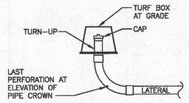
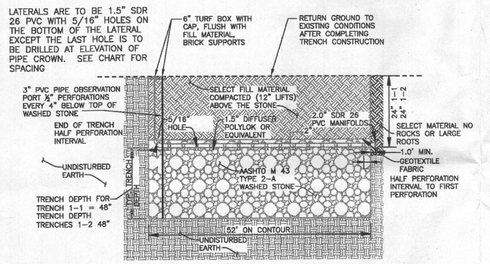
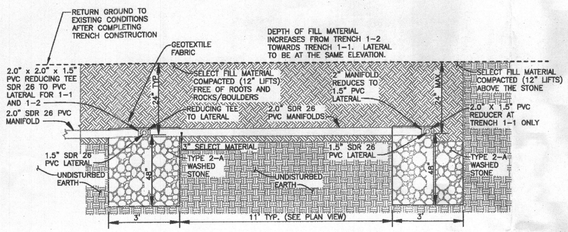


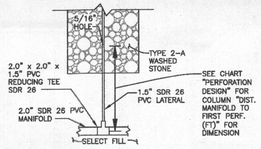
END PERFORATION AND TURN-UP DETAIL



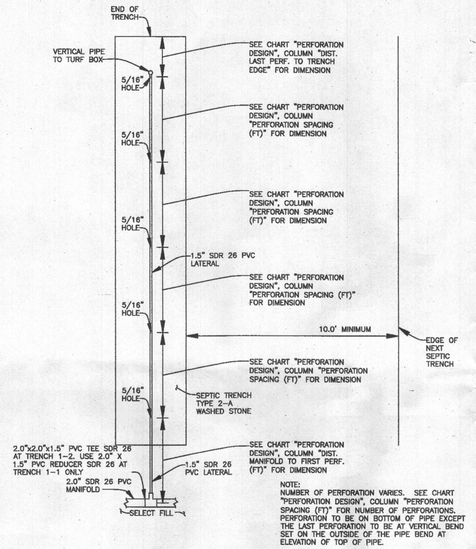
LATERAL AND TRENCH DESIGN



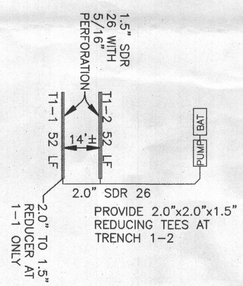
TRENCH AND MANIFOLD SECTION



OVERHEAD VIEW OF MANIFOLD AND LATERAL CONNECTION SECTION



PERFORATION SPACING AND LATERAL LENGTH DIAGRAM



TRENCH SCHEMATIC
NOT TO SCALE

Trench and Lateral Design											
Cell	Trench	Pipe Inv. Elev.	Trench Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Differential
1	1	450.4	446.4	452.4	452.4	28.2	50.5	11	1.63	17.91	0.0%
	2	450.1	446.1	452.1	452.1	27.8	55.0	10	1.78	17.78	0.7%

Perforation Diameter = 5/16 inches Target Flow = 17.91 gpm

Cell	Flow Rate
1	35.69

Depth To Effective Sidewall		Deep Trench Depth	Depth to Inlet
Trench 1	5 ft	4 ft	2 ft
Trench 2	5 ft	4 ft	2 ft

Perforation Design								
Cell	Trench	Number of Perforations	Manifold to Trench (ft)	Trench Length (ft)	Perforation Spacing (ft)	Dist. Manifold to First Perf. (ft)	Dist. Last Perf. to Trench Edge	Lateral Length (ft)
1	1	11	3.2	52	4.73	5.56	2.36	52.84
	2	10	2.5	52	5.20	5.10	2.60	51.90

Lateral Pressure Calculations																		
Cell	Trench	Pipe Elev.	Beginning Manifold Loss	Gate Valve	Manifold Bends 45D	Manifold Length	Manifold velocity	Manifold Thru Tees	Delta Loss Manifold	Total Manifold Loss	Lateral 90 degree side tee loss	Sudden Reduction Loss	Lateral Bends 45 deg. Loss	Lateral Length to first perf. Loss	Lateral Loss Summation	Total Loss to First Perf.	Total Design Head (ft)	Flow per Lateral (gpm)
1	2	450.1	0.00	0	4	188	35.8	0	4.19	4.19	0.06	0.01	0.00	0.10	0.16	4.35	27.77	17.78
1	1	450.4	4.19			14	17.9	1	0.09	4.28	0.06	0.01	0.00	0.09	0.16	4.44	28.16	17.91

Perforation Diameter = 5/16 inches Distal Head 2 feet

Friction Head
main

Friction Head = Head loss due to pipe friction
2" pipe = 202 feet

45° bends	4	loss for manifold bend	16.0 feet	per table 4.3
Str. Coupling	1	loss for straight tee	2.0 feet	per table 4.3
90 deg. Side tee	1	loss for tee bend	10.0 feet	per table 4.3 for smaller pipe
Sudden reduction	1	loss for reduction	1.0 feet	per Crane Co. technical paper
45° bends	1	loss for lateral bend	3.0 feet	per table 4.3
Gate Valve	0	loss for valve	0.0 feet	per table 4.3

Equivalent Manifold Length = 220.0 Friction loss = 4.52 feet

1.5" lateral 62.00 feet Friction loss = 1.12 feet

Total Friction Head = 5.63

Design Calculations Lot 3

Design Input: Calculations:

Capacity requirements

number of lots	1	Max. Daily Flow	900 gpd
bedrooms per lot	6	Average Daily Flow	450 gpd
use rate per bedroom	150 gpd	Maximum Daily Flow	0.63 gpm
		Average Daily Flow	0.31 gpm

Drainfield Requirements

Application Rate	1.2 gpd/sq ft	Standard Trench Length	250 ft
Trench width	3 ft	Deep Trench Conversion Factor	41.67 %
trench gravel depth	4 ft	Deep Trench Length for MDF	104.18 ft
number of trenches	2	total trench length for 100% capacity	104.18 ft
trench spacing center-center	13 ft	individual trench length	52 ft
		Approx. Lateral Length	48.00 ft

Tanks and Capacities

			minimum req. area		1,250 sf
BAT tank	2,000	gallons	req. capacity (1125+(0.75*MDF))		1,800 gal.
2nd settling tank	NA	gallons	design settling capacity		2,000 gal.
Equalization Tank	NA	gallons			
pump tank size	2,000	gallons	min. pump tank capacity (ADF)		600 gal.

Distribuition system

number of cells	1		
		Total Number of Pumps	1
trenches first system	2	laterals served by pump	2
lateral length per pump	104 ft	Vol./100 ft 1.5" SDR 26	12.6 gal.
ID 1.5" SDR 26 PVC	1.75 inches	Vol. of laterals served	13.1 gal.
Max. Forcemain length	202 ft	Vol./100 ft 2" SDR 26	19.6 gal.
ID 2" SDR 26 PVC	2.17 inches	Max. Main volume	39.6 gal.

Static Hydraulic Profile

Ground Elev. At BAT tank	434.49 ft		Tank #1 effulent elev	431.16 ft
Tank #1 invert in	431.49 ft			
Cover	2.00 ft			
Tank #1 top	432.49 ft	okay		
Fall in tanks	0.33 ft		Pump Tank effulent elev	431.03 ft
Fall between tanks	0.13 ft		Invert of pump tank	426.78 ft
Ground Elev. at pump tank	434.14 ft			
Pump Tank invert in	431.03 ft			
inv. into pump tank to top	0.84 ft		Pump Elevation	427.28 ft
Pump Tank top	431.87 ft	okay	pump intake elev.	428.07 ft
Pump Block Height	0.50 ft			
Height of Intake	0.79 ft			
Highest lateral	450.00 ft	Cell 1		

Perforation Design:

		Distal Pressure =	2.0 ft
Size of Perforation	5/16 inches	Flow	1.63 gpm
Design Separation	4.73 ft	Perforations per Lateral	11.00
Use Perforations	11	Perforation Actual Spacing	4.73 ft
Perforations per field	22	Flow rate	35.82 gpm

Dosing volume, flow rates and Pressures

lateral flow rate per pump	35.82 gpm	Static Head	21.32 ft Cell 1
Friction (C) for PVC	150	Friction Head	5.63 ft Cell 1
Miscellaneous Losses	0 ft	Distal Head	2 ft
Estimated Run Time	2.00 Min.	Max. Total Dynamic Head	28.95 ft
Cells in simultaneous use	1	Minimum Dose Vol.	150.00 gal.
Pump tank Volume	45.49 Gal/in	Min. Runtime	4.19 min.
		Selected Runtime	5.19
		Selected Dose Volume	150.00 gal.
		Average Dose	3.00 per day

