

Table 3-2 Water Fund

1. MACRO SCHEME

No.	Community	Homestead	Water Committee/Fund (E)			
		(as of Nov. 95)	Entrance Fee	Tariff (E/month)	Fund (Nov. 94)	Fund (Apr. 95)
1	Ngwazini	400	50 (500: school)	5	-	7,150
	Bekhinkosi	250	100	10	-	8,500
2	Msumpe	145	100	ND	2500	5,100
3	Somintongo	500	20 (50: cattle)	ND	1500	6,280
	Total	1,295				

2. MICRO SCHEME

(1) HHOOHIO REGION

No.	Community	Homestead	Water Committee/Fund			
		(as of Nov. 95)	Entrance Fee	Tariff (E/month)	Fund (Nov. 94)	Fund (Apr. 95)
H-1	Mbashedeni	200	100	-	-	1,200
H-2	Ngobodzi	47	100	5	140	1,115
H-3	Zinyane	285	50	ND	-	1,450
H-4	Nsangwini	266	100	-	-	3,350
H-5	Mcuba	180	10	ND	-	800
H-6	Nyakutho	300	25	ND	380	2,000
	Total	1,278				

(2) MANZINI REGION

No.	Community	Homestead	Water Committee/Fund			
			Entrance Fee	Tariff (E/month)	Fund (Nov. 94)	Fund (Apr. 95)
M-1	Mbekelweni	200	50	8	7300(*)	2,115
M-2	Ludzeludze	103	70	ND	3000+	5,299
M-3	Mahlabane West	250	50	20	1000	2,000
M-4	Mbadlane	150	5	10	500	2,500
M-5	Emnyokanyoka	70				2,400
M-6	Emsindza	100				2,800
M-7	Ethunzini	40				1,500
M-8	Sihhoye	300	100	ND	3599	3,700
M-9	Emnjoli	120	20	-	1700	2,600
M-10	Manzana	90	-	5	-	2,100
	Total	1,423				

Note (*): for Macro Scheme

(3) LUBOMBO REGION

No.	Community	Homestead	Water Committee/Fund			
			Entrance Fee	Tariff (E/month)	Fund (Nov. 94)	Fund (Apr. 95)
L-1	Mahlabatsini	75	20	1	600	1,000
L-2	Bhelebane	80	40	1	1885	1,600
L-3	Mampembeni	50	20	1	500	1,200
L-4	Mahhoshe	70	100	ND	-	1,000
L-5	Letindze	41	-	-	-	1,000
L-6	Lomvovo	213	58	5	1500	3,000
L-7	Vimbabangu					
L-8	Nokwane	57	50	ND	-	1,000
L-9	Sagula	150	100	ND	100	1,150
L-10	Shewula	125	50	5	100	500
L-11	Matjemadze	70	50	5	1500	800
	Total	931				

(4) SHISELWENI

No.	Community	Homestead	Water Committee/Fund			
			Entrance Fee	Tariff (E/month)	Fund (Nov. 94)	Fund (Apr. 95)
S-1	Makhava	150	10	10	2690	2,800
S-2	Mszaneni	300	50	1	670	2,000
S-4	Bambitje	597	10	-	300	1,000
S-5	Sigwe	225	25	ND	520	1,000
S-6	Kathumbela		25	ND	520	3,200
S-7	Ndlambuli	83				1,000
S-8	Ngamudze	430	10	-	-	2,800
	Total	1,785				

Chapter 4 Project Evaluation and Recommendation

2012年12月25日

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4-1 Project Effect

Although Swaziland has developed the rural water supply system since 1975, 65% of rural population are still obliged to use unprotected water sources. This causes the high incidence of diarrhoeal and infectious water related diseases. Mortality rate is high; it is 9.5%. Furthermore, it is severe work for women and children to fetch and carry water from distant water sources. This situation has been much worsen because of continuous severe drought since 1992. Therefore, top priority is given to supply safe water in the rural area.

In case this Project is implemented, recipient population is 12,950 for macro scheme and 54,170 for micro scheme, totaling 67,120. Population served increases to approximately 290,000 (about 43% of rural population) from 223,000.

RWSB has a plan to construct 24 macro schemes and 240 micro schemes up to the year 1997. Recipient population is estimated 115,860. Ratio of population served is improved up to 54% of rural population.

According to the long term plan up to 2005, 640 micro schemes will be constructed in 48 communities. In addition, 80 communities requested to construct water supply facilities. Considering these circumstances, provision of equipment and materials for well drilling enables RWSB to construct water wells by himself and it much contributes to accelerate the development of rural water supply.

Supply of safe water in the rural area through this Project is agree with the basic human needs in Swaziland, and it contributes to stabilizing the human welfare and improving the human life in the rural area.

It is evaluated highly beneficial to implement this Project in the rural area where urgent improvement of water supply condition is necessary.

Judging from the effect and nature of the Project mentioned below, it is proper to implement the Project under the Japan's grant aid scheme.

- (1) The Project will be implemented in the rural area and the recipient population is large, 67,000 person.
- (2) The Project aims to satisfy the Basic Human Needs (BHN). It has urgency to be implemented because Swaziland has been attacked by severe drought since 1992.
- (3) It is considered to be possible to operate and maintain the Project by the Swazi side's own fund, personnel and technique.

- (4) Swaziland intends to accelerate the improving the rural water supply project as one of the basic policy regime. The Project will contribute to attain the national policy of Swaziland.
- (5) This Project is not high profitable because it aims to improve the environment of living in the rural area.
- (6) The Project causes no negative affect to the environment because of its purpose to improve the environment.
- (7) It is considered to be possible to implement the Project without any difficulties under the Japan's grant aid scheme.

4. 2 Recommendation

The Project shall be urgently implement in the view point of countermeasure to severe drought since 1992 and satisfaction of the Basic Human Needs (BHN) to improve the environment of living and hygiene in the rural area. Furthermore, it contributes to the improvement of the rural water supply project, one of the national policy regime.

It is much significant to implement the Project under the Japan's grant aid scheme because it will be much effectual and aims to improve the Basic Human Needs (BHN) in the rural area.

The Project will be smoothly and effectively implemented, if following items will be considered in the implementation.

- (1) Daily maintenance and operation are made by Water Minders selected by the communities. The Water Minders should immediately report to RWSB through CDO in case of broken of water supply facilities. Its reporting system is, however, sometimes not clear and it makes difficult to correspond to the broken of water supply facilities. Therefore, it is recommended to construct sure communication system between RWSB and the communities.
- (2) It is important to allocate necessary budget, equipment and personnel for proper maintenance of the water supply facilities.
- (3) Operation and maintenance cost will be mainly borne by the community people. It is necessary to collect the water fund without retardation.
- (4) Necessary number of personnel should be allocate for the smooth operation of geophysical survey equipment and a drilling rig.
- (5) RWSB will continue to construct water supply facilities using the geophysical survey equipment and a drilling rig after the completion of this Project. For this purpose, it

is important to keep geophysical survey equipment and a drilling rig in normal condition.

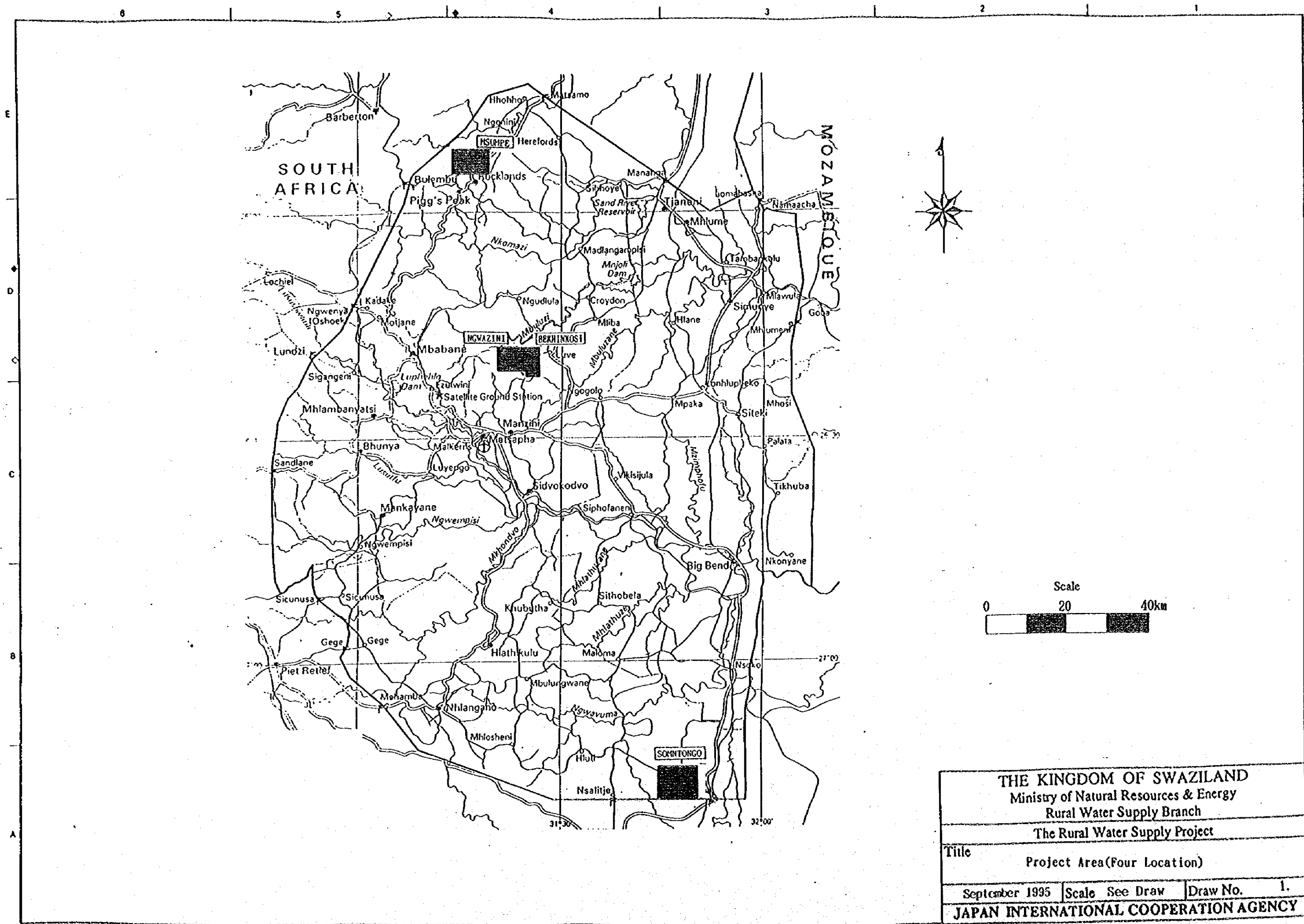
- (6) Technique of geophysical survey and drilling of well will be transferred through this Project by the OJT method. However, further training is necessary to smoothly implement the project. Therefore, it is recommended to request the Japanese government to accept training of counterparts.
- (7) As a policy of Swazi government, the construction of rural water supplies are linked to the promotion of rural sanitation through construction of the ventilated improved pit latrines. No materials for latrine construction are provided under this Project. However, it is considered necessary to construct pit latrines in the target communities. Therefore, it is recommended the Swazi side to promote latrine construction in the communities.
- (8) Water quality has been analyzed by the central laboratory in Matsapha. These data should be established as a data base in the computer which is provided by the Project and be effectively used for the implementation of the rural water supply project.
- (9) No casing and screen pipes are installed in most existing wells in Swaziland. However, it is recommended to install casing and screen pipes in wells after the completion of drilling for protection of well collapse and plugging by sand. Well logging machine to be provided in the Project should be used for determination of well design, sections of screen and casing pipes.

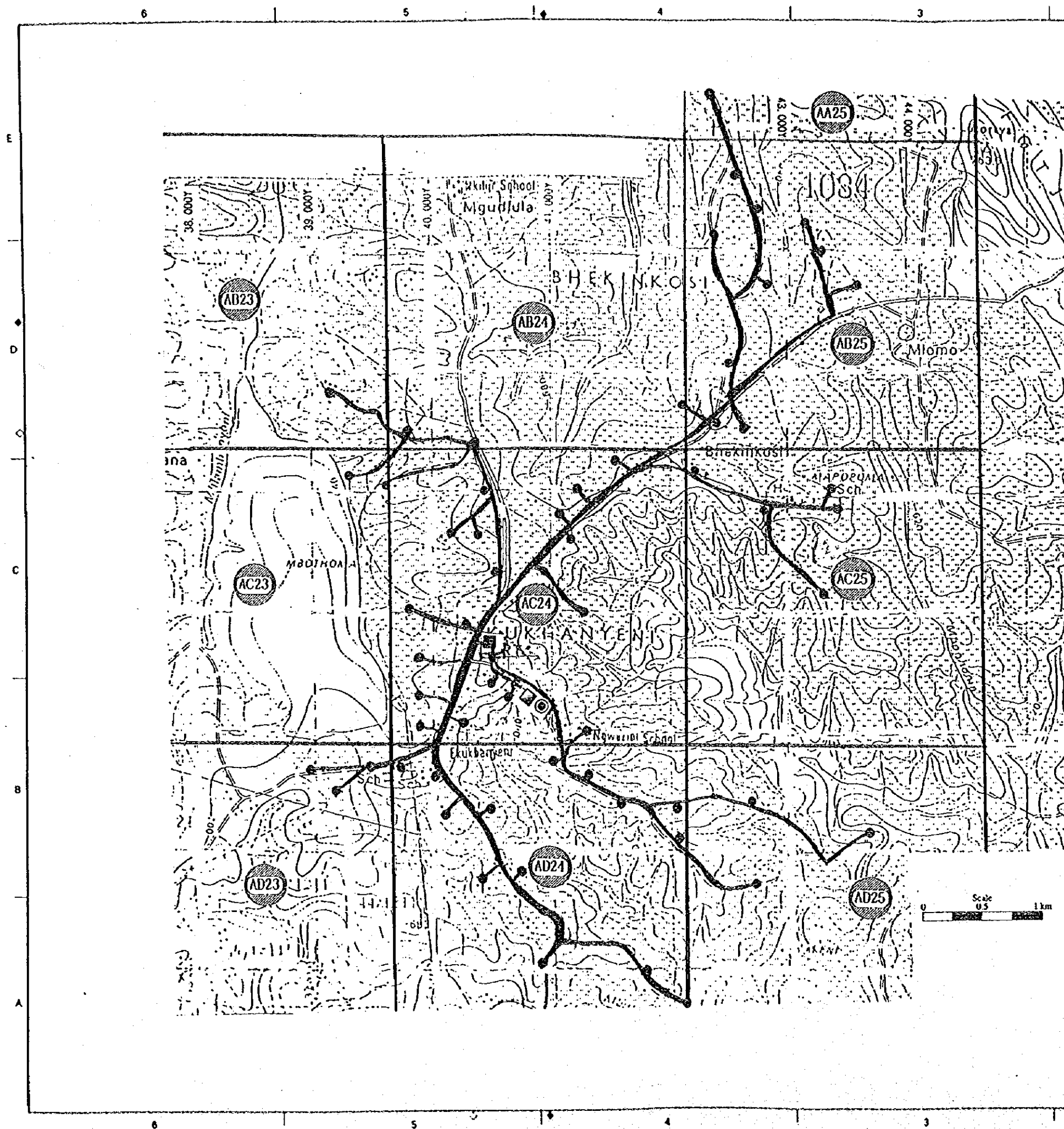
Drawings

DRAWING LIST

Title	Drawing No.	Scale
I. Outline Area		
1. Project Area(Four Location)	1	See Draw
2. Piping Route Outline (Ngwazini Community)	2	See Draw
3. Piping Route Outline (Bekhinkosi Community)	3	See Draw
4. Piping Route Outline (Msumpe Community)	4	See Draw
5. Piping Route Outline (Somntongo Community)	5	See Draw
6. Flow Sheet of Water Supply System	6	Non
II. Intake Well Facility (Ngwazini, Bekhinkosi, Somntongo Community)		
7. Intake Well Facility	7	Non
8. Intake Well Facility & Control House (Ngwazini, Bekhinkosi)	8	See Draw
9. Intake Well Facility & Control House (Somntongo)	9	See Draw
10. 5.0 m ³ Raw Water Tank (Somntongo Community)	10	See Draw
11. Control Panel (Type-1) (Ngwazini, Bekhinkosi Community)	11	See Draw
12. Control Panel (Type-2) (Somntongo Community)	12	See Draw
III. Intake River Facility (Msumpe Community)		
13. Intake Weir (Msumpe Community)	13	See Draw
IV. Water Treatment Facility (Msumpe Community)		
14. Roughing Filter (Msumpe Community)	14	See Draw
15. 2 × 20 m ³ Slow Sand Filter (Msumpe Community)	15	See Draw
16. 2 × 20 m ³ Slow Sand Filter Site Plan (Msumpe Community)	16	See Draw
17. 2 × 70 m ³ Slow Sand Filter (Msumpe Community)	17	See Draw
18. 2 × 70 m ³ Slow Sand Filter Site Plan (Msumpe Community)	18	See Draw
V. Distribution Facility		
19. Details of 300 m ³ Reservoir (Ngwazini Community)	19	See Draw
20. 300 m ³ Reservoir Site Plan (Ngwazini Community)	20	See Draw
21. Details of 170 m ³ Reservoir (Bekhinkosi Community)	21	See Draw
22. 170 m ³ Reservoir Site Plan (Bekhinkosi Community)	22	See Draw
23. Details of 20 m ³ Reservoir (Msumpe Community)	23	See Draw
24. 20 m ³ Reservoir Site Plan (Msumpe Community)	24	See Draw
25. Details of 70 m ³ Reservoir (Msumpe Community)	25	See Draw
26. 70 m ³ Reservoir Site Plan (Msumpe Community)	26	See Draw
27. Details of 90 m ³ Reservoir (Somntongo Community)	27	See Draw
28. 90 m ³ Reservoir Site Plan (Somntongo Community)	28	See Draw
29. Details of 265 m ³ Reservoir (Somntongo Community)	29	See Draw
30. 265 m ³ Reservoir Site Plan (Somntongo Community)	30	See Draw
VI. Transmission Pipeline and Supply Water Pipeline		
31. Standard Pipe Laying Works	31	Non

Title	Drawing No.	Scale
32. Under Ground Piping(Road, Field, Bridge, River Crossing and others)	32	See Draw
33. Details of Break Pressure Tank	33	1/20
34. Details of each Valve Chamber for Supply Water Pipeline	34	1/20
35. Detail of Valve Chamber, Anchor Block & Washout	35	1/20
36. Detail of Standpipe	36	See Draw
37. Handpump(For Borehole)	37	See Draw
38. Supply Water Pipeline (1)(Ngwazini Community)	38	1/10,000
39. Supply Water Pipeline (2)(Ngwazini Community)	39	1/10,000
40. Supply Water Pipeline (3)(Ngwazini Community)	40	1/10,000
41. Supply Water Pipeline (4)(Ngwazini Community)	41	1/10,000
42. Supply Water Pipeline (5)(Ngwazini Community)	42	1/10,000
43. Supply Water Pipeline (6)(Ngwazini Community)	43	1/10,000
44. Supply Water Pipeline (7)(Ngwazini Community)	44	1/10,000
45. Supply Water Pipeline (8)(Ngwazini Community)	45	1/10,000
46. Supply Water Pipeline (9)(Ngwazini Community)	46	1/10,000
47. Supply Water Pipeline(10)(Ngwazini Community)	47	1/10,000
48. Supply Water Pipeline (1)(Bekhinkosi Community)	48	1/10,000
49. Supply Water Pipeline (2)(Bekhinkosi Community)	49	1/10,000
50. Supply Water Pipeline (3)(Bekhinkosi Community)	50	1/10,000
51. Supply Water Pipeline (4)(Bekhinkosi Community)	51	1/10,000
52. Supply Water Pipeline (5)(Bekhinkosi Community)	52	1/10,000
53. Supply Water Pipeline (1)(Msumpe Community)	53	1/10,000
54. Supply Water Pipeline (2)(Msumpe Community)	54	1/10,000
55. Supply Water Pipeline (3)(Msumpe Community)	55	1/10,000
56. Supply Water Pipeline (4)(Msumpe Community)	56	1/10,000
57. Supply Water Pipeline (5)(Msumpe Community)	57	1/10,000
58. Supply Water Pipeline (6)(Msumpe Community)	58	1/10,000
59. Supply Water Pipeline (1)(Somtongo Community)	59	1/10,000
60. Supply Water Pipeline (2)(Somtongo Community)	60	1/10,000
61. Supply Water Pipeline (3)(Somtongo Community)	61	1/10,000
62. Supply Water Pipeline (4)(Somtongo Community)	62	1/10,000
63. Supply Water Pipeline (5)(Somtongo Community)	63	1/10,000
64. Supply Water Pipeline (6)(Somtongo Community)	64	1/10,000
65. Supply Water Pipeline (7)(Somtongo Community)	65	1/10,000
66. Supply Water Pipeline (8)(Somtongo Community)	66	1/10,000
67. Supply Water Pipeline (9)(somtongo Community)	67	1/10,000





Legend

- ⊙ ; Borehole
- ◻ ; Control House
- ◻ ; Type Reservoir
- ; Type Reservoir
- - - ; Transmission Pipeline
- ; Supply Water Pipeline
- ; Standpipe
- ⊙ ; Index Number

		AA25
AB23	AB24	AB25
AC23	AC24	AC25
AD23	AD24	AD25

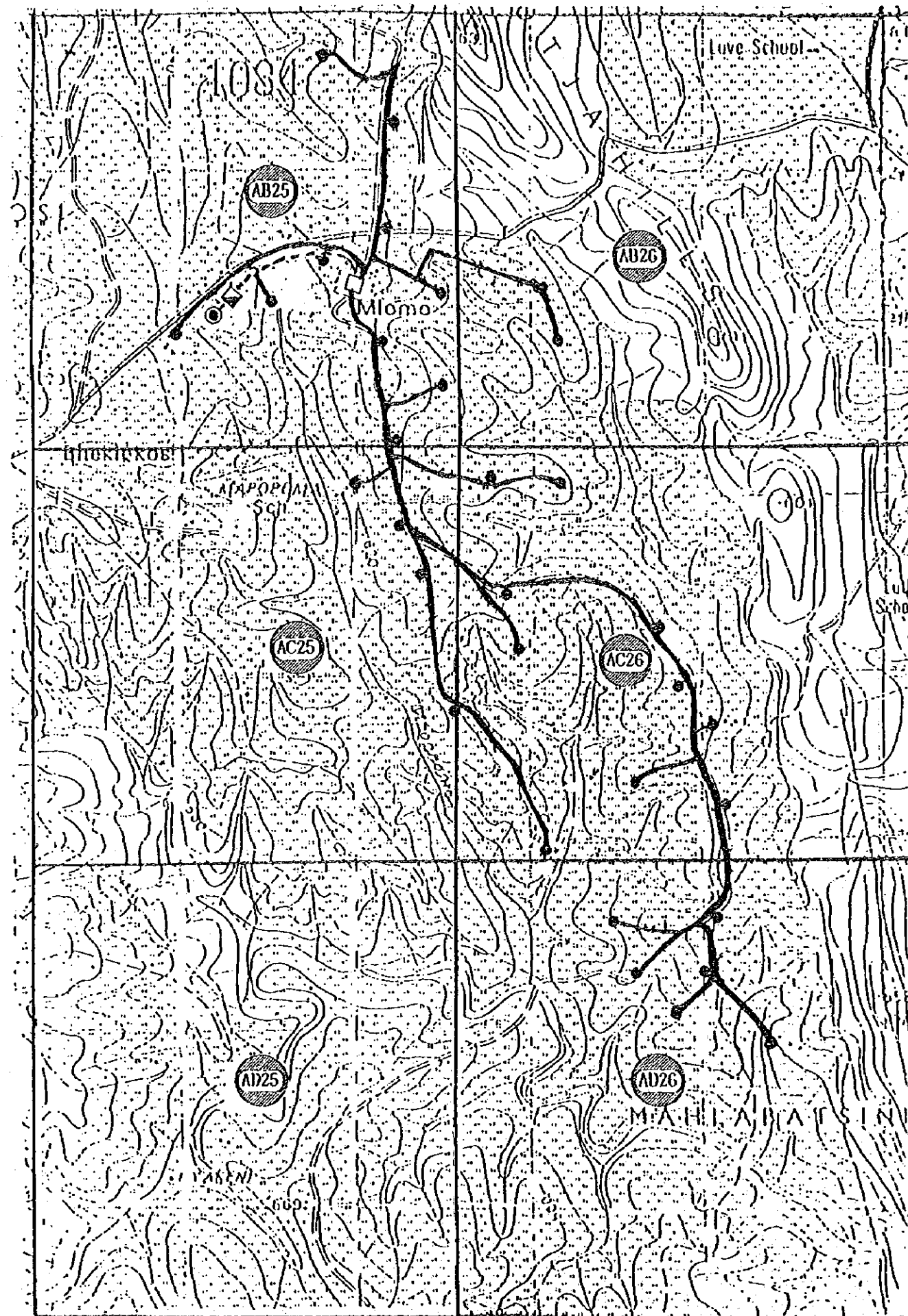
THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

The Rural Water Supply Project

Title Piping Route Outline (Ngwazini Community)

September 1995 Scale See Draw Draw No. 2.

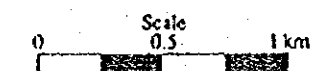
JAPAN INTERNATIONAL COOPERATION AGENCY



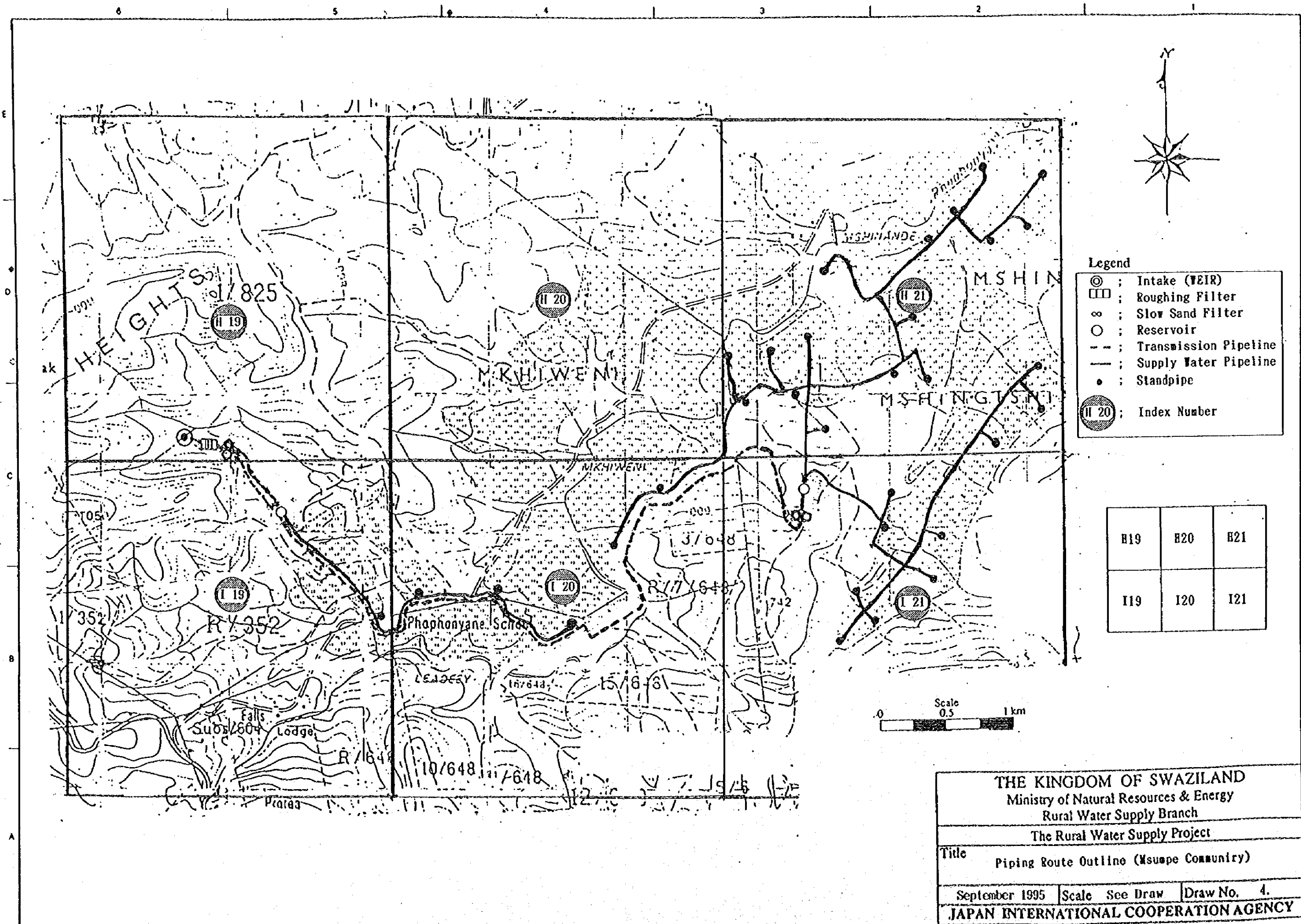
Legend

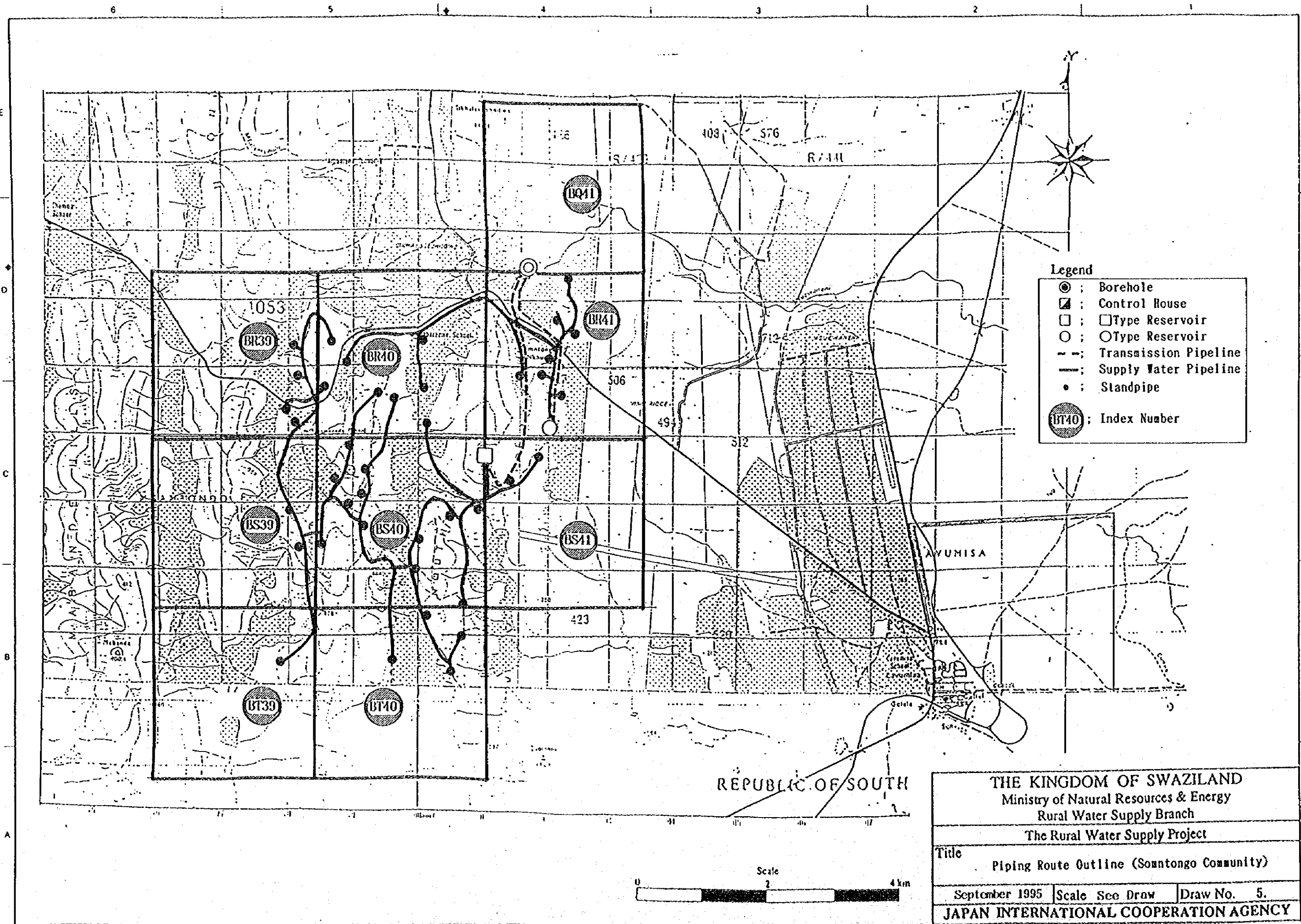
- ⊙ : Borehole
- ▣ : Control House
- : □Type Reservoir
- : ○Type Reservoir
- - : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- ⊙AD25 : Index Number

