP system.

3.7 TRENCH EXCAVATION FOR PIPES AND CONDUIT

- A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.
- B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- C. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
- D. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/45 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads to insure continuous bearing of pipe barrel on bearing surface.

3.8 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35° F.

3.9 BACKFILL AND FILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in part 2 of this Section.
 - 1. Under grassed areas, use satisfactory excavated or borrow material.
 - 2. Under septic and pump tanks, use subbase material.
 - 3. Under the L.P.P. system use fill material and satisfactory excavated material..
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 - 4. Removal of trash and debris from excavation.
 - 5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.10 FILL PLACEMENT AND COMPACTION

- A. L.P.P. System:
 - 1. Contractor shall not commence backfill and filling operations until verification and approval from Engineer.
 - 2. L.P.P. system fill material shall be placed in eight (8) to twelve (12) inch lifts. Avoid compaction of soil to extent practical. The initial lift shall be mixed to a depth of six (6) inches with the existing soil.
 - 3. The side slope of the fill shall not exceed a rise to run ratio of 1V:3H.
 - 4. The outside edge of the L.P.P. system shall be located at least five (5) feet horizontally from the top of the side slope.
 - 5. Plow strip, or break up sloped surfaces steeper than 1 vertical to 3 horizontal so that fill material will bond with existing surface.
- B. Septic and Pump Tanks:
 - 1. Place backfill material evenly adjacent to tanks, piping, or conduit to required elevations.

2. Prevent wedging action of backfill against tanks or displacement of piping or conduit by carrying material uniformly around tank piping, or conduit to approximately same elevation in each lift.
3. Compact top 6 inches of subgrade and each layer of backfill at 90 percent maximum density.

C. Piping:

1. Backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than 1-inch diameter. Place acceptable backfill material in 6" lifts, compacting each lift.

3.11 GRADING

- A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

3.12 FIELD QUALITY CONTROL

A. Quality Control During L.P.P. System Construction:

1. All stripping of topsoil and excavation work associated with the area shall be under the control of Engineer and Health Department.
2. The Contractor, local health department and Engineer shall establish a program that provides the necessary field supervision and quality control monitoring and testing which may be required to meet the requirements of all site work.

3.13 EROSION CONTROL

Provide erosion control methods in accordance with Section 02270 - Erosion and Sediment Control and the North Carolina Department of Environment, Health & Natural Resources, Land Quality Section.

3.14 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on owner's property. Stockpile soil or spread as directed by Engineer.
- B. Removal From Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property in a legal manner.

END OF SECTION 02200ww

SECTION 02270 - EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including technical data, operations & maintenance requirements, and supporting data apply to work of this section.
- B. North Carolina Department of Energy, Mineral & Land Resources EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, latest edition, hereinafter referred to in this Section as the Practice Standards and Specifications.

1.2 SUMMARY

- A. The extent of the work required under this section is that required to minimize water, air, and soil erosion and siltation.
- B. Temporary erosion control measures which may be necessary include, but are not limited to, temporary berms, dikes, dams, drainage ditches, silt basins, silt ditches, perimeter swales, slope drains, structures, vegetation, mulches, mats, netting, gravel or any other methods or devices that are necessary to control or restrict erosion. Temporary erosion control measures may include work outside the right-of-way or construction limits where such work is necessary as a result of construction such as borrow pit operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in waste areas furnished by the Contractor.
- C. Related Work Specified Elsewhere:
 - 1. Site Clearing: Section 02110ww
 - 2. Earthwork: Section 02200ww
 - 3. Gravity Sewers: Section 02730ww
 - 4. Force Mains: Section 02733ww
 - 3. Precast Tanks: Section 02740

1.3 SUBMITTALS

Not Used.

1.4 QUALITY ASSURANCE

- A. Furnish certification from supplier that materials are as specified.
- B. Codes and Standards:
 - 1. North Carolina Sedimentation Pollution Control Act of 1973 and the Rules and Regulations promulgated pursuant to the provisions of said act.

2. North Carolina Department of Energy, Mineral & Land Resources - EROSION AND SEDIMENT CONTROL PLANNING & DESIGN MANUAL, latest edition.
3. "Standard Specifications for Roads and Structures", North Carolina Department of transportation (NCDOT).
4. In the event of conflict between the regulations listed above and the requirements of these specifications, the more restrictive requirement shall apply.

1.5 SANCTIONS

- A. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltations, and pollution will result in the Architect notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the owner may suspend the work as provided above, or may proceed to have such measures performed with other forces and equipment, or both. The cost of such work performed by other forces will be deducted from monies due the Contractor on his contract.

PART 2 - PRODUCTS

2.1 SILT FENCES:

- A. Posts: Steel posts shall be 1.33 lb/linear ft. steel with a minimum length of 5 feet. Posts shall have projections to facilitate fastening the fabric.
- B. Posts shall be spaced at 8' max. when silt fence is backed with wire mesh, and 6' when no wire mesh is used or as required by Engineer.
- C. Woven Wire: for reinforcement of standard strength filter fabric, use wire fence with a minimum 14 gauge and a maximum mesh spacing of 6 inches.
- D. Fabric: Provide woven synthetic fiber of at least 95% by weight of polyolefins or polyester, which is certified by the manufacturer or supplier as conforming to the requirements in ASTM D 6461, which is shown in part in table 6.62b in the Practice Standards and Specifications.

2.2 FILTER CLOTH

- A. For use under rip rap provide woven synthetic fiber with burst strength of 500 psi, permeability of 0.01 cm/sec and apparent sieve size of approximately 70 as manufactured by MIRAFI EXXON, CONTECH, TREVIARA or equal approved by Engineer.

2.3 MATTING FOR EROSION CONTROL

- A. Matting for erosion control shall be jute matting or excelsior matting. Other acceptable material manufactured especially for erosion control may be used when approved by the engineer in writing before being used. Matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.

2.4 SEEDING

- A. Seeding grasses and legumes shall meet the requirements of Section 6.11 of the Practice Standards and Specifications.
- B. Use certified seed for permanent seeding. This seed shall meet published North Carolina Standards and should bear an official "Certified Seed" label.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, and water, air and noise pollution caused by his operations. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep himself fully informed of all such regulations which in any manner affect the conduct of the work, and shall at all times observe and comply with all such regulations. In the event of conflict between such regulations and the requirements of the specifications, the more restrictive requirements shall apply.
- B. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property.
- C. Prior to suspension of operations on the project or any portion thereof, the Contractor shall take all necessary measures to protect the construction areas, including but not limited to borrow sources, soil type base course sources, and waste areas, from erosion during the period of suspension.
- D. Provide diversion ditches and berms as necessary to prevent concentrated flow of water across disturbed areas.
- E. Stockpile excavated material on the opposite side of the utility trenches from the watercourses to the extent that is possible.
- F. In the event that stockpiles are placed on the watercourse side of the trench, provide silt fence or silt berms with stone filter outlets along the entire length of the stockpile that is on the watercourse side of the trench. Upon the completion of backfilling, the measures shall be removed and the site graded to its natural grade or as shown on plans.
- G. Maintain natural buffer zones along all watercourses sufficient to retain all visible siltation within the first 25 percent of the buffer width.
- H. Provide a settling basin with a gravel filter outlet for all water pumped from trenches or dewatering equipment. Pumping of that water directly into any stream, pond, or watercourse is prohibited.
- I. Tamp, fertilize, seed and mulch the disturbed areas as soon as practicable after line is installed and, in all cases, no later than 30 days after completion of the line segment or work at a particular site.
- J. When construction operations are suspended for more than 30 days, provide temporary seeding and mulching of all disturbed areas including those areas in which further construction

is necessary.

- K. Erosion control measures installed by the Contractor shall be acceptably maintained by the Contractor.
- L. Silt fences shall be provided where shown on the drawings and/or as necessary to prevent erosion.
- M. Catch basins shall be protected from silt by placing straw bales or silt fence around the openings until vegetative cover is established.

3.3 SILT FENCE

- A. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
- B. Ensure that the height of the sediment fence does not exceed 24 inches above the ground surface. (Higher fences may impound volumes of water sufficient to cause failure of the structure).
- C. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with overlap to the next post.
- D. Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts using heavy duty wire staples at least 1 inch long, or tie wires. Extend the wire mesh support to the bottom of the trench.
- E. When the wire mesh support fence is used, space posts a maximum of 8 ft. apart. Support posts should be driven securely into the ground to a minimum of 24 inches.
- F. Extra strength filter fabric with 6' post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or zip ties shall have a minimum 50 pound tensile strength.
- G. Excavate a trench approximately 4 inches wide and 8 inches deep along the proposed line of posts and upslope from the barrier. Place 12 inches of the filter fabric along the bottom and side of the trench.
- H. Backfill the trench with compacted soil or gravel placed over the filter fabric.
- I. Do not attach filter fabric to existing trees.

3.4 MAINTENANCE

- A. Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.
- B. Should the fabric of the sediment fence collapse, tear, decompose or become ineffective, replace it promptly. Replace burlap every 60 days.
- C. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.
- D. Remove all fencing materials and unstable sediment deposits and bring the area to grade and

stabilize it after the contributing drainage area has been properly stabilized.

3.5 SEEDING

- A. See Drawing for seeding mixture.
- B. Seeding for erosion control shall be performed in accordance with the recommended outlined in the Practice Standards and Specifications.
- C. Soil Amendments: Apply lime and fertilizer according to soil test, or apply 3,000 - 5,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.
- D. Mulch: Apply 4,000 lb/acre grain straw or equivalent cover of another suitable mulch. Anchor straw by tacking with asphalt, netting, or roving or by crimping with a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.
- E. All seeded areas will be fertilized, reseeded as necessary, and mulched according to these specifications to maintain a vigorous, dense vegetative cover.

3.6 WATER AND AIR POLLUTION

- A. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent pollution of rivers, streams, and water impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste shall not be discharged into or alongside of rivers, streams, or impoundments, or into natural or man made channels leading thereto.
- B. The Contractor shall comply with all State or local air pollution regulations throughout the life of the project.

3.7 DUST CONTROL

- A. The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project, including, but not specifically limited to, unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources, and production sites. Dust control shall not be considered effective condition, public nuisance, or condition endangering the value, utility, or appearance of any property.

3.8 NOISE CONTROL

- A. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent excessive and unnecessary noise. The Contractor shall choose his methods so as to minimize the disturbance of area residents.

END OF SECTION 02270

SECTION 02730ww - GRAVITY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- A. This Section includes sanitary sewerage system piping and appurtenances from a point ten (10) feet outside the building to the point of disposal (septic tank).
- B. Related Work Specified Elsewhere:
 - 1. Section 02110ww - Site Clearing
 - 2. Section 02200ww - Earthwork

1.3 QUALITY ASSURANCE

- A. Comply with applicable portions of Local Health Departments site improvement permit.

1.4 SEQUENCING AND SCHEDULING

- A. Coordinate connection to building sewer pipe with plumbing contractor.
- B. Coordinate with other utility work i.e water line, power and storm sewer system.

PART 2 - PRODUCTS

2.1 GRAVITY SEWER PIPE

- A. PVC (Polyvinyl Chloride) Sewer Pipe:
 - Pipe: ASTM D1785 Schedule 40
 - Fittings: ASTM D2466 Schedule 40
 - Joints: ASTM D2564 Solvent Cement Type
- B. Ductile-Iron Sewer Pipe:
 - Pipe: AWWA C151, Class 50, push-on joints
 - Lining: AWWA C104, Cement lined
 - Gaskets: AWWA C111, Rubber

PART 3 - EXECUTION

3.1 PREPARATION OF FOUNDATION FOR BURIED SANITARY SEWER PIPE

- A. Grade trench bottom to provide smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.
- B. Remove unstable, soft, and unsuitable materials at the surface upon which the sewer pipes are to be laid, and backfill with clean sand to indicated level.
- C. Shape bottom of trench to fit bottom of pipe. Fill uneven areas with tamped sand backfill.

3.2 INSTALLATION, GENERAL

- A. General Locations and Arrangements:

Drawings (plans and details) indicate the general location and arrangement of the underground sanitary sewer line. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical.

- B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations.
- C. Extend sanitary sewer pipe to connect to building sewer pipe.

3.3 PIPE INSTALLATION

- A. PVC Pipe: Join and install in accordance with ASTM D2321.
- B. D.I. Pipe: Join and install in accordance with AWWA C600.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform testing of completed piping in accordance with permit conditions and as directed by Engineer.

END OF SECTION 02730ww

SECTION 02733_{ww} - WASTEWATER FORCE MAIN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- A. This Section includes wastewater effluent force main piping and appurtenances from dosing pump to supply manifold.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 02200_{ww} - Earthwork

1.3 QUALITY ASSURANCE

- A. Comply with applicable portions of Local Health Department site improvement permit.

1.4 PROJECT CONDITIONS

- A. Site Information: Perform site survey and verify existing utility locations. Contractor to physically locate existing utilities and protect each during construction.

PART 2 - PRODUCTS

2.1 WASTEWATER FORCE MAINS

- A. PVC (Polyvinyl Chloride) plastic pipe
 - Pipe: ASTM D1785 Schedule 40
 - Fittings: ASTM D2466 Schedule 40
 - Joints: ASTM D2564 Solvent cement type
- B. PVC plastic ball valves, unions and check valves
 - Valves to be PVC valves
 - Shall be designed for a working pressure of 150 psi.
- C. Ductile Iron Pipe (D.I.P.) pipe for pressure applications:
 - Pipe shall be 4" to 12" class 350 and shall conform to AWWA C150 and AWWA C151. Minimum pressure shall be 150 psi with 100 psi surge allowance, with a safety factor of 2, for a total design pressure of 500 psi. External load design criteria shall be a minimum of 4 feet depth of cover at 120 lbs. per cubic feet soil weight, and live load based on one AASHTO H-20 truck load. Fittings material and installation shall conform to AWWA C110 grey or ductile iron.

PART 3 – EXECUTION

3.1 DEPTH OF PIPE:

- A. 36-inch minimum cover, ground surface to top of pipe.

3.2 STRINGING, CLEANING:

- A. Pipe and fittings shall be strung out along the route of construction with the bells facing in the direction in which the Work is to proceed. Pipe shall be placed where it will cause the least interference with traffic. Pipe shall be handled by mechanical equipment. Before the pipe is lowered into the trench, it will be swabbed or brushed out, if required, to insure that no dirt or foreign material remains in the finished line. Trench water shall be kept out of pipes and the pipe kept closed by means of a test plug whenever Work is not in progress. The Contractor shall provide the means for dewatering the trench and the cost thereof shall be included in the price for installing the pipe.

3.3 PREPARATION OF TRENCH & BEDDING:

- A. Pipe shall be laid in a level trench. Irregularities shall be smoothed out or filled in with sand and tamped as required. Holes shall be scooped out where the joints occur leaving the entire barrel of the pipe bearing on the pipe bed.

3.4 DEFLECTIONS:

- A. Deflections from a straight line or grade made necessary by vertical curves or horizontal curves or offsets shall not exceed the manufacturer's recommendations. If the specified or required alignment requires deflections in excess of those recommended, the Contractor shall either provide special bends as approved by the Owner or his Engineer or a sufficient number of shorter lengths of pipe to provide angular deflections within the required limit.

3.5 JOINTING:

- A. Jointing shall be carried out following the recommendations of the manufacturer of the pipe. All joints shall be watertight and any leaks or defects discovered shall be immediately repaired to the satisfaction of the Engineer. Any pipe which has been disturbed after being laid shall be taken up, the joints cleaned and the pipe properly relaid. Any superfluous material inside the pipe shall be flushed or removed by means of an approved follower or scraper after joints are made. Installation of fittings and pipe joints shall be in strict accordance with the manufacturer's recommendations.

3.6 THRUST BLOCKS:

- A. Thrust blocks shall be installed at all fittings within the system which change direction of flow or create unbalanced forces about the fitting. When directed, thrust blocks shall also be installed on each side of pipe where bends are made by deflecting pipe or joints and soil conditions do not provide adequate support for the pipe.

- B. Thrust blocks shall be constructed of concrete which develops a 28-day strength of 2,500 psi and shall have a bearing area or volume as indicated on the Drawings. Concrete shall be kept behind the bells of fittings so as not to interfere with the joint or bolts and shall not run against gasket or pipe.
- C. Thrust blocks shall be constructed so as to bear against undisturbed soil unless special provisions are made which are approved prior to construction. If the soil encountered has insufficient bearing capacity to resist thrusts special provisions shall be made as required by the Engineer. Special provisions may include removal of poor soil and replacement with suitable material; installation of tie rods and collars; or installation of pile and thrust block.

