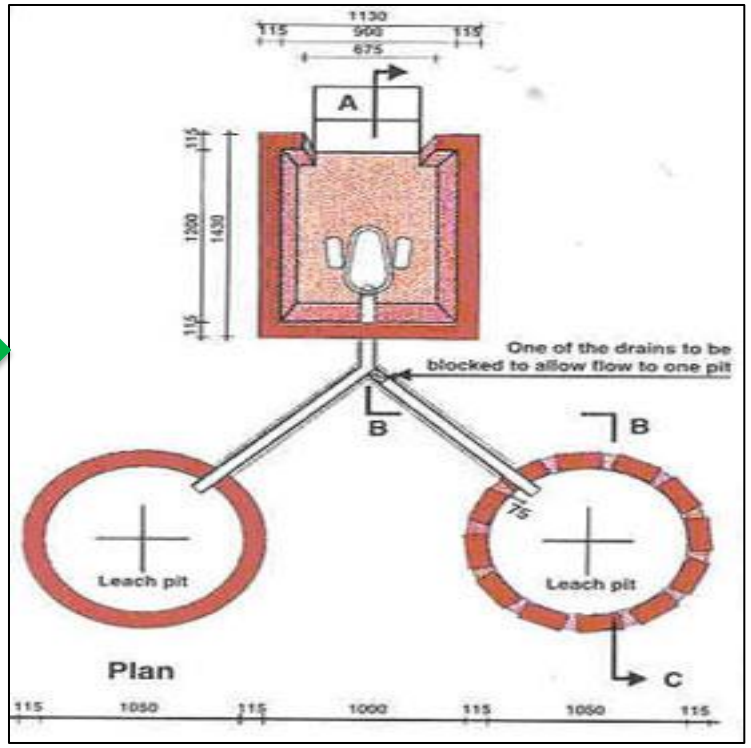
Swachh Warangal

Training Programme for Toilet Builders

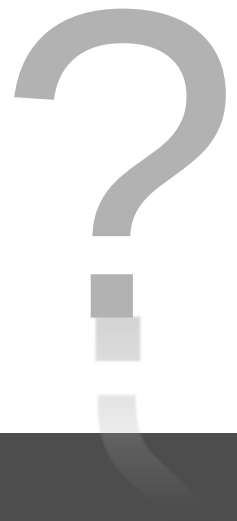
2016

In cooperation with:

Twin pit model



This system consists of two alternating pits connected to a Pour Flush Toilet.



How to design a twin pit?

Pit	5 users		10 users		15 users	
	Diameter	Depth	Diameter	Depth	Diameter	Depth
	1	1.3	1.4	1.4	1.6	1.5

Note:
Depth from bottom of pit to invert level of incoming pipe or drain Sludge.(in meter)
Storage Volume is 3 years.
300 mm of free board should be provided between invert level of pipe to pit cover.

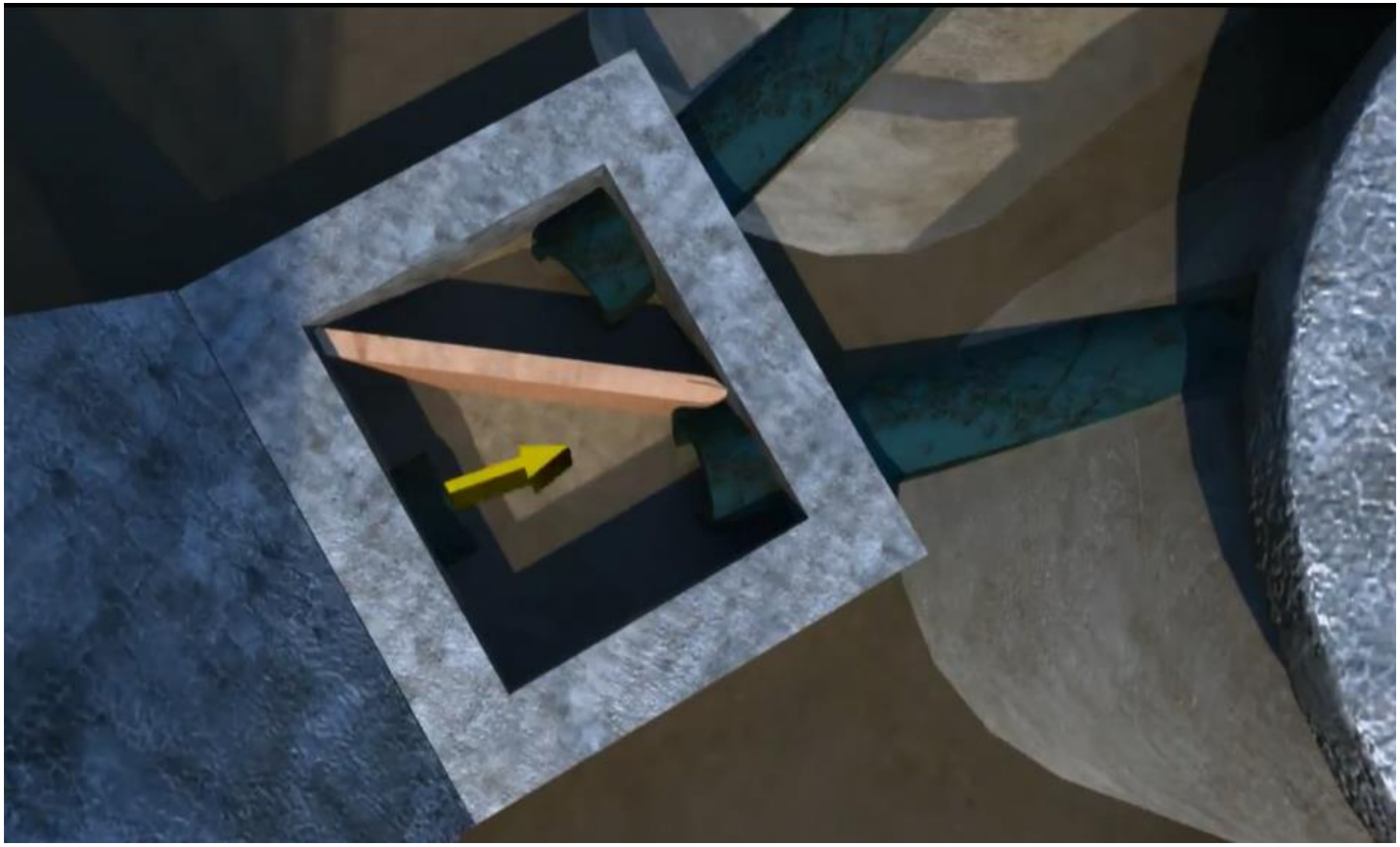
Components of Twin Pit model design

Pan

Inspection Chamber

Twin Pit

Design of Inspection Chamber

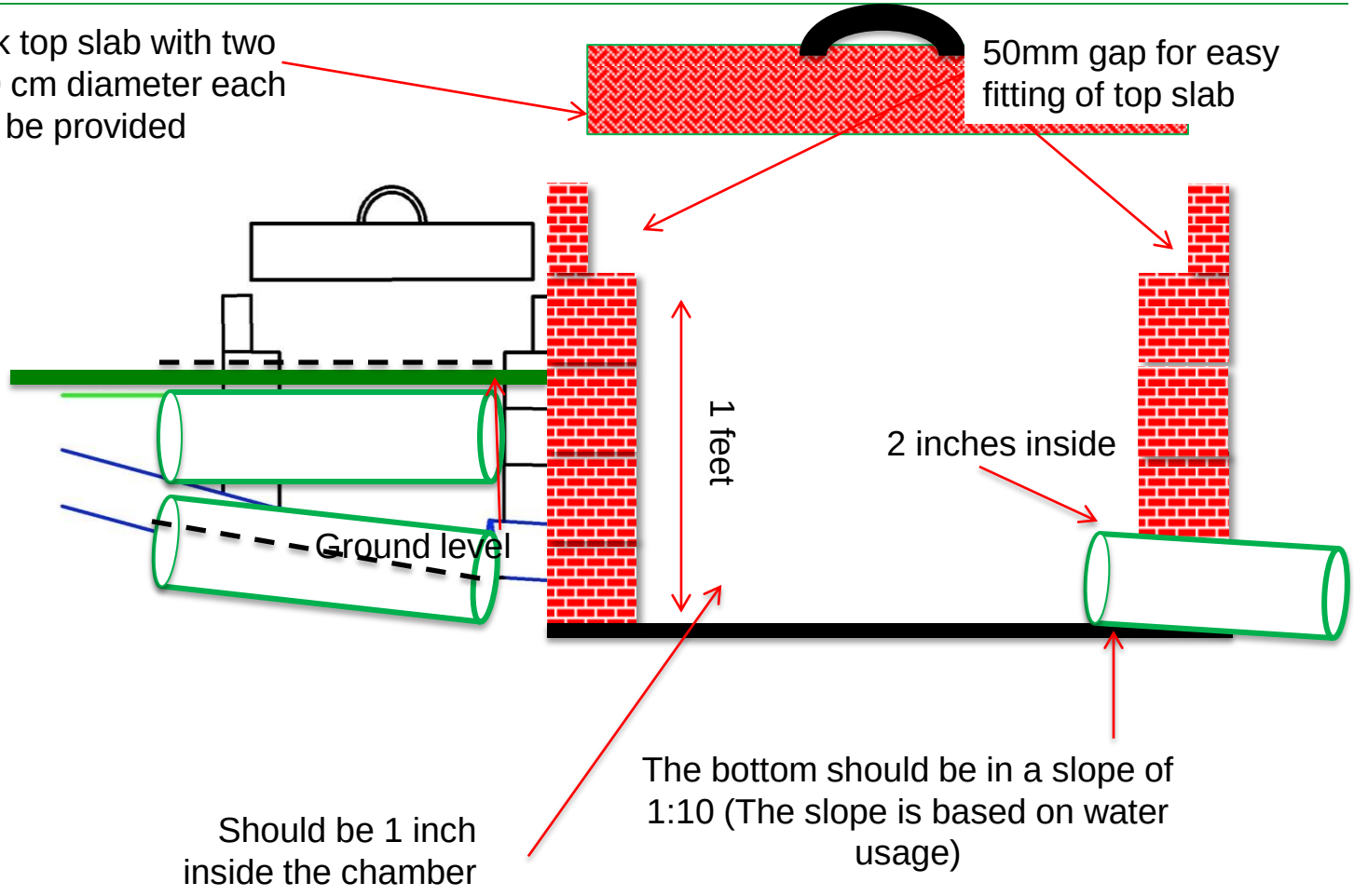


Inspection Chamber

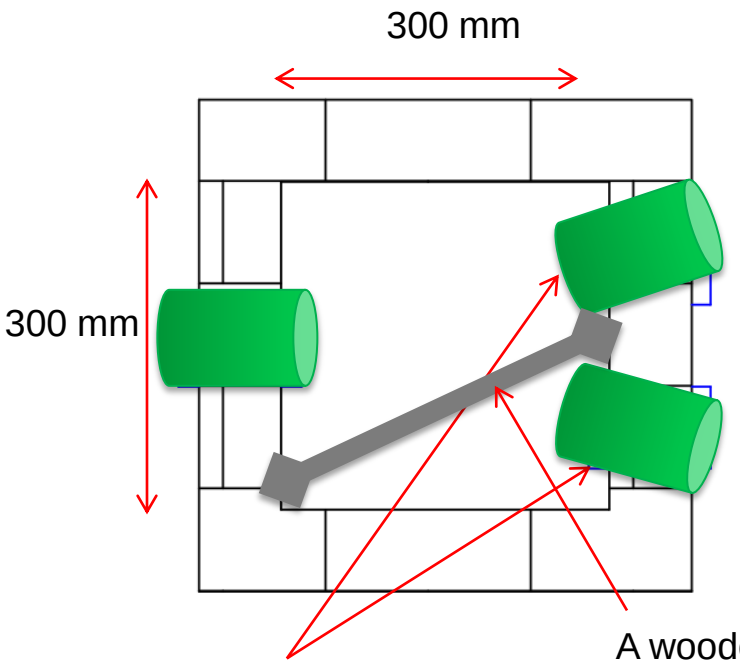
Requisite of design (inspection chamber)

In case pipes are used, a chamber is provided at the bifurcation point to facilitate cleaning and allowing flow to one pit at a time.

