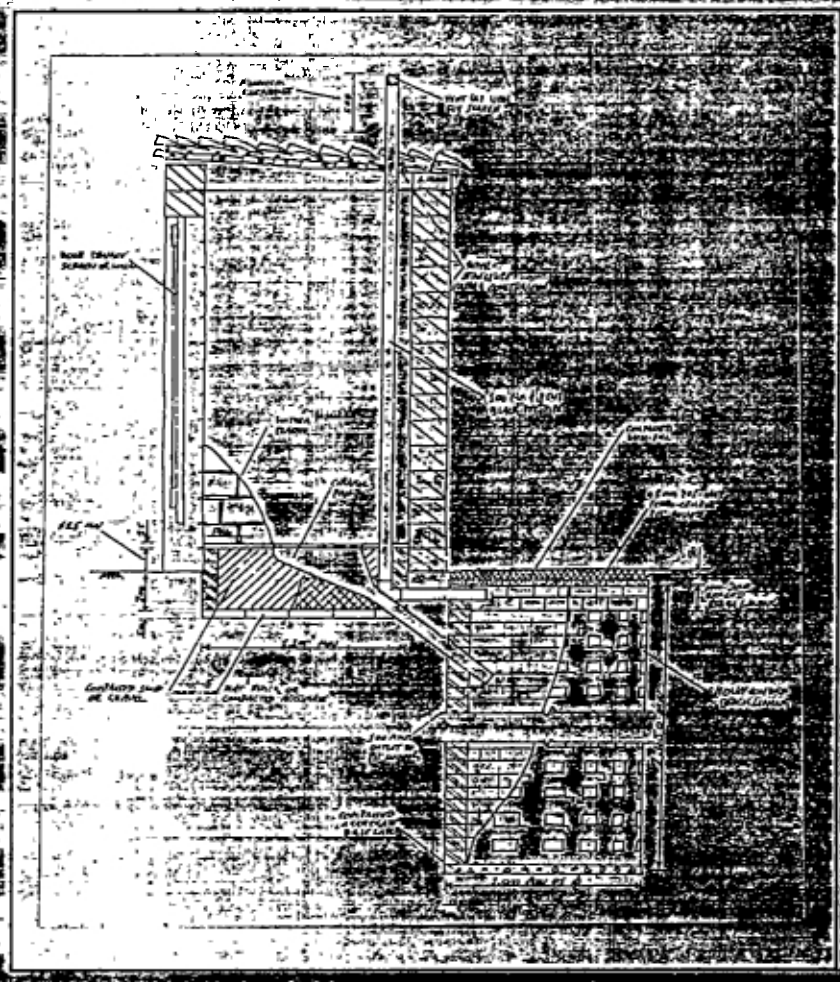
WATER AND SANITATION CELL

LOCAL GOVERNMENT AND RURAL DEVELOPMENT DEPARTMENT

QUETTA, BALOCHISTAN

FIELD MANUAL FOR WATER AND SANITATION TECHNICIAN



TECHNICAL FIELD MANUAL — TABLE OF CONTENTS

STEP NUMBER 1: ACTIVITY: ASSESS LOCALLY AVAILABLE SKILLS AND MATERIALS

Objectives:

- To determine the level of technical skills in the village
- To determine what types of construction material is available in the village
-
-

Target Group:

- Village men
-

Methods:

- Observations
- Discussions
-

Means and Materials:

-
-

Organisation:

- Group discussion with village men
- Village walk if necessary
-

Main Messages and Outputs:

- Are there any skilled or semi-skilled workers in the village?
- What kinds of materials are available locally?
-

STEP NUMBER 1: ACTIVITY: ASSESS LOCALLY AVAILABLE SKILLS AND MATERIALS

- **Observations:**

  - Is there any kind of workshop in the village, if so what does it make or repair? who works there and what are his skills?

  - Do any of the houses have walls or foundations made of stone in them, if yes where does the stone come from?

  - Are fired bricks used in any of the village buildings, if yes where did they come from and how expensive are they?

  - Are there any "pukka" buildings in the village, if so who constructed them?

- **Discussions:**

  - Are their any craftsmen in the village, if so is he a mason, mechanic, carpenter, blacksmith?

  - Have any of the village men worked on construction sites in the district towns or centre?

  - Have any of the men had experience working with cement or reinforced concrete?

- **Outputs:**

  LGRDD technician will be able to make following decisions:

  - Is there enough stone locally or will bricks need to be purchased?

  - Is sand and aggregate available locally or will it need to be purchased?

  - Are there enough skilled or semi-skilled men in the village, or will a mason need to be hired?

  - Do the village men need training in construction for pump and latrine installation?

STEP NUMBER 1: ACTIVITY: VILLAGE WALK

Objectives:

- To assess existing wells for handpump installation
- If there are no suitable existing wells, to assess possible sites for well digging
- To conduct walk together with male community organiser

Target Group:

- Village men
-

Methods:

- Observations
- Discussions and questions
- Measurements

Means and Materials:

- Pencil and paper
- 30 metre tape measure
-
-

Organisation:

- Group discussion with village men
- Walk around village to existing well sites
- If no existing wells, discussion about new sites

Main Messages and Outputs:

- Are there any existing wells which are suitable for handpump installation?
- If there are no suitable wells, where should new well digging be located?
-

STEP NUMBER 1: ACTIVITY: VILLAGE WALK

- **Assessing Existing Wells For Handpump Installation:**

- **User Group Criteria:**

  For an existing well site to be selected the following points must be satisfied:

  - The site must be accessible to all households in the user group

  - The site must be accessible to all women in the user group households

  - The user group for each well should not be more than approximately 150 people

  - If there is a dispute between two factions in the user group the site may not be acceptable, and an extra pump may have to be provided.

- **Technical Criteria:**

  For an existing well to be selected the following points must be satisfied:

  - The site must be at least 15 metres from the nearest compound or public building (mosque, school etc)

  - The site must be at least 15 metres from any existing latrine, graveyard or permanent surface water storage

  - The existing well should be in stable condition and should not be likely to collapse

  - The existing site must have good drainage and local topography for safe drainage of excess water

  - The existing well should have reasonable yield and should not run dry very frequently

  - The water from the existing well must be acceptable to the user group

- **Assessing Possible Sites For Digging Of New Well:**

  If there are no existing wells in the village, or if the existing well site(s) do not satisfy the above criteria, then a new well must be dug by the community.

STEP NUMBER 1: ACTIVITY: VILLAGE WALK

Ask the village men to indicate sites where they know that the ground water is acceptable for drinking. Each proposed site for digging of a new well should satisfy the criteria set out for existing wells.

- **Outputs:**

After conducting the village walk and talking to the male members of the user group the LGRDD technician should have the following information:

- The number and location of any existing wells in the village which are suitable for handpump installation.

- If there are no existing wells, or none of the existing wells are suitable, the best location for the village community to dig a new well or wells.

This information should be discussed with the other members of the team and recorded in the village file. The possible well sites should then be presented for discussion to the village women by the female community organiser.

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

Objectives:

- To test ground water quality of selected village well(s)
- To determine the well and site improvement work for pump installation
- To collect technical information for design and costing of work

Target Group:

- Village men
- Sub-engineer

Methods:

- Observations and Questions
- Measurements
- Water Quality Testing

Means and Materials:

- Blank copies of survey form
- 30 metre tape measure/water level detector
- Water quality testing kit
-

Organisation:

- Group discussion with village men
- Testing water quality at existing well site(s)
-

Main Messages and Outputs:

- What are the ground water indicators of selected wells?
- What well and site improvement work is needed of the community?
- Technical data for proposed well for design and costing estimates

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

■ **Before starting the survey:**

It is important to remember to check the testing kit before leaving for the field to make sure all the equipment and the instruction book is included.

> Note: carry out a water quality test for each proposed well in the village; record the name or number of each well on the village map and at the top of a new survey form.

Samples of the survey proforma are given below.

- **Technical Survey: page 1**

Activities for this part of the survey include:

- Direct measurements
- Site observations
- Questions and discussions with village men

- **Technical Survey: page 2**

Activities for this part of the survey include:

- Testing of physical characteristics of water source
- Testing of chemical characteristics of water source

The testing procedures are given in the instruction booklet that comes with every test kit. Follow these instructions carefully and record the details on the survey proforma.

After having carried out both parts of the survey form use this information to make the following decisions:

- Does the water source meet the critical ground water quality values?

- What additional improvement work has to be carried out for the well and the site?

- The information about well head specifications will be used in the design and quantity estimates carried out in step 2.

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

- Sample of well survey form; page 1

A	WELL SURVEY: WELL No/NAME: SITE OBSERVATION DATE: __/__/__ _____		VILLAGE: _____ U.C.: _____ DIST: _____
1.	Distance to nearest latrine	____ m	If < 15m is latrine on higher ground than well? Y / N
2.	Distance to other sources of pollution (animal excreta, rubbish sites etc)	____ m	If < 50m describe:
3.	Is there existing fence or wall to restrict animals from well?	Y / N	If no is there evidence of animals around well-head? Describe:
4.	Average distance to centre or compounds of user group	____ m	
5.	Sub-soil type and condition at well-head?		Type: sandy / loam / clay Stability of well shaft (describe):
6.	If well is lined how far is this?	____ m (-GL)	Describe type of lining:
7.	Measure well specifications:	Inside dia. of well ____ m Total depth of well ____ m -GL Depth to water level ____ m -GL	
8.	How old is the well?	___ yrs	
9.	Does the well ever run dry?	Y / N	If yes how often? Every 1 / 2 / 5 / 10 years? Other:
10.	How much water does each house hold use per day (average)?	____ l	(Try to estimate the approx. volume of local containers in litres): no. of containers per household: ___
11.	Are the users happy with the water from the well?	Y / N	If no what is the main complaint? Describe:

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

- Sample of well survey form; page 2

B	WELL SURVEY: WELL No/NAME: WATER QUALITY TESTING DATE: __/__/__ _____ TIME: _____ AM/PM	VILLAGE: _____ U.C.: _____ DIST: _____

1.	Water temperature	____ ·C	
2.	Electrical conductivity	____ µS/cm	
3.	Total dissolved solids (TDS)	____mg/l	(multiply the conductivity result (in µS/cm) by a factor of 0.65 to calculate TDS)
4.	Turbidity	____ T.U.	
5.	pH value	____	(direct reading from comparator)
6.	Free chlorine residual	____ mg/l	(direct reading from comparator)
7.	Total chlorine residual	____ mg/l	(direct reading from comparator)
8.	Nitrate ($as\ NO_3$)	____ mg/l	(direct reading from colourdisc)
9.	Combined chlorine residual	____ mg/l	(combined chlorine residual = Total minus Free in mg/l)
10.	Taste of water?	bitter __ salty __ musty __ rotten egg odour __ metallic __ other:	
11.	Colour of water?	clear __ green __ brown __ reddish brown __ other:	

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

■ **Critical Ground Water Quality Values:**

One important indicator of ground water quality is the community itself. If an existing functional well is not being used for drinking water there is probably good reason; the water is too salty or does not taste good.

However before investing in the pump installation some basic ground water quality parameters must be met.

Table 1 shows the maximum permissible levels for the four indicators tested in the field. Check the survey results against these levels:

• NOTE: If any of the results is greater than the maximum permissible levels then the water source should be carefully considered for further testing and treated to improve water quality: see water testing instructions in Annex 1 for analysis of results.

• Table 1: Maximum permissable and highest desirable levels of components in drinking water, (WHO guidelines 1984):

Parameter:	Units:	Highest Desirable Level:	Maximum Permissable Level:
Total dissolved solids	mg/l	500	2,000
Turbidity	T.U.	5	25
pH	(mg/l)	7.0 - 8.5	6.5 - 9.0
Free chlorine	mg/l	0.2 - 0.6	1.0
Nitrate ($as NO_3$)	mg/l	50	100

• Taste and colour of water can indicate certain types of contamination. Table 2 shows certain indicators for taste and colour, these should only be used in support of the results of water quality testing.

• Table 2: Indicators for taste and colour of water:

Taste of Water:	Indicator:	Colour of Water:	Indicator:
no taste	un-contaminated	clear	un-contaminated
bitter or metallic	iron, manganese, sulfate	green	organic matter
rotten-egg	hydrogen sulfide	brown	organic matter
salty	sodium chloride,	yellow	organic matter
musty	organic matter	reddish-brown	iron

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

■ **Additional Improvement works:**

Using information from page 1 of the survey decide if any improvement works must be done by the community to prepare the well and well site for construction. This may include all or some of the following:

- **Well and well head:**

  • Reduction of well diameter: existing well diameter should be reduced to approximately 1.5 metres. Discuss with the community how this can be done using local materials..

  • Increasing well yield: if there is insufficient water, or the well runs dry every year, then yield must be increased by deepening; this should be to minimum of 1.5 metre water depth allowing for yearly fluctuations.

  • Well cleaning: well bottom should be cleaned of all debris, leaves, sticks, silt etc.

  • Well site levelling: any un-even or loose ground within 5 metre radius of well should be cleared, levelled, back-filled and compacted.

  • Well lining: if the well is not dug in rocky or very stable soil, lining must be provided to at least 1.5 metres below ground level; traditional dry-stone lining provides for stable footing as ring collar foundation. Any weak sections of well shaft below 1.5 metres should also be lined to prevent collapse of the shaft.

- **Well Site:**

  • Surface contamination: any source of contamination within 15 metre radius of the well must be removed; rubbish tips, animal pens etc. Any standing water within a 15 metre radius of the well must be drained and the ground levelled and compacted.

  • Restricting animals: free access to pump site for animals should be restricted by building fencing or walls.

  • Purdah wall: if the well is located in a public place a purdah wall must be provided if requested by the village women.

STEP NUMBER 1: ACTIVITY: TECHNICAL SURVEY

- **Outputs:**

  After conducting the technical survey the LGRDD technician should have the following information:

  • Critical ground water indicators for the selected wells and final approval.

  • Which improvement works are necessary for well and well site prior to installation of handpump.

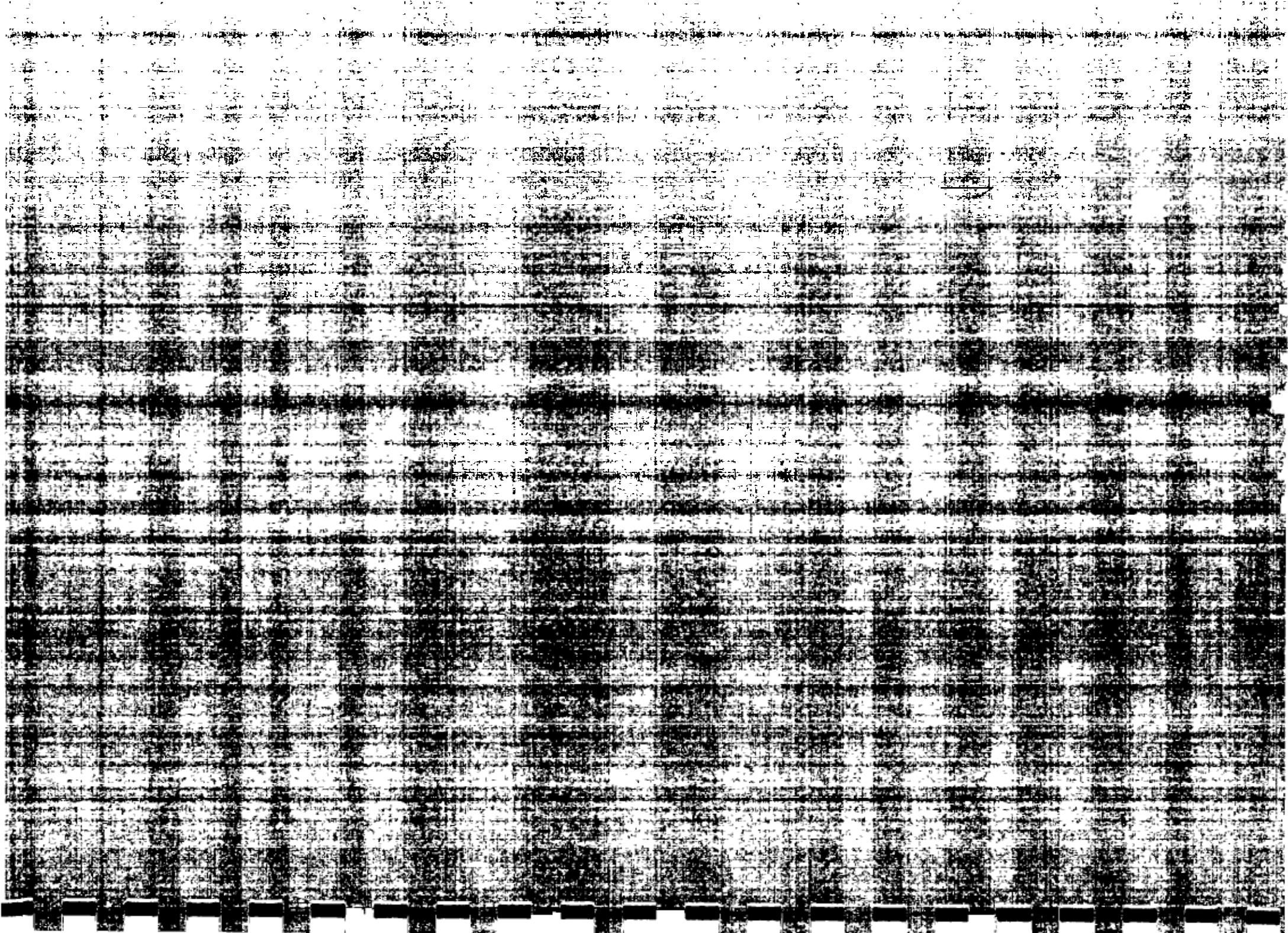
  • Technical data for design and quantity estimates

  This information should be discussed with the other members of the team and recorded in the village file. The female community organiser should present the final list of possible sites to the village women for discussion.

STEP 1 — Team Checklist

- Before starting activities in step number 2, review the activities of step number 1 to make sure that the whole team is ready to begin.
- If any of the key activities have not been fully completed the team should make a note of further action required before moving on to step number 2.

Key Activity	Expected Outputs
1. involvement of women	men agree to women's involvement for: • hygiene education • facility siting and design decisions • two female representatives to attend meetings
2. community participation	both men and women understand: • communal site and access • coat-sharing • hygiene education • operation and maintenance
3. preparation for well siting	• technical survey for feasibility of well sites • male option list given to women for site selection
4. assessment of village water supply situation	• village mapping (population and compounds) • male and female input for water use and sanitation
5. female communication channel	• female representatives selected • communication channel established



STEP NUMBER 2:	ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

Objectives:

- To finalise siting of pump with men, after input of women
- To carry out design and calculate quantity estimates for well headworks
-
-

Target Group:

- Sub-engineer
-

Methods:

- Discussions
- Calculations
-

Means and Materials:

- Pencil, paper and calculator
- Volumes and quantities calculation sheets
-
-

Organisation:

- Group discussion with village men
- Visit to existing well site, or proposed site, if necessary
-

Main Messages and Outputs:

- Village men should all agree on the selection of the communal pump site, after hearing input of village women.
- LGRDD technician calculates material quantities required for design of specific village well
-

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

■ **Finalising Pump Site:**

• Existing well site:

Any existing well site to be improved should meet all of the following conditions:

• The well meets all of the technical conditions, including water quality and yield

• The well is freely accessible to all members of the community in the user group

• The well is freely accessible to all the **women** in the user group

Input from the village women must be given to the men before finalising the site for handpump installation.

• New well site:

If there are no existing wells in the village then the community must agree on a new site which meets all the above criteria. The village men may know where the ground water is good for drinking, in which case siting will be easier.

■ **Design of Well Headwork:**

• **Standard Design:**

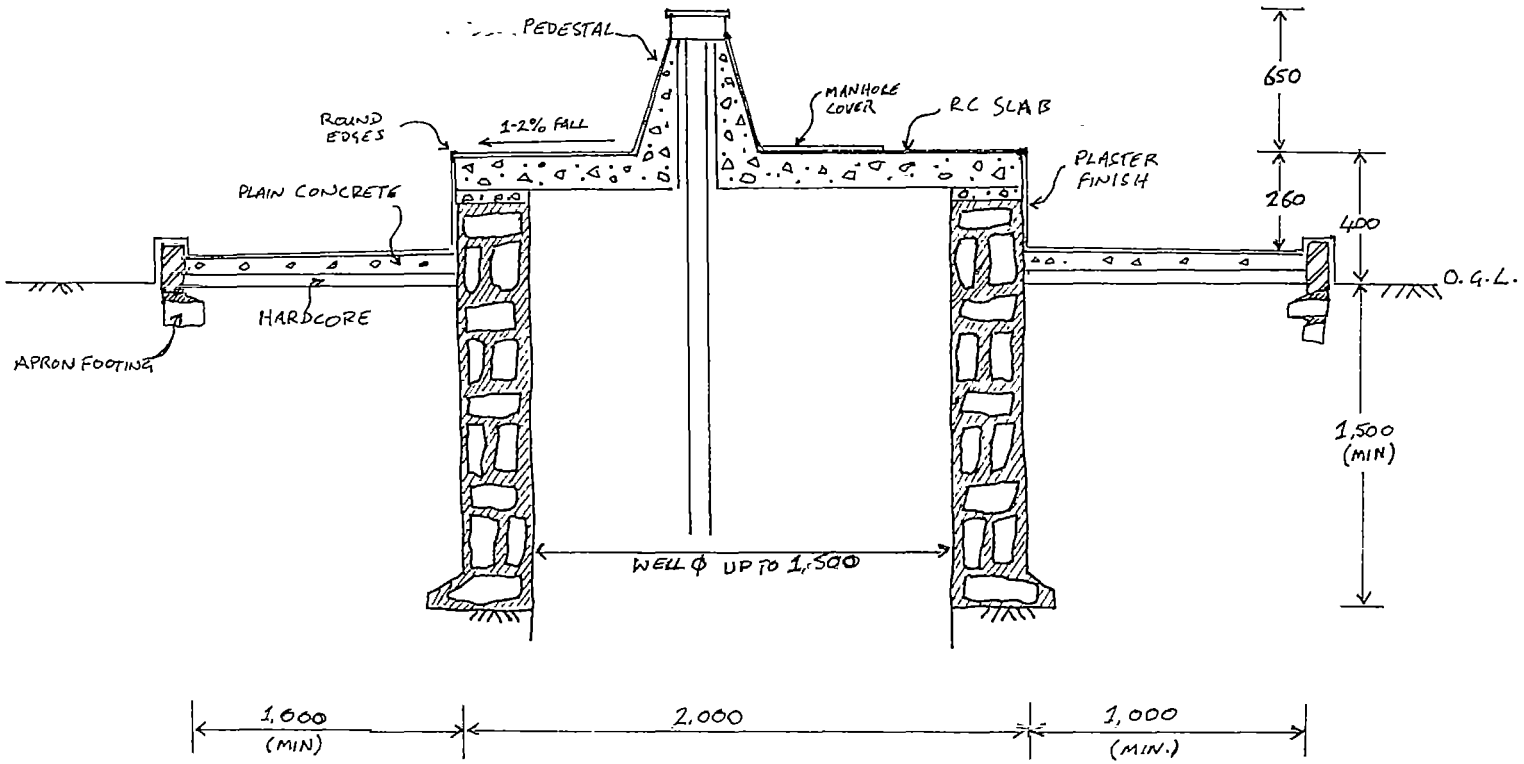
Well headwork with standard specifications shown in Figure 1 will require following material quantities:

Component:	Cement (bag)	Sand (m^3)	Aggregate (m^3)	Stone* (m^3)	Bricks* (each)	Steel (Kg)
Head wall (0.4 m)	1	0.12		0.6	(280)	___
Slab (2 m dia.)	2	0.16	0.32	---	50	32
Apron (4 m dia)	4.5	0.36	0.72	___	100	___
Drain	0.5	0.04	0.08	0.1	(50)	___
Finish work	1	___	___	___	___	___
Totals:	9	0.7	1.1	0.7	150	32

* Note: where stone is available, bricks only required for forming slab and apron.

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

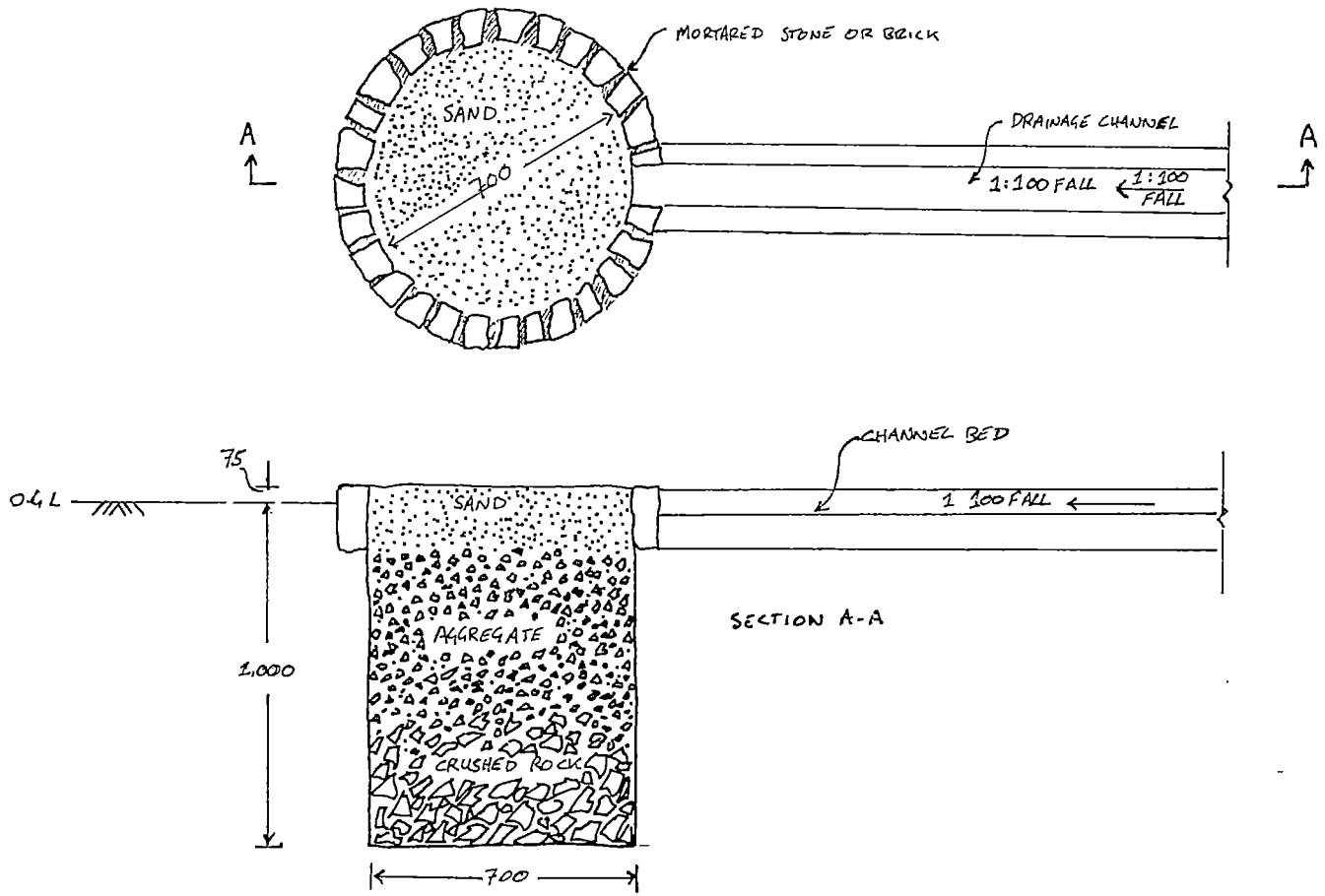
- Figure 1: Standard LGRDD well headworks specifications:



- not too scale
- all dimensions in millimetres

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

- Figure 2: Standard LGRDD soak-pit design:



- not too scale
- all dimensions in millimetres

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

■ **Design of Well Headworks:**

• **Design of non-standard headworks:**

Well cover slab: diametre may be reduced as necessary; slab diametre should not exceed 2.0 metres.

