INFILTRATOR
water technologies




Septic Tank Installation Strategies For Success

Travis Johnson – Area Sales Representative

Onsite Wastewater Mega-Conference

2024 Spokane, WA

Celebrating Tomorrow's Environment
Clean Water for the Future

Travis Johnson
Area Sales Representative for
MN, ND, & SD

TJohnson@infiltratorwater.com
(320)-362-0962

The materials being presented represent our own opinions, and do NOT reflect the opinions of NOWRA.

Agenda

- Site Selection
- Buoyancy control
- Tank installation
- Fall Protection
- Summary & Questions

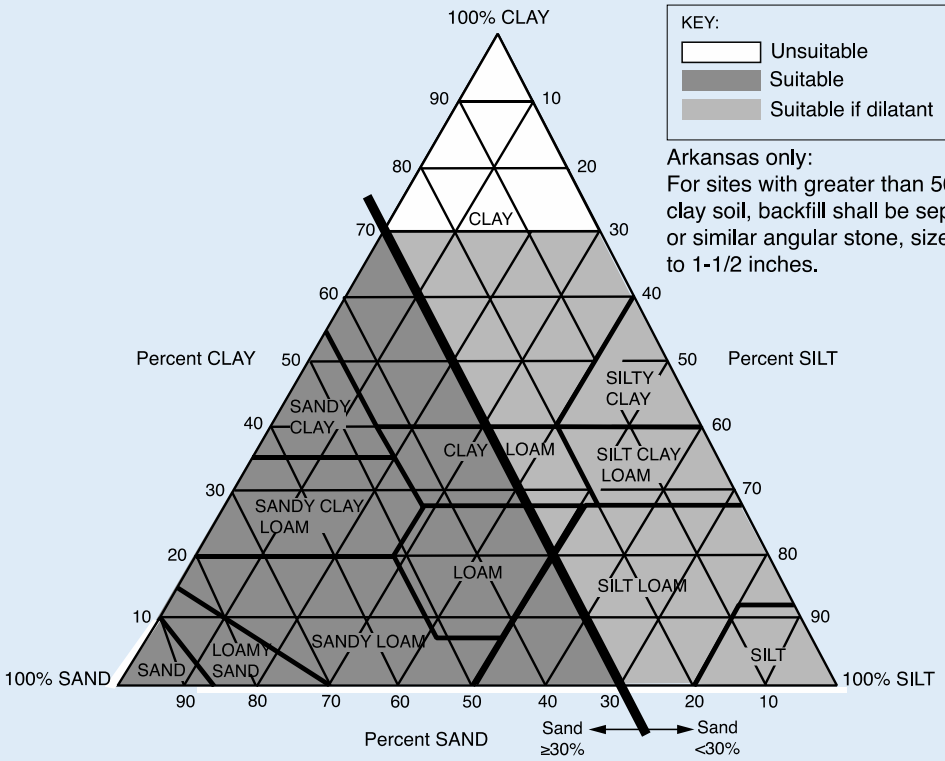
What You Need To Know

1. Burial Depth
2. Soil Type/Landscape
3. Pumper Access
4. Water Table

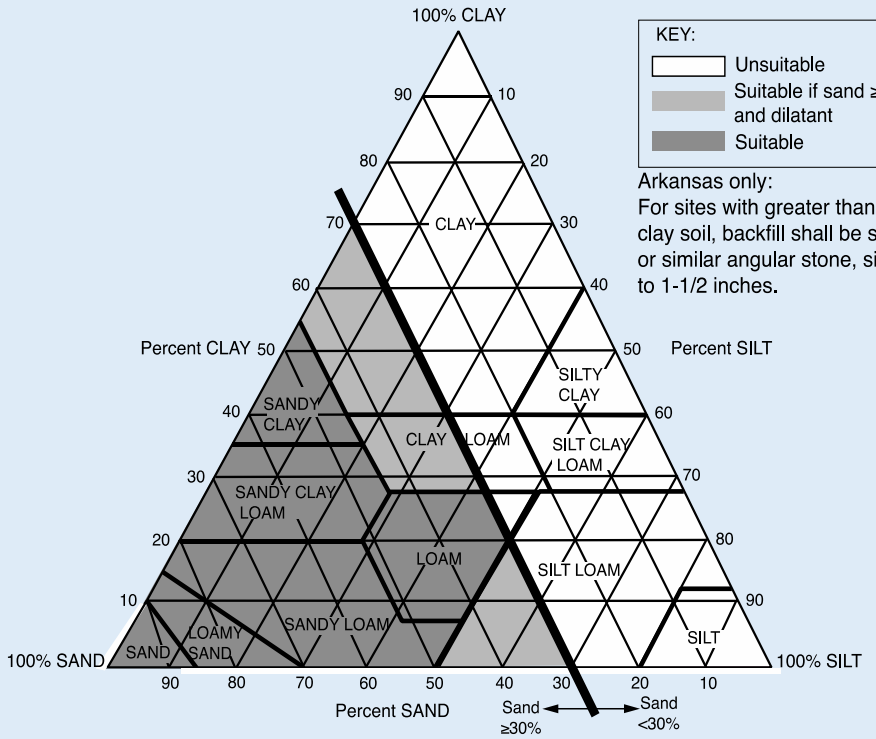
1 Burial Depth

- Minimum Depth
- Maximum Depth
- Traffic rated/HD?

2 Soil Type/ Landscape



For a tank soil cover depth of 0.5 to 2.0 feet



For a tank soil cover depth of 2.0 to 4.0 feet.

3 Pumper Access

Don't forget about the pumper!

