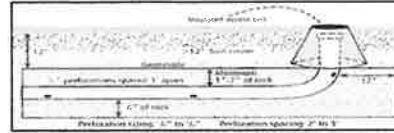


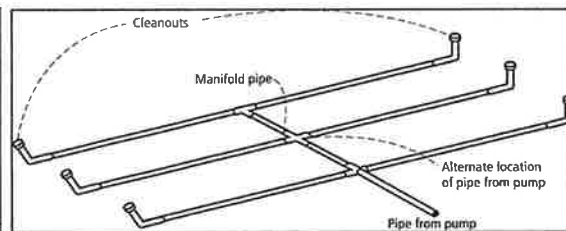
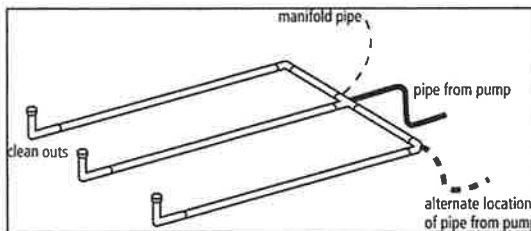
Project ID:

v 04.01.2021

- Media Bed Width: ft
- Minimum Number of Laterals in system/zone = Rounded up number of $[(\text{Media Bed Width} - 4) \div 3] + 1$.
 $[(\text{9} - 4) \div 3] + 1 = \text{3}$ laterals *Does not apply to at-grades*
- Designer Selected Number of Laterals : laterals
Cannot be less than line 2 (Except in at-grades)
- Select Perforation Spacing : ft
- Select Perforation Diameter Size: in
- Length of Laterals = Media Bed Length - 2 Feet.
 - 2ft = ft *Perforation can not be closer then 1 foot from edge.*
- Determine the Number of Perforation Spaces . Divide the Length of Laterals by the Perforation Spacing and round down to the nearest whole number.
 Number of Perforation Spaces = ft \div ft = Spaces
- Number of Perforations per Lateral is equal to 1.0 plus the Number of Perforation Spaces . Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.
 Perforations Per Lateral = Spaces + 1 = Perfs. Per Lateral



Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation											
1/4 Inch Perforations						7/32 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2 1/2	8	12	16	28	54	2 1/2	10	14	20	32	64
3	8	12	16	25	52	3	9	14	19	30	60
3/16 Inch Perforations						1/8 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2 1/2	12	17	24	40	80	2 1/2	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128



- Total Number of Perforations equals the Number of Perforations per Lateral multiplied by the Number of Perforated Laterals.
 Perf. Per Lat. X Number of Perf. Lat. = Total Number of Perf.
- Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: ft
- Select Type of Manifold Connection (End or Center):
- Select Lateral Diameter (See Table): in

13. Calculate the **Square Feet per Perforation**.

Recommended value is 4-11 ft² per perforation, Does not apply to At-Grades

a. **Bed Area** = Bed Width (ft) X Bed Length (ft)

ft X ft = ft²

b. **Square Foot per Perforation** = Bed Area ÷ by the Total Number of Perfs

ft² ÷ perf = ft²/perf

14. Select **Minimum Average Head**:

ft

15. Select **Perforation Discharge** based on Table:

GPM per Perf

16. **Flow Rate** = Total Number of Perfs X Perforation Discharge.

Perfs X GPM per Perforation = GPM

17. **Volume of Liquid Per Foot of Distribution Piping (Table II)**:

Gallons/ft

18. **Volume of Distribution Piping** =

= [Number of Perforated Laterals X Length of Laterals X (Volume of Liquid Per Foot of Distribution Piping)]

X ft X gal/ft = Gallons

19. **Minimum Delivered Volume** = Volume of Distribution Piping X 4

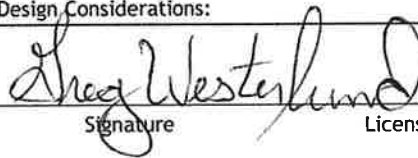
gals X 4 = Gallons

Perforation Discharge (GPM)				
Head (ft)	Perforation Diameter			
	1/8	1/16	7/32	1/4
1.0'	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0'	0.26	0.59	0.80	1.04
2.5	0.29	0.65	0.89	1.17
3.0	0.32	0.72	0.98	1.28
4.0	0.37	0.83	1.13	1.47
5.0'	0.41	0.93	1.26	1.65
1 foot	Dwellings with 3/16 inch to 1/4 inch perforations			
2 feet	Dwellings with 1/8 inch perforations			
	Other establishments and WSTS with 3/16 inch to 1/4 inch perforations			
5 feet	Other establishments and WSTS with 1/8 inch perforations			

Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

Comments/Special Design Considerations:

Greg Westerlund



L663

11/22/22

Desi

gner/ Installer

Signature

License No.

