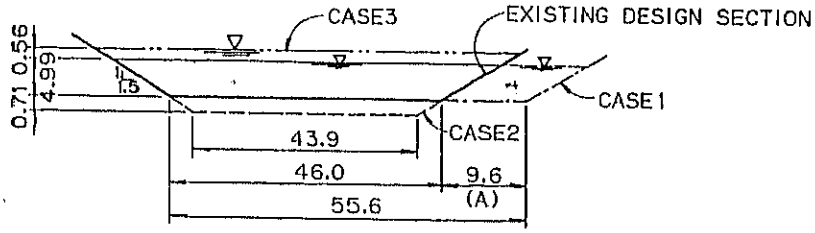
F-2 Alternative Studies

Table F-2-1 Hydraulic Calculation on Alternative Cross Section of Bahr Yusef Canal

a) Between Dairout and Manshat El Dahab regulator

Dimension; Q = 234.06 cu.m/s, I = 7.15 cm/km (1/14,000)

	"n" value	Width of Canal Bed	Width of Water	Water Depth (m)
Existing Section	0.025	46.0	61.0	4.99
Case 1	0.030	55.6	70.6	4.99
Case 2	0.030	43.9	61.0	5.70
Case 3	0.030	46.0	62.7	5.55



b) Between Mazoura and Lahoun Regulator

Dimension; Q = 194.86 cu.m/s, I = 5.00 cm/km (1/20,000)

	"n" value	Width of Canal Bed	Width of Water	Water Depth (m)
Existing Section	0.025	44.0	59.5	5.17
Case 1	0.030	52.1	67.6	5.17
Case 2	0.030	42.1	59.5	5.81
Case 3	0.030	44.0	61.0	5.67

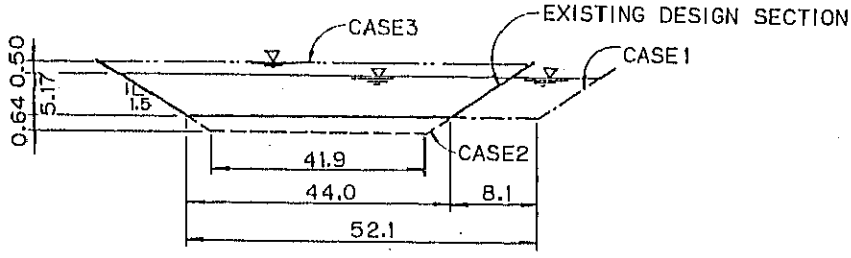


Table F-2-2 Design Water Level Controlled at Barrage and Regulators

Regulator	Actual Water level				1)	3)	4)	5)
	Jun. - Aug.	Through the Year			Restrict	Opration	Traces	Design
	Average Water Level	Maximum Water Level	Frequent Water Level	Hight Water Level	Condition of management	Water Level at the sight	Water Level at Intake	Water Level
Dairout	45.94	46.20	46.20 - 45.90	46.20 - 45.90		HWL - 45.50	- -	WL - 46.00
MANSHAT EL DAHAB	39.81	40.50	39.80 - 39.50	40.40 - 40.10	More than 39.70	MHWL - 40.40 HWL - 39.90	WL - 39.50	WL - 40.40
Sakoula	32.95	33.95	33.10 - 32.80	34.00 - 33.70	2) More than 32.70	MHWL - 33.90	WL - 33.40	WL - 33.70
Mazoura	29.29	29.88	29.40 - 29.10	29.70 - 29.40		MHWL - 29.35	WI - 29.10	WI - 29.70
Lahoun	26.35	26.70	26.40 - 26.10	26.70 - 26.40		MHWL - 26.80 HWL - 26.60	WL - 26.60	WL - 26.60

Notes :
1) Data source is interview survey at West Minia Department
2) More than 34.00 m at Terfa irrigation pump
3) Data source is interview survey from gate oprators
4) Date source is field survey by the study team during the water closure time
5) Design water level has been dicided refering to the data of actual daily water level also

Table F-2-3 Comparison on Gate Winch Type

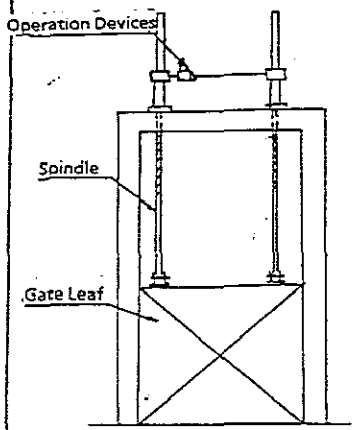
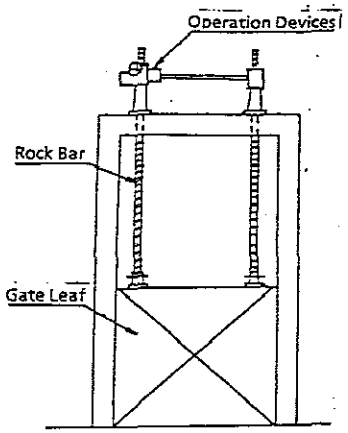
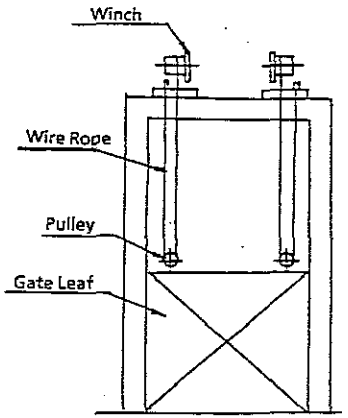
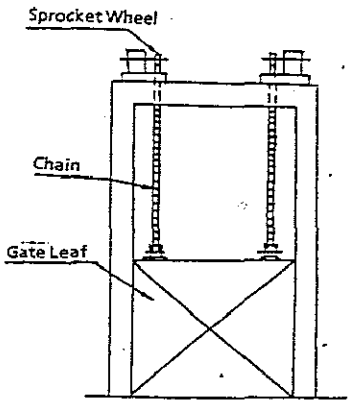
Item	Spindle Type	Rack Type	Wire Rope,Winch Type	Roller Chain Type
Rough Sketch				
General Description	This type adopts the method that gates leaves shall be hanged with spindle and the torque shall be converted to vertical force be work wheel to operate the gate leaves. But this type less efficient in operation than others due to high resistance of spindle in screw.	This type takes the method that gate leaves shall be hanged with rack bars ,and torque shall be converted to vertic1 force by penion gears etc. to operate the gate leaves ,and mechanical efficiency is so good as allow small capacity motors available.	This is the type that gate leaves shall be hanged by wire ropes to be operated by winch winding , and the mechanical efficiency is so high as to allow small capacity motors available.	This type adopts the method that gate leaves shall be hanged by roller chain and driving of spurocket wheel can perms the gate leaves operation. The mechanical efficiency is so good as to allow small capacity motors available. Some countermeasure are required to properly treat the chains apart from spurocket by winding up the gate leaves. Comparatively easy
Gate Operation System	Easy	A little complicated	A little complicated	Comparatively easy
Motor Capacity (Lower leaf)	Winding Load 5.5 ton Motor Capacity 3.7 K.W	Winding Load 5.5 ton Motor Capacity 0.75 K.W	Winding Load 5.5 ton Motor Capacity 0.75 K.W	Winding Load 5.5 ton Motor Capacity 0.75 K.W

Table F-2-3 (cont'd)

Natural Descent (Stopper)	Since self-locking is secured, safety operation is ensured for natural descent of the leaves,even in case of brakes troubles.	Without self-locking is devices with winding mechanism, there are two kinds of stopper to be provided.with worms provided with main brakes, self-locking is available, but mechanical efficiency will be reduced.	Same as the left column.	Same as the left column.
Power Operation of Gate Leaves (quick closing operation,manual operation)	Screw self-locking mechanism works to prevent gate leaves from dead load movement of the gate leaves.	Generally,the dead load movement device,which are built in the winding system,will allow the gate leaves easily operated.	If automatic operation devices are provided with the winding system,the operation can be ensured.	Same as the left column
Opening Power	Powered operation can ensur to close the gate leaves tightly.	Same as the left column	The closing force is relatively small due to by only dead load of the leaves, and there may be the case that various resistantive factors work largely upon the gate leaves to be closed imperfectly for the smallscaled gate.In such case,some weight in keeping balance shall be loaded for successful closing.	Same as the left column
Limit of Winding Height	Upto about 8.0 meters from the Screw lenght	In a range from 6.0 meters to 7.0 meters	No limit in particular	The longer chain will make operation difficult.
Operability	Easy	Easy	Easy	Easy
Depending upon the size of winding system	Small space can serve for winding system.	same as the left column	The wider space is required than those of spindle type and rack type.	The wider space is required than those of spindle type and rack.
Maintenance works	Easy	Easy	Lubricating and greasing are trouble some	Easy
Appearance	Tall spindles somtimes spoil	Same as the left column	Good appearance for landscape	Good appearance for landscape
Economy(by weight)	1.55 ton	1.20 ton	3.00 ton	3.50 ton
Examples	Many examples available with roller gates and slide gates with diameter less than 5.0 meters	Same as the left column.	Many examles available	Rarely used with crest radial gates

Table F-2-4 Comparison of Alternative Plan on Proposed Barrage and Regulators

Regulator	Case	Location of Reg. and Layout	Outline and Remarks	Area for Const. (fed)	Ratio of Const. cost	Decision	Reason of adoption
Dairout	D - 1	100 m downstreame from the existing Reg. at the major bed on the right bank	Temporary works for closing water will be light because of constructing at the elevated bank Possible to remain the existing lock The existing Reg. will be used for the bridge		1.0	Adoption	Advantage of the cost because of constructing at the elevated bank in comparison with constructing in the canal The existing lock can use
	D - 2	200 m downstreame from the existing Reg. in the canal avoided the scouring area	Necessary to carry out the temporary of clousuer a half of the stream Construction period will take long Necessary to construct the new lock The existing Reg. will be used for the bridge		1.6		
Manshat El Dahab	A - 1	Arranging in a line of the left side of the existing lock in the crop field	Upper structure provides a bridge for the existing road The existing Reg. falls into disuse, therefore the existing canal around Reg. can be filled up	6	1.0	Adoption	The area and cost of construction will be the minimum among alternatives The existing lock can be used The easiness of implementations
	A - 2	400 m upstream from the existing Reg. in crop fields on the right bank Arranging in a line of Bhar Yusef canal	Necessary to construct the management road because of the Reg. is far away from the existing road The existing Reg. will be used for the bridge	9	1.2		
	A - 3	1,000 m upstream from the existing Reg. in crop fields on the left bank Arranging in the shortcut portion of Bahr Yusef canal	Necessary to construct the management road because of the Reg. is far away from the existing road Necessary to extend the access canal of 1,000 m for the existing intakes (ex. Mashat El Dahb etc.) In case of extending the access canal, the existing lock can use Compensation area is larger than other cases	25	1.1		

