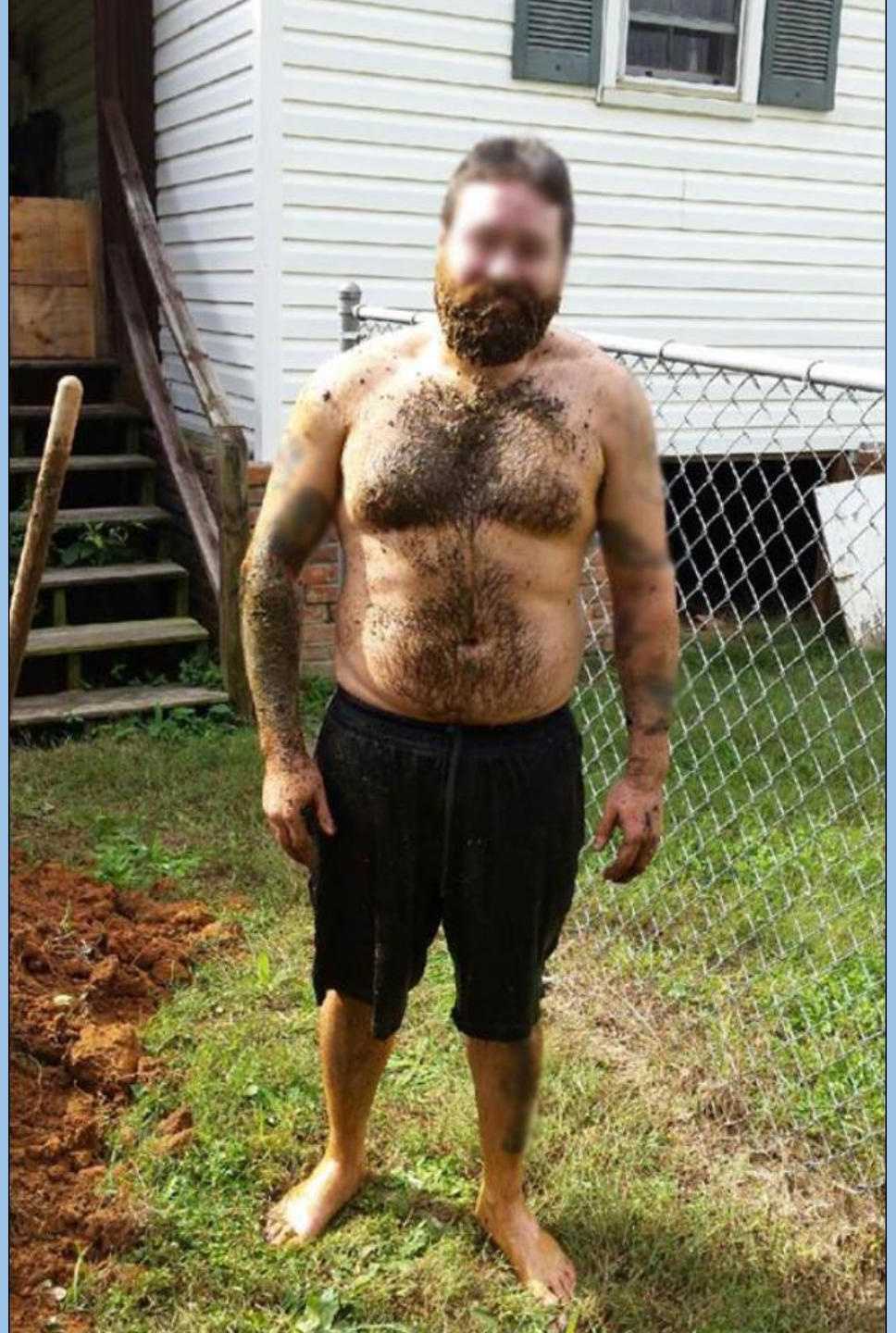
Best Practices
Thermoplastic Tank Installation

Cody Vigil

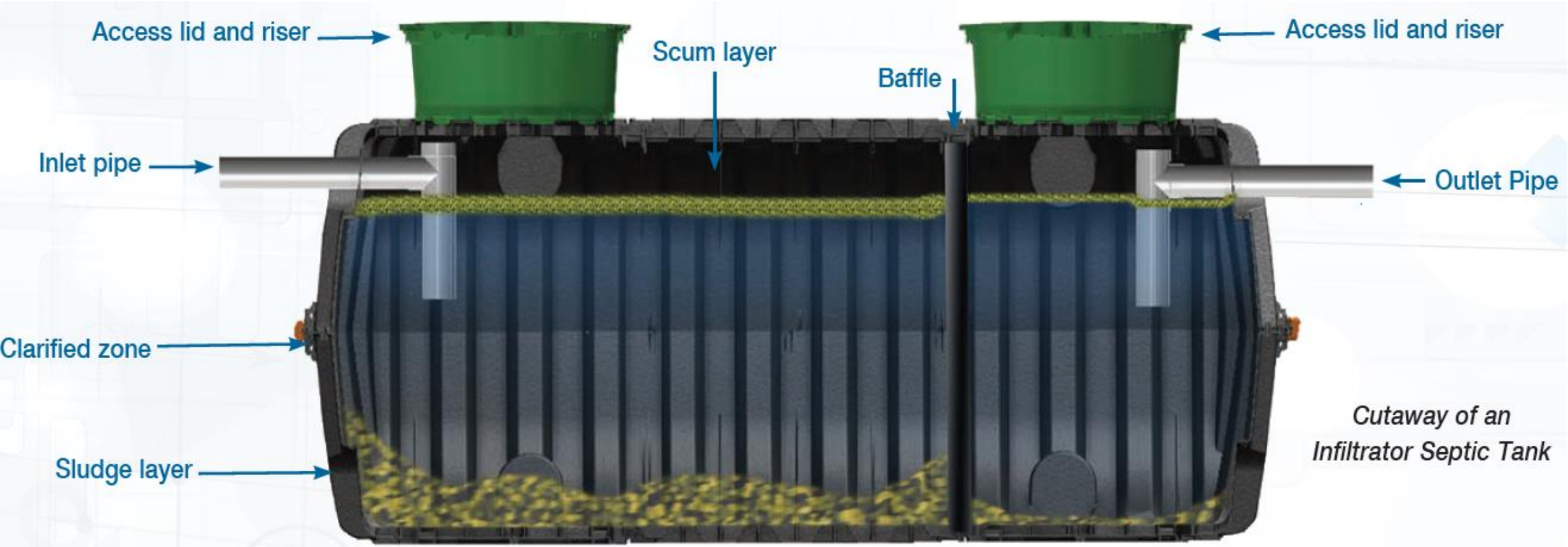
What is this?

Quite possibly the cheapest guy in the world!




Plumbing Vent
Infiltrator
Leachfield / Drainfield
Infiltrator
Septic Tank
Effluent absorption and purification
Groundwater

Septic Tank Function



Cutaway of an Infiltrator Septic Tank

The septic tank retains, stores and treats solids before releasing effluent into the leachfield.

Average Removal of BOD, TSS and Grease in Septic Tank (Residential, domestic wastewater)

Parameter	Average Raw Sewage Influent	Average Septic Tank Effluent	% Removal
BOD (mg/L)	308	122	60
TSS (mg/L)	316	72	77
Grease mg/L	102	21	79

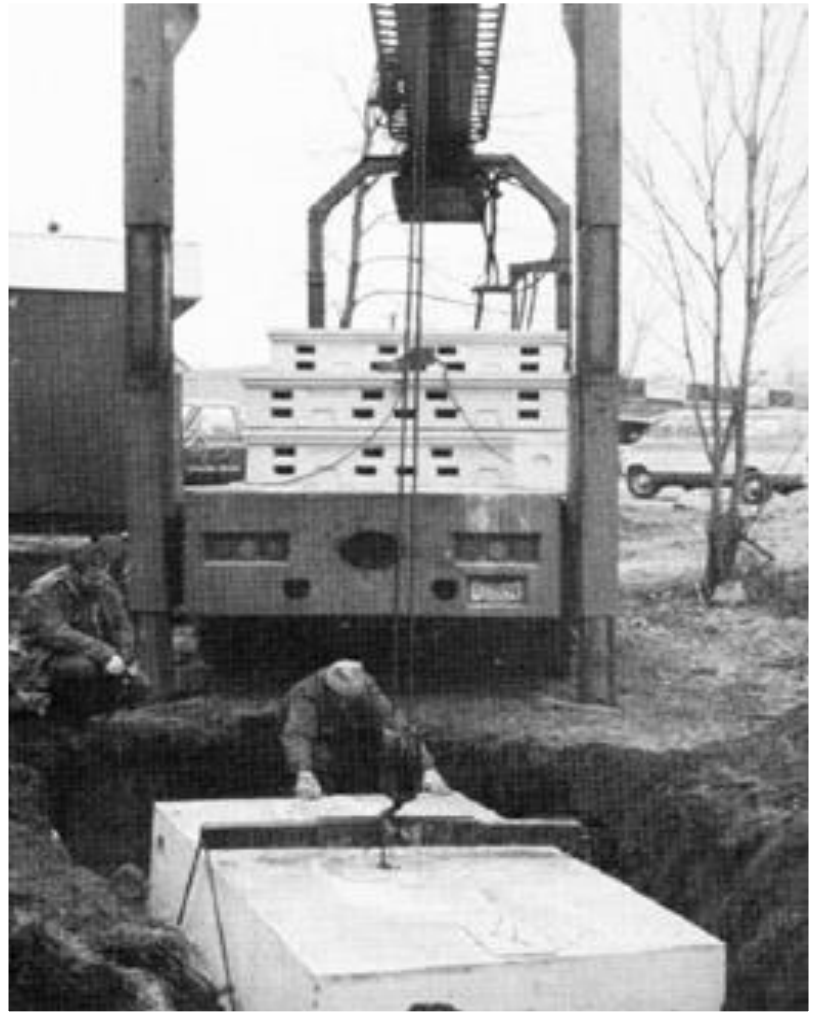
Seabloom, R.W., T.R. Bounds, and T.L. Loudon. 2005.

Material Evolution:

Clay, Rock, wood, steel, concrete block, concrete, fiberglass and thermoplastic

Each material has benefits and limitations:

- Strength
- Manufacturing Process
- Ease of transport and installation
- Corrosion properties
- Recycled Materials
- Buoyancy
- Cost

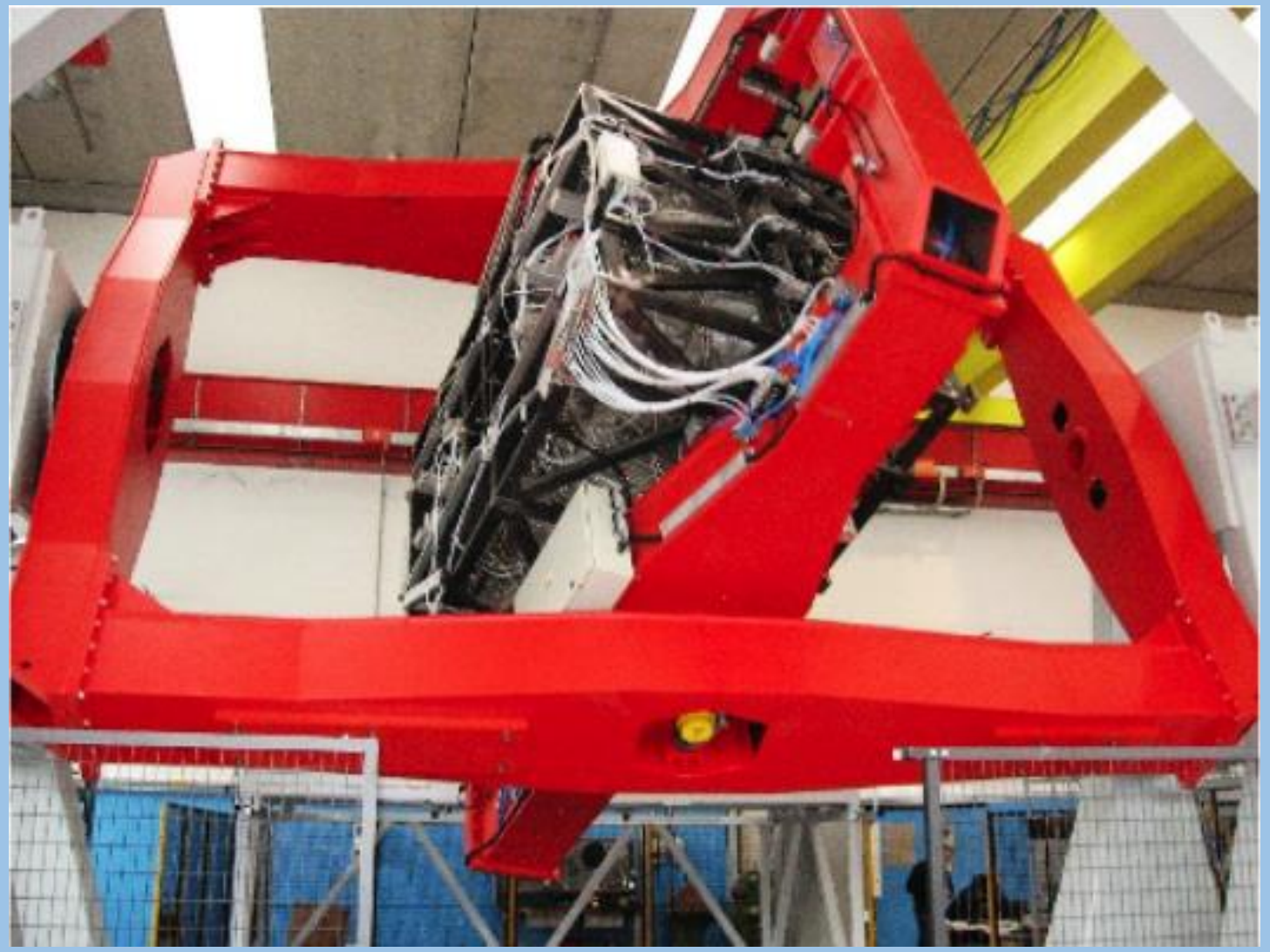


Thermoplastic Tank Manufacturing Processes:

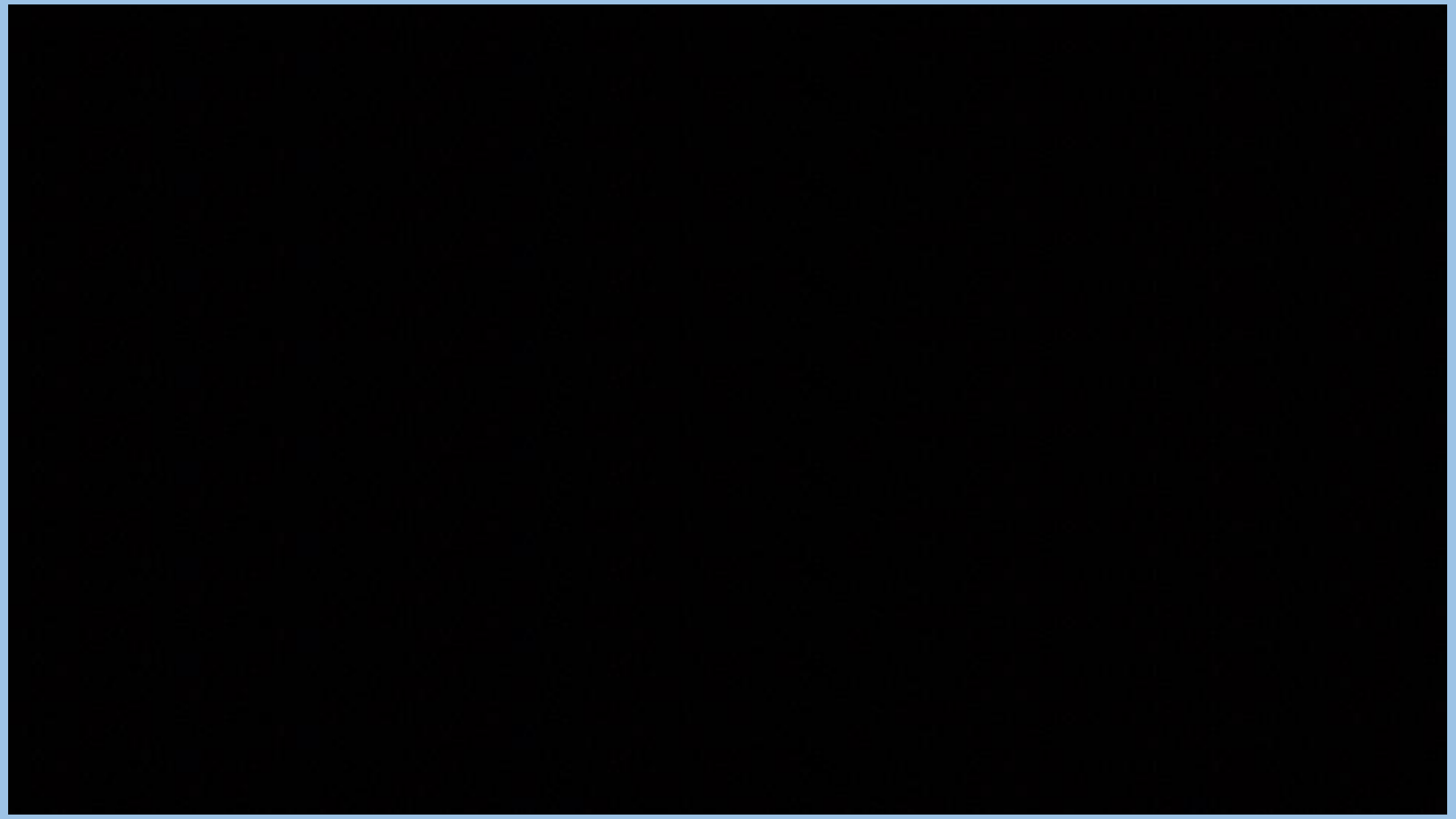
- Blow Molding
- Rotational Molding
- Injection Molding
- Others

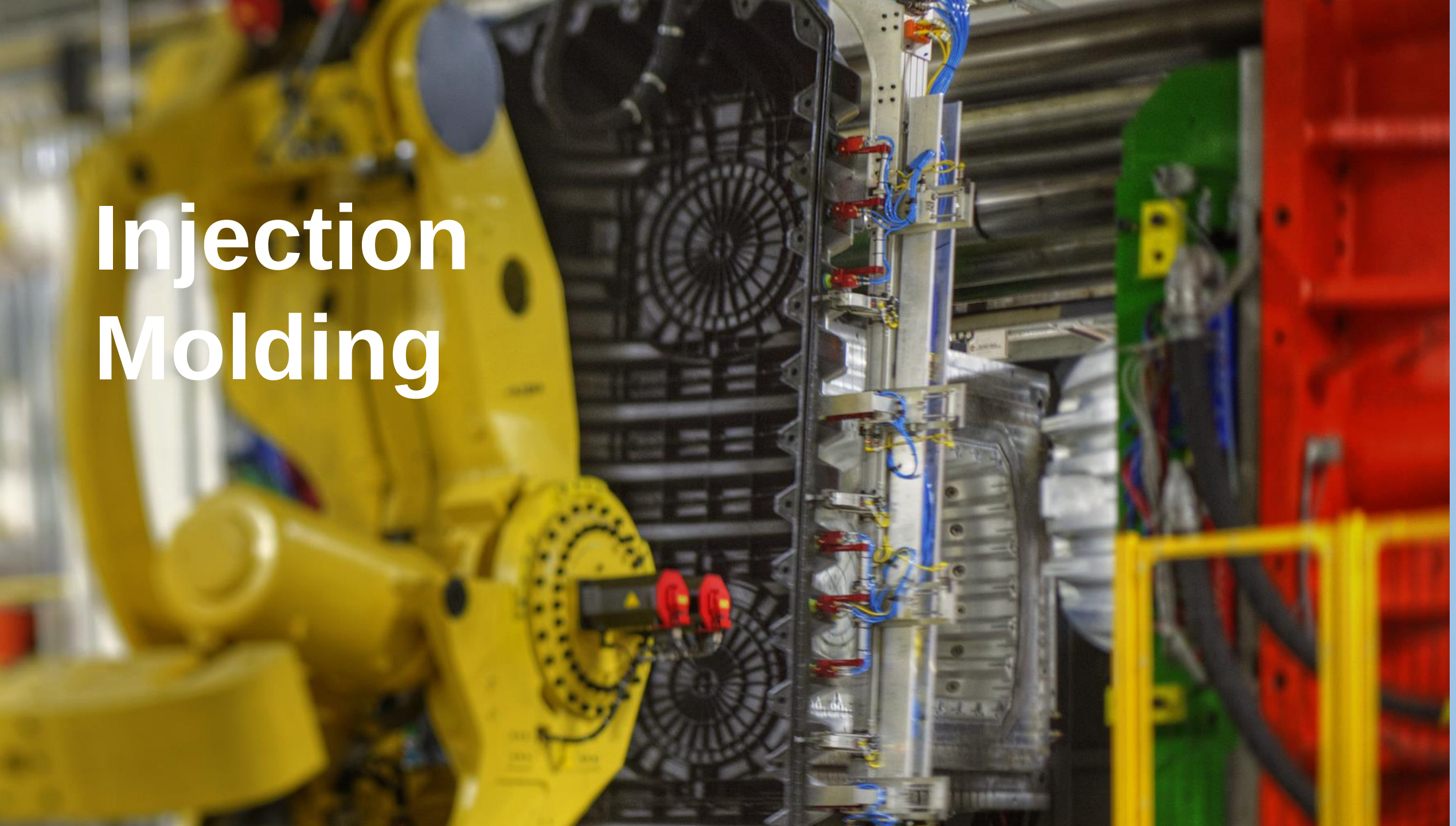
Blow Molding

Rotation Molding



Rotational (Roto) Molding




Injection
Molding

IM-1530 Manufacturing


Over 150 Million Pounds of Plastic Recycled Every Year

Injection Molded Tank Technology

IM-540

IM-1060

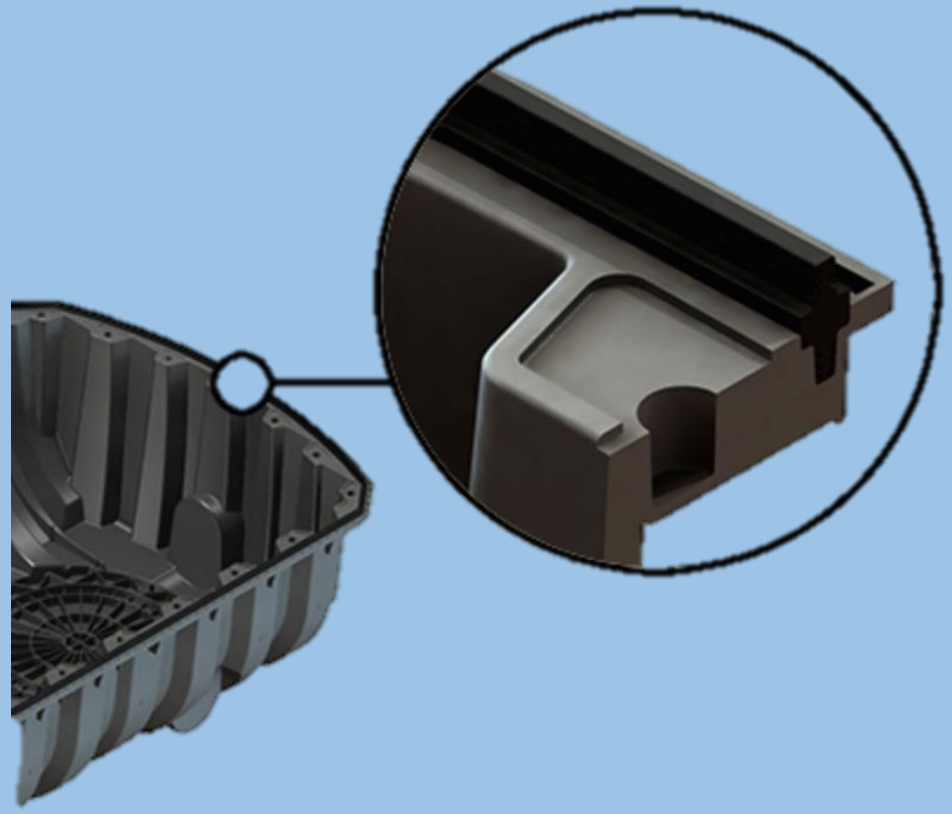
IM-1530


CSA B66
UPC
IAPMO/ANSI Z1.000
UPC

Shipping & Assembly at the Distributor


Gasket in
Bottom Half

Gasket

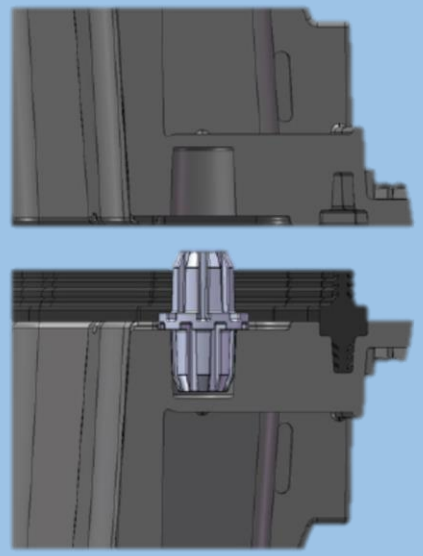


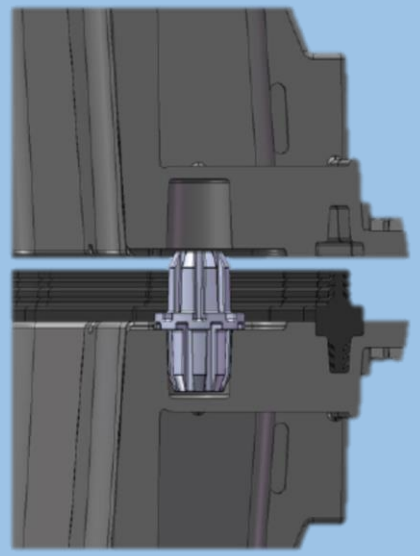
Gasket “Christmas tree” design

“Branches” bend upon engagement and contact surfaces of groove to create watertight seal

