

Mason's Training Programme on Onsite Treatment Systems

Session: 2 Design of septic tank Do's & Don'ts

November 18, 2016

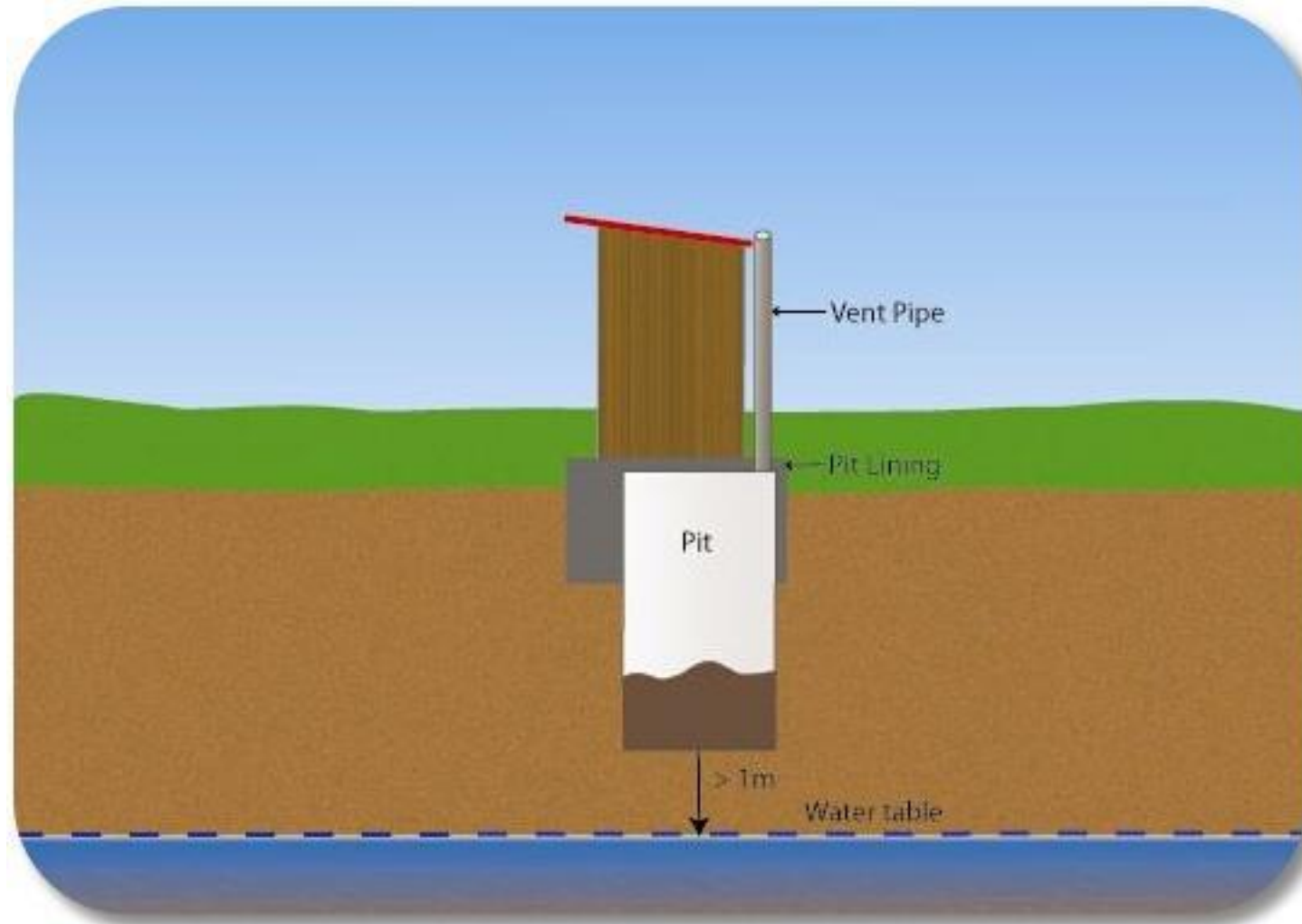
TECHNICAL
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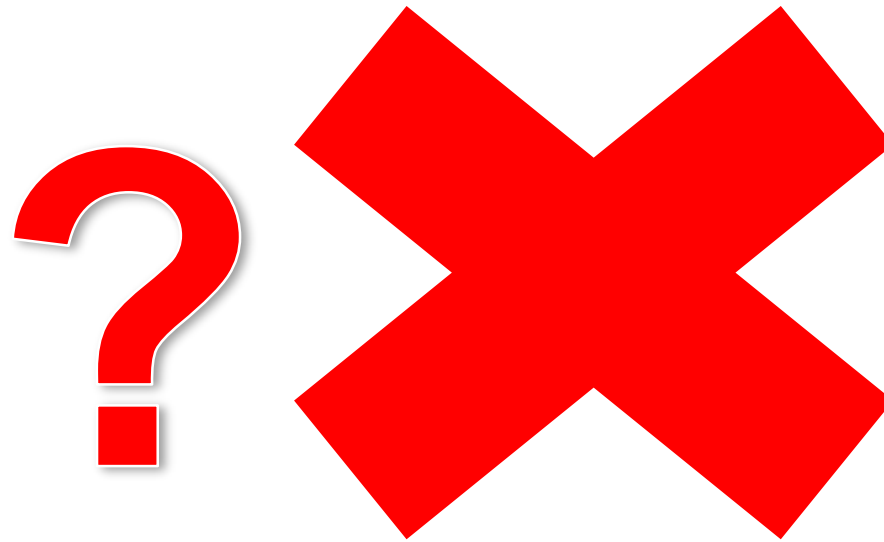
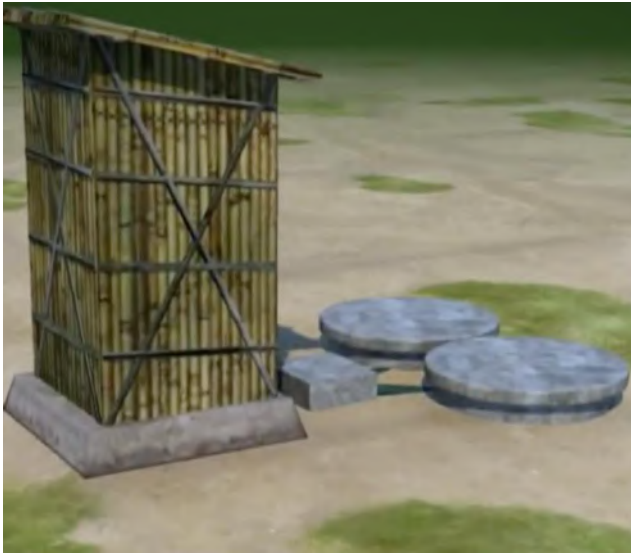
IN ASSOCIATION
WITH:



Groundwater table is high

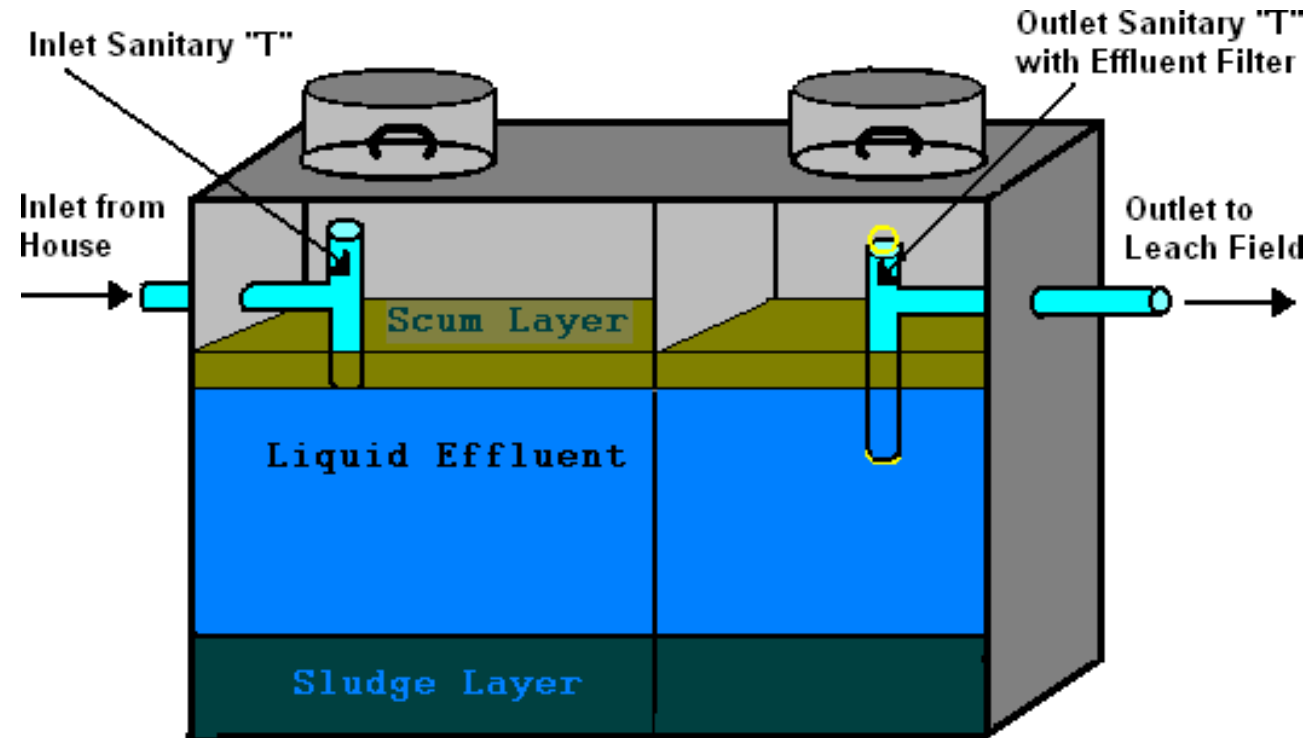


Which onsite system to install?



Pit system are not suitable for such conditions

Septic tank

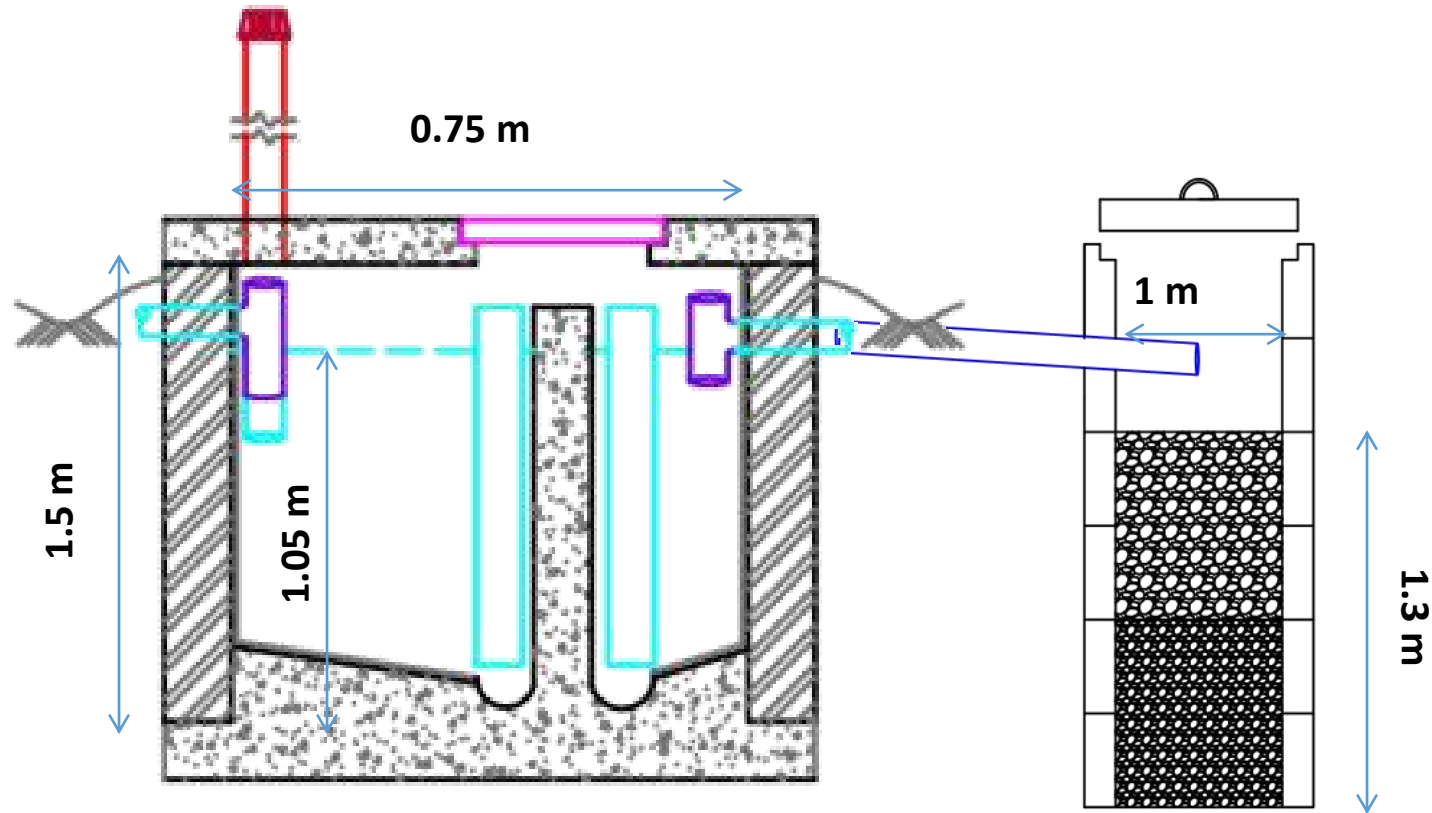


A Septic tank is underground, in which sewage is collected and allowed to decompose through bacterial activity before draining by means of a soak away.

How a Septic tank works



Dimension of Septic tank



Guidelines from CPHEEO Manual

Septic tank design guidelines									
Septic tank	5 users			10 users			15 users		
	Length	Breadth	Liquid Depth	Length	Breadth	Liquid Depth	Length	Breadth	Liquid Depth
	1.5	0.75	1.05	2	0.9	1.4	2	0.9	2

Soak pit design guidelines						
Soak 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 (all dimensions in m).
- Sludge Storage Volume is 3 years.
- 300 mm of free board should be provided between invert level of pipe to pit cover.