Tank and Float Design:

Ground over Tank =	434.14 ft	Inside Tank Dimenions	
Top of Tank =	431.87 ft	Height =	4.67 ft
Invert of Tank =	426.78 ft	Width =	5.58 ft
Pump Block=	0.50 ft	Length =	13.08 ft
Water End and Motor = per Mayer Brothers Precast	1.34 ft	Number of Tanks =	1
minimum Pump off =	428.62 ft		
Pump Off Float =	428.68 ft		
Dose =	20.05 cf		
Area of Pit	72.99 sf	Use one 2,000 gallon pump tank	
Pump on dist. =	0.27 ft		
Pump on Elev. =	428.95 ft		
Distance between Pump on and Highwater Alarm =			0.5 ft
Highwater Alarm Elevation =			429.45 ft
High Water Alarm to inlet =		1.58	
Volume Above Alarm Float to Inlet =		114.97 cf or	859.99 gallons
One Day Flow =		900.00 gallons	not okay
90% One Day Flow =		810.00 gallons	okay

Approved for Septic Plan
Howard County Health Department
NORWECO TNT960 LP
w/Mayer Bros 2000-gal Pump Tank
& Zoeller BN161 (0.5hp) Pump
Signature 1/12/2018 Date
BAT-LPD system

Pump Requirements:

Performance =	35.82 gpm
Head of Water =	28.95 feet of head

Pump Selection: Zoeller Pump BN161
1/2 horse power 115 Volts Single Phase

BENCHMARK
ENGINEERS LAND SURVEYORS PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE A SUITE 315 A ELLICOTT 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.
STATE OF MARYLAND JOHN M. CARNEY No. 45577 PROFESSIONAL ENGINEER
12/20/17

OWNER/DEVELOPERS:
ELLEN M. VAWTER,
MICHAEL A. VAWTER,
NANCY J. VAWTER,
LAURA J. LEONARD,
DREW B. LEONARD
14170 TRIADELPHIA MILL ROAD
DAYTON, MARYLAND 21036
301-706-6044

PROJECT:
VAWTER PROPERTY
LOT 3

LOCATION: 14176 TRIADELPHIA MILL ROAD
TAX MAP: 27 - GRID: 24 - PARCEL: 68
ZONED: RR-DEO RURAL RESIDENTIAL
ELECTION DISTRICT NO. 5 - HOWARD COUNTY, MARYLAND

TITLE: SEPTIC SYSTEM DESIGN DETAILS

DESIGN: LDD | DRAFT: LDD | CHECK: AAM | DATE: DECEMBER, 2017 | PROJECT NO. 2766 | SCALE: NONE | SHEET 3 OF 3

J:\2766 VAWTER PROPERTY\dwg\8026 GP.dwg, TRENCH details and calcs lot 3, 12/20/2017 9:45:14 AM, rdignar

Your Peace of Mind is Our Top Priority®

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

ZOELLER® PUMP COMPANY
Zoeller Family of Water Solutions®

SECTION: 2.15.000
FM0795
0317
Supersedes
0515

TECHNICAL DATA SHEET
HIGH HEAD FLOW-MATE SERIES
Models 161/4161, 163/4163, 165/4165 Submersible Effluent Pumps

PRODUCT SPECIFICATIONS

MOTOR	Horse Power	1/2 (161/4161, 163/4163) or 1 (165/4165)
	Voltage	115 - 575
	Phase	1 or 3 Ph
	Hertz	60 Hz
	RPM	3450
	Type	Permanent split capacitor or 3 Ph
	Insulation	Class B
	Amps	2.4 - 15.5
PUMP	Operation	Automatic or nonautomatic
	Auto On/Off Points	15-3/4" (400 mm) / 5-1/4" (133 mm)
	Discharge Size	1-1/2" NPT (optional 2" or 3" flange)
	Solids Handling	3/4" (19 mm) spherical solids
	Cord Length	20' (6 m) standard
	Cord Type	1 Ph: UL listed 3-wire neoprene cord and plug or 3 Ph: 4-wire with no plug
	Max. Head	86.5' (26 m)
	Max. Flow Rate	100 GPM (379 LPM)
	Max. Operating Temp.	130 °F (54 °C)
	Cooling	Oil filled
	Motor Protection	Auto reset thermal overload (1 Ph)
MATERIALS	Upper Bearing	Ball bearing
	Lower Bearing	Ball bearing
	Mechanical Seals	Carbon and ceramic
	Impeller Type	Non-clogging vortex
	Impeller	Bronze
	Hardware	Stainless steel
	Motor Shaft	SAE 1117 carbon steel or 416 stainless steel*
	Gasket	Neoprene square ring and gasket

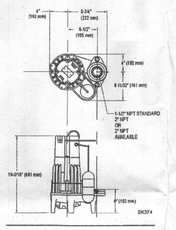
*Single seal models are built with a carbon steel motor shaft, and double seal models are built with a stainless steel motor shaft.

All Class 30 cast iron construction.

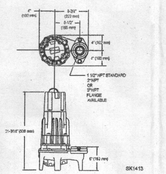
NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

NOTE: See model comparison chart for specific details.

SINGLE SEAL



DOUBLE SEAL



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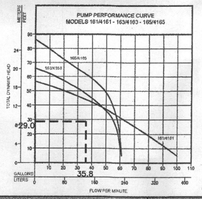
TOTAL DYNAMIC HEAD FLOW PER MINUTE

MODELS		161/4161		163/4163		165/4165	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	100	379	61	231	61	231
10	3.0	93	352	60	227	60.5	228
15	4.6	86	326	60	227	60.3	228
20	6.1	79	299	59	223	60	227
25	7.6	71	267	57	216	59	223
30	9.1	62	235	55	208	58	220
40	12.2	45	170	46	174	55	208
50	15.2	20	76	33	125	50	189
60	18.3	--	--	15	57	39	148
70	21.3	--	--	--	--	22.5	85
80	24.4	--	--	--	--	10	38
Shut-off Head:		56 ft. (17.1 m)		66 ft. (20.1 m)		86.5 ft. (26.4 m)	



**USE D165 OR EQUIVALENT

Model	MODEL COMPARISON											CERTIFICATIONS
	Seal	Motor	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex	
M161	Single	Auto	115	1	15.0	1/2	60	80	36	1	---	UL and cCSAus (2)
N161	Single	Non	115	1	15.0	1/2	60	80	36	2 or 3 & 5	4 & 5	CSA (1)
NA161	Double	Non	115	1	15.5	1/2	60	87	39	3 & 5	4 & 5	UL and cCSAus (2)
** BN161	Single	Auto	115	1	15.0	1/2	60	84	38	---	---	CSA
D161	Single	Auto	230	1	7.5	1/2	60	80	36	1	---	UL and cCSAus
E161 / E4161	Single / Double	Non	230	1	7.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H161	Single	Auto	200	1	8.8	1/2	60	80	36	1	---	cCSAus
* I161 / I4161	Single / Double	Non	200	1	8.8	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J161 / J4161	Single / Double	Non	200	3	6.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F161 / F4161	Single / Double	Non	230	3	5.2	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G161 / G4161	Single / Double	Non	460	3	2.9	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA161/BA4161	Single / Double	Non	575	3	2.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE161	Single	Auto	230	1	7.5	1/2	60	84	38	---	---	UL and cCSAus
M163	Single	Auto	115	1	15.0	1/2	60	80	36	1	---	UL and cCSAus (2)
N163 / N4163	Single / Double	Non	115	1	15.0	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	CSA (1)
BN163	Single	Auto	115	1	15.0	1/2	60	84	38	---	---	CSA
D163	Single	Auto	230	1	7.5	1/2	60	80	36	1	---	UL and cCSAus
E163 / E4163	Single / Double	Non	230	1	7.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H163	Single	Auto	200	1	8.5	1/2	60	80	36	1	---	cCSAus
* I163 / I4163	Single / Double	Non	200	1	8.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J163 / J4163	Single / Double	Non	200	3	6.0	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F163 / F4163	Single / Double	Non	230	3	4.8	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G163 / G4163	Single / Double	Non	460	3	2.9	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA163/BA4163	Single / Double	Non	575	3	2.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE163	Single	Auto	230	1	7.5	1/2	60	84	38	---	---	UL and cCSAus
D165	Single	Auto	230	1	10.2	1	60	80	36	1	---	UL and cCSAus
E165 / E4165	Single / Double	Non	230	1	10.2	1	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H165	Single	Auto	200	1	12.6	1	60	80	36	1	---	cCSAus
* I165 / I4165	Single / Double	Non	200	1	12.6	1	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J165 / J4165	Single / Double	Non	200	3	7.5	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F165 / F4165	Single / Double	Non	230	3	7.4	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G165 / G4165	Single / Double	Non	460	3	3.7	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA165/BA4165	Single / Double	Non	575	3	3.0	1	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE165	Single	Auto	230	1	10.2	1	60	84	38	---	---	UL and cCSAus

* no molded plug (1) UL listed unit available with 20 Amp plug. (2) 20 Amp duplex receptacle, P/N 10-0060 available.
Additional cords lengths are available in 25' (8 m), 35' (11 m), and 50' (15 m).

