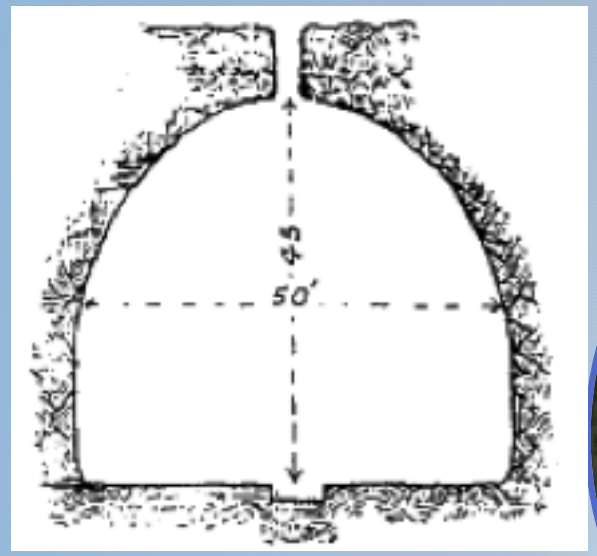
Ladybird Johnson Gardens

Designing a Rainwater Harvesting System

Learning Objectives:

- 1. Present the history, designs, and ideas that are influencing the use of rainwater harvesting systems.
- 2. Provide ideas, which will promote conversation that opens minds and supports expanding the rainwater harvesting industry globally.
- 3. Inspire you to apply the information presented and realize the added value and wide-range of benefits to your community, company, and family.



Rainwater harvesting in ancient times:

Civilizations in the Indus Valley were far more advanced than we may think nowadays. In many of the ancient cities that still remain, we can still find huge vats that were cut into the rock to collect water when there was torrential rainfall. These were used to keep the population and local vegetation going in hotter, dryer times and were fed by numerous stone gullies that weaved their way through the city. Some of these rock vats are still used today in parts of India.

The Romans and rainwater harvesting:

* During the time of the Roman Empire, rainwater collection became something of an art and science, with many new cities incorporating state of the art technology for the time. The Romans were masters at these new developments and great progress was made right up until the 6th Century AD and the rule of Emperor Caesar.

* One of the most impressive rainwater harvesting constructions can be found in Istanbul in the Sunken Palace which was used to collect rainwater from the streets above. It's so large that you can sail around it in a boat.

*Historical Snapshot

Rainwater harvesting systems are the only source of water for thousands of people globally, and the industry growth and development of this utility has grown exponentially beyond the home. This course will provide inspirational tools that promote conversations and open mindedness for more comprehensive rainwater harvesting collection systems; residential, commercial, industrial systems are being designed and implemented across the world in many different countries today

Palmas, Brazil 2013

Rome, Italy 2014

Texas, USA 2015

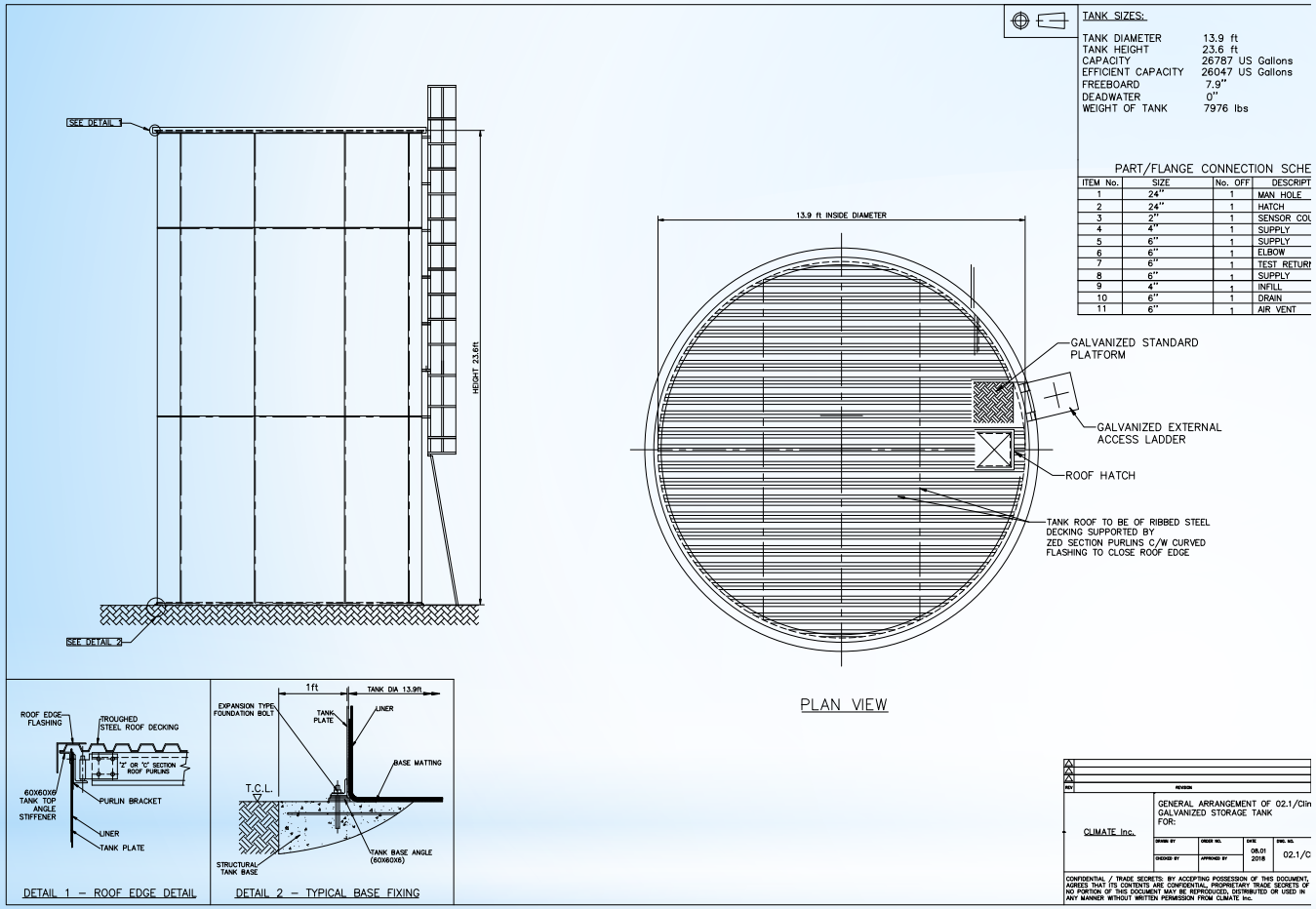
* Go into any gardening store in the US and you will no doubt be able to see various plastic butts that are designed to collect rainwater so that we can water our gardens and keep the plants in good health during any dry period. There's no doubt that climate change has got us thinking about water conservation again, especially with the supply companies beginning to put their prices up. The general consensus is that letting all that rainwater go to waste is no longer acceptable. It can be collected and that can help reduce water bills. In other words, is not only a good idea ecologically, it makes sense financially.