Components of Septic Tank design



1. Superstructure



2. Septic Tank

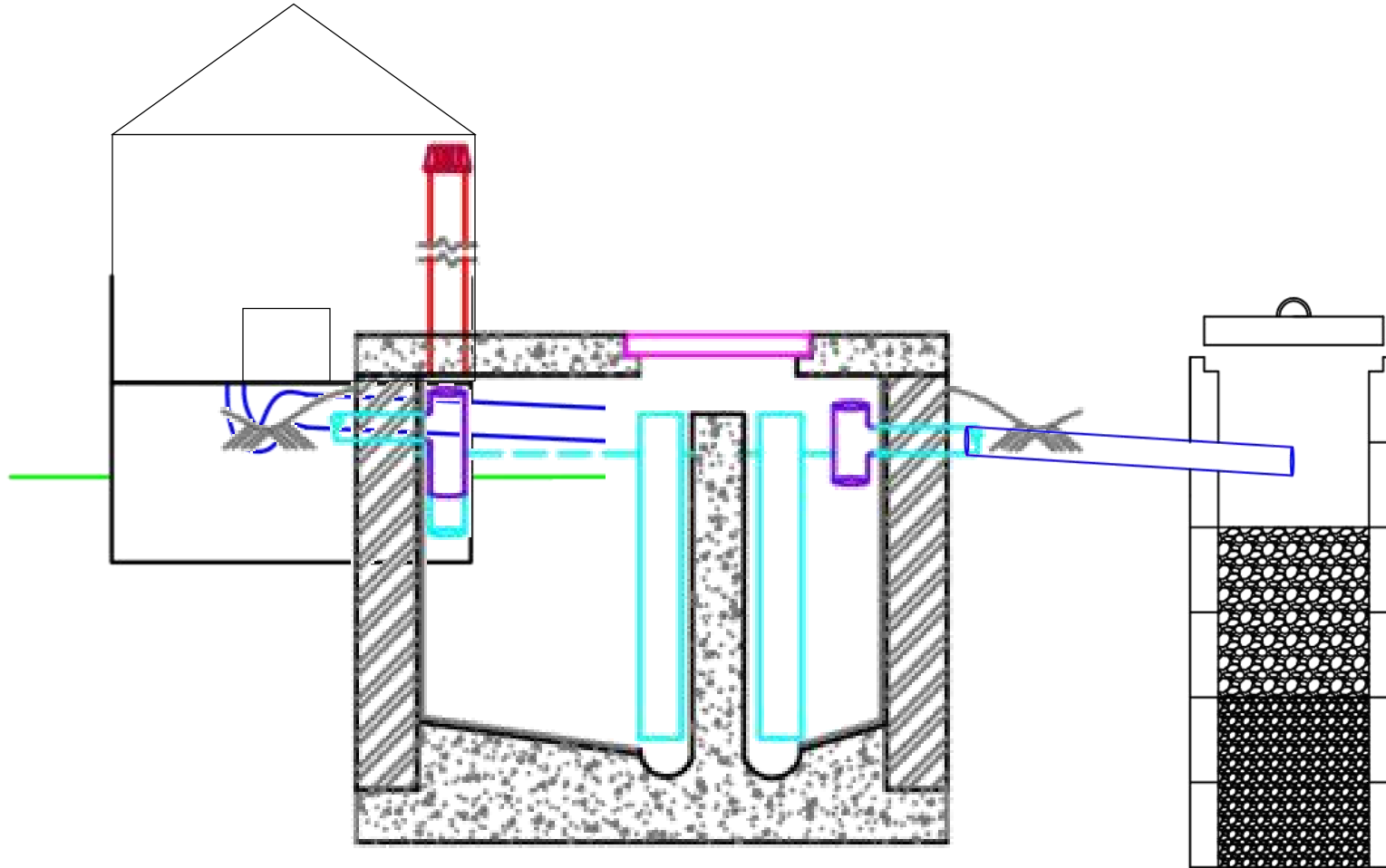


3. Soak Pit



Lets get started...

Septic tank Design Aspects

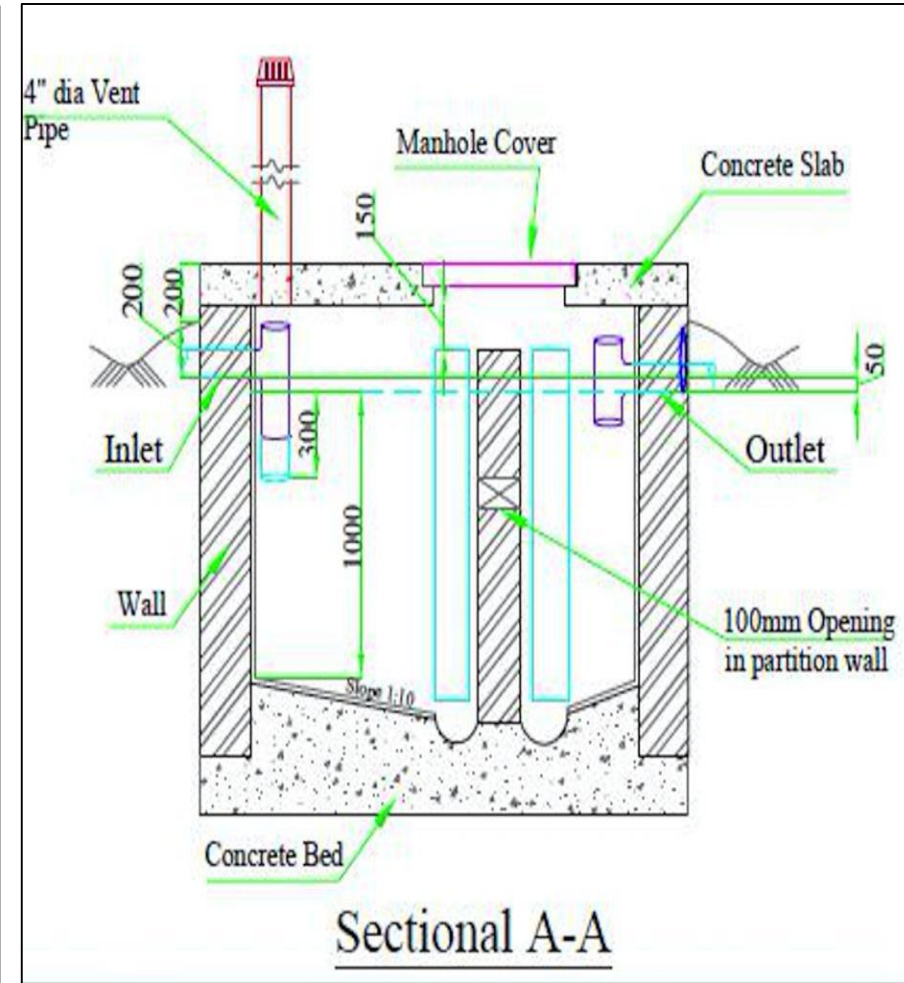
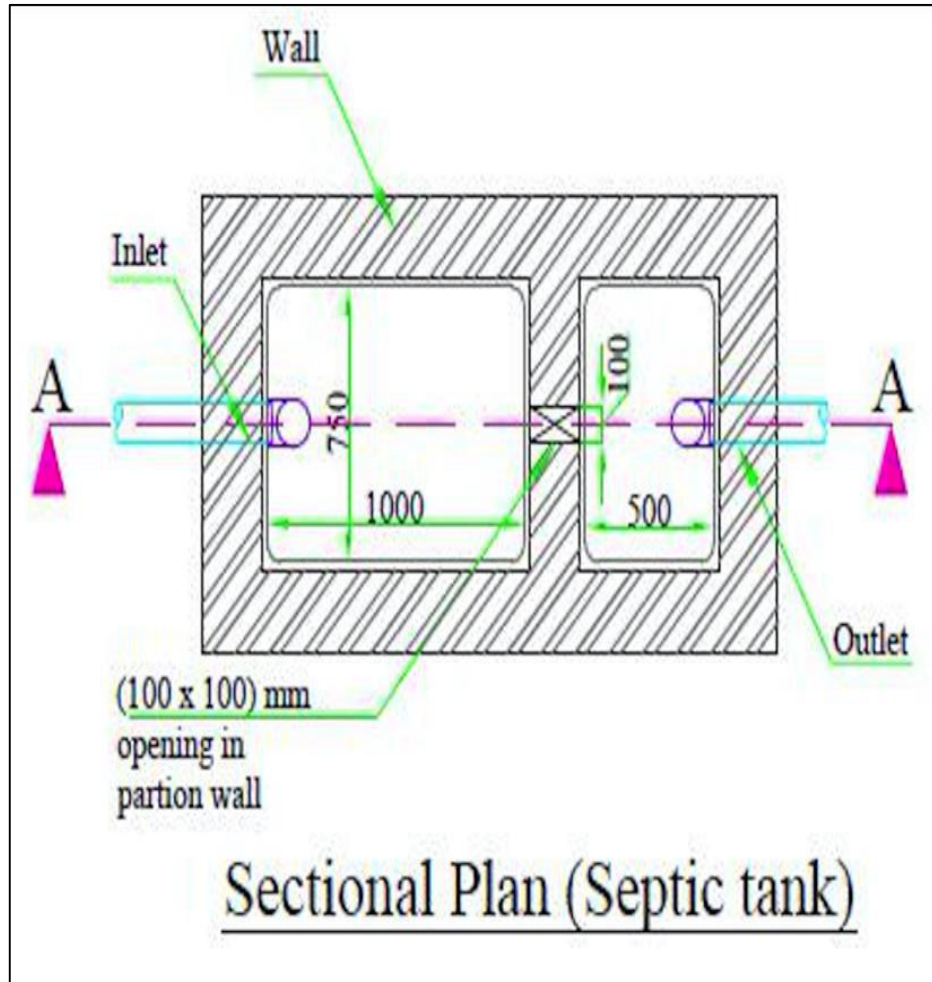