Date

University of Minnesota Pump Selection Procedure - 10/25/04

All boxed rectangles must be entered, the rest will be calculated.



1. Determine pump capacity:

A. Gravity Distribution

1. Minimum required discharge is 10 gpm
2. Maximum suggested discharge is 45 gpm

For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

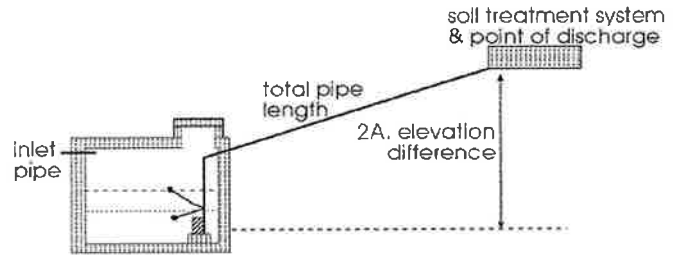
B. Pressure Distribution - see pressure design worksheet

Selected Pump Capacity: gpm

2. Determine Total Dynamic Head (TDH)

A. Elevation difference between pump and point of discharge.

feet



B. Special head requirement? (See Figure - Special Head Requirements)

feet

Special Head Requirements	
Gravity Distribution	0ft
Pressure Distribution	5ft

C. Friction loss in supply pipe

1. Select pipe diameter in
2. Enter Figure E-9 with gpm (1A or B) and pipe diameter (C1)

Read friction loss in feet per 100 feet from Figure E-9

Friction loss = ft/ 100 ft of pipe

3. Determine total pipe length from pump discharge to soil system discharge point. Estimate by adding 25 percent to pipe length for friction loss in fittings.

Pipe length times 1.25 = equivalent pipe length

ft x 1.25 = feet

4. Calculate total friction loss by multiplying friction loss (C2)

by the equivalent pipe length (C3) and divide by 100.

Friction Loss = ft/100ft X ft / 100 = feet

D. Total head requirement is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4).

ft + ft + ft

Total Head: feet

Flow Rate (gpm)	nominal pipe diameter		
	1.5"	2.0"	3"
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	6.96	2.06	0.3
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.7
60		5.6	0.82
65		6.48	0.95
70		7.44	1.09

