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How to Construct a Brick V.I.P Latrine



A Joint Publication by
African Medical and Research Foundation
and Kenya Water for Health Organisation

Edited by Nicholas Greenacre
Illustrated by Juliet Waterkeyn



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How to Construct a Brick V.I.P Latrine

A Step by Step Manual for Training Public Health Technicians.



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CONTENTS

Introduction	1
V.I.P. Designs	2
Using Available Materials	3
Plans of a brick V.I.P. Latrine	4
What is a V.I.P. Latrine?	5
Materials needed in building this Latrine	6
Tools needed	7
How to choose the right site to build	8
Construction Steps	
Step 1: Setting out the Pit	9
The 3:4:5 Method	10
The 3:4:5: Method Contd.....	11
The Layout Complete	12
Step 2 : Digging the Pit	13
Starting to Dig.....	14
How deep should you dig the Pit?	15
Step 3 : Pit Construction	17
Soil Conditions : Lining or Ring Beam?	18
Step 3.A. Hard Ground Option : Ring Beam	19
Step 3.B. Soft Ground Option : Lining	20
Foundation for Lining	21
Building the Lining	22
Finishing the Lining	23
Step 4 : Floor Slab	25
Making the Moulds	26
Reinforcement	27
Concrete Mix	28
Curing the Concrete Slab	29
Putting it in Place.....	30
Step 5 : The Walls	31
Layout and Dimensions	32
Foundations.....	33
Bonding in the Ventpipe with the Walls	34
Step 6 : Roofing	35
Final height and roofing	36
Vent pipe and Fly Screen	37
Step 7 : Keeping the Latrine Clean	39
Plastering the Inside	40
Home Hygiene	41
Regular Upkeep	42

Introduction

Cholera, dysentery, roundworm and the many other excreta – related diseases are passed from person to person by infected excreta. This infected excreta may be on the soil, in water, on food, on hands or carried by flies.

For some diseases the organisms in the excreta can infect somebody directly, (e.g. dysentery).

Some others need to develop in water or in the soil first, (e.g. Bilharzia and roundworms).

Preventing the spread of these diseases needs a combination of control measures:

- a) The safe disposal of excreta, so that it does not contaminate the surface of the soil or the water supply.
- b) Good personal hygiene, especially the washing of hands after stools have been passed and before handling food.
- c) Good food hygiene.
- d) Preventing flies from reaching it or carrying it to food.

This manual is about how to construct a brick Ventilated and Improved Latrine (VIP). It therefore relates to the above control measures a) safe disposal of excreta and d) safe disposal and fly control.

To control the diseases properly all the control measures need to be applied.

Therefore any programme promoting the construction of latrines should start with teaching why excreta can be dangerous and include education on hand-washing and food hygiene. Education on maintaining the latrine and keeping it clean is equally important. A dirty latrine can be more dangerous than no latrine.

If a household cannot afford a latrine then simply burying the excreta at least 45 cm (18") deep is a first step.

Farmers with a latrine at their house may still need to do this when they are in their fields. Parents of small children will need to put their children' excreta in the latrine.

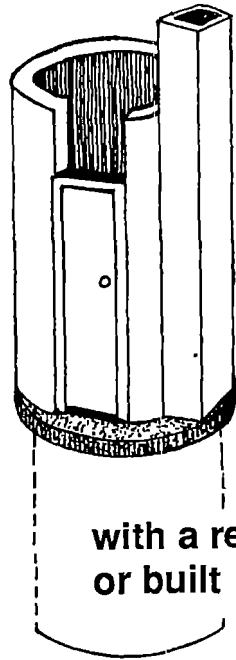
If, through an understanding of why excreta should be disposed of safely, a household wants a latrine then we hope that this manual will assist public health technicians, health assistants or other field workers in advising them how to build one.

This manual is about the construction of a brick latrine. Latrines built from other materials can be equally good. A manual on construction using poles and thatch is in preparation. As long as the principles of the VIP latrine and good building construction are followed, the actual materials and design can be adapted to suit local and individual household conditions.

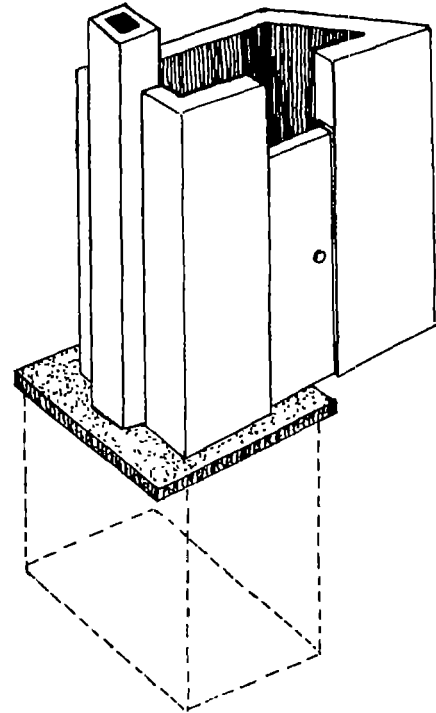
V.I.P. Latrine Designs

A V.I.P. Latrine can be any shape

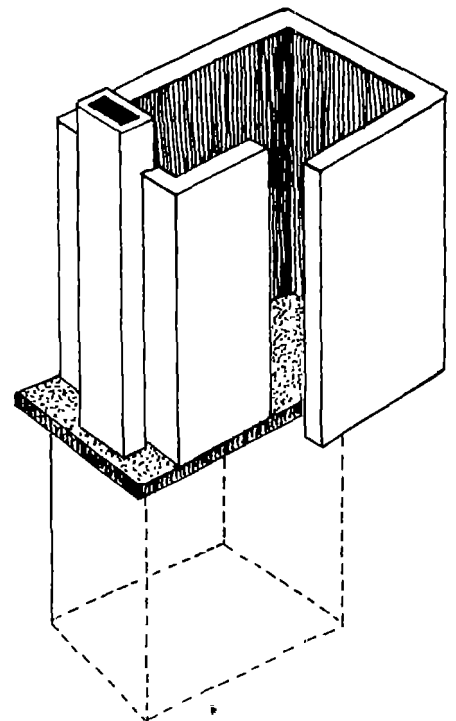
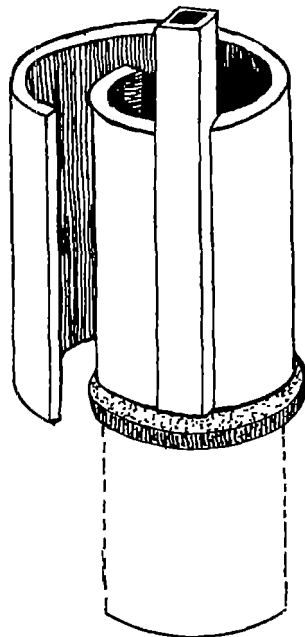
1. Round or Rectangular



with a regular door
or built in a spiral ...



but it must be well ventilated.

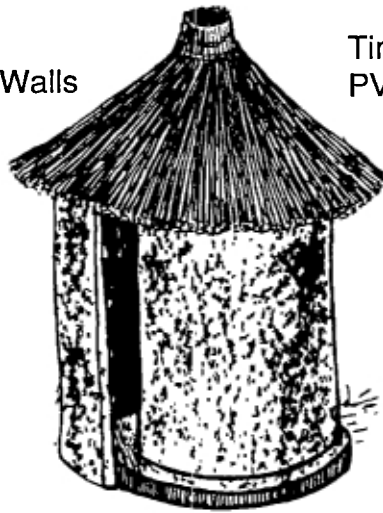


Air passes in through the door....and passes up through the
ventpipe.

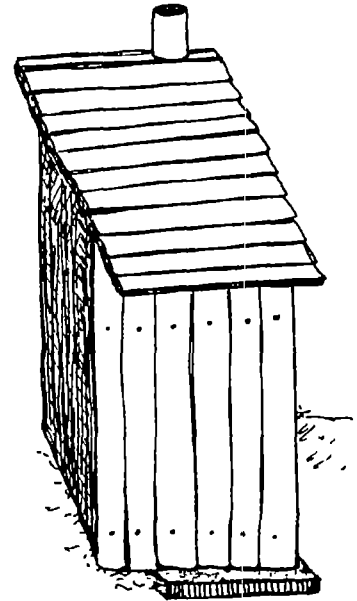
Using Available Materials

It is not important what material is used to build a V.I.P. Latrine

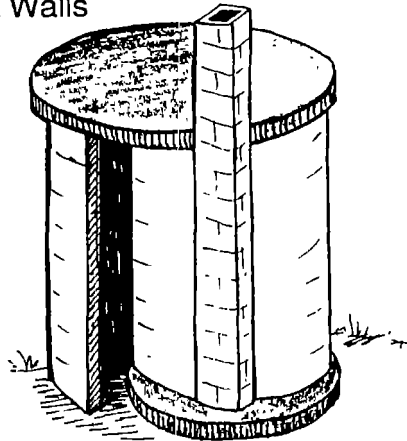
Grass Roof,
Mud and Pole Walls
and ventpipe



Timber Roof and Walls
PVC Pipe Ventpipe

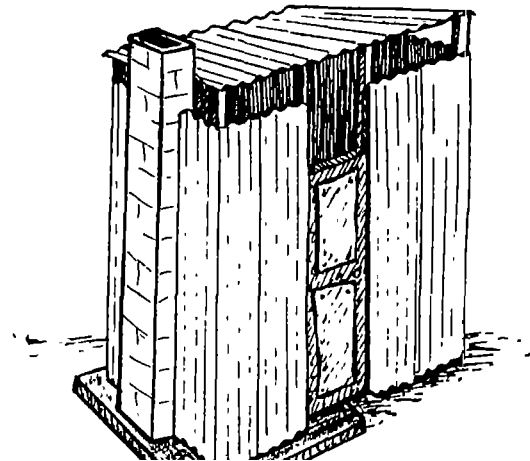


Concrete Slab Roof
Concrete Block Walls

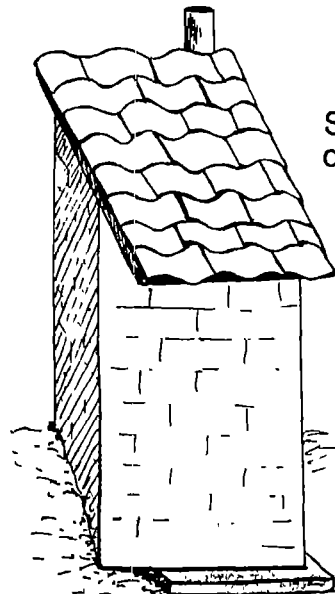


Brick Ventpipe.

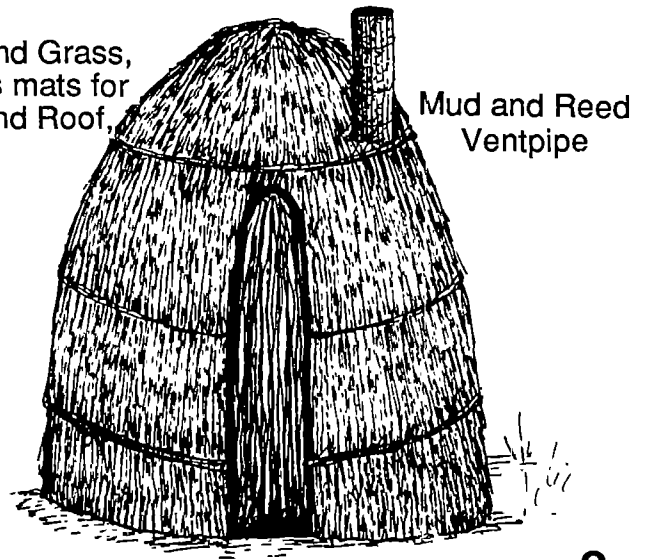
Corrugated Iron Roof and Walls



Brick walls, Asbestos/Cement
Tiled Roof and PVC Ventpipe



Sticks and Grass,
or Grass mats for
walls and Roof.

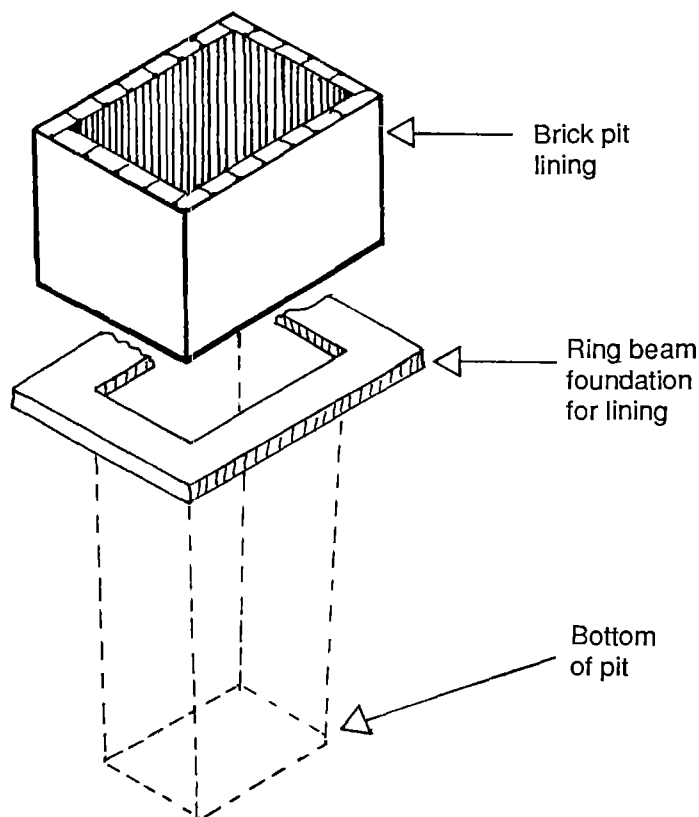
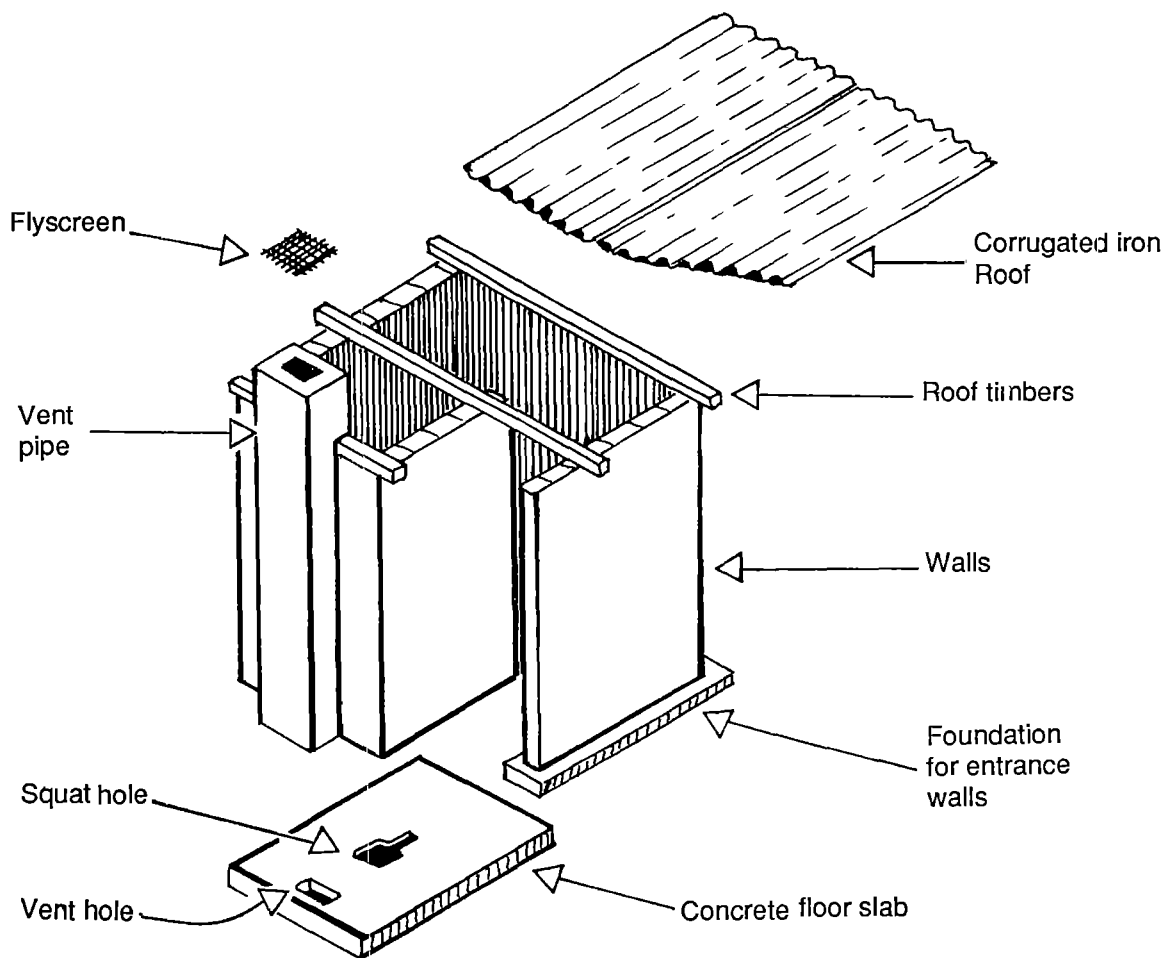


Mud and Reed
Ventpipe

Type

Parts of the Brick VIP Latrine

This manual shows how to build a brick V.I.P. Latrine



What is a V.I.P. Latrine?

