Mason's Training Programme on Onsite Treatment Systems

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

November 18, 2016

TECHNICAL SUPPORT UNIT:

iihs™
INDIAN INSTITUTE FOR HUMAN SETTLEMENTS

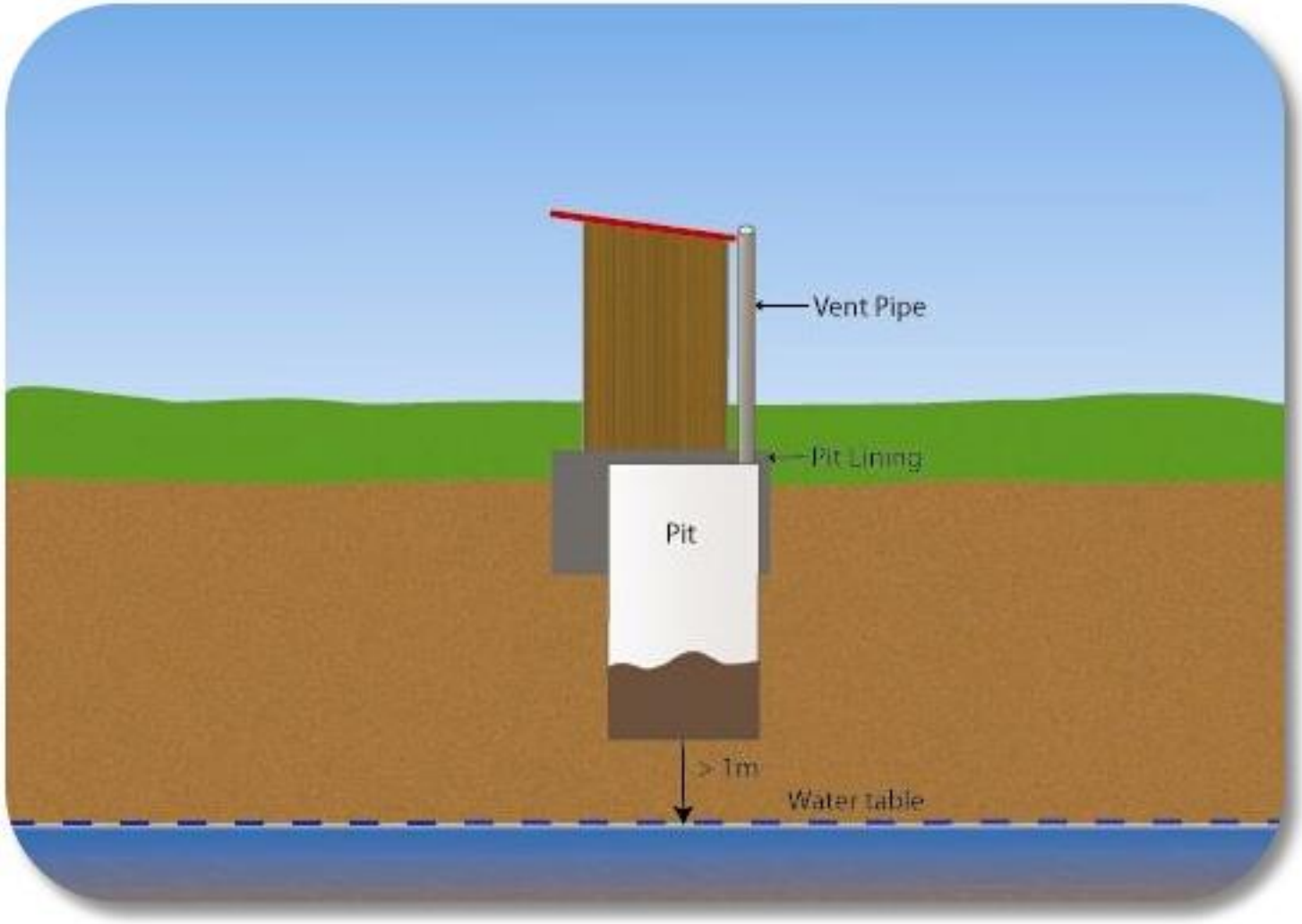
IN ASSOCIATION WITH:

Keystone

Gramalaya

CDD Consortium for DEWATS Dissemination Society

Groundwater table is high

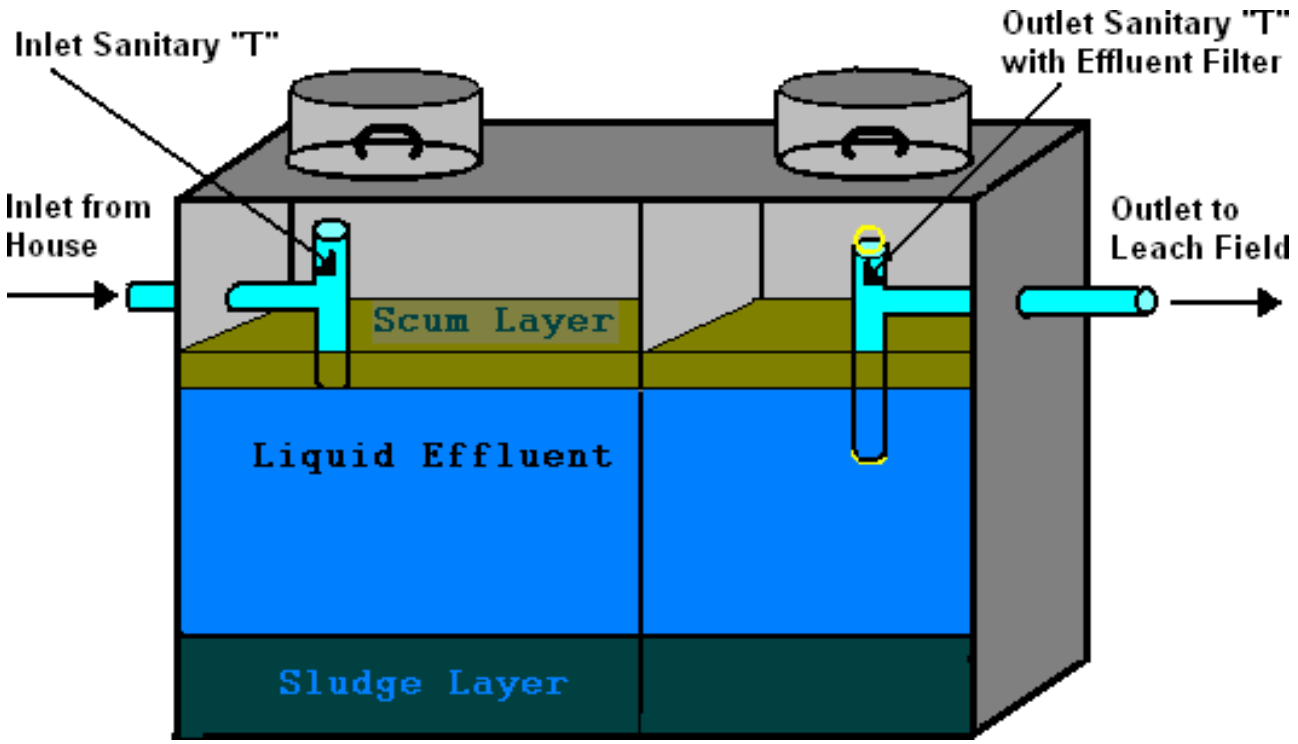


Which onsite system to install?

