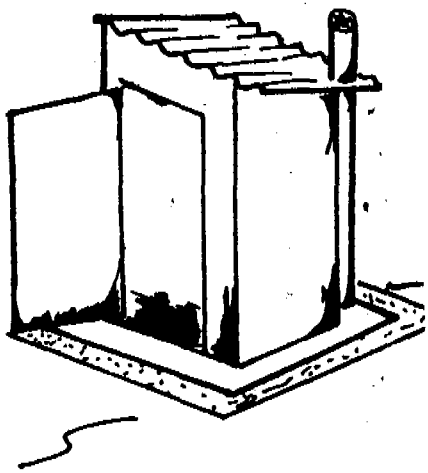
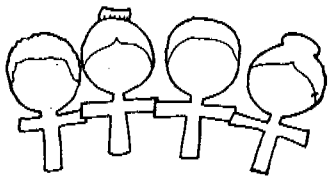
TRANSFER OF APPROPRIATE TECHNOLOGY



leaflet number seven

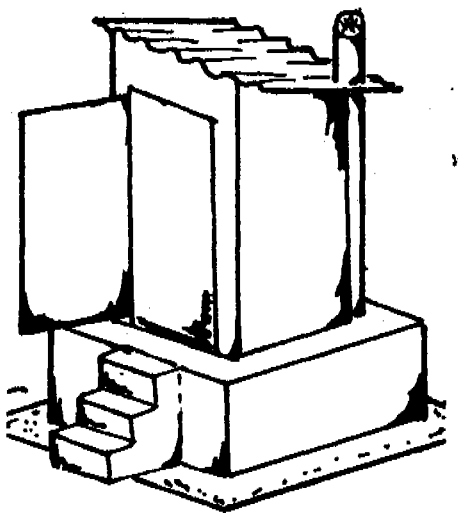
MAKING A VENTILATED IMPROVED PIT LATRINE



INSTITUTE OF
RURAL DEVELOPMENT

and

WOMEN'S DEVELOPMENT
TRAINING PROGRAMME



The University
of the
South Pacific

P.O. Private Bag
Nuku'alofa
TONGA

This leaflet on the Transfer of Appropriate Technology in the South Pacific is part of a series being produced by the Institute of Rural Development of the University of the South Pacific and the Women's Development Training Programme, based at the Institute.

The leaflets are designed to help transfer appropriate products and processes in the University region. It is intended that this sharing of tools and techniques will mainly on focus those technologies already used or of use in the countries of the South Pacific, by encouraging improvements to traditional technologies or the introduction of new technologies.

The leaflets concentrate on needed technologies which use locally available or inexpensive construction materials and basic building techniques.

This leaflet explains how to make an improved ventilated pit latrine (VIP latrine). The leaflet tells you WHAT YOU NEED in terms of tools, equipment and materials, and WHAT YOU DO to make the latrine.

This VIP latrine can be made by women as well as men, and has been one of the technologies that women have learnt to make at Women and Technology Workshops that have been presented at the Institute of Rural Development in Tonga and elsewhere in the South Pacific.

It is hoped that interested groups will be supported and help support the leaflets project. Please circulate the leaflets to your contacts and friends and write to the Institute with any questions, comments or suggestions for new leaflets. The leaflets are available freely on request.

In the leaflet the old British "Imperial" units have been generally used for more general understanding, convenience and consistency, in preference to the modern, but less widely understood, metric (SI) system; inches are variously so called, or shown as "

The supplies of the tools and materials you need to make the VIP latrine should be available from government stores or any hardware suppliers.

For further information, comments, suggestions or requests for more leaflets, please write to:

Appropriate Technology Leaflets Project
Institute of Rural Development
University of the South Pacific
PO Private Bag
Nuku'alofa
TONGA

THE LEAFLETS PROJECT IS SUPPORTED BY THE
EUROPEAN ECONOMIC COMMUNITY
AND THE
AUSTRALIAN DEVELOPMENT ASSISTANCE BUREAU
THROUGH THE SOROPTIMIST INTERNATIONAL OF VICTORIA AND TONGA

WHAT YOU NEED

(to make one latrine; for moulds for base and pedestal, see below)

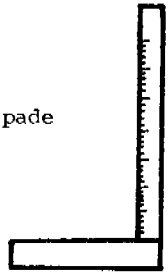
Tools/equipment:

