INTRODUCTION

The low cost series of Blair Latrines were developed by the Blair Research Laboratory between 1989 and 1991in 1989 as a response to the situation where cement supplies for the national latrine programme were becoming increasingly more difficult to procure.

The standard Blair Latrine consumes between 5 and 6 bags of cement, and provides a sturdy structure that will in most cases outlast the pit , which for most family latrines lies between 12 - 15 years.

The simplest model of the low cost Blair Latrine uses one bag of cement, a commercial vent pipe, normally made of asbestos, a concrete slab placed over a brick collar and a structure and roof made of grass or reeds. If the same structure is built over a fully cement mortared brick lined pit 2 bags of cement are used. The 3 bag model has a fully brick lined pit, a concrete slab, a brick vent pipe and brick superstructure. The roof is made of grass, but can be replaced with a ferrocement, asbestos or tin roof later. The three bag model is now used by the Ministry oif Health as its lower cost version and is described fully in another manual. This manual describes the construction of a 2 bag Blair Latrine built with a fully lined cement mortared pit, a concrete coverslab and a cement mortared brick vent pipe.

With both the 2 and 3 bag models of the Blair Latrine less cement is used in the pit lining because the pit diameter (internal) has been reduced from 1.2m to 1.1m, a modification which reduces pit life by about 2 years. Cement is also saved with the concrete slab, which is 1.3m in diameter, compared to 1.5m in the standard Blair Latrine. This slab uses one half a bag of cement. With great care at the curing stage, it is possible to make a concrete slab without reinforcing wire, although this will not normally be the standard practice. The brick pipe is made with 4 bricks per course compared to 6 bricks per course for the standard model. Where 4 bricks are used per course very great care is required to ensure that the internal surface of the brick pipe is smooth and not obstructed with cement mortar. When the pipe is made correctly the ventilation effect is maintained. The brick pipe for the 3 bag model is constructed with the bricks laid in the normal way, with the two bag model they are laid on edge to save more cement. The screen for the smaller brick pipe can measure 225mm X 225mm which also saves on screen material - the standard screen measures 300mm X 300mm. The structure and roof for the 2 bag model is made from tradtional materials like reeds or grass supported by poles, but can also be made with anthill bricks and mortar protected by a thatch roof. This can be upgraded through the 3 bag model to a fully 5 bag model.

It is therefore possible start making a Blair Latrine with 2 bags of cement and upgrade this at a later date as more materials become available. Lower cost Blair Latrines are less durable however and it is best to upgrade them as soon as possible.

Lower cost models, especially the 3 bag model , are being tried out in only a few areas of the country at the moment, but they will become more common in the future. Models which use less cement and more traditional material are cheaper to construct and this may have important implications in the future. From the users point of view any technique which saves on cost is welcome. This will be particularly important in the future when the users will be expected to provide far more of the total value of the subsidy and eventually the entire cost. This makes the technique more sustainable in the long term. The high levels of subsidy, currently provided by donor organisations through the Ministry of Health, cannot be sustained for ever, and now is the time to introduce options which retain all the properties of a standard Blair Latrine, but provide it at lower cost. In any event, only the first Blair Latrine can be subsidised for any household. The second must be built and paid for by the family itself.

I wish to acknowledge the full support of the Ministry of Health in this venture, and the Department of Environmental Health in particular. The drawings have been adapted from the work of Kors de Waard originally presented in the early manuals produced by Sue Laver. Their contribution has been invaluable.

Much credit is also due to the Field Teams who have played an important part in designing, building and testing these new structures. In particular the efforts of Ephraim Chimbunde, Cornelius Mukandi, Fambi Gono, Philimon Kademetema, Joshua Mazanza and their supporting staff are to be commended.

I also wish to acknowledge the financial support of the Swiss Federal Institute for Water Resources and Water Pollution Conrol. I also wish to thank SIDA who have encouraged the wider use of lower cost options in water and sanitation projects in Zimbabwe.

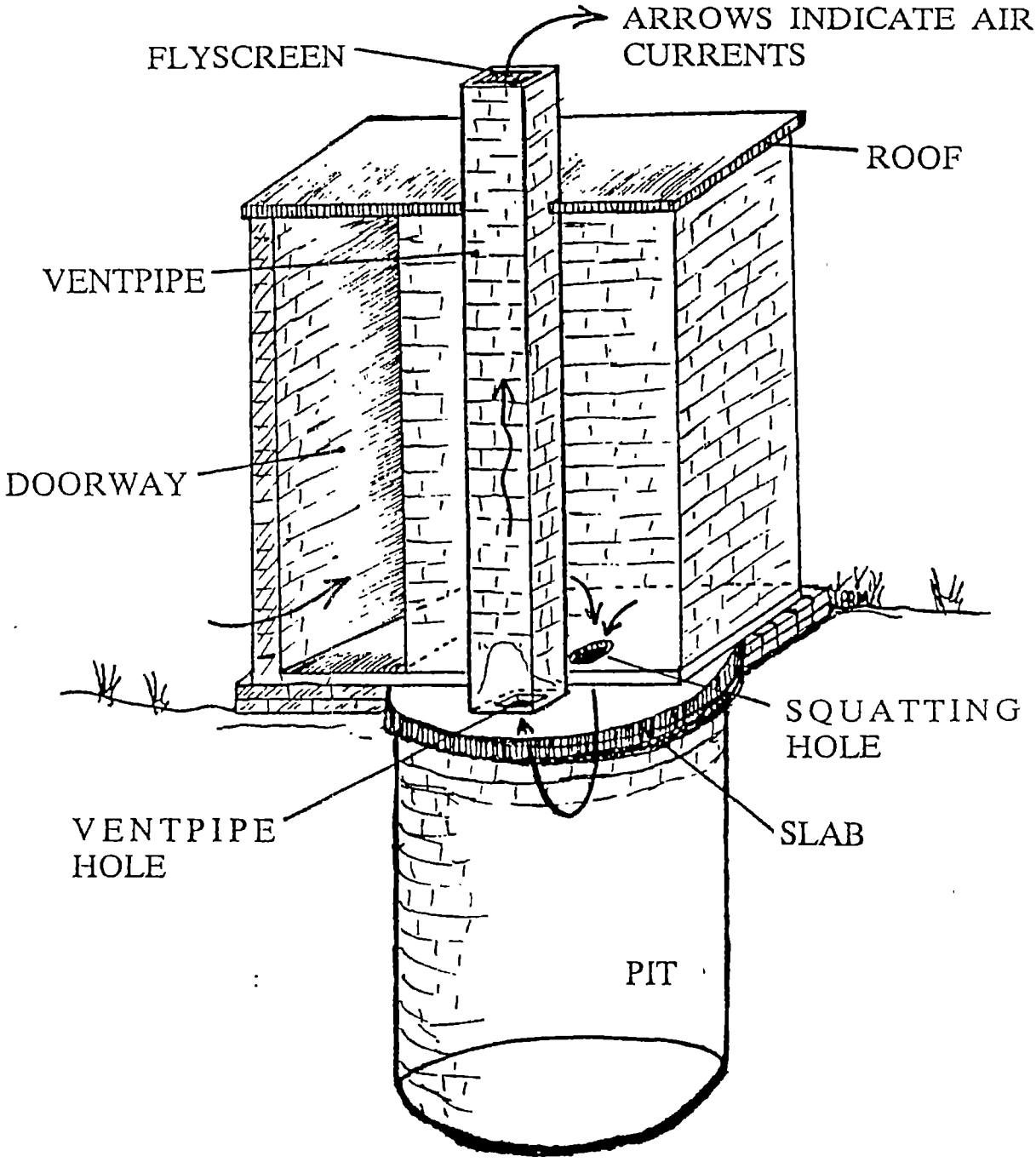
Peter Morgan
Harare.