?

Pit system are not suitable for such conditions

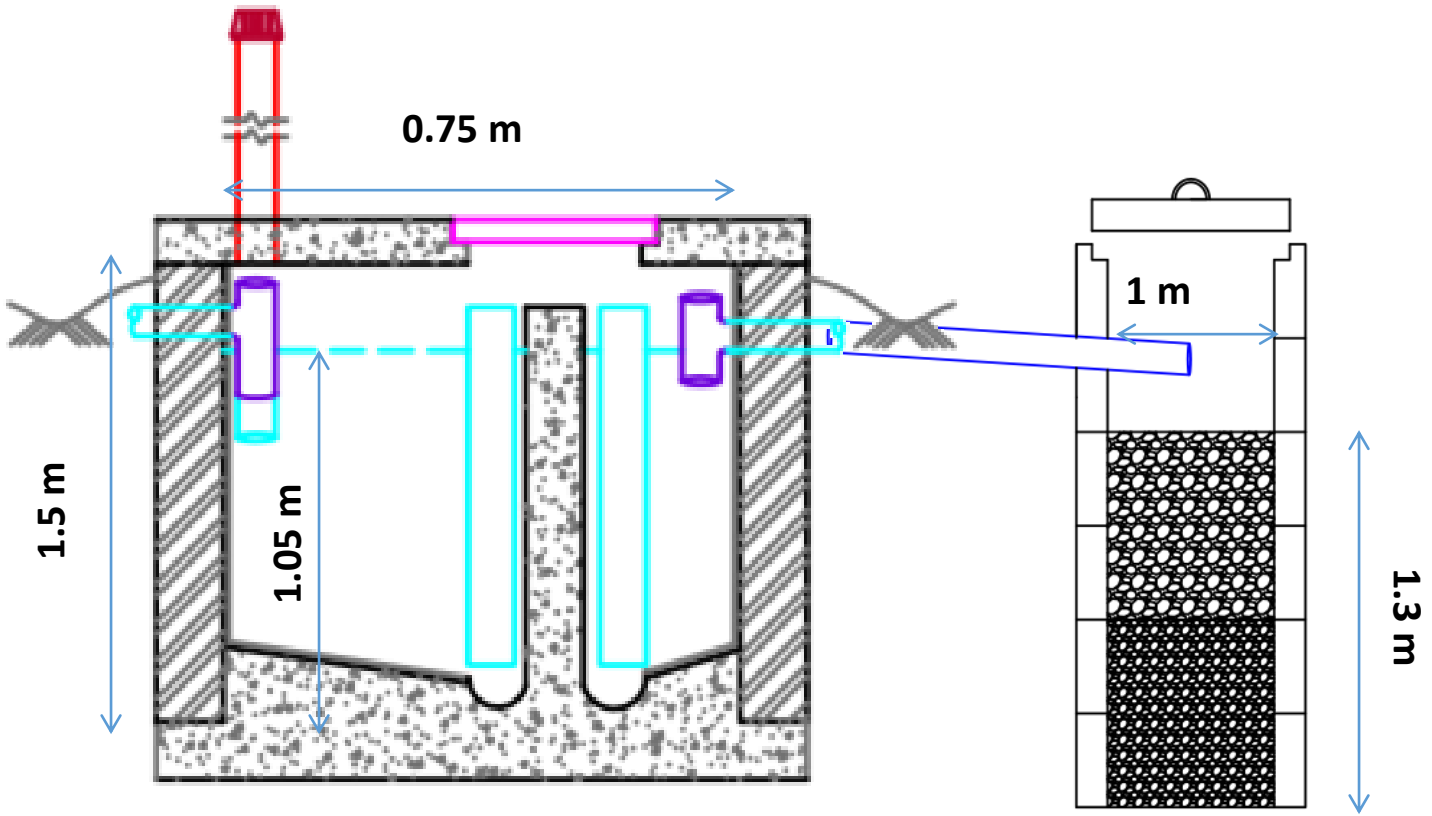
Septic tank



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									
	5 users			10 users			15 users		
Septic tank	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						
	5 users		10 users		15 users	
Soak Pit	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