V.I.P means Ventillated and Improved Pit

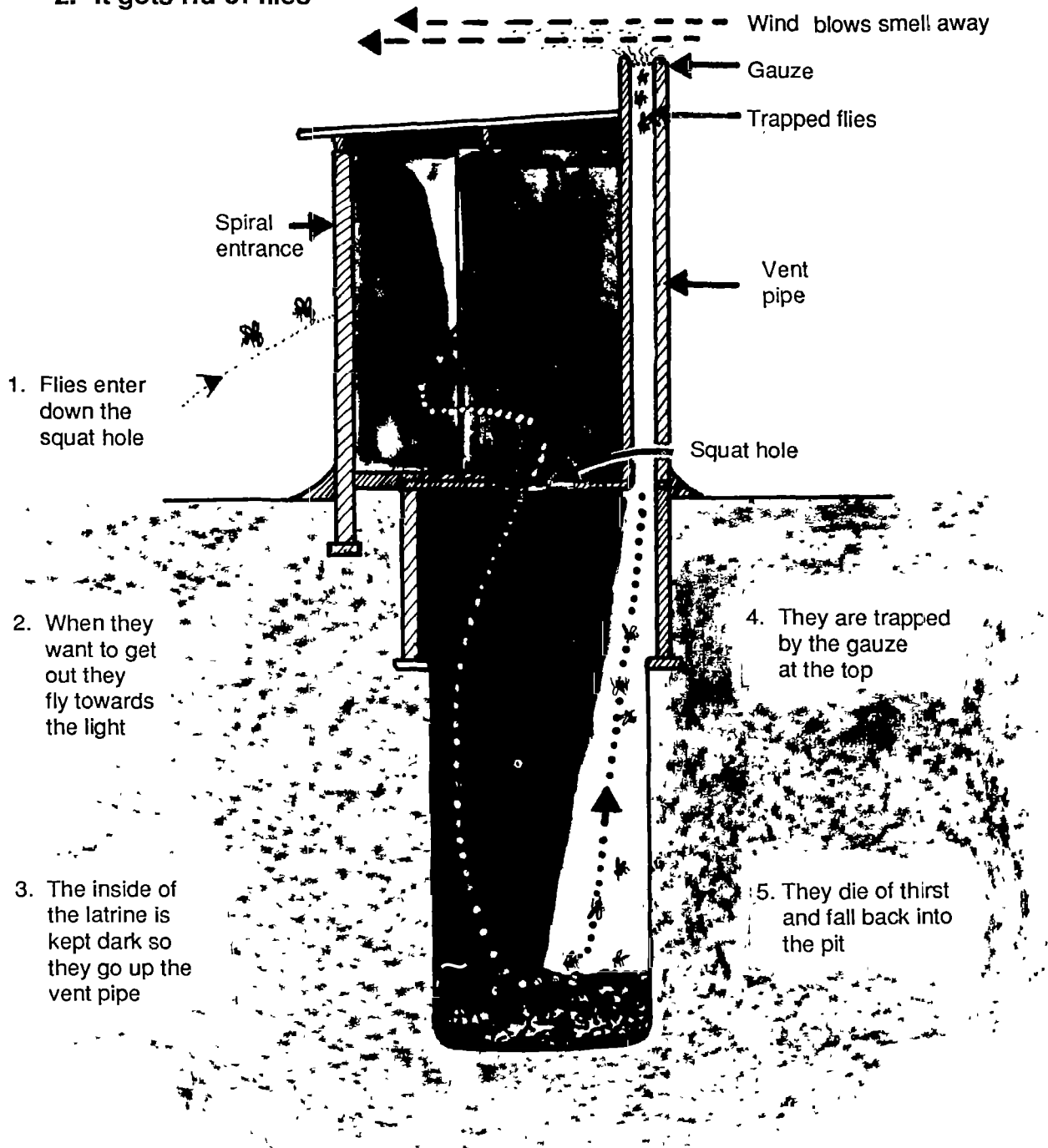
1. It takes away the smell

Spiral entrance must face the direction of the wind .

The air is sucked in through the entrance and down the squat hole.

Hot air rises up the vent pipe, taking the smell with it high above ground level.

2. It gets rid of flies

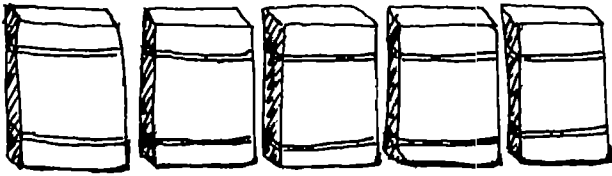


Even with these improvements a latrine will still have flies and will smell if it is not kept clean.

Material needed in building a brick VIP

Date -----

Approximate
cost



Cement

approx. 5 bags



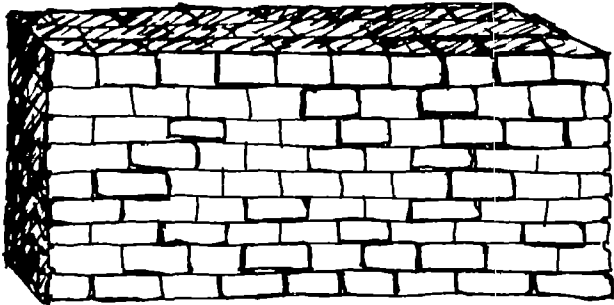
Sand

approx. 2 cubic metres



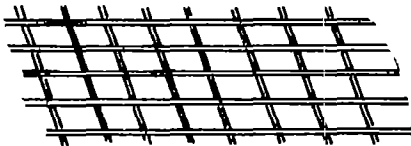
Aggregate

approx. 1 cubic metre



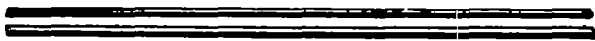
Bricks

approx. 1,000 of 12.5 x 8 x 5 cm

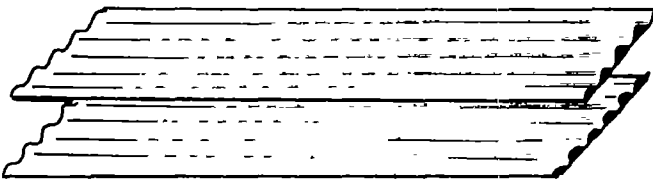


Reinforcements

BRC 610 expanded
wire mesh



2 x 8mm steel bars



GCI sheets mabati

two of 2.5 m long



Timber

5 cm x 5 cm x 12 m long



Binding strips approx. 4 m



building nails 7.5 cm, 1 kg
roofing nails 0.5 kg

6



Fly screen 30 cm x 30 cm

Tools Needed

Layout



Measuring tape



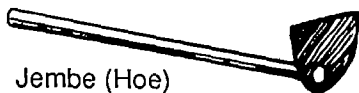
Hammer

Sharpened pegs (round)

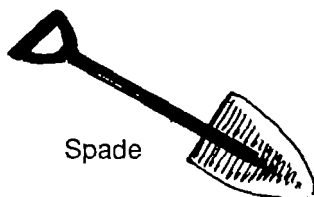


Panga

Digging

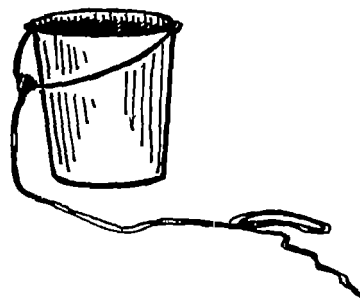


Jembe (Hoe)



Spade

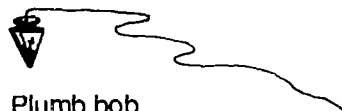
Bucket and rope



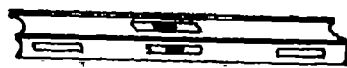
Building



Trowel



Plumb bob



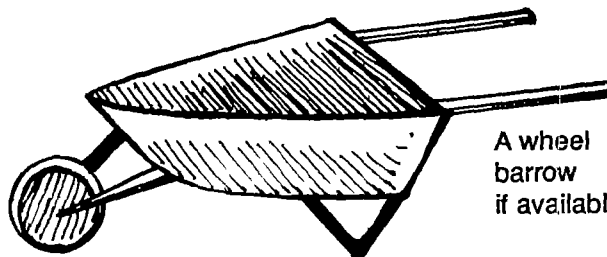
Spirit level



Some karai's

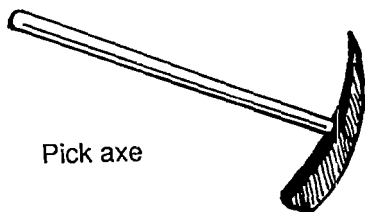


Some sacks
or plastic sheeting



A wheel
barrow
if available

For Rocky Areas



Pick axe



Cold
chisel

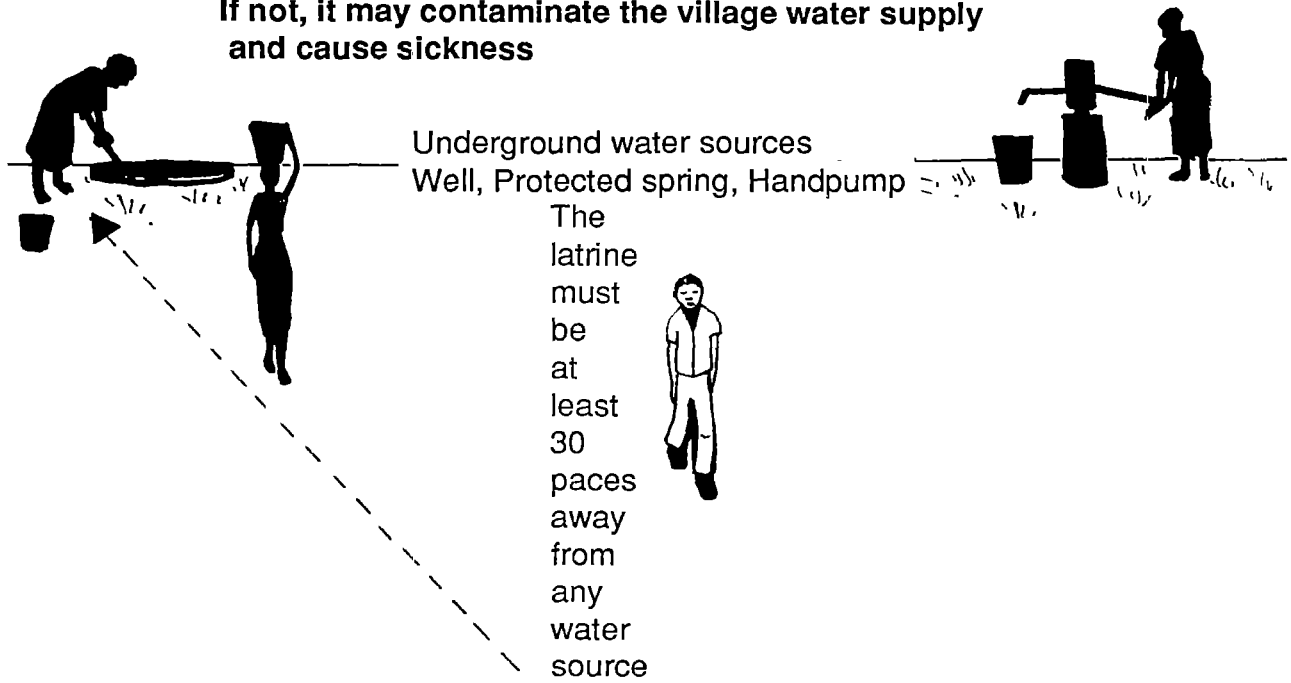


Heavy duty
hammer

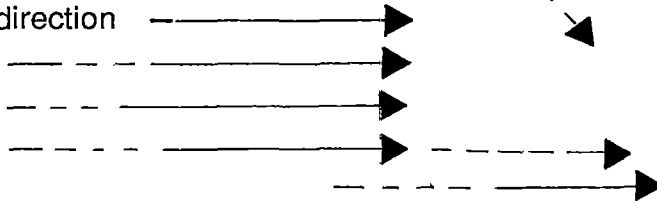
How to choose the right site to build

1. The latrine should be downhill from any underground water source and at least 30 metres away from it.

If not, it may contaminate the village water supply and cause sickness

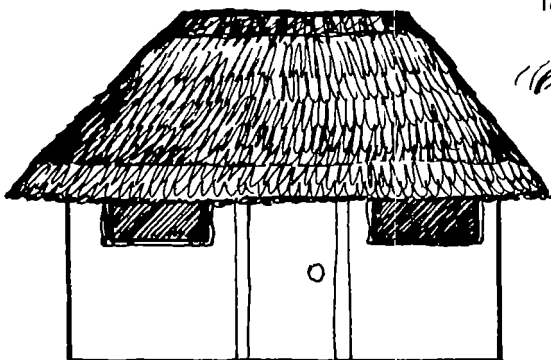


Usual wind direction

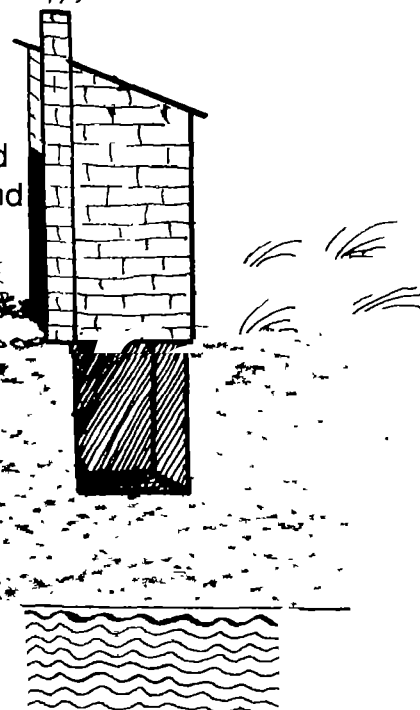


3. The vent pipe must be able to catch the wind, so the area in front must be clear of trees and buildings.

2. The latrine should be down wind from the house or school



Door should face the wind



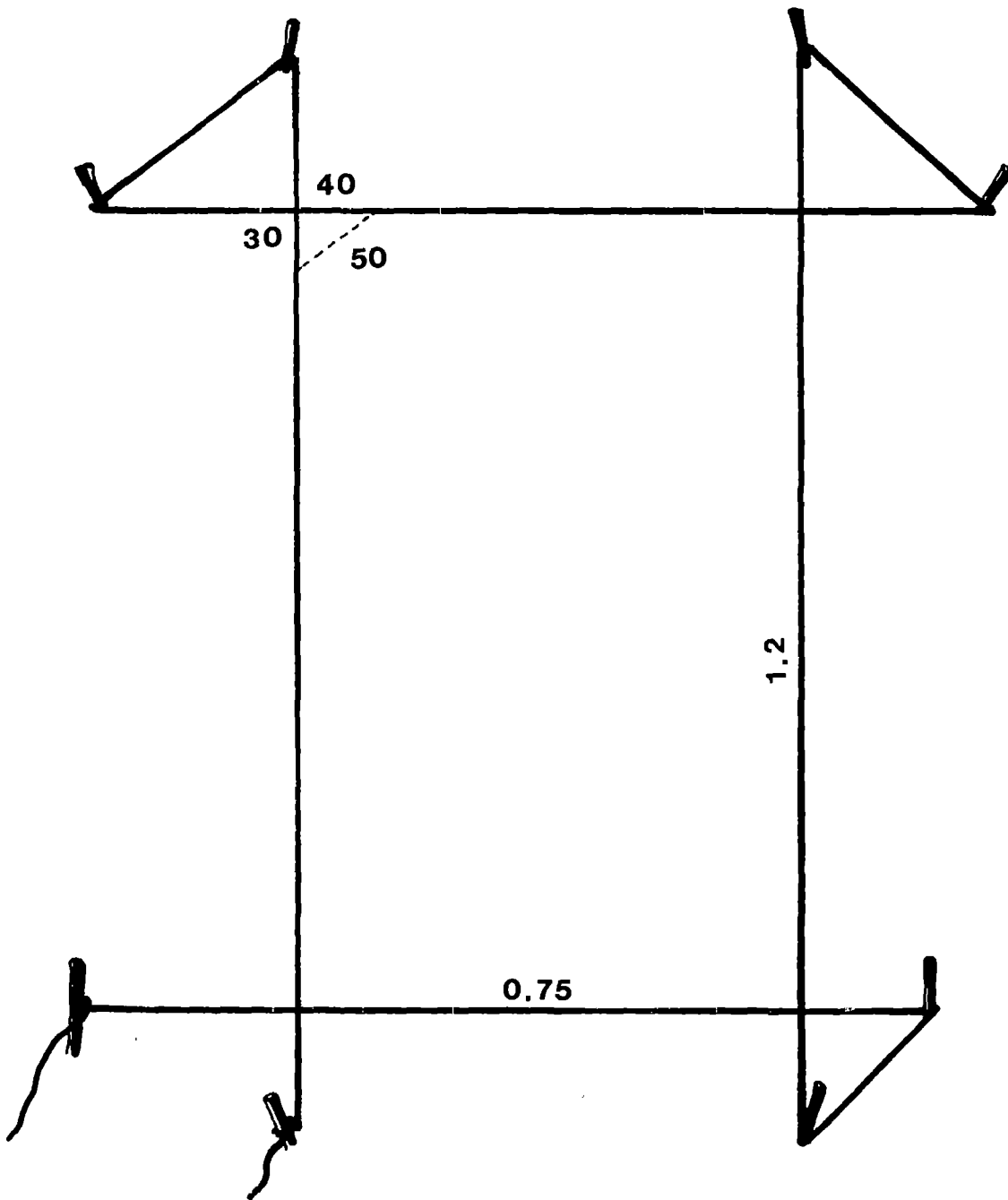
4. The pit should always be well above the water table.

Construction Steps

Step 1: Setting out the Pit

The 3:4:5 Method

The Layout Complete



Step 1: Setting out the Pit

The 3:4:5 Method



About 2 metres away
put in Peg B

Tie on one end of
the string



Put in Peg A

Put in Peg C close
(about 30 cms)
(towards Peg A)



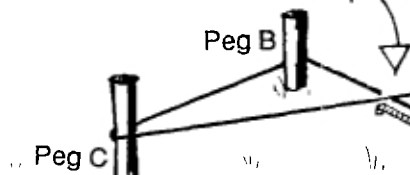
Peg C

Peg B



Peg A

With a pen (or soil)
make the first mark
where string crosses
A-B line



Measure exactly 30 cms from
1st mark. Then make a 2nd mark.

Keep line
in position
on mark



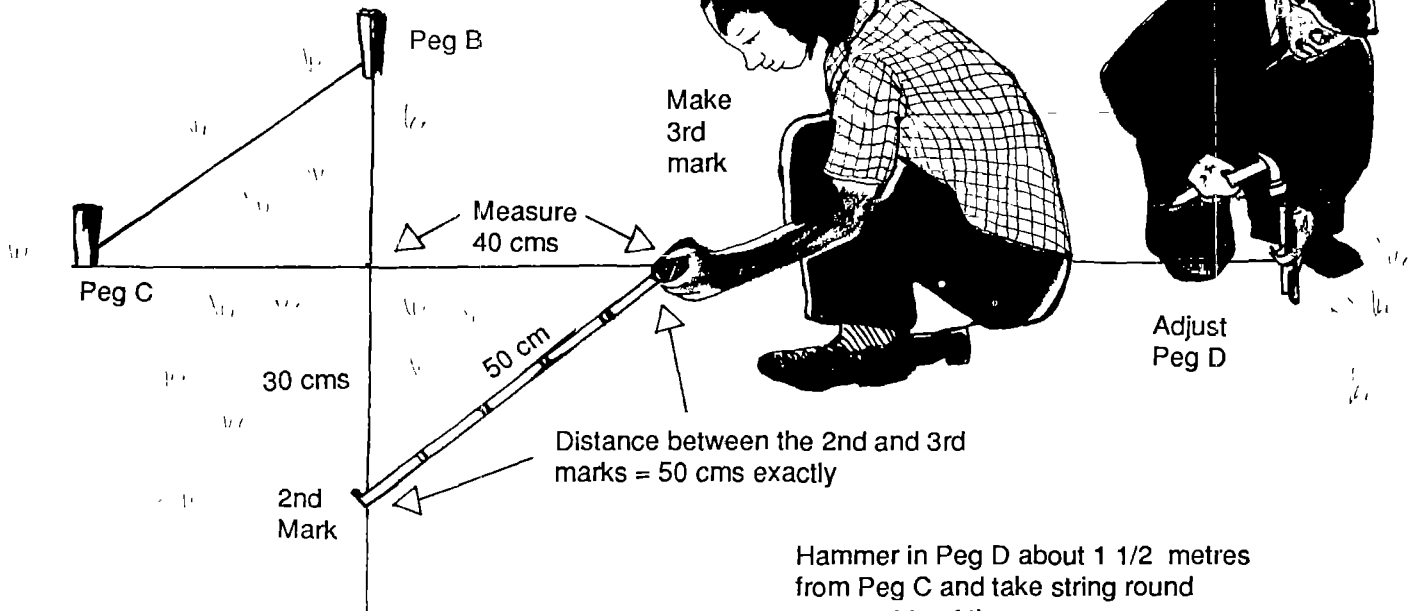
Take string from Peg B
around the outside of Peg C
and back across A - B line.