SELECTION GUIDE

1. Integral float operated mechanical switch, no external control required.
2. For automatic use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. See FM1228 for correct model of simplex control panel.
4. See FM0712 for correct model of duplex control panel.
5. Variable level control switch 10-0763 used as a control activator, specify simplex (3) float or duplex (4) float system. Refer to FM0526.

⚠ 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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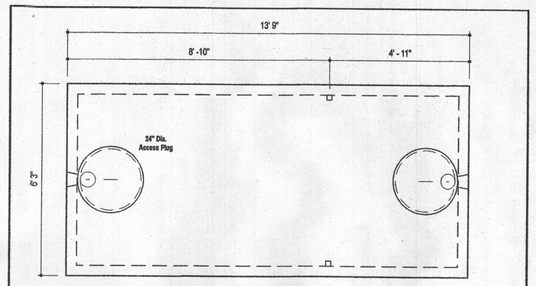
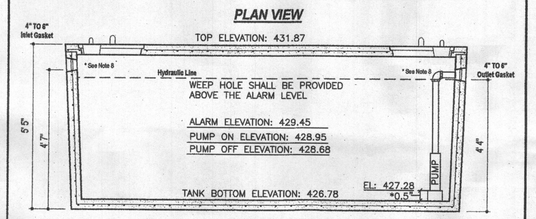


PLAN VIEW



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 = 150 pcf.
[2] Cement - Portland Type III per ASTM C 150-92.
[3] Admixtures & plasticizers per ASTM C 309-98 & 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.

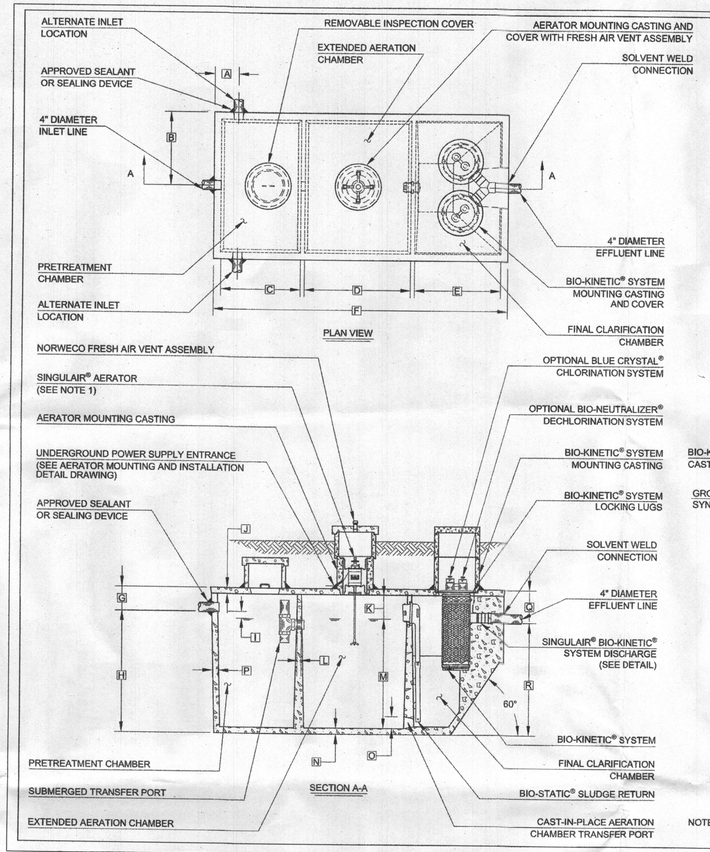
FLOAT TREE:	ELEV.	RELATIVE TO BOTTOM
BOTTOM OF TANK	426.78	
TOP OF PUMP	428.62	1'-10 1/16"
PUMP OFF	428.68	1'-10 3/16"
PUMP ON	428.95	2'-2 3/64"
HIGH ALARM	429.45	2'-8 3/64"

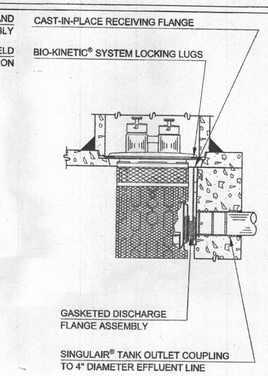
WEIGHT = 19,000 lbs.

MBI Mayer Bros., Inc.
6364 Race Road
Elkridge, Maryland 21075
Tel. 410.796.1434
Fax. 410.796.1438
www.mayerbrosprecast.com

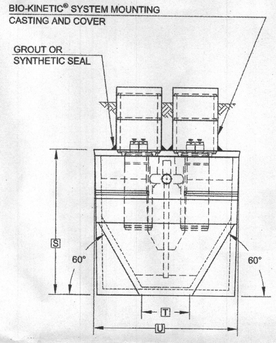
2,000 GALLON SEPTIC TANK
1-Compartment
Stock Item [Approx. 19,000 lbs]

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





BIO-KINETIC® SYSTEM DISCHARGE DETAIL



OUTLET END VIEW

NOTE: TOTAL SYSTEM CAPACITY: 1,725 GALLONS
RATED CAPACITY: 750/800 GALLONS PER DAY

GENERAL NOTES:

① SINGULAIR® AERATOR, AS TESTED AND ACCEPTED BY NSF.

② FALL THROUGH SINGULAIR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.

③ ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE. INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.

④ TANK REINFORCED PER ACI STD. 318.

⑤ REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.

⑥ CONTACT THE LOCAL, LICENSED SINGULAIR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: _____

NAME: _____

CONTRACTOR'S CERTIFICATION:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: _____

NAME: _____

CRITICAL DIMENSIONS			
A	1'- 0"	N	0'- 3"
B	3'- 0"	O	0'- 6"
C	3'- 4"	P	0'- 3"
D	4'- 5"	Q	1'- 4"
E	3'- 7"	R	4'- 8"
F	12'-2"	S	6'- 0"
G	1'- 0"	T	2'- 0"
H	5'- 0"	U	6'- 0"
I	0'- 3"	V	
J	0'- 3"	W	
K	1'- 0"	X	
L	0'- 2"	Y	
M	4'- 6"	Z	

U.S. AND FOREIGN PATENTS PENDING

© MMXVI

norweco®

LOW PROFILE SINGULAIR® BIO-KINETIC® WASTEWATER TREATMENT SYSTEM MODEL 960LP-750GPD

DRAWN BY	MT
CHECKED BY	JMM
DATE	4-25-2016
SCALE	NTS
DRAWING NO.	PC-5-7157

BAT TREATMENT SYSTEM TANK AND PUMP TANK (LOT 3)
N.T.S.

NOTE: RATED CAPACITY: 750 GALLONS PER DAY PER MANUFACTURER.

SEE MANUFACTURES SPECIFICATIONS FOR DETAILS. WWW.NORWECO.COM

Approved Septic System Plan
Howard County Health Department
NORWECO TNT 960 LP
w/ Mayer Bros. 2000-gal Pump Tank
1 Zoeller BN161 (@.5 hp) Pump
Signature 1/12/2018 Date
BAT- LPD system

THE DETAILS SHOWN HEREON ARE BASED ON TYPICAL MANUFACTURES DRAWINGS PROVIDED BY NORWECO, ACTUAL MANUFACTURER MAY DIFFER. CONTRACTOR TO VERIFY THAT ALL DIMENSION ARE IN COMPLIANCE WITH THE HEALTH DEPARTMENT REQUIREMENTS.

BENCHMARK
ENGINEERS LAND SURVEYORS PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE, SUITE 315 ELLICOTT 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.

