13. Some special constructional techniques

Ecological sanitation is partly concerned with building toilet structures and partly with recycling the humus and urine to grow vegetables and other plants. The details of latrine construction and methods of applying the humus and urine to improve crop production have already been described. What remains is a brief description of some allied constructional techniques which are valuable in supporting the practice of ecological sanitation. These include the construction of cement jars in which humus can be formed from human excreta and also cement basins in which plants can be grown. It also includes various low cost pedestals, both urine diverting and non urine diverting. Also low cost ventilation pipes for latrines and hand washing devices. None of these have so far been described in this book.

Making cement jars and basins

The most economical method of making containers that will last year after year (if treated carefully) and be recharged many times is to use off-the-shelf buckets or basins as a mould and cast replicas in concrete. The concrete containers are heavier than the plastic bucket or basin, and thus more cumbersome to move, but in the long term they are very durable, being made of concrete, particularly if they are well made and cured and cared for. Split cement jars can be made of 30 or 80 litre capacity and a good concrete basin of 10 litres capacity. The best shape for growing shallow rooted vegetables (lettuce, spinach, rape, covo, onion) is broader and not so deep, so the concrete basin of 10 litres capacity is possibly best and most economical. The ten litre basin about 38cm in diameter and 14cm deep serves this ideally. Up to 50 ten litre concrete basins, can be moulded from a single bag of cement and river sand. Each basin will contain 2 or 3 rape or spinach plants, 1 or 5 – 10 onions. This is quite an economical way of containing precious eco-humus and using it efficiently for vegetable growth. Maize can also be grown on shallow basins of this type for small scale production. Tomatoes are best grown in buckets.

1. Making a 10 litre cement basin for vegetable growing.

This method is very simple and effective. The ingredients are river sand and cement. The mould is a standard 10 litre plastic basin. The mixture is 3.5 parts river sand to 1 part cement, using a pea tin container as a measuring device (400ml containing 500 gms cement). Two tins of cement (1 kg) are mixed with 7 tins of sand and water is added to form a moderately stiff but workable mix. The mix can be made in a separate basin. A piece of plastic sheet (from plastic bag) is cut into the shape of the base of the basin and laid down within the basin. The cement is spread and drawn up the inner sides of the basin using hands and trowel. A layer is also trowelled evenly over the base. The cement mix is spread out evenly. Several of these can be made at one sitting depending on the number of basins available. Six is a good number and can be made in less than one hour. Once finished, the concrete work is covered with a plastic sheet and left overnight. The following morning the concrete is watered and left under the plastic sheet for another one or two days. The next morning the basins are turned over, exposing the base, and laid in the sun. This heats the plastic, which expands and the plastic basin mould can easily be lifted off the concrete replica. The concrete basins are then carefully lifted and immersed in water or kept wet under plastic for several more days - the longer the better - to gain strength. Once cured, five 8 - 10mm holes can be drilled in the base with a masonry drill for drainage. With care nails and hammer can also be used to make holes. The concrete basin is now thoroughly washed down and is now ready for filling with a suitable growing medium.

On the left six plastic basins are lined up ready to have the concrete mix added. A disc of plastic sheet has been added to each basin to ease the extraction of the cement basin later. On the right the mix has been made up (2 parts cement, 7 parts river sand and 2 parts water – made into a stiff mix). The mix is trowelled on the base and up the sides and smoothed down. It is then cured over a period of days. Various other photos in this book show the basins in use. About 50 can be made with a bag of cement.

2. Making a 30 litre split cement jar for excreta processing or vegetable growing

Where a family is using a urine diverting toilet (***Skyloo***)and processing its faecal matter into humus held temporarily in buckets, the 30 litre split cement jar is a very good option as a "secondary processing site". The section below describes how a cement jar can be made in two halves (shells) so that it can be used to contain the combination of faeces, paper, wood ash and soil from the toilet - it can also be used to grow vegetables.

A 30 litre plastic bucket is carefully cut exactly in half with a hacksaw blade along a line marked on the bucket. The bottom surface and the top rim are retained to keep the shape of the bucket. In addition it is useful to cut a wooden spacer and attach to the top rim of both halves of the bucket to ensure that the rim keeps its shape. It is best that the two halves cast in concrete on the bucket mould keep their shape and match each other when fitted together. Once cut in half the bucket handle mounts are cut off and trimmed. The outer surfaces of the bucket are then sanded down to roughen the surface slightly. A layer of grease or thick oil is applied to the outer surface. The concrete mix is then prepared. This is a mixture of river sand (3 parts) and cement (1part). A small tin (volume 450mls) containing about 500 gms of cement can be used as a measure. 15 tins of sand and 5 tins of cement are used for each split jar (2 pieces). The cement is applied to a thickness of one centimetre and smoothed down.

