E-2 Present Conditions on Irrigation and Drainage

Table E-2-1 Summary of Discharge at Bahr Yusef Intake

Month	Monthly Discharge in MCM/month 1986	1987	1988	1989	1990	Mean
Jan.	42.3	61.0	20.0	29.0	26.0	35.7
Feb.	269.9	252.6	246.5	301.8	328.0	279.7
Mar.	368.3	320.1	328.4	341.5	384.5	348.5
Apr.	343.8	297.4	305.9	325.0	362.3	326.9
May	369.4	346.6	361.9	379.8	401.4	371.8
June	434.6	416.1	434.8	442.8	497.3	445.1
July	511.0	490.7	543.4	522.0	571.3	527.7
Aug.	489.9	487.0	538.3	520.6	566.2	520.4
Sept.	366.9	362.3	396.8	377.2	402.1	381.0
Oct.	299.8	310.4	342.7	313.0	334.5	320.1
Nov.	242.0	242.0	292.2	280.7	281.7	267.7
Dec.	169.5	175.5	218.3	218.1	269.6	210.2
Total	3,907.1	3,761.5	4,029.0	4,051.1	4,424.8	4,034.7
Monthly Mean	325.6	313.5	335.8	337.6	368.7	336.2
do, except Jan	351.3	336.4	364.5	365.6	399.9	363.5
Monthly Maximum	511.0	490.7	543.4	522.0	571.3	527.7
M. Ave. June to Aug.	478.5	464.6	505.5	495.1	544.9	497.7
M. Ave. other months	274.6	263.1	279.2	285.1	310.0	282.4
do, except Jan	303.7	310.4	336.8	339.7	370.0	332.1
M. Ave of Dec.	169.5	175.5	218.3	218.1	269.6	210.2
Daily Max. Q	16.8	16.8	18.3	17.5	18.8	17.6
Daily Min. Q Except Jan	4.0	4.5	3.0	4.0	4.0	3.9
Month	Daily Discharge in 1000 m3/day					
Jan.	1,364.5	1,967.7	645.2	935.5	838.7	1,150.3
Feb.	8,704.8	8,146.8	7,950.0	9,733.9	10,581.1	9,023.3
Mar.	11,879.0	10,325.8	10,592.5	11,016.1	12,403.5	11,243.4
Apr.	11,090.3	9,593.5	9,869.1	10,483.9	11,686.2	10,544.6
May	11,916.1	11,179.0	11,673.5	12,250.0	12,947.4	11,993.2
June	14,017.7	13,422.6	14,025.8	14,282.3	16,042.3	14,358.1
July	16,482.3	15,827.4	17,530.0	16,837.1	18,429.0	17,021.2
Aug.	15,801.6	15,708.1	17,364.5	16,794.0	18,263.3	16,786.3
Sept.	11,833.9	11,686.0	12,799.0	12,166.5	12,969.4	12,291.0
Oct.	9,669.4	10,013.5	11,054.8	10,095.2	10,789.7	10,324.5
Nov.	7,806.5	7,806.5	9,424.2	9,053.2	9,088.2	8,635.7
Dec.	5,467.7	5,661.3	7,040.3	7,033.9	8,695.2	6,779.7
	Equivalent Discharge in m3/sec					
Monthly Mean	123.89	119.28	127.76	128.46	140.31	127.9
do, except Jan	122.55	117.34	127.13	127.54	139.48	126.8
Monthly Maximum	190.77	183.19	202.89	194.87	213.30	197.0
M. Ave. June to Aug.	180.57	175.33	190.79	186.86	205.66	187.8
M. Ave. other months	104.79	100.38	106.52	108.78	118.28	107.8
Daily Max. Q	193.87	193.87	211.23	202.55	217.30	203.8
Daily Min. Q Except Jan	46.30	52.08	34.72	46.30	46.30	45.1

Source : Discharge data from Minia Irrigartion Directorate

Table E-2-2 Lifted Amount by Nine Drainage Pump Stations (Related to Bahr Yusef Canal)

(unit : 1000 m3)

M/Y	1986	1987	1988	1989	1990	Mean
Jan	36,377.0	45,719.1	37,294.3	37,083.8	36,318.3	38,558.5
Feb	58,528.5	78,699.6	43,680.7	43,307.6	31,664.6	51,176.2
Mar	65,789.0	80,553.6	45,487.1	51,362.2	60,193.7	60,677.1
Apr	72,705.4	77,194.6	41,344.7	48,405.8	55,930.0	59,116.1
May	63,933.0	64,710.4	41,679.1	45,570.3	52,748.4	53,728.2
Jun	63,192.6	59,135.7	40,477.4	36,999.2	44,810.1	48,923.0
Jul	66,489.6	72,396.0	45,117.2	51,785.7	58,329.4	58,823.6
Aug	66,812.8	62,829.2	53,690.4	45,915.4	58,892.4	57,628.0
Sep	69,478.6	77,487.3	60,173.9	59,459.6	74,103.9	68,140.7
Oct	88,209.3	85,351.5	56,813.9	57,298.5	65,244.2	70,583.5
Nov	95,357.9	91,920.6	68,260.8	74,963.8	74,757.4	81,052.1
Dec	102,156.0	101,697.5	80,011.6	68,046.3	81,045.4	86,591.4
Total	849,029.7	897,695.1	614,031.1	620,198.2	694,037.8	734,998.4
Max.	102,156.0	101,697.5	80,011.6	74,963.8	81,045.4	86,591.4
Min.	36,377.0	45,719.1	37,294.3	36,999.2	31,664.6	38,558.5
	Mean Daily Lifted Amount in 1000 m3/day					
Jan	1,173.5	1,474.8	1,203.0	1,196.3	1,171.6	1,243.8
Feb	2,090.3	2,810.7	1,560.0	1,546.7	1,130.9	1,827.7
Mar	2,122.2	2,598.5	1,467.3	1,656.8	1,941.7	1,957.3
Apr	2,423.5	2,573.2	1,378.2	1,613.5	1,864.3	1,970.5
May	2,062.4	2,087.4	1,344.5	1,470.0	1,701.6	1,733.2
Jun	2,106.4	1,971.2	1,349.2	1,233.3	1,493.7	1,630.8
Jul	2,144.8	2,335.4	1,455.4	1,670.5	1,881.6	1,897.5
Aug	2,155.3	2,026.7	1,731.9	1,481.1	1,899.8	1,859.0
Sep	2,316.0	2,582.9	2,005.8	1,982.0	2,470.1	2,271.4
Oct	2,845.5	2,753.3	1,832.7	1,848.3	2,104.7	2,276.9
Nov	3,178.6	3,064.0	2,275.4	2,498.8	2,491.9	2,701.7
Dec	3,295.4	3,280.6	2,581.0	2,195.0	2,614.4	2,793.3
Max.	3,295.4	3,280.6	2,581.0	2,498.8	2,614.4	2,793.3
Min.	2,062.4	1,971.2	1,344.5	1,233.3	1,130.9	1,630.8
	Mean Daily Lifted Amount in m3/sec					
Jan	13.582	17.069	13.924	13.846	13.560	14.396
Feb	24.193	32.531	18.056	17.902	13.089	21.154
Mar	24.563	30.075	16.983	19.176	22.473	22.654
Apr	28.050	29.782	15.951	18.675	21.578	22.807
May	23.870	24.160	15.561	17.014	19.694	20.060
Jun	24.380	22.815	15.616	14.274	17.288	18.875
Jul	24.824	27.030	16.845	19.334	21.778	21.962
Aug	24.946	23.457	20.045	17.142	21.988	21.516
Sep	26.806	29.895	23.215	22.940	28.589	26.289
Oct	32.934	31.867	21.212	21.392	24.360	26.353
Nov	36.789	35.463	26.336	28.921	28.841	31.270
Dec	38.141	37.970	29.873	25.405	30.259	32.330
Max.	38.141	37.970	29.873	28.921	30.259	32.330
Min.	23.870	22.815	15.561	14.274	13.089	18.875

Source : MED, Minia Irrigation Directorate, MPWWR

Table E-2-3 Results of Discharge Measurement

Bahr Yusef Canal

Date : 12:20 to 13:30, August 25, 1991
km : 4.2 km downstream from the Dairout Regulator

Station	Distance	Depth	1st			2nd			N	V	A	Q
			n	t	n1	n	t	n2		(m/sec)	(m2)	(m3/sec)
	(m)	(m)										
EP	0	0										
No7+5	3	1.6										
No7	8	3.8	225	60.65	3.71	230	60.52	3.80	3.76	0.622	36.375	22.628
No6+5	13	3.75										
No6	18	4.16	295	60.46	4.88	300	60.49	4.96	4.92	0.812	40.175	32.616
No5+5	23	4										
No5	28	5.03	275	60.44	4.55	275	60.51	4.54	4.55	0.751	45.150	33.917
No4+5	33	4										
No4	38	4.1	280	60.34	4.64	285	60.39	4.72	4.68	0.773	40.500	31.299
No3+5	43	4										
No3	48	4.23	285	60.66	4.70	295	60.43	4.88	4.79	0.791	40.600	32.105
No2+5	53	3.78										
No2	58	3.63	290	60.32	4.81	280	60.37	4.64	4.72	0.780	36.100	28.152
No1+5	63	3.4										
No1	68	2.93	175	60.67	2.88	180	60.75	2.96	2.92	0.487	30.475	14.828
No0+5	73	1.47										
No0	78	0										
Total											(m3/sec)	195.546
											(MCM/day)	16.895

Ibrahimia Canal

Date : 14:45 to 16:00, August 25, 1991
km : 2.45 km downstream from the Dairout Regulator

Station	Distance	Depth	1st			2nd			N	V	A	Q
			n	t	n1	n	t	n2		(m/sec)	(m2)	(m3/sec)
	(m)	(m)							(rps)			
No.0	0	0										
+3	3	0										
No.1	8	2.93	190	60.62	3.13	190	60.53	3.14	3.14	0.521	24.600	12.823
+5	13	3.98										
No.2	18	4.13	305	60.34	5.05	280	60.86	4.60	4.83	0.797	39.980	31.861
+5	23	3.75										
No.3	28	4.05	365	60.33	6.05	355	60.57	5.86	5.96	0.981	39.750	38.985
+5	33	4.05										
No.4	38	4.05	375	60.50	6.20	370	60.62	6.10	6.15	1.013	40.750	41.264
+5	43	4.15										
No.5	48	4.12	315	60.31	5.22	300	60.90	4.93	5.07	0.837	41.050	34.365
+5	53	4.03										
No.6	58	2.88	290	60.32	4.81	280	60.37	4.64	4.72	0.780	27.355	21.332
+5	65	0										
Total											(m3/sec)	180.630
											(MCM/day)	15.606

Note : Equation

$V(m/sec) = 0.163 * N + 0.01$

$Q(m3/sec) = V * A$

rps : rotation per second

Table E-2-4 Monthly Net Water Requirement (based on ID Unit Water Requirement)

(unit:1000m3/month)

	1986	1987	1988	1989	1990	Mean
P.A	990,854	1,005,505	1,012,763	1,017,579	1,032,032	1,011,747
Jan	0	0	0	0	0	0
Feb	274,779	259,106	248,175	252,524	276,788	262,274
Mar	306,784	289,259	280,916	286,238	301,866	293,013
Apr	305,353	284,043	271,127	281,954	299,502	288,396
May	282,285	289,614	286,437	284,546	285,878	285,752
Jun	334,840	363,224	367,600	363,191	364,624	358,696
Jul	386,879	428,170	438,957	432,761	442,664	425,886
Aug	376,460	380,028	390,565	402,817	383,043	386,583
Sep	267,311	253,012	260,428	283,000	257,337	264,218
Oct	217,755	198,139	201,071	216,652	192,666	205,257
Nov	164,163	161,580	154,120	150,035	164,183	158,816
Dec	247,535	251,446	247,687	241,356	260,270	249,659
Total	3,164,144	3,157,621	3,147,083	3,195,074	3,228,821	3,178,549

Daily Net Water Requirement in 1000m3/day

Year	1986	1987	1988	1989	1990	Mean
Jan	0	0	0	0	0	0
Feb	9,814	9,254	8,863	9,019	9,885	9,367
Mar	9,896	9,331	9,062	9,233	9,738	9,452
Apr	10,178	9,468	9,038	9,398	9,983	9,613
May	9,106	9,342	9,240	9,179	9,222	9,218
Jun	11,161	12,107	12,253	12,106	12,154	11,957
Jul	12,480	13,812	14,160	13,960	14,279	13,738
Aug	12,144	12,259	12,599	12,994	12,356	12,470
Sep	8,910	8,434	8,681	9,433	8,578	8,807
Oct	7,024	6,392	6,486	6,989	6,215	6,621
Nov	5,472	5,386	5,137	5,001	5,473	5,294
Dec	7,985	8,111	7,990	7,786	8,396	8,054

Daily Net Water Requirement in m3/sec

Year	1986	1987	1988	1989	1990	Mean
Jan	0.0	0.0	0.0	0.0	0.0	0
Feb	113.6	107.1	102.6	104.4	114.4	108.4
Mar	114.5	108.0	104.9	106.9	112.7	109.4
Apr	117.8	109.6	104.6	108.8	115.5	111.3
May	105.4	108.1	106.9	106.2	106.7	106.7
Jun	129.2	140.1	141.8	140.1	140.7	138.4
Jul	144.4	159.9	163.9	161.6	165.3	159.0
Aug	140.6	141.9	145.8	150.4	143.0	144.3
Sep	103.1	97.6	100.5	109.2	99.3	101.9
Oct	81.3	74.0	75.1	80.9	71.9	76.6
Nov	63.3	62.3	59.5	57.9	63.3	61.3
Dec	92.4	93.9	92.5	90.1	97.2	93.2

Note : P.A = Planted Area in Feddan
Qmean = 100.8 m3/sec
Qmax = 165.3 m3/sec
Qmin = 57.9 m3/sec except Jan.
Source : Unit Water Requirement from ID, MPWWR

Table E-2-5 Summary of ETo by Modified Penman Method

Minia (unit : mm/day)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1986	2.4	3.7	4.9	7.4	7.5	9.2	9.4	7.5	7.3	5.1	2.8	2.1
1987	2.5	3.4	4.9	7.1	7.8	10.5	8.8	7.9	7.1	5.7	3.0	2.5
1988	2.6	4.1	5.8	8.3	9.8	10.1	10.1	8.4	8.6	5.9	3.4	2.5
1989	2.8	3.6	5.3	7.9	9.9	10.7	9.2	7.8	7.9	6.0	3.9	2.7
Mean	2.6	3.7	5.2	7.7	8.8	10.1	9.4	7.9	7.7	5.7	3.3	2.4

Beni Suef

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1986	2.6	3.9	5.5	6.6	7.0	8.3	8.7	7.7	7.1	5.2	3.1	2.4
1987	2.8	3.5	4.7	6.8	7.1	8.5	8.9	8.1	6.9	5.5	3.5	2.5
1988	2.5	3.3	5.3	7.2	8.5	8.2	9.5	7.8	7.6	5.3	3.5	2.3
1989	2.4	3.5	5.1	7.4	8.2	8.4	8.7	7.7	7.8	5.4	3.3	2.6
Mean	2.6	3.6	5.1	7.0	7.7	8.3	9.0	7.8	7.3	5.4	3.3	2.5

Faiyum

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1986	2.3	3.5	5.0	6.2	6.6	7.9	8.3	7.3	6.6	5.2	2.9	2.2
1987	2.3	3.3	4.6	6.4	6.6	8.2	8.5	7.7	6.5	5.1	2.9	2.2
1988	2.1	2.9	4.6	6.5	7.8	8.0	8.6	7.4	7.0	4.8	2.9	2.0
1989	2.3	3.3	4.7	6.7	8.0	8.3	8.4	7.5	7.1	4.7	3.1	2.3
Mean	2.3	3.3	4.7	6.5	7.3	8.1	8.4	7.5	6.8	5.0	2.9	2.2

Giza

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1986	2.6	3.7	5.3	6.7	7.0	8.9	8.5	7.6	6.6	4.9	3.2	2.6
1987	2.9	3.8	5.5	6.7	8.3	8.5	8.9	7.8	7.1	5.4	3.2	2.5
1988	2.4	3.7	5.4	7.7	8.3	8.9	9.0	7.9	6.9	5.1	3.2	2.4
1989	2.4	3.4	5.3	7.3	8.4	8.4	8.3	7.5	7.0	5.2	3.3	2.5
Mean	2.6	3.7	5.4	7.1	8.0	8.7	8.7	7.7	6.9	5.2	3.2	2.5

Summary

(unit: mm/day)

Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minia	2.6	3.7	5.2	7.7	8.8	10.1	9.4	7.9	7.7	5.7	3.3	2.4
B.Suef	2.6	3.6	5.1	7.0	7.7	8.3	9.0	7.8	7.3	5.4	3.3	2.5
Faiyum	2.3	3.3	4.7	6.5	7.3	8.1	8.4	7.5	6.8	5.0	2.9	2.2
Giza	2.6	3.7	5.4	7.1	8.0	8.7	8.7	7.7	6.9	5.2	3.2	2.5
Mean	2.5	3.5	5.1	7.1	7.9	8.8	8.9	7.7	7.2	5.3	3.2	2.4

Table E-2-6 Consumptive Use of Major Crops (by Modified Penman Method)

Crop/Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
ETo (mm)	2.5	3.5	5.1	7.1	7.9	8.8	8.9	7.7	7.2	5.3	3.2	2.4	Total
Wheat													
kc	0.92	1.10	1.10	0.84	0.33						0.60	0.65	
ETcrop	2.3	3.9	5.6	5.9	2.6	0.0	0.0	0.0	0.0	0.0	1.9	1.6	
days	31	28	31	22	0	0	0	0	0	0	6	31	149
ETC/month (mm)	71.4	109.5	175.0	130.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	48.4	545.7
ETC/m3/fed	299.7	460.1	735.1	545.8	0.0	0.0	0.0	0.0	0.0	0.0	48.2	203.2	2292.0
L. Berseem													
kc	1.03	1.05	1.05	1.05	1.05					0.56	0.75	0.94	
ETcrop	2.6	3.7	5.4	7.4	8.3	0.0	0.0	0.0	0.0	3.0	2.4	2.2	
days	31	28	31	15	0	0	0	0	0	7	30	31	173
ETC/month (mm)	79.9	104.3	166.6	111.2	0.0	0.0	0.0	0.0	0.0	20.7	71.4	69.7	623.7
ETC/m3/fed	335.6	437.9	699.5	467.0	0.0	0.0	0.0	0.0	0.0	86.9	299.7	292.9	2619.5
Beans													
kc	1.14	1.10	0.79	0.41							0.55	0.89	
ETcrop	2.9	3.9	4.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	1.8	2.1	
days	31	28	10	0	0	0	0	0	0	0	23	31	123
ETC/month (mm)	88.5	108.9	40.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.3	66.0	344.3
ETC/m3/fed	371.6	457.3	170.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169.2	277.2	1445.9
Cotton (a)													
kc			0.32	0.38	0.64	1.02	1.15	1.13	0.94	0.72			
ETcrop	0.0	0.0	1.6	2.7	5.1	9.0	10.2	8.7	6.7	3.8	0.0	0.0	
days	0	0	7	30	31	30	31	15	0	0	0	0	144
ETC/month (mm)	0.0	0.0	11.5	80.5	157.4	268.8	315.0	130.6	0.0	0.0	0.0	0.0	963.6
ETC/m3/fed	0.0	0.0	48.1	338.0	661.1	1128.8	1322.8	548.4	0.0	0.0	0.0	0.0	4047.3
S. Maize													
kc						0.38	0.91	1.12	1.05				
ETcrop	0.0	0.0	0.0	0.0	0.0	3.3	8.1	8.7	7.6	0.0	0.0	0.0	
days	0	0	0	0	0	29	31	29	0	0	0	0	89
ETC/month (mm)	0.0	0.0	0.0	0.0	0.0	97.1	250.0	251.0	0.0	0.0	0.0	0.0	598.0
ETC/m3/fed	0.0	0.0	0.0	0.0	0.0	407.8	1049.8	1054.0	0.0	0.0	0.0	0.0	2511.7
S. Sunflower													
kc					0.36	0.75	1.07	0.93					
ETcrop	0.0	0.0	0.0	0.0	2.9	6.6	9.5	7.2	0.0	0.0	0.0	0.0	
days	0	0	0	0	28	30	31	13	0	0	0	0	102
ETC/month (mm)	0.0	0.0	0.0	0.0	80.0	198.3	293.9	93.4	0.0	0.0	0.0	0.0	665.5
ETC/m3/fed	0.0	0.0	0.0	0.0	335.9	832.7	1234.4	392.3	0.0	0.0	0.0	0.0	2795.3
S. Sorghum													
kc						0.37	0.80	1.06	0.79				
ETcrop	0.0	0.0	0.0	0.0	0.0	3.2	7.1	8.2	5.7	0.0	0.0	0.0	
days	0	0	0	0	0	25	31	31	3	0	0	0	90
ETC/month (mm)	0.0	0.0	0.0	0.0	0.0	80.4	220.7	253.1	17.0	0.0	0.0	0.0	571.2
ETC/m3/fed	0.0	0.0	0.0	0.0	0.0	337.7	926.8	1063.0	71.6	0.0	0.0	0.0	2399.1
W. Vegetable													
kc	1.14	0.89								0.44	0.65	1.04	
ETcrop	2.9	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.1	2.5	
days	31	14	0	0	0	0	0	0	0	29	30	31	135
ETC/month (mm)	88.7	44.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.9	62.1	77.2	340.3
ETC/m3/fed	372.7	186.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	285.2	260.9	324.1	1429.1

Table E-2-7 Total Discharge by Four Irrigation Pump Stations

(unit : 1000 m3)

M/Y	1986	1987	1988	1989	1990	Mean
Jan	2,940.7	3,560.3	2,858.4	5,060.6	4,760.4	3,836.1
Feb	22,459.7	18,916.7	15,940.6	19,061.4	19,026.4	19,081.0
Mar	31,094.0	24,408.0	25,747.9	29,136.7	28,294.3	27,736.2
Apr	32,235.1	24,027.0	25,583.7	31,604.2	27,350.9	28,160.2
May	29,599.0	31,883.2	29,347.2	32,130.1	27,848.0	30,161.5
Jun	30,593.3	24,900.6	23,927.7	26,828.3	30,008.5	27,251.7
Jul	30,686.1	28,979.8	14,102.2	25,640.8	41,574.8	28,196.7
Aug	29,318.7	25,855.0	14,061.3	27,054.3	38,085.4	26,874.9
Sep	32,897.6	21,990.9	17,473.1	26,771.8	37,769.8	27,380.6
Oct	28,609.2	23,087.9	19,645.5	32,469.2	39,358.3	28,634.0
Nov	25,621.6	19,049.4	19,591.4	27,555.3	32,719.0	24,907.3
Dec	22,556.5	20,097.8	18,058.4	25,344.3	40,501.3	25,311.7
Total	318,611.5	266,756.6	226,337.4	308,657.0	367,297.1	297,531.9
Mean	26,551.0	22,229.7	18,861.5	25,721.4	30,608.1	24,794.3
Max.	32,897.6	31,883.2	29,347.2	32,469.2	41,574.8	33,634.4
Min.	2,940.7	3,560.3	2,858.4	5,060.6	4,760.4	3,836.1
	Discharge in 1000 m3/Day					
M/Y	1986	1987	1988	1989	1990	Mean
Jan	94.9	114.8	92.2	163.2	153.6	123.7
Feb	802.1	675.6	549.7	680.8	679.5	677.5
Mar	1,003.0	787.4	830.6	939.9	912.7	894.7
Apr	1,074.5	800.9	852.8	1,053.5	911.7	938.7
May	954.8	1,028.5	946.7	1,036.5	898.3	973.0
Jun	1,019.8	830.0	797.6	894.3	1,000.3	908.4
Jul	989.9	934.8	454.9	827.1	1,341.1	909.6
Aug	945.8	834.0	453.6	872.7	1,228.6	866.9
Sep	1,096.6	733.0	582.4	892.4	1,259.0	912.7
Oct	922.9	744.8	633.7	1,047.4	1,269.6	923.7
Nov	854.1	635.0	653.0	918.5	1,090.6	830.2
Dec	727.6	648.3	582.5	817.6	1,306.5	816.5
Mean	873.8	730.6	619.1	845.3	1,004.3	814.6
Max.	1,096.6	1,028.5	946.7	1,053.5	1,341.1	1,093.3
Min.	94.9	114.8	92.2	163.2	153.6	123.7
	Discharge in m3/sec					
M/Y	1986	1987	1988	1989	1990	Mean
Jan	1.098	1.329	1.067	1.889	1.777	1.432
Feb	9.284	7.819	6.362	7.879	7.865	7.842
Mar	11.609	9.113	9.613	10.878	10.564	10.356
Apr	12.436	9.270	9.870	12.193	10.552	10.864
May	11.051	11.904	10.957	11.996	10.397	11.261
Jun	11.803	9.607	9.231	10.350	11.577	10.514
Jul	11.457	10.820	5.265	9.573	15.522	10.527
Aug	10.946	9.653	5.250	10.101	14.219	10.034
Sep	12.692	8.484	6.741	10.329	14.572	10.564
Oct	10.681	8.620	7.335	12.123	14.695	10.691
Nov	9.885	7.349	7.558	10.631	12.623	9.609
Dec	8.422	7.504	6.742	9.462	15.121	9.450
Mean	10.114	8.456	7.166	9.784	11.624	9.429
Max.	12.692	11.904	10.957	12.193	15.522	12.654
Min.	1.098	1.329	1.067	1.889	1.777	1.432

Note: Since all figures are rounded up, figures in the 'Total' colume are not Mactched with the actual one.

Source : MED, Minia, MPWWR

Table E-2-8 Present Amount of Drinking Water

1) For Inhabitants

Governorate	Population (person)	Per Capita (lit/day)	Drinking Water (m3/day)
Minia	295, 000	100	29, 500
Beni Suef	197, 000	100	19, 700
Faiyum	1, 544, 000	100	154, 400
Giza	2, 330, 000	100	233, 000
Total (day, m3)	4, 366, 000		436, 600
Total (Month, 1000 m3)			13, 098
Total (Year, 1000 m3)			159, 359

2) For Animals

No. of Animals

Animals	Minai	Beni Suef	Faiyum	Giza	Total
Cattle Adult	10, 488	25, 043	101, 806	34, 086	171, 423
Cattle Calf	6, 677	6, 601	50, 399	67, 908	131, 585
Baffalo A	11, 954	16, 428	63, 626	55, 747	147, 755
Baffalo C	5, 506	6, 785	29, 305	83, 122	124, 718
Camel/Horse	1, 003	776	6, 953	3, 400	12, 132
Donkey	18, 416	16, 346	96, 913	51, 100	182, 775
Sheep	19, 436	25, 753	130, 366	118, 150	293, 705
Goat	25, 000	13, 636	57, 011	15, 666	111, 313
Total	98, 480	111, 368	536, 379	429, 179	1, 175, 406

Amount of Water for Animals

Animals	No. of Animals (heads)	Per Capita (lit/day)	Amount of Water
Cattle	303, 008	30	9, 090
Baffalo	272, 473	40	10, 899
Camel/Horse	12, 132	65	789
Donkey	182, 775	30	5, 483
Sheep	293, 705	3	881
Goat	111, 313	3	334
Others	LS (10% od Above)		2, 748
Total (day)	1, 175, 406		30, 224
Total (Month, 1000 m3)			907
Total (Year, 1000 m3)			11, 032

Note: Per capita of water for aminals is based on Agricultural Compendium, USAID

3) Total Amount of Water

Item	per Day (m3/day)	per Month (1000 m3)	per Year (1000 m3)
Inhabitants	436, 600	13, 098	159, 359
Animals	30, 224	907	11, 032
Sub-Total	466, 824	14, 005	170, 391
Industrials	233, 412	7, 003	85, 196
Total	700, 236	21, 008	255, 587

Table E-2-9 Present Monthly Net Water Requirement

(unit:1000m3/month)

P.	1986	1987	1988	1989	1990	Mean
Area	990,854	1,005,505	1,012,763	1,017,579	1,032,032	1,011,747
Jan	215,951	208,914	212,979	257,873	229,394	225,022
Feb	238,146	230,554	234,696	280,783	255,849	248,005
Mar	281,279	267,280	270,787	314,304	304,059	287,542
Apr	158,688	149,512	160,809	191,753	155,479	163,248
May	197,760	187,372	202,793	227,636	194,232	201,959
Jun	291,859	300,300	316,261	333,302	307,465	309,838
Jul	459,155	486,449	511,472	525,004	501,047	496,625
Aug	391,190	418,493	447,897	469,366	448,608	435,111
Sep	227,903	230,051	255,636	295,417	263,470	254,495
Oct	93,194	67,785	77,118	117,702	72,672	85,694
Nov	154,366	138,285	140,276	182,266	153,078	153,654
Dec	184,759	176,708	179,934	225,714	194,102	192,243
Total	2,894,252	2,861,702	3,010,658	3,421,118	3,079,453	3,053,437

Daily Net Water Requirement in 1000m3/day

P.	1986	1987	1988	1989	1990	Mean
Area	990,854	1,005,505	1,012,763	1,017,579	1,032,032	1,011,747
Jan	6,966	6,739	6,870	8,318	7,400	7,259
Feb	8,505	8,234	8,093	10,028	9,137	8,799
Mar	9,074	8,622	8,735	10,139	9,808	9,276
Apr	5,290	4,984	5,360	6,392	5,183	5,442
May	6,379	6,044	6,542	7,343	6,266	6,515
Jun	9,729	10,010	10,542	11,110	10,249	10,328
Jul	14,811	15,692	16,499	16,936	16,163	16,020
Aug	12,619	13,500	14,448	15,141	14,471	14,036
Sep	7,597	7,668	8,521	9,847	8,782	8,483
Oct	3,006	2,187	2,488	3,797	2,344	2,764
Nov	5,146	4,609	4,676	6,076	5,103	5,122
Dec	5,960	5,700	5,804	7,281	6,261	6,201

Daily Net Water Requirement in m3/sec

P.	1986	1987	1988	1989	1990	Mean
Area	990,854	1,005,505	1,012,763	1,017,579	1,032,032	1,011,747
Jan	80.6	78.0	79.5	96.3	85.6	84.0
Feb	98.4	95.3	93.7	116.1	105.8	101.9
Mar	105.0	99.8	101.1	117.3	113.5	107.3
Apr	61.2	57.7	62.0	74.0	60.0	63.0
May	73.8	70.0	75.7	85.0	72.5	75.4
Jun	112.6	115.9	122.0	128.6	118.6	119.5
Jul	171.4	181.6	191.0	196.0	187.1	185.4
Aug	146.1	156.3	167.2	175.2	167.5	162.5
Sep	87.9	88.8	98.6	114.0	101.6	98.2
Oct	34.8	25.3	28.8	43.9	27.1	32.0
Nov	59.6	53.3	54.1	70.3	59.1	59.3
Dec	69.0	66.0	67.2	84.3	72.5	71.8

Note: P. Area: Planted Area in feddan
Qmean = 96.8 m3/sec
Qmax = 196.0 m3/sec
Qmin = 25.3 m3/sec
Source:Unit water requirement from FAO Irri. and Drainage Paper #24

Table E-2-10 Overall Irrigation Efficiency at Present

1986 (unit: 1000 m3/day)

Month	Intake	Q by DPS	Q by F.PS	G.W. Contribution	Total	Net WR	Q by IPS	Drinking	Total	Ratio (%)
Jan	1,364.5	1,296.6	0.0	696.6	3,357.7	6,966.0	94.9	21.0	7,081.9	210.9
Feb	8,704.8	2,227.8	0.0	850.5	11,783.1	8,505.0	802.1	21.0	9,328.1	79.2
Mar	11,879.0	2,386.4	0.0	907.4	15,172.8	9,074.0	1,003.0	21.0	10,098.0	66.6
Apr	11,090.3	2,855.3	0.0	529.0	14,274.6	5,298.0	1,074.5	21.0	6,385.5	44.7
May	11,916.1	2,258.9	0.0	637.9	14,812.9	6,379.0	954.8	21.0	7,354.8	49.7
Jun	14,017.7	2,368.6	778.3	972.9	18,137.5	9,729.0	1,019.8	21.0	10,769.8	59.4
Jul	16,482.3	2,394.7	1,184.9	1,481.1	21,542.9	14,811.0	989.9	21.0	15,821.9	73.4
Aug	15,801.6	2,464.2	1,009.5	1,251.9	20,537.2	12,619.0	945.8	21.0	13,585.8	66.2
Sep	11,833.9	2,595.7	0.0	759.7	15,189.3	7,597.0	1,096.6	21.0	8,714.6	57.4
Oct	9,569.4	3,125.7	0.0	300.6	13,095.7	3,006.0	922.9	21.0	3,949.9	30.2
Nov	7,886.5	3,414.3	0.0	514.6	11,735.4	5,146.0	854.1	21.0	6,021.1	51.3
Dec	5,467.7	3,494.6	0.0	596.0	9,558.3	5,960.0	727.6	21.0	6,708.6	70.2

1987 (unit: 1000 m3/day)

Month	Intake	Q by DPS	Q by F.PS	G.W. Contribution	Total	Net WR	Q by IPS	Drinking	Total	Ratio (%)
Jan	1,967.7	1,597.9	0.0	673.9	4,239.5	6,739.0	114.8	21.0	6,874.8	162.2
Feb	8,146.8	2,948.2	0.0	823.4	11,918.4	8,234.0	675.6	21.0	8,930.6	74.9
Mar	10,325.8	2,862.7	0.0	862.2	14,050.7	8,622.0	787.4	21.0	9,430.4	67.1
Apr	9,593.5	2,805.0	0.0	498.4	12,896.9	4,984.0	800.9	21.0	5,805.9	45.0
May	11,179.0	2,283.9	0.0	604.4	14,067.3	6,044.0	1,028.5	21.0	7,093.5	50.4
Jun	13,422.6	2,233.4	800.8	1,001.0	17,457.8	10,010.0	830.9	21.0	10,861.0	62.2
Jul	15,827.4	2,585.3	1,255.4	1,569.2	21,237.2	15,692.0	934.8	21.0	16,647.8	78.4
Aug	15,708.1	2,335.6	1,080.0	1,350.0	20,473.7	13,500.0	834.0	21.0	14,355.0	70.1
Sep	11,686.0	2,862.6	0.0	766.8	15,315.4	7,668.0	733.0	21.0	8,422.0	55.0
Oct	10,013.5	3,033.5	0.0	218.7	13,265.7	2,187.0	744.8	21.0	2,952.8	22.3
Nov	7,806.5	3,299.7	0.0	460.9	11,567.1	4,609.0	635.0	21.0	5,265.0	45.5
Dec	5,661.3	3,479.8	0.0	570.0	9,711.1	5,700.0	648.3	21.0	6,369.3	65.6

1988 (unit: 1000 m3/day)

Month	Intake	Q by DPS	Q by F.PS	G.W. Contribution	Total	Net WR	Q by IPS	Drinking	Total	Ratio
Jan	645.2	1,326.1	0.0	687.0	2,658.3	6,570.0	92.2	21.0	6,983.2	262.7
Feb	7,950.0	1,695.7	0.0	809.3	10,455.0	8,093.0	549.7	21.0	8,663.7	82.9
Mar	10,592.5	1,826.6	0.0	873.5	13,292.6	8,735.0	830.6	21.0	9,586.6	72.1
Apr	9,869.1	1,682.4	0.0	536.0	12,087.5	5,360.0	852.8	21.0	6,233.8	51.6
May	11,673.5	1,603.7	0.0	654.2	13,931.4	6,542.0	946.7	21.0	7,509.7	53.9
Jun	14,025.8	1,751.8	843.4	1,054.2	17,675.1	10,542.0	797.6	21.0	11,360.6	64.3
Jul	17,530.0	1,855.6	1,319.9	1,649.9	22,355.4	16,499.0	454.9	21.0	16,974.9	75.9
Aug	17,364.5	2,120.3	1,155.8	1,444.3	22,085.5	14,448.0	453.6	21.0	14,922.6	67.6
Sep	12,799.8	2,347.1	0.0	852.1	15,998.2	8,521.0	582.4	21.0	9,124.4	57.0
Oct	11,054.8	2,209.2	0.0	248.8	13,512.8	2,488.0	633.7	21.0	3,142.7	23.3
Nov	9,424.2	2,579.7	0.0	467.6	12,471.5	4,676.0	653.8	21.0	5,350.0	42.9
Dec	7,040.3	2,823.5	0.0	580.4	10,444.2	5,804.0	582.5	21.0	6,407.5	61.3

Note: Unit water requirement based on FAO Irri. & Drainage paper #24.

Table E-2-10 (cont'd)

1989 (unit: 1000 m3/day)

Month	Intake	Q by DPS	Q by F.PS	G.W. Contribution	Total	Net WR	Q by IPS	Drinking	Total	Ratio
Jan	935.5	1,331.4	0.0	831.8	3,098.7	8,318.0	163.2	21.0	8,502.2	274.4
Feb	9,733.9	1,710.3	0.0	1,002.8	12,447.0	10,028.0	680.8	21.0	10,729.8	86.2
Mar	11,016.1	1,930.0	0.0	1,013.9	13,960.0	10,139.0	939.9	21.0	11,099.9	79.5
Apr	10,483.9	1,852.4	0.0	639.2	12,975.5	6,392.0	1,053.5	21.0	7,466.5	57.5
May	12,250.0	1,580.8	0.0	734.3	14,665.1	7,343.0	1,036.5	21.0	8,400.5	57.3
Jun	14,282.3	1,453.3	888.8	1,111.0	17,745.4	11,110.0	894.3	21.0	12,025.3	67.8
Jul	16,837.1	1,883.6	1,354.9	1,693.6	21,769.2	16,936.0	827.1	21.0	17,784.1	81.7
Aug	16,794.0	1,709.3	1,211.3	1,514.1	21,228.7	15,141.0	872.7	21.0	16,034.7	75.5
Sep	12,166.5	2,204.5	0.0	984.7	15,355.7	9,847.0	892.4	21.0	10,760.4	70.1
Oct	10,095.2	2,034.1	0.0	379.7	12,509.0	3,797.0	1,047.4	21.0	4,865.4	38.9
Nov	9,053.2	2,681.6	0.0	607.6	12,342.4	6,076.0	918.5	21.0	7,015.5	56.8
Dec	7,033.9	2,350.9	0.0	728.1	10,112.9	7,281.0	817.6	21.0	8,119.6	80.3

1990 (unit: 1000 m3/day)

Month	Intake	Q by DPS	Q by F.PS	G.W. Contribution	Total	Net WR	Q by IPS	Drinking	Total	Ratio
Jan	838.7	1,282.8	0.0	740.0	2,861.5	7,400.0	153.6	21.0	7,574.6	264.7
Feb	10,581.1	1,242.3	0.0	913.7	12,737.1	9,137.0	679.5	21.0	9,837.5	77.2
Mar	12,403.5	2,101.7	0.0	980.8	15,486.0	9,808.0	912.7	21.0	10,741.7	69.4
Apr	11,686.2	2,016.6	0.0	518.3	14,221.1	5,183.0	911.7	21.0	6,115.7	43.0
May	12,947.4	1,820.9	0.0	626.6	15,394.9	6,266.0	898.3	21.0	7,185.3	46.7
Jun	16,942.3	1,647.6	819.9	1,024.9	19,534.7	10,249.0	1,000.3	21.0	11,270.3	57.7
Jul	18,429.0	2,017.9	1,293.0	1,616.3	23,356.2	16,163.0	1,341.1	21.0	17,525.1	75.0
Aug	18,263.3	2,026.1	1,157.7	1,447.1	22,894.2	14,471.0	1,228.6	21.0	15,720.6	68.7
Sep	12,969.4	2,589.3	0.0	878.2	16,436.9	8,782.0	1,259.0	21.0	10,062.0	61.2
Oct	10,789.7	2,378.1	0.0	234.4	13,402.2	2,344.0	1,269.6	21.0	3,634.6	27.1
Nov	9,088.2	2,796.2	0.0	510.3	12,394.7	5,163.0	1,090.6	21.0	6,214.6	50.1
Dec	8,695.2	2,920.3	0.0	626.1	12,241.6	6,261.0	1,306.5	21.0	7,588.5	62.0

Note: Unit water requirement based on FAO Irri. & Drainage paper #24.

Present Overall Irrigation Efficiency by Month

(unit:%)

Month	1986	1987	1988	1989	1990	Mean
Jan	210.9	162.2	262.7	274.4	264.7	235.0
Feb	79.2	74.9	82.9	86.2	77.2	80.1
Mar	66.6	67.1	72.1	79.5	69.4	70.9
Apr	44.7	45.0	51.6	57.5	43.0	48.4
May	49.7	50.4	53.9	57.3	46.7	51.6
Jun	59.4	62.2	64.3	67.8	57.7	62.3
Jul	73.4	78.4	75.9	81.7	75.0	76.9
Aug	66.2	70.1	67.6	75.5	68.7	69.6
Sep	57.4	55.0	57.0	70.1	61.2	60.1
Oct	30.2	22.3	23.3	38.9	27.1	28.3
Nov	51.3	45.5	42.9	56.8	50.1	49.3
Dec	70.2	65.6	61.3	80.3	62.0	67.9
Annual	58.9	57.9	59.3	68.3	58.0	60.5

Note: - Unit water requirement based on FAO #24 rate.

Table E-2-11 Drainage Projects in Bahr Yusef Command Area

No	Project Area	Area (Feddan)	Remarks
	[Minia Governorate]		
	- Existing Project -		
1	Sakoula	40, 000	Tile Drain
2	Dir El Sankoria	29, 000	Tile Drain
3	Manshat El Dahab	29, 000	Tile D., under Construction
4	Tuna & Beni Khalid	11, 400	Tile Drain
	Total	109, 400	
	- Proposed Project -		
	non	0	
	[Beni Suef Governorate]		
	- Existing Project -		
1	Sakoula	(40, 000)	Incld. in Minia G.
	- Proposed Project -		
	non	0	
	[Faiyum Governorate]		
	- Existing Project -		
1	El Amia	700	Tile Drain
2	Tbhar	4, 880	Tile Drain
3	El Shat	12, 200	Tile Drain
	Total	17, 780	
	- Proposed Project -		
1	Abo Gandear	12, 000	Tile Drain
2	Kasr Byad	4, 000	Tile and Open Drain
3	Sinro	6, 000	Tile and Open Drain
4	West Wady	6, 400	Tile and Open Drain
5	West Bats #2	4, 500	Tile and Open Drain
6	Rhor Dalia	6, 000	Tile and Open Drain
7	El Snobat	7, 500	Tile and Open Drain
8	West Aboden Kash	9, 000	Tile and Open Drain
	Total	55, 400	
	[Ground Total]		
	Existing Area	127, 180	
	Proposed Area	55, 400	
	Grand Total	182, 580	Existing + Plan

Source: Drainage Authority in Directorate

Table E-2-12 Results of Salinity Test

The water salinity was checked in the drain and at an outlet of the tile drain system in the Harika command area and at the Harika Canal and its branch canal by an electric conductivity meter. According to the result of analysis at the field, even highest salinity is about 2,000 ppm. The salinity of the branch canal of the Harika is quite good quality.

