


Training Manual for Eco-Toilet Construction



In association with :





Team for the preparation of Construction Manual of Eco-Toilet

Principal Authors

S.A. Abdullah Al Mamun and Raju Basak

Research and Assistance

Azahar Ali Pramanik, Raju Basak, Ranjan Kumar Das, Abu Darda, Rafiul Islam
Md. Fariduzzaman and Ahmed Ali

Cover and Design

Practical Action Bangladesh

Information

S.A. Abdullah Al Mamun, Sharmina Jahan and Azahar Ali Pramanik

Editorial

M. Iqbal Karim, Quamrunnihar, Monirul Alam, S. A. Abdullah Al Mamun
A.K.M. Rafiqul Islam and Arun Kumar Dutta

Preface

The Government of Bangladesh in 2003 declared 100% sanitation coverage by 2010. This was later adjusted to achieve it by 2013. Despite considerable progress (39% in 1990 to 53% in 2008: JMP 2010) in the sanitation sector, achieving 100% sanitation coverage remains major challenge.

Considering the challenges/drawbacks of current sanitation technologies, ecological sanitation has the strong potential to minimize the current gaps in sanitation and also promoting sustainable sanitation in Bangladesh. The concept of eco-sanitation has been developed in order to set up hygienic sustainable systems of human waste disposal, to retrieve and re-use the nutrients from human waste, and to economise water use. Eco-sanitation includes options such as flush-free (and odour-free) urinals, separation toilets for urine and faeces, dry and composting toilets, dehydration devices for composting of faeces, use of faeces or excreta for the generation of biogas, vacuum sewers and flush systems operating on minimal amounts of water etc.

In this context, realizing the need as well as to measure the potentiality of ecological sanitation technologies in difficult areas in Bangladesh, GOB-UNICEF taken good initiatives through an action research project on Action Research on Ecological Alternative in Sanitation in Difficult Areas of Bangladesh. The project is being implemented by Practical Action Bangladesh and its associates.

Pilot demonstration is most suitable way to popularize and disseminate of any technology or approach. Under this project 106 toilets of 7 different options have been demonstrated at the field level. At present, eco toilet is in practice in many countries of the world like India, China, and Sri Lanka and Bangladesh. The manual has been developed based on the experiences of those countries. The manual is depicted of 11 types of eco-toilet with engineering design and pictorial view of different construction steps.

This manual is aimed to popularise the Eco-toilet technology as far as possible by providing easy, step by step access to the construction process with all relevant designs and useful photographs. This Eco-toilet construction manual is an attempt in the country to understand the intricacies of the Eco-toilet structure and the methods of construction.

During the course of developing this manual, every effort was made to include the existing knowledge base, along with the interactions between personnel associated with the Eco-toilet technology.

We are hopeful that this manual would be an important source of information as well as an effort to disseminate the technical knowledge for all.

Who is it meant for:

This construction manual has been developed to assist different sector of people, especially for the Sub-Assistant Engineers and local masons, who are associated with the construction work of Eco-toilet. This manual should not be used as a complete or final reference document. However, it should be used for the purpose of extension of technical knowledge and ideas of the associated persons of this technology, through improved and simplified manner.

Who is it not meant for:

This construction manual is not a suitable tool for the approach of "Do it Yourself"; as, it requires a preliminary idea of Civil Engineering for its construction work. All technical details as per design as well as technical direction and drawing of eco-toilet mentioned within the manual is there.

A construction manual is never complete or perfect:

Eco-toilet can be constructed in many ways; so, this manual does not claim to be complete or perfect. This manual could be used as reference learning material for its further necessary change and improvements. For ensuring the best possible benefit, this manual will be available to the beneficiaries, users and use as fundamentals for future development of construction work.

The project "Action Research on Ecological Alternatives in Sanitation in Difficult Areas of Bangladesh" will appreciate, if you share your ideas and experiences for the further improvement of this Eco-toilet construction manual.

Acknowledgment

We would like to extend our sincere thanks to those people of Practical Action Bangladesh, Bangladesh Association for Social Advancement (BASA), Society for People's Action in Change and Equity (SPACE) and Commitment Consultants, who have made their best attempt to develop this manual. The practical idea and knowledge of these organizations have been extensively covered in the manual. We are also grateful for your necessary assistance regarding suggestions and information for accomplishing the activity of this manual.

Our sincere gratitude to all other individuals, who have given their valuable opinion personally and supported through providing website information, printed documents and various other journals' information as well.

The research work captured in this manual would not have been possible without the financial and technical assistance extended to the implementing organisations by the UNICEF and Department of Public Health Engineering (DPHE). We are particularly grateful to Mrs. Quamrunnahar, Water and Environmental Specialist, UNICEF; Mr. Monirul Alam, Water and Environmental Officer, UNICEF, Mr. Nurul Islam Khan, Project Director, GoB-UNICEF Project, DPHE and Mr. Md. Waliullah, Deputy Project Director, GoB-UNICEF Project, DPHE, who have given their overall assistance, especially valuable opinion and technical consultation for making the effort a success.



Content

Content	Page no
Background	5
Training Schedule	6
Session 01: Opening and Self Introduction	7
Support Note 01: Opening and Environment Creation	7
Session 02: Introduction of Eco-toilet	8
Support Note 02: Eco-toilet	9
Session 03: Eco-Toilet Construction- Day 01 Activity	13
Support Note 03: Day 01 Activity	13
Session 04: Eco-Toilet Construction- Day 02 Activity	16
Support Note 04: Day 02 Activity	16
Session 05: Construction Precaution	17
Support Note 05: Construction Precaution	17
Session 06: Eco-toilet Construction- Day 03 Activity	18
Support Note 06: Day 03 Activity	18
Session 07: Types of Eco-toilet	19
Support note 07& 09: Description of Different Types of Eco-toilet	20
Session 08: Eco-toilet Construction- Day 04 Activity	32
Support note 08: Day 04 Activity	32
Session 10: Construction Materials and Cost Estimate	33
Support Note 10: Construction Materials and Cost Estimate	33
Session 11: Eco-toilet Construction- Day 05 Activity	51
Support Note 11: Day 05 Activity	51
Evaluation by Trainee	52

Background

Sanitation management plays a vital role to keep a country environmentally healthy. Maximum people of Bangladesh are devoid of improved sanitation facilities. Only 32% people get better sanitation in Bangladesh. Every year 1 lac 25 thousand children less than five year old died of waterborne diseases like - diarrhoea and dysentery. Use of sanitary latrine is the precondition of healthy and spontaneous life.

Sanitation is always a great challenge in urban areas for our country. At present, human waste goes to the river and canal through septic tank and sewerage pipe without any treatment. As a result, hygienic sanitation is absent in urban areas in urban region, it is really challenging to ensure improved sanitation in the gradually increasing and congested slum area. To meet the sanitation demands of slum dwellers, there are huge number of pit latrines and tube-wells situated closely.. Normally, for ensuring the sanitation demand in the slum area, the pit latrines are constructed closely, where the water points also remain in vicinity to the latrine. As the slums are comparatively densely populated, it is not possible to maintain the safe distance between toilet and tube wells. As a result, there is a great risk of contamination of ground water especially where water table is high.

In the water scarce area, especially in the hilly areas of CHT, normally people break down the water seal of the latrine due to lack of sufficient water. As a result, probability of spreading out of the vector borne diseases become higher and overall unhygienic condition exists. On the otherhand, in hoar area of Sunamganj, flood is the main challenge in sanitation progress and water stagnant situation create huge difficulties to meet up the sanitation demand. The under ground water table in that area remain shallow and which become the great challenge of being contaminated by the traditional sanitation system. If the under ground water table is not beyond the 1.5 meter distance from the lower installation part of pit latrine; there remains a great possibility of contamination. In Barind area, if the reddish soil contains more mud, then it is easily become muddy and softens by a very short splash of rain. As a result, in the rainy season the pit latrines are filled up with water and can not drained out easily. To overcome all those hurdles, the sustainable and environment friendly sanitation is an important concern.

At present, an action research on Ecological Alternatives in Sanitation in difficult Areas of Bangladesh is implemented with the financial assistance of UK-aid along with the Department of Public Health Engineering (DPHE) and Unicef jointly under SHEWA-B Urban Component Program for ensuring the safe water supply, installation of hygienic latrine and cleanliness of environment. The project is under implementation in 16 clusters in seven district of Bangladesh. Three non-government organization like - BASA, SPACE and Commitment Consultants are working to implement the project under the leadership of Practical Action Bangladesh. Under this project, an initiative has been taken to develop a training manual of Eco-san toilet for the Sub-Assistant Engineers and Local Massons considering sustainable and environment friendly sanitation in different unfamiliar geographical context. We are hopeful that this manual would be an important source/guidance to build up capacity for the construction of Eco-toilet in Bangladesh.

Internationally the use of Eco-toilet is in increasing trend. In Bangladesh, many development organizations are working in small scale for the promotion of this technology. Taking into consideration of present working experience and to find out the gaps very closely; the action research on Ecological Alternatives in Sanitation in difficult Areas of Bangladesh under the SHEWA-B (GoB-UNICEF) is helping to conduct the reseach work here.

Training Schedule

Day 01		
Session	Time	Subject
Session 01	09.00-10.00	Self Introduction and Environment Creation
Session 02	10.00-10.30	Introduction of Eco-toilet
	10.30-10.45	Tea Break
Session 03	10.45-11.15	Eco-toilet Construction- Day 01 Activity
Practical	11.15-01.00	Eco-toilet Construction- Day 01 Activity
	01.00-02.00	Lunch Break
	02.30-05.00	Eco-toilet Construction- Day 01 Activity

Day 02		
	09.00-9.30	Review of Day 01 Activities
Session 04	9.30-10.00	Eco-toilet Construction- Day 02 Activity
Practical	10.00-04.30	Eco-toilet Construction- Day 02 Activity
	11.00-11.15	Tea Break
	01.00-02.00	Lunch Break
Session 05	04.30-05.00	Construction Precaution

Day 03		
	09.00-9.30	Review of Day 02 Activities
Session 06	9.30-10.00	Eco-toilet Construction- Day 03 Activity
Practical	10.00-04.00	Eco-toilet Construction- Day 03 Activity
	11.00-11.15	Tea Break
	01.00-02.00	Lunch Break
Session 07	04.00-5.00	Description of Different Types of Eco-toilet

Day 04		
	9.00-9.30	Review of Day 03 Activities
Session 08	9.30-10.30	Eco-toilet Construction- Day 04 Activity
Practical	10.30-03.00	Eco-toilet Construction- Day 04 Activity
	11.00-11.15	Tea Break
	01.00-02.00	Lunch Break
Session 09	03.00-04.00	Description of Different Types of Eco-toilet (cont.)
Session 10	04.00-05.00	Construction Materials and Cost Estimate

Day 05		
	09.00-9.30	Review of Day 04 Activities
Session 11	09.30-10.00	Eco-toilet Construction- Day 05 Activity
Practical	10.00-04.00	Eco-toilet Construction- Day 05 Activity
	11.00-11.15	Tea Break
	01.00-02.00	Lunch Break
	04.00-04.30	Evaluation by Trainee
	04.30-05.00	Certificate Distribution and Closing

Session - 01 : Opening and Self-Introduction

Duration	: 01 Hour
Method	: Speech, Game, Groupwise Discussion
Objective	: Training opening and create environment
Learning	: End of the session the participants will- <ul style="list-style-type: none">• Introduce with each other and ice break• Express the expectation and objective of training• Know the rules of training and identify the groupwise task
Logistics	: Registration Form, Banner, Name Tag, Pad, Pen, Brown Paper, Poster Paper, Marker and Multimedia and other equipments for game conduction.

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participants' participation and will explain on discussion topics and objectives of the session.
- The facilitator will encourage the participants to write any interesting notes/picture in a white paper within two minutes. Later on the participants will introduce themselves and will discuss about their picture/notes.
- The facilitator will divide the participants into two/three groups and will ask to write down their expectations in VIPP card. The facilitator will arrange the VIPP card on a white board and will discuss few expectations which are important and interesting with participants.
- After that, the facilitator will introduce the idea about the rules and regulations of the five days training programme and take the comments from the participants about training regulations and will write down sequentially on board with the participants.
- The facilitator will discuss with participants about the session conduction procedure, evaluation of programme by the trainee and necessary feedback from the participants.
- Later on, the facilitator will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants and improve the logistics, food, and accommodation etc. for the next days.

