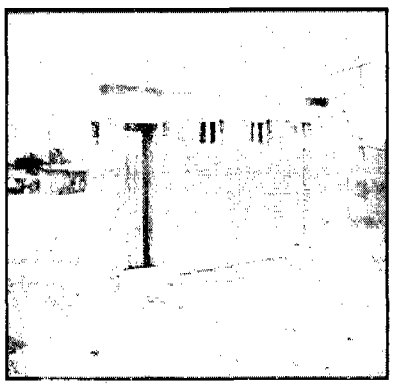
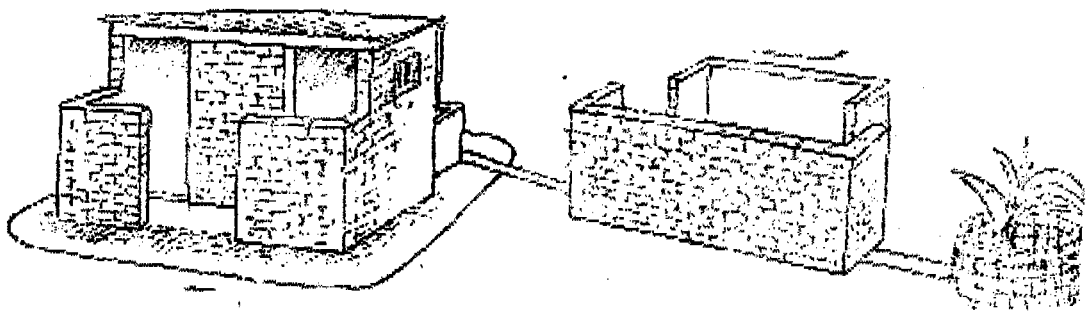
SCHOOL WATER SANITATION AND HYGIENE EDUCATION



MANUAL FOR PLANNING, CONSTRUCTION AND SUPERVISION OF FACILITIES

School Water Sanitation and Hygiene Education:



A Manual for

Planning, Construction and Supervision of

Facilities

unicef

For every child
Health, Education, Equality, Protection
ADVANCE HUMANITY

Government of
MALAWI

Acknowledgments:

This is a practical manual, and many people participated in its composition.

Of course this manual is a result of the mid term review of the School Water Sanitation and Hygiene Education project conducted in July 2004. The participants are acknowledged in that report.

We would like to acknowledge the following people who were active in compiling this manual:

In **Nkhata Bay District**, we thank the District Team, namely the Project Coordinator Mrs Matayataya, the District Education Manager, Mr B Banda; the District Building Supervisor, Mr S Kalua; the Director of Planning and Development and the Project Management Chairperson mr H Chipeni, and the District AIDS coordinator Mr P Kajani.

The following freely contributed their vast knowledge and experience for 5 days: Mr F Nkhonjera of Chinteche, Mr J Thawe of Nkhata Bay Boma, and Mr N Kamanga of Usisya. A big thank you!

In **Kusungu District**, we were assisted by the Project Chairperson, Mr A Nyasulu, and Mr Isaac Phiri who showed us around and introduced us to several builders with experience in the construction of school facilities. A special thank you to Mr J Moloko, the District building Supervisor who assisted us in both Kasung and Nkhata Bay Districts.

In **UNICEF**, we got valuable feed back from Mr S Muthar and Mr A Kudzala, who also supported us in our field work. And Jane Mlota for her kindness.

Vic Kasinja was an essential part of the team. He produced original artwork is an integral part of the manual and represents days of field work and hours of discussion. He also copied – and greatly improved – artwork from the WASHE latrine construction handbook from Zambia.

J DeGabriele

May 2005

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FORWARD

It is tempting to supply facilities on a needs basis. Most schools need hygiene and sanitation facilities, and it is not possible for a District to address all these needs at once. Supplying schools with facilities that they are unable to manage is a waste of resources that could be better allocated to schools that are better prepared. While all schools may be sensitised, the selection process should identify schools that have applied to the District and are prepared to participate in the planning and construction of facilities, in their management, and in the education of the pupils in the proper use of the facilities.

This manual serves to assist the following in the planning, construction and supervision of school hygiene and sanitation facilities:

1. ***The District***
   - To target those schools and communities that are most likely to benefit by meeting the necessary criteria
   - To provide guidelines for standardised designs and options facilitating planning, budgeting, construction and supervision.
   - To cut unnecessary expenditure by applying lessons learnt, and improve quality.
   - To budget more accurately, and plan better for purchases or provision of materials to schools in order to speed up construction
   - To use in the training of local artisans
   - To supervise planning and construction activities, at various levels: District Building Supervisors, PEAs, Extension Workers, and Teachers.
2. ***School committees and parents***
   - to decide on the number of facilities and the various options available
   - to plan for mobilisation of communities to provide resources such as skills, materials and finance
   - to request for assistance from the District communities cannot provide
   - to supervise all stages of the planning and construction process, ensuring that the layout, design and specifications are followed and resources are used properly.
   - To enhance knowledge and skills in order to improve sanitation facilities at community and household level.
3. ***Builders***
   - More detailed designs and layouts will reduce unsuitable facilities.
   - Detailed bills of quantities and labour requirements will help them manage resources better, and realise a profit that can be calculated.
   - Detailed specifications will lead to consistent, better quality construction.

This is a Malawian manual, reflecting Malawian experience in School Water, Sanitation and Hygiene Education, as well as reflecting our aspirations. We hope that it can also contribute to the International learning experience.

1 Planning Preparation and Supervision

This section provides guidelines for the proper planning, preparation and supervision.

1.1 School selection criteria

It is tempting to supply facilities on a needs basis. Most schools need hygiene and sanitation facilities, and it is not possible for a District to address all these needs at once. Supplying schools with facilities that they are unable to manage is a waste of resources that could be better allocated to schools that are better prepared. While all schools may be sensitised, the selection process should identify schools that have applied to the District and are prepared to participate in the planning and construction of facilities, in their management, and in the education of the pupils in the proper use of the facilities.

This section provides some guidelines in order to identify those schools that have a need as well as the capacity to participate. These criteria are actually indicators of existing attitudes and practice, and hint at the likelihood of good participation by the school and community. These indicators should be further explored and developed with the District Assemblies and the education authorities (DEM and PEAs).

1. There should be a water point within 500 meters that the school and community are maintaining very well.
2. Implementation of some low-cost SSH activities have already begun. i.e. there should be some completed traditional pit latrines, preferably fitted with sanplats, and good roofing.
3. The formation of a democratically elected and gender balanced parents-teachers association and school management committee according to guidelines of the Ministry of Education
4. Willingness of school committees and communities to contribute financially (for example to purchase the bib taps and buckets), as well as time (to plan, manage and supervise), and resources (such as bricks and sand).
5. Understanding, willingness and ability to maintain the facilities.
6. Agreement by at least three teachers (at least one female teacher) to take on responsibilities for planning, and supervising construction activities as well as maintenance and for hygiene education in the school.
7. School drop out rates. Better facilities may be able to retain children, especially girls.
8. The school going cohort. If the make up of the age groups of the school going children does not reflect that of the catchment area, then there may be a problem in attendance or retention.
9. School population; the District can target the more congested schools first, as these have more serious hygiene and sanitation problems.
10. Existing involvement of students in School Sanitation and Hygiene promotion.
11. Willingness from school, communities and students to sign a contractual agreement.
12. A Teachers' Development Centre – for demonstration purposes

Sensitising the schools in the area, awareness of the activities and the selection criteria.

All schools in the targeted areas should be sensitized prior to conducting the selection exercise.

The schools can make formal applications including statements of why they should be included, what they have achieved and what they are already doing and what they can contribute in terms of financial and material resources (eg bricks, sand, water, taps, etc) as well as teachers' availability and willingness to supervise cleaning of facilities and hygiene education of the pupils. The school should also outline plans on how to maintain facilities, source funding for ongoing maintenance, etc.

If schools have not made the criteria, they should be advised on how they can improve, and apply once they have made some achievements.

A school selection score sheet is given in Annex A

1.2 Contracts with the School Committee

Once a school has been selected for assistance in the construction of sanitation and hygiene facilities, the school committee and community need further mobilisation. A demand driven, rights based approach means that communities have obligations as well as rights.

In submitting its proposal to the District, the School Committee should outline in detail what the community (including the school) is able to contribute in terms of labour and supervisory input.

Conditions and mutual obligations of the school and the district need to be carefully explained and understood. These conditions and obligations form the basis of the contract between the school and the District (an example of a contract is given in Annex B).

The basic conditions and obligations include:

The obligations of the school committee and community:

1. Participate actively and provide leadership at all stages of the intervention.
2. Assume ownership and full responsibility of management and maintenance of all the facilities and the school environment.
3. Participate in community mobilisation, provide the requested materials and supervise the construction without expecting any payment or allowances.
4. Supply sufficient quantities of bricks other locally available materials, such as sand, as well as a specified cash contribution for the purchase of bib taps and buckets; no construction work will start until agreed materials are on site and the taps are purchased. Materials that cannot be sourced locally shall be requested.
5. Provide labour for specified activities
6. Participate in improving the health status of the pupils by learning about relevant disease transmission routes and how to prevent diseases, and to teach these to the pupils.
7. Supervise construction and provide security for the materials and equipment during construction
8. Take full responsibility of management and maintenance of the facilities.

The obligations of the District are:

1. To assist in the construction of the requested facilities on verification of materials on site.
2. Provide materials that cannot be sourced locally. These materials should be of the specified quality and quantity and shall be delivered in a timely manner.

3. Provide training to active school committee members in the planning, supervision and maintenance of facilities.
4. Provide training to teachers to educate pupils on proper use and maintenance of facilities, and on hygiene and sanitation education
5. to provide technical advise to the community in order to properly supervise construction activities.

1.3 Participation: Stakeholder roles.

The table suggests the inputs of the various stakeholders at the various levels of planning for the Facilities. Details should be negotiated between the school and district at the very early stages of contact.

Activity	Suggested stakeholders involved
Sensitising schools in the District	Area executive Committees, Village Development Committees, Extension Workers, Primary Education Advisors, Head teachers /School managers
Application of the school to the District	PTA, School Committee, head teacher, parents
Selection of Schools	District Assembly, DEM, PEAs
Mobilisation of school	VDC, PTA, School Committee, Village Leadership, PEA
Contract details (including obligations of school and district, including materials, labour and supervision)	School Committee, PEA on behalf of DEM
Labour – specific activities such as brick moulding, collection of sand and stones, etc	Community, VDC, School Committee
Collection of finances	PTA, school committee, traditional leaders, community.
Assessment and Verification of resources (materials and finances)	PEA, District Building Supervisor / or District Environmental Health Officer, and builder.
Siting and Planning of layout of facilities	Male and female pupils, male and female teachers, Health Surveillance Assistant, Community Development Assistant
Budgeting	School Committee, PEA, District Building Supervisor
Organising Labour input (paid and voluntary)	School Committee, PEA, District Building Supervisor
Identification of builders	School Committee, PEA, District Building Supervisor.

Note, many of these activities should be combined in order to avoid unnecessary travelling expenses.

1.4 Improving existing facilities

A major lesson learnt is that the existing facilities can be improved at no or little cost while the new facilities are being planned and constructed. This is a worth while exercise as it make take many months before the new facilities are constructed. This is also a lesson for the school and community: the focus should not be on the facilities, but how the facilities are used and managed.

Improvements to traditional pit latrine could be done by improving roofing by adding more thatching, smearing the floor and walls with new mud; improving security and privacy.

If urinals do not exist, then temporary ones made from materials such as grass or bamboo can be constructed.

Hand washing facilities can be made using 5 litre jerry cans, or pots.

The improvement of these facilities also gives the chance for the school to set up management structures for the construction, management and maintenance of the new facilities. It will also allow children to practice good sanitation and hygiene as early as possible. It will also reinforce the truth that good hygiene and sanitation can be practiced using traditional structures made from local materials.

1.5 Selecting the required facilities – type and number

One of the lessons learnt from school sanitation and hygiene promotion is that two latrines for each class (one for boys and one for girls) are in excess of requirements. This is because most children do not defecate at school, and also the provision of urinals reduces the stress on latrines. Four latrines for boys and four for girls should be sufficient.

Teachers should always be provided with latrines, one for males and one for females.

This gives a recommended package, for the average school, of 4 double pit latrines and two single pit latrines.

1.6 Resource Assessment and Verification

Before the district allocates resources and labour to a school, a resource assessment and verification exercise needs to be carried out. This is to ensure that the materials required as a contribution for the work (eg bricks, sand, etc) are of sufficient quality, quantity, are on site, and are actually allocated for the hygiene and sanitation facilities.

Resource assessment means that before the community undertakes any work such as moulding bricks, collecting sand, or stones, they should visit various locations with a qualified builder in order to assess which locations have the required resources of good quality.

The ***verification exercise*** should be carried out by a Primary Education Advisor, with input by a Community Technical Advisor, and the participation of the school committee.

1.7 Planning layouts

The planning of a layout for the sanitation and hygiene facilities is very important, and should be done at an early stage, while the type and number of facilities is being discussed. The planning exercise should be carried out by the school committee with input by the PEA, Health Surveillance Assistant, and Community Development Assistant. It is essential that boys, girls and teachers have a significant input at this stage as they are the users of the facilities.

The following points should be considered in selecting the sites and the layout of the facilities:

- *Privacy, and discretion*; boys, girls and teachers have different requirements.
- *Water sources*. Water should be easily accessible at the school to fill the hand washing tanks and to maintain the latrines and urinals clean. On the other hand the latrines should not be a source of contamination for the water, and should be positioned downhill, and at least 30 metres from the water source.
- *Access*. Hand washing facilities should be as near as possible to the latrines and urinals to encourage hand washing.

- *Security* of the facilities should be considered in order to avoid vandalism (ie people abusing facilities), or putting girls at risk.
- *Drainage* should be considered so that any natural slopes are taken advantage of in order to facilitate drainage of waste from the hand washing facilities and the urinals.
- *Space*. Schools with land to spare can take advantage of the fertilising properties of urine to grow trees or fruit such as bananas. The proceeds from the sale could be used to maintain the facilities.

(see checklist annex E)

A typical layout would be to have two double blocks, with the hand washing facilities between and behind the latrines, and the urinals at the back. This results in efficient use of space.

It is useful to have a practical exercise at school level or zone level, using bricks, in order to visualise the layout

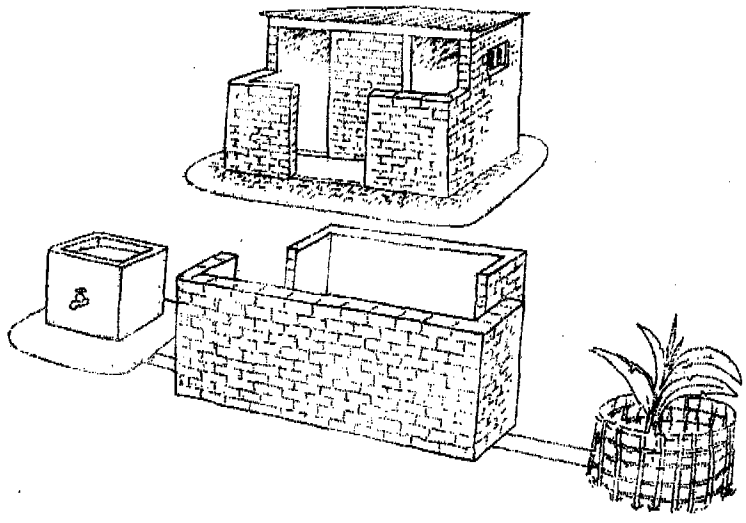


Figure 1: Typical layout of facilities with a stand alone latrine, hand washing tank and urinal

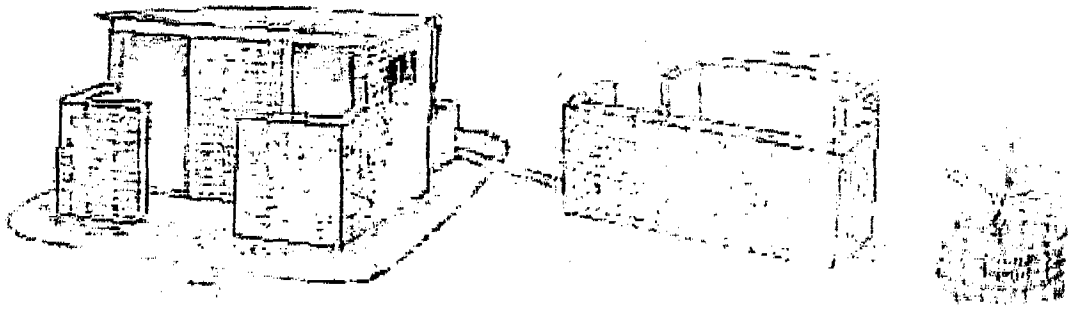


Figure 2:Arrangement of inline facilities: latrine with rain water catchment for the hand washing tank, and in line urinal.