Peg A

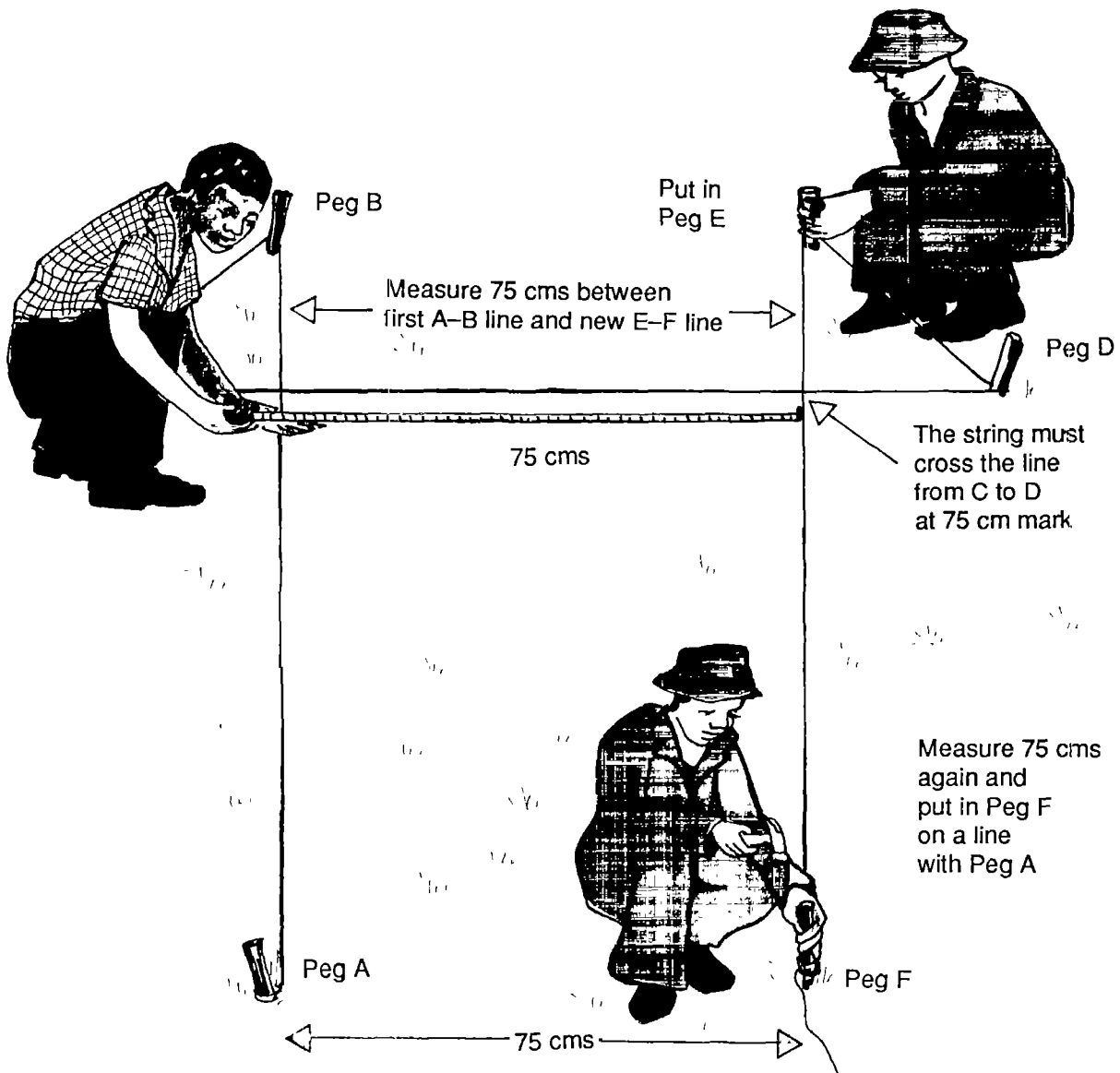
Step 1: Setting out the Pit

The 3:4:5: Method Contd.

Measure 40 cms from 1st mark along the C - D line

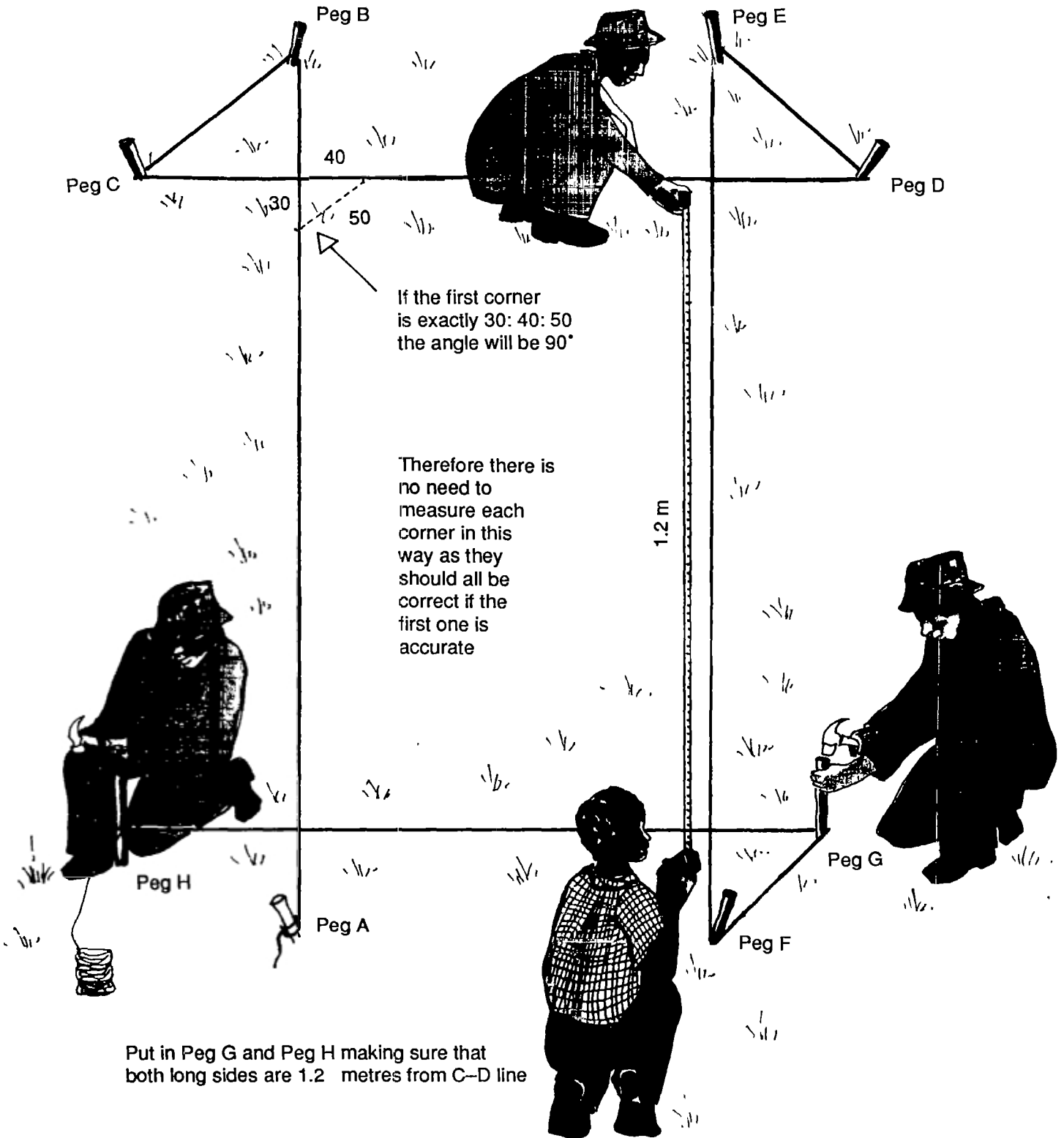


Hammer in Peg D about 1 1/2 metres from Peg C and take string round the outside of the peg

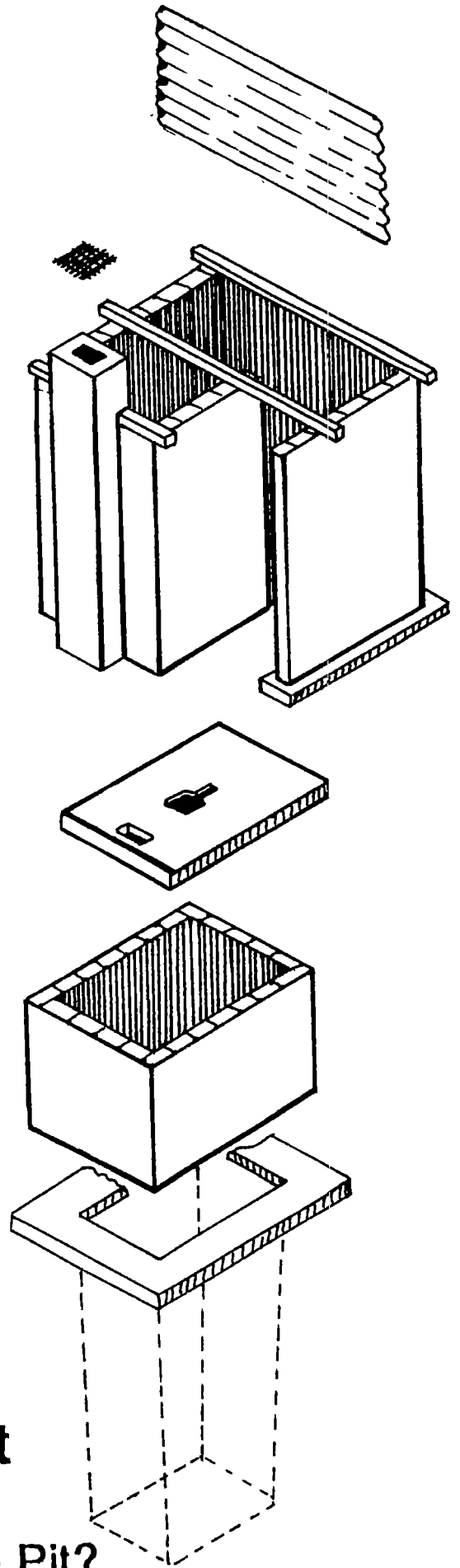


Step 1: Setting out the Pit

The Layout Complete



Check : Measure the distance between opposite corners (diagonals). They must both be 143 cm. (1 - 2 cm difference is acceptable.)

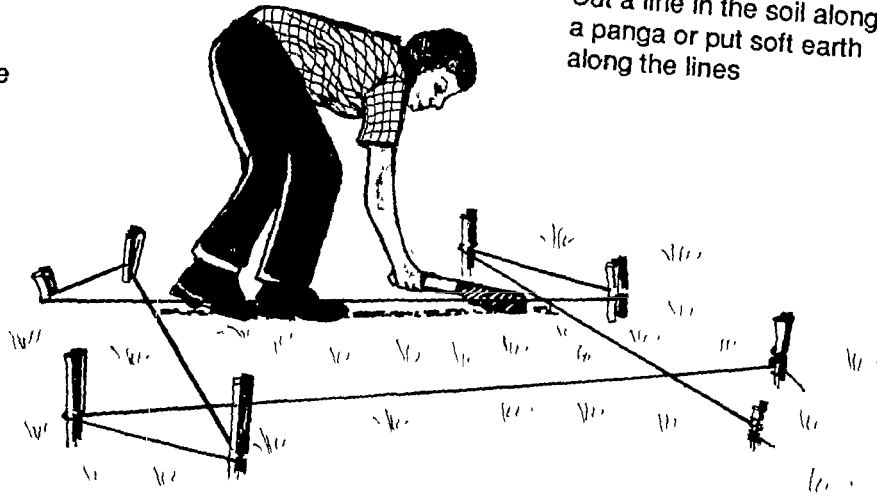


Step 2 : Digging the Pit
Starting to Dig
How deep should you dig the Pit?

Step 2 : Digging the Pit

Starting to Dig

Mark out the edge of the pit



Cut a line in the soil along the string with a panga or put soft earth along the lines

Remove the string and pegs

Start digging the hole



For a plumb line you can tie a round stone on a long piece of string

Keep checking the sides to make sure they go straight down

Keep the soil that you dug out away from the sides of the pit



Step 2 : Digging the Pit

How deep should you dig the Pit?

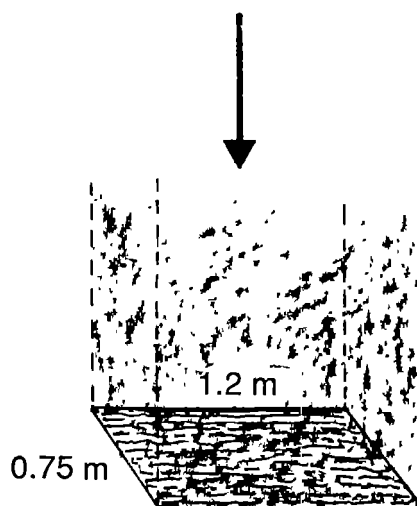
3 metres is the standard depth for a pit.

However: The deeper the pit the longer it will last

Your decision depends on:

- 1. Condition of the soil**
How easy is it to dig?
How expensive is the lining?
- 2. Materials used for lining**
If you are using timber how long will it last underground?
- 3. Number of people using the latrine**
It is estimated that one person produces 0.05m³ (cubic metre) waste per year

If the Pit is 1.2 m x 0.75 m as shown in this manual

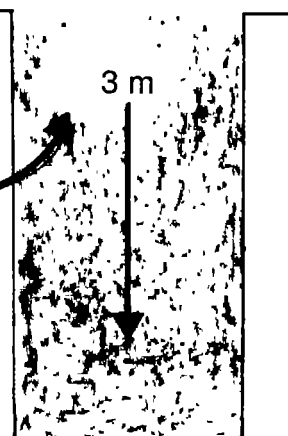


And is used by 10 people regularly

It should be 3 m deep to last for five years.

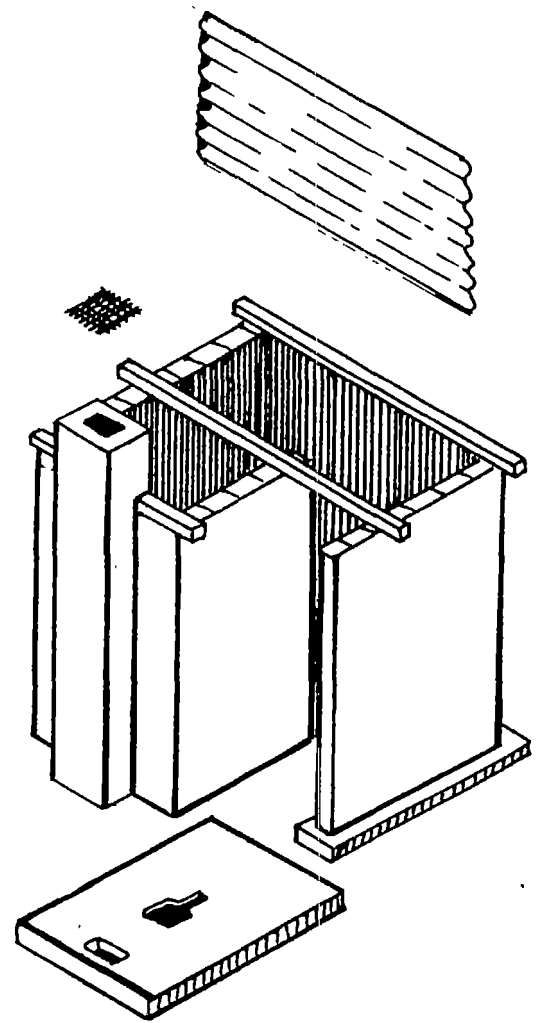
It should be 5.5 m deep to last for ten years.

For five people 3 m deep will last for ten years.



..

v



Step 3 : Pit Construction

Soil Conditions :

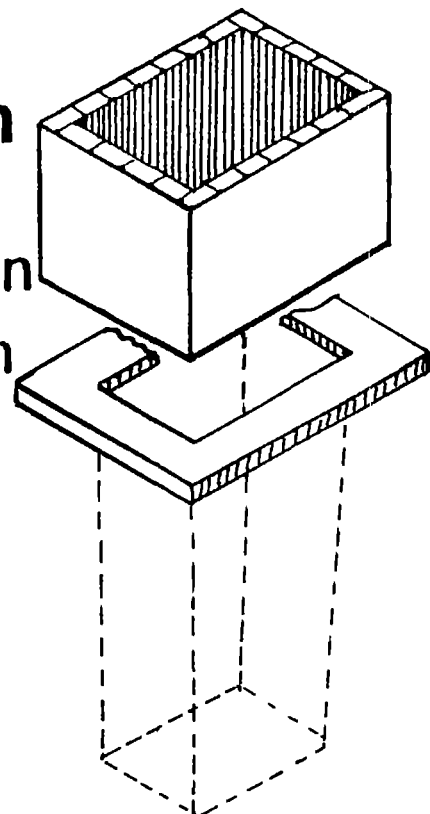
Step 3.A. Hard Ground Option

Step 3.B. Soft Ground Option

Foundation for Lining

Building the Lining

Finishing the Lining



Step 3 : Pit Constructions

Soil Conditions : Lining or Ring Beam?

