A Look Inside The Manufacturing of Watertight and Durable Concrete Wastewater Treatment Tanks

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Disclaimer

The materials in this presentation represent our own opinions, and do NOT reflect the opinions of NOWRA.

Decentralized Onsite Wastewater Treatment

Sustainable method to treat wastewater.

Technologies continue to **evolve**.

- to meet more stringent effluent limits
- to address challenging sites
- to address changing wastewater characteristics
- to lower costs and simplify O&M.
- to extend the service life of onsite treatment systems

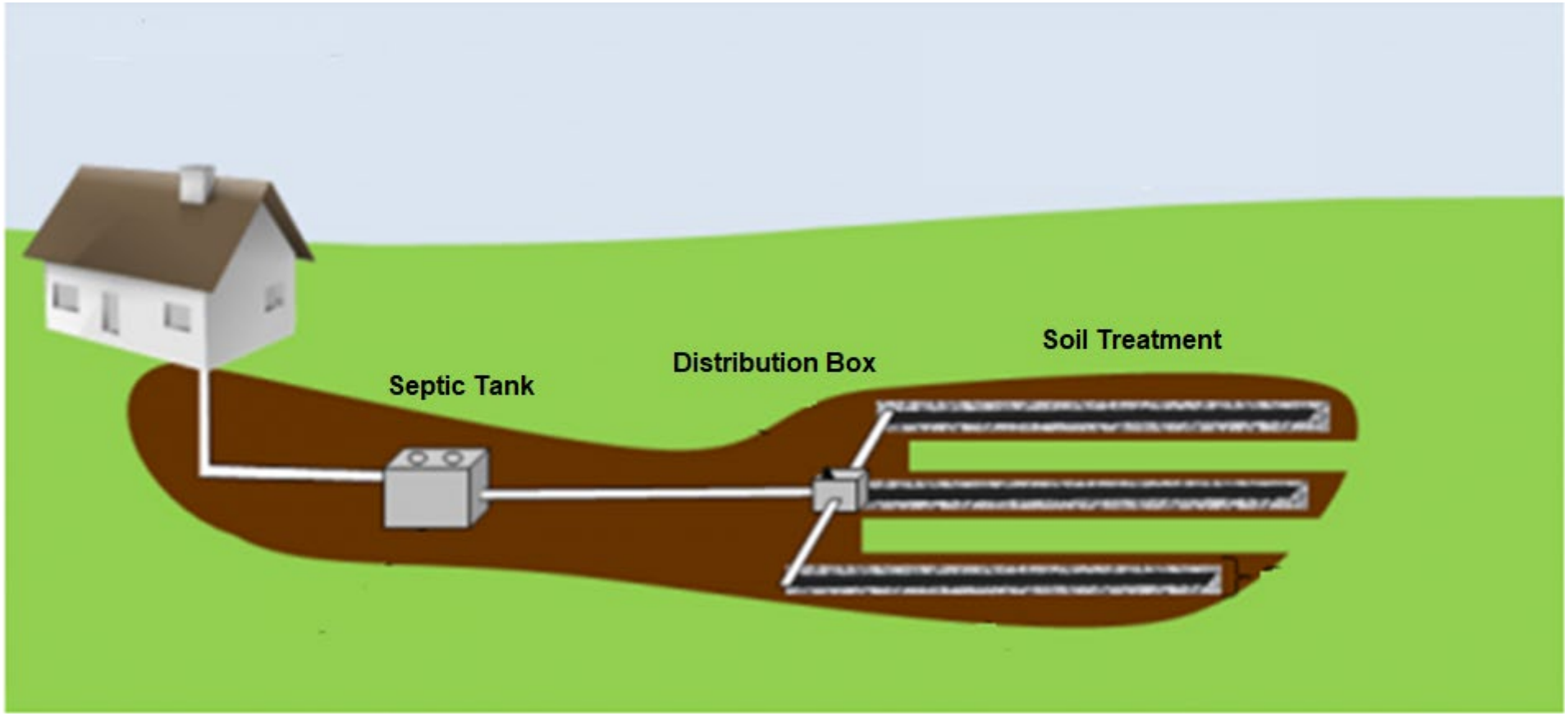
Decentralized Onsite Wastewater Treatment

Education & training of industry professionals

Enhancing:

- Design
- Installation
- Operation & Maintenance
- Homeowner Education

Decentralized Onsite Wastewater Treatment



Precast Concrete

Applications

Applications Includes

- Septic Tank
- Pump Tank
- Secondary Treatment
- Equalization Tank
- Distribution Box
- Leaching Chambers
- Gravity Grease Interceptor
- Grinder Tank
- Larger systems