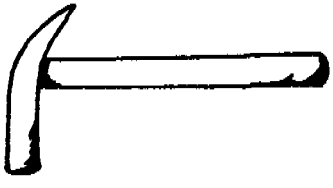
Hammer
Square
Carpenters measuring tape

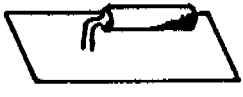
Cement measure (large tin can)
Bucket
Sieve/screen

Bolt-cutters (18")
Tin snips
Pliers (one pair)

Trowel
Float
Digging stick/spade
Shovel



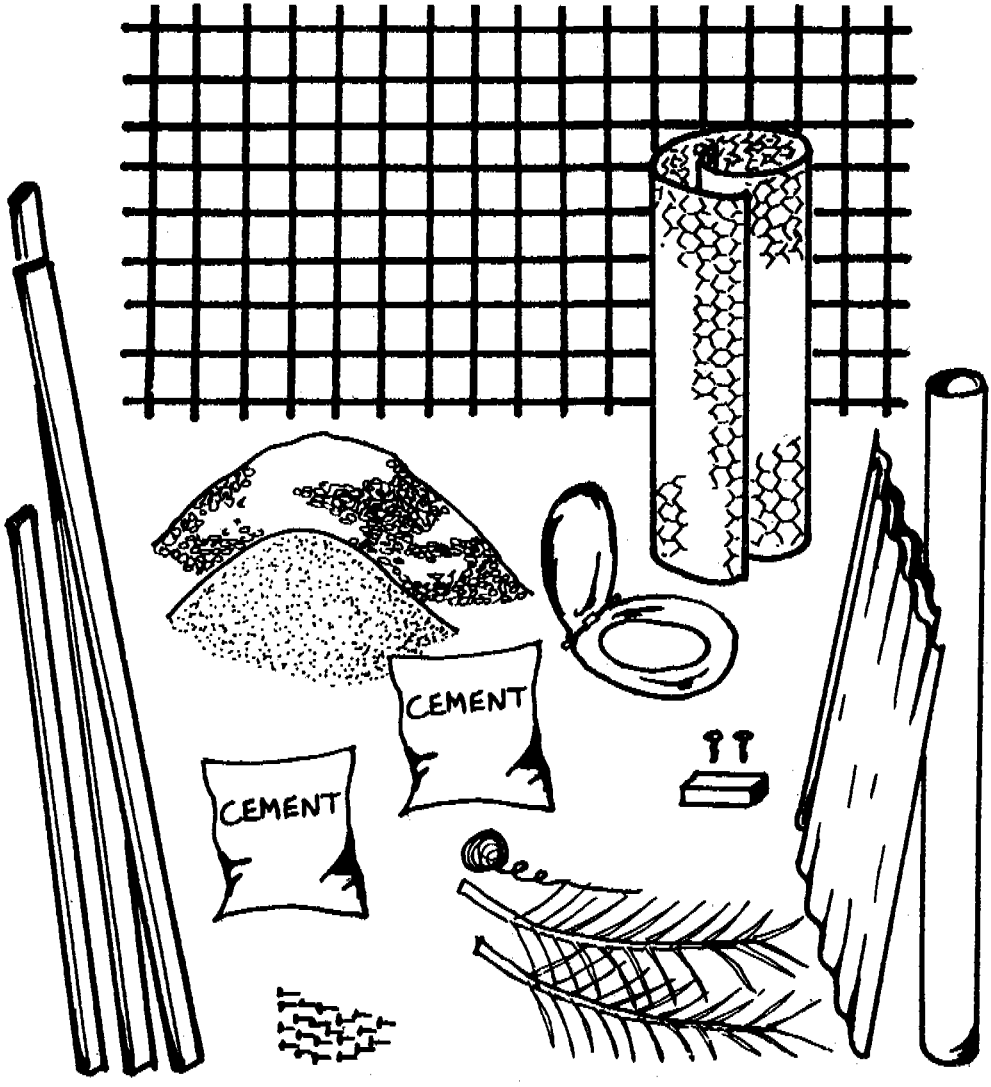




WHAT YOU NEED

Materials:

Plastic toilet seat and lid
9inches of 2inch x 4inch planed wood
Frame for house
(bush timber or 2inch square)
Corrugated roof sheet (3feet x 8feet)
Wall cladding for house
(plywood or coconut leaf etc)
4inch plastic down pipe (7feet long)
String (to tie chimney to house)
6inch weldmesh sheet (9feet x 5feet)
1/2inch chicken wire (4feet square)
Cement (1 bag)
Sand (washed)(2 bags)
1/2inch gravel/aggregate (3 bags)
Soft iron tie wire (1lb)
Two 3inch steel woodscrews
Roof nails
3inch galv. flathead nails



