Construction of spiral VIP toilet system for use in schools and homesteads.

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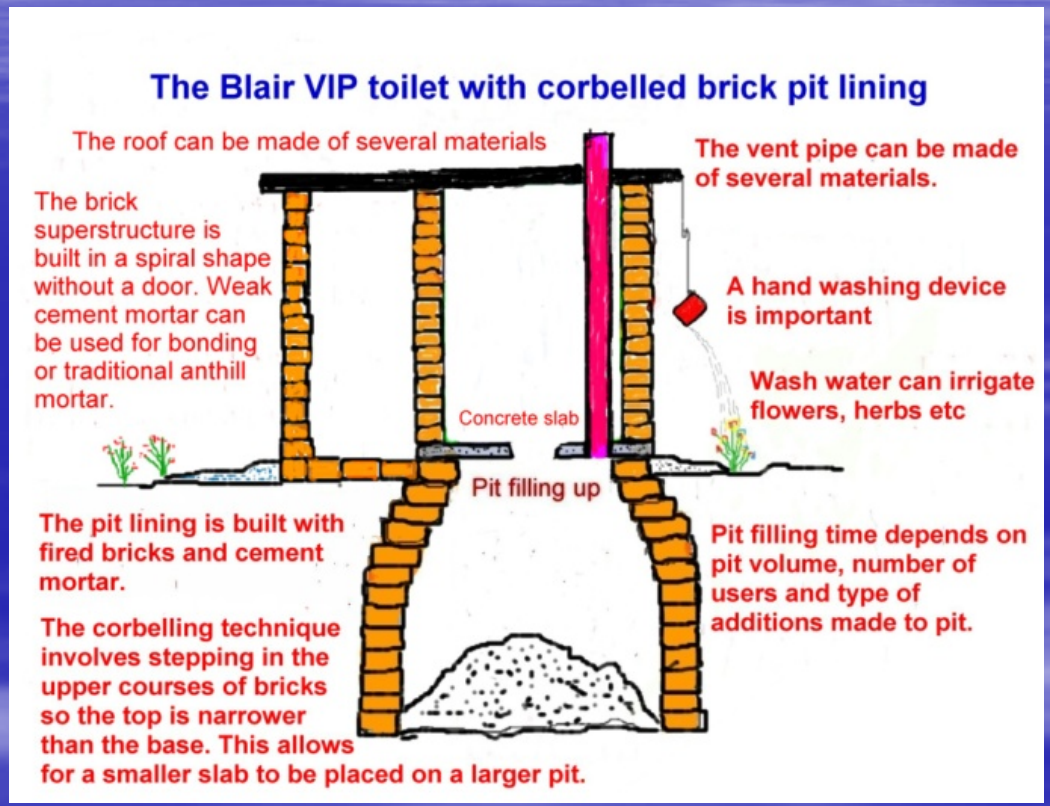
In a new experimental approach being undertaken in Zimbabwe the concept of building single Blair VIP units is being tried at schools rather than multi-compartment units.

These units have been designed so they are relatively low cost and where the structures can either be built fully or partly by the children themselves. Many of the parts are recyclable

The door-less spiral superstructure is the preferred option for schools

The unit is based on the Blair VIP concept . The pit has been reshaped to be wider (1.4m ID) but shallower (2m), which makes it easier to construct. The pit is lined with bricks using a corbelling technique where the base is wider than the top. The superstructures is built in the form of a door-less spirals which have no moving parts.



A special method of building a full size spiral Blair VIP has been developed and is especially suitable for schools (and homesteads) since it has no moving parts. Special wooden templates (2) are used to guide school pupils in the construction. The two templates are placed at both ends of the brick spiral superstructure wall. To reduce the number of bricks used to built the structure and also to reduce roof area, the orientation of the slab has been changed. This photo shows the orientation of the slab and lower parts of the wooden templates.

The toilet is built in a series of stages:

1. Make the 1.2m diameter slab (curing time one week)
2. Dig the pit (2m deep and 1.7m wide)
3. Line the pit with bricks (using corbelling technique)
4. Place slab on pit lining
5. Extend the area of the slab to one side to support the spiral extension of the superstructure
6 Erect the two wooden templates on the slab
7. Build brick superstructure
8. Make and fit roof
9. Add vent pipe
10. Make sloped floor and add protective coating if necessary

Stages 1 – 4 have been described elsewhere in this power point series. We now show stages 5 to 10.