1. Superstructure

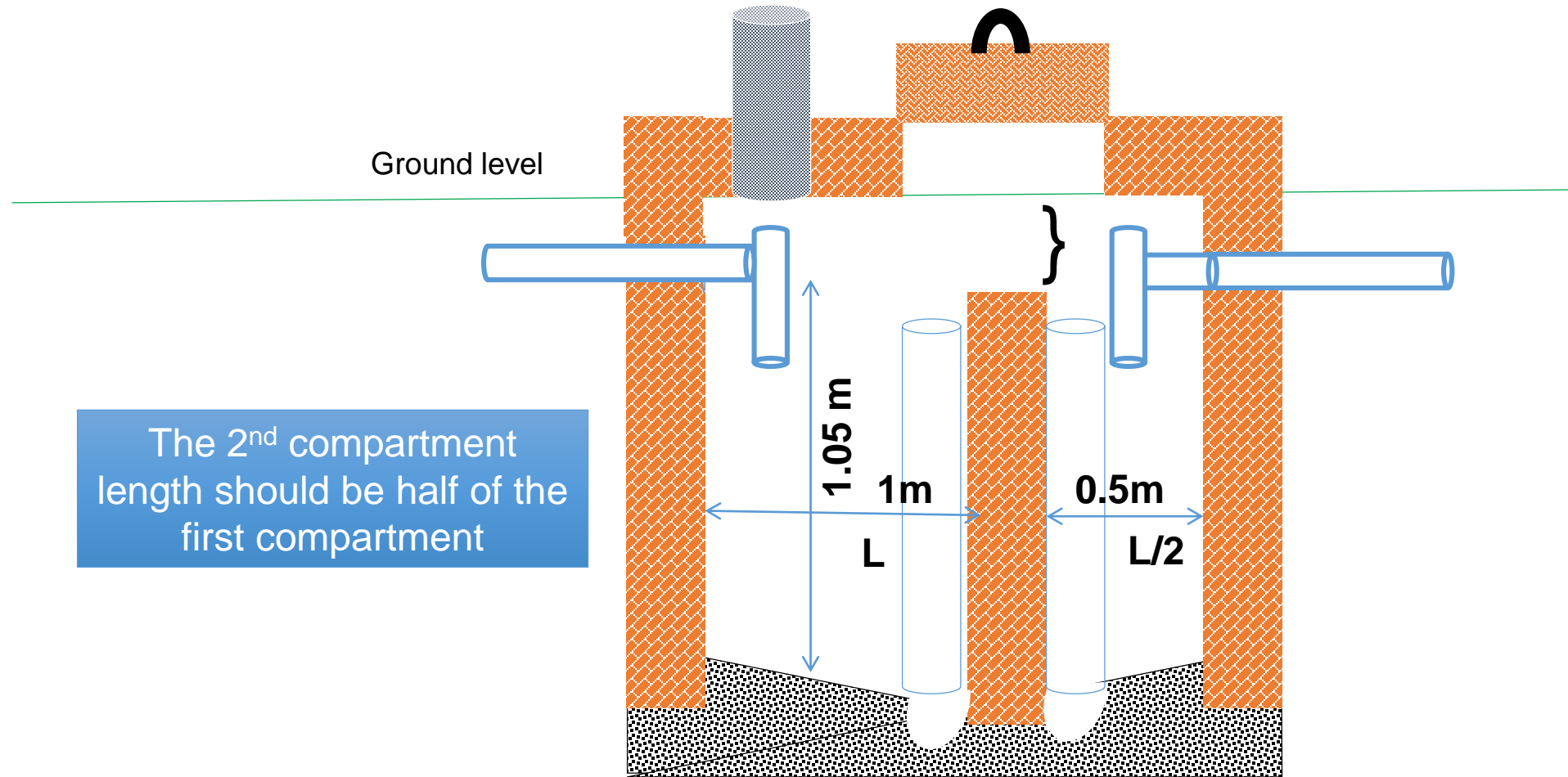
2. Septic Tank

3. Soak Pit

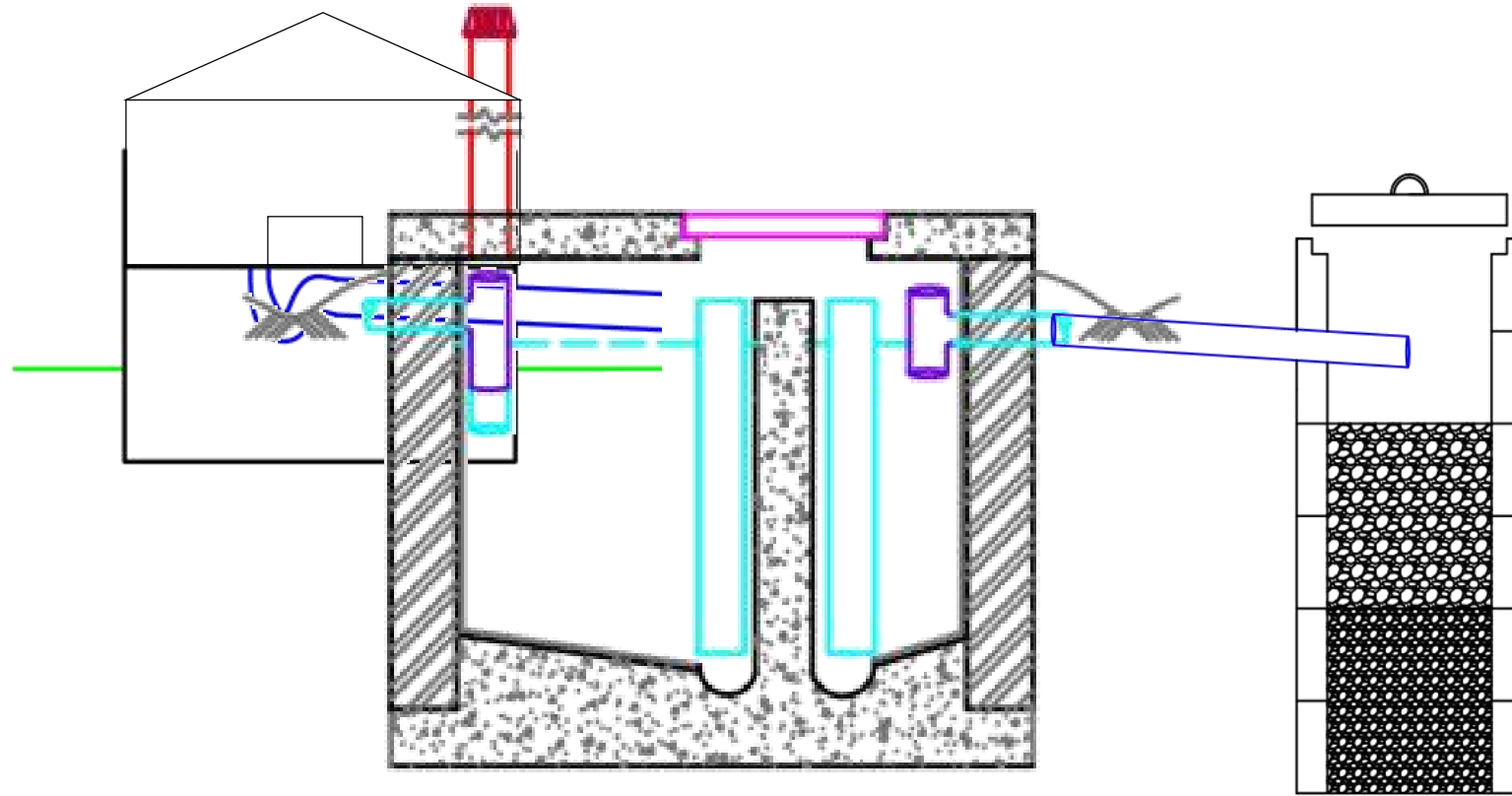
Septic tank (section & plan)