Septic Tanks

- Sizes 500 to 20,000 gallons +

Septic Tanks

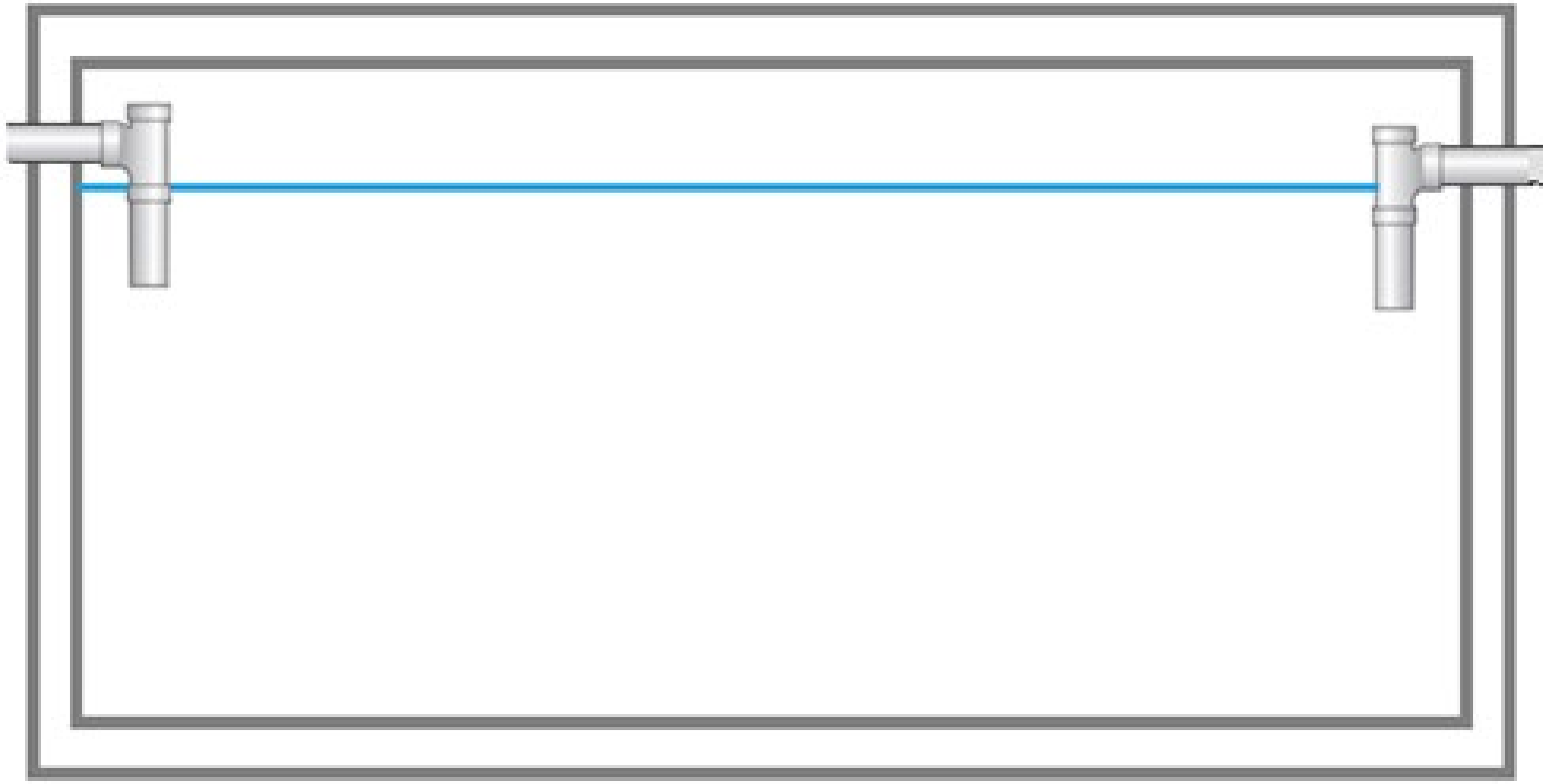
- Mid seam / Top seam

Septic Tanks

- Many seams

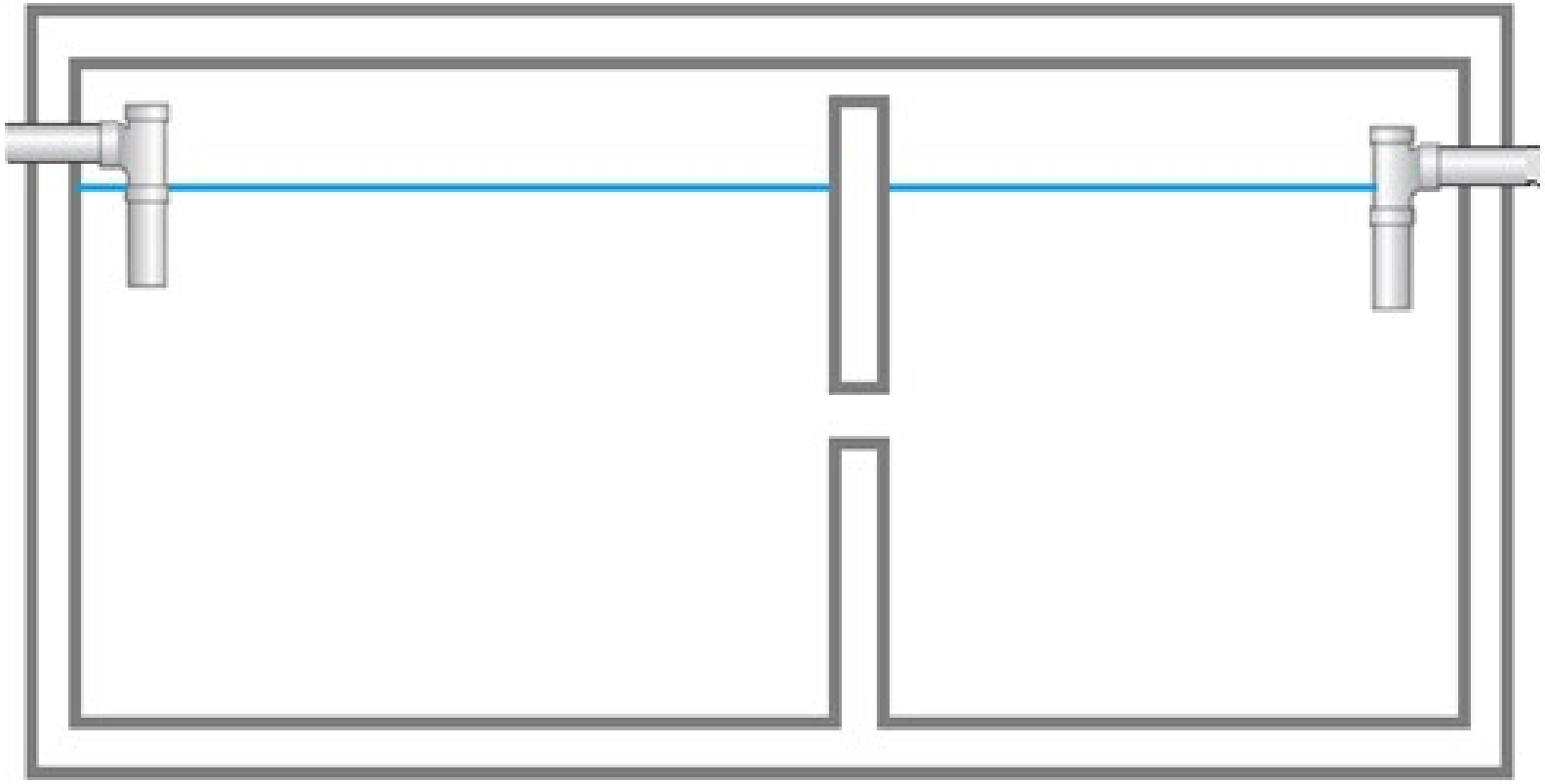
Septic Tanks

- Single compartment



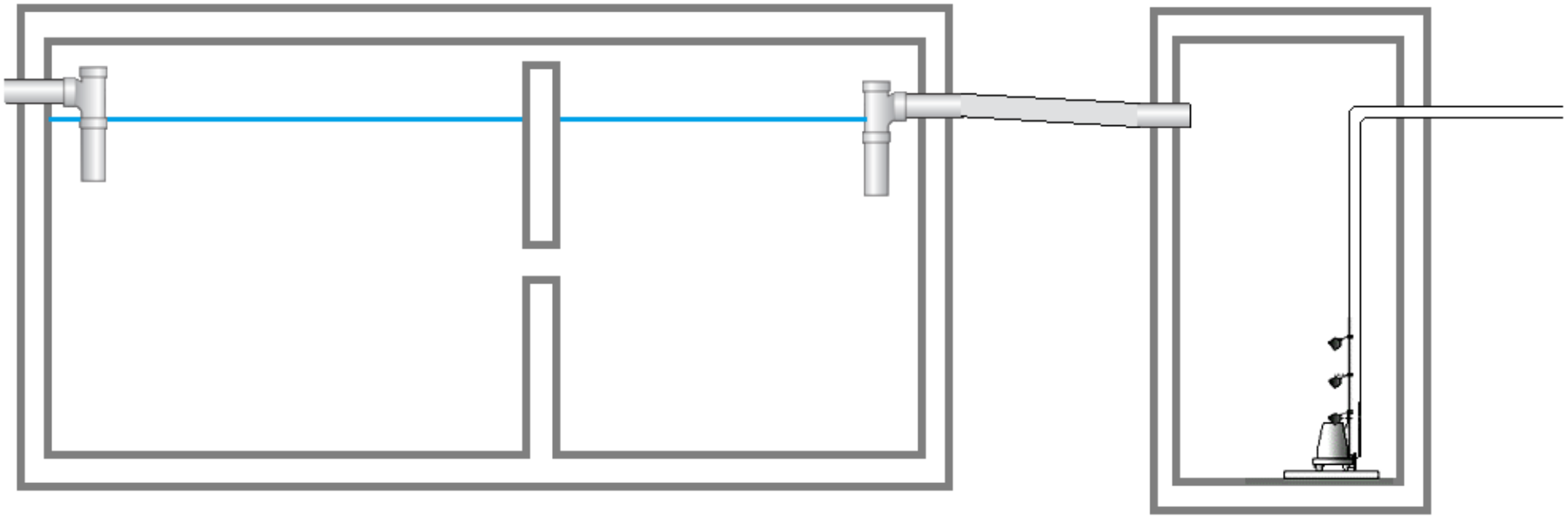
Septic Tanks

- 2-compartment



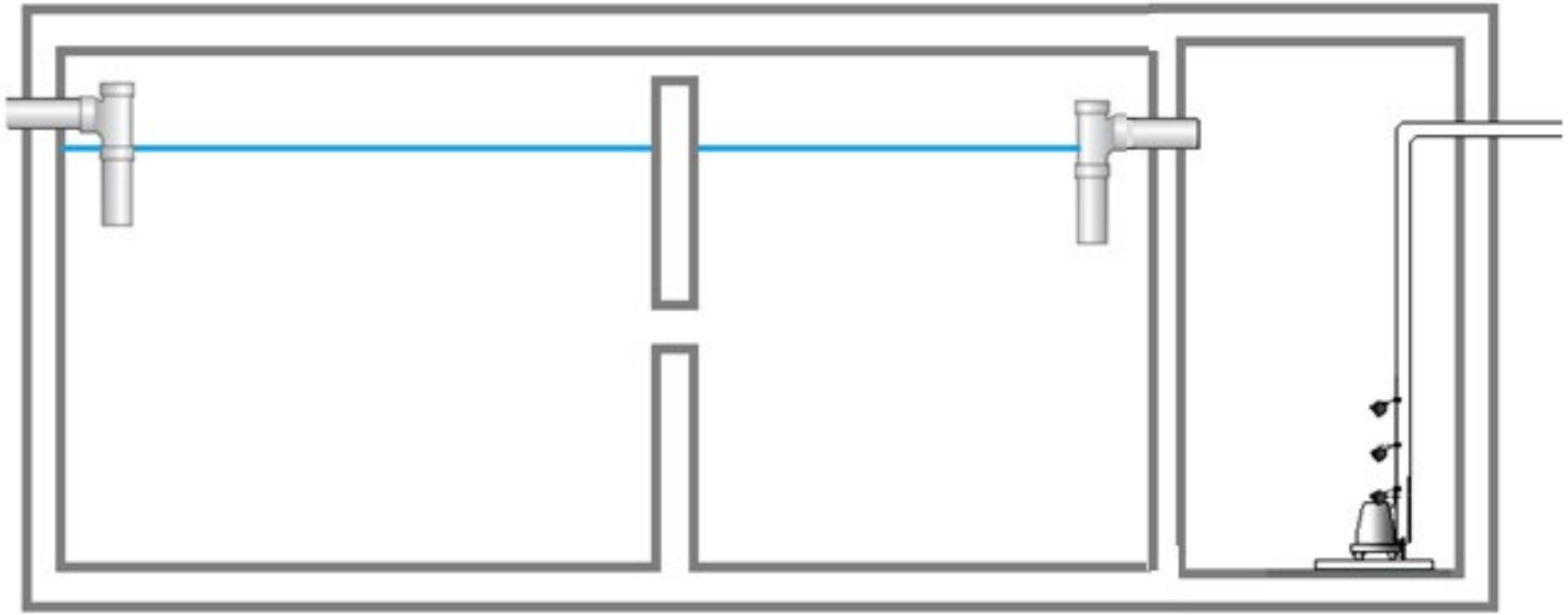
Septic Tanks

- Separate pump chamber