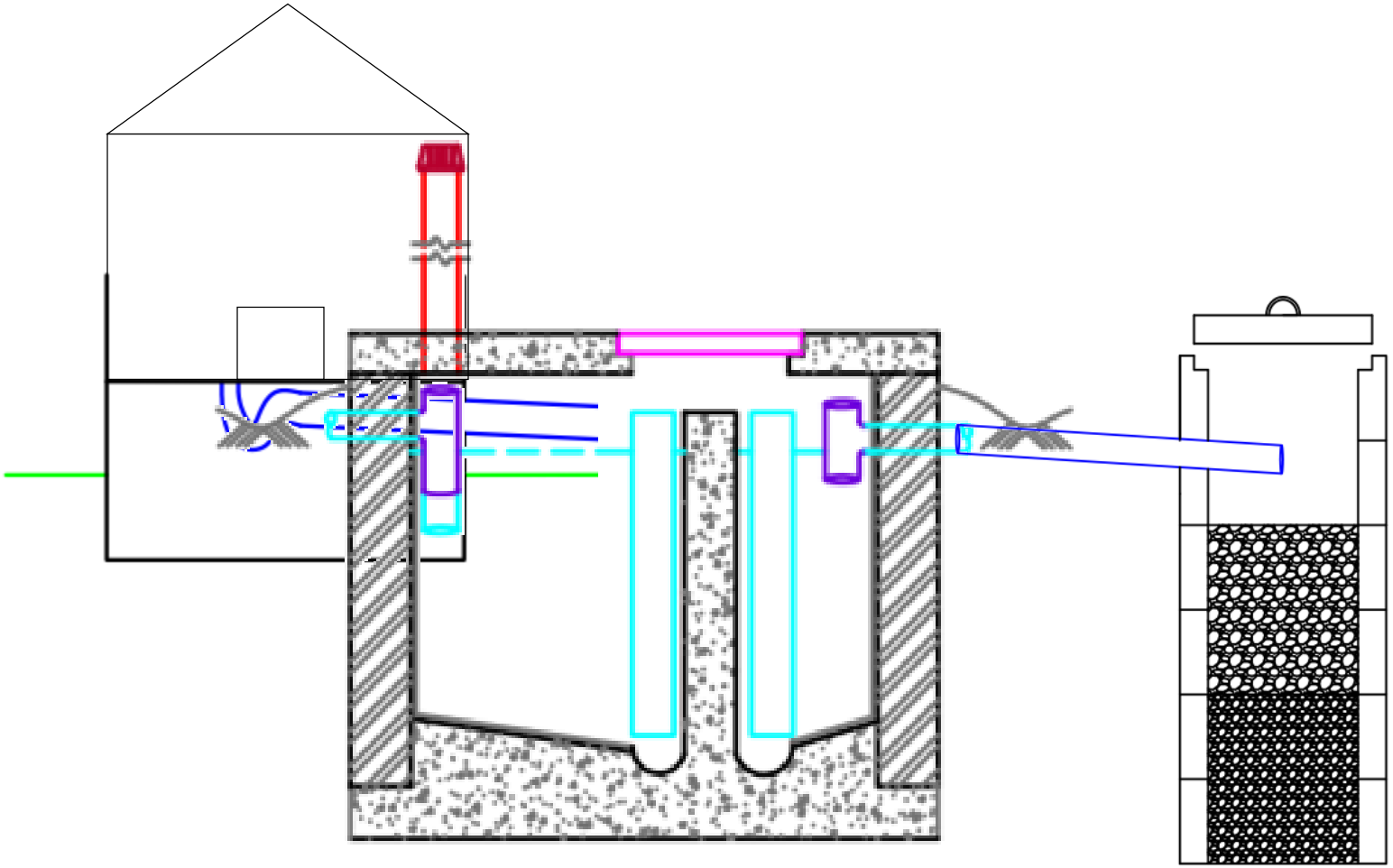
1.Superstructure

2.Septic Tank

3. Soak Pit

Lets get started…

Septic tank Design Aspects

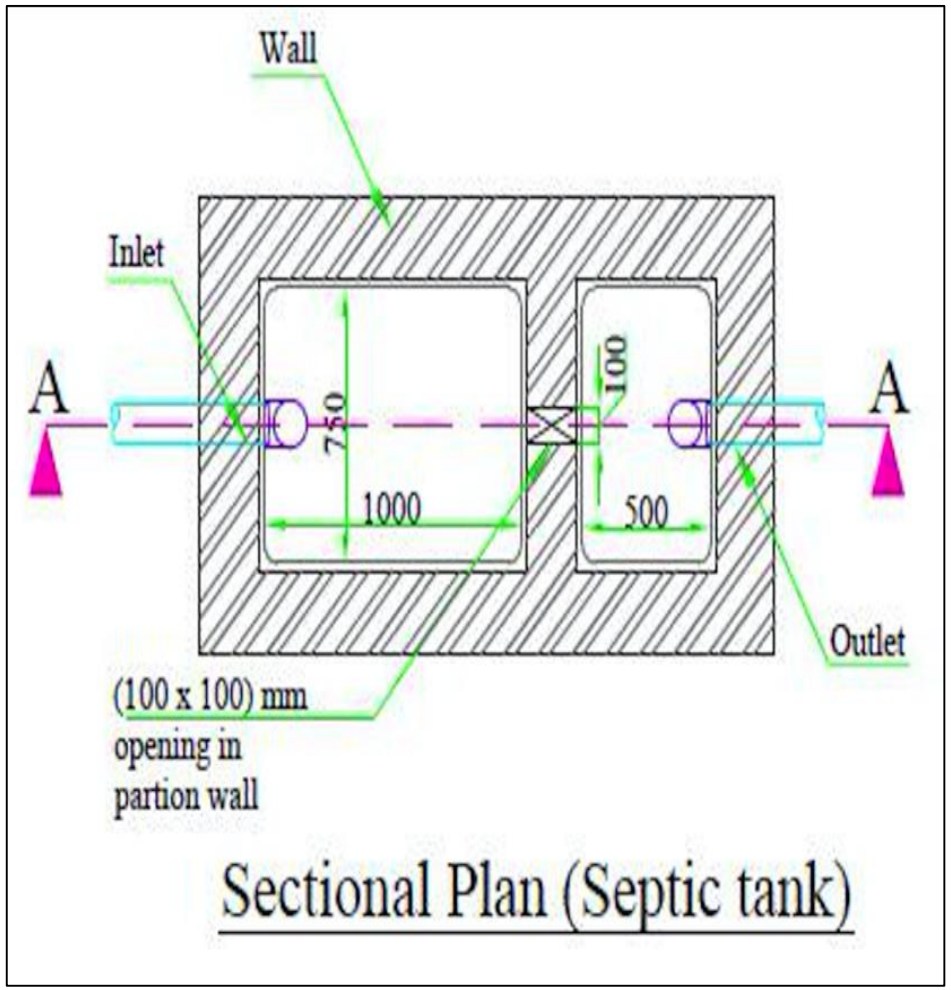


