

Bureau of Environmental Health

8930 Stanford Boulevard, Columbia, MD 21045

Main: 410-313-2640 | Fax: 410-313-2648

TDD 410-313-2323 | Toll Free 1-866-313-6300

www.hchealth.org

Facebook: www.facebook.com/hocohealth

Maura J. Rossman, M.D., Health Officer

RECEIPT DATE: 4/17/18 ONSITE SEWAGE DISPOSAL SYSTEM

P 562960

APPROVAL DATE: 7/10/18 SEC PERMIT: CONSTRUCTION

A

PROPERTY ADDRESS: 13787 Frederick Road

SUBDIVISION: Renfro Property

LOT: 1

TAX ID:

CONTRACTOR: South Carroll Backhoe

EMAIL: scbackhoe@comcast.com

CONTRACTOR ADDRESS: 4410 Salem Bottom Road, Westminster, MD 21157

PHONE: 410-596-3618

PROPERTY OWNER: Harold E. Renfro

EMAIL:

OWNER ADDRESS: 13765 Frederick Road

PHONE:

SEPTIC TANK SIZE (GALLONS): 2000

TANK MANUFACTURER: Mayer Bros

PUMP MODEL: Zoeller 1st

PUMP SIZE

1/3 HP

PUMP TANK CAPACITY: 2000

DISTRIBUTION SYSTEM:  GRAVITY

PRESSURE DOSED

BEDROOMS: 5

APPLICATION RATE 0.8

Table with 2 columns: Field Name (TRENCHES, LOCATION, NOTES) and Field Value (Linear feet required: 156, Inlet depth: 3, etc.)

ISSUED BY: Hank Oswald

ISSUE DATE: 4/17/18

EXPIRATION DATE: 4/17/19

NOTE: CONTRACTOR MUST SCHEDULE A PRE-CONSTRUCTION INSPECTION PRIOR TO BEGINNING ANY INSTALLATION

NOTE: CONTRACTOR MUST SCHEDULE AN INSPECTION AND GAIN APPROVAL OF ALL COMPONENTS PRIOR TO COVERING

NOTE: STONE MUST BE APPROVED BY HEALTH DEPARTMENT AND GRAVEL TICKET MUST BE AVAILABLE FOR REVIEW.

NOTE: WATERTIGHT TANKS REQUIRED

NOTE: ALL PARTS OF SEPTIC SYSTEM SHALL BE AT LEAST 100 FEET DOWNGRADIENT FROM ANY WATER WELL

NOTE: MANHOLE RISERS REQUIRED ON ALL SEPTIC TANKS AND PUMP CHAMBERS

NOTE: AN ELECTRICAL PERMIT IS REQUIRED FOR INSTALLATION OF ANY ELECTRICAL COMPONENTS OF THE SYSTEM

ELECTRICAL PERMIT ISSUED E

NOTE: MDE RECOMMENDS SEPTIC TANKS, BAT, AND OTHER PRETREATMENT UNITS BE PUMPED AT A FREQUENCY ADEQUATE TO ENSURE THAT SOLIDS ARE NOT DISCHARGED TO THE DISPOSAL AREA

NEITHER THE HOWARD COUNTY COUNCIL NOR THE HEALTH DEPARTMENT IS RESPONSIBLE FOR THE SUCCESSFUL OPERATION OF ANY SYSTEM.

PERMITTEE RESPONSIBLE FOR OBTAINING FINAL APPROVAL ON THIS PERMIT.

CALL 410-313-1771 TO SCHEDULE INSPECTIONS.

# BENCHMARK



## ENGINEERING, INC.

8480 Baltimore National Pike • Suite 315 • Ellicott City, Maryland 21043  
 410-465-6105 410-465-6644 (Fax)

### LETTER OF TRANSMITTAL

DATE	1/16/18	PROJECT No.	2876
ATTENTION	Frank Oswald		
RE:	Rentra Lot 1		

TO: Health

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items

Photocopies     Prints     Originals     Samples  
 Specifications     Invoices     Change Order     Other \_\_\_\_\_

COPIES of	No. of SHEETS	DESCRIPTION
3	4	OSDS Plans
1	1	Email From purchaser limiting
		house to 5 bedrooms
1	5	Architecturals for 5 bedrooms

THESE ARE TRANSMITTED as checked below

For Comment     For your use     For Approval  
 For Review     As requested     Other \_\_\_\_\_

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COPY TO: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_

SIGNED: John Carney

If enclosures are not as noted, kindly notify us at once.

## Oswald, Hank

---

**From:** Oswald, Hank  
**Sent:** Monday, February 12, 2018 8:35 AM  
**To:** John Carney (jcarney@bei-civilengineering.com)  
**Subject:** OSDS Plan\_13787 frderick Road\_Renfro Property

Hi John:

Please add the well and well note (modify note #5) to the OSDS Plan and BP Site Plan for 13787 Frederick Road.

Thanks,

Hank

Hank Oswald  
Licensed Environmental Health Specialist  
Howard County Health Department  
Bureau of Environmental Health  
Well & Septic Program  
8930 Stanford Boulevard  
Columbia, MD 21045  
410.313.1786 (Office)  
[hoswald@howardcountymd.gov](mailto:hoswald@howardcountymd.gov)

### CONFIDENTIALITY NOTICE

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# BENCHMARK



## ENGINEERING, INC.

8480 Baltimore National Pike • Suite 315 • Ellicott City, Maryland 21043  
 410-465-6105 410-465-6644 (Fax)

### LETTER OF TRANSMITTAL

DATE	2/12/18	PROJECT No.	2876
ATTENTION	Frank Oswald		
RE:	Renfro Lot 1		

TO: Heath

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items
- Photocopies  Prints  Originals  Samples
  - Specifications  Invoices  Change Order  Other \_\_\_\_\_

COPIES of	No. of SHEETS	DESCRIPTION
3	4	OSDS Permit Plan

THESE ARE TRANSMITTED as checked below

- For Comment  For your use  For Approval
- For Review  As requested  Other \_\_\_\_\_

REMARKS: Please put an approved copy  
of front for our pickup.

Thanks

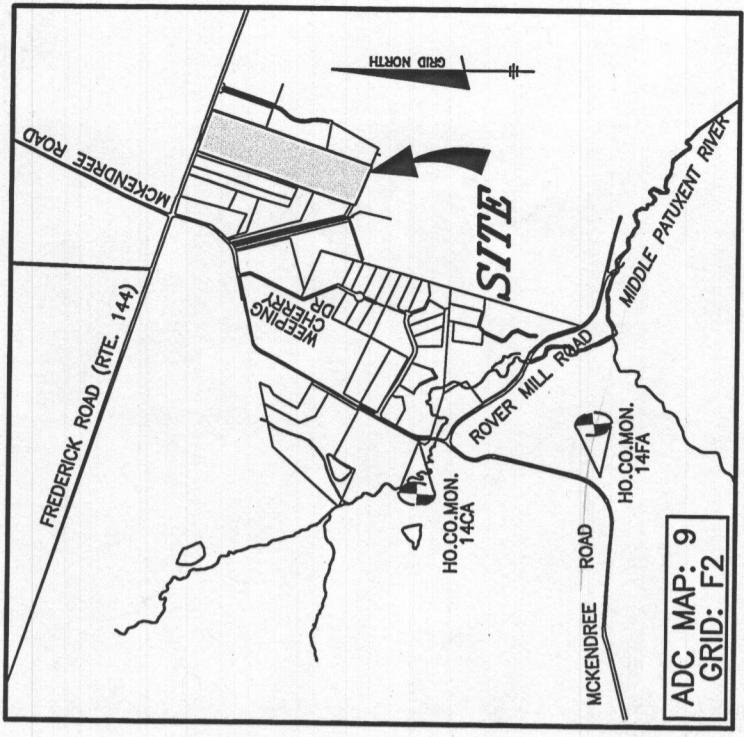
John

COPY TO: \_\_\_\_\_

RECEIVED BY: [Signature]

SIGNED: [Signature]

If enclosures are not as noted, kindly notify us at once.

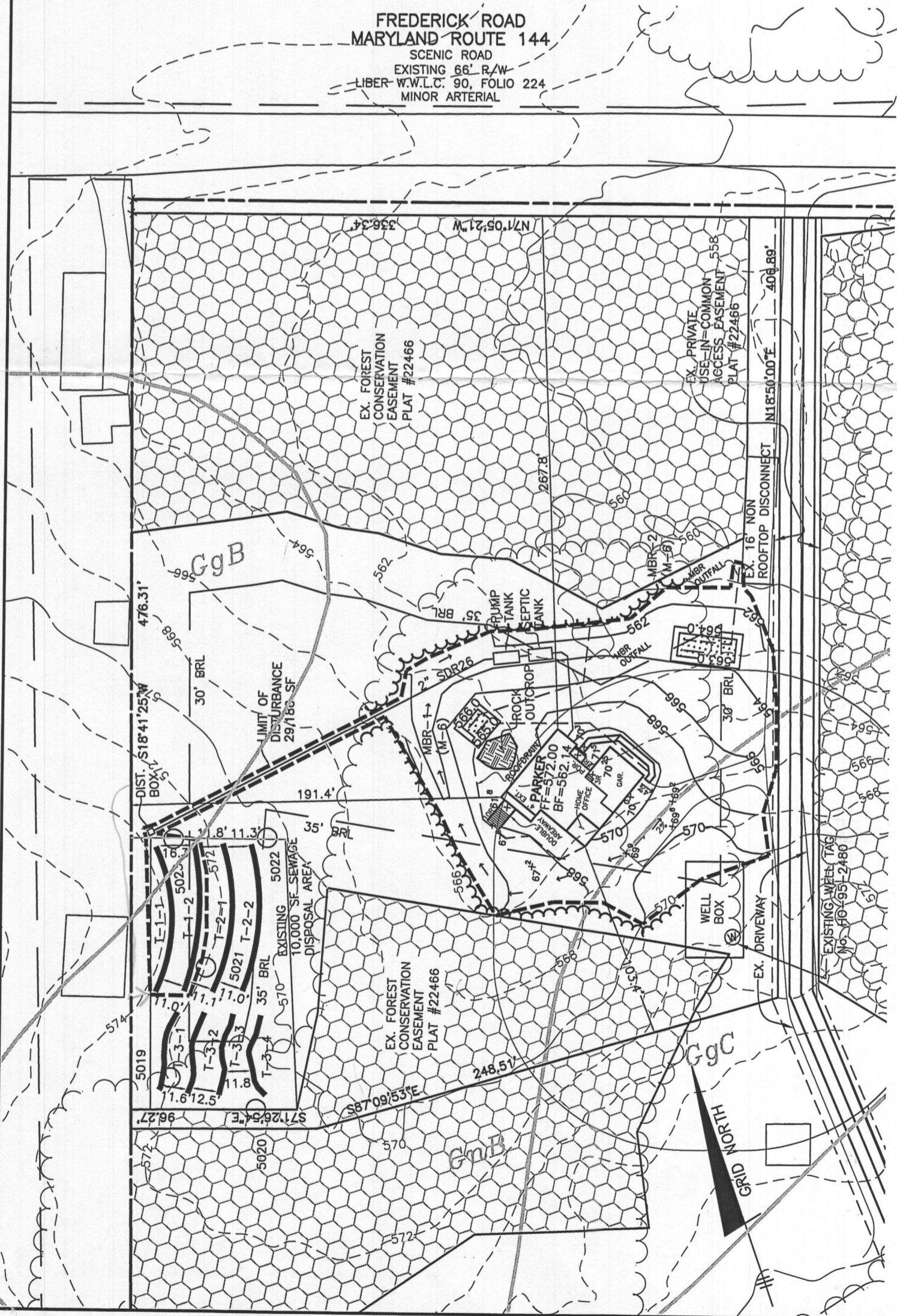


**VICINITY MAP**  
SCALE: 1" = 2000'

**BUILDING PERMIT PLAN NOTES:**

1. THE LOT SHOWN HEREON WAS RECORDED ON THE PLAT FOR RENFRO PROPERTY, PLAT Nos. 22465-22466. REFER TO THE PLATS FOR LOT DIMENSIONS, LOT AREAS, ALL EASEMENTS AND CONDITIONS.
2. SEDIMENT AND EROSION CONTROLS WERE APPROVED BY HOWARD SOIL CONSERVATION
3. TOPOGRAPHY SHOWN HEREON IS TAKEN FROM THE APPROVED ROAD CONSTRUCTION PLANS AND TOPOGRAPHIC INFORMATION PROVIDED BY F-13-040, ON OR ABOUT FEBRUARY, 2013. ALL SEDIMENT AND EROSION CONTROL FEATURES USED ON THIS SITE SHALL COMPLY WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
4. ALL DRAINAGE AND STORMWATER MANAGEMENT FEATURES USED ON THIS SITE MUST COMPLY WITH THE APPROVED SUPPLEMENTAL CONSTRUCTION PLANS EXCEPT AS WAIVED OR REDESIGNED.
5. THE EXISTING WELL SHOWN ON THIS PLAN, HO-95-2480, WAS FIELD LOCATED BY BENCHMARK ENGINEERING, INC., ON JANUARY 22, 2018, AND IS ACCURATELY SHOWN.
6. THERE ARE NO EXISTING WELLS OR SEPTIC SYSTEMS WITHIN 100' OF THIS PROJECT'S BOUNDARY EXCEPT AS NOTED.
7. ANY CHANGES TO A PRIVATE SEWAGE DISPOSAL AREA OR WELL BOX SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN.
8. STORMWATER MANAGEMENT FOR THIS LOT WAS DESIGNED AND PROVIDED BY TWO MICRO-BIORETENTION FACILITIES. MICRO-BIORETENTION SHALL HAVE EITHER A 4" OR 6" ROOF LEADER DEPENDING ON ROOF-TOP AREA.
9. THE SEPTIC TANK WILL HAVE A 2000 GALLON 2 COMPARTMENT TANK.