STATE OF MARYLAND AARON M. KIRBY No. 45577 PROFESSIONAL ENGINEER
12/20/17

OWNER/DEVELOPERS:
ELLEN M. VAWTER,
MICHAEL A. VAWTER,
NANCY J. VAWTER,
LAURA J. LEONARD,
DREW B. LEONARD
14170 TRIADELPHIA MILL ROAD
DAYTON, MARYLAND 21036
301-706-6044

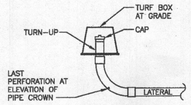
PROJECT:
VAWTER PROPERTY
LOT 3

LOCATION: 14176 TRIADELPHIA MILL ROAD
TAX MAP: 27 — GRID: 24 — PARCEL: 68
ZONED: RR-DEO RURAL RESIDENTIAL
ELECTION DISTRICT NO. 5 — HOWARD COUNTY, MARYLAND

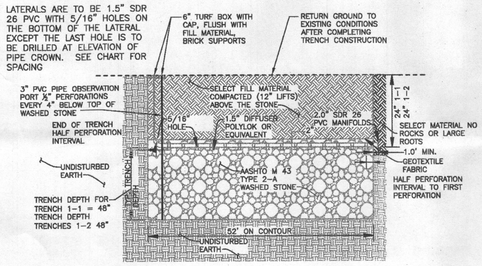
TITLE: SEPTIC SYSTEM DESIGN DETAILS

DESIGN: LDD	DRAFT: LDD	CHECK: AAM	DATE: DECEMBER, 2017	PROJECT NO. 2766
			SCALE: NONE	SHEET 2 OF 3

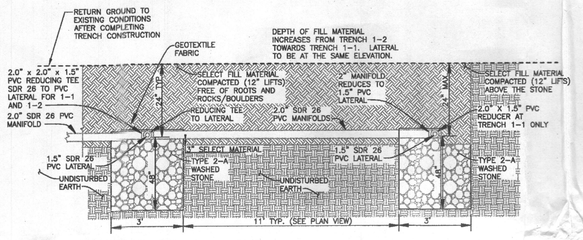
J:\2766 VAWTER PROPERTY\dwg\8026 GP.dwg, SEPTIC TANK AND PUMP details lot 3, 12/20/2017 7:53:08 AM, mfigner



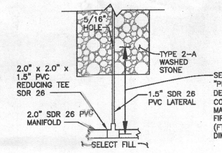
END PERFORATION AND TURN-UP DETAIL



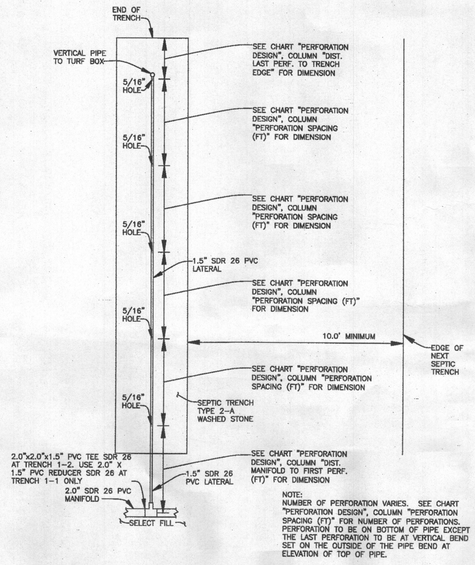
LATERAL AND TRENCH DESIGN



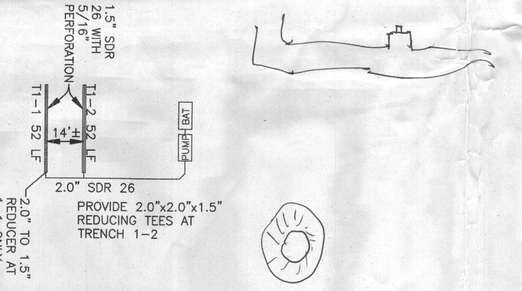
TRENCH AND MANIFOLD SECTION



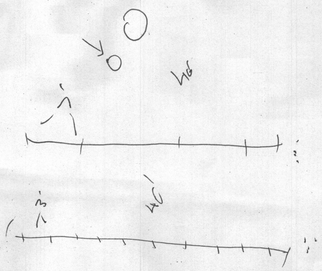
OVERHEAD VIEW OF MANIFOLD AND LATERAL CONNECTION SECTION



PERFORATION SPACING AND LATERAL LENGTH DIAGRAM



TRENCH SCHEMATIC
NOT TO SCALE



Trench and Lateral Design											
Cell	Trench	Pipe Inv. Elev.	Trench Bottom Elev.	Highest Ground Over	Lowest Ground Over	Total Design Head (ft)	Approx. Lateral Length (ft)	Number of Perforations	Flow per Perforation (gpm)	Flow per Lateral (gpm)	Flow Differential
1	1	450.4	446.4	452.4	452.4	28.2	50.5	11	1.63	17.91	0.0%
	2	450.1	446.1	452.1	452.1	27.8	55.0	10	1.78	17.78	0.7%

Perforation Diameter = 5/16 inches Target Flow = 17.91 gpm

Cell	Flow Rate
1	35.69

Depth To Effective Sidewall		Deep Trench Depth	Depth to Inlet
Trench 1	5 ft	4 ft	2 ft
Trench 2	5 ft	4 ft	2 ft

Perforation Design								
Cell	Trench	Number of Perforations	Manifold to Trench (ft)	Trench Length (ft)	Perforation Spacing (ft)	Dist. Manifold to First Perf. (ft)	Dist. Last Perf. to Trench Edge	Lateral Length (ft)
1	1	11	3.2	52	4.73	5.56	2.38	52.84
	2	10	2.5	52	5.20	5.10	2.60	51.90

Lateral Pressure Calculations																		
Cell	Trench	Pipe Elev.	Beginning Manifold Loss	Gate Valve	Manifold Bends 45D	Manifold Length	Manifold velocity	Manifold Thru Tees	Delta Loss Manifold	Total Manifold Loss	Lateral 90 degree side tee loss	Sudden Reduction Loss	Lateral Bends 45 deg. Loss	Lateral Length to first perf. Loss	Lateral Loss Summation	Total Loss to First Perf.	Total Design Head (ft)	Flow per Lateral (gpm)
1	2	450.1	0.00	0	4	188	35.8	0	4.19	4.19	0.06	0.01	0.00	0.10	0.16	4.35	27.77	17.78
1	1	450.4	4.19			14	17.9	1	0.09	4.28	0.06	0.01	0.00	0.09	0.16	4.44	28.16	17.91

Perforation Diameter = 5/16 inches Distal Head 2 feet

Friction Head
main

Friction Head = Head loss due to pipe friction
2" pipe = 202 feet

45° bends	4 loss for manifold bend	16.0 feet	per table 4.3
Str. Coupling	1 loss for straight tee	2.0 feet	per table 4.3
90 deg. Side tee	1 loss for tee bend	10.0 feet	per table 4.3 for smaller pipe
Sudden reduction	1 loss for reduction	1.0 feet	per Crane Co. technical paper
45° bends	1 loss for lateral bend	3.0 feet	per table 4.3
Gate Valve	0 loss for valve	0.0 feet	per table 4.3

Equivalent Manifold Length = 220.0 Friction loss = 4.52 feet

1.5" lateral 62.00 feet Friction loss = 1.12 feet

Total Friction Head = 5.63

Design Calculations

Lot 3

Design Input:

Calculations:

Capacity requirements

number of lots	1	
bedrooms per lot	6	
use rate per bedroom	150 gpd	

Max. Daily Flow	900 gpd
Average Daily Flow	450 gpd
Maximum Daily Flow	0.63 gpm
Average Daily Flow	0.31 gpm

Drainfield Requirements

Application Rate	1.2 gpd/sq ft	
Trench width	3 ft	
trench gravel depth	4 ft	
number of trenches	2	
trench spacing center-center	13 ft	

Standard Trench Length	250 ft
Deep Trench Conversion Factor	41.67 %
Deep Trench Length for MDF	104.18 ft
total trench length for 100% capacity	104.18 ft
individual trench length	52 ft
Approx. Lateral Length	48.00 ft

Tanks and Capacities

BAT tank	2,000	gallons
2nd settling tank	NA	gallons
Equalization Tank	NA	gallons
pump tank size	2,000	gallons

minimum req. area	1,250 sf
req. capacity (1125+(0.75*MDF))	1,800 gal.
design settling capacity	2,000 gal.
min. pump tank capacity (ADF)	600 gal.

Distribuition system

number of cells	1	
trenches first system	2	
lateral length per pump	104 ft	
ID 1.5" SDR 26 PVC	1.75 inches	
Max. Forcemain length	202 ft	
ID 2" SDR 26 PVC	2.17 inches	

Total Number of Pumps	1
laterals served by pump	2
Vol./100 ft 1.5" SDR 26	12.6 gal.
Vol. of laterals served	13.1 gal.
Vol./100 ft 2" SDR 26	19.6 gal.
Max. Main volume	39.6 gal.

