

JPA-THIN WALL CONSTRUCTION SYSTEM- **SINGLE LATRINE CUBICLE SUPERSTRUCTURE**



USER MANUAL



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Introduction

This manual will tell you how to make Latrine superstructures with Parry Equipment. Concrete is the most appropriate material for storage, it is cheap, permanent, does not contaminate the contents and can be made from locally available materials.

The superstructure comprises of a back wall and two side walls and, having a narrow cross section virtually the whole of the entrance (the fourth wall) will accommodate a door set comprising door, frame (jambs and head) and hinges. The door sets will be pre-fabricated by local firms supplying house builders in the same area.

The speed of the construction of the latrine superstructure is such that it is possible to erect a complete unit in one working day on prepared footings.

Using the method and elements developed under the programme putting together the precast elements to form the superstructure should be possible with a mornings work. In the course of the afternoon of the same day it should be possible to tidy and finish the interior by applying a gloss paint. The superstructure will then be ready for fitting the floor and 'keyhole' unit which will be arranged separately from the superstructure sets.

In the manufacture of cement based products good quality depends on maintaining low water content and good compaction. This is achieved by mechanical vibration. Using the Parry vibrating apparatus it is possible for the small producer to make high quality products. Parry Associates are strongly committed to the provision of training and technical support. Customer's staff can attend courses of familiarisation and training at our Cradley Heath headquarters in the UK or through our field technicians in Africa.

Equipment

The Equipment

LARGE FORMAT VIBRATING TABLE x1



ROOF SLAB MOULD X1



SCOOP x1



FLOAT x1



1 METRE WATER TANK MOULD



TAMPING TOOLS x2



VENTILATION PANEL INSERT TOOL x2



PATTERN IMPRINT PLATES x3



SHORT INFIL PANEL MOULD x1 (FOR USE WITH DOUBLE CUBICLE)



- STEP TREAD MOULD- STEEL INNER x1



- STEP TREAD MOULD- OUTER x1



- CONSTRUCTION TEMPLATE x1



- WALL PANEL MOULDING FRAMES- SHORT C/W PEGS x1



WALL PANEL MOULDING FRAMES -LONG C/W PEGS x1



WALL PANEL SETTING BASES x30



Raw materials required

Raw Materials

Cement

Ordinary Portland Cement (OPC) is suitable. Care should be taken to avoid purchase of old or rebagged cement. No more than two weeks requirements should be held in stock.

Sand

Coarse sand is suitable for wall/block making.

Aggregate

Crushed gravel stone is better than rounded (pea gravel). It should be graded and pass a 6mm screen.

Mix for components

5 parts small stone

4 parts sand (coarse)

1-2 parts cement

The mix should be just wet enough to hold together when squeezed in hand.