3. Pump Selection

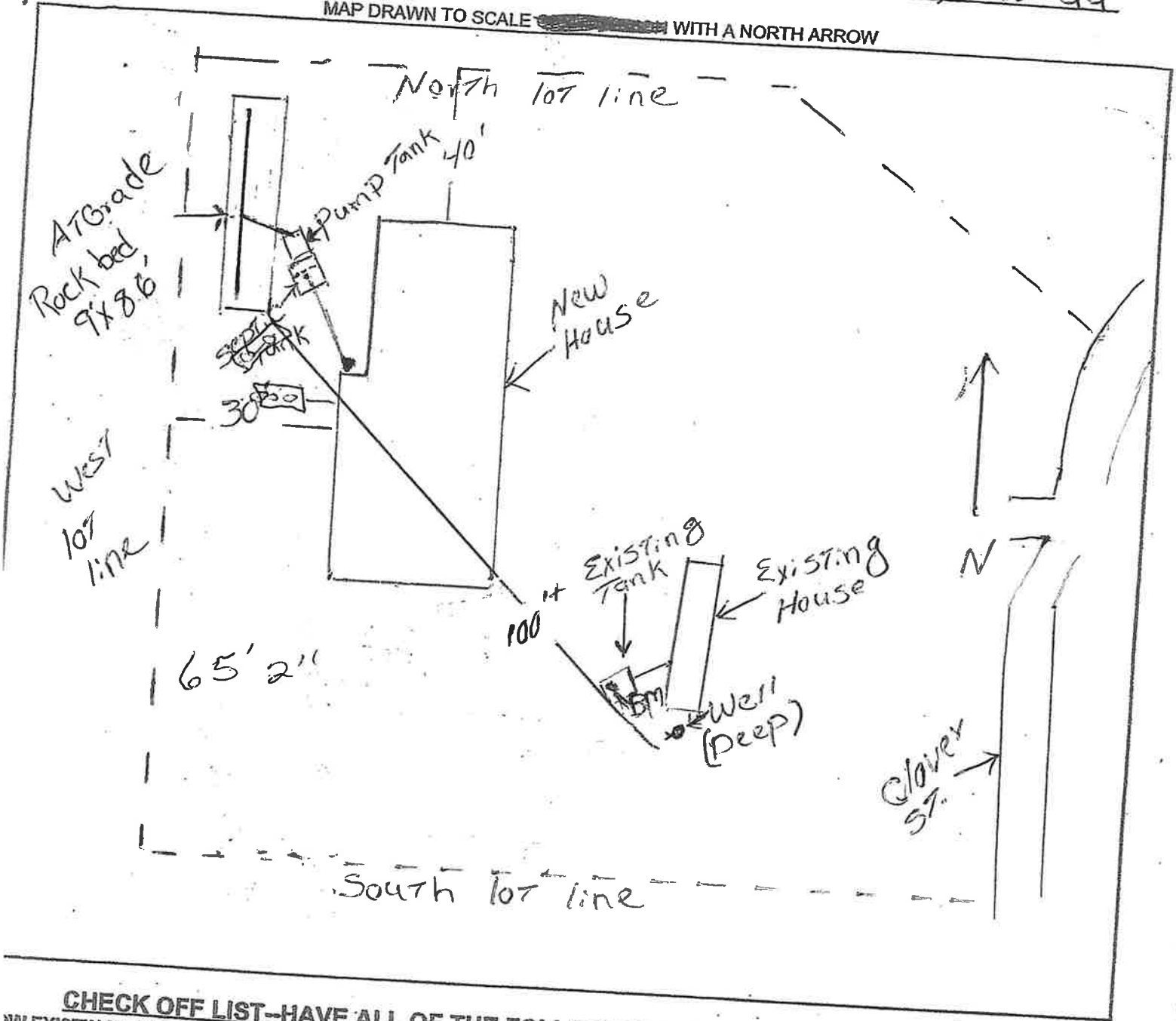
1. A pump must be selected to deliver at least gpm (1A or B) with at least feet of total head (2D).

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Greg Westlund (signature) 663 (license #) 7/30/22 (date)

DATE: 7/30/22

MAP DRAWN TO SCALE WITH A NORTH ARROW



CHECK OFF LIST-HAVE ALL OF THE FOLLOWING BEEN DRAWN ON THE MAP??

- WATER WELLS WITHIN 100 FT OF TREATMENT AREAS
- PRESSURE WATER LINES WITHIN 10 FT OF TREATMENT AREAS
- STRUCTURES
- SOIL TREATMENT AREAS
- HORIZONTAL AND VERTICAL REFERENCE
- POINT OF SOIL BORINGS
- EASEMENTS
- STURBED/COMPACTED AREAS
- EROSION PROTECTION-LATHE AND RIBBON EVERY 15 FT
- ACCESS ROUTE FOR TANK MAINTENANCE
- FIRE SETBACKS
- STRUCTURES
- PROPERTY LINES

INDICATE ELEVATIONS

- BENCHMARK 100
- ELEVATION OF SEWER LINE @ HOUSE 99
- ELEVATION @ TANK INLET 98.5
- ELEVATION @ BOTTOM OF ROCK LAYER 101
- ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER 94
- ELEVATION OF PUMP 95
- ELEVATION OF DISTRIBUTION DEVICE 101.5

