

## Gramalaya – Tiruchirapalli



**Appropriate technologies on low-cost toilets**

## **Gramalaya – Tiruchirapalli**

### **Appropriate Low-cost toilet technology – An Indian perspective**

#### **Toilet Technology cum Training center**

Gramalaya has been implementing for more than two and half decades various toilet technology depending on the terrain with the support of WaterAid and Water.org for the last 20 years. There are several designs and technologies available for installing a household type sanitary latrine. Therefore, it is important to give several technological options or informed choices to the user to choose and own and maintain a sanitary latrine without much external support but several inter-related factors play important role in installing a sanitary latrine to a rural household. This includes:

- Affordability
- Space in the home
- Geographical conditions - soil/water table etc
- Cultural habits
- Availability of water/scarcity of water
- Availability of skilled or semi skilled manpower

Gramalaya increases the coverage of toilets by awareness creation, motivation and hygiene education. Gramalaya through its community based organizations provide accessible sanitation to every household promoting low-cost technological option and also help the communities to avail financial assistance from lending institutions.

Gramalaya has established a Toilet Technology cum Training Centre at its rural headquarters in the village of Kolakudipatti in Thottiam block, Tiruchi district. The Center was established with funding support from Water.org, USA as a part of its WATSAN programme and displays a range of toilet models, including an eco-san toilet, which are appropriate for use in the Total Sanitation Campaign (TSC). The Centre provides training for representatives and field staff of Non Governmental Organisations (NGOs) and Government officials, including block co-ordinators involved in the TSC programme as well as to masons and members of women Self -Help Groups (SHGs) formed by Gramalaya. Here visitors learn how they can construct zero budget toilets using locally available materials.

Field visits to villages where zero budget toilets are in use are also arranged by the organisation. The Centre has models of both waterless toilets and toilets that only require minimal water input, making them suitable in coastal, tribal, rocky and water-logged areas. Models appropriate for operation in urban areas are also displayed. The Centre has domestic toilet models ranging in price from Rs.150 to Rs.15000 which are also environment friendly. All models in the centre are based on the fact that they were successfully introduced in rural areas in various parts of the district. Gramalaya has also introduced child friendly toilets in municipalities. These toilets are situated adjacent to the regular toilets constructed by the City

Corporation and therefore are maintained under the pay and use concept by Women Self-Help Groups. All Child Friendly Toilets are fully utilised by neighbourhood children.

The centre also has miniature models of School toilets which are suitable for primary and middle schools in rural areas. Similarly the Centre has models of toilets that can be built in Anganwadis under the TSC programme. Furthermore, there are the facilities to provide training and demonstration - for nominal fees - of toilet models for the benefit of NGO representatives and government officials involved in water supply, health and sanitation. The models displayed are only indicative and the Center encourages innovative, location-specific models using local materials.

- Latrines gives social status and privacy for women and children
- Sanitation brings improvement in environmental conditions.
- Accessible sanitation facilities save time and increases working hours.
- Usage of latrines reduce incidence of diarrheal diseases and medical expenses.
- Sanitation improves income status

### **Technology for Toilets**

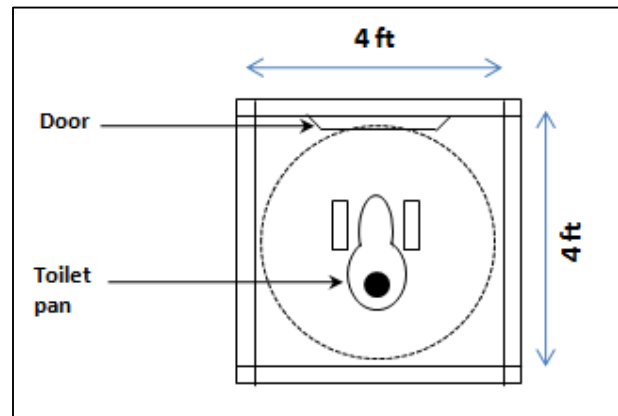
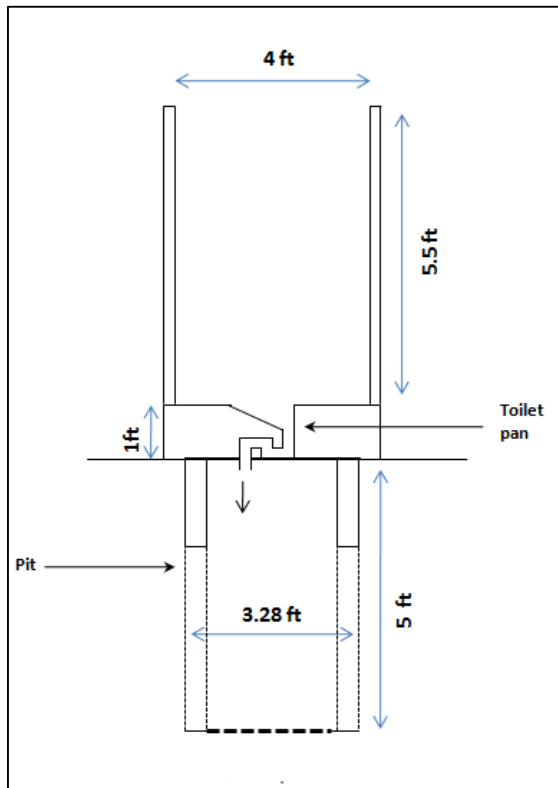
Gramalaya places emphasis on low-cost, location specific, acceptable technologies and designs which will be constructed by community members of their own accord and depending on their socio-economic status, with the support from field staff working for the project. The technologies promoted by Gramalaya are field tested and proven to be successful. Whatever Gramalaya has learnt from its various projects over the years is taken onboard when approaching interested communities. In this way Gramalaya is able to maintain excellence and innovation with every new intervention community and at every stage of the project from its beginnings to its completion.

All the above activities either can be supported through grant or loan schemes depending upon the project area and support available. In all places, more emphasis will be given for toilets with a bathroom and water storage facilities, and that use water saving rural pans.