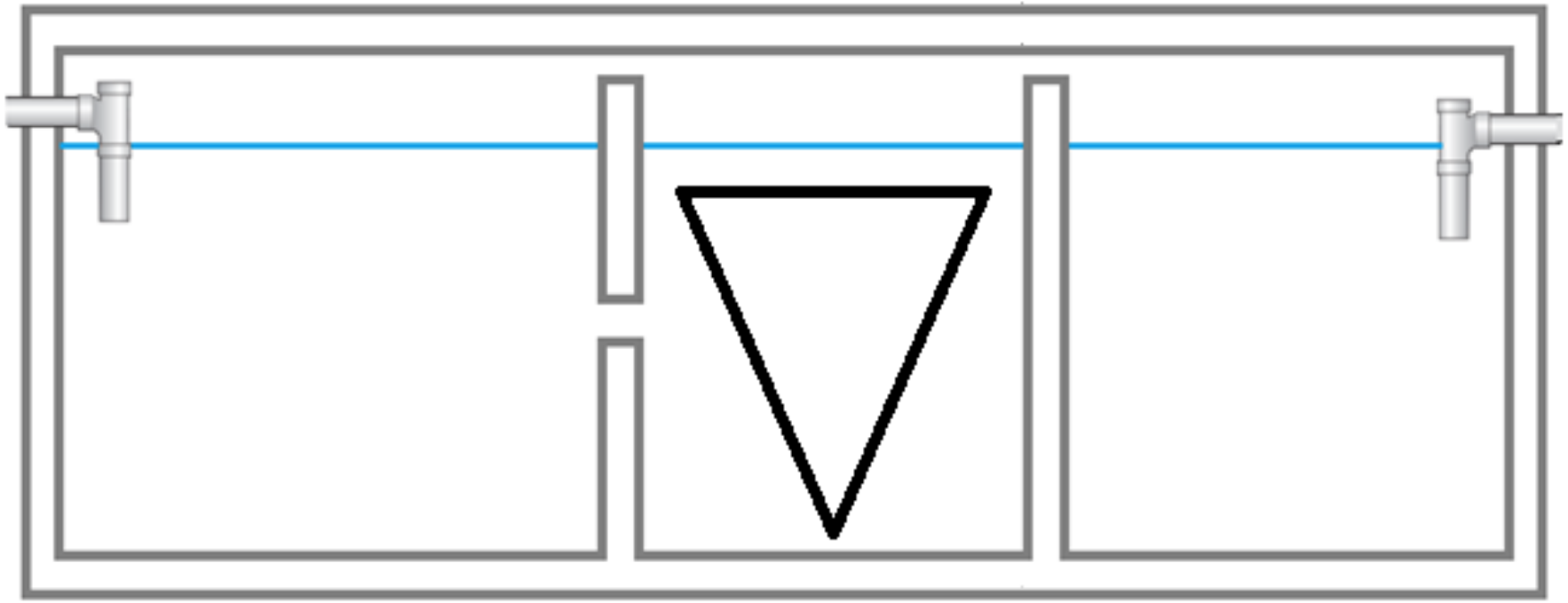
Septic Tanks

- 3 compartment with pump chamber



Septic Tanks

- Adaptable to treatment technologies



Septic Tanks

- Adaptable to treatment technologies

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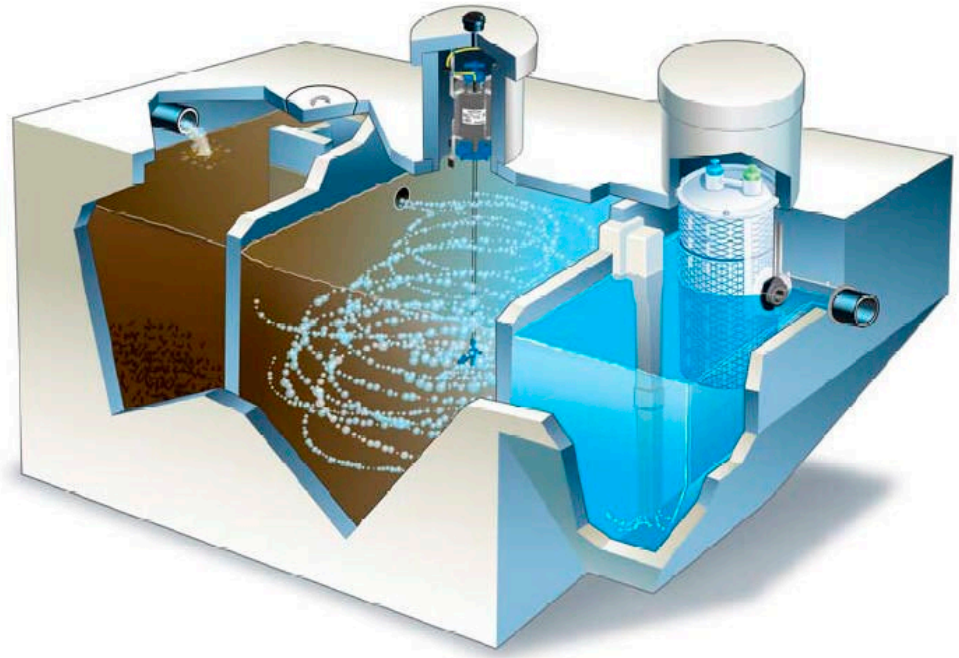
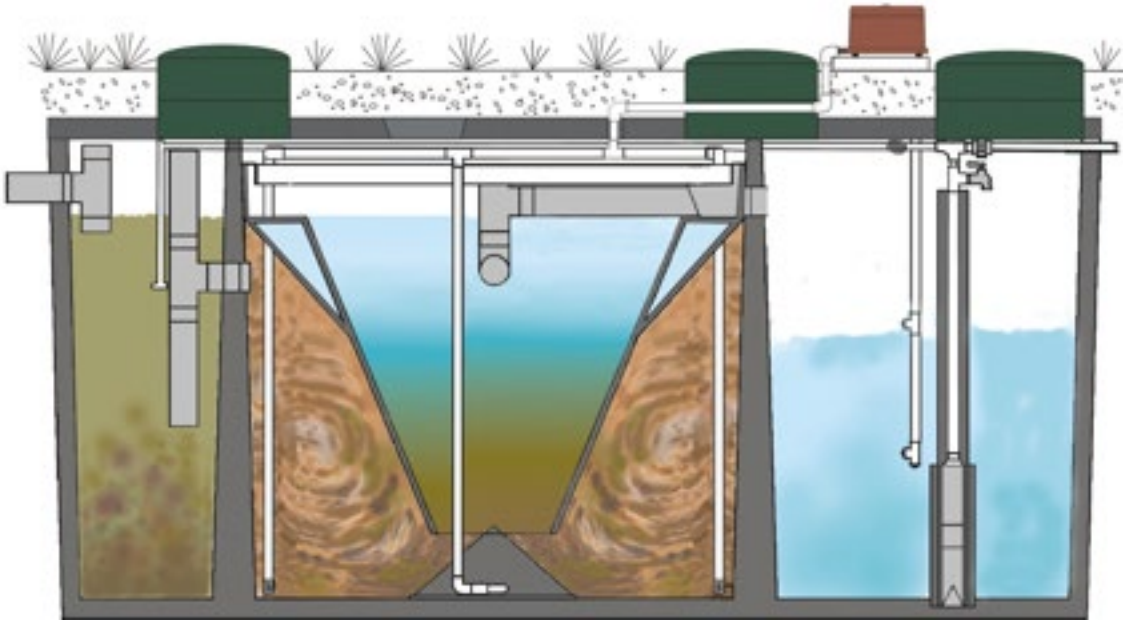




Septic Tanks

- All shapes and sizes!