Static Hydraulic Profile

Ground Elev. At BAT tank	434.49 ft	
Tank #1 invert in	431.49 ft	
Cover	2.00 ft	
Tank #1 top	432.49 ft	okay
Fall in tanks	0.33 ft	
Fall between tanks	0.13 ft	
Ground Elev. at pump tank	434.14 ft	
Pump Tank invert in	431.03 ft	
inv. into pump tank to top	0.84 ft	
Pump Tank top	431.87 ft	okay
Pump Block Height	0.50 ft	
Height of Intake	0.79 ft	
Highest lateral	450.00 ft	Cell 1

Tank #1 effulent elev	431.16 ft
Pump Tank effulent elev	431.03 ft
Invert of pump tank	428.78 ft
Pump Elevation	427.28 ft
pump intake elev.	428.07 ft

Perforation Design:

Size of Perforation	5/16 inches
Design Separation	4.73 ft
Use Perforations	11
Perforations per field	22

Distal Pressure =	2.0 ft
Flow	1.63 gpm
Perforations per Lateral	11.00
Perforation Actual Spacing	4.73 ft
Flow rate	35.82 gpm

Dosing volume, flow rates and Pressures

lateral flow rate per pump	35.82 gpm
Friction (C) for PVC	150
Miscellaneous Losses	0 ft
Estimated Run Time	2.00 Min.
Cells in simultaneous use	1
Pump tank Volume	45.49 Gal/in

Static Head	21.32 ft Cell 1
Friction Head	5.63 ft Cell 1
Distal Head	2 ft
Max. Total Dynamic Head	28.95 ft
Minimum Dose Vol.	150.00 gal.
Min. Runtime	4.19 min.
Selected Runtime	5.19
Selected Dose Volume	150.00 gal.
Average Dose	3.00 per day

Tank and Float Design:

Ground over Tank =	434.14 ft
Top of Tank =	431.87 ft
Invert of Tank =	426.78 ft
Pump Block=	0.50 ft
Water End and Motor =	1.34 ft
per Mayer Brothers Precast	
minimum Pump off =	428.62 ft
Pump Off Float =	428.68 ft
Dose =	20.05 cf
Area of Pit	72.99 sf

Inside Tank Dimenions

Height =	4.67 ft
Width =	5.58 ft
Length =	13.08 ft
Number of Tanks =	1

Use one 2,000 gallon pump tank

Pump on dist. =	0.27 ft	
Pump on Elev. =	428.95 ft	
Distance between Pump on and Highwater Alarm =		0.5 ft
Highwater Alarm Elevation =		429.45 ft
High Water Alarm to inlet =	1.58	
Volume Above Alarm Float to Inlet =	114.97 cf or	859.99 gallons
One Day Flow =	900.00 gallons	not okay
90% One Day Flow =	810.00 gallons	okay

Approved Septic System Plan
Howard Coty Health Department
NORWECO NT 960 LP
w/ Mayer Bros. 2000-gal Pump Tank
& Zoeller BN161 (0.5 hp)
1/12/2018
Signature Date
A1-LPD system

Pump Requirements:

Performance =	35.82 gpm
Head of Water =	28.95 feet of head

Pump Selection: Zoeller Pump BN161
1/2 horse power 115 Volts Single Phase

BENCHMARK
ENGINEERS LAND SURVEYORS PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT 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.

STATE OF MARYLAND JOHN M. CARNEY No. 45577 PROFESSIONAL ENGINEER
12/20/17

OWNER/DEVELOPERS:
ELLEN M. VAWTER,
MICHAEL A. VAWTER,
NANCY J. VAWTER,
LAURA J. LEONARD,
DREW B. LEONARD
14170 TRIADELPHIA MILL ROAD
DAYTON, MARYLAND 21036
301-706-5044

PROJECT:
VAWTER PROPERTY
LOT 3

LOCATION: 14176 TRIADELPHIA MILL ROAD
TAX MAP: 27 - GRID: 24 - PARCEL: 68
ZONED: RR-DEO RURAL RESIDENTIAL
ELECTION DISTRICT NO. 5 - HOWARD COUNTY, MARYLAND

TITLE: SEPTIC SYSTEM DESIGN DETAILS

DESIGN: LDD	DRAFT: LDD	CHECK: AAM	DATE: DECEMBER, 2017	PROJECT NO. 2766
			SCALE: NONE	SHEET 3 OF 3

J:\2766 VAWTER PROPERTY\dwg\8026 GP.dwg, TRENCH details and calcs lot 3, 12/20/2017 9:45:14 AM, nfignar

Your Peace of Mind Is Our Top Priority®

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

ZOELLER® PUMP COMPANY
Zoeller Family of Water Solutions™

SECTION: 2.15.090
FM0785
0317
Supersedes
0515

TECHNICAL DATA SHEET
HIGH HEAD FLOW-MATE SERIES
Models 161/4161, 163/4163, 165/4165 Submersible Effluent Pumps

PRODUCT SPECIFICATIONS

MOTOR	Horse Power	1/2 (161/4161, 163/4163) or 1 (165/4165)
	Voltage	115 - 575
	Phase	1 or 3 Ph
	Hertz	60 Hz
	RPM	3450
	Type	Permanent split capacitor or 3 Ph
	Insulation	Class B
	Amps	2.4 - 15.5
PUMP	Operation	Automatic or nonautomatic
	Auto On/Off Points	15-3/4" (400 mm) / 5-1/4" (133 mm)
	Discharge Size	1-1/2" NPT (optional 2" or 3" flange)
	Solids Handling	3/4" (19 mm) spherical solids
	Cord Length	20' (6 m) standard
	Cord Type	1 Ph: UL listed 3-wire neoprene cord and plug or 3 Ph: 4-wire with no plug
	Max. Head	86.5' (26 m)
	Max. Flow Rate	100 GPM (379 LPM)
	Max. Operating Temp.	130 °F (54 °C)
	Cooling	Oil filled
	Motor Protection	Auto reset thermal overload (1 Ph)
MATERIALS	Upper Bearing	Ball bearing
	Lower Bearing	Ball bearing
	Mechanical Seals	Carbon and ceramic
	Impeller Type	Non-clogging vortex
	Impeller	Bronze
	Hardware	Stainless steel
	Motor Shaft	SAE 1117 carbon steel or 416 stainless steel*
	Gasket	Neoprene square ring and gasket

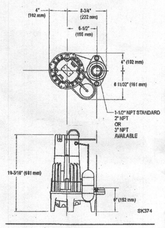
*Single seal models are built with a carbon steel motor shaft, and double seal models are built with a stainless steel motor shaft.

All Class 30 cast iron construction.

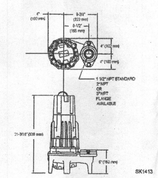
NOTE: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

NOTE: See model comparison chart for specific details.

SINGLE SEAL



DOUBLE SEAL

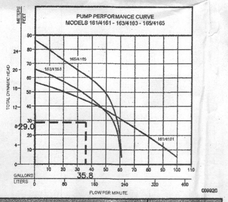


Tested to Standard UL1776 and Certified to CSA Standard C22.2 No. 108

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

TOTAL DYNAMIC HEAD FLOW PER MINUTE

MODELS		161/4161		163/4163		165/4165	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	100	379	61	231	61	231
10	3.0	93	352	60	227	60.5	229
15	4.6	86	326	60	227	60.3	228
20	6.1	79	299	59	223	60	227
25	7.6	71	267	57	216	59	223
30	9.1	62	235	55	208	58	220
40	12.2	45	170	46	174	55	208
50	15.2	20	76	33	125	50	189
60	18.3	--	--	15	57	39	148
70	21.3	--	--	--	--	22.5	85
80	24.4	--	--	--	--	10	38
Shut-off Head:		56 ft. (17.1 m)		66 ft. (20.1 m)		86.5 ft. (26.4 m)	