The results of field investigations are as follows:

Place of Sampling	EC (micro S/cm)	Salt Concentration (ppm)
Harika Canal		
Intake point		
during high water	406	260
during w. closure	994	636
Regulator 22.75 km	453	290
H-4 point 25 km	456	292
Beni Amer sub-branch	465	298
Sakoula drain	2,670	1,709
Sakoula drain end of Harika C.	2,320	1,484
Tile drain outlet in B. Suef	789	505
〃	3,310	2,118
Drain in B. Suef	1,093	700
〃	2,890	1,850

Figure E-2-1 Intake Discharge at Dairout Barrage

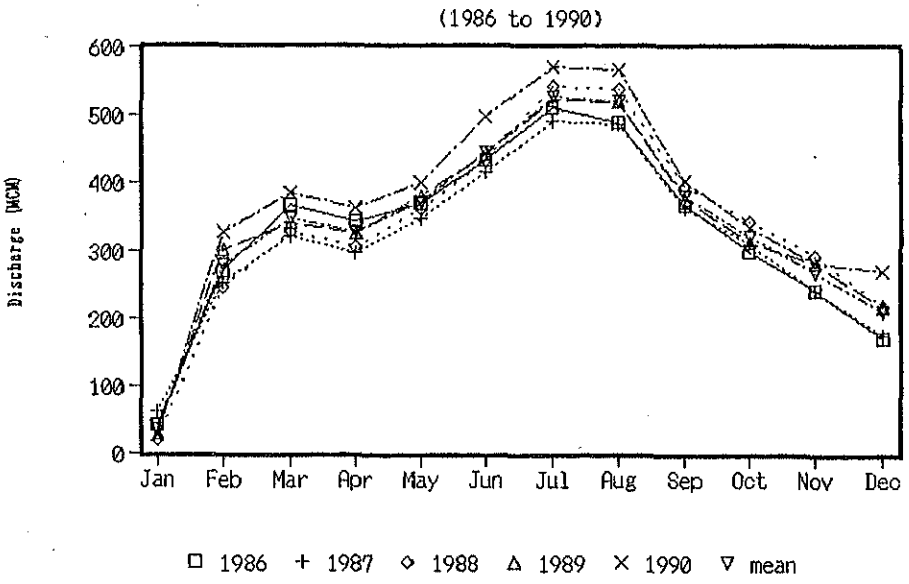


Figure E-2-2 Monthly Drainage Discharge by Nine Drainage Pump Stations

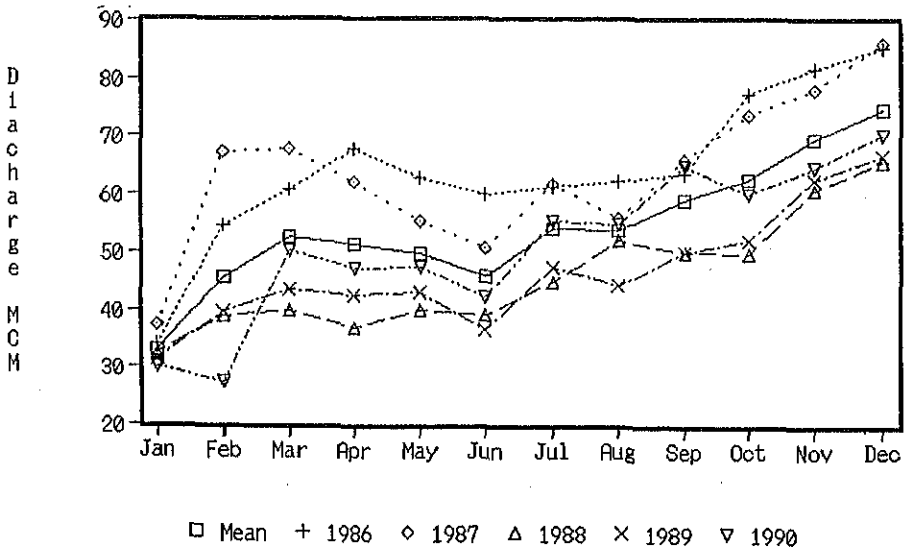


Figure E-2-3 Comparison of Net Water Requirement (between ID and FAO)

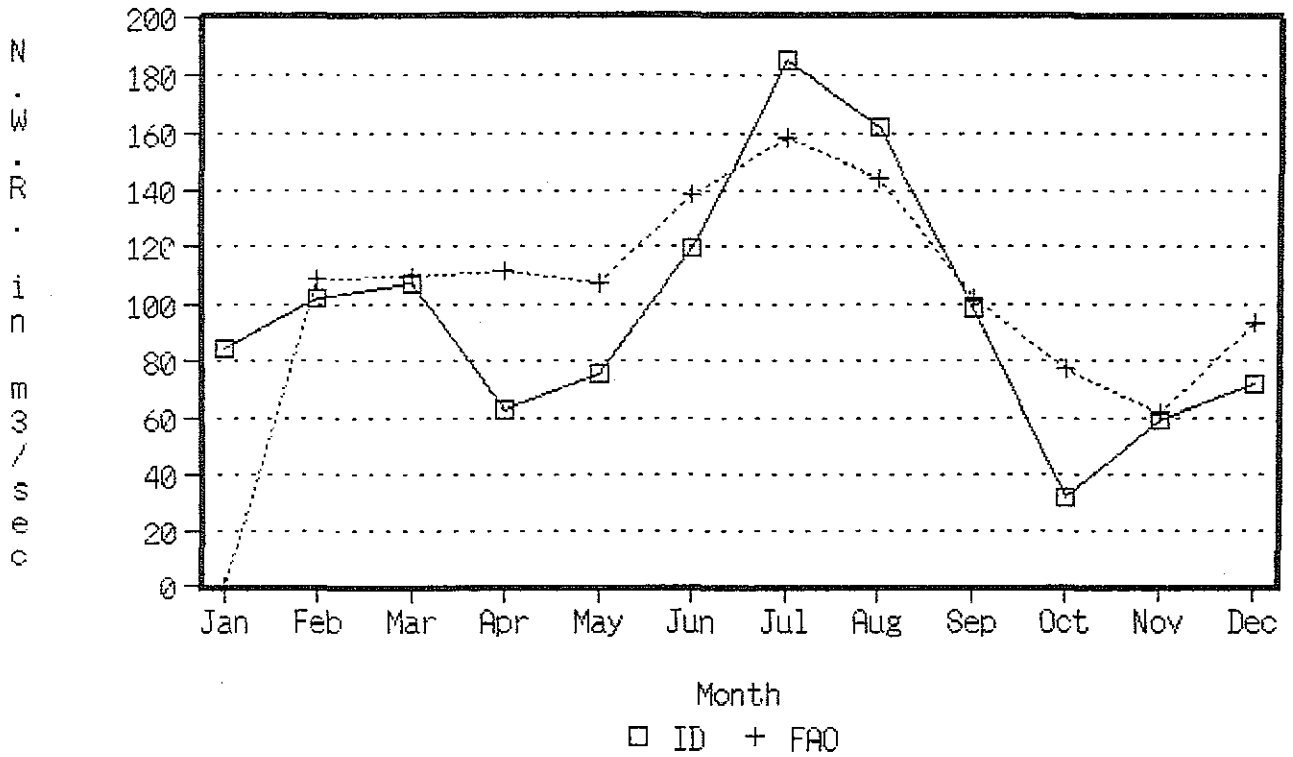


Figure E-2-4 Meteorological Conditions of Bahr Yusef Command Area

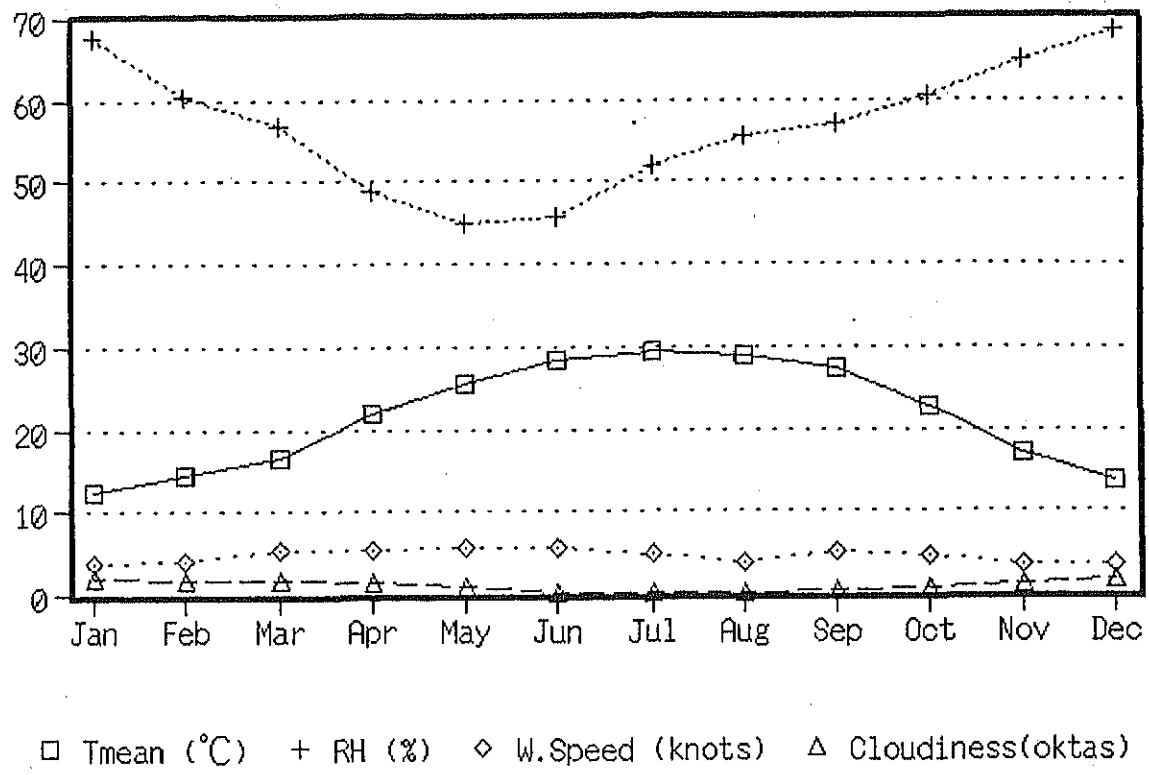


Figure E-2-5 Comparison of ETo by Three Methods

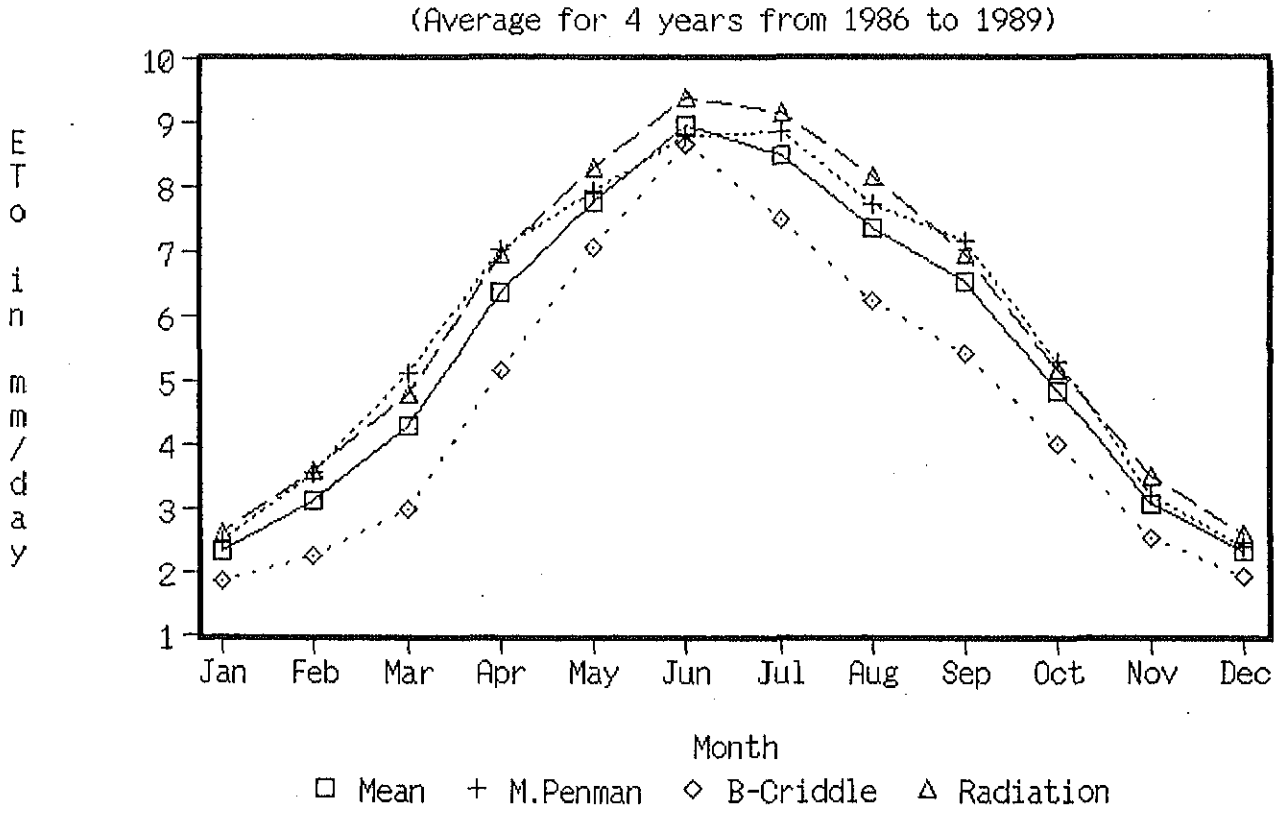


Figure E-2-6 ETo by Blaney-Criddle Method

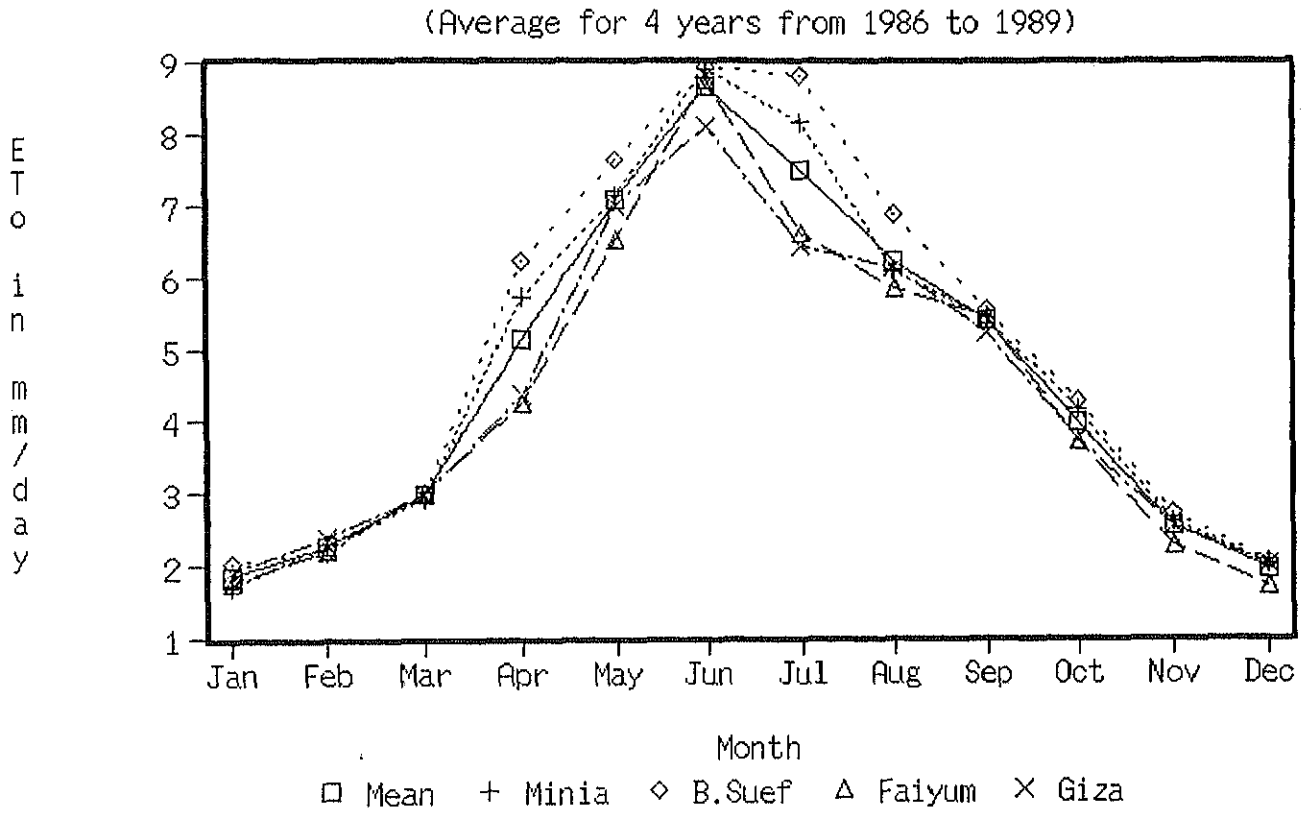


Figure E-2-7 ETo by Modified Penman Method

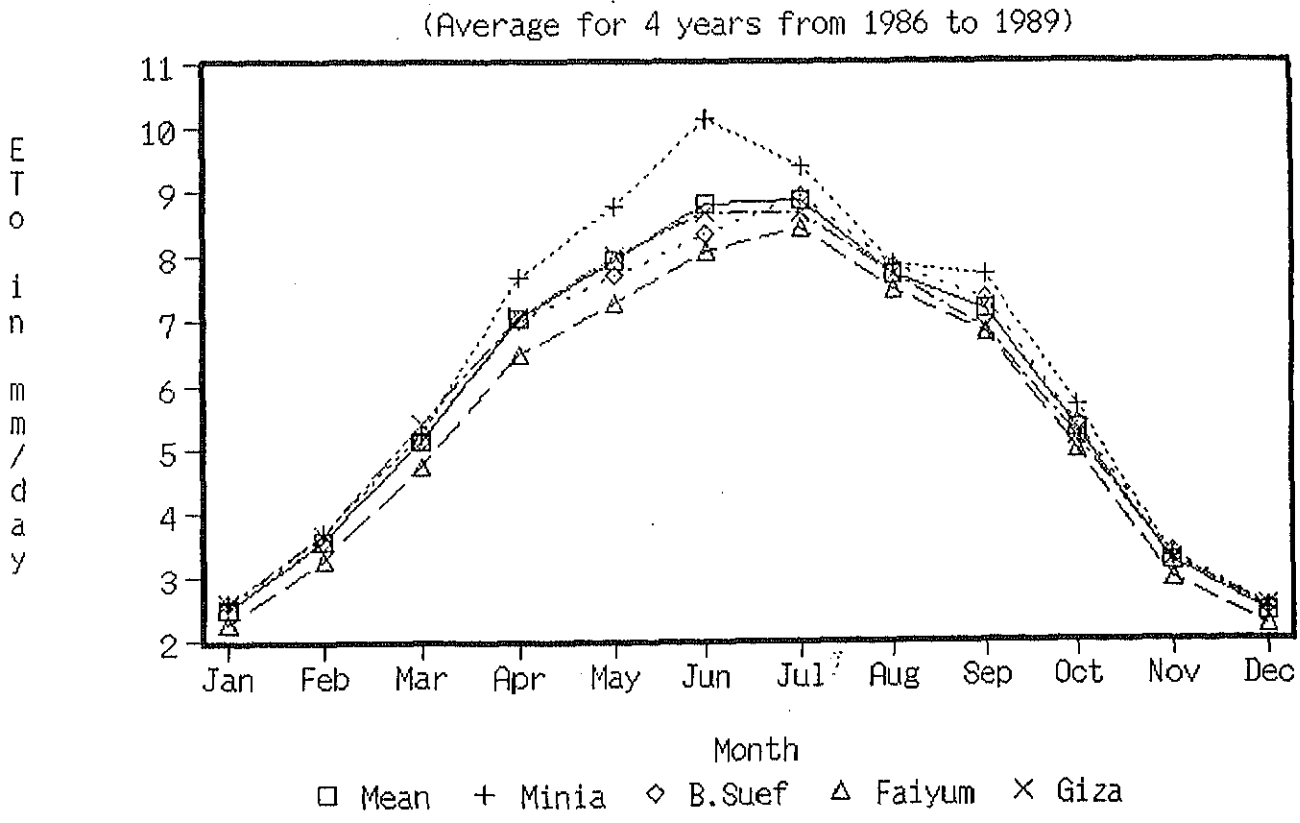


Figure E-2-8 ETo by Radiation Method

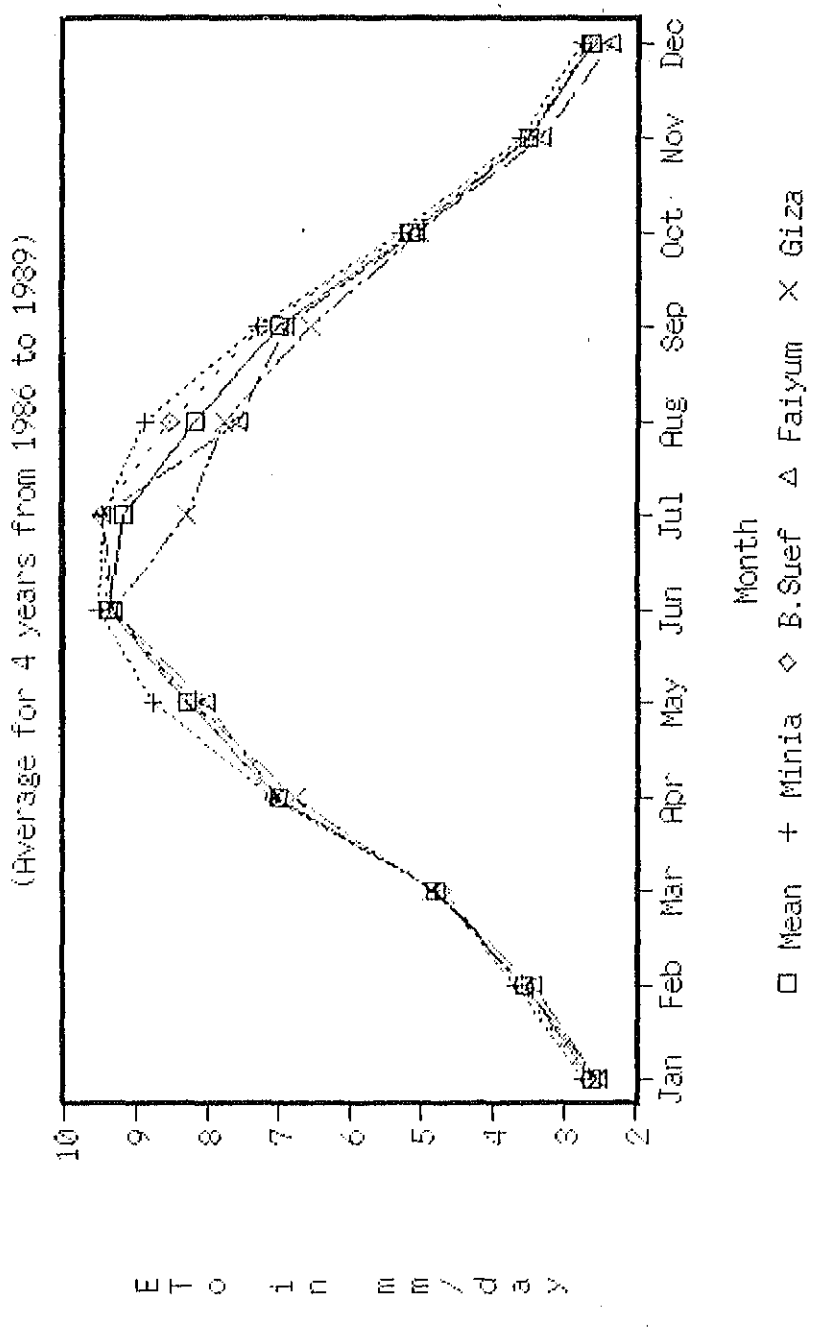
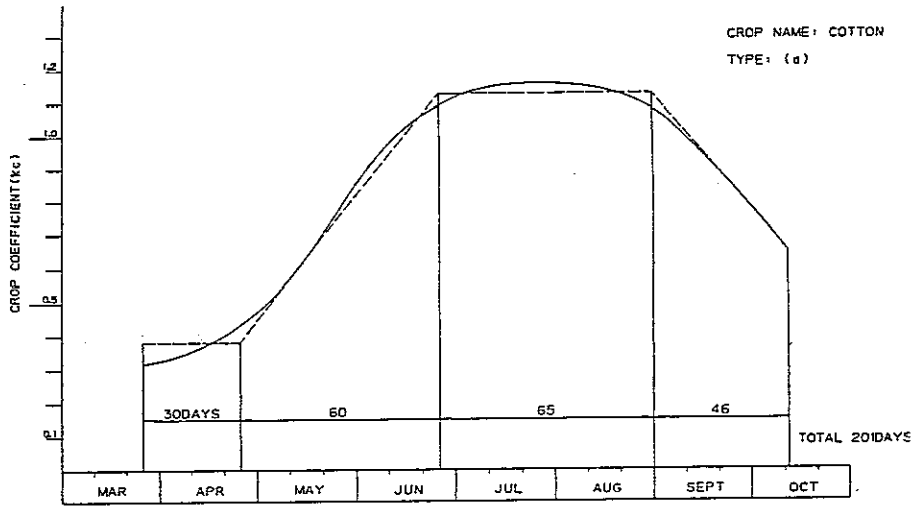


Figure E-2-9 Calculation of kc Value of Major Crops



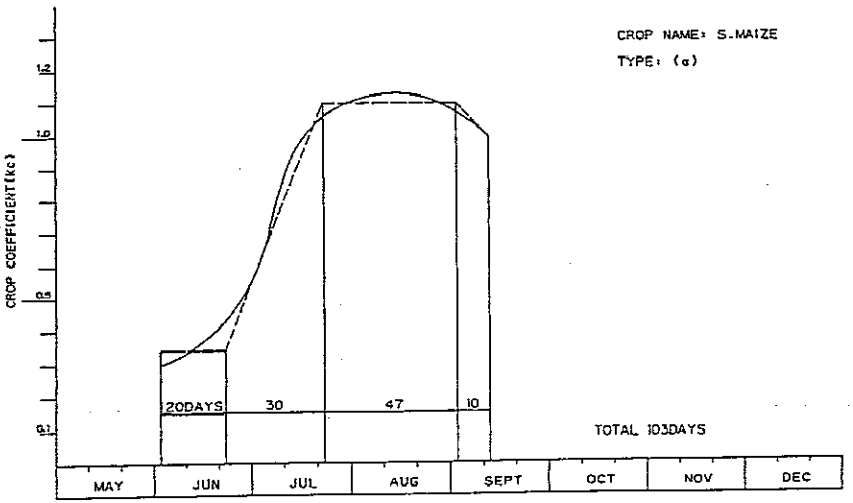
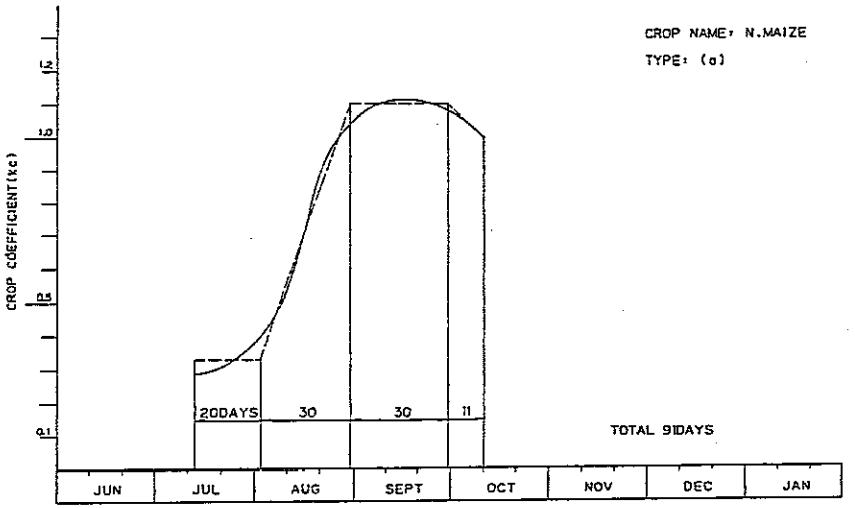


Figure E-3-6 Calculation of kc Value (cont'd)



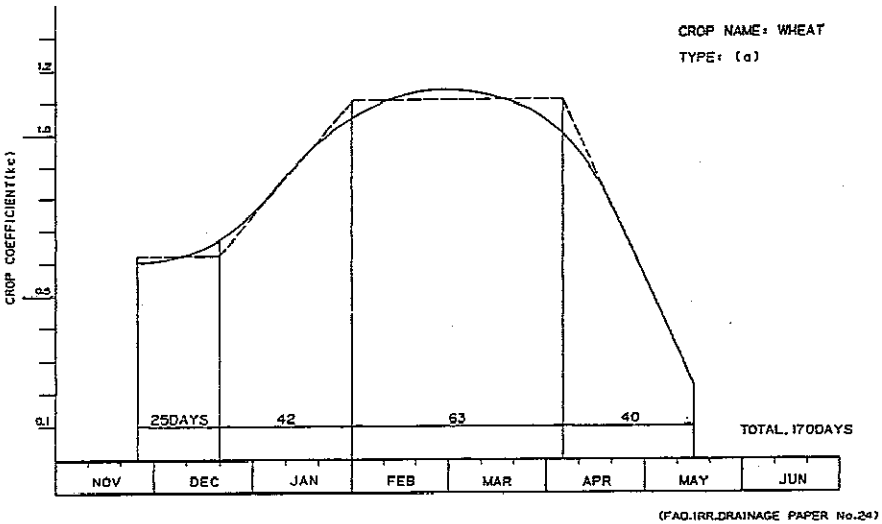


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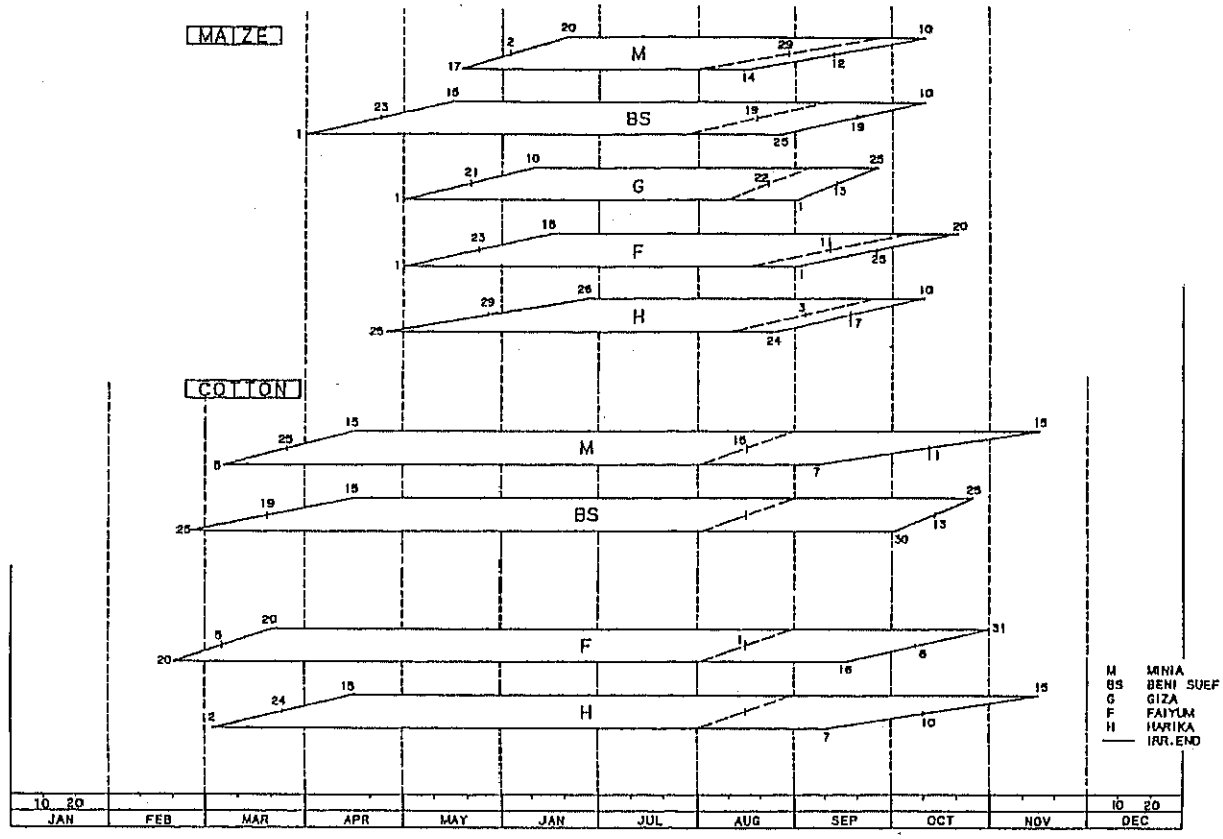
Figure E-2-10 Present Cropping Calendar of Major Crops



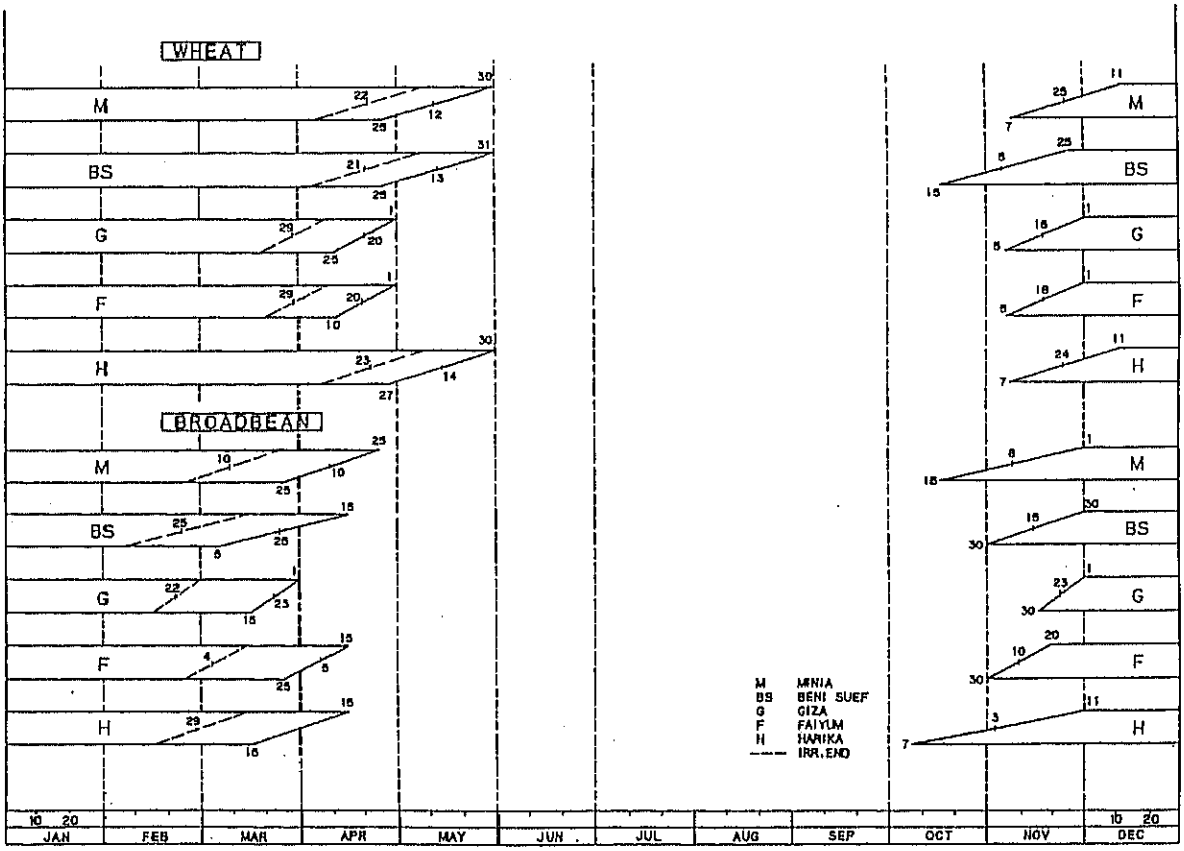
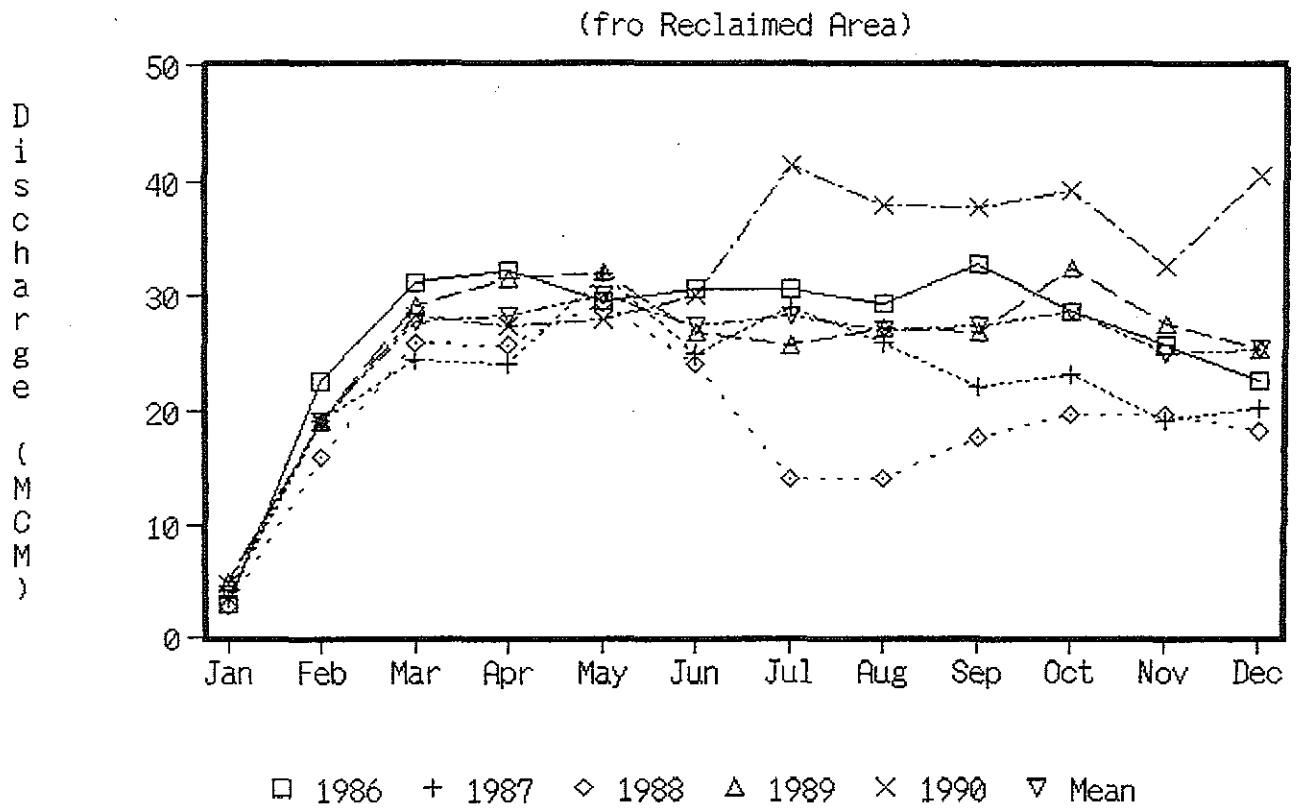


