

G. PHYSICAL PLAN

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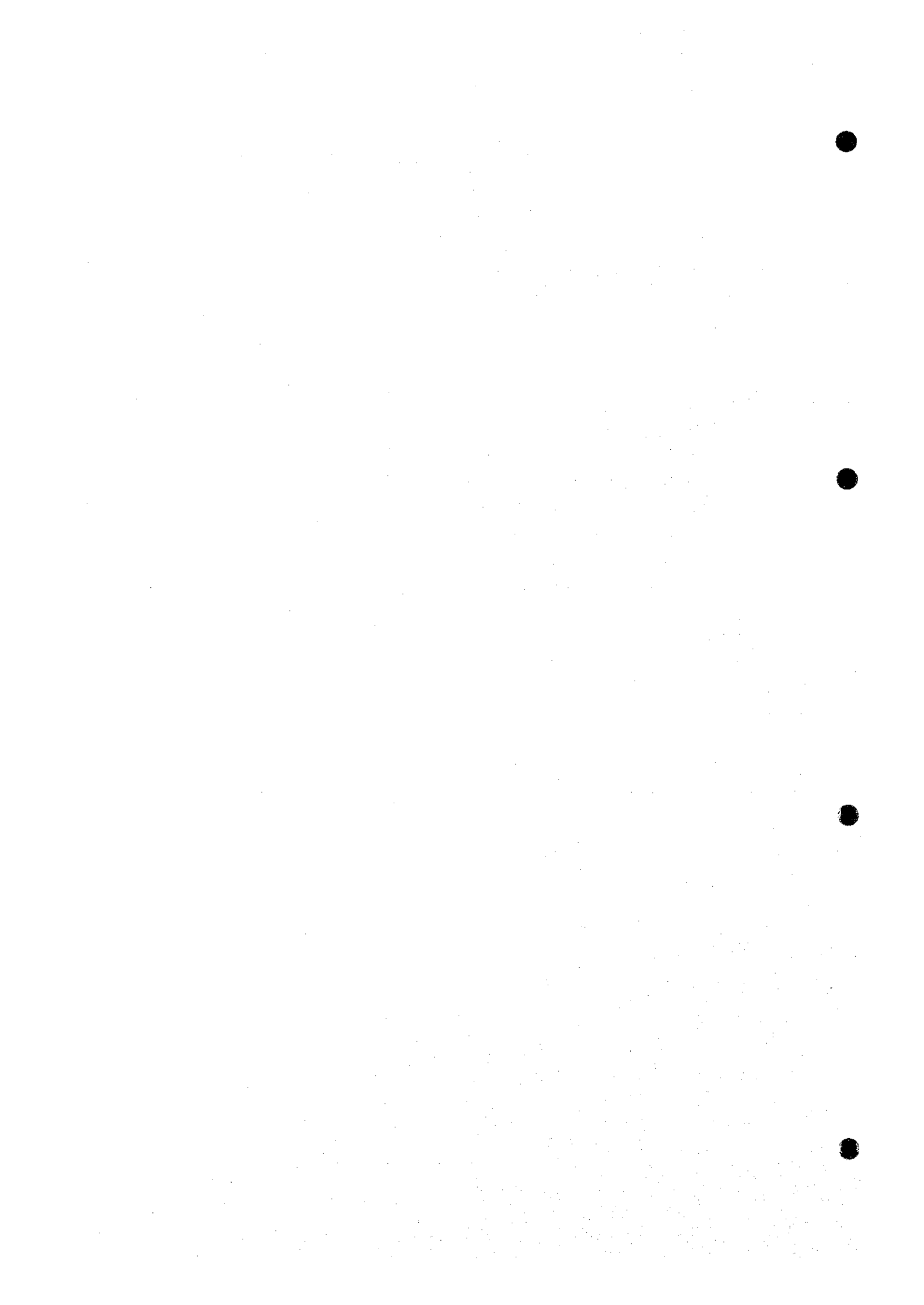


Table G-1-1 List of Existing Main Bridge over Omoum Main Drain

Bridge Name Station (km)	Elevation (MSL. m)			Bridge Size (m)			
	Bridge Bottom (1)	Road Surface (2)	Design Water Level (3)	Bottom Width (4)	Bridge Height (5)	Bridge Length (6)	Road Width (7)
Bab El Abeer Brd. km 8.940	-7.13	-1.05	-2.88	20.00	6.08	48.00	6.00
El Kaptan Brd. km 10.700	-6.73	-1.10	-2.83	33.00	5.63	22.00	6.00
El Senawi Brd. km 28.280	-5.77	0.55	-2.27	22.00	6.32	38.00	6.00
Maron Brd. km 30.083	-6.14	0.50	-2.60	15.00	6.64	34.00	6.00
El Helbawy Brd. km 33.100	-4.27	-0.30	-2.07	11.00	3.97	24.00	6.00

* Data Source ; EPADP

* Items (1) to (7) are as follows ;

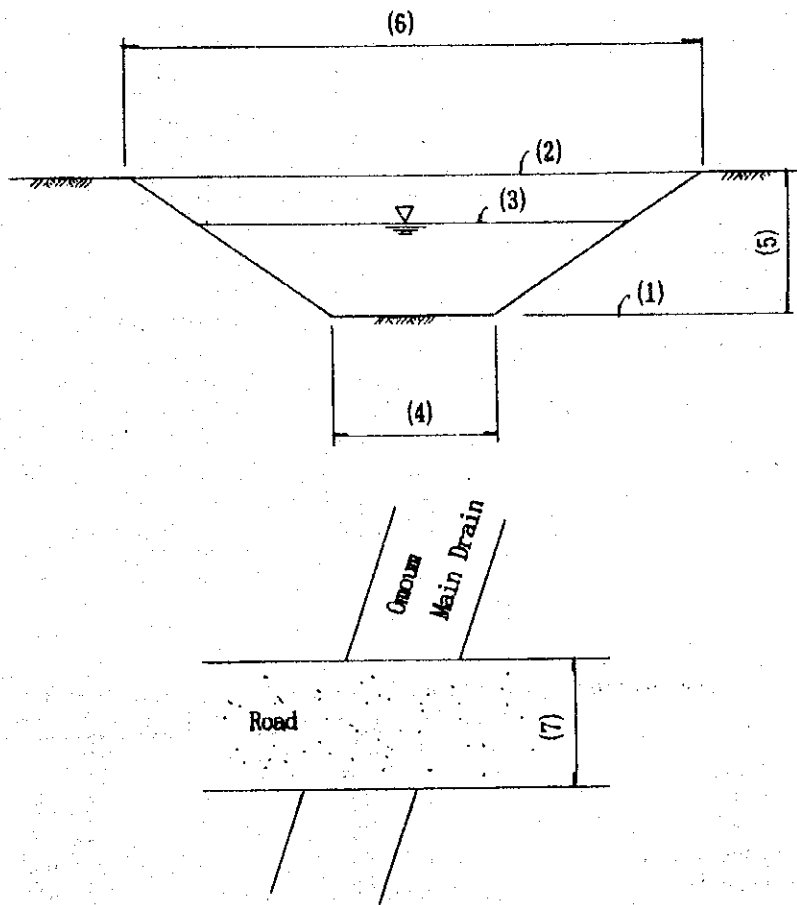


Table G-1-2 Present Condition Analysis of Omoum Main Drain
(Results of Water Surface Tracing Calculation)

	Station	Distance (m)	Discharge (%)	Water Depth (m)	Cross- section (m')	Velocity (%)	Velocity Head (m)	Wetted Perimeter (m)	Hydraulic Gradient	Head Loss (m)	Energy	Water Level	Bed Level
El-Max P.S.	SP 1+ 70.0	0.0	102.00	1.570	75.36	1.354	0.093	85.66	0.001359	0.000	-3.157	-3.250	-4.820
	SP 1+270.0	200.0	102.00	3.326	165.98	0.615	0.019	56.91	0.000057	0.142	-3.015	-3.034	-6.360
	SP 2+ 0.0	730.0	102.00	4.676	176.10	0.579	0.017	59.41	0.000049	0.039	-2.977	-2.994	-7.670
	SP 4+ 0.0	2000.0	102.00	4.632	128.22	0.796	0.032	52.86	0.000121	0.171	-2.805	-2.838	-7.470
	SP 4+550.0	550.0	102.00	2.753	96.84	1.053	0.057	60.96	0.000374	0.136	-2.670	-2.727	-5.480
Siphon (Outlet)	SP 4+670.0	120.0	102.00	4.241	199.73	0.511	0.013	74.19	0.000044	0.025	-2.645	-2.659	-6.900
Siphon (Inlet)	SP 4+860.0	0.0	102.00	4.560	195.62	0.521	0.014	71.55	0.000044	0.000	-2.526	-2.540	-6.900
	SP 4+940.0	80.0	102.00	3.030	106.59	0.957	0.047	58.98	0.000260	0.012	-2.513	-2.560	-5.590
	SP 6+ 0.0	1060.0	102.00	5.084	187.11	0.545	0.015	64.94	0.000045	0.162	-2.351	-2.366	-7.450
Abis P.S.	SP 6+700.0	700.0	102.00	4.777	168.11	0.607	0.019	62.08	0.000061	0.037	-2.314	-2.333	-7.110
	SP 8+ 0.0	1300.0	102.00	4.203	218.53	0.467	0.011	68.01	0.000029	0.058	-2.256	-2.267	-6.470
	SP10+ 0.0	2000.0	102.00	4.174	177.55	0.574	0.017	68.04	0.000057	0.086	-2.170	-2.186	-6.360
Hares P.S.	SP11+200.0	1200.0	102.00	4.231	165.01	0.618	0.019	58.03	0.000059	0.070	-2.100	-2.119	-6.350
Dishudi P.S.	SP11+750.0	550.0	71.20	4.265	166.97	0.426	0.009	58.28	0.000028	0.024	-2.076	-2.085	-6.350
	SP12+ 0.0	250.0	71.20	4.262	166.80	0.427	0.009	58.26	0.000028	0.007	-2.069	-2.078	-6.340
	SP14+ 0.0	2000.0	71.20	4.332	120.13	0.593	0.018	45.87	0.000061	0.089	-1.980	-1.998	-6.330
	SP14+790.0	790.0	71.20	3.675	116.89	0.609	0.019	49.92	0.000075	0.053	-1.926	-1.945	-5.620
	SP16+ 0.0	1210.0	71.20	4.400	149.15	0.477	0.012	54.82	0.000037	0.068	-1.859	-1.870	-6.270
	SP17+150.0	1150.0	71.20	4.371	145.84	0.488	0.012	49.81	0.000036	0.042	-1.817	-1.829	-6.200
	SP18+ 0.0	850.0	71.20	4.689	160.62	0.443	0.010	49.66	0.000026	0.026	-1.791	-1.801	-6.490
	SP20+ 0.0	2000.0	71.20	4.625	177.13	0.402	0.008	51.79	0.000020	0.045	-1.746	-1.755	-6.380
	SP22+ 0.0	2000.0	71.20	4.689	159.20	0.447	0.010	47.22	0.000025	0.044	-1.701	-1.711	-6.400
	SP24+ 0.0	2000.0	71.20	4.486	143.56	0.496	0.013	46.80	0.000034	0.059	-1.642	-1.654	-6.140
Truga P.S.	SP25+700.0	1700.0	71.20	3.995	113.44	0.628	0.020	37.04	0.000055	0.076	-1.565	-1.585	-5.580
	SP25+750.0	50.0	46.30	4.008	113.91	0.406	0.008	37.08	0.000023	0.002	-1.563	-1.572	-5.580
	SP26+ 0.0	250.0	46.30	4.394	112.89	0.410	0.009	37.69	0.000024	0.006	-1.557	-1.566	-5.960
	SP28+ 0.0	2000.0	46.30	3.943	113.96	0.406	0.008	39.04	0.000025	0.049	-1.508	-1.517	-3.460
	SP30+ 0.0	2000.0	46.30	4.958	92.19	0.502	0.013	35.62	0.000044	0.069	-1.439	-1.452	-6.410
	SP32+ 0.0	2000.0	46.30	4.404	106.86	0.433	0.010	35.87	0.000027	0.072	-1.367	-1.376	-5.780
Shereshera P.S.	SP33+500.0	1500.0	46.30	3.246	68.91	0.672	0.023	31.99	0.000101	0.097	-1.271	-1.294	-4.540
	SP33+570.0	70.0	11.07	3.271	52.29	0.212	0.002	25.95	0.000011	0.004	-1.267	-1.269	-4.540
	SP34+ 0.0	430.0	11.07	3.825	72.21	0.153	0.001	27.59	0.000004	0.003	-1.263	-1.265	-5.090
	SP36+ 0.0	2000.0	11.07	4.095	65.69	0.169	0.001	26.98	0.000005	0.009	-1.254	-1.255	-5.350
	SP38+ 0.0	2000.0	11.07	3.078	59.59	0.186	0.002	28.29	0.000008	0.013	-1.240	-1.242	-4.320
	SP40+ 0.0	2000.0	11.07	2.555	43.03	0.257	0.003	25.77	0.000021	0.029	-1.211	-1.215	-3.770
Abu Hommos P.S.	SP41+800.0	1800.0	11.07	2.072	27.13	0.408	0.008	22.42	0.000081	0.091	-1.120	-1.128	-3.200

Pumping Station	Designed Delivery W.L. each Pumping Station (m. MSL)	Analyzed W.L. of Omoum Main Drain (m. MSL)
El-Max P.S.	(-) 3.25	(-) 3.250
Abis P.S.	(-) 2.70	(-) 2.333
Hares P.S.	(-) 2.80	(-) 2.119
Dishudi P.S.	(-) 2.63	(-) 2.085
Truga P.S.	(-) 2.00	(-) 1.585
Shereshera P.S.	(-) 1.60	(-) 1.294
Abu Hommos P.S.	(-) 0.80	(-) 1.128

Table G-1-3 Maintenance Cost Record in Dredging Works of Branches
(from 1992 to 1994)

Drainage Block	Maintenance Cost (UNIT ; LE)
Qalla	162,250
Abis	136,000
Hares	589,600
Dishudi	330,750
Truga	999,350
Shereshera	1,296,750
Abu Hommos	546,650
Total	4,061,350

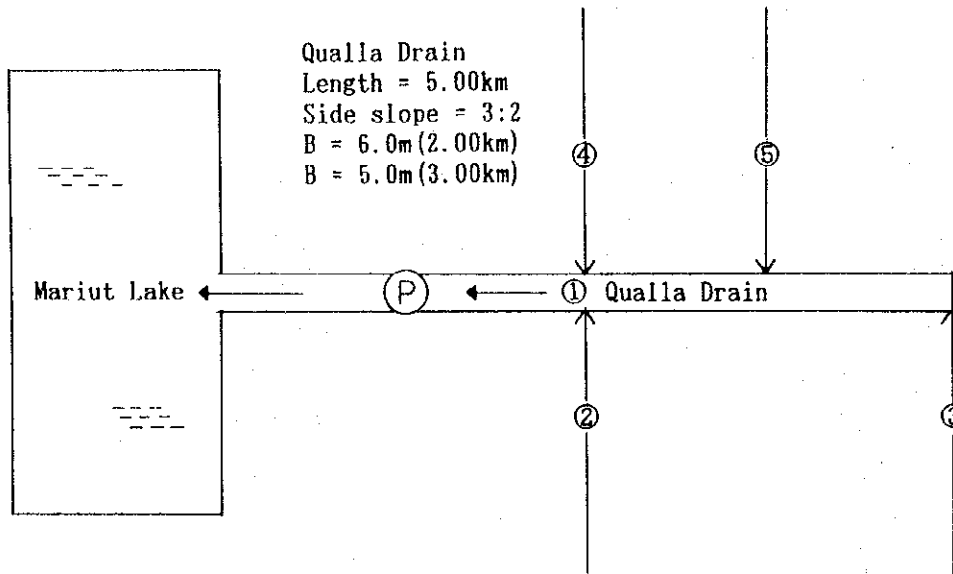
* Data Source : EPADP

* Maintenance Cost for the last three years (1992 to 1994)

* Average Cost ; 5,000 (LE/km)

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (1/7)

- QALLA DRAINAGE BLOCK -



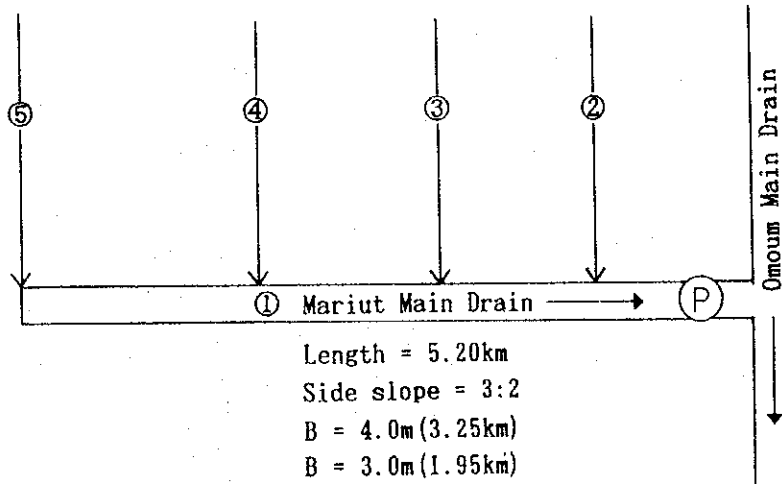
Qalla Drainage Block : Total Catchment Area = 5,880 (ha) (14,000 (fed))

Name	Catchment Area		Length (km)	B. Width (m)	Length (km)	EL. (MSL)		W. Depth (m)		Bed width (m)	Length (km)
	(ha)	(fed)				D.S.	U.S.	D.S.	U.S.		
① Qalla	5,880	14,000	5.00	6.00	2.00	-8.30	-7.55	1.00	0.75	6.00	2.00
				5.00	3.00					5.00	3.00
② Zahra	1,260	3,000	5.00	3.00	5.00	-7.10	-6.35	0.75	0.70	3.00	10.15
③ Ramla	504	1,200	0.95	1.00	0.95	-5.75	-5.40	0.80	0.80	1.00	2.75
④ Amlek	630	1,500	5.15	3.00	5.15	-7.00	-6.49	-6.20	-5.69		
⑤ Mazra			1.80	1.00	1.80	-6.50	-6.32	0.70	0.70	Total	17.90

** Drainage Discharge : 40 cu.m/F/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (2/7)

- ABIS DRAINAGE BLOCK -



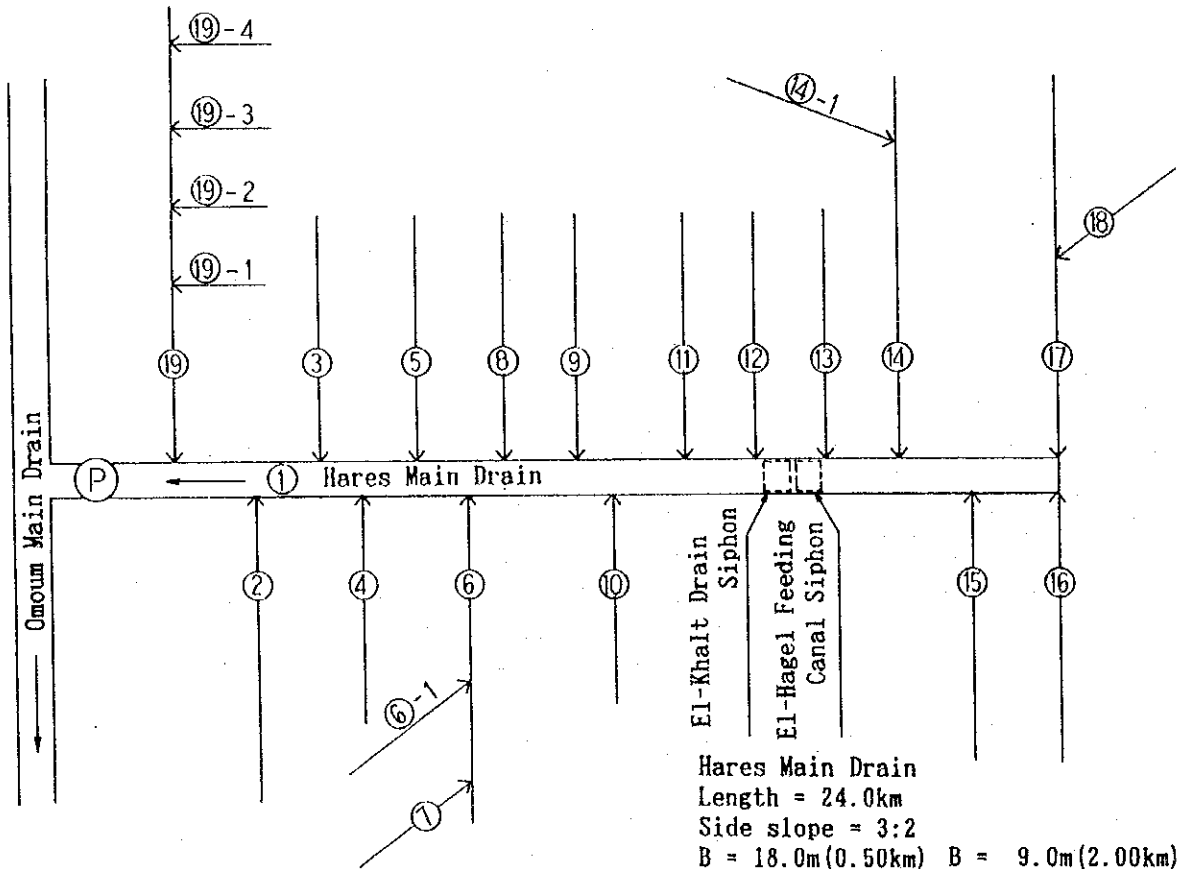
Abis Drainage Block : Total Catchment Area = 3,780 (ha) (9,000 (fed))

Name	Catchment Area		Length (km)	Bed Width (m)		EL. (MSL)		W. Depth (m)		Bed Width (m)	Length (km)
	(ha)	(fed)		(m)	(m)	D.S.	U.S.	D.S.	U.S.		
① Mariut Drain (Main)	3,780	9,000	5.20	4.0	3.25	-8.80	-7.08	2.00	0.80	4.00	3.25
				3.0	1.95					3.00	1.95
② Mensheiya No.4	504	1,200	5.40	2.0	5.40	-7.70	-6.62	1.00	0.46	2.00	22.00
③ Mensheiya No.3	1,386	3,300	5.75	2.0	5.75	-8.00	-6.85	1.40	0.82	Total	27.20
④ Mensheiya No.2	1,050	2,500	5.65	2.0	5.65	-7.73	-6.60	1.30	0.73		
⑤ Mensheiya No.1	420	1,000	5.20	2.0	5.20	-7.08	-6.30	0.80	0.54		

** Drainage Discharge : 50 cu.m/F/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (3/7)

- HARES DRAINAGE BLOCK -



Hares Main Drain
 Length = 24.0km
 Side slope = 3:2
 B = 18.0m (0.50km) B = 9.0m (2.00km)
 B = 16.0m (6.50km) B = 6.0m (5.50km)
 B = 13.0m (3.00km) B = 4.0m (1.00km)
 B = 10.0m (2.50km) B = 2.0m (3.00km)

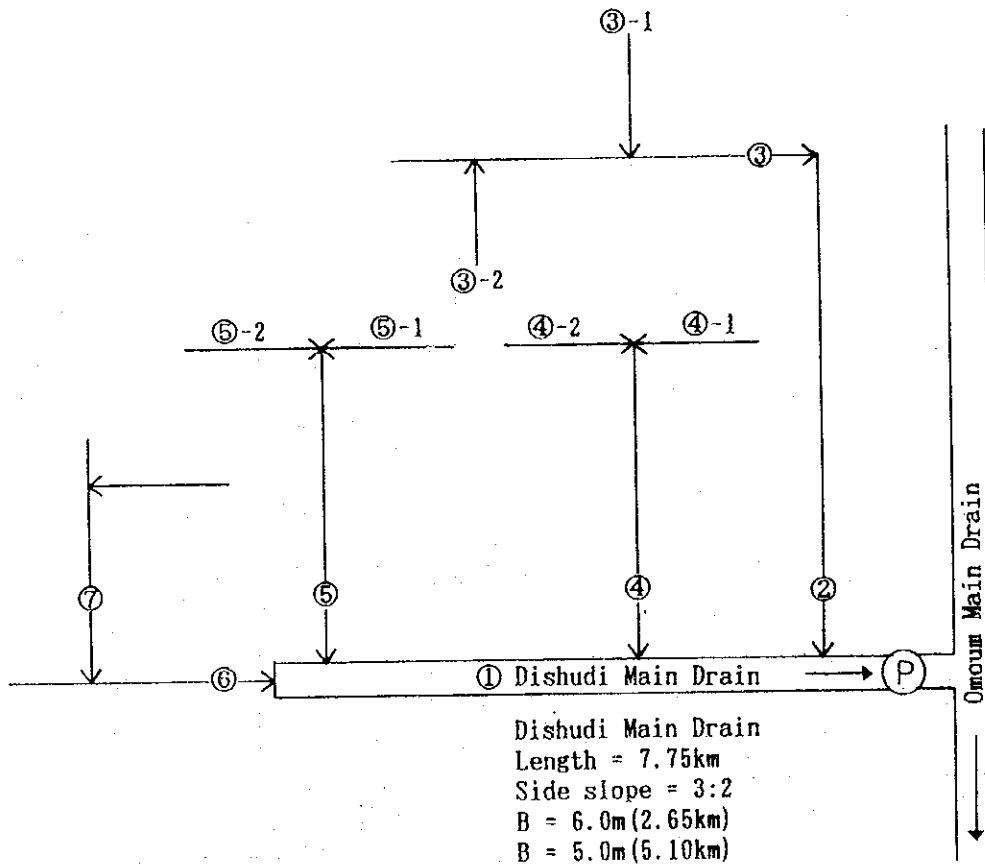
Hares Drainage Block ; Total Catchment Area = 26,600 (ha) (63,330 (fed))