4 Water Table

44 inches from the bottom of the excavation

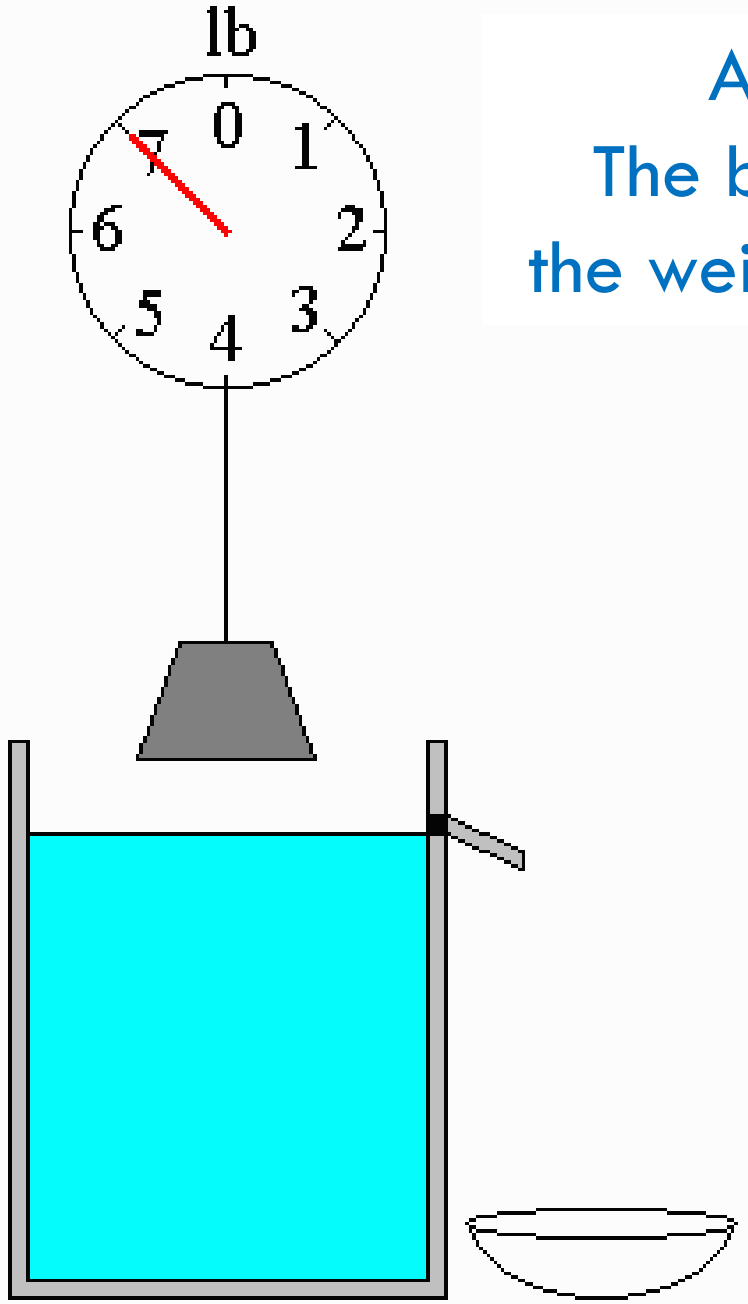
Nobody Wants This…

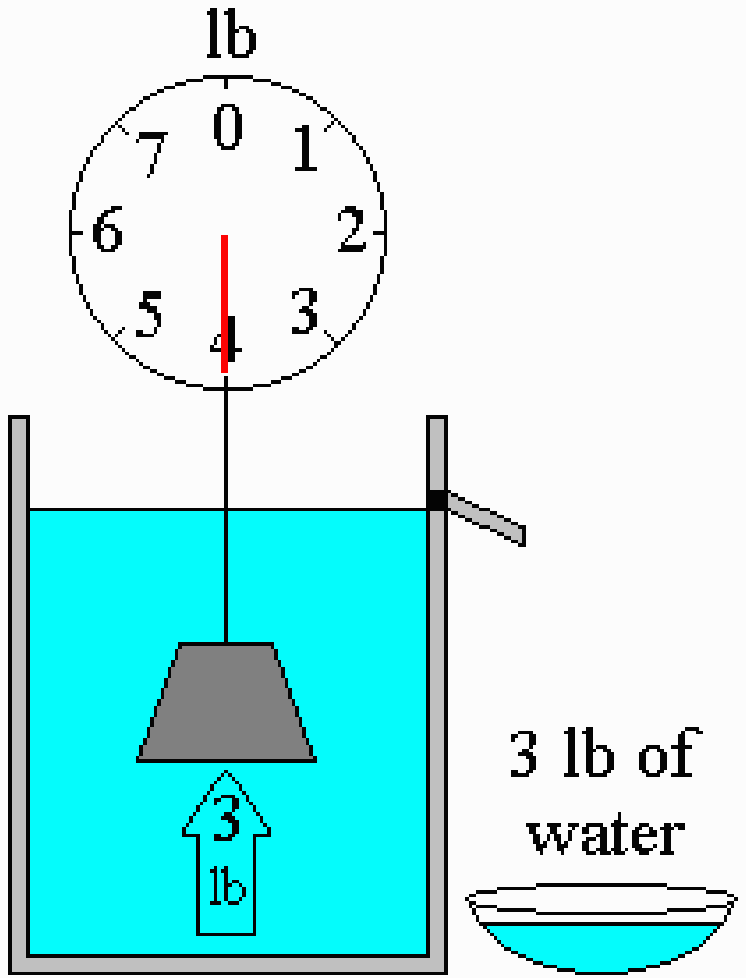

Or this…

Or This…

Why Do Tanks Float?

Archimedes' Principle:
The buoyant force is equal to the weight of the displaced water





3 lb of water

https://physics.weber.edu/carroll/archimedes/principle.htm

Tank Buoyant Force Comparison

Beach ball	Ford F150	Skid steer	Mini-Excavator
			
33 lbs	**4,000 lbs**	**10,000 lbs**	**14,000 lbs**
Beach Ball	**500-gal Pump Tank**	**1,000-gal Septic Tank**	**1,500-gal Septic Tank**

Roth Multi-Tank Buoyancy Calculations

BUOYANCY CALCULATIONS

YOUR ENVIRONMENT IS OUR BUSINESS.

MATERIAL	#/CF	#/GAL
SOIL (dry)	100	
SOIL (saturated)	117	
SOIL (net)	83	
WATER	62.4	8.34
CONCRETE	150	

VESSEL	WEIGHT (POUNDS) W	VOLUME (GALLONS) V	AREA (SQ FT) A	COVER (#/INCH) CW	WEIGHT DISPLACED WD=V*8.34	BUOYANT FORCE (POUNDS) BF=WD-W	COVER REQUIRED (INCHES) BF/CW
ST-500	225	537	21.8	150.8	4478.58	4253.58	28.2
ST-750	360	1007	36.8	254.5	8398.38	8038.38	31.6
ST-900	450	1147	43.3	299.5	9565.98	9115.98	30.4
ST-1060	520	1337	50	345.8	11150.58	10630.58	30.7
ST-1250	560	1464	56.3	389.4	12209.76	11649.76	29.9
ST-1500	640	1771	68.9	476.6	14770.14	14130.14	29.7

NOTES:

1. AREA OF TANKS IS CALCULATED WITHOUT MANHOLES.
2. BUOYANCY FORCE IS ASSUMING SATURATED SOIL (WORST CASE SCENARIO).
3. THE NUMBERS CAN BE CHANGED BY CHANGING THE DRY SOIL WEIGHT FOR SITE CONDITIONS..
4. WET SOIL WEIGHT IS INDEXED TO DRY SOIL.
5. TANK IS ASSUMED TO BE FULLY SUBMERGED, IF ONLY 50% SUBMERGED, FORCES ARE HALVED.
6. ALL CALCULATIONS ARE BASED ON AN EMPTY TANK.
7. PLEASE SEE THE ROTH RESTRAINING COLLAR DRAWING FOR HIGH GROUNDWATER . THE SAFETY FACTOR NOTED ON THE DRAWING DOES NOT CONSIDER THE LOADING OF THE EARTH ON TOP OF THE TANK.

http://www.roth-usa.com/PDF_Download_Files/RMT_buoyancy_calc.pdf

Roth Multi-Tank Restraining Collar Design

Details Provided by APPIAN Consulting Engineers – www.appianengineers.com 12/06/2005 – 10:07:05 AM

RESTRAINING COLLAR FOR HIGH GROUNDWATER

TOP

GENERAL NOTE:

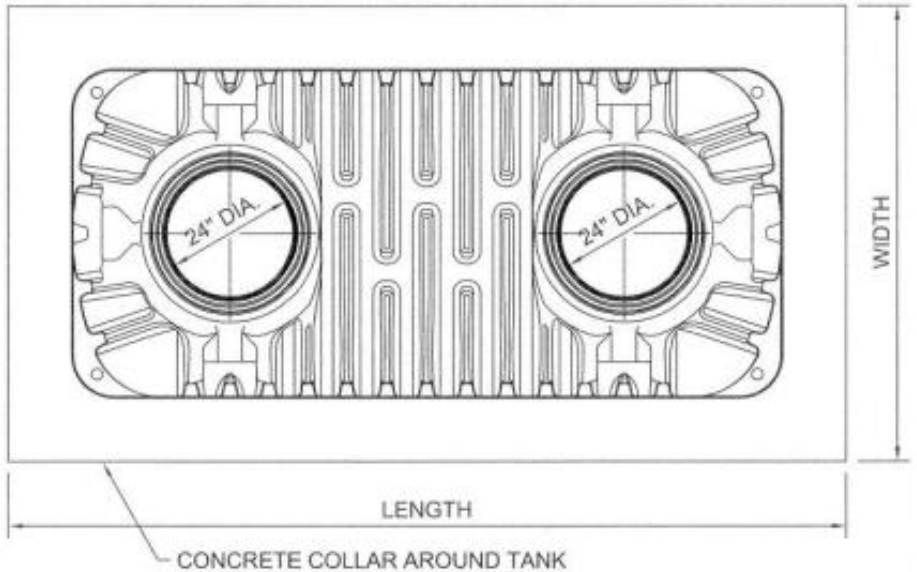
1. THE BUOYANCY RESTRAINING COLLAR DESIGN IS BASED ON BUOYANCE CALCULATIONS AVAILABLE ON REQUEST FROM FRALO PLASTECH, LLC.

CONCRETE NOTES:

1. PROVIDE CONCRETE TO OBTAIN THE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
2. CONCRETE MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH ACI-318-99 (BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE) AND ACI-301-LATEST EDITION (SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS).

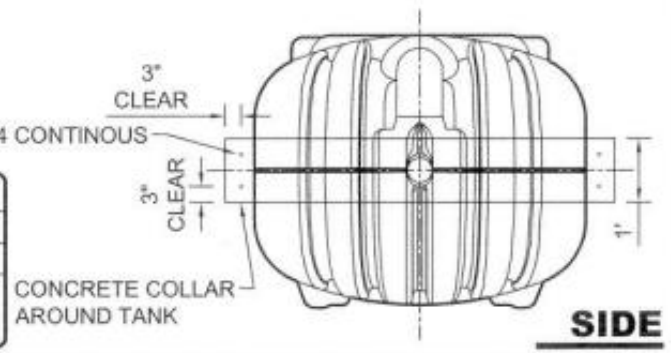
REINFORCING STEEL:

1. ALL REINFORCING STEEL SHALL BE BILLET STEEL CONFORMING TO STANDARDS OF ASTM A615, GRADE 60.



CONCRETE COLLAR SPECS

TANK MODEL	ST-500	ST-750	ST-1060	ST-1250	ST-1500
WIDTH (FEET)	7'-0"	7'-0"	7'-6"	7'-6"	7'-6"
LENGTH (FEET)	7'-0"	10'-6"	12'-0"	14'-0"	16'-6"
FACTOR-OF-SAFETY AGAINST FLOATING	2.96	2.15	2.09	2.10	2.02