Inspection Chamber (Side view)



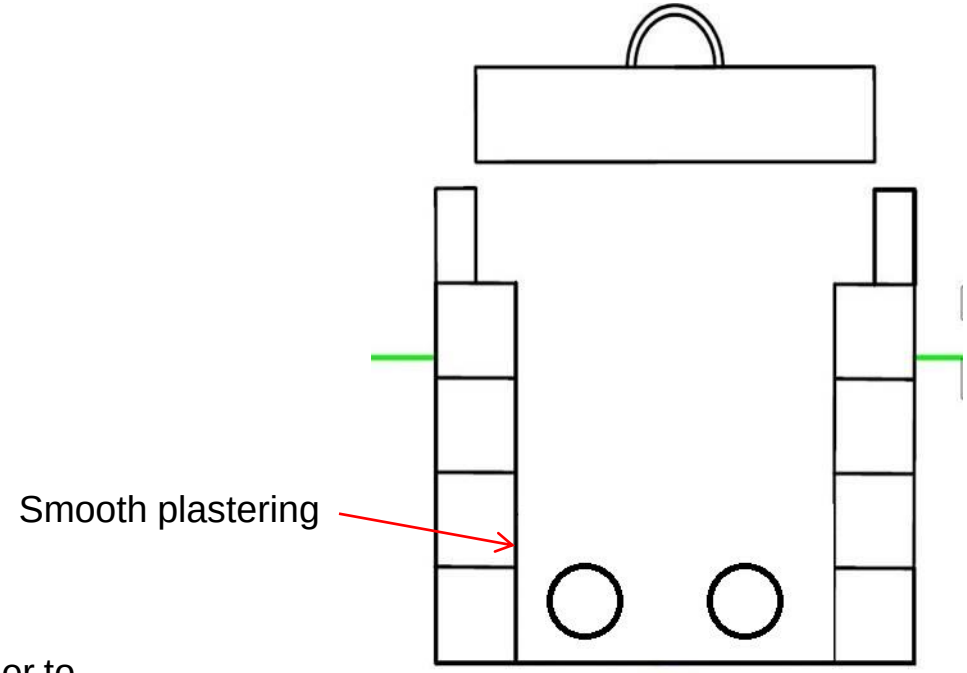
Inspection Chamber



The pipes should be placed at 100 mm from each other and 50 mm from the wall

A wooden stopper to control the flow once the pit is filled

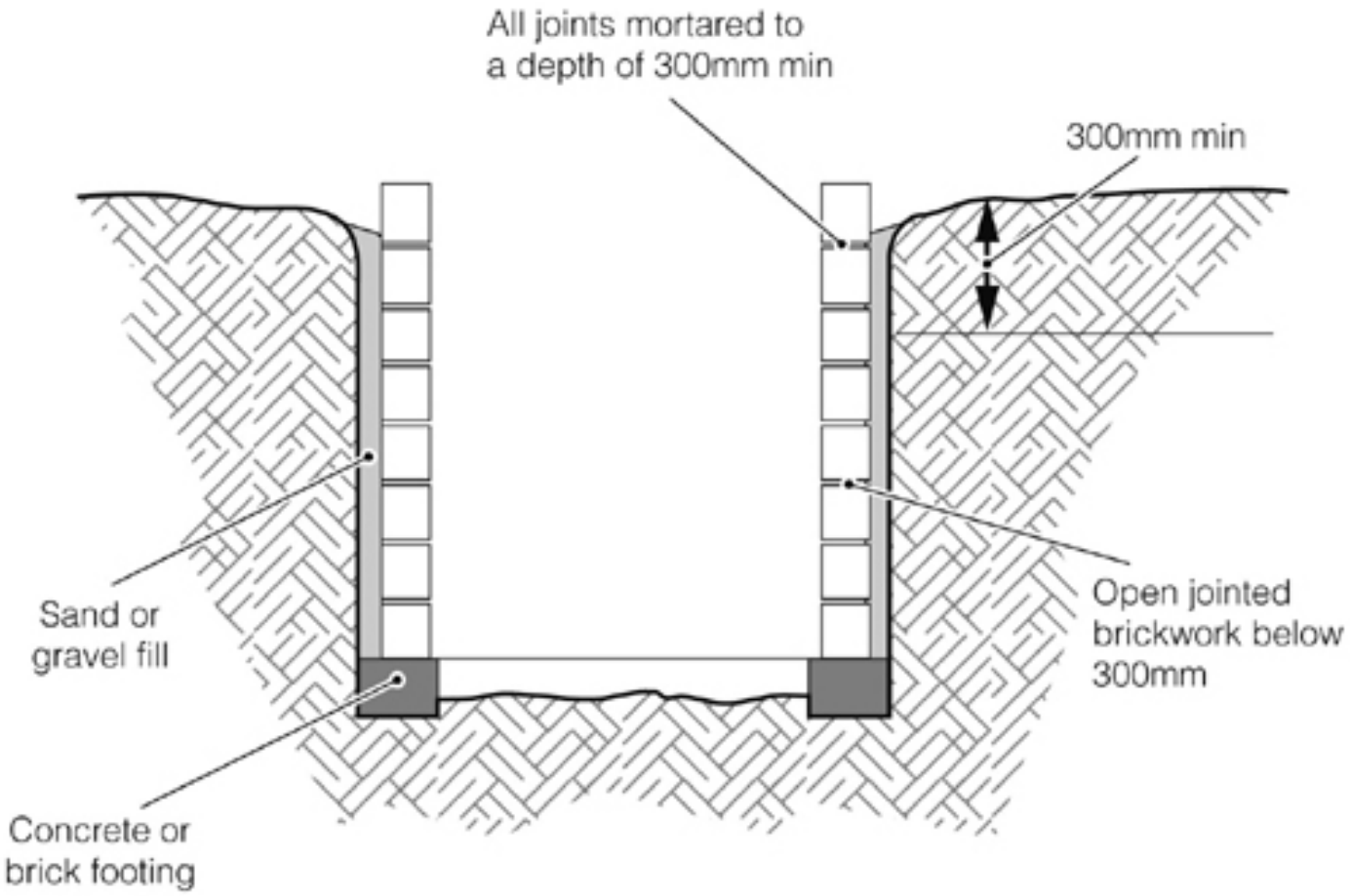
Top View



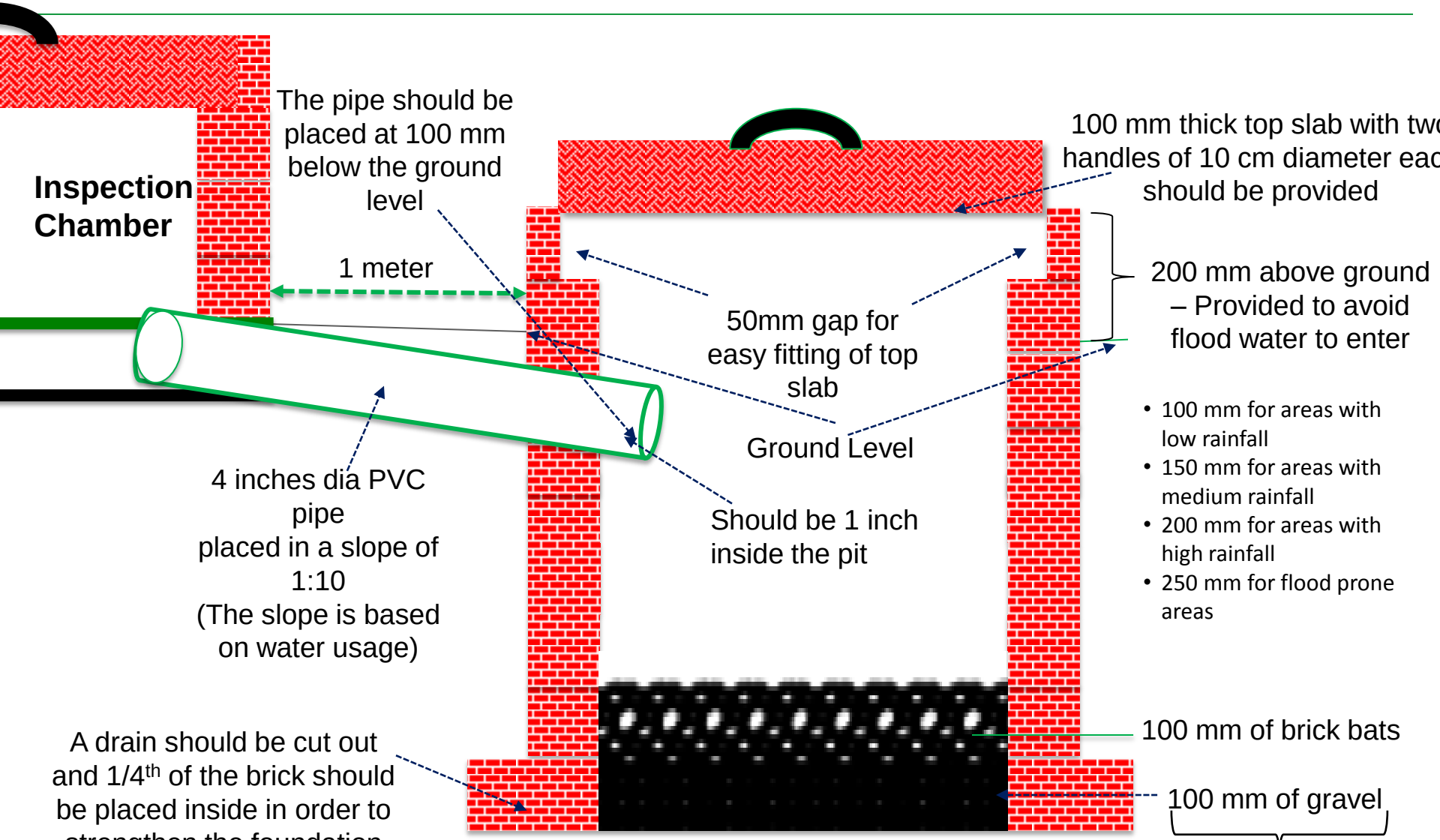
Side View

Pit

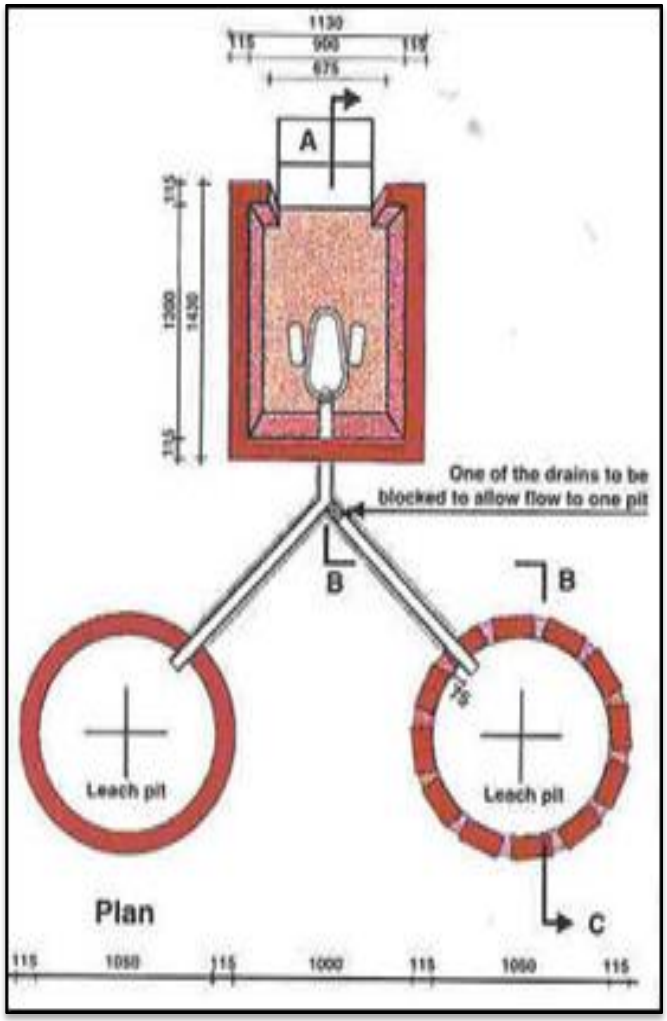
Pit


All joints mortared to
a depth of 300mm min
300mm min
Sand or
gravel fill
Open jointed
brickwork below
300mm
Concrete or
brick footing

