

# Caruso Homes

## Engineered Option Permit Pressure Manifold System

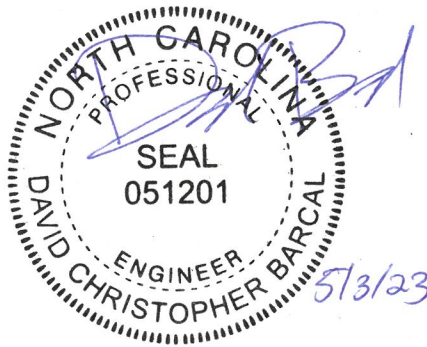
1425 Baptist Grove Rd  
Harnett County, North Carolina

### Application Package for Single Family Residence

Project No.: A73268.00

Submittal Date: May 03, 2023

Prepared By: EFE      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

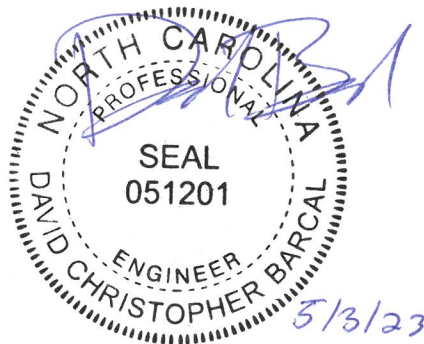
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**Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina**

**Engineered Option Permit  
Pressure Manifold System**

**Application Form and Supporting Documents**



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Cary, North Carolina 27513**

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NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

ROY COOPER • Governor
KODY H. KINSLEY • Secretary
HELEN WOLSTENHOLME • Interim Deputy Secretary for Health
MARK T. BENTON • Assistant Secretary for Public Health
Division of Public Health

COMMON FORM FOR ENGINEERED OPTION PERMIT

See Instructions for Use in Appendix A

Except for "Date received", this Section to be completed by the Professional Engineer licensed in accordance with G.S. 89C

LHD USE ONLY: Initial submittal of this NOI received: \_\_\_\_\_ by \_\_\_\_\_
Date Initials

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

[X] Single System or [ ] Multiple Systems

AND

[X] 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.): Caruso Homes, Inc.

Authorized Signatory: James Rumley

Mailing address: 110 Horizon Drive, Suite 320 City: Raleigh State: NC Zip: 27615

Telephone number: 240-886-3229 E-mail Address: jrummy@carusohomes.com

2. Professional Engineer (PE) name: David Barcal, PE 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: 27588

Telephone number: 919-569-6407 E-mail Address: \_\_\_\_\_

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:

[X] PE [X] LSS [ ] LG [X] On-site Wastewater Contractor

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


LOCATION: 5605 Six Forks Road, 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

- 7. Property location (physical address, tax parcel identification number or subdivision lot, block number of the property to be permitted): 1425 Baptist Grove Rd  
County Name: Harnett
- 8. Type of facility:  Place of residence No. Bedrooms: 4 No. Occupants: 8  
 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(b) Pressure Mainfold With (EZ-Flow)
- 11. Design wastewater flow: 480 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 18A .1950:  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, PE hereby attest that the information required to be included with this Notice of Intent to Construct is accurate and complete to the best of my knowledge and that the proposed system shall meet applicable federal, state, and local laws, regulations, rules, and ordinances in accordance with G.S. 130A-336-.1(e)


  
 \_\_\_\_\_ 5-03-2023 \_\_\_\_\_  
 Signature of Licensed Professional Engineer Date

***This section is for Owner use to either designate PE as their legal representative or to self-submit the NOI.***

***Designation of Registered Professional Engineer as legal representative of Owner for this Notice of Intent:***

I, James Rumley hereby designate David Barcal, PE  
*Print Name of Owner* *Print Name of Registered Professional Engineer*

as my legal representative for purposes of this Notice of Intent pursuant to G.S. 130A-336.1.

James Rumley authorized signor 5-3-23  
*Signature of Owner* *Date*

***Owner self-submittal of NOI:***

I, \_\_\_\_\_ hereby submit this NOI prepared by \_\_\_\_\_  
*Print Name of Owner* *Print Name of Licensed PE*

pursuant to G.S. 130A-336.1.

\_\_\_\_\_  
*Signature of Owner* *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)]*

***RIGHT OF ENTRY:*** *The submittal of this Notice of Intent to Construct grants right of entry to the Local Health Department and the State to the referenced property.*

***ISSUANCE OF BUILDING PERMIT:*** *Once the LHD deems that the Notice of Intent to Construct is complete via signature in the section below, the owner may apply to the local permitting agency for a permit for electrical, plumbing, heating, air conditioning or other construction, location, or relocation activity under any provision of general or special law pursuant to G.S. 130A-338.*

***This section for Local Health Department use only.***

**PART 2: LHD Completeness Review of the Notice of Intent to Construct**

*“(c) Completeness Review for Notice of Intent to Construct. – The local health department shall determine whether a notice of intent to construct, as required pursuant subsection (b) of this section, is complete within 15 business days after the local health department receives the notice of intent to construct. A determination of completeness means that the notice of intent to construct includes all of the required components. If the local health department determines that the notice of intent to construct is incomplete, the department shall notify the owner or the professional engineer of the components needed to complete the notice. The owner or professional engineer may submit additional information to the department to cure the deficiencies in the notice. The local health department shall make a final determination as to whether the notice of intent to construct is complete within 10 business days after the department receives the additional information from the owner or professional engineer. If the department fails to act within any time period set out in this subsection, the owner or professional engineer may treat the failure to act as a determination of completeness.”*

The review for completeness of this Notice of Intent was conducted in accordance with G.S. 130A-336.1(c). This NOI is determined to be:

INCOMPLETE (If box is checked, Information in this section is required.)

Based upon review of information submitted in Part 1, the following items are missing: \_\_\_\_\_

Copies of this form listing missing items were sent to the design PE and the Owner on \_\_\_\_\_  
*Date*

via \_\_\_\_\_ with directions to re-submit missing items using Page 5 of this form.  
*Email, FAX, USPS, hand-delivered*

\_\_\_\_\_  
*Print Name of Authorized Agent of the LHD*      *Signature of Authorized Agent of the LHD*      *Date*

COMPLETE (If box is checked, information in this section is required.)

Based upon review of information submitted in Part 1 of this form, this NOI is deemed COMPLETE.

Copies of this signed form were sent to the design PE and the Owner on \_\_\_\_\_ via \_\_\_\_\_.  
*Date*      *Email, FAX, USPS, hand-delivered*

A copy of this NOI and tracking information was sent to the State on \_\_\_\_\_ via \_\_\_\_\_.  
*Date*      *Email, FAX, USPS, hand-delivered*

\_\_\_\_\_  
*Print Name of Authorized Agent of the LHD*      *Signature of Authorized Agent of the LHD*      *Date*





**PART 3: Authorization to Operate (ATO)**

*Except for date received, the Section below is to be completed by the Owner or the PE.*

<p>LHD USE ONLY: Initial submittal of request for ATO received: _____ by _____  <small style="margin-left: 150px;">Date</small> <small style="margin-left: 150px;">Initials</small></p> <p>Date of Post-construction Conference: _____</p> <p>Post-construction Conference waived in accordance with G.S. 130A-336.1(j): _____</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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

- |                                                                                                                                     |                              |                             |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------|
| 1. Signed and sealed copy of the Engineer’s report that includes the information in G.S. 130A-336.1(k)(1) and 15A NCAC 18A .1971(f) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Operation and management program and ORC contract, if applicable                                                                 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. Fee (as applicable)                                                                                                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Notarized letter documenting Owner’s acceptance of the system from the PE                                                        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Owner meets requirements of ownership or control of the system per 15A NCAC 18A .1938(j)                                         | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. Easement, right of way, or encroachment agreement required per 15A NCAC 18A .1938(j)                                             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 7. Multi-party agreements required, as applicable, pursuant to 15A NCAC 18A .1937(h)                                                | <input type="checkbox"/> Yes | <input type="checkbox"/> 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 to the  
*Print name of Owner or Professional Engineer*  
\_\_\_\_\_ County LHD and the system shall meet 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*

*This section for LHD Use Only.*

**LHD Review of required information for the ATO**

INCOMPLETE  
Based upon review of information submitted in the Section above, the following items are missing from the information required for an Authorization to Operate for an EOP: \_\_\_\_\_

Copies of this signed form were sent to the design PE and the Owner on \_\_\_\_\_ via \_\_\_\_\_  
Date Email, FAX, USPS, Hand-delivered

\_\_\_\_\_  
*Print name of authorized Agent of the LHD* \_\_\_\_\_ \_\_\_\_\_  
*Signature of authorized Agent of the LHD* Date

COMPLETE  
Based upon review of information submitted in the Section above, this Authorization to Operate is hereby issued in accordance with G.S. 130A-336.1(m).

A copy of this complete NOI/ATO with tracking information was sent to the State on \_\_\_\_\_ via \_\_\_\_\_  
Date Email, FAX, USPS, Hand-delivered

\_\_\_\_\_  
*Print name of authorized Agent of the LHD* \_\_\_\_\_ \_\_\_\_\_  
*Signature of authorized Agent of the LHD* Date

**ISSUANCE OF CERTIFICATE OF OCCUPANCY:** Once the LHD determines completeness based upon the ATO submission, the owner may apply to the local permitting agency for permanent electrical service to a residence, place of business or place of public assembly pursuant to G.S. 130A-339.



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

11/29/2022

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).

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

**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 INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> <b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			Q97-0842712	11/04/2022	11/04/2023	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 GENERAL AGGREGATE \$ 4,000,000 PRODUCTS - COMP/OP AGG \$ 4,000,000 \$
A	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			Q97-0842712	11/04/2022	11/04/2023	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input checked="" type="checkbox"/> <b>UMBRELLA LIAB</b> <input type="checkbox"/> OCCUR <input checked="" type="checkbox"/> <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$			Q31-1070288	07/10/2022	07/10/2023	EACH OCCURRENCE \$ 2,000,000 AGGREGATE \$ 2,000,000 \$
A	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	Q91-1000820	07/10/2022	07/10/2023	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> 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	09/17/2022	09/17/2023	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)

1/23/2023

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 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).

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

**COVERAGES**

CERTIFICATE NUMBER: 23-24

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	
	<b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:						EACH OCCURRENCE	\$
							DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
							MED EXP (Any one person)	\$
							PERSONAL & ADV INJURY	\$
							GENERAL AGGREGATE	\$
							PRODUCTS - COMP/OP AGG	\$
								\$
	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident)	\$
							BODILY INJURY (Per person)	\$
							BODILY INJURY (Per accident)	\$
							PROPERTY DAMAGE (Per accident)	\$
								\$
	<b>UMBRELLA LIAB</b> <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$						EACH OCCURRENCE	\$
							AGGREGATE	\$
								\$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> 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	<b>Errors and Omissions/ Professional Liability</b>			MEO112305	2/1/2023	2/1/2024	General Aggregate	\$3,000,000
							Each Occurrence	\$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\*

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

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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# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

6/20/2022

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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<b>PRODUCER</b> SIA Group, Inc. 827 Gum Branch Road Jacksonville NC 28540	<b>CONTACT NAME:</b> Certificate Administrator <b>PHONE (A/C. No. Ext):</b> 910-478-3373 <b>E-MAIL ADDRESS:</b> certs@siagroup.com		<b>FAX (A/C. No.):</b> 910-455-7481
	<b>INSURER(S) AFFORDING COVERAGE</b>		
<b>INSURED</b> David Brantley & Sons, Inc. 37 Pine Ridge Road Zebulon NC 27597	DAVIBRA-02	INSURER A : Owners Insurance Company	NAIC # 32700
		INSURER B : Auto-Owners Insurance Company	18988
		INSURER C : FFVA Mutual Insurance Co.	10385
		INSURER D :	
		INSURER E :	
		INSURER F :	

**COVERAGES**

CERTIFICATE NUMBER: 1444136286

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	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> Contractual liab GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			35506165	7/2/2022	7/2/2023	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	<b>AUTOMOBILE LIABILITY</b> <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			53-914661-00	7/2/2022	7/2/2023	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
B	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input checked="" type="checkbox"/> RETENTION \$ 0			53-914661-01	7/2/2022	7/2/2023	EACH OCCURRENCE \$ 3,000,000 AGGREGATE \$ 3,000,000 \$
C	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A	WC850-0050098-2022A	7/2/2022	7/2/2023	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 500,000 E.L. DISEASE - EA EMPLOYEE \$ 500,000 E.L. DISEASE - POLICY LIMIT \$ 500,000
A	Contractors Equipment			35506165	7/2/2022	7/2/2023	Leased/Rented \$50,000

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  
 Carry 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

© 1988-2015 ACORD CORPORATION. All rights reserved.

P.O. Box 129  
Morrisville, NC 27560  
Phone: 919-467-1239



501 Cascade Pointe Lane  
Suite 103  
Cary, NC 27513  
Fax: 919-319-6510

**MACCONNELL  
& ASSOCIATES, P.C**

May 2, 2023

Re: Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina  
MacConnell & Associates Project Number: A73268.00

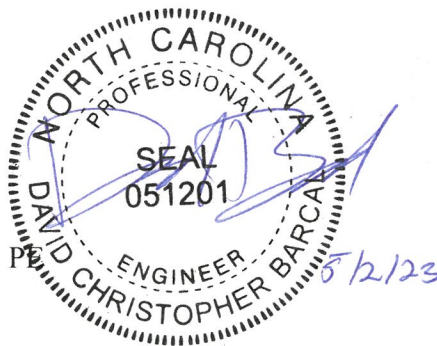
To Whom it May Concern:

This letter accompanies the EOP septic Application for 1425 Baptist Grove Rd in Harnett County, North Carolina. To satisfy requirement 12 of the application pertaining to regulation G.S. 130A 334(7a), a plat was submitted with all application documentation. Although the submitted plat does not provide all items per regulation G.S. 130A 334(7a), in my professional opinion, it does satisfy the intent of said regulation because it is being submitted concurrently with a site plan based on information provided by the plat surveyor which includes the proposed wastewater system, water supply (when applicable), and related appurtenances.

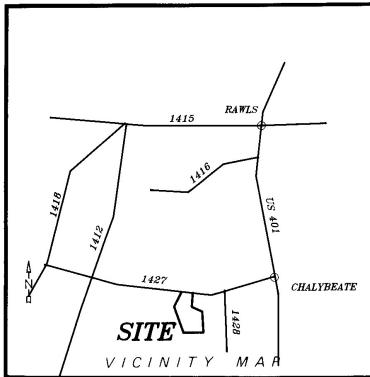
Thank you for your consideration for this EOP septic Application. If you have any questions or require additional information, please contact me at (919) 467-1239.

Sincerely,

David C. Barcal, PE  
Project Manager



P. # F. Slide 778C



- LEGEND**
- Lines Surveyed
  - - - Lines Not Surveyed
  - EIP/ES Existing Iron Pipe or Stake Control Corner
  - ECM Existing Concrete Monument
  - IS Non Stake set
  - PKN P K Nail
  - DMD Double Meridian Distance
  - R/W Right of Way
  - DB Dead Book
  - CM Concrete Monument
  - ELS Existing Lightwood Stake

NORTH CAROLINA  
HARNETT COUNTY

I, Thomas Lester Stancil, certify that this plat was drawn under my supervision from an actual survey made under my supervision (deed description recorded in Book 338, page 18, etc.) (other), that the ratio of precision as calculated by latitude and departures is 1/10,000, that the boundaries not surveyed are shown as broken lines plotted from information found in Book     , page     , that this plat was prepared in accordance with G. S. 42-30 as amended. Witness my original signature, registration number and seal this 5th day of December, A.D. 19 95.

*Thomas Lester Stancil*  
Surveyor  
L - 1512  
Registration Number

I HEREBY CERTIFY THAT THIS IS A SURVEY OF AN EXISTING PARCEL OF LAND.  
NORTH CAROLINA  
JOHNSTON COUNTY

THOMAS LESTER STANCIL, P.A.  
I, a Notary Public of the County and State aforesaid, certify that Thomas Lester Stancil, a registered land surveyor, personally appeared before me this day and acknowledged the execution of the foregoing instrument. Witness my hand and official stamp or seal, this 5th day of December, 19 95.

