Government of Lesotho

Ministry of Interior, Chieftainship Affairs and Rural Development

Village Water Supply Section

MANUAL OF STANDARDISATION

Planning, Design and Construction

of Village Water Supplies

Third Edition 1991

INDEX AND CONTENT

LIST OF ABBREVIATION:

General:

MS	:	Maseru District
TT	:	Thaba Tseka District
B	:	Berea District
L	:	Leribe District
MK	:	Mokhotlong District
BB	:	Butha Buthe District
MH	:	Mohales Hoek District
MF	:	Mafeteng District
Q	:	Quthing District
QN	:	Qachas Nek District
DRDO	:	District Rural Development Officer
RDA	:	Rural Development Assistant
DDC	:	District Development Committee
G.I.	:	Galvanised Iron Pipe
P.E.	:	Polyethylene Pipe

Design:

ø	:	Diameter
mm	:	millimetre
cm	:	centimetre
m	:	meter
km	:	kilometre
l	:	litre
sec.	:	second
min.	:	minute
l/cd	:	litre /capita x day
Q	:	flow in l/sec ; l/min
$Q_{available}$	:	total minimum yield of spring or springs
$Q_{req.}$	:	Water requirement as defined by per capita use (30l/cd).
$Q_{max.}$	:	Maximal flow rate in a given section of a pipeline

LIST OF FORMS

A	Initial Village Information		
B	Preliminary Survey		
C	Spring Yields		
E	Survey		
F	Friction Losses (Table)		
G	Friction Losses (Chart)		
H	Hydraulic Calculation		
I 1.	Material Requirements	-	Pipes
I 2.	Material Requirements	-	Fittings
I 3.	Material Requirements	-	Building materials
K 1.- 8.	Bill of Quantities and Costing / Actual Cost		
L 1	Maintenance Report (english)		
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M1	Monthly Construction Report		
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M4 - M7	Progress of Work on Construction Sites in %		
O	Annual Construction Program		
P	Construction Schedule		
Q1 - Q3	Final Report		
R	Construction Site Report		
S	Personal Report		
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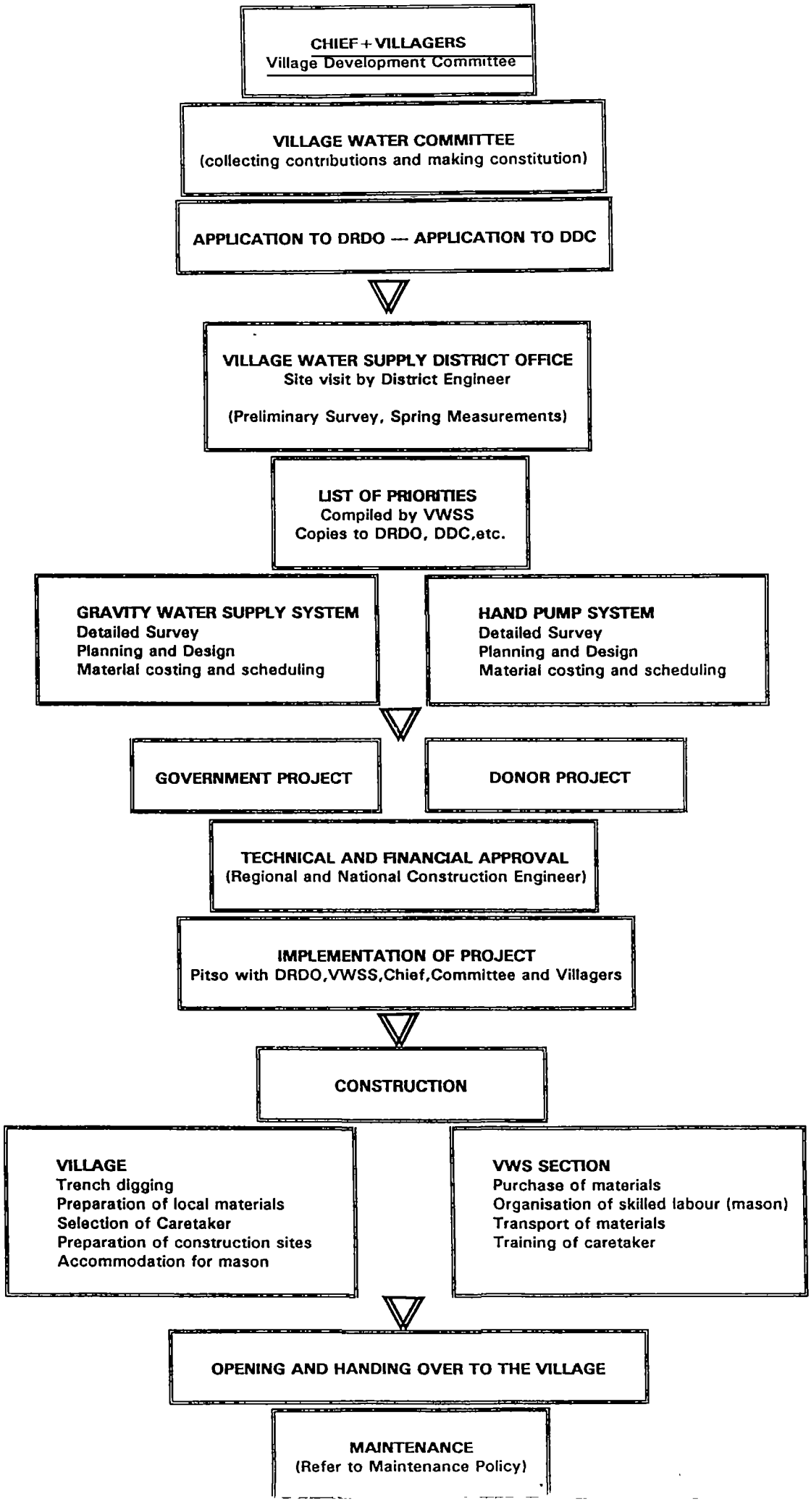
T 2.	Additional Tools		
U	Construction Personnel Evaluation		
V	Water Supply Design Proposal		

LIST OF APPENDICES

ORGANISATION OF WATER SYSTEM CONSTRUCTION



1. PRELIMARY SURVEY

The preliminary survey should give all the necessary basic information to the planning engineer about the project he is going to build. The engineer is advised to inform all parties involved in the construction of a village water supply, from this early stage of planning.

A reference number will be issued to the village by the DRDO's office which shows the district and which has a separate number for the village concerned e.g. MS-33.

There are three forms available:

Form A: **Initial Village Information**

This form is used to get information about a village which cannot be visited by the district engineer in the immediate future. It can be filled by anybody who is interested in forwarding information to the Village Water Supply Section.

Form B: **Preliminary Survey** (for internal use only)

This form is used by the District Engineer on his first site visit. It has to be used together with a copy of a topographic map, or with a sketch showing the sources, the number of huts and their scattering over the area to be served by the water supply system. The map also shows the approximate alignment of any old existing System.

Estimation of population

A sound population count shall be carried out by the village water committee. The committee shall list all inhabitants in the village including children and migrant workers not present throughout the year.

A rough estimation is done as follow:

Number of huts x 3 inhabitants\hat

From C: **Spring yields**

While filling form B, Form C also has to be filled for the first time. It shows the variable yields of the sources throughout the year. Spring readings must be taken every three months or as often as possible to ensure a reliable source. Reliable long term spring measurements help in the proper design of the system. Spring readings must be taken in such a way as to reflect minimum and maximum yield.

2. DETAILED SURVEY

2.1. SURVEY METHODS

Normally, the survey is carried out with the following instruments:

Abney level	:	measuring the vertical angle*
Clino meter	:	measuring the vertical angle*
Compass	:	measuring the horizontal angle*
Measuring wheel	:	measuring the distance between survey points.

* Use either 90°or 100g instruments, uniform in a particular district.

In flat areas where heights are critical, we use a levelling instrument or a theodolite. Always close the survey with a control measurement in order to check the accuracy of the survey. During the survey a sketch is prepared to visualise the survey points, the roads and tracks, the huts and the special landmarks. The following form is used for compilation of readings: Form E : Survey.

2.2. GENERAL NOTES

The following points should be considered when making any survey:

Siltbox	:	as close as possible to the spring catchment
Gradient	:	between spring catchment and siltbox min. 3%
	:	between siltbox and tank min. 3%
	:	highpoints and lowpoints should be well defined.
Pipeline	:	keep it as short as possible
Donga crossing	:	should be placed at the most economical place and should be well founded and taking account of future erosion.
Tanks	:	as close as possible to the consumers, to use the

most efficient pipe diameter, but preferably more than 5m above the first tap.

Distribution : place taps on high- and lowpoints (avoid additional structures)
not more than 150m walking distance to the nearest tap. Exception: if less than 40 consumers, up to 300m walking distance is acceptable).

Placement of private taps: Special cases refer to the Management Village Water Supply Section.

No. of taps : not more than 150 consumers per tap
not less than 40 consumers per tap
Average consumers per tap the village 80 - 120

3. DESIGN OF A WATER SUPPLY SYSTEM

3.1. WATER CONSUMPTION

From the preliminary survey use the total population to get the required amount of water per day. Use the population count list compiled by the Village Water Committee. To consider the increase of consumption and the population growth use a demand of **30 l/cd**. However local condition (accessability of springs, growth of village, possibility of drilling) may require the engineer to accept a system providing less than 30 l/cd.

The following values for institutions have to be considered, if they will be supplied by a new water supply system:

- Boarding school — 60 l/ student x day
- Ordinary school — 2 l/ pupil x day
- Govt. clinic — 100 l/ bed x day plus 30 l/ employee x day
- Dwelling house linked with any of the above — 200 l/ home x day

Special attention has to be given to future plans for village development in terms of new schools, clinics, local courts etc.

3.2. PIPELINE FROM CATCHMENT TO SILTBOX

Q_{max} for design = 5 to 15 times maximum measured flow according to FORM C and depending on the degree of confidence in the readings.

Diameter ø = minimum 40mm pipe.

Install sufficient diameter to ensure that all the water is carried to the siltbox.

Flow rates:

- **ø 40mm : Qmax = 1.2 l/sec.**
- **ø 50mm : Qmax = 2.2 l/sec.**

3.3 SILTBOX

The volume of the siltbox must provide a minimum of 20 minutes retention for the maximum capacity of the pipeline (Q_{max}) to the tank. Adequate overflows should be provided near the inflow of the siltbox for the discharge of excess water. The size of the overflow must be equal to the number and size of the inlet pipe.

3.4 PIPELINE FROM SILTBOX TO TANK

Diameter according to

$$Q_{req} \text{ (l/sec)} = \frac{\text{Total consumption per day}}{86{,}400} \quad \frac{l}{s}$$

If the spring yields more than 30 l/cd all the water should be brought to the distribution system to serve additional purposes (communal gardens,etc.) depending on economic considerations.

$Q_{avl.} \geq Q_{req.}$ (30l/cd)

$Q_{max.} \leq Q_{req.}$

$Q_{max.}$

min: appropriate pipe size according $Q_{req.}$

max: any pipe size, under a cost benefit calculation up to maximum 10% cost increase of the cost per capita.

An uncontrolled overflow at the tank must be avoided and shall be controlled by a ballvalve (to force an overflow at the siltbox)

3.5 STORAGE TANK

The volume of the storage tank must be minimum of 66% of the required water consumption per day. For a pump system, the size of the tank is dependent on the pumping rate and the daily pumping time.

3.6 HYDRAULIC CALCULATIONS

The following forms are available:

Form F — Waterflows and Friction losses
- Waterflow required to supply the number of taps in the distribution system.
- Pipe diameter, waterflow (l/sec) and friction loss in mm/m.

Form G — Waterflows and Friction losses
- Quick reference table to determine the most adequate pipe diameter

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Form G — Waterflows and Friction losses
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Form H Hydraulic calculation

This is used for the calculation and drawing of the longitudinal section of the pipeline to find a reasonable pipe size, (not to make sure that every tap will be supplied with the theoretical amount of 0.2 l/sec.)

Line 1 : Survey point number according to Form E and the site plan.

Line 2 : Horizontal distance between survey points in meters (m).

Line 3 : Reduced level according to the heights calculated in Form E in meters (m).

Line 4 : Static pressure head is the difference in level (m) between the previous free water surface (spring, siltbox, pressure break tank, storage tank) and the level at the specific point.

Line 5 : Flow in l/sec can be obtained from Form F, from section 3.2 and 3.6.

Line 6 : Pipe size and type (e.g. GI 20mm)

Line 7 : Friction losses in m/km are read from Form F and G. These figures include an additional 10% for friction of fittings and progressive roughness of used pipes.

Line 8 : Friction head for each pipe section is found multiplying line 2 x line 7 (length x friction per length). Use consistent units (e.g. km and m/km or m and mm/m).

Line 9 : Friction chainage is obtained by adding all the friction heads (line 8), starting from the point with free waterlevel to each specific point.

Line 10 : Dynamic pressure head is the difference between the static pressure head and the friction chainage (L4-L9).

** Always indicate the maximum capacity of the pipeline between siltbox and tank on the hydraulic profile sheet.

Comments:
Since the theoretical amount of 0.2 l/sec tap does not correspond to the actual rate of flow, the calculated dynamic pressure head is not equivalent to the actual pressure head at the taps. To make sure that all taps in the system get water, taps showing more than 15m calculated dynamic pressure head should be reduced by means of washer (bored 2 cent coin). The size of reduction should be determined on the completed system, so that the actual rate of flow on a single tap (the others not in use) remains about 0,4 l/sec.

RULE: NO NEGATIVE PRESSURE IN ANY VWSS SYSTEMS

GOVERNMENT OF LESOTHO

MINISTRY OF INTERIOR, CHIEFTAINSHIP AFFAIRS
AND RURAL DEVELOPMENT

VILLAGE WATER SUPPLY

HA MOKOTJELA WATER SUPPLY

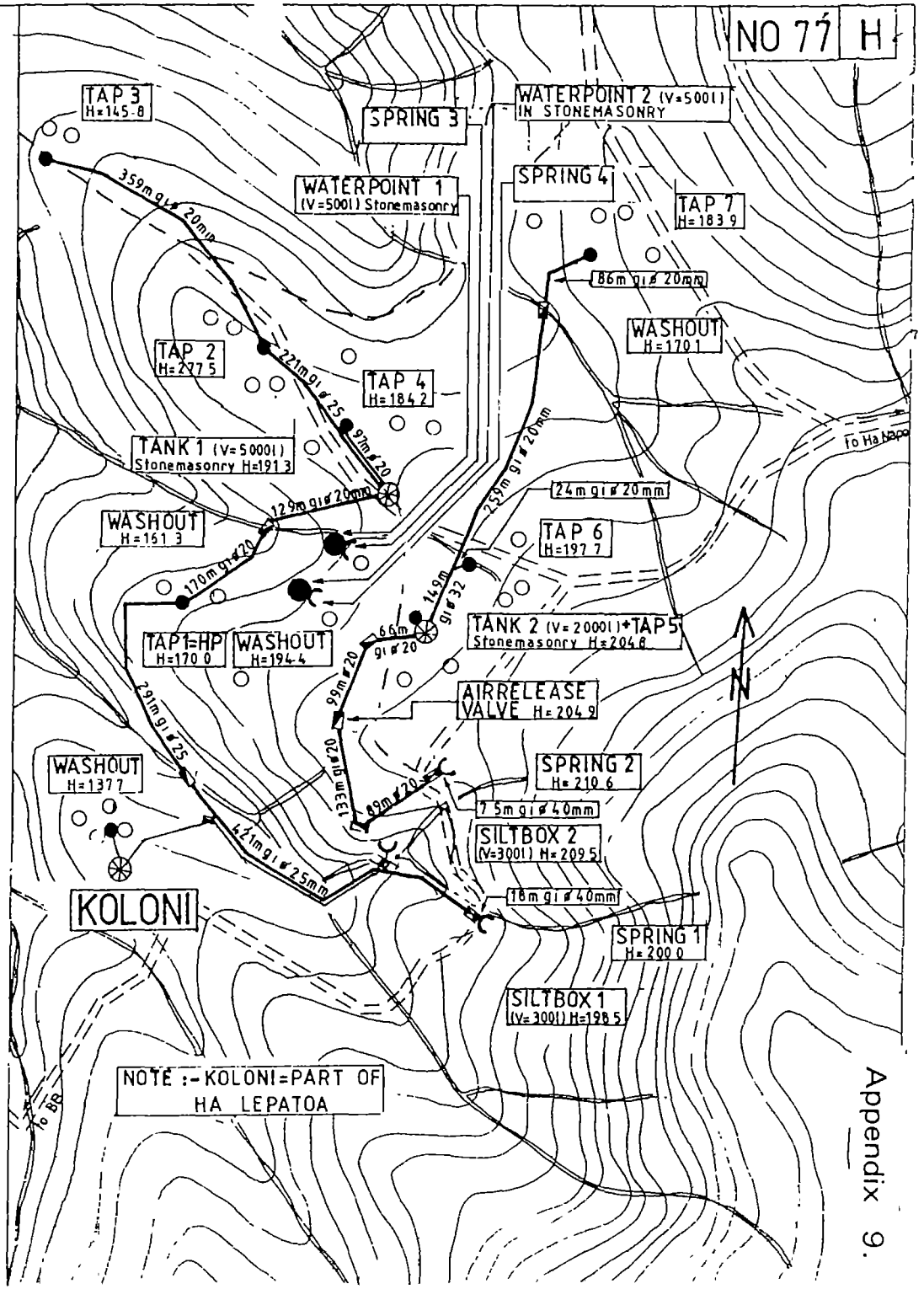
PLAN SCALE 1 : 5000

Situated . 31 km east of Butha Buthe Camp

Coordinates : 28° 37' S / 28° 31' E
1870 m above sea level

Map Sheet . 2828 DA1 / 1 : 20'000

TECHNICAL OFFICE BUTHA BUTHE	ACTION	DATE	BY
SITE PLAN	SURVEY		
	DESIGN		
	DRAWN		
	CHECKED		
	AS BUILD		
	BB - 33		



- Keys and mixing ratios
- Plan of the structure, scale 1 : 20
- Required sections, usual scale 1 : 20

Refer to APPENDIX I of this manual for the list of available standard plans. On special request there is a list showing plans for standard structures built from 1978 to 1983 and special structures (see VWSS library).

5. COMPILING LIST OF MATERIAL AND COSTS

The following forms are available:

Form I MATERIAL REQUIREMENTS

I 1 PIPES for compiling the required amount of GI - or PE-pipes for one project.

I 2 FITTINGS for compiling the required amounts of GI - and PE-fittings for all the structures and pipelines. Depending on the alignment, additional elbows or bends are necessary for changes of gradient and direction.

I 3 LOCAL MATERIAL for all structures. For donga crossings and other protective structures, additional cement, sand, crushed stones and stones should be added.

Form K BILL OF QUANTITIES AND COSTING/ACTUAL COST. This is used for compiling the costs of pipes, fittings, local material, transport and skilled labour. It is used also for compiling the actual costs of the project.

The compiled quantities from Forms I1, I2 and I3 have to be transferred to the correct column on Form K. To get the final costs the current price list has to be used.

6. SITE PLAN

6.1 SCALES

The site plan or layout is plotted at one of the following scales:

Very big projects	1 : 10'000
Average projects (normal scale)	1 : 5'000

6.2 TITLE AND TITLE PAGE

The required space for the title is usually the bottom 6cm of the right lower corner of the plan. Refer to APPENDIX 4 for the information which is required in the title. For more complex projects the full A4 size (21 x 29,7cm) is required. It has to be placed at the bottom right corner of the plan. Refer to APPENDIX 5 for the A4 size title. In order to trace the origin of the plan, MASERU has to be replaced by the name of the relevant district office (e.g. MOHALE'S HOEK, BUTHA-BUTHE, THABA TSEKA etc). To get similar plan titles use the same size of stencil and pen as the samples in APPENDICES II AND III. Mark the villages served by the same supply below the main village (including Ref. No.)

6.3 SYMBOLS FOR DRAWINGS

APPENDIX 3 SYMBOLS FOR DRAWINGS

additional information can be added if necessary : e.g.

- Sea Level 2158,5m on landmarks
- Red. Level 49,3m on structures
- Standard plan B - 03 / S - 21 etc

The base of a site plan is an enlargement of the 1 : 20'000 or 1 : 50'000 Lesotho map from Lands and Surveys Department:

- contours with elevations above sea level
- rivers, cliffs, roads, buildings etc.

The plan has to be completed with information from the survey sketch:

- roofed houses, footpaths, dongas etc.
- north direction, village names, eventually enlarged details of tank sites

Refer to APPENDIX 9 for presentation.

6.4 LONGITUDINAL SECTIONS

These are drawn for the hydraulic calculation only, and are not part of the plan.
Use FORM H for plotting

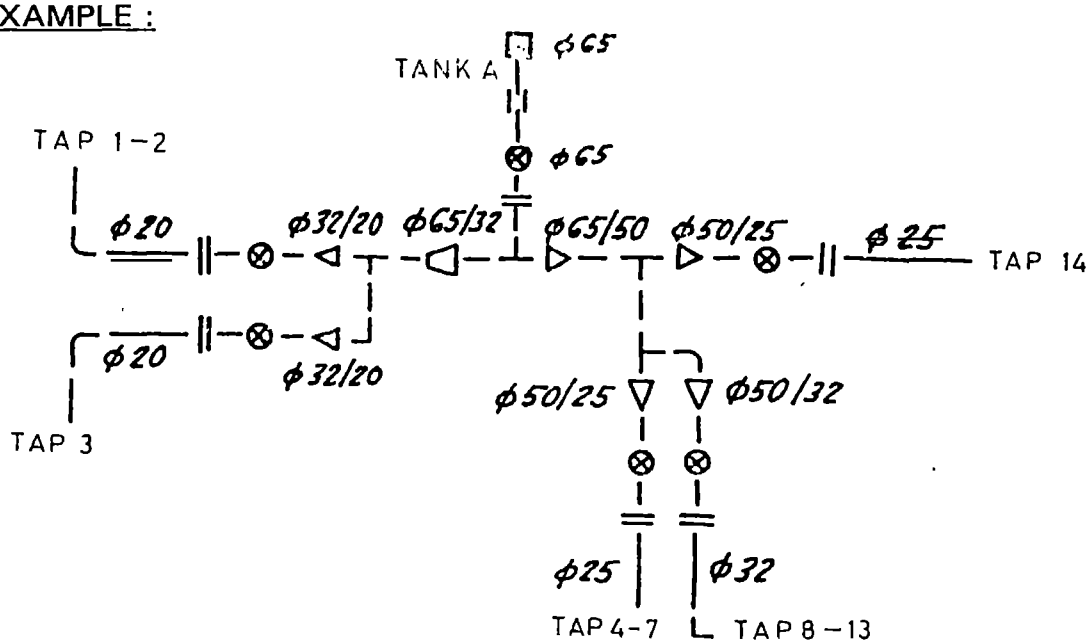
6.5 INSTALLATION PLAN

The following symbols are used for enlarged installation plans and schemes.

-	Gate Valve	-	Tee
-	Globe Valve	-	Union
-	Float Valve	-	Nipple
-	Non Return Valve	-	Socket
-	Strainer	-	Reducing Bush
-	Bibcock	-	Elbow
-	Bend	-	Plug

An installation plan is made for tanks, valves chambers, washouts, air releases and donga crossing in order to get the correct fittings and the right size of the structures. To help the foreman on the site, the installation plan is either drawn on the site plan or on a separate sheet of paper. It will also be used to fill FORM I 2 . FITTINGS.