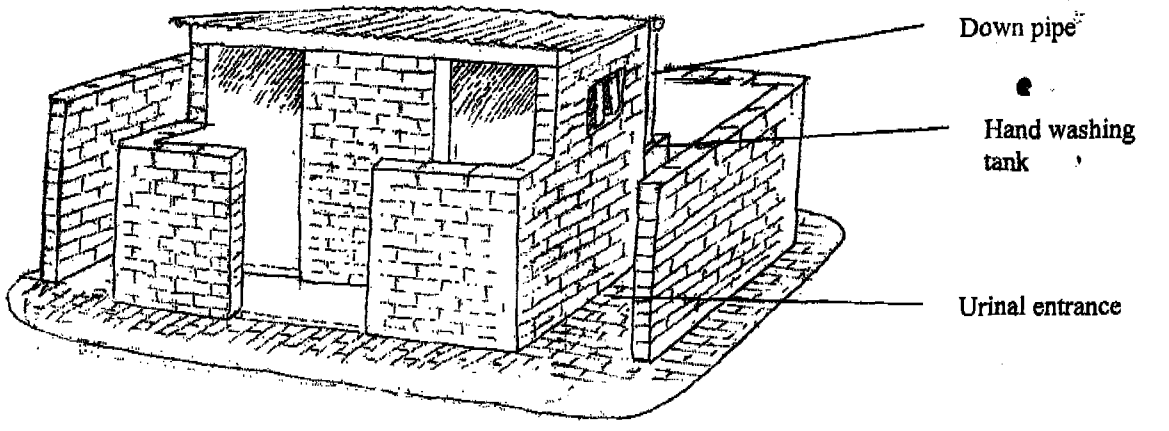


Figure 3:Typical layout of integrated latrine with rain water collection, hand washing facilities and urinal

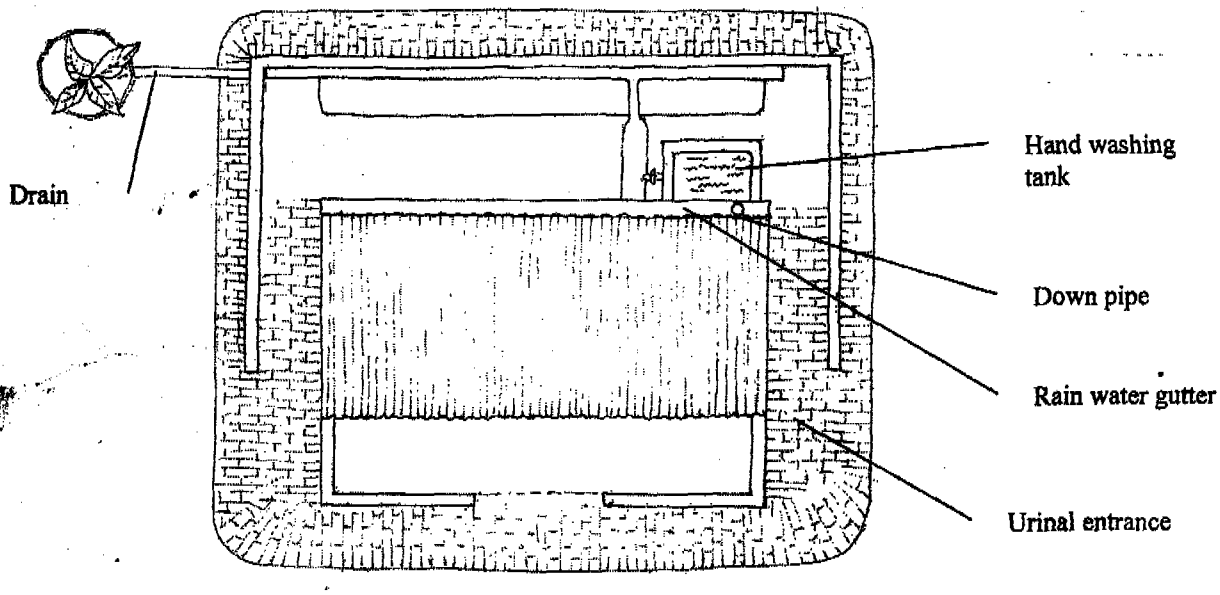


Figure 4:Floor plan of integrated latrine with rain water collection, hand washing facilities and urinal

1.8 Qualifications of Foremen, Builders, Labourers, and Supervisors

In order that the work is conducted to a good standard, it is recommended that those involved should have the following minimum qualifications. Following these guidelines should assist in selecting a workforce in a transparent manner, based on qualifications.

Foremen

The foremen are to be local – ie not central, but this does not mean that they have to be form the school catchment area. In calculating the labour input it is assumed that the foreman will also build.

In order to ensure good quality construction, the foremen should have at least the following qualifications:

- Should be in possession of a builder's trade test certificate, at least grade 3.
- At least 3 years experience
- Should show examples of work done
- Should be able to describe the different mortar and concrete mixes, as well as curing describing the curing process
- Should be able to read the simple drawings and the dimensions
- Should agree to the Bills of Quantities that will form part of the contract.

Builders

Builders should be literate and have relevant building experience.

Labourers

In making its application to the District, the school committee should specify the volunteer labour it is willing to contribute towards the work. Such labour can include digging of pits, hauling of water, and carrying of materials directly to the site.

However, builders will require the input of full time labourers for such activities as mixing mortar, and carrying bricks.

Labourers can be recruited from the school catchment area in order to build capacity and empower people economically.

People recruited as labourers should be willing to work regular shifts and regular hours.

Supervisors

Good supervision ensures that the facilities will be of the required standards. There are many experiences of work that has been done to a poor standard because of lack of supervision.

Supervision is essential at all stages of the construction process, from the verification of materials on site, to ensuring that the proposed site of the facilities meets the required criteria, and the final commissioning of the facilities.

Supervision should be done as much as possible by people in the locality, and involve the teachers, the HSAs, CDAs, PEAs, etc. Training should include both specification checklists (see annex E) as well as a discussion on the various supervisory roles. In the tables indicating labour requirements, supervision requirements are also indicated with suggested roles.

This type of local supervision is essential, but the drawback is that because it is conducted on a voluntary basis, the quality of supervision may not be guaranteed, the supervision may not be carried out consistently, and the supervisor is not accountable.

Gender issues

The hiring of suitably qualified and able women at all the above levels is to be encouraged. In particular the District should encourage the training of women as masons as part of the ongoing activities, as this will improve business opportunities for women, as well as broaden the skill base in the communities to construct facilities at household level.

1.9 Notes of costs and budgeting

Due to the high inflation rate in Malawi, and the variations in costs in different parts of the country, tables have been included to assist Districts and school committees to calculate cost of materials and labour using local rates.

In order to give an example of the costs of constructing the facilities some indicative costs have been included: these materials and labour costs are based on quotations from Lilongwe City, May 2005, with an exchange rate of MK120.00 per US$1.00

Note that in calculating costs of materials, transport costs, and on loading and off loading, should be included where necessary.

Basic materials costs

Costs for the basic materials (not including transport) are:

- Bricks at MK 1200 per 1000 bricks
- River Sand at MK 500 per ton, or MK35 per wheel barrow
- Dambo Sand at MK 300 per ton, or MK20 per wheel barrow
- Quarry stone at K900 per ton, or MK75 per wheel barrow
- Cement at MK 1300 per 50kg pocket
- 6mm steel round bar, at MK475 per 12 m length
- Brick force, both 4 ½ and 9 inches are MK265 per 18 m length
- Corrugated iron sheets, 28 gauge, are MK120 per foot.
- Nails are at MK160 per kg.
- Rough sawn timber: 3x2 inches is at MK150 per 18 feet length, and 5x2 inches is MK250 per 18 feet length.

Other costs are included in Annex D.

Labour inputs include:

- Foreman and Builders at MK 200 per day, standard rate
- Labourers at Mk120 per day standard rate, although the community should contribute to some of the labour costs.
- Supervision: As much of the supervision is carried out by local stakeholders such as teachers, PEAs, there is no cost attached. Supervision by District based staff (Building Supervisors, District Education Manager, etc) need to be budgeted. If Community Technical Advisors are to be engaged they also need to be budgeted for.
- Other costs are on contract, such as joinery (making concrete moulds, roofing and doors), painting (whitewash and doors) and plumbing (threading pipes), at local rates.

A form in the annex D, indicates materials costs, and includes a blank column to assist the school in computing costs.

1.10 *Units of measurement*

In this manual the most common units of measurement are used. Generally, lengths are given in centimetres. Other items such as roofing sheets, nails, timber and plumbing are given in feet and inches because these are the sizes they are sold in.

The units used to measure materials are:

- Cement: 50 kg bags (2 bags per wheel barrow)
- Sand and aggregate: wheel barrows

Approximately, 1 ton of sand equals 16 wheel barrows, and 1 ton of aggregate is about 12 wheel barrows.

Note that the number of brick is approximate, as the size of bricks varies considerably. The number of bricks ordered needs to be increased to take into account broken bricks (*maduka*).

PART 2: CONSTRUCTION OF FACILITIES

2 Pit latrines

This manual is based on the average school package of 4 double latrines for the pupils and 2 single pit latrines for the teachers; the basic technology can be adopted in the community.

Two designs are presented: a double pit latrine and a single pit latrine. The design details are almost the same. The material and unskilled labour requirements of a single latrine are just over one half that of a double latrine. However in budgeting, it may be assumed that the requirements for one double latrine are the same as for two single latrines.

2.1 Summary of basic materials and labour inputs required

A summary for the Bill of quantities (BOQs) for the basic inputs (bricks, cement, sand, quarry, roofing, and labour requirements) are as follow:

Table 1: summary of material BOQs and labour inputs for pit latrines

	1 Unlined pit & slab	**1 Lined pit & slab**	**Basic super structure (single latrine)**	**Basic super structure (double latrine)**
Bricks	90	90	1100	2150
Cement (bags)	1 25	3.85	3.5	7
Sand (wheel barrows)	1.6	4.1	8	16
Quarry (wheel barrows)	1.1	6.7		
Other materials	1 length 6mm round bar	1 length 6mm round bar	1.5 roll brick force, 4.5" timber: 6 m 75x50mm timber: 4 m of 100x50mm 3 x GI sheets, 7 feet Nails, ½ kg 5" nails and ½ kg of roof nails ½ kg wire Sheldrite, 0.5 litre Wood preservative, 1 litre	3 rolls brick force, 4.5" timber: 11m of 75x50mm timber: 7m of 100x50mm GI sheets: 6 x 7 feet Nails, 1 kg roof nails, 1 kg 5" nails 1 kg binding wire Sheldrite, 1 litre Wood preservative, 2 litres
Skilled input (person days)	1.55 person days	2.75	7	14
Unskilled input (person days)	6.05 person days	7.25	13.1	19
Materials costs, total, MK	2347	6235	10773	21546
Labour costs, total, MK	1036	1420	2972	5080
Total cost of basic facility, MK	**3073**	**7655**	**13745**	**26626**

Therefore the total basic cost of a completed latrine (substructure and superstructure) is:

- One single latrine with unlined pit: MK16818 (or US$140)
- One single latrine with line pit: MK21400 (or US$178)
- One double latrine with lined pits: MK41936 (or US$349).

An average complement of 4 double latrines, fully lined, and 2 single lined latrines would cost a total of MK 210544 (or US$1754).

Labour requirements are split into skilled input (foreman and builders), and labourers, including builders' labourers and water drawers. Units of labour are given as person days. For example, 10 person days could mean one person working for 10 days, or 2 people working for 5 days each. If the time to set out a pit is noted as 0.1 days, this means that 10 pits can be set out in one day.

This table (and the more detailed tables in other sections) should guide the school and the district in planning the costs and acquisition of resources.

2.2 Substructure: Unlined pits

Unlined pits are suitable for stable soils, such as *katondo*. Constructing unlined pits results in considerable savings in resources (eg money, materials, time). However due to safety considerations, double pits should always be ined.

In order to save time, the slabs should be constructed as early as possible in order to allow proper curing.

Table 2: Detailed BOQ 1 for 1 unlined pit

substructure - for 1 unlined pit	bricks	Cement (bags)	Sand (wheel barrows)	quarry stone (wheel barrows)	Other materials:
footing course		0.25	0.25	0.5	
Collar	90	0.5	0.75		
slab		0.5	0.6	0.6	12m of 6mm round bar , binding wire
Total materials	**90**	**1.25**	**1.6**	**1.1**	• 12m of 6mm round bar • ½ kg binding wire
Total materials cost (MK)	**108**	**1625**	**56**	**83**	**575**

Table 3: Labour requirements are for 1 unlined pit:

component	Skilled labour – person days	Unskilled input – person days
Setting out	0.1	0.1
Excavation of pit	0.5	5
Construction of base ring	0.2	0.2
collar	0.5	0.5
slab	0.25	0.25
Total input	**1.55** person days	**6.05** person days
Cost of labour , MK	**310**	726

Labour requirements include casting 4 slabs per day (1 skilled builder and one labourer), but does not include curing. Curing can be done while conducting other activities.

2.3 Construction details for unlined pit

Step 1 Setting out

For a single pit, draw a circle of 45cm radius on the chosen site.

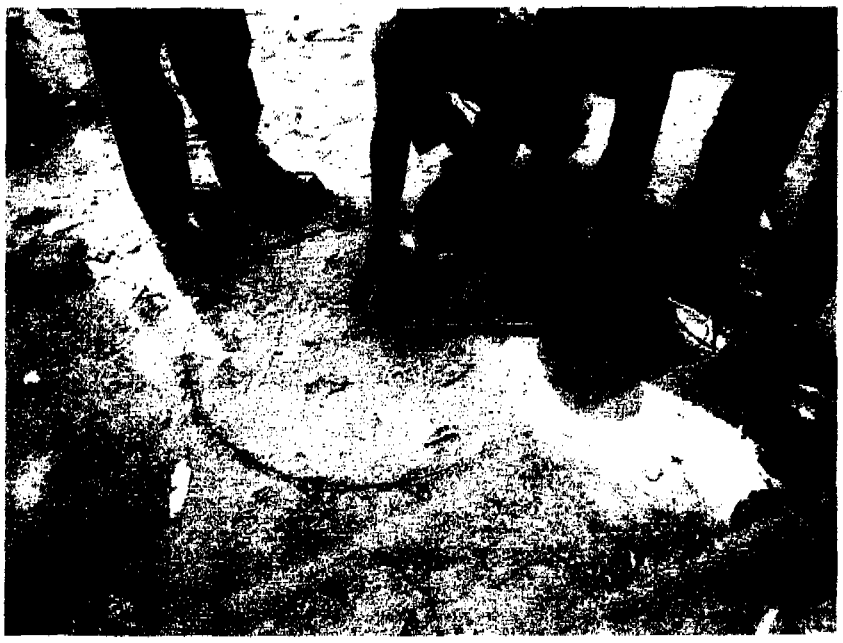


Figure 5: setting out a pit for excavation, radius is 45 cm

Step 2 Excavation

The pit should be excavated to a depth of not less than 3m. During construction a gauge stick of 90cm length should be used to maintain a constant diameter of the pit, and a plumb line (string and weight) to make sure that the pit is vertical. If the diameter of the pit is more than 100cm, then the slab will be too small.