Table F-2-4 (cont'd)

Regulator	Case	Location of Reg. and Layout	Outline and Remarks	Area for Const. (fed)	Ratio of Const. cost	Decision	Reason of adoption
Manshat El Dahab	A - 4	120 m Upstream from the existing Reg. at inside canal.	120 m Upstream from the existing Reg. at inside canal. Long constraction period and high cost of the Temporary works are needed. The existing Lock can be utlized. The exisiting Reg. will be used for traffic as public bridge. Additional Right-of-Way is not aquired.		1.5		
Sakoula	S - 1	320 m upstream from the existing Reg. in crop fields on the left bank	The existing intakes and lock can use Necessary to construct the management road because of the Reg. is far away from the existing road The existing Reg. will be used for the bridge	5	1.0	Adoption	Compensation area and construction cost is the minimum among alternatives The existing intakes and lock can use
	S - 2	500 m upstream from the existing Reg. in crop fields on the right bank Arranging in a line of Bhar Yusef canal	The linear shape of Bhar Yusef canal is bad Necessary to construct the management road and a new lock arranging a line of the new Reg. The existing Reg. will be used for the bridge	5	1.2		
	S - 3	900 m upstream from the existing Reg. in crop fields on the right bank Arranging in the shortcut portion of Bahr Yusef canal	The linear shape of Bhar Yusef canal is better than before construction Necessary to construct the management road and a new lock arranging a line of the new Reg. The existing Reg. will be used for the bridge. Compensation area is larger than other cases	28	1.3		
	S - 4	120 m Upstream from the existing Reg. at inside canal.	Temporary works of coffer dam and diversion channel are required. Long constraction period and high cost of the Temporary works are needed. The existing Lock will be utlized. The exisiting Reg. will be used for traffic as public bridge. Additional Right-of-Way is not aquired.		1.5		

Table F-2-4 (cont'd)

Regulator	Case	Location of Reg. and Layout	Outline and Remarks	Const. (fed)	Const. cost	Decision	Reason of adoption
Mazoura	M - 1	200 m upstream from the existing Reg. in crop fields on the left bank Arranging in the shortcut portion of Bahr Yusef canal	Necessary to construct the management road because of the Reg. is far away from the existing road The linear shape of Bhar Yusef canal is better than before construction The existing lock can use The existing Reg. will be used for the bridge	5	1.0	Adoption	Compensation area is the minimum among alternatives and construction cost is about same as other's The existing lock can use The location of Reg. is the closest from the existing road
	M - 2	Arranging in a line of the right side of the existing lock in the crop field.	The existing lock can use Upper Structure provides a bridge for the existing road The existing Reg. falls into disuse. therefor; the existing canal around Reg. can be filled up.	7	1.0		
	M - 3	In line of the left side of the exsiting Reg. at a distance of 80 m in crop fields Arranging in the shortcut portion of Bahr Yusef canal	The existing lock can use Upper structure provides a bridge for the existing road The existing Reg. falls into disuse, therefore the existing canal around Reg. can be filled up	12			
	M - 4	120 m Upstream from the existing Reg. at inside canal.	Temporary works of coffer dam and diversion channel are required. Long constraction period and high cost of the Temporary works are needed. The existing Lock will be utlized. The exisiting Reg. will be used for traffic as public bridge. Additional Right-of-Way is not aquired.		1.5		
Lahoun	L - 1	Between the exsiting Reg. and lock at the top of the garden	Retaining walls and rectangular flume by reinforced concrete shall be adopted for the entrance of approch and canal because of limited construction area Necessary to costruct a bridge or culvert for national road at the downstream of the new Reg.	1.5	1.0	Adoption	Compensation area and cost is the minimum among alternatives

Table F-2-4 (cont'd)

Regulator	Case	Location of Reg. and Layout	Outline and Remarks	Area for Const. (fed)	Ratio of Const. cost	Decision	Reason of adoption
Lahoun	L - 2	Between the exsiting Reg. and lock at the top of the garden	Retaining walls and rectangular flume by reinforced concrete shall be adopted for the entrance of approch and canal because of limited construction area Possible to design that Reg. was regarded as a bridge for national road, in this case, a new movable bridge is necessary for the lock	2	1.2		
	L - 3	Expanding Hassan Wasef canal with length of 880 m for the purpose of conveying the flow of Bhar Yusef, and new Reg. for Bhar Yusef is installed at the branch Short cutting of Lahoun village	Necessary to construct new canal at the downstream of new Reg. with lengh of 720 m and new crossing structure of Hassan Wasef canal for the road The existing Reg. falls into disuse, therefore the existing canal around Reg. can be filled up Compensation area is very large	12	1.5		
	L - 4	100 m Upstream from the existing Reg. at inside canal.	Temporary works of coffer dam and diversion channal (the existing Lock is used) are required. Long constraction period and high cost of the Temporary works are needed. The existing Lock will be utlized. The exisiting Reg. will be used for traffic as public bridge. Additional Right-of-Way is not aquired.		1.5		
	L - 5	The existing Lock is used for Canal and intake structure is located at the mouth of the inlet.	The existing Lock is expired its' function due to replacement with canal. Extremely high velocity in the existing Lock as a canal due to Small flow area for a purpose of the canal. Expansion of the existing Lock is not so easy and costly for the withdrawal of the part of structures. Additional Right-of-Way is not aquired.				

Table F-2-5 Design Cross Section of Harika Branch Canal

Type	Q (m^3/s)	I (cm/km)	L (m)	S (m)	(h) (m)	(h) (m)
A	6.978	8	11.750	6.0	3.00	2.19
B	5.169	7	4.050	5.0	3.00	2.11
C	4.096	7	3.050	4.0	3.10	2.06
D	3.307	7	5.350	3.5	3.25	1.95
E	2.434	6	6.410	3.0	3.25	1.84
F	1.557	-	2.250	2.0	2.60	-

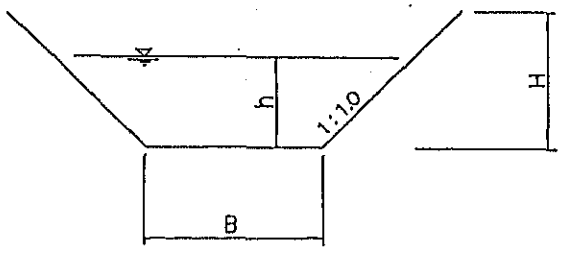


Figure F-2-1 Hydraulic Profile of Bahr Yusef Canal in Case-3

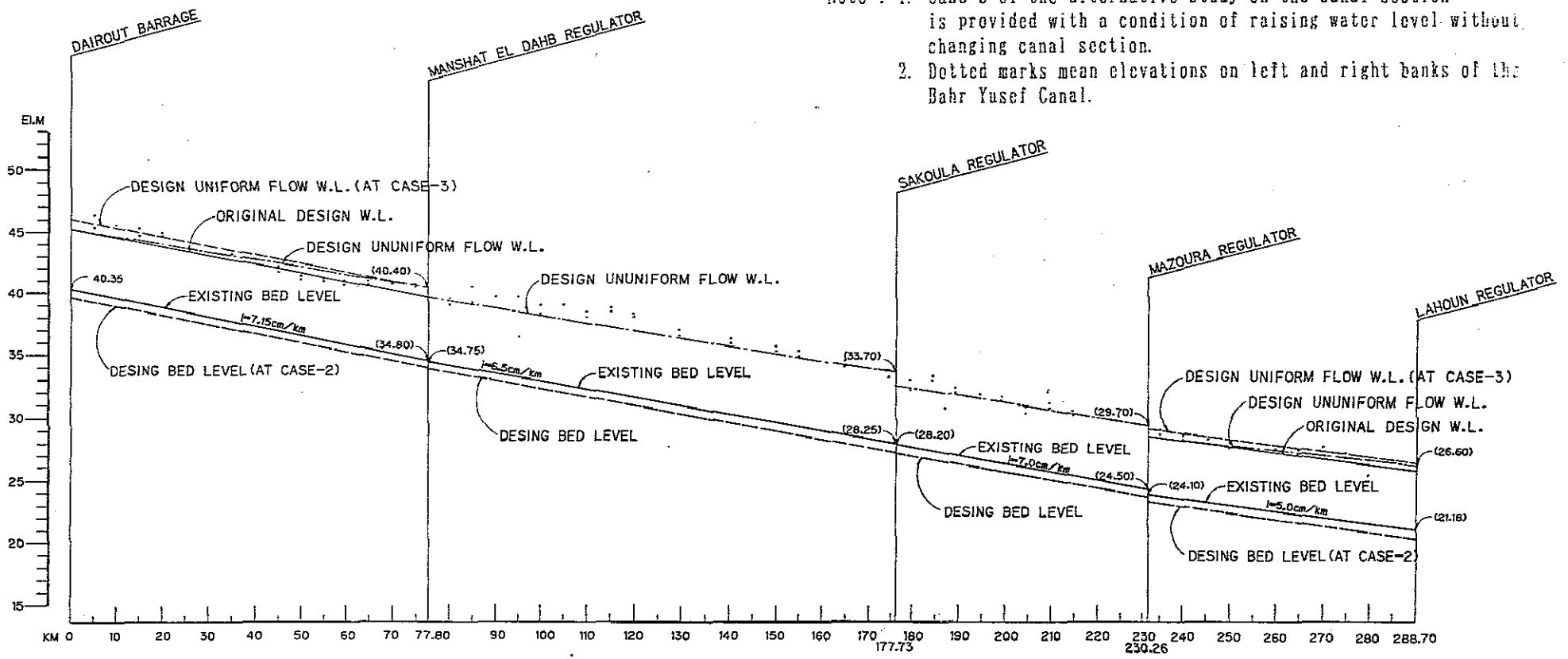


Figure F-2-2 Hydraulic Profile of Bahr Yusef Canal (Deepen Canal Bed by 70 cm)