Horizontal center structure provides stability and prevents folding

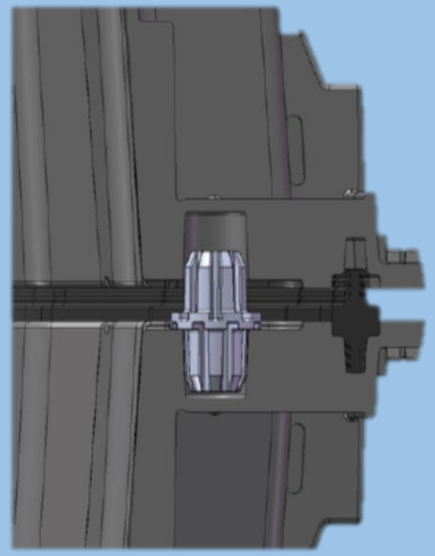
Step 1

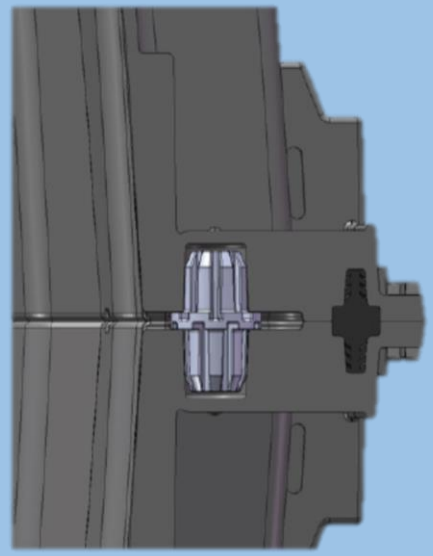




Step 2

Step 3





Step 4

https://www.roth-america.com/product/septic-cistern-rainwater/

The Big Question

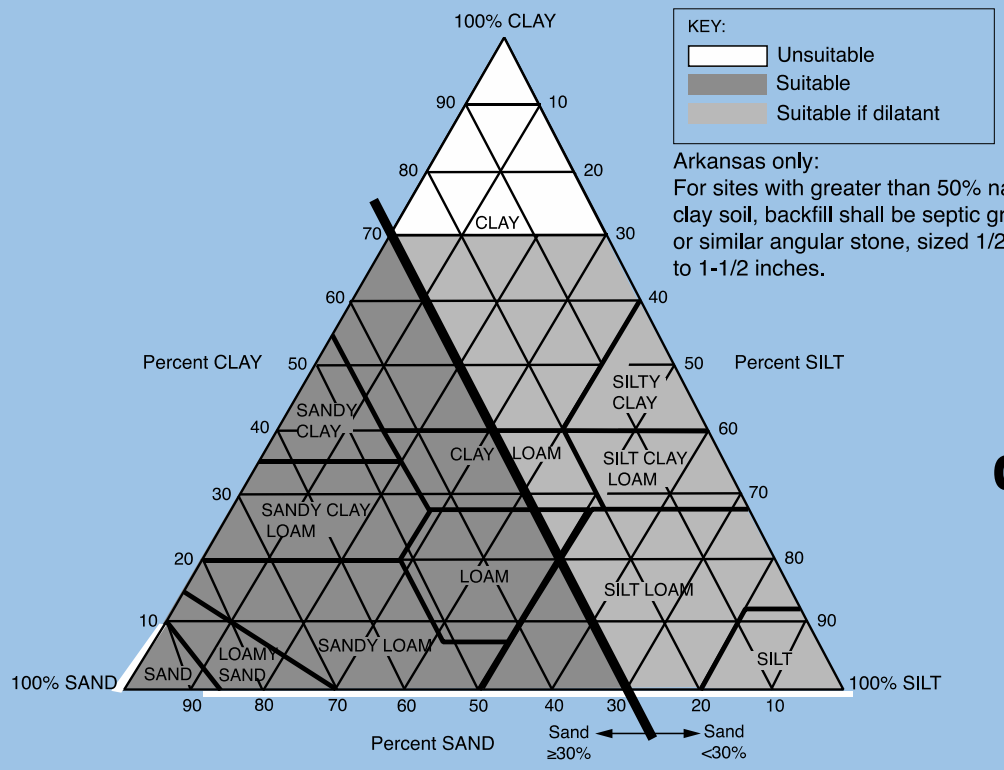
Thermoplastic

OR

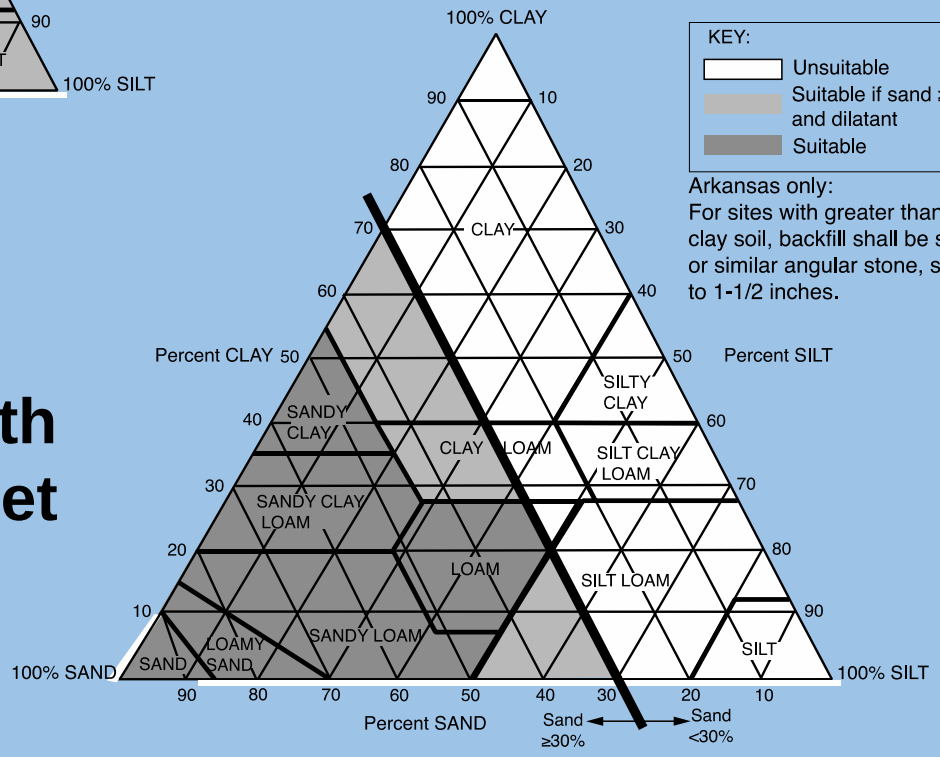
Concrete

Soil

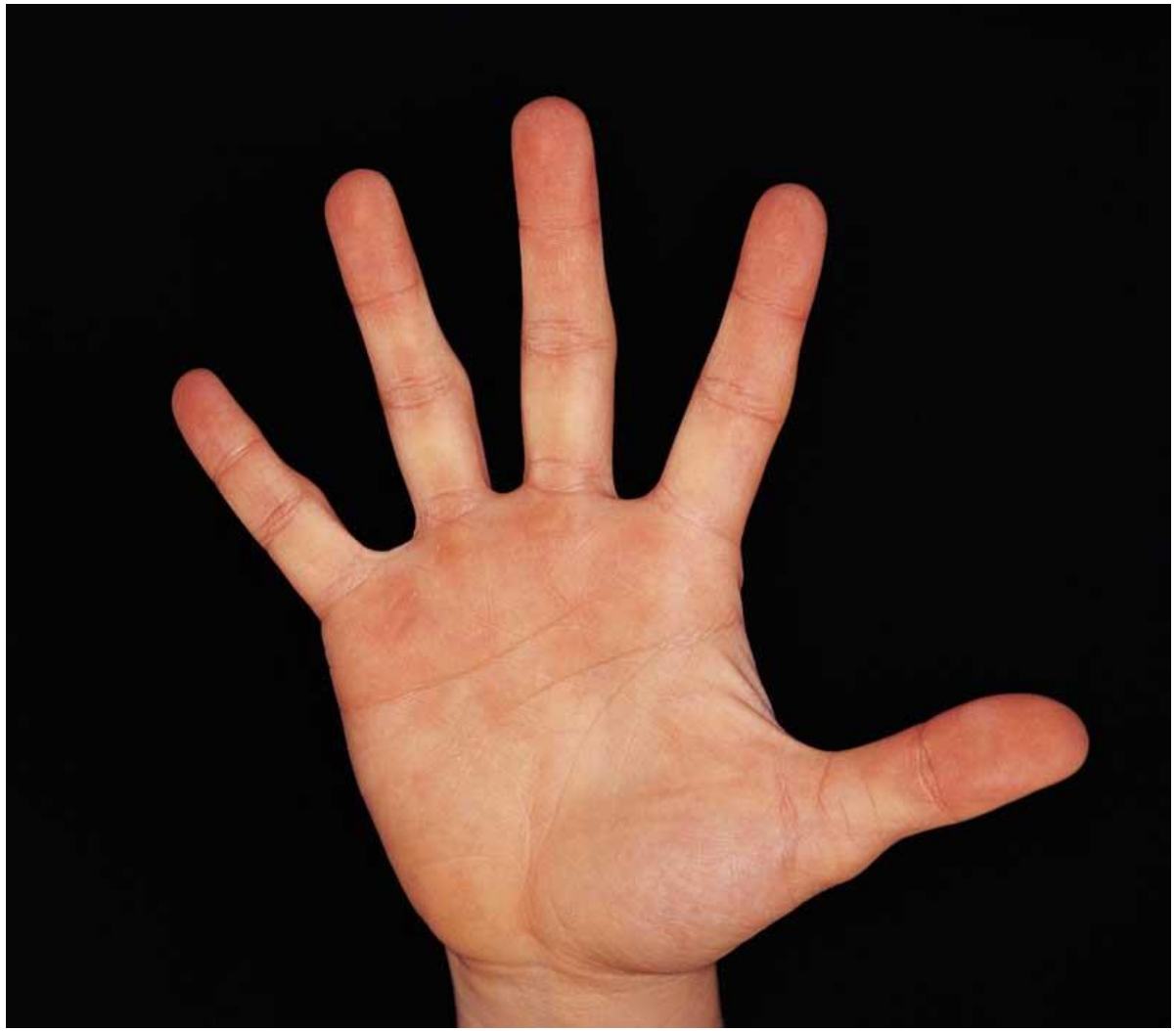
For a tank soil cover depth of 0.5 to 2.0 feet



For a tank soil cover depth that is greater than 2.0 feet and up to 4.0 feet.



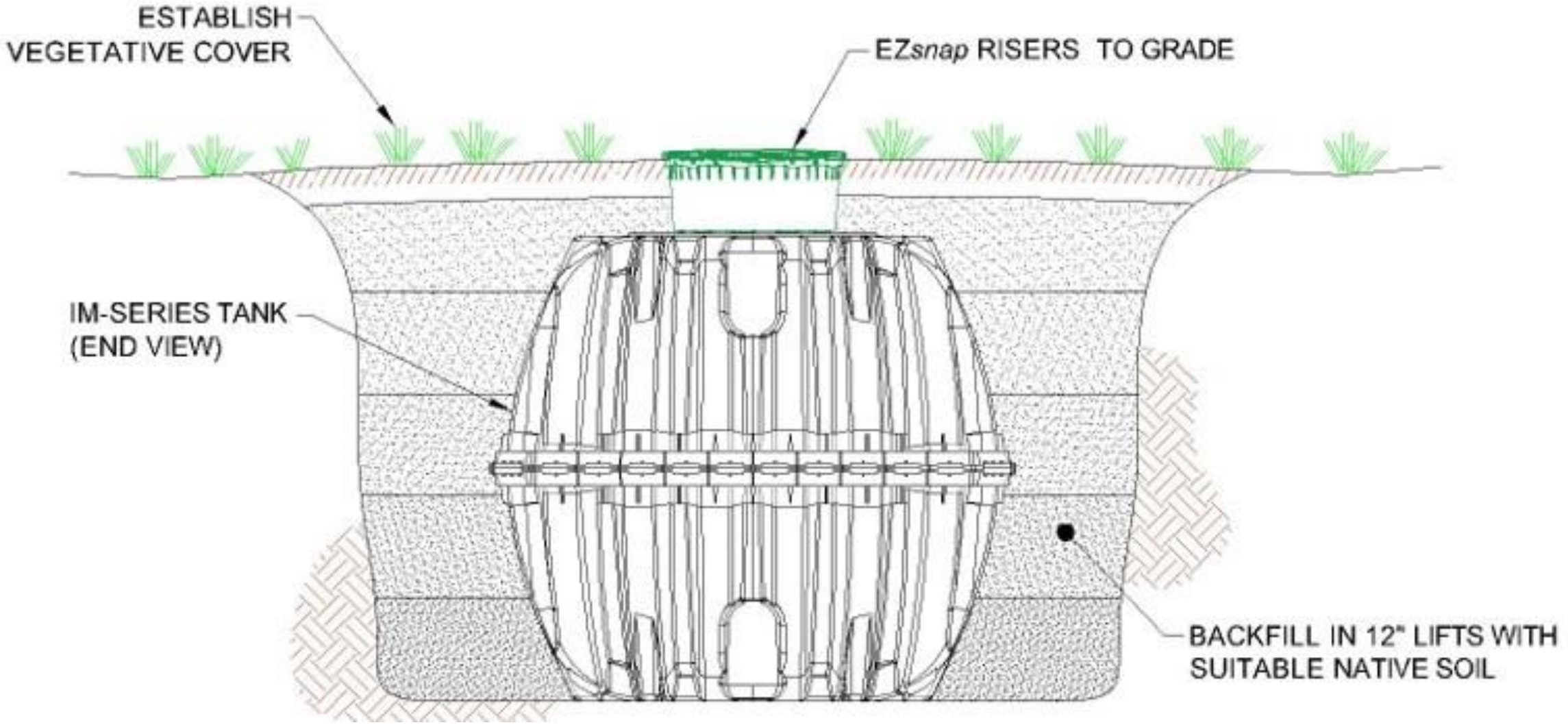
5 Key Points for Installation



18” Excavation Around All Sides of Tank

Hard Flat Bottom

12” Maximum Backfill Lifts

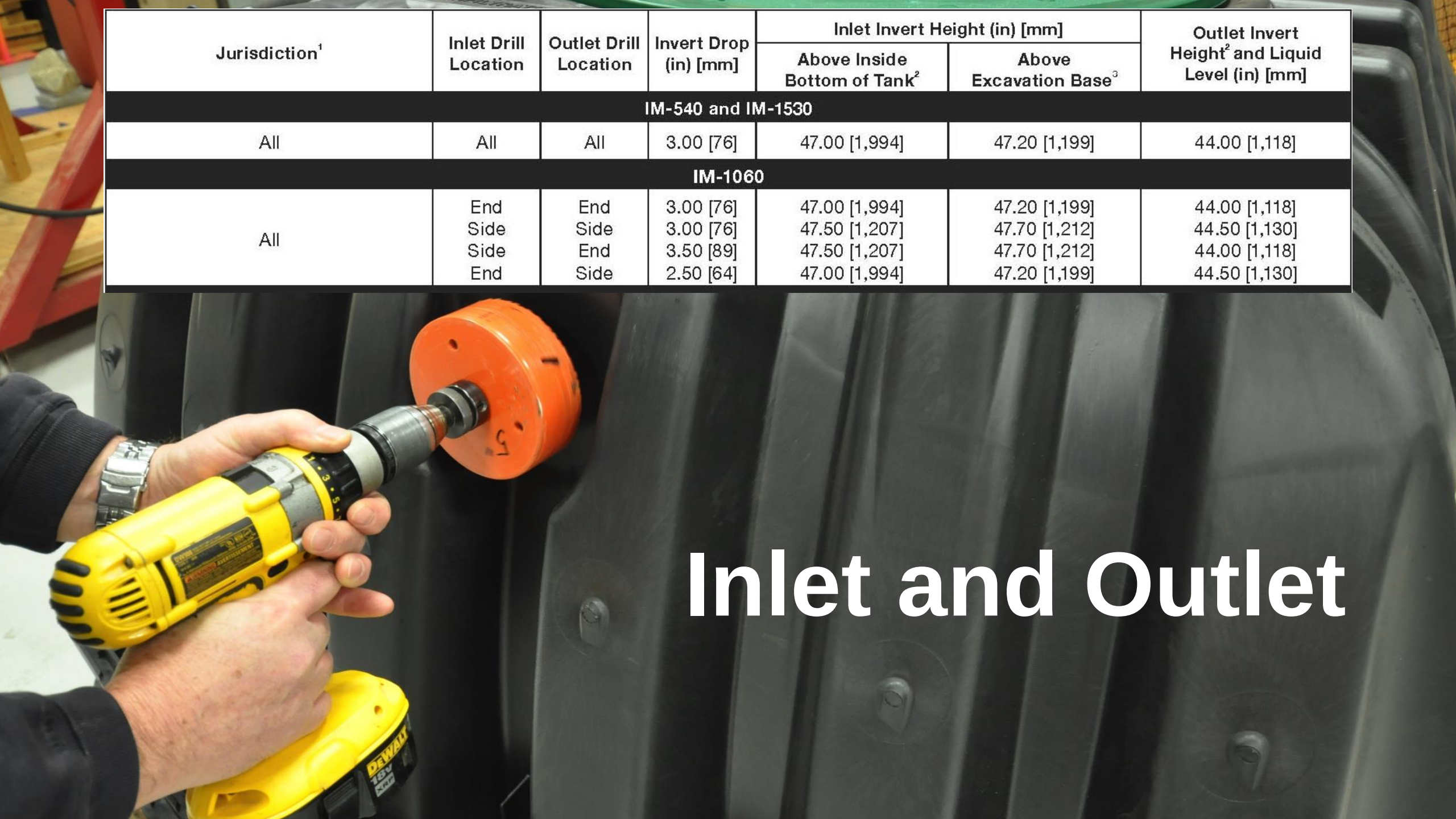


Walk in Backfill

Place Final Cover minimum of 6”