Equalization Tanks

Pump Tanks / Grinder Tanks

Distribution Boxes

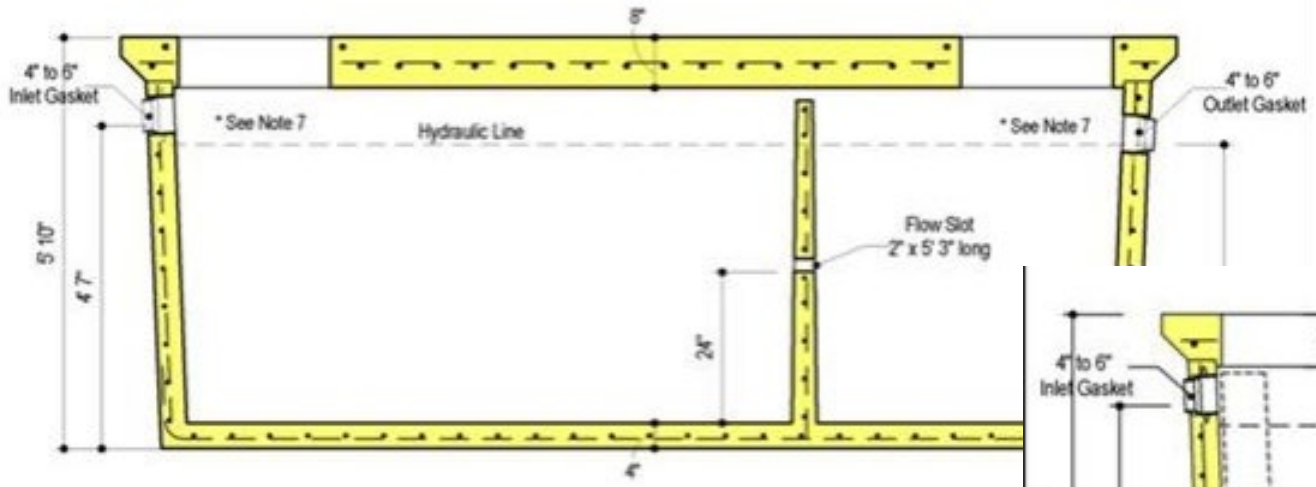
Leaching Chambers

Gravity Grease Interceptors

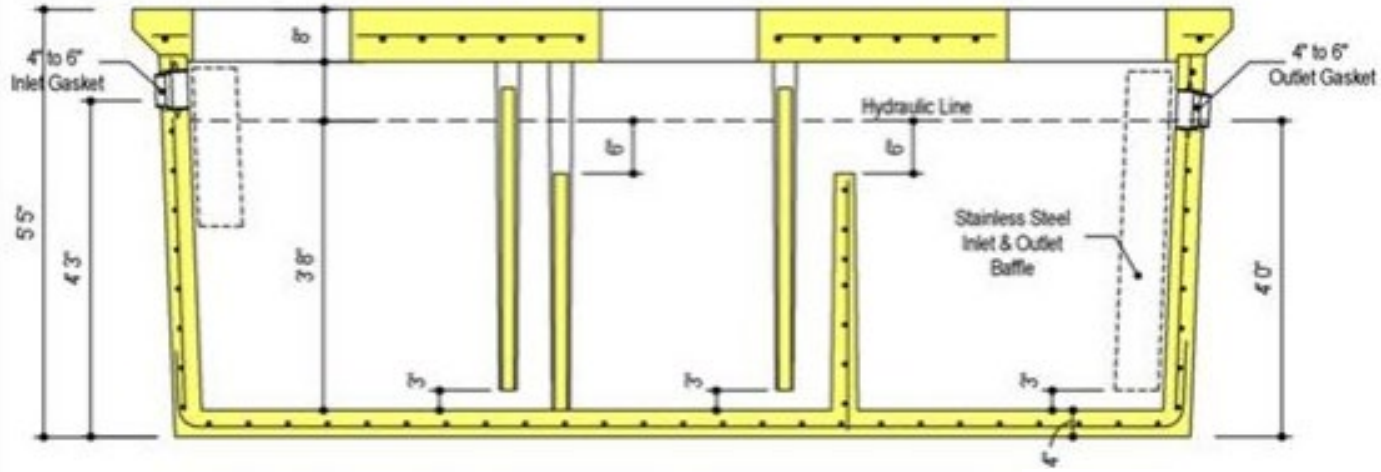
- Many different configurations.

Gravity Grease Interceptors

- Many different configurations.