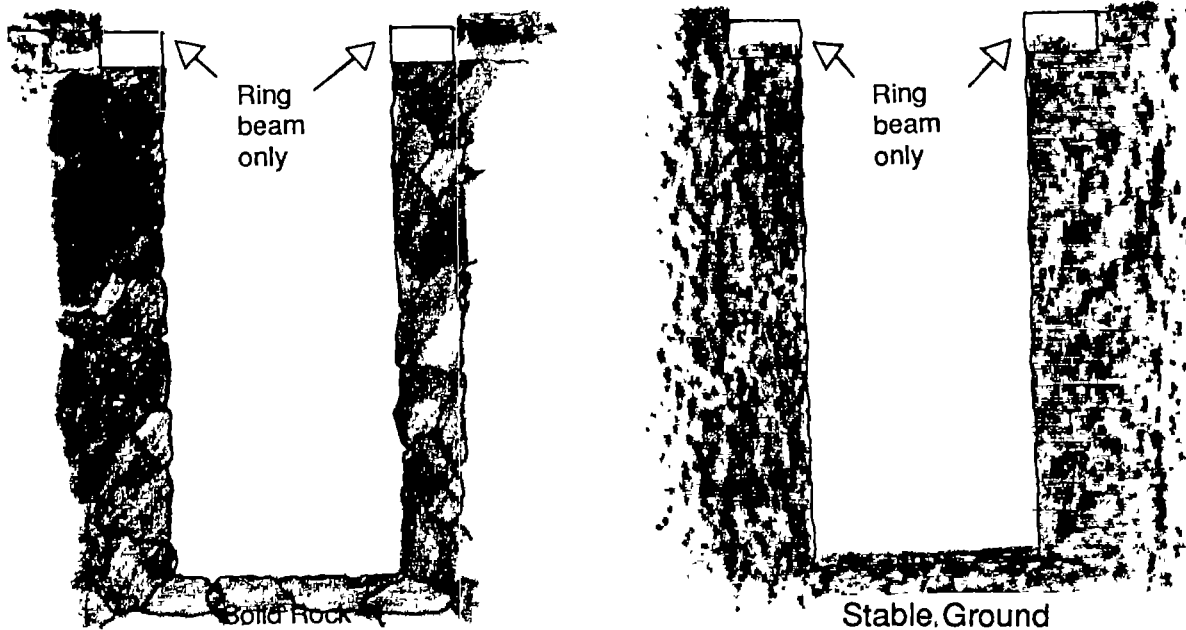
You can only decide this once you have looked at the soil conditions in the area.

1. Stable Ground

Follow Step 3.A Page 19

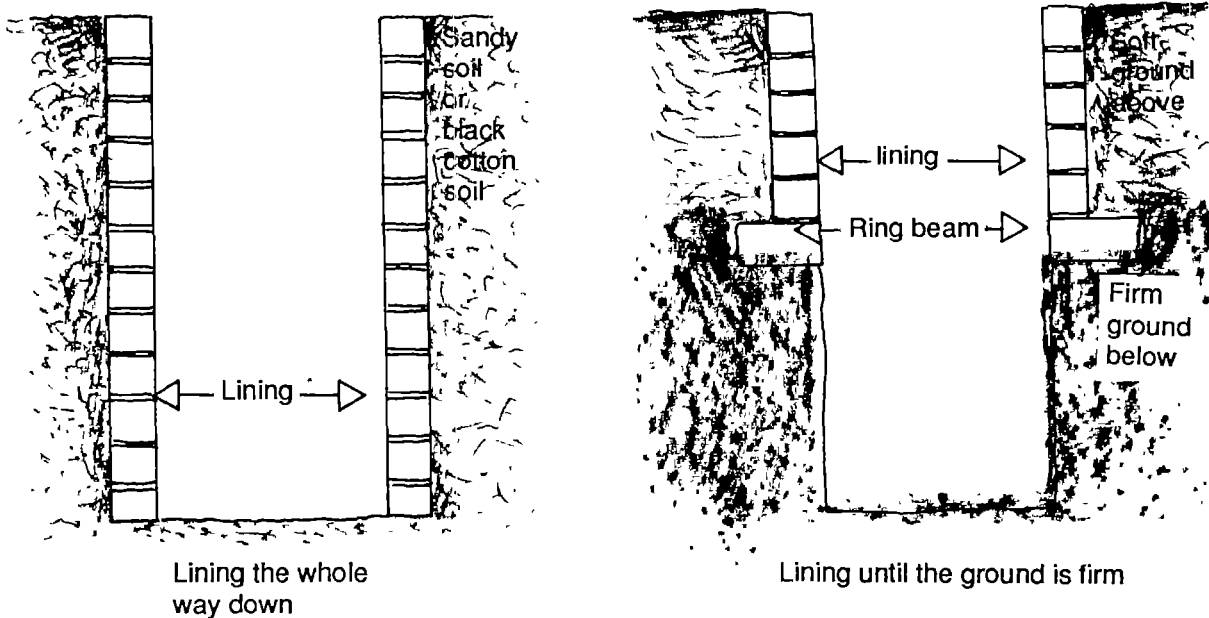
No lining is necessary.

Only a Ring Beam should be made to support the slab



2. Unstable Ground

Follow Step 3.B Page 20



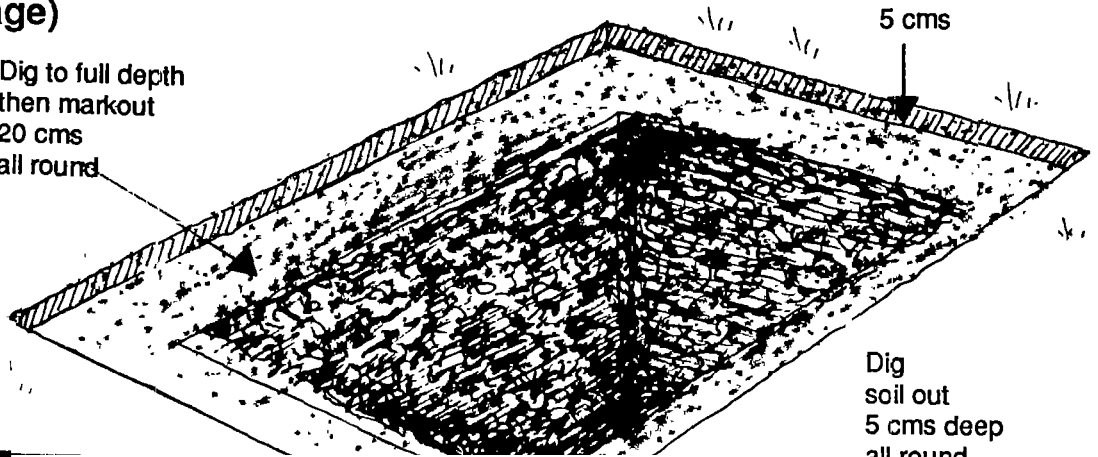
To prevent collapse the pit must be lined wherever the walls are soft.

Step 3.A: Pit Constructions

Hard Ground Option : Ring Beam

N.B. If the Ground is SOFT, miss this page and go to Step 3.B, Page 20 (next page)

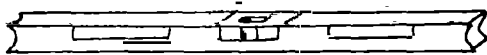
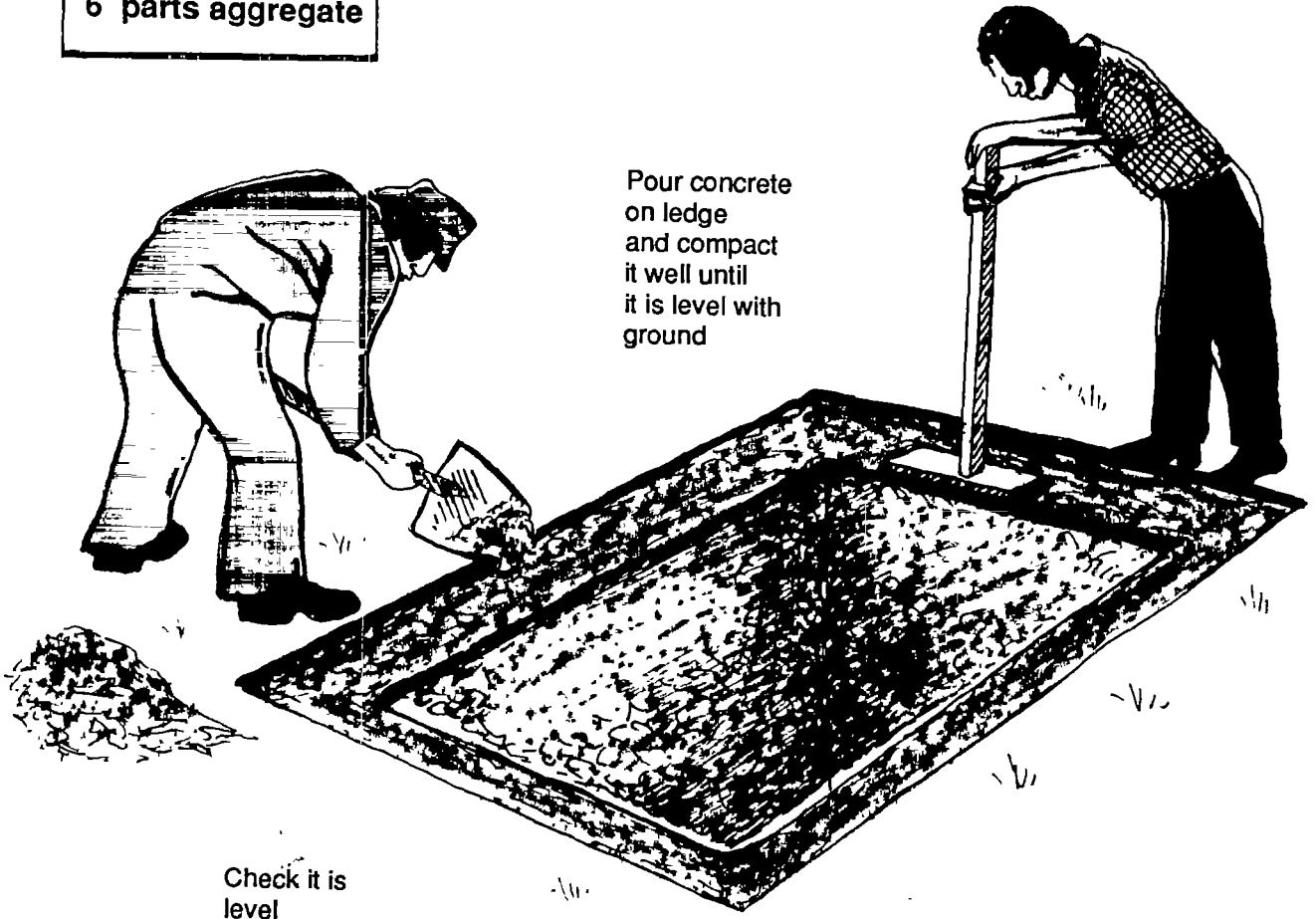
Dig to full depth then markout 20 cms all round



Mix Concrete

1 part cement
3 parts sand
6 parts aggregate

Pour concrete on ledge and compact it well until it is level with ground

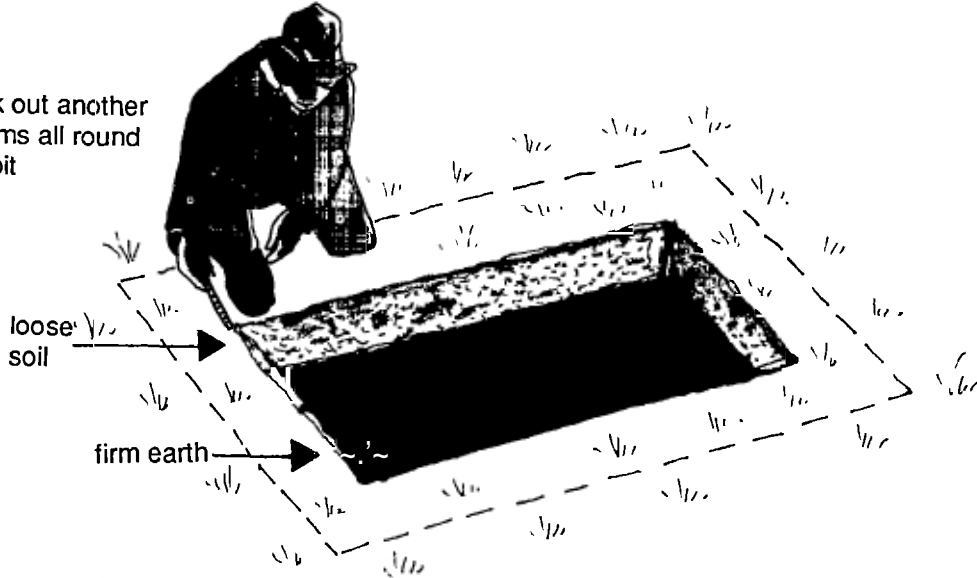


Leave overnight to set well.

Step 3.B: Pit Constructions

Soft Ground Option : Lining

Mark out another 30 cms all round the pit

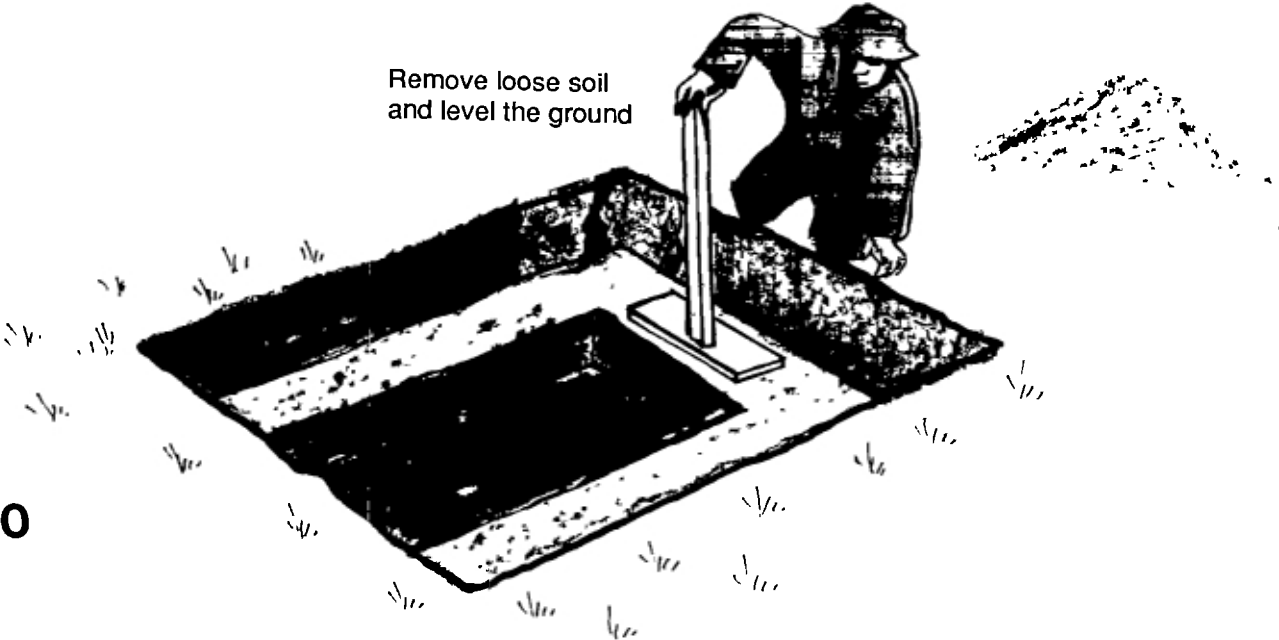


Dig the soil out until the ground is firm






Every site is different.
Look at page 14 to see
how far down you should dig.