The castings are allowed to set overnight and the following morning they are watered and placed under a sack or plastic sheet. They are kept wet for another 5 days mounted on the moulds. Then they are carefully separated from the moulds to provide two halves. The longer concrete (cement/sand mix) is kept wet, the stronger the jar will become. It is best to immerse them in water for another week. The moulds are cleaned down and coated with another layer of grease to make another set of castings. About 18 split cement jars can be made with a single bag of cement. Cement, when properly cured is a very strong and long lasting material and a makes a very valuable container.


Plastering the two shells of the 30 litre split cement jar on a mould made from a 30 litre plastic bucket. After a few days of curing the two cement shells can be separated from the mould.

Making the lid

The same mixture (3:1) is used to make the lid. This will require about 3 tins of sand and 1 of cement). A 15 litre plastic bucket is topped up with soil and a sheet of plastic paper is cut and placed on the soil. The cement mix is then added to the top surface about 1.5cm deep and a handle (such as a steel chain link) is set in a raised section in the middle. Only 1 or 2 lids are required, as only one will be filling at one time. The rest will be holding plants or will be empty. Lids are required to protect the excreta from flies and animals.

Assembling

The two shells are placed on the ground together in a suitable place in the garden, possibly in a flower bed. They are then wired together to make the shape of the container. In this case the container is erected so that the broader base is at the bottom. This allows for good drainage from the container. The additions of soil and excreta are then made over some days or weeks. These may be the contents from buckets containing excreta coming from the urine separating toilets or even dog/animal manure. Layers of soil (and leaves) are added between the additions of excreta as the layers build up. The lid is kept in place at all times when the fresh material is being built up. Good drainage is important on containers holding fresh excreta and soil.

30 litre split cement jars are ideal for processing faeces. The two shells are held together with wire. A lid is made to fit over the jar. Painting makes the jar more decorative.

3. The 80 litre split cement jar

This is made in a similar way to the smaller jar but on a bigger scale. An 80 litre plastic dustbin can be used as a mould. The handles of the dustbin are cut off and the outer surface smoothed down. The bin is carefully marked and cut in half with a saw. The same process is followed as for the 30 litre jar. A thin layer of grease or oil is applied to the outer surface and the mix of river sand and cement made up. The mix is 3 parts river sand and one part cement. In this case 18 (450 ml) tins of sand are mixed with 6 tins of cement for each of the two shells made. The mortar is built up to 15 - 20mm thickness. The curing, removal and further curing are carried out in the same way as for the smaller jar. It is important to allow sufficient time for the cement to cure by keeping it wet for several days under plastic sheet. Once fully cured the two shells are carefully separated from the mould and then wired together with the wider end at the base. A cement lid should also be made to fit the jar. This jar makes an excellent container for composting manure and organic kitchen wastes. If four are made, the processed manure, together with kitchen wastes can be used in sequence continuously, with one being filled with another two processing and the fourth reaching a stage where it can be emptied.

Making the larger 80 litre split cement jar using a plastic dustbin as a mould.

Four 80 litre jars were made and used in rotation to process compost from kitchen wastes and manure

Low cost pedestals

There are several ways of making low cost pedestals for use in toilets. In each of the methods described here a plastic bucket is used as a mould and insert for the pedestal. That is the pedestal is built up around in the bucket in cement, which acts as a mould, but also the bucket is left in place to provide a smooth surface inside the pedestal which can be cleaned down.

1. Very low cost pedestal

There is a pedestal which can be made cheaply from a 10 litre bucket. In this case the base of the ten litre bucket is sawn off and laid wide end down on a sheet of plastic. A line is drawn around the base rim of the bucket about 75mm out. Some strong cement mortar is now made 2 parts river sand and one part cement. This is built up along the inside along the line drawn on the plastic and up the side walls of the bucket. With care this can be done in one sitting. This is left to cure for two nights and then the bucket and its concrete surround is lifted up and turned into a base mould made of wood measuring about 40cm X 40cm. The base is cast in 3:1 sand and cement and left to cure. The seat is formed by the rim of concrete laid around the bucket on the plastic. It can be shaped and smoothed down with sand paper and once it is dry painted with an enamel paint. This is really a low cost but practical method of making a pedestal with easy to wash down plastic insert.


Very low cost pedestal made from a ten litre plastic bucket and cement only. It is durable and with suitable painting can be made very smart.

2. Low cost pedestal with concrete seat

This method uses a 20 litre bucket - and to reduce cost - a seat made of concrete. In this case a mould is first made in concrete for the seat. This is made by mixing cement and river sand (about 1:3) and building up a “slab” about 50 mm deep inside some bricks (dimensions about 50cm X 60cm). The commercially made plastic seat is then pressed into the cement and held down with a weight. It is left there until the concrete is stiff and then the plastic seat can be removed, leaving an impression of the seat. This should be done with care. It may be necessary to finish off the mould with a small trowel to get it smooth. The mould is left to cure for a week, being kept wet at all times. Once cured and dry, it is smoothed down with sand paper. Then it can be used to make more concrete seats. These are made by taking very thin plastic sheets and covering the seat part of the mould. A very strong mix of river sand and cement (2:1) is then used to fill the depression to make the seat.