Name	Catchment Area (ha)	Area (fed)	Length (km)	B. Width (m)	Length (km)	EL. (MSL) D.S. U.S.	W. Depth (M) D.S. U.S.	Bed Width (m)	Length (km)
① Hares Main	26,600	63,330	24.00	18.0 16.0 13.0 10.0 9.0 6.0 4.0 2.0	0.50 5.50 3.00 2.50 2.00 5.50 1.00 3.00	-8.10 -4.21	2.10 1.52	18.0 16.0 13.0 10.0 9.0 6.0 4.0 3.0	0.50 6.50 3.00 2.50 2.00 5.50 7.20 35.79
② Hares L-1	1,890	4,500	5.29	3.0	5.29	-8.41 -4.57	1.21 0.68	2.5	4.70
③ Hares R-1	630	1,500	2.90	2.0	2.90	-5.90 -5.32	0.70 0.56	2.0	38.74
④ Hares L-2	1,260	3,000	4.60	1.5	4.60	-6.23 -4.90	1.25 0.79	1.6	14.45
⑤ Hares R-2	840	2,000	2.80	2.0	2.80	-5.77 -5.21	0.87 0.71	1.0	15.70
⑥ Hares L-3	4,620	11,000	9.50	3.0	9.50	-6.23 -3.35	1.63 1.13		
⑥-1 Branch of L-3	1,050	2,500	6.05	1.5	6.05	-4.50 -2.70	1.00 0.70		
⑦ El-Alla	No Data		3.30	2.0	3.30	NO DATA			
⑧ El-Ameen	1,260	3,000	3.20	2.0	3.20	NO DATA			
⑨ Hares R-3	1,722	4,100	3.30	3.0	3.30	-5.60 -5.15	1.10 0.68		
⑩ Hares L-4	2,940	7,000	7.10	3.0 2.0	4.80 2.30	-5.85 0.95	1.15 0.60		
⑪ El-Andalos	630	1,500	2.00	2.0	2.00	NO DATA			
⑫ El-Khaliel	546	1,300	2.00	2.0	2.00	NO DATA			
⑬ El-Gala	504	1,200	3.00	1.0	3.00	NO DATA			
⑭ Khalig-El-Gewari	2,016	4,800	6.70	2.5 2.0	4.70 2.00	-4.50 -2.20	1.20 1.01		
⑭-1 Branch of ⑭	714	1,700	2.45	2.6	2.45	-4.00 -2.90	0.80 0.68		
⑮ Abdel Radi	1,890	4,500	7.00	3.0 2.0	4.00 3.00	-4.50 -1.10	1.10 0.80		
⑯ El-Mahdeia	630	1,500	3.12	2.0	3.12	NO DATA			
⑰ Sa-Aida	3,570	8,500	4.47	2.0	4.47	-3.90 -2.92	1.35 1.27		
⑱ Abu-Dabous	1,176	2,800	5.10	3.0	5.10	NO DATA			
⑲ Omoum Left Side	2,940	7,000	16.00	4.0 3.0 2.0 1.5	6.20 3.80 2.20 3.80	-7.05 -5.00	1.35 0.42		
⑲-1 Branch No. 1	840	2,000	2.40	1.0	2.40	-6.05 -5.67	0.80 0.85		
⑲-2 Branch No. 2	840	2,000	4.20	1.0	4.20	-5.67 -5.15	1.50 1.00		
⑲-3 Branch No. 3	462	1,100	4.50	1.0	4.50	-5.40 -4.50	0.80 0.80		
⑲-4 Branch No. 4	378	900	1.60	1.0	1.60	-5.27 -4.95	0.70 0.70		
Total									136.68

** Drainage Discharge : 33 cu.m/1/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (4/7)

- DISHUDI DRAINAGE BLOCK -



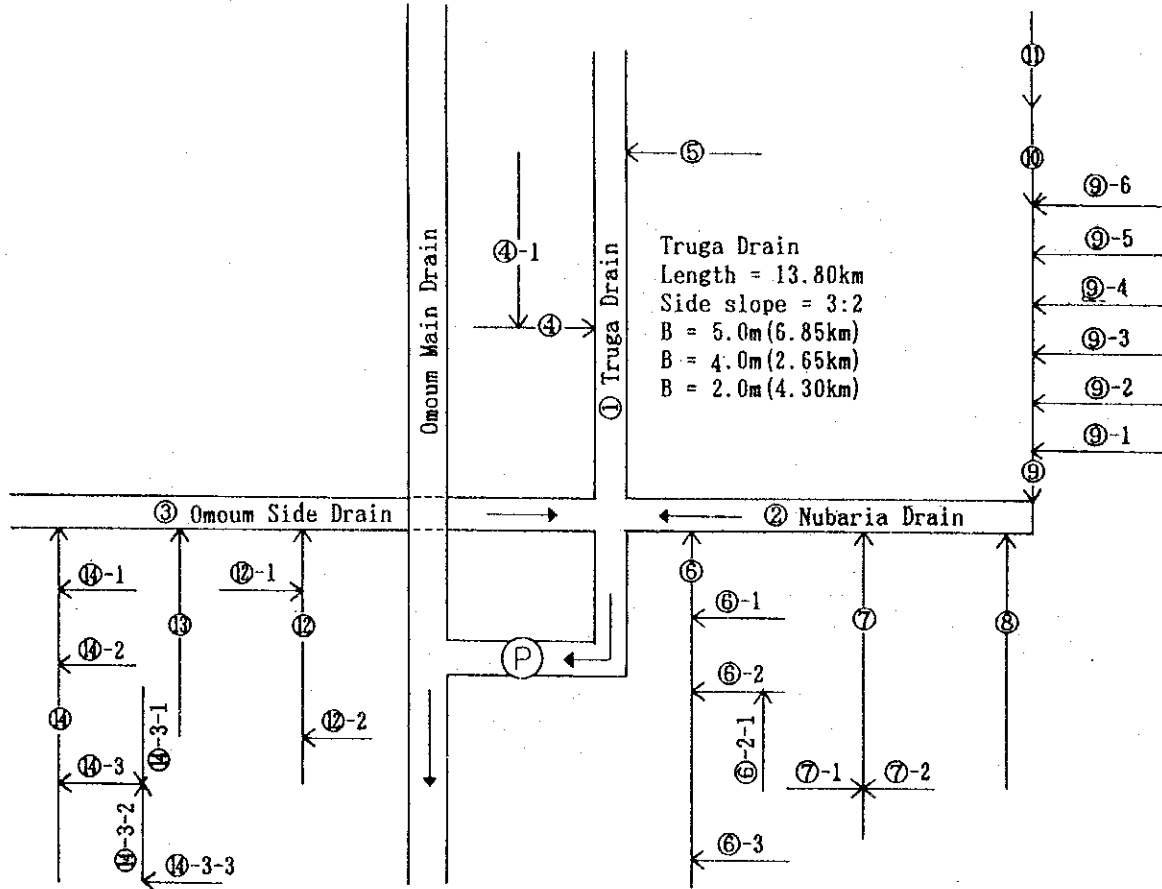
Dishudi Drainage Block : Total Catchment Area = 15,330 (ha) (36,500 (fed))

Name	Catchment Area		Length (km)	B. Width (m)	Length (km)	EL. (MSL)		W. Depth (m)		Bed Width (m)	Length (km)
	(ha)	(fed)				D.S.	U.S.	D.S.	U.S.		
① Mohit Mariut El Sharki	15,330 (7,560)	36,500 (18,000)	7.75	6.0	2.65	-7.75	-5.97	2.00	0.62	6.00	11.40
				5.0	5.10					5.00	9.10
② Right Side Drain of Omoum	7,770	18,500	4.75	6.0	4.75	-7.70	-6.99	2.00	1.76	4.00	11.00
										3.00	10.82
③ Dishudi Drain	7,350	17,500	16.43	6.0	4.00	-6.99	-2.90	1.79	0.70	2.00	15.97
				5.0	4.00					1.00	6.80
				3.0	4.30						
				2.0	4.13						
Total											65.09
③-1 El Sabih Drain	1,260	3,000	3.94	2.0	3.94	-5.20	-3.82	0.80	0.60		
③-2 Branch of Dishudi Drain	630	1,500	2.50	2.0	2.50	-4.90	-3.45	0.80	0.30		
④ Abis Drain	3,360	8,000	10.60	4.0	7.00	-7.10	-5.33	1.50	0.58		
				3.0	3.60						
④-1 Kinz Osman No. 4	252	600	2.30	1.0	2.30	-4.10	-3.41	0.60	0.37		
④-2 Kinz Osman No. 3	168	400	1.20	1.0	1.20	-4.10	-3.74	0.60	0.48		
⑤ Gezirat El Gewa	2,940	7,000	6.92	4.0	4.00	-6.75	-5.71	1.35	0.86		
				3.0	2.92						
⑤-1 Kinz Osman No. 2	84	200	1.00	1.0	1.00	-4.90	-4.60	0.60	0.50		
⑤-2 Kinz Osman No. 1	252	600	2.30	1.0	2.30	-4.90	-4.21	0.60	0.37		
⑥ Mohit Mariut El Khebli	420	1,000	5.40	2.0	5.40	-5.97	-5.54	0.62	0.46		
⑦ Elbedi Drain	No Data										
⑦-1 Sinhaba Drain	No Data										

** Drainage Discharge : 33 cu.m/F/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (5/7)

- TRUGA DRAINAGE BLOCK -



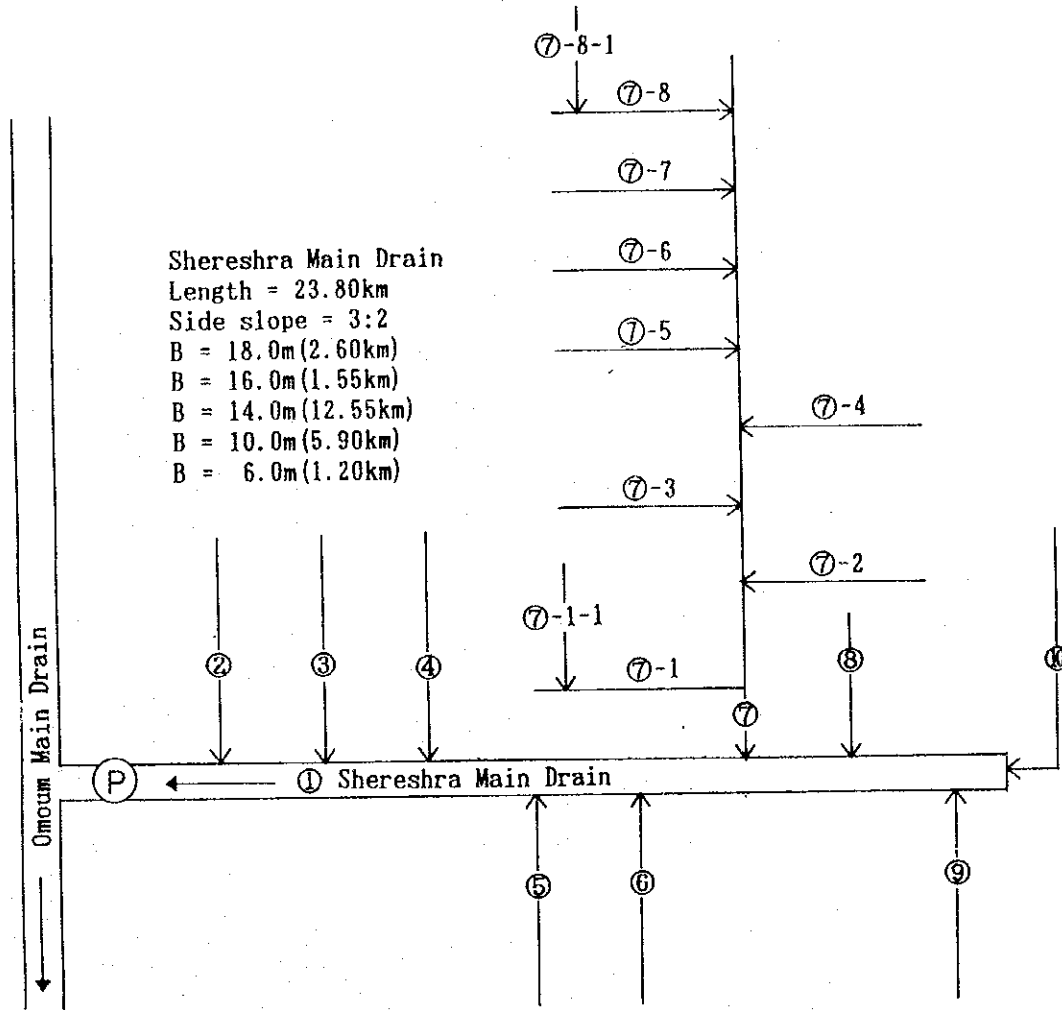
Truga Drainage Block : Total Catchment Area = 43,080(ha) (102,570(fed))

Name	Catchment Area (ha)	(fed)	Length (km)	B. Width (m)	Length (km)	EL. (MSL) D.S.	U.S.	W. Depth (m) D.S.	U.S.	Name	Catchment Area (ha)	(fed)	Length (km)	B. Width (m)	Length (km)	EL. (MSL) D.S.	U.S.	W. Depth (m) D.S.	U.S.	Bed Width (m)	Length (km)
① Main	19,740	47,000	13.80	5.0	6.85	-6.40	-4.24	1.50	0.94	③-3 Zerfodilly	323	778	2.90	2.0	2.90	0.90	1.18	0.68	0.50	8.00	9.50
	(3,640)	(8,670)		4.0	2.65					④-4 El Saka El Bas	630	1,500	6.69	2.0	6.69	-1.90	-1.32	0.70	0.48	7.00	3.20
② El Nubarria Drain	26,210	62,700	16.16	8.0	9.00	-7.10	-5.18	2.40	2.15	⑤-5 Boughos	1,806	4,300	7.40	3.0	3.48	-2.40	-1.90	0.96	0.53	6.00	10.48
				7.0	3.20									2.0	3.92					6.00	20.92
③ Omoum Side Drain	13,230	31,560	13.00	8.0	9.00	-7.00	-5.37	2.10	1.87	⑥-6 El Maded Drain	1,060	2,500	3.25	3.0	1.30	-1.60	-0.36	0.80	0.54	4.00	7.76
				6.0	3.95									2.0	1.85					3.00	26.14
④ Kowakil	1,006	2,400	3.40	3.0	3.30	-6.00	-4.21	0.60	0.82	⑦-7 El Krdoon	No Data		4.60		4.60					2.00	77.14
④-1 Sayed Ahmed	433	1,030	2.80	2.0	2.48	-4.81	-4.26	0.84	0.70	⑧-8 El Maded	No Data		7.30		7.30					1.00	6.05
④-2 Naba Side Dm.	1,850	2,500	3.60	2.0	3.60	-4.75	-4.03	0.90	0.72	⑨-9 El Maded	No Data		7.30		7.30					1.00	10.56
④-3 El Saadli	2,725	6,300	4.43	3.0	4.43	-4.65	-3.00	1.25	0.96	⑩-10 El Maded	No Data		7.30		7.30					1.00	17.02
④-4 El Amry	578	1,375	3.60	1.0	3.60	-3.63	-2.18	0.73	0.60	⑪-11 El Maded	No Data		7.30		7.30					1.00	10.56
④-5 Abu Deboum	No Data		6.22	No Data	6.22					⑫-12 El Maded	No Data		7.30		7.30					1.00	10.56
④-6 El Andorch Drain	3,024	7,200	6.20	3.0	4.70	-4.47	-1.96	1.47	0.92	⑬-13 El Maded	No Data		7.30		7.30					1.00	10.56
				2.0	1.50					⑭-14 El Maded	No Data		7.30		7.30					1.00	10.56
④-1 Branch ①	No Data									⑮-15 El Maded	No Data		7.30		7.30					1.00	10.56
④-2 El Aslah Drain	1,175	2,800	5.65	2.0	3.85	-0.90	1.23	0.90	0.50	⑯-16 El Maded	No Data		7.30		7.30					1.00	10.56
				1.0	1.78					⑰-17 El Maded	No Data		7.30		7.30					1.00	10.56
④-3 Khensky	No Data									⑱-19 El Maded	No Data		7.30		7.30					1.00	10.56
④-4 Abu El Matoum Drain	8,820	21,000	10.06	6.0	2.83	-4.20	-1.90	2.20	0.85	⑲-20 El Maded	No Data		7.30		7.30					1.00	10.56
				6.0	2.07					⑳-21 El Maded	No Data		7.30		7.30					1.00	10.56
				3.0	2.48					㉑-22 El Maded	No Data		7.30		7.30					1.00	10.56
				2.0	2.67					㉒-23 El Maded	No Data		7.30		7.30					1.00	10.56
④-1 Sarwit Drain	440	2,800	6.85	2.0	6.85	-2.85	-0.18	0.84	0.45	㉓-24 El Maded	No Data		7.30		7.30					1.00	10.56
④-2 Zerfodilly	1,374	4,700	6.20	3.0	2.80	-2.70	-0.76	1.00	0.62	㉔-25 El Maded	No Data		7.30		7.30					1.00	10.56
				2.0	2.40					㉕-26 El Maded	No Data		7.30		7.30					1.00	10.56

** Drainage Discharge : 43 cu.m/7/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (6/7)

- SHERESHERA DRAINAGE BLOCK -



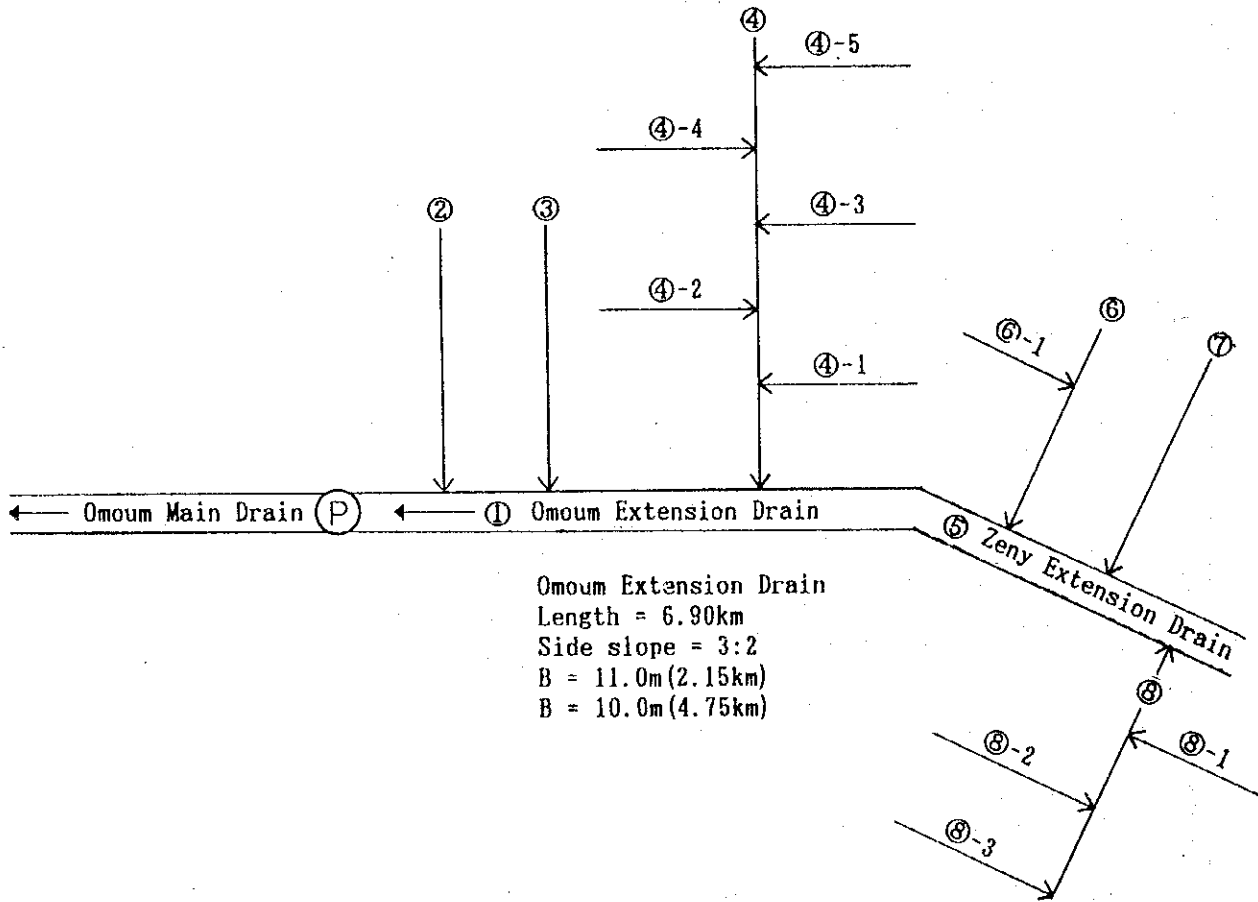
Shereshera Drainage Block ; Total Catchment Area = 56,720 (ha) (135,060 (fed))

Name	Catchment Area		Length (km)	B. Width (m)	Length (km)	EL. (MSL)		W. Depth (m)		Bed width (m)	Length (km)
	(ha)	(fed)				D.S.	U.S.	D.S.	U.S.		
① Main	56,720	135,060	23.80	18.0 16.0 14.0 10.0 6.0	2.60 1.55 12.55 5.90 1.20	-7.55	-4.62	3.30	1.80	18.0 16.0 14.0 10.0 6.0	2.60 1.55 12.55 5.90 1.20
② Zeny	4,200	10,000	13.20	4.0 3.0 2.0	5.00 5.00 3.20	-6.20	-2.15	1.70	0.79	5.0 4.0 3.0	8.00 26.20 27.95
③ Mahallid Khil	2,520	6,000	13.25	2.0 1.5 1.0	7.12 3.88 2.25	-5.00	-2.12	1.40	0.51	2.6 2.0 1.5	1.00 69.45 11.73
④ Sidi Azab	2,604	6,200	12.90	3.0 2.0	4.25 8.65	-4.60	-2.02	1.40	0.52	1.0	9.00
⑤ El Gayar	1,953	4,650	4.00	3.0 2.0	1.80 2.20	-3.65	-2.30	1.05	0.52	Total	177.13
⑥ Ruzaimet	840	2,000	3.50	2.0	3.50	-3.50	-2.45	0.80	0.46		
⑦ Gabis el Gabri	13,650	32,500	22.74	5.0 4.0 3.0 2.0	8.00 4.50 4.00 6.24	-4.90	-0.10	2.40	0.55		
⑦-1 Malha	1,260	3,000	3.20	2.5 2.0	1.00 2.20	-4.10	-3.29	1.00	0.52		
⑦-1-1 F. Malha	336	800	2.65	1.5	2.65	-3.60	-2.54	0.60	0.34		
⑦-2 Bernugi	4,830	11,500	13.40	3.0 2.0	4.50 8.90	-3.50	-0.28	1.80	0.59		
⑦-3 Abu Diab	766	1,800	5.20	1.5	5.20	-2.50	-1.20	0.75	0.49		
⑦-4 Mahuba Agar	1,260	3,000	5.11	2.0	5.11	-2.10	-0.75	1.10	0.77		
⑦-5 Nidiba	378	900	3.30	1.0	3.30	-1.63	-0.74	0.58	0.48		
⑦-6 Zahra	1,092	2,600	6.08	2.0	6.08	-1.85	-0.17	0.85	0.63		
⑦-7 Akalln	840	2,000	5.15	2.0	5.15	-1.56	-0.10	0.78	0.47		
⑦-8 Meshulya	924	2,200	4.50	2.0 1.0	2.66 1.85	-1.33	-0.54	0.85	0.38		
⑦-8-1 F. Meshulya	147	350	1.60	1.0	1.60	-0.65	-0.01	0.50	0.28		
⑧ Horara	3,570	8,500	10.70	3.0 2.0	5.00 5.70	-4.70	-1.49	1.70	0.58		
⑩ Abu Zarazir	5,153	14,650	22.85	4.0 3.0 2.0	16.70 3.40 2.75	-3.92	1.79	1.72	0.58		