Remove loose soil and level the ground

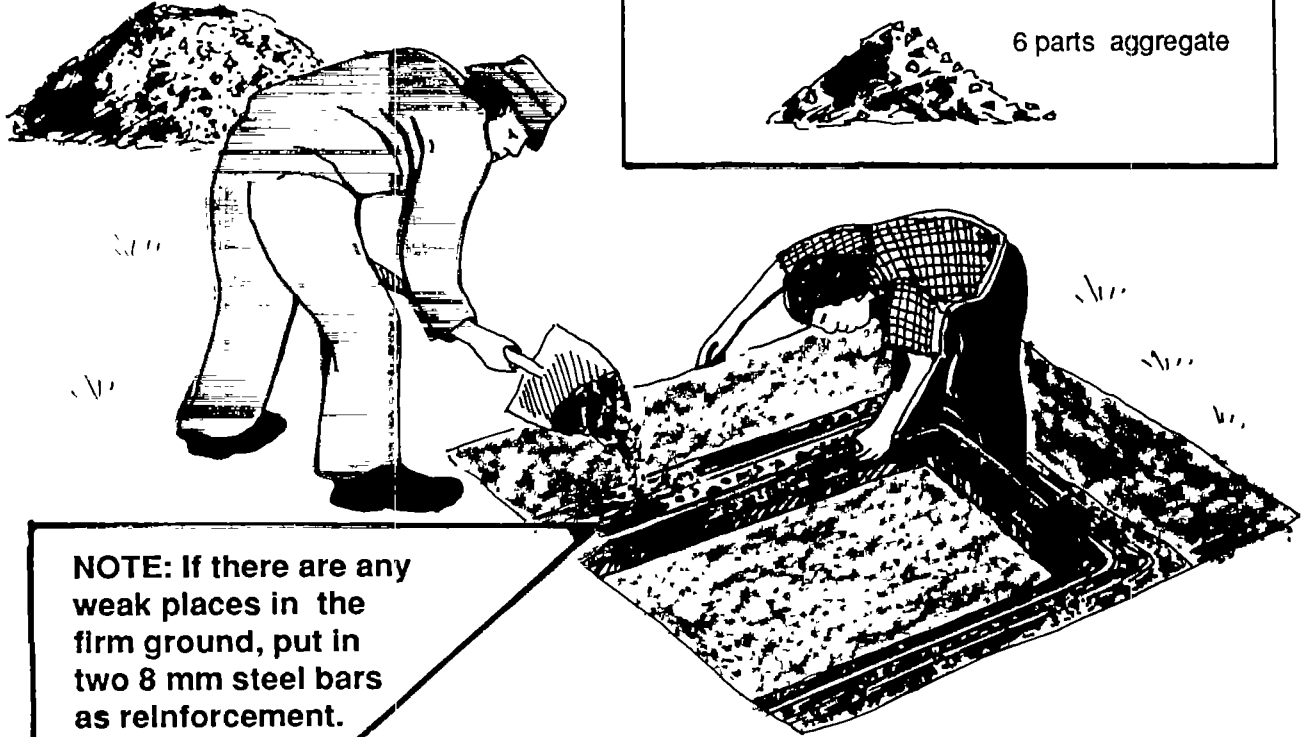


Step 3.B Soft Ground Option : Lining Foundation for Lining

Mix Concrete

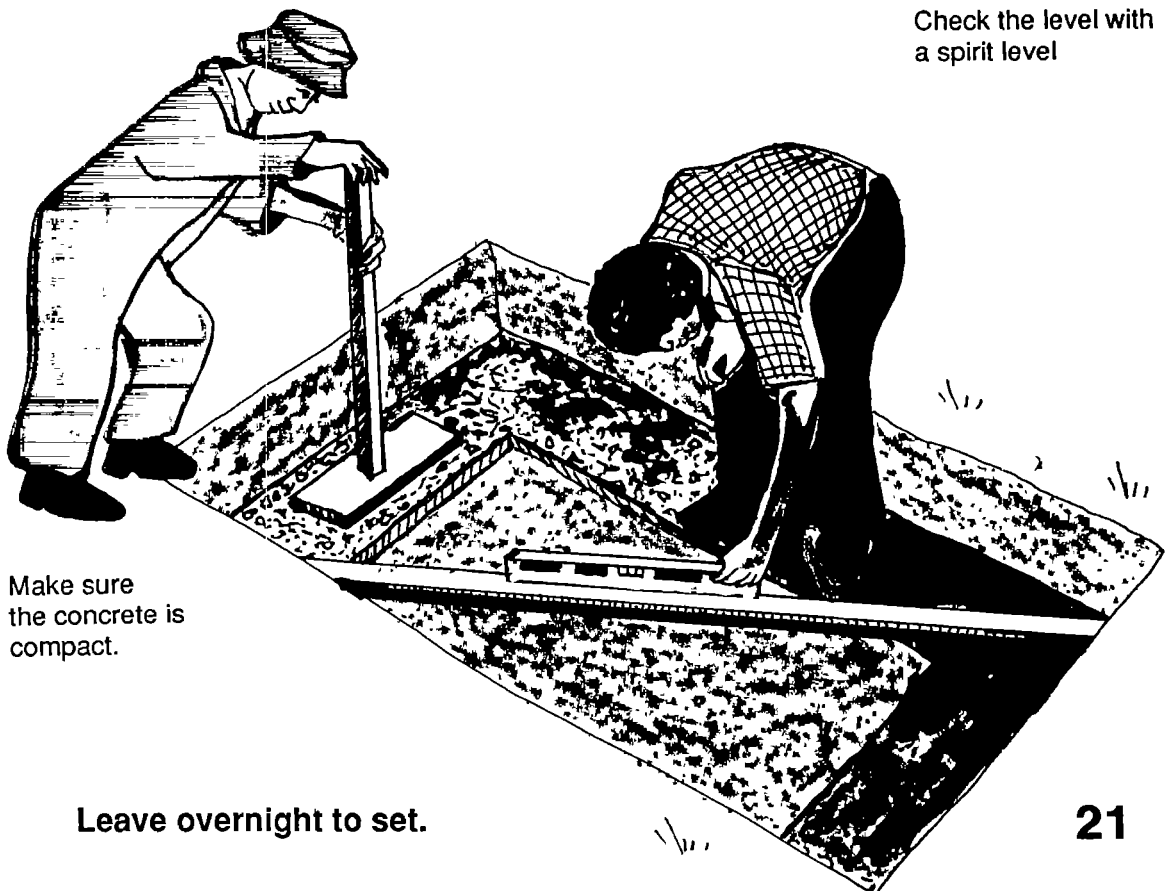
	1 part cement
	3 parts sand
	6 parts aggregate

Pour concrete on the ledge to form a foundation 5 cms thick



NOTE: If there are any weak places in the firm ground, put in two 8 mm steel bars as reinforcement.

Check the level with a spirit level

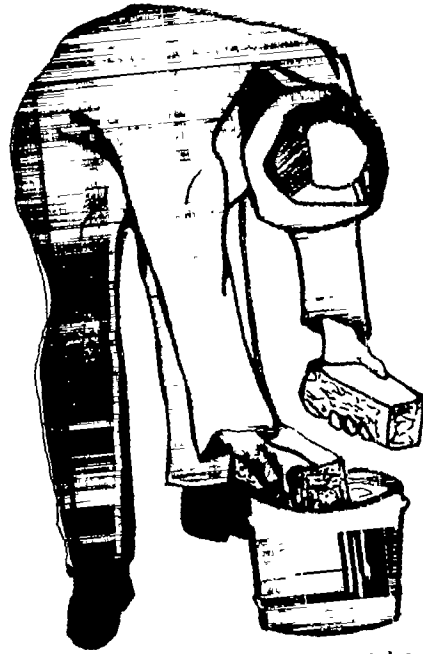


Make sure the concrete is compact.

Leave overnight to set.

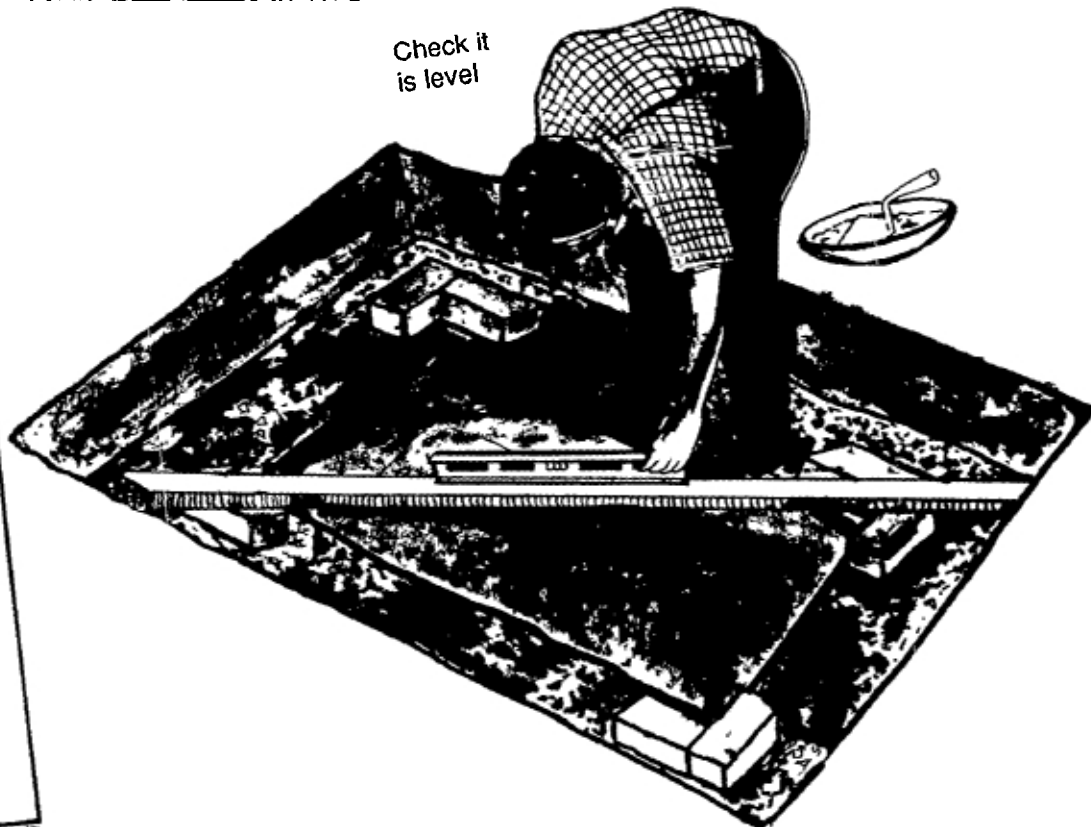
Step 3.B Soft Ground Option : Lining

Building the Lining



Place a layer of mortar at the corners and lay the corner bricks 5 cms from the edge

Check it is level




Mix the Mortar

6 parts sand



1 part cement

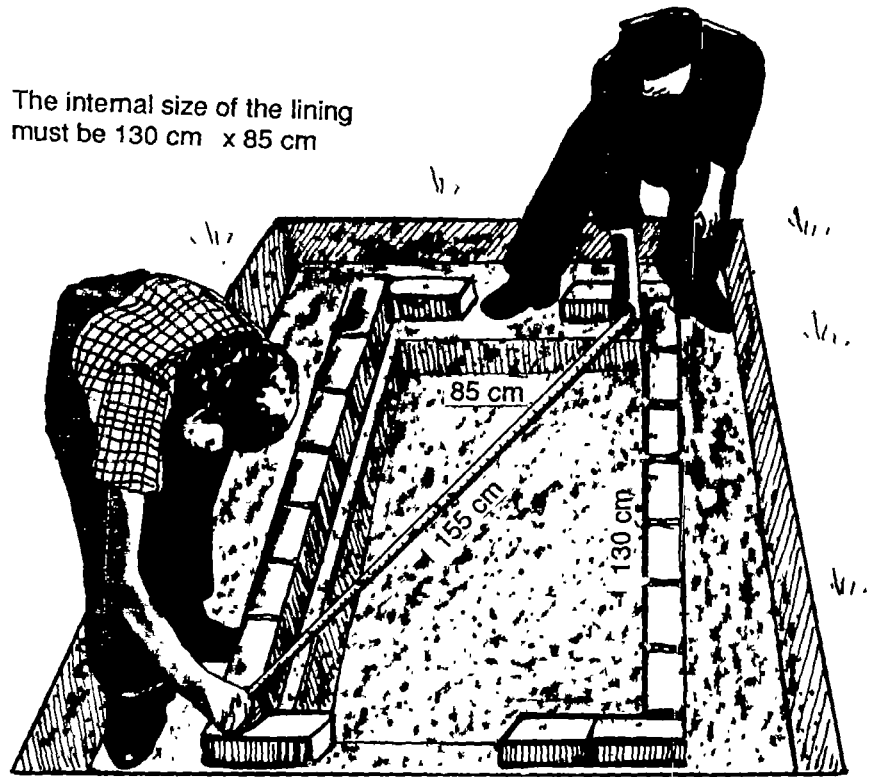


Step 3.B Soft Ground Option : Lining Finishing the Lining

The internal size of the lining must be 130 cm x 85 cm

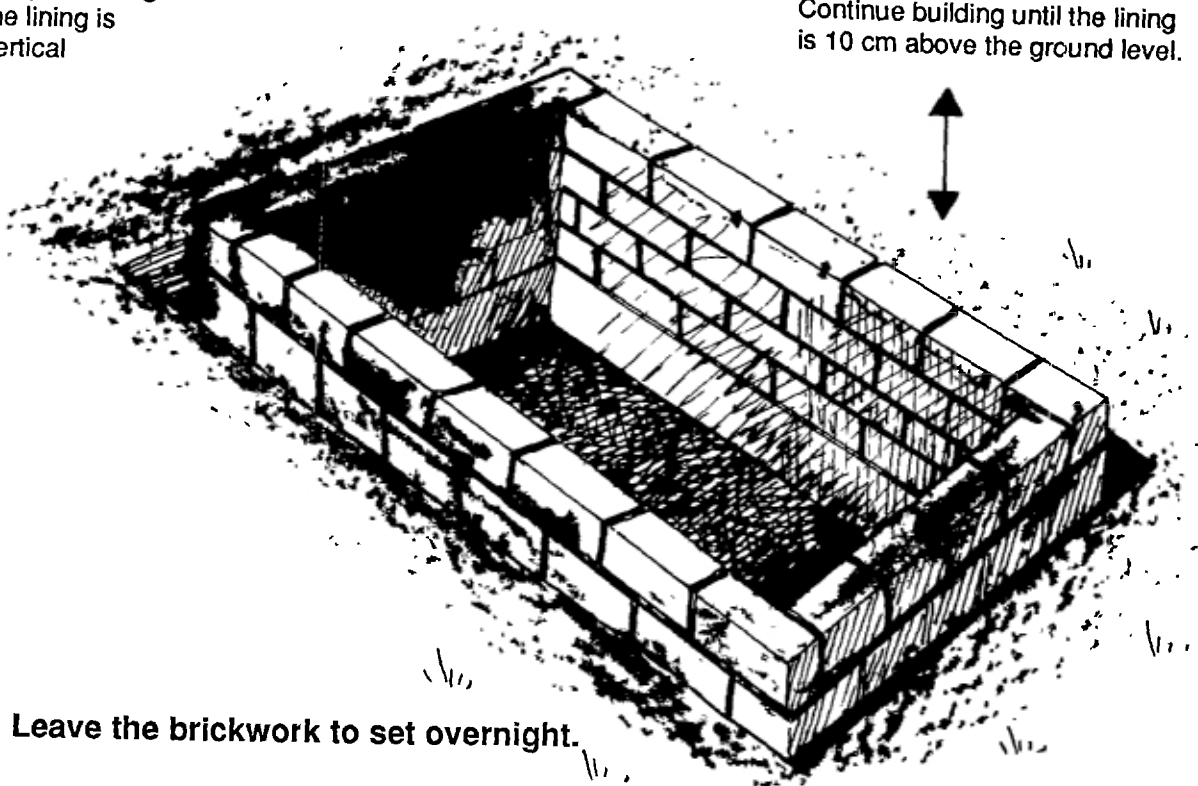


Keep checking the lining is vertical



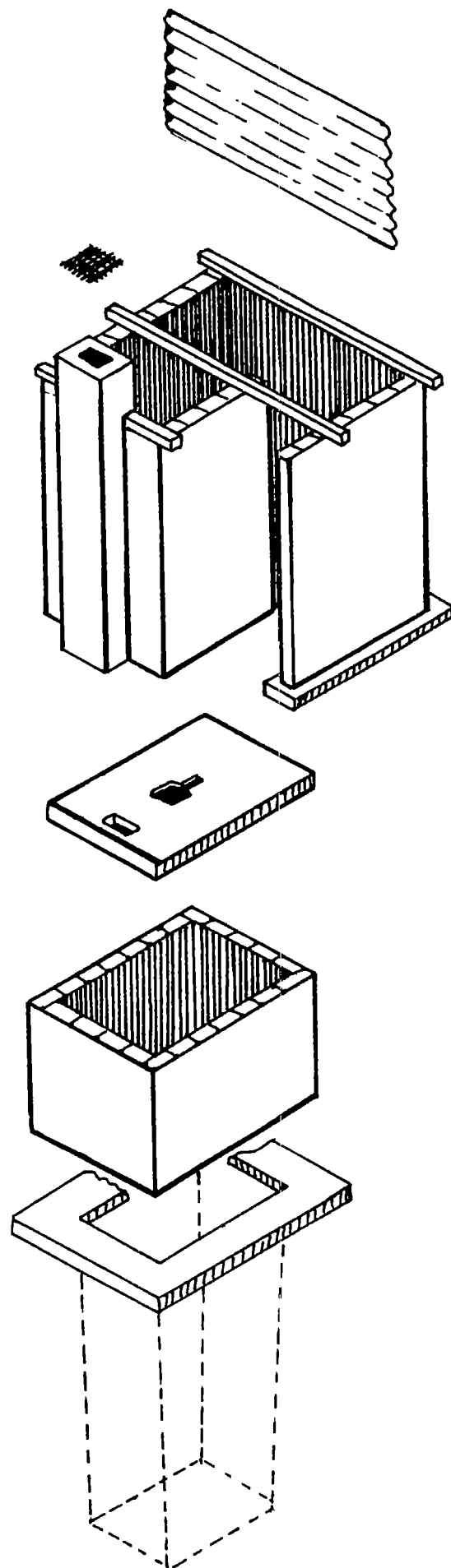
Complete the first course of bricks
check both diagonals are 155 cms

Continue building until the lining is 10 cm above the ground level.



Leave the brickwork to set overnight.

Step 4 : Floor Slab
Making the Moulds
Reinforcement
Concrete Mix
Curing the Concrete Slab
Putting it in Place

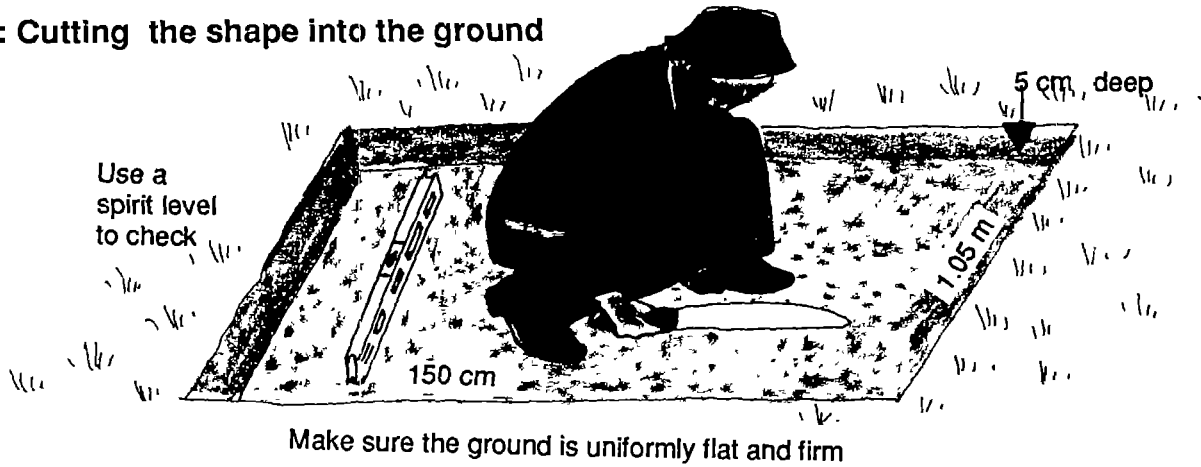


Step 4 : Floor Slab

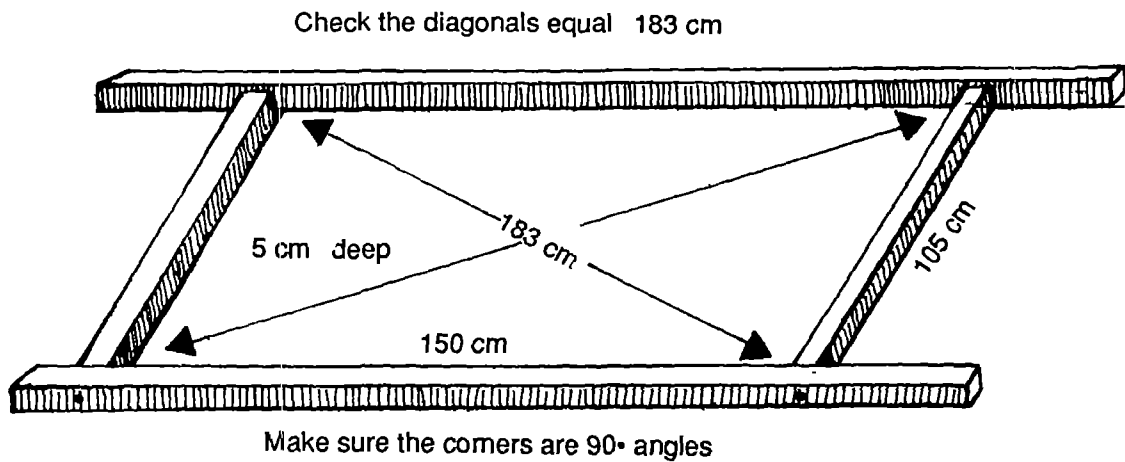
Making the Moulds

There are two ways to do this depending on your materials and the soil :

EITHER: Cutting the shape into the ground



OR: by making a Timber Frame.