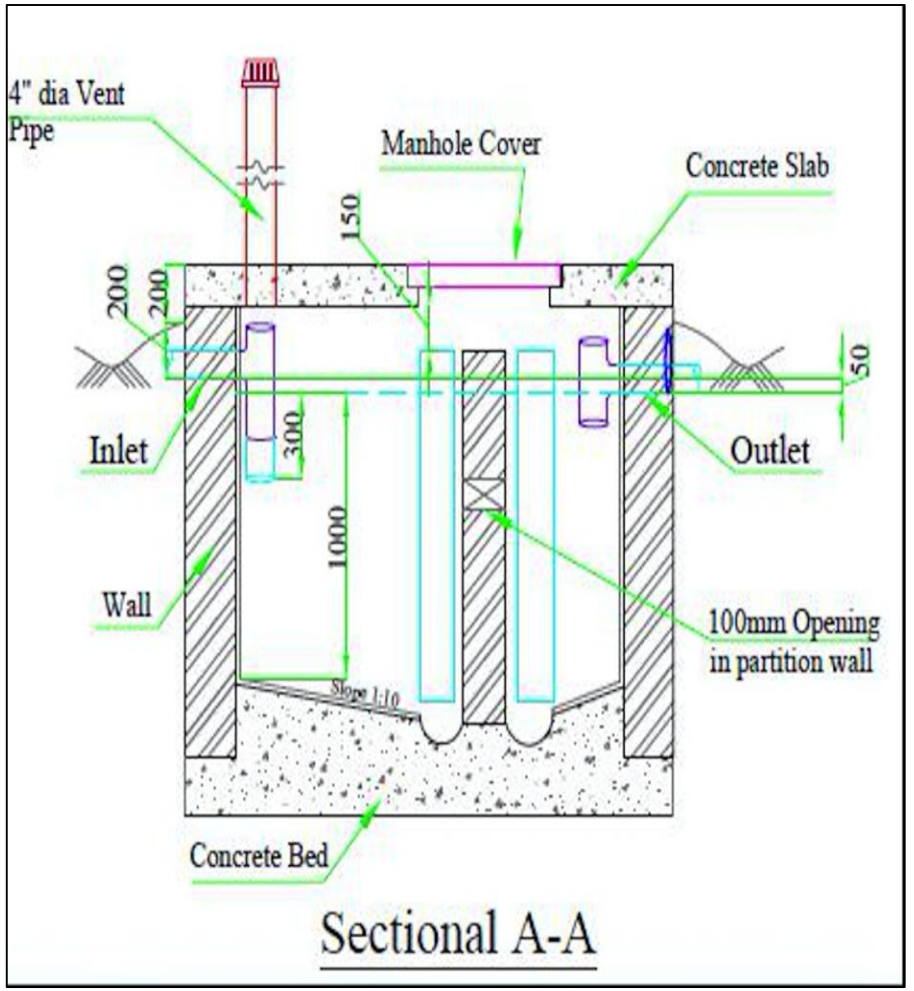
1.Superstructure

2.Septic Tank

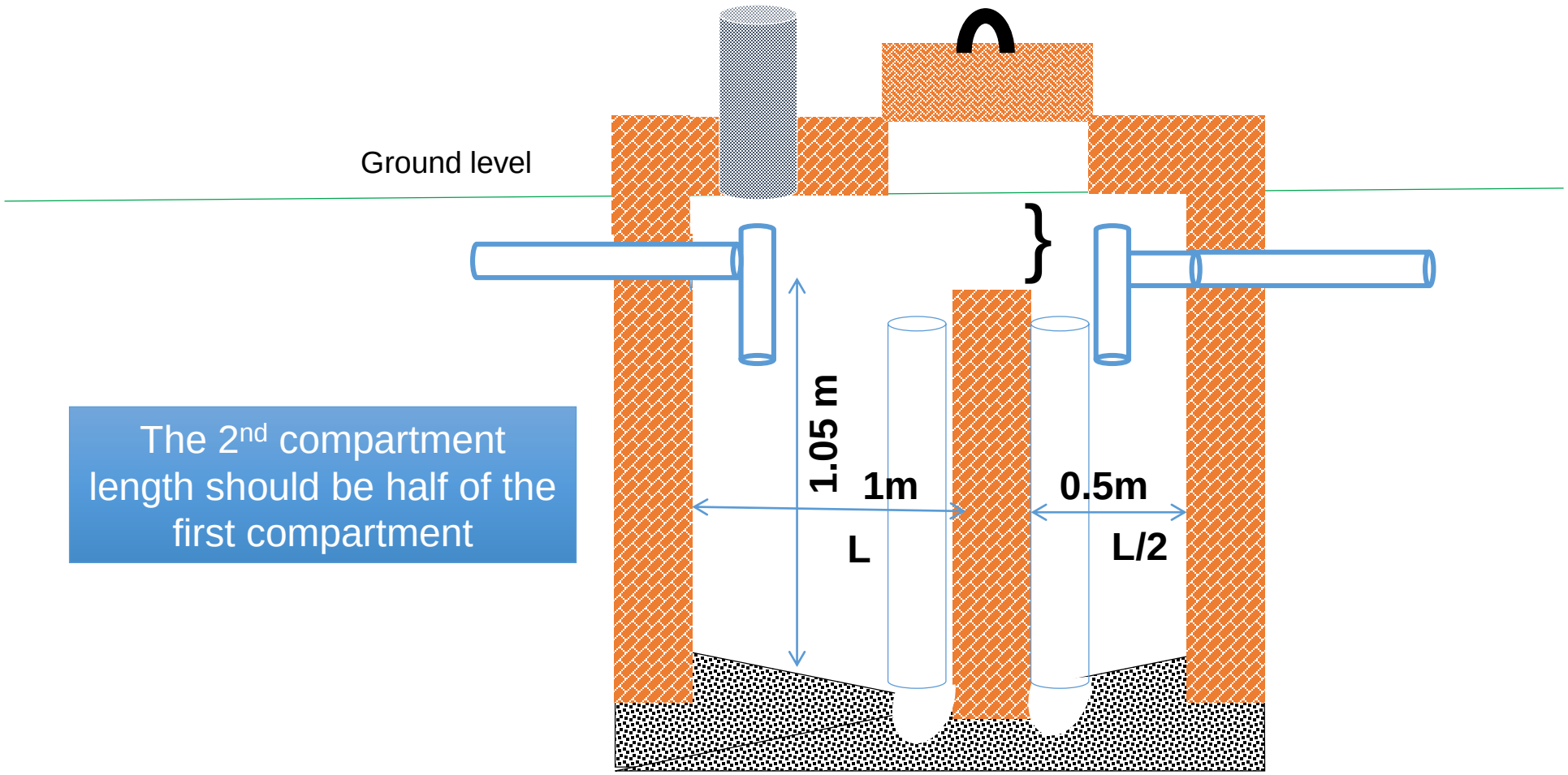
3. Soak Pit

Septic tank (section & plan)



