



# MODERNISTIC WASTE WATER SOAKAWAY

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**Abstract:** Urbanization and industrialization is trend of this and past century and it taking over in every field possible. As fast technology is growing the side effects are now coming in views. The more urbanization and population are growing the more pollution and waste is being generated. Waste consists of plastic, waste water, degradable and biodegradable material. Some of the waste can be recycled, some can be reused and some just disposed. Now that earth consist 70 % of water, the waste water is comes walking right behind it. But main relief is waste water recyclable and reusable. Government install sewage treatment plants wherever possible but it is not possible to install in some of rural areas as there is other alternative to this problem is soak pit. The aim of this study to analyze and to study soaks pit method in detail in order to highlight its importance more.

**Index Terms - Soakaway, Waste Water, Groundwater, Recycling, Pollution Control**

## I. INTRODUCTION

In rural areas domestic wastewater is a source of wastewater i.e. water utilized for bathing, cooking, washing utensils and clothes. Such water is not so dangerous and can be a source of artificial groundwater recharge with some basic treatment. Also the wastewater in rural areas is disposed of on open land and gutters which creates unhygienic condition which causes different diseases to people living around. Utilizing such wastewater can avoid such condition and can help to increase the groundwater

The waste water from houses like water used for bathing, washing clothes and utensils is disposed in gutters and on open land in rural areas. Such water creates unhygienic condition in nearest areas. Also villages have lack of drainage system. Such disposal creates nuisance of mosquito to the people and also various diseases rises. The study is about disposal of domestic wastewater without creating unhygienic condition at domestic level. The study uses the method of magic soak pit for disposal of wastewater. The study identifies that the magic soak pit method is safe to dispose the wastewater. The method used is not only disposes the wastewater but also increases the ground water level.

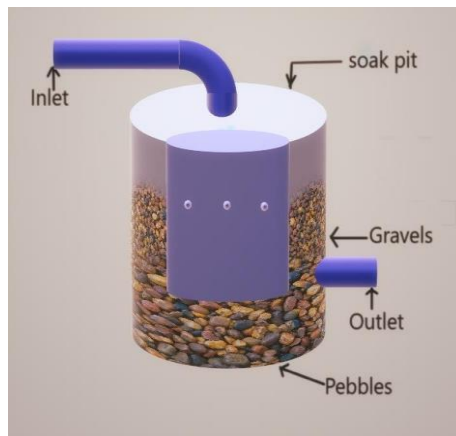


Fig. 1.1 agic Soak pit

Water -:

Water is a transparent and nearly colorless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. Its chemical formula is H<sub>2</sub>O, meaning that its molecule contains one oxygen and two hydrogen atoms that are connected by covalent bonds. Strictly speaking, water refers to the liquid state of a substance that prevails at standard ambient temperature and pressure; but it often refers also to its solid state (ice) or its gaseous state (steam or water vapor).

A greater quantity of water is found in the earth's interior. Safe drinking water is essential to humans and other life forms even though it provides no calories or organic nutrients. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. There is a clear correlation between access to safe water and gross domestic product per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability.

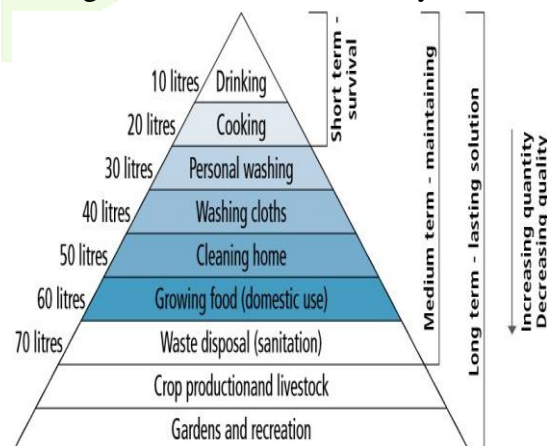


Fig.1.2 water demand

Soil

Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together support life. Earth's body of soil, called the pedosphere, has four important functions.

- As a medium for plant growth
- As a means of water storage, supply and purification.
- As a modifier of Earth's atmosphere
- As a habitat for organisms

### Problem Statement

The waste water generated from houses like water use for bathing, washing clothes and utensils is disposed in gutters and on open land in rural areas.