SIDE

DWG SCALE: 1:1
PLOT SCALE: 1:2
SHEET #: 1 OF 1

SEPTECH™ TANK BUOYANCY RESTRAINING SYSTEM
THE NEXT GENERATION OF ONSITE WASTEWATER PRODUCTS

FRALO Plastech

FRALO PLASTECH
One General Motors Drive
Syracuse N.Y. 13206
Call Toll Free 866.943.7256
www.fralo.net

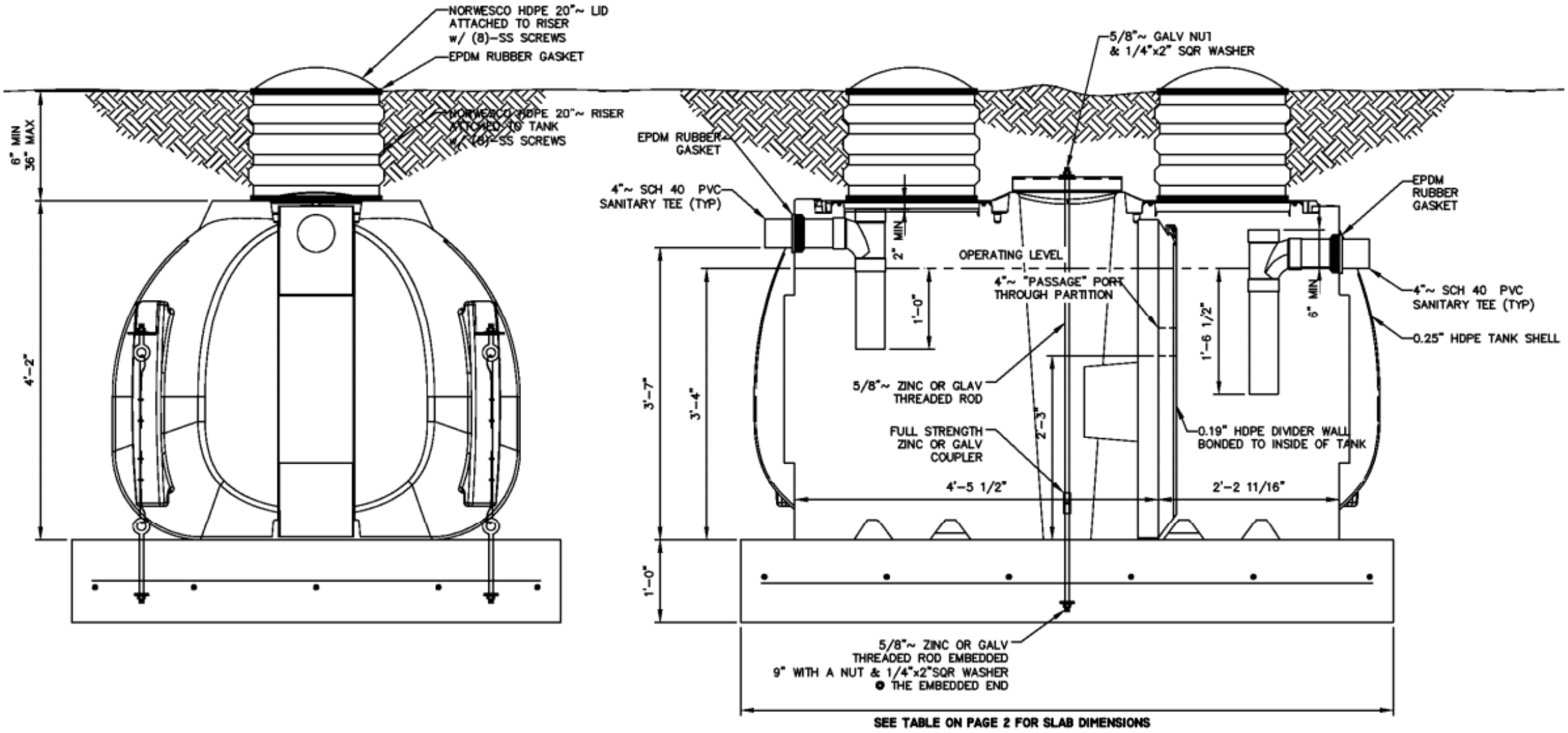
http://www.roth-usa.com/PDF_Download_Files/RMT_buoyancy_calc.pdf