3.7 BEDDING, INITIAL & INTERMEDIATE BACKFILL:

- A. Regardless of the bedding type specified, the pipe barrel shall be supported uniformly throughout its length. Bell or coupling holes shall be provided such that no pipe loads are supported by bells or couplings.
- B. Unless shown otherwise on the Drawings, bedding and initial backfill shall be type one when subgrade is stable (as examined by the Engineer) and trench width at the top of the pipe does not exceed that specified.
- C. Material for initial and intermediate backfill (as defined on the Drawings and below) shall be selected borrow material, granular material as defined under Section 02200ww - Earthwork or selected trench material free of organics, refuse, stones larger than one inch and frozen material.
- D. Initial backfill is that which is placed from the pipe bedding material up to the centerline of the pipe. Initial backfill shall be hand-placed and carefully tamped under pipe haunches.
- E. Intermediate backfill is that which is placed from the initial backfill to one foot above the top of the pipe. Intermediate backfill shall be placed and tamped. Material shall be placed and tamped in layers not exceeding six inches thick when compaction required exceeds 80% of maximum dry density.
- F. Minimum Compaction:

Class 2 - unimproved areas
 Class 1 - roadways, road shoulders, driveways, walkways and slopes greater than 20%

% of Maximum Dry Density		<u>Class 2</u>	<u>Class 1</u>
<u>Pipe</u>	<u>Backfill Zone</u>		
PVC SCH 40	Initial Intermediate	80%	90%

3.8 FIELD QUALITY CONTROL, TESTING & INSPECTION

- A. Hydrostatic Testing:
 - 1. The Contractor shall be required to perform leakage tests on newly constructed mains as outlined herein. The Contractor will furnish the gauge for making the tests and Engineer shall approve the measuring device. The Contractor shall furnish the pump, pipe, connections and all other necessary apparatus, and shall furnish the necessary

assistance to conduct the tests.

2. Leakage tests shall be performed on all sections of line. Testing shall be conducted as the Work progresses unless otherwise directed.
3. All testing for record shall be performed in the presence of the Engineer or representative.
4. Where any section of a main is provided with concrete thrust blocking or encasement, hydrostatic testing shall not be performed until at least five days have elapsed after the concrete was installed. If high-early strength cement is used in the concrete for thrust blocks and encasement, the hydrostatic tests shall not be performed until at least one day has elapsed, unless otherwise directed by the Engineer.

B. Test Procedures:

1. After completion of preparation and after test connections are made in a manner satisfactory to the Engineer each section of pipe shall be slowly filled with water and pressurized. All pressures shall be based on the elevation of the lowest point in the test section and corrected to the elevation of the test gauge.
2. All air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so the air can be expelled as the line is filled with water. After all air has been expelled, the corporation cocks shall be closed and testing begun.
3. After all air has been expelled from a test section, all connections made and other preparations completed, the test section shall be subjected to leakage test pressure. This test pressure shall be sustained by a pump, and the quantity of water delivered to the system by the pump for a specified duration of time shall be measured. At the end of the designated time period, the quantity of water delivered to the test section shall be equal to or less than the allowable leakage computed for the test section.
4. If any test of the pipe discloses leakage greater than that specified, the Contractor, at his own expense, shall locate and repair defective joints and/or material until the leakage is within the specified allowance.
5. The Engineer shall be furnished a written report of the results of the leakage test that identifies the specific length of pipe tested, the pressure, the duration of the test, the amount of actual leakage and the leakage allowance. The report shall be signed by the Contractor and the Engineer.

D. Hydrostatic Test Pressure, Duration and Allowance:

1. The design working pressure (p) shall be calculated for the lowest point in a test section (see Standard Detail Sheet).
 - a) Test pressure shall not exceed the pressure class of the pipe.
 - b) Test pressure shall not cause the working pressure of any valve or other appurtenance to be exceeded.
 - c) Maximum test pressure shall be 60 psi.
 - d) Minimum test pressure shall be 50 psi.

2. The test pressure shall be corrected to the elevation of the test gauge.
3. Duration of the leakage test shall be two hours for sewage force mains.
4. The leakage allowance shall be the following gallons per day per mile of pipe per inch or nominal diameter at test pressure computed above.

<u>Material</u>	<u>Allowance</u>
PVC	10

5. The allowable leakage for a test section - L in gallons per hour - shall be calculated as follows:

$$\text{Lgph} = \frac{\text{Length (ft.)} \times \text{Dia. (in.)} \times 10}{5280}$$

E. Water for Testing and Disinfection:

1. Water for the Work outlined in this Section of the Specifications shall be provided by the Contractor.

END OF SECTION 02733

SECTION 02740 - PRECAST TANKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- A. This Section includes precast septic and pump tank installation.
- B. Related Sections: The following Sections contain requirements that donate to this Section:
 - 1. Section 02110ww - Site Clearing
 - 2. Section 02200ww - Earthwork

1.3 SUBMITTALS

- A. General: Submit tank details from manufacturer.
- B. Shop drawings showing fabrication of each tank.

1.4 QUALITY ASSURANCE

- A. Comply with applicable portions of Local Health Department site improvement permit.
- B. Precast tanks (septic & Pump) shall be constructed in accordance with plans that have been approved by the NCDHHS Environmental Health Section and with all requirements of the Law and Rules for Sewage Treatment and Disposal Systems, Section .1900 which is hereby adopted by reference.
- C. All tanks produced shall bear an imprint identifying the manufacturer, the serial number assigned to the manufacturer's plans and specifications approved by the State, and the liquid or working capacity of the tanks. This imprint for septic tanks shall be located to the right of the blockout made for the outlet pipe on this outlet end of the tank. The imprint for pump tanks shall be located to the left of the outlet blockout. All tanks shall also be permanently marked with the date of manufacturer adjacent to the tank imprint or on the top of the tank directly above the imprint.

PART 2 - PRODUCTS

2.1 PRECAST TANK UNITS

- A. General:
1. Provide tanks and accessories according to State approved plans, details and permit conditions.
 2. Provide access openings and manhole castings as indicated.
- B. Septic Tank 2,507-gallon pre-cast tank as distributed by Green Acres Land Development STB 500, or equal as approved by Engineer.
- C. Equalization Tank 2,036-gallon pre-cast tank as distributed by Green Acres Land Development PT 409, or equal as approved by Engineer.
- D. Recirculation Tank 2,557-gallon pre-cast tank as distributed by Green Acres Land Development PT 410, or equal as approved by Engineer.
- E. Dosing Tank 3,432-gallon pre-cast tank as distributed by Green Acres Land Development PT 337, or equal as approved by Engineer.
- D. Spoils Tank 750-gallon pre-cast traffic-rated tank as distributed by Green Acres Land Development or equal as approved by Engineer.

2.2 MANHOLE COVERS

- A. Manhole covers shall be approved fiberglass/composite/resin 24" and 30" diameter in non-traffic rated areas. Adapters shall be incorporated with precast tanks as noted on the plans.
- B. Manhole covers shall be East Jordan Iron Works, Inc., V-1384 with "Sanitary Sewer" imprinted on top as noted on the plans or equal as approved by Engineer in all traffic rated applications.

2.3 ALUMINUM HATCH COVERS

Aluminum Hatch covers shall be water-tight access frame and covers unless otherwise specified. Aluminum hatches shall be U.S.F. Fabrications, Inc., Halliday Products or Thompson Fabricating, L.L.C., or equal as approved by Engineer/Owner.

2.4 TANK SUBBASE MATERIAL

- A. Subbase Material: Compacted native soils.

PART 3 - EXECUTION

3.1 TANK INSTALLATION

A. Excavation

1. Dig suitable excavation, braced and sheeted as soil conditions dictate, refer to Section 02200ww - Earthwork.
2. The excavation shall be kept free of water at all times. The contractor shall provide the means for dewatering the pit and the cost thereof shall be included in the price for installing tanks.

B. Subbase:

1. Compact native soils.

C. Waterproofing:

1. After joining, tanks manufactured in two sections shall be plastered along the joint with hydraulic cement, cement mortar, or other approved waterproofing sealant. Other methods of waterproofing tanks may be used as specifically approved in the Plans and Specifications for the system.
2. Prior to backfilling, the local health department and Engineer shall make a finding that a two section tank is watertight.

D. Leakage Test:

1. Prior to backfilling and covering tanks; perform leak test as follows:
 - a. Notify local health department and Engineer 24 hours prior to beginning test.
 - b. Tanks to be filled with clear water to top of tank (inlet and outlet pipes shall be plugged). The water shall be left in the tank for 24 hours and water level measured by Engineer.
 - c. With soil dewatered, water level in tank must not drop more than one-half (½") inch.

E. Backfill and Compaction:

1. Backfill in accordance with Section 02200ww - Earthwork
2. Protect tank from equipment and vehicular traffic.
3. Grade site to prevent ponding of water above and around tanks.

END OF SECTION 02740

SECTION 02741 - PUMPS AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Technical Data, Operation & Maintenance Requirements and Supporting Data apply to this Section.

1.2 SUMMARY

- A. This Section includes sewage effluent pumps, controls, wiring, control panel with related work and accessories.
- B. The electric power supply to the wastewater control panel will be installed by the General Contractor. The wastewater contract electric system shall commence at the above supply stub-out and include connection to same up to and including final connection to equipment provided in this section.

1.3 SUBMITTALS

- A. Product Data: Submit complete descriptive data for all items. Data shall consist of specifications, data sheets, capacity ratings, performance curves, catalog cuts, dimensional drawings, wiring diagrams, installation instructions, and any other information necessary to indicate complete compliance with contract documents.

1.4 QUALITY ASSURANCE

- A. Comply with applicable portions of Local Health Department Site Improvement Permit.
- B. All electric work and materials under this section shall be in strict compliance with more stringent requirements of the North Carolina State Building Code, including the National Electric Code, NFPA 101 - Life Safety Code, Regulations of the State Fire Marshal, UL Directory of Electrical Construction Materials, and requirements of the local utility company.
- C. It is the intention of the Specifications and Drawings to call for finished work, tested and ready for operation.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment installed as a permanent part of the project shall be new, unless otherwise indicated or specified, and of the indicated type and quality. Where no specific type and quality of material is given, a first-class standard article as approved by the Engineer shall be furnished.
- B. The listing of a particular manufacturer or model number is not intended to indicate a sole source but rather a minimum standard of quality or performance acceptable. Where material

or equipment is identified by proprietary name, model number and/or manufacturer, furnish named item, or its equal, subject to approval by Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for available space, required arrangement, and application. Submit all data necessary to determine suitability of substituted items, for approval.

- C. Where more than one item is named, only the first named item has been verified as suitable. Substituted items, including items other than first named shall be equal or better in quality and performance to that of the specified items, and must be suitable for available space, required arrangement and application.
- D. The contractor shall be required to adapt all substituted materials and equipment without increase to the contract amount. Where substitutions involve more than minor deviations from the plans and specifications, such deviations shall be submitted to the Engineer for approval prior to installation.

2.2 PUMPS: (Verify power supply with utility company prior to ordering pump and controls)

EQ PUMP: 2 REQUIRED
CAPACITY: 30 GPM @ 10' TDH
MYERS ME3F
1/3 HP, 115V, SINGLE PHASE
1.5" NPT DISCHARGE

RECIRC PUMPS: 2 REQUIRED
CAPACITY: 70 GPM @ 30' TDH
STA-RITE STEP 30
1.0 HP, 230V, SINGLE PHASE
1.25" NPT DISCHARGE

DOSING PUMPS: 2 REQUIRED
CAPACITY: 40 GPM @ 14.02' TDH
MYERS ME 45
1/2 HP, 230V, SINGLE PHASE
2" NPT DISCHARGE

2.3 CONTROL EQUIPMENT

- A. The control equipment manufacturing and wiring for dwelling shall be done in accordance with the NEC, latest revisions. Control equipment shall generally consist of the following for each system:
 - 1. A main duplex control panel housing motor overcurrent protection and starters, control circuit transformer and control circuit switches, and indicators.
 - 2. Level switches.
 - 3. Alarm indicator light and bell on 6-inch by 6-inch salt-treated post at pump station. Alarms at pump station shall be on separate circuit from pumps and controls.
- B. All control equipment shall bear the Underwriters Laboratory label. Main control panel shall

be either UL listed or be constructed of UL listed components. Control panel shall be 8115X by Alderon Industries or approved equal.

- C. Panel enclosures shall be NEMA 4X enclosures. Enclosure shall be fiberglass.
- D. The main control panel shall have:
 - 1. a dead front with separate removable inside panel to protect electrical equipment.
 - 2. a lock hasp on outside door. (lock to be provided by owner)
 - 3. a main circuit breaker for pump.
 - 4. main circuit breaker for alarm and control circuits, separate from pump.
 - 5. separate auxiliary circuit breakers for alarm and control circuits.
 - 6. yellow run light.
 - 8. alarm switch for On-Off and Test.
 - 9. weatherproof outside flashing red alarm light.
 - 10. weatherproof outside alarm bell.
 - 11. a terminal strip for connecting pump and controls.
 - 12. an elapsed time meter.
 - 13. surge arrester to protect against lightning
 - 14. a schematic diagram fixed on the inside of door.
 - 15. provide weatherproof 110V receptacle.
 - 16. a cycle counter
 - 17. alarm must have a latching feature so that when the high water alarm float drops the alarm remains engaged.
 - 18. a programmable timer
- E. Level switches shall:
 - 1. be mercury tube switches sealed in a solid polyurethane float.
 - 2. have sealed power cord with weight attached above the float to hold switch in place.
 - 3. be suspended from a stainless steel float bracket through holes provided with rubber snubbers to protect the cord and to hold cord at any set height. (PVC "tree" may be substituted).
 - 4. be set to heights shown on Drawings.
- F. Contractor shall provide Owner two sets of operation and maintenance instructions with parts

list for each pump station and controls.

- G. All wire leads for pumps and floats shall pass through a watertight and gas-tight conduit to the control panel. Conduit shall be of sufficient size to enable all leads to pass through.

2.4 PUMP LIFTING CHAIN

- A. Pump lifting chain shall be of adequate size, stainless steel chain and shall be connected to transfer lifting loads to the pump. Upper end of chain shall be secured at the top of the basin within easy reach from above.

PART 3 - EXECUTION

3.1 PUMPS AND CONTROLS

- A. Pump and controls shall be installed in accordance with manufacturer's instructions and all applicable local and state building codes.

3.2 TESTING

- A. Once system pressure head is set, a drawdown test shall be performed. The drawdown shall be measured in gallons per minute and compared to the design flow.
- B. Alarm Test: With power off, fill pump tank with water until level is above alarm float level. Turn power on; alarm light should energize. Pump (single) should energize. Alarm light should de-energize when water level drops below alarm level.
- C. Operate all equipment, floats and controls to ensure proper installation.

END OF SECTION 02741

SCHEDULE A

OPERATION AND MAINTENANCE REQUIREMENTS

I. GENERAL

1. Facility: PIN: 011400000360000
 1126 COROLLA VILLAGE RD.
 COROLLA, CURRITUCK COUNTY
2. Owner: TFP, LLC
 P.O. Box 369
 COROLLA, NC 27927
3. Engineering Plans and Technical Specifications:
Plans and Specifications for this system were prepared by WithersRavenel. and approved by ARHS. They are hereby incorporated into this Agreement by reference.

II. OPERATION AND MAINTENANCE REQUIREMENTS:

1. The Owner shall be responsible for contracting with a properly licensed operator to be the operator-in-responsible charge (ORC) for this system.
2. The Owner shall keep the plumbing system in the facility in good repair and eliminate leaks, drips, or excess flows as they are found.
3. Non-biodegradable products (plastics, metals, etc.), chemicals (disinfectants, drain cleaners, acids, alkalines, pesticides, petroleum products, etc.), or grease shall not be discharged into the septic system. Use of a garbage disposal is prohibited unless specifically permitted by ARHS.
4. Surface and subsurface water shall be diverted away from the tanks and drainfield. Outlets on diversion ditches and tile drainage tubes shall be kept open and free flowing.
5. The septic tank shall be inspected monthly by the owner for leakage, blockage of influent/effluent lines, structural integrity, condition of baffle and tee, condition of risers if present, scum and solids levels, and effluent clarity.
6. The recirculation tank and pump tank shall be inspected monthly by the owner for leakage, structural integrity, condition of riser(s), solids level and effluent clarity. Solids shall be removed when solids are removed from the septic tank and when the solids level is up to the pump intake level. Solids accumulation on the pump and floats shall be removed by hosing.
7. Pumps and electrical controls shall be inspected at least twice a year by the system operator for pump presence and proper automatic functioning, floats/pipe/control valves/union/anti-siphon hole in proper working condition, control panel/electrical connections properly maintained and operational, highwater alarm present and operating properly.
8. The septage generated from this system shall be disposed of in accordance with Article 9 of Chapter 130A 15A NCAC 13B et seq. and in a manner approved by the North Carolina Division of Solid Waste Management.
9. Pump drawdown level (between on-float and off-float) and approximate dosing volume shall be measured by the system operator at least twice a year and pump delivery rate measured after each purging and pressure head adjustment.

10. The owner shall be responsible for assuring any broken pipe, lateral end caps or cleanouts are to be repaired immediately after becoming aware of such a problem. Condition of all pipe shall be evaluated by the operator during each inspection.
11. The system operator shall flush the Low Pressure Pipe drainfield system laterals a minimum of two (2) times annually.

TECHNICAL DATA

LPP Design Calculations

Project:

1126 Corolla Village Rd
24-1038

Date:

3/30/2026

Calculated by:

WR

1) Design Flow:

989 GPD

2) L.T.A.R.:

0.80 gpd/sf

3) Drainfield:

Area Required (25% reduction): 927.2 sq.ft (gpd/LTAR)

Area Provided: 960.0 sq.ft

Drainline Required: 309.1 ln.ft.

Drainline Provided: 320.0 ln.ft.

Length per line req'd: 38.6 ln.ft. based on 8 lines

Length per line Provided: 40.0 ln.ft. based on 8 lines

Number of Fields Provided: 1

Number of Lines per Field: 8

Center fed = 2; End fed = 1

Lateral spacing: 3 ft. on centers

4) Manifold design:

Lateral diameter: 1.610 in.