The toilet seat mould is covered with very thin plastic sheet and a layer of high strength concrete is laid in the depression which will form the toilet seat. A loop of wire is laid within the concrete. After levelling off, L shaped wires are then inserted into the concrete. An upturned plastic bucket (with base removed) is then placed over the mould with the wire arranged around the outside of the bucket as shown above. Cement is then built up around the sides of the bucket. The wires strengthen the cement work.

A loop of wire is introduced to provide strength. L shaped wire inserts are now placed in concrete to strengthen the link between the seat and the side walls of the pedestal. This is done by laying the wider end of the 20 litre bucket (with the base already sawn off) on the seat. L shaped pieces of wire are then introduced into the cement around the rim of the bucket. The bucket can be left in place whilst the seat cures. Next a layer of strong cement mortar (2 parts river sand and one part cement) is built up around the bucket till it reaches the top. This is left to cure overnight and some thin wire is wrapped around the cement work (in a spiral form) and another layer of cement is applied. This is left to cure for another day or two, then the seat and the side walls of the pedestal can be removed. The pedestal (right way up) is then mounted within a wooden base mould (dimensions - outer 50cm X 50 cm - inner 40 cm X 40 cm) and the space between the wooden mould and the side walls of the pedestal are now filled with a 3:1 mix of river sand and cement with some wire reinforcing. This left to cure for another few days being kept wet at all times. Once cured and washed down, the pedestal seat can be sanded down and any small holes filled with neat cement slurry (nil) and then allowed to dry. The pedestal is then painted with an enamel paint and put to use by cementing in place within the latrine.

Very low cost and durable pedestals can be made with off-the-shelf plastic buckets and cement. With care and paint they can be made into very attractive units.

3. Low cost pedestal with plastic seat

This is easier to make and smarter, but more expensive. A commercially made plastic toilet seat is required. First holes are made with a hot wire in the supporting plastic ribs under the seat, so that a ring of wire can be threaded through under the seat. The "hollow" under the plastic seat can then be filled with a strong 2:1 river sand/cement mix with the wire inside. At the same time the 20 litre bucket (with base sawn off) is placed over the seat in a central position and L shaped pieces of wire inserted around the rim of the bucket into the cement. This is left to cure for a few hours. Then the side walls of the bucket can be covered with a 2:1 sand/cement mix. This is left to harden a little. Later some thin wire is laid spirally up the side walls of the pedestal to strengthen the unit. A further layer of mortar is then applied to the side walls. This is left to cure, being kept wet at all times. The pedestal is then overturned into a base mould made of wood, and the base made with more strong concrete - and left to cure. This procedure makes a neat, comfortable and long lasting pedestal.

Sequence of making pedestal

Finally a strong durable pedestal is made

4. Home made urine diverting squat plate

Squatting is the preferred position for defecation over much of Africa. It therefore makes sense to use a squatting type urine diverting device, if urine diversion is the chosen method of taking up ecological sanitation. The urine diverting squat plate is used almost universally in China and commercially made units are also available in Kenya. A home made copy of this effective unit can be made using off-the-shelf buckets and cement.


Make a mould in wood to make a small concrete slab 60 cm long by 30cm wide. Before pouring concrete cut a ten litre bucket, using the lower part to make rear squat hole, 20 cm wide and the upper part of the bucket to make the front hole (about 23cm wide) for later insertion of urine receiver. The strong concrete mix can be made from 3 parts river sand and one part cement. Reinforcing wires are laid in the cement for additional strength. This is left to cure for a few days, being kept wet after the concrete has set.


To make the urine receiver, take another 10 litre bucket and drill hole in lower end and attach a small 20mm plastic pipe fitting. This can be attached by welding the plastic or by using an epoxy adhesive. The bucket is cut so the upper edge at the front is higher than the rear. The rear edge should be at slab level.


Before the bucket is finally cut, it is inserted in the front hole of the slab and tilted so all urine will drain into the urine exist hole and the forward part of the bucket is higher. The bucket is marked and cut ands then placed in the hole and strong cement mortar is laid all around the bucket on top and beneath. This is also allowed to set and cure.


1. **After curing the unit is allowed to dry and is painted with an enamel paint. Note the side view of the unit on the left photo. See how the front of the urine collector is raised and the rear is low allowing good drainage of urine into the urine pipe. A raised front end catches urine better. The great advantage of the urine diversion squat plate is that males can urinate whilst standing above the unit. This offers a larger target for urine compared to most urine diverting pedestals. It is important however that males urinate in the correct hole. The urine diverting squat plate is fitted over a concrete slab in which a rectangular hole of suitable size has been made. Cement work does absorb urine, so the cement parts should be well protected with enamel paint.**

5. Home made urine diverting pedestals

This can be an adaptation of the pedestals which have been described earlier in which a urine diverter, made from a plastic bucket, is inserted in the front part of the chute of the pedestal. This urine diverter can be attached to the main bucket of the home made pedestal by welding, gluing, bolting or by wiring.