OWNER SIGNATURE: Greg Westlund

DATE: 7/30/22



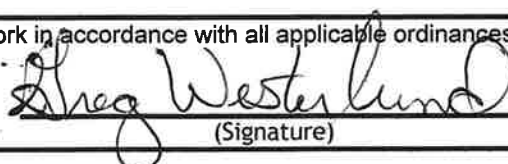
Client/ Address:		James & Shantelle Dougherty			Legal Description/ GPS:		Lot 1, Blek 1, / 37789 Clover ST, Aitkin MN			
Soil parent material(s): (Check all that apply) <input checked="" type="checkbox"/> Outwash <input type="checkbox"/> Lacustrine <input type="checkbox"/> Loess <input type="checkbox"/> Till <input type="checkbox"/> Alluvium <input type="checkbox"/> Bedrock <input type="checkbox"/> Organic Matter										
Landscape Position: (check one) <input type="checkbox"/> Summit <input checked="" type="checkbox"/> Shoulder <input type="checkbox"/> Back/Side Slope <input type="checkbox"/> Foot Slope <input type="checkbox"/> Toe Slope Slope shape							convex			
Vegetation		wooded		Soil survey map units		4588	Slope%	1.0	Elevation:	98
Weather Conditions/Time of Day:			Over- cast				Date		11/21/22	
Observation #/Location:		Soil Boring #2 / Noth end of proposed site				Observation Type:		Auger		
Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I----- Structure-----I			
							Shape	Grade	Consistence	
7	Loamy Sand	<35%	10YR 3/1				Single grain	Structureless	Loose	
19	Loamy Sand	<35%	10YR 4/6				Single grain	Structureless	Loose	
43	Loamy Sand	<35%	10YR 4/4				Single grain	Weak	Friable	
44	Loamy Coarse Sand	<35%	10YR 4/4	7.5YR 4/4	Concentrations	S1	Single grain	Weak	Friable	
Comments										
I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.										
Greg Westerlund							663	#REF!	11/21/2022	
(Designer/Inspector)							(License #)	(Date)		

OSTP Soil Observation Log

Project ID:

v 03.19.15



Client/ Address:		James & Shantelle Dougherty			Legal Description/ GPS:		Lot 1, Blek 1, / 37789 Clover ST, Aitkin MN			
Soil parent material(s): (Check all that apply) <input checked="" type="checkbox"/> Outwash <input type="checkbox"/> Lacustrine <input type="checkbox"/> Loess <input type="checkbox"/> Till <input type="checkbox"/> Alluvium <input type="checkbox"/> Bedrock <input type="checkbox"/> Organic Matter										
Landscape Position: (check one) <input type="checkbox"/> Summit <input checked="" type="checkbox"/> Shoulder <input type="checkbox"/> Back/Side Slope <input type="checkbox"/> Foot Slope <input type="checkbox"/> Toe Slope Slope shape							convex			
Vegetation		wooded		Soil survey map units		4588	Slope%	1.0	Elevation:	98
Weather Conditions/Time of Day:			Over- cast				Date		11/21/22	
Observation #/Location:		Soil boring #1 South end of proposed site				Observation Type:		Soil Pit		
Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	----- Structure-----			
							Shape	Grade	Consistence	
7	Loamy Sand	<35%	10YR 3/1				Single grain	Structureless	Loose	
19	Loamy Sand	<35%	10YR 4/6				Single grain	Structureless	Loose	
42	Loamy Sand	<35%	10YR 4/4				Single grain	Weak	Friable	
43	Loamy Coarse Sand	<35%	10YR 4/4	7.5YR 4/4	Concentrations	S1	Single grain	Weak	Friable	
Comments										
I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.										
Greg Westerlund						663		#REF!	11/21/2022	
(Designer/Inspector)		(Signature)				(License #)		(Date)		

CEMSTONE

TANK INSTALLATION INSTRUCTIONS

SITE CONDITIONS

The site must be accessible to large, heavy trucks. The site shall be free of items like trees, stumps, overhead wires, etc. that could interfere with delivery, and installation of the tank. The site conditions must allow trucks to within 3 to 6 feet of placement while ensuring safe site conditions.

EXCAVATION

Excavation shall be approximately 12" minimum larger than the tank size to allow for adequate back fill. This may vary with soil conditions. Excavation must allow the truck within 3 to 6 feet for placement of tank. Excavation shall have a level bottom so the weight bears on the outside walls of the tank.

BEDDING

Proper use of the bedding materials is important to ensure service life of tank structure. Bedding must be capable of bearing the weight of the tank. Bedding material shall have the ability of 100% to pass thru a 1/2" screen. Bedding thickness shall be 1" minimum compacted (thickness may vary with existing soil conditions).

WATER TABLE

When tanks are being placed where water levels can potentially be higher than the elevation of the tank cover, an alternate location should be considered.

BACKFILL MATERIAL

Sidewalls of tanks require clean dry backfill materials that have the ability of 100% to be able to pass through a 2" screen and a minimum of 12" on all sides from the bottom to top of tank. Backfill material shall be placed in a manner that avoids uneven loads on sidewalls of the tank. No compaction shall be permitted on the sidewalls of the tank.