Pit

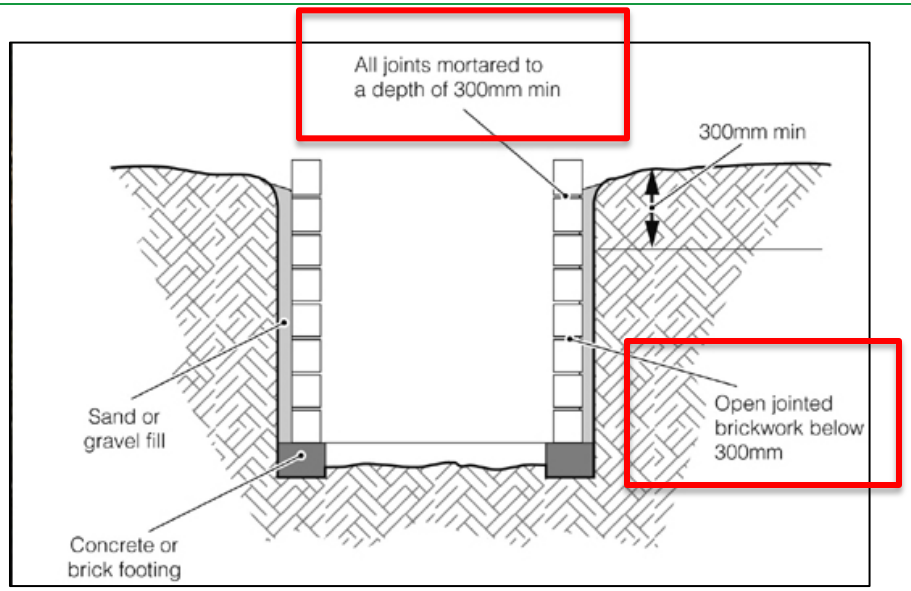

Inspection Chamber
The pipe should be placed at 100 mm below the ground level
1 meter
4 inches dia PVC pipe placed in a slope of 1:10 (The slope is based on water usage)
50mm gap for easy fitting of top slab
Ground Level
Should be 1 inch inside the pit
100 mm thick top slab with two handles of 10 cm diameter each should be provided
200 mm above ground – Provided to avoid flood water to enter
• 100 mm for areas with low rainfall
• 150 mm for areas with medium rainfall
• 200 mm for areas with high rainfall
• 250 mm for flood prone areas
A drain should be cut out and 1/4th of the brick should be placed inside in order to strengthen the foundation
100 mm of brick bats
100 mm of gravel
Provided for filtration

Requisite for design



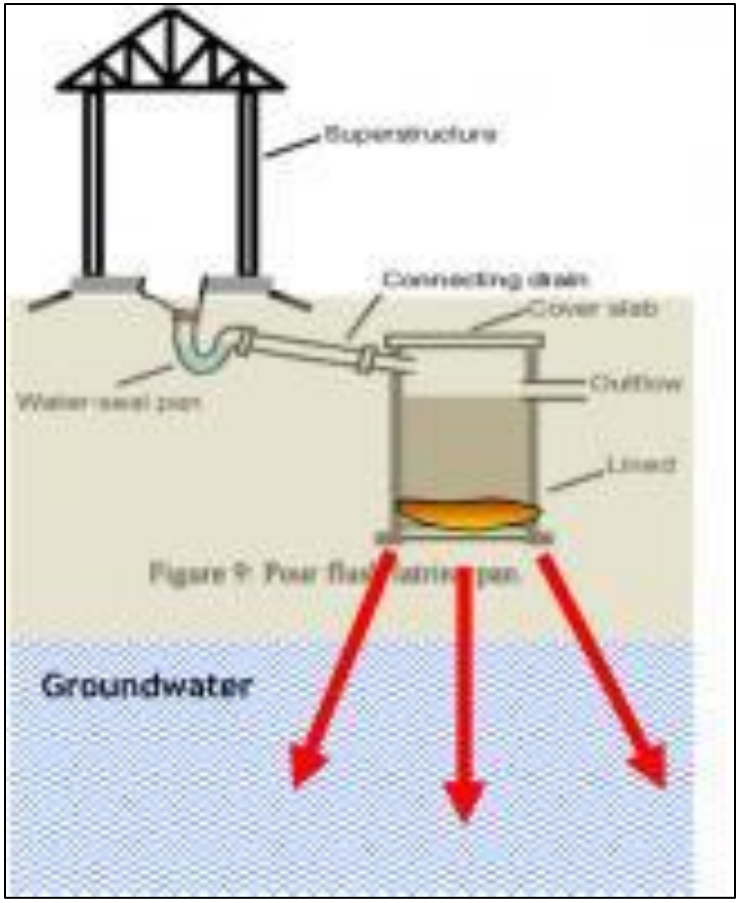
The two pits should be at least 1 meter apart.

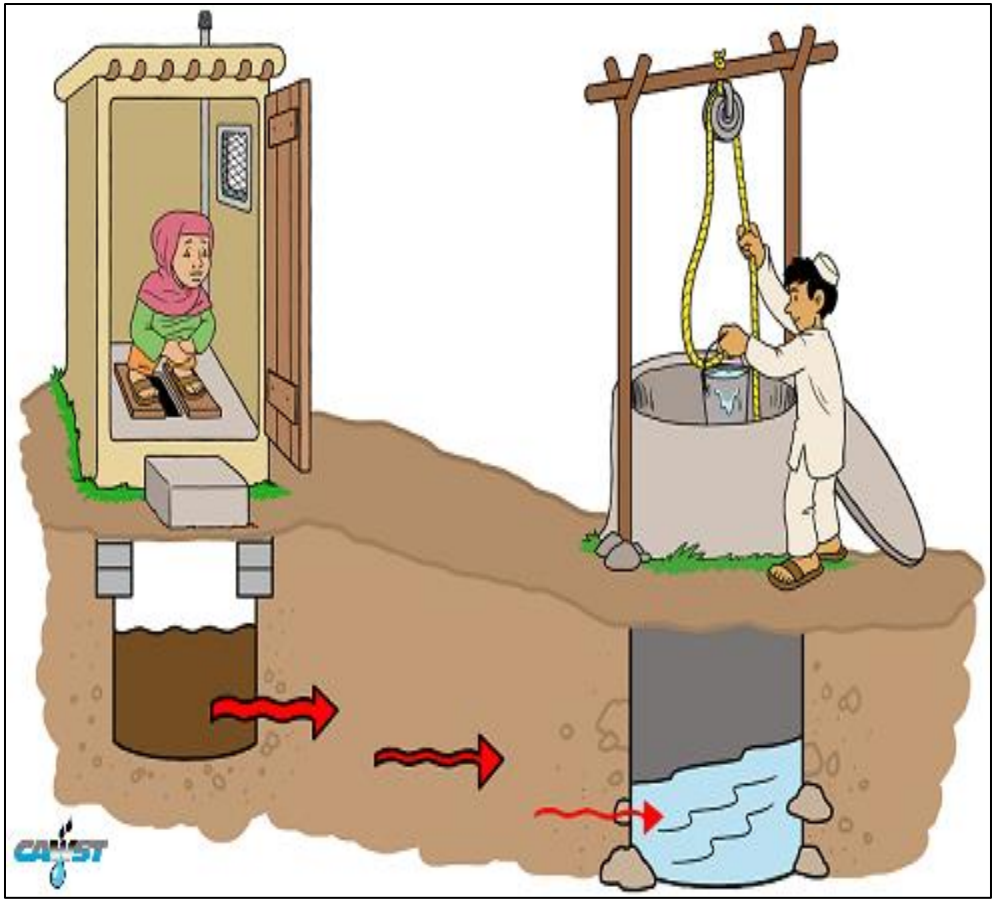
Requisite for design



There should be 3 finger gap between the bricks for water percolation.

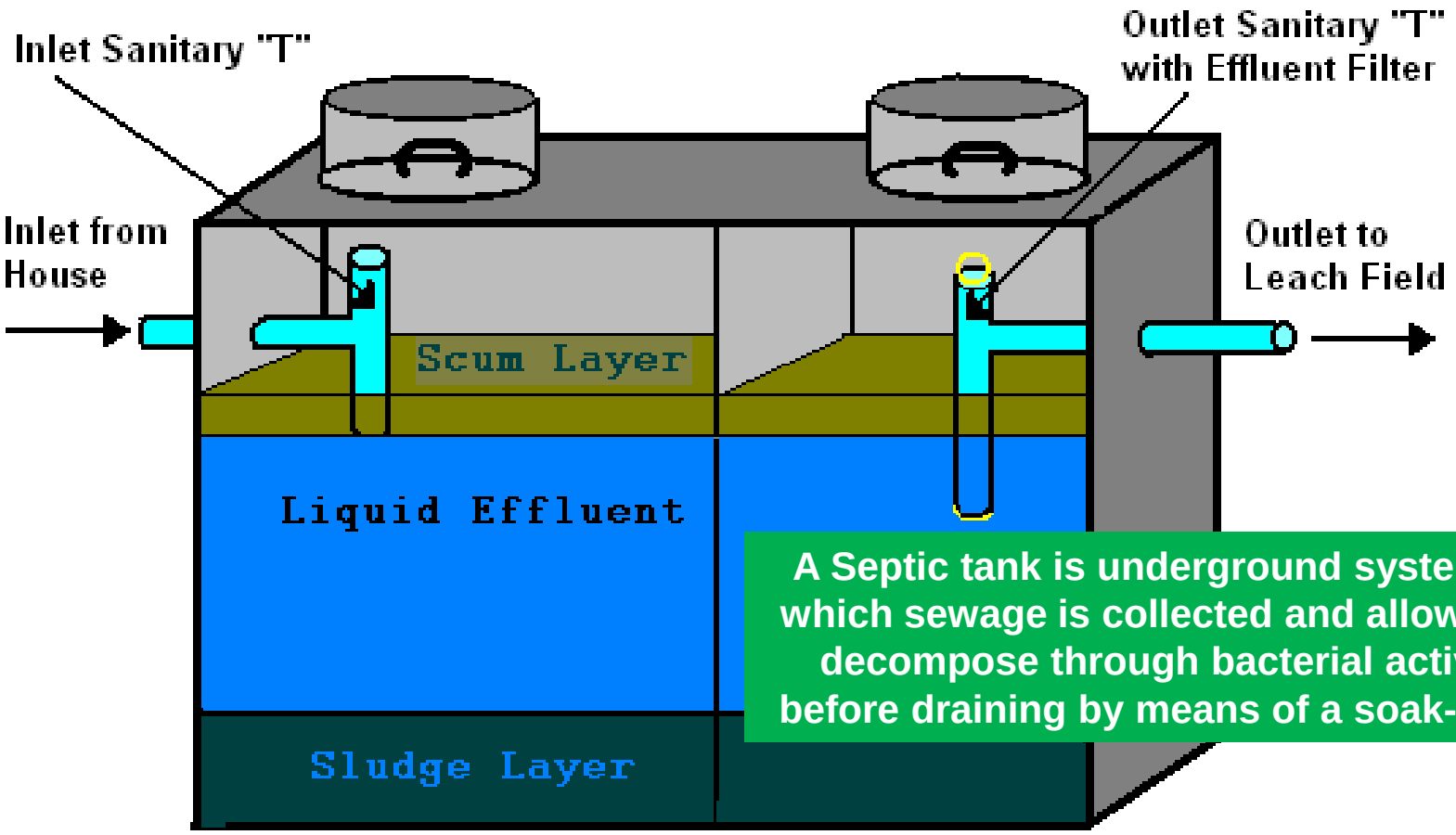
Requisite for design





Based on soil conditions maintain a minimum horizontal distance of 10 feet from nearby water sources