There are many ways of doing this, the main aim being to catch and divert as much urine as possible so it can be piped to a plastic storage container. The faeces can then drop into the vault below.


In this method a piece of plastic from a bucket is bolted to the side wall of the larger chute bucket to make the urine diverter. At the base of the diverter a polyethylene pipe is fitted in place with epoxy putty. Urine passes down the diverter, through the pipe into the urine storage vessel. This plastic unit is then built up in cement and a seat is fitted as described earlier.


In this method the urine diverter (yellow) is made from a 10 litre bucket and fitted inside the larger chute bucket (25 litre) with wire straps. These wires pass through the plastic and later cement work. The rest of the pedestal is then built up as described earlier. A plastic pipe fitting is then attached to the yellow bucket to lead the collected urine into a urine storage vessel.


On the left the completed urine diverter fitted to a Skyloo. The bucket which collects the faeces, soil and ash can be seen directly beneath the pedestal. On the right a home made urine diverting pedestal made in Kenya.


Once again a 10 litre bucket is cut to shape as shown to make a urine diverter which can fit into a standard (non urine diverting) pedestal as described earlier. A urine outlet pipe is fitted through a hole made in the bottom of the urine diverting bucket. When fitted on to the pedestal, the bottom of the urine bucket is sloped so that urine drains towards the outlet pipe. On the right the wire loops formed in the pedestal to hold the urine diverter. These can be fitted when the pedestal is being made or threaded through holes drilled later through the bucket and cement work.


A side view with the pedestal upside down showing how the lower part of the urine diverter slopes downwards so that urine will drain into the pipe. The lower part of the urine diverter must be able to pass through the hole made for the pedestal in the slab in such a way that the pedestal itself sits on top of the slab. The part of the diverter which holds urine before it drains through the pipe is actually held underneath the slab. On the right the finished urine diverting pedestal.

Method of making a urine diverting pedestal with urine pipe above slab level

Normally the urine diverting pedestal directs urine into a pipe which is held beneath the toilet slab or floor. In this way the pipe is protected and is able to safely lead the urine either to a soak pit, into a garden or a urine collecting chamber made of plastic. Great care is required to ensure that the pipe allows urine to flow freely downwards to avoid air locks occurring in the pipe, as these can cause problems with the free flow of urine from the diverter to the collector. When a double vault system is used, care is required in disconnecting the urine pipe linked to one vault with the urine pipe of the second vault.

These problems can partly be overcomes by making a urine diverting pedestal where the urine outlet pipe is placed above the floor or slab level. Thus it is possible to connect a pipe directly to a fitting on the pedestal and lead the pipe away and to the rear above ground. This method is particularly suitable where the urine diverting pedestal is placed over a shallow pit toilet. Once the pedestal is fitted on top of the toilet slab, the urine pipe can be led away to the rear of the toilet and direct urine either into a a seepage area around a tree, or vegetable garden or into a urine container which can be dug in a shallow hole below ground level.

Sequence of making a urine diverting pedestal with urine outlet pipe above slab level

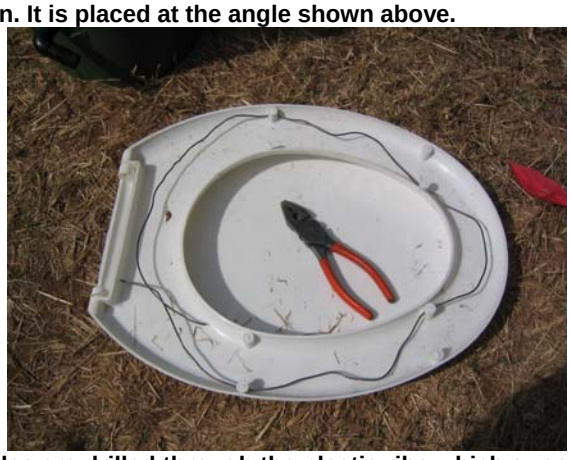
The material requirements are a 20 litre plastic bucket, a 20mm polyethylene bend, a plastic toilet seat and cement, sand and wire. First the base is sawn off the bucket squarely.

Next the plastic base of the bucket is sawn in two, one of these halves will be used to make the urine diverter within the bucket.

The half base is fitted within the bucket about half way up the walls at an angle. It is secured in place by drilling small holes through cut base and bucket walls and passing wire through and tightening.



A hole is drilled through the bucket wall just above the base of the urine diverter. The 20mm polyethylene bend is fitted through the hole as shown. It is placed at the angle shown above.

The toilet seat is now prepared. Using a hot wire, holes are drilled through the plastic ribs which support the seat. These allow a wire to be threaded in a loop under the seat.


A strong mix of concrete using 3 parts river sand and 1 part cement is mixed and added to the toilet seat as shown. This will add strength to the seat and form a bond between the seat and side walls of the pedestal. The bucket is now fitted centrally over the toilet seat as shown.