Manifold diameter req'd: 3.810 in.

The ratio of the inside cross-sectional area of the supply manifold to the sum of the cross-section areas of laterals served shall be greater than or equal to 0.7:1

Manifold dia. Provided: 4.026 in.

Lateral area: 2.036 sq.in

total area of laterals: 16.287 sq.in

Manifold area: 12.73029413

Ratio provided: 0.78 : 1

5) L.P.P. Laterals:

hole spacing: 5 ft. on centers

holes per lateral: 8

hole size: 5/32 in.

static head pressure: 5.0 ft

flow per hole: 0.64 gpm/hole

total number of holes: 64

total flow req'd to dose: 38.40 gpm

flow provided: 40.00 gpm

6) Drainfield dosing:

dose volume provided: 528.0 gallons

Doses per day 1.87

DF volume 10.6 times drainfield vol

target dose between 5 and 10 times the drainfield volume

gal. per ln.ft. of lateral: 0.106 gallons

gal. per ln.ft. of manifold: 0.661 gallons

volume each lateral: 4.230 gallons

volume total laterals: 33.840 gallons

manifold length: 24.0 ln.ft.

manifold volume: 15.870 gallons

drainfield volume: 49.711 gallons

5 times drainfield vol: 248.553 gallons

7.5 times drainfield vol: 372.829 gallons

10 times drainfield vol: 497.105 gallons

7) Tank sizing:

Minimum Septic Tank:

1657 gallons

Hazen-Williams Equation
for Pressure Loss in Pipes (hf):

$$10.44(L)(Q^{1.852})$$

$$C^{1.852} \cdot d^{4.86555}$$

Specified Data

C = Hazen-Williams roughness constant
 Q = volume flow (gal/min)
 d = Pipe diameter (inches)
 L = Pipe Length * 1.2(Safety factor)
 hs = Static head
 hp = pressure head*
 hs + hp total
 hf = Pressure loss through pipe

	130.00
	40.00
	2.060
	66.00
	6.25
	5.00
	11.25
	2.31

TOTAL TDH (hs + hp + 1.2 x hf = TDH) 14.02
 lbs/sq.in : psi 6.08

Static head high point (drainfield line)	4.00
Static head low point (invert of pump tank)	-4.20

*Per (6)(A) Design flow rate shall be based upon delivering two feet to five feet of static pressure head at the distal end of all lateral lines

Q	TDH
0	11.2500
5	11.3089
10	11.4625
15	11.7002
20	12.0170
25	12.4095
30	12.8752
35	13.4122
40	14.0188
45	14.6937
50	15.4358
55	16.2438
60	17.1170
65	18.0545
70	19.0555
75	20.1194
80	21.2455
85	22.4332
90	23.6819
95	24.9912
100	26.3606
105	27.7896
110	29.2777
115	30.8247
120	32.4300
125	34.0933
130	35.8143
135	37.5927
140	39.4280
145	41.3201
150	43.2686

PROJECT: 24-1038
 OWNER: TFP, LLC
 DATE: 4/1/2026 16:27
 PUMP STATION NAME: DOSING TANK

Populate Highlighted Cells as Required

(Q) 1. Design Flow		989 GPD		
(Q _{app}) 2. Average Flow	(Q)/1440 = 0.686805556 GPM			
(Q _{peak}) 3. Peak Flow	Q _{app} X 2.5 = 0.824166667 GPM			
4. Force Main Diameter		2.0 inch		
5. Q pump required:	$Q=(2fps)(\pi)(r/12)^2$	0.0436	x 7.48 gal/cf x 60sec/min=	19.58 GPM <i>use 19.58 GPM</i>
6. Q pump selected:	Q _{pump}	40 GPM		<i>(AT 10 FPS)</i>
		<i>4.09 fps</i>		<i>97.91 GPM</i>
		40 GPM	is less than	19.58 GPM
7. Dose:	Dose Depth in inches=	10.0 inch	(d)	
	Structure Type: RECTANGULAR		(interior dimensions)	
	LENGTH	14.6 ft		
	WIDTH	5.8 ft	(Enter 0 for Circular Basin)	
	Volume per ft depth=	84.68 cu.ft.		
	gallons per cu.ft.=	7.48 gal		
	vd gallons per ft. depth =	633.45 gal		
	gallons per dose=	527.88 gal	(d)/12*vd	
	time to dose d at Q _{app} =	768.60 min	(d)/12*vd	
	pumprun time to dose d at Q _{pump} =	13.20 min	(d)/12*vd/Q _{pump}	
	inflow @ pump run pump run inflow=	0.28 min	(pumprun*Q _{peak})/(Q _{pump} -Q _{peak})	
	ttd total time to dose=	782.07 min		
	NOTE: CALCULATIONS ARE BASED ON A RECTANGULAR STRUCTURE			
8. Cycles per Hour:	(60min/hr)/(ttd)=	0.08 cyc./hr.	Dosing cycles	
9 Storage	Storage Accounted For=	875.00 gal		
	Hours of Storage Required=	12 hours		
	Storage Volume Required=	494.50 gal	for 12 hours	
	Storage Volume Req'd in Tank=	0.00 gal		
	Storage Volume Provided=	1877.96 gal	svp	
	Storage Depth Required=	0.00 ft	(above alarm float)	
379.77% of required storage	Storage Depth Provided=	1.58 ft	(above alarm float)	
	Hours of Storage Provided=	45.57 hours	(svp/Q)*24hrs/day	

**NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION
ON-SITE WATER PROTECTION BRANCH**

INNOVATIVE WASTEWATER SYSTEM APPROVAL
--

Innovative Wastewater System Approval Number: IWWS 2015-03-R5

Issued To: E-Z Treat Company
PO Box 176
Haymarket, VA 20168
Eztreat.net

Contact: Mike Stidham
703-408-2916

For: E-Z Treat Model 600 Pretreatment Systems

Approval Date:	April 24, 2015	
	June 15, 2015	Tank Size and Sampling Revisions
	January 6, 2017	Addition of Single Bulb UV Unit
	January 31, 2024	Modification to Tank Sizes and Addition of NSF/ANSI Standard 350 and Reduction to Property Line
	December 31, 2024	Renewed for 2025
	July 8, 2025	Modification to the use of Property Line Setbacks

In accordance with G.S. 130A-343 and 15A NCAC 18E Section .1700, an application by E-Z Treat Company for a renewal of the approval for their advanced pretreatment system has been reviewed and found to meet the standards of an Innovative system when the following conditions are met.

I. General

A. Scope of this Innovative Approval

1. Design, installation, use, and operation and maintenance guidelines for E-Z Treat Pretreatment systems to meet TS-I and TS-II effluent standards pursuant to Rule 15A NCAC 18E .1201(a), Table XXV.
2. Operation, maintenance, and monitoring requirements for E-Z Treat Pretreatment systems and associated dispersal fields to ensure the treatment performance standards are met.

B. This Innovative System Approval is applicable to wastewater systems treating domestic strength effluent, as defined in 15A NCAC 18E .0402(a), Table III, utilizing E-Z Treat Pretreatment systems that have a design daily flow not exceeding 3,000 gallons per day (gpd).

Use of E-Z Treat Pretreatment systems for facilities with high strength effluent, as defined in 15A NCAC 18E .0402(a), Table III or industrial process wastewater, shall be proposed by E-Z Treat

Company and a North Carolina Professional Engineer (PE) to the Department for review and approval on a case-by-case basis, prior to permitting by the local health department (LHD). The system design shall include the proposed raw wastewater strength (BOD₅, COD, TN, TSS, and fats, oils, and grease, the expected organic loading rate (in pounds of BOD), and hydraulic loading rate on the pretreatment system, and the calculations, references, and any other needed information to support the proposed design.

- C. Any site utilizing these systems shall have wastewater with sufficient alkalinity to facilitate biological treatment processes. The influent shall not have a pH or toxins that significantly inhibit microbial growth.
- D. Use of E-Z Treat Pretreatment systems that have a design daily flow exceeding 3,000 gpd may be permitted after approval by the Department on a case-by-case basis in accordance with 15A NCAC 18E .0302(e) or G.S. 130A-336.1.

II. System Description

The E-Z Treat Pretreatment system consists of the following components: a Department approved septic tank; a recirculation tank (or chamber); single or multiple E-Z Treat Pretreatment pods; and a final dosing tank (or chamber). Additional treatment may be used to ensure that treatment performance standards shall be met.

The E-Z Treat Pretreatment system can utilize either a two tank configuration or a three tank configuration. The two tank configuration has the following components: the first tank is a septic tank and the second separate tank has a recirculation chamber and final dosing chamber. The three tank configuration consists of three separate tanks: a septic tank, a recirculation tank, and a final dosing tank.

III. Siting Criteria

The E-Z Treat Pretreatment systems and associated dispersal fields shall be sited and sized in accordance with 15A NCAC 18E Section .1200 for TS-I and TS-II systems. Drip irrigation systems used with E-Z Treat Pretreatment systems shall be sited and sized in accordance with 15A NCAC 18E .1204 and the manufacturer specific drip approval. The E-Z Treat Pretreatment systems and associated dispersal fields shall meet all applicable horizontal setback requirements in accordance with 15A NCAC 18E Section .0600 and be located to prevent surface and subsurface water inflow and infiltration.

IV. Dispersal Field System Sizing

The dispersal field system sizing criteria shall be based upon the long-term acceptance rate specified in the appropriate portion of the rules or the Provisional, Innovative, or Accepted system approval for the type of dispersal system to be used.

V. Special Site Evaluation

A special site evaluation may be required based on the proposed dispersal system. Refer to 15A NCAC 18E .0510(c) for when a special site evaluation is required.

VI. Design Criteria

A. The E-Z Treat Pretreatment system shall be designed in accordance with the following criteria.

1. All septic, recirculation, and dosing tanks must be approved by the Department and E-Z Treat Company specifically for use with the E-Z Treat Pretreatment system.
2. The E-Z Treat Pretreatment system can utilize either a two tank configuration or a three tank configuration. The two tank configuration has the following components: the first tank is a septic tank and the second separate tank has a recirculation chamber and final dosing chamber. The three tank configuration consists of three separate tanks: a septic tank, a recirculation tank, and a final dosing tank.
3. The E-Z Treat Pretreatment system consists of a septic tank, a recirculation tank/chamber, a final dosing tank/chamber, and E-Z Treat media pod(s) as specified in Table 1 below.

Table 1 – Model 600 and Tank Volumes			
Design Daily Flow (gpd)	Minimum Septic Tank Volume (gallons)	Minimum Recirculation/Pump Tank Volume (gallons)**	Number of Media Pods
< 480	1,000	1,250	1 Model 600 pod
4 Bedrooms	1,000	1,500	1 Model 600 pod
5 Bedrooms	1,250	1,850	1 Model 600 pod
6 Bedrooms	1,500	2,200	2 Model 600 pods
601 – 1,500	$V = 1.17Q + 500$	$V = 1.17Q + 500$	1 Model 600 pod per 600 gallons
1,501 – 3,000	$V = 0.75Q + 1,125$	$V = 0.75Q + 1,125$	1 Model 600 pod per 600 gallons

*Q – design daily flow

**Recirculation/pump tank minimum size based on total internal tank volume.

4. Septic tanks will have an inlet sanitary tee and a Department approved, appropriately sized effluent filter on the outlet end approved by the E-Z Treat Company for use with the E-Z Treat Pretreatment system.
5. The minimum required volume in the recirculation chamber/tank prior to discharge to the dosing tank/chamber shall be the design daily flow.
6. The recirculation tank/chamber will contain the recirculating splitter valve or an external splitter box may be used. The recirculation tank/chamber shall have an inlet sanitary tee. The sanitary tee shall be visible and reachable from the riser opening to serve as the influent sampling point.
7. When the recirculation tank and dosing tank are combined, the baffle wall between chambers shall extend to the top of the tank and shall be constructed so that the liquid levels in either compartment are independent. Liquids will not by-pass between

- compartments except as designated by the system's treatment flow path.
8. The final dosing tank must meet the minimum size requirements of 15A NCAC 18E .0802. For drip irrigation systems, the pump tank shall be sized in accordance with 15A NCAC 18E .1602(b).
 9. A drainback configuration without a pump check valve is required for the force main supplying the media pod.
 10. The recirculation pump shall be either Sta-Rite Model number STEP 20 or manufacturer approved equal.
 11. The E-Z Treat media pod is constructed of a polymer suitable for use in contact with wastewater. The Model 600 pod is approximately seven feet four inches by four feet with a surface area approximately 30 square feet and is 42 inches in depth. The pod is fitted with a weatherproof cover properly secured. The pod is designed and constructed to create channels down the sidewalls to facilitate air flow. The sidewall channels provide airspace to the bottom of the pod. The bottom of the vessel is designed to provide total drainage of the treated effluent back to the recirculation tank/chamber.
 12. As the effluent enters the recirculation tank/chamber, this tank/chamber acts to further separate the septic tank effluent. The effluent entering the recirculation tank/chamber is charged by the recirculation pump to the media pod(s). The effluent is sprayed over the media mattress(es) using a spray manifold of evenly spaced wide-angle spray nozzles. The nozzles are manufactured with a free passage of 0.0625 inches in diameter. The system is set to recirculate effluent through the media pod on an average of four to six times prior to discharge.
 13. The effluent is sprayed on mattress(es) measuring a total area of 30 square feet. The mattress(es) are fabricated from a non-biodegradable, chemically resistant, loose weave polypropylene material. The openings in the weave allow for effluent and air flow while containing the media. The media inside the mattress(es) are made of a styrene material. The specific gravity of this material meets the following criteria: light enough to prevent compaction which results in a loss of effective surface area and provides a reduction in channeling or short circuiting across the media.
 14. Effluent passes through the media and enters a Schedule 40 pipe located at the bottom of the pod. The effluent than gravity feeds back to the recirculation tank/chamber and the process is repeated.
 15. The effluent bypass valve or splitter box is piped to intercept filtered wastewater and deliver it to the recirculation tank/chamber or the dosing tank/chamber, based on liquid volumes.
 16. The Control Panel for the E-Z Treat System will consist of recirculation pump on/off timer, discharge pump alarm, and high/low water alarm. Control panels shall meet the requirements of 15A NCAC 18E .1103 and shall be approved in writing by E-Z Treat Company for use in their systems.
 17. Separate control and alarm circuits will be provided. The E-Z Treat systems will utilize a device for the automatic measurement and recording of daily flow to the dispersal field in accordance with 15A NCAC 18E .1702(a)(2)(I). This information will be stored in the data logger for drip irrigation systems (provided by the manufacturer of the drip irrigation control panel). For pressure manifold and LPP systems, the manufacturer shall approve the control panel in writing. The operator authorized in writing by E-Z Treat Company (authorized operator) must be able to access the panel directly on site and shall be available to the LHD with 24-hour notice in the event a direct connection is necessary.

18. The UV disinfection system shall be rated for the appropriate discharge rate from the E-Z Treat pod. The UV disinfection system will be one of the following:
 - a. E-Z Set UV-101 (single bulb);
 - b. E-Z Set UV-202 (dual alternating bulbs); or
 - c. Other UV systems specifically approved by the Department and E-Z Treat Company.
 19. All access riser hatches shall be secured by approved tamper-resistant hardware approved by the manufacturer or by other means approved by the manufacturer as equal. Riser construction, attachment to tanks and security systems shall be pre-approved by the Department and E-Z Treat Company in accordance with the E-Z Treat specific approvals for the septic tanks and pump tanks, as applicable.
 20. Buoyancy calculations shall be completed by a PE if any parts of the tanks, pods, or other system components are installed in a seasonal high-water table. Additional ballast may be required.
 21. Influent samples shall be taken from the inlet sanitary tee into the recirculation tank. Effluent samples shall be taken from the final pump doing tank or a spigot or sampling port that is placed on the force main from the final dosing tank.
 22. The property line setback in Group I soils may be reduced to five feet for the initial wastewater system or when the initial wastewater system has failed, and a repair is being installed. The proposed design configuration shall meet all of the following requirements:
 - a. is designed by a PE;
 - b. has been certified by NSF International to meet NSF/ANSI Standard 350;
 - c. meets TS-II in accordance with 15A NCAC 18E .1201(a), Table XXV; and
 - d. meets a standard of Nitrate (as N) of 10 mg/L and Nitrite (as N) of 1 mg/L.The system shall be sampled for the above constituents in accordance with 15A NCAC 18E .1302 and .1709.
- B. E-Z Treat Pretreatment systems shall be designed by a designer authorized in writing by E-Z Treat Company (authorized designer) or a PE. Systems over 1,000 gpd shall be designed by a PE.

VII. Installation and Testing

- A. A preconstruction conference shall be required to be attended by the following, as applicable: authorized designer, Authorized On-Site Wastewater Evaluator (AOWE), PE, installer authorized in writing by E-Z Treat Company (authorized installer), E-Z Treat Company licensed distributor, and LHD prior to beginning installation of the E-Z Treat Pretreatment system.
- B. All E-Z Treat Pretreatment systems shall be installed according to directions provided by E-Z Treat Company.
- C. All individuals or companies installing E-Z Treat Pretreatment systems shall be in possession of all necessary permits and licenses before attempting any portion of a new or repair installation. The company or individual must be a Level IV installer and authorized in writing by E-Z Treat Company.
- D. Watertightness of the tanks shall be tested by either of the following protocols: 24-hour hydrostatic test or a vacuum test.