SECTION VIEW



SECTION VIEW

Large Systems

- Treatment plants

Large Systems

- Above ground systems

Large Systems

- Afton, MN
- 55,000 GPD

Large Systems

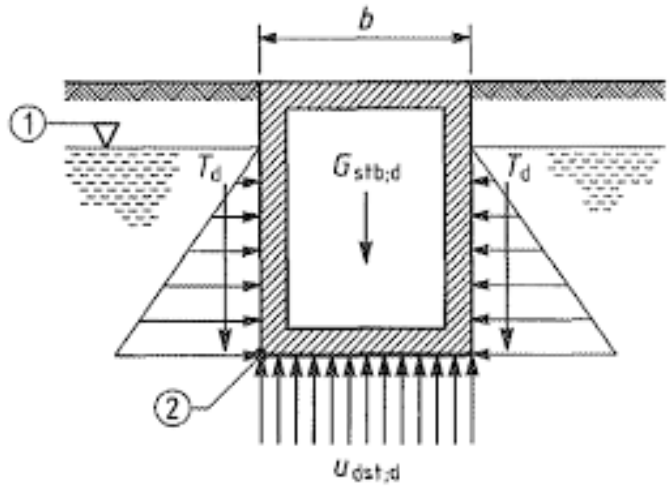
- Afton, MN
- 55,000 GPD

Design and Manufacturing

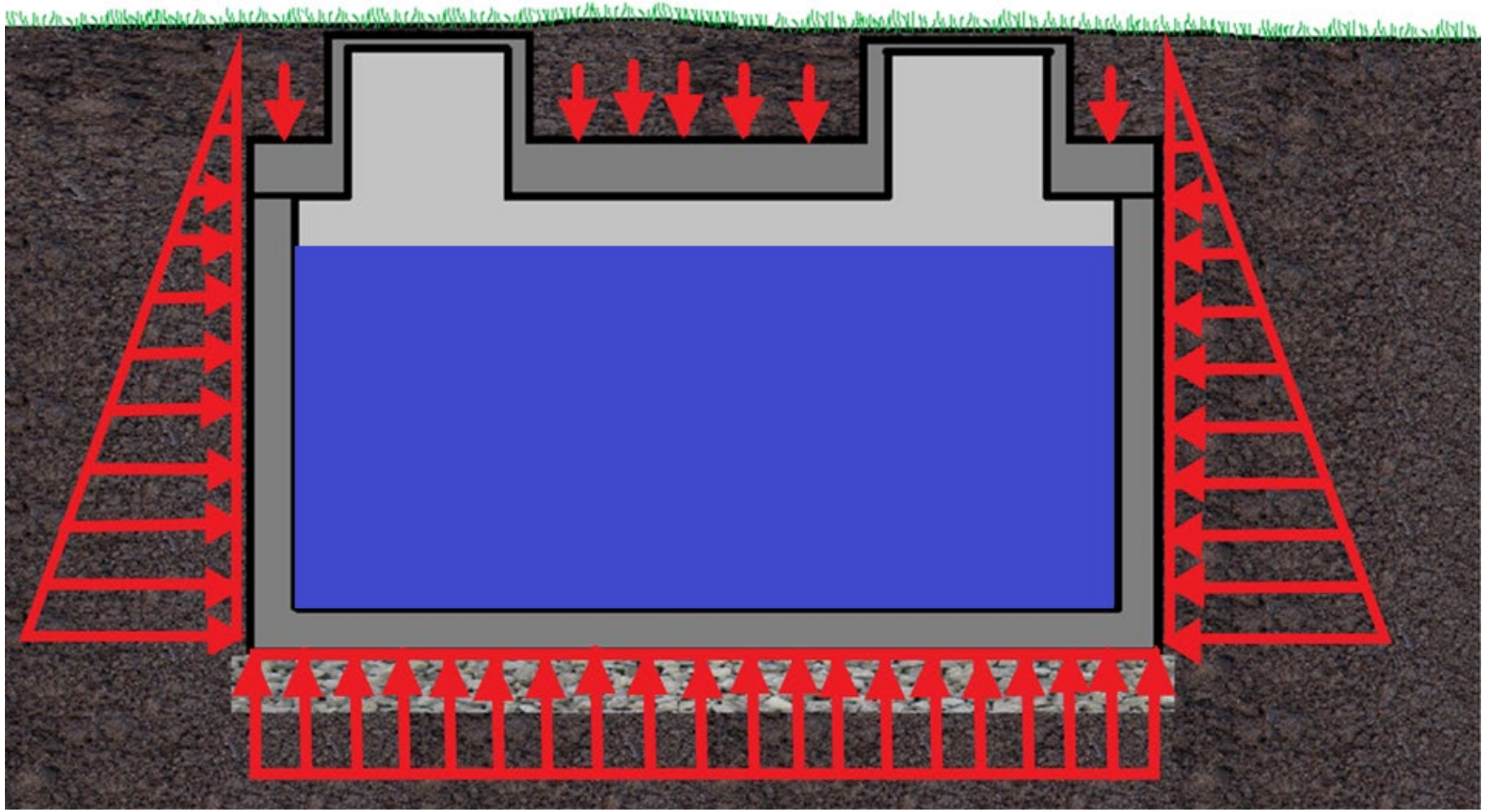
Design

ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures

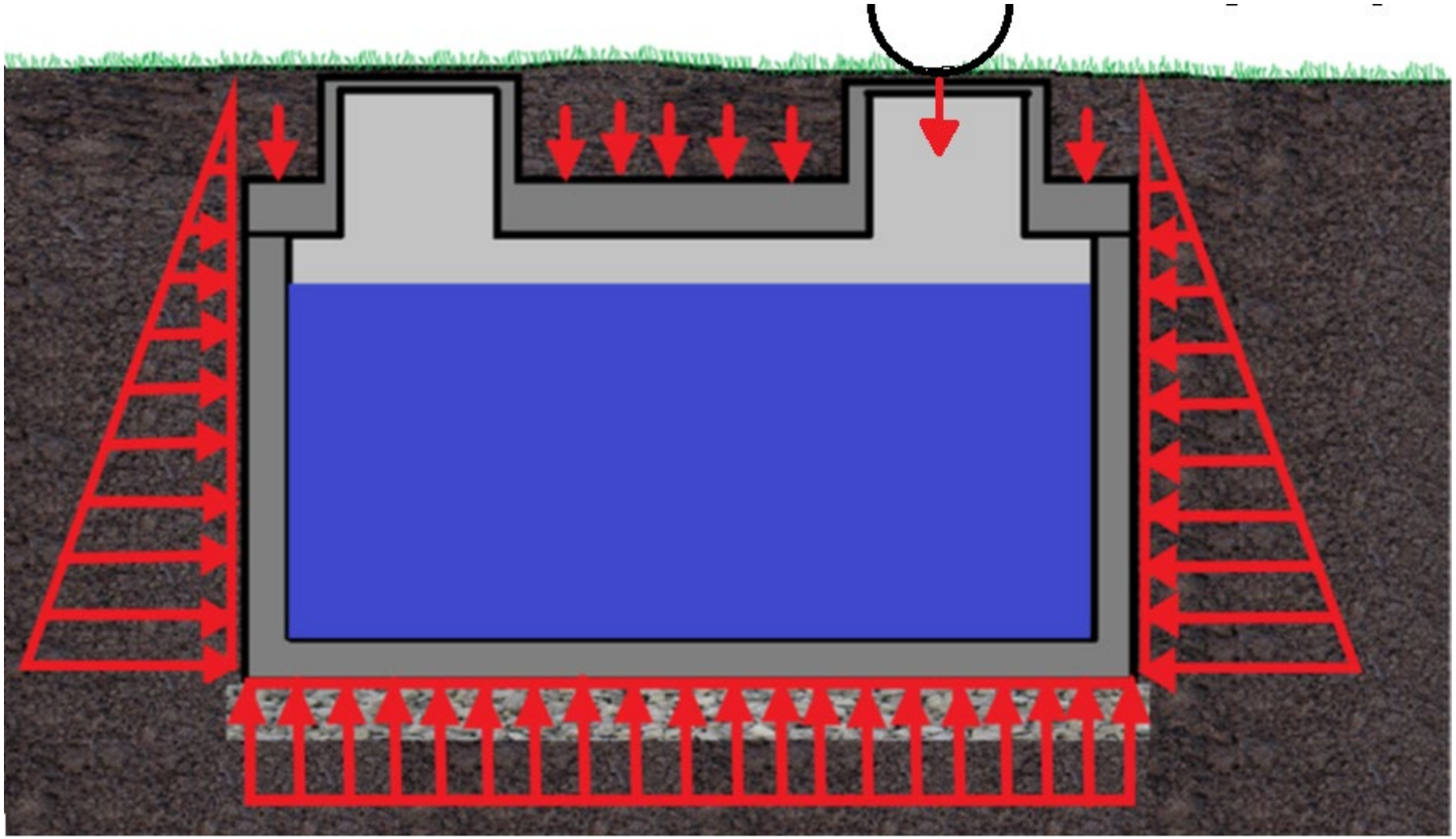
Applicable local regulations



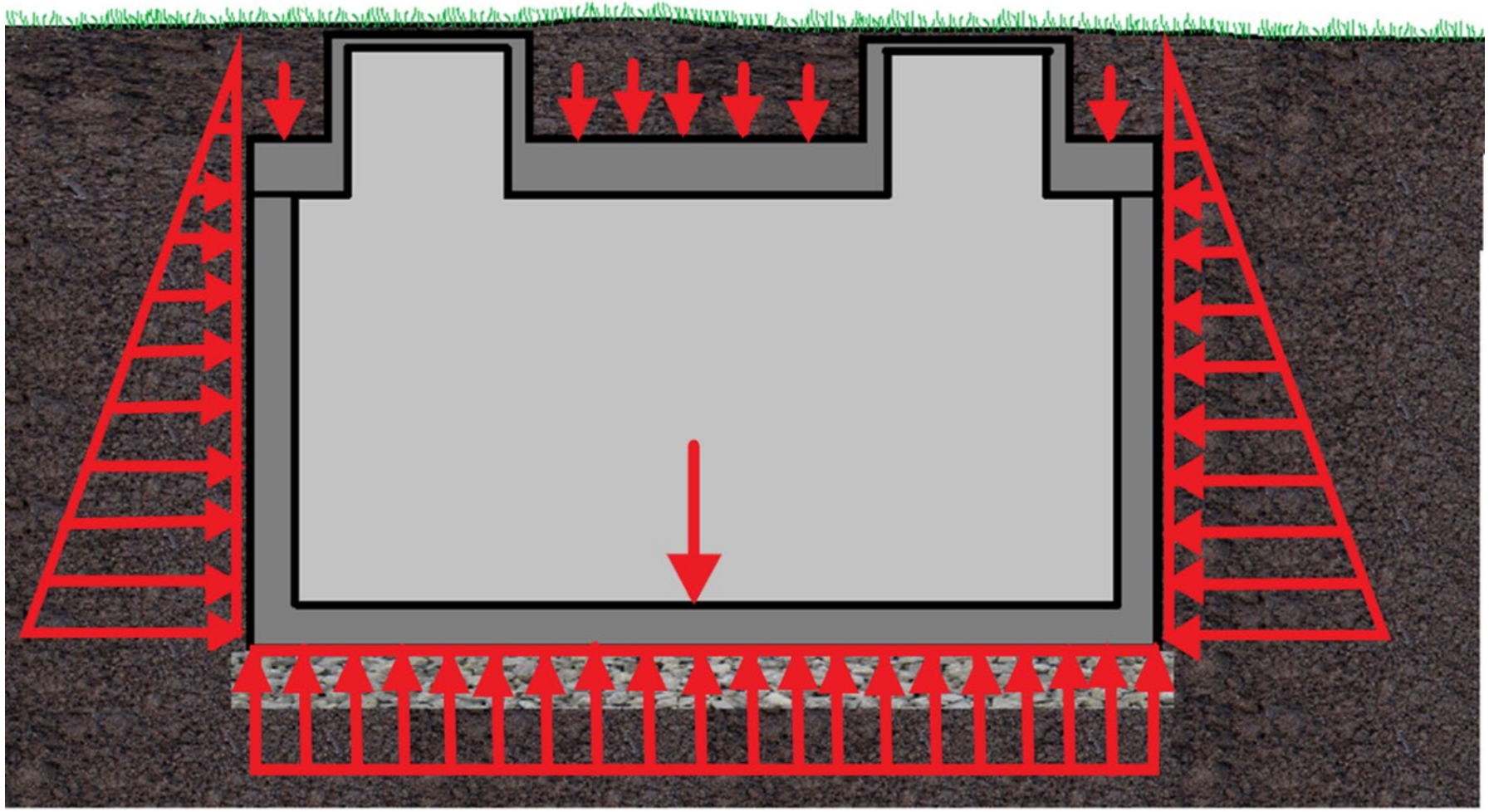
Design



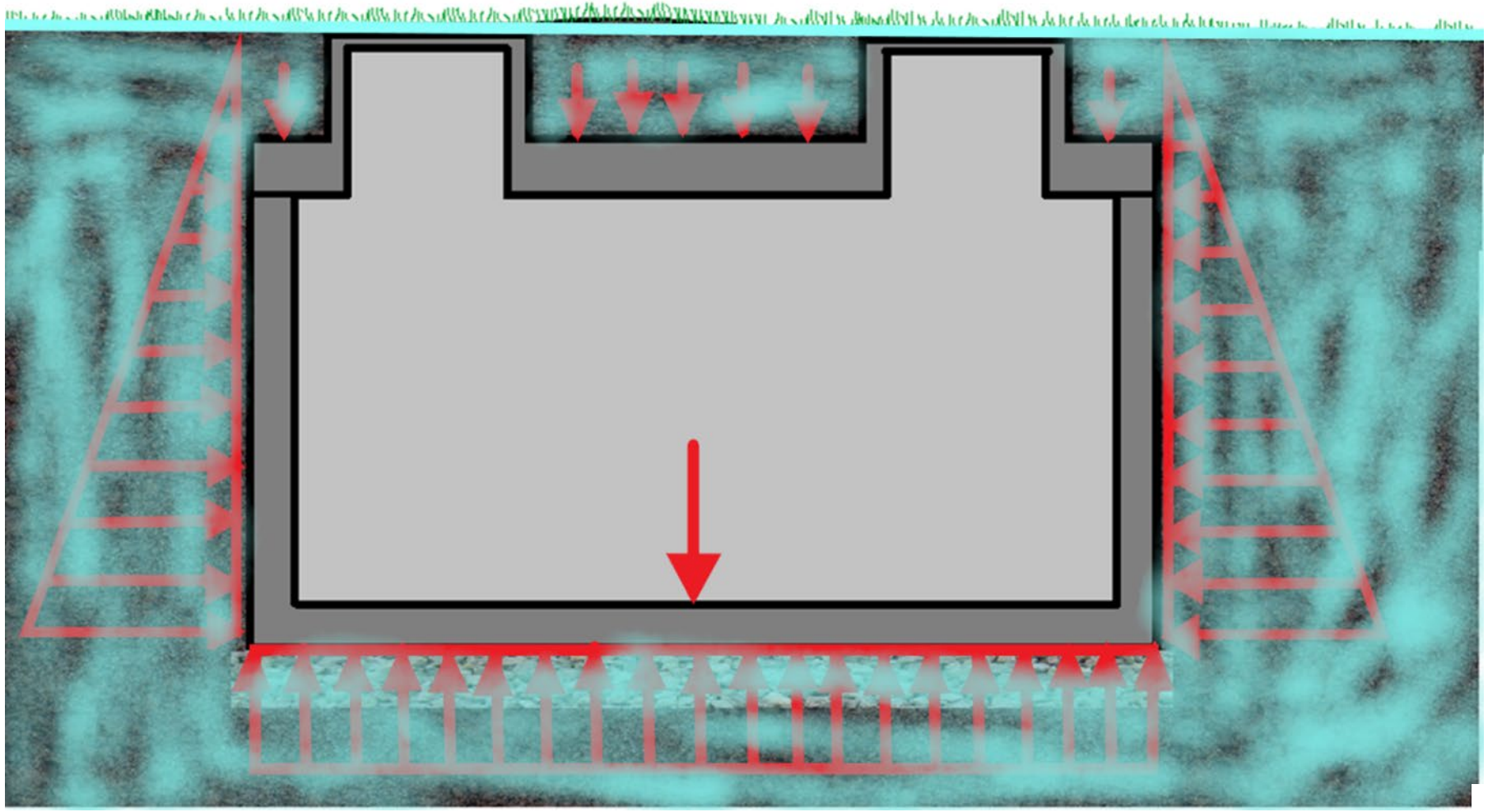
Design



Design



Design



Design

Buoyancy

Available at

https://precast.org/npca-technical-precast-product-resources/

Click on Buoyancy Calculator

Rectangular Tank

*** ALL ORANGE CELLS MUST BE FILLED ***

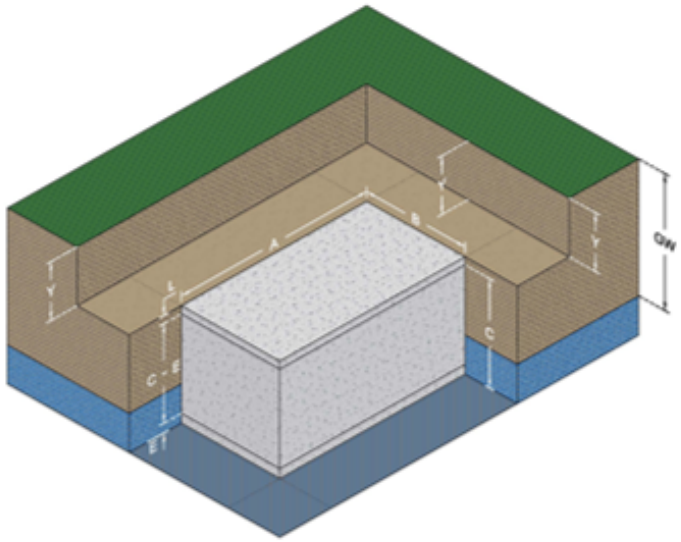
Values for f, Ka, and e can be found in Tables 1, 2, and 3 in the accompanying document.