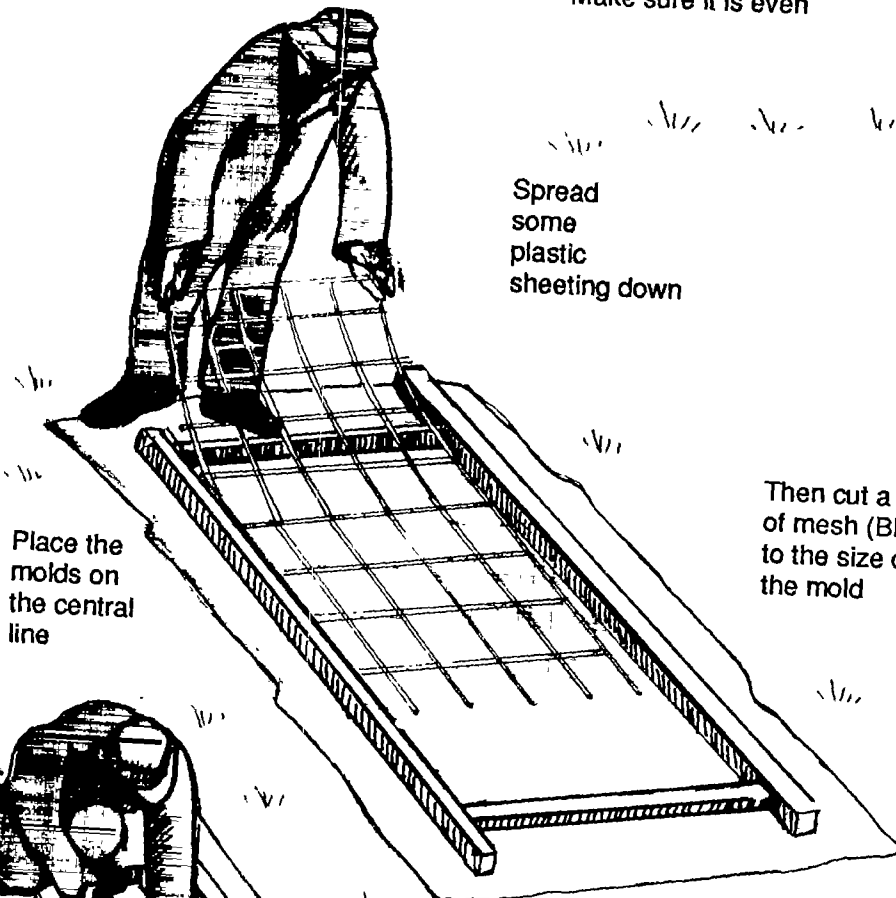
<p>Squat hole mould.</p> <p>Make the mold for the squat hole</p> <p>20 cm</p> <p>20 cm</p> <p>20 cm</p> <p>5 cm</p> <p>cut off the corners</p>	<p>Vent pipe mould.</p> <p>either a brick wrapped in paper</p> <p>10 cm</p> <p>20 cm</p> <p>5 cm</p> <p>or wood block</p>
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Step 4 : Floor Slab Reinforcement

Clear a flat area for the slab
Make sure it is even

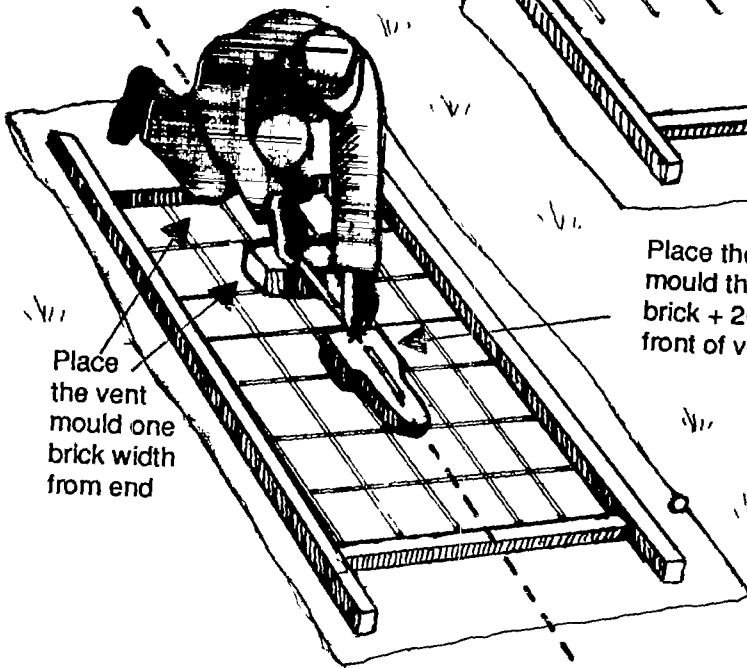


Spread
some
plastic
sheeting
down



Place the
molds on
the central
line

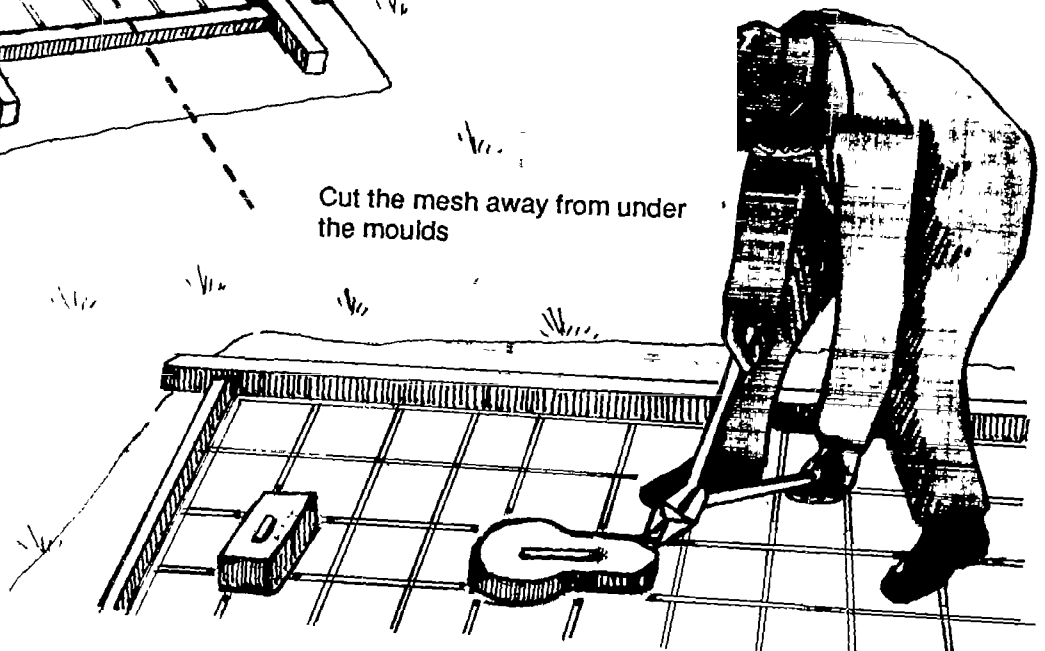
Then cut a piece
of mesh (BRC. 610)
to the size of
the mold



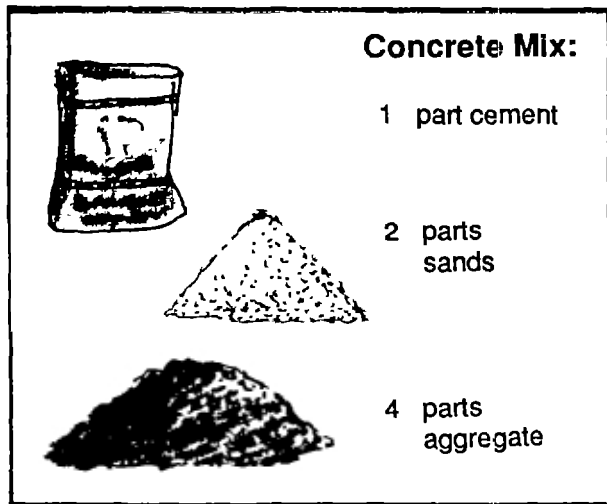
Place
the vent
mould one
brick width
from end

Place the squat hole
mould the width of one
brick + 20 cm in
front of vent mould

Cut the mesh away from under
the moulds

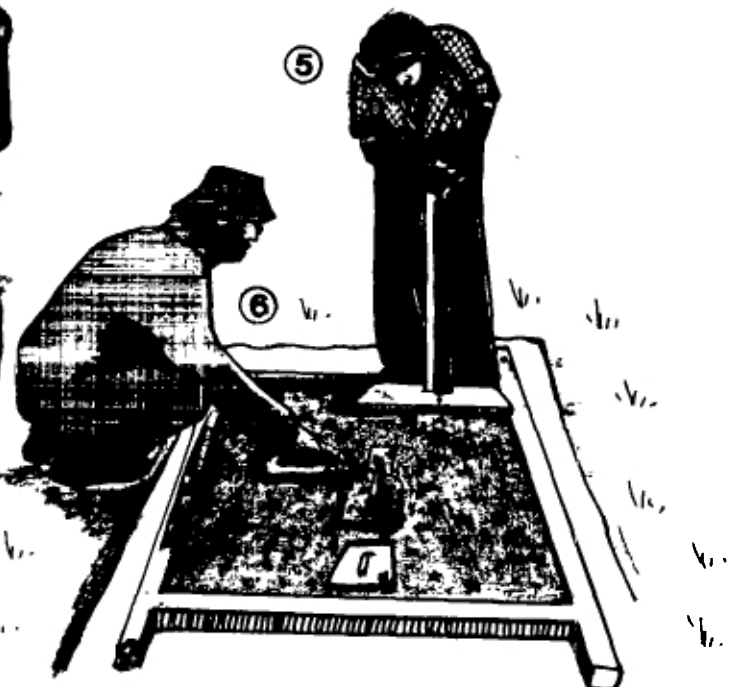
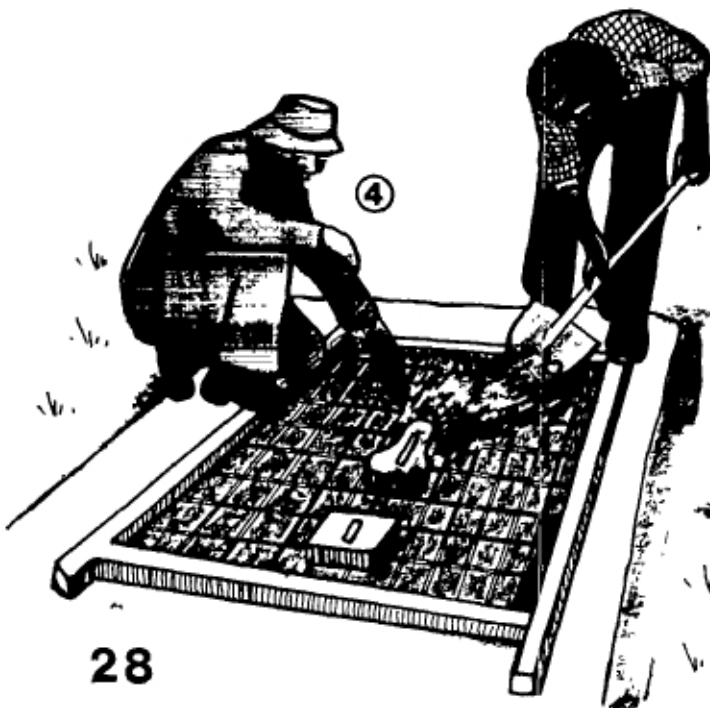


Step 4 : Floor Slab Concrete Mix



Be careful not to make the concrete too wet as too much water will weaken it and cause cracks.

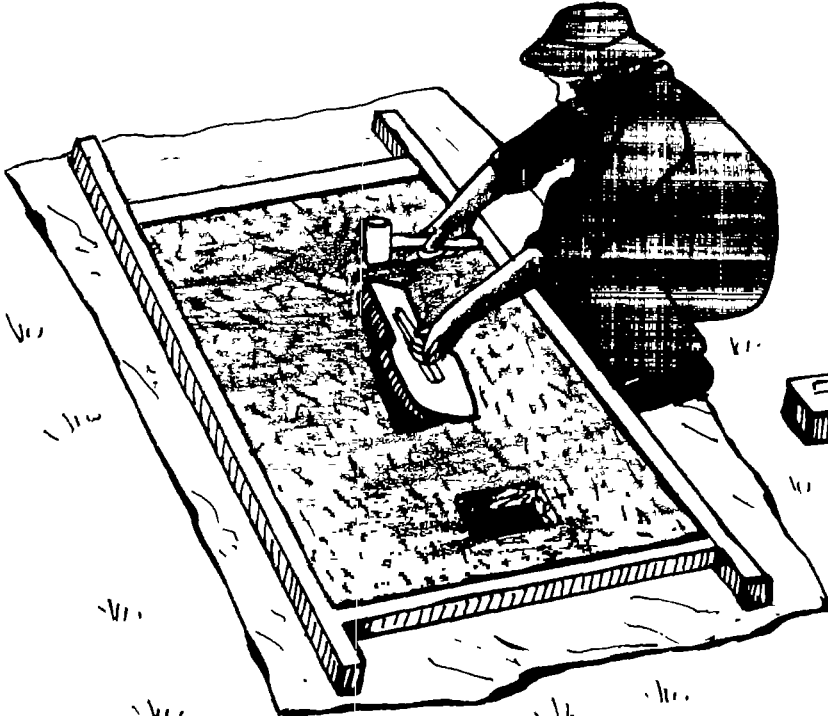
1. First prepare a dry mix.
2. Then add water
3. Put a little concrete into the frame.
4. Raise BRC 610 so that it is in the centre of the concrete.
5. Compact the concrete so it is level with the top of the frame.
6. Finish with a wooden float



Step 4 : Floor Slab

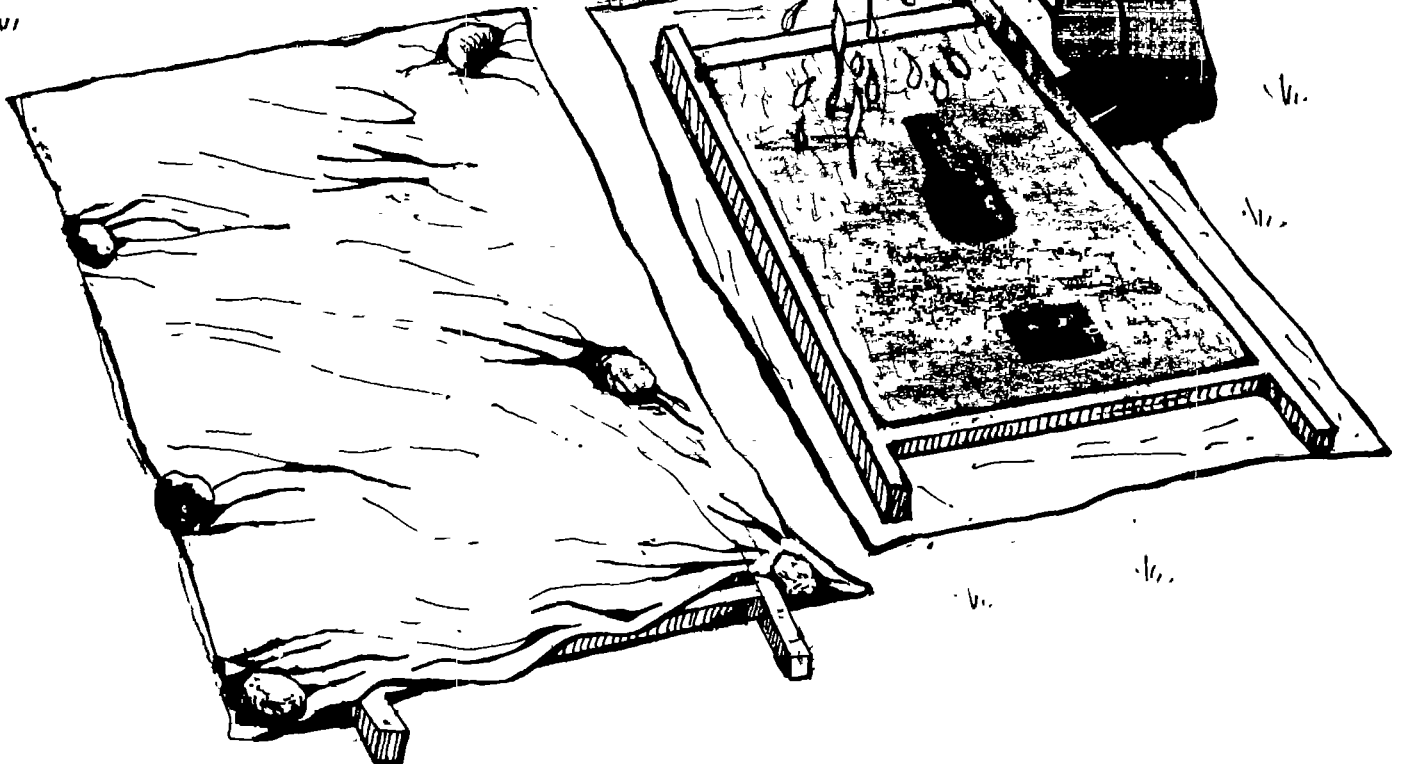
Curing the Concrete Slab

After 1/2 hour
remove the squat hole
and vent pipe
moulds
carefully
cover the
mould



Every day for 7 days
pour water on the concrete
and recover to make sure
it reaches full strength