Apron: diametre may be increased as necessary; apron diametre should never be reduced to less than 1 metre greater than radius of well cover slab diametre.

Head wall: height may vary according to requirement but should not exceed 0.5 metres including slab thickness

Drainage channel: should always be a minimum length of 4 metres; if no farm land or a kitchen garden for drainage a soak-pit must be provided (see Figure 2).

> Note: if there is no existing drainage system then a soak-pit must be constructed

■ **Calculating Volumes:**

For quantity estimation calculate all volumes for each component in the headworks:

• Reinforced or plain concrete (1:2:4 mix):

well cover slab (inc. steel rebar)
pump pedestal
well apron
drainage channel base

• Stone or fired brick:

head wall
lining to 1.5 m
drainage channel lining
bricks for apron and slab shuttering (150 number)

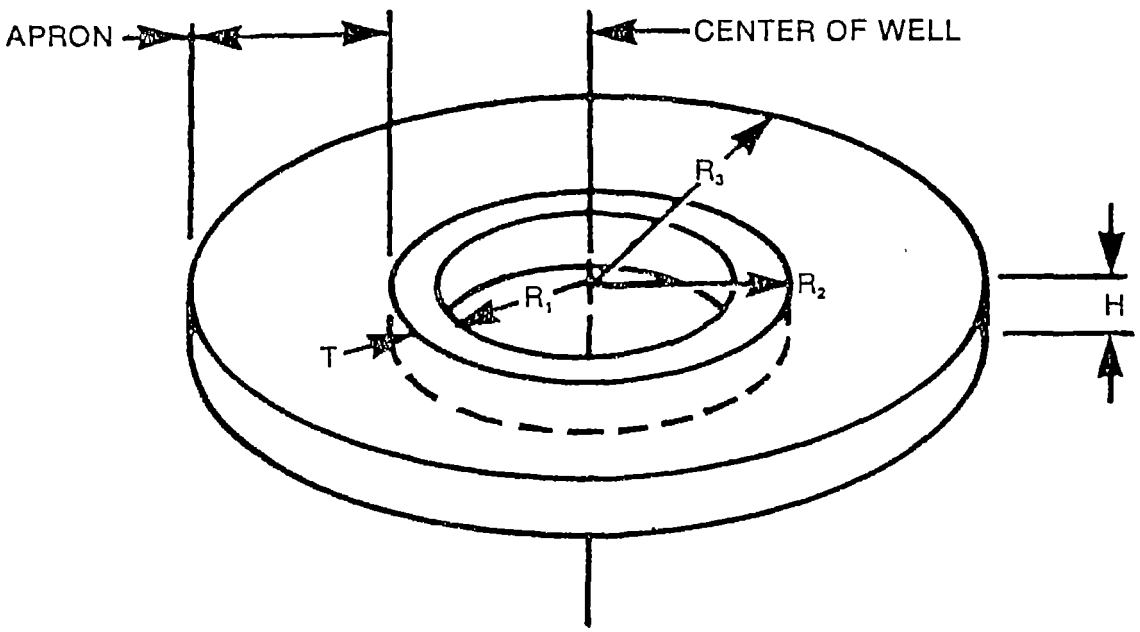
• Mortar (1:4) and Rendering (neat):

mortar for headwall and drainage channel
plaster finish for slab, apron and headwall

Figure 3 is quick reference guide for calculating volumes of cylinders, slabs etc

STEP NUMBER 2:	ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

- Figure 3: Quick reference guide to calculating volumes:



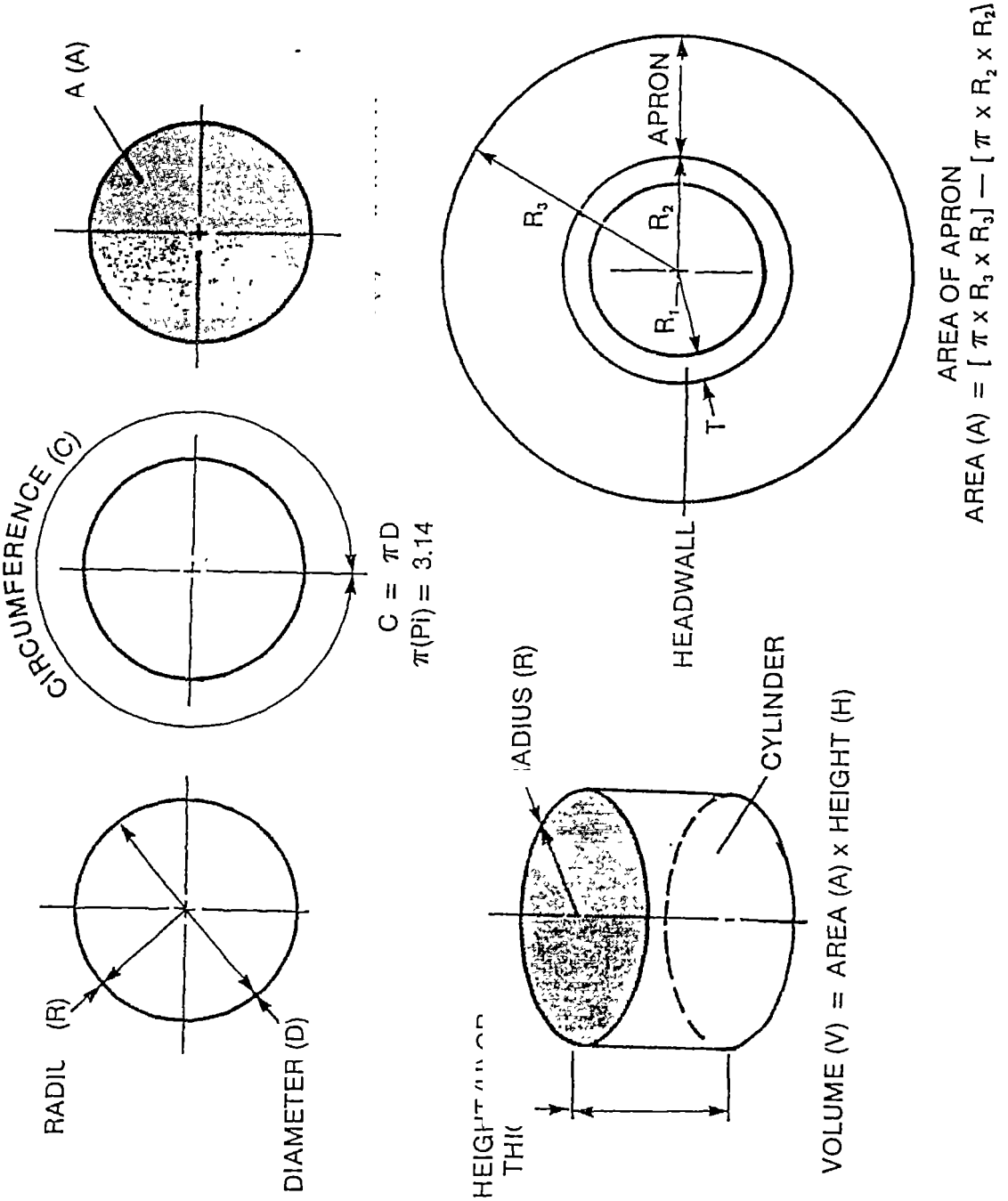
π = 3.14
H = 0.15m
T = 0.15m
R_1 = 0.75m
R_2 = R_1 + T
R_3 = 2.20m

V (APRON) = (π x R_3 xR_3 x H) - (π x R_2 xR_2 x H)

V = (3.14 x 2.2 x 2.2 x 0.15) - (3.14 x 0.9 x 0.9 x 0.15)
V = (2.28) - (0.38)
V = 1.9 (IN CUBIC METERS)

STEP NUMBER 2: **ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES**

- Figure 3: Quick reference guide to calculating volumes (cont):

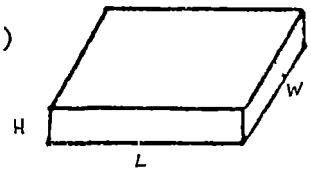


STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

- Figure 3: Quick reference guide to calculating volumes (cont):

Key: V=Volume H=height W=width L=length B=base R=radius π=3.14

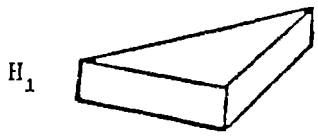
1. Rectangular solid (box)



V=H x W x L

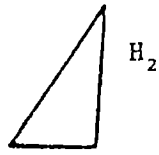
2. Extended Triangle

V=h_1 x area of base



base

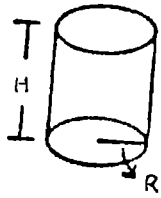
plan



Plan

Area = 1/2B x H_2

3. Cylinder

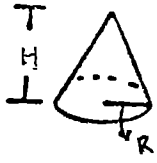


V=H x area of base

Area of base = πR^2

V=H x (πR^2)

4. Cone



V=1/3H x (πR^2)

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

- **Calculating Materials:**

After calculating required volumes for non-standard design, use tables 3 and 4 to estimate individual material quantities such as sand, cement etc.

> Note: when calculating materials always add 10% for waste and losses to the final volume

- **Outputs:**

LGRDD technician should have finalised the following:

- Site selection for handpump installation with input of village men and women.
- Material quantities from standard design if possible; or
- Calculated volumes and material quantities for non-standard well heads.

This information should be discussed with the other members of the team and a materials list prepared for the community.

STEP NUMBER 2: ACTIVITY: SITING, DESIGN AND QUANTITY ESTIMATES

- Table 3: Quantity Estimates for Finish Concrete and Mortars per Cubic Metre:

Mix Ratio:	Cement (bags)	Sand (m^3)	Aggregate (m^3)	Rebar* (m)	Bricks (each)	Stone (m^3)
Reinforced Concrete						
1:2:4	6.0	0.45	0.9	115	---	---
Plain Concrete						
1:2:4	6.0	0.45	0.9	---	---	---
Mortar						
1:4	1.8	0.24	---	---	500	1.0

* Note: length of rebar is for one cubic metre of concrete with uniform depth of 100 mm with steel bar at 0.15 metre centre to centre

- Table 4: Conversion Units:

To **convert to metric**, multiply by factor shown
To **convert from metric**, divide by factor shown

Units	**Factor**	**Units**	**Factor**
Area:		**Volume:**	
acres:sq metres	4406.8	cub yard:cub metre	0.7640
acres:hectares	0.4047	cub feet:cub metre	0.0281
sq yards:sq metres	0.8361	cub inch:cub centim	16.38
sq feet:sq metres	0.0929	**Capacity:**	
sq feet:sq centim.	929.03	gallons:litres	4.546
sq inch:sq millim.	645.16	quarts:litres	1.137
sq inch:sq centim.	6.4516	pints:litres	0.568
Length:		**Mass:**	
miles:kilometres	1.6093	tons:kilogrms	1016
yards:metres	0.9144	stones:kilogrms	6.350
feet:metres	0.3048	pounds:kilogrms	0.453
inch:millimetres	25.4	ounces:kilogrms	28.35
inch:centimetres	2.54		

STEP NUMBER 2:	ACTIVITY: HANDOVER PUMP AND ENSURE CORRECT STORAGE

Objectives:

- To handover all pump hardware, rising mains and rods to community
- To explain importance of correct storage
-
-

Target Group:

- Village men
-

Methods:

- Discussions
- Demonstration
-

Means and Materials:

- Pump hardware
- Rising mains and rods
-

Organisation:

- Group discussion with village men
- Visit to village storage area
-

Main Messages and Outputs:

- Community should take over responsibility for safe-keeping of pump hardware
- Rising main pipes and rods should be stored correctly
-

STEP NUMBER 2: ACTIVITY: HANDOVER PUMP AND ENSURE CORRECT STORAGE

■ **Handover of Pump Hardware:**

After the community has signed the group contract handover the pump and all hardware:

• Lifting rods: stored carefully without bending or snagging the rods together.

• Rising main pipe: PVC pipes must always be stored away from direct sunlight, stack in straight layers no more than three layers high.

> Note: never store PVC pipe in direct sunlight, this will cause burning and warping of the pipes

• Pump head and spares: store pump head and casing upright, all spares, bearings, handle and pedestal frame should be kept together in a secure room

■ **Community Responsibility:**

• Community takes over full responsibility for the pump and all the accessories and spares; if any parts go missing before the pump is installed they will be responsible for replacing these at their own expense.

■ **Outputs:**

• community stores all pump and hardware correctly

• community takes responsibility for safe-keeping

STEP NUMBER 2: ACTIVITY: ASSESS FEASIBILITY OF LATRINE PROGRAMME

Objectives:

- To assess technical feasibility of village latrine programme
- To determine whether there is any risk of contamination of existing ground water sources
- To decide on latrine design option
-

Target Group:

- Village men
- Sub-engineer

Methods:

- Discussions and observations
-
-

Means and Materials:

- Completed technical survey forms
-
-

Organisation:

- Group discussion with village men
- Visit to compound wells if necessary
-

Main Messages and Outputs:

- Is latrine programme technically feasible in the village?
- What is the risk of contaminating water sources in the village?
- Which type of latrine is to be selected for the village?

STEP NUMBER 2: ACTIVITY: ASSESS FEASIBILITY OF LATRINE PROGRAMME

■ **Technical Criteria:**

• **Ground water contamination:**

The three most important factors in ground water contamination for compound latrines are:

- vertical water table level
- horizontal distance from latrine site to well water source
- soil porosity

- **Low risk situations:**

- water table greater than 4 metres in depth.
- horizontal distance of 15 metres or more from latrine site to well water source.
- soil with low porosity: clay, loam, fine sand

In these compounds the standard latrine designs can be used with little risk of contamination.

- **High risk situations:**

- water table less than 4 metres in depth.
- horizontal distance of 15 metres or less from latrine site to well water source.
- soil with high porosity: gravel, coarse sand

To proceed with the programme in these compounds the standard designs should be modified:
1 Increase horizontal distance from well source as far as possible
2 Seal pit base and provide sand filter (see Step 5, Activity: Specify latrine preparation work)

Risk of ground water contamination will be highest in compounds with existing wells. In this case it is recommended to educate households to use compound well water for washing and cleaning purposes only.

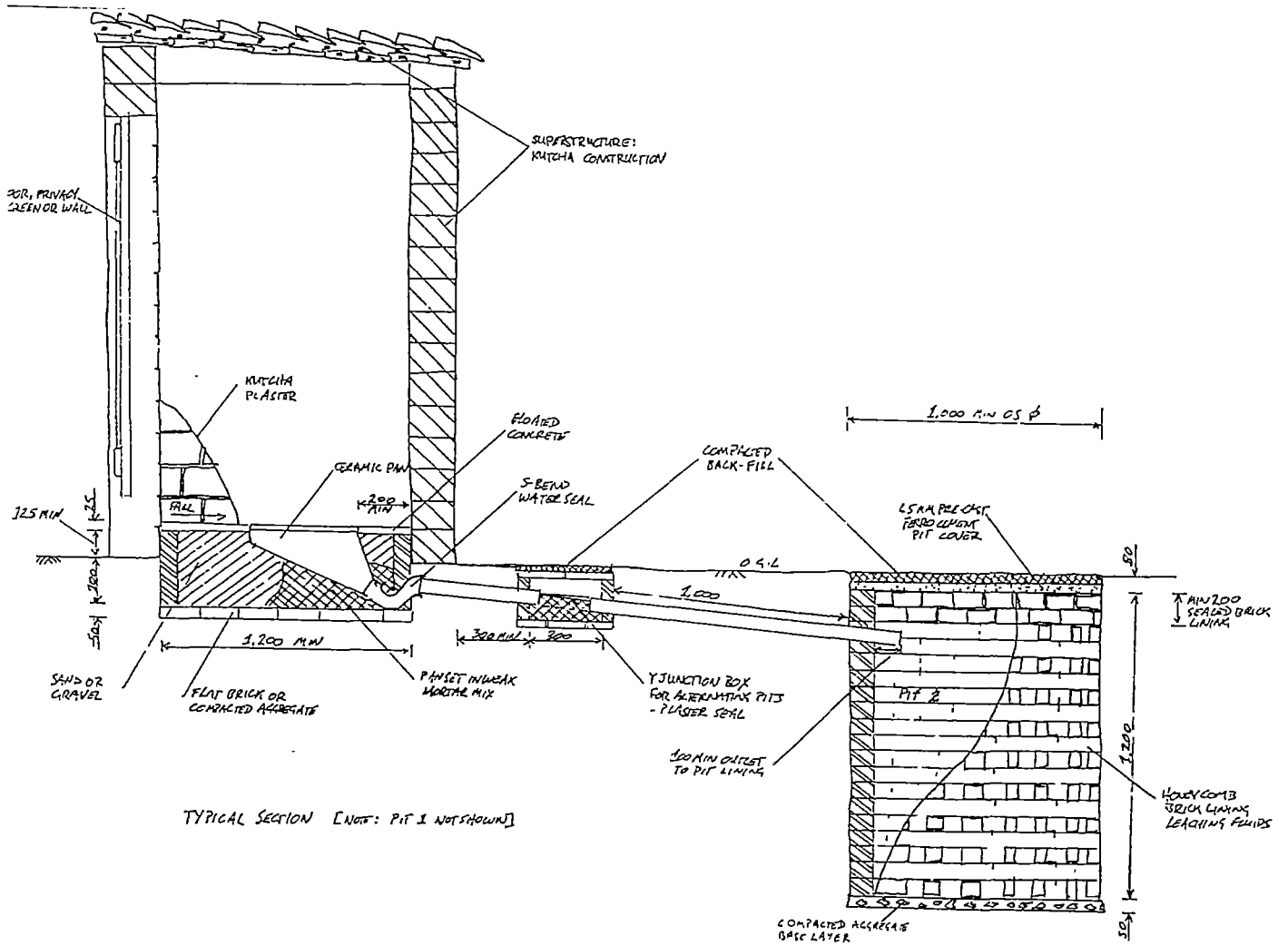
• **Water Requirements:** **(see figure 4.a and 4.b)**

For proper flushing and use of on-site latrines the following additional water requirement will need to be met:

- Pour flush latrine: 3-4 litres per person per use
- Indirect pit latrine: 1-2 litres per person per use

STEP NUMBER 2: ACTIVITY: ASSESS FEASIBILITY OF LATRINE PROGRAMME

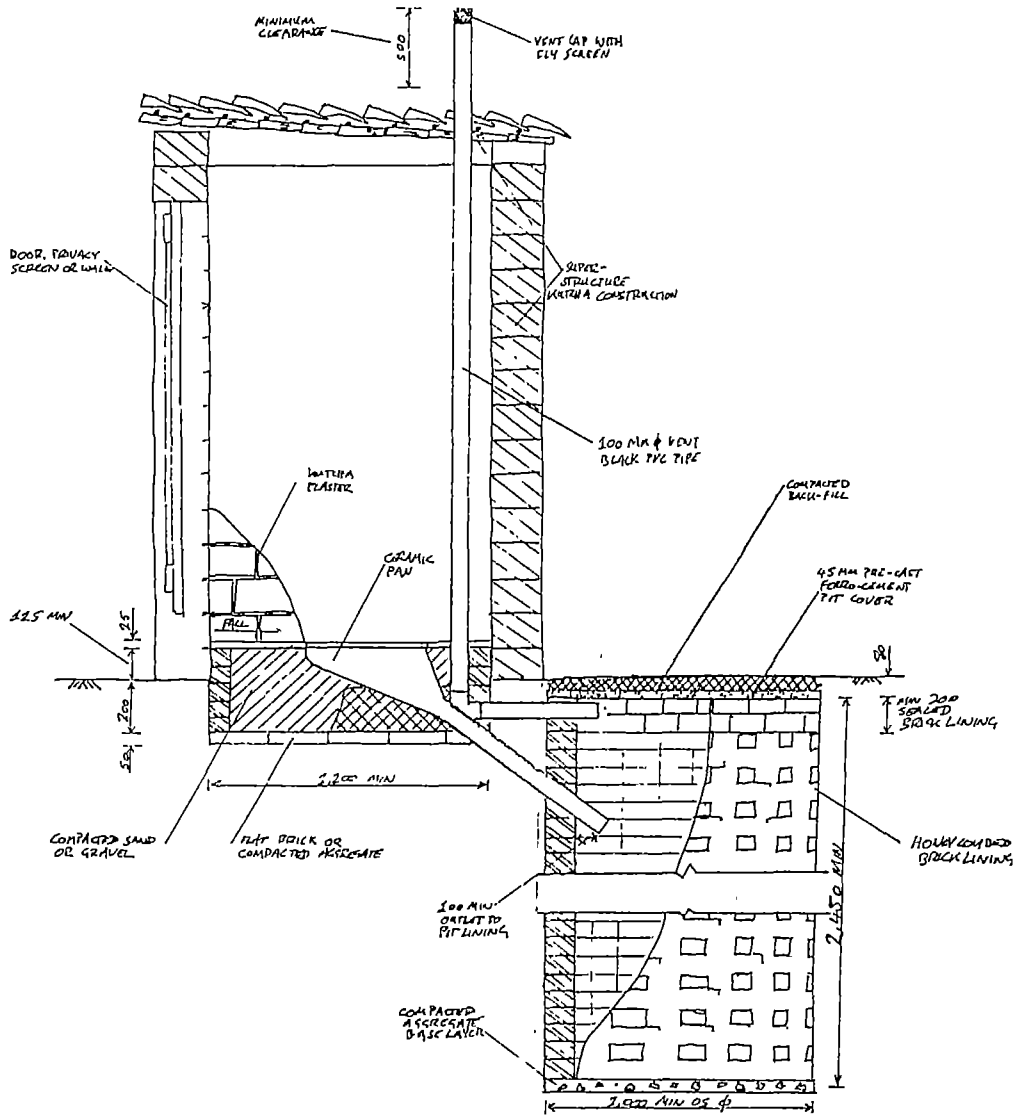
- Figure 4.a: Standard LGRDD Pour Flush Latrine design specifications (section only)



- not too scale
- all dimensions in millimetres

STEP NUMBER 2: ACTIVITY: ASSESS FEASIBILITY OF LATRINE PROGRAMME

- Figure 4.b: Standard LGRDD Indirect Pit Latrine design specifications (section only)



- not too scale
- all dimensions in millimetres

STEP NUMBER 2: ACTIVITY: ASSESS FEASIBILITY OF LATRINE PROGRAMME

In both cases sufficient water must be provided to operate and flush the latrine. Compound users should be capable of meeting this increased water requirement before proceeding with the latrine programme

- **Selecting Latrine Design:**

Use following criteria to select latrine design:

Soil type and drainage: in soils with very poor drainage select lower water use option (IPL)

Water availability: in areas where there is little convenient and easily available water select lower water use option (IPL)

Existing hygiene awareness: in areas where people have poor sanitary habits (using bulky anal cleansing material) only promote PFL if hygiene education is likely to improve peoples behaviour

Groundwater table: if groundwater table is higher than 4 metres select PFL with shorter pit depth, except where soils are highly permeable

The most important factor is easy and convenient availability of a water source to reduce the additional task of water collection required for flushing and operation.

- **Outputs:**

The LGRDD technician should be able to determine the following:

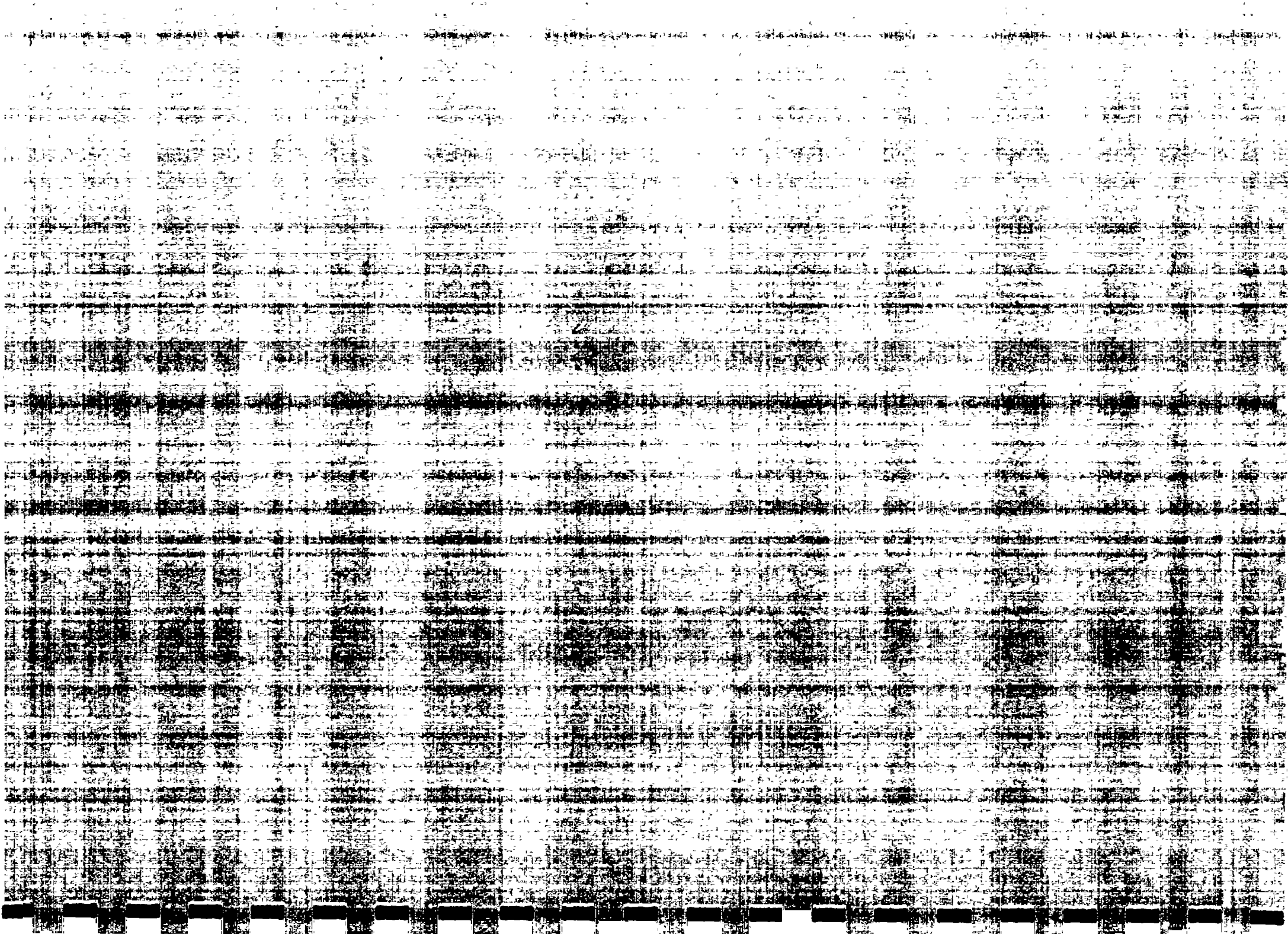
- The feasibility of installing latrines in village compounds.
- The associated risks of ground water contamination.
- Modifications to pit construction in order to reduce risks of ground water contamination if necessary.
- Availability of water to meet additional requirements and willingness of compound users (women) to supply this water.
- Selection of appropriate latrine design

This information should be shared with other members of the team and recommendation given for latrine programme to go ahead.