Such water creates unhygienic condition in nearby areas. Also villages have lack of drainage system.

Such disposal creates nuisance of mosquito to the peoples and also various diseases rises.

The above facts highlight the need to find effective system of waste water management to meet the problems of water demands, health aspects & purifying the domestic waste water.

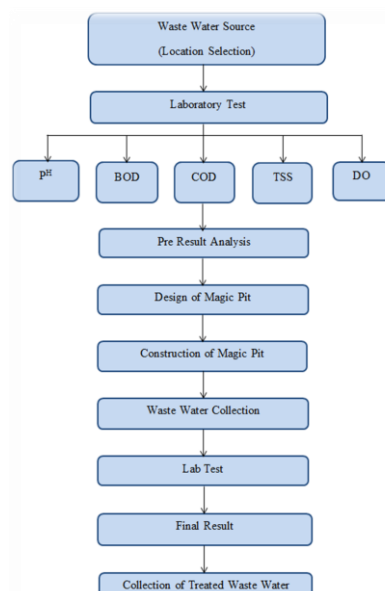
### Objectives:

1. To select the source of waste water generation and to study the properties of physical.
2. To carry out the various tests to find the properties like BOD, COD, TSS, etc.
3. To design the magic pit, based on discharge of wastewater.
4. To analyze physical and chemical impurities from the treated waste water from magic pit.
5. To check the feasibility of uses of waste water.

## I. RESEARCH METHODOLOGY:

We studied about the project resources and requirements, literature studies and schedule to get more information in this study. All the materials are collected from journals, texts books and research papers gathered from the libraries and internet and performed.

In this project we studied the water characteristics, wastewater characteristics, soil properties,



materials and equipment's needed to do the project.

## DESIGN AND CONSTRUCTION

### Design of Septic Tank

A septic tank is designed to carry out the liquid waste of the household or community including human feces. It has to be constructed based on the instruction given in the Indian Standard code IS 2470.

#### Design consideration of Soak pit

- The soak pit shall not be less than 900mm in diameter & 1500mm in depth below the invert level of the inlet pipe.
- The absorption area of the soak pit could be 1 sq. m to 1.5 sq. m per head of the user.
- The soaking pit should be by the precast slab.

#### Key Design Criteria of soak pit model:

- Depth of Outer Tank: 1m
- Depth of Inner Tank: 50cm
- Size of Big size stones: 10cm to 15cm
- Small Pebbles: 2.5cm to 3cm
- Width of tank: 50cm
- Diameter of inner Tank: 40cm
- Pipe diameter at outlet: 5cm

#### Steps in Construction of soak pit: Step 1

Excavate a cube in the ground that's 3 to 4 feet to a side. Dig the hole away from the low, wet area and where there is little access to people. You may have to vary the pit size according to the available room and the type of soil you are working in.

#### Step 2

Excavate a 1-foot-deep and six-inch-wide trench from the area with excessive water to the soak pit. The trench should slope 1/4 inch for every 10 feet in length to ensure the water drains toward the pit. The trench should end where the soak pit begins.

#### Step 3

Cover the walls of the excavation so that the dirt does not fill inward to the pit. Options include using construction blocks or a cement crepe.

#### Step 4

Stack the blocks on top of one another around the excavated area, making a four-sided chamber. You won't have to mortar together the blocks. Leave enough room between two of the blocks to allow access by the drain pipe. Fill in the space between the outside of the concrete blocks and the edges of the excavation with soil, and tamp it down.

#### Step 5

Hand-tamp the dirt on the walls so it is solid and stable. Mix together 4 parts of cement, 1 part of sand and enough water to make a thin mixture like a pancake batter. Trowel this over the dirt walls of the pit in a thin layer, leaving an opening for the drain pipe. Let the crepe cement dry thoroughly.

## Step 6

Lay 6 inches of sand or gravel on the bottom of the pit. Precise measurements or leveling is not required.

## Step 7

Fill the soak pit with rocks of various sizes, taking care to not damage any crepe cement. Do not tightly pack the pit, which prevents water flow downward. The rocks should be of sufficient amount to keep the concrete block walls from pushing inward. The tops of the rocks should be just below where the drain pipe enters.

