

# World Toilet Day

19<sup>th</sup> November 2021

World Toilet Day is about celebrating the importance of toilet and to inspire actions to tackle global sanitation issues.

## Importance of IHHT

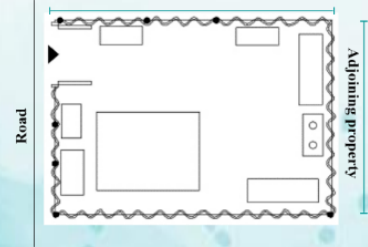
In India, the launch of the Swachh Bharath Mission brought attention to ending open defecation and the need for individual household toilets. Under SBM, an impetus was given to construct individual household toilets and additionally, many state governments and cities have taken measures to support households in vulnerable areas and provide incentives to build their own toilets. A major challenge that many public agencies often cite is the **lack of space for the construction of toilet** as a key reason for not being able to make individual household toilets available for the urban poor. Additionally, it is noted that **lack of funds also acts as a commonly faced barrier** in constructing individual household toilets.

## Beat the Space Constraints

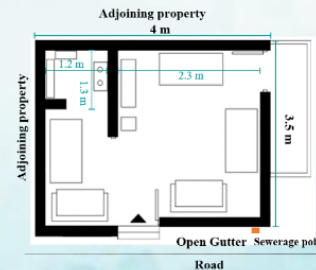
Design Competition for Individual Household Toilets (IHHT) in Small Houses in Slum Areas

The challenge focusses on encouraging innovative ideas and appropriate measures to be adopted in order to achieve access to individual household toilets in vulnerable areas. A series of layouts and pictures of houses located in the slums have been provided to the participants for which they will have to deal with the issue of space constraints and provide low cost solutions for constructing a toilet for the particular household. Design should incorporate aspects related to convenience and access, as well as social considerations.

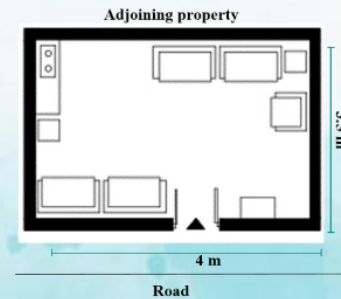
**Case 1**  
Inhabitants - 3  
House Size – 9.8 sq. mts  
Superstructure – Kutchha



**Case 2**  
Inhabitants - 3  
House Size – 14 sq. mts  
Superstructure – Pucca



**Case 3**  
Inhabitants - 5  
House Size – 25 sq. mts  
Superstructure – Pucca



Please visit [www.pas.org.in](http://www.pas.org.in) to know more about our study on IHHT



Credits:  
Case study inspiration by Siddhi Mehta  
Sketches by Saurabh Agashe

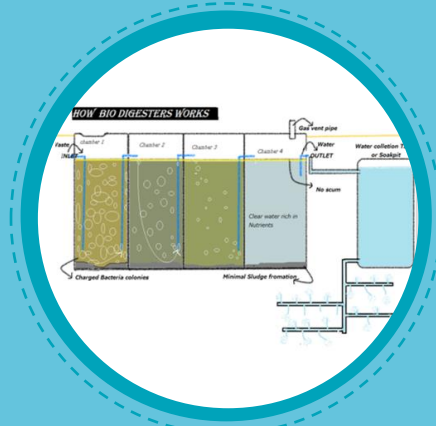
CWAS CENTER FOR WATER AND SANITATION

CRDF CEPT RESEARCH AND DEVELOPMENT FOUNDATION

CEPT UNIVERSITY

# Key design feature

- 1. Minimum space requirement
- 2. Self sustainable
- 3. Reuse / resource recovery



The methane gas collected is stored in a underground tank and is utilized to run the pump for drawing water and for kitchen and water heating purposes. Lid of the tank is designed such that it rises when the tank is full and thus lets the excess gas escape.