Cover the slab
with plastic, (sacks)
grass or sand to keep
it damp

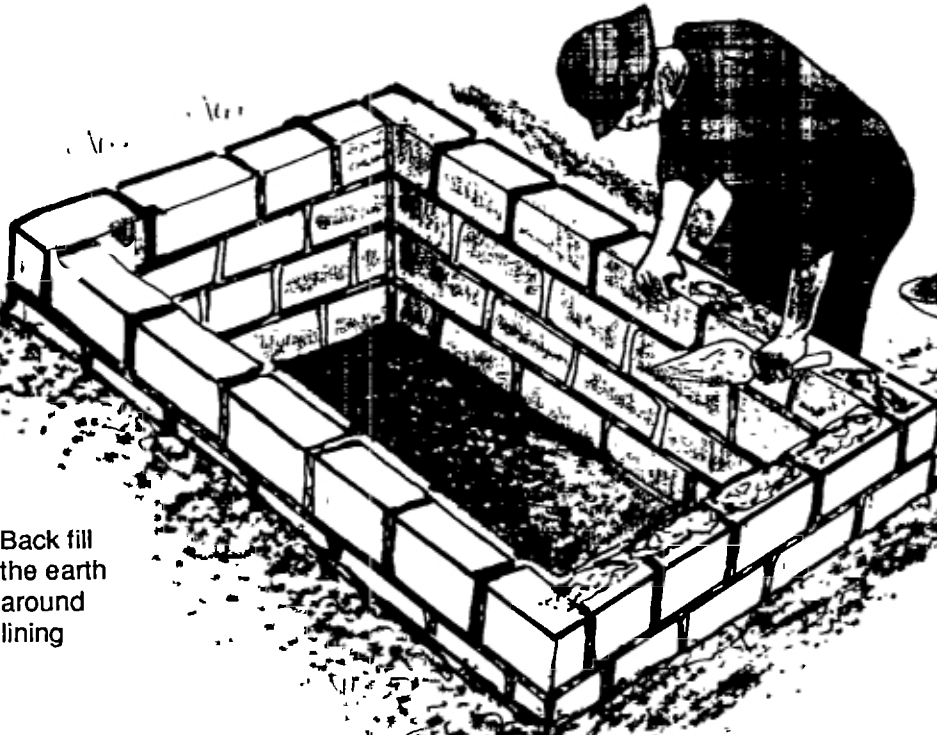


Step 4 : Floor Slab

Putting it in Place

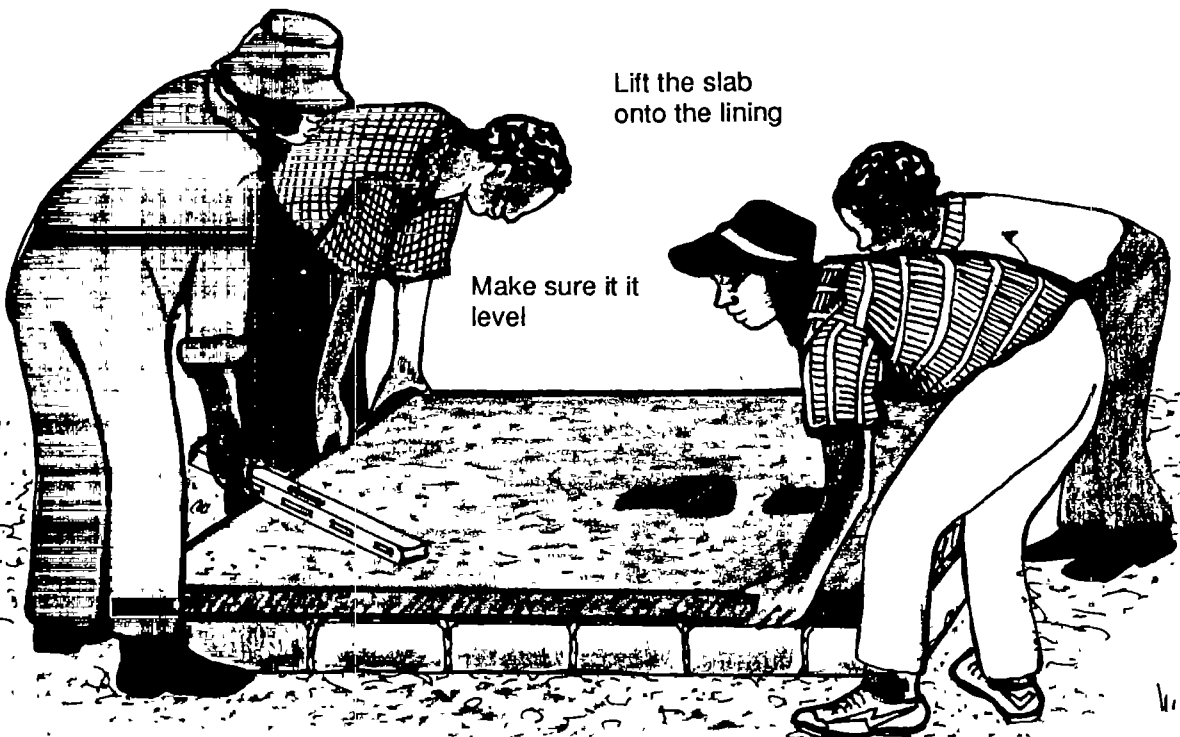
Put a layer of mortar all the way round top course of bricks...

Back fill the earth around lining

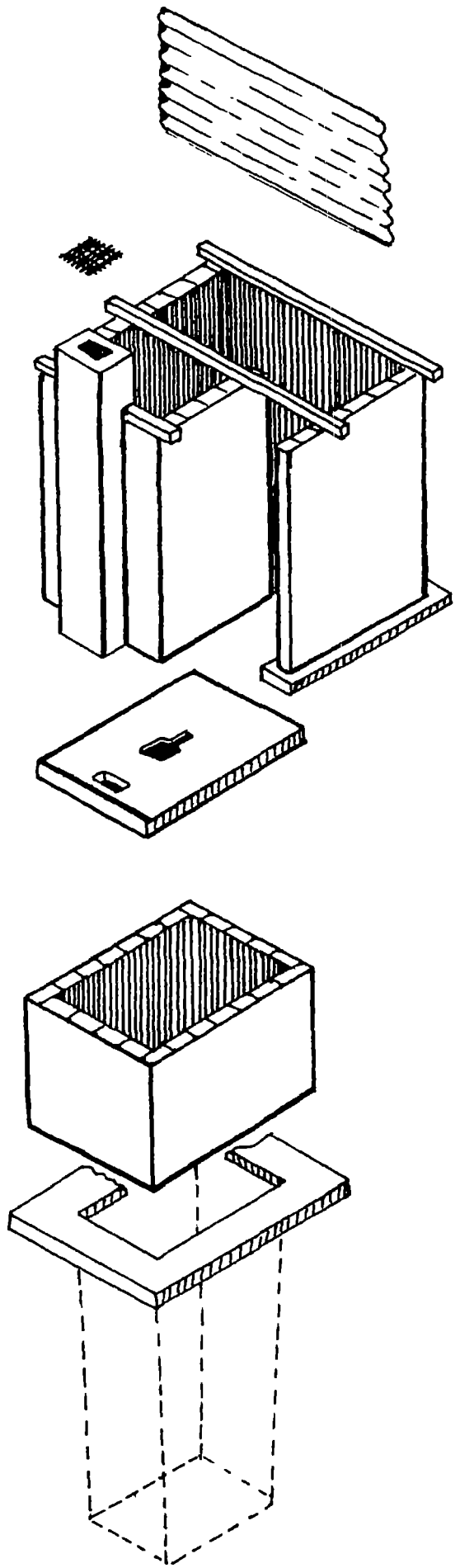


Lift the slab onto the lining

Make sure it is level



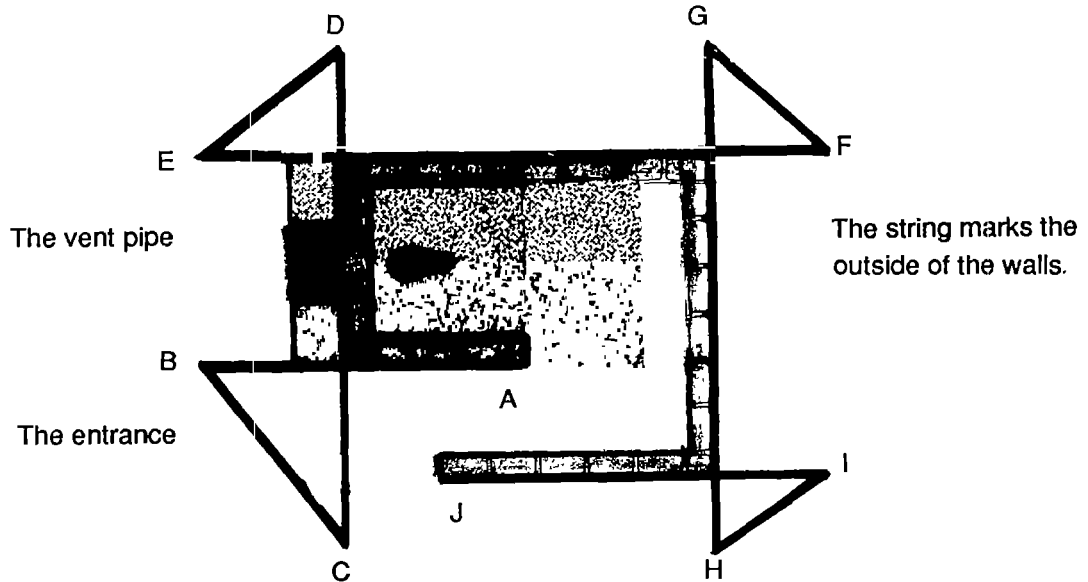
Step 5 : The Walls
Layout and Dimensions
Foundations
Bonding in the Ventpipe



Step 5 : The Walls

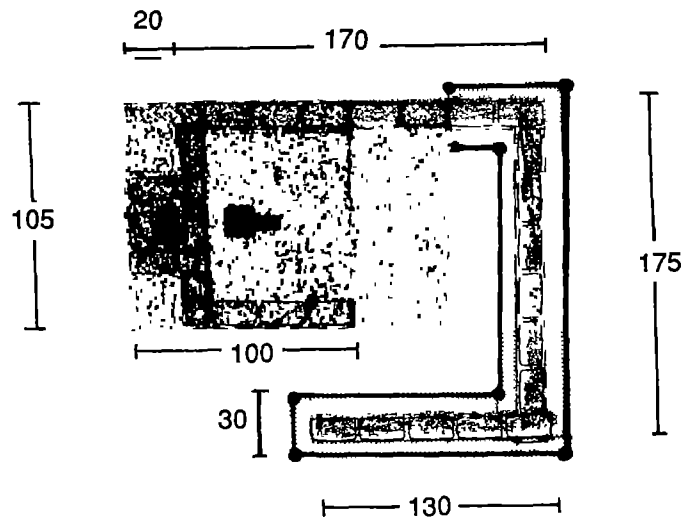
Layout and Dimensions

Using string and pegs set out the lines for the walls using the 3:4:5 method in step 1.



Dimensions for Walls


Use pegs and string to mark the foundations



The foundations are 30 cm wide (10 cm outside string and 20 cm inside)


Step 5 : The Walls Foundations

Concrete Mix:




1 part
cement

3 parts
sand



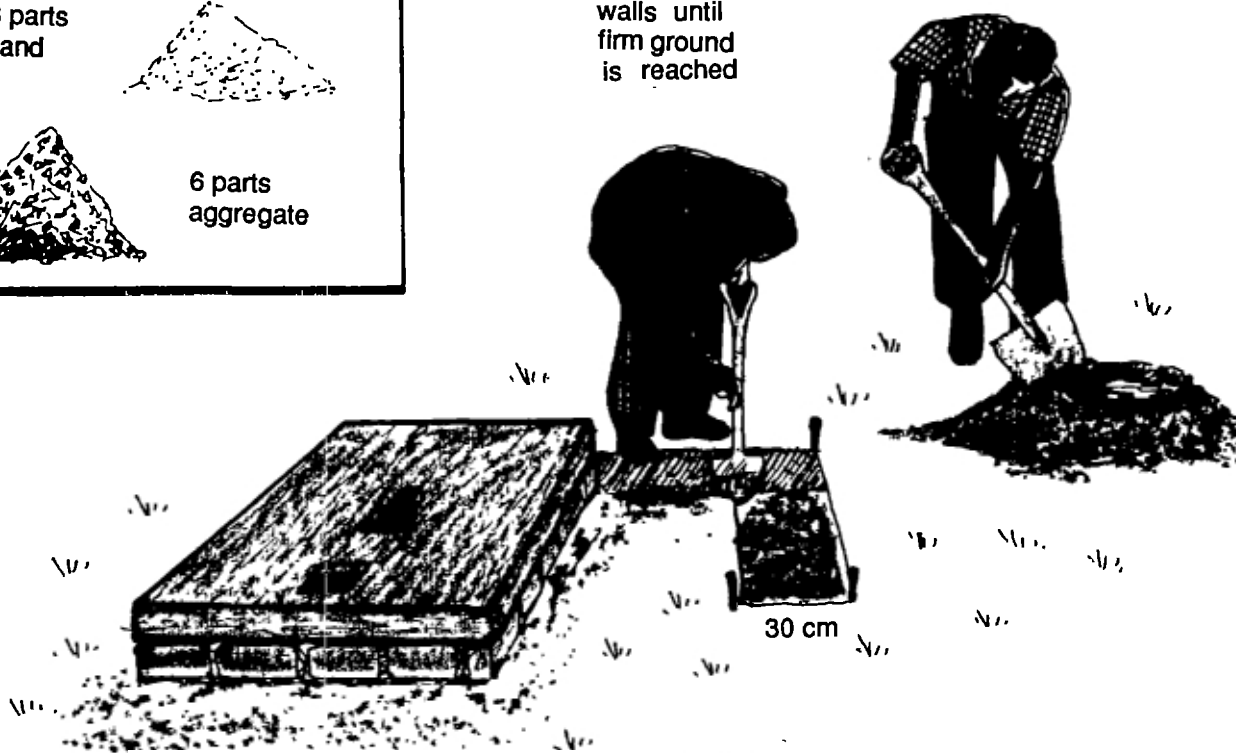
6 parts
aggregate



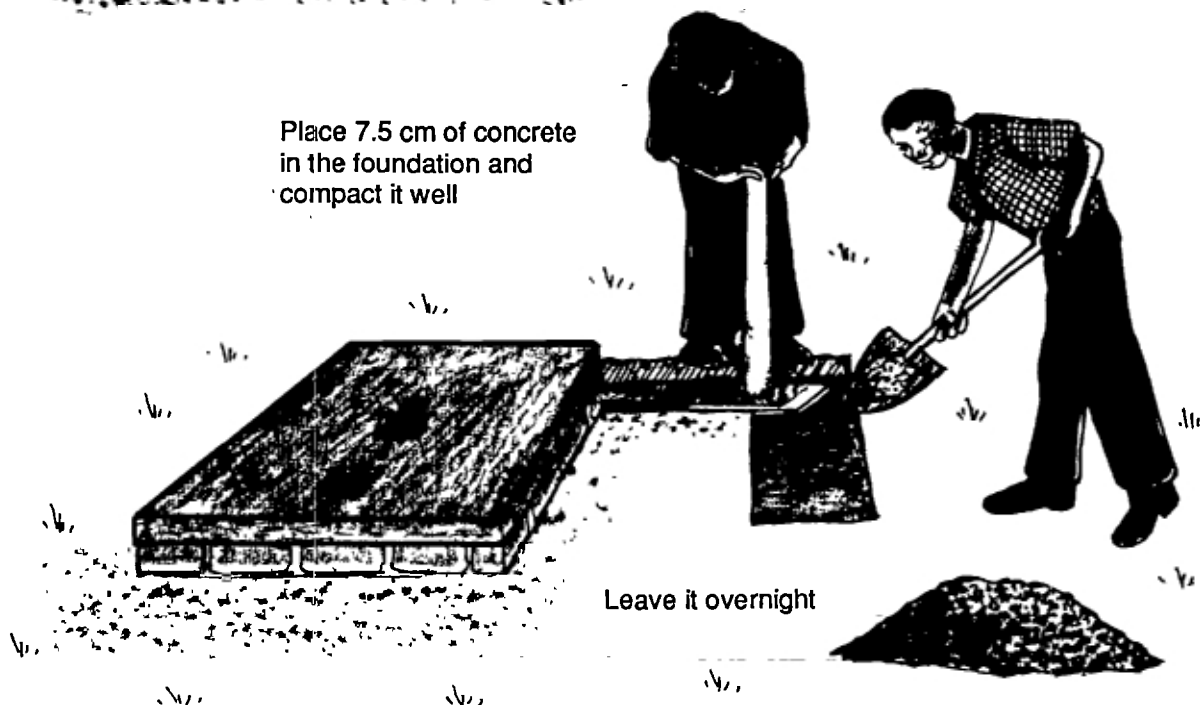
Take the string off the pegs

Leave the pegs in the ground

Dig the foundation for entrance walls until firm ground is reached



Place 7.5 cm of concrete in the foundation and compact it well



Step 5 : The Walls


Bonding in the Ventpipe



Soak the bricks before building




Mortar mix:

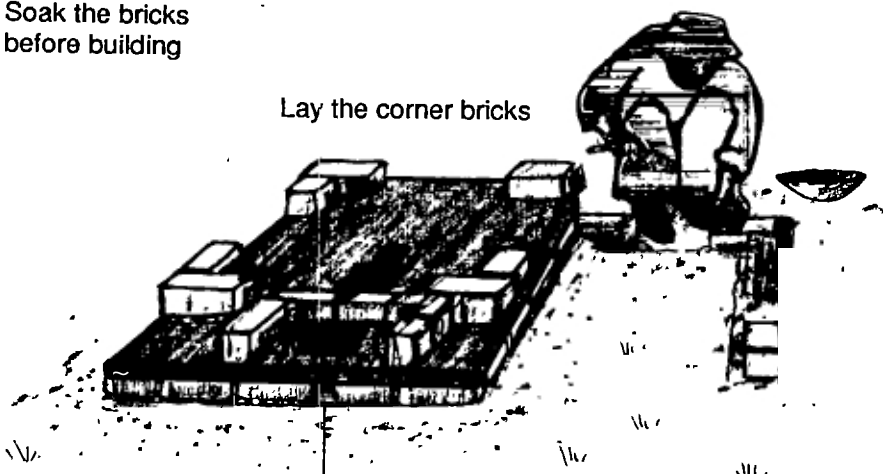


1 part
cement

6 parts
sand

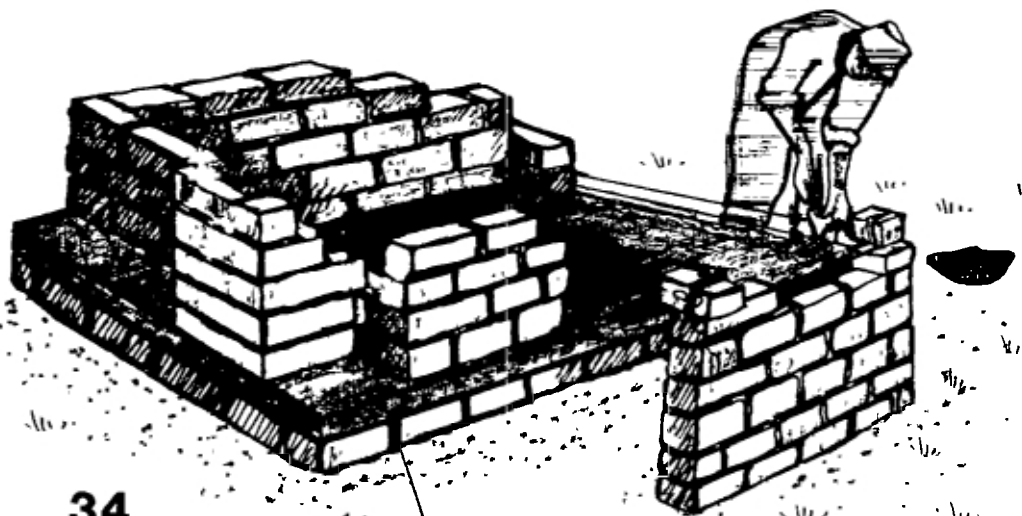
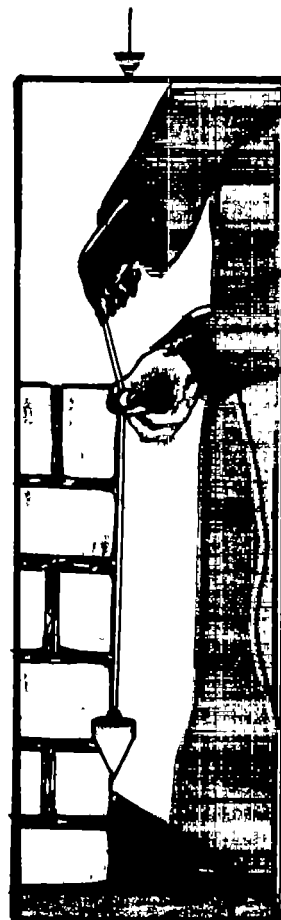