8 pieces of bent wire are now introduced into the cement supporting the seat. This is allowed to cure overnight. Next a further mix of 3:1 sand and cement is made and plastered half way up the walls of the bucket. This is left overnight again to cure.


The following morning the upper half of the bucket is cemented with a 3:1 mix and allowed to cure overnight. The next morning the bucket and seat are overturned into a base mould made with wood, about 60cm X 60sm and 40mm deep. It is laid over a plastic sheet.


The base mould is filled with the same 3:1 river sand/cement mix. Some wire is added to the base. Also some thin wire is also coiled around the pedestal. Next a final later of 3:1 mix is plastered up the side walls of the pedestal over the wire. The final layer can be made with cement watered down to make a thick paint and is applied with a brush. This is allowed to cure for several days being kept wet at all times. It is covered with plastic sheet and sacking.


The space between the bucket side wall and urine diverter is now sealed. Any type of pliable putty can be used for this job. Even chewing gum will do. It is pressed into the gap from underneath first. The putty should also be pressed into the gap from the upper side too. Urine passing into the urine diverter should find its way through the plastic bend and through the plastic pipe.


The urine outlet pipe has been added to the polyethylene pipe bend. This is led back over the concrete base of the urine diverting pedestal to the rear of the toilet.


The pedestal can be made more attractive by coating with enamel paint once the concrete is completely cured and dry. Once dry it can be mounted into the toilet.


The urine diverting pedestal can be fitted into a single or double vault dehydrating or composting toilet. It can also be fitted over a shallow pit toilet. The urine pipe can be led into a soakaway or into a vegetable garden, preferably beneath ground level. It can also be led to a tree like a banana, as shown above. The urine can also be led to a plastic container placed in a hole dug in the ground. It is advisable to protect the pipe in some way by covering with soil etc. Here the pipe is exposed for the photo.

Final note on this method

Where the urine is led through the pipe to a tree or vegetable garden, it is possible to add more water through the urine diverter to cleanse the pipe and dilute the urine. When the diverter is used over a shallow pit toilet, it is advisable to add soil and ash to cover the deposit to encourage dehydration. If composting is required in the pit, as in the ***Fossa alterna***, the pit contents must be moistened by adding urine or water, with soil and ash and preferably leaves.

6. Home made vent pipes.

A vent pipe is a valuable part of any pit toilet. It draws out air from the pit, mostly by the action of wind blowing across the top of the pipe. The air that flows out of the pipe is replaced by air passing down the squat hole or pedestal. This is most efficient when the slab and pit collar are sealed and airtight. The effect is that any foul odour from the pit does not escape into the structure, but is diluted by air and passes out of the pipe into the atmosphere. The effect is that the toilet becomes almost odourless. The other property of note is that, if the top of the pipe is screened with a corrosion resistant screen made of aluminium or stainless steel, and the structure is fitted with a roof, the pipe also acts as a flytrap. Where the interior of the toilet is semi dark, flies will enter the pipe from inside and are trapped. This is because flies are attracted to light when they leave the pit and enter the pipe which is the most obvious light source. From the outside, flies are attracted by odours coming from the pit and most of these are expelled through the head of the vent. If the head of the pipe is screened, they cannot enter the pit. This simple effect can dramatically reduce fly breeding in the pit toilet and thus reduce the passage of fly-born disease. So the vent helps to reduce fly breeding and odour. Toilets fitted with a vent are generally known as VIP's (ventilated pit latrines). There are over half a million in Zimbabwe alone.

Even on shallow pit eco-toilets like the ***Arborloo*** and ***Fossa alterna***, venting helps. Whilst the addition of plenty of ash and soil, helps to reduce odours and the potential for fly breeding considerably, the action of the pipe also helps to remove excess moisture from the pit chamber, as well as removing odours and reducing fly breeding. Vent pipes can be made from bricks, steel, asbestos and PVC. Asbestos is more durable than PVC, and the most efficient are smooth walled round pipes, asbestos and PVC being the most common. 110mm is a minimum acceptable vent diameter, although 90mm may just pass for eco-toilets which already have some degree of fly and odour protection from the regular addition of soil and ash. Commercial pipes are very expensive, but there are ways and means of making then at the homestead.

Several methods are available, one being the use of hessian cloth (sacking) soaked in a mix of cement and sand (ratio 1:1). The cloth absorbs the cement slurry which is best cut into strips about10cm across. The slurry filled strips are then wrapped around a suitable mould. This can be made of a wire or reed tube or even a bundle of grass suitably wrapped. Alternatively a PVC tube can be used as a mould to make many cement pipes. In this case the PVC tube is covered with plastic sheet and the hessian strips wrapped around it and spiralled up the tube. Four length of thin wire (about 2 – 3mm thick) are then placed down the length of the pipe and held in place with thinner wire. Then the strips of cement filled hessian are then wound spirally back down the pipe again with strips overlapping. The final layer is painted with the slurry using a brush. It is left to set overnight and then made wet in the morning and covered with plastic sheet. The pipe is kept wet for at least 7 days before it is moved. The PVC pipe is then twisted out of the cement pipe and the plastic sheet extracted. A suitable screen is then fitted by wrapping around the head of the pipe and fixing with wire. Plain steel screens corrode quickly and are of little value in fly control. Aluminium screen is best. If well made and cured, such cement pipes are very strong and durable – far more so than PVC.