* Recycled water can be used for a variety of daily tasks from washing clothes, flushing toilets and even cleaning the car. With the possibility that we could face more prolonged drier periods in the near future, the onus is on us all to conserve what we consume and make the most of what comes to us free of charge from the sky.

* Modern Rainwater Harvesting

* We will examine the critical role that data, design, materials and supporting technology play in meeting the evolving needs of our environment. This course includes photos, schematics, and designs that will address the role you can play in creating great systems, and the importance of considering environmental impacts at the same time as developing each project. This course will also show you completed projects that illustrate powerful results when rainwater harvesting systems are considered at the early phases of development. By the end of this course, participants will leave inspired by the role they can play in communicating the real importance of conserving our natural resource of water.

* Critical Role



*Rainwater Harvesting Model

Sources of contamination

- Wet deposition
- Dry deposition
- Reaction with system materials
- Bird/animal faeces

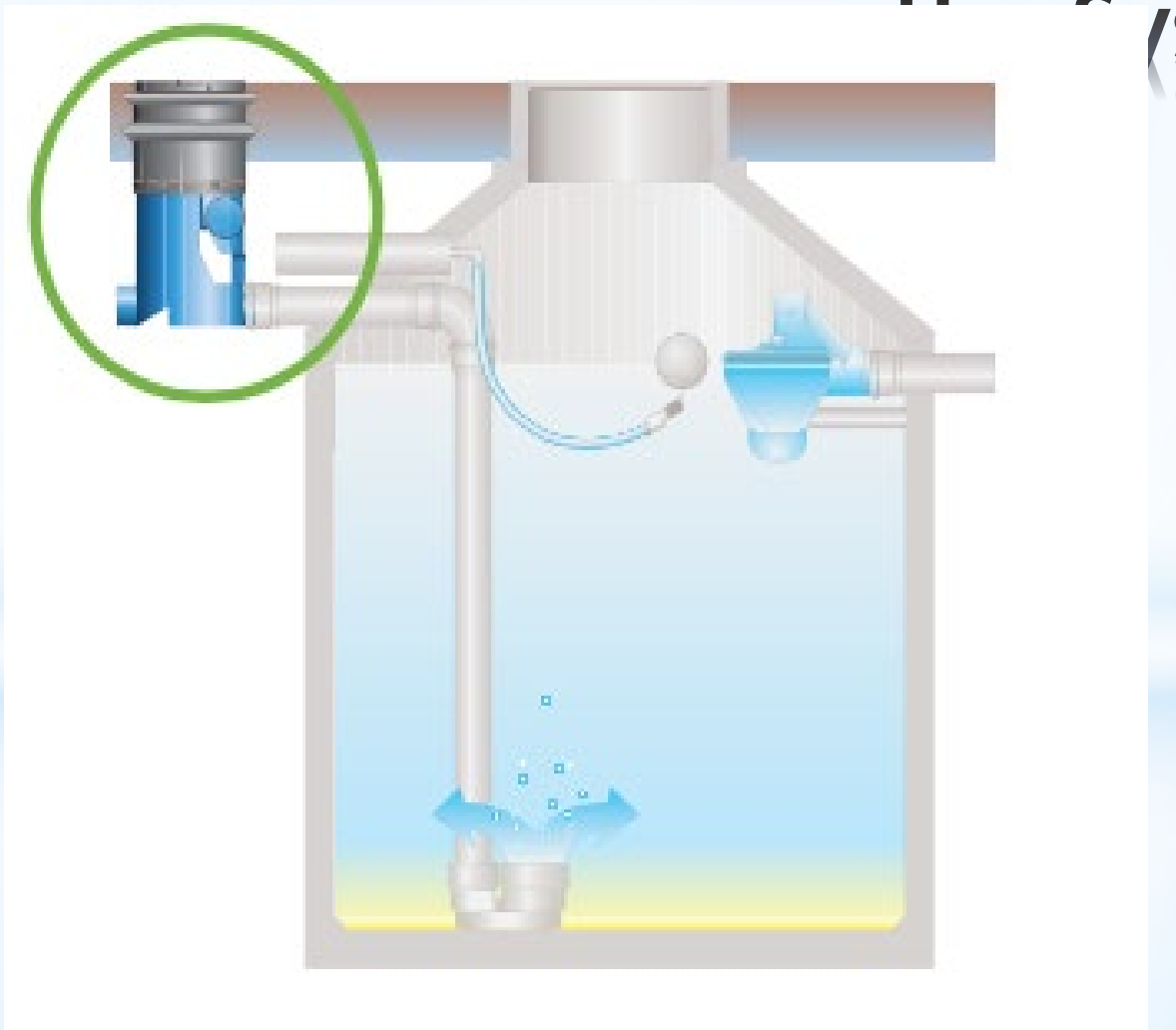
Rainwater Quality

Chemical and physical contaminants

- Wet & dry deposition
- Roofing materials (Metallic ions, turbidity, pH)
- Length of dry periods
- Location
- Component selection