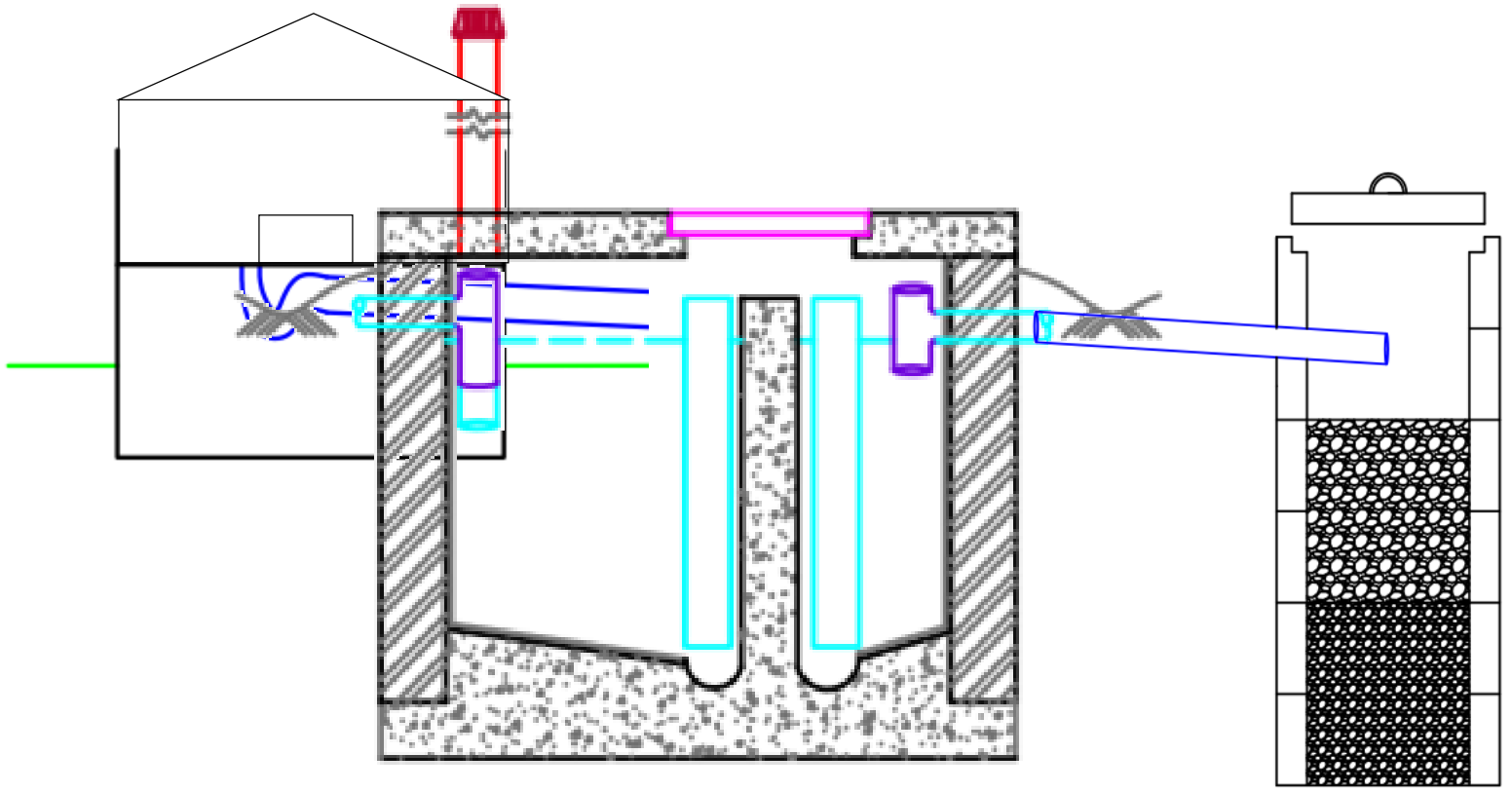


Guideline for compartment



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

Soak pit Design Aspects

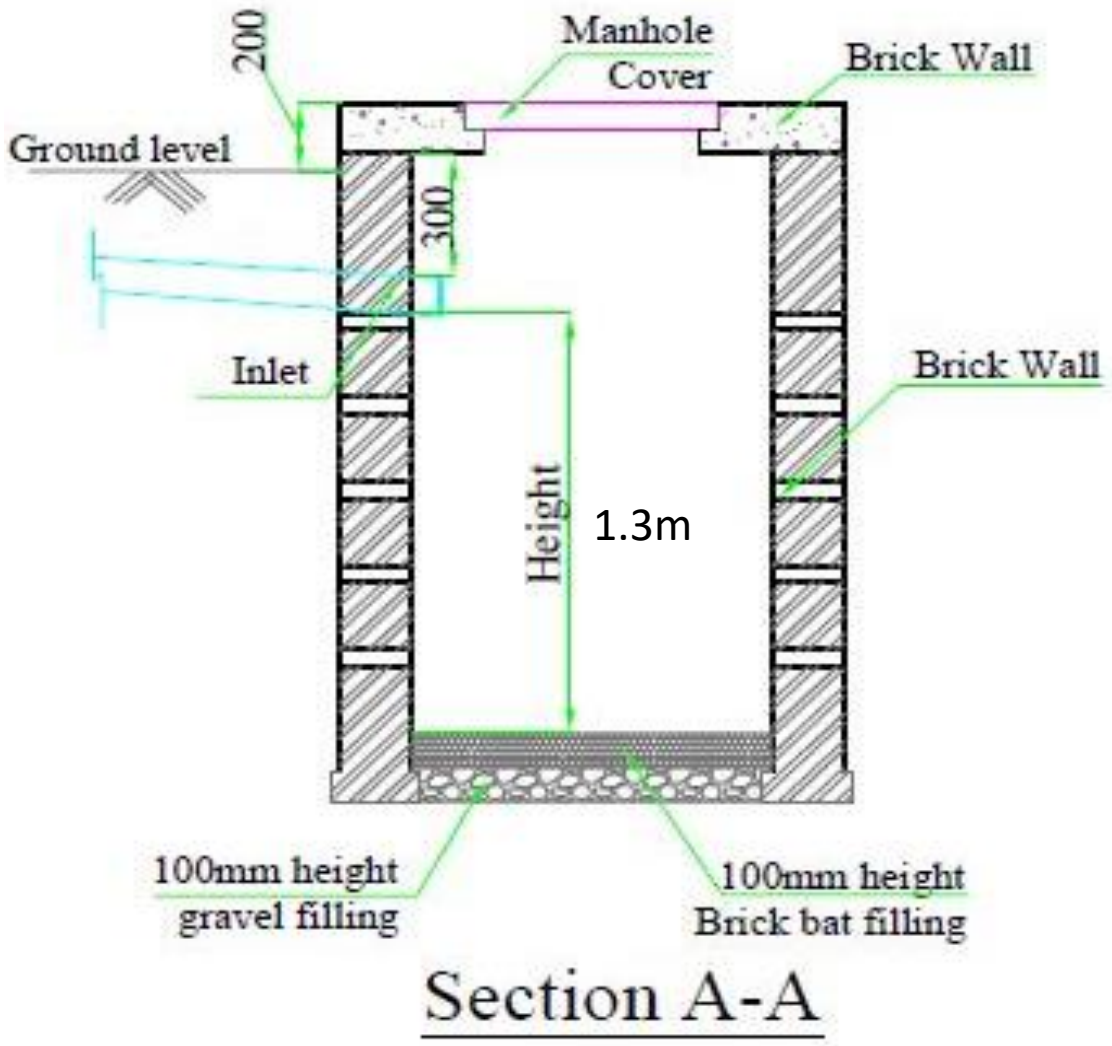