A durable home made vent pipe constructed from Hessian and a sand cement slurry with some wire reinforcing. Very effective and longlasting.

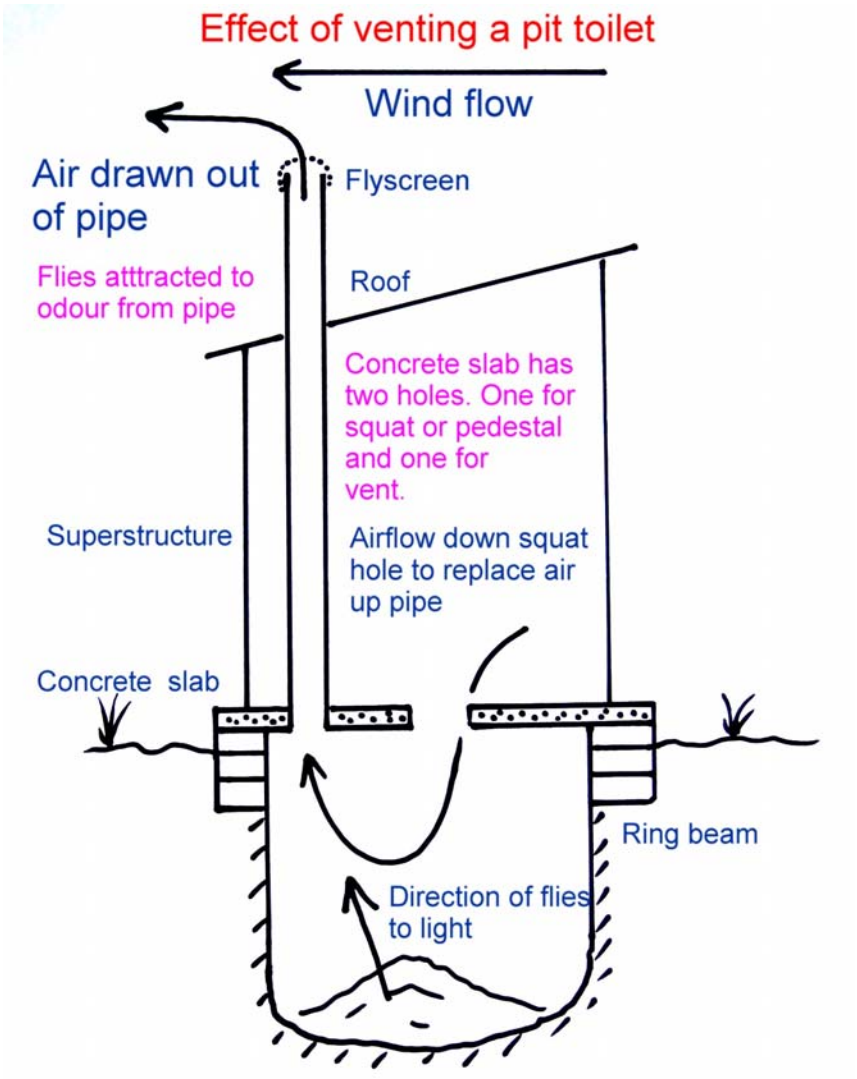


Diagram showing effect of vent pipe on functions of pit toilet

A steel framed superstructure for use on a range of on-site toilets

We have read in the book about the huge range of superstructures which can be used with these eco-toilets. Grass and poles through to brick, or iron sheet. All work, their primary aim is to provide privacy. One particular technique has proved itself to be particularly adaptable to a wide range of conditions and is described here. It consists of a light steel frame welded together using a combination of 25mm angle iron and 25mm flat bar. The durable hinge is made from old car tyre. The roof panel is covered with chicken wire and then a plastic sheet. Grass can be placed on top or thin iron sheet. The walling can be covered with any suitable material, which can include grass, reeds, plastic sheet, sacking or hessian, thin plywood or even wooden slats or other timbers. Whilst the frame is not particularly low cost (the steel costs around US$50 and a similar amount for labour), one made it will last afamily for many tears and can be covered with locally available materials which can be collected freely or cheaply.