** Drainage Discharge : 29 cu. m/F/day

FIGURE G-1-1 SCHEMATIC DIAGRAM OF DRAINAGE BRANCHES (7/7)

- ABU HOMMOS DRAINAGE BLOCK -



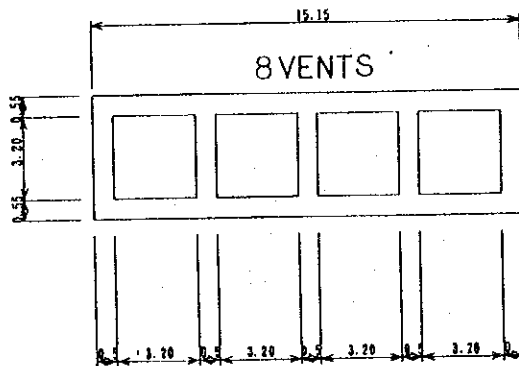
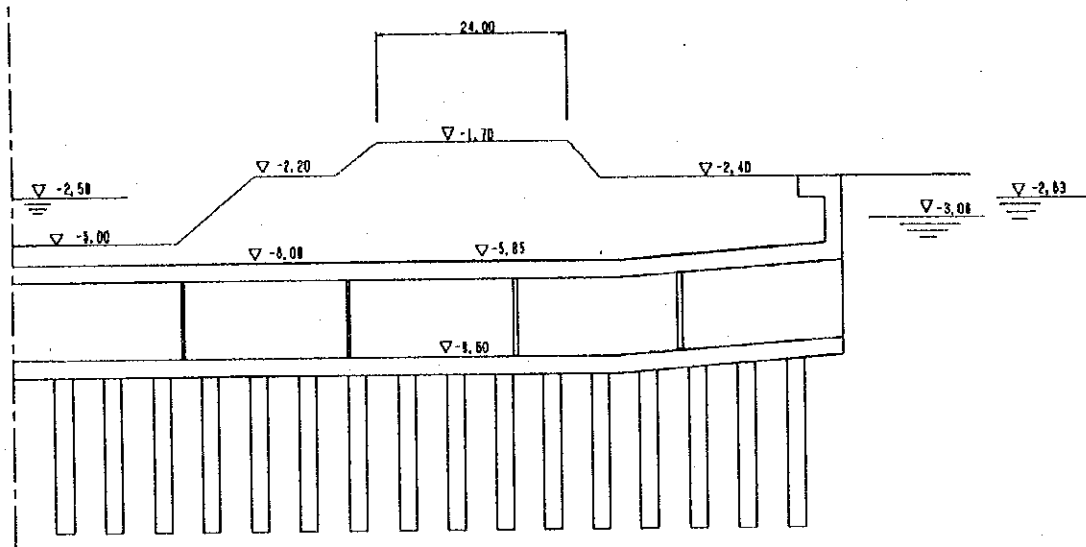
Omoum Extension Drain
 Length = 6.90km
 Side slope = 3:2
 B = 11.0m (2.15km)
 B = 10.0m (4.75km)

Abu Hommos Drainage Block ; Total Catchment Area = 19,910(ha) (47,400(fed))

Name	Catchment Area		Length (km)	B. Width (m)	Length (km)	EL. (MSL)		W. Depth (m)		Bed Width (m)	Length (km)
	(ha)	(fed)				D. S.	U. S.	D. S.	U. S.		
① Main	19,910	47,400	6.90	11.0	2.15	-4.92	-4.93	2.30	2.06	11.00	2.15
② Sarafi	840	2,000	4.80	2.0	4.80	-3.35	-1.91	0.85	0.37	10.00	9.33
③ Balaktar	1,218	2,900	6.92	2.0	4.00	-3.30	-1.57	0.85	0.51	6.00	3.17
④ Abu Hommos	5,460	13,000	17.68	5.0	7.90	-3.95	-0.79	1.70	0.70	5.00	9.20
				4.0	6.10					4.00	13.85
				3.0	3.68					3.00	10.38
				2.0	6.10					2.00	41.99
④-1 El Kenawnyl	420	1,000	2.05	1.0	2.05	-2.25	-1.63	0.65	0.34	1.50	6.86
④-2 Branch of Abu Hommos	273	650	2.14	1.0	2.14	-1.10	-0.47	0.60	0.50	1.00	11.11
④-3	No Data										
④-4 Sahaily	588	1,400	3.30	1.5	3.30	-1.55	-0.56	0.70	0.47		
④-5 Abu Hommos Extension	546	1,300	3.55	1.5	3.55	-1.30	-0.41	0.65	0.47		
⑤ Zeny Extension	12,600	30,000	14.45	10.0	4.68	-4.30	-1.96	2.03	0.48		
⑥ Zwatnaeen	1,680	4,000	4.89	2.0	4.89	-3.10	-1.60	1.00	0.32		
				1.0	4.00	-2.70	-1.70	1.00	0.60		
				3.0	6.70						
⑦ El Gerwy	756	1,800	4.75	2.0	4.75	-2.35	-1.49	0.75	0.37		
⑧ Demanhur	6,300	15,000	16.00	5.0	1.30	-3.45	0.74	1.55	0.49		
				4.0	7.75						
				2.0	6.95						
⑧-1 Abd El Hameed	1,890	4,500	9.00	2.0	9.00	-3.00	-0.94	1.30	0.33		
⑧-2 Khorsheed	231	550	1.90	2.0	1.90	-1.55	-1.17	0.65	0.40		
⑧-3 El Safaseef	1,260	3,000	6.70	2.0	6.70	-1.85	-0.61	1.05	0.38		
Total											108.03

** Drainage Discharge : 33 cu.m/F/day

FIGURE G-1-2 ORIGINAL DESIGN SECTION OF NUBARIYA SIPHON



Hydraulic Design

a) Design of the final section of Omoum drain in the position of syphon :-

from Original Design Report(an extract)

$Q = 93.00 \text{ m}^3/\text{sec}$
 $i = 1.5 \text{ cm/k m}$

Manning's Formura:

$Q = 1/n \times m^{2/3} \times i^{1/2} \times A$

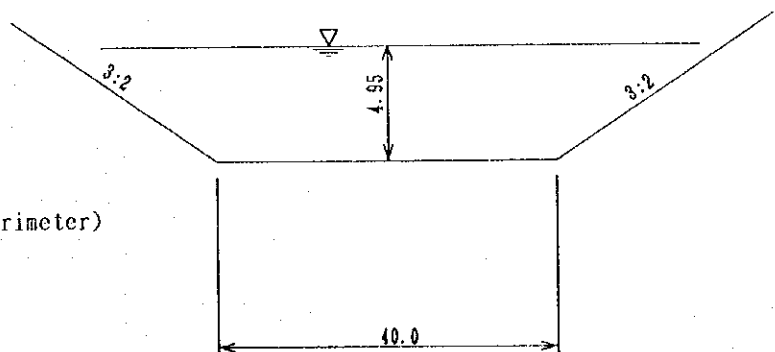
$A = (b + rd) \times d$ (r=sideslope)
 $= (40 + 1.5 \times 4.95) \times 4.95$
 $= (40 + 7.42) \times 4.95 = 235.00 \text{ m}^2$

$P = b + 2 \times 1.8d$ (P=wetted perimeter)
 $= 40 + 2 \times 1.8 \times 4.95 = 57.8 \text{ m}$

$m = A/P = 235/57.8 = 4.07 \text{ m}$

$Q = 40 \times (4.07)^{2/3} \times (1.5/100000)^{1/2} \times 235$
 $= 93.5 \text{ m}^3/\text{sec}$

$V = 40 \times (4.07)^{2/3} \times (1.5/100000)^{1/2} = 0.395 \text{ m/sec}$



b) Choise of number of vents of syphon :

$$Q = 93.00 \text{ m}^3/\text{sec}$$

Assuming 8 vents of dimensions $3.20 \times 3.20 \text{ m}$

$$A = 8 \times 3.2 \times 3.2 = 81.92 \text{ m}^2$$

$$\therefore V_{\text{syphon}} = 93.00/81.92 = 1.135 \text{ m/sec}$$

Between 2&3 V_{Ds} \therefore O. K

C) Heading up

General Formula:

$$h = V_s^2/2g(\epsilon_e + \epsilon_b + \epsilon_p + \epsilon_c + \epsilon_o)$$

For raund edged entrance $\epsilon_e = 0.06$

For $\theta = 5.00^\circ / \epsilon_b = 0.02$

$$\epsilon_c = 0, \epsilon_o = 1.00, \epsilon_p = f1/R, f = a(1+b/R)$$

R = Area of watwray / wetted perimeter

$$= 3.20 \times 3.20 / 4 \times 3.20 = 10.20/12.80 = 0.800 \text{ m}$$



For R.C Syphons :

$$a = 0.00316, b = 0.0305$$

$$f = a(1+0.0305/0.80)$$

$$= 0.00316 \times 1.0375 = 0.00328$$

$$l = 186 \text{ m}, \epsilon_p = (0.00328 \times 186)/0.800 = 0.765$$

$$h = 1.135/2 \times 9.81(0.06+0.02+0.765+0.00+1.00)$$

$$= 1.28/19.62 \times 1.845$$

$$= 0.12 \text{ m} = 12.00 \text{ cm}$$

FIGURE G-1-3 PRESENT SECTION OF RAILWAY BRIDGE
 (at Immediate Up-stream of El-Max Pump Station)

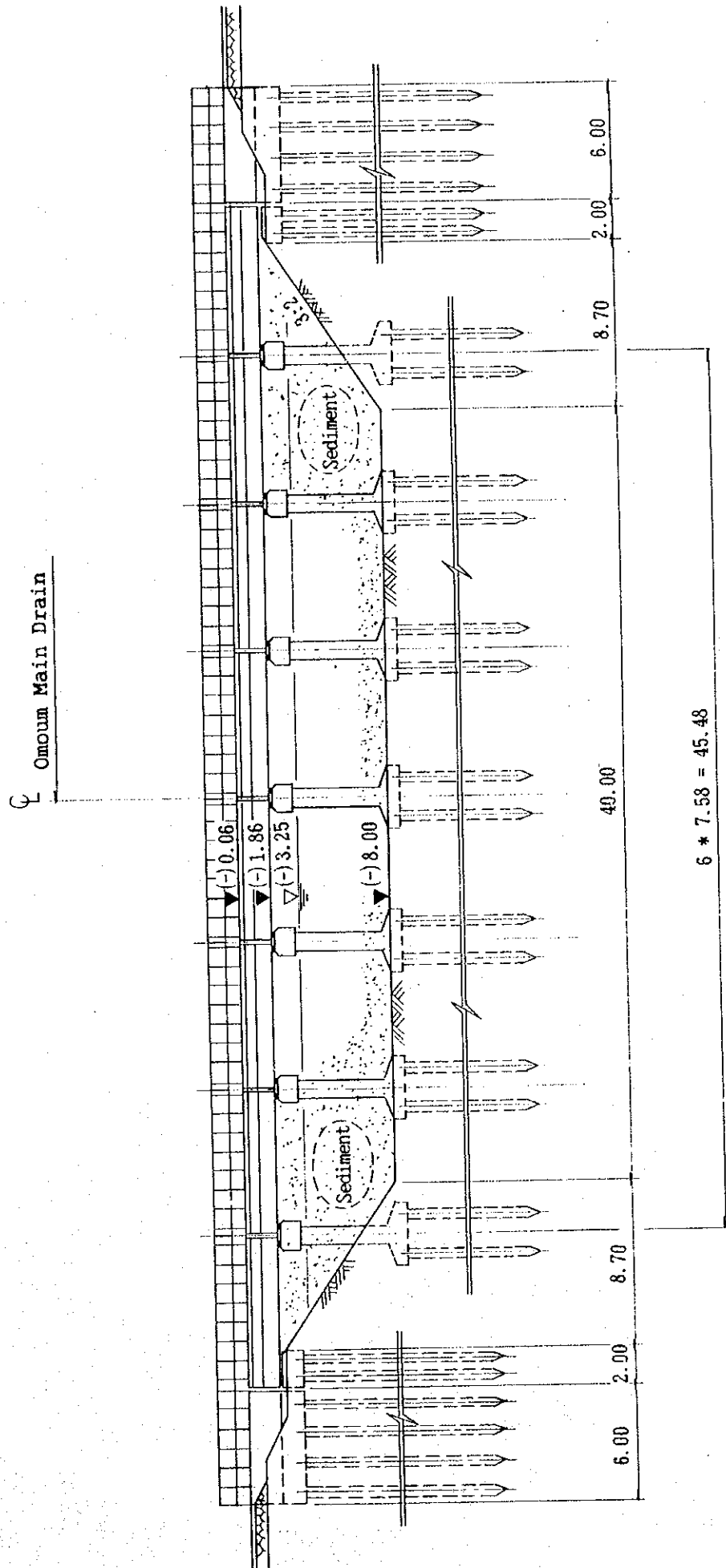


FIGURE G-1-4 PROFILE OF ORIGINAL DESIGN AND EXISTING WATER LEVEL
IN OMUUM MAIN DRAIN

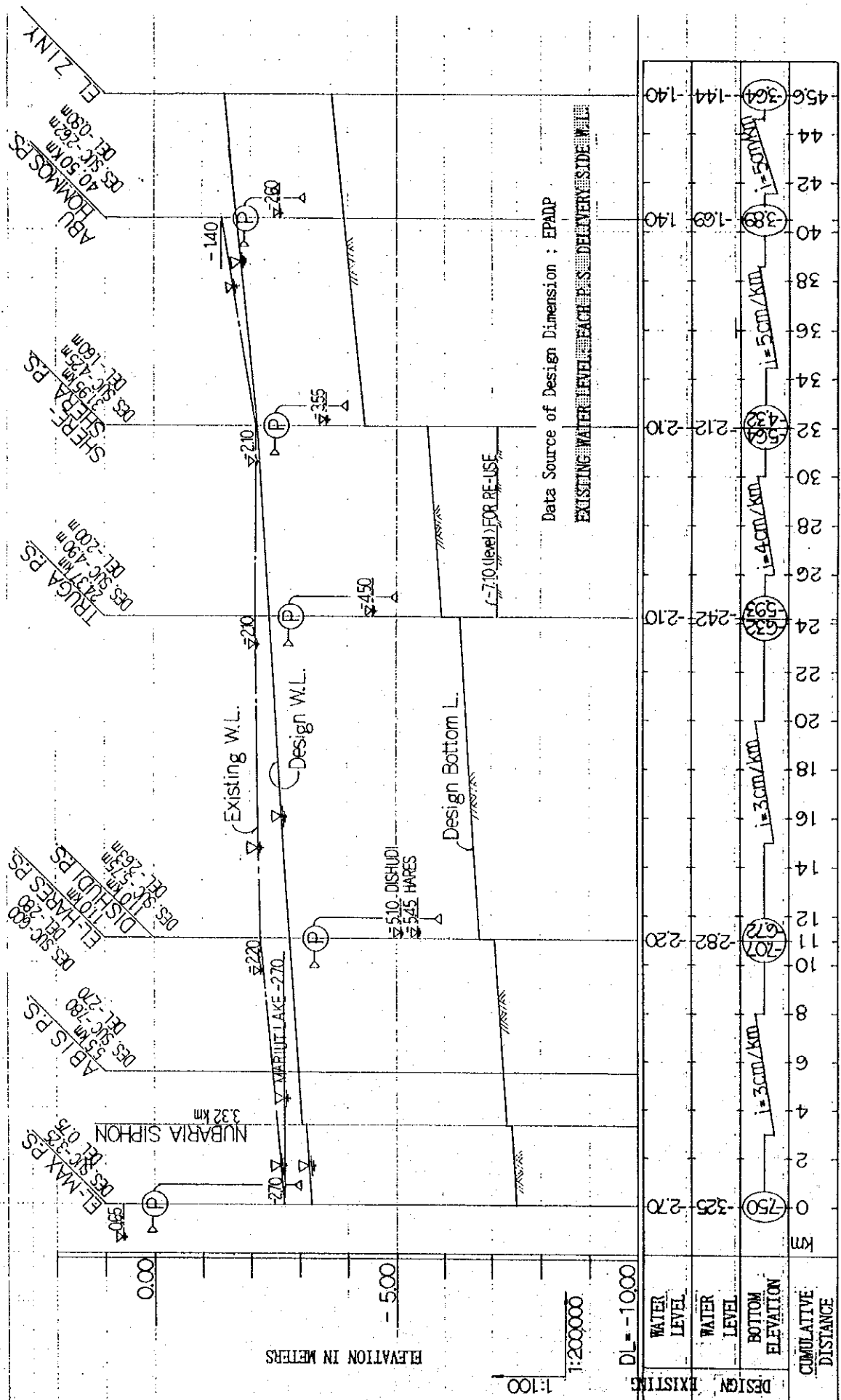


Table G-2-1 Technical Data of Pumps (1/10 -- 10/10)

(1/10)

Description	Unit	① Old EL-MAX	② New EL-MAX	③ Old QALLA	④ ABIS	⑤ HARES	Remarks
1. GENERAL Station Code NO.	-	111101	111102	111304	111305	111302	
Purpose	-	Drainage	Drainage	Drainage	Drainage	Drainage	
Area In Feddan	f	300000		24000	8000	65000	
Date of Operation	-	01. Aug. 1963	01. Mar. 1983	01. Jan. 1979	01. Jan. 1989	01. Jan. 1968	
Numbers of Pumps	Sets	6 (One standby)	6 (One standby)	2 (One standby)	4 (One standby)	4 (One standby)	
Nominal Capacity	cum/s	12.5*5=62.50	12.5*5=62.50	5.0*1= 5.00	1.8*3=5.40	8.0*3=24.0	
Static Head	m	4.00	4.25	4.90	4.50	3.20	
Type of Prime Mover		Electric Motor	Electric Motor		Electric Motor	Electric Motor	
Design Water Suction Level		-3.25	-3.25	-6.50	-6.80 , -7.80	-6.00	
Delivery		0.60	0.80	-2.50	-2.70 , -3.10	-2.80	
Transformers Station Name		EL-MAX	EL-MAX	QALLA	DISHUDI	DESHUDI	
2. STRUCTURE							
Ground Level	EL. m	1.75	1.75	-2.00	0.00	-2.00	
Platform (S. side)	EL. m	-2.00	-2.00	-4.75	-5.80	-5.25	
(D. side)	EL. m	1.65	1.65	-2.00	-2.00	-2.30	
Bed Level (S. side)	EL. m	-6.85	-6.85		-8.80	-8.80	
(D. side)	EL. m	-4.00	-4.00		-5.10	-6.95	
Opening (Nos. W. L)	Nos.	6	6	2	4	4	
	m	W=4.00, L=6.00	W=4.00, L=6.00	W=2.50, L=6.00		W=3.35, L=6.00	

Data source: MED

Technical Data of Pump Stations

(2/10)

Description	Unit	① Old EL-MAX	② New EL-MAX	③ Old QALLA	④ ABIS	⑤ HARES	Remarks
3. PUMPS							
Industry & Factory No.	-	Japan, Hitachi AP-GI, NO. 6578776	West Germany Foyet Type 19014	Austorian Foit Type 025hr 30599	Hungarian Ganz-Movag Type	Japan, Hitachi NO. 621542414	
Type or Model	-	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	
Nos of Blades		Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	
Nominal Capacity	cum/s	12.5cum/s at manometer Head 4.25 m	12.5cum/s Nominal Operation	5.0 cum/s at manometer Head 4.90 m	1.8 cum/s at manometer Head 4.50 m	8.0 cum/s at manometer Head 3.20 m	
Speed	rpm	180	190	367	472	180	
Direction of Rotation	-	The Watch Opposite	The Watch Opposite	The Watch Opposite	The Watch Opposite	The Watch Opposite	
Diameter (Suc. Side)	mm	2250	1900	1400		1800	
(Del. Side)	mm	2300	1900	1400		1800	
Shaft Type	-	Inclined 45 Deg. Cast Iron	Inclined 45 Deg. Cast Iron	Inclined 45 Deg. Cast Iron	Vertical Cast Iron	Inclined 45 Deg. Cast Iron	
Valves	-	Hydraulic Layer	Hydraulic Layer	None			
Structure	-	Horizontal Division	Horizontal Division	Horizontal Division			
Type / Nos of Thrust Bearing	-	Type of Casing Ingot Bearing	Ingot	32032/29334 Balls	Balls	Ingot	
Lubrication & Cooling	-	by Gear Oil Pump	by Gear Oil Pump		By Oil Bath	Lubrication Pump	
Kind of Oil, Grease / Lubrication	-	Heavy Medium Mobile DTI	Heavy Medium Mobile DTI		30 Telpa or 100 Oil	Oil 100	
Medium Gear Bearing Type & Nos.	-	None	None		Ingot	None	
Way of Lubrication and Cooling G. Bearing	-	None	None	Forced by Oil Pump	Forced by Greasing Tool	None	
Kind of Grease / Lubri	-	None	None	ICo-V322	Multiple or 30 Lifona	None	

Technical Data of Pump Stations

(3/10)

Description	Unit	① Old EL-MAX	② New EL-MAX	⑤ Old QALLA	⑥ ABIS	④ HARES	
Kind / Number of Lower Guide Bearing	-	None	None	None	None	None	
Way of Lubrication Cooling G. Fans Bearing	-	None	None	None	None	Multiple by Electro-lubricating Tool	
Kind of Grease / Lubri.	-	None	None	None	None	None	
Kind / Number of Guide Bearing	-	Ingot	Ingot	None	None	Ingot	
Lubrication / Cooling G. Bearing	-	Grease-water Cooling	Water from Pump	None	Forced by Greasing Tool		
Grease / Lubrication	-	Mobile Grease	47 Mobile Grease		Multiple or 3 Lifona	Multiple Purpose Grease	
End Cuppling	-	Rubber Washers	Rubber Washers	Rubber Washers	Rubber Washers	Rubber Washers	
Medium Cuppling	-	None	Rubber Washers	Rubber Washers	None	Rubber Washers	
Diameter Suction	-	2250mm .Cast Iron	.Cast Iron	1400mm .Cast Iron	1900mm .Cast Iron	1800mm .Cast Iron	
Diameter Delivery	-	2300mm .Cast Iron	.Cast Iron	1400mm .Cast Iron	1900mm .Cast Iron	1800mm .Cast Iron	
4. GEAR BOX							
Industry	-	Japanese Hitachi DRP10 NO. 5578777	West Germany Fofel Type AD-56 NO. 117564	Austorian Foit Type 025hw 30599	Hungarian GENZ MAUNG Type CFW1500	Japanese Hitachi Type NI-OY-CY	
Type	-	Double Helical of one-stage	Double Helical and Cylindrical	Helical Sloping	Double Helical	Helical and Cylindrical	
Power and High Speed.R	-	700kw, 960rpm	800kw, 987rpm	280 kw	100kw, 1485rpm	360kw, 1470rpm	
Ratio of Reduc. Speed	-	1:6	987/194	1:4	1:3.15	6:49	
Bearings	-	Capl. Ball-Bearing NO. 430	Ingot	Ball Bearing nj2222	Ingot	Ball-2732, -2324	
Medium Speed Gear	-	None	None	None	None	None	

Technical Data of Pump Stations

(4/10)