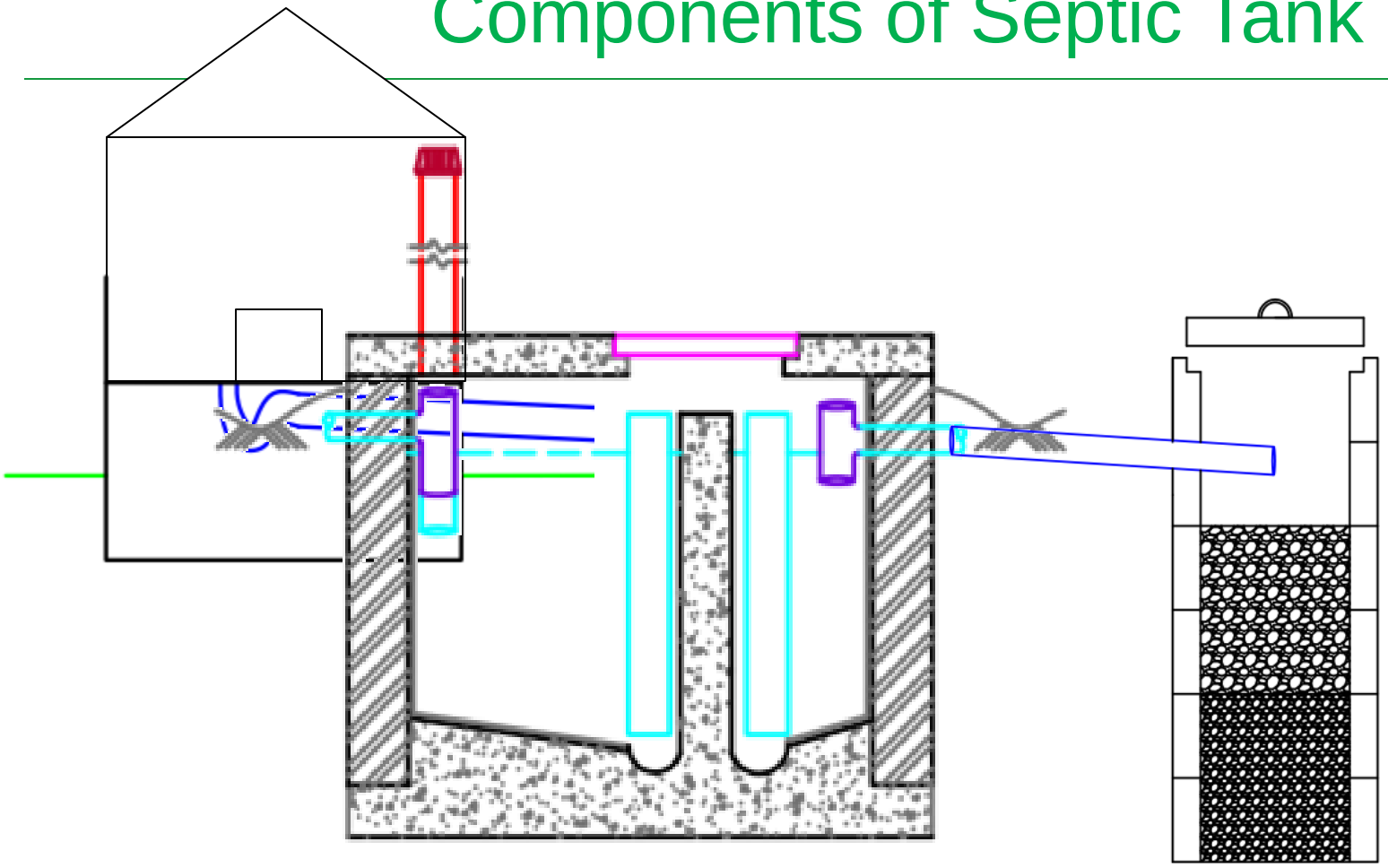
Septic Tank with Soak Pit



A Septic tank is underground system, in which sewage is collected and allowed to decompose through bacterial activity before draining by means of a soak-away.

Septic tank

Components of Septic Tank design



1.Superstructure

2.Septic Tank

3. Soak Pit

Guidelines from CPHEEO Manual

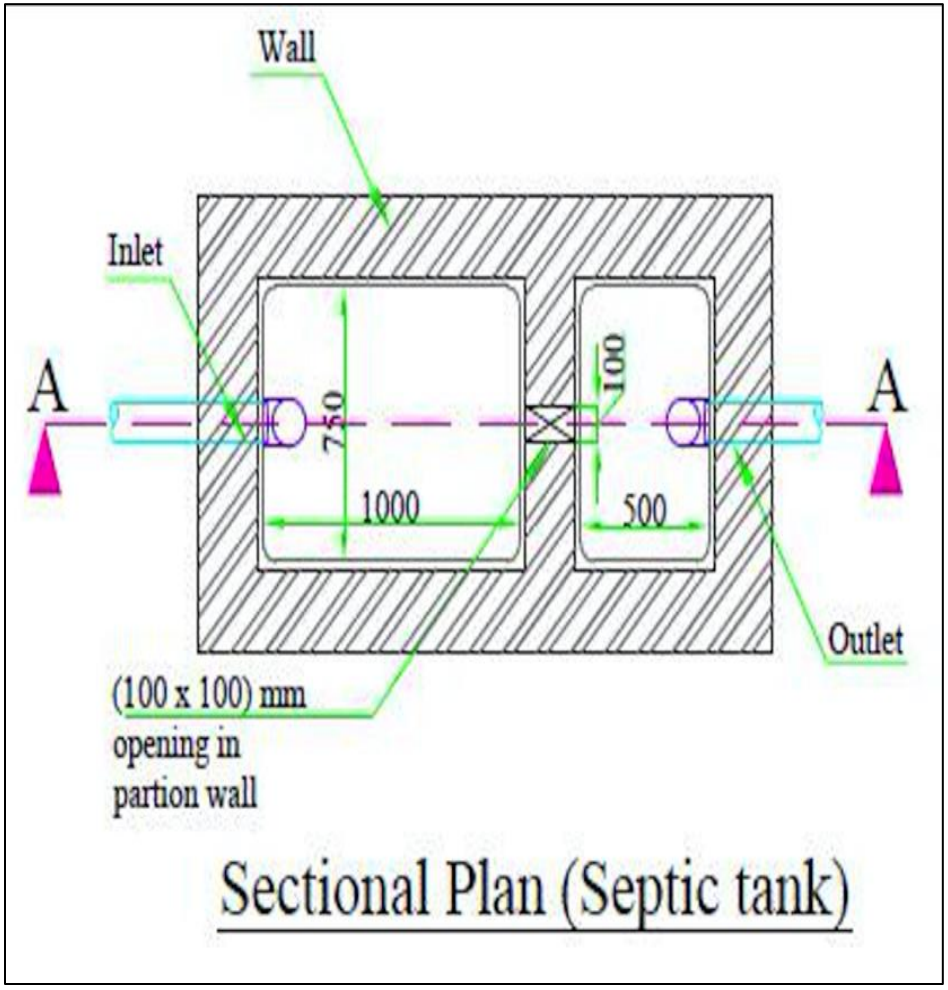
Septic tank design guidelines									
	5 users			10 users			15 users		
Septic tank	Length	Breadth	Liquid Depth	Length	Breadth	Liquid Depth	Length	Breadth	Liquid Depth
	5	2.5	3.5	6.5	3	4.5	6.5	3	6.5

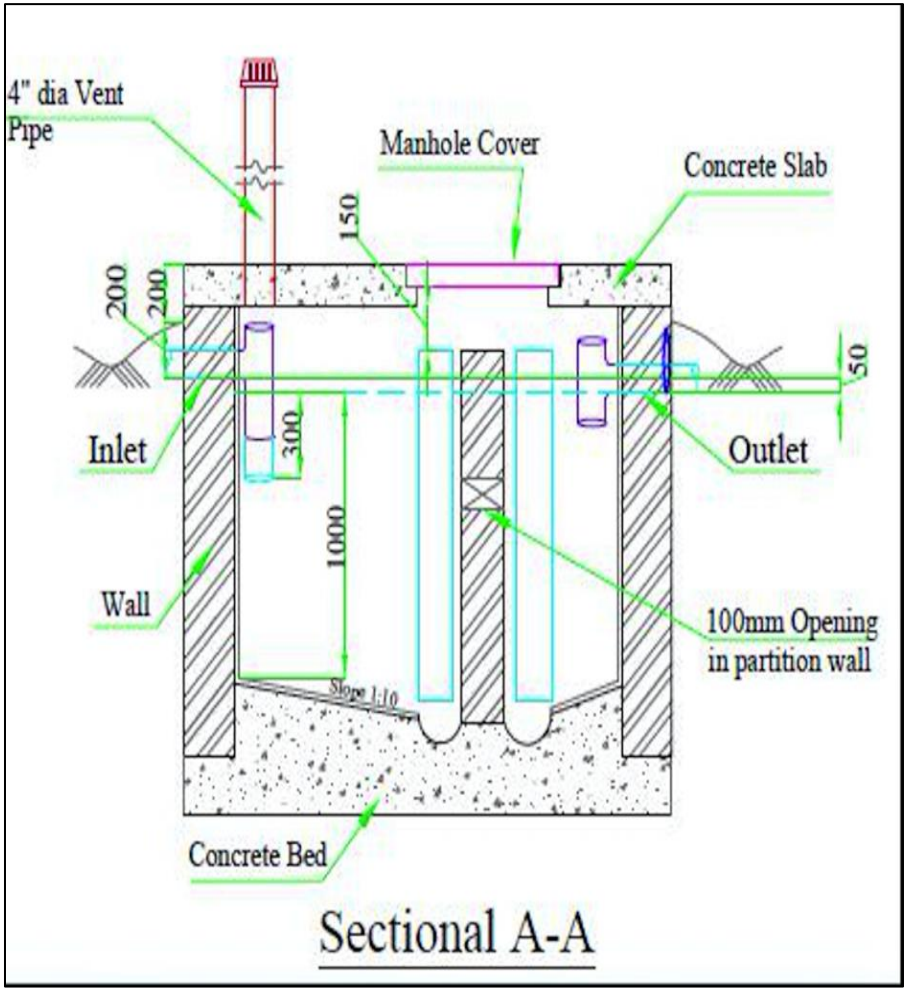
Soak pit design guidelines						
	5 users		10 users		15 users	
Soak Pit	Diameter	Depth	Diameter	Depth	Diameter	Depth
	3.2	4	3.2	4	3.2	5

Note:

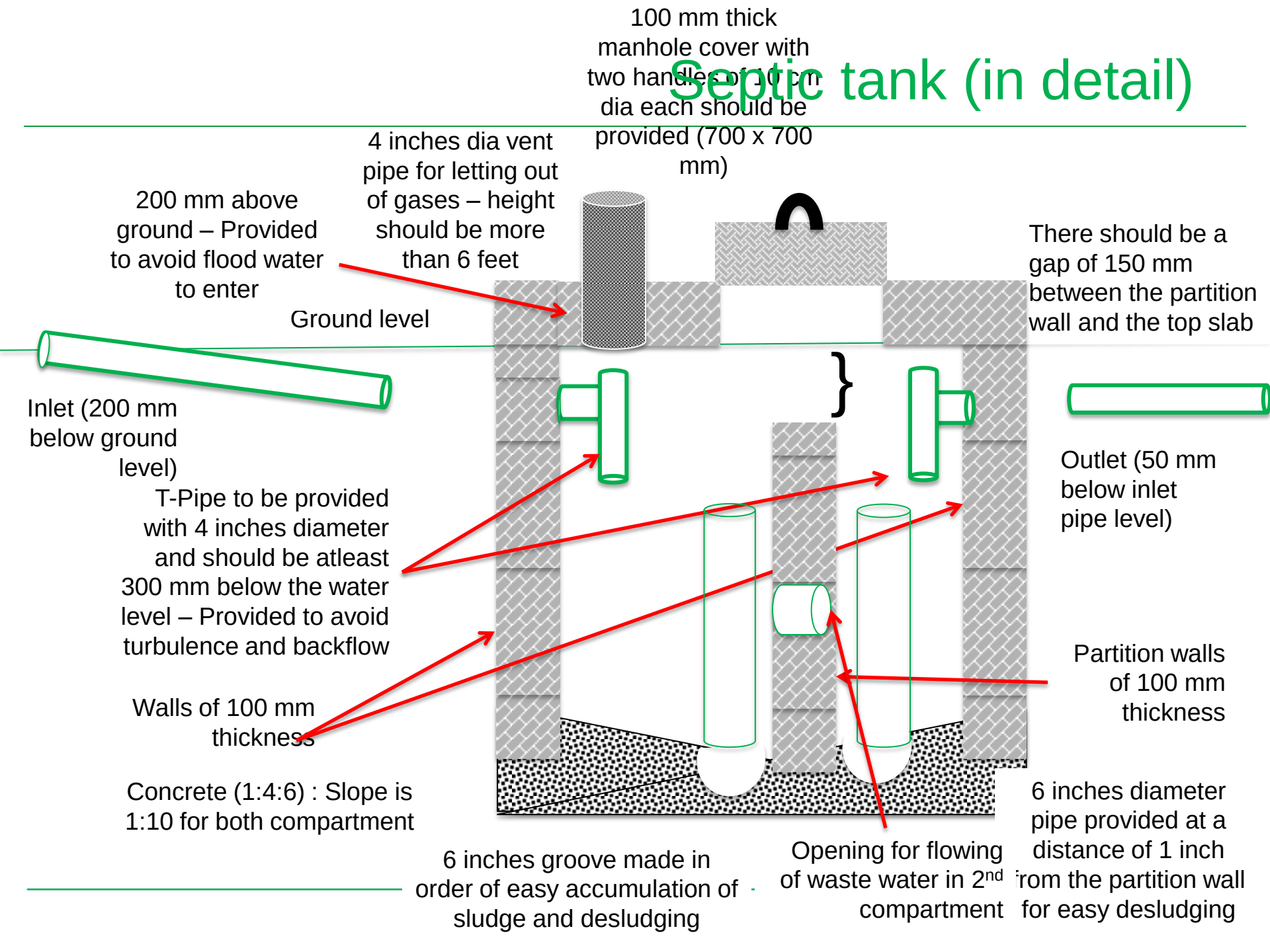
- Depth from bottom of pit to invert level of incoming pipe or drain (all dimensions in feet).
- Sludge Storage Volume is 3 years.
- 1 feet of free board should be provided between invert level of pipe to pit cover.

Septic tank (section & plan)



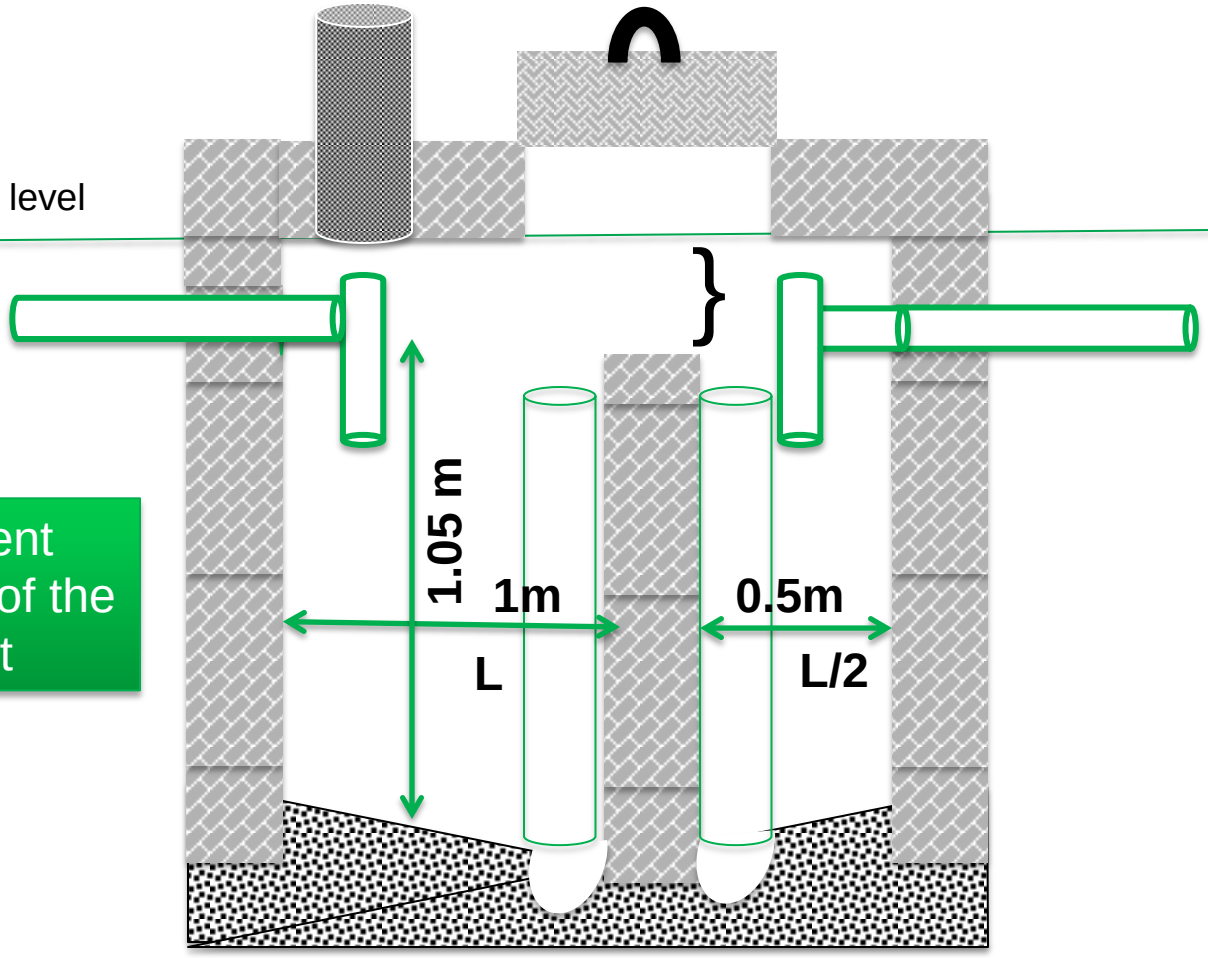


Septic tank (in detail)