**USE D165 OR EQUIVALENT

MODEL COMPARISON

Model	Seal	Motor	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex	CERTIFICATIONS
M161	Single	Auto	115	1	15.0	1/2	60	80	36	1	---	UL and cCSAus (2)
N161	Single	Non	115	1	15.0	1/2	60	80	36	2 or 3 & 5	4 & 5	CSA (1)
N4161	Double	Non	115	1	15.5	1/2	60	87	39	3 & 5	4 & 5	UL and cCSAus (3)
** BN161	Single	Auto	115	1	15.0	1/2	60	84	38	---	---	CSA
D161	Single	Auto	230	1	7.5	1/2	60	80	36	1	---	UL and cCSAus
E161 / E4161	Single / Double	Non	230	1	7.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H161	Single	Auto	200	1	8.8	1/2	60	80	36	1	---	cCSAus
* I161 / I4161	Single / Double	Non	200	1	8.8	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J161 / J4161	Single / Double	Non	200	3	6.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F161 / F4161	Single / Double	Non	230	3	5.2	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G161 / G4161	Single / Double	Non	460	3	2.9	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA161/BA4161	Single / Double	Non	575	3	2.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE161	Single	Auto	230	1	7.5	1/2	60	84	38	---	---	UL and cCSAus
M163	Single	Auto	115	1	15.0	1/2	60	80	36	1	---	UL and cCSAus (2)
N163 / N4163	Single / Double	Non	115	1	15.0	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	CSA (1)
BN163	Single	Auto	115	1	15.0	1/2	60	84	38	---	---	CSA
D163	Single	Auto	230	1	7.5	1/2	60	80	36	1	---	UL and cCSAus
E163 / E4163	Single / Double	Non	230	1	7.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H163	Single	Auto	200	1	8.5	1/2	60	80	36	1	---	cCSAus
* I163 / I4163	Single / Double	Non	200	1	8.5	1/2	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J163 / J4163	Single / Double	Non	200	3	6.0	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F163 / F4163	Single / Double	Non	230	3	4.8	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G163 / G4163	Single / Double	Non	460	3	2.9	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA163/BA4163	Single / Double	Non	575	3	2.4	1/2	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE163	Single	Auto	230	1	7.5	1/2	60	84	38	---	---	UL and cCSAus
D165	Single	Auto	230	1	10.2	1	60	80	36	1	---	UL and cCSAus
E165 / E4165	Single / Double	Non	230	1	10.2	1	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	UL and cCSAus
* H165	Single	Auto	200	1	12.6	1	60	80	36	1	---	cCSAus
* I165 / I4165	Single / Double	Non	200	1	12.6	1	60	80 / 87	36 / 39	2 or 3 & 5	4 & 5	cCSAus
* J165 / J4165	Single / Double	Non	200	3	7.5	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* F165 / F4165	Single / Double	Non	230	3	7.4	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* G165 / G4165	Single / Double	Non	460	3	3.7	1	60	80 / 87	36 / 39	3 & 5	4 & 5	UL and cCSAus
* BA165/BA4165	Single / Double	Non	575	3	3.0	1	60	80 / 87	36 / 39	3 & 5	4 & 5	cCSAus
BE165	Single	Auto	230	1	10.2	1	60	84	38	---	---	UL and cCSAus

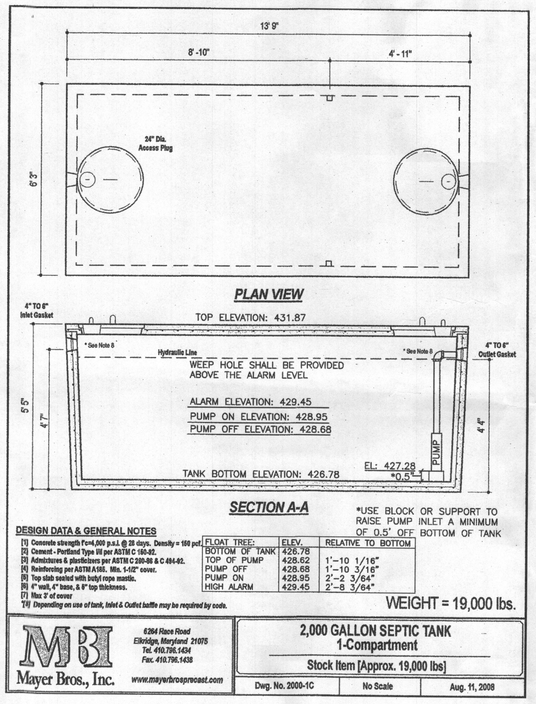
* no molded plug (1) UL listed unit available with 20 Amp plug. (2) 20 Amp duplex receptacle, P/N 10-0060 available. Additional cords lengths are available in 25' (8 m), 35' (11 m), and 50' (15 m).

SELECTION GUIDE

1. Integral float operated mechanical switch, no external control required.
2. For automatic use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. See FM1228 for correct model of simplex control panel.
4. See FM0712 for correct model of duplex control panel.
5. Variable level control switch 10-0763 used as a control activator, specify simplex (3) float or duplex (4) float system. Refer to FM0526.

⚠ 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).

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



*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 = 150 pcf.
[2] Cement - Portland Type III per ASTM C 150-92.
[3] Admixtures & plasticizers per ASTM C 260-94a & 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 2' of cover
[8] Depending on use of tank; Inlet & Outlet baffle may be required by code.

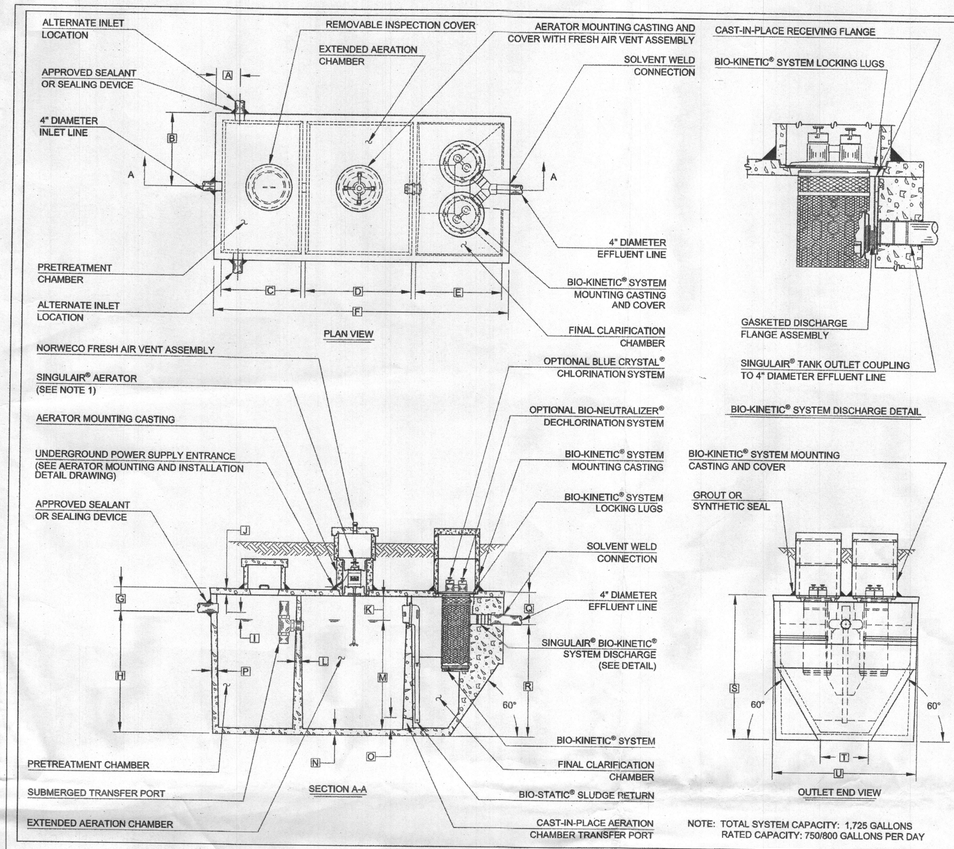
FLOAT TREE:	ELEV.	RELATIVE TO BOTTOM
BOTTOM OF TANK	426.78	
TOP OF PUMP	428.62	1'-10 1/16"
PUMP OFF	428.68	1'-10 3/16"
PUMP ON	428.95	2'-2 3/64"
HIGH ALARM	429.45	2'-8 3/64"

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



NOTE: TOTAL SYSTEM CAPACITY: 1,725 GALLONS
RATED CAPACITY: 750/800 GALLONS PER DAY

GENERAL NOTES:

① SINGULAIR® AERATOR, AS TESTED AND ACCEPTED BY NSF.

② FALL THROUGH SINGULAIR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.

③ ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE. INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.

④ TANK REINFORCED PER ACI STD. 318.

⑤ REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.

⑥ CONTACT THE LOCAL, LICENSED SINGULAIR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: _____

NAME: _____

CONTRACTOR'S CERTIFICATION:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: _____

NAME: _____

CRITICAL DIMENSIONS

A	1'- 0"	N	0'- 3"
B	3'- 0"	O	0'- 6"
C	3'- 4"	P	0'- 3"
D	4'- 5"	Q	1'- 4"
E	3'- 7"	R	4'- 8"
F	12'-2"	S	6'- 0"
G	1'- 0"	T	2'- 0"
H	5'- 0"	U	6'- 0"
I	0'- 3"	V	
J	0'- 3"	W	
K	1'- 0"	X	
L	0'- 2"	Y	
M	4'- 6"	Z	

U.S. AND FOREIGN PATENTS PENDING

© MMXVI

norweco®

LOW PROFILE SINGULAIR® BIO-KINETIC® WASTEWATER TREATMENT SYSTEM MODEL 960LP-750GPD

DRAWN BY	MT
APPROVED BY	JMM
DATE	4-25-2016
SCALE	NTS
DRAWING NO.	PC-5-7157

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SHALL NOT BE REPRODUCED, DISCLOSED TO OTHERS OR USED FOR ANY PURPOSE EXCEPT WITH WRITTEN PERMISSION OF NORWECO, INC.