	Plan of bio digester
	Size of the tank 3ft X 4ft X 2ft Capacity : 700 lit
	Costing : tank 9,500 + toilet super structure 5,500 = total 14,500



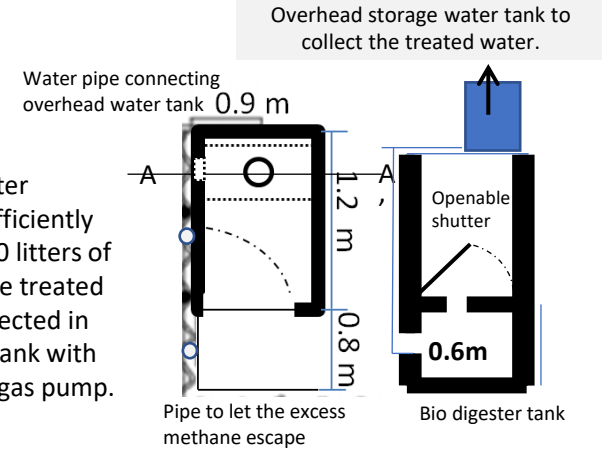
The bio- digester is a tank at the bottom with multiple sections separating each other with a bacteria embedded sheets .The bacteria can multiply within the sheets and function effectively from 0-55degree Celsius . The process involved in breaking down the bacteria into water and methane are Hydrolusis , Acidogenesis , Acetogenesis and Methanogenesis



## Case 1 Proposed design using Bio digester

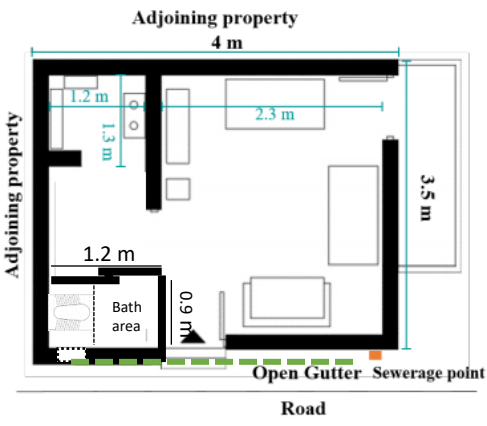
Parameters	Before	After
PH	7.5	7.2
BOD mg/lit	65	4
COD mg/lit	156	11
Nitrate mg/lit	1.8	0.08
Phosphate mg/lit	6.8	0.03
Chloride mg/lit	26.2	28
D.O mg/lit	0.5	5

The bio –digester installed can efficiently treat about 700 liters of water daily. The treated water gets collected in the overhead tank with the help of biogas pump.



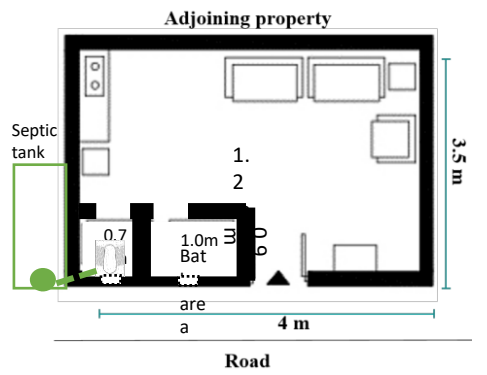
## Case 2 Proposed design

The site is located in a slum area with pucca superstructure and with three persons inhabiting the area of 14 sq.mts. The sewer lines pass through the road adjacent to the house. The IHHT proposed is made of FRP sheets of 0.05m thickness. The out of the toilet is connected to the open gutter sewerage point just out side the house. The IHHT is located in the house in a manner which creates a seclusion of space . This factor facilitates the access to menstrual hygienic and usage of toilet by women of in the house. Window for ventilation is carved out of the exiting wall facing the road.



## Case 3 Proposed design

Considering the number of tenements a separate bath and toilet cubicle is proposed the same is built in brick and plaster with a septic tank outside the premises of the house. The IHHT prosed is divided into two parts. The bath area is segregated from the toilet cubicle with a brick wall. The entire structure of the toilet is made up of brick wall with ventilation chambers. Considering that there is no adjoining the property next to the toilet wall, a septic tank is proposed. The septic tank can either be independent or on shared basis depending on the distance of the next house.