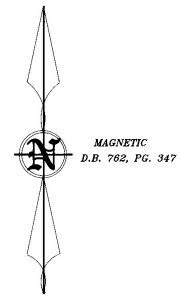
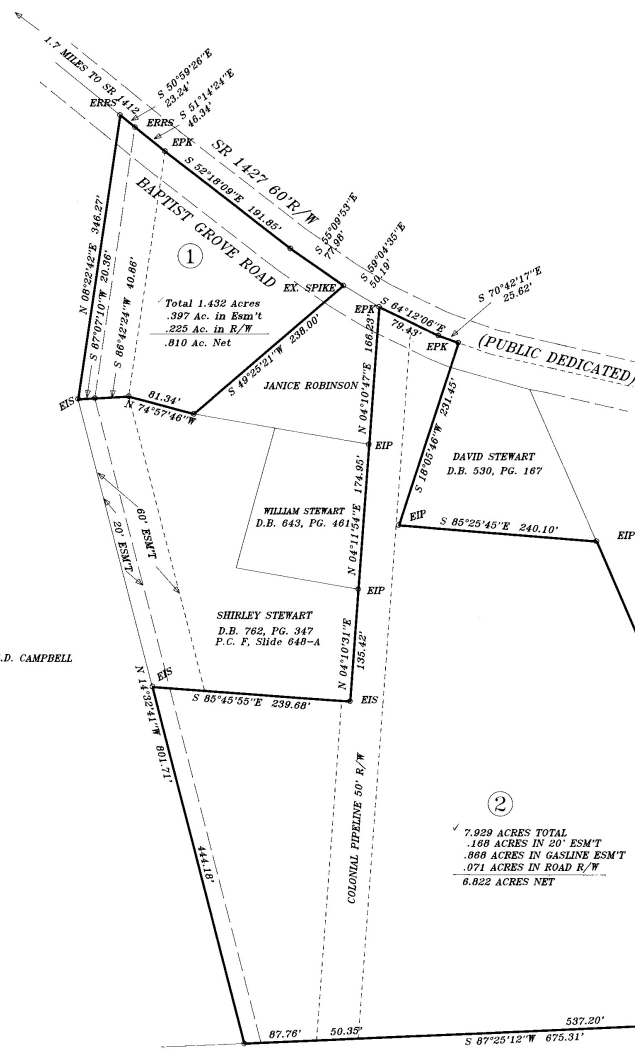
*Nancy S. Stancil*  
Notary Public  
Commission expires 7-4-99

NORTH CAROLINA  
HARNETT COUNTY

The foregoing certificate of NANCY S. STANCIL, Notary Public, of Johnston Co., is certified to be correct. This instrument was prepared for registration and recorded on the 5th day of December, 19 95 at 2:45 p.m.

*Styfle P. Holder* By *Judi C. Smith*  
Register of Deeds Deputy Reg. of Deeds

Recorded in Harnett County Plat Cabinet F, Slide 778C



N/F G.D. CAMPBELL

N/F T.L. CAVINESS

N/F DONALD W. BETTS

REFERENCE  
D.B. 338, PG.118

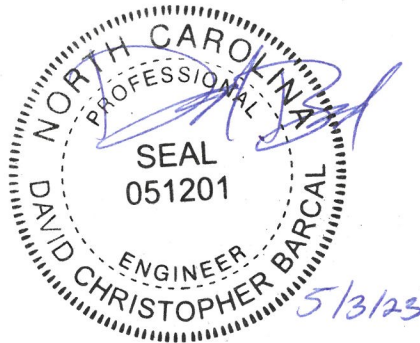
REVISIONS	PROPERTY OF		<b>STANCIL &amp; ASSOCIATES,</b> Registered Land Surveyor, P.A. P. O. Box 730, Angler, N.C. 27501 919-639-2133	
	<b>BESSIE ROBINSON ESTATE</b> RT. 2 BOX 232, FUQUAY VARINA N.C. 27526			
TOWNSHIP: HECTORS'S CREEK	COUNTY: HARNETT	DATE: 12-05-95	SURVEYED BY: CS	FIELD BOOK
STATE: NORTH CAROLINA		SCALE: 1"=100'	DRAWN BY: JRR	30-N
ZONE: RA-30	TAX MAP: 08-0643-0030	CHECKED & CLOSURE BY:		DRAWING NO.
				LHHC-664

778C Slide 778C

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett 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

Owners/Builders	Caruso Homes
Property Address	1425 Baptist Grove Rd
Facility Bedrooms	4
Flow Reduction	0%
Design Flow (GPD)	480

Caruso Homes is developing the property located at 1425 Baptist Grove Rd. in Harnett County, North Carolina. The developers propose to construct a four-bedroom single-family home plus workshop and are seeking an Engineered Option Permit for the onsite wastewater system. MacConnell & Associates, P.C. has been contracted by Caruso 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 1,000-gallon septic tank, one 1,000-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 18A .1900 rules amended January 1, 1999. The proposed system will meet all the requirements and specifications outlined in the On-Site Water Protection Branch's Accepted Wastewater System Approval Nos. AWWWS 2005-01-R4 and AWWWS-2005-02-R6.



## Proposed System Design

Design daily flows and calculations:

Unadjusted Daily Design Flow:	4 Bedrooms * 120 GPD/bedroom = <u>480 GPD</u>
System Type:	Septic Tank, Pump Tank, Pressure Manifold, and EZ Flow Drain Lines.
Septic Tank Volume:	1,000 Gallons
Pump Tank Volume:	1,000 Gallons
Pump Rate:	25.2 GPM at 25.1 Feet Head
Pump Model:	Zoeller Dose-Mate Series, Model 152, 4/10 HP
Pump Dose Volume:	212 Gallons
Dose Type:	Demand Dosed ± 2 Times per Day
Drain Lines:	see calculations.
Trench Type:	EZ Flow 1203 H type drainpipe
LTAR:	0.3 GPD/SF
Area Required:	<u>480 GPD</u> / 0.3 GPD/SF = 1,600 SF
Linear Feet:	1,600 SF / 4 SF/LF = 400 LF

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

## Septic Tank

The proposed wastewater treatment system will provide both treatment and solids removal in a new 1,000-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 1,000-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**

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.

## **Project Contacts**

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

### Owner/Builder:

Caruso Homes  
Mr. James Rumley  
110 Horizon Drive, Suite 320  
Raleigh, NC 27615  
Email: jrumley@carusohomes.com  
Phone: (240) 886-3229

### Soil Scientist:

Mr. Jason Hall, LSS  
Central Carolina Soil Consulting, PLLC  
1900 South Main Street, Suite 110  
Wake Forest, NC 27588  
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

### Installer:

Mr. Cory Brantley  
David Brantley & Sons  
37 Pine Ridge Road  
Zebulon, NC 27597  
Phone: (252) 478-3721

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett 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**

Matthew S. Willis Register of Deeds  
Harnett County, NC  
Electronically Recorded

02/21/2023 03:18:13 PM

NC Rev Stamp: \$320.00

Book: 4183 Page: 288 - 289 (2) Fee: \$26.00

Instrument Number: 2023002586

HARNETT COUNTY TAX ID #  
080643 0030 01

02-21-2023 BY: AG

## NORTH CAROLINA GENERAL WARRANTY DEED

Excise Tax: \$320.00

Parcel Identifier No. 080643 0030 01 Verified by \_\_\_\_\_ County on the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_  
By: \_\_\_\_\_

Mail/Box to: Grantee

This instrument was prepared by: Gwynn, Edwards & Getter, PA

Brief description for the Index: Tract 2, Baptist Grove Rd.

THIS DEED made this 21 day of Feb, 2023 by and between

GRANTOR

**Emanuel L. Prince, unmarried  
And  
Mariel Frankia Prince, unmarried**

**400 Bass Lake Road  
Holly Springs, NC 27540**

GRANTEE

**CHRISTY LANE ALARCON ROLFSON  
and spouse,  
KRIS KENRIC ROLFSON**

**mailing address:  
123 Wise Oak Lane  
Garner, NC 27529**

Enter in the appropriate block for each party: name, address, and, if appropriate, character of entity, e.g. corporation or partnership.

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, and 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 the City of Fuquay Varina, \_\_\_\_\_ Township, Harnett County,

North Carolina and more particularly described as follows:

**BEING ALL OF TRACT 2, CONTAINING 7.929 ACRES TOTAL ENTITLED "PROPERTY OF BESSIE ROBINSON ESTATE", AS SHOWN ON MAP PREPARED BY STANCIL & ASSOCIATES, RLS, PA, DATED DECEMBER 5, 1995 AND RECORDED IN PLAT CABINET F, SLIDE 778-C, OF THE HARNETT COUNTY REGISTRY, REFERENCE TO WHICH IS HEREBY MADE FOR GREATER CERTAINTY OF DESCRIPTION.**

**LESS AND EXCEPT THAT 1.014 ACRES AS SHOWN ON MAP OF SURVEY DATED SEPTEMBER 12, 1998, PREPARED FOR EMANUEL L. PRINCE BY LESTER STANCIL & ASSOCIATES, RLS P.A. AND RECORDED AS MAP NUMBER 98-442 OF THE HARNETT COUNTY REGISTRY, REFERENCE TO WHICH IS HEREBY MADE FOR GREATER CERTAINTY OF DESCRIPTION.**

**THE ABOVE DESCRIBED TRACT 2 IS SUBJECT TO A 20 FOOT INGRESS AND EGRESS EASEMENT AS SHOWN IN PLAT CABINET F, SLIDE 778-C AND SUBJECT TO A GAS LINE EASEMENT CONTAINING .868 ACRES AS SHOWN IN PLAT CABINET F, SLIDE 778-C, HARNETT COUNTY REGISTRY.**

**ALSO CONVEYED HERewith IS AN EASEMENT OF INGRESS AND EGRESS BEING 60 FOOT IN WIDTH AND RUNNING FROM THE ABOVE DESCRIBED TRACT TO NCSR 1427 (BAPTIST GROVE RD.) AS SHOWN IN PLAT CABINET F, SLIDE 778-C, HARNETT COUNTY REGISTRY.**

**PARCEL 080643 0030 01**

The property hereinabove described was acquired by Grantor by instrument recorded in Book 3771 Page 260  
All or a portion of the property herein conveyed \_\_\_\_\_ includes or  does not include the primary residence of a Grantor.

A map showing the above described property is recorded in Plat Book F Page 778-C

Submitted electronically by "Gwynn, Edwards & Getter, PA"  
in compliance with North Carolina statutes governing recordable documents  
and the terms of the submitter agreement with the Harnett County Register of Deeds.

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, other than the following exceptions:

- 1. Ad valorem taxes for the current year and subsequent years.
- 2. Easements, restrictions and other matters of record affecting title to the subject property.

IN WITNESS WHEREOF, the Grantor has duly executed the foregoing as of the day and year first above written.

\_\_\_\_\_  
 (Entity Name) Emanuel L. Prince (SEAL)  
 Emanuel L. Prince

By: \_\_\_\_\_ (SEAL)  
 Title: \_\_\_\_\_

By: \_\_\_\_\_ (SEAL)  
 Title: \_\_\_\_\_  
 Mariel Frankia Prince

By: \_\_\_\_\_ (SEAL)  
 Title: \_\_\_\_\_

**SEAL - STAMP**  
 Brooke Kilbourne  
 NOTARY PUBLIC  
 Wake County  
 North Carolina  
 My Commission Expires September 13, 2025

SEAL - STAMP State of NC - County of Wake  
 I, the undersigned Notary Public of the County and State aforesaid, certify that Emanuel L. Prince, unmarried and Mariel Frankia Prince, unmarried personally appeared before me this day and acknowledged the due execution of the foregoing instrument for the purposes therein expressed. Witness my hand and Notarial stamp this 26 day of Feb, 2023.  
 My Commission Expires: \_\_\_\_\_  
 \_\_\_\_\_  
 Notary Public

SEAL - STAMP State of \_\_\_\_\_ - County of \_\_\_\_\_  
 I, the undersigned Notary Public of the County and State aforesaid, certify that \_\_\_\_\_ personally came before me this day and acknowledged that he is the \_\_\_\_\_ of \_\_\_\_\_ a North Carolina or \_\_\_\_\_ corporation/limited liability company/general partnership, and that by authority duly given and as the act of each entity, he signed the foregoing instrument in its name on its behalf as its act and deed. Witness my hand and Notarial stamp this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.  
 My Commission Expires: \_\_\_\_\_  
 \_\_\_\_\_  
 Notary Public

SEAL - STAMP State of \_\_\_\_\_ - County of \_\_\_\_\_  
 I, the undersigned Notary Public of the County and State aforesaid, certify that \_\_\_\_\_ personally appeared before me this day and acknowledged the due execution of the foregoing instrument for the purposes therein expressed. Witness my hand and Notarial stamp this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.  
 My Commission Expires: \_\_\_\_\_  
 \_\_\_\_\_  
 Notary Public

The foregoing Certificate(s) of \_\_\_\_\_ is/are certified to be correct. This instrument and this certificate are duly registered at the date and time and in the Book and Page shown on the first page hereof.  
 \_\_\_\_\_ Register of Deeds for \_\_\_\_\_ County.  
 By: \_\_\_\_\_ Deputy/Assistant - Register of Deeds

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett 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

---

April 20, 2023

Project # 4426 - Lot 2

Caruso Homes  
Attention: James Rumley  
110 Horizon Drive, Suite 320  
Raleigh, NC 27615

RE: Preliminary soil/site evaluation for EOP at Baptist Grove Road Lot 2 Harnett, NC.

Dear Mr. Rumley:

Central Carolina Soil Consulting, PLLC conducted a preliminary soil evaluation on the referenced parcel for a subsurface wastewater system in January 2023 for lot recordation and again in April 2023 for additional soils work for an EOP submittal. The soil/site evaluation was performed using hand auger borings and during moist soil conditions based on the criteria found in the State Subsurface Rules, 15ANCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems" along with "Regulations Governing Sewage Treatment and Disposal Systems in Harnett County, Amended October 27, 2011".

The lot is proposed for a 4-bedroom house. A septic system field layout was completed based on the house location surveyed in the field. The proposed system is a Pressure Manifold Distribution using lines 7-10 totaling 420 feet of accepted product (EZ-Flow). The repair field is a Pressure Manifold Distribution using lines 1-6 totaling 440 feet of accepted product (EZ-Flow).

**Based on the findings during the field evaluation, the area on the attached map has at least 38 inches (initial) and 44 inches (repair) of provisionally suitable soils for an accepted status system. The assigned LTAR for the site is 0.30 gal/day/ft<sup>2</sup> with a maximum depth of 20 inches for the initial system installation of the drain lines due to slope correction. The assigned LTAR for the site is 0.30 gal/day/ft<sup>2</sup> with a maximum depth of 24 inches for the repair system installation of the drain lines due to slope correction.**



- Pressure Manifold Distribution Initial System, Accepted Product (420' for Initial)
- 20" maximum trench depth
- 0.30 LTAR
- 1000 gallon septic tank & 1000 gallon pump tank
- 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
- 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 sites. 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 anytime. Thank you allowing Central Carolina Soil Consulting to perform this site evaluation for you.