Front and side views of the superstructure frame covered with grass

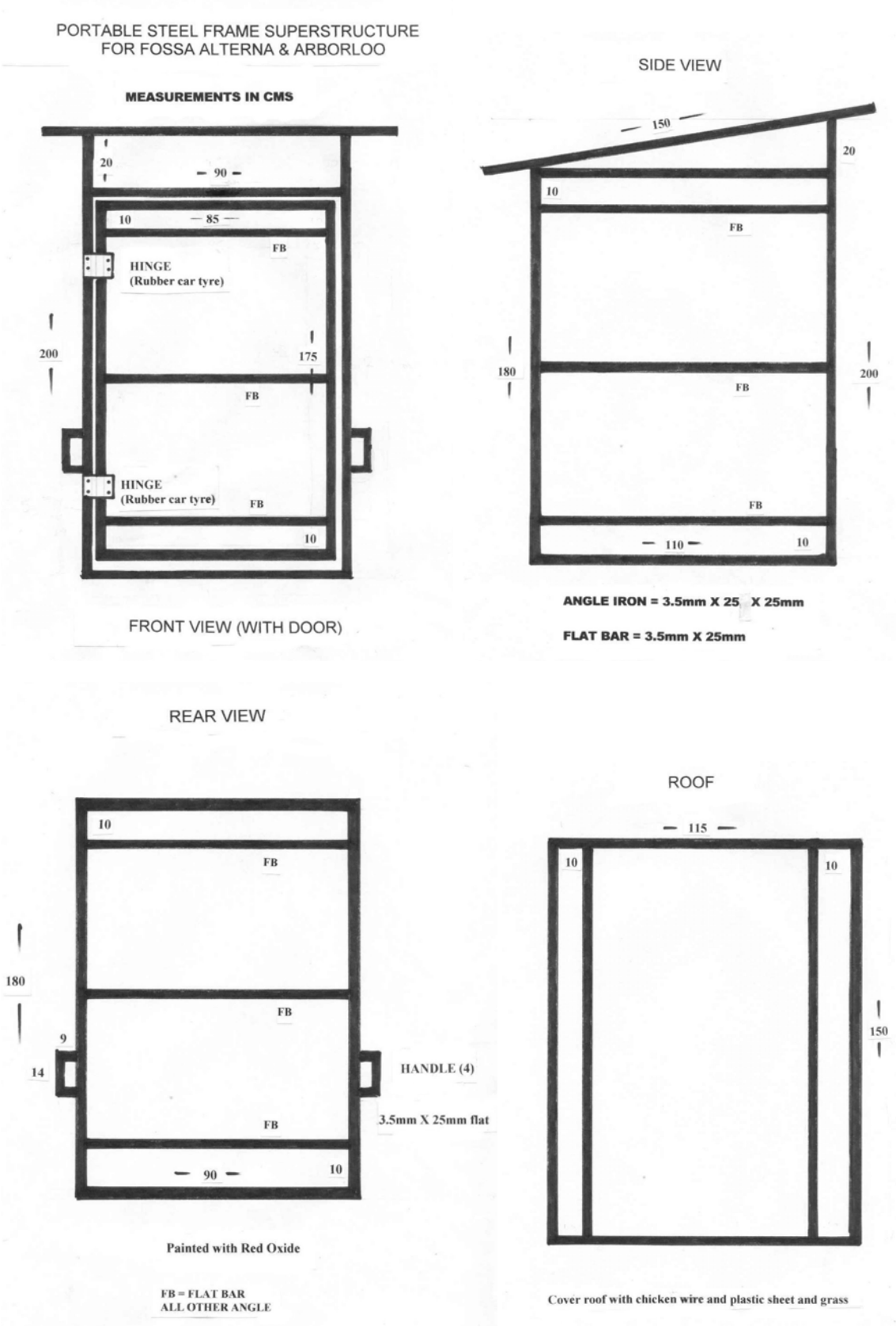
Rear view of structure and close up of carrying handle and rubber hinge


Close up of hinge and carrying handle and arrangement of steel work.


Close up of upper parts of the frame and roof


The asbestos pipe passing through the roof and a neat seat made from a bucket and concrete work only.

The frame dimensions



6. Hand washing devices

Hand washing facilities are vital if any hygienic value can be expected out of a toilet system. Hand washing is perhaps the most vital part of the process of improving personal hygiene. In fact hand washing is essential if an improved state of health is to be achieved in relation to toilet use. So all eco-toilets (and any other toilet) should be fitted with a simple hand washing device. There are several ways of making them.

1. Using a 5 litre plastic oil container and pill bottle.

In this design a discarded pill bottle and an old 5 litre plastic oil container are used.