1.Superstructure

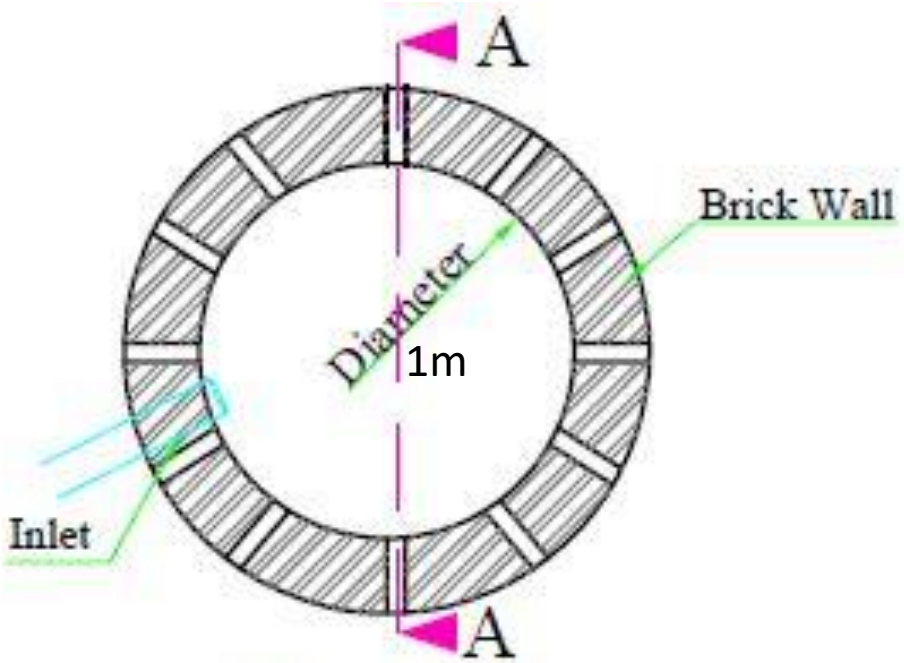
2.Septic Tank

3. Soak Pit

Section of Pit

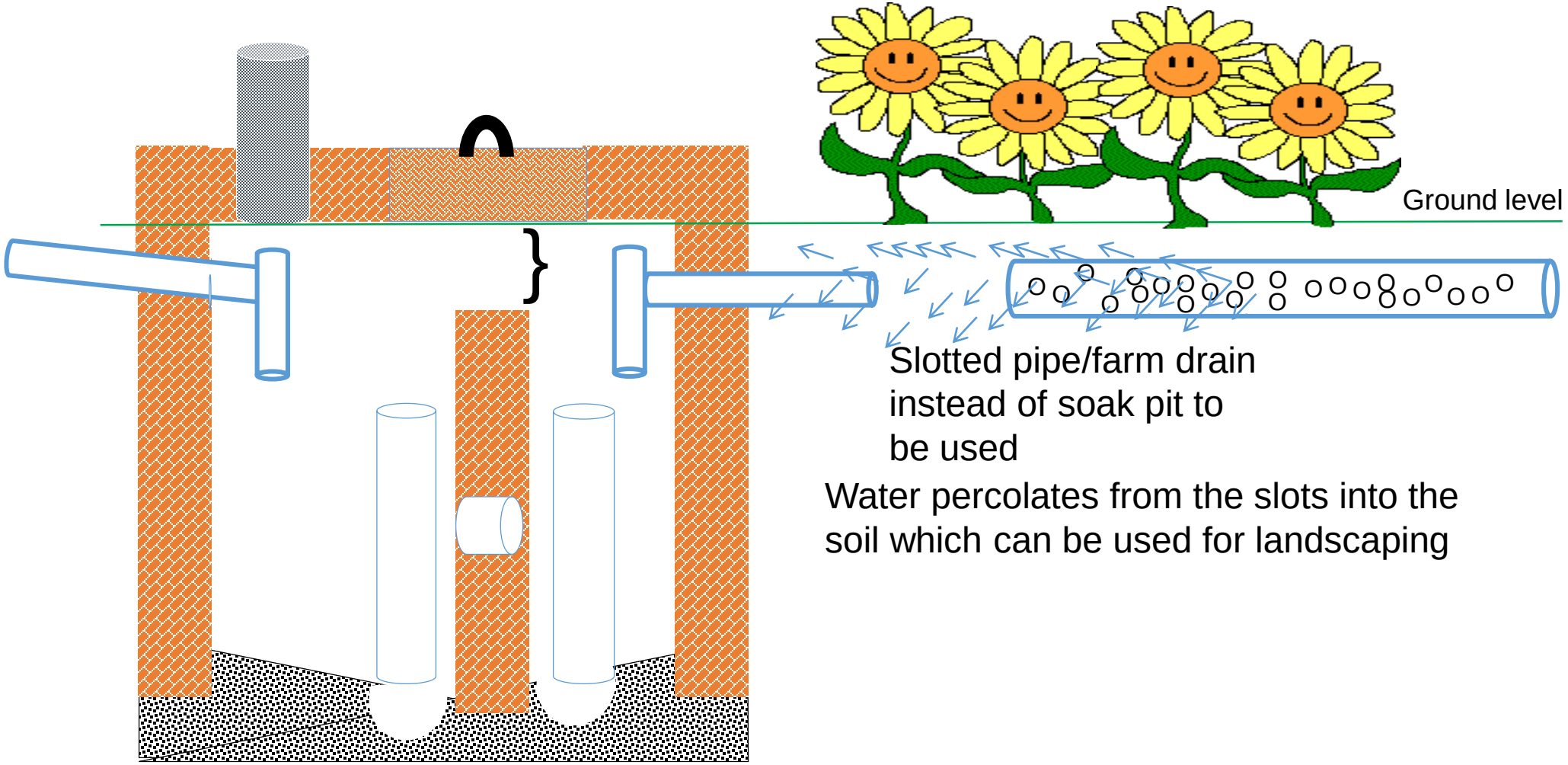


Plan of soak pit



Plan (Pit)