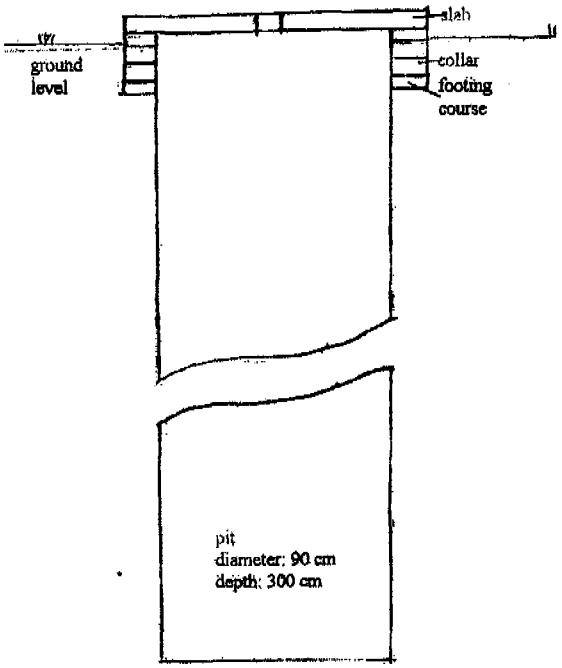


Figure 6: section of unlined pit showing construction details: footing course, brick collar, slab

Step 3 ***Concrete footing course***

The concrete base ring forms the base of the collar, and provides additional stability.

Once the pit has been excavated, the top of the pit can be further excavated to a diameter of 140 cm, and a depth of 30 cm.

A plywood shutter is made for the inner part of the ring, and concrete (1:2:4 mix) is poured in. A setting time of 24 hours is sufficient.

Step 4 ***Collar***

The brick collar rests on the footing course. The collar is made of 3 layers of bricks, using an English Bond (header, stretcher, header). Best quality burnt bricks should be selected for the collar. The cement mix should be 1:3.

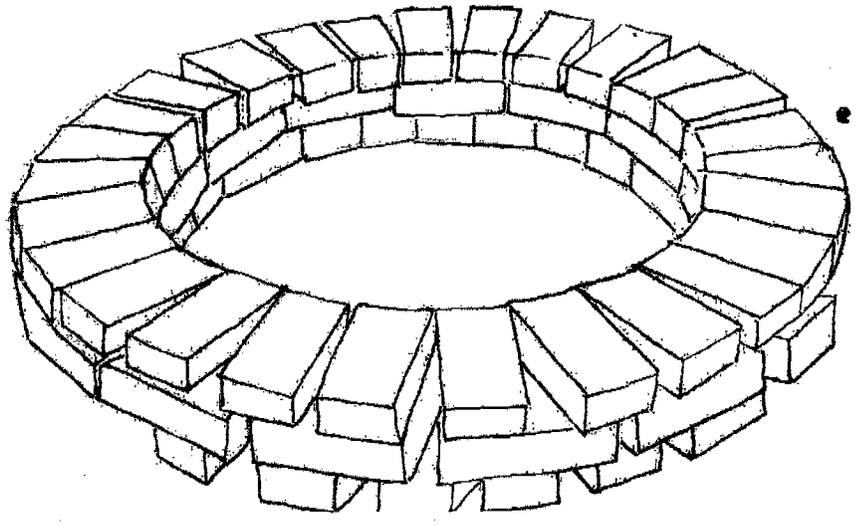


Figure 7: pit collar showing English bond

The inside diameter of the collar is 90 cm and the outside diameter is about 130 cm. On average, there should be about 26 headers on each course, and the stretchers are about 17 bricks on the outside and about 13 on the inside (total about 90 bricks).

Step 5 Slab

This section gives instructions for casting a round sanplat of 120cm diameter using a plastic mould.

- ✓ Select a flat surface close to the pit for casting the slab. It is best to select a shady place under a tree for casting. Level the area and compact the soil. Assemble the ring mould.
- ✓ Lay a cement bag paper on the compacted ground and place the ring mould on it. The cement paper will stop the soil underneath from absorbing the water from the concrete mixture, so the concrete will not dry too quickly. The concrete needs to be kept wet for 7 days to be strong; if it dries to quickly the slab will be weak.
- ✓ The concrete in the slab needs to be strengthened with reinforcing steel. For one slab, one length (of 12 meters) of 6 millimetre round bar is needed. (Total wire used for the sanplat is about 11.20 metres) It is to be cut to the following lengths as shown in the diagram me.
- ✓ Arrange the bars according to the diagram below. Most of the bars should be about 20 cm apart, but 2 0f the outer bars should be only 15 cm from the other bars. Putting reinforcing near the edges will prevent cracks from developing. The bars should then be tied together using pieces of binding wire about 15cm long.

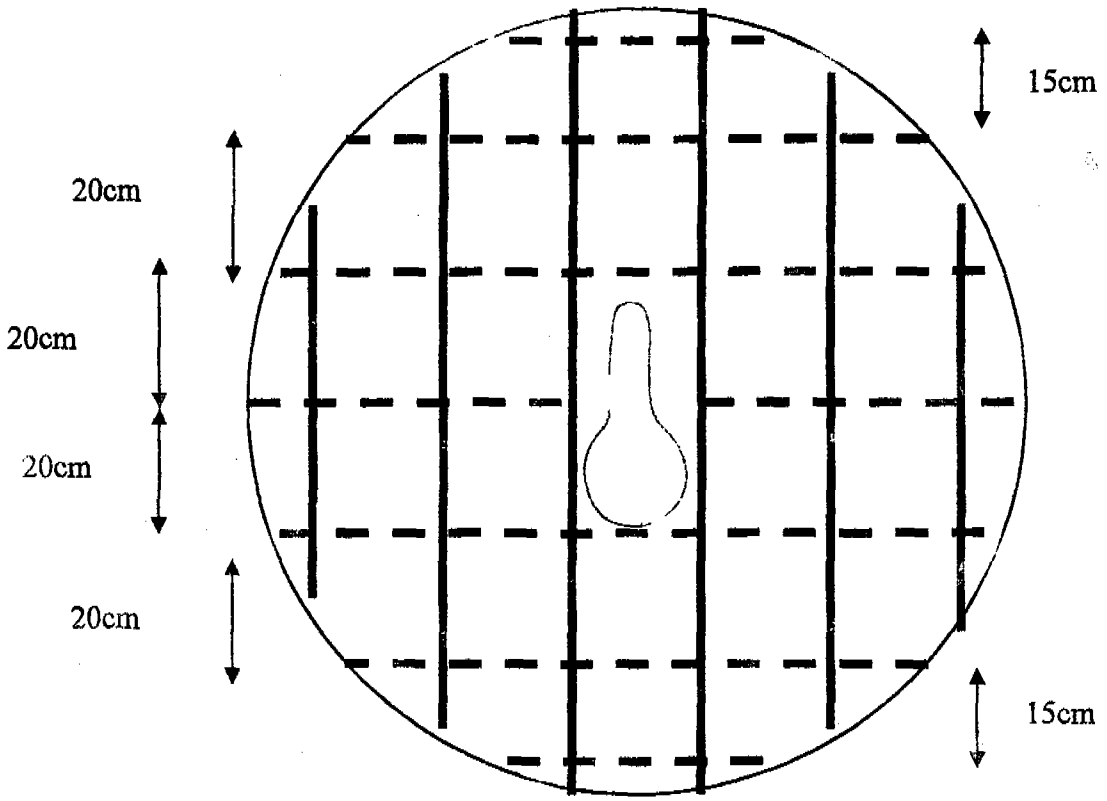
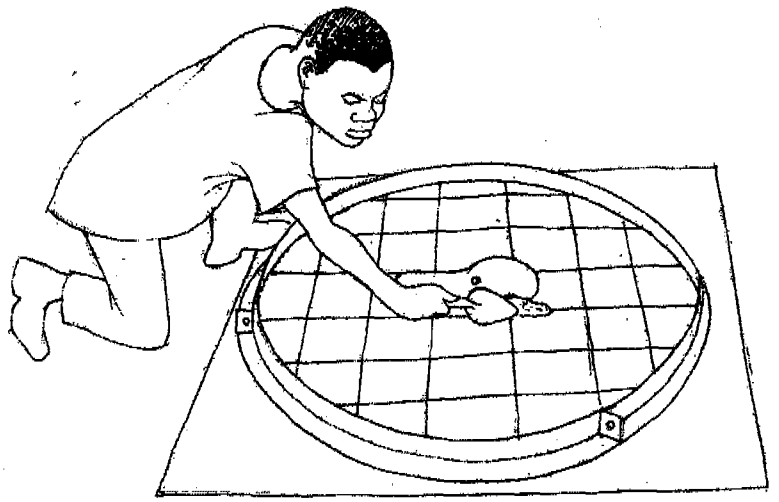
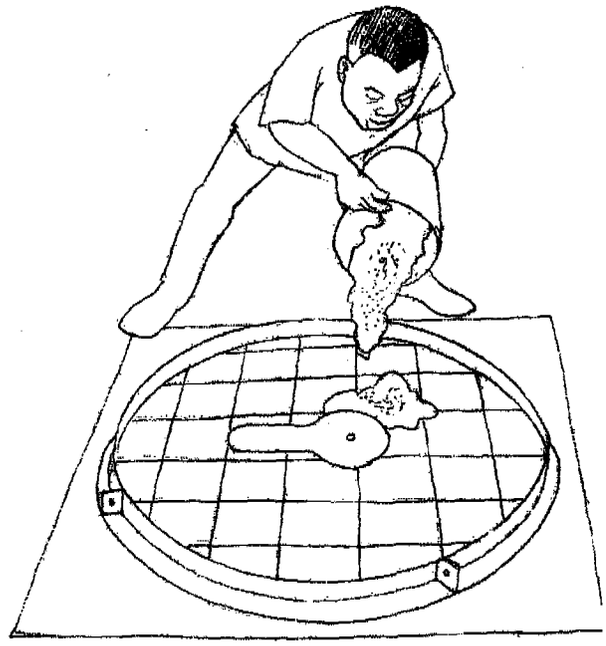


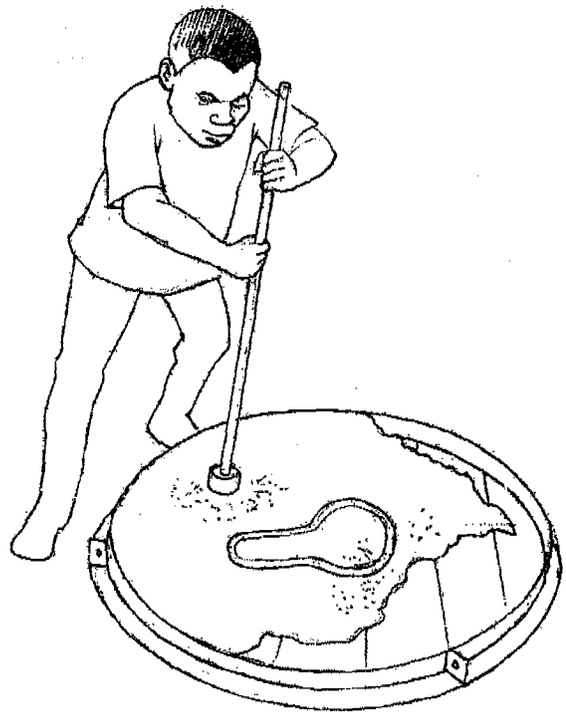
Figure 8: Arrangement of steel bars in sanplat mould

- ✓ Place the steel bars in the ring mould. The hole mould should be placed between the two bars marked "A"
- ✓ Small pieces of 20 millimetre (3/4 inch) quarry stone are placed inside the ring mould to act as spacers between the ground and the steel reinforcing wire.
- ✓ For one slab, the concrete is prepared by mixing half bag of cement, with half a wheel barrow of sand and half a wheel barrow of quarry stone. The mixture should be a little wet and not dry.



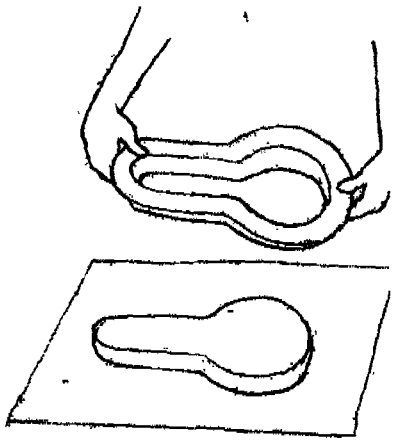
✓ Mix a small quantity of cement and sand by taking 1 shovel of cement with 3 shovels of sand. Pour the cement mixture about 2 to 3 centimetres thick all around the outer surface of the hole mould. This rich mixture of cement and sand will make the surface of the hole smooth. Fill the concrete mixture in the ring mould and compact it. Use a small stick to ensure all the air bubbles are removed form the sanplat.





- ✓ Place the hole cover mould. Make a mortar of 1 shovel cement and 3 shovels sand. Fill the hole cover mould with mortar, compact and make the surface smooth using a float.

- ✓ After one hour open the hole cover mould, and leave the drop hole cover for at least 6 hours to set and harden.



Step 7 ***Smoothing the surface***

- ✓ After 6 hours, or the next day, the surface of the sanplat and the drop hole cover can be smoothed. Special attention should be paid to the edges so as to make a good seal with the drop hole.
- ✓ Make a porridge of cement and water, and plaster the top surfaces with a thin layer. The sides of the drop hole and the drop hole cover should also be even and smoothed. Leave for about half an hour and then rub the sides smooth with a piece of cement bag paper.

Step 8 ***Curing***

- ✓ It is essential to properly cure the sanplat and the drop hole cover if they are to be strong. If curing is not done properly the sanplat will be weak and crack.
- ✓ Curing is done by keeping the sanplat and drop hole cover wet for at least 7 days. These should be left inside a building, or in the shade, covered with cement paper bags, and water should be poured on them at least in the morning and afternoon.

2.4 *Construction details for fully lined pit substructure*

Lined pits are necessary were there is unstable and collapsing soil structures, such as sandy soil or high water table.

For safety reasons it is recommended that all double pits should be fully lined with concrete rings and the distance between the centres of the circles when setting out is 160 cms, so that the minimum distance between the walls on excavation is 60cm.

Construction details are basically the same as for unlined pits, except that the bottom of the pit has a base ring, on which rest 6 concrete rings.

Because of the rings, the dimensions of the pit are different from that of an unlined pit.

- The pit diameter is 100cm
- The depth of the pit for 6 rings is 340 cms. (base ring, 10cm + 6 rings, 300cm, + footing course, 10cm, part of the collar, 20cm).