FREDERICK ROAD  
MARYLAND ROUTE 144  
SCENIC ROAD  
EXISTING 66' R/W  
LIBER. W.W.L.C. 90, FOLIO 224  
MINOR ARTERIAL



**PLAN VIEW**

1" = 60'  
Approved Septic System Plan  
Howard County Health Department

Signature: *Handwritten Signature*  
Date: 2/15/18

<b>BENCHMARKS NAD'83 HORIZONTAL</b>	HO. CO. #14CA
STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE	STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE
N 595829.611' E 131062.217' ELEVATION: 560.299'	N 597624.973' E 1311015.48' ELEVATION: 560.299'

**BUILDER:**  
TAYLOR FARIS  
7233 DARBY DOWNS  
ELKRIDGE, MD 21075  
443-864-3479

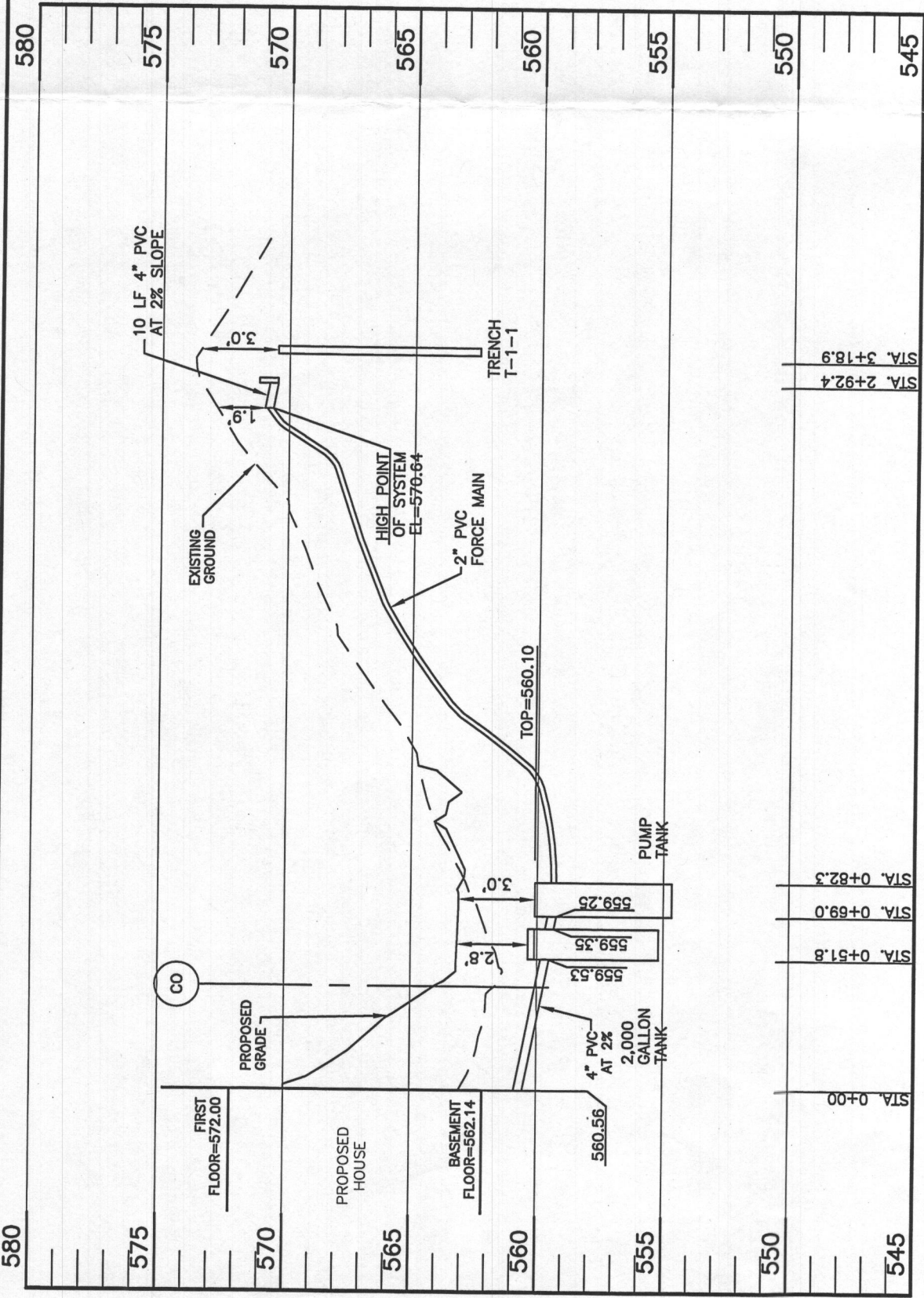
**OWNER:**  
HAROLD E. RENFRO, JR.  
MERILYN S. RENFRO  
13765 FREDERICK ROAD  
WEST FRIENDSHIP, MD 21794  
301-854-6782

**BENCHMARK**  
ENGINEERS LAND SURVEYORS PLANNERS  
**ENGINEERING, INC.**  
8480 BALTIMORE NATIONAL PIKE SUITE 315  
ELLCOTT CITY, MARYLAND 21043  
(P) 410-465-6105 (F) 410-465-6644  
WWW.BEI-CIVILENGINEERING.COM

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.



<b>PROJECT:</b>	RENFRO PROPERTY LOT 1
<b>LOCATION:</b>	TAX MAP: 15, GRID: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654
<b>TITLE:</b>	ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN
<b>HOUSE TYPE:</b>	PARKER
<b>DATE:</b>	FEBRUARY, 2018 PROJECT NO. 2876
<b>SCALE:</b>	AS SHOWN DRAWING 1 OF 4



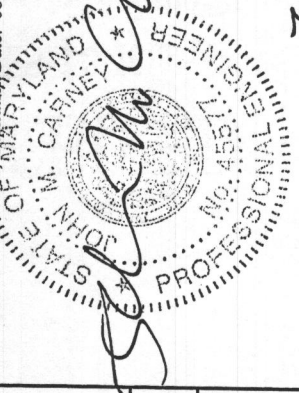
INITIAL SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

1st REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

2nd REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	7.5	ft
Design Flow	750	gpd
Drainage Field square footage	938	sf
Sidewall reduction credit	0.55555556	
Trench width	3	
Effective Area Depth	2.5	
<b>Linear Length of trench Required</b>	<b>174</b>	<b>lf</b>

INITIAL SYSTEM		FUTURE FIRST REPAIR	
TRENCH T-1-1	78 LF	TRENCH T-2-1	78 LF
TRENCH LENGTH	573.6	TRENCH LENGTH	571.6
GROUND ELEVATION	570.6	GROUND ELEVATION	568.6
INVERT ELEVATION	565.6	INVERT ELEVATION	563.6
MAX. BOTTOM ELEV.		MAX. BOTTOM ELEV.	
TRENCH T-1-2	78 LF	TRENCH T-2-2	78 LF
TRENCH LENGTH	572.3	TRENCH LENGTH	570.9
GROUND ELEVATION	569.3	GROUND ELEVATION	567.9
INVERT ELEVATION	564.3	INVERT ELEVATION	562.9
MAX. BOTTOM ELEV.		MAX. BOTTOM ELEV.	

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.



THIS PLAN IS FOR SEPTIC DESIGN ONLY  
SEE MANUFACTURES SPECIFICATIONS FOR DETAILS.  
WWW.MAYERPRECAST.COM  
EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUTED.

SIGNATURE AND SEAL ARE FOR SEPTIC PROFILE AND CALCULATIONS ONLY, TANK AND DETAILS WERE NOT DESIGNED OR REVIEWED BY THE ENGINEER:

**BENCHMARK**  
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**BUILDER:**  
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7233 DARBY DOWNS  
ELKRIDGE, MD 21075  
443-864-3479

**OWNER:**  
HAROLD E. RENFRO, JR.  
MERILYN S. RENFRO  
13765 FREDERICK ROAD  
WEST FRIENDSHIP, MD 21794  
301-854-6782

**PROJECT:** RENFRO LOT 1

**LOCATION:** TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654

**TITLE:** ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN

**HOUSE TYPE:** PARKER

**DATE:** FEBRUARY, 2018

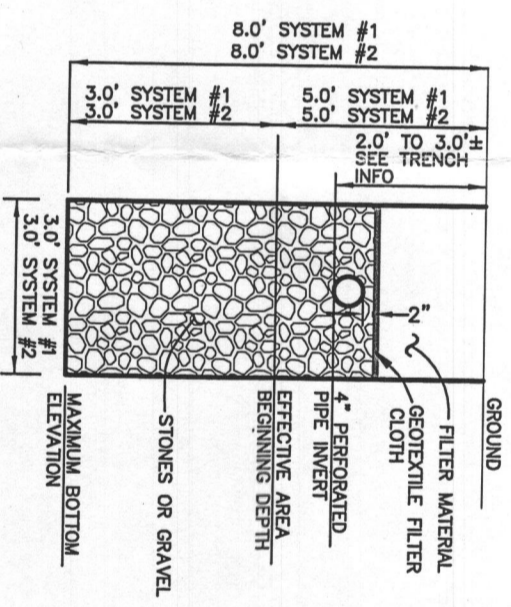
**PROJECT NO.:** 2876

**SCALE:** AS SHOWN

**DRAWING** 2 OF 4

<b>Pumping Station</b>	Diameter of Force Main and Manifold =	2 of SDR 21 pipe	Length of Force Main =	197 feet	SDR 21 gallons/100 feet =	18.8 Table 4.2
	Volume of Main =	37.1 gallons	Total Volume =	37.1 gallons	volume =	18.84222 gal/100 ft
	Minimum Dose must be greater than 1/6 of the design flow	125 gallons	Minimum Dose must be greater than the volume of the main	37 gallons		
	Use minimum dose of	150 gallons	okay	Doses per Day =	5	
	<b>Size Pump Chamber</b>					
	Pump chamber must be able to hold one dose and one days design flow					
	One day Capacity =	750 gallons	Dose =	150 gallons	Totals =	900 gallons
	Use 2,000 gallon pump tank					
	<b>Sizing the Pump</b>					
	Flow: runtime =	7 minutes	rate =	21.43 gallons/minute		
	<b>Design Head:</b>					
	Design Head = Static Head + Friction Head					
	Static Head = highest elevation of main - pump off elevation					
	Highest component of system =	570.64 Main HP	Pump off elevation =	557.00	Static Head =	13.64 feet
	Friction Head = Head loss due to pipe friction					
	2.0" pipe =	197 feet	45° bends	1 loss for bend	4 feet	per table 4.3
	Gate Valve	0 loss for tee		0 feet	0 feet	per table 4.3
	Friction loss per table 4.4 =			0.84 (ft/100 ft)		
	Equivalent Length =	201	Friction loss	1.69 feet	Total Friction Head =	1.69
	Design Head =	15.33 feet				
	<b>Pump Requirements:</b>					
	Performance =	21.43 gpm	Head of Water =	15.33 feet of head		
	<b>Pump Selection:</b>					
	Zoeller Pump Company Flow-mate Series, Model 151					
	1/3 horse power					
	Pump Flow Rate =	39.00 gallons/minute	per rating curve	TDH analysis	3.85 Minutes	18.68 ft
			Between design and curve? Yes			

<b>Design Pump Chamber</b>	Ground over Tank =	563.10	Cover	3 ft
	Top of Tank =	560.10	Invert of Tank =	555.01
	6" Riser =	0.50 feet	Pump Height =	1.10 feet
	Min. Pump off =	556.61	Selected Pump off =	557.00
	Dose =	20.1 cf	Area of Pit =	73.05 sf
	Pump on dist. =	0.27	Pump on Elev. =	557.27
	Distance between Pump on and Highwater Alarm =	0.5 feet	Highwater Alarm Elevation =	557.77
	Dist. for a dose above alarm =	1.37	Minimum Inlet Elev. =	559.15
	Tank Inlet =	559.26 Okay	Dist. Alarm to Inlet =	1.49 Okay



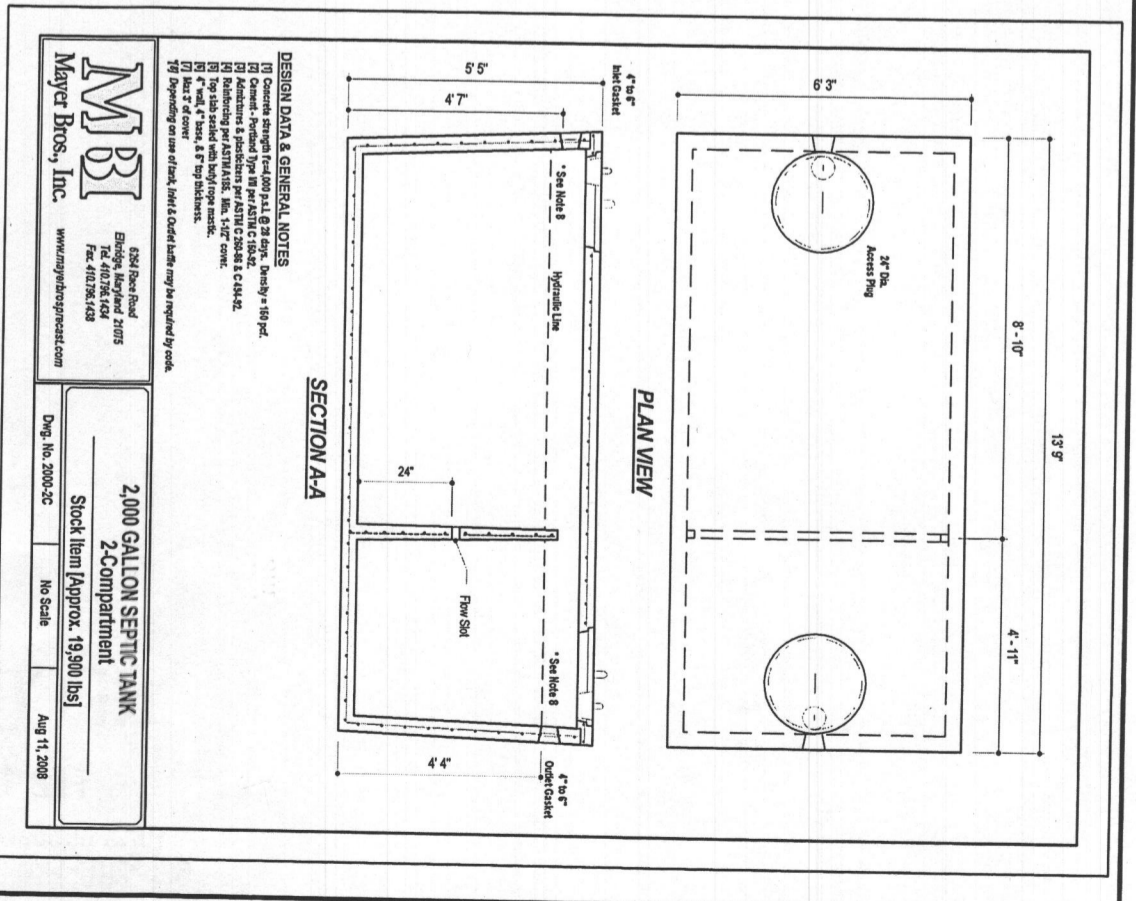
**TYPICAL TRENCH DETAIL**  
NOT TO SCALE

**THIS PLAN IS FOR SEPTIC DESIGN ONLY**

SEE MANUFACTURES SPECIFICATIONS FOR DETAILS. EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUED.

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Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 45577, Expiration Date: 06-08-2018.