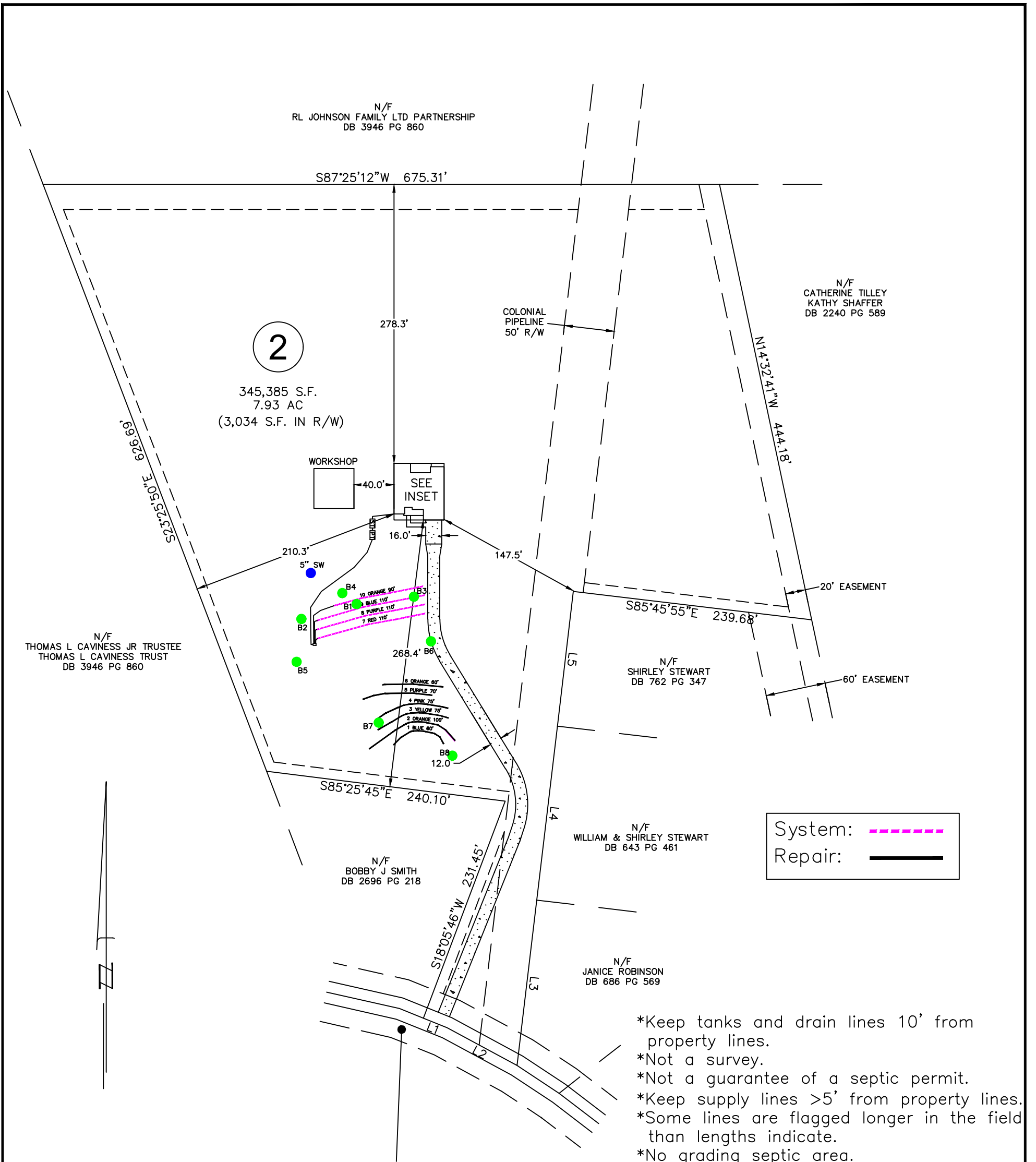
Sincerely,



Jason Hall

NC Licensed Soil Scientist #1248





## BAPTIST GROVE ROAD

GRAPHIC SCALE  
1" = 100'



System: Pressure Manifold Lines: 7-10, (420') Accepted Status System 0.30 Soil LTAR 20" Trench Bottom
Repair: Pressure Manifold Lines: 1-6, (440') Accepted Status System 0.30 Soil LTAR 24" Trench Bottom



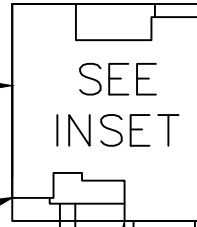
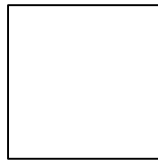
**Central Carolina Soil Consulting, PLLC**  
1900 South Main Street, Suite 110  
Wake Forest, North Carolina 27587  
Phone (919)569-6704 Fax (919)569-6703

4-Bedroom Septic Layout  
Lot 2, Baptist Grove Road  
Harnett County, North Carolina

Job# : 4426  
Drawn By : MS  
Date : 04/20/2023

- \*Keep tanks and drain lines 10' from property lines.
- \*Not a survey.
- \*Not a guarantee of a septic permit.
- \*Keep supply lines >5' from property lines.
- \*Some lines are flagged longer in the field than lengths indicate.
- \*No grading septic area.

WORKSHOP



MUST HAVE RISERS

16.0'

210.3'

5" SW

B2

B4

B1

B3

B5

268.4'

B6

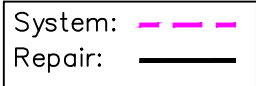
12.0'

B7

B8

S85°25'45"E 240.10'

- 10 ORANGE 90'
- 9 BLUE 110'
- 8 PURPLE 110'
- 7 RED 110'
- 6 ORANGE 60'
- 5 PURPLE 70'
- 4 PINK 75'
- 3 YELLOW 75'
- 2 ORANGE 100'
- 1 BLUE 60'



System: Pressure Manifold  
 Lines: 7-10, (420')  
 Accepted Status System  
 0.30 Soil LTAR  
 20" Trench Bottom

Repair: Pressure Manifold  
 Lines: 1-6, (440')  
 Accepted Status System  
 0.30 Soil LTAR  
 24" Trench Bottom

GRAPHIC SCALE  
 1" = 50'



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

4-Bedroom Septic Layout  
 Lot 2, Baptist Grove Road  
 Harnett County, North Carolina

Job# : 4426
Drawn By : MS
Date : 04/20/2023
Revision:

Sheet:  
 Property ID:  
 Lot #: 2  
 File #:  
 AppID:

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

Owner: CARUSO HOMES

Applicant:

Address: \_\_\_\_\_ Date Evaluated: 4/11/2023

Proposed Facility: 4-Bedroom Design Flow (.1949) 480 gal/day

Property Size:

Location of Site: Baptist Grove Road Property Recorded: Yes

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 12%	AE 0-6	GR SL	VFR NS NP SEXP	48				PS 0.30
		Bt 6-38	SBK C	FR SS SP SEXP					
		BC 38-48	W-SBK CL	FR SS SP SEXP					
2	LS 12%	Bt1 0-5	SBK CL	FR SS SP SEXP	38				PS 0.30
		Bt2 5-28	SBK C	FR SS SP SEXP					
		BC 28-38	W-SBK CL	FR SS SP SEXP					
		C 38+							
3	LS 10%	AE 0-5	GR SL	FR SS SP SEXP	48				PS 0.30
		Bt 5-28	SBK C	FR SS SP SEXP					
		BC 28-48	W-SBK CL	FR SS SP SEXP					
4	LS 12%	AE 0-10	GR SL	VFR NS NP SEXP	48				PS 0.30
		Bt 10-42	SBK C	FR SS SP SEXP					
		BC 37-48	W-SBK CL	FR SS SP SEXP					
5	LS 6%	AE 0-6	GR SL	VFR NS NP SEXP	48				PS 0.30
		Bt 6-37	SBK C	FR SS SP SEXP					
		BC 37-48	W-SBK CL	FR SS SP SEXP					

Description	Initial System	Repair System
Available Space (.1945)	Yes	Yes
System Type(s)	III B	III B
Site LTAR	0.30	0.30

Other Factors (.1946):  
 Soil Evaluation By:  
 Others Present:  
 Site Classification (.1948): Provisionally Suitable  
 Site Evaluation By: Michael Seewald  
 Others Present:



<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	II	SL-Sandy Loam	0.8 - 0.6	CR-Crumb
FS-Foot Slope		L-Loam		GR-Granular
NS-Nose Slope		SI-Silt		SBK-Subangular Blocky
HS-Head Slope	III	SICL-Silty Clay	0.6 - 0.3	ABK-Angular Blocky
CC-Concave Slope		Loam		PL-Platy
CV-Convex Slope		CL-Clay Loam		PR-Prismatic
T-Terrace		SCL-Sandy Clay		
FP-Flood Plain	IV	Loam	0.4 - 0.1	
		SC-Sandy Clay		
		SIC-Silty Clay		
		C-Clay		

**Consistence**

**Moist**

VFR-Very Friable  
 FR-Friable  
 FI-Firm  
 VFI-Very Firm  
 EFI-Extremely Firm

**Consistence**

**Wet**

NS-Non-Sticky  
 SS-Slightly Sticky  
 S-Sticky  
 VS-Very Sticky  
 NP-Non-Plastic  
 SP-Slightly Plastic  
 P-Plastic  
 VP-Very Plastic

**Mineralogy**

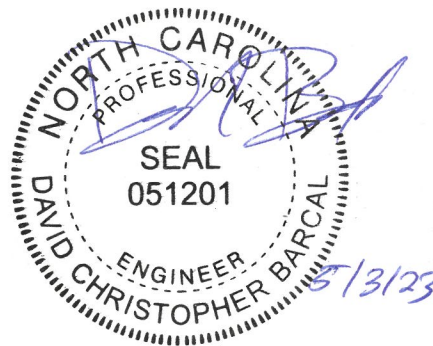
SEXP-Slightly Expansive  
 EXP-Expansive

**Sketch of Soil Evaluation Locations**

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina**

**Engineered Option Permit  
Pressure Manifold System**

**Project Specifications**



**MacConnell & Associates, P.C.  
501 Cascade Pointe Lane, Suite 103  
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Morrisville, North Carolina 27560**

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

# 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 18A .1952-.1954. The septic and field dosing tanks should be installed on a 12-inch minimum layer of No. 57 washed stone aggregate.
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  $2/3^{\text{rd}}$  to  $1/3^{\text{rd}}$ . 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.

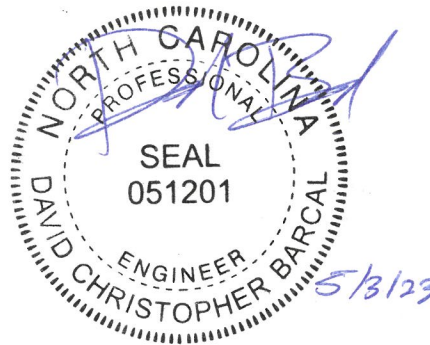
## **Drain Lines**

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.

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina**

**Engineered Option Permit  
Pressure Manifold System**

**Design Calculations**



**MacConnell & Associates, P.C.  
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Cary, North Carolina 27513**

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

## Septic Tank (1,000 ST-502)

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)	8.88	(feet)
Width of Tank (B)	4.29	(feet)
Height of Tank Excluding Lid (C) - This value includes the base thickness but excludes the lid thickness.	5.50	(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		
<b>Add Concrete Inside the Tank:</b>		
Initial Inside Height of Tank - This measurement is the value of C - E.	5.17	(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.		
<b>Increase Thickness of the Base:</b>		
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.		
<b>Create Lip:</b>		
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.	5.83	(feet)
Final Inside Height of Tank - This measurement is the value of C - E - U.	5.17	(feet)
Final Volume of Tank	164.17	(cf)
Final Volume of Tank	1228.11	(gallons)

<b>Unit Weights</b>		
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)

<b>Changes in Total Concrete Weight Due to Customizations</b>		
Weight of extra concrete inside tank used to create thicker base (Weight of extra concrete due to U)	0	(lb)
Weight of extra concrete on bottom of tank used to create thicker base (Weight of extra concrete due to F)	0	(lb)
Weight of extra concrete due to lip (Weight of extra concrete due to P)	0	(lb)
Weight of concrete removed due to lid hole	311	(lb)

<b>Soil and Concrete Weights</b>		
Weight of Soil on Lid	2271	(lb)
Weight of Soil on Lip	0	(lb)
Weight of Lid Alone	1574	(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.	8371	(lb)

<b>Water in Tank</b>		
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	(lb)

<b>Weight of System Components</b>		
Total Weight of Soil on Tank	2271	(lb)
Total Weight of Concrete	8371	(lb)
Total Weight (Tank, Water in Tank, and Soil)	10642	(lb)

<b>Sliding Resistance</b>		
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	16577	(lb)

<b>Uplift Force</b>		
Uplift Force	13856.31	(lb)
Safety Factor	1.50	
Uplift Force with Safety Factor	20784.46	(lb)

<b>Additional Ballast Required</b>		
Additional Ballast Required	NONE	(lb)

## Pump Tank (1,000 PT 237)

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)	7.79	(feet)
Width of Tank (B)	4.96	(feet)
Height of Tank Excluding Lid (C) - This value includes the base thickness but excludes the lid thickness.	4.50	(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		
<b>Add Concrete Inside the Tank:</b>		
Initial Inside Height of Tank - This measurement is the value of C - E.	4.17	(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.		
<b>Increase Thickness of the Base:</b>		
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.		
<b>Create Lip:</b>		
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.	4.83	(feet)
Final Inside Height of Tank - This measurement is the value of C - E - U.	4.17	(feet)
Final Volume of Tank	135.45	(cf)
Final Volume of Tank	1013.26	(gallons)

<b>Unit Weights</b>		
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)

<b>Changes in Total Concrete Weight Due to Customizations</b>		
Weight of extra concrete inside tank used to create thicker base (Weight of extra concrete due to U)	0	(lb)
Weight of extra concrete on bottom of tank used to create thicker base (Weight of extra concrete due to F)	0	(lb)
Weight of extra concrete due to lip (Weight of extra concrete due to P)	0	(lb)
Weight of concrete removed due to lid hole	311	(lb)

<b>Soil and Concrete Weights</b>		
Weight of Soil on Lid	2310	(lb)
Weight of Soil on Lip	0	(lb)
Weight of Lid Alone	1601	(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.	7361	(lb)

<b>Water in Tank</b>		
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	(lb)

<b>Weight of System Components</b>		
Total Weight of Soil on Tank	2310	(lb)
Total Weight of Concrete	7361	(lb)
Total Weight (Tank, Water in Tank, and Soil)	9671	(lb)

<b>Sliding Resistance</b>		
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	11971	(lb)

<b>Uplift Force</b>		
Uplift Force	11643.88	(lb)
Safety Factor	1.50	
Uplift Force with Safety Factor	17465.82	(lb)

<b>Additional Ballast Required</b>		
Additional Ballast Required	NONE	(lb)

MacConnell & Associates, P.C.

Project:	Caruso Homes
Project Number:	A73268.00
Facility Address	1425 Baptist Grove Rd
County:	Harnett County, North Carolina
Subject:	Tank Sizing Calculations
Date:	May 2, 2023

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:	4.0 Rooms	Given
Average Daily Flow per Bedroom:	120 GPD	
Unadjusted Design Flow:	480.0 GPD	
Flow Reduction:	0 %	15A NCAC 18A .1949
Adjusted Flow:	480.0 GPD	
<b>SEPTIC TANK SIZING</b>		
Minimum Septic Tank Volume Required:	1,000.0 Gallons	per 15A NCAC 18A .1952
Septic Tank Volume Provided:	1,000.0 Gallons	
<u>Septic Tank storage and effective volume calculations:</u>		
Septic Tank Total Void Volume = L * W * D:		
Tank length:	8.0 foot	
Tank Width:	3.8 foot	
Tank Depth:	5.2 foot	
Total Void Volume:	1,172.3 Gallons	
Septic Tank Effective Volume = L * W * Lowest Invert To Tank Bottom:		
Tank length:	8.0 foot	
Tank Width:	3.8 foot	
Lowest Invert:	4.5 foot	
Effective Volume:	1,021.0 Gallons	
Septic Tank Detention Time:	2.1 Days	Effective Volume / ADF
<b>FIELD DOSING TANK SIZING:</b>		
Minimum Field Dosing Tank Volume Required:	1,000.0 Gallons	per 15A NCAC 18A .1952
Field Dosing Tank Provided:	1,000.0 Gallons	
<u>Field Dosing Tank storage and effective volume calculations:</u>		
Field Dosing Tank Total Void Volume= L * W * D:		
Tank length:	7.3 foot	
Tank Width:	4.5 foot	
Tank Depth:	4.2 foot	
Total Void Volume:	1,013.2 Gallons	
Field Dosing Tank Effective Volume To Tank Bottom = L * W * Lowest Invert To Tank Bottom:		
Tank length:	7.3 foot	
Tank Width:	4.5 foot	
Lowest Invert To Tank Bottom:	3.4 foot	
Effective Volume:	830.8 Gallons	
Field Dosing Tank Effective Volume To Pump Off = L * W * Lowest Invert To Pump Off:		
Tank length:	7.3 foot	
Tank Width:	4.5 foot	
Lowest Invert To Pump Off:	1.9 foot	
Effective Volume:	466.1 Gallons	
Effective Volume Storage:	1.0 Days	
Total System Storage =	799.7 Gallons	
<b>Emergency Storage</b>		
Depth of Emergency Storage	17.0 Inches	
Gallons per Inch of Pump Tank	20.3 Gal/Inch	
Emergency Storage in Septic Tank	189.1 Gallons	
Total Emergency Storage	533.6 Gallons	

**MACCONNELL AND ASSOCIATES, P.C.  
CARUSO HOMES  
PRESSURE MANIFOLD DESIGN - INITIAL**

Name: Caruso Homes P.I.N. #: 0643-77-5737 D#: N/A  
 Address: 1425 Baptist Grove Rd Subdiv:  Lot#: 2  
Harnett County, North Carolina  
 # of BDR: 4 Daily Flow: 480 gal/day L.T.A.R.: 0.3 gal/day/sq.ft  
 Septic Tank: 1000 gals Pump Tank: 1000 gals Sq. Foot: 1260 Stone Depth: N/A

Number of Taps: <u>4</u>	Length of Trenches: <u>420</u> ft(See Tap Chart for Details)
Depth of Trenches: <u>20</u> in	Manifold Length: <u>42</u> in
Manifold Diameter: <u>4 inches</u>	Tap Configuration: 6 in spacing <u>1</u> side(s) of manifold
Supply Line length: <u>130</u> ft	Diameter(Supply Line): <u>1-1/2 in. SCH40 PVC Pipe</u> ID (Inch) <u>1.61</u>

Friction Loss + Fitting Loss: <u>8.69</u> ft(supply line length + 70' for fittings in pump tank)
Design Head: <u>2</u> ft Elevation Head: <u>14.40</u> ft
Total Head: <u>25.1</u> ft Pump to Deliver: <u>25.2</u> gals/min at <u>25.1</u> ft head

Dosing Volume: 212 gals,

Pump Selection: Drawdown: 212 gals divided by 20.3 gals/in = 10.5 inches head

Pump Selection: As shown on the construction drawings.