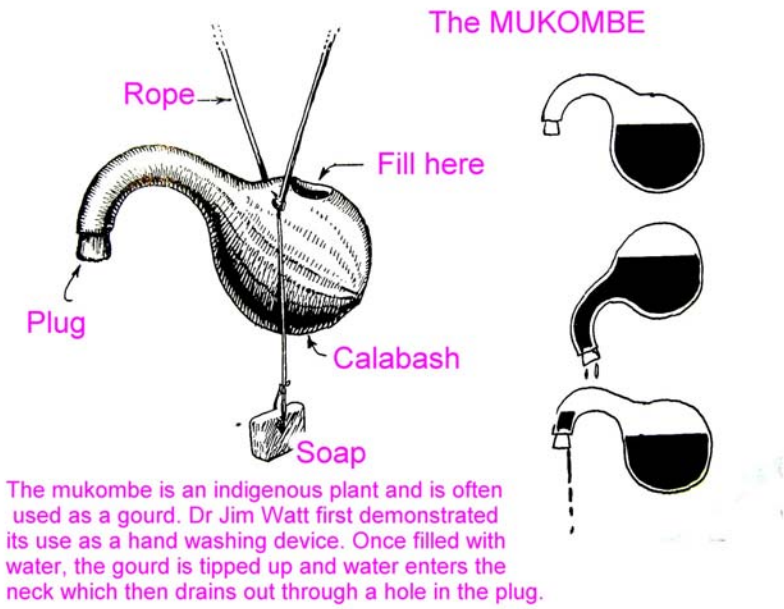
Hand washing device made from an old 5 litre oil container and pill bottle

The pill bottle is chosen to fit into the neck of the oil container. Cuts are made in the pill bottle lid and side wall as shown - one in the bottle cap, one in the bottle base and a 2mm hole is also drilled - see photo. The 5 litre container must be suspended on a wire or string so that it is balanced. A hole is drilled in the handle section and the container suspended on a wire placed through this hole.

The container is then thoroughly washed out and filled with water and the modified pill bottle

inserted in the neck of the container. When the water container is tilted forwards, water will flow into the pill bottle through the cut made in the lid and slowly drain out of the small hole. The second opening in the pill bottle allows air out of the bottle whilst water is entering. Otherwise there would be an air lock. The small amount of water released is sufficient to wash the hands - one or two charges may be necessary. There are several variations on this theme of putting together a novel hand washing device using discarded plastic containers. Local innovation is required. There is no end to the variation of design.

2. The Mukombe hand washing device



The mukombe is an indigenous plant and is often used as a gourd. Dr Jim Watt first demonstrated its use as a hand washing device. Once filled with water, the gourd is tipped up and water enters the neck which then drains out through a hole in the plug.

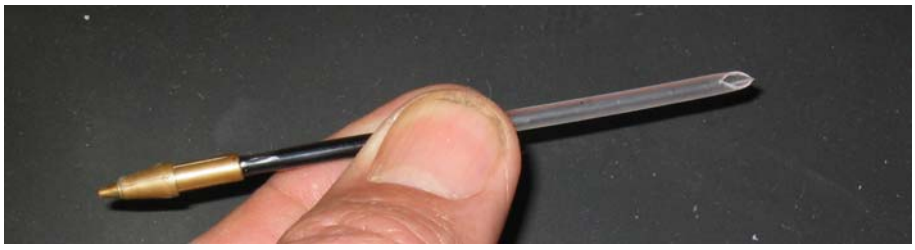
3. The milk bottle hand washing device

Another type of hand washing device made from a milk bottle. In this case the lower part of the neck of the handle is blocked off and a small hole drilled above this level. The device hangs on a string attached to a wire passed through the bottle. When the bottle is tipped up, water enters the upper side of the handle and drains out through the hole.

4. Making a hand washing facility from a plastic bottle and "ball point" ink tube.

The discarded ink-carrying plastic tube from an old "ball point" (biro) pen can be used here. A 50mm section is cut off with sharp knife at an angle. A 2 litre (or another size) plastic water bottle is taken with a screw top. The bottle should be round. A small hole is made in the lower part of bottle with a thin hot wire and then the plastic "ball point" tube is pushed through the hole. It should be a tight fit. The bottle is now suspended in some way - with wires or strings near the toilet. The bottle can also be laid on a shelf or laid on a hand washing basin. The bottle is filled with water. There are two ways of regulating the discharge of water through the "ball point" tube. The first way is to release the water by unscrewing the top and thus allowing some air in the bottle. This will release some of the water through the pipe. The water flow will stop once the top is screwed up tight again. The second way is to find a small wire, grass or thin piece of wood which will act as a stopper when placed in the "ball point" tube. This can be attached to a piece of string. Water is released by removing the stopper and replacing after hand washing is complete. It is a very simple and effective device which can be made at "no cost" since all the parts are "throwaways!"

Take a plastic bottle with a screw cap. Make a hole near the base with a hot wire. Next take an old used ball point ink cartridge. Cut a section at an angle about 30mm long. Push the section of ink cartridge into the hole. Experiment so it makes a tight fit. Fill the bottle with water, and close the cap. Water will be released when the cap is opened and sufficient to wash the hands. It is an economical way of using precious water to wash the hands which can carry disease. The pipe regulates the flow of water.



All hand washing devices should be provided in some way with soap or some other hand washing material like wood ash which helps to clean the hands properly. The soap can be suspended from a string passed and tied through a hole drilled or cut through the soap.

Clean hands for Health!