See the diagram below:

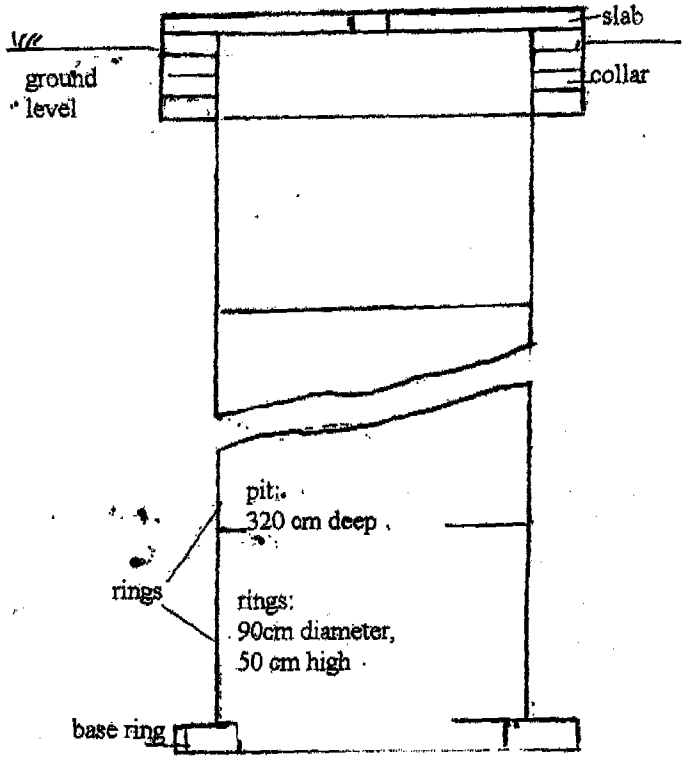


Figure 9: Detail of line pit

A summary of material and labour inputs is given below.

Table 4: Detailed materials BOQs for 1 lined pit

substructure - for 1 pit, lined with concrete rings	bricks	Cement (bags)	Sand (wheel barrows)	quarry stone (wheel barrows)	other materials
concrete base ring		0.2	0.2	0.4	
6 rings		2.4	2.4	4.8	0.5 l engine oil
footing course		0.25	0.25	0.5	
collar	90	0.5	0.75		
slab		0.5	0.5	1.0	12 m of 6mm round bar, binding wire
Total	**90**	**3.85**	**4.1**	**6.7**	• 0.5 l engine oil • 12 m of 6mm round bar, • binding wire
Costs (MK)	**108**	**5005**	**144**	**603**	• **775**

Total material costs are MK6635.00

Labour inputs are the same as for unlined pits but include the construction and lowering of rings. Labour is calculated on the availability of 3 moulds on a site, making 4 rings per mould. 60 rings would require 5 days to complete, not including curing time.

Table 5: detailed labour requirements for 1 lined pit

component	Skilled labour – person days	Unskilled input – person days
Setting out	0.1	0.1
Excavation of pit	0.5	5
Construction of base ring	0.2	0.2
Construction of 6 rings	0.5	0.5
Installing rings	0.5	0.5
Construction of footing course	0.2	0.2
collar	0.5	0.5
slab	0.25	0.25
Total input	**2.75** person days	**7.25** person days
Total labour costs (MK)	**550**	**870**

Labour costs total MK1420 per lined pit.

Note that the labour estimates do not include the time necessary for curing the rings as this can be done during other activities.

2.5 *Construction details for a lined pit substructure*

Step 1: Setting out.

Setting out for a single lined pit is similar to setting out for an unlined pit, except that the diameters are 50 cm instead of 45 cm.

The setting out for a double latrine, there are two circles of 50cm radius; the centres of the circles should be 160cm apart. This means that the minimum thickness between the pits is 60cm.

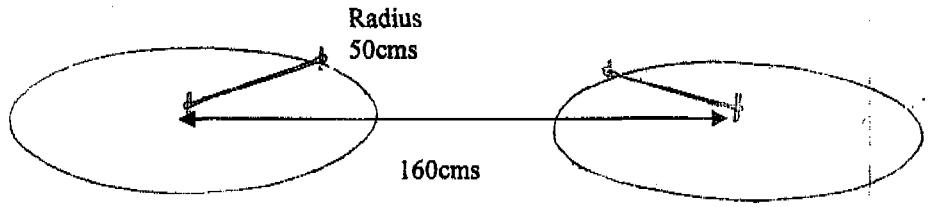


Figure 10: setting of double pits for excavation, pit diameters 100 cm, distance between centres = 160 cm

Step 2 ***Excavation:***

The diameter of the circle is 100cm to accommodate the rings (which are 90 cm diameter), and the pit should be 340cm deep for 6 rings. If more rings a required, the depth should increase in 50cm stages.

A stick gauge of 100cm should be used to make sure the diameter of the pit is accurate, and a plumb line (string with a weight attached) to make sure it is vertical.

Step 2 ***Base ring***

The base ring is important as the concrete rings will rest on it. It is constructed at the bottom of the pit using a concrete mix of 1:2:4. It should be 15cm wide and 10 cm thick. 1 bag of cement is enough to make base rings for 5 pits. Thin plywood is a suitable shutter.

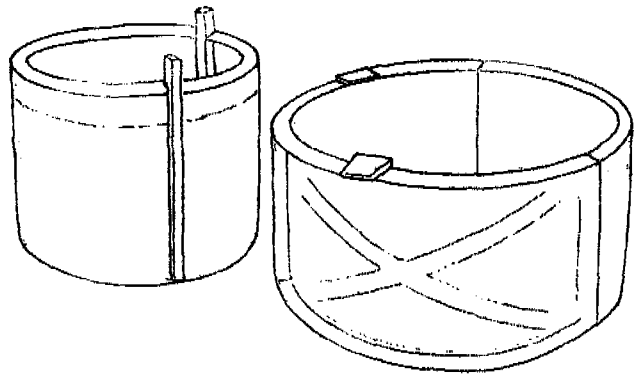
Step 3 ***Concrete rings.***

The concrete rings are 50cm high, and have an outside diameter of 90 cm. They are 5 cm thick. They are made in plastic moulds. The rings are made of concrete mix, 1 cement:2 sand:4 quarry. The sand should be clean and sieved, and the quarry should be sieved to 20mm. 2 bags of cement is sufficient to make 5 rings.

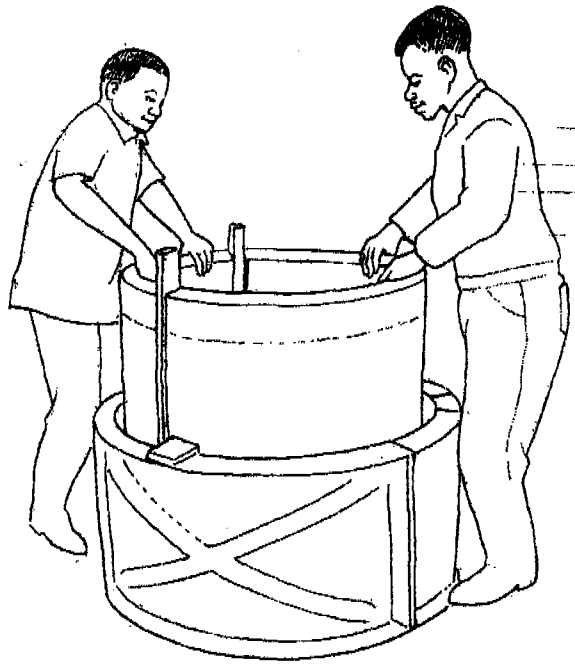
With three moulds, 12 rings can be made every day so that 60 rings would take 5 days to make. The moulds should be smeared with clean engine oil before pouring in the concrete. The moulds must be washed thoroughly clean after each application. The rings should be cured for 7 days, by keeping them in the shade, wrapping them with paper from the cement bags, or grass, or plastic sheeting, and wetting the rings morning and afternoon.

It is important to have sufficient holes in the rings in order to allow fluids in the pit to seep into the soil. These holes are made by putting in pieces of timber, 10cm thick and about 10cm in diameter at even spaces. Pieces of pine 2x2 inch are good for this job, as are pieces of bamboo. There should be 4 holes at the bottom level.

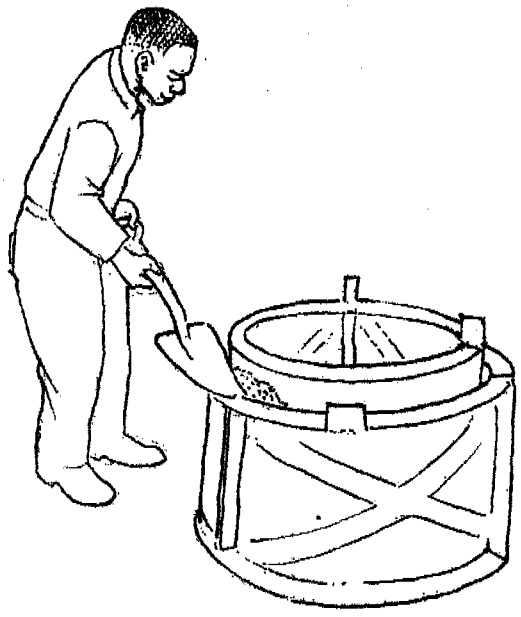
Once the rings have fully cured, the pieces of timber are removed.



1. The ring moulds should be smeared with release agent (such as clean engine oil) on the surfaces in contact with concrete.

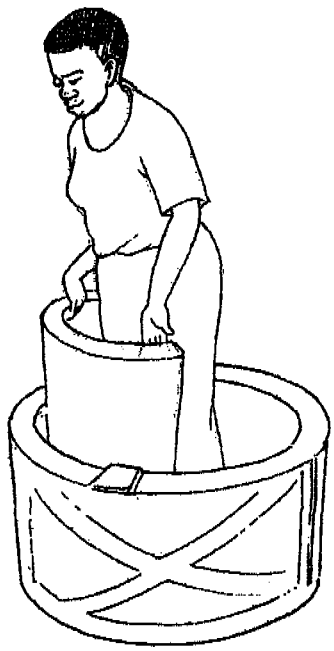


2. The mould should be assembled

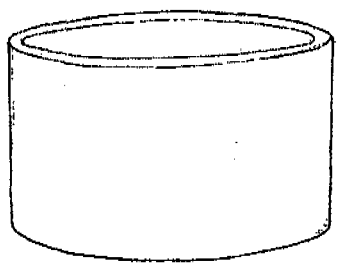


3. The concrete mix should be poured into the mould

4. The concrete should be compacted with a stick to remove any air gaps.



5. After 2 hours the separators should be removed and the mould may be removed, to be used to make another ring.



6. The ring should be kept wet and allowed to cure for 7 days.

Step 4 ***Lowering the rings***

Once the rings are fully cured they are lowered into the pit. Lowering process needs to be done carefully or the rings will break. After the first ring is lowered the space between the ring and the pit is back filled with soil and the next ring is lowered. Ensure that the rings are properly aligned. The space is backfilled after each ring is lowered. Complete the process until all rings have been lowered.

Step 5 The ***Footing ring*** and ***collar*** are made in the same way as described in the section on unlined pits. Finally the slab is placed on the collar, sealed with layer of mortar

2.6 *Latrine Superstructures*

This section deals with the latrine superstructures, the basic models being a single pit latrine with a blind wall and a double pit latrine with blind walls. Double latrines are suitable for pupils, while the single latrine design is suitable for teachers and household level.

Options include doors and washing facilities for senior girls.

The overall sizes (outside dimensions) of the latrines are:

- Double latrine: 285cm long, 235 cm wide, and 195 cm high.
- Single latrines: 150 cm long, 235 cm wide, and 195 cm high.