**TAP CHART**

Pump Tank Elevation	<u>279.0</u>	Pump Elevation	<u>273.3</u>	Manifold Elevation	<u>287.7</u>	High Point in Forcemain:	<u>287.7</u>		
Line	Color	Rod Read	Relative Elevation	Length	Hole Size	flow/tap	gal/day	Trench Area	LINE LTAR
7	Red		287.3	110	1/2in SCH 40	7.11	135.5	330	0.411
8	Purple		286.5	110	1/2in SCH 40	7.11	135.5	330	0.411
9	Blue		285.7	110	1/2in SCH 80	5.48	104.5	330	0.317
10	Orange		284.7	90	1/2in SCH 80	5.48	104.5	270	0.387

% of Dose Vol.	<u>78%</u>	total feet =	<u>420</u>	gal/min =	<u>25.2</u>	LTAR =	<u>0.300</u>
Dose Volume	<u>212</u>	Des. Flow	<u>480</u>			(tar + 5%)	<u>0.315</u>
Dose Pump Time	<u>8.4</u>	Pump Run=	<u>19.06</u>			(tar W/ 25% reduction)	<u>0.400</u>
Drawdown in Inches	<u>10.5</u>	Tank Gal/IN	<u>20.3</u>			(tar + 5%)	<u>0.420</u>
Supply Line Length	<u>130</u>	Elev. Head	<u>14.40</u>				
		Velocity fps	<u>3.97</u>				

**Comments:**

**Hydraulic Profile**

Manifold Elevation	<u>287.7</u>
Pump Tank Elevation	<u>279.0</u>
Pump Elevation	<u>273.3</u>

**Supply Line Velocity Check**

ID (INCH)	gal/ft	Velocity Check (>2ft/s)
1-1/4 in. SCH40 PVC Pipe	1.38 0.077654555	5.40
1-1/2 in. SCH40 PVC Pipe	1.61 0.105696478	3.96
2 in. SCH40 PVC Pipe	2.067 0.174216673	2.41

**MACCONNELL AND ASSOCIATES, P.C.  
CARUSO HOMES  
PRESSURE MANIFOLD DESIGN - REPAIR**

Name: Caruso Homes P.I.N. #: 0643-77-5737 D#: N/A  
 Address: 1425 Baptist Grove Rd Subdiv:  Lot#: 2  
Harnett County, North Carolina  
 # of BDR: 4 Daily Flow: 480 gal/day L.T.A.R.: 0.3 gal/day/sq.ft  
 Septic Tank: 1000 gals Pump Tank: 1000 gals Sq. Foot: 1260 Stone Depth: N/A

Number of Taps: <u>6</u>	Length of Trenches: <u>420</u> ft(See Tap Chart for Details)
Depth of Trenches: <u>24</u> in	Manifold Length: <u>54</u> in
Manifold Diameter: <u>4 inches</u>	Tap Configuration: 6 in spacing <u>1</u> side(s) of manifold
Supply Line length: <u>266</u> ft	Diameter(Supply Line): <u>1-1/2 in. SCH40 PVC Pipe</u> ID (Inch) <u>1.61</u>

Friction Loss + Fitting Loss: <u>30.90</u> ft(supply line length + 70' for fittings in pump tank)
Design Head: <u>2</u> ft Elevation Head: <u>22.2</u> ft
Total Head: <u>55.1</u> ft Pump to Deliver: <u>37.8</u> gals/min at <u>55.1</u> ft head

Dosing Volume: 203 gals,

Pump Selection: Drawdown: 203 gals divided by 20.3 gals/in = 10.0 inches head

**TAP CHART**

Line	Color	Rod Read	Relative Elevation	Length	Hole Size	flow/tap	gal/day	Trench Area	LINE LTAR
1	Blue		295.3	60	1/2in SCH 80	5.48	69.6	180	0.387
2	Orange		294.8	80	1/2in SCH 40	7.11	90.4	240	0.376
3	Yellow		294.2	75	1/2in SCH 40	7.11	90.4	225	0.402
4	Pink		293.7	75	1/2in SCH 40	7.11	90.4	225	0.402
5	Purple		292.3	70	1/2in SCH 80	5.48	69.6	210	0.332
6	Orange		291.7	60	1/2in SCH 80	5.48	69.6	180	0.387

Pump Tank Elevation: 279.0 Pump Elevation: 273.3 Manifold Elevation: 295.5 High Point in Forcemain: 295.5

% of Dose Vol.	<u>74%</u>	total feet =	<u>420</u>	gal/min =	<u>37.8</u>	LTAR =	<u>0.300</u>
Dose Volume	<u>203</u>	Des. Flow	<u>480</u>	Pump Run =	<u>12.71</u>	(ltar + 5%)	<u>0.315</u>
Dose Pump Time	<u>5.37</u>	Tank Gal/IN	<u>20.3</u>	Elev. Head	<u>22.20</u>	(ltar W/ 25% reduction)	<u>0.400</u>
Drawdown in Inches	<u>10.0</u>	Velocity fps	<u>5.95</u>			(ltar + 5%)	<u>0.420</u>
Supply Line Length	<u>266</u>						

**Comments:**

**Hydraulic Profile**

Manifold Elevation	<u>295.5</u>
Pump Tank Elevation	<u>279.0</u>
Pump Elevation	<u>273.3</u>

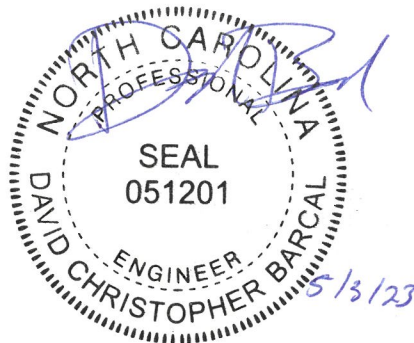
**Supply Line Velocity Check**

	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

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina**

**Engineered Option Permit  
Pressure Manifold System**

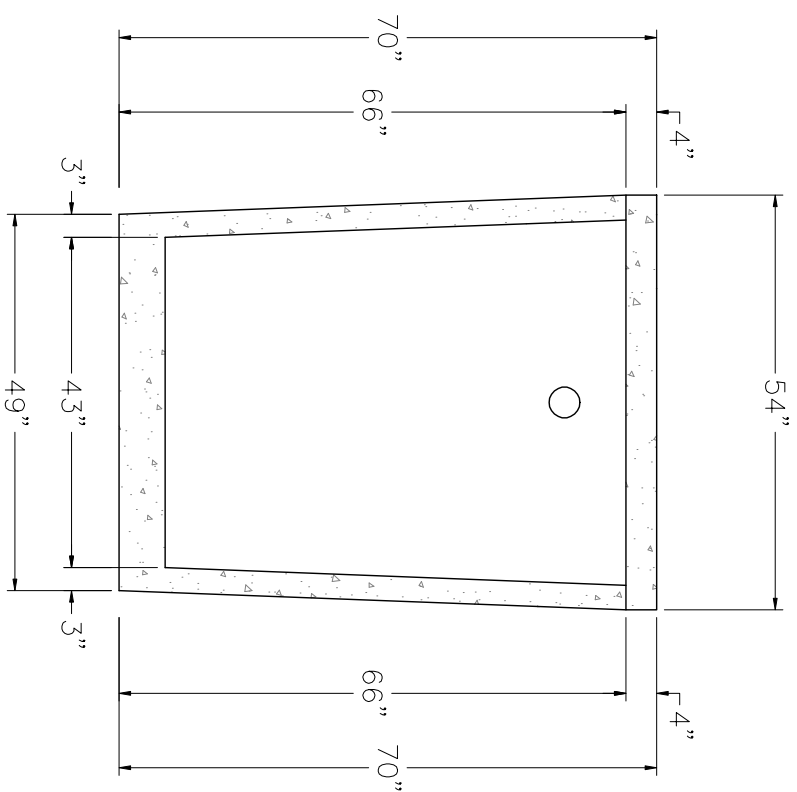
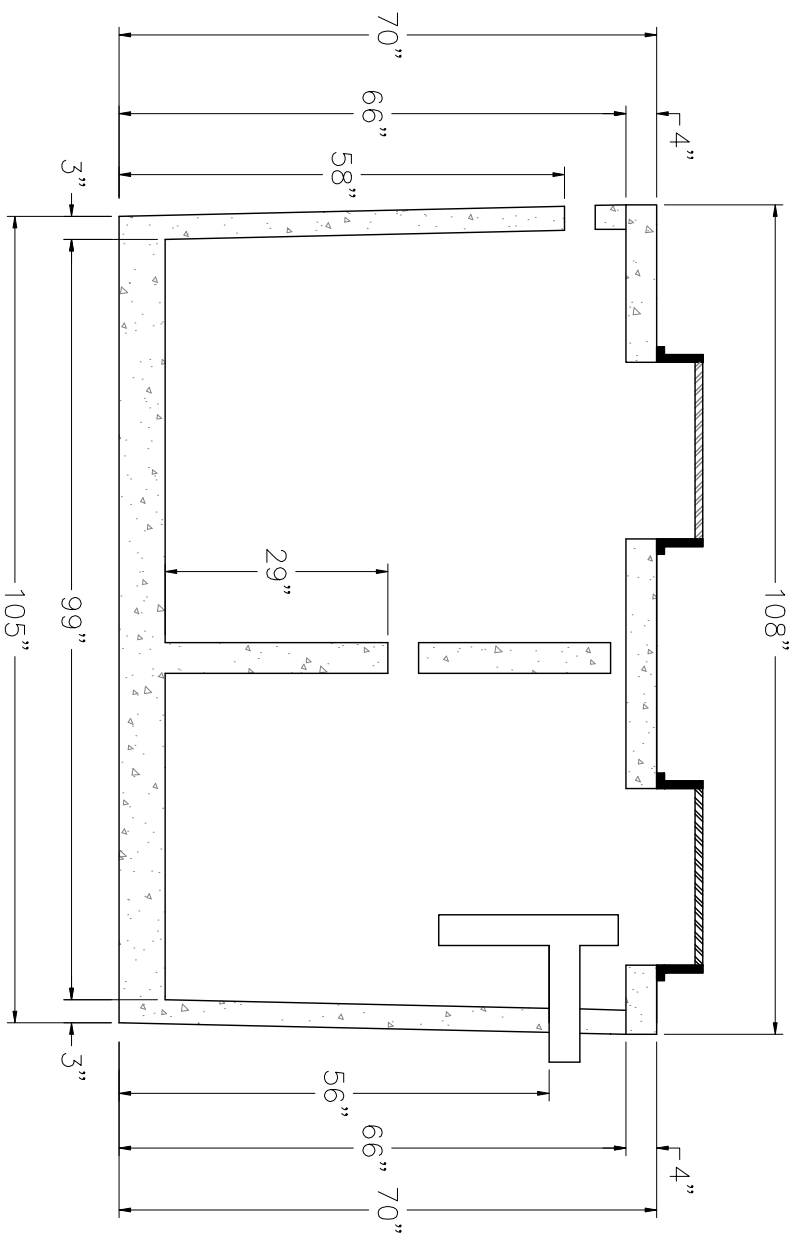
**Equipment**



**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**



# 1,000 ST 502

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

DATE : April 11, 2014

CONTACT:  
 CORY BRANTLEY

REVISION NO.

Original Submittal

Revision 1

Revision 2

Revision 3

Master Set

DATE

April 11, 2014

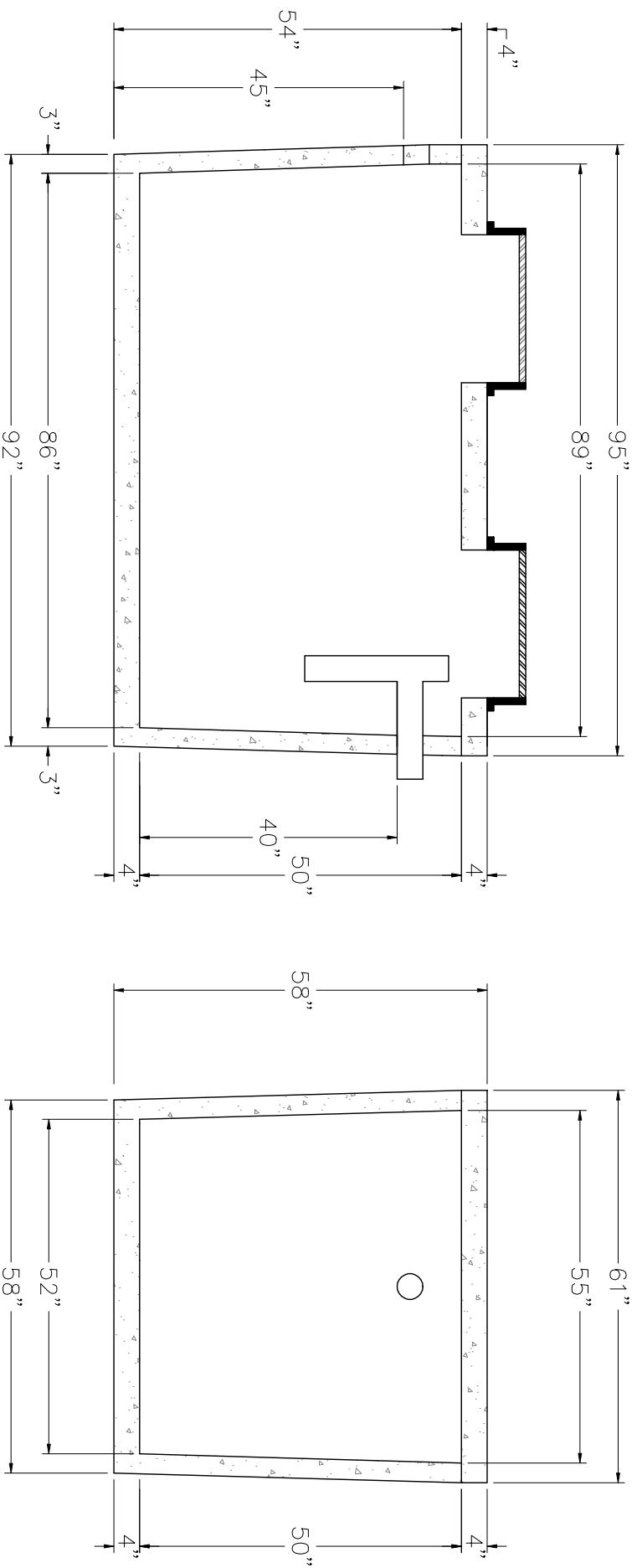
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BRANTLEY TANK MODEL