Support Note 01: Opening and Environment Creation

Self-Introduction and Ice-breaking:

To create environment at the starting of training programme is very essential. The participants are self conscious enough to create the required environment for training programme. Cooperative mentality has to be created among the participants. For that purpose, self introduction with each other, discussion with each other and cooperation to each other is mandatory and beneficial for the training programme.

The Objective and Expectation of Training:

Among the participants, some may think that the training programme will be theoretical only and by participating in this programme, s/he will obtain little theoretical knowledge. For having a justified reflection, the facilitator will clarify that the participants will obtain practical experience as well as theoretical knowledge. Some of participants may have few practical experiences which is important. Facilitator can play important role in experience sharing the session among the participants.

This manual has been prepared for five days training programme comprising of 20/25 participants. But the number of participants may be changed in particular situation. At that stage, the facilitator has to choose the appropriate group wise activities and wider place for sitting arrangement.

Session - 02 : Introduction of Eco-Toilet

Duration	: 1.00 Hour
Method	: Discussion and video slides
Logistics	: Marker, Flip Chart, Board, Multimedia etc.
Objective	: End of the session the participants will- <ul style="list-style-type: none">• Know about Eco-toilet• Know about the main components and functions of eco-toilet, merits and demerits, life span, construction materials and maintenance procedure

Session Structure :

Steps	Discussion Topics	Duration	Method
01	Introduction of Eco-toilet	10 minutes	Multimedia/ Poster
02	Main components and function of Eco-toilet	20 minutes	Multimedia/ Poster
03	Merits and demerits, life span, construction materials, maintenance procedure	25 minutes	Multimedia/ Poster

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants about the idea regarding eco-toilet and he will note down the idea/comments of the participants. Then the facilitator will convey the clear message about eco-toilet to the participants.
- After that, the facilitator will introduce the idea about main components and functions of eco-toilet, its merits and demerits, life span, operation and maintenance procedure using multimedia/poster paper presentation with the participants.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 02: Eco-Toilet

Eco-Toilet:

Eco-toilet is a kind of compost latrine which has been invented to ensure sustainable sanitation and supplying compost for farming.

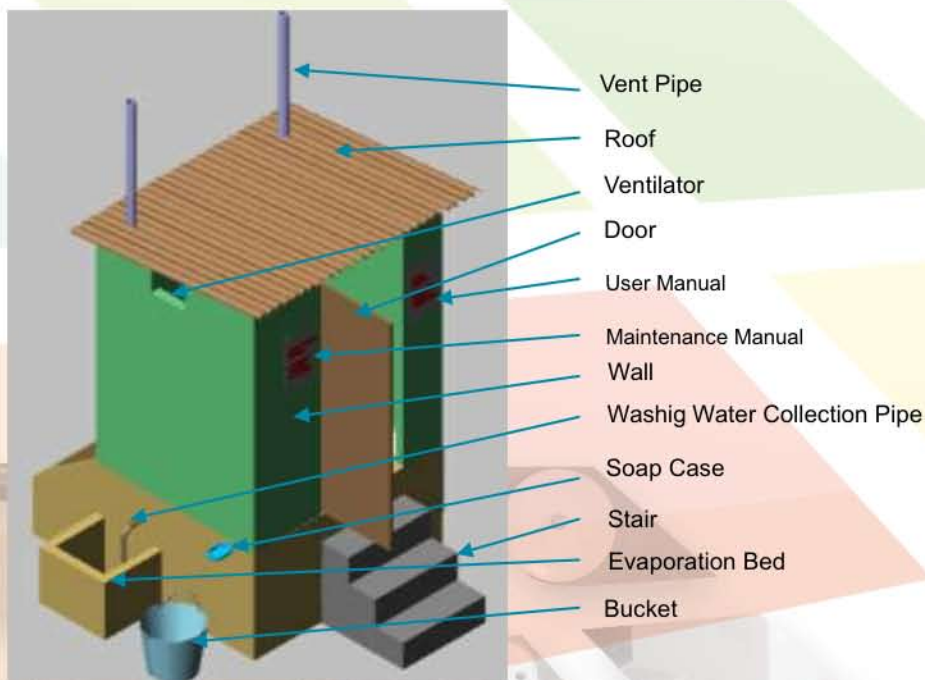
Eco-toilet has two pits or chambers and once a pit is filled up then second one can be put into use. The main feature of the toilet is that, it has a separation and collection system of urine, faeces and anal cleansing water. Users have to use ash or saw dust which helps to dry up and composting of the faeces and that's why this is called composting latrine.

Crop production gets higher using the compost of Eco-toilet and helps to improve the soil fertility and subsequently reduces the chemical fertiliser use. Besides, the collected urine can be used in crop fields directly mixing with water with a highest ration of 1:10 as a substitute of urea fertiliser.

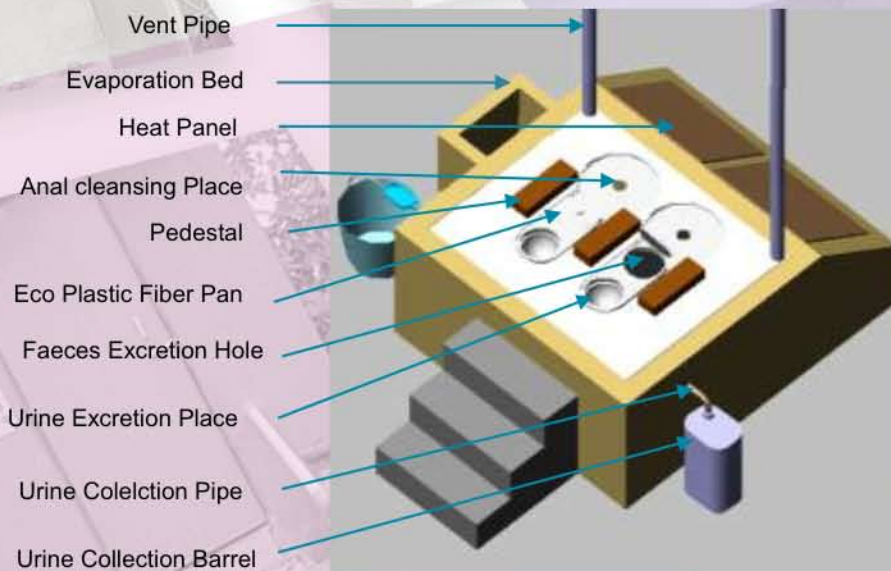
The following table shows the merits, demerits, construction materials, life span, maintenance and suitable area for Eco-toilet construction: -

Merits	<ul style="list-style-type: none"> • Odour free and can be constructed attached to the reside ^{residence} • Does not pollute ground and surface water • Source of quality compost • Hygienic and durable latrine • Safe • Flood proof • Has a scope of eco -compost marketing
Demerits	<ul style="list-style-type: none"> • Construction cost comparatively high • Require specialised knowledge to construct the toilet • Requires practical training to use and maintenance • Requires training on eco-compost preparation and use • Comparatively low acceptance among the user as it is a new technology • It takes time to habituate with the new use procedure
Life Span	<ul style="list-style-type: none"> • 15-20 years
Construction Materials	<ul style="list-style-type: none"> • Brick, sand, chips nad MS rod for chamber construction • Brick, sand and MS Bar for Brick made super-structure; or CI Sheet, Wood, hinge, nail, Nut & Bolt for semi-built superstructure • Door: Wooden Plunk or Plain sheet, hinge, MS Bar • Urine Collection: Plastic barrel and pipe
Maintenance	<ul style="list-style-type: none"> • Regular cleaning • Continuous attention to prevent entering water into the faeces chamber • Use of urine in crop field after filled up the barrel.
Suitable Area for Construction	<ul style="list-style-type: none"> • Location should be high and flood free locality where there is a water scarcity. The toilet can be constructed everywhere, having raised earthen base to protect the toilet from flood water. Construction of Eco-toilet is more suitable for the hilly area by using local materials.

Different Components of Eco-toilet:



Picture: Outside View of Eco-Toilet



Picture: Internal components of Eco-Toilet

Function of the Key Components

Vent Pipe : Disposes the odour from the faeces chamber and keep the toilet clean and odour free. A 3 inch dia and 9.5 feet long PVC (Poly Venyle Chloride) pipe used as Vent Pipe and a Cowl and screen are used at the top of the pipe to protect rain water and vectors.



Roof : Protects the users from sunlight and rain and also extend the life span of the toilet by keeping the inner part safe from heavy rain and droughts. The Roof can be made of concrete, CI sheet or straw. Even other available local materials can be used for roof.



Ventilator : Keeps the toilet free from odour and dry by passing the air into the toilet.



Door : Helps the users to enter and move out the toilet. It also ensure the privacy of the users in using toilet.



User Guideline : Aims to help the users to be oriented about the operation and maintenance of different parts of the toilets and cleanliness of the toilet.



Wall : Gives shape of the toilet.



Heat Pannel : Absorb sunlight and faster the drying process of the compost and it is to be made of GI Sheet and colour of the outer side would be dark black.



Anal Cleansing Place : Used for anal cleansing after excretion.

Urine Collection Pipe: Used to transport urine from urination place to urine storage barrel. A 1.25 inch dia PVC (Poly Venyle Chloride) pipe with elbow used as urine collection pipe.

Padestal : Used to sit on during excretion.

Eco Plastic Fibre Pan : Due to the cultural and religious practice , Bangladeshi people use water for anal cleaning. They do not feel comfortable with switch defecation pan to anal cleansing place. The eco-pan has been introduced for adaptation of anal cleaning provision using water in the conventional ecosan option. Eco plastic fibre pan is used to transport anal cleansing water, urine collection and entering the faeces into the chamber.

Urine Diversion Pan : Used to collect urine separately and faeces & anal cleaning combinely.

Eco Hi-Comode : Two different comodes used during excretion process, one is used for urine and faeces excretion and another used for anal cleansing.

Evaporation Bed : Used to store and evaporate the anal cleansing water. Evaporation bed is made of sand and brick chips to filter the grey water.



Session - 03 : Eco-Toilet Construction- Day 01 Activity

Duration	: 30 Minutes
Method	: Discussion and video slides
Logistics	: Marker, board, multimedia projector etc.
Objectives	: End of the session the participants will- <ul style="list-style-type: none"> • Be able to explain about Eco Pan • Know how to prepare construction bed • Know the rules of RCC casting on construction bed • Know the rules of sub-structure wall construction • Know how to construct heat panel

Session Structure

Step no.	Discussion topics	Duration	Method
01	Explaining of Eco Pan	06 minutes	Discussion
02	Rules of construction bed preparation	06 minutes	Discussion
03	Rules of CC casting on construction bed	06 minutes	Discussion
04	Rules and volume of sub-structure wall construction	06 minutes	Discussion
05	Rules and volume of heat panel construction	06 minutes	Discussion

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants on day 01 activities by visualizing poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 03: Day 01 Activity

Eco-Toilet Construction- Day 01 Activity Description:

- Explanation of Eco pan
- Construction bed preparation
- 2 inch CC casting
- 5 inch brick wall construction
- Construction of heat panel (if exist)

Materials: Brick, Sand, Polythene sheet and other masonry equipments.

Construction Bed: Construction bed is the base of the Eco-toilet. Beginning of the construction work, earth cutting of toilet area with 6 inches depth is required and area should include 3 more inches in each side. Then a 4 inch compact bed of sand have to prepare with local sand and water. Hence, construction bed will be prepared.