EXAMPLE :



7. SELECTION OF PUMP AND ENGINE

A) Surveying of local conditions :

- Level pump - tank ⇒ Static head
- Diameter of pipe Dynamic head
- Yield of spring / pump test of borehole
- Storage beside the pump house
- Availability of electricity

B) Selecting the most effective and economic combination: (Running costs and maintenance costs)

- Diesel drive	- Borehole pump - Horizontal pump
- Electric drive	- Horizontal pump - Submersible pump
- Solar	- Submersible and surface pumps.

C) Calculation and dimensioning are done on a separate sheet. There is a counter-check made by the maintenance engineer and/or by the supplier.

D) Design details are:

- Daily pumping time:
  - 8 to maximum 10 hours for diesel engines.
  - 12 hours maximum for electric pumps.
- Control system on electric pump systems:
  - Float switch
  - Low water cut off.

REFER TO ENGINEERS HAND BOOK /PUMP DESIGN

8. CONSTRUCTION DETAILS

8.1 DEPTH OF TRENCHES

The depth of trenches should be :

- Through fields 1,0 metre
- Through pastures 0,6 metre
- For road crossings 1,0 metre
- On rock, the pipe should be protected with a dry stone wall and packed in soil, or it can be carried on pillars (masonry or steel).

When crossing roads, liaise with Roads Department. A GI pipe is used as a sleeve protecting the water carrying pipe. The minimum diameter of this pipe is 50mm. If using a culvert, the pipe should run on the roof.

8.2 DETAILS OF STRUCTURES

Refer to APPENDIX I , to the standard plans and to the special file on building construction. (Foreman- and Supervisor Course Manuals)

9. REPORT SYSTEM

9.1. REPORTS FILLED IN BY DE'S STO'S OR SUPERVISORS

9.11. TECHNICAL REPORT

This report, compiled and signed by the District Engineer, is a component of the project file for each project built or supported by VWS - Section and has to be included in the file for approval by the Regional Engineer. (see also chapter 10) The following sections must be included:

A. INTRODUCTION: When was the application made? Where is the village situated? Is there only one village or several small ones? Are there other rural development projects already going on?

B. POPULATION: Give the populations of sub villages.

Is it a growth area or not?
Are there already plans to extend the village?

C. SOURCES: What sources are available, give locations? Who owns them? What is the yield (l/min.) Amount of water available (m^3/day; l/day) Amount of water required (m^3/day with 30 l/cd). Specify maximum and minimum yield. Attach Form D Spring Yields

D. DESIGN: Pipe material, building material. Structures to be build (Standards). Outline of the pipeline. (Topo-graphical problems etc.)

E. COSTING: Material. transport, labour. Give the expected village contribution if possible. Total cost and cost per capita.

F. CONSTRUCTION SCHEDULE:Starting date, duration, manpower required, completion date.

G. FINAL OBSERVATION: Personal remarks, about expected improvements in the water supply situation, health etc. Comments about maintenance etc.

9.1.2. MONTHLY CONSTRUCTION REPORT FORM M1

Paragraph 2.Transfers shall cover all the movements from projects to projects as well as transfers from district to district. The form is submitted to the Regional Engineer at the end of each month but latest by the 10th day of the following month.

9.1.3. MONTHLY MAINTENANCE REPORT FORM M2

The form is submitted to the Regional Engineer at the end of each month but latest by the 10th day of the following month, together with the

Monthly Construction Report M1 and the Monthly Staff Report M3.

9.1.4. MONTHLY STAFF REPORT FORM M3

The form is submitted to the Regional Engineer at the end of each month but latest by the 10th day of the following month, together with the Monthly Construction Report M1 and the Monthly Maintenance Report M2. Please note that the Monthly Staff Report Form is for the **following** pay day.

9.1.5. PROGRESS OF WORK SITES IN % FORM M4 - M7

Progress of all kinds of construction must be reported. Gravity-, Hand Pump- Maintenance-, and Rehabilitation Projects. The forms are submitted to the Regional Engineer at the end of each month but latest by the 10th day of the following month.

The regional engineer submits a quarterly summary of all activities to the National Construction Engineer.

9.1.6. FINAL REPORT FORM Q1, Q2, Q3

Final reports must be submitted with the Quarterly Report for the period in which the project was completed. A site plan "as built" has to be attached to the report, as well as a copy of the map 1:20,000/1:50,000 with all the information required to keep the central maps in Maseru up to-date. The Final Report including the "as built" plan must reach the Regional Engineer 2 months after the project has been completed.

9.1.7. CONSTRUCTION PERSONNEL EVALUATION FORM U

This form must be filled by end of the year or if a transfer from one district to an other materializes. The evaluation/interview is conducted by the District Engineer in the presence of the Supervisor/ Senior Technical Officer and Technical Officer..

9.1.8. ANNUAL CONSTRUCTION PROGRAM FORM O

A working tool to plan and monitor the construction activities throughout the year.

9.1.9. CONSTRUCTION SCHEDULE FORM P

9.1.10. ANNUAL REVIEW AND WORKPLAN FOR THE FOLLOWING YEAR

Each year the PME Coordinator will propose a format and announce the date for submission.

9.2. REPORTS BY FOREMAN AND MASONS

9.2.1. CONSTRUCTION SITE REPORT FORM R

- To be collected at payday -

This report is about activities on the site. Presence of foreman, masons and community (how many villagers). Stock control of cement. This form has to be filled in by the foreman daily, and checked and signed by the supervisor and the chairman of the committee.

9.2.2. PERSONAL REPORT FORM S

- To be collected at payday -

The personal report must be kept by the foreman and masons daily. The mason's report will be signed by the foreman and the foreman's report will be signed by the supervisor.

9.2.3. STANDARD TOOLS AND EQUIPMENT FORM T1

This list has to be filled in by the Storekeepers when they issue tools to the masons or foreman. This form will be kept by the district engineer. Whenever tools or equipment have to be replaced, the person concerned must present the list to stores to enter exchanges. The item/tool to be replaced must be returned to the storekeeper.

The person who receives the tools and equipment in the first place must

sign. When the items are returned to the store, the Storekeeper has to sign.

9.2.4. ADDITIONAL TOOLS FORM T 2

The same applies to this form as to form T 1

- Additional tools remain the property of the district not the foreman

9.3. MAINTENANCE REPORT FORM L1 + L2

This form is available in English L1 and Sesotho L2. It has to used by the villages whenever they need VWS maintenance. Forms will be kept by the DRDO's office. One copy together with the maintenance job-card has to be submitted to the district engineer concerned.

The district engineer is responsible for the adequate filing of all the forms.

10. FILING SYSTEM

10.1 CONSTRUCTION FILE

The district engineer keeps a file with all important forms, plans, notes etc. for example:

- Forms A - V
- Locational map 1:50'000/1:20'000
- Site plan 1:5'000
- Technical report etc.

10.2 FILE FOR APPROVAL FORM V

This file has to be submitted to the RE and the NCE for approval and must contain:

- Map of Lesotho 1:250'000 (photocopy of the relevant part only).
- Locational map 1:50'000/1:25 000/1:20 000
- Site plan 1:5'000
- Hydraulic calculation

- Technical report
- Bill of qualities and costing
- Spring gauging

After completion the final report and the site plan "as built" have to be added, as well as the map 1:20'000/50'000 as mentioned under 9.1.6.

STANDARD PLANS

STRUCTURE		STONE	BRICK
Siltbox Volume	300lt	S-01	B-01
Siltbox Volume	500lt	S-01	B-01
Siltbox Volume	750lt	S-01	B-01
Siltbox Volume	1000lt	S-01	B-01
Siltbox 150lt Collection Chamber		S-11	B-10
Pressure Break or Collection Chamber		S-11	B-11
Pressure Break Chamber with Float Valve		S-12	B-12
Distribution Chamber		S-11	B-13
Valve Chamber 60 x 45cm			B-14/15
Valve Chamber 60 x 95cm			B-14/15
Tank Volume	$1m^3$ / $2m^3$ / $3m^3$ / $4m^3$	S-20	B-20
	$5m^3$ / $7.5m^3$ / $10m^3$	S-20	B-20
	$15m^3$	S-20	B-20
Tank Volume	$20m^3$ / $30m^3$	S-23	B-23
Waterpoint Volume 300lt		S-30	B-30
Waterpoint Volume 500,750,1000,2000lt		S-31	B-31
Stand pipe			B-40
HAND PUMP SLAB			B-40
Pumphouse combined with borehole			B-50
Pumphouse for horizontal pump			B-50

PANTOGRAPH

ENLARGEMENTS FROM 1 : 50,000 MAPS

to:			Hole no Step 1	Hole no Step 2	Hole no Step 3
1	:	25,000	2		
1	:	20,000	2½		
1	:	10,000	5		
1	:	5,000	2	5	
1	:	2,000	5	5	
1	:	1,000	5	5	2
1	:	500	5	5	2

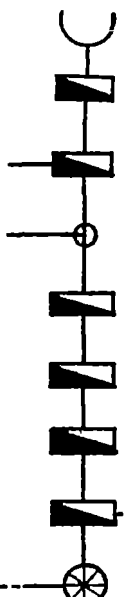
ENLARGEMENTS FROM 1 : 25,000 MAPS

to:			Hole no Step 1	Hole no Step 2	Hole Step 3
1	:	10,000	2½		
1	:	5,000	5		
1	:	2,000	2½	5	
1	:	1,000	5	5	
1	:	500	5	5	2

ENLARGEMENTS FROM 1 : 25,000 MAPS

to:			Hole no Step 1	Hole no Step 2
1	:	10,000	2	
1	:	5,000	4	
1	:	2,000	2	5
1	:	1,000	4	5
1	:	500	8	5

SYMBOLS FOR DRAWINGS



	STENCIL		INKPEN	
	5mm	2,5mm	0,5	0,25
SPRINGCATCHMENT YIELD 4,5l/min	X	X	X	X
SILTBOX V = I	X		X	
COLLECTION CHAMBER	X		X	
TEE	X		X	
WASHOUT	X		X	
AIRRELEASE (VALVE)	X		X	
PRESSURE BREAK TANK	X		X	
DISTRIBUTION CHAMBER	X		X	
STORAGE TANK V = m^3 (I)	X		X	
VALVE CHAMBER	X		X	X
TAP 1	X		X	
NEW GRAVITY MAIN 125m GI 32mm PE 32mm		X	X	X
EXISTING GRAVITY MAIN 234m GI 25mm		X		X
NEW PUMP MAIN 567m GI 50mm		X	X	X
EXISTING PUMP MAIN 345m GI 40mm		X		X
HYDRAM TYPE JOHN B. NR 1 RATE 0,5 l/min	X	X	X	X
D/E PUMP TYPE MONO HD 10 RATE 0,7l/sec ENGINE LISTER LT 1	X	X	X	X
BH NR3 + D/E PUMP TYPE SUBMERSIBLE RATE 0,4l/sec ENGINE EM 1,2 KW	X	X	X	X
HP NR 3 BH DEPTH 50m STATIC WL 15m YIELD 0,30l/sec TYPE MONO HP SET AT 45m RATE 0,25l/sec	X	X	X	X
BH NR3 DEPTH 50m STATIC WL 15m YIELD 0,25l/sec	X	X	X	X

SIZE OF STENCILS

○ = 2.5mm STENCIL

◉ = 3.5mm STENCIL

⊕ = 5mm STENCIL

◎ = 7mm STENCIL

◓ = 10mm STENCIL

⊕TECHNICAL OFFICE MASERU	◉	ACTION	DATE ◉	BY ◉
	◉	SURVEY	12.05.80 ○	A H ○
◎MATSIENG 27° 35' EAST 29° 37' SOUTH 5KM EAST OF MORIJA	◉	DESIGN	25.10.80 ○	Schi ○
	◉	DRAWN	02.01.83 ○	GTR ○
	◉	CHEKED	22.02.83 ○	Schi ○
⊕SITE PLAN ⊕1:5'000	◉	AS BUILT	07.07.83 ○	UG ○
○GOVERNMENT OF LESOTHO ○MINISTRY OF INTERIOR CHIEFTAINSHIP AFFAIRS AND RURAL DEVELOP ○VILLAGE WATER SUPPLY SECTION	MS-33 ◓			

⊙GOVERNMENT OF LESOTHO
MINISTRY OF INTERIOR CHIEFTAINSHIP AFFAIRS AND RURAL DEVELOP.
VILLAGE WATER SUPPLY SECTION

⊖MATSIENG WATER SUPPLY

⊙INCLUDES THE FOLLOWING VILLAGES AS WELL:

⊙MAKOABATING	MS-64	HA RAMOJAPELA	
HA PAANYA		TLOKOENG	
HA RAMABELE	MS-97	MAHLOENYENG	
ST LOUIS MISSION		HA PETJE	
KHOLOKOE		HA MPHAFI	MS-34
HA MAFA	MS-32	HA SANTI	

⊙COORDINATES: 27° 35' EAST 29° 37' SOUTH
LOCATION : 5KM EAST OF MORIJA
MAP SHEET : 2927DA 1:50'000

⊕TECHNICAL OFFICE MASERU

ACTION	DATE	BY
SURVEY	23.JAN.78	A.HART.
DESIGN	02.OKT.80	T.HLAB.
DRAWN	31.JAN.81	T.SEPA.
CHECKED	05.MAR.81	A.HART.
AS BUILT	29.FEB.83	S.SCHI.

⊖SITE PLAN 1:5'000

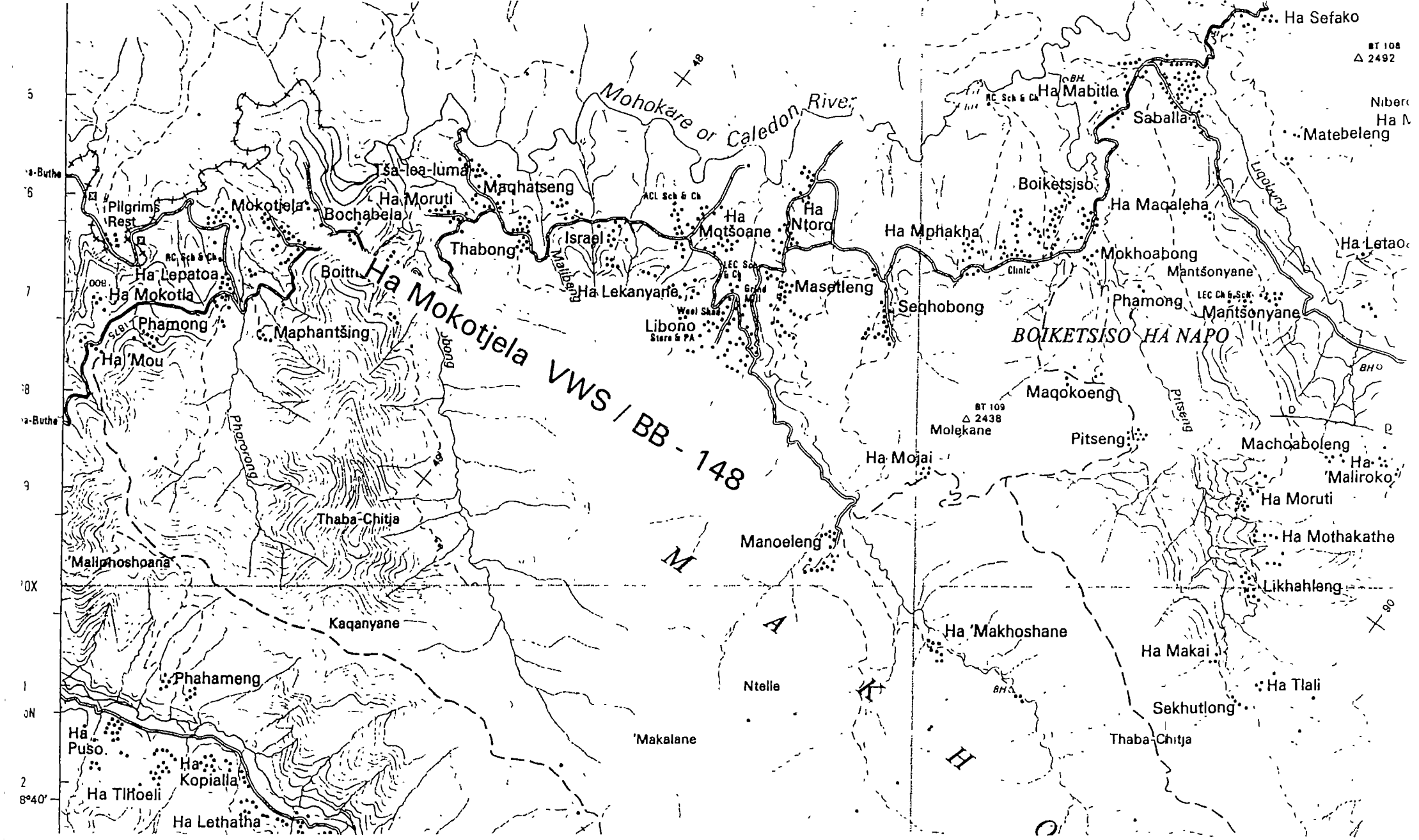
MS-33

LOAD GUIDELINES FOR TRUCKS

MATERIAL	WEIGHT PER UNIT	VERY BAD ROAD 4t TRUCK	POOR ROAD 4t TRUCK	GOOD ROAD 4t TRUCK	VERY BAD ROAD 8t TRUCK	POOR ROAD 8t TRUCK	GOOD ROAD 8t TRUCK	GOOD ROAD HIRE
		1½ t	2t	4t	6t	7t	8t	15t
CEMENT	50kg/BAG	30 BAGS	40 BAGS	80 BAGS	120 BAGS	140 BAGS	160 BAGS	300 BAGS
BRICKS	2,8kg/UNIT	535 BRICKS	700 BRICKS	1400 BRICKS	2140 BRICKS	2500 BRICKS	2850 BRICKS	5350 BRICKS
G.I.PIPE M.D. ø 65mm								
6.00 m	42.39 kg/Lg	35 Lengths	47 Lengths	95 Lengths	141 Lengths	164 Lengths	190 Lengths	354 Lengths
6.70 m	47.33 kg/Lg	31 lengths	42 Lengths	84 Lengths	126 Lengths	147 Lengths	169 Lengths	316 Lengths
G.I.PIPE M.D. ø 50mm								
6.00m	32.80kg/Lg	45 Lengths	61 Lengths	122 Lengths	183 Lengths	214 Lengths	244 Lengths	457 Lengths
6.70m	36.63kg/Lg	41 Lengths	54 Lengths	108 Lengths	163 Lengths	191 Lengths	218 Lengths	409 Lengths
G.I.PIPE M.D. ø 40mm								
6.00m	23.15kg/Lg	65 Lengths	86 Lengths	172 Lengths	259 Lengths	302 Lengths	344 Lengths	647 Lengths
6.70m	25.86kg/Lg	58 Lengths	77 Lengths	154 Lengths	232 Lengths	270 Lengths	309 Lengths	580 Lengths
G.I.PIPE M.D. ø 32mm								
6.00m	20.11kg/Lg	75 Lengths	99 Lengths	189 Lengths	298 Lengths	347 Lengths	397 Lengths	746 Lengths
6.70m	22.46kg/Lg	66 Lengths	89 Lengths	178 Lengths	267 Lengths	311 Lengths	356 Lengths	667 Lengths
G.I.PIPE M.D. ø 25mm								
6.00m	15.60kg/Lg	96 Lengths	128 Lengths	256 Lengths	384 Lengths	448 Lengths	512 Lengths	961 Lengths
6.70m	17.43kg/Lg	86 Lengths	115 Lengths	230 Lengths	344 Lengths	401 Lengths	458 Lengths	860 Lengths
G.I.PIPE M.D. ø 20mm								
6.00m	10.10kg/Lg	148 Lengths	198 Lengths	396 Lengths	594 Lengths	693 Lengths	792 Lengths	1485 Lengths
6.70m	11.27kg/Lg	133 Lengths	177 Lengths	354 Lengths	532 Lengths	621 Lengths	709 Lengths	1330 Lengths

M.D. = MEDIUM DUTY PIPE

Appendix 6



Ha Mokotjela VWS / BB - 148

LESOTHO MAP

Scale 1 : 50'000
Sheet 2828 DA

Appendix 7.

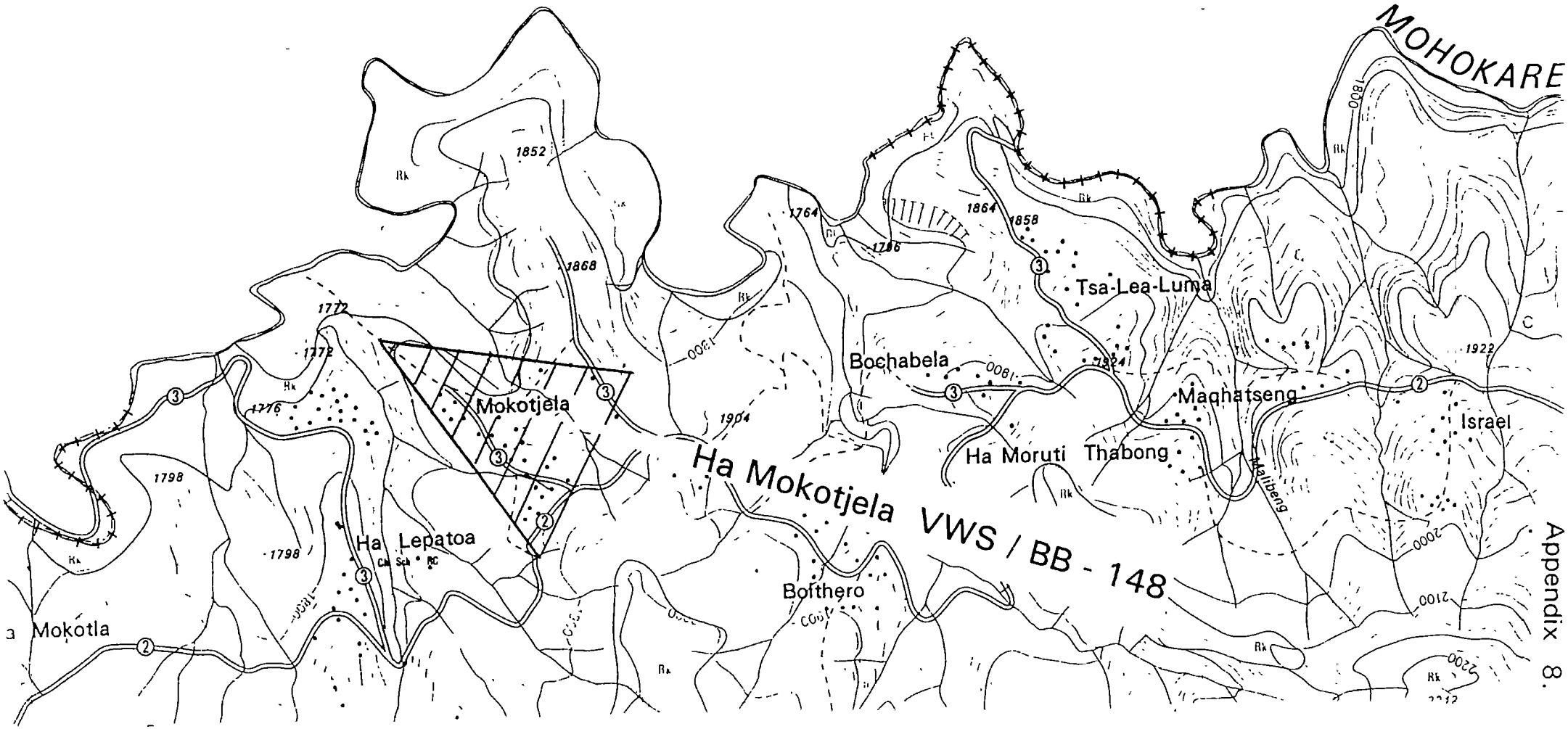
Ha Mokotjela VWS / BB - 148

Project Area

LESOTHO MAP

Scale 1 : 20'000

Sheet 2828 DA1



Appendix 8.