Description	Unit	① Old EL-MAX	② New EL-MAX	④ Old QALLA	③ ABIS	⑤ HARES	Remarks
Medium Gear & Bearing	-	None	None	None	Bearing Ingot	None	
Slow Speed Gear R & Type	-	180 Double Helical Cylindrical	194 Double Helical Cylindrical	387, Inclined Ball-Bearing 23224	472, Straight Tooth	180 Double Helical Cylindrical	
Grease / Lubrication	-	Capl. Ball-Bearing	Forced by pump	Forced by Oil Pump	Oil Bath	By Mechanical Pump	
Way of Cooling	-	By Suction and Del. Serptine	By Delivery	Serptine Oil	By Water	Forced Lubrication Using Oil Pump	
Grease used	-	Extra Heavy Medium DTI	Extra Heavy Medium DTI	100 Lubrication or 30 Telpa	100 Lubrication or 30 Telpa	Oil 100, or Telpa 30	
5. Main Motors							
01 Code No.	-	010103	020207	020080	100100	010163	
02 Number of Factory	-	315042	45910601	AEG	GIN 800	335807-3	
03 Power	KW	662.2	800	242	97.68	353.3	
04 Speed	rpm	1000	983	489	1485	1470	
05 Rotation Direction	-	2 Watch Direction	2 Watch Direction	2 Watch Direction	2 Watch Direction	2 Watch Direction	
06 Kind	-	2 Gliding Rings Cage	2 Gliding Rings Cage	Affecting 4	Affecting 4	4	
07 Numbers of Phases	-	3	3	3	3	3	
08 Frequency	Herz	50	50	50	50	50	
09 Starting	-	5 by begining Tension	5 by begining Tension	5 by begining Tension	3 Curtain/Delta	5 by begining Tension	
10 General Shape	-	11 Fixed Completely Locked(Closed)	11 Fixed Completely Locked(Closed)	11 Fixed at Foundation(Closed)	11 Fixed at Foundation(Closed)	14 Fixed at Foundation(Closed)	
11 Insulation Type	-		6	F12		12B	
12 Stator Voltage	V	6000		6000	380	6000	
13 Ampere	A	75	33	32.49	132	39	

Technical Data of Pump Stations

(5/10)

Description	Unit	① Old EL-MAX	② New EL-MAX	④ Old QALLA	③ ABIS	⑤ HARES	Remarks
14 Power Factor	-	0.890	0.860	0.780	0.850	0.930	
15 Stator Coil Conection	-	3 Curtain	3 Curtain		3 Curtain		
16 Rotor Voltage	V	970	970		605	965	
17 Rotor Ampere	A	430	860		249	221	
18 Rotor Coil Conection	-	3 Curtain	3 Curtain		3 Curtain	3 Curtain	
19 Lightering Volt	V	6000	6000	6000	6000	1000	
20 Lightering Ampere	A	75	95	249		600	
21 Number of Poles	-	6	6			4	
22 Bearing (Cuppling)	-	HU 322	HU 224			319	
23 Bearing	-	7322 aagb to get out	nb 7224 - m 6224			7319	
24 Lubrication Type	-	Multiple Purpose	Multiple Purpose	Bearing Grease	Multiple Purpose	Bearing Grease	
25 Cuppling	-	None	None	Rubber Washers	Elastic	Rubber	
5. OTHERS							
Over Head Crane	-	Manual 8 ton	Manual 10 ton	Manual 5 ton	Manual 5 ton	Manual 7.5 ton	
Trash Rack	-	Auto	Auto	Manual	Manual	Auto	
Bar Screen	-	586.4 cm=32 cm t=8 mm, Steel	4811.1 cm=45 cm t=8 mm, Steel	With	With	786.5cm =45.5 cm t=8 mm, Steel	

Technical Data of Pump Stations

Source: MED

(6/10)

Description	Unit	⑥ Old DESHUDI	⑦ TRUGA	⑧ SHERESHRA	⑨ ABU HOMOS	Remarks
1. GENERAL						
Station Code NO.	-	111031	111202	111203	112110	
Purpose	-	Drainage	Drainage	Drainage	Drainage	
Area in Feddan	f	60000	103000	150000	45000	
Date of Operation	-	01. Jan. 1958	12. Aug. 1984	01. Aug. 1977	09. Mar. 1977	
Numbers of Pumps	Sets	3 (One standby)	5 (One standby)	6 (One standby)	6 (One standby)	
Nominal Capacity	cum/s	6.0*2=12.00	8.0*4=32.00	8.0*5=40.00	5.0*5=25.00	
Static Head	m	3.12	2.20, 2.70	2.25, 2.50	1.82, 1.02	
Type of Prime Mover		Electric Motor	Electric Motor	Electric Motor	Electric Motor	
Design Water Level		-5.75	-4.30, -4.20	-3.50, -4.25	-1.62, -2.62	
Delivery Level		-2.63	-2.70, -1.50	-1.00, -2.50	-0.80, -1.60	
Transformers Station Name		DESHUDI	TRUGA	TRUGA	Kafrel Dawar	
2. STRUCTURE						
Ground Level	EL. m		-1.30	-1.00	0.20	
Platform (S. side)	EL. m	-4.50	-4.20	-3.50	-1.62	
(D. side)	EL. m	-1.96	-1.50	-1.00	0.20	
Bed Level (S. side)	EL. m	-8.20	-7.66	-7.75	-5.52	
(D. side)	EL. m	-6.40	-5.74	-5.75	-4.50	
Opening (Nos. W. L.)	Nos. m	3	5 W=4.05, L=3.30	6 W=4.00, L=11.00	6 W=3.00, L=11.00	

Data source: MED Data

Technical Data of Pump Stations

(7/10)

Description	Unit	⑤ Old DESHUDI	⑦ TRUGA	⑧ SHERESHRA	⑨ ABU HOMOS	Remarks
3. PUMPS						
Industry & Factory No.	-	Hungarian Ganz-Movag 86'34691	Hungarian No.17928	YUGO SABIA	Japanese .Kubota SP1400 No.99393101	
Type or Model	-	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	Axial Flow Single Suction Single Stage	
Nos of Blades	-	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	Open Impeller 4 vanes Fixed	
Nominal Capacity	cum/s	6.0 cum/s at manometer Head 3.12 m	8.0 cum/s at manometer Head 3.06 m	8.0 cum/s at manometer Head 2.65 m	5.0 cum/s at manometer Head 2.10 m	
Speed	rpm	245	243	164	172	
Direction of Rotation	-	The watch Direction	The Watch Opposite	The watch Direction	The Watch Opposite	
Diameter (Suc. Side)	mm	1500	2000	2050	1400	
(Del. Side)	mm	1500	2180	2190	1400	
Shaft Type	-	Inclined 45 Deg. Cast Iron	Inclined 45 Deg. Cast Iron	Inclined 45 Deg. Cast Iron	Inclined 45 Deg. Cast Iron	
Valves	-		None	None	None	
Structure	-		Horizontal Division	Horizontal Division	Cylindrical	
Type / Nos of Thrust Bearing	-	Ingot	29356E, 22208 Balls	Ingot	29374 Balls	
Lubrication & Cooling	-	by Gear Oil Pump	Forced	Forced/Oil	By Oil Pump	
Kind of Oil, Grease / Lubrication	-	Extra Reavy Lubrication	Heavy Medium Mobile DTI	Mobile 26		
G. Bearing Type Nos.	-	None		Ingot	22234 Balls	
Way of Lubrication and Cooling G. Bearing	-	None	Forced by Greasing	Forced by Greasing	Forced by Oil Pump	
Kind of Grease / Lubri	-	None		Mobile 47	Hydraulic 37	

Technical Data of Pump Stations

(8/10)

Description	Unit	③ Old DESHUDI	⑦ TRUGA	⑧ SHERESHRA	⑨ ABU HOMOS	Remarks
Kind / Number of Lower Guide Bearing	-	None	None	None	Ingot	
Way of Lubrication Cooling G. Fans Bearing	-	None	None	None	Mechanical Lubrication Tools	
Kind of Grease / Lubri	-	None	None	None		
Kind / Number of Guide Bearing	-	Ingot			None	
Lubrication / Cooling G. Bearing	-	Mechanical Greasing Tool				
Grease / Lubrication	-	Multiple or 3 Lifona				
End Cuppling	-	Rubber Washers		By Nails	Ruber	
Medium Cuppling	-	Rubber Washers				
Diameter Suction	-	1500mm, Cast Iron		1800mm, Cast Iron	1222mm, Cast Iron	
Diameter Delivery	-	1500mm, Cast Iron		2000mm, Cast Iron	1400mm, Cast Iron	
4. GEAR BOX						
Industry	-	West Germany Flender	West Germany Flender No.413509001	YUGO SABIA Litosroj rav-630, P-91071	Japanese .Kubota SRB-315 No. R11010	
Type	-	Helical and Clyindrical	Slanting Gear			
Power and Speed	-	346kw, 1470rpm	355kw, 1480rpm	280kw, 985rpm	165kw, 970rpm	
Ratio of Reduc. Speed	-	1:6	1:6.1147	1:6.07	1:5	
Bearings	-	Ball-Bearing	AB41323RNS	Ingot	Solid, 32318	
Medium Speed Gear	-	None	None	None	None	

Technical Data of Pump Stations

(9/10)

Description	Unit	③ Old DESHUDI	⑦ TRUGA	⑧ SHERESHRA	⑨ ABU HOMOS	Remarks
Medium Gear & Bearing	-	None	None	None	None	
Slow Speed Gear, Kind	-	245 Double Helical Cylindrical	242. Bevel Gear 3228B	162. Bevel Gear	172. Solid, 23028CD240	
Grease / Lubrication	-	Forced by pump	Forced	Forced	By Oil Pump	
Way of Cooling	-	Serpentine Oil	Oil, using Serpentine	Oil, using Serpentine	Serpentine for Deli.	
Grease used	-	Heavy Medium	Mobile 632	Mobile 629	Hydraulic 31	
5. Main Motors						
01 Code No.	-	030111			010000	
02 Number of Factory	-	999286			80108297 is	
03 Power	KW	315			146	
04 Speed	rpm	1470			975	
05 Rotation Direction	-	2 Match Direction			2 Watch Direction	
06 Kind	-	4			Gliding Rings	
07 Numbers of Phases	-	3			3	
08 Frequency	Herz	50			50	
09 Starting	-	5 by beginning Tension			1 Resistance of the Mobile Part	
10 General Shape	-	11 Fixed Completely Locked(Closed)			11 Fixed Completely Locked(Closed)	
11 Insulation Type	-				B	
12 Stator Voltage	V	6000			380	
13 Ampere	A	95			305	

Technical Data of Pump Stations

(10/10)

Description	Unit	③ Old DESHUDI	⑦ TRUGA	⑧ SHERESHRA	⑨ ABU HOMOS	Remarks
14 Power Factor	-	0.856			0.860	
15 Stator Coil Connection	-	3 Curtain			3	
16 Rotor Voltage	V	450			340	
17 Rotor Ampere	A	355			295	
18 Rotor Coil Connection	-	3 Curtain			3	
19 Lightering Volt	V				-	
20 Lightering Ampere	A				-	
21 Number of Poles	-	2			6	
22 Bearing (Cupling)	-				322 NU	
23 Bearing	-	Balls			6319	
24 Lubrication Type	-	Bearing Grease			Shell 2	
25 Cuppling	-	None			Rubber Washers	
5. OTHERS						
Over Head Crane	-	Manual 10 ton	Manual 10 ton	Manual 10 ton	Manual ton	
Trash Rack	-	Manual	Auto	Manual	Manual	
Bar Screen	-	With	With	596 cm=30 cm t=8 mm, Steel	With	

Table G-2-2 Existing Pump Conditions (1/8 -- 8/8)

SURVEY DATE			
NAME			
PUMP CAPACITY (cuw/s)	12.5+5=62.5		
NOS OF PUMP MACHINE (sets)	6 (One standby)		
TOTAL OUT PUT (KW)	662+8=	3972 (1/8)	

NAME OF PUMP STATION	EL-MAX (OIG)
GOVERNORATE	ALEXANDRIA
COMPLETION	01 AUG 1963

No.	ITEM	PAST RECORD			PRESENT CONDITION							PLANNING			REMARKS
		NO	OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	DANGER	NOISE / VIBRATION	RUST / CORROSIIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS	REPLACE MENT	
1	MAIN PUMP	1	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
2		2	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
3		3	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
4		4	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
5		5	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
6		6	10000hr	Done	MPR	Good	-	-	Yes	Yes	Yes	-	Yes	Yes	Urgently
7	REDUCTION GEAR	1	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
8		2	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
9		3	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
10		4	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
11		5	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
12		6	10000hr	Done	GBR	Good	-	-	-	-	-	-	-	-	Urgently
13	FLAP VALVE	1-6	Many	Done	FVR	Good	-	-	-	-	-	-	-	-	Urgently
14	MOTOR	1	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
15		2	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
16		3	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
17		4	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
18		5	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
19		6	10000hr	Done	MR	Good	-	-	-	-	-	-	-	-	Urgently
20	SWITCH BOARD		Annual	Done		Good	-	-	-	-	-	-	-	-	Urgently
21	TRANSFORMER		Annual	Done		Good	-	-	-	-	-	-	-	-	Urgently
22	GREASE PUMP		1000hr	Done		Good	-	-	-	-	-	-	-	-	Urgently
23	LUBRICATION S		10000hr	Done		Good	-	-	-	-	-	-	-	-	Urgently
24	DEWATERING P		Monthly	Done		Bad	Yes	Yes	Yes	Yes	Yes	-	-	-	Urgently
25	0 H CRANE		Annual	Done		Good	-	-	-	-	-	-	-	-	Urgently
26	STOP LOG/CRANE		Annual	Done		Bad	Yes	Yes	Yes	Yes	Yes	-	-	-	Urgently
27	SCREEN(Auto)		10000hr	Done		Bad	Yes	Yes	Yes	Yes	Yes	-	-	-	Urgently

Data source: MED Data

Notes : - : Well Condition
 MPR : Balds. Shaft Sleafs. Low Bearing. Grand. Thrust Bearing. Rings. Shaft
 GBR : Oil Gear Pumps. Roller Bearing. Seling. Pinion. Low Speed Gear
 MR : Cleanings. Bearing. Slipping
 FVR : S-rings. Bearing. Geasing. Mognetic V. Oil System

EXISTING PUMP CONDITIONS

NAME OF PUMP STATION	EI-MAX (New)
GOVERNORATE	ALEXANDRIA
COMPLETION	01 MAR 1983

SURVEY DATE	NAME
PUMP CAPACITY (cum/s)	12.5*5=62.5
NOS OF PUMP MACHINE (sets)	6 (one standby)
TOTAL OUT PUT (KW)	800*6= 4800

(2/8)

No.	ITEM	PAST RECORD			PRESENT CONDITION					PLANNING			REMARKS	
		OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	ANGER	NOISE / VIBRATION	RUST / CORROSSIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS		REPLACE MENT
1	MAIN PUMP	1 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
2		2 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
3		3 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
4		4 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
5		5 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
6		6 @10000hr	Done	MPR	Good	-	-	-	-	Yes	-	-	-	-
7	REDUCTION GEAR	1 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
8		2 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
9		3 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
10		4 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
11		5 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
12		6 @10000hr	Done	GBR	Good	-	-	-	-	Yes	-	-	-	-
13	FLAP VALVE	1-6 Many	Done	FVR	Normal	-	-	-	-	Yes	-	-	-	-
14	MOTOR	1 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
15		2 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
16		3 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
17		4 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
18		5 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
19		6 @10000hr	Done	MR	Good	-	-	-	-	Yes	-	-	-	-
20	SWITCH BORD	Annual	Done		Good	-	-	-	-	Yes	-	-	-	-
21	TRANSFORMER	Annual	Done		Good	-	-	-	-	Yes	-	-	-	-
22	GREASE PUMP	@ 10000hr	Done		Good	-	-	-	-	Yes	-	-	-	-
23	LUBRICATION S	@10000hr	Done		Good	-	-	-	-	Yes	-	-	-	-
24	DEWATERING P	Monthly	Done		Good	-	-	-	-	Yes	-	-	-	-
25	O.P CRANE	Annual	Done		Good	-	-	-	-	Yes	-	-	-	-
26	STOP LOG/CRANE	Annual	Done		Bad	Yes	Yes	Yes	Yes	-	-	-	-	-
27	SCREEN(Auto)	@10000hr	Done		Bad	Yes	Yes	Yes	Yes	-	-	-	-	-

Notes :
 - : Well Condition
 MPR : Impeller, Low Bearing, Shaft, Shift Sreave, Grand, Thrust Brearing
 GBR : Bearing
 MR : Greasing, Bearing, Wire, Slipring, Closing.
 FVR : Bearing, Geasing, Controlling System, Modification

EXISTING PUMP CONDITIONS

SURVEY DATE	NAME
PUMP CAPACITY (cum/s)	5*1= 5
NOS OF PUMP MACHINE (sets)	2 (one standby)
TOTAL OUT PUT (KW)	313*2 = 630

NAME OF PUMP STATION	QALLA No.2
GOVERNORATE	ALEXANDRIA
COMPLETION	01 JAN 1990 Replace

No.	ITEM	PAST RECORD			PRESENT CONDITION					PLANNING			REMARKS		
		NO	OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	DANGER	NOISE / VIBRATION	RUST / CORROSIIVE	NO SPARE PARTS	LEAKAGE/ OTHERS		REPAIRING WORKS	REPLACE MENT
1	MAIN PUMP	1	@10000hr	No		Good					Yes				
2		2	@10000hr	No		Good									
3	REDUCTION GEAR	1	@10000hr	No		Good					Yes				
4		2	@10000hr	No		Good					Yes				
5	FLAP VALVE	1~2	@10000hr	Done	G.A	Good					Yes			1995	
6	MOTOR	1	@10000hr	Done	Brush	Good					Yes				
7		2	@10000hr	Done	Brush	Good					Yes				
10	SWITCH BORD		96 Month			Normal								Yes	
11	TRANSFORMER					Normal									
12	GREASE PUMP		@ 5000hr								Yes				
13	LUBRICATION. S		@10000hr	Done	Bearing	Normal									
14	DEWATERING. P		@ 5000hr	Done										Yes	New
15	O. H CRANE		@ 5000hr	Done											
16	STOP LOG/CRANE		@ 5000hr	Done											
17	SCREEN(Auto)		@10000hr	Done	Chain	Bad					Yes				

LGB : lower Guide Bearing
HG : High Speed Gear

EXISTING PUMP CONDITIONS

NAME OF PUMP STATION	ABIS
GOVERNORATE	ALEXANDRIA
COMPLETION	01 JAN 1989 Replace

SURVEY DATE	
NAME	
PUMP CAPACITY (cum/s)	1.8*3=5.4
NOS OF PUMP MACHINE (sets)	4 (one standby)
TOTAL OUT PUT (KW)	93*4
	392 (4 / 8)

No.	ITEM	PAST RECORD				PRESENT CONDITION				PLANNING			REMARKS
		NO OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	OPERATION CONDITION	DANGER / VIBRATION	RUST / CORROSIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS	
1	MAIN PUMP	1 @10000hr			Normal		Material	Yes	Yes	Yes	Yes		1994/1995
2		2 @10000hr			Normal		Material	Yes	Yes	Yes	Yes		1994/1995
3		3 @10000hr			Normal		Material	Yes	Yes	Yes	Yes		1994/1995
4		4 @10000hr	Done	Bell Mous	Normal		Material	Yes	Yes	Yes	Yes		1994/1995
5	REDUCTION GEAR	1 @10000hr	Done	Oil Seal	Normal				Yes	Yes	Yes		1994/1995
6		2 @10000hr	Done	Oil Seal	Normal				Yes	Yes	Yes		1994/1995
7		3 @10000hr			Normal				Yes	Yes	Yes		1994/1995
8		4 @10000hr	Done	Oil Seal	Normal				Yes	Yes	Yes		1994/1995
9	FLAP VALVE	-	No Flap Valves										
10	MOTOR	1 @10000hr			Good		Building						
11		2 @10000hr			Good		Building						
12		3 @10000hr			Good		Building						
13		4 @10000hr			Good		Building						
14	SWITCH BORD		Done	?	Bad		Overall			Yes	Yes		1994
15	TRANSFORMER		Done	?	Bad		Design			Yes	Yes		1994
16	GREASE PUMP	@ 5000hr	Done	?	Bad		Design			Yes	Yes		1994
17	LUBRICATION S												
18	DEWATERING P												
19	O H CRANE	@ 5000hr	Done	?	Very Bad		Overall			Yes	Yes		1995
20	STOP LOG/CRANE				Bad								
21	SCREEN(Auto)	@10000hr			Normal				Yes	Yes	Yes		1996

Notes : - : Well Condition

EXISTING PUMP CONDITIONS

SURVEY NAME	DATE
PUMP CAPACITY (cum/s)	8*3=24
NOS OF PUMP MACHINE (sets)	4 (one standby)
TOTAL OUT PUT (KW)	354*4=
	1416

NAME OF PUMP STATION	HARES
GOVERNORATE	ALEXANDRIA
COMPLETION	01 JAN 1988

(5/8)

No.	ITEM	PAST RECORD			PRESENT CONDITION							PLANNING			REMARKS
		NO OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	DANGER	NOISE / VIBRATION	RUST / CORROSIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS	REPLACE MENT	YEAR (IMPLE)	
1	MAIN PUMP	1 @10000hr	Done	LGG	Normal			Yes	Yes	Yes		Yes	Urgently		
2		2 @10000hr	Done	LGG	Normal			Yes	Yes	Yes		Yes	Urgently		
3		3 @10000hr	Done	LGG	Normal			Yes	Yes	Yes		Yes	Urgently		
4		4 @10000hr	Done	LGG	Normal			Yes	Yes	Yes		Yes	Urgently		
5	REDUCTION GEAR	1 @10000hr	Done	Bearing	Normal			-	-	-		Yes			
6		2 @10000hr	Done	Bearing	Normal			-	-	-		Yes			
7		3 @10000hr	Done	Bearing	Normal			-	-	-		Yes			
8		4 @10000hr	Done	Bearing	Normal			-	-	-		Yes			
9	FLAP VALVE	1~4 Many	Done	Parts	Bad			Yes	Yes	Yes		Yes			
10	MOTOR	1 @10000hr	Done	Bearing	Normal										
11		2 @10000hr	Done	Bearing	Normal										
12		3 @10000hr	Done	Bearing	Normal										
13		4 @10000hr	Done	Bearing	Normal										
14	SWITCH BOARD	10 YEAR	Done	?	Normal			Old	Yes	Yes		Yes	New		
15	TRANSFORMER	10 YEAR	Done	?	Normal			Old	Yes	Yes		No	Urgently		
16	GREASE PUMP	@ 5000hr	Done	?	Normal			Old				Yes	Urgently		
17	LUBRICATION S	@10000hr	Done	?	Normal			Old				Yes	Urgently		
18	DEWATERING. P	@ 5000hr	Done					Old				Yes	Urgently		
19	O. H CRANE	@10000hr	Done		Bad			Old				Yes	Urgently		
20	STOP LOG/CRANE														
21	SCREEN(Auto)	@10000hr	Done		Bad			Old				No	New		

Notes : - : Well Condition
LGB : Lower Guide Bearing

EXISTING PUMP CONDITIONS

SURVEY DATE	
NAME	
PUMP CAPACITY (cum/s)	6*2=12
NOS OF PUMP MACHINE (sets)	3 (one standby)
TOTAL OUT PUT (KW)	315*3= 945

NAME OF PUMP STATION	DISHUDI
GOVERNORATE	ALEXANDRIA
COMPLETION	Replaced in 1989

No.	ITEM	PAST RECORD			PRESENT CONDITION					PLANNING			REMARKS
		NO OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION LOW CONDITION	FUNCTION	DANGER	NOISE / VIBRATION	RUST / CORROSIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS	
1	MAIN PUMP	1 @10000hr	Done	LGG	Normal		Yes	Yes	Yes	Yes	Yes		1994
2		2 @10000hr	Done	LGG	Normal						Yes		1994
3		3 @10000hr	Done	LGG	Normal						Yes		1994
4	REDUCTION GEAR	1 @10000hr	Done	HG	Normal		Yes	Yes	Yes	Yes	Yes		1995
5		2 @10000hr	Done	HG	Normal		Yes	No	Yes	No	Yes		1996
6		3 @10000hr	Done	HG	Normal		Yes	No	Yes	No	Yes		1996
7	FLAP VALVE	1-3 Many	Done	Parts	Bad		Yes	Yes	Yes	Yes	Yes		New
9	MOTOR	1 @10000hr	Done	Bearing	Normal						Yes		1996
10		2 @10000hr	Done	Bearing	Normal						Yes		1994
11		3 @10000hr	Done	Bearing	Normal						Yes		1994
12	SWITCH BOARD	Monthly	Done										
13	TRANSFORMER	Monthly	Done										
14	GREASE PUMP	@10000hr	Done										
15	LUBRICATION. S	@10000hr	Done										
16	DEWATERING. P	Monthly	Done										
17	O. H CRANE	Monthly	Done										
18	STOP LOG/CRANE	Monthly	Done										
18	SCREEN(Auto)	@10000hr	Done		Bad								

Notes :
 - : Well Condition
 LGB : Lower Guide Bearing
 HG : High Speed Gear

EXISTING PUMP CONDITIONS

SURVEY DATE	
NAME	
PUMP CAPACITY (cum/s)	8.4-32
NOS OF PUMP MACHINE (sets)	5 (one standby)
TOTAL OUT PUT (KW)	355*5= 1775 (7/8)

