

**Christine & Joshua Haymond
(Ruffy Homes)**

**Engineered Option Permit
Pressure Manifold System**

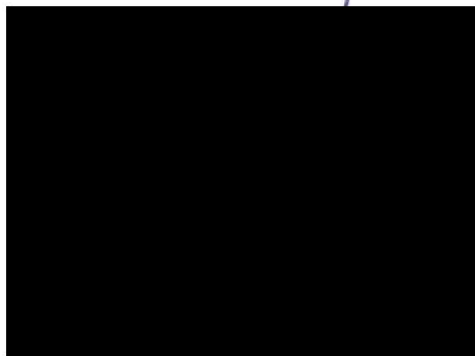
**6004 Canadero Drive
Wake County, North Carolina**

Application Package for Single Family Residence

Project No.: A35907.00

Submittal Date: June 3, 2024

Prepared By: CAC/ACM Reviewed By: DCB



**Prepared By:
MacConnell & Associates, P.C.**

**501 Cascade Pointe Lane, Suite 103
Cary, NC 27513
Phone: (919) 467-1239**

**P.O. Box 129
Morrisville, NC 27560
Fax: (919) 319-6510**

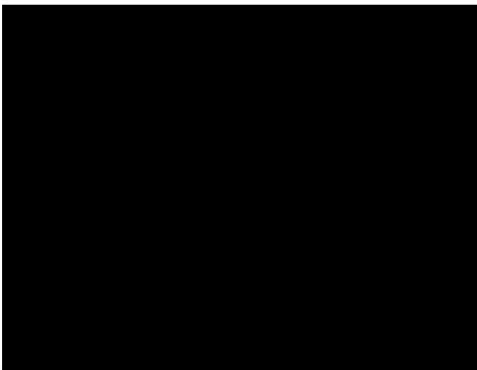
Table of Contents

- Application Form and Supporting Documents
- Project Narrative
- Proof of Ownership
- Soils Evaluation
- Project Specifications
- Design Calculations (Initial)
- Design Calculations (Repair)
- Equipment (Initial)
- Equipment (Repair)
- Operation and Maintenance Procedures

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Application Form and Supporting Documents



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501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

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Morrisville, North Carolina 27560**

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NC DEPARTMENT OF
**HEALTH AND
HUMAN SERVICES**

ROY COOPER • Governor

KODY H. KINSLEY • Secretary

MARK BENTON • Chief Deputy Secretary for Health

SUSAN KANSAGRA • Assistant Secretary for Public Health

Division of Public Health

COMMON FORM FOR ENGINEERED OPTION PERMIT

LHD USE ONLY: Initial submittal of this NOI received: 6/11/2024 by FP
Date Initials

PART 1: Notice of Intent to Construct (NOI) - Please check all that apply.

☐ Single System or ☐ Multiple Systems

AND

☐ New ☐ Expansion ☐ Relocation of all or part of the Existing System ☐ Relocation of Repair Area

☐ Repair – LHD Permit Number _____ ☐ Repair – EOP/LSS COVID 19/AOWE Permit Number _____

1. Facility Owner's name: (Owner, Company Name, Utility, Partnership, Individual, etc.): _____
Christine & Joshua Haymond (Rufty Homes)

Mailing address: 4229 Laurel Ridge Drive City: Raleigh State: NC Zip: 27612

Telephone number: _____ E-mail Address: _____

2. Professional Engineer (PE) name: David Barcal License number: 51201

Mailing address: P.O. Box 129 City: Morrisville State: NC Zip: 27560

Telephone number: (919) 467-1239 E-mail Address: david@macconnellandassoc.com

3. Licensed Soil Scientist (LSS) name: Jason Hall License number: 1248

Mailing address: 1900 South Main Street, Suite 110 City: Wake Forest State: NC Zip: 27587

Telephone number: (919) 569-6704 E-mail Address: jhall@centralcarolinasoil.com

4. Licensed Geologist (LG) (if applicable) name: _____ License number: _____

Mailing address: _____ City: _____ State: _____ Zip: _____

Telephone number: _____ E-mail Address: _____

5. On-Site Wastewater Contractor name: David Brantley & Sons, Inc. License number: 1036

Mailing address: 37 Pine Ridge Road City: Zebulon State: NC Zip: 27597

Telephone number: (252) 478-3721 E-mail Address: 1installer@gmail.com

6. Proof of Errors and Omissions or other appropriate liability insurance for the following persons is attached that includes the name of the insurer, name of the insured and the effective dates of coverage:

☒ PE ☒ LSS ☐ LG ☒ On-site Wastewater Contractor

7. Property location (physical address, tax parcel identification number or subdivision lot, block number of the property to be permitted): 6004 Canadero Drive, Raleigh NC 27612 PIN: 0777619747

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES • DIVISION OF PUBLIC HEALTH

LOCATION: 5605 SIX FORKS RD, RALEIGH NC 27609

MAILING ADDRESS: 1642 MAIL SERVICE CENTER, RALEIGH NC 27699-1642

www.ncdhhs.gov • TEL: 919-707-5874 • FAX: 919-845-3972

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

County Name: Wake

8. Type of facility: ☒ Place of residence No. Bedrooms: 5 No. Occupants: 10
☐ Place of business Basis for flow calculation: _____
☐ Place of public assembly Basis for flow calculation: _____
9. Factors that would affect the wastewater load: Domestic wastewater loading will be typical of a single family residence.
10. Type and location of proposed wastewater system: Initial System: Type III (b) Pressure Manifold System with EZ Flow. Repair System: Type III(e) Pressure Manifold System with T&J Panel Block.
11. Design wastewater flow: 600 gpd (For flow > 3,000 gpd and industrial process, duplicate plans shall be sent to the State.)
Design wastewater strength: ☒ domestic ☐ high strength ☐ industrial process
12. A plat as defined in G.S. 130A-334(7a) is attached: ☐ Yes ☒ No
13. Location of proposed or existing wells (drinking water, irrigation, geothermal, groundwater monitoring, sampling, etc.) and any potable and non-potable water conveyance lines is indicated on attached plans and complies with 15A NCAC 18E .0601: ☒ Yes ☐ No
This is a saprolite system. ☐ Yes ☒ No
14. Evaluation(s) of soil conditions and site features in accordance with G.S. 130A-335(a1) signed and sealed by a LSS is attached: ☒ Yes ☐ No
15. Evaluation of geologic and hydrogeologic conditions signed and sealed by a LG is attached ☐ Yes ☒ NA
16. Proposed landscape, site, drainage, or soil modifications are attached: ☐ Yes ☒ NA

Attestation by Professional Engineer licensed in North Carolina pursuant to G.S. 89C

I, David Barcal hereby attest that the information required to be included with
this Notice of Intent is complete to the best of my knowledge and that the proposed
system shall meet all applicable local laws, regulations, rules, and ordinances in accordance with
G.S. 130A-336.1.

Christine & Josh Raymond hereby designate David Barcal
as my legal representative for purposes of this Notice of Intent pursuant to G.S. 130A-336.1.
Signature of Owner Date
Josh Raymond Christie Raymond
Signature of Owner Date
6/3/2024

Owner self-submittal of NOI:

I, _____ hereby submit this NOI prepared by _____
pursuant to G.S. 130A-336.1.
Signature of Owner Date

PART 3: Authorization to Operate (ATO)

LHD USE ONLY: Initial submittal of this ATO received: _____ by _____
Date Initials

The following items are included in this Authorization to Operate for an EOP:

- | | | |
|---|------------------------------|-----------------------------|
| 1. Signed and sealed copy of the Engineer's report that includes the information in G.S. 130A-336.1(k)(1) | ☐ Yes | ☐ No |
| 2. Operation and management program and ORC contract, if applicable | ☐ Yes | ☐ No |
| 3. Letter documenting Owner's acceptance of the system from the PE | ☐ Yes | ☐ No |
| 4. Owner meets requirements control of the system per 15A NCAC 18E .0301(b) | ☐ Yes | ☐ No |
| 5. Easement, right of way, or encroachment agreement required per 15A NCAC 18E .0301(c) | ☐ Yes | ☐ No |
| 6. Multi-party agreements required, as applicable, per 15A NCAC 18E .0204(g) | ☐ Yes | ☐ No |
- If yes, agreements filed in _____ County Register of Deeds in Deed Book _____ Page _____

Attestation by the Owner or the PE for Authorization to Operate

I, _____ hereby attest that all items indicated above have been provided
Print name of Owner or Professional Engineer
and the system meets applicable federal, State, and local laws, regulations, rules, and ordinances in accordance with G.S. 130A-336-.1(e)(6).

Signature of Owner or Professional Engineer

Date

NOTES:

LIABILITY: The Department, the Department's authorized agents, or local health departments shall have no liability for wastewater systems designed, constructed, and installed pursuant to an Engineer Option Permit [G.S. 130A-336.1(f)]



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

10/27/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Harris & Company - Cary Office 215 E Chatham St. Suite 120		CONTACT NAME: Chris Ham PHONE (A/C, No, Ext): (919)467-8126 E-MAIL ADDRESS: chris@hc1935.com FAX (A/C, No): (919)467-8175	
Cary	NC 27511	INSURER(S) AFFORDING COVERAGE	
INSURED MacConnell & Associates PC Po Box 129 Morrisville NC 27560-0129		INSURER A: ERIE Insurance Exchange	
		INSURER B: Continental Casualty Co	
		INSURER C:	
		INSURER D:	
		INSURER E:	
		INSURER F:	

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL SUBR INSD WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC OTHER:		Q97-0842712	11/04/2023	11/04/2024	EACH OCCURRENCE \$ 2,000,000
		DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 2,000,000				
		MED EXP (Any one person) \$ 5,000				
		PERSONAL & ADV INJURY \$ 2,000,000				
A	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ OWNED AUTOS ONLY ☒ HIRED AUTOS ONLY ☐ SCHEDULED AUTOS ☒ NON-OWNED AUTOS ONLY		Q97-0842712	11/04/2023	11/04/2024	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000
		BODILY INJURY (Per person) \$				
		BODILY INJURY (Per accident) \$				
		PROPERTY DAMAGE (Per accident) \$				
A	UMBRELLA LIAB ☒ EXCESS LIAB ☐ DED ☐ RETENTION \$		Q31-1070288	07/10/2023	07/10/2024	EACH OCCURRENCE \$ 2,000,000
		AGGREGATE \$ 2,000,000				
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	☐ Y ☒ N	Q91-1000820	07/10/2023	07/10/2024	☒ PER STATUTE ☐ OTH-ER
		E.L. EACH ACCIDENT \$ 1,000,000				
		E.L. DISEASE - EA EMPLOYEE \$ 1,000,000				
		E.L. DISEASE - POLICY LIMIT \$ 1,000,000				
B	Professional Liability & Pollution Incident Liability Insurance		AEH591893132	09/17/2023	09/17/2024	Each Claim \$2,000,000
						Aggregate \$2,000,000
						Deductible \$5,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Engineer, Policy Forms and Endorsements Apply

CERTIFICATE HOLDER**CANCELLATION**

This Certificate is for
Informational Purposes Only.
Certificate Holder Name and
Address Needed to Validate.

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Christal D. Ham

Fax:
ACORD 25 (2016/03)

Email:

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CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

1/16/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Wade Associates, LLC 250 Pollock St. New Bern NC 28560	CONTACT NAME: Angela Sensenig PHONE (A/C, No, Ext): (252) 631-5269 FAX (A/C, No): (252) 649-2443 E-MAIL ADDRESS: asensenig@wadeict.com
INSURED Central Carolina Soil Consulting PLLC 1900 S. Main St. Ste. 110 Wake Forest NC 27587	INSURER(S) AFFORDING COVERAGE INSURER A: Markel Insurance Company INSURER B: INSURER C: INSURER D: INSURER E: INSURER F:
	NAIC # 38970

COVERAGES**CERTIFICATE NUMBER: 24-25****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☐ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☐ PRO-JECT ☐ LOC ☐ OTHER:						EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ HIRED AUTOS ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)
	UMBRELLA LIAB EXCESS LIAB ☐ OCCUR ☐ CLAIMS-MADE ☐ DED ☐ RETENTION \$						EACH OCCURRENCE AGGREGATE
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below Y / N ☐ N / A						PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT
A	Errors & Omissions			ME0112306	2/1/2024	2/1/2025	General Aggregate Each Occurrence \$3,000,000 \$3,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION*****FOR INFORMATIONAL PURPOSES ONLY***XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

N Whitsett/RACHEL

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ACORD 25 (2014/01)

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INS025 (201401)



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

7/6/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER SIA Group, Inc. 827 Gum Branch Road Jacksonville NC 28540	CONTACT NAME: Certificate Administrator PHONE (A/C, No, Ext): 910-478-3373 E-MAIL ADDRESS: certs@siagroup.com	FAX (A/C, No): 910-455-7481
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Owners Insurance Company		32700
INSURER B : Auto-Owners Insurance Company		18988
INSURER C : FFVA Mutual Insurance Co.		10385
INSURER D : Westchester Surplus Lines Insurance		
INSURER E :		
INSURER F :		

COVERAGES**CERTIFICATE NUMBER:** 397976543**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC OTHER:			35506165	7/2/2023	7/2/2024	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
A	☒ AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ONLY ☒ NON-OWNED AUTOS ONLY			53-914661-00	7/2/2023	7/2/2024	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
B	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED ☒ RETENTION \$ 10,000			53-914661-01	7/2/2023	7/2/2024	EACH OCCURRENCE \$ 3,000,000 AGGREGATE \$ 3,000,000 \$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N ☐	N / A	WC850-0050098-2023A	7/2/2023	7/2/2024	☒ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A D	Contractors Equipment Pollution			35506165 G71661957001	7/2/2023 8/10/2022	7/2/2024 8/10/2023	Leased/Rented Limit \$50,000 \$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

MacConnell & Associates, P.C.
501 Cascade Point Lane Suite 103
PO Box 129 Morrisville NC 27560
Cary NC 27513

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

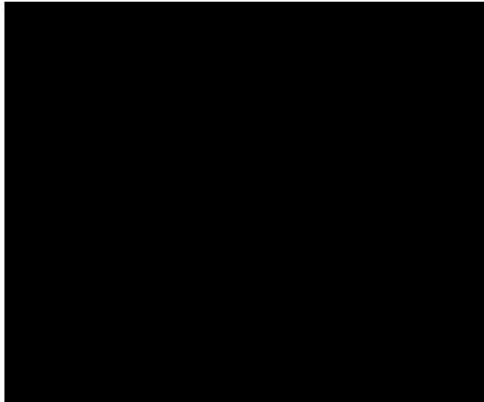
AUTHORIZED REPRESENTATIVE

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**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Project Narrative



**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

Project Narrative

Introduction

6004 Canadero Drive is located in Wake County, North Carolina. The Builder, Rufty Homes, proposes to construct a 5-bedroom single-family home and is seeking an Engineered Option Permit for the onsite wastewater system. MacConnell & Associates, P.C. has been contracted by Rufty Homes for the EOP design. The scope of this project is to design a pressure manifold system based on the Soils Evaluation Report prepared by Jason Hall, L.S.S of Central Carolina Soil Consulting, PLLC.

The design proposes a pressure manifold system with one 1,500-gallon septic tank, one 1,500-gallon pump tank with one pump to dose the daily average flow, a SCH 40 force main to convey flow to the manifold, and the drain lines to dispose of the domestic wastewater from the building. The drainfield will receive flow with a pump controlled by a demand-dosed control panel.

The proposed wastewater treatment and disposal system does not have any conflicts with existing utilities in the area. The system also maintains all buffer and setback requirements set in the 15A NCAC 18E rules amended November 9, 2023.

Proposed Initial System Design

Design daily flows and calculations:

Unadjusted Daily Design Flow:	5 Bedrooms * 120 GPD/bedroom = <u>600 GPD</u>
System Type:	Septic Tank, Pump Tank, Pressure Manifold, and EZ Flow Drain Lines.
Septic Tank Volume:	1,500 Gallons
Pump Tank Volume:	1,500 Gallons
Pump Rate:	37.8 GPM at 27.2 Feet Head
Pump Model:	Zoeller Flow-Mate Series, Model 145, 3/4 HP
Pump Dose Volume:	254 Gallons
Dose Type:	Demand Dosed $\pm$ 2 Times per Day
Drain Lines:	see calculations
Trench Type:	Quick4 Plus Standard chambers or EZ Flow 1203 H type drainpipe
LTAR:	0.3 GPD/SF
Area Required:	<u>600 GPD</u> / 0.3 GPD/SF = 2,000 SF
Linear Feet:	2,000 SF / 4 SF/LF = 500 LF

Where 4 SF/LF is the equivalency factor to provide 25% linear reduction

Proposed Repair System Design

Design daily flows and calculations:

Unadjusted Daily Design Flow:	5 Bedrooms * 120 GPD/bedroom = <u>600 GPD</u>
System Type:	Septic Tank, Pump Tank, Pressure Manifold, and Prefabricated Permeable Block Panel Drain Lines.
Septic Tank Volume:	1,500 Gallons
Pump Tank Volume:	1,500 Gallons
Pump Rate:	22.7 GPM at 33.6 Feet Head
Pump Model:	Zoeller Dose-Mate Series, Model 153, ½ HP
Pump Dose Volume:	313 Gallons
Dose Type:	Demand Dosed ± 2 Times per Day
Drain Lines:	see calculations
Trench Type:	Prefabricated Permeable Block Panel
LTAR:	0.3 GPD/SF
Area Required:	480 GPD/ 0.3 GPD/SF = 1,600 SF
Linear Feet:	1,600 SF / 6 SF/LF = 267 LF

Where 6 SF/LF is the equivalency factor to provide 50% linear reduction

Septic Tank

The proposed wastewater treatment system will provide both treatment and solids removal in a new 1,500-gallon septic tank. The tank will be manufactured by David Brantley and Sons, Inc. which has been previously approved by the On-Site Water Protection Branch (OSWP) or approved equal by engineer. This tank will provide greater than 2 days of detention time for adequate treatment and solids removal from the wastewater. Septic tank effluent will drain into the pump tank as wastewater flows into the septic tank. The septic tank will contain a POLYLOK PL-68 or SIM/TECK STF-110 effluent filter to prevent solids from reaching the pump tank.

Pump Tank

The pump tank is a new 1,500-gallon tank which will also be provided by David Brantley and Sons, Inc., or approved equal. The pump tank will house the equipment required to pump the septic tank effluent to the pressure manifold two times per day.

Pressure Manifold

The pressure manifold will be as shown on the construction drawings or approved equal. The forcemain will carry wastewater to the pressure manifold where it will be distributed to the drainfield laterals.

Control Panel

The control panel will be the Demand Dosed Simplex Control Panel Model 112 by SJE Rhombus or approved equal by engineer.

Chambers/EZ Flow Drain Lines (Initial)

The drain lines will be either Quick4 Plus Standard chambers or EZflow 1203H – GEO by Infiltrator. The drain lines shall be installed per manufacturer's recommendations. Please note, the OSWP approved equivalency factor of 4.0 SF/LF allows for a 25 percent reduction of the minimum required linear feet for drain lines.

Prefabricated Permeable Block Panel System Drain Lines (Repair)

The PPBPS drain lines will be manufactured by T&J Panel or approved equal. The drain lines shall be installed horizontally per manufacturer's recommendations.

Project Contacts

Names, addresses, phone and fax numbers of the owner, soil scientist, engineer, and installer are as follows:

Owners:

Christine & Joshua Haymond
4229 Laurel Ridge Drive
Raleigh, NC 27612

Developers

Sydney Jamison
Rufty Homes
5121 Kingdom Way, Suite 208
Raleigh, NC 27607
Phone: (919) 459-8684

Soil Scientist:

Mr. Jason Hall, LSS
Central Carolina Soil Consulting, PLLC
1900 South Main Street, Suite 110
Wake Forest, NC 27587
Phone: (919) 569-6704

Engineer:

Mr. David C. Barcal, PE
MacConnell & Associates, P.C.
Physical: 501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513
Mailing: P.O. Box 129
Morrisville, North Carolina 27560
Phone: (919) 467-1239 Cell: (919) 523-2248 Fax: (919) 319-6510

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Proof of Ownership

**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

Excise Tax: \$ 1050.00

REID: 0018916

Recording Time, Book and Page

Mail after recording to: Grantee

This instrument was prepared by: Stephen D. Lowry, 8358-104 Six Forks Rd, Raleigh NC 27615

Brief Description for the index:

Lot 2, Canadero S/D, Sect 1

NORTH CAROLINA GENERAL WARRANTY DEED

This Conveyance is insured by a title policy issued by Key Title

THIS DEED made this 29 day of June, 2021, by and between

GRANTOR	GRANTEE
David George Heeter, Trustee of The Revocable Declaration of Trust by David George Heeter dated July 18, 2008 1200 Carlos Drive, #106 Raleigh, NC 27609 ☐ If Checked, the property subject to conveyance includes the primary residence of at least one of the Grantors, otherwise, note as N/A, (per NC GS105-317.2)	Christine Cook Haymond and spouse, Joshua David Haymond <u>Property Address:</u> 5004 Canadero Drive, Raleigh, NC 27612 <u>Mailing Address:</u> 4229 Laurel Ridge Drive, Raleigh, NC 27612 ((to verify that your name(s), status and mailing address are correct, please initial <u>CH</u>))

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

WITNESSETH, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee in fee simple, all that certain lot or parcel of land situated in Wake County, North Carolina and more particularly described as follows:

BEING all of Lot 2, Canadero Subdivision, Section 1, according to the plat thereof recorded in Book of Maps 1972, Page 80, Wake County Registry.

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor is seized of the premises in fee simple, has the right to convey the same in fee simple, that title is marketable and free and clear of all encumbrances, and that Grantor will warrant and defend the title against the lawful claims of all persons whomsoever except for the exceptions hereinafter stated.

Submitted electronically by "Lowry & Assoc"
in compliance with North Carolina statutes governing recordable documents
and the terms of the submitter agreement with the Wake County Register of Deeds.

Title to the property hereinabove described is subject to the following exceptions:

1. Subject to ad valorem taxes for the year 2021 and all subsequent years.
2. Subject to all easements, agreements, and rights of way of record.
3. Subject to restrictions of record, Wake County Registry.

IN WITNESS WHEREOF, the Grantor has hereunto set his hand and seal the day and year first above written.

The Revocable Declaration of Trust by David George Heeter dated July 18, 2008

By: David G. Heeter
David George Heeter, Trustee

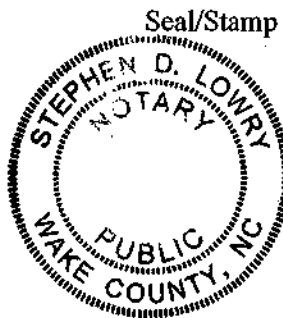
STATE OF NC
COUNTY OF Wake

I, certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she signed the foregoing document: **David George Heeter, Trustee of The Revocable Declaration of Trust by David George Heeter dated July 18, 2008.**

Witness my hand and official stamp or seal, this the 29 day of June, 2021.

My commission expires: 6/22/23

SLD
Notary Public



**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Soils Evaluation

**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**



Central Carolina Soil Consulting, PLLC

1900 South Main Street, Suite 110

Wake Forest, 27588

919-569-6704

September 20, 2023

Project #4689

Rufty Homes
Attention: Sydney Jamison
5121 Kingdom Way
Suite 208
Raleigh, NC 27607

RE: Preliminary soil/site evaluation for an EOP at 6004 Canadero Drive, Raleigh, NC.

Dear Ms. Jamison:

Central Carolina Soil Consulting, PLLC conducted a preliminary soil evaluation on the referenced parcel for a subsurface wastewater system in on September 18, 2023 for an EOP submittal. The soil/site evaluation was performed using hand auger borings and during dry soil conditions based on the criteria found in the State Subsurface Rules, 15ANCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems".

The lot currently has an existing house which is proposed removed for a new 5-bedroom single family residence. The existing septic system was not located, the permit was not on file. There is an existing well on-site to remain. A septic system field layout was completed based on the new house location and property lines surveyed in the field.

The proposed Initial system for the house is a Pressure Manifold distribution using lines 4-10 totaling >500 feet of accepted product (EZ-Flow) which the PE will have the final design footage. The repair field is a vertical panel block using lines 1-3 totaling >333' feet of product.

Septic Installation:

The septic system for the lot should be installed during dry soil conditions (no rain events within 72 hours). The septic system should be installed on contour while maintaining all required setbacks.

Based on the findings during the field evaluation, the area on the attached map has at least 48 inches of suitable soils for a modified conventional septic system. The assigned LTAR for the site is 0.3 gal/day/ft² with a maximum depth of 26 inches for the initial system installation of the drain lines due to slope correction. The assigned LTAR for the site is 0.3 gal/day/ft² with a maximum depth of 28 inches for the repair system installation of the drain lines due to slope correction.

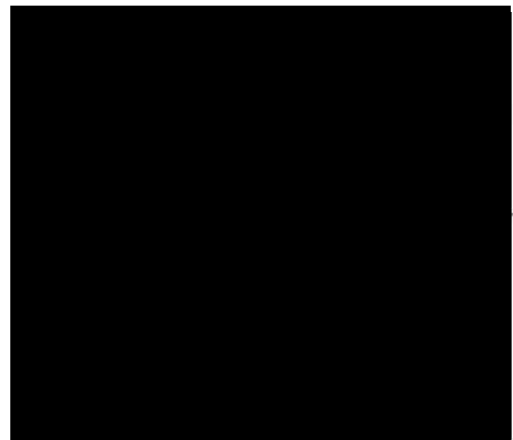
House:

- Initial: Pressure Manifold, lines 4-10 totaling >500' (see layout)
- Repair Vertical Panel Block, lines 1-3 totaling >333' (see layout)
- 600 gal/day flow rate (5-bedroom)
- Initial: 26" max trench depth
- Repair: 28" max trench depth
- 0.3 LTAR
- No grading/filling septic areas
- No cuts >2' within 15' of septic areas
- Keep tanks and drain lines 10' from property lines
- Keep supply line >5' property lines
- Install in dry soil conditions (No rain events within 72 hours)
- Maintain natural contours when clearing the lot

This letter discusses the location of provisionally suitable soils for subsurface wastewater disposal systems and does not guarantee the future function of any wastewater system on site. Central Carolina Soil Consulting, PLLC is a professional consulting firm specializing in soil delineations and design for on-site wastewater disposal systems.

If you have any questions regarding the findings on the attached map or in this report, please feel free to contact me at any time. Thank you allowing Central Carolina Soil Consulting, PLLC to perform this site evaluation for you.

Sincerely,



Jason Hall

NC Licensed Soil Scientist #1248

**CCSC SOIL/SITE EVALUATION
for ON-SITE WASTEWATER SYSTEM**

Sheet:
Property ID:
Lot #:
File #:
ApplID:

Owner: Rufty Homes

Applicant:

Address: Date Evaluated: 9/18/2023

Proposed Facility: 5-Bedroom Design Flow (.1949) 600 gal/day

Property Size:

Location of Site: 6004 Canadero Drive, Raleigh NC

Property Recorded:

Water Supply: ☐ Public ☐ Individual ☒ Well ☐ Spring ☐ Other

Evaluation Method: ☒ Auger Boring ☐ Pit ☐ Cut

Type of Wastewater: ☒ Sewage ☐ Industrial Process ☐ Mixed

P R O F I L E #	.1940 Landscape Position/ Slope%	Horizon Depth (IN.)	SOIL MORPHOLOGY .1941		b PROFILE FACTORS				Profile Class & LTAR
			.1941 Structure/ Texture	.1941 Consistence Mineralogy	.1942 Soil Wetness/ Color	.1943 Soil Depth (IN.)	.1956 Sapro Class	.1944 Restr Horiz	
1	LS, 7%	A, 0-5	Gr, SL	VFR, NS, NP		S			S .3
		Bt, 5-48	SBK, Clay	FI, SS, SP, SEXP					
2	LS, 7%	A, 0-4	Gr, SL	VFR, NS, NP		S			S .3
		Bt, 4-48	SBK, Clay	FI, SS, SP, SEXP					
3	LS, 5%	A, 0-2	Gr, SL	VFR, NS, NP		PS S			PS .35 S .3
		Bt, 2-21	SBK, CL	FR, SS, SP, SEXP					
		Bt2, 21-48	SBK, Clay	FI, SS, SP, SEXP					

Description	Initial System	Repair System
Available Space (.1945)	Yes	Yes
System Type(s)	Accepted	PPBPS
Site LTAR	.3	.3

Other Factors (.1946):

Soil Evaluation By: Jason Hall

Others Present: Michael Seewald

Site Classification (.1948): S

Site Evaluation By:

Others Present:

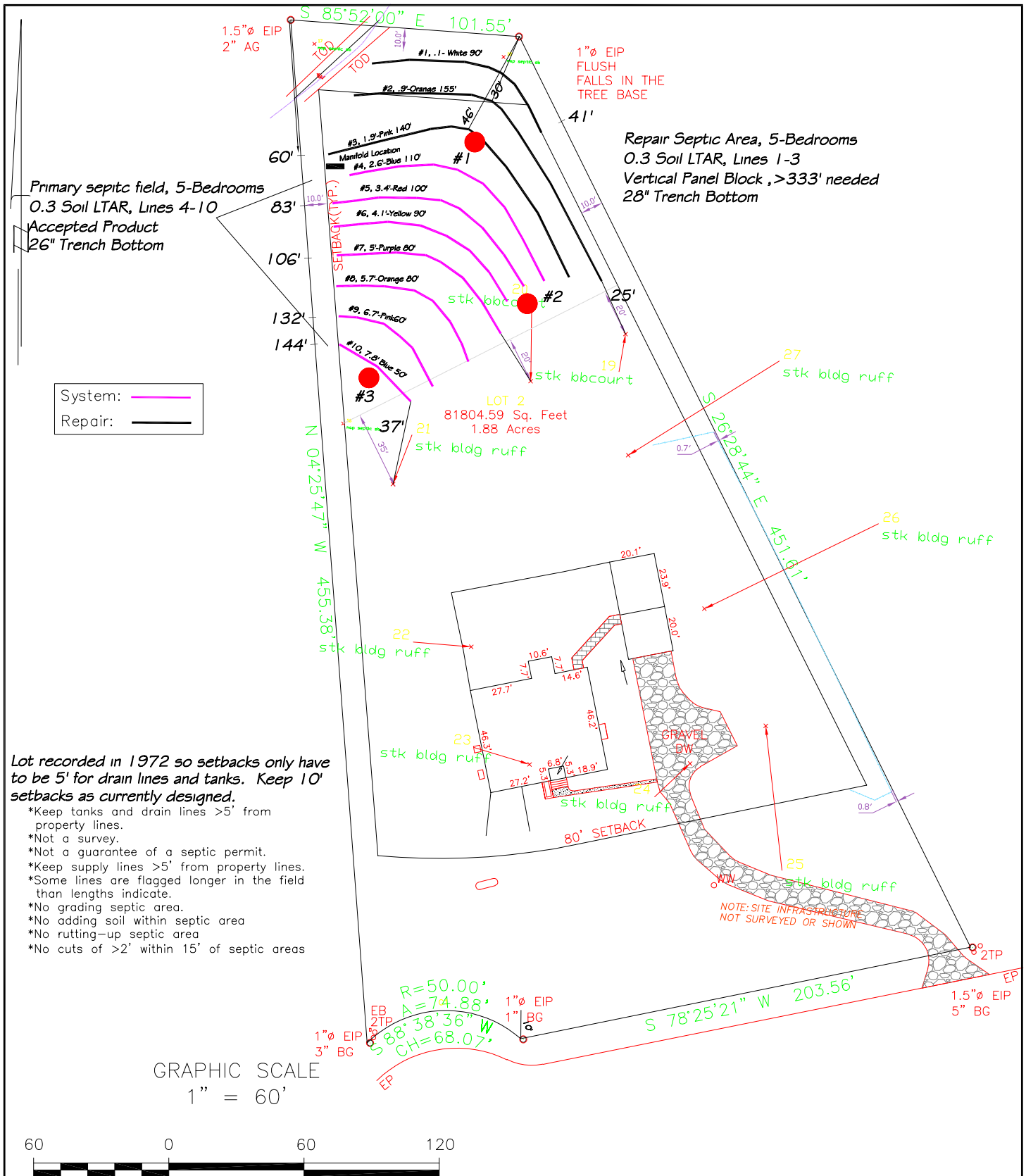
COMMENTS:

Sheet:
FILE #:

<u>Landscape Position</u>	<u>Group</u>	<u>Texture</u>	<u>.1955 LTAR</u>	<u>Structure</u>
R-Ridge	I	S-Sand	1.2 - 0.8	SG-Single Grain
SS-Shoulder Slope		LS-Loamy Sand		M-Massive
LS-Linear Slope				CR-Crumb
FS-Foot Slope	II	SL-Sandy Loam	0.8 - 0.6	GR-Granular
NS-Nose Slope		L-Loam		SBK-Subangular Blocky
HS-Head Slope				ABK-Angular Blocky
CC-Concave Slope	III	SI-Silt	0.6 - 0.3	PL-Platy
CV-Convex Slope		SICL-Silty Clay		PR-Prismatic
T-Terrace		Loam		
FP-Flood Plain	IV	CL-Clay Loam	0.4 - 0.1	
		SCL-Sandy Clay		
		Loam		
		SC-Sandy Clay		
		SIC-Silty Clay		
		C-Clay		

<u>Consistence</u>	<u>Consistence</u>	<u>Mineralogy</u>
<u>Moist</u>	<u>Wet</u>	SEXP-Slightly Expansive
VFR-Very Friable	NS-Non-Sticky	EXP-Expansive
FR-Friable	SS-Slightly Sticky	
FI-Firm	S-Sticky	
VFI-Very Firm	VS-Very Sticky	
EFI-Extremely Firm	NP-Non-Plastic	
	SP-Slightly Plastic	
	P-Plastic	
	VP-Very Plastic	

Sketch of Soil Evaluation Locations



Central Carolina Soil Consulting, PLLC
 1900 South Main Street, Suite 110
 Wake Forest, North Carolina 27587
 Phone (919)569-6704 Fax (919)569-6703

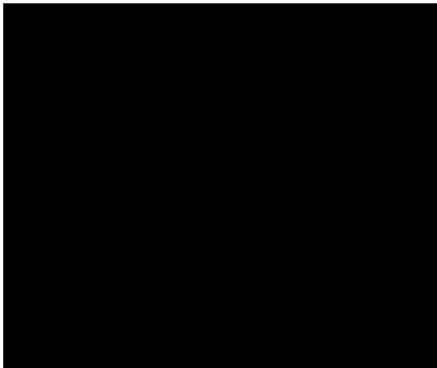
5-Bedroom Layout
 6004 Canadara Drive
 Raleigh, North Carolina

Job# : 4689
 Drawn By : JH
 Date : 9/19/23
 Revision:

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Project Specifications



**MacConnell & Associates, P.C.
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Project Specifications

Excavation and Backfilling

1. Excavated materials acceptable as backfill shall be stockpiled in a location approved by the Owner. The materials shall be located away from the edge of any excavations. Excavated materials shall not be stored where existing trees are located.
2. All open excavations shall be barricaded when construction in the area has stopped. Night barricading should include posted warning lights.
3. Protect existing structures, utilities, sidewalks, pavement, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Protect root systems from damage or dry-out to the greatest extent possible.
4. Soil materials shall be free of boulders, roots, sod, organic matter, and frozen material.
5. Bedding materials for pre-cast concrete structure installation shall be #57 washed stone to the dimensions and depth shown on the construction drawings.
6. All excavation is unclassified and includes excavation to subgrade elevations indicated on the construction drawings regardless of character of materials and obstruction encountered. In the event rock is encountered, the Contractor shall remove it at no additional cost to the owner.
7. Stability of excavations shall be maintained by sloping of the sides and shall comply with local codes, ordinances, and requirements of agencies having jurisdiction. Where space restrictions prevent sloping of the sides, shoring and bracing of the walls shall be employed in full compliance with OSHA requirements. In the case of pipe installations, sheeting shall remain in place until backfilling progresses to a stage where no damage to the pipe will result from removal.
8. The Contractor shall attempt to prevent surface and subsurface water from flowing into excavations. The Contractor shall provide equipment, materials, and work necessary to dewater any accumulation of water in the excavation to prevent softening of the soils, undercutting of footings, and changes to the soils detrimental to the stability of the improvements.
9. Excavations for structures shall conform to dimensions and elevations shown on the construction drawings within a tolerance of plus or minus 0.10 feet and to the standards of ASTM C891-90.
10. Backfill shall be installed to excavated spaces in 8-inch lifts and tamped by hand or pneumatically around pipe or structures. Tamping shall be performed evenly on both sides

of pipe and around sides of structures to a depth such that damage to the pipe or structures is avoided as a result of subsequent methods of compaction. Extreme care shall be exercised in backfilling operations to avoid displacement of pipe and structures either horizontally or vertically. Backfill consolidation by ponding water is not permitted. Compaction of each layer of backfill and the top 6 inches of subgrade shall achieve a 90 percent maximum dry density as measured by AASHTO method T-99.

11. Remove all waste materials including unacceptable excavated material, trash, and debris and legally dispose of it off Owner's property. Where settling is measurable or observable at excavated areas during project warranty period, the Contractor shall remove surface finish, add backfill material, compact, and replace surface treatment to a quality and appearance matching adjacent areas of previous work.

Septic and Field Dosing Tank Installation and Testing

1. Septic tanks shall conform to criteria in 15A NCAC 18E .0801-.0805.
2. Place bell ends of pre-cast sections or the groove end of the concrete facing down. In preparation for making joints, all surfaces of the portion of the section to be jointed and the factory-made jointing materials shall be clean and dry. Each joint, seam, and pipe penetration inside and outside of joints shall receive liberal applications of non-shrink grout as well as liberal amounts of bitumastic waterproof sealant.
3. Lifting holes and other penetrations of the pre-cast structure wall shall be sealed with nonshrinking grout. Pipe connections shall be made so that the pipe does not project beyond the inside wall of the structure. Grout connections as necessary to make smooth and uniform surfaces on the inside of the structure.
4. Before placing any tank into operation, remove any dropped grout, sand or other imperfections and obstructions from the interior of the structure. Specifically, the inside walls of the tank shall be smooth and uniform. Smooth-finish inverts so that wastewater flow is confined and directed through the inlet and outlet pipes with easy transition.
5. Tanks shall be backfilled in accordance with the applicable specifications herein before described.
6. All pipe penetrations shall be through Press-Seal Cast-A-Seal 402 rubber connectors or approved equal.
7. All joints (mid-seam, top-seam) shall be sealed using Concrete Sealants butyl sealant #CS-102 meeting ASTM C-990.
8. All service access openings will be a minimum of 24 inches. All access openings shall be fitted with E-Z Set riser assemblies.

9. A 24-hour static water test, in accordance with ASTM standards, shall be performed on all precast tanks in order to insure they are watertight.
 - a. The testing shall be performed in the presence of the engineer or his representative.
 - b. Each tank shall be filled with water and the initial water level shall be measured.
 - c. At the end of the 24-hour period, the level of the water shall be measured again.
 - d. The engineer shall pass the tank if the water level did not drop more than 0.5 inches or if the total volume of the displaced water is less than 1 percent of the total effective liquid capacity of the tank.
 - e. Tanks may also be leak-tested by applying a vacuum of 5-inches of Hg with riser assemblies in place.
 - f. Each failed tank shall be tested again. In the event the tank does not pass the second test, the Contractor shall remove and replace the tank at no additional cost to the owner.
10. Septic Tank and Field Dosing Tank shall meet the following additional criteria:
 - a. Minimum liquid depth of 36 inches.
 - b. Minimum airspace of 9 inches.
 - c. Length shall be at least twice as long as the width.
 - d. Septic tank shall be constructed with a baffle wall dividing the tank interior $\frac{2}{3}$ rd to $\frac{1}{3}$ rd. The baffle wall shall be constructed to permit passage of effluent through a slot or holes located between 45 and 55 percent of the interior depth.
11. Septic tank shall be fitted with either a POLYLOK PL-68 or SIM/TECK STF-110 effluent filter or engineer approved equal that extends down to 50 percent of the liquid depth of the tank.
12. Septic and field dosing tank model shall be as shown on the construction drawings or approved equal by engineer.

Piping Installation and Testing

1. Piping shall be PVC and of type and size as shown on the construction drawings. Piping shall be installed with a minimum of three (3) feet of cover unless shown otherwise on the construction drawings.
2. Piping shall be installed to be able to meet a pressure test whereby the pressure remains constant for a minimum of two hours, and the allowable leakage is not more than 10 gpd/inch of pipe diameter/mile.
3. Any line installed under a driveway shall be sleeved in Class 52 Ductile Iron Pipe or encased in concrete and extend a minimum of 5 feet on either side and as shown on the construction drawings.
4. Forcemains installed under streams shall be sleeved in Class 52 Ductile Iron Pipe as shown on the construction drawings.

Manifold Control Panel and Pumps

1. The control panel shall be by the Demand Dosed Simplex Control Panel Model 112 by SJE Rhombus or approved equal by engineer. The control panel will have the dose volume to be set as shown on the construction drawings.
2. The control panel shall be as specified on the construction drawings and installed per manufacturer's recommendation.
3. Manifold pump will be as specified on the construction drawings or approved equal by engineer and installed per manufacturer's recommendation.

Initial Drain Lines

1. The drain lines shall be either Quick4 Plus Standard chambers by Infiltrator or EZflow (1203H – GEO type).
2. Drain lines shall be installed per manufacturer's recommendations unless shown otherwise on the construction drawings.

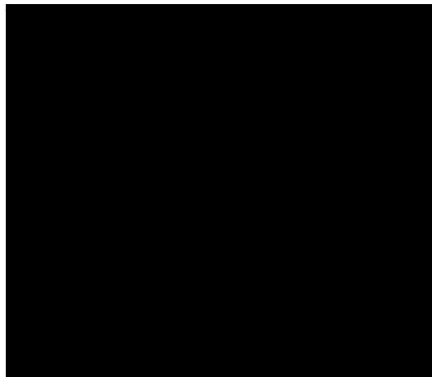
Repair Drain Lines

1. Drain lines for the initial and repair system shall be Prefabricated Permeable Block Panels by T&J Panel.
2. Panel trench lines shall be installed using horizontal placement per manufacturer's recommendations unless shown otherwise on the construction drawings.