*Some of the successfully field tested models are provided below:*

1. Twin pit pour flush UNDP designed leach pit model in the hard soil areas
2. Single pit pour flush leach pit model with honeycomb brickwork or lined pits using local stones
3. Dry pit latrines in difficult areas like tribal belts and economically deprived communities
4. Eco-san toilets/compost latrines for water-logged, water scarce, coastal and rocky areas
5. Community latrines for urban slums/peri-urban/densely populated areas where space is a constraint.
6. Individual toilets with bathroom facilities connected to a sewerage network or underground drainage areas
7. Child friendly toilets for Anganwadis and school toilet complexes

## 1. Plinth level toilet with temporary superstructure



### Salient features

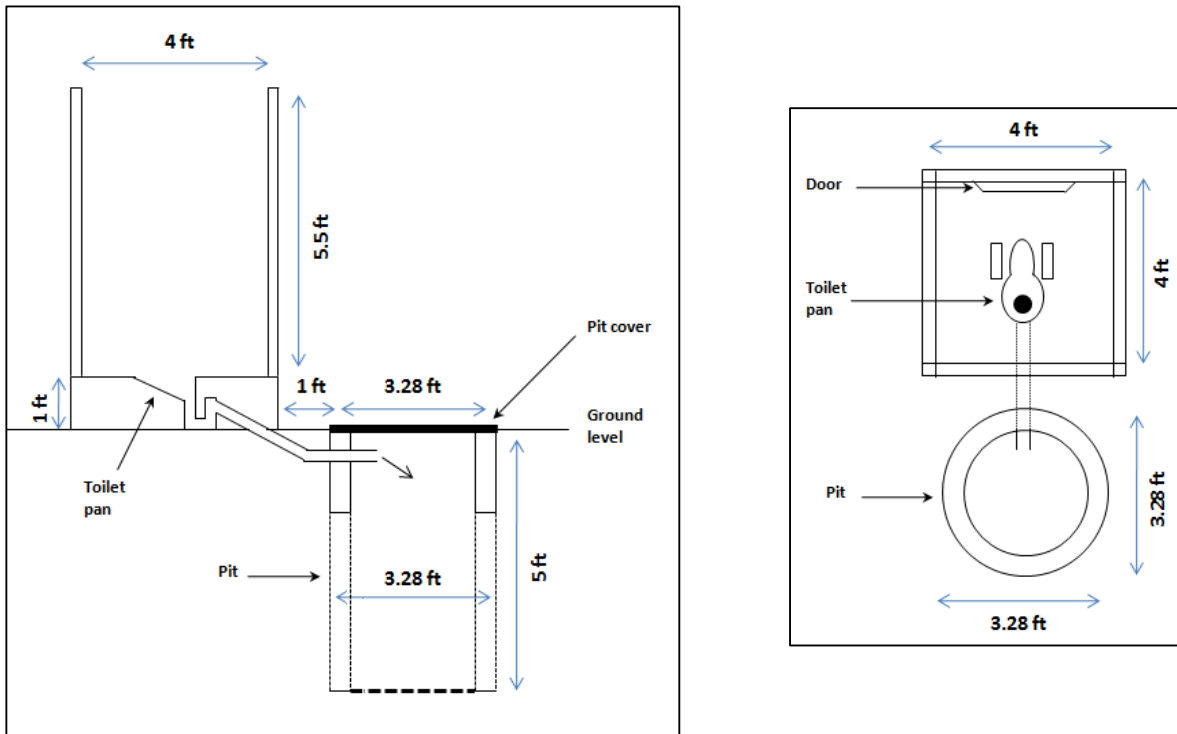
1. Appropriate where space is limited
2. Easier to empty when pit fills
3. Low cost
4. Superstructure made from locally available materials such as banana

5. leaves, bamboo sticks and gunny bags
5. It is appropriate for festival places and during emergencies
6. It is constructed in one day
7. The plinth level basement may be circle or square shape

### Cost Estimate :

Details	No. of units	Unit cost (in Rs.)	Total amount (in Rs.)
Toilet pan with p-trap (ceramic rural pan with deep slope)	1	250	250
Jaggery and jute bag for connecting the p-trap and pan			75
Squatting slab	1	300	300
Cement	1/2 bag	140	140
Masonry charges	1 mason	350	350
Sand	3 bond	100	100
Soling stone for pit lining		1/2 unit	300
<b>Total</b>			<b>1515</b>

## 2. Toilet only model with superstructure using hollow bricks



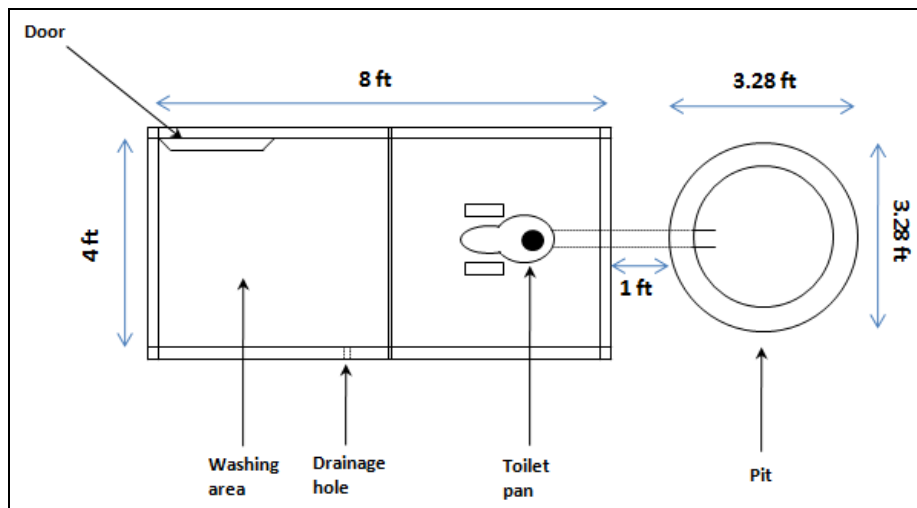
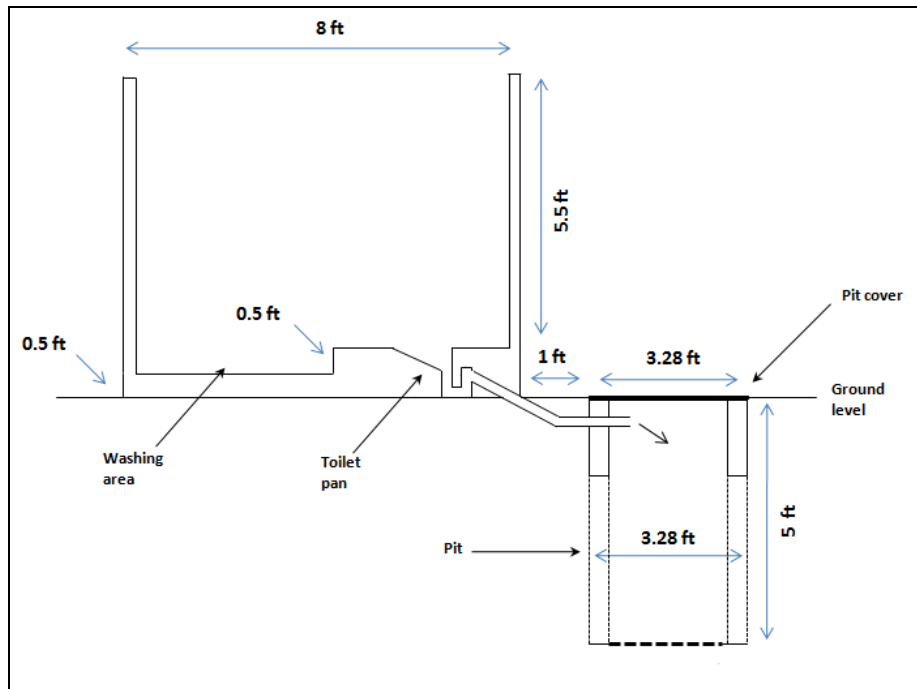
### Salient features