HOW THE BLAIR LATRINE WORKS

The latrine slab is made with two holes, one for the squatting hole and one for the vent pipe. The vent pipe sucks air from the pit and fresh air is drawn down through the squat hole. The latrine itself is therefore odourless.

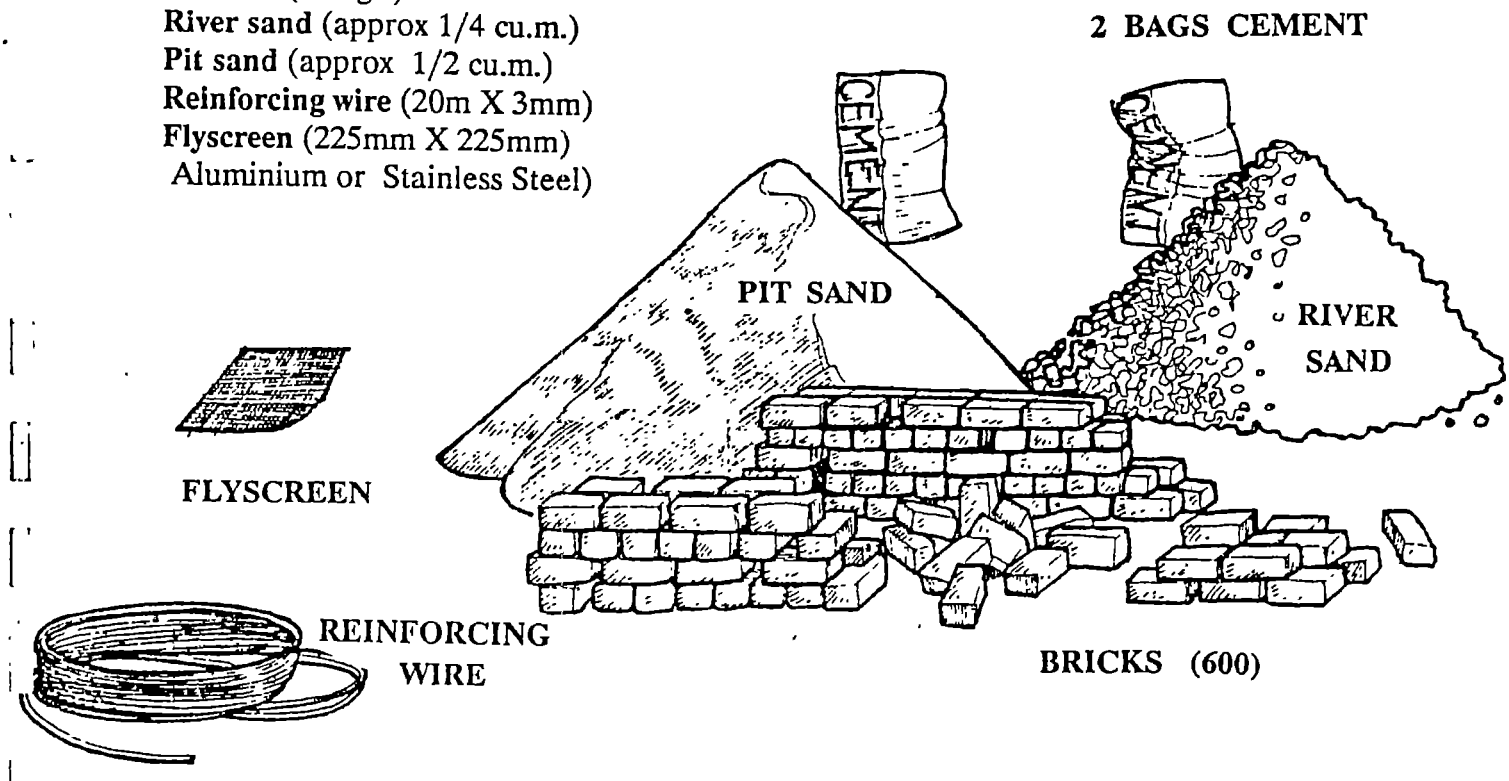
Flies approaching the latrine are attracted to odours coming from the pipe but cannot pass the screen to enter the pit. Flies escaping from the latrine are attracted to the light coming down the pipe but are trapped by the screen and cannot escape.

THIS IS A CUT OPEN VIEW OF A BLAIR LATRINE



MATERIALS REQUIRED TO BUILD A 2 BAG BLAIR LATRINE

Cement (2 bags)
River sand (approx 1/4 cu.m.)
Pit sand (approx 1/2 cu.m.)
Reinforcing wire (20m X 3mm)
Flyscreen (225mm X 225mm)
Aluminium or Stainless Steel)



SITING THE BLAIR LATRINE

The site should chosen by the family with assistance from an Environmental Health Technician and should be at least 30 metres from a well.

The site should be:

Down hill from a well or borehole - so that waste from the latrine does not drain into the water supply.