## Step 8

Fill the drainage trench with 2 inches of gravel, taking care that the downward sloping is protected.

## Step 9

Set a PVC drain pipe on the gravel, perforated side down. The pipe should extend into the center of the pit. Fill the trench with soil and level it off slightly higher than the existing soil. The soil will settle downward.

## Step 10

Place a large, flat rock under the end of the pipe in the pit. This disburse the flow of water and prevents erosion of the rocks below.

**Tank Calculations:**

Liquid capacity per user in liters is 135 liters Hence for  
5 persons :  $135 \times 5 = 675$  liters Assume detention period 48  
hr.

Total wastewater in 2 days:  $675 \times 2 = 1350$ L Minimum  
depth of septic tank is taken as 1m Sludge settled down  
per person: 30L/ year

Sludge removal once every 5 years =  $30 \times 5 \times 5 = 750$ L

Total tank capacity =  $1350 + 750 = 2100$ L 1cum = 1000L =  $2100/750 = 2.1$ cum.

Area required =  $2.1/1 = 2.1$  sq. m

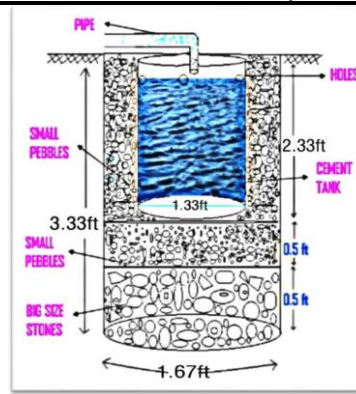


Fig. 4.1 Soak pit

Layer level	Contents of layer	Depth of Layer	Position of layer
01	Boulders or Big size stones	6 inches	Most Bottom
02	Small Pebbles	6 inches	Between 3rd & 2nd
03	Fine sand	28 inches	Between 2nd & 1st

Table 4.1- Layers of Magic soak pit Model

## EXPERIMENTAL ANALYSIS

Tests conducted on wastewater

1. PH
2. BOD AND COD
3. TSS
4. ELECTRICAL CONDUCTIVITY

## PRINCIPLE:

The pH electrode used in the pH measurement is a combined glass electrode. It consists of sensing half-cell and reference half-cell, together form an electrode system. The sensing half-cell is a thin pH sensitive semi permeable membrane, separating two solutions, viz., the outer solution, the sample to be analyzed and the internal solution, enclosed inside the glass membrane and has a known pH value. An electrical potential is developed inside and another electrical potential is developed outside, the difference in the potential is measured and is given as the pH of the sample.

## PROCEDURE:

1. Three major steps are involved in the experiment. They are
2. Preparation of Reagents
3. Calibrating the Instrument
4. Testing of Sample



**IV. RESULTS AND DISCUSSION:**

Constituents	Unit	Typical Concentration		
		Low	Medium	High
BOD (biochemical oxygen demand)	Mg/l	110	190	350
COD (Chemical oxygendemand)	Mg/l	250	430	800
TOC (Total organicc carbon)	Mg/l	80	140	260
O&G (Oil and Grease)	Mg/l	50	90	100

**CONCLUSION:**

1. After studying this method of disposing wastewater we found that the method is economical, easy to construct, effective in disposing the domestic wastewater at house level.
2. We treated waste water for reducing characteristic of waste water which produces bad effect to human being as well as animal and courses water pollution.
3. The present techniques are easy, cost-effective and sustainable in the long term. Many of these can be adopted by the individuals, rural and urban communities with locally available materials and manpower.
4. This is method is effective worked in such situation where no possible to treat waste water, due to its economy it can afford any common family for constructing magic pit in his house. It doesn't require more space for construction and also required less materials and equipment's. Through the magic pit we can also improve the parameter of waste water and increased quality of water, if we mix the influent in natural water or ground water it will not affect the quality of water it may dilute with water.
5. Compared to the conventional treatment systems, constructed wetlands need lesser material and energy, are easily operated, have no sludge disposal problems and can be maintained by untrained personnel.
6. Further these systems have lower construction, maintenance and operation costs as these are driven by natural energies of sun, wind, soil, microorganisms, plants and animals endeavors.

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