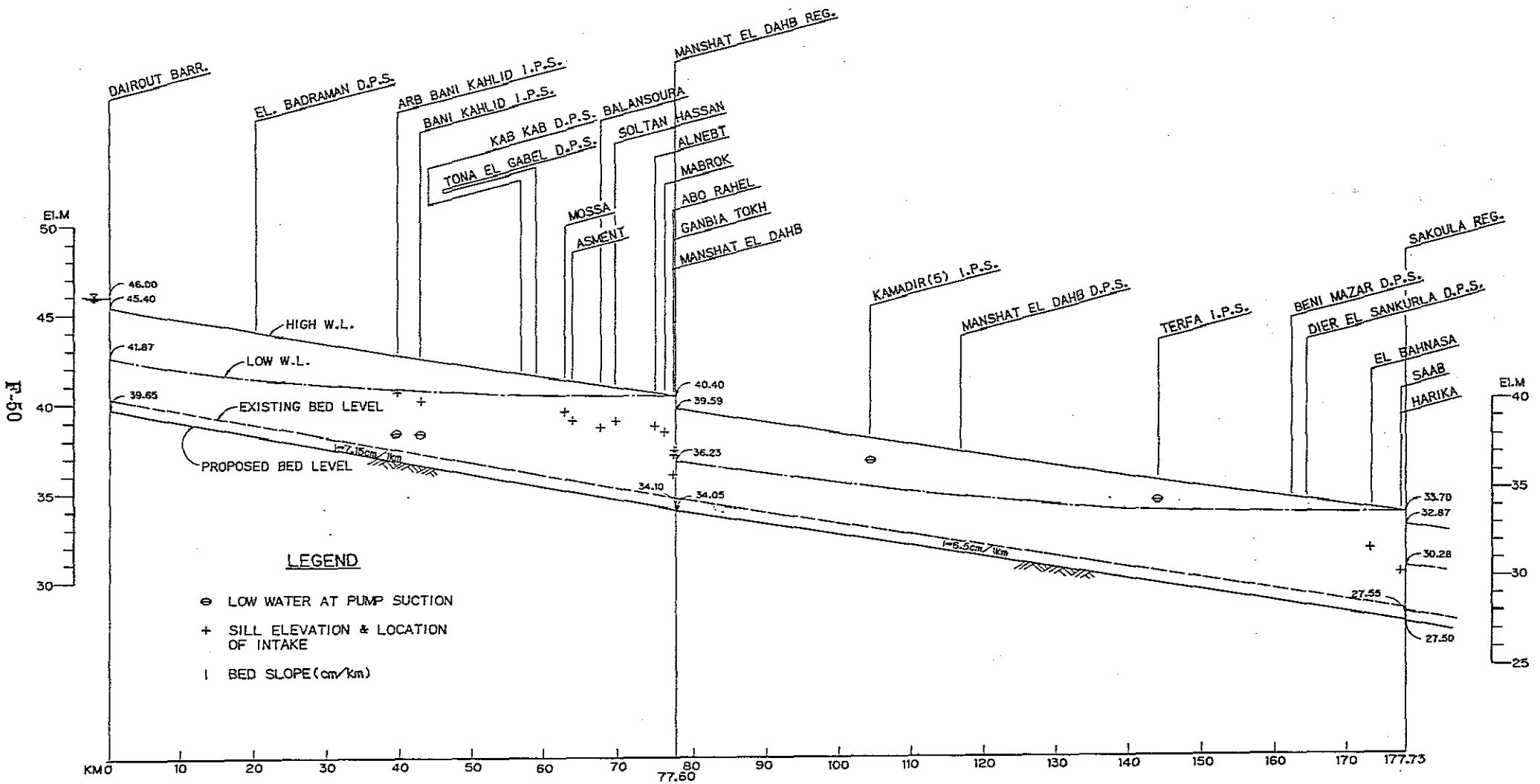


Figure F-2-2 (cont'd)