Figure E-2-11 Monthly Discharge by Four Irrigation Pump Stations



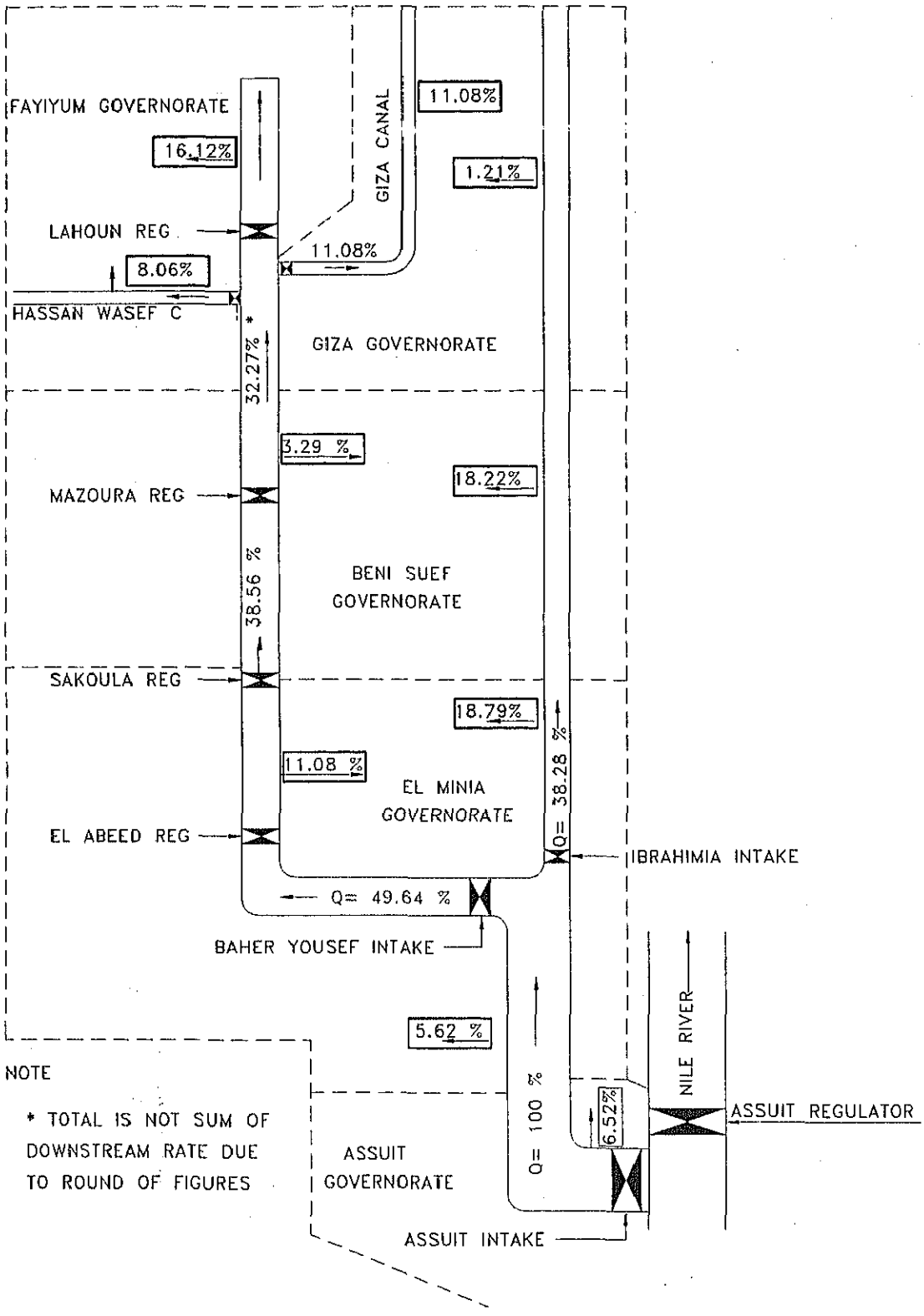


Figure E-2-12 Present Water Distribution System of Bahr Yusef Canal

Figure E-2-13 Skeleton Map of Irrigation Facilities Related to Bahr Yusef Canal

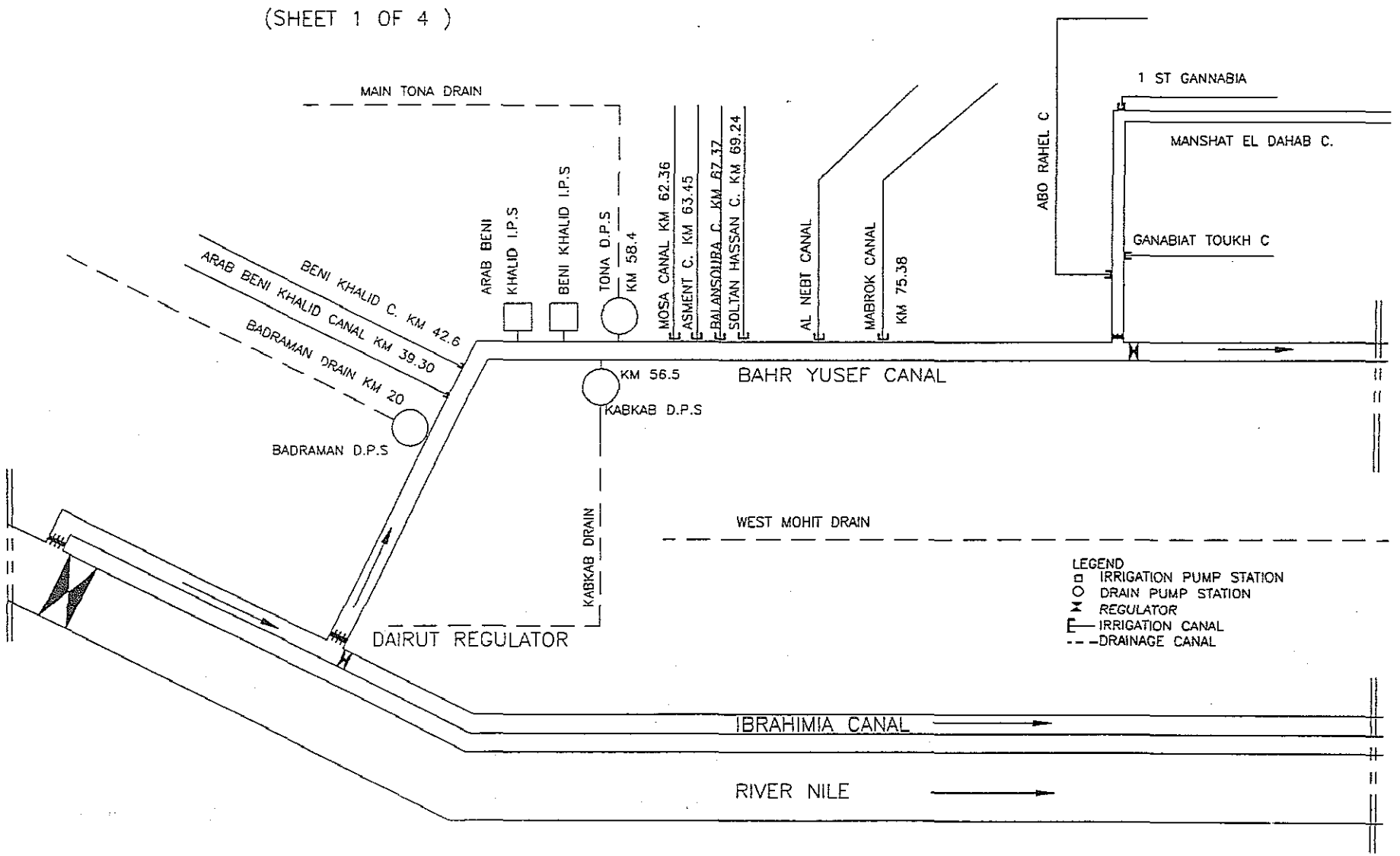
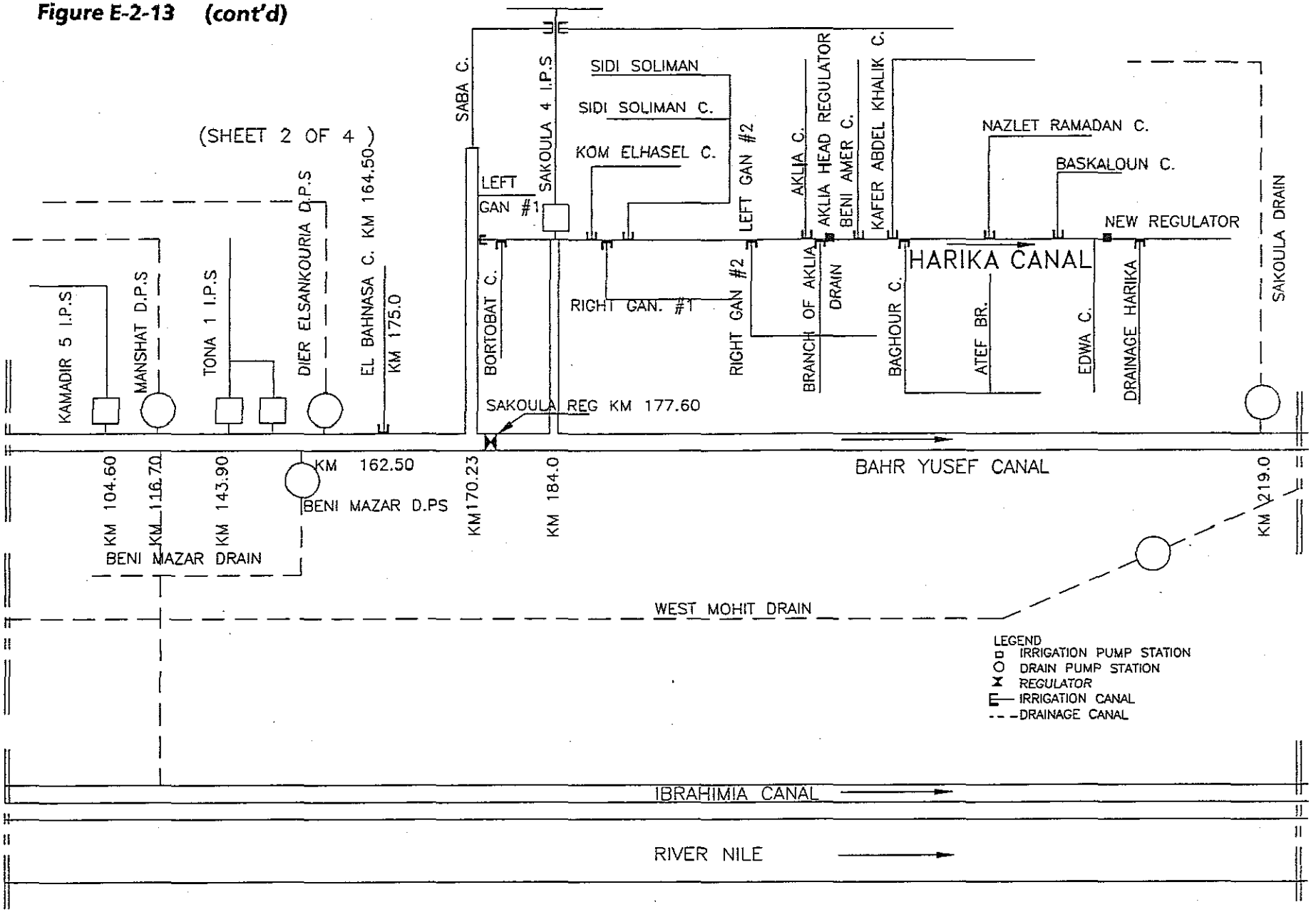


Figure E-2-13 (cont'd)



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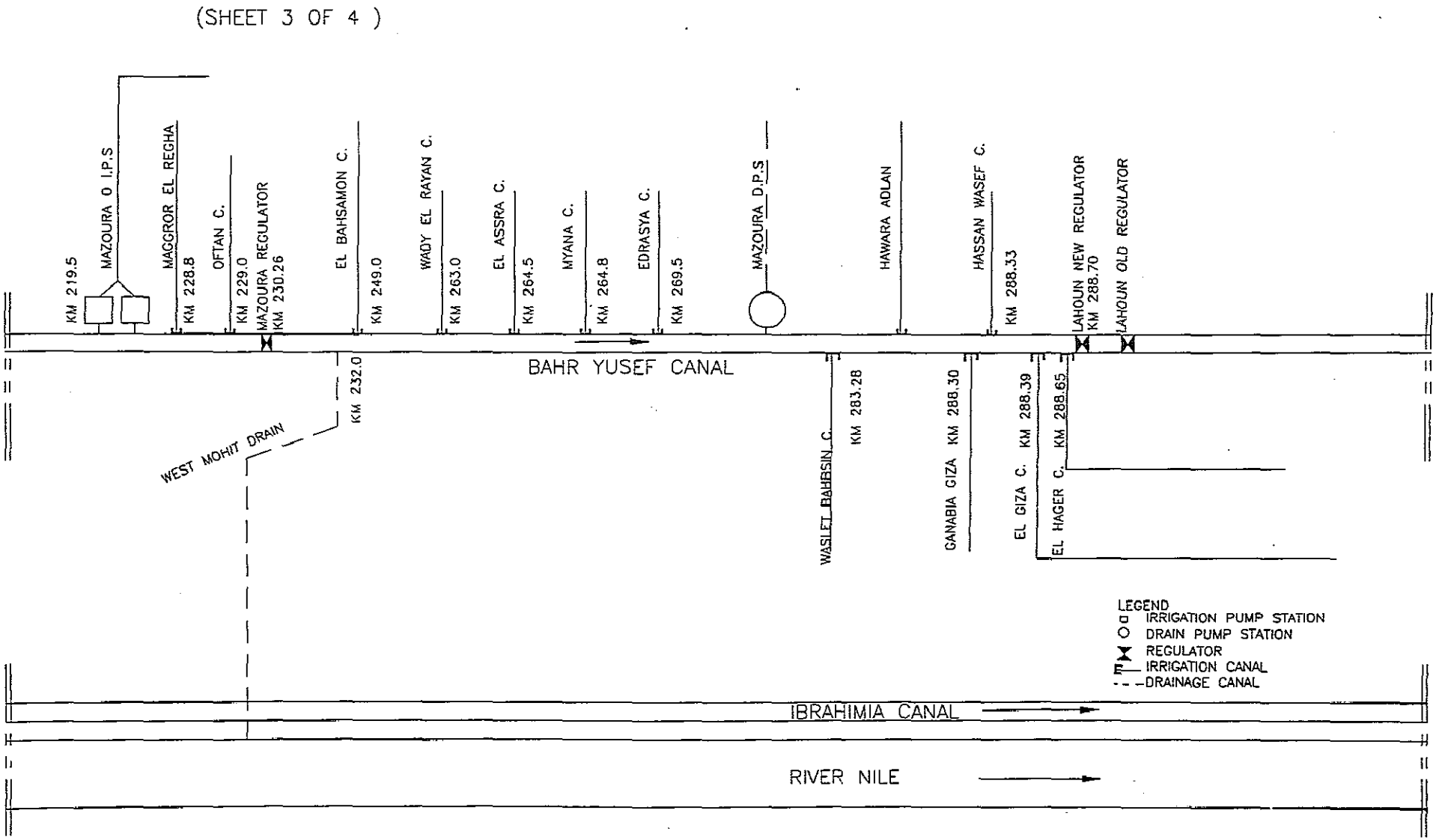

Figure E-2-13 (cont'd)

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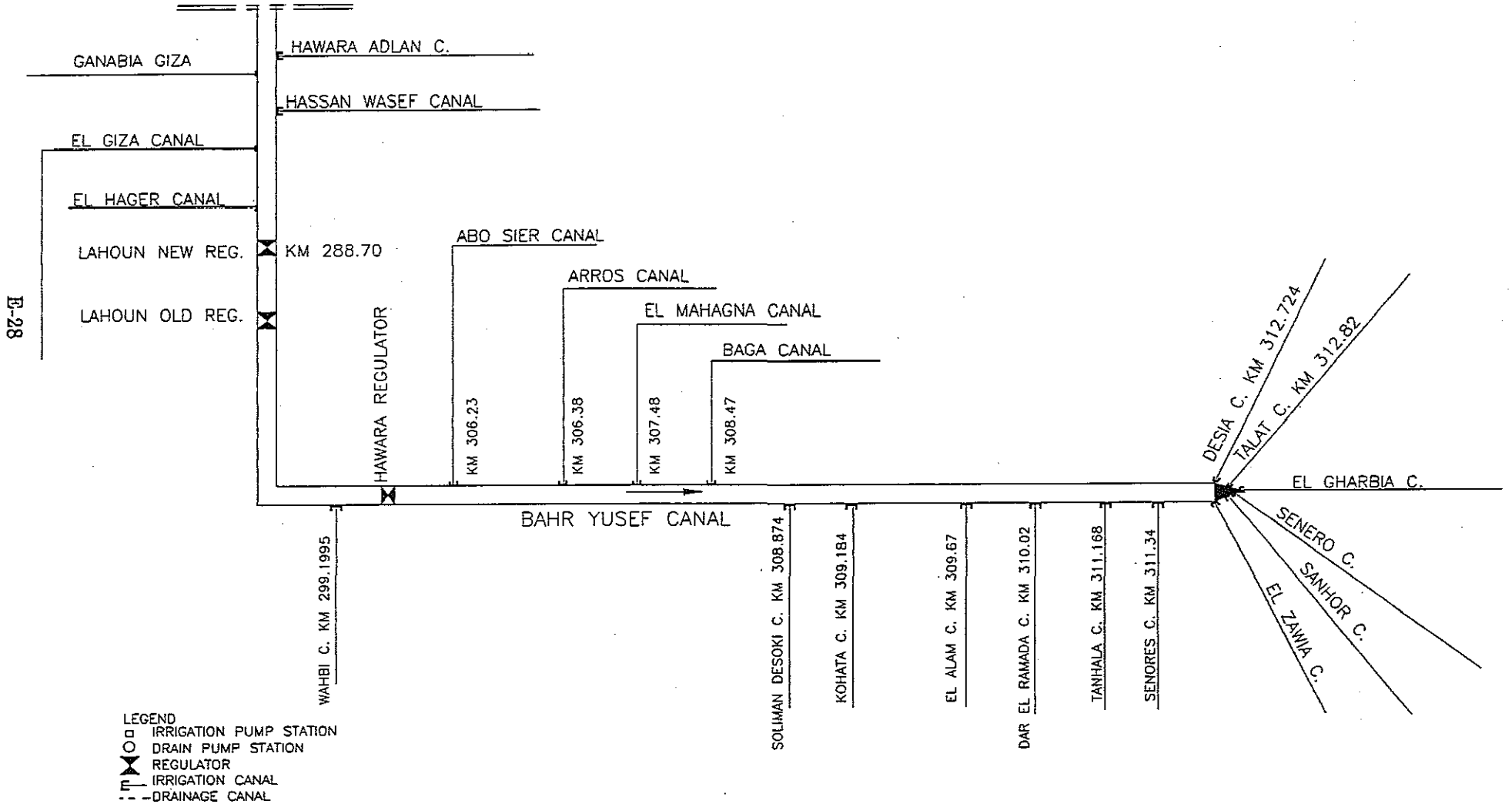


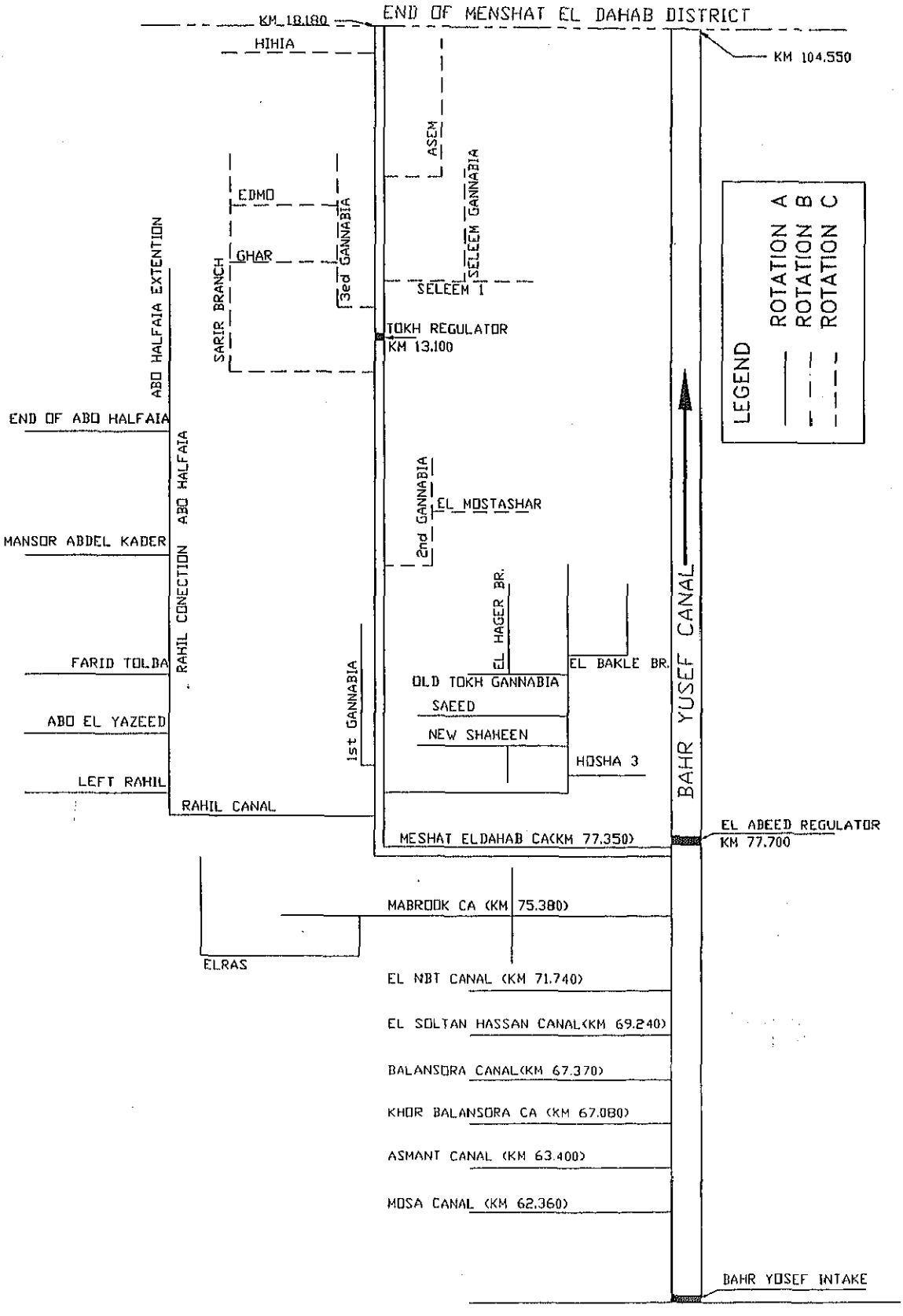
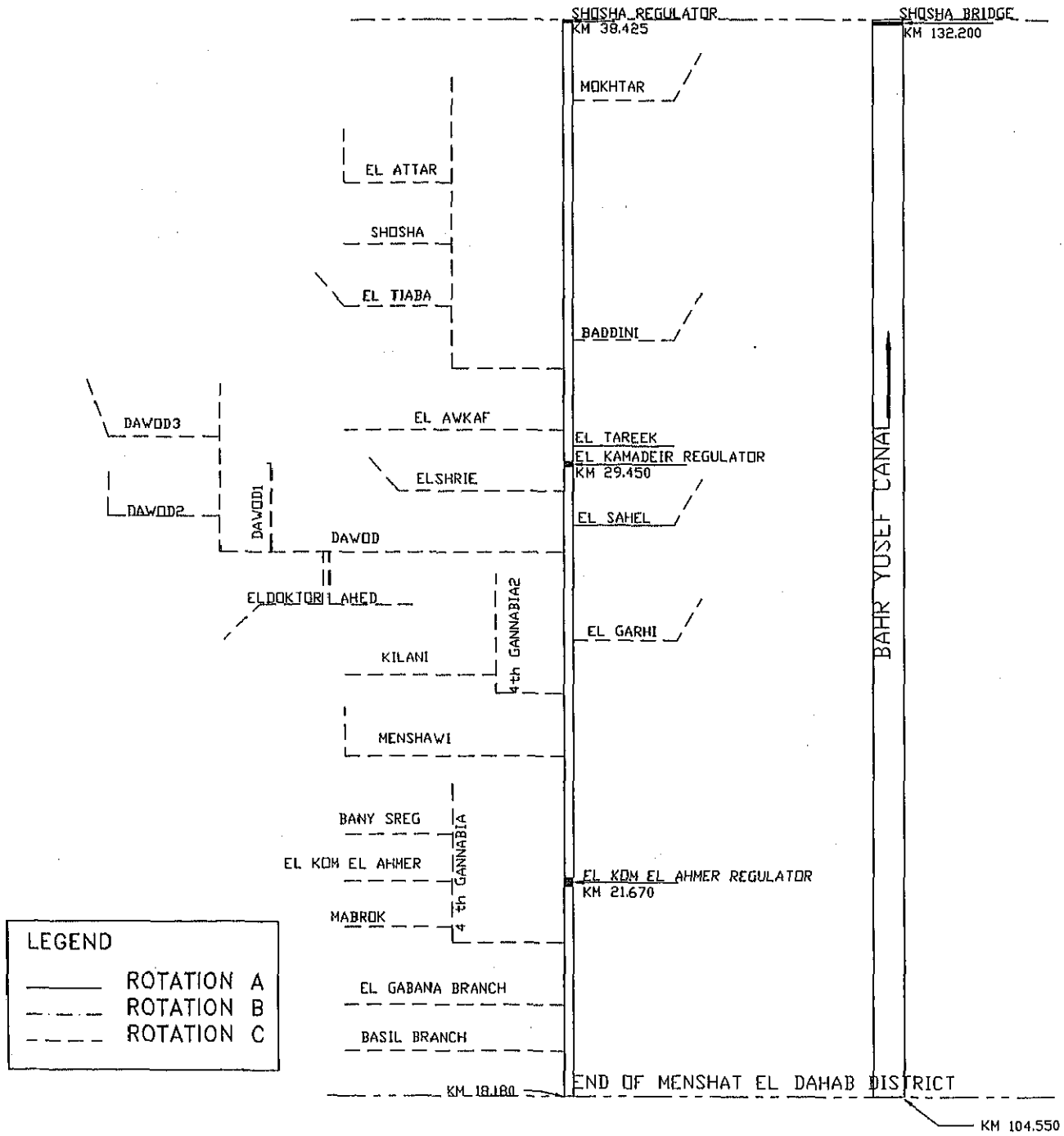


Figure F-2-14 Skeleton Map of Branch Canals of Bahr Yusef Canal



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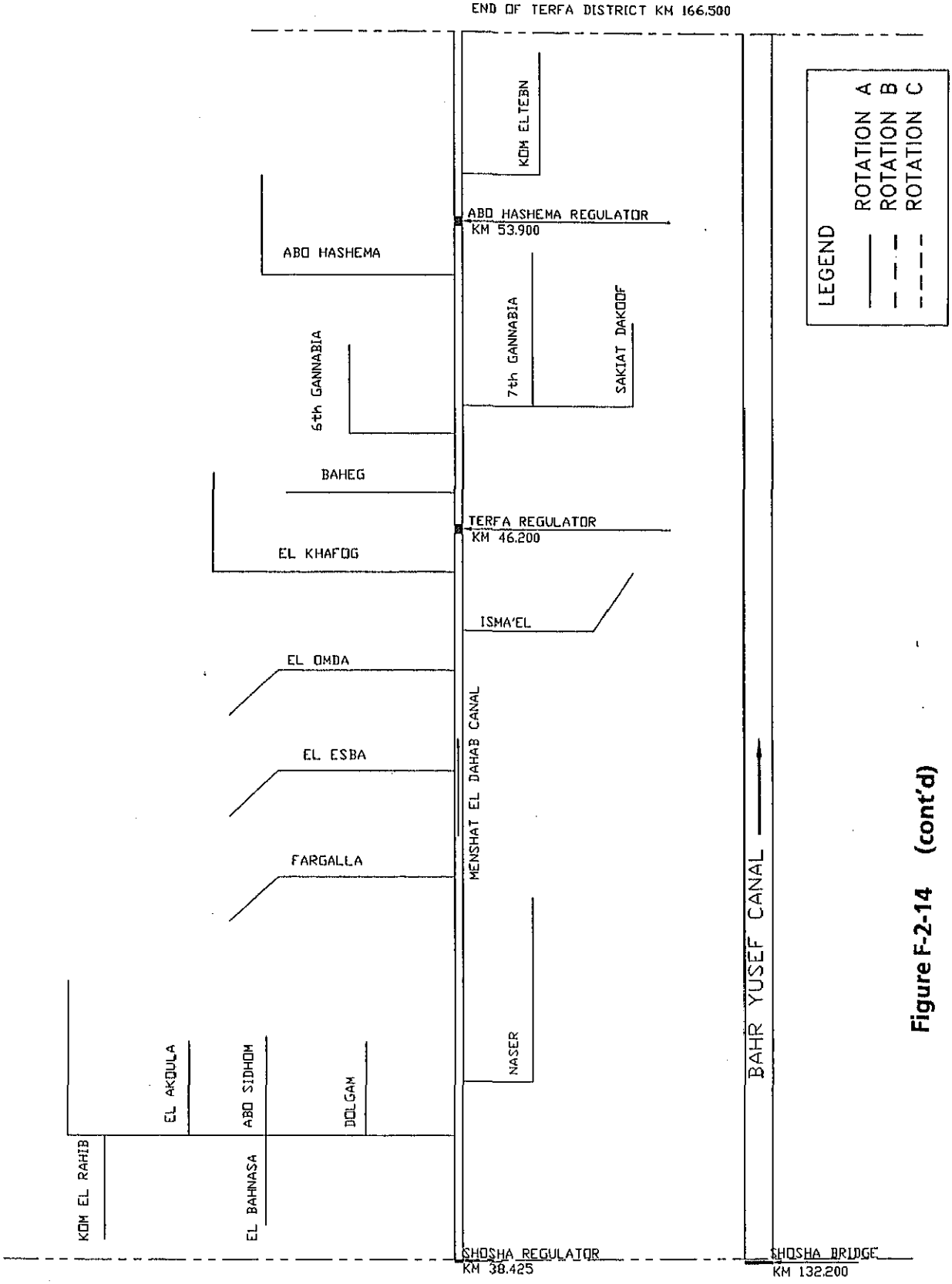


Figure F-2-14 (cont'd)

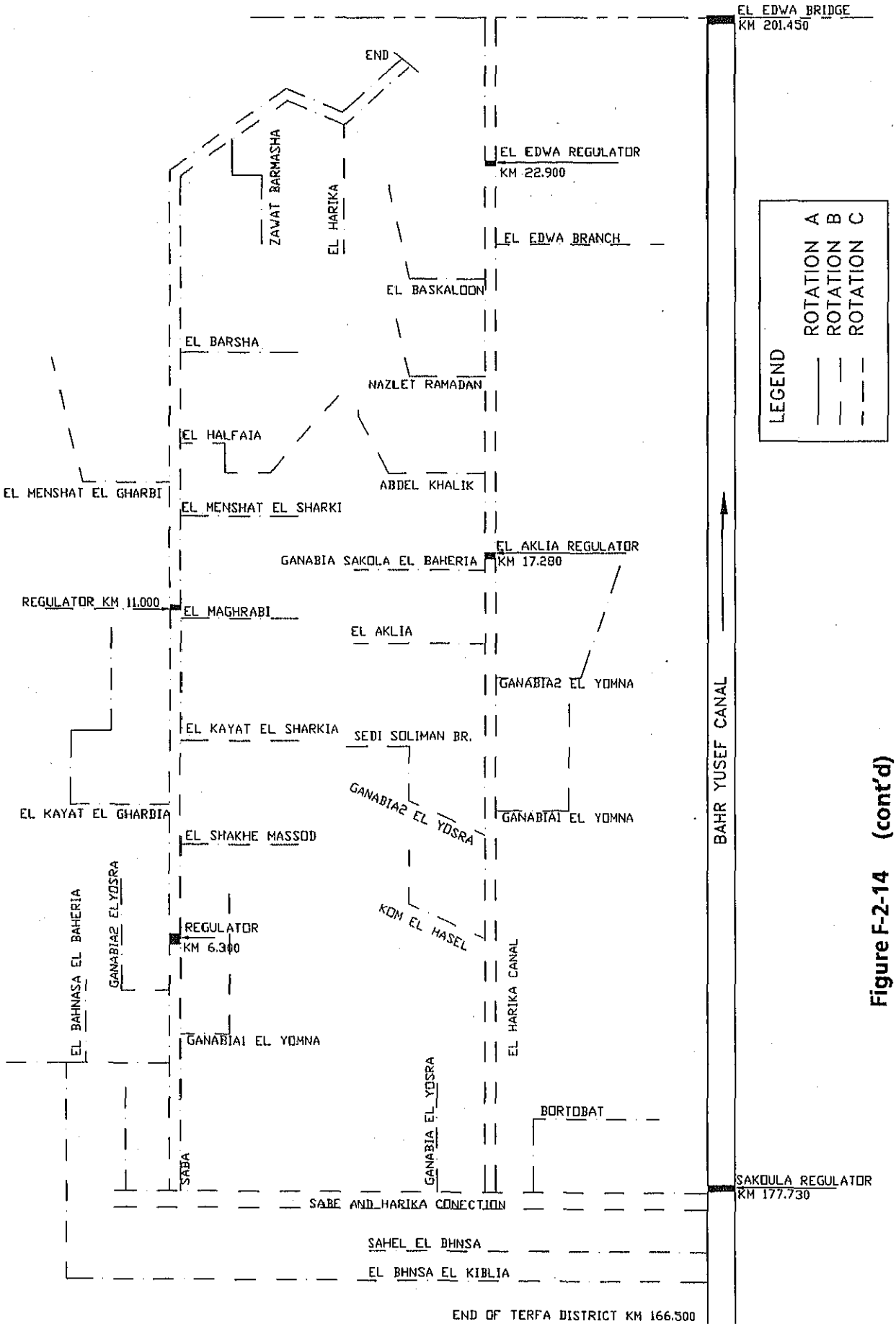
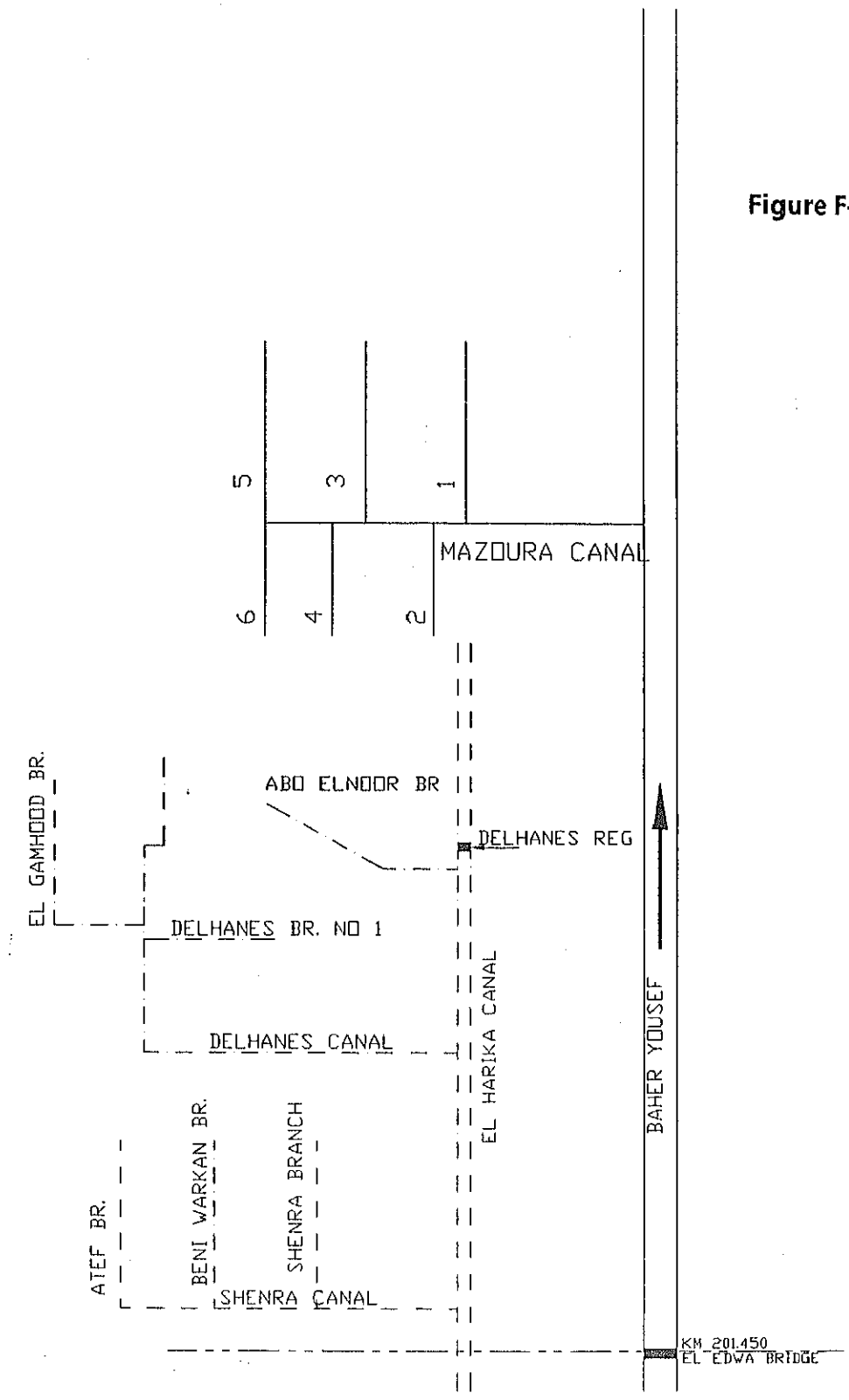


Figure F-2-14 (cont'd)

Figure F-2-14 (cont'd)



REACH NO 1 OF BENI SWAFE DISTRICT

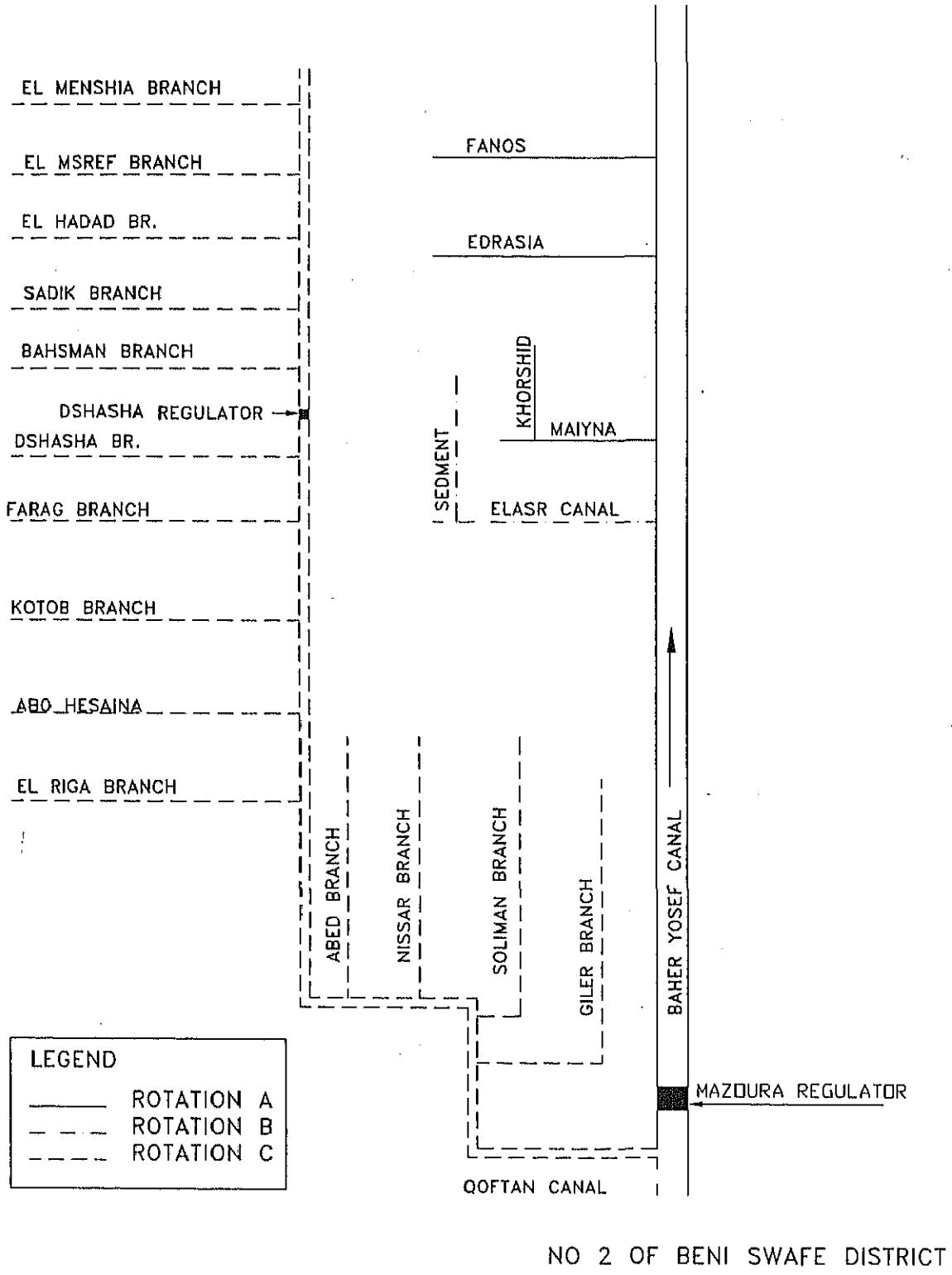


Figure F-2-14 (cont'd)

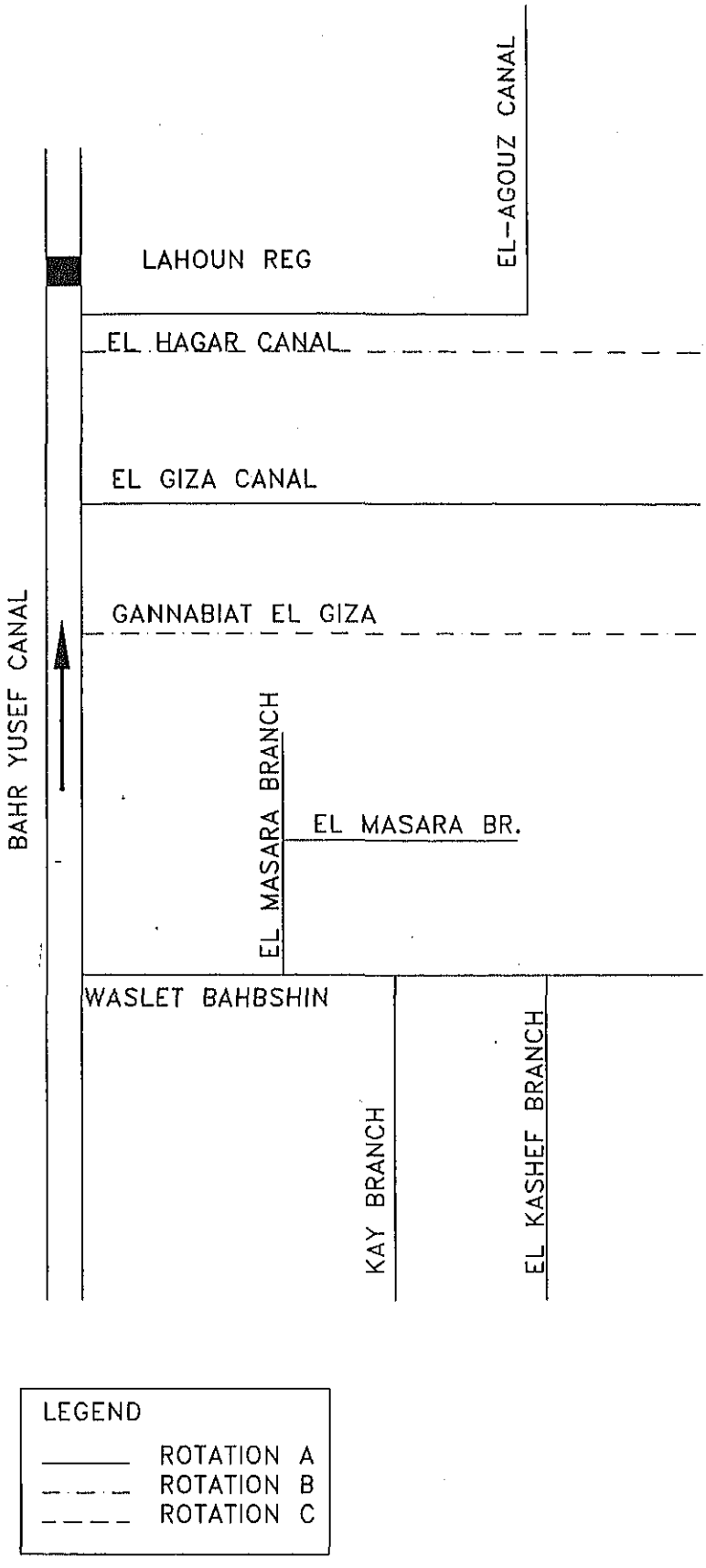


Figure F-2-14 (cont'd)