Guideline for compartment



Soak pit Design Aspects

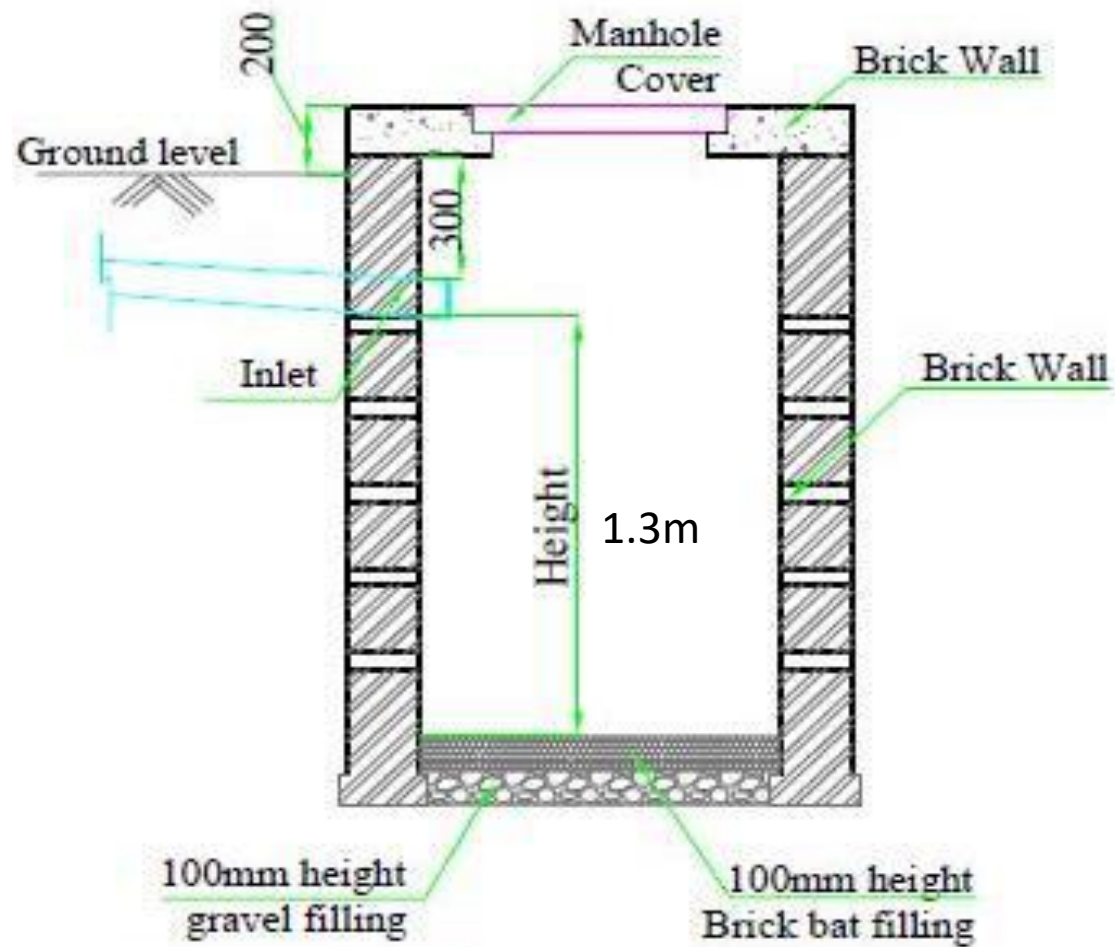


1. Superstructure

2. Septic Tank

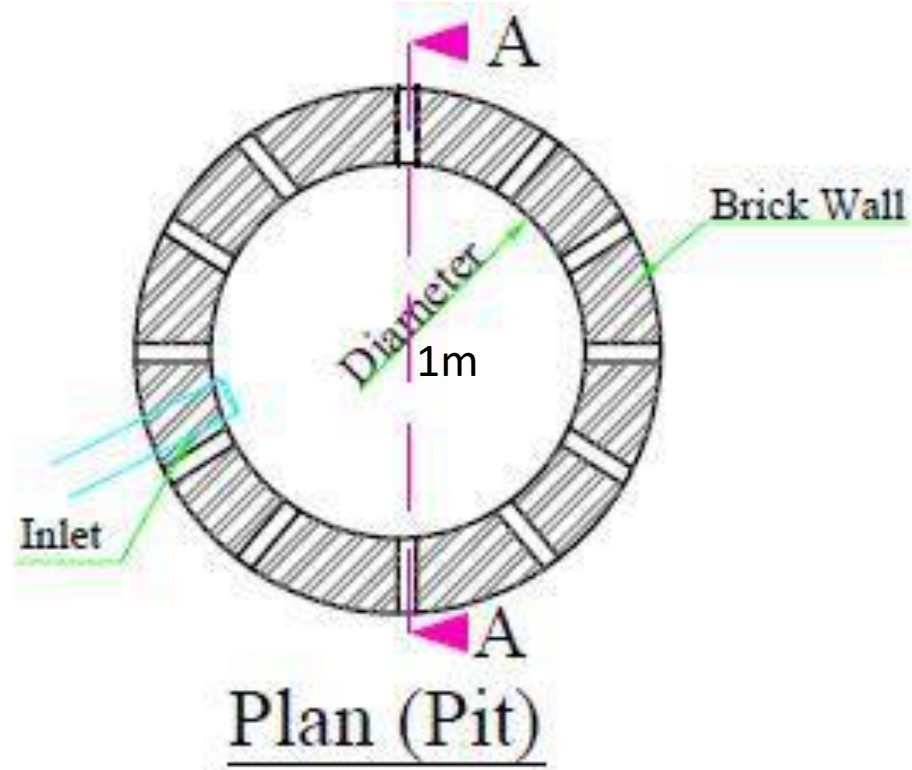
3. Soak Pit

Section of Pit

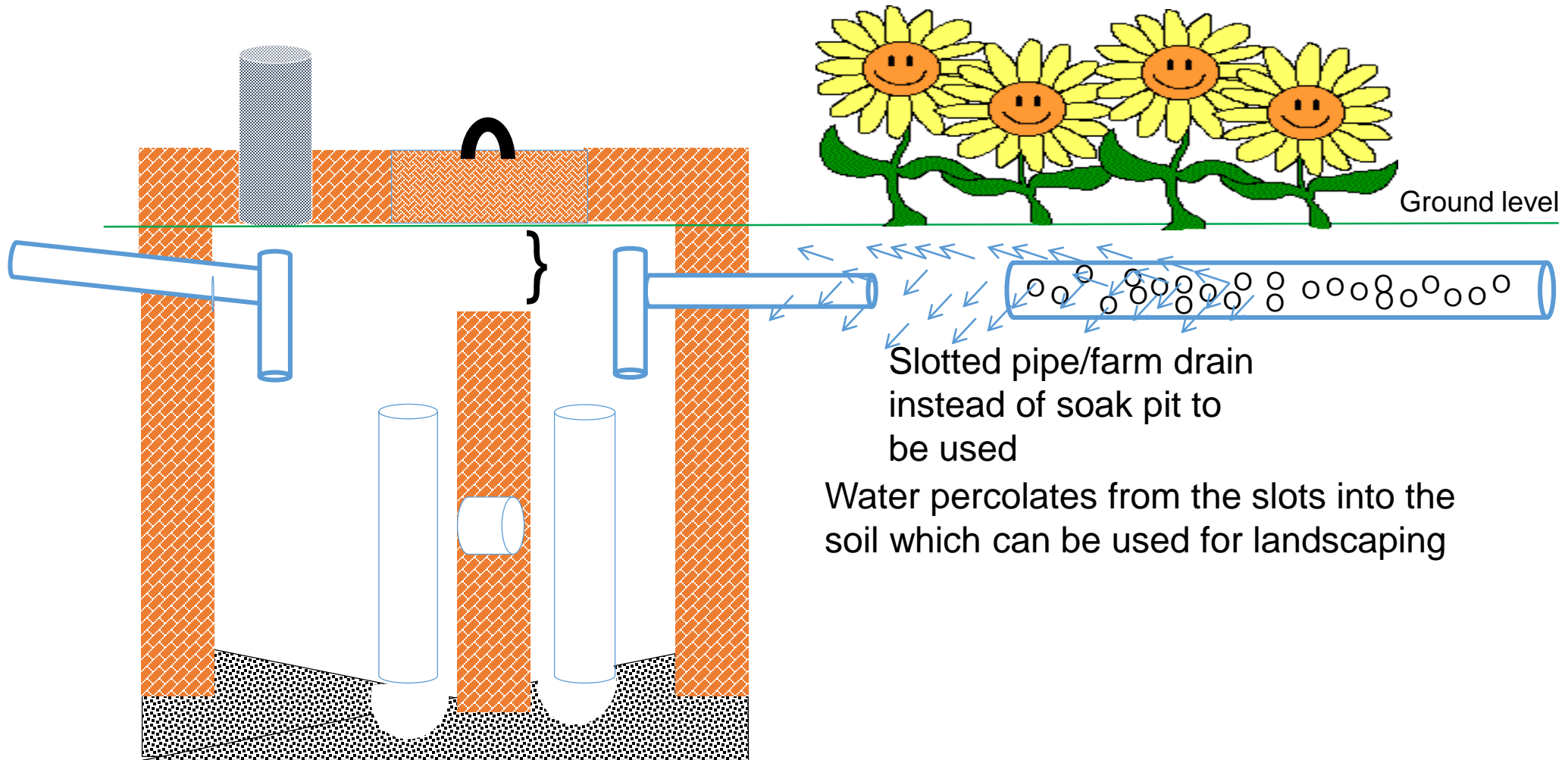


Section A-A