Table 01: Volume of earth cutting for different types of Eco-Toilet

Types of Eco-Toilet Design	Length	Width	Depth
Design 1: Fixed Chamber System Using Plastic Fibre Pan	5'-6"	6'-0"	6"
Design 2: Movable Drum System Using Plastic Fibre Pan (Single Pan)	5'-0"	6'-0"	6"
Design 3: Movable Drum System Using High Commode	5'-0"	6'-0"	6"
Design 4: Fixed Chamber System Using Modified Traditional Eco Pan	5'-6"	6'-0"	6"
Design 5: Fixed Chamber System Using Traditional Eco Pan	7'-0"	5'-0"	6"
Design 6: Movable Drum System Using Traditional Eco Pan	7'-0"	4'-0"	6"
Design 7: Elevated Movable Drum System with RCC Column	No construction bed is required for the design		
Design 8: Single Pit Urine Diversion Toilet			
Design 9: Twin Pit Urine Diversion Toilet			
Design 10: Waste Concern Model Using Urine Diversion Pan			
Design 11: Community Based Urine Diversion Toilet with Bio-gas Plant	7-11		

Note: Length should be directed towards X axis and Width should be directed towards Y axis.

Two Inch CC Casting: After preparation of the construction bed, a polythene have to be set on it and a 2 inches CC casting have to be constructed on it. The ration of the construction materials in casting would be Cement: Sand: Brick chips = 1:3:6. This ratio will ensure the casting quality and also reduce the construction cost.



Five Inch Brick wall construction: According to the design dimension of sub-structure, a 5 inch brick wall have to be constructed and ration of the construction material in the mortar is Cement: Sand = 1:5. The height of the wall would be 2 feet and 3 inches from the CC casting and the height of the rear wall would be 1 feet 6 inch.



Table 02: Dimension of 5 inch wall for different types oEco-toilet

Design no.	Name of the design	Length	Width	Height
Design 1	Fixed Chamber System Using Plastic Fiber Pan	5'-6"	6'-0"	2'-6"
Design 2	Movable Drum System Using Plastic Fiber Pan (Single Pan)	5'-0"	4'-10"	2'-6"
Design 3	Movable Drum System Using High Commode	5'-0"	4'-10"	2'-6"
Design 4	Fixed Chamber System Using Modified Traditional Eco Pan	5'-6"	6'-0"	2'-6"
Design 5	Fixed Chamber System Using Traditional Eco Pan	7'-0"	6'-0"	2'-6"
Design 6	Movable Drum System Using Traditional Eco Pan	7'-0"	4'-0"	2'-6"
Design 7	Elevated Movable Drum System with RCC Column	5'-0"	4'-10"	2'-6"
Design 8	Single Pit Urine Diversion Toilet	No wall required for sub-structure		
Design 9	Twin Pit Urine Diversion Toilet	3'-6"	3'-6"	1'-3"
Design 10	Waste Concern Model Using Urine Diversion Pan	3'-6"	3'-6"	2'-6"
Design 11	Community Based Urine Diversion Toilet with Bio-gas Plant	Depends on the number of users and number of toilet chambers.		

Note: Length should be directed towards X axis and Width should be directed towards Y axis.

Session - 04 : Eco-Toilet Construction- Day 02 Activity

Duration	: 30 minutes
Method	: Discussion and video slides
Logistics	: Marker, board, multimedia projector etc.
Objectives	: End of the session the participants will- <ul style="list-style-type: none"> • know about curing • know about the construction process of stair and evaporation bed • know the process of plastering and cement coating finishing of the inner wall of sub-structure • know how to prepare MS Bar arrangement in RCC casting • know about the preparation of shuttering

Session Structure :

Step no.	Discussion Topics	Duration	Method
01	Curing	06 minutes	Poster presentation, Discussion
02	Process of Stair and Evaporation bed construction	06 minutes	Poster presentation, Discussion
03	Process of plastering and cement coating on the inner wall of sub-structure.	06 minutes	Poster presentation, Discussion
04	Preparation of MS Bar arrangement in RCC casting	06 minutes	Poster presentation, Discussion
05	Preparation for shuttering	06 minutes	Poster presentation, Discussion

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants on day 02 activities by visualising poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 04: Day 02 Activity

Eco-Toilet Construction- Day 02 Activity Description:

Curing: At the starting of day, the previously constructed structures have to be cured with water properly. Enough water has to be stored in site for curing purpose. If the source of water stands at a distance, large bucket or drum has to be manage for water storing purpose. Dirty or turbid water cannot be used for curing. Tubewell or clean pond water can be used for curing. To make the inner bond between brick and mortar strong, curing is essential.

Stair and Evaporation Bed Construction: Stair and evaporation bed have to be constructed by brick as per design. To reduce the construction cost, filling sand can be used for filling the gap in stair construction.

Plastering and Net Cement Finishing on the Inner Wall of Sub-structure: Plastering has to be done inner portion of 5 inch brick wall of sub-structure. Thickness of plastering should be ½ inch and after that, net cement finishing has to be done. The ratio of mortar for plastering is cement: sand = 1: 6.

MS Bar Arrangement in RCC Casting: For RCC slab casting, MS bar has to be cut 1 inch less from both side of box. 8 mm dia reinforcement has to be set 8 inch interval in both direction. Site engineer has to be careful in bar arrangement for eco-pan setting.

Shattering Preparation: Wood, bamboo, nail and GI tar has to be arranged for shattering purpose.

Session - 05 : Construction Precaution

Duration	: 30 minutes
Method	: Discussion and presentation
Logistics	: Marker, Board, Multimedia Display
Objectives	: End of the session the participants' will- <ul style="list-style-type: none">• Know the precaution during construction

Session Structure :

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will ask the participants about the precaution taken during construction and will write down sequentially on board. Later on s/he will clearly brief the participants on precautions which have to be taken during Eco-toilet construction by displaying poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 05: Precaution during Construction

1. Must be aware about proper curing. Beneficiary who has selected for Eco-toilet construction will ensure the curing two times in a day.
2. For proper curing, sufficient water storage is essential.
3. To ensure the quality of brick, field test of brick has to be conducted. If no mark on the body of brick can be made by nail, metallic sound create from brick at striken by a hammer or put down from 6 feet height after making a "T", but the brick remains unbroken, it can be said that the brick quality is satisfactory. Colour and shape of brick also should be verified.
4. Brick has to be properly wetted by sufficient water before brick work in wall.
5. The qualities of sand also should be verified. One handful of sand has to be put into a glass of water and wait for 10 minutes. After 10 minutes, if full amount of sand deposited into the bottom of the glass and clear water exerts on the top portion of glass, the sand quality will be satisfactory. Sieving of sand to remove dusts and garbages is essential.
6. Cement should be fresh which is be used in construction work. Stiffy cement has to avoided for quality construction work. It feels cool after inserting the hand into the cement bag if cement is fresh.
7. The ratio of cement and sand should be accurate in preparation of mortar.
8. Slope of urine and anal cleansing water pipe has to be maintained during brick work.
9. Slope of heat panel should be as per design and entrance of rainwater into heat panel must be prohibited.



Session - 06 : Eco-Toilet Construction- Day 03 Activity

Duration	: 30 minutes
Method	: Discussion, Video presentation
Logistics	: Marker, Board, Multimedia etc
Objectives	: End of the session the participants will-
	<ul style="list-style-type: none">• Know about curing• Know about the process of shattering• Know about the function of urine and anal cleansing water collection pipe• Know about RCC slab casting• Know about 3 inch wall for super-structure

Session Structure :

Step no.	Discussion Topics	Duration	Method
01	Curing	06 minutes	Poster presentation, Discussion
02	Shattering	06 minutes	Poster presentation, Discussion
03	Function of urine and anal cleansing water collection pipe	06 minutes	Poster presentation, Discussion
04	RCC slab casting	06 minutes	Poster presentation, Discussion
05	3 inch wall for super-structure	06 minutes	Poster presentation, Discussion

Session Conduction Process:

- Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants on day 03 activities by visualising poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 06: Day 03 Activity

Eco-Toilet Construction- Day 03 Activity Description:

Curing: At the starting of day, the previously constructed structures have to be cured with water properly. Enough water has to be stored in site for curing purpose. If the source of water stands at a distance, large bucket or drum has to be managed for water storing purpose. Dirty or turbid water cannot be used for curing. Tubewell or clear pond water can be used for curing. To make the inner bond between brick and mortar strong, curing is essential.

Shattering: Shattering has to be prepared for 4 inch RCC slab casting according to the toilet design with bamboo and wood. To maintain the clear cover between reinforcement and shatter, previously prepared concrete block can be used.

Urine and anal cleansing water collection pipe: For collection of urine and anal cleansing water, 1 inch dia PVC pipe has to be set in time of shattering according to the design and should be careful about displacement of pipe in time of casting.

RCC slab casting: After proper setting of shattering and reinforcement, RCC slab casting has to be done. Before slab casting, a hole for vent pipe has to be maintained. Site engineer should check the distance between side wall to pan, pan to pedestal, pan to pan before casting. The ration of the construction materials in slab casting would be Cement: Sand: Brick Chips = 1:3: 6.

After finishing of RCC slab casting, two hour interval is required. After that 3 inch brick wall casting has to be started.

Three inch wall of super-structure: Three inch brick wall is used for super structure in eco-toilet. Not more than 3 feet of brick wall will be constructed in a day. The ration of the construction materials in wall casting would be Cement: Sand = 1:5. After casting of 3 feet brick wall, the activity of day 03 will be finished.

Session - 07 : Types of Eco-Toilet

Duration	: 2 Hour 30 minutes
Method	: Discussion, Video presentation
Logistics	: Marker, Board, Multimedia etc
Objectives	: End of the session the participants will- <ul style="list-style-type: none">• Know about different types of eco-toilet• Know about the suitability of different options in different geographical regions.

Session Structure :

Step no.	Discussion topics	Duration	Method
01	Different types of options	30 minutes	VIPP Card, Video presentation
02	Suitability of different options in different geographical regions.	120 minutes	3-D Animation, Multimedia, Video presentation

Session Conduction Process:

- At the Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will ask the participants about the different types of eco-toilets and will write down sequentially on board. Later on, s/he will clearly brief the participants on different types of eco-toilet by VIPP Card.
- After that the facilitator will show the participants different types of eco-toilet and suitability of different types of eco-toilet in different geological conditions by 3D Animation/ Multimedia presentation.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

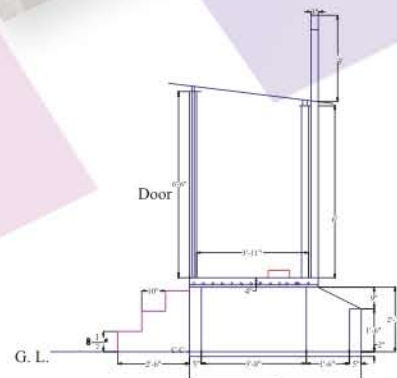
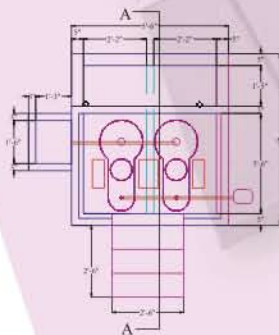
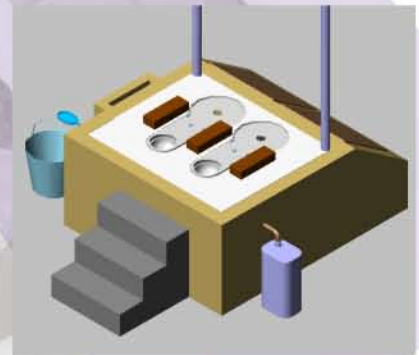
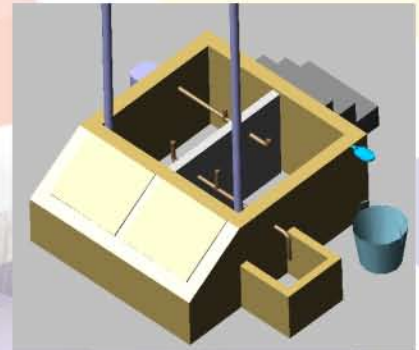