COVER MATERIAL

Cover material shall be clean and dry soil that has the ability of 100% to be able to pass through a 4" screen. Cover material shall be mounded over tank and around risers in a manner that promotes runoff away from the center of the tank and riser rings.

MAINTENANCE HOLE COVER

Cover for maintenance holes must:

- (1) be secured by being locked, being bolted or screwed having a weight of at least 95 pounds, or other methods approved by the local unit of government. Covers shall also be leak resistant; and be designed so the cover cannot be slid or flipped, which could allow unauthorized access to the tank;
- (2) have a written and graphic label warning of the hazardous conditions inside the tank;
- (3) be capable of withstanding a load that the cover is anticipated to receive; and
- (4) be made of a material suitable for outdoor use and resistant to ultraviolet degradation.

PIPE & OFFSET

Pipe not to exceed 1" past interior wall of tank where a baffle is used.

BURIAL DEPTH

Tanks to be installed to depths according to each model's maximum bury recommendations.

LIABILITY

The septic tank installer shall be responsible for installing and securing risers and covers for all maintenance openings after the completed delivery of the septic tank or tanks to the jobsite. The tank installer shall be solely liable and responsible for the proper installation and securing of the maintenance hole covers after the completed delivery of the septic tank or tanks to the job site.

Tank Model: 1500 C
Gallon Capacity: 1015-518
Tank Type: Septic + Pump
Date of Manufacturing: 11/4/22

Maximum Burial Depth: 5'
Date of Delivery: Nov. 22 2022
Customer Name: WESTERLUND CONST.
Customer Signature:

CEMSTONE

TANK INSTALLATION INSTRUCTIONS

SITE CONDITION

The site must be accessible to large, heavy trucks. The site shall be free of items like trees, stumps, overhead wires, etc. that could interfere with delivery, and installation of the tank. The site conditions must allow trucks to within 3 to 6 feet of placement while ensuring safe site conditions.

EXCAVATION

Excavation shall be approximately 12" minimum larger than the tank size to allow for adequate back fill. This may vary with soil conditions. Excavation must allow the truck within 3 to 6 feet for placement of tank. Excavation shall have a level bottom so the weight bears on the outside walls of the tank.

BEDDING

Proper use of the bedding materials is important to ensure service life of tank structure. Bedding must be capable of bearing the weight of the tank. Bedding material shall have the ability of 100% to pass thru a 1/2" screen. Bedding thickness shall be 4" minimum compacted (thickness may vary with existing soil conditions).

WATER TABLE

When tanks are being placed where water levels can potentially be higher than the elevation of the tank cover, an alternate location should be considered.

BACKFILL MATERIAL

Sidewalls of tanks require clean dry backfill materials that have the ability of 100% to be able to pass through a 2" screen and a minimum of 12" on all sides from the bottom to top of tank. Backfill material shall be placed in a manner that avoids impact loads on sidewalls of the tank. No compaction shall be permitted on the sidewalls of the tank.

COVER MATERIAL

Cover material shall be clean and dry soil that has the ability of 100% to be able to pass through a 4" screen. Cover material shall be mounded over tank and around risers in a manner that promotes runoff away from the center of the tank and riser runs.

MAINTENANCE HOLE COVER

Cover for maintenance holes must:

- (1) be secured by being locked, being bolted or screwed having a weight of at least 95 pounds, or other methods approved by the local unit of government. Covers shall also be leak resistant; and be designed so the cover cannot be slid or flipped, which could allow unauthorized access to the tank;
- (2) have a written and graphic label warning of the hazardous conditions inside the tank;
- (3) be capable of withstanding a load that the cover is anticipated to receive; and
- (4) be made of a material suitable for outdoor use and resistant to ultraviolet degradation.

INLET & OUTLET

Pipe not to exceed 1" past interior wall of tank where a baffle is used.

BURIAL DEPTH

Tanks to be installed to depths according to each model's maximum bury recommendations.

LIABILITY

The septic tank installer shall be responsible for installing and securing covers for all maintenance openings after the completed delivery of the septic tank or tanks to the jobsite. The tank installer shall be solely liable and responsible for the proper installation and securing of the maintenance hole covers after the completed delivery of the septic tank or tanks to the job site.

Tank Model #

1000 P

Gallon Capacity

1030

Tank Type

PUMP

Date of Manufacturing

11/4/22

Maximum Burial Depth

5'

Date of Delivery

Nov. 22 2022

Customer Name

WESTERLUND COAST.

Customer Signature