WHAT YOU DO

A. Making the moulds:

(If the moulds are not already available)

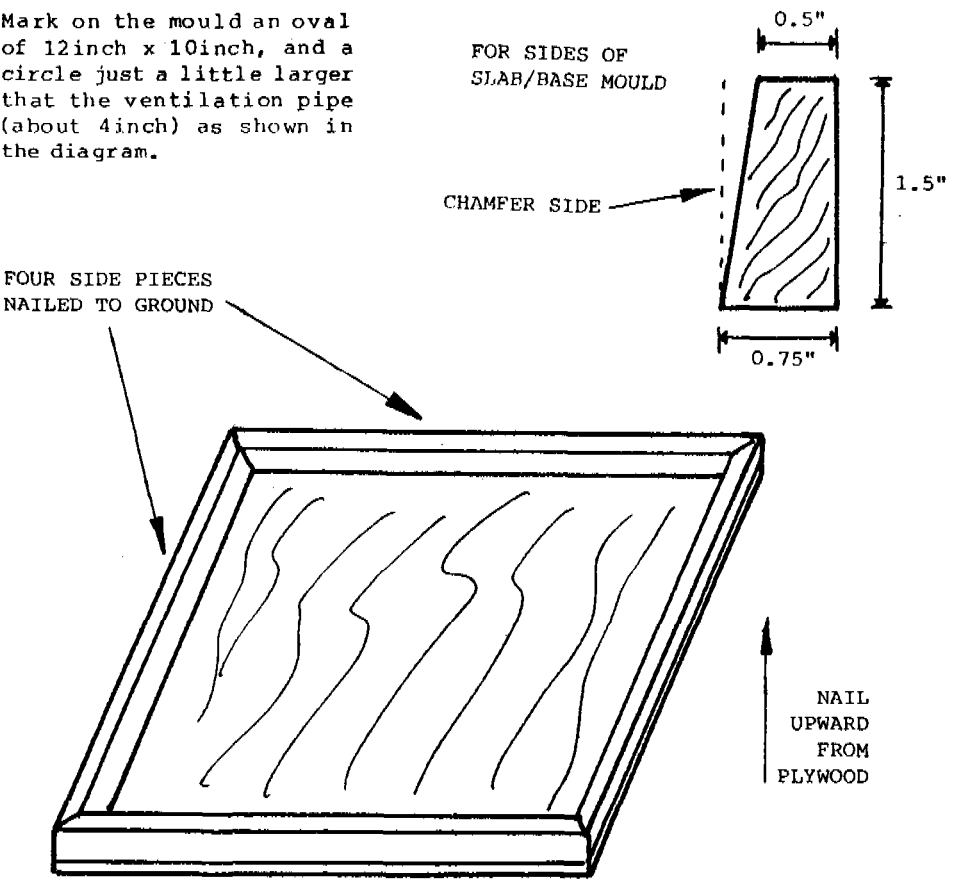
THE CONCRETE SLAB/BASE

What you need: 48" x 48" of half-inch plywood
16 feet 1.5" x 1.5" planed timber
20 x 1.5" flathead galv. nails

What you do:

Cut a piece of half-inch plywood to 48ins square (half one sheet). Cut 16 feet of wood 1.5inch x 0.75inch and chamfer one 0.75inch side down to 0.5inch as shown in diagram. Cut this wood into four pieces of 4 feet long and chamfer ends to 45 degrees. Nail (1.5" nails) these four pieces to the edges of the plywood as shown. Then paint the mould in undercoat and two coats of gloss to make it last longer.

Mark on the mould an oval of 12inch x 10inch, and a circle just a little larger that the ventilation pipe (about 4inch) as shown in the diagram.