Support Note 7 & 9: Description of Different Types of Eco-toilet

Option 1: Fixed Chamber System Using Plastic Fibre Pan

Characteristics

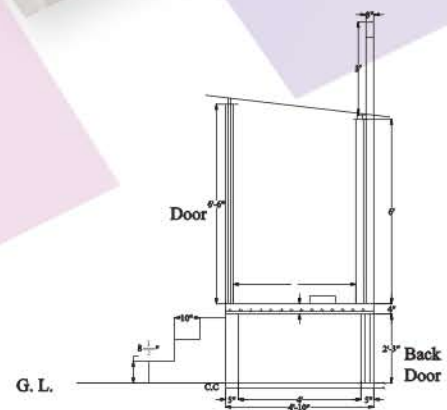
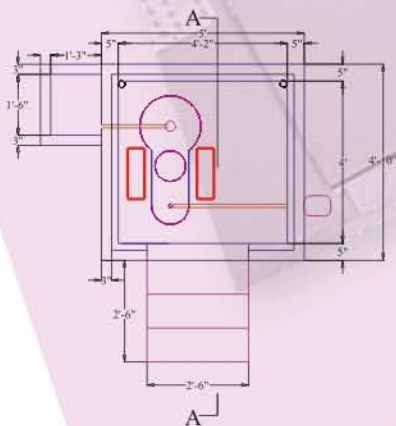
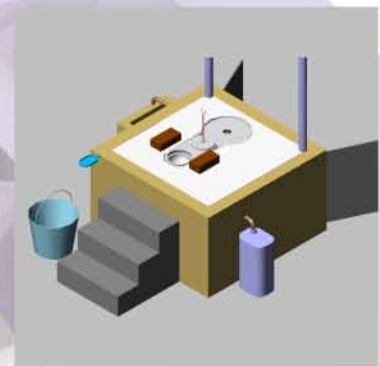
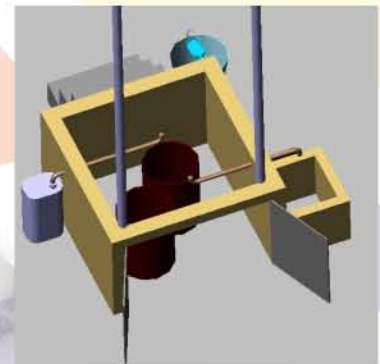
- Two plastic fibre eco-pans (alternate use in six months interval), eco-pan separates the faeces, urine, and anal cleansing water
- Two fixed chamber (brick made) for faeces storage.
- Dark black painted GI sheet is used as the heat panel on back of the chamber, Heat panel facilitate the drying of faeces and moisture reduction ensuring heat trapping from sunlight.
- Two vent pipes from two corners are used to remove the odor from the toilet.
- Require 33 square feet of area.
- Sub-structure should be made of brick.
- Construction cost BDT 12819.00 for brick structure (substructure cost BDT 8369.00) and Cost BDT 11219.00, if superstructure made by Bamboo.



Option 2: Movable Drum System Using Plastic Fiber Pan (Single Pan)

Characteristics

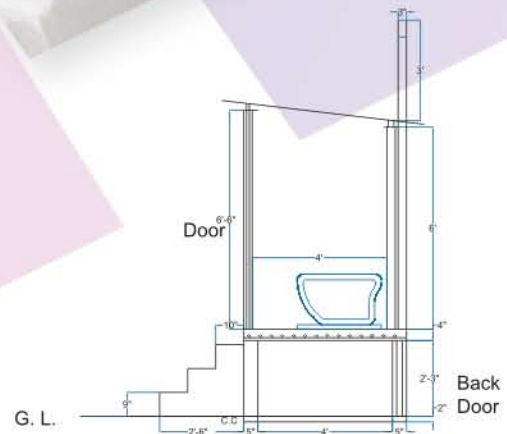
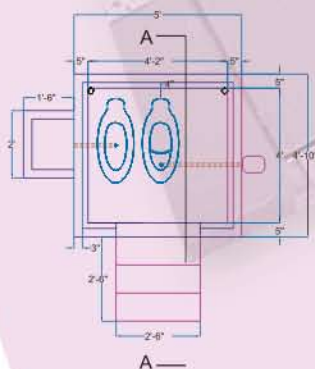
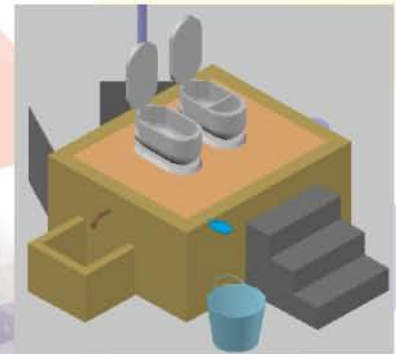
- One plastic fiber eco-pan is used (Eco-pan will separate the faeces, urine and anal cleansing water)
- Two plastic drums are used instead of fixed chamber (alternate use in six month interval)
- Two vent pipes in two corners have been used to remove the odor from the toilet
- No heat panel is used as faeces store in drum
- A back door is provided for taking in and out of the plastic drum
- Require 25 square feet of area
- Bamboo/Mud or other available materials can be used for sub-structure of the toilet
- Construction cost BDT 12156.00 for brick structure (substructure cost BDT 7766.00) and Cost BDT 10616.00, if superstructure made by Bamboo.



Option 3: Movable Drum System Using High Commode (Single Pan)

Characteristics

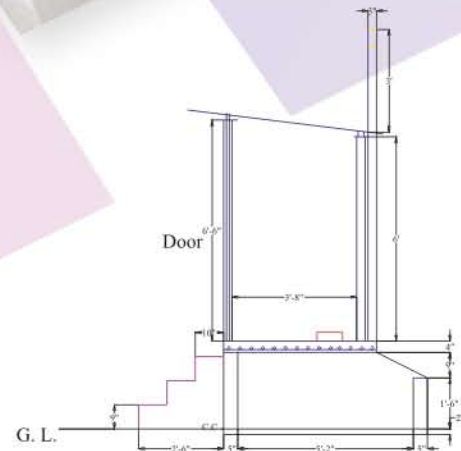
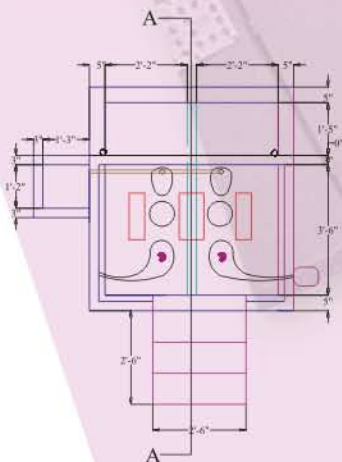
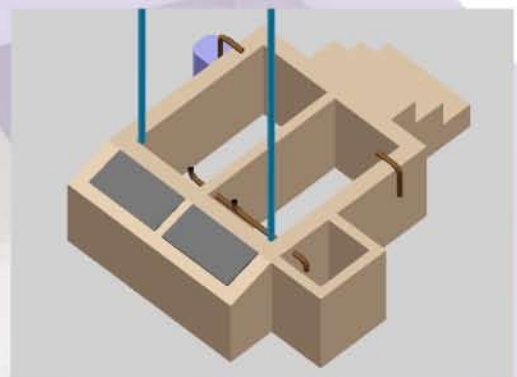
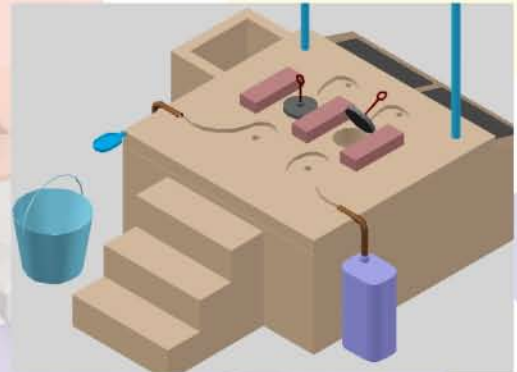
- Two special types of high commode is used. One commode is used to divert the urine and collect faeces on drum, another for anal cleansing.
- Two plastic drums are used instead of fixed chamber (alternate use in six month interval).
- Two vent pipes from two corners are used to remove the odor from the toilet.
- No heat panel will be used as faeces stored in drum.
- A back door is provided for taking in and out of the plastic drum instead of heat panel.
- Area required for construction is 25 sq feet.
- Construction cost BDT 13146.00 for brick structure (substructure cost BDT 8696.00) and Cost BDT 11196.00, if superstructure made by Bamboo.
- Bamboo/Mud or other available materials can be used for sub-structure of the toilet.



Option 4: Fixed Chamber System Using Modified Traditional Eco Pan

Characteristics

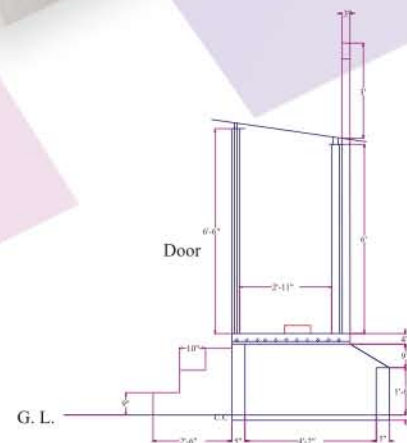
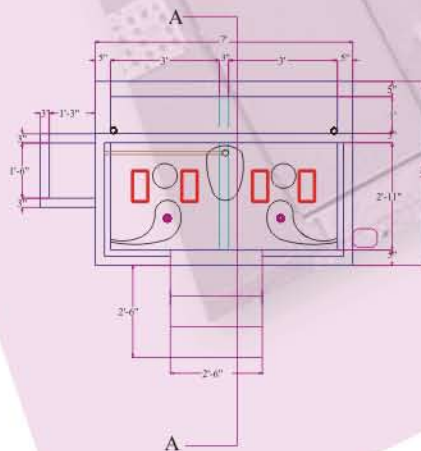
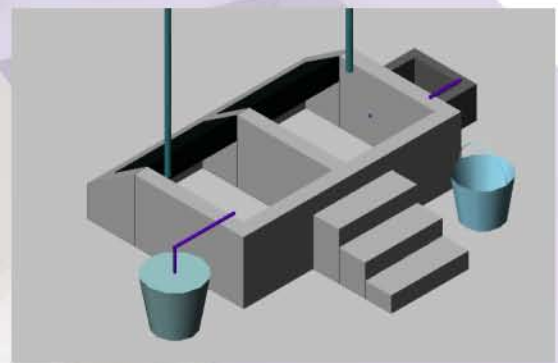
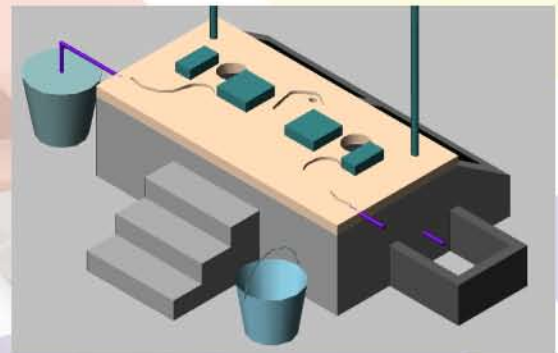
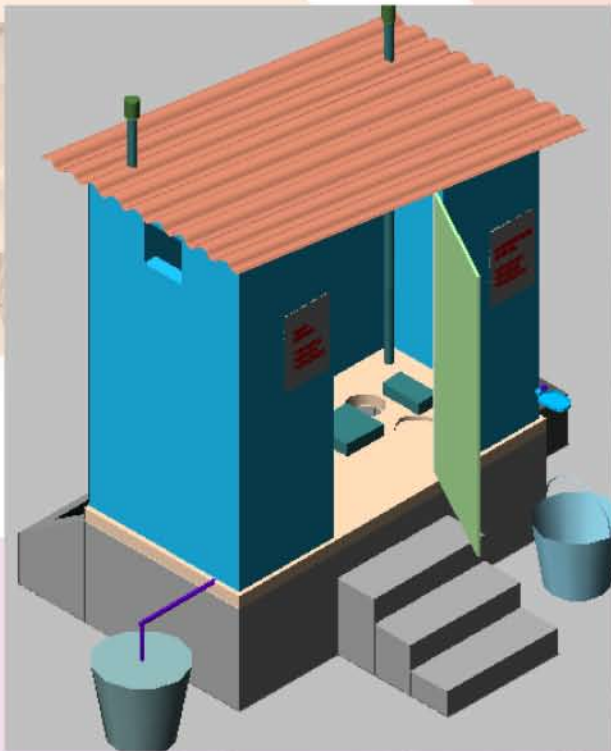
- Option modified from traditional eco-pan introduced by BARD.
- Slab on PL (plinth level) constructed such a way which provides facilities for urinal separation and faeces.
- Anal cleansing facility is provided back instead of middle of the slab (it reduce the space requirement).
- Two pans and two fixed chamber is used.
- Two vent pipes in two corners are used removing the odor from the toilet.
- Dark black painted GI sheet is used as the heat panel on back of the chamber.
- Option requires 33 square feet of area.
- Substructure should be made on brick.
- Construction cost BDT 11679.00 for brick structure (substructure cost BDT 7229.00) and Cost BDT 10079.00, if superstructure made by Bamboo.