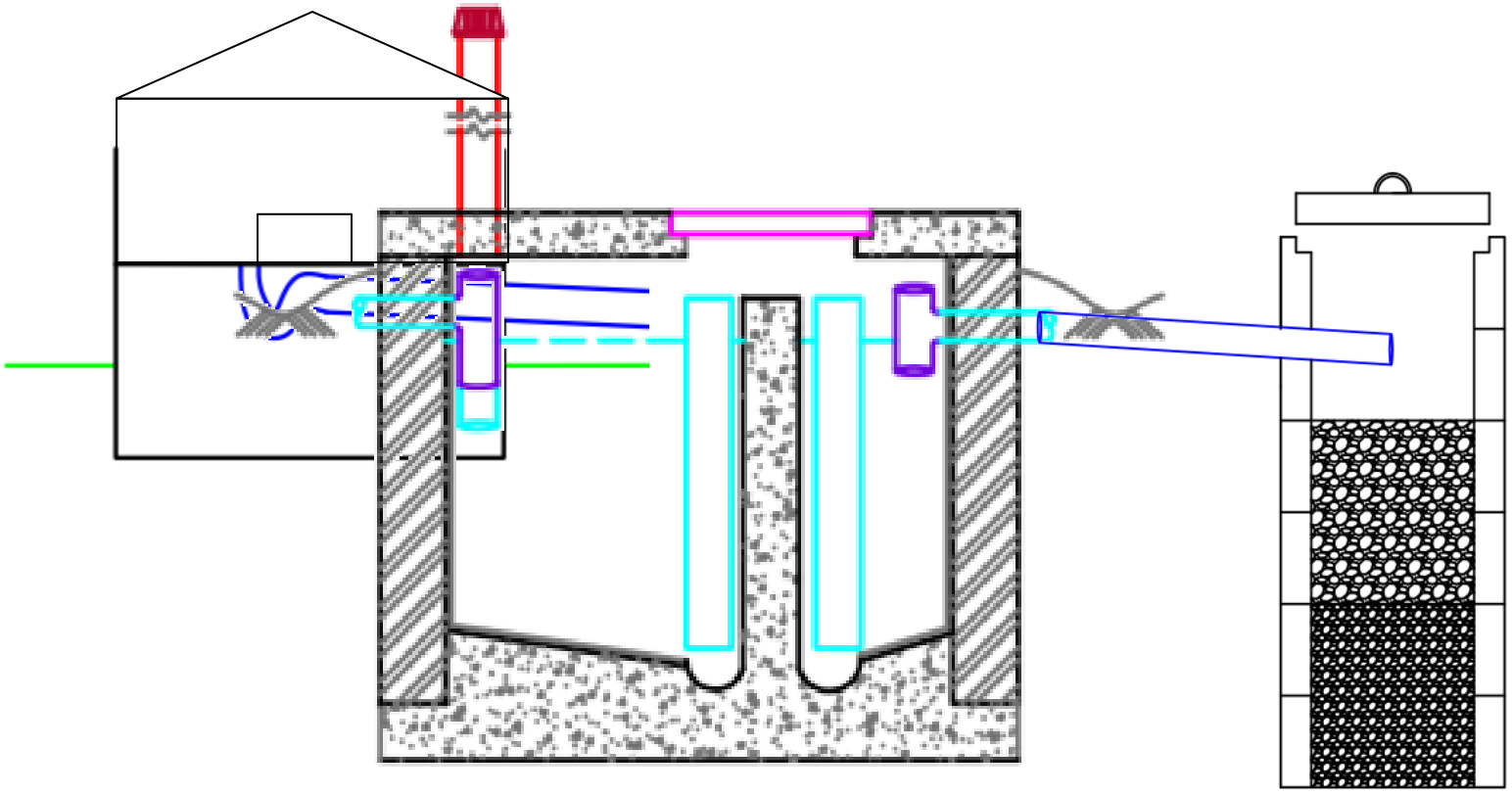


Guideline for compartment

The 2nd compartment length should be half of the first compartment



Soak pit

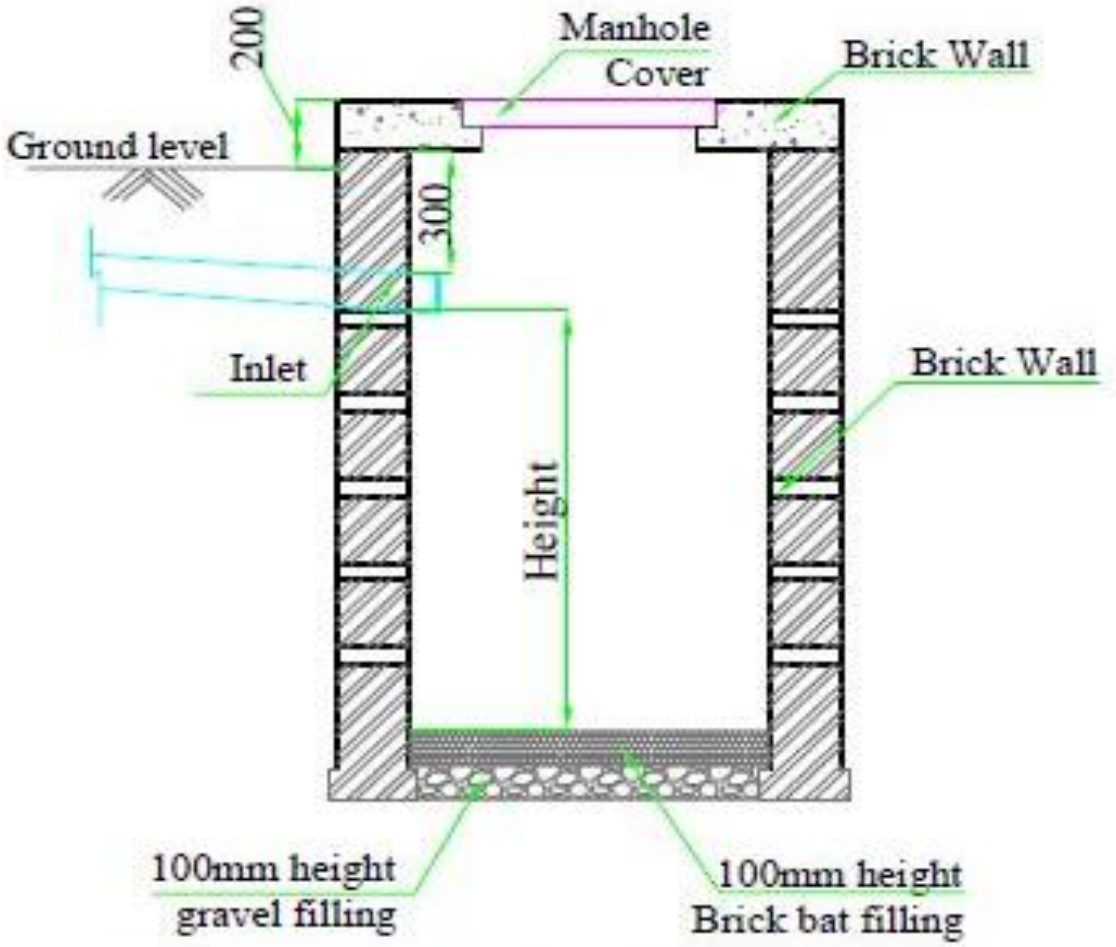


1.Superstructure

2.Septic Tank

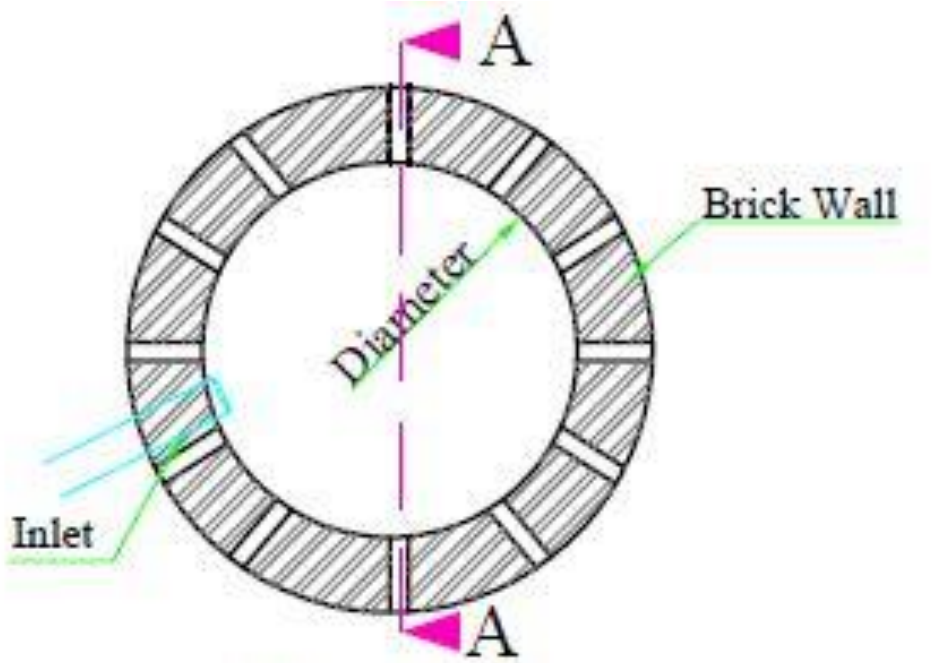
3. Soak Pit

Section of Pit



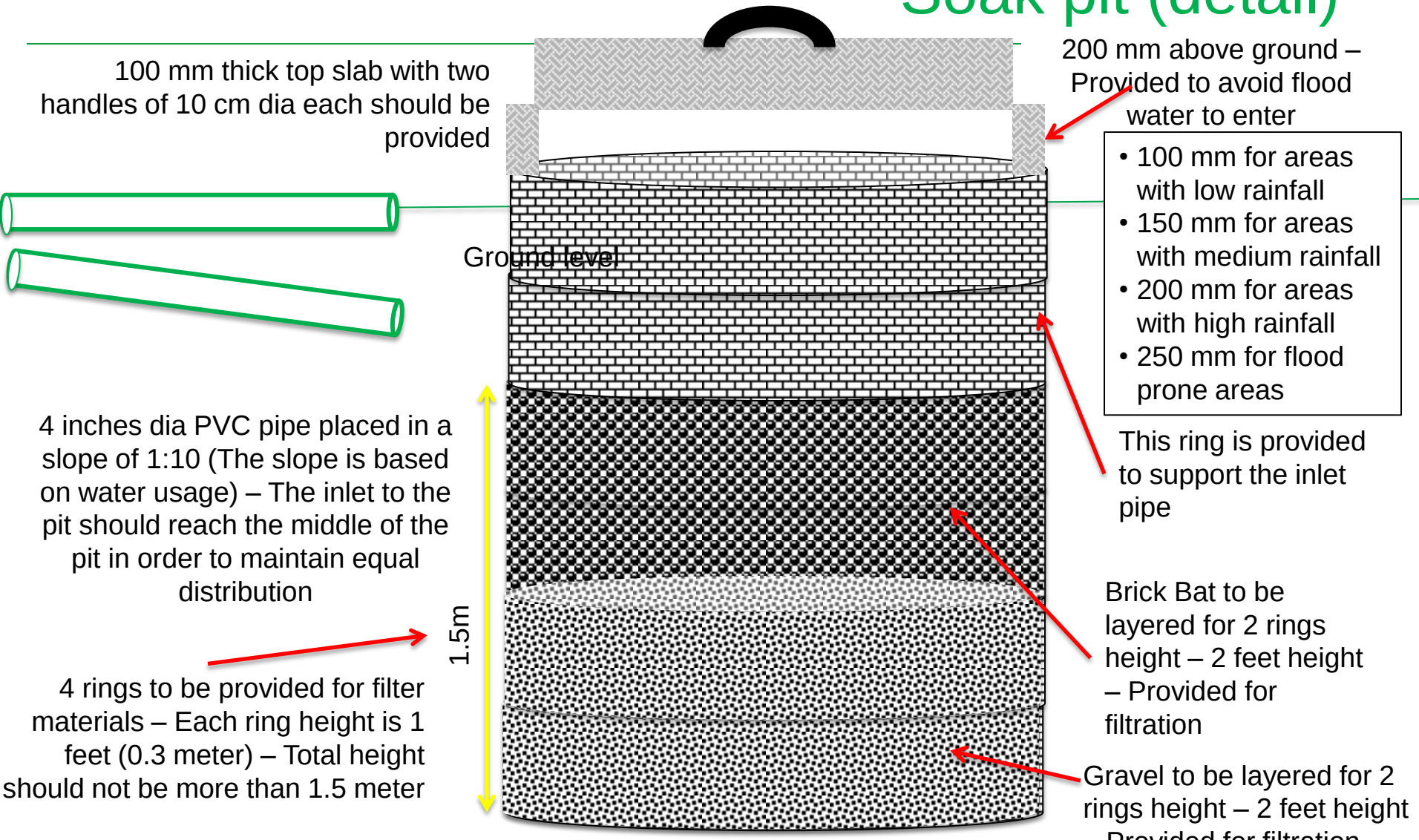
Section A-A

Plan of pit

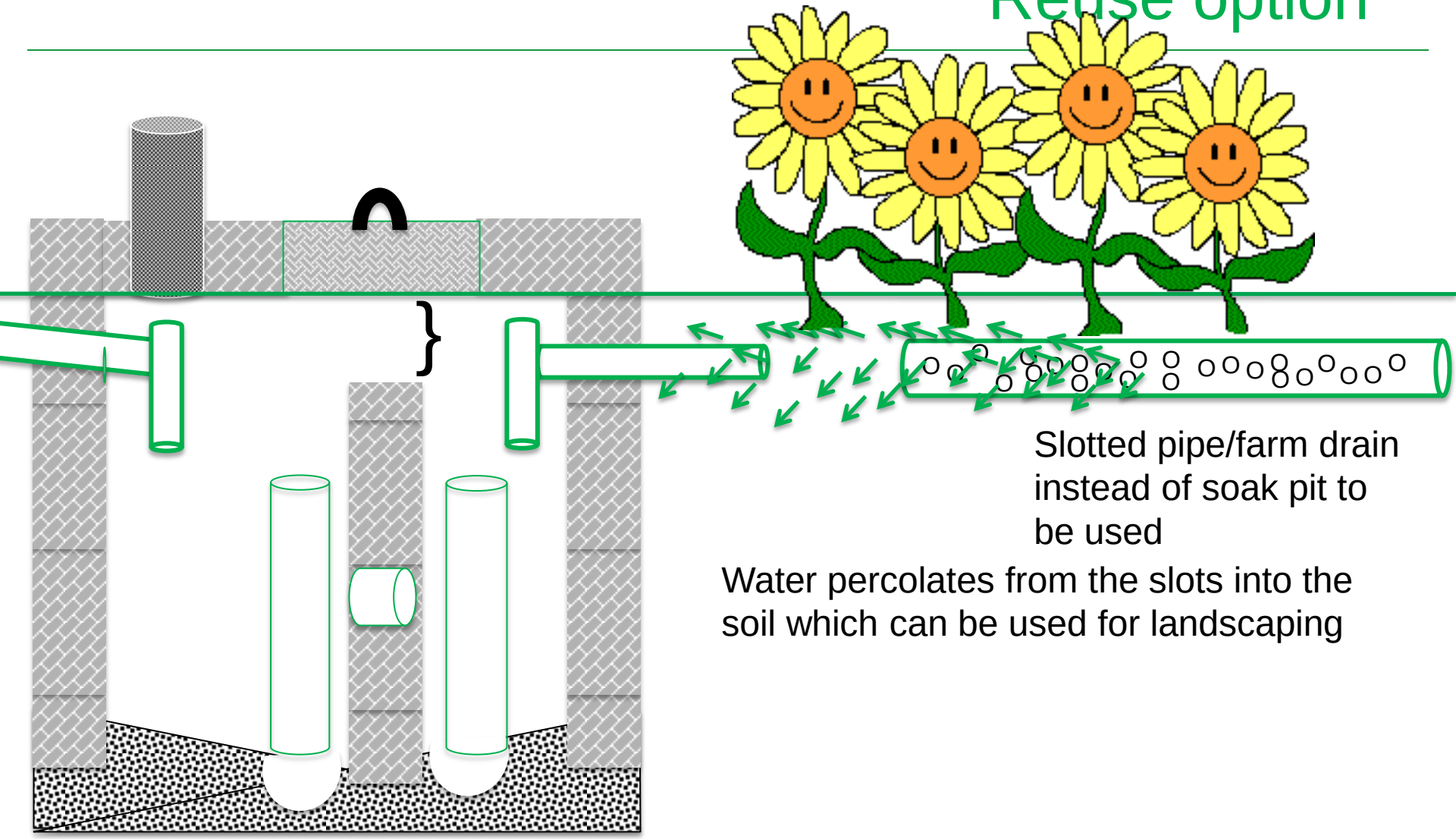


Plan (Pit)

Soak pit (detail)



Reuse option



Slotted pipe/farm drain instead of soak pit to be used

Water percolates from the slots into the soil which can be used for landscaping

Design Specifications

- Septic tank is always partitioned with an opening in between
- Length to breadth ratio is 2-3 to 1
- Walls and base of septic tank needs to be plastered for preventing water seepage
- Vent pipe should be provided connecting to the top slab and should be extended above the toilet roof to direct the gas above average human height

To remember

- Septic tank need to be periodically desludged (local municipality must ensure this service).
- Septic tank outlet must not be let out into storm water drain.
- Septic tank must always be followed by soak pit, if not to be connected to a farm drain for reuse.
- Septic tank must be easily accessible for desludging

How to construct a Septic tank?