1. Hydrostatic Test
 - a. Temporarily seal the inlet and outlet pipes.
 - b. Fill tank with clean water to a point at least two inches above the outlet pipe connection.
 - c. Measure the water level.
 - d. Allow the tank to sit for 24 hours.
 - e. Re-measure the water level.
 - f. If the water level change is ½-inch or less or one percent of the liquid tank capacity, the tank passes the leak test.
 - g. If the water level change is greater than ½-inch, any visible leaks can be repaired and the tank may be topped off with water and allowed to sit for a minimum of one hour.
 - h. The tank passes the leak test if there are no visible leaks (flowing water or dripping in a steady stream) and no measureable drop in water level after one hour. Otherwise, the tank fails the leak test.
2. Vacuum Test¹
 - a. Temporarily seal the inlet and outlet pipes.
 - b. A vacuum of four inches of mercury should be pulled on the tank and held for five minutes.
 - c. During the testing, the tank manufacturer or their representative can seal the tank if it is found to be leaking.
 - d. If the tank is repaired, the vacuum must be brought back up to four inches and held for five minutes.

- E. The authorized installer, PE, AOWE, or authorized designer, and the authorized operator shall conduct a final inspection and start-up of the E-Z Treat Pretreatment system and all associated system components. The LHD will attend and observe the final inspection and start-up.
- F. Specified site preparation steps and construction specifications for the dispersal system shall be strictly adhered to, including specified depth of trenches in relation to site limiting conditions, cover material specifications (if needed), trench installation method, etc.

VIII. Operation, Maintenance, Monitoring, and Reporting

- A. E-Z Treat Pretreatment systems shall be classified, at a minimum, as a Type Va system in accordance with 15A NCAC 18E .1301(b), Table XXXII. Management and inspection shall be in accordance with 15A NCAC 18E, Section .1300.
- B. All E-Z Treat Pretreatment systems require an operation and maintenance agreement between the system owner and E-Z Treat Company, Inc., its authorized representative, or with an authorized operator in accordance with 15A NCAC 18E .1302(c). The authorized operator must have proper equipment and training to access and program the control panels on site. The authorized operator shall be:
 1. a North Carolina certified subsurface operator (Operator in Responsible Charge); and
 2. either an employee of E-Z Treat Company, Inc., or authorized in writing by E-Z Treat Company, Inc.

¹ National Precast Concrete Association, *Best Practices Manual Precast Concrete On-Site Wastewater Tanks*, Second Edition, October 2005, 24.

- C. All E-Z Treat Pretreatment systems shall be operated and maintained according to the latest version of E-Z Treat Company's O&M manual.

- D. At each E-Z Treat Pretreatment system inspection the authorized operator shall follow service procedure steps identified in the E-Z Treat Company, Inc., O&M Manual and, at a minimum, observe, monitor, and record the following:
 - 1. Wastewater level in all the tanks.
 - 2. Sludge, scum, and grease levels in all the tanks.
 - 3. Clogging of effluent filter.
 - 4. Watertightness of tanks, risers, and pipe penetrations at the tanks.
 - 5. Operation of pumps, floats, valves, electrical controls, and alarms.
 - 6. Dispersal field pump delivery rate (drawdown test), determination of the average pump run time, and dispersal field dosing volume.
 - 7. Any structural damage, accessibility issues, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the dispersal field, or surfacing of effluent on the dispersal field.
 - 8. Sample of E-Z Treat Pretreatment system effluent collected from the sampling point to check for effluent clarity and odor and a sample of influent, as required.
 - 9. Readings from pump cycle counters and run time meters and any water meter readings, as applicable.
 - 10. Current operational set up for TS-II nitrogen removal enhancement (percent returned to septic tank), and recommendation for modifications (if needed).
 - 11. System operating conditions, from the review of stored data for flow variances or other abnormal conditions.

- E. The authorized operator shall conduct any other measurements, monitoring, maintenance activities, and observations as specified in the Operation Permit (OP) and recommended by the manufacturer.

- F. Sampling and Testing
 - 1. All sampling shall be done in accordance with 15A NCAC 18E .1302 and .1709. E-Z Treat systems shall be sampled annually when the design daily flow is less than or equal to 1,500 gpd. Systems with design daily flows greater than 1,500 gpd and less than or equal to 3,000 gpd shall be sampled twice a year.
 - 2. Effluent for all systems shall be tested for effluent CBOD₅ and NH₄-N. Systems designed to meet the TS-II standard shall also have the effluent analyzed for TN (TKN and NO₃-N). Sampling is not required for fecal coliforms when the site is found to be compliant with all other constituents in Table XXV of 15A NCAC 18E .1201(a).
 - 3. Systems installed five feet from a property line shall be sampled for all the constituents in Section VI.22.
 - 4. Effluent samples shall be taken from the final dosing tank/chamber or a sampling port located downstream from the final treatment process.
 - 5. Influent samples, if needed, shall be taken from a sampling port located between the septic tank and recirculation tank/chamber.

G. Notification and Performance of Maintenance and Repairs

1. The authorized operator shall alert E-Z Treat Company, the LHD, and the system owner within 48 hours of needed maintenance or repair activities including but not limited to landscaping, tank sealing, tank pumping, pipe or control system repairs, media replacement, and/or adjustments to any other system component.
2. The authorized operator shall notify the system owner, E-Z Treat Company, and the LHD whenever the pump delivery rate efficiency or average pump run times are not within 25 percent of the initial measurements conducted prior to system start-up.
3. System troubleshooting and needed maintenance shall be provided to maintain the pump delivery rate and average pump run time within 25 percent of initial measurements conducted during system start-up.
4. Tanks will be pumped as needed upon the recommendation of the authorized operator and in accordance with the E-Z Treat Pretreatment system Operation and Maintenance instructions. At a minimum, the entire contents of all septic tank compartments shall be removed whenever the depth of both the scum and sludge is found to be more than one-third of the liquid depth in any compartment.
5. The tanks shall be pumped by a properly permitted septage management firm, and the septage handled in accordance with 15A NCAC 13B .0800.
6. All maintenance activities shall be recorded in the authorized operator reports provided to the system owner, the LHD, and E-Z Treat Company.

H. Reporting

The authorized operator shall provide a written report to the system owner, E-Z Treat Company, and the LHD within 30 days of each inspection. At a minimum this report shall specify:

1. The date and time of inspection;
2. Results from any laboratory analysis of any influent and effluent samples;
3. Maintenance activities performed since the last inspection report;
4. An assessment of overall system performance;
5. A list of any improvements or maintenance needed;
6. A determination of whether the system is malfunctioning, and the specific nature of the malfunction;
7. Any changes made in system settings, based on recommendations of the manufacturer; and
8. A summary report of data retrieved from the control panel including flow variances and other operating conditions.

IX. Responsibilities and Permitting Procedures

- A. Prior to the installation of an E-Z Treat Pretreatment system at a site, the owner shall submit an application or Notice of Intent (NOI) to the LHD for the proposed use of this system. Improvement Permits (IP) or Construction Authorizations (CA) issued by the LHD shall have a soil and site evaluation conducted either by the LHD, LSS, or Authorized On-Site Wastewater Evaluator (AOWE). The NOI shall include a soil and site evaluation conducted by an LSS.
- B. The IP, CA, and NOI shall contain all the conditions the site approval is based upon, including the proposed use of the Innovative system. The OP will include all conditions specified in the IP and CA. The Authorization to Operate (ATO) should include all the conditions specified in the

NOI.

- C. When a special site evaluation is required pursuant to 15A NCA 18E .0510, an evaluation and written, sealed report from a Licensed Soil Scientist (LSS) regarding the site shall be provided to the LHD. The report shall contain the information specified in 15A NCAC 18E .0510(d). The LHD may request the assistance of their Regional Soil Scientist in evaluating this report prior to permit issuance.
- D. The E-Z Treat Pretreatment system shall be designed by either an authorized designer, AOWE, or a PE. Systems over 1,000 gpd, or as required in accordance with 15A NCAC 18E .0303(a) shall be designed by a PE.
- E. Prior to the LHD issuing a CA for an E-Z Treat Pretreatment system, a design submittal prepared by an authorized designer, AOWE, or PE shall be submitted. The design submittal shall include the information required in 15A NCAC 18E .0305.
- F. It is recommended that local authorized environmental health specialists attend a design training session offered by the manufacturer or the authorized representative prior to permitting the system. Also, at the request of the LHD, a Regional Engineer will review the design.
- G. For sites required to be evaluated by an LSS or Licensed Geologist (LG), see Section V and IX.C, the LHD, AOWE, or PE may specify as a condition of the IP and CA that an LSS or LG oversee critical phases of the dispersal field installation and certify in writing that the installation was in accordance with their specified site and installation requirements prior to the OP or ATO issuance.
- H. The authorized operator shall be present during the final inspection of the system prior to the issuance of the OP or ATO.
- I. The LHD shall issue the OP after the following:
 - 1. Field verification of installation completion;
 - 2. Receipt of written documentation from the authorized designer, AOWE, or PE that the system has been designed, installed, and is operating in accordance with the approved plans; and
 - 3. All necessary legal documents have been completed, including the contract between the system owner and the authorized operator.

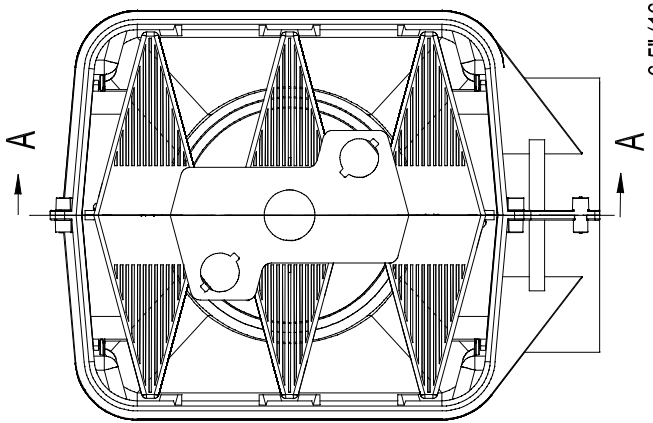
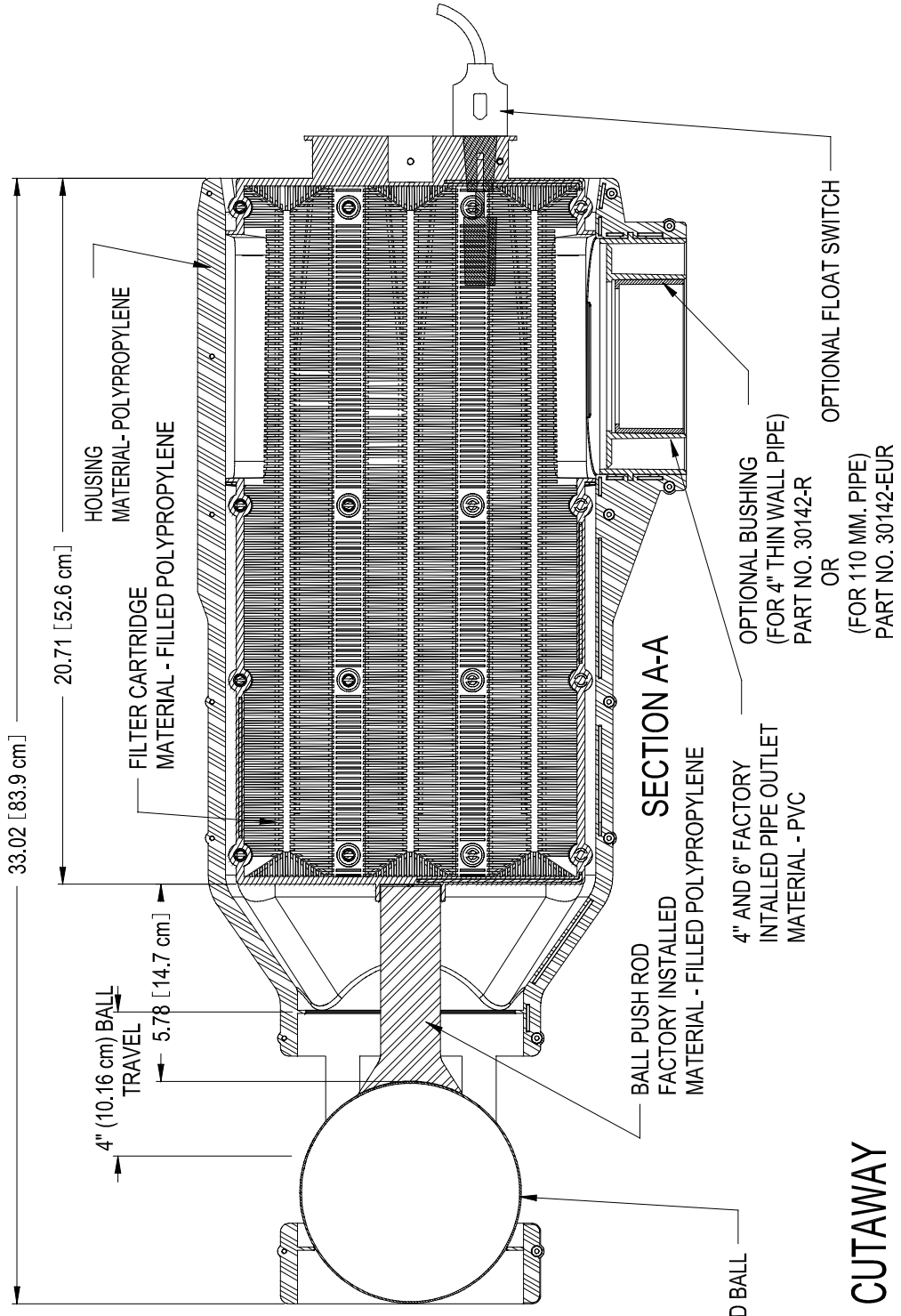
The LHD shall issue the OP for an (a2) and (a5) application after all necessary legal documents have been completed, including the contract between the system owner and the authorized operator.

The ATO shall be submitted to the LHD in accordance with G.S. 130A-336.1 and G.S. 130A-336.2.

X. Repair of Systems

The provisions of 15A NCAC 18E .1306 shall govern the use of the E-Z Treat Pretreatment system for repairs to existing malfunctioning wastewater systems.

Approved By: _____ Date: _____



POLYLOK PL-525 - 625 CUTAWAY

Alderon Industries Submittal

Date:

Job:

Model: 8115

Electrical: 120/230, 20AMPS
MAX

UL 508 Industrial Controls
UL 698A Intrinsically Safe Controls



ALDERONTM
Industries

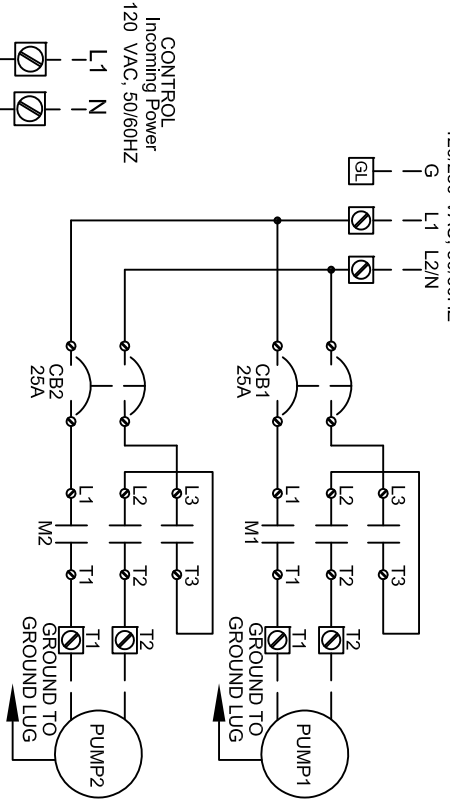
Leading Edge Control Products

Submittal Information

PO Box 827 Hawley MN, 56549 Phone 218-483-3034

Fax 218-483-3036 www.alderonind.com

PUMP
Incoming Power
120/230 VAC, 50/60HZ
Branch Circuit Protection Device/Disconnect Means Field Provided -
size per manufacturing specifications for pump/motor



F1, F2 FUSE MUST BE REPLACED WITH 1 AMP 5mmX20mm TYPE FAST ACTING 250 V MAX.