1. It is a suitable model for all
2. Low cost
3. Appropriate where space is limited

### Cost Estimate :

Details	No. of units	Unit cost (in Rs.)	Total amount (in Rs.)
Toilet pan with p-trap (ceramic rural pan with deep slope)	1	250	250
PVC pipe - 4 feet (4 inch dia)	4 feet pipe	22	88
Hollow bricks	75	15	1125
Cement	2.5 bags	275	687
Masonry charges	3 masons	350	1050
Sand	1 bullock cart	400	400
Door	1	600	600
Soling stone	1 bullock cart	500	500
Cover slab for pit	1	300	300
Transport charges		500	500
<b>Total</b>			<b>5500</b>

### 3. Toilet attached bathroom using hollow bricks without roof



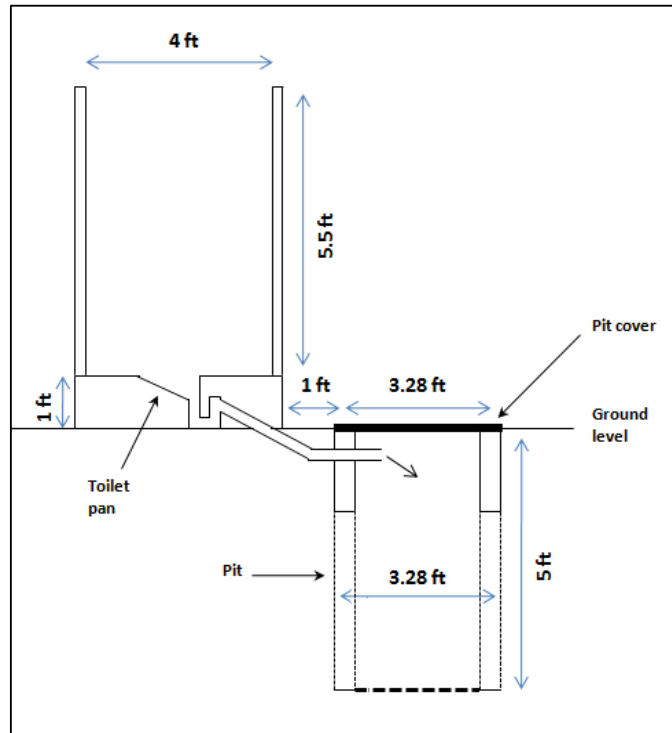
#### Salient features

1. Provides privacy for ablution, especially important for women and adolescent girls
2. Provides water storage, bathing and washing facilities inside the toilet
3. Promotes kitchen garden from bathroom waste water
4. Multifunctional structure

**Cost estimate:**

<b>Details</b>	<b>No. of units</b>	<b>Unit cost (in Rs.)</b>	<b>Total amount (in Rs.)</b>
Toilet pan with p-trap (ceramic rural pan with deep slope)	1	250	250
PVC pipe - 10 feet (4 inch dia)	10 feet	22	220
Country bricks (locally made)	500	4	2000
Cement	2.5 bags	275	687
Masonry charges	4 masons	350	1400
Sand	1 bullock cart	500	500
Door	1	600	600
Soling stones	1 bullock cart	500	500
Cover slab for pit	2	300	600
Transport charges		500	500
<b>Total</b>			<b>7257</b>

4. Toilet only model with superstructure using bricks with roof (Concrete rings pit)



**Salient features**

1. Low cost
2. Appropriate where space is limited
3. Provides privacy
4. Roof provides cover during rainy season

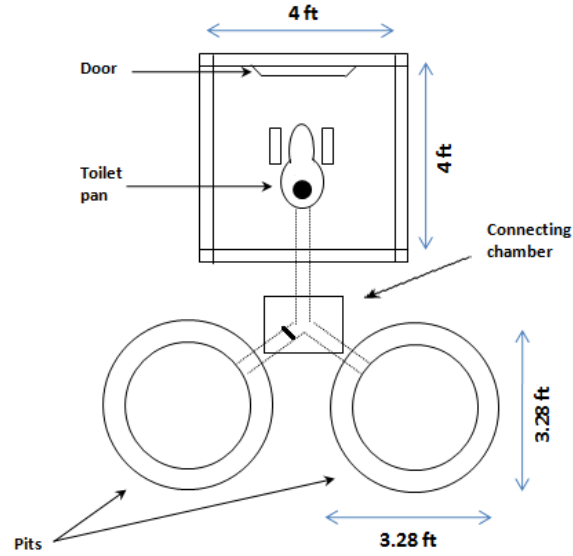
**Cost estimate:**

Details	No. of units	Unit cost (in Rs.)	Total amount (in Rs.)
Toilet pan with p-trap (ceramic rural pan with deep slope)	1	250	250
PVC pipe - 4 feet (4 inch dia)	4 feet pipe	22	88
Country bricks (locally made)	500	4	2000
Cement	2.5 bags	275	687
Masonry charges	3 masons	350	1050
Sand	1 bullock cart	400	400



Door	1	600	600
Concrete rings (3 feet dia)	4	250	1000
Cover slab for pit	1	300	300
Transport charges		500	500
<b>Total</b>			<b>6875</b>