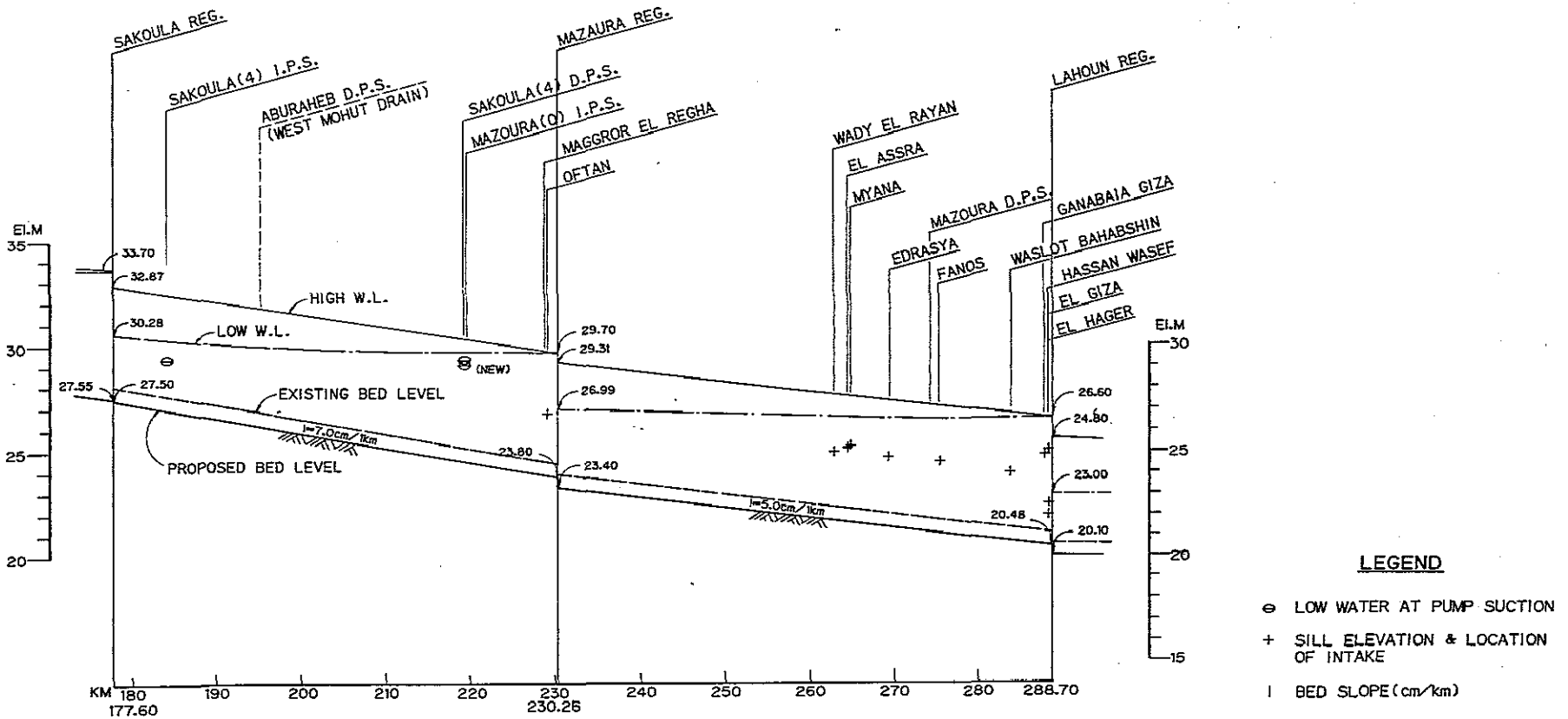


Figure F-2-3 Investigated Site of Shortcut

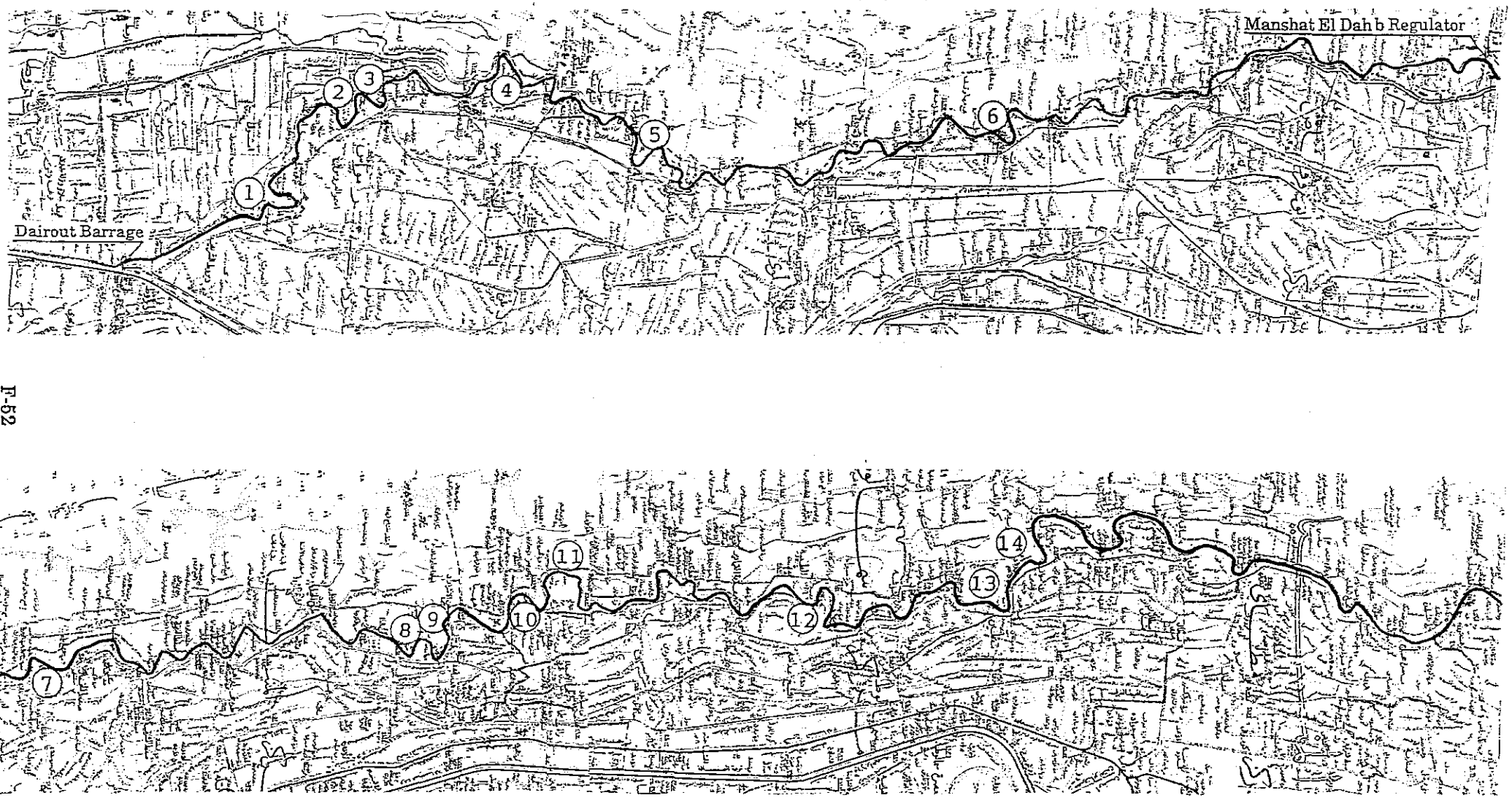
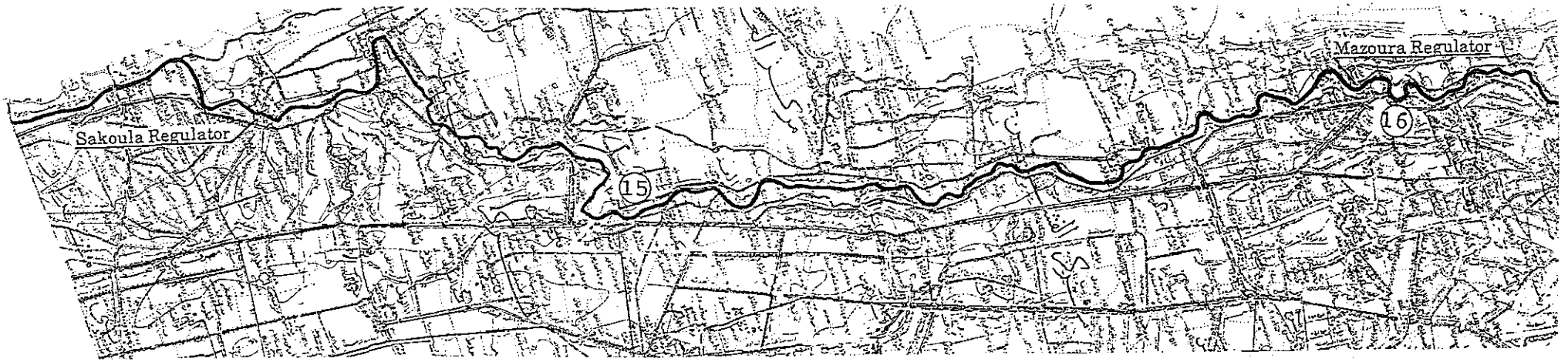
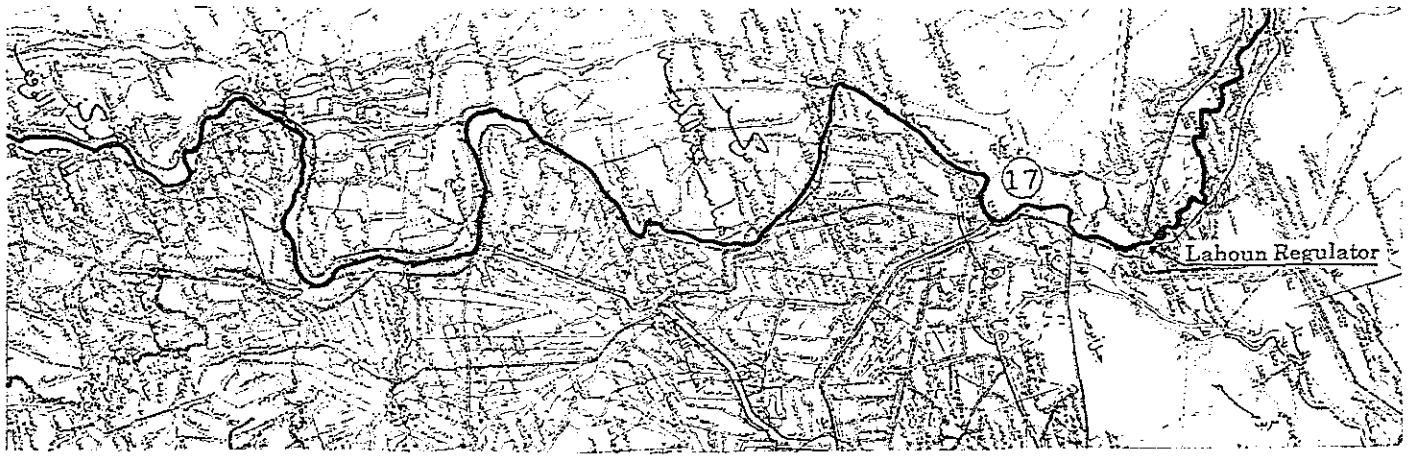


Figure F-2-3 (cont'd)

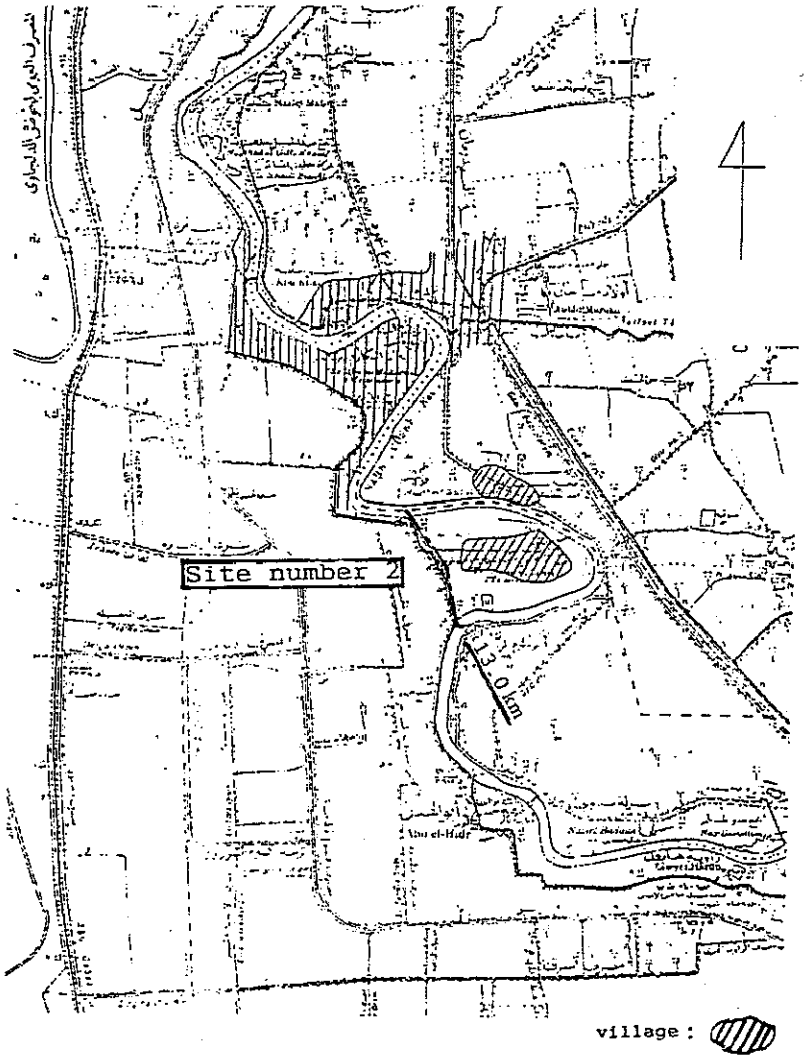




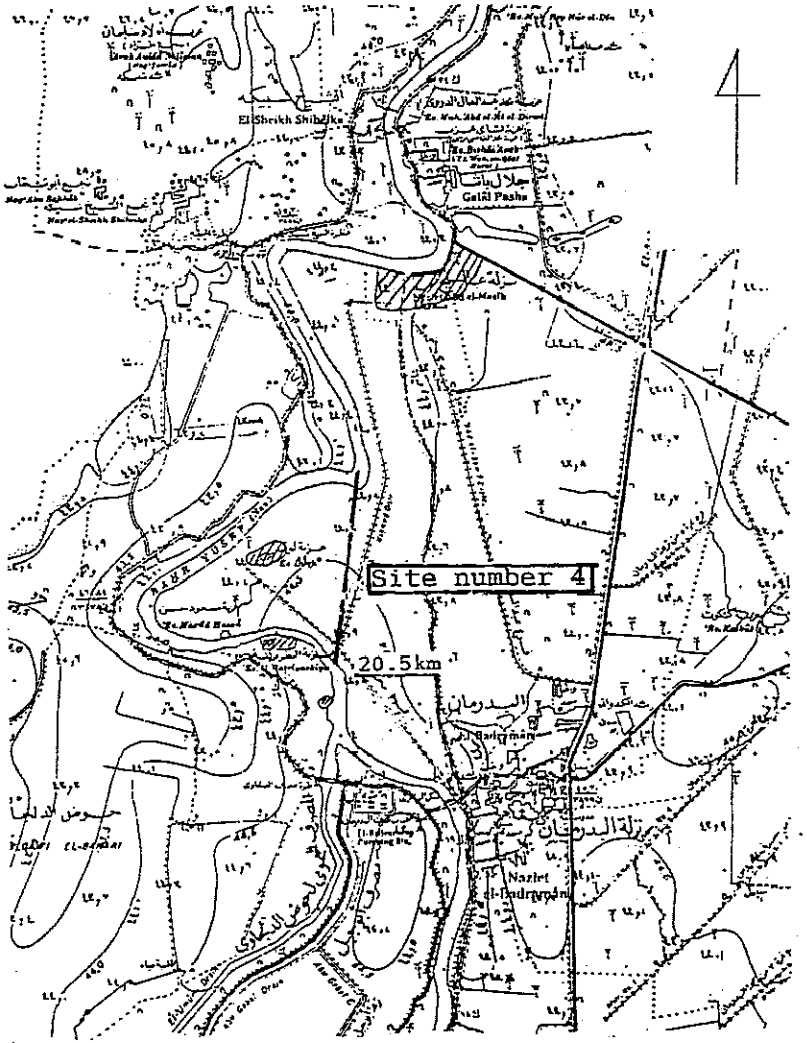
List of shortcut planning

Site	Location (km)	Map No.
1	6.0	54/585
2	13.0	54/585
3	15.5	54/585
4	20.5	55/585
5	30.5	55/585
6	51.5	57/585
7	80.5	59/585
8	99.5	60/570
9	101.2	60/570
10	107.0	60/570
11	110.0	60/570
12	126.0	61/570
13	137.0	62/570
14	140.0	62/570
15	193.5	66/585
16	231.5	68/585
17	282.0	71/600