TECHNICAL REPORT

MOKOTJELA VWS BB-148

---

1. INTRODUCTION

Donor : UK IV

Co-ordinates : 28° 37' South
28° 31' East
1870m above sea level

Location : 31km East of Butha Buthe Town

Population : 350 people

2. SOURCES

Water requirement: (30l/pcd 350 people) = 10 500 l/day

Spring yield : Minimum Spring Yield = 9 500 l/day
: Maximum Spring Yield = 15 900 l/day

3. INITIAL CONTACT AND VILLAGE PREPARATION

A village water committee was elected in 1986. The committee forwarded an application for a water supply through the DRDO's office in 1987.
First spring yield measurements in September 1987.
Preliminary survey and second spring yield measurements March 1988.

The VWS liaison officer maintains regular contact with the village water committee and the villagers since January 1989.

4. DESIGN

The water gravitates from spring № 1 down to a washout in the donga and then up to tap № 1 at a high point to serve part of the village. From Tap № 1 the pipeline follows a straight line through a second donga and ends at Tank № 1 (storage volume 5000l.)

The pipeline from spring № 1 shares the same trench with Koloni pipeline (which is part of Ha Lepatoa water supply) for a distance of approximately 300m.

Tank № 1 serves the lower part of the village with 3 standpipes.

The upper part of the village is served from Tank № 2 (storage volume 2000l). Three taps are connected to the 500 m long distribution. The pipeline between spring № 2 and tank № 2 requires two washouts and an air release.

Spring № 3 and № 4 feed waterpoints of 500l storage capacity each.

Structures:

4 Spring Catchments	
2 Siltboxes v = 300l	Bricks
2 Donga Crossing	
1 Tank v = 5000l	Stone Masonry
1 Tank v = 2000l	Stone Masonry
2 Waterpoints V 500l **	Stone Masonry
1 Valve Chamber 45 X 60 cm	Bricks
7 standpipes **	Concrete

3000 m of steel pipes are required to construct the water supply.

** 40 Villagers to share one tap.

	Q design	Q max
Siltbox № 1 to tank № 1	0.07 l/s	0.1 l/s
Siltbox № 2 to tank № 2	0.03 l/s	0.1 l/s

5. CONSTRUCTION SCHEDULE

Skilled labour	1 foreman
	2 masons
Duration	5 month
Starting date	September 1989
Completion date	January/February 1990

6. COSTING

Summary of Form K 1 to K8

Pipes	=	M 9,621.12
Fittings	=	M 1,136.80
Building materials	=	M 3,550.40
Transport	=	M 1,284.00

Wages	=	M 6,500.00
Contingencies	=	M 2,207.68
Total		M24,300.00
Expected contribution of village labour		**M10,000.00**
Cost per capita excluding village labour		**M 69.43**

7. FINAL COMMENT

Although only 22 litres of water can be supplied during dry periods this will be a great improvement over the present situation.

Date: District Engineer:

Government of Lesotho, MICARD, Village Water Supply Section — FORM A

INITIAL VILLAGE INFORMATION

DISTRICT: _____

VILLAGE: _____ Ref. No: _____

Villages included: a) _____ b) _____ c) _____
d) _____ e) _____ f) _____

Where is the village located: _____

Coordinates: _____ East _____ South

1) INFORMATION ABOUT POPULATION

Village	Yes	☐	No	☐	Residents _____
Primary School	Yes	☐	No	☐	Pupils _____
Secondary School	Yes	☐	No	☐	Pupils _____
High School	Yes	☐	No	☐	Students _____
Boarding School	Yes	☐	No	☐	Students _____
Clinic	Yes	☐	No	☐	Beds/Staff _____
Mission	Yes	☐	No	☐	Sisters + staff _____
Police station	Yes	☐	No	☐	Permanent staff _____
Court	Yes	☐	No	☐	Permanent staff _____

Total Population = _____

2) INFORMATION ABOUT SOURCE

Source presently used:	☐ Spring (No)	☐ Borehole (No)	☐ Dam, River
Location of source:	☐ Above village	☐ Below village	☐ In village
Distance to source:	☐ 0-100 m	☐ 100-1000m	☐ More than 1km
Is the source polluted:		☐ Yes	☐ No
Is the source subject to drought:		☐ Yes	☐ No
Are there other SPRINGS which could be used:		☐ Yes	☐ No
Distance to these springs:	☐ 0-100	☐ 100-1000m	☐ More than 1km

3) GENERAL INFORMATION

Accessibility by road:	☐ Good	☐ Bad	☐ Not accessible
Committees existing:	☐ VWC	☐ VDC	☐ None
Application to DRDO:	☐ Yes	☐ No	Year _____
Funds collected:	☐ Yes	☐ No	Amount _____
Existing supply:	☐ Yes	☐ No	
Type:	☐ Gravity	☐ Pump	☐ Handpump

Remarks: _____

_____

_____

_____

Compiled By: _____ Designation: _____

Place: _____ Date: _____ Signature: _____

Government of Lesotho, MICARD, Village Water Supply Section FORM B

PRELIMINARY SURVEY

Location: ° 'E ° 'S

Extract: Map no Scale

Project: _____ Ref. no: _____

Villages: _____

Institutions:

Population:	Village Contribution: M
Chief:	Application:
☐VDC Chairman: ☐VWC	Date: Survey By:

Key to attached copy of map

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

(11)

(12)

(13)

(14)

SPRING YIELDS

PROJECT : _____

REF.NO. : _____

SOURCE : ☐ SPRING ☐ BOREHOLE

☐ GRAVITY ☐ HANDPUMP
☐ HYDRAM ☐ D/E PUMP
☐ SOLAR ☐ _____

DATE	SOURCE NO.								
	1		2		3		4		TOTAL
	s/l	l/s	s/l	l/s	s/l	l/s	s/l	l/s	
Min yield l/min									
Max. yield l/min									
Min yield per day m^3									
Max yield per day m^3									
Coliform analysis									

POPULATION TO BE SERVED : _____ people

WATER REQUIRED: _____ m^3/day

WATER AVAILABLE: _____ m^3/day

_____ l/cd

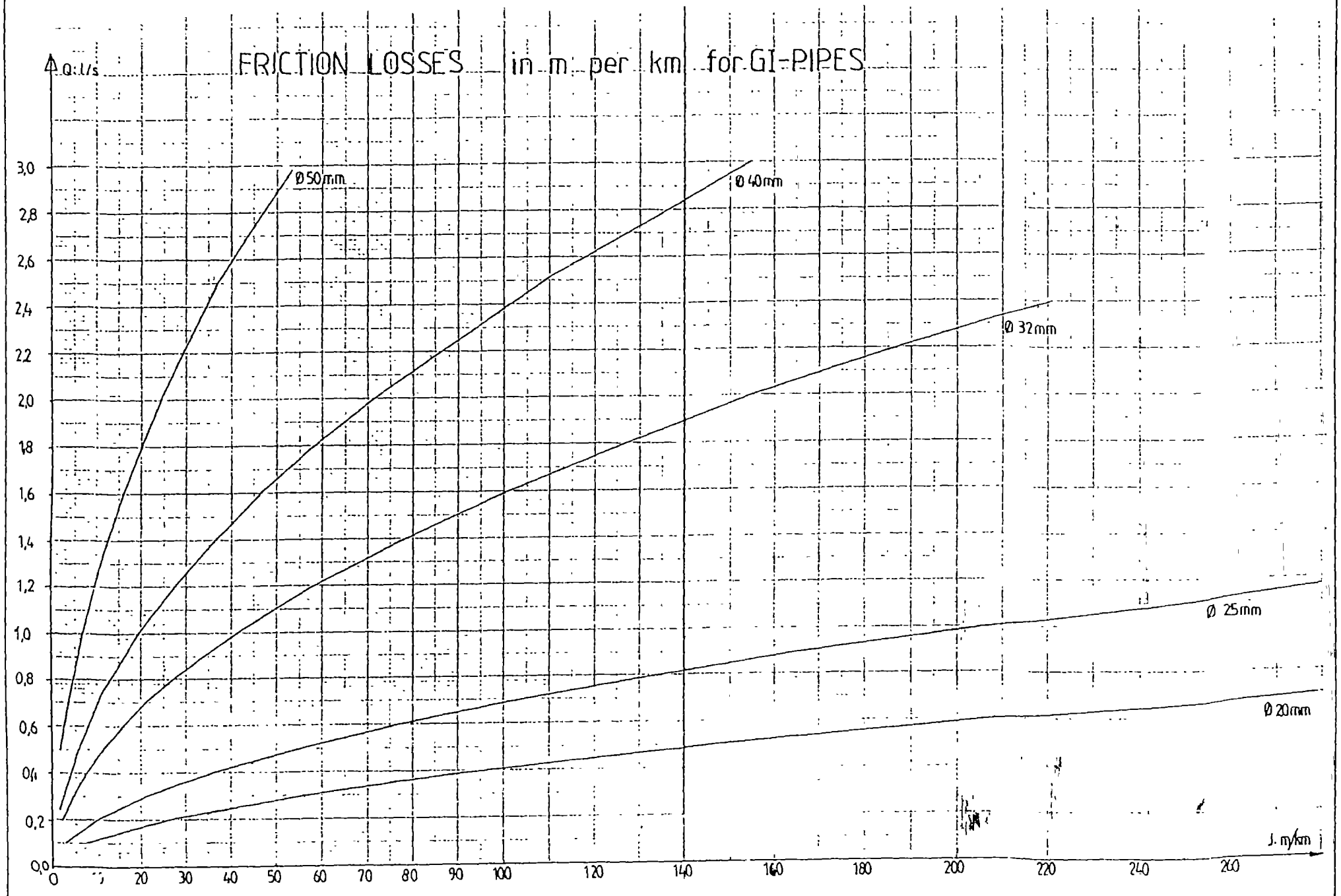
Government of Lesotho, MICARD, Village Water Supply Section FORM E

LOCATION : ______________________ REF. NO: ____________

DATE : ______________ SURVEYOR : ____________ ☐ TICK RIGHT

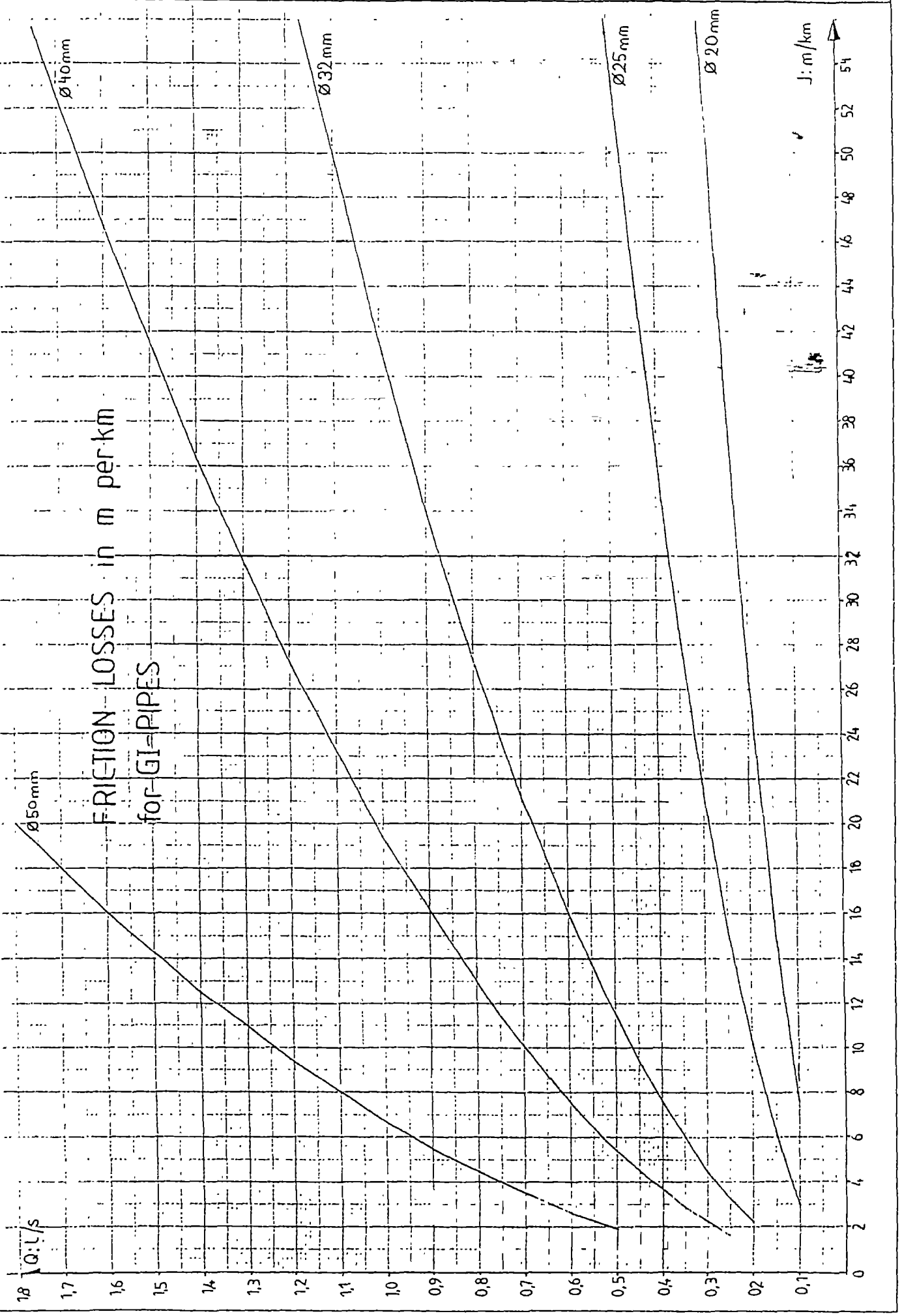
FROM TO	ANGLES		DISTANCE	HORIZONTAL DISTANCE l red	VERTICAL DISTANCE Δh_v	RED LEVEL	
	Horizonal ☐ 90° ☐ 100ᵍ	Vertical ☐ 90° ☐ 100ᵍ				PT	LEVEL

Government of Lesotho, MICARD, Village Water Supply Section						FORM F
WATERFLOW		FRICTION IN MM/M				
No of Taps	Flow l/s	20 mm	25 mm	32 mm	40 mm	50 mm
1	0.20	26.6	10.2			
2	0.40	96.5	36.4	7.6		
3	0.50		55.3	11.5	5.4	
4	0.60			16.0	7.8	
5	0.70			21.3	10.2	3.5
6	0.80			27.3	13.4	4.5
7	0.90			34.0	16.5	5.5
8	1.00			41.5	19.3	6.7
9	1.10				23.2	8.0
10	1.20				27.1	9.4
11	1.25				29.4	10.2
12	1.30				31.7	10.9
13	1.35				34.0	11.7
14	1.40				36.3	12.5
15	1.45					13.4
16	1.50					14.3
17	1.55					15.1
18	1.60					16.0
19	1.65					17.0
20	1.70					18.0



Government of Lesotho, MICARD, Village Water Supply Section

FORM G


FRICTION-LOSSES in m per km
for GI-PIPES
Ø 50 mm
Ø 40 mm
Ø 32 mm
Ø 25 mm
Ø 20 mm
Q: l/s
J: m/km

Government of Lesotho, MICARD, Village Water Supply Section FORM H

TECHNICAL OFFICE

HYDRAULIC CALCULATION

ACTION	DATE	BY
SURVEY		
DESIGN		
CHECKED		

GOVERNMENT OF LESOTHO
MINISTRY OF INTERIOR CHIEFTAINSHIP AFFAIRS
AND RURAL DEVELOPMENT
VILLAGE WATER SUPPLY SECTION

VILLAGE (No/Name) :

COORDINATES :

LOCATION :

PIPELINE:

FROM	TO

SCALE VERTICAL	1:	00
SCALE HORIZONTAL	1:	'000
1)	POINT NUMBER	
2)	DISTANCE BETWEEN POINTS	m
3)	REDUCED LEVEL	m
4)	STATIC PRESSURE HEAD	m
5)	FLOW RATE	l/s
6)	PIPE SIZE AND TYPE	
7)	FRICTION LOSS	m/km, mm/m
8)	FRICTION HEAD	m
9)	FRICTION CHAINAGE	m
10)	DYNAMIC PRESSURE HEAD	m

Government of Lesotho, MICARD, Village Water Supply Section FORM I1

MATERIAL REQUIREMENTS

NAME OF VILLAGE: REF. NO.

1. PIPES

1.1 GI - PIPES

SECTION	80mm	65mm	50mm	40mm	32mm	25mm	20mm
TOTAL							

1.2 PE - PIPES

SECTION	80mm	65mm	50mm	40mm	32mm	25mm	20mm
TOTAL							

2. FITTINGS

2.1 BRASS - FITTINGS

ITEM	80mm	65mm	50mm	40mm	32mm	25mm	20mm
Bibcock							
Gatevalve							
Globevalve							
Non return V.							
Air release V.							
Float valve							

2.2 GI - FITTINGS

ITEM	80mm	65mm	50mm	40mm	32mm	25mm	20mm
Socket							
Nipple							
Union flat face							
Union conic							
Red. socket							
Elbow F/F 90°							
Elbow M/F 90°							
Bend M/F 45°							
Red. bush							
Tee equal F/F 90°							
Plug solid							

3. BUILDING MATERIAL

	TOTAL
STANDARD PLAN NO	
STRUCTURE	
NO OF STRUCTURES	
CEMENT BAGS	
BRICKS PCS	
SHAPED STONES M3	
CRUSHED STONES M3	
SAND M3	
MESH REF 100 M2	
RODS ø 6MM M1	
RODS ø 8MM M1	
C.I.MH COVER PCS	
GABION (WOVEN) 2X1X1m	
GABION (WOVEN) 2X1X0,5m	
BARBED WIRE	
POLES	

Government of Lesotho, MICARD, Village Water Supply Section — FORM K1

BILL OF QUANTITIES AND COSTING/ACTUAL COST

VILLAGE: REF.NO: DATE:

1. PIPES

1.1 GI-PIPES

	ESTIMATE			ACTUAL				
SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
80 mm								
65 mm								
50 mm								
40 mm								
32 mm								
25 mm								
20 mm								
TOTAL GALVANIZED STEEL PIPES								

1.2 PE - PIPES

	ESTIMATE			ACTUAL				
SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
80 mm								
65 mm								
50 mm								
40 mm								
32 mm								
25 mm								
20 mm								
TOTAL POLYETHYLENE PIPES								

TOTAL PIPES	

Government of Lesotho, MICARD, Village Water Supply Section — FORM K2

BILL OF QUANTITIES AND COSTING REF. NO:

2. FITTINGS
2.1 BRASS FITTINGS

		ESTIMATE			ACTUAL				
ITEM	SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
BIB-COCKS	20mm								
GATEVALVE	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
GLOBE VALVE	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
NON RETURN V.	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
AIR RELEASE V.	40mm								
	25mm								
FLOAT VALVE	40mm								
	25mm								
	20mm								
TOTAL BRASS FITTINGS									

Government of Lesotho, MICARD, Village Water Supply Section FORM K3

BILL OF QUANTITIES AND COSTING REF. NO:

2. FITTINGS
2.1 GI FITTINGS

		ESTIMATE			ACTUAL				
ITEM	SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
SOCKET	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
NIPPLE	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
UNION FLAT FACE	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
UNION CONIC	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
REDUCING SOCKET									

Government of Lesotho, MICARD, Village Water Supply Section — FORM K4

BILL OF QUANTITIES AND COSTING

REF. NO:

		ESTIMATE			ACTUAL				
ITEM	SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
ELBOW F/F 90°	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
ELBOW M/F 90°	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
BEND M/F 45°	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
REDUCING BUSH	80/65								
	80/50								
	65/40								
	50/40								
	50/32								
	50/25								
	50/20								
	40/32								
	40/25								
	40/20								
	32/25								
	32/20								
	25/20								

Government of Lesotho, MICARD, Village Water Supply Section — FORM K5

BILL OF QUANTITIES AND COSTING REF. NO:

		ESTIMATE			ACTUAL				
ITEM	SIZE	QUANTITY UNIT	UNIT COST	ESTIMATED COST	DELIVERED TO SITE	RETURNED TO STORE	USED	UNIT COST	ACTUAL COST
TEE EQUAL F/F 90°	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
PLUG SOLID	80mm								
	65mm								
	50mm								
	40mm								
	32mm								
	25mm								
	20mm								
TOTAL GALVANIZED FITTINGS									
TOTAL FITTINGS									

Government of Lesotho, MICARD, Village Water Supply Section FORM K6

BILL OF QUANTITIES AND COSTING REF: NO:

3. BUILDING MATERIAL

	ESTIMATE			ACTUAL				
ITEM/SIZE	QUANT UNIT	UNIT COST	ESTIM. COST	DELIV. TO SITE	RETURN TO STORE	USED	UNIT COST	ACTUAL COST
Cement								
Bricks								
		--	--		--			--
Crushed stones								
Local sand		--	--		--		--	--
Mesh Ref. 100								
Rod 0 8 mm								
Rod 0 10 mm								
Man hole cover c.i.								
Ladder ALU/IRON								
Chawl Door								
Drain mesh 8.8 cm								
Wire ø 2 mm								
Nails (50/75/100mm)								
Gabion 2x1x1m								
Gabion 2x1x0,5m								
Nails f. roof + washers								
Dicing oil								
Thread sealing tape								
Slab formwork 200x100 cm								
SAP 9".2" (23x5cm)								
SAP 6".1" (15x2,5cm)								
SAP 2,5".1,5" (6,5x3,5cm)								
Petrol f. Jackh. + vibrator								
Two stroke oil f. Jackhammer								
Chisel f. Jackhammer								
Water Minder Tools Box								
Soil protection eg trees/bushes								
Roofing sheets Size:								
Barbed Wire								
Wooden Creosoled Poles								
Dropper								
Standards								

BILL OF QUANTITIES AND COSTING REF. NO:

4. TRANSPORT

	ESTIMATE				ACTUAL			
	TONS	RATE/ TRIP	NO/ TRIP	ESTIM. COST	TONS	RATE/ TRIP	NO/ TRIP	ACTUAL COST
TRANSPORT TO SITE								
LOCAL TRANSPORT								
TOTAL TRANSPORT								

5. SKILLED LABOUR

	ESTIMATE			ACTUAL		
	MAN DAYS	DAILY RATE	ESTIMATED COST	MAN DAYS	DAILY RATE	ACTUAL COST
FOREMAN						
MASONS						
TOTAL SKILLED LABOUR						

6. VILLAGE LABOUR

	ESTIMATE			ACTUAL		
	MAN* DAYS	DAILY RATE	ESTIMATED COST	MAN DAYS	DAILY RATE	ACTUAL COST
VILLAGE LABOUR						
TOTAL VILLAGE LABOUR						

* 10% OF POPULATION X CONSTRUCTION PERIOD

Government of Lesotho, MICARD, Village Water Supply Section — FORM K8

BILL OF QUANTITIES AND COSTING REF. NO:

COMPILATION

	ESTIMATE INCL. VILLAGE LABOUR	ESTIMATE EXCL. VILLAGE LABOUR	ACTUAL INCL. VILLAGE LABOUR	ACTUAL EXCL. VILLAGE LABOUR
1. Pipes				
2. Fittings				
3. Building material				
4. Transport				
5. Skilled labour				
6. Village labour				
Cost:				
Contingencies (10 - 15%)				
Total Cost:				
Cost per capita (Population =.....)				

