

## **ANNEX 20**

### **REFERENCES**



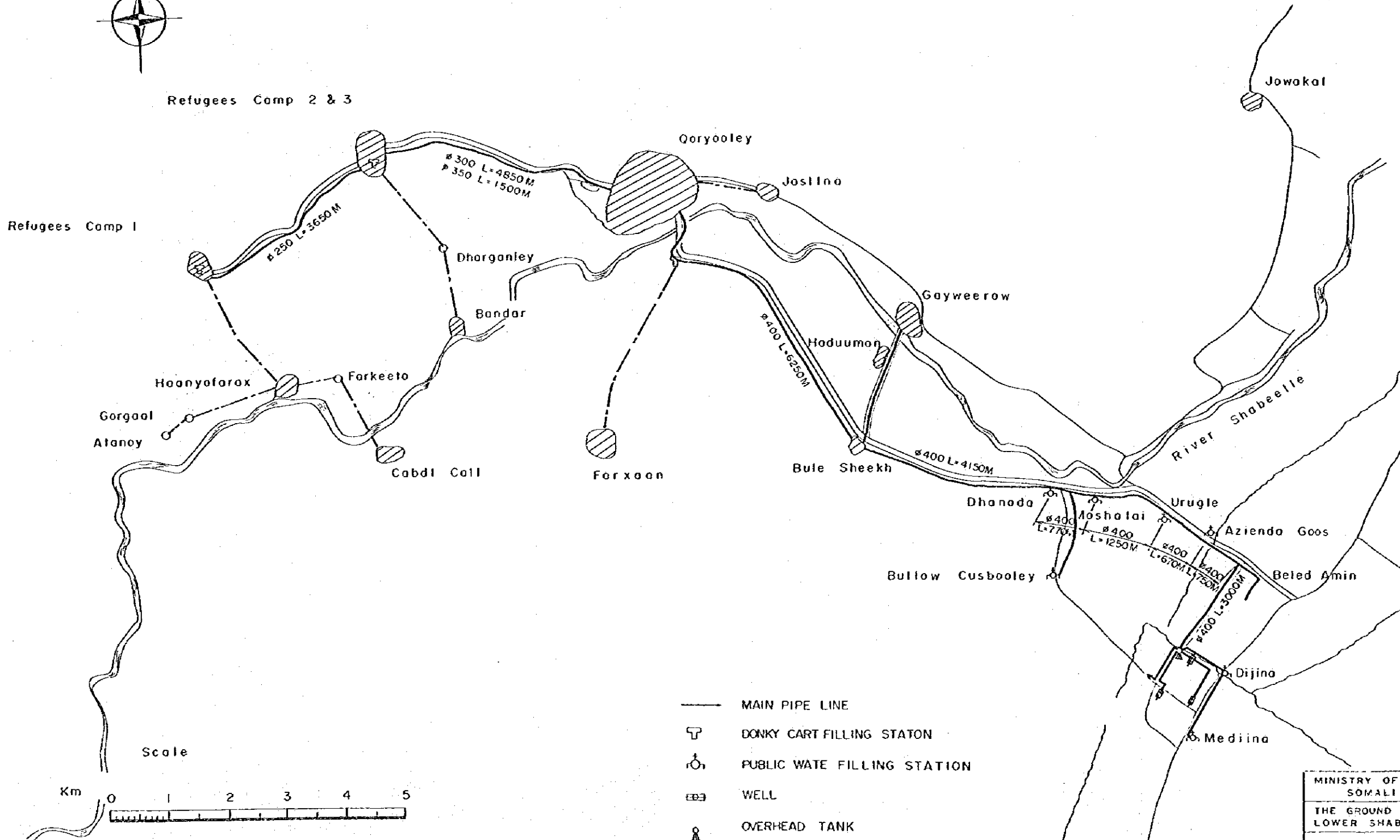
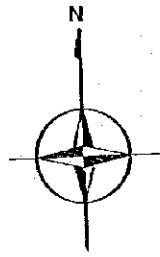
## REFERENCES

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1984-1986 Ministry of National Planning 1983/12
2. Planning for the Drinking Water Supply and Sanitation Decade in  
Somalia for the period 1984 - 1990 Volume II 1985/2
3. - Technical Report -  
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4. Somalia in figures Ministry of National Planning 1985/2
5. Plan for the Drinking Water Supply and Sanitation Sector in  
Somalia for the decade 1981 - 1990 Volume I 1981/10
6. Refugee Settlement Programme in Somalia
7. Agricultural Refugee Settlement Schemes at Qoryoley District,  
& Lower Shabell Region UNHCR 1985/1
8. Qoryooley Water Supply Project WHO 1981/4
9. Five Year Development Plan 1982-1986  
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10. Annual Development Plan 1985  
Ministry of National Planning 1984/12
11. Italian Program for Refugees in Somalia  
ETACONSUIT 1984/7
12. Oxfam Water Supply Scheme for Refugee Camps
13. Proposal for Programme Implementation GJZ 1984/7
14. Somalia Geological Map MMWR 1979

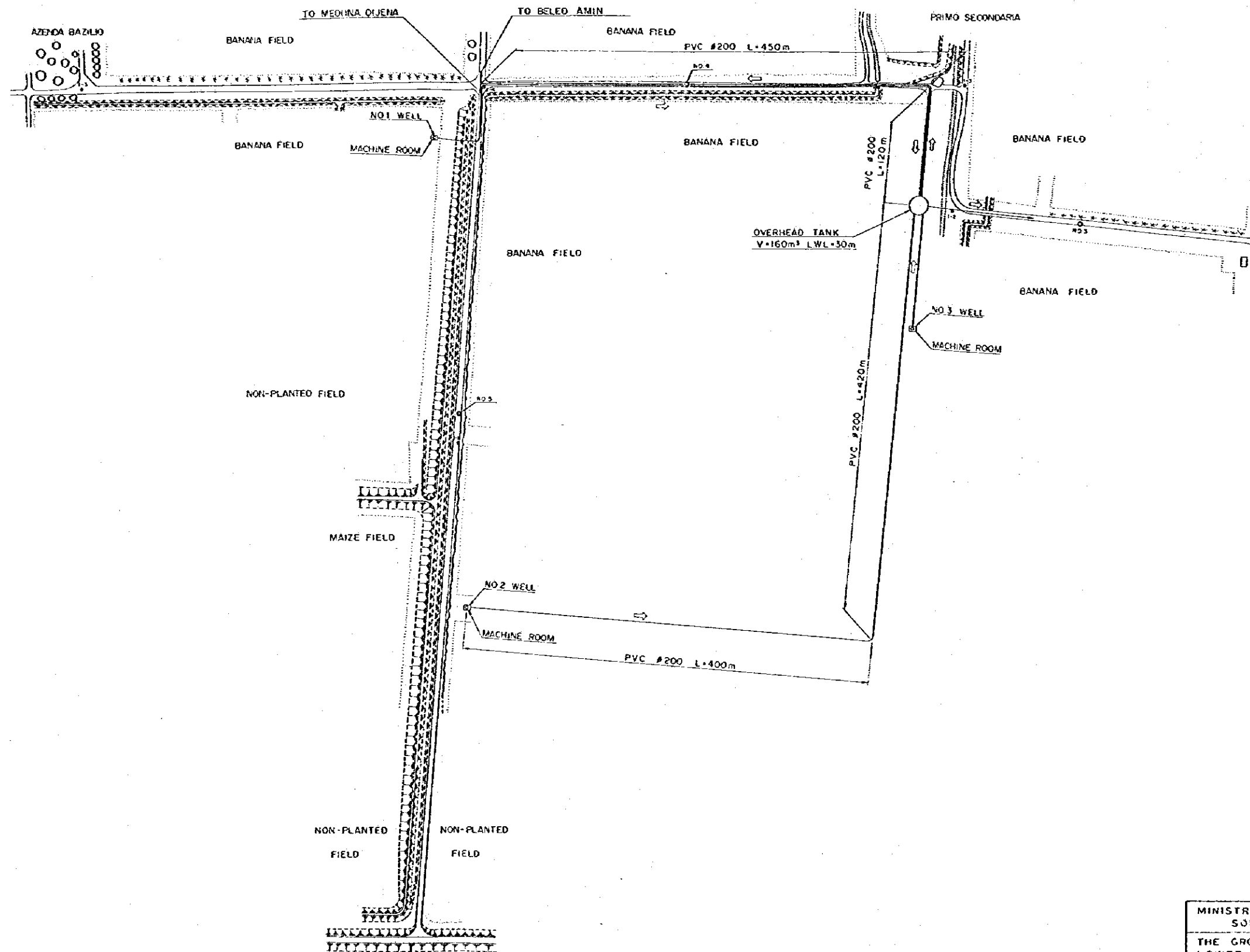
15. Report of Irrigation Authority 1985
16. Somali Meteorological Authority 1985
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Groundwater Resources in Agricultural Land  
in Janaale 1985
18. Hydrogeological Report in Janaale reported by MacDonald 1978
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20. Ministry of Health 1985

DRAWINGS

# GENERAL PLAN



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC			
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I			
<b>GENERAL PLAN</b>			
Date	OCT. 1985	Drawing No	I
JAPAN INTERNATIONAL COOPERATION AGENCY			

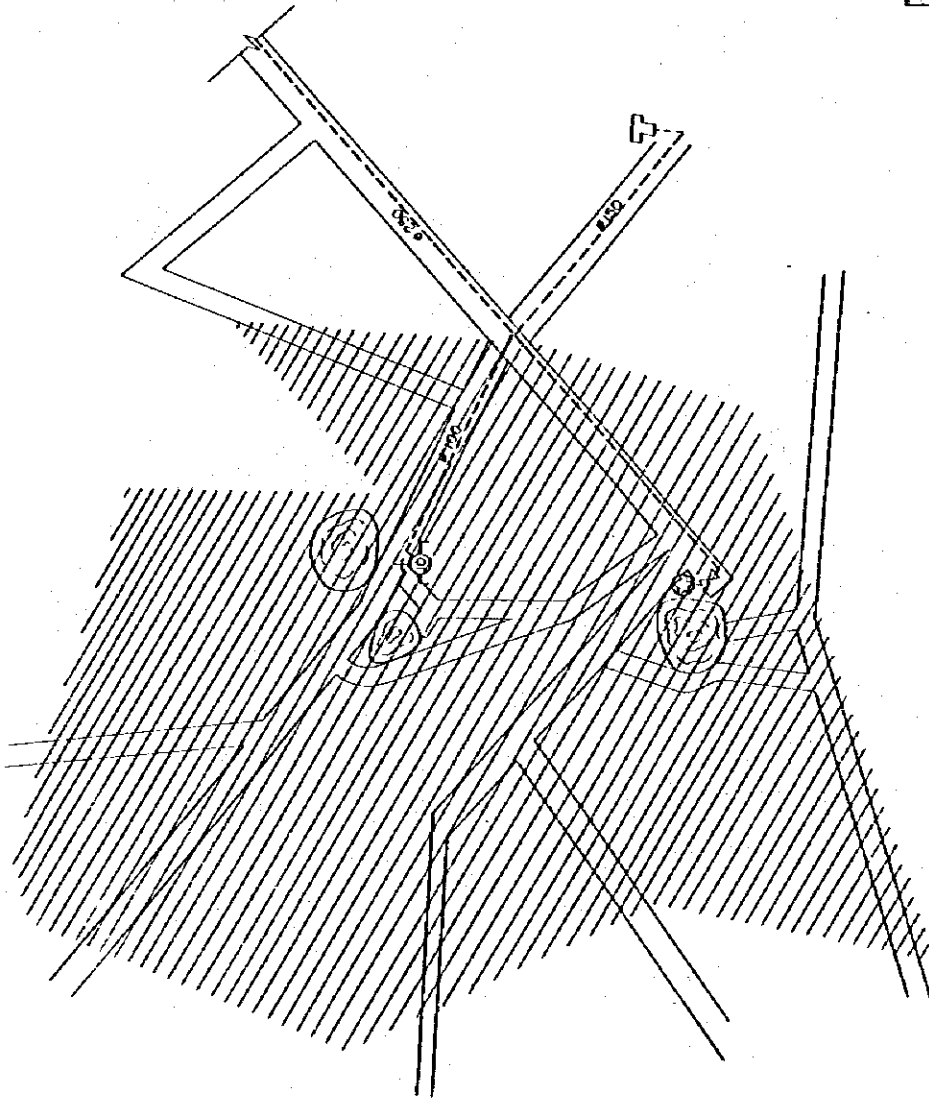
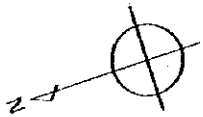






MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC		
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I		
LAYOUT OF WATER RESOURCE FACILITIES		
Date	OCT. 1985	Drawing No. 2
JAPAN INTERNATIONAL COOPERATION AGENCY		





LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - I



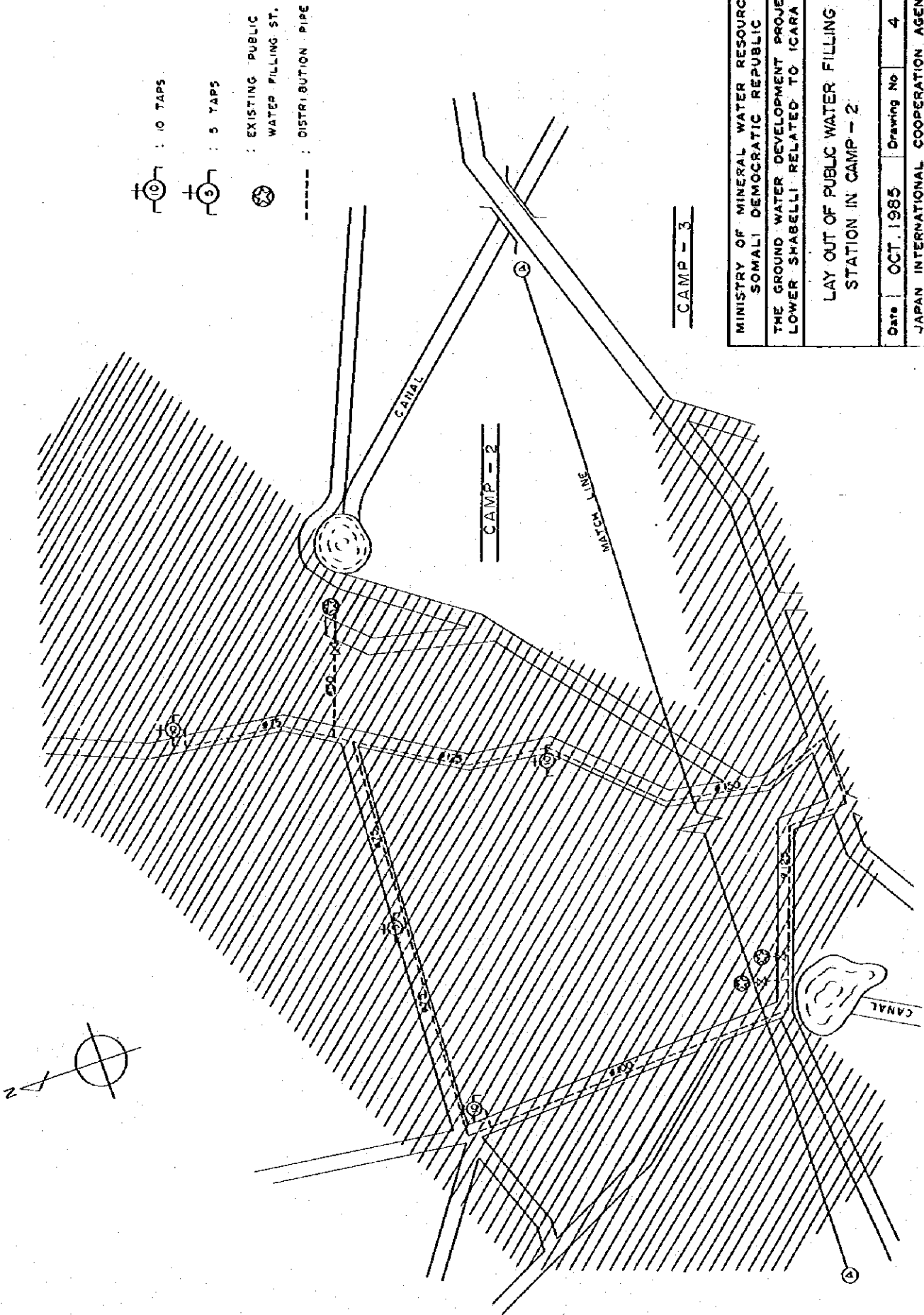
-  : 10 TAPS
-  : EXISTING, PUBLIC WATER FILLING ST.
-  : DISTRIBUTION PIPE
-  : DONKEY CART FILLING STATION

MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC	
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I	
LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - I	
Date	OCT. 1985
Drawing No	3
JAPAN INTERNATIONAL COOPERATION AGENCY	

CAMP - I



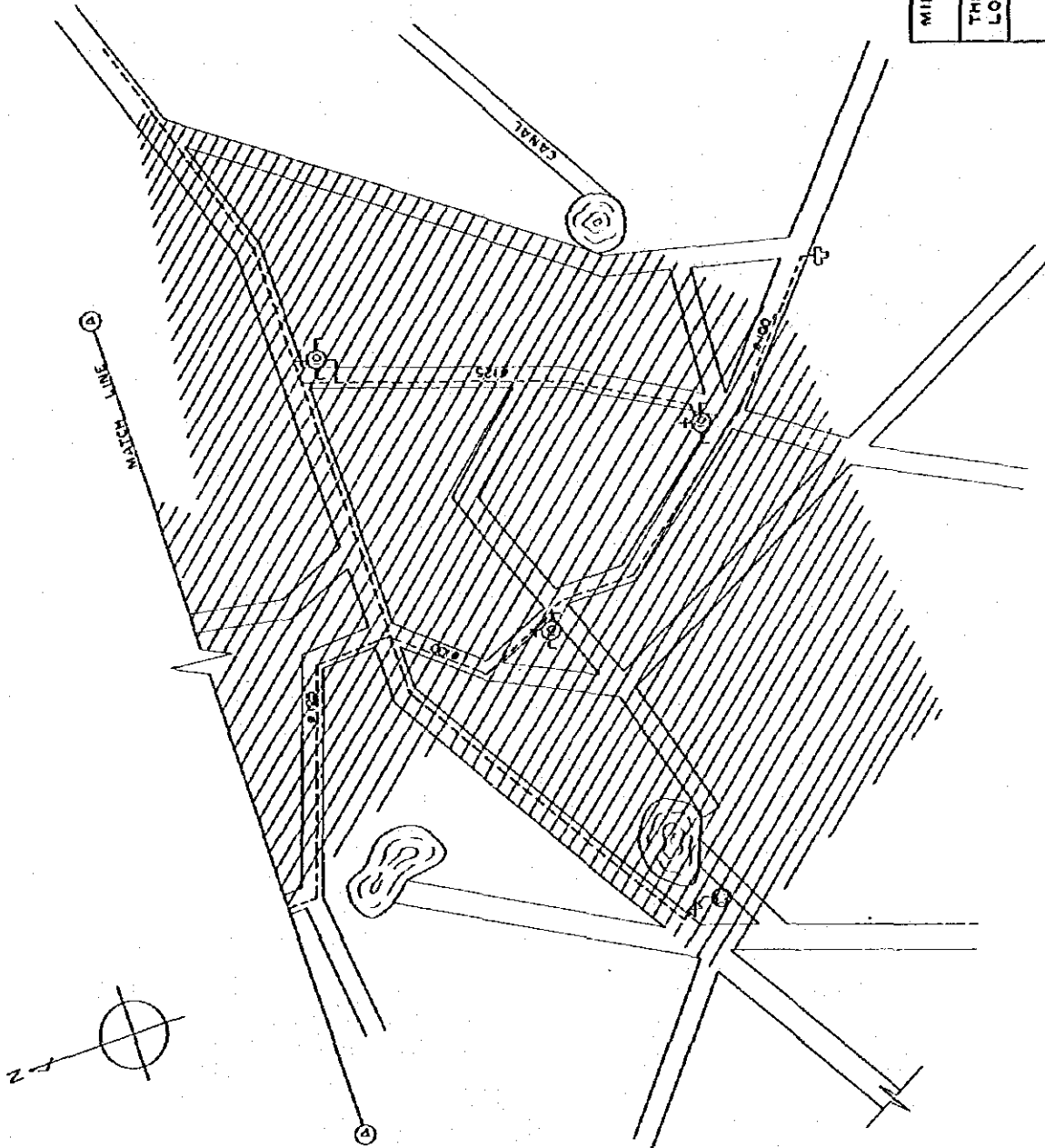
LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - 2



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC	
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I	
LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - 2	
Date	OCT. 1985
Drawing No	4
JAPAN INTERNATIONAL COOPERATION AGENCY	



LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - 3



- ⊕ : IO TAPS
- ⊕ : EXISTING WATER FILLING STATION
- - - : DISTRIBUTION PIPE
- ⊕ : DONKEY CART FILLING STATION

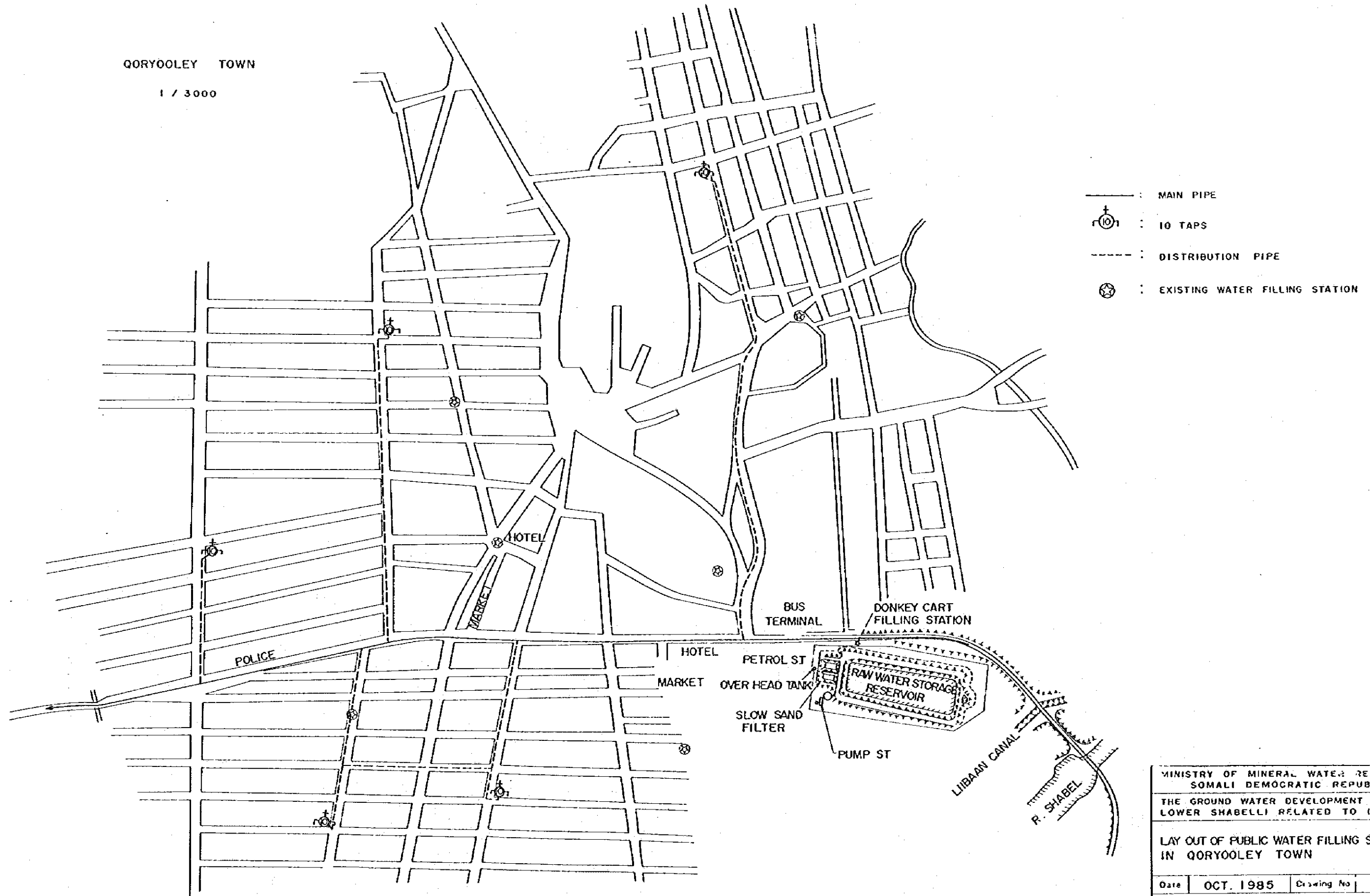
MINISTRY OF MINERAL WATER RESOURCES	
SOMALI DEMOCRATIC REPUBLIC	
THE GROUND WATER DEVELOPMENT PROJECT	
LOWER SHABELLI RELATED TO ICARA I	
LAY OUT OF PUBLIC WATER FILLING STATION IN CAMP - 3	
Date	OCT. 1985
Drawing No	5
JAPAN INTERNATIONAL COOPERATION AGENCY	

CAMP - 3

LAYOUT OF PUBLIC WATER FILLING STATION

QORYOOLEY TOWN

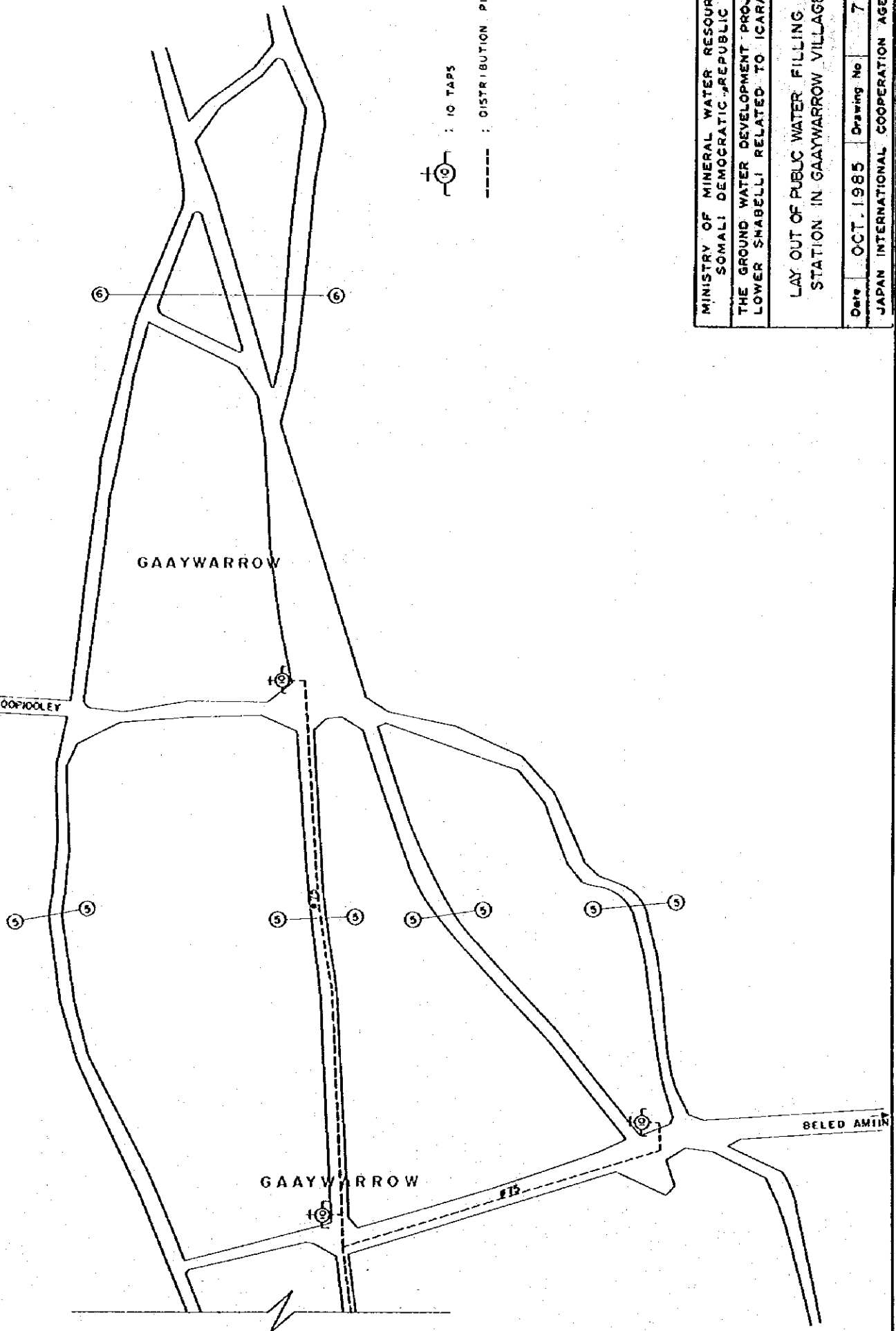
1 / 3000



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC		
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I		
LAY OUT OF PUBLIC WATER FILLING STATION. IN QORYOOLEY TOWN		
Date	OCT. 1985	Drawing No 6
JAPAN INTERNATIONAL COOPERATION AGENCY		