## 5. Twin pit – Pour flush latrine



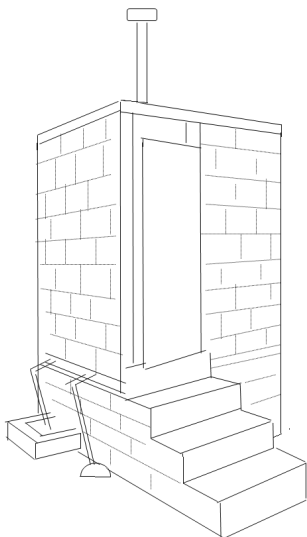
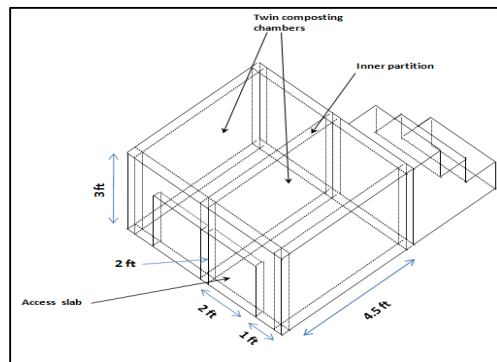
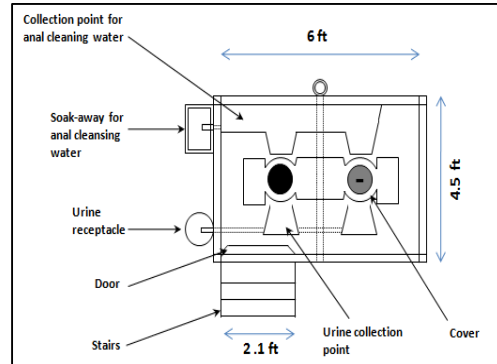
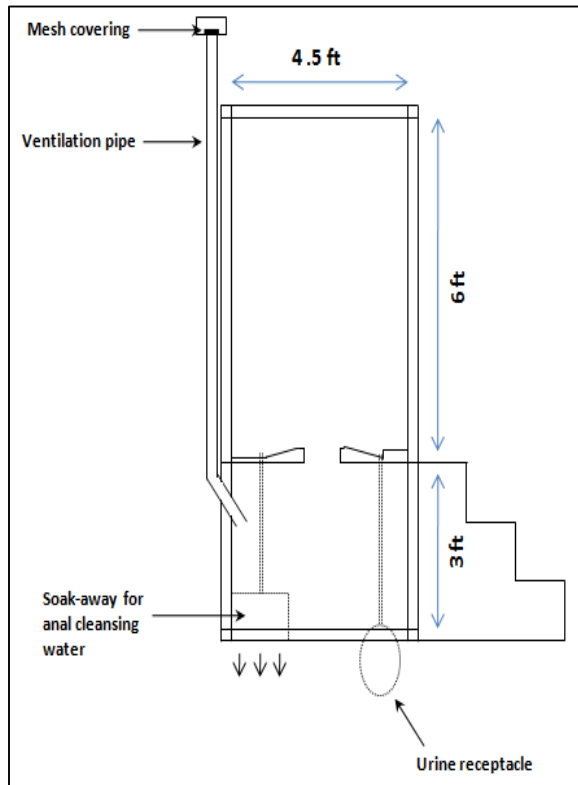
### **Salient features**

1. When the first pit gets filled up, the flow of excreta has to be diverted to the second pit
2. Two leach pits are connected to one single pour-flush toilet
3. Twin-pit toilets have a high convenience
4. When emptying one pit, people use the another pit

**Cost estimate:**

<b>Details</b>	<b>No. of units needed</b>	<b>Unit cost (in Rs.)</b>	<b>Total amount (in Rs.)</b>
Toilet pan with p-trap (ceramic rural pan with deep slope)	1	250	250
PVC pipe - 10 feet (4 inch dia)	10 feet	22	220
Country bricks (locally made)	500	4	2000
Cement	2.5 bags	275	687
Masonry charges	4 masons	350	1400
Sand	1 bullock cart	500	500
Door	1	600	600
Soling stones	1 bullock cart	500	500
Cover slab for pit	2	300	600
Transport charges		500	500
<b>Total</b>			<b>7257</b>

## 6. ECO-SAN toilets



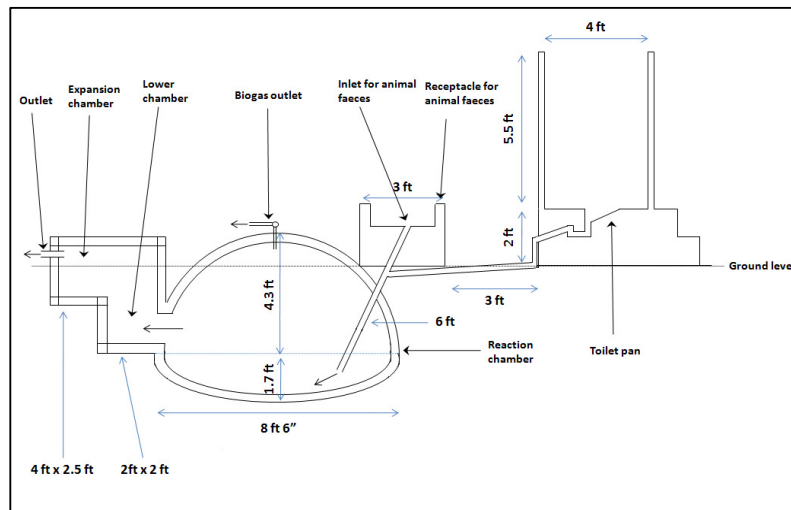
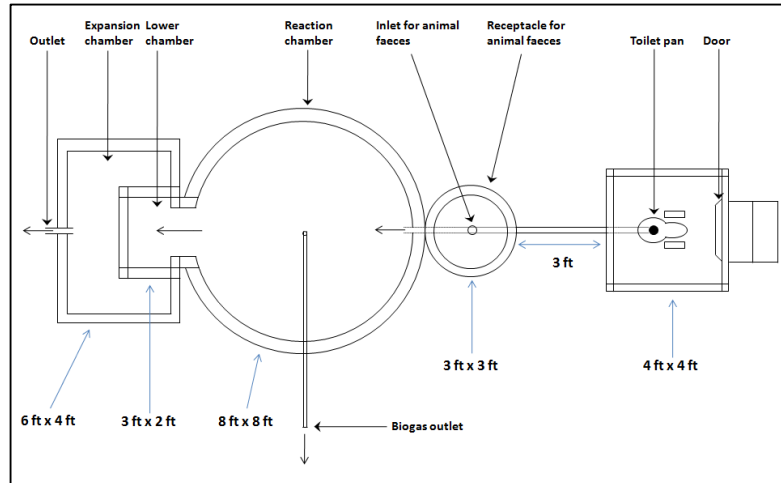
### Salient features