Name: .....

Designation: .....

Signature: ..... Date: .....

BILL OF QUANTITIES AND COSTING FOR HANDPUMPS

Project : ..... Ref. No. .....

Population : ..... Donor .....

No. of Handpumps : ..... Type .....

	ESTIMATE			ACTUAL		
ITEM	QUANTITY UNIT	UNIT COST	ESTIMATED COST	QUANTITY UNIT	UNIT COST	ACTUAL COST
DRILLING HANDPUMPS PLATFORM CONSTRUCTION						
TOTAL COST						
COST PER CAPITA						

COMMENTS:

Compiled by: Name : .....

Designation : .....

Date : .....

Signature : .....

Government of Lesotho, MICARD, Village Water Supply Section FORM L1

BREAK-DOWN REPORT FORM VILLAGE WATER SUPPLY

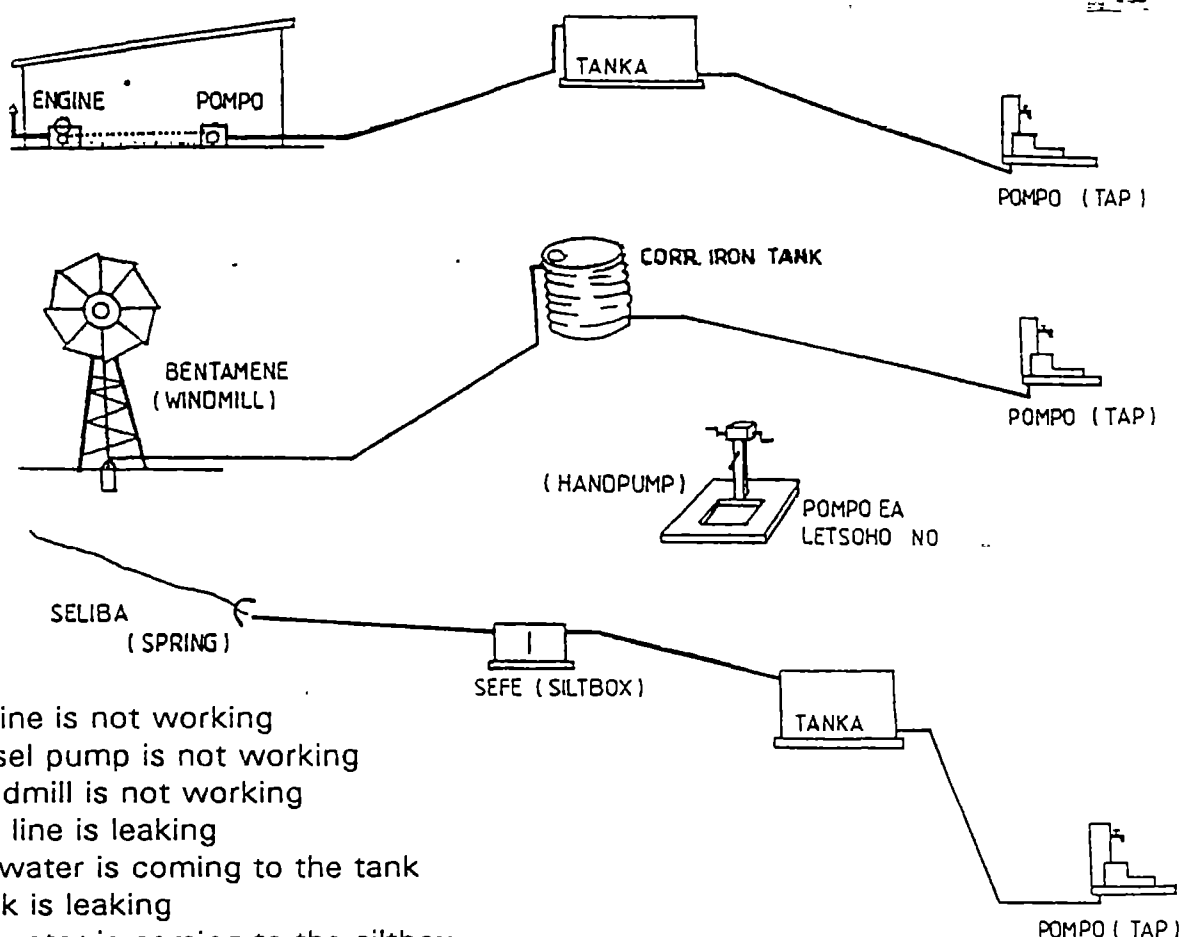
VILLAGE: ..... REF. NO: .....

DISTRICT: ..... CHIEF: .....

WATERMINDER: ..... CHAIR PERSON VWC: .....

DATE: .....

Place circle around trouble spot and indicate with a cross the corresponding break-down below:



- ☐ Engine is not working
- ☐ Diesel pump is not working
- ☐ Windmill is not working
- ☐ The line is leaking
- ☐ No water is coming to the tank
- ☐ Tank is leaking
- ☐ No water is coming to the siltbox
- ☐ No water is coming to the tap
- ☐ Handpump is not working

Any other remarks:.....

.....

.....

This form will be sent to: Village Water Supply
Maintenance Section
P.O. Box .....
.....

TLALEHO EA HO SE SEBETSE HOA PHEPELO EA METSI

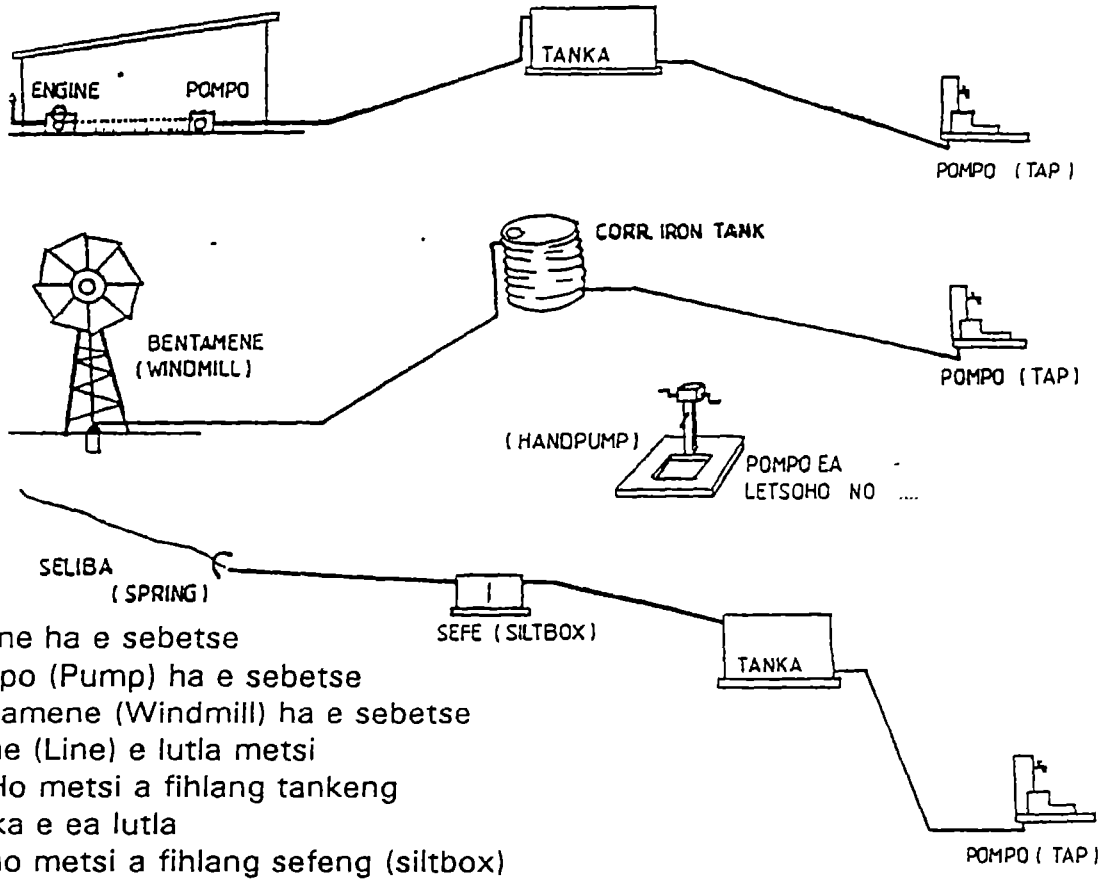
MOTSE: ..... NOMORO: .....

SETEREKE: ..... RAMOTSE: .....

LEBITSO LA MOLISA: ..... MOLULA - SETULO: .....

LETSATSI: .....

Ngola lesakana sebakeng seo khathatso e leng hona teng o be o bontse ka sekere lesakaneng le amanang le khathatso ka tlase.



- ☐ Engine ha e sebetse
- ☐ Pompo (Pump) ha e sebetse
- ☐ Bentamene (Windmill) ha e sebetse
- ☐ Laene (Line) e lutla metsi
- ☐ Ha Ho metsi a fihlang tankeng
- ☐ Tanka e ea lutla
- ☐ Ha ho metsi a fihlang sefeng (siltbox)
- ☐ Ha ho metsi a fihlang pompong (tap)
- ☐ Pompo ea letsoho ha e sebetse

Hlalosa tse ling:.....

.....

.....

Foromo ena e khutlisetsoe Maseru atereseng ena:-

Village Water Supply
Maintenance Section
P.O. Box .....
.....

Government of Lesotho, MICARD, Village Water Supply Section FORM M1

MONTHLY CONSTRUCTION REPORT

Page ...

Gravity |___|
Drilling |___|
HP Installation |___|

Month/Year :_____

Region/District :_____

1. CONSTRUCTION ACTIVITIES

Project	Ref. No.	Donor	Pop.	Progress % Start Date Compl. Date	Remarks

2. TRANSFERS

Name	Date	From	To	Remarks

3. PROJECTS INITIATED THIS MONTH

Project	Ref. No.	Donor	Pop.	Remarks

Prepared by DE:_____ Checked by RE: _____

Date: _____ Date: _____

Distribution: RE

Government of Lesotho, MICARD, Village Water Supply Section FORM M2

MONTHLY MAINTENANCE REPORT

Gravity |___|
Borehole |___|
HP |___|

Month/Year :_____

Region/District :_____

1. MAINTENANCE ACTIVITIES

Project	Ref. No.	HP No.	Progress % Start Date Compl. Date	Remarks (Rehabilitation/ Exlusions etc)

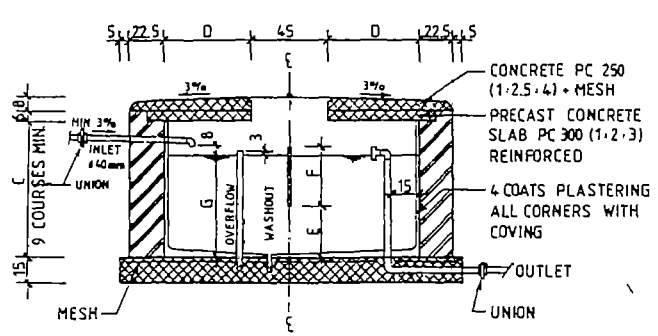
2. PROJECTS INITIATED THIS MONTH

Project	Ref. No.	HP No.	Remarks

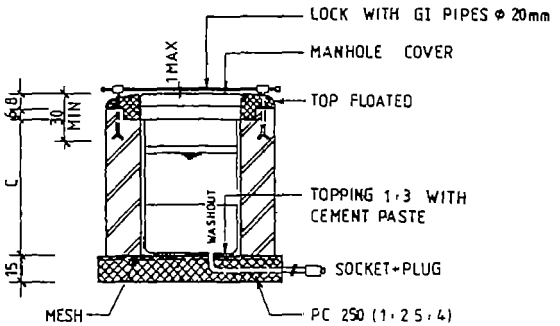
Prepared by DE:_____ Checked by RE: _____

Date: _____ Date: _____

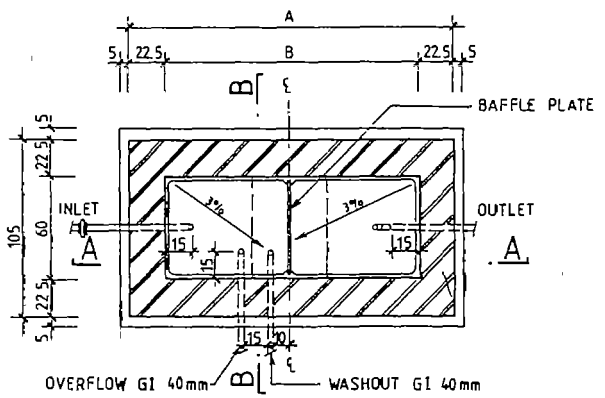
Distribution: RE



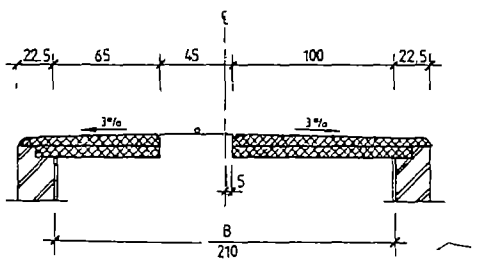
SECTION A-A



SECTION B-B



PLAN



DETAIL TOP OF SILTBOX V= 1000 lt

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

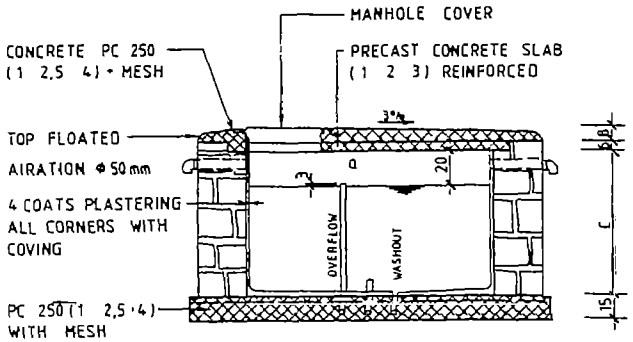
MEASUREMENTS VOLUME lt		300	500	750	1000
A		151	197	208	255
B		106	152	163	210
C		79		104	104
D		30,5		59	
E		20		30	30
F		35	35	52,5	52,5
G		50	60	77,5	77,5
FITTINGS					
PIPE Φ 40mm	M1	4	4	4	4
PIPE Φ 25mm	M1	1	1	1	1
PIPE Φ 20mm	M1	1	1	1	1
SOCKETS Φ 40mm	PCS	1	1	1	1
SOCKETS Φ 20mm	PCS	2	2	2	2
UNION FLAT FACE Φ 40mm	PCS	1	1	1	1
UNION FLAT FACE Φ	PCS	1	1	1	1
ELBOWS 90° Φ 40mm	PCS	4	4	4	4
ELBOWS 90° Φ	PCS	2	2	2	2
TEE EQUAL Φ	PCS	1	1	1	1
TEE EQUAL Φ 25mm	PCS	2	2	2	2
PLUG SOLID Φ 40mm	PCS	1	1	1	1
MATERIALS					
CEMENT	BAGS	8	13	15	17
BRICKS	PCS	350	470	600	700
(SHAPED STONES)	M3				
CRUSHED STONES	M3	0,5	0,7	0,8	1,0
SAND	M3	0,6	1,0	1,5	1,7
MESH REF 100	M2	5,0	8,0	8,0	9,0
RODS Φ 8mm	M1	5,0	5,0	8,0	14,0
C I MANHOLE COVER	PCS	1	1	1	1
(ASBESTOS SHEETS)	M1	1,2	1,2	1,8	1,8
SAP 15 x 2,5cm	M1	6,0	7,0	7,0	8,0
SLABFORMWORK	PCS				
SIDEFORMWORK	PCS				

	ACTION	DATE	BY
TECHNICAL OFFICE MASERU	DESIGN	SEPT 83	H PF
	DRAWN	NOV 86	BUK
SILTBOX IN BRICKWORK	APPROV	NOV 86	J M
	SCALE	1 20	
	REV	NOV 86	J M
GOVERNMENT OF LESOTHO VILLAGE WATER SUPPLY SECTION	B-01		

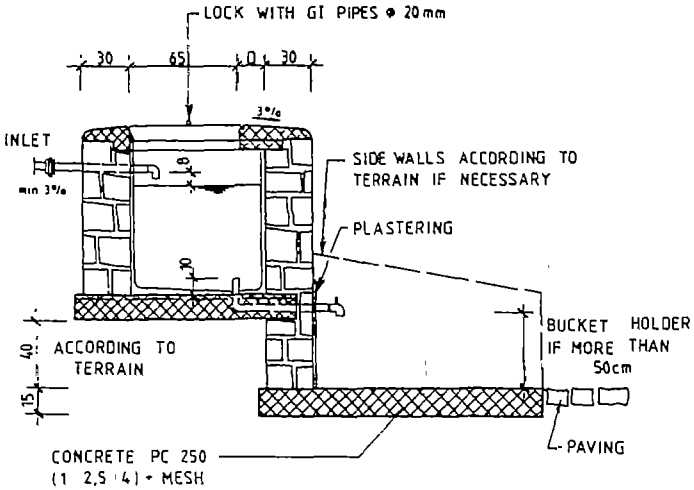
BUILDING MATERIAL REF NO

FORM F3

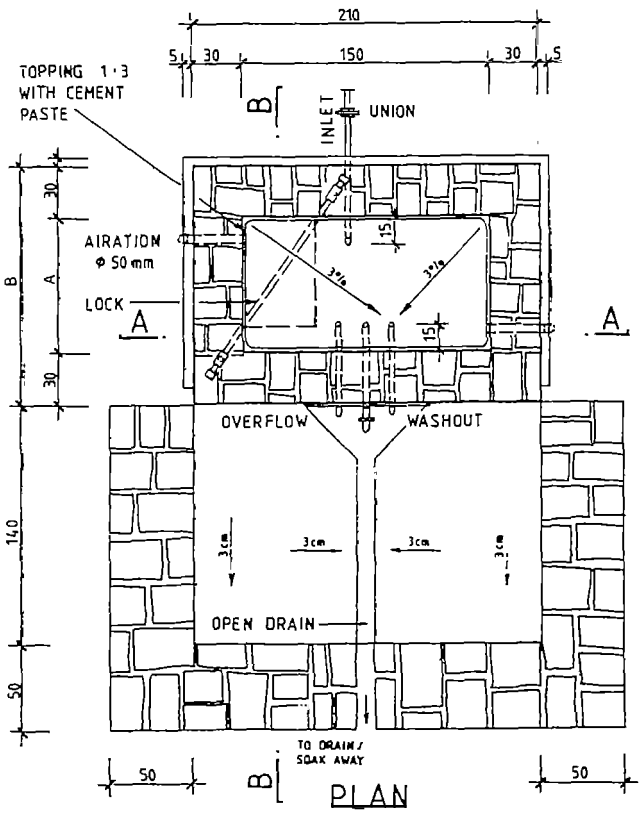
STO PLAN NO	STRUCTURE	NO OF STRUCTURES	CEMENT bags	BRICKS pcs	SHAPED STONES m³	CRUSHED STONES m³	SAND m³	MESH REF m²	RODS Ø 8mm m	CLAY COVER pcs		SOCKET 40mm	SOCKET 20mm	UNION F-F 40mm	UNION F-F 20mm	UNION F-F 50mm	ELBOWS 90° 40mm	ELBOWS 90° 20mm	ELBOWS 90° 50mm	ELBOWS 90° ?	TEE EQUAL 25	TEE EQUAL ?	PLUG SOLID 40mm	FLOAT VALVE 25/32/40	STRAINER	GATE VALVE 50mm	BIBCOK
SPRING CATCHMENT			6	-	1 0	0,5	0,5	2	-	-	-	-	-														
S-01	SILTBOX 300LT		10	-	1,5	0,5	1 0	6	6	1	6	1	2	1	-	-	4	-		2	2	1	1	-	-		-
"	" - 500 LT		13		2,0	0 7	1,5	9	6	1	7																
"	" 750LT		16	-	3,0	0,8	2,0	10	8	1	7																
"	" -1000LT		19	-	3,0	1 0	2,5	11	13	1	8																
B-01	" - 300LT		8	350	-	0 5	0,6	5	5	1	6	1	2	1	1		4	-	-	2	2	1	1	-	-		-
"	" - 500 LT		13	470	-	0 7	1 0	8	5	1	7																
"	" 750 LT		15	600	-	0 8	1,5	8	8	1	7																
"	" - 1000 LT		17	700	-	1 0	1,7	9	14	1	8																
S-11	SILTBOX-150 LT		8		1,0	0 3	0,8	2	-	1	6	1	2	1	1	-	4	-	-	2	2	1	1	-	-		-
"	COLL/PRBREAK		8		1 0	0,3	0,8	2		1	6																
"	DISTRIBUTION		5		0,5	0,3	0,5	2	-	1	6																
S-12	PBK + FLT V 300		10		1 5	0,5	1 0	6	6	1	6	1	2	1	1	-	3		-	1	2		1	1	1	-	-
"	PR BREAK 500 LT		13		2,0	0,7	1,5	9	6	1	7																
B-11	SILTBOX 150 LT		5	260		0,3	0,6	2		1	6	-	-	-	-		-	-	-	-	-		-		-		
"	COLL/PR BREA		5	260		0,3	0,6	2		1	6																
"	DISTRIBUTION		4	160		0,3	0 4	2		1	6																
B-12	PB-BV 300 LT		8	350		0,5	0,6	5	5	1	6	1	2	1	1	-	3	-	-	1	2	-	1	1	1	-	-
"	PB-BV 500 LT		13	450		0,7	1 0	8	5	1	7																
B-14	V CHAMB 45/60		2	115	-	0 2	0,2	1	5	1		-	2	-	-	-	-			1	2	-	-	-	-	-	-
15	" 60/95		2	145	-	0 2	0,2	1	8	1																	
S-20	TANK- 1m³		16	-	2,5	1,0	2,0	10	12	1	8	-	2	-	-	-	-		5	-	2	-	1	-	-	-	-
"	" - 2m³		21	-	3 0	1 5	3 0	16	25	1	10																
"	" - 3m³		25	-	4,0	1,5	3 5	15	22	1	10									1							
"	" - 4m³		28	-	4,5	1,5	3,5	17	26	1	11																
"	" - 5m³		35	-	5,0	2,5	4,5	28	32	1	12																
"	" - 7,5m³		46		7,5	3 5	6 0	38	46	1	14																
"	" - 10m³		55	-	8,5	4,0	7,0	40	62	1	17																
"	" - 15m³		67	-	11,0	5,0	8,5	62	78	1	19																
S-23	" - 20m³		140	-	24,0	7,5	20 0	100	120	1000R	24	-	-			2	-	-	13	-	-	-			-	3	-
"	" - 30m³		170	-	29,0	10,0	25 0	120	174	1000R	24																
B-20	" - 1m³		13	650	-	1,0	1,5	10	12	1	8	-	2	-	-	-	-	-	5	-	2	-	1	-	-	-	-
"	" - 2m³		20	850	-	1,5	2,5	16	25	1	10																
"	" - 3m³		23	1100	-	1,5	2,5	15	22	1	10																
"	" - 4m³		26	1250	-	2 0	3,0	17	26	1	11																
"	" - 5m³		40	2400	-	3 0	5,0	35	40	1	12																
"	" - 7,5m³		50	3000	-	3,5	6,0	45	60	1	14																
"	" - 10m³		60	3500	-	4,5	7,0	55	70	1	17																
"	" - 15m³		70	4500	-	5,0	9 0	65	92	1	19																
B-23	" - 20m³		130	8500	-	7,5	18,0	100	120	1000R	24	-	-	-	-		-	-	13	-	-	-		-	-	3	-
"	" - 30m		160	10000	-	8,0	20,0	120	174	1000R	24																
S-30	WP -300LT		14	-	2,0	0,7	1,5	8	5	1	6	-	2	1	-	-	5	1	-	-	2	-	1	-	-	-	1
"	" - 500LT		16	-	2 0	1,0	20	13	6	1	7																
"	" - 750LT		18	-	2,5	1,0	2,0	15	12	1	7																
"	" -1000LT		20	-	3,0	1,0	2,5	15	12	1	7																
"	" - 2000LT		25	-	3,0	1,5	3,0	19	24	1	10																
"	" - 3000LT		29	-	4,0	1,5	3,5	19	24	1	10																
B-30	" - 300LT		12	450	-	0,7	1 0	7	5	1	6	-	2	1	-	-	5	1	-	-	2	-	1	-	-	-	1
B 31	" - 500LT		15	550	-	0,8	1,5	8	51	1	"	-	2		1	-	4	1	2	1	2	-	1	-	-	-	1
"	" - 700LT		17	600	-	0 8	1,5	8	16	1	"																
"	" - 1000LT		18	750	-	1 0	1,5	12	16	1	8																
"	" - 2000LT		21	900		1,5	2,5	18	25	1	10																
"	" - 3000LT		23	1150	-	1,5	2,5	18	25	1	10																
S-31	WP - 500LT		16	-	2,0	1,0	2,0	13	6	1	7	-	2	-	1	-	4	1	2	1	2	-	1	-	-		1
"	" - 750LT		18	-	2,5	1,0	2,0	15	12	1	7																
"	" - 1000LT		20	-	3 0	1,0	2,5	15	12	1	7																
"	" - 2000LT		25	-	3 0	1,5	3,0	19	24	1	10																
"	" - 3000LT		29	-	4,0	1,5	3,5	19	24	1	10																
B-40	ST-PIPE HAND PUMP		5		-	4,0	2,5	-	-	-	-	-	2	-	1	-	-	2	-	-	-	-	-	-	-	-	-	1
B-50	PUMPHOUSE		40	3100	-	3 5	5 0	30	50	1000R	30	-	2	-	-	1	-	-	2		2	-	-				-
TOTAL																											