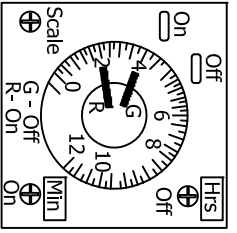
--- FIELD WIRING
..... FIELD SUPPLIED
[Symbol] TERMINAL BLOCK

Power Wiring = BLK
120VAC Control Wiring = RED
Neutral = WHT
Ground = GRN

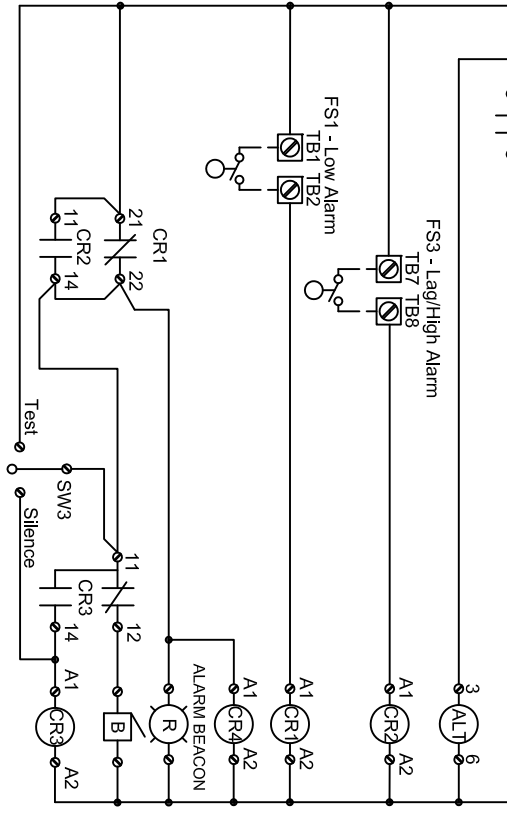
ANG/ OR CIRCULAR MILL SIZE	TIGHTENING TORQUE IN INCH POUNDS	EXTERNAL DRIVE WRENCH
14	35	75
12	35	75
10	35	75
8	40	75
6	45	110
4	45	110
2	50	150
1	50	180
1/0	50	180
2/0	50	180

LEGEND	DESCRIPTION
CR	CONTROL RELAY
CB	CIRCUIT BREAKER
GL	GROUND LUG
SW1,2	HOK SWITCH
SW3	TEST/SILENCE SWITCH
R	ALARM BEACON
B	ALARM BUZZER
ETM	ELAPSED TIME METER
M1,2	MAGNETIC CONTACTOR
GL,2	PUMP RUN INDICATOR
GL	GROUND LUG
FS	FLOAT SWITCH
TDI	Repeat Cycle Timer

This control panel is for duplex timed dosing applications. When the timer enable float is up, the timer will start timing for the duration of the "Off" time and when complete, the lead pump will start for the duration of the "On" time. Both Off and On times are adjustable. This pattern repeats until the timer enable float lowers and turns off. The Low float acts as a redundant off and will also activate the alarm. If the level reaches the High float switch, the alarm will activate and lag pump will start.



To set the timer, use a screwdriver to change timer Scale (0-12 most common). Use a screwdriver to change the "On" time increments (minutes most common). Use a screwdriver to change the "off" time increments (hours most common). Turn the dial with the Red line to the desired "On" time (this example is 2 minutes). Turn the dial with the Green line to the desired "Off" time (this example is 4 Hours).



Alarm
AUXILIARY DRY CONTACT 5A, 120V MAX

FS1 - Low Alarm
FS2 - Timer Enable
FS3 - Lag/High Alarm

Float Switch Field Wiring
*FS1 - Normally Open, Narrow Angle
*FS2 - Normally Open, Wide Angle
*FS3 - Normally Open, Narrow Angle

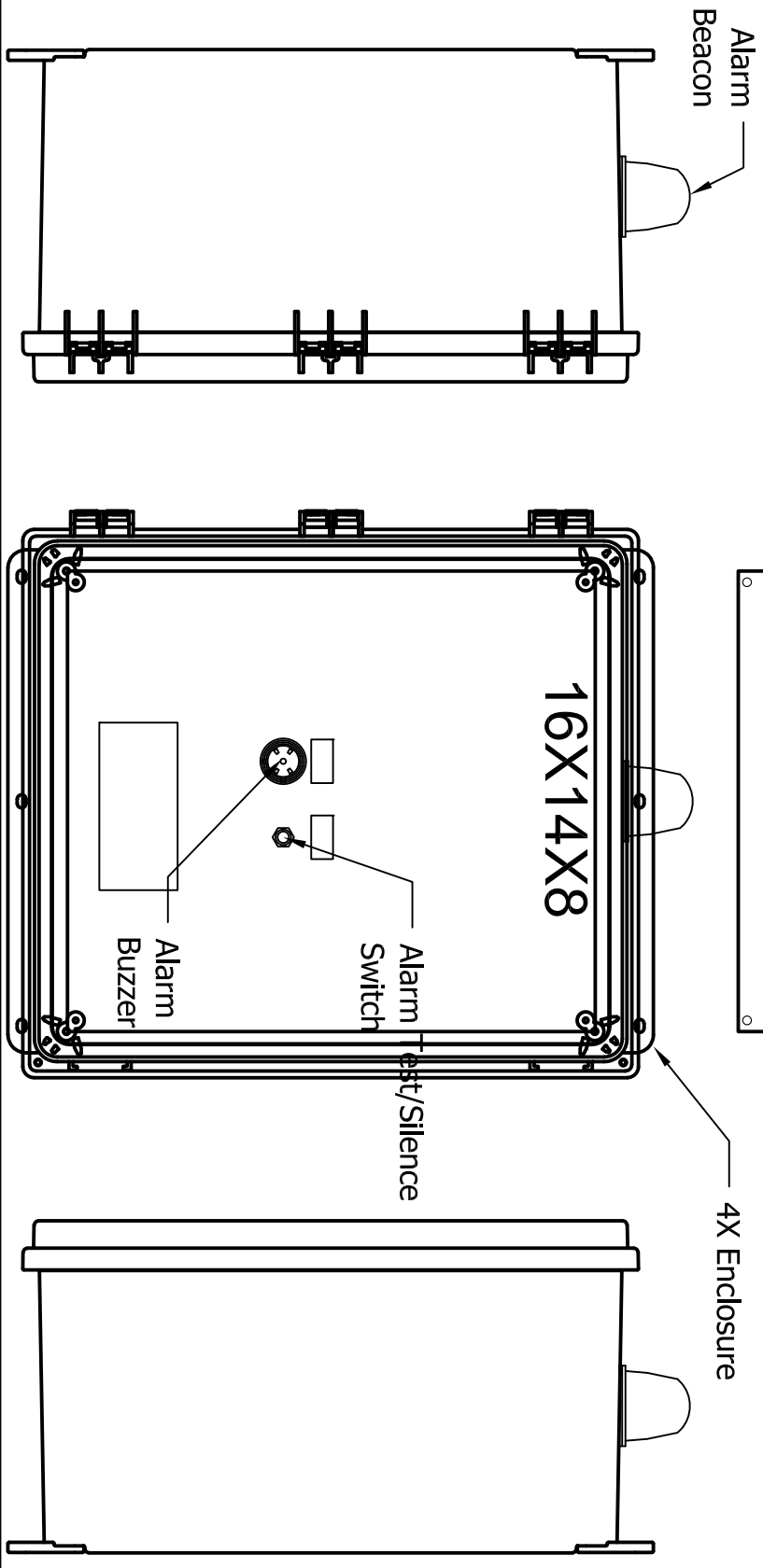
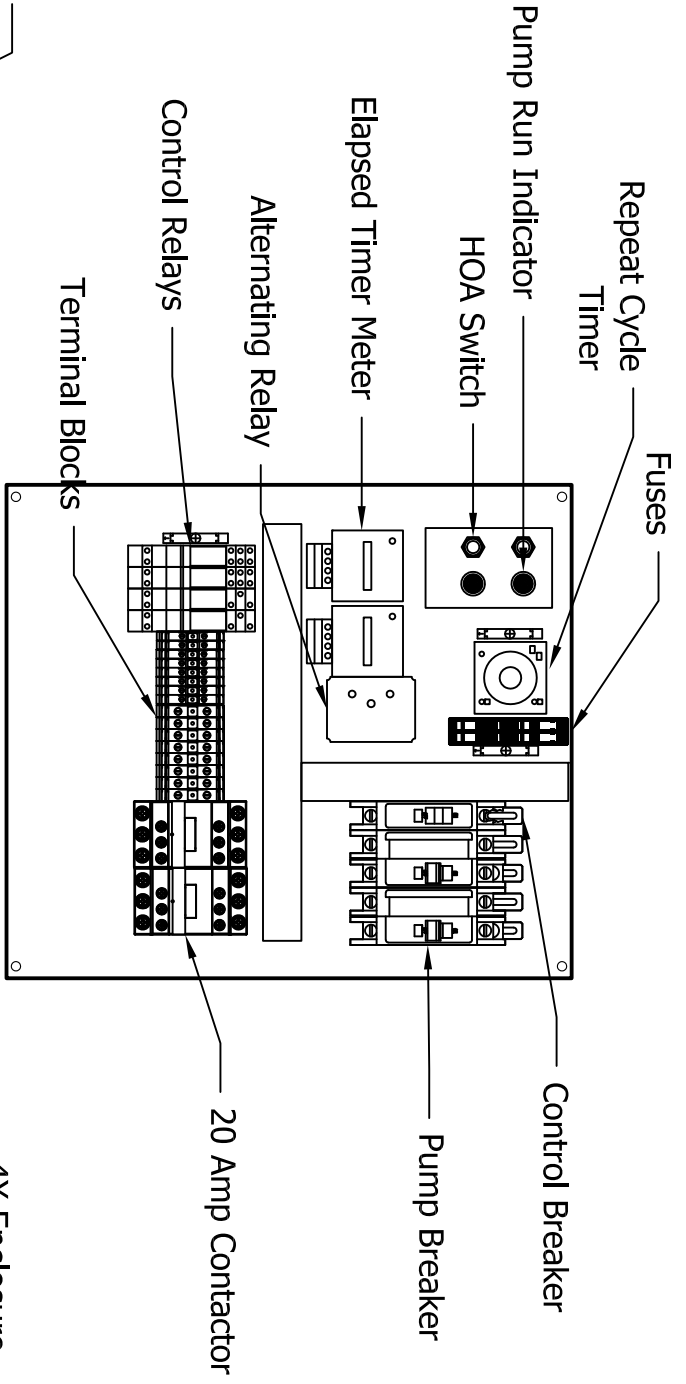
- NOTES:
1. WARNING! Electrical Shock Hazard! Disconnect power before servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.
 2. Install in accordance with National Electric Code, NFPA 70. Seal all boxes, fittings and conduit with appropriate seal devices to prevent moisture and gases from entering enclosure.
 3. Connect all grounds to a good ground.
 4. Dashed lines represent field wiring - Use *minimum* 60 deg C Copper Wire
 5. Branch Circuit Protection Device/Disconnect Means Field Provided.

Model Number:	8115
DWG Number:	8115
Quote Number:	N/A
Drawn By:	A. Vandeberg
Checked By:	B. Klabunde
Date:	6/1/17
Revision Level:	AAA

Page Notes:
1

ALDERON Industries
Leading Edge Control Products
151 16TH ST. SOUTH
HAWLEY MIN, 56549
Fax: 218-839-8584 www.alderon.com

Sheet No: 1
Of 1
Production Schematic



Notes:

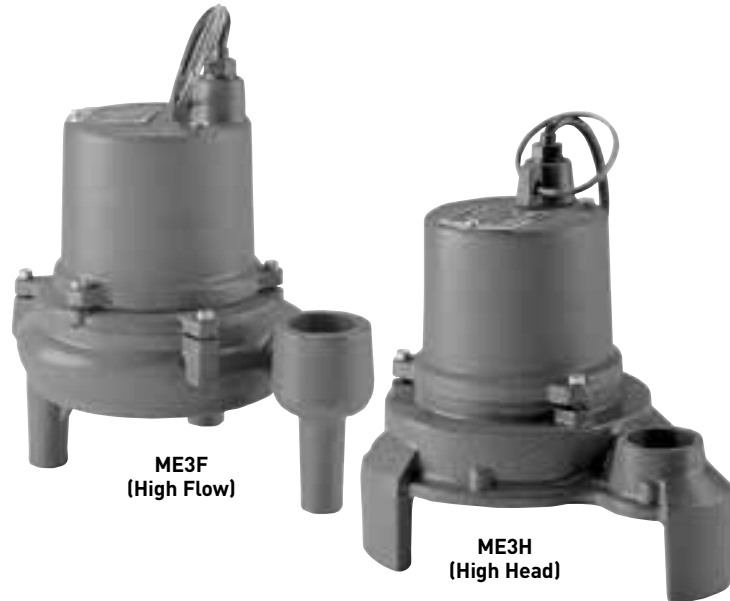
1. WARNING! Electrical Shock Hazard! Disconnect power before servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.
2. Install in accordance with National Electric Code, NFPA 70. Seal all boxes, fittings and conduit with appropriate seal devices to prevent moisture and gases from entering enclosure.
3. Connect all grounds to a good ground.
4. Dashed lines represent field wiring - Use minimum 60 deg C Copper Wire
5. Branch Circuit Protection Device/Disconnect Means Field Provided.

Sheet No: 1 Of 1	Ident. Number: 8115		Page Notes:	
	Part Number: 8115		---	
	Quote Number: N/A			
	Drawn By: A. Vandenberg			
	Checked By: B. Klabunde			
Date: 6/1/17		Revision Level: AAA		
Sheet Description:				

ALDERON™ Industries
 Leading Edge Control Products
 151 16TH ST. SOUTH
 HAWLEY MN, 56549
 PH 218-483-3034 WWW.ALDERONIND.COM

MYERS® ME3 SERIES

The Myers ME3 series submersible effluent pumps are constructed of the most durable combination of materials to withstand the harshest environments. The ME3 is available with a recessed impeller for high-head applications or an enclosed impeller for high-flow installations. Available in tethered automatic piggyback models or manual models for use with external controls.



APPLICATIONS

Effluent removal, sump drainage, water transfer, flood control

SPECIFICATIONS

Capacities – ME3H: 36 GPM (136 LPM); ME3F: 66 GPM (249 LPM)

Shut-off Head – ME3H: 35' (10.7 m); ME3F: 31' (9.5 m)

Maximum Spherical Solids – 3/4" (19 mm)

Liquids Handling – Domestic effluent and drain water

Intermittent Liquid Temperature – Up to 140°F (60°C)

Motor/Electrical Data – 1/3 HP, 1550 RPM, shaded pole, oil-filled; 115V, 12A, 1Ø, 60Hz; 230V, 6A, 1Ø, 60Hz

Acceptable pH Range – 6-9

Specific Gravity – .9-1.1

Viscosity – 28-35 SSU

Discharge, NPT – 1-1/2" (50.8 mm)

Housing – Heavy cast iron

Minimum Sump Diameter –

Simplex: 24" (61 cm)

Duplex: 36" (91.4 cm)

Power Cord – 20', 16/3, SJTW

FEATURES

Two Powerful Pumps

High head (ME3H), High flow (ME3F)

Maximum Heat-handling

Durable, oil-filled motor for continuous bearing lubrication and maximum heat dissipation

Powerful Starts

High-torque, no starting switches or relays to wear out

Thermal Protection

Heat sensor overload protection with automatic reset when motor cools to a safe operating temperature

Longer-lasting Motor

Lower ball bearing eliminates sleeve bearing wear and reduces motor wear

Manual Operation

Tethered automatic models can be operated manually by unplugging piggyback switch and plugging pump directly into outlet

MYERS® ME3 SERIES

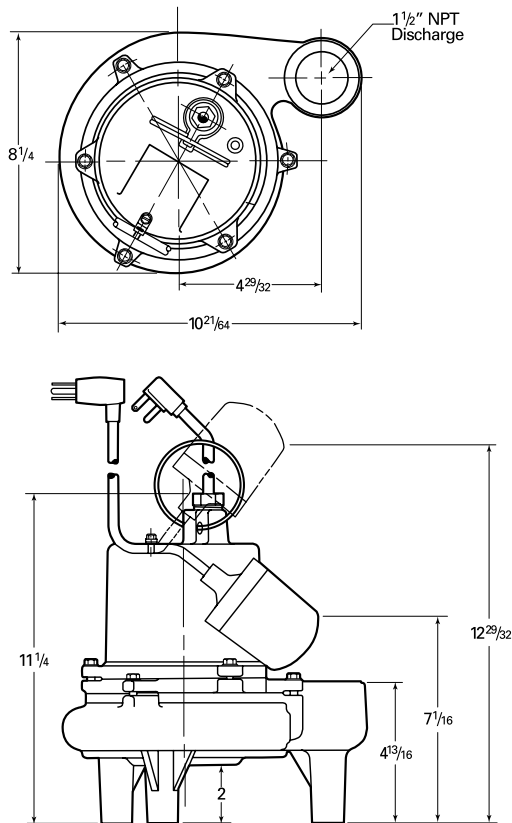
ORDERING INFORMATION

Catalog Number	HP	Volts	Phase/Cycles	Amps	Discharge Size	Switch Type	Cord Length	Approx. Wt. Lbs.
ME3H-11	1/3	115	1/60	12	1-1/2"	Manual	20'	37
ME3H-11P	1/3	115	1/60	12	1-1/2"	Automatic*	20'	38
ME3H-21	1/3	230	1/60	6	1-1/2"	Manual	20'	37
ME3H-21P	1/3	230	1/60	6	1-1/2"	Automatic*	20'	38
ME3F-11	1/3	115	1/60	12	1-1/2"	Manual	20'	37
ME3F-11P	1/3	115	1/60	12	1-1/2"	Automatic*	20'	38
ME3F-21	1/3	230	1/60	6	1-1/2"	Manual	20'	37
ME3F-21P	1/3	230	1/60	6	1-1/2"	Automatic*	20'	38