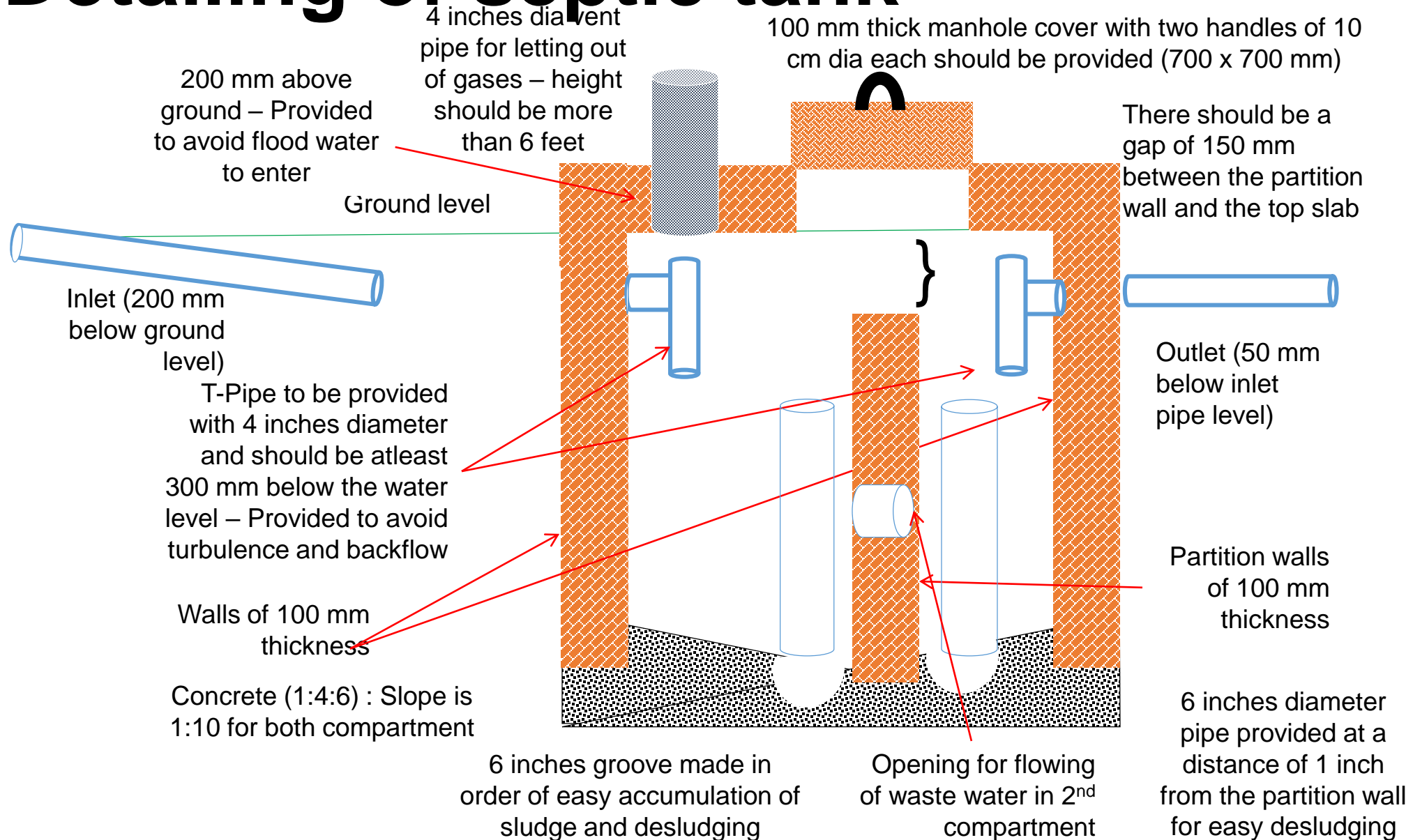
Plan of soak pit



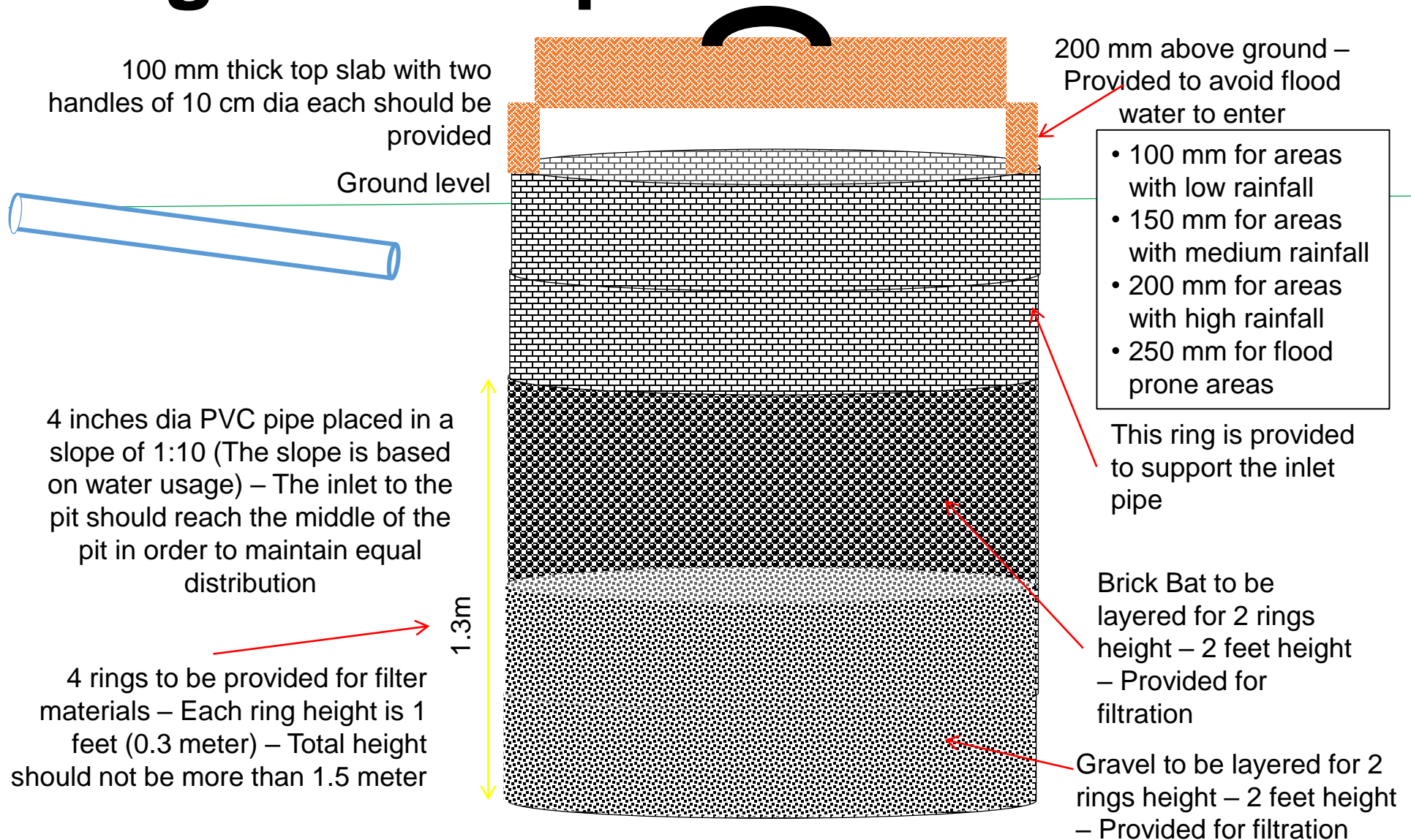
Draining Trench



Detailing of septic tank



Detailing of Soak pit





Finer aspects of septic tank

Septic tank need to be periodically desludged (local municipality must ensure this service).

Septic tank outlet cannot be let out into storm water drain.

Septic tank must always be followed by soak pit or draining trench, if not can be connected to a farm drain for reuse.

Septic tank walls and base have to be water tight.

How to construct a Septic tank?



