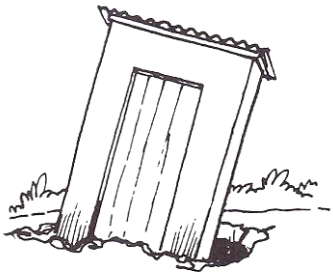
PRACTICAL ACTION
Technology challenging poverty

COLLAPSING LATRINE PITS

Problem
Unstable soils

Reality
Two of the most common reasons for not building latrines are collapsing soil and high water-tables, often in combination with each other.



Solutions
For unstable soils the following measures can be taken:

- Use round pits
- Introduce pit linings
- Reduce pit dimensions

1. Round pits

In areas where there is a tradition of building latrines the population have already discovered that round pits are more stable than rectangular ones.

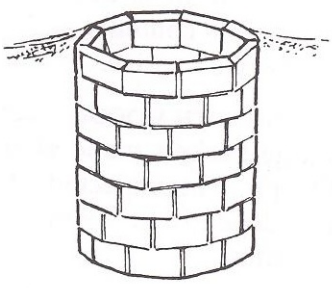
In Malawi, for example, where the soil is generally stable, the population as a rule dig rectangular pits. An exception is at the lake shore where pits, as a rule, are round because the sandy soil is less stable. The same is true in Mozambique: in the areas along the coast, the round pit is the only shape you will find, whereas inland people dig rectangular pits. You will find the same phenomenon in most places in Eastern and Southern Africa.

When asking why this is the case, few people refer to soil stability, but instead give tradition as a reason. In areas with mixed soil conditions, where the soil is less stable, there are often no latrines. It may be tempting to propose round pits for all situations as strength is an advantage and the cost seems to be the same. Covering a narrow rectangular pit is, however, simpler, especially if the availability of long, strong logs is a problem.

The same kind of logic also works for latrine slabs of concrete. Round slabs are generally cast on-site, while rectangular slabs can easily be segmented and transported in pieces.

2. Introduce pit linings

Round pit linings are very stable and can be made relatively cheaply, while rectangular pit linings are structurally unsound and need to be made with strong building materials. Pit linings should therefore normally be made round. The material used will depend on what is available and affordable.



Lining with burnt bricks
Burnt bricks, when available and affordable, are very good for pit-lining. Cement or mud mortar in horizontal joints are recommended as the bricks may break under the load of the slab and the superstructure.

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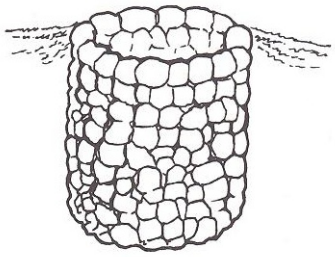
technical brief

Lining with concrete blocks

Due to the production process, concrete blocks usually have exact dimensions. They can therefore be used without mortar, being simply stacked along the sides of the pit. The top courses should be fixed with cement mortar as the surrounding soil is often washed away with heavy rams.

Lining with stones

Natural stone makes an excellent lining material which requires no mortar except in the top layers. The strength of the stone allows it to take a considerable load without breaking, while the weight of the structure holds the stone in place. The top of the lining may need to be set in mortar as the stones might otherwise start falling away. If you are going to use a concrete slab you may need some mortar anyway to fill the gap between the slab and the lining.

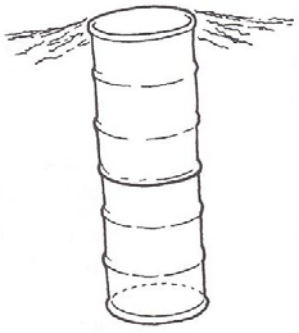


Lining with concrete rings

Using concrete rings for pit-lining can be very expensive if normal well rings are used. They are heavy to transport and difficult to set in place. Using segmented rings with interlocking joints may be easier.

Lining with oil drums

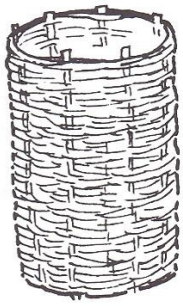
Old oil drums are frequently used for pit-lining. After the bottom of each drum has been cut out, they can be placed one on top of another to line deep pits.



The small volume and the high cost of the drums make this method fairly expensive. If the sides of the drums are not provided with sufficient perforations, absorption of liquids can be a problem. Another problem is that the sheet metal will eventually corrode and collapse if the drums are too old.
The pit contents and the resultant gases in a latrine are very corrosive.

Lining with wooden baskets

Large baskets made of sticks and twigs can be put into the pit. The expected lifetime is around two years but this depends on the material used and whether there are termites.



If the back-fill around the pit is made with well compacted termite clay, a very stable pit can be achieved in loose sandy soils. When dry, this clay will form a firm pit lining even after the wood in the basket has been eaten by termites.

3. Reduce pit dimensions

Apart from the shape, size also influences pit stability, and the risk of collapse. Pits with small diameters are more stable than pits with large diameters.

In areas of unstable soil it may be tempting to compensate for the poor depth by making pits wider to achieve a reasonable volume. This is only possible if the pit is lined. Lining material may be difficult to find or too expensive to use. In such cases the solution is to reduce the pit diameter.

Pits in unstable soils should not be made too deep as a pit collapse during the excavation may have serious consequences for the people digging. It should be possible to dig a 2m pit with relative safety for the builders. Should the soil collapse it would only fill half of the pit, and the person at the bottom would only be covered up to waist level. This should allow the person

to breathe while help is organized.

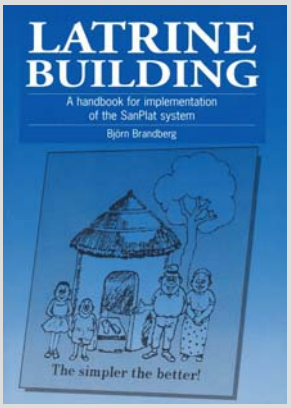
Further reading

- *Pit Emptying Systems* Boot, N. (2007). Practical Action.
- *Simple Pit Latrine*. Chatterton, K. WEDC.
- *Latrine Buidling: A Handbook for Implementation of the SanPlat System* Brandberg, B. Practical Action Publishing.

Also see
http://www.sanplat.se/

http://www.connectinternational.nl/files/ST6.1%20MANUAL%20FOR%20CONSTRUCTION%20OF%20PIT%20LATRINES1.pdf

This technical brief is an extract taken from Brandberg, Björn (2002) *Latrine Building: A handbook for Implementation of the SanPlat System, pp.36-8* Practical Action Publishing, Rugby, UK. (ISBN 9781853393068 and available for purchase from http://developmentbookshop.com/)



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