NAME OF PUMP STATION	TRUGA
GOVERNORATE	BEHERA
COMPLETION	12 AUG 1984~1989

No.	ITEM	PAST RECORD				PRESENT CONDITION					PLANNING			REMARKS
		OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	LEAKAGE/ OTHERS	NO SPARE PARTS	RUST / CORROSIIVE	NOISE / VIBRATION	REPAIRING WORKS	REPLACE MENT	YEAR (IMPLE)	
1	MAIN PUMP		Done	PS, LGB	Good	-	-	Yes	-	Yes	-	1995		
2		①10000hr	-	-	Good	-	-	-	-	-	-	1994		
3		②10000hr	-	-	Good	-	-	-	-	-	-	1994		
4		③10000hr	Done	PS	Good	-	-	-	-	-	-	1995		
5		④10000hr	-	-	Good	-	-	-	-	-	-	1995		
6	REDUCTION GEAR	1 4 times	Done	HSG	Good	-	-	-	-	-	-	1995		
7		2 2 times	Done	HSG	Good	-	-	-	-	-	-	1995		
8		3 3 times	Done	HSG	Good	-	-	-	-	-	-	1995		
9		4 4 times	Done	HSG	Good	-	-	-	-	-	-	1995		
10		5 1 times	Done	HSG	Good	-	-	-	-	-	-	1995		
11	FLAP VALVE	1~5 Many	Done	Overall	Bad	Yes	Yes	Yes	Yes	Yes	Yes	Under		
12	MOTOR	1 ①10000hr	Done	Bearing	Good	-	-	-	-	-	-	1995		
13		2 ①10000hr	Done	Bearing	Good	-	-	-	-	-	-	1994		
14		3 ①10000hr	Done	SL, R	Good	-	-	-	-	-	-	1994		
15		4 ①10000hr	Done	Bearing	Good	-	-	-	-	-	-	1995		
16		5 ①10000hr	Done	Bearing	Good	-	-	-	-	-	-	1995		
17	SWITCH BOARD	In time	Done	Replaced	-	-	-	-	-	-	-	1994		
18	TRANSFORMER	In time	-	-	Normal	Yes	Yes	Leaking	Yes	Yes	Yes	1994		
19	GREASE PUMP	Many	Done	Cupling	Normal	-	-	-	-	-	-	1994		
20	LUBRICATION S	①10000hr	Done	-	Good	-	-	-	-	-	-	1994		
21	DEWATERING P	② 5000hr	Done	Oil seal	Bad	Yes	Yes	Leaking	-	-	-	1994		
22	0 H CRANE	Annual	Done	-	Good	-	-	-	-	-	-	1995		
23	STOP LOG/CRANE	MANY	Done	-	Bad	Yes	Yes	Yes	Yes	Yes	Yes	Under		
24	SCREEN(Auto)	-	-	-	Good	-	-	-	-	-	-	1995		

Notes : - : Well Condition
 PS : Protective Sleeve
 HSG : High Speed Gear

SURVEY DATE	
NAME	
PUMP CAPACITY (cum/s)	8*5=40.
NOS OF PUMP MACHINE (sets)	6 (one standby)
TOTAL OUTPUT (KW)	236*6= 1416 (8/8)

EXISTING PUMP CONDITIONS	
NAME OF PUMP STATION	SHERESHRA
GOVERNORATE	BEHERA
COMPLETION	01 AUG 1977

No.	ITEM	PAST RECORD			PRESENT CONDITION					PLANNING			REMARKS
		NO OVERHAUL	REPAIRING	REPAIRED PARTS	OPERATION CONDITION	LOW FUNCTION	ANGER	NOISE / VIBRATION	RUST / CORROSIVE	NO SPARE PARTS	LEAKAGE / OTHERS	REPAIRING WORKS	
1	MAIN PUMP	1 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1994
2		2 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1994
3		3 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1994
4		4 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1995
5		5 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1995
6		6 @10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1995
7	REDUCTION GEAR	1 @10000hr	Done	HSB	Good	-	-	-	-	Yes	Yes	-	1994
8		2 @10000hr	Done	HSB	Good	-	-	-	-	Yes	Yes	-	1994
9		3 @10000hr	Done	HSB	Good	-	-	-	-	Yes	Yes	-	1994
10		4 @10000hr	Done	HSG	Good	-	-	-	-	Yes	Yes	-	1995
11		5 @10000hr	Done	HSG	Good	-	-	-	-	Yes	Yes	-	1995
12		6 @10000hr	Done	HSB	Good	-	-	-	-	Yes	Yes	-	1995
13	FLAP VALVE	1-6 Many	Done	HP. Tube	Normal	-	-	-	Yes	Yes	Yes	-	1994-1995
14	MOTOR	1 @10000hr	Done	Bearing	Good	-	-	-	-	Yes	Yes	-	1994
15		2 @10000hr	Done	Slip ring	Good	-	-	-	-	Yes	Yes	-	1994
16		3 @10000hr	Done	Slip ring	Good	-	-	-	-	Yes	Yes	-	1994
17		4 @10000hr	Done	Slip ring	Good	-	-	-	-	Yes	Yes	-	1995
18		5 @10000hr	Done	Bearing	Good	-	-	-	-	Yes	Yes	-	1995
19		6 @10000hr	Done	Bearing	Good	-	-	-	-	Yes	Yes	-	1995
20	SWITCH BOARD	Annual	Done	Cables	Good	-	-	-	-	Yes	Yes	-	1994
21	TRANSFORMER	Annual	Done	Cables	Good	-	-	-	-	Yes	Yes	-	1994
22	GREASE PUMP	Many	Done	Cables	Good	-	-	-	-	Yes	Yes	-	1994
23	LUBRICATION. S	@10000hr	Done	-	Good	-	-	-	-	Yes	Yes	-	1994
24	DEWATERING. P	\$5000	Done	All	Normal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1994
25	O. H CRANE	Annual	Done	All	Bad	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Under
26	STOP LOG/CRANE	MANY	Done	All	Bad	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Under
27	SCREEN(Auto)	In time	Done	All	Bad	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Under

Notes : - : Well Condition
 LSB : Low Speed Bearing

Table G-2-3 EL-MAX Pump Running Record(1/6 -- 6/6)

EL-MAX (OLD) JAN. 1990~JULY. 1994
MONTHLY REPORT

Data source : MED (1/6)

NO.	MONTH	RUNNING HOURS												ELECTRIC POWER												TOTAL	NOTES																						
		PUMP NO.												PUMP NO.																																			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12																								
1	1990	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1343	1468	1400	...	13.2	14.5	13.8	...	1343	1468	1400	...	13.2	14.5	13.8	...	1343	1468	1400	...	13.2	14.5	13.8	...
2	1991	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
3	1992	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
4	1993	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
5	1994	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
TOTAL		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12

(2/6)

EL-MAX (NEW) JAN' 1990-JULY 1994
MONTHLY REPORT

NO.	MONTH YEAR	DISCHARGE (1000 CUB)						WATER LEVEL						ELECTRIC POWER						TOTAL CWT/1								
		1	2	3	4	5	6	TOTAL	SUC	DEL	HEAD	W	1	2	3	4	5	6	1		2	3	4	5	6			
1	1990	550	727	513	299	419	770	2248	15828	25088	44538	21948	34655	44331	-2.45	0.90	1.3	3.35	193300	193300	193300	193300	193300	193300	193300	428400	135300	
2	1990	648	400	338	38	438	831	2416	2166	4801	24742	31115	11932	-2.51	1.24	3.35	2.9310	293100	293100	293100	293100	293100	293100	293100	293100	293100	444800	144800
3	1990	524	438	316	316	503	2288	29020	19192	19099	18888	8400	11930	-2.47	0.89	3.15	3.15	307000	307000	307000	307000	307000	307000	307000	307000	307000	444800	144800
4	1990	524	584	246	251	431	1898	17145	28488	12571	12840	54225	92347	-2.47	0.85	3.12	3.12	209200	209200	209200	209200	209200	209200	209200	209200	209200	444800	144800
5	1990	248	521	129	411	510	1318	12332	26435	5477	20807	25840	92141	-2.47	0.77	3.04	3.04	141000	141000	141000	141000	141000	141000	141000	141000	141000	444800	144800
6	1990	489	410	344	304	309	2068	25276	26168	17412	25532	15883	108439	-2.48	0.78	3.05	3.05	183000	183000	183000	183000	183000	183000	183000	183000	183000	444800	144800
7	1990	571	871	330	435	597	2154	28358	23873	15341	17775	29483	132994	-2.48	0.76	3.14	3.14	193000	193000	193000	193000	193000	193000	193000	193000	193000	444800	144800
8	1990	485	588	209	838	521	2132	24615	23873	15341	17775	29483	132994	-2.48	0.76	3.14	3.14	193000	193000	193000	193000	193000	193000	193000	193000	193000	444800	144800
9	1990	434	434	572	619	867	2905	21854	18888	29857	10531	33884	25381	-2.44	0.78	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
10	1990	488	436	539	223	619	822	3045	21337	24750	29888	11179	21975	-2.43	0.75	3.18	3.18	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
11	1990	538	137	437	35	538	355	2192	20222	18343	24456	5322	25275	-2.43	0.75	3.18	3.18	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
12	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
13	1990	248	427	578	424	743	311	2004	18599	10780	11048	10434	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
14	1990	248	427	578	424	743	311	2004	18599	10780	11048	10434	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
15	1990	492	219	218	532	311	1732	20065	10229	10349	29840	18482	11701	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
16	1990	413	313	302	389	321	431	20378	13271	13271	13271	13271	13271	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
17	1990	434	434	572	619	867	2905	21854	18888	29857	10531	33884	25381	-2.44	0.78	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
18	1990	488	436	539	223	619	822	3045	21337	24750	29888	11179	21975	-2.43	0.75	3.18	3.18	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
19	1990	538	137	437	35	538	355	2192	20222	18343	24456	5322	25275	-2.43	0.75	3.18	3.18	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
20	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
21	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
22	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
23	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
24	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
25	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
26	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
27	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
28	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
29	1990	485	388	432	131	718	79	2182	12528	21879	29214	24564	33432	-2.43	0.75	3.12	3.12	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
30	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
31	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
32	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
33	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
34	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
35	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
36	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
37	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
38	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
39	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
40	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
41	1992	207	316	428	448	245	1819	15984	26566	10711	18948	26566	22813	-2.40	0.70	3.50	3.50	143000	143000	143000	143000	143000	143000	143000	143000	143000	444800	144800
42	1992	207	316	428	448	245	1819	15984	26566	10711	18948																	

(4/6)

DAILY REPORT EL-MAX (NEW) NOV. 1991

Table with columns: RUNNING HOURS, DISCHARGE (L/HR), WATER LEVEL, ELECTRIC POWER, TOTAL, and NOTES. Includes sub-tables for NOV DISCHARGE and NOV ELECTRIC POWER.

DAILY REPORT EL-MAX (NEW) DEC 1991

Table with columns: RUNNING HOURS, DISCHARGE (L/HR), WATER LEVEL, ELECTRIC POWER, TOTAL, and NOTES. Includes sub-tables for DEC DISCHARGE and DEC ELECTRIC POWER.

DAILY REPORT EL-MAX (NEW)

JAN. 1952

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for JAN 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for FEB 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for JAN 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for FEB 1952.

DAILY REPORT EL-MAX (NEW)

FEB 1952

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for JAN 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for FEB 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for JAN 1952.

Table with columns: RUNNING HOURS, PUMP No., DISCHARGE (1000 CUB), WATER LEVEL (SUC, DELT, HEAD), ELECTRIC POWER (PUMP No.), TOTAL (KW, HP), NOTES. Includes a summary row at the bottom for FEB 1952.

Table G-2-4 Hares Pump Running Record (1/ 5)

MAY' 1991 ~ DEC' 1994

Data source ; MED

NO	MONTH YEAR	RUNNING HOURS				TOTAL hr	DISCHARGE (1000'cum)				TOTAL	WATER LEVEL			
		PUMP No.					PUMP No.					SUCTI Elm	DELIV Elm	HEAD m	
		1 hr	2 hr	3 hr	4 hr		1	2	3	4					
1	1991	1													
2		2													
3		3													
4		4													
5		5	571	520	552	578	2221	16436	14969	16234	16646	64285	-4.95	-1.96	2.99
6		6	638	139	680	694	2151	18362	4018	19574	19997	61951	-5.14	-2.08	3.06
7		7	740	-	739	744	2223	21307	-	21278	21421	64006	-5.07	-2.06	3.01
8		8	737	-	742	735	2214	21234	-	21364	21153	63751	-4.84	-2.10	2.74
9		9	719	-	719	716	2154	20687	-	20687	20601	61975	-4.14	-2.02	2.12
10		10	318	508	744	675	2245	9176	14639	21421	19427	64663	-4.15	-1.91	2.24
11		11	428	357	679	707	2171	12312	10361	19561	20356	62590	-4.06	-1.83	2.23
12		12	353	672	711	251	1987	10171	19305	20522	7228	57226	-4.14	-1.60	2.54
13	1992	1	143	335	595	460	1533	4110	9581	17149	13262	44101	-4.96	-1.90	3.06
14		2	488	233	560	382	1663	14046	6711	16128	10658	47543	-5.36	-2.08	3.28
15		3	477	642	407	169	1695	13721	18500	11722	4408	48351	-5.31	-2.12	3.19
16		4	401	642	134	245	1422	11553	18489	3804	7057	40903	-5.36	-2.27	3.09
17		5	291	503	294	389	1477	8377	14474	8470	11216	42537	-5.41	-2.35	3.06
18		6	530	373	518	467	1888	12385	10556	14918	13442	51301	-5.48	-2.40	3.08
19		7	567	429	433	545	1974	16315	12357	12454	16709	56835	-5.45	-2.37	3.08
20		8	598	344	599	378	1919	17213	9826	17267	10884	55190	-5.46	-2.35	3.11
21		9	551	319	617	542	2029	15856	9189	17784	15612	58441	-5.39	-2.31	3.08
22		10	574	538	591	494	2197	16531	15436	17020	14233	63280	-5.40	-2.27	3.13
23		11	333	714	398	668	2113	9592	20557	11463	19247	60859	-5.45	-2.31	3.14
24		12	178	524	631	546	1879	5125	15089	18171	15732	54117	-5.49	-2.28	3.21
25	1993	1	90	677	648	321	1736	2596	19494	18657	9254	50001	-5.37	-2.46	2.91
26		2	104	617	435	125	1291	2371	17775	12538	3607	36291	-5.67	-2.49	3.10
27		3	380	709	634	-	1723	10978	20416	18262	-	49656	-5.69	-2.42	3.17
28		4	229	560	539	39	1367	6595	16141	15523	1123	39382	-5.69	-2.54	3.15
29		5	319	461	550	374	1704	9183	13276	15822	10786	49067	-5.64	-2.44	3.20
30		6	83	489	564	599	1735	2393	14090	16257	17247	49987	-5.61	-2.42	3.19
31		7	227	476	673	668	2044	6251	13708	19389	19244	58586	-5.49	-2.34	3.15
32		8	556	135	606	652	1949	16011	3888	17741	18781	56421	-5.44	-2.35	3.09
33		9	516	218	699	662	2095	14862	6220	20128	19071	60341	-5.35	-2.19	3.16
34		10	525	278	677	644	2124	15126	8001	19506	18549	61182	-5.43	-2.22	3.21
35		11	285	419	537	531	1772	8212	12069	15466	15288	51035	-5.45	-2.31	3.14
36		12	221	563	615	565	1964	6368	16212	17727	16271	56578	-5.44	-2.24	3.20
37	1994	1	135	877	644	465	1921	3268	19495	18088	13395	54246	-5.43	-2.24	3.19
38		2	132	492	414	245	1283	3802	14167	11925	7056	36950	-5.53	-2.41	3.13
39		3	442	499	464	264	1675	12902	15063	13362	7606	48933	-5.48	-2.26	3.22
40		4	320	519	467	387	1693	9213	14946	13548	11046	48753	-5.41	-2.21	3.20
41		5	283	465	472	508	1728	8152	13392	13592	14627	49763	-5.43	-2.23	3.20
42		6	263	531	565	508	1867	7576	15871	16269	14632	54348	-5.39	-2.23	3.17
43		7	NG	NG	NG	NG	NG	NG	NG	NG	NG	***57945	-5.36	-2.10	3.25
44		8	NG	NG	NG	NG	NG	NG	NG	NG	NG	***48705	-5.40	-2.17	3.23
45		9	*** 30	*** 289	*** 313	*** 322	*** 954	*** 867	*** 8323	*** 9156	*** 9276	*** 59420	-5.23	-2.08	3.15
46		10	75	615	646	582	1918	2162	17708	18601	16772	55243	-5.33	-2.17	3.16
47		11	223	681	561	690	2155	6423	19653	16818	19883	62777	-4.78	-2.09	2.69
48		12	138	621	481	242	1482	3988	17882	13853	6957	42680	-5.42	-2.23	3.19
TOTAL															
1991		4504	2196	5566	5100	17366	129685	63292	160041	146029	500447	-4.56	-1.95	2.62	
1992		5131	5596	5777	5285	21789	144024	160825	166349	151460	623458	-5.38	-2.25	3.13	
1993		3535	5602	7177	5180	21494	100946	161350	207010	149221	618527	-5.51	-2.37	3.15	
1994		2017	5100	4714	3891	15722	57486	148177	136056	111974	453693	-5.35	-2.20	3.15	
TOTAL Mean		15187	18494	23234	19456	76371	432941	533644	670056	559484	2196125	-5.20	-2.19	3.01	

Data source ; MED

Table G-2-4 Hares Pump Running Record (2/ 5)

DAILY REPORT

DEC' 1991

(2/5)

DATE	RUNNING HOURS					DISCHARGE (1000' cum)					WATER LEVEL							
	PUMP No.				TOTAL	PUMP No.				TOTAL	SUCTION ELm	DELIV ELm	HEAD m					
	1	2	3	4		1	2	3	4									
	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m				
1	11	15	24	00	24	00	12	45	72	00	324	691	691	367	2073	-3.25	-1.72	1.53
2	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-3.17	-1.62	1.55
3	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-2.90	-1.52	1.38
4	7	15	16	45	24	00	24	00	72	00	209	482	691	691	2073	-2.92	-1.50	1.42
5	24	00	-	-	24	00	24	00	72	00	691	-	691	691	2073	-2.90	-1.50	1.40
6	24	00	6	15	17	45	24	00	72	00	691	180	511	691	2073	-2.95	-1.50	1.45
7	12	00	24	00	12	00	24	00	72	00	346	691	345	691	2073	-3.12	-1.42	1.70
8	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-3.25	-1.40	1.85
9	7	15	16	45	24	00	24	00	72	00	209	482	691	691	2073	-3.42	-1.40	2.02
10	10	15	13	45	23	00	24	00	71	00	295	396	662	691	2044	-3.60	-1.43	2.17
11	15	40	24	00	24	00	8	20	72	00	452	691	691	239	2073	-3.75	-1.45	2.30
12	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-4.00	-1.40	2.60
13	10	00	24	00	24	00	14	00	72	00	288	691	691	403	2073	-4.23	-1.40	2.83
14	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-3.75	-1.45	2.30
15	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-3.75	-1.45	2.30
16	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-3.77	-1.47	2.30
17	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-3.95	-1.50	2.45
18	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-4.15	-1.50	2.65
19	24	00	24	00	20	00	-	-	72	00	691	691	576	-	1958	-4.45	-1.50	2.95
20	24	00	23	00	22	00	-	-	69	00	691	662	634	-	1987	-4.85	-1.57	3.28
21	2	25	24	00	24	00	-	-	50	25	71	691	691	-	1453	-5.05	-1.65	3.40
22	2	00	24	00	24	00	-	-	50	00	58	691	691	-	1440	-4.95	-1.70	3.25
23	3	00	24	00	24	00	-	-	51	00	87	691	691	-	1469	-5.00	-1.70	3.30
24	-	-	24	00	24	00	-	-	48	00	-	691	691	-	1382	-5.05	-1.75	3.30
25	4	00	24	00	22	00	-	-	50	00	115	634	691	-	1440	-5.08	-1.78	3.30
26	-	-	24	00	20	00	-	-	44	00	-	691	576	-	1267	-5.10	-1.80	3.30
27	-	-	20	00	24	00	-	-	44	00	-	576	691	-	1267	-5.18	-1.83	3.35
28	9	00	24	00	24	00	-	-	57	00	259	691	691	-	1641	-5.15	-1.85	3.30
29	1	00	24	00	24	00	-	-	49	00	29	691	691	-	1411	-5.15	-1.90	3.25
30	1	00	24	00	22	00	-	-	47	00	29	691	634	-	1354	-5.23	-1.93	3.30
31	17	00	24	00	24	00	-	-	65	00	490	691	691	-	1872	-5.20	-1.95	3.25
	351	125	670	150	710	45	250	65	1991	25	10171	19305	20522	7228	57226	-4.138	-1.598	2.54

Data source ; MED

Table G-2-4 Hares Pump Running Record (3/ 5)

DAILY REPORT

JAN' 1992

DATE	RUNNING HOURS							DISCHARGE (1000' cum)					WATER LEVEL						
	PUMP No.							TOTAL	PUMP No.				TOTAL	SUCTI ELm	DELIV ELm	HEAD m			
	1		2		3		4		1	2	3	4							
	hr	m	hr	m	hr	m	hr										m		
1	24	00	24	00	24	00	-	-	72	00	691	691	691	-	2073	-4.95	-1.95	3.00	
2	5	00	24	00	24	00	9	25	62	25	144	691	691	272	1798	-3.75	-1.85	1.90	
3	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-3.72	-1.72	2.00	
4	24	00	-	-	24	00	24	00	72	00	691	-	691	691	2073	-3.78	-1.60	2.18	
5	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-4.00	-1.60	2.40	
6	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-4.22	-1.60	2.62	
7	-	-	24	00	24	00	24	00	72	00	-	691	691	691	2073	-4.50	-1.60	2.90	
8	-	-	24	00	24	00	24	00	72	00	-	634	691	691	2016	-5.05	-1.60	3.45	
9	-	-	24	00	11	30	21	00	56	30	-	691	331	605	1627	-5.05	-1.60	3.45	
10	-	-	24	00	8	00	24	00	56	00	-	691	231	691	1613	-4.90	-1.70	3.20	
11	-	-	-	-	22	45	19	00	41	45	-	-	655	548	1203	-5.00	-1.65	3.35	
12	-	-	7	00	22	00	13	00	42	00	-	202	634	375	1211	-5.05	-1.70	3.35	
13	-	-	16	40	8	00	20	00	44	40	-	480	231	576	1287	-5.20	-1.88	3.32	
14	-	-	24	00	5	00	12	00	41	00	-	691	144	346	1181	-5.25	-1.90	3.35	
15	-	-	2	00	20	00	14	00	36	00	-	-	58	576	403	1037	-5.15	-1.90	3.25
16	-	-	22	00	18	00	-	-	40	00	-	634	519	-	1153	-5.15	-1.90	3.25	
17	-	-	-	-	20	00	14	00	34	00	-	-	576	403	979	-5.20	-1.95	3.25	
18	-	-	-	-	22	30	13	00	35	30	-	-	648	375	1023	-5.15	-1.95	3.20	
19	-	-	4	00	24	00	7	00	35	00	-	115	691	202	1008	-5.15	-1.95	3.20	
20	-	-	-	-	24	00	19	00	43	00	-	-	691	547	1238	-5.22	-1.95	3.27	
21	-	-	-	-	24	00	19	00	43	00	-	-	691	547	1238	-5.20	-1.98	3.22	
22	-	-	6	00	24	00	10	00	40	00	-	173	691	288	1152	-5.20	-2.00	3.20	
23	3	00	11	00	19	00	5	00	38	00	87	317	547	144	1095	-5.27	-2.10	3.17	
24	13	30	13	00	10	20	-	-	36	50	389	375	297	-	1061	-5.25	-2.10	3.15	
25	21	00	4	00	16	00	-	-	41	00	605	115	461	-	1181	-5.25	-2.15	3.10	
26	17	00	-	-	14	00	6	00	37	00	490	-	403	173	1066	-5.35	-2.15	3.20	
27	-	-	9	00	19	00	7	00	35	00	-	259	547	202	1008	-5.30	-2.15	3.15	
28	-	-	-	-	19	15	20	00	39	15	-	-	555	576	1131	-5.35	-2.15	3.20	
29	-	-	-	-	22	00	19	00	41	00	-	-	634	547	1181	-5.35	-2.15	3.20	
30	14	30	-	-	9	25	24	00	47	55	418	-	272	691	1381	-5.30	-2.15	3.15	
31	20	40	-	-	20	40	21	00	61	80	595	-	595	605	1795	-5.30	-2.15	3.15	
	142	40	334	40	595	25	460	25	1533	10	4110	9581	17148	13262	44101	-4.954	-1.90	3.06	