Rainwater Quality

* 1st Step in Rainwater Harvesting/Filter (No Debris Enters stem)



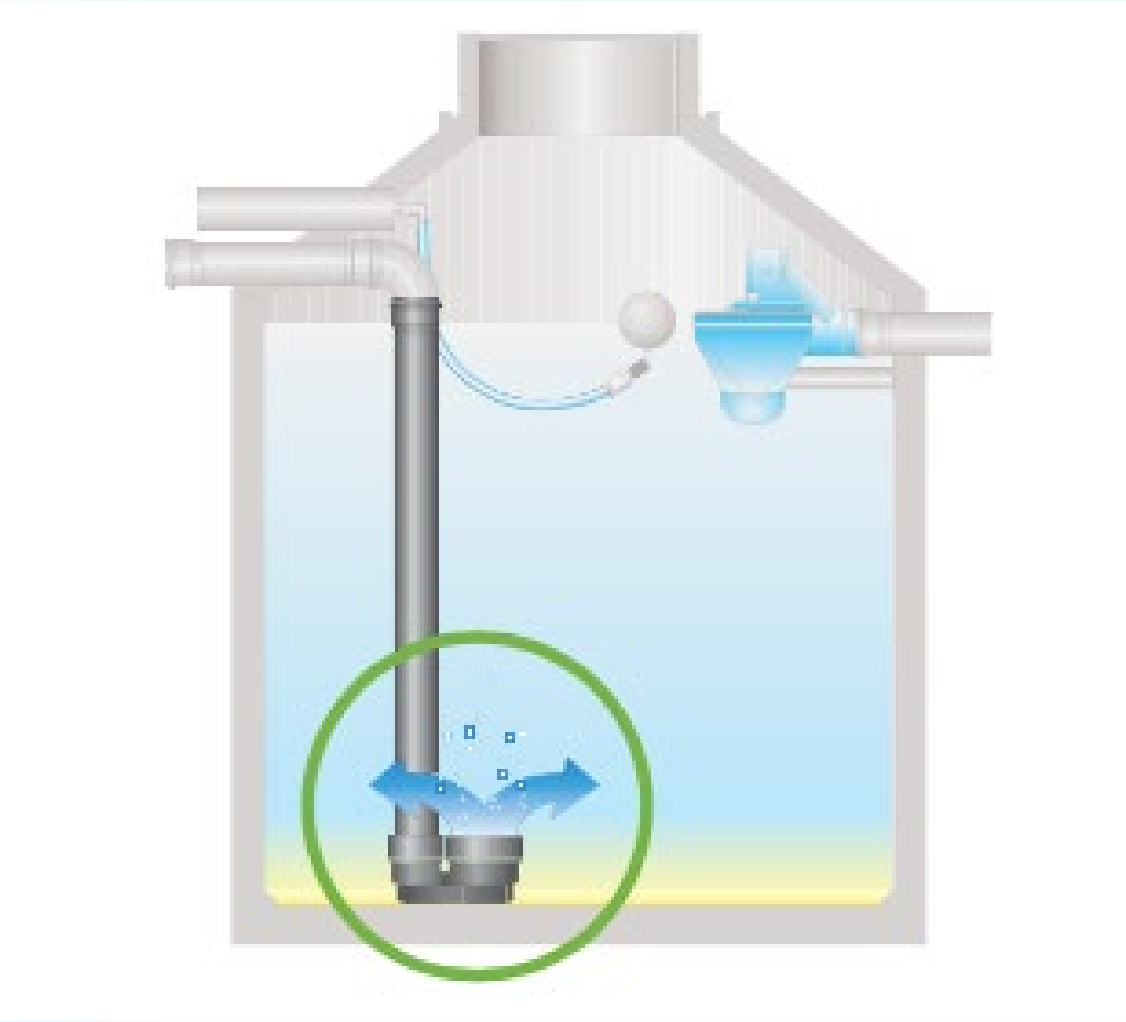
*Pre-filtration:

Two step cleaning system, therefore high level of filtering efficiency, independent of flow rate. Due to the steep inclination of the filter cartridge the dirt is continuously cleaned away into the sewer. Frost resistant.

Self cleaning, low maintenance intervals, filter insert is easily removed for cleaning and does not have to be changed. Low maintenance, due to the self cleaning design.

Food grade quality polyethylene construction. Cleaned water can be used in washing machines, toilet flushing and garden watering, in homes, in commerce, in public buildings and in industry.

2nd Step in Rainwater Harvesting/Calming Inlet (No Anaerobic Material Disturbance)



*Calmed Inlet(s):

Carrying out the second cleaning step in the rainwater tank, the calmed inlet is designed to prevent water from becoming stained and odorous, while at the same time ensuring fresh water is supplied to the lower area of the tank.

This ensures the best possible water quality by forcing complete and regular replenishment of stored water, and preventing sediment at the base of the tank from becoming disturbed, protecting pumps and appliances.