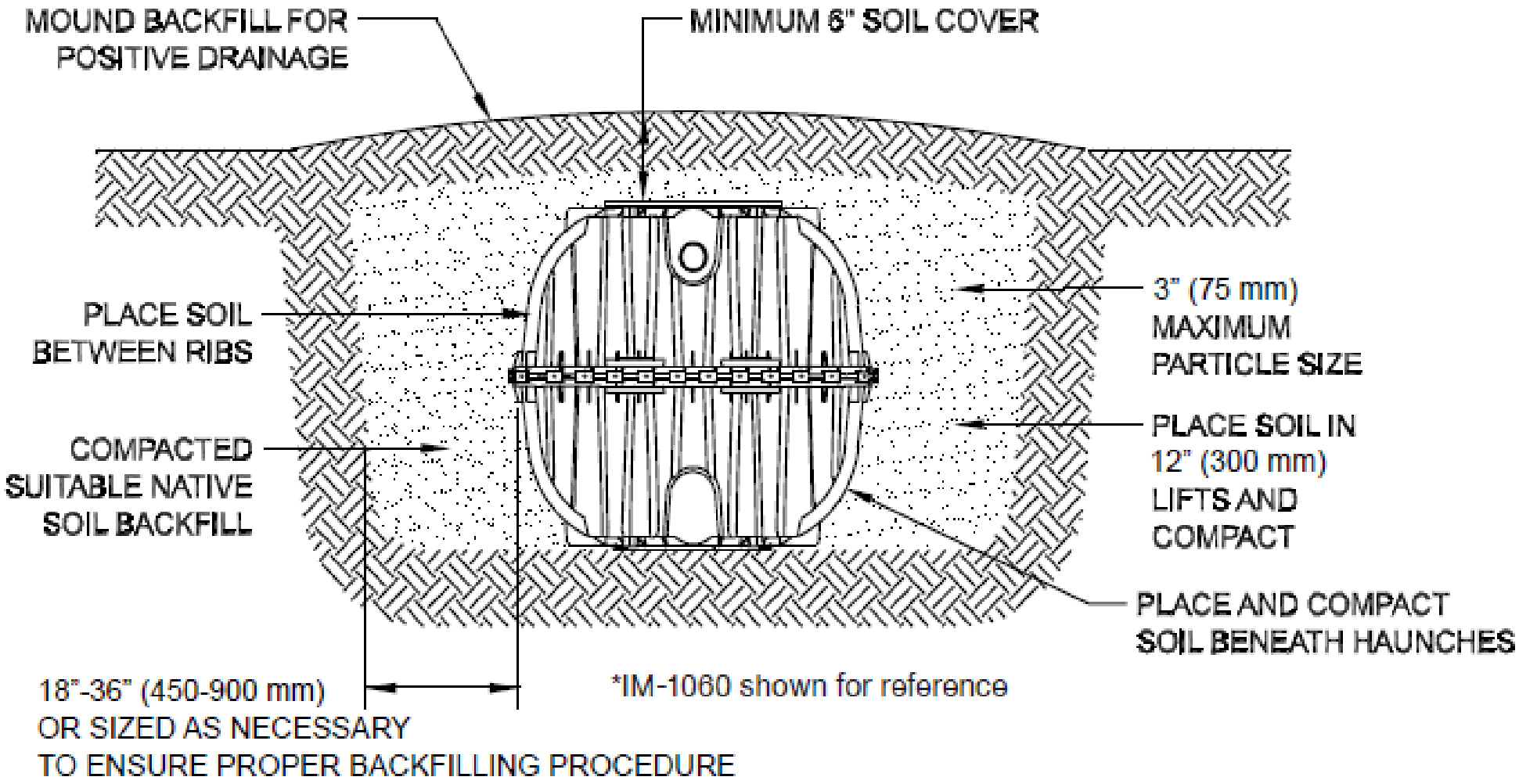
Excavation and Install

Jurisdiction[1]	Inlet Drill Location	Outlet Drill Location	Invert Drop (in) [mm]	Inlet Invert Height (in) [mm]		Outlet Invert Height[2] and Liquid Level (in) [mm]
				Above Inside Bottom of Tank[2]	Above Excavation Base[3]	
IM-540 and IM-1530						
All	All	All	3.00 [76]	47.00 [1,994]	47.20 [1,199]	44.00 [1,118]
IM-1060						
All	End	End	3.00 [76]	47.00 [1,994]	47.20 [1,199]	44.00 [1,118]
	Side	Side	3.00 [76]	47.50 [1,207]	47.70 [1,212]	44.50 [1,130]
	Side	End	3.50 [89]	47.50 [1,207]	47.70 [1,212]	44.00 [1,118]
	End	Side	2.50 [64]	47.00 [1,994]	47.20 [1,199]	44.50 [1,130]



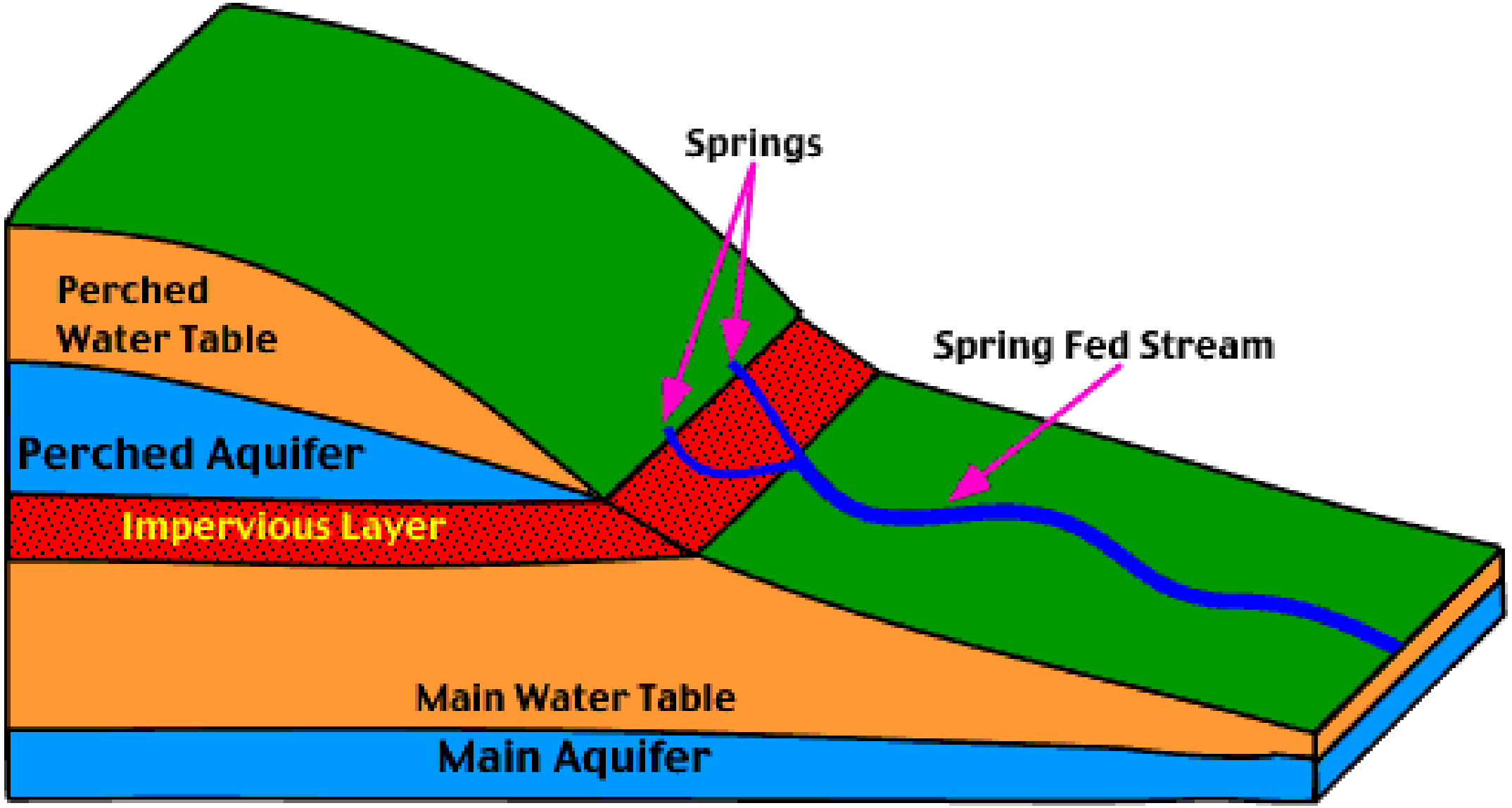
Inlet and Outlet

Backfilling in Tight Soils:



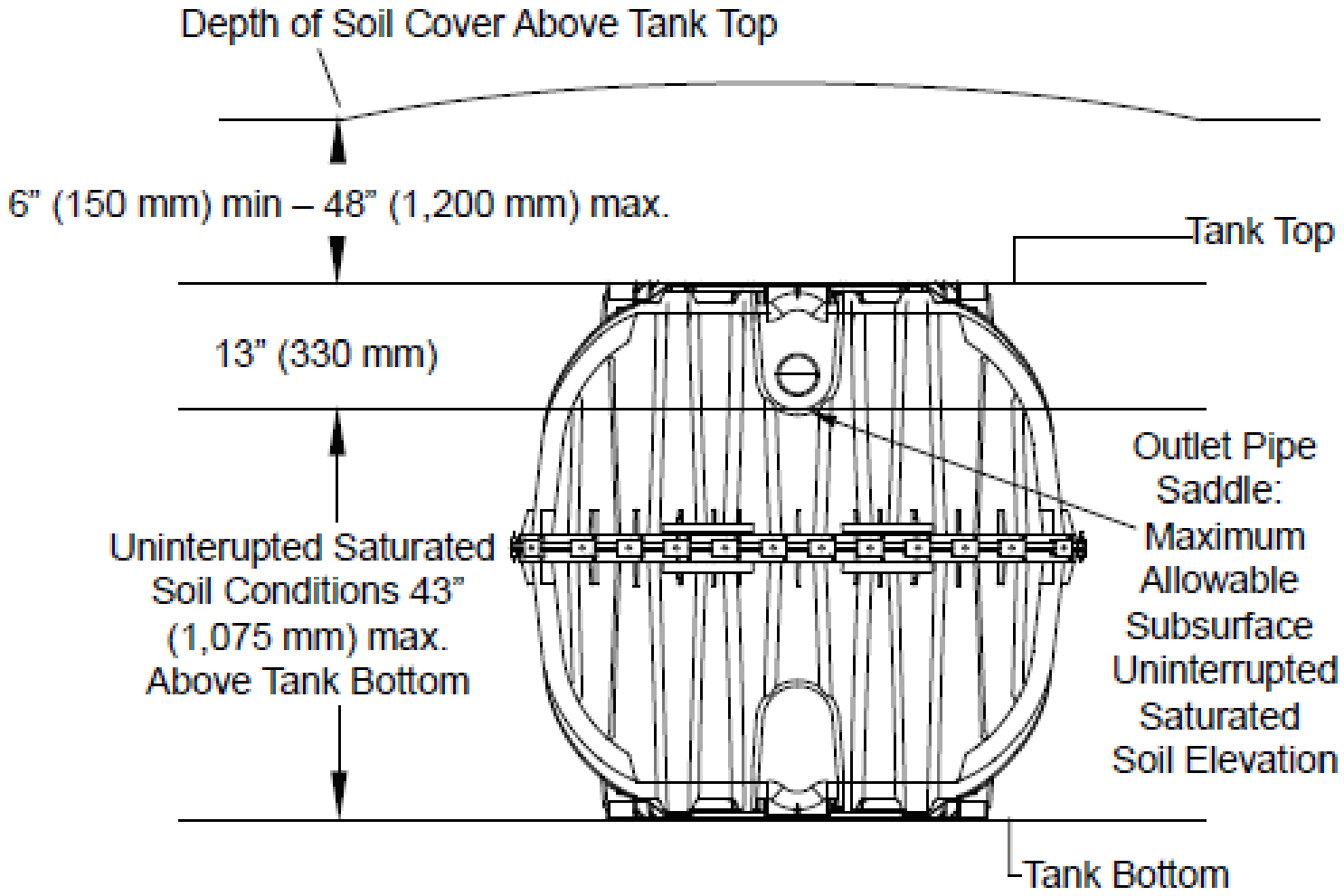
Proper Backfill

- Native soil within specification
- Nothing in excess of 3” in diameter (point loads).
- No pea gravel or rounded stone – use angular / road base material / Sand
- 12” Lifts & fill in haunches
- Account for settling


Springs
Perched
Water Table
Spring Fed Stream
Perched Aquifer
Impervious Layer
Main Water Table
Main Aquifer

When is buoyancy control necessary?

Figure 1:
Limitations When Saturated Soil Conditions are Present Above Tank Bottom

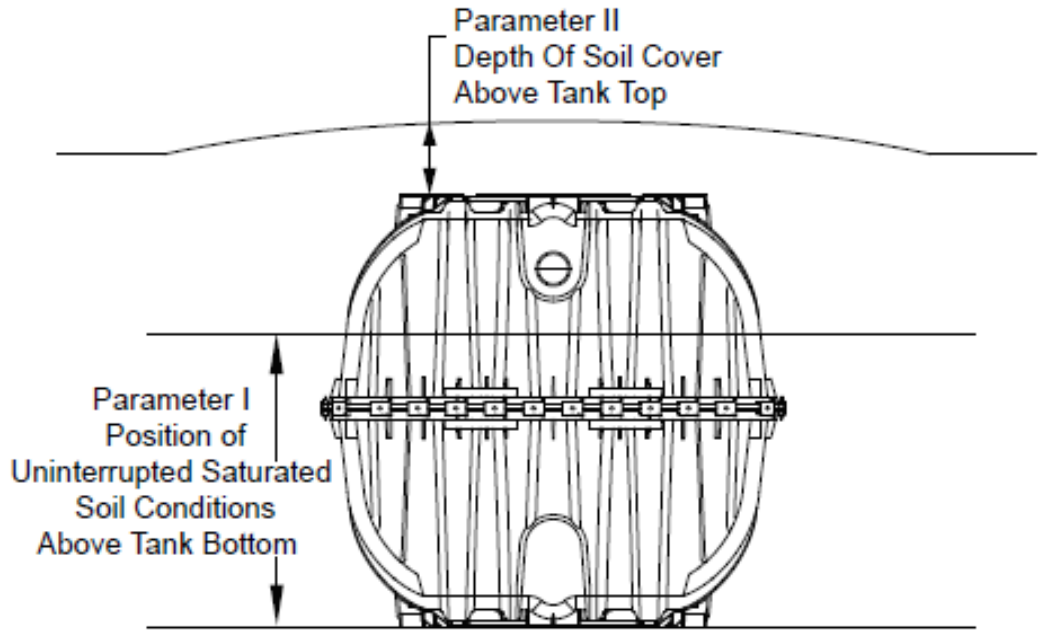


Buoyancy Control is needed if…

Table 1:
Infiltrator Tank Models[1] and Conditions Requiring Buoyancy Control

Parameter I: Position of uninterrupted saturated soil conditions above tank bottom		Parameter II: Soil cover depth above tank top[2]	
		A	B
		6 in (150 mm) to 12 in (300 mm)	Above 12 in (300 mm)
1	Above outlet pipe saddle[3] (greater than 43" [1,075 mm])	Do not install	Do not install
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

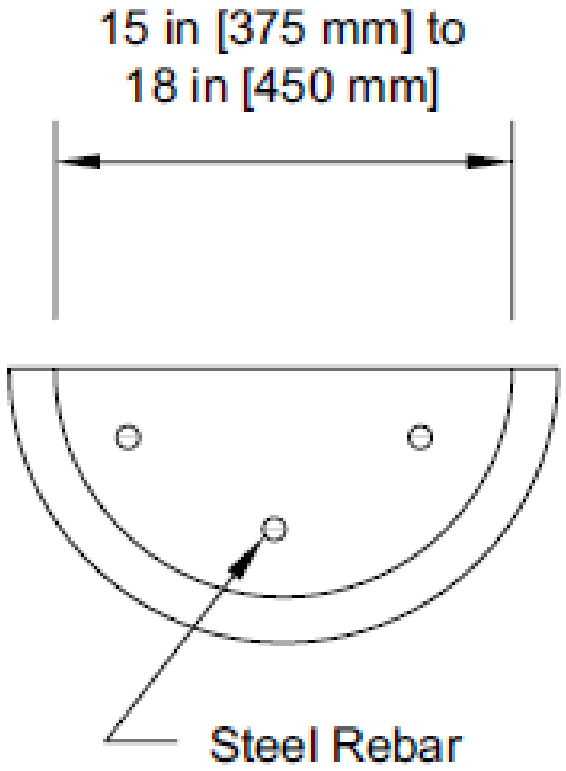
Figure 2:
Buoyancy Control Parameters for Table 1