Option 5: Fixed Chamber System Using Traditional Eco-Pan

Characteristics

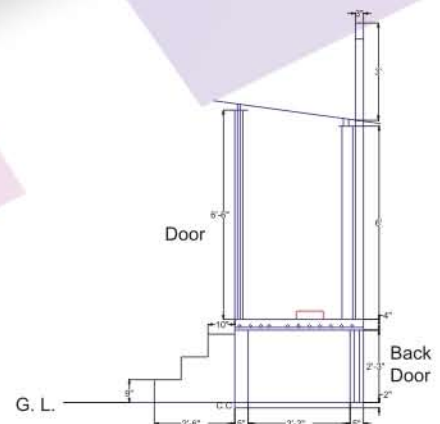
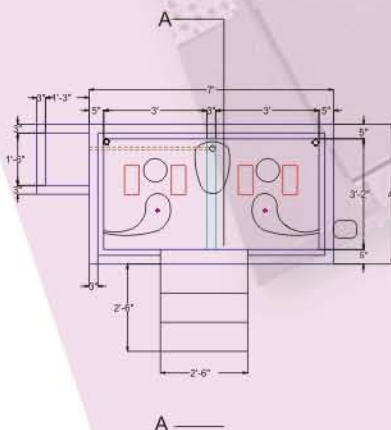
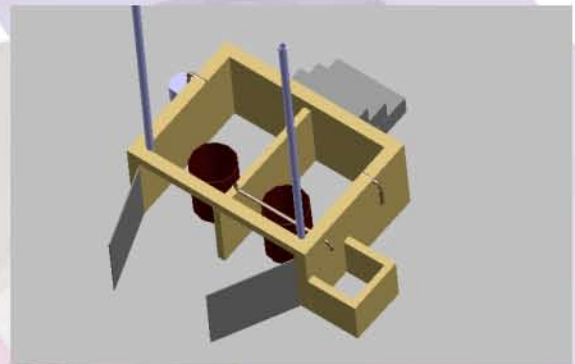
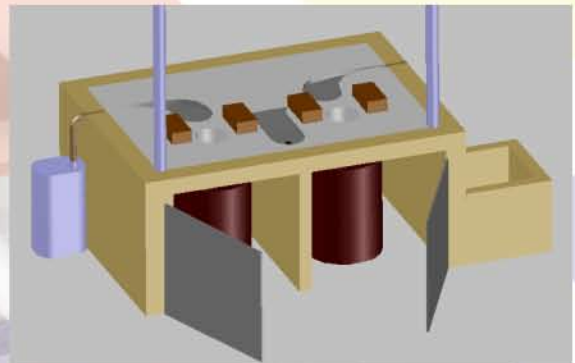
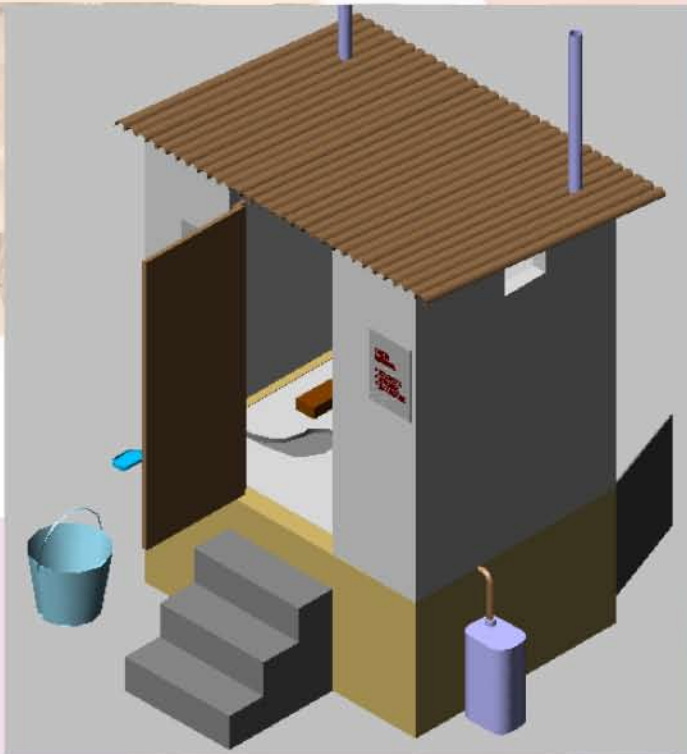
- Traditional eco-toilet.
- Slab on PL (plinth level) constructed such a way which provides facilities for urinal separation and faeces.
- Anal cleansing facility is provided middle of the slab two pans and two fixed chamber is used.
- Two vent pipes in two corners are used removing the odor from the toilet.
- Dark black painted GI sheet is used as the heat panel on back of the chamber.
- Option requires 35 square feet of area.
- Substructure should be made on brick.
- Construction cost BDT 12279.00 for brick structure (substructure cost BDT 7789.00) and Cost BDT 10639.00, if superstructure made by Bamboo.



Option 6: Movable Plastic Drum System Using Traditional Eco-Pan

Characteristics

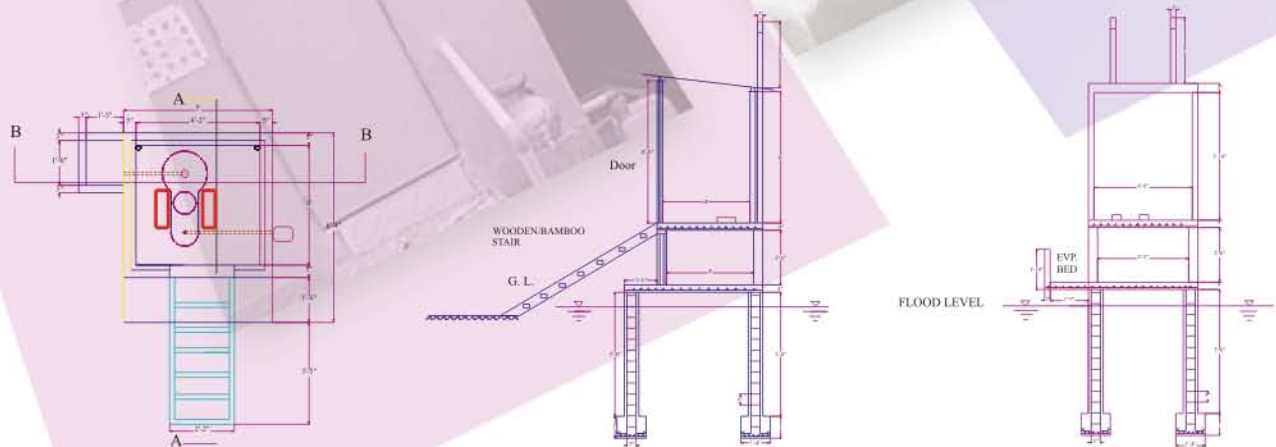
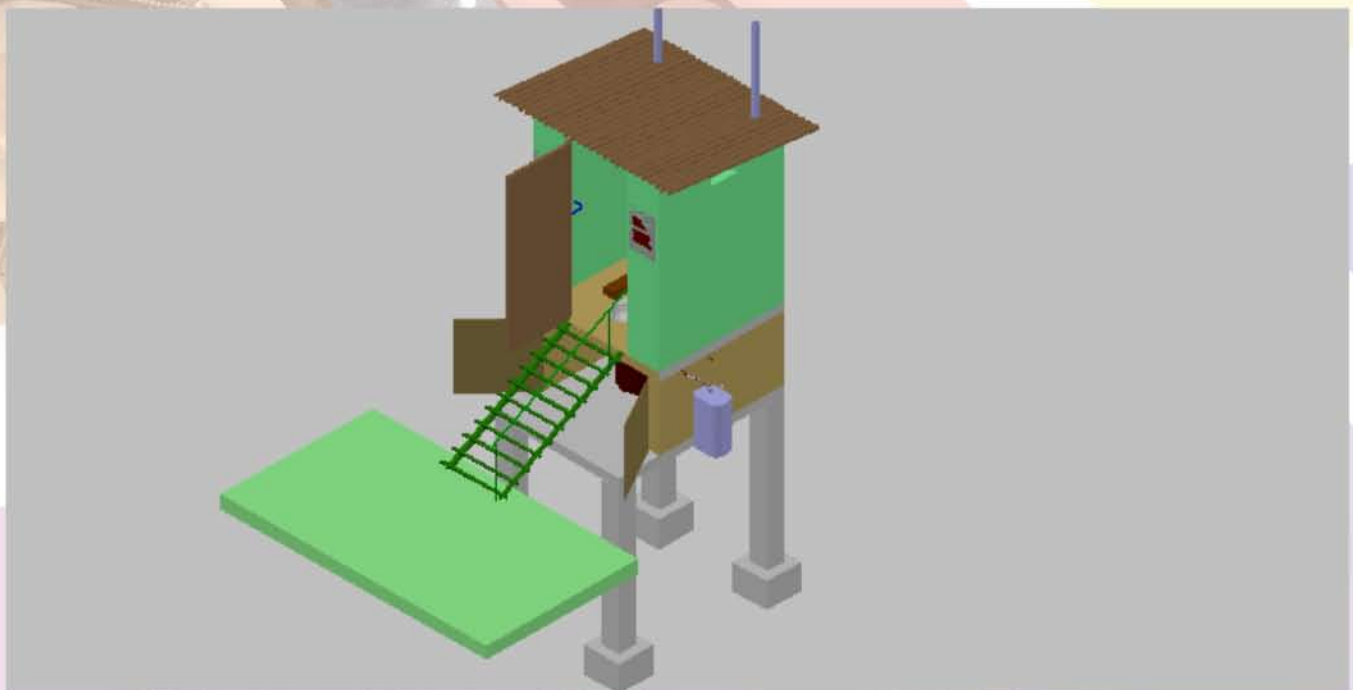
- Option modified from traditional eco-pan introduced by BARD.
- Slab on PL (plinth level) constructed such a way which provides facilities for urinal separation and faeces.
- Anal cleansing facility is provided back instead of middle of the slab (it reduces the space requirement).
- Two pans and two movable drums are used.
- Two vent pipes in two corners are used removing the odor from the toilet.
- A back door is provided for taking in and out of the plastic drum instead of heat panel.
- Option requires 35 square feet of area.
- Construction cost BDT 12436.00 for brick structure (substructure cost BDT 7946.00) and Cost BDT 10796.00, if superstructure made by Bamboo.
- Bamboo/Mud or other available materials can be used for sub-structure of the toilet.