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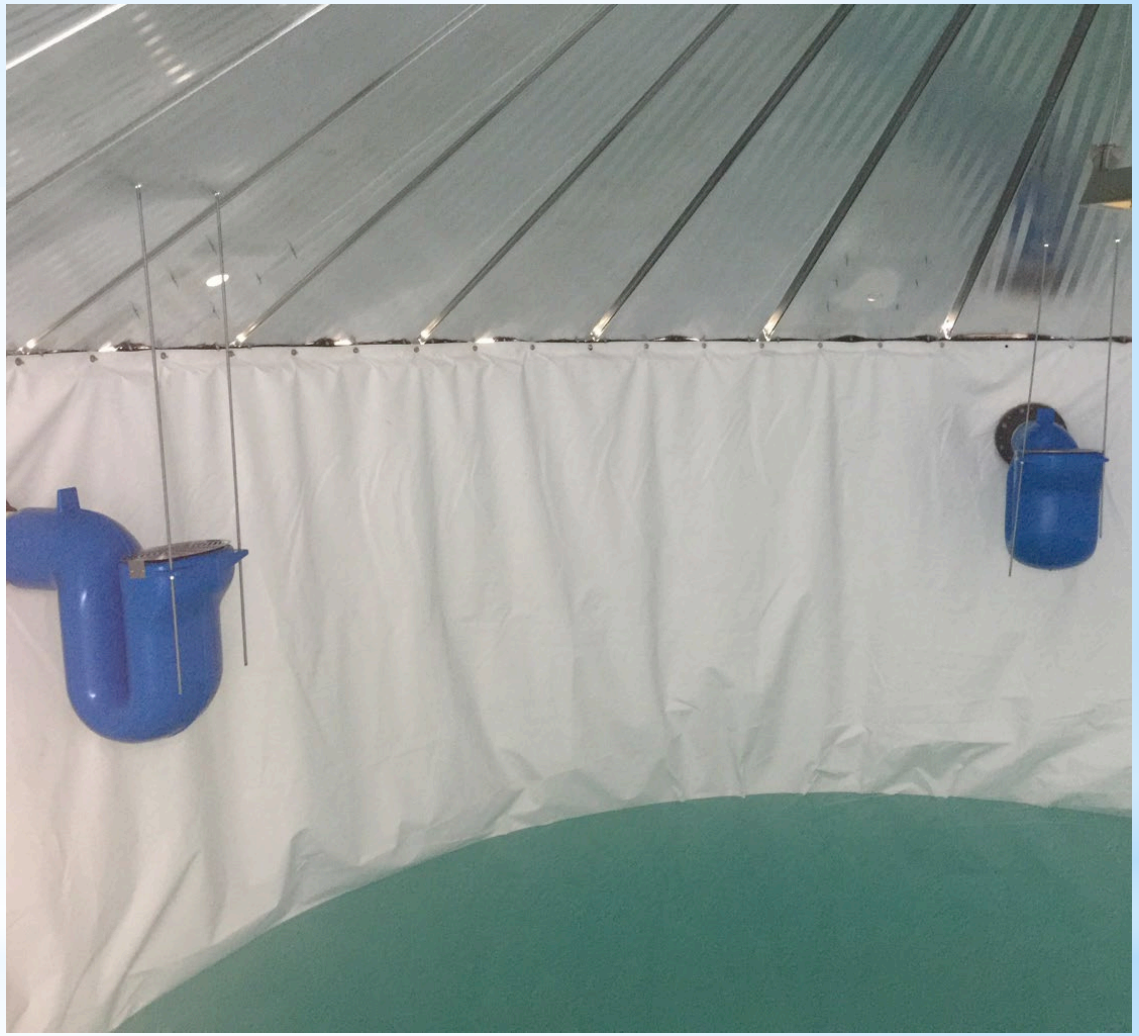
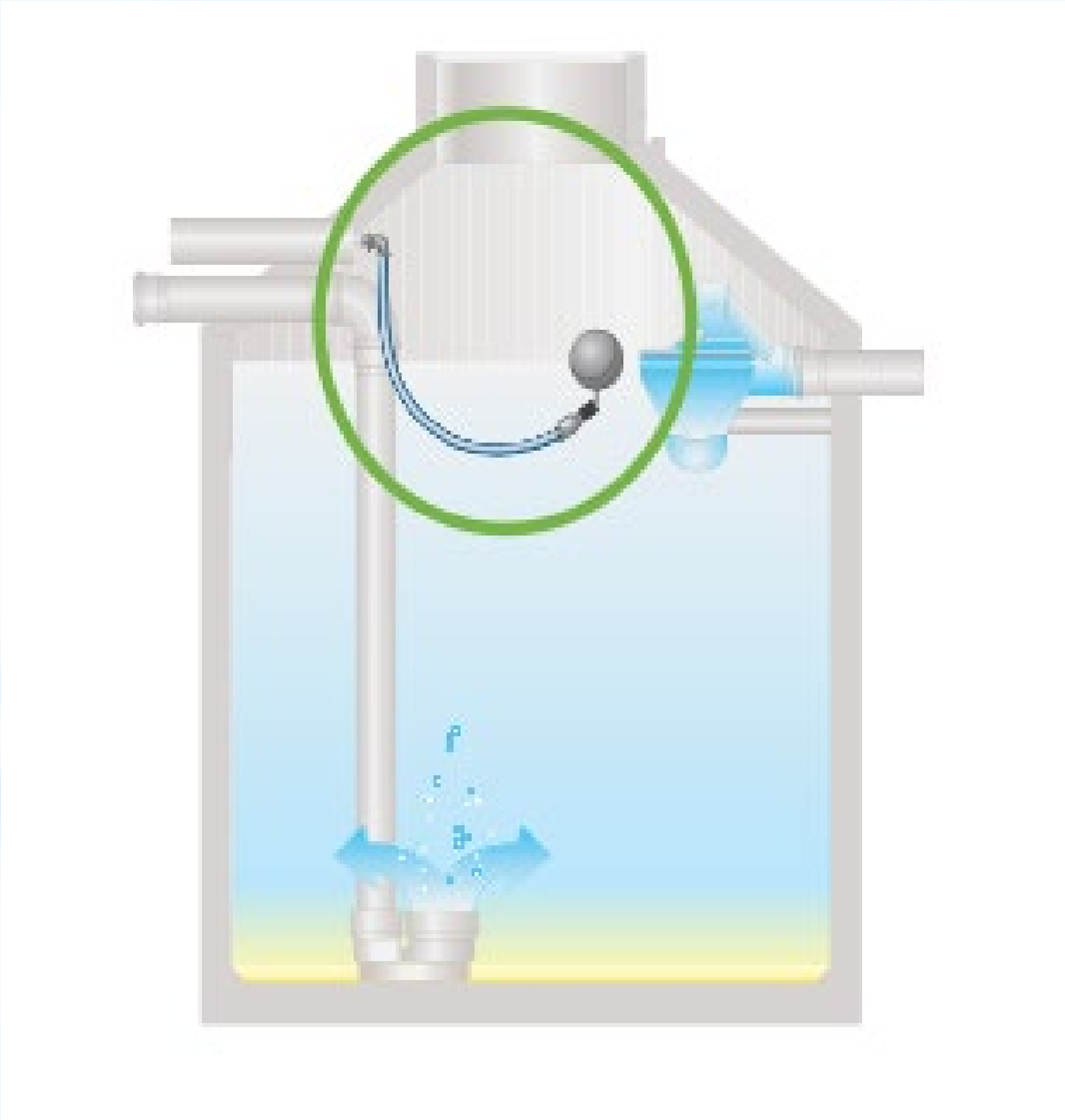
* 3rd Step in Rainwater Harvesting/Siphon Overflow (Siphons Top Particles/Overflow/Blocks Entry-Bugs)