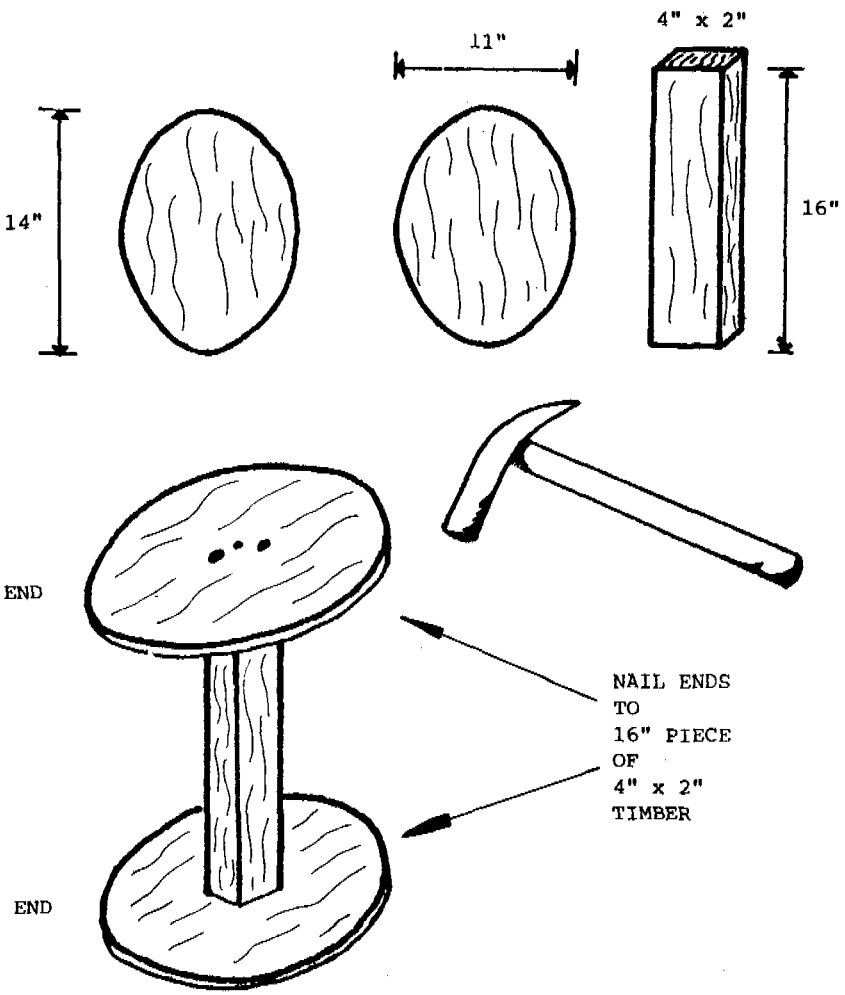


THE PEDESTAL

What you need: two pieces 11inch x 14inch
of half-inch plywood
16inches of 2inch x 4inch planed timber
8 x 3inch flathead galv. nails
17inch x 48inch flat galv. tin sheet.

Cut pieces of half-inch plywood measuring 14inch long and 11inch wide into oval shapes. Nail the two pieces together with the piece of 2inch x 4inch timber as shown in the drawing.

Bend the piece of tin 17inch wide around the oval mould, to wrap around the mould with 6 inches approximate overlap.



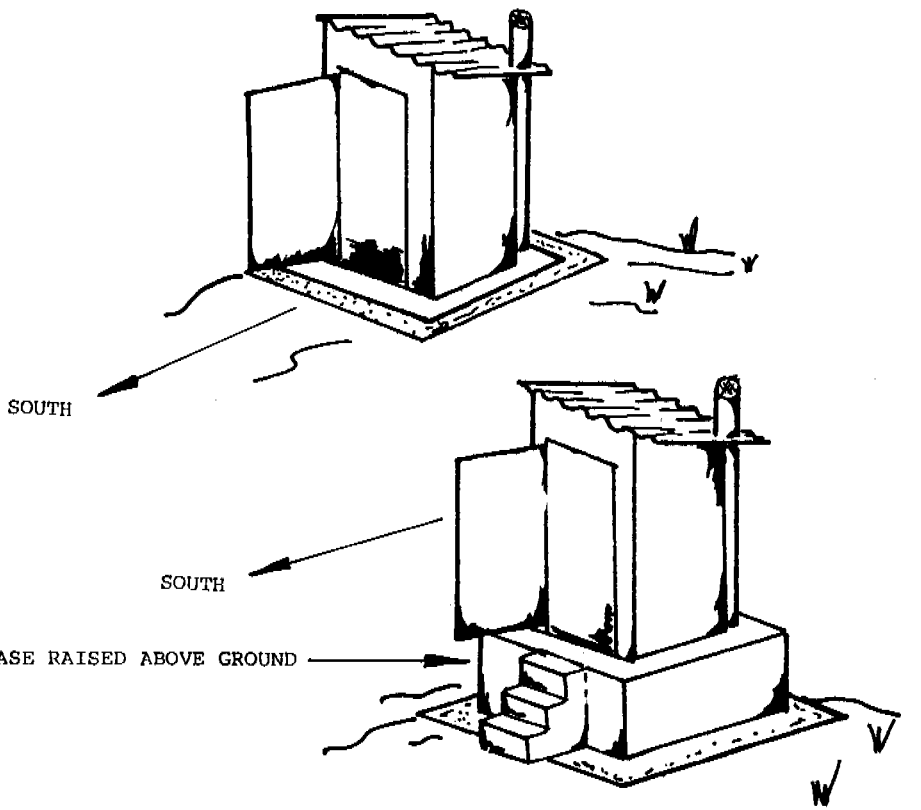
B. Making the latrine

SITE SELECTION:

In selecting the site for your toilet the things to remember are that it should be convenient but not too close to the house and kitchen, and not too close (either downhill or on the sea-side) to any wells. The site should be as flat as possible and the chimney should face North to get the sunshine (to help ventilate the pit), and so the door should face South.

The latrine should have a pit at least 6 feet deep - the deeper the better, because deeper pits last longer.

It may be difficult or impossible to dig a pit 6 feet deep, because of bedrock close to the ground surface or some other problem. If so, you can raise the latrine BASE above the ground COLLAR by making four slabs of reinforced concrete 4 feet long x 2 feet high, tying them into a square on the collar and then putting the base on top. This gives extra volume in the pit without digging deeper. Raising the base above the ground is also useful if you live in an area where floods are frequent - the raised base will help stop the floods getting into the pit and lower the risks of pollution. (See "Notes" on page 12 for details).



MAKING THE COLLAR

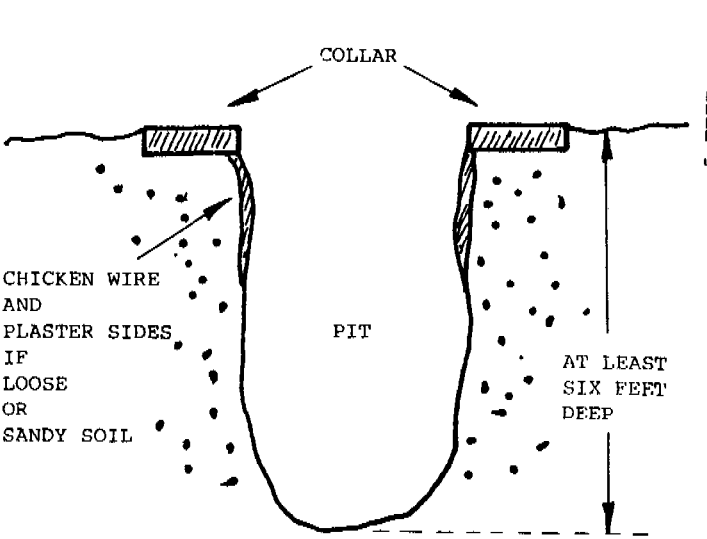
1. Cut out a piece of weld-mesh 60inch (5 feet) square and then cut a square hole of 36inch (3 feet) in the middle of this.

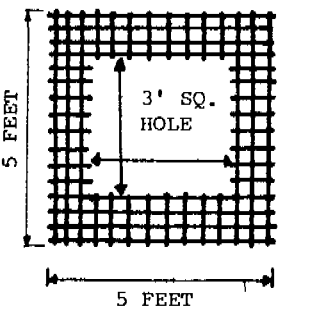
2. If necessary, level the ground for the toilet. Lay the piece of weld-mesh where you want the toilet and mark the inside and outside squares with a spade. Remove the weld-mesh and dig a trench of about 3inch deep between these two squares. Clean the trench of loose soil.

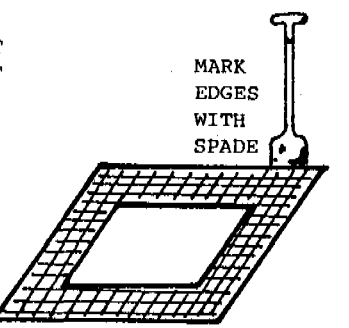
3. Mix concrete in the ratio of 1 cement, 2 sand and 3 gravel, do not add too much water - keep the mixture as dry as possible. Put about 1 inch of concrete into the trench. Place on the weld-mesh, hold down and cover with concrete to top of trench. Leave to dry

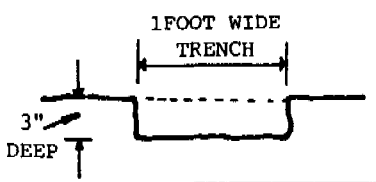
Note: concrete takes about a day to dry, but needs a week to "cure" to reach full strength.
When the concrete is curing, keep the concrete wet.