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Design Calculations (Initial)



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Septic Tank (1,500 ST 322)

Basic Dimensions

Lid Thickness (L)	0.33	(feet)
Lid Hole Diameter (H1)	24.00	(inches)
Lid Hole Diameter (H2) - If tank has only one hole, leave blank.	24.00	(inches)
Lid Hole Diameter (H3) - If tank has only one hole, leave blank.		(inches)
Length of Tank (A)	10.38	(feet)
Width of Tank (B)	5.38	(feet)
Height of Tank Excluding Lid (C) - This value includes the base thickness but excludes the lid thickness.	5.42	(feet)
Depth of Bury (Y) - This measurement extends from the ground level to the top of the lid.	1.50	(feet)
Wall Thickness (T)	0.25	(feet)
Base Thickness (E)	0.33	(feet)
Distance to Groundwater (GW)	0.00	(feet)

Customizations To Add Ballast

Add Concrete Inside the Tank:

Initial Inside Height of Tank - This measurement is the value of C - E.	5.08	(feet)
Add concrete inside the tank to make thicker base?	0.00	(feet)
If yes, how much? (U) If no, enter a value of 0. Please note: The value entered must be less than the inside height of the tank.		

Increase Thickness of the Base:

Initial Base Thickness - This measurement is the value of E.	0.33	(feet)
Add concrete below the base of the tank to make thicker base?	0.00	(feet)
If yes, how much? (F) If no, enter a value of 0.		

Create Lip:

Extend the base horizontally to create a lip? - The lip will be the thickness of E plus F, below, and it will extend this horizontal distance, P, from all four tank walls.	0.00	(feet)
If yes, how much? (P) If no, enter a value of 0.		

Summary of Final Measurements after Ballast Customizations

Final Base Thickness - This measurement is the sum of E and F.	0.33	(feet)
Lip Thickness - This measurement is the sum of E and F.	0.33	(feet)
Total Height of the Tank from the Top of the Lid to the Bottom of the Base - This measurement is the sum of L, C, and F. This is equivalent to the sum of L, C - E, E, and F.	5.75	(feet)
Final Inside Height of Tank - This measurement is the value of C - E - U.	5.08	(feet)

Final Volume of Tank	244.71	(cf)
Final Volume of Tank	1,830.59	(gallons)

Unit Weights		
Unit Weight of Water	62.40	(lb/cf)
Unit Weight of Dry Soil	110.00	(lb/cf)
Unit Weight of Submerged Soil	47.60	(lb/cf)
Unit Weight of Saturated Soil	120.00	(lb/cf)
Unit Weight of Concrete	145.00	(lb/cf)

Changes in Total Concrete Weight Due to Customizations		
Weight of extra concrete inside tank used to create thicker base (Weight of extra concrete due to U)	0.00	(lb)
Weight of extra concrete on bottom of tank used to create thicker base (Weight of extra concrete due to F)	0.00	(lb)
Weight of extra concrete due to lip (Weight of extra concrete due to P)	0.00	(lb)
Weight of concrete removed due to lid hole	300.65	(lb)

Soil and Concrete Weights		
Weight of Soil on Lid	3,981.67	(lb)
Weight of Soil on Lip	0.00	(lb)
Weight of Lid Alone	2,367.73	(lb)
Weight of Empty Tank - This value is the sum of weights of the body of the tank, the tank lid, the lip (P, if applicable), the thickened base (F, if applicable), and the extra concrete inside tank (U, if applicable), minus the weight of the concrete removed due to the hole in the lid.	10,683.33	(lb)

Water in Tank		
Water Level in Tank - Please note: The value entered must be less than the final inside height of the tank.	0.00	(feet)
Weight of Water in Tank	0.00	(lb)

Weight of System Components		
Total Weight of Soil on Tank	3,981.67	(lb)
Total Weight of Concrete	10,683.33	(lb)
Total Weight (Tank, Water in Tank, and Soil)	14,665.00	(lb)

Sliding Resistance		
Specific Gravity of Soil, SG	2.75	
Friction Factor (Found in Table 1), f	0.30	
Void Ratio (Found in Table 3), e	0.85	
Ratio of Lateral to Vertical Earth Pressure (Found in Table 2), Ka	0.33	
Sliding Resistance	19,380.90	(lb)

Uplift Force		
Uplift Force	19,997.11	(lb)
Safety Factor	1.50	
Uplift Force with Safety Factor	29,995.66	(lb)

Additional Ballast Required	NONE	(lb)

Pump Tank (1,500 PT 293)

Basic Dimensions		
Lid Thickness (L)	0.33	(feet)
Lid Hole Diameter (H1)	24.00	(inches)
Lid Hole Diameter (H2) - If tank has only one hole, leave blank.	24.00	(inches)
Lid Hole Diameter (H3) - If tank has only one hole, leave blank.	0.00	(inches)
Length of Tank (A)	10.38	(feet)
Width of Tank (B)	5.38	(feet)
Height of Tank Excluding Lid (C) - This value includes the base thickness but excludes the lid thickness.	4.67	(feet)
Depth of Bury (Y) - This measurement extends from the ground level to the top of the lid.	1.50	(feet)
Wall Thickness (T)	0.25	(feet)
Base Thickness (E)	0.33	(feet)
Distance to Groundwater (GW)	0.00	(feet)

Customizations To Add Ballast		
Add Concrete Inside the Tank:		
Initial Inside Height of Tank - This measurement is the value of C - E.	4.33	(feet)
Add concrete inside the tank to make thicker base?	0.00	(feet)
If yes, how much? (U) If no, enter a value of 0. Please note: The value entered must be less than the inside height of the tank.		
Increase Thickness of the Base:		
Initial Base Thickness - This measurement is the value of E.	0.33	(feet)
Add concrete below the base of the tank to make thicker base?	0.00	(feet)
If yes, how much? (F) If no, enter a value of 0.		
Create Lip:		
Extend the base horizontally to create a lip? - The lip will be the thickness of E plus F, below, and it will extend this horizontal distance, P, from all four tank walls.	0.00	(feet)
If yes, how much? (P) If no, enter a value of 0.		

Summary of Final Measurements after Ballast Customizations		
Final Base Thickness - This measurement is the sum of E and F.	0.33	(feet)
Lip Thickness - This measurement is the sum of E and F.	0.33	(feet)
Total Height of the Tank from the Top of the Lid to the Bottom of the Base - This measurement is the sum of L, C, and F. This is equivalent to the sum of L, C - E, E, and F.	5.00	(feet)

Final Inside Height of Tank - This measurement is the value of C - E - U.	4.33	(feet)
Final Volume of Tank	208.61	(cf)
Final Volume of Tank	1,560.51	(gallons)

Unit Weights		
Unit Weight of Water	62.40	(lb/cf)
Unit Weight of Dry Soil	110.00	(lb/cf)
Unit Weight of Submerged Soil	47.60	(lb/cf)
Unit Weight of Saturated Soil	120.00	(lb/cf)
Unit Weight of Concrete	150.00	(lb/cf)

Changes in Total Concrete Weight Due to Customizations		
Weight of extra concrete inside tank used to create thicker base (Weight of extra concrete due to U)	0.00	(lb)
Weight of extra concrete on bottom of tank used to create thicker base (Weight of extra concrete due to F)	0.00	(lb)
Weight of extra concrete due to lip (Weight of extra concrete due to P)	0.00	(lb)
Weight of concrete removed due to lid hole	314.16	(lb)

Soil and Concrete Weights		
Weight of Soil on Lid	3,981.67	(lb)
Weight of Soil on Lip	0.00	(lb)
Weight of Lid Alone	2,474.12	(lb)
Weight of Empty Tank - This value is the sum of weights of the body of the tank, the tank lid, the lip (P, if applicable), the thickened base (F, if applicable), and the extra concrete inside tank (U, if applicable), minus the weight of the concrete removed due to the hole in the lid.	10,218.65	(lb)

Water in Tank		
Water Level in Tank - Please note: The value entered must be less than the final inside height of the tank.	0.00	(feet)
Weight of Water in Tank	0.00	(lb)

Weight of System Components		
Total Weight of Soil on Tank	3,981.67	(lb)
Total Weight of Concrete	10,218.65	(lb)
Total Weight (Tank, Water in Tank, and Soil)	14,200.32	(lb)

Sliding Resistance		
Specific Gravity of Soil, SG	2.75	
Friction Factor (Found in Table 1), f	0.30	
Void Ratio (Found in Table 3), e	0.85	

Ratio of Lateral to Vertical Earth Pressure (Found in Table 2), Ka	0.33	
Sliding Resistance	15,592.80	(lb)

Uplift Force		
Uplift Force	17,398.88	(lb)
Safety Factor	1.50	
Uplift Force with Safety Factor	26,098.31	(lb)

Additional Ballast Required	NONE	(lb)

MacConnell & Associates, P.C.

Project: Christine & Joshua Haymond (Ruffy Homes)
Project Number: A35907.00
Facility Address: 6004 Canadero Drive
County: Wake County, North Carolina
Subject: Tank Sizing Calculations
Date: June 1, 2024

Notes:

Input

Calculated

Assumptions And Calculations:

1. Treatment flow is based on unadjusted flow.
2. Irrigation flow is based on reduced flow

Number of Bedrooms:	5.0 Rooms	Given
Average Daily Flow per Bedroom:	120 GPD	15A NCAC 18E .0401
Unadjusted Design Flow:	600.0 GPD	& Wake County Rules
Flow Reduction:	0 %	
Adjusted Flow:	600.0 GPD	

SEPTIC TANK SIZING

Minimum Septic Tank Volume Required:	1,500.0 Gallons	per 15A NCAC 18E .0801
Septic Tank Volume Provided:	1,500.0 Gallons	& Wake County Rules

Septic Tank storage and effective volume calculations:

Septic Tank Total Void Volume = L * W * D:

Tank length:	9.6 foot
Tank Width:	4.9 foot
Tank Depth:	5.1 foot
Total Void Volume:	1,784.1 Gallons

Septic Tank Effective Volume = L * W * Lowest Invert To Tank Bottom:

Tank length:	9.6 foot
Tank Width:	4.9 foot
Lowest Invert:	4.3 foot
Effective Volume:	1,520.9 Gallons

Septic Tank Detention Time:	2.5 Days	Effective Volume / ADF
-----------------------------	----------	------------------------

FIELD DOSING TANK SIZING:

Minimum Field Dosing Tank Volume Required:	1,500.0 Gallons	per 15A NCAC 18E .0801
Field Dosing Tank Provided:	1,500.0 Gallons	& Wake County Rules

Field Dosing Tank storage and effective volume calculations:

Field Dosing Tank Total Void Volume= L * W * D:

Tank length:	9.6 foot
Tank Width:	4.9 foot
Tank Depth:	4.3 foot
Total Void Volume:	1,520.9 Gallons

Field Dosing Tank Effective Volume To Tank Bottom = L * W * Lowest Invert To Tank Bottom:

Tank length:	9.6 foot
Tank Width:	4.9 foot
Lowest Invert To Tank Bottom:	3.7 foot
Effective Volume:	1,286.9 Gallons

Field Dosing Tank Effective Volume To Pump Off = L * W * Lowest Invert To Pump Off:

Tank length:	9.6 foot
Tank Width:	4.9 foot
Lowest Invert To Pump Off:	2.2 foot
Effective Volume:	760.4 Gallons
Effective Volume Storage:	1.3 Days

Total System Storage =	1,257.7 Gallons
------------------------	-----------------

Emergency Storage

Depth of Emergency Storage	21.0 Inches
Gallons per Inch of Pump Tank	29.2 Gal/Inch
Emergency Storage in Septic Tank	292.5 Gallons

Total Emergency Storage	906.7 Gallons
-------------------------	---------------

MACCONNELL AND ASSOCIATES, P.C.
CHRISTINE & JOSHUA HAYMOND (RUFFY HOMES)
PRESSURE MANIFOLD DESIGN - INITIAL

Name: Christine & Joshua Haymond (Ruffy Homes) **P.I.N. #:** 0777619747 **D#:** N/A

Address: 6004 Canadero Drive
Wake County, North Carolina **Subdiv:** Canadero **Lot#:** 2

of BDR: 5 **Daily Flow:** 600 gal/day **L.T.A.R.:** 0.3 gal/day/sq.ft

Septic Tank: 1500 gals **Pump Tank:** 1500 gals **Sq. Foot:** 1560 **Stone Depth:** N/A

Number of Taps: 7	Length of Trenches: 520 ft(See Tap Chart for Details)
Depth of Trenches: 26 in	Manifold Length: 60 in
Manifold Diameter: 4 inches	Tap Configuration: 6 in spacing 1 side(s) of manifold
Supply Line: length: 252.4 ft	Diameter(Supply Line): 2 in SCH40 PVC Pipe ID (Inch) 2.067

Friction Loss + Fitting Loss: 8.78 ft(supply line length + 70' for fittings in pump tank)	
Design Head: 2 ft	Elevation Head: 16.40 ft
Total Head: 27.2 ft	Pump to Deliver: 37.8 gals/min at 27.2 ft head

Dosing Volume: 254 gals,

Pump Selection: Drawdown: 254 gals divided by 29.2 gals/in = 8.7 inches head

Pump Selection: As shown on the construction drawings.

TAP CHART

Pump Tank Elevation	404.6			Pump Elevation	398.9		Manifold Elevation	415.3	High Point in Forcemain:	415.3
Line	Color	Rod Read	Relative Elevation	Length	Hole Size	flow/tap	gal/day	Trench Area	LINE LTAR	
4	Blue		415.2	110	1/2in SCH 40	7.11	112.9	330	0.342	
5	Red		414.6	100	1/2in SCH 40	7.11	112.9	300	0.376	
6	Yellow		413.8	90	1/2in SCH 40	7.11	112.9	270	0.418	
7	Purple		413.1	80	1/2in SCH 80	5.48	87.1	240	0.363	
8	Orange		411.9	70	1/2in SCH 80	5.48	87.1	210	0.415	
9 & 10	Pink & Blue		410.5 & 409.4	70	1/2in SCH 80	5.48	87.1	210	0.415	

% of Dose Vol. 75%	total feet = 520	gal/min = 37.8	LTAR = 0.300
Dose Volume 254	Des. Flow 600		(ltar + 5%) 0.315
Dose Pump Time 6.7	Pump Run= 15.89		(ltar W/ 25% reduction) 0.400
Drawdown in Inches 8.7	Tank Gal/IN 29.2		(ltar + 5%) 0.420
Supply Line Length 252.4	Elev. Head 16.40		
	Velocity fps 3.61		

Comments:

Hydraulic Profile

Manifold Elevation	415.3
Pump Tank Elevation	404.6
Pump Elevation	398.9

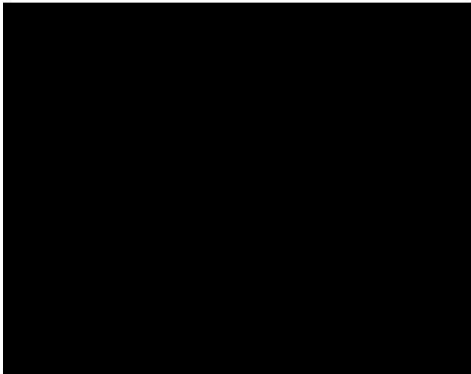
Supply Line Velocity Check

	ID (INCH)	gal/ft	Velocity Check (>2ft/s)
1-1/4 in. SCH40 PVC Pipe	1.38	0.077654555	8.10
1-1/2 in. SCH40 PVC Pipe	1.61	0.105696478	5.95
2 in. SCH40 PVC Pipe	2.067	0.174216673	3.61

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Design Calculations (Repair)



**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

MACCONNELL AND ASSOCIATES, P.C.
CHRISTINE & JOSHUA HAYMOND (RUFFY HOMES)
PRESSURE MANIFOLD DESIGN - REPAIR

Name: McKee Homes, Inc. P.I.N. #: 0777619747 D#: N/A
Address: 6004 Canadero Drive Subdiv: Canadero Lot#:
Wake County, North Carolina
of BDR: 5 Daily Flow: 600 gal/day L.T.A.R.: 0.3 gal/day/sq.ft
Septic Tank: 1500 gals Pump Tank: 1500 gals Sq. Foot: 1125 Stone Depth: N/A

Number of Taps: <u>3</u>	Length of Trenches: <u>375</u> ft(See Tap Chart for Details)
Depth of Trenches: <u>28</u> in	Manifold Length: <u>36</u> in
Manifold Diameter: <u>4 inches</u>	Tap Configuration: 6 in spacing <u>1</u> side(s) of manifold
Supply Line: length: <u>300</u> ft	Diameter(Supply Line): <u>2 in.</u> SCH40 PVC Pipe ID (Inch) <u>1.61</u>

Friction Loss + Fitting Loss: <u>13.25</u> ft(supply line length + 70' for fittings in pump tank)	
Design Head: <u>2</u> ft	Elevation Head: <u>18.3</u> ft
Total Head: <u>33.6</u> ft	Pump to Deliver: <u>22.7</u> gals/min at <u>33.6</u> ft head

Dosing Volume: 313 gals,

Pump Selection: Drawdown: 313 gals divided by 29.2 gals/in = 10.7 inches head

TAP CHART

Pump Tank Elevation		Pump Elevation		Manifold Elevation		High Point in Forcemain:				
404.6		398.9		417.2		417.2				
Line	Color	Rod Read	Relative Elevation	Length	Hole Size	flow/tap	gal/day	Trench Area	LINE LTAR	Number of Panels
1	White		417.2	90	1/2in SCH 80	5.48	144.9	270	0.537	21
2	Orange		416.5	155	3/4in SCH 80	10.1	267.1	465	0.574	36
3	Pink		414.9	130	1/2in SCH 40	7.11	188.0	390	0.482	30

Number of Panels	<u>87</u>	3.6-7.2gal	total feet =	<u>375</u>	gal/min =	<u>22.7</u>	LTAR =	<u>0.300</u>
Dose Volume per Panel	<u>3.6</u>			<u>Des. Flow</u>	<u>600</u>		(ltar + 5%)	<u>0.315</u>
Dose Volume	<u>313</u>			Pump Run=	<u>26.44</u>		(ltar W/ 50% reduction)	<u>0.600</u>
Dose Pump Time	<u>13.8</u>			Tank Gal/IN	<u>29.2</u>		(ltar + 5%)	<u>0.630</u>
Drawdown in Inches	<u>10.7</u>			Elev. Head	<u>18.30</u>			
Supply Line Length	<u>300.0</u>			Velocity fps	<u>3.58</u>			

Hydraulic Profile

Manifold Elevation	<u>417.2</u>
Pump Tank Elevation	<u>404.6</u>
Pump Elevation	<u>398.9</u>

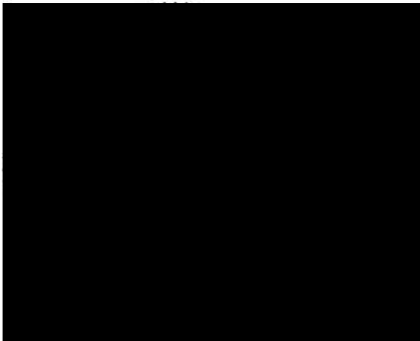
Supply Line Velocity Check

	ID (INCH)	gal/ft	Velocity Check (>2ft/s)
1-1/4 in. SCH40 PVC Pipe	1.38	0.077654555	4.86
1-1/2 in. SCH40 PVC Pipe	1.61	0.105696478	3.57
2 in. SCH40 PVC Pipe	2.067	0.174216673	2.17

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

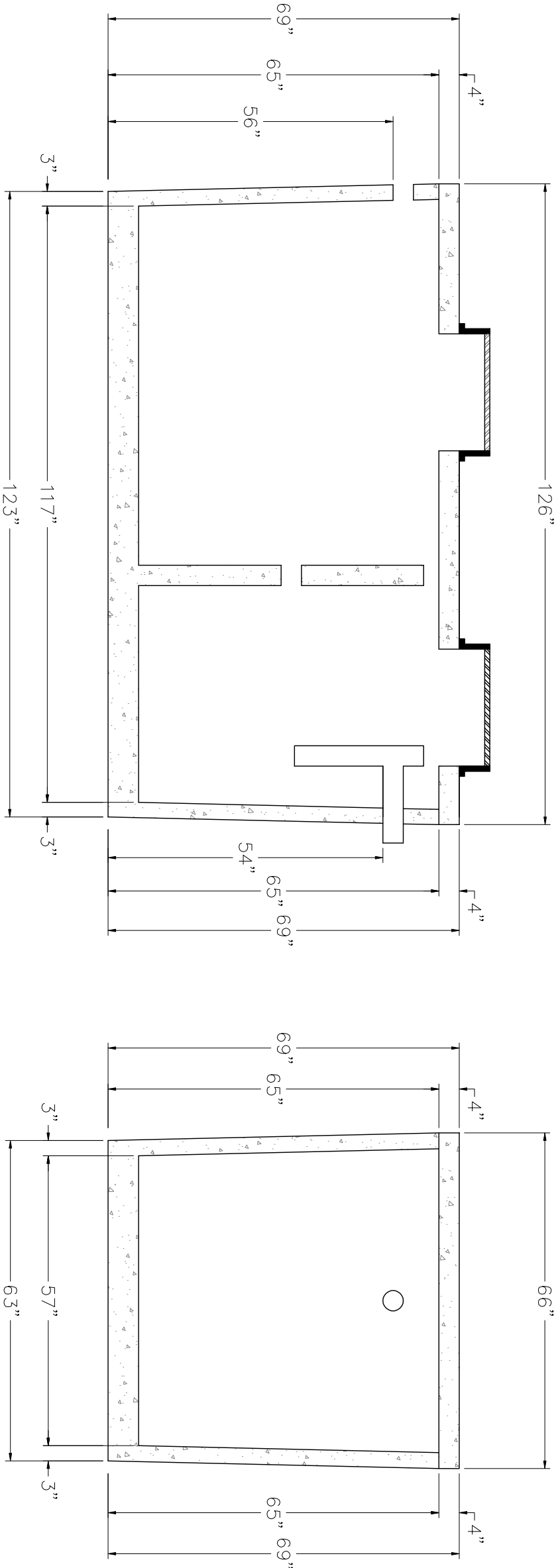
Equipment (Initial)



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**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

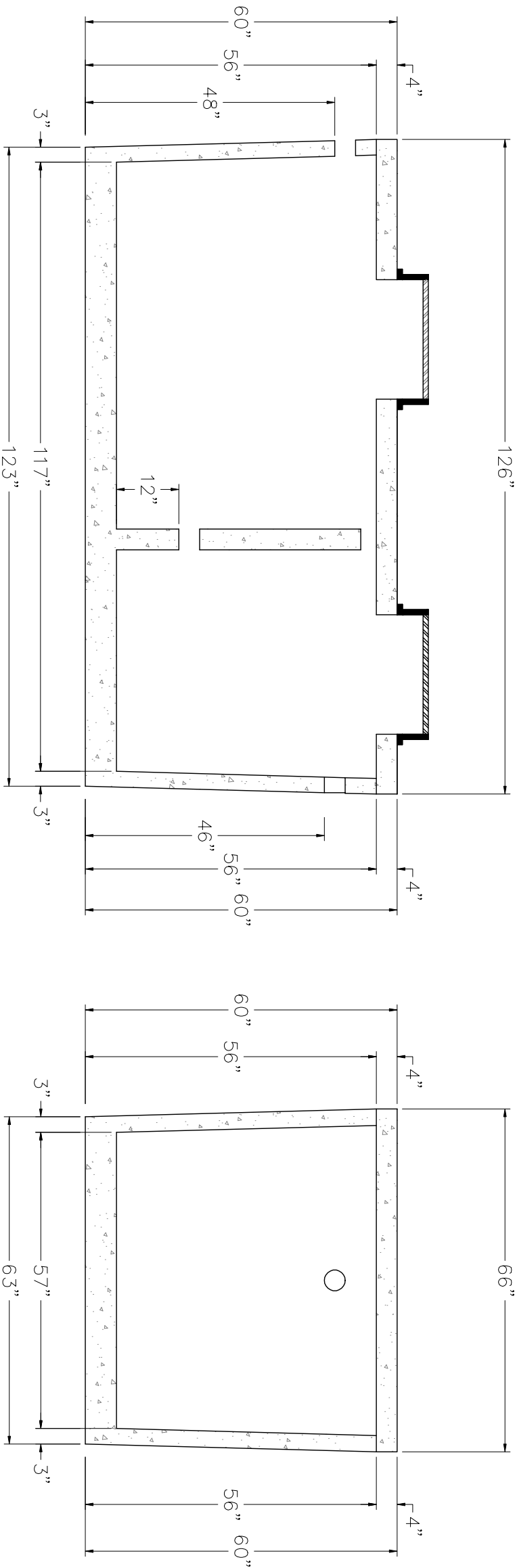


1,500 ST-322

NTS

NON TRAFFIC BEARING

DAVID BRANTLEY & SONS 37 Pine Ridge Rd. Zebulon, NC 27597 Office 252-478-3721 Fax 919-573-0443 1installer@gmail.com	PREPARED FOR :	David Brantley & Sons 37 Pine Ridge Rd. Zebulon, NC 27597	REVISION NO.	DATE	BRANTLEY TANK MODEL 1,500 ST 322
	DATE :	April 11, 2014	Original Submittal	April 11, 2014	
	CONTACT:	CORY BRANTLEY	Revision 1		SHEET NUMBER 1 of 1
			Revision 2		
			Revision 3		
			Master Set	----	



1,500 PT 293

NTS

NON TRAFFIC BEARING

DAVID BRANTLEY & SONS

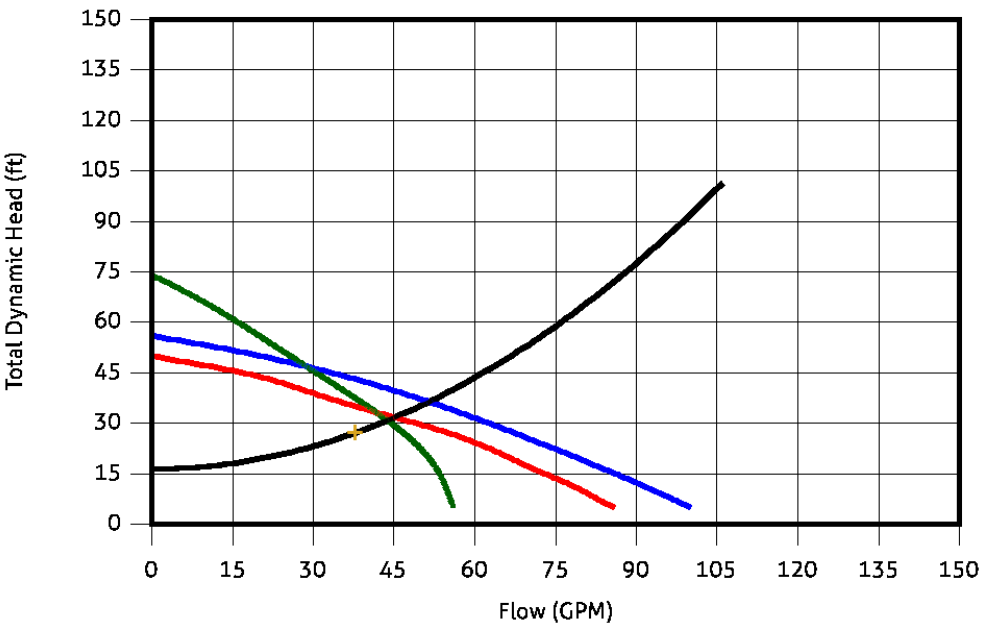
37 Pine Ridge Rd.
Zebulon, NC 27597
Office 252-478-3721
Fax 919-573-0443
tinstaller@gmail.com

PREPARED FOR : David Brantley & Sons 37 Pine Ridge Rd. Zebulon, NC 27597	REVISION NO.	DATE	BRANTLEY TANK MODEL 1,500 PT 293
	Original Submittal	April 11, 2014	
	Revision 1		
	Revision 2		
DATE : April 11, 2014	Revision 3		SHEET NUMBER 1 of 1
CONTACT: CORY BRANTLEY	Master Set	----	

Known Flow and TDH

Effluent

Sizing ID: 6EN-1F2-RKQ



System Curve		Fittings
GPM	TDH (ft)	None Selected
0.00	16.40	
17.00	18.58	
34.00	25.14	
51.00	36.06	
68.00	51.35	
85.00	71.01	
102.00	95.04	

Flow (GPM)*: 37.80
TDH (ft)*: 27.20

*Per user data

Curve Models	Eq. Flow	Eq. Head
140	45.11	31.78
145	43.79	30.89
161	51.45	36.41

Pump Specs	
Electrical	115 volt, 1 phase, 60 Hertz
Physical	
Discharge Size	1.50" NPT
Solids Handling (in.)	0.5
Static Head (ft)	16.4000
TDH (ft)	27.2

By registering on this site, user acknowledges that Zoeller Company is not responsible for inaccurate pump sizing or misapplication due to incorrect information entered by the user. For sizing assistance, please contact Zoeller's Product Support Department at [1-800-928-7867](tel:1-800-928-7867) (or [+1-502-778-2731](tel:+1-502-778-2731)), extension 6, or email zcotechnical@zoeller.com

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

TECHNICAL DATA SHEET FLOW-MATE SERIES

Models 140/4140, 145/4145 Effluent / Dewatering Pumps

PRODUCT SPECIFICATIONS

MOTOR	Horse Power	3/4 - 1
	Voltage	115 or 230
	Phase	1 Ph
	Hertz	60 Hz
	RPM	3450
	Type	Permanent split capacitor
	Insulation	Class B
	Amps	6.0 - 13.0
PUMP	Operation	Automatic or nonautomatic
	Discharge Size	1-1/2" NPT
	Solids Handling	1/2" (12 mm), 3/4" (19 mm) spherical solids
	Cord Length	20' (6 m)
	Cord Type	UL listed, neoprene cord
	Max. Head	50' (15.2 m) or 74' (22.6 m)
	Max. Flow Rate	86 GPM (326 LPM) or 61 GPM (232 LPM)
	Max. Operating Temp.	130 °F (54 °C)
	Cooling	Oil filled
	Motor Protection	Auto reset thermal overload
MATERIALS	Cap	Cast iron
	Motor Housing	Cast iron
	Pump Housing	Cast iron
	Base	Cast iron
	Upper Bearing	Sleeve bearing
	Lower Bearing	Ball bearing
	Mechanical Seals	Carbon and ceramic
	Impeller Type	Single vane (145) or non-clogging vortex (140)
	Impeller	Engineered thermoplastic
	Hardware	Stainless steel
	Motor Shaft	JIS S45C steel
	Gasket	Neoprene

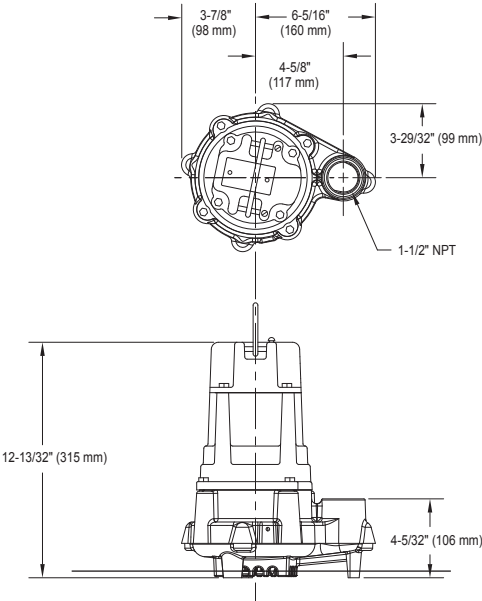
NOTE: See model comparison chart for specific details.

Made In The USA.

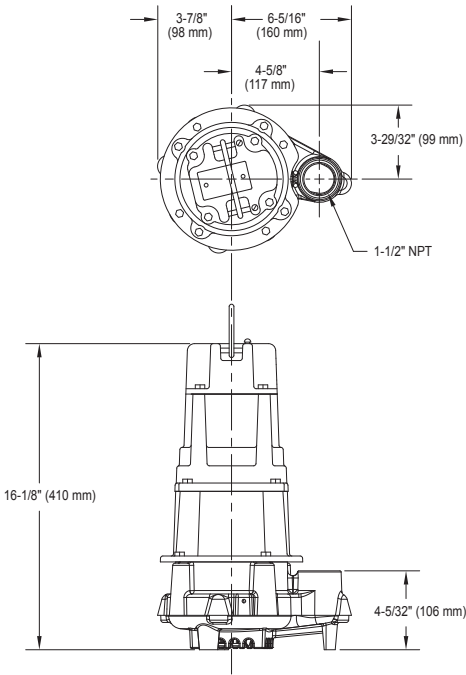
Using a MAJORITY of U.S. components.



SINGLE SEAL



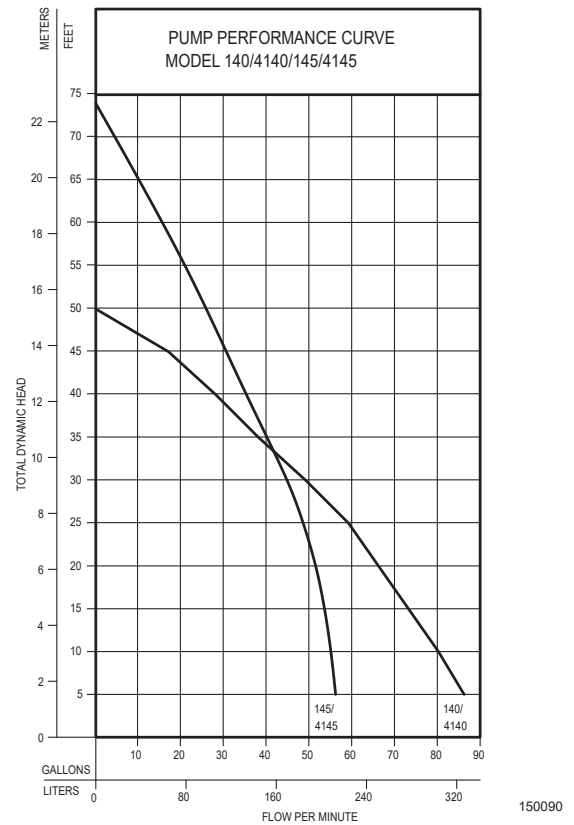
DOUBLE SEAL



SK1524

TOTAL DYNAMIC HEAD FLOW PER MINUTE

MODEL		140/4140		145/4145	
Feet	Meters	Gal.	Liters	Gal.	Liters
5	1.5	86	326	56	212
10	3.0	80	303	55	208
15	4.6	73	276	53	200
20	6.1	66	250	51	193
25	7.6	59	223	48	182
30	9.1	49	185	45	170
40	12.2	28	106	35	132
50	15.2	--	--	26	98
60	18.3	--	--	16	61
Shut-off Head:		50 ft.(15.2m)		74 ft.(22.6m)	



Model	MODEL COMPARISON										
	Seal	Mode	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex
N140	Single	Non	115	1	12.0	1	60	46	21	1 or 2	3
E140	Single	Non	230	1	6.0	1	60	46	21	1 or 2	3
BN140	Single	Auto	115	1	12.0	1	60	47	21	*	---
BE140	Single	Auto	230	1	6.0	1	60	47	21	*	---
E145	Single	Non	230	1	6.0	3/4	60	46	21	1 or 2	3
N145	Single	Non	115	1	13.0	3/4	60	46	21	1 or 2	3
BN145	Single	Auto	115	1	13.0	3/4	60	48	22	*	---
N4140	Double	Non	115	1	12.0	1	60	65	29	*	---
E4140	Double	Non	230	1	6.0	1	60	65	29	1 or 2	3
BN4140	Double	Auto	115	1	12.0	1	60	66	30	*	---
BE4140	Double	Auto	230	1	6.0	1	60	66	30	*	---
N4145	Double	Non	115	1	13.0	3/4	60	64	29	1 or 2	3
BN4145	Double	Auto	115	1	13.0	3/4	60	64	29	*	---

* Single piggyback switch included.

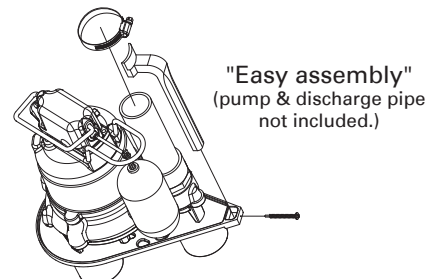
BN and BE models include a 20' (6 m) piggyback variable level pump switch. Additional cord lengths are available in 15' (5 m), 25' (8 m), 35' (11 m) and 50' (15 m). 50' (15 m) cord length is for 230 V only.

SELECTION GUIDE

- For automatic, use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
- See FM1228 for correct model of simplex control panel.
- See FM0712 for correct model of duplex control panel.

OPTIONAL PUMP STAND P/N 10-2421

- Reduces potential clogging by debris
 - Replaces rocks or bricks under the pump
 - Made of durable, noncorrosive ABS
 - Raises pump 2" (5 cm) off bottom of basin
 - Provides the ability to raise intake by adding sections of 1-1/2" or 2" (DN40 or DN50) PVC piping
 - Attaches securely to pump
 - Accommodates sump, dewatering and effluent applications
- NOTE: Make sure float is free from obstruction.



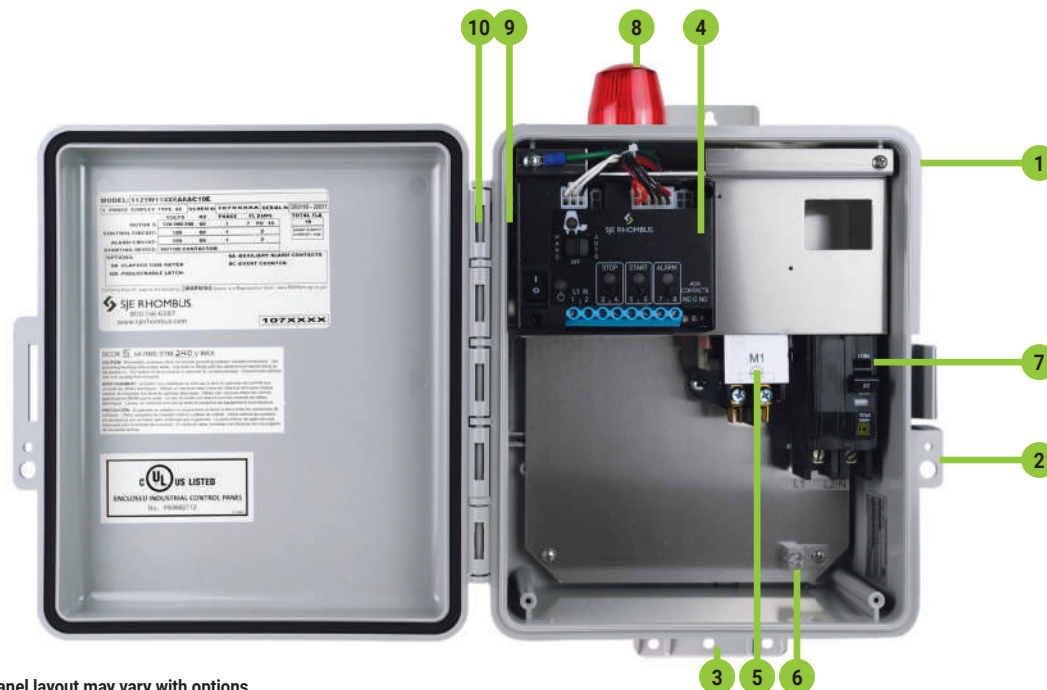
All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

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502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | zoellerpump.com

MODEL 112 CONTROL PANEL

Single Phase, Simplex Motor Contactor Control



Panel layout may vary with options.

This latest generation Model 112 control panel controls one 120, 208, or 240 VAC single phase pump in water and sewage installations. This panel includes a new innovative simplex controller for pump control and alarm; including float status LEDs, control/alarm power on/off switch with LED indicator, pump run LED, HOA switch, auxiliary contacts and more!

The Model 112 control panel features built in pump failure and float out of sequence detection. In addition, there are three user selectable field programmable options: alarm steady state or flashing; alarm auto reset or manual reset; and optional seal failure alarm beacon plus horn activation.

Simplex controller features include:

- Touch safe circuit board housing and low voltage 24 VDC float circuits
- Alarm (field programmable to flash)
- Alarm automatic reset (field programmable to manual alarm reset)
- Float out-of-sequence detection
- Pump contactor failure detection
- Controller protected by three auto resettable fuses (control, alarm, and pump 1)

Note: SJE Rhombus recommends separate pump and control/alarm power sources.

COMPONENTS

1. Enclosure measures 10 x 8 x 4 inches (25 x 20 x 10 cm) NEMA 4X (ultraviolet stabilized thermoplastic) for indoor or outdoor use
2. Integral padlockable latch for added safety
3. Integral mounting feet for indoor or outdoor use
4. Simplex controller provides pump and alarm control; elevated in the enclosure for easy access and field wiring
 - a. HOA switch for manual control of the pump
 - b. Pump run green LED indicator
 - c. Control power ON/OFF switch
 - d. Power ON green LED indicator
 - e. Float push-to-test buttons
 - f. Float status red LED indicators
 - g. Auxiliary alarm contacts Form C
 - h. Option: adjustable seal failure circuit and red LED indicator (must select option 5E when ordering)
5. Magnetic motor contactor
6. Ground lug
7. Circuit breaker
8. Red LED beacon provides 360° visual check of alarm condition - Note: NEMA 1 style utilizes a door mounted indicator in lieu of a beacon
9. Alarm horn provide audible warning of alarm condition (83 to 85 decibel rating) - Note: NEMA 1 style utilizes an internally mounted buzzer in lieu of horn (**Not shown**)
10. Exterior alarm test/normal/silence switch allows horn to be silenced in an alarm condition; alarm automatically resets once alarm condition has been cleared (**Not shown**)

Notes: Options, voltage, and amp range selected may change enclosure size and component layout.

Other options available.

Schematic/Wiring Diagram and Pump Specification Label are located inside the panel.



Model 112 - Single phase, simplex motor contactor control.