*Protected Overflow Design:

Overflow Siphon: Since particulate contaminants such as pollen tend to float to the water's surface, removing the floating layer of surface pollutants through regular overflow from the tank is conducive to maintaining high-quality water and a clean tank environment. This overflow siphon creates a skimmer effect at the max tank level to remove surface particulate, ejecting it with the tank overflow.



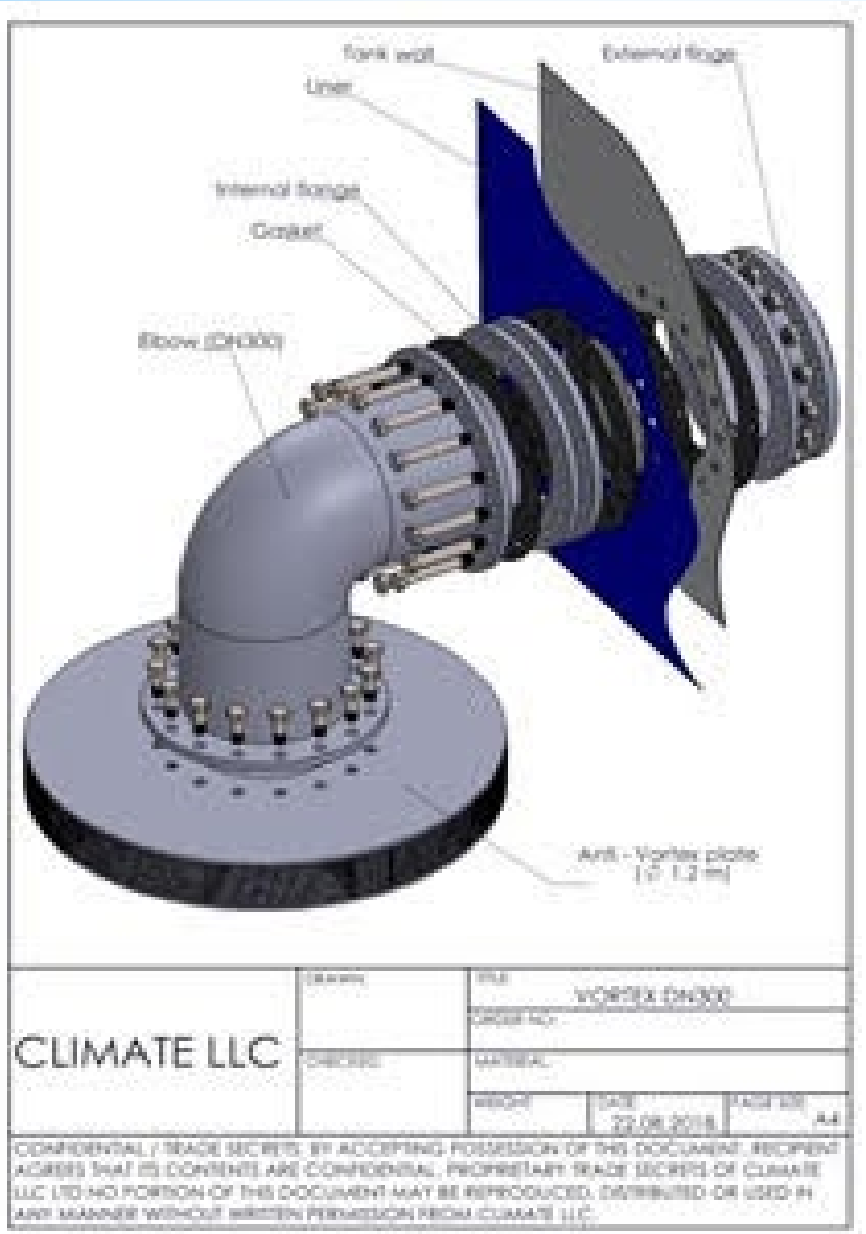
4th Step in Rainwater Harvesting/Floating Intake (Extracts the Very Best Water Quality)



*Floating Extractor and Hose

In Climate designed systems, the floating filter acts more as an uptake point for the pump than a filter. Because all water is filtered before entering the tank, the floating filter should never clog, but will instead take water from just below the surface. Water at this depth is the highest quality water in the tank because any particulate that enters the tank either floats on the surface or settles to the bottom. This filter should never require maintenance. However, it is standard practice to install the filter so that it can be accessed through the man-way without anyone entering the tank. Multiple filters can be used together when required flow rates are high.