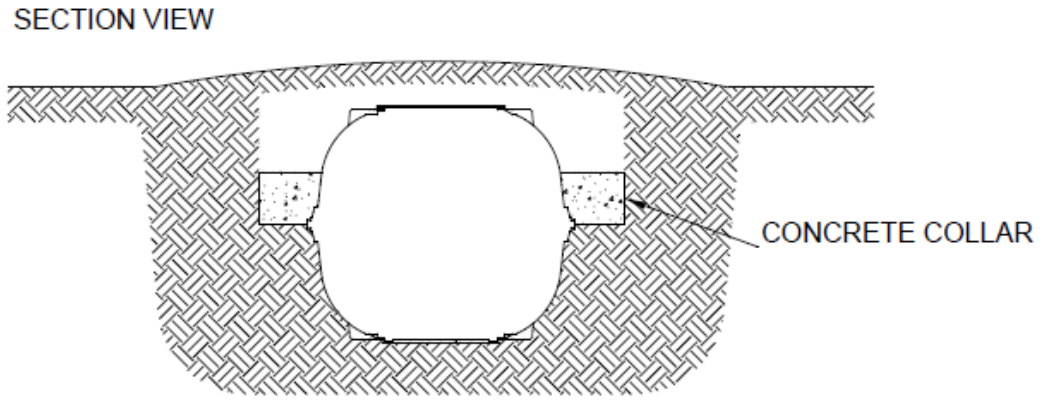


Buoyancy Control Methods

Tank Model	Parameter I: Position of uninterrupted saturated soil conditions above tank bottom	Parameter II: Soil cover depth above tank top	Minimum supplemental downward force required[1] (total, both tank sides)	Buoyancy Control Methods				
				Concrete-filled half pipe (min. length/ side)	Concrete parking bumpers (min. length/ side)	Concrete traffic barriers (min. length/ side)	Helical anchors (min. no./side)	Concrete collar (min. width x min. height)
IM-540	36 in (900 mm) to outlet pipe saddle[2]	6 in (150 mm) to 12 in (300 mm)	2,200 lbs (1,000 kg)	3.8 ft (1.2 m)	3.8 ft (1.2 m)	3.8 ft (1.2 m)	2	6 in (150 mm) x 9 in (225 mm)
IM-1060	36 in (900 mm) to outlet pipe saddle[2]	6 in (150 mm) to 12 in (300 mm)	2,700 lbs (1,225 kg)	4.2 ft (1.3 m)	4.5 ft (1.4 m)	4.2 ft (1.3 m)	2	12 in (300 mm) x 9 in (225 mm)
IM-1530	30 in (750 mm) to outlet pipe saddle[2]	6 in (150 mm) to 12 in (300 mm)	4,300 lbs (1,955 kg)	6.3 ft (2.0 m)	6.5 ft (2.0 m)	6.3 ft (2.0 m)	2	12 in (300 mm) x 9 in (225 mm)

Buoyancy Control Methods





Helical Soil Anchor

Implementation

- **Excavation Requirements**
  Provide adequate clearance beyond the tank on all sides when utilizing buoyancy control

- **Placement of Deadman and Anchors**
  Concrete Deadman anchors are to be installed at the bottom of the tank excavation, parallel to the long axis of the tank.

Figure 3: Plan View

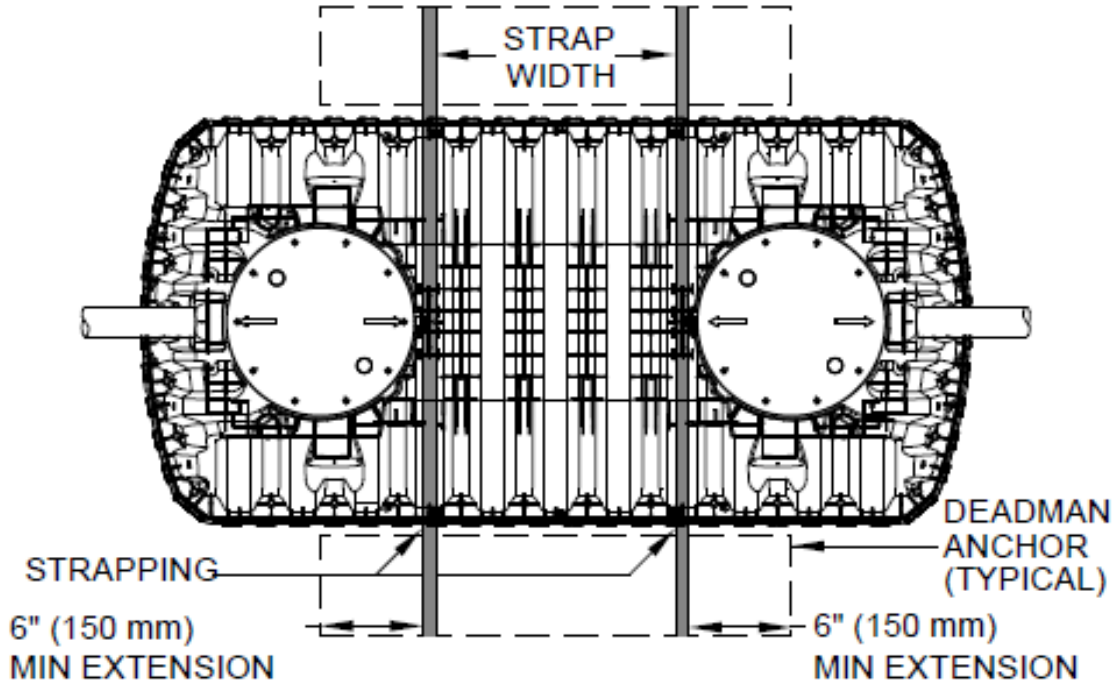
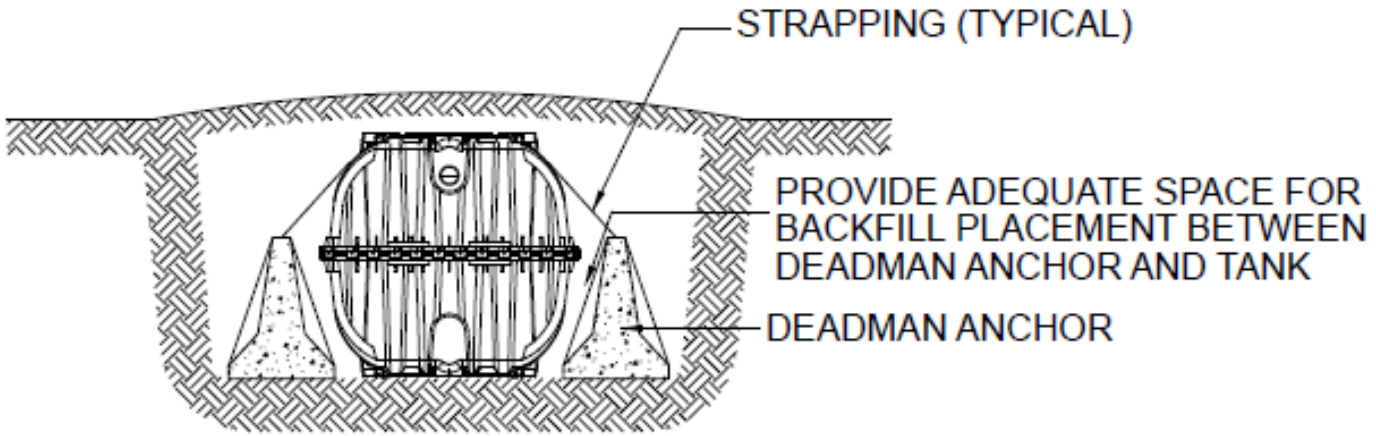


Figure 4: Section View




Buoyancy Control

A Good Effort ?

Installation Best Practices – Strap Capacity

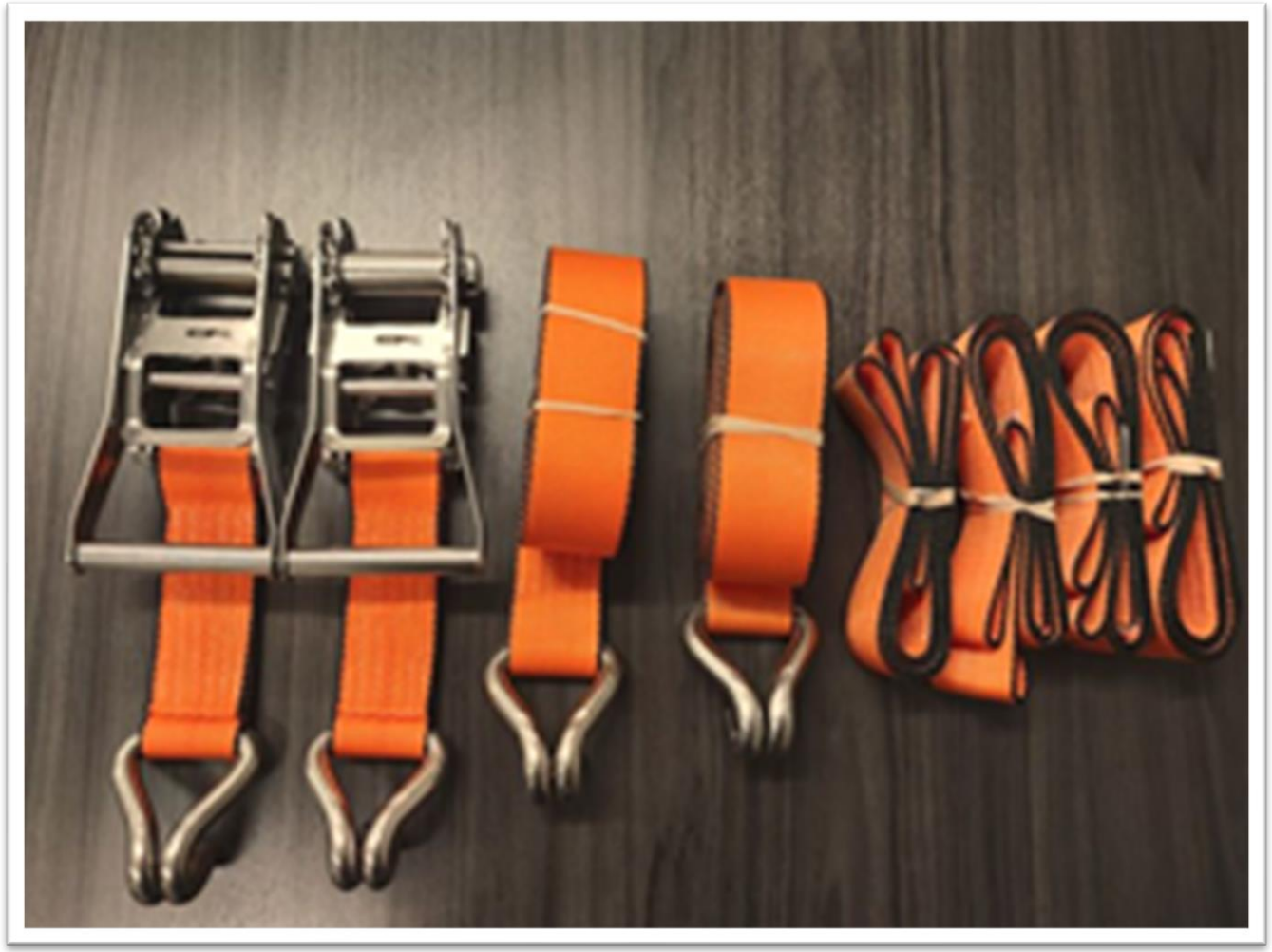
Verify strap capacity

- Determine tank uplift
- Determine tension in straps
- Verify that adequate strap safety factor exists

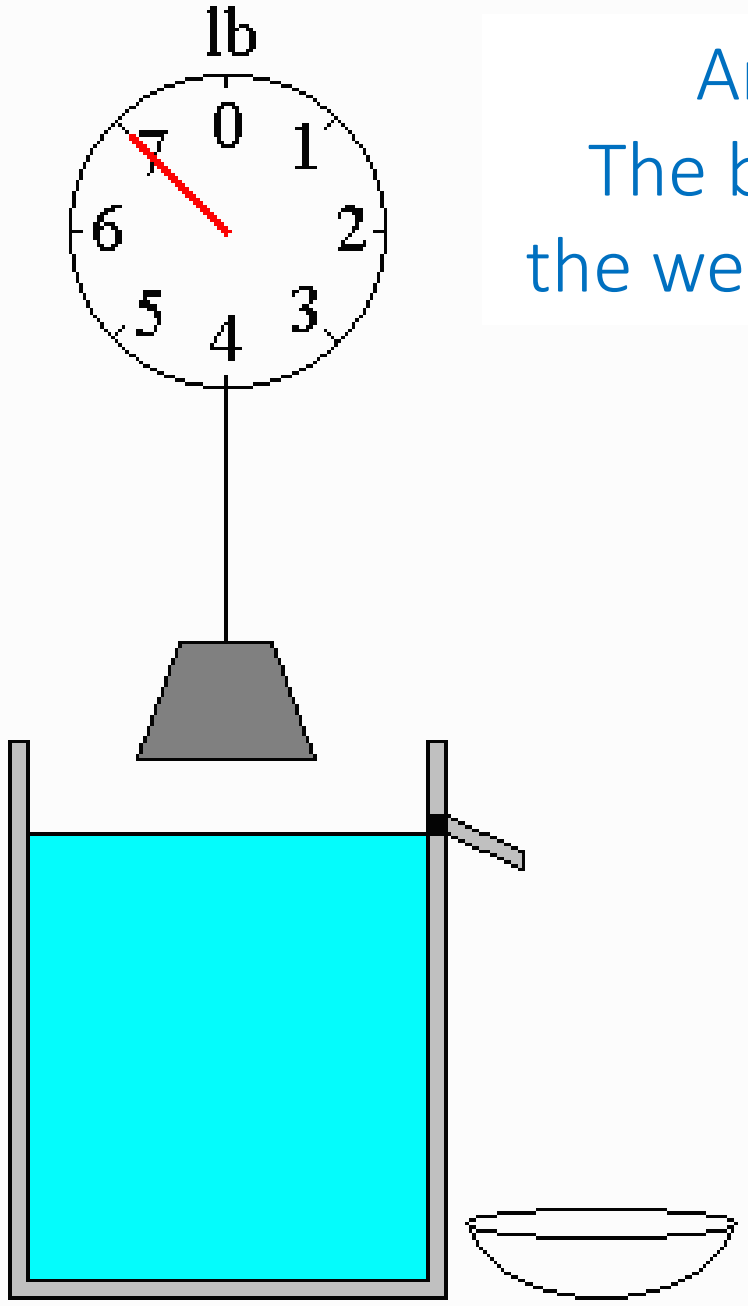
$$\text{Safety Factor} = \frac{\text{Resisting Force}}{\text{Driving Force}} = \frac{\text{10,000 lb capacity}}{\text{5,000 lb uplift}} = 2.0$$

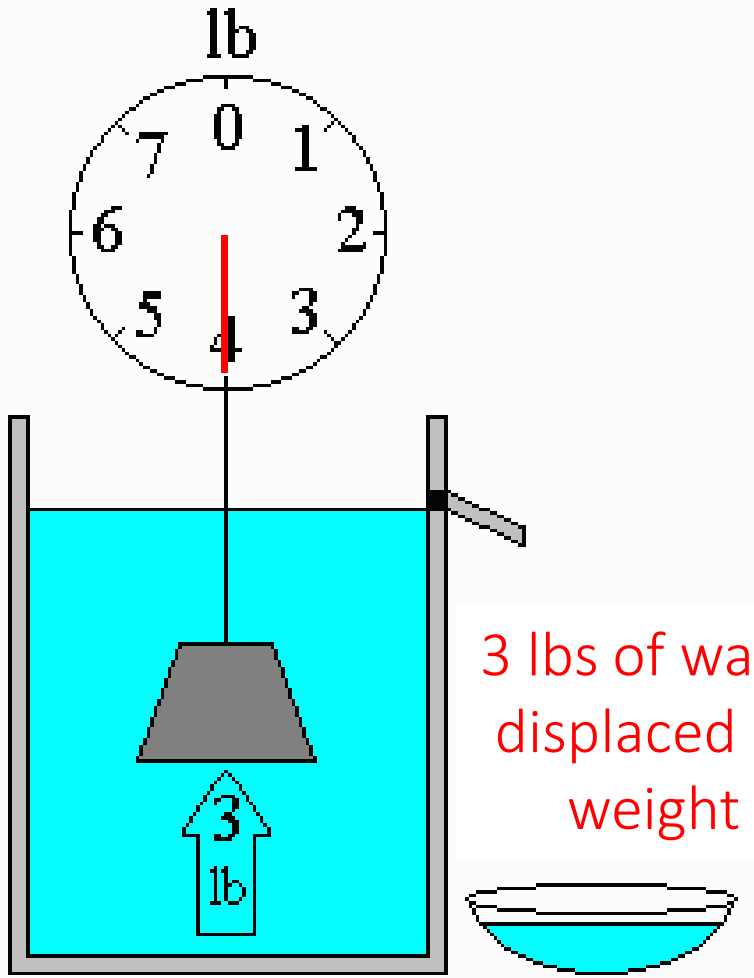
Infiltrator Buoyancy Control Strap Kit

- Strap Material: Polyester
- Strap Hooks: Stainless
- Tightening Mechanism: Stainless
- Strap Assembly Tensile Strength: 10,000 lb.