NO Buoyancy Control is Required if…

Table 1: Infiltrator Tank Models1 and Conditions Requiring Buoyancy Control

Parameter I: Subsurface water height above tank bottom		Parameter II: Soil cover depth above tank top2	
		A	B
		6 in (150 mm) up to 12 in (300 mm)	12 in (300 mm) or greater
1	Above outlet pipe saddle3 (greater than 43" [1,075 mm])	Do not install tank	Do not install tank
2	36" (900 mm) to 43" (1,075 mm) (to outlet pipe saddle)	All models	Not Required
3	30" (750 mm) to 36" (900 mm)	IM-1530	Not Required
4	Less than 30" (750 mm)	Not Required	Not Required

Snyder/Norwesco Concrete Slab System



https://www.norwesco.com/_site_components/uploads/pdfs/WWM%20Below%20Ground/Installation%20Instructions/CounterBuoyancy.pdf

Buoyancy Control Methods

Fiberglass Beam

Balanced anchor placement

Tight straps

Balanced anchor placement

Five Key Points for Installation

What you need to Do

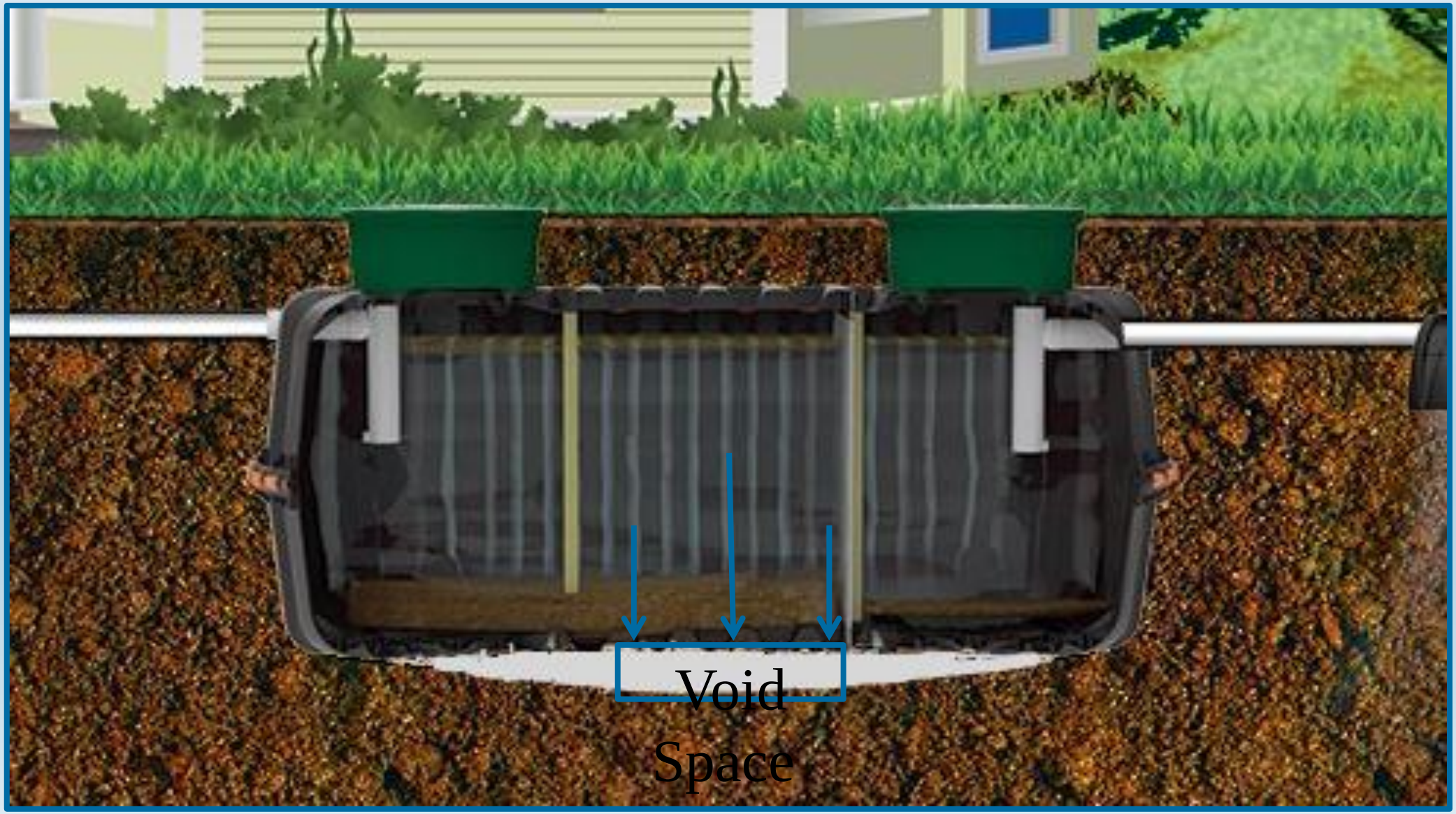
1. Hard Flat Base
2. 18" Overdig
3. Backfill in 12" lifts
4. Properly Compacted Backfill
5. Final Cover/ Vegetation