Wall Panels

Production: -

Dry weight

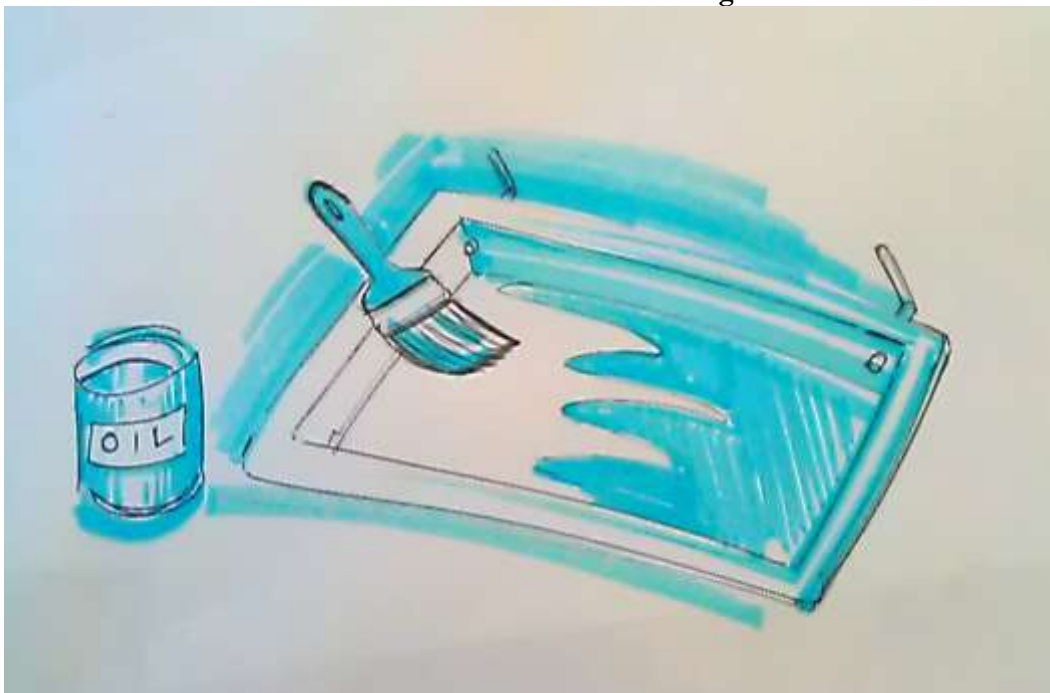
26 kgs Long Panel- 11 scoops

24½ kgs short panel – 10 scoops

1. Place the wall panel mould on to a setting base



2. Thoroughly oil the inside of the mould and the base of the setting board and interface sheet between setting base



Wall Panels

3. **Ensure that pegs are inserted in the holes provided. (6 pegs per long panel, 4 pegs per short panel) and lock into position .**



4. **Part fill the mould tamp down well**



5. Tamp and Compact with the tools provided.



6. Hold down the mould and vibrate.



Wall Panels

7. Fill the mould & Vibrate Trowel off to a smooth finish.



8. **Pattern Imprinting:** Place the imprint pattern board on top of the trowelled surface



9. Hold down the pattern imprint board and vibrate



10. Lift the mould off the table and place on a steady surface.



Wall Panels

11. Leave to cure in an enclosed cool dry space for 2 days before use.



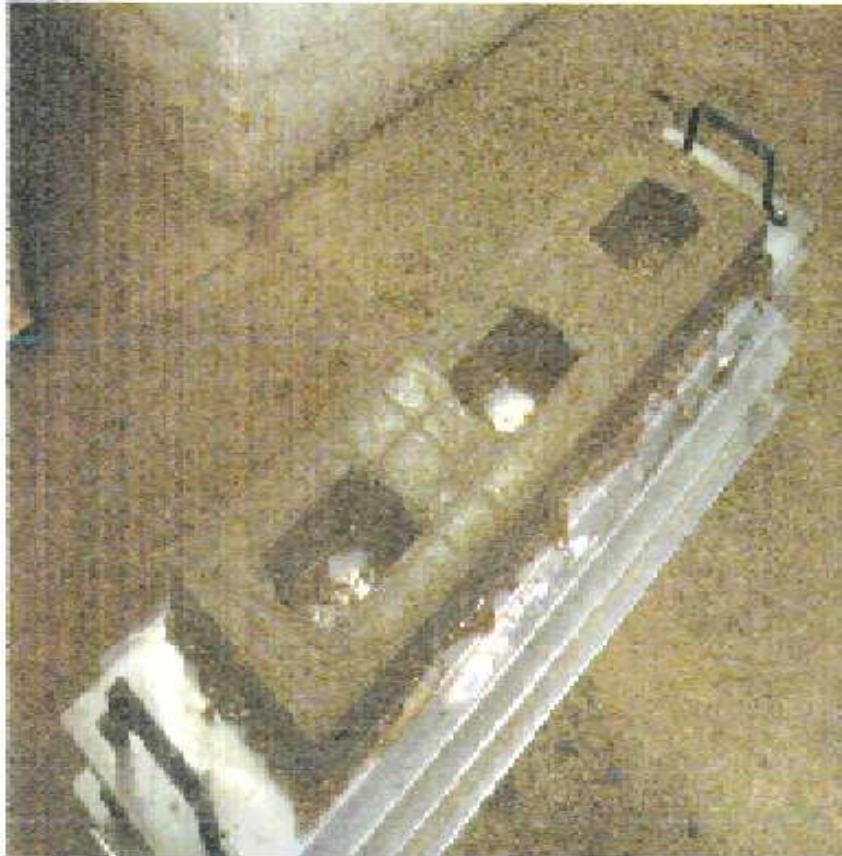
Please Note: Wash the concrete remnants from the panel mould Repeat the process throughout the day.

Remove panel from setting board next day. Thoroughly clean board before re use and dress off any rough edges.