1,000 ST 502

SHEET NUMBER

1 of 1



**1,000 PT 237**  
NTS

**NON TRAFFIC BEARING**

**DAVID BRANTLEY & SONS**

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BRANTLEY TANK MODEL

**1,000 PT 237**

SHEET NUMBER

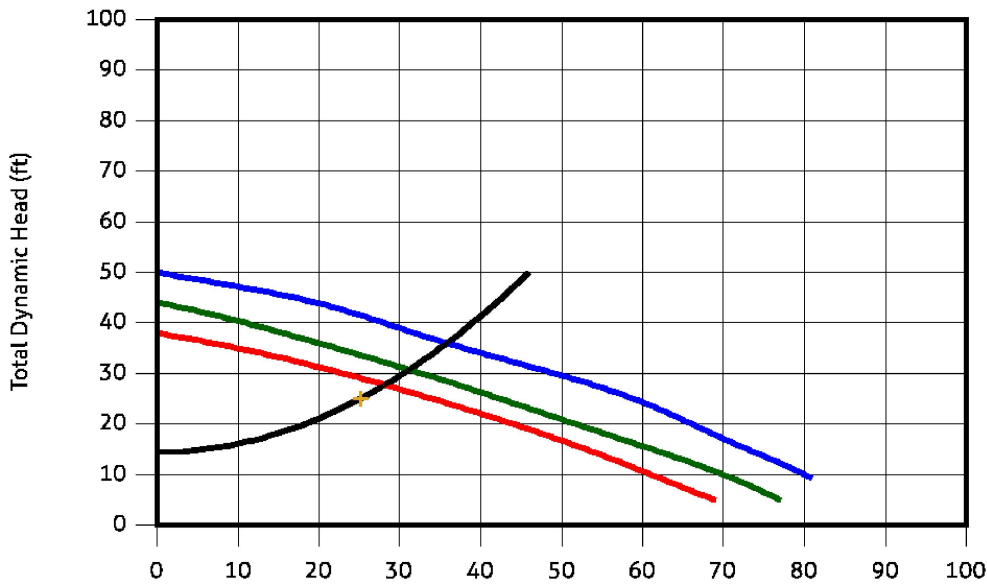
**1 of 1**



# Known Flow and TDH

Effluent

Sizing ID: X1X-55H-AJ0



### System Curve

GPM	TDH (ft)
0.00	14.40
7.00	15.23
14.00	17.70
21.00	21.83
28.00	27.61
35.00	35.04
42.00	44.12

### Fittings

None Selected

Flow (GPM)\*: 25.20

TDH (ft)\*: 25.10

\*Per user data

Curve Models	Eq. Flow	Eq. Head
152	28.13	27.74
153	31.15	30.75
140	35.80	36.00

Flow (GPM)

### Pump Specs

<b>Electrical</b>	115 volt, 1 phase, 60 Hertz
<b>Physical</b>	
<b>Discharge Size</b>	1.50" NPT
<b>Solids Handling (in.)</b>	0.5
<b>Static Head (ft)</b>	14.4000
<b>TDH (ft)</b>	25.1

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](mailto:zcotechnical@zoeller.com)

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

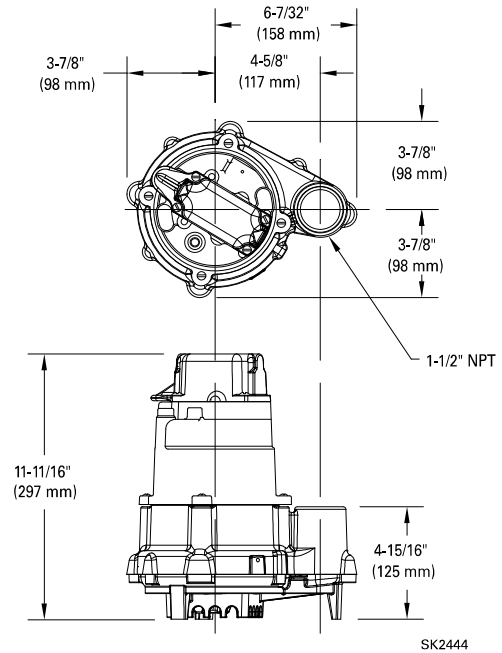


## TECHNICAL DATA SHEET DOSE-MATE SERIES Models 151, 152, 153 Effluent Pumps

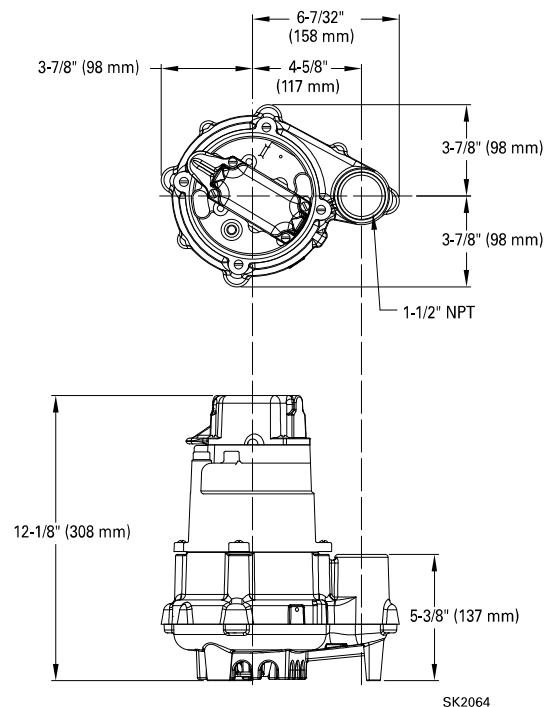
### PRODUCT SPECIFICATIONS

<b>MOTOR</b>	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
<b>PUMP</b>	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
<b>MATERIALS</b>	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

**MODEL 151**



**MODELS 152 & 153**



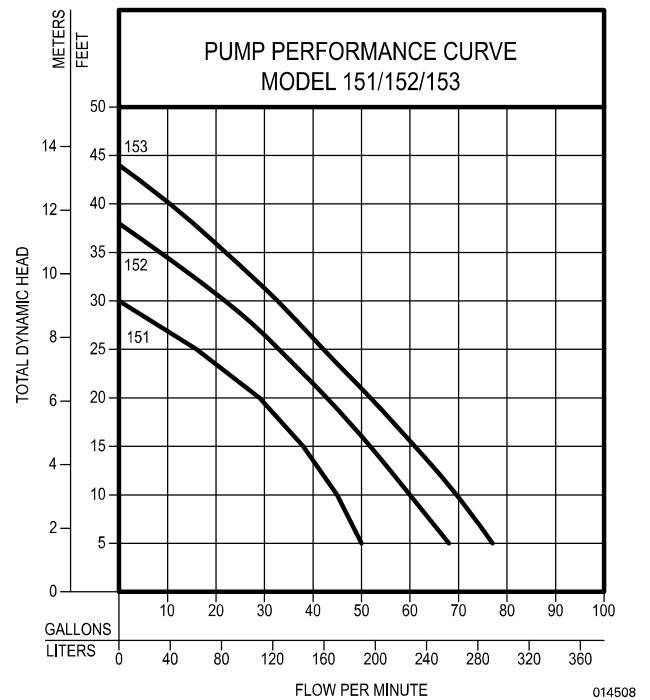
NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

NOTE: See model comparison chart for specific details.



## 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.

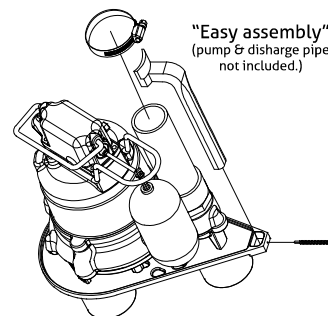
NOTE: Model 151 has a plastic base. Models 152 & 153 have a cast iron base.

### SELECTION GUIDE

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

#### OPTIONAL PUMP STAND P/N 10-2421

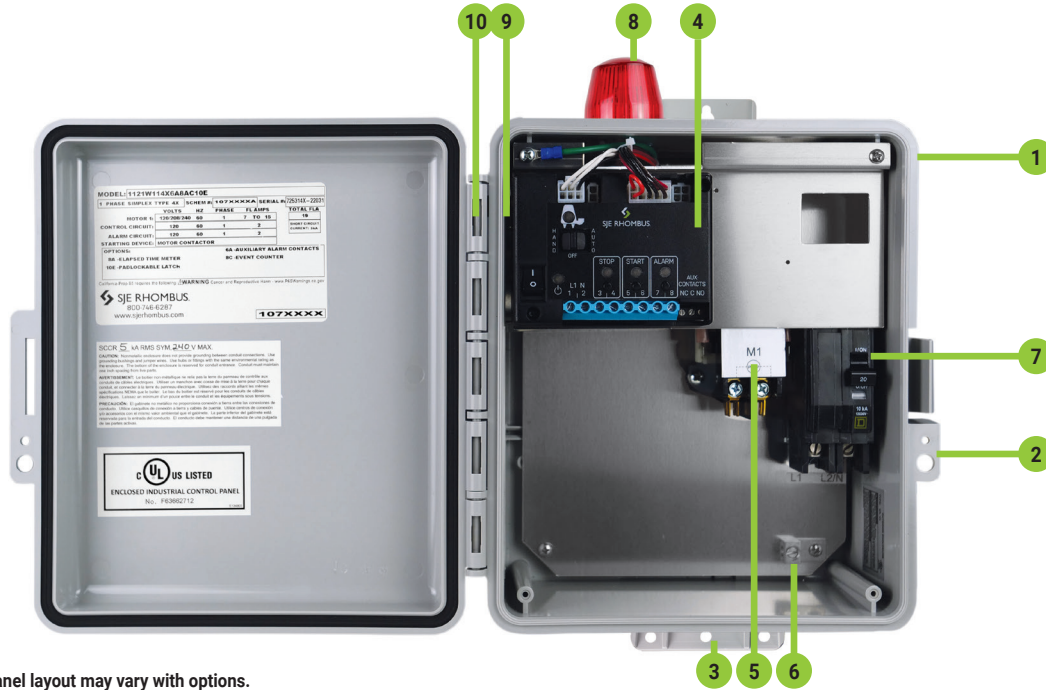
- Reduces potential clogging by debris
  - Replaces rocks or bricks under the pump
  - Made of durable, noncorrosive ABS
  - Raises pump 2" (5 cm) off bottom of basin
  - Provides the ability to raise intake by adding sections of 1/2" or 2" (DN40 or DN50) PVC piping
  - Attaches securely to pump
  - 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).

# 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

<b>112</b> CONTROL PANEL	<b>1</b> ALARM PACKAGE	<b>W</b> ENCLOSURE RATING	<b>1</b> STARTING DEVICE	<b>2</b> PUMP FULL LOAD AMPS	<b>4</b> PUMP DISCONNECTS	<b>H</b> FLOAT SWITCH APPLICATION	<b>6A10E</b> 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

<b>Model 112 Base Price</b> _____ (includes Alarm Package, Enclosure Rating, Starting Device and Pump Disconnect)
Pump Full Load Amps _____
Total Options _____
Enclosure Upsize _____
<b>TOTAL LIST PRICE</b> _____

**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	<b>Auxiliary Alarm Contact, Form C (included as standard)</b>
✓ 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
✓ 10E	<b>Lockable Latch - NEMA 4X (included as standard)</b>
✓ 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

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.

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

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



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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](mailto:sales@press-seal.com)  
Web: [www.press-seal.com](http://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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*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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*Protecting Our Planet's Clean Water Supply*  
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Email: [sales@press-seal.com](mailto:sales@press-seal.com)  
Web: [www.press-seal.com](http://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)

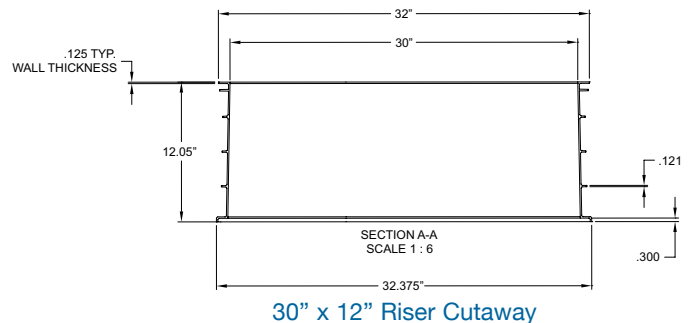
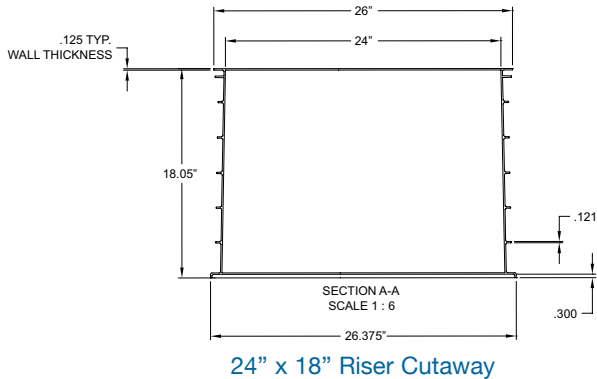
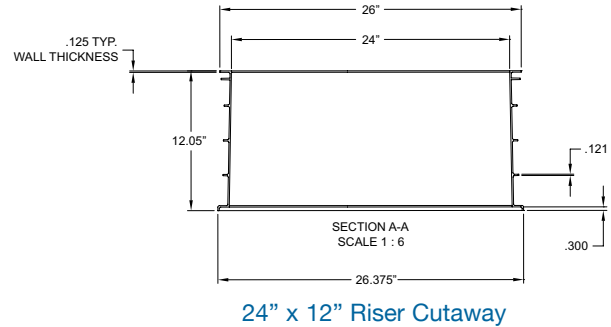
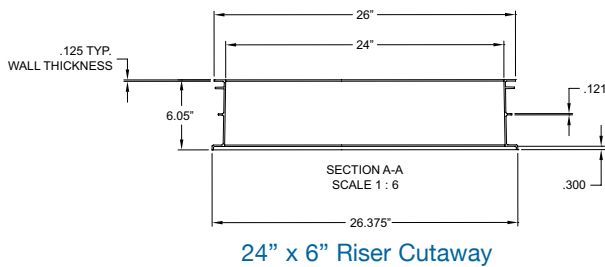
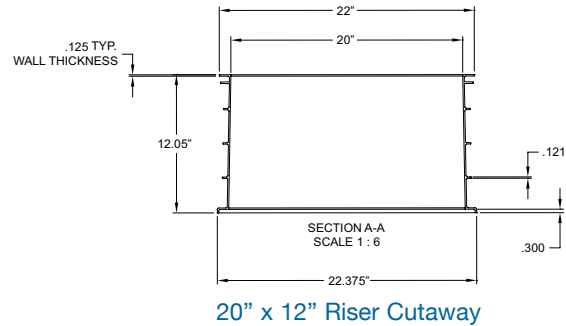
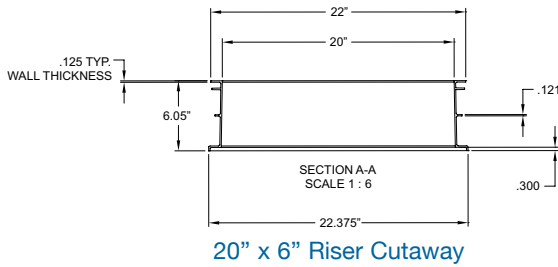


30" x 12" Riser



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.