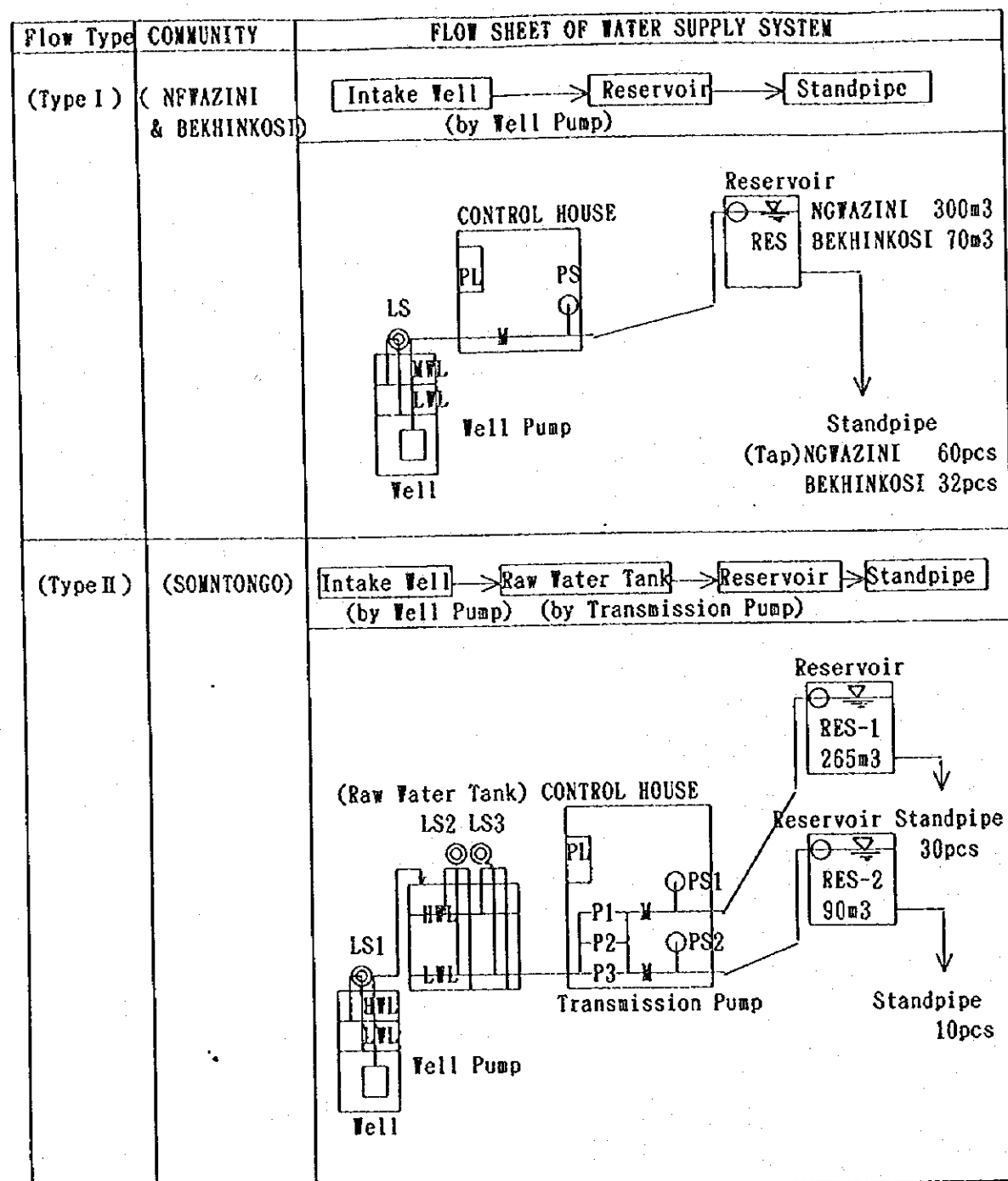
AB25	AB26
AC25	AC26
	AD26



THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title			
Piping Route Outline (Bekhinkosi Community)			
September 1995	Scale	See Draw	Draw No. 3.
JAPAN INTERNATIONAL COOPERATION AGENCY			







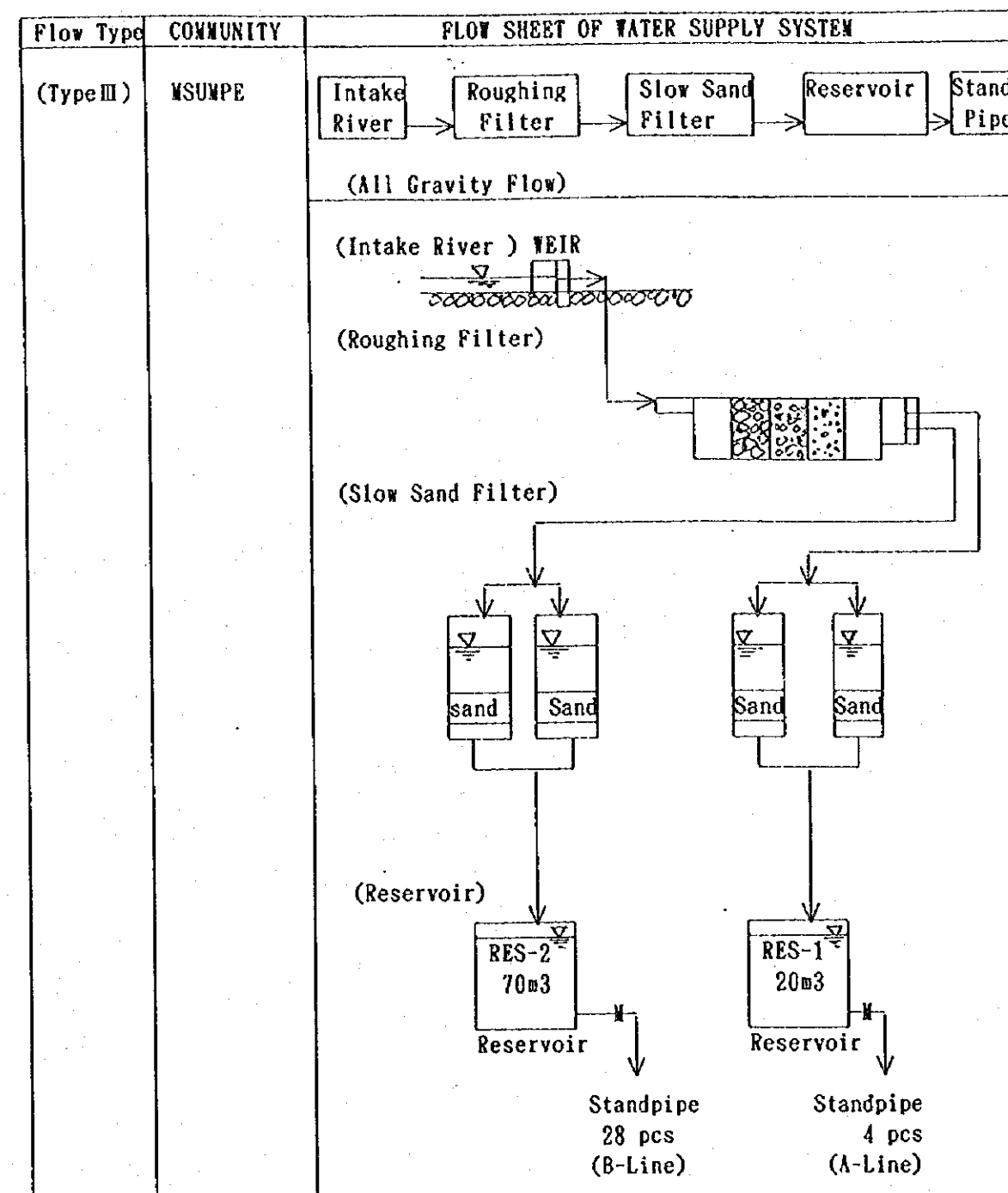
Legend

PL ; Control Panel

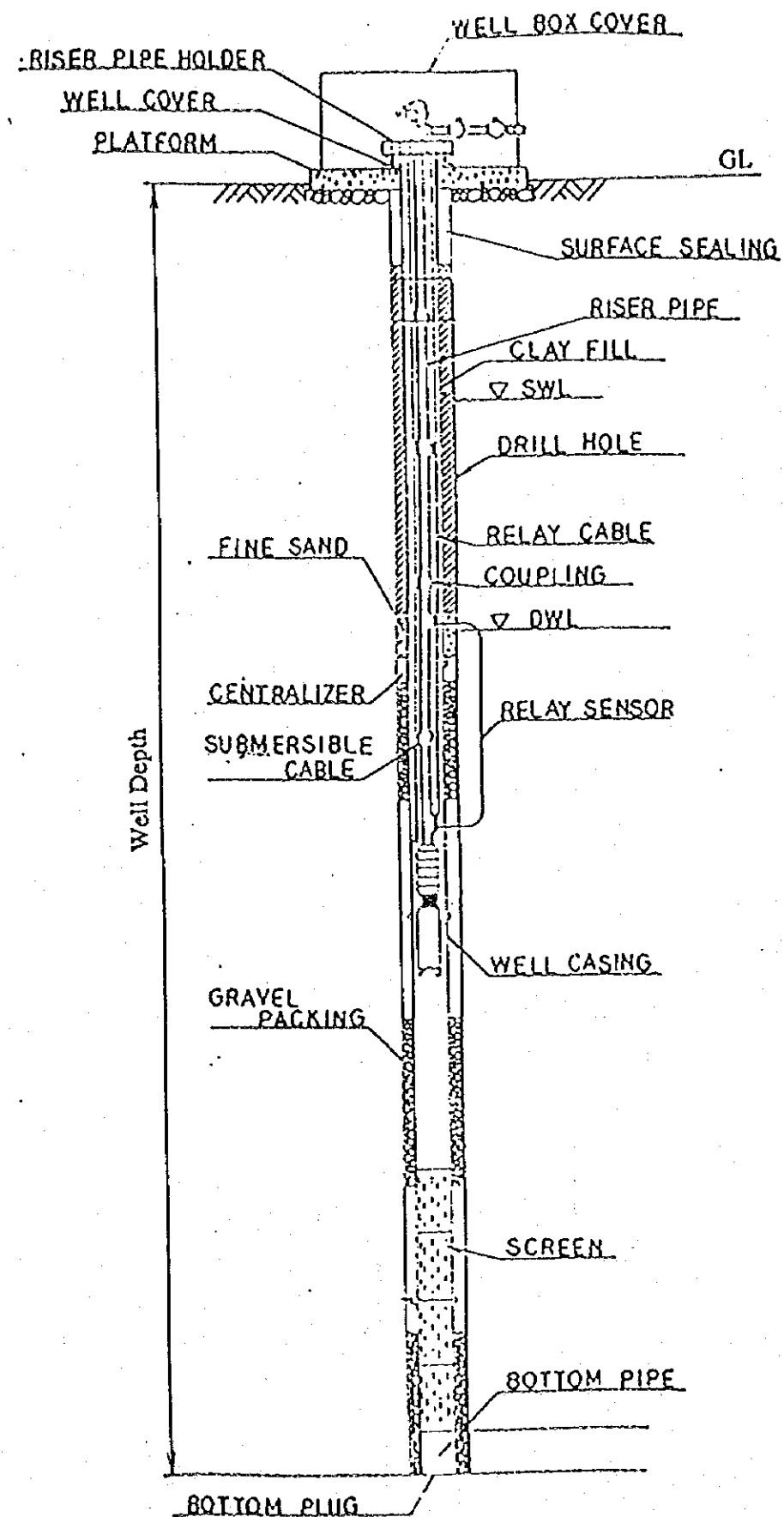
PS ; Pressure Switch

M ; Flow Meter

LS ; Level Switch

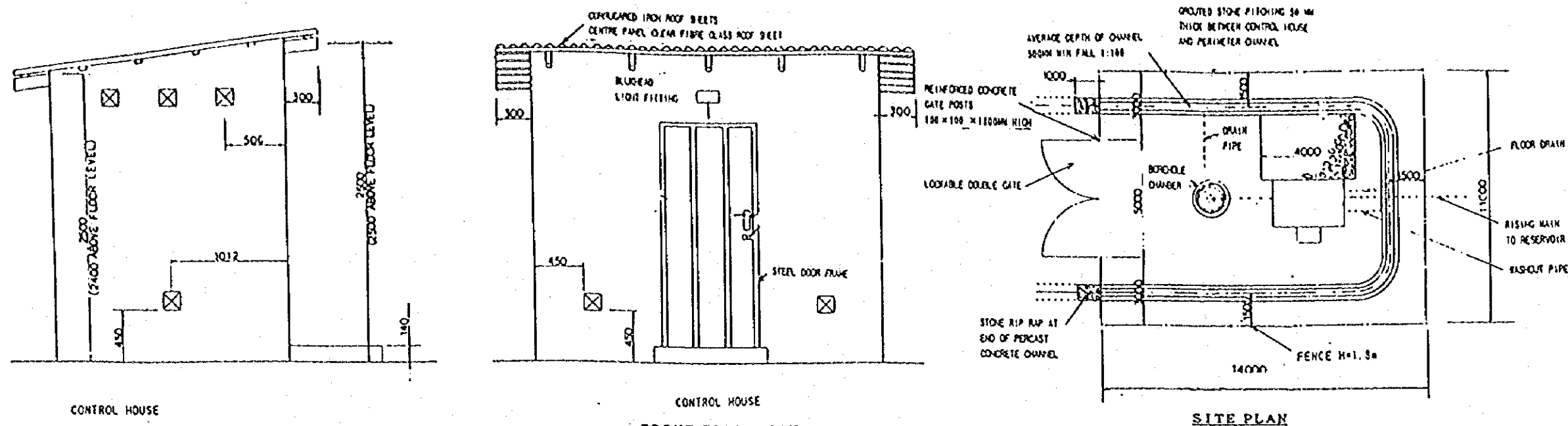


THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title Flow Sheet of Water Supply System		
September 1995	Scale Non	Draw No. 6.
JAPAN INTERNATIONAL COOPERATION AGENCY		

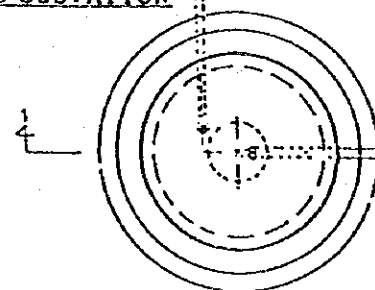


	Ngwazini	Bekhinkosi	Somntongo
Ground Level (m)	699.6	672.5	230
Well Depth (m)	60	55	88
Static Water Level (m)	-29.8	-18.6	-5.4
Dynamic Water Level (m)	-37.6	-20.6	-11.2
Discharge Capacity (l/min)	165	165	189
Total Head (m)	100	100	30
Motor Capacity (kw)	5.5	5.5	3.7

THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Intake Well Facility	
September 1995	Scale Non	Draw No. 1.
JAPAN INTERNATIONAL COOPERATION AGENCY		

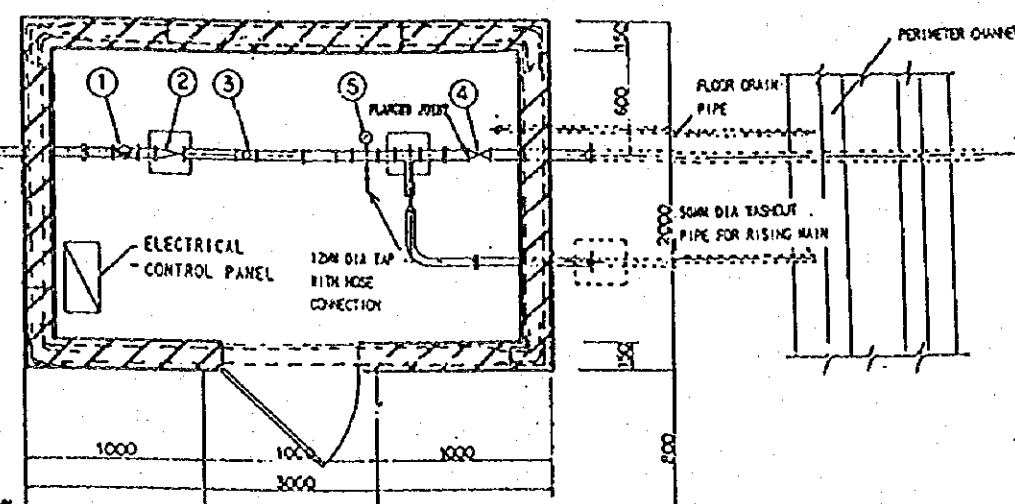


SIDE ELEVATION



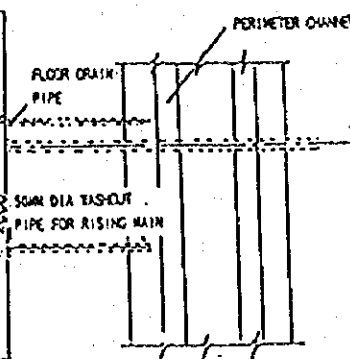
BOREHOLE CHAMBER

SECTIONAL PLAN 2-2

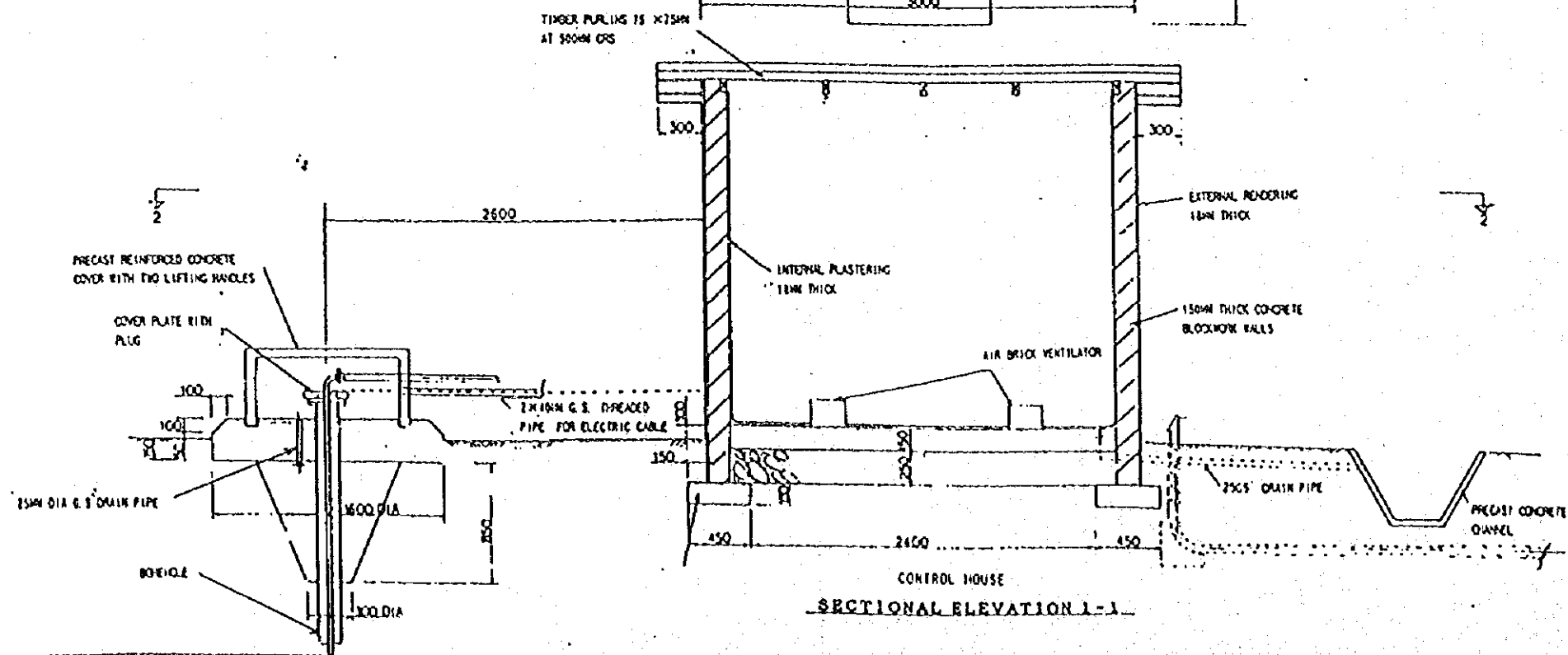


CONTROL HOUSE

FRONT ELEVATION



No	LIST
①	AIR RELEASE VALVE
②	— 2 VALVE
③	WATER METER
④	GATE VALVE
⑤	PRESSURE GAUGE



CONTROL HOUSE

SECTIONAL ELEVATION 1-1

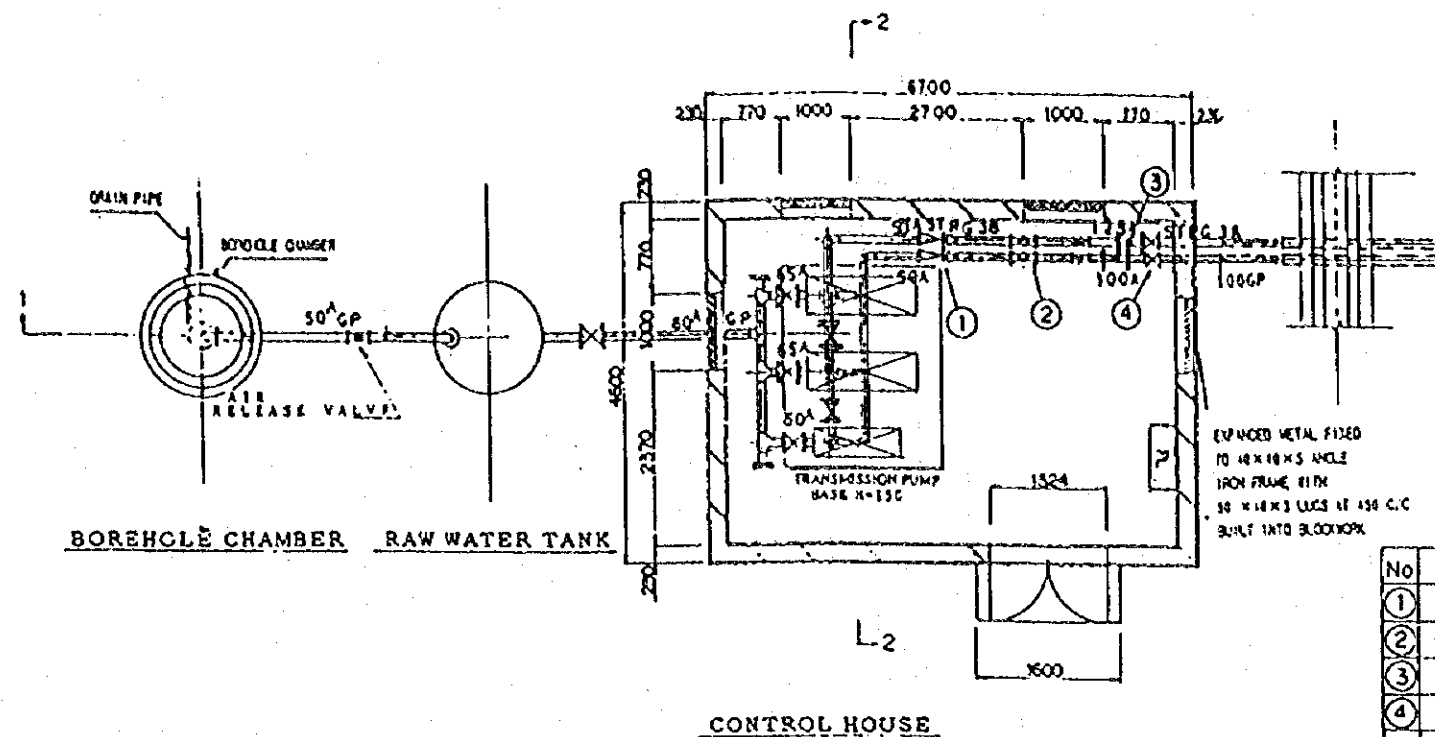
THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

The Rural Water Supply Project

Title	Intake Well Facility & Control House (Ngwazini, Bekhinkosi Community)
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September 1995	Scale See Draw	Draw No. 8.
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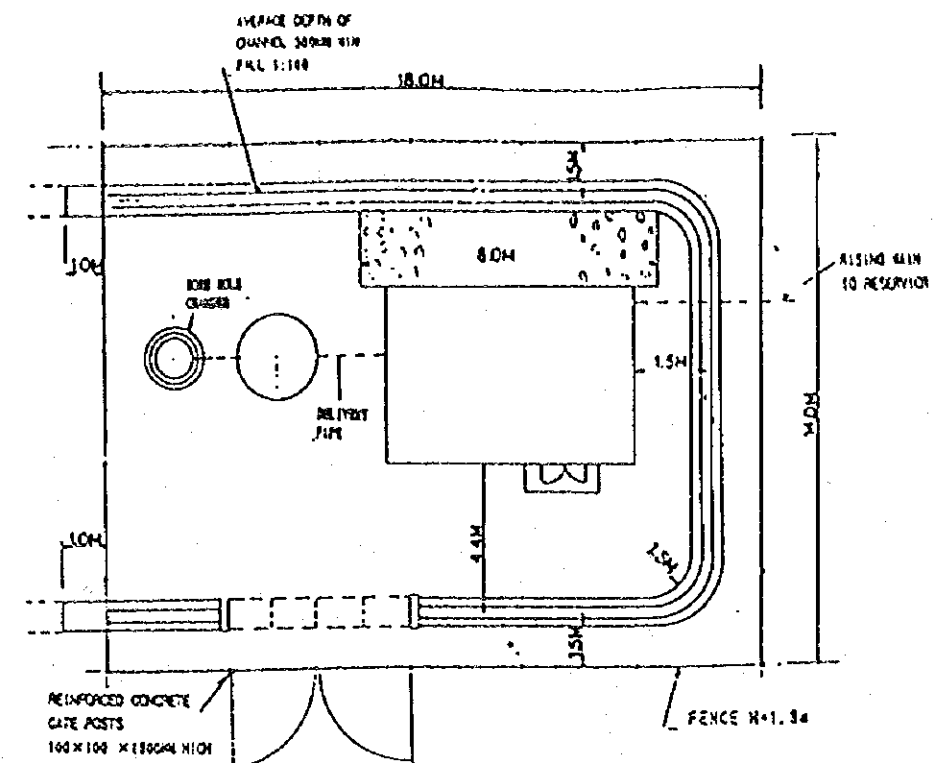
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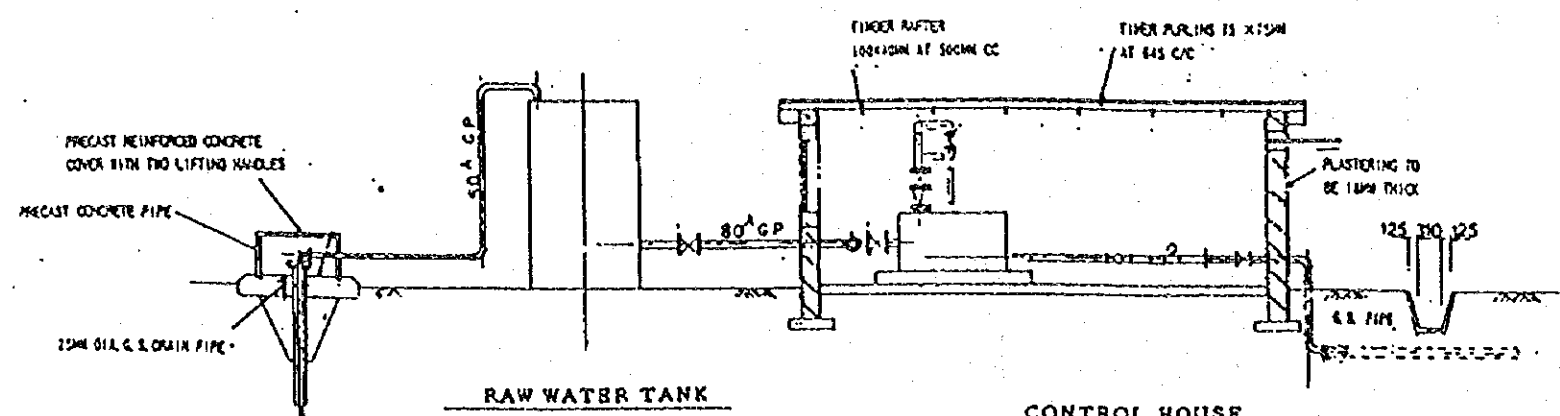
CONTROL HOUSE

SECTIONAL PLAN
SCALE S=1/100

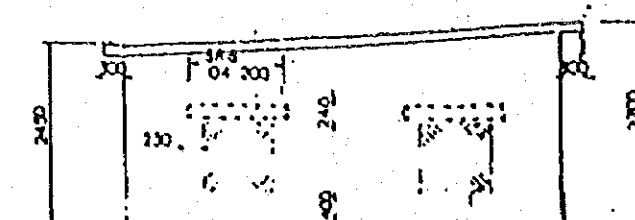
No	LIST
①	CHECK VALVE
②	WATER METER
③	PRESSURE GAUGE
④	GATE VALVE
PL	CONTROL PANEL



PLAN
S=1/200



SECTIONAL ELEVATION 1-1
S=1/100



SIDE ELEVATION

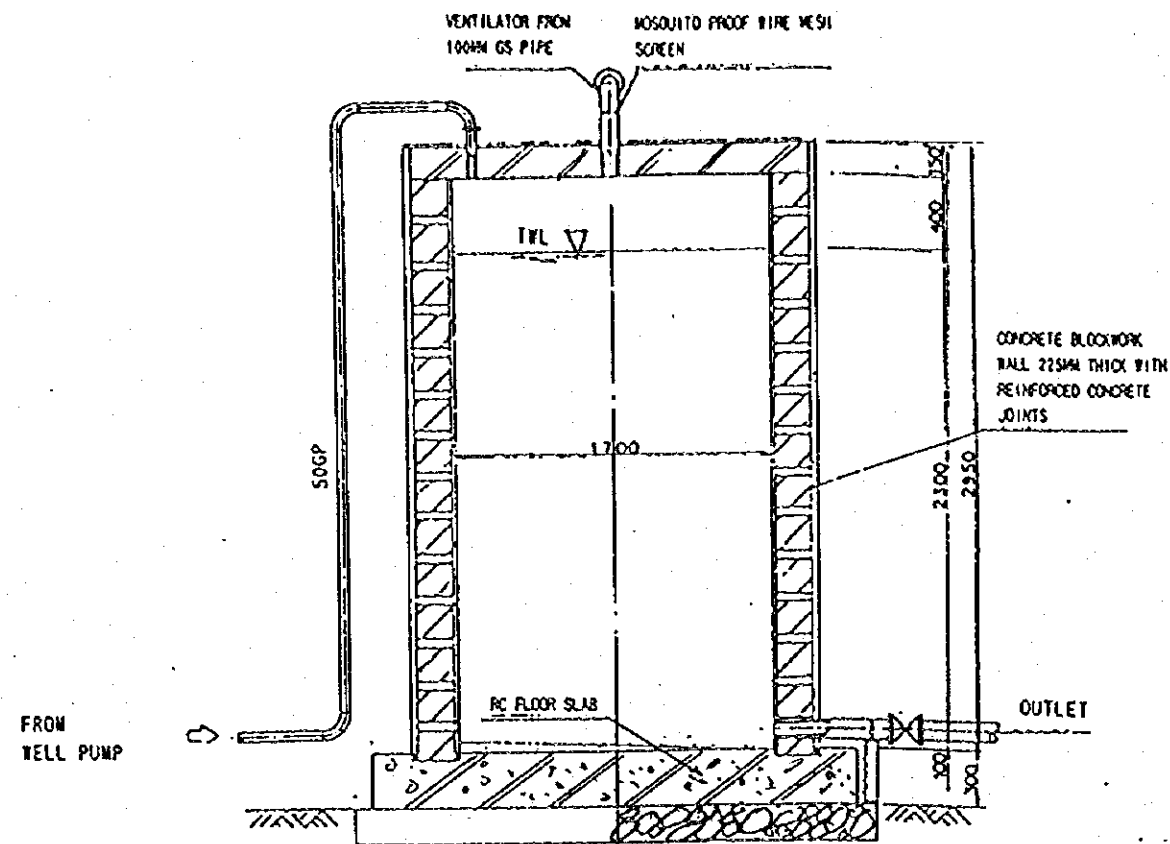
THE KINGDOM OF SWAZILAND
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Rural Water Supply Branch

The Rural Water Supply Project

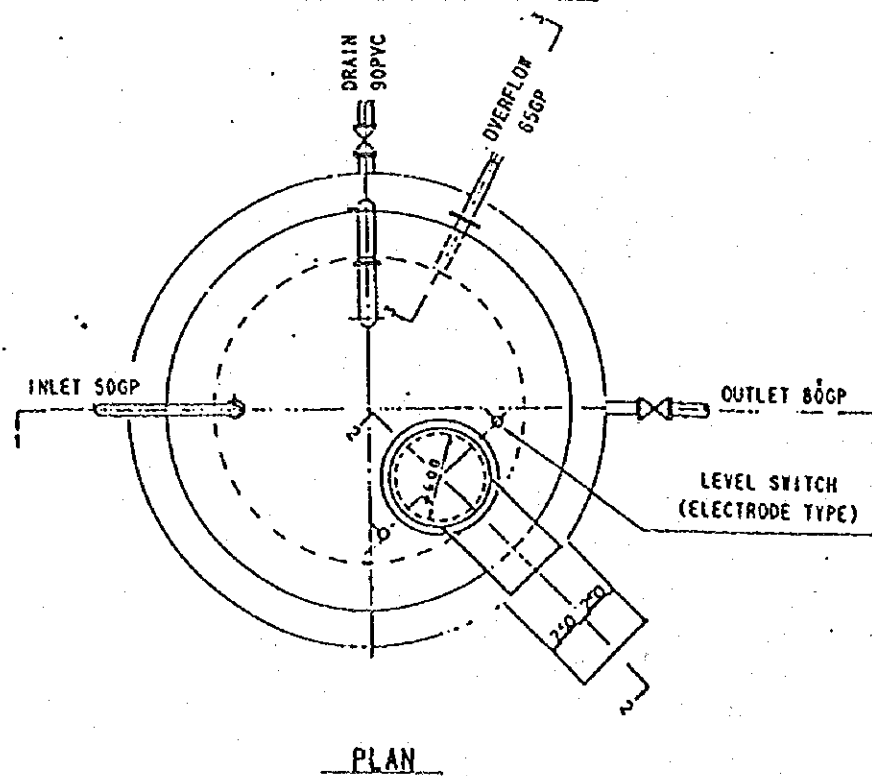
Title Intake Well Facility & Control House
(Sontongo Community)

September 1995 Scale See Draw Draw No. 9.