Data source ; MED

Table G-2-4 Hares Pump Running Record (4 / 5)

DAILY REPORT

NOV' 1994

DATE	RUNNING HOURS								DISCHARGE (1000' cum)					WATER LEVEL				
	PUMP No.								TOTAL	PUMP No.				TOTAL	SUCTI ELm	DELIV ELm	HEAD m	
	1	2	3	4	TOTAL					1	2	3	4					
	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m	hr	m
1	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-5.40	-2.30	3.10
2	6	00	24	00	18	00	24	00	72	00	173	691	519	691	2074	-5.40	-2.10	3.30
3	2	00	24	00	22	00	24	00	72	00	58	691	634	691	2074	-5.30	-2.10	3.20
4	6	00	24	00	18	00	24	00	72	00	173	691	519	691	2074	-5.25	-2.10	3.15
5	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-4.95	-2.10	2.85
6	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-4.25	-2.10	2.15
7	4	00	24	00	20	00	24	00	72	00	115	691	576	692	2074	-4.45	-2.20	2.25
8	7	00	24	00	17	00	24	00	72	00	202	691	490	691	2074	-4.70	-2.15	2.55
9	-	-	21	00	11	00	24	00	56	00	-	605	317	691	1613	-5.40	-2.15	3.25
10	-	-	20	30	12	00	18	00	50	30	-	590	346	518	1454	-5.40	-2.25	3.15
11	-	-	20	00	14	00	20	00	54	00	-	576	403	576	1555	-5.40	-2.25	3.15
12	1	00	24	00	-	-	24	00	49	00	29	691	-	691	1411	-5.50	-2.30	3.20
13	11	00	24	00	-	-	21	00	56	00	317	691	-	605	1613	-5.50	-2.25	3.25
14	13	00	24	00	-	-	21	00	58	00	374	691	-	605	1670	-5.50	-2.25	3.25
15	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-5.20	-2.20	3.00
16	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-4.60	-2.05	2.55
17	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-3.85	-2.00	1.85
18	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-3.65	-2.00	1.65
19	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-3.75	-2.05	1.70
20	-	-	24	00	24	00	24	00	72	00	-	691	691	692	2074	-4.10	-2.10	2.00
21	4	00	20	00	20	00	24	00	68	00	115	576	691	692	2074	-4.95	-2.10	2.85
22	5	00	24	00	24	00	19	00	72	00	144	691	691	548	2074	-5.10	-2.10	3.00
23	13	00	16	00	16	00	23	00	68	00	375	461	576	662	2074	-3.60	-2.00	1.60
24	24	00	14	00	14	00	24	00	76	00	691	403	691	692	2477	-3.70	-1.95	1.75
25	24	00	24	00	24	00	24	00	96	00	691	691	691	692	2765	-4.00	-1.85	2.15
26	24	00	24	00	24	00	24	00	96	00	691	691	691	692	2765	-4.65	-1.85	2.80
27	20	00	22	00	22	00	24	00	88	00	576	634	691	691	2592	-5.15	-1.95	3.20
28	24	00	23	00	24	00	24	00	95	00	691	691	691	692	2765	-4.50	-1.90	2.60
29	24	00	22	00	22	00	24	00	92	00	691	634	691	691	2707	-4.75	-1.90	2.85
30	11	00	23	00	23	00	16	00	73	00	317	663	691	461	2132	-5.30	-1.95	3.35
	223	00	681	30	661	00	690	00	2155	30	6423	19653	16818	19883	62777	-4.78	-2.09	2.69

Data source ; MED

Table G-2-4 Hares Pump Running Record (5/ 5)

DAILY REPORT

DEC' 1994

DATE	RUNNING HOURS						DISCHARGE (1000' cum)					WATER LEVEL		
	PUMP No.				TOTAL		PUMP No.				TOTAL	SUCTI	DELIV	HEAD
	1	2	3	4			1	2	3	4		ELm	ELm	m
	hr : m	hr : m	hr : m	hr : m	hr : m	hr : m								
1	-	-	21 00	21 00	21 00	63 00	-	605	605	604	1814	-5.35	-1.95	3.40
2	-	-	24 00	15 00	11 00	50 00	-	691	432	317	1440	-5.30	-2.00	3.30
3	-	-	24 00	24 00	-	48 00	-	691	691	-	1382	-5.35	-2.00	3.35
4	-	-	22 00	24 00	-	46 00	-	634	691	-	1325	-5.40	-2.10	3.30
5	-	-	24 00	13 00	7 00	44 00	-	691	374	202	1267	-5.40	-2.10	3.30
6	-	-	22 00	14 00	-	36 00	-	634	403	-	1037	-5.40	-2.10	3.30
7	4 00	24 00	7 00	-	-	35 00	115	691	202	-	1008	-5.40	-2.10	3.30
8	4 00	17 00	16 00	-	-	37 00	115	490	461	-	1066	-5.45	-2.20	3.25
9	5 25	15 00	11 00	4 30	-	35 55	157	432	317	129	1035	-5.40	-2.25	3.15
10	4 00	16 00	9 00	6 00	-	35 00	115	461	259	173	1008	-5.45	-2.25	3.20
11	3 00	16 00	11 00	12 00	-	42 00	86	461	317	346	1210	-5.45	-2.25	3.20
12	5 00	23 00	17 00	-	-	45 00	144	662	490	-	1296	-5.50	-2.25	3.25
13	-	-	14 00	14 00	20 00	48 00	-	403	403	576	1382	-5.40	-2.25	3.15
14	-	-	24 00	18 00	8 00	50 00	-	691	518	231	1440	-5.40	-2.25	3.15
15	5 00	16 00	9 00	15 00	-	45 00	144	461	259	432	1296	-5.45	-2.30	3.15
16	7 00	17 00	-	24 00	-	48 00	202	489	-	691	1382	-5.45	-2.30	3.15
17	-	-	24 00	8 00	14 00	46 00	-	691	231	403	1325	-5.45	-2.30	3.15
18	-	-	24 00	24 00	2 00	50 00	-	691	691	58	1440	-5.45	-2.30	3.15
19	19 00	24 00	24 00	15 00	-	82 00	548	691	691	432	2362	-5.30	-2.20	3.10
20	14 00	23 00	24 00	22 00	-	83 00	403	662	691	634	2390	-5.30	-2.20	3.10
21	3 00	19 00	20 00	17 00	-	59 00	86	547	576	490	1699	-5.45	-2.25	3.20
22	-	-	24 00	24 00	-	48 00	-	691	691	-	1382	-5.45	-2.25	3.20
23	-	-	21 00	18 00	1 00	40 00	-	605	518	29	1152	-5.50	-2.30	3.20
24	22 00	7 00	14 00	-	-	43 00	634	201	403	-	1238	-5.50	-2.30	3.20
25	4 00	12 00	17 00	3 00	-	36 00	115	346	490	86	1037	-5.47	-2.32	3.15
26	-	-	14 00	21 00	11 00	46 00	-	403	605	317	1325	-5.50	-2.35	3.15
27	4 00	16 00	17 00	5 00	-	42 00	115	461	490	144	1210	-5.55	-2.35	3.20
28	6 00	24 00	-	17 00	-	47 00	173	691	-	490	1354	-5.45	-2.35	3.10
29	-	-	24 00	20 00	6 00	50 00	-	691	576	173	1440	-5.45	-2.35	3.10
30	12 00	22 00	21 00	-	-	55 00	346	633	605	-	1584	-5.40	-2.35	3.05
31	17 00	24 00	6 00	-	-	47 00	490	691	173	-	1354	-5.40	-2.35	3.05
38	25 00	21 00	18 00	24 30	-	148 55	3988	17882	13853	6957	42680	-5.42	-2.23	3.19

Data source ; MED

Table G-2-5 Total Running Hours and Ratio

NAME of P. S	① EL-MAX-1 (Old)	② EL-MAX-2 (New)	③ QALLA-1 (Old)	④ QALLA-2 (New)	⑤ ABIS	⑥ HARES	⑦ DISHUDI	⑧ TRUGA	⑨ SHERE SHERA	⑩ ABU HOMOS
Nos. of PUMP	6	6	3	2	4	4	3	5	6	6
Established	AUG 1963	MAR 1983	JAN 1979	JAN 1989	1990	JAN 1968	1989	AUG 1989	AUG 1977	MAR 1990
Running Hrs Pump NO. 1	187366	50152	29772	16176	12173	86928	23232	18358	57261	6840
2	169423	44882	34555	15056	11263	74444	12424	9960	48024	5846
3	207412	7482	44450	-	22200	116237	19579	7290	42222	5909
4	144531	42207	-	-	15384	115495	-	28642	38481	6181
5	188779	61145	-	-	-	-	-	22218	66490	6311
6	176302	53212	-	-	-	-	-	-	58596	5074
Total	1073813	259080	108777	31232	61020	393104	55235	86468	311074	36161
hrs/set	178969	43180	36259	15616	15255	98276	18412	17294	51846	6027
Years	30.8	11.3	15.4	5.4	4	26.4	5	4.8	16.8	4
Running hrs (A)	16	10	6	8	10	10	10	10	8	4
(B)	19	13	10	16	14	14	15	12	10	5
hrs/day/set										
Ratio of R. H (A)	0.66	0.44	0.27	0.33	0.44	0.42	0.42	0.41	0.35	0.17
Ratio of R. H (B)	0.80	0.52	0.40	0.66	0.58	0.57	0.63	0.51	0.42	0.21

Notes

Data Source MED

Ratio of R. H(A) . . . Including of Standby Pump

Ratio of R. H(B) . . . Excluding of Standby Pump

Table G-2-6 Maximum Water Depth on Platform

Pump Station	Kinds	Unit	Water Level, Head & Discharge				Elevation		Platform	Capacity	REMARKS	
			Desgn	Average	Max	Min	Bed	Platf or m	⑤-④ >0	⑥-③ >0		
			①	②	③	④	⑤	⑥	⑦	⑧		
1 EL-MAX	Suction	EL(m)	-3.25	-2.50	-2.90	-1.86	-6.85	-2.00	-0.14	▲	S. WL. → Down	
	Q=12.50 cum/s	Delivery	EL(m)	0.75	0.78	0.95	0.60	-4.00	1.65	0.70		O.K
	H=4.00 m	Head	(m)	4.00	3.28	3.85	2.46					
	N=(10+2) sets	Discharge	cum/s	125.00	78.29	106.10	54.48					18.90 O.K
2 QALLA	Suction	EL(m)	-6.50	-5.38	-5.90	-4.30	?	-4.75	-0.45	▲	S. WL. → Down D. WL. → Down	
	Q=5.00 cum/s	Delivery	EL(m)	-2.50	-1.36	-0.20	-2.00		-2.00	-1.80		▲
	H=4.50 m	Head	(m)	4.00	4.02	5.70	2.30	-8.80				
	N=(3+2) sets	Discharge	cum/s	15.00	8.55	13.87	1.44	-5.10				1.13 O.K
3 ABIS	Suction	EL(m)	-7.80	-5.58	-6.80	-4.00		-5.80	-1.80	▲	S. WL. → Down D. WL. → Down	
	Q=1.80 cum/s	Delivery	EL(m)	-3.10	-2.20	-1.80	-2.60		-2.00	-0.20		▲
	H=4.50 m	Head	(m)	4.70	3.38	5.00	1.40	-8.80				
	N=(3+1) sets	Discharge	cum/s	5.40	1.66	3.20	1.44	-6.95				2.20 O.K
4 HARES	Suction	EL(m)	-6.00	-4.49	-5.80	-2.00		-5.25	-3.25	▲	S. WL. → Down D. WL. → Down	
	Q=8.00 cum/s	Delivery	EL(m)	-2.80	-2.08	-1.40	-2.75	-8.20	-2.30	-0.90		▲
	H=3.20 m	Head	(m)	3.20	2.41	4.40	-0.75	-6.40				
	N=(3+1) sets	Discharge	cum/s	24.00	19.92	24.55	10.17					-0.55 ▲
5 DISHUDI	Suction	EL(m)	-5.75	-4.30	-5.72	-4.30	-7.66	-4.50	-0.20	▲	S. WL. → Down D. WL. → Down	
	Q=6.00 cum/s	Delivery	EL(m)	-2.63	-2.14	-1.42	-2.86	-5.74	-1.96	-0.54		▲
	H=3.12 m	Head	(m)	3.12	2.16	4.30	1.44					
	N=(2+1) sets	Discharge	cum/s	12.00	7.61	12.74	2.62					-0.74 ▲
6 TRUGA	Suction	EL(m)	-4.90	-3.62	-4.85	-1.47	-7.75	-4.20	-2.73	▲	S. WL. → Down D. WL. → Down	
	Q=8.00 cum/s	Delivery	EL(m)	-2.00	-1.80	-1.10	-2.50	-5.75	-1.50	-0.40		▲
	H=2.90 m	Head	(m)	2.90	1.82	3.75	-1.03					
	N=(4+1) sets	Discharge	cum/s	32.00	16.61	29.82	11.04					2.18 O.K
7 SHERHISERA	Suction	EL(m)	-4.25	-3.15	-5.65	-1.10	-5.52	-3.50	-2.40	▲	S. WL. → Down D. WL. → Down	
	Q=8.00 cum/s	Delivery	EL(m)	-1.60	-1.25	0.00	-2.50	-4.50	-1.00	-1.00		▲
	H=2.65 m	Head	(m)	2.65	1.90	5.65	-1.40					
	N=(5+1) sets	Discharge	cum/s	40.00	17.80	25.62	5.54					14.38 O.K
8 ABU-HOMOS	Suction	EL(m)	-2.62	-2.06	-2.99	-0.55		-1.62	-1.07	▲	S. WL. → Down	
	Q=5.00 cum/s	Delivery	EL(m)	-0.80	-1.38	-0.11	-2.64		0.20	0.31		O.K
	H=1.82 m	Head	(m)	1.82	0.68	2.88	-2.09					
	N=(5+1) sets	Discharge	cum/s	25.00	4.29	6.37	3.01					18.63 O.K

Table G-2-7 Maximum and Minimum Water Level

Pump Station	Water Level	Data Source MED												Remarks	
		Suction(EL.m)				Delivery(EL.m)				Head(m)					
		1991	1992	1993	AVERAGE	1991	1992	1993	Average	Head	1991	1992	1993		Average
EL-MAX	HWL	-1.86	-2.20	-2.70	-2.25	0.90	0.95	0.67	0.84	Max.	3.42	3.85	3.47	3.58	
	MWL	-2.19	-2.55	-2.75	-2.50	0.80	0.78	0.66	0.75	Avr.	2.99	3.33	3.41	3.24	
	LWL	-2.52	-2.90	-2.80	-2.74	0.70	0.60	0.65	0.65	Min.	2.56	2.80	3.35	2.90	
QALLA	HWL	-4.30	-4.70	-5.30	-4.77	-1.00	-0.20	-1.65	-0.95	Max.	4.75	5.70	4.65	5.03	
	MWL	-5.03	-5.30	-5.80	-5.38	-1.15	-1.10	-1.83	-1.36	Avr.	3.88	4.20	3.97	4.02	
	LWL	-5.75	-5.90	-6.30	-5.98	-1.30	-2.00	-2.00	-1.77	Min.	3.00	2.70	3.30	3.00	
ABIS	HWL	-4.00	-5.10	-5.00	-4.70	-1.80	-2.00	-2.55	-2.12	Max.	4.30	4.50	4.25	4.35	
	MWL	-5.05	-5.80	-5.90	-5.58	-1.95	-2.30	-2.78	-2.34	Avr.	3.10	3.50	3.12	3.24	
	LWL	-6.10	-6.50	-6.80	-6.47	-2.10	-2.60	-3.00	-2.57	Min.	1.90	2.50	2.00	2.13	
HARES	HWL	-2.00	-3.72	-4.32	-3.35	-1.40	-1.60	-2.10	-1.70	Max.	3.90	4.20	3.70	3.93	
	MWL	-3.65	-4.76	-5.06	-4.49	-2.58	-3.49	-2.71	-2.93	Avr.	1.07	1.27	2.35	1.56	
	LWL	-5.30	-5.80	-5.80	-5.63	-3.75	-5.38	-3.32	-4.15	Min.	-1.75	-1.66	1.00	-0.80	
DISHUDI	HWL	-3.22	-2.42	-4.12	-3.25	-1.42	-1.90	-2.00	-1.77	Max.	3.25	3.76	3.72	3.58	
	MWL	-3.95	-4.04	-4.92	-4.30	-3.14	-2.20	-2.43	-2.59	Avr.	0.81	1.84	2.49	1.71	
	LWL	-4.67	-5.66	-5.72	-5.35	-4.85	-2.50	-2.86	-3.40	Min.	-1.63	-0.08	1.26	-0.15	
TRUGA	HWL	-1.47	-2.15	-4.20	-2.61	-1.10	-1.20	-2.00	-1.43	Max.	3.30	3.45	2.85	3.20	
	MWL	-2.94	-3.40	-4.53	-3.62	-1.68	-1.65	-3.23	-2.19	Avr.	1.26	1.75	1.30	1.44	
	LWL	-4.40	-4.65	-4.85	-4.63	-2.25	-2.10	-4.45	-2.93	Min.	-0.78	0.05	-0.25	-0.33	
SHERHISERA	HWL	-1.40	-1.10	-3.00	-1.83	0.00	-1.20	-1.10	-0.77	Max.	3.75	4.45	2.85	3.68	
	MWL	-2.58	-3.38	-3.48	-3.15	-1.00	-2.35	-1.80	-1.72	Avr.	1.58	1.03	1.68	1.43	
	LWL	-3.75	-5.65	-3.95	-4.45	-2.00	-3.50	-2.50	-2.67	Min.	-0.60	-2.40	0.50	-0.83	
ABU-HOMOS	HWL	-1.28	-0.55	-1.95	-1.26	-0.33	-0.11	-1.05	-0.50	Max.	2.66	2.59	1.80	2.35	
	MWL	-2.14	-1.63	-2.40	-2.06	-1.49	-1.04	-1.48	-1.34	Avr.	0.65	0.59	0.92	0.72	
	LWL	-2.99	-2.70	-2.85	-2.85	-2.64	-1.96	-1.90	-2.17	Min.	-1.38	-1.41	0.05	-0.91	

Table G-2-8 O & M Cost

Unit : LE/Year

YEAR	EXPENDITURE	EL. MAX	ABIS	QALLA	EL. HARES	DESHUDI	TRUGA	SHERE SHERA	ABU HOMOS	Total
① 1993/1994	Personnel Expenditure	202872	NA	27271	34094	50390	35484	20436	7440	377987
	Electric Charge	6254597	NA	553229	728898	417483	1817376	455096	132906	10359585
	Repairing Fee	64411	NA	2678	4324	2402	13949	15102	498	103364
	Material Fee	57553	NA	2362	1221	12777	-	-	-	73913
	Others	-	NA	169	27	242	-	-	36	474
	Total	6579433	NA	585709	768564	483294	1866809	490634	140880	10915323
② 1993/1992	Personnel Expenditure	190009	NA	32520	26364	25194	74779	12864	7440	369170
	Electric Charge	4126541	NA	88699	587580	340453	812744	763740	88411	6808168
	Repairing Fee	42490	NA	2147	3860	3965	12282	8565	486	73795
	Material Fee	6139	NA	394	3485	11320	-	-	-	21338
	Others	52087	NA	-	-	193	-	-	36	52316
	Total	4417266	NA	123760	621289	381125	899805	785169	96373	7324787
①+②/2	Personnel Expenditure	196441		29896	30229	37792	55132	16650	7440	373579
	Electric Charge	5190569		320964	658239	378968	1315060	609418	110659	8583877
	Repairing Fee	53451		2413	4092	3184	13116	11834	492	88580
	Material Fee	31846		1378	2353	12049	0	0	0	47626
	Others	26044		85	14	218	0	0	36	26395
	Total	5498350		354735	694927	432210	1383307	637902	118626.5	9120055

Annual O & M Cost (Proposed)

Unit : LE/Year

Annual O/M Cost	Personnel Expenditure	332000	1000	21000	42000	24000	84000	39000	7000	550000
	Electric Charge	5191000	11900	321000	658000	379000	1315000	609000	111000	8595900
	Repairing & Material	320000	41000	52000	268000	52000	52000	175000	40000	1000000
	Others	58000	-	1000	3000	12000	-	-	-	74000
	Total	5901000	53900	395000	971000	467000	1451000	823000	158000	10219900
	Pump Age	31	4	5	26	5	5	17	4	97

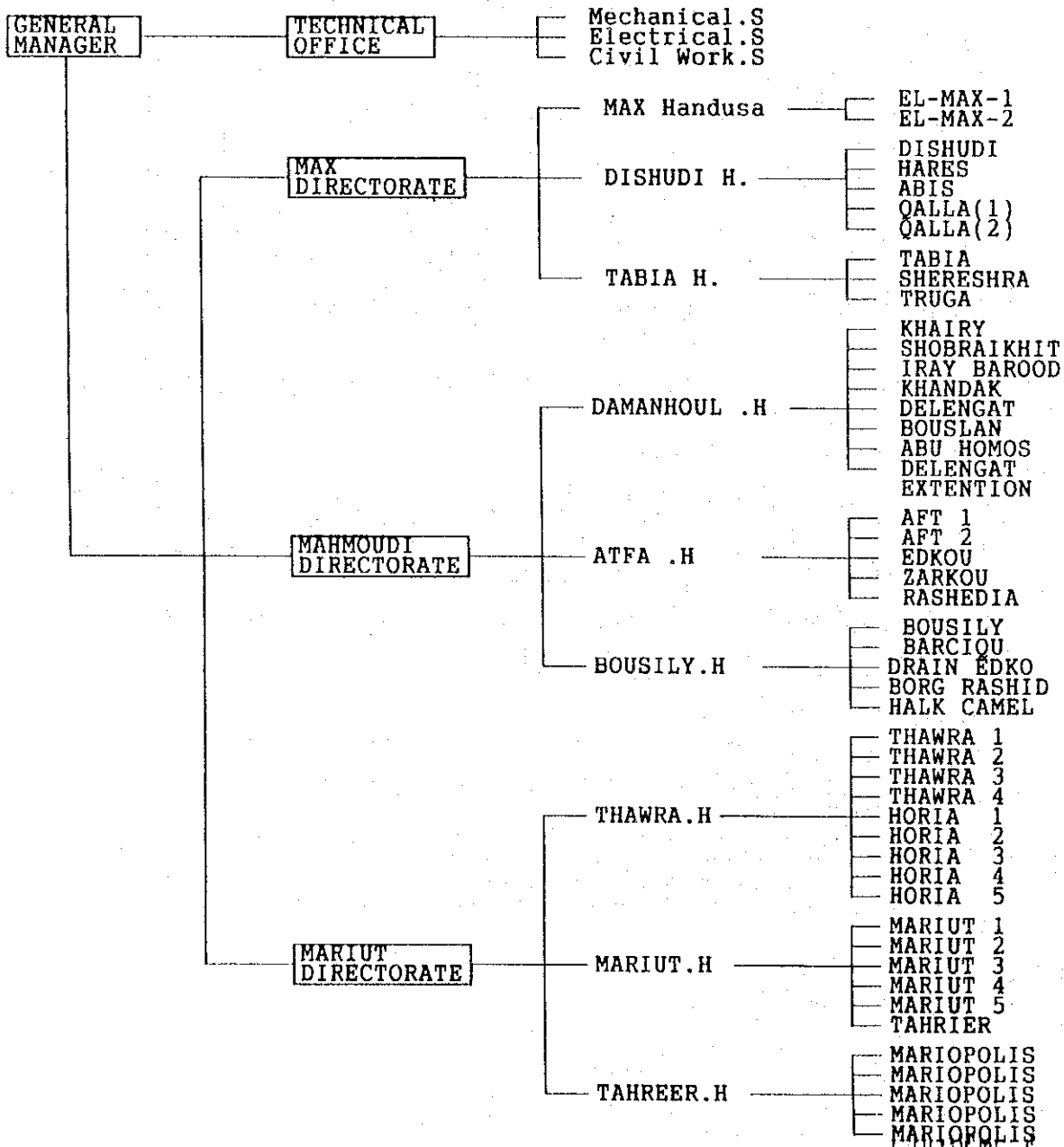
Noties

- Source: MED. Damanhur
- ABIS Electric Charge was calculated by applying annual total discharge (Table B-9) and pump capacity.
 $52310000(\text{cum}) \times 98(\text{kw}) \times 0.15(\text{LE/KW}) / (1.8(\text{cum/s}) \times 3600(\text{s}))$
- Personnel Expenditure
 Total 1143 stuffs are working in Damannpur office with three Diretorate.
 Personal expenditure of Max Diretrate is assumed as follows.
 $1143 \times 200 \times 12/5 = 550000 \text{ LE}$ Each expenditure were shared by electric charges.
- Repairing fee were shared total repairing of one million LE by age of P. S.