LAY OUT OF PUBLIC WATER FILLING STATION IN GAAYWARROW VILLAGE

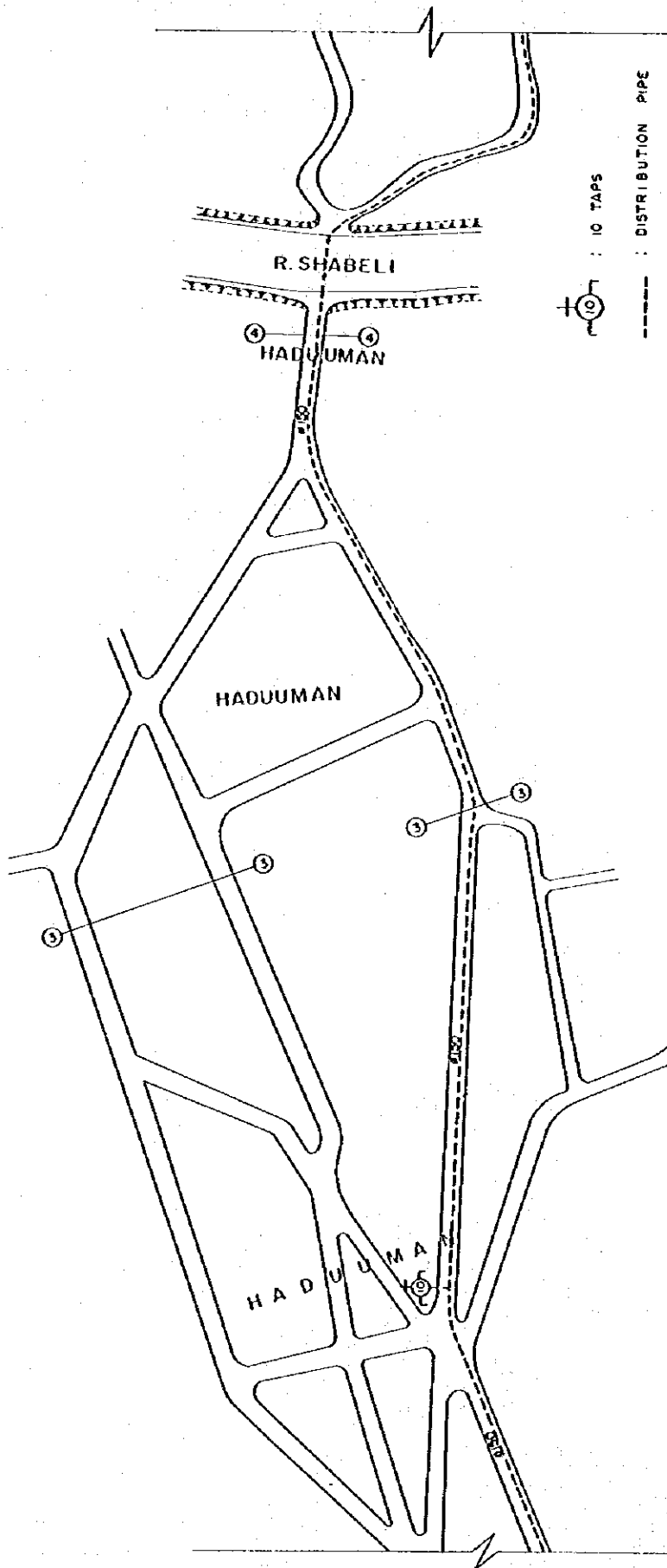


MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC	
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I	
LAY OUT OF PUBLIC WATER FILLING STATION IN GAAYWARROW VILLAGE	
Date	OCT. 1985
Drawing No	7
JAPAN INTERNATIONAL COOPERATION AGENCY	





LAY OUT OF PUBLIC WATER FILLING STATION IN HADUUMAN VILLAGE



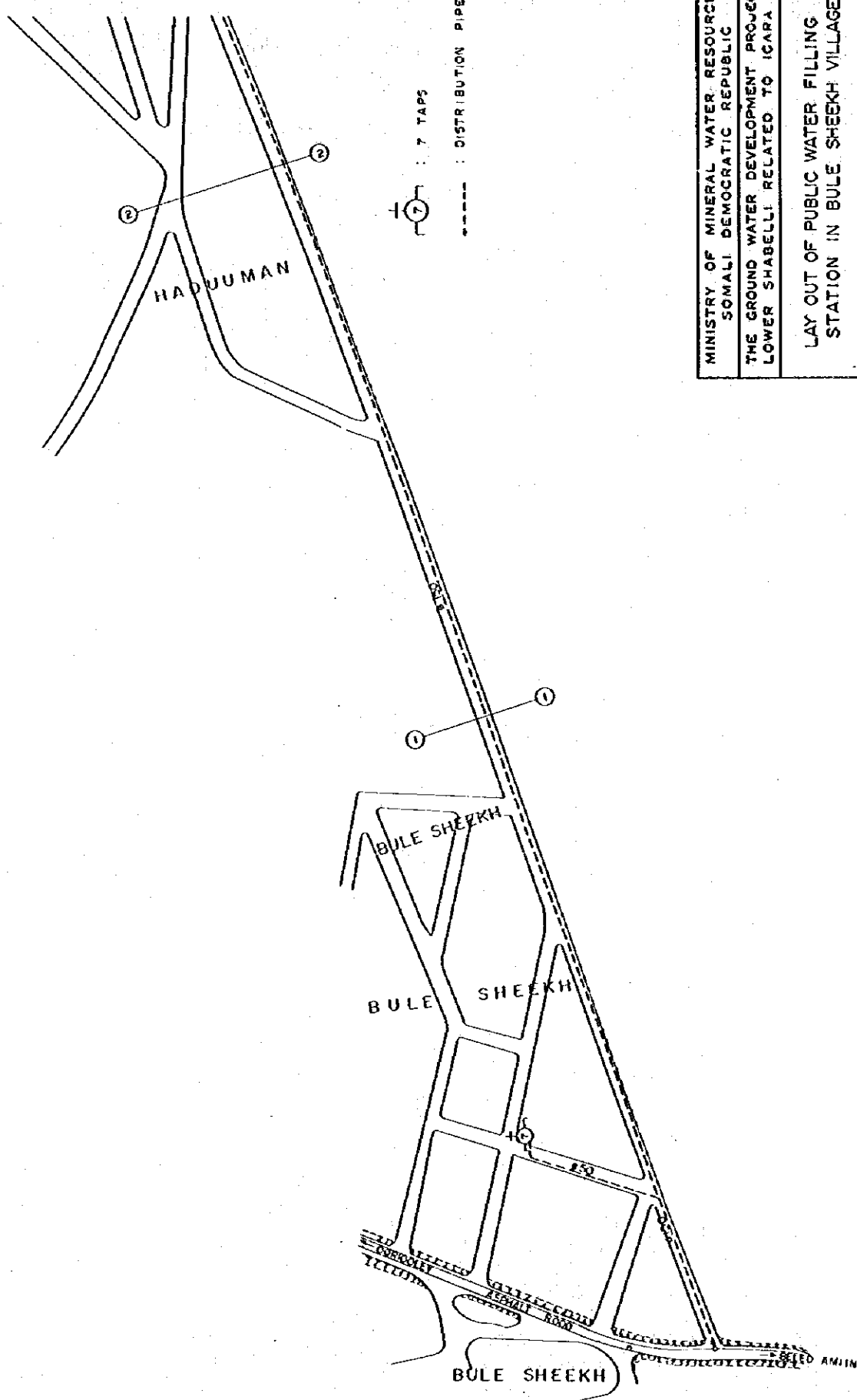
MINISTRY OF MINERAL WATER RESOURCES  
 SOMALI DEMOCRATIC REPUBLIC  
 THE GROUND WATER DEVELOPMENT PROJECT  
 LOWER SHABELLI RELATED TO ICARA I

LAY OUT OF PUBLIC WATER FILLING  
 STATION IN HADUUMAN VILLAGE

Date | OCT. 1985 | Drawing No. | 8  
 JAPAN INTERNATIONAL COOPERATION AGENCY

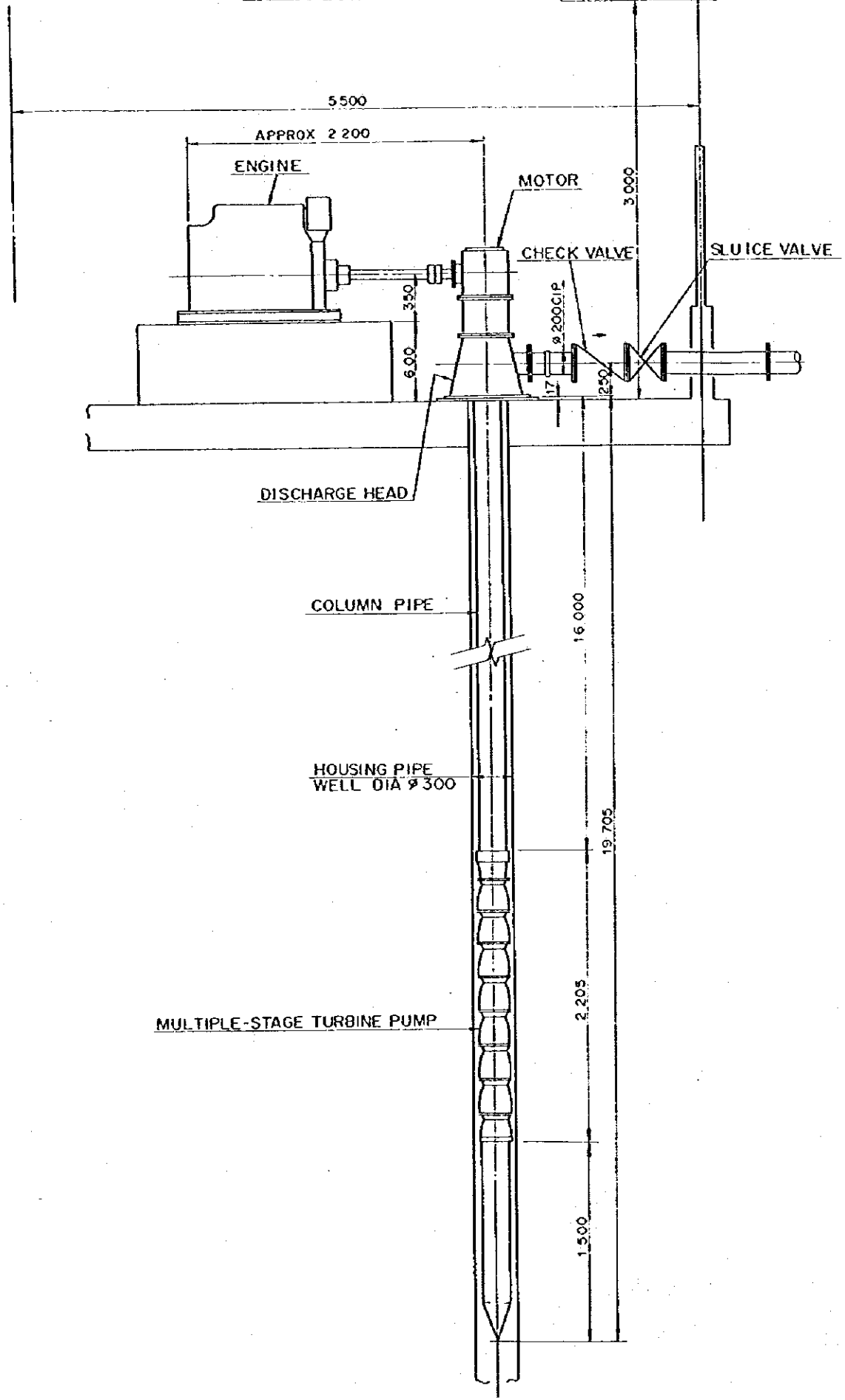


LAY OUT OF PUBLIC WATER FILLING STATION IN BULE SHEEKH VILLAGE



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC	
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I	
LAY OUT OF PUBLIC WATER FILLING STATION IN BULE SHEEKH VILLAGE	
Date	OCT. 1985
Drawing No.	9
JAPAN INTERNATIONAL COOPERATION AGENCY	