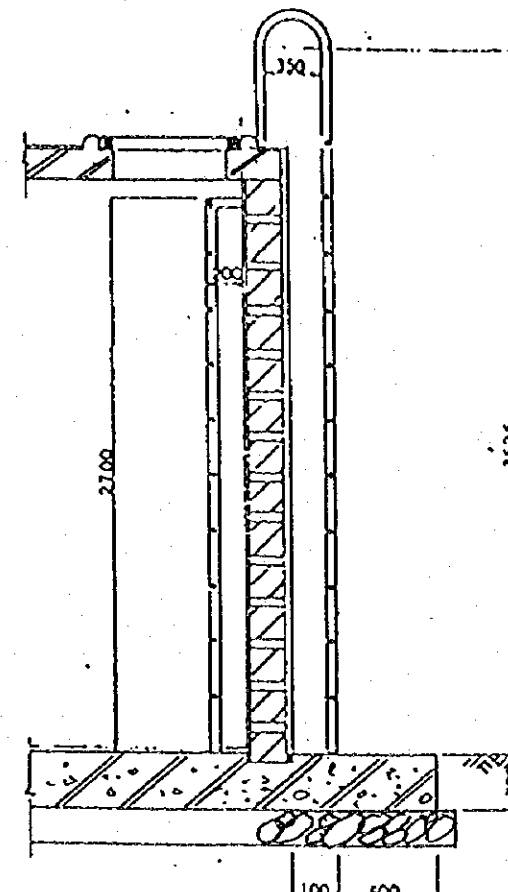
JAPAN INTERNATIONAL COOPERATION AGENCY



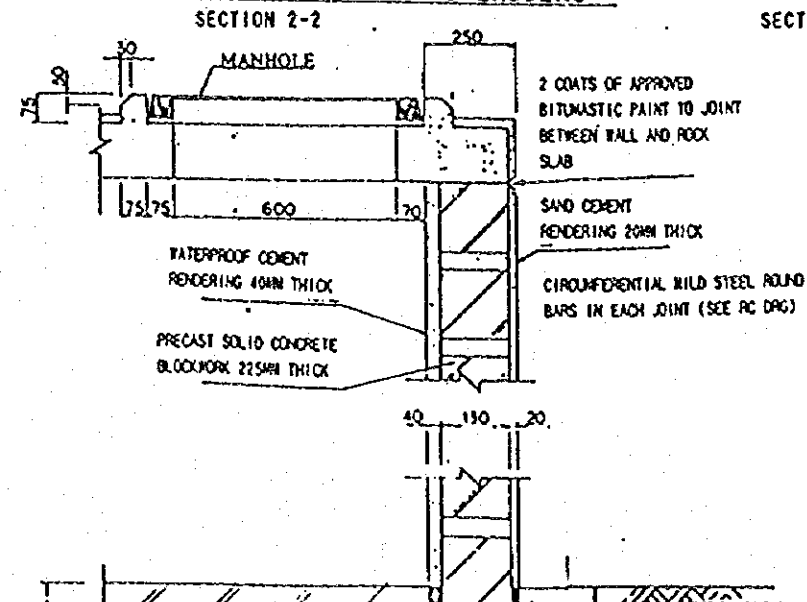
SECTIONAL ELEVATION 1-1



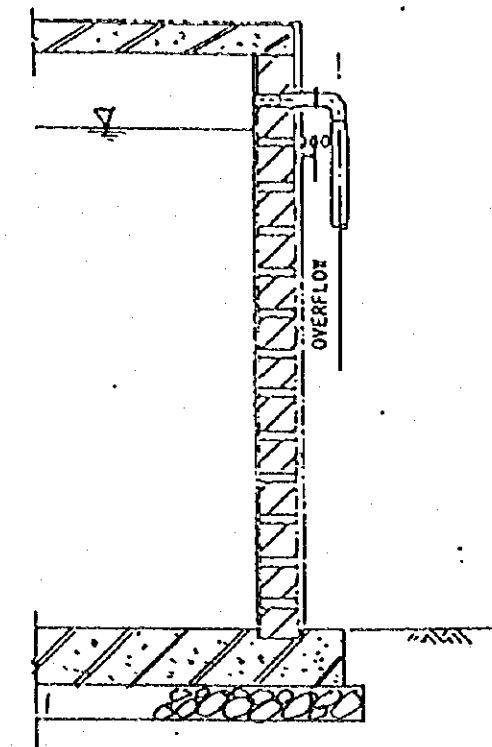
PLAN



DETAIL OF ACCESS LADDERS



TYPICAL DETAIL OF PERIMETER WALL AT ROOF AND FLOOR SLAB



DETAIL OF OVERFLOW PIPE

Note:
The direction of nozzles to be installed will be determined in the detailed design.

THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

The Rural Water Supply Project

Title
5.0 m³ Raw Water Tank (Somntongo Community)

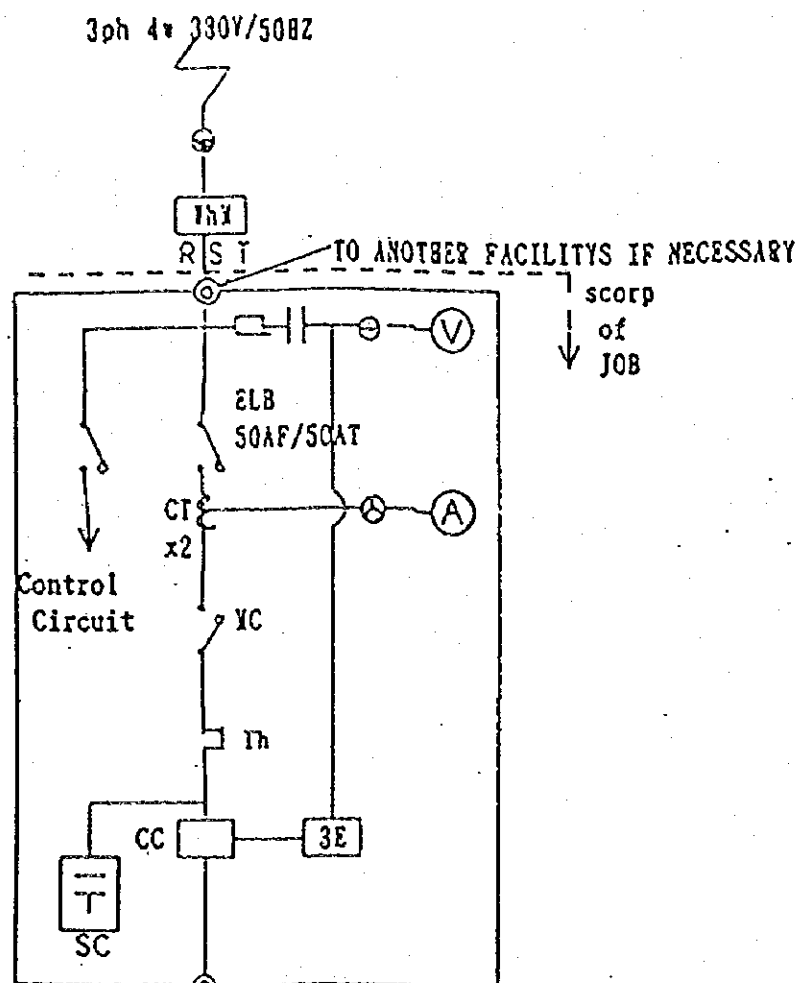
September 1995 Scale See Draw Draw No. 10.

JAPAN INTERNATIONAL COOPERATION AGENCY

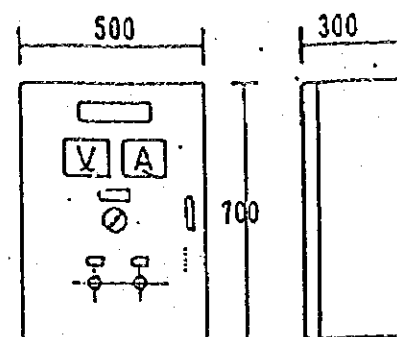
CONTROL PANEL

Type-1.....Automatic Control System

(For Well Pump ----- NGWAZINI COMMUNITY & BEKHINKOSI COMMUNITY)



TYPICAL SINGLE LINE DIAGRAM

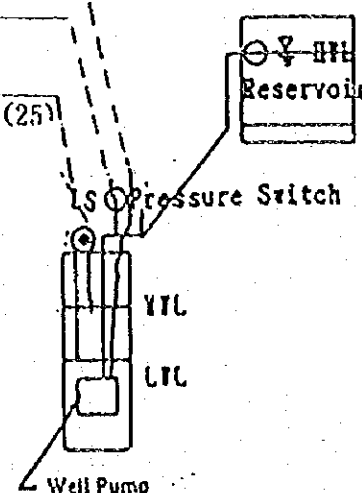


TYPICAL PANEL OUTLINE

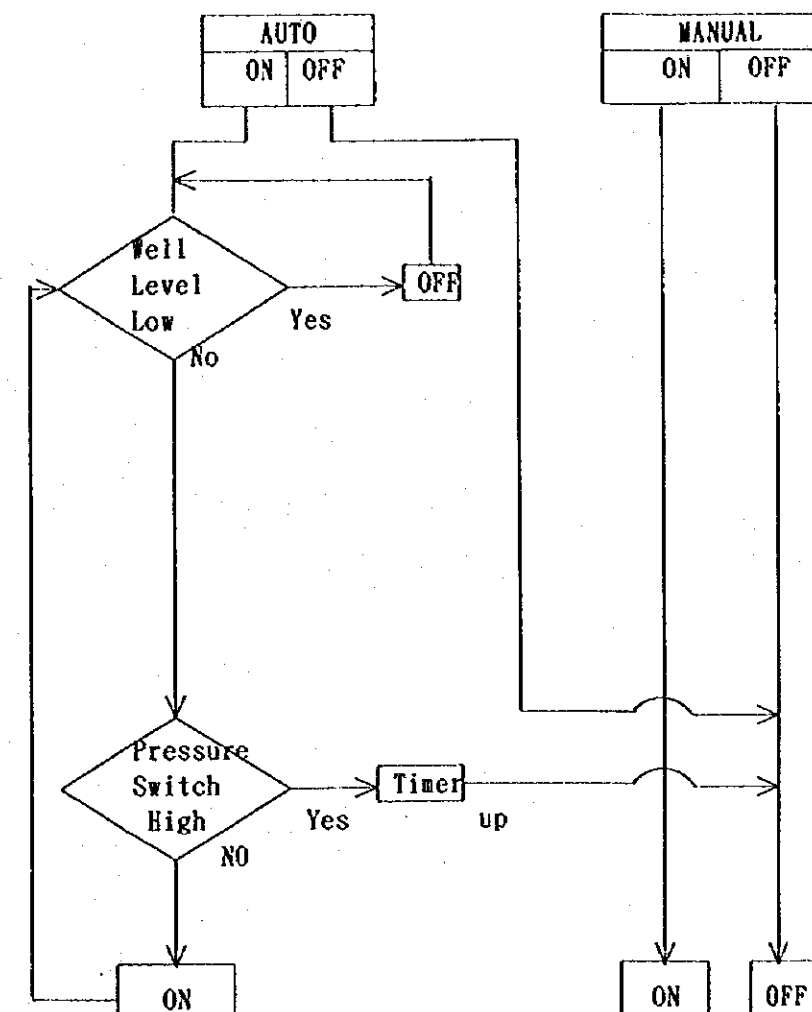
REMARKS: Dimension (approx.)
KEY WILL BE PROVIDED
AT THE DOOR
THE PANEL IS INDOOR
WALL MOUNTED TYPE

TO CONTROL
PANEL

Power Cable
VCT 5.5sqx3C GP(25)
Control Cable
CVV 2sqx3C GP(25)
Control Cable x2
Pump Accessory Cable GP(25)



TYPICAL PLOT DIAGRAM



FAULT: THERMAL RELAY ENERGIZED
3E RELAY ENERGIZED ELB TRIPPED

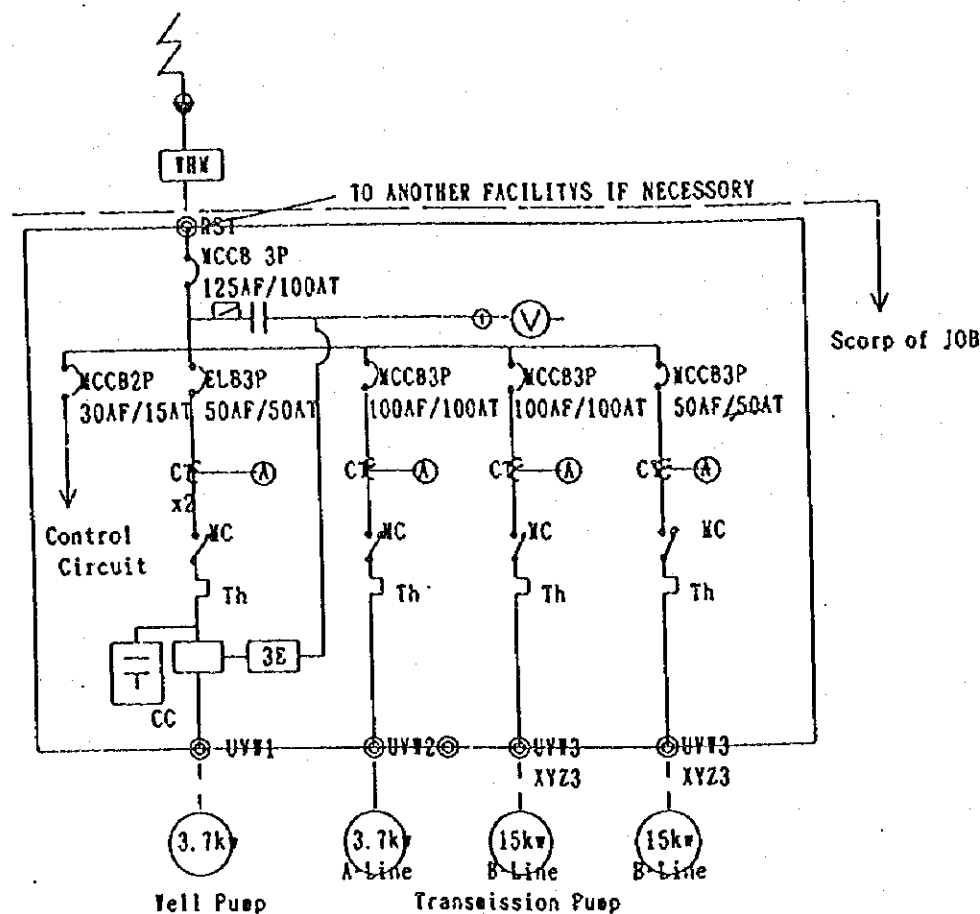
TYPICAL OPERATION DIAGRAM

THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Control Panel (Type-1) (Ngwazini, Bekhinkosi Community)	
September 1995	Scale See Draw	Draw No. 11
JAPAN INTERNATIONAL COOPERATION AGENCY		

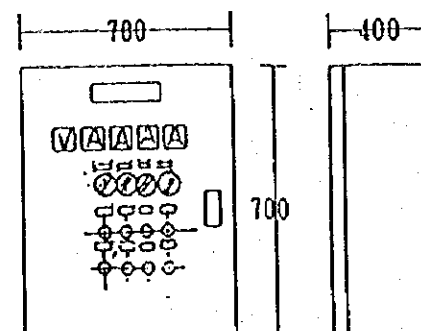
CONTROL PANEL

Type-2.....Automatic Control System
(For Well Pump & Transmission PumpSOMNTONGO COMMUNITY)

3ph 4w380V/50HZ

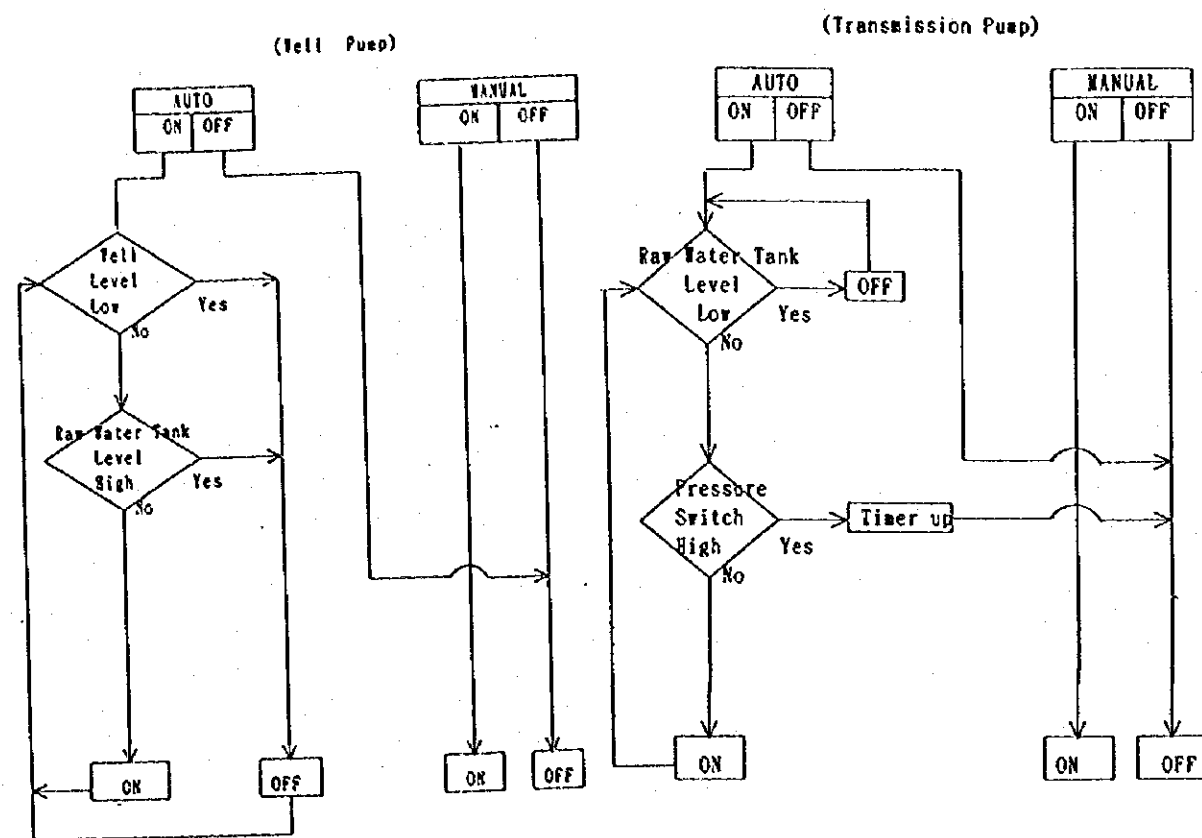


TYPICAL SINGLE DIAGRAM



TYPICAL PANEL OUTLINE

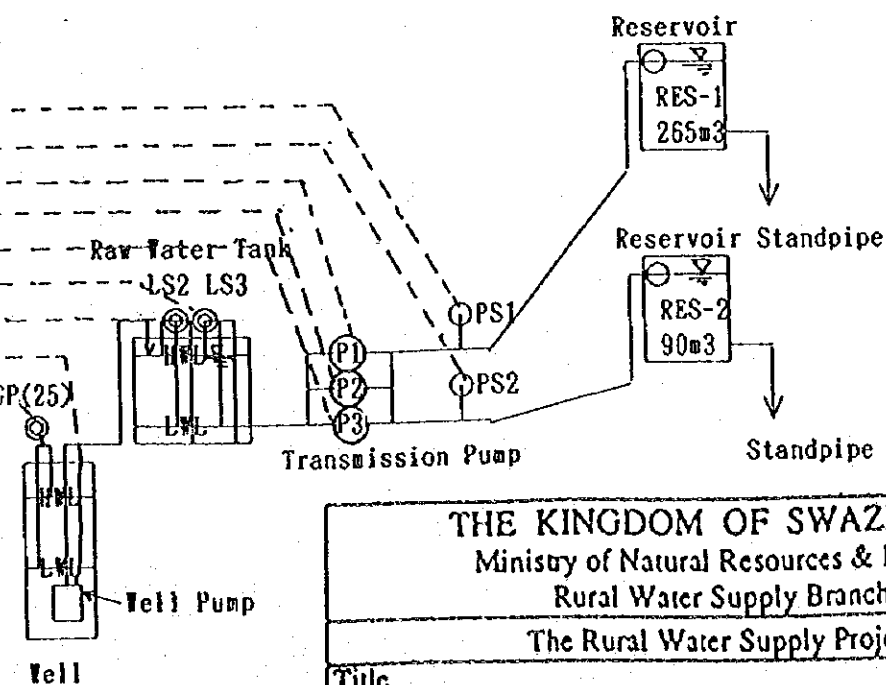
REMARKS: Dimension (approx.)
KEY WILL BE PROVIDED
AT THE DOOR
THE PANEL IS INDOOR
WALL MOUNTED TYPE



TYPICAL OPERATION DIAGRAM

TO CONTROL
PANEL

Control Cable CVV 2sqx3C GP(25)
Control Cable CVV 2sqx3C GP(25)
Power Cable VCT8sqx4C-2 GP(32)
Power Cable VCT8sqx4C-2 GP(32)
Power Cable VCT3.5sqx4C GP(25)
Control Cable CVV 2sqx3C GP(25)
Control Cable CVV 2sqx3C GP(25)
Power Cable VCT 3.5sqx3C GP(25)
Control Cable Pump Accessory Cable-2 GP(25)



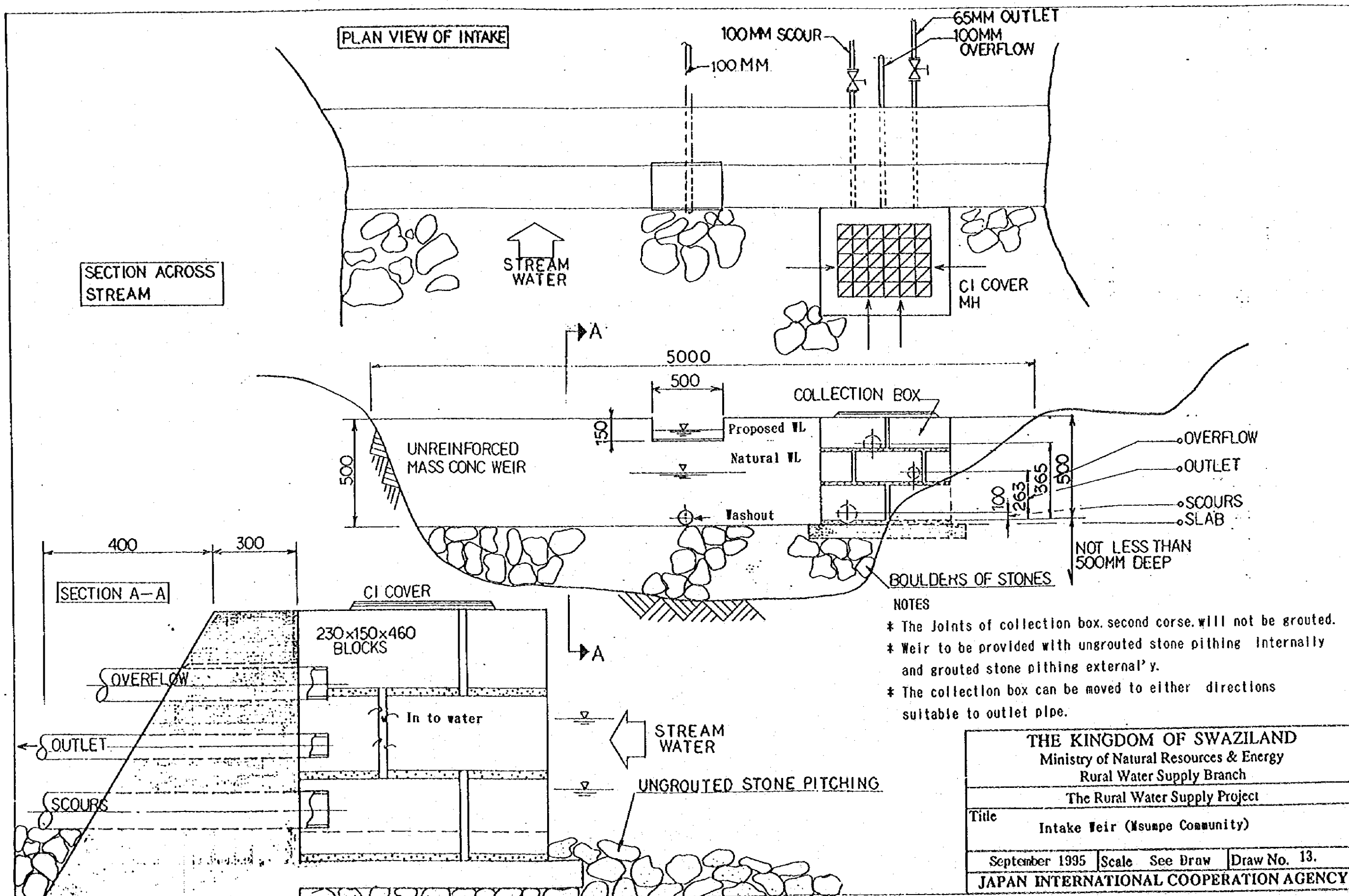
THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

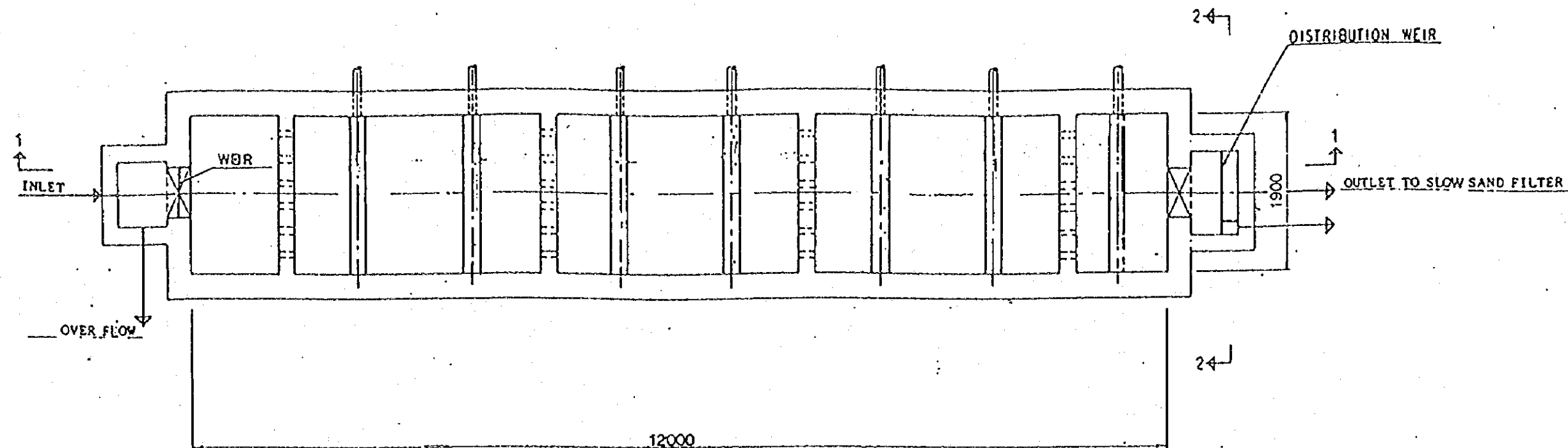
The Rural Water Supply Project

Title Control Panel (Type-2) (Somntongo Community)

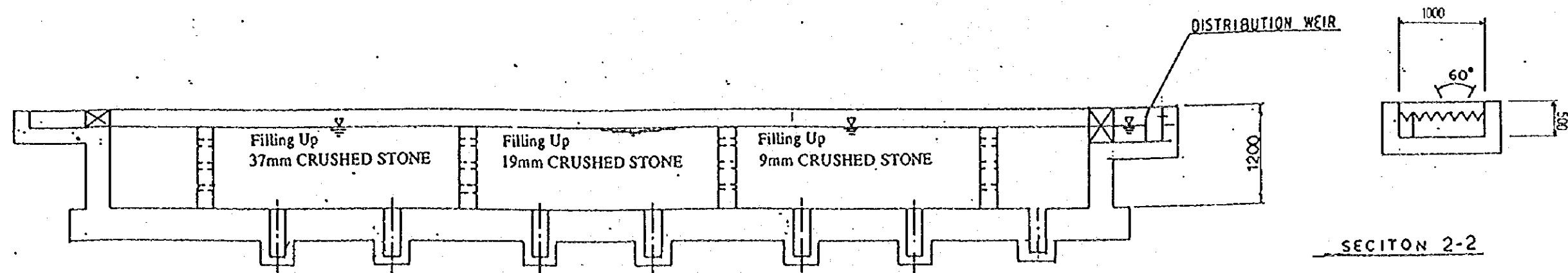
September 1995 Scale See Draw Draw No. 12.

JAPAN INTERNATIONAL COOPERATION AGENCY





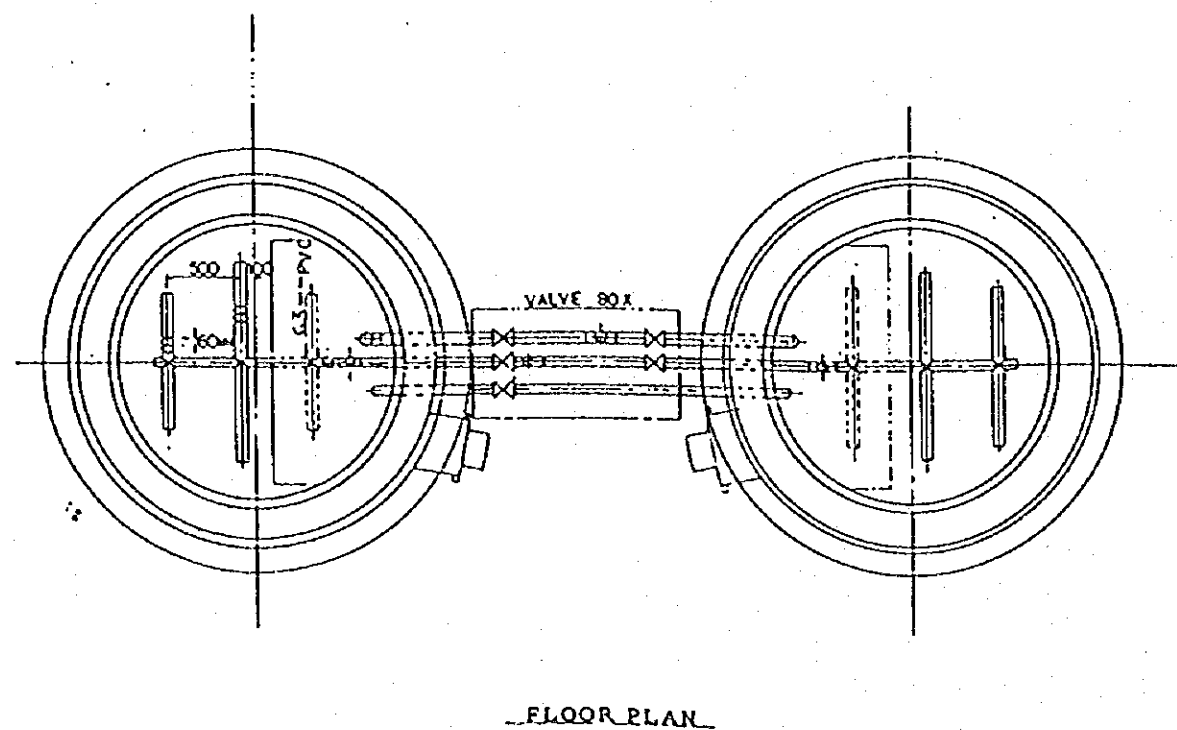
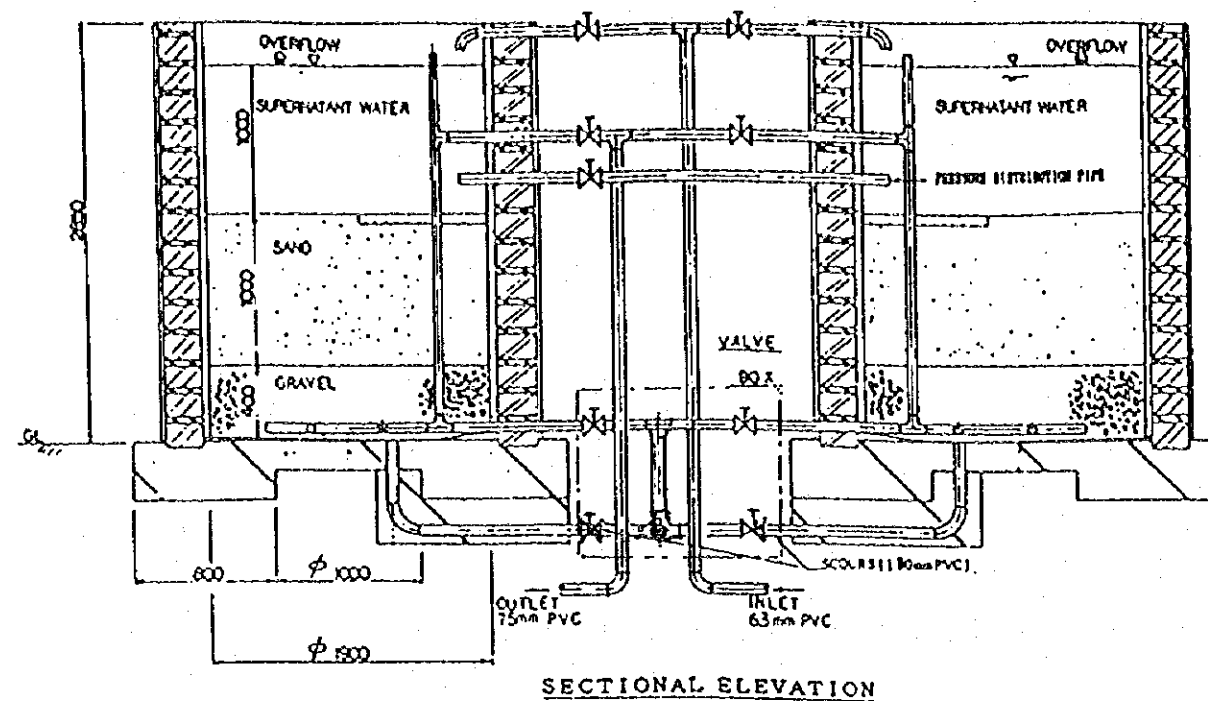
HORIZONTAL ROUGHING FILTER FOR 0.83 l/s OUTFLOW