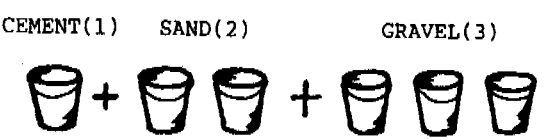
4. When the collar is dry (after a day) dig a hole for the pit in the middle of the square, to at least 6 feet - the deeper the better, because the latrine will last longer. If the soil is sandy and the sides of the pit are loose, put chicken wire around the sides of the hole at the top. Plaster with mortar (1 cement to 2 sand) so that it will hold the soil and prevent it from falling into the pit.











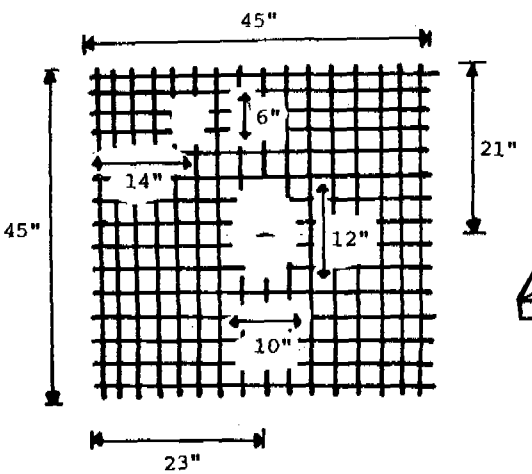
C. Making the base

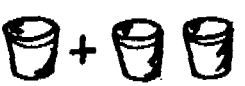
1. Cut out a piece of weld-mesh 45 inches square, and cut out holes as shown on the drawing for the seat (12inch x 10inch oval) and the vent pipe (about 4inch diameter - depending on the size of vent pipe you have). Cut out a piece of half-inch chicken wire the same shape as the weld-mesh and tie on to the weld-mesh sheet using tie-wire, making a space for the oval and circular holes.

2. Cut two pieces of tin sheet 1.5in wide by 42inch and 15inch long for the edge of the oval and circular holes for the toilet and vent pipe holes in the base, as marked on the bottom of the base mould (you can also use a small fish tin for the vent hole). Bend and tie the metal strips into an oval and circle to the shapes marked on the mould.

3. Oil the mould and place the weld-mesh and chicken-wire sheet onto the mould; oil the oval and circular metal strips and put them into the holes in the positions shown.

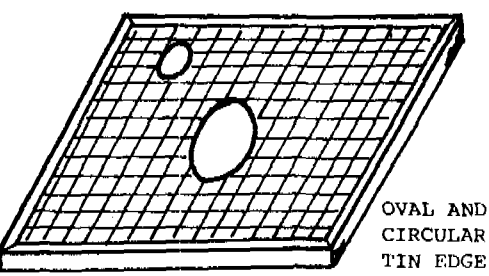
4. Mix the mortar in the ratio of 1 cement to 2 and of sand. Fill the mould to half depth (about 3/4inch) around the holes with mortar, put on the reinforcing mesh/wire, hold the reinforcement down and then fill the mould to the top with mortar, tapping the mortar down to make sure that the mortar fills the mould. Finally level across the mould top and let dry.



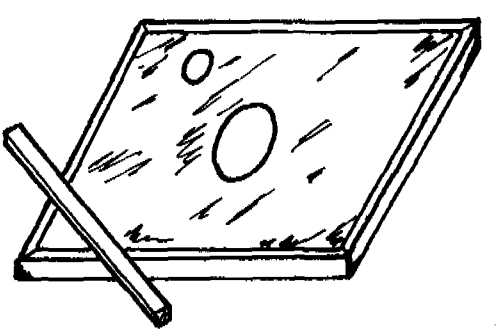


CEMENT(1) SAND(2)

