The Chisungu Primary School Water and Sanitation project

How we made an Arborloo and upgraded it to a Low cost Blair VIP

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What is an Arborloo?

*An Arborloo is a very low cost pit toilet.

*The pit is shallow (1m) and fills up with a mix of excreta soil and ash.

*The pit is protected by a "ring beam" of concrete or bricks (if the soil is a bit firm)

*A concrete slab sits on the ring beam

*A simple toilet house is built around the slab

What is an Arborloo?

*The addition of soil and ash in to the pit helps to turn the excreta into compost.

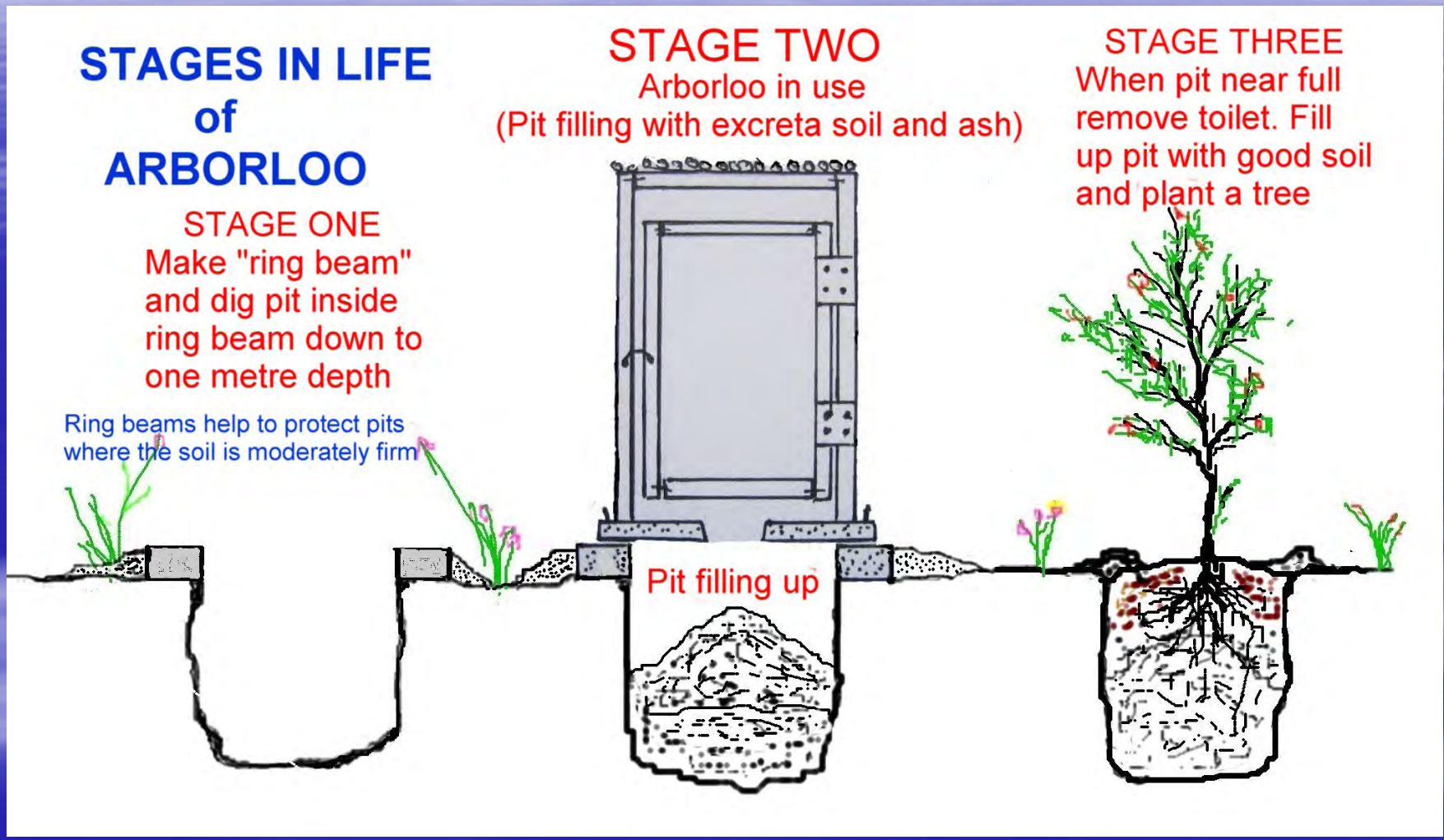
*The soil and ash also helps to reduce flies and odours