4 Business Park Road  
P.O. Box 768  
Old Saybrook, CT 06475  
860-577-7000 • Fax 860-577-7001  
**1-800-221-4436**  
[www.infiltratorwater.com](http://www.infiltratorwater.com)

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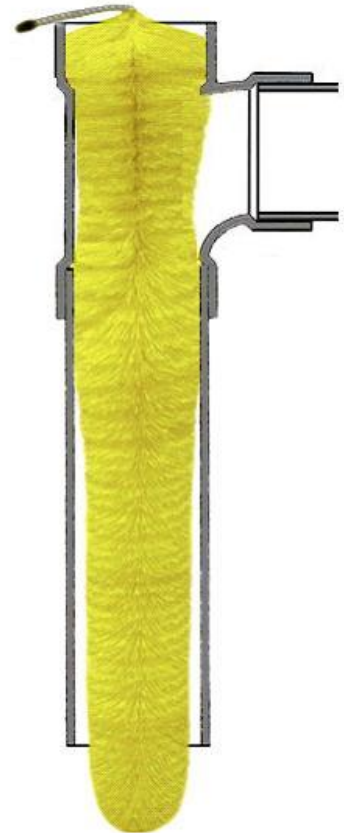
**Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4436**

## Sim/Tech Filter's Unique Gravity Filtration

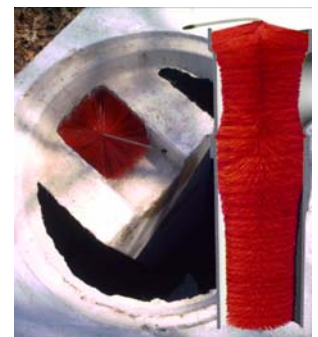
# The STF-110 series Bristle Filter

## 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.



Maintenance Sleeve



7" Filter in a 5" square concrete baffle

Patent# 6,811,692

*Solutions*

For the protection and performance of wastewater systems by

## 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.

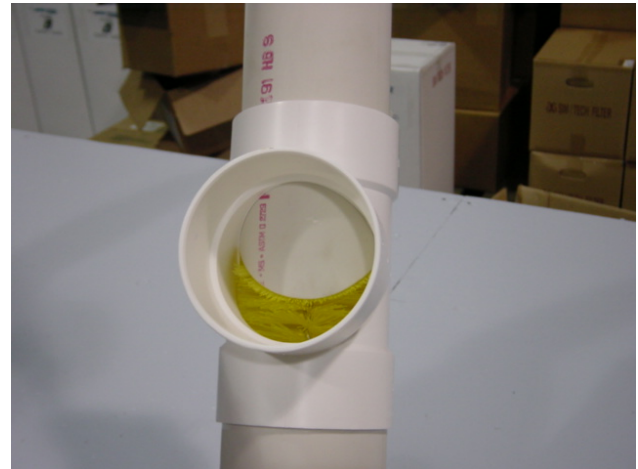
- After performing one of the options above, remove filter by pulling up on the filter handle.
- Place the used filter in the provided plastic bag for proper disposal.
- Install a new replacement filter as described in the installation instructions at the top of the page.
- If a maintenance sleeve was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



Maintenance  
Sleeve partially  
inserted into  
"Tee"

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 1/2" 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](mailto:simtech@freeway.net) WEB [www.gag-simtech.com](http://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**

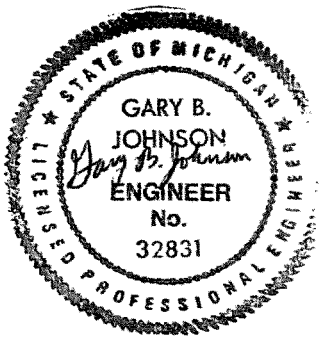
The Disposable Septic Tank Filter is constructed as a twisted-in-wire brush with 26" long brush body, 1/4" tip and 2 3/4" long handle end with 90 degree bend. Brush body will have a major diameter of 4.313" for a length of 9 1/2" starting 1/2" from the 90 degree handle bend, then will transition down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

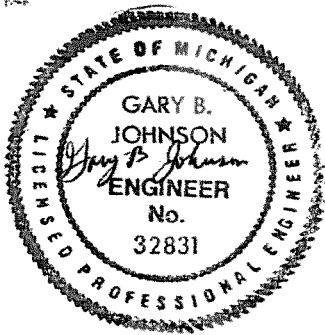


TABLE B	Sim/Tech	Tuff-Tite	Zabel	Zoeller
<b>Time to achieve 2" head height</b>	1 hr. 40 min.	7 min.	6 min.	* 2 hrs.
<b>Particulate caught in 1500 micron sieve</b>	0	0	0	0
<b>Particulate caught in 600 micron sieve</b>	0	0.2	0.3	1.2
<b>Particulate caught while changing filter</b>	0	0.3	0	0
<b>Particulate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

\*Ended test at 2 hours, total head height was at 1 3/4"

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

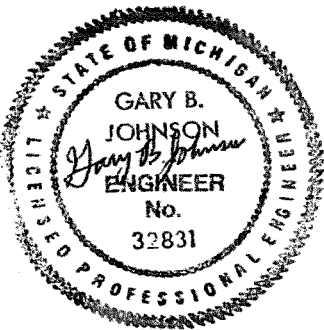


### THIRD PARTY VERIFICATION OF FLOW RATES ON THE STF-110 AND THREE OTHER GRAVITY SEPTIC TANK FILTERS

- 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 1/2" and 1" head height above outlet level
- All filters tested using the above conditions

#### FILTER FLOW RATES

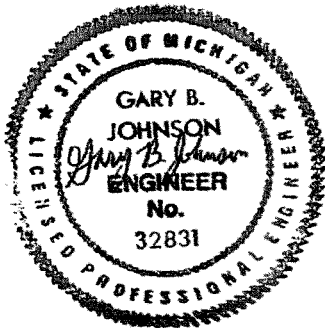
	Sim/Tech	Tuff-Tite	Zabel	Zoeller
1/2" head height above outlet flow	1, 800 GPD	1, 440 GPD	1, 195 GPD	900 GPD
1" head height above outlet flow	5, 040 GPD	4, 680 GPD	4, 858 GPD	1, 800 GPD





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.

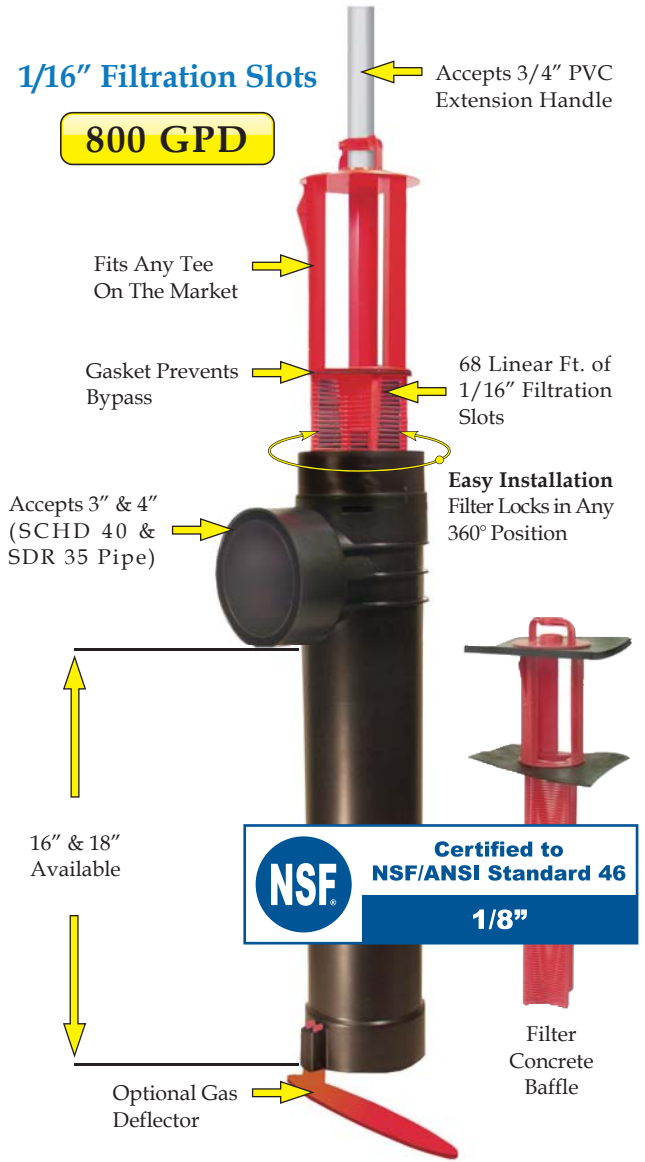
**PL-68 Maintenance:**

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 & Lok™



**Extend & Lok™**  
 Easily installs into existing tanks.



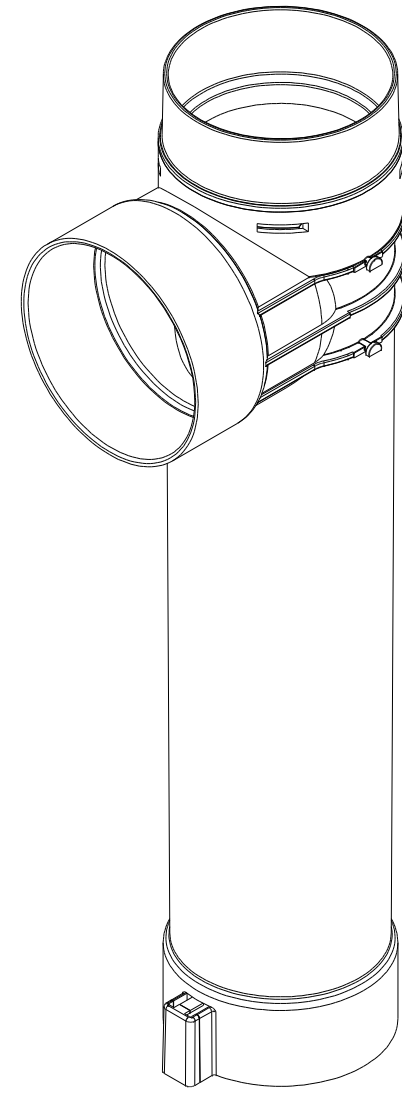
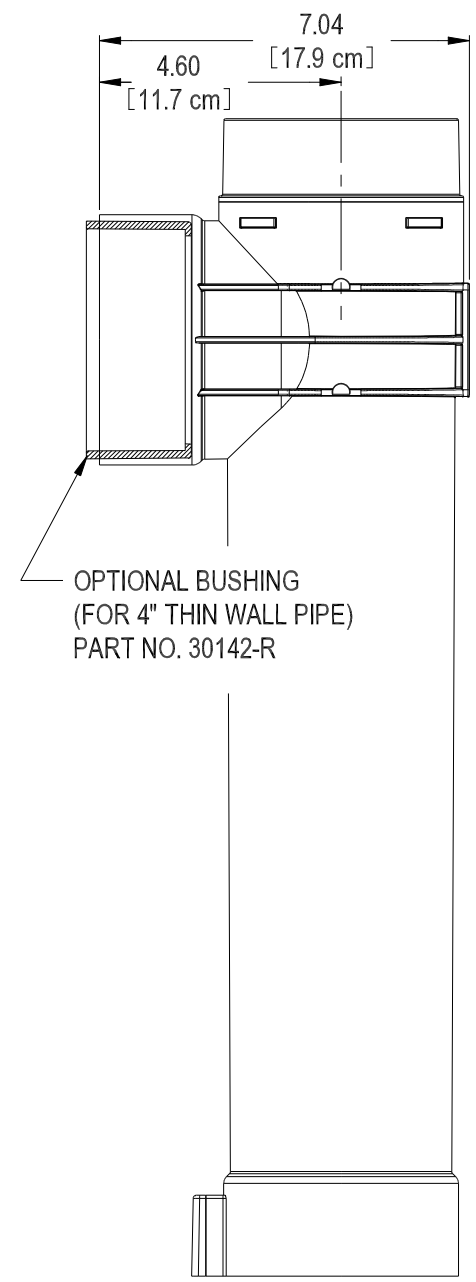
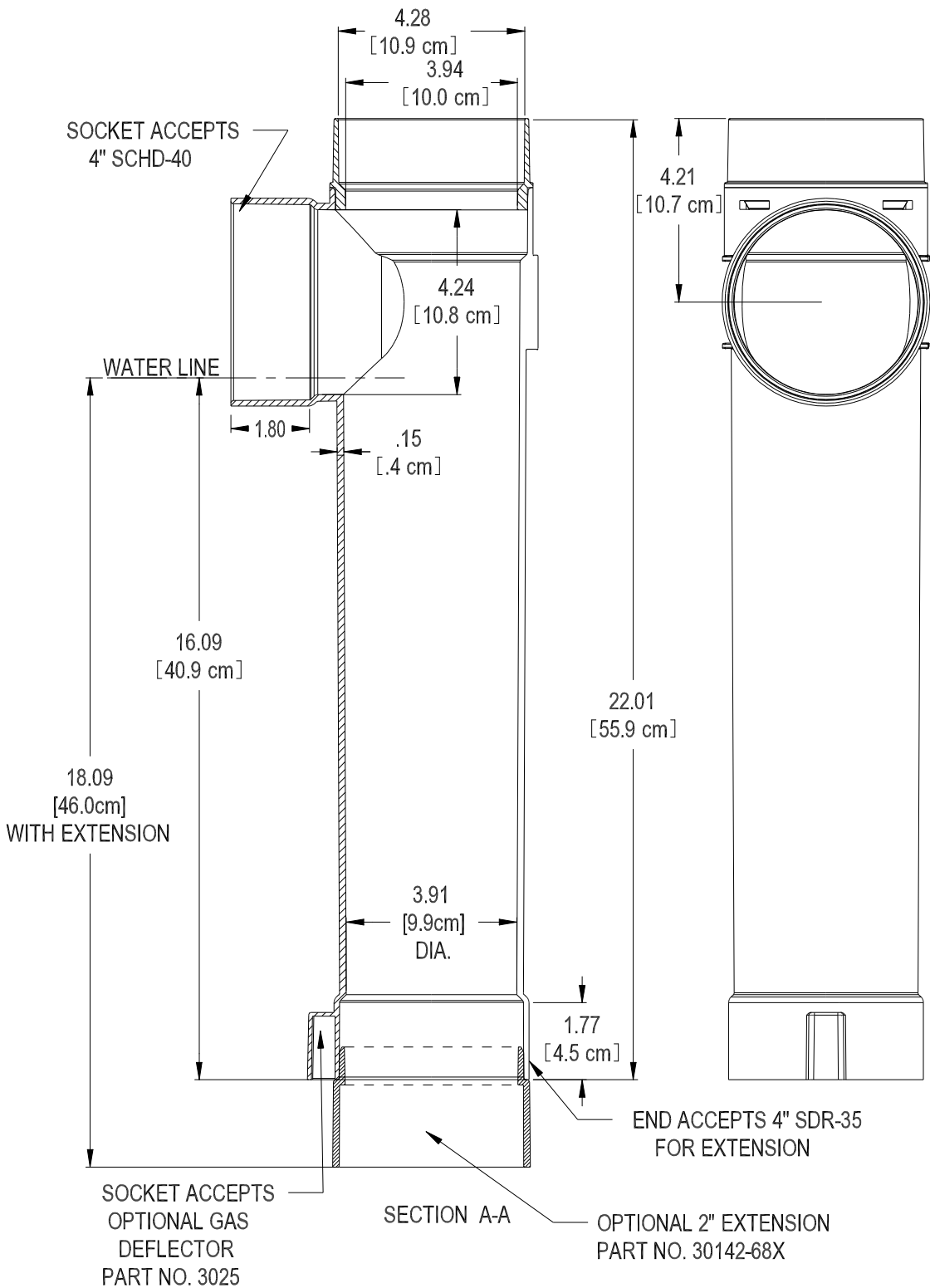
Spacer Bushing  
 4” SCHD 40 to SDR 35



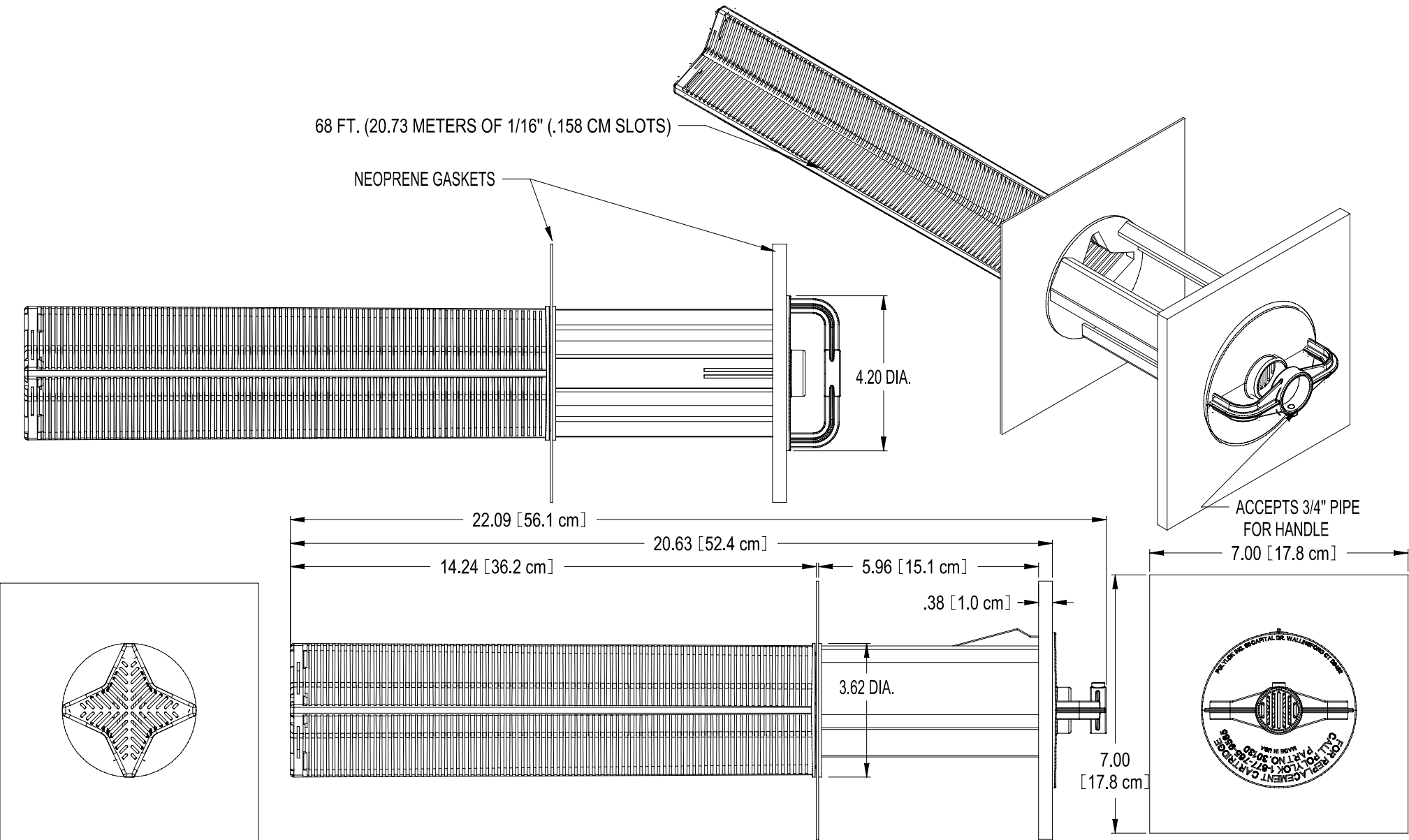
Spacer Bushing  
 4” SCHD 40 to 110mm Pipe



2” Extender



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



PL-68 FILTER CARTRIDGE (FOR USE IN A CONCRETE BAFFLE)  
 PART NO. - 30130-CB  
 MATERIAL - POLYPROPYLENE



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&>

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### 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 cm ± 0.005 cm (1/8" ± 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 ± 0.005 cm (1/8" ± 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

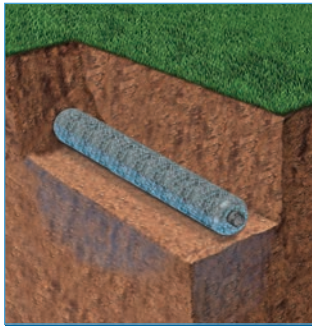
construction offers structural integrity and resists compaction. Engineered flow-channels increase void space creating improved water flow and greater storage.