**2,000 GALLON SEPTIC TANK**  
2-Compartment  
Stock Item [Approx. 19,900 lbs]  
Mayer Bros, Inc. www.mayerbros.com  
4394 River Road, Elkridge, Maryland 21075, Tel: 410.763.164, Fax: 410.763.1438  
Dwg. No. 2000-2C No. Scale Date: Aug 11, 2008

**BUILDER:** TAYLOR FARIS, 7233 DARBY DOWNS, ELKRIDGE, MD 21075, 443-864-3479  
**OWNER:** HAROLD E. RENFRO, JR., MERILYN S. RENFRO, 13765 FREDERICK ROAD, WEST FRIENDSHIP, MD 21794, 301-854-6782

**PROJECT:** RENFRO LOT 1

**LOCATION:** TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO, THIRD ELECTION DISTRICT, HOWARD COUNTY, MD, TAX ID NUMBER 03-595654

**TITLE:** ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN  
**HOUSE TYPE:** PARKER

**DATE:** JANUARY, 2018  
**SCALE:** AS SHOWN  
**PROJECT NO.:** 2876  
**DRAWING:** 3 OF 4



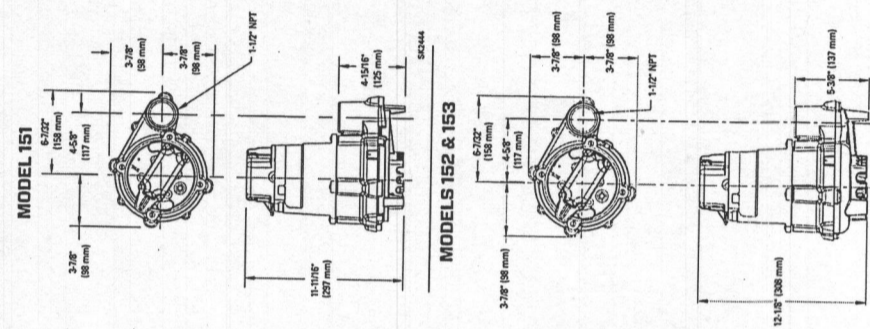
Trusted. Tested. Tough.<sup>™</sup>

SECTION: 2.15.080  
FMZ784  
1017  
Supersedes  
0315

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

**PRODUCT SPECIFICATIONS**

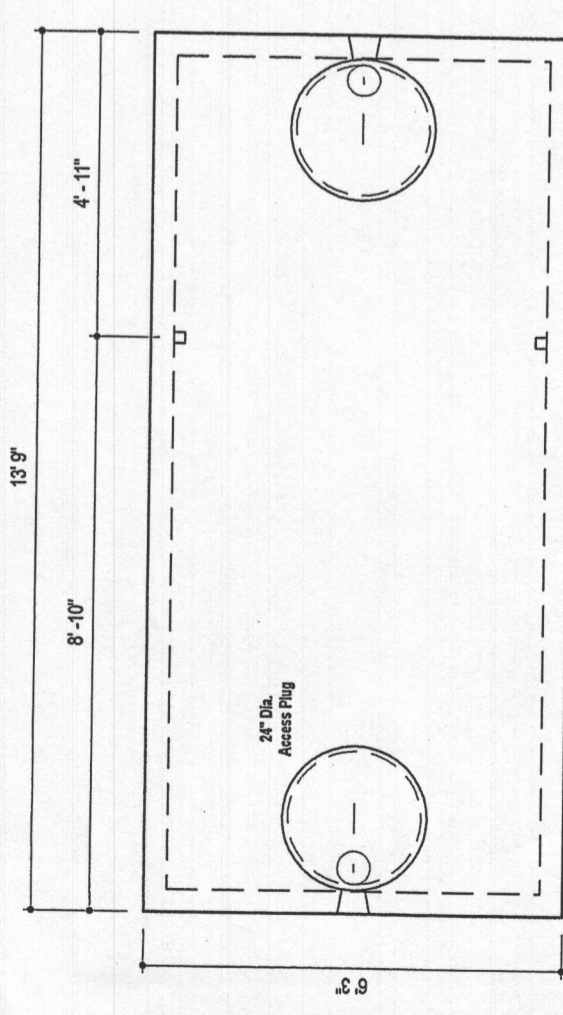
<b>MOTOR</b>	Horse Power	1/2 (151), 4/10 (152), 1/2 (153)
	Voltage	115 or 230
	Phase	1 Ph
	Herz	60 Hz
	RPM	3450
	Type	Permanent split capacitor
	Insulation	Class B
	Amps	3.0 - 10.5
	Operation	Automatic or nonautomatic
	Discharge Size	1-1/2" NPT
	Solids Handling	1/2" (12 mm), 3/4" (19 mm) spherical solids
	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
	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-dagging vane
	Impeller	Engineered thermoplastic
	Hardware	Stainless steel
	Motor Shaft	ANSI 1215 steel
	Gasket	Neoprene



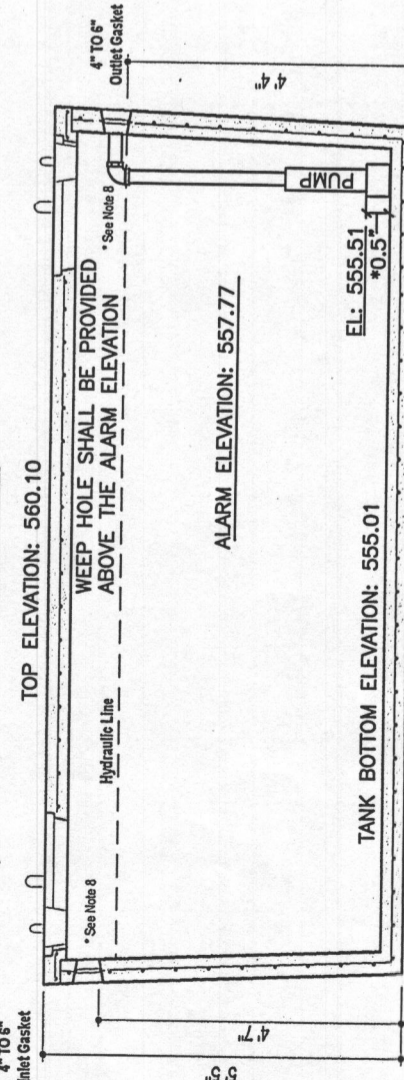
NOTE: The string of effluent systems normally requires variable level float(s) to achieve required pumping cycles or dosing timers with nonautomatic pumps.  
NOTE: See model comparison chart for specific details.



© Copyright 2017 Zoeller Co. All rights reserved.  
502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | zoellerpumps.com



**PLAN VIEW**



**SECTION A-A**

**DESIGN DATA & GENERAL NOTES**

- Concrete strength f<sub>c</sub>=4,000 p.s.i. @ 28 days. Density = 160 pcf.
- Cement - Portland Type III per ASTM C 150-92.
- Admixtures & plasticizers per ASTM C 260-98 & C 494-92.
- Reinforcing per ASTM A198. Min. 1-1/2" cover.
- Top slab sealed with butyl rope mastic.
- 4" wall, 4" base, & 6" top thickness.
- Max 3" of cover
- Depending on use of tank, Inlet & Outlet baffle may be required by code.

**DESIGN DATA & GENERAL NOTES**

<b>FLOAT TREE:</b>	ELEV.	RELATIVE TO BOTTOM
BOTTOM OF TANK	555.01	1'-7 1/4"
TOP OF PUMP	556.61	2'
PUMP OFF	557.00	2'-3 1/8"
PUMP ON	557.27	2'-9 1/8"
HIGH ALARM	557.77	

WEIGHT = 19,000 lbs.

**2,000 GALLON SEPTIC TANK**  
1-Compartment

Stock Item [Approx. 19,000 lbs]

Dwg. No. 2000-1C No Scale Aug. 11, 2008

**MBI**  
Mayer Bros., Inc.

6264 Race Road  
Elkridge, Maryland 21075  
Tel. 410.796.1434  
Fax 410.796.1438  
www.mayerbrosprecast.com

**TOTAL DYNAMIC HEAD**  
**FLOW PER MINUTE**

MODEL	151	152	153
Feet	Meters	Gal.	Liters
5	1.5	50	189
10	3.0	45	170
15	4.5	38	144
20	6.1	29	110
25	7.6	19	71
30	9.1	11	41
35	10.7	7	26
40	12.2	5	18
45	13.7	3	11
50	15.3	2	7

RECOMMENDED PUMP: BN151

**MODEL PERFORMANCE CURVE**  
MODEL 151/152/153

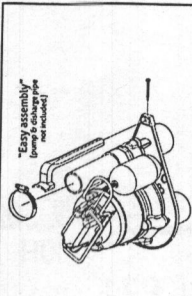
**MODEL COMPARISON**

Model	Seal	Mode	Volts	Ph	Amps	HP	Lbs	Kg	Simplex	Duplex
N151	Single	Non	115	1	6.0	1/2	32	15	1	2 or 3
E151	Single	Non	230	1	3.0	1/2	32	15	1	2 or 3
BN151	Single	Auto	115	1	6.0	1/2	33	15	*	2 or 3
BE151	Single	Auto	230	1	3.0	1/2	33	15	*	2 or 3
N152	Single	Non	115	1	8.5	4/10	60	27	1	2 or 3
E152	Single	Non	230	1	4.3	4/10	60	27	1	2 or 3
BN152	Single	Auto	115	1	8.5	4/10	60	27	*	2 or 3
BE152	Single	Auto	230	1	4.3	4/10	60	27	*	2 or 3
N153	Single	Non	115	1	10.5	1/2	60	27	1	2 or 3
E153	Single	Auto	115	1	10.5	1/2	60	27	1	2 or 3
BN153	Single	Auto	230	1	5.3	1/2	60	27	1	2 or 3
BE153	Single	Auto	230	1	5.3	1/2	60	27	1	2 or 3

\*BN and BE models include a 20' (6 m) piggyback variable level pump switch. Additional cord lengths are available in 25' (8 m) and 35' (11 m). 50' (15 m) cords are available for 230 V units only.  
NOTE: Model 151 has a plastic base. Models 152 & 153 have a cast iron base.

**SELECTION GUIDE**

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



- OPTIONAL PUMP STAND P/N 10-2421**
- Reduces potential clogging by debris
  - Replaces rocks or bricks under the pump
  - Made of durable, noncorrosive ABS
  - Raises pump 2" (5 cm) off bottom of basin
  - Can be made by adding sections of 1 1/2" or 2" (38 mm or 51 mm) PVC pipe
  - Accommodates sump, dewatering and effluent applications
  - Attaches securely to pump
  - NOTE: Make sure float is free from obstruction.

**CAUTION** 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).  
© Copyright 2017 Zoeller Co. All rights reserved.  
502-778-2731 | 800-928-7867 | 3649 Cane Run Road | Louisville, KY 40211-1961 | zoellerpumps.com

**SIGNATURE AND SEAL ARE FOR SEPTIC PROFILE AND CALCULATIONS ONLY, TANK, PUMP AND DETAILS WERE NOT DESIGNED OR REVIEWED BY THE ENGINEER:**

**THIS PLAN IS FOR SEPTIC DESIGN ONLY**

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.



SEE MANUFACTURES SPECIFICATIONS FOR DETAILS. EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUTED.

**BENCHMARK**  
ENGINEERS LAND SURVEYORS PLANNERS  
**ENGINEERING, INC.**  
8480 BALTIMORE NATIONAL PIKE SUITE 315  
ELLCOTT CITY, MARYLAND 21043  
(P) 410-465-6105 A (F) 410-465-6644  
WWW.BEI-CIVILENGINEERING.COM

**BUILDER:**  
TAYLOR FARIS  
7233 DARBY DOWNS  
ELKRIDGE, MD 21075  
443-864-3479

**OWNER:**  
HAROLD E. RENFRO, JR.  
MERILYN S. RENFRO  
13765 FREDERICK ROAD  
WEST FRIENDSHIP, MD 21794  
301-854-6782

**PROJECT:** RENFRO LOT 1

**LOCATION:** TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654

**TITLE:** ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN

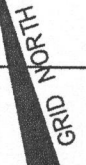
**HOUSE TYPE:** PARKER

**DATE:** JANUARY, 2018 PROJECT NO. 2876

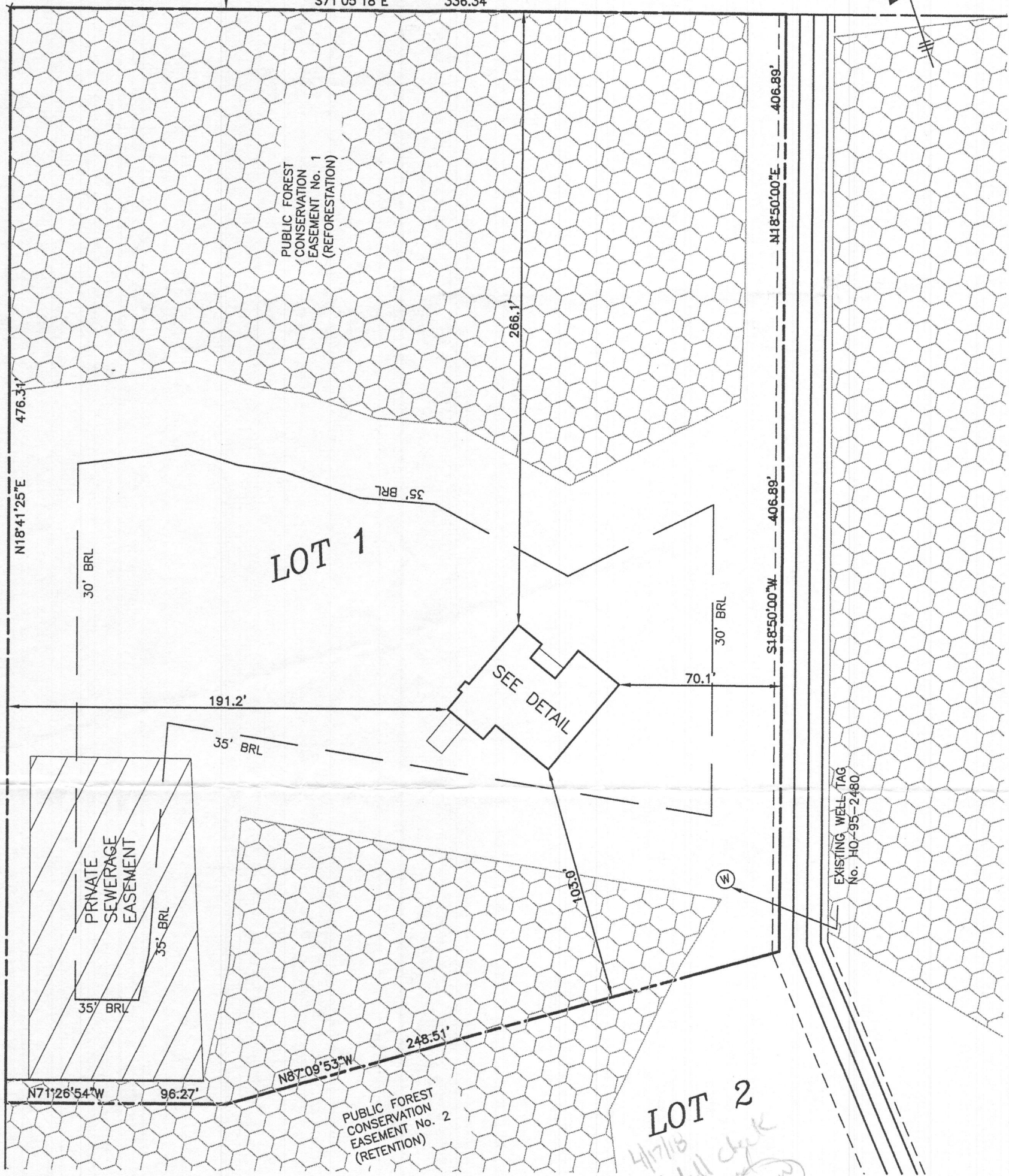
**SCALE:** AS SHOWN DRAWING 4 OF 4

CL ROAD

FREDERICK ROAD  
MARYLAND ROUTE 144  
SCENIC ROAD  
MINOR ARTERIAL  
S71°05'18"E 336.34'

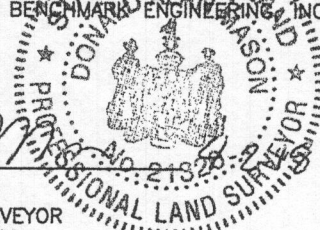


PROPERTY OF  
MICHAEL EDWARD BELL  
L. 6045, F. 301



**SURVEYOR'S CERTIFICATE**

I HEREBY CERTIFY THAT THESE DOCUMENTS, WERE PREPARED BY ME OR UNDER MY RESPONSIBLE CHARGE, AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21320, EXPIRATION DATE 1-7-2019 AND TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF, THAT THE DIMENSIONS OF THE BUILDING WALLS SHOWN HEREON ARE CORRECT; THAT THEY ARE BASED ON A FIELD RUN SURVEY PERFORMED BY BENCHMARK ENGINEERING, INC. ON 04/02/2018.