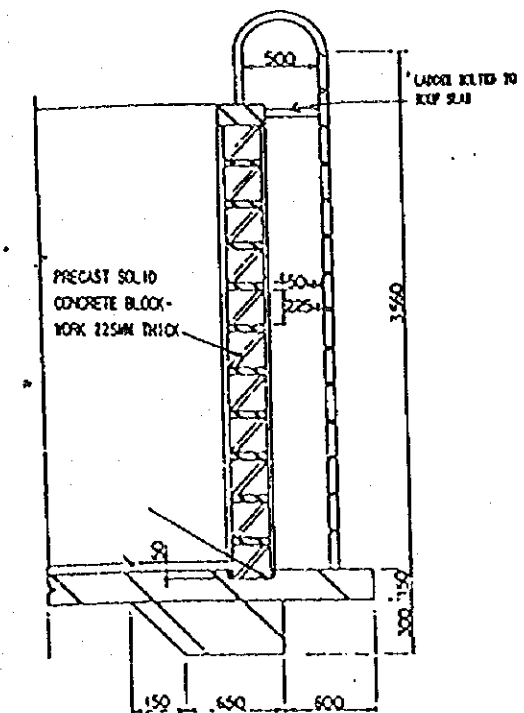
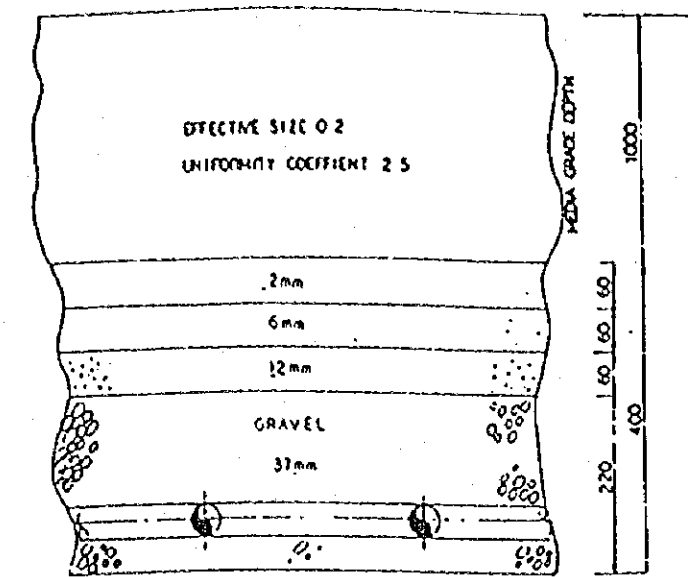
SECTION 1-1

SECTION 2-2

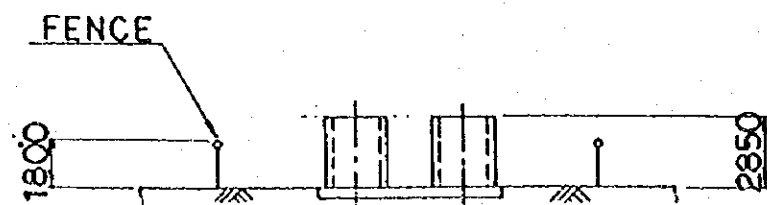
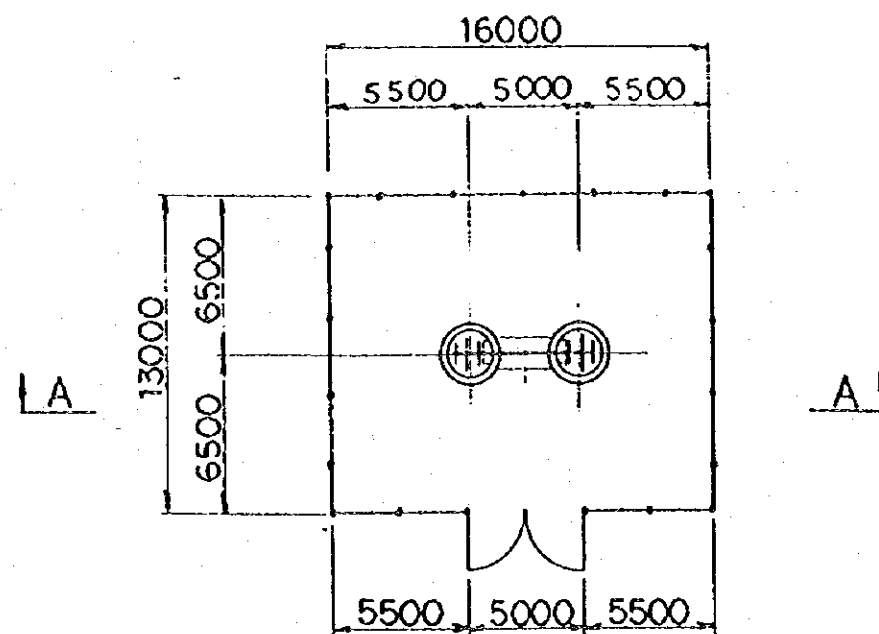
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title			
Roughing Filter (Msumpe Community)			
September 1995	Scale	See Draw	Draw No. 14.
JAPAN INTERNATIONAL COOPERATION AGENCY			



NOTE
THE DIRECTION OF
NOZZLES TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN

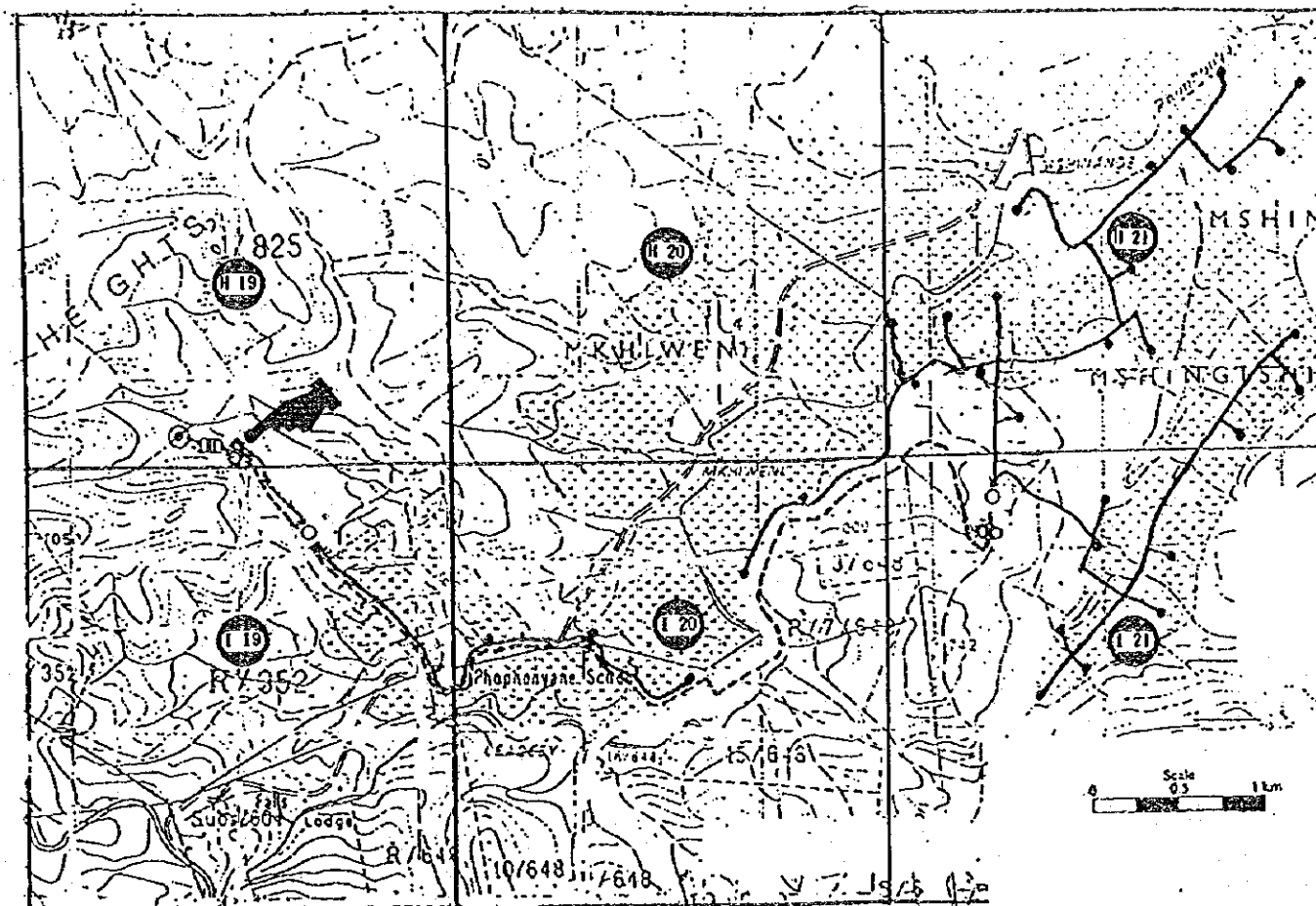


THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title	2 x 20 m ³ Slow Sand Filter (Msumbe Community)		
September 1995	Scale	See Draw	Draw No. 15
JAPAN INTERNATIONAL COOPERATION AGENCY			



A - LINE SLOW SAND FILTER

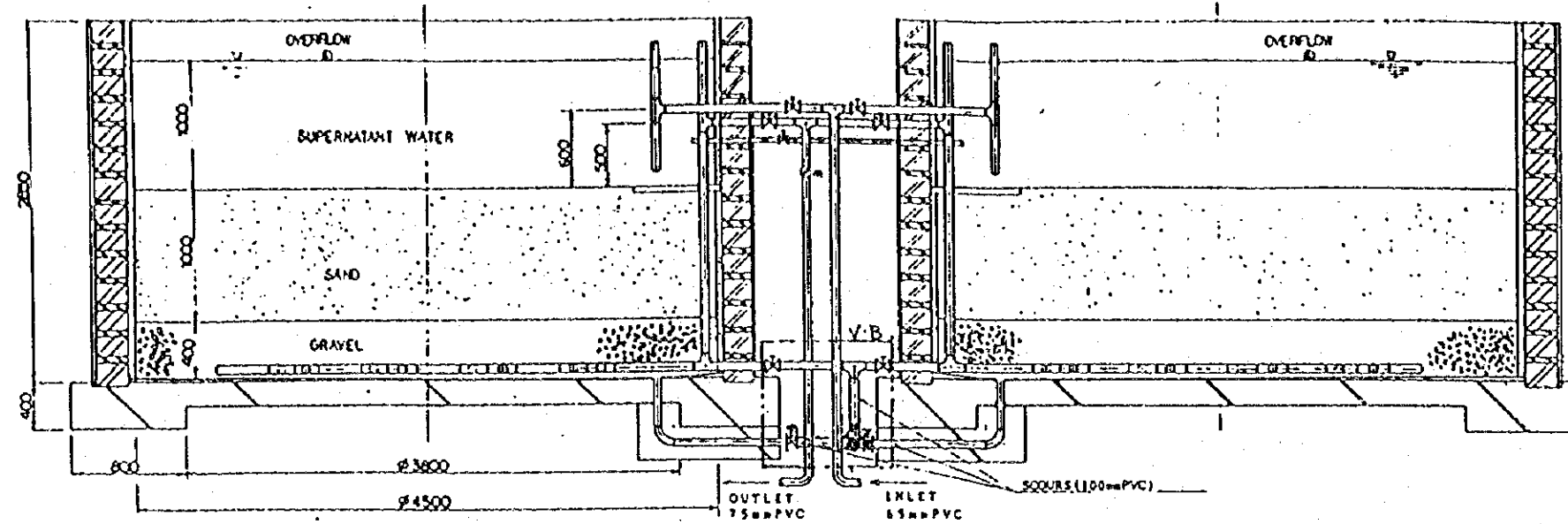
[KEY PLAN]



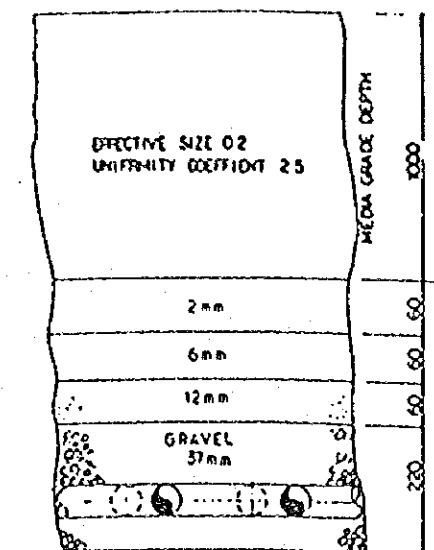
Legend

- ⊙ : Intake (IEIR)
- : Roughing Filter
- ∞ : Slow Sand Filter
- : Reservoir
- - : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- ⊙ 20 : Index Number

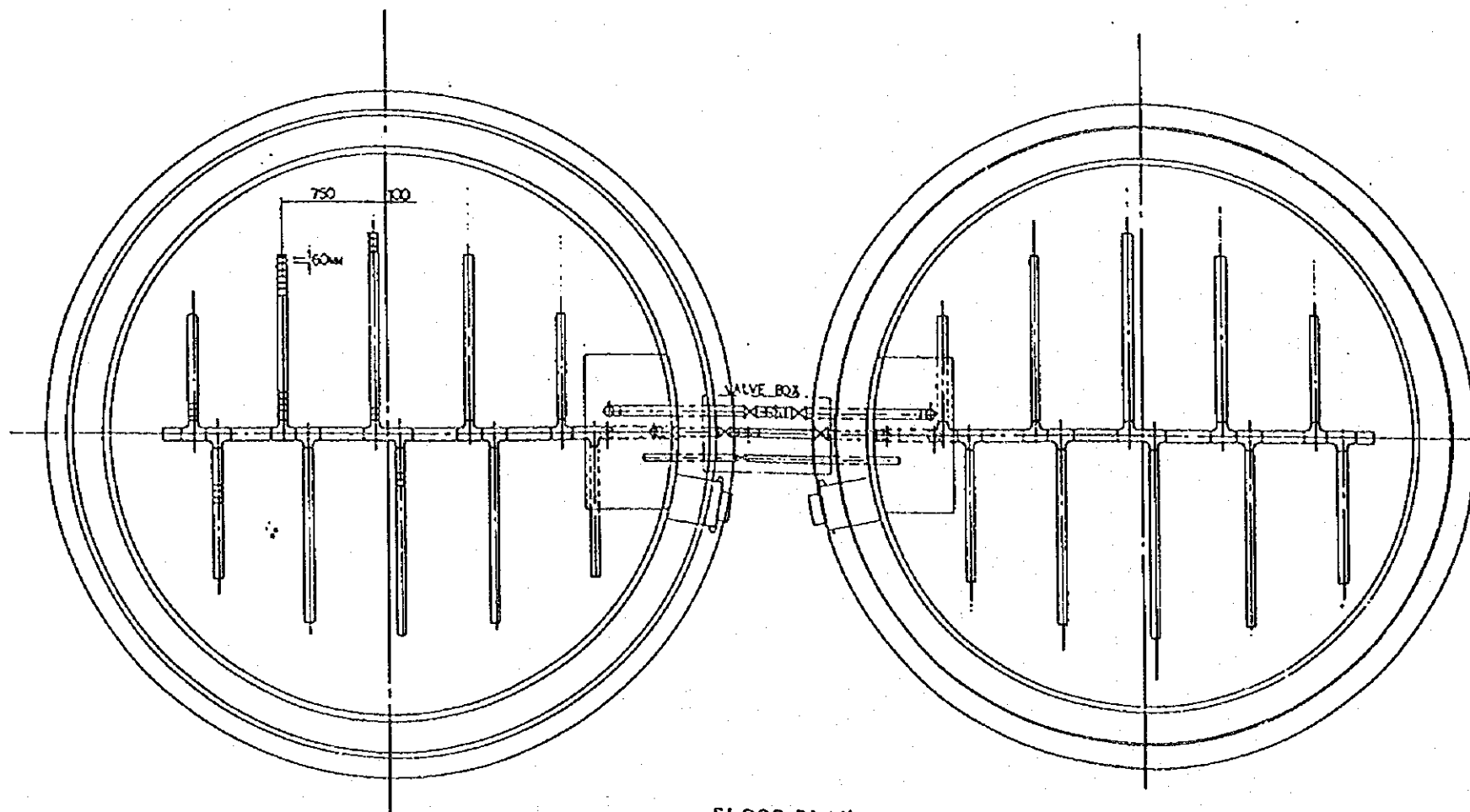
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title	2 x 20 m ³ Slow Sand Filter Site Plan (Msumpe Community)		
September 1995	Scale	See Draw	Draw No. 16.
JAPAN INTERNATIONAL COOPERATION AGENCY			



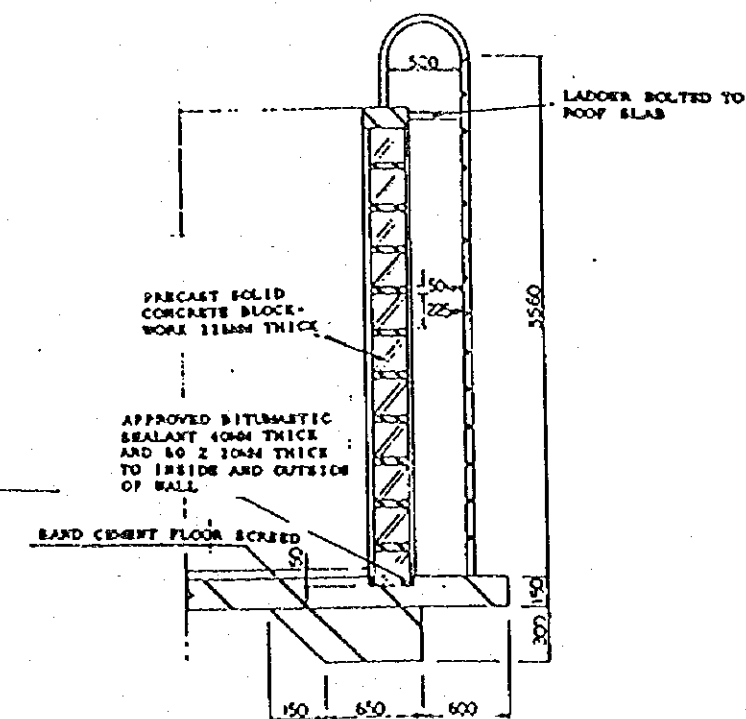
SECTIONAL ELEVATION



TYPICAL SECTION OF
FILTER MEDIA
(NOT TO SCALE)



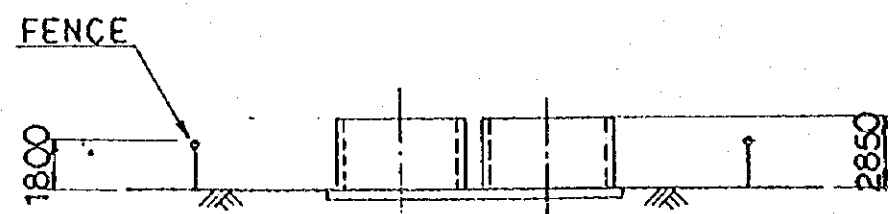
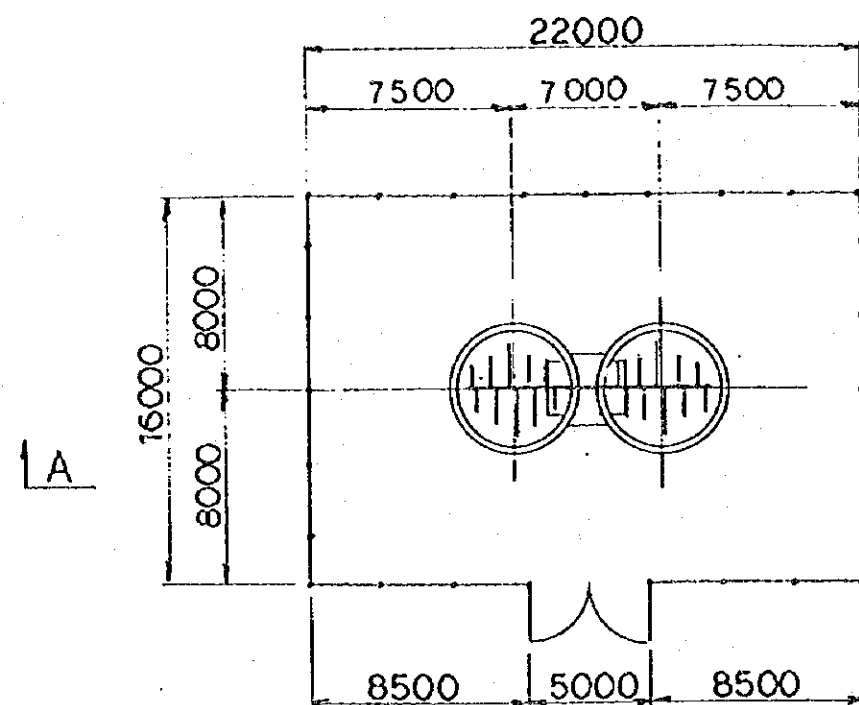
FLOOR PLAN



DETAIL OF ACCESS

NOTE
THE DIRECTION OF
NOZZLES TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN

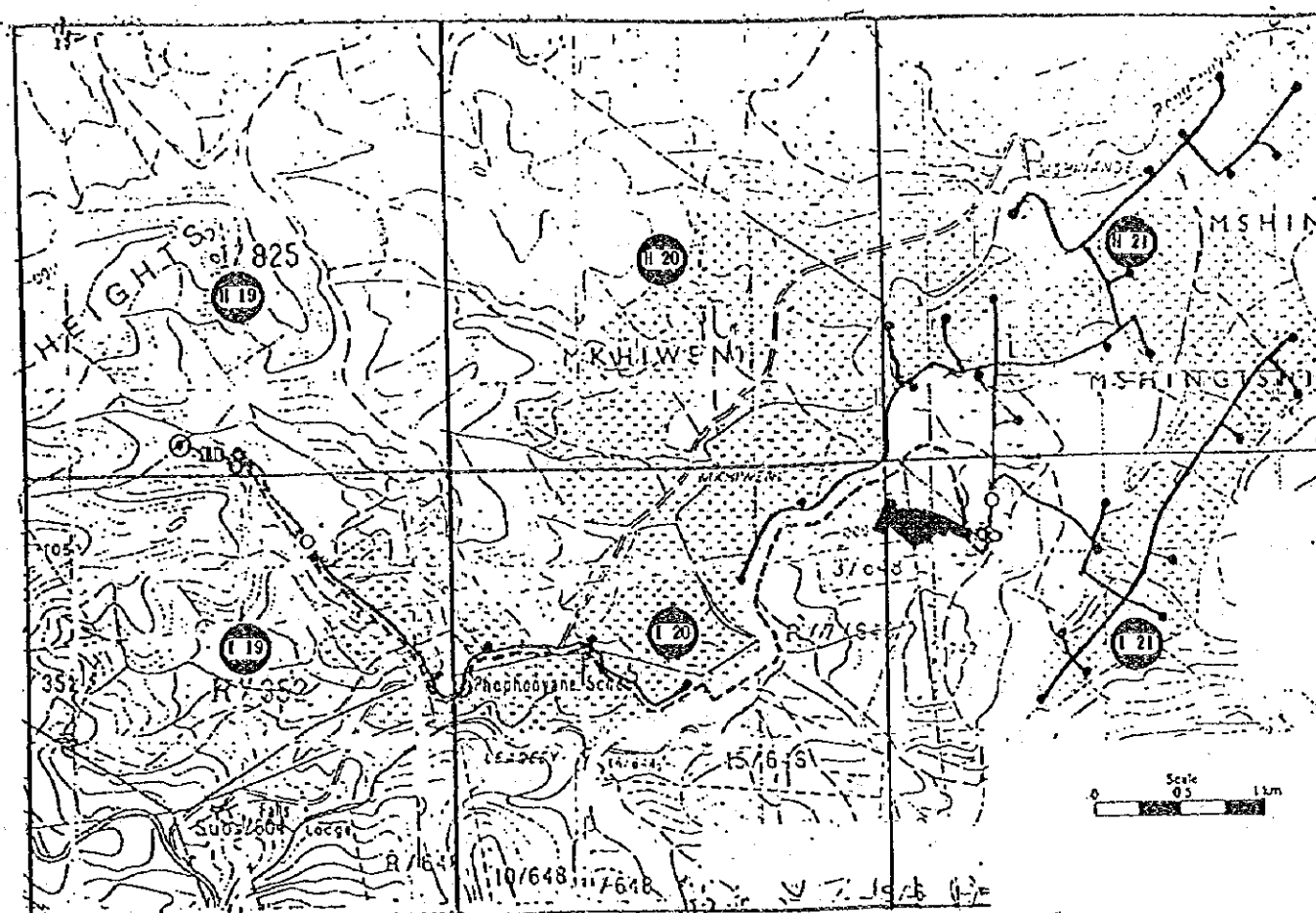
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title	2 x 70 m ³ Slow Sand Filter (Usumbe Community)		
September 1995	Scale	See Draw	Draw No. 17.
JAPAN INTERNATIONAL COOPERATION AGENCY			



A - A

B-LINE SLOW SAND FILTER

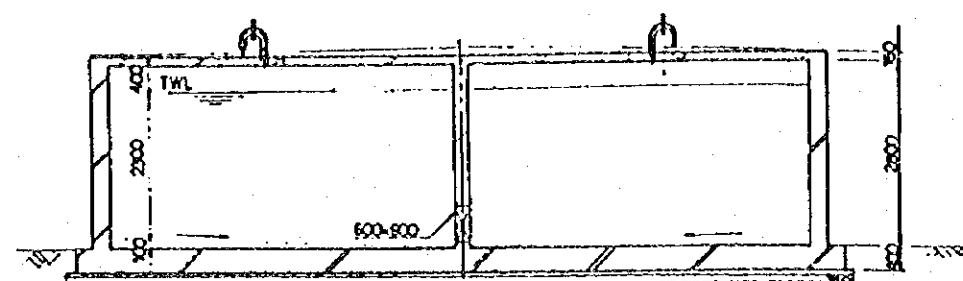
[KEY PLAN]



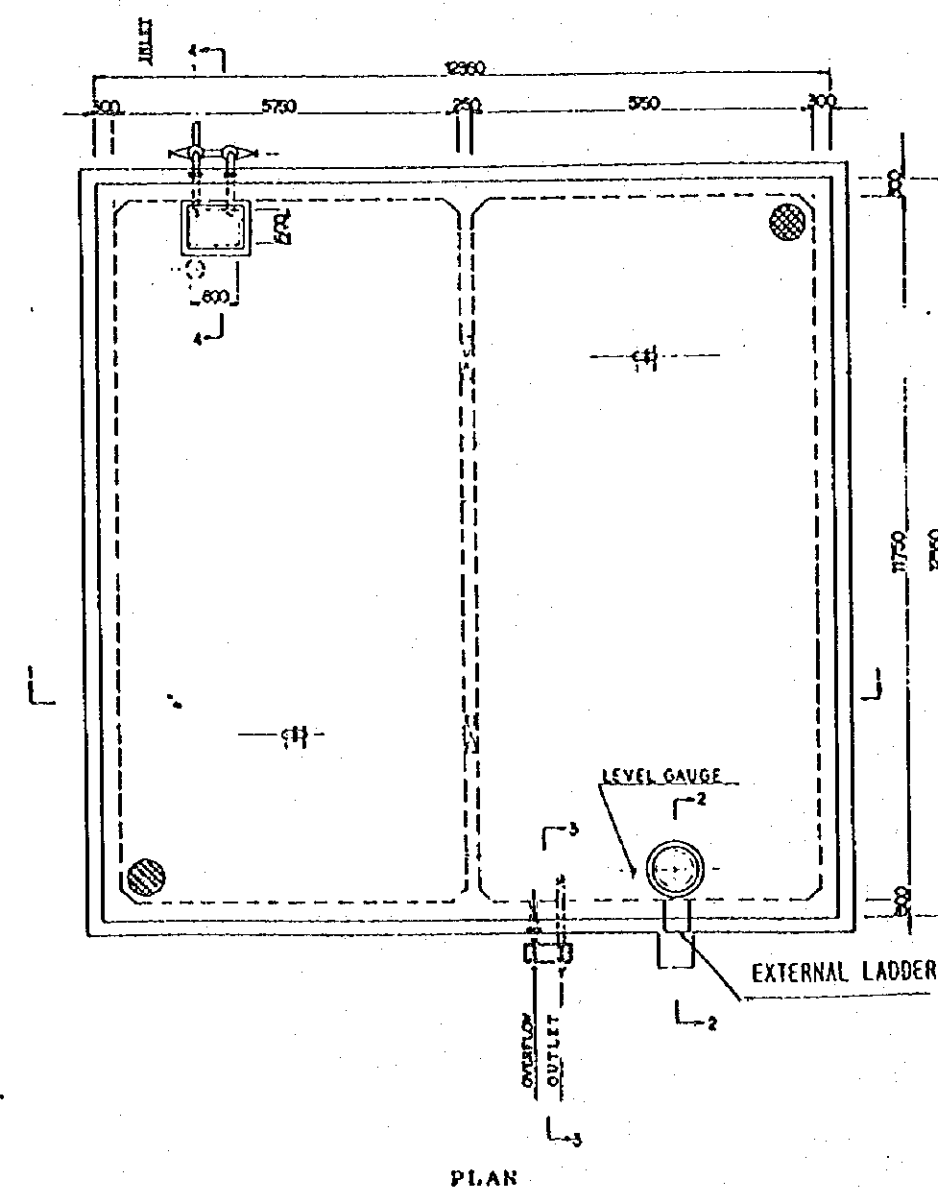
Legend

- ⊙ : Intake (VEIR)
- ⊞ : Roughing Filter
- ∞ : Slow Sand Filter
- : Reservoir
- - - : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- (B 20) : Index Number

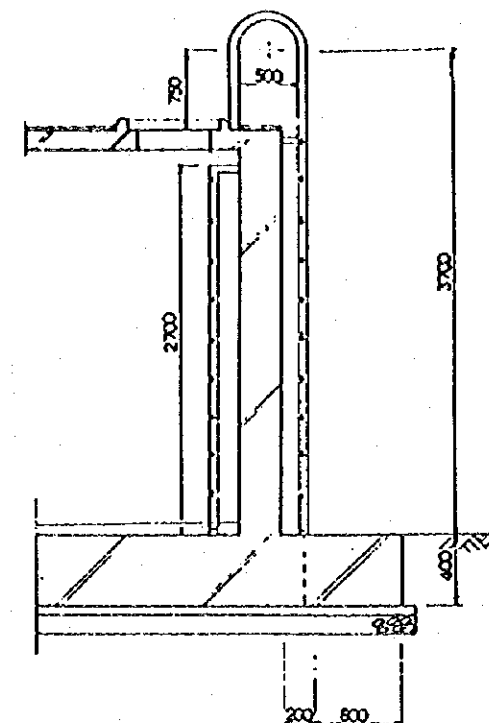
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	2 x 70 m ³ Slow Sand Filter Site Plan (Msumpe Community)	
September 1995	Scale See Draw	Draw No. 18.
JAPAN INTERNATIONAL COOPERATION AGENCY		



SECTIONAL ELEVATION 1-1

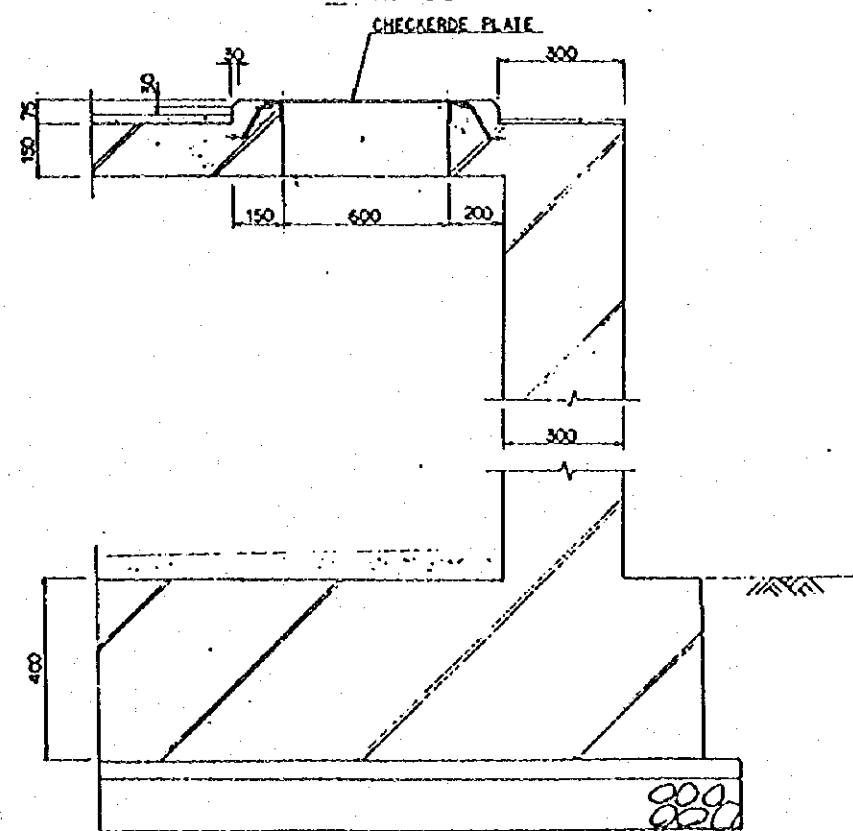


PLAN



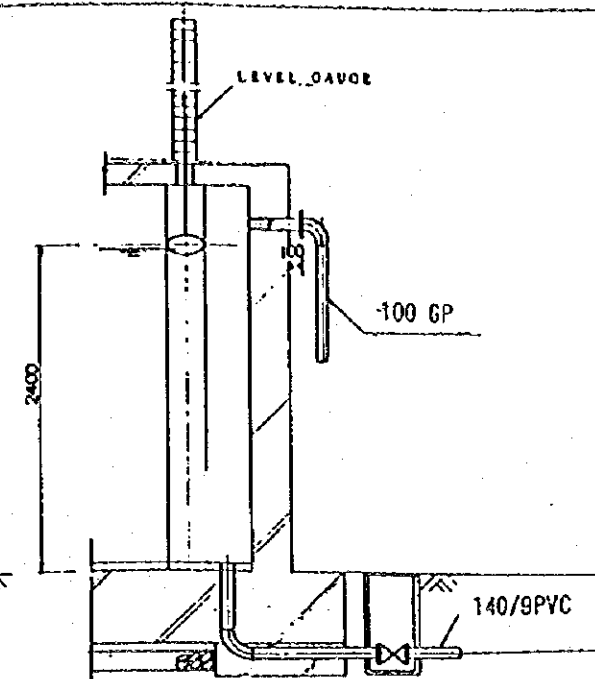
DETAIL OF ACCESS LADDERS

SECTION 2-2



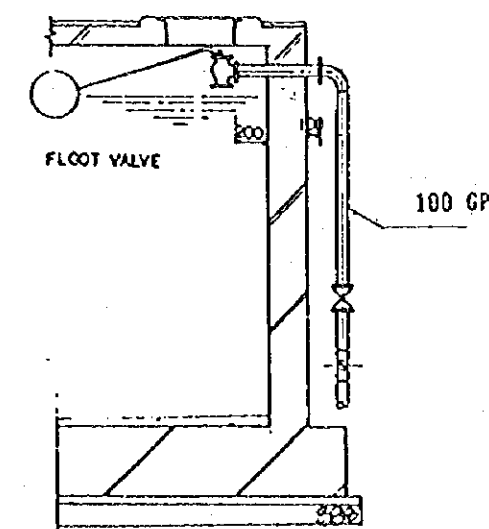
TYPICAL DETAIL OF PERIMETER WALL AT ROOF AND FLOOR SLAB

NOTE
THE DIRECTION OF
NOZZLES TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN



DETAIL OF OVERFLOW
DETAIL OF OUTLET PIPE

SECTION 3-3



DETAIL OF INLET PIPE

SECTION 4-4

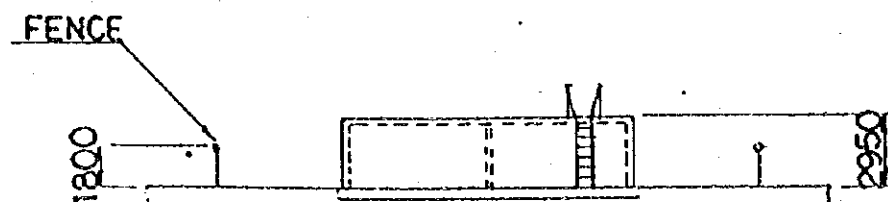
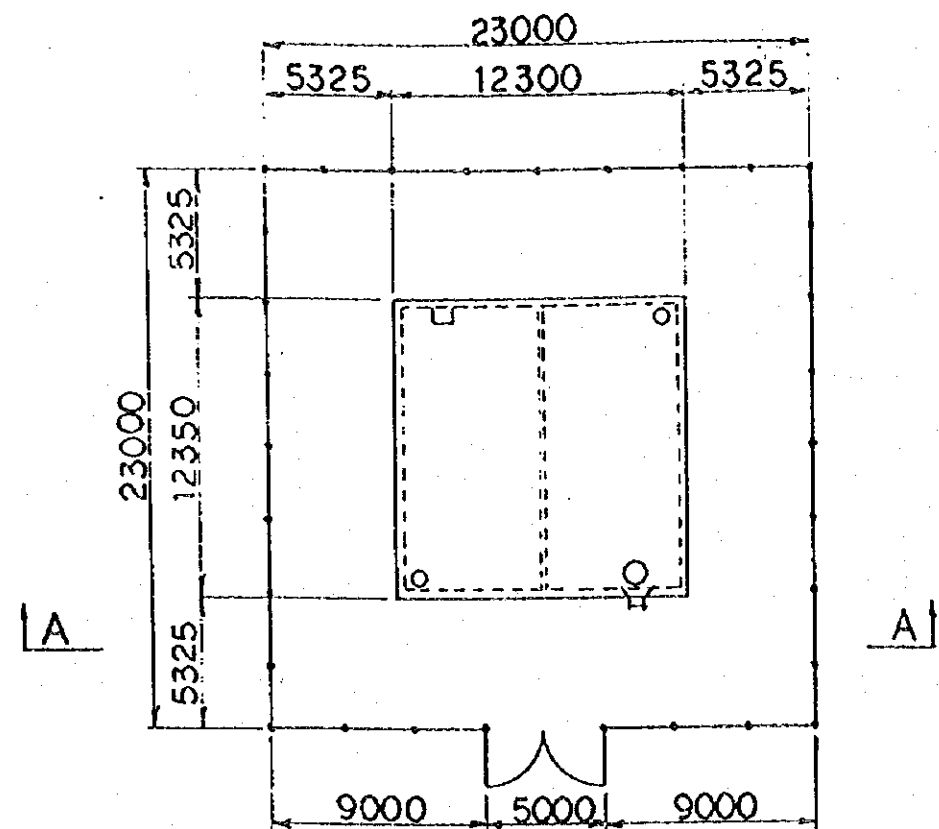
THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

The Rural Water Supply Project

Title
Details of 300 m³ Reservoir (Ngwazini Community)

September 1995 Scale See Draw Draw No. 19.