Part #	Pre-configured Panels for Easy Ordering
1071824	1121W114X6A10E
1071853	1121W124X6A10E
1071823	1121W114H6A10E17G
1071822	1121W124H6A10E17G
1071841	1121W114H6A8AC10E17G
1075046	1121W124H6A8AC10E17G

112 CONTROL PANEL	1 ALARM PACKAGE	W ENCLOSURE RATING	1 STARTING DEVICE	2 PUMP FULL LOAD AMPS	4 PUMP DISCONNECTS	H FLOAT SWITCH APPLICATION	6A10E OPTIONS (LISTED BELOW)
-----------------------------	---------------------------	------------------------------	-----------------------------	---------------------------------	------------------------------	--------------------------------------	--

CONTROL PANEL	✓	112	Single Phase Simplex
ALARM PACKAGE	✓	1	Alarm Package (includes test/normal/silence switch, fuse, red light, horn & float)
ENCLOSURE RATING	✓	W	Weatherproof, NEMA 4X (engineered thermoplastic)
STARTING DEVICE	✓	1	Magnetic Motor Contactor 120/208/240V
PUMP FULL LOAD AMPS		0	0 - 7 FLA
		1	7 - 15 FLA
	✓	2	15 - 20 FLA
		3	20 - 30 FLA (Enclosure Upsize Required)
PUMP DISCONNECT	✓	4	Circuit Breaker 120/208/240V
FLOAT SWITCH APPLICATION	✓	H	Floats - Pump Down (select Option 17G below - 3 floats by default when selected)
		L	Floats - Pump Up (select Option 17G below - 3 floats by default when selected)
		X	No Floats

Model 112 Base Price _____
(includes Alarm Package, Enclosure Rating, Starting Device and Pump Disconnect)

Pump Full Load Amps _____

Total Options _____

Enclosure Upsize _____

TOTAL LIST PRICE _____

ENCLOSURE UPSIZE: If you selected three or more of the ♦ options or one ♦♦ option, add a one-time charge for enclosure upsize.

OPTIONS	DESCRIPTION
5A ♦	Thermal Cutout/Heat Sensor Auto Reset (for pumps with thermal switch leads)
5E	Seal Failure Circuit & Red Indicator (2 wire) (Normally Open)
✓ 6A	Auxiliary Alarm Contact, Form C (included as standard)
✓ 8A ♦	Elapsed Time Meter
✓ 8C ♦	Event (Cycle) Counter
9_A ♦♦	Pump Overload - Specify Amperage after Number 9 Followed by Letter "A" Example: 912A = 12 amp pump
	0 - 25 FLA 25 - 30 FLA
✓ 10E	Lockable Latch - NEMA 4X (included as standard)
✓ 10F ♦	Lightning Arrestor
10K ♦	Anti-condensation Heater
14B ♦♦	Main Disconnect (rotary style, mounted through door, non-fused, padlockable in the OFF position, door interlock in the ON position (must select Circuit Breaker)
	0 - 20 FLA 20 - 30 FLA
15A	Control / Alarm Circuit Breaker

For additional control panel options, please contact Technical Support at techsupport@sjeinc.com.

OPTIONS	DESCRIPTION
✓ 17G	20' SJE MilliAmpMaster™ / Pipe Clamp (3 Floats) - Mechanical
19T	TOA (Test/Off/Automatic) Switch and Pump Run Light through Door Mounted
19U	HOA (Hand/Off/Automatic) Switch and Pump Run Light through Door Mounted
19X	Door Mounted Pump Run Indicator

SJE Rhombus recommends the SJE MilliAmpMaster™* control float switch to operate the 112 control panel. For alternative cord lengths or float switch options, select the "X" option (switch application) and select from the float kits below or see our control switch catalog pages to order and ship separately.

ITEMS LISTED BELOW SHIP SEPARATELY.

PART NUMBER	DESCRIPTION
1075005	3 Float Kit. 30' SJE MilliAmpMaster™ Pipe Clamp - Normally Open
1075006	3 Float Kit. 20' Sensor Float®, Mercury Pipe Clamp - Normally Open
1075007	3 Float Kit. 20' Sensor Float®Mini, Mercury Pipe Clamp - Normally Open

*Float Kit pricing and part numbers are only available when ordering with a 112 control panel.

CAST-A-SEAL 402/402F

PIPE TO MANHOLE & TANK CONNECTOR

What It Is

The Cast-A-Seal 402/402F is a simple cast-in pipe-to-manhole connector that offers a watertight flexible connector that is cast into the structure when the concrete is poured.

The key lock is integrally cast-in during the production process providing a secure seal for storm water and sanitary collection systems.

How It Works

- The connector is folded into the casting position.
- It is placed on the reusable mandrel and then placed on the form.
- After curing, the mandrel is removed.
- The connector is then simply unfolded at the jobsite.
- Take-up clamps made from series 304 stainless steel with quick adjusting screws secure the connector to the pipe.



Why It's Better

- Durable and reusable mandrel forms.
- Integrally cast into the structure at time of casting.
- Contractor can backfill immediately after pipe insertion.
- The 4" connector is available in either open or closed end face.
- Contractor can save time and money by backfilling immediately.

Where To Use

- Manholes
- Wet wells
- Square pump and lift stations
- Stormwater structures
- On-site treatment structures
- Junction chambers
- Grease interceptors



Press-Seal believes all information is accurate as of its publication date. Information, specifications, and prices are all subject to change without notice. Press-Seal is not responsible for any inadvertent errors. Copyright 2022.

Phone: 800-348-7325
Fax: (260) 436-1908

PRESS-SEAL CORPORATION
Protecting Our Planet's Clean Water Supply
ISO 9001: Registered • Version 02.16.22.11.17

Email: sales@press-seal.com
Web: www.press-seal.com

CAST-A-SEAL 402/402F

SUBMITTAL SPECIFICATIONS

A flexible pipe-to-structure connector shall be employed in the connection of the sanitary sewer pipe to precast structures. The connector shall be Cast-A-Seal® 402/402F as manufactured by Press-Seal Corporation, Fort Wayne, Indiana, or approved equal. The connector shall be the sole element relied on to assure a flexible, watertight seal of the pipe to the precast structure. The connector shall consist of a rubber gasket and an external take-up clamp.

The rubber gasket element shall be constructed solely of synthetic or natural rubber, and shall meet or exceed the physical property requirements of ASTM C 923.

The external take-up clamp shall be constructed of Series 300 non-magnetic stainless steel and shall utilize no welds in its construction. The clamp shall be installed by torquing the adjusting screw using a torque-setting wrench available from the connector manufacturer.

Selection of the proper size connector for the structure and pipe requirement, and installation thereof, shall be in strict conformance with the recommendations of the connector manufacturer. Any dead end pipe stubs installed in connectors shall be restrained from movement per ASTM C 923.

The finished connection shall provide sealing to 13 psi (minimum) and shall accommodate deflection of the pipe to 7 degrees (minimum) without loss of seal.

Vacuum testing shall be conducted in strict conformance with ASTM C 1244 prior to backfill. Other testing shall be conducted in strict conformance with the requirements of the connector manufacturer.

Product Performance

Cast-A-Seal 402/402F meets and/or exceeds all requirements of ASTM C 923, including physical properties of materials and performance testing, including:

- 13 PSI minimum in straight alignment
- 10 PSI at minimum 7° angle
- 10 PSI minimum under shear load of 150 lbs/in. pipe diameter

Cast-A-Seal 402/402F meets and/or exceeds the requirements of the following Standards, Specifications, Codes, and Test Methods:

- IAPMO/ANSI Z1000 Standard for Prefabricated Septic Tanks
- IAPMO/ANSI Z1001 Standard for Prefabricated Gravity Grease Interceptors
- NPCA Best Practices Manual for Precast Concrete On-Site Wastewater Tanks
- NOWRA Model Code Framework
- ASTM C 1227 Standard Specification for Precast Concrete Septic Tanks
- ASTM C 1644 Standard Specification for Resilient Connectors Between Reinforced Concrete On-Site Wastewater Tanks and Pipes (CAS 402)
- ASTM C 1613 Standard Specification for Precast Concrete Grease Interceptor Tanks
- ASTM C 923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
- ASTM C 1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test
- ASTM C 1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals

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Fax: (260) 436-1908

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Protecting Our Planet's Clean Water Supply
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Email: sales@press-seal.com
Web: www.press-seal.com



CAST-A-SEAL 402/402F

SELECTION GUIDE

PIPE SIZE	CAST-A-SEAL 402	PIPE O.D. RANGE	WALL THICKNESS*	APPLICATION
1.25" - 2" 31 - 51 mm	452.0250	1.5" - 2.75" 38 - 70 mm	2.5" - 6" 64 - 150 mm	STANDARD
4" 100 mm	452.0450	4.2" - 4.7" 107 - 119 mm	2.5" - 6" 64 - 150 mm	STANDARD
4" 100 mm	452.0402F1	4.2" - 4.7" 107 - 119 mm	2.5" - 4.0" 64 - 102 mm	Closed Face
6" 150 mm	452.0650	6.2" - 6.7" 157 - 170 mm	2.5" - 6" 64 - 150 mm	STANDARD
3" 75 mm	CAS ADAPTER	3.2" - 3.6" 81 - 91 mm	---	Use with 4" CAST-A-SEAL



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Phone: 800-348-7325
Fax: (260) 436-1908

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Email: sales@press-seal.com
Web: www.press-seal.com

EZset by Infiltrator risers and lids are made from glass reinforced polypropylene, providing superior strength and durability. They come in green or black and in 20", 24", and 30" diameters making them ideal for use with any concrete or plastic tank. The slip resistant lids are fastened using stainless steel screws and can be further secured by installing locking rings.

20" Riser System

- 20" x 6" Risers (Green or Black)
- 20" x 12" Risers (Green or Black)
- 20" Lids (Green or Black)



20" x 6" Riser



20" x 12" Riser



20" Lid



Adapter Flange

24" Riser System

- 24" x 6" Risers (Green or Black)
- 24" x 12" Risers (Green or Black)
- 24" x 18" Risers (Green or Black)
- 24" Lids (Green or Black)



24" x 6" Riser



24" x 12" Riser



24" x 18" Riser



24" Lid

30" Riser System

- 30" x 12" Risers (Green or Black)
- 30" Lids (Green or Black)

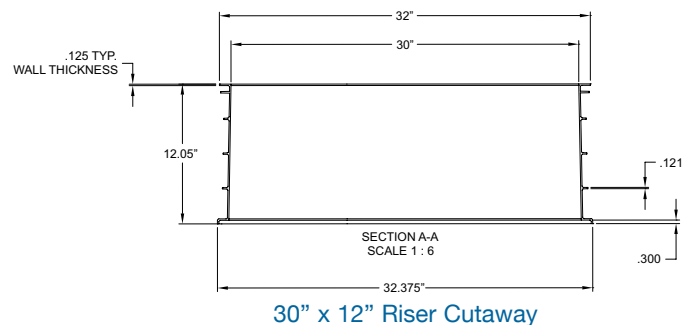
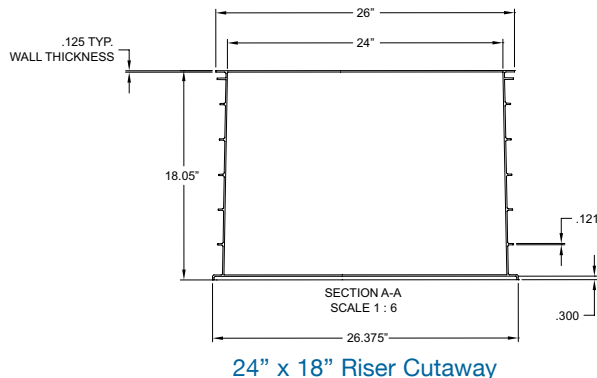
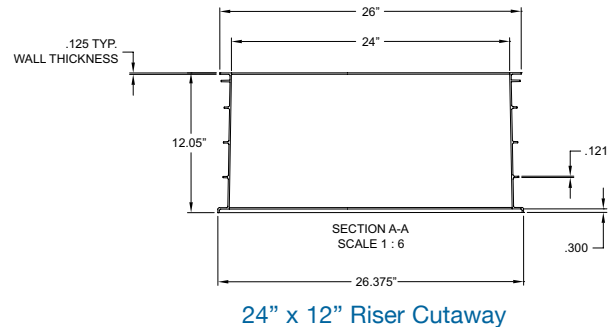
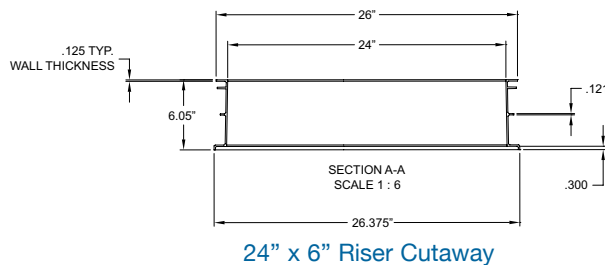
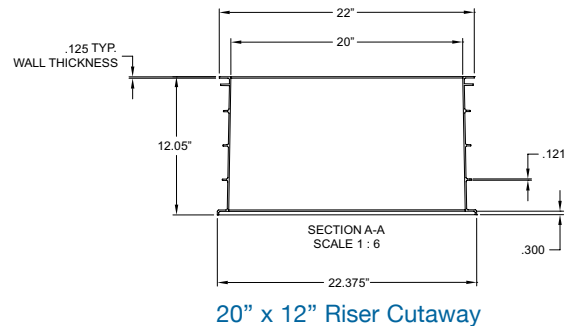
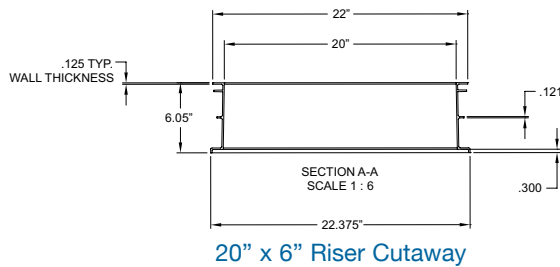


30" x 12" Riser



30" Lid

- Adhesive Sealant
- 20" Locking Rings
- 20" Safety Pans
- 24" Locking Rings
- 24" Safety Pans
- 24" Adapter Rings
- 30" Locking Rings



INFILTRATOR WATER TECHNOLOGIES, LLC ("Infiltrator") EZset by Infiltrator LIMITED WARRANTY ONE (1) YEAR MATERIALS AND WORKMANSHIP LIMITED WARRANTY

(a) This limited warranty is extended to the end user of an EZset by Infiltrator riser and lid system and other accessories. An EZset system manufactured by Infiltrator, when installed and operated in accordance with Infiltrator's installation instructions and local regulation by a licensed installer, is warranted to you: (i) against defective materials and workmanship for one (1) years after installation. Infiltrator will, at its option, (i) repair the defective product or (ii) replace the defective materials. Infiltrator's liability specifically excludes the cost of removal and/or installation of the EZset system.

(b) In order to exercise its warranty rights, you must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect.

(c) YOUR EXCLUSIVE REMEDY WITH RESPECT TO ANY AND ALL LOSSES OR DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER SHALL BE SPECIFIED IN SUBPARAGRAPH (a) ABOVE. INFILTRATOR SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, HOWEVER OCCASIONED, WHETHER BY NEGLIGENCE OR OTHERWISE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

(d) THIS LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY GIVEN BY INFILTRATOR AND SUPERSEDES ANY PRIOR, CONTRARY, ADDITIONAL, OR SUBSEQUENT REPRESENTATIONS, WHETHER ORAL OR WRITTEN. INFILTRATOR DISCLAIMS AND EXCLUDES TO THE GREATEST EXTENT ALLOWED BY LAW ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FINESSE FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. NO PERSON (INCLUDING ANY EMPLOYEE, AGENT, DEALER, OR REPRESENTATIVE) IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY CONCERNING THIS PRODUCT, EXCEPT TO REFER YOU TO THIS LIMITED WARRANTY. EXCEPT AS EXPRESSLY SET FORTH HEREIN, THIS WARRANTY IS NOT A WARRANTY OF FUTURE PERFORMANCE, BUT ONLY A WARRANTY TO REPAIR OR REPLACE.

(e) YOU MAY ASSIGN THIS LIMITED WARRANTY TO A SUBSEQUENT PURCHASER OF YOUR HOME.

(f) NO REPRESENTATIVE OF INFILTRATOR HAS THE AUTHORITY TO CHANGE THIS LIMITED WARRANTY IN ANY MANNER WHATSOEVER, OR TO EXTEND THIS LIMITED WARRANTY.

CONDITIONS AND EXCLUSIONS

There are certain conditions or applications over which Infiltrator has no control. Defects or problems as a result of such conditions or applications are not the responsibility of Infiltrator and are NOT covered under this warranty. They include failure to install the EZset system in accordance with instructions or applicable regulatory requirements or guidance, altering the EZset system contrary to the installation instructions and disposing of chemicals or other materials contrary to normal EZset system usage.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of an EZset system should contact Infiltrator's corporate headquarters in Old Saybrook, Connecticut, prior to such purchase to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of an EZset system.

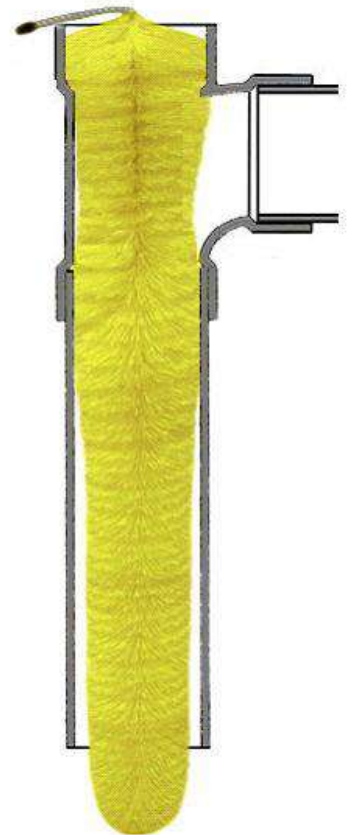
Sim/Tech Filter's Unique Gravity Filtration

The STF-110 series Bristle Filter

Main Features

- Keep out hair, lint, tissue, seeds and more that can clog a drain field
- Excellent filtration - visit our website or call us to see our 3rd party test results.
- Multi-directional flow combined with the contoured design that pre-filters effluent greatly reduces filter clogging
- Over 1/2 mile of filtration media
- Over 319 cubic inches of open area to reduce clogging
- Flexible filters can be used in tees, square baffles, hard to reach baffles etc.
- Multiple Sizes available - Yellow 4", White 6", Red 7", Blue 8"
- Maintenance sleeve (optional) available for servicing between tank pumping. Prevents flow out of tank during service.

Patent# 6,811,692



Maintenance
Sleeve



7" Filter in a 5" square
concrete baffle

Solutions

For the protection and performance of wastewater systems by

SIM/TECH
FILTER



Bristle Filter Instructions For STF-110 4" (Installation & Maintenance)

Instructions for installation in standard 4" outlet "Tee" of septic tank.

- Orient the filter so that the wire handle faces opposite the discharge outlet.
- Push filter into top of "Tee" until the 90 degree wire handle touches the top of the "Tee". The filter is now "installed", as shown in the picture to the right.
- The flexibility of the STF-110 bristle filter allows it to be used in just about any situation. If you need help with a custom installation please call Sim/Tech Filter toll free at 888-999-3290.



Installed Filter

Recommended maintenance schedule

For maximum protection, it is recommended that the filter be replaced annually. If not, it should be inspected at least once per year. The filter is capable of lasting three years under normal conditions. Such factors as garbage disposals, pets, laundry, etc. may cause the need for more frequent inspection or service.

Instructions for performing maintenance in standard 4" outlet "Tee" of septic tank.



STF-130
Maintenance
Sleeve

- Before removing filter, one of two options must be performed. These options need to be performed to prevent any outflow of unfiltered effluent from the tank while the filter is removed.

Option 1

Insert a STF-130 maintenance sleeve (sold separately) with the handle coupling on the same side of the "Tee" as the outlet hole. Push the sleeve into the "Tee" until the handle coupling hits the top of the "Tee". Do not remove the sleeve until a filter has been put back in the "Tee".

Option 2

Have the tank pumped down by a professional septic service company.

- After performing one of the options above, remove filter by pulling up on the filter handle.
- Place the used filter in the provided plastic bag for proper disposal.
- Install a new replacement filter as described in the installation instructions at the top of the page.
- If a maintenance sleeve was used (option 1), remove the sleeve from the outlet "Tee".



Maintenance
Sleeve partially
inserted into
"Tee"

U.S. Patent #
6,811,692

Always use a STF-130 SIMTECH maintenance sleeve
to service
STF-110 SIMTECH septic tank bristle filter 4" yellow
if not pumping the tank down

(STF-130 not included-sold separately)



**Note: Handle does not come attached to maintenance sleeve as shown above.
A ½" pvc pipe is needed to make a handle to desired length.**



TOLL FREE 888-999-3290 OFFICE 231-582-1020 FAX 231-582-7324
EMAIL simtech@freeway.net WEB www.gag-simtech.com



THIRD PARTY VERIFICATION
GARY B. JOHNSON
MICHIGAN # 32831
WISCONSIN # E-25985
MINNESOTA # 41217

SIM/TECH FILTER

NEW STF-110 DISPOSABLE SEPTIC TANK FILTER THIRD PARTY VERIFICATION

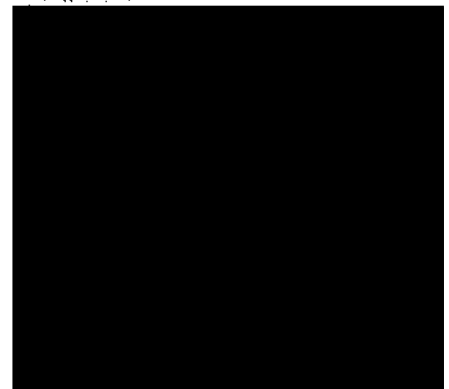
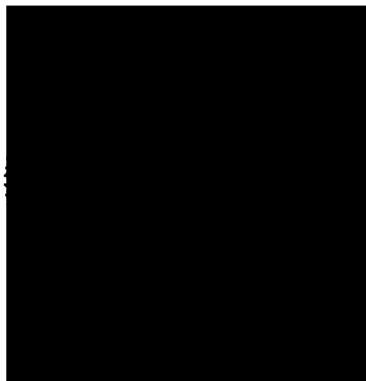
The Disposable Septic Tank Filter is constructed as a twisted-in-wire brush with 26" long brush body, 1/4" tip and 2 3/4" long handle end with 90 degree bend. Brush body will have a major diameter of 4.313" for a length of 9 1/2" starting 1/2" from the 90 degree handle bend, then will transition down to 3 1/2" diameter over the next 2 1/2" and held at 3 1/2" diameter for the next 14".

There will be a scallop cut into the O.D. in the major diameter beginning 2 1/2" from the top, transitioning down to 3 1/2" over the next 2", and then transitioning up to the major diameter over the next 2".

The stem will be 11-gauge stainless steel and the fill material will be .012 yellow polypropylene.

The filter has a total of 2,962 lineal feet of bristle equaling 35,544 lineal inches of bristle. By calculating the total length x the total perimeter of Sim/Tech's uniquely shaped bristle, it gives us a **filtering surface of 2,215 square inches.**

Volume of a 4"x26" Septic Tee	326.7 cubic inches
Volume of the STF-110 Filter	4.265 cubic inches
Volume as open for fluid	322.435 cubic inches





THIRD PARTY VERIFICATION OF FILTRATION ON THE STF-110 AND THREE OTHER GRAVITY SEPTIC TANK FILTERS

- Test was checking for filtering qualities with particulate that could be found in septic tank effluent
- This test used five types of particulate added to a clean tank
- The five types of particulate were hair, seeds, tissue paper, lint, and chain saw chips (see table A below)
- Test tank was riled manually every five minutes while performing tests to represent a large influx of water
- Water was introduced into the test tank at 210 gallons per hour
- Test was run to a 2" head height above outlet flow
- Recorded length of time to achieve a 2" head height (see table B below)
- Recorded what was caught in a 1500 micron sieve during the total run time (see table B below)
- Recorded what was caught in a 600 micron sieve below the 1500 micron sieve during total run time (see table B below)
- Recorded particulate caught while changing filters 15 minutes after ending test using manufacturers recommended instructions (see table B below)
- Recorded particulate removed with filters themselves (all filters were removed slowly) (see table B below)
- All particulate was recorded in grams using a OHAUS Scout II Scale (Serial #BJ380398) with capacity 400 times 0.1g (purchased scale 11/17/01)

TABLE A	Grams
Human hair	2
Horse hair	2
Dog hair	1
Cat hair	1
Tomato seeds	2
Pepper seeds	2
Cucumber seeds	2
Dill seeds	2
Charmin tissue paper	2
Scott tissue paper	2
Northern tissue paper	2
Lint	2
Chainsaw chips	4

TABLE B	Sim/Tech	Tuff-Tite	Zabel	Zoeller
Time to achieve 2" head height	1 hr. 40 min.	7 min.	6 min.	* 2 hrs.
Particulate caught in 1500 micron sieve	0	0	0	0
Particulate caught in 600 micron sieve	0	0.2	0.3	1.2
Particulate caught while changing filter	0	0.3	0	0
Particulate contained within or on filter itself	15.0	6.3	2.2	2.3

*Ended test at 2 hours, total head height was at 1 ¾"

Note: All filters except Sim/Tech caught seeds in 1500 micron sieve but was not recordable in 1/10g scale

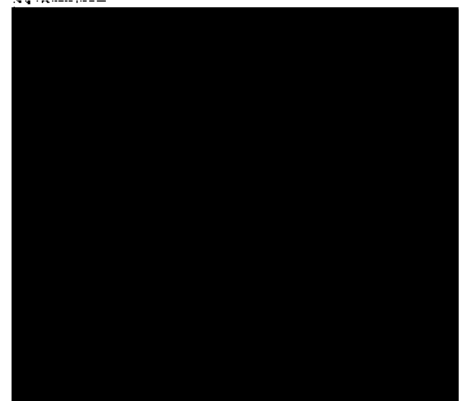
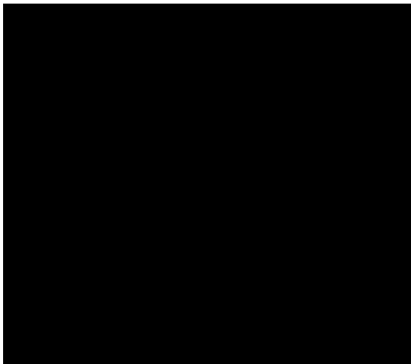


THIRD PARTY VERIFICATION OF FLOW RATES ON THE STF-110 AND THREE OTHER GRAVITY SEPTIC TANK FILTERS

- Test done with clean water and no particulate
- Filters placed in a standard outlet tee of S & D type with a 17" tailpiece to outlet level
- Test tank was a plastic 55 gallon drum
- There was an accurate method to measure head height above outlet level
- Test was done for a ½" and 1" head height above outlet level
- All filters tested using the above conditions

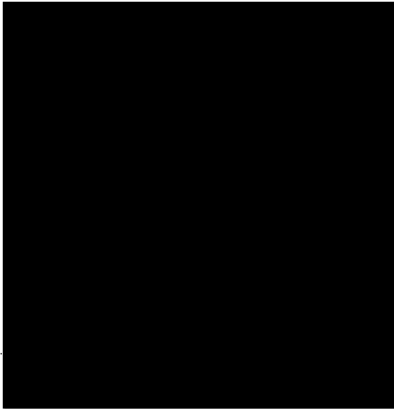
FILTER FLOW RATES

	Sim/Tech	Tuff-Tite	Zabel	Zoeller
½" head height above outlet flow	1, 800 GPD	1, 440 GPD	1, 195 GPD	900 GPD
1" head height above outlet flow	5, 040 GPD	4, 680 GPD	4, 858 GPD	1, 800 GPD



It is my opinion that the Sim/Tech filter will prove to be a superior septic tank filter because of its basic design; bristles to catch any "paper like" debris on the outside surface (guided there because of the bristle's bending at the ends under pressure of the flow). A dead zone near the center to collect small particles as they fall out of the flow. Plus the incalculable water paths through, and around, the filter fibers.

Gary B. Johnson P.E.
363 Silver Creek Rd
Petoskey, Mi 49770



PL-68 Filter and Tee

PL-68 is much more than just an effluent filter. The housing can also be used as an inlet baffle (tee) or an outlet baffle. The housing is designed to accept Polylok's snap in gas deflector to deflect gas bubbles away from the tee and to keep the solids in the tank.

Features:

- Offers 68 linear feet of 1/16" filter slots, which significantly extends time between cleaning.
- Accepts 3/4" PVC handle.
- Locks in any 360° position when used with PL-68 Tee.
- PL-68 Housing can be used as an inlet or outlet tee.
- Gasket prevents bypass.

PL-68 Installation:

Ideal for residential waste flows up to 800 gallons per day (GPD). Easily installs in any new or existing 4" outlet tee.

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the outlet pipe, or use a Polylok Extend & Lok if not enough pipe exists.
4. Insert the PL-68 filter into tee.
5. Replace and secure the septic tank cover.

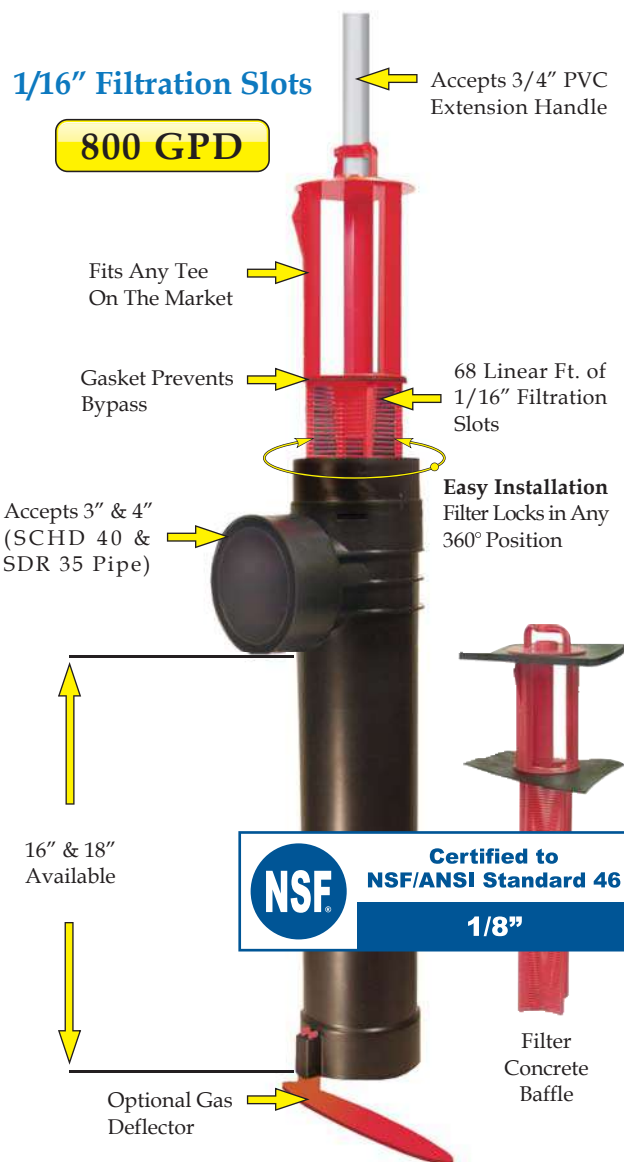
PL-68 Maintenance:

The PL-68 Effluent Filter will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years.

1. Do not use plumbing when filter is removed.
2. Pull PL-68 out of the tee.
3. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
4. Insert filter back into tee/housing.

Related Products:

PL-68 Filter Concrete Baffle
Extend & LokTM



Extend & LokTM
Easily installs
into existing tanks.



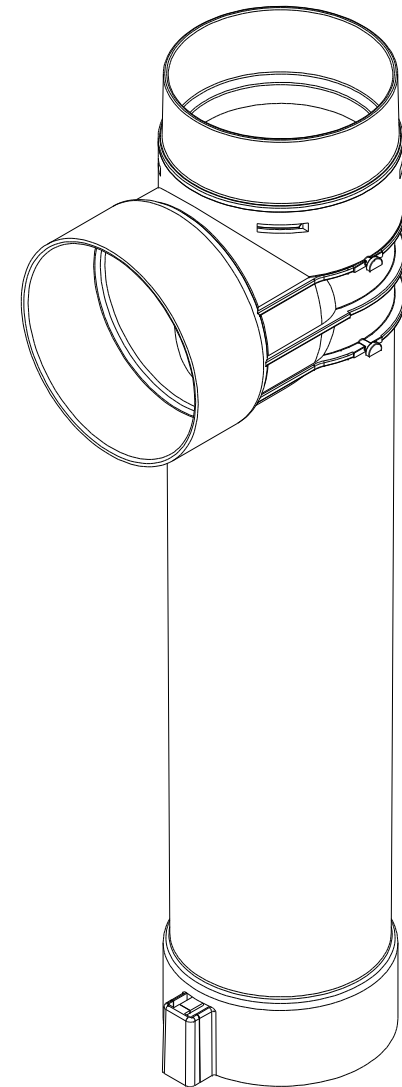
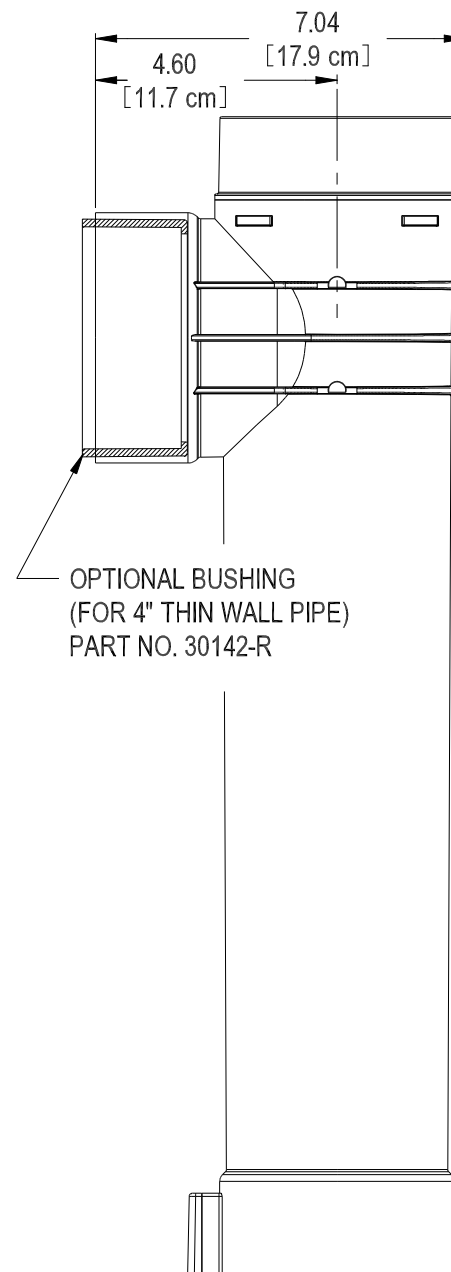
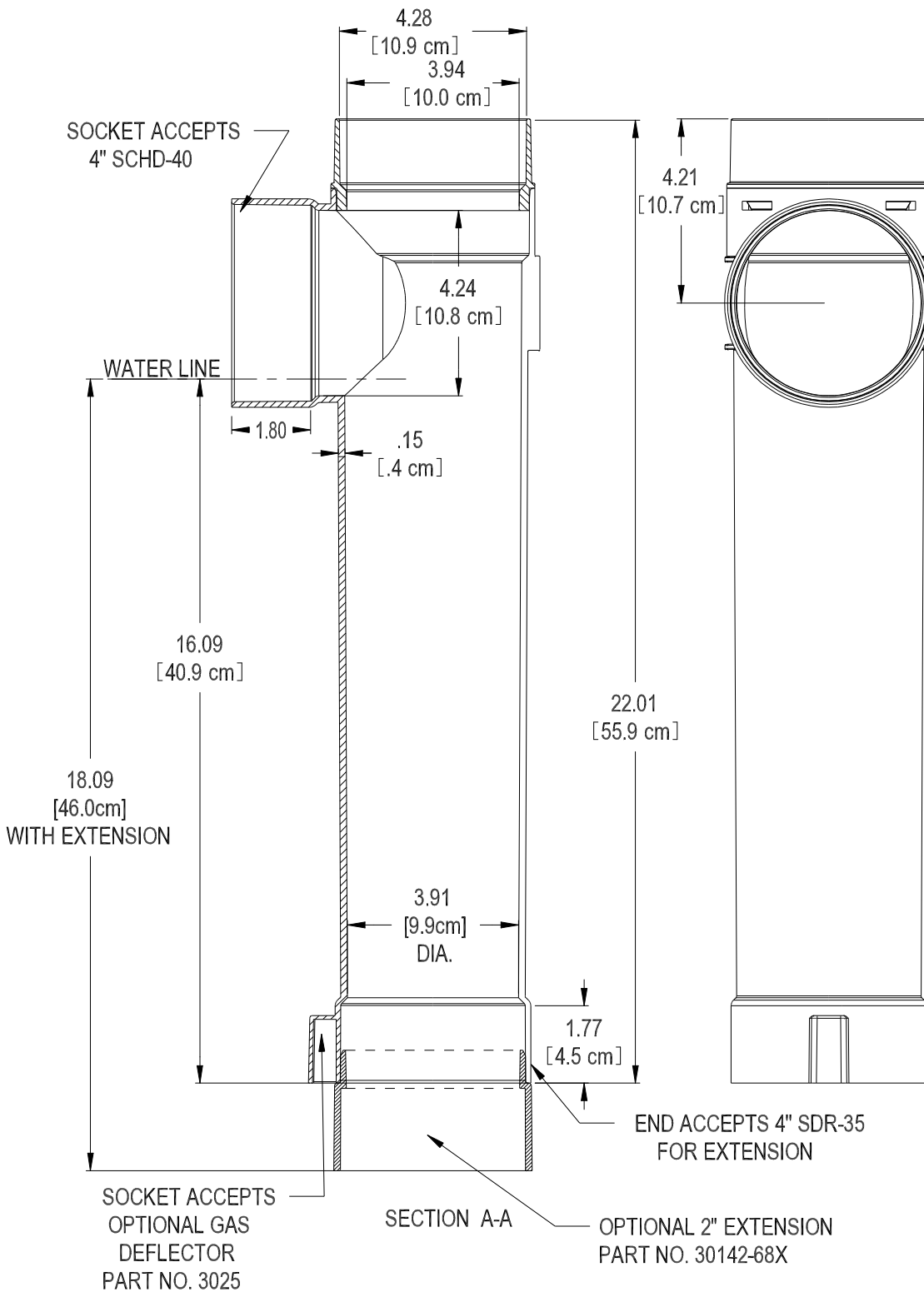
Spacer Bushing
4" SCHD 40
to SDR 35



Spacer Bushing
4" SCHD 40
to 110mm Pipe



2" Extender



POLYLOK PL-68 HOUSING 4"
PART NO. 30142-68-4
MATERIAL - ABS
COLOR - BLACK



The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Wednesday, April 06, 2016** at 12:15 a.m. Eastern Time. Please [contact NSF International](#) to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information: <http://info.nsf.org/Certified/Wastewater/Listings.asp?Standard=046&Company=79580&>

NSF/ANSI 46 Evaluation of Components and Devices Used in Wastewater Treatment Systems

Polylok Inc.
3 Fairfield Boulevard
Wallingford, CT 06492
United States
877-765-9565
203-265-6340

Facility : Cheshire, CT

Septic Tank Effluent Filters[1]

PL-122	PL-250	PL-525	PL-625	PL-68
--------	--------	--------	--------	-------

[1] Performance tested using bead size $0.338 \text{ cm} \pm 0.005 \text{ cm}$ ($1/8" \pm 0.002"$). Meets the full requirements of NSF/ANSI 46-2010.

Facility : Evansville, IN

Septic Tank Effluent Filter Components[1]

A101-12x20	A101-12x28	A101-12x36	A101-8x18	A101-8x26
A101-8x32	A1801-4x18[4]	A1801-4x22[4] [5]	A301-12x20	A301-12x28
A301-12x36	A301-8x18	A301-8x26	A301-8x32	

[1] Septic Tank Effluent Filter Components are exempt from bearing the NSF Component Mark and shall bear the NSF Unit Mark.

- [4] Filter cartridges Certified in ABS and PVC materials.
 [5] Failure sensing and signaling equipment of this product not evaluated by NSF.

Septic Tank Effluent Filters[2] [3]

A100-12x20	A100-12x20-VC	A100-12x20/BALL	A100-12x28-VC	A100-12x36-VC
A100-8x18-VC	A100-8x26-VC	A100-8x32-VC	A1800-4x18-30142-68	A1800-4x18-VT-B35
A1800-4x18-VT-B40	A1800-4x18-VTF-B35	A1800-4x18-VTF-B40	A1800-4x22-30142-68	A1800-4x22-VT-B35
A1800-4x22-VT-B40	A1800-4x22-VTF-B35	A1800-4x22-VTF-B40	A300-12x20	A300-12x20-VC
A300-12x20/BALL	A300-12x28-VC	A300-12x36-VC	A300-8x18-VC	A300-8x26-VC
A300-8x32-VC	A600-12x20	A600-12x20/BALL	A600-12x28-VC	A600-12x36-VC
A600-8x18-VC	A600-8x26-VC	A600-8x32-VC		

[2] Suffix VC denotes a filter cartridge with Versa-Case assembly.

[3] Performance tested using bead size 0.338 cm $\pm$ 0.005 cm (1/8" $\pm$ 0.002"). Meets the full requirements of NSF/ANSI 46-2010.

NOTE: All filters come Smartfilter ready.

Number of matching Manufacturers is 1

Number of matching Products is 52

Processing time was 0 seconds



EZflow by Infiltrator is an environmentally friendly replacement to traditional stone and pipe drainfields using an engineered geosynthetic aggregate modular design. The EZflow system is designed to improve infiltration performance by eliminating the fines associated with crushed stone, and reducing compaction and embedment associated with stone. Preassembled units include a 3" or 4" perforated pipe surrounded by aggregate and held in place with a durable high-strength netting. This product comes in easy-to-contour 5' and 10' lengths and in diameters of 7, 8, 9, 10, 12, 13, or 14 inches.

Lightweight expanded polystyrene

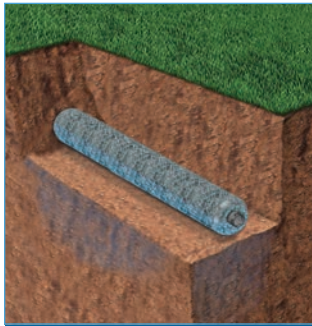
construction offers structural integrity and resists compaction. Engineered flow-channels increase void space creating improved water flow and greater storage.