Fitting the concrete slab

The slab is laid flat over the pit lining and a mortar fill can be placed between the slab and the bricks to ensure it is level and properly embedded. Once the slab is caste in position and the pit “capped” the toilet floor is extended. The method depends on the type of superstructure used – doored or spiral. In this case an extension is made for the spiral structure. In this configuration the squat hole faces the slab extension as shown in the right photo. This differs from earlier BVIP designs and is a feature which conserves bricks and reduces roof area and is also easier to build.

Stages of construction – extend the floor area as a foundation for the spiral superstructure

Once the slab has been mounted over the pit the floor area is extended so that the spiral superstructure can be built on top. Bricks are laid to the side of the slab and built up as shown in the photos. The curved brick wall is built up to slab level. The extension should extend about 65cm beyond the slab

The extension of the slab and toilet floor outside the slab area for the spiral superstructure

Stages of construction – extend the floor area as a foundation for the spiral superstructure

The space between the slab and the wall is filled with rubble and a layer of strong concrete is laid over this to form the toilet floor extension.

The final result at this stage is a flat surface on which the spiral superstructure can be built. The extension of the slab is about 65cm.

Stages of construction – erect the wooden templates

Two templates are used as guides for the brickwork. These are made of hardwood. Both have a support ing leg.

The specially designed wooden templates are placed on the slab as shown. Using a spirit level both are made vertical. Each templates acts as a guide to the end of the brick wall. Note the orientation of the squat hole towards the spiral opening.

Stages of construction

Get the bricks on site and prepare the mortar mix

About 400 – 500 burnt pricks are required for the spiral superstructure.
The mortar mix is 20 parts pit sand and 1 part cement (PC15 – Portland).

Stages of construction – erect the spiral wall.

Using the templates as guides build up the wall of the spiral superstructure. The toilet entrance should be 50cm wide.

This method of construction and the use of templates has been specifically designed to make it easier for school pupils to build the larger spiral superstructure.

Stages of construction – building the spiral wall using the well established bonding technique

The spiral shape of the structure provides great strength to the wall, even if it not made perfectly.

Stages of construction

Pupils, instructors and a kindly builder all contribute the the final success of the project.

When the structure is built by pupils, it is wise to have a builder standing by to guide them.

Stages of construction

The number of courses is about 20 or 21 depending on brick size. About 20 bricks are used per course.

Traditional mortar can also be used to bond the brickwork. 2 parts sandy soil and 1 part termite hill soil

Interior views and special design features

This special design with its curved 6 or 9 shape follows the rim of the slab for most of its length making it easier to build for pupils. The wall follows a well defined line of construction. The shape – full of curves provides a natural structural strength. The use of templates also assists by defining the ends of the curved wall with vertical guides. These special features of this design make the larger and more universal spiral BVIP easier to build.

Pride of the achievement of construction

Pupils are always proud of their achievement. In this case a pupil made a wall plaque by herself to record the event

Pride of achievement counts for a lot for any person young or old.

Making the roof

The roof in this case has been made from a wooden frame and corrugated iron sheet.

The wooden frame is made with 7 pieces of softwood. Most are standard brandering (38mm X 38mm). The front long timber is 2m x 76mm x 50mm, the rear long timber is 2m x 38mm X 38mm, The 5 shorter pieces are 0.95m long. This arrangement gives a slight slope to the roof once the iron sheets are fitted. The timbers are nailed together with 100mm nails. The frame is treated with a mix of old engine oil and carbolinium.

Making the roof

Fitting the sheets to the roof timber.

The three iron sheets are laid over the roof timbers so that it is completely covered. Nails are then used to secure the sheets to the wooden frame. The roofing sheets cover an area of 1.5m X 2+m.

Removing the templates

Once the bricks walls are built up to full height (about 1.8m above floor level) the templates are carefully removed.

Fitting the roof

Once the bricks walls are built up to full height the roof is placed on top of the brickwork and secured with wires.

