

Lesson Plan: Constructing a Toilet

 120 minutes total

Lesson Description



Participants build a toilet from a plastic bucket for people to sit on during defecation (also called a seat or pedestal). The toilet may be urine-diverting.

Learning Outcomes



At the end of this session participants will be able to:

1. Demonstrate how to construct a urine-diverting toilet seat for a latrine.

Trainer Notes



This toilet seat design is based on the following resource:

Morgan, P. (2007). Toilets that Make Compost: Low-cost, sanitary toilets that produce valuable compost for crops in an African context. Stockholm Environment Institute, EcoSanRes Programme. Stockholm, Sweden. Also available in French. Available at: www.ecosanres.org/toilets_that_make_compost.html

If you have other toilet seat designs, please share them with CAWST so that we can incorporate it into future training materials: resources@kawst.org

Scheduling this Lesson in the Agenda



The Lesson Plan: Toilets should be delivered before participants construct the toilets. This will ensure that they understand key design features and modifications for different users.

Time for this lesson is divided over three days. Day 1 requires 60 minutes to construct the base structure of the toilet seat. Day 2 requires 30 minutes to finish up the structure. Day 3 requires 30 minutes to install the toilet seat on the slab.

Note: In hot climates, the mortar will dry quickly and it may be possible to construct the entire toilet in one day.

Materials



- Construction tools and materials (one set per group):
 - Toilet seat
 - Plastic bucket
 - Saw
 - ½" polyethylene elbows
 - Short ½" pipes
 - Pliers
 - Chicken wire
 - Metal wire
 - Hose
 - Candle
 - Lighter
 - Silicone
 - Sand (5 litres for 1 toilet)
 - Cement (15 litres for 1 toilet)
 - Water
 - Marker
- First aid kit

Optional:

- Power drill (Making holes manually using a candle and lighter can take a long time. If power is available, using a drill as a faster option)

Preparation



- Review topic in Technical Brief: Sanitation System – User Interface
- Review topic in Toilets That Make Compost by Peter Morgan (2007). This free online resource shows the steps for making a low-cost urine diversion seat from a plastic bucket. Available at: www.ecosanres.org/toilets_that_make_compost.html
- Print construction instructions (one set per group)

Introduction

5 minutes



1. Ask participants to go back to their workbook.
 2. Ask the participants to discuss in pairs “What were the different options you proposed for toilets?”
 3. Share some of the answers as a large group. Ask the participants to explain the reasons why their options would be acceptable.
 4. Explain to participants that squatting is not always the best alternative for different groups or cultures. For this reason, participants will learn how to build a toilet seat using local materials.
-

Construction Health and Safety**5 minutes**

Note: This activity only needs to be delivered in the first practical session. Participants can be reminded in subsequent practical sessions about protection measures for that particular activity.



1. Explain that it is important to work safely and avoid the potential for injury during latrine construction. Participants will be using sharp tools, lifting heavy objects, and handling potentially dangerous materials. When properly managed, the risks involved in these tasks can be reduced to avoid injuries.
2. Explain that everyone on the construction site should wear closed shoes to reduce foot injuries, and reduce tripping or catching of sandals. In dusty environments, they can wear a face mask to prevent inhaling dust. In loud environments, workers should wear earplugs to protect their hearing.
3. Make sure everyone knows where the first aid kit is located. Make sure everyone knows who to call in an emergency. Write important phone numbers on flipchart paper and post it in a visible area.

Construct a Toilet**120 minutes**

1. Divide the participants into small construction groups of 4 to 5 people.
2. Hand out a set of construction instructions to each group.



3. Ask the participants to review the construction steps before starting. Explain the different steps of construction. Explain that the full construction of the toilet seat will be divided over three practical sessions in the workshop.
4. Ask participants to collect all the materials they will need to construct the toilet.
5. On Day 1, cut off the base of the bucket using a saw. Remind the participants that the more they cut, the shorter the height of the toilet seat, which may be inconvenient for some users.
6. Cut the base of the plastic bucket in half. One of these halves will be used to construct the urine diverter.
7. Place one of the half pieces inside the bucket, approximately in the middle of one of the walls. Attach it to the bucket by drilling small holes through the bucket walls and the half piece, and then passing wire through the holes. Make sure that the half piece is angled (approximately 30–45 degrees) and not perpendicular to the bucket (90 degrees).
8. Make a hole in the bucket just above the base of the urine diverter. Fit the polyethylene elbow into the hole. Make sure that it fits well and the longer part of the elbow is on the outside of the bucket. Turn the elbow to an angle.
9. Wrap chicken wire around the bucket. This reinforcement will give extra strength to the toilet base.
10. Heat up the wire using a candle. Then use the hot wire to make holes through the stiffeners in the toilet seat. Next, pass a long piece of wire through the holes and create a wire ring instead the toilet seat.