*When the pit is nearly full the parts of the toilet are moved to another place

*The pit is filled with soil and a tree is planted in the soil.

* The tree must be well watered and protected

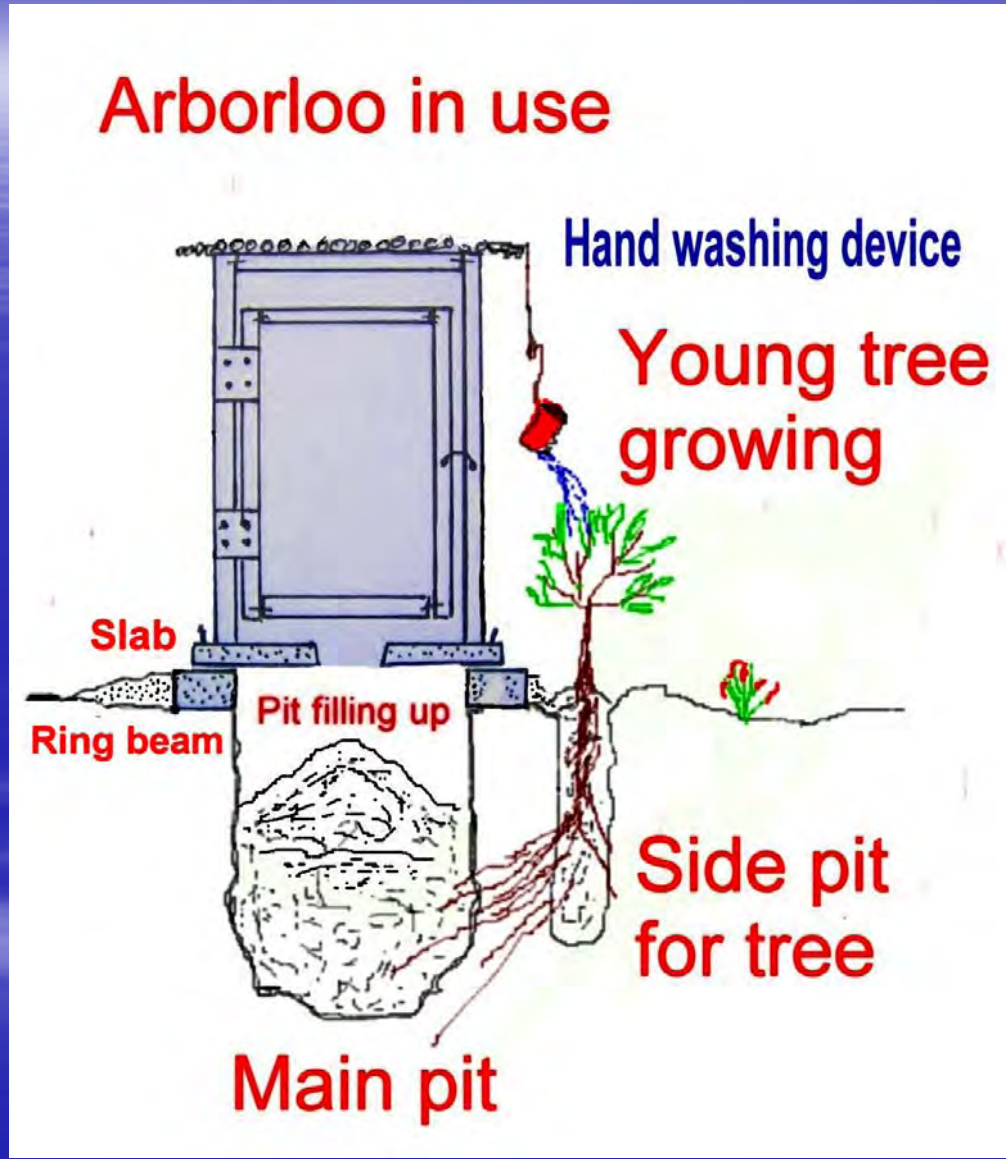
Stages in life of the Arborloo



Planting trees on or near Arborloo pits

It is also possible to plant the tree at the same time as building the Arborloo

Eventually The tree roots Will enter the pit and use the nutrients



Stages in the construction of the Arborloo

The Arborloo toilet is made in a series of stages:

1. Make the slab
2. Make the ring beam (in brick or concrete)
3. Dig the pit inside the ring beam down to one metre
4. Fit the slab on the upper pit lining
5. Build the superstructure around the slab
6. Fit a roof
7. Fit a hand washing device
8. Plant a tree!

Stage one

Make the concrete slab

The concrete slab is quite easy to make once the training has taken place. A 1.1metre diameter slab uses 10 litres of cement (PC15) and 50litres of river sand and about 8m of 3mm wire. A full bag of cement holds 50 litres of cement. The slab is made with apertures for both squat (pedestal) hole and vent pipe hole. This means the slab can be used on simpler toilets without pipes or with Blair VIPs.

Stage one

Make the concrete slab

Half the concrete mix is added first within a mould made of bricks (or steel shuttering) 1.1m in diameter. The wires are then added and the second half of the mix added and smoothed down. Once the concrete slab has set hard (overnight) it is cured by leaving it covered and wet for a week before moving. This standardised slab can be used to make a wide range of toilets.

The slab is now curing

Now we find the place where we will build the toilet, clean up and level the area and mark the spot for the ring beam

Stage two

Make a concrete "ring beam"