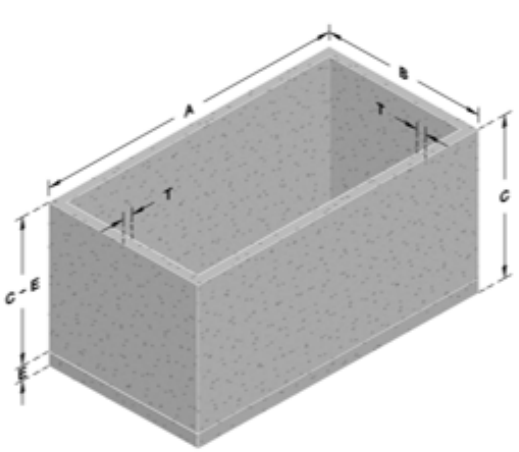
Disclaimer: Use of this calculator does not guarantee the proper function or performance of any product manufactured in accordance with the data herein. It is the user's responsibility to ensure their product is designed and manufactured to resist all forces applied.

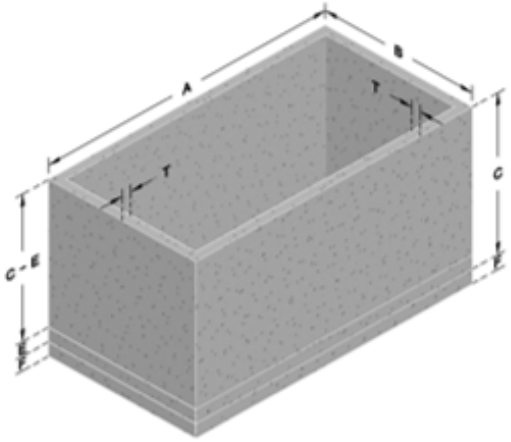
Basic Dimensions		
Lid Thickness (L)	0.50	(foot)
Lid Hole Diameter (H4)	12.00	(inches)
Length of Tank (A)	5.00	(foot)
Width of Tank (B)	3.00	(foot)
Height of Tank Excluding Lid (C) - This value includes the bare thickness but excludes the lid thickness.	3.50	(foot)
Depth of Bury (Y) - This measurement extends from the ground level to the top of the lid.	2.00	(foot)
Wall Thickness (T)	0.50	(foot)
Bare Thickness (E)	0.50	(foot)
Distance to Groundwater (GW)	4.00	(foot)