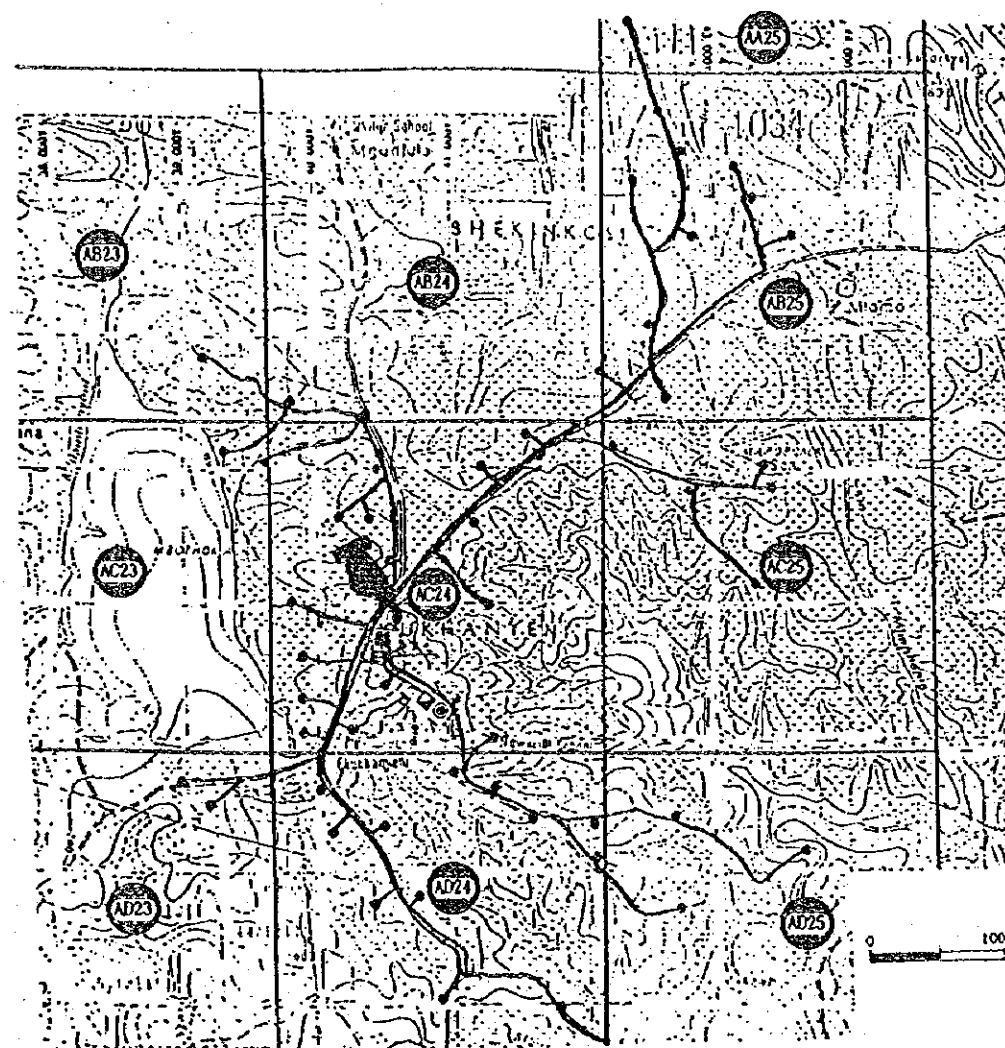
JAPAN INTERNATIONAL COOPERATION AGENCY



A - A

300m³ RESERVOIR

[KEY PLAN]

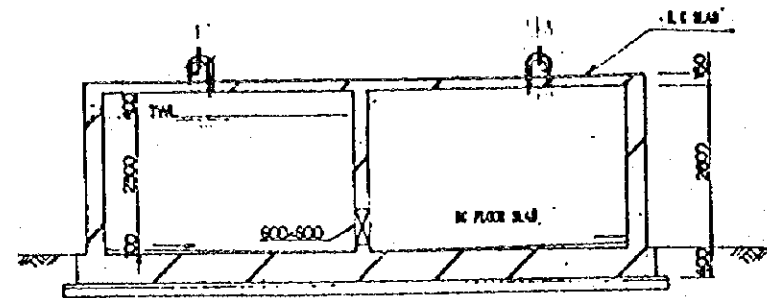


Legend

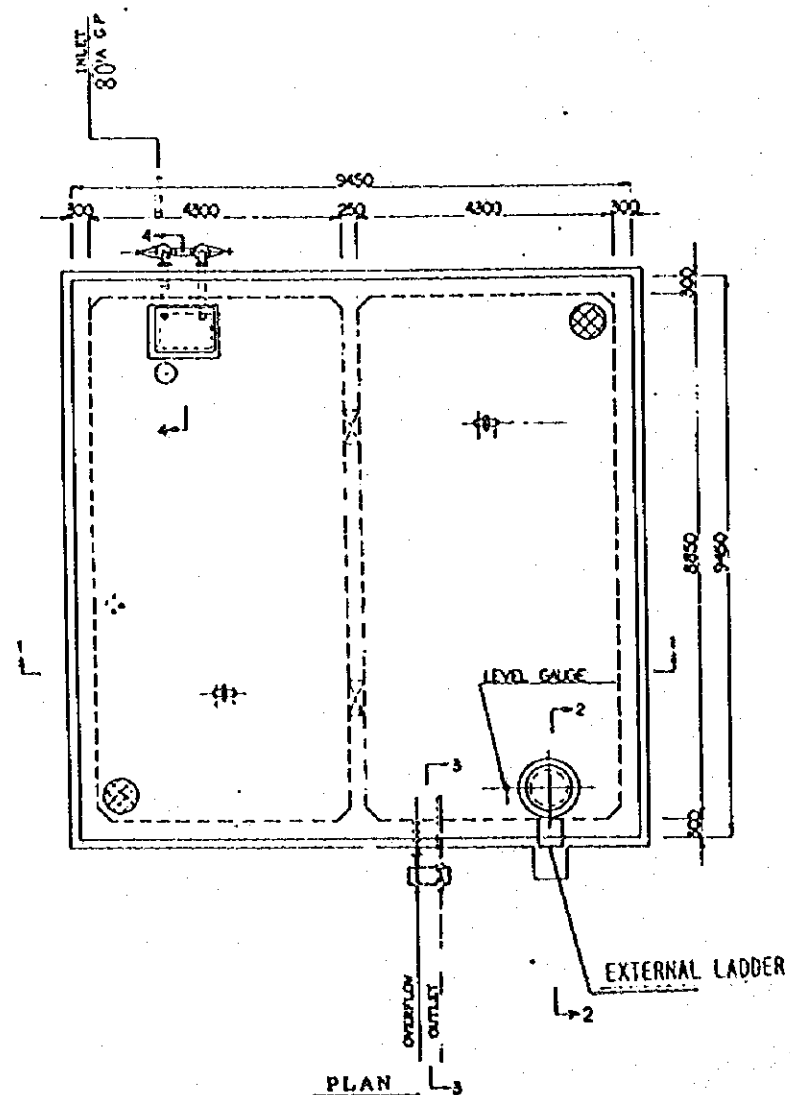
- : Borehole
 □ : Control House
 ■ : □ Type Reservoir
 ○ : ○ Type Reservoir
 - - : Transmission Pipeline
 — : Supply Water Pipeline
 * : Standpipe

(AB23): Index Number

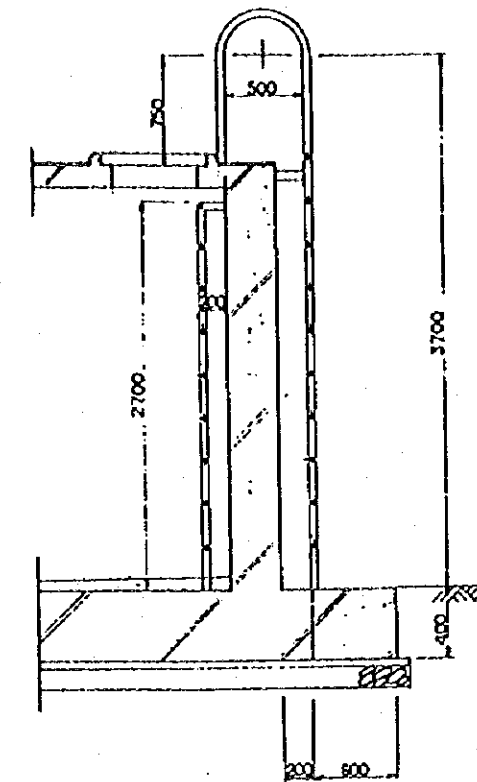
<p align="center">THE KINGDOM OF SWAZILAND Ministry of Natural Resources & Energy Rural Water Supply Branch</p>		
<p align="center">The Rural Water Supply Project</p>		
<p>Title 300 m³ Reservoir Site Plan(Ngwazini Community)</p>		
<p>September 1995</p>	<p>Scale See Draw</p>	<p>Draw No. 20.</p>
<p align="center">JAPAN INTERNATIONAL COOPERATION AGENCY</p>		



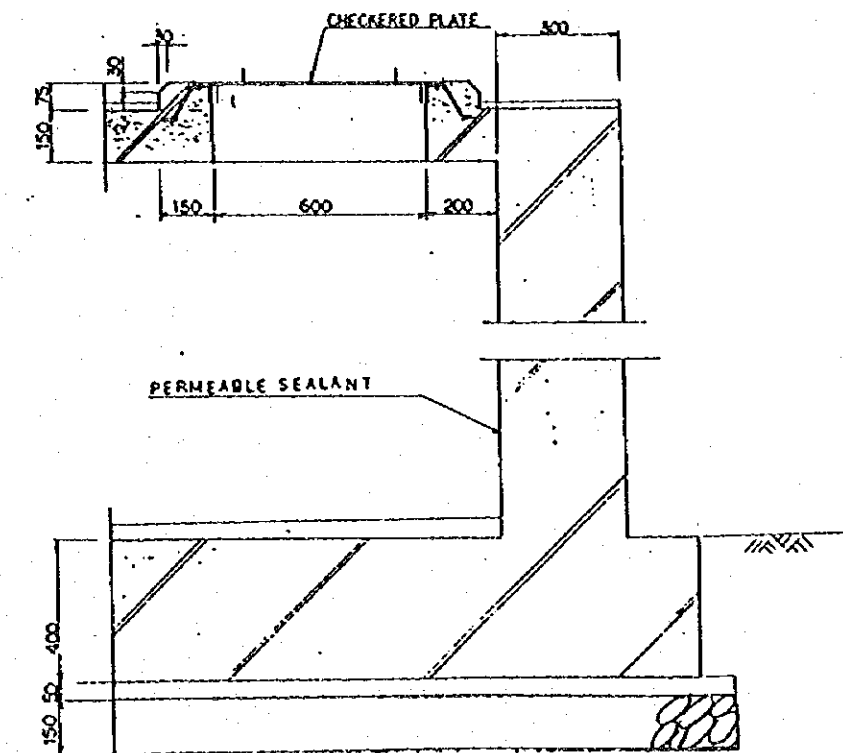
SECTIONAL ELEVATION 1-1



PLAN

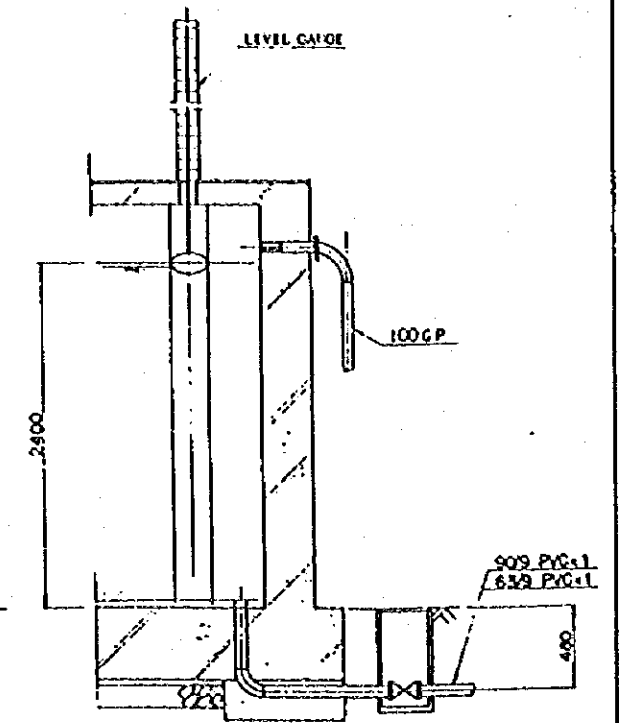


DETAIL OF ACCESS LADDERS
SECTION 2-2

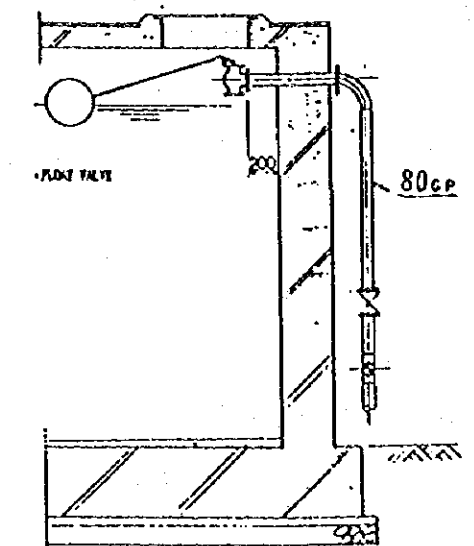


TYPICAL DETAIL OF PERIMETER
WALL AT ROOF AND FLOOR SLAB

NOTE
THE DIRECTION OF
NOZZLES TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN



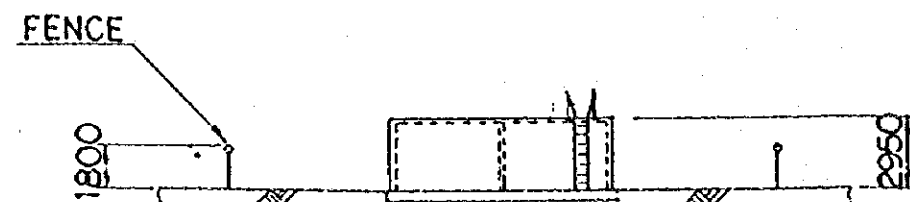
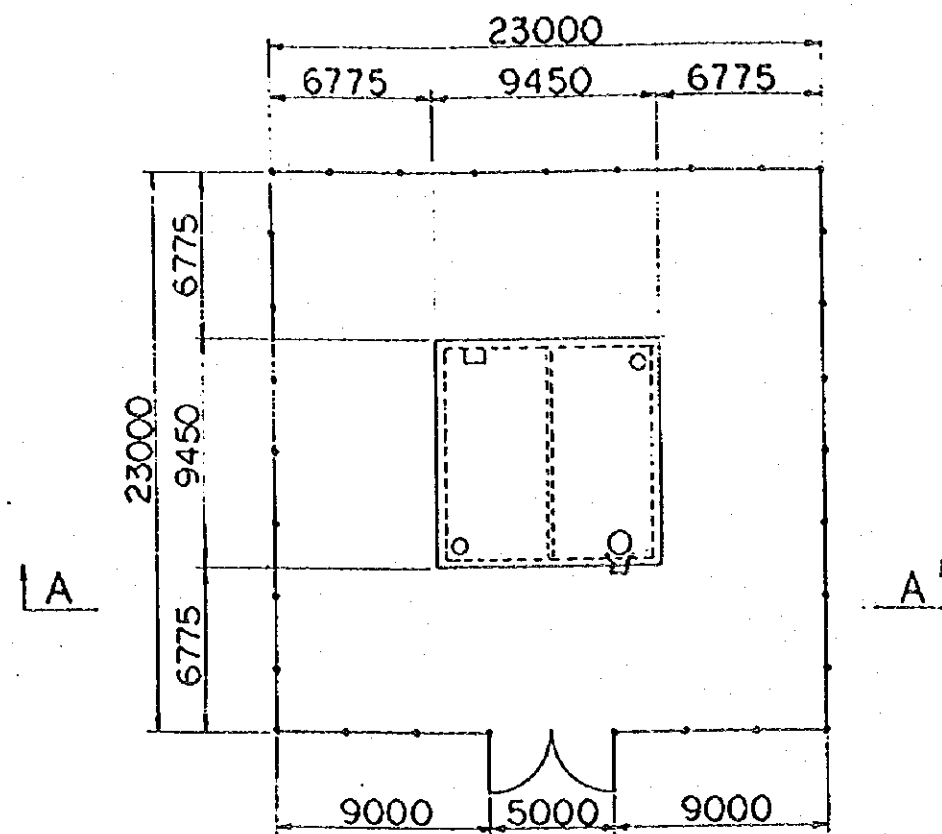
DETAIL OF OVERFLOW
DETAIL OF OUTLET PIPE
SECTION 3-3



DETAIL OF INLET PIPE
SECTION 4-4

THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch
The Rural Water Supply Project

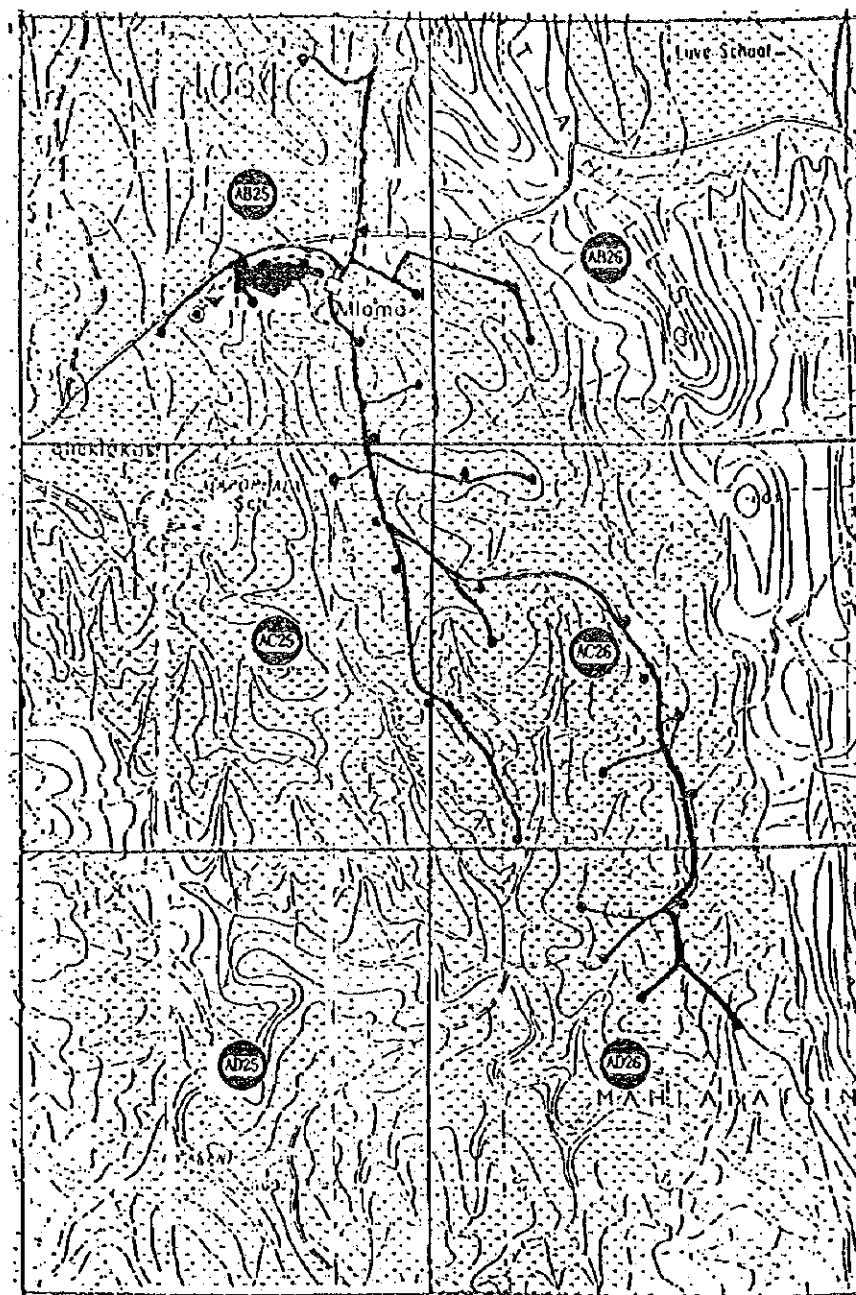
Title
Details of 170 #3 Reservoir (Bekhinkosi Community)
September 1995 Scale See Draw Draw No. 21.
JAPAN INTERNATIONAL COOPERATION AGENCY



A - A

170m³ RESERVOIR

[KEY PLAN]

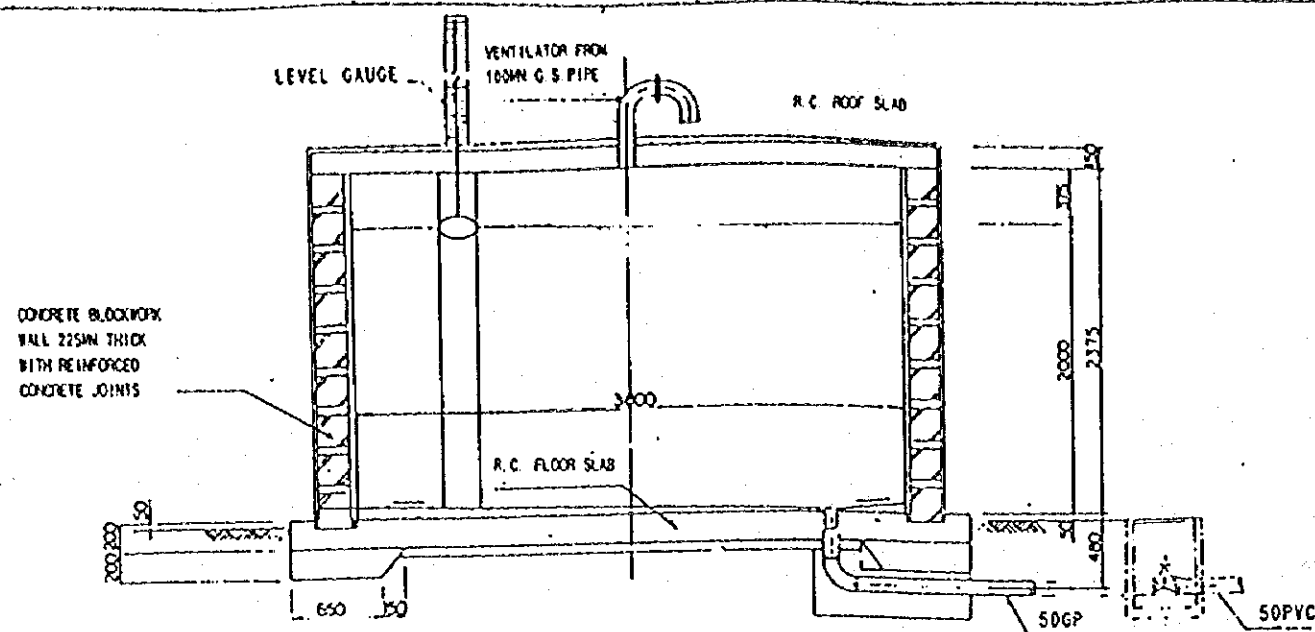


Legend

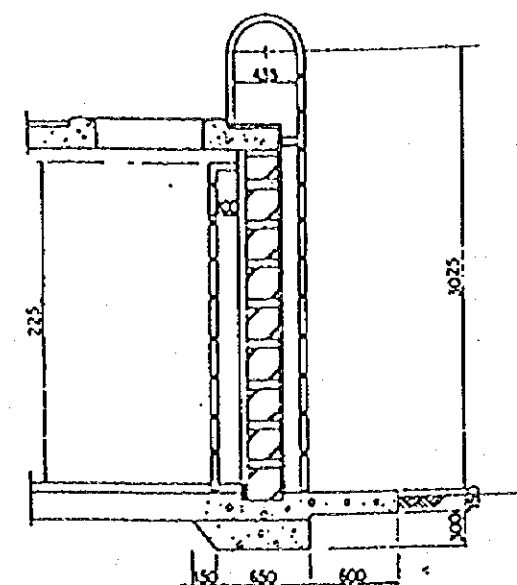
- : Borehole
- : Control House
- : Type Reservoir
- : Type Reservoir
- - : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- (AB23) : Index Number



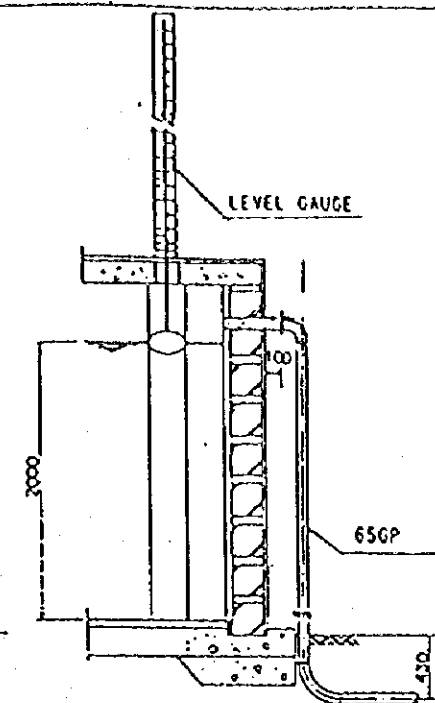
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title		
170 m³ Reservoir Site Plan(Bekhinkosi Community)		
September 1995	Scale See Draw	Draw No. 22.
JAPAN INTERNATIONAL COOPERATION AGENCY		



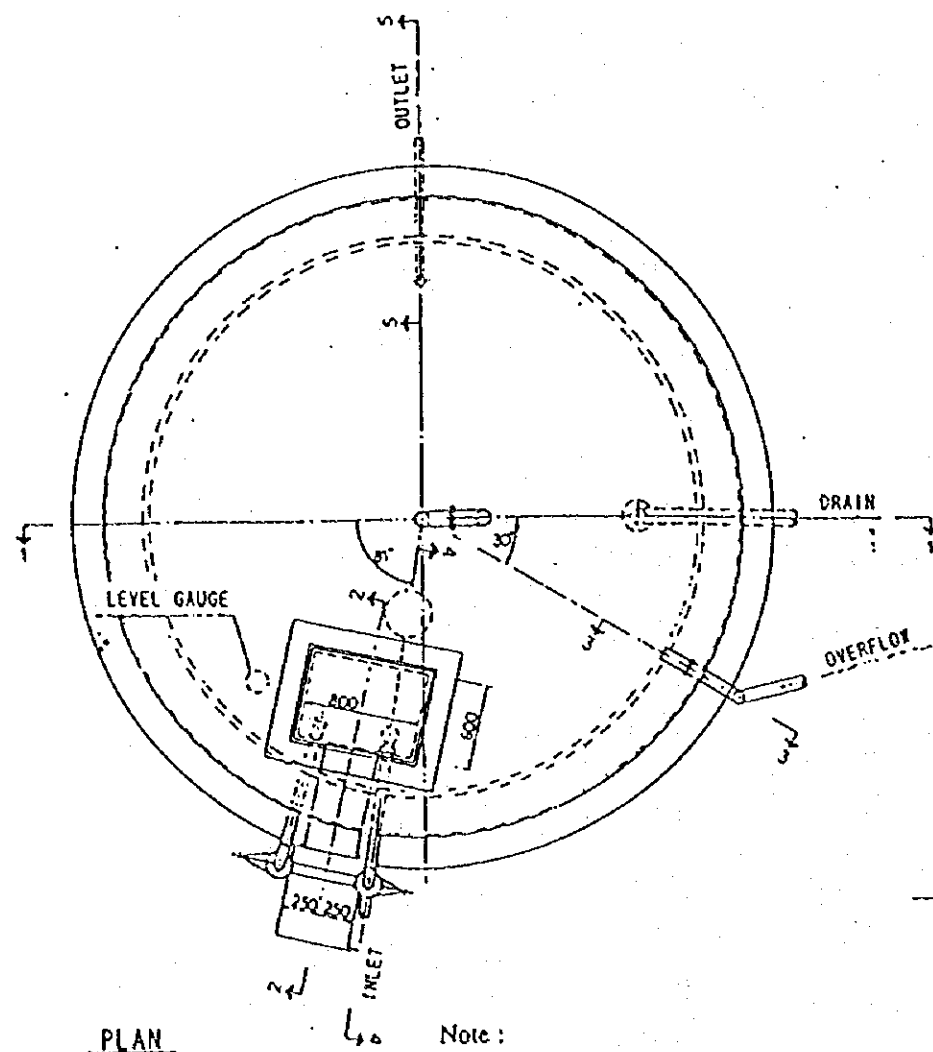
SECTIONAL ELEVATION 1-1



DETAIL OF ACCESS LADDERS

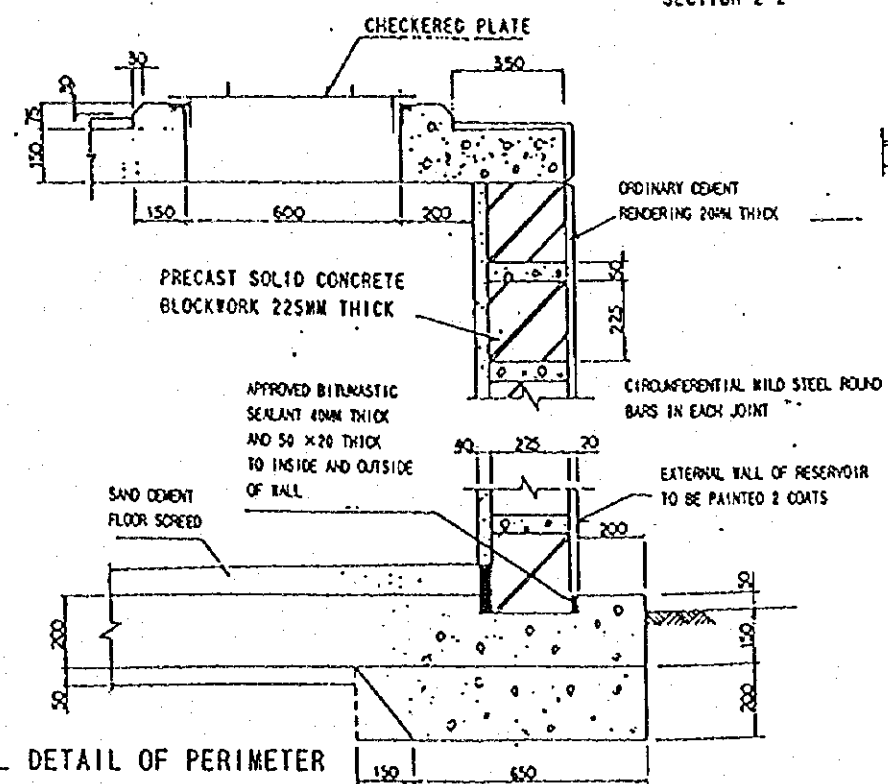


DETAIL OF OVERFLOW PIPE

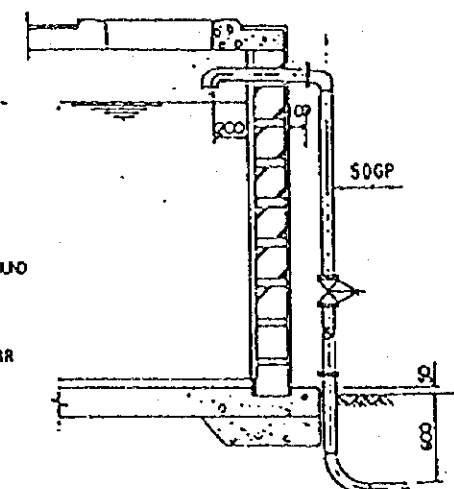


PLAN

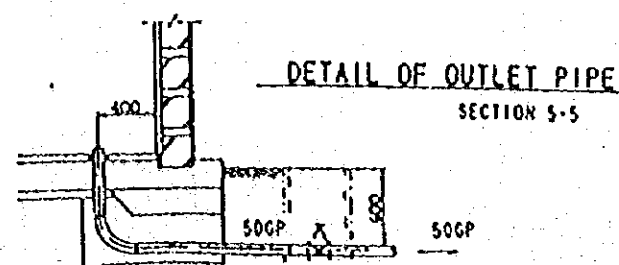
Note:
The direction of nozzles to be installed will be determined in the detailed design