Where the soil is firm - so that the latrine will not collapse

On slightly raised ground - so that rainwater can drain away

Near the house - so that the latrine can be used easily

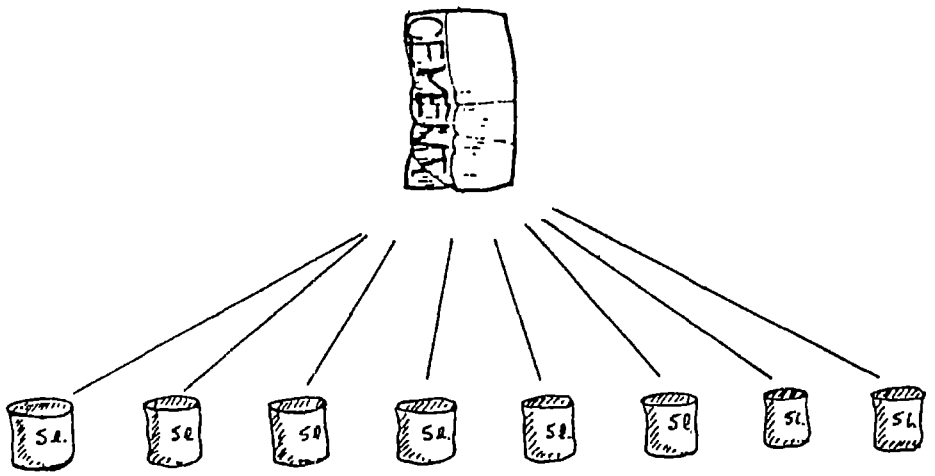
Away from trees - so that air can flow easily over the pipe

Facing the wind - so that air blows into the entrance

MEASURING THE CEMENT

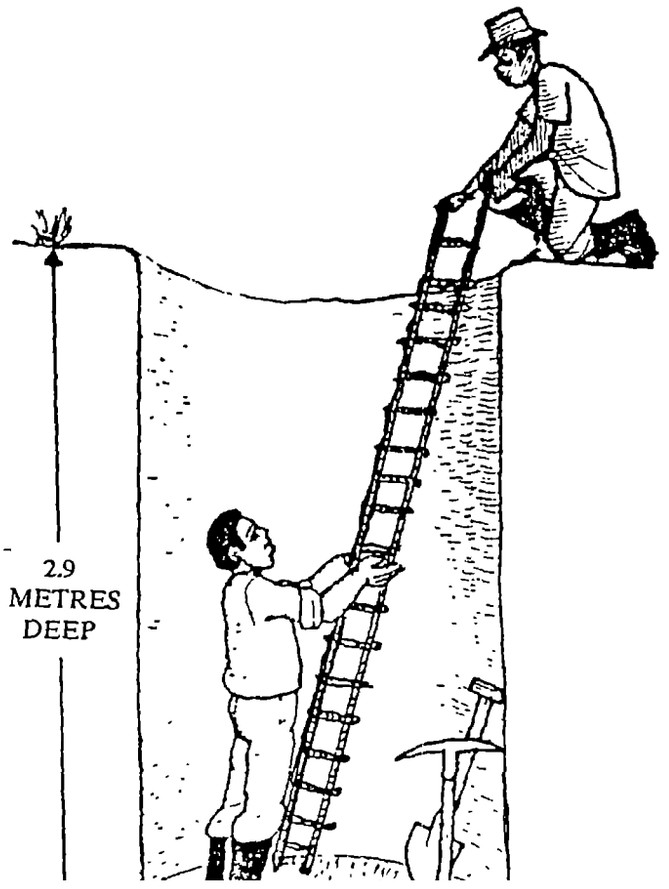
WHERE A LIMITED NUMBER OF BAGS OF CEMENT ARE BEING USED FOR THE CONSTRUCTION OF A BLAIR LATRINE IT IS IMPORTANT TO MEASURE THE CEMENT ACCURATELY, SO THAT MAXIMUM BENEFIT CAN BE MADE OF THE CEMENT.

ONE BAG OF CEMENT CAN BE DIVIDED INTO 8 X 5 LITRE TINS OF CEMENT, AND THE FIVE LITRE TIN MAKES A CONVENIENT MEASURE.



THE FOLLOWING AMOUNTS OF CEMENT SHOULD BE USED TO MAKE DIFFERENT PARTS OF THE TWO BAG MODEL OF THE BLAIR LATRINE (AND OPTIONAL FERROCEMENT ROOF).

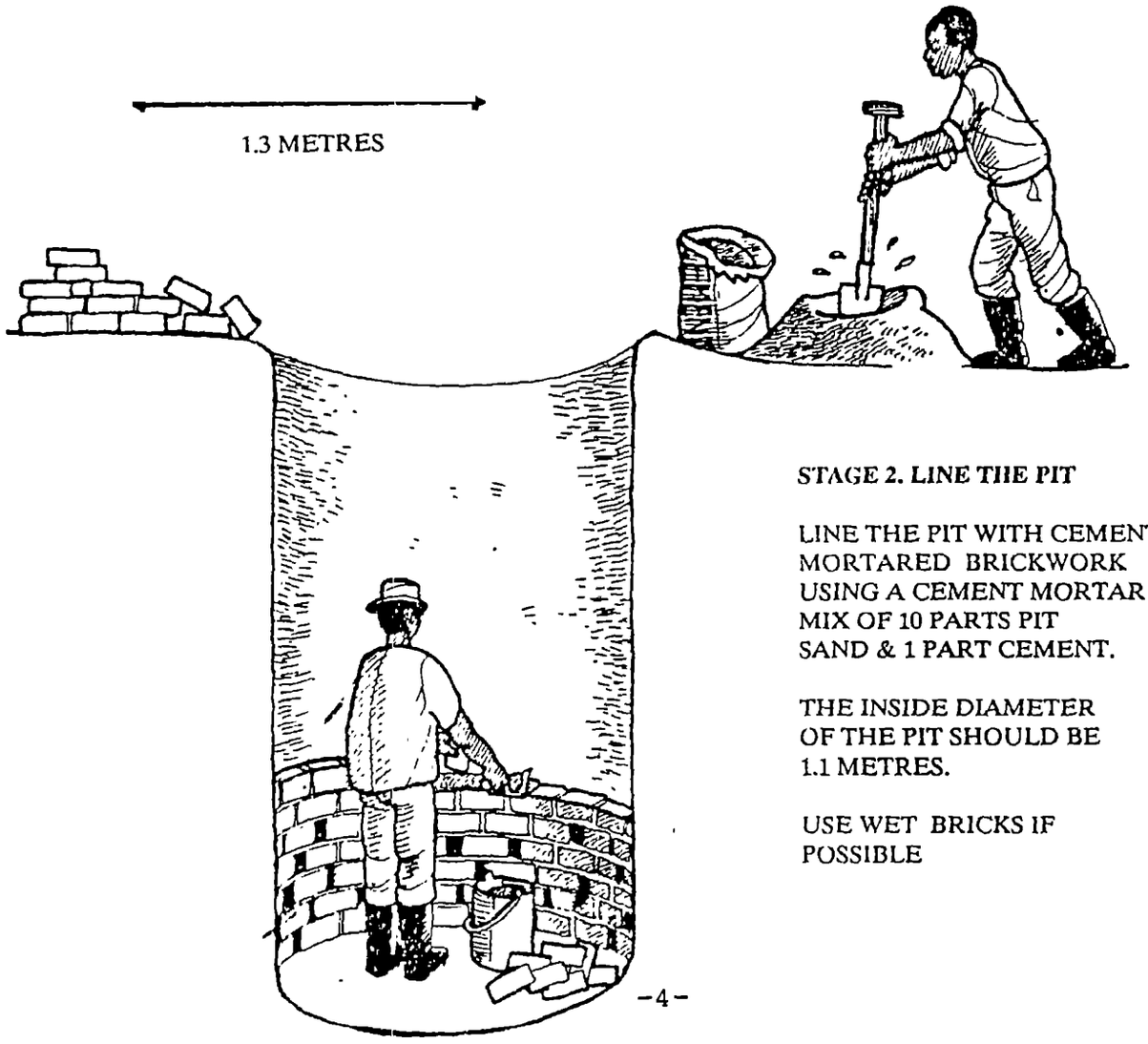
PART OF LATRINE	CEMENT USED (5 LITRE TINS)	SAND USED (5 LITRE TINS)	MIX
PIT LINING	8	80 PIT SAND	10:1
SLAB	4	20 RIVER SAND	5:1
BRICK VENT PIPE	2	16 PIT SAND	8:1
FILLER FOR BRICK FLOOR	2	16 RIVER SAND	8:1