LEGEND

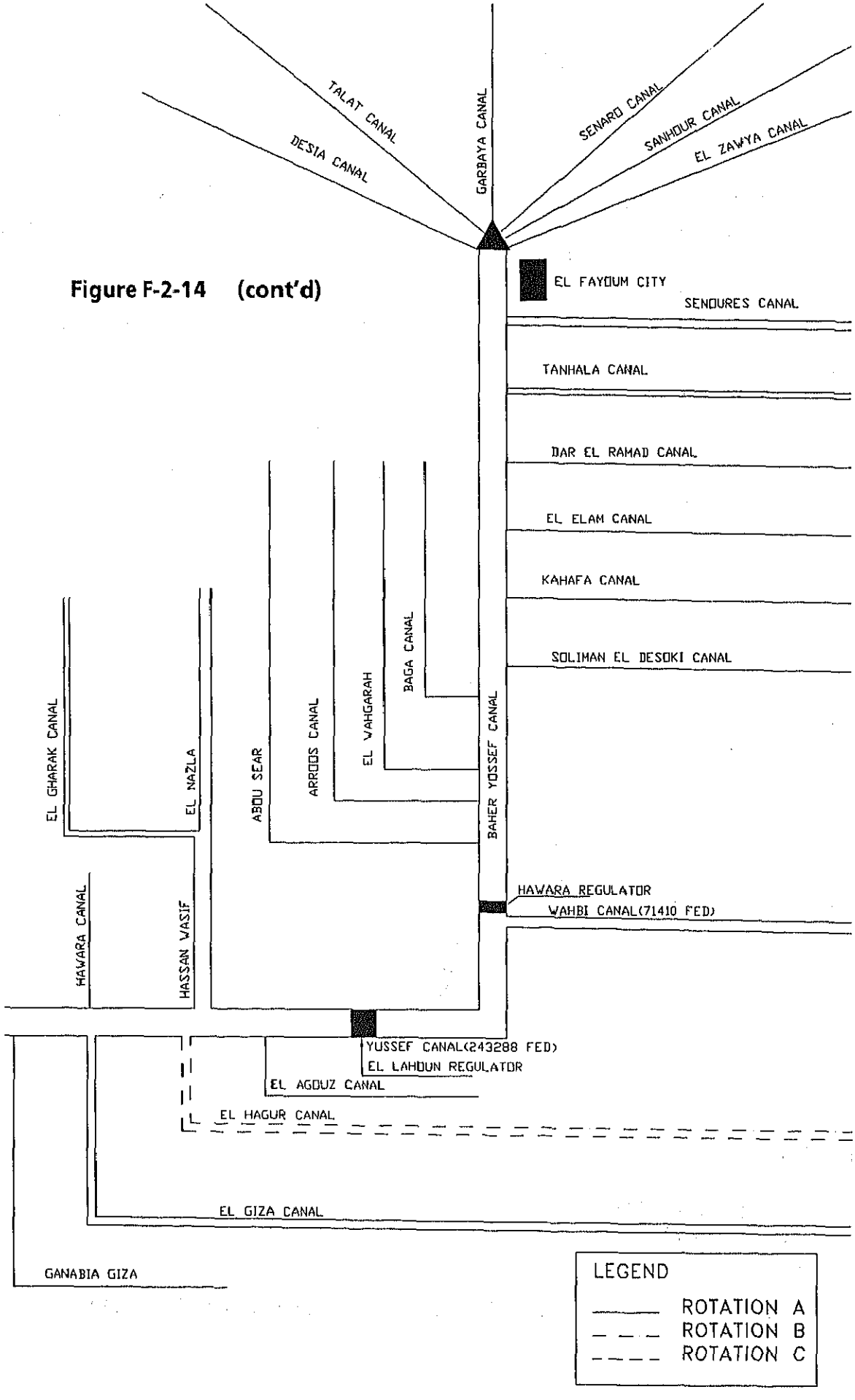
——— ROTATION A

– · – · – ROTATION B

– – – – ROTATION C

THE END REACH OF BENI SWAFE DISTRICT

Figure F-2-14 (cont'd)



EL FAYOUM DISTRICT

E-3 Proposed Irrigation Plan

Table E-3-1 ETcrop of Major Crops by Modified Penman Method

(unit: mm/month)

Crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Wheat (a)	299.7	460.1	735.1	545.8	0.0	0.0	0.0	0.0	0.0	0.0	48.2	203.2	2292.0
Wheat (b)	349.8	472.6	701.8	452.5	0.0	0.0	0.0	0.0	0.0	0.0	190.2	244.9	2411.7
Wheat (c)	367.2	467.1	571.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.4	250.1	1753.1
Broadbean (a)	371.6	457.3	170.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169.2	277.2	1445.9
Broadbean (b)	364.0	405.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	117.7	239.7	1127.2
Broadbean (c)	368.3	365.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.1	233.4	1029.7
S. Berseem (a)	343.3	265.8	0.0	0.0	0.0	0.0	0.0	0.0	258.3	504.2	384.0	326.2	2081.8
S. Berseem (b)	338.9	437.9	699.5	31.1	0.0	0.0	0.0	0.0	0.0	0.0	272.9	285.6	2065.9
S. Berseem (c)	335.6	438.0	22.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	247.2	278.3	1321.7
S. Berseem (d)	343.3	437.9	225.7	0.0	0.0	0.0	0.0	0.0	116.9	446.9	369.2	324.1	2264.0
L. Berseem (a)	335.6	437.9	699.5	467.0	0.0	0.0	0.0	0.0	0.0	86.9	299.7	292.9	2619.5
L. Berseem (b)	343.3	437.9	361.1	0.0	0.0	0.0	0.0	0.0	0.0	338.2	342.5	317.9	2140.8
L. Berseem (c)	341.1	437.9	609.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	283.6	292.9	1964.9
W. Onion (a)	336.7	421.2	333.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	218.5	296.0	1606.1
W. Vegetable (a)	372.7	186.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	285.2	260.9	324.1	1429.1
W. Vegetable (b)	372.7	185.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	135.7	198.0	298.1	1190.1
W. Other C. (a)	328.0	107.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	269.5	365.2	322.0	1392.0
W. Other C. (b)	368.3	386.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	230.1	322.0	1306.5
W. Other C. (c)	376.0	474.0	655.1	477.4	0.0	0.0	0.0	0.0	0.0	0.0	136.3	329.3	2448.1
Cotton (a)	0.0	0.0	48.1	338.0	661.1	1128.8	1322.8	548.4	0.0	0.0	0.0	0.0	4047.3
Cotton (b)	0.0	0.0	253.4	474.4	853.9	1221.3	1361.3	516.0	0.0	0.0	0.0	0.0	4680.2
S. Rice (a)	0.0	0.0	0.0	0.0	575.8	1232.4	1361.3	1217.3	997.0	0.0	0.0	0.0	5383.7
S. Maize (a)	0.0	0.0	0.0	0.0	0.0	407.8	1049.8	1054.0	0.0	0.0	0.0	0.0	2511.7
S. Maize (b)	0.0	0.0	0.0	66.4	375.3	880.8	1265.2	682.4	0.0	0.0	0.0	0.0	3270.0
S. Maize (c)	0.0	0.0	0.0	0.0	117.3	588.4	1230.5	809.1	0.0	0.0	0.0	0.0	2745.4
S. Maize (d)	0.0	0.0	0.0	0.0	93.0	521.8	1145.9	1143.5	353.4	0.0	0.0	0.0	3257.6
S. Sorghum (a)	0.0	0.0	0.0	0.0	0.0	337.7	926.8	1063.0	71.6	0.0	0.0	0.0	2399.1
S. Soybean (a)	0.0	0.0	0.0	0.0	0.0	666.1	1207.5	394.6	0.0	0.0	0.0	0.0	2268.2
Sesame (a)	0.0	0.0	0.0	0.0	143.9	703.2	1234.4	887.0	0.0	0.0	0.0	0.0	2968.5
S. Vegetable (a)	0.0	0.0	0.0	68.5	478.6	1051.0	719.0	0.0	0.0	0.0	0.0	0.0	2317.1
S. Vegetable (b)	0.0	0.0	0.0	73.5	420.1	880.8	1088.3	137.9	0.0	0.0	0.0	0.0	2600.6
S. Vegetable (c)	0.0	0.0	149.6	658.3	1184.4	285.7	0.0	0.0	0.0	0.0	0.0	0.0	2278.0
S. Vegetable (d)	0.0	0.0	0.0	0.0	0.0	163.8	684.5	1103.2	671.3	0.0	0.0	0.0	2622.8
S. Sunflower (a)	0.0	0.0	0.0	0.0	335.9	832.7	1234.4	392.3	0.0	0.0	0.0	0.0	2795.3
S. Fodder C. (a)	0.0	0.0	178.4	705.7	395.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1279.7
S. Oil Crops (a)	0.0	0.0	0.0	0.0	147.3	632.8	1211.3	242.4	0.0	0.0	0.0	0.0	2233.8
S. Other C. (a)	0.0	0.0	0.0	0.0	158.6	562.5	1053.7	876.2	0.0	0.0	0.0	0.0	2651.0
S. Other C. (b)	0.0	0.0	0.0	0.0	174.9	681.0	1257.5	376.9	0.0	0.0	0.0	0.0	2490.2
S. Other C. (c)	0.0	0.0	0.0	123.9	733.4	740.9	0.0	0.0	0.0	0.0	0.0	0.0	1598.2
S. Other C. (d)	0.0	0.0	0.0	97.9	433.8	773.5	1076.7	908.8	0.0	0.0	0.0	0.0	3290.6
N. Maize (a)	0.0	0.0	0.0	0.0	0.0	0.0	234.4	747.8	864.1	0.0	0.0	0.0	1846.4
N. Maize (b)	0.0	0.0	0.0	0.0	0.0	0.0	246.2	647.2	972.9	118.1	0.0	0.0	1984.4
N. Fodder C. (a)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	238.7	568.4	130.0	0.0	937.1
N. Vegetable (a)	0.0	0.0	0.0	0.0	0.0	0.0	411.5	878.6	1024.2	254.2	0.0	0.0	2568.5
N. Other C. (a)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	231.2	682.8	715.1	79.2	0.0	1708.3
N. Other C. (b)	0.0	0.0	0.0	0.0	0.0	0.0	355.0	868.5	939.6	203.6	0.0	0.0	2366.8
N. Other C. (c)	0.0	0.0	0.0	0.0	0.0	44.4	461.5	865.2	963.8	648.6	43.5	0.0	3026.9
Garden (a)	0.0	0.0	166.6	400.3	619.7	777.2	807.5	653.9	498.5	309.4	140.5	0.0	4373.6
Garden (b)	212.5	271.1	399.7	533.7	619.7	610.6	634.5	553.3	498.5	378.2	240.8	187.6	5140.3

Note : a - Wheat requirement (WR) type based on the cropping pattern, mainly for Minia area
b - do, mainly for Beni Suef area
c - do, mainly for Giza area
d - do, mainly for Faiyum area
However, in the case that cropping pattern was almost same notwithstanging difference areas, same WR rate is applied.

Table E-3-2 Command Area of Bahr Yusef Canal (by Governorate and Regulator)

(unit: feddan)

Governorate	Item	Intake to M. Dahab	M. Dahab to Sakoula	Sakoula to Mazoura	Mazoura to Lahoun	U. S of Lahoun Regulator	D. S of Lahoun Regulator	Total
Minia	Old land	72,926	39,175	2,000	0	0	0	114,101
	(%)	10.9	5.8	0.3	0.0	0.0	0.0	17.0
	Reclaimed A.	8,722	24,277	0	0	0	0	32,999
	(%)	19.9	55.4	0.0	0.0	0.0	0.0	75.3
	Expansion A.	0	0	0	0	0	0	0
	(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	81,648	63,452	2,000	0	0	0	147,100
	(%)	10.6	8.2	0.3	0.0	0.0	0.0	19.1
B. Suef	Old land	0	5,000	15,686	17,839	18,770	0	57,295
	(%)	0.0	0.7	2.3	2.7	2.8	0.0	8.5
	Reclaimed A.	0	0	10,850	0	0	0	10,850
	(%)	0.0	0.0	24.7	0.0	0.0	0.0	24.7
	Expansion A.	0	0	0	5,000	0	0	5,000
	(%)	0.0	0.0	0.0	8.9	0.0	0.0	8.9
	Total	0	5,000	26,536	22,839	18,770	0	73,145
	(%)	0.0	0.6	3.4	3.0	2.4	0.0	9.5
Faiyum	Old land	0	0	0	0	121,017	240,572	361,589
	(%)	0.0	0.0	0.0	0.0	18.1	35.9	53.9
	Reclaimed A.	0	0	0	0	0	0	0
	(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Expansion A.	0	0	0	0	17,500	22,500	40,000
	(%)	0.0	0.0	0.0	0.0	31.3	40.2	71.4
	Total	0	0	0	0	138,517	263,072	401,589
	(%)	0.0	0.0	0.0	0.0	18.0	34.2	52.1
Giza	Old land	0	0	0	0	137,300	0	137,300
	(%)	0.0	0.0	0.0	0.0	20.5	0.0	20.5
	Reclaimed A.	0	0	0	0	0	0	0
	(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Expansion A.	0	0	0	0	11,000	0	11,000
	(%)	0.0	0.0	0.0	0.0	19.6	0.0	19.6
	Total	0	0	0	0	148,300	0	148,300
	(%)	0.0	0.0	0.0	0.0	19.3	0.0	19.3
Total	Old land	72,926	44,175	17,686	17,839	277,087	240,572	670,285
	(%)	10.9	6.6	2.6	2.7	41.3	35.9	(100%)
	Reclaimed A.	8,722	24,277	10,850	0	0	0	43,849
	(%)	19.9	55.4	24.7	0	0	0	(100%)
	Expansion A.	0	0	0	5,000	28,500	22,500	56,000
	(%)	0	0	0	8.9	50.9	40.2	(100%)
	Total	81,648	68,452	28,536	22,839	305,587	263,072	770,134
	(%)	10.6	8.9	3.7	3	39.7	34.2	(100%)

Note: M. Dahab = Manshat El Dahab, U. S = Upstream, D. S = Downstream, A. = Area

Source: ID, MPWWR

Table E-3-3 Proposed Amount of Drinking Water etc.

1) Population and Water Requiremnt in 1990

Governorate	Present Population	Ratio (%)	q per Capita (lit/day)	Q (m3/day)
Minia	295,000	6.7	100	29,500
Beni Suef	197,000	4.5	100	19,700
Faiyum	1,544,000	35.4	100	154,400
Giza	2,330,000	53.4	100	233,000
Total	4,366,000	100%		436,600

2) Drinking Water for Animals

Governorate	Ratio (%)	Q (m3/day)
Minia	6.7	2,025
Beni Suef	4.5	1,360
Faiyum	35.4	10,699
Giza	53.4	16,140
Total	100%	30,224

3) Present Water Requirement

Governorate	Inhabitants (m3/day)	Animals (m3/day)	Total (m3/day)
Minia	29,500	2,025	31,525
Beni Suef	19,700	1,360	21,060
Faiyum	154,400	10,699	165,099
Giza	233,000	16,140	249,140
Total	436,600	30,224	466,824

4) Proposed Water Requirement

Governorate	Present	Proposed			
		Drinking	Industry	Total	
	(m3/day)	(m3/day)	(m3/day)	(m3/day)	(m3/sec)
Minia	31,525	63,050	31,525	94,575	1.09
Beni Suef	21,060	42,120	21,060	63,180	0.73
Faiyum	165,099	330,198	165,099	495,297	5.73
Giza	249,140	498,280	249,140	747,420	8.65
Total	466,824	933,648	466,824	1,400,472	16.21

Note: Q1 : Drinking water for inhabitants and animals
Q2 : Industrial water (50% of drinking water)

5) Water Requirement by Regulator

Section	Q (m3/sec)
Dairout to M. el Dahab	16.21
M. el Dahab to Sakoula	15.67
Sakoula to Mazoura	15.12
Mazoura to Lahoun	14.76

Table E-3-4 Proposed Net Water Requirement for Reclaimed Area (by Modified Penman Method)

(unit:1000m3/month)

Crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wheat	3,556	4,700	6,420	1,104	0	0	0	0	0	0	465	2,125
Berseem(L)	1,236	1,612	2,575	1,719	0	0	0	0	0	320	10	1,078
Sugarbeet	0	0	0	0	0	0	0	0	0	0	0	0
Alfalfa	1,339	1,707	704	0	0	0	0	0	0	860	1,332	1,258
W. Tomato	1,555	1,990	1,853	0	0	0	0	0	0	0	992	1,049
W. Onion	1,172	1,371	913	0	0	0	0	0	0	995	1,320	1,128
Garlic	909	1,108	894	0	0	0	0	0	0	0	526	795
Other W. Crops	674	859	971	0	0	0	0	0	0	0	420	544
S. Tomato	0	0	0	587	2,076	1,224	0	0	0	0	0	0
Groundnut	0	0	0	0	1,239	3,088	2,880	0	0	0	0	0
Other S. Crops	0	0	0	0	718	1,789	1,669	0	0	0	0	0
Sesame	0	0	0	0	458	2,236	3,925	2,820	0	0	0	0
Sunflower	0	0	0	166	538	596	203	0	0	0	0	0
Water Melon	0	0	0	0	1,011	3,614	5,733	2,036	0	0	0	0
Nepiagrass	0	0	0	0	0	0	0	0	0	0	0	0
Maize	0	0	0	0	0	1,709	4,399	4,417	0	0	0	0
Sordan	0	0	0	0	0	1,437	4,776	7,235	5,847	989	0	0
Garden	489	624	919	1,228	1,425	1,404	1,459	1,273	1,147	870	554	431
Total	10929	13971	15250	4805	7465	17096	25044	17780	6993	4034	5618	8408
36% up	16072	20546	22426	7066	10978	25141	36829	26147	10284	5932	8262	12365

Efficiency = 1/0.8 * 1/0.85 = 1/0.68

Crop	(1-LR)	Area
Wheat	0.98	9,604
Berseem(L)	0.94	3,461
Sugarbeet	0.98	0
Alfalfa	0.94	4,051
W. Tomato	0.95	3,809
W. Onion	0.89	3,038
Garlic	0.89	2,334
Other W. Crops	0.86	1,760
S. Tomato	0.95	1,670
Groundnut	0.96	2,559
Other S. Crops	0.95	1,467
Sesame	0.92	2,925
Sunflower	0.92	442
Water Melon	0.94	4,883
Nepiagrass	0.96	0
Maize	0.93	3897
Sordan	0.93	6080
Garden	0.92	2,116
Total		54096

Sectional Water Requirement in m3/sec

	from	Intake	M. Dahab	Sakoula	Mazoura	US	DS
	to	M. Dahab	Sakoula	Mazoura	Lahoun	Lahoun	Lahoun
	Total	(19.9%)	(55.4%)	(24.7%)	(0%)	(0%)	(0%)
M	(1000m3)	----------	----------	(m3/sec)	----------	----------	----------
Jan	16072	6.00	1.19	3.32	1.48	0	0	0
Feb	20546	7.67	1.53	4.25	1.89	0	0	0
Mar	22426	8.37	1.67	4.64	2.07	0	0	0
Apr	7066	2.64	0.53	1.46	0.65	0	0	0
May	10978	4.10	0.82	2.27	1.01	0	0	0
Jun	25141	9.39	1.87	5.20	2.32	0	0	0
Jul	36829	13.75	2.74	7.62	3.40	0	0	0
Aug	26147	9.76	1.94	5.41	2.41	0	0	0
Sep	10284	3.84	0.76	2.13	0.95	0	0	0
Oct	5932	2.21	0.44	1.22	0.55	0	0	0
Nov	8262	3.08	0.61	1.71	0.76	0	0	0
Dec	12365	4.62	0.92	2.56	1.14	0	0	0

Calculation of Leaching Water

Name of Crop	CEw (mmhos/cm)	ECe (mmhos/cm)	LR	(1-LR)
Wheat	0.6	8.0	0.02	0.98
Berseem(L)	0.6	2.3	0.06	0.94
Sugarbeet	0.6	7.0	0.02	0.98
Alfalfa	0.6	2.0	0.06	0.94
W. Tomato	0.6	2.5	0.05	0.95
W. Onion	0.6	1.2	0.11	0.89
Garlic	0.6	1.2	0.11	0.89
Other W. Crops	0.6	1.0	0.14	0.86
S. Tomato	0.6	2.5	0.05	0.95
Groundnut	0.6	3.2	0.04	0.96
Other S. Crops	0.6	2.5	0.05	0.95
Sesame	0.6	1.7	0.08	0.92
Sunflower	0.6	1.7	0.08	0.92
Water Melon	0.6	2.2	0.06	0.94
Nepiagrass	0.6	2.8	0.04	0.96
Maize	0.6	1.8	0.07	0.93
Sordan	0.6	1.8	0.07	0.93
Garden	0.6	1.7	0.08	0.92

Note: Salinity of water ECw of 600 mmhos/cm is applied due to the future mixed water use.

Sectional Discharge at Regulator in m3/sec

M	Total	Intake M. Dahab	Sakoula	Mazoura	Lahoun
Jan	6.00	6.00	4.81	1.48	0	0
Feb	7.67	7.67	6.14	1.89	0	0
Mar	8.37	8.37	6.70	2.07	0	0
Apr	2.64	2.64	2.11	0.65	0	0
May	4.10	4.10	3.28	1.01	0	0
Jun	9.39	9.39	7.52	2.32	0	0
Jul	13.75	13.75	11.01	3.40	0	0
Aug	9.76	9.76	7.82	2.41	0	0
Sep	3.84	3.84	3.08	0.95	0	0
Oct	2.21	2.21	1.77	0.55	0	0
Nov	3.08	3.08	2.47	0.76	0	0
Dec	4.62	4.62	3.70	1.14	0	0

Table E-3-5 Proposed Net Water Requirement for Expansion Planned Area

Net Water Requirement by M. Penman Method for Expansion Area

(unit:1000m3/month)

Crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wheat	2, 370	3, 132	4, 278	736	0	0	0	0	0	0	310	1, 416
Berseem(L)	2, 106	2, 749	4, 390	2, 931	0	0	0	0	0	545	17	1, 838
Sugarbeet	2, 932	3, 676	4, 980	0	0	0	0	0	0	1, 211	1, 826	2, 594
Alfalfa	1, 421	1, 812	747	0	0	0	0	0	0	913	1, 414	1, 335
W. Tomato	1, 511	1, 933	1, 800	0	0	0	0	0	0	0	964	1, 019
W. Onion	926	1, 083	722	0	0	0	0	0	0	786	1, 043	891
Garlic	818	997	805	0	0	0	0	0	0	0	474	716
Other W. Crops	325	415	469	0	0	0	0	0	0	0	203	263
S. Tomato	0	0	0	1, 882	6, 651	3, 920	0	0	0	0	0	0
Groundnut	0	0	0	0	920	2, 293	2, 139	0	0	0	0	0
Other S. Crops	0	0	0	0	444	1, 159	2, 227	1, 713	150	0	0	0
Sesame	0	0	0	0	297	1, 452	2, 549	1, 832	0	0	0	0
Sunflower	0	0	0	1, 221	3, 953	4, 380	1, 491	0	0	0	0	0
Water Melon	0	0	0	0	704	2, 517	3, 992	1, 418	0	0	0	0
Nepiagrass	0	0	0	0	0	0	2, 363	2, 646	2, 384	875	0	0
Maize	0	0	0	0	0	1, 469	3, 782	3, 797	0	0	0	0
Sordan	0	0	0	0	0	898	2, 985	4, 522	3, 654	618	0	0
Garden	1, 132	1, 444	2, 129	2, 843	3, 301	3, 252	3, 379	2, 947	2, 655	2, 014	1, 283	999
Total	13541	17241	20320	9612	16269	21340	24907	18873	8844	6962	7532	11071
1/0. 68 up	19913	25354	29882	14135	23925	31382	36628	27754	13006	10238	11076	16281

Note: Irrigation efficiency of 0.68 is applied.
Also, leaching water is added in the above calculation.

Crop	(1-LR)	Area
Wheat	0. 97	6, 400
Berseem(L)	0. 88	5, 900
Sugarbeet	0. 96	7, 600
Alfalfa	0. 86	4, 300
W. Tomato	0. 89	3, 700
W. Onion	0. 74	2, 400
Garlic	0. 74	2, 100
Other W. Crops	0. 67	850
S. Tomato	0. 89	5, 350
Groundnut	0. 92	1, 900
Other S. Crops	0. 89	1, 550
Sesame	0. 83	1, 900
Sunflower	0. 83	3, 250
Water Melon	0. 87	3, 400
Nepiagrass	0. 90	2, 500
Maize	0. 84	3350
Sordan	0. 84	3800
Garden	0. 83	4, 900
		65150

Sectional Water Requirement in m3/sec

M	from to Total (1000m3)	Intake M. Dahab (0%)	M. Dahab Sakoula (0%)	Sakoula Mazoura (0%)	Mazoura Lahoun (8. 9%)	U. S Lahoun (50. 9%)	D. S Lahoun (0. 402)
		(m3/sec)					
Jan	19913	7. 43	0	0	0	0. 66	3. 78	2. 99
Feb	25354	9. 47	0	0	0	0. 84	4. 82	3. 81
Mar	29882	11. 16	0	0	0	0. 99	5. 68	4. 49
Apr	14135	5. 28	0	0	0	0. 47	2. 69	2. 12
May	23925	8. 93	0	0	0	0. 79	4. 55	3. 59
Jun	31382	11. 72	0	0	0	1. 04	5. 97	4. 71
Jul	36628	13. 68	0	0	0	1. 22	6. 96	5. 50
Aug	27754	10. 36	0	0	0	0. 92	5. 27	4. 16
Sep	13006	4. 86	0	0	0	0. 43	2. 47	1. 95
Oct	10238	3. 82	0	0	0	0. 34	1. 94	1. 54
Nov	11076	4. 14	0	0	0	0. 37	2. 11	1. 66
Dec	16281	6. 08	0	0	0	0. 54	3. 09	2. 44

Sectional Discharge at Regulator in m3/sec

M	Total	Intake	M. Dahab	Sakoula	Mazoura	Lahoun
Jan	7. 43	7. 43	7. 43	7. 43	7. 43	2. 99
Feb	9. 47	9. 47	9. 47	9. 47	9. 47	3. 81
Mar	11. 16	11. 16	11. 16	11. 16	11. 16	4. 49
Apr	5. 28	5. 28	5. 28	5. 28	5. 28	2. 12
May	8. 93	8. 93	8. 93	8. 93	8. 93	3. 59
Jun	11. 72	11. 72	11. 72	11. 72	11. 72	4. 71
Jul	13. 68	13. 68	13. 68	13. 68	13. 68	5. 50
Aug	10. 36	10. 36	10. 36	10. 36	10. 36	4. 16
Sep	4. 86	4. 86	4. 86	4. 86	4. 86	1. 95
Oct	3. 82	3. 82	3. 82	3. 82	3. 82	1. 54
Nov	4. 14	4. 14	4. 14	4. 14	4. 14	1. 66
Dec	6. 08	6. 08	6. 08	6. 08	6. 08	2. 44

Table E-3-6 ETcrop and Irrigation Days for Expansion Planned Area

ETcrop by M. Penman Method for EXPANSION AREA

(unit: m3/feddan/month)

Crop Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Wheat	362.9	479.6	655.1	112.7	0.0	0.0	0.0	0.0	0.0	0.0	47.4	216.8	1874.5
Berseem(L)	335.6	437.9	699.5	467	0.0	0.0	0.0	0.0	0.0	86.9	2.7	292.9	2322.5
Sugarbeet	378.1	474.0	642.2	0.0	0.0	0.0	0.0	0.0	0.0	166.1	235.5	334.5	2220.4
Alfalfa	310.6	396.2	163.3	0.0	0.0	0.0	0.0	0.0	0.0	199.6	309.0	291.8	1670.5
W. Tomato	387.9	496.2	462.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	247.5	261.6	1855.3
W. Onion	343.3	401.7	267.6	0.0	0.0	0.0	0.0	0.0	0.0	291.4	386.6	330.4	2021.0
Garlic	346.5	422.6	341.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.7	303.3	1614.1
Other W. Crops	329.1	419.8	474.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	205.1	265.8	1694.3
S. Tomato	0.0	0.0	0.0	334.1	1181.0	696.1	0.0	0.0	0.0	0.0	0.0	0.0	2211.2
Groundnut	0.0	0.0	0.0	0.0	464.9	1158.4	1080.6	0.0	0.0	0.0	0.0	0.0	2703.9
Other S. Crops	0.0	0.0	0.0	0.0	271.9	710.6	1365.1	1049.6	92.2	0.0	0.0	0.0	3489.4
Sesame	0.0	0.0	0.0	0.0	143.9	703.2	1234.4	887	0.0	0.0	0.0	0.0	2968.5
Sunflower	0.0	0.0	0.0	345.5	1119.0	1239.8	422.0	0.0	0.0	0.0	0.0	0.0	3126.3
Watre Melon	0.0	0.0	0.0	0.0	194.6	695.8	1103.6	391.9	0.0	0.0	0.0	0.0	2385.9
Nepiagrass	0.0	0.0	0.0	0.0	0.0	0.0	907.5	1016.1	915.5	336.0	0.0	0.0	3175.1
Sordan	0.0	0.0	0.0	0.0	0.0	219.8	730.6	1106.6	894.3	151.3	0.0	0.0	3102.6

Irrigation Days of New Expansion Area

(unit:days)

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
	31	28	31	30	31	30	31	31	30	31	30	31	365
Wheat	31	28	31	10	-	-	-	-	-	-	6	31	137
Berseem(L)	31	28	31	30	3	-	-	-	-	6	30	31	190
Sugarbeet	31	28	27	-	-	-	-	-	-	16	30	31	163
Alfalfa	31	28	8	-	-	-	-	-	-	18	30	31	146
W. Tomat	31	28	25	-	-	-	-	-	-	-	30	31	145
W. Onion	31	28	15	-	-	-	-	-	-	27	30	31	162
Garlic	31	28	19	-	-	-	-	-	-	-	25	31	134
Other W. Crops	31	28	23	-	-	-	-	-	-	-	25	31	138
S. Tomato	-	-	-	26	31	19	-	-	-	-	-	-	76
Groundnut	-	-	-	-	26	30	31	9	-	-	-	-	96
Other S. Crops	-	-	-	-	24	30	31	31	5	-	-	-	121
Sesame	-	-	-	-	15	30	31	10	-	-	-	-	86
Sunflower	-	-	-	23	31	30	21	-	-	-	-	-	105
Water Melon	-	-	-	-	16	30	31	15	-	-	-	-	92
Nepiagrass	-	-	-	-	-	-	31	31	30	15	-	-	107
Sordan	-	-	-	-	-	18	31	31	30	11	-	-	121

Table E-3-7 Study of Existing Drainage Pump Capacity

Calculation of Drainage Pump Capacity
(in July)

No.	Pump Station	No. of pump	Capacity per unit	Total (1) Capacity (m3/sec)	Total Capacity (2) (m3/sec)	(MCM/day)	(MCM/month)	Remarks
1	El Badraman	3	2.00	6.00	4.00	0.346	10.368	
		4	2.50	10.00	7.50	0.648	19.440	
2	Kabkab	5	2.90	14.50	11.60	1.002	30.067	*
3	Tona el Gabel	4	0.60	2.40	1.80	0.156	4.666	
4	M. el Dahab	3	1.63	4.89	3.26	0.282	8.450	
5	Beni Mazar	4	3.00	12.00	9.00	0.778	23.328	
6	Dier el sankoria	4	3.50	14.00	10.50	0.907	27.216	
7	Abu Raheb	4	3.80	15.20	11.40	0.985	29.549	*
8	Sakoula	4	4.50	18.00	13.50	1.166	34.992	
9	Mazoura	3	3.57	10.71	7.14	0.617	18.507	
	Total	38		107.70	79.70	6.886	206.582	
	Within B.Y Command Area			78.00	56.70	4.899	146.966	

Note: (1) : Excluding stand by pump
(2) : Including stand by pump
Above capacity is in case that after perairing works will be implemented.
* mark means the pump station is not in the Bahr Yusef Command area.

Analysis of Pump Capacity
(in July)

(unit:m3/sec)

Section from	Section to	Total (1) Pump Capacity	Total (2) Pump Capacity	Drainage Amount	Addt' l Drainage Amount	Total Drainage Amount
Dairout	M. E. Dahab	13.30	18.40	9.93	1.57	11.50
M. E. Dahab	Sakoula	22.76	30.89	5.57	0.95	6.52
Sakoula	Mazoura	13.50	18.00	3.41	0.38	3.79
Mazoura	Lahoun	7.14	10.71	3.06	8.42	11.48
Downstream of Lahoun			8.45	1.88	6.57	8.45
Total		56.70	78.00	23.85	17.89	33.29

Note: (1) : excluding stand by pump
(2) : including stand by pump
Additional drainage amount dose not includ darin discharge of 2.08 m3/sec
due to location of expansion planned is downstream of the pump station.

Table E-3-8 Proposed Overall Irrigation Efficiency

(Proposed Plan)

(unit:m3/sec)

M	Net Water Requirement					Total Water Supply	Over All Irrigation Efficiency
	Old Land	Drinking etc.	Reclamed Land	Expansion Planned	Total		
Jan	60.81	16.21	3.83	4.79	85.64	121.23	70.64%
Feb	79.36	16.21	5.43	6.75	107.75	152.89	70.48
Mar	86.74	16.21	5.39	7.22	115.55	166.39	69.45
Apr	57.48	16.21	1.75	3.47	78.92	110.71	71.28
May	70.27	16.21	2.62	5.69	94.79	135.09	70.17
Jun	100.77	16.21	6.19	7.70	130.87	189.10	69.20
Jul	160.23	16.21	8.74	8.70	193.89	284.99	68.03
Aug	140.62	16.21	6.17	6.58	169.57	248.13	68.34
Sep	92.52	16.21	2.50	3.19	114.43	164.27	69.66
Oct	31.04	16.21	1.39	2.44	51.07	68.99	74.03
Nov	40.85	16.21	2.00	2.72	61.78	84.96	72.71
Dec	48.14	16.21	2.93	3.90	71.19	99.43	71.60
Total	968.84	194.52	48.93	63.15	1,275.44	1,826.19	69.84

Note : Total Water Supply = ② + ⑪ ～ ⑮ in Table E-3-9

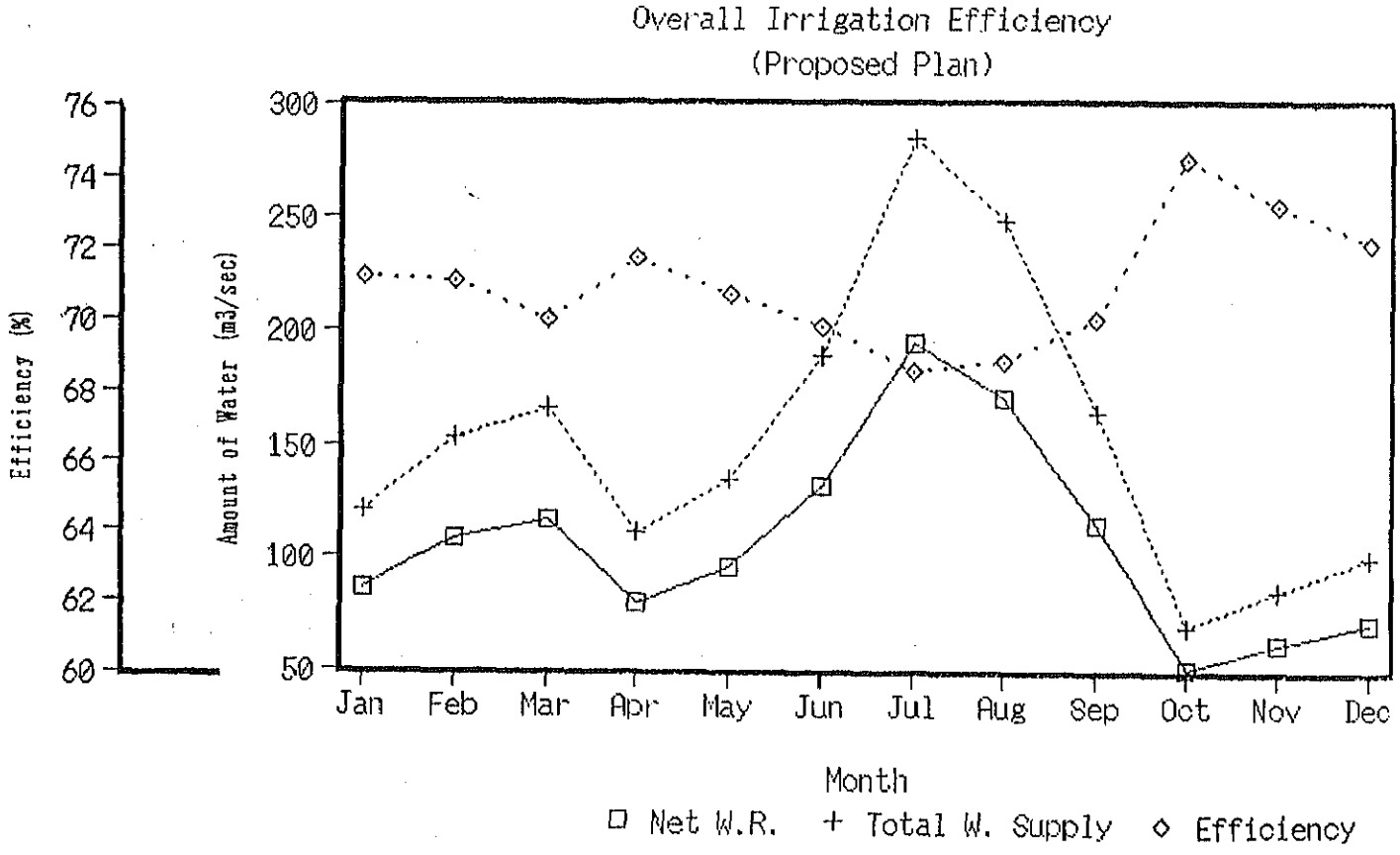


Table E-3-9 Calculation of Proposed Intake Water (at Dairout Barrage)

(unit:m3/sec)

	NWR based on FAO ①	G. Water Contrbtn. ② 1*0.1	Differ-ence ③ 1-2	GWR ④ 3/0.8	Farmer's Gain W. ⑤	Difference ⑥ 4-5	DWR ⑦ 6/0.8	Drink-ing etc. ⑧
Jan	60.81	6.08	54.73	68.41	0.00	68.41	85.51	16.21
Feb	79.36	7.94	71.43	89.28	0.00	89.28	111.60	16.21
Mar	86.74	8.67	78.06	97.58	0.00	97.58	121.97	16.21
Apr	57.48	5.75	51.73	64.67	0.00	64.67	80.83	16.21
May	70.27	7.03	63.25	79.06	0.00	79.06	98.82	16.21
Jun	100.77	10.08	90.69	113.36	0.00	113.36	141.71	16.21
Jul	160.23	16.02	144.21	180.26	0.00	180.26	225.33	16.21
Aug	140.62	14.06	126.55	158.19	0.00	158.19	197.74	16.21
Sep	92.52	9.25	83.27	104.09	0.00	104.09	130.11	16.21
Oct	31.04	3.10	27.94	34.92	0.00	34.92	43.65	16.21
Nov	40.85	4.08	36.76	45.96	0.00	45.96	57.44	16.21
Dec	48.14	4.81	43.33	54.16	0.00	54.16	67.70	16.21

	NRA ⑨	NRA in Future ⑩	Gain W. by DPS ⑪	Gain W. by Grvty ⑫	Gain W. from NRA ⑬	Addtnl. Q by DPS ⑭	Balance (m3/sec) ⑮	Intake W. (MCM/day) ⑯	
Jan	6.00	7.43	14.81	0.74	3.47	0.00	96.13	8.31	
Feb	7.67	9.47	21.61	0.74	3.47	0.00	119.13	10.29	
Mar	8.37	11.16	24.70	0.74	3.47	0.00	128.80	11.13	
Apr	2.64	5.28	24.49	0.74	3.47	0.00	76.26	6.59	
May	4.10	8.93	21.32	0.74	3.47	0.00	102.53	8.86	
Jun	9.39	11.72	20.89	0.74	3.47	9.07	144.86	12.52	
Jul	13.75	13.68	23.84	0.74	3.47	14.42	226.50	19.57	Max
Aug	9.76	10.36	23.66	0.74	3.47	12.66	193.55	16.72	
Sep	3.84	4.86	28.15	0.74	3.47	0.00	122.66	10.60	
Oct	2.21	3.82	28.57	0.74	3.47	0.00	33.11	2.86	Min
Nov	3.08	4.14	33.19	0.74	3.47	0.00	43.47	3.76	
Dec	4.62	6.08	33.86	0.74	3.47	0.00	56.54	4.89	

Note: NWR based on FAO = net water requiremnt by modified Penman equation based on FAO Irrigation and Drainage Paper #24

G. Water Contrbtn. = ground water contribution, 10% of net water requirement

GWR = gross water requirement, on-farm irrigation efficiency 80%

Farmer's Gain W. = Farmer's gain water from drain = 0% of GWR during Jun to Aug.

DWR = diversion water requiement, conveyance efficiency of 20%

Dirnking etc. = drinking and industrial water etc., two (2) times of present estimated amount

NRA = based on the proposed cropping pattern by the JICA study team

NRA in Future = based on the proposed cropping pattern on the expansion planned by the JICA study team

Gain W. by DPS = gain water by 9 Drainage Pump Stations (DPS) related to Bahr Yusef canal and 2 DPS in Faiyum

Gain W. by grvty = gain of drain water by gravity in Faiyum

Gain W. from NRL = reuse of water from expansion area of 56000 feddan
= 1.5 mm/day * 56000 feddan * 0.85 * 4200 m2/feddan / 86400
= 3.47 m3/sec

Addtnl. Q by DPS = additional reuse water by proposed drainage pump stations

⑭=⑦+⑧+⑨+⑩-⑪-⑫-⑬-⑭

Table E-3-10 Calculation of Proposed Discharge at Manshat El Dahab Regulator

(unit:m3/sec)

	NWR based on FAO ①	G. Water Contrbtn. ② 1*0.1	Differ-ence ③ 1-2	GWR ④ 3/0.8	Farmer's Gain W. ⑤	Difference ⑥ 4-5	DWR ⑦ 6/0.8	Drink-ing etc. ⑧
Jan	54.18	5.42	48.76	60.95	0.00	60.95	76.19	15.66
Feb	70.71	7.07	63.64	79.55	0.00	79.55	99.44	15.66
Mar	77.29	7.73	69.56	86.95	0.00	86.95	108.69	15.66
Apr	51.21	5.12	46.09	57.61	0.00	57.61	72.01	15.66
May	62.61	6.26	56.35	70.44	0.00	70.44	88.05	15.66
Jun	89.79	8.98	80.81	101.01	0.00	101.01	126.27	15.66
Jul	142.76	14.28	128.48	160.60	0.00	160.60	200.76	15.66
Aug	125.29	12.53	112.76	140.95	0.00	140.95	176.19	15.66
Sep	82.44	8.24	74.20	92.75	0.00	92.75	115.93	15.66
Oct	27.66	2.77	24.89	31.12	0.00	31.12	38.90	15.66
Nov	36.40	3.64	32.76	40.95	0.00	40.95	51.19	15.66
Dec	42.89	4.29	38.60	48.25	0.00	48.25	60.31	15.66

	NRA ⑨	NRA in Future ⑩	Gain W. by DPS ⑪	Gain W. by Grvty ⑫	Gain W. from NRA ⑬	Addtnl. Q by DPS ⑭	Balance (m3/sec) ⑮	Intake W. (MCM/day) ⑯	
Jan	4.80	7.43	10.12	0.74	3.47	0.00	89.75	7.75	
Feb	6.14	9.47	11.71	0.74	3.47	0.00	114.79	9.92	
Mar	6.71	11.16	15.51	0.74	3.47	0.00	122.50	10.58	
Apr	2.11	5.28	15.16	0.74	3.47	0.00	75.69	6.54	
May	3.28	8.93	11.94	0.74	3.47	0.00	99.77	8.62	
Jun	7.52	11.72	11.75	0.74	3.47	8.08	137.13	11.85	
Jul	11.02	13.68	13.91	0.74	3.47	12.85	210.15	18.16	Max
Aug	7.82	10.36	13.54	0.74	3.47	11.28	181.00	15.64	
Sep	3.08	4.86	17.86	0.74	3.47	0.00	117.46	10.15	
Oct	1.77	3.82	17.52	0.74	3.47	0.00	38.42	3.32	Min
Nov	2.47	4.14	21.85	0.74	3.47	0.00	47.40	4.10	
Dec	3.70	6.08	21.80	0.74	3.47	0.00	59.74	5.16	

Note: NWR based on FAO = net water requiremnt by modefied Penman equation based on FAO Irrigation and Drainage Paper #24

G. Water Contrbtn. = ground water contribution, 10% of net water requirement

GWR = gross water requirement, on-farm irrigation efficiency 80%

Farmer's Gain W. = Farmer's gain water from drain = 0% of GWR during Jun to Aug.