Venting blocks

Venting blocks (8-10 mm scoops)

Using the same forming skirt as for the wall panels, attach the venting insert and lock into position. Ensure the pegs are in position and fill as before. The venting panels do not have a pattern imprint.



Step Production

Step Production: - *Dry weight – 31 kg*

1. Oil the inner section of the mould and the internal side panels of the outer skirt, place the skirt over the inner core, ensuring that it sits firmly within its angles.



2. Fill as before with the wall panels part filling tamping,vibrating until complete.



Step Production

3. Place the imprint pattern board on top of the towelled surface, press down firmly whilst vibrating.



4. Use the pattern imprint board as a pusher plate and carefully lift the outer skirt away from the block.



Step Production

5. Place to set for 48 hours



When set, gently tap the metal inner away from the concrete step and leave to cure. After remoulding the first step block clean the outer & inner mould sections and make a second step.

Demoulding the steps.

1. Give the mould a light tap, with a wooden mallet 2-3 times



2. Remove the product from the mould.



Roof Mould

Roof Mould (12x10mm scoops)

Dry weight 27½kg

3. Fit the mould, base & skirt together.



4. Lie the mould length ways across the table for stability.



Roof Mould

5. Oil the inside of the mould, base & skirt well.

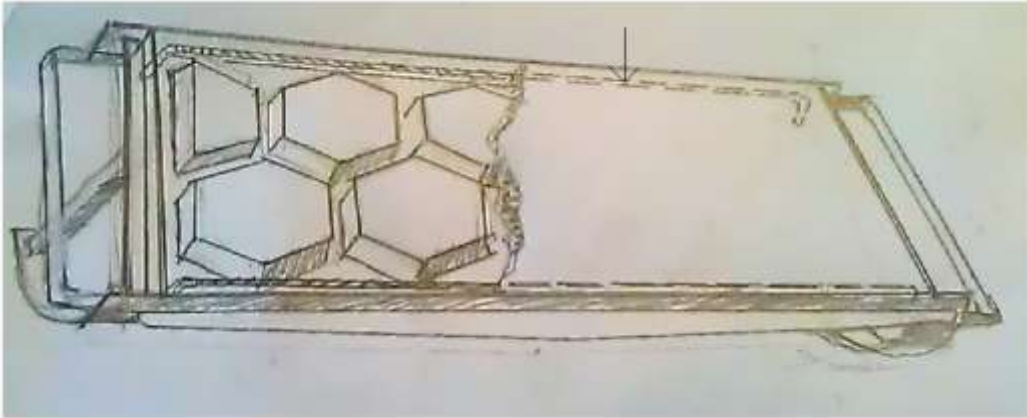


6. Part fill the mould, tamp down , vibrate



Roof Mould

7. Insert Rebar



8. Fill the mould,trowell off until smooth



Roof Mould

9. Place the roof mould on to a flat surface.



10. Turn the mould on its side before laying flat.



Roof Mould

Roof Mould

11. Roll it over flat so the handles are facing the ceiling.



12. Leave to cure



1m Tank Mould 8-10mm scoops)

1. .Place the outer skirt on to the moulding tray and insert the plug and oil the mould inside.



2. Part fill ensuring that both sides of the block are well tamped.



1m Tank Mould 8-10mm scoops)

3. Vibrate, and then fill to the top



4. Vibrate again then trowel the top surface smoothly.



1m Tank Mould 8-10mm scoops)

5. Prepare a sanded area so the moulds wont stick to the floor surface



6. Using the moulding tray, carry the block to a flat sanded surface.



1m Tank Mould 8-10mm scoops)

7. Remove the plug and using the pusher plate provided, push the block out of the mould.



8. Push the block out of the mould as demonstrated below.



Production Procedures

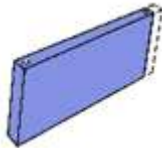
Components:-

Modular Latrine Structure components required-

- Per Latrine – 41 long side panels



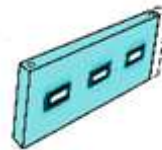
- 10 short side panels



- 3 long venting panels



- 1 Short venting Panel



- 4 Roof Panels



- 3-4 step blocks (as required)



The manufacturing times do not include mixing of material or preparation of mould

(oiling to aid release) and a third person would be required for this.