1. Avoids contamination of water sources and soil
2. Composting of human waste for use as a natural fertilizer
3. There is no need of emptying the pits
4. It is applicable for water logged, water scarce, coastal and rocky areas
5. Promotes soil fertility and improved crop production

**Cost estimate:**

<b>Details</b>	<b>No. of units</b>	<b>Unit cost (in Rs.)</b>	<b>Total amount (in Rs.)</b>
Hollow bricks	200	15	3000
PVC pipe - 10 feet (3 inch dia)	10 feet	36	360
PVC pipe - 1 inch	10 feet		200
Cement	2.5 bags	275	687
Masonry charges	4 masons	350	1400
Sand	1 bullock cart	500	500
Door	1	600	600
Roof slab - 5'x2.5' -	2 slab	600	1200
Cover slab for chamber - 2x2	2	300	600
Squatting slab	2	400	800
Pot, buckets with lid			200
Foundation work			700
Transport charges		500	500
<b>Total</b>			<b>10747</b>

## 6. Bio-gas linked toilets



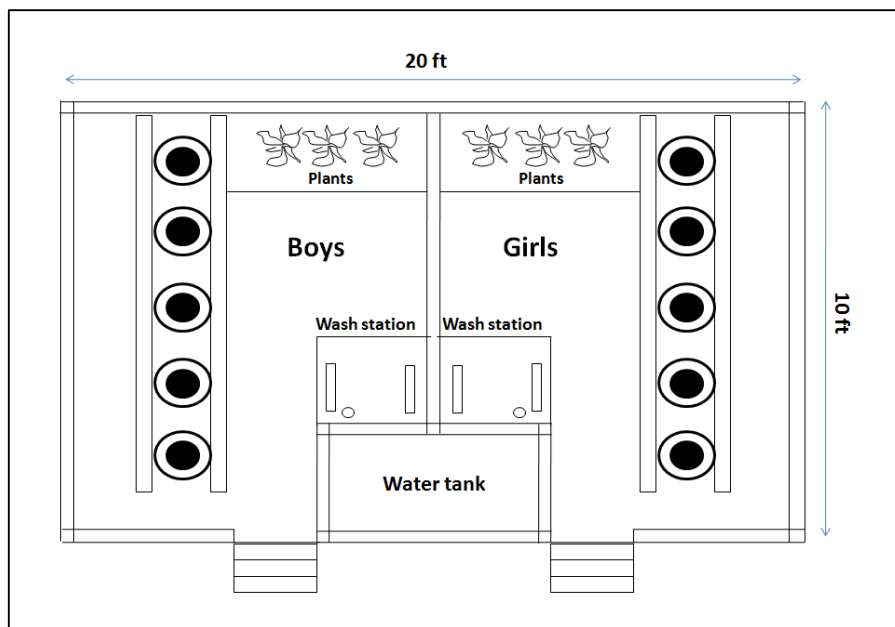
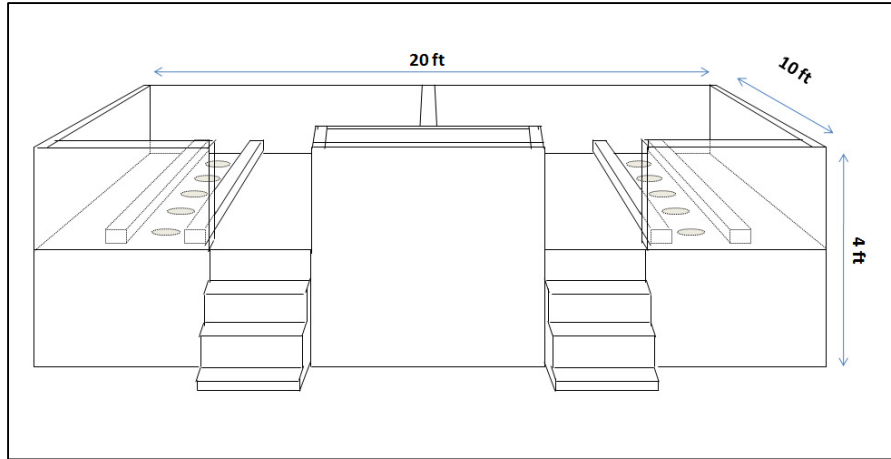
### Salient features

1. Bio-gas is a promising non-conventional energy that converts waste matter
2. Eco-friendly
3. Cost effective
4. Provides a fuel for electricity, heat and light.
5. Bio-manure increases productivity and soil conservation

**Cost estimate:**

<b>Details</b>	<b>No. of units</b>	<b>Unit cost (in Rs.)</b>	<b>Total amount (in Rs.)</b>
Bricks	1500	5	7500
PVC pipe/ rubber pipe - 1/2 inch	1 length	100	100
GI pipe - 3/4 inch	1.5 feet	40	60
PVC pipe - 4 inch	10 feet	22	220
Cement	15	275	687
Masonry charges			6000
Sand	1 bullock cart	500	500
Door	1	600	600
Roof slab -4 x 2	2 slab	300	600
Gas stove			1200
PVC pipe L bend - 4 inch	1	60	60
Gate volve - 1/2 inch	1	80	80
PVC reducer - 3/4 x 1/2	1	10	10
Cover slab - 3x3	2	400	800
Hollow bricks	100	15	1500
Toilet pan	1	250	250
Foundation work			1000
<b>Total</b>			<b>21167</b>

## 7. Child friendly toilets - Model - I





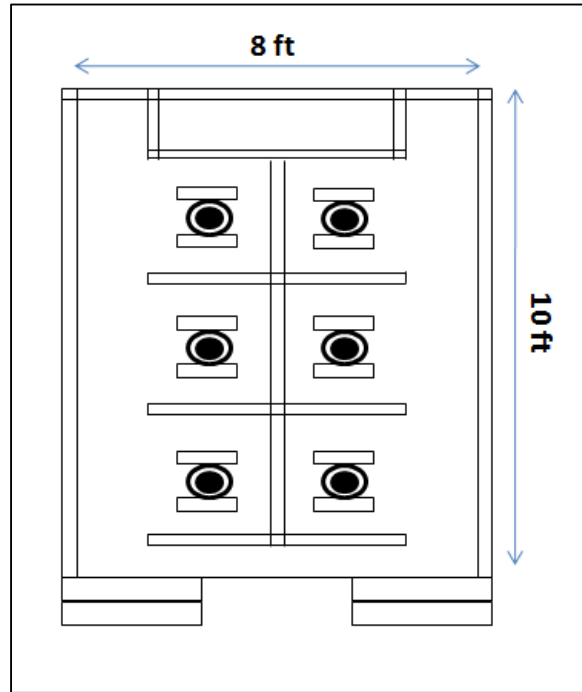
### **Salient features**

1. Privacy for children
2. Beautiful caricatures of pets and animals on the wall
3. Partition for boys and girls
4. No fear among the children to use the toilet
5. Anal cleaning and hand washing facilities are inside the toilet
6. As the CFTs are constructed adjacent to the community toilets, maintenance is easier
7. Promoting proper hygiene behaviour from childhood