DWR = diversion water requiement, conveyance efficiency of 20%

Dirnking etc. = drinking and industrial water etc., two (2) times of present estimated amount

NRA = based on the proposed cropping pattern by the JICA study team

NRA in Future = based on the proposed cropping pattern on the expansion planned by the JICA study team

Gain W. by DPS = gain water by 9 Drainage Pump Stations (DPS) related to Bahr Yusef canal and 2 DPS in Faiyum

Gain W. by grvty = gain of drain water by gravity in Faiyum

Gain W. from NRL = reuse of water from expansion area of 56000 feddan
= 1.5 mm/day * 56000 feddan * 0.85 * 4200 m2/feddan / 86400
= 3.47 m3/sec

Addtnl. Q by DPS = additional reuse water by proposed drainage pump stations
⑭=⑦+⑧+⑨+⑩-⑪-⑫-⑬-⑭

Table E-3-11 Calculation of Proposed Discharge at Sakoula Regulator

(unit:m3/sec)

	NWR based on FAO ①	G. Water Contrbtn. ② 1*0.1	Differ-ence ③ 1-2	GWR ④ 3/0.8	Farmer's Gain W. ⑤	Difference ⑥ 4-5	DWR ⑦ 6/0.8	Drink-ing etc. ⑧
Jan	50.17	5.02	45.15	56.44	0.00	56.44	70.55	15.12
Feb	65.47	6.55	58.92	73.65	0.00	73.65	92.07	15.12
Mar	71.57	7.16	64.41	80.52	0.00	80.52	100.65	15.12
Apr	47.42	4.74	42.68	53.35	0.00	53.35	66.68	15.12
May	57.97	5.80	52.17	65.22	0.00	65.22	81.52	15.12
Jun	83.14	8.31	74.83	93.53	0.00	93.53	116.92	15.12
Jul	132.19	13.22	118.97	148.71	0.00	148.71	185.89	15.12
Aug	116.01	11.60	104.41	130.51	0.00	130.51	163.14	15.12
Sep	76.33	7.63	68.70	85.87	0.00	85.87	107.34	15.12
Oct	25.61	2.56	23.05	28.81	0.00	28.81	36.01	15.12
Nov	33.70	3.37	30.33	37.91	0.00	37.91	47.39	15.12
Dec	39.71	3.97	35.74	44.67	0.00	44.67	55.84	15.12

	NRA ⑨	EA in Future ⑩	Gain W. by DPS ⑪	Gain W. by Grvty ⑫	Gain W. from EA ⑬	Addtnl. Q by DPS ⑭	Balance (m3/sec) ⑮	Intake W. (MCM/day) ⑯	
Jan	1.48	7.43	6.50	0.74	3.47	0.00	83.87	7.25	
Feb	1.89	9.47	6.82	0.74	3.47	0.00	107.52	9.29	
Mar	2.07	11.16	9.97	0.74	3.47	0.00	114.82	9.92	
Apr	0.65	5.28	9.67	0.74	3.47	0.00	73.85	6.38	
May	1.01	8.93	7.22	0.74	3.47	0.00	95.15	8.22	
Jun	2.32	11.72	7.19	0.74	3.47	7.48	127.19	10.99	
Jul	3.40	13.68	8.35	0.74	3.47	11.90	193.64	16.73	Max
Aug	2.41	10.36	8.02	0.74	3.47	10.44	168.36	14.55	
Sep	0.95	4.86	11.63	0.74	3.47	0.00	112.43	9.71	
Oct	0.55	3.82	11.53	0.74	3.47	0.00	39.76	3.44	Min
Nov	0.76	4.14	13.97	0.74	3.47	0.00	49.23	4.25	
Dec	1.14	6.08	13.67	0.74	3.47	0.00	60.30	5.21	

Note: NWR based on FAO = net water requiremnt by modified Penman equation based on FAO Irrigation and Drainage Paper #24

G. Water Contrbtn. = ground water contribution, 10% of net water requirement

GWR = gross water requirement, on-farm irrigation efficiency 80%

Farmer's Gain W. = Farmer's gain water from drain = 0% of GWR during Jun to Aug.

DWR = diversion water requiement, conveyance efficiency of 20%

Dirnking etc. = drinking and industrial water etc., two (2) times of present estimated amount

NRA = based on the proposed cropping pattern by the JICA study team

NRA in Future = based on the proposed cropping pattern on the expansion planned by the JICA study team

Gain W. by DPS = gain water by 9 Drainage Pump Stations (DPS) related to Bahr Yusef canal and 2 DPS in Faiyum

Gain W. by grvty = gain of drain water by gravity in Faiyum

Gain W. from NRL = reuse of water from expansion area of 56000 feddan
= 1.5 mm/day * 56000 feddan * 0.85 * 4200 m2/feddan / 86400
= 3.47 m3/sec

Addtnl. Q by DPS = additional reuse water by proposed drainage pump stations

⑭=⑦+⑧+⑨+⑩-⑪-⑫-⑬-⑭

Table E-3-12 Calculation of Proposed Discharge at Mazoura Regulator

(unit:m3/sec)

	NWR based on FAO ①	G. Water Contrbtn. ② 1*0.1	Differ-ence ③ 1-2	GWR ④ 3/0.8	Farmer's Gain W. ⑤	Difference ⑥ 4-5	DWR ⑦ 6/0.8	Drink-ing etc. ⑧
Jan	48.59	4.86	43.73	54.66	0.00	54.66	68.33	14.75
Feb	63.41	6.34	57.07	71.34	0.00	71.34	89.17	14.75
Mar	69.31	6.93	62.38	77.97	0.00	77.97	97.47	14.75
Apr	45.93	4.59	41.34	51.67	0.00	51.67	64.59	14.75
May	56.14	5.61	50.53	63.16	0.00	63.16	78.95	14.75
Jun	80.52	8.05	72.47	90.59	0.00	90.59	113.23	14.75
Jul	128.02	12.80	115.22	144.02	0.00	144.02	180.03	14.75
Aug	112.35	11.24	101.12	126.39	0.00	126.39	157.99	14.75
Sep	73.92	7.39	66.53	83.16	0.00	83.16	103.95	14.75
Oct	24.80	2.48	22.32	27.90	0.00	27.90	34.87	14.75
Nov	32.64	3.26	29.38	36.72	0.00	36.72	45.90	14.75
Dec	38.46	3.85	34.61	43.27	0.00	43.27	54.08	14.75

	NRA ⑨	EA in Future ⑩	Gain W. by DPS ⑪	Gain W. by Grvty ⑫	Gain W. from EA	Addtnl. Q by DPS ⑬	Balance (m3/sec) ⑭	Intake W. (MCM/day) ⑮	
Jan	0.00	7.43	3.45	0.74	3.47	0.00	82.85	7.16	
Feb	0.00	9.47	3.88	0.74	3.47	0.00	105.30	9.10	
Mar	0.00	11.16	6.64	0.74	3.47	0.00	112.53	9.72	
Apr	0.00	5.28	6.26	0.74	3.47	0.00	74.15	6.41	
May	0.00	8.93	3.71	0.74	3.47	0.00	94.71	8.18	
Jun	0.00	11.72	4.08	0.74	3.47	7.25	124.16	10.73	
Jul	0.00	13.68	4.94	0.74	3.47	11.52	187.79	16.22	Max
Aug	0.00	10.36	4.78	0.74	3.47	10.11	164.00	14.17	
Sep	0.00	4.86	7.46	0.74	3.47	0.00	111.89	9.67	
Oct	0.00	3.82	6.87	0.74	3.47	0.00	42.37	3.66	Min
Nov	0.00	4.14	8.45	0.74	3.47	0.00	52.13	4.50	
Dec	0.00	6.08	7.98	0.74	3.47	0.00	62.72	5.42	

Note: NWR based on FAO = net water requiremnt by modefied Penman equation based on FAO Irrigation and Drainage Paper #24

G. Water Contrbtn. = ground water contribution, 10% of net water requirement

GWR = gross water requirement, on-farm irrigation efficiency 80%

Farmer's Gain W. = Farmer's gain water from drain = 0% of GWR during Jun to Aug.

DWR = diversion water requiement, conveyance efficiency of 20%

Dirnking etc. = drinking and industrial water etc., two (2) times of present estimated amount

NRA = based on the proposed cropping pattern by the JICA study team

EA in Future = based on the proposed cropping pattern on the expansion planned by the JICA study team

Gain W. by DPS = gain water by 9 Drainage Pump Stations (DPS) related to Bahr Yusef canal and 2 DPS in Faiyum

Gain W. by grvty = gain of drain water by gravity in Faiyum

Gain W. from NRL = reuse of water from expansion area of 56000 feddan
= 1.5 mm/day * 56000 feddan * 0.85 * 4200 m2/feddan / 86400
= 3.47 m3/sec

Addtnl. Q by DPS = additional reuse water by proposed drainage pump stations

⑭=⑦+⑧+⑨+⑩-⑪-⑫-⑬-⑭

Table E-3-13 Calculation of Proposed Discharge at Lahoun Regulator

(unit:m3/sec)

M	NWR based on FAO ①	G. Water Contrbtn. ② 1*0.1	Difference ③ 1-2	GWR ④ 3/0.8	Farmer's Gain W. ⑤	Difference ⑥ 4-5	DWR ⑦ 6/0.8	Drinking etc. ⑧
Jan	21.83	2.18	19.65	24.56	0.00	24.56	30.70	2.87
Feb	28.49	2.85	25.64	32.05	0.00	32.05	40.06	2.87
Mar	31.14	3.11	28.03	35.03	0.00	35.03	43.79	2.87
Apr	20.64	2.06	18.58	23.22	0.00	23.22	29.03	2.87
May	25.22	2.52	22.70	28.37	0.00	28.37	35.47	2.87
Jun	36.18	3.62	32.56	40.70	0.00	40.70	50.88	2.87
Jul	57.52	5.75	51.77	64.71	0.00	64.71	80.89	2.87
Aug	50.48	5.05	45.43	56.79	0.00	56.79	70.99	2.87
Sep	33.21	3.32	29.89	37.36	0.00	37.36	46.70	2.87
Oct	11.14	1.11	10.03	12.53	0.00	12.53	15.67	2.87
Nov	14.67	1.47	13.20	16.50	0.00	16.50	20.63	2.87
Dec	17.28	1.73	15.55	19.44	0.00	19.44	24.30	2.87

M	NRA ⑨	EA in Future ⑩	Gain W. by DPS ⑪	Gain W. by Grvty ⑫	Gain W. from EA ⑬	Addtnl. Q by DPS ⑭	Balance (m3/sec) ⑮	Intake W. (MCM/day) ⑯	
Jan	0.00	2.99	0.41	0.74	1.39	0.00	34.02	2.94	
Feb	0.00	3.81	0.58	0.74	1.39	0.00	44.03	3.80	
Mar	0.00	4.49	2.05	0.74	1.39	0.00	46.97	4.06	
Apr	0.00	2.12	1.67	0.74	1.39	0.00	30.22	2.61	
May	0.00	3.59	1.26	0.74	1.39	0.00	38.54	3.33	
Jun	0.00	4.71	2.02	0.74	1.39	3.26	51.05	4.41	
Jul	0.00	5.50	1.88	0.74	1.39	5.18	80.07	6.92	Max
Aug	0.00	4.16	2.14	0.74	1.39	4.54	69.20	5.98	
Sep	0.00	1.95	1.86	0.74	1.39	0.00	47.53	4.11	
Oct	0.00	1.54	2.22	0.74	1.39	0.00	15.73	1.36	Min
Nov	0.00	1.66	1.91	0.74	1.39	0.00	21.12	1.82	
Dec	0.00	2.44	1.54	0.74	1.39	0.00	25.94	2.24	

Note: NWR based on FAO = net water requiremnt by modified Penman equation based on FAO Irrigation and Drainage Paper #24

G. Water Contrbtn. = ground water contribution, 10% of net water requirement

GWR = gross water requirement, on-farm irrigation efficiency 80%

Farmer's Gain W. = Farmer's gain water from drain = 0% of GWR during Jun to Aug.

DWR = diversion water requiement, conveyance efficiency of 20%

Dirnking etc. = drinking and industrial water etc., two (2) times of present estimated amount

NRA = based on the proposed cropping pattern by the JICA study team

EA in Future = based on the proposed cropping pattern on the expansion planned by the JICA study team

Gain W. by DPS = gain water by 9 Drainage Pump Stations (DPS) related to Bahr Yusef canal and 2 DPS in Faiyum

Gain W. by grvty = gain of drain water by gravity in Faiyum

Gain W. from NRL = reuse of water from expansion area of 56000 feddan
= 1.5 mm/day * 22500 feddan * 0.85 * 4200 m2/feddan / 86400
= 1.39 m3/sec

Addtnl. Q by DPS = additional reuse water by proposed drainage pump stations

⑭=⑦+⑧+⑨+⑩-⑪-⑫-⑬-⑭

Table E-3-14 Sectional Monthly Net Water Requirement

(unit:m3/sec)

	Intake to M. Dahab (10.9%)	M. Dahab to Sakoula (6.6%)	Sakoula to Mazoura (2.6%)	Mazoura to Lahoun (44.0%)	DS Lahoun (35.9%)	Total (100%)
Jan	6.63	4.01	1.58	26.76	21.83	60.81
Feb	8.65	5.24	2.06	34.92	28.49	79.36
Mar	9.45	5.72	2.26	38.17	31.14	86.74
Apr	6.27	3.79	1.49	25.29	20.64	57.48
May	7.66	4.64	1.83	30.92	25.22	70.27
Jun	10.98	6.65	2.62	44.34	36.18	100.77
Jul	17.46	10.58	4.17	70.50	57.52	160.23
Aug	15.33	9.28	3.66	61.87	50.48	140.62
Sept	10.08	6.11	2.41	40.71	33.21	92.52
Oct	3.38	2.05	0.81	13.66	11.14	31.04
Nov	4.45	2.70	1.06	17.97	14.67	40.85
Dec	5.25	3.18	1.25	21.18	17.28	48.14

Sectional Monthly Net Water Requirement

(unit:m3/sec)

	Intake	M. Dahab	Sakoula	Mazoura	Lahoun
Jan	60.81	54.18	50.17	48.59	21.83
Feb	79.36	70.71	65.47	63.41	28.49
Mar	86.74	77.29	71.57	69.31	31.14
Apr	57.48	51.21	47.42	45.93	20.64
May	70.27	62.61	57.97	56.14	25.22
Jun	100.77	89.79	83.14	80.52	36.18
Jul	160.23	142.77	132.19	128.02	57.52
Aug	140.62	125.29	116.01	112.35	50.48
Sept	92.52	82.44	76.33	73.92	33.21
Oct	31.04	27.66	25.61	24.8	11.14
Nov	40.85	36.4	33.7	32.64	14.67
Dec	48.14	42.89	39.71	38.46	17.28

Table E-3-15 Sectional Gain Water by Drainage Pump Stations and Drinking Water

Gain Water by DPS

(unit:m3/sec)

	Intake to M. Dahab	M. Dahab to Sakoula	Sakoula to Mazoura	Mazoura to Lahoun	DS Lahoun	Total
Jan	4.69	3.62	3.05	3.04	0.41	14.81
Feb	9.90	4.89	2.94	3.30	0.58	21.61
Mar	9.19	5.54	3.33	4.59	2.05	24.70
Apr	9.33	5.49	3.41	4.59	1.67	24.49
May	9.38	4.72	3.51	2.45	1.26	21.32
Jun	9.14	4.56	3.11	2.06	2.02	20.89
Jul	9.93	5.57	3.41	3.06	1.88	23.84
Aug	10.12	5.52	3.24	2.64	2.14	23.66
Sept	10.29	6.23	4.17	5.60	1.86	28.15
Oct	11.05	5.99	4.66	4.65	2.22	28.57
Nov	11.34	7.88	5.52	6.54	1.91	33.19
Dec	12.06	8.13	5.69	6.44	1.54	33.86

Gain Water by DPS

(unit:m3/sec)

	Intake	M. Dahab	Sakoula	Mazoura	Lahoun
Jan	14.81	10.12	6.50	3.45	0.41
Feb	21.61	11.71	6.82	3.88	0.58
Mar	24.70	15.51	9.97	6.64	2.05
Apr	24.49	15.16	9.67	6.26	1.67
May	21.32	11.94	7.22	3.71	1.26
Jun	20.89	11.75	7.19	4.08	2.02
Jul	23.84	13.91	8.35	4.94	1.88
Aug	23.66	13.54	8.02	4.78	2.14
Sept	28.15	17.86	11.63	7.46	1.86
Oct	28.57	17.52	11.53	6.87	2.22
Nov	33.19	21.85	13.97	8.45	1.91
Dec	33.86	21.80	13.67	7.98	1.54

Drinking Water

(unit:m3/sec)

	Intake to M. Dahab	M. Dahab to Sakoula	Sakoula to Mazoura	Mazoura to Lahoun	DS Lahoun	Total
Jan	0.55	0.54	0.37	11.88	2.87	16.21
Feb	0.55	0.54	0.37	11.88	2.87	16.21
Mar	0.55	0.54	0.37	11.88	2.87	16.21
Apr	0.55	0.54	0.37	11.88	2.87	16.21
May	0.55	0.54	0.37	11.88	2.87	16.21
Jun	0.55	0.54	0.37	11.88	2.87	16.21
Jul	0.55	0.54	0.37	11.88	2.87	16.21
Aug	0.55	0.54	0.37	11.88	2.87	16.21
Sept	0.55	0.54	0.37	11.88	2.87	16.21
Oct	0.55	0.54	0.37	11.88	2.87	16.21
Nov	0.55	0.54	0.37	11.88	2.87	16.21
Dec	0.55	0.54	0.37	11.88	2.87	16.21

Sectional Monthly Net Water Requirement

(unit:m3/sec)

	Intake	M. Dahab	Sakoula	Mazoura	Lahoun
Jan	16.21	15.66	15.12	14.75	2.87
Feb	16.21	15.66	15.12	14.75	2.87
Mar	16.21	15.66	15.12	14.75	2.87
Apr	16.21	15.66	15.12	14.75	2.87
May	16.21	15.66	15.12	14.75	2.87
Jun	16.21	15.66	15.12	14.75	2.87
Jul	16.21	15.66	15.12	14.75	2.87
Aug	16.21	15.66	15.12	14.75	2.87
Sept	16.21	15.66	15.12	14.75	2.87
Oct	16.21	15.66	15.12	14.75	2.87
Nov	16.21	15.66	15.12	14.75	2.87
Dec	16.21	15.66	15.12	14.75	2.87

Table E-3-16 Discharge Distribution at Maximum Water Requirement (July)

(unit:m3/sec)

Facility	Area (feddan)	km	inflow	Addtn' l inflow	outflow	Discharge	
Dairout Brg.		0.0				226.50	
Command area (1)	1953	10.0			0.66	225.84	
Badraman DPS		20.0	5.72	0.90		232.46	
Command area (2)	9564	38.3			3.22	229.24	
Kabkab DPS		56.5	3.59	0.57		233.40	
Command area (3)	185	57.5			0.06	233.34	
Tona el Gaber DPS		58.4	0.62	0.10		234.06	Max
Command area (4)	2289	63.8			0.77	233.29	
Command area (5)	58935	77.3			19.85	213.44	
Drinking Water		77.6			0.55	212.89	
Reclaimed Land		77.6			2.74	210.15	
Mansht el Dahab Reg.		77.6				210.15	
Command area (6)	991	91.1			0.33	209.82	Max
Kamadier IPS		104.6			3.81	206.01	
Command area (7)	444	110.7			0.15	205.86	
Mansht el Dahab DPS		116.7	0.37	0.06		206.29	
Drinking Water		127.4			0.55	205.74	
Command area (8)	998	130.3			0.34	205.40	
Terfa IPS		143.9			3.81	201.59	
Command area (9)	756	154.2			0.25	201.34	
Beni Mazar DPS		162.5	2.70	0.46		204.50	
Deir el Sankoria DPS		164.5	2.50	0.43		207.43	
Command area (10)	40986	177.2			13.79	193.64	
Sakoula Reglator		177.7				193.64	
Command area (10)	246	181.3			0.08	193.56	
Sakoula #4 IPS		184.9			1.70	191.86	
Command area (11)	1168	202.0			0.39	191.47	
Sakoula DPS		219.0	3.41	0.38		195.26	Max
Command area (12)	17	219.3			0.01	195.25	
Drinking Water		219.4			0.37	194.88	
Mazora #0 IPS		219.5			1.69	193.19	
Command area (13)	16255	229.0			5.40	187.79	
Mazoura Regulator		230.3				187.79	
Command area (14)	18	230.5			0.01	187.78	
Abo Rahab DPS		230.8	2.303	4.77		194.86	Max
Command area (15)	11454	252.5			3.85	191.01	
Mazora DPS		274.3	0.756	1.57		193.33	
Command area (16)	8418	281.3			2.83	190.50	
Hassan Wasef Canal	118306	288.3			39.77	150.73	
New Expansion Area				2.08	8.18	144.63	
Drinking Water					11.88	132.75	
Giza Canal	156730	288.4			52.69	80.06	
Lahoun Regulator						80.06	

Note: Mean drainage pump discharge in July is used.

Table E-3-17 Water Balance Study by Section at Maximum Water Requirement (July)

(unit:m3/sec)

Facility	Inflow	Outflow	Discharge (QQ)
Dairout Barrage			226.500
-Gain W. by DPS			
Badraman DPS	5.720		
Kabkab DPS	3.592		
Tona el Gabel DPS	0.616		
-WR for RCLMD A.		2.740	
-Drinking water		0.550	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	1.570		
-WR for old land		24.558	
M. el Dahab Reg.			210.150
-Gain W. by DPS			
M. el Dahab DPS	0.373		
Beni Mazar DPS	2.696		
D. el Sankoria DPS	2.496		
-WR for RCLMD A.		7.620	
-Drinking water		0.550	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	0.950		
-WR for old land		14.855	
Sakoula Reg.			193.640
-Gain W. by DPS			
Sakoula DPS	3.410		
-WR for RCLMD A.		3.390	
-Drinking water		0.370	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	0.380		
-WR for old land		5.880	
Mazoura Reg.			187.790
-Gain W. by DPS			
Abo Rahab DPS	2.303		
Mazoura DPS	0.756		
-WR for RCLMD A.		0.000	
-Drinking water		11.880	
-WR for EXPASN A.		8.180	
-Gain from EXPNSN A.	2.080		
-Adtnal. W by DPS	6.340		
-WR for old land		99.139	
Lahoun Reg.			80.070

Table E-3-18 Discharge Distribution at Minimum Water Requirement (October)

(unit:m3/sec)

Facility	Area (feddan)	km	in-flow	Addtn'l inflow	out-flow	Dis-charge	
Dairout Brg.		0.0				33.11	
Command area (1)	1953	10.0			0.13	32.98	
Badraman DPS		20.0	6.36	0.00		39.34	
Command area (2)	9564	38.3			0.62	38.72	
Kabkab DPS		56.5	4.28	0.00		43.00	
Command area (3)	185	57.5			0.01	42.99	
Tona el Gaber DPS		58.4	0.42	0.00		43.41	Max
Command area (4)	2289	63.8			0.15	43.26	
Command area (5)	58935	77.3			3.84	39.42	
Drinking Water		77.6			0.55	38.87	
Reclaimed Land		77.6			0.44	38.42	
Mansht el Dahab Reg.		77.6				38.42	
Command area (6)	991	91.1			0.06	38.36	
Kamadier IPS		104.6			0.61	37.75	
Command area (7)	444	110.7			0.03	37.72	
Mansht el Dahab DPS		116.7	0.31	0.00		38.03	
Drinking Water		127.4			0.55	37.48	
Command area (8)	998	130.3			0.07	37.41	
Terfa IPS		143.9			0.61	36.80	
Command area (9)	756	154.2			0.05	36.75	
Beni Mazar DPS		162.5	2.57	0.00		39.32	
Deir el Sankoria DPS		164.5	3.11	0.00		42.43	Max
Command area (10)	40986	177.2			2.67	39.76	
Sakoula Reglator		177.7				39.76	
Command area (10)	246	181.3			0.02	39.74	
Sakoula #4 IPS		184.9			0.28	39.46	
Command area (11)	1168	202.0			0.08	39.38	
Sakoula DPS		219.0	4.67	0		44.05	Max
Command area (12)	17	219.3			0.00	44.05	
Drinking Water		219.4			0.37	43.68	
Mazora #0 IPS		219.5			0.27	43.41	
Command area (13)	16255	229.0			1.05	42.37	
Mazoura Regulator		230.3				42.37	
Command area (14)	18	230.5			0.00	42.37	
Abo Rahab DPS		230.8	4.001	0.00		46.37	Max
Command area (15)	11454	252.5			0.75	45.62	
Mazora DPS		274.3	0.647	0.00		46.27	
Command area (16)	8418	281.3			0.55	45.72	
Hassan Waset Canal	118306	288.3			7.71	38.01	
New Expansion Area				2.08	2.28	37.81	
Drinking Water					11.88	25.93	
Giza Canal	156730	288.4			10.21	15.73	
Lahoun Regulator						15.73	

Note: Mean drainage pump discharge in October is used.

Table E-3-19 Water Balance Study by Section at Minimum Water Requirement (October)

(unit:m3/sec)

Facility	Inflow	Outflow	Discharge (QQ)
Dairout Barrage			33.110
-Gain W. by DPS			
Badraman DPS	6.361		
Kabkab DPS	4.276		
Tona el Gabel DPS	0.415		
-WR for RCLMD A.		0.440	
-Drinking water		0.550	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	0.000		
-WR for old land		4.752	
M. el Dahab Reg.			38.420
-Gain W. by DPS			
M. el Dahab DPS	0.311		
Beni Mazar DPS	2.571		
D. el Sankoria DPS	3.110		
-WR for RCLMD A.		1.220	
-Drinking water		0.550	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	0.000		
-WR for old land		2.882	
Sakoula Reg.			39.760
-Gain W. by DPS			
Sakoula DPS	4.670		
-WR for RCLMD A.		0.550	
-Drinking water		0.370	
-WR for EXPASN A.		0.000	
-Gain from EXPNSN A.	0.000		
-Adtnal. W by DPS	0.000		
-WR for old land		1.140	
Mazoura Reg.			42.370
-Gain W. by DPS			
Abo Rahab DPS	4.001		
Mazoura DPS	0.647		
-WR for RCLMD A.		0.000	
-Drinking water		11.880	
-WR for EXPASN A.		2.280	
-Gain from EXPNSN A.	2.080		
-Adtnal. W by DPS	0.000		
-WR for old land		19.208	
Lahoun Reg.			15.730

Table E-3-20 Basic Data for Non-Uniform Flow Analysis of Bahr Yusef Canal at Proposed Stage

from Dairout to Manshat el Dahab				from Manshat el Dahab to Sakoula			
Q	(Max)	234.060	(m3/sec)	Q	(Max)	209.820	(m3/sec)
	(Min)	43.410			(Min)	42.430	
B		43.9	(m)	B		43.9	(m)
SS	(1:)	1.5		SS	(1:)	1.5	
n1	SS	0.03		n1	SS	0.03	
n2	C. bed	0.03		n2	C. bed	0.03	
STA	Dis (m)	EL. (m)	W. Depth (m)	STA	Dis (m)	EL. (m)	W. Depth (m)
1	0	34.100	6.300	1	0	27.550	6.150
2	5000	34.458		2	5000	27.875	
3	5000	34.815		3	5000	28.200	
4	5000	35.173		4	5000	28.525	
5	5000	35.530		5	5000	28.850	
6	5000	35.888		6	5000	29.175	
7	5000	36.245		7	5000	29.500	
8	5000	36.603		8	5000	29.825	
9	5000	36.960		9	5000	30.150	
10	5000	37.318		10	5000	30.475	
11	5000	37.675		11	5000	30.800	
12	5000	38.033		12	5000	31.125	
13	5000	38.390		13	5000	31.450	
14	5000	38.748		14	5000	31.775	
15	5000	39.105		15	5000	32.100	
16	5000	39.463		16	5000	32.425	
17	2600	39.650		17	5000	32.750	
				18	5000	33.075	
				19	5000	33.400	
				20	5000	33.725	
				21	5130	34.050	
	77600				100130		

from Sakoula to Mazoura				from Mazoura to Lahoun			
Q	(Max)	195.260	(m3/sec)	Q	(Max)	194.860	(m3/sec)
	(Min)	44.050			(Min)	46.370	
B		41.9	(m)	B		41.9	(m)
SS	(1:)	1.5		SS	(1:)	1.5	
n1	SS	0.03		n1	SS	0.03	
n2	C. bed	0.03		n2	C. bed	0.03	
STA	Dis (m)	EL. (m)	W. Depth (m)	STA	Dis (m)	EL. (m)	W. Depth (m)
1	0	23.800	5.900	1	0	20.480	6.120
2	5000	24.150		2	5000	20.730	
3	5000	24.500		3	5000	20.980	
4	5000	24.850		4	5000	21.230	
5	5000	25.200		5	5000	21.480	
6	5000	25.550		6	5000	21.730	
7	5000	25.900		7	5000	21.980	
8	5000	26.250		8	5000	22.230	
9	5000	26.600		9	5000	22.480	
10	5000	26.950		10	5000	22.730	
11	5000	27.300		11	5000	22.980	
12	2530	27.500		12	5000	23.230	
				13	3440	23.400	
	52530				58440		

Table E-3-21 Results of Non-Uniform Flow Analysis of Bahr Yusef Canal at Proposed Stage

Dairout to Manshat el Dahab (Qmax)
SIDE SLOPE 1: 1.500
ROGHNESS COEFFICIENT of SIDE SLOPE 0.0300
ROGHNESS COEFFICIENT of CANAL BED 0.0300
Discharge 234.060 (m3/sec)

ST	EL (m)	DIS (m)	H (m)	A (m2)	P	V (m/sec)	HF (m)	WL (m)
1	34.100	0	6.300	336.1	66.615	0.696	0.0000	40.425
2	34.458	5000	6.200	329.9	66.256	0.710	0.2593	40.684
3	34.815	5000	6.115	324.6	65.950	0.721	0.2730	40.957
4	35.173	5000	6.042	320.0	65.685	0.731	0.2855	41.242
5	35.530	5000	5.981	316.2	65.465	0.740	0.2967	41.539
6	35.888	5000	5.929	313.0	65.278	0.748	0.3065	41.846
7	36.245	5000	5.887	310.4	65.125	0.754	0.3151	42.161
8	36.603	5000	5.851	308.2	64.995	0.759	0.3224	42.483
9	36.960	5000	5.822	306.4	64.891	0.764	0.3286	42.812
10	37.318	5000	5.797	304.9	64.803	0.768	0.3338	43.146
11	37.675	5000	5.778	303.8	64.734	0.771	0.3382	43.484
12	38.033	5000	5.762	302.8	64.675	0.773	0.3418	43.826
13	38.390	5000	5.750	302.0	64.630	0.775	0.3448	44.170
14	38.748	5000	5.739	301.3	64.591	0.777	0.3472	44.517
15	39.105	5000	5.731	300.8	64.562	0.778	0.3492	44.867
16	39.463	5000	5.723	300.4	64.536	0.779	0.3508	45.217
17	39.650	2600	5.719	300.1	64.521	0.780	0.1830	45.400

Manshat el Dahab to Sakoula (Qmax)
SIDE SLOPE 1: 1.500
ROGHNESS COEFFICIENT of SIDE SLOPE 0.0300
ROGHNESS COEFFICIENT of CANAL BED 0.0300
Discharge 209.820 (m3/sec)

ST	EL (m)	DIS (m)	H (m)	A (m2)	P	V (m/sec)	HF (m)	WL (m)
1	27.550	0	6.150	326.7	66.074	0.642	0.0000	33.721
2	27.875	5000	6.051	320.5	65.716	0.655	0.2266	33.948
3	28.200	5000	5.964	315.2	65.404	0.666	0.2390	34.187
4	28.525	5000	5.889	310.5	65.132	0.676	0.2505	34.437
5	28.850	5000	5.824	306.6	64.899	0.684	0.2610	34.698
6	29.175	5000	5.769	303.2	64.700	0.692	0.2704	34.968
7	29.500	5000	5.722	300.3	64.532	0.699	0.2788	35.247
8	29.825	5000	5.683	297.9	64.390	0.704	0.2861	35.533
9	30.150	5000	5.650	295.9	64.271	0.709	0.2924	35.826
10	30.475	5000	5.623	294.2	64.172	0.713	0.2979	36.124
11	30.800	5000	5.600	292.9	64.090	0.716	0.3025	36.426
12	31.125	5000	5.581	291.7	64.022	0.719	0.3064	36.732
13	31.450	5000	5.565	290.8	63.966	0.722	0.3097	37.042
14	31.775	5000	5.553	290.0	63.920	0.724	0.3124	37.354
15	32.100	5000	5.542	289.4	63.883	0.725	0.3146	37.669
16	32.425	5000	5.534	288.9	63.852	0.726	0.3165	37.986
17	32.750	5000	5.527	288.4	63.826	0.727	0.3181	38.304
18	33.075	5000	5.521	288.1	63.805	0.728	0.3193	38.623
19	33.400	5000	5.516	287.8	63.789	0.729	0.3204	38.943
20	33.725	5000	5.512	287.6	63.775	0.730	0.3212	39.264
21	34.050	5130	5.517	287.8	63.791	0.729	0.3295	39.594

Sakoula to Mazoura (Qmax)
SIDE SLOPE 1: 1.500
ROGHNESS COEFFICIENT of SIDE SLOPE 0.0300
ROGHNESS COEFFICIENT of CANAL BED 0.0300
Discharge 195.260 (m3/sec)

ST	EL (m)	DIS (m)	H (m)	A (m2)	P	V (m/sec)	HF (m)	WL (m)
1	23.800	0	5.900	299.4	63.173	0.652	0.0000	29.722
2	24.150	5000	5.797	293.3	62.801	0.666	0.2478	29.970
3	24.500	5000	5.708	288.1	62.482	0.678	0.2624	30.232
4	24.850	5000	5.633	283.6	62.212	0.688	0.2757	30.508
5	25.200	5000	5.570	279.9	61.984	0.698	0.2876	30.795
6	25.550	5000	5.518	276.9	61.795	0.705	0.2981	31.093
7	25.900	5000	5.475	274.3	61.639	0.712	0.3072	31.401
8	26.250	5000	5.439	272.3	61.511	0.717	0.3149	31.715
9	26.600	5000	5.410	270.6	61.407	0.722	0.3214	32.037
10	26.950	5000	5.387	269.2	61.322	0.725	0.3268	32.364
11	27.300	5000	5.368	268.1	61.254	0.728	0.3313	32.695
12	27.500	2530	5.338	266.4	61.145	0.733	0.1703	32.865

Mazoura to Lahoura (Qmax)
SIDE SLOPE 1: 1.500
ROGHNESS COEFFICIENT of SIDE SLOPE 0.0300
ROGHNESS COEFFICIENT of CANAL BED 0.0300
Discharge 194.860 (m3/sec)

ST	EL (m)	DIS (m)	H (m)	A (m2)	P	V (m/sec)	HF (m)	WL (m)
1	20.480	0	6.120	312.6	63.966	0.623	0.0000	26.620
2	20.730	5000	6.083	310.4	63.832	0.628	0.2131	26.833
3	20.980	5000	6.050	308.4	63.713	0.632	0.2174	27.050
4	21.230	5000	6.021	306.7	63.609	0.635	0.2213	27.272
5	21.480	5000	5.995	305.1	63.517	0.639	0.2248	27.496
6	21.730	5000	5.973	303.8	63.437	0.641	0.2279	27.724
7	21.980	5000	5.954	302.6	63.366	0.644	0.2307	27.955
8	22.230	5000	5.937	301.6	63.305	0.646	0.2331	28.188
9	22.480	5000	5.922	300.7	63.252	0.648	0.2353	28.423
10	22.730	5000	5.909	300.0	63.205	0.650	0.2372	28.661
11	22.980	5000	5.898	299.3	63.165	0.651	0.2389	28.899
12	23.230	5000	5.888	298.7	63.130	0.652	0.2404	29.140
13	23.400	3440	5.884	298.5	63.115	0.653	0.1660	29.306

Table E-3-22 Hydropower Generation Analysis

Daily Mean Generating Power in KH						
Month	1986	1987	1988	1989	1990	Mean
Jan	na	610.8	604.5	632.9	607.7	614.0
Feb	584.1	713.0	606.7	575.7	588.6	613.6
Mar	650.5	675.2	647.5	544.2	613.7	626.2
Apr	656.2	686.7	571.1	557.1	592.6	612.8
May	644.8	643.6	604.5	544.2	624.9	612.4
Jun	694.8	693.2	611.2	551.9	540.3	618.3
Jul	703.3	721.3	717.8	675.6	677.5	699.1
Aug	683.8	640.8	730.9	683.1	681.5	684.0
Sept	718.7	654.6	686.7	652.6	664.5	675.4
Oct	707.5	652.7	599.4	599.4	572.2	626.2
Nov	686.6	701.8	657.8	617.6	639.2	660.6
Dec	637.7	681.8	612.0	614.6	630.4	635.3
Mean	669.8	673.0	637.5	604.1	619.4	640.8
Power Generating Days						
Jan	0.0	10.0	10.0	10.0	10.0	8.0
Feb	12.0	16.0	16.0	16.0	16.0	15.2
Mar	31.0	31.0	31.0	31.0	31.0	31.0
Apr	30.0	30.0	30.0	30.0	30.0	30.0
May	31.0	31.0	31.0	31.0	31.0	31.0
Jun	30.0	30.0	30.0	30.0	30.0	30.0
Jul	31.0	31.0	31.0	31.0	31.0	31.0
Aug	30.0	30.0	30.0	30.0	30.0	30.0
Sept	30.0	30.0	30.0	30.0	30.0	30.0
Oct	31.0	31.0	31.0	31.0	31.0	31.0
Nov	30.0	30.0	30.0	30.0	30.0	30.0
Dec	31.0	31.0	31.0	31.0	31.0	31.0
Total	317	331	331	331	331	328.2
Total*	305	305	305	305	305	305.0
Generating Power in 1000 KWH						
Jan	0.0	146.6	145.1	151.9	145.9	117.9
Feb	168.2	273.8	233.0	221.1	226.0	224.4
Mar	484.0	502.3	481.7	404.9	456.6	465.9
Apr	472.5	494.5	411.2	401.1	426.6	441.2
May	479.7	478.9	449.7	404.9	464.9	455.6
Jun	500.3	499.1	440.0	397.4	389.0	445.2
Jul	523.3	536.7	534.0	502.6	504.1	520.1
Aug	492.3	461.4	526.3	491.8	490.7	492.5
Sept	517.5	471.3	494.4	469.9	478.4	486.3
Oct	526.4	485.6	445.9	446.0	425.7	465.9
Nov	494.3	505.3	473.6	444.6	460.2	475.6
Dec	474.4	507.3	455.3	457.2	469.0	472.7
Total	5,133.0	5,362.6	5,090.4	4,793.4	4,937.2	5063.3
Total*	4,964.8	4,942.3	4,712.3	4,420.5	4,565.3	4721.0

Note: Total* means the total except Jan. and Feb.