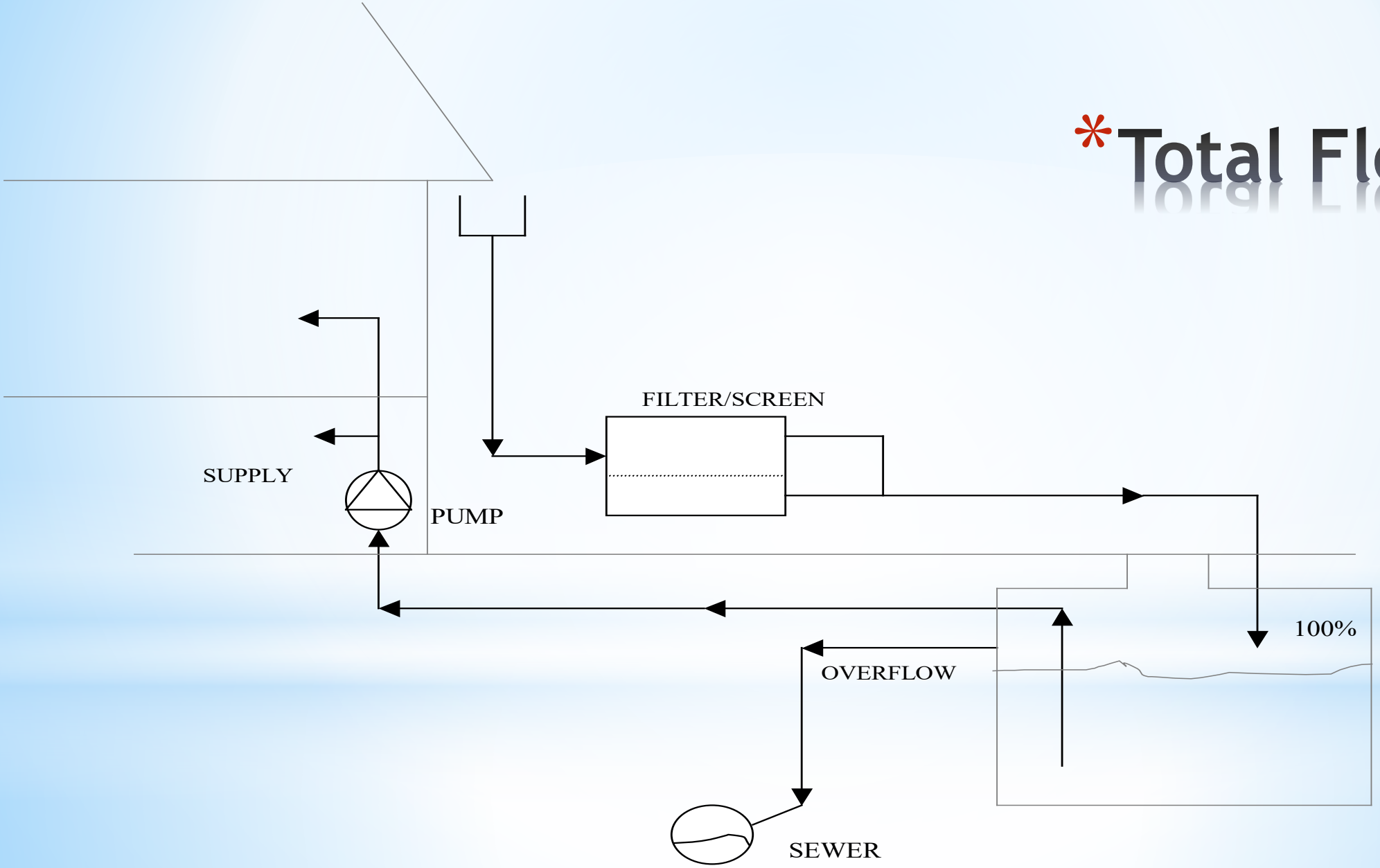
*Vortex Inhibitors



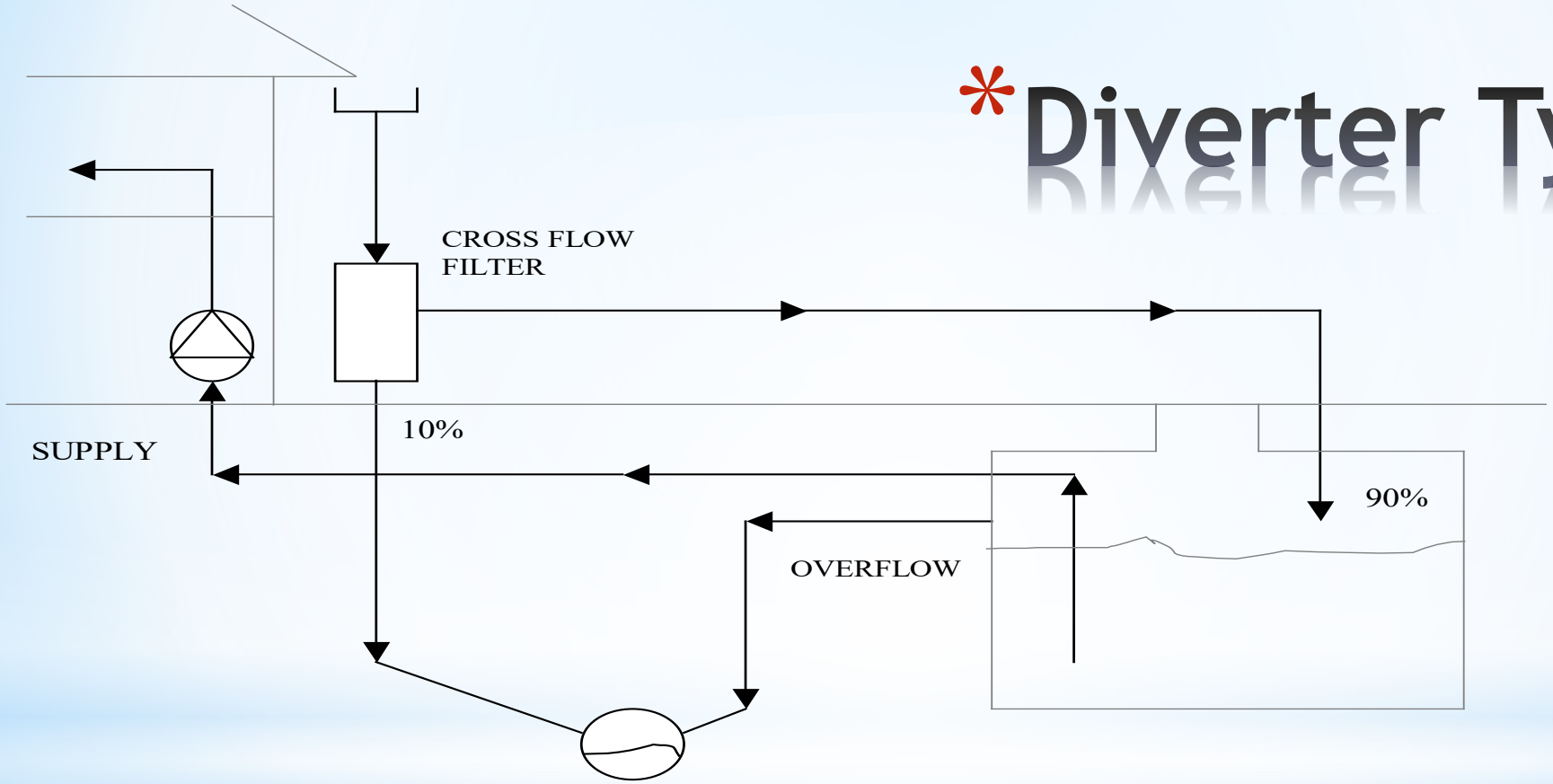
System categories (non-potable applications)(cont.)

- Categorised by hydraulic properties
  - Total flow
  - Diverter
  - Retention & Throttle
  - Infiltration