DONALD A. MASON  
PROFESSIONAL LAND SURVEYOR  
MARYLAND REG. No. 21320

FEMA FIRM No. 24027C0035D  
ZONE: X  
DATED: 11/6/2013

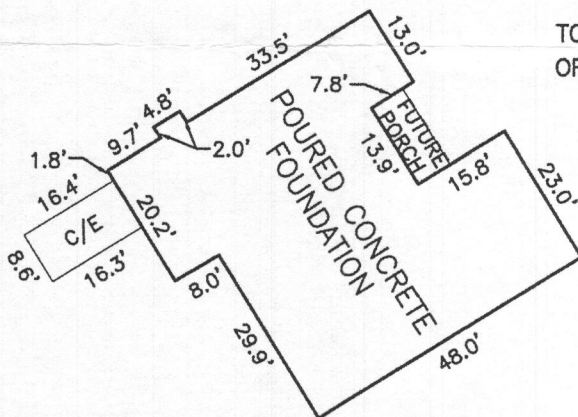
**BENCHMARK**

ENGINEERS LAND SURVEYORS PLANNERS

ENGINEERING, INC.

8480 BALTIMORE NATIONAL PIKE SUITE 315  
ELLCOTT CITY, MARYLAND 21043  
(P) 410-465-6105 (F) 410-465-6644

WWW.BEI-CVLENGINEERING.COM



FOUNDATION DETAIL  
SCALE: 1" = 30'

FIELD OBS. BY PJ&ML  
COMP. BY EWF  
DRAWN BY EWF

TOP OF FOUNDATION WALL = 570.8'  
OFFSET DIMENSIONS TO PROPERTY LINES ARE ± 0.1'

*4/17/18  
Wall check  
EWF*

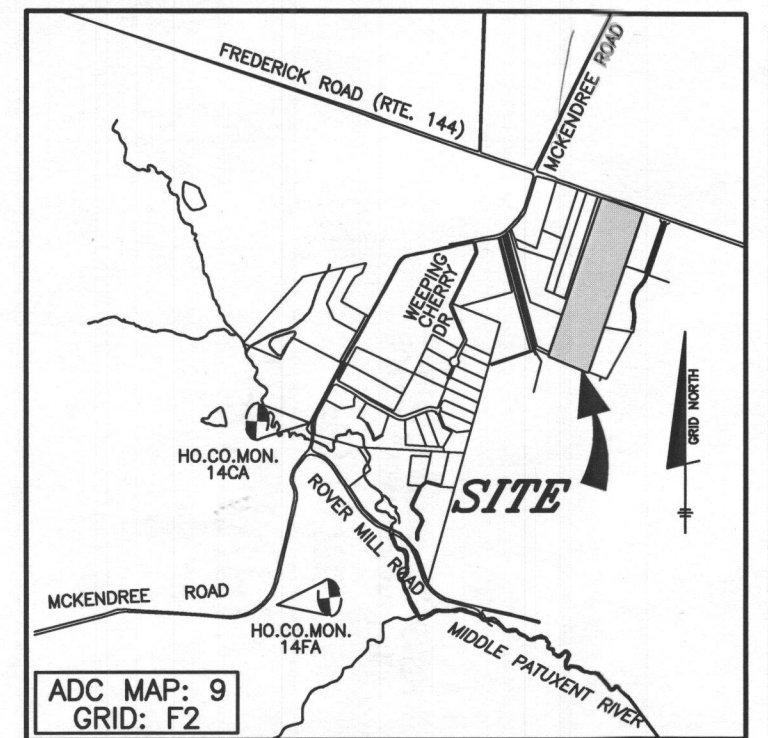
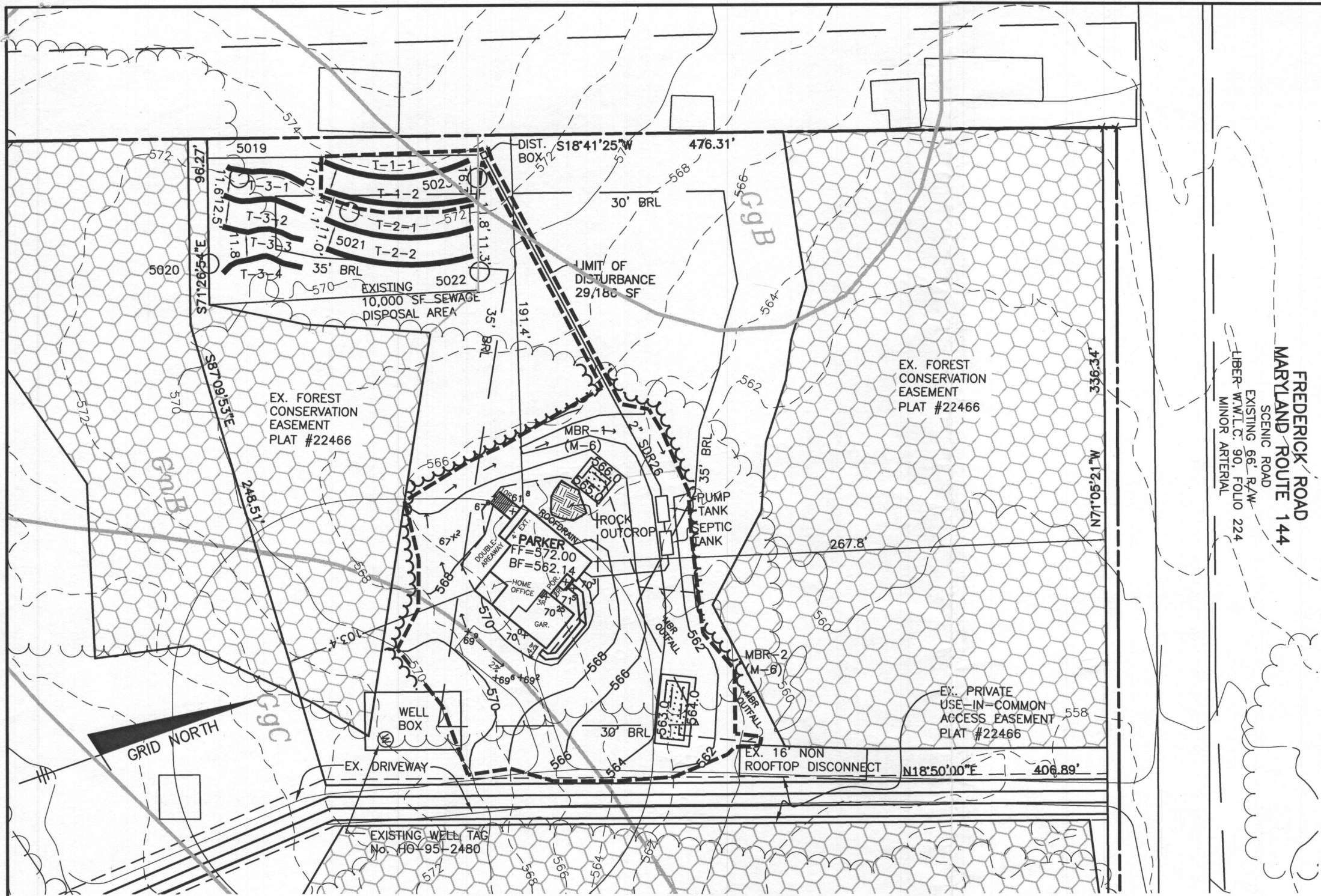
**WALL CHECK**

**RENFRO PROPERTY  
BUILDABLE LOTS 1 THRU 5  
PLAT No. 22466  
LOT No. 1**

13787 FREDERICK ROAD

3RD ELECTION DISTRICT  
HOWARD COUNTY, MARYLAND

SCALE: 1" = 50' DATE: 04/02/2018



VICINITY MAP  
SCALE: 1" = 2000'

- BUILDING PERMIT PLAN NOTES:**
1. THE LOT SHOWN HEREON WAS RECORDED ON THE PLAT FOR RENFRO PROPERTY, PLAT Nos. 22465-22466. REFER TO THE PLATS FOR LOT DIMENSIONS, LOT AREAS, ALL EASEMENTS AND CONDITIONS.
  2. SEDIMENT AND EROSION CONTROLS WERE APPROVED BY HOWARD SOIL CONSERVATION
  3. TOPOGRAPHY SHOWN HEREON IS TAKEN FROM THE APPROVED ROAD CONSTRUCTION PLANS AND TOPOGRAPHIC INFORMATION PROVIDED BY F-13-040, ON OR ABOUT FEBRUARY, 2013. ALL SEDIMENT AND EROSION CONTROL FEATURES USED ON THIS SITE SHALL COMPLY WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
  4. ALL DRAINAGE AND STORMWATER MANAGEMENT FEATURES USED ON THIS SITE MUST COMPLY WITH THE APPROVED SUPPLEMENTAL CONSTRUCTION PLANS EXCEPT AS WAIVED OR REDESIGNED.
  5. THE EXISTING WELL SHOWN ON THIS PLAN, HO-95-2480, WAS FIELD LOCATED BY BENCHMARK ENGINEERING, INC., ON JANUARY 22, 2018, AND IS ACCURATELY SHOWN.
  6. THERE ARE NO EXISTING WELLS OR SEPTIC SYSTEMS WITHIN 100' OF THIS PROJECT'S BOUNDARY EXCEPT AS NOTED.
  7. ANY CHANGES TO A PRIVATE SEWAGE DISPOSAL AREA OR WELL BOX SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN.
  8. STORMWATER MANAGEMENT FOR THIS LOT WAS DESIGNED AND PROVIDED BY TWO MICRO-BIORETENTION FACILITIES. MICRO-BIORETENTION SHALL HAVE EITHER A 4" OR 6" ROOF LEADER DEPENDING ON ROOF-TOP AREA.
  9. THE SEPTIC TANK WILL HAVE A 2000 GALLON 2 COMPARTMENT TANK.

**PLAN VIEW**

1" = 60'

Approved Septic System Plan  
Howard County Health Department

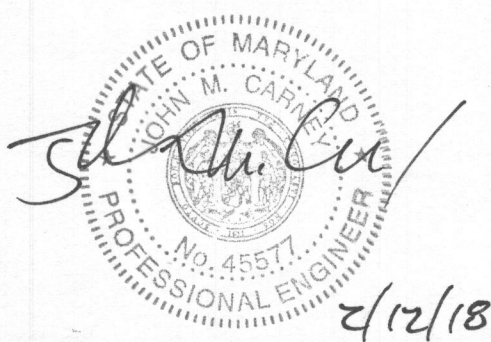
*Hank Osborn*  
Signature Date 2/5/18

**BENCHMARKS NAD'83 HORIZONTAL**

HO. CO. #14FA  
STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE.  
N 595829.611' E 1310622.17'  
ELEVATION: 560.299'

HO. CO. #14CA  
STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE  
N 597624.973' E 1311015.48'  
ELEVATION: 560.299'

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.