We have calculated that to manufacture the concrete elements per latrine module you will require:-

810kg small stone

587kg sand

239kg cement

Building Unit Derived from The Latrine Superstructure System
Amount of time required- 327 mins, or one working day inclusive of rest periods,
using a team of at least 3 workers.

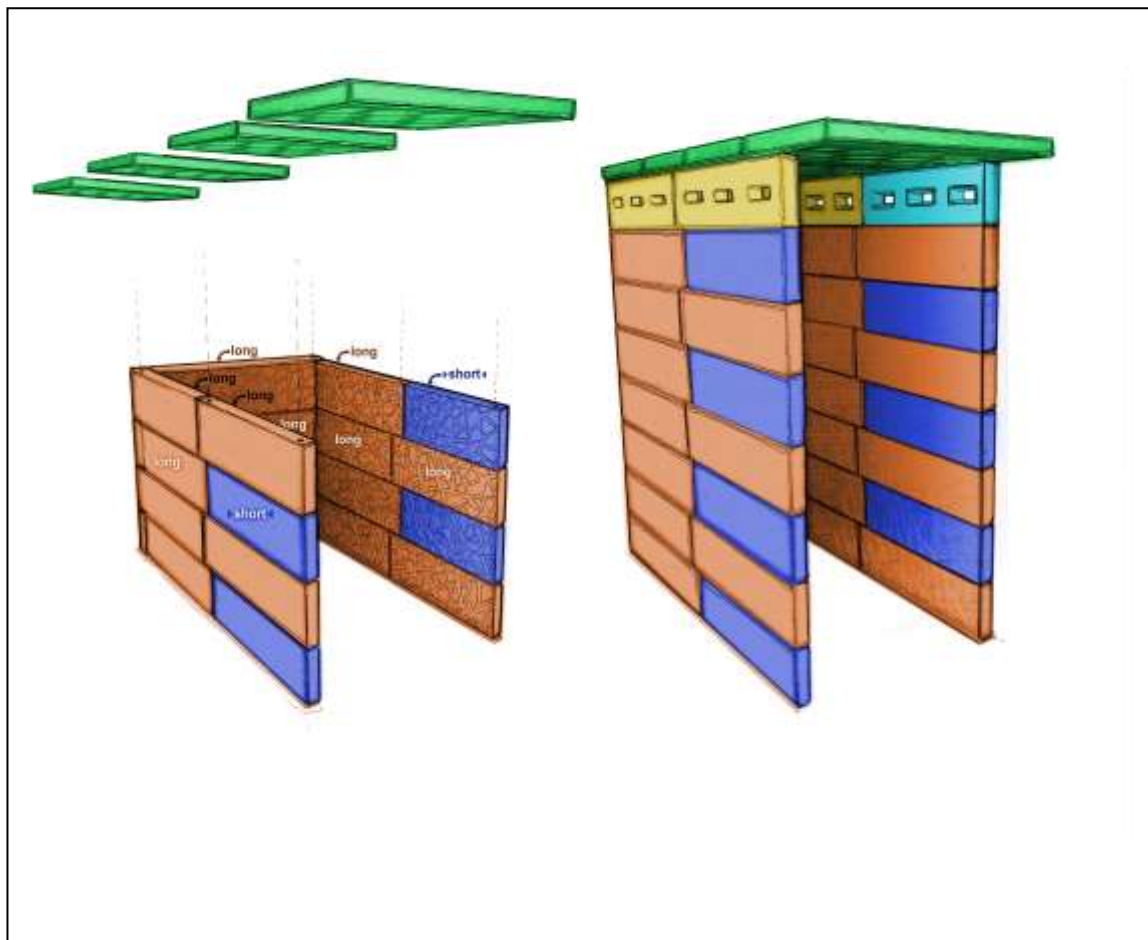
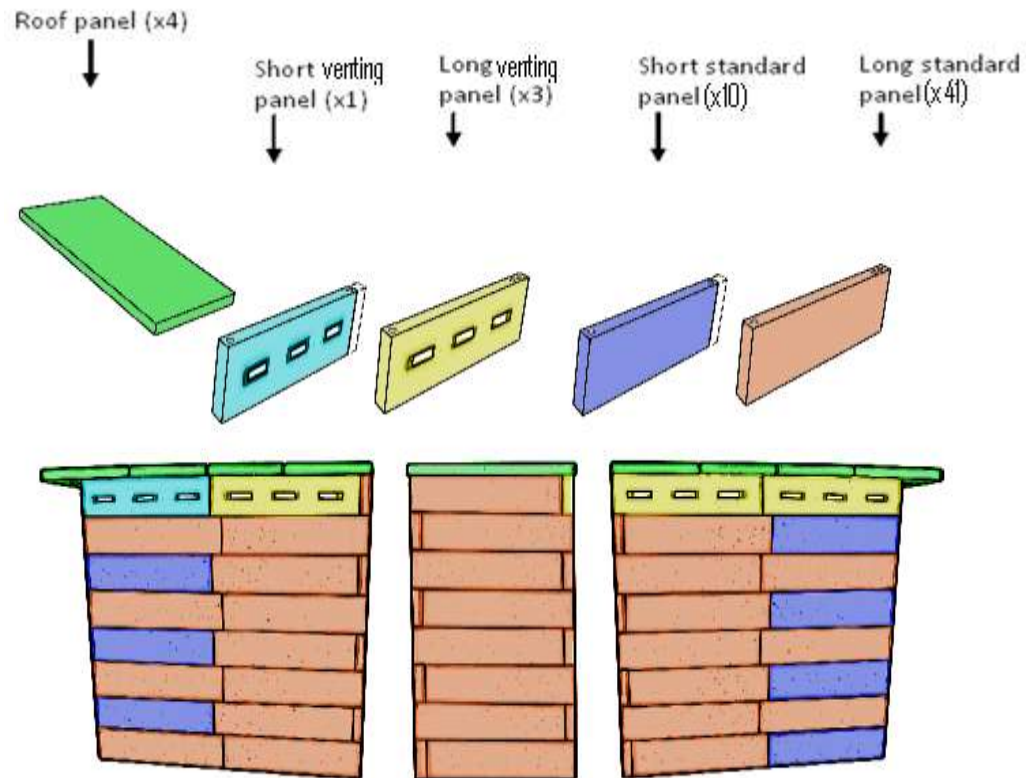
All panels should be transported by stacking them on edge, not flat on top of each other. A standard 10 ton load should be able to carry at least 6 sets of latrine elements.