Customizations To Add Ballast		
Add Concrete Inside the Tank:		
Initial Inside Height of Tank - This measurement is the value of C - E.	3.00	(foot)
Add concrete inside the tank to make thicker bare? If yes, how much? (U) If no, enter a value of 0. Please note: The value entered must be less than the inside height of the tank.	0.00	(foot)
Increase Thickness of the Bare:		
Initial Bare Thickness - This measurement is the value of E.	0.50	(foot)
Add concrete below the bare of the tank to make thicker bare? If yes, how much? (F) If no, enter a value of 0.	0.00	(foot)
Create Lip:		
Extend the bare horizontally to create a lip? - The lip will be the thickness of E plus F, below, and it will extend this horizontal distance, P, from all four tank walls. If yes, how much? (P) If no, enter a value of 0.	0.00	(foot)

Summary of Final Measurements after Ballast Customizations		
Final Bare Thickness - This measurement is the sum of E and F.	0.50	(foot)
Lip Thickness - This measurement is the sum of E and F.	0.50	(foot)
Total Height of the Tank from the Top of the Lid to the Bottom of the Bare - This measurement is the sum of L, C, and F. This is equivalent to the sum of L, C - E, E, and F.	4.00	(foot)
Final Inside Height of Tank - This measurement is the value of C - E - U.	3.00	(foot)







Design

Handling Loads

Stripping

Shipping

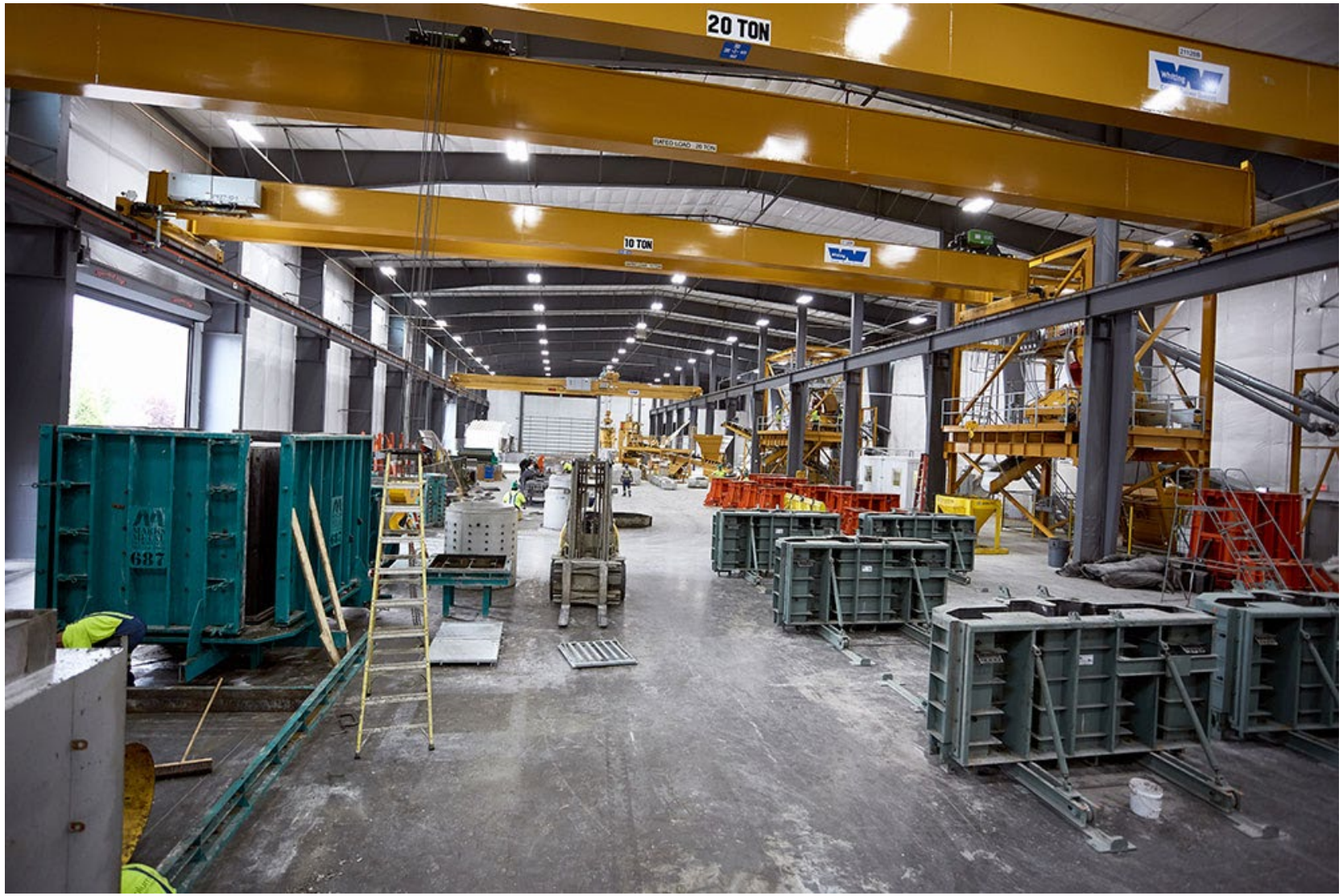
Installation

Manufacturing

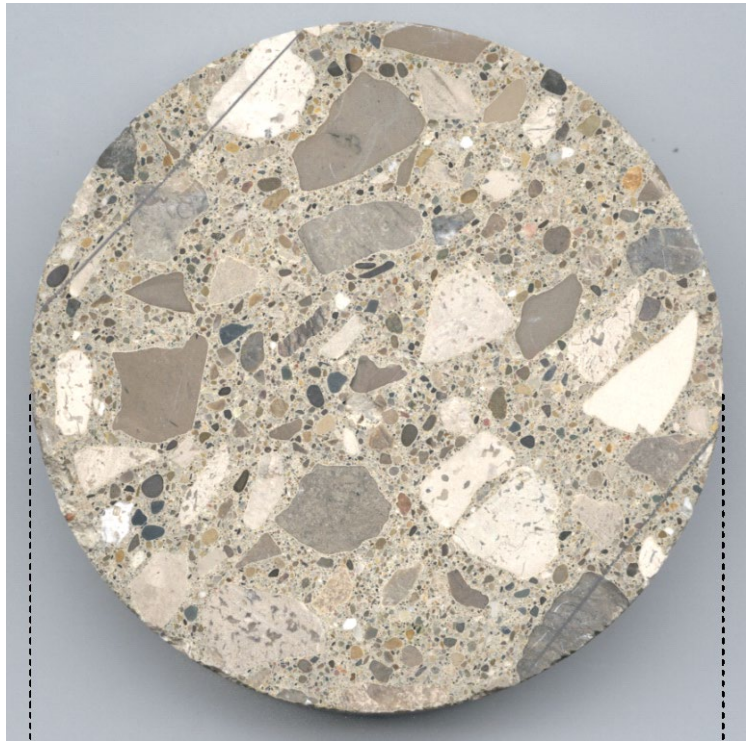
Precast Plant

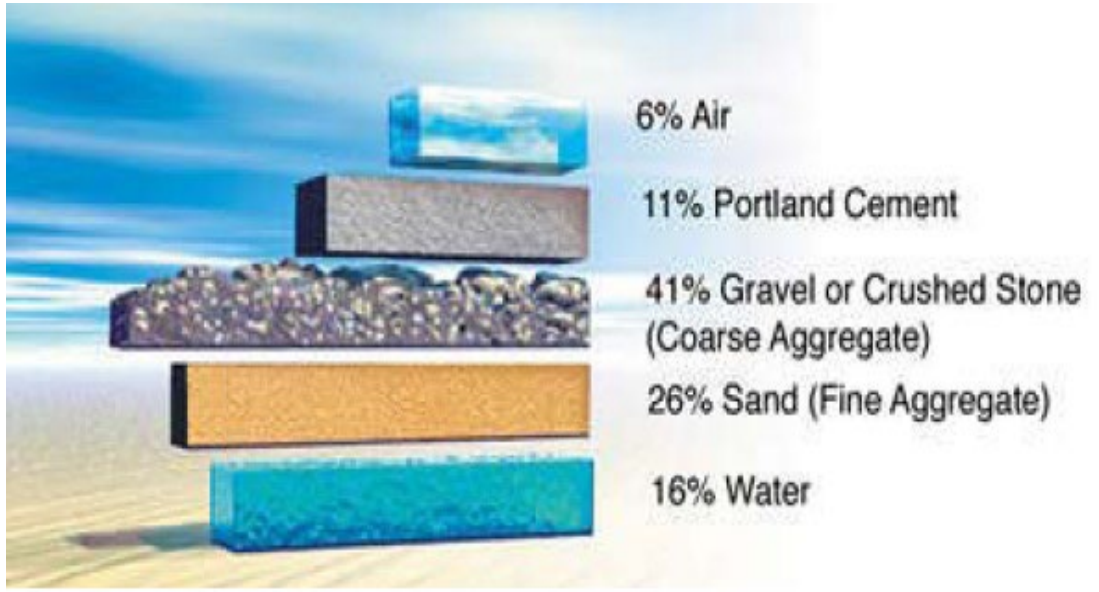
Precast Plant

Precast Plant



Materials





http://www.portcement.org/cb/index.asp

Materials

Cementitious Materials

Materials

Cementitious Materials

Materials

Aggregates

Materials

FINE AGGREGATE (SAND)