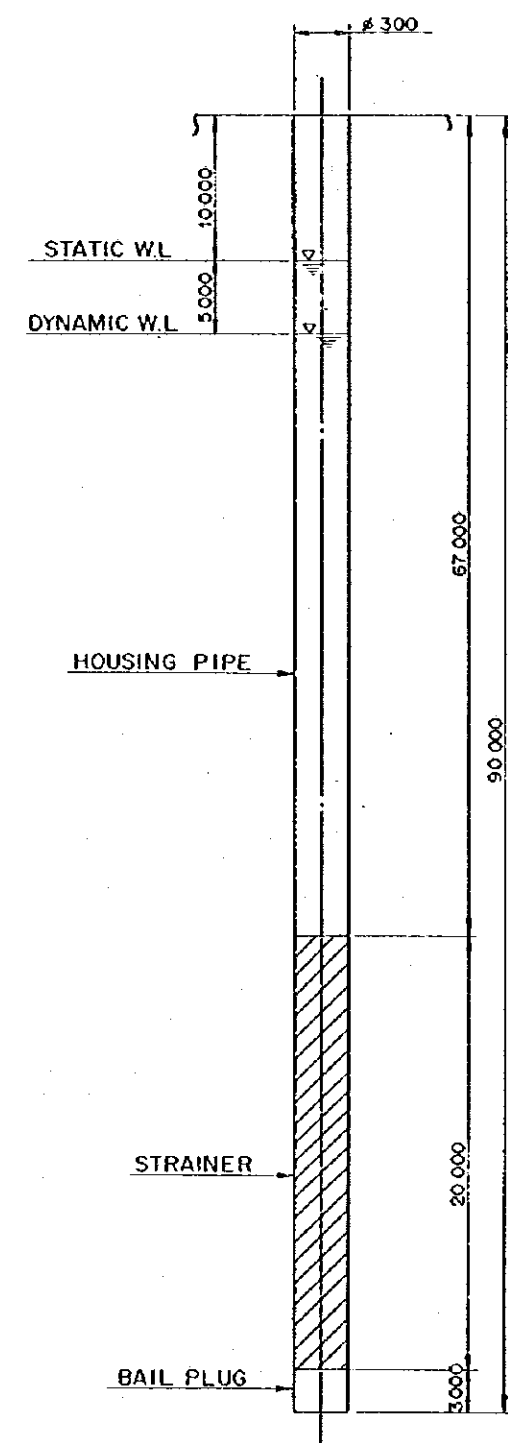
INSTALLATION OF PIPE



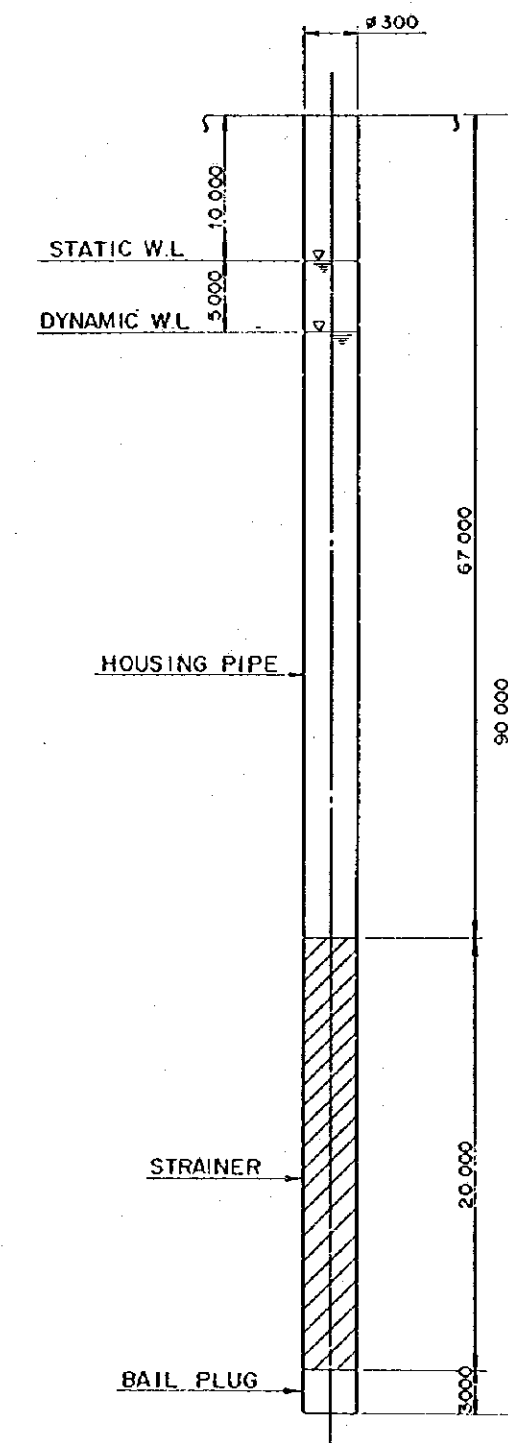
PROPOSED PRODUCTION WELL

SV • 1/250 SH•1/20

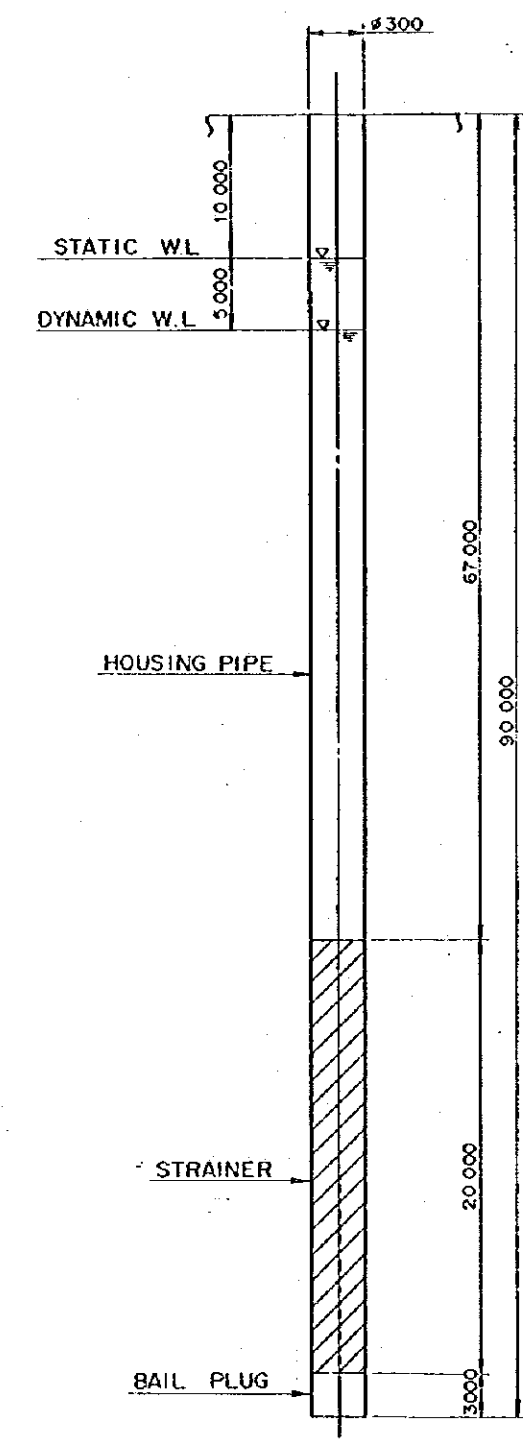
NO 1 WELL



NO 2 WELL



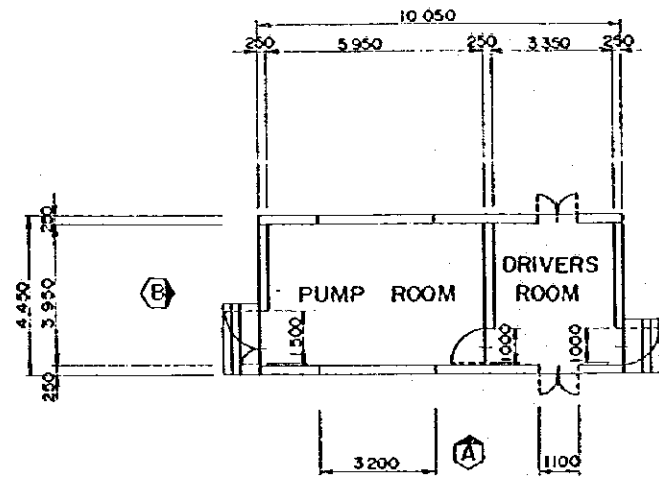
NO 3 WELL



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC		
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I		
PROFILE OF PRODUCTION WELL		
Date	OCT. 1985	Drawing No 10
JAPAN INTERNATIONAL COOPERATION AGENCY		

# PUMP HOUSE

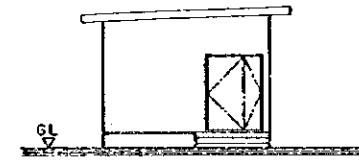
SCALE 1:100  
PUMP HOUSE PLAN



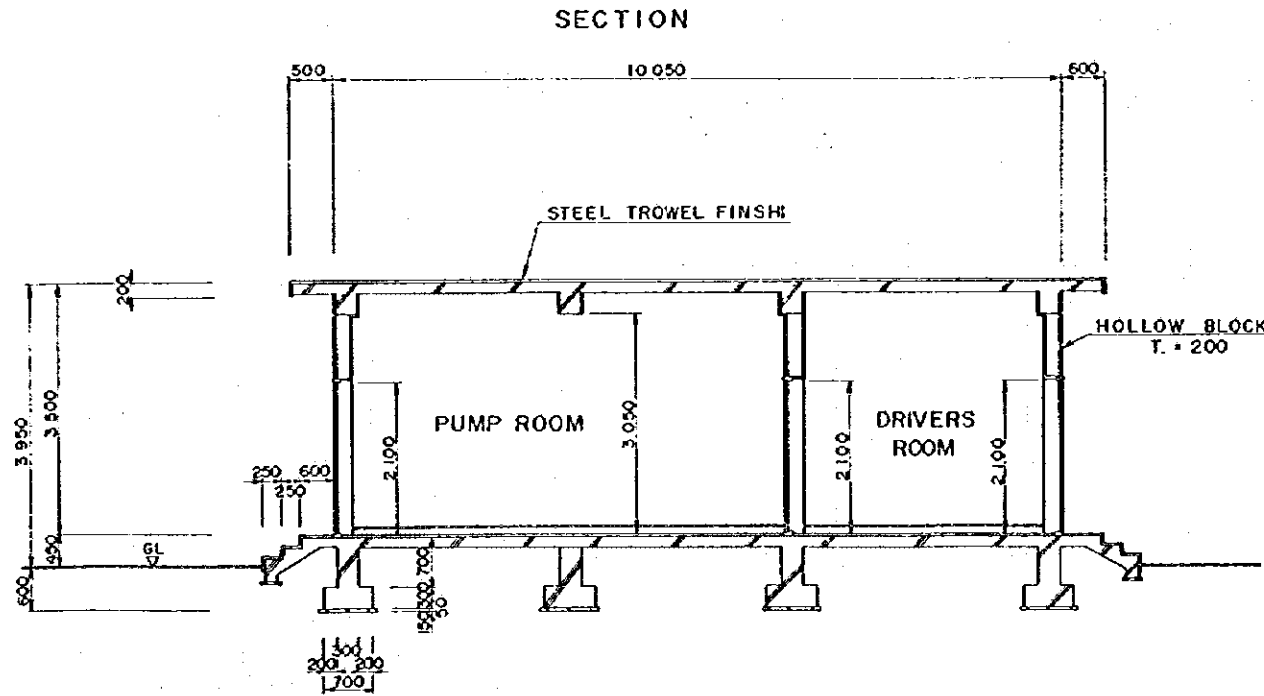
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SECTION - A



SCALE 1:100  
SECTION - B

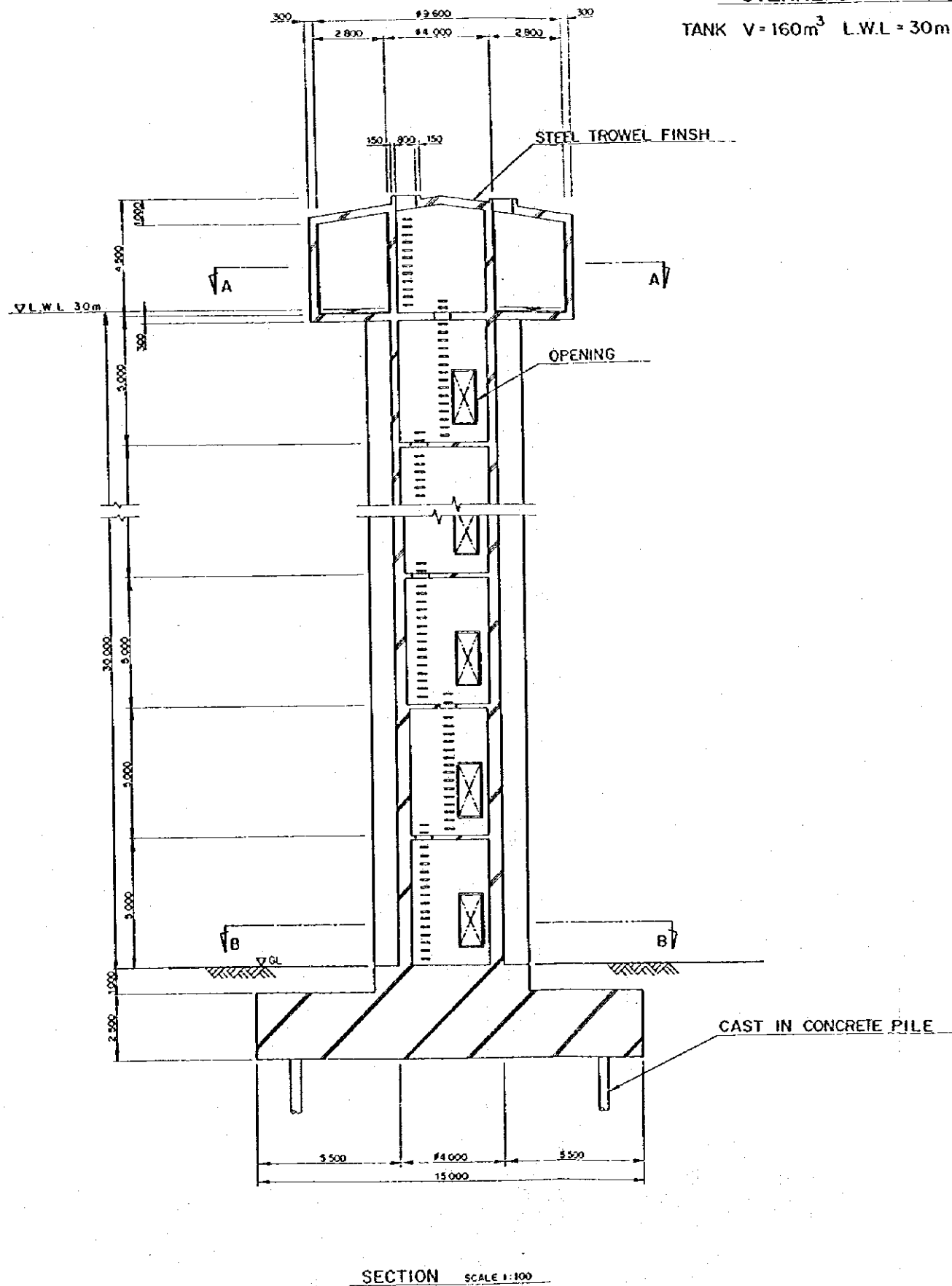


SCALE 1:50  
SECTION

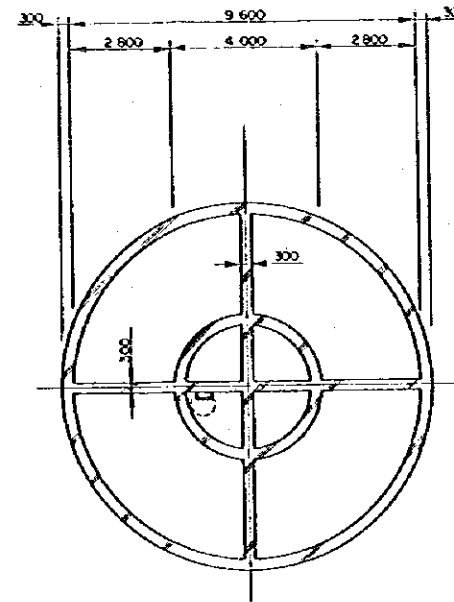


MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC			
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I			
PUMP HOUSE PLAN AND SECTION			
Date	OCT. 1985	Drawing No	11
JAPAN INTERNATIONAL COOPERATION AGENCY			