STEP 2 — Team Checklist

- Before starting activities in step number 3, review the activities of step number 2 to make sure that the whole team is ready to begin.
- If any of the key activities have not been fully completed the team should make a note of further action required before moving on to step number 3.

Key Activity	Expected Outputs
1. female input in siting decision	male villagers have been given women's input for design and siting of pump before making final decisions
2. finalise siting and pump design	communal site has been chosen with female input for quantity and costing, including drainage requirements and pump specifications
3. pump caretaker	village men have selected caretaker(s) who will receive training and be responsible for maintenance and proper usage of facility
4. hygiene education	both men and women have received hygiene education about safe water sources, use and storage
5. community contract	village men have signed the community contract with LGRDD field staff showing their commitment to the project and selected: • 2 female representatives for each compound • 1 or 2 pump caretaker(s) • 2 latrine mistri's
6.	



STEP NUMBER 3: ACTIVITY: SPECIFY PREPARATION WORK, MATERIALS AND SET CONSTRUCTION TIME-TABLE

Objectives:

- To specify well preparation and site improvement works for community
- To specify materials list and tools for community
- To set construction time-table with community men
-

Target Group:

- Village men
- Sub-engineer

Methods:

- Discussions and questions
- Design specifications
-

Means and Materials:

- Technical survey results
- Village walk results
- Material quantities

Organisation:

- Group discussion with village men
- Visit to well site if necessary
-

Main Messages and Outputs:

- What preparation work is necessary for well and site?
- What are the materials and tools to be supplied for construction?
- When will the construction take place?

STEP NUMBER 3: ACTIVITY: SPECIFY PREPARATION WORK, MATERIALS AND SET CONSTRUCTION TIME-TABLE

- **Specifying Preparation Work:**

  On basis of technical survey, specify work to be done by community for following as necessary:

  • well improvements: reduction of well diametre, lining, cleaning and de-silting, well deepening, well site levelling, removal of existing lifting mechanism.

  • site improvements: removal of surface contamination, restricting access to animals, construction of purdah wall.

  Discuss ways in which the work can be carried out with community men; use traditional lining methods and materials where possible.

- **Specifying Materials:**

  On basis of design calculations list all materials to be provided by community:

  • Locally available materials: sand, aggregates, hardcore, stone.
  • Materials to be purchased: fired bricks, cement, reinforcing steel.
  • Additional materials: well hole cover (1 each), tie-wire (1 kg), used motor oil (1 litre).

  Give the materials list in quantities which the village men will understand: 1 tractor load = 2 cubic metres.

- **Specifying Tools:**

  Ask the men to collect as many hand-tools as possible for construction, including:

  • picks, shovels, buckets, wheelbarrows, pliers, hack-saw, carpenters saw, cement trowels and floats.

- **Setting Construction Time-table:**

  Construction and installation will require two visits to the village with at least seven days in-between. Agree on a time-table which accounts for:

  • on-going commitments to other villages by LGRDD team.
  • on-going work commitments for the villagers (farm work, harvesting etc).

STEP NUMBER 3:	ACTIVITY: SPECIFY PREPARATION WORK, MATERIALS AND SET CONSTRUCTION TIME-TABLE

■ **Outputs:**

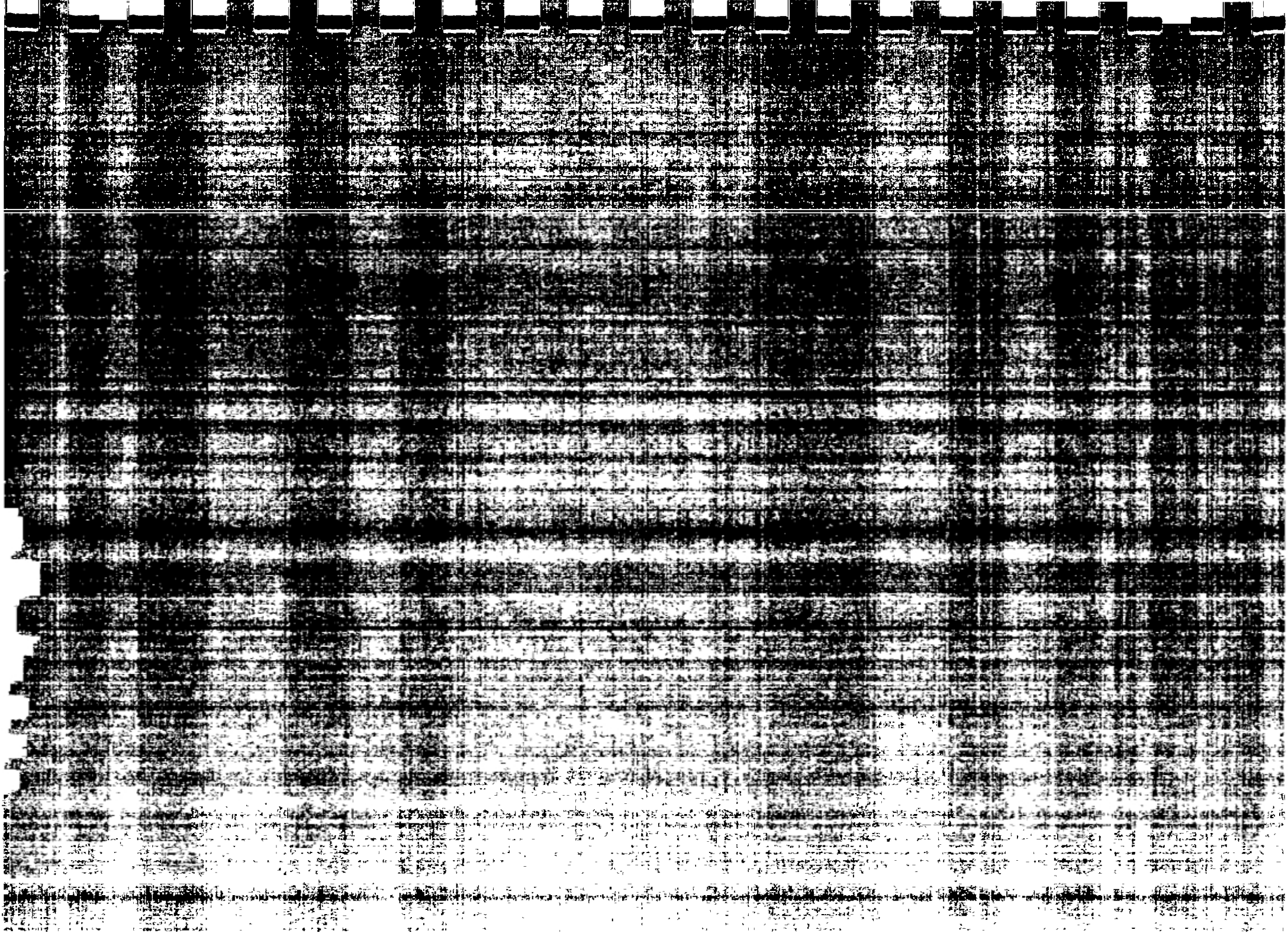
Village men should know:

- What preparation work needs to be done for well and site.
- What materials and tools must be provided for construction.
- When the construction will take place.

STEP 3 — Team Checklist

- Before starting activities in step number 4, review the activities of step number 3 to make sure that the whole team is ready to begin.
- If any of the key activities have not been fully completed the team should make a note of further action required before moving on to step number 4.

Key Activity	Expected Outputs
1. Preparation work for construction	Male villagers informed of: • well improvement works, materials, • list specifications and date, construction time table set out.
2. introduce latrine concept and policies	Both male and female informed about latrine programme, women asked to begin compound discussions about numbers of latrines.



STEP NUMBER 4:	ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN

Objectives:

- To give village men training in basics of construction methods
-
-
-

Target Group:

- Village men
-

Methods:

- Training session
- Discussions
- On-the-job training and supervision

Means and Materials:

- Construction posters
-
-

Organisation:

- One hour training session with discussions
- Group work with on-the-job training on well head construction
-

Main Messages and Outputs:

- Village men should learn basics of working with cement, ratios for various mixes, masonry techniques and tying of reinforcing steel
-
-

STEP NUMBER 4: ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN

- **Function of Construction Training:**

  LGRDD technician has supervisory role and is responsible for key activities such as setting out work and levelling.

  Community men should carry out most of the work

- **Training Session:**

  Session to be carried out early on day of construction; one hour maximum time duration. Most training will be on-the-job experience.

  Use posters for concrete and mortar mixing, masonry and tying of rebar (see examples in figure 5 below); cover the following topics:

  - ingredients and tools required for cement work
  - mix ratios for concrete and mortar
  - preparation and cleaning of sand and aggregate
  - dry batch mixing by volume
  - wet mix and volume of clean water
  - importance of correct and adequate vibration (tamping)
  - floating and finish work
  - importance of correct and adequate curing
  - working with mortar and laying masonry joints
  - tying and placing of reinforcing steel

  Include standard container and units of measure community members can work with.

  Some of the above topics will be covered as construction progresses on headworks.

- **Outputs:**

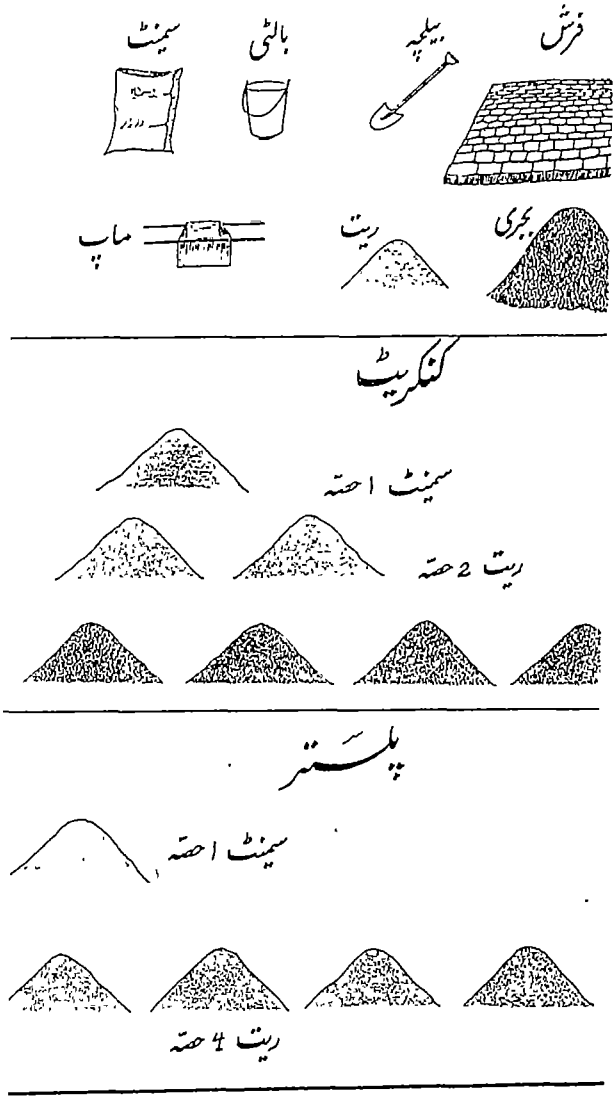
  After the training village men should have learnt:

  - Basics of reinforced and plain concrete.
  - Basics of laying masonry.
  - Importance of correct vibration, floating and curing.

STEP NUMBER 4:	ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN

- Figure 5: Construction Training posters

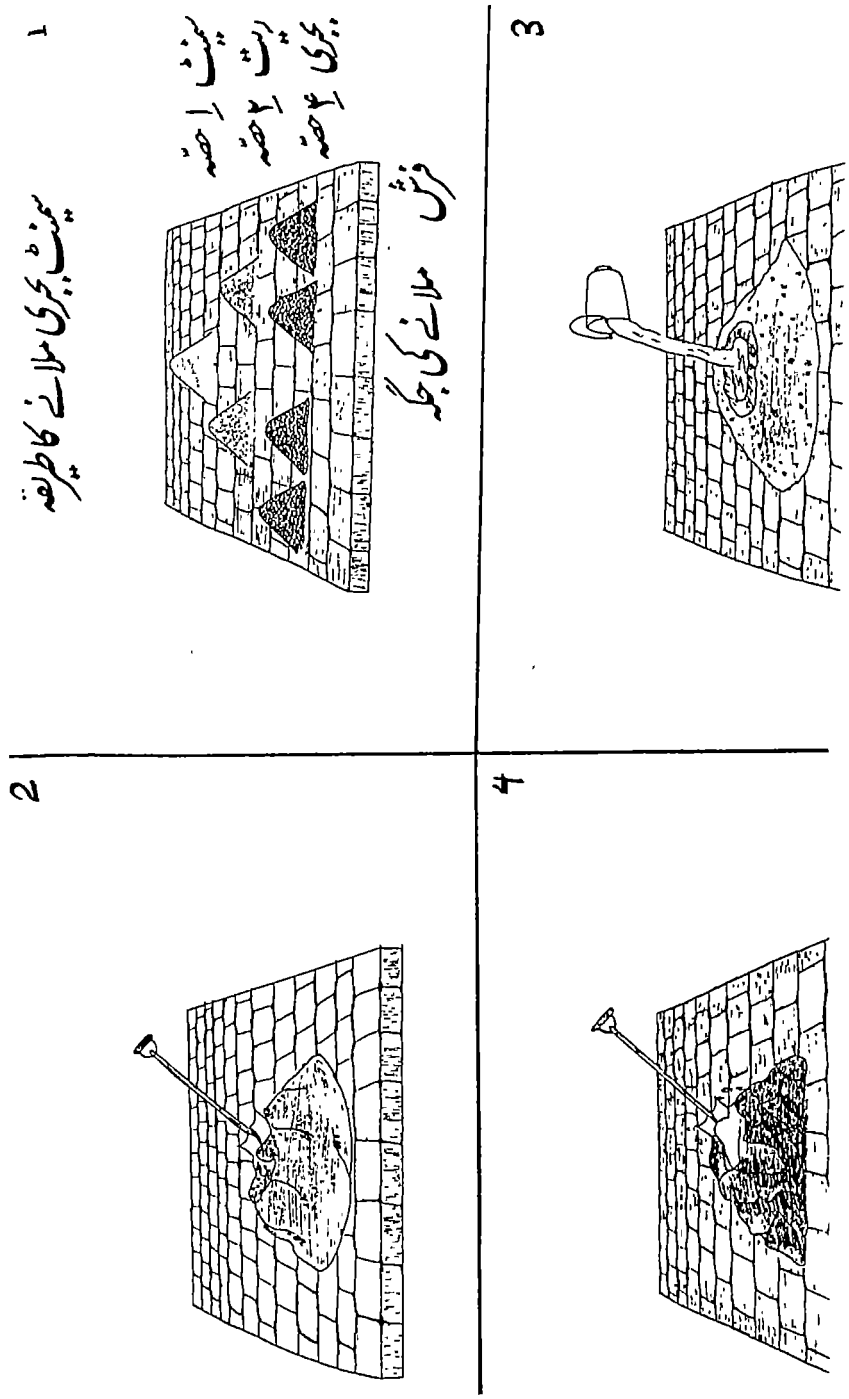
  Ingredients for making concrete and mortar



STEP NUMBER 4: **ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN**

- Figure 5: Construction Training posters (cont.)

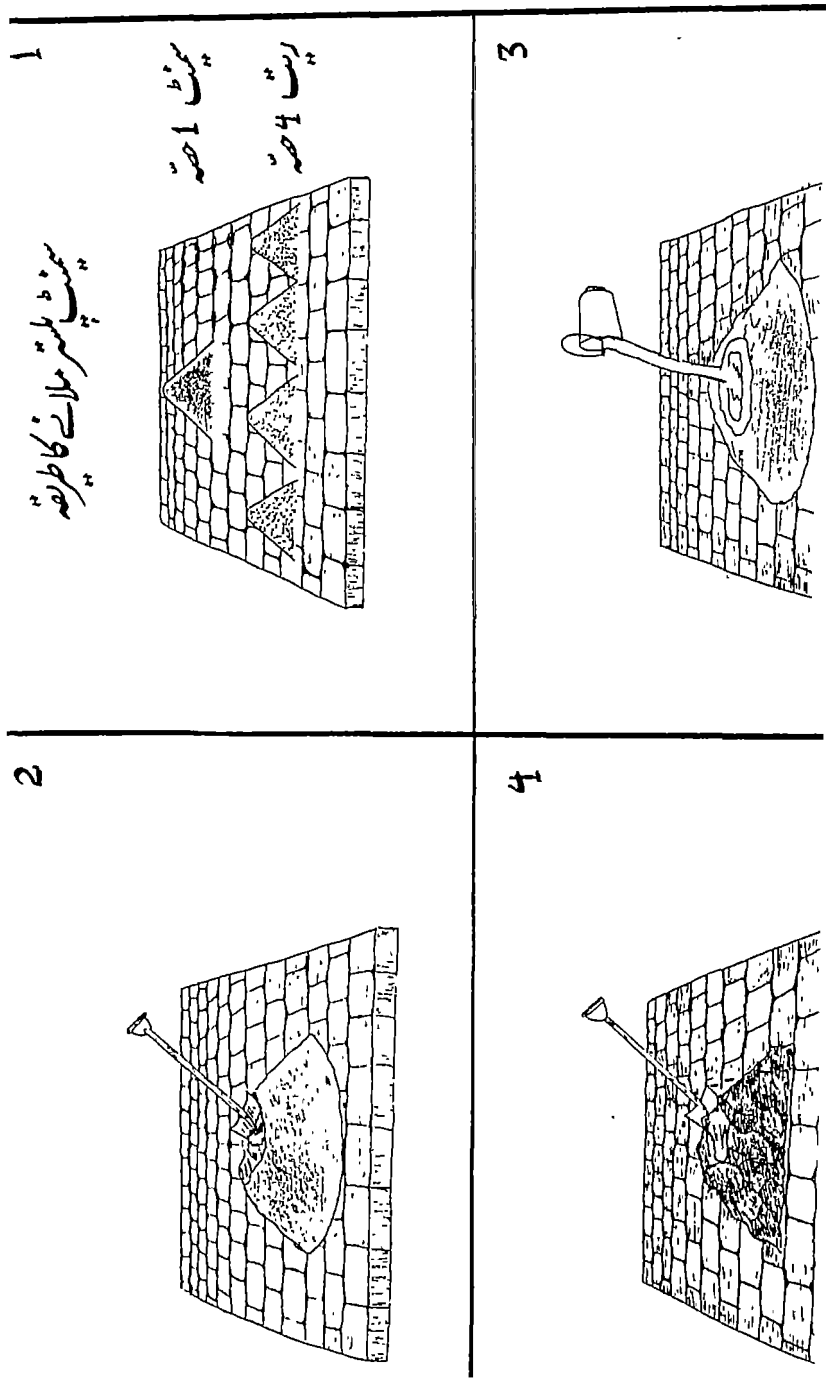
Mix ratio for making concrete



STEP NUMBER 4: **ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN**

- Figure 5: Construction Training posters (cont.)

  Mix ratio for making mortar

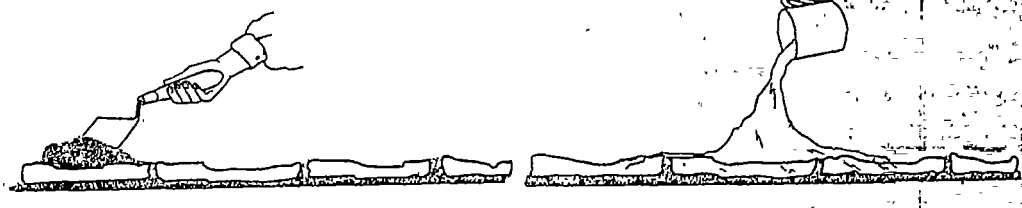


STEP NUMBER 4: **ACTIVITY: CONSTRUCTION ~~TRAINING FOR VILLAGE MEN~~**

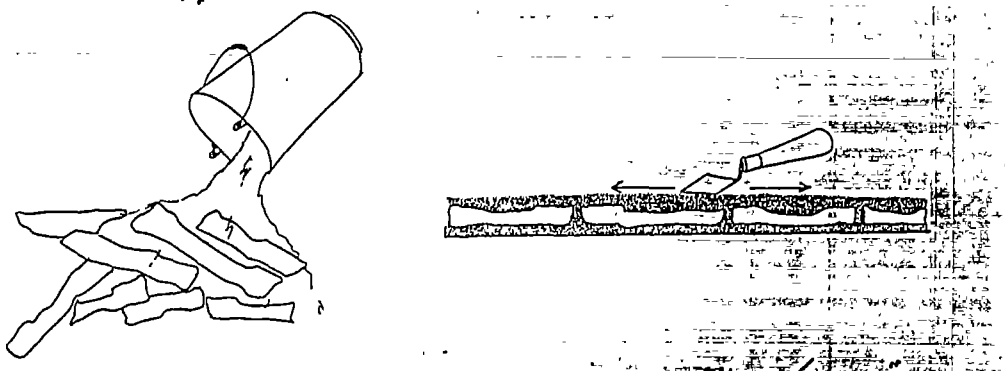
- Figure 5: Construction Training posters (cont.)

Technique for laying stone masonry

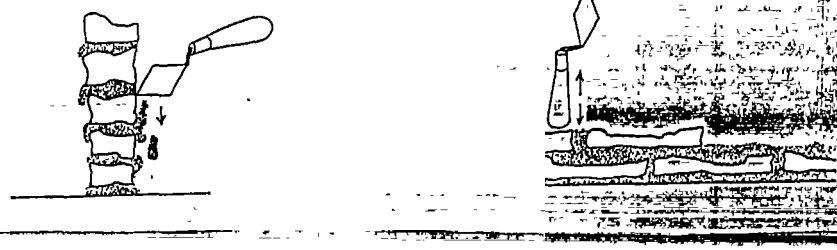
دوسرا ردا لگانے سے پہلے سطح کو گیلا کرلیں۔ دوسرا ردا لگانے سے پہلے زیادہ مصالہ ڈالیں۔



مسالہ کی سطح کو برابر لگائیں۔ پتھروں کو لگانے سے پہلے دھولیں۔



پتھروں کو اچھی طرح مسالہ میں جمادیں۔ جوڑوں سے فالتو مسالہ صاف کردیں۔

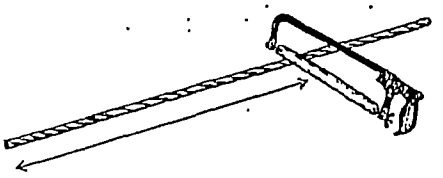


STEP NUMBER 4: **ACTIVITY: CONSTRUCTION TRAINING FOR VILLAGE MEN**

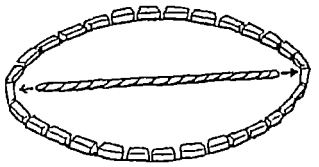
- Figure 5: Construction Training posters (cont.)