### **Cost estimate:**

<b>Sl. No.</b>	<b>Particulars</b>	<b>Quantity/Nos.</b>	<b>Unit cost</b>	<b>Amount Rs.Ps.</b>
1	Cement	15 bags	280.00	4200.00
2	Sand	1/2 unit	1500.00	1500.00
3.	Ground level Earth work	L.S.	....	1500.00
4.	R.R. work foundation	L.S.	.....	5000.00
5.	Stoneware pipes – 4 “	2 Nos.	60.00	120.00
6.	Half-cut PVC pipes, grating and gully traps etc.,	L.S.	.....	2000.00
7.	Pre-cast cement slab – 2’ x 2’ with 6” drop hole, 2” thickness – reinforced slab	10 No.	120.00	1200.00
8.	Plastering charges	L.S	.....	2500.00
9.	Country Bricks for basement and sidewall construction	3000 Nos.	4.00	1200.00
10.	Masonry charges	10 Days	400.00	4000.00
11.	Unskilled labour charges	10 days	150.00	1500.00
12.	Transport charges	.....	.....	1000.00
13.	Taps for water supply with plumbing charges	....	.....	1500.00
14.	White washing and painting charges			2500.00
	<b>Total Cost</b>			<b>29720.00</b>

8. Child friendly toilets – Model - 2



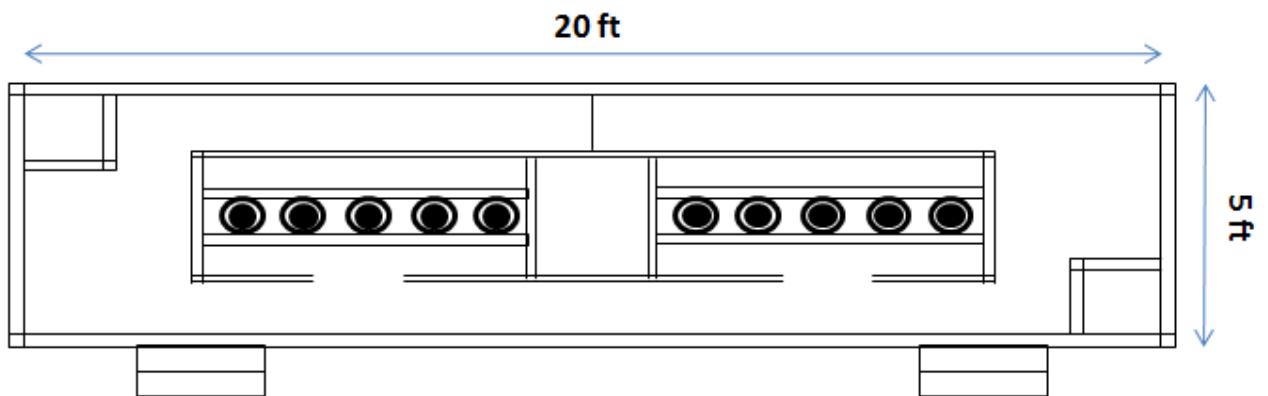
### **Salient features**

1. Privacy for children
2. Beautiful caricatures of pets and animals on the wall
3. Partition for boys and girls
4. No fear among the children to use the toilet
5. Annual cleaning and hand washing facilities are inside the toilet
6. As the CFTs are constructed adjacent to the community toilets, maintenance is easier

### **Cost estimate:**

<b>Sl. No.</b>	<b>Particulars</b>	<b>Quantity/Nos.</b>	<b>Unit cost</b>	<b>Amount Rs.Ps</b>
1	Cement	8 bags	280.00	2240.00
2	Sand	1/2 unit	1500.00	1500.00
3.	Groundlevel Earth work	L.S.	....	1500.00
4.	R.R. work foundation	L.S.	.....	3000.00
5.	Stoneware pipes – 4 “	10 Nos.	60.00	600.00
6.	Grating and gully traps etc.,	L.S.	.....	400.00
7.	Pre-cast cement slab – 2’ x 2’ with 6” drop hole, 2” thickness – reinforced slab	6 No.	120.00	720.00
8.	Plastering charges	L.S	.....	1200.00
9.	Country Bricks for basement and sidewall construction	500 Nos.	4.00	2000.00
10.	Masonry charges	5 Days	400.00	2000.00
11.	Unskilled labour charges	5 days	150.00	750.00
12.	Transport charges	.....	.....	500.00
13.	Taps for water supply with plumbing charges	.....	.....	750.00
14.	White washing and painting charges			1000.00
	<b>Total Cost</b>			<b>18160.00</b>

### 9. Child friendly toilets – Model - 3



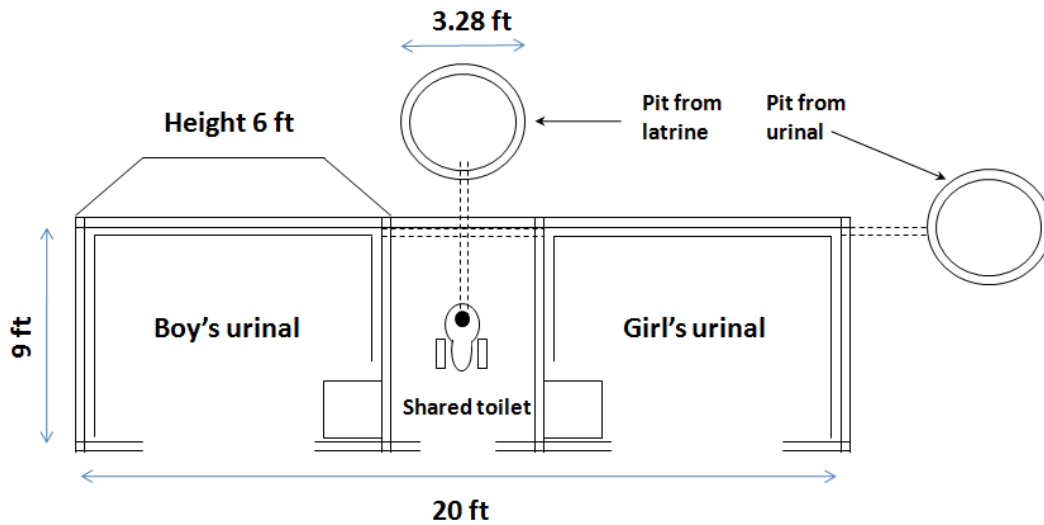
#### **Salient features**

1. Privacy for children
2. Beautiful caricatures of pets and animals on the wall
3. Partition for boys and girls
4. No fear among the children to use the toilet
5. Annual cleaning and hand washing facilities are inside the toilet
6. As the CFTs are constructed adjacent to the community toilets, maintenance is easier