WIRE REINFORCEMENT



OVAL AND CIRCULAR TIN EDGE MOULDS FOR CHIMNEY AND PEDESTAL HOLES



D. Making the pedestal

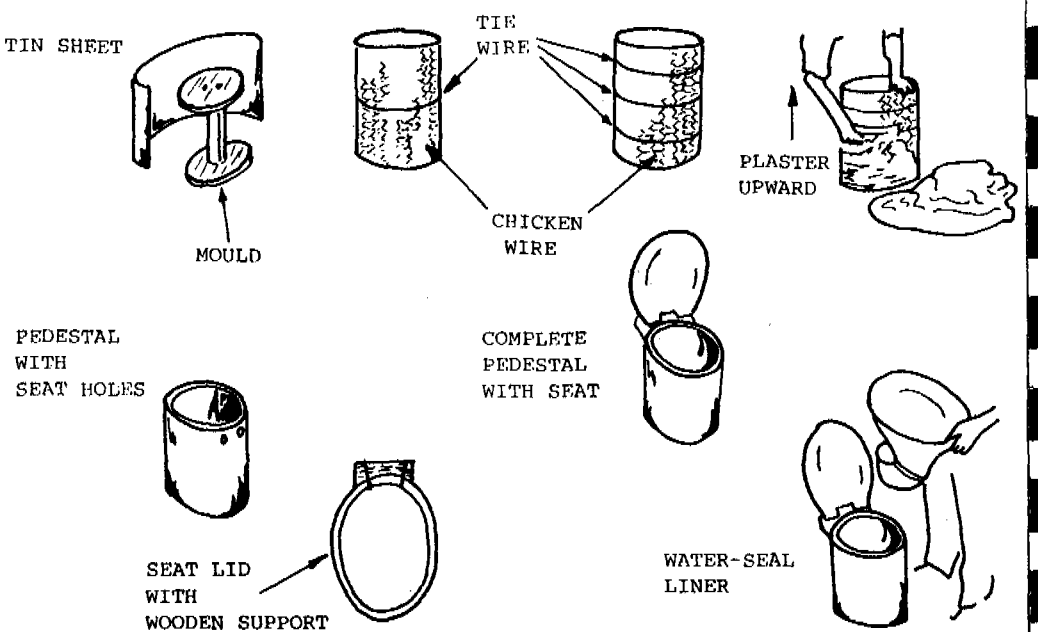
1. Take the mould for the pedestal and put thick paper or cardboard around the edges of the oval shaped end pieces, this will help you when you want to remove the mould. Then wrap around the piece of tin sheet, using a length of wire (each 48inch long) to tie in place around the middle.

2. Wrap chicken wire around the mould and two lengths (48inch) of wire around the top and bottom to hold it in place and add extra strength.

3. Mix mortar (in ratio one cement: 2 sand) and plaster around the wired mould and leave to dry. When dry, carefully remove the mould by first pulling out the packing paper (soaking this in water may make it easier). Then mix some mortar in the above ration and plaster the inside of the pedestal, covering the reinforcement. Make this as smooth as possible. Leave to dry.

4. Take the 9-inch piece of 2inch x 4inch wood and cut to the shape of the back of the pedestal - this is the piece that will support the toilet seat. Drill two holes (1/4inch) in the wood as shown. Then take dry pedestal, place piece of wood at the middle of the top at the back and mark position of holes, and drill through with 1/4inch masonry drill. An alternative to drilling is to use the drilled wood to make two holes in pedestal when the mortar is still wet.

5. Once the cement has dried attach the wooden toilet seat support to the pedestal with two 3inch woodscrews from the inside. The toilet seat may then be fixed into position by whatever fixing system the seat is designed to use - normally the wooden support will need to be drilled for the seat to bolt in place (plastic bolts are usually supplied with the seat unit).