FIGURE G-2-1

ORGANIZATION OF MECHANICAL and ELECTRICAL DEPARTMENT IN DAMANHOUL

Regional Dir. North West Delta



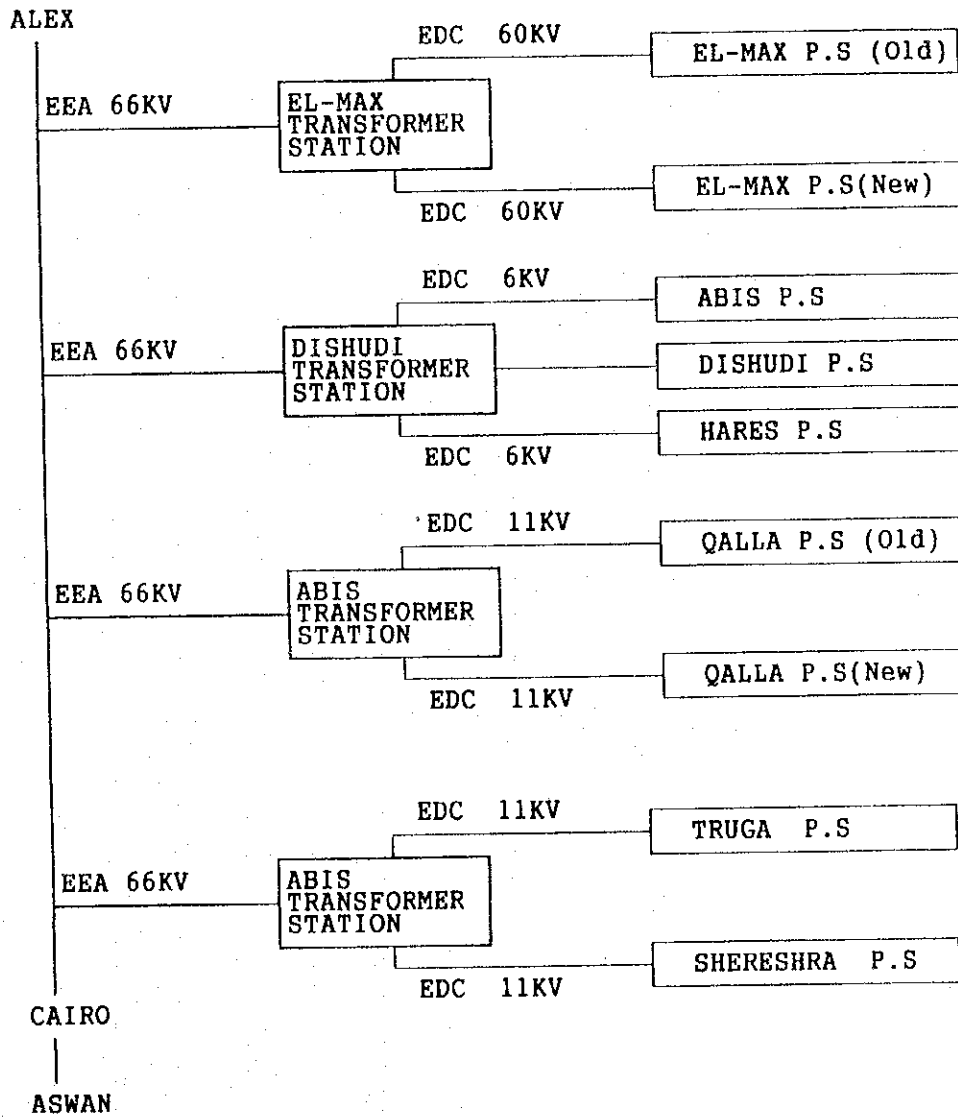
NOTES; Nos of Pump Stations are as follows.

- 22 Irrigation Pump Stations
- 19 Drainage Pump Stations
- 7 Mixing Pump Stations

Data source ; MED

FIGURE G-2-2

TRANSMISSION LINE



Data source : MED

FIGURE G-2-3 EL-MAX (OLD) PUMP PERFORMANCE CURVE

SPECIFICATIONS	
Type	Inclined Shaft Axial Flow Pump
Delivery Bore	2300 mm
Capacity	12.5 cum/sec
Static Head	4.0 m
R.P.M	160 rpm
Out Put	700 kw

Data source : MED

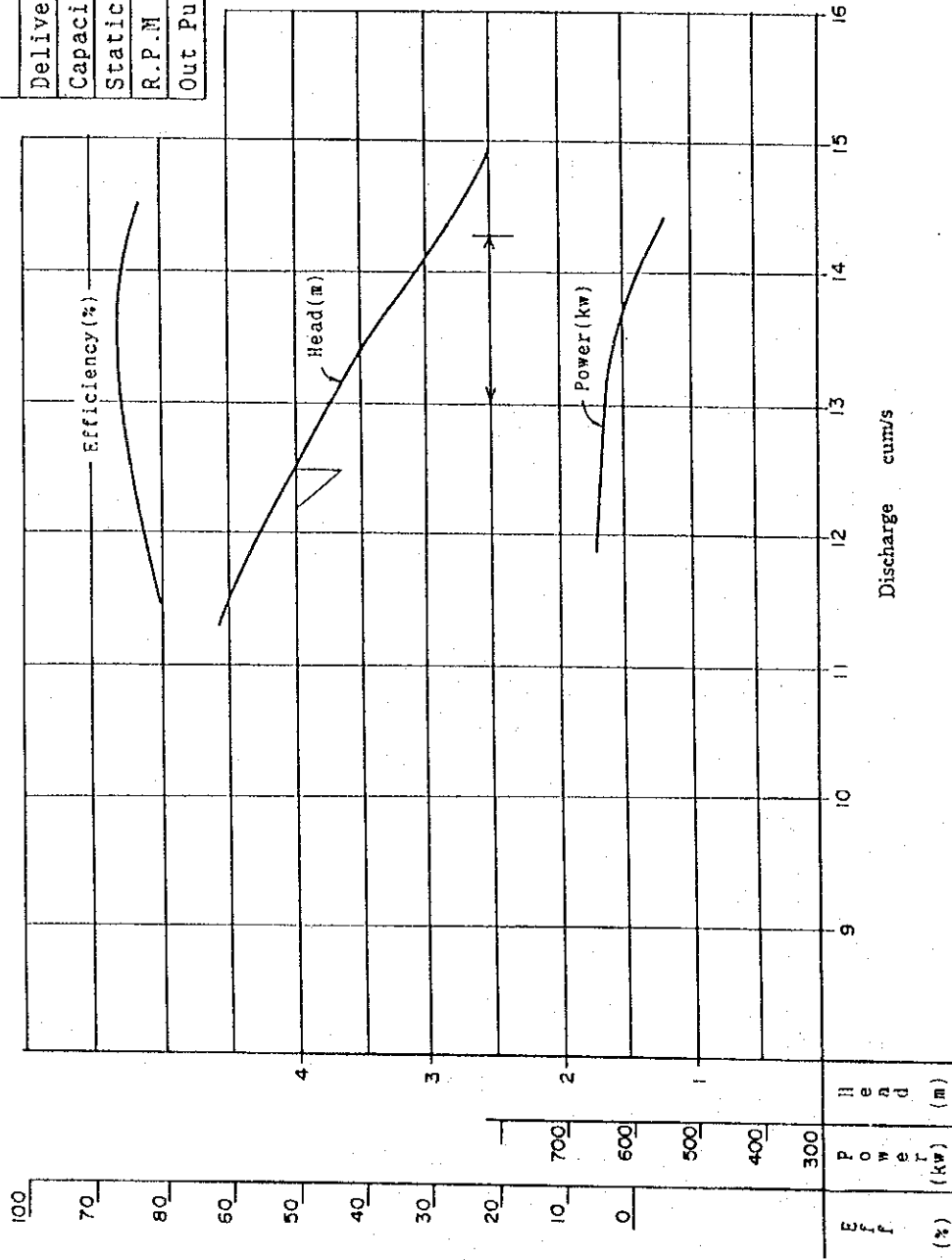


Table G-3-1 Proposed Hydraulic Design of Hares Main Drain
(Results of Water Surface Tracing Calculation)

Station	Distance	Discharge	Water Depth (m)	Cross-section (m')	Velocity	Velocity Head	Wetted Perimeter (m)	Hydraulic Gradient	Head Loss (m)	Energy	Water Level	Bed Level
	(m)	(%)			(%)	(m)						
SP 0+ 0.0	0.0	30.00	2.450	53.10	0.565	0.016	26.83	0.000080	0.000	-5.984	-6.000	-8.450
SP 0+500.0	500.0	30.00	2.450	53.10	0.565	0.016	26.83	0.000080	0.040	-5.944	-5.960	-8.410
SP 0+500.0	0.0	26.30	2.431	47.76	0.551	0.015	24.77	0.000079	0.000	-5.943	-5.959	-8.390
SP 7+ 0.0	6500.0	26.30	2.427	47.66	0.552	0.016	24.75	0.000079	0.515	-5.428	-5.443	-7.870
SP 7+ 0.0	0.0	24.40	2.424	40.32	0.605	0.019	21.74	0.000100	0.000	-5.428	-5.446	-7.870
SP10+ 0.0	3000.0	24.40	2.425	40.34	0.605	0.019	21.74	0.000100	0.301	-5.126	-5.145	-7.570
SP10+ 0.0	0.0	21.50	2.422	33.02	0.651	0.022	18.73	0.000124	0.000	-5.126	-5.148	-7.570
SP12+500.0	2500.0	21.50	2.431	33.17	0.648	0.021	18.76	0.000123	0.309	-4.818	-4.839	-7.270
SP12+500.0	0.0	15.40	2.094	25.42	0.606	0.019	16.55	0.000129	0.000	-4.818	-4.836	-6.930
SP14+500.0	2000.0	15.40	2.093	25.40	0.606	0.019	16.54	0.000130	0.259	-4.559	-4.577	-6.670
SP14+500.0	0.0	10.30	1.954	17.45	0.590	0.018	13.04	0.000148	0.000	-4.559	-4.576	-6.530
SP18+ 0.0	3500.0	10.30	1.945	17.35	0.594	0.018	13.01	0.000150	0.521	-4.037	-4.055	-6.000
SP18+150.0	0.0	9.50	1.860	16.35	0.581	0.017	12.71	0.000151	0.000	-3.733	-3.750	-5.610
SP20+ 0.0	1850.0	9.50	1.859	16.34	0.581	0.017	12.70	0.000151	0.279	-3.454	-3.471	-5.330
SP20+ 0.0	0.0	6.10	1.742	11.52	0.530	0.014	10.28	0.000151	0.000	-3.454	-3.468	-5.210
SP21+ 0.0	1000.0	6.10	1.742	11.52	0.530	0.014	10.28	0.000151	0.151	-3.304	-3.318	-5.060
SP21+ 0.0	0.0	2.20	1.338	5.36	0.410	0.009	6.82	0.000145	0.000	-3.304	-3.312	-4.650
SP24+ 0.0	3000.0	2.20	1.329	5.31	0.415	0.009	6.79	0.000149	0.442	-2.863	-2.871	-4.200

El-Maalt Drain Siphon

El-Hagal feeding Canal Siphon

*Siphon Head Loss ; 0.30(m)... (refer to Table G-3-3, Annex G)

Table G-3-2 Proposed Major Dimensions of Branch Drains

Name of Drain	Length	Bed Gradient	Bed Width	Water Depth	Velocity
	(km)	(cm/km)	(m)	(m)	(m/sec)
Hares No.1 (Right)	2.90	25	3.0	0.78	0.430
Hares No.2 (Right)	2.80	20	2.0	0.78	0.363
El-Ameen	3.20	20	2.0	0.98	0.410
Hares No. 3 (Right)	3.30	15	3.0	1.06	0.391
El-Andalos	2.00	20	2.0	0.68	0.339
El-Khaliel	2.00	20	2.0	0.63	0.324
El-Gala	3.00	20	1.0	0.90	0.349
Khaling-El-Gawari	4.70	30	2.5	1.05	0.537
	2.00	30	2.0	0.51	0.355
Khalig-El-Gawari Branch	2.45	8	2.0	0.93	0.252
Sa-Aida	4.47	30	2.0	1.50	0.627
Abu Dabous	5.10	30	2.0	0.85	0.465
Hares No.1 (Left)	5.29	30	3.0	0.93	0.516
Hares No.2 (Left)	4.60	25	1.5	1.03	0.450
Hares No.3 (Left)	4.00	25	3.0	1.57	0.620
	5.50	30	3.0	1.27	0.609
Hares No.3 (Left) Branch	6.05	30	1.5	0.91	0.462
El-Alla	3.30	30	2.0	0.89	0.475
Hares No.4 (Left)	3.00	25	3.0	1.33	0.569
	1.80	40	3.0	1.18	0.675
	2.30	40	2.0	0.65	0.466
Abu-del-Hadi	4.00	30	2.0	1.46	0.619
	3.00	30	2.0	0.85	0.465
El-Mahdia	3.12	25	2.0	0.64	0.367
Omoum Left Side	3.00	5	4.0	1.79	0.309
	3.10	5	4.0	1.69	0.300
	4.20	5	3.0	1.59	0.279
	1.90	12	2.0	0.89	0.302
	3.80	22	1.5	0.56	0.307
Branch No.1	2.40	25	1.0	0.93	0.400
Branch No.2	4.20	25	1.0	1.14	0.452
Branch No.3	4.50	25	1.0	0.70	0.348
Branch No.4	1.60	20	1.0	0.66	0.302
Total	112.58 (km)				

Table G-3-3 Head Loss of Siphon
(Khalt Siphon and El-Hager Siphon)

* Head losses (which should be) considered in hydraulic design of
Khalt Siphon (Existing) and El-Hager Siphon (Propose)

The following head losses must be considered in principle in the siphon design.

- Head loss due to friction
- Head loss due to inflow or outflow
- Head loss due to trashrack
- Head loss due to bend

(1) Head loss due to friction

The calculation of head loss due to friction is made by using the Manning formula as shown below:

$$hf = (n \cdot V / R^{2/3})^2 \cdot L = 0.049 \text{ (m) (Khalt Siphon)}$$

$$hf = (n \cdot V / R^{2/3})^2 \cdot L = 0.044 \text{ (m) (El-Hager Siphon)}$$

where, hf: Head loss due to friction (m)

R: Hydraulic radius (m)	= 0.45	(R=A/P=2.54/5.65)
V: Mean velocity (m/s)	= 1.244	(v=Q/A=9.50/7.63)
L: Distance calculated (m)	= 64	(Khalt Siphon)
L: Distance calculated (m)	= 58	(El-Hager Siphon)
n: Coefficient roughness	= 0.013	

(2)-1 Head loss due to inflow ; hsc

- Head loss due to change of section

Head loss due to change of the section is calculated as follows:

Sudden contraction : hsc

$$hsc = fsc \cdot V^2 / 2g = 0.024 \text{ (m)}$$

where, hsc: Head loss due to sudden contraction (m)

V: Mean velocity after sudden contraction (m/s)	= 1.244
fsc: Coefficient of head loss due to sudden contraction (A2/A1=7.63/16.35=0.47)	= 0.31
g: Acceleration of gravity (m/s ²)	= 9.8

(2)-2 Head loss due to outflow ; hse

Sudden enlargement ; hse

$$hse = fse * V^2/2g = 0.025 (m)$$

where, hse: Head loss due to sudden enlargement (m)

V: Mean velocity before sudden enlargement (m/s) =1.244

fse: Coefficient of head loss due to sudden enlargement =0.32

(A2/A1=7.63/17.40=0.44)

g: Acceleration of gravity (m/s²) =9.8

(3) Head loss due to trashrack

The Kirschmer's formula will be used if there is no trash, but if there is trash, Suzuki's formula will be used.

$$hs = 6.69 \sin \theta \cdot (t/b)^{4/3} \exp(0.074 \gamma a a/H) V^2/2g = 0.002 (m)$$

where, hs: Head loss due to trash (m)

a: Height of trash attached to trackrack (m) =0.30

γa : Wet unit weight of trash(kgf/m³), in general =200

H: Water depth in the upstream of the screen (m) =1.86

t: Thickness of the screen bars (m) =0.009

b: Clear space between two bars (m) =0.291

θ : Inclined angle of screen degree =60°

V: Flow velocity in the upstream of the screen (m/s) =0.580

g: Acceleration of gravity (m/s²) =9.8

(4) Head loss due to bend

Head loss due to bend is calculated as follows:

$$hbe = fbe V^2/2g = 0.002 (m)$$

where, hbe: Head loss due to bend

fbe: Coefficient of head loss due to bend =0.03

($\therefore Re = 25 \times 10^5$, $\alpha = 13.6^\circ$)

V: Mean velocity in the siphon (m/s) =1.244

(5) Total

$$\Sigma h = (1)+(2)+(3)+(4)$$

$$= 0.049 + 0.024 + 0.025 + 0.011 + 0.002 \times 4 = 0.117 (m) \text{ (Khalt Siphon)}$$

$$= 0.044 + 0.024 + 0.025 + 0.011 + 0.002 \times 4 = 0.112 (m) \text{ (El-Hager Siphon)}$$

$$\approx 0.12 (m) \rightarrow 0.15 (m)$$

Table G-3-4 Proposed Road Pavement of O/M Road

Kind of Pavement	Route of Pavement (Name of Drain)	Length (km)	Remarks
Gravel Pavement	Hares Main	24.00	
	Hares No.1 (Right)	2.90	
	Hares No.2 (Right)	2.80	
	El-Ameen	4.00	Left Side
	Hares No.3 (Right)	3.30	
	El-Andalos	2.00	
	El-Khaliel	3.50	
	Khalig-El-Gawari	6.80	right side
	Sa-Aida	2.00	right side
	Abu Dabous	5.00	
	Hares No.1 (Left)	6.50	right side
	Hares No.2 (Left)	3.75	right side
	Hares No.3 (Left)	4.00	right side(location...2km~6km)
		3.80	left side(location...6km~9km)
	Hares No.3 (Left)-Branch	3.00	Left Side
	El-Alla	2.00	right side
	Abu Del Hadi	7.00	right side
	El-Mahdia	3.20	Left Side
	Omoum Left Side Drain		
	-Branch No.1	2.40	
-Branch No.2	4.10		
-Branch No.3	1.60		
-Branch No.4	1.30		
	Total	98.95	
Asphalt Pavement	Hares Main	24.00	
	Hares No.3 (Left)	2.00	left side(location...E.P.~2km)
	Total	26.00	
	Grand Total	124.95	

Table G-3-5 Proposed New Bridges of O/M Road

Name of Drain	Type of Bridge	Location
Hares Main	C	12.3km point
El-Ameen	D	End Point
	D	2.3km point
El-Andalos	D	End Point
	D	2.0km point
El-Khaliel	D	End Point
Hares No.4 (Right)	D	End Point
Khalig-El-Gawari	B	End Point
	D	1.0km point
	D	2.5km point
Abu Dabous	D	1.2km point
Hares No.1 (Left)	D	5.0km point
Hares No.2 (Left)	D	3.7km point
	D	4.0km point
Hares No.3 (Left) -Branch	D	3.0km point
	D	4.0km point
El-Alla	D	1.5km point
Abu Del Hadi	B	End Point
	D	3.0km point
	D	4.0km point
El-Mahdia	A	1.7km point
Omoum Left Side Drain	C	End Point
<hr/>		
Total	Type:A	(3m- 8m-3m) 1 (L.S)
	Type:B	(3m-10m-3m) 2 (L.S)
	Type:C	(3m-12m-3m) 2 (L.S)
	Type:D	(Open Brd.) 17 (L.S)

Table G-3-6 Area of Collector Pipes for Design of Tile Dain

Discharge in mm/day			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Diameter inch	cm	Slope cm/100m	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)	Area (fed.)
6	15	6	101	67	50	40	33	29	25	22	20
		8	119	79	59	47	39	34	29	26	23
		10	134	89	67	53	44	38	33	29	26
8	20	4	219	146	109	87	73	62	54	48	43
		5	247	165	123	99	82	70	61	55	49
		6	274	182	137	109	91	78	68	60	54
10	25	3	339	226	169	135	113	97	84	75	67
		4	398	265	199	159	132	113	99	88	79
12	30	3	553	368	276	221	184	158	138	122	110
14	35	3	834	556	417	333	278	238	208	185	166
16	40	3	1,192	795	596	477	397	340	298	265	238
18	45	3	1,634	1,089	817	653	544	466	408	363	326
		2	1,732	1,155	866	693	577	495	433	385	346
20	50	3	2,165	1,443	1,082	866	721	618	541	481	433
		2	2,235	1,490	1,117	894	745	638	558	496	447
22	55	3	2,793	1,862	1,396	1,117	931	798	698	620	558
		2	2,820	1,880	1,410	1,128	940	805	705	626	564
24	60	3	3,524	2,349	1,762	1,409	1,174	1,007	881	783	704

*Note: Using VISSER FORMULA and Taking A Reduction For 6" Pipes = 40%
For Bigger Pipes = 25%

$$\text{Visser Formula : } A = (c * d^a * i^b) / q$$

Where A ... is the drainable area in feddan

d ... is pipes diameter in cm

i ... is pipes slope in cm/m

a, b, c ... is values used according to VISSER EQ. as

practised by FIDD avoid sedimentation and bad alignment

a = 2.672

b = 0.55

c = 2408

q = discharge for collectors in mm/day

Table G-3-7 Proposed Hydraulc Design of Omoum Main Drain
(Results of Water Surface Tracing Calculation)