Compared with stone and pipe, benefits include:

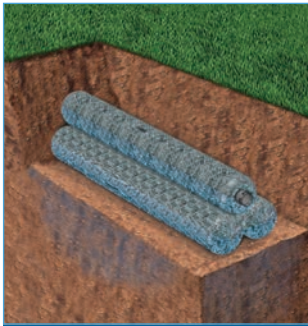
- Always clean and free of fines
- Bundles are quick to install, saving costs on heavy machinery and labor
- Modular construction allows configurations to match trench dimensions for most system shapes and sizes
- Engineered for optimal storage and absorption efficiencies
- Ability to contour along sloped sites and around trees or landscaping
- Lightweight system is perfect for repairs and tight job sites
- Easily hand-carried into position reducing time and labor
- 5' or 10' lengths with simple snap, internal couplers
- Easier cleanup at the job site with the elimination of stone
- Manufactured from recycled materials rather than a mined natural resource
- A wide variety of diameters and configurations to meet any installation professional's needs
- Approved in many jurisdictions with an increased efficiency rating, reducing drainfield size
- Backed by the leader in the onsite wastewater industry

Bundle System Configurations: Available in 7", 8", 9", 10", 12", 13" and 14" diameter bundles.



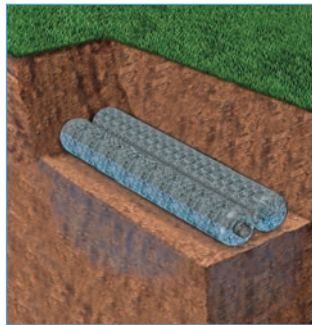
Single Bundle

0701P-GEO 1201P-GEO
0801P-GEO 1401P-GEO
1201P-GEO 1801P-GEO
1001P-GEO



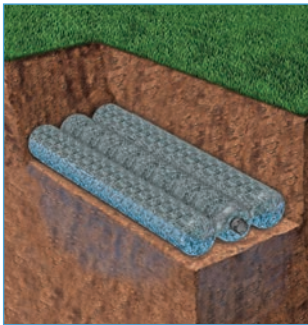
Triangular Bundle

1003T-GEO 1303T-GEO
1203T-GEO 1403T-GEO



Horizontal Bundles

0705H-GEO 1303H-GEO 1206H-GEO 1402H-GEO
0904H-GEO 1202H-GEO 1303H-GEO 1802H-GEO
1002H-GEO 1203H-GEO



Vertical Bundles

1002V-GEO 1006V-GEO 1203V-GEO 1206V-GEO
1003V-GEO 1202V-GEO 1204V-GEO 1402V-GEO
1004V-GEO

Notes:

1. Other systems include 10" and 12" bed systems. Bed size will dictate the number of bundles.
2. System dimensions are dependent upon bundle diameter and configuration.
3. LLP is for "Low Pressure Pipe" in which a pressurized distribution pipe is field installed within the corrugated pipe.
4. Internal pipe and couplings meet the requirements of ASTM F405.
5. Bundles are also available without geotextile between the netting and synthetic aggregate.

INFILTRATOR WATER TECHNOLOGIES STANDARD LIMITED WARRANTY

(a) The structural integrity of each EZflow by Infiltrator expanded polystyrene drainfield system and other accessories manufactured by EZflow by Infiltrator ("Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one year from the date that the septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required by applicable law, the warranty period will begin upon the date that installation of the septic system commences. To exercise its warranty rights, Holder must notify Infiltrator in writing at its Corporate Headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for Units determined by EZflow by Infiltrator to be covered by this Limited Warranty. EZflow by Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.

(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

(c) This Limited Warranty shall be void if any part of the EZflow system is manufactured by anyone other than EZflow by Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator's installation instructions.

(d) No representative of Infiltrator has the authority to change or extend this Limited Warranty. No warranty applies to any party other than the original Holder.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator's Corporate Headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of Units.



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U.S. Patents: 4,759,661; 5,017,041; 5,156,488; 5,336,017; 5,401,116; 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844 Canadian Patents: 1,329,959; 2,004,564 Other patents pending. Infiltrator, Equalizer, Quick4, and SideWinder are registered trademarks of Infiltrator Water Technologies. Infiltrator is a registered trademark in France. Infiltrator Water Technologies is a registered trademark in Mexico. Contour, MicroLeaching, PolyTuff, ChamberSpacer, MultiPort, PosiLock, QuickCut, QuickPlay, SnapLock and StraightLock are trademarks of Infiltrator Water Technologies. PolyLok is a trademark of PolyLok, Inc. TUF-TITE is a registered trademark of TUF-TITE, INC. Ultra-Rib is a trademark of IPEX Inc.

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EZ01 0315AG

Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4436

North Carolina

The North Carolina Department of Health and Human Services Onsite Water Protection Branch approved the use of EZflow by Infiltrator drainfields as a replacement for conventional drain media in a variety of system applications, as described in the EZflow innovative and accepted product approvals.

Materials & Equipment Needed

- EZflow Bundles
- EZflow Barrier Paper
- EZflow Internal Pipe Couplers
- Pipe for Header and Inlet
- Backhoe
- Laser, Transit, or Level
- Shovel and Rake

Trench Systems

Installation Instructions

The instructions for installation of EZflow products are given below. This product must be installed in accordance with these installation instructions, the product approval, and Onsite Water Protection Branch requirements.

NOTE: As is the case with conventional systems, do not install the systems in wet conditions or in overly moist soils, as this causes machinery to smear the soil.

1. Stake or mark the bed location with paint per plan and permit. Set the elevations for the: bed bottom, header pipe or distribution box, invert pipe, and tank excavation.
2. If smearing or glazing of trench sidewalls and bottom has occurred in clay soils, it is recommended that these soil surfaces be raked or scarified.
3. The proper elevation of solid PVC header pipe shall be determined to ensure compliance with the required maximum trench bottom depth as shown on the permit. This height may vary depending on system height and configuration used.
4. Each trench system must have a minimum separation between trench walls as required by 15A NCAC 18A.
5. Remove EZflow stretch wrap prior to placing bundles in the trench(es). Remove all stretch wrap from the trench before the system is covered and dispose of properly.
6. Place EZflow bundle(s) in the configuration shown on the permit specified for the particular site. Join bundles containing pipe end-to-end with an internal pipe coupler. Additional aggregate-only bundles shall be butted against the other aggregate-only bundles and do not require connection.
7. Header lines can be connected to the pipe-containing EZflow bundles with the EZflow Versa Coupler™. The opposite end of the Versa Coupler is designed to connect to either 4" SDR 35 or 4" Schedule 40 pipe with a standard primer and glue connection.
8. The top of each GEO bundle contains an integral filter fabric. The fabric prevents soil intrusion. Place the bundle with fabric in the top position and in contact with the fabric contained in the adjacent



February 2021

Installation Instructions for EZflow Systems in North Carolina



bundle before backfilling. The end-to-end gap distance between pipe containing GEO bundles, as measured from the straps fixing the netting to the pipe or from the face edges of aggregate on adjoining bundles, shall be no greater than 3 inches.

9. If not using a GEO product, EZflow systems require covering over the top of the system with geotextile
10. Header or lead lines from the distribution box or device shall be connected to the top or center-most pipe bundle in each trench or inserted into the pipe.
11. EZflow trenches shall be installed level in all directions plus or minus one-half-inch tolerance from side-to-side and with a maximum fall in a single trench bottom not exceeding one-fourth inch in 10 feet end-to-end for any continuous contoured segment. Trenches shall follow the contour of the ground surface elevation (uniform depth).
12. When surface slopes are greater than two percent, the bottom of the trenches shall follow the contour of the ground.
13. The soil cover shall be to a depth of at least six inches.
14. The finished grade shall be landscaped to prevent the ponding of surface water.
15. Soil cover above the original grade shall be placed at a uniform depth over the entire nitrification field, except as required to prevent the ponding of surface water.
16. The soil cover shall be placed over the drainfield after proper preparation of the original ground surface.

As required by state or local requirements, be sure to obtain proper installation inspection from the health department prior to covering the system.

After the system has been completely covered, only drive across the trenches when necessary. Never drive parallel to the direction

of the trench. To avoid additional soil compaction, prevent any heavy equipment from driving across or parallel to the direction of the trench.

Sod or seed the drainfield area to control erosion, as may be required by permit of local requirement.

Sizing

1. The long-term acceptance rate (LTAR) shall be as shown in the permit for the site.

2. To determine the minimum total trench bottom area (sf) required, divide the design daily sewage flow by the applicable LTAR shown on the permit. The minimum linear footage for EZflow drainfield systems shall be determined by dividing the minimum required trench bottom area by the following equivalency factors:

Model	Equivalency Factor (sf/lf)
1203H/1203H-GEO	4.0
1203T/1203T-GEO	4.0
1003T/1003T-GEO	3.0

Bed-in-Fill Systems

Installation Instructions

1. Stake or mark the bed location with paint per plan and permit. Set the elevations for the: bed bottom, header pipe or distribution box, invert pipe, and tank excavation.

2. Before placing fill, the site shall be void of a vegetative cover, organic litter, and any debris. Do not remove soil.

3. Place Group I soil fill in six-inch lifts with a maximum 3:1 sideslope. Place Group I fill to the lines and elevation specified in the permit.

4. Remove stretch wrap from EZflow bundles and the bed prior to placing bundles in the bed. Dispose of stretch wrap properly.

5. Place EZflow bundles on the Group I fill in the approved configuration. Place bundles edge-to-edge on 3-foot centers.

6. Join bundles containing pipe end-to-end with an internal pipe Versa Coupler. Additional aggregate-only bundles shall be butted against the other aggregate-only bundles and do not require connection.

7. The top of each GEO bundle contains filter fabric. Place the bundle so that the fabric is in the top position and in contact with the fabric contained in the adjacent bundle.

8. If not using a GEO product, cover the EZflow bundles with geotextile.

For gravity distribution:

9. Install the header piping and connect to each pipe-containing EZflow bundle with the EZflow Versa Coupler. The opposite end of the Versa Coupler is designed to connect to either 4-inch SDR 35 or 4-inch Schedule 40 pipe with a primer and glue connection. Alternatively, 3-inch Schedule 40 pipe may be used for the connection between the septic tank and the pipe-containing EZflow bundle and inserted into the 4-inch corrugated pipe in the bundle.

10. Place Group I fill around the perimeter of the bed and directly

against the outer bundles of EZflow to the top of the bundles.

11. Place a minimum of six inches of cover (Group II or III soil) over the bed and side slopes.

For low-pressure distribution:

12. Insert low-pressure pipe (LPP) pressure laterals into each pipe-containing bundle.

13. To allow the pressure laterals to drain after each pump cycle, drill the first and last orifices in the bottom of each lateral. All other orifices shall be drilled in the LPP laterals facing upward.

14. Glue the pressure lateral pipe to the header piping.

15. Place Group I fill around the perimeter of the bed and directly against the outer bundles of EZflow to the top of the bundles.

16. Place a minimum of four inches of cover (Group II or III soil) over the bed and side slopes.

Obtain required installation inspections from the health department prior to covering the system.

Sod or seed the cover area to control erosion, as required.

Sizing

1. LTAR shall be shown on the permit.

2. To determine the minimum total bed bottom area (sf) required, divide the daily sewage flow by the applicable LTAR. The resulting area value shall be increased by 50%. The minimum linear footage for EZflow in a bed-in-fill system shall be determined by dividing the total required bed bottom area by a bed equivalency factor of 3.0 sf/lf.

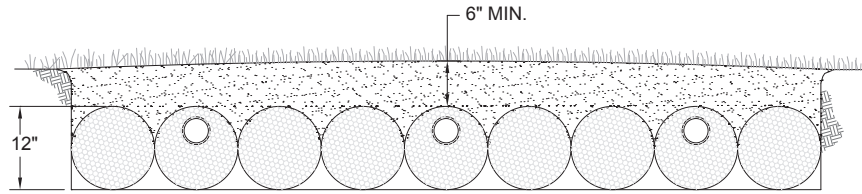
Operation and Maintenance

Operation and maintenance for EZflow 1203H-GEO utilizing an equivalency of 4.0 sf/lf or less shall have a minimum classification of IIa. All other EZflow drainage systems shall have a minimum classification as a Type IIIg system (other non-conventional trench systems) in accordance with Rule 15A NCAC 18A. These recommendations include: avoiding excessive amounts of water, grease or non-biodegradable materials entering the septic tank, promoting even wastewater distribution, avoiding chemical or biological additives, promoting ready access to the septic tank for maintenance and periodic inspection and pumping of the septic tank.

System Inspection

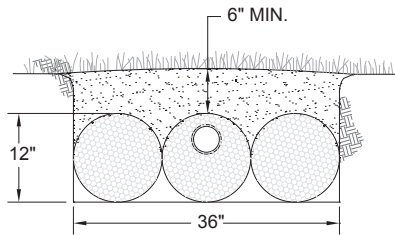
Provisions of the NC Rules apply, except as modified by the applicable innovative wastewater approval. Inspection is significantly easier due to the pre-assembly of the components. Levelness of the trench bottom may be checked by inserting a rod between the aggregate bundles down to the trench bottom.

EZflow Bed System



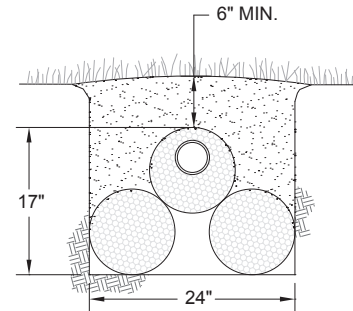
The EZflow Drainage system 1203H and 1203H-GEO configurations may be used in a bed system with the three cylindrical bundles placed in adjacent rows. The minimum area (without reduction or equivalency factor) for a bed system shall be determined as required in 15A NCAC 18A.1955(d). This configuration is installed foot-for-foot with a conventional gravel and pipe bed system.

EZflow 1203H/1203H-GEO Trench



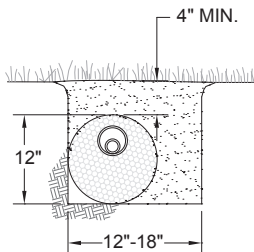
EZflow 1203H/1203H-GEO Approved at 4.0 sf/lf
 EXAMPLE: 300 sf required.
 $300 \text{ sf} \div 4.0 \text{ sf/lf} = 75 \text{ lf}$ required

EZflow 1003T/1003T-GEO Trench



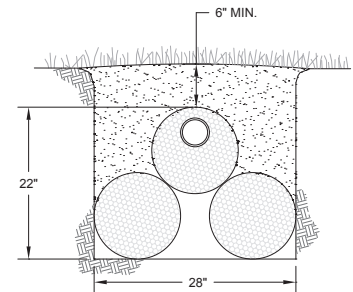
EZflow 1003T/1003T-GEO Approved at 3.0 sf/lf
 EXAMPLE: 300 sf required.
 $300 \text{ sf} \div 3.0 \text{ sf/lf} = 100 \text{ lf}$ required

EZflow 1201P/1201P-GEO Trench



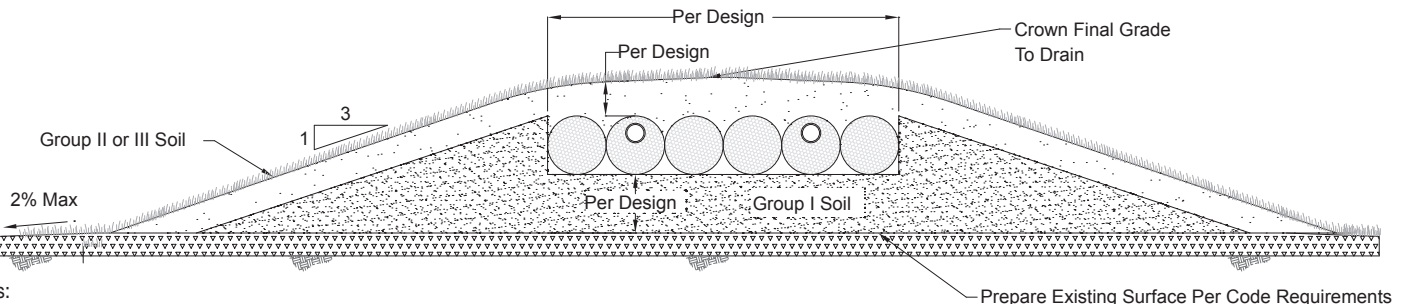
The central bundle of the EZflow 1203H or 1203H-GEO containing the offset four-inch pipe may be used as an alternative to gravel in a low-pressure pipe (LPP) system, sized equivalent to LPP systems as required in 15A NCAC 18A and as described in the EZflow innovative and accepted approvals.

EZflow 1203T/1203T-GEO Trench



EZflow 1203T Approved at 4.0 sf/lf
 EXAMPLE: 300 sf required.
 $300 \text{ sf} \div 4.0 \text{ sf/lf} = 75 \text{ lf}$ required

EZflow Bed-in-Fill System



Notes:

1. To be installed in accordance with the innovative or accepted approval, as applicable.
2. All approved separation distances must be met.
3. Bed width must be no more than 24 feet and be a multiple of three feet.
4. Maximum eight lines on each side of the distribution device.
5. The maximum spacing between opposing EZflow bundles adjacent to the distribution device shall be six feet.

Table 1. Trench and Bed Specifications

Product Specifications	EZflow Configurations					
	1003T/1003T-GEO TRENCH	1203H/1203H-GEO TRENCH	1203T/1203T-GEO TRENCH	1201P LPP TRENCH	1203H BED /1203H-GEO	1203H/1203H-GEO BED-IN-FILL
Overall System Height (in)	17	12	19	12	12	12
Trench Width (in)	24	36	30	12 - 18	-	-
Equivalency Factor* (sf/lf)	3.0	4.0	4.0	-	-	3.0
Min. Cover (in)	6	6	6	4	6	6/4****
Min. Trench Spacing (ft)	7.5	9.0	9.0	-	-	-
Min. Trench Depth Below Finished Grade** (in)	23	18	25	18	18	18/16****
Max. Trench Depth Below Finished Grade (in)	36	60***	36	36	36	-
Nominal Pipe Height Above Trench Bottom (in)	10	6	11	6	6	6

* The design (equivalent) trench width and equivalency factor shall not exceed the excavated trench width for systems installed in fill or food service facilities, meat markets, and other places of business where accumulation of grease can cause premature failure of soil absorption systems. Reductions in trench bottom area up to those allowed by applying Design (equivalent) trench width and equivalency factors may be permitted for facilities where data from comparable facilities indicate that fats, oil, and grease content of the effluent will be less than 30 mg/l and the chemical oxygen demand (COD) will be less than 500 mg/l.

** Note that on sloping lots, minimum required trench depths shall be greater.

*** EZflow 1203H-GEO systems installed at depths greater than 36 inches shall be sized with an equivalency factor of 3.0 sf/lf.

**** Variation in bed-in-fill cover and trench depth below finished grade requirements is due to the LPP distribution requiring 2 inches less cover than gravity distribution.



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info@infiltratorwater.com

The top of configurations with the suffix "GEO" contain a filter fabric pre-manufactured in between the netting and aggregate. The fabric is inserted to prevent soil intrusion. The installer shall make sure that the fabric is on top and is in contact with the fabric contained in the adjacent cylinder before backfilling. If not utilizing a GEO product, installer should use untreated building paper. Other barrier material may be used as approved by the state's DEC and manufacturer.

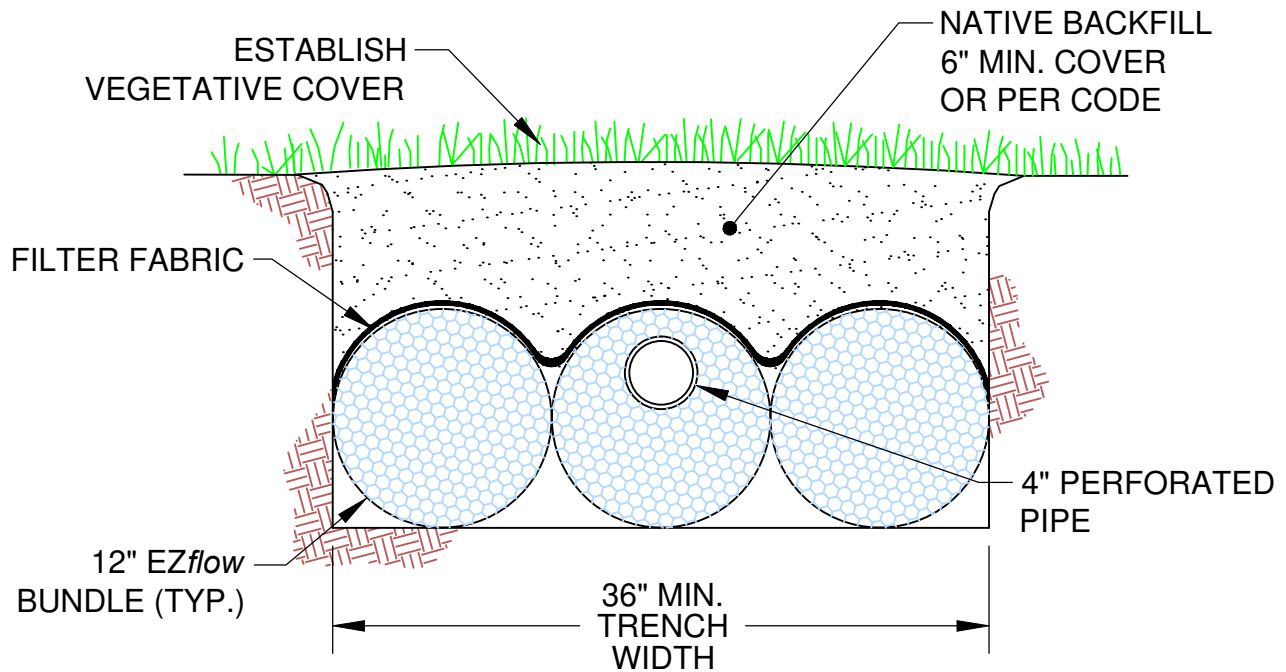
ISO 9001 Registered.

U.S. Patents: 8322948; 8337119; 8297880; 7914230; 7008138. Other patents pending. Infiltrator, Quick4 and EZflow are registered trademarks of Infiltrator Water Technologies. Infiltrator Water Technologies is a wholly-owned subsidiary of, Advanced Drainage Systems, Inc. (ADS).

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EZ36 0221

EZflow 1203H - GEO



NOTE:
PRODUCT CONFIGURATION AND INSTALLATION
DEPTH MUST COMPLY WITH APPLICABLE
REGULATORY REQUIREMENTS.



INFILTRATOR SYSTEMS INC.
4 Business Park Rd. Old Saybrook, CT 06475
(800) 221-4436

EZflow 1203H - GEO

Drawn by: EMB	Date: 08/07/2013
Scale: NOT TO SCALE	Checked by: DFH Sheet: 1 of 1

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

ACCEPTED WASTEWATER SYSTEM APPROVAL
--

Accepted Wastewater System Approval Number: AWW-2005-02-R6

Issued To: EZflow, LP, a wholly owned subsidiary of Infiltrator Water Technologies, LLC
PO Box 768
Old Saybrook, CT 06475
800-221-4436; Fax: 860-577-7001
www.ezflowlp.com

Contact: David Lentz, P.E.

For: "EZflow by Infiltrator" Bundled Expanded Polystyrene Synthetic Aggregate Units
(EZ1203H and EZ1203H-GEO)

Approval Date:	April 2, 2005	Accepted Status Granted for Model EZ1203H
	February 6, 2008	Addition of EZ1203H-GEO and 5-foot units
	August 18, 2010	Addition of 3-foot and 7-foot units
	May 1, 2012	Clarification of Approval Language
	August 15, 2012	Addition of Sizing for LTARs Greater Than 1.0 gpd/sq ft
	February 20, 2015	Elimination of Particle Density Specification
	August 21, 2015	Add alternating dual-field systems, update trench levelness requirements, and change company name from Infiltrator Systems, Inc. to Infiltrator Water Technologies, LLC

In accordance with G.S. 130A-343(h) and 15A NCAC 18A .1969(h), a petition to the Commission for Public Health by EZflow, LP, a wholly owned subsidiary of Infiltrator Water Technologies, LLC (previously Ring Industrial Group of Oakland, TN), for modification of its approved accepted status for EZflow Drainfield Systems has been reviewed by the Department and approved by the Commission. The EZflow systems have been found to perform in a manner that is equal to or superior to a conventional wastewater system and to meet the standards of an accepted system when all of the conditions of this approval are met.

I. General

A. Scope of this Accepted Approval

1. Use, design, and installation requirements for the EZflow polystyrene aggregate drainfield systems.

B. The following polystyrene aggregate drainfield system models have been found to meet the standards of an accepted system:

- EZ1203H
- EZ1203H-GEO

II. System Description

- A. Minimum pretreatment by septic tank as required in 15A NCAC 18A .1952.
- B. EZflow expanded polystyrene aggregate particles (EPS) shall meet the following requirements:
 - 1. EPS shall consist of three dimensional rectangular shapes resembling capital E's placed back-to-back (also known as the "double E") with void channels and surface area protuberances.
 - 2. EPS shall range in size from 0.75 inches to 1.75 inches along any axis.
- C. The EZflow drainfield system units (also referred to as cylindrical units) shall meet the following general specifications:
 - 1. EPS shall be contained in cylindrical high strength netting.
 - 2. The physical and chemical properties of the netting shall be durable and resistive enough to retain the shape of the units and to withstand system installation, backfilling, corrosion, and loss of aggregate under intended use.
 - 3. Cylindrical units shall be 12-inches in diameter +/- 1/2 inch.
 - 4. Cylindrical units shall be manufactured in 3-, 5-, 7-, and 10-foot long sections, +/- 2 inches.
 - 5. The taper, or reduction in diameter, at each end of the cylindrical units shall not begin more than 3 inches from the point of enclosure, as measured along the linear axis of the unit.
 - 6. Cylindrical units shall be able to withstand an AASHTO H-10 axle load of 16,000 pounds when covered with 12 inches of compacted soil and a shallow cover axle load of 4,000 pounds when covered with 6 inches of compacted soil without collapsing, fracturing or breaking when installed in a trench equaling the product configuration width.
- D. The EZ1203H shall meet the following description and specifications:
 - 1. The product shall be comprised of three 12-inch-diameter units 3-, 5-, 7-, or 10-feet long placed side-by-side across the bottom of a 36-inch-wide trench.
 - 2. The outer units shall contain aggregate only, with the netting tied off at both ends to prevent the escape of aggregate.
 - 3. The central unit shall contain aggregate and a 4-inch-diameter perforated flexible plastic pipe as is typically used in nitrification lines.
 - 4. The pipe shall be certified as complying with ASTM F 405, Standard Specifications for Corrugated Polyethylene (PE) Tubing and Fittings, and shall be in accordance with 15A NCAC 18A .1955(f).
 - 5. The netting for the central unit shall be tied off at both ends of the pipe.
 - 6. The 4-inch pipe shall be offset from center towards the top of the unit whereby 5 to 6 inches of aggregate is located between the bottom of the pipe and the bottom of the unit, and 1 1/4- to 2 1/2- inches of aggregate is located between the top of the pipe and the top of the unit.
 - 7. The pipe shall be connected by an internal coupling device to allow continuous connection from one section to the next.
 - 8. The end-to-end gap distance between pipe containing cylinders, as measured from the straps fixing the netting to the pipe or from the face edges of aggregate on adjoining cylinders, shall be no greater than 3 inches.
- E. The EZ1203H-GEO shall meet the same product specifications as the EZ1203H as described in paragraph D, above, with the addition of geotextile fabric pre-inserted between the netting and aggregate spanning 180 degrees +/- 15 degrees along the top of each cylinder. The geotextile shall have the minimum average value specifications described in Table I.

Table I - Minimum Geotextile Barrier Material Specifications for EZ1203H-GEO

Property	Value
Unit Weight	0.5 ounces per square yard
Tensile Strength	Cross Direction: 40 N/2.54cm +/- 20% Machine Direction: 50 N/2.54cm +/- 20%
Air Permeability	775 cubic feet per minute +/- 20%

III. Siting Criteria

The EZflow drainfield system shall be sited equivalently to rock aggregate and pipe in accordance with the following criteria:

- A. Sites which are classified Suitable or Provisionally Suitable for a conventional nitrification field system in accordance with 15A NCAC 18A .1948(a) and (b).
- B. Sites which have been reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(1), (2), (4), (5), and (6).
- C. Sites which meet the criteria for new or existing fill in accordance with 15A NCAC 18A .1957(b). The provisions of Rule .1957(b) are applicable whenever any portion of the aggregate cylinders in an EZflow nitrification trench system extends into fill material. There shall be no reduction in trench length compared to conventional gravel trench. This reference to "fill material" applies to the site fill and not the backfill placed between the trench and the cylinder sidewall.
- D. The required vertical separation shall be measured from the trench bottom.

IV. EZflow Drainfield System Sizing

- A. The maximum long-term acceptance rate (LTAR) shall be as follows:

Table II

Textural Group		LTAR (GPD/ft ²)	
		Natural	Saprolite
Soil/Group I (Sands)	Sand	0.8-1.0*	0.6-0.8
	Loamy Sand		0.5-0.7
Soil Group II (Coarse Loams)	Sandy Loam	0.6-0.8	0.4-0.6
	Loam		0.2-0.4
Soil Group III (Fine Loams)	Silt Loam	0.3-0.6	0.1-0.3
	Other Fine Loams		NA
Soil Group IV	Clays	0.1-0.4	NA

*When the LTAR exceeds 1.0 gpd/sq ft, the nitrification trench system shall be sized using the Equivalency Factors in Table IV.

- B. The LTAR shall be based on the most hydraulically limiting naturally occurring soil horizon within three feet of the ground surface or to a depth of one foot below the trench bottom whichever is deeper.

- C. For LTAR values equal to or less than 1.0, the minimum total trench bottom area (ft²) required shall be determined by dividing the design daily sewage flow by the applicable LTAR shown in Table II above. The minimum linear footage for EZflow drainfield systems shall be determined by dividing the total trench bottom area by the following equivalency factor:

Table III

EZflow Product Configuration	Excavated Trench Width	Equivalency Factor* (SF/LF)
EZ1203H	36 inches	4.0
EZ1203H-GEO	36 inches	4.0

*Reduction in nitrification trench length allowed by use of this Equivalency Factor, as compared to sizing requirements delineated in Rule .1955 for conventional systems, apply only to drainfields receiving effluent of domestic strength or better quality. The system may be used in an alternating dual field application pursuant to 15A NCAC 18A .1955(p) provided that the equivalency factor for sizing each of the two complete nitrification fields does not exceed 4.61 SF/LF. Any proposed use of the system for facilities producing higher strength wastewater shall be sized in adherence with conditions set forth in Rule .1969(m).

Example:

Three bedroom residence with a design daily sewage flow of 360 gallons on a sandy clay loam (Group III) soil

Total computed trench bottom area is:

$$360 \text{ gpd} / 0.5 \text{ gpd/square foot (LTAR)} = 720 \text{ ft}^2$$

The minimum required linear footage for the accepted EZflow drainfield system is:

$$720 \text{ ft}^2 / 4.0 \text{ ft} = 180 \text{ linear ft.}$$

Where 4.0 SF/LF is the equivalency factor for the accepted EZflow EZ1203H

- D. For LTAR values greater than 1.0, the minimum total trench bottom area (ft²) required shall be determined by dividing the design daily sewage flow by the applicable LTAR shown in Table II above. The minimum linear footage for EZflow drainfield systems shall be determined by dividing the total trench bottom area by the following equivalency factors:

Table IV

EZflow Product Configuration	Excavated Trench Width	Equivalency Factor (SF/LF)
EZ1203H	36 inches	3.0
EZ1203H-GEO	36 inches	3.0

- E. The EZflow drainfield system may be used in a bed system with the three cylindrical bundles placed in rows next to each other. The minimum area (without reduction or equivalency factor) for a bed system shall be determined as required in 15A NCAC 18A. 1955(d). The available space requirements of Rule .1945 shall be met, and this approved accepted system may be designated as the required replacement system.

V. Special Site Evaluation

A special site evaluation may be required based on the proposed ground absorption system. Refer to Rule .1970(p).

VI. Design Criteria

Refer to Siting Criteria (Section III) and Installation (Section VII) for design details.

VII. Installation

- A. The EZflow drainfield system shall be configured in accordance with Section II, above, installed in excavated trenches constructed with the following minimum center-to-center spacing, trench widths, and soil cover. Dimensional minimums are included for installation and inspection guidance.

Table IV

Product Configuration	Minimum Trench Spacing (ft on center)	Maximum Trench Width (in)	Minimum Soil Cover ¹ (in)	Minimum Trench Depth (in)	Minimum Pipe Depth Below Grade ² (in)
EZ1203H	9	36	6	18	12
EZ1203H-GEO	9	36	6	18	12

¹ On sloping lots, minimum required trench depths may be greater

² Measurements for pipe height are to the pipe invert or bottom of pipe

- B. A backfill barrier shall be placed over the EZ1203H cylinders to prevent the infiltration of backfill material into the trench void spaces. The backfill barrier shall be 60 pound weight untreated building paper provided by the manufacturer or alternate with equal or better performance characteristics. An alternate backfill barrier shall be approved in writing by the manufacturer on a case-by-case basis. The barrier shall not be placed along the trench sidewalls below the pipe invert elevation. The barrier shall be protected from becoming wet enough to tear until backfilling is completed. The EZ1203H-GEO units are prefabricated with a geotextile backfill barrier between the netting and aggregate. The EZ1203H-GEO units shall be oriented in the trench with the geotextile covering the top of the system. No additional backfill barrier material shall be required.
- C. Native soil removed from the trench excavation may be used as backfill. Backfill shall be free of trash or debris. Vehicular traffic and excavation equipment shall not travel over any uncovered drainfield. The latest version of the manufacturer's installation procedures shall be followed.
- D. EZflow trenches shall be installed level in all directions with a plus or minus one-half-inch tolerance from side-to-side and maximum fall in a single trench bottom not exceeding one-fourth inch in 10 feet end-to-end for any continuous contoured segment. Trenches shall follow the contour of the ground surface elevation (uniform depth). Trenches shall be constructed with all continuous adjoining 3-, 5-, 7- or 10-foot units placed end-to-end, with the central cylinder distribution pipe interconnected, without any dams, stepdowns or other water stops.
- E. The 10-foot-long units shall be used to make up the majority of the line length, with the 3-, 5-, and 7-foot units being used only at the distal end of the trench. A maximum of three 3-, 5-, or 7-foot units may be used in any one line length. Examples: A 65-foot trench would utilize six 10-foot units and one 5-foot unit. A 71-foot trench would utilize six 10-foot units, one 5-foot unit, and two 3-foot units.
- F. EZflow drainfield systems installed on sloping sites may use distribution devices or step downs as described in 15A NCAC 18A .1955(j) and (l) when it is necessary to change level nitrification line segments from upper to lower elevations.

- G. Manufacturer's installation instructions for the EZflow drainfield systems shall be followed, except as required herein or by 15A NCAC 18A .1900 et. seq.
- H. The system shall be installed by a contractor authorized in writing by EZflow LP or its designated representative for EZflow drainfield systems.

VIII. Operation, Maintenance, and Monitoring

The accepted EZflow drainfield system shall have a classification equivalent to a conventional trench system in accordance with Table V(a) of 15A NCAC 18A .1961(b).

IX. Responsibilities and Permitting

- A. The local health department shall permit these accepted system in an equivalent manner as a conventional system, when the requirements of 15A NCAC 18A .1900 et. Seq., laws, and conditions of this accepted system approval are met.
- B. When use of one or more of these accepted systems is requested in the application for a Construction Authorization, the local health department shall include a design for the designated accepted system(s) in accordance with the approved siting, sizing, and design criteria on the Construction Authorization.
- C. When a permit or authorization is issued for a conventional system, the permit or authorization shall contain a statement that indicates that an accepted system may also be used. These accepted systems may be installed without permit/authorization modification, prior approval of the health department, or separate sign-off, if the accepted system can be placed in the permitted/authorized trench footprint and the installation is in accordance with the accepted system approval, without unauthorized product alteration.
- D. When substitution with one of these accepted systems for a conventional system or another accepted system is made, permit modification, prior approval of the health department or separate owner sign-off is not required as long as no changes are necessary in the location of each nitrification line (except reduction in line length and/or number as allowed for in this approval), trench depth, or effluent distribution method.
- E. Notwithstanding paragraphs C and D above, when a substitution in system type compared to a previously permitted or authorized system type or types shall result in a change in the location of any nitrification line (including any increase in line length), trench depth, or effluent distribution method, prior approval by the local health department is required before system installation. The local health department shall modify the permit/authorization upon a finding that all provisions of this approval and all other applicable rules shall be met.
- F. The type of system installed shall be indicated on the Operation Permit, including designation of the manufacturer and model or unique code.

X. Repair of Systems

The provisions of 15A NCAC 18A .1961(l) shall govern the use of the EZflow drainfield systems for repairs to existing malfunctioning wastewater systems.

Approved By: _____ Date: _____

PRESSURE MANIFOLD DESIGN
FOR GROUND ABSORPTION SEWAGE SYSTEMS

Steven J. Berkowitz
February, 1986

Large subsurface wastewater systems are being used more frequently as alternatives to discharging systems for many public and private facilities.

Dosing effluent periodically and uniformly throughout the drain field improves absorption field performance and increases field longevity (Otis et al. 1977, Harget et al. 1982). Low-pressure distribution of effluent in small diameter, perforated laterals has become a popular design alternative for achieving uniform distribution. Over 2,000 low-pressure pipe systems are now in use at single-family homes in North Carolina. A comprehensive design and installation manual for residential low-pressure pipe systems is available (Cogger et al. 1982). Design criteria and a simplified design procedure have also been published (Otis 1982). Available information, however, does not adequately address some key design parameters for the more extensive low-pressure pipe networks being planned and installed in North Carolina.

Pressure distribution manifolds feeding conventional gravity drain lines is another alternative being used in North Carolina to improve the distribution of effluent in large subsurface fields. This method is applied where soil conditions are favorable for conventional trenches and where the length of drain pipe required and degree of field slope would make it difficult to achieve uniform distribution between laterals in a low-pressure pipe network. Design criteria for such systems have not been previously available.

This paper sets forth some critical design parameters for pressure manifolds and laterals in large conventional and low-pressure pipe ground absorption sewage systems. The justification for these design parameters is presented elsewhere (Berkowitz, 1985)

PRESSURE MANIFOLDS
FOR CONVENTIONAL DRAIN FIELDS

The traditional approach to dividing effluent between conventional trenches is with a gravity distribution box. While relatively simple in concept and design, distribution boxes have proven to be generally ineffective in uniformly distributing effluent, especially when the number of trenches to be dosed is large (Mitchell, 1983).

Pressure manifolds can be designed to more effectively split flow between separate conventional trenches while still under pressure from the dosing tank. Schematics are presented below of pressure manifolds designed for level (Fig. 1) and sloping (Fig. 2) sites.

Pressure manifolds must be installed level, although some deviations may not seriously impair flow uniformity. Protective accessible boxes are recommended to be constructed around pressure manifolds installed above the drain field on sloping sites. Note that precautions against freezing may be necessary in cold

The author is: Steven J. Berkowitz, Environmental Engineer, Sanitation Branch, N. C. Division of Health Services, Raleigh, NC 27602-2091.

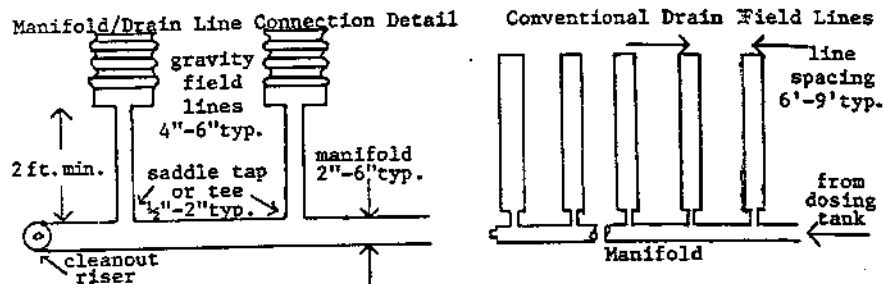


Fig. 1 Pressure Manifold For Level Site (1 ft. = .305 m)

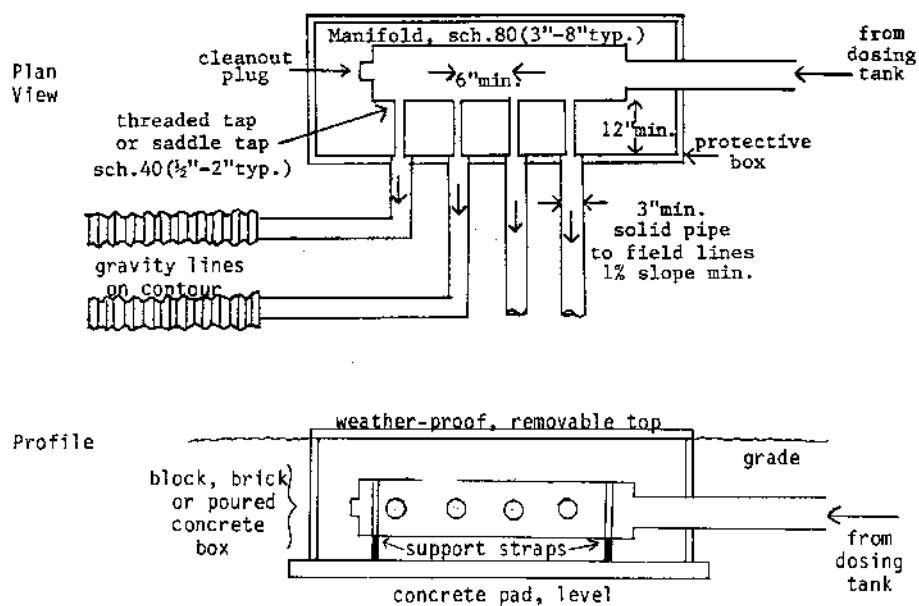


Fig. 2 Pressure Manifold For Sloping Sites

regions if the system is subject to extended periods of disuse unless provisions are made to drain out the manifolds, since they will normally remain about half-full between dosing cycles.

Design criteria for pressure distribution manifolds and laterals are presented in Table 1. Shown are the maximum number to taps by differently sized laterals which can be made out of manifolds of varying sizes, while maintaining no more than a five-percent difference between flow rates into each lateral. An important further assumption is that 1 to 4 feet of pressure head are available at the lateral outlets. Design criteria are presented both for manifolds with lateral taps in one side and for manifolds with lateral taps in adjacent sides.