**Cost estimate :**

<b>Sl. No.</b>	<b>Particulars</b>	<b>Quantity/Nos.</b>	<b>Unit cost</b>	<b>Amount Rs.Ps</b>
1	Cement	12 bags	280.00	3360.00
2	Sand	1/2 unit	1500.00	1500.00
3.	Groundlevel Earth work	L.S.	....	1500.00
4.	R.R. work foundation	L.S.	.....	2000.00
5.	Stoneware pipes – 4 “	2 Nos.	60.00	120.00
6.	Half-cut PVC pipes, grating and gully traps etc.,	L.S.	.....	1500.00
7.	Pre-cast cement slab – 2’ x 2’ with 6” drop hole, 2” thickness – reinforced slab	10 No.	120.00	1200.00
8.	Plastering charges	L.S	.....	1700.00
9.	Country Bricks for basement and sidewall construction	2000 Nos.	4.00	8000.00
10.	Masonry charges	5 Days	400.00	2000.00
11.	Unskilled labour charges	5 days	150.00	750.00
12.	Transport charges	.....	.....	1000.00
13.	Taps for water supply with plumbing charges	....	.....	1500.00
14.	White washing and painting charges			2000.00
	Total Cost			28130.00

## 10. School sanitary complex – Model 1



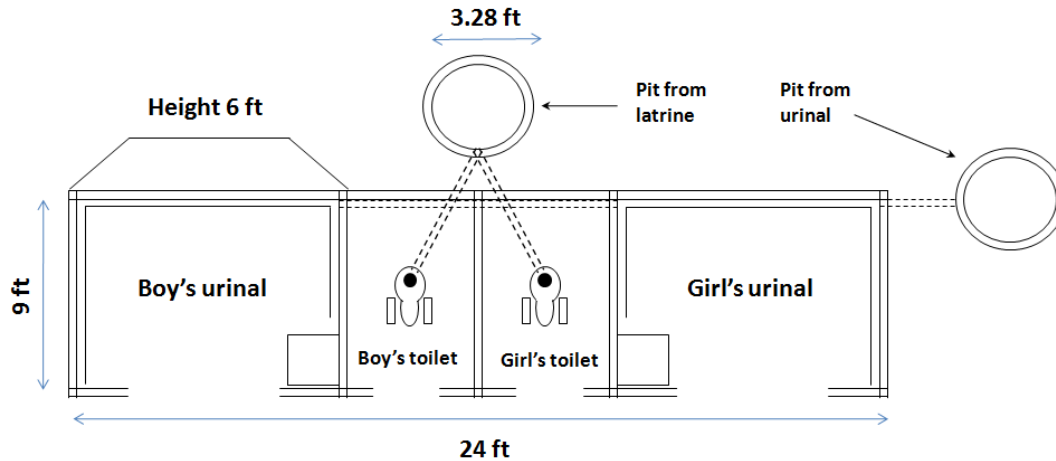
### **Salient features**

1. School Sanitation is a tool for promoting better sanitation and water management for children
2. Improves the school environment
3. Privacy for school children
4. Promoting proper hygiene behaviours from childhood
5. Operation and maintenance by school children
6. Separate facilities for children for urination and defecation

7. School toilets should be constructed within the school campus
8. Incinerator should be installed in girls toilet for menstrual hygiene management
9. One toilet is enough for primary school children
10. Water facilities and hand washing facilities should be inside of the toilet

Sl. No.	Particulars	Quantity/Nos.	Unit cost	Amount Rs.Ps.
1	Cement	25 bag	280.00	7000.00
2	Sand	2 Unit	2400.00	4800.00
3	Ceramic pan Water Closet 18” size with P trap and footrest	1 No.	270.00	270.00
4.	Stoneware pipes – 4 “ or PVC pipes – 4 inches	6 Nos.	60.00	360.00
5.	Earth work excavation charges	L.S.	.....	2000.00
6.	R.R. foundation work with soling stone	1 Cart load	750.00	750.00
7.	Basement work with R.R.	L.S.	....	1500.00
8.	White washing and painting	L.S.	....	3000.00
9.	Ceramic tiles and fitting charges	Tiles 8” x 8” size – 8 boxes	500.00	4000.00
10.	Water Tap connection to toilets and urinals	L.S.	.....	1500.00
11.	Pre-cast cement slab – 4’x 2’ size , 2” thickness – reinforced slab for toilet roof	4 No.	300.00	1200.00
12.	Door with iron frame and tin sheet 5’ x 2’ size	3 No.	1000.00	3000.00
13.	Country Bricks – 9” size	3000 Nos.	4.00	12000.00
14.	Masonry charges	10 Days	400.00	4000.00
15.	Unskilled labour charges	20 days	Rs.150.00	3000.00
16.	Transport charges			1500.00
	Total Cost			49880.00

## 11. School sanitary complex – Model 2



### **Salient features**

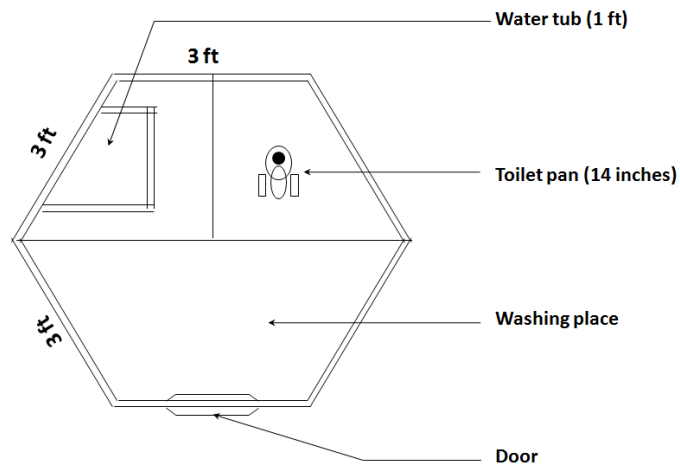
1. School Sanitation is a tool for promoting better sanitation and water Management for children
2. To improve the school environment
3. Privacy for school children
4. Following hygiene behaviours from the childhood
5. Operation and maintenance by school children
6. Separate facilities for children for urination and defecation
7. School toilets should construct within the school campus
8. Incinerator should be installed in girls toilet for menstrual hygiene management
9. One toilet is enough for primary school children
10. Water facilities and hand washing facilities should be inside of the toilet