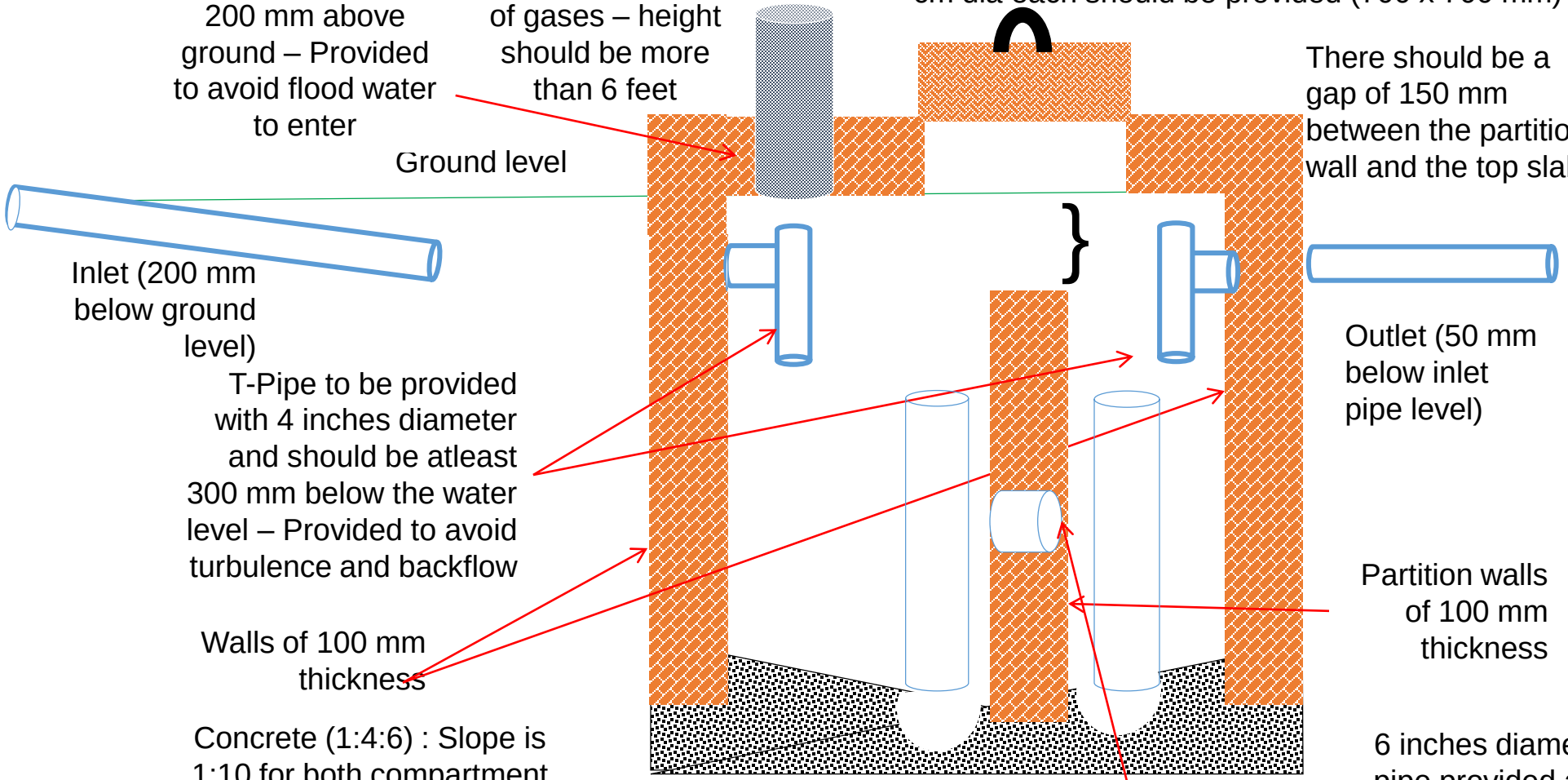
Draining Trench



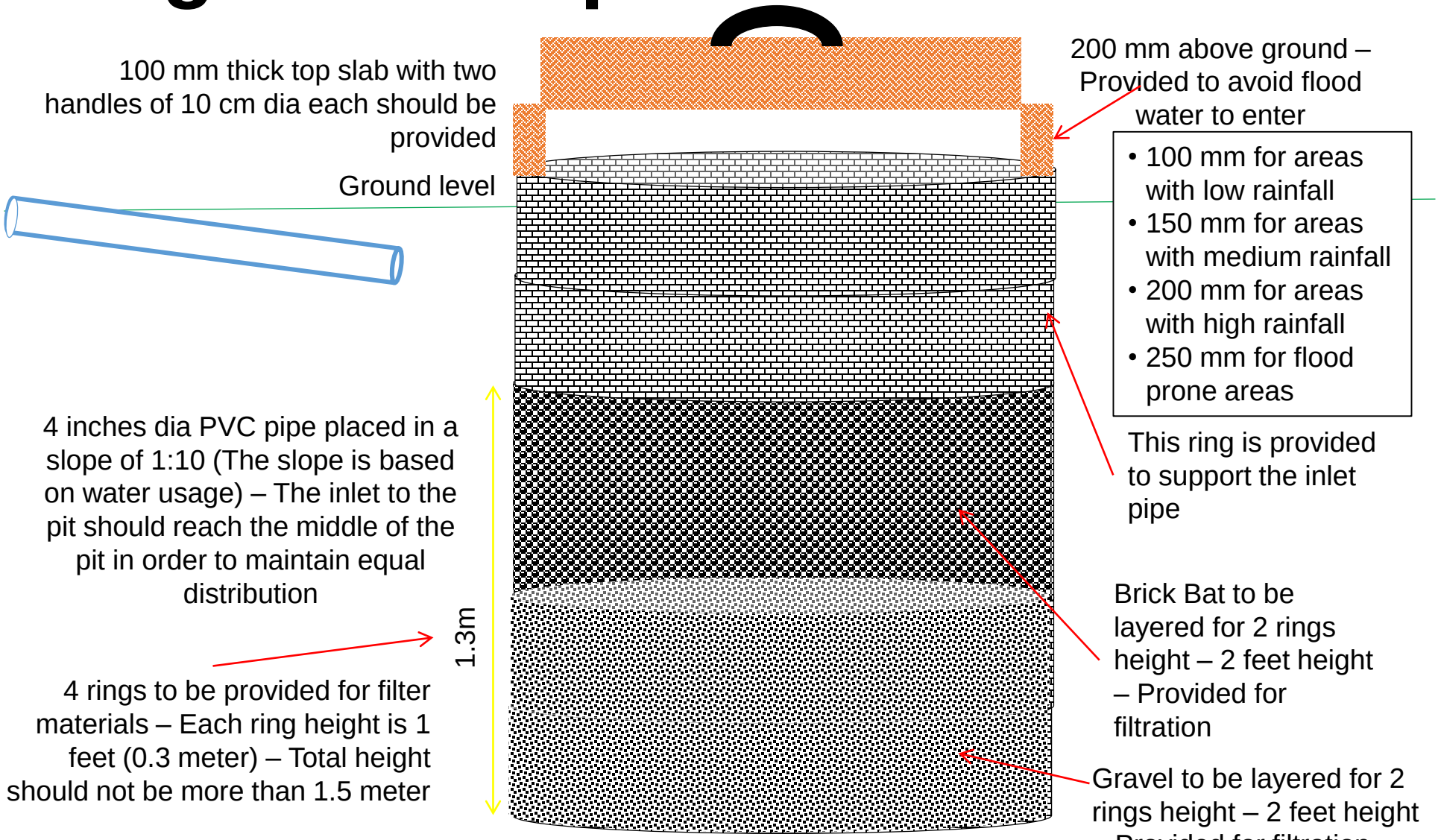
Slotted pipe/farm drain instead of soak pit to be used