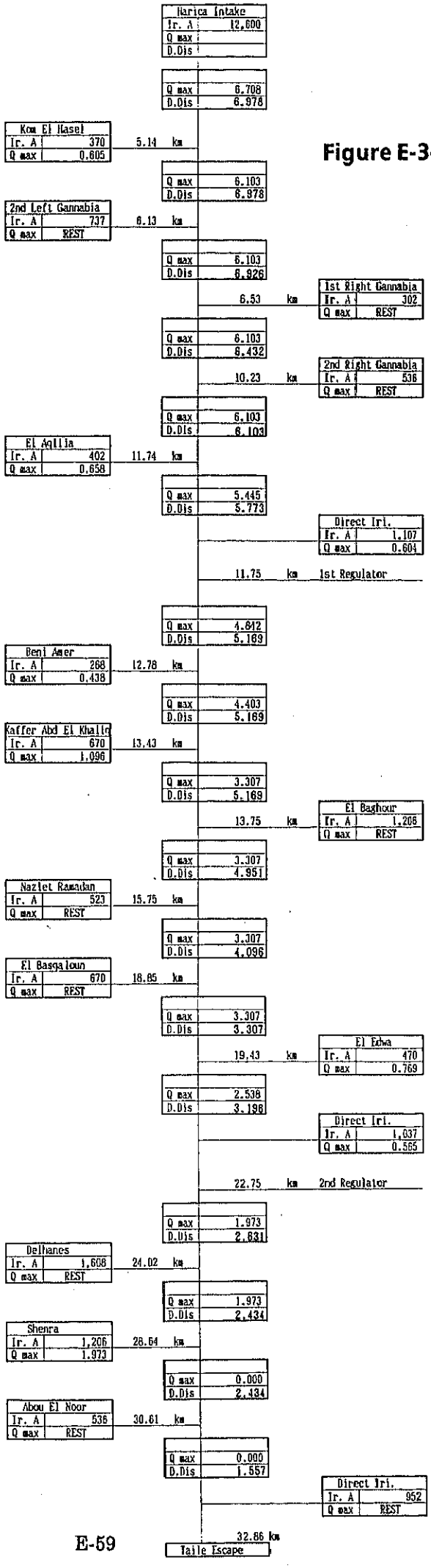


Figure E-3-1 Design Discharge in Group-A

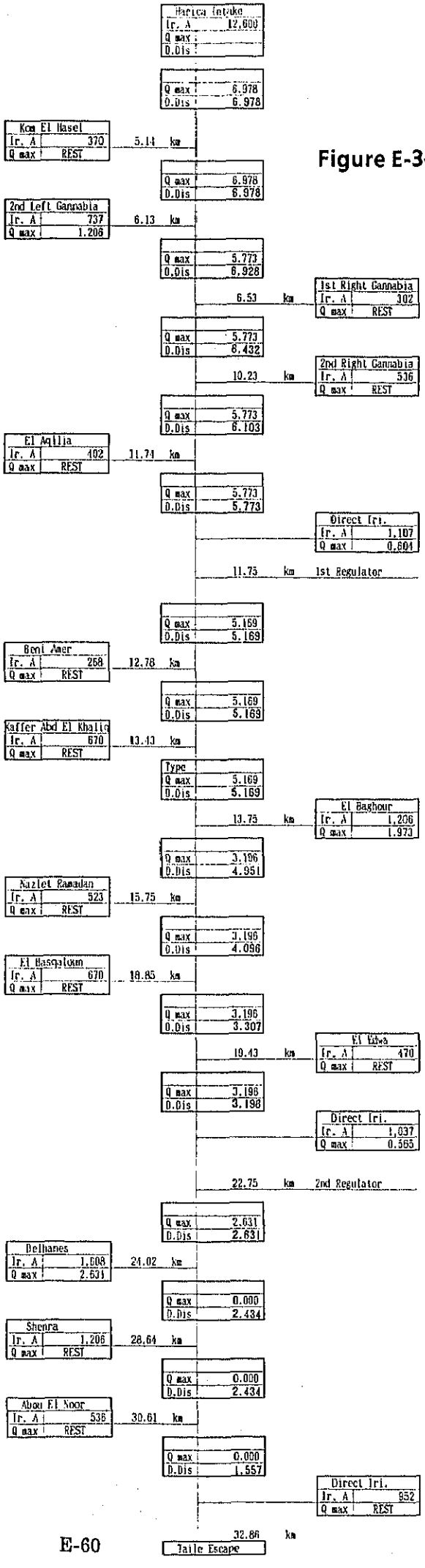


Figure E-3-2 Design Discharge in Group-B

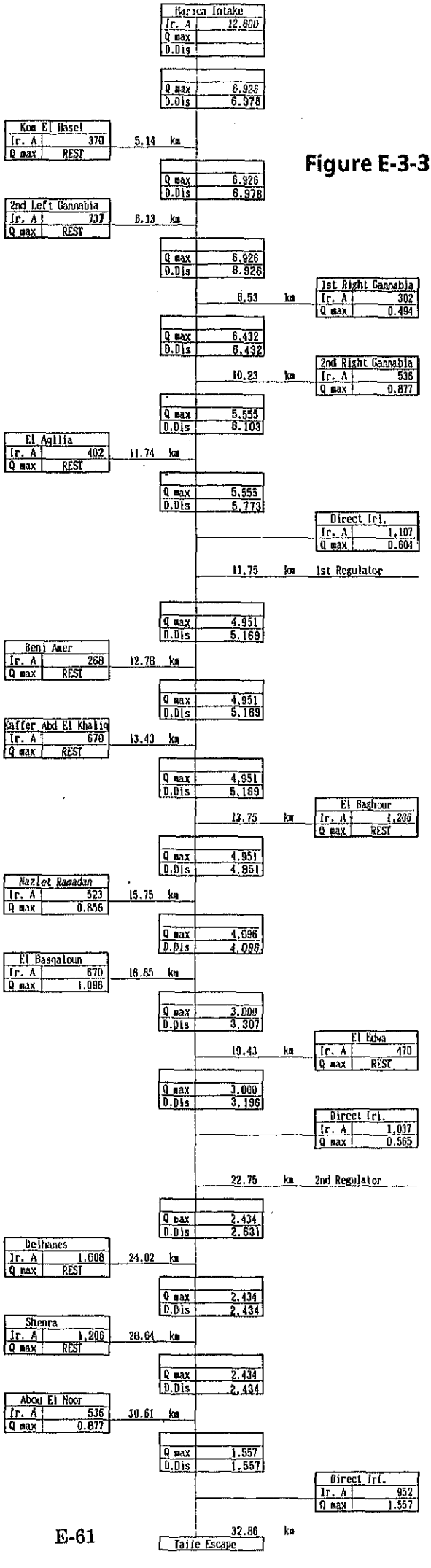


Figure E-3-3 Design Discharge in Group-C

APPENDIX F IRRIGATION AND DRAINAGE FACILITIES

F-1 Present Condition of Facilities

Table F-1-1 Maintenance Record in Dredging Works of Bahr Yusef Canal

Location	Station			Dredged		Finished by
	From	To	Distance	Total	Per m	
	Km	Km	Km	m^3	m^3/m	
East Minia	0.000	13.500	13.5	803,000	60	Sept. 1989
	13.500	38.250	24.75	1,044,000	41	Sept. 1989
	38.250	58.250	20.00	1,030,000	52	June 1989
West Minia	62.700	77.600	14.90	1,580,000	106	Feb. 1986
	62.700	69.450	18.90	1,347,000	105	Apr. 1991
	71.450	77.600				
	77.600	177.700	100.10	11,000,000	110	Feb. 1986
	(Manshat El Dahb)	(Sakoula)				
	77.600	89.000	85.10	9,224,000	109	Apr. 1991
	104.000	177.700				
	177.700	201.400	23.70	1,749,000	74	Apr. 1991
	(Sakoula)	(Edwa)				
Beni Suef	177.730	230.260	52.53	3,078,000	59	June 1986
	(Sakoula)	(Mazoura)				
	202.300	230.260	27.96	721,000	26	June 1987
	(EdwaBridege)	(Mazoura)				
	230.260	288.700	58.44	2,491,000	43	June 1987
	(Mazoura)	(Lahoun)				

Source : Irrigation Directorate of East Minia, West Minia and BeniSuef

Table F-1-2 Result of Compressive Strength Test by Shumit Hammer (Thee Regulators)

(unit : kg/km^2)

Manshat El Dahb Regulator				Sakoula Regulator				Mazoura Regulator			
Vent No.	A	B	C	Vent No.	A	B	C	Vent No.	A	B	C
1	220	130	200	1	120	120	260	1	180	230	170
2	190	260	280	2	140	180	250	2	230	240	230
3	180	220	250	3	140	280	210	3	210	210	150
4	250	250	250	4	250	240	190	4	230	220	180
5	250	210	250	5	170	220	280	5	210	260	210
6	190	240	250	6	190	250	180	6	150	160	150
7	190	210	260	7	210	260	140	7	140	220	210
8	180	220	210	8	100	250	240	8	140	190	180
9	140	190	180	9	140	120	250	9	150	210	150
10	170	270	270	10	140	240	220	10	140	210	250
11	260	270	260	11	180	240	240	11	180	210	280
12	140	180	200	12	180	260	260	12	210	210	210
13	200	250	180	13	180	180	240	13	170	190	210
14	240	240	190	14	160	260	260	14	190	210	210
15	280	250	220	15	140	240	250	15	180	180	210
16	140	240	240	16	140	250	240	16	150	180	230
17	220	220	150	17	130	180	250	17	190	180	210
18	280	250	210	18	170	180	240	18	120	230	210
19	140	165	250	19	150	170	180	19	170	210	210
20	180	260	210	20	210	240	210	20	180	180	210
-	240	210	-	-	130	240	-	21	120	180	230
								22	180	180	210
								23	140	210	210
								24	180	190	210
								25	120	190	210
								-	180	180	-

Source : JICA Study Team

Note : 1) Compressive strength was tested at the site with the schmidt test hummer.
2) Vent no. is shown from the left bank of regulator.
3) Test point A : 0.5 m up from the top of pier.
Test point B : 1.5 m up from the top of pier
Test point C : 1.0 m up at the vent center.

Table F-1-3 Representative Structure Boring-log Record (Dairout Barrage)

N.C.O.

NILE ENGINEERING CONEULTING OFFICE R.G.B. Dapt.

Dayrout Regulator (Bahi Kamal)

Boring Log.

B.H. No.: 4(G.P)U.S Dia 75 mm Depth 8.8 mt

Operator: Machine :

Date Started: 15.11.88 Date Completed:

Depth mt	Description	Core. cms	Core R. %	Remarks
				c.e.
0-1	1st coping then r.b. mas. with b. cl. morter.	54	54	milky & brownish moderate penetration
1-2	r. brick rubble with b cl.l. morter.	56	56	high penetration rate
2-3	ditto..	55	55	brownish
3-4	ditto.	54	54	"
4-5	ditto.	53	53	"
5-6	r. brick & lst rubble with b.cl. l.morter.	53	53	moderate penetration
6-7	ditto.	52	52	brownish
7-8	ditto.	55	55	"
8-8.8	ditto.	54	67	pink

Engineer

N.C.O.

NILE ENGINEERING CONEULTING OFFICE R.G.B. Dapt.

Dayrout Regulator (Bahi Kamal)

Boring Log.

B.H. No.: 22(GP)(D.S) Dia 75 mm Depth 8.8 mt

Operator: Machine :

Date Started: 2.11.88 Date Completed:

Depth mt	Description	Core. cms	Core R. %	Remarks
				c.e
0-1	1st coping.	68	68	milky
1-2	ditto	62	62	ditto
2-3	r.b. mas. with b.cl.l. morter.	41	41	greyish
3-4	ditto.	41	41	pink
4-5	ditto (disintegrated).	42	42	brown
5-6	ditto.	51	51	pink
6-7	ditto. but more consolidated.	67	67	ditto
7-8	ditto.	40	40	ditto
8-8.8	r.b. & lst rubble mas. with morter.	40	50	milky

Engineer

Table F-1-4 Representative Structure Grouting Record (Dairout Barrage)

N.C.O. R.G.B

Dayrout REGULATORS (Bachir Youssef)

GROUTING LOG

B.H. No. 3 G.P U.S R.L.( ) Depth 8.8 mts

M/C Operator Date 19 /11/ 83

Stage	From	to	qs	P.Bar	Cement kgs	Remarks
1	8.8	5.8		2.0	25	
2	5.8	2.8		2.0	50	
3	2.8	0		2.0	75	
					150kg	

N.C.O. R.G.B.Eng.

Date: / /

N.C.O. R.G.B

Dayrout REGULATORS (Bachir Youssef)

GROUTING LOG

B.H. No. 20 G.P.L.D.S R.L.( ) Depth 8.8 mts

M/C Operator Date 13 /11 / 83

Stage	From	to	qs	P.Bar	Cement kgs	Remarks
1	8.8	5.8		2.0	50	
2	5.8	2.8		2.0	50	
3	2.8	0		2.0	75	
					175 kg	

N.C.O. R.G.B.Eng.

Date: / /

Table F-1-5 Representative Results of Permeability Test (Dairout Barrage)

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dapt.

Dayrout (Bahr Yousef)
Permeability Test (Lugeon's)

B.H.No. 3(G.P)U.S R.L. ( ) Depth 8.8 mt.

Date	Internal m from	to	Time min	Press bar.	Q lit.	q_s	q_s av	Wat: Cem.
16/11								
	8.8	5.8	10	1.0	132	0.44		
			10	1.5	200	0.44	0.45	5:1
			10	2.0	280	0.47		
	5.8	2.8	10	1.0	141	0.47		
			10	1.5	213	0.48	0.48	5:1
			10	2.0	293	0.49		
	2.8	0	10	1.0	155	0.52		
			10	1.5	230	0.51	0.52	3:1
			10	2.0	315	0.53		

/6/ 11 / 1983 Engineer

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dapt.

Dayrout (Bahr Yousef)
Permeability Test (Lugeon's)

B.H.No. 16(G.P)D.S R.L. ( ) Depth 8.8mt.

Date	Internal m from	to	Time min	Press bar.	Q lit.	q_s	q_s av	Wat: Cem.
6/11								
	8.8	5.8	10	1.0	140	0.47		
			10	1.5	225	0.5	0.48	5:1
			10	2.0	280	0.47		
	5.8	2.8	10	1.0	160	0.53		
			10	1.5	250	0.56	0.55	3:1
			10	2.0	330	0.55		
	2.8	0	10	1.0	170	0.57		
			10	1.5	290	0.64	0.62	3:1
			10	2.0	390	0.65		

6 / 11 / 1983 Engineer

Table F-1-6 Representative Structure Boring-log Record (Lahoun Regulator)

N.C.O.

NILE ENGINEERING CONEULTING OFFICE R.G.B. Dapt.

El Lahoon Regulator

Boring Log.

B.H. No.: 3 P_1 Dia 75 mm Depth 8.5 mt

Operator: Machine :

Date Started: Date Completed:

Depth mt	Description	Core. cms	Core R. %	Remarks c.e
0-1	1st. coping over r. brick mas. with b. cl. l. morter.	58	58	milky to pink
1-2	r. brick mas. with b. cl. l.morter	60	60	pink high penetration rate
2-3	ditto.	59	59	"
3-4	ditto.	61	61	"
4-5	1st. rubble mas. with b. cl. l. morter.	63	63	milky low penetration rate.
5-6	1st. mas. with b. cl. l. morter.	59	59	yellow to milky.
6-7	ditto.	62	62	"
7-8	ditto.	61	61	milky
8-8.5	ditto.	29	58	yellow to milky.

Engineer

N.C.O.

NILE ENGINEERING CONEULTING OFFICE R.G.B. Dapt.

Lahoon Regulator

Boring Log.

B.H. No.: AL28 Dia 75 mm Depth 8 mt

Operator: Machine :

Date Started: 21.2.88 Date Completed: 21.2.88

Depth mt	Description	Core. cms	Core R. %	Remarks c.e.
0-1	15 cm. lst. 7 cm. morter.	22	22	greyish
1-2	25 cm. r. brick masonry with b. cl. l. morter. 5 cm. lst.	30	30	pinkish to grey yellowish
2-3	22 cm. r. brick masonry with b. cl. l. morter. 15 cm. L.S.	37	37	pinkish to grey
3-4	35 cm. r. brick masonry with b. cl. l. morter.	35	35	reddish
4-5	35 cm. r. brick masonry with b. cl. l. morter.	35	35	brownish
5-6	24 cm. r. brick masonry with b. cl. l. morter.	24	24	ditto
6-7	46 cm. r. brick masonry with b. cl. l. morter.	46	46	ditto
7-8	60 cm. lst with morter.	60	60	milky

Engineer

Table F-1-7 Representative Structure Grouting Record (Lahoun Regulator)

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dept.

Lahoon Regulator
Grouting Log

B.H.No. AR 21" R.L ( ) Depth 8 mt

Stage	From	to	q_s	P.bar.	Cement kg	Ramarks
1	8	5		2	50	
2	5	2		2	50	
3	2	0		2	125	
				Total	225 kg	

Date / / 198 Engineer

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dept.

Lahoon Regulator
Grouting Log

B.H.No. AL 22" R.L ( ) Depth 8 mt

Stage	From	to	q_s	P.bar	Cement kg	Ramarks
1	8	5		2	50	
2	5	2		2	75	
3	2	0		2	75	
				Total	200 kg	

Date 25 / 4 / 198 Engineer

Table F-1-8 Representative Results of Permeability Test (Lahoun Regulator)

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dept.

Lahoon
Permeability Test (Lugeon's)

B.H.No. 1 P_2 R.L. ( ) Depth 8.5mt.

Date	Internal m from	to	Time min	Press bar.	Q lit.	q_s	q_s av	Wat: Cem.
1	8.5	5.5	10	1	360	1.2		
			10	1.5	480	1.1	1.1	2 1
			10	2	630	1.1		
2	5.5	2.5	10	1	130	0.43		
			10	1.5	200	0.44	0.44	5 1
			10	2	270	0.45		
3	2.5	0.0	10	1	30	0.12		
			10	1.5	60	0.16	0.16	5 1
			10	2	100	0.2		

/ / 198 Engineer

N.C.O.
NILE ENGINEERING CONSULTING OFFICE R.G.B.Dapt.

Lahoon
Permeability Test (Lugeon's)

B.H.No. A.R 22 // R.L. ( ) Depth 8 mt.

Date	Internal m from	to	Time min	Press bar.	Q lit.	q_s	q_s av	Wat: Cem.
27-4-88								
	8	5	10	1.0	113	0.38		
			10	1.5	155	0.34	0.35	5:1
			10	2.0	200	0.33		
	5	2	10	1.0	185	0.62		
			10	1.5	243	0.54	0.56	3:1
			10	2.0	311	0.51		
	2	0	10	1.0	113	0.56		
			10	1.5	158	0.53	0.55	3:1
			10	2.0	223	0.55		

27/ 4 / 1988 Engineer

Table F-1-9 Representative Structure Boring-log (Manshat El Dahab Regulator)

NILE ENG. CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

REFERENCE NO. : 2 — REGULATOR : Manshat El Dahb
HOLE DIAMETER : 75 mm — MACHINE : Acker A.C.E
ELEVATION : 41.60 mt. — HOLE DEPTH : 24.0 mt.
DRILLING DATE : 20-1-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	CORE R CM	CORE R %	R.Q.D %	SAMPLE LOG	REMARKS
0		First 50cm: Monolithic l.st.cryst. Overlies red brick mas. with b. cl.-l.st. mortar	60	68	57		
1		Red brick mas.with b.cl. l.st mortar with little of small cracks	95	95	79		
2		Ditto, with little of cavities	97	97	89		
3		Ditto	98	98	98		
4		Ditto with traces of cavities	95	95	95		
5		Ditto	97	97	78		
6		Ditto	98	98	92		
7		Ditto	98	98	98		
8		R. brick mas. l.st mortar with lots l.st mortar (basement) moderatly hard					8.0
8.8			10	42	12		8.8
9							
10	4,5,7	Dark grey fine sand in sat.dense state					
11							
12	6,5,4	Light grey fine to med.sand in sat. dense state					
13							
14	13,15,15	Yellow sat. sand in dense state					
15							
16	25/10 25/9 25/8	Yellow coarse sand with thin intercalation of black silty clay					
17							
18	10,13,1	Grey fine to med.sand in dense state					
19							
20	13,12,1	Yellow med.sand in dense state					
21							
22	25/10 25/9 25/8	Yellow coarse to med.sand in very dense state					
23							
24	25/6 25/5 25/6	Ditto					End of boring 24.0m

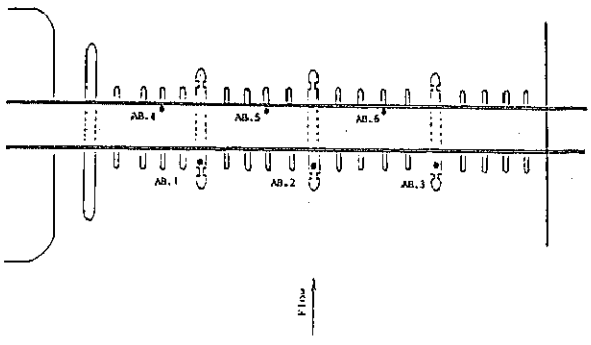
KEY: N = NUMBER OF BLOWS PER EACH PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D% = ROCK QUALITY DESIGNATION PERCENT

NILE ENG. CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

REFERENCE NO. : 4 — REGULATOR : Manshat El Dahb
HOLE DIAMETER : 75mm — MACHINE : Craelius
ELEVATION : 43.0mt — HOLE DEPTH : 6 mt.
DRILLING DATE : 18-1-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	CORE R CM	CORE R %	R.Q.D %	SAMPLE LOG	REMARKS
0		Sea paving layer then Limestone rubble around foundation Overlies fill consisting of sand					
1		Red brick mas.with b.-cl.-l.st mortar with little of vertical cracks	85	94	41		1.10 Cut rate of excavation
2		Red brick mas.with b.-cl.-l.st. mortar	95	95	49		
3		Ditto, with little of inclined cracks	97	97	75		Material R. of greek.
4		Ditto, but horizontal cracks	92	97	75		
5		R. brick mas.with b.-cl.- l.st. mortar with inclined cracks mate consolidated,	95	95	95		
6							End of boring

KEY: N = NUMBER OF BLOWS PER EACH PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D% = ROCK QUALITY DESIGNATION PERCENT



BORING HOLES OF Manshat El Dahb REGULATOR

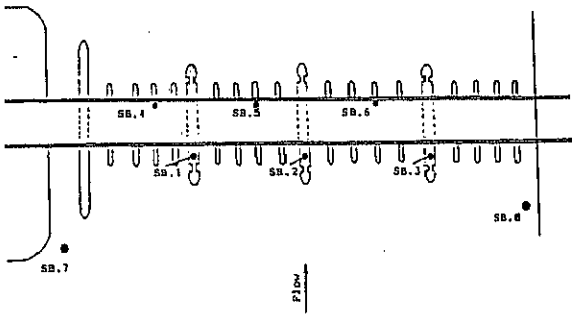
Table F-1-10 Representative Structure Boring-log (Sakoula Regulator)

NILE ENG.CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

BOREHOLE NO. : 1 — REGULATOR : SAKOULA
HOLE DIAMETER : 75mm — MACHINE : Crecllus
ELEVATION : 35.45 mt. — HOLE DEPTH : 8mt.
DRILLING DATE : 25-1-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	CORE R CM	CORE R %	R.Q.D %	SWELL LOG	REMARKS
0		First 50cm L.st. cyclop overlies R.brick wal.with cement morter	81	81	57		Slow rate of penet.
1		R.brick wag.with h.cl.-l.st. morter cement morter at the upper mat 15 cm	98	98	98		
2		R.brick wag. with h.cl.-l.st. morter	98	98	84		
3		Ditto	99	99	99		
4		Ditto	95	95	84		
5		Ditto	97	97	90		
6		Ditto	98	98	89		
7		Ditto	98	98	90		
8		Ditto					End of boring 8.0mt

KEY: N = NUMBER OF BLOWS PER 18CM PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D = ROCK QUALITY DESIGNATION PERCENT



BORING HOLES OF SAKOULA REGULATOR

NILE ENG.CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

BOREHOLE NO. : 7 — REGULATOR : SAKOULA
HOLE DIAMETER : 100 mm — MACHINE : Acker A.C.E
ELEVATION : 32.45 mt. — HOLE DEPTH : 26 mt.
DRILLING DATE : 30-1-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	CORE R CM	CORE R %	R.Q.D %	SWELL LOG	REMARKS
0		Dark grey sandy clay					
1							
2	1,1,1	Dark grey sandy silty clay with some of red brick and L.st gravel					s*
3							
4	1,2,4	Dark grey sandy silty clay with some of L.st. gravel					
5							
6	3,9,8	Light grey med.to fine sand in ms. dense state					loss of drilling mud
7							
8	12,10,1	Yellow med.to fine sand with little sheets of sandy clay in mod. dense state					
9							
10	9,11,12	Yellow med. to fine sand in mod. dense state					
11							
12	25/8 25/6 25/3	L.grey course sand in very dense state					
13							
14	25/5 25/4	Ditto					
15							
16	25/6 25/3 25/3	Ditto					
17							
18	25/6 25/3	Ditto, with little of fine gravel					
19							
20	25/8 25/6 25/3	L.grey med.sand in very dense state					
21							
22	25/7 25/5 25/3	Yellow coarse sand with some of fine gravel in very dense state					
23							
24	25/6 25/7 25/4	Ditto					
25							
26	25/6 25/7 25/4	L.grey med.to coarse sand in very dense state					End of boring 26.0mt
		N.B. loss of precipitation is evident at depth 6mt					

KEY: N = NUMBER OF BLOWS PER 30CM PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D = ROCK QUALITY DESIGNATION PERCENT

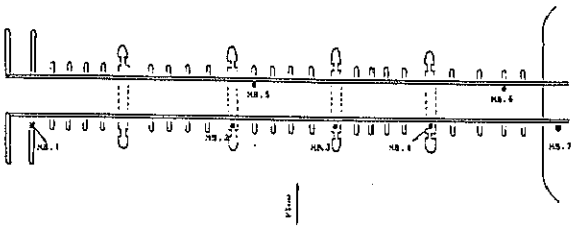
Table F-1-11 Representative Structure Boring-log (Mazoura Regulator)

NILE ENG.CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

BOREHOLE NO. : 2 — LOCATION : MAZOURA 1
HOLE DIAMETER : 75 mm — MACHINE : Craelius
ELEVATION : 30.95 mt — HOLE DEPTH : 8.0 mt.
DRILLING DATE: 4-2-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	RECOVERY R CM	RECOVERY R %	R.Q.D %	SYMBOL LOG	REMARKS
0		First 50cm 1.st. crying overlies B.brick mas.with b.cl.-1.st morte	97	97	53		Slow rate of cement.
1		B. brick mas. with b. cl.-1.st mortar	98	98	98		N.R. of pene
2		Ditto	98	98	98		
3		Ditto	96	96	84		
4		Ditto	97	97	97		
5		Ditto	95	95	90		
6		Ditto	98	98	91		
7		Ditto	98	98	58		
8						End of	boring 8.0m

KEY: N = NUMBER OF BLOWS PER 100M PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D = ROCK QUALITY DESIGNATION PERCENT



BORING HOLES OF MAZURA REGULATOR

NILE ENG.CONSULTING OFFICE — SOIL INVESTIGATION BORING LOGS

BOREHOLE NO. : 7 — REGULATOR : MAZOURA
HOLE DIAMETER: 100 mm — MACHINE : Acker A.C.B
ELEVATION : 31.85 mt — HOLE DEPTH : 29 mt
Ground Water Level: 29.95mt. — DRILLING DATE: 8-2-92

DEPTH	S.P.T. N VALUE	DESCRIPTION	RECOVERY R CM	RECOVERY R %	R.Q.D %	SYMBOL LOG	REMARKS
0		Fill,consisting of limestone rubble cobbdal in sandy clay					
1							
2							2.0
3	1,1,1	Dark brown soft loam					
4							
5	2,2,2	Ditto with med.consistency					
6							
7	1,1,1	Dark brown soft sandy clay					
8							8.0
9	5,5,5	Grey med.sand with little of clay in mod.denso state					
10							
11	14,15,7	Grey course sand in dense state					
12							
13	25/10 25/8 25/5	Ditto, in very dense state					
14							
15	25/14 25/10 25/7	Ditto					
16							
17	25/12 25/9 25/6	Ditto					
18							
19	25/7 25/4 25/4	Yellowish grey course sand in very dense state					
20							
21	25/8 25/6	Grey course sand with thin sheets of clay					
22							
23	25/11 25/8 25/5	Grayish yellow course sand in very dense state					
24							
25	25/9 25/8 25/4	Light grey course sand in very dense state					
26							
27	25/12 25/9 25/6	Ditto					
28							
29	25/12 25/8 25/7	Ditto					
						End of	boring 29.0

KEY: N = NUMBER OF BLOWS PER 100M PENETRATION
R = TOTAL CORE RECOVERY
R.Q.D = ROCK QUALITY DESIGNATION PERCENT

Table F-1-12 Compressive Strength of Core Samples

Manshat El Dahb REGULATOR

Date: Jan. 29, 1992

SNO	Sample	identification		Gross density gm/cm³	Specimen length cm	Stress kg/cm²
1	AB 1	1	1 m	1.960	10.50	44.8
2		2	2 m	1.946	12.00	53.1
3		3	3 m	1.886	11.50	55.8
4		4	4 m	1.963	12.10	44.2
5		5	5 m	1.875	12.00	37.6
6		6	6 m	1.882	12.00	53.1
7		7	7 m	1.931	11.90	48.7
8		8	8 m	1.995	11.80	70.1
9	AB 2	1	1 m	1.947	11.70	48.6
10		2	2 m	1.939	12.00	57.5
11		3	3 m	1.946	11.5	44.2
12		4	4 m	1.903	12.00	41.1
13		5	5 m	1.932	12.10	57.5
14		6	6 m	1.947	12.00	50.8
15		7	7 m	1.942	12.10	53.5
16		8	8 m	1.818	11.80	53.1
17	AB 3	1	1 m	1.873	8.50	48.6
18		2	2 m	1.938	11.20	44.2
19		3	3 m	1.884	10.40	48.8
20		4	4 m	1.981	12.00	42.9
21		5	5 m	1.938	12.10	48.6
22	AB 3	6	6 m	1.970	11.50	42.0
23		7	7 m	1.945	11.70	44.2
24		8	8 m	1.902	9.40	59.7
25	AB 4	1	2 m	1.836	12.00	48.6
26		2	4 m	1.959	7.30	70.7
27		3	5 m	1.876	10.70	61.9
28		4	6 m	1.892	11.90	44.7
29	AB 5	1	3 m	1.811	9.60	45.1
30		2	3 m	1.882	10.20	55.4
31		3	5 m	1.980	11.50	44.7
32		4	6 m	1.913	10.00	35.8
33	AB 6	1	3 m	1.826	12.30	59.7
34		2	4 m	1.873	11.50	45.1
35		3	5 m	1.854	11.90	61.9
36		4	6 m	1.851	9.60	70.7

Notes: The specimen diameter is 6.00 cm

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SAKOULA REGULATOR

Date: Feb. 6, 1992

SNO	SAMPLE	Sample Depth	WATER CONTENT %	Gross density gm/cm³	SPECIMEN LENGTH cm	STRESS KG/cm²
1	SB.1	1.0m	10.42	2.014	11.0	106.1
2		2.0		1.984	12.0	120.0
3		3.0	13.93	1.962	9.5	24.8
4		4.0		1.733	10.0	51.1
5		5.0		2.062	12.4	35.4
6		6.0		1.936	11.0	56.6
7		7.0		1.844	10.5	14.2
8		8.0		1.917	12.0	99.0
9	SB.2	1.0		1.910	9.00	38.9
10		2.0		1.973	9.5	51.1
11		3.0	16.69	1.806	7.5	46.0
12		4.0		1.887	12.0	35.4
13		5.0		2.093	11.0	44.2
14		6.0		1.910	12.0	51.1
15		7.0		1.910	8.00	50.1
16		8.0		2.160	12.6	61.0
17	SB.3	1.0	6.72	1.833	10.8	63.7
18		2.0	19.50	1.897	11.0	42.4
19		3.0		1.953	12.0	56.7
20		4.0		1.991	8.0	18.9
21		5.0		1.834	12.4	44.2
22		6.0		1.987	12.4	61.9
23		7.0		1.864	12.2	53.1
24		8.0		2.014	11.0	106.1
25	SB.4	2.0		1.996	12.4	150.3
26		3.0		1.998	10.5	122.2
27		4.0		1.960	12.2	50.3
28		6.0	21.50	1.928	9.0	84.9
29	SB.5	3.0	13.04	1.815	10.0	61.9
30		4.0		1.772	9.0	61.9
31		5.0	21.43	1.942	12.2	67.7
32		6.0		1.857	8.00	66.1
33	SB.6	2.0	19.55	2.066	11.8	53.1
34		3.0		1.695	12.0	70.0
35		4.0		1.760	12.2	45.5
36		6.0		1.860	11.6	61.0

Note: The specimen diameter is 6.00 cm.

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MAZOURA REGULATOR

Date: Feb. 12, 1992

SNO	Sample	identification		water absorption %	Gross density gm/cm3	Specimen length cm	strene kg/cm²
1	M.B.1	1 - 2.0 m			2.102	12	57.5
2	M.B.1	2 3.0 m			2.060	8.0	40.2
3	M.B.1	3 - 4.0 m			2.131	7.5	36.3
4	M.B.1	4 - 5.0 m		22.40	1.806	10.8	66.8*
5	M.B.1	5 - 6.0 m			1.890	11.5	79.6
6	M.B.1	6 - 7.0 m			2.126	8.5	26.5
7	M.B.1	7 - 8.0 m			1.868	8.0	50.0
8	M.B.1	8 - 8.5 m			2.094	12.5	40.0
9	M.B.2	1 - 2.0 m		22.91	1.859	12.0	44.2*
10	M.B.2	2 - 3.0 m			1.874	10.0	42.0
11	M.B.2	3 - 4.0m		25.06	1.945	11.0	62.0*
12	M.B.2	4 - 5.0m		27.39	1.930	11.5	46.4*
13	M.B.2	5 - 6.0 m			1.873	9.0	53.1
14	M.B.2	6 - 7.0 m		21.80	1.794	12.4	67.0*
15	M.B.2	7 - 8.0 m			1.966	7.5	35.4
16	M.B.3	1 - 2.0 m			2.219	8.0	44.2
17	M.B.3	2 - 3.0 m			2.251	17.0	37.6
18	M.B.3	3 - 4.0 m			1.893	9.7	53.1
19	M.B.3	4 - 5.0 m			1.901	11.2	45.1
20	M.B.3	5 - 6.0 m		23.02	1.931	11.5	57.5*
21	M.B.3	6 - 7.0 m		21.13	1.900	12.2	61.9*
22	M.B.4	1 - 1.0 m		29.96	1.820	11.0	68.0*
23	M.B.4	2 - 2.0 m			1.768	10.0	57.5
24	M.B.4	3 - 3.0 m		27.12	1.810	8.5	53.1*
25	M.B.4	4 - 4.0 m			1.849	11.0	69.9
26	M.B.4	5 - 5.0 m			2.210	10.0	33.2
27	M.B.4	6 - 6.0 m			2.071	12.5	72.1
28	M.B.5	1 - 2.0 m			2.111	12.5	57.9
29	M.B.5	2 - 3.0 m			1.914	8.0	50.0
30	M.B.5	3 - 4.5 m			2.093	6.0	30.3
31	M.B.5	4 - 4.7 m			1.837	8.0	55.7
32	M.B.6	1 - 2.0 m			1.835	8.0	36.3
33	M.B.6	2 - 3.0 m			1.801	12.2	57.5
34	M.B.6	3 - 4.0 m			1.991	10.5	46.0
35	M.B.6	4 - 5.5 m		24.56	1.815	12.2	70.7*
36	M.B.6	5 - 6.0 m			1.945	12.2	31.8

Notes:

1- Specimens diameter = 6.00 cm

2- * was tested after 24 hours soaking

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Table F-1-13 Investigated Traffic Volume

Manshat El Dahab Regulator

Time 30th Jan.	Truck	Tractor	Pick-up	Sedan	Mortor Cycle	People
8:00 - 9:00	-	2	26	1	2	120
9:00 - 10:00	4	8	27	-	3	60
10:00 - 11:00	4	10	19	2	2	80
11:00 - 12:00	-	10	28	1	4	50
12:00 - 13:00	2	4	20	1	1	90
13:00 - 14:00	2	6	15	1	2	100
14:00 - 15:00	3	5	22	1	3	50
15:00 - 16:00	2	8	26	2	1	95
16:00 - 17:00	1	6	20	3	-	120
17:00 - 18:00	1	5	19	2	2	150
Total	19	64	222	14	20	915

Sakoula Regulator

Time 4th Feb.	Truck	Tractor	Pick-up	Sedan	Mortor Cycle	People
8:00 - 9:00	4	11	25	15	4	140
9:00 - 10:00	1	6	17	11	3	111
10:00 - 11:00	1	7	20	9	1	165
11:00 - 12:00	3	21	19	4	1	135
12:00 - 13:00	2	5	26	10	2	90
13:00 - 14:00	1	4	21	9	1	295
14:00 - 15:00	3	8	27	6	3	275
15:00 - 16:00	1	5	15	11	4	85
16:00 - 17:00	2	10	10	8	1	113
17:00 - 18:00	1	8	19	14	1	154
Total	19	85	199	97	21	1,566

Mazoura Regulator

Time 7th Mar.	Truck	Tractor	Pick-up	Sedan	Mortor Cycle	People
8:00 - 9:00	15	25	55	7	5	40
9:00 - 10:00	12	22	54	5	3	35
10:00 - 11:00	13	23	56	6	-	32
11:00 - 12:00	11	19	50	8	2	38
12:00 - 13:00	9	20	52	6	1	31
13:00 - 14:00	12	18	49	7	4	40
14:00 - 15:00	8	22	50	4	5	36
15:00 - 16:00	9	21	55	3	7	45
16:00 - 17:00	11	19	57	5	5	44
17:00 - 18:00						
Total	100	189	478	51	32	341

Table F-1-14 Present Conditions of Existing Regulators

Name of Regulator		Base	Aprons	Up-streame		Dw.-streame		Road	Lock		
				Bed	Slope	Bed	Slope				
Dairout			C	C	D	D	D	B	B		
		Gate No.1	Gate No.2	Gate No.3	Gate No.4	Gate No.5	Gate No.6	Gate No.7	Gate No.8	Gate No.9	Gate No.10
(1) Piers	+20										
	+10	C	C	C	C	C					
(2) Arches	+20										
	+10	C	C	C	C	C					
(3) Gates	+20										
	+10	B B B	B B B	B B B	B B B	D B B					

Name of Regulator		Base	Aprons	Up-streame		Dw.-streame		Road	Lock		
				Bed	Slope	Bed	Slope				
Manshat El Dahb			B	B	C	D	D	B	B		
		Gate No.1	Gate No.2	Gate No.3	Gate No.4	Gate No.5	Gate No.6	Gate No.7	Gate No.8	Gate No.9	Gate No.10
(1) Piers	+20										
	+10	B C	C C	B C	B C	B C	B C	B C	B C	B C	B C
(2) Arches	+20										
	+10	B B	B B	B B	B B	B B	B B	B B	B B	B B	B B
(3) Gates	+20										
	+10	B B B B	B B B B	B B C B	B B B B	B B B B	B B C B	B B C B	B B B B	B B B B	B B B B

Name of Regulator		Base	Aprons	Up-streame		Dw.-streame		Road	Lock		
				Bed	Slope	Bed	Slope				
Sokoula			B	B	C	D	D	D	B		
		Gate No.1	Gate No.2	Gate No.3	Gate No.4	Gate No.5	Gate No.6	Gate No.7	Gate No.8	Gate No.9	Gate No.10
(1) Piers	+20										
	+10	B B	B B	B B	B B	B B	C B	C B	C B	D B	D B
(2) Arches	+20										
	+10	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C
(3) Gates	+20										
	+10	B B C B	B B B B	C B D B	C B D B	C B B B	D B C B	D B B B	D B B B	D B D B	D B B B

Name of Regulator		Base	Aprons	Up-streame		Dw.-streame		Road	Lock		
				Bed	Slope	Bed	Slope				
Mazoura			C	B	C	D	D	B	B		
		Gate No.1	Gate No.2	Gate No.3	Gate No.4	Gate No.5	Gate No.6	Gate No.7	Gate No.8	Gate No.9	Gate No.10
(1) Piers	+20	B	B	B	B	B					
	+10	B B	C B	B B	C C	C C	B C	B C	B B	B B	B B
(2) Arches	+20	B	B	B	B	B					
	+10	B B	B B	B B	B B	B B	B B	B B	B B	B B	C B
(3) Gates	+20	D B	D C	D B	D C	D C					
	+10	D B D B	D B D B	B C D B	B B B B	D B D B	D C D B	D C D B	D C D B	D C D B	D C D B

Name of Regulator		Base	Aprons	Up-streame		Dw.-streame		Road	Lock		
				Bed	Slope	Bed	Slope				
Lahoun			D	–	D	D	B	C	B		
		Gate No.1	Gate No.2	Gate No.3	Gate No.4	Gate No.5	Gate No.6	Gate No.7	Gate No.8	Gate No.9	Gate No.10
(1) Piers	+20										
	+10	D	D	D							
(2) Arches	+20										
	+10	C	C	C							
(3) Gates	+20										
	+10	D	C	C							

Remark
A B C
Up Mid Low
Gate

Grade	Descriptions
A :	No necessity of repairing
B :	The nesesityies of repairring partly
C :	The nesesityies of rehabilitation : can not oprate
D :	The nesesityies of reconstruction : broken

Table F-1-15 Intake Structures on the Bahr Yusef Canal

Name of Canal	KM	Area Served (feddan)	Intake Structure					Canal				
			No. of Gate	Gate Type	Gate Width	Gate Height	Gate Sill Elevation	Bed Width	Side Slope	Canal Depth	Bed Slope (cm/Km)	Length (m)
Arb Bani Kahlid	39.3	2,130	1	FH	2.50	2.10	40.70	2.0	1:1	1.7	6	
Arab Bani Khalid Pump Station		(2,500)										
Bani Khalid	42.6	2,220	1	FH	2.50	2.30	40.20	3.0	1:1	1.7	3	
Bani Khalid P.S		(3,500)										
Mossa	62.36	300	1	Slide	1.10	2.00	39.50	1.5	1:1	1.5	10	2,040
Asment	63.45	400	1	Slide	1.10	2.00	39.00	1.5	1:1	1.5	8	2,450
Balansoura	67.37	330	1	Slide	1.10	2.00	38.75	2.0	3:2	1.5	10	2,760
Soltan Hassan	69.24	200	1	Slide	1.10	2.00	39.00	1.5	1:1	1.5	10	2,040
Alnebt	74.74	200	1	Slide	1.10	2.00	38.70	1.5	1:1	1.7	Horizontal	1,560
Mabrok	75.38	300	1	Slide	1.10	2.00	38.50	1.5	1:1	1.7	5	3,380
Manshat El Dahb	77.3	50,400	4	FH	2.50	3.50	37.00	17.0	1:1	2.7	6	63,000
Ganbid Tokh	77.3	1,600	1	FH	2.00	2.60	38.70	3.5	1:1	1.7	8	14,650
Abo Rahel	77.3	5,620	1	Chain Slide	2.90	2.60	38.50	3.0	3:2	1.9	5	11,940
Kamadir 5 P.S	104.6	(8,720)										
Terfa 1 P.S	143.9	(14,649)										
El Bahnasa	173.4	4,700	1	FH	3.00	2.90	31.00	3.0	1:1	1.3	10	9,900
Saab (Sakola)	177.23	17,000	3	FH	2.50	3.60	30.40	9.0	3:2	1.85	6	23,015
Harika	177.23	18,800	3	FH	2.50	3.60	30.40	8.0	1:1	2.0	6	32,805
Sakoula 4 P.S	184.0	(13,164*)										

Note : FH - Fahmy Henen Gate, Manual - Steel Gate, * Since the command area of the Sakoula 4 pump station was not available, the total command area of the Sakoula No. 5A (1,216 fed) and 5b (11,948 fed) pump stations is applied.

Source : Minia, Beni Suef and Faiyum Irrigation Directrates

Table F-1-15 (cont'd)

Name of Canal	KM	Area Served (feddan)	Intake Structure					Canal				
			No. of Gate	Gate Type	Gate Width	Gate Height	Gate Sill Elevation	Bed Width	Side Slope	Canal Depth	Bed Slope (cm/Km)	Length (m)
Mazoura O.P.S	219.5	(10,850)	-	-	-	-	-	10.0	3.2	2.5	10	10,000
Maggror El Regha	228.8	200	No intake facility					1.0	3.2	1.0	15	1,110
Oftan	229.0	15,686	3	FH	2.0	4.0	26.80	10.0	1:1	2.0	10	17,460
El Bahsamon	249.0	2,500	1	Slide	1.0	1.2		2.0	1:1	2.0	10	6,500
Wady El Rayan	263.0	2,600	1	FH	2.0	3.7	25.00	4.0	1:1	2.5	10	2,600
El Assra	264.5	2,300	1	FH	2.0	2.5	25.20	3.0	1:1	2.0	10	10,450
Myana	264.8	2,000	1	Slide	1.2	1.3	25.20	2.0	1:1	2.0	10	4,730
Edrasya	269.5	500	1	Slide	1.0	2.5	24.80	1.0	1:1	1.5	10	4,200
Fanos	275.45	600	1	Slide	1.0	2.0	24.50	1.0	1:1	1.5	10	2,200
Waslat Bahabshin	283.7	2,270	1	Slide	1.0	2.5	24.00	2.0	1:1	1.5	5	3,720
Hawara		1,448	1	Slide	1.0	2.0		2.5	1:1	2.0	Horizontal	4,300
Ganabaia Giza	288.31	3,600	1	FH	2.0	3.2	24.90	2.0	1:1	2.0	15	5,500
Hassan Wasef	288.33	118,306	4	CSDL	3.0	5.1	22.00	15.0	1:1	5.0	7.5	13,555
El Giza	288.39	153,117**	5	CSDL	3.0	4.6	22.50	22.0	1:1	3.5	5	
El Hager	288.65	3,600	1	FH	3.0	3.0	25.10	3.5	1:1	2.0	10	15,500
Direct Irri.		10,179										
New Land		6,000										
Sadne by Irri. Pump Station		(6,000)										

Note: FH - Fahmy Henen Gate, Manual - Steel Gate, * The command area of the Mazoura 0 pump station is not available, therefore the command area of the Mazoura No.1 is applied. ** Including command area of 8,117 feddan in Beni Suef. CSDL : Chain Slide Double Leaf
The figure in blankets is irrigated by the Bahr Yusef canal in summer season only due to shortage of water in the Ibrahimia canla.