Hard Flat Bottom

Hard Base

Loose Base

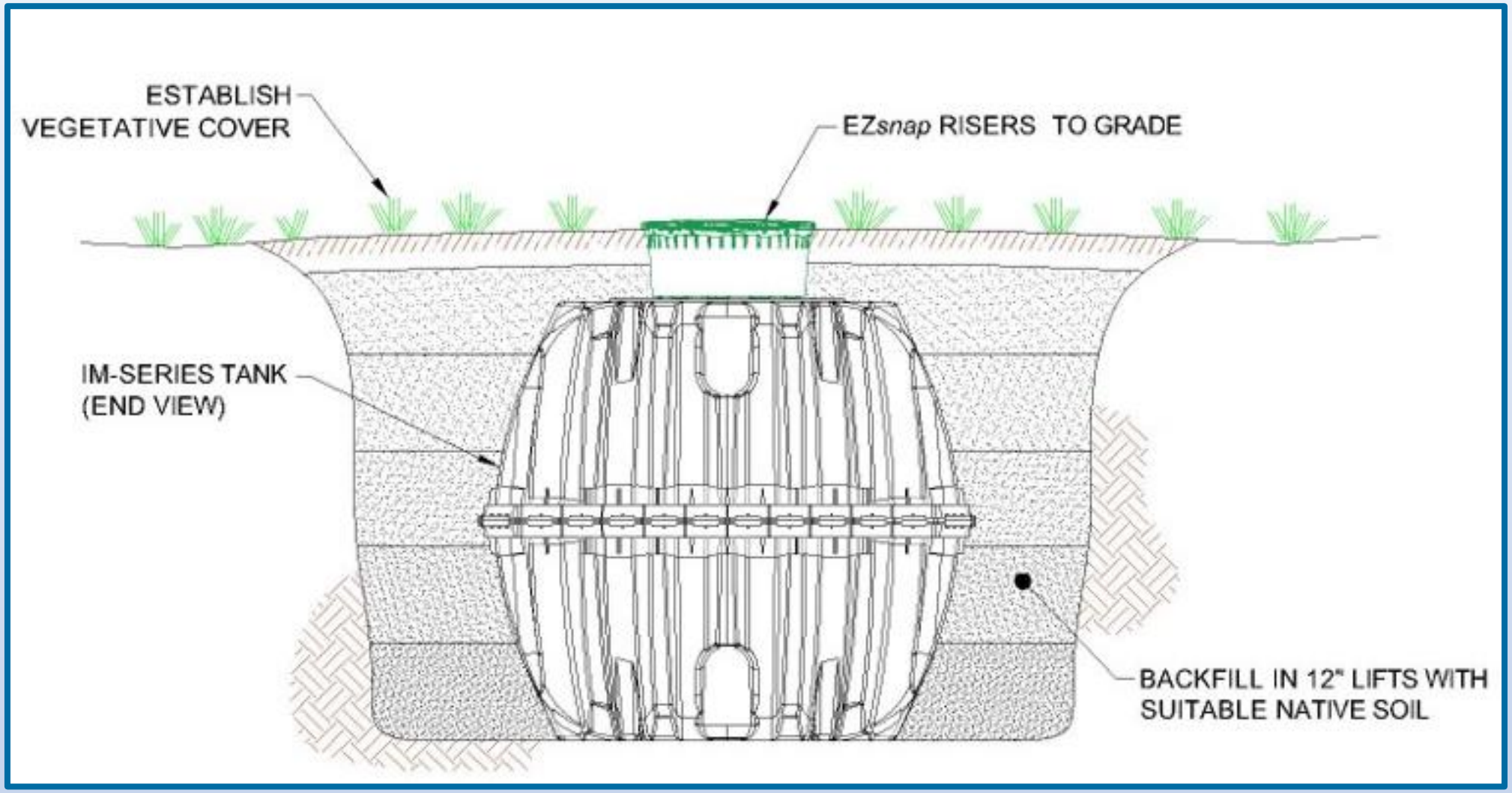
Concave excavation: Tank will deform in center