# Key design feature

## Eco bricks

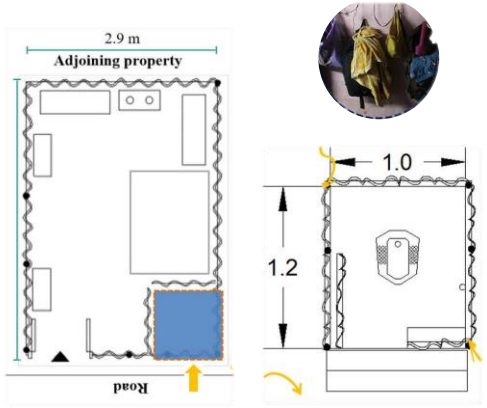


An Eco-brick is a reusable building block comprising a plastic bottle filled with solid non-biodegradable waste to a set density. Eco-bricks are a sustainable way to reuse non-biodegradable plastic waste as plastic waste is regarded as a long-lasting and durable material. The design has vibrant colourful outlook to the wall that is aesthetically pleasing. The material also enables several geometric designs. The SGHs in the city can be trained to construct the toilets with eco bricks, from the initial to turnkey stage.



## Case 1 Proposed design

The design is proposed to be constructed in fibre glass corrugated sheets. The disposal system proposed is Aqua-privy system. The aqua privy system is a simplified variation of a septic tank. It is a simple storage and setting tank immediately under the latrine floor. Excreta drop directly into the tank trough a pipe. The bottom of the pipe is submerged in the liquid in the tank, forming a water seal to prevent smell and flies. The accumulated solids must be removed frequently. A small vent is to be provided according to the wind direction and the sun path diagram. The angle of the roof can be determined using the wind direction.

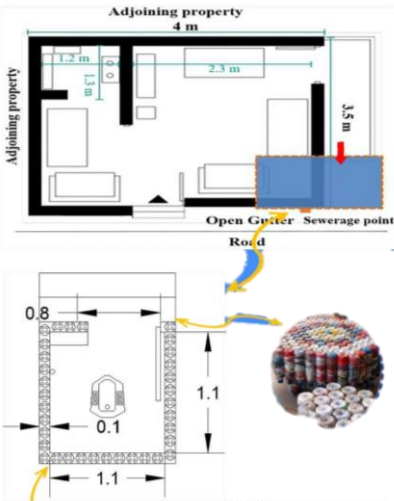


## Case 2 Proposed design

The placement location chosen for the IHHT in this house is based on the social behaviour of using the toilet preferably outside the house. The use of Eco bricks allows different geometrics to be applied for optimum space usage and to integrate better climate responsive designs as per the geographic location. The outer interface can be subjected to multiple uses.

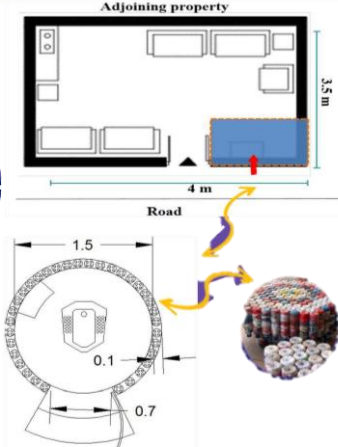
Description	Units	Per Unit Rate	Cost
Eco bricks	2000 bottles approx.	5 Rs. (based on the availability)	10,000/-
Toilet Fittings	1	380 Rs.	380/-
Disposal System	1	8,000 Rs. (Approx.)	8000/-
Other (Construction, Materials etc.)	-	-	5000/-
<b>Total</b>	-	-	<b>23,380/-</b>

**APPROX. COST OF 1 IHHT**



## Case 3 Proposed design

The access of the toilet can be from outside with a buffer to the interface of the house and the toilet. Considerations for storage natural smell diffusers have been incorporated in the design according to the NBC norms. The design is proposed to be constructed using eco bricks that are readily available in slums and are sustainable building material. The angle of the roof can be determined using the wind direction and for ample light provisions along with the aim of harnessing maximum daylight of the region and to provide good ventilation.