11. Mix mortar using a ratio of 3 parts sand to 1 part cement. Make sure that you add enough water to have a dense mixture that is not too watery. 5:15 litres is enough to cover one toilet.
12. Fill the underside of the toilet seat with the mortar.
13. Place the bucket in the middle of the toilet seat. Make sure that the urine diverter and elbow face the front of the seat.
14. Place 8 pieces of doubled over wire to the mortar in the toilet seat. The wire will help to anchor the toilet seat to the mortar base. Leave it to cure until the following day.
15. On Day 2, make a new mortar mix of 1 part cement to 3 parts sand. Apply the mortar to the bucket until it is covered to the half-way point. Leave the bucket again to cure until the following day.
16. On Day 3, make a new mortar mix of 1 part cement to 3 parts sand. Cover the remaining half of the bucket with mortar. Optional: A final layer can be made with mortar watered down to make a thick paint. Use a brush to apply a smooth finish to the entire outside of the bucket.
17. Let the mortar cure for at least 7 days (preferably longer) before moving and installing it. While curing, cover it with plastic or moist cloths. Add water as needed to keep it damp. Once the mortar is dry, the toilet seat can be flipped over and placed on top of the slab.
18. Use silicone to seal the space between the bucket wall and the urine diverter. Seal it from underneath first, and then the upper side. This will make sure that urine doesn't leak from the structure.
19. Attach the toilet to the latrine slab using the same mortar mix as the previous days.
20. Connect a hose to the elbow joint. Connect the other end of the hose to the container for collecting urine or to a soak pit. Test the connections for leaks by pouring water through the urine diverter.

Review**5 minutes**

1. Divide participants in pairs.
2. A will mime the different steps required to construct a toilet seat.
3. B will describe what A is miming.

Reflections on Lesson

Toilet Construction Instructions



Materials needed for construction.



Step 1. Cut the base of the bucket.



Step 2. Cut the base in half.



Step 3. Connect one half of the base half way up the bucket using wire. The base should be at an angle so that it will collect urine.



Step 4. Make a hole just above the urine separator. Fit an elbow connector into the hole. Leave enough space between the bucket and the elbow to cover the bucket in mortar.



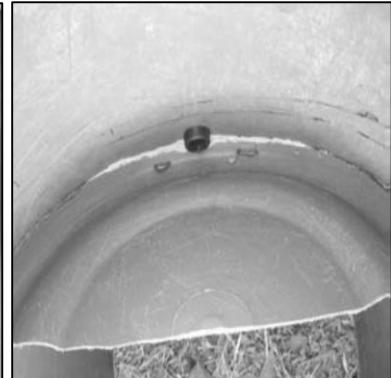
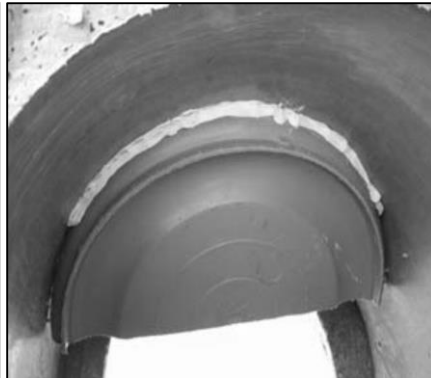
Step 5. Connect the toilet seat to the bucket. First, heat some wire (using a candle). Then use the hot wire to make holes through the stiffeners in the toilet seat. Next, pass a long piece of wire through the holes.



Step 6 (left). Make mortar using 1 part cement to 3 parts sand. Fill the underside of the toilet seat with the mortar. Step 7 (right). Place the bucket on the toilet seat with the urine separator facing the front of the seat.



Step 8 (left). Place 8 pieces of doubled over wire to the mortar in the toilet seat. Leave it to cure until the following day. Step 9 (right). On Day 2, make a new mortar mix of 1 part cement to 3 parts sand. Apply the mortar to the bucket until it is covered to the half-way point. Leave the bucket again to cure until the following day.



Step 10 (left). On Day 3, make a new mortar mix of 1 part cement to 3 parts sand. Cover the remaining half of the bucket with mortar. Step 11 (centre and right). Use silicone to seal the joint of the urine separator from below and above.



Step 12. Turn the bucket over. Connect a hose to the elbow joint and connect the other end to the container for collecting urine.

(All photos credit: Morgan, 2007)