We suggest that built on firm,stable ground the footings should be formed with a shallow trench to support the back and 2 sides of the latrine with a thin level layer of concrete. Builders must ensure that the first course of panels is level and dimensionally parallel. If the base ground is less stable then concrete pads can be used with the depth of the pad sufficient to be in contact with stable subsoil.

[use the contruction template provided] Back & side panels can be built up using pegs in the holes provided to ensure the panels are located accurately in their place, ending with the ventillation panels on each side of the top.The roof panels can then be placed in position and their joints grouted together.
Roof Panels, 4 are needed for the construction of the Latrine, 3-5 mins required for each panel **ROOF PANELS MUST NOT BE WALKED ON!** Roof panels are quite thin to reduce weight and aid lifting into position. Grouting the joints should be done from the side of the building.

Building Unit Derived from The Latrine Superstructure System

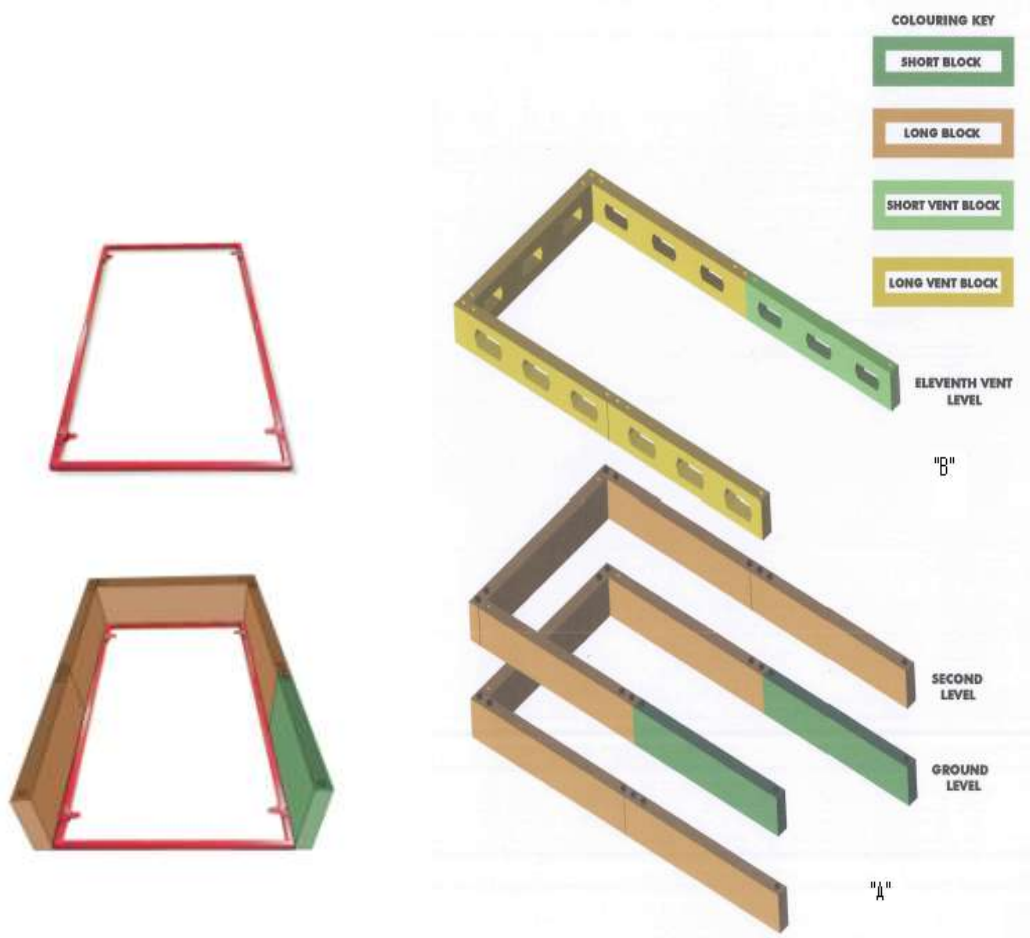
Making the Latrine Super Structure



Construction

This page shows the orientation of the rows of side panels for the modular latrine structure.

Starting with diagram "A" as the first course, diagram "B" will be the second course. Continue construction alternating rows "A" and "B" finishing with the row of venting panels. Ensure that each row of panels is pegged at each end of each panel using the peg holes provided. Wood or steel pegs can be used. The roof panels can now be placed in position and grouted together. DO NOT STAND on the roof panels but grout from the side. Below on the left is a copy of the latrine setting out template. Please note that this template gives the INTERNAL DIMENSIONS OF THE STRUCTURE.



Building the walls

BUILDING THE SUPERSTRUCTURE

The panels are placed in position and tapped gently to close the joints.