Recommended design steps utilizing these criteria are as follows:

1. Select Drain Field Configuration: Determine the required field size, number of laterals to be dosed for each pressure manifold, and desired lateral and tap spacing.
2. Choose Lateral Tap Size: For pump dosed systems, pick the largest pressure tap that can be adequately pressurized by a reasonable sized pump. Use the orifice equation¹ to compute required flow per tap, assuming at least 2 feet of pressure head to each lateral opening. Taps less than one-half-inch nominal size is not recommended. For siphon-dosed systems, select a tap size large enough to handle the maximum siphon discharge rate with the head available between the siphon outlet and the pressure manifold, while still maintaining a sufficient pressure head at the minimum siphon discharge rate.
3. Select Manifold Size: Given the desired lateral tap size and spacing, select from Table 1 the minimum size of manifold from which at least the desired number of taps can be made while staying within the five-percent flow variation limit. Selecting the next larger sized manifold will yield an even greater degree of flow distribution uniformity.

¹Orifice equation:

$$Q = 13 (d^2)(h^{\frac{1}{2}})$$

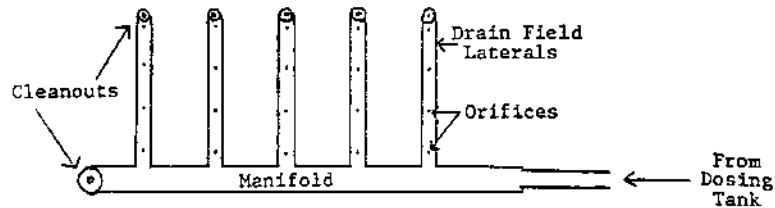
where Q = flow from orifice, gallons per minute
d = diameter of orifice, inches
h = pressure head, feet

Table 1: Pressure Distribution Manifolds for Conventional Septic Systems; Manifold and Lateral Tap Size Criteria^a

Tap Separation Distance (Feet)	Manifold Size (Inches)	Lateral Taps out of <u>One Side</u> of Manifold Lateral Tap Size (inches)						Lateral Taps out of <u>Both Sides</u> of Manifold Lateral Tap Size (inches)					
		½	¾	1	1 ¼	1 ½	2	½	¾	1	1 ¼	1 ½	2
		Maximum Number of Taps						Maximum Number of Tap Pairs					
0.5°	2	4	2					2					
	3	9	5	3	2			4	2				
	4	16	9	5	3	2		7	4	2			
	6	40+	21	12	7	5	3	18	10	6	3	2	
	8		38	22	12	9	5		17	10	6	4	2
3.0°	2	8	2					2					
	3	14	12	3	2			6	2				
	4	21	18	6	3	2		16	5	3			
	6	38	30	26	8	5	3	20+	19	7	3	2	
	8												
6.0°	2	5	4					4					
	3	9	7	6	2			7	3	2			
	4	14	11	9	4	2		10	9	3			
	6	27	20	17	14	7	3	19	15	13	4	3	
	8												
9.0°	2	4	3	3				3					
	3	7	6	5	2			6	5	2			
	4	12	9	7	6	3		8	7	6	2		
	6	22	16	13	11	10	4	15	12	10	5	3	
	8												
Assumptions:		1 to 4 feet (.3 to 1.2 meters) head at lateral outlets; 5% maximum flow differential maintained between laterals; Hazen-Williams "C" factor of 140; taps are of Schedule 40 PVC and manifolds are of Schedule 80 PVC, with the following actual inside diameters:											
		----nominal pipe size (inches)----											
		½	¾	1	1 ¼	1 ½	2	3	4	6	8		
		----actual inside diameter: inches (millimeters)----											
Taps		.622(19)	.824(25)	1.049(42)	1.38(42)	1.61(49)	2.067(63)						
Manifolds							1.94(59)	2.90(88)	3.83(117)	5.76(176)	7.63(232)		
Use for pressure manifold distribution box designed for sloping lots, located above highest field line.													
Use for pressure manifold on flat lots, located adjacent to end of each field line.													

PRESSURE MANIFOLDS
FOR LOW-PRESSURE PIPE DRAIN FIELDS

Low-pressure systems involve distributing effluent throughout the nitrification field within a pressurized manifold and small diameter lateral network. Effluent enters the nitrification trenches from orifices drilled into the distribution laterals (Fig. 3).



Pressure is generally maintained between 2 and 5 feet in the laterals to facilitate uniform distribution while minimizing scour outside of the orifices.

Critical design parameters for laterals are pipe diameter, lateral length, orifice size, and orifice spacing. In most low-pressure pipe applications in North Carolina, orifices range from 1/8-inch to 1/4-inch, with 5/32-inch orifices now recommended as the minimum size to use. Curves were developed which relate maximum lateral length to pipe diameter, orifice size, and spacing, based on yielding no more than a ten-percent difference between flow rates from each orifice (Fig. 4).

Critical design decisions for low-pressure system manifolds involve selecting the manifold diameter needed relative to the diameter of the laterals served and determining the maximum number of laterals which can be fed off a common supply manifold. Manifold design criteria are presented for the condition that the nitrification field is level and the manifold and laterals are on the same level (e.g.; laterals tee directly off from the manifold). Lateral spacing is assumed to be 5 feet, the most frequently used spacing for low-pressure pipe systems in North Carolina. Results are presented in Fig. 5 showing the maximum number of laterals of different sizes which can be supplied by a common manifold at varying mean lateral flow rates, while maintaining no more than 15-percent difference between flow rates into each lateral.

Results shown in Fig. 5 indicate that relatively few laterals can be served by small manifolds. It is uncertain, however, whether these criteria can be considered directly transferable to the more popular design whereby laterals are above the manifold, connected by short risers which tee off of the manifold and are elbowed or teed into each lateral. Under these conditions, more laterals than shown in Fig. 5 may in fact be fed by a common manifold while still maintaining relatively uniform flow distribution. Further research in this area is needed.

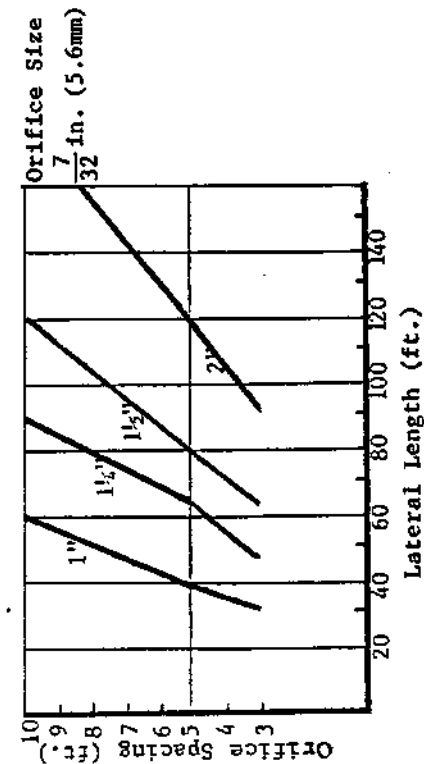
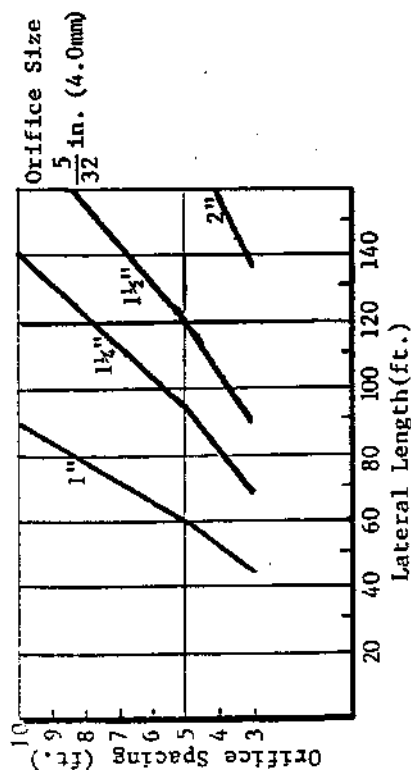
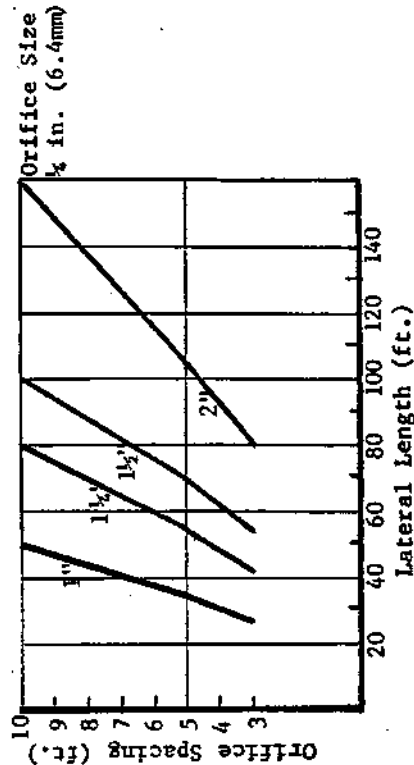
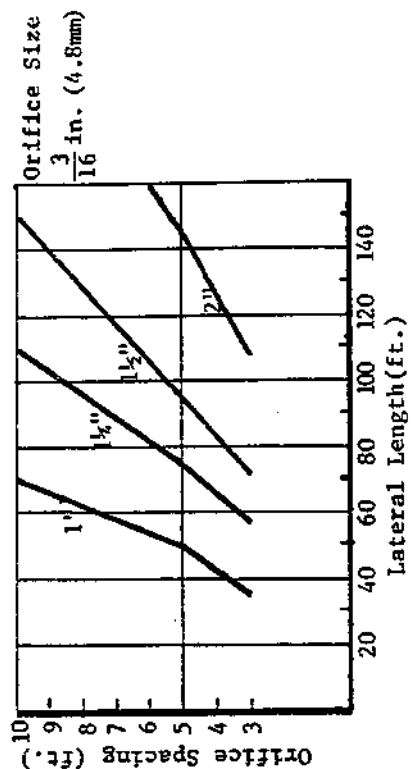


Fig. 4 Maximum Length of Different Sized Laterals For Low-Pressure
Pipe Systems With Varying Orifice Sizes and Spacings (1 ft. = .305 m)

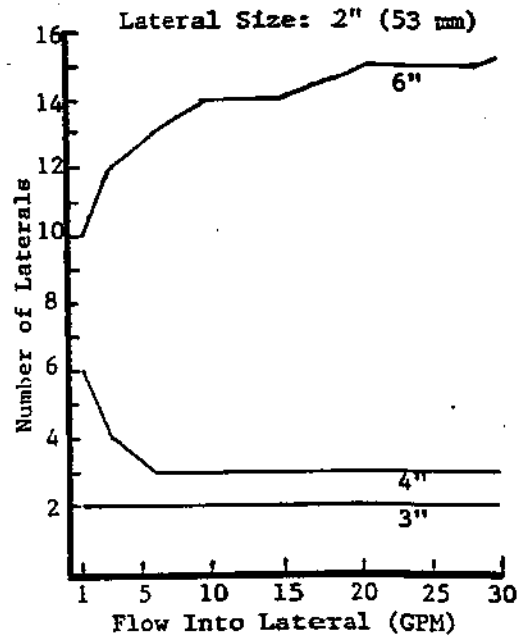
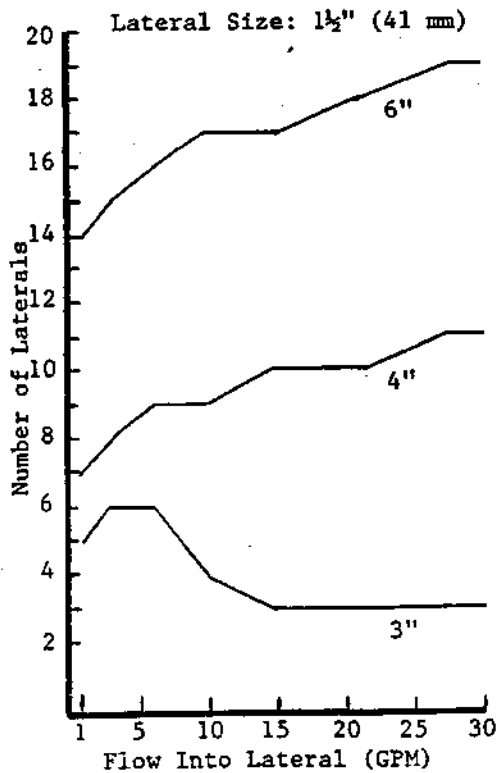
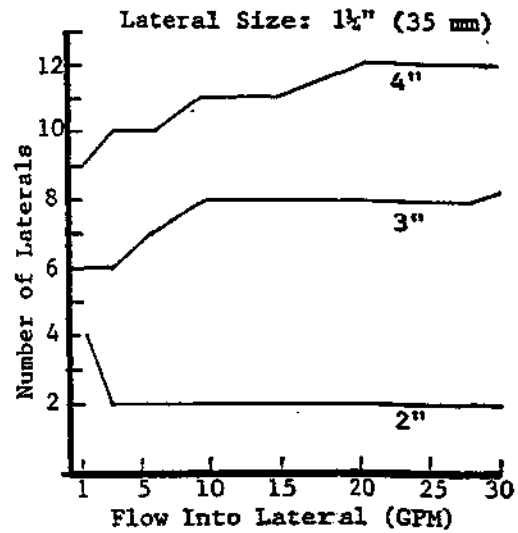
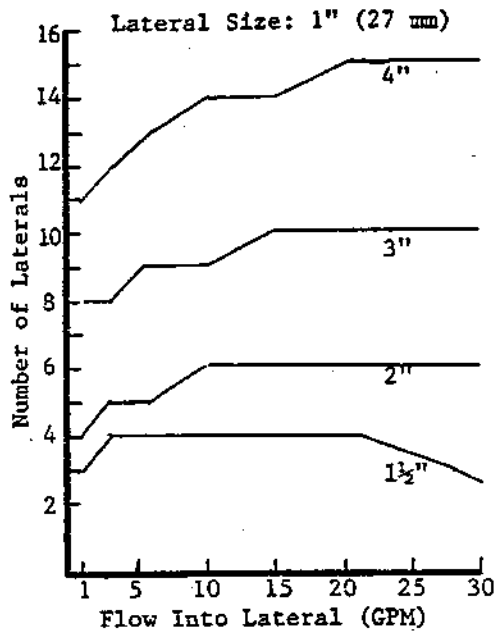


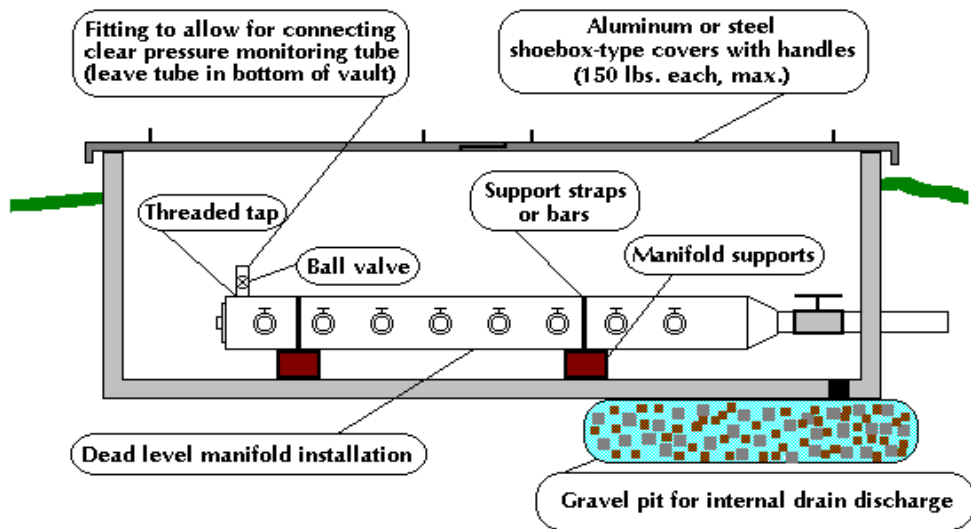
Fig. 5 Maximum Number of Different Sized Laterals For Low-Pressure Pipe Systems With Varying Sizes of Manifolds and Varying Rates of Flow Into Lateral (1 GPM = .0631 l/sec)

Recommended design steps using these criteria are as follows:

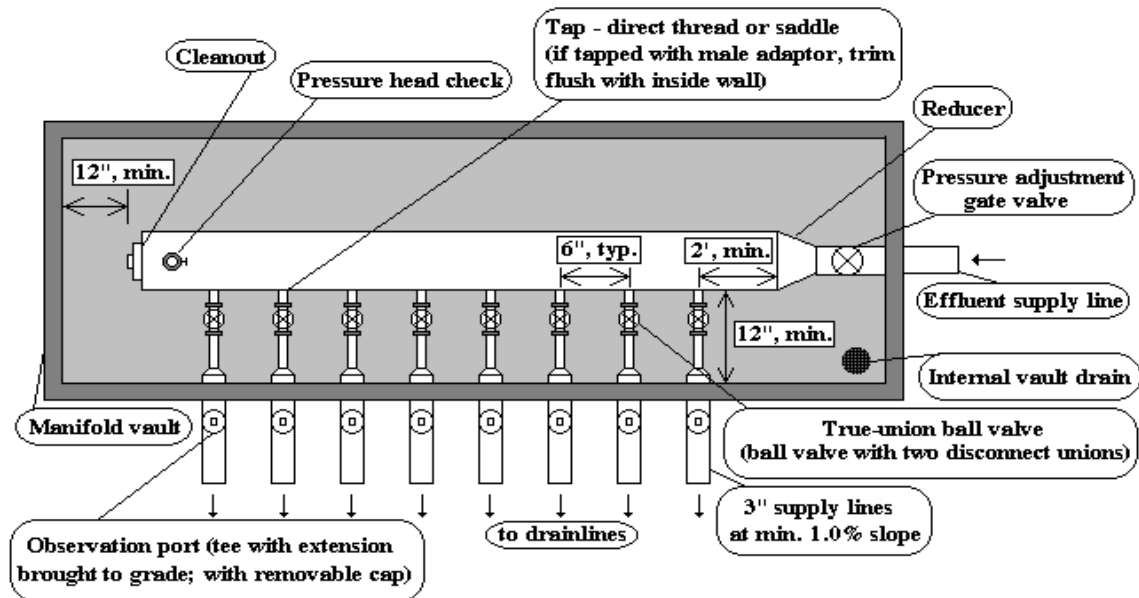
1. Select Drain Field Configuration: Determine the desired field size configuration, lengths of laterals, and location of supply manifolds.
2. Choose Orifice Size and Spacing: For pump dosed systems, select the largest orifice size and shortest orifice spacing resulting in a total number of orifices which can be adequately pressurized by a reasonably sized pump. Use the orifice equation to compute required flow per orifice, assuming at least 2 feet of pressure head at each orifice. Taps less than 5/32-inch and spacing greater than 10 feet are not recommended. For siphon-dosed systems, select an orifice size and spacing so that there are enough orifices of sufficient size to handle the maximum siphon discharge rate with the head available between the siphon outlet and the drain field, while still maintaining a sufficient pressure head at the minimum siphon discharge rate.
3. Choose Lateral Diameter: Given the desired lateral length and orifice size and spacing, select from Fig. 4 the minimum size of lateral from which at least the desired size and spacing of orifices can be used while staying within the 10-percent flow variation limit.
4. Select Manifold Size: Given the desired lateral size and lateral design flow rate, select from Fig. 5 the minimum size of manifold from which at least the desired number of laterals can be dosed while staying within the 15-percent flow variation limit.
5. Optimize Design: Repeat steps 1 through 4 above until a practical, workable manifold and lateral network design is obtained.

REFERENCES

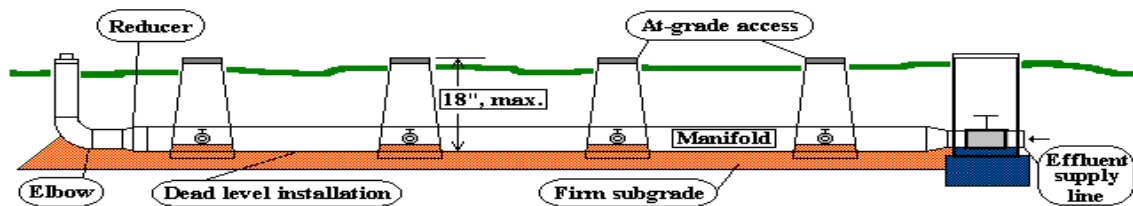
1. Berkowitz, S. J. 1985. Pressure manifold design for large subsurface ground absorption sewage systems. In: On-Site Wastewater Treatment: Proceedings of the fourth national symposium on individual and small community sewage systems. Dec. 10-11, 1984. New Orleans. American Society of Agricultural Engineers.
2. Cogger, C., B. L. Carlile, D. Osborne and E. Holland. 1982. Design and installation of low-pressure pipe waste treatment systems. UNC Sea Grant College Pub. UNC-SG-82-03. 31p.
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4. Otis, R. J. 1982. Pressure distribution design for septic tank systems. Jour. Of the Env. Eng. Div., ASCE 108(1): 123-140.
5. Otis, R. J., J. C. Converse, B. L. Carlile and J. E. Witty. 1977. Effluent distribution. Home Sewage Treatment. ASAE Pub. 5-77. St. Joseph, Mich. 61-85



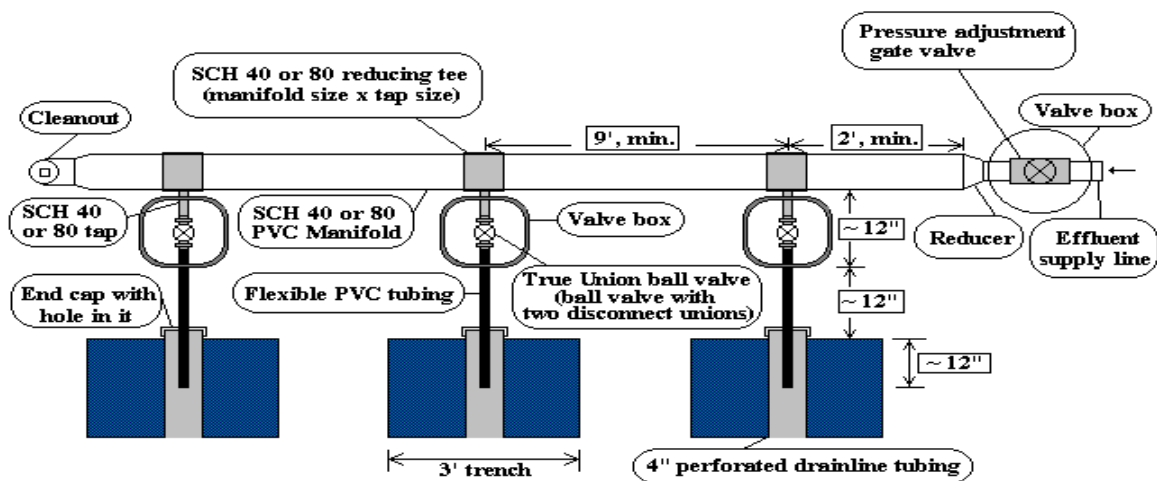
Profile View of Pressure Manifold for Sloping Site Installation (not to scale)



Plan View of Pressure Manifold for Sloping Site Installation (not to scale)



**Profile View of Pressure Manifold for Level Site Installation
(not to scale)**

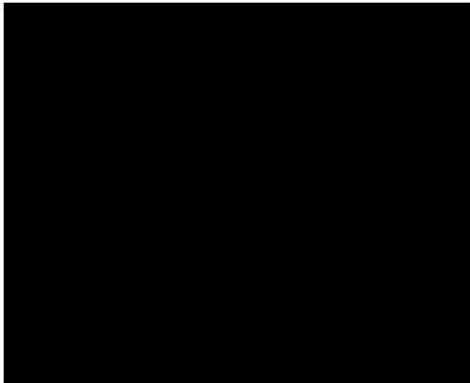


**Plan View of Pressure Manifold for Level Site Installation
(not to scale)**

**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Equipment (Repair)



**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

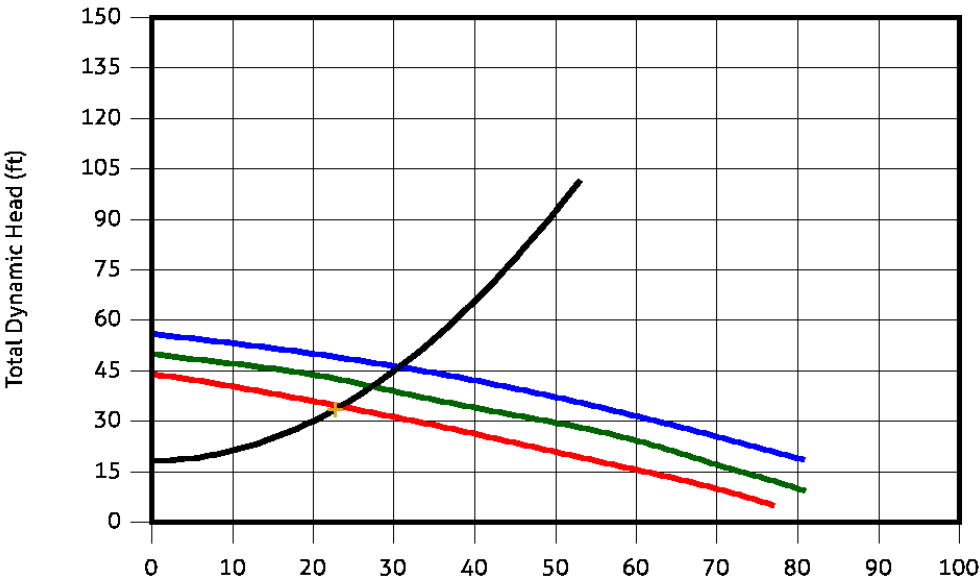
**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

Known Flow and TDH

Effluent

Sizing ID: HHN-OER-KIH



System Curve		Fittings
GPM	TDH (ft)	None Selected
0.00	18.30	
9.00	20.71	
18.00	27.92	
27.00	39.95	
36.00	56.78	
45.00	78.43	
Flow (GPM)*: 22.70		
TDH (ft)*: 33.60		
*Per user data		

Curve Models	Eq. Flow	Eq. Head
153	23.33	34.46
140	27.28	40.40
161	30.64	46.18

Flow (GPM) Pump Specs	
Electrical	115 volt, 1 phase, 60 Hertz
Physical	
Discharge Size	1.50" NPT
Solids Handling (in.)	0.5
Static Head (ft)	18.3000
TDH (ft)	33.6

By registering on this site, user acknowledges that Zoeller Company is not responsible for inaccurate pump sizing or misapplication due to incorrect information entered by the user. For sizing assistance, please contact Zoeller's Product Support Department at [1-800-928-7867](tel:1-800-928-7867) (or [+1-502-778-2731](tel:+1-502-778-2731)), extension 6, or email zcotechnical@zoeller.com

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.



TECHNICAL DATA SHEET

DOSE-MATE SERIES

Models 151, 152, 153 Effluent Pumps

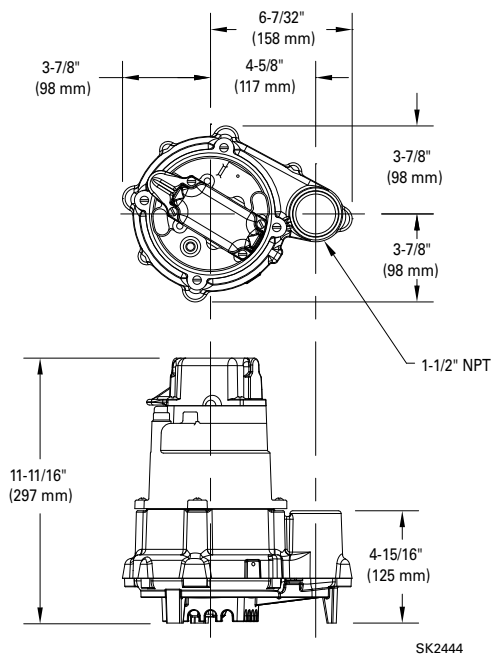
PRODUCT SPECIFICATIONS

MOTOR	Horse Power	1/3 (151), 4/10 (152), 1/2 (153)
	Voltage	115 or 230
	Phase	1 Ph
	Hertz	60 Hz
	RPM	3450
	Type	Permanent split capacitor
	Insulation	Class B
	Amps	3.0 - 10.5
PUMP	Operation	Automatic or nonautomatic
	Discharge Size	1-1/2" NPT
	Solids Handling	1/2" (12 mm), 3/4" (19 mm) spherical solids
	Cord Length	20' (6 m)
	Cord Type	UL listed power cord
	Max. Head	44' (13.4 m)
	Max. Flow Rate	77 GPM (291 LPM)
	Max. Operating Temp.	130 °F (54 °C)
	Cooling	Oil filled
	Motor Protection	Auto reset thermal overload
MATERIALS	Cap	Cast iron
	Motor Housing	Cast iron
	Pump Housing	Cast iron
	Base	Plastic or cast iron
	Upper Bearing	Sleeve bearing
	Lower Bearing	Ball bearing
	Mechanical Seals	Carbon and ceramic
	Impeller Type	Non-clogging vortex
	Impeller	Engineered thermoplastic
	Hardware	Stainless steel
	Motor Shaft	AISI 1215 steel
	Gasket	Neoprene

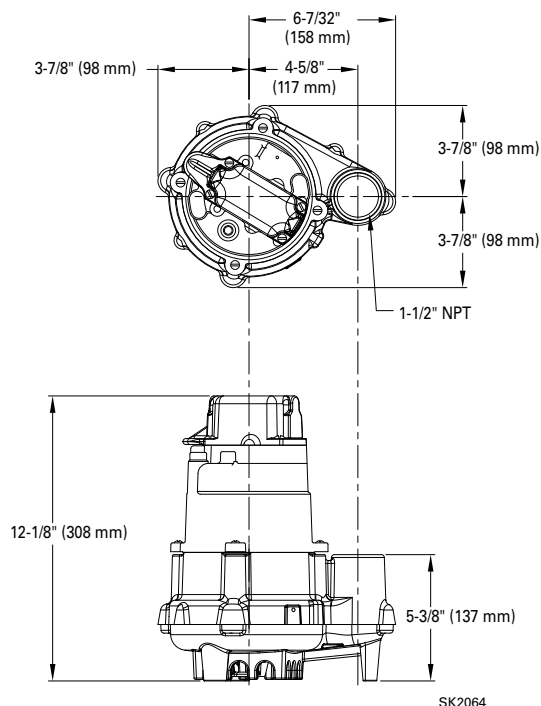
NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

NOTE: See model comparison chart for specific details.

MODEL 151



MODELS 152 & 153

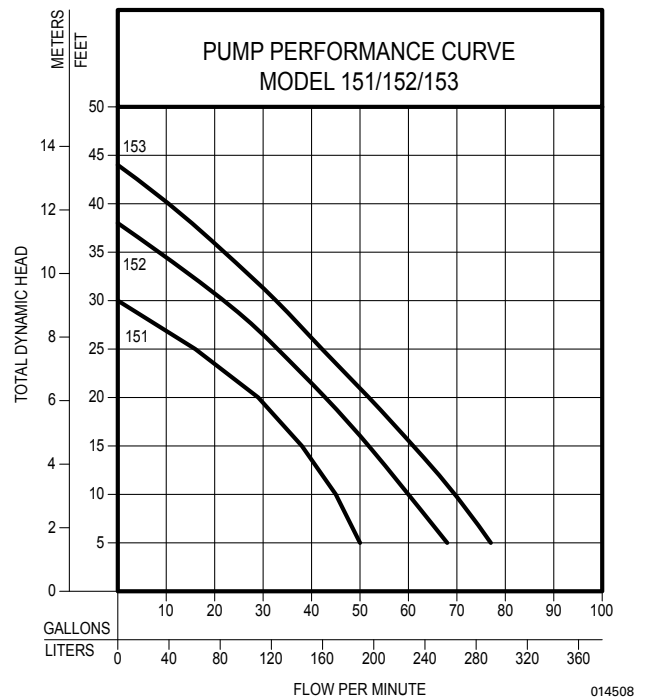


Tested to UL Standard UL778
and Certified to CSA
Standard CSA22.2 No. 108



TOTAL DYNAMIC HEAD FLOW PER MINUTE

MODEL		151		152		153	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	50	189	69	261	77	291
10	3.0	45	170	61	231	70	265
15	4.6	38	144	53	201	61	231
20	6.1	29	110	44	167	52	197
25	7.6	16	61	34	129	42	159
30	9.1	--	--	23	87	33	125
35	10.7	--	--	--	--	22	85
40	12.2	--	--	--	--	11	42
Shut-off Head:		30 ft. (9.1m)		38 ft. (11.6m)		44 ft. (13.4m)	



Model	MODEL COMPARISON										
	Seal	Mode	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex
N151	Single	Non	115	1	6.0	1/3	60	32	15	1	2 or 3
E151	Single	Non	230	1	3.0	1/3	60	32	15	1	2 or 3
BN151	Single	Auto	115	1	6.0	1/3	60	33	15	*	2 or 3
BE151	Single	Auto	230	1	3.0	1/3	60	33	15	*	2 or 3
N152	Single	Non	115	1	8.5	4/10	60	37	17	1	2 or 3
E152	Single	Non	230	1	4.3	4/10	60	37	17	1	2 or 3
BN152	Single	Auto	115	1	8.5	4/10	60	39	18	*	2 or 3
BE152	Single	Non	230	1	4.3	4/10	60	39	18	*	2 or 3
N153	Single	Non	115	1	10.5	1/2	60	37	17		
BN153	Single	Auto	115	1	10.5	1/2	60	39	18	*	2 or 3
E153	Single	Non	230	1	5.3	1/2	60	37	17	1	2 or 3
BE153	Single	Non	230	1	5.3	1/2	60	39	18	*	2 or 3

*BN and BE models include a 20' (6 m) piggyback variable level pump switch. Additional cord lengths are available in 25' (8 m) and 35' (11 m). 50' (15 m) cords are available for 230 V units only.

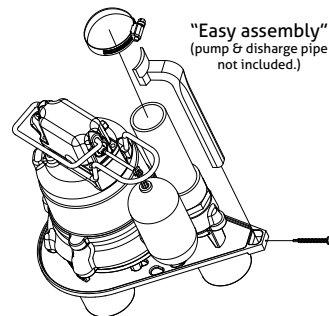
NOTE: Model 151 has a plastic base. Models 152 & 153 have a cast iron base.

SELECTION GUIDE

- For automatic, use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
- See FM1228 for correct model of simplex control panel.
- See FM0712 for correct model of duplex control panel.

OPTIONAL PUMP STAND P/N 10-2421

- Reduces potential clogging by debris
 - Replaces rocks or bricks under the pump
 - Made of durable, noncorrosive ABS
 - Raises pump 2" (5 cm) off bottom of basin
 - Provides the ability to raise intake by adding sections of 1½" or 2" (DN40 or DN50) PVC piping
 - Attaches securely to pump
 - Accommodates sump, dewatering and effluent applications
- NOTE: Make sure float is free from obstruction.



All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

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502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | zoellerpumps.com

**Design, Installation and
Maintenance
of the
T & J Panel
Wastewater Treatment System**



A Better Quality Effluent

Environmental Health Specialists
Engineers
Septic Tank Installers

Updated 2021

TABLE OF CONTENTS

Introduction.....	pg. 2
System Design	pg. 3 – pg. 6
Preparing for Installation	pg. 7 – pg. 9
Installation Process	pg. 10 – pg. 12
Pressure Dosed and Low-Pressure Panels (Design & Install)	pg. 13 – pg. 14
Deep Installation of Panels.....	pg. 15- pg. 16
Final Inspection	pg. 17
Design Resources & Illustrations	pg. 18- pg. 21
Frequently Asked Questions	pg. 22

Introduction

Although this manual is sectioned for specific user groups, we at T&J Panel suggest you familiarize yourself with the complete manual. Please visit our website at www.TJPanel.com for more resources regarding design, installation and maintenance of T&J Panel Systems. All of the resources provided in this manual are available online to print. The most current and up-to-date version of this manual is posted on our website at www.TJPanel.com and supersedes all printed editions. For further discussion of this manual, questions about design, or other inquiries about our product, please reach out to our office at 704-924-8600.

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Installer Training

While T&J Panels does not require a product specific installer certification, it is our goal to train installers to correctly install a panel block system. If it is your first time installing, inspecting, or designing a system, please do not hesitate to reach out to us, or to ask us to include the installer training for your job. Installation training will send a company representative to your jobsite to discuss the panel block system and how to properly install them. T&J Panels recommends an installation training for each orientation of the panel block system (both horizontal and vertical). Contact our offices to schedule your install training at 704-924-8600.

SYSTEM DESIGN

The primary reason for permitting the panel block system is because of insufficient space for a conventional system. The panel block system should be considered when: a quality effluent may be needed, space is limited, usable soil is limited, or there are indications that at some future time space may be needed for other development. When there is a trend for added development such as additions to homes, pools or other special landscaping development, a T&J Panel System may prevent insufficient space later. As the Environmental Health Specialist who is designing a system, know that the panel block system may be an option the property owner would like to utilize if they desire continued future development of their lot.

As noted in the regulations, a T&J Panel (Prefabricated, Permeable, Block Panel System) is permitted where soils are suitable, provisionally suitable, or reclassified provisionally suitable, however only one half of the nitrification area required by a conventional system is needed. This is one reason the panel block system can help to utilize the best soils available on the lot. The minimum soil depth required for vertically installed Panel Systems is 34-inches (minimum depths require 6" of suitable soil cover), whereas the minimum soil depth required for horizontally installed Panel Systems is 26-inches in a traditional trench or 18-inches if utilizing fill. Most of the concepts for laying out a panel block system are the same as for a conventional system; the biggest difference being the nitrification area needed and the quality of effluent being introduced into the ground.

T&J panels can be gravity fed, pumped to a pressure manifold or distribution box and then gravity fed into the lines, or pumped to low-pressure panel lines. When designing a pressure system, the principles of low-pressure distribution are as described in the LPP manual. There is further discussion on pressure systems on page 13 of this manual.

T&J Panel Sizing in Trench Formation

T&J Panel sizing can be calculated by multiplying the nitrification area or linear footage required for a standard conventional system by 0.5.

For example:

A three-bedroom house with a 0.4 gpd application rate. (The first three steps are the same as for the conventional system.)

- 1) 120 gallons per bedroom X 3 bedrooms = 360 gallons per day design flow rate.
- 2) 360 gallons' flow rate / 0.4 application rate = 900 sq. ft. of conventional trench bottom.
- 3) 900 sq. ft. / 3 ft. wide trench = 300 linear feet of conventional system.

This conventional layout requires 2400 sq. ft. of area on the lot with another equal area of repair space for a total of 4800 sq. ft. of suitable usable area. To calculate the size of the T&J Panel system, the above calculations must be made with an additional fourth step.

- 4) $300 \text{ linear feet of conventional system} \times 0.5$ for a horizontally or vertically installed 16inch panel block system = 150 linear feet of T&J Panel System.

A panel block system requires only a 975 sq. ft. area on the lot for the system with an equal area for repair, a total of 1,950 sq. ft. With the panel block system, the installation and repair can go into the same area as the initial area required for a conventional gravel trench system.

T&J Panel Bed System Sizing

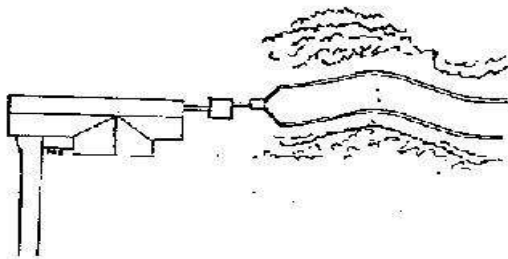
A three-bedroom house with a 0.4 gpd application rate. (The first three steps are the same as for the conventional system.)

- 1) $120 \text{ gallons per bedroom} \times 3 \text{ bedrooms} = 360 \text{ gallons per day design flow rate.}$
- 2) $360 \text{ gallons' flow rate} / 0.4 \text{ application rate} = 900 \text{ sq. ft. of conventional trench bottom.}$
- 3) $900 \text{ sq. ft.} \times 1.5 = 1,350 \text{ sq. ft of conventional bed area needed}$
- 4) $1,350 \text{ sq. ft} \times 0.5 = 675 \text{ sq. ft of T\&J Panel bed area needed}$

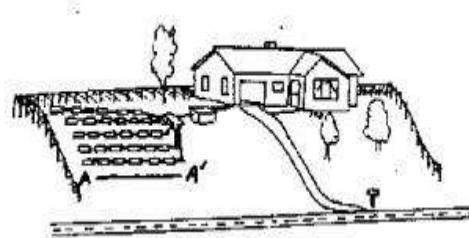
T&J Panel beds are excavated in 3-foot increments up to a maximum bed width of 24 feet. Nitrification lines are placed 3 foot on center and 1.5 feet from the bed sidewalls. Bed systems will require a greater number of panels than a typical trench layout. This ensures proper distribution along with added storage and treatment capabilities. Bed systems can be considered when dealing with lots that are limited by space, topography, or other site-planning considerations and can only be used in soil group types I, II, and III per 1955(d). Design daily flow for a single bed cannot exceed 600 gallons per day. For a complete guide to the design, installation, and inspection process for a T&J Panel Bed System, please refer to our T&J Panel Bed Design & Installation Manual found on our website at tjpanel.com.

Window Effect

To prevent hydraulic overload in the soil, aerial space should always be a consideration for any system. This condition is especially notable with panel block systems, as with any system that reduces the size of the aerial area drain field. The following is a simplistic example of this concept:



MOST DESIRABLE

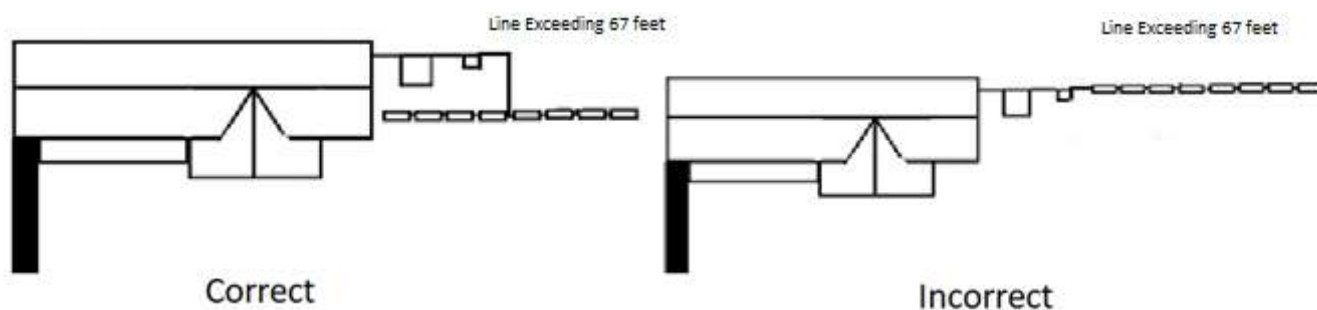


LESS DESIRABLE

While both systems have the same linear footage of trench, the second diagram is a less desirable design. The effluent must pass through the area A-A' which can cause a strain on that area and even a failure because of hydraulic overloading.