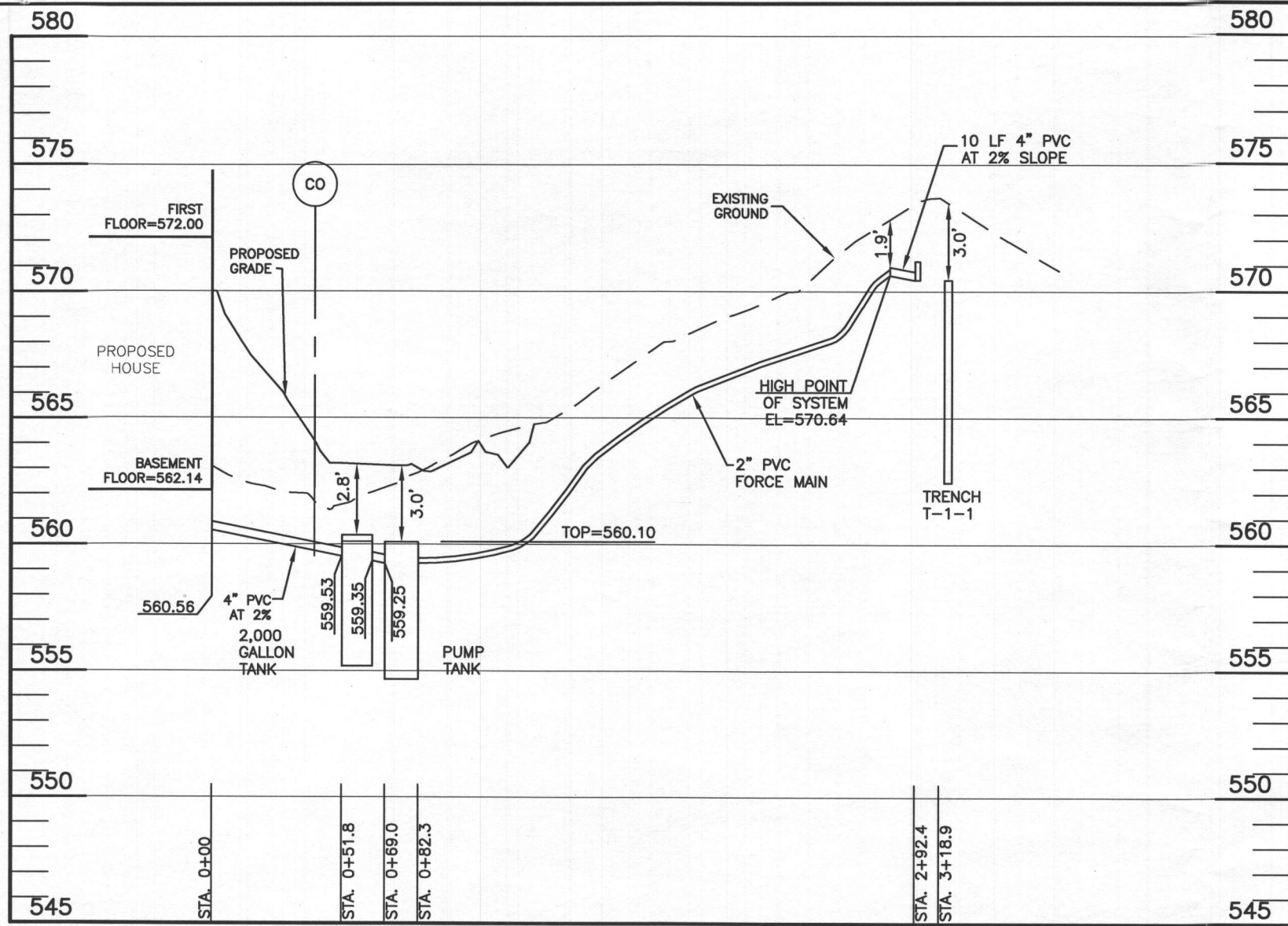


**BUILDER:**  
TAYLOR FARIS  
7233 DARBY DOWNS  
ELKCRIDGE, MD 21075  
443-864-3479

**OWNER:**  
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MERILYN S. RENFRO  
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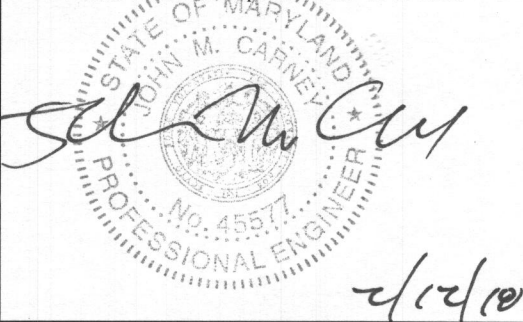
PROJECT:	<b>RENFRO PROPERTY</b>	
	LOT 1	
LOCATION:	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
TITLE:	<b>ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN</b>	
HOUSE TYPE:	<b>PARKER</b>	
DATE:	FEBRUARY, 2018	PROJECT NO. 2876
SCALE:	AS SHOWN	DRAWING 1 OF 4



INITIAL SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

1st REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.



THIS PLAN IS FOR SEPTIC DESIGN ONLY

SEE MANUFACTURERS SPECIFICATIONS FOR DETAILS. WWW.MAYERPRECAST.COM EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUTED.

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WWW.BEI-CMLENGINEERING.COM

**INITIAL SYSTEM**

TRENCH T-1-1	
TRENCH LENGTH	78 LF
GROUND ELEVATION	573.6
INVERT ELEVATION	570.6
MAX. BOTTOM ELEV.	565.6
TRENCH T-1-2	
TRENCH LENGTH	78 LF
GROUND ELEVATION	572.3
INVERT ELEVATION	569.3
MAX. BOTTOM ELEV.	564.3

**FUTURE FIRST REPAIR**

TRENCH T-2-1	
TRENCH LENGTH	78 LF
GROUND ELEVATION	571.6
INVERT ELEVATION	568.6
MAX. BOTTOM ELEV.	563.6
TRENCH T-2-2	
TRENCH LENGTH	78 LF
GROUND ELEVATION	570.9
INVERT ELEVATION	567.9
MAX. BOTTOM ELEV.	562.9

2nd REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	7.5	ft
Design Flow	750	gpd
Drainage Field square footage	938	sf
Sidewall reduction credit	0.55555556	
Trench width	3	
Effective Area Depth	2.5	
<b>Linear Length of trench Required</b>	<b>174</b>	<b>lf</b>

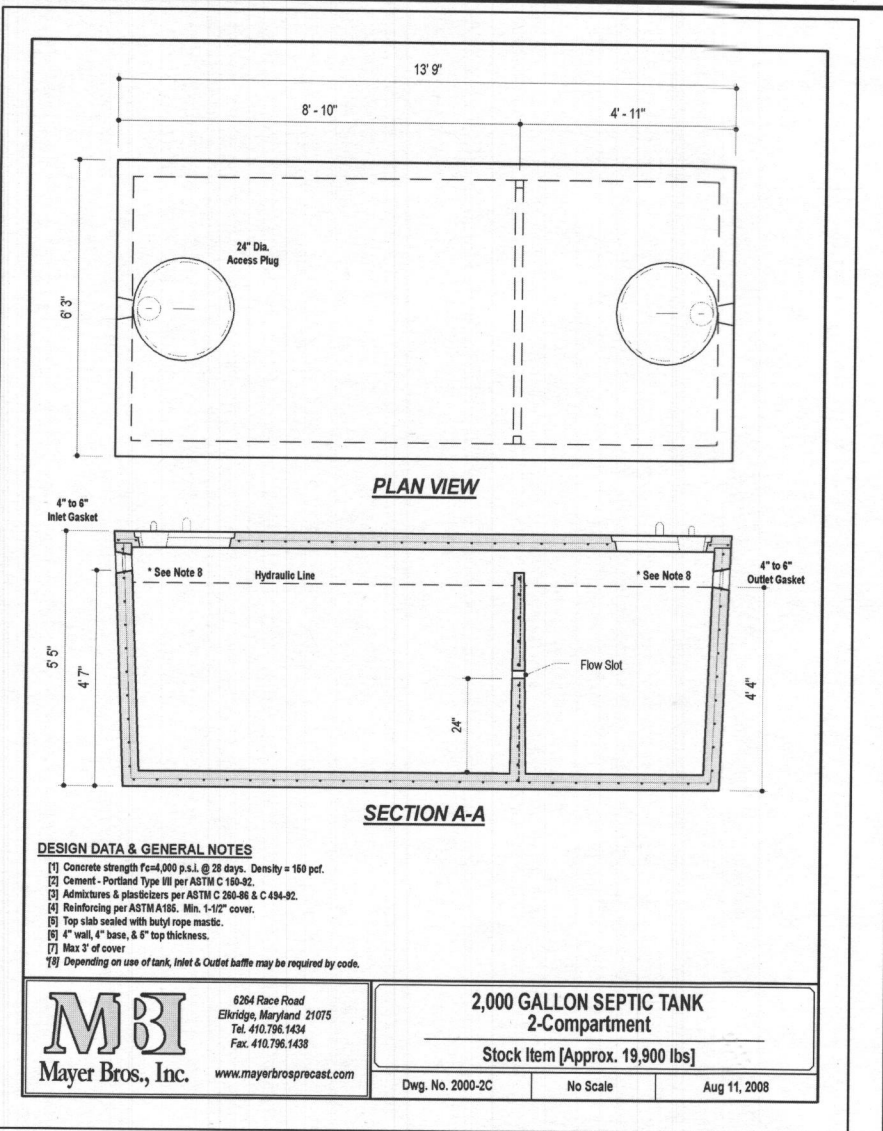
**BUILDER:**  
TAYLOR FARIS  
7233 DARBY DOWNS  
ELKRIDGE, MD 21075  
443-864-3479

**OWNER:**  
HAROLD E. RENFRO, JR.  
MERILYN S. RENFRO  
13765 FREDERICK ROAD  
WEST FRIENDSHIP, MD 21794  
301-854-6782

PROJECT:	RENFRO LOT 1	
LOCATION:	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
TITLE:	ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN	
HOUSE TYPE:	PARKER	
DATE:	FEBRUARY, 2018	PROJECT NO. 2876
SCALE:	AS SHOWN	DRAWING 2 OF 4

Pumping Station			
Diameter of Force Main and Manifold =	2 of SDR 21 pipe		
Length of Force Main =	197 feet	SDR 21 gallons/100 feet =	18.8 Table 4.2
Volume of Main =	37.1 gallons	ID =	2.149
		length =	100 gallon/sq ft 7.480519
Total Volume =	37.1 gallons	volume =	18.84222 gal/100 lf
Minimum Dose must be greater than 1/6 of the design flow	125 gallons		
Minimum Dose must be greater than the volume of the main	37 gallons		
Use minimum dose of	150 gallons okay	Doses per Day =	5
Size Pump Chamber			
Pump chamber must be able to hold one dose and one days design flow			
One day Capacity =	750 gallons		
Dose =	150 gallons		
Totals =	900 gallons		
Use 2,000 gallon pump tank			
Tank Dimensions:			
	Exterior	Interior	
	Length: 13.75 feet	Length: 13.08 feet	Walls: 0.33 feet
	Width: 6.25 feet	Width: 5.58 feet	Bottom: 0.33 feet
	Height: 5.42 feet	Height: 4.67 feet	Top: 0.42 feet
		Area: 73.05 sf	Bottom to Inlet: 4.58 feet
		Volume: 341.14 cf	
Sizing the Pump			
Flow:	runtime =	7 minutes	
	rate =	21.43 gallons/minute	
Design Head:	Design Head = Static Head + Friction Head		
	Static Head = highest elevation of main - pump off elevation		
	Highest component of system =	570.64 Main HP	
	Pump off elevation =	557.00	
	Static Head =	13.64 feet	
	Friction Head = Head loss due to pipe friction		
	2.0" pipe =	197 feet	
	45° bends	1 loss for bend	4 feet per table 4.3
	Gate Valve	0 loss for tee	0 feet per table 4.3
	Friction loss per table 4.4 =	0.84 (ft/100 ft)	
	Equivalent Length =	201	Friction loss 1.69 feet
	Total Friction Head =	1.69	
	Design Head =	15.33 feet	
Pump Requirements:			
	Performance =	21.43 gpm	
	Head of Water =	15.33 feet of head	
Pump Selection:	Zoeller Pump Company Flow-mate Series, Model 151 1/3 horse power		
Pump Flow Rate =	39.00 gallons/minute	per rating curve	3.85 Minutes
		TDH analysis	18.68 ft
		Between design and curve? Yes	

Design Pump Chamber			
Ground over Tank =	563.10	Cover	3 ft
Top of Tank =	560.10		
Invert of Tank =	555.01		
6" Riser =	0.50 feet		
Pump Height =	1.10 feet		
Min. Pump off =	556.61		
Selected Pump off =	557.00		
Dose =	20.1 cf		
Area of Pit =	73.05 sf		
Pump on dist. =	0.27		
Pump on Elev. =	557.27		
Distance between Pump on and Highwater Alarm =	0.5 feet		
Highwater Alarm Elevation =	557.77		
Dist. for a dose above alarm =	1.37		
Minimum Inlet Elev. =	559.15		
Tank Inlet =	559.26 Okay		
Dist. Alarm to Inlet =	1.49 Okay		



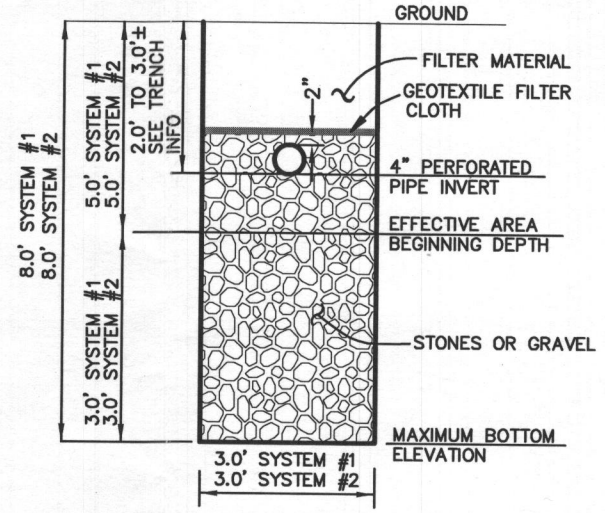
**DESIGN DATA & GENERAL NOTES**

- [1] Concrete strength f'c=4,000 p.s.i. @ 28 days. Density = 150 pcf.
- [2] Cement - Portland Type III per ASTM C 150-82.
- [3] Admixtures & plasticizers per ASTM C 260-96 & C 494-92.
- [4] Reinforcing per ASTM A193. Min. 1-1/2" cover.
- [5] Top slab sealed with butyl rope mastic.
- [6] 4" wall, 4" base, & 8" top thickness.
- [7] Max 3" of cover.
- [8] Depending on use of tank, Inlet & Outlet baffle may be required by code.

**Mayer Bros., Inc.**  
6264 Race Road  
Elkridge, Maryland 21075  
Tel. 410.796.1434  
Fax. 410.796.1438  
www.mayerbrosprecast.com

**2,000 GALLON SEPTIC TANK  
2-Compartment**  
Stock Item [Approx. 19,900 lbs]

Dwg. No. 2000-2C    No Scale    Aug 11, 2008



**TYPICAL TRENCH DETAIL**  
NOT TO SCALE

**SIGNATURE AND SEAL ARE FOR SEPTIC PROFILE AND CALCULATIONS ONLY, TANK, PUMP AND DETAILS WERE NOT DESIGNED OR REVIEWED BY THE ENGINEER:**