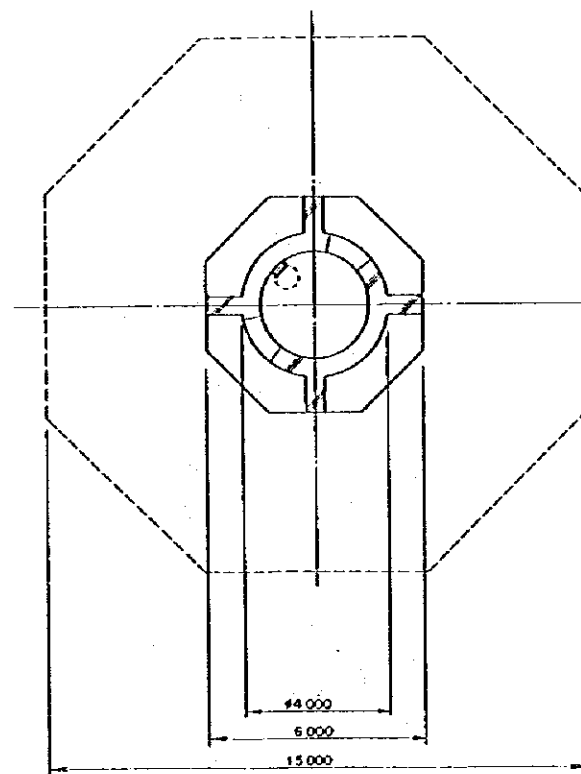
OVERHEAD TANK  
TANK V = 160m<sup>3</sup> L.W.L = 30m



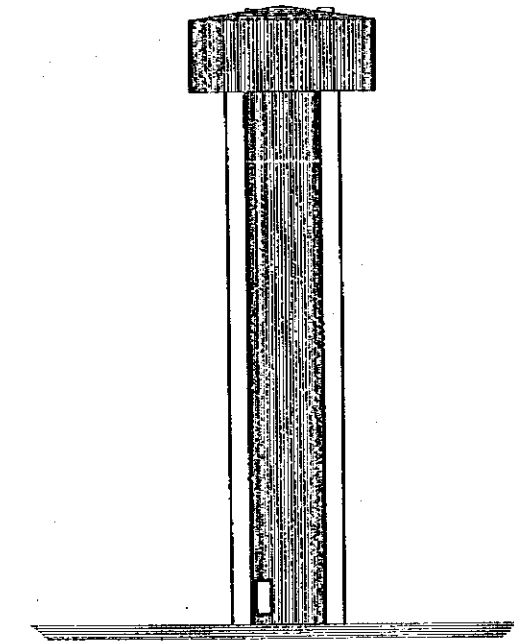
SECTION SCALE 1:100



A - A SECTION SCALE 1:100

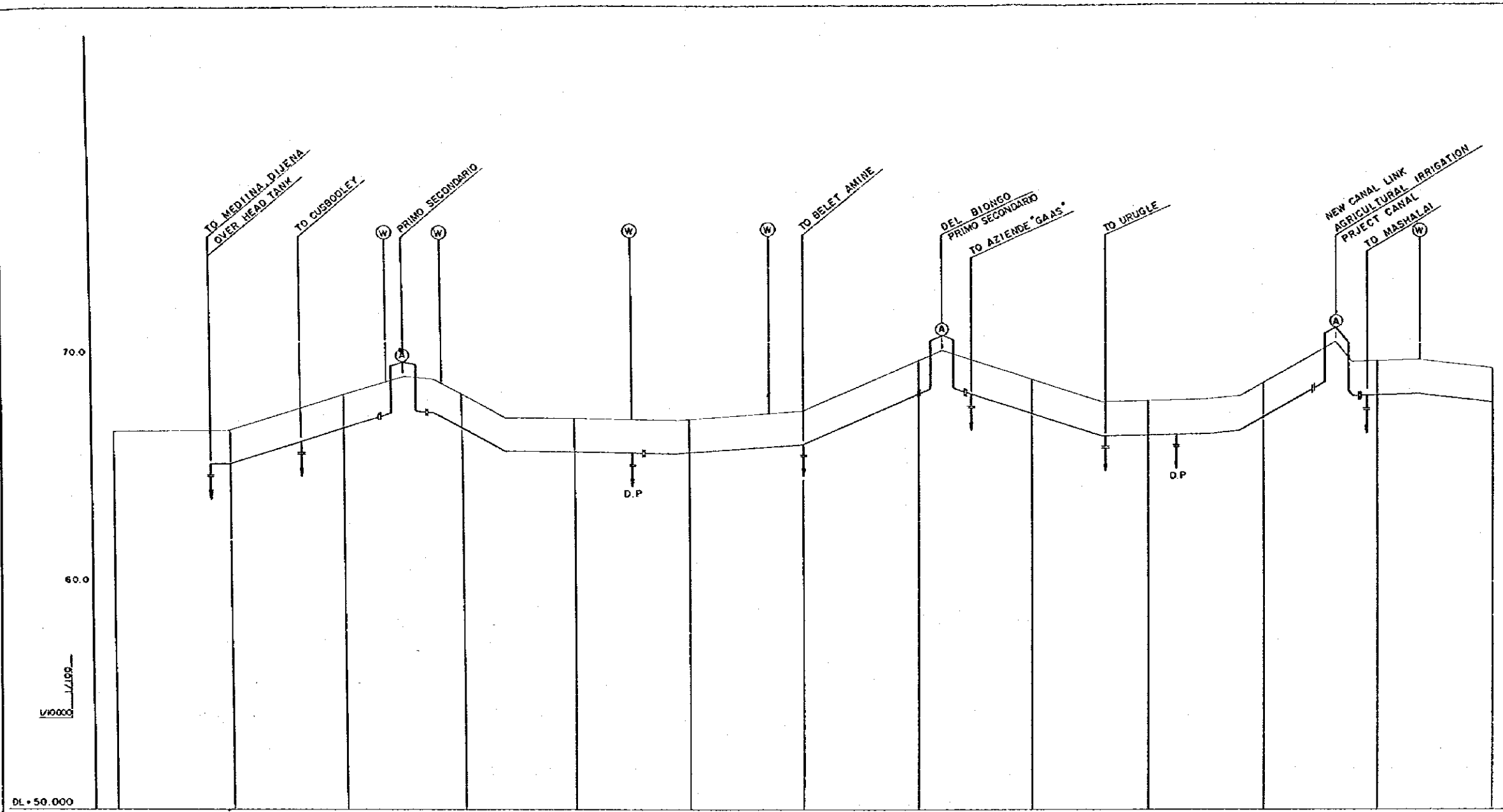


B - B PLAN SCALE 1:100



OUT VIEW SCALE 1:200

MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC			
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I			
OVERHEAD TANK PLAN AND SECTION			
Date	OCT. 1985	Drawing No	12
JAPAN INTERNATIONAL COOPERATION AGENCY			



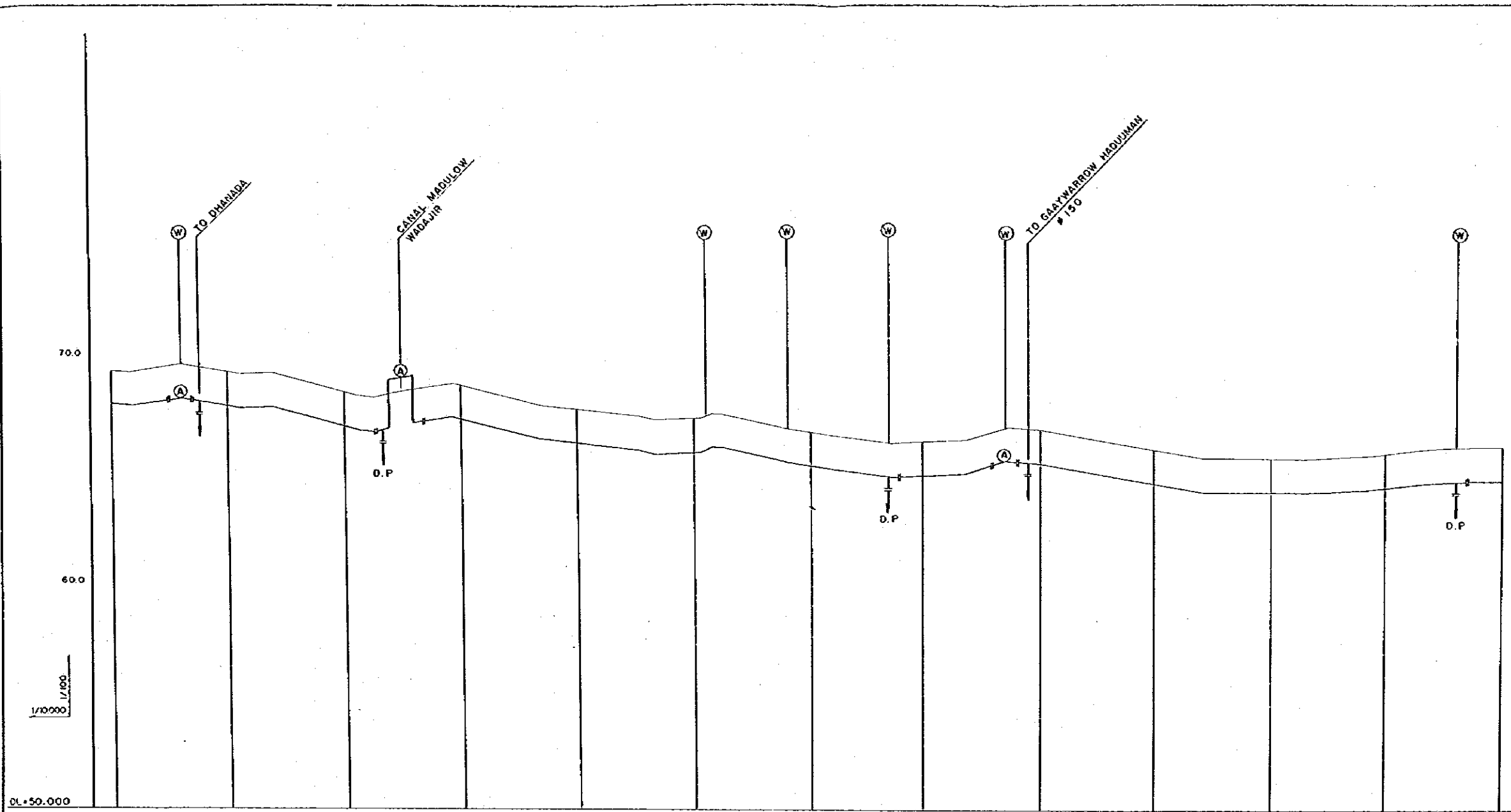
RADIUS	NO.	LENGTH	TOTAL LENGTH	G.L.	C.P.L (m)	TYPE & DIA.
	- IP 1-6 - NO. 5		- 2328.4 - 2500.0	66.47 66.50	66.54 65.07	
	- IP 1-4		- 2191.6	67.49		
	- NO. 4		- 2000.0	68.13	66.70	
	- IP 1-3		- 1737.8	68.83		
	- IP 1-2		- 1621.0	68.72		
	- NO. 3		- 1500.0	68.10	66.67	
	- IP 1-1		- 1229.6	67.03		
	- NO. 2		- 1000.0	67.95	65.52	
	- IP 1-1 - NO. 1		- 550.2 - 500.0	66.87 66.88	65.45	
	NO. 0 IP 1		0.0	67.28	65.85	
	NO. 1 IP 2		600.0 612.9	69.50 69.95	66.07	
	NO. 2		1000.0	68.68	67.25	
	IP 2'		1309.3	67.70		
	NO. 3		1500.0	67.75	66.32	
	IP 3 IP 4 IP 5		1731.1 1801.9 1889.3	67.80 67.86 67.95		
	NO. 4		2000.0	68.55	67.12	
	IP 6 IP 7 NO. 5		2321.1 2382.7 2500.0	70.33 69.54 69.54	66.11	
	IP 8		2674.4	69.33		
	NO. 6		3000.0	69.20	67.77	