# Key concept



## Transforming livelihoods and women empowerment

The woman and children benefit a lot from the IHHTs, it raises their self-esteem. The school going girls sense a comfort in using household toilet considering the cleanliness. It improves the accessibility for the specially abled people living in slums and assists them in transforming themselves. It raises the living standards of the residents of slums, they don't have to queue up every morning outside the community toilets in discomfort.



## Social and Environmental Benefits

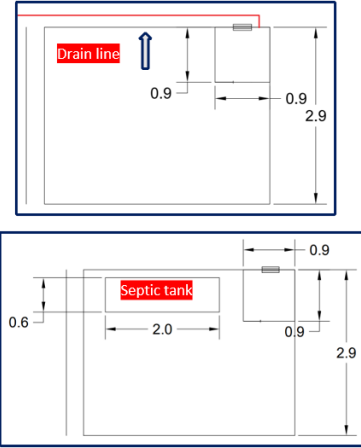
The IHHTs can be cleaned properly on daily basis so as to avoid any diseases that generally breakout due to unhygienic sanitation. Certain initiatives like 'one home, one toilet' have been put forth by some organizations in order to provide the facility. With community centric and cost sharing approaches, slum residents can be empowered to build their own toilet.



### Case 1 Proposed design

The proposed toilet is of dimensions - 0.9 m \* 0.9 m \* 2.1 m. The toilet has a window cut out for ventilation and avoiding foul smell. It is located near kitchen, the location is preferable for room ventilation and also space can be distributed properly as per the circulation and considering the size of the house. The toilet seat is Indian WC with proper piping system. Precast material is to be used in order to limit construction activities in the kutcha structure. The toilet is placed such as to avoid any interference with adjoining properties. The toilet drain is connected to drainage line from alongside the property directed towards the road side. The septic tank is located near entrance, with dimensions of 600 mm diameter and 2 m length, precast cylindrical can be placed.

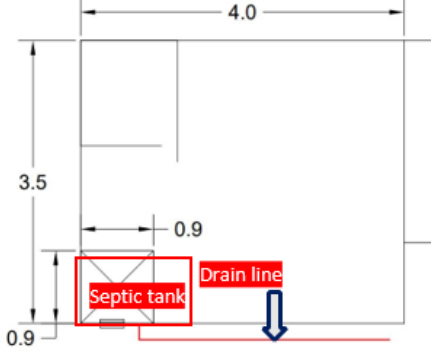
Case 1 - Proposed toilet and septic tank layout



### Case 2 Proposed design

The toilet drain is connected to sewerage point from alongside the property directed towards the road side, adjoining the gutter. The toilet outlet can directly be connected to the sewerage point dug outside house which can be easy to open and keep cleanliness. The outlet can be connected by PVC pipes, vent with the outlet in case of leakage or smell. The septic tank is located below the toilet, with dimensions 1.5 m \* 0.75 m \* 1.0 m, can be constructed with two chambers. Capacity of septic tank constructed is for 1-3 individuals in a household. The septic tank location is accessible, can be pumped out at regular intervals as opening can be kept at roadside.

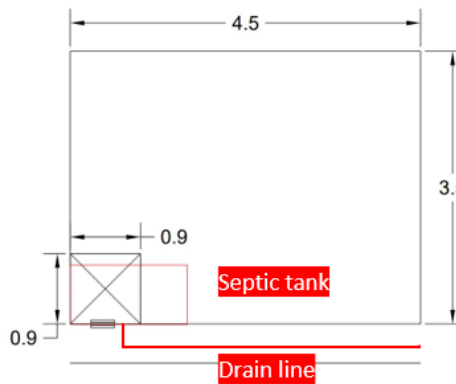
Case 2 - Proposed toilet and septic tank layout



### Case 3 Proposed design

No precast and proper construction of walls. The toilet outlet is towards the road and gutter side so as to avoid and leakages in other places. The connection of toilet drain is connected directly to sewerage point outside. If in some households bathroom is present, it can be combined into one single unit. The septic tank is located below the toilet, with dimensions 2 m \* 0.76 m \* 1.5 m, can be constructed, with 2 chambers. The septic tank location is accessible, can be pumped out at regular intervals as opening can be kept at roadside. The outlet can be connected by PVC pipes, vent with the outlet in case of leakage or smell.