Figure F-2-4 Candidate Site on Shortcut Works

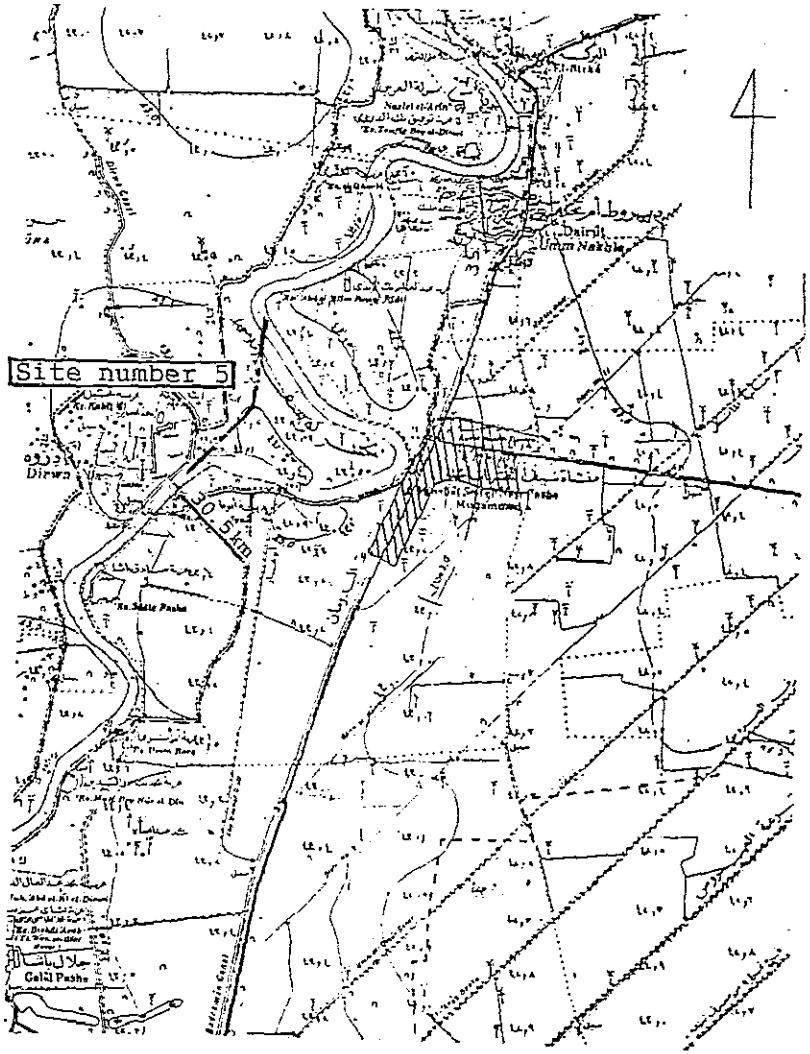


Site number 2
There is a village of 40 - 50 households living inside of the curve and also a village of 5 - 10 households living along the right bank of Bahr Yusef canal.

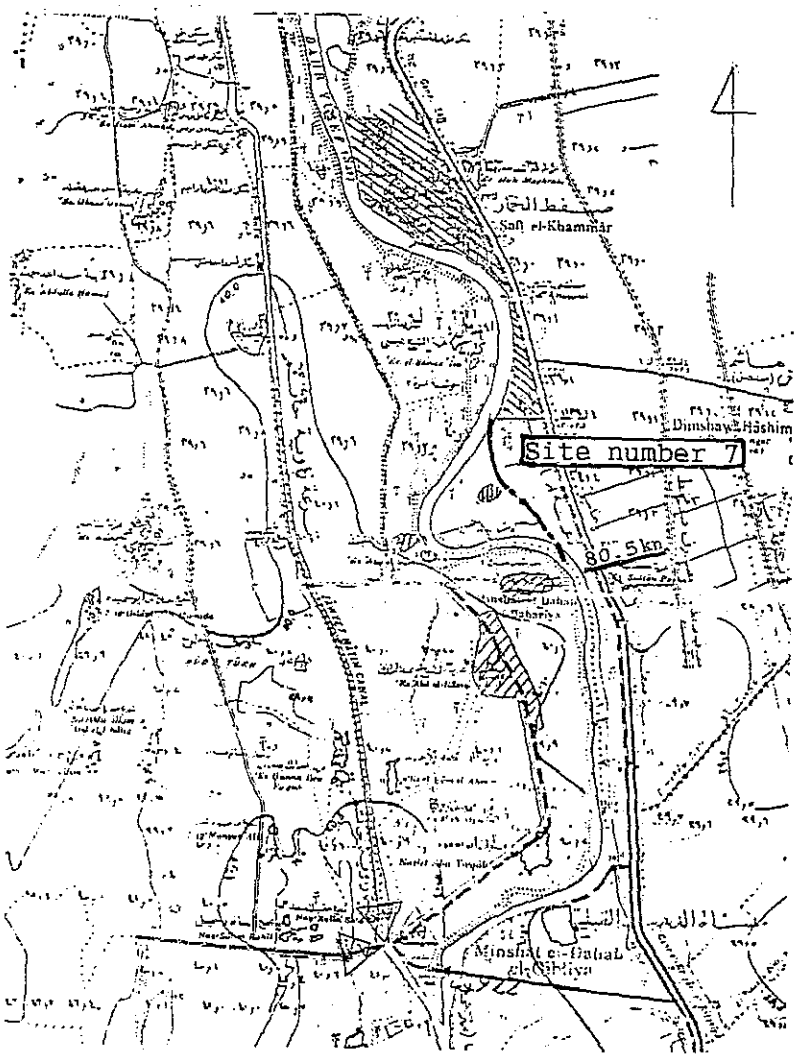


Site number 4
Some households exist inside of the curve and two household exist along the left bank of the canal. Compensations can solve such scale of problems.

Figure F-2-4 (cont'd)

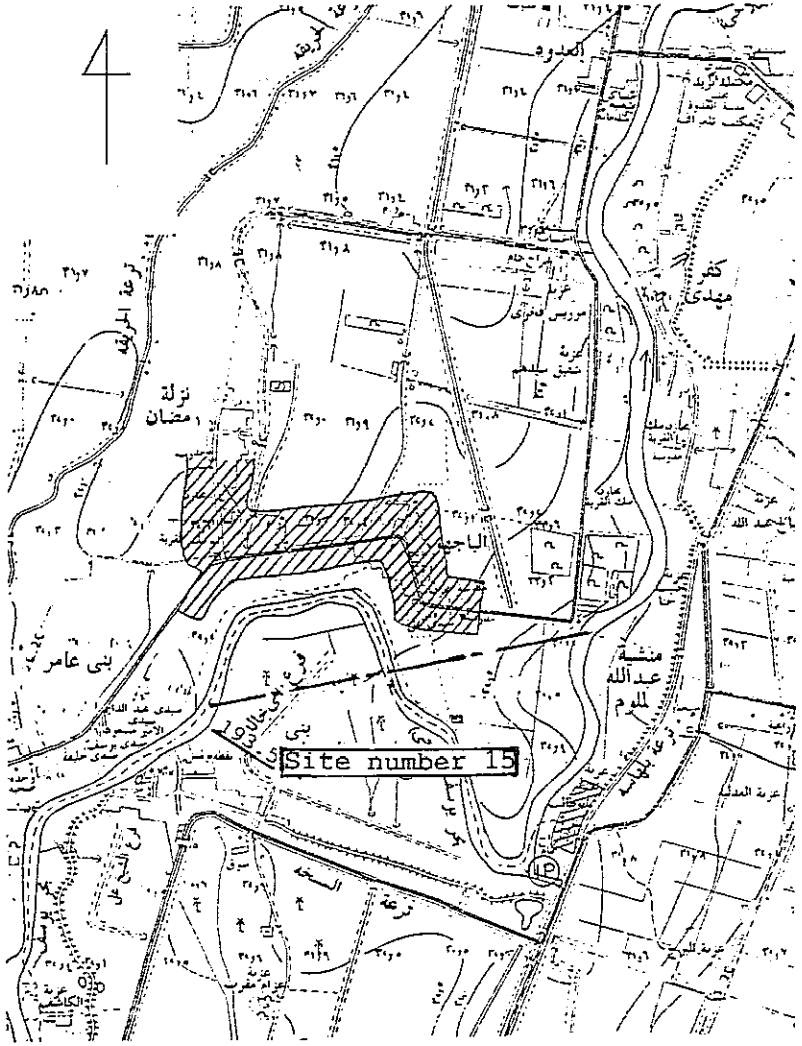


Site number 5
However a village exists at the peak of the curve, it is possible to plan shortcut that Badraman canal existent along the village can supply domestic water for the households.