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





3 lbs of water displaced by weight

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


Water displaced by the aircraft carrier weighs more than the ship, so the ship floats

http://corysimon.github.io/articles/tip-of-the-icerberg/

Tank Installation Summary

Burial Depth: 6 inches to 4 feet (see soil triangle)

Water Table: 43 inches max.

Buoyancy Control: see table

Excavation: Hard Base

Backfill:

- - 3” clods or less
- - No rounded stone – use angular
- - 12” lifts & fill haunches
- - Account for settling

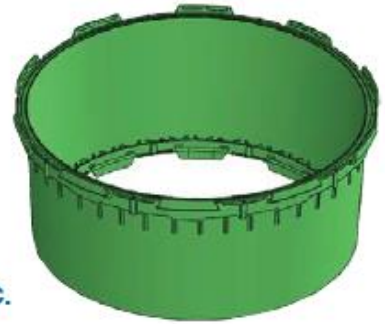
EZsnap Risers

2, 6 & 12 Inch Riser System
Available in Green and Black

- **A.** 24" x 2" Risers
- **B.** 24" x 6" Risers
- **C.** 24" x 12" Risers
- **D.** 24" Lids
- **E.** 24" Adapter Rings
- **F.** 24" Safety Star

A.

B.



C.

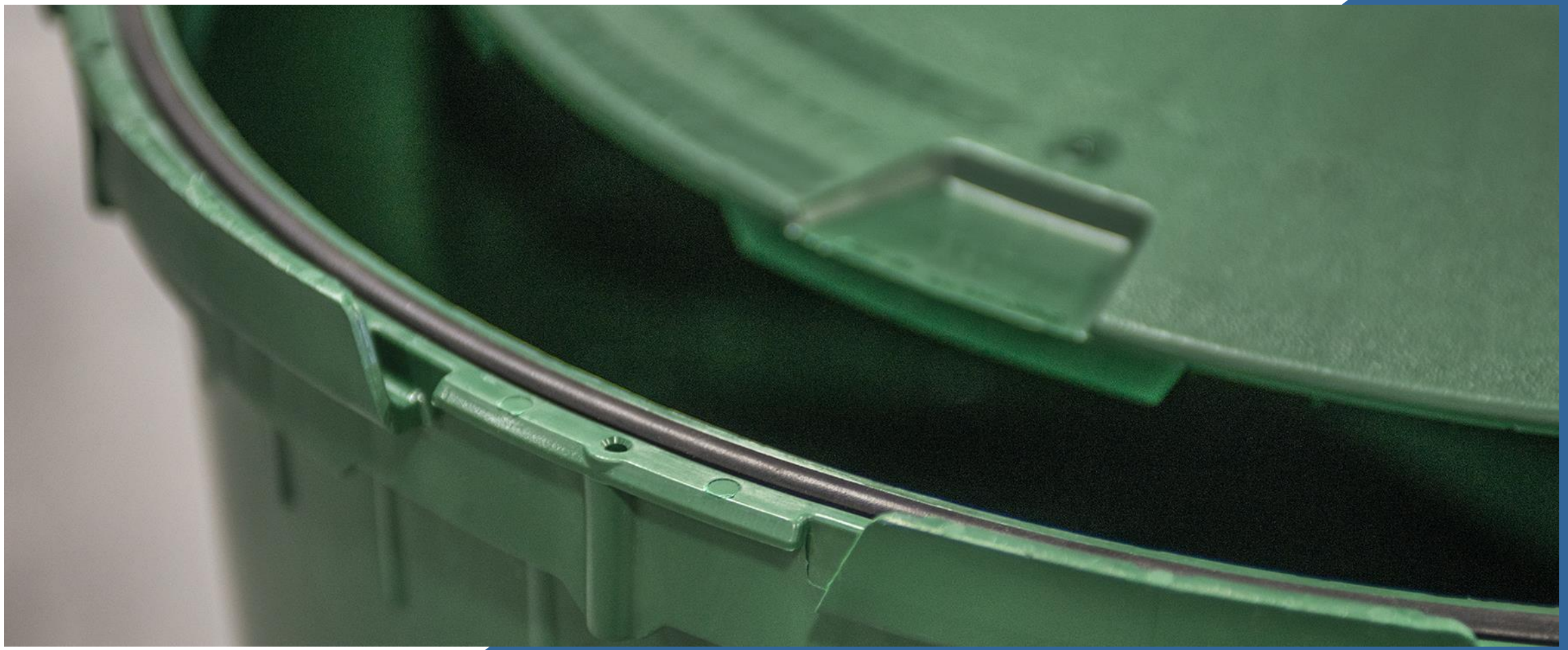
D.

E.

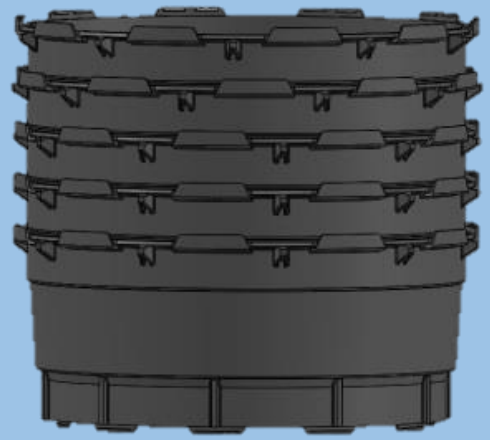
F.

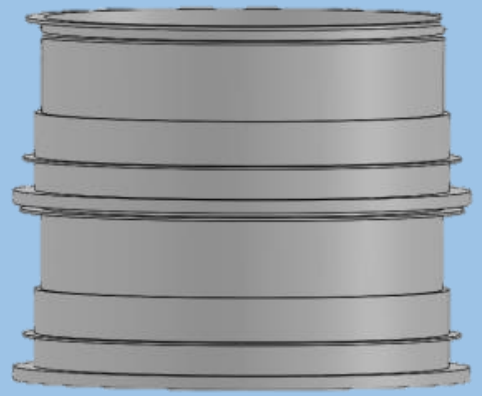
EZsnap Pipe Adapter Ring for Riser Pipe Applications

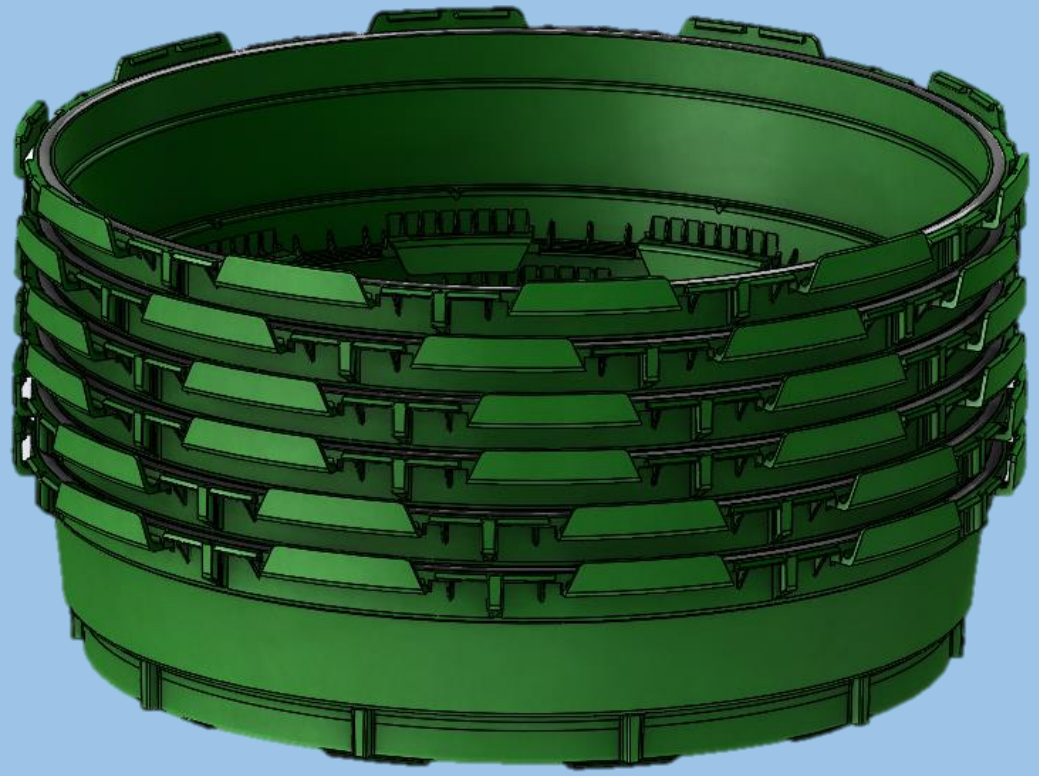
EZsnap Riser - Gasket



Improved Shipping







Storage Efficiency

Potable Water Tanks

IAPMO RESEARCH AND TESTING, INC.

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NSF/ANSI 61

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Effective Date: March 2019 — Void After: March 2024

Product: Drinking Water System Components - Health Effects — File No. N-7256

Issued To: Infiltrator Water Technologies, Llc
4 Business Park Road
Po Box 768
Old Saybrook, CT 06475-0768

Identification: Each product shall be permanently and legibly marked with the manufacturer's name or trademark. The product may also be marked with the standard designation "NSF/ANSI/CAN 61".

Characteristics: Materials or products that come into contact with drinking water and/or drinking water treatment chemicals. Products and materials may include process media, protective materials, joining and sealing materials, pipes and related products, mechanical devices used with treatment/transmission/distribution systems, and mechanical plumbing devices. To be installed in accordance with the manufacturer's instruction. Lead free requirements are addressed under a separate certificate of listing.

Products listed on this certificate have been tested by an IAPMO R&T recognized laboratory. This recognition has been granted based upon the laboratory's compliance to the applicable requirements of ISO/IEC 17025.

Chairman, Product Certification Committee

CEO, The IAPMO Group

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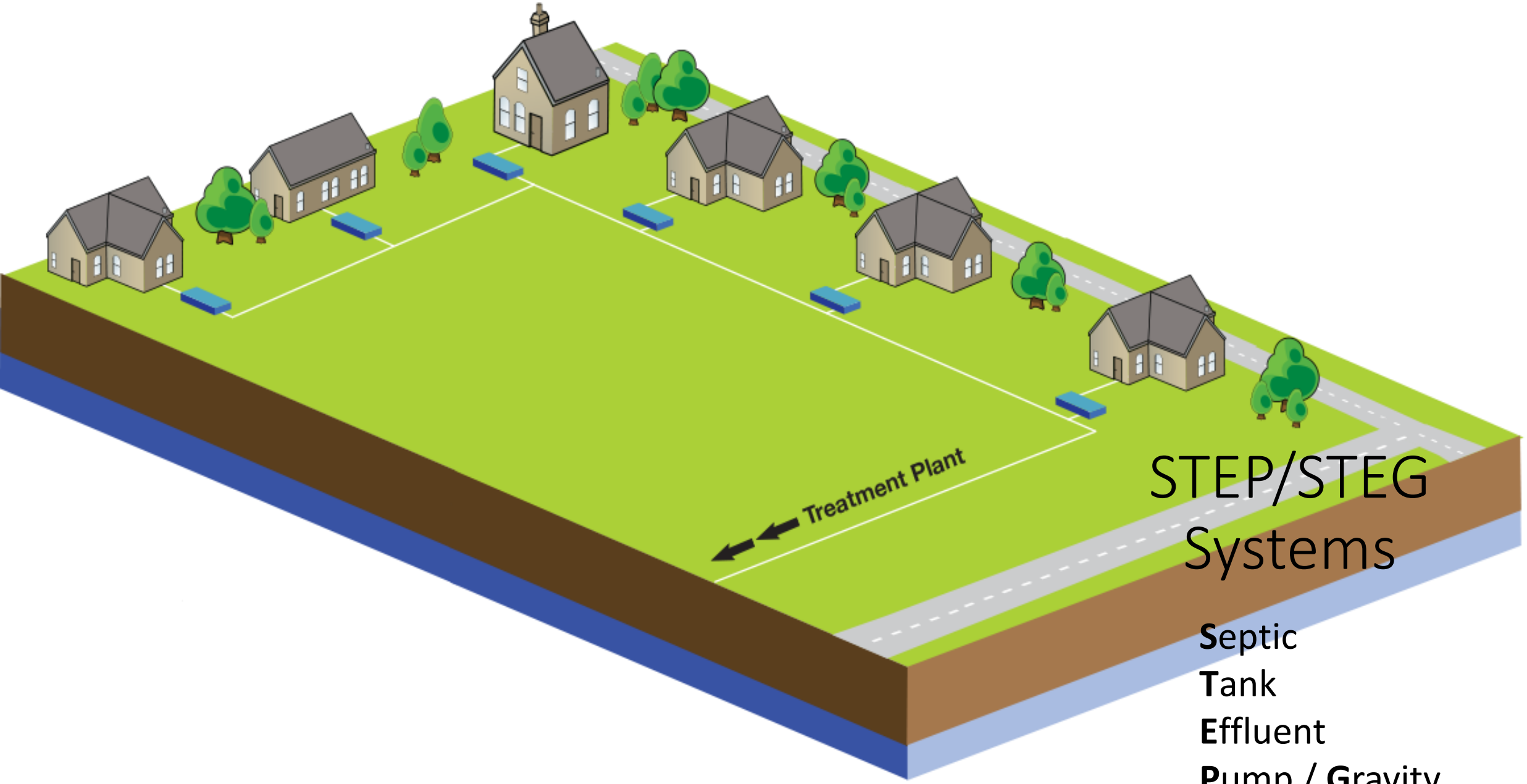
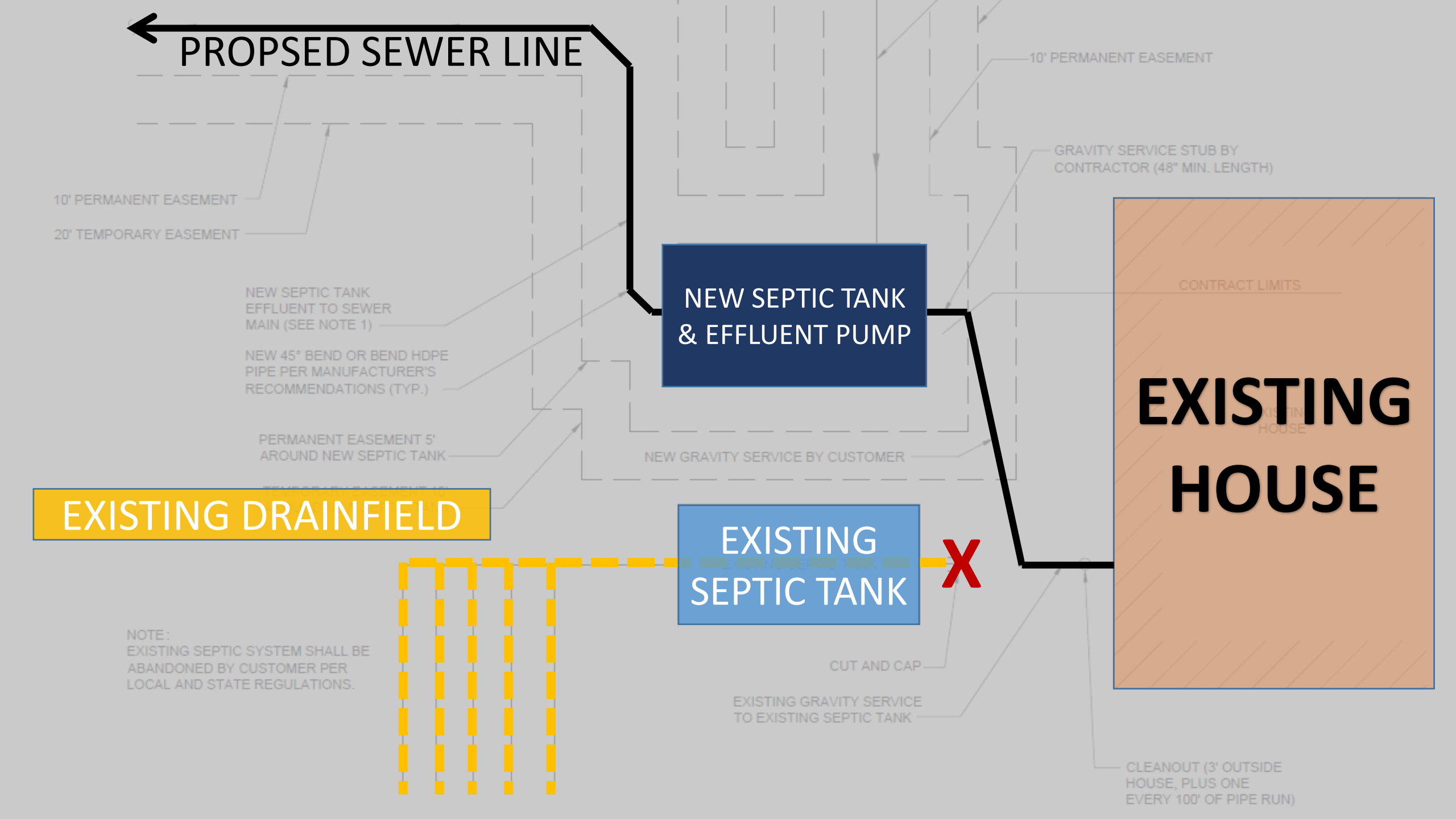