The ring beam helps protect the shallow pit and lifts the concrete slab off the ground. It can be made of bricks or concrete. The ring beam has an internal diameter of 1 metre and an outer diameter of 1.3m. 10 litres cement (PC15) and 50 litres clean river sand are thoroughly mixed. Half this mix is added to a mould made of bricks. A length of 3mm wire is then laid in the middle of the concrete. Then the remaining concrete is added on top.

Make a concrete "ring beam"

The concrete of the ring beam is then smoothed down and made flat. The ring beam is covered and left to cure. It should cure for several days before the pit is dug down inside it.

Both slab and ring are cured for one week and kept wet.

Stage 3.

Dig the pit inside the ring beam

Dig a hole inside the ring beam 1m deep. Ram the soil taken out of the pit around the ring beam and ram it hard in place. The hole is dug down to one metre only. It is safe!

Moving the slab on to the ring beam.

Since neither the slab or ring beam are perfectly flat a layer of weak cement mortar or damp termite soil is laid on the ring beam.

The slab is embedded into this.

Making the superstructure (toilet house)

The traditional method using poles and grass will work well. The holes for the upright poles are dug or drilling. The one being made here will have a spiral (door-less) shape and is made of poles and grass. Structures with doors can also be built.

Mounting the poles and roof timbers

The roof timbers are made up so that the poles placed in the ground can support the roof. It may be best to make the roof first and then drill the holes to match the roof timbers.

Mounting and linking the upright poles and roof timbers with wire.

Reeds are laid over the roof timbers to support plastic sheet and a grass cover.

Adding a plastic sheet over the reeds of the roof and grass to the walls.

The grass is tied with string or cord.