Option 7: Elevated Movable Plastic Drum System with RCC Column

Characteristics

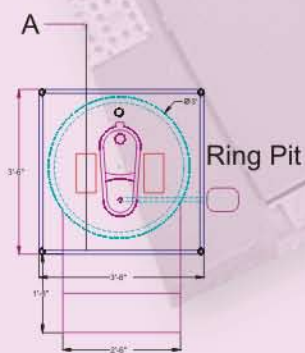
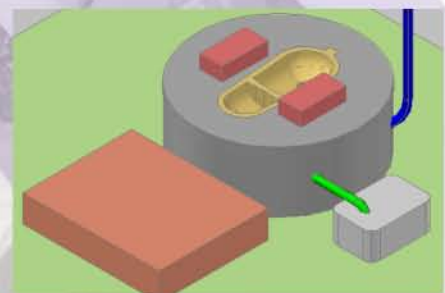
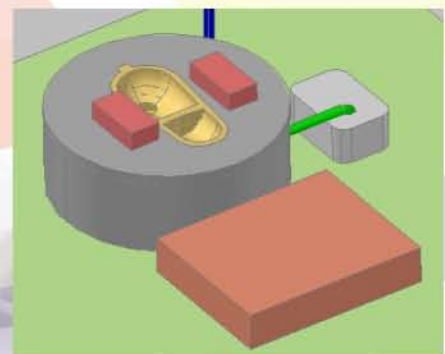
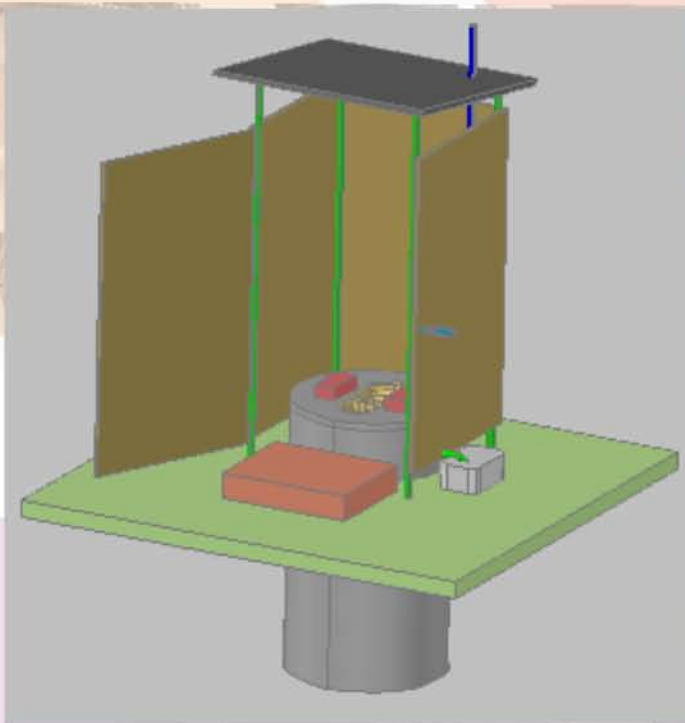
- Option specially designed for haor and flood prone area
- The toilet has an elevated platform by R.C.C column and slab.
- One plastic fibre eco-pan and two movable plastic drum is used
- One ladder is provided to reach the elevated platform from ground level.
- No heat panel is used
- A back door provided for taking in and out of the plastic drum instead of heat panel
- This option requires 25 square feet of area.
- Entire structure made by brick and concrete
- Construction cost BDT 17500.00 for brick structure (substructure cost BDT 13110.00) and Cost BDT 15960.00, if superstructure made by Bamboo.



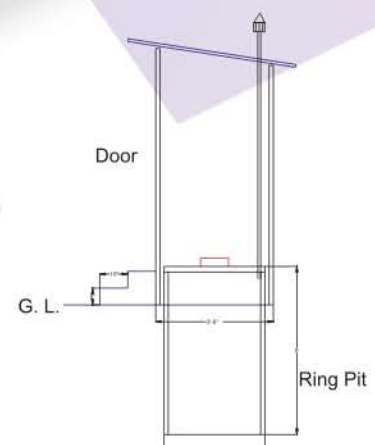
Option 8: Single Pit Urine Diversion Toilet

Characteristics

- By definition, it can not be said eco toilet.
- Option specially designed with minimum cost for the poor people.
- One urine diversion pan with water sealing component is used.
- One special pan provides facilities for separation urine and faeces.
- No separate facilities for anal cleansing.
- Faeces and anal cleansing water will go directly to the ring pit (05 nos).
- Vent is provided at the middle of the toilet.
- Urine will go to the urine pot through separate pipeline.
- This option requires 12 square feet of area.
- Cost BDT 5405.00 for bamboo made super-structure.



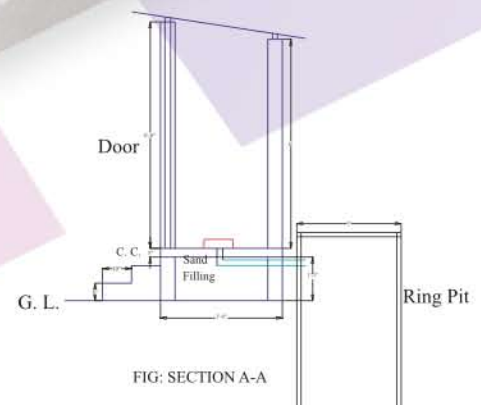
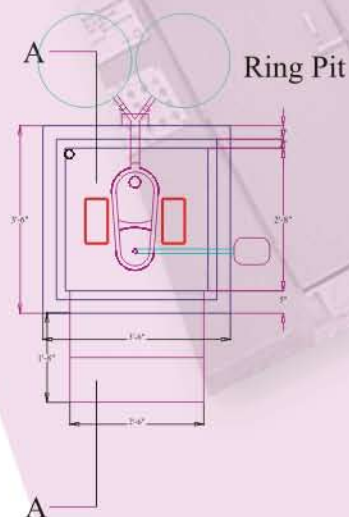
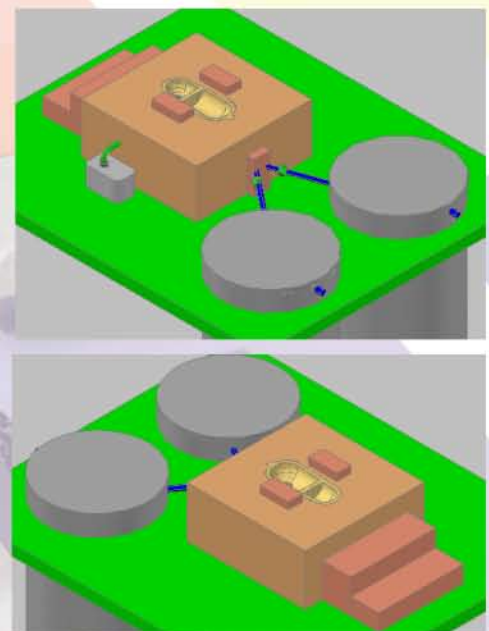
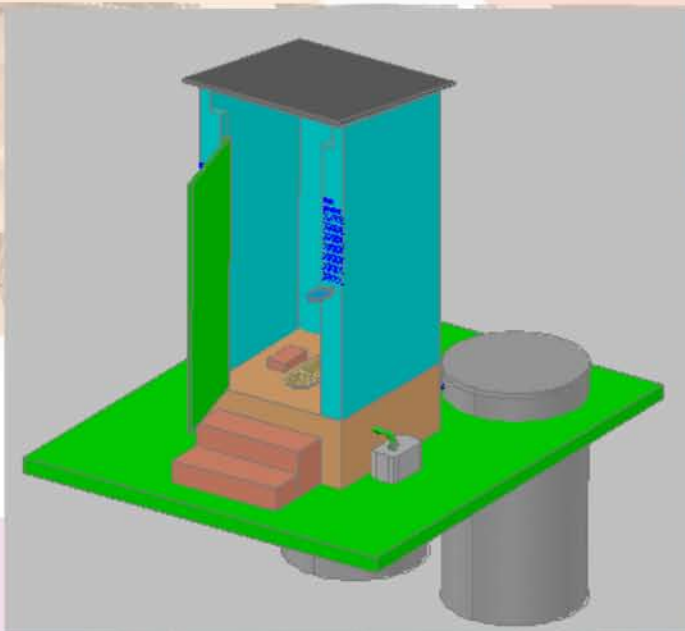
A —



Option 9: Twin Pit Urine Diversion Toilet

Characteristics

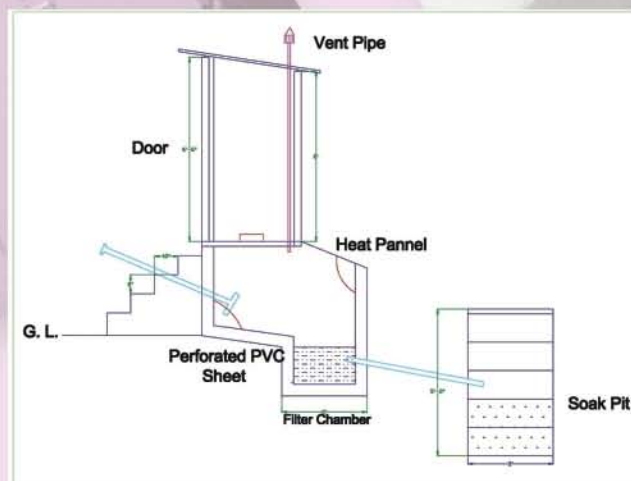
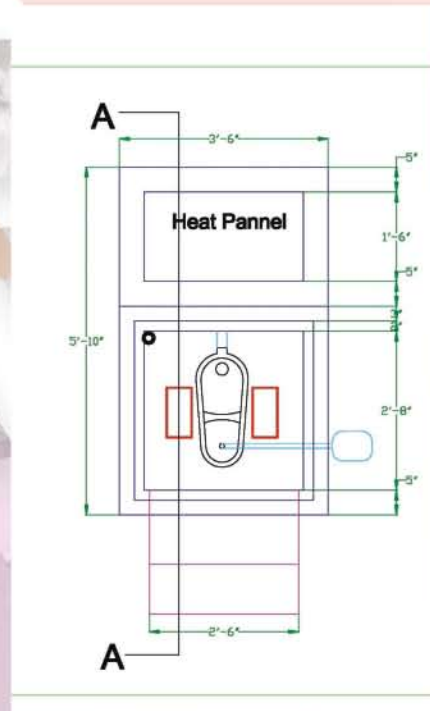
- Popularly known as twin pit but little modification that is one special pan provides facilities for separation of urine and faeces with water sealing component.
- One urine diversion pan is used for this option.
- No separate facilities for anal cleansing.
- Faeces and anal cleansing water will go directly to the ring pit (10 nos).
- Two ring pits is used alternately in six month interval after filling of one.
- The area required to construct this option is 25 sq feet.
- Construction cost BDT 11200.00 for brick structure (substructure cost BDT 7600.00) and Cost BDT 9220.00, if superstructure made by Bamboo.



Option 10: Waste Concern Model using Urine Diversion Pan

Characteristics

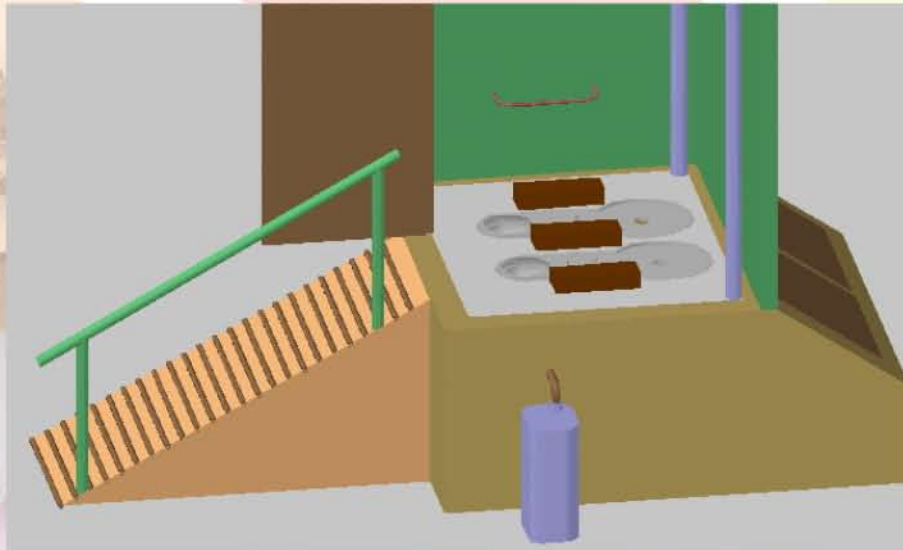
- UNICEF designed implemented by waste concern.
- Urine will go directly to the urine container by separate pipeline
- Faeces and anal cleansing water goes to the sub-structure chamber.
- Anal cleansing water goes to soak pit through a filter media
- Faces will remain upon on the filter media
- Heat panel is used.
- The area required to construct this option is 30 sq feet.