MINISTRY OF MINERAL WATER RESOURCES  
SOMALI DEMOCRATIC REPUBLIC  
THE GROUND WATER DEVELOPMENT PROJECT  
LOWER SHABELLI RELATED TO ICARA 3

PROFILE OF PIPE LINE

Date | OCT. 1985 | Drawing No | 13  
JAPAN INTERNATIONAL COOPERATION AGENCY





RADIUS	NO.	LENGTH	TOTAL LENGTH	G.L.	C.P.L. (m)	TYPE & DIA.
	NO. 6	3000.0	3000.0	69.20	67.77	
	IP 9	3081.2	6081.2	69.12		
	IP 10	3302.2	9383.4	69.44		
	IP 11	3486.6	12870.0	69.13		
	NO. 7	3500.0	16370.0	69.01	67.67	
	IP 12	3566.3	19936.3	69.03		
	IP 13	3647.3	23583.6	69.04		
	IP 14	3708.6	27292.2			
	NO. 8	4000.0	31292.2	68.20	66.77	
	IP 15	4059.3	35351.5	68.04		
	IP 16	4127.0	39478.5	67.97		
	IP 17	4189.8	43668.3	68.16		
	IP 18	4467.0	48135.3	68.54	67.02	
	NO. 9	4500.0	52635.3	68.43		
	IP 19	4830.9	57466.2	67.61		
	NO. 10	5000.0	62466.2	67.40	63.97	
	IP 20	5261.3	67727.5	67.09		
	IP 21	5323.9	73051.4	66.97		
	NO. 11	5430.0	78481.4	67.05	65.61	
	IP 22	5537.9	84019.3	67.05		
	IP 23	5579.2	89598.5	67.23		
	IP 24	5626.7	95225.2	67.22		
	IP 25	5902.7	101127.9	66.56		
	NO. 12	6000.0	107127.9	66.40	64.97	
	IP 26	6301.3	113429.2	65.96		
	NO. 13	6500.0	119929.2	66.02	64.59	
	IP 26	6673.3	126602.5	66.09		
	IP 27	6751.1	133353.6	66.29		
	IP 28	6802.1	140155.7	66.67		
	NO. 14	7000.0	147155.7	66.33	65.10	
	IP 29	7000.0	154155.7	66.33		
	NO. 15	7000.0	161155.7	65.70	64.87	
	IP 30	7697.7	168853.4	65.37		
	NO. 16	8000.0	176853.4	65.34	63.91	
	IP 30	8116.0	184969.4	65.32		
	IP 31	8444.9	193414.3	65.34		
	NO. 17	8500.0	201914.3	65.62	64.19	
	IP 32	8647.5	210561.8	65.81		
	IP 33	8778.0	219339.8	65.88		
	NO. 18	9000.0	228339.8	65.96	64.53	

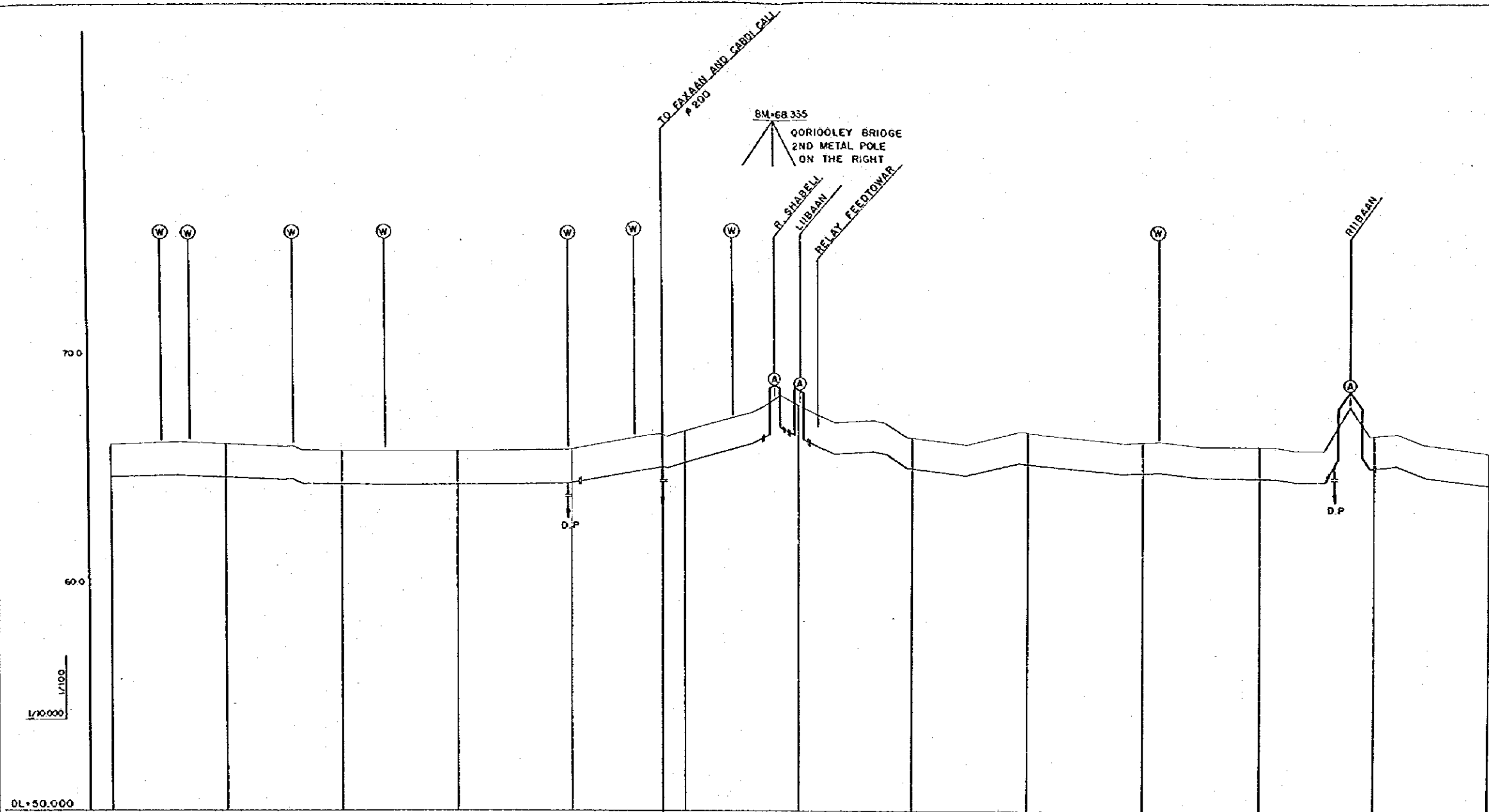
MINISTRY OF MINERAL WATER RESOURCES  
SOMALI DEMOCRATIC REPUBLIC

THE GROUND WATER DEVELOPMENT PROJECT  
LOWER SHABELLI RELATED TO ICARA I

PROFILE OF PIPE LINE

Date: OCT. 1985    Drawing No: 14

JAPAN INTERNATIONAL COOPERATION AGENCY

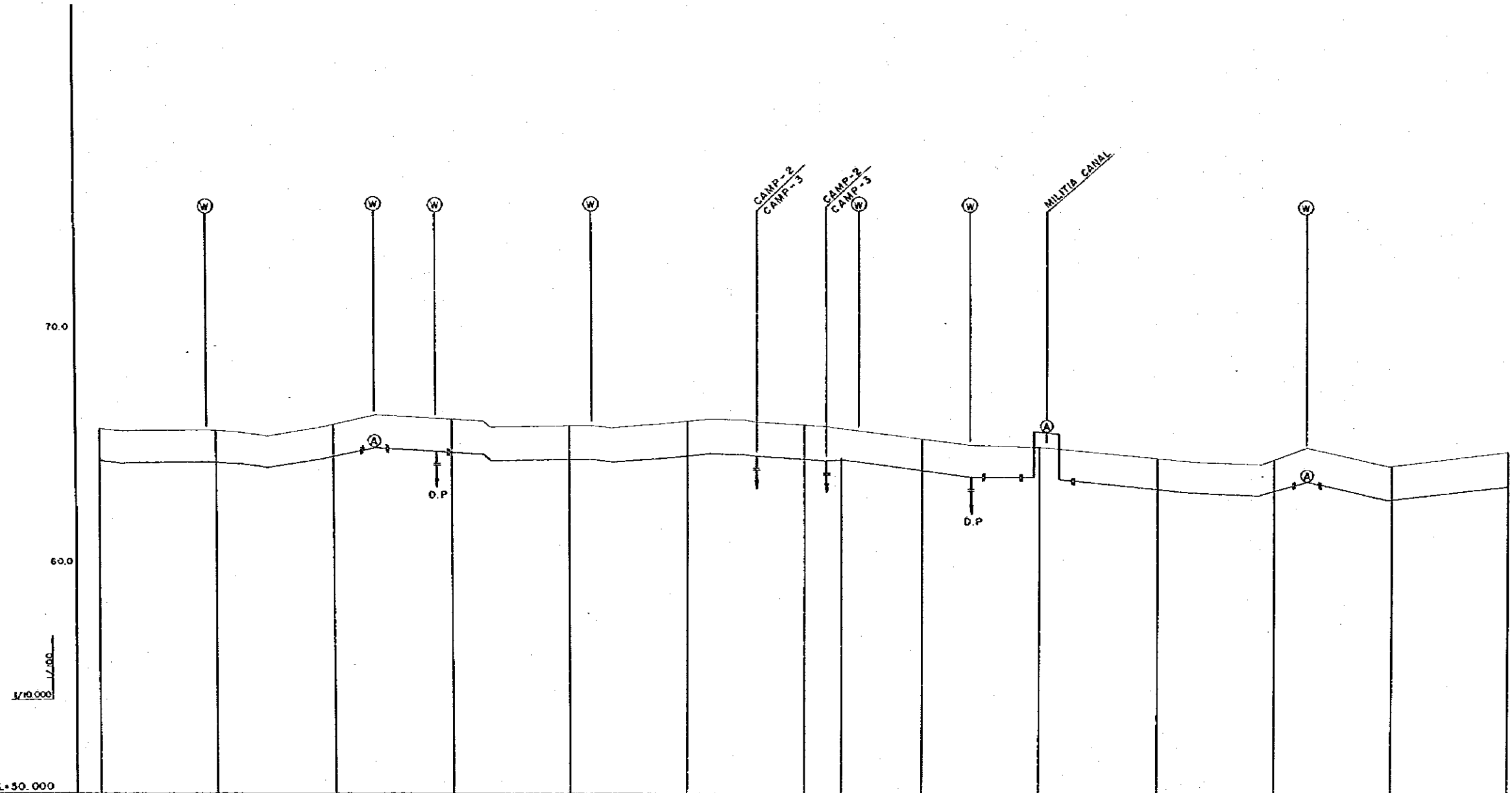


RADIUS	NO.	LENGTH	TOTAL LENGTH	G.L.	C.P.L. (m)	TYPE & DIA.
	NO.18	9 000.0	65.96	64.53		
	IP 34	9 313.3	66.00			
	NO.19	9 500.0	65.92	64.49		
	IP 35	9 766.7	65.80			
	IP 36	9 796.7	65.83			
	IP 37	9 824.7	65.85			
	NO.20	10 000.0	65.63	64.20		
	IP 37-1	10 204.6	65.60			
	NO.21	10 500.0	65.62	64.19		
	IP 37-2	10 907.6	65.64			
	NO.22	11 000.0	65.67	64.24		
	IP 38	11 304.4	66.25			
	IP 39	11 368.9	66.27			
	IP 40	11 425.7	66.18			
	NO.23	11 500.0	66.40	65.04		
	IP 41	11 793.9	67.22			
	IP 42	11 848.0	67.56			
	IP 43	11 913.7	67.98			
	NO.24	12 200.0	67.55	67.20		
	IP 44	12 093.4	67.08			
	IP 45	12 175.0	66.75			
	IP 46	12 332.7	66.87			
	IP 47	12 399.9	66.74			
	IP 47-1	12 482.7	66.12			
	NO.25	12 500.0	66.12	64.76		
	IP 47-4	12 733.7	65.82			
	IP 48	12 963.2	66.37			
	IP 48-1	12 988.6	66.36			
	NO.26	13 000.0	66.33	64.99		
	IP 49	13 000.0	66.26			
	IP 50	13 405.6	65.94			
	NO.27	13 500.0	66.00	64.64		
	IP 51	13 574.9	66.01			
	IP 52	13 741.9	65.81			
	NO.28	14 000.0	65.80	64.44		
	IP 53	14 023.1	65.80			
	IP 54	14 079.8	65.78			
	IP 55	14 146.6	65.66			
	IP 56	14 284.0	65.70			
	IP 57	14 342.5	67.57			
	IP 58	14 488.0	66.31			
	NO.29	14 500.0	66.33	64.99		
	IP 59	14 600.0	66.43			
	IP 60	14 722.2	65.96			
	NO.30	15 000.0	65.62	64.26		

MINISTRY OF MINERAL WATER RESOURCES  
 SOMALI DEMOCRATIC REPUBLIC  
 THE GROUND WATER DEVELOPMENT PROJECT  
 LOWER SHABELLI RELATED TO ICARA I

PROFILE OF PIPE LINE

Date OCT. 1985 Drawing No 15  
 JAPAN INTERNATIONAL COOPERATION AGENCY



NO.	RADIUS	TOTAL LENGTH	G.L.	C.P.L. (m)	TYPE & D.I.A.
NO. 30		15000.0	65.62	64.26	
IP 61		15087.9	65.48		
IP 62		15459.0	65.51	64.15	
NO. 31		15500.0	65.51		
IP 63		15587.8	65.43		
IP 64		15720.4	65.23		
IP 65		15962.4	65.64	64.37	
NO. 32		16000.0	65.73		
IP 66		16178.0	66.12		
NO. 33		16500.0	65.93	64.37	
IP 67		16640.4	65.83		
IP 68		16673.2	65.80		
NO. 34		17000.0	65.66	64.30	
IP 69		17091.3	65.54		
IP 70		17181.9	65.54		
IP 71		17411.5	65.72		
NO. 35		17500.0	65.84	64.48	
IP 72		17602.9	65.92		
IP 73		17745.5	65.91		
IP 74		17873.4	65.80		
NO. 36		18000.0	65.68	64.32	
IP 75		18091.7	65.62		
NO. 37		18500.0	65.11	63.80	
IP 77		18692.5	64.86		
IP 78		19000.0	64.79	63.48	
NO. 38		19029.1	64.77		
NO. 39		19500.0	64.34	63.03	
IP 78		19643.8	64.18		
IP 79		19829.5	64.09		
NO. 40		20000.0	64.30	62.99	
IP 80		20141.0	64.81		
IP 81		20487.5	64.06	62.78	
NO. 41		20500.0	64.09		
NO. 42		21000.0	64.70	63.39	