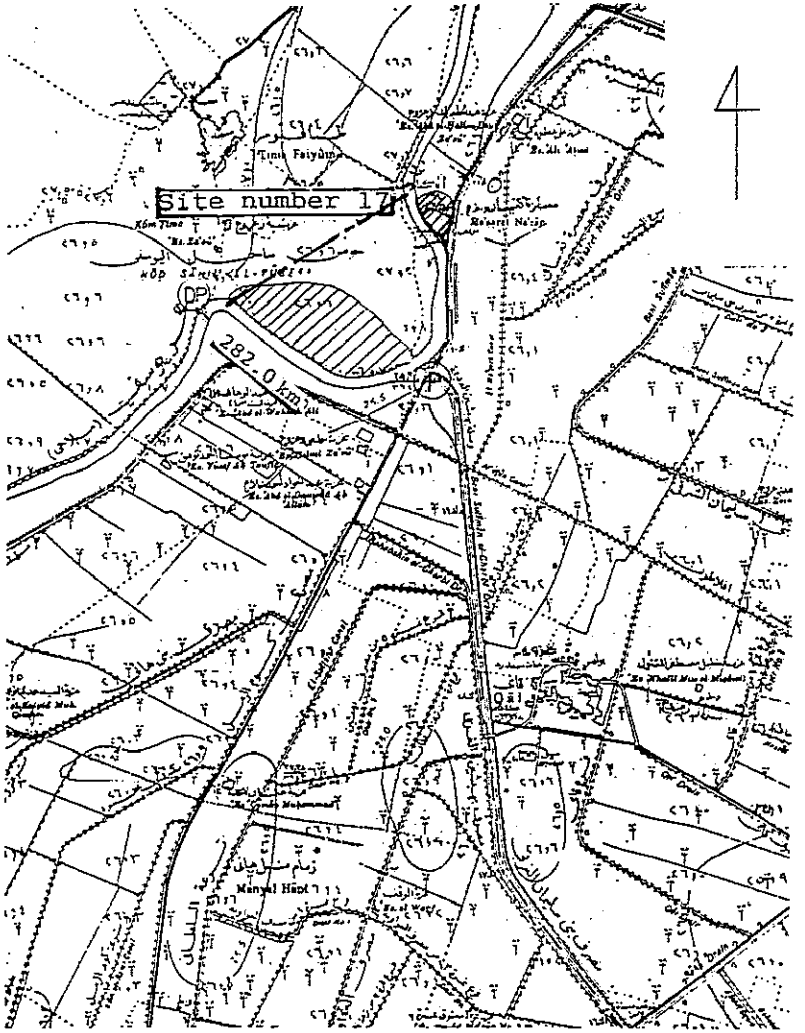


Site number 7
There is a village at the end of curve on the right bank, so the plan of shortcut should avoid this portion.

Figure F-2-4 (cont'd)

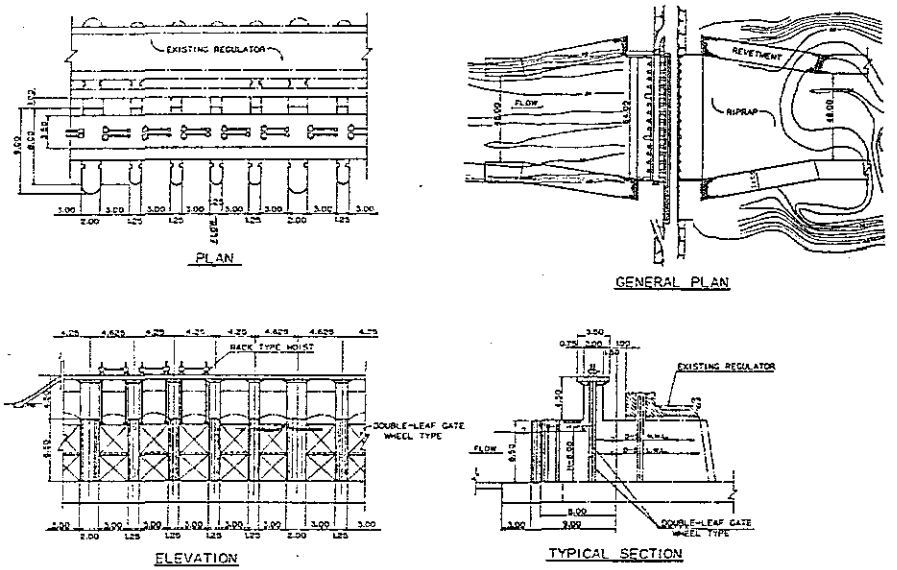


Site number 15
There are villages on the both side of bank but those do not face to Bahr Yusef canal, so that the problem of domestic water dose not occur. Irrigation pumps to supply water for Sherry canal exist at the peak of curve, but they are supposed to be illegal.

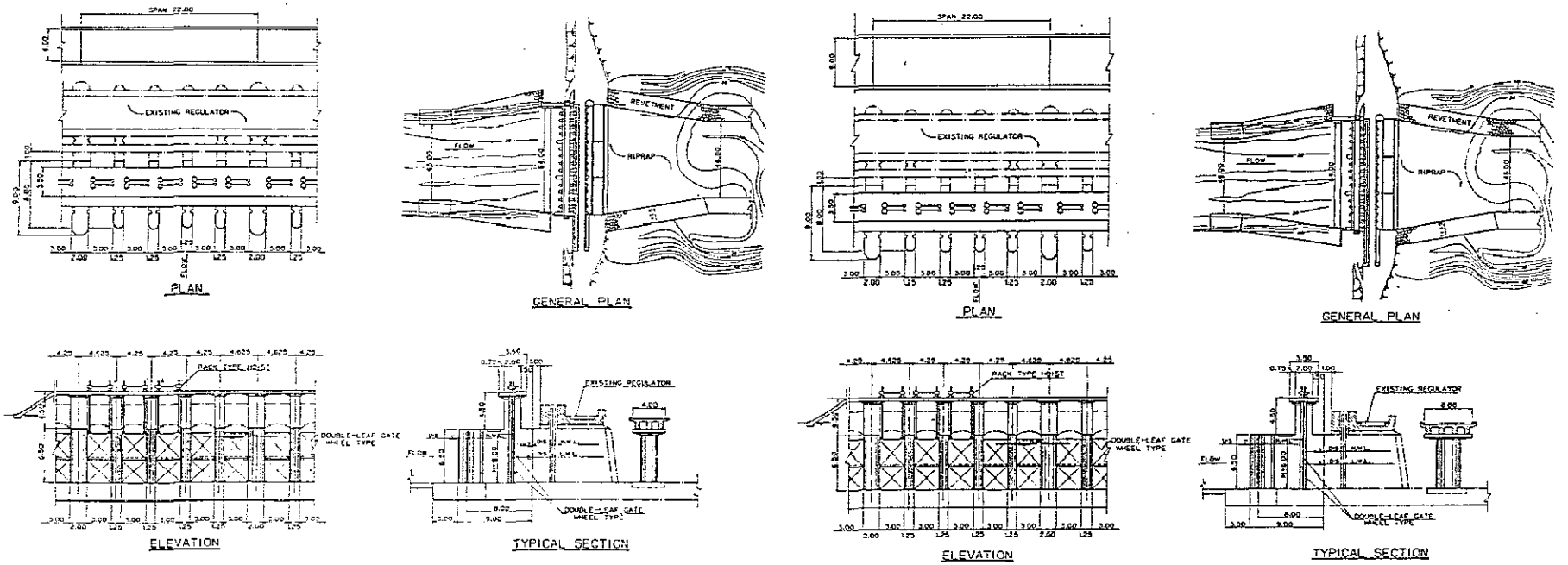


Site number 17
There are a large village faced to Bahr Yusef canal and the drainage pump on the left bank and the pump station for drinking water exists at the peak of curve on the right bank.

Figure F-2-5 Alternative Plan A of Improvement of Regulator



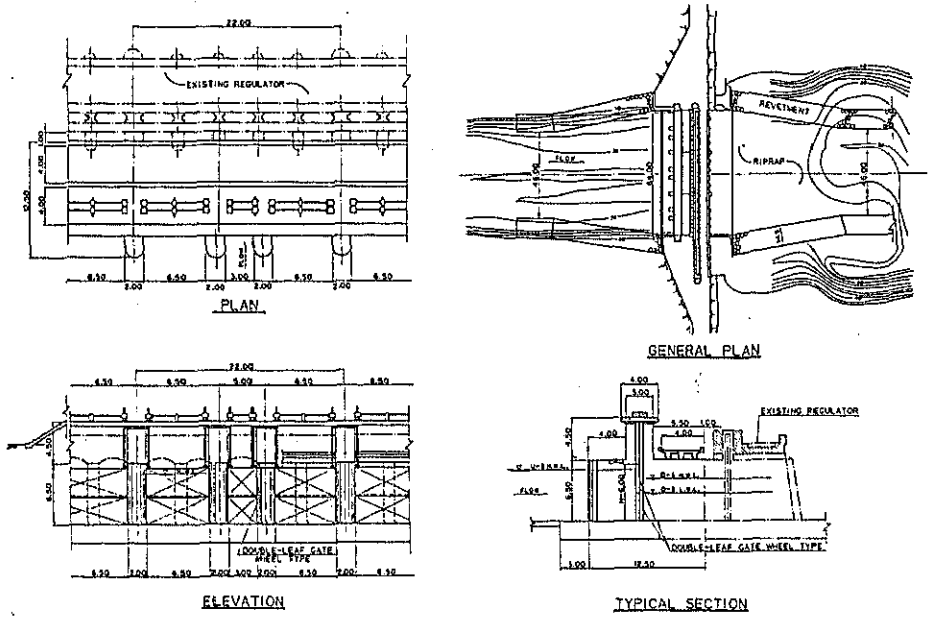
ALTERNATIVE PLAN A-1



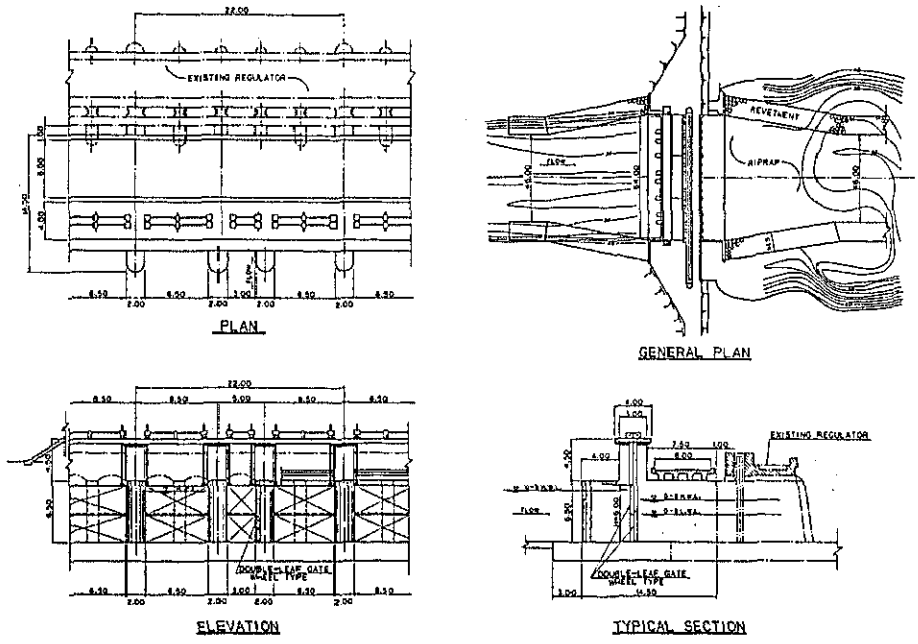
ALTERNATIVE PLAN A-2

ALTERNATIVE PLAN A-3

Figure F-2-6 Alternative Plan B of Improvement of Regulator

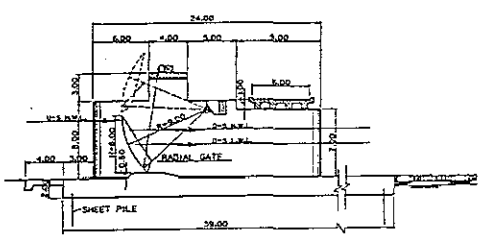


ALTERNATIVE PLAN B-1

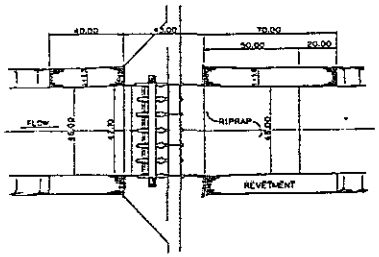


ALTERNATIVE PLAN B-2

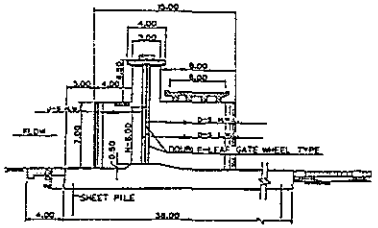
Figure F-2-7 Alternative Plan C of Improvement of Regulator