Option addressing Women, Special need, Disable issue and Child Friendly

Characteristics

- The stair of the toilet has been made sloppy with a railing instead of strip (tread and rise); it will reduce the probability of accident in time of access to the eco-toilet and also provide an access for wheel chair for disable people.
- There is a handle in the wall near of the pedestal to make easy movement for anal cleansing and urination.
- The pedestal size has been increased to 15 inch from 10 inch which will help for moving backward for anal cleansing.
- Women should use anal cleansing place for urination and anal washing during their menstrual period because this water will directly go to the evaporation bed which will make them free from shy feelings. The face of the women should be behind the door (that means turning to the back wall) in time of using the toilet during menstrual period.
- This type of criteria has been shown in every design options.



Suitability of Proposed Options

Toilet Option	Hilly	Barind Track	Flood Prone	Slum	Haor
Fixed Chamber System Using Plastic Fibre Pan	✓	✓	✓	✓	✓
Movable Plastic Drum System Using Plastic Fibre Pan (Single Pan)	✓	✓		✓	
Movable Plastic Drum System Using High Commode	✓	✓			
Fixed Chamber System Using Modified Traditional Eco Pan	✓	✓	✓	✓	✓
Fixed Chamber System Using Traditional Eco Pan	✓	✓	✓		✓
Movable Plastic Drum System Using Traditional Eco Pan	✓	✓			
Elevated Movable Plastic Drum System with RCC Column			✓		✓
Single Pit Urine Diversion Toilet	✓	✓		✓	
Twin Pit Urine Diversion Toilet	✓	✓	✓	✓	✓
Waste Concern Model using Urine Diversion Pan	✓	✓	✓	✓	✓
Community Based Urine Diversion Toilet with Biogas Plant	✓	✓	✓	✓	✓
Suitable option depending on site	10	10	7	7	7

Session - 08 : Eco-Toilet Construction-Day 04 Activity

Duration	: 30 Minutes
Method	: Discussion, Video Presentation
Logistics	: Marker, Board, Multimedia etc.
Objectives	: End of the session the participants will- <ul style="list-style-type: none">• Know about curing• Know about 3 inch wall of super-structure

Session Structure

Step no.	Discussion Topic	Duration	Method
01	Curing	10 minutes	Poster presentation, discussion
02	3 inch wall of Super-structure	20 minutes	Poster presentation, discussion

Session Conduction Process:

- At the Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants on day 04 activities by visualising poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 8: Day 04 Activity

Eco-Toilet Construction- Day 04 Activity Description:

Curing: At the starting of the day, the previously constructed structures have to be cured with water properly. Enough water has to be stored in site for curing purpose. If the source of water stands at a distance, large bucket or drum has to manage for water storing purpose. Dirty or turbid water cannot be used for curing. Tubewell or clean pond water can be used for curing. To make the inner bond between brick and mortar strong, curing is essential.

Three inch wall of super-structure: The rest part of 3 inch brick wall have to be constructed for super structure. The ration of the construction materials in wall casting would be Cement: Sand = 1:5. After casting of 3 inch brick wall, the activity of day 04 will be finished.

Session - 10 : Construction Materials and Cost Estimate

Duration	: 1.00 Hour
Method	: Discussion, Presentation
Logistics	: Eco pan, Bricks, Tiles, Different construction materials, Board, Multimedia etc,
Objectives	: End of the session the participants will be - <ul style="list-style-type: none"> • Able to know the construction materials for eco-toilet • Know the estimated cost of different types of eco-toilet

Session Structure

Step no.	Discussion Topic	Duration	Method
01	Construction Materials	15 minute	Vibrant discussion, power point presentation and construction materials display
02	Cost Estimation	45 minute	Examples and exercise

Session Conduction Process:

- At the Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will give the participants idea about the construction materials by power point presentation. Then s/he will give the participants concept about detail BoQ of different options of eco-toilets by exercise.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	450	4	1,800
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	8	53	424
Door	2.5'x6'	no.	1	600	600
Back Cover		nos.	2	200	400
Hardware items		-	-	-	200
Sub total 1					4,644
Sanitary Items Cost					
Eco-Pan		nos.	2	700	1,400
Vent Pipe	3"	ft	15	15	225
Cowl	3"	nos.	2	15	30
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					2,025
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					8,369

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	290	4	1,160
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,450
Total Amount (A+4)					12,819.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					13,919.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					11,219.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					10,869.00

Details BoQ of Option 2:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	335	4	1,340
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	7	53	371
Back Door	3.5' x2.25'	nos.	1	500	500
Door	2.5'x6'	no.	1	600	600
Drum		nos.	2	300	600
Hardware items		-	-	-	200
Sub total 1					4,831
Sanitary Items Cost					
Eco-Pan		nos.	1	700	700
Vent Pipe	3"	ft	10	15	150
Cowl	3"	nos.	1	15	15
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					1,235
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					7,766

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	275	4	1,100
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,390
Total Amount (A+4)					12,156.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					13,316.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					10,616.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					10,266.00

Details BoQ of Option 3:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	370	4	1,480
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	7	53	371
Back Door	3.5' x2.25'	nos.	1	500	500
Door	2.5'x6'	no.	1	600	600
Drum		nos.	2	300	600
Hardware items		-	-	-	200
Sub total 1					4,971
Sanitary Cost	Items				
Eco-Pan		nos.	2	700	1,400
Vent Pipe	3"	ft	15	15	225
Cowl	3"	nos.	2	15	30
Pipe(For clinging & diversion)	anal urine 1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					2,025
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					8,696

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	290	4	1,160
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,450
Total Amount (A+4)					13,146.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					14,246.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					11,546.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					11,196.00

Details BoQ of Option 4:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	450	4	1,800
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	8	53	424
Door	2.5'x6'	no.	1	600	600
Back Cover		nos.	2	200	400
Hardware items		-	-	-	200
Sub total 1					4,644
Sanitary Items Cost					
Pipe for making Pan	8"	ft	1	120	120
Pan Cover		nos.	2	70	140
Vent Pipe	3"	ft	15	15	225
Cowl	3"	nos.	2	15	30
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					885
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					7,229

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	290	4	1,160
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,450
Total Amount (A+4)					11,679.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					12,779.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					10,079.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					9,729.00

Details BoQ of Option 5:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	500	4	2,000
Cement	Composite	bags	3	360	1,080
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	8	53	424
Door	2.5'x6'	no.	1	600	600
Back Cover		nos.	2	200	400
Hardware items		-	-	-	200
Sub total 1					5,204
Sanitary Items Cost					
Pipe for making Pan	8"	ft	1	120	120
Pan cover		nos.	2	70	140
Vent Pipe	3"	ft	15	15	225
Cowl	3"	nos.	2	15	30
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					885
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					7,789

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	300	4	1,200
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,490
Total Amount (A+4)					12,279.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					13,339.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					10,639.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					10,289.00

Details BoQ of Option 6:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	400	4	1,600
Cement	Composite	bags	3	360	1,080
Sand	FM=1.2	cft	25	20	500
M.S. Rod	8 mm@ 8" C/C	kg	7	53	371
Back Door	3.5' x2.25'	nos.	1	500	500
Door	2.5'x6'	no.	1	600	600
Drum		nos.	2	300	600
Hardware items		-	-	-	200
Sub total 1					5,451
Sanitary Items Cost					
Pipe for making Pan	8"	ft	1	120	120
Pan Cover		nos.	2	70	140
Vent Pipe	3"	ft	10	15	150
Cowl	3"	nos.	1	15	15
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					795
Labour Cost					
Mason charge		Contract	-	-	1,500
Roof & Door making		Contract	-	-	200
Sub total 3					1,700
Total (1+2+3)=A					7,946

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	300	4	1,200
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,490
Total Amount (A+4)					12,436.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					13,496.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					10,796.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					10,446.00

Details BoQ of Option 7:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub- Structure (Common Items)					
Brick	Second class	nos.	270	4	1,080
Cement	Composite	bags	6	360	2,160
Sand	FM=1.2	cft	25	20	500
Khoa	First Class	cft	30	40	1,200
M.S. Rod	8 mm@ 8" C/C	kg	35	53	1,855
Back Door	3.5' x2.25'	nos.	1	500	500
Bamboo		nos.	4	120	480
Door	2.5'x6'	no.	1	600	600
Drum		nos.	2	300	600
Hardware items		-	-	-	200
Sub total 1					9,175
Sanitary Items Cost					
Eco-Pan		nos.	1	700	700
Vent Pipe	3"	ft	10	15	150
Cowl	3"	nos.	1	15	15
Pipe(For anal clinging & urine diversion)	1"	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Flexible pipe	1"	meter	1	30	30
Urine Pot	Transparent	no.	1	150	150
Sub total 2					1,235
Labour Cost					
Mason charge		Contract	-	-	2,500
Roof & Door making		Contract	-	-	200
Sub total 3					2,700
Total (1+2+3)=A					13,110

Super- Structure Made by Brick Wall					
Brick	Second class	nos.	275	4	1,100
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Paint & White Cement		kg	5	40	200
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,000
Paint labour charge		Contract	-	-	150
Sub total 4					4,390
Total Amount (A+4)					17,500.00

Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5'x6'	nos.	7	350	2,450
G.I Sheet for Roof	2.5'x6'	nos.	2	350	700
Wood for Batten	2.5" x 2.5"	cft	2	300	600
Pillar/Khuti		nos.	4	250	1,000
Hardware Items		-	-	-	200
Carpenter Charge		Contract			600
Sub total 5					5,550
Total Amount (A+5)					18,660.00

Super- Structure Made by Bamboo Fench					
Bamboo Fench	2.5'x6'	nos.	10	200	2,000
Bamboo		nos.	2	150	300
GI Tar		kg	1.5	100	150
Labour Charge		Contract			400
Sub total 6					2,850
Total Amount (A+6)					15,960.00

Super- Structure Made by Mud					
Mud		Van	4	150	600
Rice Husk		Kg	10	20	200
Bamboo Fench for Roof	2.5'x6'	nos.	2	200	400
Bamboo		nos.	2	150	300
Labour Charge		nos.	4	250	1,000
Sub total 7					2,500
Total Amount (A+7)					15,610.00

Details BoQ of Option 8:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
G.I Sheet for roof	2.5'x9'	nos.	1	500	500
Door	2.5'x6'	no.	1	700	700
GI Tar		kg	2	90	180
Ring Pit	3' Dia	nos.	5	150	750
Labour for Earthwork	L/S				600
Bamboo Fench	2.5' x6'	nos.	6	150	900
Bamboo		nos.	2	120	240
Labour Charge		nos.	2	150	300
Sub total					4,170
Sanitary Items Cost					
Slab with UD Pan		nos.	1	700	700
Vent Pipe	3"	ft	10	15	150
Cowl	3"	nos.	1	15	15
Pipe for urine Diversion	1.5"	ft	10	15	150
Flexible Pipe	1.5"	ft	1	30	30
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Urine Pot	Transparent	no.	1	150	150
Sub total					1,235
Total (1+2)					5,405.00

Details BoQ of Option 9:

Items	Specification	Unit of Measure	Unit	Unit cost	Amount in TK.
Sub-Structure (Common Items)					
Brick	Second Class	nos.	150	4	600
Cement	Composite	Bags	1	360	360
Sand	F.M-1.2	cft	20	20	400
G.I Sheet for Roof	2.5'x9'	nos.	1	500	500
Door	2.5'x6'	no.	1	700	700
Ring Pit (5+5)	3' Dia	nos.	12	150	1,800
Labour for Earthwork	L/S				1,200
Mason Charge		Contract			1,000
Sub total 1					6,560
Sanitary Items Cost					
UD Pan	PAB Model	nos.	1	700	700
Pipe for urine Diversion	ft	ft	10	15	150
Elbow	1"	nos.	3	10	30
Tee	1"	no.	1	10	10
Urine Pot	Transparent	no.	1	150	150
Sub total 2					1,040
Total (1+2)= A					7,600.00