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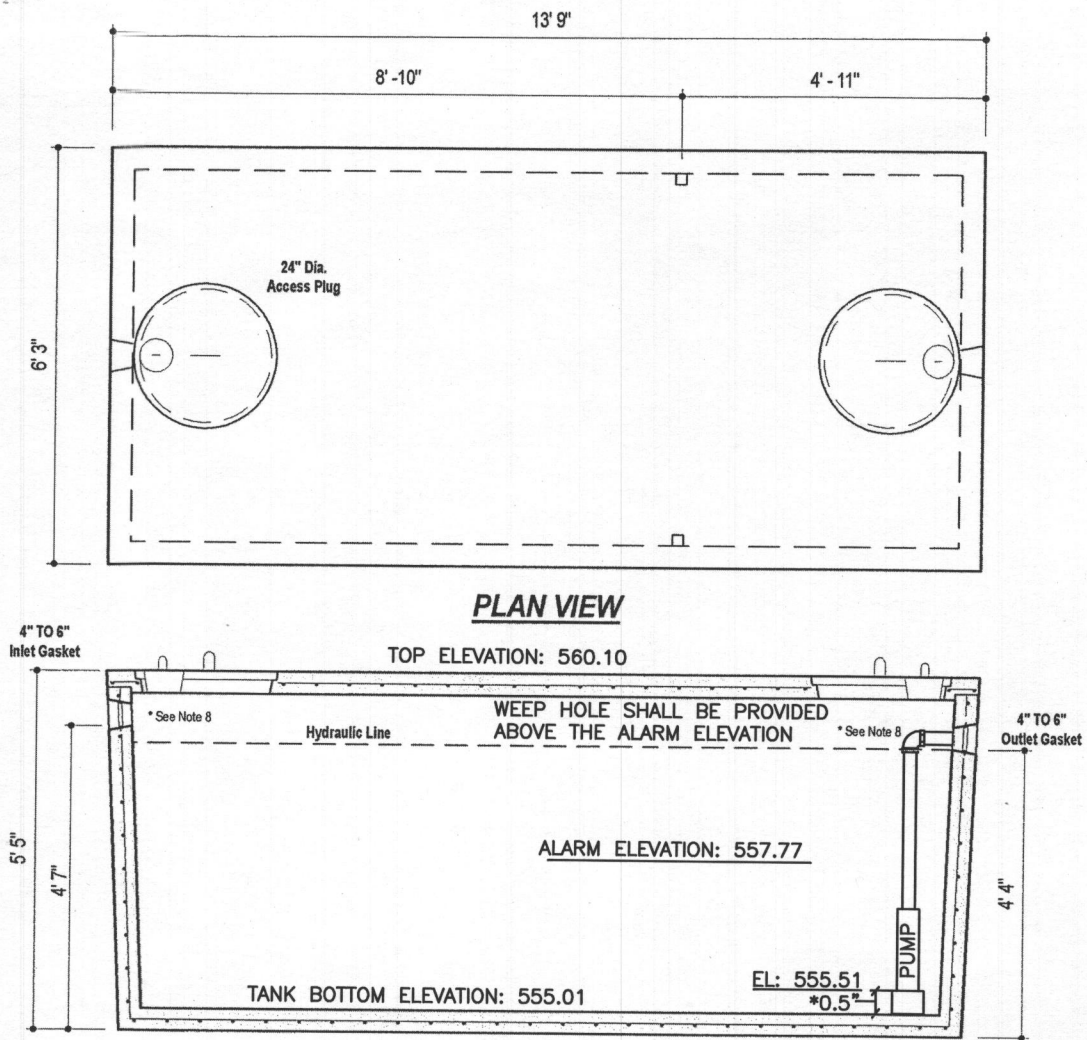
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<b>BUILDER:</b> TAYLOR FARIS 7233 DARBY DOWNS ELKRIDGE, MD 21075 443-864-3479	<b>OWNER:</b> HAROLD E. RENFRO, JR. MERILYN S. RENFRO 13765 FREDERICK ROAD WEST FRIENDSHIP, MD 21794 301-854-6782
---	--

<b>PROJECT:</b>	<b>RENFRO LOT 1</b>	
<b>LOCATION:</b>	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
<b>TITLE:</b>	<b>ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN</b>	
<b>HOUSE TYPE:</b>	<b>PARKER</b>	
<b>DATE:</b>	JANUARY, 2018	<b>PROJECT NO. 2876</b>
<b>SCALE:</b>	AS SHOWN	<b>DRAWING 3 OF 4</b>



**PLAN VIEW**

**SECTION A-A**

\*USE BLOCK OR SUPPORT TO RAISE PUMP INLET A MINIMUM OF 0.5' OFF BOTTOM OF TANK

**WEIGHT = 19,000 lbs.**

**DESIGN DATA & GENERAL NOTES**

- [1] Concrete strength  $f_c=4,000$  p.s.i. @ 28 days. Density = 150 pcf.
- [2] Cement - Portland Type VII per ASTM C 150-92.
- [3] Admixtures & plasticizers per ASTM C 260-96 & C 494-92.
- [4] Reinforcing per ASTM A185. Min. 1-1/2" cover.
- [5] Top slab sealed with butyl rope mastic.
- [6] 4" wall, 4" base, & 6" top thickness.
- [7] Max 3" of cover
- [8] Depending on use of tank, Inlet & Outlet baffle may be required by code.

FLOAT TREE:	ELEV.	RELATIVE TO BOTTOM
BOTTOM OF TANK	555.01	
TOP OF PUMP	556.61	1'-7 1/4"
PUMP OFF	557.00	2'
PUMP ON	557.27	2'-3 1/8"
HIGH ALARM	557.77	2'-9 1/8"

**MBI**  
Mayer Bros., Inc.  
6264 Race Road  
Elkridge, Maryland 21075  
Tel. 410.796.1434  
Fax. 410.796.1438  
www.mayerbrosprecast.com

**2,000 GALLON SEPTIC TANK**  
**1-Compartment**  
Stock Item [Approx. 19,000 lbs]  
Dwg. No. 2000-1C    No Scale    Aug. 11, 2008

Trusted. Tested. Tough.<sup>™</sup>  
Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

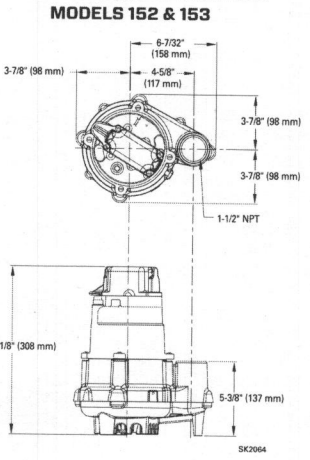
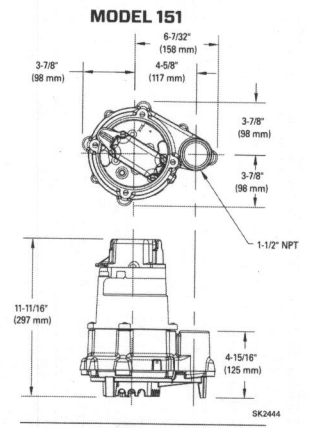


SECTION: 2.15.080  
FM2784  
1017  
Supersedes  
0315

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

**PRODUCT SPECIFICATIONS**

MOTOR	MODEL 151
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
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
Cap	Cast iron
Motor Housing	Cast iron
Pump Housing	Cast iron
Base	Plastic or cast iron
Upper Bearing	Sleeve bearing
Lower Bearing	Ball bearing
Mechanical Seals	Carbon and ceramic
Impeller Type	Non-clogging vortex
Impeller	Engineered thermoplastic
Hardware	Stainless steel
Motor Shaft	AISI 1215 steel
Gasket	Neoprene



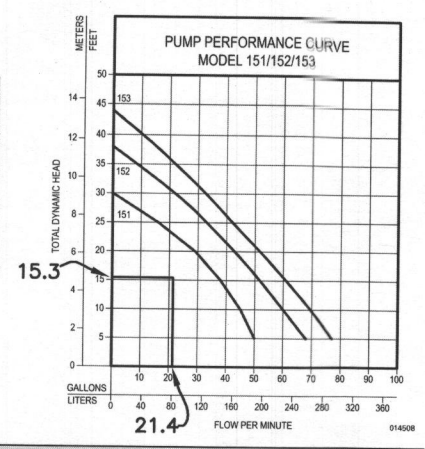
NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.  
NOTE: See model comparison chart for specific details.



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

**TOTAL DYNAMIC HEAD FLOW PER MINUTE**

MODEL	151	152	153
Feet	1.5	4.5	12.2
Meters	50	170	44
Gal.	189	61	231
Liters	69	231	85
Shut-off Head:	30 ft. (9.1m)	38 ft. (11.6m)	44 ft. (13.4m)



RECOMMENDED PUMP: BN151

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	Auto	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 230V units only.  
NOTE: Model 151 has a plastic base. Models 152 & 153 have a cast iron base.

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

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

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

NOTE: Make sure float is free from obstruction.

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

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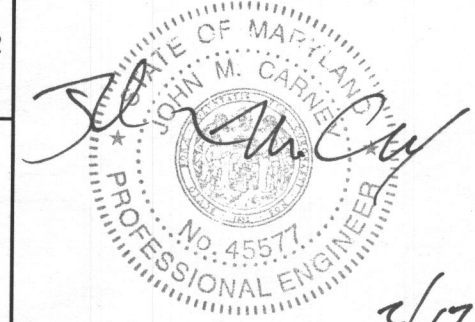
**THIS PLAN IS FOR SEPTIC DESIGN ONLY**

<b>BUILDER:</b> TAYLOR FARIS 7233 DARBY DOWNS ELKBRIDGE, MD 21075 443-864-3479	<b>OWNER:</b> HAROLD E. RENFRO, JR. MERILYN S. RENFRO 13765 FREDERICK ROAD WEST FRIENDSHIP, MD 21794 301-854-6782
--	--

SEE MANUFACTURES SPECIFICATIONS FOR DETAILS. EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUTED.

**BENCHMARK**  
ENGINEERS LAND SURVEYORS PLANNERS  
**ENGINEERING, INC.**  
8480 BALTIMORE NATIONAL PIKE SUITE 315  
ELLCOTT CITY, MARYLAND 21043  
(P) 410-465-6105 (F) 410-465-8644  
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**PROJECT:** RENFRO LOT 1

**LOCATION:** TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654

**TITLE:** ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN

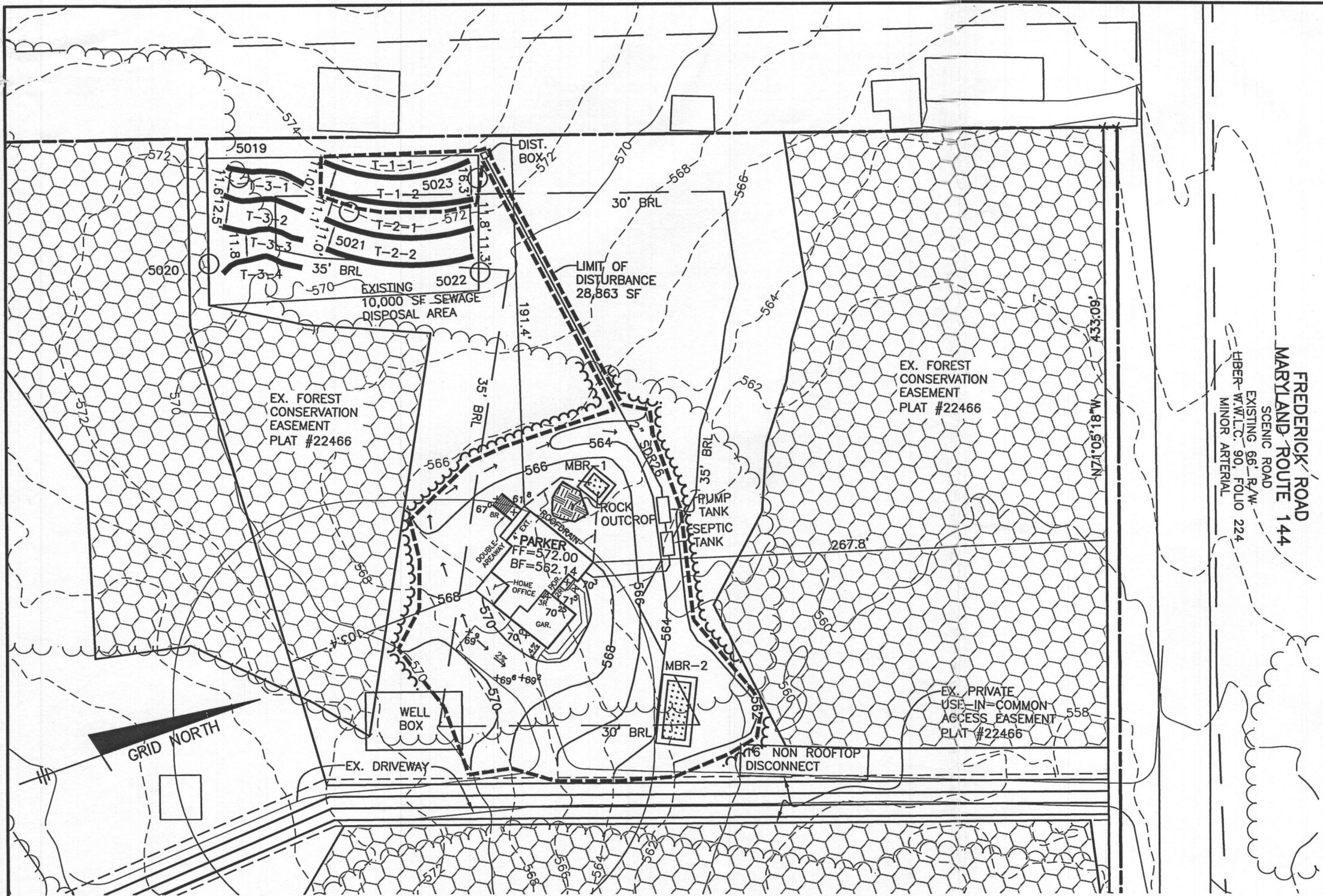
**HOUSE TYPE:** PARKER

**DATE:** JANUARY, 2018

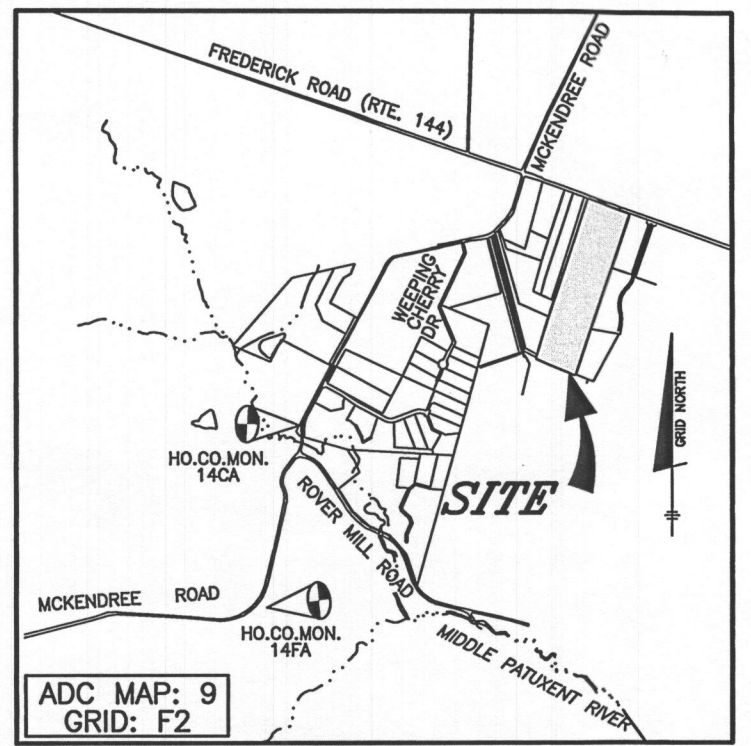
**SCALE:** AS SHOWN

**PROJECT NO.:** 2876

**DRAWING:** 4 OF 4



**PLAN VIEW**  
1" = 60'

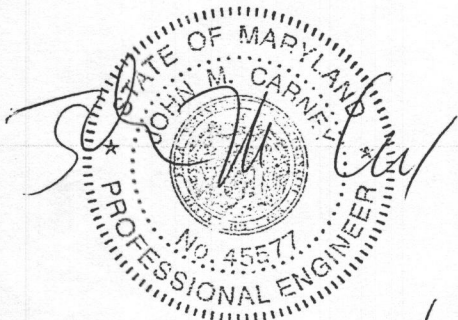


**VICINITY MAP**  
SCALE: 1" = 2000'

**BUILDING PERMIT PLAN NOTES:**

1. THE LOT SHOWN HEREON WAS RECORDED ON THE PLAT FOR RENFRO PROPERTY, PLAT Nos. 22465-22466. REFER TO THE PLATS FOR LOT DIMENSIONS, LOT AREAS, ALL EASEMENTS AND CONDITIONS.
2. SEDIMENT AND EROSION CONTROLS WERE APPROVED BY HOWARD SOIL CONSERVATION
3. TOPOGRAPHY SHOWN HEREON IS TAKEN FROM THE APPROVED ROAD CONSTRUCTION PLANS AND TOPOGRAPHIC INFORMATION PROVIDED BY F-13-040, ON OR ABOUT FEBRUARY, 2013. ALL SEDIMENT AND EROSION CONTROL FEATURES USED ON THIS SITE SHALL COMPLY WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
4. ALL DRAINAGE AND STORMWATER MANAGEMENT FEATURES USED ON THIS SITE MUST COMPLY WITH THE APPROVED SUPPLEMENTAL CONSTRUCTION PLANS EXCEPT AS WAIVED OR REDESIGNED.
5. THE EXISTING WELL SHOWN ON THIS PLAN, HO-95-2480, WILL BE FIELD LOCATED BY BENCHMARK ENGINEERING, INC. PRIOR TO BUILDING PERMIT ISSUANCE.
6. THERE ARE NO EXISTING WELLS OR SEPTIC SYSTEMS WITHIN 100' OF THIS PROJECT'S BOUNDARY EXCEPT AS NOTED.
7. ANY CHANGES TO A PRIVATE SEWAGE DISPOSAL AREA OR WELL BOX SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN.
8. STORMWATER MANAGEMENT FOR THIS LOT WAS DESIGNED AND PROVIDED BY TWO MICRO-BIORETENTION FACILITIES. MICRO-BIORETENTION SHALL HAVE EITHER A 4" OR 6" ROOF LEADER DEPENDING ON ROOF-TOP AREA.
9. THE SEPTIC TANK WILL HAVE A 2000 GALLON 2 COMPARTMENT TANK.