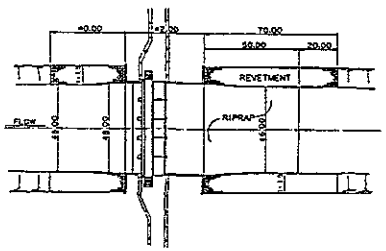
TYPICAL SECTION



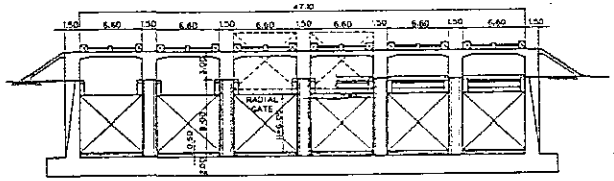
GENERAL PLAN



TYPICAL SECTION

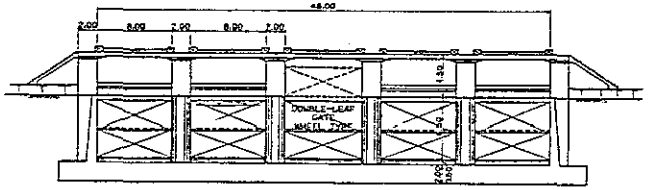


GENERAL PLAN



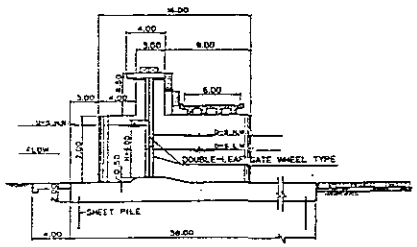
ELEVATION

ALTERNATIVE PLAN C-1

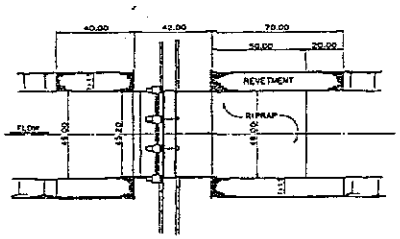


ELEVATION

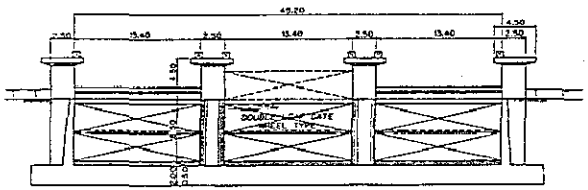
ALTERNATIVE PLAN C-2



TYPICAL SECTION



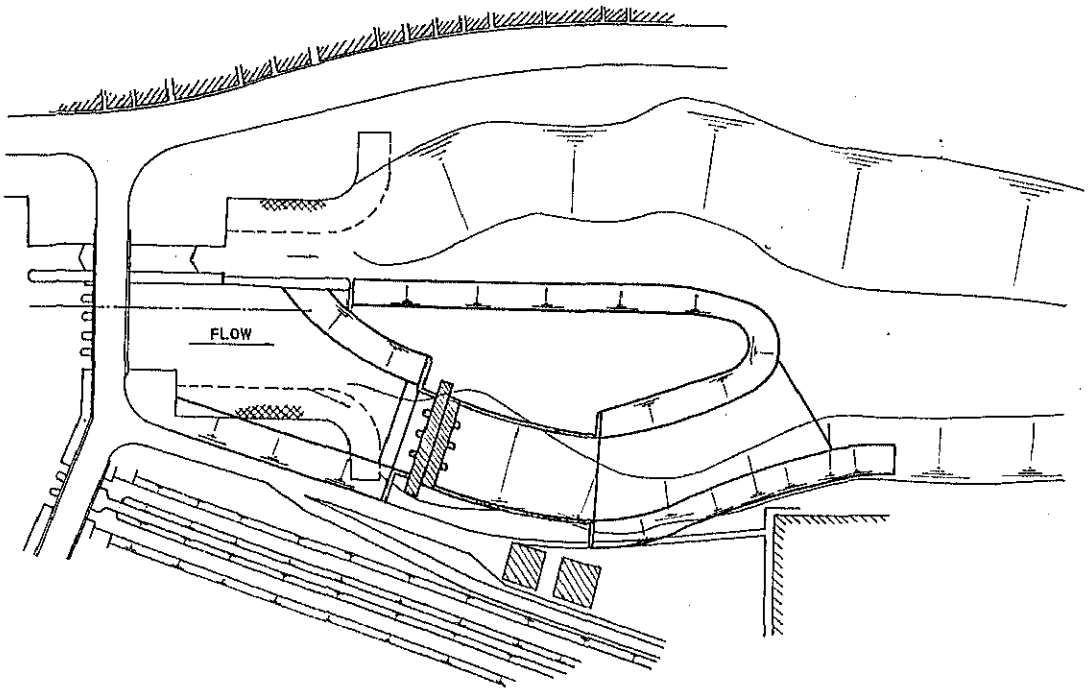
GENERAL PLAN



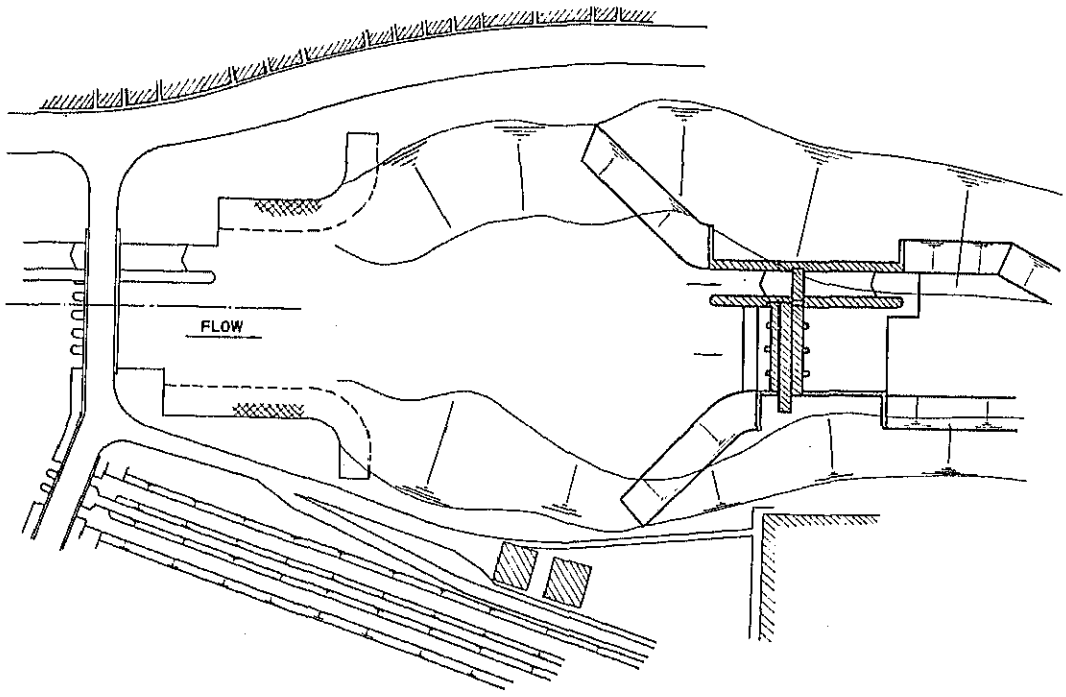
ELEVATION

ALTERNATIVE PLAN C-3

Figure F-2-8 Alternative Plan of Proposed Site (Dairout Barrage)