BAT TREATMENT SYSTEM TANK AND PUMP TANK (LOT 3)

N.T.S.

NOTE: RATED CAPACITY: 750 GALLONS PER DAY PER MANUFACTURER.

SEE MANUFACTURES SPECIFICATIONS FOR DETAILS. WWW.NORWECO.COM

Approved Septic System Plan
Howard County Health Department
NORWECO #NT 960 LP
w/ Mayer Bros. 2000-gal Pump Tank
& Zoeller BN161 (0.5 hp) Pump
Signature
1/12/2018
Date
BAT-LPD system

THE DETAILS SHOWN HEREON ARE BASED ON TYPICAL MANUFACTURES DRAWINGS PROVIDED BY NORWECO, ACTUAL MANUFACTURER MAY DIFFER. CONTRACTOR TO VERIFY THAT ALL DIMENSION ARE IN COMPLIANCE WITH THE HEALTH DEPARTMENT REQUIREMENTS.

BENCHMARK
ENGINEERS LAND SURVEYORS PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT 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.

STATE OF MARYLAND LICENSED PROFESSIONAL ENGINEER No. 45577

12/20/17

OWNER/DEVELOPERS:

ELLEN M. VAWTER,
MICHAEL A. VAWTER,
NANCY J. VAWTER,
LAURA J. LEONARD,
DREW B. LEONARD
14170 TRIADELPHIA MILL ROAD
DAYTON, MARYLAND 21036
301-706-6044

PROJECT:

VAWTER PROPERTY
LOT 3

LOCATION: 14176 TRIADELPHIA MILL ROAD
TAX MAP: 27 — GRID: 24 — PARCEL: 68
ZONED: RR-DEO RURAL RESIDENTIAL
ELECTION DISTRICT NO. 5 – HOWARD COUNTY, MARYLAND

TITLE: SEPTIC SYSTEM DESIGN DETAILS

DESIGN: LDD	DRAFT: LDD	CHECK: AAM	DATE: DECEMBER, 2017	PROJECT NO. 2766
			SCALE: NONE	SHEET 2 OF 3

J:\2766 VAWTER PROPERTY\dwg\8026 GP.dwg, SEPTIC TANK AND PUMP details lot 3, 12/20/2017 7:53:08 AM, nfigner

GENERAL NOTES

1. THE LOT SHOWN HEREON COMPLIES WITH THE MINIMUM OWNERSHIP WIDTH AND LOT AREA AS REQUIRED BY THE MARYLAND STATE DEPARTMENT OF THE ENVIRONMENT.
2. THIS AREA DESIGNATES A PRIVATE SEWAGE DISPOSAL AREA OF AT LEAST 10,000 S.F. AS REQUIRED BY THE MARYLAND STATE DEPARTMENT OF THE ENVIRONMENT FOR INDIVIDUAL SEWERAGE DISPOSAL. IMPROVEMENTS OF ANY NATURE IN THIS AREA ARE RESTRICTED UNTIL PUBLIC SEWER IS AVAILABLE. THIS EASEMENT SHALL BECOME NULL AND VOID UPON CONNECTION TO A PUBLIC SEWER SYSTEM. THE COUNTY HEALTH OFFICER SHALL HAVE THE AUTHORITY TO GRANT ADJUSTMENTS TO THE PRIVATE SEWERAGE EASEMENT. RECORDATION OF A MODIFIED SEWERAGE EASEMENT PLAT SHALL NOT BE REQUIRED.
3. TOPOGRAPHY SHOWN WITHIN THE LIMIT OF DISTURBANCE IS BASED ON HOWARD COUNTY GIS, 2 FOOT CONTOURS, AND VERIFIED WITH FIELD RUN TOPOGRAPHY BY BENCHMARK ENGINEERING, INC., IN JULY, 2017.
4. TO THE BEST OF OUR KNOWLEDGE, ALL WELLS AND SEPTIC SYSTEMS LOCATED WITHIN 100' OF THE PROPERTY BOUNDARIES AND 200' DOWN GRADIENT OF ANY WELL AND/OR SEPTIC HAVE BEEN SHOWN.
5. ANY CHANGES TO A PRIVATE SEWAGE EASEMENT SHALL REQUIRE A REVISED PERCOLATION CERTIFICATION PLAN.
6. STORMWATER MANAGEMENT FOR THIS LOT COMPLIES WITH THE "MARYLAND DEPARTMENT OF THE ENVIRONMENT STORMWATER MANAGEMENT ACT OF 2007" AND THE "HOWARD COUNTY DESIGN MANUAL VOLUME I, CHAPTER 5". STORMWATER MANAGEMENT IS PROVIDED BY NON-ROOFTOP DISCONNECTION (N-2), TWO (M-6) MICRO BIO-RETENTIONS AND TWO (M-5) DRY WELLS. THEY ARE PRIVATELY OWNED AND PRIVATELY MAINTAINED.
7. A DECLARATION OF INTENT FOR SINGLE FAMILY RESIDENTIAL LOT EXEMPTION (CLEARING LESS THAN 20,000 SQUARE FEET OF FOREST) SHALL BE FILED WITH DPZ.
8. PROPERTY ACREAGE: (LOT 3) 3.59 AC., ZONED RR-DEO.
9. PROPOSED LIMIT OF DISTURBANCE: 3.0 AC.
10. FOREST STAND DELINEATION HAS BEEN PERFORMED BY BENCHMARK ENGINEERING, INC. IN FEBRUARY, 2017, AND IS PROVIDED AS PART OF THE SIMPLIFIED ENVIRONMENTAL CONCEPT PLAN SUBMISSION.
11. SPECIMEN TREES HAVE BEEN FIELD LOCATED BY BENCHMARK ENGINEERING, INC. AND ARE DEPICTED ON THIS PLAN.
12. THE EXISTING WELL SHOWN (TAG #HO-17-0196) SHOWN ON THIS PLAN HAS BEEN FIELD LOCATED BY BENCHMARK ENGINEERING, INC. DECEMBER, 2017 AND IS ACCURATELY SHOWN.
13. EXACT LENGTH OF SEPTIC TRENCHES IS TO BE DETERMINED BY THE HEALTH DEPARTMENT AT THE TIME OF TRENCH LAYOUT AND INSPECTION.
14. ANY CHANGES TO THE LOCATION OR DEPTHS TO ANY COMPONENTS MUST BE APPROVED BY THE ENGINEER AND THE HOWARD COUNTY HEALTH DEPARTMENT PRIOR TO INSTALLATION. A REVISED SITE PLAN MAY BE REQUIRED.
15. THE MAXIMUM EARTH COVER OVER THE SEPTIC TANK IS 3 FEET. GREATER EARTH COVER WILL REQUIRE A HEAVY LOAD BEARING TANK.

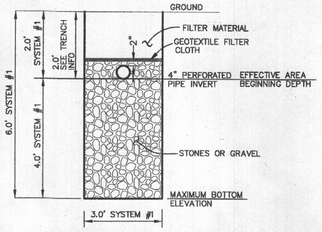
REQUIRED BAT SITE PLAN NOTES

1. ANY CHANGE TO THE LOCATIONS OR DEPTHS TO ANY COMPONENTS MUST BE APPROVED BY THE ENGINEER AND THE HOWARD COUNTY HEALTH DEPARTMENT PRIOR TO INSTALLATION. A REVISED SIT PLAN MAY BE REQUIRED.
2. THE MAXIMUM DEPTH OF THE BAT SHALL BE PER THE MANUFACTURER'S SPECIFICATION.
3. THE BLOWER MAY NOT BE LOCATED FURTHER FROM THE TANK THAN THE MANUFACTURER'S SPECIFICATIONS.
4. THE BAT SYSTEM SHALL BE MAINTAINED AND OPERATED FOR THE LIFE OF THE SYSTEM.
5. THE BAT SHALL BE OPERATED BY AND MAINTAINED BY A CERTIFIED SERVICE PROVIDER.
6. WITHIN ONE MONTH OF INSTALLATION, A PERSON INSTALLING THE BAT SYSTEM SHALL REPORT TO THE MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE) IN A MANNER ACCEPTABLE TO MDE, THE ADDRESS AND DATE OF COMPLETION OF THE BAT INSTALLATION AND THE TYPE OF BAT INSTALLED.
7. ELECTRICAL WORK FOR THE BAT INSTALLATION MUST BE PERFORMED BY A LICENSED ELECTRICIAN.
8. AN AGREEMENT AND EASEMENT MUST BE COMPLETED AND SIGNED BY ALL APPLICABLE PARTIES, AND RECORDED IN LAND RECORDS OF HOWARD COUNTY.
9. THE HEALTH DEPARTMENT REQUIRES DOCUMENTATION FOR THE START-UP CERTIFICATION FROM THE MANUFACTURER PRIOR TO FINAL APPROVAL OF THE INSTALLATION.