Technique for cutting and tying of reinforcing steel

سریا کی مطلوبہ لمبائی کاٹ لیں ۔

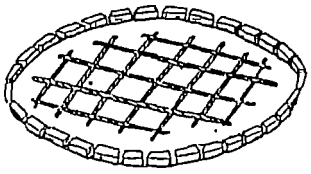


سریئے کو شٹرنگ کے کنارے سے دو انچ اندر رکھیں ۔

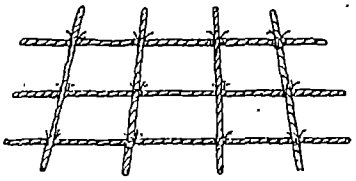


سریئے کو پانچ پانچ انچ کے فاصلے پر اوپر نیچے رکھیں ۔

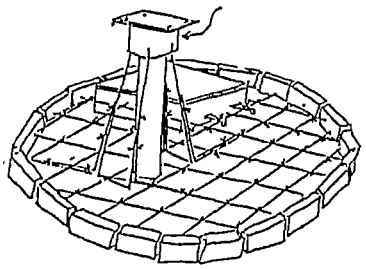
سریئے کے ہر جوڑ کو باریک تار سے باندھیں ۔

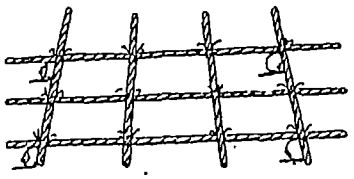


پورے جال کو زمین سے ایک انچ اوپر کریں نیچے پتھر رکھ کر اٹھا دیں ۔



کنکریٹ ڈالنے سے پہلے ہیڈ سٹل لوڈ مین ہول کور کو بھی جال سے باندھ دیں ۔





STEP NUMBER 4:	ACTIVITY: HEADWORKS CONSTRUCTION

Objectives:

- Day 1: To pre-cast well slab cover and pedestal, construct head wall, pour apron and lay out drainage channel
- Day 2: To set slab, and carry on with any finish plaster work (construct soak-pit if necessary)
-

Target Group:

- Village men
-

Methods:

- Supervision of construction work
- On-the-job training and supervision
-

Means and Materials:

- LGRDD construction equipment
- Village construction tools
-

Organisation:

- Two days of construction work with at least 7 days curing time in between
- Supervision of community labour on-site
-

Main Messages and Outputs:

- Community men responsible for carrying out majority of construction work
- LGRDD technician responsible for supervising, general setting out and levelling work
-

STEP NUMBER 4: ACTIVITY: HEADWORKS CONSTRUCTION

■ **Construction Equipment:**

LGRDD team should have following tools and equipment:

- 30 m tape measure
- 10 mm dia clear plastic hose
- batch box
- lay-out string
- carpenters saw
- hand compactor
- wooden pegs
- straight edge (1 x 3m, 1 x 1m, 2 x 1.5m)
- spirit level
- bar cutter or hacksaw
- trowel and float
- masons hammer
- crowbar
- 100 mm dia pipe
- pedestal mould

■ **Facility Construction:**

Construction work spread over two days, with at least 7 days in between for adequate curing. Each activity is outlined below; LGRDD technician must directly supervise highlighted activities:

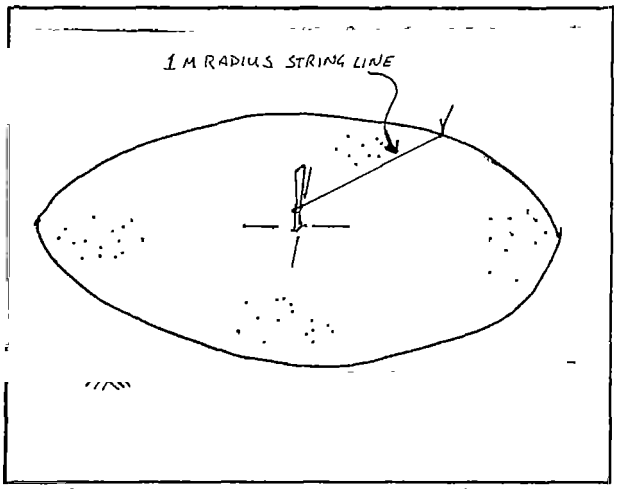
■ **Construction Activities, Day 1:**

• **Activity 1: Pre-casting slab cover and pedestal:** (see Figure 6)

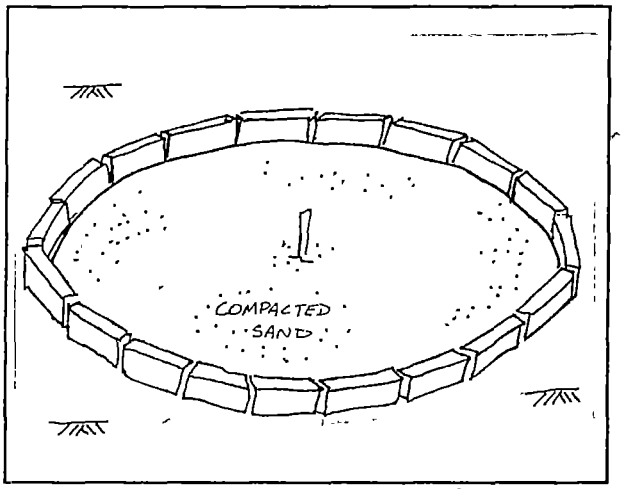
1	roughly level area of ground close to well with diametre of just over 2 metres
2	scribe outside edge of slab on ground with peg and string at 2 metre diametre
3	set out bricks flush with outside edge mark for shuttering
4	back-fill mould with 25 mm sand level and compact
5	lay out well hole cover and 100 mm dia. pipe for rising main, ensure correct orientation for spout outlet and drainage
6	set out steel at 0.15 m c/c (min. clearance to shuttering of 50 mm), tie-up and raise grid by 25 mm, tie on pedestal stand
7	pour concrete (1:2:4) and vibrate
8	check level and direction of pedestal; adjust if necessary
9	float slab with slight uniform fall away from centre
10	wait until slab has set enough to work on (1.5 - 2 hours)
11	oil inside of pedestal shuttering and fit around frame
12	pour concrete and vibrate
13	add neat plaster to cover slab and finish
14	start curing procedure and explain importance of curing
15	strike pedestal shuttering following morning and continue curing

STEP NUMBER 4: **ACTIVITY: HEADWORKS CONSTRUCTION**

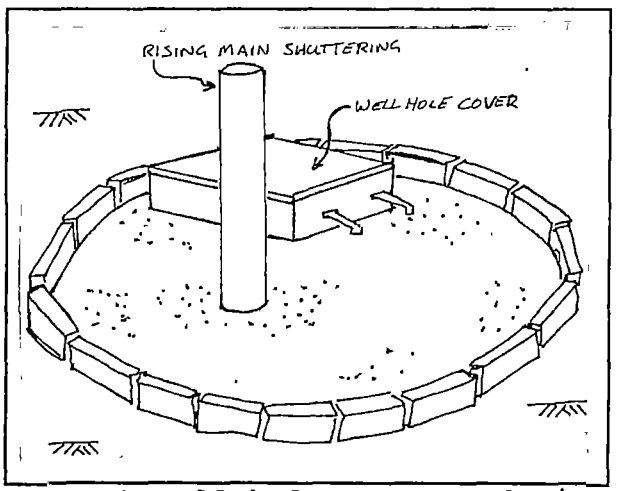
- **Figure 6: Pre-casting cover slab:**



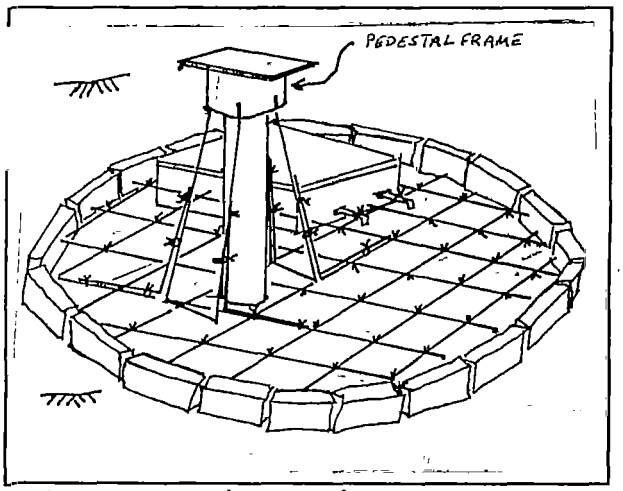
Scribe mark around outside edge of slab mould



Set out bricks on outside edge of mark as shuttering



Lay out well hole cover and pipe for rising main shuttering



Set out reinforcing steel and tie-up

STEP NUMBER 4:	ACTIVITY: HEADWORKS CONSTRUCTION

■ **Construction Activities, Day 1 (cont.):**

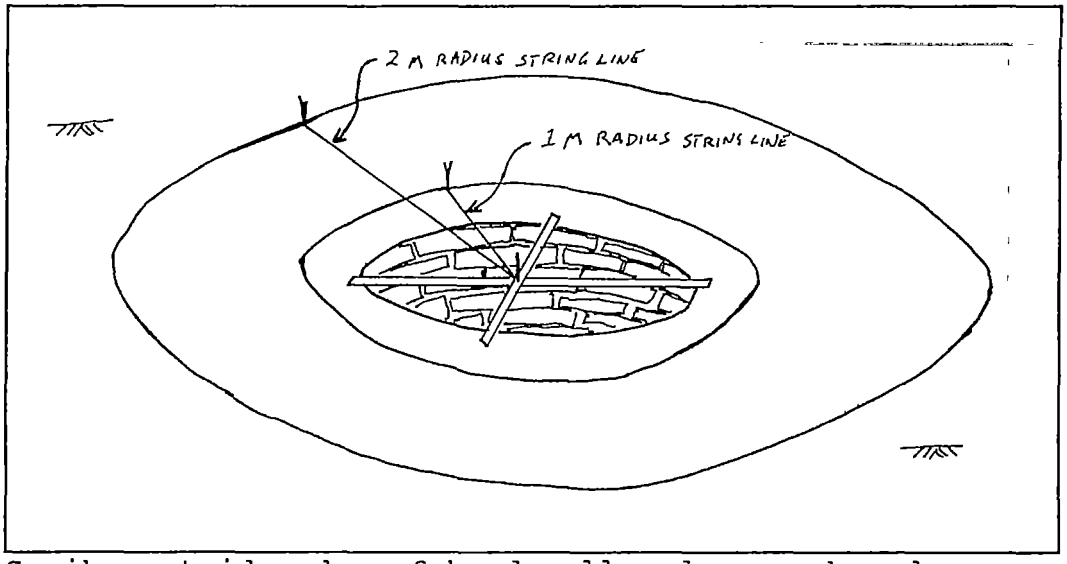
• **Activity 2: Head wall construction:**	(see Figure 7)
1	centre wooden cross over well, using nail as pivot rotate string to scribe 2 metre (outside edge of head wall) and 4 metre (outside edge of apron) marks
2	lay 25 mm bed of concrete on inside of 2 metre diametre mark
3	build up masonry head wall (stone or fired brick) to approx. 250 mm; finish with concrete copping of 25 mm thickness
4	check that height of wall is approximately 300 mm from original ground level and it is level across top
5	re-work mortar joints to ensure clean exterior finish

• **Activity 3: Set out and pour apron:**	(see Figure 8)
1	place 8 set out pegs starting at drainage outlet; mark off finish concrete level on peg no.1 and transfer this level to all other pegs; mark off top of finish concrete on all 7 pegs according to level schedule (see figure 6)
2	using 1 metre straight edge against head wall, lay out bricks to form apron curb, back-fill behind bricks with aggregate
3	back-fill apron area with hardcore to 75 mm and compact
4	pour concrete (1:2:4) to just below finish level on pegs and vibrate
5	finish with neat plaster up to finish concrete level on pegs; plaster over bricks to form apron curb
6	form drainage v-groove around apron to drain outlet at 100 mm from curb
7	start curing procedure and explain importance of curing

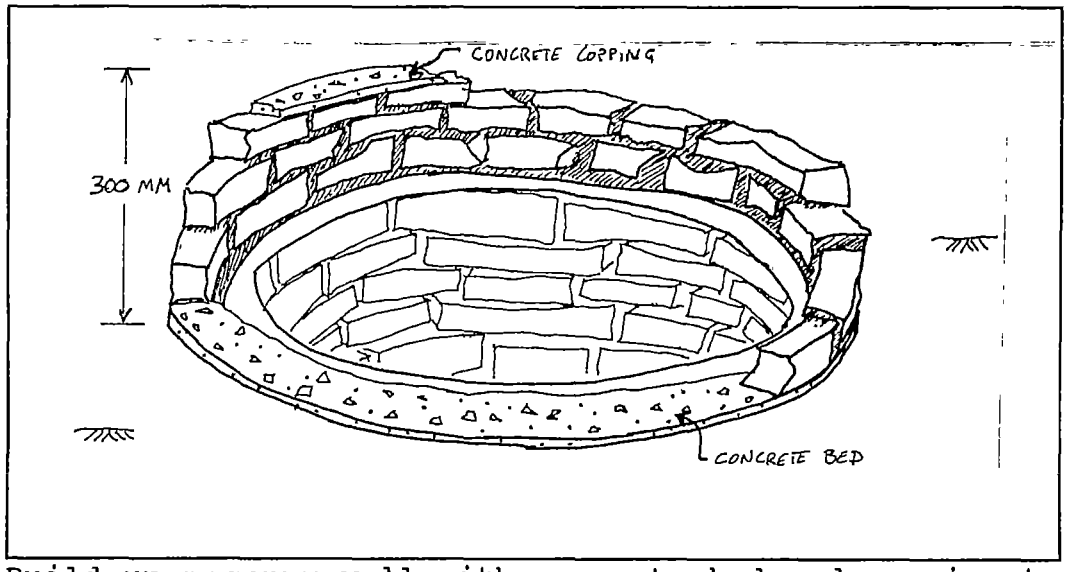
• **Activity 4: Construct drainage channel:**	(see Figure 9)
1	open apron curb directly opposite pump spout outlet
2	set string lines at 350 mm apart for full length of drain
3	excavate channel to at least 200 mm below ground level
4	compact base of channel with 50 mm hardcore and grade to 1:100 fall
5	place stone or brick lining to form channel sides at 1:2 slope ratio
6	pour concrete (1:2:4) along channel bed maintaining 1:100 fall
7	finish mortar work on channel

STEP NUMBER 4:	ACTIVITY: HEADWORKS CONSTRUCTION

- **Figure 7: Head wall construction:**



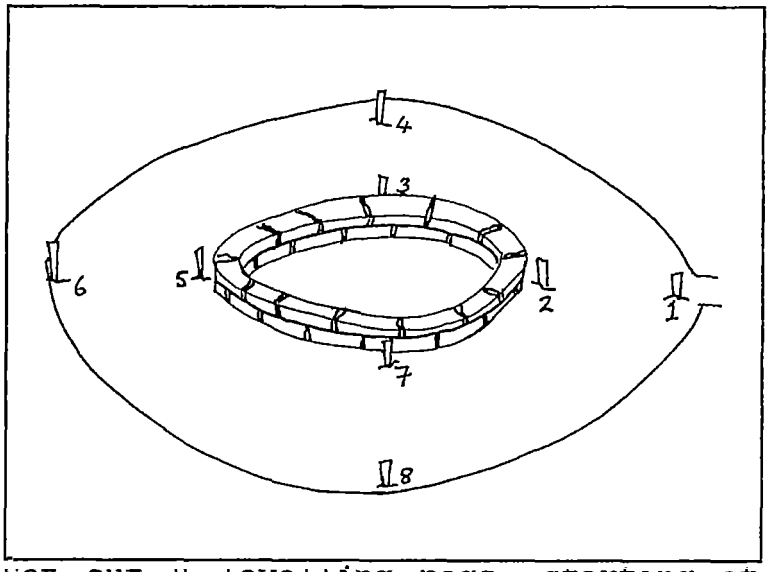
Scribe outside edge of head wall and apron boundary



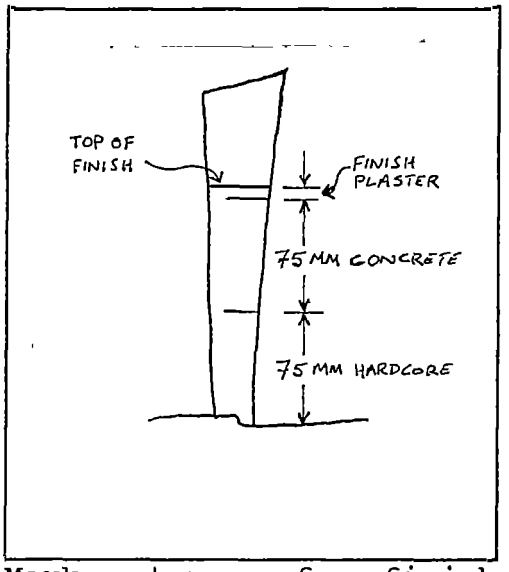
Build up masonry wall with concrete bed and copping to 300 mm

STEP NUMBER 4: ACTIVITY: HEADWORKS CONSTRUCTION

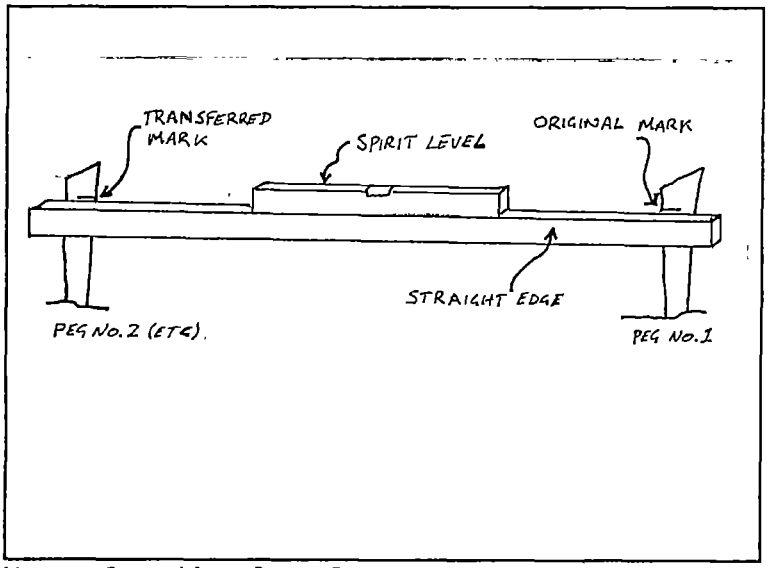
- **Figure 8: Setting out apron:**



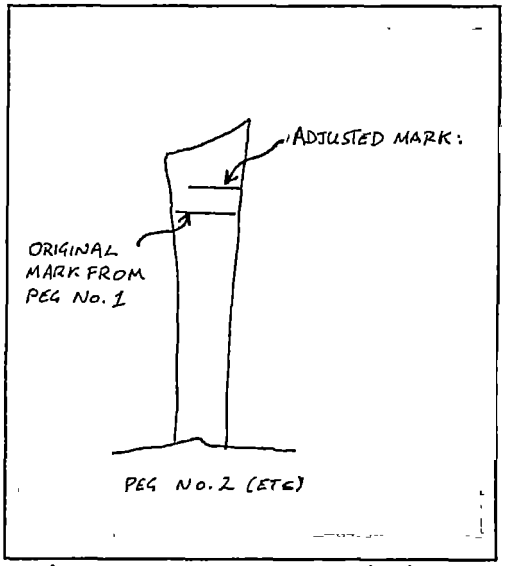
Set out 8 levelling pegs, starting at drainage outlet



Mark top of finish concrete level on peg no. 1



Transfer the level from peg no. 1 to all the other pegs in the apron lay out



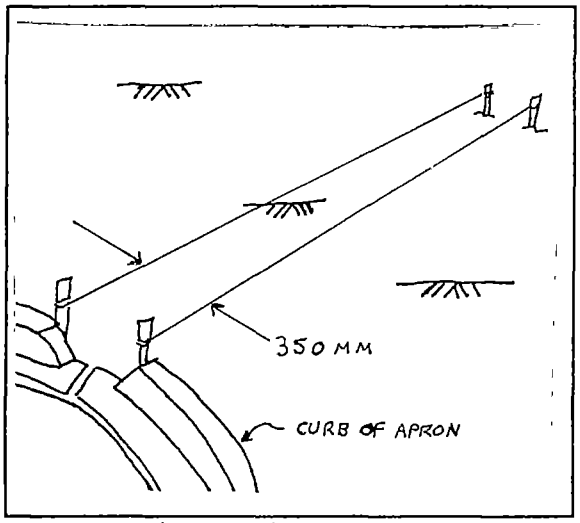
Adjust for top of finished concrete on pegs 2 - 7 according to schedule below

STEP NUMBER 4:	ACTIVITY: HEADWORKS CONSTRUCTION

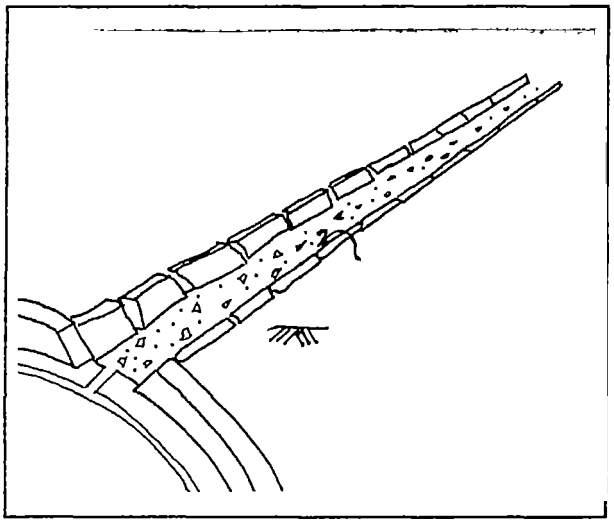
- **Figure 8 (cont): Setting out levels for apron pegs:**

Peg Number:	Level (mm):
1	0.0
2	15.0
3	55.0
4	35.0
5	65.0
6	50.0
7	55.0
8	35.0

- **Figure 9: Setting out drainage channel:**



set string lines at 350 mm apart for full length of drain



Place stone lining to form channel side slopes

STEP NUMBER 4:	ACTIVITY: HEADWORKS CONSTRUCTION

- **Curing:**

  Explain importance of curing to community men; all concrete work finished on day one should be carefully cured for at least 7 days.

  Site to be checked at least 3 times daily and wetted more frequently in hot weather; use wetted sacking or cloth to cover concrete during curing.

- **Construction Activities, Day 2:**

  The second day of construction should only begin after the well cover slab has been allowed to cure for at least 7 days.

- **Activity 1: Set well cover slab:**

1	prepare head wall by laying 25 mm bed of mortar on top of copping
2	scribe mark on well cover slab showing direction of drain
3	lift cover slab with uniform support around perimeter and place on head wall in correct position
4	check for level across slab and adjust if necessary
5	finish mortar (1:4) over slab-head wall exterior joint

- **Activity 2: Construct soak-pit:** (see Figure 2)
  (if necessary)

1	using peg and string, scribe 0.7 m diametre circle at end of drainage channel outlet
2	excavate pit to 1.0 m
3	line outside opening with stone, flush with top of drainage outlet and to minimum depth of 200 mm below ground level
4	mortar (1:4) open joints and finish
5	back-fill soak-pit starting with large grade hardcore at base and reducing diametre aggregate up to bottom of stone lining; fill top 150 mm with sand

STEP NUMBER 4: ACTIVITY: HEADWORKS CONSTRUCTION

■ **Construction Activities, Day 2 (cont.):**

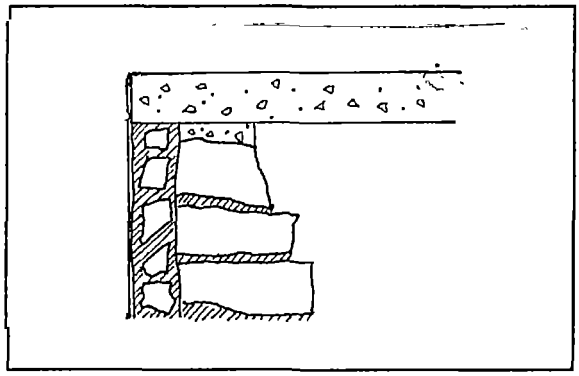
• **Activity 4: Finish work:**

After setting slab finish off all plaster work on head wall, drain and curbing. Finish work can be completed un-supervised by community men if they have learnt basics of plastering.

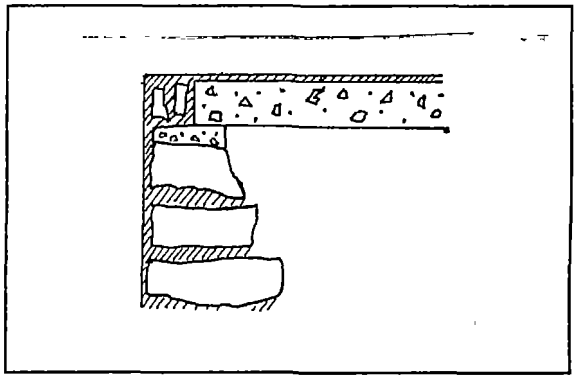
• **Common problems:**

Well cover slab is not exactly same size as head wall; in this case the best solutions are:

• If the slab is too big? do not try to cut back the slab, make up the outside head wall diametre with stone or brick and mortar; when this has cured plaster the exterior joint to finish.



• If the slab is too small? build up the outside edge with broken stone masonry or concrete; when this has cured plaster exterior joint and re-finish slab platform.



■ **Outputs:**

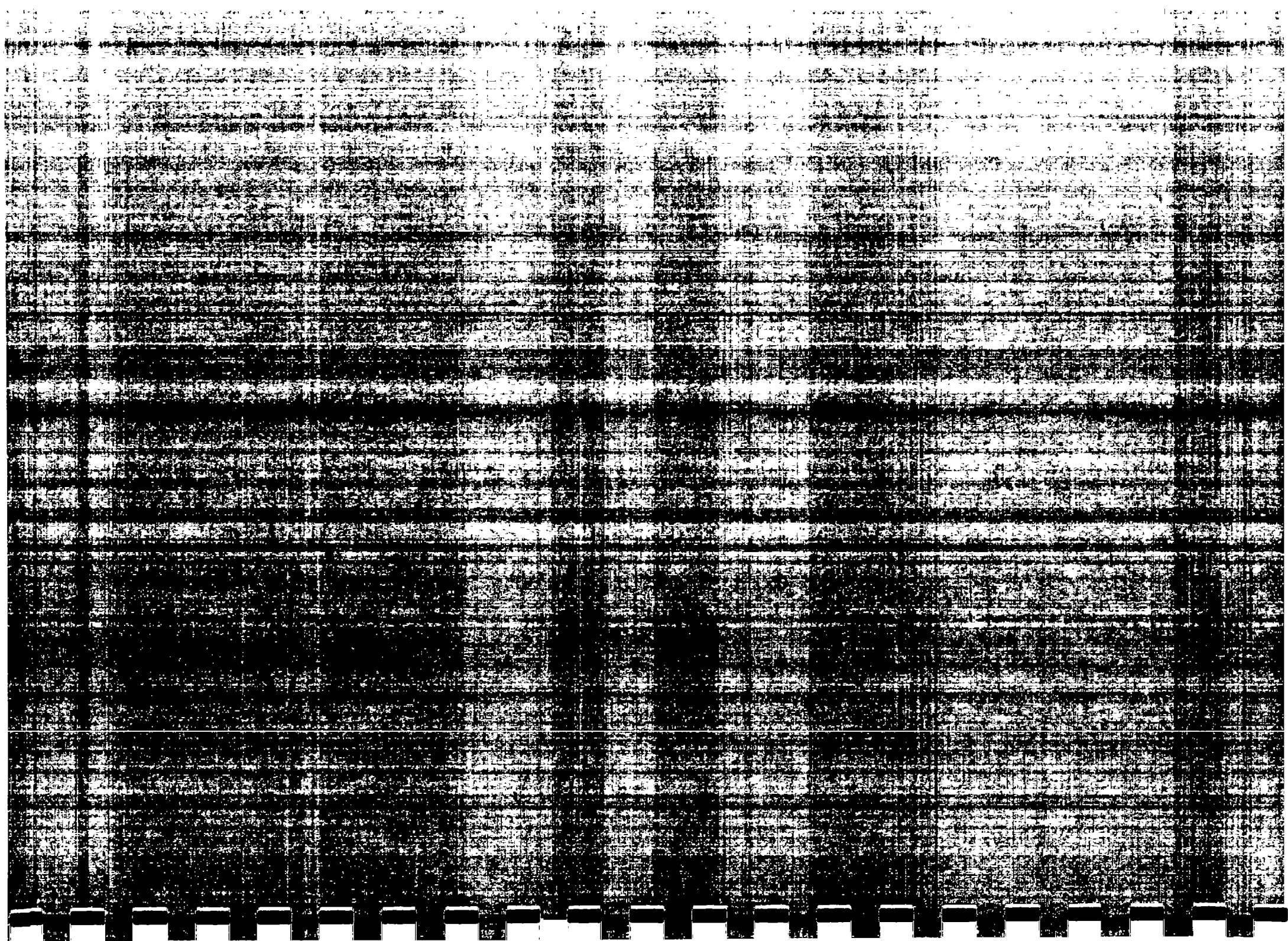
• Community user group carries out most of construction with supervision of LGRDD technician.