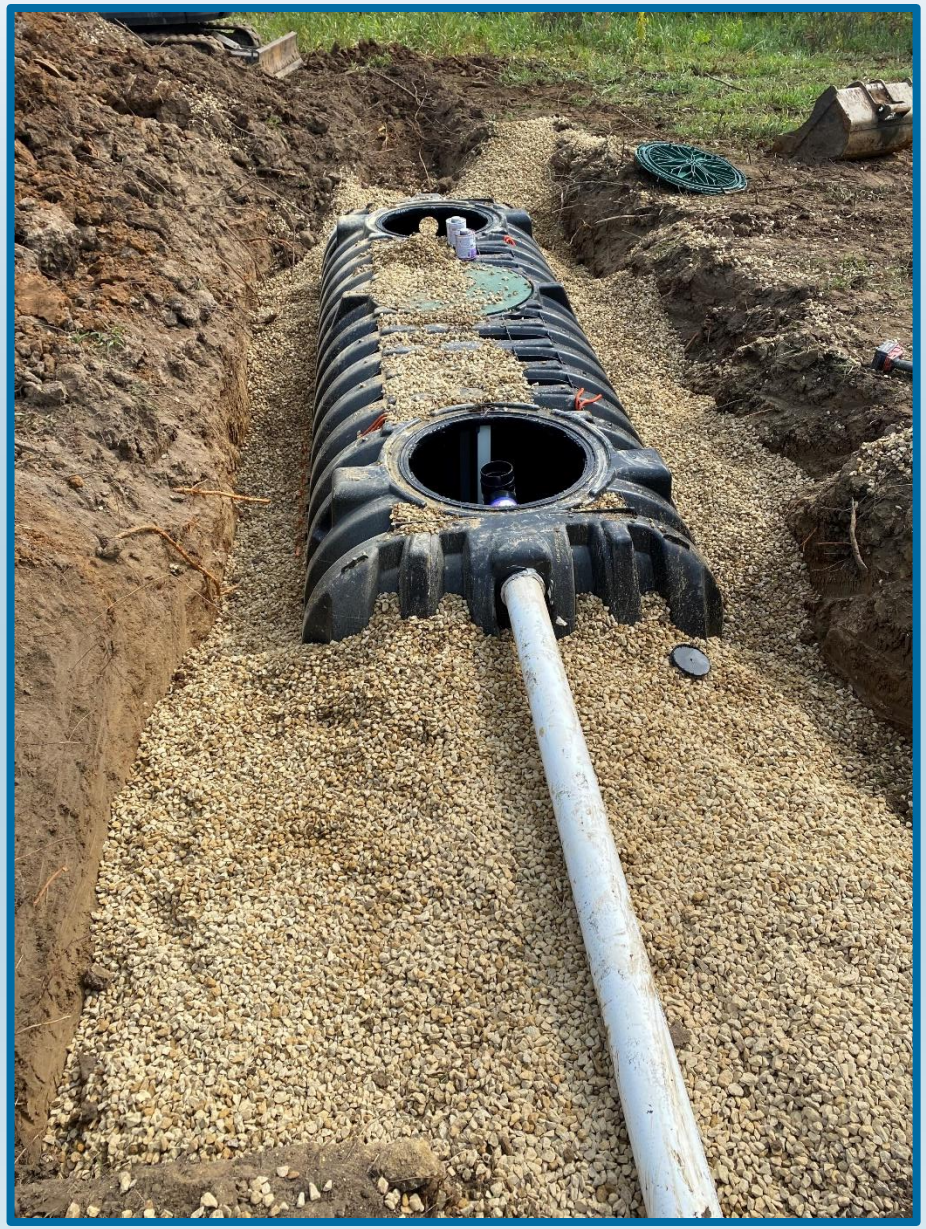


Convex excavation: Tank will deform at ends

18” Over Dig Around All Sides of Tank

12” Maximum Backfill Lifts






E35

Properly Compacted Backfill

Follow Manufacturer Fill Requirements

Be An Onsite Safety Star

PLEASE use a secondary safety lid whenever the lid to a septic tank is exposed.

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Questions?