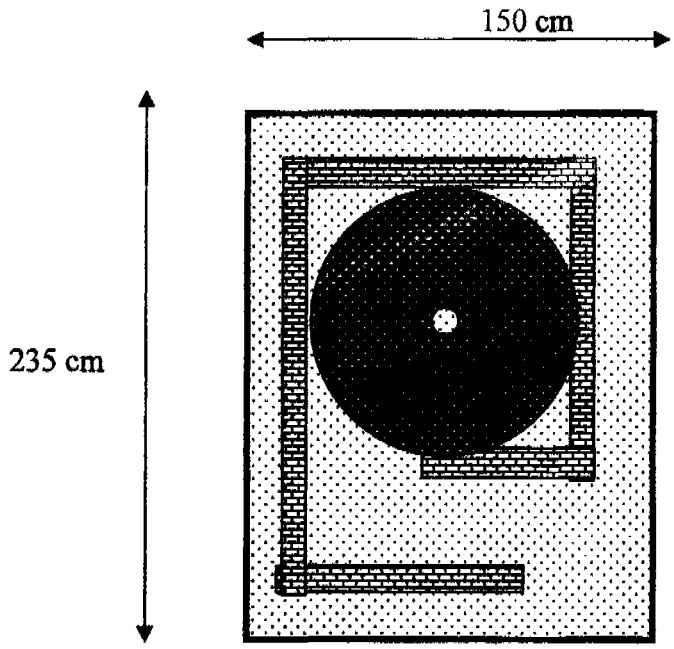


Figure 11: floor plan for single pit latrine with blind wall

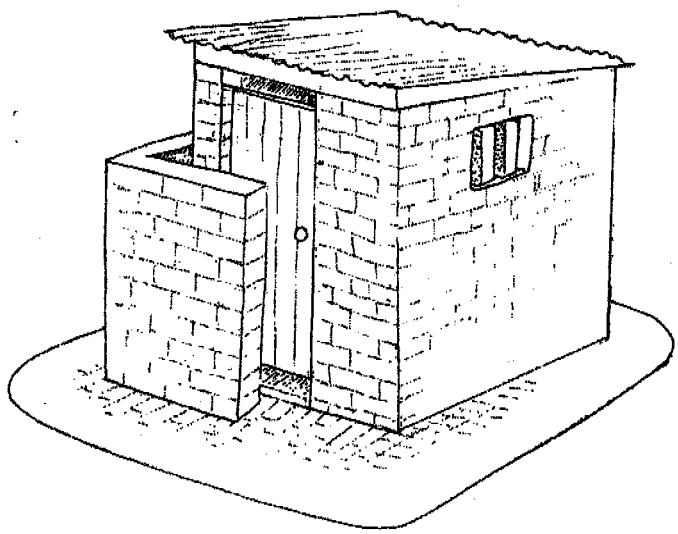


Figure 12: sketch of single latrine, with door option

Super structure floor plan: double latrine

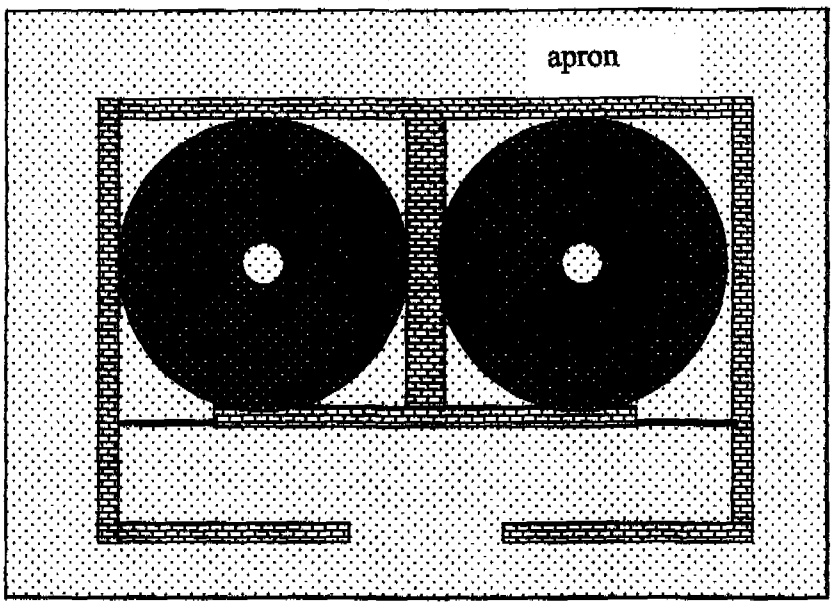


Figure 13: floor plan of double pit latrine with blind walls

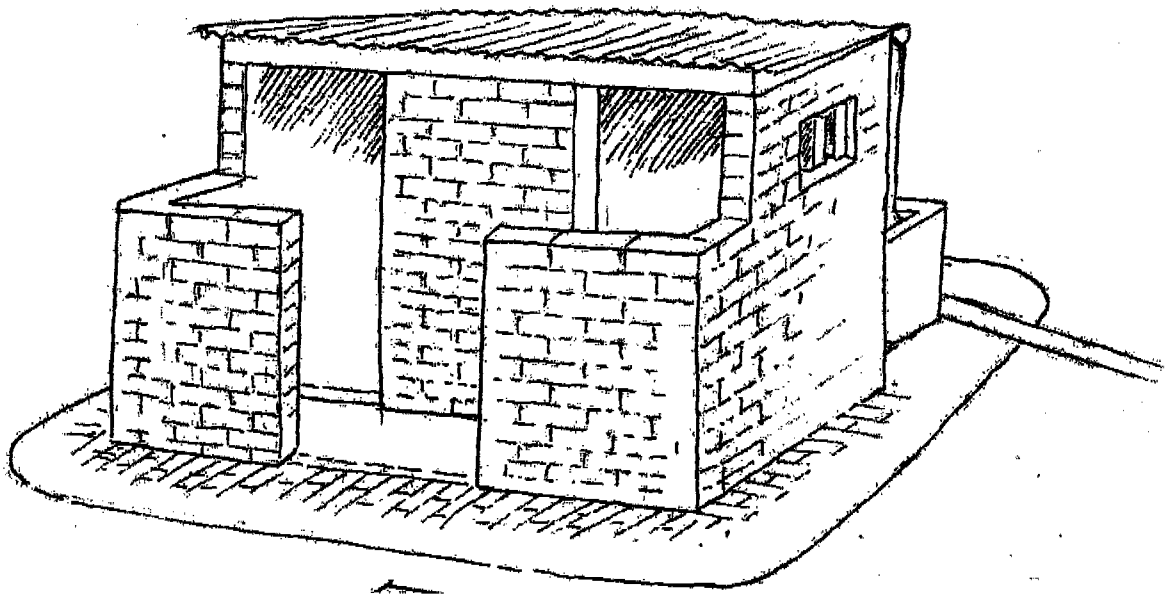


Figure 14: Double latrines with blind walls and rain water catchment facilities and attached hand washing tank

Table 6: Basic materials **BOQs for the superstructure:**

	Materials: **Basic super structure (single latrine)**	**Cost:** **Basic super structure (single latrine) MK**	**Basic super structure (double latrine)**	**Basic super structure (4 doubles and 2 singles)**
Bricks	1100	1320	2070	10350
Cement (bags)	3.5	4550	7	35
Sand (wheel barrows)	8	280	16	80
Brick force , 4.5" rolls	1.5 rolls	398	3	15
Termite proofing	0.5 litres	500	1 litre	5l
timber	17 feet of 3 x 2 12 feet 5 x 2	150 + 250	33 feet of 3x2 21 feet of 5 x 2	165 feet of 3 x 2 105 feet 5 x 2
Timber preservative	0.5 litres	500	1 litre	5 l
Roofing sheets	3 sheets, 7 feet	2520	6 sheets, 7 feet	30 sheets, 7 feet
Nails, wire	0.5 kg roof nails, 0.5 kg 5" nails 0.5 kg wire	125 80 100	1 kg roof nails, 1 kg 5" nails 1 kg wire	5 kg roof nails, 5 kg 5" nails 5 kg wire
Total materials cost of one basic super structure		**MK 10548**	**MK 21529**	**MK 107212**

Table 7: Summary of labour requirements for constructing pit superstructures

Skill level	**Persons days for** **1 single pit latrine**	**Person days for** **1 double pit latrine**
Skilled labour, person days	7	14
Unskilled labour, person days	13.1	19
Total labour costs, MK	**2972**	**5080**

2.7 *Detailed Bills of Quantities for one double latrine*

The following materials are required for the basic superstructure of a double latrine:

Table 8: Detailed BOQ for one double latrine superstructure

	bricks	Cement (bags)	Sand (wheel barrows)	other materials	Costs (MK)
footing	450	2	3		3275
walls	1120	2	6	4 ½ " brick force, 3 rolls	4949
plaster		1	3		1435
pointing		0.5	1		695
hard core	100	0.5	1		815
floor		0.5	1		715
apron	400	0.5	1		1195
purlings,				3x2, 3 pieces 4 m	300
rafters,				5x2, 3 pieces 2.5 m	500
GI sheets				6 sheets, 7 feet	5040
termite proofing				1 l	1000
wood preservative				1 l	1000
roof nails				1kg roof nails	250
wire nails				1kg of 5" nails	160
plain wire				1 kg of 8 gauge	200
total for one double latrine	**2070**	7	**16**		**MK 21529**

Total materials costs for the basic double latrine superstructure is MK21529.00

Table 9: doors

door frame, 70 cm wide, 200 cm high, and Door. LBB, 70 cm wide, 170 cm high	
Primer, Under coat, gloss.	0.25 litres per door
Hinges,	3 per door
Hasp,	1 per door
tower bolt	1 per door

Table 10: Detailed labour requirements for 1 double superstructure

	Skilled labour (person days)	Labourers (person days)
Setting out	0.4	0.4
Excavation	0.4	0.4
Brick footing	1.2	1.2
Walls	3.2	3.2
Plaster	1	1
Flooring	1	1
Pointing	3	6
Apron	2.2	4
Beam filling	1.6	1
landscaping	0	0.8
total person days	**14** person days	**19** person days
Total labour cost:	**MK2800**	**MK2280**

Total labour cost for a double latrine superstructure is MK5080.00

Contract costs:

Costs for the following contracts need to be estimated and negotiated according to local rates

- Carpentry: roof: MK1000 per double latrine
- Carpentry – doors: MK per door, including frame
- White wash: MK600 per double latrine
- Painting doors: MK300 per door

2.8 Superstructure Construction Details

Once the substructure has been constructed, the slab installed work may start on the superstructure.

Step 1 Setting out and excavation

The foundation needs to be set up according to the design floor plan.

The excavation work is carried out in preparation for the footing course, and the depth should be 20cm.

Figure 15: setting up a double pit latrine

Step 2 ***Brick footing***

This consists of 3 courses of English bond (header, stretcher, header). The mortar mix should be 1:3. The footing should extend all along the structure, even through the openings.

Brick footing

This consists of 3 courses of English bond (header, stretcher, header). The mortar mix should be 1:3. The footing should extend all along the structure, even through the openings.

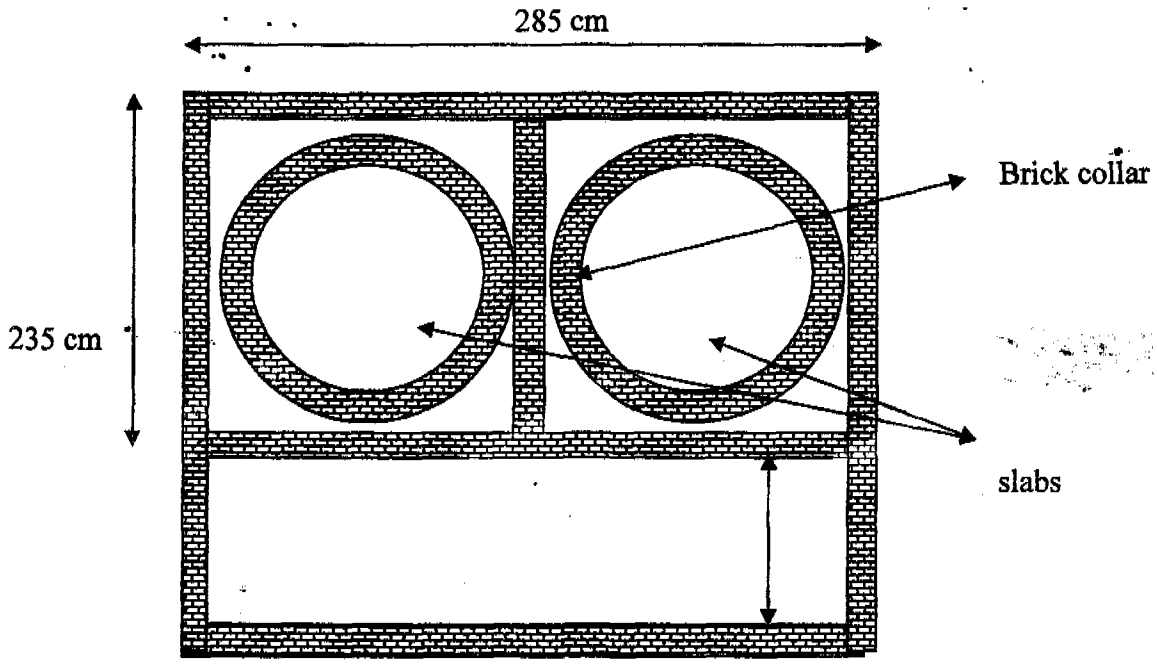


Figure 16: Plan for brick footing for double latrine

Step 3 ***Walls***

Brick work for the walls is single brick course. The termite course is 3 bricks, using a mortar mix of 1:3. The wall uses a mortar mix of 1:6.

For a double latrine, 3 rolls of 4 ½ inch brick force are required.

The walls need to be plastered on the inside using a 1:6 mix.

The outside should be pointed – tooled a tacked is economical and durable.

Step 4 ***Floor***

As the slab forms most of the floor, only the corners need filling in with a mix of 1:4, so little cement is required. The corners should be finished so that they slope towards the centre of the latrine, following the slope of the slab. This is to make sure that when the latrines are cleaned and washed then dirt can be swept into the drop hole.

A hard core forms the base of the entrance of the latrines, finished with a cement shine. The floor should slope outwards towards the outside entrance to drain rain water.

Step 5 ***Apron***

The apron is a very important part of the structure as it protects the latrine from erosion caused by rain. A pointed apron is more economical in use of cement.

Step 6 ***Roofing***

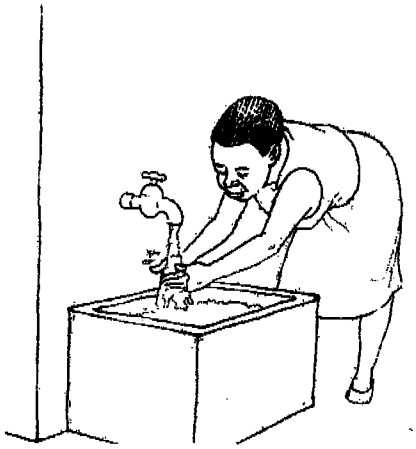
If doors are not chosen as an option, 210 cm (7 feet) iron sheets are suitable. If doors are an option, then 10 feet iron sheets can be considered in order to protect the doors from the elements and increase lifespan. The sheets should be 28 gauge.

Purlings should be 75 x 50 mm (3x2 inch) sawn timber, and rafters 100 x 50 mm (4x2 inch) rough sawn timber. The timber should be treated with solignum; note that in most cases the timber was treated with a pirate copy which is ineffective.

2.9 Options

1 Senior girls' washing facilities

These facilities can encourage girls to attend school even when they are menstruating. One of the double latrine blocks should be dedicated to senior girls, and either one or both of the latrines can be fitted with washing facilities.



The basic design of these facilities is a basin inside the latrine; water is fed through a small tank (similar in design to the hand washing tanks), situated directly behind the latrines dedicated for the senior girls.

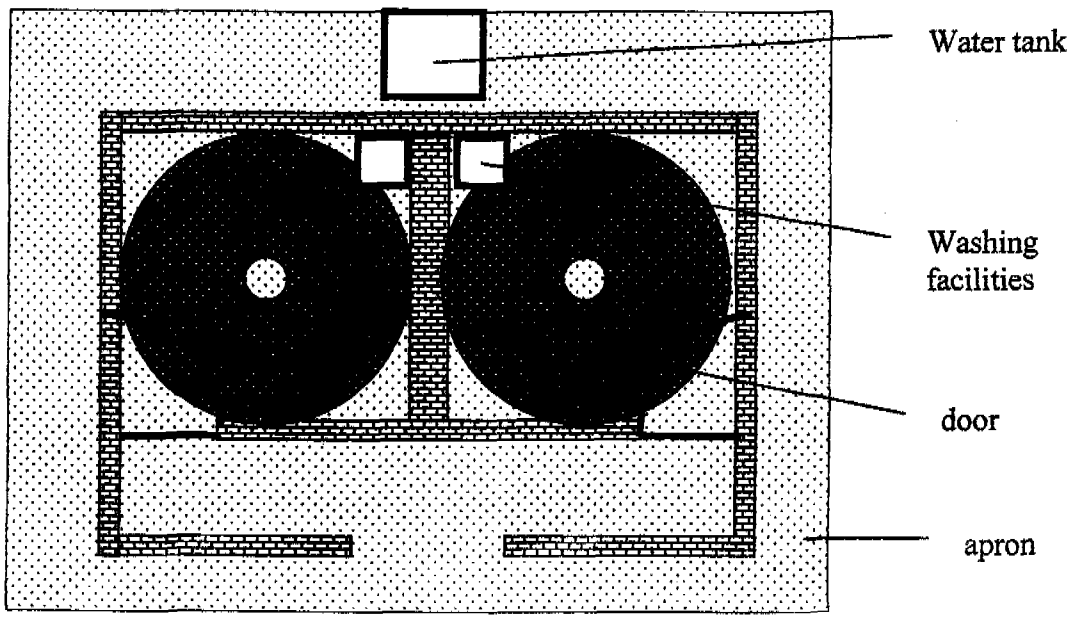


Figure 17: floor plan of double pit latrine for senior girls with blind walls and showing girls washing faculties, doors and water tank

The water tank

The tank's construction follows that of the hand washing facilities but is of smaller size and capacity (80 litres). Also access steps are not required as the tank is much lower and filling with water and cleaning is easier.

Water is fed to the sinks in the latrines through a ½ inch GI pipe with a T piece and extension for the bib taps. The height of the outlet pipe is 60cm from the ground; the pipe is fitted with a bib tap.

The sink

The sink rests in a 30cm high pedestal. . The sink is constructed from single brick on edge, and plastered with a 1;3 mix to make it water tight and easy to clean. The depth of the sink is 15 cm.

Waste water is taken via 50mm PVC pipe to a soak away pit outside the latrine.

2 *Doors*

The function of a latrine door is meant to provide privacy for the occupant and security against vandalism.

Privacy is easily achieved using blind walls. These have the advantage of being cheaper to build and maintain, and are more replicable at household level.

The inclusion of doors does not prevent vandalism as in reality the majority of doors do not lock after a short period, because the key is lost, the lock is broken, or the doors have swollen and cannot be closed.

Doors are required for teachers latrines to afford privacy and security in keeping with their position. (If single pit latrines are constructed in the community or at teachers' houses they should have a blind corner instead of a door, as doors are costly and require costly maintenance)

Senior girls' latrines can also have doors, to ensure privacy and security. On option is a single door at the main opening, or 2 doors at each of the openings. 3 doors is an unnecessary expense.