STEP/STEG Systems

Septic
Tank
Effluent
Pump / **G**ravity


PROPSED SEWER LINE
10' PERMANENT EASEMENT
20' TEMPORARY EASEMENT
NEW SEPTIC TANK EFFLUENT TO SEWER MAIN (SEE NOTE 1)
NEW 45° BEND OR BEND HDPE PIPE PER MANUFACTURER'S RECOMMENDATIONS (TYP.)
PERMANENT EASEMENT 5' AROUND NEW SEPTIC TANK
NEW SEPTIC TANK & EFFLUENT PUMP
10' PERMANENT EASEMENT
GRAVITY SERVICE STUB BY CONTRACTOR (48" MIN. LENGTH)
CONTRACT LIMITS
EXISTING HOUSE
NEW GRAVITY SERVICE BY CUSTOMER
EXISTING DRAINFIELD
EXISTING SEPTIC TANK
X
CUT AND CAP
EXISTING GRAVITY SERVICE TO EXISTING SEPTIC TANK
CLEANOUT (3' OUTSIDE HOUSE, PLUS ONE EVERY 100' OF PIPE RUN)
NOTE:
EXISTING SEPTIC SYSTEM SHALL BE ABANDONED BY CUSTOMER PER LOCAL AND STATE REGULATIONS.

IM-Series Septic Tanks for STEP/STEG

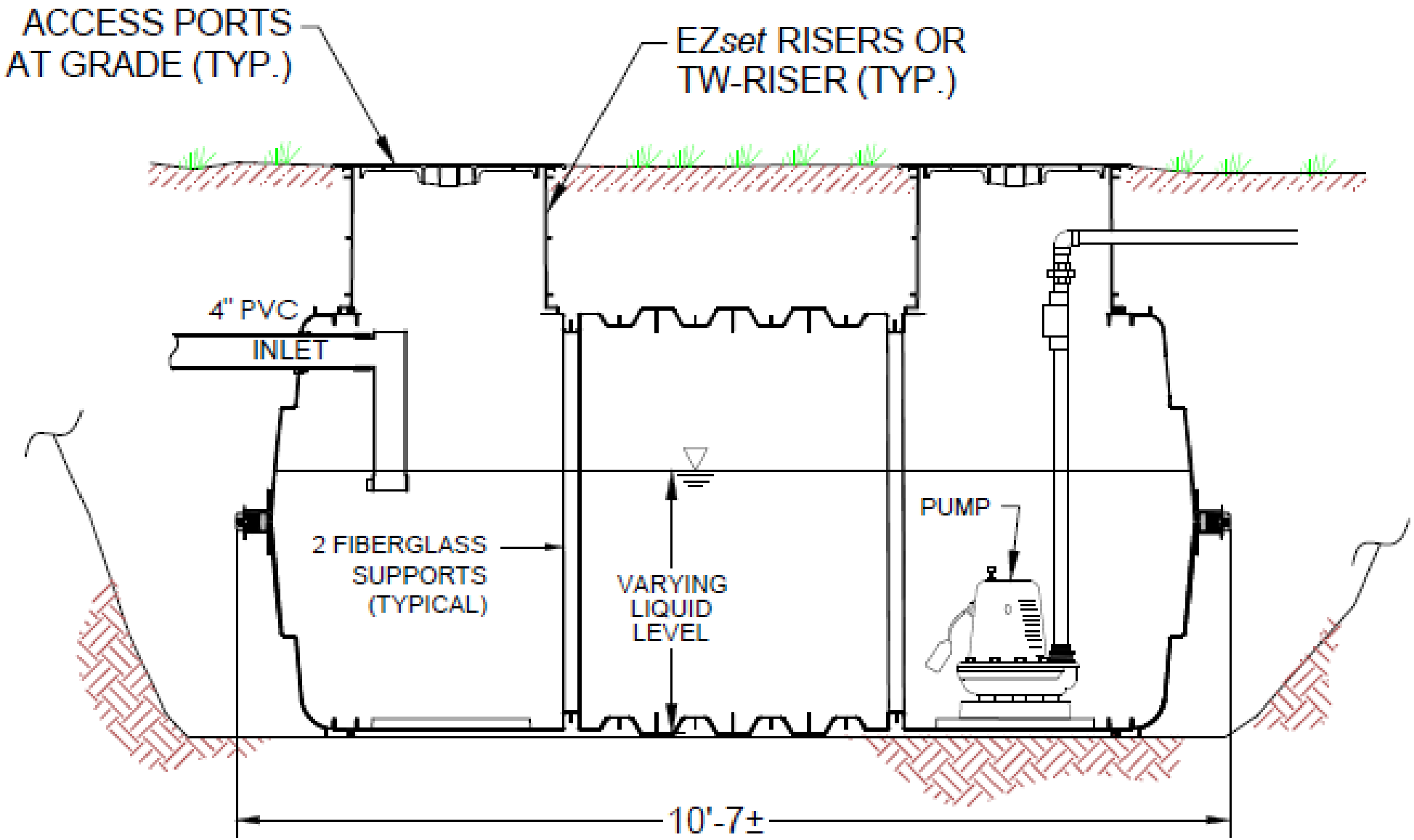
Tanks are …

- Watertight
- Structurally sound

IM-1060	IM-1530
1,000 gal	1,500 gal

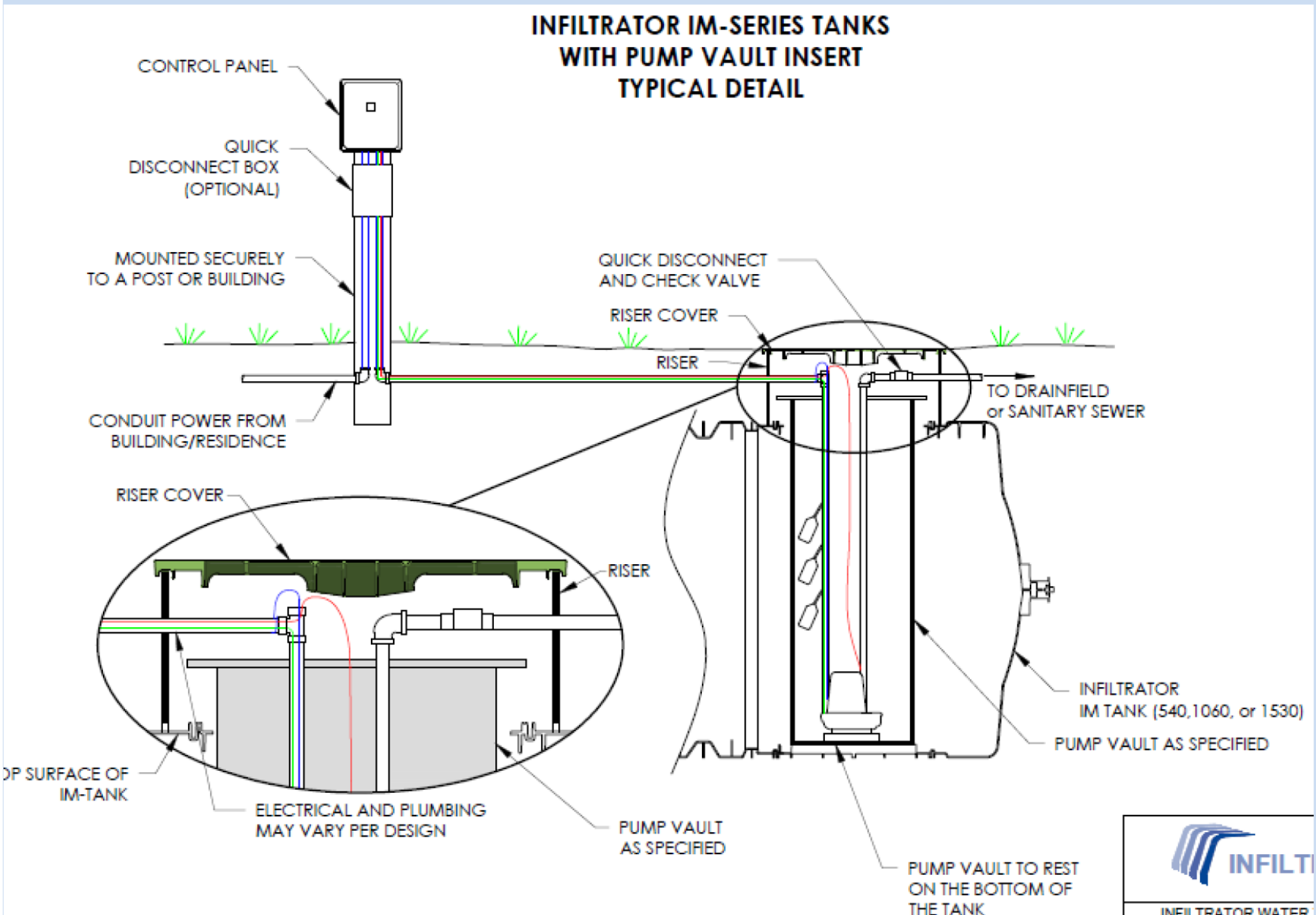
Pump Tank

details



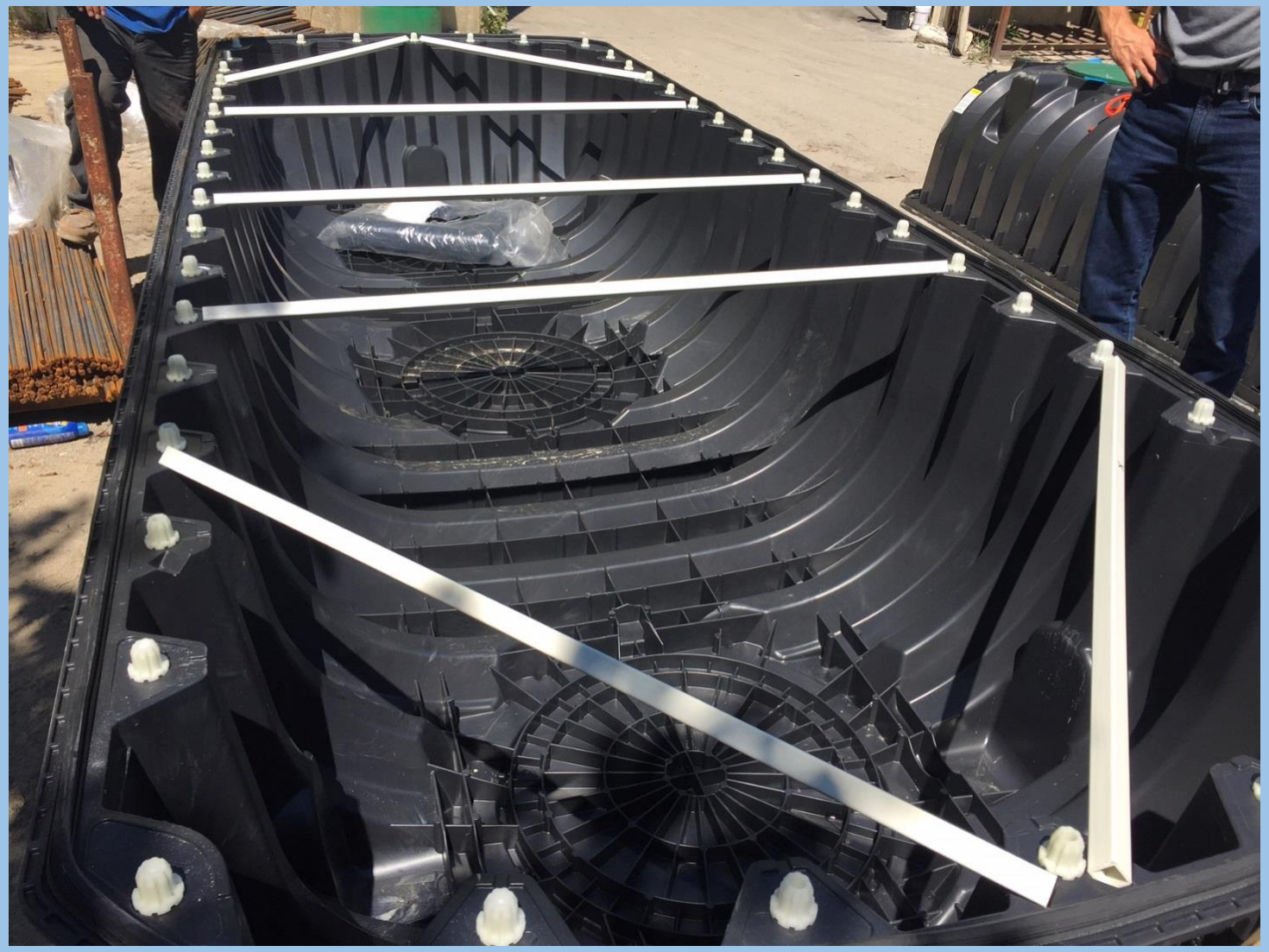
Pump Tank

details



- ECOPOD
- Enviro-Aire
- Various thers

CAT 4 Bracing



Why CAT 4 Bracing

- CAT 4 Horizontal Bracing in Heavy Clays Adds Tremendous Benefit
- Due To Tanks Being Dosed To Low Liquid Levels - Adds Strength To The Sidewall
- Adds Support During Massive Rain Events

Instructions

Available on our website

Infiltrator IM-Series Septic Tank General Installation Instructions

INFILTRATOR tanks

BEFORE YOU BEGIN

Infiltrator Water Technologies' tanks must be installed according to state and/or local regulations and approvals, which supersede the manufacturer's installation instructions. If unsure of the installation requirements for a specific site, contact the health department or permitting authority. The IM-Series referred to in this document includes the IM-540, IM-1060, and IM-1530 models.