STAGE 1. DIG THE PIT

DIG A ROUND PIT
1.3 METRES IN
DIAMETER AND
2.9 METRES DEEP

DIG THE PIT
WITH STRAIGHT
SIDES



STAGE 2. LINE THE PIT

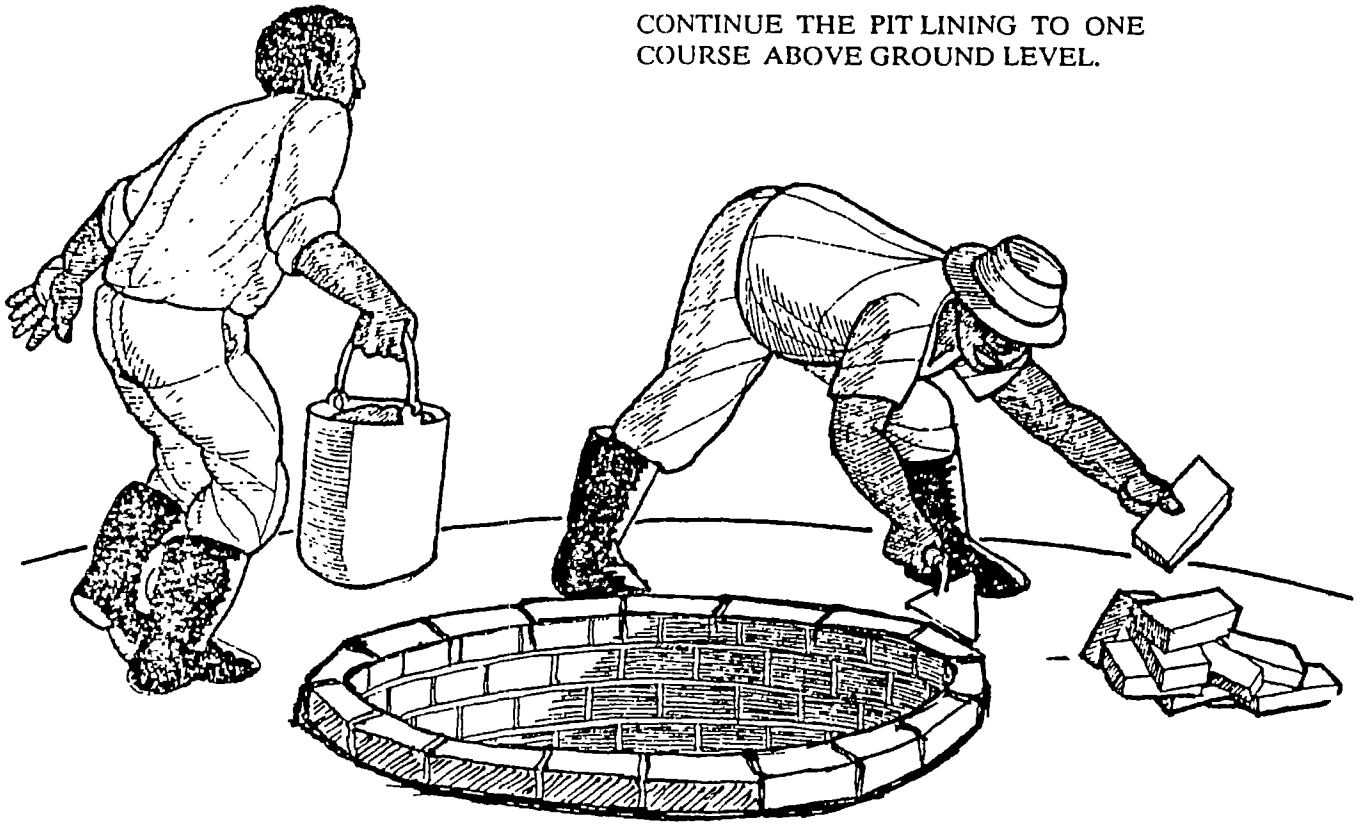
LINE THE PIT WITH CEMENT
MORTARED BRICKWORK
USING A CEMENT MORTAR
MIX OF 10 PARTS PIT
SAND & 1 PART CEMENT.

THE INSIDE DIAMETER
OF THE PIT SHOULD BE
1.1 METRES.