**Cost estimate:**

Sl. No.	Particulars	Quantity/Nos.	Unit cost	Amount Rs.Ps
1	Cement	30 bag	280.00	8400.00
2	Sand	2 Unit	2400.00	4800.00
3	Ceramic pan Water Closet 18” size with P trap and footrest	2 No.	270.00	540.00
4.	Stoneware pipes – 4 “ or PVC pipes	8 Nos.	60.00	480.00
5.	Earth work excavation charges	L.S.	....	1500.00
6.	R.R. foundation work with soling stone	1 Cart load	750.00	750.00
7.	Basement work with R.R.	L.S.	.....	1500.00
8.	White washing and painting	L.S.	....	3000.00
9.	Ceramic tiles and fitting charges	Tiles 8” x 8” size 12 boxes	500.00	6000.00
10.	Water Tap connection to toilets and urinals	L.S.	....	1500.00
11.	Pre-cast cement slab – 4’x 2’ size , 2” thickness – reinforced slab for toilet roof	8 No.	300.00	2400.00
12.	Door with iron frame and tin sheet 5’ x 2’ size	4 No.	1000.00	4000.00
13.	Country Bricks – 9” size	3000 Nos.	4.00	12000.00
14.	Masonry charges	12 Days	400.00	4800.00
15.	Unskilled labour charges	24 days	Rs.150.00	3600.00
16.	Transport Charges	....	.....	1500.00
	Total Cost			56770.00

## 12. Anganwadi toilet



### **Salient features**

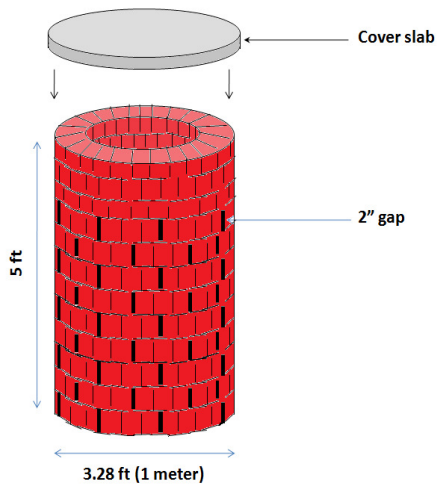
1. It is a platform for behaviour change for the children
2. Promoting hygiene behaviours from childhood
3. Child friendly door with a provision for opening from inside and outside of the toilet
4. Displays pet animal pictures inside the wall, providing a friendly environment
5. Smallest toilet pan with 14 inches should be used
6. To maintain one foot height of water storing tub. Water tub should be easy to access for children for cleaning and washing

**Cost estimate:**

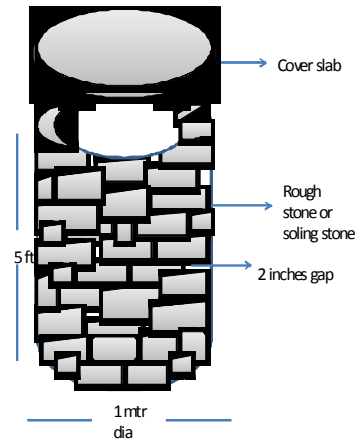
Sl. No.	Particulars	Quantity/Nos.	Unit cost	Total Rs. Ps
1	Cement	4 bag	280.00	1120.00
2	Sand	½ unit	1200.00	1200.00
3	Ceramic pan Water Closet baby friendly size with P trap and footrest	1 No.	270.00	270.00
4.	Stoneware pipes – 4 “	2 Nos.	60.00	120.00
5.	Pre-cast cement slab for roof – 6’ dia, 2” thickness – reinforced slab in 2 pieces for roofing	2 No.	350.00	700.00
6.	Door with iron frame and tin sheet 5’ x 2’ size	1 No.	750.00	750.00
7.	Country Bricks	700 Nos.	4.00	2800.00
8.	Earth work including pitting charges			500.00
9.	Rough stone or soling stone			350.00
10.	Cover slab for leach pit	1 no.	300.00	300.00
8.	Masonry charges	6 Days	400.00	2400.00
9.	Unskilled labour charges	6 days	Rs.150.00	900.00
10.	White washing and painting charges			750.00
				500.00
10.	Transport charges	.....	....	
	Total Cost			12660.00

## Leach pit models

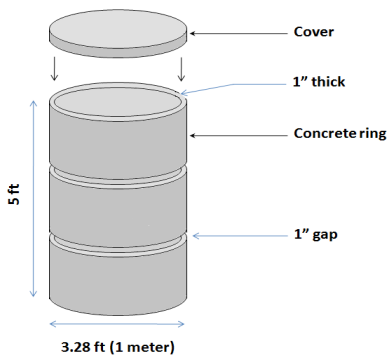
Leach pit with honeycomb brick work model using bricks



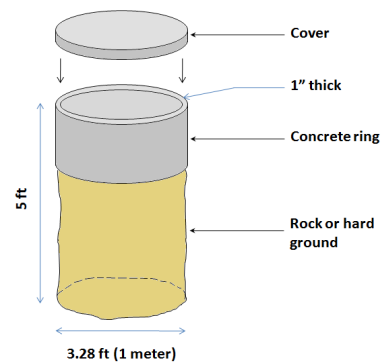
Leach pit with honeycomb brick work model using rough stone or soling stone



Concrete ring model



Concrete ring model – top layer only



Note: The cost of construction materials and labour involved are subject to change according to the local conditions and price escalation.

**Technical drawings designed by:**

Mr. Luke Whaley, Water and Sanitation practitioner, London, UK

**Vision**

Gramalaya envisions a society in which all people will have equal rights and access to protected water, sanitation, health and improved income status without gender discrimination.

**Mission**

Gramalaya is an NGO dedicated to promoting water, sanitation, hygiene and overall improvement of the rural, urban, coastal and tribal population in India. Thus, working for the empowerment of marginalized communities, especially the women and children

**For more details, please contact :**

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