WARNING: IMPLOSIONS MAY CAUSE SERIOUS INJURY
Follow Infiltrator Water Technologies vacuum test instructions

MATERIALS AND EQUIPMENT NEEDED

- ☐ IM-Series tank
- ☐ Access port lid(s)*
- ☐ 10 screws per lid*
- ☐ 2 inlet/outlet gaskets (included)
- ☐ Inlet/outlet tees*
- ☐ Tape measure
- ☐ Pipe, risers, etc.
- ☐ Socket wrench
- ☐ Excavator
- ☐ Shovel
- ☐ Level
- ☐ 5-inch-diameter (125 mm) hole saw
- ☐ Utility knife
- ☐ PVC pipe glue with primer

*tee and lid inclusion varies by state/province

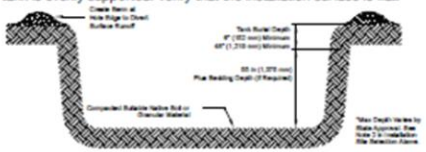
INSTALLATION SITE SELECTION

1. Do not install the tank in vehicular traffic areas. The tank is designed for non-traffic applications.
2. The allowable soil cover depth is 6 to 48" inches (150 to 1,200 mm). *18-inch (450 mm) max. in Florida for Cat. 3 IM-Series tanks; 48-inch (1,200 mm) max. in Florida for Cat. 4 IM-Series tanks; 36-inch (900 mm) max. in Massachusetts, New Hampshire, North Carolina, and Oregon.
3. Do not install where uninterrupted saturated soil could be present from the tank bottom to a height exceeding that of the outlet pipe saddle. See page 4 illustration.

EXCAVATING AND PREPARING THE SITE

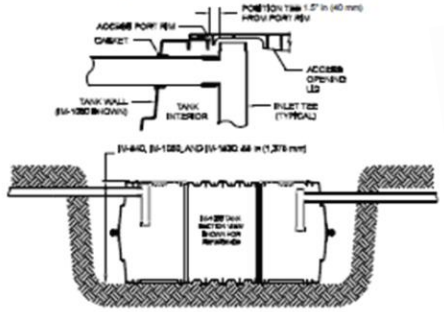
1. Unless buoyancy control measures are required, the excavation width and length should be 18 to 36 inches (450 to 900 mm) larger than the tank on each side or sized as necessary to ensure proper backfill compaction, as outlined in Steps 5-10 of "Backfilling the Tank" in this document. See Infiltrator IM-Series Tank Buoyancy Control Guidance document, available online at www.infiltratorwater.com, for specific excavation requirements when installing buoyancy control measures.
2. Excavation depth shall account for the 55-inch (1,375 mm) tank height. Also account for 4 inches (100 mm) of bedding (if required) and cover depth (permissible cover depth is 0.5 to 4 feet (150 to 1,200 mm) of soil).
   Note: If uninterrupted saturated soil conditions exist from the tank bottom to a height exceeding that of the outlet pipe saddle, tank structural integrity may be compromised. See page 4 illustration.

   Indiana installations: If the depth of the uninterrupted saturated soil conditions cannot be determined from the site soil evaluation report or other site-related data and other information indicates the possible presence of a perched ground water table, tank installation is permissible.
3. Inspect bottom of excavation to verify suitability of native soil for tank installation. Soils with large, protruding, or sharp stones or other similar objects that may damage the tank are not suitable.
4. The tank may be installed either in suitable native soil (see Backfilling the Tank section) or a minimum 4-inch (100 mm) layer of well-graded granular soil having particles less than 3 inches (75 mm) in diameter, or maximum 0.5-inch (13 mm) diameter crushed stone.
5. Create a uniform, compacted, level surface to ensure that the bottom of the tank is evenly supported. Verify that the installation surface is flat.



INSTALLING THE TANK

1. Inspect the tank for damage before installation.
2. If the tank inlet and outlet penetrations are not drilled, drill holes using the drill points provided at each of the inlet and outlet ports according to Table 3 in the Inlet and Outlet Hole Locations section. The inlet and outlet may be drilled on either the sides or ends of the tank, as required based on applicable codes and site conditions.*
   * Kentucky, Oregon, West Virginia, and certain Florida and Texas tanks are factory-drilled.
3. The gaskets supplied with the tank are compatible with Schedule 40 and SDR 35 pipe using a 5-inch-diameter (125 mm) hole saw.
4. Install the rubber gaskets at the inlet and outlet.
5. Using all four of the tank's integral lifting lugs, lower tank into excavation.
6. Slide the inlet and outlet pipes* through the gaskets. Soapy lubricant may be used to slide the pipe in.
   *For North Carolina, the inlet pipe shall be a straight pipe with no tee.
7. Horizontally position the tee 1½ inches (40 mm) from the access port rim, allowing the tee to fit into the recess in the access port lid (see detail).
8. Install lids and risers (see Installing Risers section) as necessary. Rotate lid over access opening until it indexes to tank and drops into position.

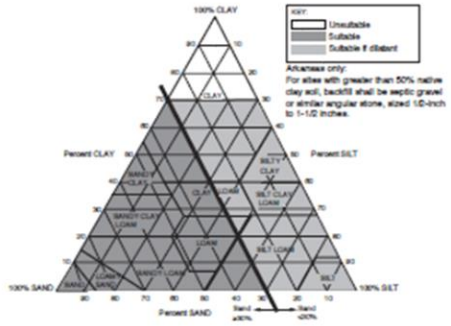


BACKFILLING THE TANK

Note: Infiltrator tanks do not require filling with water prior to backfill placement. Water filling and backfilling to the tank mid-height is required if the tank is left in either an open or backfilled excavation that may fill with water from rain or other sources.

1. Backfill with suitable native soil (max. 3-inch (75-mm) stone diameter). If native soil is unsuitable, replace unsuitable fraction with suitable soil. If suitable soil is not locally available, contact Infiltrator for assistance.
2. Suitable soil shall include soil textural classes defined in the United States Department of Agriculture soil triangle.

a) For a tank soil cover depth of 0.5 to 2.0 feet (150 to 600 mm), suitable soil textures include:



Infiltrator IM-Series Tank Riser Connection Guidance Document for EZsnap Risers

MARCH 2020

INFILTRATOR tanks

Before You Begin

This document provides recommended procedures for the connection of EZsnap Riser products to Infiltrator Water Technologies' (Infiltrator's) IM-Series tanks. The intent of this document is to provide procedures for making the connection between the riser and tank. Risers must be installed according to state and/or local regulations, which supersede the guidelines in this document. If unsure of the requirements for a particular site, contact the local health department or permitting authority.

Note: The method of PVC and HDPE riser construction shown in this document is not allowed under Florida regulations.

Parts and Supplies

The parts and supplies necessary for installation of a riser system on Infiltrator IM-Series tanks must be purchased separately from the tank. All parts and supplies are commercially available. Contact Infiltrator or the riser manufacturer for assistance obtaining parts and supplies.

Required Tools for EZsnap Risers

- Rubber Mallet
- Screw Gun
- 7/16" Hex Nut Driver Screw Gun Bit
- #3 Square Head Robertson Driver Bit, 6" Length
- #2 Phillips Driver Bit, 6" Length
- 3/8" Hex nut driver screw gun bit
- Rags
- Install riser assembly prior to backfilling tank.

Risers nest together for efficient shipping

Note: The EZsnap Riser segment includes factory-installed gaskets on both ends of the riser segment, so the application of a sealant or mastic on the connection surface is not required. Proper care must be taken to ensure the gasket surface is clean and free of debris. It's recommended that all gaskets and connection surfaces be wiped clean. Each riser section is tapered to have a narrow end and a wide end. When shipped the EZsnap Risers are stacked wide end down and nested together. When making riser connections the narrow ends are designed to connect to the narrow end and the wide end is designed to connect to the wide end. It is a recommended best practice that the taller sections be installed at the deepest points of the installation.

Engage one set of tabs into proper position

Use mallet to engage the rest of the tabs

Screws required for riser to tank connection only

Riser-to-Tank Connection

Insert the EZsnap Riser, narrow end down into the IM-Tank opening. Rotate the riser until the riser connection tabs align with the tank indexing tabs on the tank opening. Screw pilot holes will be in alignment on the riser and tank when in proper position. On one side of the tank insert the riser connection tabs into the tank indexing tabs and engage into the proper position. Then using a rubber mallet pound down on the top of the riser engaging the rest of the tab It is helpful to move around the circumference of the tar opening. It is required for the tank to riser connectic only to secure the connection with the supplied (1 x 2" stainless steel screws. Tighten screws in a "str pattern, tightening screws on opposite sides of the EZsnap Riser.

Riser to Riser Connection

The EZsnap Risers come in multiple heights to generate the desired finished grade. Each Riser is tapered to have a large end and small end align like-diameter ends of riser segments. Rotate until the tabs on the upper riser segment drops into alignment on the lower riser segm alignment, push directly down on the riser segment until the connection ta lower riser segment. A rubber mallet engage the tabs by hitting on the t manual pressure is not adequate.

The Infiltrator Safety Star Installation

The Infiltrator Safety Star is designed to be mounted to the screw pilot holes at a narrow end riser connection.

Infiltrator IM-Series Tank Buoyancy Control Guidance

MAY 2019

INFILTRATOR tanks

Before you Begin

This document presents a method for assessing buoyancy control needs for Infiltrator Water Technologies (Infiltrator) IM-Series tanks. Tank buoyancy control measures must be implemented according to state and/or local regulations and approvals, which may supersede these guidelines. If unsure of the requirements for a particular site, contact the local health department or permitting authority.

If tank buoyancy control measures are implemented, refer to Infiltrator IM-Series Tank Installation Instructions and Riser Connection Guidance documents, as applicable, for completing the installation.

How to Use this Document

1. Using Step 1, Table 1, and Figures 1 and 2, verify that the level of uninterrupted saturated soil is below the height of the outlet pipe saddle and determine if buoyancy control is required.
2. Use the appropriate row in Step 2, Table 2 to determine the minimum buoyancy control methods for the site conditions.
3. Once the preferred buoyancy control method is selected, follow the implementation procedures provided in Step 3.

Step 1 – Determine Need for Buoyancy Control

Required information: (1) maximum height of uninterrupted saturated soil above the tank bottom; and (2) the depth of soil cover above the tank top. Tank buoyancy control may be required if:

- the level of uninterrupted saturated soil outside the tank has the potential to rise 30 inches (750 mm) or more above the bottom of the tank; and
- less than 12 inches (300 mm) of soil cover is to be placed as backfill over the tank top.

NO BUOYANCY CONTROL IS REQUIRED IF THERE ARE AT LEAST 12 INCHES (300 MM) OF SOIL COVER ABOVE THE TANK TOP.

Figure 1: Limitations When Saturated Soil Conditions are Present Above Tank Bottom

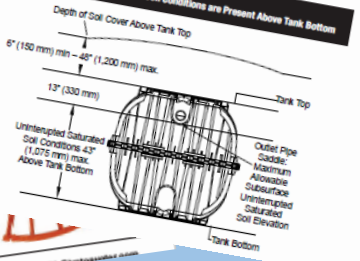


Table 1 Instructions

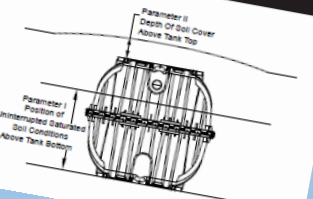
1. In the left-hand column of Table 1, locate the row corresponding to the height of the uninterrupted saturated soil elevation outside the tank and above the tank bottom (Parameter I) for the site conditions. See Figure 2.
2. Follow that row to the right until reaching the column corresponding to the depth of soil cover above the tank top (Parameter II). See Figure 2.
3. If the tank model is listed in that cell, then buoyancy control is required (proceed to Step 2). If the tank model is not listed in that cell, then no buoyancy control is required.
4. IM-Series tanks shall not be installed where the uninterrupted saturated soil level outside the tank exceeds the height of the outlet pipe saddle.

Table 1: Infiltrator Tank Models* and Conditions Requiring Buoyancy Control

	Parameter I: Position of uninterrupted saturated soil conditions above tank bottom	Parameter II: Soil cover depth above tank top*	
		A	B
1	Above outlet pipe saddle* (greater than 43" (1,075 mm))	6 in (150 mm) to 12 in (300 mm)	Above 12 in (300 mm)
2	36" (900 mm) to 43" (1,075 mm) (to outlet pipe saddle)	Do not install tank	Do not install tank
3	30" (750 mm) to 36" (900 mm)	All models	Not Required
4	Less than 30" (750 mm)	IM-1530	Not Required
		Not Required	Not Required

NOTES:
1. Infiltrator tank models include: IM-540, IM-1060, and IM-1530.
2. Minimum 6 inches (150 mm) soil cover backfill is required.
3. IM-Series tanks shall not be installed where the uninterrupted saturated soil outside the tank exceeds the height of the outlet pipe saddle. See Figure 1. For Indiana installations, if the depth of uninterrupted saturated soil conditions cannot be determined from the site soil evaluation report or other site-related data and other information indicates the possible presence of a perched ground water table, no buoyancy controls are required.

Figure 2: Buoyancy Control Parameters for Table 1



EPA
United States Environmental Protection Agency

A
Home
G

Soil

SEPTIC SYSTEM OWNER'S MANUAL

INFILTRATOR®
water technologies

A Guide to the Proper Care and Maintenance of Your Onsite Wastewater Treatment System

COURTESY OF INFILTRATOR WATER TECHNOLOGIES

s Guide

College of Food, Agricultural and Natural Resource Sciences
Revised 2008

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EXTENSION