MINISTRY OF MINERAL WATER RESOURCES  
SOMALI DEMOCRATIC REPUBLIC

THE GROUND WATER DEVELOPMENT PROJECT  
LOWER SHABELLI RELATED TO ICARA I

PROFILE OF PIPE LINE

Date	OCT. 1985	Drawing No	16
JAPAN INTERNATIONAL COOPERATION AGENCY			

1/10000  
1/100

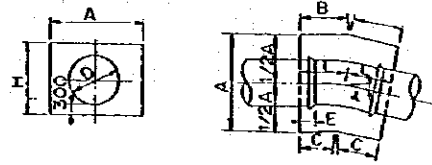
20.0  
6.00

DL = 50.000

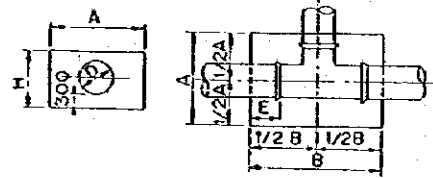
RADIUS	NO.	LENGTH	TOTAL LENGTH	G.L.	C.P.L. (m)	TYPE & DIA.
	NO. 42 IP 52	21000.0 21000.2	21000.0 21000.2	64.70 64.72	63.39	
	IP 63	21231.2	21231.2	64.77		
	IP 65	21337.2	21337.2	64.31		

MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC			
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I			
PROFILE OF PIPE LINE			
Date	OCT. 1985	Drawing No.	17
JAPAN INTERNATIONAL COOPERATION AGENCY			

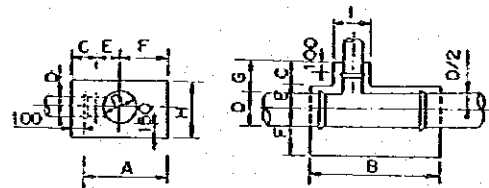
THRUST BLOCK & TYPICAL CROSS SECTION OF PIPE LAYING



D	A	B	C	E	H	L	Z
450	900	850	750	250	850	800	11 <sup>1</sup> / <sub>2</sub>
450	1350	880	620	300	950	750	22 <sup>1</sup> / <sub>2</sub>

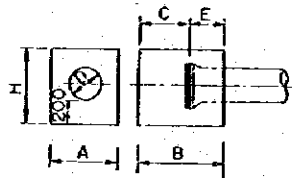
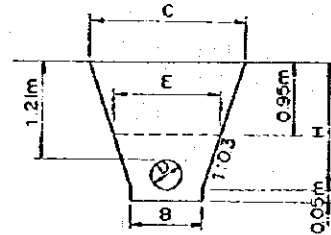


D	A	B	E	H
450 x450	1350	2100	610	950

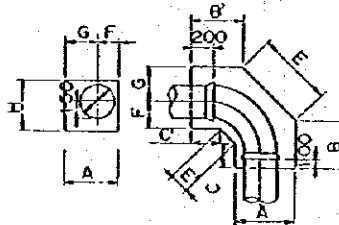


D	D/2	A	B	C	E	F	G	H	I
300 1500	161.4	550	1330	305	200	350	3436	520	400

TYPICAL CROSS SECTION OF PIPE LAYING



D	A	B	C	E	H
75	300	400	200	200	450
100	350	450	250	200	500
150	400	450	250	200	550
200	450	500	300	200	600
250	500	550	300	250	650
300	550	650	400	250	700
350	650	750	400	350	750
400	700	800	500	400	800
450	750	850	500	400	850



D	A	B	B'	C	C'	E	E'	F	G	H
200	450	513	569	326	383	538	166	200	250	410
300	650	624	718	355	449	746	207	300	350	520

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THRUST BLOCK & TYPICAL CROSS SECTION OF PIPE LAYING

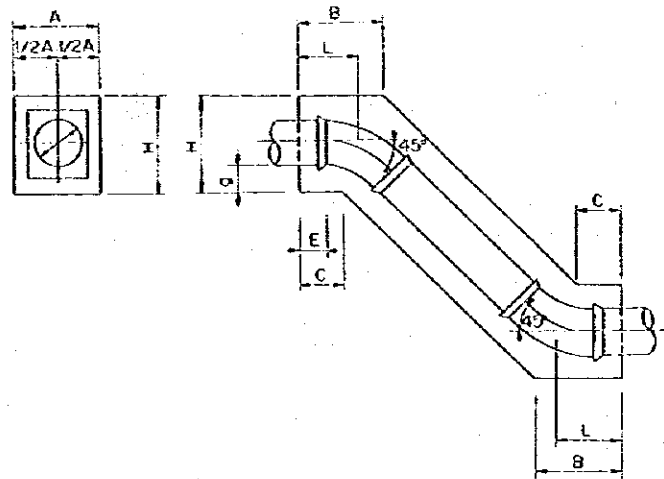
Date: OCT. 1985 Drawing No: 18  
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THRUST BLOCK & VALVE BOX

D	A	B	C	E	G	H	L
200	430	644	466	200	150	410	500
300	620	718	461	200	150	520	600
450	1000	1220	780	530	300	1050	1000

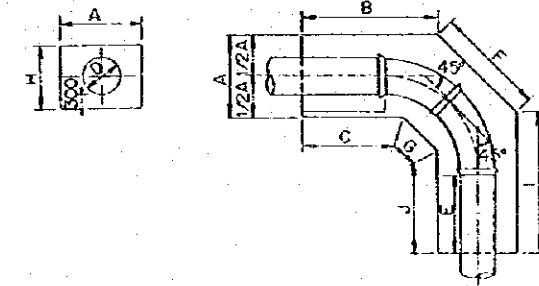
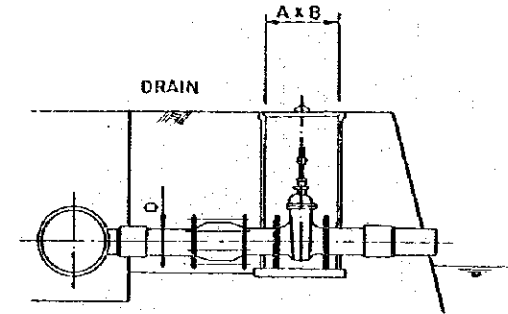
THRUST BLOCK

PIPE	BEND					TEE	PIPE	PIPE
	D1A	90°	45°	22 1/2°	11 1/4°			
75								
100								
150								
200								
250								
300								
350								
400								
450								



SCHEDULE OF VALVE BOX

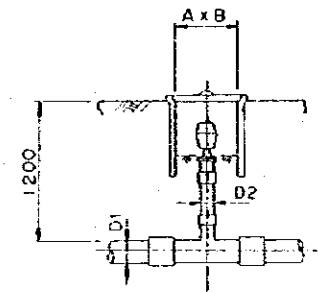
D	A	B
75	600	600
100	800	800
150	800	800



D	A	B	C	E	E	F	G	I	J	H
450	1350	1020	460	270	170	1640	520	1060	500	950

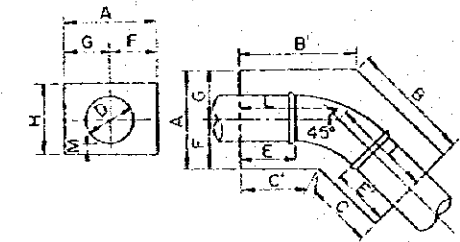
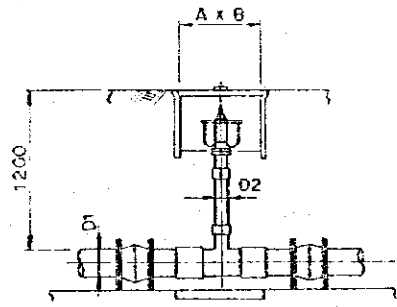
SCHEDULE OF VALVE BOX(AIR)

D1	D2	A	B
200	75	500	500
300	75	500	500



SCHEDULE OF VALVE BOX(AIR)

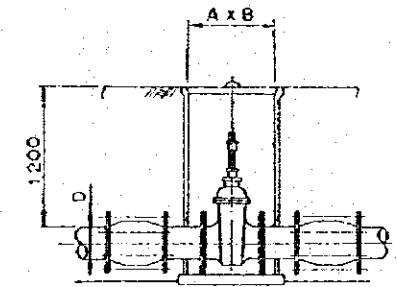
D1	D2	A	B
450	75	700	500



D	A	B/B'	C/C'	E/E'	F	G	H	L	M
200	430	588	470	200	200	230	410	-	150
300	620	718	461	200	300	320	520	-	150
450	1350	1030	470	280	675	675	950	750	300

SCHEDULE OF VALVE BOX

D	A	B
200	800	800
300	900	900
450	1000	1000



MINISTRY OF MINERAL WATER RESOURCES  
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THRUST BLOCK & VALVE BOX

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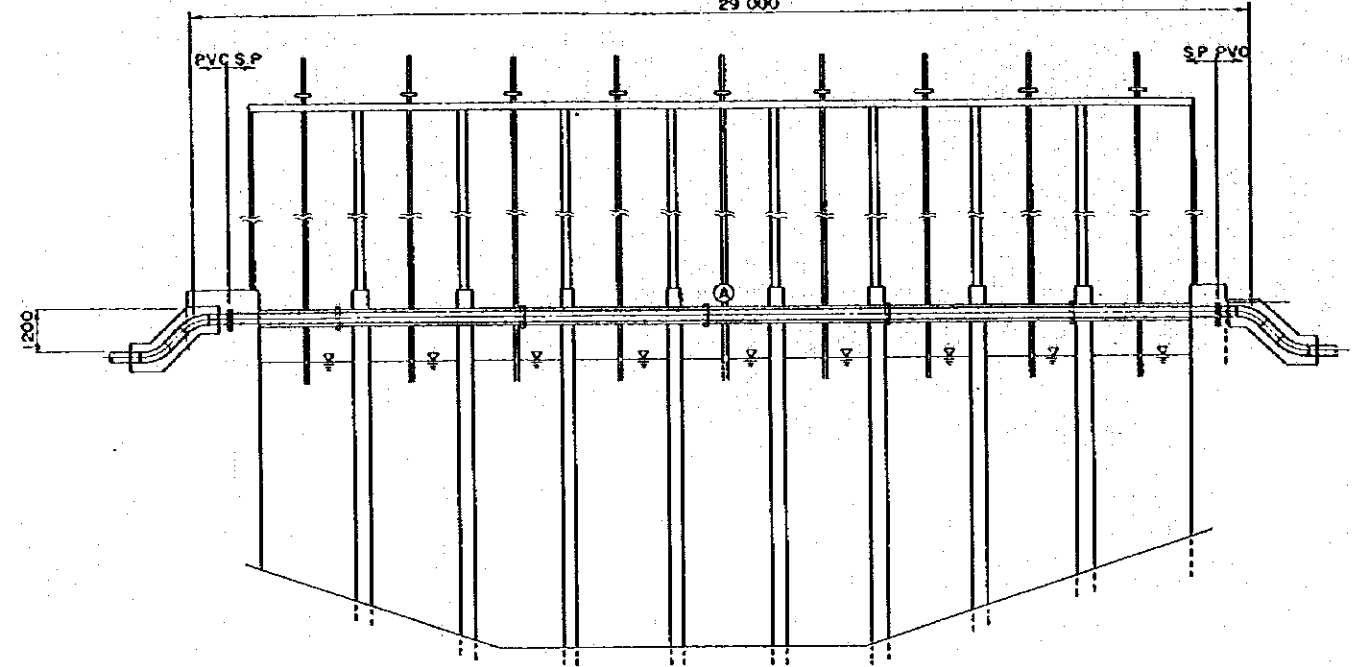
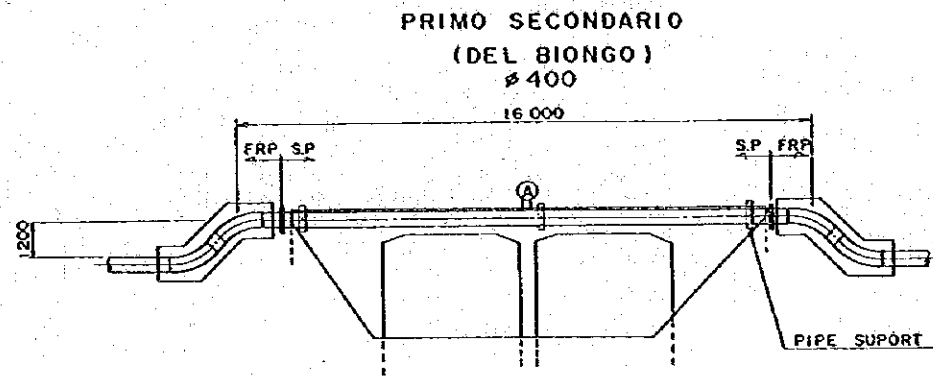
**RIVER CROSSING**