Source: Minia, Beni Suef, Giza and Faiyum Irrigation Directrates

Table F-1-15 (cont'd)

Name of Canal	KM	Area Served (feddan)	Intake Structure					Canal				
			No. of Gate	Gate Type	Gate Width	Gate Height	Gate Sill Elevation	Bed Width	Side Slope	Canal Depth	Bed Slope (cm/Km)	Length (m)
El Agouz	288.70	1,266	1	Wooden stoplog	3.0	2.0	n.a	2.5		1.65		
Wahbi	299.195	71,410	2	FH	3.0	4.0	20.90	14.0	1:1	4.00	5	68,000
Abo Sier	306.23	2,254	1	Slide	1.2	2.3	22.00	2.5	1:1	1.5	5	4,510
Aroos	306.38	10,980	2	FH	1.0	3.0	20.50	6.0	1:1	1.5	5	9,605
El Mahagna	307.48	746	1	Slide	0.8	2.0	21.73	1.5	1:1	1.5	5	3,350
Baga	308.47	538	1	Slide	1.0	2.0	21.62	1.0	1:1	1.5	5	2,642
Soliman Desoki	308.874	2,351	1	Slide	1.0	2.6	21.15	3.0	1:1	1.05	4	7,740
Kohafa	309.184	612	1	Slide	2.0	3.5	20.50	1.0	1:1	2.8	5	2,000
El Ehlam	309.72	10,525	2	Slide	0.7/0.9	2.5/2.5	21.00	6.0	1:1	2.0	5	6,180
Dar El Ramad	310.02	831	1	Slide	0.7	30	21.06	2.5	1:1	1.9	5	2,525
Tanhala	311.168	21,169	4	Slide	1.0	2.9	20.65	7.0	1:1	2.12	20	14,900
Senories	311.34	27,963	2	Slide	1.5	2.8	20.72	6.0	1:1	3.7	10	10,500
Desia	312.70	19,193	2	Slide	1.5	2.2	20.80	7.0	1:1	2.6	8	4,750
El Zawia	312.70	10,471	2	Slide	1.5	2.8	20.20	5.0	1:1	2.2	5	8,380
Talat	312.70	12,923	2	Slide	1.5	2.5	20.50	7.0	1:1	2.8	7	3,200
El Gharbia	312.70	20,064	3	Slide	1.5	2.5	20.25	10.0	1:1	2.1	16	7,166
Senero	312.70	10,838	2	Slide	1.5	2.4	20.30	6.0	1:1	2.3	5	3,608
Sanhor	312.70	14,637	2	Slide	2.0	2.5	20.50	6.0	1:1	2.5	5	19,860

Note : FH - Fahmy Henen Gate, Manual - Steel Gate, USL Itk - Upstreem left intake, USR Itk - Upstreem right intake
Source : Minia, Beni Suef and Faiyum Irrigation Directrates

Table F-1-16 Present Conditions of Existing Intake Facilities

Name of Intake	Arb Bani Kahlid	Serial Number	A - 1	Position (Km)	L - Bank 45.0	Irrigation Area (Feddan)	2.130
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.5 x 2.1 x 1	FH	C	42.50	40.70	×	Earth 15 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.5 x 2.1 x 14.5	Brick	C	42.80	8.0	×	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	2.0 x 1.7	Riprap 10 m	D	3.0	×	R - Bank L - Bank	C D
Remarks							
- During Jul. to Sep. it can take water from Bahr Yusef by the gravity. but the other peiriod. (HWL = 41.50 m) pumping up by two pumps.							

Name of Intake	Bani Kahlid	Serial Number	A - 2	Position (Km)	L - Bank 48.5	Irrigation Area (Feddan)	2.220
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.5 x 2.3 x 1	FH	B	42.00	40.20	×	Earth 50 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.5 x 2.5 x 14.0	Brick	B	42.70	5.7	×	B
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.0 x 1.7	×	D	6.0	×	R - Bank	D
Remarks							
- During Jul. to Sep. it can take water from Bahr Yusef by the gravity. but the other peiriod. (HWL = 41.00 m) pumping up by two pumps.							

Name of Intake	Manshat El Dahb	Serial Number	A - 9	Position (Km)	L - Bank 77.3	Irrigation Area (Feddan)	50.400
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	3.5 x 2.5 x 4	FH	B	39.50	36.00	×	Earth 300 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	3.5 x 4.1 x 20.0	Brick	D	40.05	×	×	×
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	17.0 x 2.7	×	D	3.0 3.0	× ×	R - Bank L - Bank	C C

Name of Intake	Ganbid Tokh	Serial Number	A - 10	Position (Km)	L - Bank 77.3	Irrigation Area (Feddan)	1.600
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.0 x 2.6 x 1	FH	C	39.50	37.15	×	Earth 300 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.0 x 3.0 x 15.0	Brick	D	39.75	3.0	×	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.5 x 1.7	×	D	×	×	×	×

Name of Intake	Abo Rahel	Serial Number	A - 11	Position (Km)	L - Bank 77.3	Irrigation Area (Feddan)	5.620
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.9 x 2.6 x 1	Chainblock steel	D	39.50	37.40	×	Earth 300 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.9 x 3.0 x 5.0	Brick	D	40.20	×	×	×
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.0 x 1.9	×	D	4.0	×	R - Bank	C

Grade DescriDescriptions

A : No necessity of repairing
B : The nesesityies of repairring partly
C : The nesesityies of rehabilitation : can not oprate
D : The nesesityies of reconstruction : broken

Table F-1-16 (cont'd)

Name of Intake	El Bahnasa	Serial Number	S - 3	Position (Km)	L - Bank 173.4	Irrigation Area (Feddan)	4.700
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	3.0 x 2.9 x 1	FH	A	33.10	31.00	×	Earth 300 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	3.0 x 3.6 x 12.0	Brick	D	35.30	3.5	×	D
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.0 x 1.3	×	D	2.0	×	R - Bank	D

Name of Intake	Saab	Serial Number	S - 4	Position (Km)	L - Bank 177.2	Irrigation Area (Feddan)	17.000
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.7 x 3.6 x 3	FH	D	33.40	30.40	×	Earth 1.500
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.7 x 4.0 x 17.0	Brick	D	34.55	6.0	×	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	9.0 x 1.9	Riprap 100 m	C	4.0	×	R - Bank	C

Name of Intake	Harica	Serial Number	S - 5	Position (Km)	L - Bank 177.2	Irrigation Area (Feddan)	18.800
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.5 x 3.6 x 3	FH	D	33.50	30.40	×	Earth 1.500
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.5 x 4.4 x 16.0	Brick	D	34.80	6.0	×	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	8.0 x 3.0	Riprap 120 m	C	5.0	×	R - Bank	C

Name of Intake	Oftan	Serial Number	M - 4	Position (Km)	L - Bank 229.0	Irrigation Area (Feddan)	15.686
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.0 x 4.0 x 3	FH	B	30.10	26.80	×	Earth 300 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.0 x 4.0 x 19.0	Concrete	A	30.80	8.0	Concrete	A
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	10.0 x 2.0	Partial Riprap	C	3.0	×	R - Bank	C

- Completed in 1987

Name of Intake	Wady El Rayan	Serial Number	L - 2	Position (Km)	L - Bank 262.5	Irrigation Area (Feddan)	2.600
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.0 x 3.7 x 1	FH	B	27.50	25.00	A	Earth 200 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.0 x 3.7 x 20.0	Concrete	A	28.70	5.5	Ash.	A
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	4.0 x 2.5	×	D	5.5	Ash.	L - Bank	A

- Completed in 1989

Name of Intake	El Assra	Serial Number	L - 3	Position (Km)	L - Bank 264.3	Irrigation Area (Feddan)	2.300
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.0 x 2.5 x 1	FH	B	27.50	25.20	A	×
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.0 x 2.9 x 14.0	Concrete	C	28.10	8.0	×	D
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.0 x 2.0	Partial Riprap	D	3.0 4.0	×	L - Bank R - Bank	D

- Completed in 1985

Table F-1-16 (cont'd)

Name of Intake	Myana	Serial Number	L - 4	Position (Km)	L - Bank 264.8	Irrigation Area (Feddan)	2.000
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	1.2 x 1.25 x 1	Spindle, Slide	D	27.50	25.20	B	Earth 50 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	φ1.0 x 9.3	Brick	D	26.90	6.0	×	D
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	2.0 x 2.0	×	D	3.0	×	R - Bank	B

Name of Intake	Ganabaia Giza	Serial Number	L - 9	Position (Km)	R - Bank 288.3	Irrigation Area (Feddan)	3.600
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	2.0 x 3.2 x 1	FH	B	26.60	24.90	×	Earth 50 m
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	2.0 x 3.4 x 15.0	Brick	A	28.10	9.5	Ash.	B
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	2.0 x 2.0	Partial Riprap	C	4.0	×	L - Bank	D
- Along Root no.2							

Name of Intake	Hassan Wasef	Serial Number	L - 10	Position (Km)	R - Bank 288.3	Irrigation Area (Feddan)	118.306
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	3.0 x 2.7 x 4 3.0 x 2.7 x 4	Chain, Slide	C	26.60	22.00	B	×
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	3.0 x 5.1 x 12.4	Brick	D	28.10	5.9	Concrete	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	15.0 x 4.3	×	C	3.0	×	L - Bank	C
- Piers were reinforced by mortal - The bridge was made of reinforced concrete				- There is wire fence at the upstream of intake			

Name of Intake	El Giza	Serial Number	L - 11	Position (Km)	R - Bank 288.4	Irrigation Area (Feddan)	153.117
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	3.0 x 2.4 x 5 3.0 x 2.4 x 5	Chain, Slide	D	26.60	22.50	D	×
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	3.0 x 6.2 x 12.0	Brick	D	27.70	5.0	Ash.	C
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	22.0 x 3.5	Partial Riprap	C	6.0	×	R - Bank	C
- As compared with the width of road (w = 9.5 m), the width of bridge is very narrow. - Particulary piears and gates are superannuated. - There is a problem water flow is obstructed by water weeds at the screen.							

Name of Intake	El Hager	Serial Number	L - 12	Position (Km)	R - Bank 288.7	Irrigation Area (Feddan)	3.600
Intake	Gates			Intake HWL.	Gate Sill EL.	Screen	Access Canal
	B x H x N (m)	Type	Condition				
	3.0 x 3.0 x 1	FH	B	26.60	25.10	×	×
Structures	Culvert, Piers and/or Abutments				Crossing Road		
	W x H x L (m)	Material	Condition	Top EL.	W (m)	Pavement	Condition
	3.0 x 3.0 x 11.0	Brick	C	28.10	8.0	Ash.	B
Branch Canal	Canal			Manegement Road			
	B x H (m)	Lining	Condition	W (m)	Pavement	Position	Condition
	3.5 x 2.0	×	C	4.0	×	R - Bank	C
- Particulary upper structures have much damages.							

Table F-1-17 Salient Features of Existing Pump Stations

Location (km)	Name of Station	Inst. Year	Type of Pump	Diameter (mm)	No. of Pump	Pump Ca (m3/s)	Shaft Position	Acturai Head (m	Design W.L.(EL.m) Section High	Section Low	Discharge High	Discharge Low	Power (kw)	Area (1000fed	History of Repair
1. Drainage	Pump Stations														
20.00	EL BADRAM	1937	Sulgur, Swissry	1.000	3	2.0	Horizontal	2.4	-	40.60	43.00	-	137	85	Last Repair in
			ASCPT, Swissry	1.000	4	2.5	Horizontal	2.4	-	40.60	43.00	-	137		Unit No.1 11/86
															Unit No.2 5/87
			(37-74) Diesel												Unit No.3 11/87
			(74-91) Elect.												Unit No.4 9/89
															Unit No.5 5/86
															Unit No.6 1/86
56.50	KAB KAB	1983	J.M.Voith, AUSTRIA	900	5	2.9	Inclined Angle 45	4.36	39.00	38.00	42.40	41.00	170	63	NO Repair
58.40	TONA EL G	1973	EL-Masbec,Swis	500	4	0.6	Horizontal	3.00	38.50	38.00	41.80	41.50	55	12	No.1 12/87
															No.2 under repair
															No.3 7/86,No.4 4/91
116.70	MANSHAT	1986	J.M.Voith, AUSTRIA	900	3	1.63	Inclined Angle 45	1.27	-	23.87	35.07	34.91	30	2	NO Repair
162.50	BENI MAZA	1984	J.M.Voith, AUSTRIA	1.500	4	3.0	Inclined Angle 45	3.00	-	31.00	35.00	-	170	53	NO Repair
164.50	DIER EL SANKUR	1983	MEZ.BRND	1.300	4	3.5	Inclined Angle 45	2.9	32.50	31.00	34.50	-	150	50	Data: 3/91
(195.0)	ABU RAHEB	1980	J.M.Voith, AUSTRIA	1.300	4	3.8	Inclined Angle 45	2.1	30.000	28.90	31.00	29.90	116	67	NO Repair
219.00	SAKOULA	1978	SOR5P72 CZECHO.	1.400	4	4.5	Inclined Angle 45	2.9	30.00	27.50	33.00	29.50	200	40	NO Repair
274.30	MAZOURA	1980	AG11 BB-4SP CZECHO.	1.100	3	3.57	Inclined Angle 45	2.9	30.00	23.95	31.60	27.30	200	32	NO Repair
2. Irrigation Pump Stations															
45.00	ARAB BANI KHALID	1973	MR-50 U.S.A (73-85) Diesel (85-91)Elect.	500	2	0.8	Horizontal	3.0	38.3	38.25	41.30	41.25	76	3.5	Date: 6/91
48.50	BENI KHAL	1973	MR-50 U.S.A (73-85) Diesel (85-91)Elect.	500	2	0.8	Horizontal	3.0	38.3	38.25	41.30	41.25	76	3.5	Date: 6/91
104.60	KAMADIR(5	1969	PEZ-700 GERM	700	4	1.34	Vertical	1.6	-	36.70	38.70	38.30	70 HP	8.72	Date: 11/86, 2/88, 1/91
143.90	TERFA(1)	1968	EV-750 ITALY	800	6	1.472	Vertical	2.2	34.80	34.50	36.70	36.55	73.5	14.64	Date: 11/85, 3-6/88,
143.90	TERFA(1) N	1984	CLZ-700 MAG	800	4	1.9	Vertical	2.95	34.80	34.40	36.70	36.55	132	14.64	NO Repair
184.90	SAKOULA(4)	1967	PEZ-700 GERM	700	4	1.225	Vertical	2.75	32.00	29.40	33.85	-	66	-	3/83, 6/87, 8/90,
219.50	MAZOURA(0	1967	PEZ-700 GERMANY	700	4	1.47	Vertical	1.99	30.50	29.25	31.24	30.00	81	22	No.1:12/83No.2:5/86 No.3:2/89,No.4:1/90
219.50	MAZOURA(0	1984	CLZ-800 MAGR	700	4	2.00	Vertical	2.6	30.00	29.00	31.90	30.90	145	50	Date: 5/90

Table F-1-18 Present Conditions of Existing Pump Stations

NAME OF STATIONS	EFFICIENCY	PRESENT CONDITION	OPERATION CONDITIONS
1-DRAINAGE PUMP STATIONS			Actual operation in 1990
El Badraman	POOR	Low efficiency due to very old pump Spare parts are not available.	-Total operation hour is 20,534 hr average operation per unit 3,402 hr
Kab Kab	GOOD	The efficiency of the pump is sufficient. Electrical spare parts are not available	
Tona El Gabal	POOR	Low efficiency due to very old pump Electrical & Mechanical spare parts are not available	-Total operation hour is 6,341 hr average operation per unit 1,585 hr
Manshat El Dahab	GOOD	The efficiency of the pump is sufficient. Electrical & Mechanical spare parts are not available	-Total operation hour is 1,481 hr average operation per unit 494 hr
Beni Mazar	GOOD	-do-	-Total operation hour is 5,275 hr average operation per unit 1,319 hr
Dier El Sankouria	GOOD	-do-	-Total operation hour is 6,388 hr average operation per unit 1,597 hr
Abu Raheb	FAIR	-do-	
Sakoula	FAIR	-do-	-Total operation hour is 7,604 hr average operation per unit 1,901 hr
Mazoura	FAIR	-do-	-Total operation hour is 1,803 hr average operation per unit 601 hr
2-IRRIGATION PUMP STATIONS			Actual operation in 1990
Arab Beni Khalid	POOR	Low efficiency due to very old pump Spare parts are not available.	-Total operation hour is 2,728 hr average operation per unit 1,364 hr -Operation for 8 months from Oct to May.
Beni Khalid	POOR	-do-	-Total operation hour is 4,033 hr average operation per unit 2,017 hr -Operation for 8 months from Oct to May.
Kamadir (5)	FAIR	The efficiency of the pump is sufficient. Electrical & Mechanical spare parts are not available	-Total operation hour is 17,036 hr average operation per unit 4,259 hr
Terfa(1)	FAIR	-do-	-Total operation hour is 16,501 hr average operation per unit 2,750 hr
Terfa(1) new	GOOD	-do-	
Sakoula (4)	FAIR	-do-	-Total operation hour is 16,124 hr average operation per unit 4,031 hr
Mazoura (o)	FAIR	-do-	-Total operation hour is 13,710 hr average operation per unit 3,428 hr
Mazoura (o) new	GOOD	-do-	-Total operation hour is 8,788 hr average operation per unit 2,192 hr

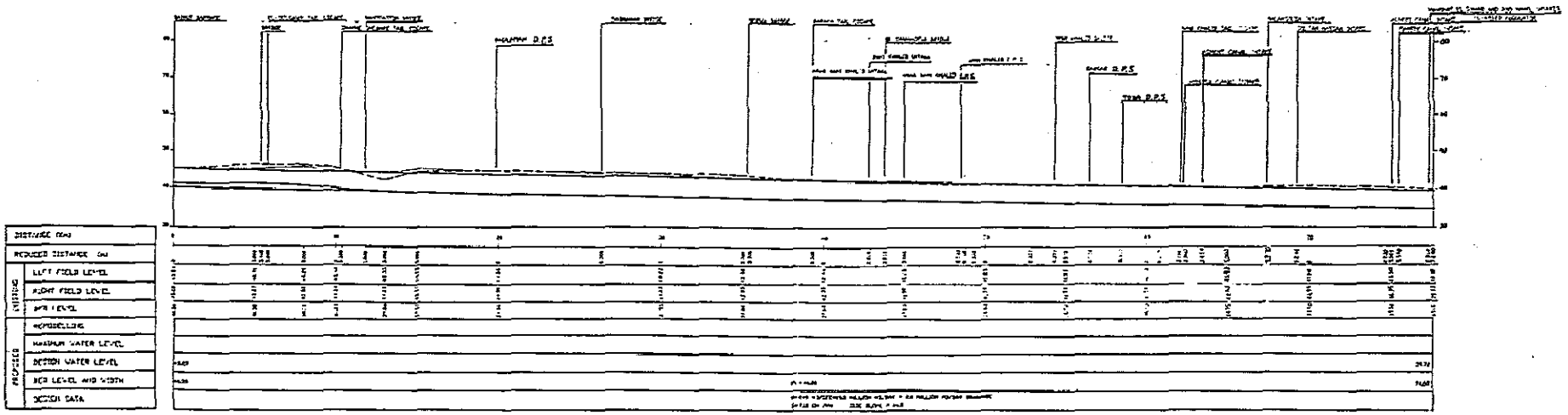
Table F-1-19 List of Existing Bridge Over Bahr Yusef Canal

Name of Bridge	KM
Between Dairout and El Abeed Reg.	
1. Dairout Bridge	5.4
2. Navigation Bridge	11.8
3. Badraman Bridge	26.3
4. Derwa Bridge	35.4
5. El Sawahgein	43.8
6. Beni Khalid Bridge	54.3
Between El Abeed and Sakoula Reg.	
7. Touku El-Khaid Bridge	95.0
8. Hasan Basha Bridge	110.0
9. Shousha Bridge	132.2
10. Ebgag El-Hatab Bridge	157.05
Between Sakoula and Mazoura Reg.	
11. El-Edwa Bridge	202.3
12. Delharnes Bridge	210.0
Between Mazoura and Lahoun Reg.	
13. El-Deep Bridge	239.0
14. Sedment Bridge	278.0
15. El Bahary Bridge	313.0

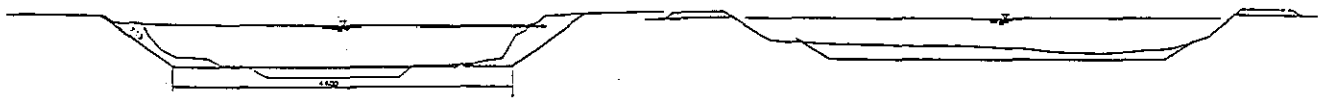
Note : Since El-Deeb Brdg. was newly constructed, Name and distance are preliminary given.

Source : Longitudinal Profile of Bahr Yusef Canal, ID, MPWWR

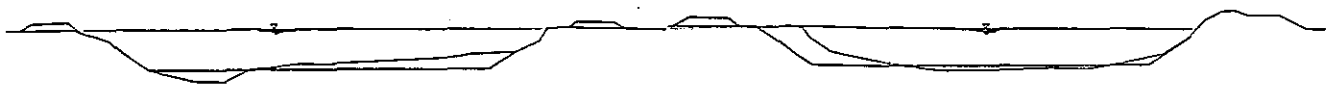
Figure F-1-1 Present Profile of Bahr Yusef Canal



PROFILE OF BAHER YOSEF CANAL (REACH # 1)



KM 30.000 KM 62.800



KM 15.250 KM 45000

NOTES

1. Levels in metres above Mean Sea Level , Alexandria.
2. Abbreviations
   - (m) : 3rd metre (s)
   - Q : Discharge at head of reach (m3/s)
   - I : Water surface slope
   - N : New structure
   - R : New structure to replace existing one
   - M : Structure to be modified/repaired
   - D : Structure to be demolished
   - BG : Bridge
   - C : Canal
   - X-REG : Cross regulator
3. Remodelling

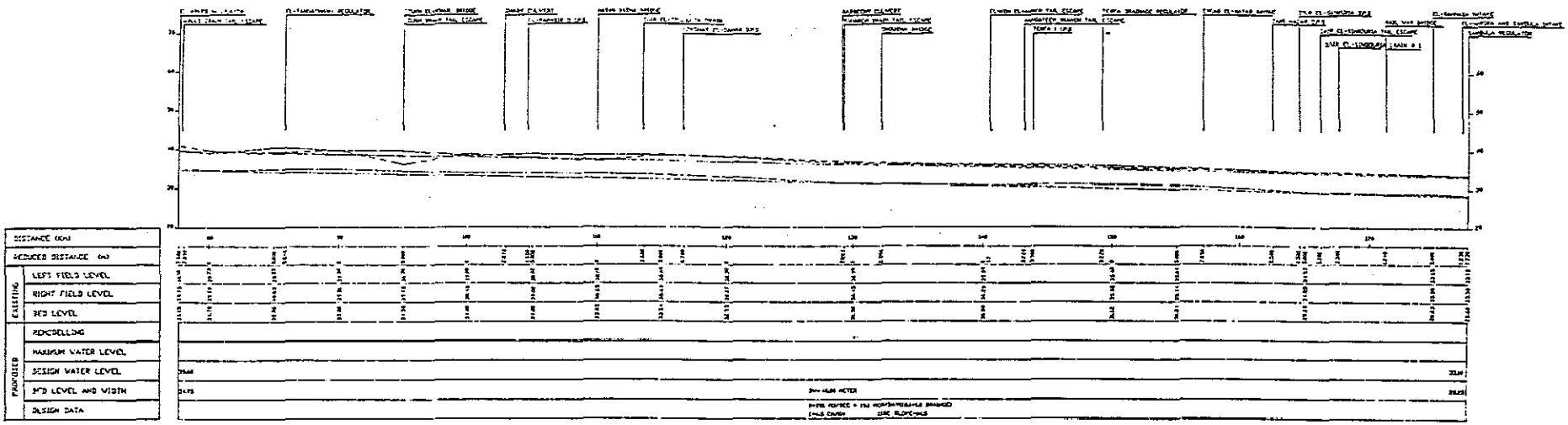
SCALES

HORIZONTAL

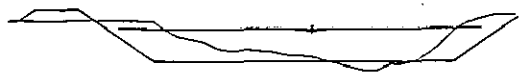
0 1 2 3 4 5 6 7 8 9 10 km

VERTICAL

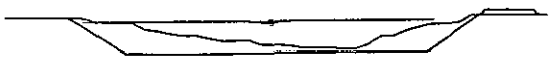
0 1 2 3 4 m



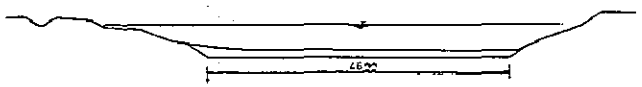
PROFILE OF BAHER YOSEF CANAL (REACH # 2)



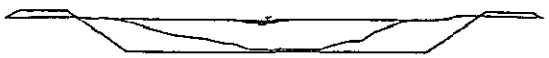
KM 115+250



KM 165.000



KM 90.000



KM 140.000

NOTES

1. Levels in metres above mean Sea Level , Measurements
2. Abbreviations
   - BW = Bed width (m)
   - Q = Discharge at head of reach (m3/s)
   - I = Water surface slope
   - N = New structure
   - R = New structure to replace existing one
   - M = Structure to be modified/repaired
   - D = Structure to be demolished
   - BG = Bridge
   - C = Canal
   - X-REG = Cross regulator
3. Remodelling

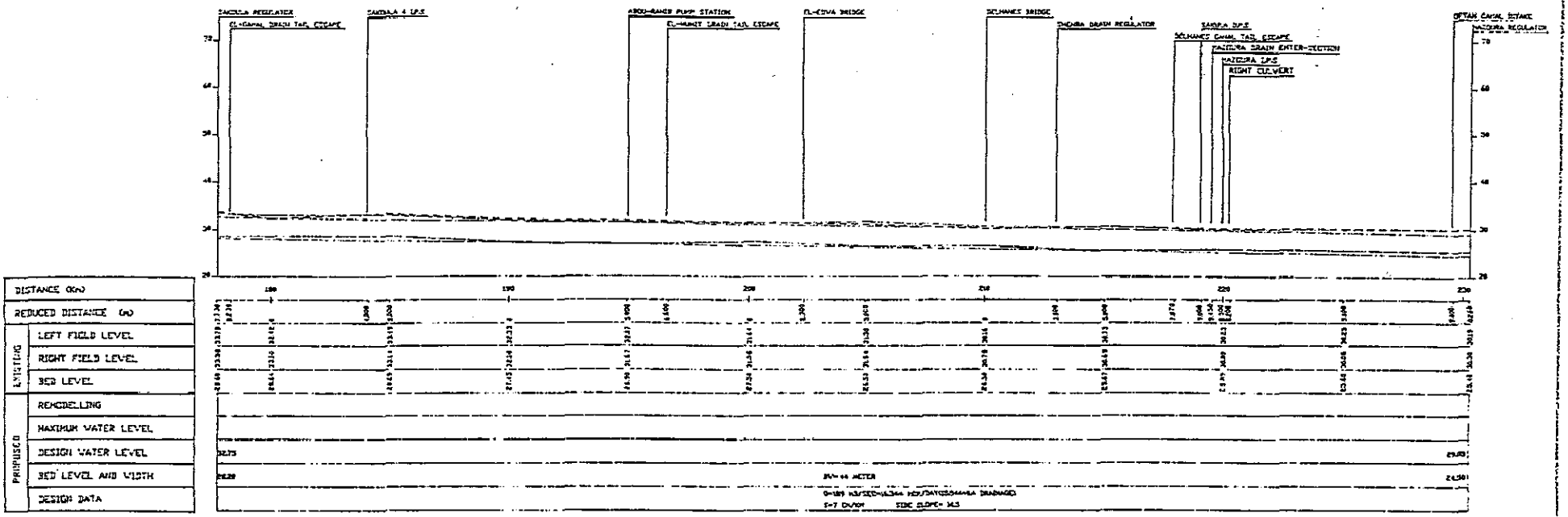
SCALES

HORIZONTAL

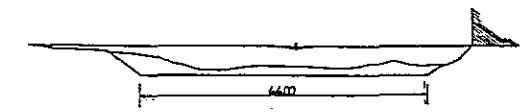
VERTICAL

Figure F-1-1 (cont'd)

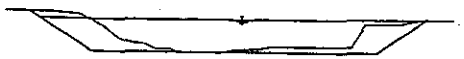
Figure F-1-1 (cont'd)



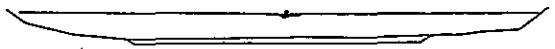
PROFILE OF BAHER YOSEF CANAL (REACH # 3)



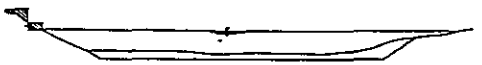
KM 198.200



KM 225.200



KM 185.000



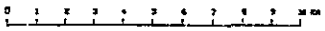
KM 231.700

NOTES

1. Levels in metres above Mean Sea Level.
2. Abbreviations
   - Bm : Bed width (m)
   - Q : Discharge at head of reach (m3/s)
   - S : Water surface slope
   - N : New structure
   - R : New structure to replace existing one
   - M : Structure to be modified/repaired
   - D : Structure to be demolished
   - Br : Bridge
   - C : Canal
   - X-REG : Cross regulator
3. Remodelling

SCALES

HORIZONTAL



VERTICAL

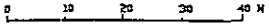
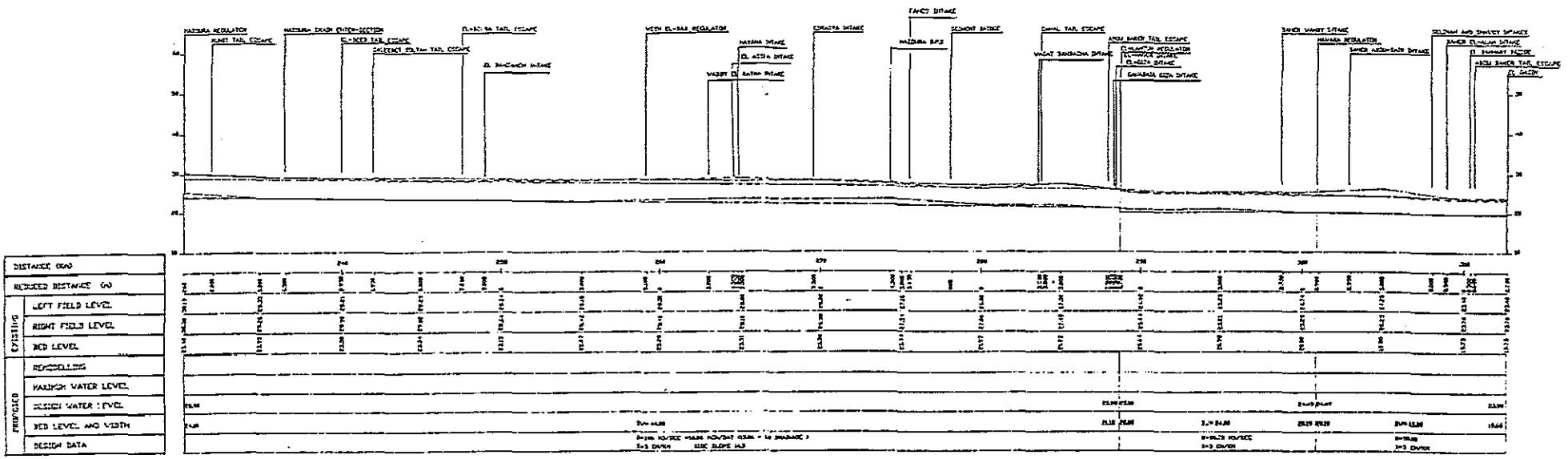
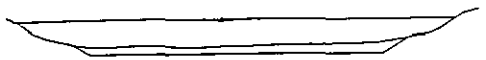


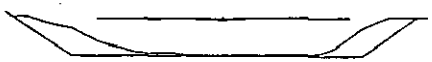
Figure F-1-1 (cont'd)



PROFILE OF BAHER YOSEF CANAL (REACH # 4)

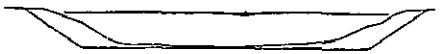


KM 260.250



KM 281.200

KM 236.400



KM 267.700

NOTES

1. Levels in metres above Mean Sea Level, Alexandria.
2. Abbreviations
   - BW : Bed width (m)
   - Q : Discharge at head of reach (m3/s)
   - S : Water surface slope
   - N : New structure
   - R : New structure to replace existing one
   - M : Structure to be modified/repaired
   - D : Structure to be demolished
   - BG : Bridge
   - C : Canal
   - X-REG : Cross regulator
3. Remodelling

SCALES

HORIZONTAL

VERTICAL

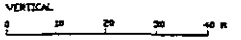
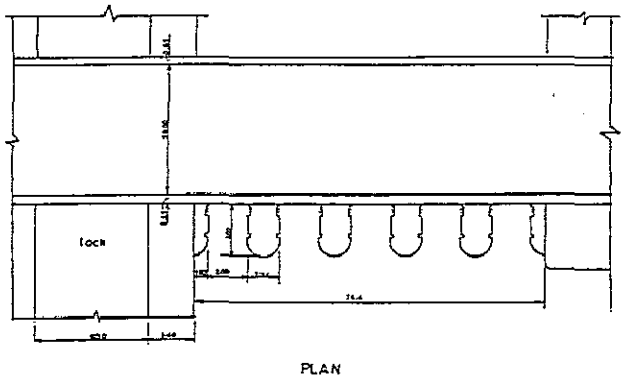
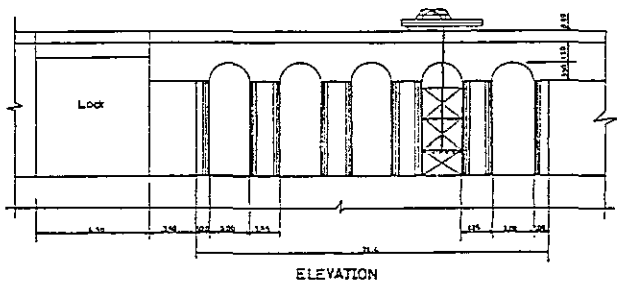
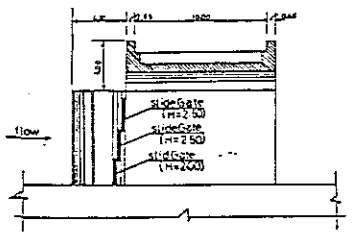


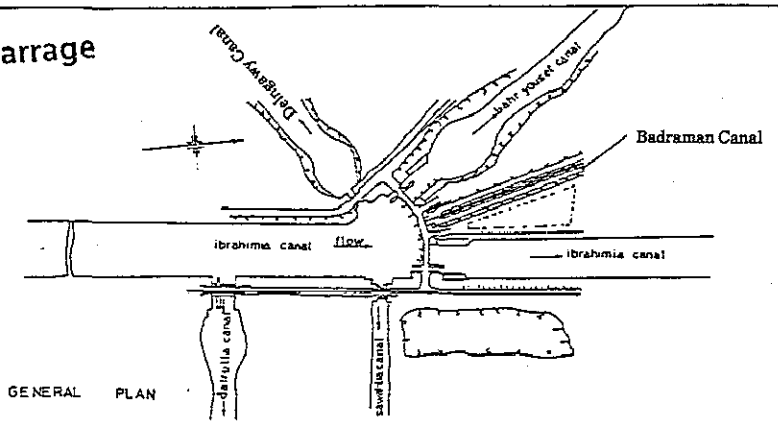
Figure F-1-2 General Plan of Existing Dairout Barrage







note: all dimension by[M]



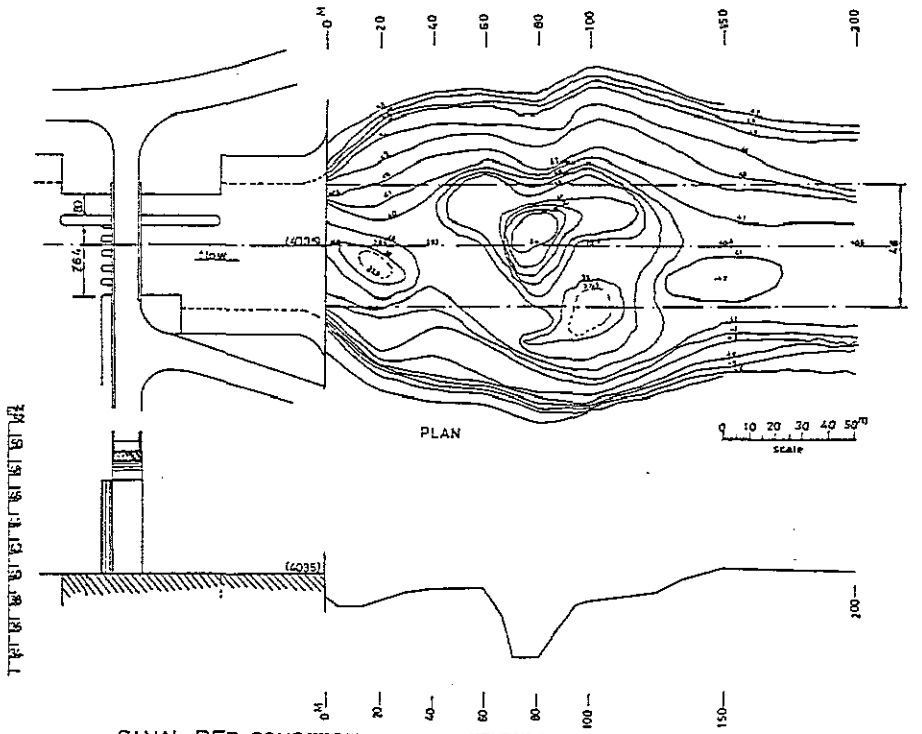
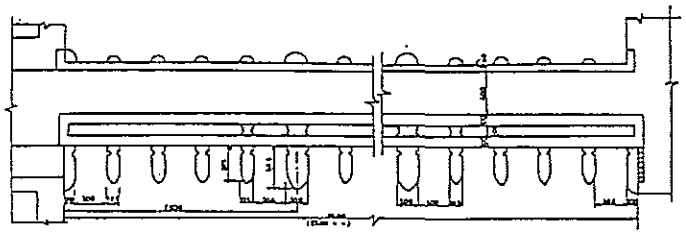
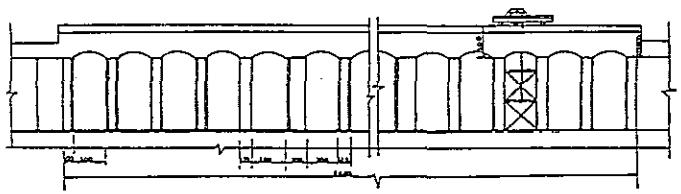


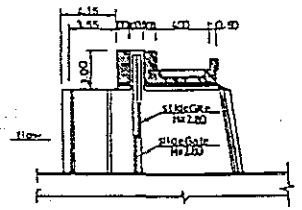
Figure F-1-3 General Plan of Existing Manshat El Dahab Regulator



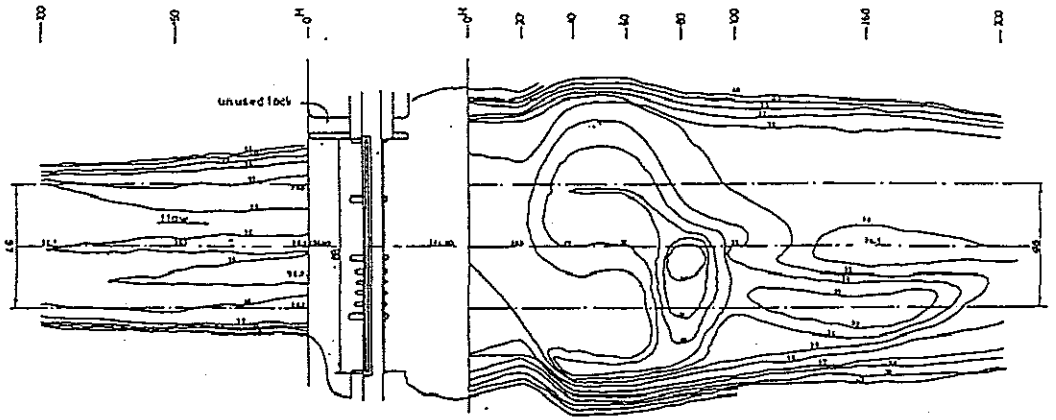
PLAN

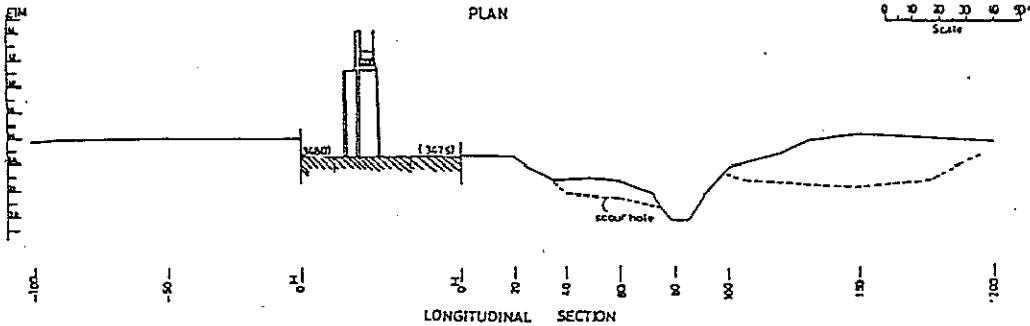


ELEVATION



TYPICAL SECTION

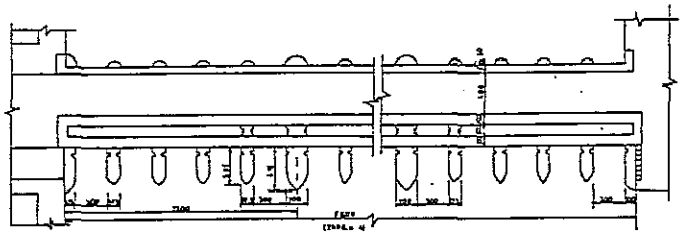




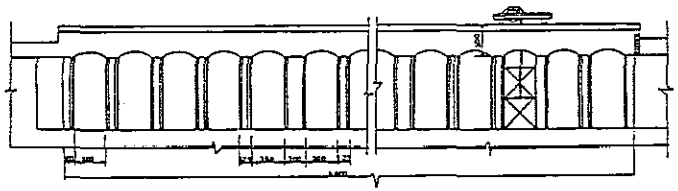
CANAL BED CONDITION

note: all dimension by[illegible]

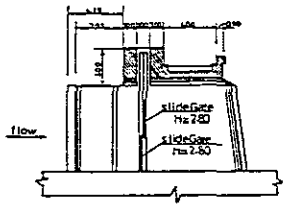
Figure F-1-4 General Plan of Existing Sakoula Regulator