Case 3 - Proposed toilet and septic tank layout





## Key design feature

The **Septic Tank** is a precast septic tank cylindrical shaped structure of size 1420 liters. The cover will go under the bed or seating with concealed handles. thick rug can be placed over for no visibility and sealed with cement on sides so can be easily chipped when need to desludge.



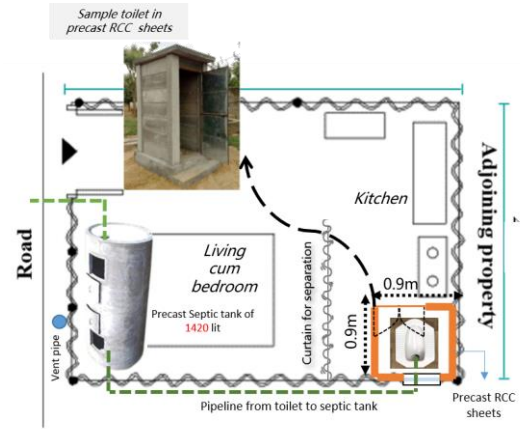
Concrete is inherently watertight, whereas plastic and fiberglass must undergo extra processes in order to hold water. The natural watertightness of concrete reduces the risk of leaks during the life of the tank.



### Case 1 Proposed design

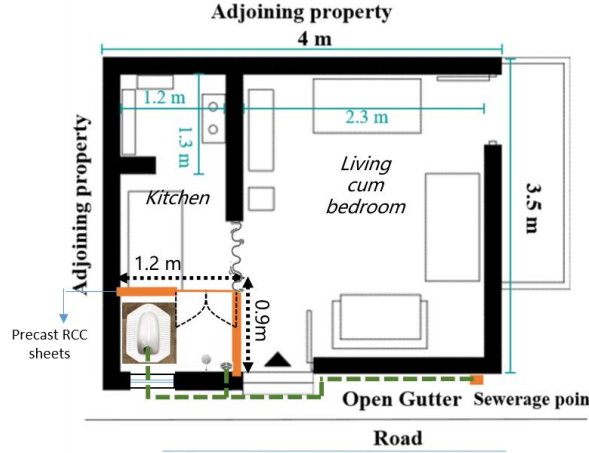
**Costing details**  
**Approximate Cost:**  
 Excavation- 1000/-  
 Superstructure- 12000/-  
 Septic tank- 9000/-  
 Plumbing- 8000/-  
 Miscellaneous- 2000/-  
**Total- 32,000/-**

Proposed toilet's inner dimensions are (0.9 x 0.9 x 2.1)m. It is located in the kitchen area which is the inner side of the house. Also toilet being a private area can be separated by a curtain or hanging a saree. Women of the house will be comfortable to use when required. A cutout can be made in the corrugated sheets for ventilation.



### Case 2 Proposed design

Proposed toilet's inner dimensions are of (1.2 x 0.9 x 2.1)m. Located on the roadside of the house for ventilation, easy plumbing and in a more private area. Also ensuring that it is near kitchen where more accessible and comfortable for women. Use of Precast RCC sheets for the two walls, PVC for door and pipelines for the plumbing works.