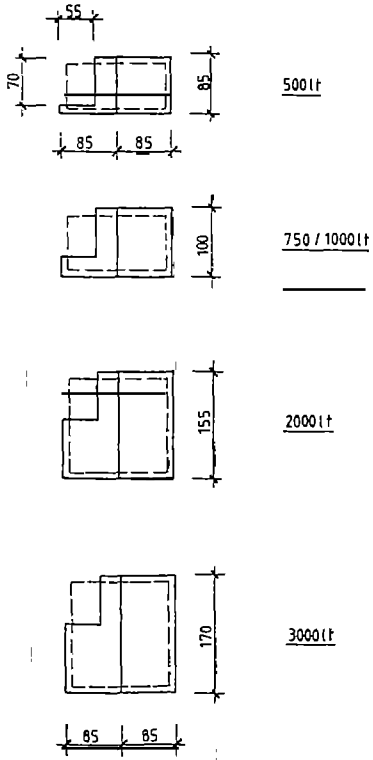
SECTION A-A



SECTION B-B



PLAN



PRECAST SLABS 1 50

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS	VOLUME lt		500	750	1000	2000	3000
A			65	80	80	135	150
B			125	140	140	195	210
C			80	85	105	120	155
D				15	15	70	85
FITTINGS							
PIPE Φ 50 mm		M1			1	1	1
PIPE Φ 40 mm		M1	4	4	4	4	4
PIPE Φ 25 mm	LOCK	M1	1	1	1	1	1
PIPE Φ 20 mm	LOCK	M1	1	1	1	1	1
BIBCOCKS		PCS	1	1	1	1	1
SOCKETS Φ 20mm	LOCK	PCS	2	2	2	2	2
UNION FLAT FACE Φ	INLET	PCS	1	1	1	1	1
ELBOWS 90° Φ 50 mm		PCS			2	2	2
ELBOWS 90° Φ 20 mm		PCS	1	1	1	1	1
ELBOWS 90° Φ 40 mm	W O / O F	PCS	4	4	4	4	4
ELBOWS 90° Φ	INLET	PCS	1	1	1	1	1
TEE EQUAL Φ 25 mm	LOCK	PCS	2	2	2	2	2
PLUG SOLID Φ 40 mm		PCS	1	1	1	1	1
MATERIALS							
CEMENT		BAGS	16	18	20	25	29
BRICKS		PCS					
SHAPED STONES		M3	2,0	2,5	3,0	3,0	4,0
CRUSHED STONES		M3	1,0	1,0	1,0	1,5	1,5
SAND		M3	2,0	2,0	2,5	3,0	3,5
MESH REF 100		M2	13,0	15,0	15,0	19,0	19,0
RODS Φ 8 mm		M1	6,0	12,0	12,0	24,0	24,0
C I MANHOLE COVER		PCS	1	1	1	1	1
SAP 15 x 2,5cm		M1	7,0	7,0	7,0	10,0	10,0
SLABFORMWORK		PCS					
SIDEFORMWORK		PCS					

TECHNICAL OFFICE MASERU

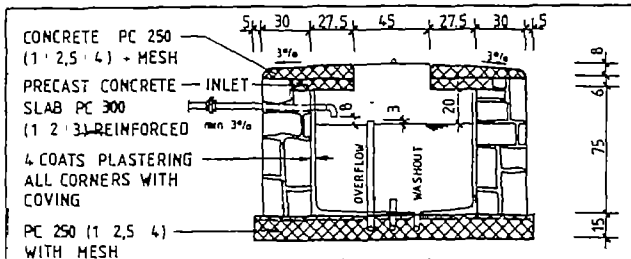
	ACTION	DATE	BY
	DESIGN	APR 84	H PF
	DRAWN	DEC 86	BUK
	APPROV	DEC 86	J M
	REV	DEC 86	J M
	SCALE	1 20	

WATERPOINT

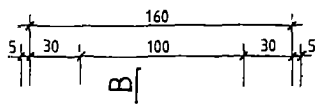
V = 500 / 750 / 1000 / 2000 / 3000 lt

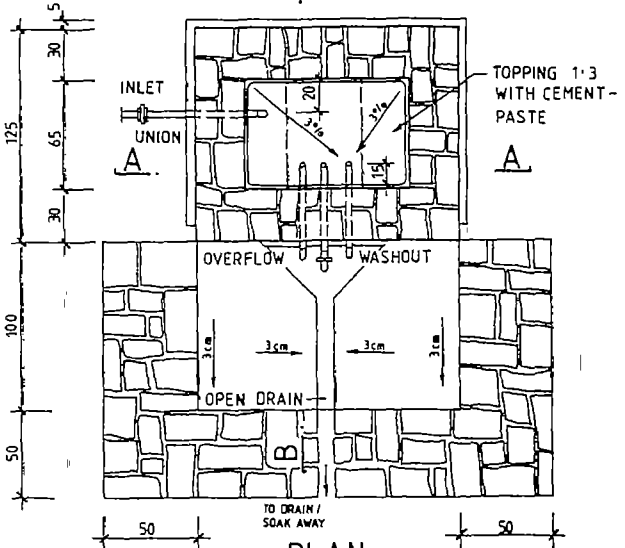
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

S - 31

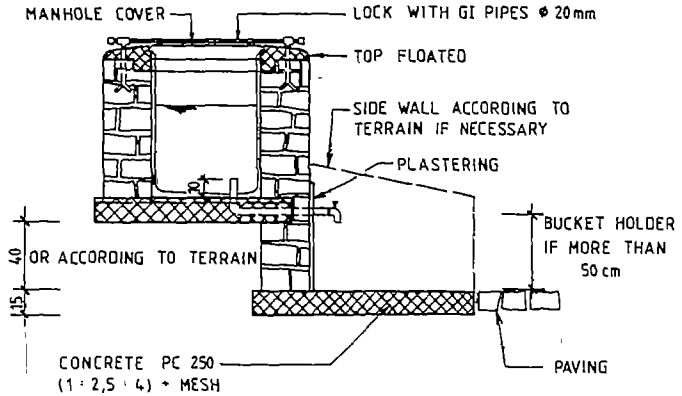


SECTION A-A





PLAN



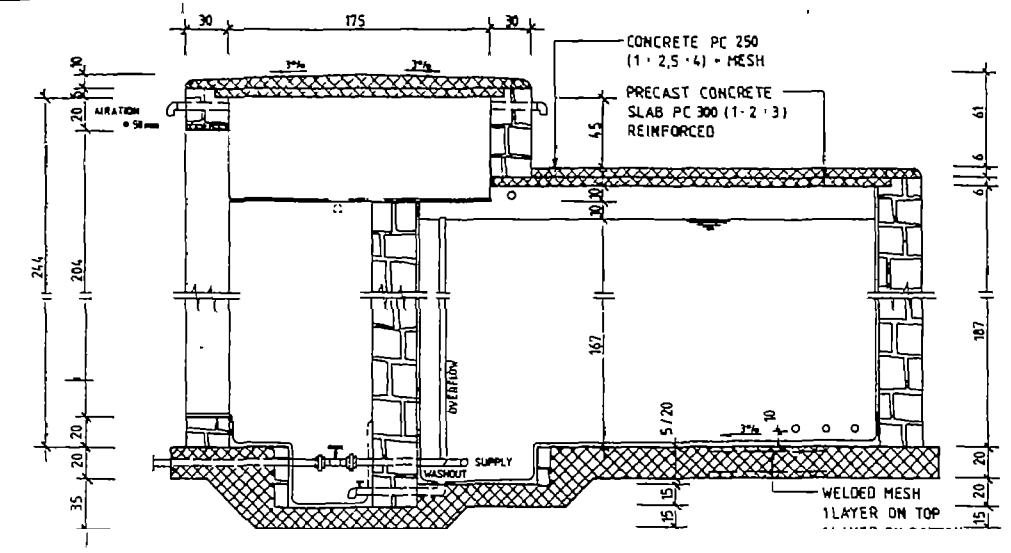
SECTION B-B

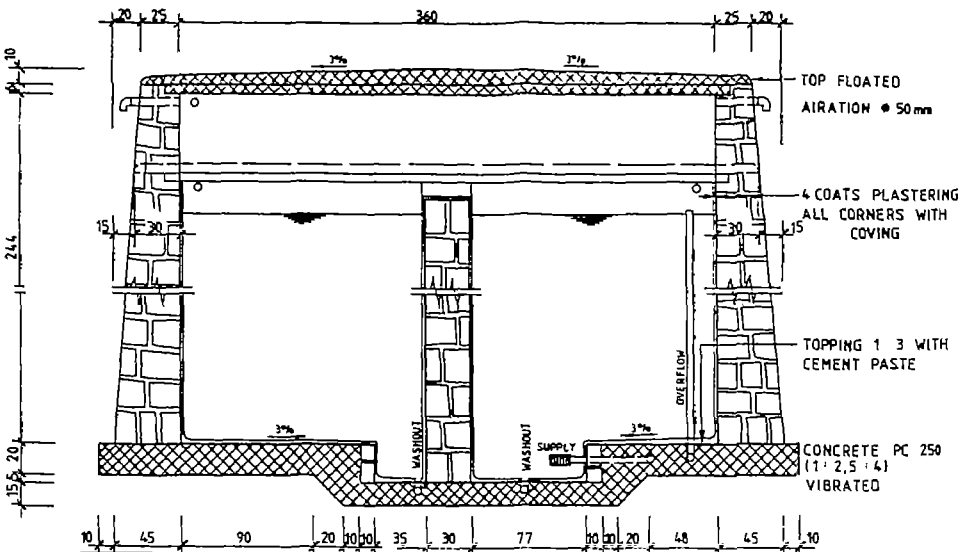
LOCK
LOCK
LOCK
LOCK

14
2,0
1,5
8,0
6,0

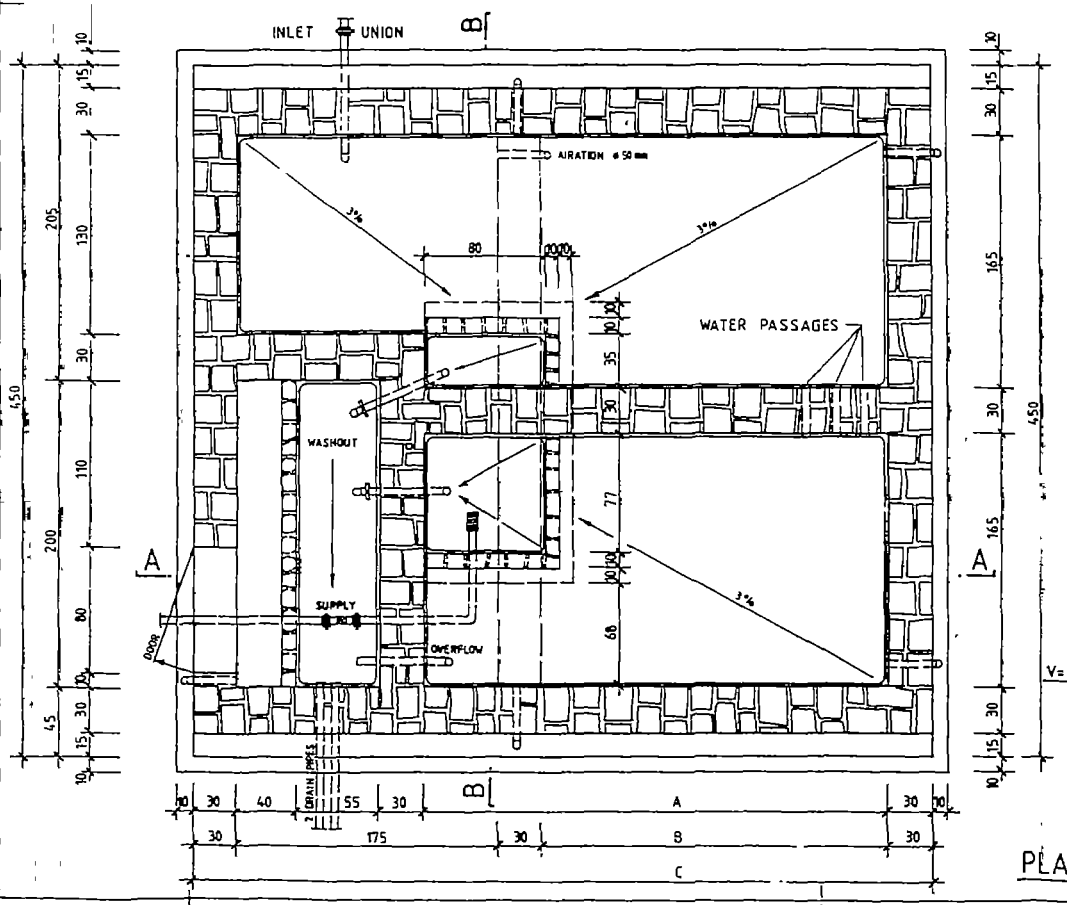
MEASUREMENTS IN CENTIMETRES ((cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

S-30

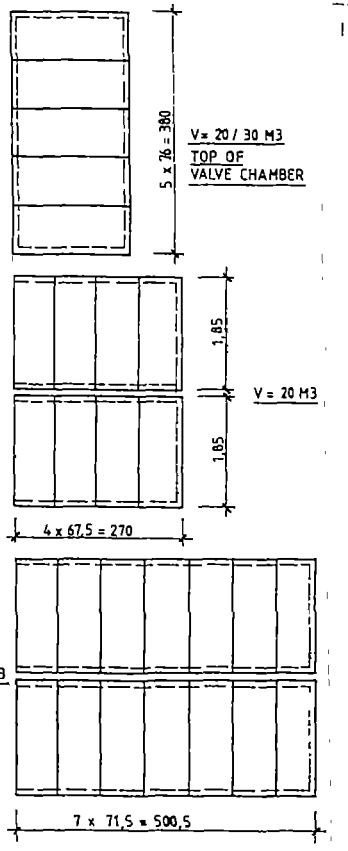




SECTION B-B



PLAN



PRECAST SLABS 1 : 50

MEASUREMENTS IN CENTIMETRES (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS		20 M3	30 M3
A		310	540
B		230	460
C		495	725
FITTINGS			
PIPE ⌀ 50 mm	M1	6	6
PIPE ⌀ (DRAIN)	M1		
GATE VALVE ⌀ 50 mm	PCS	3	3
UNION FLAT FACE	PCS	2	2
ELBOWS 90° ⌀ 50 mm	PCS	13	13
MATERIALS			
CEMENT	BAGS	140	170
BRICKS	PCS		
SHAPED STONES	M3	24	29
CRUSHED STONES	M3	7,5	10
SAND	M3	20	25
MESH REF 100	M2	100	120
RODS ⌀ 8 mm	M1	120	174
DOOR + FRAME STEEL	PCS	1	1
DRAIN MESH	PCS	2	2
SAP 23 x 5 cm	M1	24	24
SLABFORMWORK			
SIDEFORMWORK			

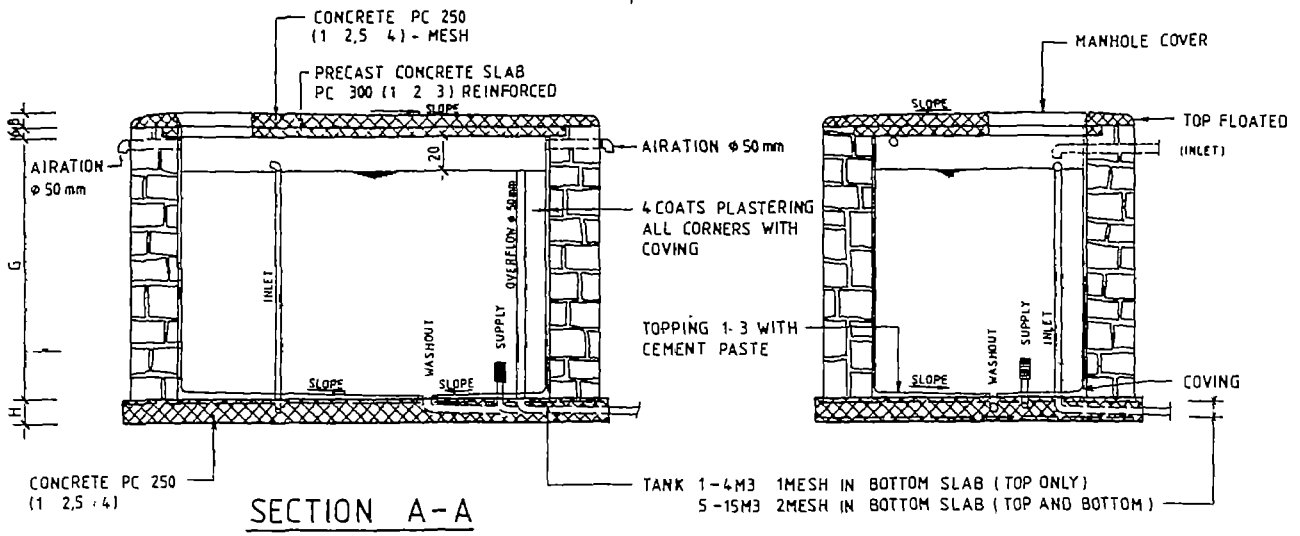
TECHNICAL OFFICE MASERU

STORAGE TANK
VOLUME 20 / 30 M3

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	APR 84	U BW
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	DEC 86	J M
SCALE	1 20	

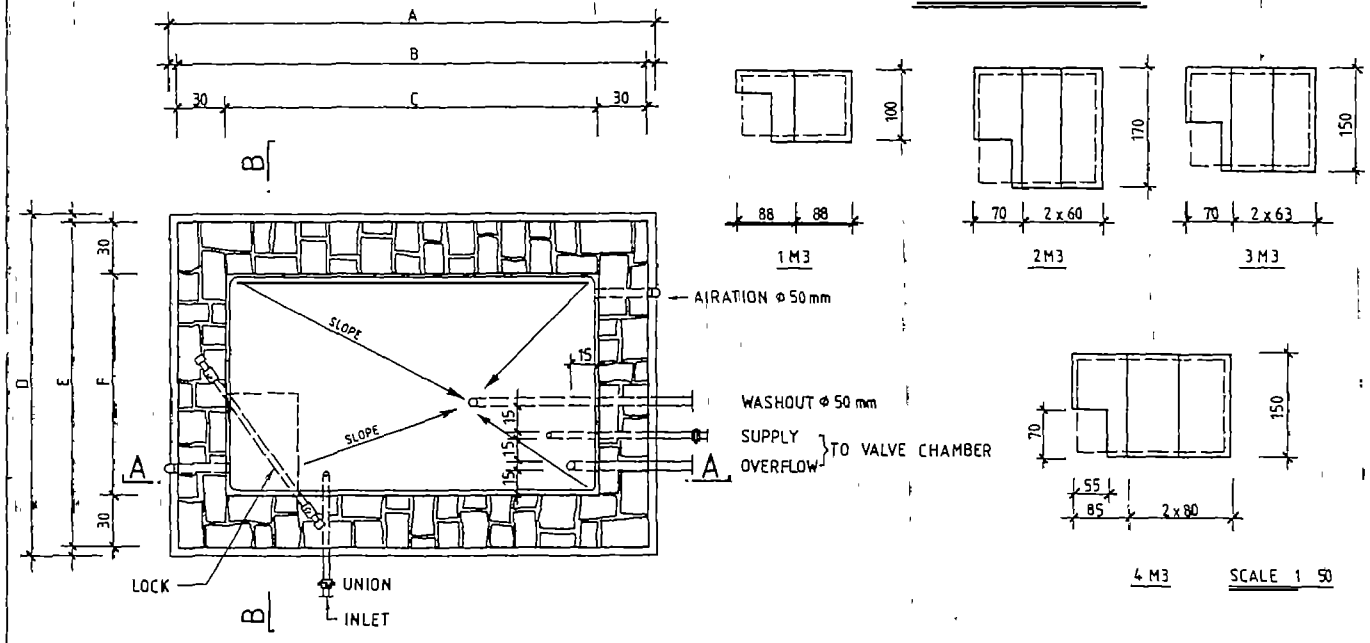
S - 23



SECTION A-A

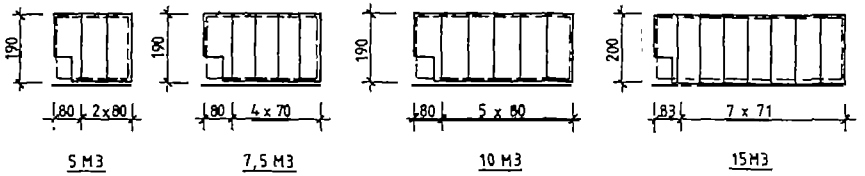
SECTION B-B

MEASUREMENTS IN CENTIMETRES (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER



SCALE 1 50

PLAN



PRECAST SLABS

SCALE 1 100

MEASUREMENTS	VOLUME M3	1	2	3	4	5	7,5	10	15
A		225	240	245	295	300	420	540	640
B		215	230	235	285	280	400	520	620
C		155	170	175	225	220	340	460	560
D		150	220	200	200	250	250	250	260
E		140	210	190	190	230	230	230	240
F		80	150	130	130	170	170	170	180
G		105	105	155	155	160	160	160	170
H		15	15	15	15	20	20	20	20
FITTINGS									
PIPE Φ 50 mm	M1	6	6	6	6	6	6	6	6
PIPE Φ 25 mm LOCK	M1	1	1	1	1	1	1	1	1
PIPE Φ 20 mm LOCK	M1	1	1	1	1	1	1	1	1
SOCKETS Φ 20 mm LOCK	PCS	2	2	2	2	2	2	2	2
UNION FLAT FACE Φ	PCS								
ELBOWS 90° Φ 50 mm	PCS	5	5	5	5	5	5	5	5
TEE EQUAL Φ 25 mm LOCK	PCS	2	2	2	2	2	2	2	2
PLUG SOLID Φ W O	PCS	1	1	1	1	1	1	1	1
MATERIALS									
CEMENT	BAGS	16	21	25	28	35	46	55	67
BRICKS	PCS								
SHAPHED STONES	M3	2,5	3,0	4,0	4,5	5,0	7,5	8,5	11,0
CRUSHED STONES	M3	1,0	1,5	1,5	1,5	2,5	3,5	4,0	5,0
SAND	M3	2,0	3,0	3,5	3,5	4,5	6,0	7,0	8,5
MESH REF 100	M2	10,0	16,0	15,0	17,0	28,0	38,0	40,0	62,0
RODS Φ 8 mm	M1	12,0	25,0	22,0	26,0	32,0	46,0	62,0	78,0
C I MANHOLE COVER	PCS	1	1	1	1	1	1	1	1
SAP 15 x 2,5 cm	M1	8,0	10,0	10,0	11,0				
SAP 23 x 5,0 cm	M1					12,0	14,0	17,0	19,0
SLABFORMWORK	PCS								
SIDEFORMWORK	PCS								

TECHNICAL OFFICE MASERU

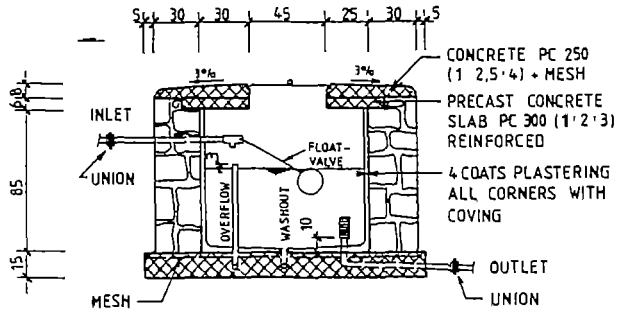
STORAGE TANK

VOLUME 1 - 15 M3

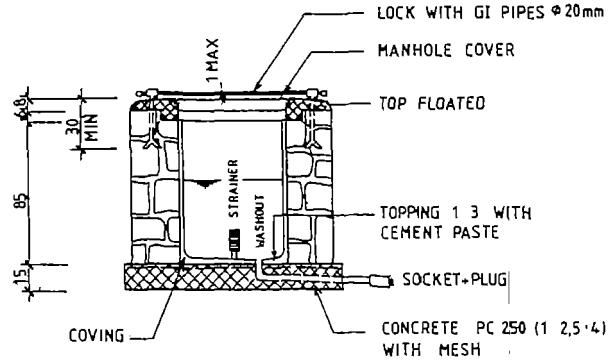
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	MAR 84	H PF
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	DEC 86	J M
SCALE	1 20	

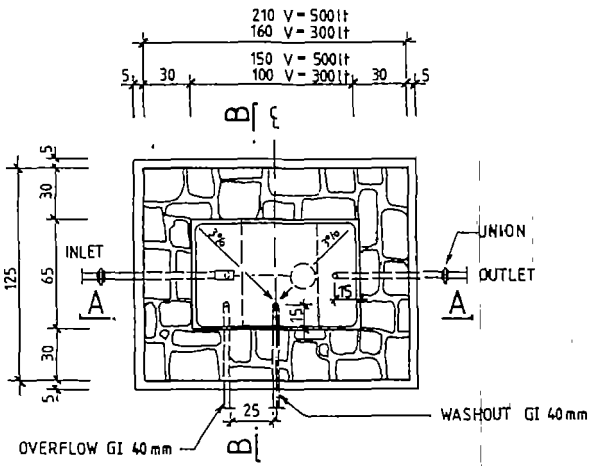
S - 20



SECTION A-A



SECTION B-B



PLAN

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS			
PIPE Φ 40mm	M1	4	
PIPE Φ 25mm	M1	1	LOCK
PIPE Φ 20 mm	M1	1,5	LOCK
SOCKETS Φ 40mm	PCS	1	
SOCKETS Φ 20mm	PCS	2	LOCK
UNION FLAT FACE Φ	PCS	1	INLET
UNION FLAT FACE Φ	PCS	1	OUTLET
ELBOWS 90° Φ 40mm	PCS	3	
ELBOWS 90° Φ	PCS	1	OUTLET
TEE EQUAL Φ 25mm	PCS	2	LOCK
PLUG SOLID Φ 40 mm	PCS	1	
FLOATVALVE Φ 25 / 32/40 mm	PCS	1	
STRAINER Φ	PCS	1	OUTLET

MATERIALS		V= 300lt	V=500lt
CEMENT	BAGS	10	13
BRICKS	PCS		
(SHAPED STONES)	M3	1,5	2,0
CRUSHED STONES	M3	0,5	0,7
SAND	M3	1,0	1,5
MESH REF 100	M2	6,0	9,0
RODS Φ 8mm	M1	6,0	6,0
C I MANHOLE COVER	PCS	1	1
BAFFLE PLATE (OPTIONAL)	M1	1,2	1,2
SAP 15 x 2,5cm	M1	6,0	7,0
SLABFORMWORK	PCS		
SIDEFORMWORK	PCS		

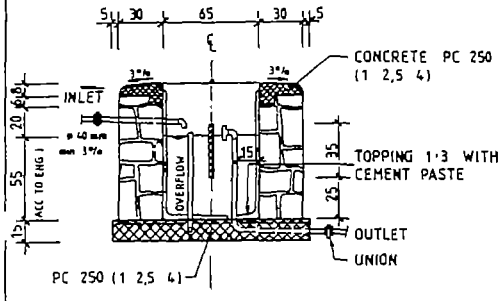
TECHNICAL OFFICE MASERU

PRESSURE BREAK TANK WITH FLOATVALVE

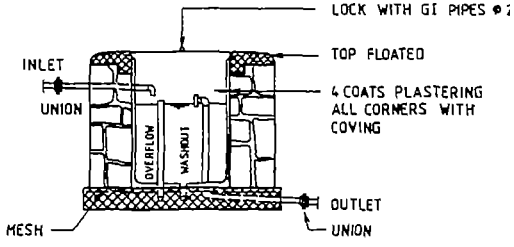
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	OCT 84	H H
DRAWN	NOV 86	BUK
APPROV	NOV 86	J M
REV	NOV 86	J M
SCALE	1 20	

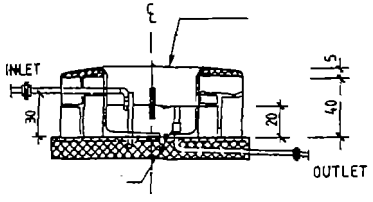
S-12



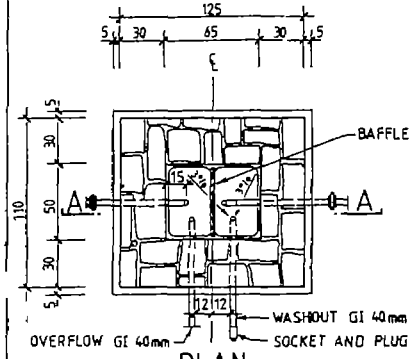
SECTION A-A



SECTION A-A

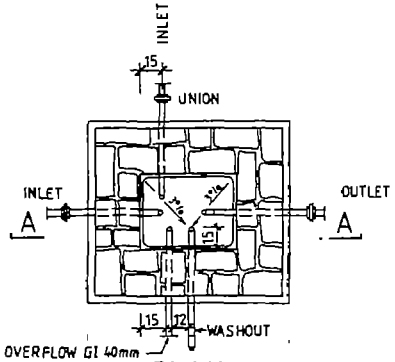


SECTION A-A



PLAN

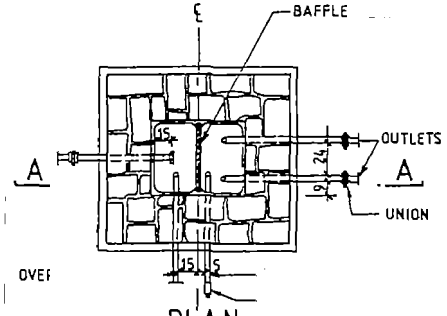
SILTBOX V = 150 lt



PLAN

COLLECTION /
PRESSURE BREAK

DISTRIBUTION-CHAMBER MAY BE PLACED ON TOP OF TANK / WATERPOINT



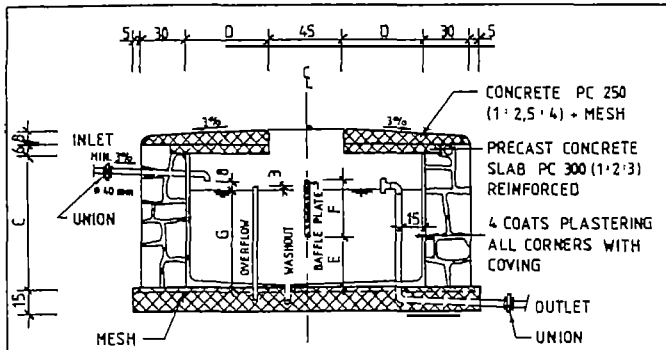
PLAN

DISTRIBUTION
CHAMBER

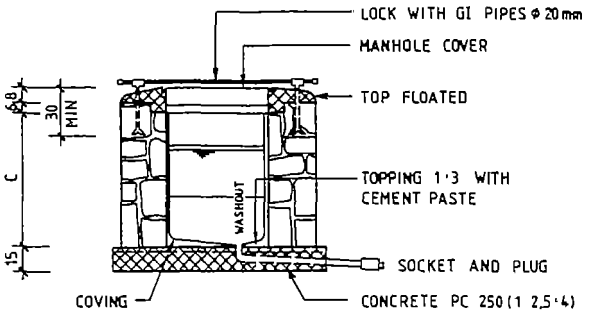
MEASUREMENTS IN CENTIMETRES ! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS		SILTBOX	COLLECTION / PRESSURE BREAK	DISTRIBUTION	
PIPE ⌀ 40 mm	M1	4	4	2	
PIPE ⌀ 25 mm	M1	1	1	1	LOCK
PIPE ⌀ 20 mm	M1	1	1	1	LOCK
SOCKETS ⌀ 40 mm	PCS	1	1	1	
SOCKETS ⌀ 20 mm	PCS	2	2	2	LOCK
UNION FLAT FACE ⌀ 40 mm	PCS	1		1	
UNION FLAT FACE ⌀	PCS	1	(3)		
ELBOWS 90° ⌀ 40 mm	PCS	4	3	3	
ELBOWS 90° ⌀	PCS	2			OUTLET
TEE EQUAL ⌀	PCS	1	1		OUTLET
TEE EQUAL ⌀ 25 mm	PCS	2	2	2	LOCK
PLUG SOLID ⌀ 40 mm	PCS	1	1	1	
MATERIALS					
CEMENT	BAGS	8	8	5	
BRICKS	PCS				
SHAPED STONES	M3	1,0	1,0	0 5	
CRUSHED STONES	M3	0,3	0,3	0,3	
SAND	M3	0,8	0,8	0,5	
MESH REF 100	M2	2,0	2,0	2,0	
RODS ⌀ 8 mm	M1				
C I MANHOLE COVER	PCS	1	1	1	
(ASBESTOS SHEETS)	M1	0,9		0,9	
SAP 15 x 2,5 cm	M1	6,0	6,0	6,0	

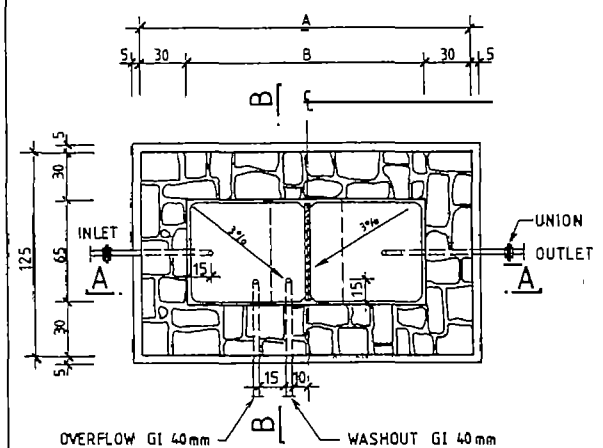
	ACTION	DATE	BY
TECHNICAL OFFICE MASERU	DESIGN	DEC 86	J M
SILTBOX V = 150 lt COLL. / PRESSURE BREAK DISTRIBUTION CHAMBER	DRAWN	DEC 86	BUK
	APPROV	DEC 86	J M
	SCALE	1 20	
GOVERNMENT OF LESOTHO VILLAGE WATER SUPPLY SECTION		S-11	



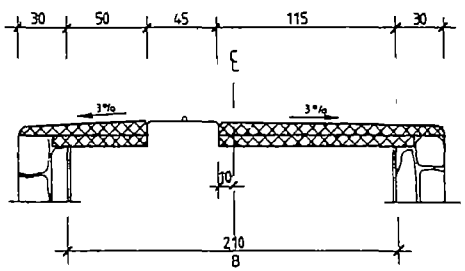
SECTION A-A



SECTION B-B



PLAN



DETAIL TOP OF SILTBOX V=1000 lt

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS VOLUME lt		300	500	750	1000
A		160	210	220	270
B		100	150	160	210
C		75	80	105	105
D		27,5	52,5	57,5	
E		20	30	30	32
F		35	35	52,5	52,5
G		50	60	77,5	79,5
FITTINGS					
PIPE ⌀ 40mm	M1	4	4	4	4
PE ⌀ 25mm	M1	1	1	1	1
PE ⌀ 20mm	M1	1	1	1	1
ICKETS ⌀ 40 mm	PCS	1	1	1	1
ICKETS ⌀ 20 mm	PCS	2	2	2	1
ION FLAT FACE ⌀ 40mm	PCS	1	1	1	1
ION FLAT FACE ⌀	PCS	1	1	1	1
ELBOWS 90° ⌀ 40mm	PCS	4	4	4	4
ELBOWS 90° ⌀	PCS	2	2	2	2
TEE EQUAL ⌀	PCS	1	1	1	1
TEE EQUAL ⌀ 25mm	PCS	2	2	2	2
PLUG SOLID ⌀ 40mm	PCS	1	1	1	1
MATERIALS					
CEMENT	BAGS	10	13	16	19
BRICKS	PCS				
(SHAPED STONES)	M3	1,5	2,0	3,0	3,0
CRUSHED STONES	M3	0,5	0,7	0,8	1,0
SAND	M3	1,0	1,5	2,0	2,5
MESH REF 100	M2	6,0	9,0	10,0	11,0
RODS ⌀ 8mm	M1	6,0	6,0	8,0	13,0
C I MANHOLE COVER	PCS	1	1	1	1
(ASBESTOS SHEETS)	M1	1,2	1,2	1,8	1,8
SAP 15 x 2,5cm	M1	6,0	7,0	7,0	8,0
SLABFORMWORK	PCS				
SIDEFORMWORK	PCS				

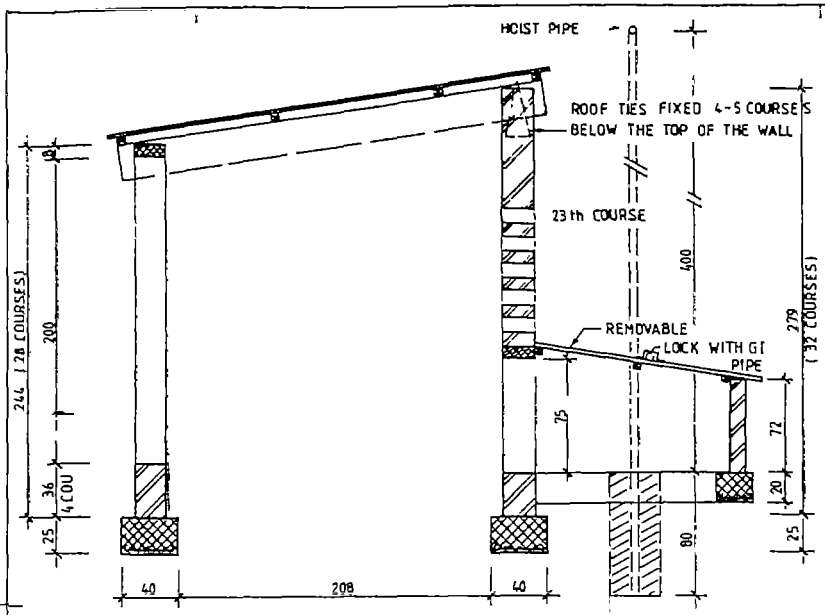
TECHNICAL OFFICE MASERU

SILTBOX IN STONEMASONERY

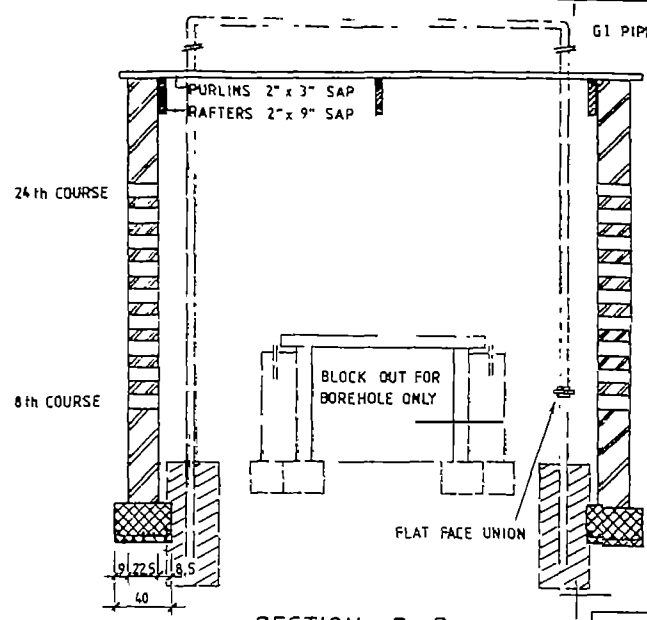
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	OCT 84	H PF
DRAWN	NOV 86	BUK
APPROV	NOV 86	J M
SCALE	1 20	
REV	NOV 86	J M

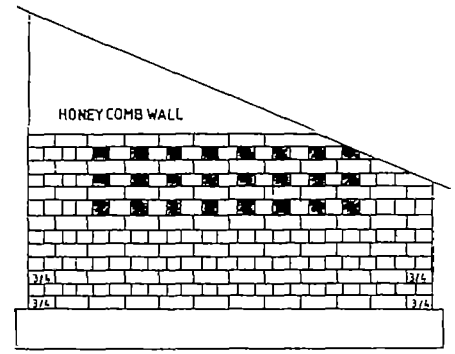
S - 01

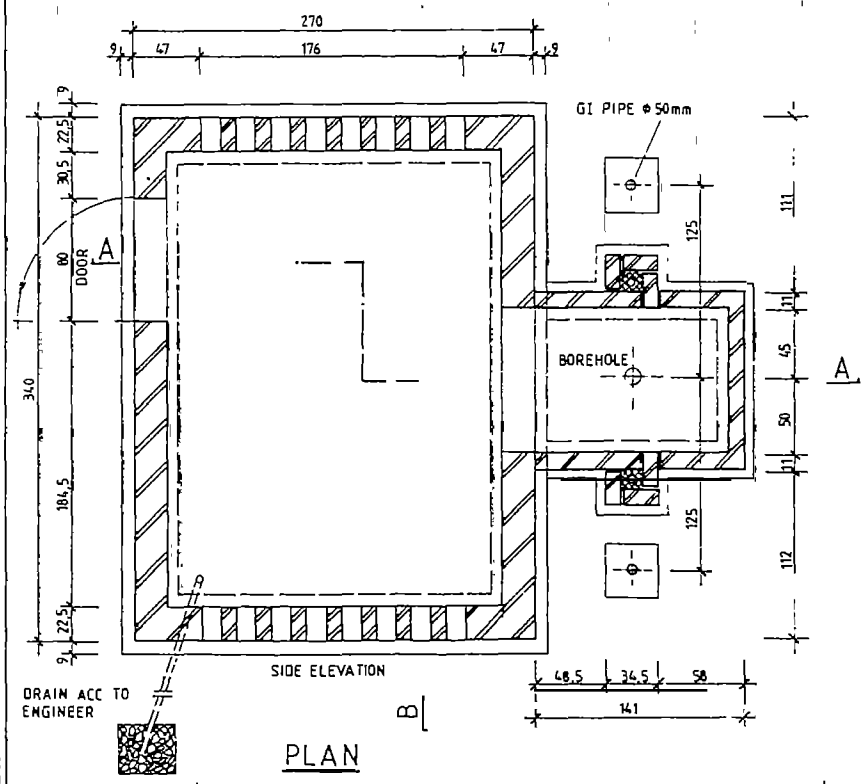


SECTION A-A

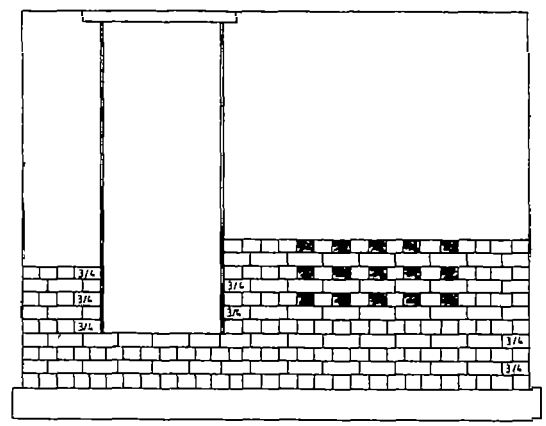


SECTION B-B





PLAN



FRONT ELEVATION

MEASUREMENTS IN CENTIMETRES (cm)
PIPES AND FITTINGS ACCORDING TO ENGINEER

MATERIALS			
CEMENT	BAGS	40	
BRICKS	PCS	3100	
CRUSHED STONES	M3	3,5	
SAND	M3	5,0	
MESH REF 100	M2	30	
RODS ⌀ 8mm	M1	50	
DOOR + FRAME STEEL	PCS	1	
SAP 23 x 5cm (FUNDATION)	M1	30	
CONCRETE LINTOLS (L=150cm)	PCS	2	BOREHOLE
ROOF			
SAP 2" x 9" (L= 300cm)	PCS	3	
SAP 2" x 3" (L= 360cm)	PCS	4	
NAILS 4"	KG	2	
ROOFINGS SCREWS WITH WASHERS	BOX	1	
CORR. IRON SHEETS 300cm LONG	PCS	6	
WIRE	M1	50	
COVER BOREHOLE (ADDITIONALS)			
SAP 2" x 3" (L = 120cm)	PCS	3	
CORR IRON SHEETS 150cm LONG	PCS	2	
PIPE ⌀ 25mm	M1	1	
PIPE ⌀ 20mm	M1	2	
PIPE ⌀ 50mm	M1	14	
SOCKETS ⌀ 20mm	PCS	2	
UNION FLAT FACE ⌀ 50mm	PCS	1	
ELBOWS 90° ⌀ 50mm	PCS	2	
TEE EQUAL ⌀ 25mm	PCS	2	