TYPICAL DETAIL OF PERIMETER WALL AT ROOF AND FLOOR SLAB



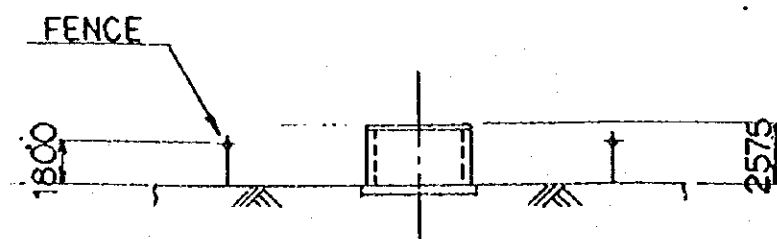
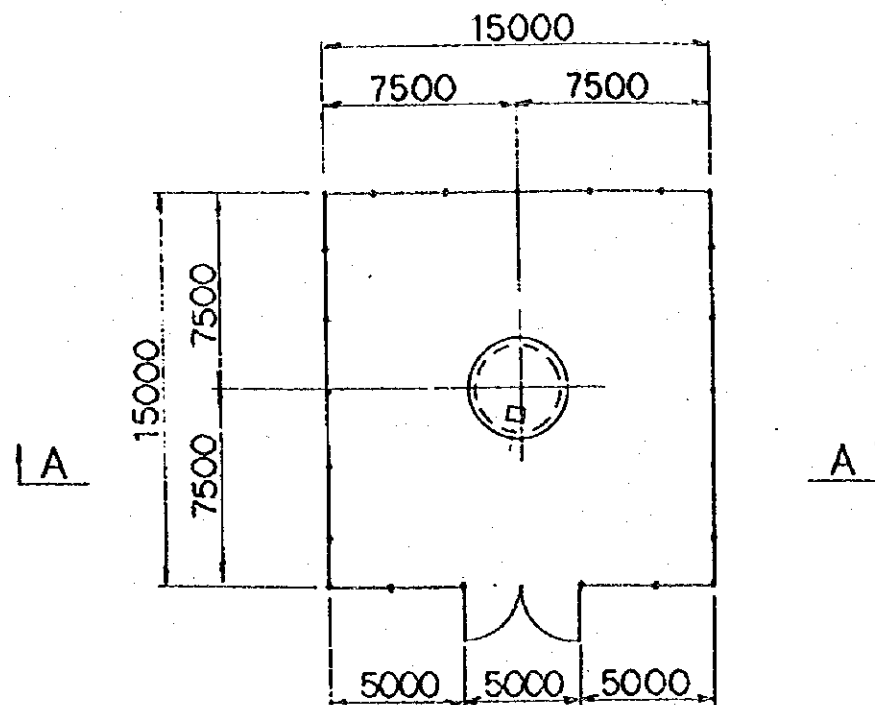
DETAIL OF INLET PIPE



DETAIL OF OUTLET PIPE

SECTION 5-5

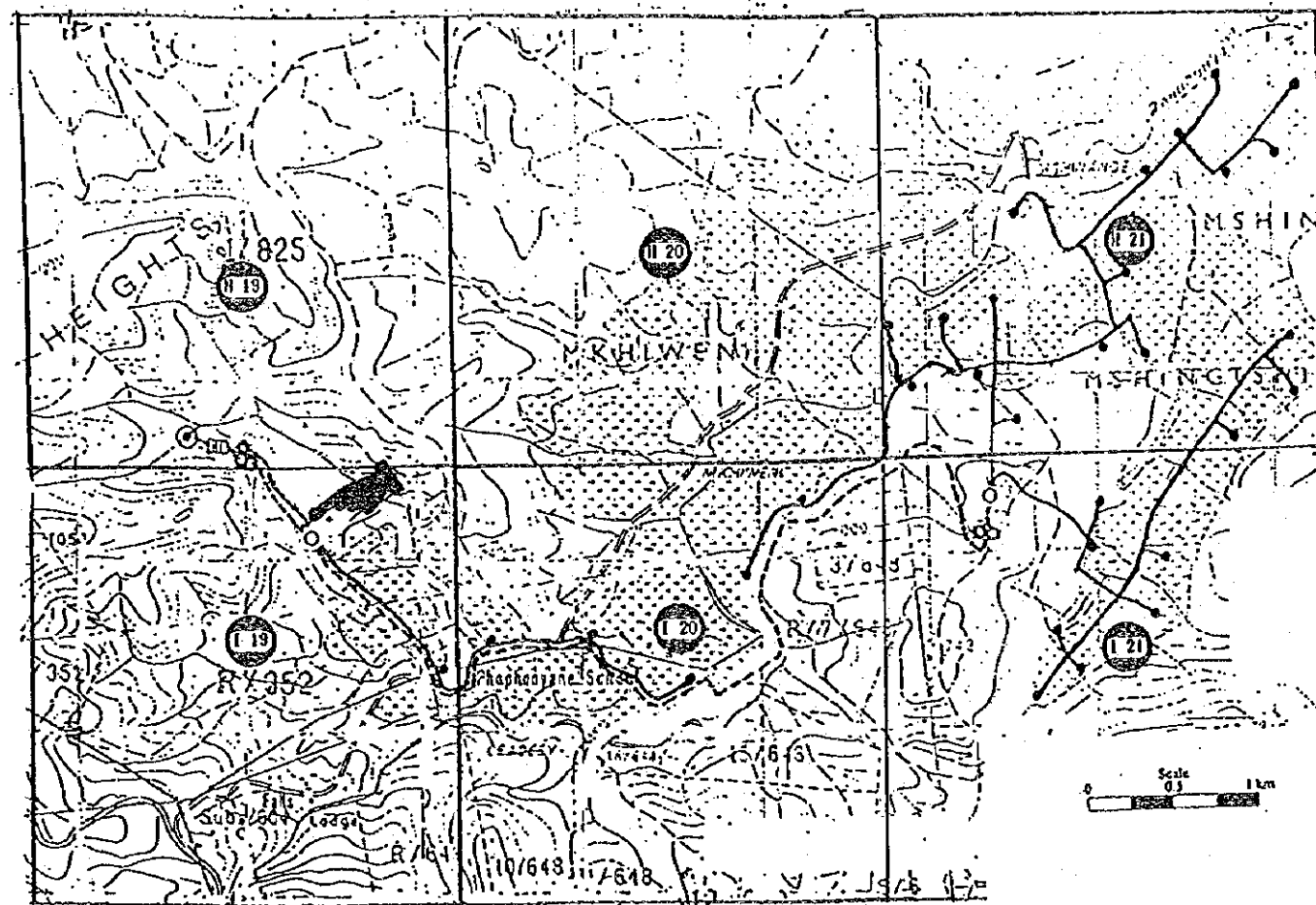
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title			
Details of 20 m³ Reservoir (Ysape Community)			
September 1995	Scale	See Draw	Draw No. 23.
JAPAN INTERNATIONAL COOPERATION AGENCY			



A - A

20m³ RESERVOIR

[KEY PLAN]



Legend

- ⊙ : Intake (I 20)
- ⊞ : Roughing Filter
- ∞ : Slow Sand Filter
- : Reservoir
- : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- I 20 : Index Number

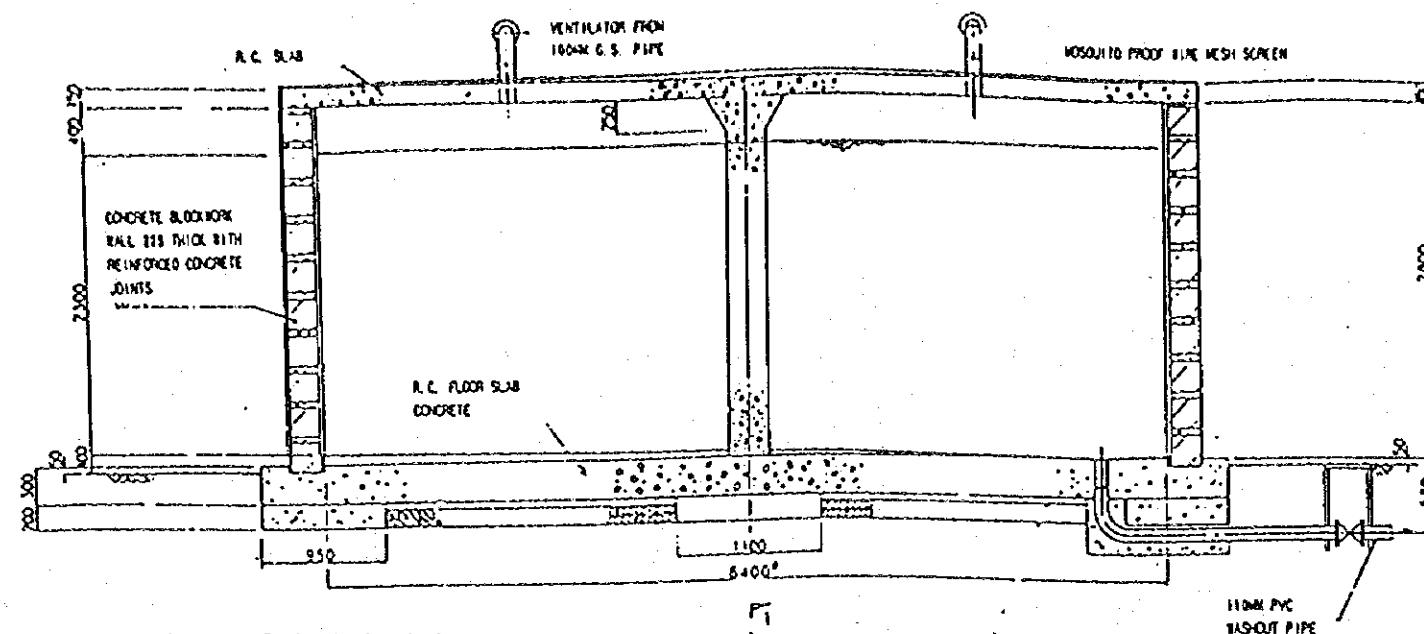
THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

The Rural Water Supply Project

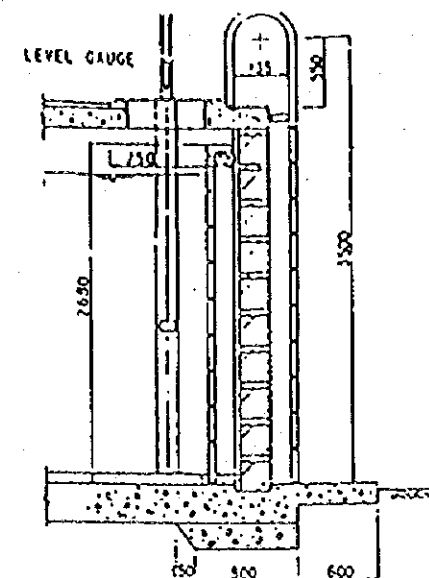
Title 20 m³ Reservoir Site Plan (Usunpe Community)

September 1995 Scale See Draw Draw No. 24.

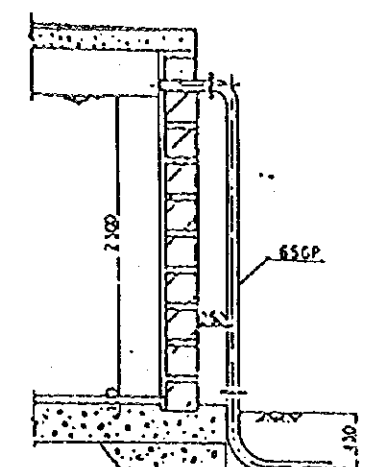
JAPAN INTERNATIONAL COOPERATION AGENCY



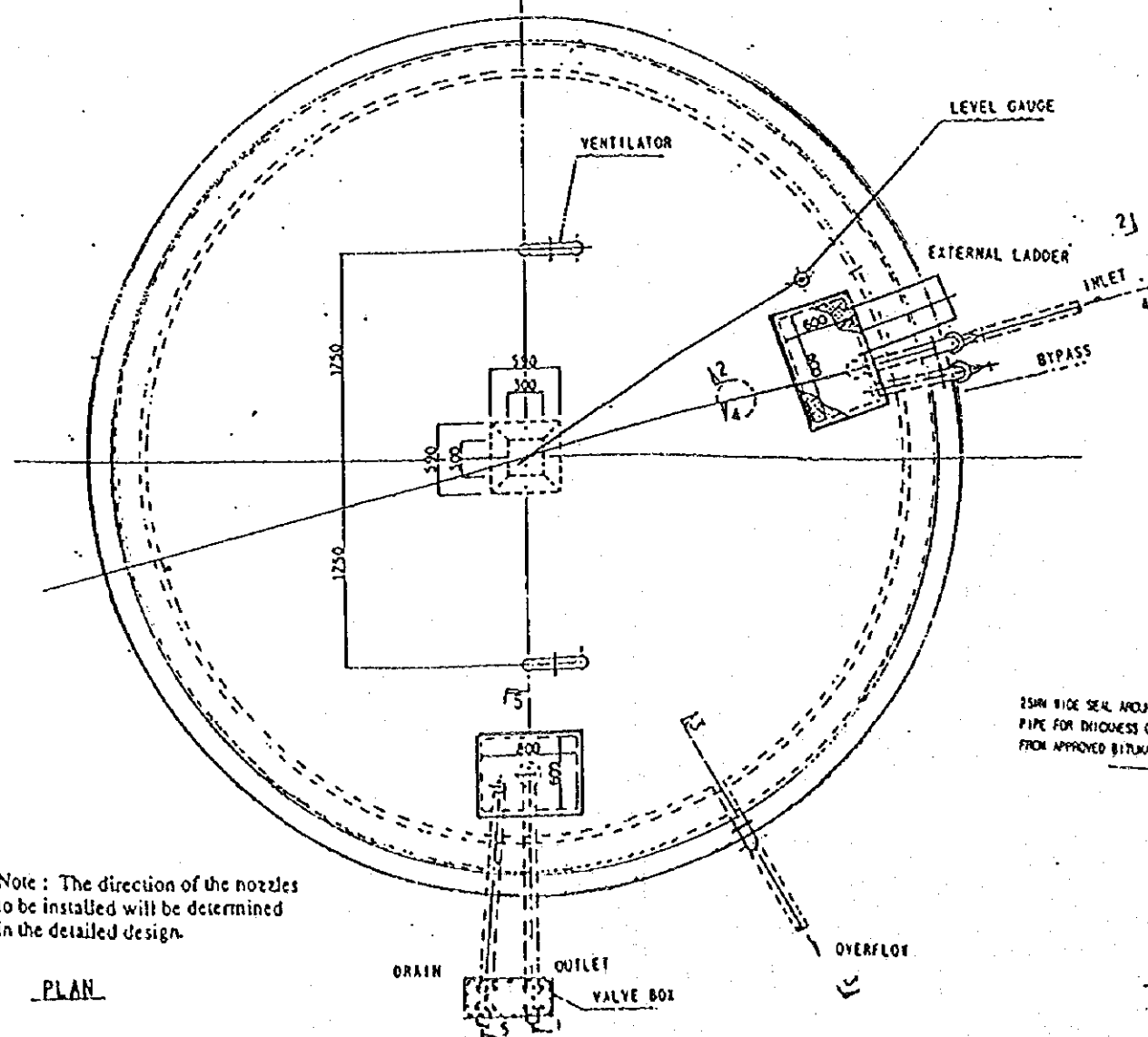
SECTIONAL ELEVATION 1-1



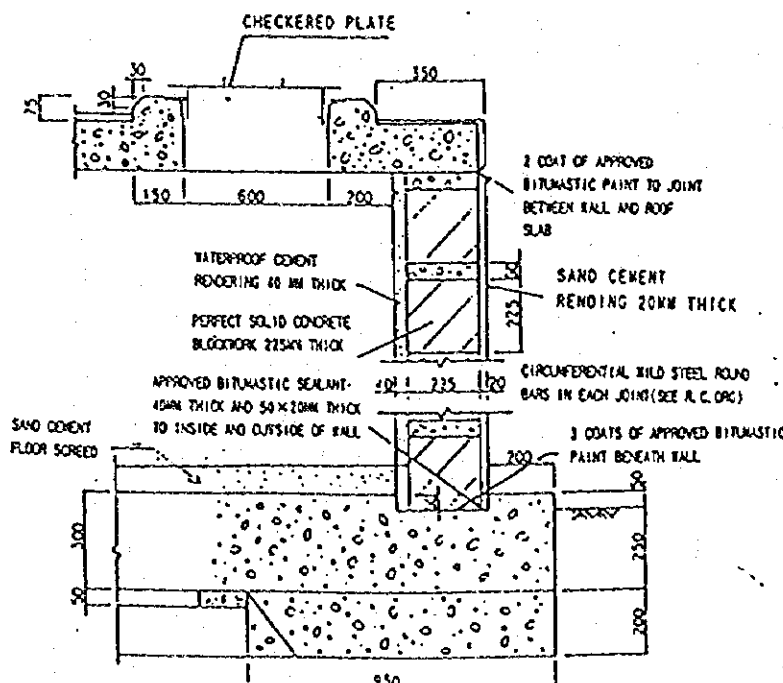
DETAIL OF ACCESS LADDERS
SECTION 2-2



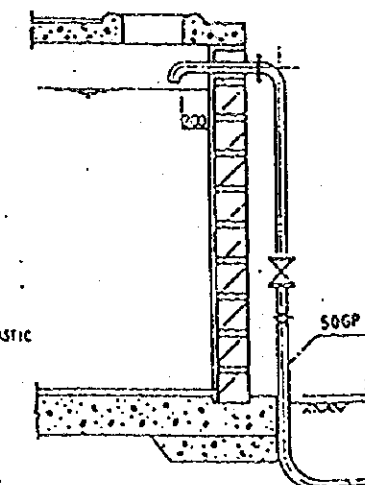
DETAIL OF OVERFLOW PIPE
SECTION 3-3



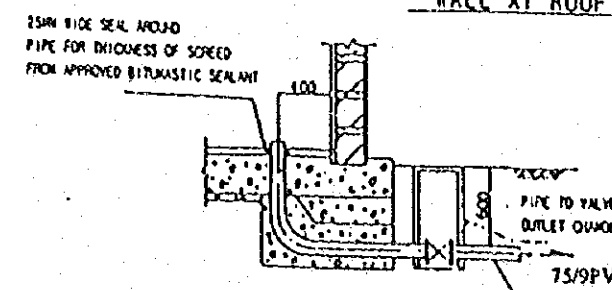
PLAN



TYPICAL DETAIL OF PERIMETER
WALL AT ROOF AND FLOOR SLAB

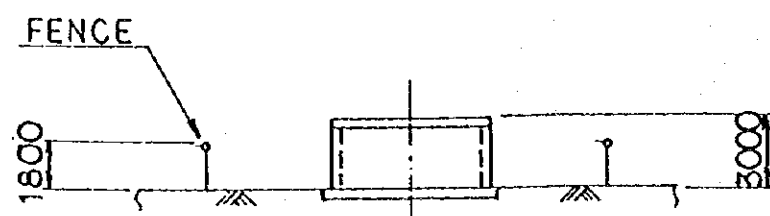
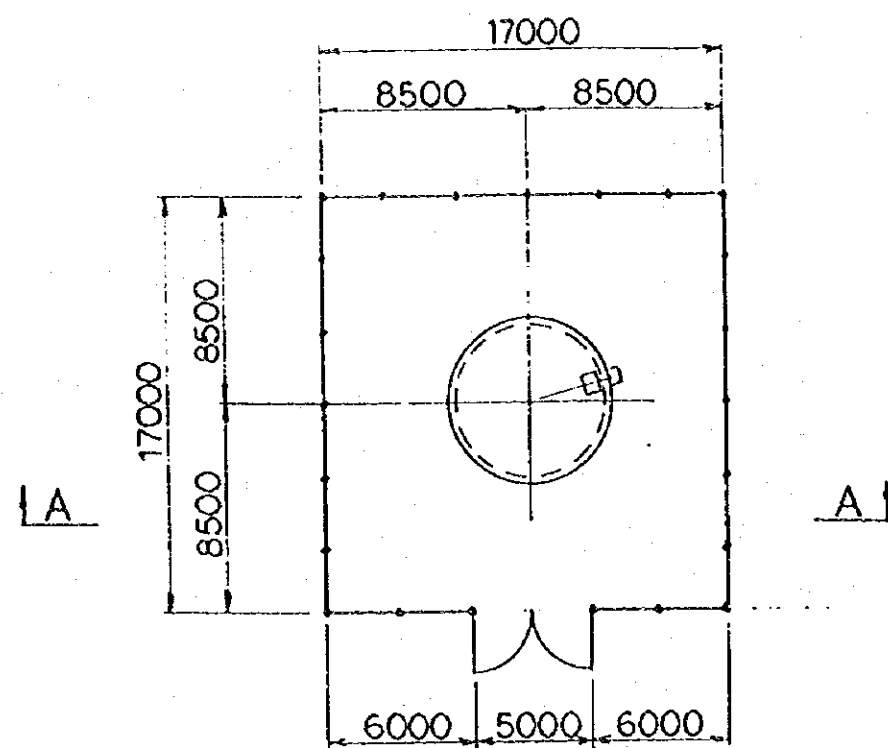


DETAIL OF INLET PIPE
SECTION 4-4



DETAIL OF OUTLET PIPE
SECTION 5-5

THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Details of 70 m ³ Reservoir (Nsumbe Community)	
September 1995	Scale See Draw	Draw No. 25.
JAPAN INTERNATIONAL COOPERATION AGENCY		

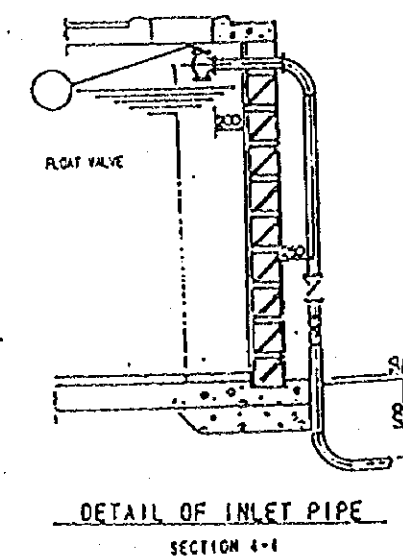
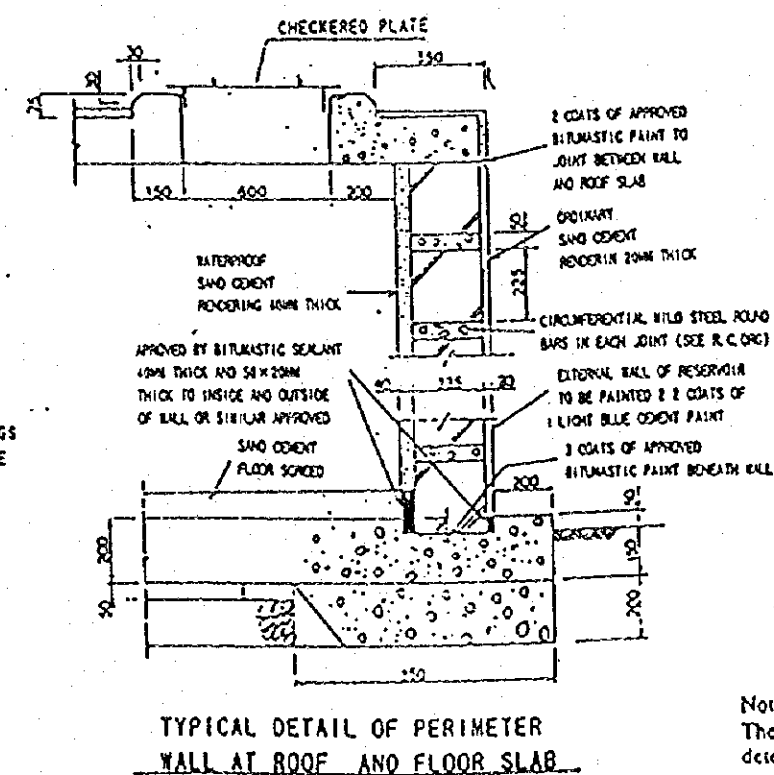
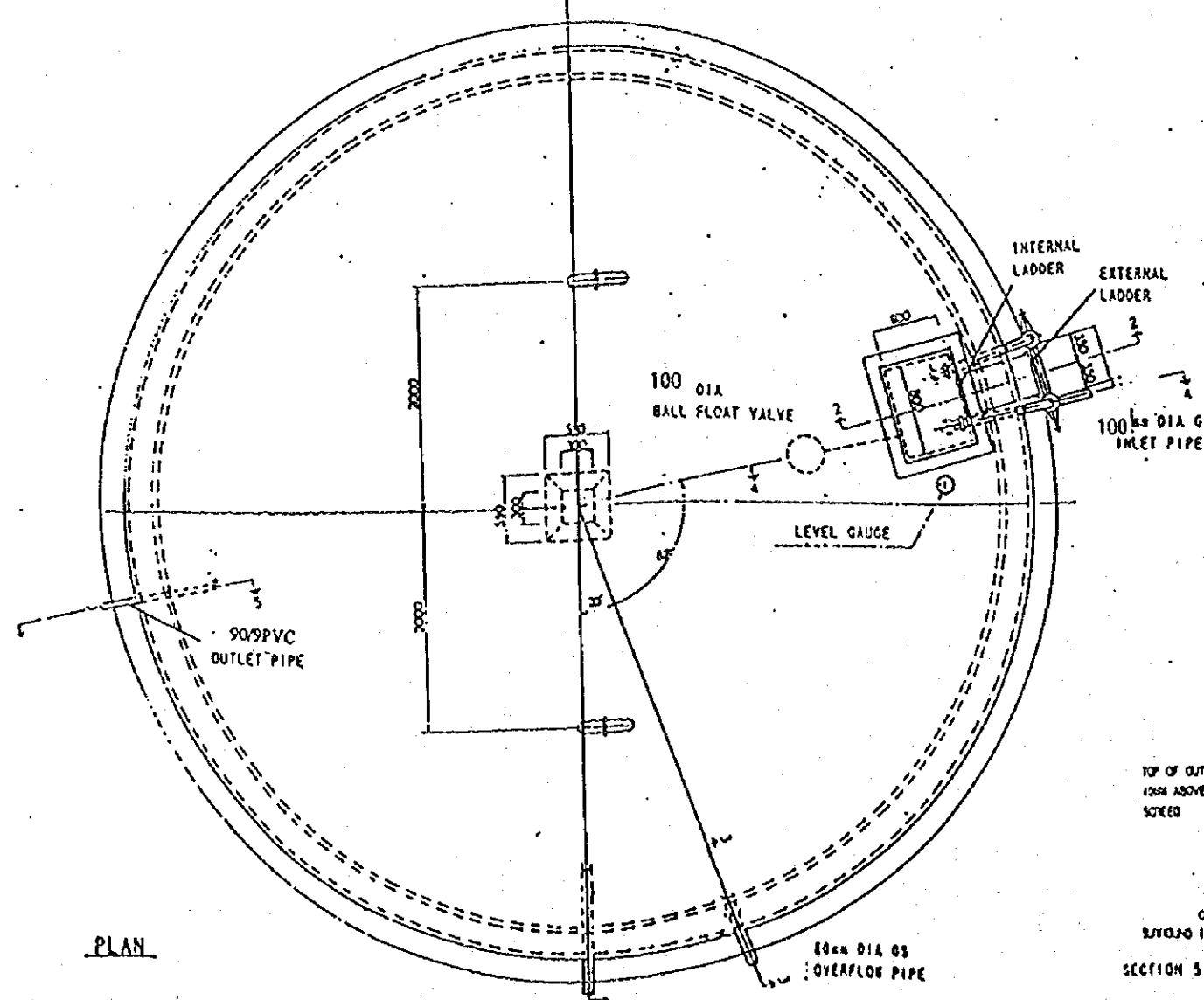
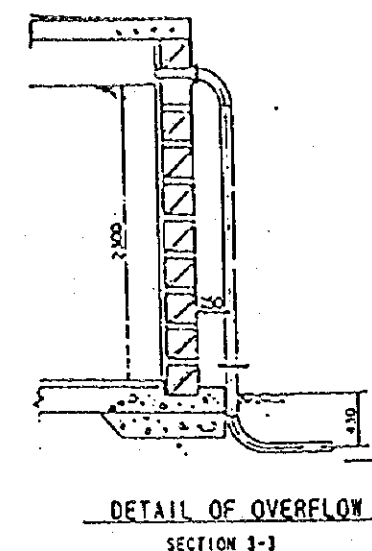
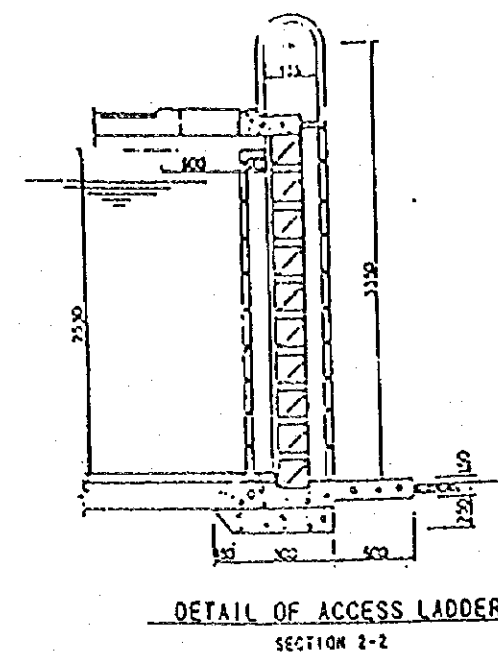
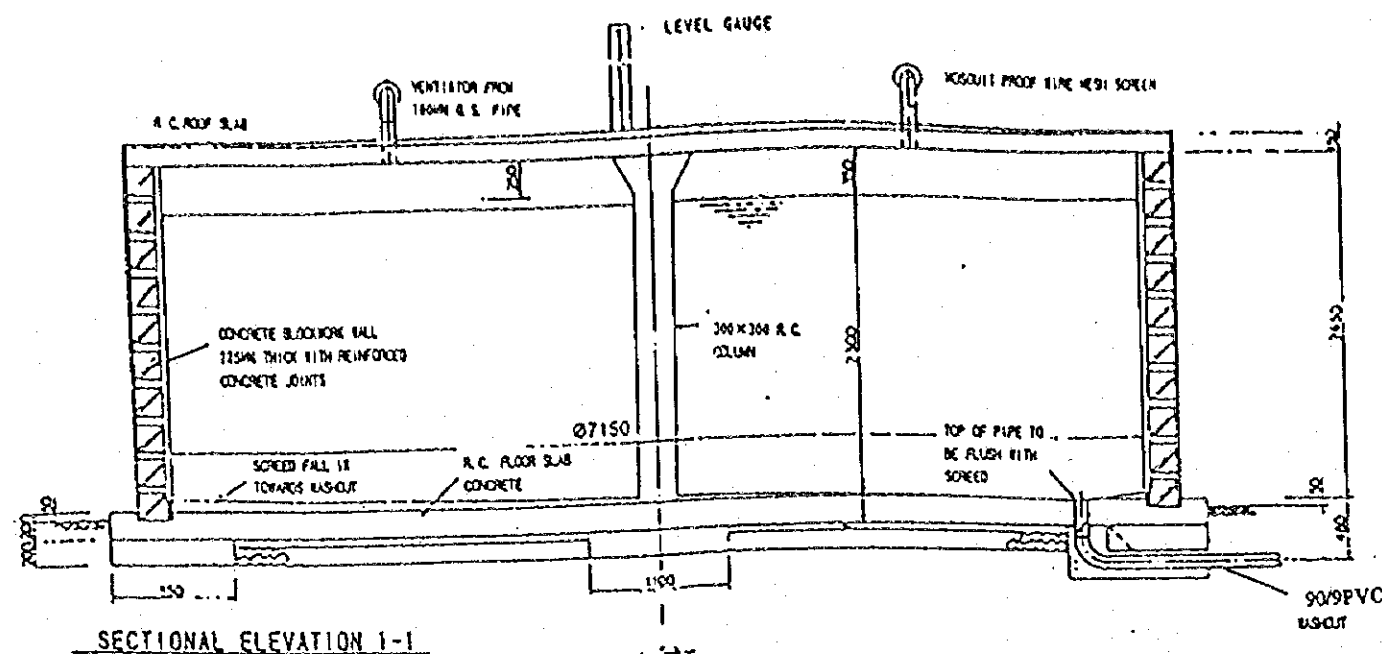
[illegible]