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1/16/18

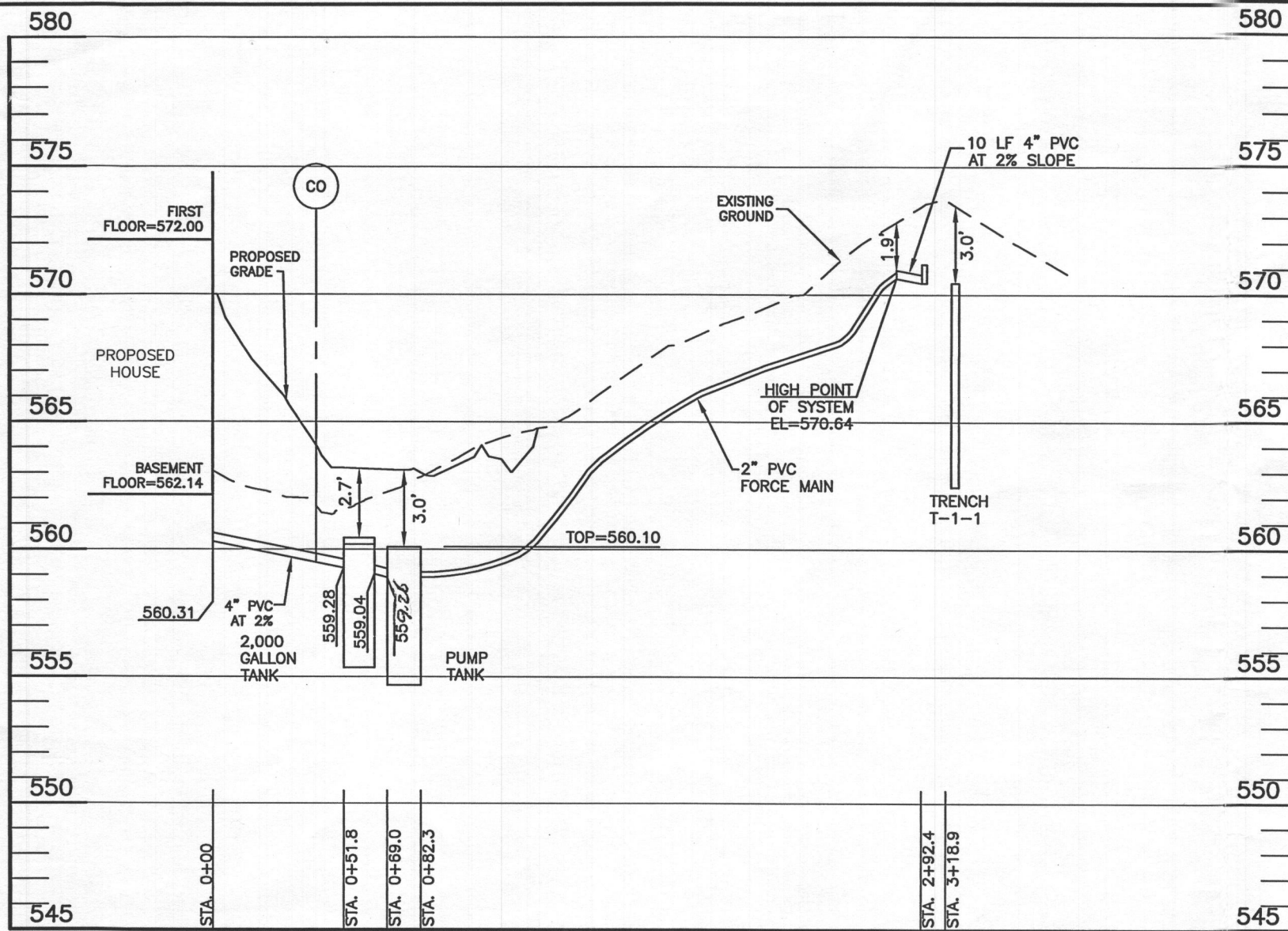
**BENCHMARKS NAD'83 HORIZONTAL**

HO. CO. #14FA STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE. N 595829.611'    E 1310622.17' ELEVATION: 560.299'	HO. CO. #14CA STAMPED BRASS DISK SET ON TOP OF CONCRETE BASE N 597624.973'    E 1311015.48' ELEVATION: 560.299'
--	---

<b>BUILDER:</b> TAYLOR FARIS 7233 DARBY DOWNS ELKCRIDGE, MD 21075 443-864-3479	<b>OWNER:</b> HAROLD E. RENFRO, JR. MERILYN S. RENFRO 13765 FREDERICK ROAD WEST FRIENDSHIP, MD 21794 301-854-6782
--	--

**BENCHMARK**  
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8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315  
ELLCOTT CITY, MARYLAND 21043  
(P) 410-465-6105 ▲ (F) 410-465-6644  
WWW.BEI-CMLENGINEERING.COM

<b>PROJECT:</b>	<b>RENFRO PROPERTY LOT 1</b>	
<b>LOCATION:</b>	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
<b>TITLE:</b>	<b>ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN</b>	
<b>HOUSE TYPE:</b>	<b>PARKER</b>	
<b>DATE:</b>	JANUARY, 2018	<b>PROJECT NO.</b> 2876
<b>SCALE:</b>	AS SHOWN	<b>DRAWING</b> 1 OF 4



INITIAL SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

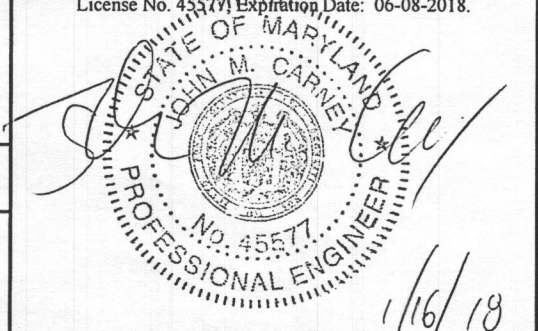
1st REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	8	ft
Design Flow	750	gpd
Drainage Field square footage	937.5	sf
Sidewall reduction credit	0.50	
Trench width	3	
Effective Area Depth	3	
<b>Linear Length of trench Required</b>	<b>156</b>	<b>lf</b>

2nd REPLACEMENT SYSTEM		
Number of Bedrooms	5	
Application Rate	0.8	gpd/sf
Effective Area Beginning Depth	5	ft
Bottom Max Depth	7.5	ft
Design Flow	750	gpd
Drainage Field square footage	938	sf
Sidewall reduction credit	0.55555556	
Trench width	3	
Effective Area Depth	2.5	
<b>Linear Length of trench Required</b>	<b>174</b>	<b>lf</b>

INITIAL SYSTEM	
TRENCH T-1-1	
TRENCH LENGTH	78 LF
GROUND ELEVATION	573.6
INVERT ELEVATION	570.6
MAX. BOTTOM ELEV.	565.6
TRENCH T-1-2	
TRENCH LENGTH	78 LF
GROUND ELEVATION	572.3
INVERT ELEVATION	569.3
MAX. BOTTOM ELEV.	564.3

FUTURE FIRST REPAIR	
TRENCH T-2-1	
TRENCH LENGTH	78 LF
GROUND ELEVATION	571.6
INVERT ELEVATION	568.6
MAX. BOTTOM ELEV.	563.6
TRENCH T-2-2	
TRENCH LENGTH	78 LF
GROUND ELEVATION	570.9
INVERT ELEVATION	567.9
MAX. BOTTOM ELEV.	562.9

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**BUILDER:**  
 TAYLOR FARIS  
 7233 DARBY DOWNS  
 ELKRIDGE, MD 21075  
 443-864-3479

**OWNER:**  
 HAROLD E. RENFRO, JR.  
 MERILYN S. RENFRO  
 13765 FREDERICK ROAD  
 WEST FRIENDSHIP, MD 21794  
 301-854-6782

PROJECT:	RENFRO LOT 1	
LOCATION:	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
TITLE:	ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN	
HOUSE TYPE:	PARKER	
DATE:	JANUARY, 2018	PROJECT NO. 2876
SCALE:	AS SHOWN	DRAWING 2 OF 4

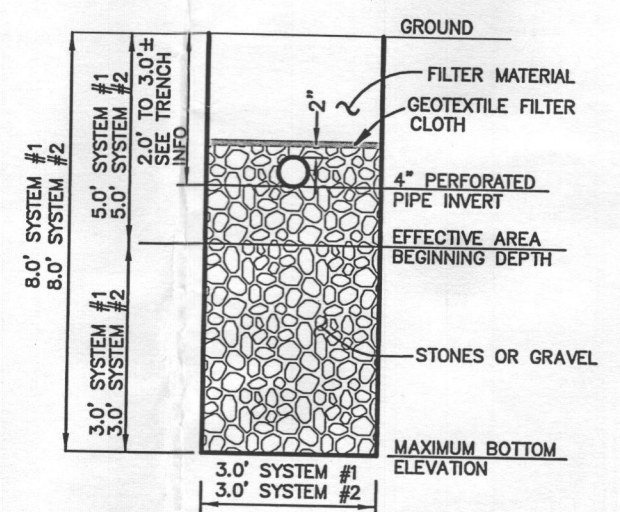
<b>Pumping Station</b>	
Diameter of Force Main and Manifold =	2 of SDR 21 pipe → Sch. 40
Length of Force Main =	197 feet SDR 21 gallons/100 feet = 18.8 Table 4.2
Volume of Main =	37.1 gallons ID = 2.149 length = 100 gallon/sq ft 7.480519
Total Volume =	37.1 gallons volume = 18.84222 gal/100 lf
Minimum Dose must be greater than 1/6 of the design flow	125 gallons
Minimum Dose must be greater than the volume of the main	37 gallons
Use minimum dose of	150 gallons okay Doses per Day = 5

<b>Size Pump Chamber</b>	
Pump chamber must be able to hold one dose and one days design flow	
One day Capacity =	750 gallons
Dose =	150 gallons
Totals =	900 gallons
Use 2,000 gallon pump tank	
Tank Dimensions:	Exterior Interior
Length:	13.75 feet Length: 13.08 feet Walls: 0.33 feet
Width:	6.25 feet Width: 5.58 feet Bottom: 0.33 feet
Height:	5.42 feet Height: 4.67 feet Top: 0.42 feet
	Area: 73.05 sf Bottom to
	Volume: 341.14 cf Inlet: 4.58 feet

<b>Sizing the Pump</b>	
Flow:	runtime = 7 minutes rate = 21.43 gallons/minute
Design Head:	Design Head = Static Head + Friction Head
	Static Head = highest elevation of main - pump off elevation
	Highest component of system = 570.64 Main HP
	Pump off elevation = 557.00
	Static Head = 13.64 feet
	Friction Head = Head loss due to pipe friction
	2.0" pipe = 197 feet
	45° bends 1 loss for bend 4 feet per table 4.3
	Gate Valve 0 loss for tee 0 feet per table 4.3
	Friction loss per table 4.4 = 0.84 (ft/100 ft)
	Equivalent Length = 201 Friction loss 1.69 feet
	Total Friction Head = 1.69
	Design Head = 15.33 feet

<b>Pump Requirements:</b>	
Performance =	21.43 gpm
Head of Water =	15.33 feet of head
Pump Selection:	Zoeller Pump Company Flow-mate Series, Model 151 1/3 horse power
Pump Flow Rate =	39.00 gallons/minute per rating curve 3.85 Minutes TDH analysis 18.68 ft Between design and curve? Yes

<b>Design Pump Chamber</b>	
Ground over Tank =	563.10 Cover 3 ft
Top of Tank =	560.10
Invert of Tank =	555.01
6" Riser =	0.50 feet
Pump Height =	1.10 feet
Min. Pump off =	556.61
Selected Pump off =	557.00
Dose =	20.1 cf
Area of Pit =	73.05 sf
Pump on dist. =	0.27
Pump on Elev. =	557.27
Distance between Pump on and Highwater Alarm =	0.5 feet
Highwater Alarm Elevation =	557.77
Dist. for a dose above alarm =	1.37
Minimum Inlet Elev. =	559.15
Tank Inlet =	559.26 Okay
Dist. Alarm to Inlet =	1.49 Okay