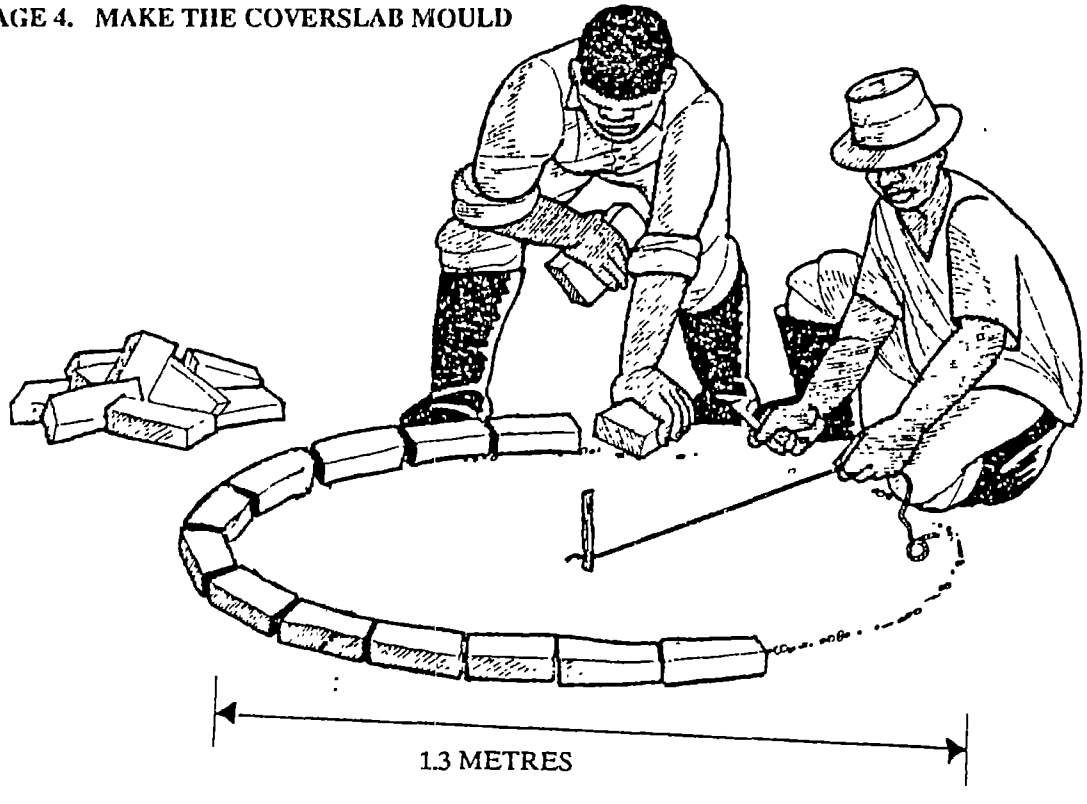
USE WET BRICKS IF
POSSIBLE

STAGE 3. FINISH THE LINING

CONTINUE THE PIT LINING TO ONE COURSE ABOVE GROUND LEVEL.