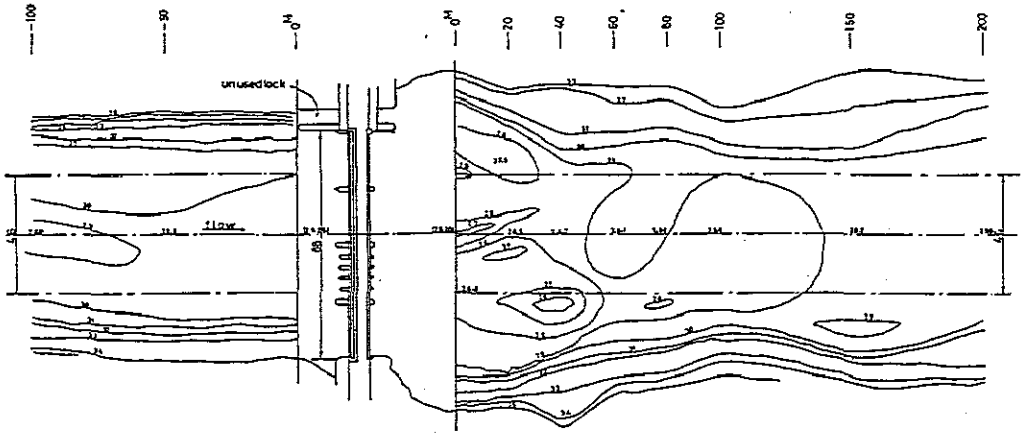
PLAN



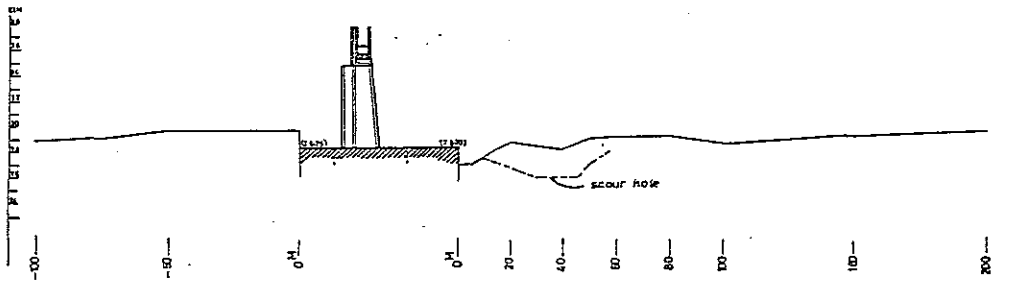
ELEVATION



TYPICAL SECTION



PLAN

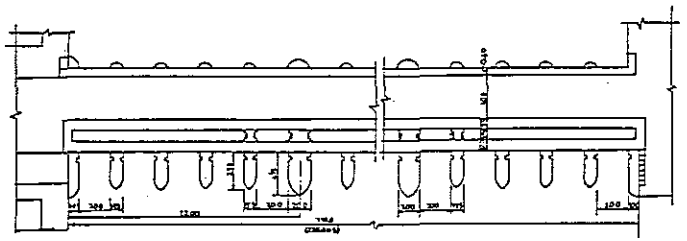


LONGITUDINAL SECTION

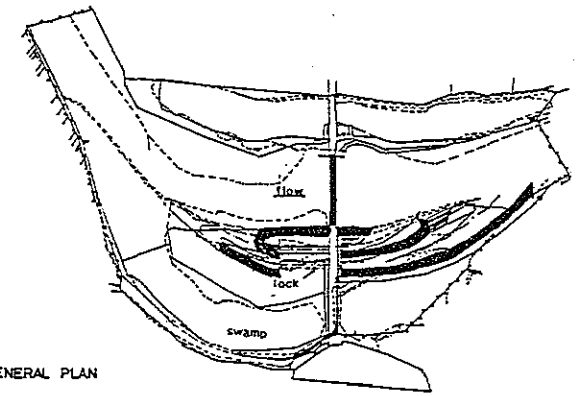
CANAL BED CONDITION

note: all dimension by(M)

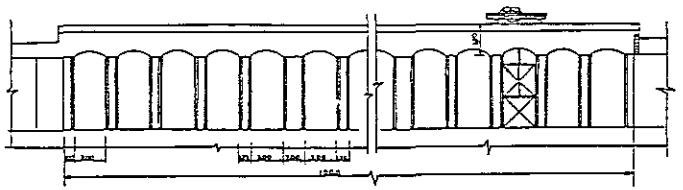
Figure F-1-5 General Plan of Existing Mazoura Regulator



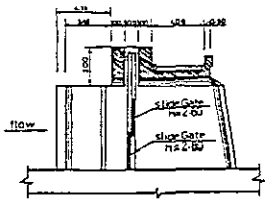
PLAN



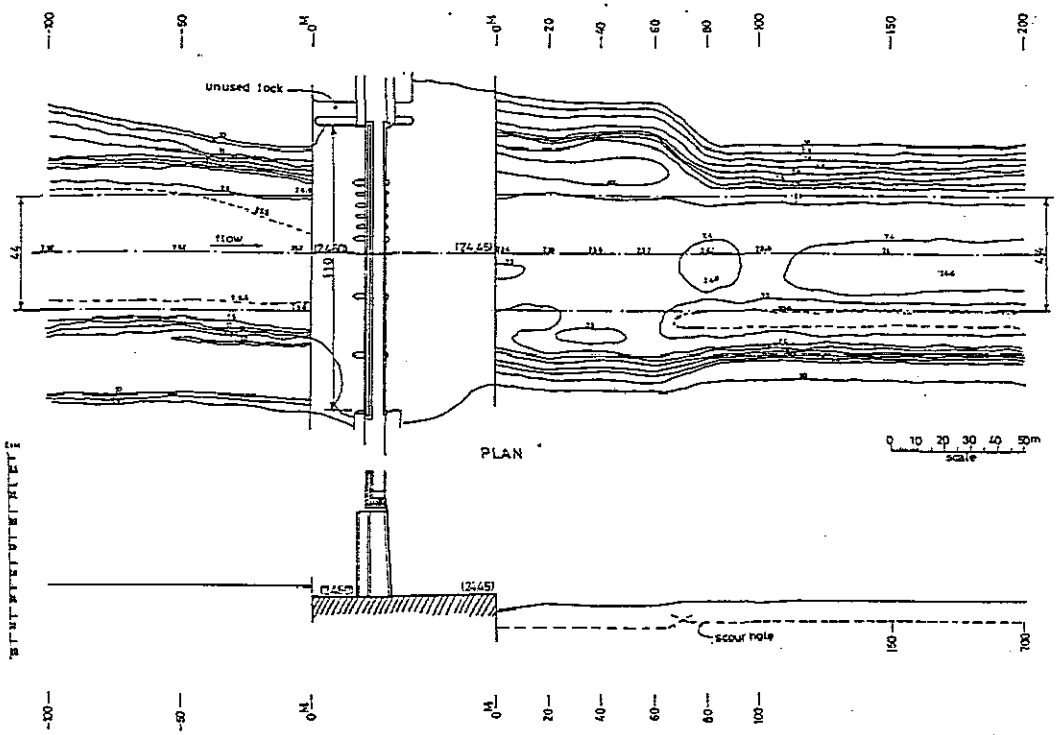
GENERAL PLAN



ELEVATION



TYPICAL SECTION

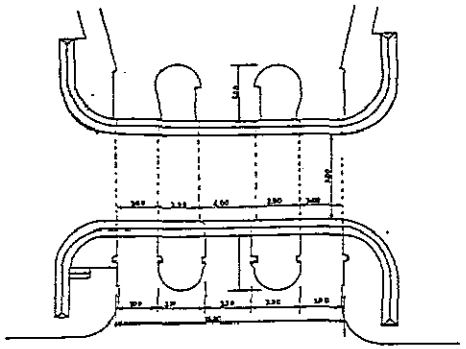


PLAN

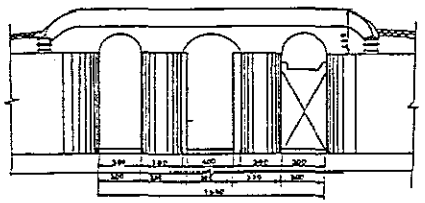
LONGITUDINAL SECTION
CANAL BED CONDITION

note: all dimension by (M)

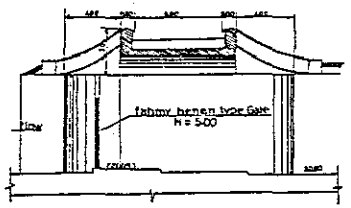
Figure F-1-6 General Plan of Existing Lahoun Regulator



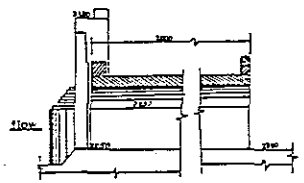
PLAN



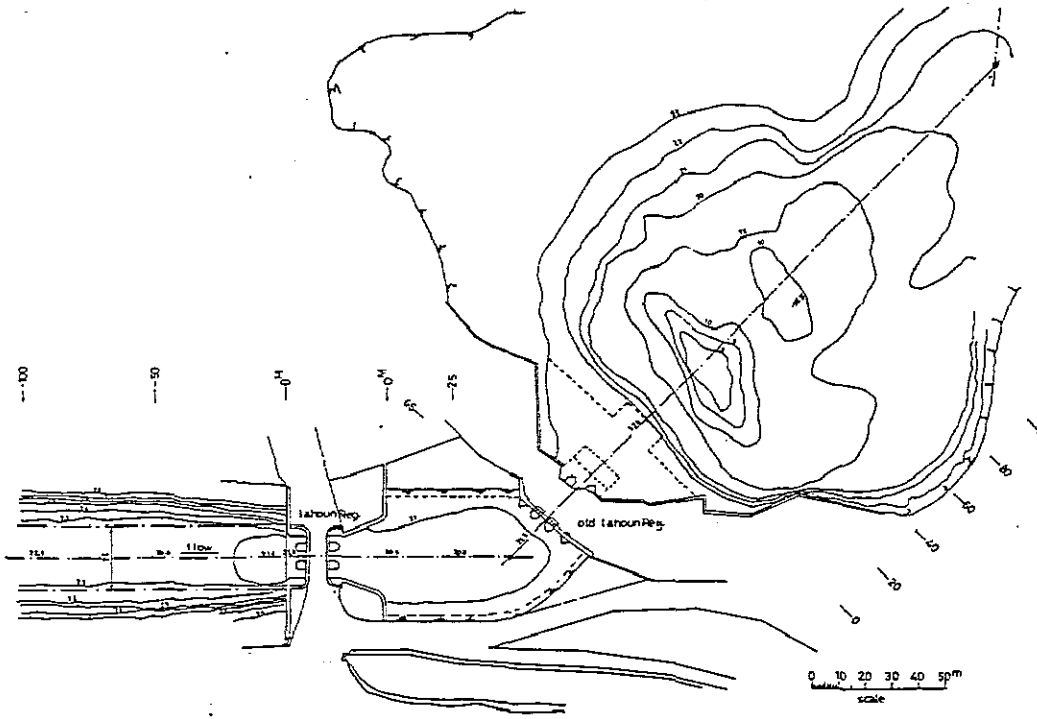
ELEVION



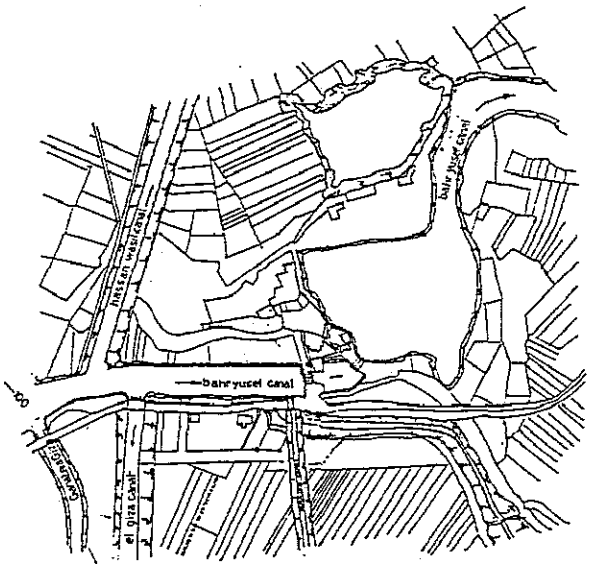
TYPICAL SECTION



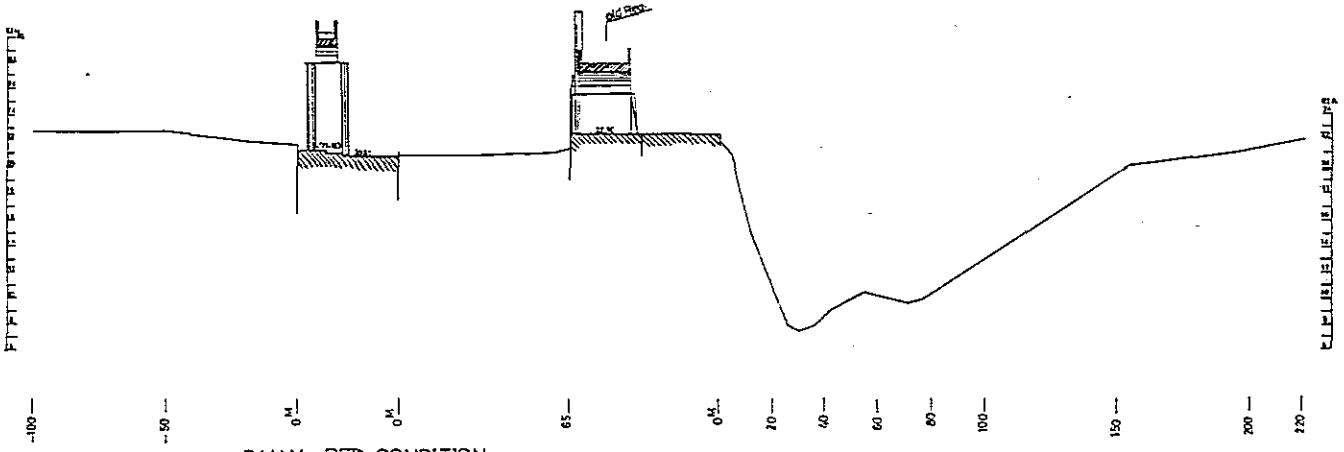
TYPICAL SECTION
(OLD REGULATOR)



PLAN

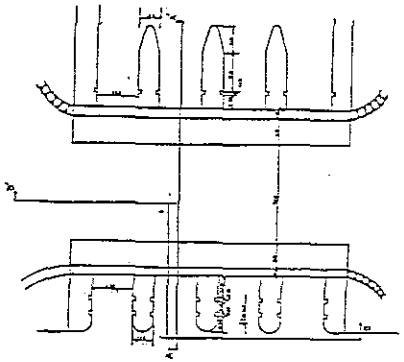


GENERAL PLAN

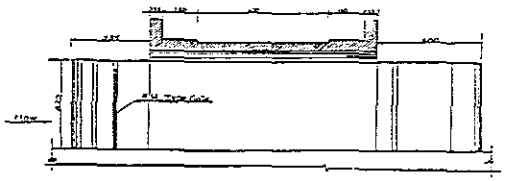


CANAL BED CONDITION LONGITUDINAL SECTION

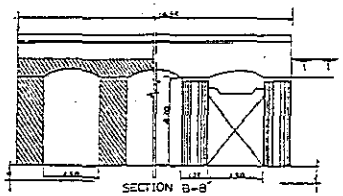
Figure F-1-7 Existing Major Intake Structures on Bahr Yusef Canal



PLAN



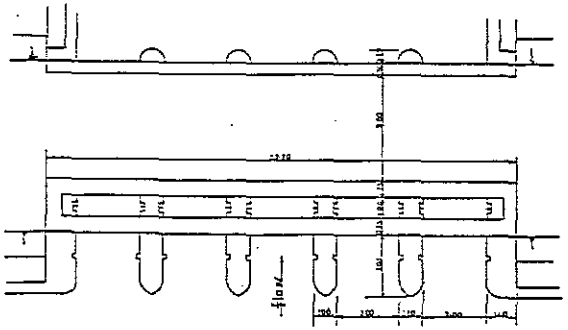
SECTION A-A'



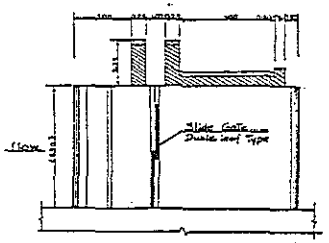
SECTION B-B'

SECTION B-B'

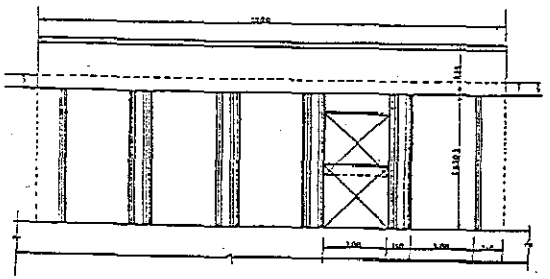
MANSHAT EL DAHAB INTAKE



PLAN

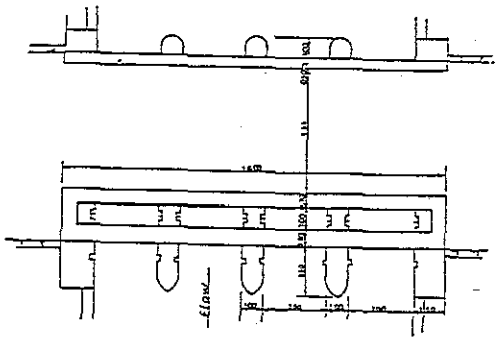


TYPICAL SECTION

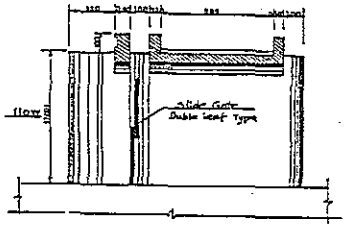


ELEVATION

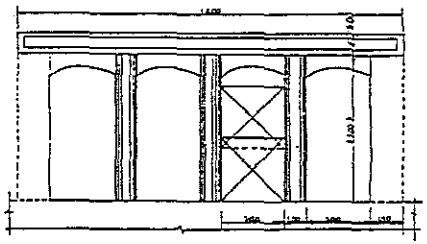
EL GIZA C.INTAKE



PLAN



TYPICAL SECTION



ELEVATION

HASSAN WASEF INTAKE

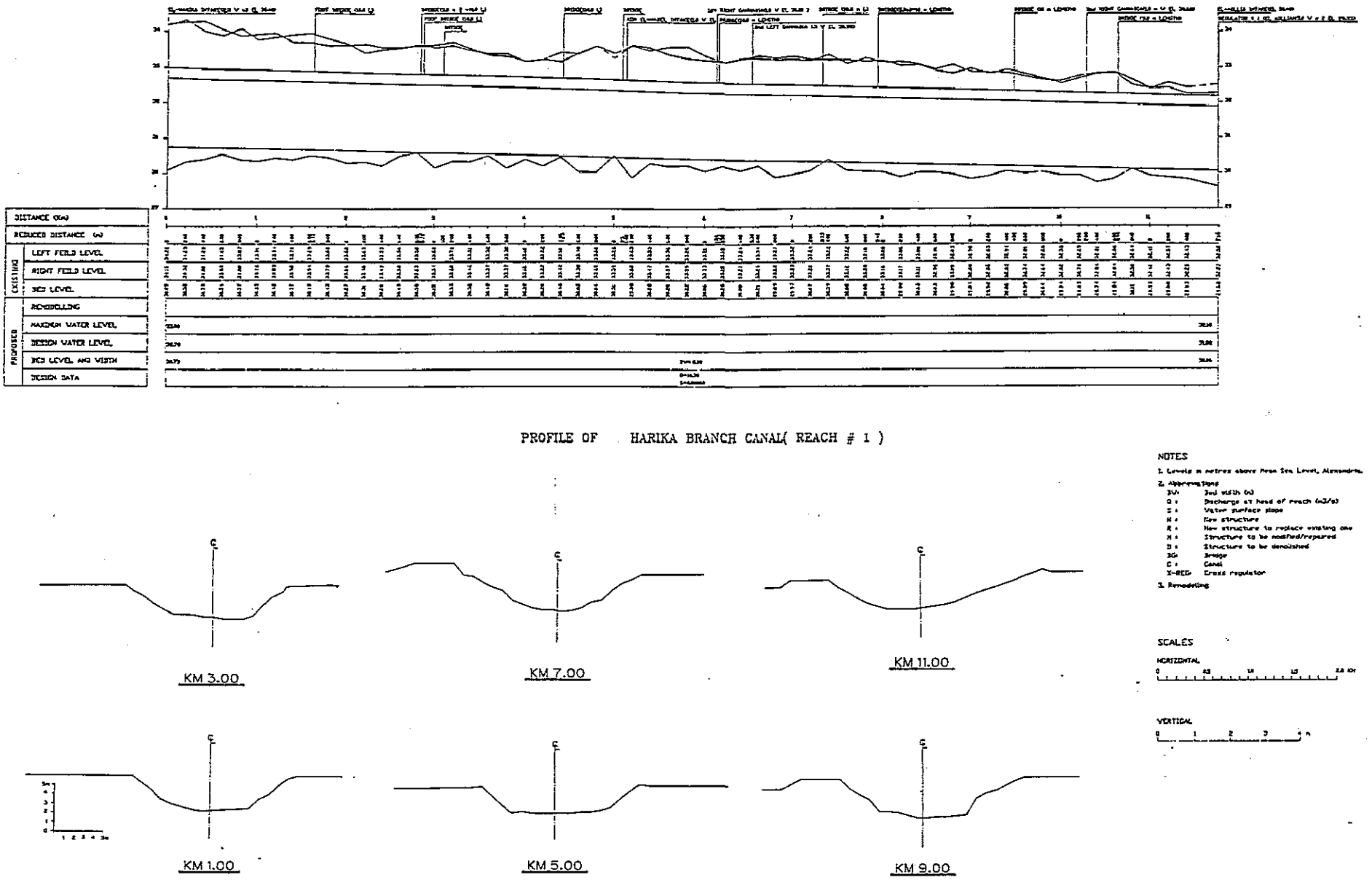
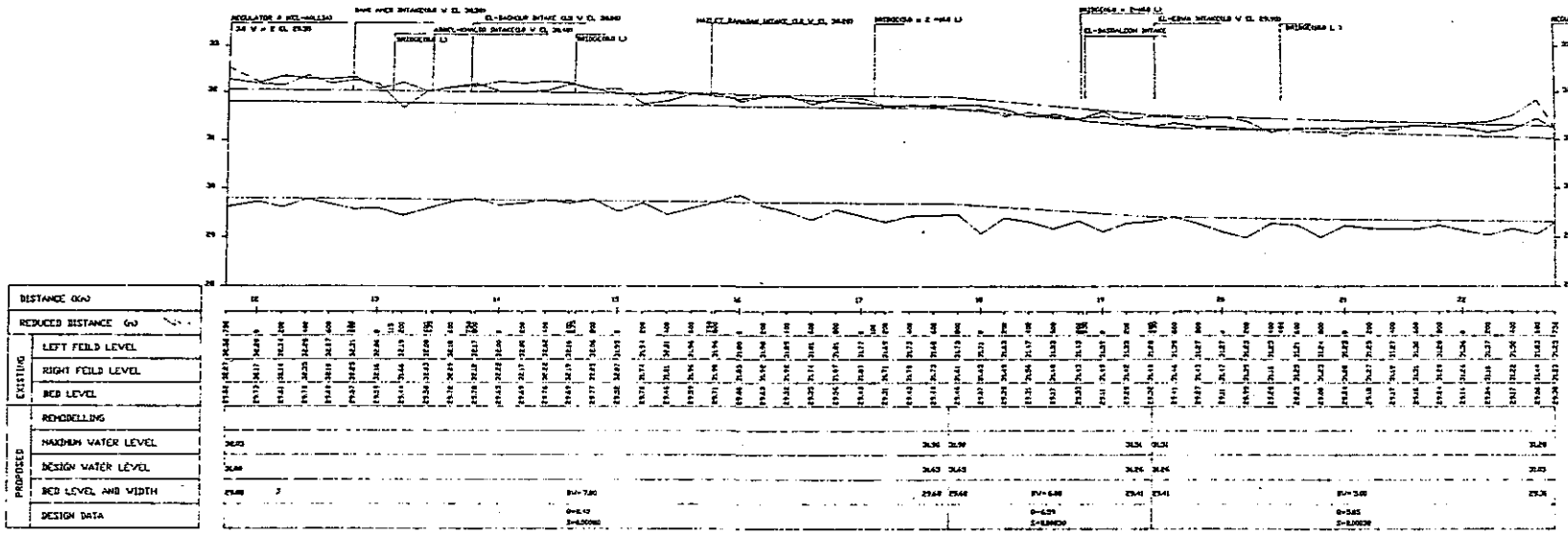
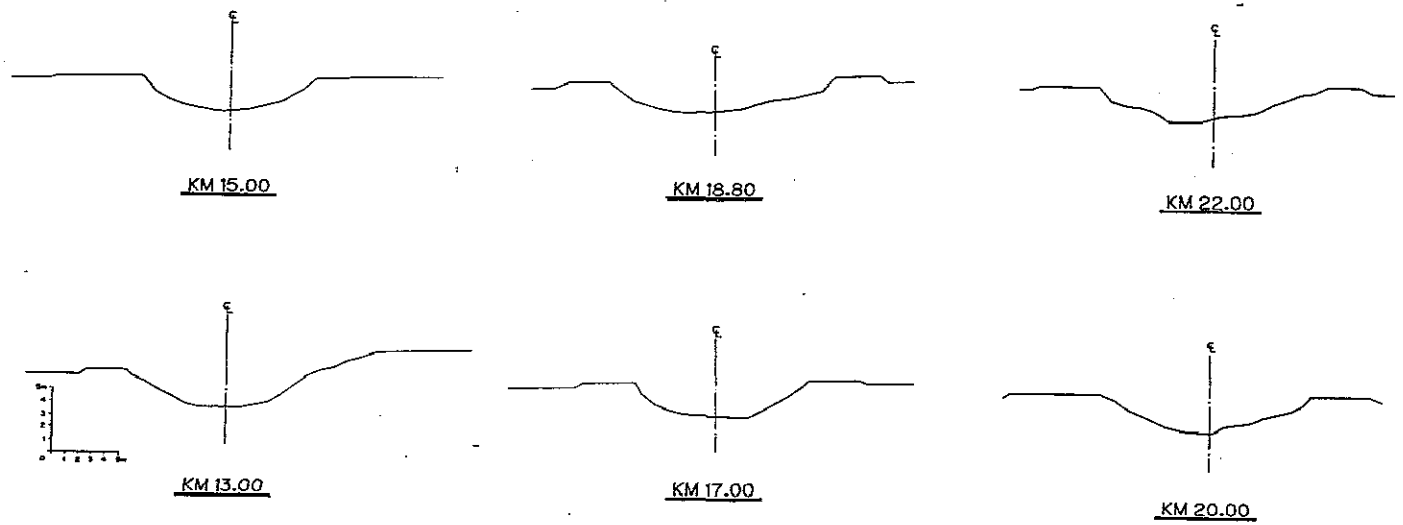


Figure F-1-8 Present Profile of Harika Branch Canal



PROFILE OF HARIKA BRANCH CANAL (REACH #2)



NOTES

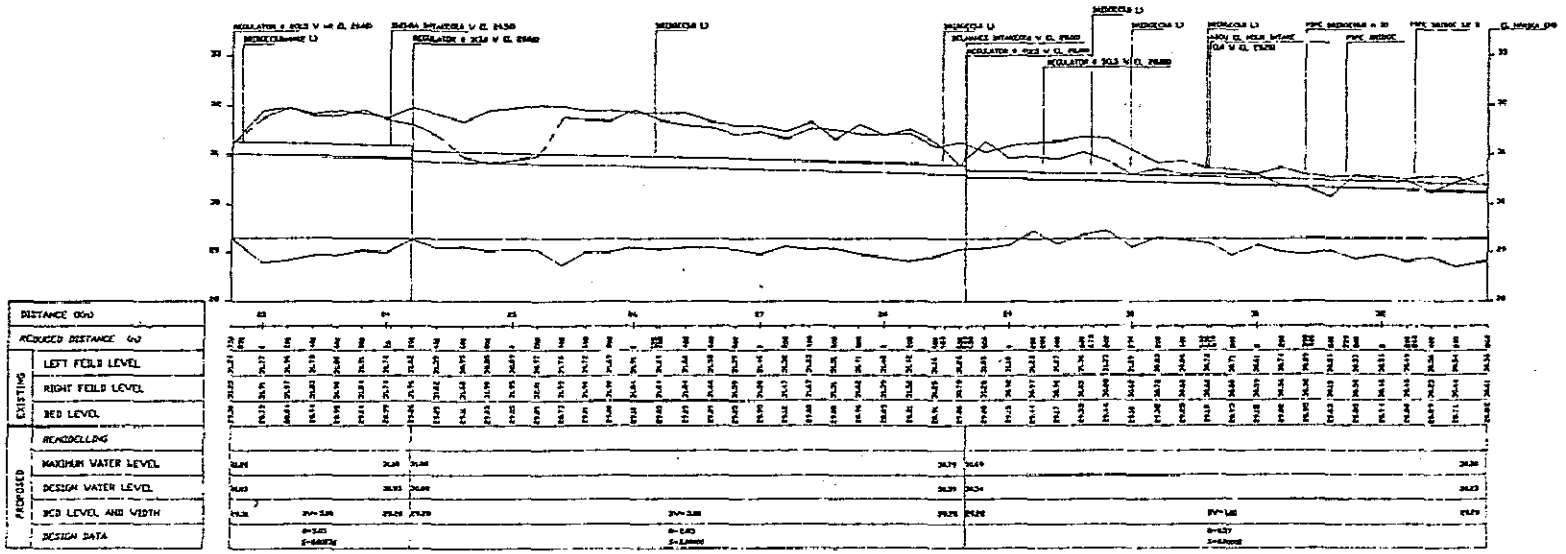
1. Levels in metres above Mean Sea Level, Alexandria.
2. Abbreviations
   - BW = Bed width (m)
   - Q = Discharge at head of reach (m3/s)
   - S = Water surface slope
   - N = New structure
   - R = New structure to replace existing one
   - M = Structure to be modified/repaired
   - D = Structure to be demolished
   - BG = Bridge
   - C = Canal
   - X-REG = Cross regulator
3. Remodelling

SCALES

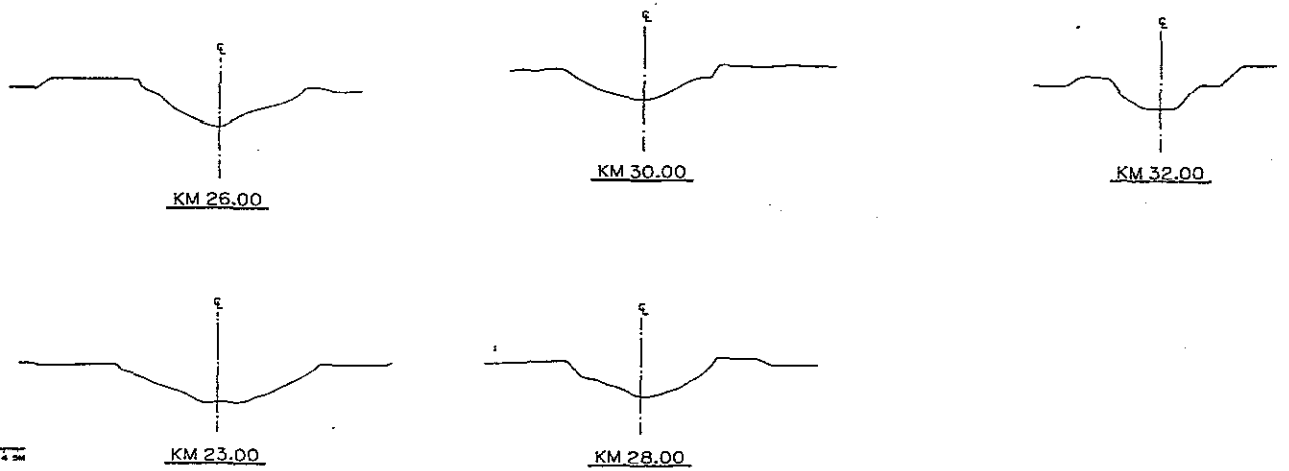
HORIZONTAL 0 5 10 15 20 km

VERTICAL 0 1 2 3 4 m

Figure F-1-8 (cont'd)



PROFILE OF HARIKA BRANCH CANAL (REACH #3)



NOTES

1. Levels in metres above Mean Sea Level, Alexandria.
2. Abbreviations
   - BW = Bed width (m)
   - Q = Discharge at head of reach (m3/s)
   - I = Water surface slope
   - N = New structure
   - R = New structure to replace existing one
   - M = Structure to be modified/repaired
   - D = Structure to be demolished
   - BG = Bridge
   - C = Canal
   - X-REG = Cross regulator
3. Remodelling

SCALES

HORIZONTAL

0 .05 1.0 1.5 2.0 KM

VERTICAL

0 1 2 3 4 m

Figure F-1-8 (cont'd)

Figure F-1-9 General Plan of Existing Intake and Regualtor on Haika Branch Canal

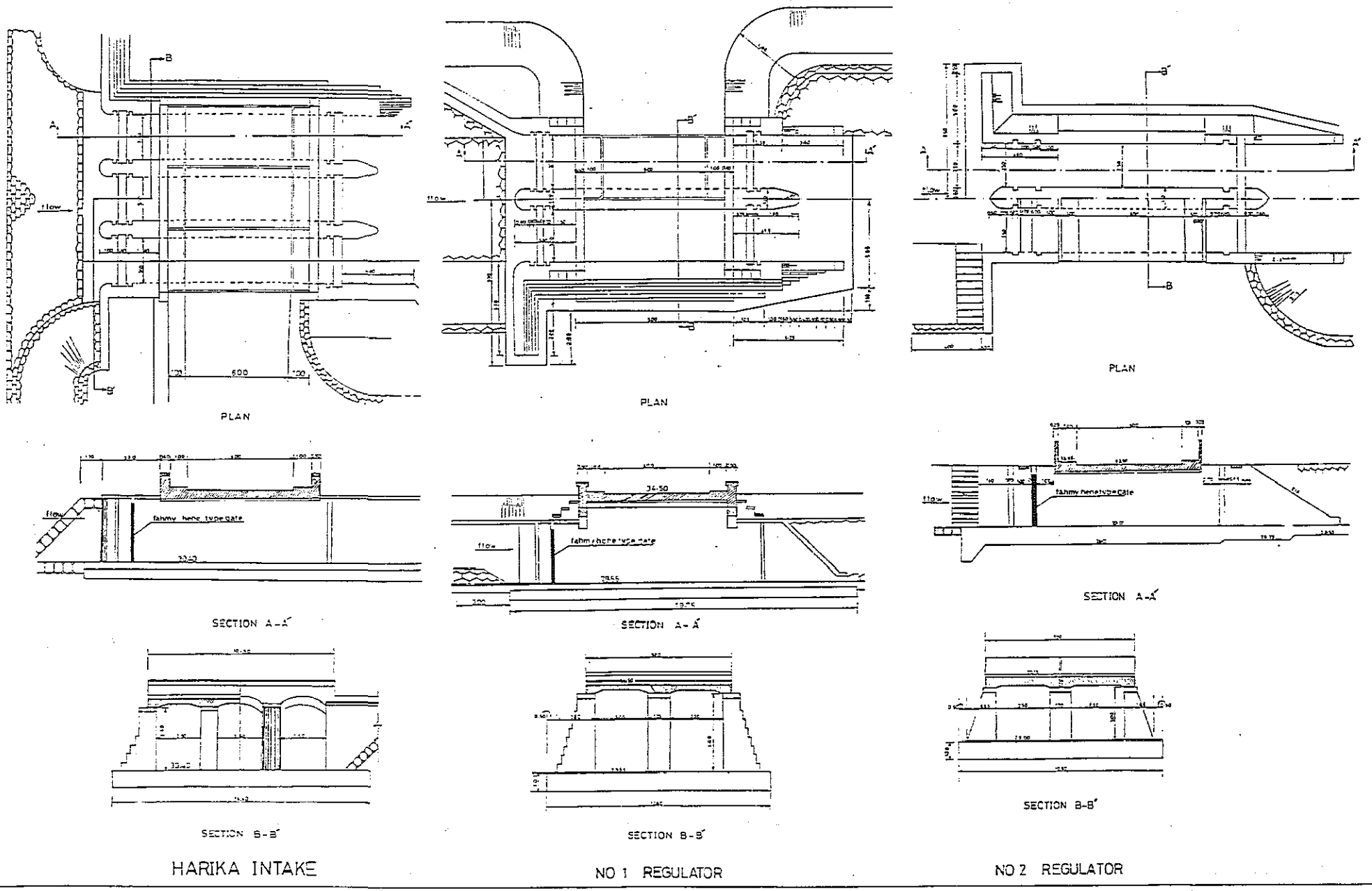


Figure F-1-10 Observed Water Level of Harika Branch Canal (Setp. 7, 1991)

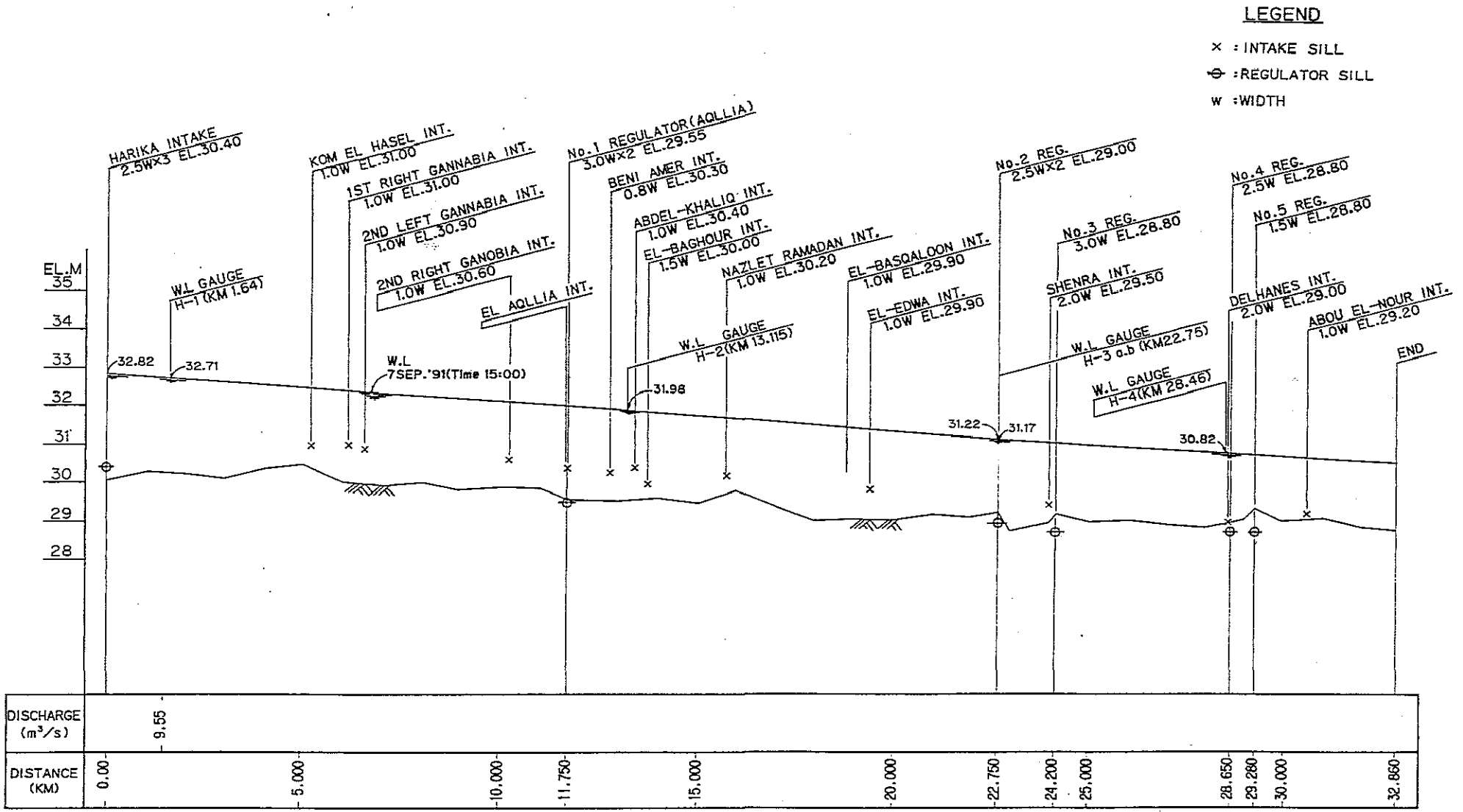
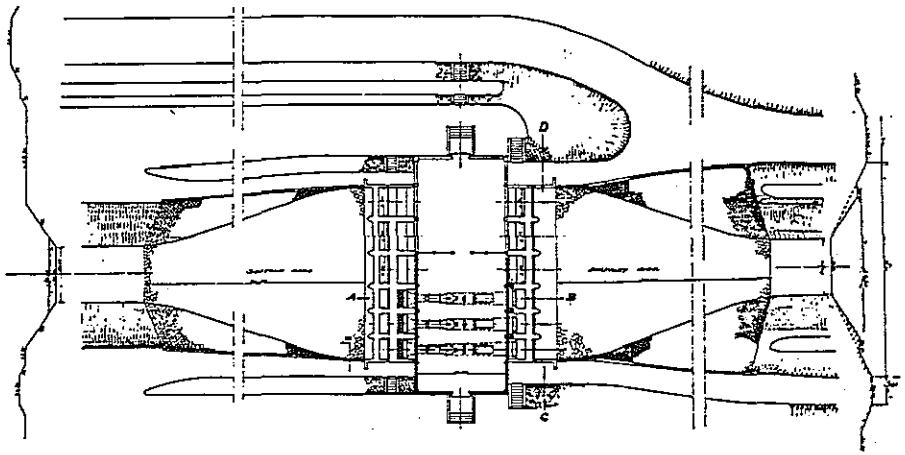
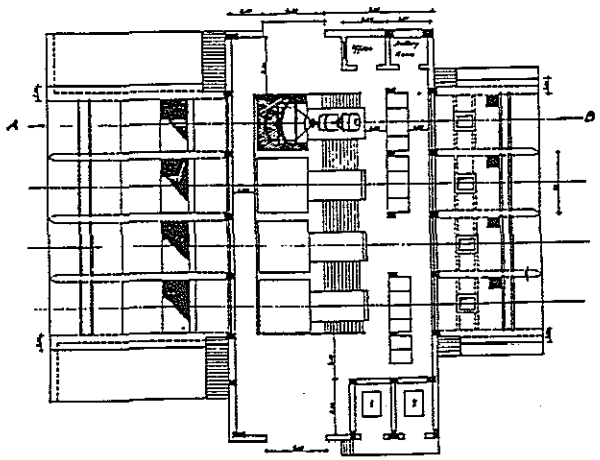


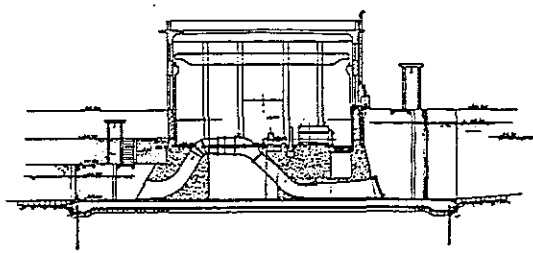
Figure F-1-11 General Plan of Existing Drainage Pump Stations



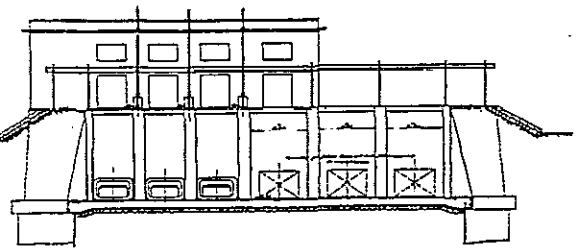
PLAN



PLAN

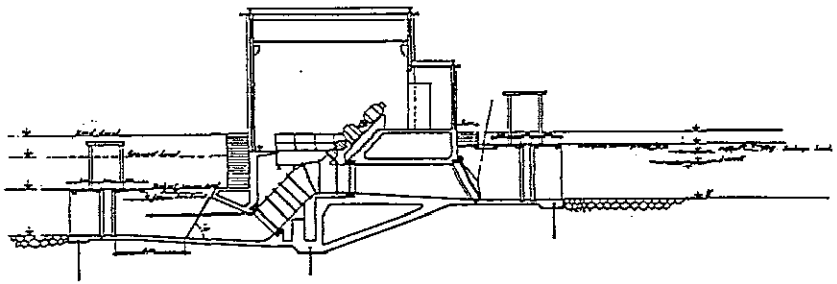


SECTION A-B



SECTION C-D

EL BADRAMAN PUMP STATION



SECTION A-B

DIER EL SANKOURIA PUMP STATION SAKOULA PUMP STATION