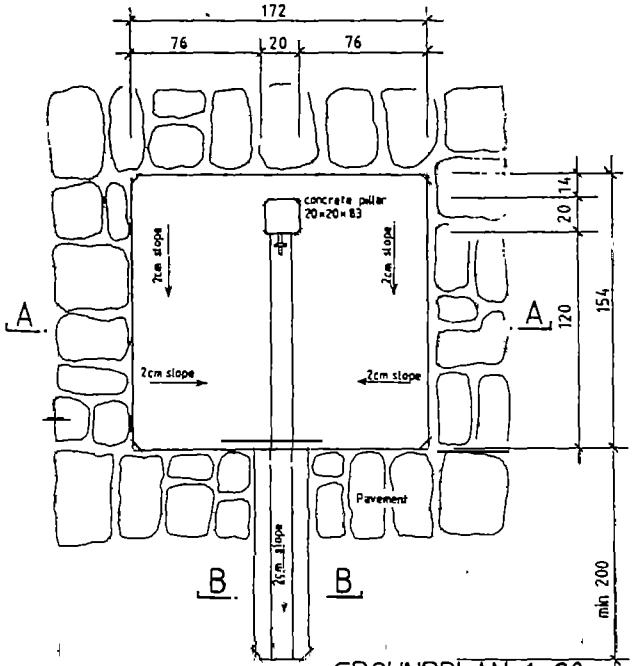
TECHNICAL OFFICE MASERU

ACTION	DATE	BY
DESIGN	JUN 84	H PF
DRAWN	FEB 87	BUK
APPROV	FEB 87	J M
REV	FEB 87	J M
SCALE	1 20	

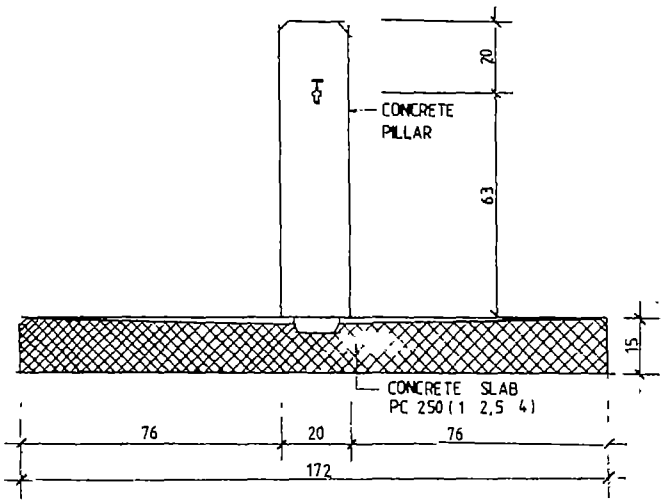
PUMPHOUSE

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

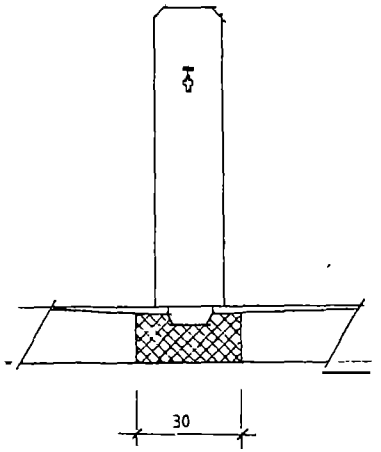
B-50



GROUNDPLAN 1:20

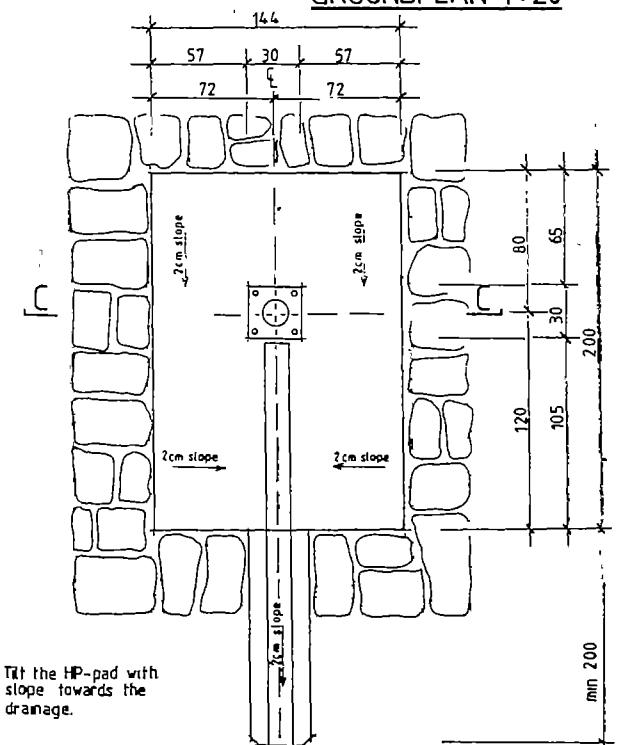


SECTION A-A 1:10



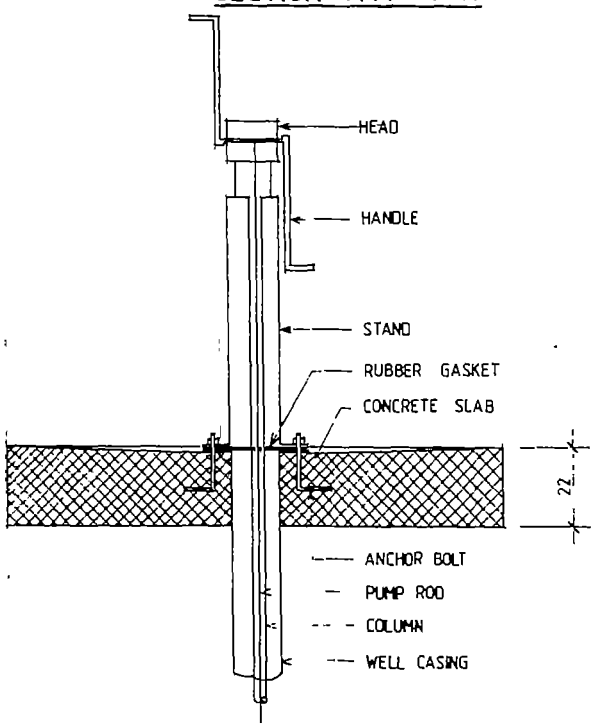
SECTION B-B 1:10

MEASUREMENTS IN CENTIMETRES ! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER



N.B Tilt the HP-pad with slope towards the drainage.

GROUNDPLAN 1.20



SECTION C-C 1:10

MATERIALS		STANDPIPE	HANDPUMP
CEMENT	BAGS	4	5
SAND	LT	250	250
CRUSHED STONES	LT	300	400
STONES FOR PAVEMENT	M2	5	5
FITTINGS			
PIPE ø 20mm	M1	4	
SOCKET ø 20mm	PCS	2	ACCORDING TO
ELBOWS ø 20mm	PCS	2	ENGINEER
UNION ø 20mm	PCS	1	
BIBCOCK	PCS	1	

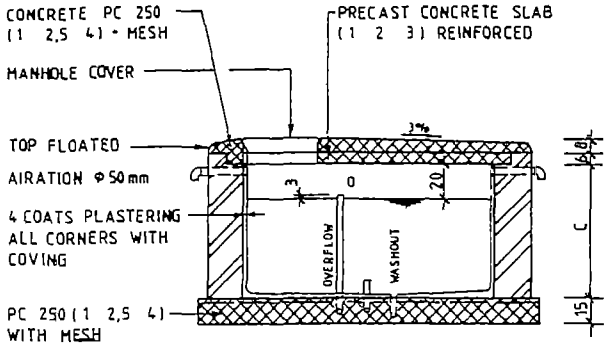
TECHNICAL OFFICE MASERU

STANDPIPE IN CONCRETE
HANDPUMP SLAB

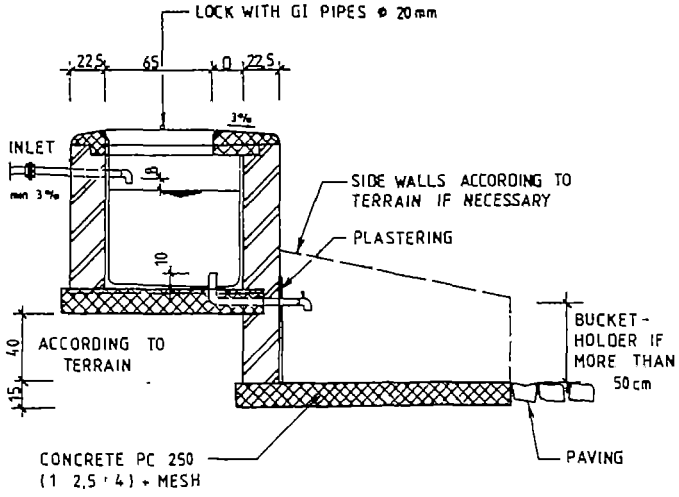
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	AUG 83	U BRU
DRAWN	AUG 87	M M
APPROV		
REV	JUNE 87	J ZIM
SCALE	1 10/20	

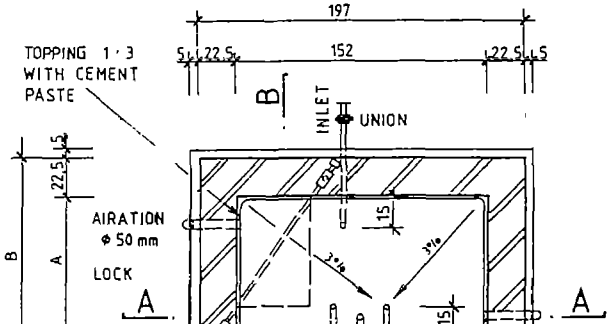
40

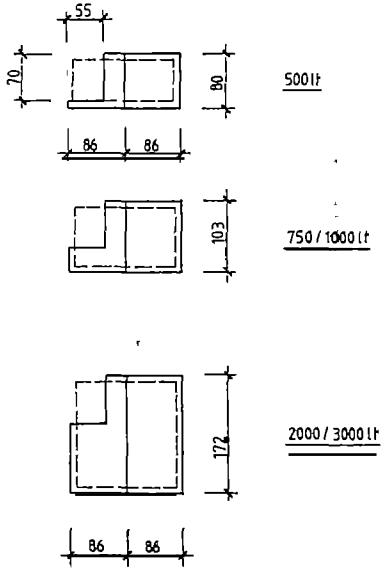


SECTION A-A



SECTION B-B





500 lt

750 / 1000 lt

2000 / 3000 lt

PLAN

PRECAST SLABS 1:50

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS VOLUME lt		500	750	1000	2000	3000
A		60	83	83	152	152
B		105	128	128	197	197
C		79	79	104	104	123
D			18	18	87	87
FITTINGS						
PIPE Φ 50 mm	M1			1	1	1
PIPE Φ 40 mm	M1	4	4	4	4	4
PIPE Φ 25 mm LOCK	M1	1	1	1	1	1
PIPE Φ 20 mm LOCK	M1	1	1	1	1	1
BIBCOCKS	PCS	1	1	1	1	1
SOCKETS Φ 20 mm LOCK	PCS	2	2	2	2	2
UNION FLAT FACE Φ INLET	PCS	1	1	1	1	1
ELBOWS 90° Φ 50 mm	PCS			2	2	2
ELBOWS 90° Φ 20 mm	PCS	1	1	1	1	1
ELBOWS 90° Φ 40 mm W O / O F	PCS	4	4	4	4	4
ELBOWS 90° Φ INLET	PCS	1	1	1	1	1
TEE EQUAL Φ 25 mm LOCK	PCS	2	2	2	2	2
PLUG SOLID Φ 40 mm	PCS	1	1	1	1	1
MATERIALS						
CEMENT	BAGS	15	17	18	21	23
BRICKS	PCS	550	600	750	900	1150
SHAPED STONES	M3					
CRUSHED STONES	M3	0,8	0,8	1,0	1 5	1,5
SAND	M3	1,5	1,5	1,5	2 5	2,5
MESH REF 100	M2	8,0	8,0	12,0	18,0	18 0
RODS Φ 8 mm	M1	5,0	16,0	16,0	25,0	25,0
C I MANHOLE COVER	PCS	1	1	1	1	1
SAP 15 x 2,5cm	M1	7 0	7,0	8,0	10 0	10,0
SLABFORMWORK	PCS					
SIDEFORMWORK	PCS					

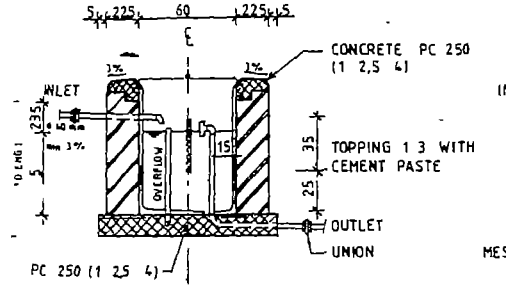
TECHNICAL OFFICE MASERU

ACTION	DATE	BY
DESIGN	APR 84	H PF
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	DEC 86	J M
SCALE	1 : 20	

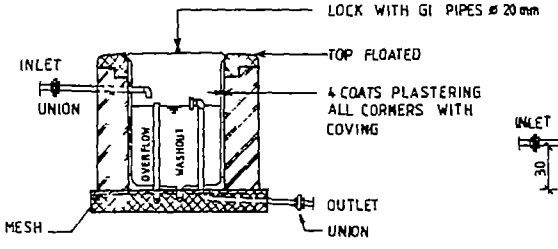
WATERPOINT
V = 500 / 750 / 1000 / 2000 / 3000 lt

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

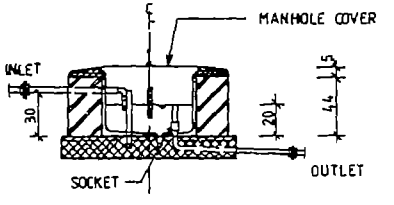
B-31



SECTION A-A

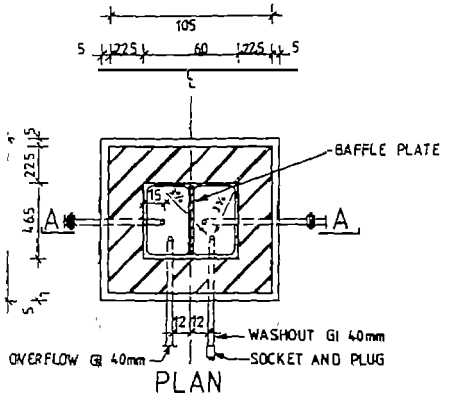


SECTION A-A



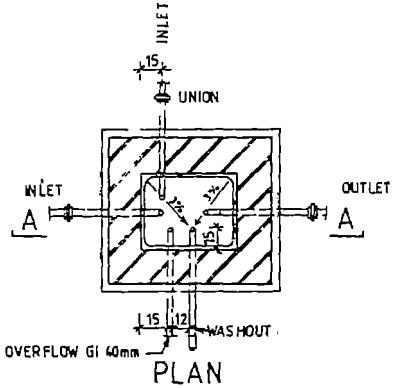
SECTION A-A

DISTRIBUTION-CHAMBER MAY BE PLACED ON TOP OF TANK / WATERPOINT



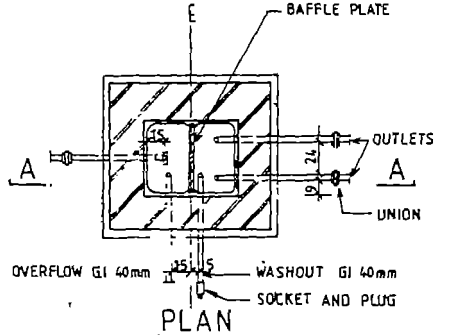
PLAN

SILTBOX V = 150 lt



PLAN

COLLECTION / PRESSURE BREAK



PLAN

DISTRIBUTION CHAMBER

MEASUREMENTS IN CENTIMETRES ! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS		SILTBOX	COLLECTION / PRESSURE BREAK	DISTRIBUTION	
PIPE ø 40 mm	M1	4	4	2	
PIPE ø 25 mm	M1	1	1	1	LOCK
PIPE ø 20 mm	M1	1	1	1	LOCK
SOCKETS ø 40 mm	PCS	1	1	1	
SOCKETS ø 20 mm	PCS	2	2	2	LOCK
UNION FLAT FACE ø 40 mm	PCS	1			
UNION FLAT FACE ø	PCS	1	(3)		
ELBOWS 90° ø 40 mm	PCS	4	3	3	
ELBOWS 90° ø	PCS	2			OUTLET
TEE EQUAL ø	PCS	1	1		OUTLET
TEE EQUAL ø 25 mm	PCS	2	2	2	LOCK
PLUG SOLID ø 40 mm	PCS	1	1	1	
MATERIALS					
CEMENT	BAGS	5	5	4	
BRICKS	PCS	300	300	160	
SHAPED STONES	M3				
CRUSHED STONES	M3	0,3	0,3	0,3	
SAND	M3	0,6	0,6	0,4	
MESH REF 100	M2	2,0	2,0	2,0	
RODS ø 8 mm	M1				
C I MANHOLE COVER	PCS	1	1	1	
(ASBESTOS SHEETS)	M1	0,9		0,9	
SAP 15 × 2,5 cm	M1	6,0	6,0	6,0	

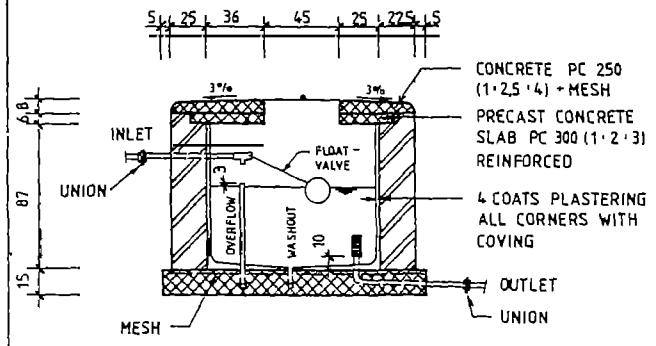
TECHNICAL OFFICE MASERU

	ACTION	DATE	BY
	DESIGN	DEC 86	J M
	DRAWN	DEC 86	L M
	APPROV	DEC 86	J M
	SCALE	1 20	

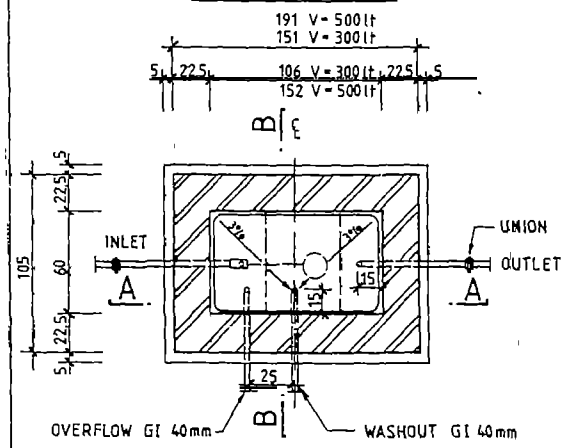
SILTBOX V = 150 lt
COLL / PRESSURE BREAK
DISTRIBUTION CHAMBER

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

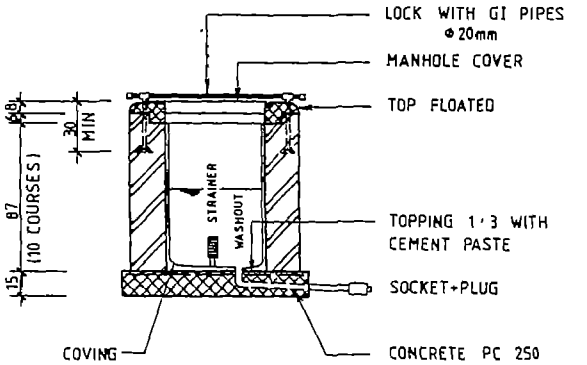
B-11



SECTION A-A



PLAN



SECTION B-B

MEASUREMENTS IN CENTIMETRES! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS			
PIPE Φ 40mm	M1	4	
PIPE Φ 25 mm	M1	1	LOCK
PIPE Φ 20 mm	M1	1,5	LOCK
SOCKETS Φ 40mm	PCS	1	
SOCKETS Φ 20mm	PCS	2	LOCK
UNION FLAT FACE Φ	PCS	1	INLET
UNION FLAT FACE Φ	PCS	1	OUTLET
ELBOWS 90° Φ 40mm	PCS	3	
ELBOWS 90° Φ	PCS	1	OUTLET
TEE EQUAL Φ 25mm	PCS	2	LOCK
PLUG SOLID Φ 40 mm	PCS	1	
FLOATVALVE Φ 25 / 32 / 40 mm	PCS	1	
STRAINER Φ	PCS	1	OUTLET

MATERIALS		V=300lt	V=500lt
CEMENT	BAGS	8	13
BRICKS	PCS	350	470
(SHAPED STONES)	M3		
CRUSHED STONES	M3	0,5	0,7
SAND	M3	0,6	1,0
MESH REF 100	M2	5,0	8,0
RODS Φ 8mm	M1	5,0	5,0
C I MANHOLE COVER		1	1
BAFFLE PLATE (OPTIONAL)		1,2	1,2
SAP 15 x 2,5cm	M1	6,0	7,0
SLABFORMWORK	PCS		
SIDEFORMWORK	PCS		

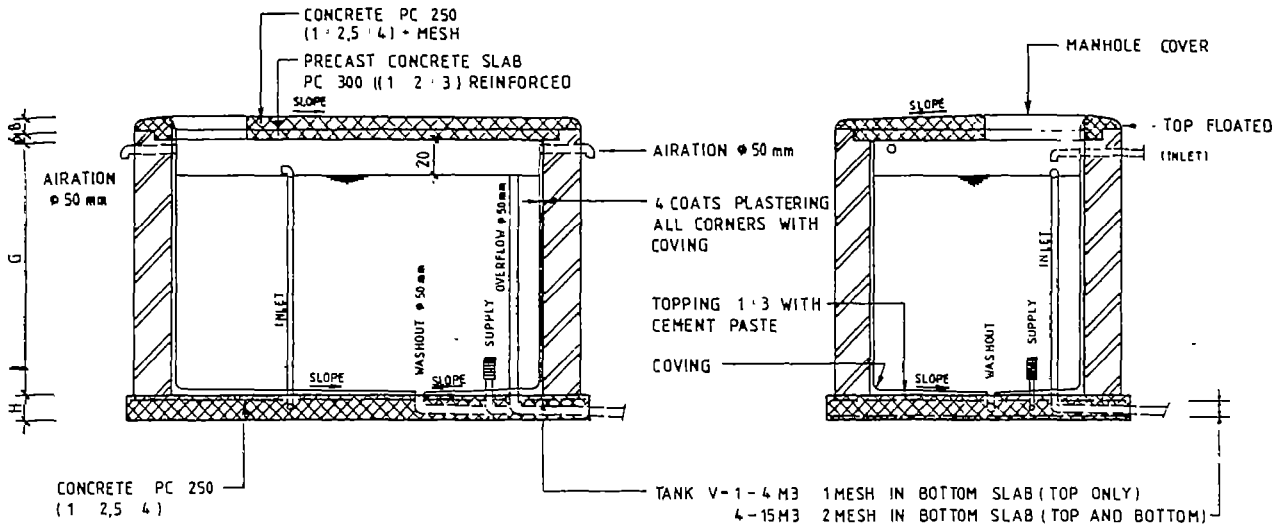
TECHNICAL OFFICE MASERU

PRESSURE BREAK TANK WITH FLOATVALVE

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	JAN 84	H H
DRAWN	NOV 86	BUK
APPROV	NOV 86	J M
SCALE	1:20	
REV	NOV 86	J M