	Station	Distance (m)	Discharge (%)	Water Depth (m)	Cross- section (m ²)	Velocity (%)	Velocity Head (m)	Wetted Perimeter (m)	Hydraulic Gradient	Head Loss (m)	Energy	Water Level	Bed Level	
Improvement	El-Max P.S.	SP 1+ 70.0	0.0	150.00	4.970	322.75	0.465	0.011	77.23	0.000020	0.000	-3.239	-3.250	-8.220
		SP 1+270.0	200.0	150.00	4.754	306.67	0.489	0.012	76.26	0.000023	0.004	-3.234	-3.246	-8.000
		SP 2+ 0.0	730.0	150.00	4.971	322.83	0.465	0.011	77.23	0.000020	0.016	-3.218	-3.229	-8.200
		SP 4+ 0.0	2000.0	150.00	4.971	322.83	0.465	0.011	77.23	0.000020	0.040	-3.178	-3.189	-8.160
		SP 4+550.0	550.0	150.00	4.972	322.91	0.465	0.011	77.24	0.000020	0.011	-3.167	-3.178	-8.150
	Siphon (Outlet)	SP 4+670.0	120.0	150.00	4.975	323.09	0.464	0.011	77.25	0.000020	0.002	-3.165	-3.175	-8.150
	Siphon (Inlet)	SP 4+860.0	0.0	86.00	3.720	224.84	0.382	0.007	69.64	0.000019	0.000	-3.053	-3.060	-6.780
		SP 4+940.0	80.0	86.00	3.722	224.94	0.382	0.007	69.64	0.000019	0.002	-3.051	-3.058	-6.780
		SP 5+890.0	950.0	86.00	3.720	224.82	0.383	0.007	69.64	0.000019	0.018	-3.033	-3.040	-6.760
		SP 5+890.0	0.0	86.00	3.720	217.90	0.395	0.008	66.41	0.000020	0.000	-3.032	-3.040	-6.760
Condition	Abis P.S.	SP 6+700.0	700.0	86.00	3.716	217.65	0.395	0.008	66.40	0.000020	0.014	-3.016	-3.024	-6.740
		SP 6+700.0	0.0	82.00	3.617	211.30	0.388	0.008	66.04	0.000020	0.000	-3.016	-3.023	-6.640
		SP 8+ 0.0	1300.0	82.00	3.613	211.04	0.389	0.008	66.03	0.000020	0.026	-2.990	-2.997	-6.610
		SP10+ 0.0	2000.0	82.00	3.613	211.04	0.389	0.008	66.03	0.000020	0.040	-2.950	-2.957	-6.570
	Hares P.S.	SP11+200.0	1200.0	82.00	3.617	211.30	0.388	0.008	66.04	0.000020	0.024	-2.926	-2.933	-6.550
	Dishudi P.S.	SP11+750.0	550.0	82.00	3.432	121.69	0.674	0.023	51.94	0.000091	0.031	-2.895	-2.918	-6.350
		SP11+750.0	0.0	71.00	3.437	121.98	0.582	0.017	51.99	0.000068	0.000	-2.895	-2.913	-6.350
		SP12+ 0.0	250.0	71.00	3.444	122.34	0.580	0.017	52.04	0.000067	0.017	-2.878	-2.896	-6.340
		SP14+ 0.0	2000.0	71.00	3.414	90.72	0.783	0.031	39.29	0.000125	0.193	-2.685	-2.716	-6.330
		SP14+790.0	790.0	71.00	3.020	86.30	0.823	0.035	44.91	0.000177	0.119	-2.566	-2.600	-5.620
Present		SP16+ 0.0	1210.0	71.00	3.837	119.75	0.593	0.018	51.46	0.000071	0.150	-2.416	-2.433	-6.270
		SP17+150.0	1150.0	71.00	3.843	120.86	0.587	0.018	47.24	0.000062	0.076	-2.339	-2.357	-6.200
		SP18+ 0.0	850.0	71.00	4.181	136.72	0.519	0.014	48.07	0.000042	0.044	-2.295	-2.309	-6.490
		SP20+ 0.0	2000.0	71.00	4.145	153.46	0.463	0.011	50.27	0.000030	0.072	-2.224	-2.235	-6.380
		SP22+ 0.0	2000.0	71.00	4.236	132.44	0.536	0.015	46.03	0.000044	0.074	-2.150	-2.164	-6.400
		SP24+ 0.0	2000.0	71.00	4.054	147.82	0.480	0.012	47.61	0.000032	0.076	-2.074	-2.086	-6.140
	Truga P.S.	SP25+700.0	1700.0	71.00	3.605	105.10	0.676	0.023	43.82	0.000089	0.103	-1.972	-1.995	-5.600
		SP25+700.0	0.0	45.00	3.618	100.51	0.448	0.010	35.89	0.000032	0.000	-1.972	-1.982	-5.600
		SP25+750.0	50.0	45.00	3.600	99.89	0.451	0.010	35.84	0.000032	0.002	-1.970	-1.980	-5.580
		SP26+ 0.0	250.0	45.00	3.988	98.61	0.456	0.011	36.39	0.000034	0.008	-1.962	-1.972	-5.960
Condition		SP28+ 0.0	2000.0	45.00	3.558	99.81	0.451	0.010	37.88	0.000035	0.069	-1.892	-1.902	-5.460
		SP30+ 0.0	2000.0	45.00	4.601	80.23	0.561	0.016	36.46	0.000064	0.099	-1.792	-1.809	-6.410
		SP32+ 0.0	2000.0	45.00	4.076	95.86	0.470	0.011	35.00	0.000036	0.100	-1.692	-1.704	-5.780
	Shereshera P.S.	SP33+500.0	1500.0	45.00	3.006	61.59	0.731	0.027	30.78	0.000132	0.126	-1.567	-1.594	-4.540
		SP33+500.0	0.0	15.00	3.027	46.34	0.324	0.005	25.06	0.000029	0.000	-1.567	-1.573	-4.540
		SP33+570.0	70.0	15.00	2.969	44.95	0.334	0.006	24.85	0.000032	0.002	-1.565	-1.571	-4.540
		SP34+ 0.0	430.0	15.00	3.532	64.86	0.231	0.003	26.76	0.000010	0.009	-1.555	-1.558	-5.090
		SP36+ 0.0	2000.0	15.00	3.815	58.79	0.255	0.003	25.90	0.000014	0.024	-1.531	-1.535	-5.350
		SP38+ 0.0	2000.0	15.00	2.820	52.82	0.284	0.004	27.41	0.000021	0.035	-1.496	-1.500	-4.320
		SP40+ 0.0	2000.0	15.00	2.340	37.95	0.395	0.008	26.01	0.000053	0.074	-1.422	-1.430	-3.770
Abu Hommos P.S.	SP41+800.0	1800.0	15.00	1.923	28.75	0.522	0.014	22.55	0.000123	0.158	-1.263	-1.277	-3.200	

	Pumping Station	Designed Delivery W.L. each Pumping Station (m. MSL)	Proposed W.L. of Omoum Main Drain (m. MSL)
Improvement	El-Max P.S.	(-) 3.25	(-) 3.25
	Abis P.S.	(-) 2.70	(-) 3.02
	Hares P.S.	(-) 2.80	(-) 2.93
Present Condition	Dishudi P.S.	(-) 2.63	(-) 2.92
	Truga P.S.	(-) 2.00	(-) 2.00
	Shereshera P.S.	(-) 1.60	(-) 1.60
	Abu Hommos P.S.	(-) 0.80	(-) 1.28

Table G-3-8 Head Loss of Nubariya Siphon

* Head losses (which should be) considered in hydraulic design of Nubariya Siphon

The following head losses must be considered in principle in the siphon design.

- Head loss due to friction
- Head loss due to inflow or outflow
- Head loss due to trashrack
- Head loss due to bend

(1) Head loss due to friction

The calculation of head loss due to friction is made by using the Manning formula as shown below:

$$h_f = \left(n \frac{V}{R^{2/3}} \right)^2 \times L = 0.062 \text{ (m)}$$

where, h_f : Head loss due to friction (m)

- R: Hydraulic radius (m) = 0.80
- V: Mean velocity (m/s) = 1.045 ($v=Q/A=86.0/81.92$)
- L: Distance calculated (m) = 186
- n: Coefficient roughness = 0.015

(2)-1 Head loss due to inflow : h_{gc}

- Head loss due to change of section

Head loss due to change of the section is calculated as follows:

Gradual contraction : h_{gc}

$$h_{gc} = h_c + h_f = f_{gc} \left(\frac{V_2^2}{2g} - \frac{V_1^2}{2g} \right) + I_m \cdot L = 0.010 + 0.013 = 0.023 \text{ (m)}$$

where, h_{gc} : Head loss due to gradual contraction (m)

h_c : Head loss due to gradual contraction of transition (m) = 0.010
 (= $0.2 \cdot \left(\frac{1.045^2}{2 \cdot g} - \frac{0.393^2}{2 \cdot g} \right)$)

V_1 : Mean velocity before gradual contraction (m/s) = 0.393

V_2 : Mean velocity after gradual contraction (m/s) = 1.045

g : Acceleration of gravity (m/s^2) = 9.8

h_f : Head loss due to friction in transition (m) = 0.013

I_m : Mean hydraulic gradient in length of transition L

$$h_f = I_m \cdot L = \left(\frac{I_1 + I_2}{2} \right) \cdot L$$

I_1 : Hydraulic gradient before transition = 1/50,000

I_2 : Hydraulic gradient after transition = 1/1,350

L: Length of transition (m) = 35

f_{gc} : Coefficient of head loss due to gradual contract = 0.2

(2)-2 Head loss due to outflow ; hge

Gradual enlargement ; hge

$$hge = h_e + h_f = f_{ge} * (V_1^2/2g - V_2^2/2g) + I_m * L = 0.013 + 0.013 = 0.026(m)$$

- where, hge: Head loss due to gradual enlargement (m)
 h_e: Head loss due to gradual enlargement in transition (m) = 0.013
 (= 0.3 * (1.045²/2 * g - 0.464²/2 * g))
 V₁: Mean velocity before gradual enlargement (m/s) = 1.045
 V₂: Mean velocity after gradual enlargement (m/s) = 0.464
 g: Acceleration of gravity (m/s²) = 9.8
 h_f: Head loss due to friction in length of transition (m) = 0.013
 I_m: Mean hydraulic gradient in transition L

$$h_f = I_m * L = (I_1 + I_2) / 2 * L$$

- I₁: Hydraulic gradient before transition = 1/1,350
 I₂: Hydraulic gradient after transition = 1/50,000
 f_{ge}: Coefficient of head loss due to gradual enlargement = 0.3

Head Loss Coefficient at Transition (Syphon, Culvert, Tunnel)

Changing Condition of Open Transition Formation	Gradual contraction coefficient f_{gc}	Gradual expansion coefficient f_{ge}
Straight line formation (width of rectangular section to be narrowed to reach its end where rectangular intake is connected)	0.10	0.20
Straight line formation (width of rectangular section to be narrowed to reach its end where closed transition is installed, or where fillet is provided at open transition to smoothly connect with round intake)	0.20	0.30
Trapezoidal straight line formation (Twisted wall to reach between trapezoidal section and rectangular section to its end where rectangular intake is connected)	0.20	0.30
Trapezoidal straight line formation (Twisted wall to reach between trapezoidal section and rectangular section to its end where closed transition is installed or fillet is provided at open transition to smoothly connect with round intake)	0.30	0.40
Trapezoidal curved formation (Curved wall to reach between trapezoidal section and rectangular section to its end where rectangular intake is connected)	0.30	0.50
Trapezoidal curved formation (Curved wall to reach between trapezoidal section and rectangular section to its end where round intake is connected)	0.40	0.70

(3) Head loss due to trashrack

The Kirschmer's formula will be used if there is no trash, but if there is trash, Suzuki's formula will be used.

$$h_s = 6.69 \sin \theta (t/b)^{4/3} \exp(0.074 \gamma a/H) V_1^2/2g = 0.002 \text{ (m)}$$

where, h_s : Head loss due to trash (m)	
a : Height of trash attached to trackrack (m)	= 0.30
γa : Wet unit weight of trash(kgf/m ³), in general	= 200
H : Water depth in the upstream of the screen (m)	= 3.68
t : Thickness of the screen bars (m)	= 0.009
b : Clear space between two bars (m)	= 0.291
θ : Inclined angle of screen degree	= 59°
V_1 : Flow velocity in the upstream of the screen (m/s)	= 0.393
g : Acceleration of gravity (m/s ²)	= 9.8

(4) Head loss due to bend

Head loss due to bend is calculated as follows:

$$h_{be} = f_{be} V^2/2g = 0.001 \text{ (m)}$$

where, h_{be} : Head loss due to bend	
f_{be} : Coefficient of head loss due to bend	= 0.01
($\because Re = 25 \times 10^5$, $\alpha = 5^\circ$)	
V : Mean velocity in the siphon (m/s)	= 1.045

(5) Total

$$\begin{aligned} \Sigma h &= (1) + (2) + (3) + (4) \\ &= 0.062 + 0.023 + 0.026 + 0.002 + 0.001 \times 4 \\ &= 0.117 \text{ (m)} \\ &\approx 0.12 \text{ (m)} \end{aligned}$$

Table G-3-9 Major Dimensions of Sand Settling Basin
(at Up-stream of Nubariya Siphon)

1) Designed Condition

- Designed Discharge : 67 (cum/sec)
- Designed Diameter of Sediment : approx. 0.3 (mm) -- 0.5 (mm)

2) Width and Depth Settling Basin

$$B = Q / h * u$$

- where, B ; Width of Settling Basin (m) = 70 (m)
 h ; Water Depth on Sediment Terrace (m)
 Q ; Design Discharge (cum/sec)
 u ; Critical Washing Velocity of Sediment (m/sec)
 generally, Diameter of Sediment 0.3 (mm) ---> u=0.2 (m/sec)

$$h = Q / B * u = 67 / 70 * 0.2 = 4.79 = 4.80 (m)$$

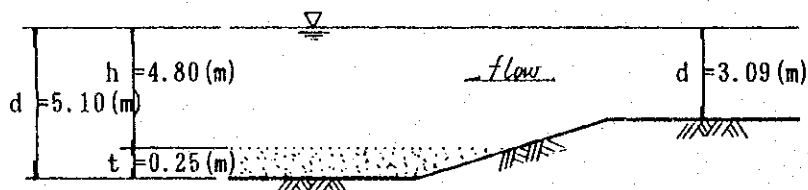
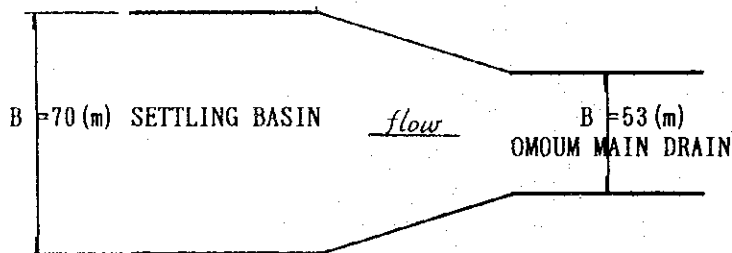
2) Length of Settling Basin

$$L = K * Q / B * Vg$$

- where, L ; Length of Settling Basin
 K ; Safty Factor = 1.5--2.0
 B ; Width of Settling Basin
 Vg ; Critical Faling Velocity of Sediment (as follow) = Av. 0.030

Specific Gravity of Muddy Water	Dia- meter (mm)	0.1	0.2	0.3	0.5	1.0	1.2	3.0
1.100	Vg m/s	0.003	0.010	0.025	0.049	0.085	0.140	0.194
1.064	Vg m/s	0.005	0.015	0.032	0.057	0.100	0.192	0.217

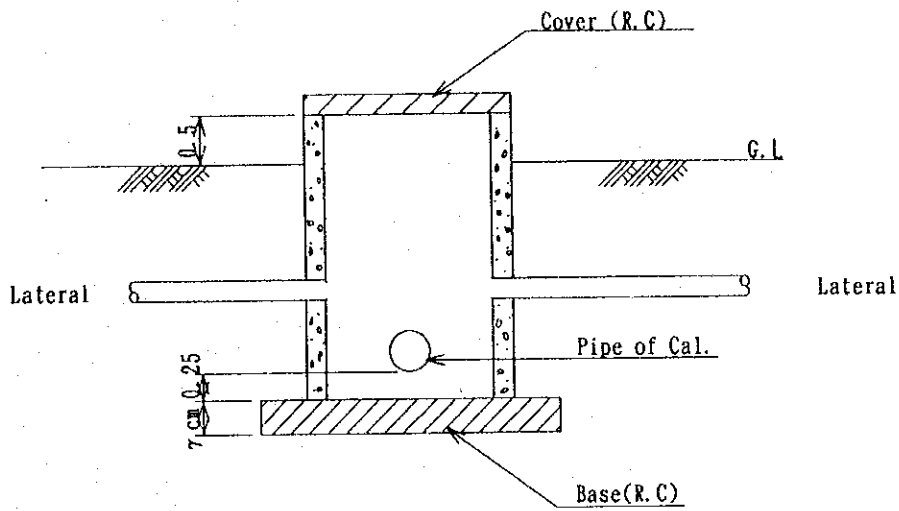
$$L = K * Q / B * Vg = 2.0 * 67 / 70 * 0.03 = 63.8 = 65 (m)$$



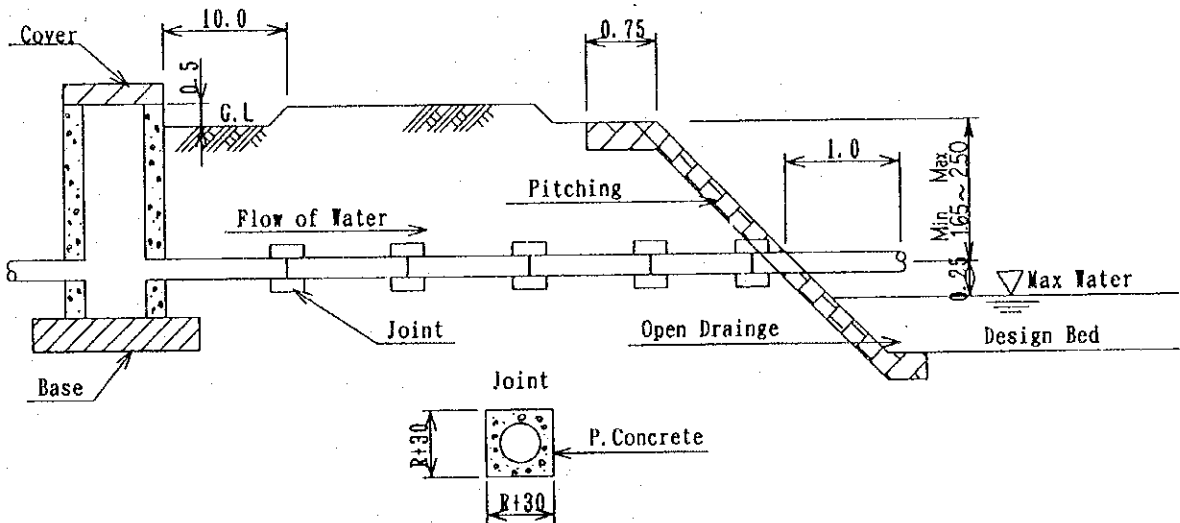
t; Thickness of sediment terrace

FIGURE G-3-1 GENERAL SECTION OF TILE DRAIN

Manhole



The Out Let



Flashing Junction

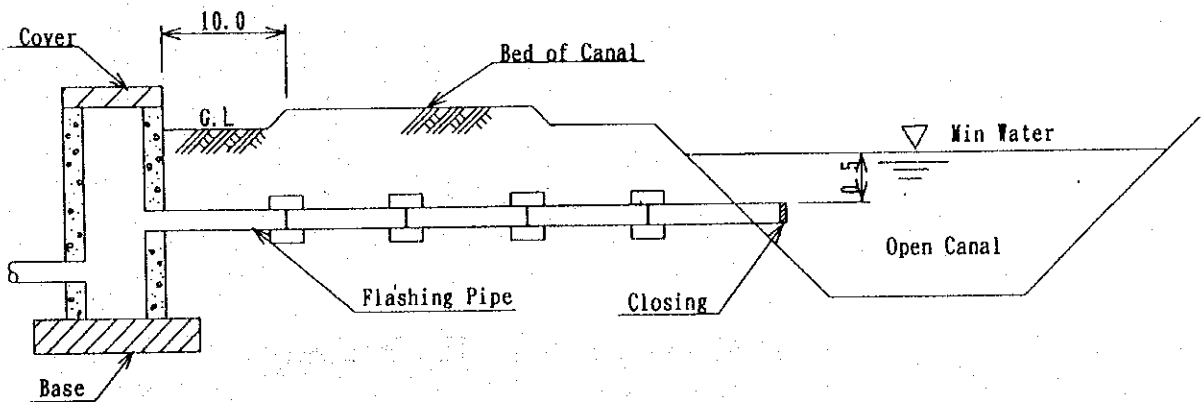
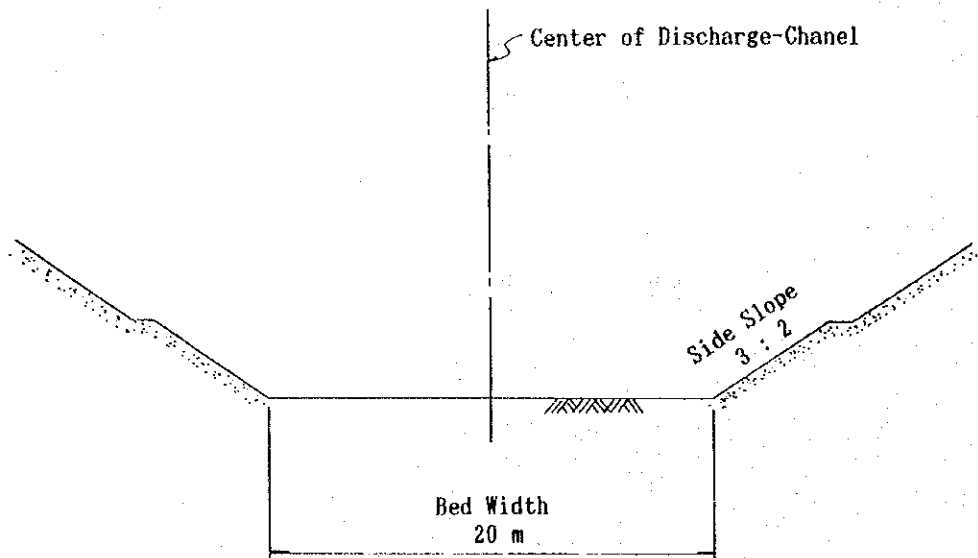


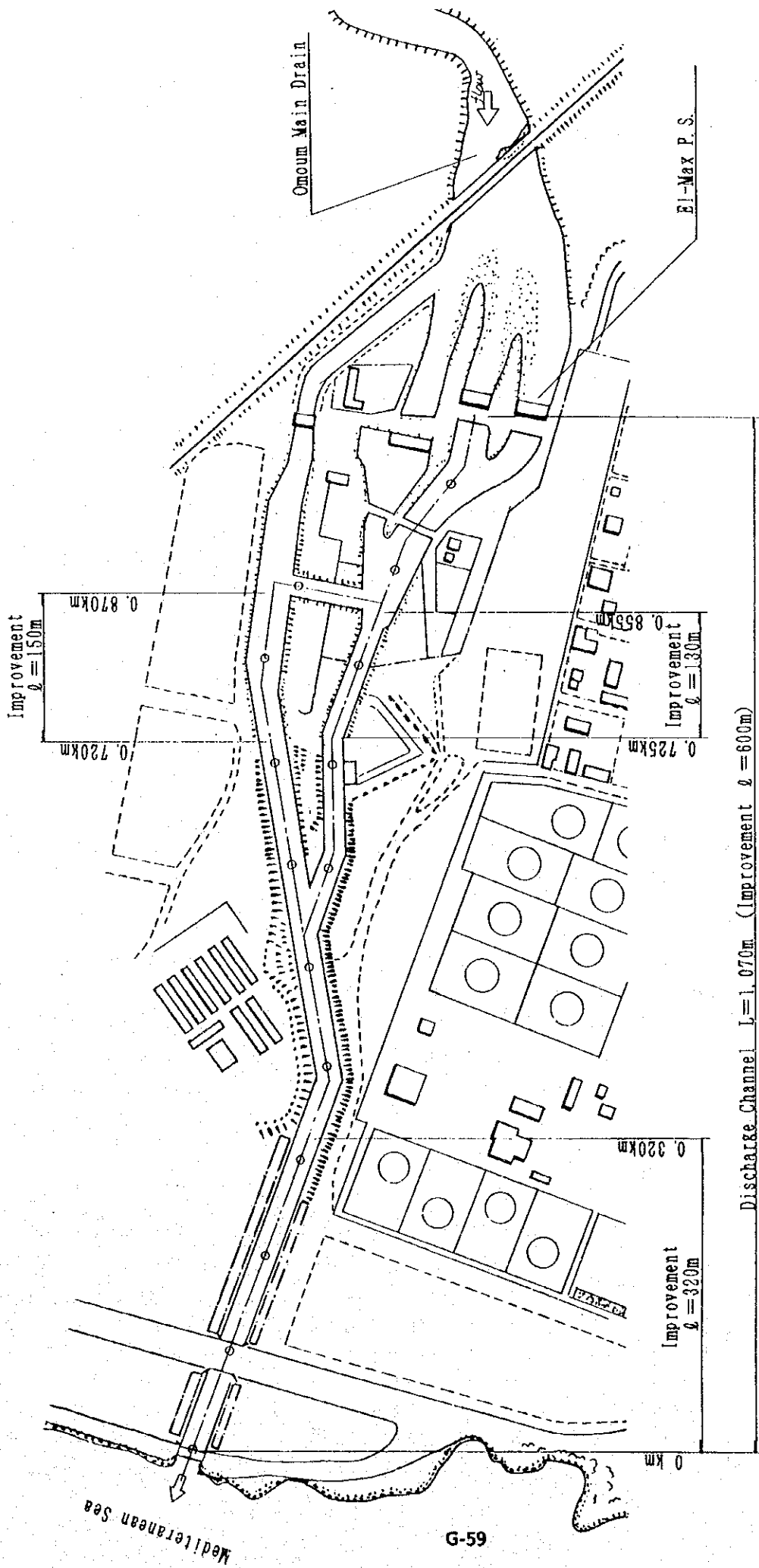
FIGURE G-3-2 CASE STUDY OF HYDRAURIC DESIGN ABOUT DISCHARGE-CHANNEL
(Results of Water Surface Tracing Calculation)

Case No.	Conditions of Analysis			Result	Remark
	Longitudinal and cross section	discharge (cu.m/sec)	Water Level of Starting Point (m.MSL) **	Water Level of El-Max P.S. (m.MSL) ***	
Case-1	Present	150	0.50	Over Flow	for check present capacity
Case-2	Present	55	0.50	0.78	for check present capacity
Case-3.1	Longi.--Present Cross.--Proposed	109*	0.50	0.73	Proposed Bed Width 20m
Case-3.2	Longi.--Present Cross.--Proposed	150	0.50	0.88	Proposed Bed Width 20m

- * This Value is maximum when Reuse is considered.
- ** Equivalent to high water level at Mediteranean Sea.
- *** Designed Delivery Water Level is 0.75 m.MSL.



PROPOSED CROSS SECTION OF DISCHARGE CHANNEL



IMPROVEMENT PLAN OF DISCHARGE-CHANNEL BY CASE-3.1