### Case 3 Proposed design

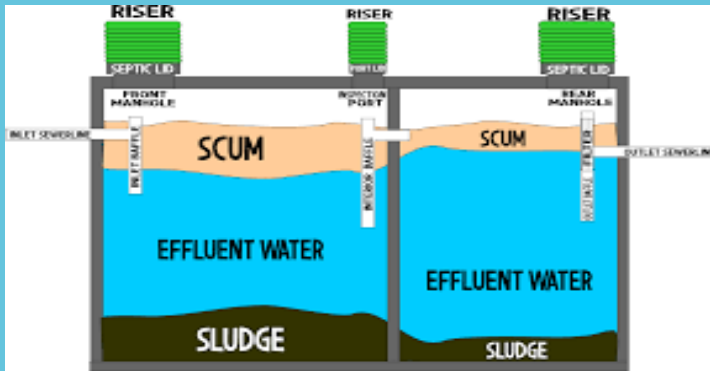
The proposed toilet is located near the kitchen area but on the roadside for easy accessibility, of services, ventilation, etc. A small curtain or saree can be used as a partition of private and public area. This will ensure that women will also get their privacy. The Septic Tank of size 2500 liters is located in front of the house along the road. Considering the availability of space the precast septic tank should be taken of a longer length and as per available (smaller) width. The vent pipe should be of 8-10 ft vertical length to avoid bad odors. Keeping the chamber covers accessible by sealing with cement on sides to prevent any hazards.



## Key design feature

### Two compartment septic tank

The first one is a settling tank. It keeps the sludge and scum (grease) out of the drain field. The upper part of the first tank drains into the top of the second tank.

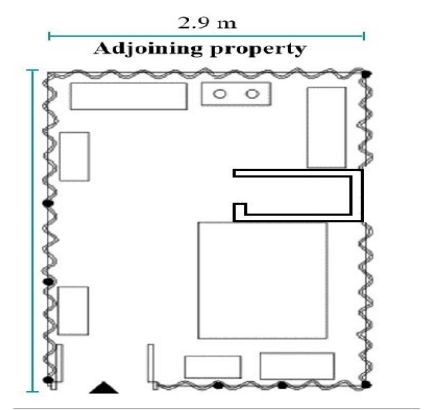


The first section holds the heavy solids that sink and the floating material. The second chamber is there if you are not conscient enough to pump the tank regularly. You have got a little more time before the waste material enters the leach field and fails the whole system.



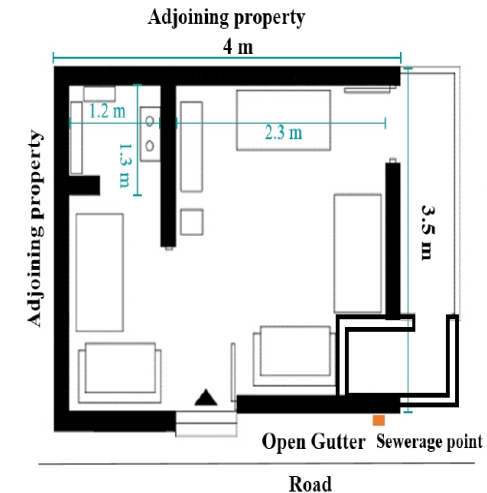
### Case 1 Proposed design

The walls of the toilet will be constructed up to 1M height in brick work and above 1 M height teen sheets will be fixed up to roof height from inner face of the wall. The wall of toilets HH can use to keep there kitchen wears. So that the thickness of the wall will also gets utilized by them to keep there kitchen accessories. Septic tank will be constructed in Fly ass bricks which requires less watering for work and also save the time of construction. For flooring instead of tiles we can do neru finish rough plastering with slop towards pan to avoid water logging



### Case 2 Proposed design

The toilet structure will be constructed in fly ash bricks which gives good finished surface and plastering will be avoided and also construction cost will get reduced. The septic tank of size 2.2M x 1M with depth of 1.2M will be provided below the toilet by considering 3 years of desludging cycle with outlet of 6 inch dia. pipe connected to the sewer line towards the road. Water will be stored out site of the toilet block and used for flushing. For flooring neru finished rough plaster will be provided with sloping towards the pan to avoid water logging and for walls tiles are provided up to 2 feet of height.



### Case 3 Proposed design

The septic tank of size 2.2M x 1M with depth of 1.2 M will be provided below the toilet by considering 3 years of desludging cycle with outlet chamber at the outer face of house towards the road. Water tank of 500L will be provided at the top of the roof with ½ inch connection tab to the toilet block. For flooring tiles will be provided with sloping towards the pan to avoid water logging and for walls tiles are provided up to 2 feet of height.