Lay the corner bricks



The vent pipe is outside the latrine room

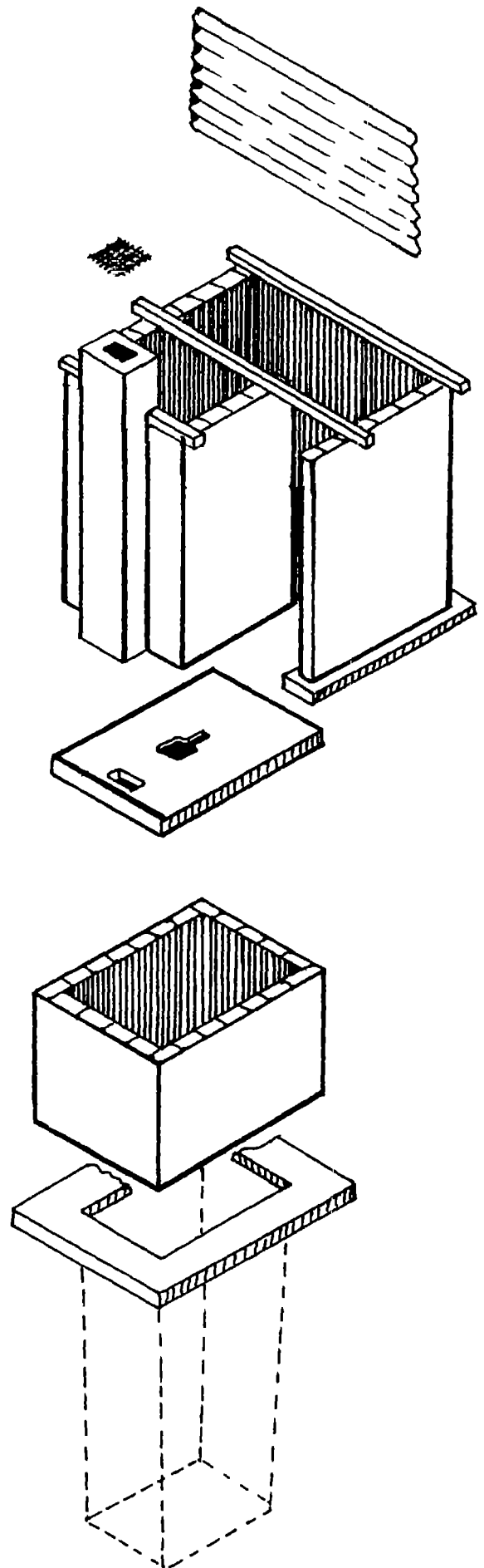
Keep checking that the walls are vertical with a plum bob



Bond in the vent pipe walls

Step 6 : Roofing

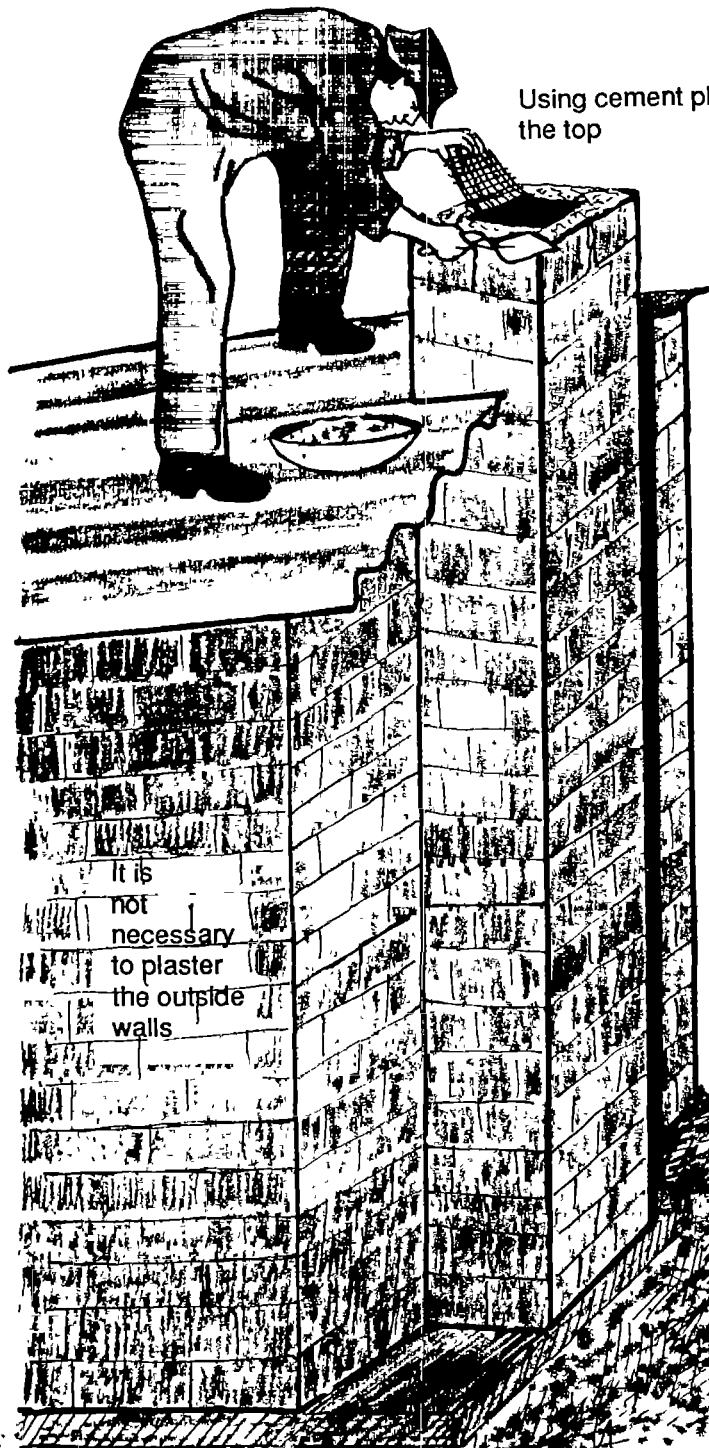
Final height and roofing
Vent pipe and Fly Screen



Step 6 : Roofing

Vent pipe and Fly Screen

Cut a piece of wire mesh 30 cm x 30 cm to fit the top of the vent pipe



Using cement plaster it on to the top

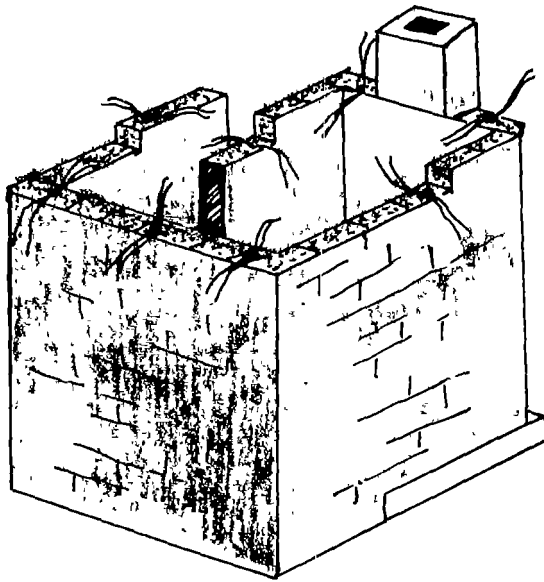
It is not necessary to plaster the outside walls

Remember to slope the earth away from the walls of the latrine or put a cement strip around the walls to enable water to run off



Step 6 : Roofing

Final height and roofing



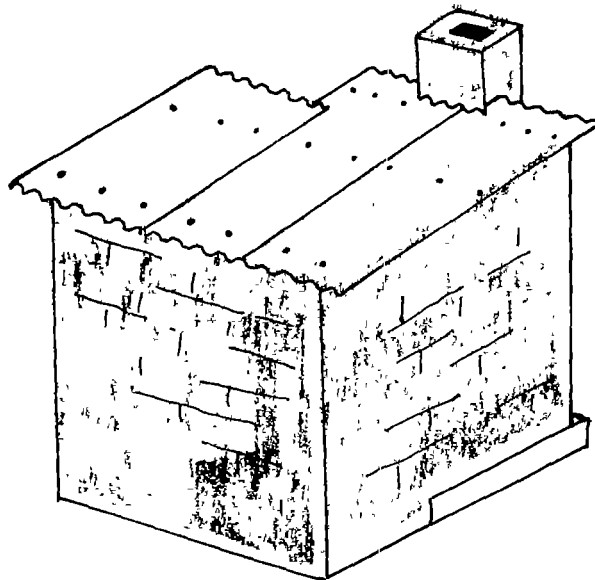
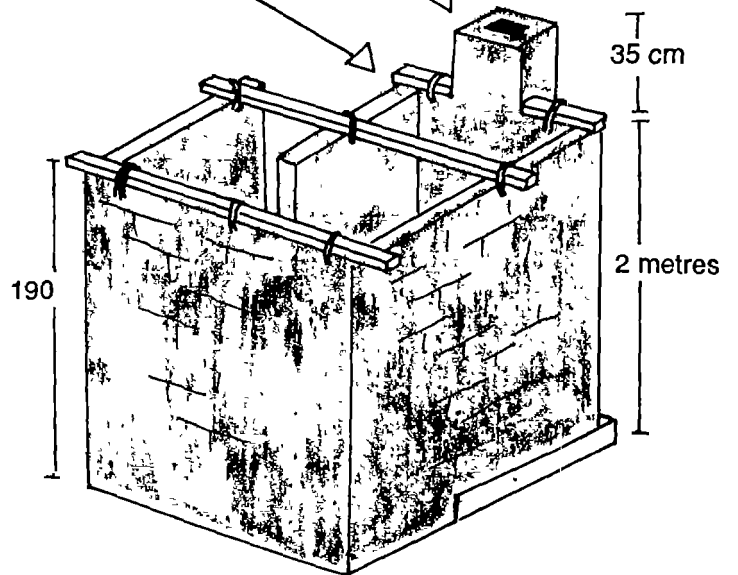
When the back wall is 1.8 metres high put in pieces of wire as binding straps to tie down the wall plates (roof supports)

Continue building to full height

The inside height of the tallest wall must be 2 metres

the vent pipe must be 35 cm higher

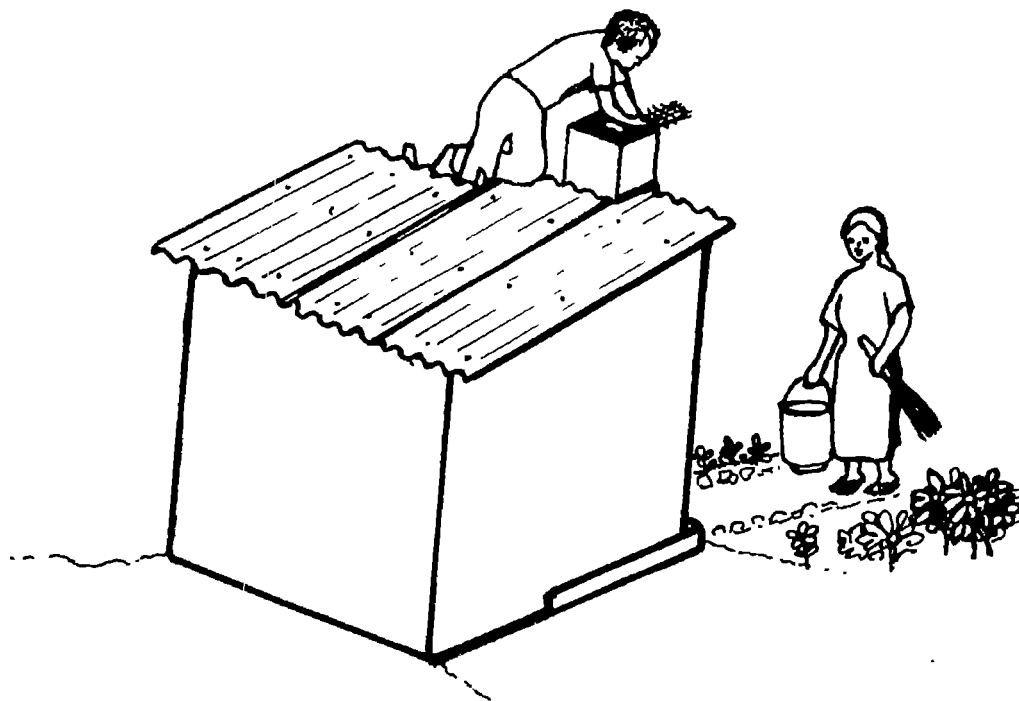
Take 3 roof timbers 5 cm x cm (2" x 2") and tie down with binding straps



Take the mabati sheets (corrugated iron) and nail them down onto the roof supports use roofing nails

Step 7 : Keeping the Latrine Clean

Plastering the Inside
Home Hygiene
Regular Upkeep



Step 7 : Keeping the Latrine Clean

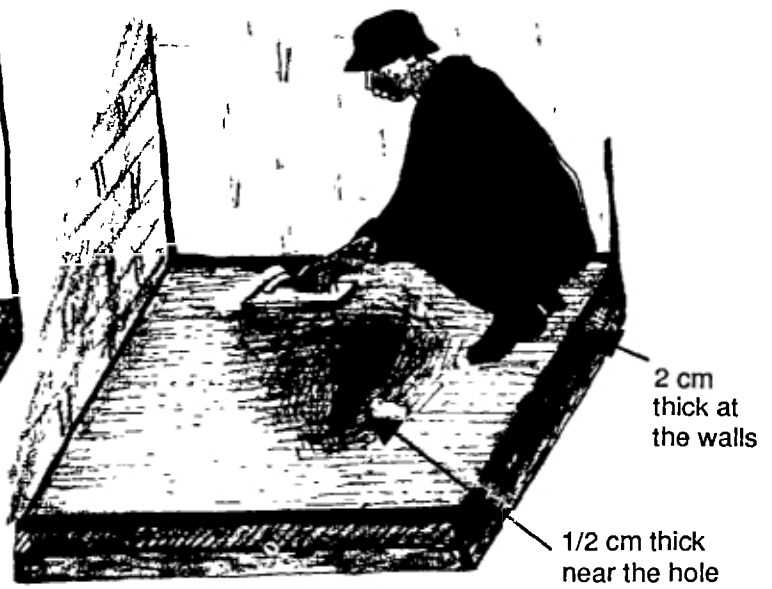
Plastering the Inside

To enable the latrine to be kept clean inside :

1. The floor should slope towards the hole so it can be washed down easily

Wash the floor slab

Plaster so floor slopes towards hole



2. The walls must be plastered 60 cm above the floor so that splashed urine can be washed off easily

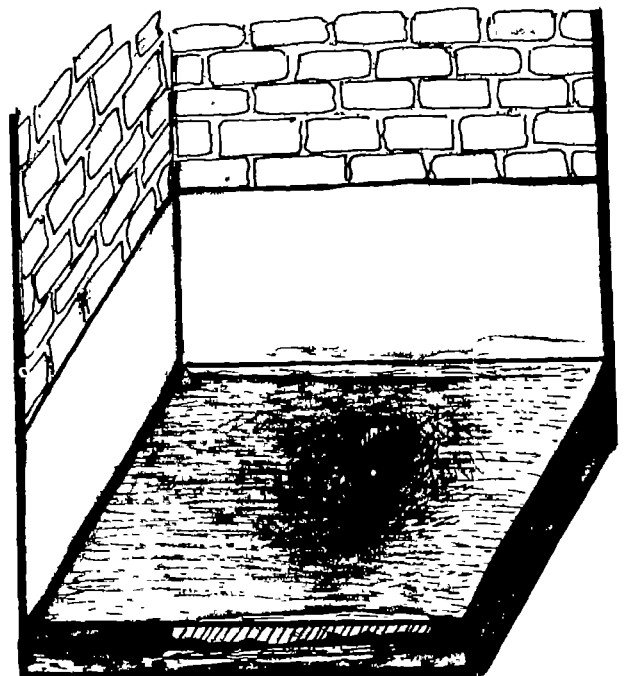
Mortar Mix :



1 part cement



3 parts sand



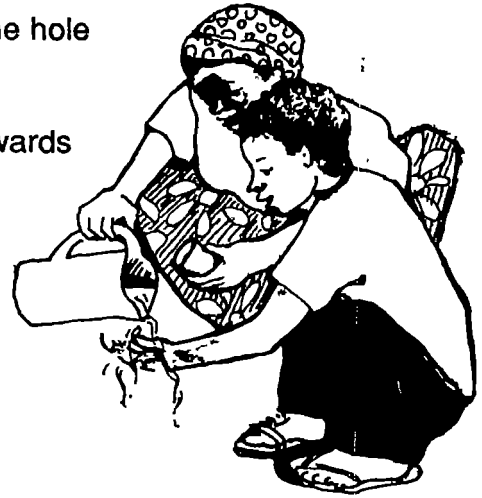
Step 7 : Keeping the Latrine Clean

Home Hygiene



① Aim down the hole

② Wash your hands afterwards with soap



③ Teach children not to mess the floor.

④ Scrup the floor every day with soapy water.

If there are flies around the squat hole it needs cleaning.



⑤ Don't use the latrine as a rubbish pit.

Burn all your rubbish.

⑥ Soft paper will dissolve down the pit, but stones, leaves, newspaper, tins, and plastic bottles will make the pit fill up sooner.

Step 7 : Keeping the Latrine Clean

Regular Upkeep



① Once a week, pour water down the vent pipe to clean it.

② Check that the earth around the walls slopes away, so that the rain water can run off easily.

③ Keep the area clean and make your latrine look inviting!

④ If the wire mesh rusts or gets damaged, replace it immediately.