Distribution

When utilizing gravity flow on longer line lengths, consider the ability to feed the line at the center or at multiple points to provide better downline distribution. In the incorrect example below, the aerial space is good and the chance of hydraulic overloading is greatly reduced. The resulting problem lies in that a long trench fed from only one end will not give optimal downline distribution. In the correct example the long trench has been fed from the midpoint. Feeding lines from multiple points is another option to decrease the length that effluent must travel and thus provide more optimal distribution. Because the panel lines are put in as level as possible (never exceeding $\frac{1}{4}$ inch of drain line fall in 10 feet of run), the supply line will feed in both directions equally. T&J Panel recommends that no gravity line exceed 67 feet from the point of introduction. T&J Panel recommends that distribution between 68 and 85 feet long from the point of introduction utilize a pressure manifold to gravity, and distribution exceeding 85 feet long from the point of introduction utilize low-pressure distribution. (These are best practice, but not required)



Any questions regarding the optimal distribution method for your system design, please contact our office.

Calculating Panels per Trench

To calculate the number of panels needed for a given nitrification line length, the formula is **Number of Panels** = LF(linear feet) x 12/52. If the result is a decimal of .4 or lower, round down to the nearest panel (panel spacing may be slightly closer than 6 inches to fit the line length). If the result is a decimal of .5 or higher, round up (panel spacing may be slightly further than 6 inches to fit the line length). To calculate the number of panels needed for a 50-foot line, multiply 50' X 12" = 600", then divide by 52" which is 46 inches for the panel and 6 inches for the space between the panels in the trench. $600" / 52" = 11.5$ panels; therefore, the 50-foot line would call for 12 panels. Ideally, the sizing of the lines should be as equal as possible with as close to the same number of panels in each trench as is practical.

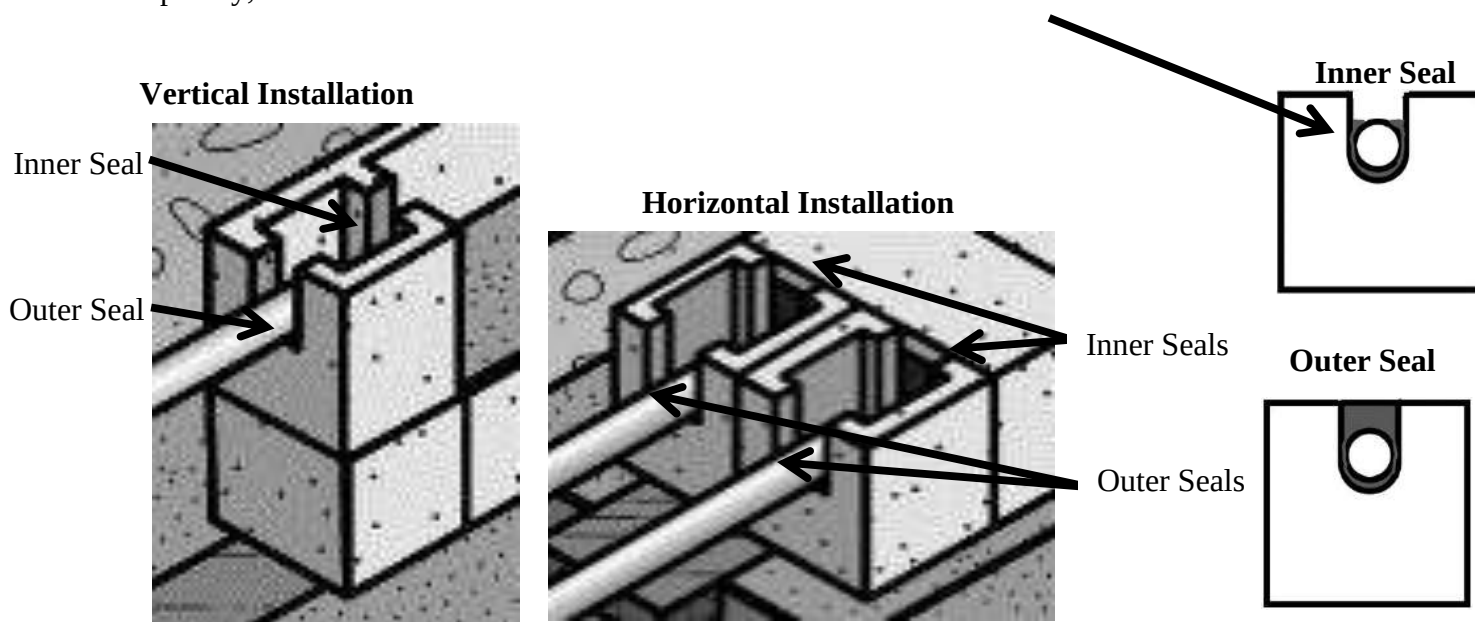
Backfill

Backfill sand shall be a clean, screened, medium-grade sand that is naturally-occurring. Acceptable sands are sands that are suitable for the production of ready-mix concrete and clean of organic debris and stone. In true Group I soils, panels can be installed directly on the trench bottom (when soil depth is limited). Additional backfill sand used during installation should meet grade and specs listed below. Sands dredged from rivers and creeks can be used, if gradation is sufficient to be blended into ready-mix concrete production. Product description includes, but is not limited to: Concrete Sand, NC-2S Sand, ASTM C-33 Sand, FA-10 Sand and Grade "A" Sand. Product suitability is important and T&J Panel, Inc. will help answer any questions.

S.A.P. Sand Alternative Product: is the geotextile fabric inside each panel for quality control and downline and horizontal distribution. (this takes the place of medium blasting sand)

Foam Sealant / Tar Seals

The drawings below illustrate the outer and inner seal. Note that while the outer seal is a complete seal, the inner seal is only up to the top of the connecting pipe. This is to allow for over flow of the effluent into the sand at peak use. These seals can be inspected by lifting the caps at the ends of the panels while inspecting the system installation. GE Foam Sealer is an approved alternative to tar for these seals. Care should be used not to glue the caps down with the use of GE Foam Sealer. When using GE Foam Sealer, special care should be used on the inner seals of the panel not to over fill or under fill this seal. The **inner** seal, if sealed off completely, will restrict the overflow reservoir.



Preparation for Installation

The Panel Block System

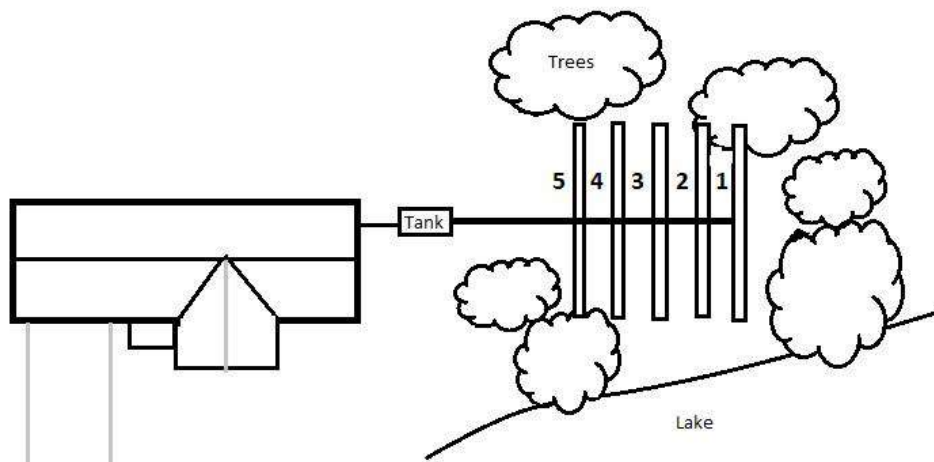
Generally, on level open land, a panel block system can be installed in about the same amount of time as a conventional system; however, traditionally, panel block systems have been installed where space and topography have restricted the use of a conventional system. For this reason, panel block system installations typically require more time. Many installers enjoy the change of working with panels, not handling gravel, and the satisfaction of knowing a better quality, long-lasting system has been installed.

Ordering Materials

T&J Panel partners with suppliers to ensure panel block systems are available statewide. Please be sure to let your supplier know what installation method you are utilizing, as this will affect the amount of materials needed for the system. For information on the distributor located closest to you, call **704-924-8600** or email **info@tjpanel.com**.

Installation Tips

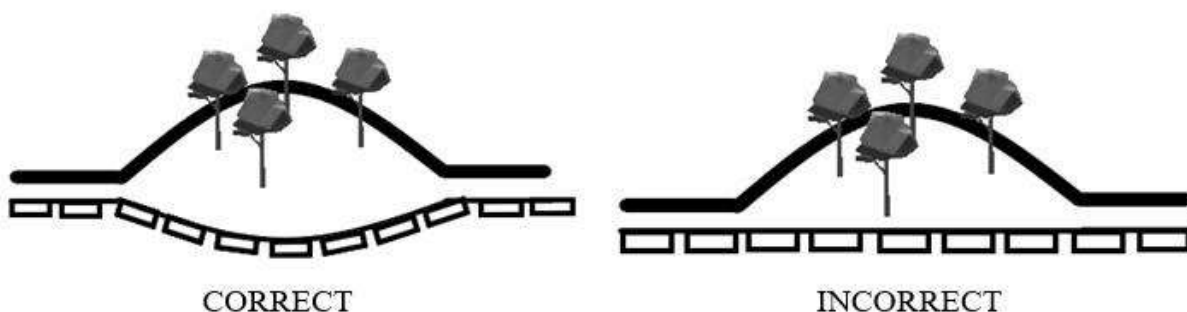
Installation for multiple line systems should begin in the most confining area and be worked to the more open areas.



Above is an example of a multiple line installation. As you can see, the installation should begin with the line marked 1 and proceed to 2, 3 then 4. This procedure will greatly ease material handling and backfilling. (Note, sections of the drain lines should be left uncovered to allow for inspection of lines when area is confined and return access to lines is limited.)

Most Panel Systems are currently used due to space considerations and caution should be taken to preserve suitable soil structure and site conditions.

Below are two examples of drain lines on sloping lots. The second drawing shows the drain line going through a slope making the center of the line deeper in the ground, resulting in an undesirable situation. The first drawing shows the drain line going around the slope (on contour) keeping the trench depth and cover uniform for the entire length of the line. On slopes, care should be given to avoid cutting away valuable topsoil in an effort to make straight lines. The panel line should be installed on grade with the contour of the natural slope. Panel lines can be curved to almost any degree.



Trench Preparation

Trench grade should be established so that backfill cover will be four to six inches over the tops of the panels. (Note, on severe slopes, system depth should be adjusted to protect against breakout of effluent.) In shallow soil conditions, panel blocks may be installed at grade and require 6 inches of topsoil suited for vegetative growth be brought in. In soils containing clay as the key mineralogy, the trench side walls should be raked to bring slicked over areas back as near to original structure as possible. A light dusting of lime on the sidewalls will help restore the soils back to their original structure.

***** Please Let Your Distributor Know If You Need Vertical or Horizontal Panels*****
(This will change the amount of materials needed to complete your job)

Materials Needed for Vertical Installation

- One can of GE Foam Sealer per five panels or 3ft of half inch tar seal rope per panel
- Two feet of 2-inch SCH 40 pipe per panel (unless low pressure distribution is used). For low pressure systems, use the same linear feet as line layout of 1 ¼ or 1 ½ inch pipe. Additional pipe is needed for all supply lines.
- Same linear feet of 1x4 or 1x6 boards as total line length of system to be installed
- Bag of powder lime when in clay soil

Materials Needed for Horizontal Installation

- Three cans of GE Foam Sealer per ten panels or five feet of half inch tar seal rope per panel
- Two pieces of two foot long 1 ½ inch SCH 40 pipe per panel (unless low pressure distribution is used). For low pressure systems, use the same linear feet as line layout of 1 ¼ or 1 ½ inch pipe. Additional pipe is needed for all supply lines.
- Same linear feet of 1x6 boards as total line length of system to be installed
- Bag of powder lime when in clay soil

T&J Panels Jobsite Worksheet



Homeowner/Job Name: _____ County: _____

_____ Address: _____

System Description (Distribution type, total lines, line lengths, etc.): _____

MATERIALS CHECKLIST:

_____ Vertical T&J Panels (Caps included)

_____ Horizontal T&J Panels (Caps included)

_____ GE Foam Sealer (amount varies based on installation method)

_____ Powdered Lime

_____ Entry T (per line, Horizontal Installation ONLY)

AVAILABLE FOR
PURCHASE FROM T&J
PANEL.

_____ 2" Pipe

_____ 1 1/2" Pipe

_____ 1 1/4" Pipe

_____ Fittings for Pipe

_____ Backfill Sand (Clean, Screened, Naturally-Occurring, Concrete Sand, or ASTM-C33, NC-2S, FA-10 and Grade "A" Sands)

↳ Be sure to use the correct backfill sand material. Contact our offices for backfill sand sources or with any questions regarding backfill sand material.

_____ 1x4 or 1x6 Board (Does not need to be treated)

ADDITIONAL PRODUCTS THAT MAY BE NEEDED FOR COMPLETION:

_____ Septic Tank _____ Gallon

_____ Pump Tank _____ Gallon

_____ 4" Pipe

_____ Distribution Box

_____ Manifold _____ Taps _____ Size

_____ Install Training

_____ Tar Seal Rope (5ft. per panel)

Installation Process

Vertical Trench Installation

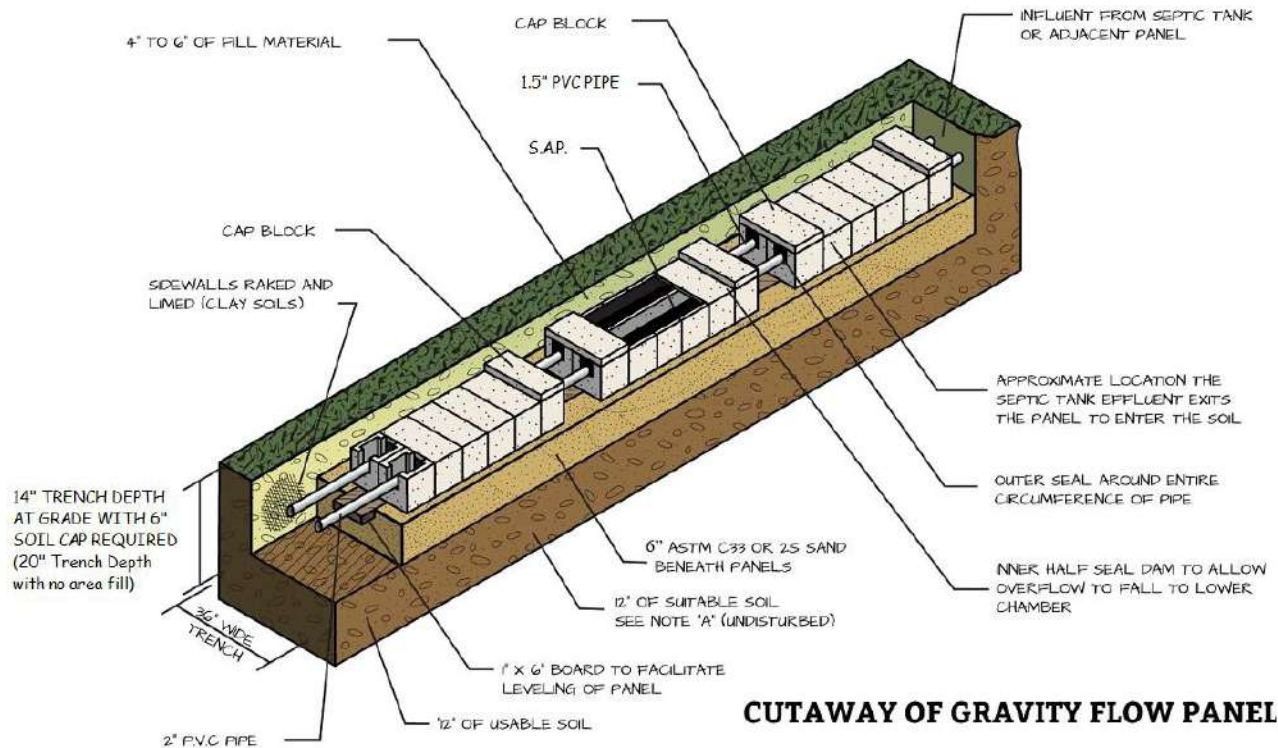
1. Start by shooting grade and marking contour of the lot
2. Using the lowest or shallowest grade on contour, add the specified trench depth
3. Dig the trench at the elevation derived, checking grade frequently.
4. Trenches should be two feet wide and spaced at least 8 foot on-center.
5. If smearing of the side walls is present (as is the case in most clay dominant mineralogy), the side walls affected should be raked to bring them back to original structure.
6. Place a 6-inch layer of appropriate backfill sand (natural, clean, screened) in the trench and level to grade.
7. Place 1x4 or 1x6 inch boards flat down the middle of the trench.
8. Check the grade of the boards by shooting the grade off the top of the boards.
9. Once grade boards have been set, panels may be set into the trench on top of the boards using equipment and a lift chain, or if need be by hand.
10. Panels can be placed about 6 inches apart. This spacing can be adjusted to ensure the correct number of panels can be placed into each nitrification line.
11. GE Foam Sealer or tar seal rope should be placed in the bottom of the U outs to form seals around the pipe as shown in earlier drawings.
12. Once the GE Foam Sealer or tar seal rope is in place, a 24-inch section of 2 inch PVC pipe (for gravity distribution, see page 13 for pressure distribution instructions) is cut to span from the middle top chamber of the first panel to the middle top chamber of the next panel.
13. Using foam sealer or tar seal rope, form a complete seal on all outer cutouts. Ensure that inner seals are partial seals that do not extend over top of the PVC pipe.
14. After completing the inner and outer seals, place a cap block on each end of the panel to cover all openings.
15. The cap block may serve as an inspection port at some later date.
16. Use the appropriate backfill sand to backfill up to the top of the panel block.
17. The system is now ready for final inspection.
18. After final inspection, a minimum of 4-6 inches soil cover is to be added over top of the panel block system.

Horizontal Trench Installation

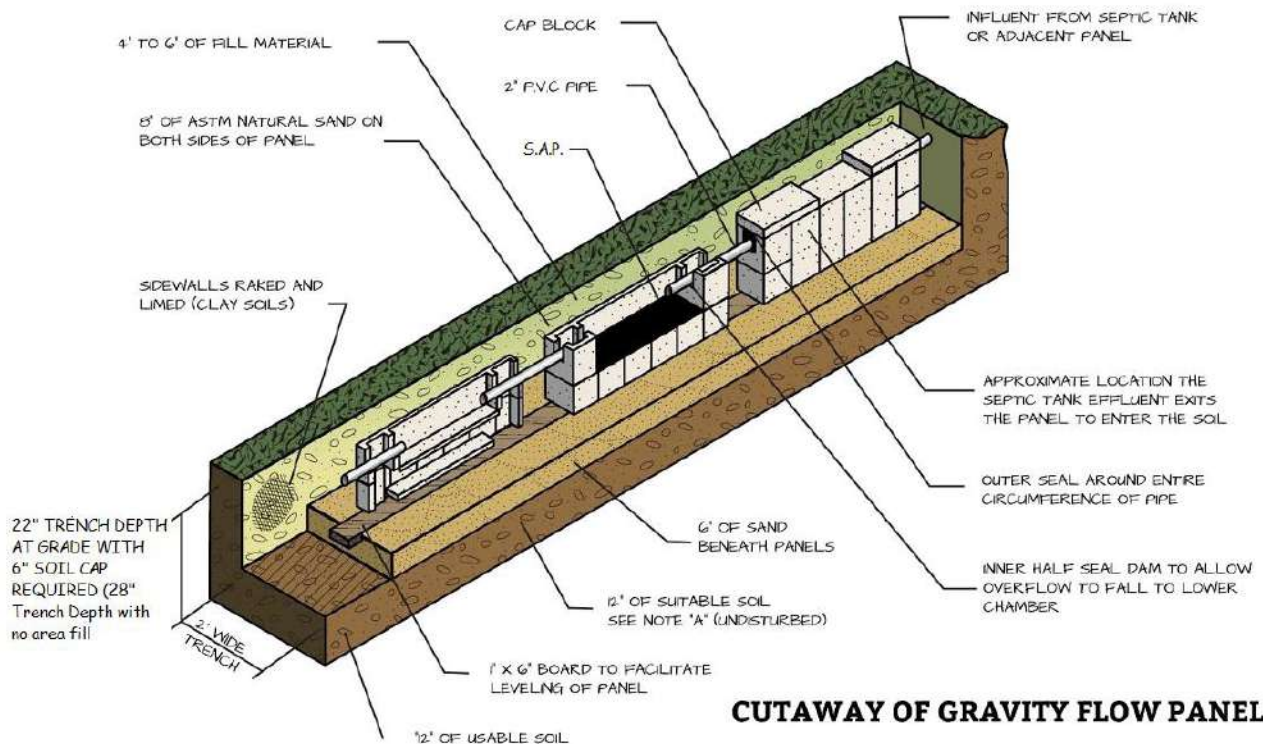
1. Start by shooting grade and marking contour of the lot
2. Using the lowest or shallowest grade on contour, add the specified trench depth
3. Dig the trench at the elevation derived, checking grade frequently.
4. The recommended trench width for horizontal panels is three feet wide and spaced at 9 foot on center unless 8 foot on-center is required to meet setbacks. A two-foot wide trench may be used when limited by slope-correction.
5. If smearing of the side walls is present (as is the case in most clay dominant mineralogy), side walls effected should be raked to bring them back to original structure.
6. Place a 6-inch layer of appropriate backfill sand (natural, clean, screened) in the trench and level to grade. If installing in Group I soil, this 6-inch layer of sand beneath the panel is optional.
7. Place 1x6 inch boards flat down the middle of the trench.
8. Check the grade of the boards by shooting the grade off the top of the boards.
9. One grade boards have been set, panels may be set into the trench on top of the boards using equipment and a lift chain, or if need be by hand.
10. Panels can be placed about 6 inches apart. This spacing can be adjusted to ensure the correct number of panels can be placed into each nitrification line.
11. At the beginning of each line, install an Entry T (for gravity distribution) to divide the gravity flow, as close to the beginning of the first panel as possible.
12. GE Foam Sealer or tar seal rope should be placed in the bottom of the U outs to form seals around the pipe as shown in earlier drawings.
13. Once the GE Foam Sealer or tar seal rope is in place, a 24-inch section of 1 ½ inch PVC pipe (for gravity distribution, see page 13 for pressure distribution instructions) is cut to span from the middle top chamber of the first panel to the middle top chamber of the next panel.
14. Using foam sealer or tar seal rope, form a complete seal on all outer cutouts. Ensure that inner seals are partial seals that do not extend over top of the PVC pipe.
15. After completing the inner and outer seals, place a cap block on each end of the panel to cover all openings.
16. The cap block may serve as an inspection port at some later date.
17. Use the same backfill sand as used in the trench bottom to backfill up to to the top of the panel block.
18. The system is now ready for final inspection.
19. After final inspection, soil cover is to be added over top of the panel block system.

The following page provides illustrations of proper installation of vertical and horizontal panels along with all necessary components.

Isometric Drawing of a Segment of T & J Panel Horizontal Installation



Isometric Drawing of a Segment of T & J Panel Vertical Installation



Pump to Pressure Manifold Gravity Feed

When pumping to gravity feed, the vertical panel should be dosed at 3.6 gal per panel and the horizontal panel should be dosed between 3.6 gal to 7.2 gal per panel. The outer and inner seal on the first panel in each line should be a full seal. The maximum flow per tap on a vertical panel should be 12.5 gpm and 17.7 gpm on horizontal panels.

Low-Pressure Distribution

The LP Panel uses technology similar to that of Low Pressure Pipe (LPP) Systems, with the orifices discharging into the panels. The tables and distribution design described in the LPP manual, in most regards, is applicable to the pressure Panel System. The system should be used with two to four feet of head. In *both* horizontally and vertically installed pressure dosed panel systems, valves should be banked in a valve box and turn-ups should be neatly capped, covered and labeled for future service. Pump tanks should be constructed as shown in the drawing on page 21 to allow for service and repairs.

Vertical Panels with Pressure Distribution

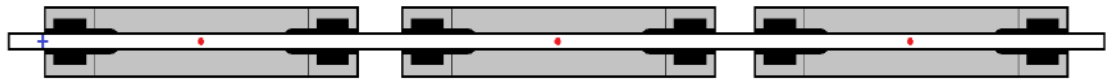
When using low pressure distribution, our recommended dosing is 3.6 gallons per panel. By dosing each panel at 3.6 gallons, the top chamber will have the optimal ratio of both effluent and freeboard, allowing for storage capacity and high oxygen content. By drilling one hole per panel in the distribution line, the total dose volume can easily be calculated by multiplying the number of panels by 3.6. As an example, for a system with 34 panels and identical orifice sizes, the total dose volume would be 122 gallons ($34 \times 3.6 = 122$). Special care should be taken to ensure that only one hole is drilled per panel. The first and last hole of each line should be drilled at 6 o'clock (facing trench bottom) to act as weep holes, helping any residual effluent to escape the line. All holes in between should be drilled alternating from the 10 o'clock and the 2 o'clock positions on the distribution pipe, with only one hole per panel. If the hole sizing changes in the system, the pump cycle is set by the hole that is discharging the fastest.

Horizontal Panels with Pressure Distribution

When dosing a horizontal panel with low pressure distribution, the same ideas apply. Panels will have one orifice each. For cost effectiveness, it is allowable to run a single distribution pipe per line rather than having to install two for each line (one in each chamber). We recommend the distribution line be installed in the chamber that is most uphill. The chamber without the distribution still serves its purpose of storage capacity as the panel block matrix allows for effluent permeability. The chambers without a distribution line must have a full seal of foam sealer on the outer cutout. Additional materials may be used to give structure to the foam sealer to prevent unstable seals during the curing process. As with vertical panels, calculating total dose volume for a low-pressure horizontal panel system can be achieved by multiplying total number of panels by 3.6 gallons. If a system has 34 panels and all holes are the same size, you would multiply 34×3.6 to get 122 gallons per dose cycle. that the effluent is pumped into the inner chambers of the panel. If the hole sizing changes in the system, the pump cycle is set by the hole that is discharging the fastest. The first and last hole of each line should be drilled at 6 o'clock (facing trench bottom) to act as weep holes, helping any residual effluent to escape the line. All holes in between should be drilled alternating from the 10 o'clock and the 2 o'clock positions on the distribution pipe, with only one hole per panel. If the hole sizing changes in the system, the pump cycle is set by the hole that is discharging the fastest.

Proper Hole Placement in a Low-Pressure Panel Block System

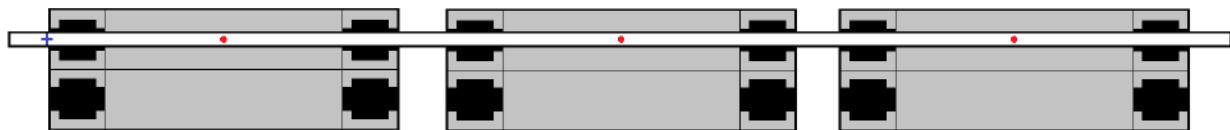
The following diagram shows how to easily drill orifices in the distribution line for a T&J Panel system utilizing low-pressure distribution.



In the picture above, we see that the distribution line has been run through the full number of panel blocks for a given trench length. The goal is to drill the orifices close to the middle of the panel (23 inches from the end of the panel). The red circles indicate the ideal location for the distribution orifices. By marking a cross where the distribution line enters the first panel in the line, it is easy to keep track of orientation for drilling holes at the appropriate angles. This mark will also help give a reference point as to where the distribution pipe should be reset to after all holes are drilled.

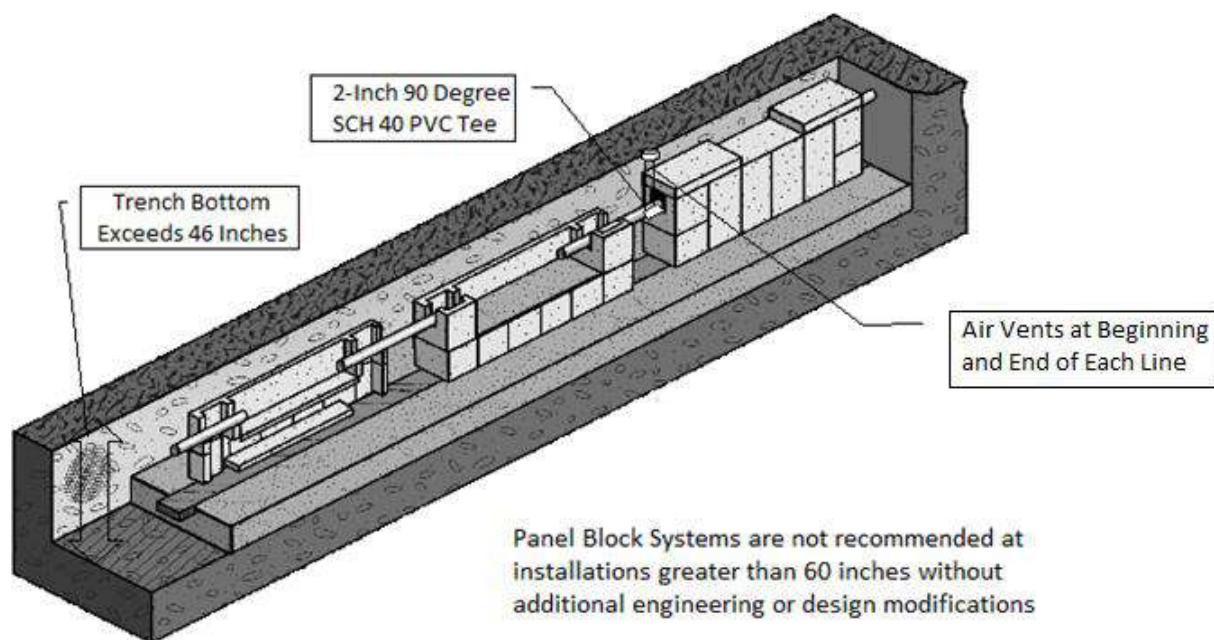


Once the orientation mark has been made, the distribution pipe can be pulled outward just over 23 inches. This allows for each orifice to be drilled just in front of the corresponding panel. After drilling all holes at the proper angles as mentioned in the previous section, the distribution pipe can be returned to its proper location by aligning the blue cross with the front side of the first panel block. The same process applies for a horizontal installation, with only one side of panel receiving the distribution line as shown below.



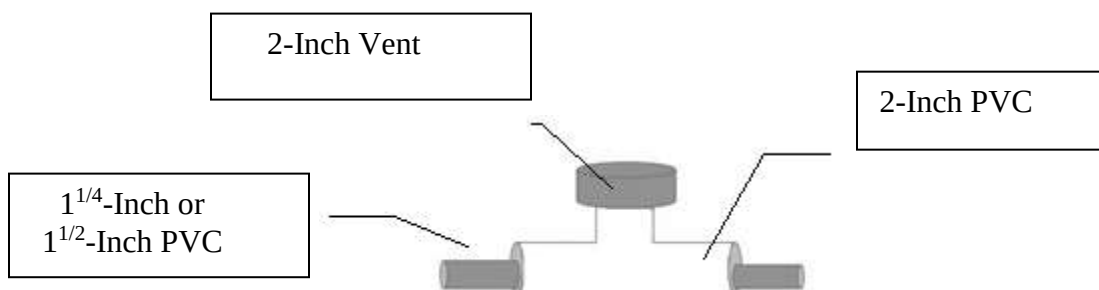
Deep Installation of Panel Block Systems

Utilize these specifications for ventilation when Trench Bottom *exceeds* 46-inches. In certain situations, there are more desirable soil conditions deeper in the soil profile. On these sites, Panel Systems can still be utilized, with proper ventilation to the system. Air vents are used with Panel Systems to allow the chambers within the Panel to receive the air needed for treatment. Air vents should be installed as designed.



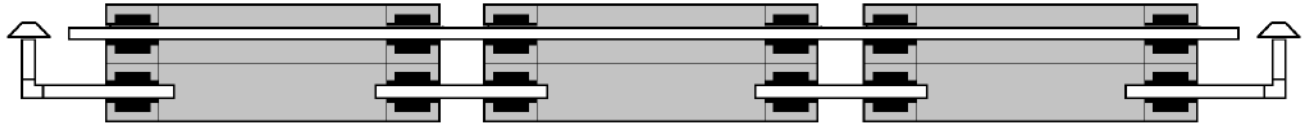
Gravity Flow Installation: Air vents should be placed at the beginning and end of each line to provide adequate oxygen content. For vertical panels, cut the 24-inch long, 2-inch PVC pipe in half, then reconnect with a 2-inch 90-Degree SCH 40 Tee. Extend the 2-inch Tee up to ground surface to allow ventilation. For horizontal panels, follow the same procedure on one side of the panel block and utilize 1 ½-inch PVC. Air vents should come to or just below finish grade and housed neatly in something such as an irrigation box/cover for protection.

Vertical Panel Deep LP Installation (Low Pressure Pipe): Insert your 1¼-inch or 1½-inch into a 2-inch PVC “sleeve” that spans from one inner chamber of a panel to the next. Connect a 2-inch 90 Degree SCH 40 Tee to this “sleeve” halfway between one panel and the next. Extend the 2-inch Tee up to ground surface to allow ventilation.



Horizontal Panel Deep LP Installation

For deep horizontal installations, venting can be supplied to the side of the panels not being utilized by the distribution line. 2-foot sections of 1 ½-inch SCH 40 PVC can be used to connect the panels from inner chamber to inner chamber. At the beginning and end of each line of panels, connect a 1 ½- inch SCH 40 Tee and extend the vent line to ground surface to allow for ventilation. The diagram below illustrates this configuration.



Final Inspection

The following list are key points that an inspector should look for when issuing a completion permit:

- 1) Were panels installed horizontally or vertically, according to the permit?
- 2) Are the proper number of panels for each line installed?
- 3) Is the depth of the panels within guidelines?
- 4) Are drain lines level or less than ¼ inch fall in ten feet?
- 5) Have seals been properly constructed?
- 6) Was the proper foam sealer (GE) or tar seal rope used to construct the seals?
- 7) Was the proper sand used in the trench backfill?
Is the sand clean? (i.e. free of debris, large organics, leaves, etc.)
Has the sand been screened? (to a medium-grade, not too fine, free of large rocks)
Is the sand naturally-occurring? (i.e. from a river, creek, sand pit, etc., not manufactured)
- 8) If in soils where clay is present, were the sidewalls raked and limed?

For Pumped Systems

- 9) Have pump size, head pressure and dose cycle been properly sized and set?
Set dose cycle for 3.6 gallons per panel with pressure distribution
Set dose cycle at 3.6 gallons per vertical panel and 3.6 to 7.2 gallons per horizontal panel when pumping to pressure manifold and gravity feeding.
- 10) Record field data on operations permit.

Design Resources

Please feel free to contact a member of T&J Panel with any design, installation or maintenance questions related to an LP Panel or Pressure Manifold system

Here you will find a pressure head table to help in flow design of your LP Panel system. These numbers are a guide to help you in selecting the right flow for your system. We have found that in most systems the 5/32" and 3/16" hole at 2 to 4 feet of head pressure works the best in giving a pump cycle of more than 5 minutes and keeps the same maximum top chamber flow load as sited on the previous page.

Flow Chart of Various Orifices and Pressure Heads

FLOW CHART OF VARIOUS ORIFICES AND HEAD PRESSURES

Head Pressure Ft.	Orifice Size									
	3/32" .094"	1/8" .125"	5/32" .156"	3/16" .188"	7/32" .219"	1/4" .250"	9/32" .281"	5/16" .313"	11/32" .344"	3/8" .375"
2.0	.15	.26	.41	.59	.80	1.04	1.32	1.63	1.97	2.34
2.1	.15	.27	.42	.60	.82	1.07	1.35	1.67	2.02	2.40
2.2	.15	.27	.43	.61	.84	1.09	1.38	1.71	2.07	2.46
2.3	.16	.28	.44	.63	.86	1.12	1.41	1.75	2.11	2.51
2.4	.16	.29	.46	.64	.87	1.14	1.44	1.78	2.16	2.57
2.5	.16	.29	.46	.66	.89	1.17	1.47	1.82	2.20	2.62
2.6	.17	.30	.46	.67	.91	1.19	1.5	1.86	2.25	2.67
2.7	.17	.30	.47	.68	.93	1.21	1.53	1.89	2.29	2.72
2.8	.17	.31	.48	.69	.94	1.23	1.56	1.93	2.33	2.77
2.9	.18	.31	.49	.71	.96	1.25	1.59	1.96	2.37	2.82
3.0	.18	.32	.50	.72	.98	1.28	1.62	1.99	2.41	2.87
3.1	.18	.32	.51	.73	.99	1.3	1.64	2.03	2.45	2.92
3.2	.19	.33	.51	.74	1.01	1.32	1.67	2.06	2.49	2.97
3.3	.19	.33	.52	.75	1.02	1.34	1.69	2.09	2.53	3.01
3.4	.19	.34	.53	.76	1.04	1.36	1.72	2.12	2.57	3.06
3.5	.19	.34	.54	.78	1.06	1.38	1.74	2.15	2.61	3.10
3.6	.20	.35	.55	.79	1.07	1.40	1.77	2.18	2.64	3.15
3.7	.20	.35	.55	.80	1.09	1.42	1.79	2.21	2.68	3.19
3.8	.20	.36	.56	.81	1.10	1.44	1.82	2.24	2.72	3.23
3.9	.20	.36	.57	.82	1.11	1.46	1.84	2.27	2.75	3.27
4.0	.21	.37	.58	.83	1.13	1.47	1.87	2.30	2.79	3.32

GPM

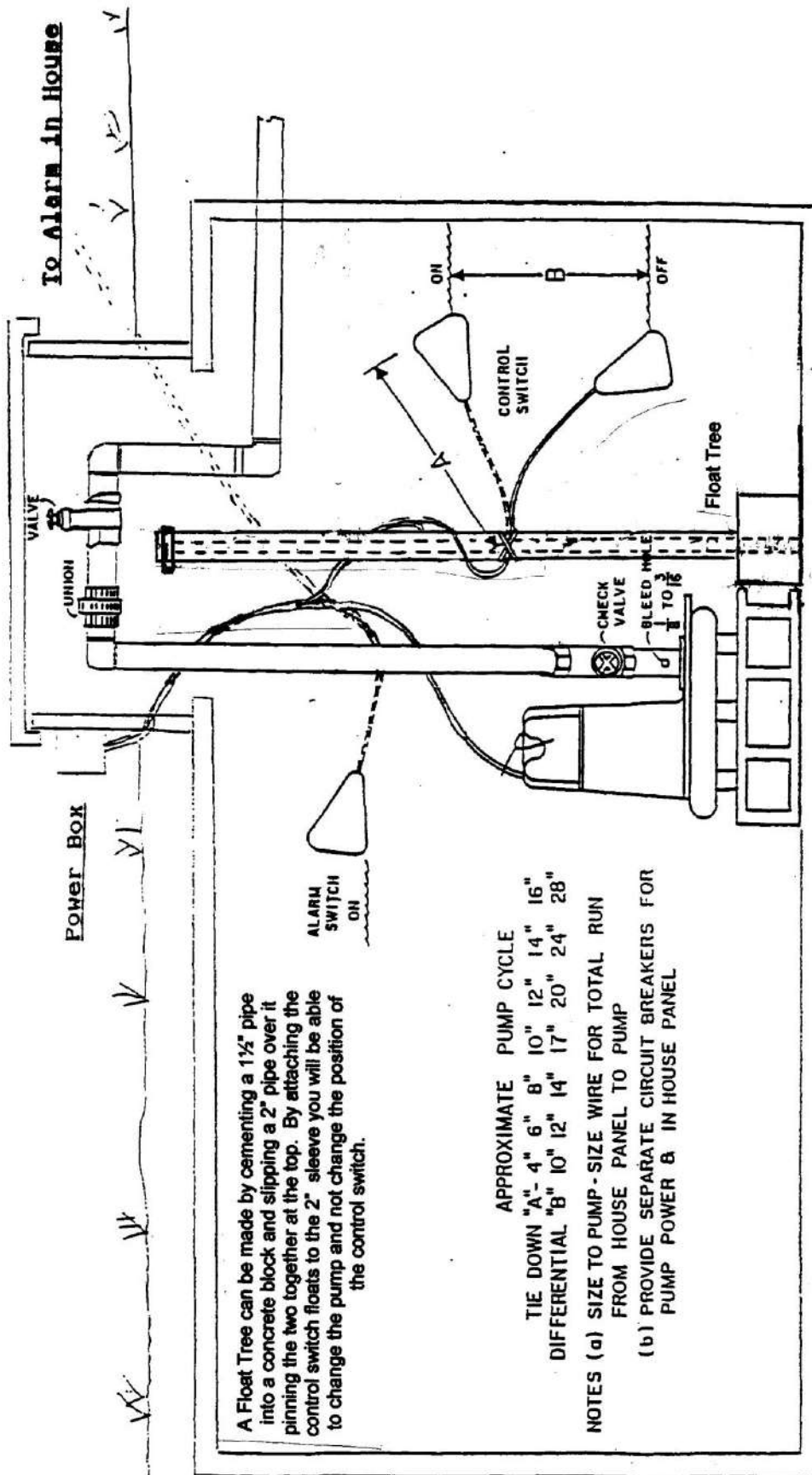
This chart will assist you in determining the proper tap sizes when you have to pump to a pressure manifold in a gravity system.