INITIAL SYSTEM		
Number of Bedrooms	6	
Application Rate	1.2	gpd/sf
Effective Area Beginning Depth	2	ft
Bottom Max Depth	6	ft
Design Flow	900	gpd
Drainage Field square footage	750	sf
Sidewall reduction credit	0.417	
Trench width	3	
Effective Area Depth	4	
Linear Length of trench Required	**104**	lf

1st REPLACEMENT SYSTEM		
Number of Bedrooms	6	
Application Rate	1.2	gpd/sf
Effective Area Beginning Depth	2	ft
Bottom Max Depth	6	ft
Design Flow	900	gpd
Drainage Field square footage	750	sf
Sidewall reduction credit	0.417	
Trench width	3	
Effective Area Depth	4	
Linear Length of trench Required	**104**	lf

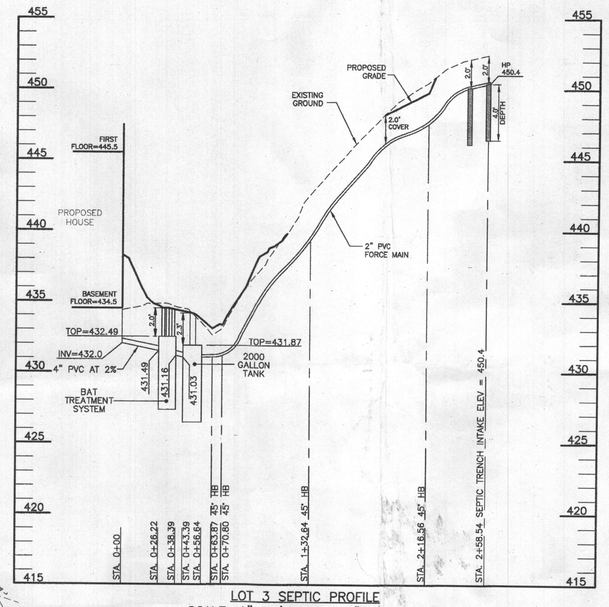
2nd REPLACEMENT SYSTEM		
Number of Bedrooms	6	
Application Rate	1.2	gpd/sf
Effective Area Beginning Depth	2	ft
Bottom Max Depth	6	ft
Design Flow	900	gpd
Drainage Field square footage	750	sf
Sidewall reduction credit	0.417	
Trench width	3	
Effective Area Depth	4	
Linear Length of trench Required	**104**	lf



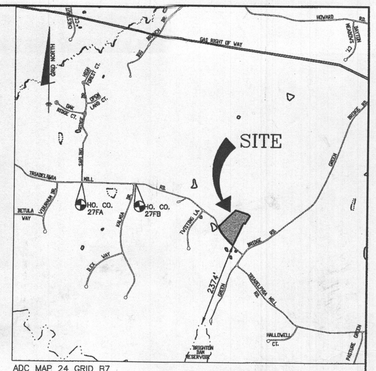
TYPICAL TRENCH DETAIL
NOT TO SCALE

LAYOUT PLAN
SCALE: 1" = 30'

(IN FEET)
1 inch = 30 ft.



LOT 3 SEPTIC PROFILE
SCALE: 1"=50' HORIZ., 1"=5' VERT.



VICINITY MAP
SCALE : 1"=2000'

BENCHMARKS (NAD83)

HO. CO. No. 27FA ELEV. 496.35
18.2' SOUTH OF THE CENTERLINE OF TRIADELPHIA MILL RD AT THE INTERSECTION OF SAPLING RIDGE DR.
N 569002.176 E 1306892.586

HO. CO. No. 27FB ELEV. 512.22
3.2' SOUTH OF THE EDGE OF PAVING OF TRIADELPHIA MILL RD 61' EAST OF THE CENTERLINE OF KALMIA DR.
N 568975.151 E 1308421.369

TRENCH INFORMATION

TRENCH 1-1	
TRENCH LENGTH	52 LF
GROUND ELEVATION	552.4
INVERT ELEVATION	550.4
MAX. BOTTOM ELEV.	546.4

TRENCH 1-2	
TRENCH LENGTH	52 LF
GROUND ELEVATION	552.1
INVERT ELEVATION	550.1
MAX. BOTTOM ELEV.	546.1

TRENCH 2-1	
TRENCH LENGTH	52 LF
GROUND ELEVATION	551.5
INVERT ELEVATION	549.5
MAX. BOTTOM ELEV.	545.5

TRENCH 2-2	
TRENCH LENGTH	52 LF
GROUND ELEVATION	551.0
INVERT ELEVATION	549.0
MAX. BOTTOM ELEV.	545.0

TRENCH 3-1	
TRENCH LENGTH	52 LF
GROUND ELEVATION	550.1
INVERT ELEVATION	548.1
MAX. BOTTOM ELEV.	544.1

TRENCH 3-2	
TRENCH LENGTH	52 LF
GROUND ELEVATION	548.8
INVERT ELEVATION	546.8
MAX. BOTTOM ELEV.	542.8

LEGEND

- SOILS CLASSIFICATION — GrB
- SOILS DELINEATION
- EXISTING CONTOURS — 480 / 478
- EXISTING WOODS LINE
- EXISTING WELL
- PROPOSED WELL — PROPOSED WELL BOX
- PASSING PERCOLATION TEST
- FAILING PERCOLATION TEST
- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- PROPOSED SEWAGE DISPOSAL AREA
- BETWEEN 20% AND 24.99% SLOPES
- EX. 100 YEAR FLOODPLAIN

SOILS LEGEND

SYMBOL	TYPE	K* FACTOR	NAME
Co*	C	.37**	CODORUS AND HATBORO SILT LOAM, 0 TO 3 PERCENT SLOPES
GgC	B	.28	GLENELG LOAM, 3 TO 8 PERCENT SLOPES
MoC	B	.32	MANOR LOAM, 8 TO 15 PERCENT SLOPES
MoD	B	.32**	MANOR LOAM, 15 TO 25 PERCENT SLOPES

* INDICATES HYDRIC SOILS
** HIGHLY ERODIBLE, K>0.35, AND/OR 15% OR GREATER SLOPES
TAKEN FROM THE NRCS WEB SOIL SURVEY, APRIL 2016. PAGE 15

Approved Septic System Plan
Howard County Health Department
NORWECO TNT 960 gal
w/ Meyer Bros. 2000-gal Pump Tank
& Zoeller B.N.U.(1/2 hp) Pump
R. Bricker 1/12/2018
Signature Date
BAT-LDD system

THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION INSPECTION DIVISION AT 410-313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF ANY WORK.

THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.

BENCHMARK
ENGINEERS LAND SURVEYORS PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE & SUITE 315 & ELLICOTT 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.

STATE OF MARYLAND — ADAM M. GAINES — No. 45577 — PROFESSIONAL ENGINEER

12/20/17

OWNER/DEVELOPERS:

ELLEN M. VAWTER,
MICHAEL A. VAWTER,
NANCY J. VAWTER,
LAURA J. LEONARD,
DREW B. LEONARD
14170 TRIADELPHIA MILL ROAD
DAYTON, MARYLAND 21036
301-706-6044

PROJECT:

VAWTER PROPERTY

LOT 3

LOCATION: 14176 TRIADELPHIA MILL ROAD
TAX MAP: 27 – GRID: 24 – PARCEL: 68
ZONED: RR-DEO RURAL RESIDENTIAL
ELECTION DISTRICT NO. 5 – HOWARD COUNTY, MARYLAND

TITLE: SEPTIC SYSTEM DESIGN PLAN

DESIGN: LDD	DRAFT: LDD	CHECK: AAM	DATE: DECEMBER, 2017	PROJECT NO. 2766
			SCALE: AS SHOWN	SHEET 1 OF 3

J:\2766 VAWTER PROPERTY\dwg\8026 GP.dwg, SEPTIC lot 3, 12/20/2017 9:44:15 AM, mfignar