Step by Step

Step for construction – Day 1



Marking for excavation – 1 hour



Step for construction – Day 1



Excavation – 1 day

Step for construction – Day 2



Leveling of the base

Step for construction – Day 2



Leveling of the base

Step for construction – Day 3



RCC 1:4:8 for base slab and leveling

Step for construction - Day 4,5



Wall construction – Hollow bricks/ Sun dried Bricks/ RCC

Steps for construction – Day 4,5



Inspection
chamber for
bigger size septic
tanks

Opening in Partition wall

Step for construction – Day 5



110m dia pipe – embedded
in wall

110m dia Tee



Fixing Inlet / Outlet pipes

Steps for construction – Day 6



Waterproof plastering of walls

Steps for construction – Day 7



Frame with rebar for Septic tank roof

Step for construction – Day 7



Top RCC with Opening for Manhole

Steps for construction – Day 8



provide manhole and cast manhole cover

Step for construction – Day 9



Provision for Air Vent

Steps for construction Day 9

Air vent pipe



Fixing – Vent pipe with vent cowl

Steps for construction – Day 9



Piping and connecting to toilet pan

Steps for construction Day 10



Backfilling

Step for construction - day 10



Backfilling & Clearing of Debris

Exercise time



Exercise

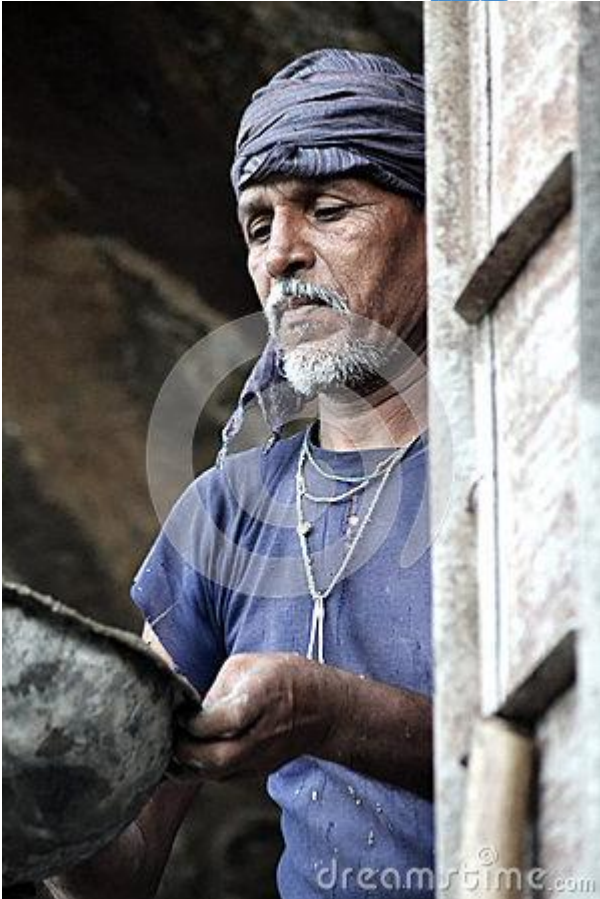


Mr. X is constructing a pour flush toilet. He wants to connect it to a septic tank

He calls you to do the job

Exercise

You have to construct 1 septic tank with soak pit with given information



- Given: 1 household = 5 person
- Frequency of desludging = 3 years
- Length of septic tank= 2m
- Breadth of septic tank=0.9m
- Depth of septic tank= 1m
- PVC non-pressure pipe =100 mm diameter
- Gradient= 1:10
- No. of labour=2



Answer the following

- How will you check the feasibility?
- What are the tools required?
- What is the time required for different activities?
- Approx. quantity of bricks required?
- Approx. quantity of mortar required?
- What will be the cost of construction?

Resources required to construct a septic tank



Assumptions

No. of persons



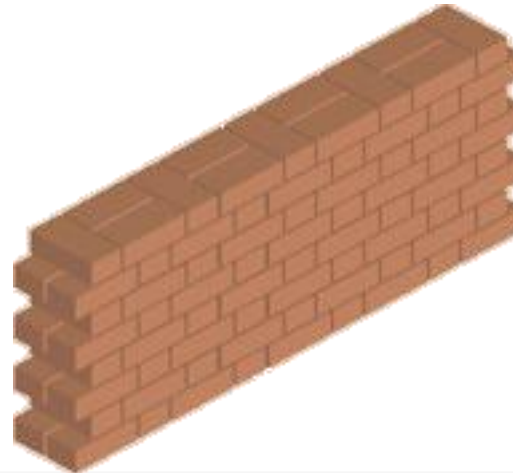
= 5

Frequency of desludging



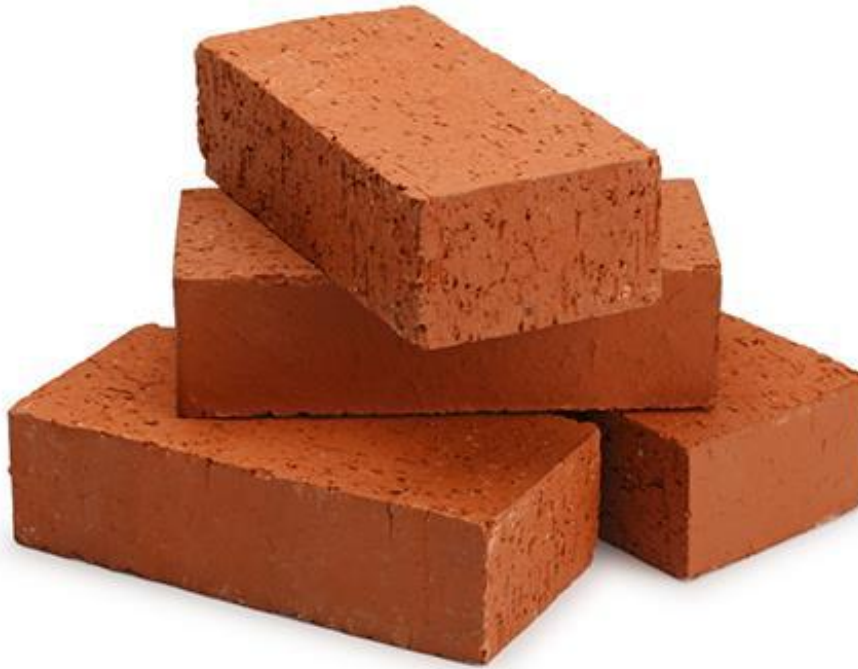
= 3 years

Wall Thickness



= 200 mm

Resource Required



Bricks

Bricks	
Quantity	2000 numbers

Resource Required



Cement

Bricks	
No. of Bags	15
Quantity	750 kg
Total	750 kg (15 bags)

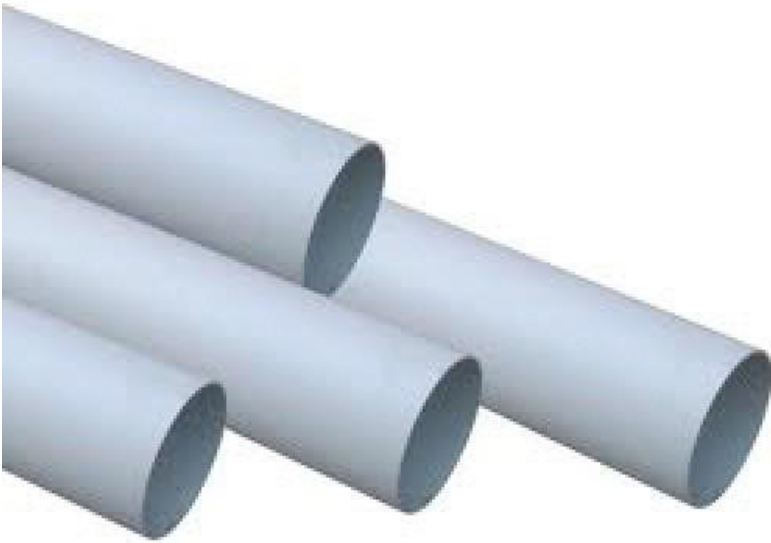
Resource Required



Sand

bricks	
Quantity	1.2 cum

Resource Required



PVC Pipes

Pipes	
Length	6 feet
No.	2
Diameter	4"

Resource Required



Coarse aggregates	
Quantity	1.4 cum

Aggregates

Resource Required



50 Kg

Steel bars



Total Resource Requirement

Resources	Unit	Quantity
Brick	Nos.	2000
Cement	Kg (bags)	750 (15 bags)
Sand	cum	1.2
Pipes	Nos.	2 (6 feet)
Aggregates	cum	1.4
Steel rods	Kg	50

Tools required



Mortar pan



Square
Trowel



Hawk

Joint
Filler



Bricklayer
Hammer



Mason
Trowel

Tools required

Plumb bob



Steel square



Leveler








Chalk Line



Blocking chisel

Do's and Don'ts for septic tank

-  Never throw objects in toilet
-  Provide ample space for desludging the septic tank
-  Provide easily openable manhole covers
-  Septic Tank should always have two chambers and watertight
-  Soak pit should be located atleast 10 ft away from the water source



Thank You!