COARSE AGGREGATE (CRUSHED STONE)

COARSE AGGREGATE (GRAVEL)

Materials

Aggregate bins

Materials

Admixtures

Types of Concrete

Dry Cast

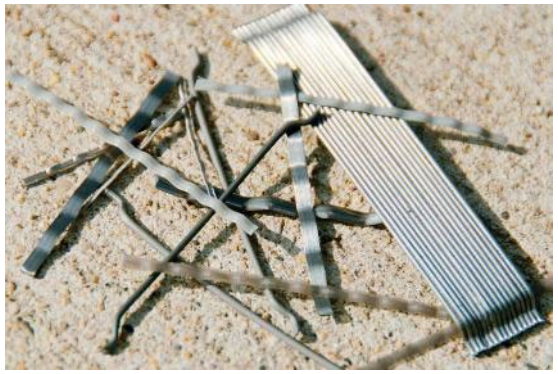
Conventional

Self Consolidating

Reinforcing

Reinforcing

Fibers



Manufacturing

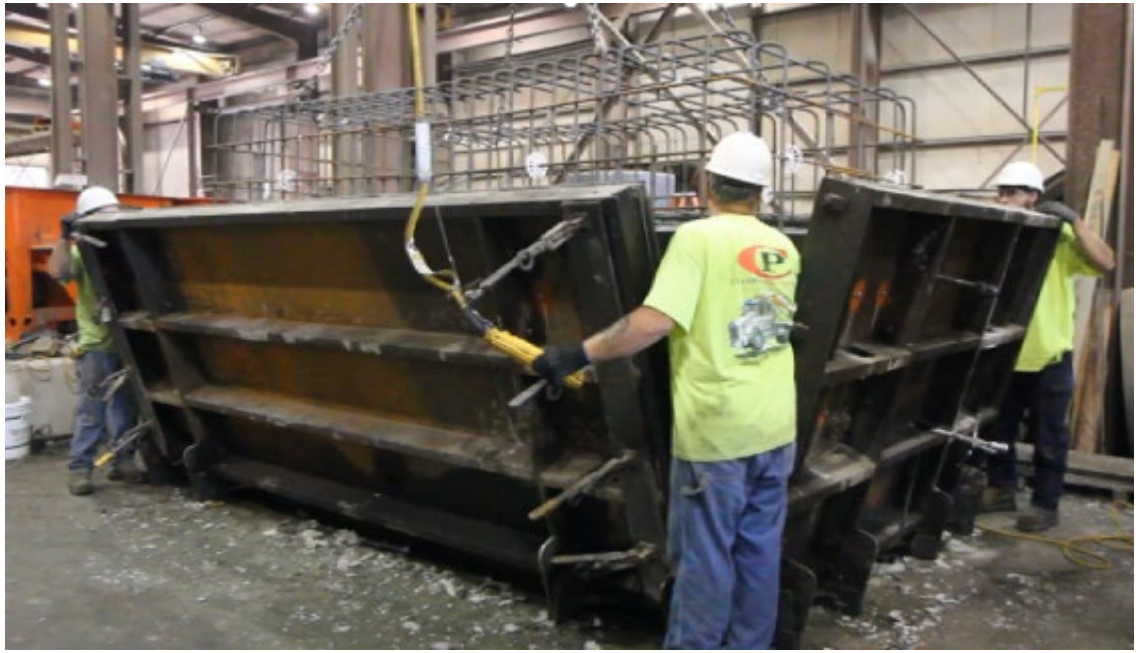
Stripping structures from previous pour

Manufacturing

Preparing forms

Manufacturing

Reinforcement assembly



Manufacturing

Manufacturing

Embedded items

Manufacturing

Embedded items

Manufacturing

Pre pour inspection

Manufacturing

Batch Plant

Manufacturing

Batch Plant

Manufacturing

Measuring aggregates

Manufacturing

Mixer

Manufacturing

Transporting fresh concrete

Manufacturing

Transporting fresh concrete

Manufacturing

Placing fresh concrete

Manufacturing

Placing fresh concrete

Manufacturing

Quality Control

Fresh concrete testing

Manufacturing

Quality Control

Fresh concrete testing

Manufacturing

Finishing

Manufacturing

Curing

Manufacturing

Quality Control

Hardened concrete testing

Manufacturing

- Stripping forms

Manufacturing

Post pour inspection

Manufacturing

Manufacturing

Storage & delivery

Quality Control Program

Precast concrete onsite wastewater structures should be manufactured using a

quality control program

Quality Control Program

- Qualified and educated personnel
- Completeness of work orders and product drawings
- Quality of raw materials
- Quality of forms
- Fabrication and Positioning of Reinforcing Steel
- Concrete Quality
- Placement and consolidation of concrete
- Product dimensions
- Positioning of embedded items
- Curing of concrete
- Handling, storing and transporting products
- Recordkeeping
- Testing

CONTINUOUS IMPROVEMENT

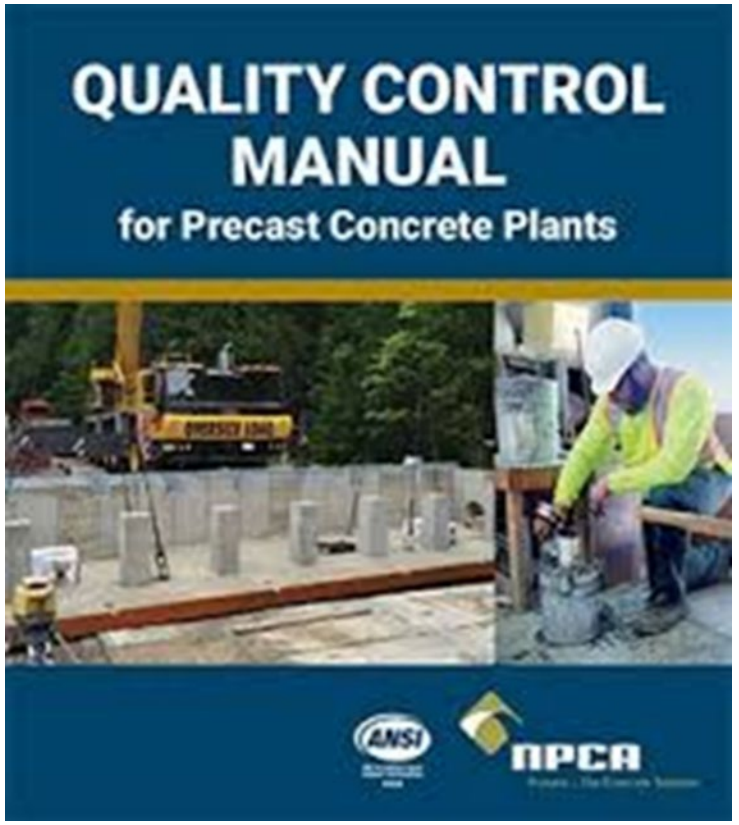
Quality Control Program

Example of something you'd find in a plant QC manual:

Compressive strength (7- or 28-day age) of the concrete shall be tested a minimum of every 150 cubic yards (115 cubic meters) of concrete of each mix or once per week, whichever occurs first. Strength data shall be retained in the files for a minimum of three (3) years.

Reinforcing steel shall be positioned as specified by the design and the concrete cover must conform to product requirements. Unless otherwise required, the tolerance on concrete cover shall be one-third of that specified but not more than ½ inch. Concrete cover shall not be less than ½ inch, however concrete cover greater than ½ inch is recommended.

In hot weather the temperature of concrete at the time of placing shall not exceed 90 degrees F (32 degrees C). In cold weather the temperature of concrete at the time of placing shall not be less than 45 degrees F



Download or print the manual for free from precast.org

Decentralized Wastewater Infrastructure Solutions

- Watertight
- Engineered solutions
- Strong
- Durable
- Fully customizable
- Cost-effective
- Long-lasting
- Eco-friendly

Summary

- Proud to support decentralized onsite wastewater treatment industry
- Many applications for precast concrete
- Design for resiliency
- Manufacturing with pride
- Quality is a culture.
- We will continue to explore technologies to continue improving our products

Questions?

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