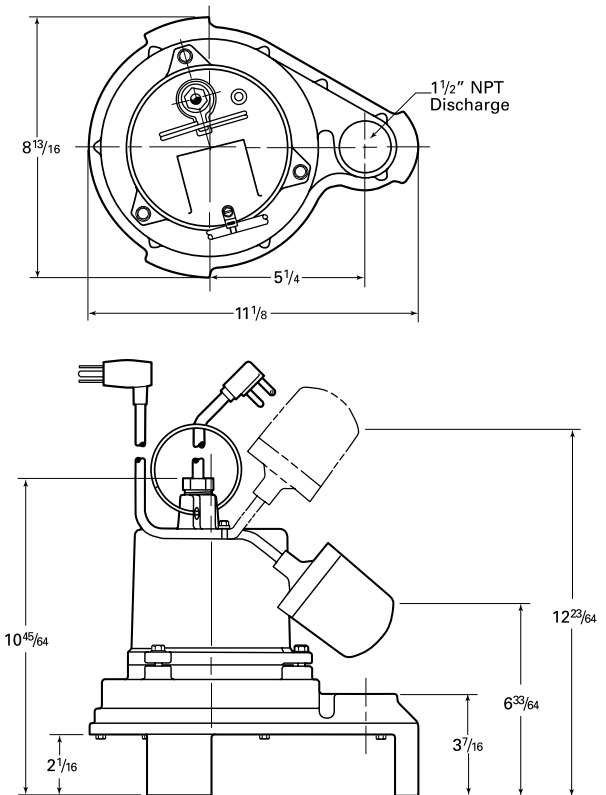
*Piggyback

DIMENSIONS

ME3F (High Flow)

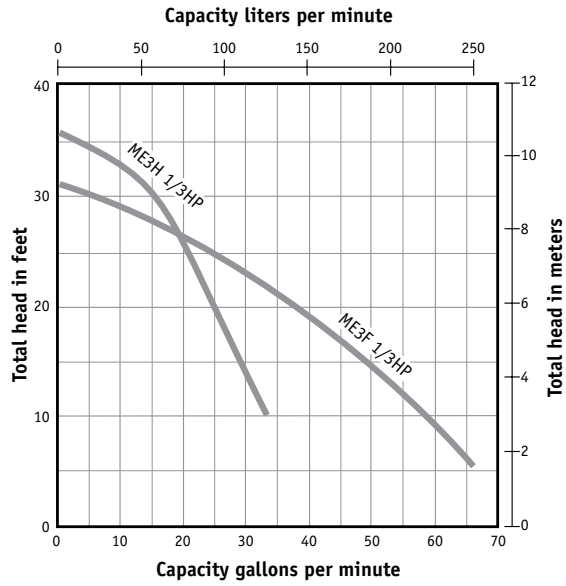


ME3H (High Head)



MYERS® ME3 SERIES

PUMP PERFORMANCE



MYERS® ME3 SERIES

SPECIFICATIONS

Effluent Pumps – Pump(s) shall be F. E. Myers ME3F / ME3H series sump pumps selected in accordance with the following design criteria:

Number of Pumps:	_____	Motor Horsepower:	1/3
Primary Design Flow:	_____	Motor Speed:	1550 RPM
Primary Design Head:	_____	Electrical:	115 Volts, 1Ø, 60 Hz or 230 Volts, 1Ø, 60 Hz
Minimum Shut-off Head:	36		

Pump – The pump shall be designed to handle septic tank effluent and be capable of passing 3/4 inch spherical solids. The pump shall be capable of handling liquids with temperatures to 140°F intermittent.

Motor – The pump motor shall be of the submersible type rated 1/3 hp at 1550 RPM and shall be for _____ 115 volts or _____ 230 volts single phase, 60 cycles. Single phase motor shall be of the shaded pole type with no relays or starting switches. Stator winding shall be of the open type with Class A insulation rated for 105°C maximum operating temperature. The winding housing shall be filled with clean dielectric oil to lubricate bearings and seals, and transfer heat from the windings to the outer shell. The motor winding assembly shall be pressed into the stator housing for best alignment and heat transfer.

The motor shall be capable of operating over the full range of the performance curve without overloading the motor and causing any objectionable noise or vibration. The motor shall have two bearings to support the rotor; an upper sleeve bearing to accommodate radial loads and a lower sleeve bearing with thrust pad to take thrust and radial loads.

A heat sensor thermostat and overload shall be attached to the top end of the motor windings and shall be wired in series with the windings to stop the motor if the motor winding temperature reaches 221°F. The overload thermostat shall reset automatically when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be 20 feet SJTW type. The cord shall have a molded compression grommet to insulate electrical connections. The grommet shall thread into the motor housing to provide a positive seal and to prevent leaking of liquid into the motor housing. The sealing grommet shall provide strain relief for the power cord assembly.

Optional Control Switch – The effluent pump shall be controlled by an optional piggyback float switch. The float switch shall be of a non-mercury type and be capable of directly controlling the pump motor without the need for an external control panel.

Shaft Seal – The motor shall be protected by a rotating mechanical shaft seal. The seals shall have carbon and ceramic seal faces lapped to a tolerance of one light band. Metal parts and springs for seals shall be 300 series stainless steel.

Pump Impeller (ME3F) – The pump impeller shall be of the two vane enclosed type. The impeller shall be constructed of engineered thermoplastic. A stainless steel wear ring shall be molded into the neck of the impeller to provide a sealing surface. A replaceable Buna-N sealing cup shall effect a seal between the volute and impeller in order to maintain high efficiency and prevent recirculation.

Pump Impeller (ME3H) – The pump impeller shall be of the recessed type. The impeller shall be constructed of engineered thermoplastic.

Motor Castings – The motor housing castings shall be of high tensile strength Class 30 gray cast iron. Castings shall be treated with phosphate and chromate rinse and painted with a high quality air dry alkyd enamel for corrosion protection.

Pump Case – The pump case shall be a high efficiency volute design capable of passing 3/4 inch spherical solids. The pump volute shall be constructed of Class 30 gray cast iron.

Fasteners – All exposed fasteners shall be of 300 series stainless steel.



USA
293 WRIGHT STREET, DELAVAN, WI 53115 WWW.FEMYERS.COM
PH: 888-987-8677 ORDERS FAX: 800-426-9446

CANADA
490 PINEBUSH ROAD, UNIT 4, CAMBRIDGE, ONTARIO N1T 0A5
PH: 800-363-7867 ORDERS FAX: 888-606-5484

Because we are continuously improving our products and services, Pentair reserves the right to change specifications without prior notice.



high head multi-stage submersible effluent pumps

NOW AVAILABLE:

- Higher HP
- Higher GPM
- Longer Cords



The STEP Plus® 4" submersible filtered effluent pumps in 10, 20, 30 and 50 GPM models offer dependable performance and value for high pressure filtered effluent applications.

These STEP Plus pumps will handle "dry run" conditions where other manufacturers fail.

The 10, 20, 30 and 50 GPM are industry standard 3-3/4" in diameter.

APPLICATIONS

- **Filtered Effluent...** for residential, commercial, and agricultural use.

SPECIFICATIONS

Shell – Stainless steel

Discharge – 10, 20 and 30 GPM models: fiberglass-reinforced thermoplastic; 50 GPM models: stainless steel

Discharge Bearing – Nylatron®

Impellers – Delrin®

Diffusers – Polycarbonate

Suction Caps – Polycarbonate with stainless steel wear ring

Thrust Pads – Proprietary spec.

Shaft and coupling – Stainless steel 300 grade

Intake – Fiberglass-reinforced thermoplastic

Intake Screen – Polypropylene

Jacketed Cord – 300 Volt "SOOW" jacketed 10' leads (2-wire with ground); optional 20', 30', 50' and 100' lengths available

Delrin® is a registered trademark of E.I. DuPont de Nemours and Co. Nylatron® is a registered trademark of Polymer Corp. STEP Plus® is a registered trademark of Pentair Water. In order to provide the best products possible, specifications are subject to change.

STEP Plus®

STA-RITE EFFLUENT PUMP

FEATURES

Proven "Floating Impeller"

Staging System – Incorporates 1st-in-class performance, sand handling and thrust management staging system with the industry exclusive "dry-run" design element. Reinforced engineered composites and stainless steel, offering high resistance to corrosion and abrasion.

Discharge – Tested-tough, fiberglass-reinforced thermoplastic, with proven internal check valve. Large wrench flats and rope hole.

Shell – 300-grade stainless steel pump shell offers high corrosion resistance.

Shaft – Hexagonal 3/8", 300-grade stainless steel pump shaft; offers generous impeller drive surfaces.

Shaft Bearing – Exclusive self-lubricating Nylatron bearing resists wear surface from sand.

Motor Bracket – Tested-tough, fiberglass-reinforced thermoplastic; incorporates an integral suction screen.



high head multi-stage submersible effluent pumps

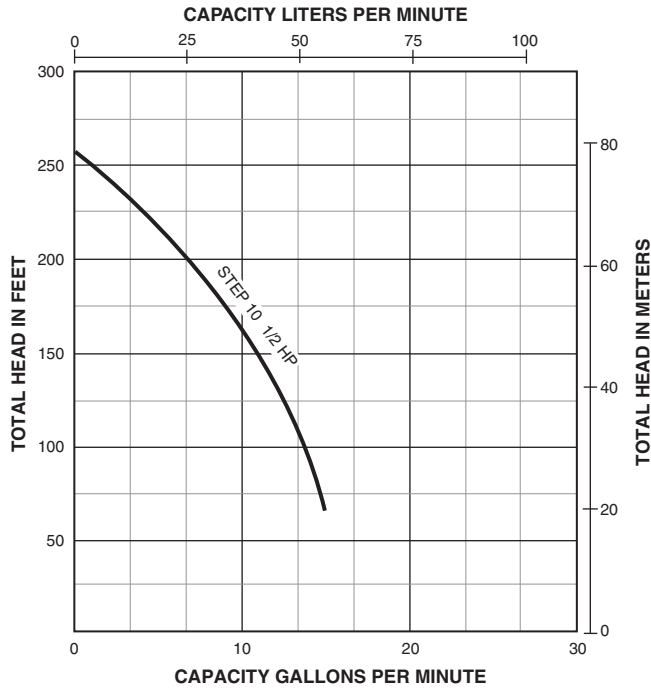
ORDERING INFORMATION						
Catalog Number	HP	Stages	Max. Load Amps	Volts	Phase/Cycles	Cord Length
STEP10	1/2	6	10.5	115	1/60	10'
STEP20	1/2	5	10.5	115	1/60	10'
STEP30-05121	1/2	3	9.5	115	1/60	10'
STEP30X20FT-05121	1/2	3	9.5	115	1/60	20'
STEP30X30FT-05121	1/2	3	9.5	115	1/60	30'
STEP30-05221	1/2	3	4.7	230	1/60	10'
STEP30X20FT-05221	1/2	3	4.7	230	1/60	20'
STEP30X30FT-05221	1/2	3	4.7	230	1/60	30'
STEP30-10221	1	5	9.1	230	1/60	10'
STEP30X20FT-10221	1	5	9.1	230	1/60	20'
STEP30X30FT-10221	1	5	9.1	230	1/60	30'
STEP30-15221	1-1/2	6	11.0	230	1/60	10'
STEP30X20FT-15221	1-1/2	6	11.0	230	1/60	20'
STEP30X30FT-15221	1-1/2	6	11.0	230	1/60	30'
STEP50-10221	1	3	9.1	230	1/60	10'
STEP50X20FT-10221	1	3	9.1	230	1/60	20'
STEP50X30FT-10221	1	3	9.1	230	1/60	30'
STEP50-15221	1-1/2	4	11.0	230	1/60	10'
STEP50X20FT-15221	1-1/2	4	11.0	230	1/60	20'
STEP50X30FT-15221	1-1/2	4	11.0	230	1/60	30'

PUMP PERFORMANCE			
Catalog Number	Gallons/Liters per Minute	Head (Feet/Meters)	PSI
STEP10	0/0	255/78	110
	5/19	228/69	99
	10/38	170/52	74
	12.5/47	120/37	52
STEP20	0/0	180/55	78
	7.5/28	160/49	69
	15/57	135/41	58
	20/76	115/35	50
	25/95	75/23	32
STEP30-05221 & STEP30-05121	0/0	102/31	44
	8/30	100/30	43
	16/61	97/30	42
	24/91	84/26	36
	30/114	68/21	29
	36/136	47/14	20
STEP30-10221	0/0	171/52	74
	8/30	166/51	72
	16/61	162/49	70
	24/91	140/43	61
	30/114	114/35	49
	36/136	78/24	34
STEP30-15221	0/0	206/63	89
	8/30	203/62	88
	16/61	199/61	86
	24/91	176/54	76
	30/114	146/45	63
	36/136	101/31	44
STEP50-10221	0/0	90/27	39
	10/38	86/26	37
	20/76	83/25	36
	30/114	79/24	34
	40/152	71/22	31
	50/190	62/19	27
	60/227	49/15	21
70/265	27/8	12	
STEP50-15221	0/0	120/37	52
	10/38	115/35	50
	20/76	110/34	48
	30/114	104/32	45
	40/152	95/29	41
	50/190	82/25	35
	60/227	65/20	28
70/265	36/11	16	