It is recommended that LBB doors are used, as these are locally made. The size should be 170cm by 70 cm, and timber should be *gmelina*. Door frames can be made of hard wood.

The advantage of a door shorter than the standard is to improve light and ventilation, as well as preventing the timber from rotting as the space from the floor is 10cm.

Experience shows that mortise locks are not practical for schools. It is recommended that doors be locked from the outside using a hasp and simple padlock (purchased by the school), and locked from the inside using a simple tower bolt.

The doors and frames need a coat each of primer, undercoat and gloss to enhance durability. However the school should be aware that the doors need regular and costly maintenance.

3 Urinals

Urinals can either be stand alone or attached to one of the latrines. When land at a school is scarce a urinal is attached to a latrine can save space, and there is some savings in materials. However, unless the facilities are well managed they may smell.

The external dimensions of a stand alone urinal is:

- Outer wall: 560 cm long, 105 cm wide, and 160 cm high.
- Inner wall: 405 cm long, 100 cm wide, and 160 cm high.

Detailed drawings are supplied in Annex C.

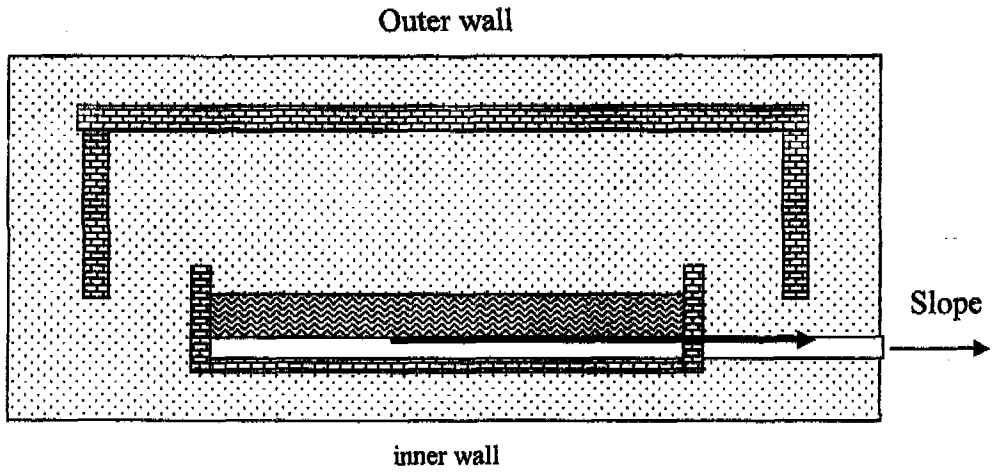


Figure 18: Floor plan of stand alone urinal

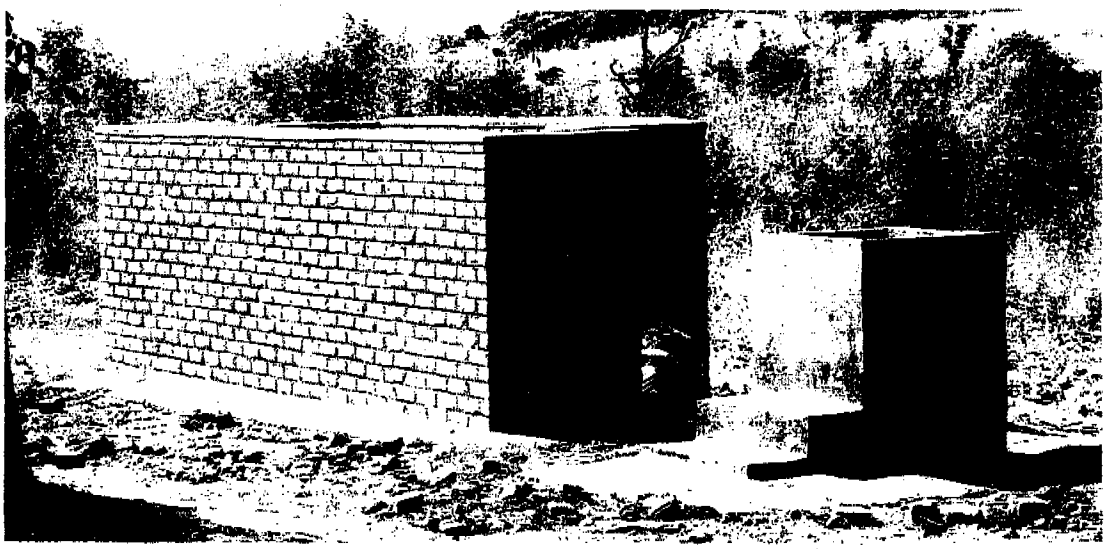


Figure 19: Finished urinal, showing layout with hand washing tank

Labour costs for one urinal are MK3400.00

Total costs for one urinal are: MK16671.00

3.1 Construction details for urinals

There are certain details in the construction of the urinal that should be observed. These are detailed in the drawings.

- The urine drain should slope at 50 cm over the 405 cm length, to ensure that the urine drains quickly.
- Waste water from the hand washing tank should be directed to drain through the urine drain in order to assist flushing out the urine.
- The floor of the urine should be sloped in such a way that rain water drains away quickly, and does not stay in puddles. There should be spaces set into the step to allow water to drain off. These spaces should be sufficiently wide to allow proper cleaning with a brush.
- For boys the splash wall should be made of hard, shiny plaster (1 to 3 cement san mix) and should be 100 cm high. The drain and the foot step should be similarly constructed of hard, shiny cement.

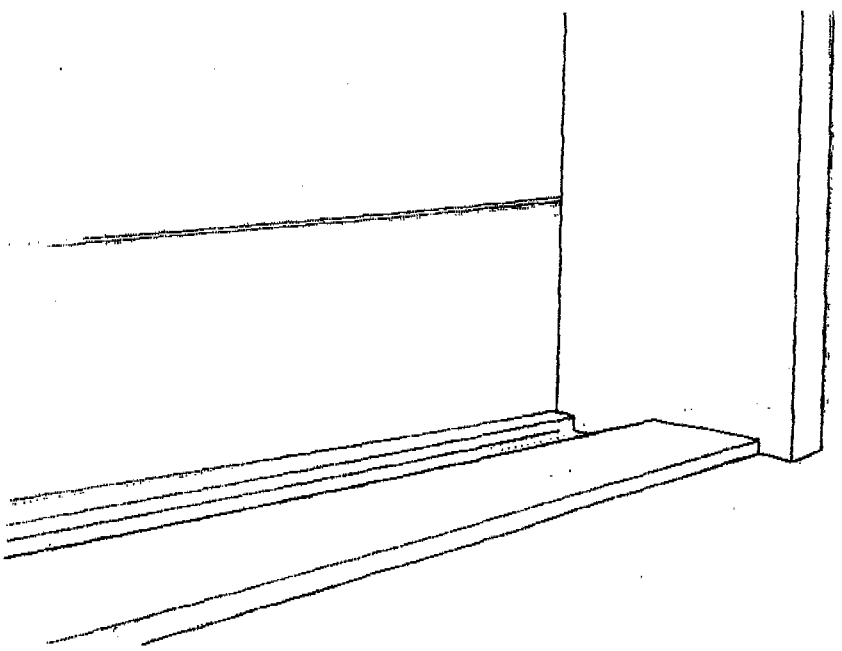


Figure 20: Detail of drain in boys' urinal, splash wall plastered to 1 metre

- The splash wall for girls' urinals need not be higher than 20 cm of moth cement.
- Girls' urinals need to be specially constructed; one design is shown below. The foot rests are constructed from bricks, plastered with hard, shiny cement. Alternatively, the foot rests can be made using the foot rest moulds from the sanplat mould, taking care to have the proper spacing and angle. The space between the foot rests should be 25 cm, and the channels should be 10 cm wide.

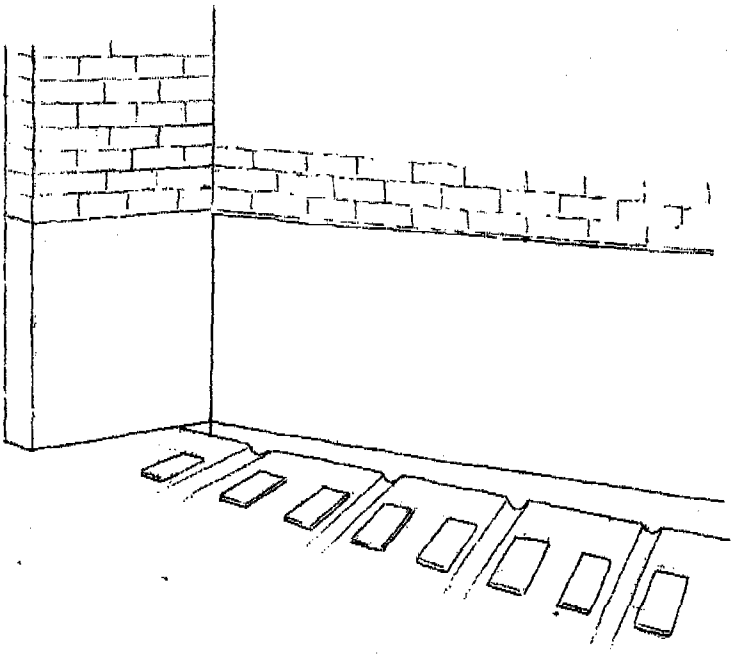


Figure 21: girls urinals detail, distance between foot rests is 25 cm, width of drain is 10 cm.

3.2 Drainage of urine

The urine, together with the waste water form the hand washing tank can be disposed of in the following ways:

- draining into a tree nursery, such as bananas, blue gum, etc. This could provide some income for the future maintenance of the facilities. It should be pointed out that it is safe to use urine in such a way
- if space is limited, the urine and waste water can drain into a soak pit.

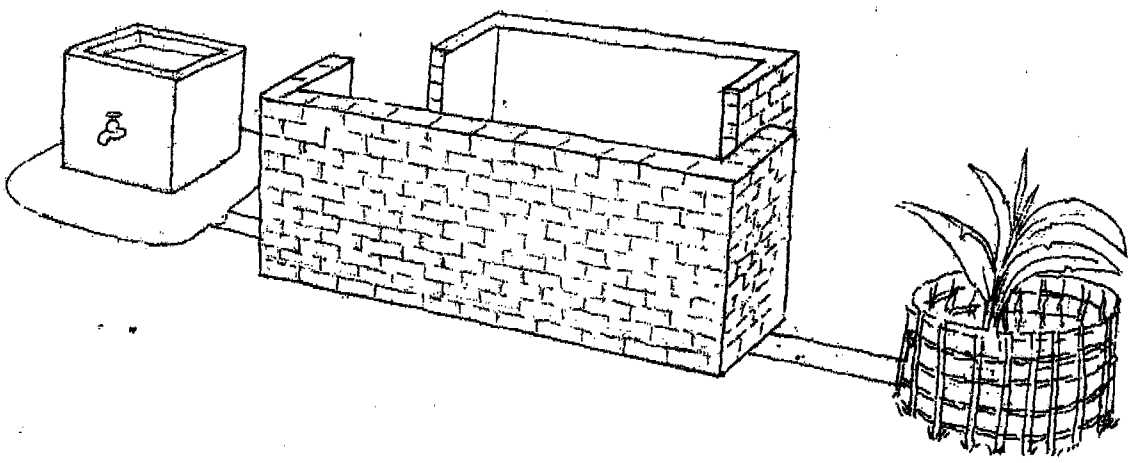


Figure 22: urinal showing drain detail

4 Hand washing tanks

It is recommended that two hand washing tanks are constructed: one for boys and one for girls, and they should be located conveniently near the latrines.

Each tank should have at least one bib tap; if the school can afford to purchase and maintain them, then 2 taps can be fitted to each tank. In order to prevent theft, the bib taps should be removed after school hours and replaced in the morning.

It is recommended that a suitable size of hand washing tank is 200 litres. This means that if the tank is filled only once in the morning, then there is enough water for the whole day.

Rain water collection is a good way of keeping the tanks topped up with water during the rainy season. The tanks should be positioned besides the latrines, and rainwater from the roof is collected in the tank via a gutter and down pipe.

If the school has a piped water supply, then taps can be constructed at a convenient place near the latrines. If the supply is uninterrupted, no tanks are needed.

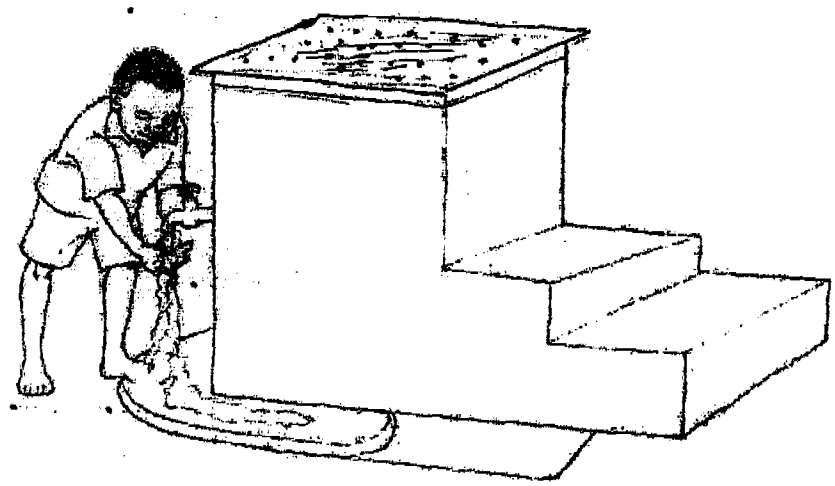


Figure 23: Hand washing facility

Materials and labour requirements

The external dimensions of the tanks are:

- pedestal: 100 cm wide, and 130 cm long
- tank: 100 cm square, and 65 cm deep.

Design details are given in annex C.

The construction of two hand washing tanks requires the following materials and labour input:

Summary of basic materials required for one hand washing tanks

Table 14: BOQ for one hand washing tanks

	quantities	Costs, MK
Bricks	570	684
Cement (bags)	3	3900
Sand (wheel barrows)	6	810
½ inch galvanised pipe	2 x 30 cm	200
¾ inch galvanised pipe	15 cm, 1 x ¾ inch plug	75 25

Materials costs: **MK5694.00**

Table 15: Summary of labour input for 1 hand washing tanks

	person days
skilled labour	3
Unskilled labour	3
Total labour costs	MK 960

Labour costs for one tank total MK960.00

The total cost for one tank (excluding bib tap) is **MK 6654.00**

Table 16: Detailed bill of quantities for hand washing tanks

	bricks	Cement (bags)	Sand (wheel barrows)
footing	120	2	4.5
pedestal	200		
tank	100		
apron	100		
drain	50		
plaster		1	1.5
plumbing			
total for one tank	**570**	**3**	**4.5**
total for 2 tanks	**1140**	**6**	**9**

Labour **requirements for one tank:**

	Skilled labour	Unskilled labourer
Setting out & foundation	0.5	0.5
construction	2	2
plaster and skimming	0.5	0.5
total person days for 1 hand washing tanks	**3**	**3**
Cost, MK	**600**	**360**

4.1 Construction details

- The hand washing tanks should be sited in such a way that the waste water drains through the urinal.
- ..The taps should face the latrines, in order to ease access for children leaving the latrines.
- The base of the tank should slope down towards the bib taps and cleaning outlet.
- In order that the pipe work should be firmly attached to the cemented brick work, a 10cm piece of 6mm round bar should be welded to the pipes.
- The tanks should be covered with a lid. The lid can be made of 2 x 2 inch hard wood frame, covered with galvanised iron sheeting. The sheeting may be perforated in order to prevent theft.