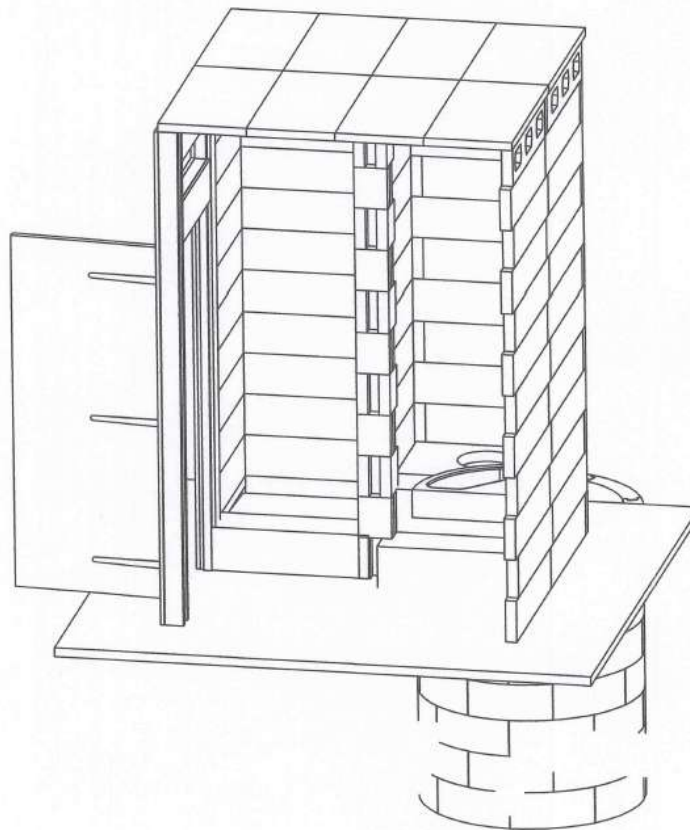
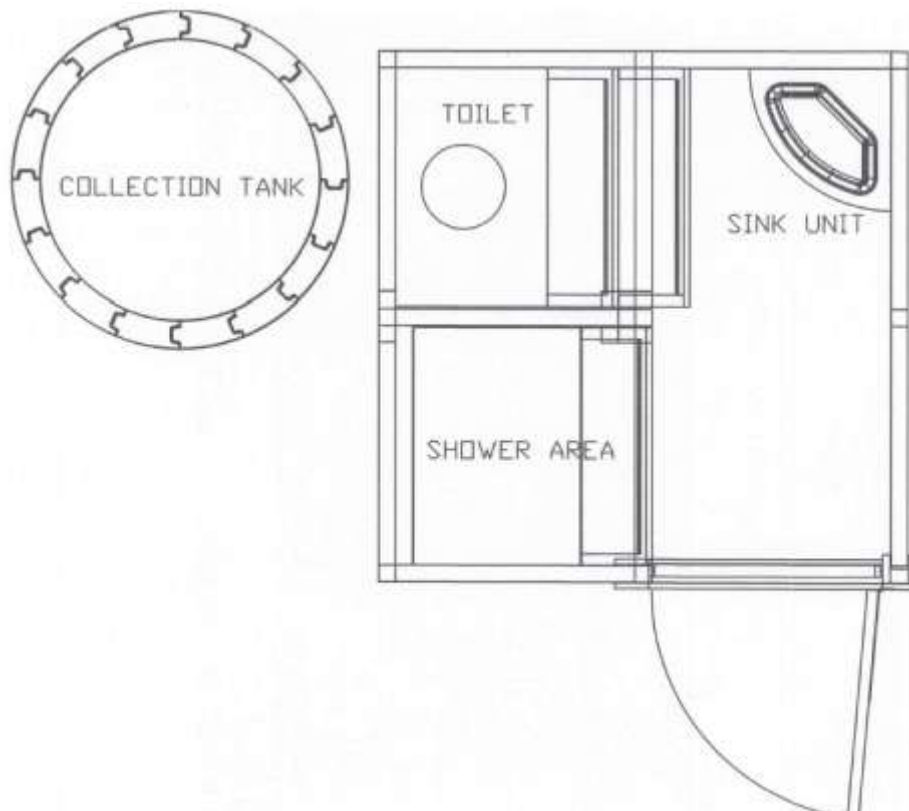
The mortar joints comprise just a slurry of cement, clay and water applied by a paint brush



Stability during construction is achieved by inserting short pegs made from short pieces of 18mm reinforcing bar which fits the holes formed in the panels during manufacture.

Building Unit Derived from The Latrine Superstructure System

Construction



Maintenance

Hand powered Machines

It is necessary to check and maintain the following:

Drive belts- these must be kept clean and checked for damage so that replacements can be made in good time. The tension or tightness of the belts should be sufficient to prevent them from slipping but over tightening will cause wear and breakage. It may be noted that the second, faster-rotating belt need not be very tight in order to work efficiently.

Bearing- the large bearings for the HP drive pulleys are fairly exposed and it is thus vital that these are kept clean and lubricated. Grease nipples are provided to enable grease to be pumped into the interior of the bearings. Greasing can be a weekly or monthly operation but cleaning with light oil should take place at least daily.

Adjustment bolts- even if the belt tension has not been changed, the bolts holding the various bearings should be checked regularly for tightness to ensure that the belts do not come loose unexpectedly.

Management Control

The aims of the workshop are to produce the maximum number of high quality products with the minimum wastage. This falls into four areas:

1. Control of the working environment,
2. Control of Raw materials used to minimise stock levels and wastage and maximise quality.
3. Control of the number and quality of items produced and stocked.
4. Financial control.

Control of the Working Environment

Keep the workshop and yard clean, uncluttered and orderly
Keep the equipment cement free and in good working order.
Allow a tidying period at the end of every day to do this.

Control of Raw Materials

Of each raw material used keep two storage areas or bunkers. When one becomes empty, use the other and order a new batch of material to go in the empty bunker. Make a note in the workshop logbook (see below) whenever you start to use a new lot of material.