A - A

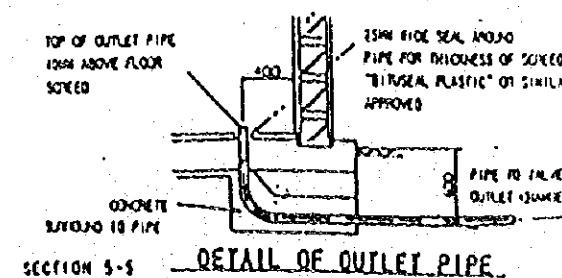
70m'RESERVOIR

- Legend**
- ⊙ : Intake (PEIR)
 - ∞ : Roughing Filter
 - ∞ : Slow Sand Filter
 - : Reservoir
 - : Transmission Pipeline
 - - : Supply Water Pipeline
 - : Standpipe
- H 20** : Index Number

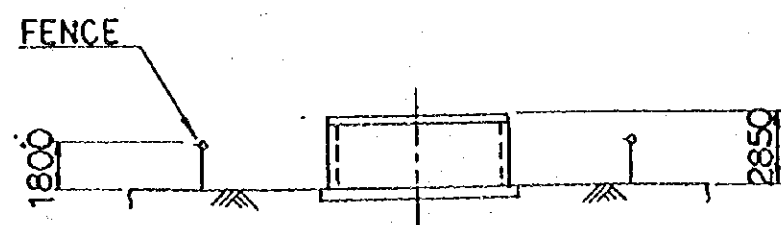
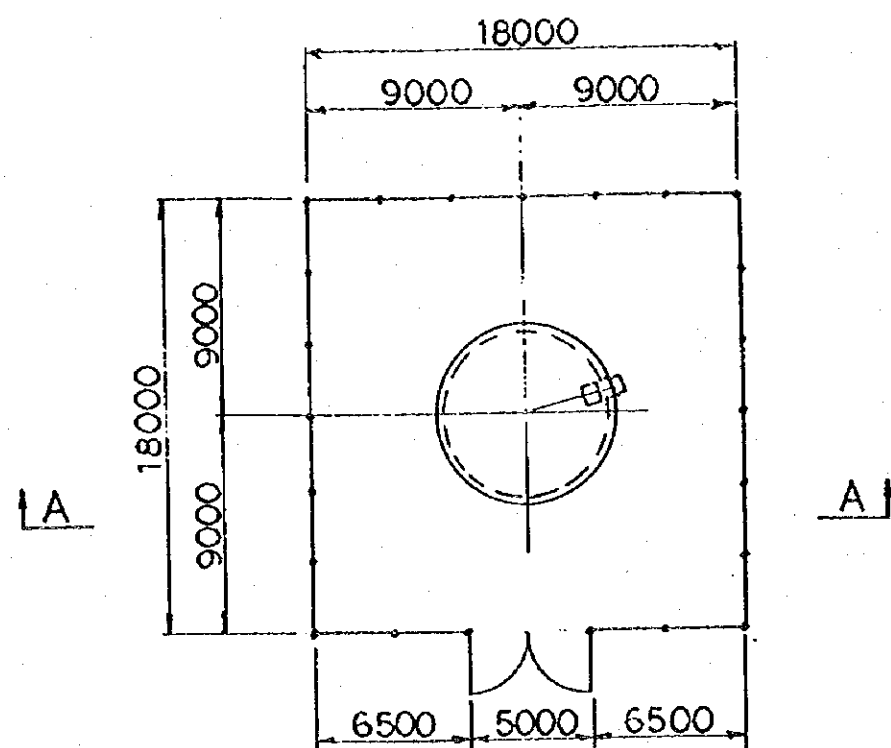
<p align="center">THE KINGDOM OF SWAZILAND Ministry of Natural Resources & Energy Rural Water Supply Branch</p>			
<p align="center">The Rural Water Supply Project</p>			
<p>Title</p>			
<p align="center">70 m³ Reservoir Site Plan (Xusumpe Community)</p>			
<p>September 1995</p>	<p>Scale</p>	<p>See Draw</p>	<p>Draw No. 26.</p>
<p align="center">JAPAN INTERNATIONAL COOPERATION AGENCY</p>			



Note :
The direction of nozzles to be installed will be determined in the detailed design



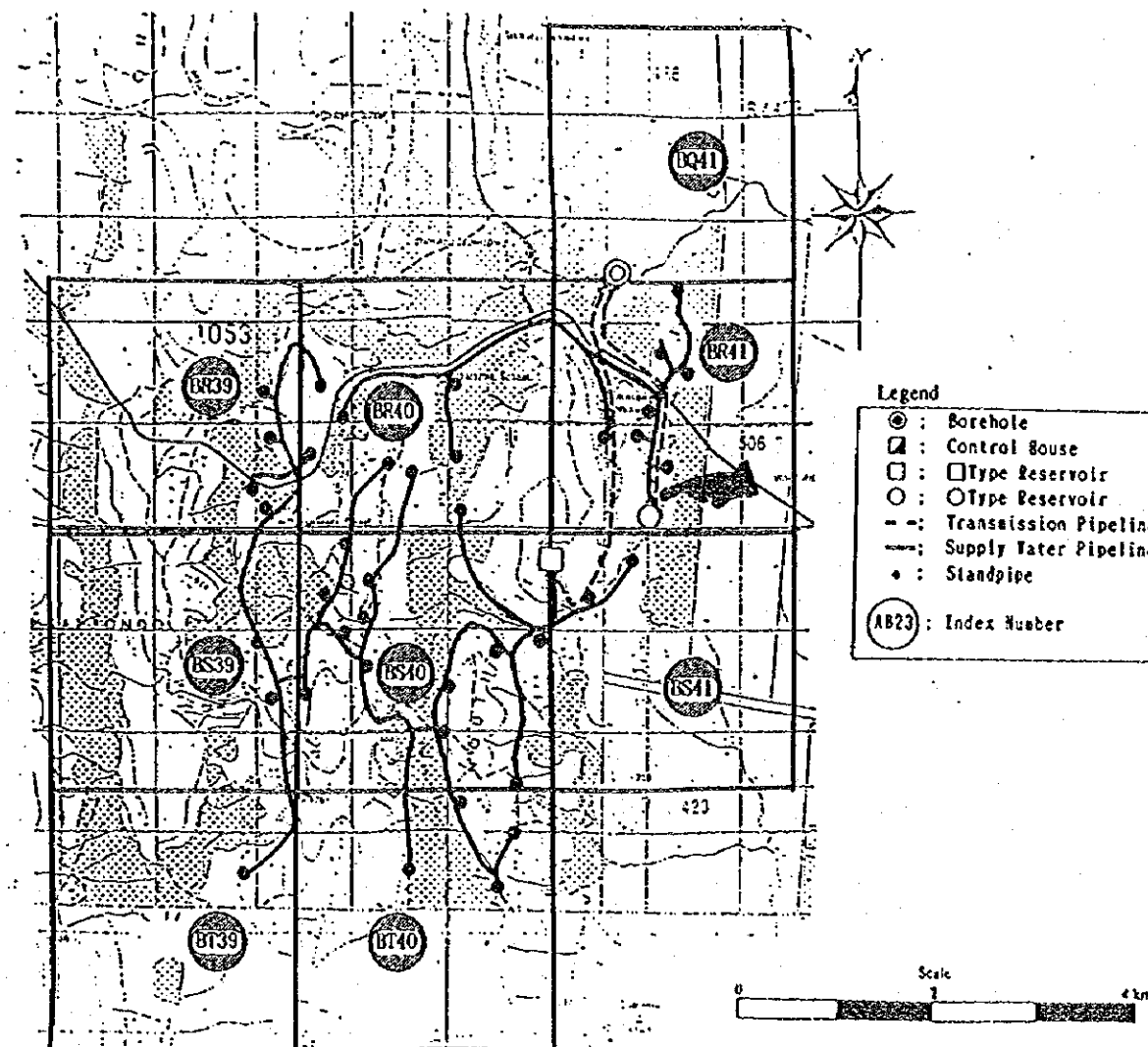
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title			
Details of 90 m ³ Reservoir (Somtongo Community)			
September 1995	Scale	See Draw	Draw No. 27.
JAPAN INTERNATIONAL COOPERATION AGENCY			



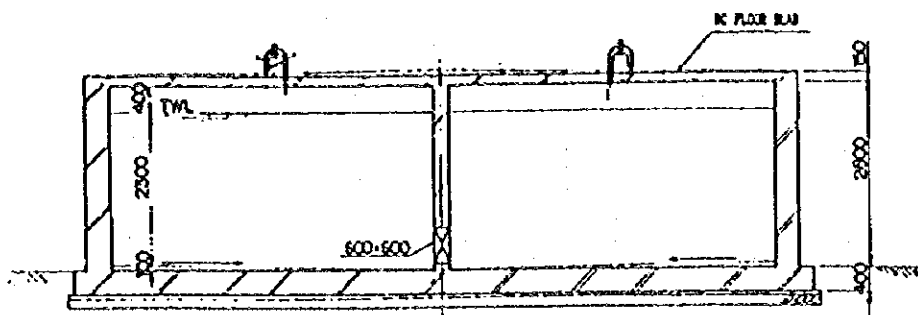
A - A

90m³ RESERVOIR

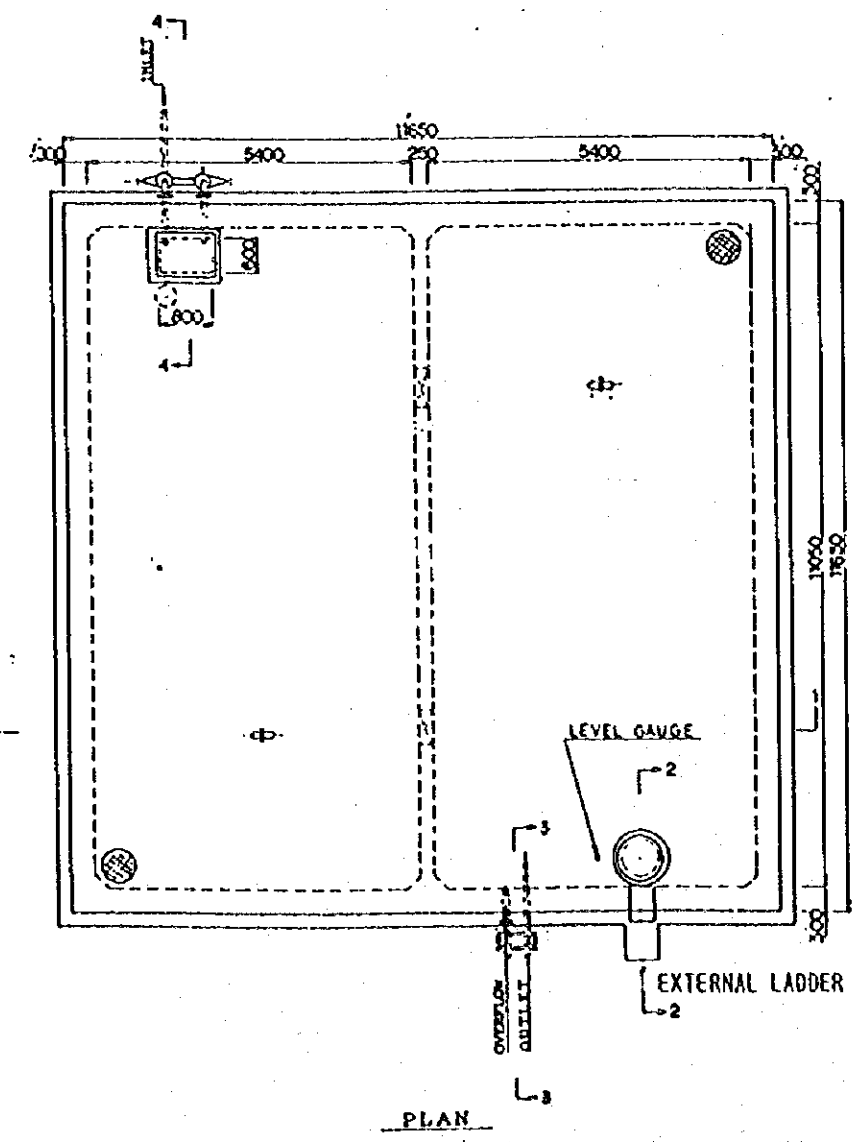
[KEY PLAN]



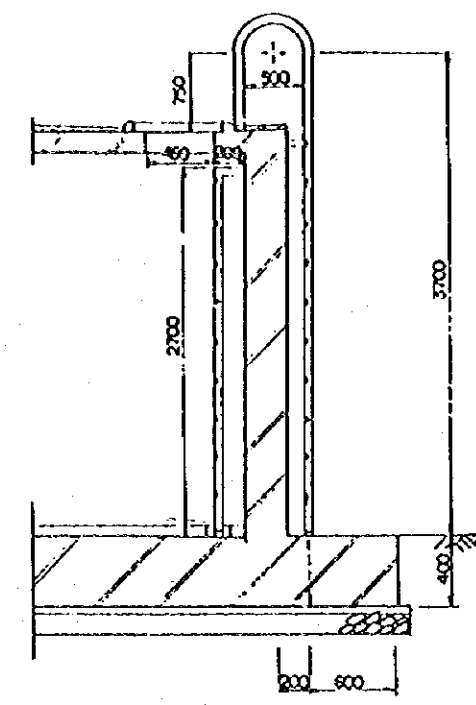
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	90 m³ Reservoir Site Plan (Somtongo Community)	
September 1995	Scale See Draw	Draw No. 28.
JAPAN INTERNATIONAL COOPERATION AGENCY		



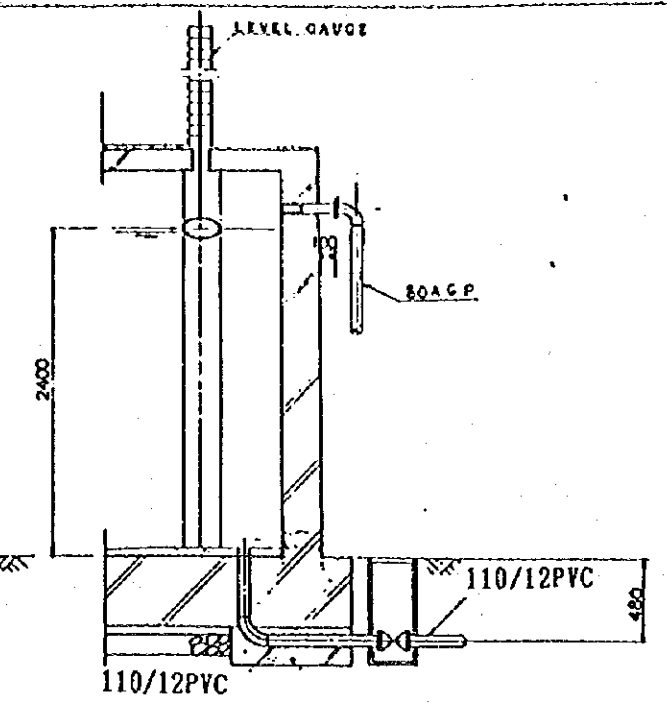
SECTIONAL ELEVATION 1-1



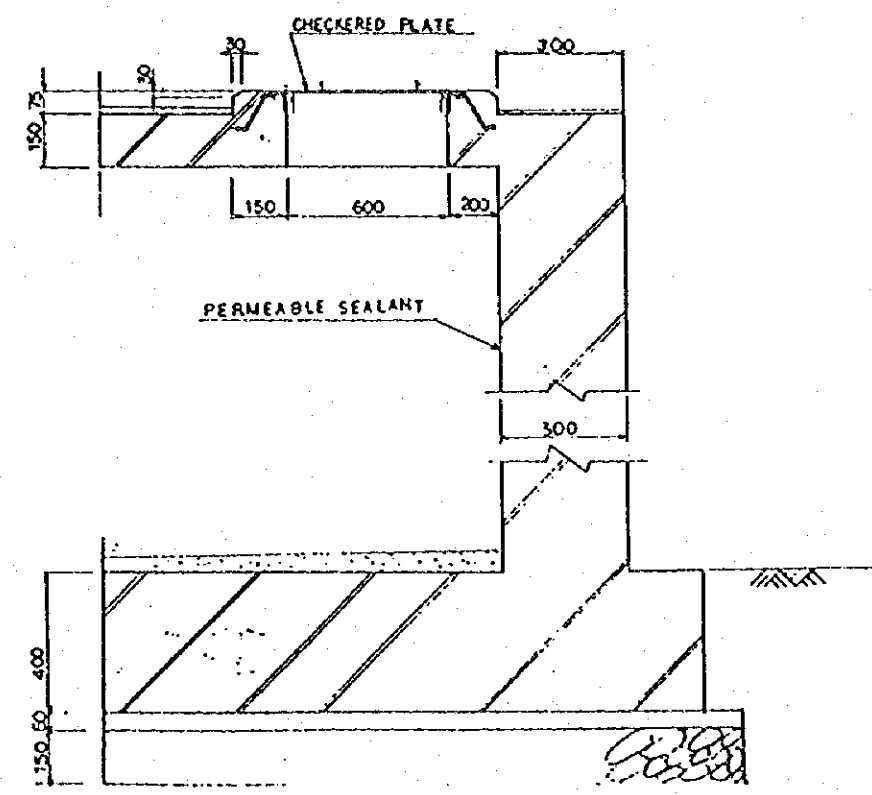
PLAN



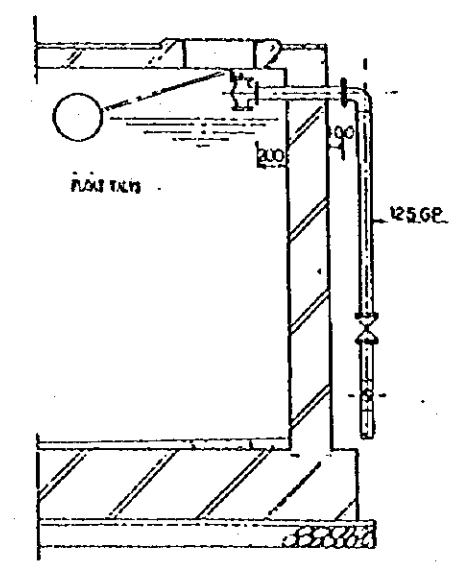
DETAIL OF ACCESS LADDERS
SECTION 2-2



DETAIL OF OVERFLOW
DETAIL OF OUTLET PIPE
SECTION 3-3



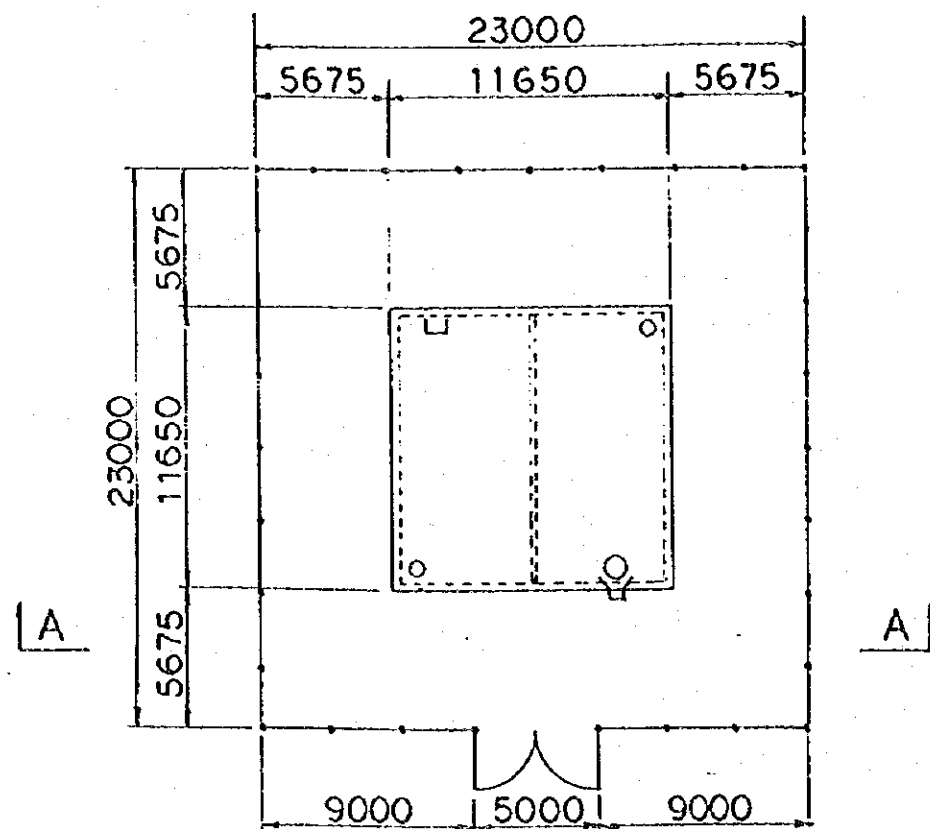
TYPICAL DETAIL OF PERIMETER
WALL AT ROOF AND FLOOR SLAB



DETAIL OF INLET PIPE
SECTION 4-4

NOTE
THE DIRECTION OF
NOZZLES TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN

THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title	Details of 265 m ³ Reservoir (Somtongo Community)		
September 1995	Scale	See Draw	Draw No. 29.
JAPAN INTERNATIONAL COOPERATION AGENCY			



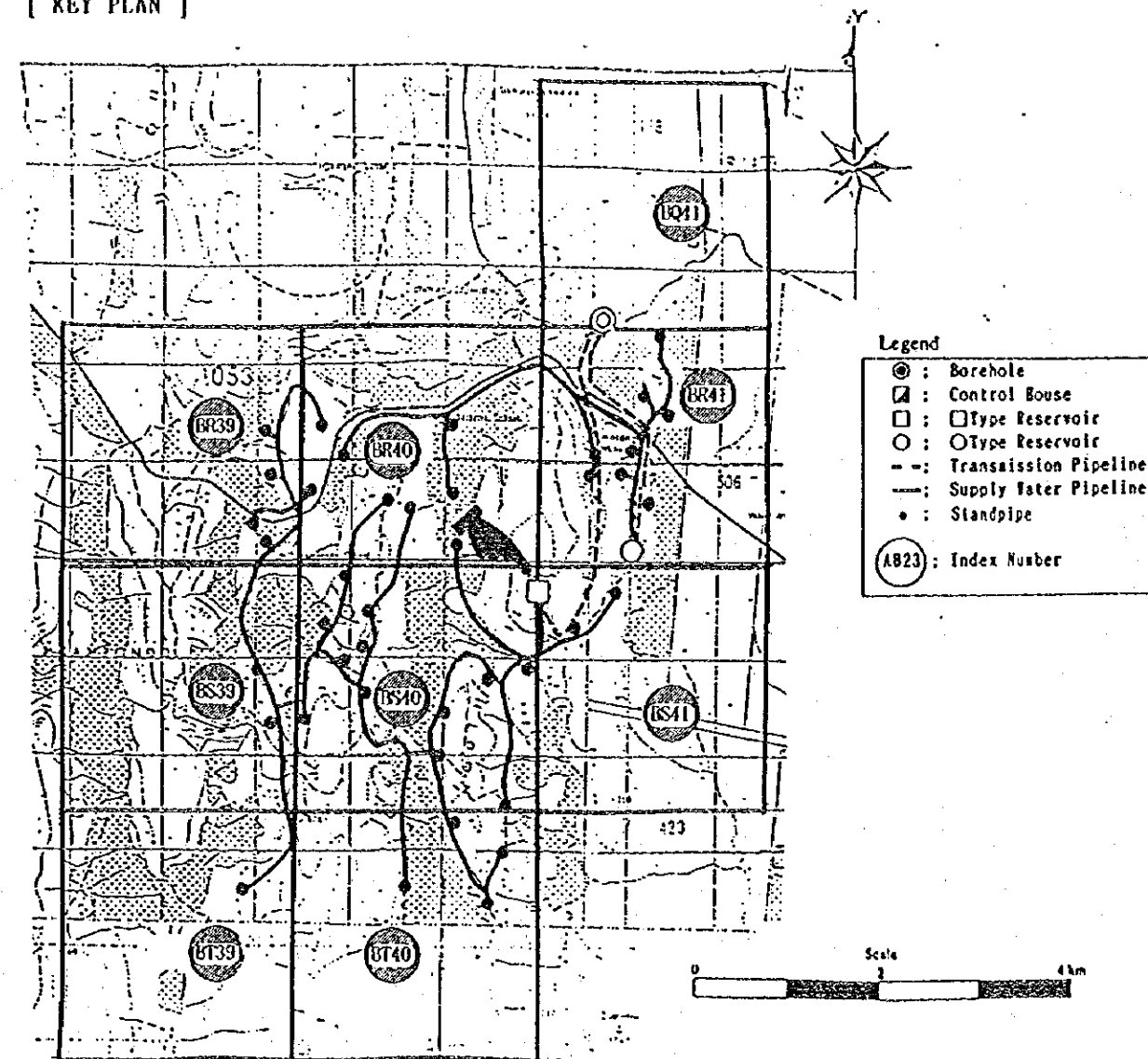
FENCE

1800

265m³ RESERVOIR

A - A

[KEY PLAN]



Legend

- : Borehole
- : Control House
- : Type Reservoir
- : Type Reservoir
- - : Transmission Pipeline
- : Supply Water Pipeline
- : Standpipe
- (A823) : Index Number

Scale 0 1 2 4 km

THE KINGDOM OF SWAZILAND
Ministry of Natural Resources & Energy
Rural Water Supply Branch

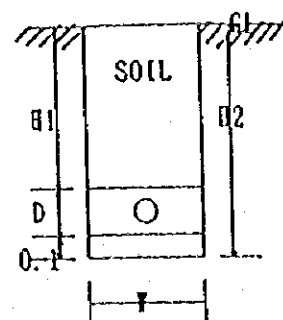
The Rural Water Supply Project

Title 265 m³ Reservoir Site Plan (Somtongo Community)

September 1995 Scale See Draw Draw No. 30.

JAPAN INTERNATIONAL COOPERATION AGENCY

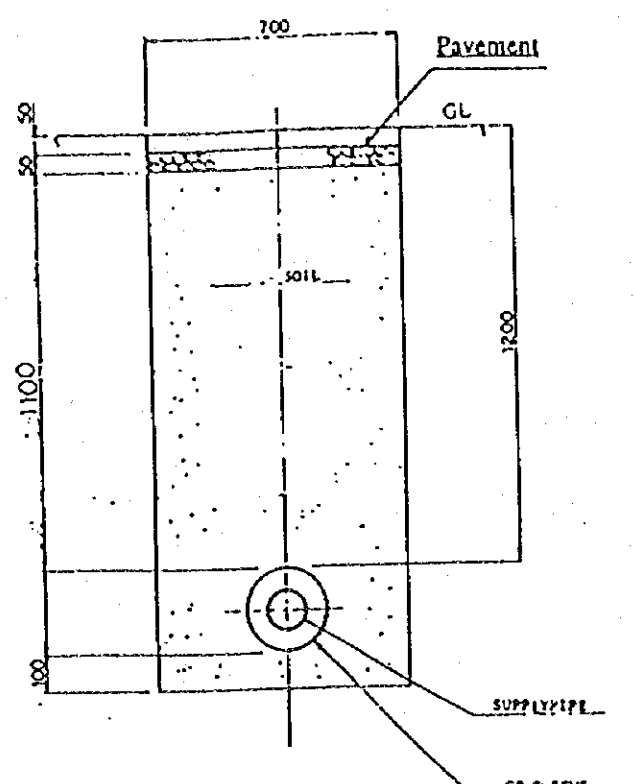
1 - 1. Standard Buried Pipings



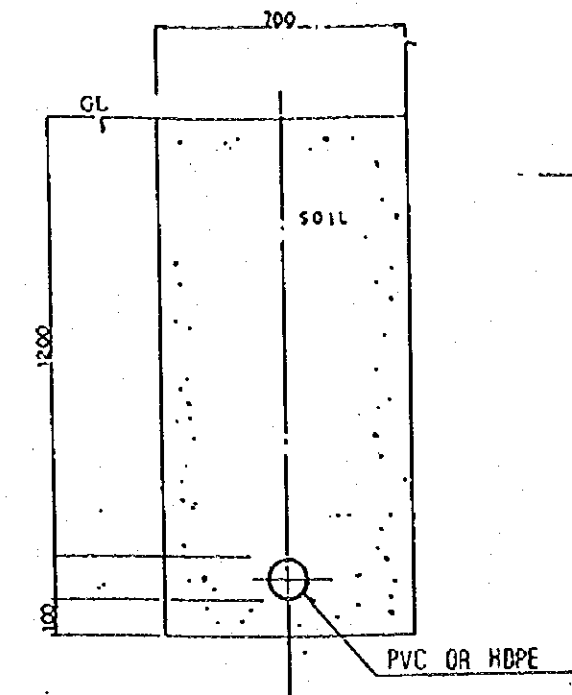
D : Pipe Dia. (m)
H1: Under Ground Pipe Depth (m)
H2: Under Ground Total Depth (m)
T : Tide (m)

Pipes	Pipe OD	H1	H2	T
	(m)	(m)	(m)	(m)
STPG38sch80125A	0.140	0.6	0.840	0.7
STPG38sch40100A	0.114	0.6	0.814	0.7
SGP 125A	0.841	0.6	0.842	0.7
SGP 100A	0.115	0.6	0.815	0.7
SGP 80A	0.090	0.6	0.790	0.7
SGP 65A	0.077	0.6	0.777	0.7
SGP 50A	0.061	0.6	0.761	0.5
SGP 40A	0.049	0.6	0.749	0.5
SGP 32A	0.043	0.6	0.743	0.5
SGP 25A	0.032	0.6	0.732	0.5
SGP 20A	0.027	0.6	0.727	0.5
PVC 140/9	0.140	0.6	0.840	0.7
PVC 110/9	0.110	0.6	0.810	0.7
PVC 90/9	0.090	0.6	0.790	0.7
PVC 75/9	0.075	0.6	0.775	0.7
PVC 63/9	0.063	0.6	0.763	0.7
PVC 50/9	0.050	0.6	0.750	0.5
HDPE 40/10	0.040	0.6	0.740	0.5
HDPE 32/10	0.032	0.6	0.732	0.5
HDPE 25/10	0.025	0.6	0.725	0.5

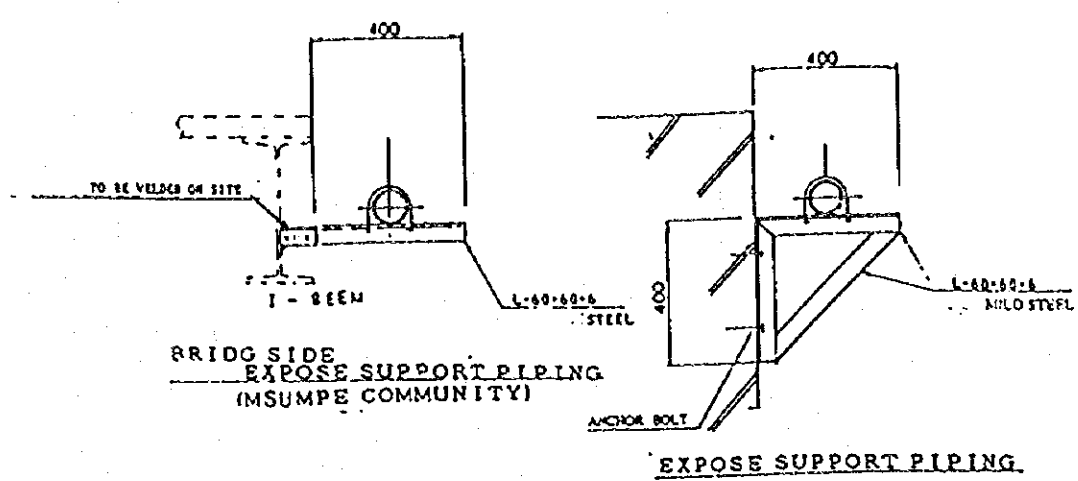
THE KINGDOM OF SWAZILAND			
Ministry of Natural Resources & Energy			
Rural Water Supply Branch			
The Rural Water Supply Project			
Title	Standard Pipe Laying Works		
September 1995	Scale	Non	Draw No. 31.
JAPAN INTERNATIONAL COOPERATION AGENCY			



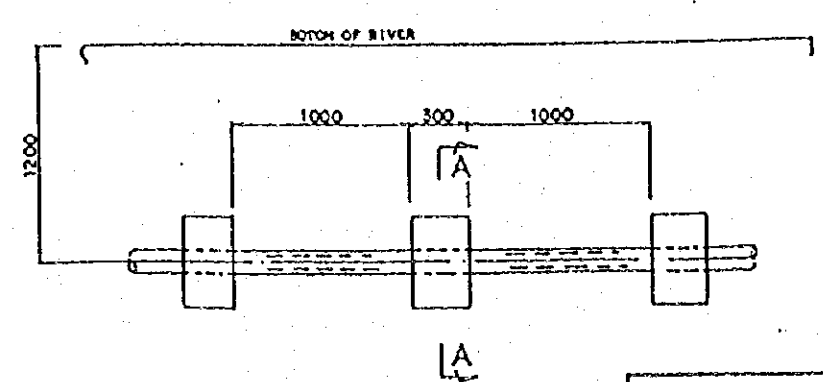
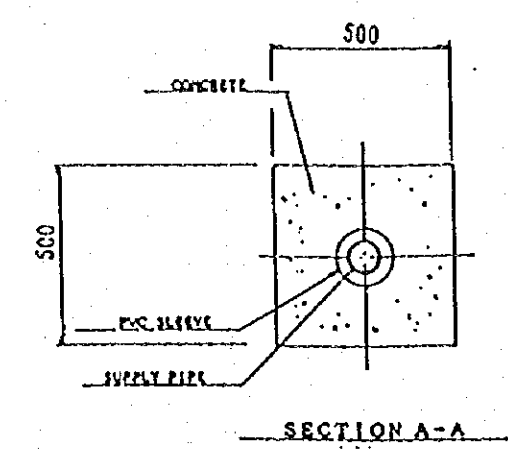
ROAD CROSSING
(UNDER GROUND PIPING)