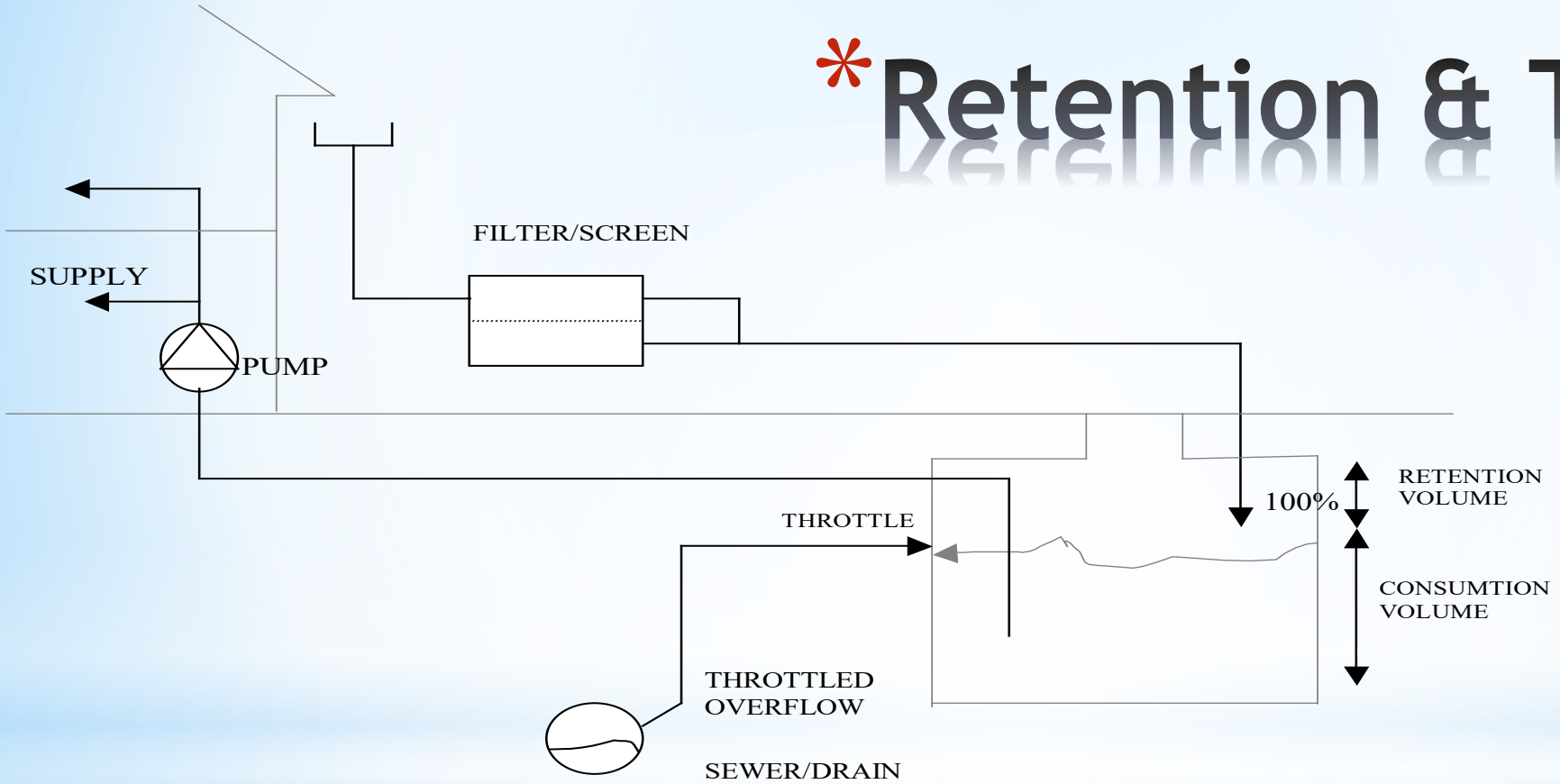
*Total Flow



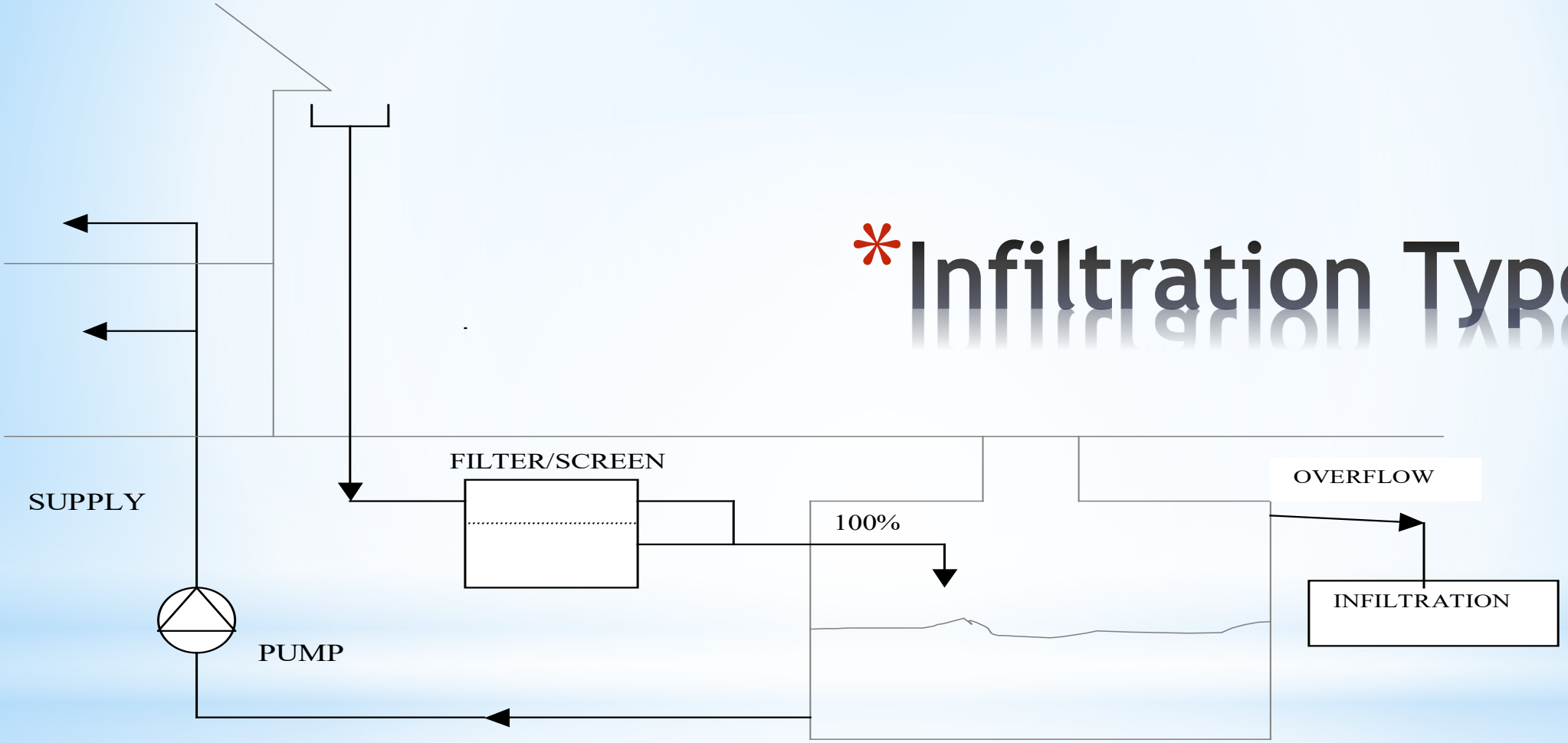
*Diverter Type



*Retention & Throttle



*Infiltration Type



*Stainless Steel

Canada

Louisiana

Washington

Russia

Texas

*Glass Fused to Steel (GFS)

Tennessee

Georgia

*Epoxy Coated Tanks

North Carolina

*Weather/Powder Coating Tanks and Panels

*Galvanized Steel Tanks

Virginia

Florida

Bermuda

Dominica

*Potable Liners: Rainwater Harvesting

*Cladding

California

Norway

*Wooden Systems

Oklahoma

Maryland

Sweden

British Virgin Islands

*Concrete Systems

Stone Cistern

*Fiberglass Underground

Oregon

Germany

France

*Fiberglass Vertical Systems

Hawaii

Guam

Marshall Islands

Guatemala

New York

*Bladder Collection System