Step by Step

Step for construction

Marking for excavation

Step for construction

Step for construction

Leveling of the base

Step for construction

Base slab – Steel reinforcement

Steps for construction

RCC 1:4:8 for base slab and leveling

Step for construction

ఉక్కు ఊచల సాయంతో అడుగు భాగం నిర్మాణం

Steps for construction

Inspection Chamber

Opening in Partition wall

Step for construction

110m dia pipe – embedded in wall

110m dia Tee

Fixing
Inlet / Outlet pipes

Steps for construction

Waterproof plastering of walls

Steps for construction

Top RCC with Opening for Manhole

Steps for construction

Cast roof with manhole and cover

Step for construction

Provision for Air Vent

Steps for construction

Piping and connecting to toilet pan

Steps for construction

Backfilling

Steps for construction

Marking for the Pit

Steps for construction

Excavation for the Pit

Steps for construction

Excavation for the Pit

Steps for construction

Pit Lined with concrete rings

Steps for construction

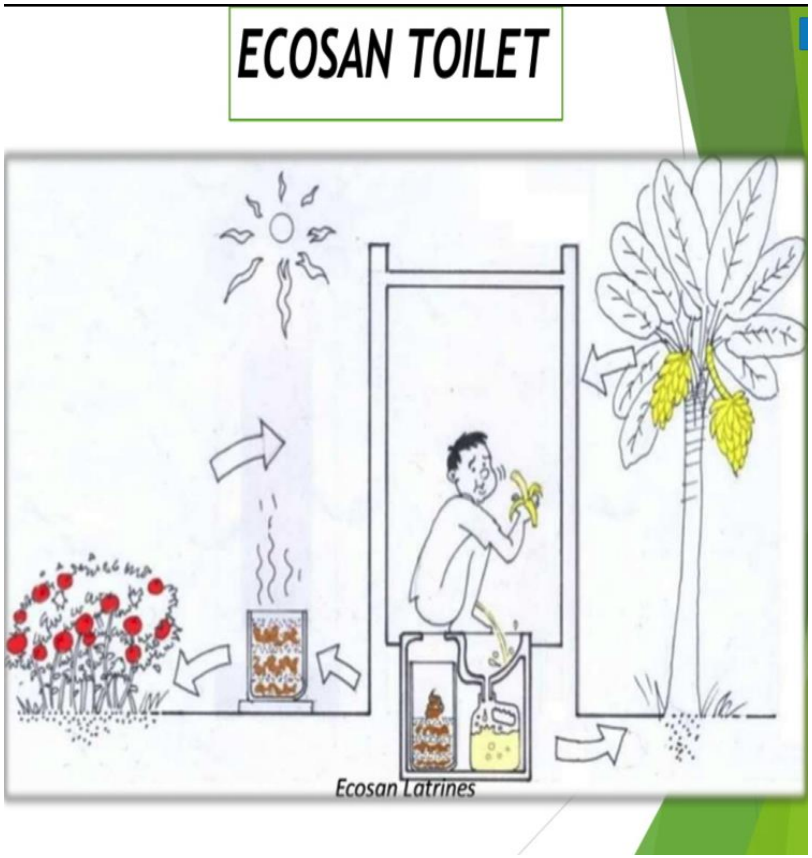
Fill Pit with Brick bats and Gravel

Steps for construction

Manhole cover for the Pit – Cast or Prefabricated slab

Introduction to Urine Diversion Dehydration Toilets (UDDT) or Ecosan

UDDT provides a similar provision



A urine-diverting dry toilet (UDDT) is

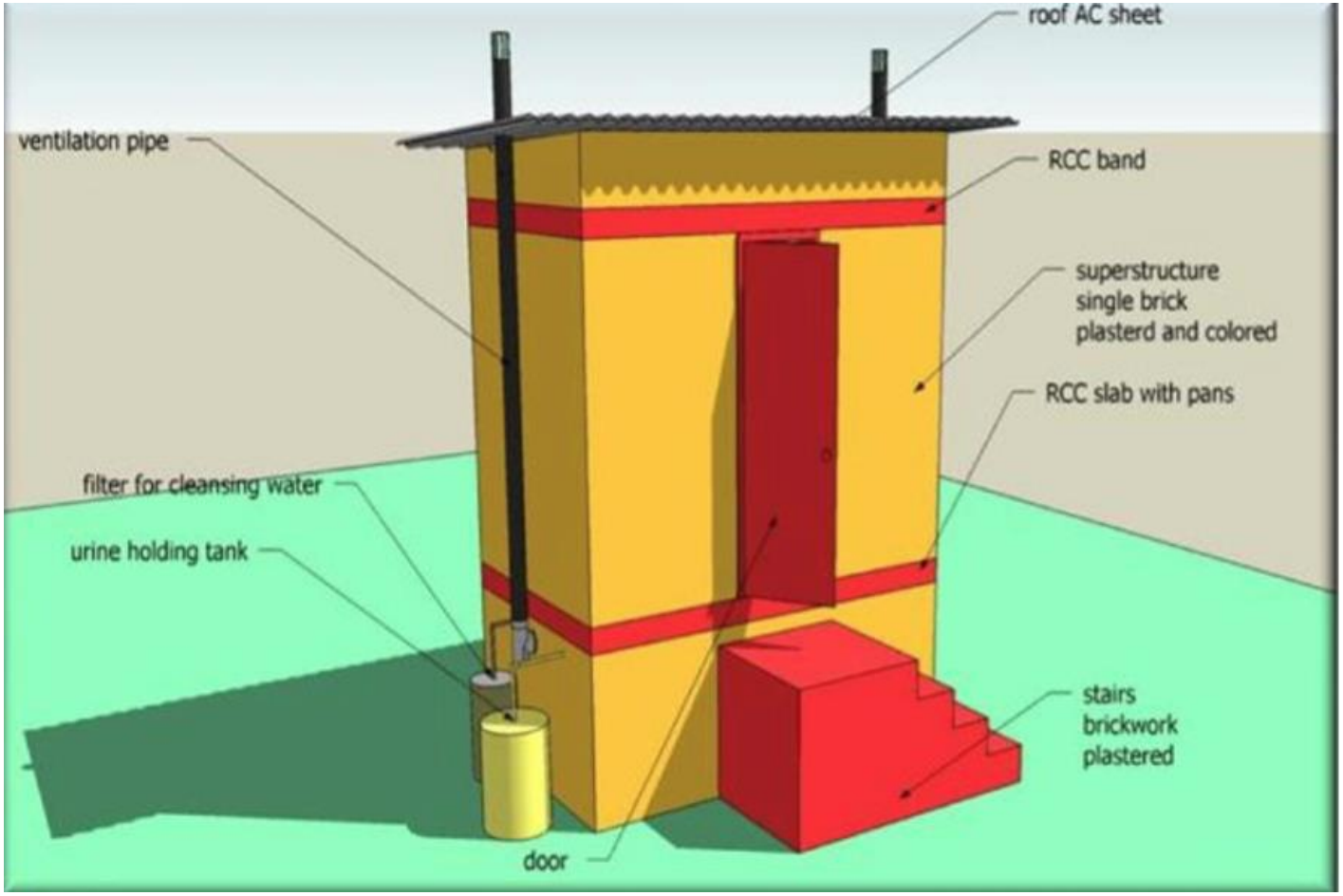
- a simple, low-cost, on-site toilet
- Operates with minimal water.
- Separate urine, fecal, water through a slab with three outlets,
- All these outlets are thereafter connected to different collection, treatment and reuse systems.

Operation

Double vault UDDT

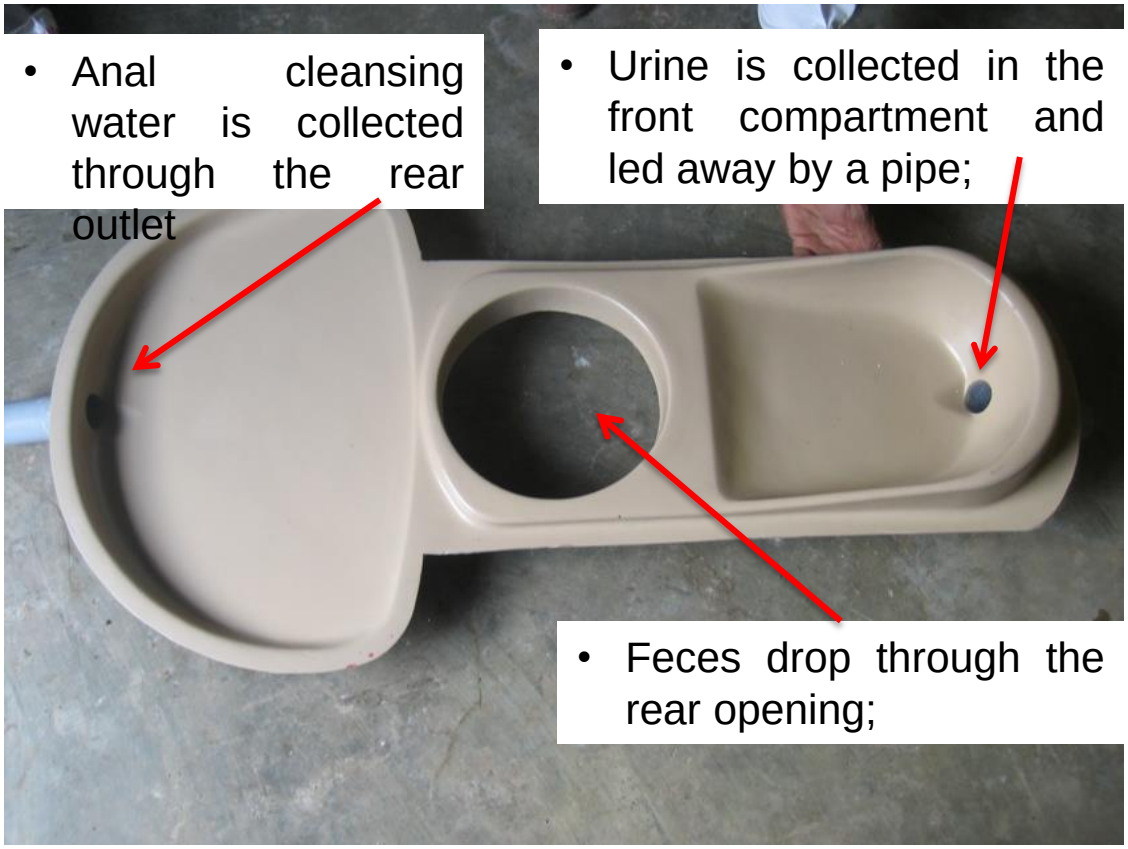
- Two seats & chambers in one toilet
- One used for first 6 months, one for the next six months
- After using 6 months, the chamber is kept idle for 6 months and then compost is removed

UDDT Components



Component of UDDT (ecosan)

1.