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

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

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

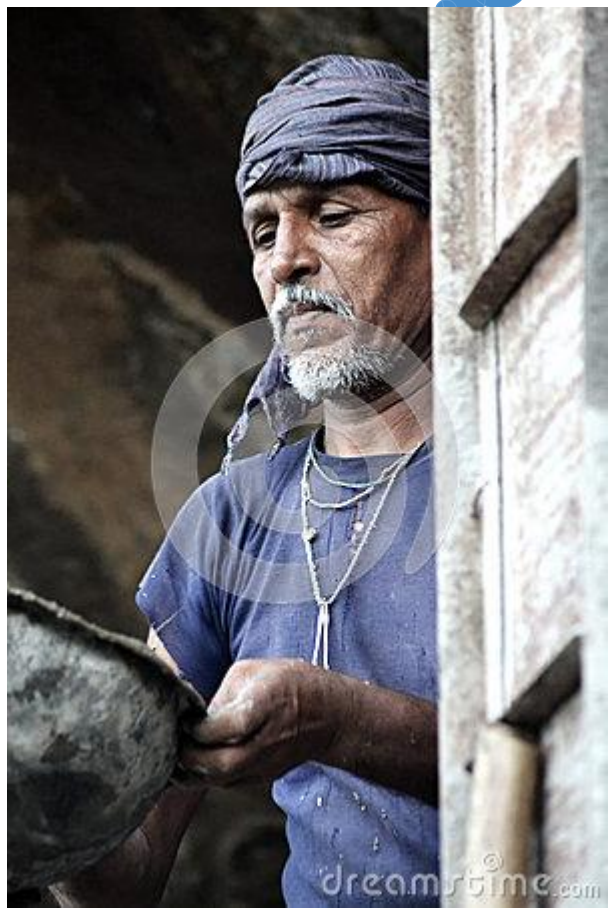
Exercise

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

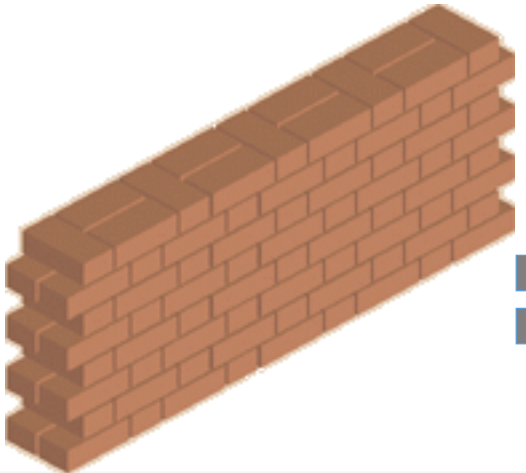
No. of persons

= 5

Frequency of desludging

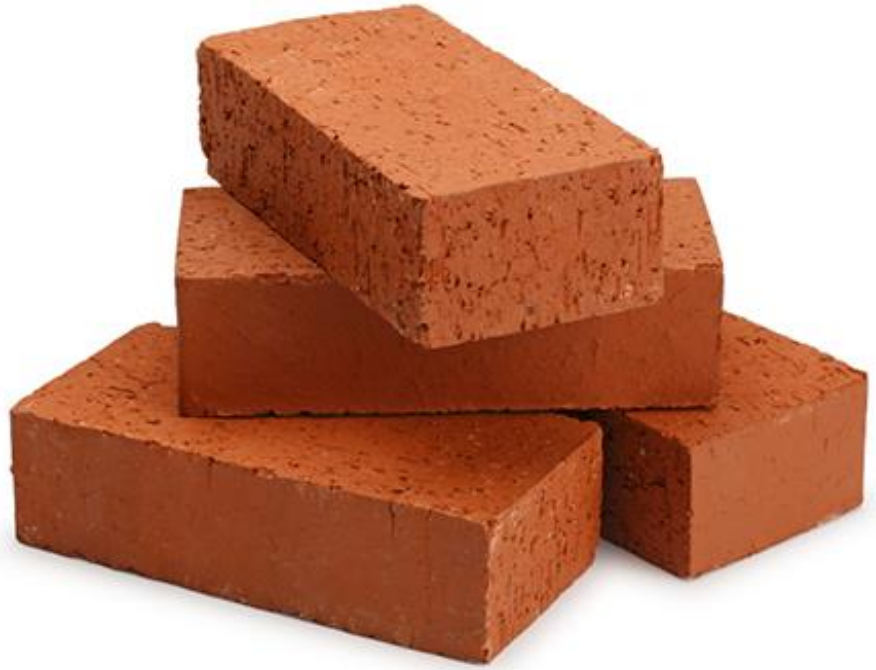
= 3 years

Wall Thickness



= 200 mm

Resource Required



Bricks

Bricks	
Quantity	2000 numbers

Resource Required

Cement

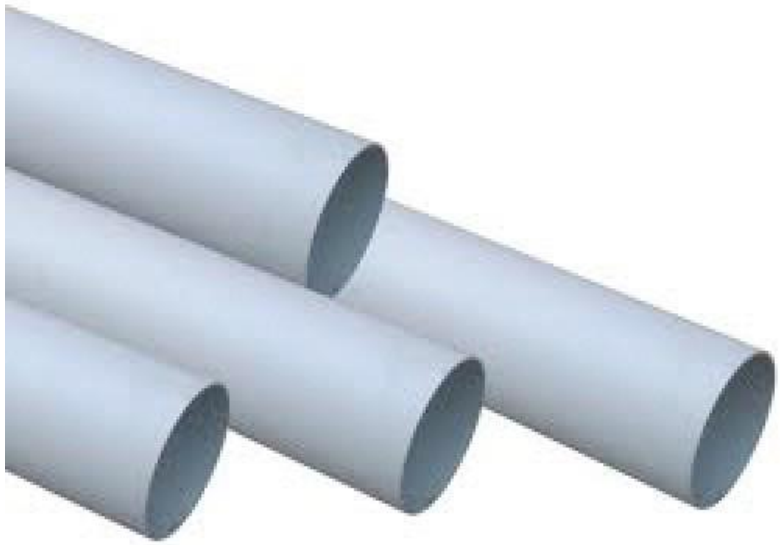
Bricks	
No. of Bags	15
Quantity	750 kg
Total	750 kg (15 bags)

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

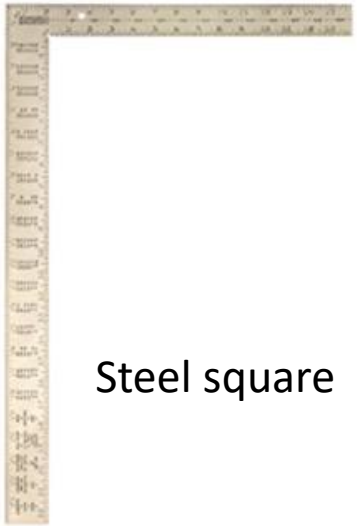
Joint Filler

Bricklayer Hammer

Mason Trowel

Tools required

Plumb bob



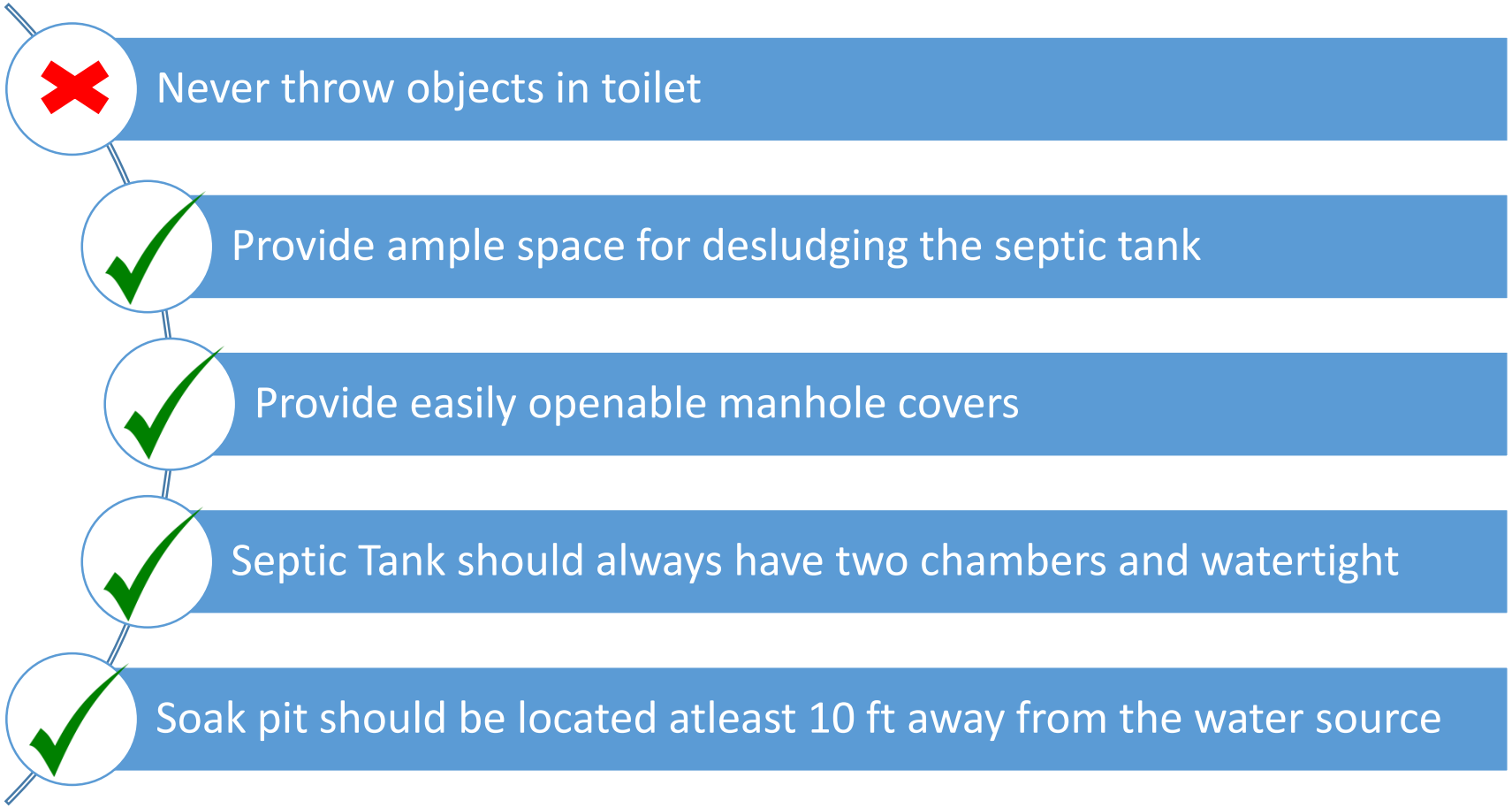
Steel square

Leveler

Chalk Line

Blocking chisel

Do’s and Don’ts for septic tank



Thank You!