B-12

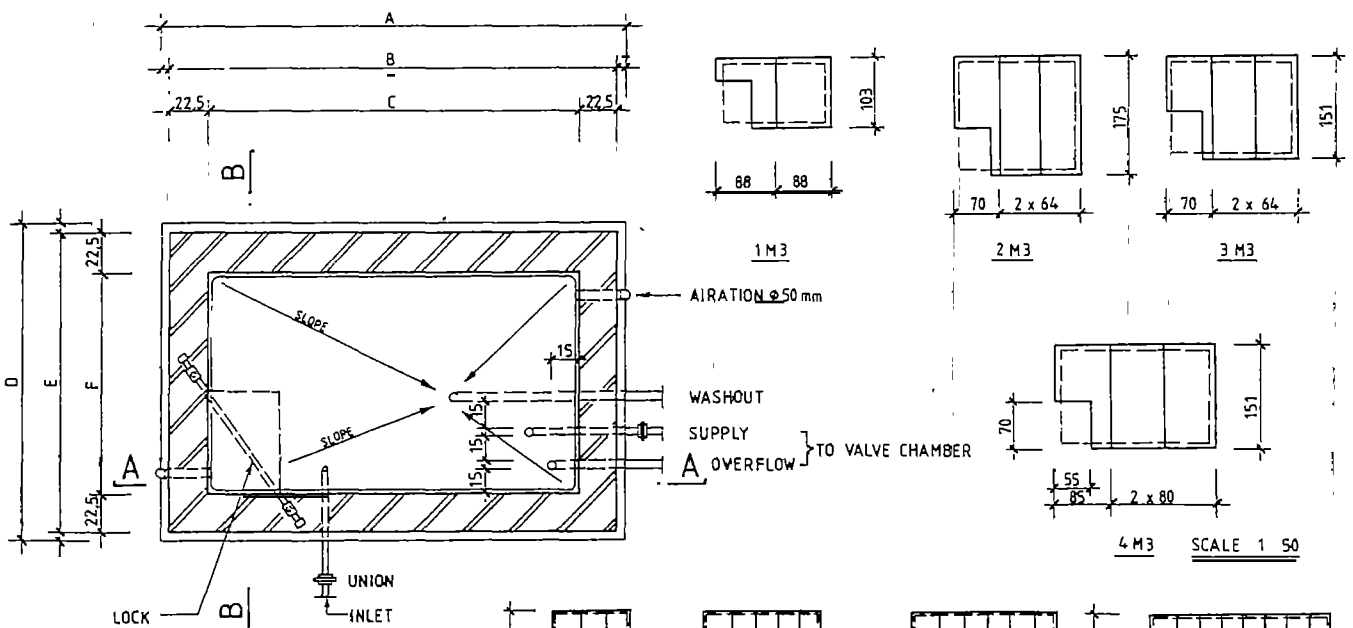


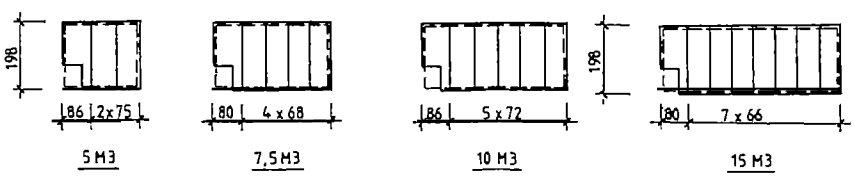
MEASUREMENTS IN CENTIMETRES! (CM)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS	VOLUME M3	1	2	3	4	5	7,5	10	15
A		210	233	233	280	304	420	514	608
B		200	223	223	270	284	400	494	588
C		155	178	178	225	216	332	426	520
D		138	210	186	186	243	243	243	243
E		128	200	176	176	223	223	223	223
F		83	155	131	131	176	176	176	178
G		105	105	150	150	159	159	159	185
H		15	15	15	15	20	20	20	20
FITTINGS									
PIPE ø 50mm	M1	6	6	6	6	6	6	6	6
PIPE ø 25mm LOCK	M1	1	1	1	1	1	1	1	1
PIPE ø 20mm LOCK	M1	1	1	1	1	1	1	1	1
SOCKETS ø 20mm LOCK	PCS	2	2	2	2	2	2	2	2
UNION FLAT FACE ø	PCS								
ELBOWS 90° ø 50mm	PCS	5	5	5	5	5	5	5	5
TEE EQUAL ø 25mm LOCK	PCS	2	2	2	2	2	2	2	2
PLUG SOLID ø W O	PCS	1	1	1	1	1	1	1	1
MATERIALS									
CEMENT	BAGS	13	20	23	26	40	50	60	70
BRICKS	PCS	650	850	1100	1250	2400	3000	3500	4500
SHAPHED STONES	M3								
CRUSHED STONES	M3	1,0	1,5	1,5	2,0	3,0	3,5	4,5	5,0
SAND	M3	1,5	2,5	2,5	3,0	5,0	6,0	7,0	9,0
MESH REF 100	M2	10,0	16,0	15,0	17,0	35,0	45,0	55,0	65,0
ROOS ø 8mm	M1	12,0	25,0	22,0	26,0	40,0	60,0	70,0	92,0
C I MANHOLE COVER	PCS	1	1	1	1	1	1	1	1
SAP 15 x 2,5 cm	M1	8,0	10,0	10,0	11,0				
SAP 23 x 5,0 cm	M1					12,0	14,0	17,0	19,0
SLABFORMWORK	PCS								
SIDEFORMWORK	PCS								

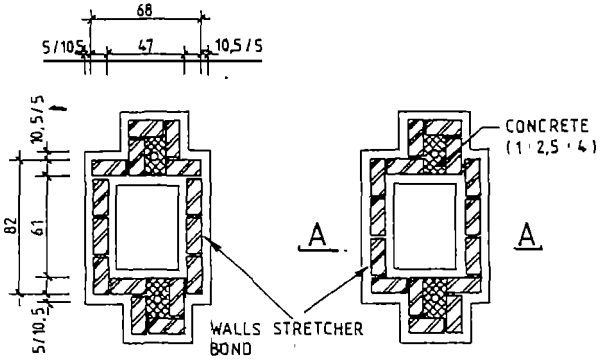
SECTION A - A

SECTION B - B

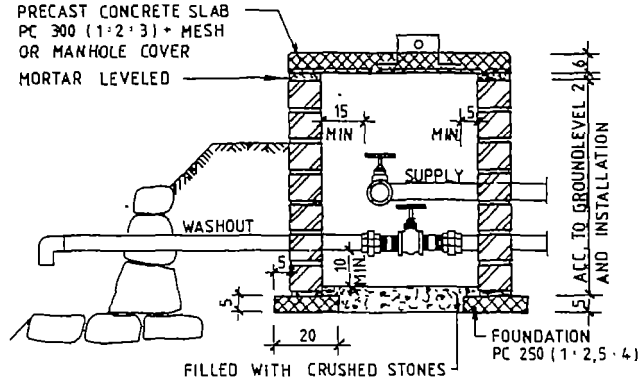




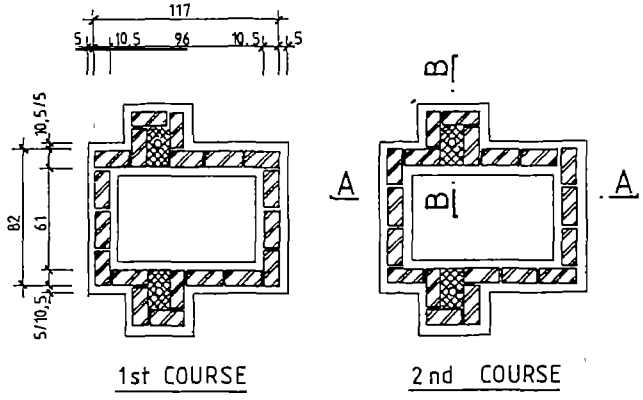
TECHNICAL OFFICE MASERU	ACTION	DATE	BY
	DESIGN	MAR 84	H PF
STORAGE TANK	DRAWN	DEC 86	BUK
VOLUME 1 - 15 M3	APPROV	DEC 86	J M
	REV	DEC 86	J M
	SCALE	1 20	
GOVERNMENT OF LESOTHO VILLAGE WATER SUPPLY SECTION	B - 20		



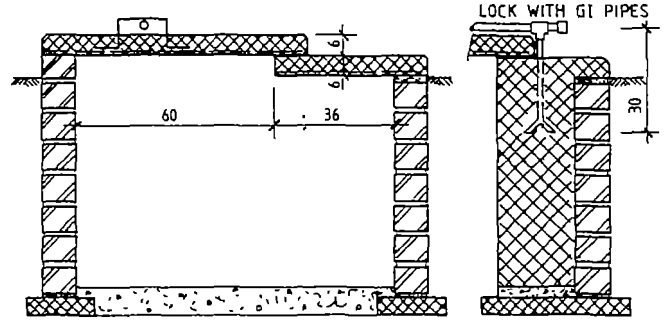
PLAN 1:20, VALVE CHAMBER 45 x 60cm



SECTION A-A, 1:10



PLAN 1:20, VALVE CHAMBER 60 x 95 cm



SECTION A-A, 1:10 B-B, 1:10

MEASUREMENTS IN CENTIMETRES (CM!)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS		CHAMBER 45 x 60 cm	CHAMBER 60 x 95 cm	
PIPE Φ 25 mm	M1	1	1	LOCK
PIPE Φ 20 mm	M1	1	1	LOCK
GATE VALVES Φ	PCS			
SOCKETS Φ 20 mm	PCS	2	2	LOCK
UNION FLAT FACE Φ	PCS			
ELBOWS 90° Φ	PCS	1	1	WASHOUT
TEE EQUAL Φ	PCS			
TEE EQUAL Φ 25 mm	PCS	2	2	LOCK
MATERIALS				
CEMENT	BAGS	2	2	
BRICKS	PCS	115	145	(7 COURSES HIGH)
SHAPED STONES	M3			
CRUSHED STONES	M3	0,15	0,15	
SAND	M3	0,15	0,15	
(MESH REF 100)	M2	1,0	1,0	
(RODS Φ 8 mm)	M1	5,0	8,0	
C I MANHOLE COVER	PCS	1	1	

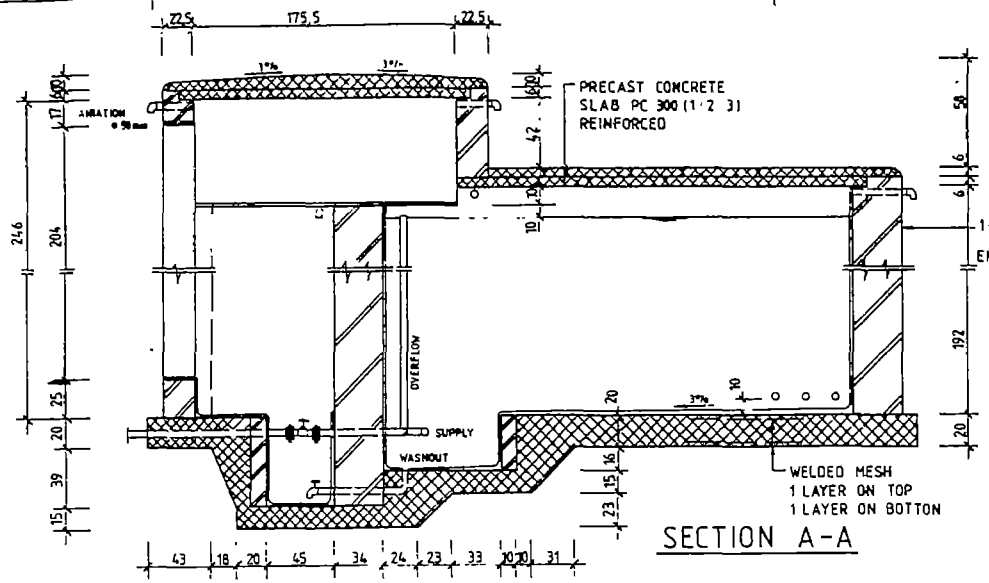
TECHNICAL OFFICE MASERU

VALVE CHAMBER 45 x 60 cm
60 x 95 cm

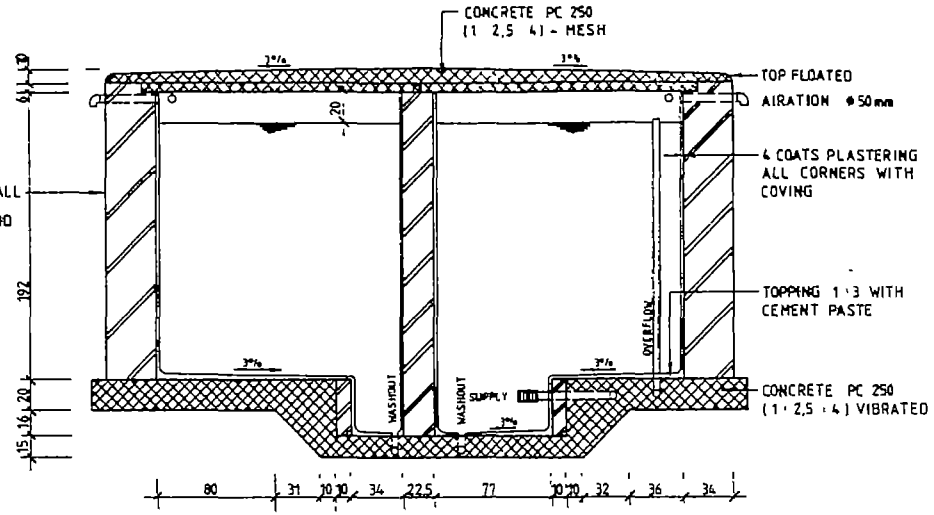
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	MAR 84	H PF
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	DEC 86	J M
SCALE	1 20/10	

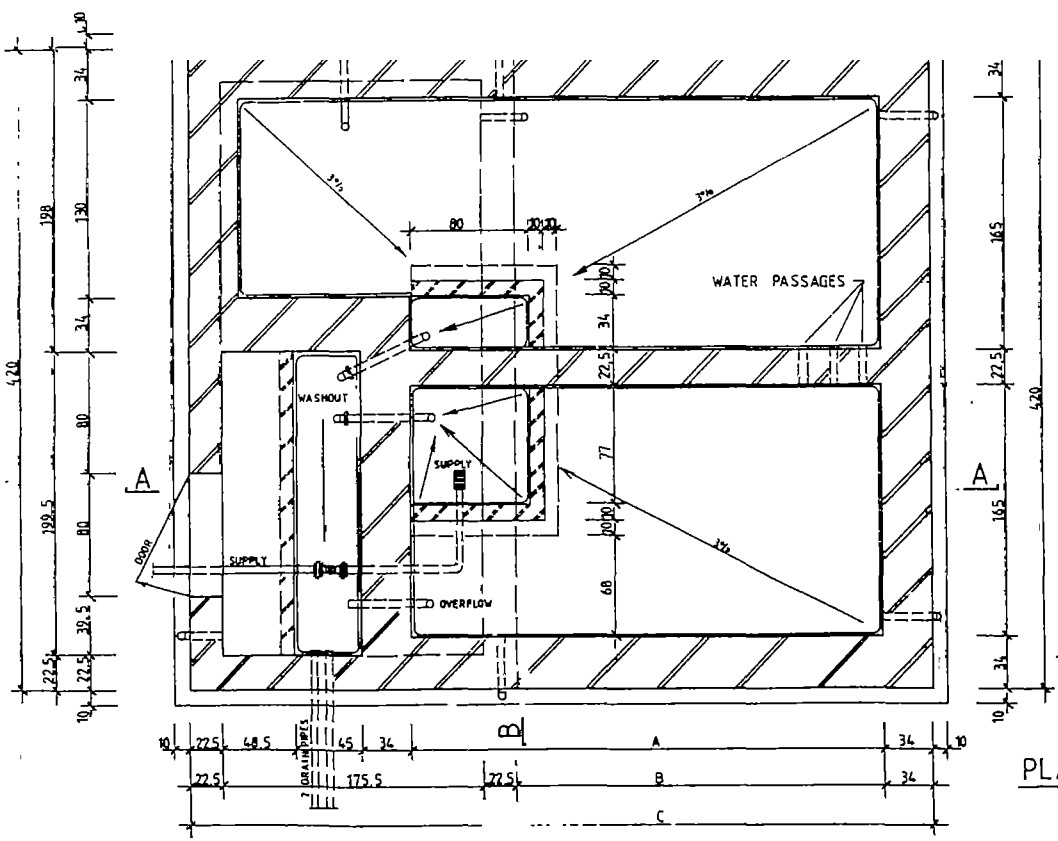
B-14/15



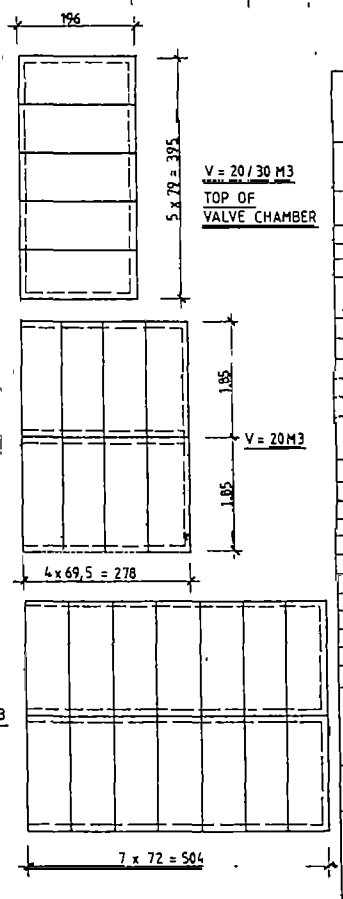
SECTION A-A



SECTION B-B



PLAN



PRECAST SLABS 1 50

MEASUREMENTS IN CENTIMETRES (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

MEASUREMENTS		20 M3	30 M3
A		316	542
B		245.5	471.5
C		500	726
FITTINGS			
PIPE ⌀ 50 mm	M1	6	6
PIPE ⌀ (DRAIN)	M1		
GATE VALVE ⌀ 50 mm	PCS	3	3
UNION FLAT FACE	PCS	2	
ELBOWS 90° ⌀ 50 mm	PCS	13	
MATERIALS			
CEMENT	BAGS	130	160
BRICKS	PCS	8500	10'000
SHAPED STONES	M3		
CRUSHED STONES	M3	7.5	8.0
SAND	M3	18	20
MESH REF 100	M2	100	120
RODS ⌀ 8 mm	M1	120	174
DOOR + FRAME STEEL	PCS	1	1
DRAIN MESH	PCS	2	2
SAP 23 x 5 cm	M1	24	24
SLABFORMWORK			
SIDEFORMWORK			

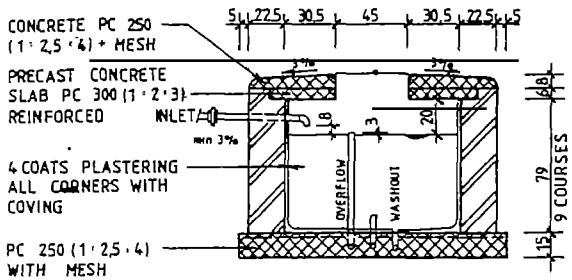
TECHNICAL OFFICE MASERU

STORAGE TANK
VOLUME 20 / 30 M3

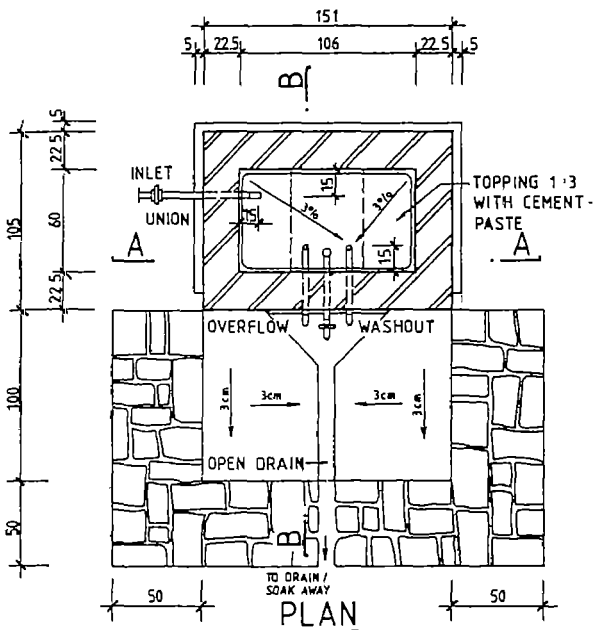
GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	APR 86	U BW
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	DEC 86	J M
SCALE	1 20	

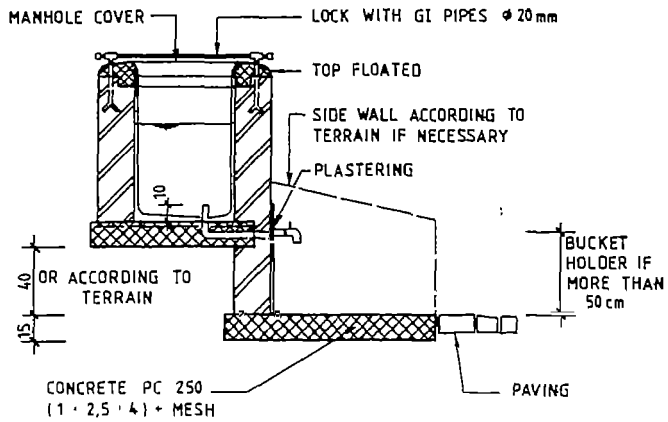
R - 23



SECTION A-A



PLAN



SECTION B-B

MEASUREMENTS IN CENTIMETRES ! (cm)
INLETS AND OUTLETS ACCORDING TO ENGINEER

FITTINGS			
PIPE ⌀ 40 mm	M1	4	
PIPE ⌀ 25 mm	M1	1	LOCK
PIPE ⌀ 20 mm	M1	1	LOCK
BIBCOCK	PCS	1	
SOCKETS ⌀ 20 mm	PCS	2	LOCK
UNION FLAT FACE ⌀ 40 mm	PCS	1	
ELBOWS 90° ⌀ 40 mm	PCS	5	
ELBOWS 90° ⌀ 20 mm	PCS	1	OUTLET
TEE EQUAL ⌀ 25 mm	PCS	2	LOCK
PLUG SOLID ⌀ 40 mm	PCS	1	
MATERIALS			
CEMENT	BAGS	12	
BRICKS *	PCS	450	
SHAPHED STONES	M3		
CRUSHED STONES	M3	0,7	
SAND	M3	1,0	
MESH REF 100	M2	7,0	
RODS ⌀ 8 mm	M1	5,0	
C I MANHOLE COVER	PCS	1	
SAP 15 x 2,5cm	M1	6,0	

* BRICKS FOR SIDEWALLS ARE NOT INCLUDED

TECHNICAL OFFICE MASERU

WATERPOINT V= 300 lt

GOVERNMENT OF LESOTHO
VILLAGE WATER SUPPLY SECTION

ACTION	DATE	BY
DESIGN	APR 84	H PF
DRAWN	DEC 86	BUK
APPROV	DEC 86	J M
REV	NOV 86	J M
SCALE	1 : 20	

B-30