All the walls are covered with grass for total privacy.

Making and fitting a hand washing device. This is an important part of the toilet.

Finishing off – the Arborloo – without vent.

Vent pipes

If the simple toilet is to be upgraded to a VIP it must have a vent pipe. The training includes teaching methods of making low cost vent pipes with wire, reeds and cement slurry. A combination of cement paint and paper can also make a good strong vent pipe.

Fitting low cost vent pipe to structure.

Once a screened vent pipe is fitted to a structure which provides semi darkness – it becomes a VIP toilet.

VIP's are popular in Zimbabwe!

-Finishing off –
A vented Arborloo is a a low cost VIP!

-The Arborloo is the simplest ecological toilet and is an effective way of starting low cost sanitation programmes. It also demonstrates how valuable the nutrients in human excreta can be !

-Most species of tree grow well on "Arborloo pits" and also some vegetables like pumpkin and tomato.

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The government is now looking seriously at revising its policy of standardising on a single high cost technology to include a larger range of sanitation options which are lower cost and fit within a sanitation ladder where upgrading from simpler to more complex designs is possible

This range of technical options includes very low cost toilets like the Arborloo but also includes lower cost version of the Blair VIP itself.

In this power point presentation we describe how to make the fully brick spiral version of a lower cost Blair VIP toilet

Construction of the Blair VIP

The Blair VIP toilet is made in a series of stages:

1. Make the slab
2. dig and line the pit (if a brick lined pit is used)
3. Fit the slab on the upper pit lining
4. Build the superstructure
5. Make and fit the roof
6. Make the vent pipe (this will have been made beforehand
7. Fit the vent pipe
8. Improve the floor at the entrance
9. Neaten all parts
9. Fit a hand washing device
10. Make a pedestal
11. Plant a tree!

Stage one

Make the concrete slab

The concrete slab is quite easy to make once the training has taken place. A 1.1metre diameter slab uses 10 litres of cement (PC15) and 50litres of river sand and about 8m of 3mm wire. A full bag of cement holds 50 litres of cement. The slab is made with apertures for both squat (pedestal) hole and vent pipe hole. This means the slab can be used on simpler toilets without pipes or with Blair VIPs.

Stage one

Make the concrete slab

Half the concrete mix is added first within a mould made of bricks (or steel shuttering). The wires are then added and the second half of the mix added and smoothed down. Once the concrete slab has set hard (overnight) it is cured by leaving it covered and wet for a week before moving. This standardised slab can be used to make a wide range of toilets.

Stage two

Dig the pit and line with bricks

In this case the toilet is being made by school children and the pit is dug down to only one metre deep. Normally a pit will be dug down to 2 or more metres deep. Fired bricks are gathered.

Stage two

Dig the pit and line with bricks

In this case the pit has been dug just over 1.5m in diameter so the internal diameter of the pit will become 1.3metre (bricks are 110mmwide). The lower courses are laid straight up. The upper courses are "corbelled" that is they are stepped in. A weak mix of cement is used (1 part cement to 16 parts pit sand).

Stage two

Dig the pit and line with bricks

The upper most courses are bricked up so that they are just above ground level and the outside diameter is the same as the diameter of the slab (1.1m). The gap between the upper brickwork and the pit wall is filled in with soil. A layer of weak cement mortar is laid on the brickwork. The slab is not perfectly flat and needs to "bed in" to a soft flexible mortar.

Stage three

Fit the slab

The cured slab is then picked up, cleaned and carried over carefully to the brick lined pit. It is laid centrally over the upper course of brickwork in the weak cement mortar.

Stage four
Build the superstructure

At this stage we have a fully brick lined pit which is stable and a strong concrete slab capping the pit fitted with a squat and ventilation pipe hole.

It is possible to build many types of superstructure on or around this slab. These can be low cost traditional structures made of grass or poles at first. But in each case they can be upgraded to fully brick structures.