Rain water collection

If rain water collection is chosen as an option, then the tanks need to be positioned directly behind the latrines. A metal or plastic rain water gutter 300cm in length, and fitted with a out flow, is attached to the roof rafters using metal or plastic brackets. As the height of the tank is only 120 cm, steps are not necessary as this would reduce the space in the urinal; at such a height, the tanks should easily be filled with water from a water point during the dry season.

The outflow pipe is directed into the tank. A low cost gutter can also be made by cutting a 110mm PVC pipe in half, lengthwise, and attached to the rafters using brackets made from steel flat bar, but this option is not very sturdy.

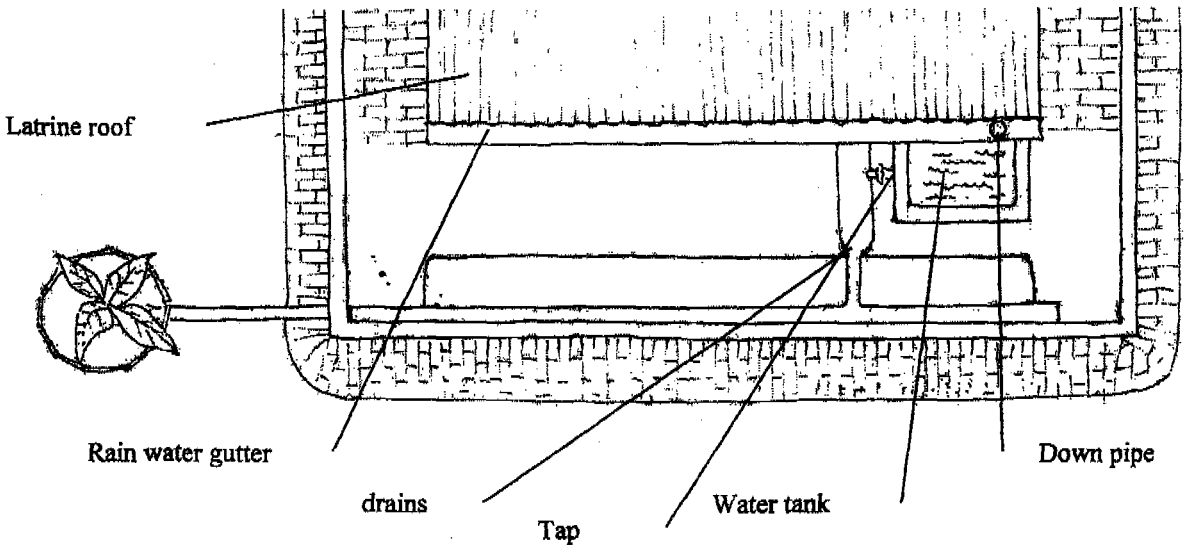


Figure 24:Detail showing rain water catchment for hand washing tank

The tank should be constructed with an opening 10 cm from the top, so that the overflow can flow into the drain apron.

For rain water collection:

300 cm of plastic or sheet metal gutter	MK 1500
4 fixing brackets	Mk 600

Total costs for one hand washing facility including rain water collection are: **MK 8754**

5 Annex A : School selection score sheet.

rank	criteria	school	school	school	school	school
1	There should be a water point within 500 meters that the school and community are maintaining very well.					
2	Implementation of some low-cost SSH activities have already begun (eg some completed traditional pit latrines).					
3	The formation of a democratically elected and gender balanced parents-teachers association and school management committee according to guidelines of the Ministry of Education					
4	Willingness of school committees and communities to contribute time and, money and resources – for example to purchase the bib taps, buckets, and to provide sand and bricks.					
5	Understanding, willingness and ability to maintain the facilities.					
6	Agreement by at least three teachers (at least one female teacher) to take on responsibilities for planning, and supervising construction activities as well as maintenance and for hygiene education in the school.					
7	School population (i.e. is it a small school, or a large school?)					
8	School drop out rate, ie would construction of facilities help in retaining pupils, especially girls?					
9	School going cohort: does the school cohort reflect that of the catchment area?					
10	Existing Involvement of students in School Sanitation and Hygiene promotion.					
11	Willingness from school, communities and students to sign an agreement.					
12	Teacher Development Centre (ie as a demonstration site)					
	passed?					
	score					

6 Annex B : Example of a Contract between School Committee and the District

SCHOOL MANAGEMENT COMMITTEE - DISTRICT AGREEMENT FOR IMPROVEMENT OF HYGIENE AND SANITATION FACILITIES THROUGH BUILDING OF PIT LATRINES HANDWASHING TANKS AND URINALS

We the Chairman of the school management committee and the Headmaster of ..... School, on behalf of the school and community, have discussed the information provided by the District and testify that the community, as well as the teachers understand the conditions for benefiting of the proposed improvement of facilities. The community understands that this intervention is community-based and community driven and that it will take the lead in all decision making. Furthermore, the community understands that the focus of the activities they participate is also to increase their participation in the management of the school.

We certify that the school is applying for the following:

- ☐ The improvement of sanitation in the school through the provision of permanent pit latrines (2 doubles for boys and 2 doubles for girls, and 2 singles for male and female teachers).
- ☐ The improvement of sanitation in the school through the provision of permanent urinals (1 for boys and 1 for girls).
- ☐ The improvement of hand washing facilities through the provision of hand washing tanks (1 for boys and 1 for girls).

We agree to the following: -

1. We have formed a democratically elected and gender balanced parents-teachers association and school management committee according to guidelines of the MoEST (Attach a list of members).
2. Participate actively and provide leadership at all stages of the intervention.
3. Assume ownership and full responsibility of management and maintenance of all the facilities and the school environment.
4. Participate in community mobilisation, provide the requested materials and supervise the construction without expecting any payment or allowances.
5. Supply sufficient quantities of bricks other locally available materials, such as sand, and stones, as well as a cash contribution amounting to MK..... for the purchase of ..... bib taps and ..... buckets. We understand that no construction work will start until agreed materials are on site and the taps are purchased. Materials that cannot be sourced locally shall be requested.
6. Participate in improving the health status of the pupils by learning about relevant disease transmission routes and how to prevent diseases, and to teach these to the pupils.
7. Supervise construction and provide security for the materials and equipment during construction
8. Take full responsibility of management and maintenance of the facilities.

The District shall provide the following: -

1. Construct the requested facilities on verification of materials on site.
2. Provide the personnel such as local teachers, extension workers, PEAs, to give the necessary technical support to the community
3. Provide materials that cannot be sourced locally.
4. Provide training to active school committee members and teachers in the planning, and supervision of construction and maintenance of facilities.
5. Provide training to teachers to educate pupils on proper use and maintenance of facilities, and on hygiene and sanitation education

On behalf of the school management committee

Signed..... Designation.....

Signed..... Designation.....

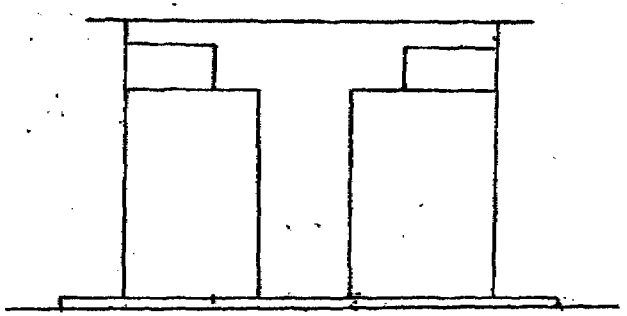
On behalf of the Project

Signed..... Designation.....

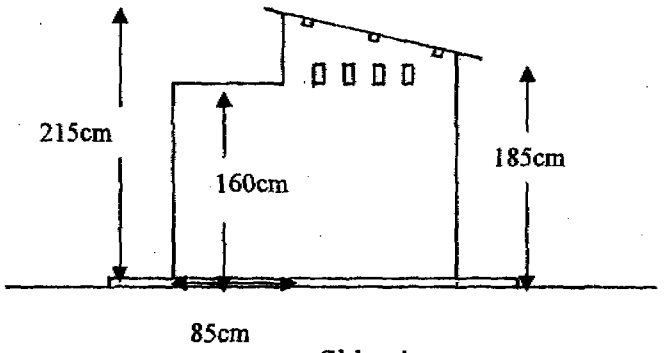
Date.....

7 Annex C : Detailed drawings of facilities

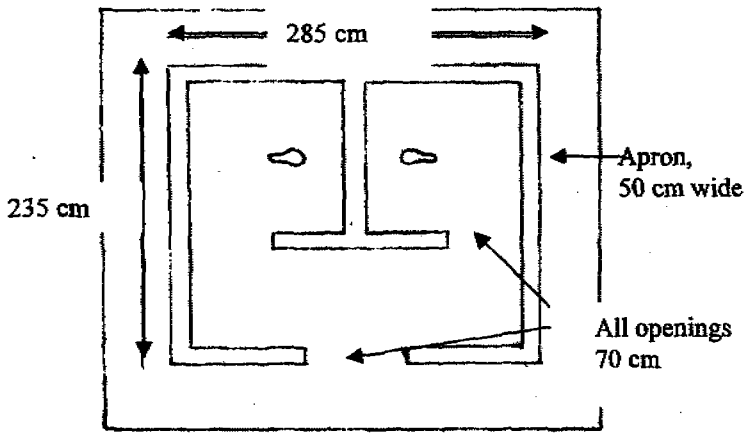
DOUBLE PIT LATRINE



Front view



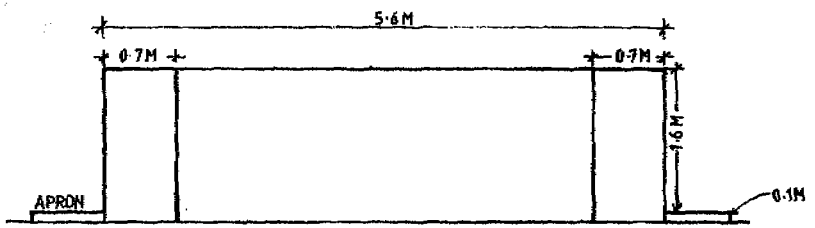
Side view



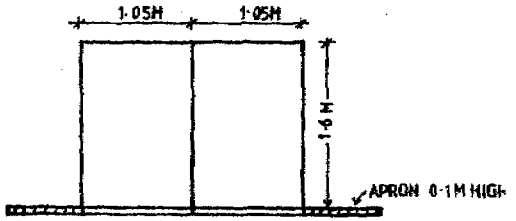
Floor plan

SCHOOL HYGIENE AND SANITATION – BOYS URINAL

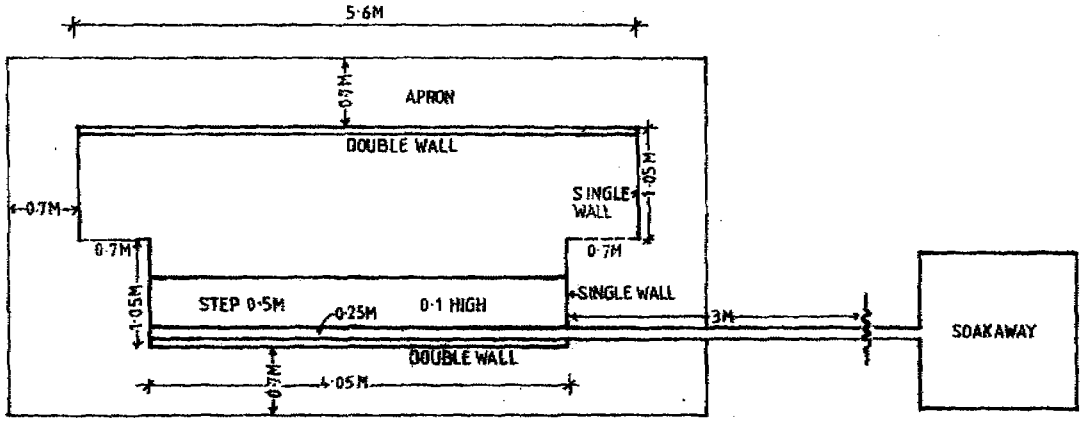
FRONT ELEVATION



SIDE ELEVATION



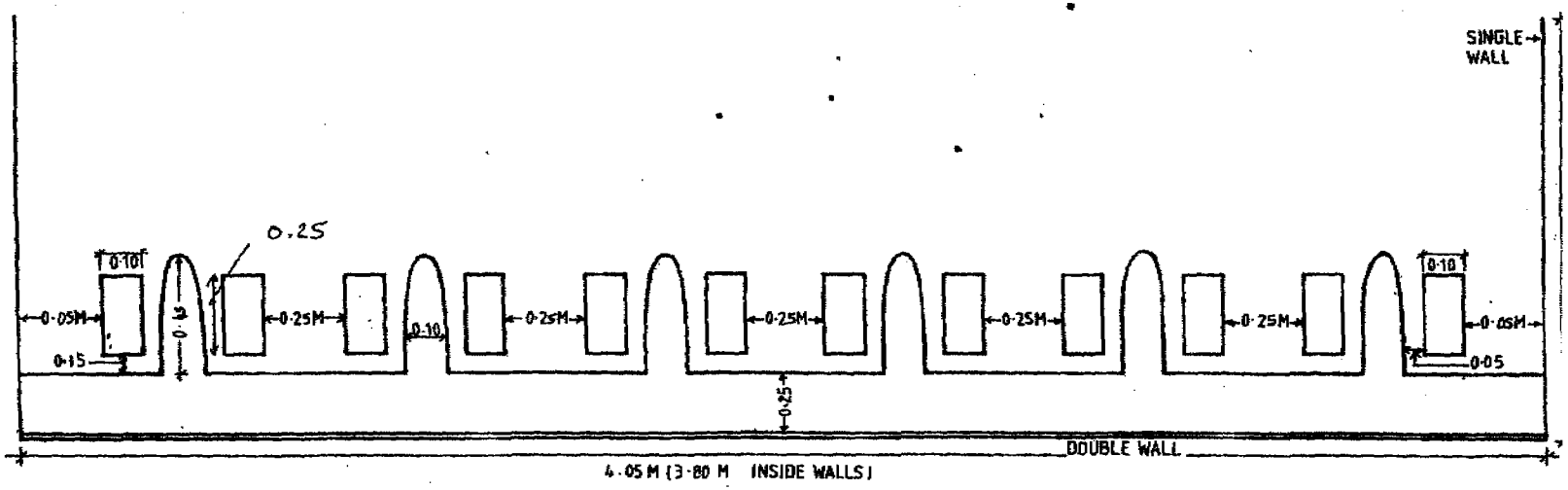
FLOOR PLAN



SCALE 1:50

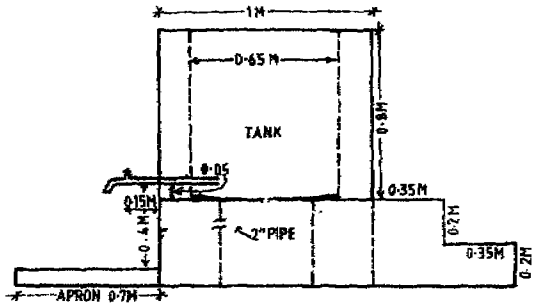
SCHOOL HYGIENE AND SANITATION – GIRLS URINAL

FLOOR PLAN : (FOR FRONT ELEVATION AND SIDE ELEVATION SEE DRAWING FOR BOYS URINAL)