PRESSURE MANIFOLD TAP FLOW

Head Pressure ft.	SCH 40		Tap Diameter	SCH 80	
	1/2" 0.622	3/4" 0.824		1/2" 0.546	3/4" 0.742
2.0	7.11	12.50		5.48	10.10
2.1	7.29	12.80		5.62	10.40
2.2	7.46	13.10		5.75	10.60
2.3	7.63	13.40		5.88	10.90
2.4	7.79	13.70		6.00	11.10
2.5	7.95	14.00		6.13	11.30
2.6	8.11	14.20		6.25	11.50
2.7	8.26	14.50		6.37	11.80
2.8	8.62	14.80	Gallons per minute	6.48	12.00
2.9	8.36	15.00		6.60	12.20
3.0	8.71	15.30		6.71	12.40
3.1	8.86	15.50		6.82	12.60
3.2	9.00	15.80		6.93	12.80
3.3	9.14	16.00		7.04	13.00
3.4	9.27	16.30		7.15	13.20
3.5	9.41	16.50		7.25	13.40
3.6	9.54	16.70		7.35	13.60
3.7	9.67	17.00		7.45	13.80
3.8	9.80	17.20		7.55	14.00
3.9	9.93	17.40		7.65	14.10
4.0	10.10	17.70		7.75	14.30

Below is a chart to aid in head selection due to friction loss in PVC pipe. In calculating friction, be sure to add 20% for loss in fittings. In the chart below, friction loss is per 100 feet of pipe. The head created by friction loss is added to the elevation head of lift from the bottom of the pump tank to the top of the highest turn-up.

Flow GPM	Pipe Diameter					
	1"	1 1/4"	1 1/2"	2"	3"	4"
	<i>Friction Loss (100ft)</i>					
1	.07					
2	.28	.07				
3	.60	.16	.07			
4	1.01	.25	.12			
5	1.52	.39	.18			
6	2.14	.55	.25	.07		
7	2.89	.76	.36	.10		
8	3.63	.97	.46	.14		
9	4.57	1.21	.58	.17		
10	5.5	1.46	.70	.21		
11		1.77	.84	.25		
12		2.09	1.01	.30	.07	
13		2.42	1.17	.35	.08	
14		2.74	1.33	.39	.09	
15		3.06	1.45	.44	.10	
16		3.49	1.65	.50	.11	
17		3.93	1.86	.56	.12	
18		4.37	2.07	.62	.16	
19		4.81	2.28	.68	.23	
20		5.23	2.46	.74	.30	
25			3.75	1.10	.39	
30			5.22	1.54	.48	
35				2.05	.58	.07
40				2.62	.81	.09
45				3.27	1.08	.12
50				3.98	1.38	.16
60					1.73	.21
70					2.09	.28
80						.37
90						.46
100						.55



Frequently Asked Questions

Q: Can I Use Vertical and Horizontal Panels in the same system to overcome certain site or soil conditions?

A: YES. Both styles are interchangeable can be used in combination.

Q: How do I calculate the amount of backfill sand for my drainfield?

A: To calculate the amount of backfill sand needed, use the equation: **LF x .17 = Tons Needed**; where LF is total linear feet of nitrification line.

Q: When designing a T&J Panel System, do lines need to be designed to certain lengths in order to make panels fit properly with 6-inch spacing between them?

A: NO, panels can be utilized in whatever line lengths are necessary for the design of a system. Spacing between the panels can be adjusted in order to make them fit into any given line length, so long as the proper number of panels are installed in that line.

Q: Does the Horizontal Panel system use more sand due to its 3-foot trench?

A: No, the cubic volume remains the same as Vertical Panel systems even though it is a 2-foot trench due to the lower trench profile.

Q: Should I consider a wider trench when installing a Vertical Panel System?

A: No, a 2-foot trench is vital in the distribution of effluent to the side walls and is key to keeping the aerobic treatment needed for breakdown.

Q: Why do Panel Block Systems have the longest lifespan on average of any system on the market:

A: The successful longevity of our system is primarily due to the fact that the storage capacity is **3X** that of a conventional system all while pretreating effluent and preserving the soil itself. This hydraulically allows the soil to accept effluent longer and in a much smaller footprint.

Q: What type of boards are used for installation and that are their purpose?

A: Any 1x4 or 1x6 board will work. Boards do not have to be treated because it will actually fossilize in the trench over time. The purpose of this board is for maintaining the level at time of installation.

Q: Do I need a certification from T&J Panels to be able to install the system?

A: No, you do not need a certification from T&J Panels to be able to install the system, but we recommend and install training from one of our company representatives for your first-time installation.

Q: Why should I consider a Panel System?

A: You may consider using a panel system if you want a system with longevity, if you have future site needs (ex. pools, additional bedrooms, landscaping needs), to maximize your development potential, or if you value having a more environmentally friendly option.

T & J Panel Wastewater Treatment System

**269 Marble Road
Statesville, NC 28625**

Office: 704-924-8600

Fax: 704-924-8681

Website: www.tjpanel.com

Email: info@tjpanel.com

Limited Warranty:

The structural integrity of each T&J Panel, when installed in accordance with manufacturer's instructions, is warranted against defective materials and workmanship for one year from date of manufacture. Should a defect appear within the warranty period, purchaser must inform T&J Panel System of the defect before the warranty expires. T&J Panel System will supply a replacement unit. T&J Panel System's liability specifically excludes the cost of removal and/or installation of the panels. There are no other warranties with respect to the units, including no warranties of merchantability or of fitness for a particular purpose. The warranty does not extend to incidental, consequential, special or indirect damages. The company shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other loss or expense incurred by buyer. Specifically excluded from warranty coverage are: Damage to the panels due to ordinary wear and tear; alteration, accident, misuse, abuse or neglect of the panels; the panels being subjected to stresses greater than those prescribed in the installation instructions; the placement by buyer of improper materials into buyer's system; or any other event, not caused by the company. Furthermore, in no event shall the company be responsible for any loss or damage to the buyer, the panels or any third party resulting from its installation or shipment. Buyer shall be solely responsible for ensuring that installation of the system is completed in accordance with all applicable laws, codes, rules and regulations. Any alteration of this warranty must be noted as "Warranty" in writing by the company.

When Your Problem In On-site Is:



Topography and Vegetation



Special Landscaping Needs



Future Site Needs



Limited Suitable Area

Then consider a better quality effluent with T & J Panel



**Christine & Joshua Haymond
(Rufty Homes)
6004 Canadero Drive
Wake County, North Carolina**

**Engineered Option Permit
Pressure Manifold System**

Operation and Maintenance Procedures



**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

HOMEOWNER GUIDE FOR UTILIZATION AND MAINTENANCE OF ON-SITE WASTEWATER DISPOSAL SYSTEMS

What is an On-site Wastewater Disposal System?

There are a number of different types of on-site wastewater disposal systems each designed for a specific set of site conditions. However, there are several system components that are common to most systems. These include the following:

1. A septic tank - a concrete tank that is designed to receive wastewater from the house and to provide a degree of pretreatment for the waste, chiefly through removal of some of the solids in the waste. Note that these solids accumulate over time and necessitate periodic pumping of the septic tank. Currently septic tanks are equipped with two access risers (normally constructed of concrete), which are designed to be at least 6 inches above the ground surface to prevent surface and shallow groundwater from entering the septic tank and to provide access for maintenance. **Care must be taken not to damage or cover these risers so that water inflow / infiltration can be prevented and the tank can be accessed for maintenance.**
2. In some installations, a pump tank - a concrete tank, very similar to the septic tank, which contains a pump along with the associated controls / componentry. The pump tank and pump is designed to receive effluent from the septic tank, and pump the effluent to a disposal field located at a higher elevation and/or to a pressurized distribution network in the disposal field. **The pump tank also has an access riser which must be protected in a similar manner to that indicated for the septic tank.** Servicing of the pump tank components often necessitates the assistance of a professional such as a septic tank installer or Certified Subsurface System Operator. The latter is required for operation and maintenance of certain types of systems.
3. A disposal field - a series of subsurface trenches and lines that are designed to distribute the effluent into the soil and provide for the ultimate treatment and disposal of the effluent. There are numerous variations on the design of the disposal field, related chiefly to the type of system chosen, site constraints, etc. Dependent on the type of disposal system, you may have to maintain a contract with a Certified Subsurface System Operator for operation and maintenance of your wastewater disposal system.

Utilization of Your Wastewater Disposal System

In order to obtain the maximum efficiency and life expectancy from your system, the following simple procedures must be adhered to:

1. **Practice water conservation.** This can include many practical considerations such as not leaving the water running while you brush your teeth, not overfilling the tub, limiting time in the shower, not replacing low flow fixtures with those of higher flows, over rinsing dishes (allow the dishwasher to do its job), immediate repair of any leaking fixtures, running washing machines and dishwashers only when full, etc.

NOTE: Washing machines generate significant volumes of wastewater. As a result, laundry activities should be spread over the week as opposed to accumulating all of laundry until the weekend.

2. **Do not utilize your wastewater disposal system as a trash can by dumping nondegradables down your drains or toilet.** These include cigarette butts, sanitary products, grease, plastics, disposable diapers, etc. Avoid use of garbage disposals. Do not retrofit garbage disposals unless the system is specifically permitted for their use. Also, do not dump harmful chemicals down the drain. These include petroleum products, paint, paint thinner, pesticides, antifreeze, etc.

Maintenance of Your Wastewater Disposal System

Every wastewater disposal system requires maintenance in order to function properly. The specific maintenance required is related to the type of system. The following are general considerations that apply to all systems.

1. **Protect your wastewater disposal system components including the tanks, access risers, disposal field and associated components.** Do not drive or park on any portion of the system. The area over the disposal field should be left undisturbed with the grass cover being maintained as you would your lawn. Location of trees and shrubs on or in close proximity to the disposal field is not recommended since roots may clog or damage your drain lines. Additionally, great care must be exercised when considering the addition of any structure(s) to the site. The location of any appurtenances cannot encroach on the installation or repair areas for your system. It is not recommended that irrigation systems be located in proximity to the disposal system since their construction can cause system damage and/or result in additional hydraulic load on the disposal field.
2. **Protect the system from excess surface and shallow groundwater.** The land surface on and around the wastewater disposal system should be landscaped to shed rainfall and runoff and prevent ponding. Be sure that foundation drains, runoff from roofs and drives, etc. are diverted away from the disposal system.
3. **Regularly have the septic tank / pump tank pumped and cleaned by a permitted septage hauler.** Although the necessary frequency of pumping varies with the household and system, most tanks need **pumping at a frequency of 3-5 years** and at any time solids occupy one-fourth to one-third of the septic tank liquid depth.

Note that all septic tanks being currently installed incorporate an effluent filter within the outlet compartment of the septic tank. This filter is to be cleaned anytime the septic tank is pumped. If plumbing becomes sluggish, this filter should be checked. If filter service is found to be necessary, the tank is to be pumped, the filter cleaned and the filter reinstalled.

4. **Be alert to warning signs that your system may not be functioning properly.**
These include sewage surfacing over the disposal system, sewage backups / slow draining in the house, lush growth over the disposal system, sewage odors, etc.
5. **Do not make or allow repairs to your system unless all necessary permits are obtained from the Local County Department of Environmental Services.**
6. **Commercial additives for septic tank systems** - It has generally not been demonstrated that these additives enhance the function of septic systems or reduce the need for tank pumping and other necessary maintenance.
7. **Special maintenance considerations** - As already alluded to, some of the more complex wastewater disposal systems require that you retain / maintain the services of a Certified Wastewater System Operator in order to comply with Laws and Rules and maintain a valid operation permit for your system. In the Local County this maintenance requirement should be recorded with Register of Deeds if applicable.

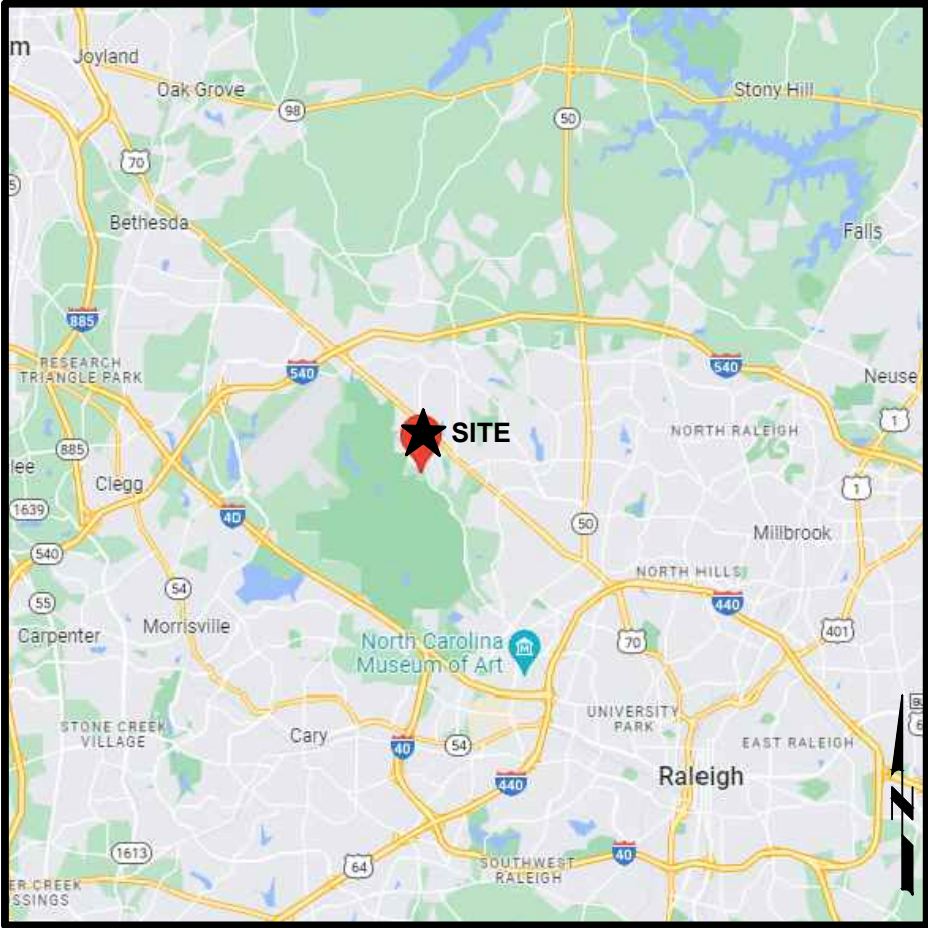
Where Do I Obtain Information and Assistance?

If you are purchasing a new home, you should request a copy of your wastewater system permit from the builder / seller along with information regarding any special maintenance requirements. You may also obtain information and assistance from the **Local County Department of Environmental Services.**

CHRISTINE & JOSHUA HAYMOND

(RUFTY HOMES)

(LOT 2 CANADERO SUBDIVISION) PRESSURE MANIFOLD SYSTEM ENGINEERED OPTION PERMIT



VICINITY MAP

6004 CANADERO DR
RALEIGH, NC 27612

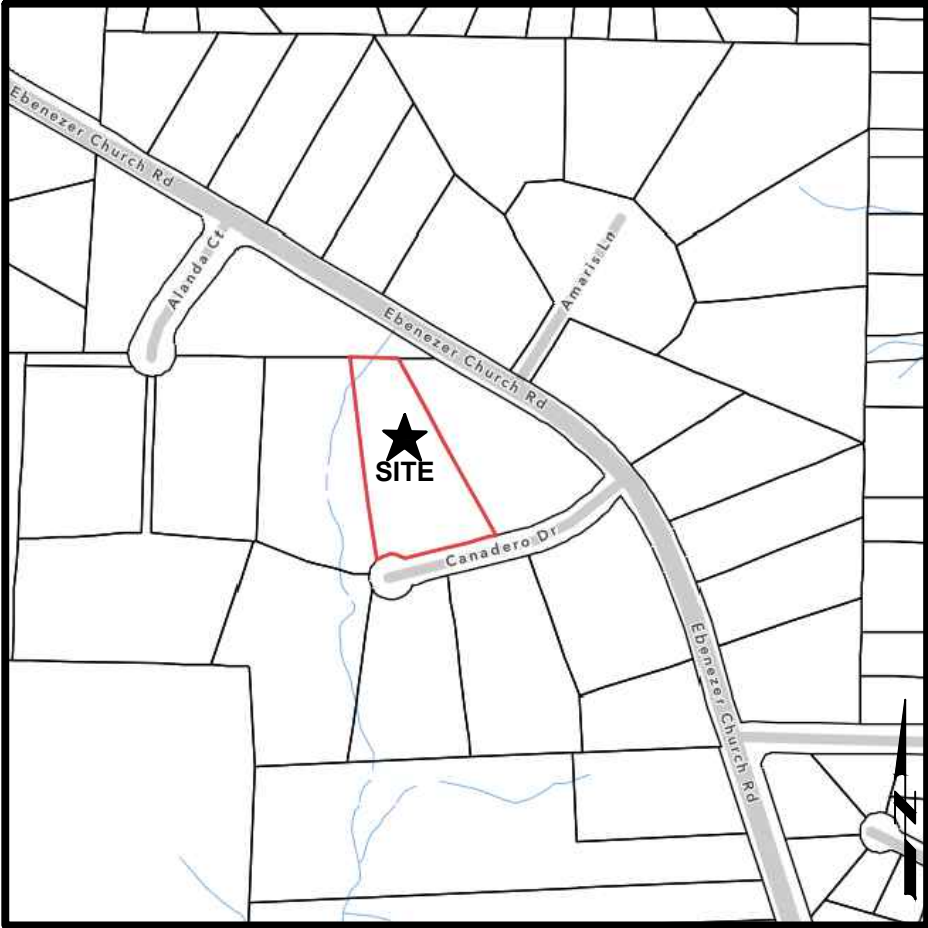
PROJECT No. A35907.00

WAKE COUNTY, NC

PIN#: 0777619747

SCHEDULE OF DRAWINGS:

C-100	COVER SHEET
C-101	OVERALL SITE LAYOUT
C-102	TREATMENT & DISPOSAL
C-103	NOTES
C-104	FORCE MAIN PLAN AND PROFILE
D-101	DETAILS 1 OF 5
D-102	DETAILS 2 OF 5
D-103	DETAILS 3 OF 5
D-104	DETAILS 4 OF 5
D-105	DETAILS 5 OF 5
E-101	ELECTRICAL DETAILS 1 OF 1



LOCATION MAP

COVER SHEET

C-100

CHRISTINE & JOSHUA HAYMOND
(RUFTY HOMES)
6004 CANADERO DRIVE
PRESSURE MANIFOLD SYSTEM
EOP
WAKE COUNTY, NC

BY: ACM, CAC

JOB #: A35907.00

DATE: 06/03/2024

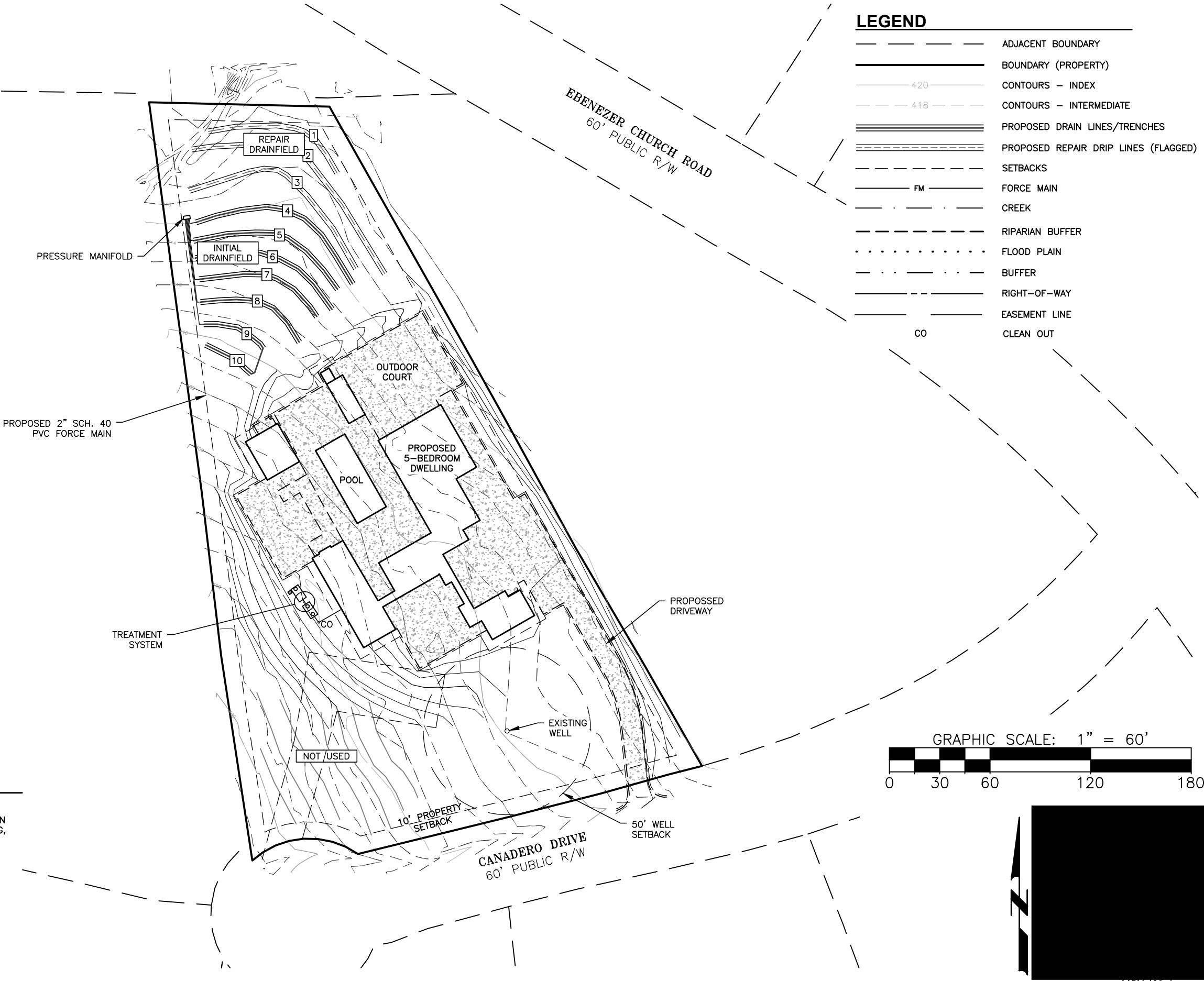
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P. O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510

MacCONNELL
& Associates, P. C.

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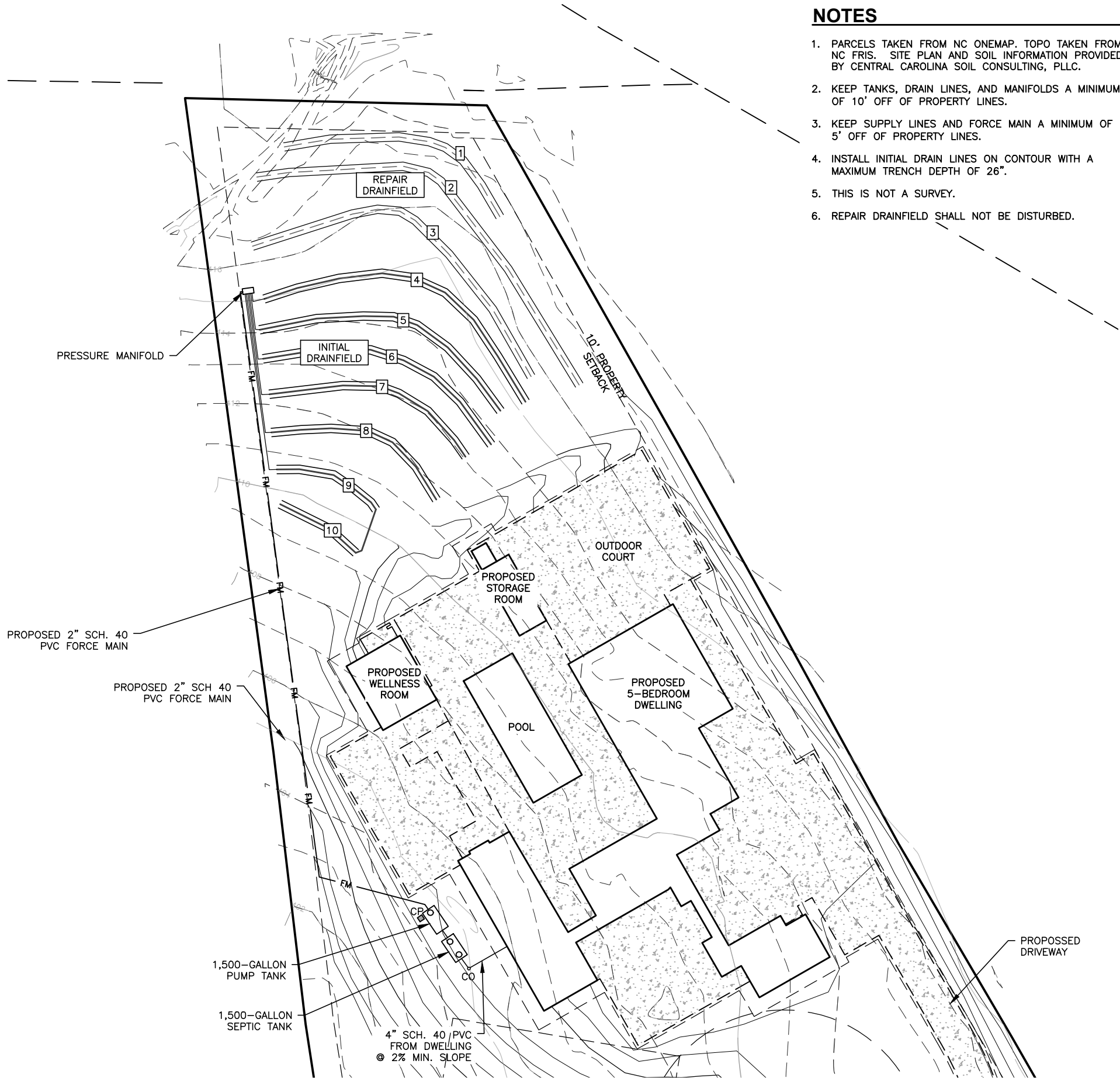
NOTES

- 1. PARCELS TAKEN FROM NC ONEMAP. TOPO TAKEN FROM NC FRIS. SITE PLAN AND SOIL INFORMATION PROVIDED BY CENTRAL CAROLINA SOIL CONSULTING, PLLC.
- 2. KEEP TANKS, DRAIN LINES, AND MANIFOLDS A MINIMUM OF 10' OFF OF PROPERTY LINES.
- 3. KEEP SUPPLY LINES AND FORCE MAIN A MINIMUM OF 5' OFF OF PROPERTY LINES.
- 4. INSTALL INITIAL DRAIN LINES ON CONTOUR WITH A MAXIMUM TRENCH DEPTH OF 26".
- 5. THIS IS NOT A SURVEY.
- 6. REPAIR DRAINFIELD SHALL NOT BE DISTURBED.



OVERALL SITE LAYOUT		C-101	
CHRISTINE & JOSHUA HAYMOND (RUFFY HOMES) 6004 CANADERO DRIVE PRESSURE MANIFOLD SYSTEM EOP WAKE COUNTY, NC			
BY:	ACM, CAC	JOB #:	A35907.00
		DATE:	06/3/2024
501 CASCADE POINTE LANE, SUITE 103 CARY, NORTH CAROLINA 27513 P. O. BOX 129 MORRISVILLE, NORTH CAROLINA 27560 TEL: (919) 467-1239 FAX: (919) 319-6510			
MacCONNELL & Associates, P. C.			

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NOTES

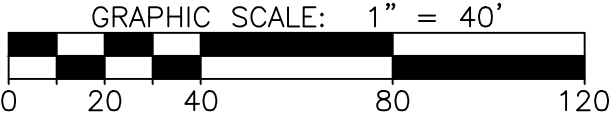
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LEGEND

- ADJACENT BOUNDARY
- BOUNDARY (PROPERTY)
- CONTOURS - INDEX
- CONTOURS - INTERMEDIATE
- PROPOSED DRAIN LINES/TRENCHES
- PROPOSED REPAIR DRIP LINES (FLAGGED)
- SETBACKS
- FM - FORCE MAIN
- CREEK
- RIPARIAN BUFFER
- FLOOD PLAIN
- BUFFER
- RIGHT-OF-WAY
- EASEMENT LINE
- CO - CLEAN OUT

LINE SEGMENTS (INITIAL)			
LINE #	FLAG	LENGTH	DESIGN LENGTH
4	BLUE	110'	110'
5	RED	100'	100'
6	YELLOW	90'	90'
7	PURPLE	80'	80'
8	ORANGE	80'	70'
9	PINK	60'	40'
10	BLUE	50'	30'
TOTAL LENGTH		520'	

LINE SEGMENTS (REPAIR)			
LINE #	FLAG	LENGTH	DESIGN LENGTH
1	WHITE	90'	90'
2	ORANGE	155'	155'
3	PINK	140'	130'
TOTAL LENGTH		375'	



TREATMENT & DISPOSAL

C-102

CHRISTINE & JOSHUA HAYMOND
(RUFFY HOMES)
6004 CANADERO DRIVE
PRESSURE MANIFOLD SYSTEM
EOP

WAKE COUNTY, NC

BY: ACM, CAC

JOB #: A35907.00

DATE: 06/3/2024

501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P. O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510

MacCONNELL & Associates, P. C.

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MAINTENANCE SCHEDULE

	FREQUENCY	TASK
WATER CONSUMPTION	MONTHLY	RECORD TOTAL GALLONS USED FROM METER AT POTABLE WATER SUPPLY SOURCE. PUMP OUT ACCUMULATED GREASE AND DISPOSE OF IN A STATE--PERMITTED MANNER/FACILITY.
SEPTIC TANKS	WEEKLY	CHECK EFFLUENT FILTERS AND CLEAN AS REQ'D.
	MONTHLY	CHECK FOR SOLIDS ACCUMULATION, BLOCKAGES, AND BAFFLE AND/OR EFFLUENT FILTER DAMAGE. CHECK FOR IN/EXFILTRATION OF LIQUID.
	12 MONTHS OR AS REQ'D	PUMP OUT ACCUMULATED SOLIDS AND DISPOSE OF IN A STATE--PERMITTED MANNER/FACILITY.
PUMP TANKS	WEEKLY	CHECK PUMPS FOR FUNCTIONALITY AND ABNORMAL VIBRATIONS. TEST CONTROL AND ALARM FUNCTIONS. RECORD PUMP ELAPSED TIME AND CYCLE COUNTER READINGS.
	MONTHLY	CHECK FOR SOLIDS ACCUMULATION, BLOCKAGES, AND BAFFLE DAMAGE. CHECK FOR IN/EXFILTRATION OF LIQUID.
	12 MONTHS OR AS REQ'D	PUMP OUT ACCUMULATED SOLIDS AND DISPOSE OF IN A STATE--PERMITTED MANNER/FACILITY.
COLLECTION SYSTEM	6 MONTHS OR AS REQ'D	USE CLEAN--OUTS TO CHECK VISUALLY FOR BLOCKAGES. REMOVE AND DISPOSE OF BLOCKED SOLIDS IN A STATE--PERMITTED MANNER/FACILITY.
PRESSURE MANIFOLDS	6 MONTHS OR AS REQ'D	MEASURE AND RECORD PUMP DOSING RATES FOR EACH FIELD. CHECK RESIDUAL PRESSURE AND ADJUST AS NECESSARY TO HEAD OF 3'-0". FLUSH OUT MANIFOLD AS NECESSARY.
DISPOSAL FIELDS	MONTHLY OR AS REQ'D	MOW VEGETATIVE COVER. CHECK FOR EROSION OR SURFACING OR PONDING OF EFFLUENT.
	MONTHLY	WATER LEVELS IN THE FIELD TRENCH OBSERVATION PORTS SHOULD BE INSPECTED/RECORDED.

DOSING CONTROL

SYSTEM SHALL DOSE ±2 TIMES PER DAY AT 254 GALLONS PER DOSE OR 6.72 MIN. AT 37.8 GPM.

FIELD DOSING OPERATING SEQUENCE

EFFLUENT FROM THE SEPTIC TANKS SHALL ENTER THE FIELD DOSING PUMP TANK, CAUSING THE WATER LEVEL TO RISE. AS THE LEVEL REACHES A FLOAT, DESIGNATED AS THE PUMP ON, A MERCURY SWITCH SHALL CLOSE, INDICATING THAT THE SYSTEM SHALL DOSE THE FIELD UNTIL THE LEVEL REACHES THE PUMP OFF LEVEL.

IF THE WATER LEVEL CONTINUES TO RISE HIGH ENOUGH FOR THE "HIGH WATER ALARM" MERCURY FLOAT SWITCH TO CLOSE, A RELAY SHALL CAUSE A FLASHING RED LIGHT ON THE PANEL FACE TO ENERGIZE, WHICH MAY ONLY BE RESET MANUALLY. ALSO, AN AUDIBLE ALARM WILL BE ENERGIZED.

THE PUMP TANK SHALL CONTAIN ONE PUMP. PUMP SHALL HAVE "HAND--OFF--AUTO" SWITCH, GREEN RUN LIGHT AND ELAPSED TIME METER.

NOTES

1. THE CONTRACTOR IS REQUIRED TO VERIFY ALL DIMENSIONS, ELEVATIONS, AND UTILITIES BEFORE BEGINNING ANY CONSTRUCTION.

2. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL REQUIREMENTS OF THE COUNTY AND STATE.

3. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OSHA, NCDOT, AND SAFETY REQUIREMENTS OF THE COUNTY AND STATE.

4. CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL CONSTRUCTION DAMAGE EXPEDITIOUSLY AND AT NO ADDITIONAL COST TO THE OWNER.

5. FOUR OR SIX--INCH DIAMETER CORRUGATED PLASTIC TUBING SHALL COMPLY WITH ASTM F405 AND G.S. 150B--21.6.

6. NITRIFICATION TRENCH SHALL FOLLOW THE CONTOUR OF THE GROUND.

7. SURFACE WATER RUNOFF AND PONDING SHALL BE PROHIBITED AT ALL TIME.

8. SOIL COVER SHALL BE PLACED OVER A NITRIFICATION FIELD ONLY AFTER PROPER PREPARATION OF THE ORIGINAL GROUND SURFACE. THE TYPE OF SOIL COVER SHALL BE APPROVED BY THE LOCAL HEALTH DEPARTMENT.

9. ALL SERVICE ACCESS OPENINGS WILL BE A MINIMUM OF 24 INCHES UNLESS OTHERWISE SHOWN.

10. ALL JOINTS (MID--SEAM, TOP--SEAM) SHALL BE SEALED USING CONCRETE SEALANTS BUTYL SEALANT # CS--102 MEETING ASTM C--990.

11. TANKS SHALL BE LEAK--TESTED PRIOR TO SYSTEM START UP BY APPLYING A VACUUM OF 5--INCHES OF MERCURY WITH RISER ASSEMBLIES IN PLACE OR A 24--HOUR STATIC WATER TEST, IN ACCORDANCE WITH ASTM STANDARDS.

12. ALL PIPE PENETRATIONS THROUGH PRECAST CONCRETE TANKS SHALL BE PRESS--SEAL CAST--A--SEAL 402 RUBBER BOOTS OR EQUAL AND GROUTED.

13. ANY CHANGES TO TANK LAYOUT AND INVERTS MAY BE ADJUSTED AS NECESSARY TO COMPLY WITH ACTUAL FIELD CONDITIONS UPON APPROVAL BY THE ENGINEER.
14. CONTRACTOR SHALL NOTIFY THE ENGINEER WHEN TANK INSTALLATION WILL OCCUR SO FIELD INSPECTION CAN TAKE PLACE.

15. CONTRACTOR SHALL DIVERT SURFACE WATER FROM ALL TANK AREAS. (SEPTIC TANKS, ETC.)

16. VEGETATIVE COVER SHALL BE ESTABLISHED IMMEDIATELY AFTER FIELD INSTALLATION.

17. ALL COMPONENTS TO BE ACCESSIBLE AT GRADE WITHOUT ENTERING INTO THE RISER/TANK.

18. CONTRACTOR MAY USE LARGER TANKS WITH ENGINEER'S APPROVAL. PT DOSE VOLUME ETC. WILL CHANGE.

19. PRE--CAST CONCRETE SEPTIC AND PUMP TANKS DIMENSIONS SHOWN ARE BASED ON DAVID BRANTLEY & SONS. OTHER MANUFACTURERS ARE ACCEPTABLE, PROVIDED THEIR PRODUCTS COMPLY WITH APPLICABLE NCDENR--DEH RULES AND HAVE BEEN ASSIGNED A STATE APPROVAL NUMBER.

20. CONCRETE SHALL HAVE A MINIMUM 4,500 PSI AT 28 DAYS. CONCRETE SHALL BE WATERPROOFED WITH BITUMINOUS MASTIC OR OTHER APPROVED COATING SYSTEM.

21. EXCAVATE AREA FOR SEPTIC AND PUMP TANKS TO FIRM EARTH. LEVEL ON STONE. TANKS SHALL BE CAREFULLY BACKFILLED TO MAXIMUM 95% DENSITY. BACK FILL SHALL DIRECT WATER AWAY FROM ACCESS RISERS. IF MORE THAN 5 FEET OF COVER IS PROPOSED, CONSULT ENGINEER AND TANK MANUFACTURER TO DEVELOP STRUCTURAL AMENDMENTS.

22. FIELD VERIFY ACCESS RISERS BEFORE ORDERING.

23. VERIFY PUMP PLACEMENT WITH PUMP MANUFACTURER BEFORE ORDERING TANK, RISERS, AND HATCHES.

24. ALL PRESSURE PIPE AND FITTINGS IN TANKS SHALL BE SCH. 80 PVC UNLESS OTHERWISE SHOWN.

25. BALL AND CHECK VALVES SHALL BE RATED AT A MIN. OF 235 PSI.

SPECIAL REQUIREMENTS

1. THIS IS AN ENGINEER OPTION PERMIT. ANY CHANGE TO INSTALLER MUST BE PRE--APPROVED BY THE ENGINEER.

2. PRECAST TANK MODEL NUMBERS SHOWN ON PLAN ARE PRE--APPROVED. "EQUAL TANKS" SHALL BE EQUIVALENT SIZE OR GREATER BY SHOAF PRECAST, INC (336--787--5826, INFO@SHOAFPRECAST.COM) WHICH ARE ALSO PRE--APPROVED. OTHER TANKS MAY BE USED WHEN PRE--APPROVED BY ENGINEER.

3. ALL SCH--40 & SCH--80 PVC PIPE AND FITTINGS SHALL BE PRESSURE RATED AND COMPLY WITH ASTM D1785 OR ASTM D2466. SCH. 40 PVC DRAIN WASTE VENT (DWV) PIPE AND FITTINGS MEETING ASTM D2665 SHALL NOT BE USED.