• Headworks completed and slab in place after two days of construction.

STEP 4 — Team Checklist

- Before starting activities in step number 5, review the activities of step number 4 to make sure that the whole team is ready to begin
- If any of the key activities have not been fully completed the team should make a note of further action required before moving on to step number 5

Key Activity	Expected Outputs
1. pump facility construction	review basic construction with men; build: • headworks, apron • cast slab and pedestal • drainage channel • return to place slab • soak-pit if necessary
2. start latrine compound survey with women	detailed household survey with women; mapping compound for horizontal distances and wells if existing



STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

Objectives:

- To install handpump with community user group
- To provide on-the-job training and orientation for pump caretaker
-
-

Target Group:

- Pump caretaker
- Male community users

Methods:

- Discussion
- On-the-job experience
-

Means and Materials:

- Pump with all hardware, mains and rods
- Pump installation guide
-
-

Organisation:

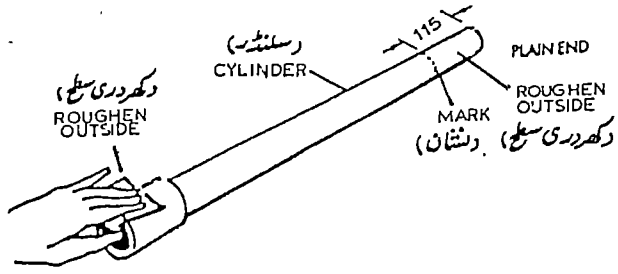
- Group discussion with village men and caretaker
- Installation at well site
-

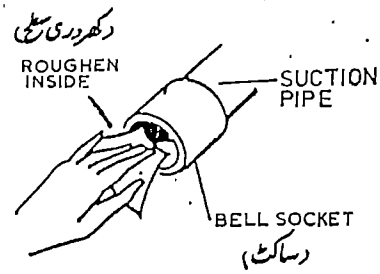
Main Messages and Outputs:

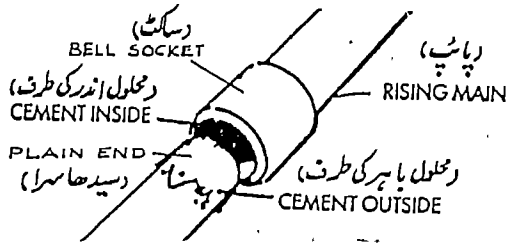
- Community users are involved in installation process
- Pump caretaker receives training and tools
-
-

STEP NUMBER 5:	ACTIVITY: INSTALL HANDPUMP
■ Activities for pump installation follow the sequence outlined below:	
1	Bring all pump, hardware, mains and tools to well head
2	Re-check total well and water table depth
3	Determine depth of pump cylinder intake setting (without pump test or comparative data use rule of thumb: total well depth less 1 metre)
4	Place required number of rising main pipe and rods on clear, flat surface close to well head
5	Measure total length of rising main pipe. Note: **exclude length of socket flare on every pipe in measurements.** Cut last section of main to required length
6	Install centraliser on every rising main pipe; set at 3 metre centre to centre
7	Install pump rod centraliser at **bottom end** of every rod up to required number of rods
8	Clean out pipe joint sockets (inside female and outside male); use cleaning solution with rag, sand lightly (see figure 10)
9	Measure out nylon rope to twice total depth plus 4 metres, cut and seal ends with heat
10	Insert nylon rope through holes in base of suction pipe and pull rope until centred (half on each side of pipe); tie off with strong knots on either side of pipe (see figure 11)
11	Pass rope through centraliser holes on either side of cylinder pipe (see figure 11)
12	Foot-valve test: take cylinder pipe with foot-valve in place and insert into bucket of water; draw water into cylinder and check for leakages by change in level of column of water
13	Joint cylinder pipe with first length rising main: • apply jointing compound inside female and outside male socket; **do not use too much compound on female socket joint** • insert pipes together in one smooth action; **do not twist into place** • clean off excess compound from outside joint • wait 5 minutes for joint to dry and strengthen
14	Lower joined cylinder and main assembly into pedestal with help of nylon rope.

- Figure 10: Pipe preparation and jointing:

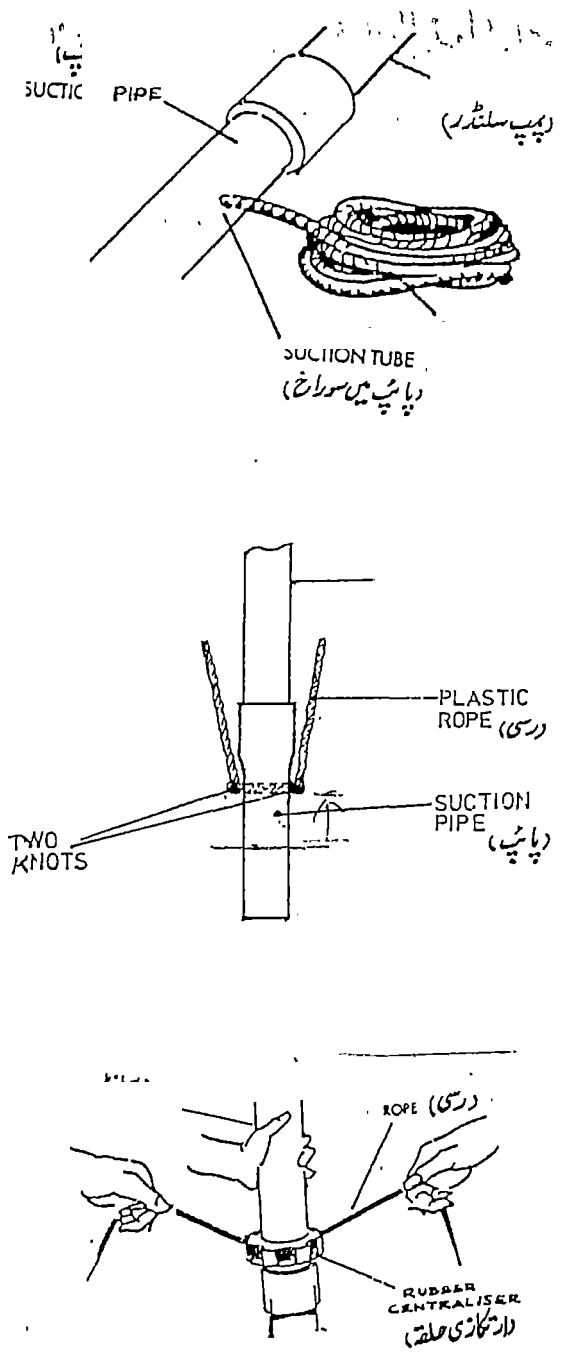




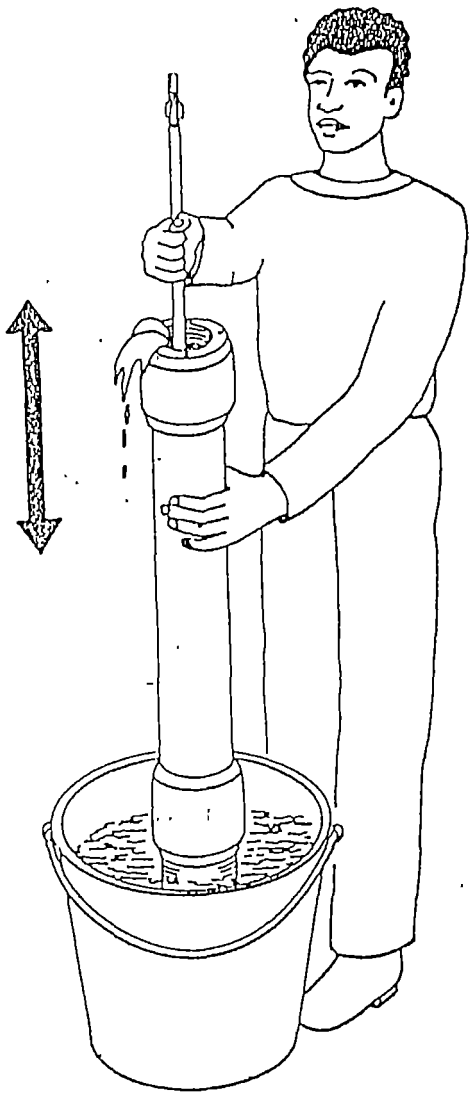


STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- **Figure 11: Attaching nylon rope to suction pipe:**



- Figure 12: Foot valve testing:



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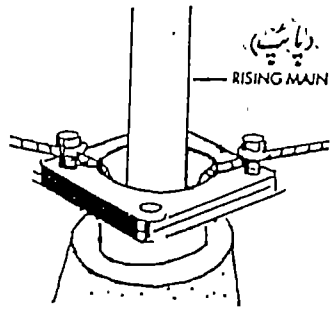
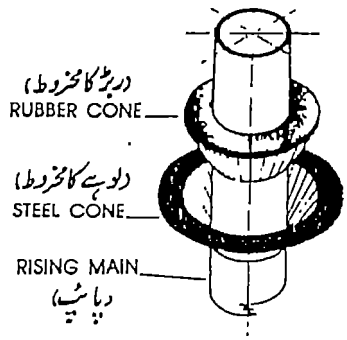
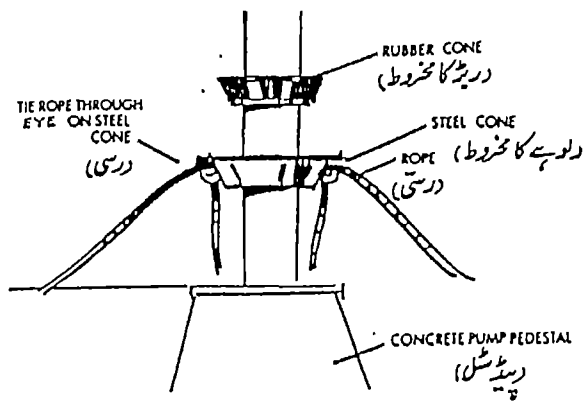
STEP NUMBER 5:	ACTIVITY: INSTALL HANDPUMP
15	Repeat jointing operation until final section of main is installed: • ensure rope passes through every centraliser on main pipes • leave approximately 30 cm of pipe extended above pedestal • tie-off rope to bolt holes in pedestal to take weight (see figure 13)
16	Un-tie rope, hold in place and remove bolts; place steel cone plate and then rubber cone over pipe and seat together. Re-tie rope on hooks under pedestal flange (see figure 13)
17	Set top-sleeve over pipe, seat steel and rubber cone assembly onto pedestal flange; lower rising main until top-sleeve resting on rubber cone (see figure 13)
18	Wait as long as possible for rising main joints to set and cure (24 hours is advisable)
19	Check foot-valve: O-ring and bobbin should be firmly in place; hold by steel hook, centralise over main opening, drop into place down rising main pipe (see figure 14)
20	Check piston: bobbin should be in place, make sure U-ring is properly seated with grooves upwards.
21	Insert first pump rod onto piston rod and ensure centralisers are in place; lower into rising main until end-socket exposed.
22	Repeat adding pump rods (see figure 15) until final rod is joined, there is no hook joint on end of final rod: • push down on rod assembly until foot-valve is seated in place on rim of cylinder • feel resistance in rod assembly and push firmly to set piston into cylinder • withdraw pump rod assembly and repeat operation to ensure piston is seated evenly inside cylinder
23	Push pump rod fully down into cylinder: • with pump rod extending above pedestal flange scribe mark 50 mm above top-sleeve • lift pump rod back out to comfortable working height • cover rising main with cloth to protect opening • cut pump rod at 50 mm mark; clean off rough edges to remove burrs (see figure 16)
24	Place lower half of pump body casing onto flange and bolt into place; tighten firmly (see figure 16)
25	Fit plastic disc into place over pump rod. Place hanger housing onto top end of pump rod; ensure fully tightened
26	Lift rod and hanger housing assembly and hold in place across slots in pump body; rest in place using spanner as temporary support (see figure 17)

STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- Figure 13: Tying off rising main, seating steel and rubber cone plates:

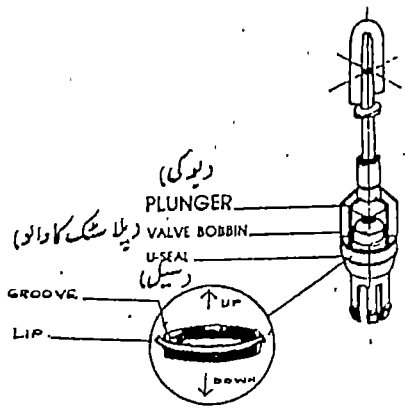


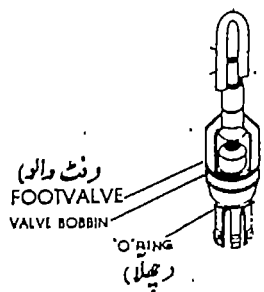


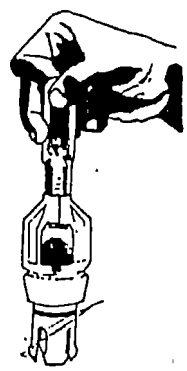


STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- **Figure 14: Checking foot-valve and plunger:**







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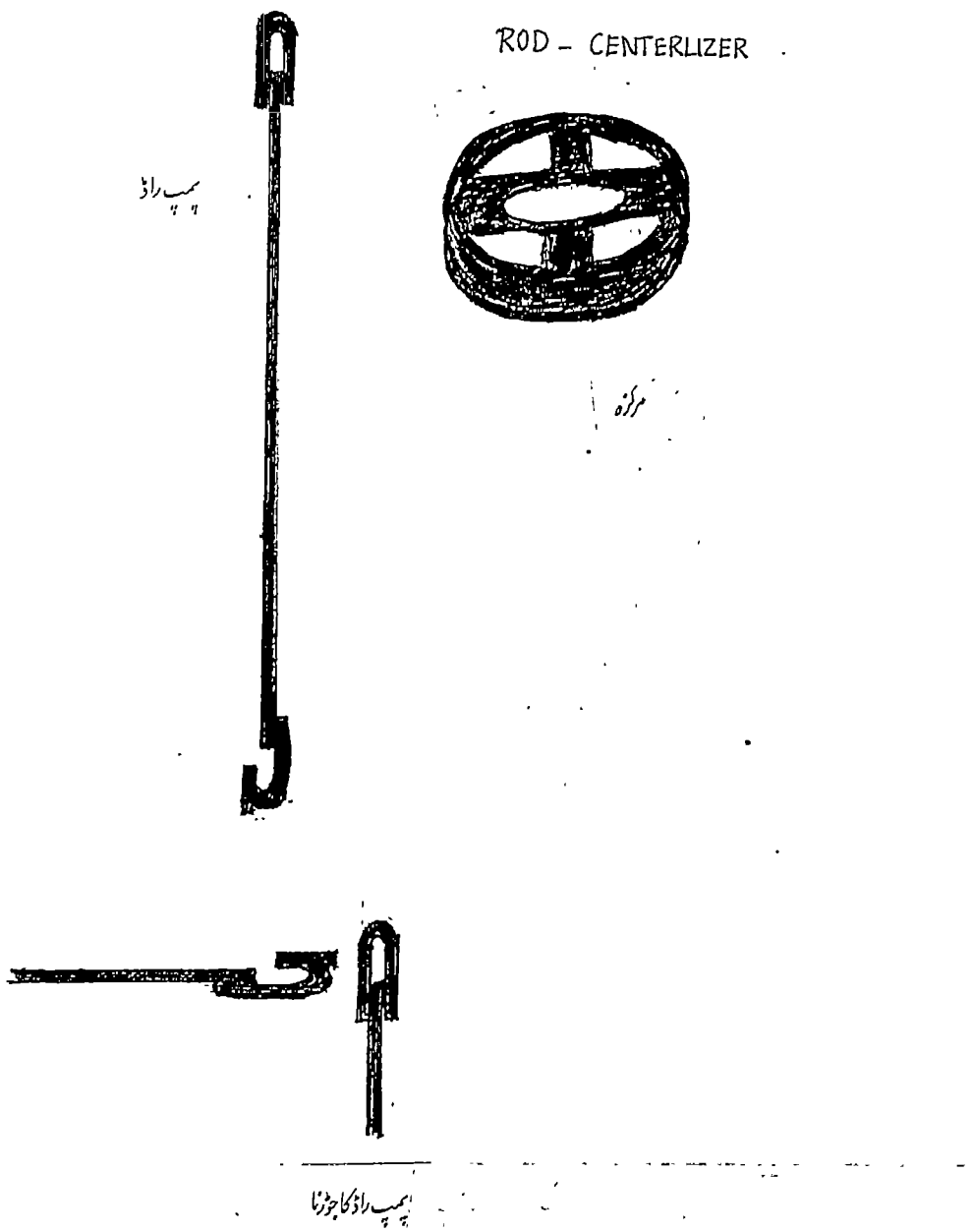
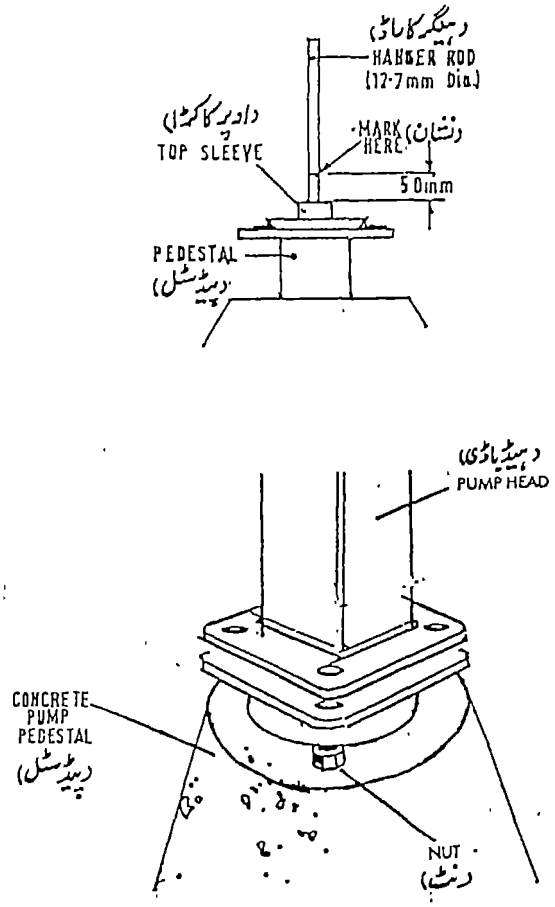
STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- **Figure 15: Hook-jointing pump rod and seating centralisers:**

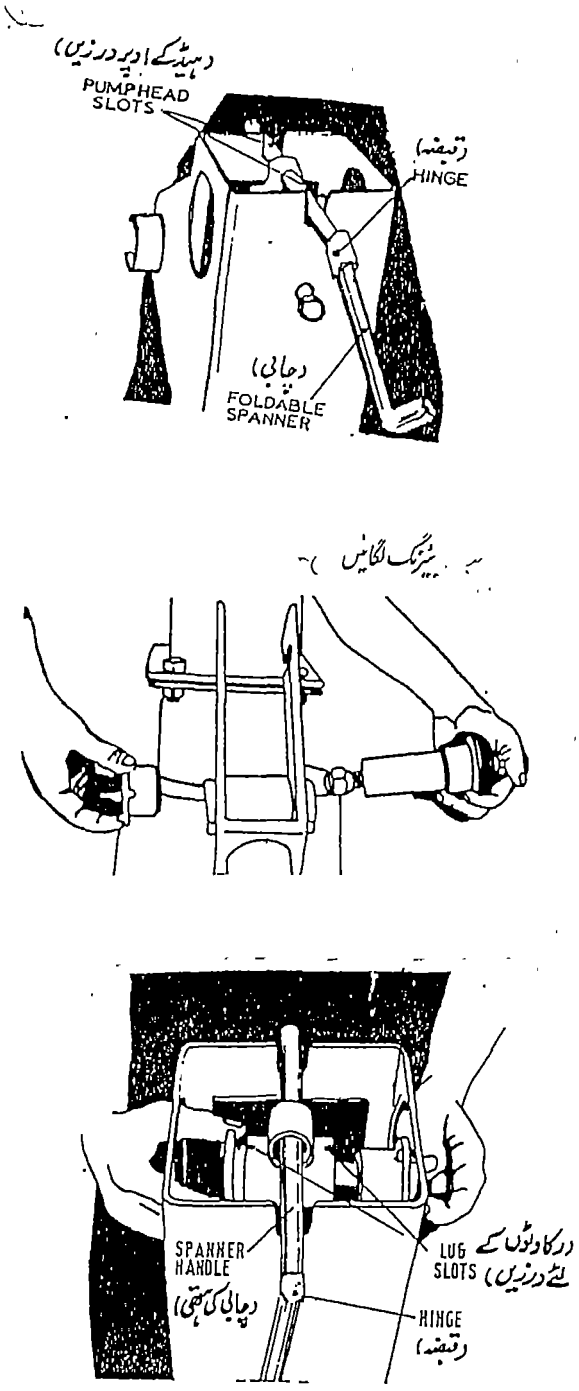


- Figure 16: Cutting pump rod and fitting lower pump body casing:



STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

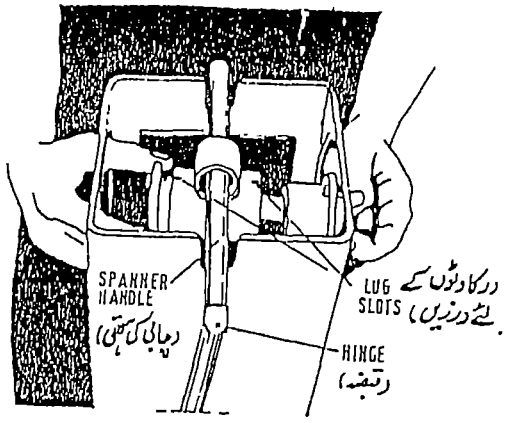
- Figure 17: Setting hanger housing assembly and installing fulcrum pin:

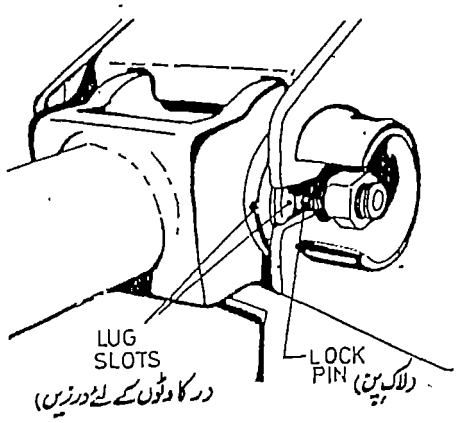


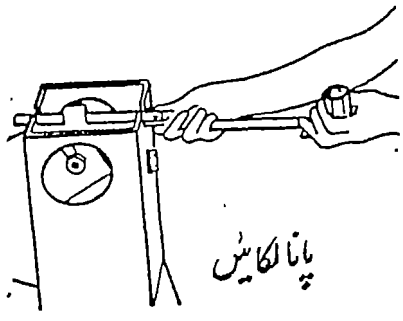
STEP NUMBER 5:	ACTIVITY: INSTALL HANDPUMP
27	Insert fulcrum pin with bearing assembly into hanger housing (see figure 17)
28	Set handle into place in pump body casing and insert fulcrum pin with bearing assembly in rear mounting
29	Ensure metal lugs and plastic tabs on both bearings are aligned; seat in place and tighten all four bolts (see figure 18)
30	Remove temporary spanner support from hanger housing to allow proper fulcrum of handle assembly (see figure 18)
31	If necessary adjust T-handle length according to water table depth: **water table:** **handle length:** 15 - 25 m 675 mm 25 - 35 m 900 mm 35 - 45 m 1,125 mm (full extension)
32	Start pumping until water yields; should require approximately 6 strokes per rising main section (eg: 9 metre depth with 3 main sections requires 18 strokes to prime)
33	Check for leakages in foot-valve by allowing column of water to sit in main and observing any drop in water level at pump head
34	Set pump body cover in place and tighten bolts (see figure 19)
36	Check pump yield: • use 20 litre bucket or any container of known volume V(ltrs) • measure total number of strokes per minute required to fill container (strokes/minute) • use following equation to determine yield: $\%\ \text{pump efficiency} = \frac{\{V(\text{ltrs}) \div 0.44\} \times 100}{\text{no. strokes}}$ • % efficiecny should be no less than 90% at installation • Note: for pump installation on wells above 15 m (50 ft) the rising main should be stabilised in at least 3 places at equal intervals. Where community cannot afford manufactured clamps or anchor pins, recommend use of local methods with wooden cross-member and rubber inner tubes.

STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- **Figure 18: Align lug bolts and plastic tabs on bearings, remove temporary spanner support:**

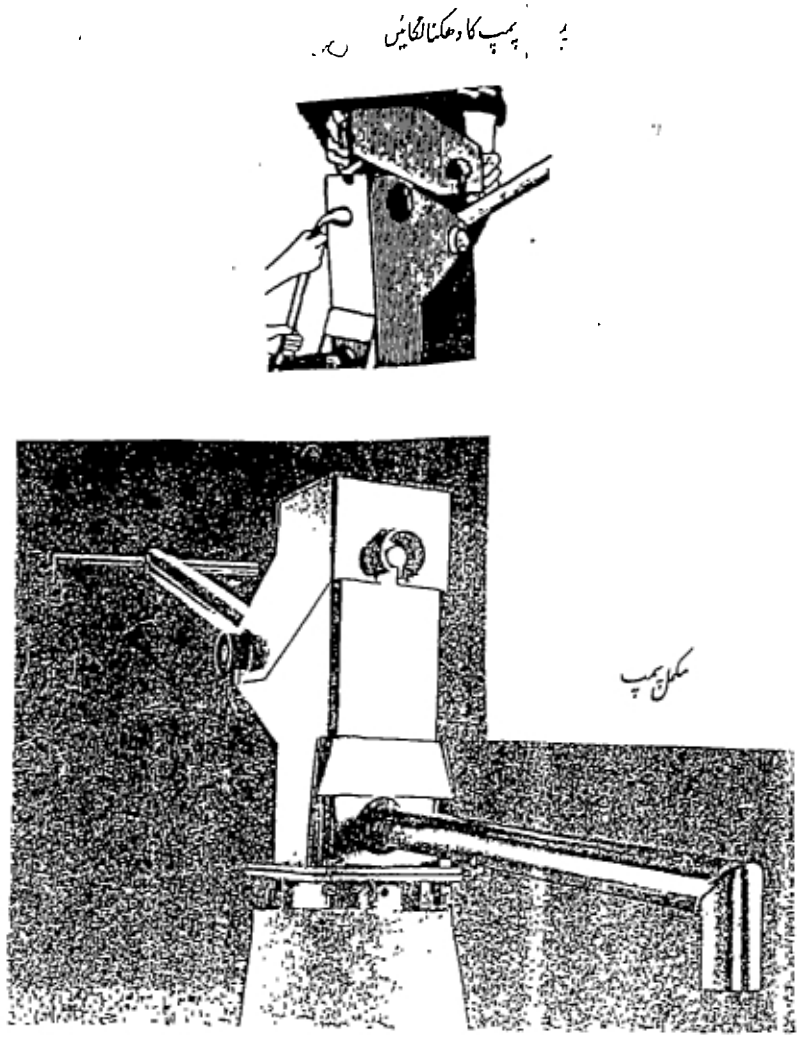






STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- Figure 19: Fit upper pump body casing and tighten:



STEP NUMBER 5: ACTIVITY: INSTALL HANDPUMP

- **Training Pump Caretaker:**

  • During installation process caretaker should be allowed to do as much of work as possible, with guidance from LGRDD technician.

  • Ensure caretaker understands below ground mechanisms (foot-valve, cylinder, piston) and knows how to withdraw pump rod assembly.

  • Go over pump guide and repair chart and handover repair tool kit.

- **Outputs:**

  Pump installation should include following:

  • Afridev pump correctly installed by community user group.

  • Caretaker trained with on-the-job experience.

  • Caretaker briefed about repair and maintenance tasks and given tools and repair guide.

STEP NUMBER 5: ACTIVITY: PUMP OPERATION AND MAINTENANCE

Objectives:

- To indicate correct operating practices and possible problems for community users and especially female users
- To explain trouble-shooting guide for pump caretaker
- To explain the role and responsibilities of caretaker
- To emphasise to the caretaker the importance of providing safe water via handpump

Target Group:

- Pump caretaker
- Male community users

Methods:

- Discussion
- Demonstration
-

Means and Materials:

- Trouble-shooting guide
- Repair chart
- Spare parts kit
-

Organisation:

- Group discussion with village men and caretaker
- Demonstration at well site
-

Main Messages and Outputs:

- Community users know correct pump operation and possible problems
- Pump caretaker receives training in trouble-shooting
- Pump caretaker is aware of his role and responsibilities
- Pump caretaker is aware of safe water through handpump programme

STEP NUMBER 5: ACTIVITY: PUMP OPERATION AND MAINTENANCE

■ **Handpump Operation:**

To ensure correct pump operation and keep water source from further contamination inform community users of following:

- Never use any oil on plastic bearings
- Use pump handle with long, smooth, even strokes; avoid short jerky movements (see figure 20)
- Clean platform and apron area daily
- Clean surrounding area daily
- Never throw rubbish near to pump area
- Do not construct latrine pits or rubbish pits within 15 metres of pump
- Keep animals away from pump area; do not allow animals to defecate near to pump area
- Do not use apron for washing or cleaning clothes; use properly constructed facilities
- Ensure excess water drains off apron and leave clean for other users
- Use excess water for irrigation of kitchen garden, fields or provide soak-pit if necessary

■ **Handpump Trouble-shooting:**

Problems may develop with pump over time. Community users (especially women) should know of the types of problems to expect and caretaker should know of probable causes and possible solutions to these problems. Women users are also informed of the types of problems to expect, and will contact the caretaker through their men. Problems with pump can be grouped into four main areas:

- Easy pumping with little resistance, but pump yields little or no water; or, after idle period (in early morning) pump requires priming before yielding water

- Difficult pumping, heavy to operate with a lot of resistance and only low yield of water; and/or low yield of muddy, unclear water

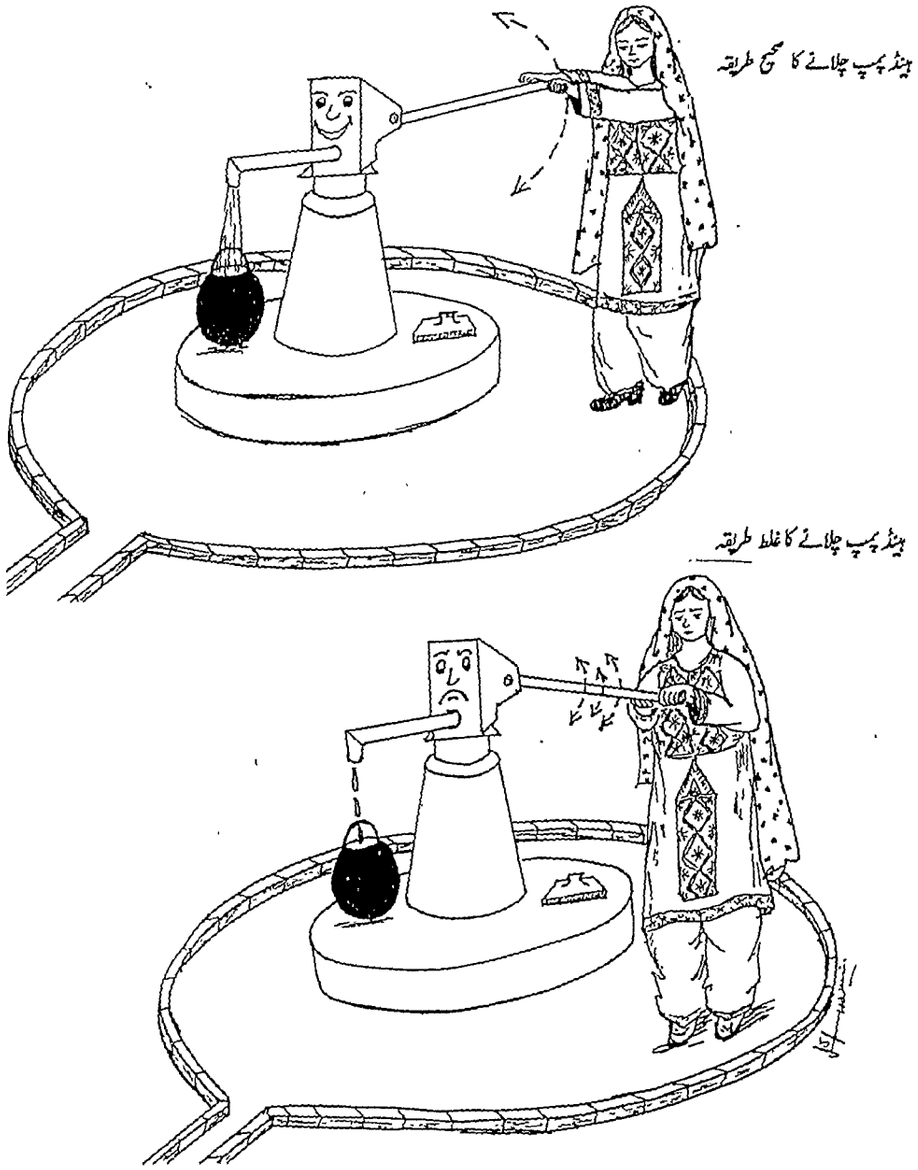
- Pump is noisy when operated (rattling sounds), or excessive free-play in handle

- Pumping action is not smooth; jerky or shuddering motion felt in handle

- Action required by caretaker is outlined in trouble-shooting guide below:

STEP NUMBER 5:	ACTIVITY: PUMP OPERATION AND MAINTENANCE

- Figure 20: Correct pumping operation:



STEP NUMBER 5:	ACTIVITY: PUMP OPERATION AND MAINTENANCE

- **Trouble-shooting Guide for Pump Caretaker:**

• Easy pumping with little resistance, but pump yields little or no water; or, after idle period (in early morning) pump requires priming before yielding water

Potential Cause:	Possible Solutions:
Piston or U-seal or bobbin worn out	Pull piston, check and replace as necessary
Foot-valve O-ring or bobbin worn out	Pull foot-valve, check and replace as necessary
Pump rod broken	Pull pump rod, check for damage and replace sections as necessary
Rising main is damaged and leaking	Pull rising main, check for damage and replace sections as necessary
Ground water table has dropped below cylinder intake	Check water level and extend rising main and pump rod if necessary

• Difficult pumping, heavy to operate with a lot of resistance, and only low yield of water; and/or low yield of muddy, unclear water

Potential Cause:	Possible Solutions:
Bearings in pump body jammed	Check bearings and replace if damaged
Foot-valve choked or blocked	Pull foot-valve, check and clean if necessary
Foot-valve sucking mud or silt	Inspect condition of well bottom, clean and de-silt if necessary

• Pump is noisy when operated (rattling sounds), or excessive free-play in handle

Potential Cause:	Possible Solutions:
Handle nuts are loose	Check and re-tighten bolts
Handle and/or hanger housing bearing worn out	Remove and inspect bearing(s) and replace as necessary

STEP NUMBER 5:	ACTIVITY: PUMP OPERATION AND MAINTENANCE

- Pumping action is not smooth, jerky or shuddering motion felt in handle

Potential Cause:	Possible Solutions:
Handle nuts are loose	Check and re-tighten bolts
Handle and/or hanger housing bearing worn out	Remove and inspect bearing(s) and replace as necessary
Piston U-seal broken or twisted and jammed against cylinder	Pull piston, check U-ring and re-seat or replace as necessary

- Go through trouble-shooting guide with caretaker and make sure he understands:
  - Repair guide and tool kit provided (see figure 21)
  - Spares kit and use or spares for routine repair and maintenance.

■ **Caretaker Role and Responsibilities:**

- All pump repair and maintenance at village level (above and below ground components)
- To contact Union Council secretary or LGRDD staff for major repair problems
- Maintenance of fence/wall restricting animal access to pump
- Safekeeping of pump spare parts, tools and repair guide
- To be responsive to pump problems reported by women in the village

■ **Outputs:**

During operation and maintenance training cover the following:

- Community users, and especially women, know about correct operation and maintenance of facility

- Community users, and especially women, are aware of potential problems and know to report these to caretaker

- Pump caretaker is briefed about possible solutions and understands spares kit and repair guide

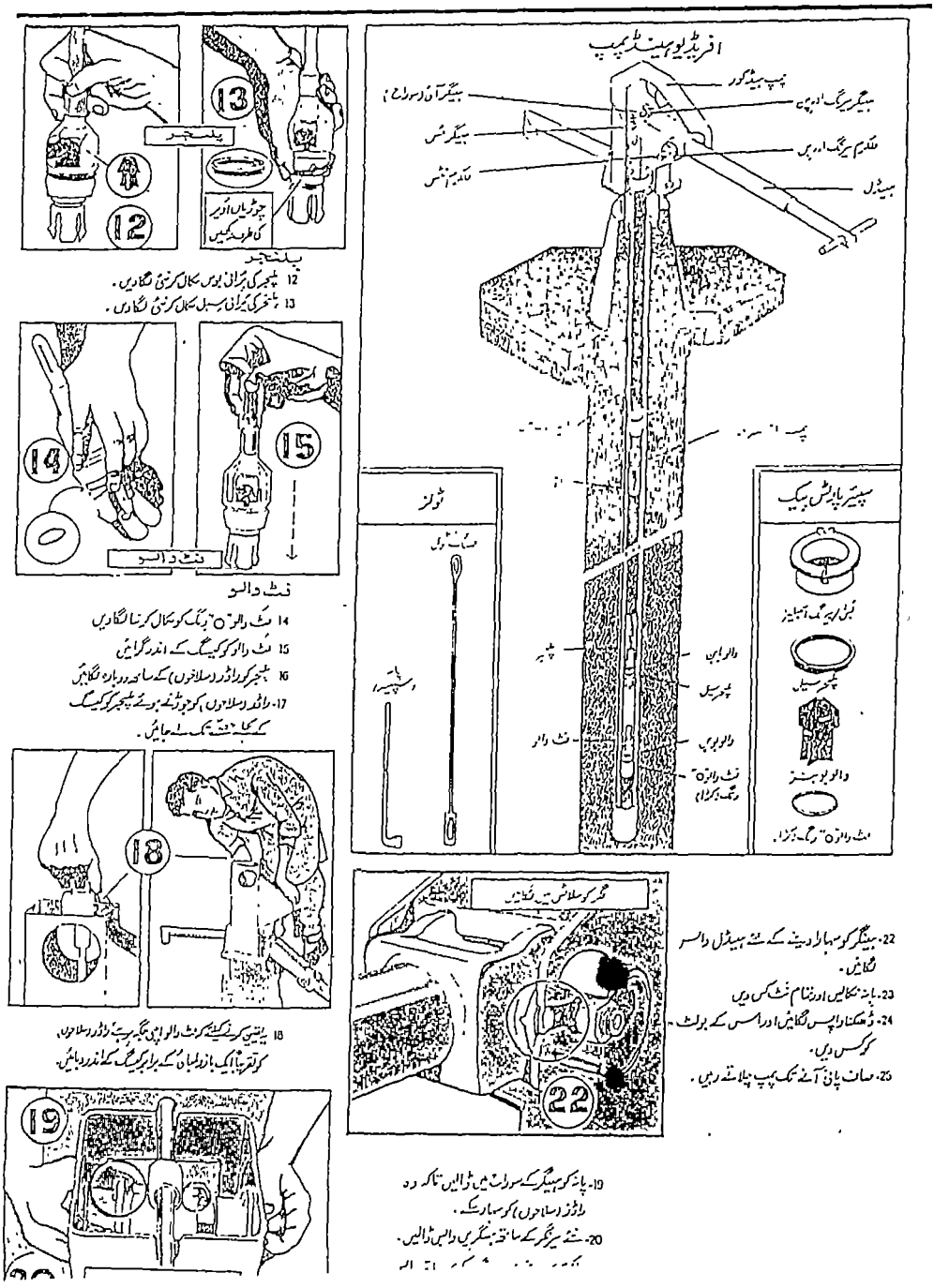
- Caretaker is responsible to ensure safe supply of drinking water from handpump at all times

STEP NUMBER 5: **ACTIVITY: PUMP OPERATION AND MAINTENANCE**

- **Figure 21: Routine maintenance guide for pump caretaker:**

STEP NUMBER 5: ACTIVITY: PUMP OPERATION AND MAINTENANCE

- **Figure 21: Routine maintenance guide for pump caretaker (cont):**



STEP NUMBER 5: ACTIVITY: DISINFECT WELL

Objectives:

- To disinfect improved well after pump installation if necessary
-
-
-

Target Group:

- Pump caretaker
- Male community users
- Sub-engineer

Methods:

- Discussions
- Disinfection

Means and Materials:

- Chlorination information
- Litres or grammes of disinfection material
- Safety gloves, face mask, goggles
- Water quality survey result

Organisation:

- Group discussion with village men and caretaker
- Physical disinfection of well with caretaker
-

Main Messages and Outputs:

- Village men should understand need to disinfect improved well
- Well should be safely disinfected and re-sealed
- Community should not use well for 24 hours after disinfecting
-

STEP NUMBER 5: ACTIVITY: DISINFECT WELL

■ **Why Disinfect The Well?:**

• Disinfecting well destroys pathological (disease-causing) organisms

• Most existing open hand-dug wells contain at least low-levels of pathogens dangerous to human health

■ **When To Disinfect The Well?:**

- If water quality survey indicates possibility of biological contamination
- After well improvement, pump installation and sealing
- After sealed well has been opened for repairs or maintenance.

■ **Health Risks Of Disinfection?:**

• Disinfecting improved well on a one-time basis is not dangerous or harmful for the users; excess chlorine must be pumped out before well water is consumed. One disinfection will not effect users natural resistance to organisms which they have built up over time.

■ **Disinfecting the Well:**

• **Materials required to disinfect the well:**

- chlorine compound (household bleach or calcium hypochlorite)
- mixing container (rubber lined, plastic or ceramic)
- measuring container or scales
- gloves, face mask and goggles

CAUTION: CHLORINE COMPOUNDS OR SOLUTIONS ARE DANGEROUS; be careful whilst handling (use gloves and glasses if possible) If you get chlorine on your skin or in your eyes, wash it out immediately with lots of water.

• **Steps in the disinfection process:**

- inform community in advance to store enough water for at least 24 hours use
- calculate volume of water in well to be disinfected
- calculate required volume of disinfectant solution
- prepare chlorine solution
- add solution to well and mix thoroughly
- disinfect well for at least 24 hours
- pump until chlorine can no longer be smelt or tasted

STEP NUMBER 5: ACTIVITY: DISINFECT WELL

■ **Calculating the volume of water in the well:**

• Measure total water depth in well; this should be done early in the morning after the well has been recharged over-night, but before users withdraw water for daily use. Measure the well diametre and use the following equation to calculate volume of water:

$$V = \pi \times r^2 \times d$$

v = volume of water (m^3)
r = radius of well (m)
d = depth of well (m)

Use Table 5 below for quick reference for volumes of wells with varying dimensions

■ **Calculating the required amount of disinfectant:**

• Required strength of chlorine for disinfection is 100 ppm (parts per million). Chlorine is available in a number of forms, the most common are:

• liquid bleach (5% chlorine available)
• calcium hypochlorite or high-test hypochlorite (70% chlorine available).

High-test hypochlorite (HTH) is the best option (70% concentration); however it requires very careful handling.

Amount of chlorine agent to be added depends on volume of water in the well:

> Worked Example:
> For 100 ppm concentration 1 cubic metre of water will require 2 litres of household bleach or 143 grammes of HTH whichever is available

• Quick calculations: Table 6 shows quantities required of household bleach and HTH for a variety of well volumes up to 20 cubic metres; instead of calculating at 5% and 70% concentrations use table by rounding up or down to nearest cubic metre or fraction of a cubic metre.

STEP NUMBER 5: ACTIVITY: DISINFECT WELL

- **Table 5: Quick reference guide to well volumes:**

Dia. of well: (m)	Depth of water: (m)	Vol. of water: (m^3)
0.75	1.5	0.66
0.75	1.75	0.77
0.75	2.0	0.88
0.75	2.5	1.1
1.0	1.5	1.18
1.0	1.75	1.37
1.0	2.0	1.57
1.0	2.5	1.96
1.25	1.5	1.84
1.25	1.75	2.15
1.25	2.0	2.45
1.25	2.5	3.07
1.5	1.5	2.65
1.5	1.75	3.09
1.5	2.0	3.53
1.5	2.5	4.42
1.75	1.5	3.61
1.75	1.75	4.21
1.75	2.0	4.81
1.75	2.5	6.01
2.0	1.5	4.71
2.0	1.75	5.49
2.0	2.0	6.28
2.0	2.5	7.85

STEP NUMBER 5: ACTIVITY: DISINFECT WELL

■ **Mixing the solution:**

• Never pour chlorine agent directly into well, it will not mix properly; first make a chlorine solution:

• **Bleach:** mix one part of bleach with one part water, then use the whole solution for disinfection

> Worked Example:
>
> 1 cubic metre of water will require a solution of 4 litres (2 litres of bleach plus 2 litres of water)

• **HTH Powder:** first mix powder with enough water to make smooth paste; then mix the paste with water in the ratio of 1 litre of water per 15 grammes of powder

> Worked Example:
>
> 1 cubic metre of water will require a solution containing 143 grammes HTH powder plus 9.5 litres of water (143 ÷ 15)

• Mix the HTH paste with water for 10 - 15 minutes; let solution stand to allow the inert materials to settle.

• Use only the clear chlorine solution and discard the residue.

> **Note:** do not mix any chlorine solution in metal containers; mix them in clean rubber-lined, plastic or ceramic containers

■ **Adding the solution to the well and disinfecting:**

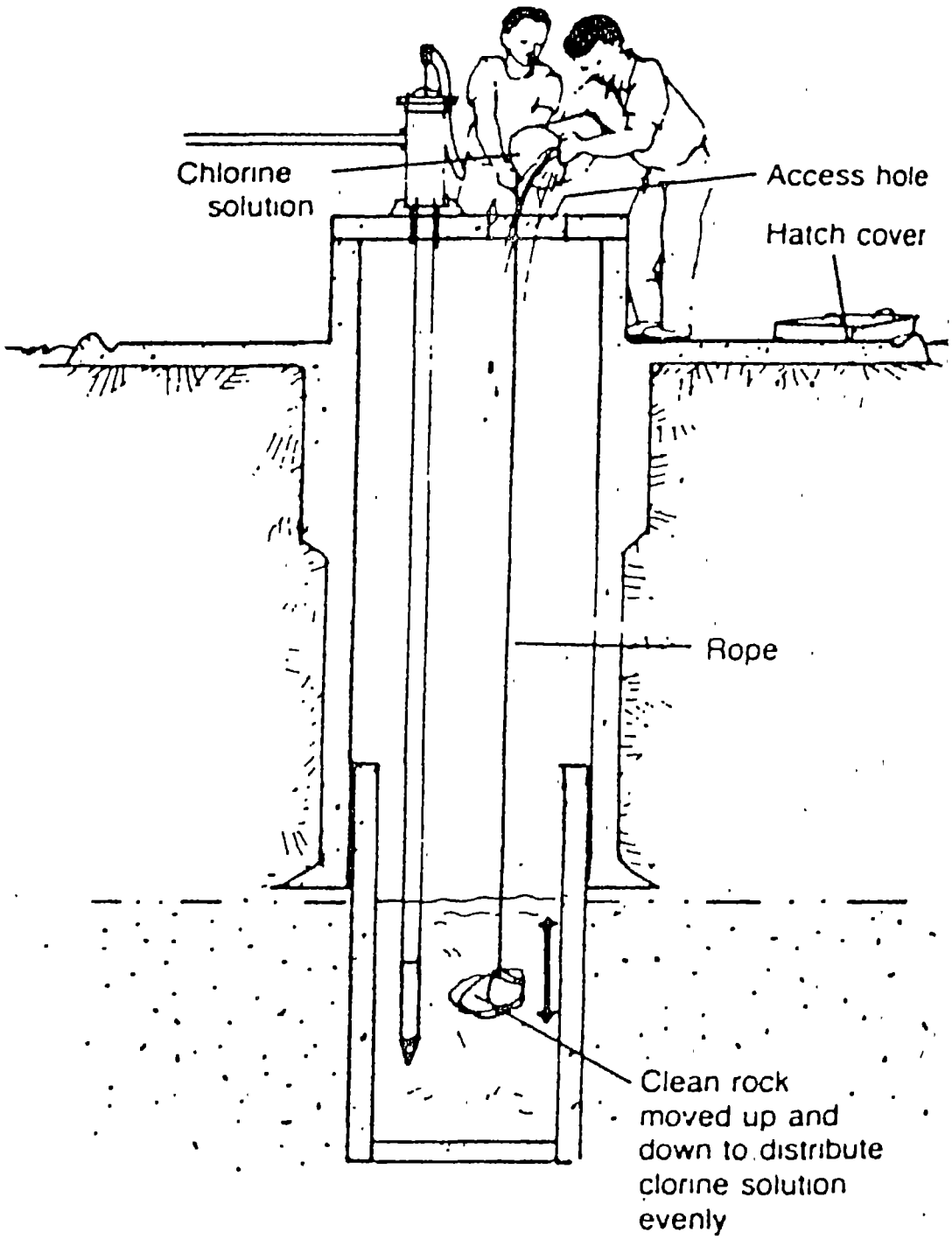
• Open well-hole cover; slowly pour clear HTH solution or bleach solution into the well

• Make sure solution covers as much of the surface area of water in the well as possible

• Thoroughly mix chlorine solution with well water. Use rope tied to a large, clean rock; lower rock into well and move it up and down in the water (see figure 22)

STEP NUMBER 5: ACTIVITY: DISINFECT WELL

- Figure 22: Adding chlorine solution to improved well:



STEP NUMBER 5: ACTIVITY: DISINFECT WELL

- Close well-hole cover and pump water from well until chlorine is smelt
- Allow the chlorine solution to remain in the well for 24 hours
- After 24 hours, pump water from the well until chlorine can no longer be smelled or tasted; dispose of this water via the drainage channel

> **CAUTION:** BE CAREFUL TO WARN THE COMMUNITY IN ADVANCE OF DISINFECTING THE WELL; THEY WILL NEED TO STORE WATER FOR 24 HOURS OF NORMAL DAILY USE **BEFORE** THE WELL IS DISINFECTED

■ **Outputs:**

Following disinfection process:

- Village men understand importance of well disinfection.
- Community users store water for use during disinfection.
- Sealed well is disinfected for at least 24 hours.

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

Objectives:

- To finalise siting and number of latrines with compound users
- To specify materials required for demonstration latrines
- To lay-out pits and inform compound men of preparation work

Target Group:

- Compound and household heads
- Latrine mistri's

Methods:

- Discussions
-
-

Means and Materials:

- Latrine compound survey results
- Information on water table levels
-
-

Organisation:

- Group discussion with compound men and mistri's
- Visit to compounds if necessary
-

Main Messages and Outputs:

- Which pit specifications are appropriate for compound?
- How many latrines and which locations for demonstration compounds?
- What materials are required for demonstration latrine construction?
- Lay-out pits and inform compound men of preparation work.