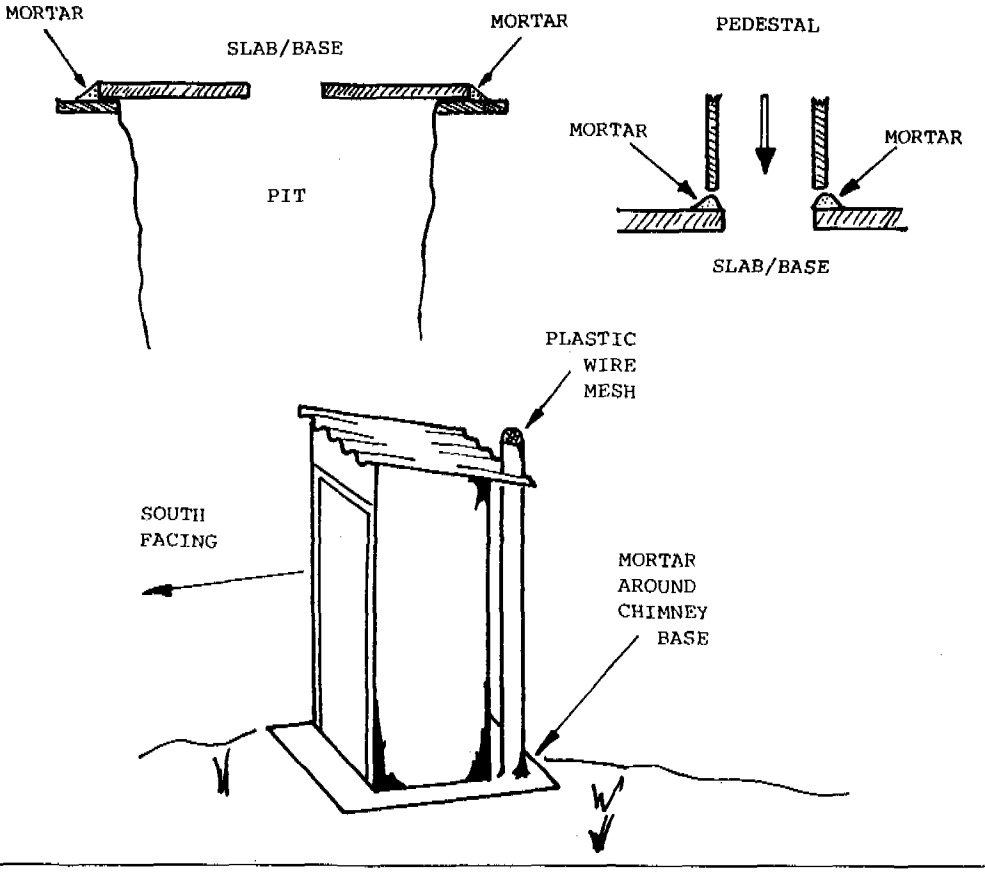


E. Assembly

1. Mix a mortar in the 1:2 ratio and lay a square about 1inch deep around the top inside edge of the pit collar. Put the base slab on the mortar, making sure that it is level. Plaster around the outside edge of the base to give a good clean fit.

2. When dry mix mortar in the 1:2 ratio and lay about 1/2inch deep around the top edge of the oval hole in the base. Place the pedestal on top of this and plaster around the outside and inside edges to give a good clean fit.

3. Make a house/shelter for the toilet leaving the hole for the pipe outside. You can put a tin roof on the top of the toilet, and collect water from the roof which can be used for washing hands after using the latrine. Put the end of the 4inch plastic vent pipe onto the hole, tie securely to the house and mortar it into position to the base to give an air and water-tight seal (usual mortar). Tie a piece of mosquito mesh over the top of the pipe to trap the flies.



Notes:

1. Water-seal liners

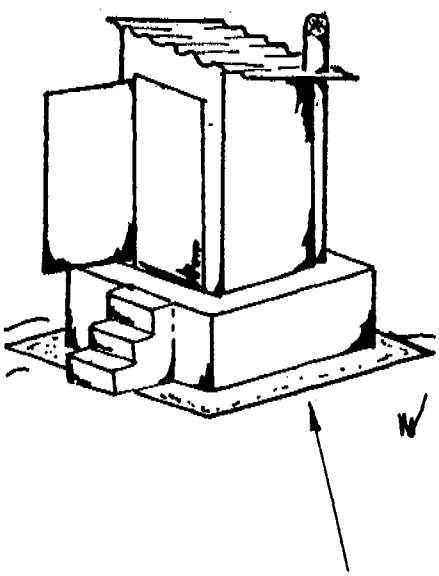
You can put a plastic water-seal liner in the pedestal so that it can be used as a pour-flush latrine. These liners are available South Pacific. You must have a good supply of water to flush with.

2. Places with a high water-table

If the water-table where you live is high (the water underground is close to the ground level), and there is a risk of flooding after heavy rain, you can raise the base of the pit latrine by making concrete slab sides to fit under the the base (see drawing under "Site Selection").

To do this, turn the base mould over, cut edge pieces as for the sides of the base mould, and nail into position. Also cut a piece of planed timber 1.5inch x 1inch, and nail in place along centre of mould, as shown. You can then use this side of the mould to cast slabs of 4feet x 2feet (approx).

To make the slabs, cut four pieces of weld-mesh 45inch x 22inch, and four pieces of half-inch chicken wire of the same size. Tie the chicken wire to the weld-mesh. Mix mortar as before, half fill the mould, place in the reinforcement, fill to the top and level. Make four slabs. Tie wire together to raise base slab 2 feet.



SLAB/BASE RAISED ABOVE GROUND

SIDE FOR CASTING WALLS

SIDE FOR CASTING BASE

WIRE REINFORCEMENT