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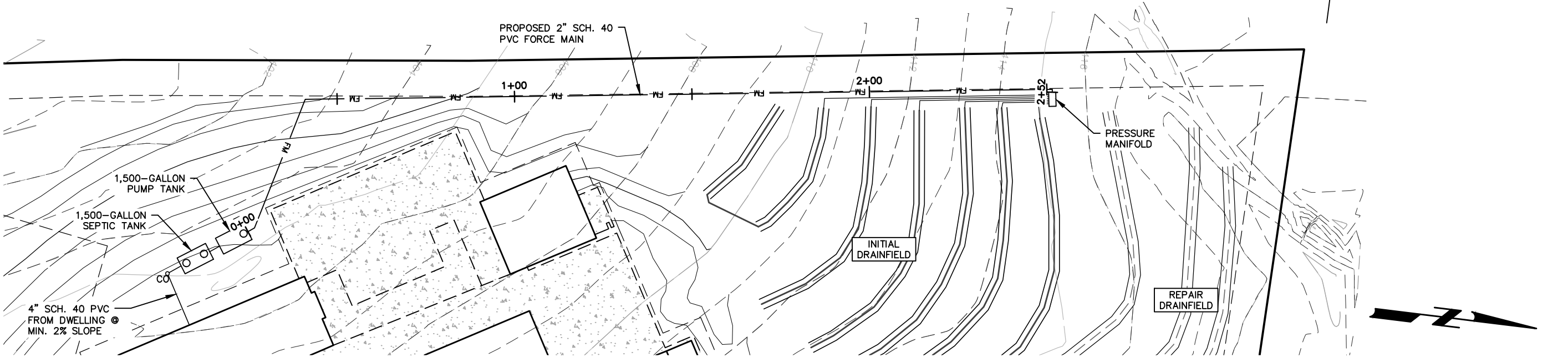
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CHRISTINE & JOSHUA HAYMOND
(RUFFY HOMES)
6004 CANADERO DRIVE
PRESSURE MANIFOLD SYSTEM
EOP
WAKE COUNTY, NC

NOTES

C-103

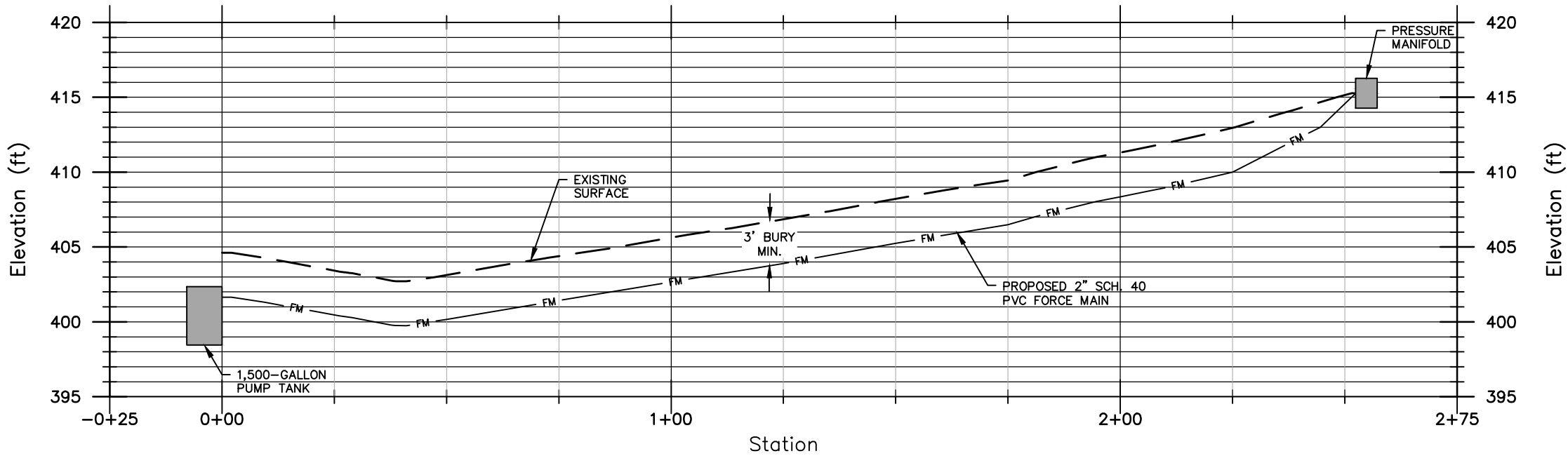
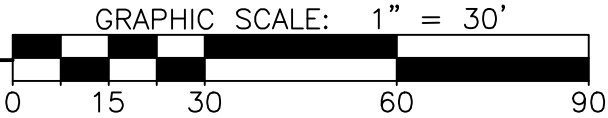
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1
C-104

FORCE MAIN PLAN STATIONS (0+00 - 2+52)

1"=30'



2
C-104

FORCE MAIN PROFILE STATIONS (0+00 - 2+52)

HORIZONTAL SCALE 1"=30' ; VERTICAL SCALE 1"=9'

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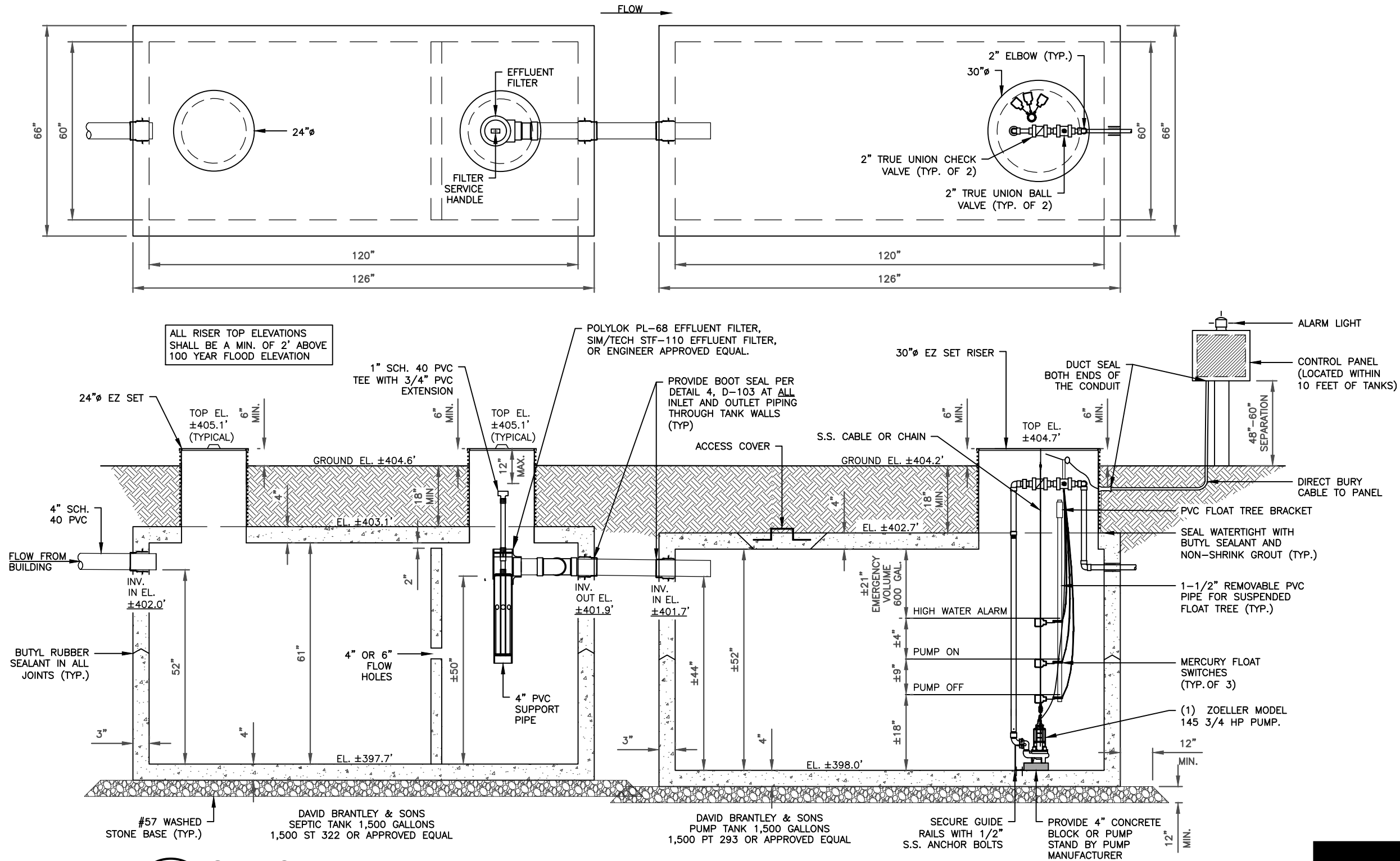
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**FORCE MAIN PLAN
AND PROFILE**

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D-101

SEPTIC TANK AND PUMP TANK

NTS



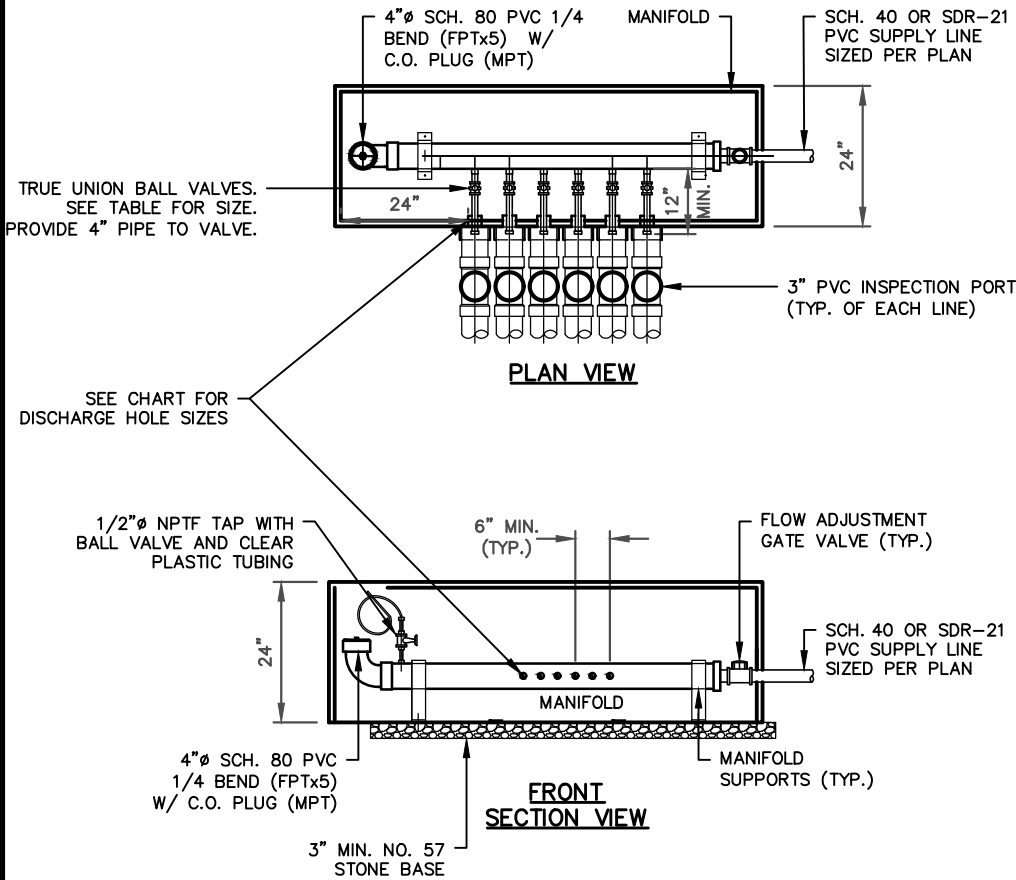
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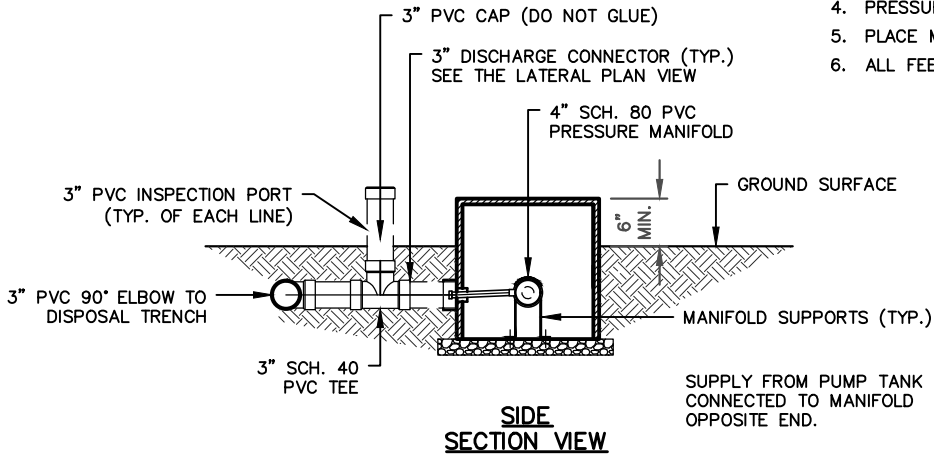
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PRESSURE MANIFOLD (INITIAL LINES) TAP CHART				
MANIFOLD TAP	LINES	FLAG COLOR	HOLE SIZES	LENGTH
1	4	BLUE	1/2" SCH. 40	110'
2	5	RED	1/2" SCH. 40	100'
3	6	YELLOW	1/2" SCH. 40	90'
4	7	PURPLE	1/2" SCH. 80	80'
5	8	ORANGE	1/2" SCH. 80	70'
6	9 & 10	PINK & BLUE	1/2" SCH. 80	70'

PRESSURE MANIFOLD (REPAIR LINES) TAP CHART				
MANIFOLD TAP	LINES	FLAG COLOR	HOLE SIZES	LENGTH
1	1	WHITE	1/2" SCH. 80	90'
2	2	ORANGE	3/4" SCH. 80	155'
3	3	PINK	1/2" SCH. 40	130'

- NOTES:**
1. LOCATE CENTERLINE OF BALL VALVE 4" FROM MANIFOLD.
 2. MANIFOLD DISCHARGE PIPES SHALL EXTEND 2" FROM EDGE OF BOX INTO 3" PVC GRAVITY PIPE.
 3. FIELD PRESSURE SHALL BE SET TO TWO FEET OF HEAD.
 4. PRESSURE MANIFOLD SHALL BE CONCRETE OR BY EZ SET, PRESSBOX, OR AN APPROVED EQUAL.
 5. PLACE MANIFOLD IN CENTER OF BOX.
 6. ALL FEEDER LINES TO BE INSTALLED ON AT LEAST 1% POSITIVE GRADE.



1 D-102 NTS PRESSURE MANIFOLD



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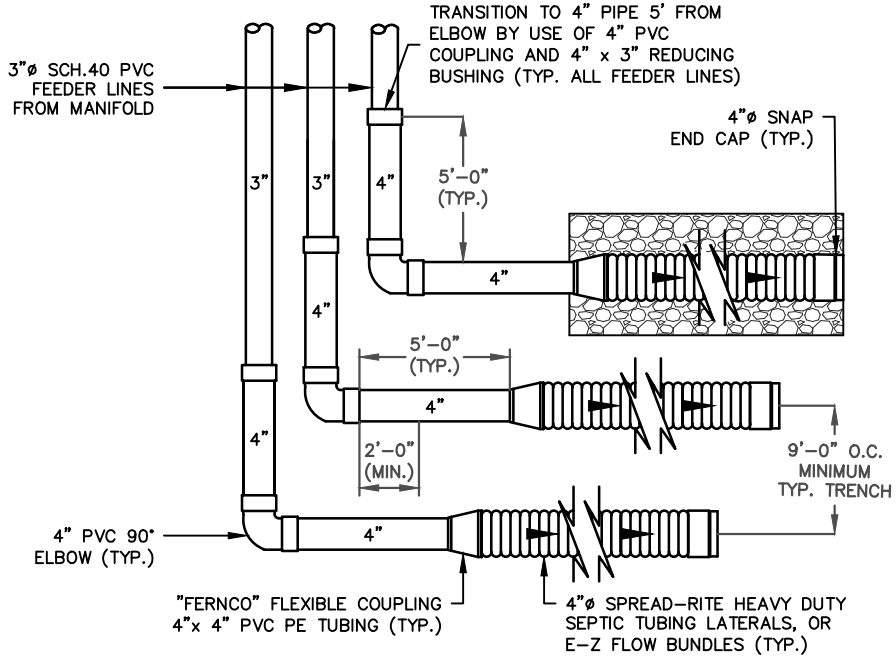
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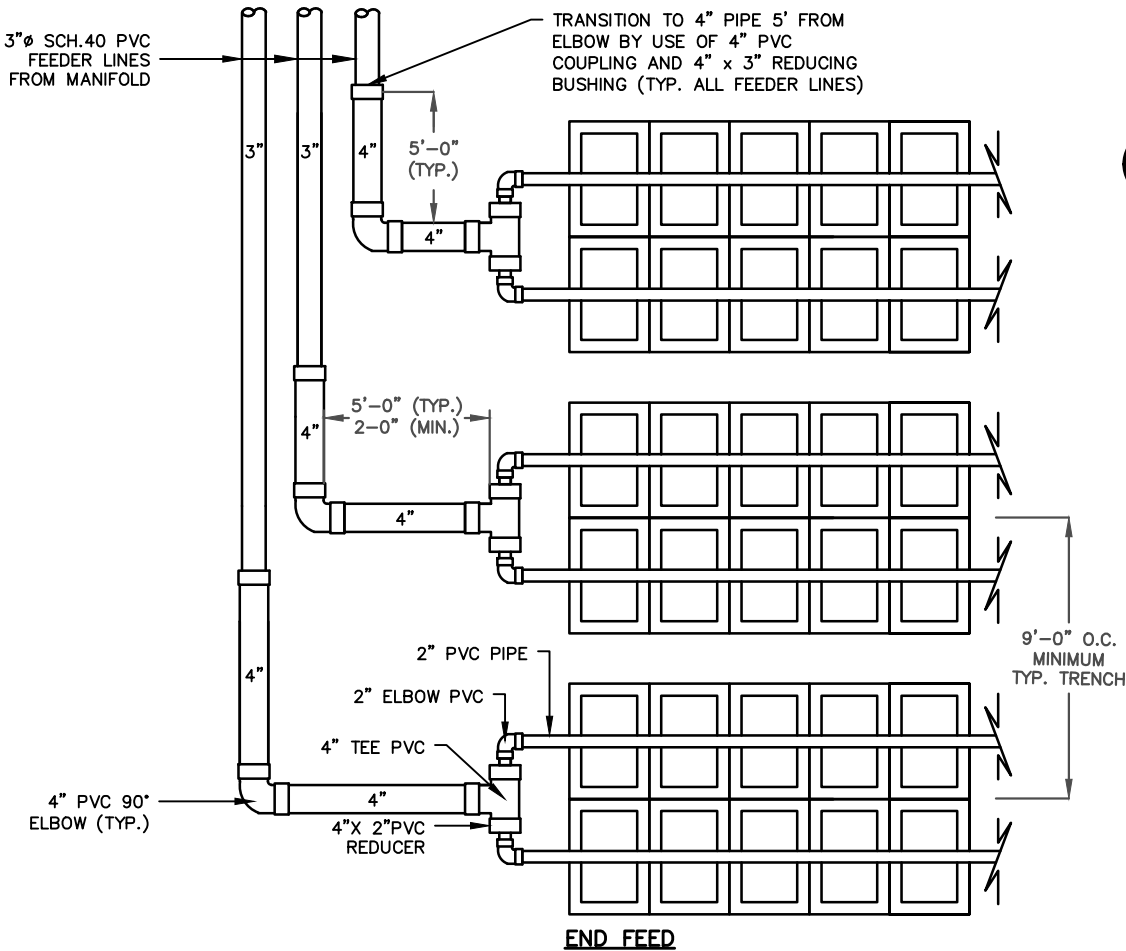
DETAILS - 2 OF 5

D-102

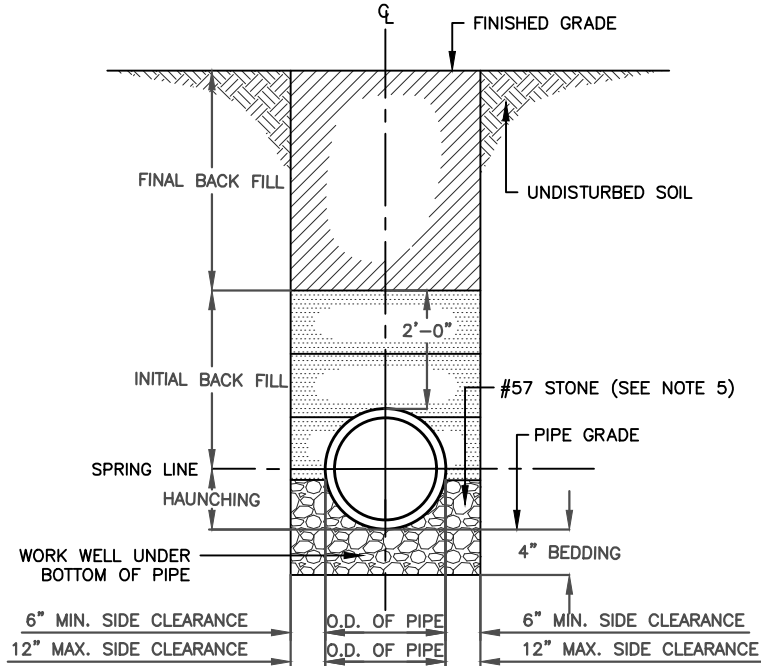
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1
D-103
NTS
END FEED
LATERAL PLAN VIEW (INITIAL SYSTEM)

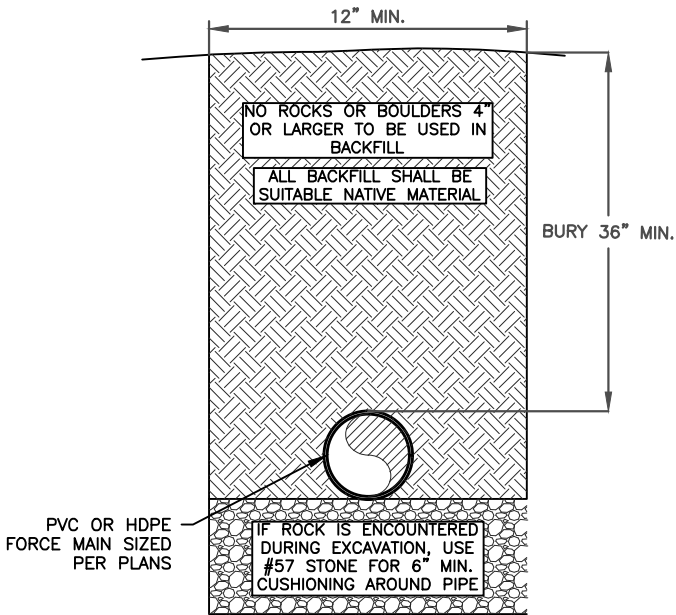


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D-103
NTS
END FEED
LATERAL PLAN VIEW (REPAIR SYSTEM)

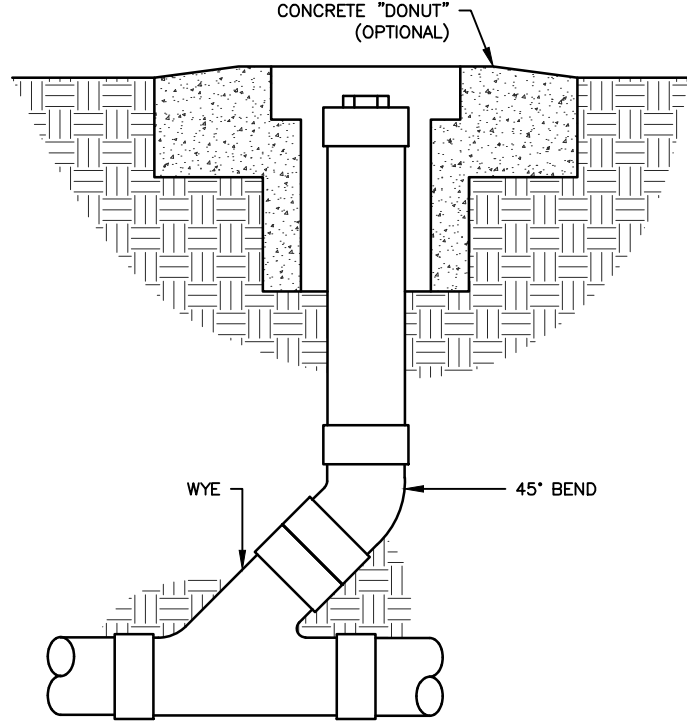


- NOTES:
- FOR TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND THE BRACING.
 - NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
 - ALL BACK FILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
 - BACK FILL SHALL BE TAMPED IN 6" LAYERS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.
 - STONE BEDDING TO BE USED IF ROCK IS ENCOUNTERED.

2
D-103
NTS
GRAVITY SEWER INSTALLATION DETAIL

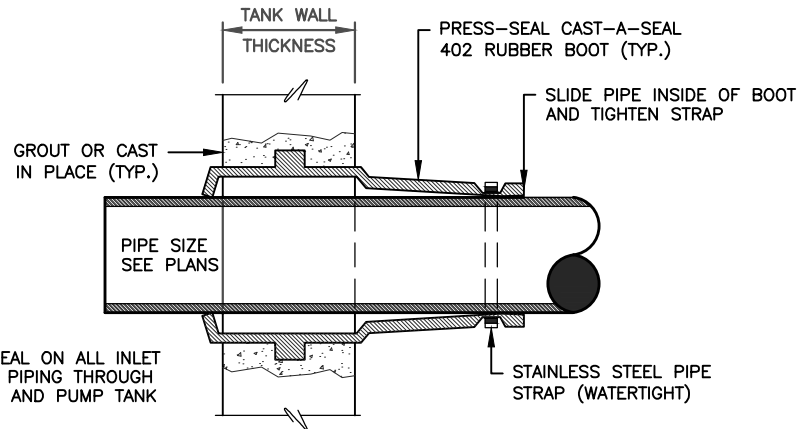


5
D-103
NTS
FORCE MAIN PIPE LAYING TRENCH



- NOTES:
- PIPING TO BE SCH. 40 PVC.
 - SEE SITE PLAN FOR PIPE SIZE.

3
D-103
NTS
GRAVITY CLEANOUT



- NOTE:
- USE BOOT SEAL ON ALL INLET AND OUTLET PIPING THROUGH SEPTIC TANK AND PUMP TANK WALLS.

6
D-103
NTS
PIPE THRU TANK PENETRATIONS

DETAILS - 3 OF 5		D-103	
CHRISTINE & JOSHUA HAYMOND (RUFFY HOMES) 6004 CANADERO DRIVE PRESSURE MANIFOLD SYSTEM EOP WAKE COUNTY, NC			
BY:	ACM, CAC	JOB #:	A35907.00
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MACCONNELL AND ASSOCIATES, P.C.
CHRISTINE & JOSHUA HAYMOND (RUFY HOMES)
PRESSURE MANIFOLD DESIGN - INITIAL

Name:Christine & Joshua Haymond (Rufly Homes)

Address:6004 Canadero Drive
Wake County, North Carolina

of BDR:5

Septic Tank:1500 gals

P.I.N. #:0777619747

Subdiv:Canadero

Daily Flow:600 gal/day

Pump Tank:1500 gals

D#:N/A

Lot#:2

L.T.A.R.:0.3 gal/day/sq.ft

Sq Foot:1560

Stone Depth:N/A

Number of Taps:2

Depth of Trenches:26 in

Manifold Diameter:4 inches

Supply Line length:252.4 ft

Length of Trenches:520 ft(See Tap Chart for Details)

Manifold Length:60 in

Tap Configuration: 6 in spacing 1 side(s) of manifold

Diameter(Supply Line): 2 in SCH40 PVC Pipe ID (Inch) 2.067

Friction Loss + Fitting Loss: 8.78 ft(supply line length + 70' for fittings in pump tank)

Design Head: 2 ft

Total Head: 27.2 ft

Elevation Head: 16.40 ft

Pump to Deliver: 37.8 gals/min at 27.2 ft head

Dosing Volume: 254 gals,

Pump Selection: Drawdown: 254 gals divided by 29.2 gals/in = 8.7 inches head

Pump Selection: As shown on the construction drawings.

TAP CHART

Pump Tank Elevation	404.6			Pump Elevation	398.9		Manifold Elevation	415.3		High Point In Foremain:	415.3
Line	Color	Rod Read	Relative Elevation	Length	Hole Size	Flow/tap	gal/day	Trench Area	LINE LTAR		
4	Blue		415.2	110	1/2in SCH 40	7.11	112.9	330	0.342		
5	Red		414.6	100	1/2in SCH 40	7.11	112.9	300	0.376		
6	Yellow		413.8	90	1/2in SCH 40	7.11	112.9	270	0.418		
7	Purple		413.1	80	1/2in SCH 80	5.48	87.1	240	0.363		
8	Orange		411.9	70	1/2in SCH 80	5.48	87.1	210	0.415		
9 & 10	Pink		410.5 & 409.4	70	1/2in SCH 80	5.48	87.1	210	0.415		
total feet =				520	gal/min =	37.8	LTAR =	0.300			
% of Dose Vol.				75%	Des. Flow	600	(ltar + 5%)	0.315			
Dose Volume				254	Pump Run =	15.89	(ltar W/ 25% reduction)	0.400			
Dose Pump Time				6.7	Tank Gal/IN	29.2	(ltar + 5%)	0.420			
Drawdown in Inches				8.7	Elev. Head	16.40					
Supply Line Length				252.4	Velocity f/s	3.61					

Hydraulic Profile

		Supply Line Velocity Check	ID (INCH)	gal/ft	Velocity Check (>2ft/s)
Manifold Elevation	415.3	1-1/4 in. SCH40 PVC Pipe	1.38	0.077654555	4.86
Pump Tank Elevation	404.6	1-1/2 in. SCH40 PVC Pipe	1.61	0.105696478	3.57
Pump Elevation	398.9	2 in. SCH40 PVC Pipe	2.067	0.174216673	2.17

1

D-104

PRESSURE MANIFOLD CALCULATIONS (INITIAL)

MACCONNELL AND ASSOCIATES, P.C.
CHRISTINE & JOSHUA HAYMOND (RUFY HOMES)
PRESSURE MANIFOLD DESIGN - REPAIR

Name:McKee Homes, Inc.

Address:6004 Canadero Drive
Wake County, North Carolina

of BDR:5

Septic Tank:1500 gals

P.I.N. #:0777619747

Subdiv:Canadero

Daily Flow:600 gal/day

Pump Tank:1500 gals

D#:N/A

Lot#:

L.T.A.R.:0.3 gal/day/sq.ft

Sq Foot:1125

Stone Depth:N/A

Number of Taps:3

Depth of Trenches:28 in

Manifold Diameter:4 inches

Supply Line length:300 ft

Length of Trenches:375 ft(See Tap Chart for Details)

Manifold Length:36 in

Tap Configuration: 6 in spacing 1 side(s) of manifold

Diameter(Supply Line): 2 in SCH40 PVC Pipe ID (Inch) 1.61

Friction Loss + Fitting Loss: 13.25 ft(supply line length + 70' for fittings in pump tank)

Design Head: 2 ft

Total Head: 33.6 ft

Elevation Head: 18.3 ft

Pump to Deliver: 22.7 gals/min at 33.6 ft head

Dosing Volume: 313 gals,

Pump Selection: Drawdown: 313 gals divided by 29.2 gals/in = 10.7 inches head

TAP CHART

Pump Tank Elevation	404.6			Pump Elevation	398.9		Manifold Elevation	417.2		High Point In Foremain:	417.2
Line	Color	Rod Read	Relative Elevation	Length	Hole Size	Flow/tap	gal/day	Trench Area	LINE LTAR		
1	White		417.2	90	1/2in SCH 80	5.48	144.9	270	0.537		
2	Orange		416.5	155	3/4in SCH 80	10.1	267.1	465	0.574		
3	Pink		414.9	130	1/2in SCH 40	7.11	188.0	390	0.482		
total feet =				375	gal/min =	22.7	LTAR =	0.300			
Number of Panels				87	Des. Flow	600	(ltar + 5%)	0.315			
Dose Volume per Panel				3.6	Pump Run =	26.44	(ltar W/ 50% reduction)	0.600			
Dose Volume				313	Tank Gal/IN	29.2	(ltar + 5%)	0.630			
Dose Pump Time				13.8	Elev. Head	18.30					
Drawdown in Inches				10.7	Velocity f/s	3.58					
Supply Line Length				300.0							

Hydraulic Profile

		Supply Line Velocity Check	ID (INCH)	gal/ft	Velocity Check (>2ft/s)
Manifold Elevation	417.2	1-1/4 in. SCH40 PVC Pipe	1.38	0.077654555	4.86
Pump Tank Elevation	404.6	1-1/2 in. SCH40 PVC Pipe	1.61	0.105696478	3.57
Pump Elevation	398.9	2 in. SCH40 PVC Pipe	2.067	0.174216673	2.17

2

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PRESSURE MANIFOLD CALCULATIONS (REPAIR)

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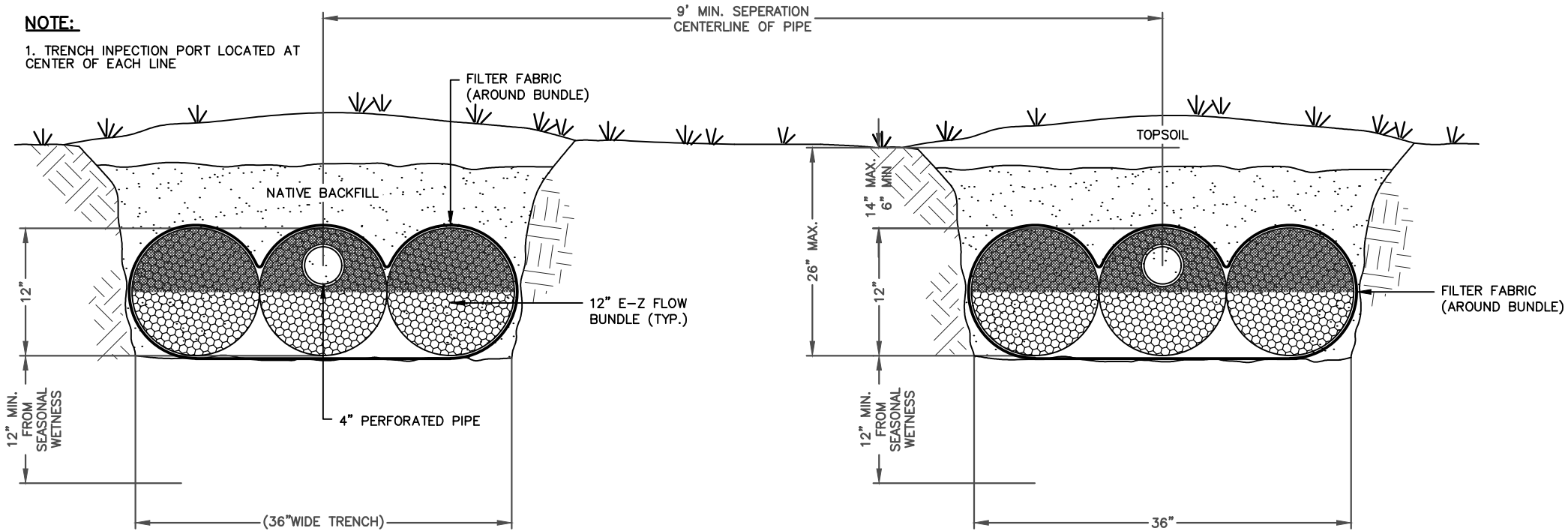
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DETAILS - 4 OF 5

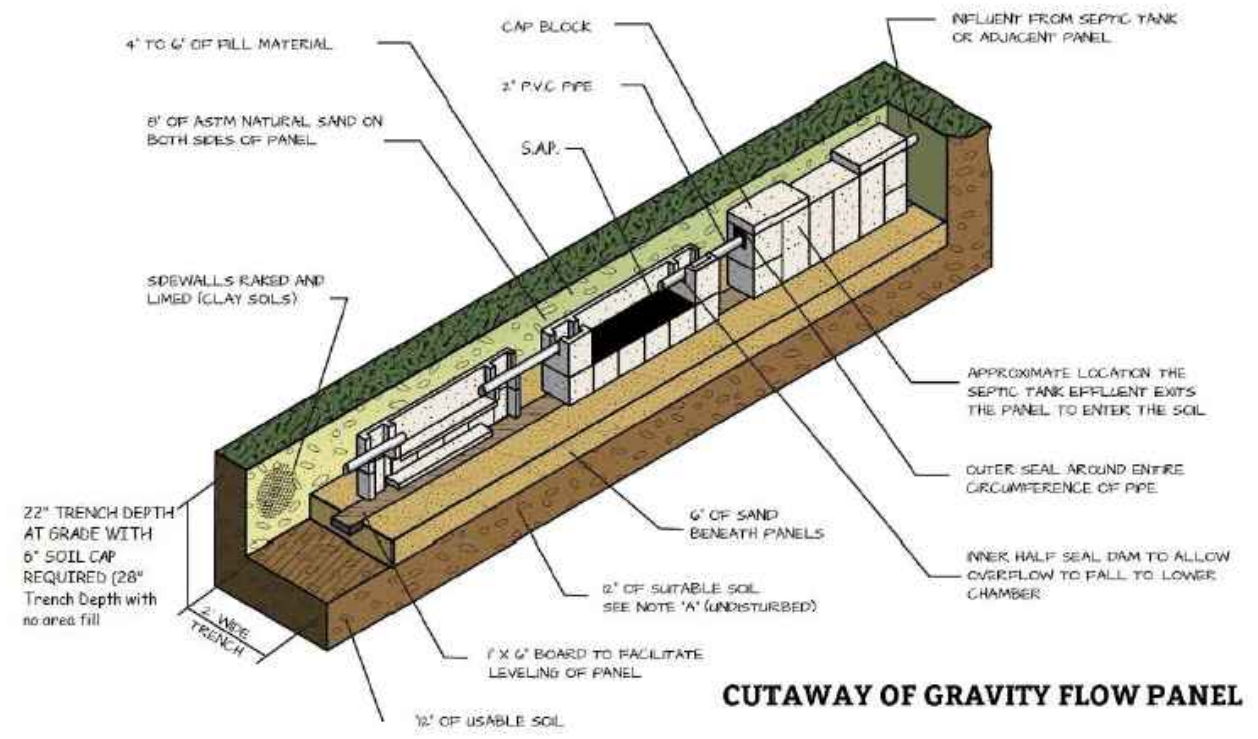
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1
D-105 INITIAL ONLY - EZ FLOW TYPICAL TRENCH DETAIL
NTS

Isometric Drawing of a Segment of
T & J Panel Vertical Installation



CUTAWAY OF GRAVITY FLOW PANEL

2
D-105 REPAIR ONLY - PREFABRICATED PERMEABLE BLOCK PANEL SYSTEM (BY T&J PANELS)
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JOB #: A35907.00
DATE: 06/03/2024

CHRISTINE & JOSHUA HAYMOND
(RUFFY HOMES)
6004 CANADERO DRIVE
PRESSURE MANIFOLD SYSTEM
EOP
WAKE COUNTY, NC

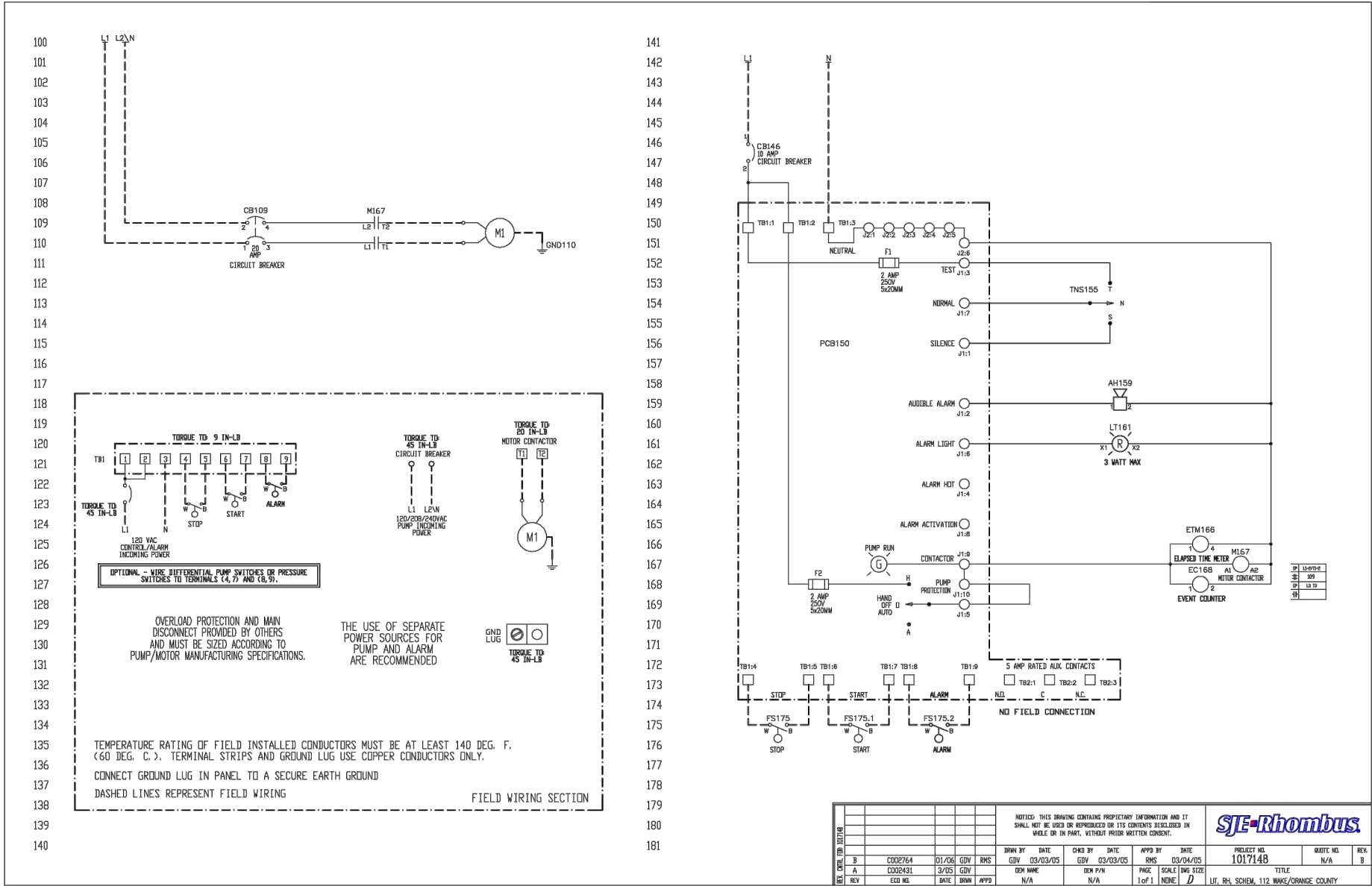
DETAILS - 5 OF 5
D-105

1

E-101

DEMAND DOSED SIMPLEX CONTROL PANEL

NTS



ELECTRICAL SPECIFICATIONS

- CONTROL PANEL(S) WILL BE APPROXIMATELY 12"X10"X6" AND A NEMA 4X, UL RATED ENCLOSURE. PANEL(S) WILL BE SUPPLIED BY SJE RHOMBUS MODEL 112 CONTROL PANEL 1121W124H8AC10E15A17J.
- PANEL(S) SHALL BE MOUNTED, BY THE ELECTRICIAN WITHIN 10' OF THE TANK UNITS AND 48" - 60" OFF THE FINISHED GRADE TO THE BOTTOM OF THE ENCLOSURE.
- THE ELECTRICIAN SHALL MAKE THE INTERNAL PANEL CONNECTIONS OF THE PUMP AND CONTROL CORDS. CONTROL PANELS WILL CONTAIN A WIRING SCHEMATIC IDENTIFYING ALL TERMINAL CONNECTIONS. THE SYSTEM INSTALLER WILL BUNDLE AND MARK EACH CORD WITH THE APPROPRIATE IDENTIFICATION AND SECURE IN THE ACCESS RISER AT THE PUMP POINT.
- THE SIMPLEX DEMAND DOSE CONTROL PANEL REQUIRES DEDICATED CIRCUITS OF 15 AMPS, 115 VOLTS, SINGLE PHASE SUPPLIED FOR THE PUMP.
- THE CONTROL PANEL REQUIRES A DEDICATED CIRCUIT OF 15 AMPS, 115 VOLTS SUPPLIED FOR THE ALARM/CONTROL SIDE OF THE PANEL.
- A MINIMUM CONDUIT SIZE OF 1½" SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICIAN AS A CONNECTION BETWEEN THE CONTROL PANEL AND THEIR RESPECTIVE TERMINATION POINTS OUT IN THE TREATMENT AREA.
- ALL OPEN CONDUIT ENDS SHALL HAVE REMOVABLE CLAY TYPE DUCT SEAL EMBEDDED TO PREVENT GASES AND MOISTURE FROM ENTERING THE CONTROL PANEL. DO NOT USE PERMANENT SILICONE OR EXPANDABLE FOAM PRODUCTS.
- ALL PUMP AND FLOAT CONTROL CORDS WILL BE SUPPLIED WITH EITHER 30' OR 50' LEADS. THIS WILL HELP KEEP SPLICES TO A MINIMUM AND SHOULD BE AVOIDED IF AT ALL POSSIBLE. IF A SPLICE MUST BE USED, IT MUST BE MADE ABOVE GRADE IN A PLASTIC NEMA 4X JUNCTION BOX.
- ALARMS SHALL BE AUDIBLE AND VISUAL.
- AUDIBLE/VISIBLE ALARMS SHALL BE EXTERNAL TO ANY STRUCTURE.
- PROVIDE DISCONNECT PER N.E.C.
- ALL ELECTRICAL INSTALLATION SHALL BE PER N.E.C.
- PROVIDE MANUAL TRANSFER SWITCH AND PLUG FOR PORTABLE EMERGENCY GENERATOR. PROVIDE DISCONNECT PER N.E.C.

Redaction Log

Reason	Page (# of occurrences)	Description
no reason	1 (1)	---
	3 (1)	
	5 (1)	
	10 (1)	
	20 (1)	
	25 (1)	
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