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

■ **Specifying Latrine Design:**

- **Pour Flush Latrine (PFL):** (see Figure 23.a and 23.b)

Advantages:
- Eliminates odours and flies completely
- Permanent sanitation solution with alternating pits

Disadvantages:
- Requires a lot of water to flush and clean properly (3-4 litres per person per day)
- Water seal can block easily with bulky anal cleansing materials (stones, sticks etc).
- Requires higher leaching requirement and more permeable soils

- **Indirect Pit Latrine (IPL):** (see Figure 24.a and 24.b)

Advantages:
- Requires less water than PFL for correct operation (1-2 litres per person per day)
- Will not block easily even if bulky anal cleansing materials are used
- Has lower leaching requirement

Disadvantages:
- Will not eliminate odours and flies as effectively as PFL
- Requires periodic addition of ash or lime to assist in breakdown of waste material
- Pit life is finite; approximately ten years

- **Selecting latrine design will depend on:**

- Soil type and permeability
- Actual or expected level of hygiene education and awareness amongst user group
- Availability of additional water for correct flushing and operation especially for PFL option

■ **Specifying Latrine Pit Design:**

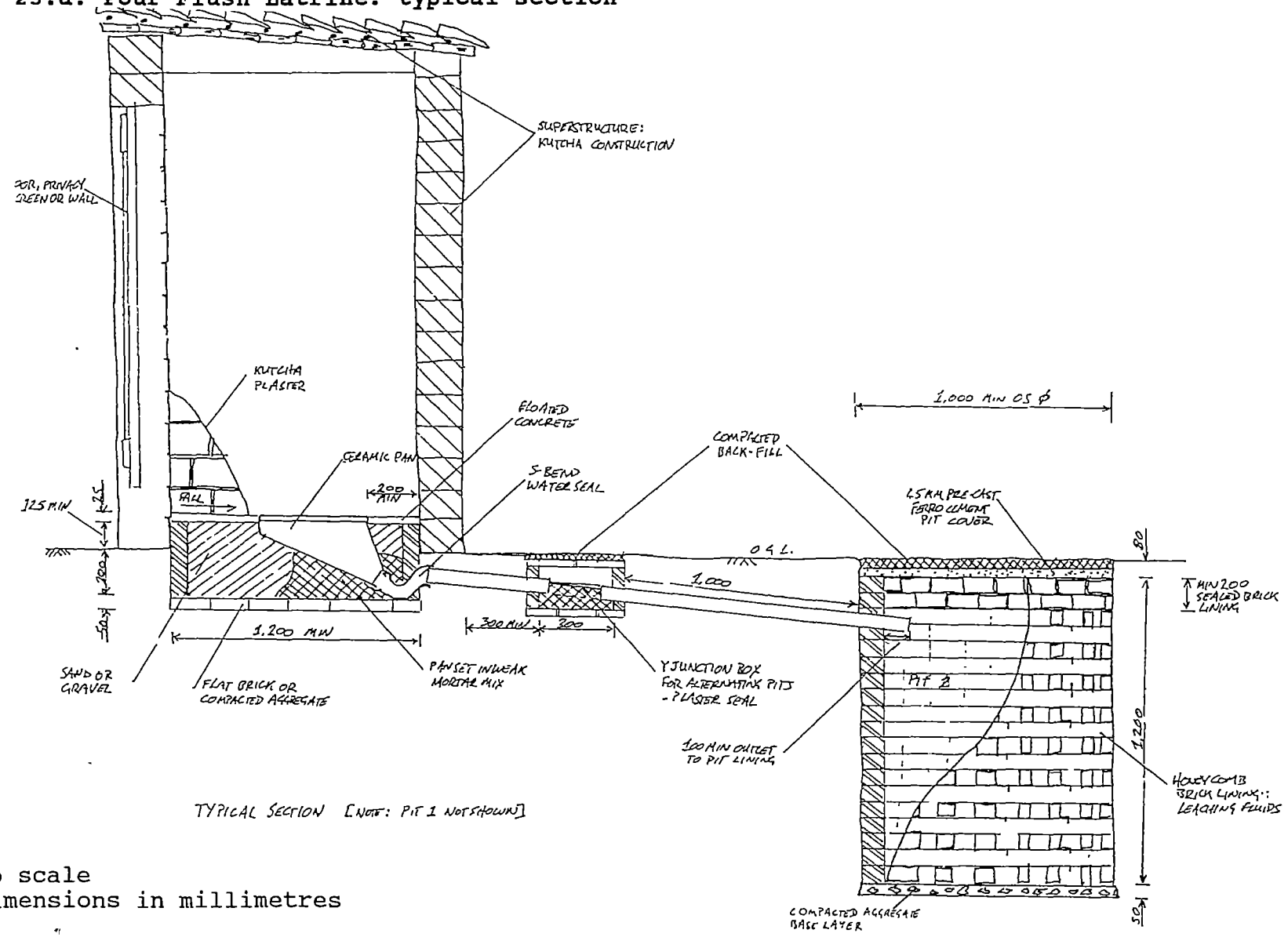
Where ground water contamination or soil type is not a consideration the standard pit specifications (Figures 23 and 24 a) will be suitable. Special considerations include the following:

- **Ground water contamination:**

- water table levels are less than 4 metres; or
- where compound well exists; and

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

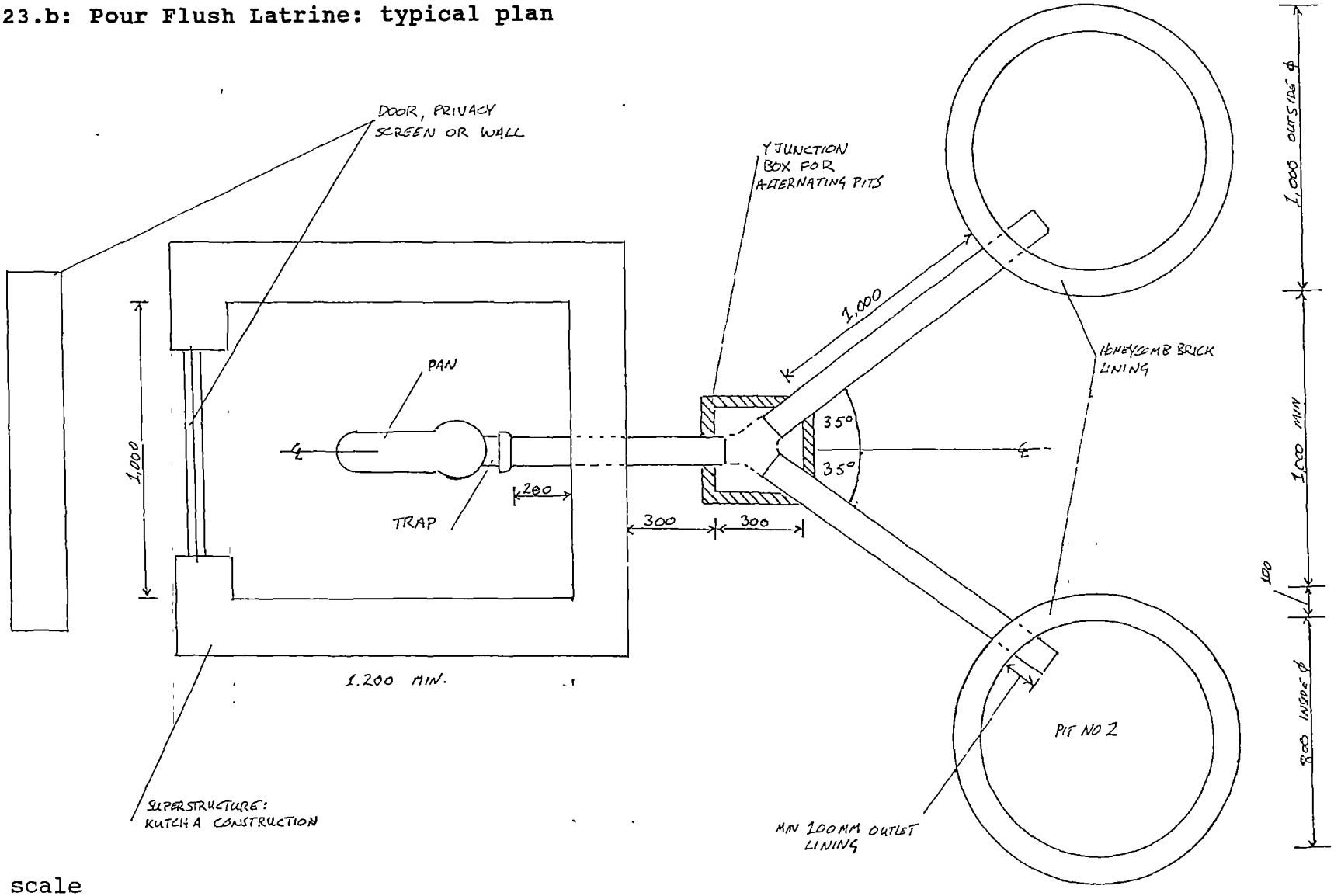
■ **Figure 23.a: Pour Flush Latrine: typical section**



TYPICAL SECTION [NOTE: PIT 1 NOT SHOWN]

- Not to scale
- All dimensions in millimetres

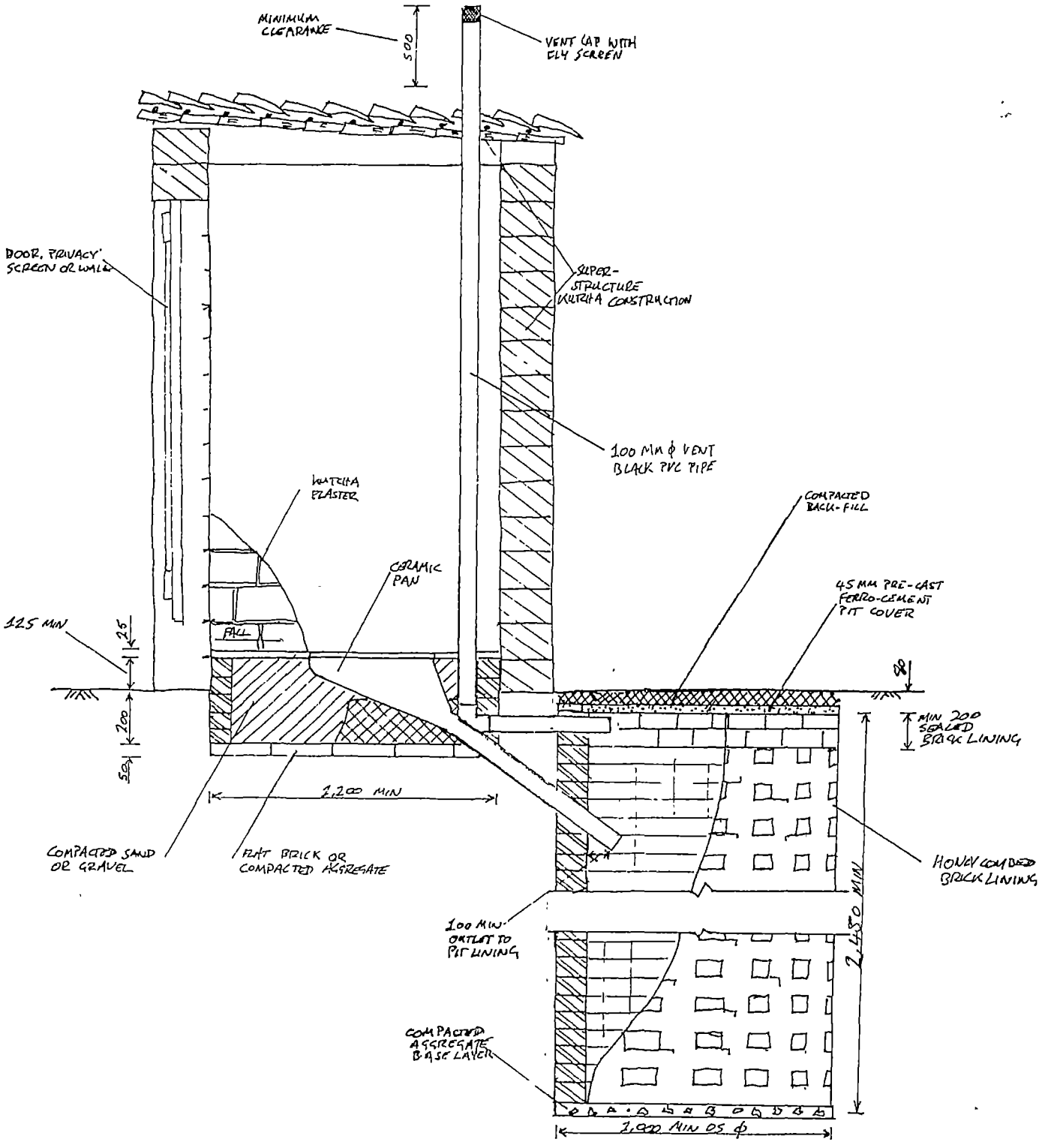
■ **Figure 23.b: Pour Flush Latrine: typical plan**



- Not to scale
- All dimensions in millimetres

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

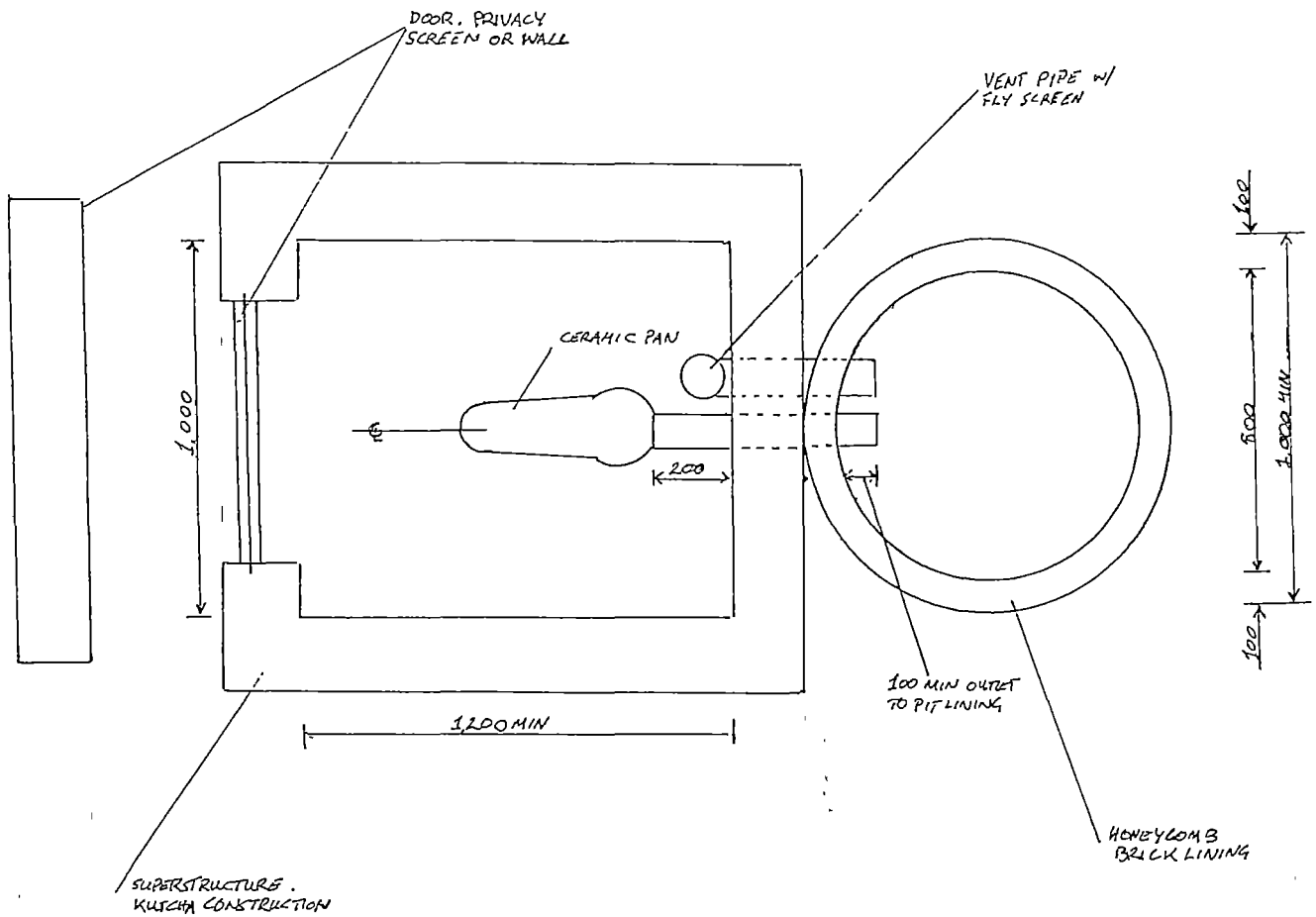
■ **Figure 24.a: Indirect Pit Latrine: typical section**



- Not to scale
- All dimensions in millimetres

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

■ **Figure 24.b: Indirect Pit Latrine: typical plan**



- Not to scale
- All dimensions in millimetres

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

• soil type is highly permeable; then use modified latrine pit design with sealed floor and sand envelope (see figure 25.a)

• **Soil type:**

• where soils are very stable or rocky; then use modified latrine pit design without lower lining and with solid ring collar (see figure 25.b)

■ **Siting Of Compound Latrines:**

• Latrine should be at least 15 metres from compound well if existing and from existing village well

• Latrine pits must be located at least 1 metre from existing buildings to avoid collapse of foundation walls

Where technical criteria are satisfied, choice of siting should be left to the compound users. Pits can be located underneath existing floors or even outside main compound walls to accommodate user preference.

■ **Number of Compound Latrines:**

• Number of users: both designs have maximum capacity of approximately 15 users per latrine. If considerably more than 15 users pit size may be increased or additional units can be added.

• Compound user preference; information from latrine survey indicating number of desired facilities (ie: one per household or two per compound, one for male and one for female users).

■ **Materials Required For Demonstration Units:**

Each demonstration latrine to be constructed requires:

• PFL:

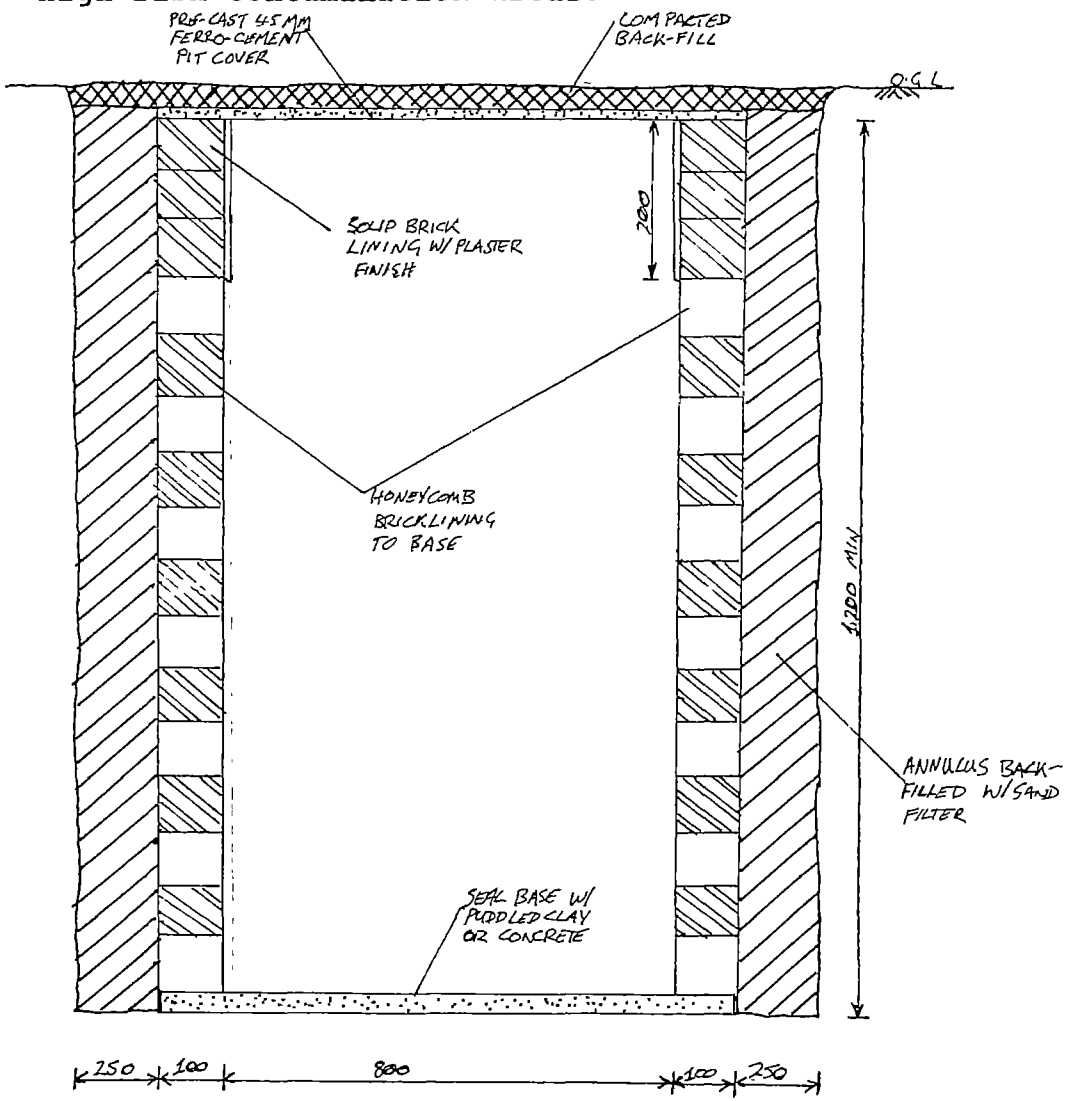
MATERIAL:	UNIT:	QUANTITY:
Cement	bag	2.0
Brick	each	300.0
Sand	m3	0.23
Aggregate	m3	0.06

• IPL:

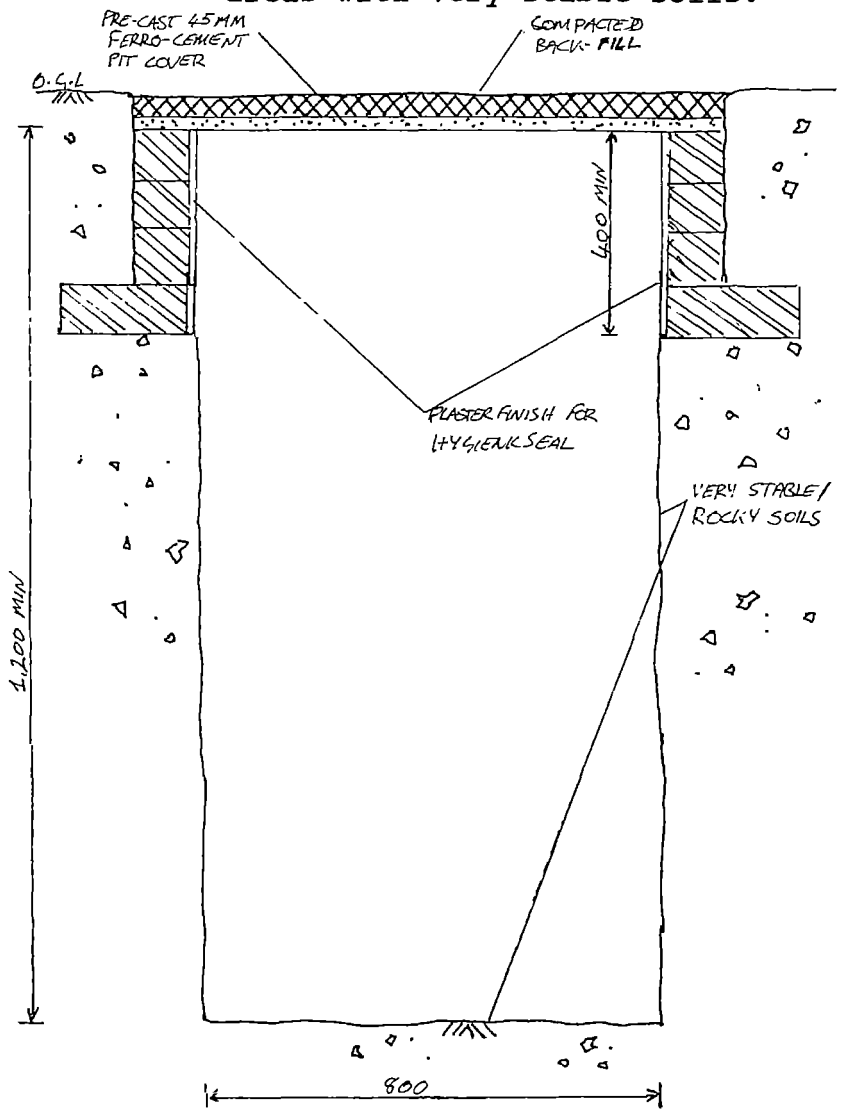
MATERIAL:	UNIT:	QUANTITY:
Cement	bag	2.0
Brick	each	280.0
Sand	m3	0.12
Aggregate	m3	0.06

STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

■ **Figure 25.a: Modified pit design for high risk contamination areas:**



■ **Figure 25.b: Modified pit design for areas with very stable soils:**



STEP NUMBER 5: ACTIVITY: SPECIFY LATRINE, MATERIALS AND PREPARATION WORK

- **Preparation Work:**

  Before constructing demonstration latrines community must carry out following:

  - Select at least two compounds for demonstration construction
  - Select at least two men who will be trained as latrine mistri's; they will be responsible to continue with construction programme in other village compounds
  - Purchase or arrange for supply of all materials for agreed upon number of demonstration latrines
  - Prepare for construction by digging required latrine pits in demonstration compounds

  Note: It is recommended to purchase materials (cement and bricks) in bulk for collective latrine programme; savings on unit cost and transport charges.

- **Outputs:**

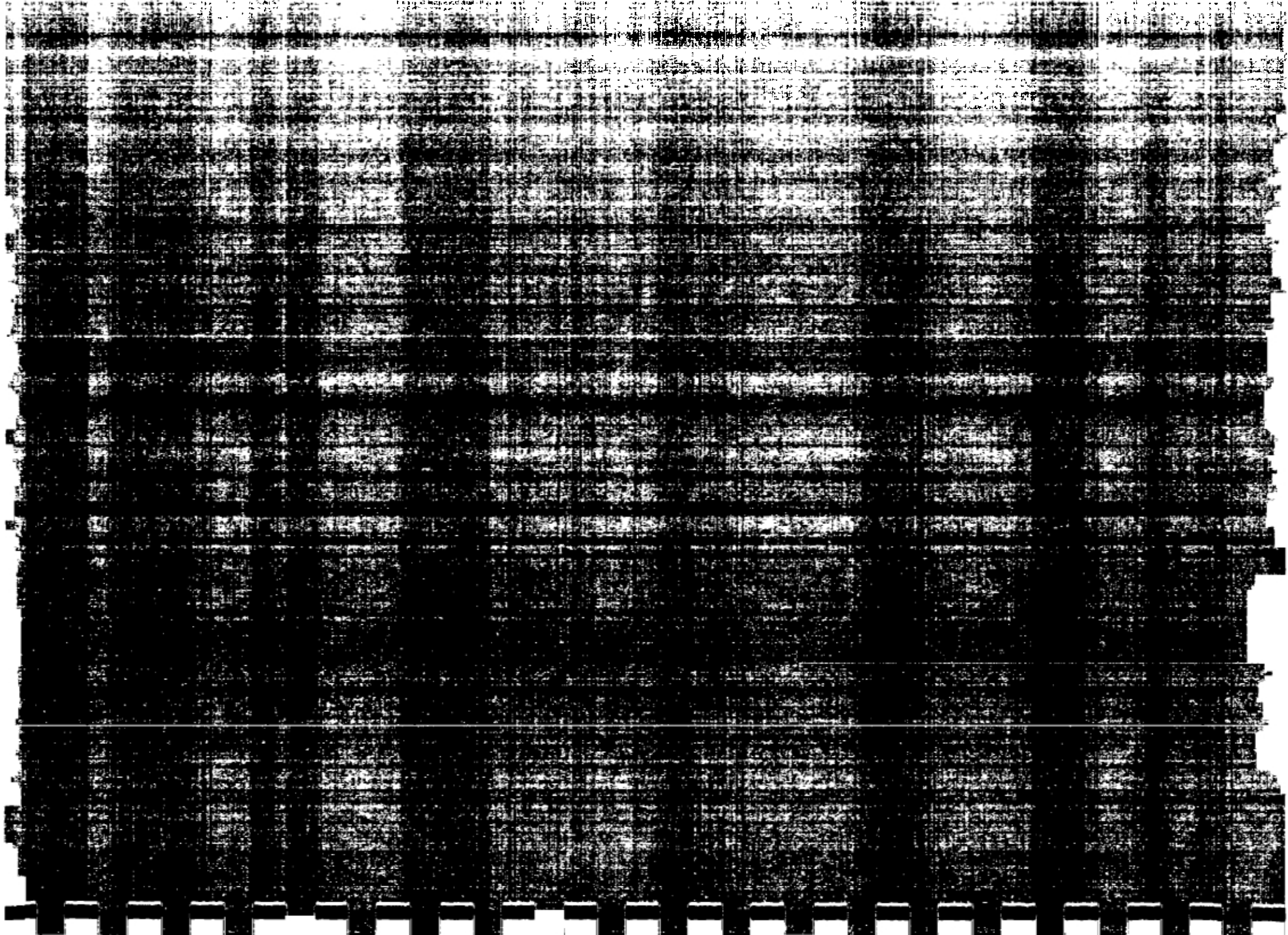
  In preparation for demonstration latrine construction, the following activities should be covered:

  - Design of latrine and pits selected.
  - Siting and number of compound latrines finalised.
  - Compound users purchase materials for construction.
  - Compound users prepare for construction.