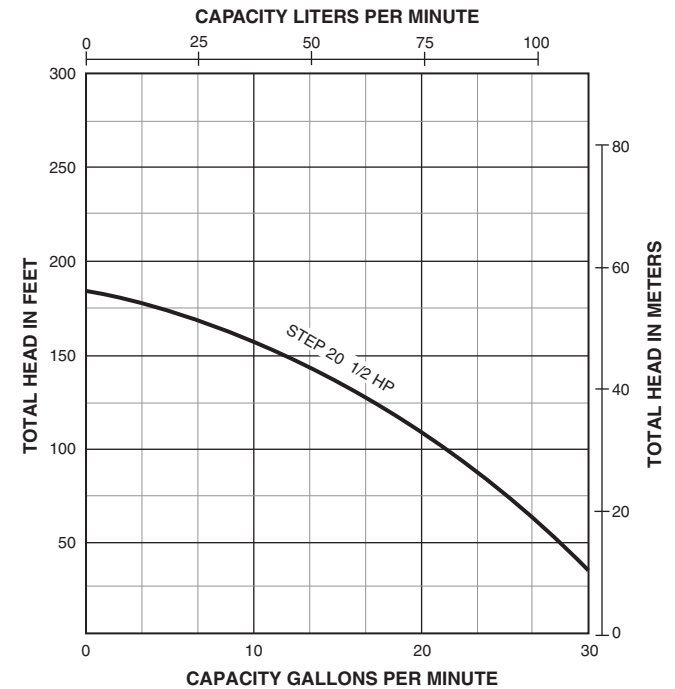


high head multi-stage submersible effluent pumps

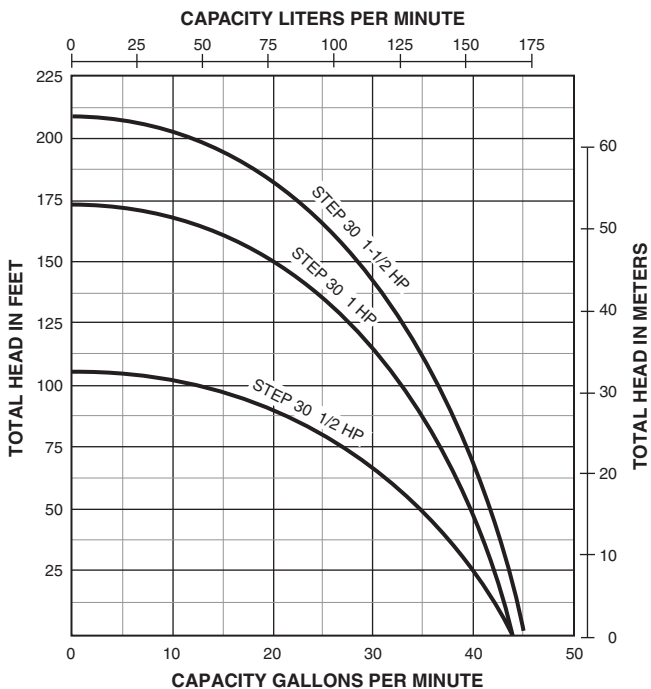
PUMP PERFORMANCE – 10 GPM



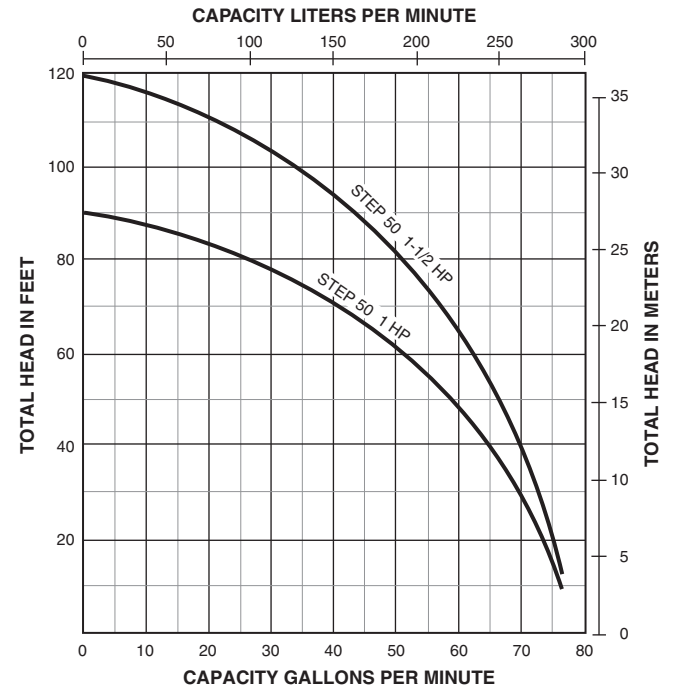
PUMP PERFORMANCE – 20 GPM



PUMP PERFORMANCE – 30 GPM



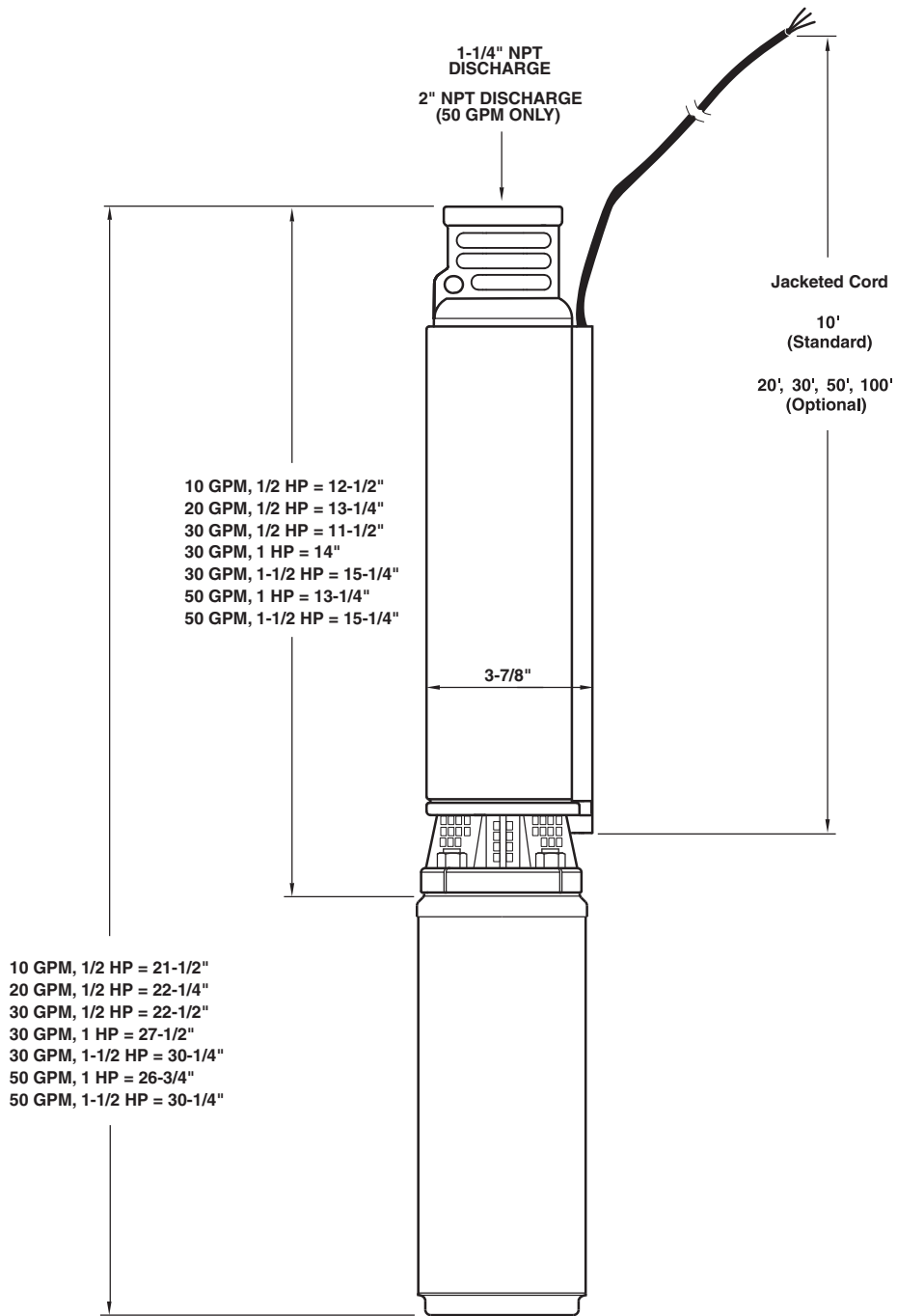
PUMP PERFORMANCE – 50 GPM





high head multi-stage submersible effluent pumps

OUTLINE DIMENSIONS



Dimensions (in inches) are for estimating purposes only.



MYERS®

ME45

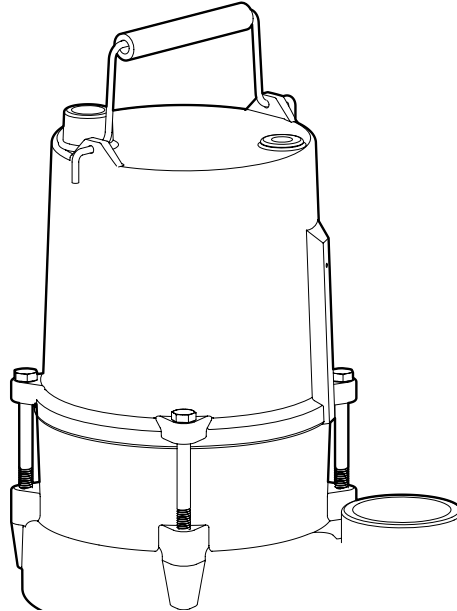
HIGH HEAD EFFLUENT

PERFORMANCE DATA

Wholesale Products Page: MY10466-1

Dated: January 2014

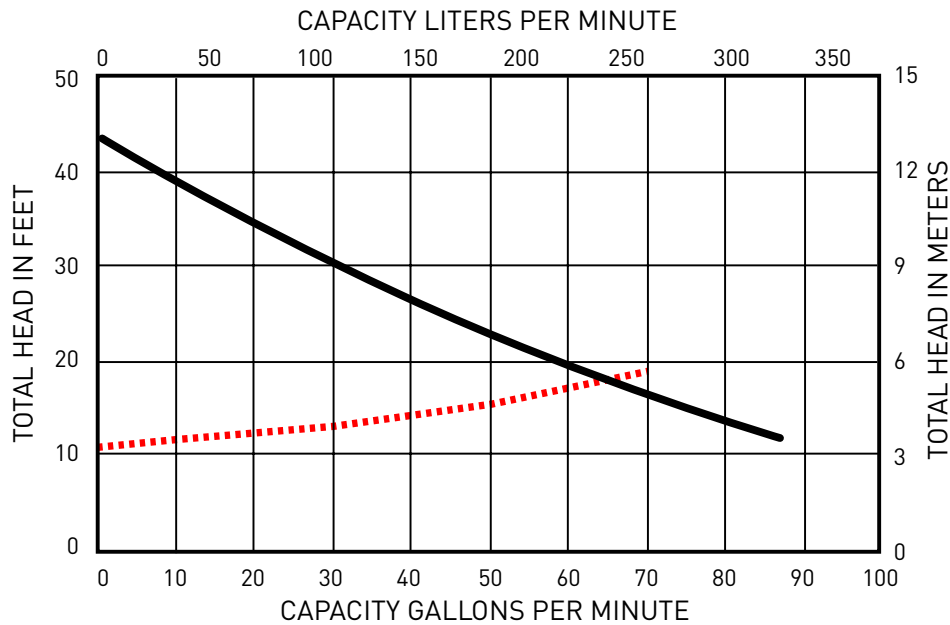
RPM: **3450** Discharge: **2"** Solids: **¾"**



DRAINFIELD PUMPS

Capacity Point = 65 GPM @ 18.05' TDH with ball valve at manifold completely open.

Operating Point = 40 GPM @ 14.03' TDH based on drainfield design. Operating Point will be achieved by partially closing the ball valve at manifold to achieve 5' discharge head @ 40 GPM.



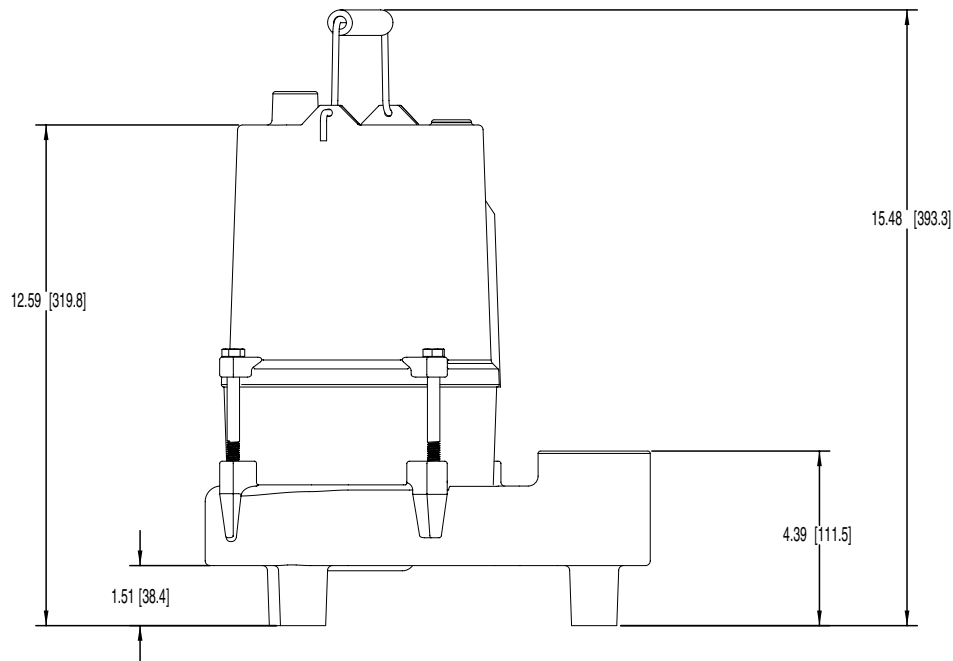
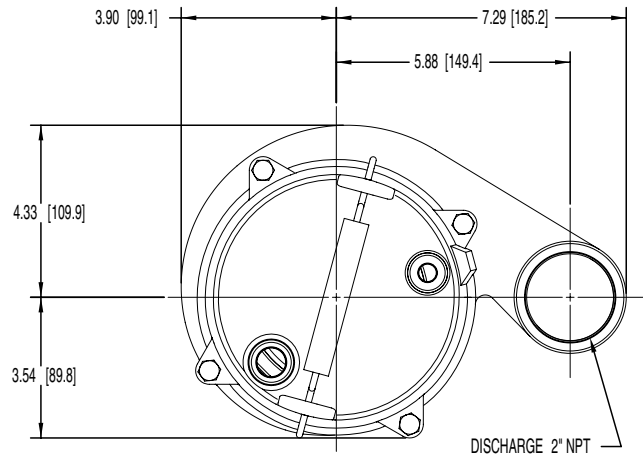
The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

MYERS® ME45 HIGH HEAD EFFLUENT

DIMENSIONAL DATA

Wholesale Products Page: MY10466-2

Dated: January 2014



All dimensions in inches. Metric for international use. Component dimensions may vary $\pm 1/8$ inch. Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product (s) and the product (s) specifications without notice.

MYERS®

ME45

HIGH HEAD EFFLUENT

ELECTRICAL DATA

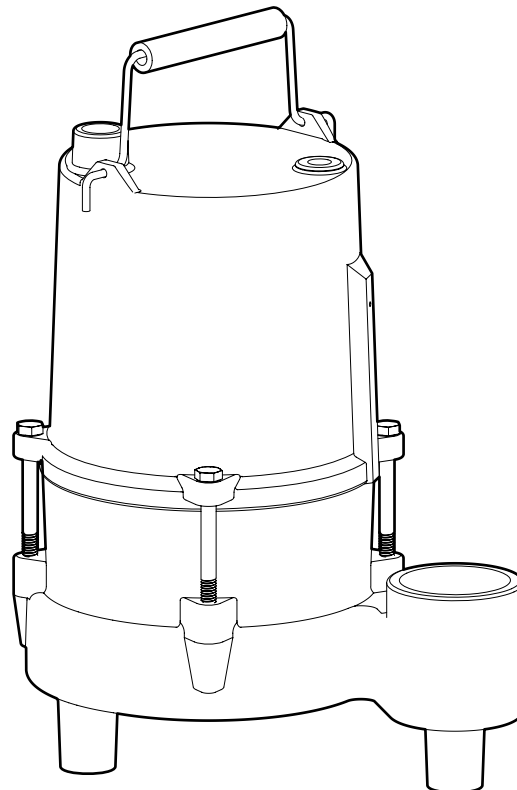
Wholesale Products Page: MY10466-3

Dated: January 2014

MODEL: ME45 HIGH HEAD EFFLUENT

R.P.M.	3450
MOTOR TYPE	THERMAL OVERLOAD, OIL FILLED
MOTOR PROTECTION	AUTOMATIC RESET / THERMAL OVERLOAD

HP	VOLTAGE	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS
1/2	115	1	-	1	9.0
	230	1		1	4.5



ME45

MODEL: ME45 HIGH HEAD EFFLUENT

Physical Data

DISCHARGE SIZE	2" NPT
SOLIDS SIZE	3/4"
IMPELLER TYPE	NON CLOG CAST IRON
CABLE LENGTH	20' STANDARD 30' OPTIONAL
PAINT	PAINTED AFTER ASSEMBLY DARK GREEN, WATER REDUCIBLE ENAMEL, ONE COAT, AIR DRIED.

Temperature

MAXIMUM LIQUID	140°F
MAXIMUM STATOR	-
OIL FLASH POINT	-

Technical Data

POWER CORD TYPE		SJT00W / SJT00W-A
MATERIALS OF CONSTRUCTION	MOTOR HOUSING	CAST IRON
	CASING	CAST IRON
	IMPELLER	THERMOPLASTIC
	MOTOR SHAFT	416 STAINLESS STEEL
	HARDWARE	STAINLESS STEEL
	"O" RINGS	BUNA - N
MECHANICAL SEALS Standard:		CARBON / CERAMIC
UPPER BEARING		BALL
LOWER BEARING		BALL

MODELS: SUBMERSIBLE SUMP/EFFLUENT MODEL ME45

1.01 GENERAL

Contractor shall furnish all labor, materials, equipment and incidentals required to provide _____ (Qty.) submersible centrifugal high head effluent pump(s) as specified herein. The pump model covered in this specification is the ME45. The pump furnished for this application shall be MODEL _____ as manufactured by MYERS.

2.01 DESIGN CONDITIONS

Each pump shall be rated _____ H.P., _____ volts, _____ phase, _____ hertz and operate at _____ RPM.

3.01 OPERATING CONDITIONS

The pump shall deliver _____ U.S. GPM/LPS at feet/meters TDK, and handle a _____ inch solid. The curve submitted for approval shall state, in addition to head and capacity performance, solid handling capability, amp rating, and design impeller diameter.

4.01 CONSTRUCTION

Each pump shall be of the sealed submersible type incorporating features normally found in pumps furnished for the residential market.

These features include:

- A The pump volute and motor housing shall be high quality gray cast iron, ASTM A-48, Class 30.
- B The pump inlet shall be open and clear, without screening to provide access for effluent and septic tank solids.
- C All external mating parts shall be machined and Buna N, O-Ring sealed.
- D All fasteners exposed to the pumped liquid shall be 300 series stainless steel.
- E All power cords shall be water resistant UL or CSA approved, with double insulation and sized as a function of Amp. draw.

5.01 MOTOR AND SHAFT

The stator, rotor and bearings shall be mounted in a sealed submersible type housing. Single phase motors shall be split phase with centrifugal switch and start capacitor. Full Load and Locked Rotor Amps as well as Start and Run winding resistance shall be tabulated for each pump.

MODELS: SUBMERSIBLE SUMP/EFFLUENT MODEL ME45**6.01 BEARINGS, SHAFT AND MECHANICAL SEAL**

An upper radial and lower thrust bearing shall be required. The upper and lower bearings shall be heavy duty single row ball bearings. The bearings will be permanently and continuously lubricated and cooled by the dielectric oil which fills the motor housing. The motor shaft shall be corrosion resistant steel and sealed from the pumped liquid with a carbon ceramic mechanical seal.

7.01 IMPELLER

The impeller shall be high capacity, two vane, high head design with four pump out vanes on the back side. These vanes wash out grit and stringy material that could damage the shaft and mechanical seal.

8.01 AUTOMATIC CONTROL

All single phase pumps should be capable of automatic operation.

9.01 FLOAT SWITCH

The pump is supplied with a tilt sensitive wide-angle float switch which is sealed in a non-corrosive PVC enclosure. The switch is UL listed for water and sewage and CSA certified. The float switch shall also be fitted with a piggy-back plug that allows the pump to be operated manually without removal from the sump.

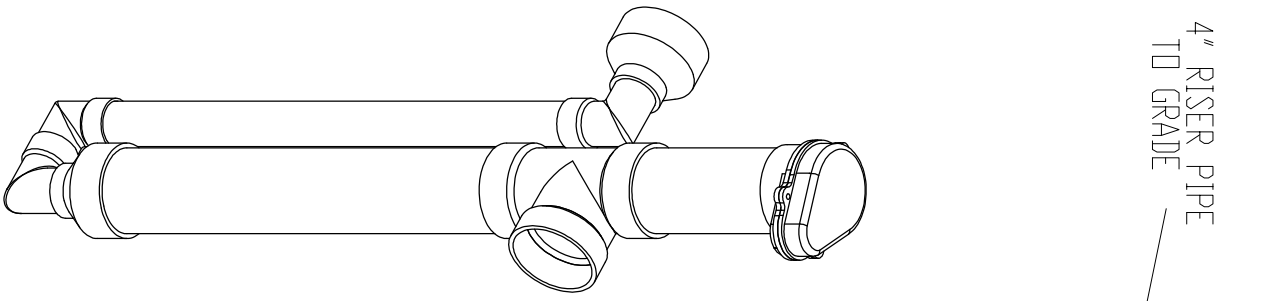
10.01 PAINTING

All cast iron parts shall be painted before assembly with a water reducible alkyd air dried enamel. The paint shall be applied in one coat with a minimum thickness of 3 to 4 mils.