Special designed pans to separate urine & anal cleansing water at source

Different designs of Urine-Diversion Squatting Pans & Pedestals

(photos: www.sswm.info

Component of UDDT (ecosan)

2.

Composting chamber for Natural Drying process

Component of UDDT (ecosan)

3.

Urine storage can for urine collection

Component of UDDT (ecosan)

4.

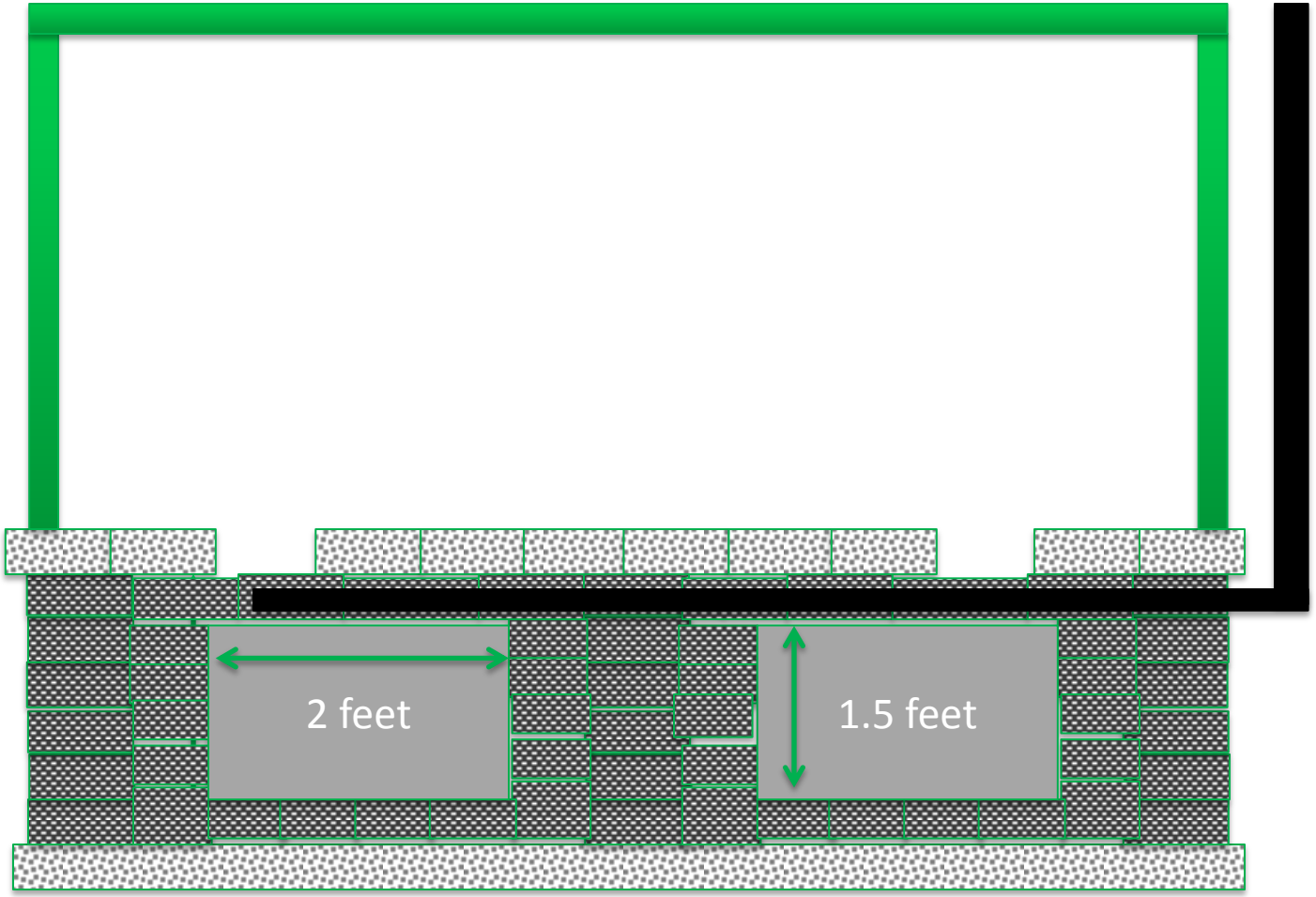
Plant Box for Infiltration of Greywater & Cleansing Water

source: GTZ, Philippines

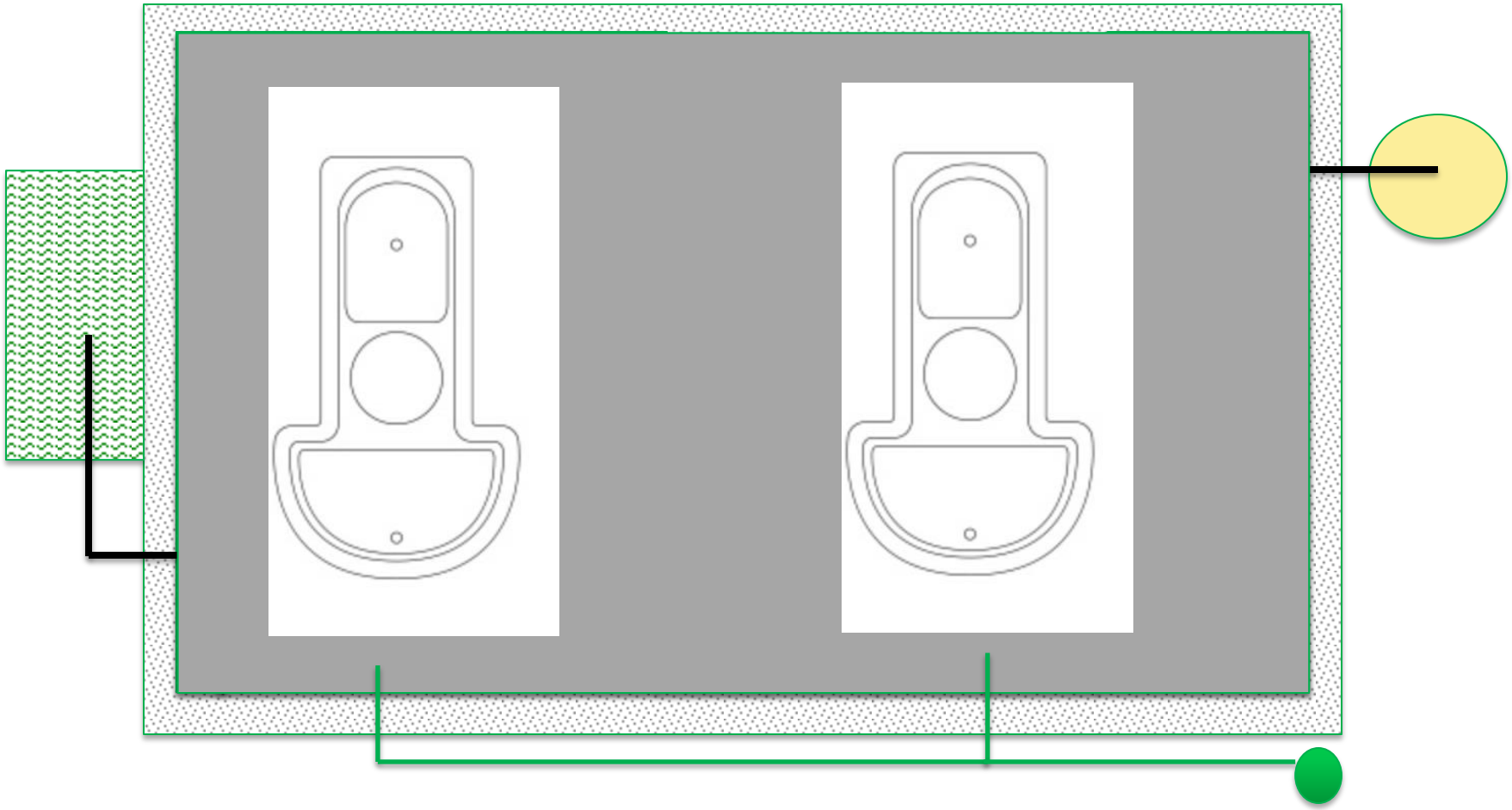
Design

Design parameters of UDDT Components

Excreta Chamber – Side View



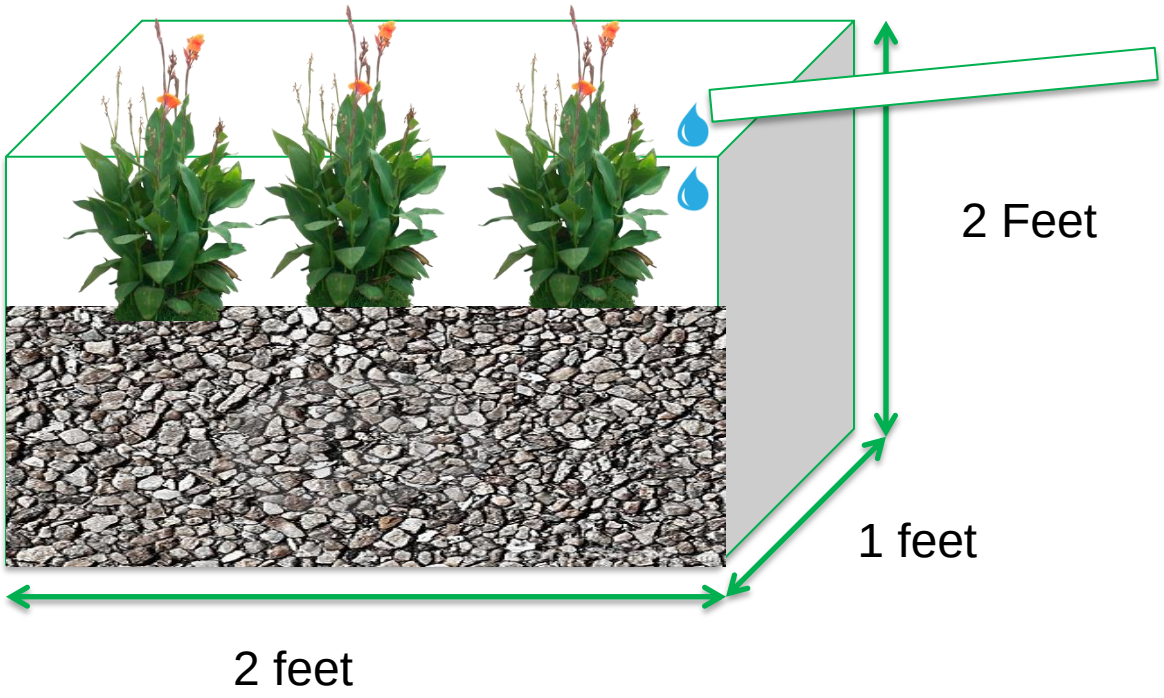
Top view of the Excreta Chamber



Essential Parameter for collection chamber

- Separate Collection of Urine, Faeces and anal cleansing water
- Water proof chamber for excreta storage
- 6 -8 months storage capacity per chamber
- Easy access and retrieval of waste

Plant Box



Anal Cleansing water

Plants such as canna indica to be used which absorb the nutrients from the wastewater

Urine Collection Chamber

Urine collection tank at least of 5 litre capacity. Once filled the urine can be diluted with water in 1:10 ratio and used as a liquid fertilizer for plants

Essential Parameter for Urine container and pipes

- Use corrosion resistant material (e.g.plastic)
- Leak proof piping between urine collection point and container
- Sufficient pipe slope for good drainage (reduces smell)
- Sealed container with pipe ending 3 inches above bottom of container (reduces smell)
- Filling level easy to observe (transparent)

How is UDDT constructed?

Site Preparation

Lineout & Excavation

Foundation Work

Slab Casting

Compost chamber

- Brick Work
- Internal Plastering
- Provisions for vents
- Coping work

Placing of Slab

Superstructure

Fixing of doors, external plumbing