Super-Structure Made by Bamboo Fench					
Bamboo Fench	2.5' x6'	nos.	6	150	900
Bamboo		nos.	2	120	240
GI Tar		Kg	2	90	180
Labour Charge		nos.	2	150	300
Sub total 3					1,620
Total Amount (A+3)					9,220.00
Super- Structure Made by Brick Wall					
Brick	Second class	nos.	225	4	900
Cement	Composite	bags	2	360	720
Sand	FM=1.2	cft	15	20	300
Paint & White Cement		kg	4	40	160
Paint (Red Oxide)		kg	0.5	240	120
Mason charge		Contract	-	-	1,200
Paint labour charge		Contract	-	-	200
Sub total 4					3,600
Total Amount (A+4)					11,200.00
Super- Structure Made by GI Sheet (Tin)					
GI Sheet	2.5' x6'	nos.	6	300	1,800
Wood for Batten	2.5" x 2.5"	cft	1.5	300	450
Piller/Khuti		nos.	4	200	800
Hardware Items		-	-	-	200
Carpenter Charge		Contract	-	-	600
Sub total 5					3,850
Total Amount (A+5)					11,450.00

Details BoQ of Option 11

Items	Unit of Measure	Unit	Unit cost	Amount in TK.
Filling Sand (FM-0.80)	cft	150	12	1800.00
Sand (FM-1.2)	cft	200	20	8000.00
Brick (Second Class)	nos.	2500	4.5	11250.00
Cement	bags	30	360	10800.00
Khoa (Brick Chips)	cft	100	40	4000.00
M.S. Rod	kg	100	53	5300.00
Door	nos.	4	700	2800.00
Tube well Installation	L/S	-	-	5000.00
Painting	L/S	-	-	1200.00
Sub total 1				40350.00
Sanitary Items Cost				
3" dia PVC Pipe	ft	30	30	900.00
3" dia PVC Socket	nos.	4	50	200.00
3" dia PVC elbow	nos.	4	50	200.00
3" dia PVC T Socket	nos.	4	50	200.00
Water Seal set	nos.	4	100	400.00
Pan	no.	4	700	2800.00
Sub total 2				4700.00
Slurry Pit Cost				
Ring (3' dia)	nos.	6	200	1200.00
6" PVC Pipe	ft	10	75	750.00
Labour Charge for Earth Cutting and Fittings	nos.	5	120	600.00
Sub total 3				2550.00
Labour Cost				
Mason charge	Contract	-	-	12000.00
Paint Labour Charge	Contract	-	-	1000.00
Sub total 4				13000.00
Biogas Plant Cost				
Sand (FM-1.2)	cft	100	20	2000.00
Brick (Second Class)	nos.	1350	4.5	6075.00
Cement	bags	15	360	5400.00
Khoa (Brick Chips)	cft	40	40	1600.00
M.S. Rod	kg	40	53	2120.00
Stove, 6" PVC Pipe, Flexible Pipe, Elbow, Get Valve etc	L/S			2000.00
Earthwork	Contract			3000.00
Bio-Gas Mason Charge	Contract			6500.00
Sub total 5				28695.00
Total Amount (1+2+3+4+5)				89,225.00
In Word: Eighty Nine Thousand two Hundred Twenty Five Taka Only				

At a glance BoQ of different Eco-toilets

Option No.	Type of Eco-Toilet	Estimated cost
1	Fixed Chamber System Using Plastic Fibre Pan	12819.00
2	Movable Drum System Using Plastic Fibre Pan (Single Pan)	12156.00
3	Movable Drum System Using High Commode	13146.00
4	Fixed Chamber System Using Modified Traditional Eco Pan	11679.00
5	Fixed Chamber System Using Traditional Eco Pan	12279.00
6	Movable Drum System Using Traditional Eco Pan	12436.00
7	Elevated Movable Drum System with RCC Column	17500.00
8	Single Pit Urine Diversion Toilet	5405.00
9	Twin Pit Urine Diversion Toilet	11200.00
10	Waste Concern Model Using Urine Diversion Pan	-
11	Community Based Urine Diversion Toilet with Bio-gas Plant	89225.00

Session - 11 : Eco-Toilet Construction- Day 05 Activity

Duration	: 30 Minutes
Method	: Discussion, Video Presentation
Logistics	: Marker, Board, Poster, Multimedia etc.
Objectives	: End of the session the participants will- <ul style="list-style-type: none">• Know about curing• Know about the plastering of super structure wall• Know about the net cement finishing of toilet floor

Session Structure

Step no.	Discussion topic	Duration	Method
01	Curing	10 minutes	Poster presentation, Discussion
02	Plastering of Super structure wall	10 minutes	Poster presentation, Discussion
03	Net cement finishing of toilet floor	10 minutes	Poster presentation, Discussion

Session Conduction Process:

- At the Beginning of the session, the facilitator will acknowledge the participation of the participants and will explain the discussion topic and objectives of the session.
- The facilitator will discuss with the participants on day 05 activities by visualising poster.
- Later on, the facilitator will discuss briefly on the selected topic and will ask some questions to observe the understanding of the participants. If the understanding of the participants is not clear, he will re-explain the topic. At the end, the facilitator will conclude the session by thanking all the participants.

Support Note 11: Day 05 Activity

Eco-Toilet Construction- Day 05 Activity Description:

Curing: At the starting of the day, the previously constructed structures have to be cured with water properly. Enough water has to be stored in site for curing purpose. If the source of water stands at a distance, large bucket or drum has to be managed for water storing purpose. Dirty or turbid water cannot be used for curing. Tubewell or clean pond water can be used for curing. To make the inner bond between brick and mortar strong, curing is essential.

Plastering of Super Structure wall: Plastering has to be done on the inner and outer wall of super structure. The ration of the construction materials in plastering would be Cement: Sand = 1:5. For plastering purpose, Fineness modulus of sand, FM= 0.8-1.2 is required. If FM exists the required limit, plaster finishing will not be smooth. Before plastering work, sieving of sand is must to remove the impurities from sand and sieve size will be 05 mm. Presence of any type of dust has to be avoided.











Net Cement Finishing: A concentrated mixture of cement and water is used for a coating on the mortar plaster is called Net Cement Finishing. Net Cement finishing is given on the toilet floor and the wall up to six inch from floor. Before net finishing, the wall needs to be sponged properly.

Evaluation by the Participants

Title of the Training :
Name of the Participant (Optional) :
Type of Participants :
Location/Venue :
Duration :

Date:To From

Please insert tick marks (√) in your desired box. Your comments will be helpful for the improvement of the course material.

S/N	Evaluation Topic	Evaluation Score			
		Not good	Average	Good	Very Good
			 	  	   
01	Presentation skill of the facilitator				
02	Expertise of the facilitator on discussed topic				
03	Usefulness and use of the training materials				
04	Participation of the participants in discussion				
05	Meeting your expectation from discussed topics				
06	Applicability of the acquired knowledge and expertise in professional life				
07	Overall organisation				

Overall Comments:

Name of the Participant:

Date: Venue/Location:

Full Marks: 05 X 10 = 50

Time : 10 Minutes

1. Which latrine is common in traditional sanitation system-

- Pit Latrine
- Septic Tank
- Ring Slab
- Above all

2. Ecological sanitation is-

- Environment friendly
- Sustainable
- Hygenic
- Above all

3. Life-span of eco-toilet is-

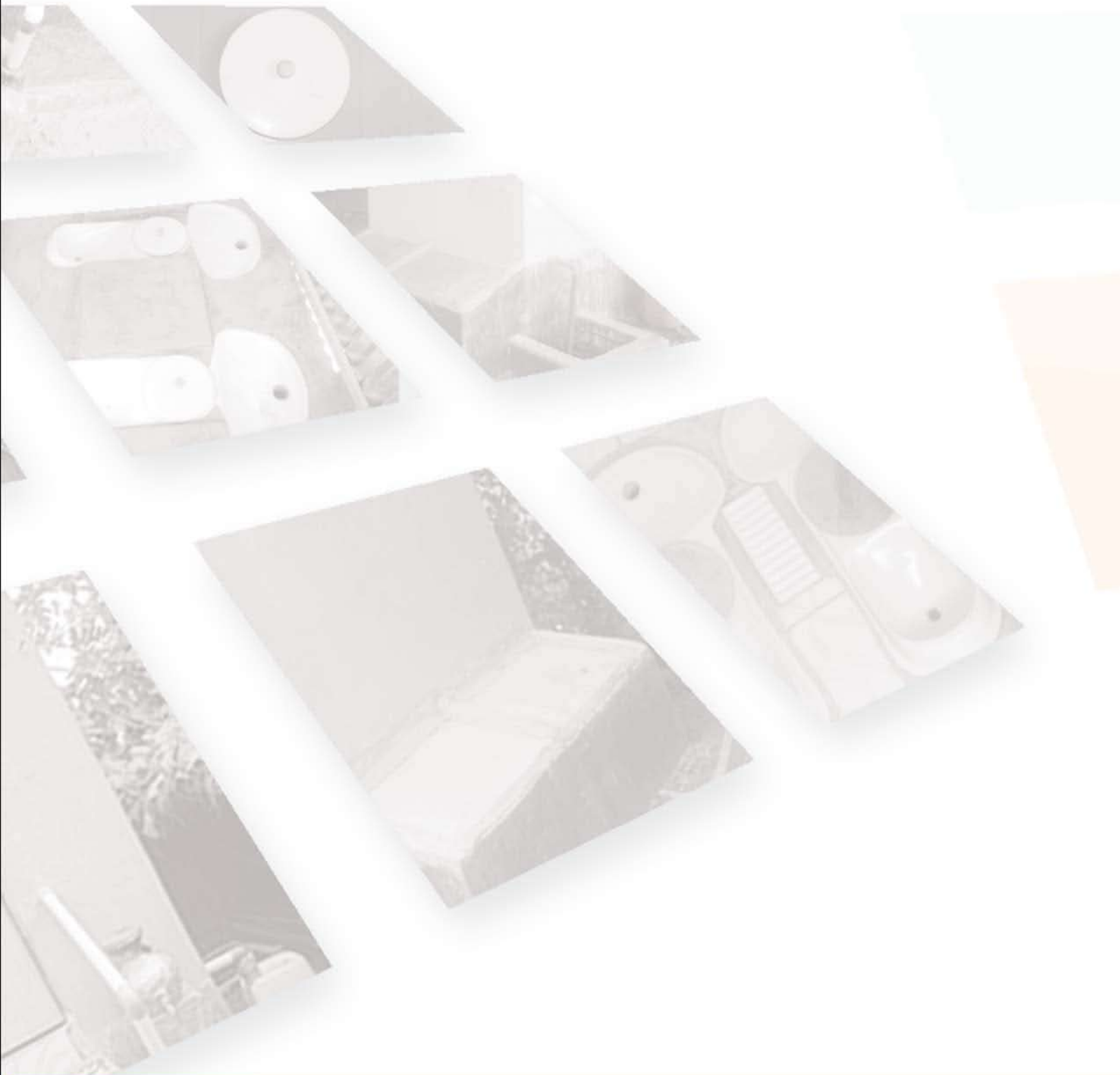
- 1-5 years
- 5-10 years
- 10-15 years
- 15-20 years

4. Which one is not the part of the Eco-toilet?

- Eco-pan
- Vent pipe
- Evaporation bed
- Water seal

5. How many types of toilet you have come to in this training?

- 8
- 12
- 13
- 11



UNICEF Bangladesh

BSL Office Complex

1, Minto Road, Dhaka 1000, Bangladesh

e-mail: infobangladesh@unicef.org

Web: www.unicef.org.bd

PRACTICAL ACTION BANGLADESH

House – 12/B, Road – 4, Dhanmondi

Dhaka – 1205, Bangladesh

Phone: +880 2 8650439, 9675236, 9675243

Fax : +880 2 9674340

e-mail: practicalaction@practicalaction.org.bd

Web: www.practicalaction.org