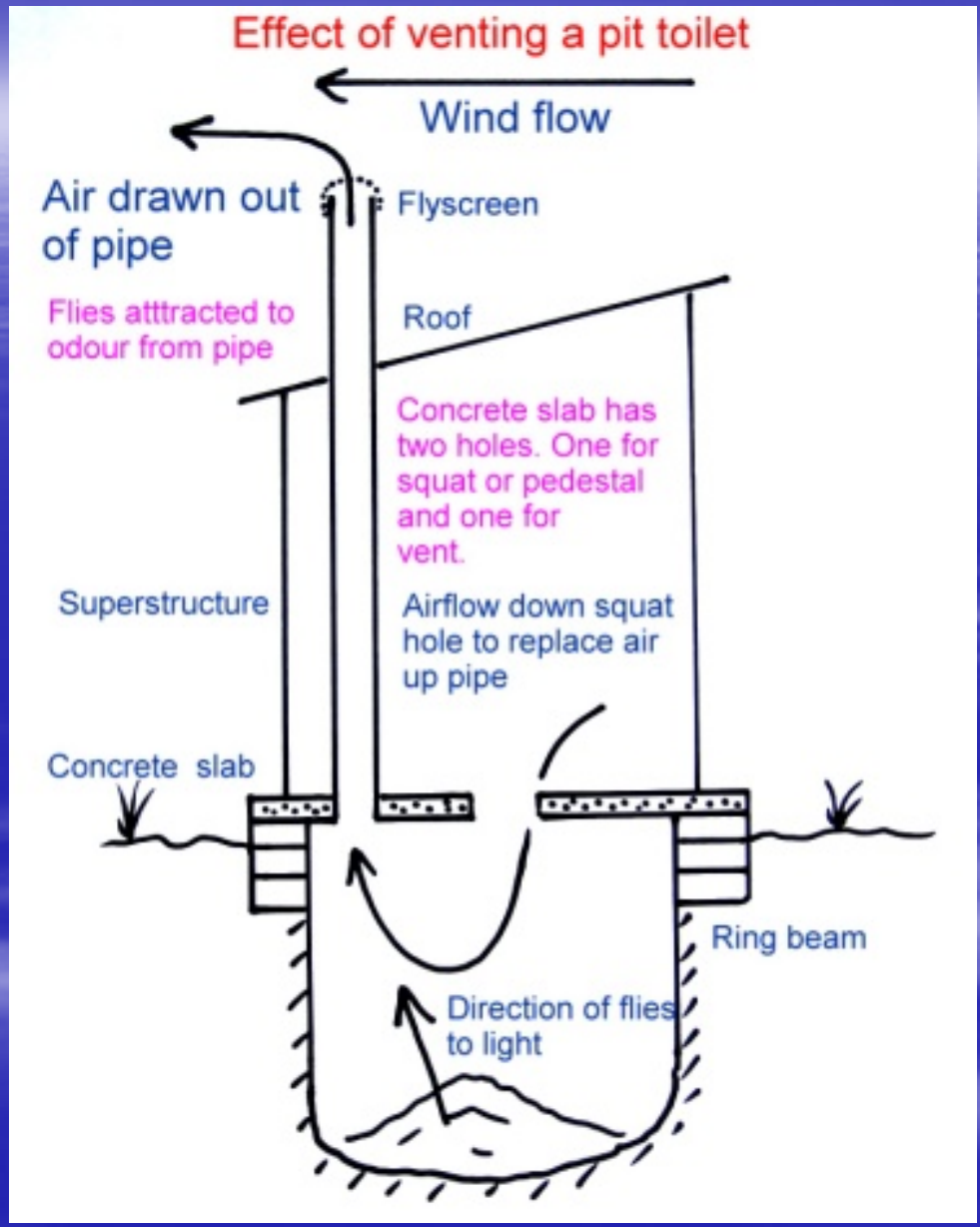
The wires are placed around the wooden frame and through the brickwork mortar 3 courses down from the top.

Stages of construction

Adding a vent pipe

A vent pipe draws air out of the pit and thus reduces odours coming out of the squat hole inside the toilet. If the pipe is fitted with a fly screen and the toilet interior is semi dark, the pipe will also trap flies.

Vent pipes can be made of bricks, PVC, resin filled hessian, cement filled hessian and other materials



Fitting the vent pipe

A 110mm vent pipe (PVC or resin filled hessian) should be fitted through the roof and into the vent hole of the slab. A hole is cut through the thin iron sheet. A nail hole is punched first, then opened with a knife and opened further with tin cutters.

Care is required to ensure that the hole in the roof is directly above the hole in the slab.

Fitting the vent pipe

The pipe (which should be fitted with a corrosion resistant fly-screen) is then placed through the roof hole and fitted in to the slab hole. Weak cement mortar is then placed around the pipe on the roof.

Care is required to ensure that the hole in the roof is directly above the hole in the slab.

Fitting the vent pipe

Views of the pipe from inside the structure

Finishing off the final structure

A sloped floor is added to the toilet and the area around cleaned up. A hand washing device can also be fitted. Trees can also be planted around the toilets.