## Compared with stone and pipe, benefits include:

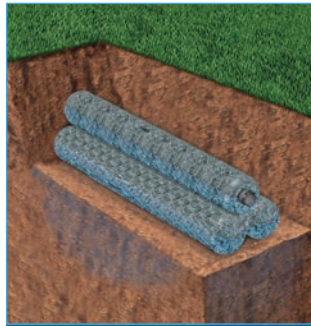
- Always clean and free of fines
- Bundles are quick to install, saving costs on heavy machinery and labor
- Modular construction allows configurations to match trench dimensions for most system shapes and sizes
- Engineered for optimal storage and absorption efficiencies
- Ability to contour along sloped 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.



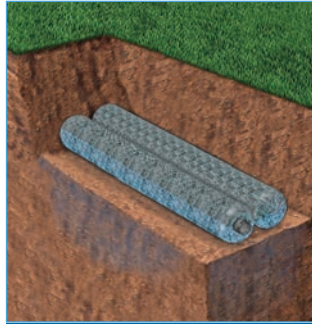
**Single Bundle**

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



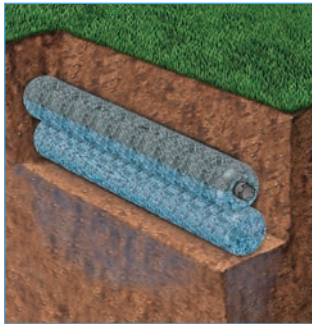
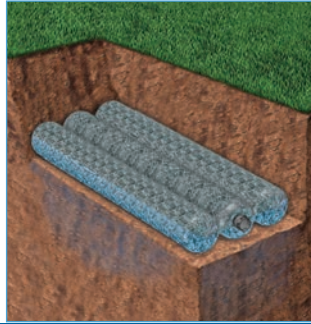
**Triangular Bundle**

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



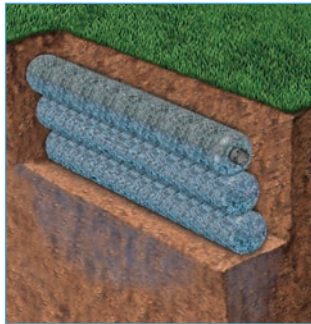
**Horizontal Bundles**

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.

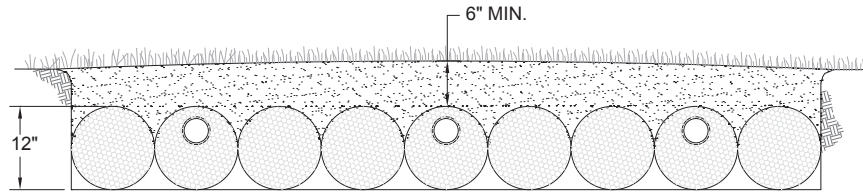
## Operation and Maintenance

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

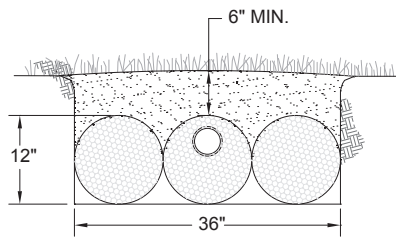
Provisions of the NC Rules apply, except as modified by the applicable innovative wastewater approval. Inspection is significantly easier due to the pre-assembly of the components. Levelness of the trench bottom may be checked by inserting a rod between the aggregate bundles down to the trench bottom.

**EZflow Bed System**



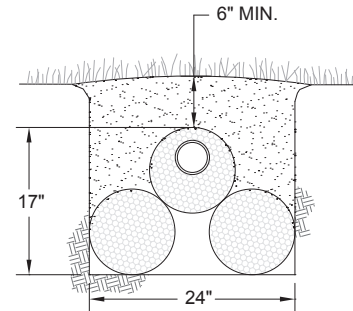
The EZflow Drainage system 1203H and 1203H-GEO configurations may be used in a bed system with the three cylindrical bundles placed in adjacent rows. The minimum area (without reduction or equivalency factor) for a bed system shall be determined as required in 15A NCAC 18A.1955(d). This configuration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

**EZflow 1203H/1203H-GEO Trench**



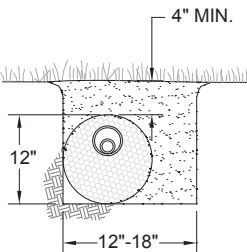
**EZflow 1203H/1203H-GEO Approved at 4.0 sf/lf**  
 EXAMPLE: 300 sf required.  
 $300 \text{ sf} \div 4.0 \text{ sf/lf} = 75 \text{ lf}$  required

**EZflow 1003T/1003T-GEO Trench**



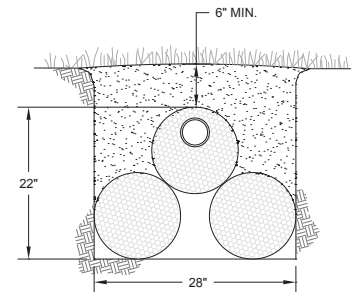
**EZflow 1003T/1003T-GEO Approved at 3.0 sf/lf**  
 EXAMPLE: 300 sf required.  
 $300 \text{ sf} \div 3.0 \text{ sf/lf} = 100 \text{ lf}$  required

**EZflow 1201P/1201P-GEO Trench**



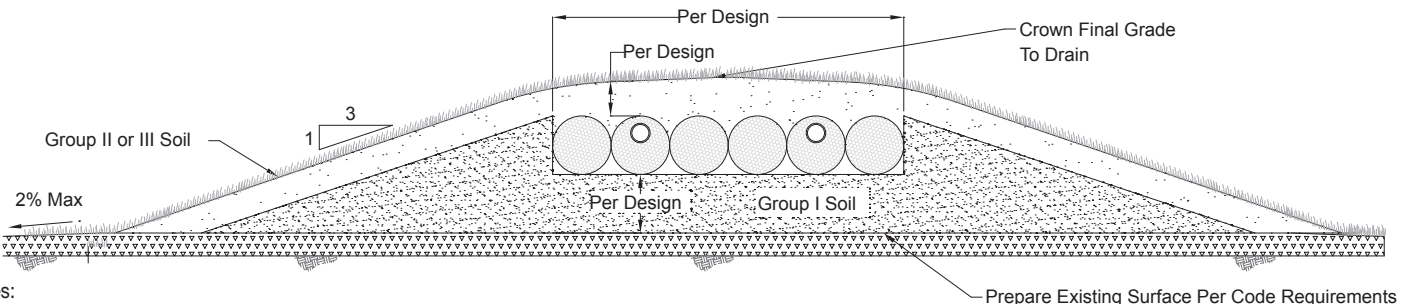
The central bundle of the EZflow 1203H or 1203H-GEO containing the offset four-inch pipe may be used as an alternative to gravel in a low-pressure pipe (LPP) system, sized equivalent to LPP systems as required in 15A NCAC 18A and as described in the EZflow innovative and accepted approvals.

**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.



**INFILTRATOR**  
water technologies

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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.

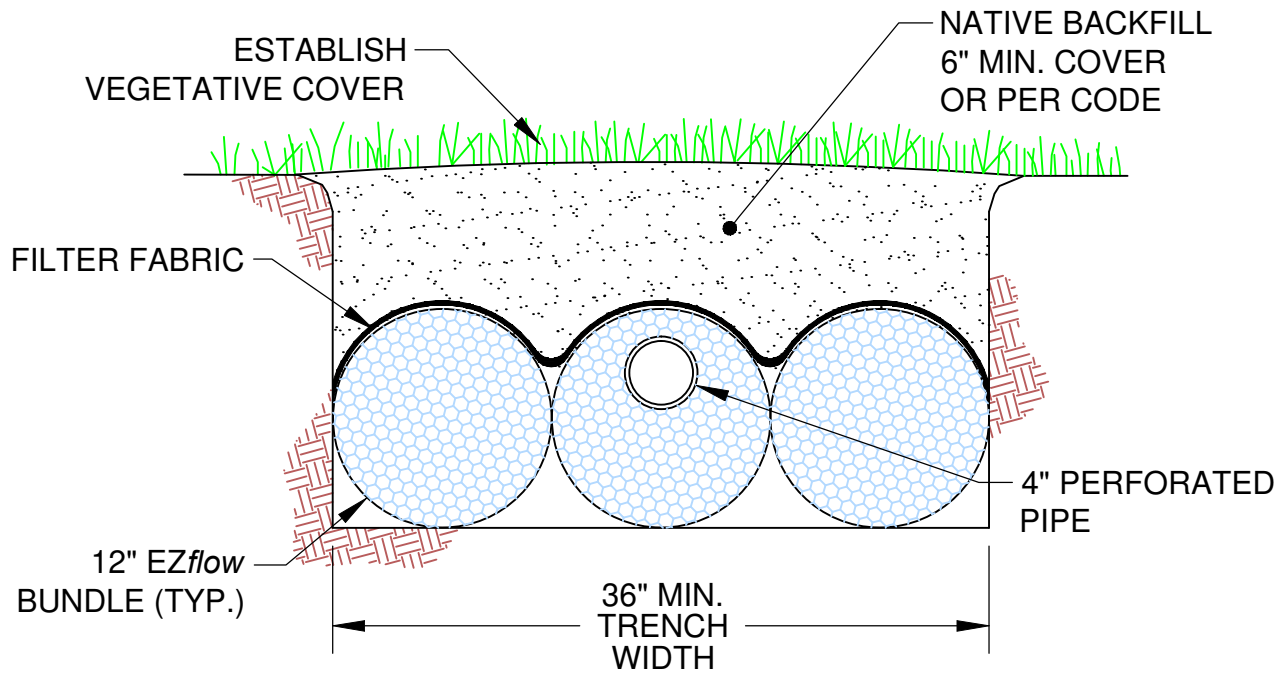
U.S. Patents: 8322948; 8337119; 8297880; 7914230; 7008138. Other patents pending. Infiltrator, Quick4 and EZflow are registered trademarks of Infiltrator Water Technologies. Infiltrator Water Technologies is a wholly-owned subsidiary of, Advanced Drainage Systems, Inc. (ADS).

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EZ36 0221

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

## 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**

<b>ACCEPTED WASTEWATER SYSTEM APPROVAL</b>
------------------------------------------------

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](http://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-foot 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 <sup>2</sup> )	
		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 (ft<sup>2</sup>) 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 (ft<sup>2</sup>) 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 <sup>1</sup> (in)	Minimum Trench Depth (in)	Minimum Pipe Depth Below Grade <sup>2</sup> (in)
EZ1203H	9	36	6	18	12
EZ1203H-GEO	9	36	6	18	12

<sup>1</sup> On sloping lots, minimum required trench depths may be greater

<sup>2</sup> 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.

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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

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

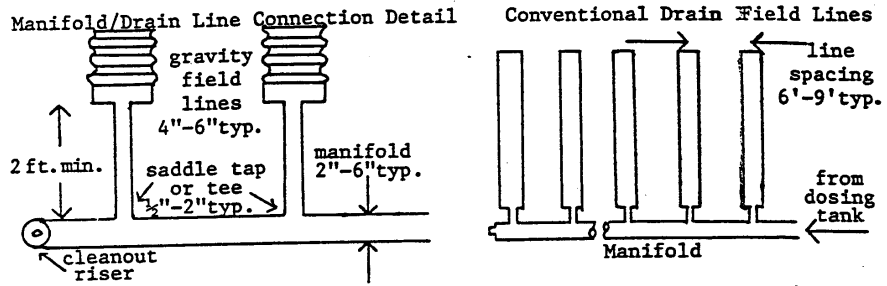


Fig. 1 Pressure Manifold For Level Site (1 ft. = .305 m)

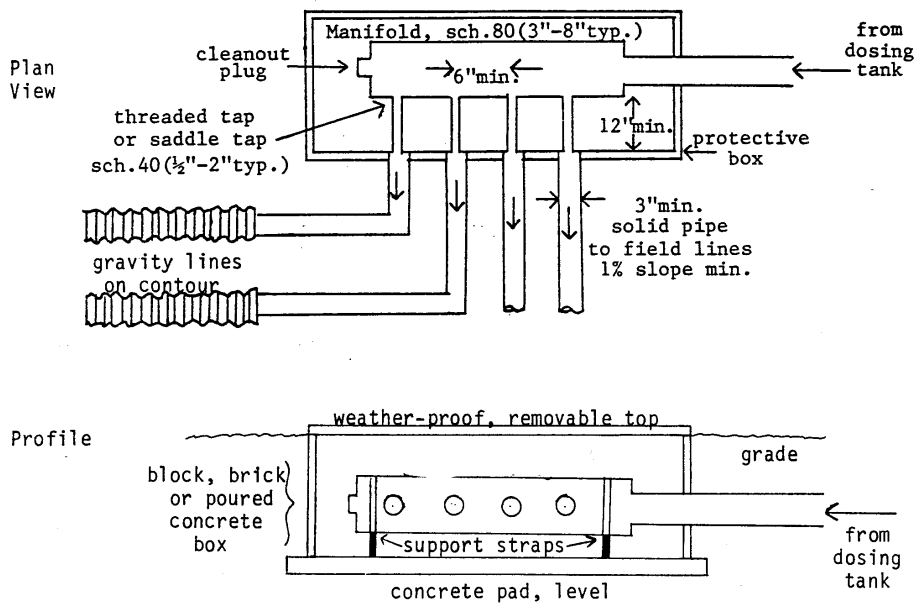


Fig. 2 Pressure Manifold For Sloping Sites

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 equation<sup>1</sup> 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.

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<sup>1</sup>Orifice equation:

$$Q = 13 (d^2)(h^{\frac{3}{2}})$$

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<sup>a</sup>

Tap Separation Distance (Feet)	Manifold Size (Inches)	Lateral Taps out of One Side of Manifold Lateral Tap Size (inches)						Lateral Taps out of Both Sides of Manifold Lateral Tap Size (inches)					
		1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2
		Maximum Number of Taps						Maximum Number of Tap Pairs					
0.5 <sup>b</sup>	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 <sup>c</sup>	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	
6.0 <sup>c</sup>	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	
9.0 <sup>c</sup>	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	
<sup>a</sup> 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)----												
	1/2	3/4	1	1 1/4	1 1/2	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)			
<sup>b</sup> Use for pressure manifold distribution box designed for sloping lots, located above highest field line.													
<sup>c</sup> 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).