STEP 5 — Team Checklist

- Before starting activities in step number 6, review the activities of step number 5 to make sure that the whole team is ready to begin :
- If any of the key activities have not been fully completed the team should make a note of further action required before moving on to step number 5.

Key Activity	Expected Outputs
1. Pump installation and handover	• pump installed • formal handover organised • disinfect if necessary
2. female pump demonstration	Female visit to pump site, demonstration of: • proper use and maintenance • signs of non-functioning • site up-keep • include add-on facilities if constructed
3. finalise latrine survey	finalise inventory of all latrines to be installed with men only after input of women's survey
4. give go-ahead for latrine programme	• indicate compound preparation work • specify materials • set construction timetable



STEP NUMBER 6: ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION

Objectives:

- To construct demonstration latrines in selected compounds
- To give on-the-job training in construction to latrine mistri's
-
-

Target Group:

- Compound representatives
- Latrine mistri's

Methods:

- Construction
- On-the-job training and supervision
-

Means and Materials:

- Construction tools
- Latrine hardware
-

Organisation:

- One day of construction
- Follow up to set pit covers
-

Main Messages and Outputs:

- Compound representatives and latrine mistri's to construct demonstration latrines
- Latrine mistri's to receive on-the-job training.
-

STEP NUMBER 6:	ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION

■ **Latrine Construction:**

• Separate construction into activities outlined below. For PFL two pits and covers are constructed to same diametre as IPL; all other construction is same for both PFL and IPL except for junction box (PFL) and pit vent pipe (IPL). For lay-out and dimensions see figure 23.a/b and 24.a/b.

• LGRDD technician should supervise activities and give additional training to latrine mistri's especially in lay-out, setting pipes, pan and trap.

• **Activity 1: Casting pit cover(s):**	(see figure 26)
1	level circular area and lay-out bricks to diametre of 1.0 metre as formwork
2	cut wire mesh to size and place two layers inside form
3	pour mortar (1:3) and place in form to 45 mm; tamp down well
4	float surface
5	start curing procedure and cure for 5 to 7 days

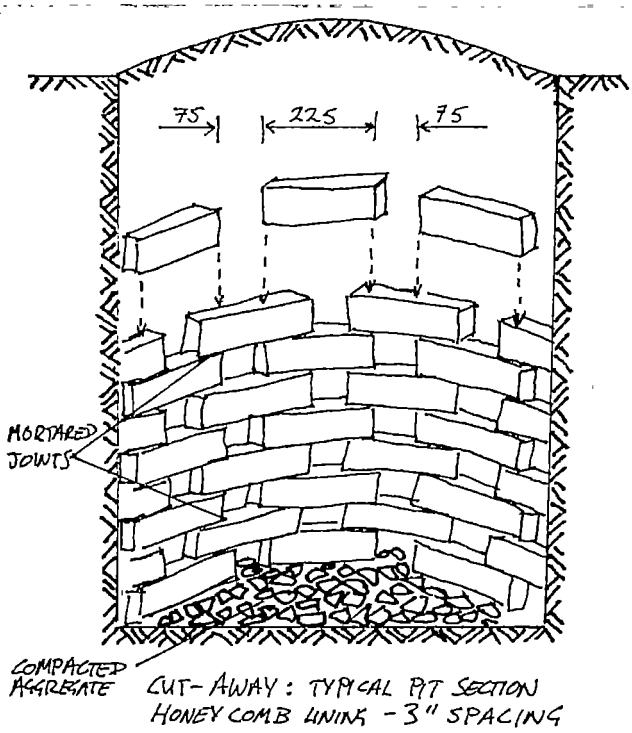
• **Activity 2: Pit lining:**	(see figure 26)
1	honeycomb brickwork lining (0.75 m. minimum inside dia.) up to 200 mm below top of pit
2	back fill any space between lining and earth with sand
3	finish top 200 mm with solid masonry lining above inlet pipe
4	plaster inside surface of top 200 mm lining to seal

• **Activity 3: Lay-out piping:**	(see figure 26)
1	excavate trench and lay piping
2	set pipe for trap at rear of latrine area
3	set outlet pipes at 1:30 slope minimum
4	PFL: set junction box piping at 200 mm maximum from outside wall of latrine
5	set end of pipe outlet into pit at least 100 mm from lining

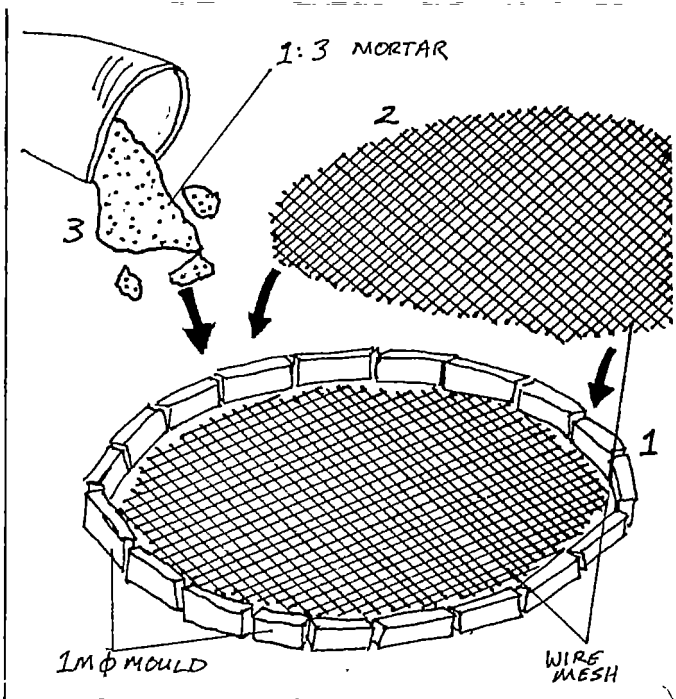
STEP NUMBER 6:

ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION

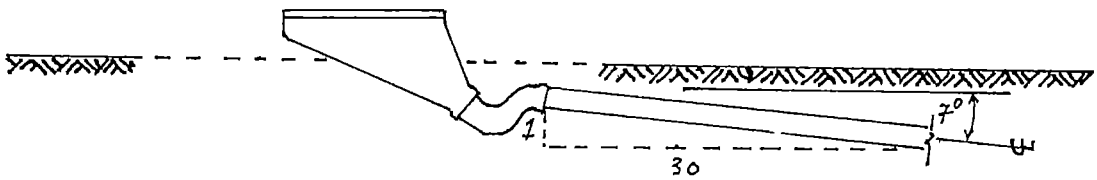
- **Figure 26: Latrine construction - casting pit cover, honeycomb brick work and pipe lay out:**



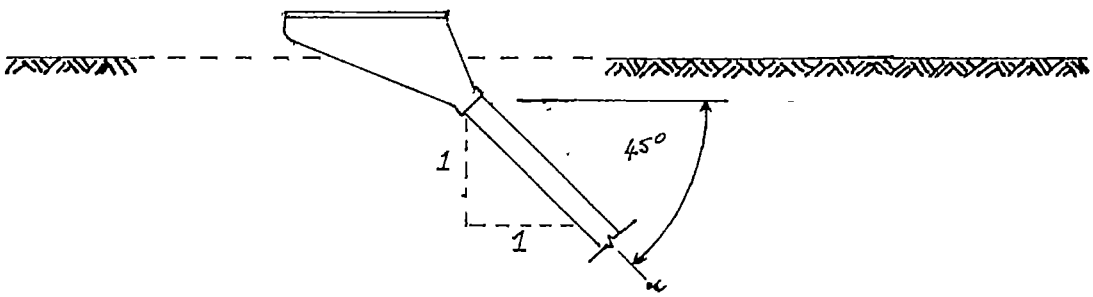
CUT-AWAY : TYPICAL PIT SECTION
HONEY COMB LINING - 3" SPACING



FERRO-CEMENT PIT COVER CASTING



POUR FLUSH : SET DRAINAGE PIPE AT 1:30 MIN. FALL OR 7°

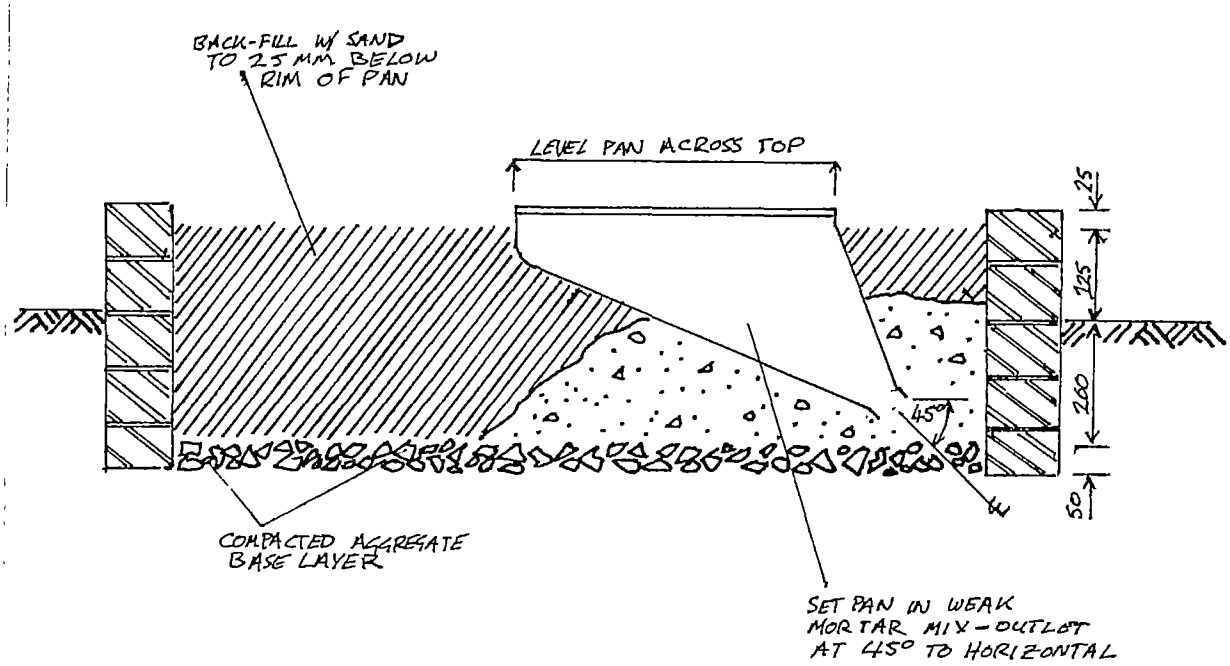


INDIRECT PIT : SET DRAINAGE PIPE AT 1:1 FALL OR 45°

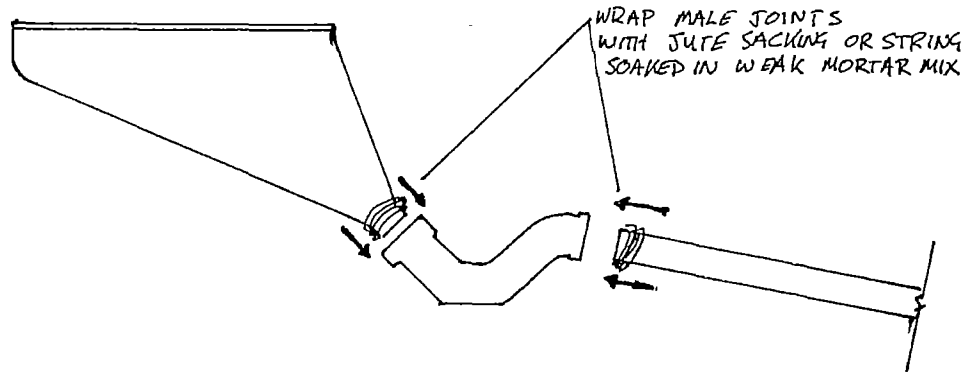
STEP NUMBER 6:	ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION
• **Activity 4: Set pan, trap and construct plinth:** (see figure 27)	
1	build up plinth with hardcore and bricks to raise pan minimum 150 mm above ground level
2	locate pan at minimum of 200 mm from inside of latrine wall
3	seal trap pipe joints with sacking and weak mortar mix
4	set pan and trap in place with weak mortar mix, ensure pan is level
5	back-fill plinth with compacted hardcore and top layer of blinding to 25 mm below rim of pan
6	float plinth surface around pan with 25 mm mortar (1:4)
7	finish surfacing with neat cement level with rim of pan and slope towards pan from all sides; cure float properly
• **Activity 5: Construct junction box (PFL only):**	
1	form box (300 mm square) with bricks
2	plaster junction chamber (1:3) and round off all corners
3	set inlet and outlet pipes in mortar lining
4	seal off one pit outlet pipe with a) flat brick with weak mortar; b) plastic bag with wet mortar jammed into pipe
5	cover junction box with brick lid, back-fill with soil
• Pit slabs must be allowed minimum curing time of 5 days; compound users can carry out remaining activities without supervision of LGRDD technician	
• **Activity 6: Set pit covers:**	
1	after curing move pit covers and set onto open pits
2	back-fill over covers with soil and compact lightly
• **Activity 7: Set pit vent pipe (IPL only):**	
1	with pit cover in place insert vent piping to below level of inlet pipe
2	fix pipe above ground level; paint black and fit fly screen with cap

STEP NUMBER 6: ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION

- Figure 27: Latrine construction - setting pan and jointing:



LEVELING PAN IN PLINTH FOUNDATION



JOINTING TRAP & PIPE FITTINGS

STEP NUMBER 6:	ACTIVITY: DEMONSTRATION LATRINE CONSTRUCTION

- **Activity 8: Building latrine superstructure:**

  Superstructure is responsibility of compound users; local materials and building techniques should be used.

1	superstructure should have inside dimensions of at least 1.2 x 1 m and height of at least 2.5 metres
2	ventilate cubicle with openings below roof line or simple pipe venting painted black
3	for IPL ensure roof is well sealed inside superstructure to create adequate draw
4	plaster inside and outside walls using mud or weak mortar mix
5	provide privacy; wooden door, or curtain, or wall screen

- **Outputs:**

  During construction of demonstration latrines carry out following:

  - Demonstration latrines are constructed in selected compounds with compound representatives and mistri's.

  - Mistri's are given additional supervision and training in key areas; setting pan and trap, laying pipe and building junction box.

STEP NUMBER 6: ACTIVITY: TRAIN LATRINE MISTRI'S AND ESTABLISH VILLAGE PROGRAMME

Objectives:

- To review pit and latrine maintenance
- Give hygiene education messages for compound users
- To establish latrine construction programme
- To establish latrine hardware supply

Target Group:

- Latrine mistri's
- Compound representatives

Methods:

- Discussion
- Demonstration with latrine

Means and Materials:

- Mistri training posters
-

Organisation:

- Mistri training
- Meeting with compound representatives
-

Main Messages and Outputs:

- What are the basic maintenance and repair works for latrines?
- What are the basic hygiene messages for safe latrine use?
- How will the village latrine programme be organised?
- How will households receive latrine hardware?

STEP NUMBER 6: ACTIVITY: TRAIN LATRINE MISTRI'S AND ESTABLISH VILLAGE PROGRAMME

- **Latrine Maintenance and Repairs:**

When carrying out latrine programme in the village, mistri's should educate compound users about the following:

- **PFL:**

- Un-blocking trap: if trap is blocked with effluent try flushing with more water; if blocked with solid objects use 1 metre flexible rod or bamboo with rubber washer or old tyre to free blockage; if trap is free, check junction box for blockage and remove.

- Alternating pits: pit life will be approximately 3 to 5 years depending on rate of use. When pit fills effluent will back-up pipe; seal off first pit in junction box and open second pit. First pit should remain sealed for at least 2 years before re-use.

- **IPL:**

- Adding lime or ash: lime to be added regularly (every month); if lime is unavailable ash to be added every week; pour approximately 0.5 kg of powder directly into pit via bowl.

- Pit life: single pit life will be approximately 8 to 10 years depending on rate of use; when effluent backs up, seal pit and relocate latrine to new site.

- **Both latrine types:**

- Superstructure: check every 4 to 6 months and keep in good repair; re-plaster internal walls and keep well ventilated

- **Hygiene Messages:**

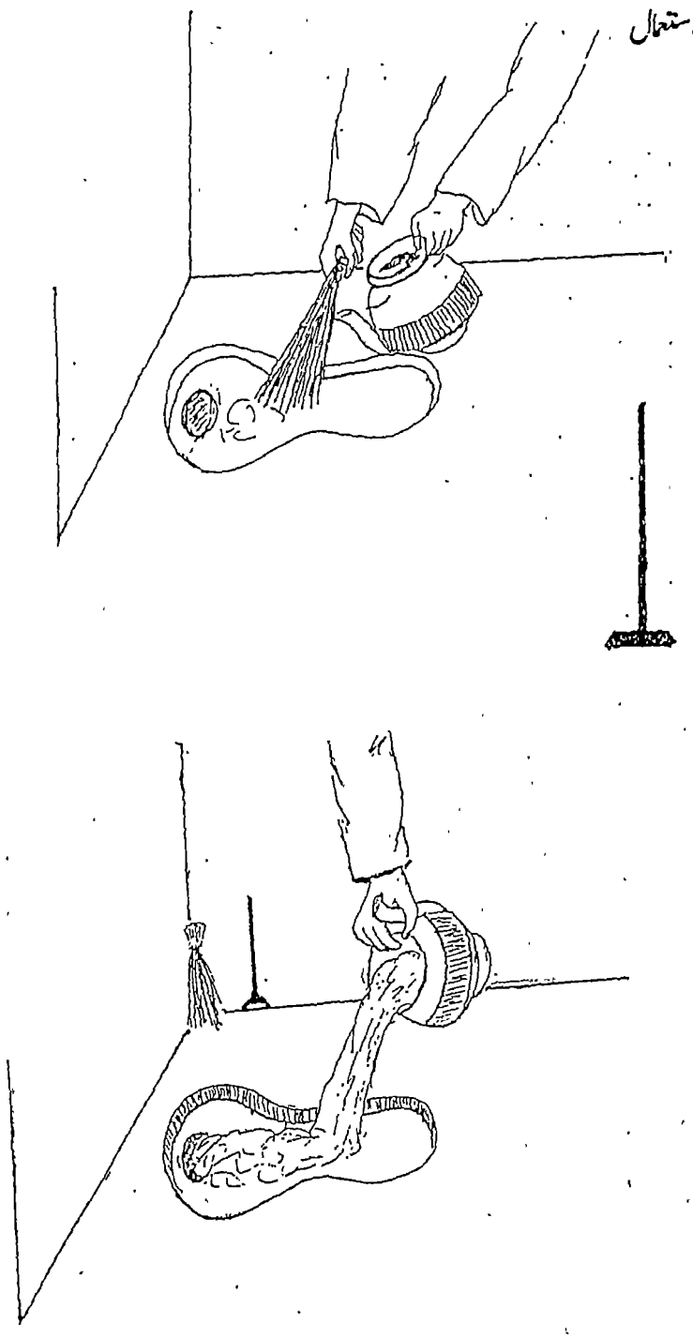
When working in other compounds latrine mistri should pass on following basic hygiene messages:

- Anal cleansing: only use water for anal cleansing; never use bulky materials (stones, corn cobs) with PFL
- Flushing: use at least 1 lota water (1-2 litres) for flushing of PFL; use enough water (0.5-1 litre) for flushing of IPL (see figure 28)
- Washing hands: all users should always wash hands with soap and water after using latrine
- Cleaning: clean pan and floor of latrine regularly (once a week)
- Encourage users to store water in bucket/container inside cubicle to ensure anal cleansing and proper flushing

STEP NUMBER 6: **ACTIVITY: TRAIN LATRINE MISTRI'S AND ESTABLISH VILLAGE PROGRAMME**

- Figure 28: Correct flushing and cleaning of latrine pan:

○ لیٹرین کی صفائی اور اس کا استعمال



STEP NUMBER 6: ACTIVITY: TRAIN LATRINE MISTRI'S AND ESTABLISH VILLAGE PROGRAMME

- **Latrine Construction Programme:**

  After receiving training in lay-out and setting pans etc, latrine mistri's are responsible for helping to duplicate latrine programme throughout village.

  Mistri's should provide construction supervision for other compounds wanting to install latrine units. To arrange this LGRDD team should:

  • Meet with mistri and all compound heads

  • Introduce latrine technology, discuss latrine options and explain function of mistri

  • Arrange with mistri for supply of all latrine hardware from LGRDD stores

  • Establish construction arrangements within village; either

  mistri acts as sub-contractor and does all construction and installation work for a fee (cash or kind); or

  mistri acts as supervisor for lay-out etc, with compound users doing most of construction work; or

  combination of both of above: users dig pits, mix concrete and lays brickwork and mistri sets pan and piping

  Arrangements for organisation of construction and installation should be made by villagers amongst themselves. Mistri coordinates supply of latrine hardware and is point of contact for LGRDD in village.

- **Supply of Latrine Hardware:**

  Households eligible to receive latrine hardware based on household survey; every household participating in original survey will receive subsidised hardware.

  All demonstration latrine hardware is transported to site by district LGRDD. All village programme latrine hardware is stored at LGRDD district headquarters and should be collected by householders themselves; head of households can collect hardware individually or collectively in compound or village group.

  It is responsibility of community members to collect and transport hardware from LGRDD district office to village. Requests for hardware will be checked against household latrine survey information by LGRDD staff.

STEP NUMBER 6: ACTIVITY: TRAIN LATRINE MISTRI'S AND ESTABLISH VILLAGE PROGRAMME

- **outputs:**

  After completing demonstration latrine units latrine mistri's know following:

  - How to supervise and install latrine units correctly
  - What basic maintenance and repairs are necessary
  - Which simple hygiene messages to pass on to household users
  - How latrine building programme will be arranged in his village and what his role will be
  - How householders can collect the subsidised latrine hardware from LGRDD

STEP NUMBER 6:	ACTIVITY: POST-INSTALLATION MONITORING

Objectives:

- To monitor technical outputs for handpump installation
- To monitor technical outputs for demonstration latrine construction
-

Target Group:

- Sub-engineer
- Development officer
- Union council secretary

Methods:

- Observation and discussion
-
-

Means and Materials:

- Monitoring proforma
-
-

Organisation:

- Inspection of completed facilities with community men and caretakers
-
-

Main Messages and Outputs:

- Completed proforma for baseline monitoring of handpump and latrine facilities installed
- Copy of proforma filed with Assistant Director at district LGRDD head office
-

STEP NUMBER 6:	ACTIVITY: POST-INSTALLATION MONITORING

■ **Post-installation Monitoring:**

Monitoring of technical outputs at end of activities in village used for:

- District staff records and future monitoring of facilities at district level
- Quetta-based staff for long-term monitoring and evaluation of outputs and project activities

Fill out monitoring proforma for each village after completing physical construction activities and training of caretakers and latrine mistri's.

■ **Filling Out Proforma:** (see sample below)

- Enter in all required information for both handpump and demonstration latrine units installed
- Each village should have the monitoring proforma completed
- Under "remarks" note down any observations about special conditions or problems, and any outstanding work to be done by community to complete facilities

■ **Expected Outputs:**

- Post-installation monitoring proforma for handpump and demonstration latrine outputs is completed for every village or cluster
- Copy of completed proforma kept on file at district headquarters
- Copy of completed proforma sent to W&S Cell headquarters in Quetta

STEP NUMBER 6:	ACTIVITY: POST-INSTALLATION MONITORING

■ **Post-Installation Monitoring Proforma:**

District: _____ Completion Date: __/__/__
U. C.: _____ Sub-engineer: _____
Village: _____

Handpump:	**Demonstration Latrine Units:**
1. No. pumps installed:_____	1. No. units constructed:_____
2. Serial no. of pumps:_____ _____ _____ _____	2. Type of units constructed? Pour flush ___ Indirect pit ___ VIP ___
3. Name of trained caretakers: _____ _____ _____	3. Name of households with units: _____ _____ _____ _____
4. Well chlorinated? Y / N Date: _____	4. Name of trained mistri's: _____ _____ _____
5. Soak-pit constructed? Y / N	5. No. of household units planned: _____
6. Add-on facility? Y / N Describe:	6. No. of latrine hardware units supplied: _____
7. Remarks:	7. Remarks:

STEP 6 — Team Checklist

- Before finalising physical activities in the village, team members should review the activities of step number 6
- If any of the key activities have not been fully completed the team should make a note of further action required before closing the village activities

Key Activity	Expected Outputs
1. pump facility completed	all work has been fully completed for pump and site, and there is full communal access for all members of user group
2. demonstration latrine constructed	demonstration latrines constructed with compound men including on-job training for mistry including hygiene education topics
3. demonstration proper latrine, operation and maintenance	demonstration of proper latrine use and hand washing for male and female compound users
4. establish latrine programme	all male compound head of households are informed about the programme: • expected input of mistry • supply of latrine hardware
5. establish communication channel	establish link between village and LGRDD district staff or Union Council on long term basis