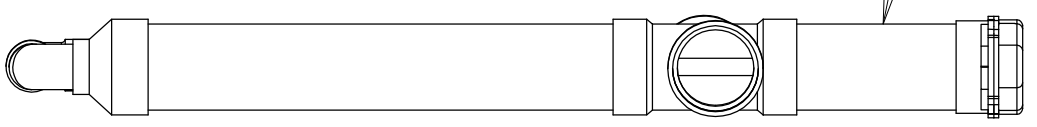
11.01 TESTING

All pumps shall be individually tested to include the following:

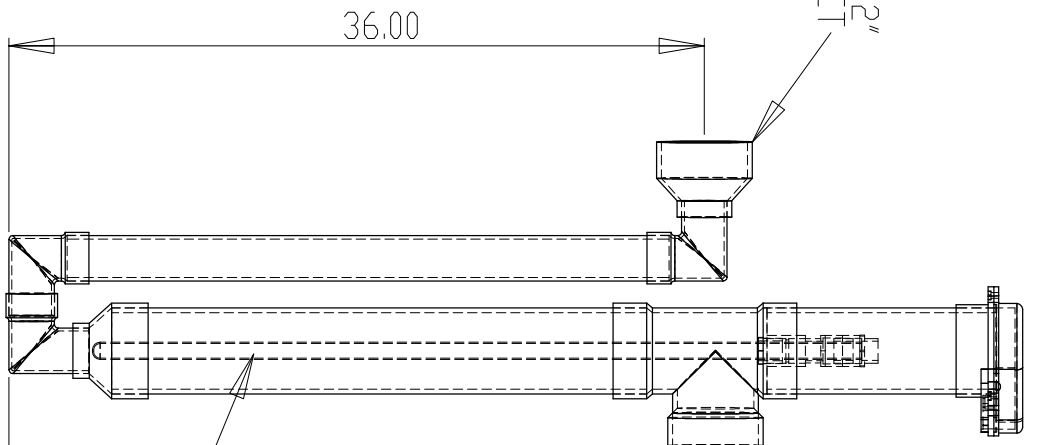
- A The pump and power cord shall be visually inspected for imperfections, cuts or nicks.
- B The pump shall have a ground continuity check and the motor chamber shall be Hi-potted to test for moisture content and/or insulation defects.
- C The motor and volute housing shall be pressurized and a 10 second air leak decay test run.
- D A specific amount of oil is added. The pump is run in a fully automated, sequenced, control console, which monitors voltage, current and watts visually and electronically. The tester listens for any noise or malfunction.



4" RISER PIPE
TO GRADE



4" WELL CAP



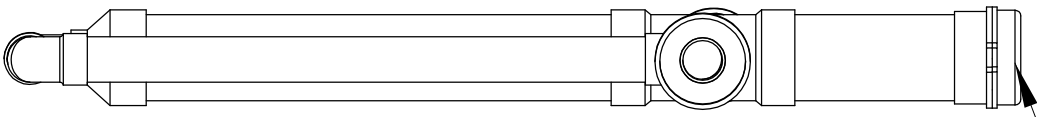
4" OR 2"
OUTLET

4" INLET

36.00

37.00

UV LAMP



PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS
DRAWING IS THE SOLE PROPERTY OF
RP MANUFACTURING. ANY
REPRODUCTION IN PART OR AS A WHOLE
WITHOUT THE WRITTEN PERMISSION OF
RP MANUFACTURING IS
PROHIBITED.

5

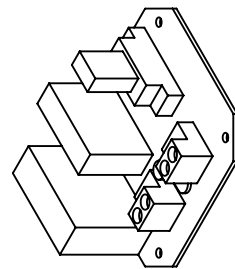
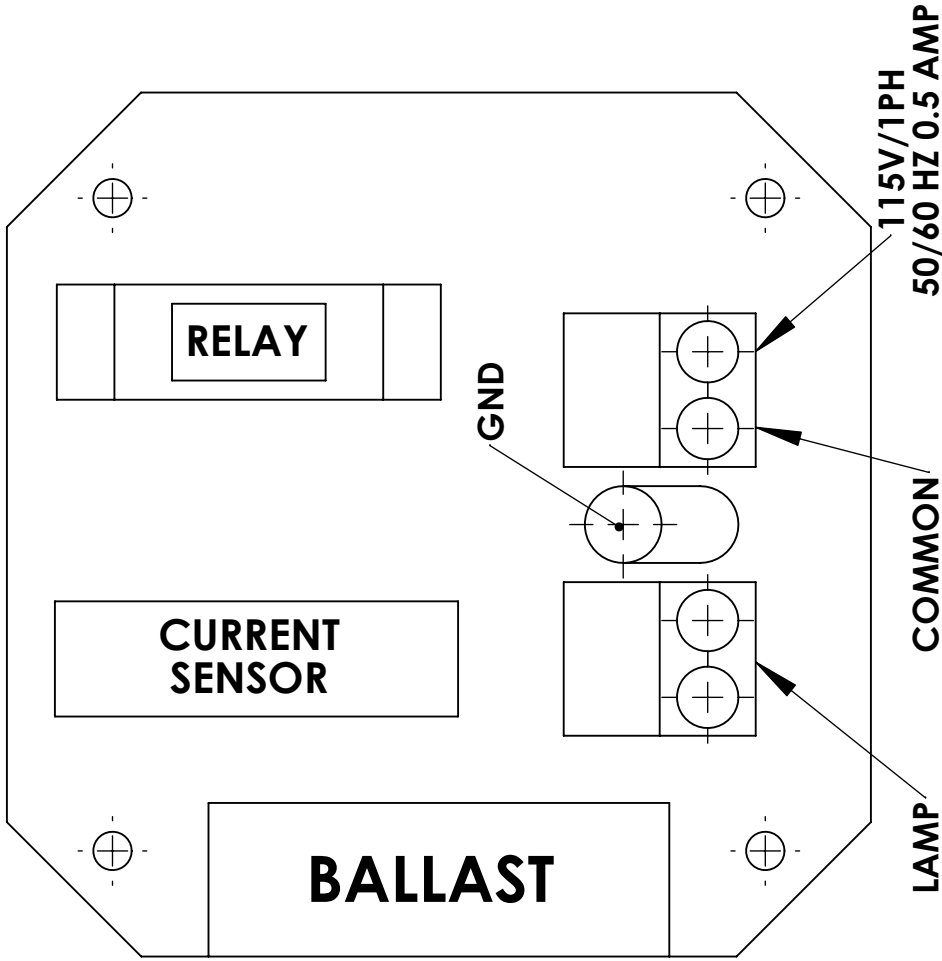
4

3

2

1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL		DRAWN	NAME	DATE
FINISH		CHECKED		
DO NOT SCALE DRAWING		ENG APPR.		
NEXT ASSY		MFG APPR.		
USED ON		QA.		
APPLICATION		COMMENTS:	FLOW RATE 10 GALLONS A MINUTE	
		PATENT PENDING		
		TITLE: UV-101 SINGLE LAMP		
		SIZE DWG. NO.		REV
		SCALE: 1:20	WEIGHT:	SHEET 1 OF 1



PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF RP MANUFACTURING LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF RP MANUFACTURING LLC, IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES		
TOLERANCES:	DRAWN	
FRACTIONAL: ±	CHECKED	
ANGULAR: MACH: ± BEND ±	ENG APPR.	
TWO PLACE DECIMAL ±	MFG APPR.	
THREE PLACE DECIMAL ±	Q.A.	
INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:	
MATERIAL		
FINISH		
USED ON		
APPLICATION		
NEXT ASSY		
DO NOT SCALE DRAWING		

TITLE:

UV-101 WIRING DIAGRAM

SIZE DWG. NO. **A** REV

SCALE: 1:5 WEIGHT: SHEET 1 OF 1

ROUTE 1185

PROJECT 1126 COROLLA VILLAGE RD

COUNTY OF CURRITUCK

DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY ENCROACHMENT AGREEMENT FOR NON-UTILITY ENCROACHMENTS ON PRIMARY AND SECONDARY HIGHWAYS

-AND-

TFP, LLC,

THIS AGREEMENT, made and entered into this the _____ day of _____, 20_____, by and between the Department of Transportation, party of the first part; and TFP, LLC _____ party of the second part,

WITNESSETH

THAT WHEREAS, the party of the second part desires to encroach on the right of way of the public road designated as Route(s) SR 1185, located AT THE INTERSECTION OF SR1185 AND SR1406 (SCHOOLHOUSE LN)

with the construction and/or erection of: installation of a single 551 LF concrete entrance, 45 LF of 15" RCP driveway culvert and associated grading. Project also proposes two water services and meters with backflow prevention devices.

WHEREAS, it is to the material advantage of the party of the second part to effect this encroachment, and the party of the first part in the exercise of authority conferred upon it by statute, is willing to permit the encroachment within the limits of the right of way as indicated, subject to the conditions of this agreement;

NOW, THEREFORE, IT IS AGREED that the party of the first part hereby grants to the party of the second part the right and privilege to make this encroachment as shown on attached plan sheet(s), specifications and special provisions which are made a part hereof upon the following conditions, to wit:

That the said party of the second part binds and obligates himself to install and maintain the encroaching facility in such safe and proper condition that it will not interfere with or endanger travel upon said highway, nor obstruct nor interfere with the proper maintenance thereof, to reimburse the party of the first part for the cost incurred for any repairs or maintenance to its roadways and structures necessary due to the installation and existence of the facilities of the party of the second part, and if at any time the party of the first part shall require the removal of or changes in the location of the said facilities, that the said party of the second part binds himself, his successors and assigns, to promptly remove or alter the said facilities, in order to conform to the said requirement, without any cost to the party of the first part.

That the party of the second part agrees to provide during construction and any subsequent maintenance proper signs, signal lights, flagmen and other warning devices for the protection of traffic in conformance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part.

That the party of the second part hereby agrees to indemnify and save harmless the party of the first part from all damages and claims for damage that may arise by reason of the installation and maintenance of this encroachment.

It is clearly understood by the party of the second part that the party of the first part will assume no responsibility for any damage that may be caused to such facilities, within the highway rights of way limits, in carrying out its construction and maintenance operations.

That the party of the second part agrees to restore all areas disturbed during installation and maintenance to the satisfaction of the Division Engineer of the party of the first part. The party of the second part agrees to exercise every reasonable precaution during construction and maintenance to prevent eroding of soil; silting or pollution of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces or other property; or pollution of the air. There shall be compliance with applicable rules and regulations of the North Carolina Division of Environmental Management, North Carolina Sedimentation Control Commission, and with ordinances and regulations of various counties, municipalities and other official agencies relating to pollution prevention and control. When any installation or maintenance operation disturbs the ground surface and existing ground cover, the party of the second part agrees to remove and replace the sod or otherwise reestablish the grass cover to meet the satisfaction of the Division Engineer of the party of the first part.

That the party of the second part agrees to assume the actual cost of any inspection of the work considered to be necessary by the Division Engineer of the party of the first part.

That the party of the second part agrees to have available at the encroaching site, at all times during construction, a copy of this agreement showing evidence of approval by the party of the first part. The party of the first part reserves the right to stop all work unless evidence of approval can be shown.

Provided the work contained in this agreement is being performed on a completed highway open to traffic; the party of the second part agrees to give written notice to the Division Engineer of the party of the first part when all work contained herein has been completed. Unless specifically requested by the party of the first part, written notice of completion of work on highway projects under construction will not be required.

That in the case of noncompliance with the terms of this agreement by the party of the second part, the party of the first part reserves the right to stop all work until the facility has been brought into compliance or removed from the right of way at no cost to the party of the first part.

That it is agreed by both parties that this agreement shall become void if actual construction of the work contemplated herein is not begun within one (1) year from the date of authorization by the party of the first part unless written waiver is secured by the party of the second part from the party of the first part.

R/W (161A) : Party of the Second Part certifies that this agreement is true and accurate copy of the form R/W (161A) incorporating all revisions to date.

IN WITNESS WHEREOF, each of the parties to this agreement has caused the same to be executed the day and year first above written.

DEPARTMENT OF TRANSPORTATION

BY: _____
DIVISION ENGINEER

ATTEST OR WITNESS:

TFP, LLC

DOUGLAS A. TWIDDY

Second Party

INSTRUCTIONS

When the applicant is a corporation or a municipality, this agreement must have the corporate seal and be attested by the corporation secretary or by the empowered city official, unless a waiver of corporate seal and attestation by the secretary or by the empowered City official is on file in the Raleigh office of the State Utilities Manager. In the space provided in this agreement for execution, the name of the corporation or municipality shall be typed above the name, and title of all persons signing the agreement should be typed directly below their signature.

When the applicant is not a corporation, then his signature must be witnessed by one person. The address should be included in this agreement and the names of all persons signing the agreement should be typed directly below their signature.

This agreement must be accompanied, in the form of an attachment, by plans or drawings showing the following applicable information:

1. All roadways and ramps.
2. Right of way lines and where applicable, the control of access lines.
3. Location of the proposed encroachment.
4. Length and type of encroachment.
5. Location by highway survey station number. If station number cannot be obtained, location should be shown by distance from some identifiable point, such as a bridge, road, intersection, etc. (To assist in preparation of the encroachment plan, the Department's roadway plans may be seen at the various Highway Division Offices, or at the Raleigh office.)
6. Drainage structures or bridges if affected by encroachment.
7. Typical section indicating the pavement design and width, and the slopes, widths and details for either a curb and gutter or a shoulder and ditch section, whichever is applicable.
8. Horizontal alignment indicating general curve data, where applicable.
9. Vertical alignment indicated by percent grade, P.I. station and vertical curve length, where applicable.
10. Amount of material to be removed and/or placed on NCDOT right of way, if applicable.
11. Cross-sections of all grading operations, indicating slope ratio and reference by station where applicable.
12. All pertinent drainage structures proposed. Include all hydraulic data, pipe sizes, structure details and other related information.
13. Erosion and sediment control.
14. Any special provisions or specifications as to the performance of the work or the method of construction that may be required by the Department must be shown on a separate sheet attached to encroachment agreement provided that such information cannot be shown on plans or drawings.
15. The Department's Division Engineer should be given notice by the applicant prior to actual starting of installation included in this agreement.
16. Method of handling traffic during construction where applicable.
17. Scale of plans, north arrow, etc.

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No.	Date of Application	
County: Currituck County		
Development Name: 1126 Corolla Village Rd		

LOCATION OF PROPERTY:

Route/Road: SR 1185 (Corolla Village Rd)

Exact Distance 0.2 Miles N S E W
 Feet

From the Intersection of Route No. SR 1185 and Route No. SR 1406 Toward _____

Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other

Property: is is not within General Business City Zoning Area.

AGREEMENT

- I, the undersigned property owner, request access and permission to construct driveway(s) or street(s) on public right-of-way at the above location.
- I agree to construct and maintain driveway(s) or street entrance(s) in absolute conformance with the current "Policy on Street and Driveway Access to North Carolina Highways" as adopted by the North Carolina Department of Transportation.
- I agree that no signs or objects will be placed on or over the public right-of-way other than those approved by NCDOT.
- I agree that the driveway(s) or street(s) will be constructed as shown on the attached plans.
- I agree that that driveway(s) or street(s) as used in this agreement include any approach tapers, storage lanes or speed change lanes as deemed necessary.
- I agree that if any future improvements to the roadway become necessary, the portion of driveway(s) or street(s) located on public right-of-way will be considered the property of the North Carolina Department of Transportation, and I will not be entitled to reimbursement or have any claim for present expenditures for driveway or street construction.
- I agree that this permit becomes void if construction of driveway(s) or street(s) is not completed within the time specified by the "Policy on Street and Driveway Access to North Carolina Highways".
- I agree to pay a \$50 construction inspection fee. Make checks payable to NCDOT. This fee will be reimbursed if application is denied.
- I agree to construct and maintain the driveway(s) or street(s) in a safe manner so as not to interfere with or endanger the public travel.
- I agree to provide during and following construction proper signs, signal lights, flaggers and other warning devices for the protection of traffic in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the District Engineer.
- I agree to indemnify and save harmless the North Carolina Department of Transportation from all damages and claims for damage that may arise by reason of this construction.
- I agree that the North Carolina Department of Transportation will assume no responsibility for any damages that may be caused to such facilities, within the highway right-of-way limits, in carrying out its construction.
- I agree to provide a Performance and Indemnity Bond in the amount specified by the Division of Highways for any construction proposed on the State Highway system.
- The granting of this permit is subject to the regulatory powers of the NC Department of Transportation as provided by law and as set forth in the N.C. Policy on Driveways and shall not be construed as a contract access point.
- I agree that the entire cost of constructing and maintaining an approved private street or driveway access connection and conditions of this permit will be borne by the property owner, the applicant, and their grantees, successors, and assignees.
- **I AGREE TO NOTIFY THE DISTRICT ENGINEER WHEN THE PROPOSED WORK BEGINS AND WHEN IT IS COMPLETED.**