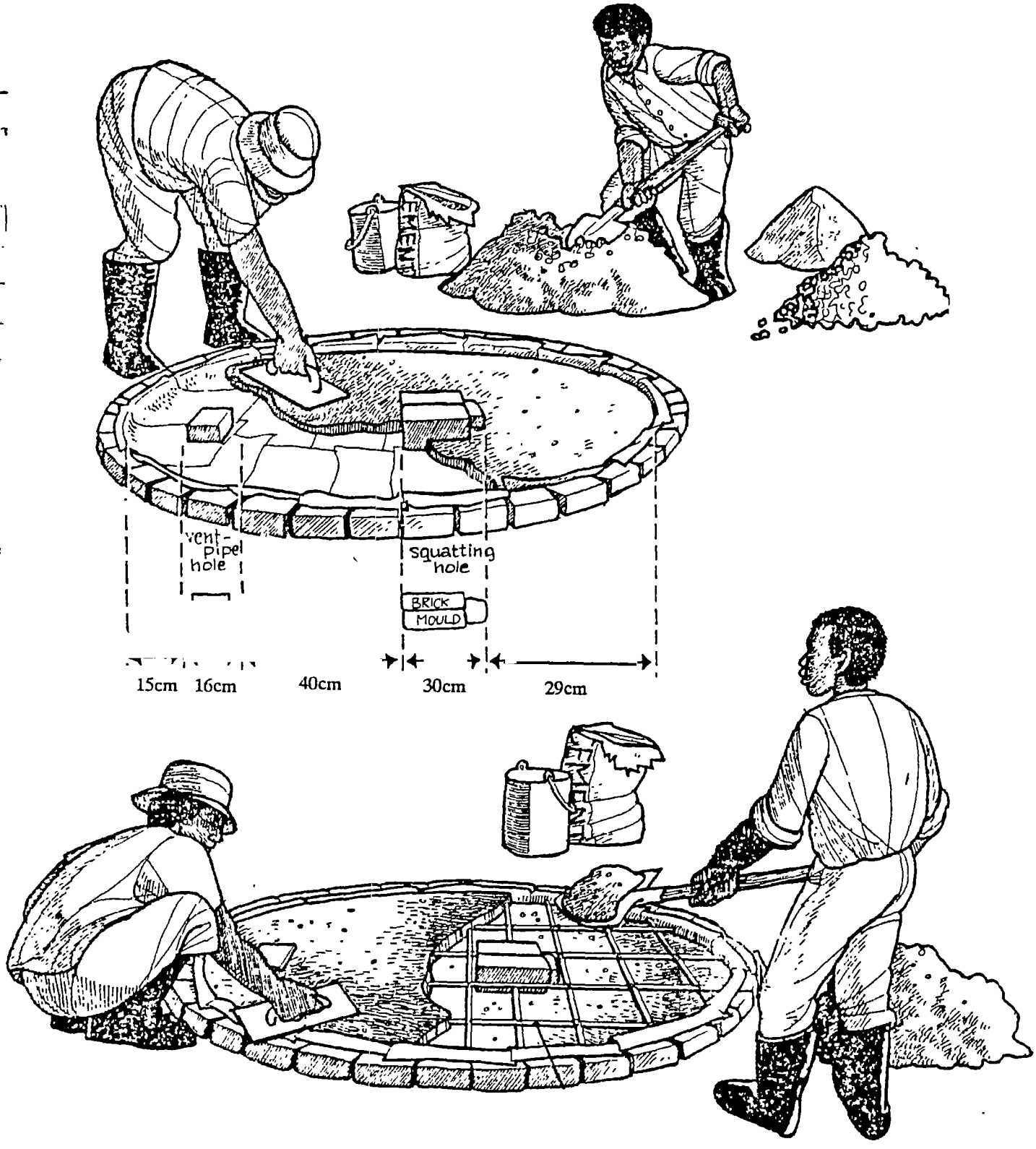
STAGE 4. MAKE THE COVERSLAB MOULD



MAKE A CIRCLE OF BRICKS WITH INTERNAL DIAMETER OF 1.3 METRES
LAY CEMENT BAG PAPER OR PLASTIC UNDER THE MOULD SITE

STAGE 5. MAKE THE COVERSLAB

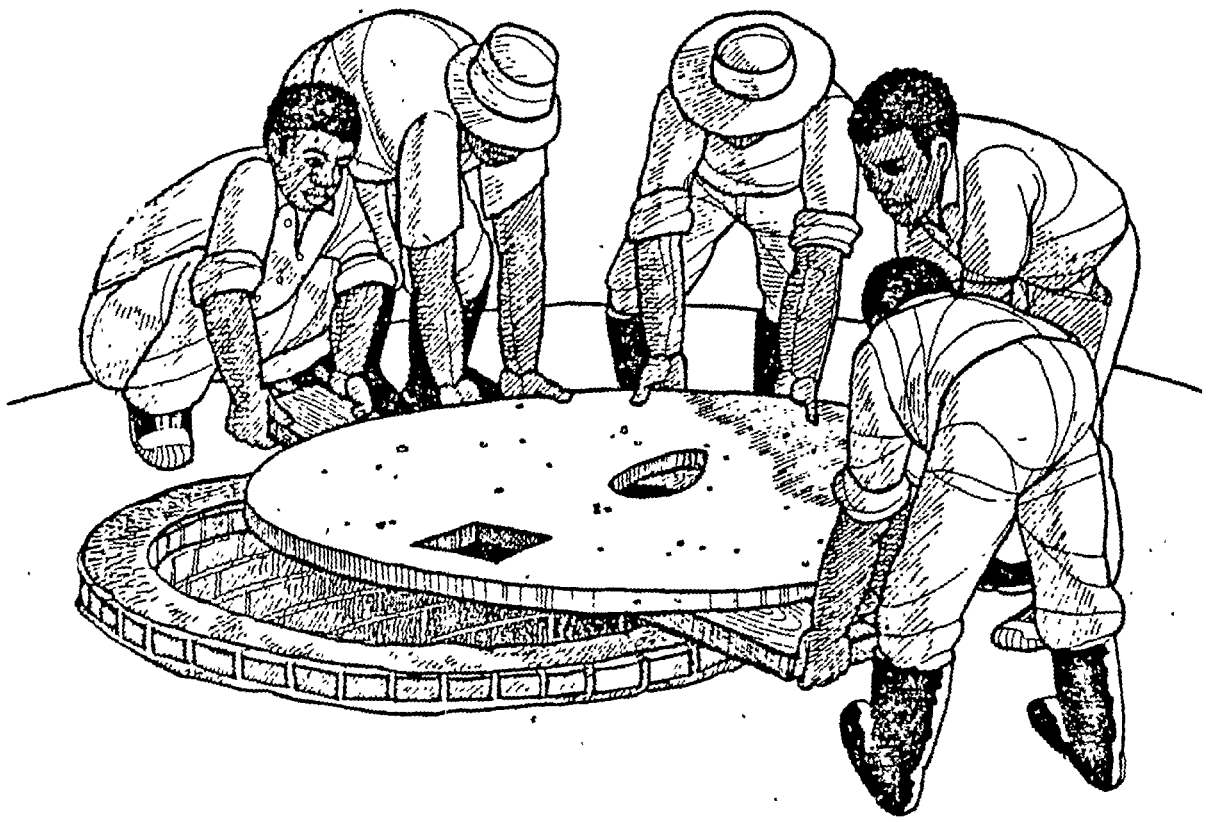
ARRANGE BRICKS TO FORM VENT PIPE HOLE AND SQUAT HOLE AS SHOWN
VENT PIPE HOLE IS 160mm X 160mm SQUAT HOLE IS 300mm X 140mm.
CONCRETE MIXTURE IS 5 PARTS WASHED RIVER SAND 1 PART CEMENT
ADD HALF THE MIXTURE FIRST (FULL MIXTURE USES HALF BAG CEMENT)
ADD 3mm REINFORCING WIRE WITH 150mm SPACES
ADD REMAINING MIXTURE UNTIL SLAB IS 75mm THICK, OUTSIDE & 50mm THICK INSIDE - MAKING A SLOPE. LEAVE FOR AT LEAST 5 DAYS TO CURE- KEEP WET.



NOTE: THE SLAB CAN BE MADE WITHOUT REINFORCING IF THE SAND IS WELL CHOSEN (CLEAN AND SHARP) AND THE CONCRETE IS ALLOWED TO CURE FOR AT LEAST 7 DAYS AND KEPT WET.

STAGE 6. PLACE COVERSLAB ON PIT

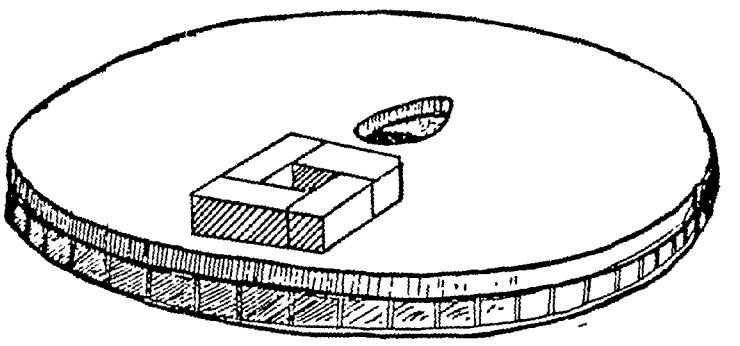
BED DOWN THE COVER SLAB ON CEMENT MORTAR LAID OVER THE BRICKS ENSURE THE ORIENTATION OF THE COVERSLAB IS CORRECT. THIS IS NORMALLY TOWARDS THE HOMESTEAD AND TOWARDS THE WIND. THE VENT PIPE WILL BE BUILT ON THE SAME SIDE AS THE DOORWAY.



MAKE SURE THE VENT PIPE HOLE IS OVER THE PIT.