The size of order to place is a balance system between the money tied up in holding extra materials and the saving in a larger delivery. On average monthly deliveries or the largest unit load will be reasonable. If you learn of a cement shortage then it is sensible to get more in, but rotate the stock so no bag is held too long before use.

If the material that arrives is different to that previously used, then it needs to be tested. Cement will generally be available of consistent quality from a reputable manufacturer. Their quality can be assessed after 24 hours and if poor, new material must be obtained. Sand is more variable and more difficult to assess. See sheet on Raw materials for details.

Production Control

Logbook

A workshop logbook should be used to record what is made. It can also be useful to have a workshop blackboard so that everyone can see production results. The next page gives an idea of what the logbook should show for a week. This page can be copied if required. If more than four different products are being made then extra columns will have to be added.

In the logbook, record each product or type of product separately, if long wall panels are to be recorded in Colum A, then put the number of long wall panels produced on Monday in the appropriate box. The next line and the number of long wall panels produced on Tuesday filled in. The results of quality control inspection will be filled in after the products have finished curing. These results will be put down on the line for the day the items were produced, so that any

Maintenance

problems can be traced back to the source. The number of items that have successfully passed the tests and have been taken to stock should also be recorded.

Management control continued.

A note should be kept of the number of bags of cement opened each day. Every week a check should be done on the amount of cement and pigment used as these are expensive items. Count the number of bags in stock then by looking at the previous weeks stock and calculate the amount of cement used. The amount of cement in the products should then be worked out by multiplying the amount of cement used and the amount of cement in the products shows you the cement wasted. You should aim to keep this amount to a minimum; there will always be some wastage, but if the amount suddenly increases you may need to check production procedures or security.

Use the comment sections to note any change of material so that if any problems are found at a later date they can be traced back to source. Similarly anything notable on production, demoulding and testing should be recorded. Record also any other workshop details such as change in workers, maintenance, or change in equipment.

At the end of the week add up all the products taken to stock, also record despatches during week and work out what the stocks should be. This figure should match the result of your stock check.

Despatch Records

The despatch book should record the date and the number and type of items despatched. The book should be signed by the driver on collection or the customer on delivery. Each week add up the number of each item dispatched and write these figures into the log book then calculate the stock left.

Stock Taking

In order to check your records, a stock take should be done. This can be done weekly and will not take long if your yard is organized sensibly. Count all the products in the yard then check this against the log book stock

Financial Control

Cash Book

A record should be kept of all money coming into and going out of the business. This should be added up at the end of every week. At the end of the month it can be split into the cost of different categories such as raw material, labour etc. This will help you to see if you are making a profit. It will also help you to decide on the price for selling your products.

Maintenance

Maintenance

Date Produced	No. Of Each Item Made				Items Rejected/Broken				Cement used (bags)	Quality Control Tests				Items to Stock				Date to Stock
	A	B	C	D	A	B	C	D		A	B	C	D	A	B	C	D	
Monday																		
Tuesday																		
Wednesday																		
Thursday																		
Friday																		
(Saturday)																		
Weekly Total																		
Cement Content										Note: All entries on one line refer to the items produced on the same day, so rejected/broken items will be filled in on the day after production and the results of the tests and solutions to stock 4-14 days later.								
Pigment Content																		
										Items Despatched (-)								
										Last Weeks Stock (+)								
										CURRENT STOCK								

Weekly Record

Comments on production or materials	Cement in stock	
	Cement used	
	Cement in products (-)	
	Cement wastage	
Quality comments	Pigment in stock	
	Pigment used	
	Pigment in products (-)	
	Pigment wastage	

Make a rough estimation of the cement in stock, then from the last weeks stock calculate the cement used. Subtract the cement in the products from the cement used to give the cement wasted. Do the same for pigment.

Products Made

A	C
B	D

Maintenance
Appendix

Suggested tool kit

The following is a list of the minimum tools you will require to run the workshop efficiently.

- Metric combination spanners- 5mm to 13mm
- Adjustable spanner- up to 15mm A/F
- Pliers
- Mole grips (self gripping wrench)
- Allen Keys – 2mm to 5mm
- Screwdriver for slot head screws
- Small pozidrive screwdriver
- Flat file
- Claw hammer
- Woodsaw
- Roll of insulating tape
- Oilcan
- Tin of grease.
- **Wooden Mallet**