Stage four

Build the superstructure

In this case we shall show how a spiral bricked walled Blair VIP can be made. This is made without a door and has no moving parts which can wear out (just like the standard Blair VIP). With the spiral version of the Blair VIP part of the superstructure is built off the slab and to one side. It is important to build a brick foundation on which the brick wall will be mounted outside the slab.

Stage four

Build the superstructure

The foundations are built up using weak cement mortar (16:1) to the level of the slab. We can see the shape building up. Bricks mounted on the slab itself are shaped in a circle. The photo on the right shows the first layer of superstructure brickwork. The space between the wall and slab is filled with soil and compacted.

Stage four

Build the superstructure

The superstructure walls are then built up with 19 courses of bricks. At about the 15th course a series of glass bottles are introduced into the wall of the structure to allow a little more light into the Blair VIP.

Stage four

Build the superstructure

These little windows are not essential, but some people think the interior of the standard Blair VIP is too dark. These windows (which is a new innovation first used at Chisungu School) allow a little light into the interior, which does not affect fly control.

Stage four

Build the superstructure

The brickwork is built up to 19 or 20 courses. For school children this means standing on chairs to get up high enough.

It can be Fun!

Stage five

Make and fit the roof

The roof must now be made and fitted. This can be made of tin sheets or asbestos or even thin cement panels. In this case a wooden frame has been made with reeds laid down inside and plastic sheets covered over the top. Grass can be laid over the plastic sheets to protect them.

Stage five

Make and fit the roof

The roof must be waterproof. Plastic sheets help and are laid down on top of the reeds or other timbers. Black plastic sheet must also used to reduce light in the structure. The roof is then laid and secured on the superstructure.

Stage six

Make the vent pipe.

Vent pipes can also be made in the home or school. There are several methods. Some use reeds formed into tubes and covered with material which is painted with cement and water made into a paint like material.

Stage six

Make the vent pipe.

Vent pipes can also be using PVC pipes as a mould and covering these with plastic sheet and then placing several layers of "newsprint" paper soaked with "cement paint" over the mould. These can form very strong and long lasting pipes if made correctly. This method will be described in detail in another power point presentation

Stage six

Finish the vent pipe – fit a fly screen.

The cured vent pipe is then fitted with a fly screen. This must be made of screen which will not corrode. Alumium is a good material which will last for at least 10 years. PVC coated fibreglass will last for 5 years. Stainless steel is best but is expensive. The screen is wired on to the pipe and the wiring is best covered with a little extra cement mortar.

Stage seven

Fit the pipe

The pipe is inspected and fitted through the roof and placed over the hole in the slab.

Stage seven

Fit the pipe

The pipe is cemented in place on the slab. The black plastic sheet is then carefully laid around the pipe. A hole must be made in the sheet around the pipe. The plastic sheet must be covered with grass to protect it from the sun. The roof can be overlaid with more permanent materials later in an upgrading process.

Stage eight

Improve the floor at the entrance

The toilet floor is the slab. But the entrance area must be covered with a layer of cement to make it durable.

Stage nine

Neaten it all up.

The toilet now needs tidying up to look all smart

Stages beyond!

And Yes there's more we can do!

We can make a pedestal

Low cost pedestals can be made with cement and plastic buckets to fit over the squat hole. The squat hole may need opening up a bit, but that is easy!

LOOKS SMART HEY?

Stages beyond!

And Yes there's more we can do

We can make and fit a hand washing device

They are also easy to make with a can or bottle and wire.

And very important for personal hygiene

Stages beyond!

And Yes there's more we can do!

We can plant a tree near to the toilet

The tree will grow over the years and then the roots will tap into the compost formed in the pit and the tree will grow much bigger and make more fruit. Here a mulberry is planted next to our toilet.

Stages beyond!
The tree and the toilet together
Lots of vitamins to come!!

And the future - WHO KNOWS!

The Headmaster and us!