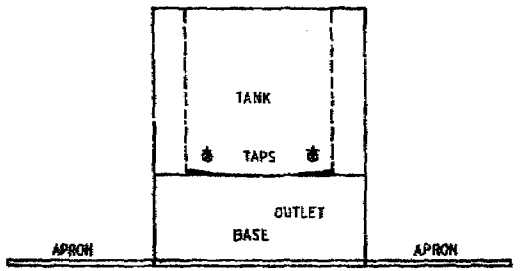


SCALE 1:12·5

SCHOOL HYGIENE AND SANITATION HAND WASHING TANK

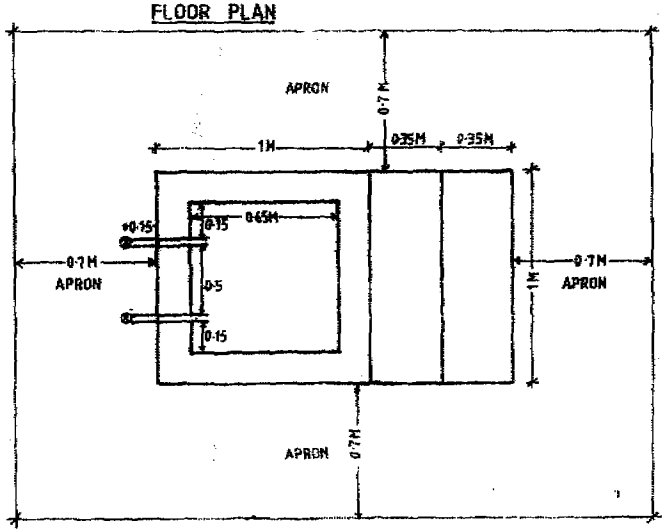


SIDE ELEVATION



FRONT ELEVATION

FLOOR PLAN



SCALE 1:20

8 Annex D: Forms for calculating materials and labour inputs

8.1 Table of local materials costs (Lilongwe May 2005, 1 US$ = MK120):

item	unit	Local Costs in MK
Bricks, including transport and loading	Per brick	1.20
River Sand, excluding transport (1 ton = 16 wheel barrows)	Per wheel barrow	35.00
Dambo Sand, excluding transport (1 ton = 16 wheel barrows)	Per wheel barrow	20.00
Quarry stone, aggregate, excluding transport (1 ton = 12 wheel barrows)	Per wheel barrow	90.00
Cement, 50 kg pocket, excluding transport	Per pocket	1500.00
6mm steel round bar	Per 12 meter length	475.00
4 ½ and 9 inch brick force	Per 18 m roll	265
Rough sawn soft wood, 75mm X 50 mm, (3 x 2 inch)	Per 18 foot length	150.00
Rough sawn soft wood, 125mm X 50 mm, (5 x 2 inch)	Per 18 foot length	250.00
Galvanised iron sheets, 28 gauge,	Per foot	120.00
Binding wire	Per kg	200.00
5 inch nails	Per kg	160.00
Roofing nails	Per kg	250.00
Wood preservative	Per litre	500.00
Termite proofing chemicals	Per litre	500.00
½ galvanised iron pipe	Per 6m length	2000.00
¾ inch galvanised iron pipe	Per 6m length	3000.00
¾ inch plug		25.00
Rainwater gutter, metal or plastic:	Per 6m length	3000.00

8.2 Table of local Labour costs:

Skill level	unit	cost
Skilled labour (builder)	Per day	200.00
Unskilled labour	Per day	120.00
Contract for carpenter: per single latrine roof	Per single pit latrine roof	500.00
Contract for carpenter: per door and door frame	Per door and door frame	1800
Contract for painter: white washing a latrine	Per single pit latrine	300.00
Contract for painter: per door	Per door and door frame	300.00

8.3 Costing Unlined pit substructures

These tables assist in calculating the materials and labour costs of one unlined pit substructure

Detailed BOQ 1 for 1 unlined pit

substructure - for 1 unlined pit	bricks	Cement (bags)	Sand (wheel barrows)	quarry stone (wheel barrows)	Other materials:
Materials Required	90	1.25	1.6	1.1	• 12 m 6mm round bar • 0.1 kg binding wire
Cost of materials per pit (MK)					

Labour requirements are for 1 unlined pit:

Component	Person days per pit	Total costs, MK
Skilled labour – person days	1.85 person days	
Unskilled input – person days	6.35 person days	
Total input		

Total materials cost per unlined pit: MK _____

Total labour cost per unlined pit: MK _____

Total materials and labour cost per unlined pit: MK _____

Cost of number of required pits: MK ----------

8.4 Costing fully lined pit substructures

These tables assist in calculating the materials and labour costs of one lined pit substructure

Detailed BOQ 1 for 1 fully lined pit

substructure - for 1 lined pit	bricks	Cement (bags)	Sand (wheel barrows)	quarry stone (wheel barrows)	Other materials:
Materials Required	90	3.85	4.1	6.7	• 12 m 6mm round bar • 0.1 kg binding wire
Cost of materials per pit (MK)					

Labour requirements are for 1 lined pit:

Component	Person days per pit	Total costs, MK
Skilled labour – person days	2.35 person days	
Unskilled input – person days	6.85 person days	
Total input		

Total materials cost per lined pit: MK _____

Total labour cost per lined pit: MK _____

Total materials and labour cost per lined pit: MK _____

Cost of number of required lined pits: MK _____

8.5 Costing superstructures

The following materials are required for the basic superstructure of a single latrine; a double latrine is approximately double the materials and labour requirements, and double the cost of a single superstructure.:

Detailed BOQ 1 for 1 single pit superstructure

substructure - for 1 unlined pit	bricks	Cement (bags)	Sand (wheel barrows)
Materials Required	1100	3.5	8
Cost of materials per pit (MK)			

Other materials (single latrine)

Item	Cost (MK)
Brick force , 4.5" , 1.5 rolls	
Termite proofing, 0.5 litres	
Timber, 17 feet of 3 x 2	
Timber, 12 feet 4 x 2	
Roofing sheets, 3 sheets, 7 feet	
Timber preservative, 0.5 litres	
0.5 kg roof nails,	
0.5 kg 5" nails	
0.5 kg wire, 8 gauge	
Total costs per single latrine superstructure	

Cost of fitting doors, per door

Item	Cost MK
door frame, 70 cm wide, 200 cm high	
Door. LBB, 70 cm wide, 170 cm high	
Primer, 0.25 litres per door	
Under coat, 0.25 litres per door	
gloss. , 0.25 litres per door	
Hinges, 3 per door	
Hasp, 1 per door	
tower bolt,1 per door	

Total materials cost per single latrine: **MK** _____

Total labour cost per single latrine: **MK** _____

Total materials and labour cost per single latrine: **MK** _____

Cost of number of required latrines: **MK** _____

Detailed labour requirements for 1 single superstructure

Component	Person days per pit	Total costs, MK
Skilled labour – person days	7 person days	
Unskilled input – person days	13.1 person days	
Total input		

Contract costs

	cost
Carpentry: roof, per single latrine	
Carpentry – doors, per door	
White wash, per latrine	
Painting doors, per door	

8.6 Costing Stand alone Urinals

BOQ 1 for 1 stand alone urinal

substructure - for 1 unlined pit	bricks	Cement (bags)	Sand (wheel barrows)	Other materials
Materials Required	2696	7.75	16.5	2 rolls 9 inch brick force
Cost of materials per pit (MK)			C	

Labour costs for 1 stand alone urinal

	Person days per pit	Total costs, MK
Skilled labour – person days	11 person days	
Unskilled input – person days	10 person days	
Total input		

Cost of materials for one urinal: MK _____

Cost of labour for one urinal: MK _____

8.7 Costing Stand integrated Urinals

BOQ 1 for 1 stand urinal integrated with latrine

substructure - for 1 unlined pit	bricks	Cement (bags)	Sand (wheel barrows)	Other materials
Materials Required	1518	5	10.5	1 roll 9 inch brick force
Cost of materials per pit (MK)				

Labour costs for 1 integrated urinal

	Person days per pit	Total costs, MK
Skilled labour – person days	5 person days	
Unskilled input – person days	5 person days	
Total input		

Cost of materials for one urinal: MK _____

Cost of labour for one urinal: MK _____

8.8 Costing Hand washing tanks

BOQ 1 for 1 hand washing tank

Hand washing tank	bricks	Cement (bags)	Sand (wheel barrows)	Other materials
Materials Required	570	3	6	• 2 x 30 cm ½ inch GI pipe • 15 cm ¾ inch GI pipe • ¾ inch plug • 2 x ½ inch sockets • 1 x ¾ inch socket
Cost of materials per pit (MK)				

Labour costs for 1 hand washing tank

	Person days per tank	Total costs, MK
Skilled labour – person days	3 person days	
Unskilled input – person days	3 person days	
Total input		

Other costs include:

	cost
welding 10 cm of 6mm round bar to each pipe	
cutting threads on one end of each pipe	
Cover for tank	

Materials costs for one hand washing tank: MK _____

Labour costs for one hand washing tank: MK _____

Total Cost for one hand washing tank: MK _____

9 Annex E: Check list for construction supervision of facilities

The following tables indicate the critical times when there needs to be supervision or verification.

Most of the verification or supervision can be done at school level, by the headmaster, the teachers, or the school committee, in which case the table indicates "school" as person responsible. It is essential that the people responsible for supervision are named, trained and held accountable for authorising work as done satisfactorily.

In some cases, the PEA, can take responsibility where more specialised training has been required; this is especially so at the initial stages. The PEA can also assist the school in its supervisory activities.

It is essential that the District ensures that adequate supervision is taking place. This can be done by inspecting the progress of work and checking it against the supervision checklist. The District can be represented by the DEM or the DEHO. For specialised knowledge, the District can call upon the services of the District Building supervisor, and other supervisors such as the school building supervisor.

The aim of this table is to ensure supervision is carried out and that there are records of who has done the supervision.

By allocating responsibility, the District will save on resources in avoiding unnecessary expenses. For example the resource assessment and verification can be done by the PEA on one visit.

Check list for construction supervision of facilities

1. Preparation and planning

NO						
1.1	Are there sufficient bricks of good quality on site?	PEA				
1.2	is sufficient sand of good quality on site?	PEA				
1.3	is sufficient quarry stone on site?	PEA				
1.4	have the bib taps been bought?	PEA				
1.5	have the latrines been properly sited for PRIVACY?	PEA				
1.6	have the latrines been properly sited for ACCESS?	PEA				
1.7	have the latrines been properly sited for SECURITY	PEA				
1.8	have the latrines been properly sited for DRAINAGE	PEA				
1.9	have the latrines been properly sited to avoid POLUTING WATER SOURCES?	PEA				

2. Construction of unlined pits

2.1	is the soil stable enough to construct unlined pits?	school				
2.2	have the pits been set out to the correctly, 90 cm diameter,	school				
2.3	have the pits been excavated to 90 cm diameter measured in 4 places	school				
2.4	are the pits at least 300cm deep?	school				
2.5	Has the concrete footing course been properly constructed using a 1:2:4 mix?	school				
2.6	has the collar been properly constructed using a header and stretcher course and 1:3 cement mix?	school				
2.7	Is the collar at least 10 cm from the ground level?	school				

3. Construction of lined pits

No						
3.1	is the soil unstable enough to require lined pits?	school				
3.2	have the pits been set out to the correctly, 100 cm diameter, and 160 cm apart?	school				
3.3	have the pits been excavated to 100 cm diameter measured in 4 places	school				
3.4	are the pits 320cm deep?	school				
3.5	Has the concrete base ring been properly constructed using a 1:2:4 mix?	school				
3.6	have the rings been properly constructed with 1: 2: 4 mix?	school				
3.7	have the rings been fully cured for 7 days?	school				
3.8	are the rings properly set on each other?	school				
3.9	have the rings been backfilled with soil?	school				
3.10	Has the concrete footing course been properly constructed using a 1:2:4 mix?	school				
3.11	has the collar been properly constructed using a header and stretcher course and 1:3 cement mix?	school				
3.12	Is the collar at least 10 cm from the ground level?	school				

4. construction of slab

4.1	have reinforcing bars been properly used?	school				
4.2	has the proper mix (1 cement:2 sand :3 stones) been used	school				
4.3	have the slabs been cured for 7 days?	school				
4.4	is the surface of the slab smooth and shiny?	school				
4.5	is the surface of the slab sloping towards the drop hole? When water is poured it should go towards the drop hole	school				
4.6	the thickness of the slab measured in 3 or 4 places is not less than 10 cm	school				
4.7	were moulds used to make the drop hole and the foot rests?	school				
4.8	the hole and foot rests are properly placed - with the hole at least 40 cm from the back wall and at least 30 cm from the entrance?	school				
4.9	have good covers been made for the teachers' and senior girls' latrines?	school				
4.10	have the slabs been tested for strength by having 4 people stand on them?	school				

5. Superstructure - walls and roof (double latrine)

5.1	has termite poison been used at foundation level?	school				
5.2	has brick force been used on every fourth course?	school				
5.3	the outside size of a double latrine is 285 cm long and 235 cm wide?	school				
5.4	the inside dimension of a latrine is 120 cm by 120 cm?	school				
5.5	the floor in the inside and outside of the latrine is smooth and strong?	school				
5.6	Are the walls the correct height: Front wall: 195cm; back wall 185cm, and blind wall 170cm.	school				
5.7	are the passage ways at least 70 cm wide?	school				
5.8	is an apron of 50 cm constructed all around the superstructure?	school				
5.9	are there ventilators on the side (2) and back wall (4)?	school				
5.10	have 5 rafters of 4x2 inch wood been used	school				
5.11	have 3 purlings of 3x2 inch wood been used?	school				
5.12	Has the wood been treated?	school				
5.13	have 6 sheets of 28 gauge been used and are well fixed to the timber ?	school				
5.14	is the inside of the latrine plastered with a 1: 5 mix, and white washed?	school				

6. options

6.1	are the door frames of steel or treated hardwood?	school				
6.2	are the doors made of hardwood at least 2.5 cm thick and with a gap of 10 cm from the floor for ventilation?	school				
6.3	have the doors been painted with primer, undercoat and gloss?	school				
6.4	have the doors been fitted with as hasp on the outside and a tower bolt on the inside?	school				
6.5	have washing facilities been placed in the latrines for senior girls?	school				
6.6	have gutters been placed under the roof for rain water collection?	school				

7. urinals

7.1	is the outer wall 560 cm long?	school				
7.2	is the inner wall 405 cm long?	school				
7.3	are the walls of double brick?	school				
7.4	are the walls 160 cm high?	school				
7.5	are the passage ways at least 70 cm wide?	school				
7.6	are the inside walls plastered with 1:5 cement mix?	school				
7.7	are the outside walls pointed?	school				
7.8	do water and urine drain quickly out of the urinal?	school				
7.9	is the floor made of smooth cement?	school				
7.10	is there a splash wall in the boys urinal, made from smooth 1:3 cement mix at least 100 cm high?	school				
7.11	do the girls urinals have proper footrests and drains?	school				
7.12	is there soak away or a drain leading to some trees or plants?	school				

8. hand washing facilities

No.	Description of item component	Person responsible for supervision or verification	Yes	No	Date	Signature
8.1	are the inside dimensions of the tank: 65cm wide and 50 cm deep?	school				
8.2	is the inside and outside of the tank sealed with a strong cement mix?	school				
8.3	is a cover fitted to the top of the tank?	school				
8.4	are there taps attached?	school				
8.5	is there provision for cleaning and draining the tanks?	school				
8.6	are steps constructed to make the tanks accessible for filling and cleaning?	school				
8.7	do the tanks show signs of leakage when filled with water?	school				
	If rainwater collection is an option	school				
8.8	Is the rain water gutter firmly attached to the rafters?	school				
8.9	Is the down pipe emptying directly into the tank?	school				
8.10	Does the tank have an overflow pipe 5cm diameter 5cm from the top of the tank	school				
8.11	Does the overflow water drain to the urinal	school				