S = 1/100

**QORYOOLEY BRIDGE**

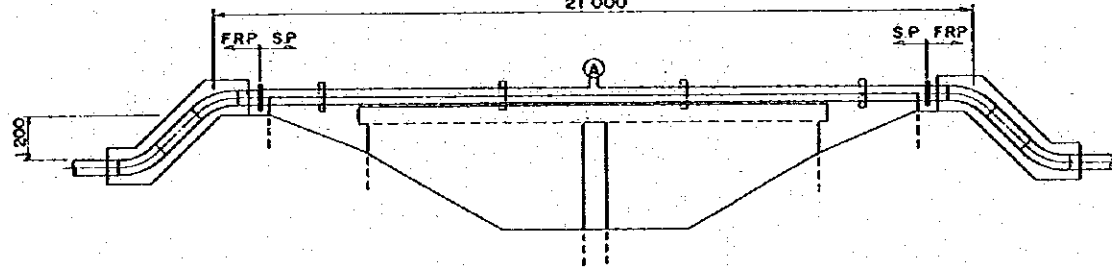
φ 300

29 000



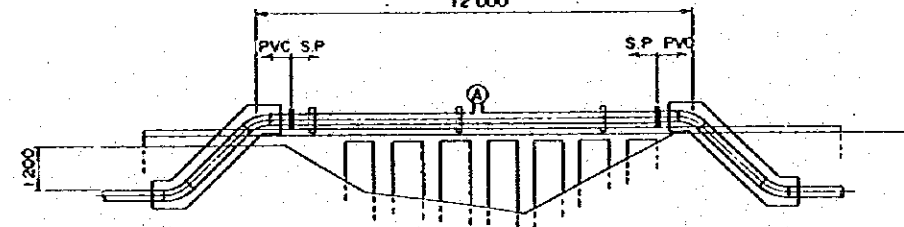
**NEW CANAL LINK**  
AGRICULTURAL IRRIGATION PROJEKT CANAL  
φ 400

21 000



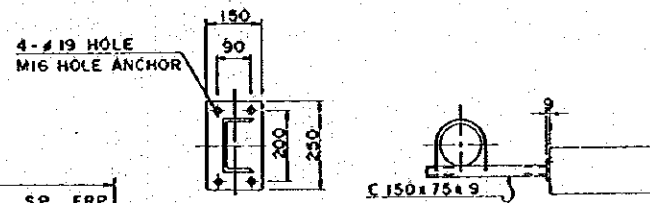
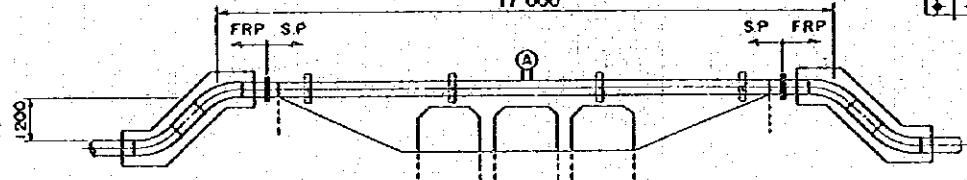
**LIIBAAN**  
φ 300

12 000



**WADAJIR**  
φ 400

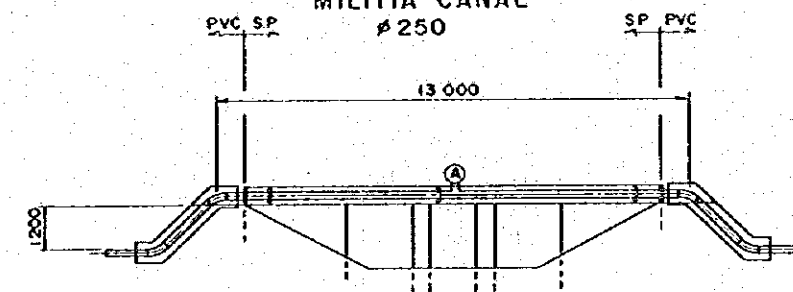
17 000



**PIPE SUPORT**  
S = NON

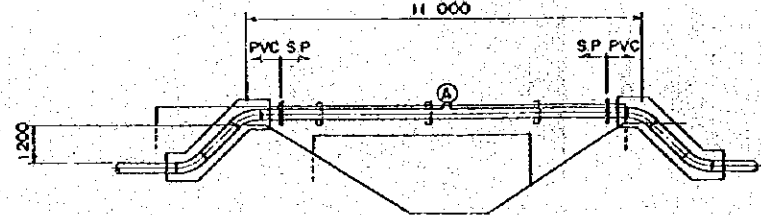
**MILITIA CANAL**  
φ 250

13 000



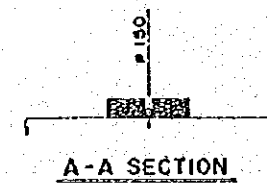
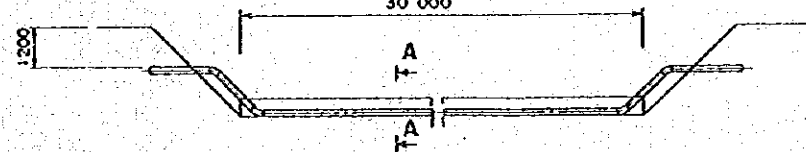
**LIIBAAN**  
φ 300

11 000



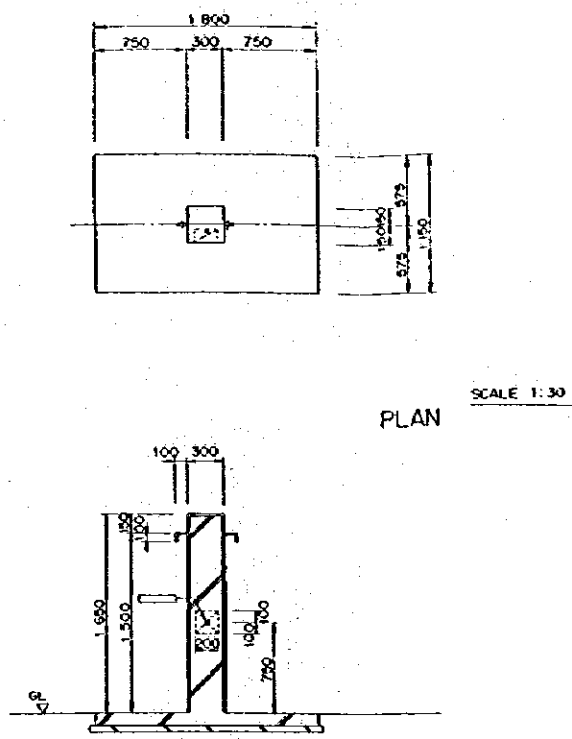
**R SHABELI**  
φ 150

30 000



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC		
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I		
<b>RIVER CROSSING</b>		
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DONK CART FILLING STATION

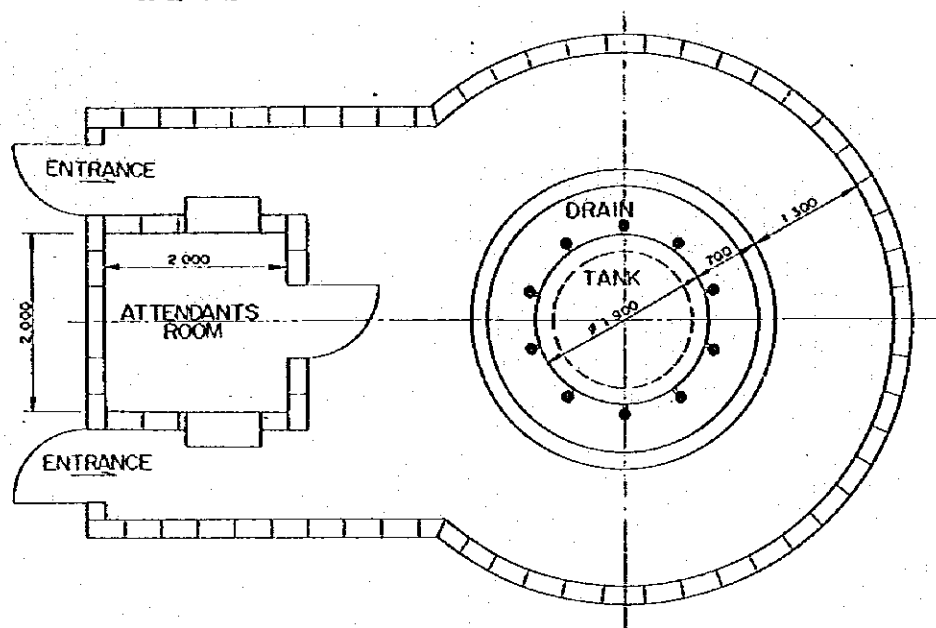


PLAN SCALE 1:30

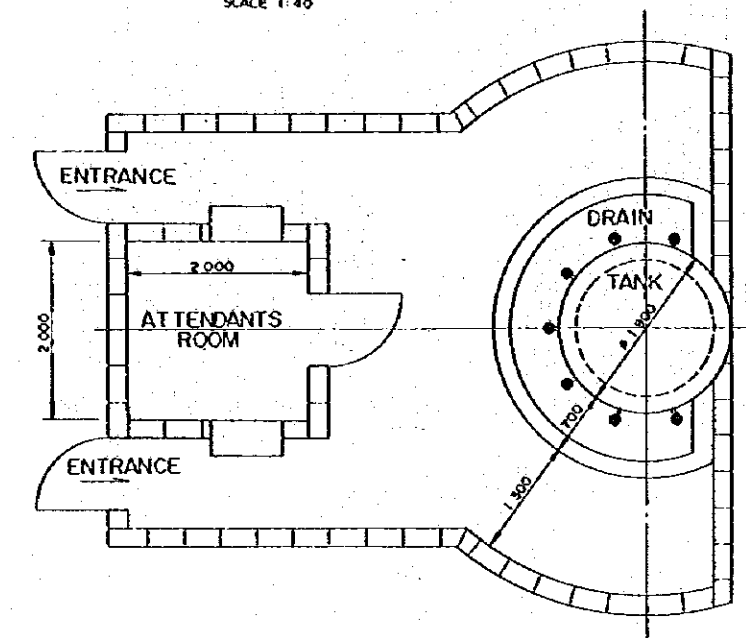
SECTION SCALE 1:30

PUBLIC WATER FILLING STATION

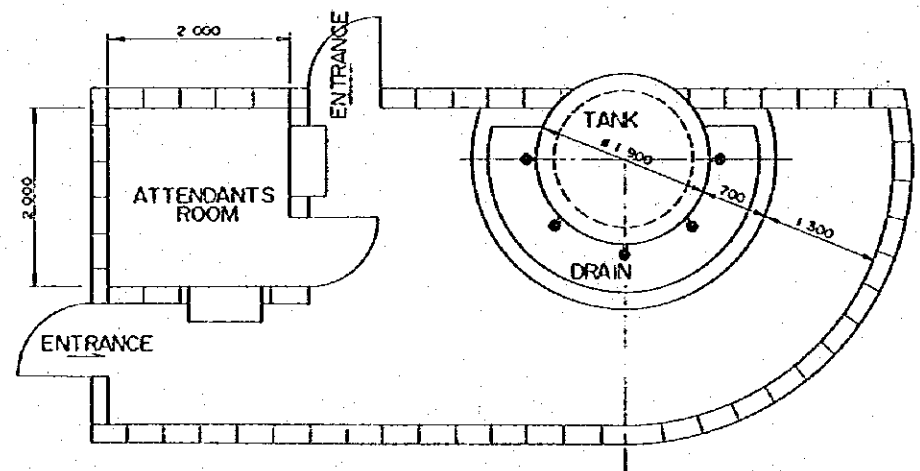
PLAN: 10 TAPS  
SCALE 1:40



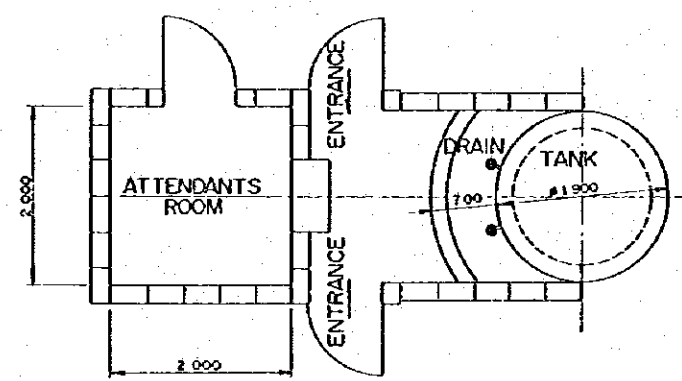
PLAN: 7 TAPS  
SCALE 1:40



PLAN: 5 TAPS  
SCALE 1:40

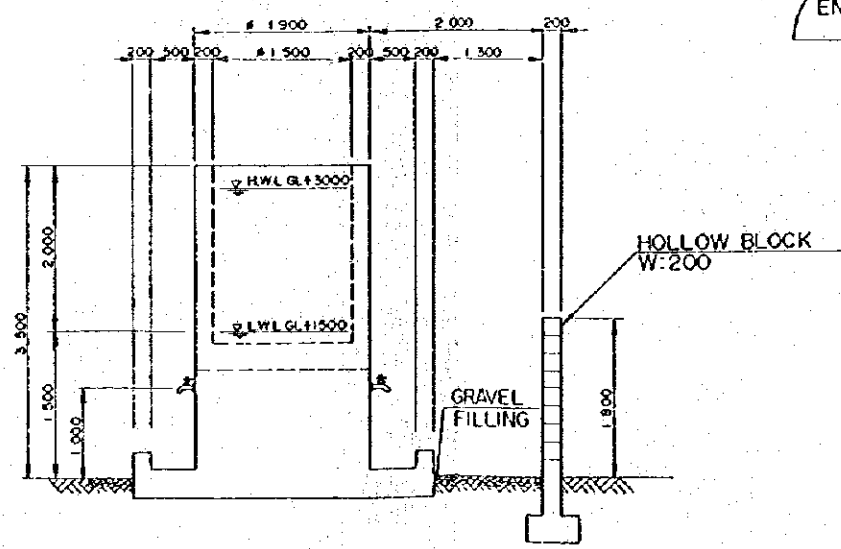


PLAN: 2 TAPS  
SCALE 1:40



PUBLIC WATER FILLING STATION  
TYPICAL SECTION

SCALE 1:40



MINISTRY OF MINERAL WATER RESOURCES SOMALI DEMOCRATIC REPUBLIC			
THE GROUND WATER DEVELOPMENT PROJECT LOWER SHABELLI RELATED TO ICARA I			
WATER FILLING STATION PLAN AND SECTION			
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JICA