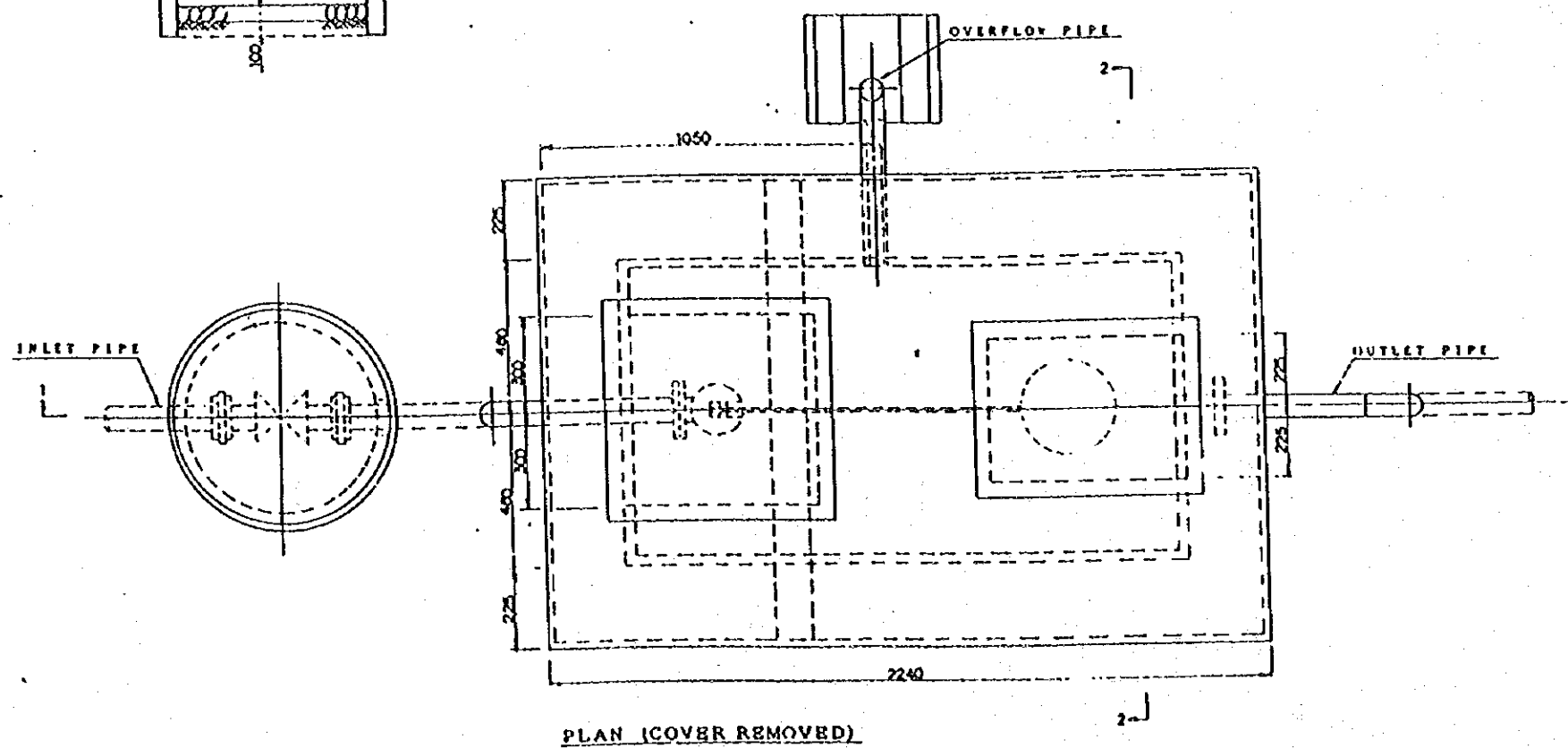
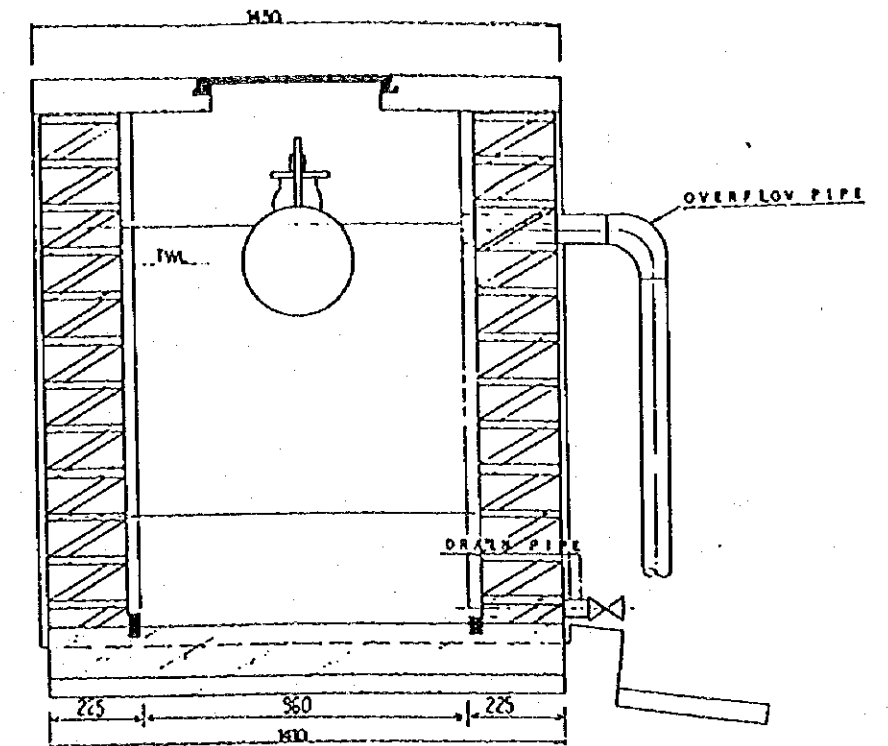
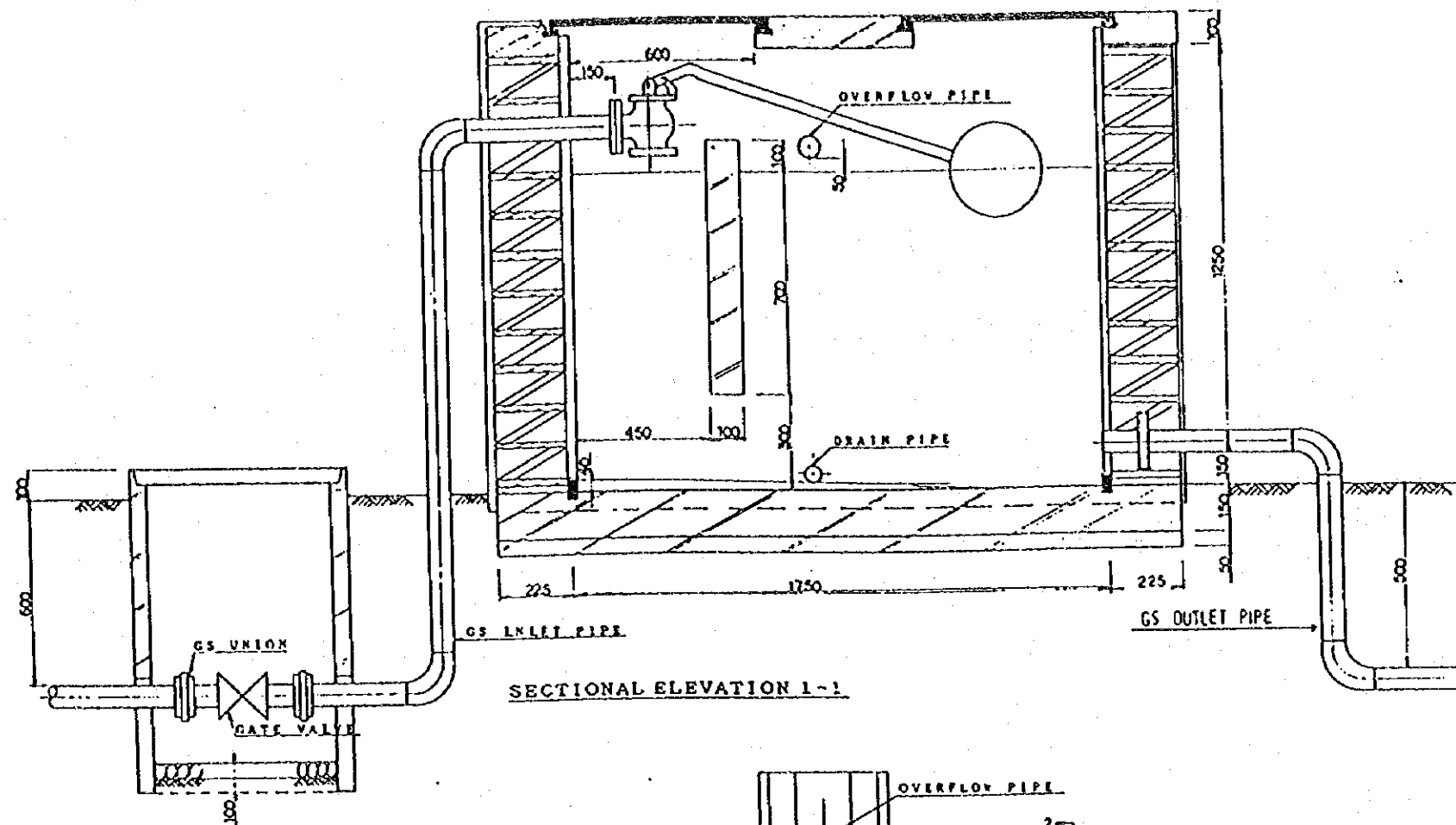
FIELD CROSSING
(UNDER GROUND PIPING)



RIVER CROSSING
(UNDER GROUND PIPING)

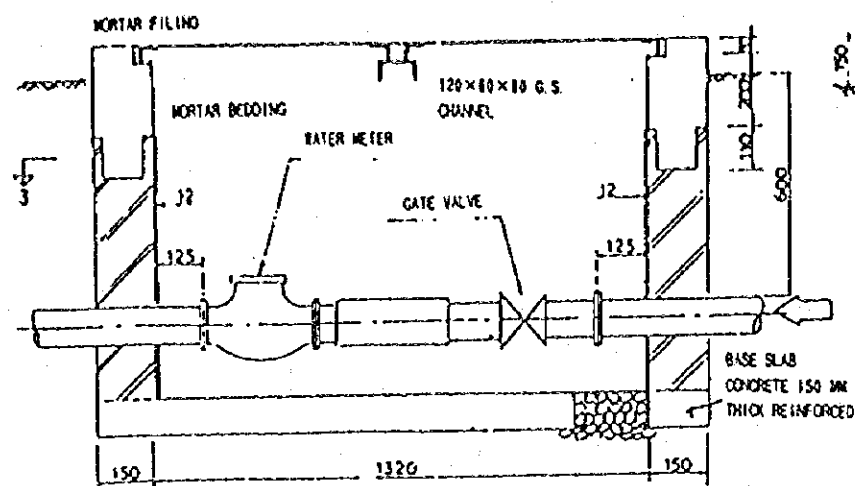


THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title Under Ground Piping(Road, Field, Bridge, River Crossing and others)		
September 1995	Scale See Draw	Draw No. 32.
JAPAN INTERNATIONAL COOPERATION AGENCY		

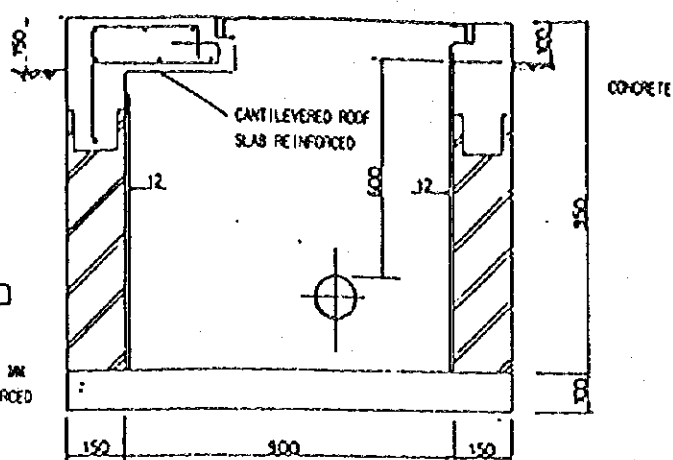


NOTE
THE DIRECTION OF NOZZLES
TO BE INSTALLED
WILL BE DETERMINED
IN THE DETAILED DESIGN

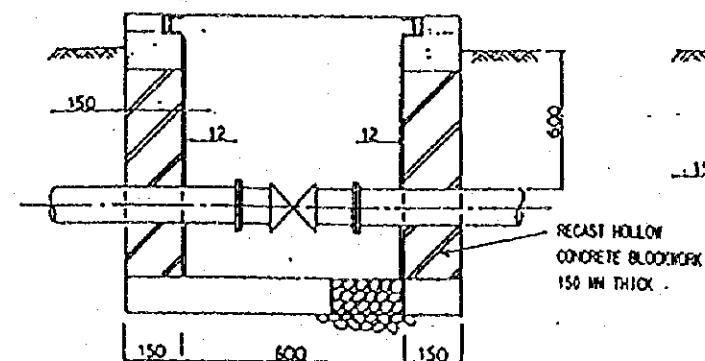
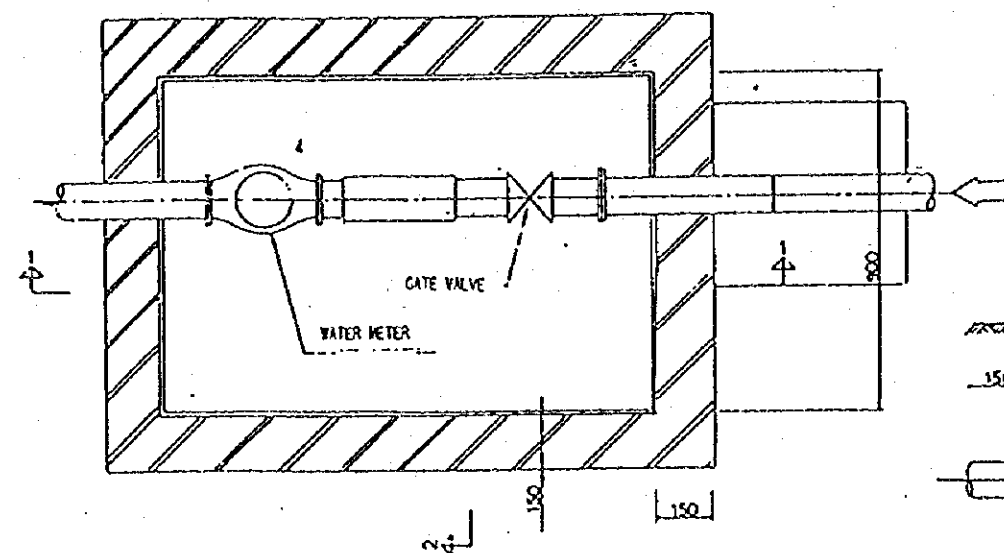
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Details of Break Pressure Tank	
September 1995	Scale 1/20	Draw No. 33.
JAPAN INTERNATIONAL COOPERATION AGENCY		



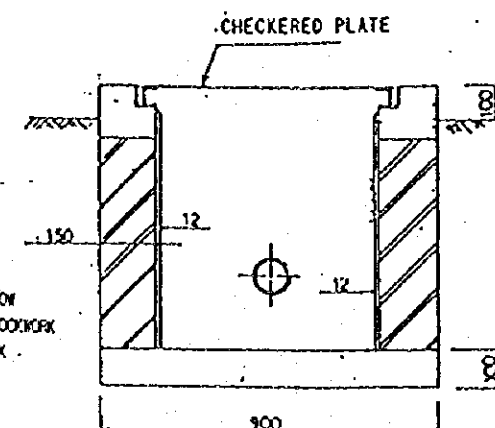
SECTION 1-1



SECTION 2-2
FLOW METER CHAMBER
(FOR MSUMPE COMMUNITY)

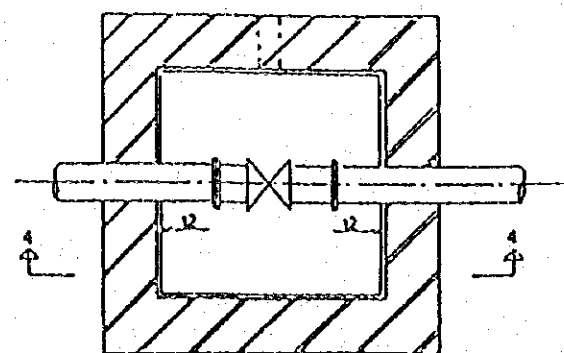


SECTION 4-4



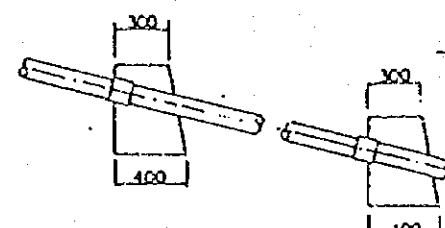
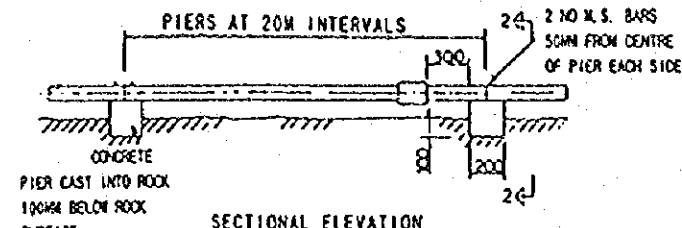
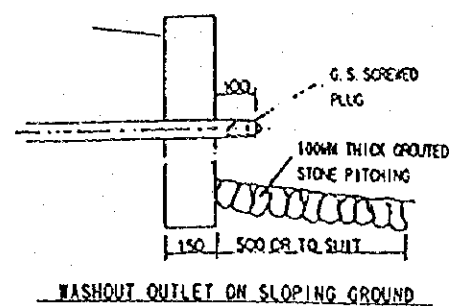
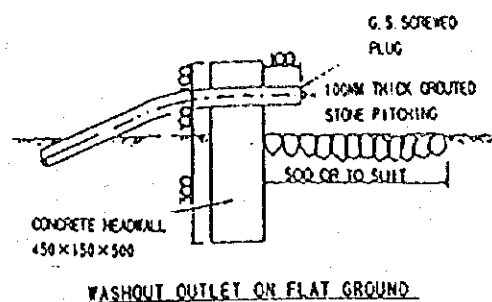
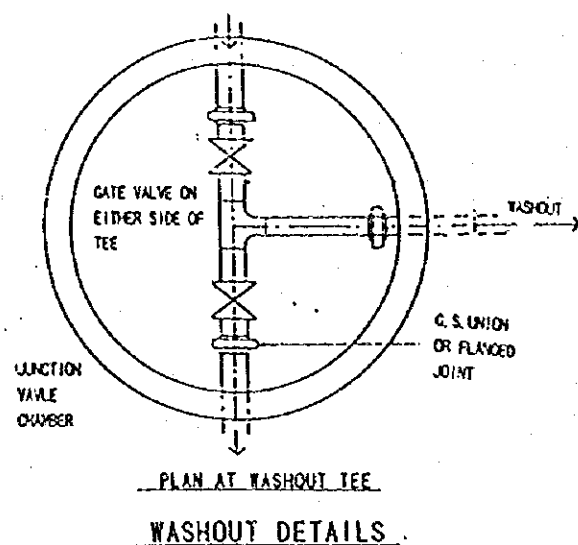
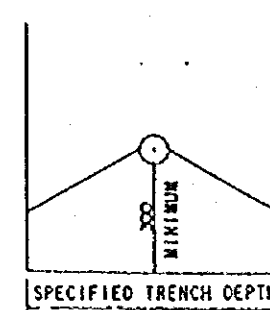
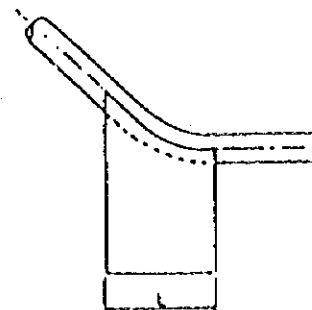
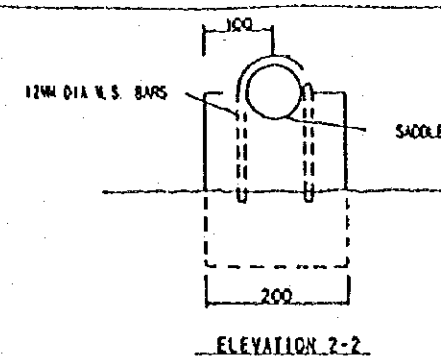
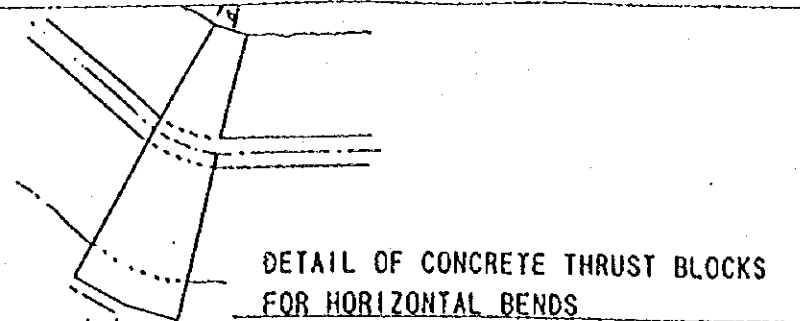
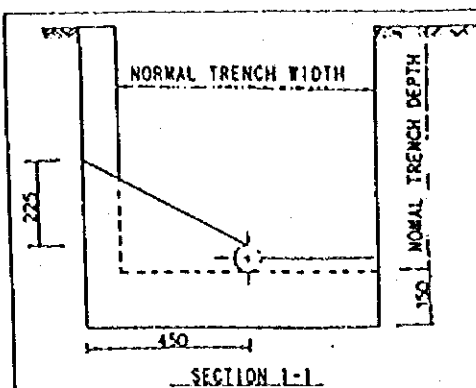
SECTION 5-5

SINGLE VALVE CHAMBER
FOR OUTLET OR WASHOUT



SECTION 6-6

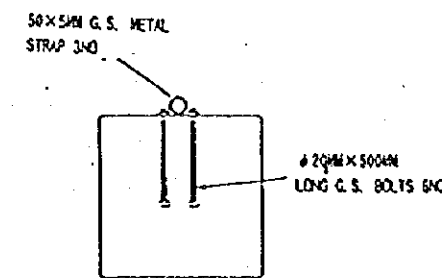
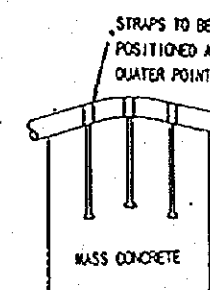
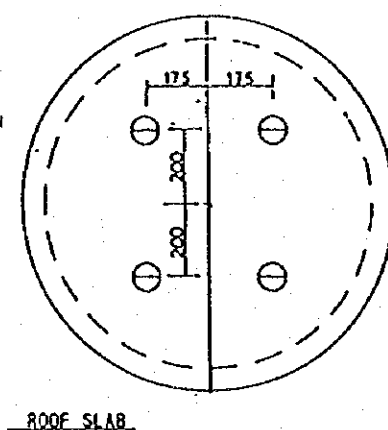
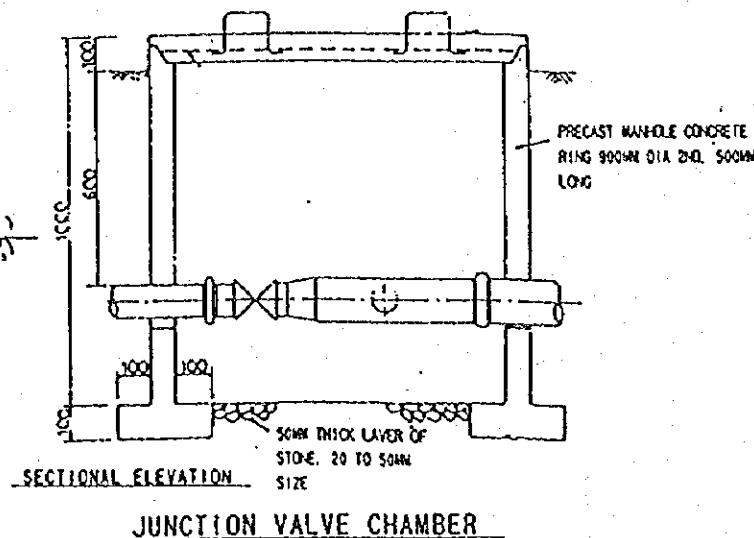
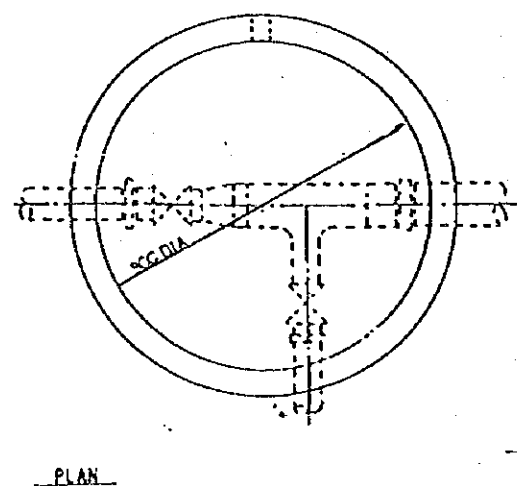
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Details of Each Valve Chamber for Supply water Line	
September 1995	Scale 1/20	Draw No. 34.
JAPAN INTERNATIONAL COOPERATION AGENCY		



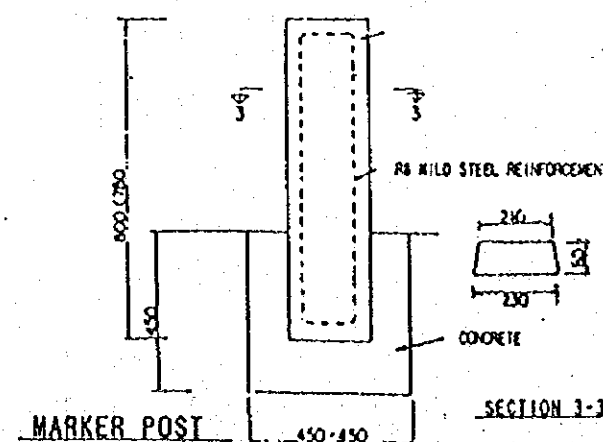
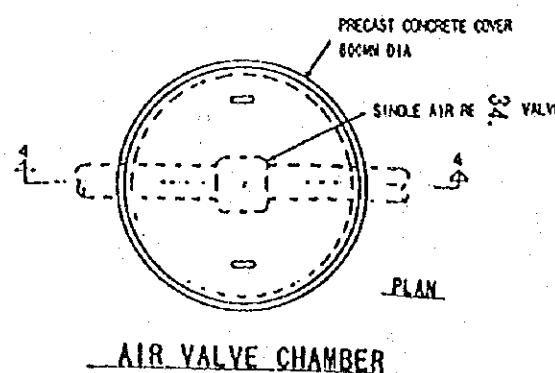
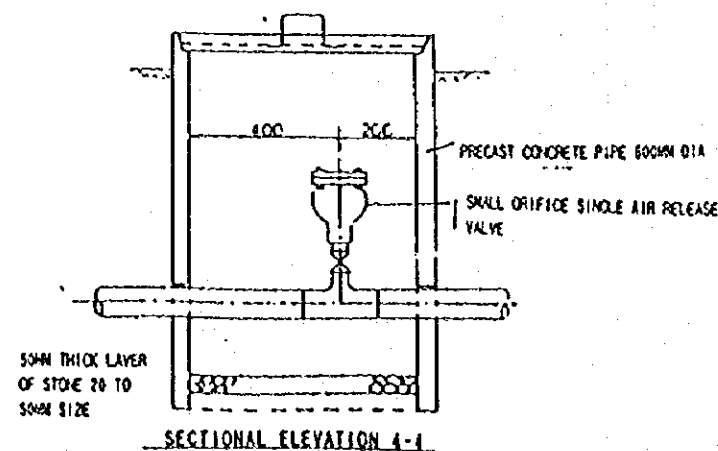
DETAIL OF CONCRETE THRUST BLOCKS FOR VERTICAL BENDS

PIPE DIA. (mm)	A (mm)	B (mm)	C (mm)
110	800	500	1700
150	800	400	1700
200	700	400	1600

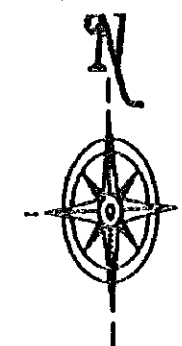
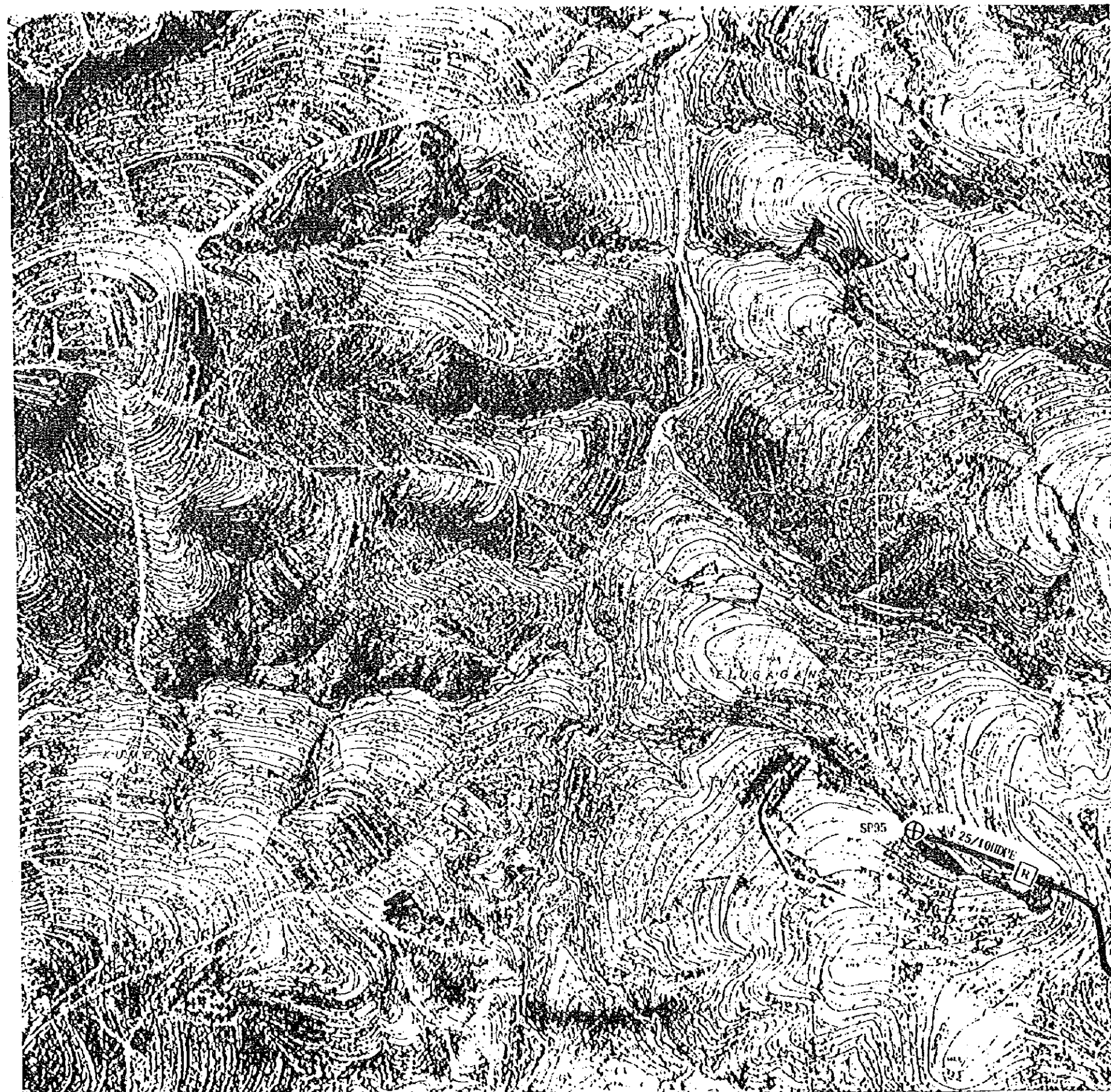
DETAIL OF ANCHOR BLOCK FOR STEEL GRADES



DETAIL OF CONCRETE THRUST BLOCKS FOR VERTICAL BENDS



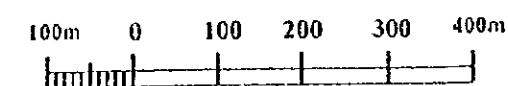
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	Details of Valve chamber, Anchor Blocks & Washout	
September 1995	Scale 1/20	Draw No. 35
JAPAN INTERNATIONAL COOPERATION AGENCY		



Legend

- [R] : Break Pressure Tank
- [A] : Air Valve Chamber
- [W] : Wash out Chamber
- [X] : Maintenance Valve Chamber
- ⊗ : Standpipe
- J : Junction

		AA25
AB23	AB24	AB25
AC23	AC24	AC25
AD23	AD24	AD25



THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title NGWAZINI COMMUNITY		
Supply Water Pipe Line(1)		
September 1995	Scale 1/10,000	Draw No. 38
JAPAN INTERNATIONAL COOPERATION AGENCY		