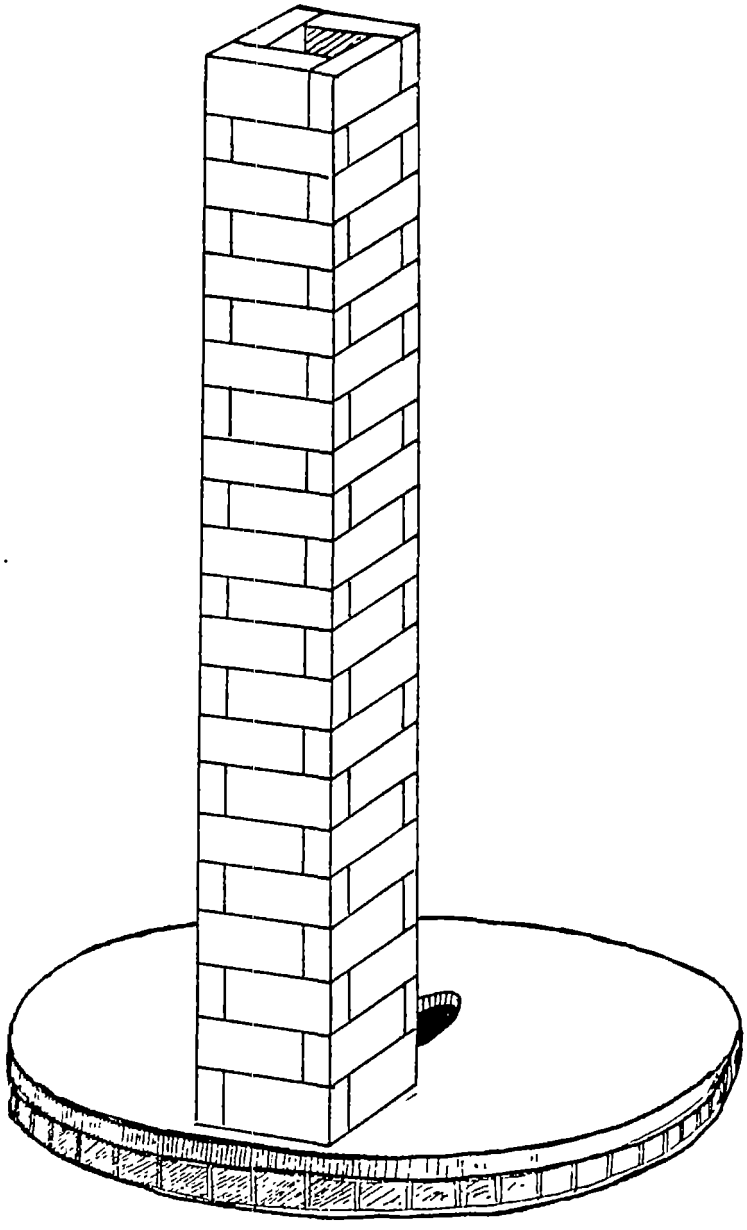
A GOOD SEAL BETWEEN THE COVER SLAB AND THE COLLAR PREVENTS FLIES FROM ENTERING AND LEAVING THE PIT OTHER THAN THROUGH THE SQUAT AND VENT PIPE HOLES.

STAGE 7. MAKE THE BRICK VENTILATION PIPE



THE FIRST COURSE OF BRICKS IS BUILT UP ON THE FOUNDATION WITH CEMENT MORTAR (8 PARTS PIT SAND & 1 PART CEMENT). THE MEASUREMENTS SHOULD BE TAKEN FROM THE PLAN IN THIS MANUAL. THE VENTILATION PIPE IS MADE WITH FOUR BRICKS PER COURSE ARRANGED AS SHOWN IN THE DIAGRAM. IT IS VERY IMPORTANT THAT THE INTERNAL MEASUREMENT OF 160mm X 160mm IS MAINTAINED THROUGHOUT THE LENGTH OF THE PIPE.

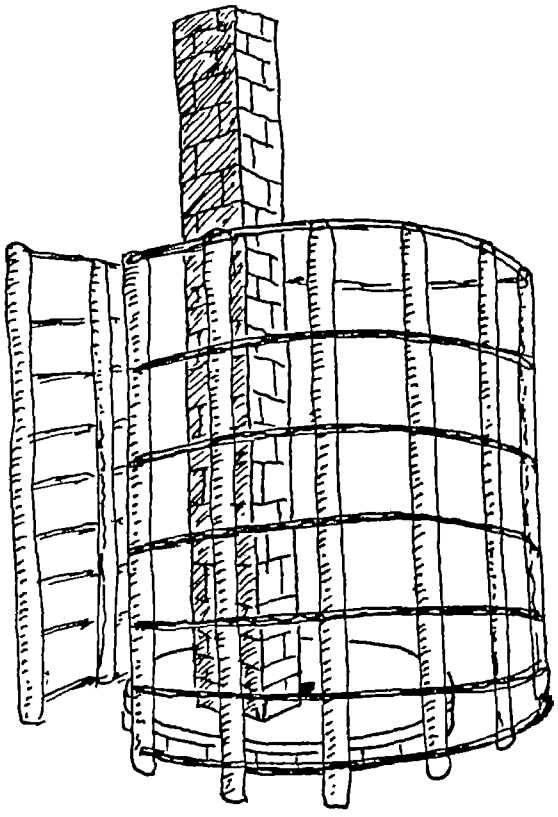
STAGE 7. MAKE THE BRICK VENTILATION PIPE (CONT.)