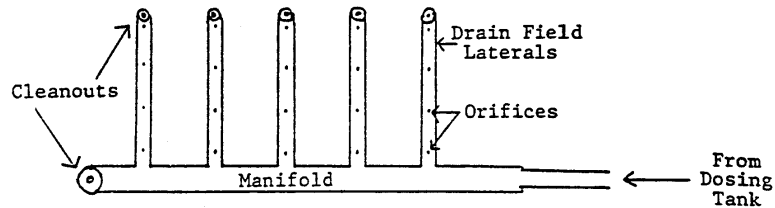


Fig. 3 Low-Pressure Pipe Drain Field

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.

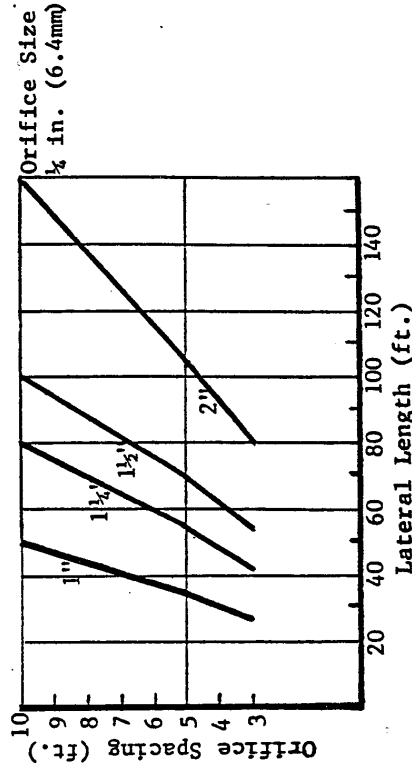
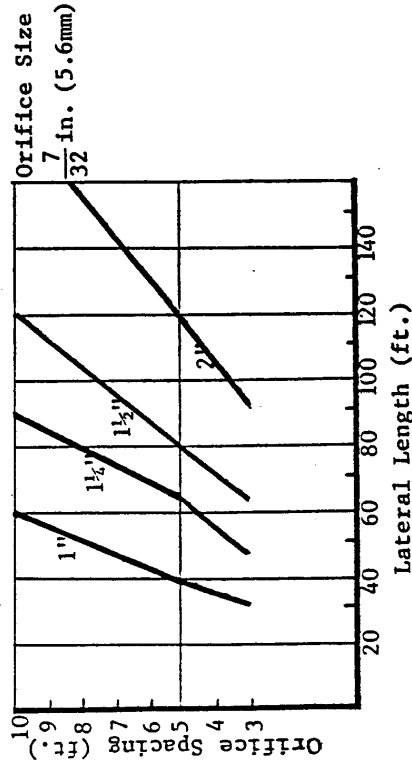
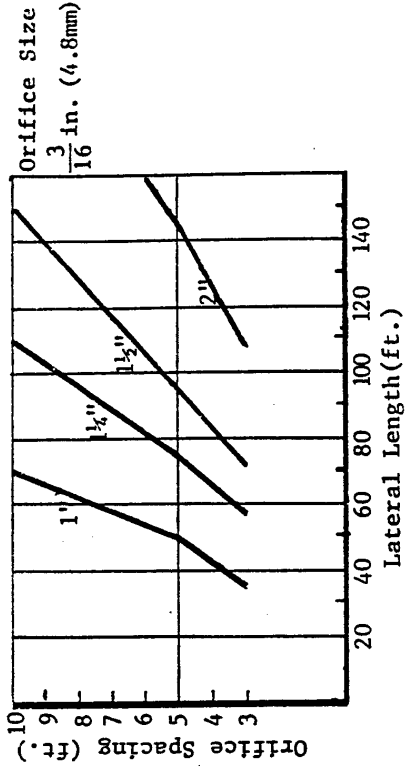
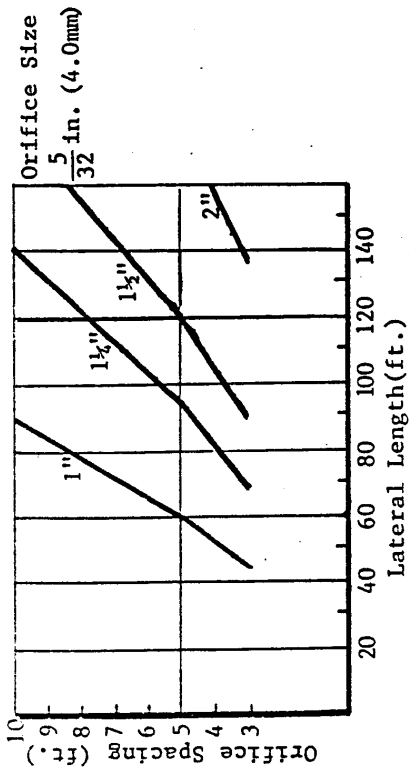


Fig. 4 Maximum Length of Different Sized Laterals For Low-Pressure Pipe Systems With Varying Orifice Sizes and Spacings (1 ft. = .305 m)

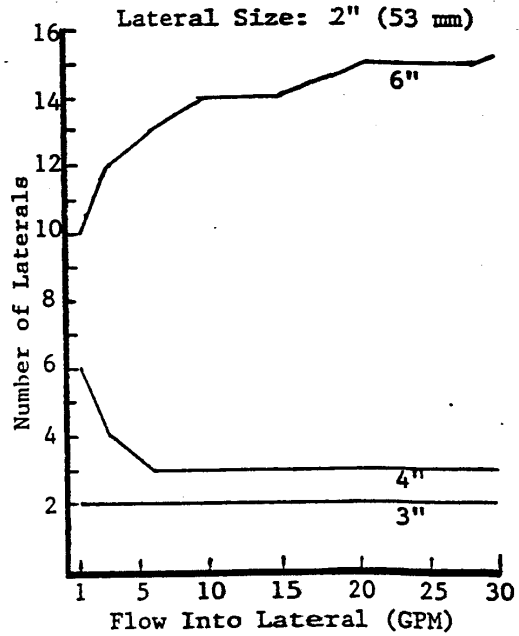
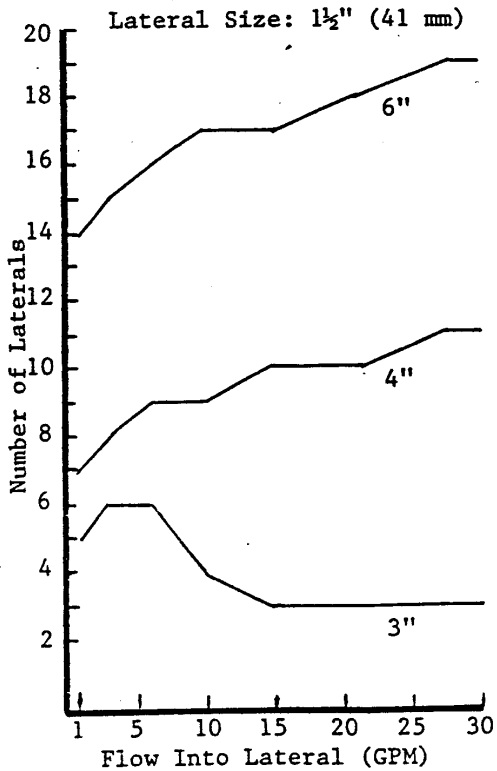
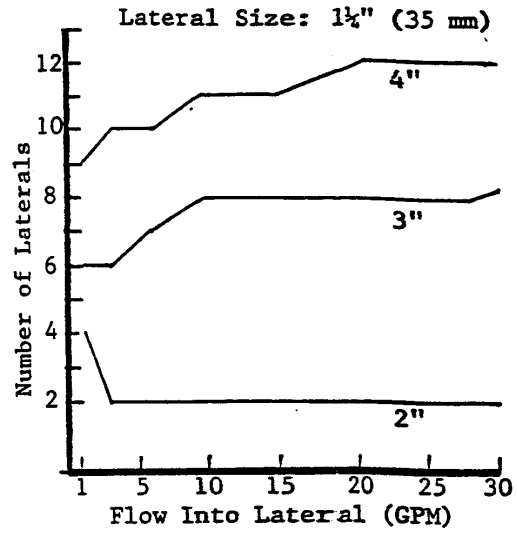
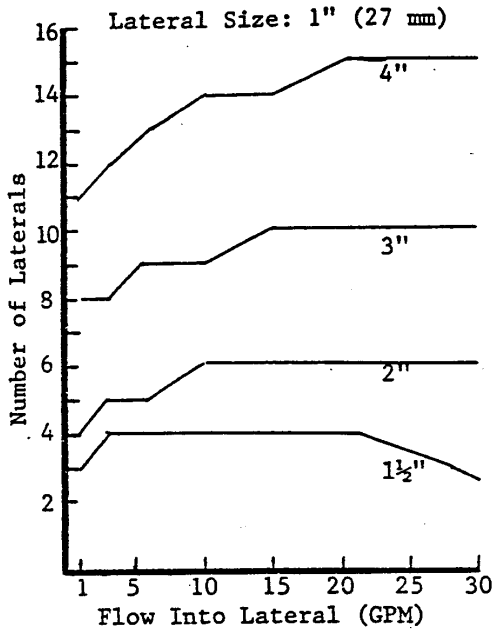


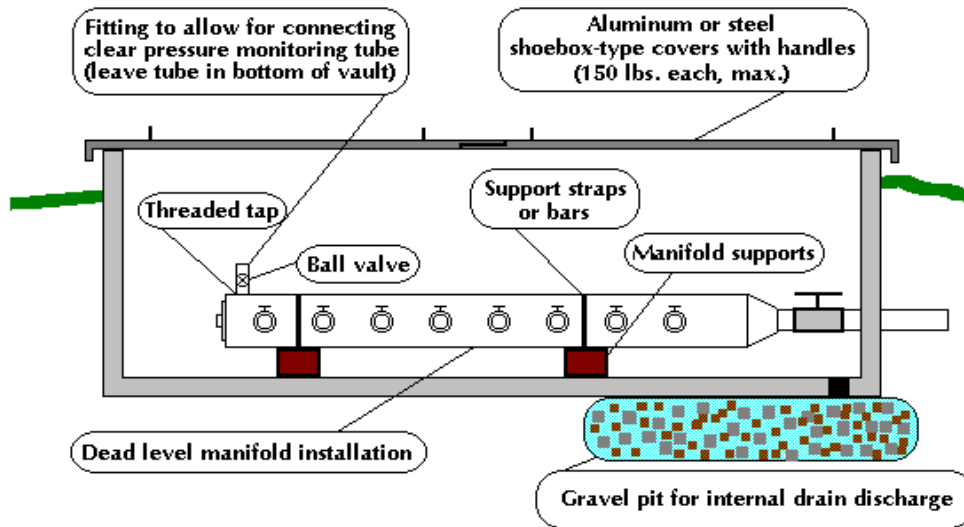
Fig. 5 Maximum Number of Different Sized Laterals For Low-Pressure Pipe Systems With Varying Sizes of Manifolds and Varying Rates of Flow Into Lateral (1 GPM = .0631 l/sec)

Recommended design steps using these criteria are as follows:

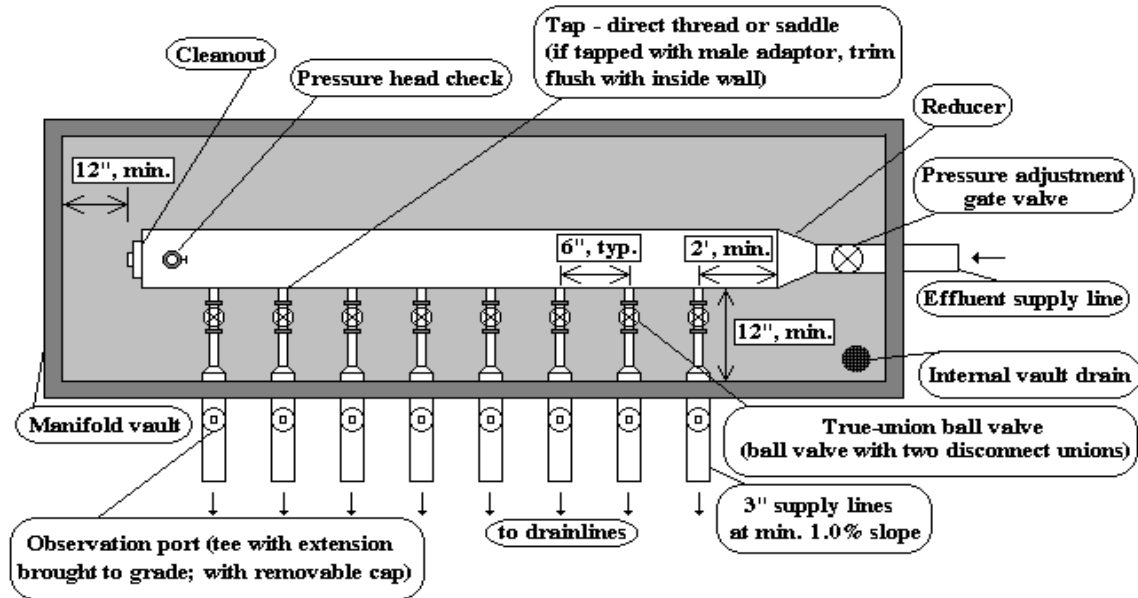
1. Select Drain Field Configuration: Determine the desired field size configuration, lengths of laterals, and location of supply manifolds.
2. Choose Orifice Size and Spacing: For pump dosed systems, select the largest orifice size and shortest orifice spacing resulting in a total number of orifices 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

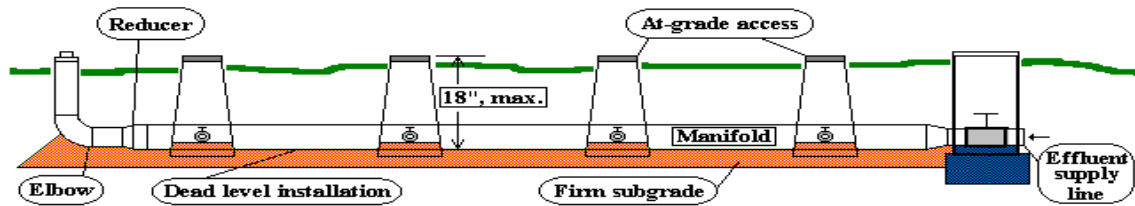
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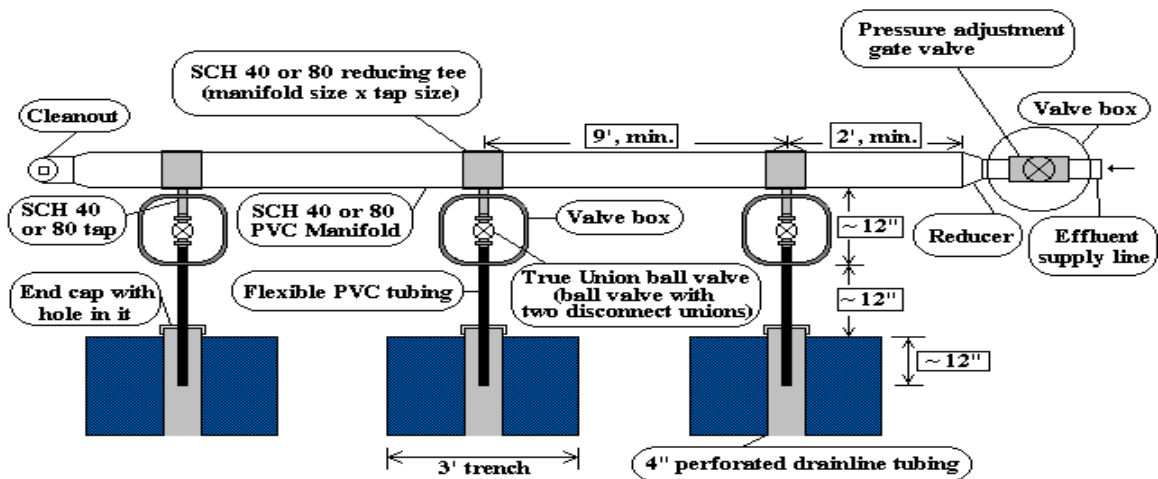
## Profile View of Pressure Manifold for Sloping Site Installation (not to scale)



## 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)**

**Caruso Homes  
1425 Baptist Grove Rd  
Harnett County, North Carolina**

**Engineered Option Permit  
Pressure Manifold System**

**Operation and Maintenance Procedures**



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## 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.**