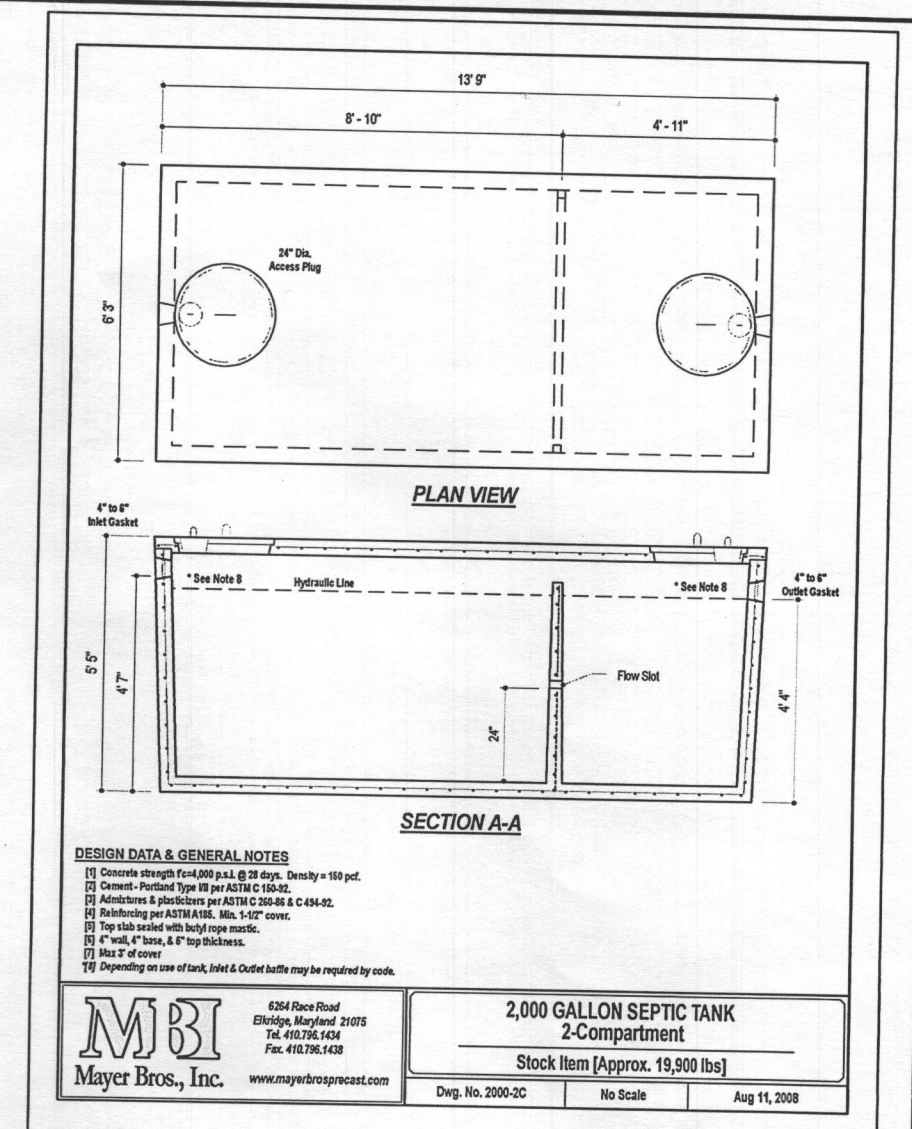
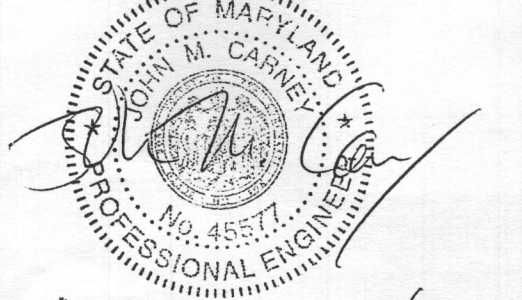
**TYPICAL TRENCH DETAIL**  
NOT TO SCALE

**THIS PLAN IS FOR SEPTIC DESIGN ONLY**

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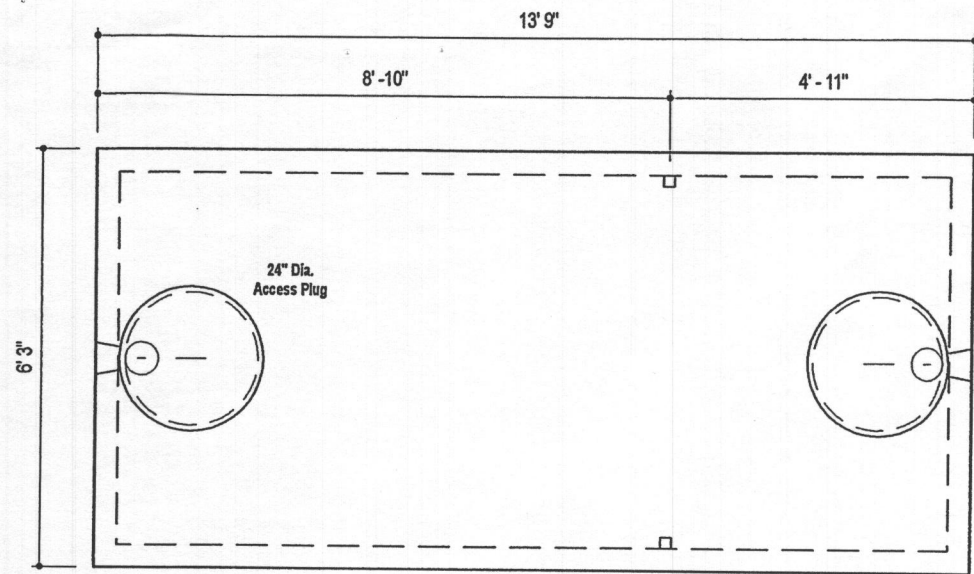
- DESIGN DATA & GENERAL NOTES**
- [1] Concrete strength f'c=4,000 p.s.i. @ 28 days. Density = 150 pcf.
  - [2] Cement-Portland Type III per ASTM C 150-92.
  - [3] Admixtures & plasticizers per ASTM C 260-96 & C 494-92.
  - [4] Reinforcing per ASTM A106, Min. 1-1/2" cover.
  - [5] Top slab sealed with butyl rope mastic.
  - [6] 4" wall, 4" base, & 6" top thickness.
  - [7] Max 3" of cover
  - [8] Depending on use of tank, Inlet & Outlet baffle may be required by code.

 6264 Race Road Elkridge, Maryland 21075 Tel. 410.796.1434 Fax. 410.796.1438 www.mayerbrosprecast.com	<b>2,000 GALLON SEPTIC TANK</b> <b>2-Compartment</b> Stock Item [Approx. 19,900 lbs]
	Dwg. No. 2000-2C    No Scale    Aug 11, 2008

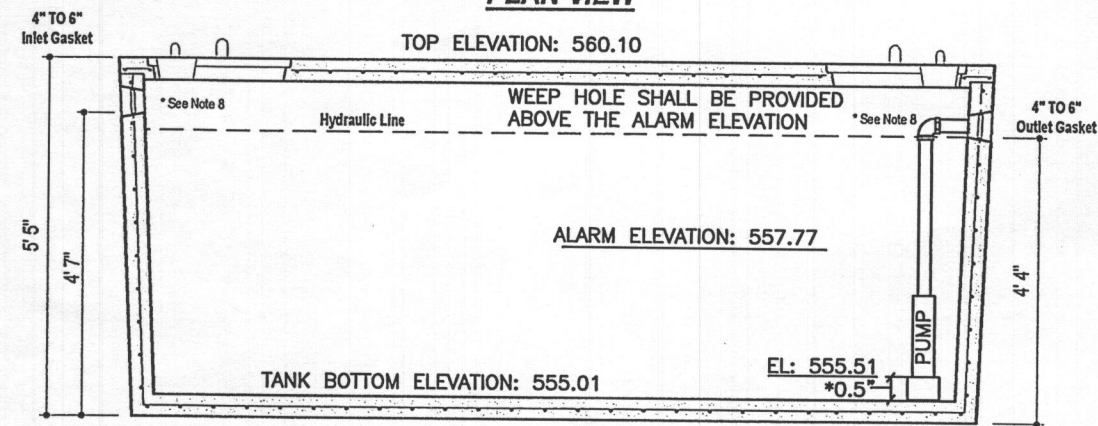
<b>BUILDER:</b>	<b>OWNER:</b>
TAYLOR FARIS 7233 DARBY DOWNS ELKRIDGE, MD 21075 443-864-3479	HAROLD E. RENFRO, JR. MERILYN S. RENFRO 13765 FREDERICK ROAD WEST FRIENDSHIP, MD 21794 301-854-6782

PROJECT:	<b>RENFRO LOT 1</b>	
LOCATION:	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
TITLE:	ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN	
HOUSE TYPE:	PARKER	
DATE:	JANUARY, 2018	PROJECT NO. 2876
SCALE:	AS SHOWN	DRAWING 3 OF 4

1/16/18



**PLAN VIEW**



**SECTION A-A**

\*USE BLOCK OR SUPPORT TO RAISE PUMP INLET A MINIMUM OF 0.5' OFF BOTTOM OF TANK

**DESIGN DATA & GENERAL NOTES**

- [1] Concrete strength  $f_c=4,000$  p.s.i. @ 28 days. Density = 160 pcf.
- [2] Cement - Portland Type VII per ASTM C 150-92.
- [3] Admixtures & plasticizers per ASTM C 260-86 & C 494-92.
- [4] Reinforcing per ASTM A185. Min. 1-1/2" cover.
- [5] Top slab sealed with butyl rope mastic.
- [6] 4" wall, 4" base, & 6" top thickness.
- [7] Max 3" of cover
- [8] Depending on use of tank, Inlet & Outlet baffle may be required by code.

FLOAT TREE:	ELEV.	RELATIVE TO BOTTOM
BOTTOM OF TANK	555.01	
TOP OF PUMP	556.81	1'-7 1/4"
PUMP OFF	557.00	2'
PUMP ON	557.27	2'-3 1/8"
HIGH ALARM	557.77	2'-9 1/8"

WEIGHT = 19,000 lbs.

**MBI**  
Mayer Bros., Inc.  
6264 Race Road  
Elkridge, Maryland 21075  
Tel. 410.796.1434  
Fax. 410.796.1438  
www.mayerbrosprecast.com

**2,000 GALLON SEPTIC TANK**  
**1-Compartment**  
Stock Item [Approx. 19,000 lbs]  
Dwg. No. 2000-1C    No Scale    Aug. 11, 2008

Trusted. Tested. Tough.™

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



SECTION: 2.15.080  
FM2784  
1017  
Supersedes  
0315

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

**PRODUCT SPECIFICATIONS**

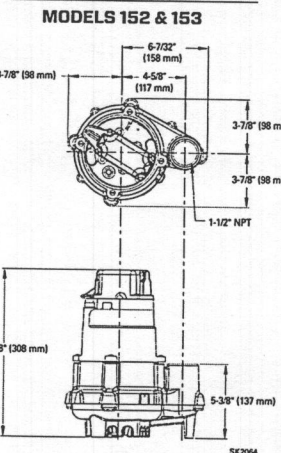
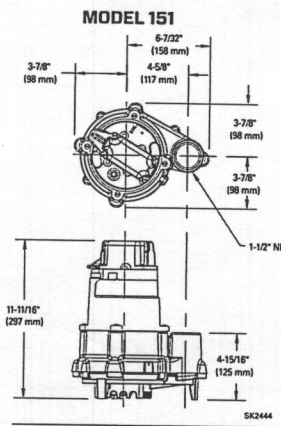
MOTOR	PUMP	MATERIALS
Horse Power	1/3 (115l), 4/10 (152), 1/2 (153)	
Voltage	115 or 230	
Phase	1 Ph	
Hertz	60 Hz	
RPM	3450	
Type	Permanent split capacitor	
Insulation	Class B	
Amps	3.0 - 10.5	
Operation	Automatic or nonautomatic	
Discharge Size	1-1/2" NPT	
Solids Handling	1/2" (12 mm), 3/4" (19 mm) spherical 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	
Cap	Cast iron	
Motor Housing	Cast iron	
Pump Housing	Cast iron	
Base	Plastic or cast iron	
Upper Bearing	Sleeve bearing	
Lower Bearing	Ball bearing	
Mechanical Seals	Carbon and ceramic	
Impeller Type	Non-clogging vortex	
Impeller	Engineered thermoplastic	
Hardware	Stainless steel	
Motor Shaft	AISI 1215 steel	
Gasket	Neoprene	

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

NOTE: See model comparison chart for specific details.

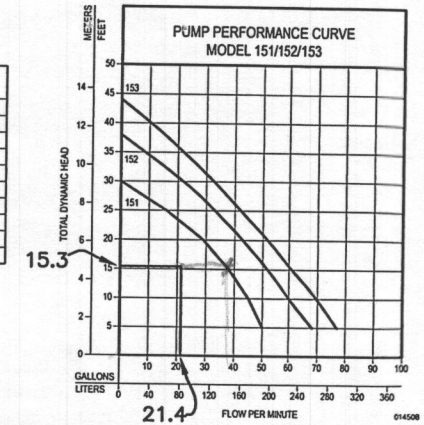


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**TOTAL DYNAMIC HEAD**  
**FLOW PER MINUTE**

MODEL	151	152	153
Feet	1.5	50	189
Meters	0.46	15.24	58.58
Gal.	45	170	61
Liters	1416	6450	2310
Shut-off Head	30 ft (9.1m)	38 ft (11.6m)	44 ft (13.4m)



RECOMMENDED PUMP: BN151

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	*	2 or 3
BN153	Single	Auto	115	1	10.5	1/2	60	37	17	*	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

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

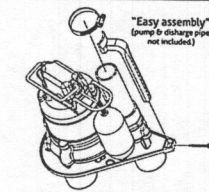
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**OPTIONAL PUMP STAND P/N 10-2421**

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

NOTE: Make sure float is free from obstruction.



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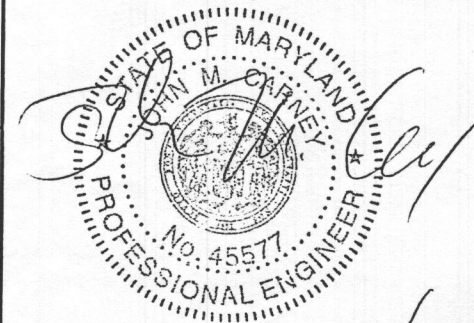
SIGNATURE AND SEAL ARE FOR SEPTIC PROFILE AND CALCULATIONS ONLY, TANK, PUMP AND DETAILS WERE NOT DESIGNED OR REVIEWED BY THE ENGINEER:

**THIS PLAN IS FOR SEPTIC DESIGN ONLY**

SEE MANUFACTURERS SPECIFICATIONS FOR DETAILS. EQUIVALENT FROM OTHER MANUFACTURERS CAN BE SUBSTITUTED.

**BENCHMARK**  
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Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 45577, Expiration Date: 06-08-2018.



PROJECT:	RENFRO LOT 1	
LOCATION:	TAX MAP: 15, GRID: 1, PARCEL: 178, ZONED: RC-DEO #13787 FREDERICK ROAD THIRD ELECTION DISTRICT, HOWARD COUNTY, MD TAX ID NUMBER 03-595654	
TITLE:	ONSITE SEWAGE DISPOSAL SYSTEM DESIGN PLAN	
HOUSE TYPE:	PARKER	
DATE:	JANUARY, 2018	PROJECT NO. 2876
SCALE:	AS SHOWN	DRAWING 4 OF 4