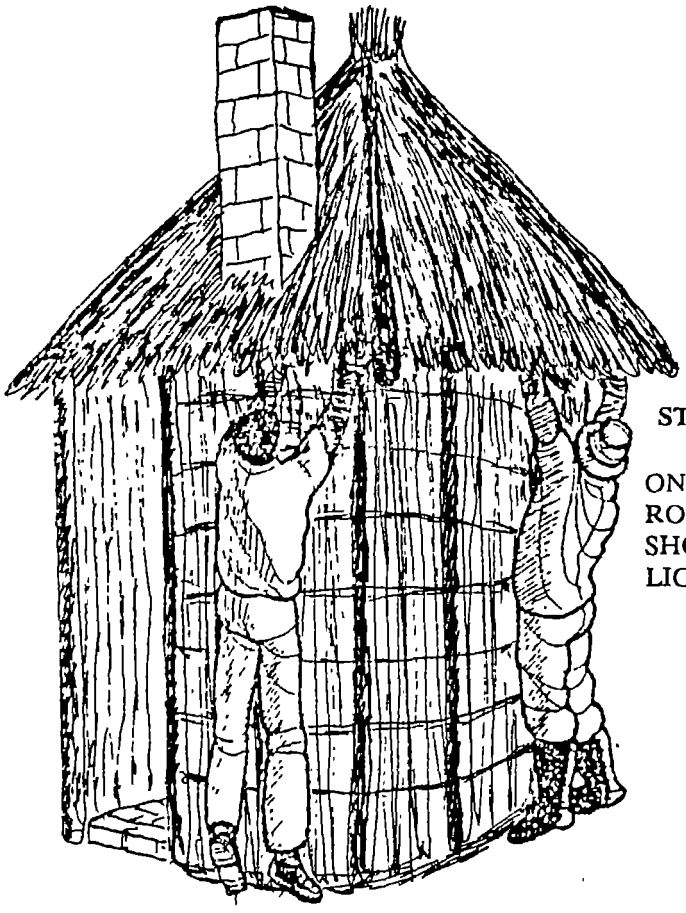


THE BRICK VENTILATION PIPE IS NOW BUILT UP TO 22 COURSES AS SHOWN IN THE DIAGRAM. CEMENT MORTAR (MIXTURE 8:1) IS USED TO BOND THE BRICKS. THE INTERNAL MEASUREMENT OF 160mm X 160mm MUST BE MAINTAINED. 22 COURSES OF BRICKS BUILT ON EDGE RISES TO 2.8M HIGH AND USED 2 X 5L TINS OF CEMENT (1/4 BAG).

STAGE 8. BUILT THE SUPERSTRUCTURE

THIS IS BUILT IN TRADTIONAL MATERIALS. GRASS SUPPORTED BY POLES CAN BE USED OR TERMITE SOIL BRICKS AND MORTAR. THE SHAPE AND SIZE IS SHOWN IN THE DIAGRAM AT THE END OF THIS MANUAL.





STAGE 9. ADD THE ROOF

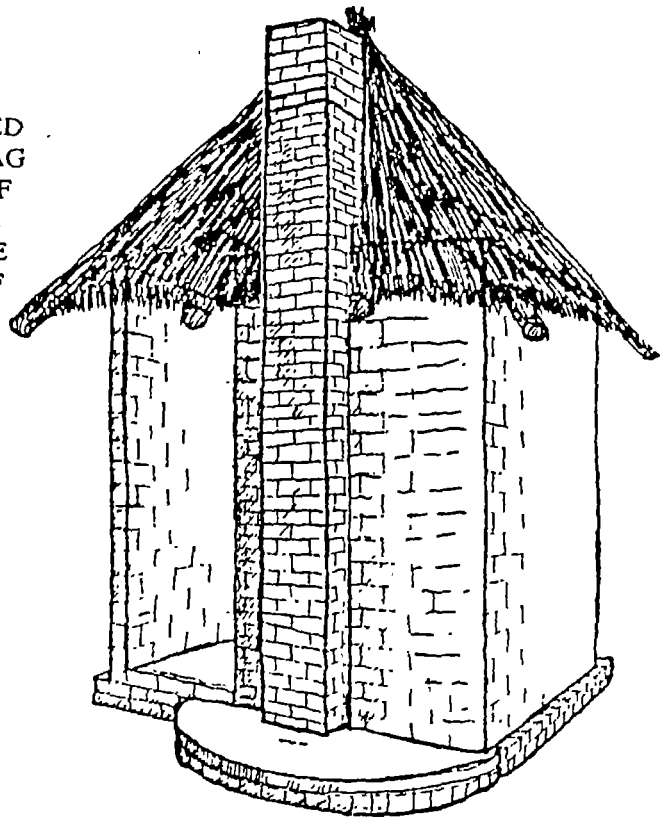
ONCE THE SUPERSTRUCTURE IS FINISHED A TRADITIONAL ROOF IS MADE AND ADDED TO THE SUPERSTRUCTURE AS SHOWN. THIS IS FITTED AROUND THE PIPE SO THAT NO LIGHT ENTERS THE INTERIOR.

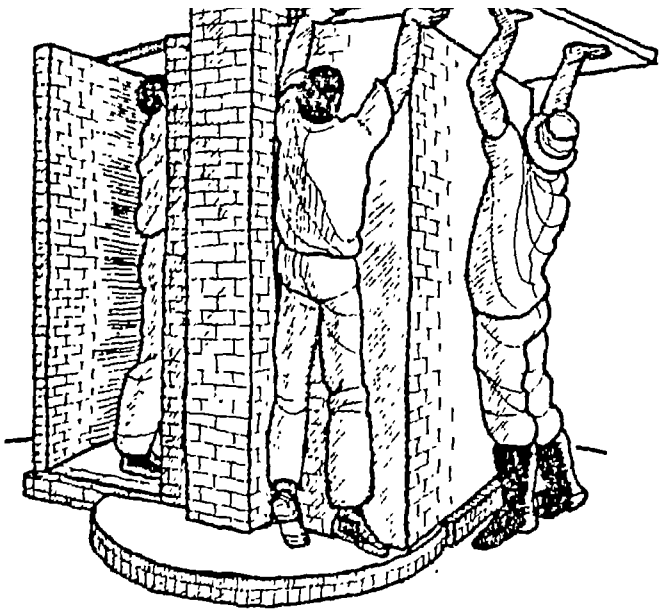
STAGE 10. FITTING THE FLYSCREEN

THIS IS A VERY IMPORTANT PART OF THE LATRINE AND CONTROLS FLIES. THE SCREEN SHOULD BE MADE OF STAINLESS STEEL OR ALUMINIUM. THE SCREEN SIZE IS 225mm X 225mm. IT IS FITTED TO THE HEAD OF THE VENT PIPE IN STRONG CEMENT MORTAR.

UPGRADING THE 2 BAG MODEL

THE GRASS STRUCTURE CAN BE REPLACED WITH A BRICK STRUCTURE AS IN THE 3 BAG MODEL. THIS REQUIRES AN EXTRA BAG OF CEMENT. THE 3 BAG MODEL CAN THEN BE UPGRADED FURTHER BY ADDING A MORE PERMANENT ROOF. THIS CAN BE MADE OF TIN OR ASBESTOS OR FERROCEMENT.
IF THE SUPERSTRUCTURE IS MADE WITH ANTHILL MORTAR IT CAN BE RENDERED WITH CEMENT MORTAR TO MAKE IT MORE DURABLE.





ADDING A FERROCEMENT ROOF

THE 3 BAG BLAIR LATRINE CAN BE UPGRADED WITH ANOTHER BAG OF CEMENT SO THAT IT IS FITTED WITH A PERMANENT FERROCEMENT ROOF. THIS IS MADE TO THE MEASUREMENTS SHOWN BELOW WITH A MIXTURE OF 4 PARTS WASHED RIVER SAND & 1 PART CEMENT. IT IS CURED FOR 7 DAYS & KEPT WET DURING THAT TIME.