ALTERNATIVE PLAN D-1



ALTERNATIVE PLAN D-2

Figure F-2-9 Alternative Plan of Proposed Site **(Manshat El Dahab Regulator)**

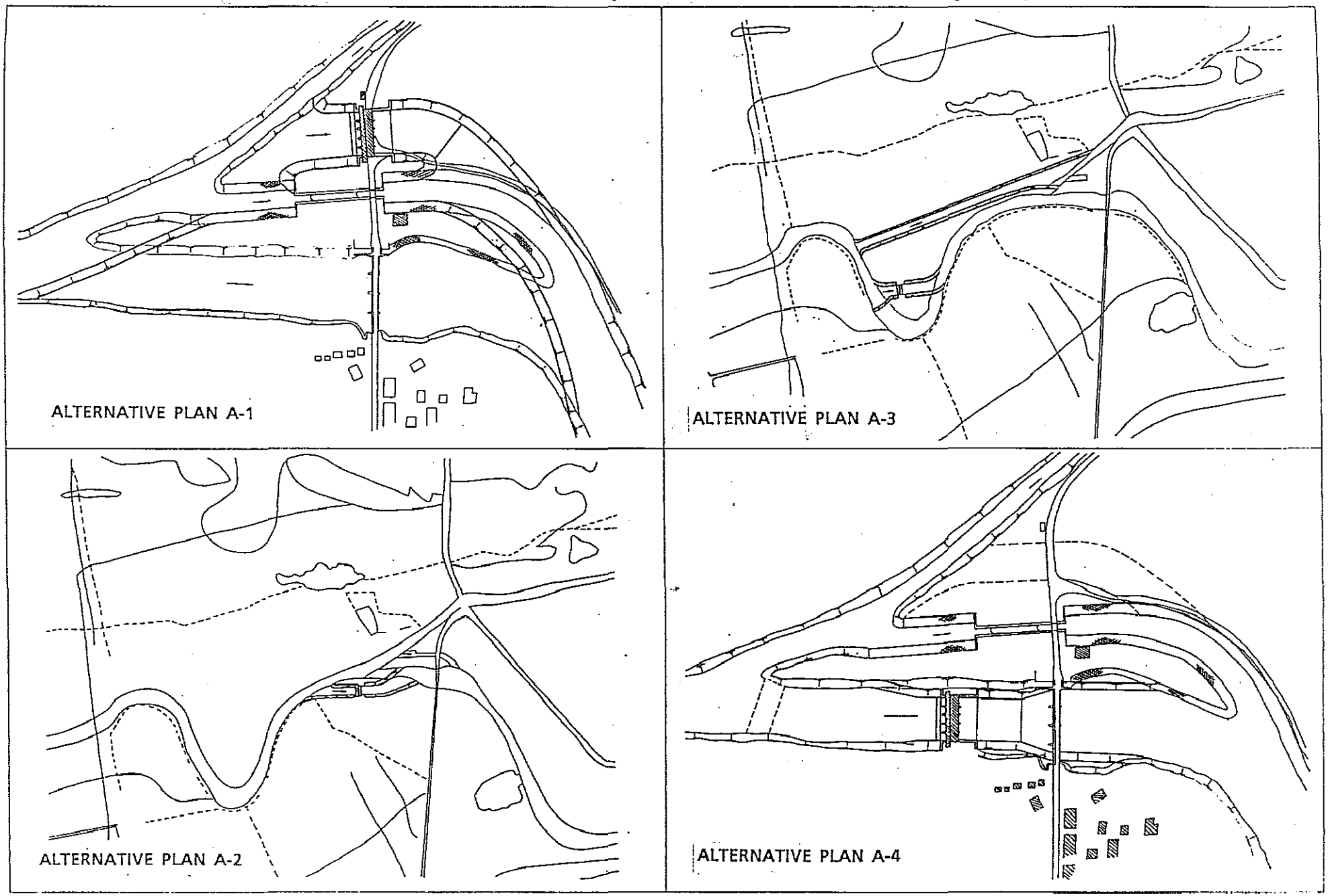


Figure F-2-10 Alternative Plan of Proposed Site (Sakoula Regulator)

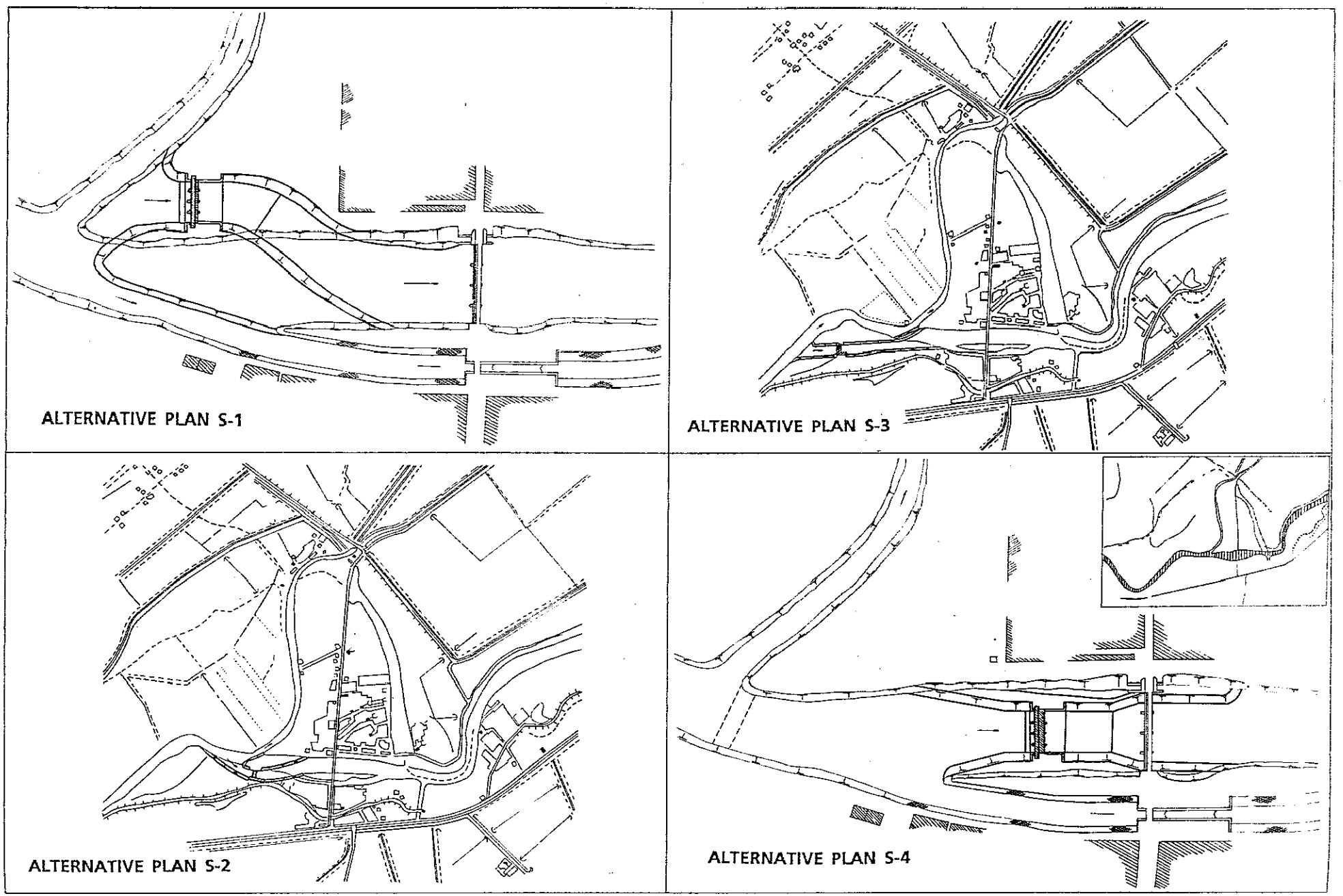


Figure F-2-11 Alternative Plan of Proposed Site (Mazoura Regulator)

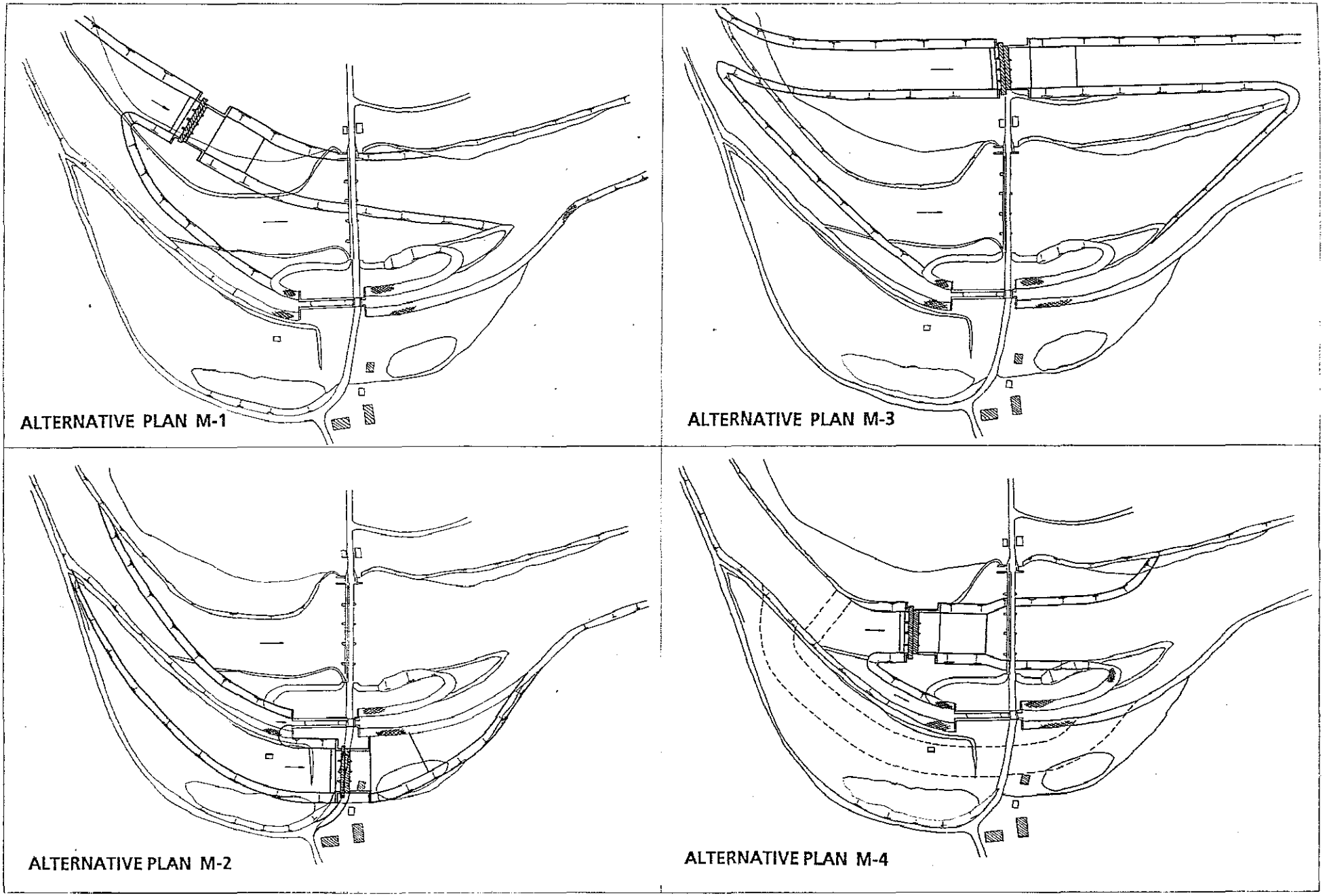


Figure F-2-12 Alternative Plan of Proposed Site (Lahoun Regulator)

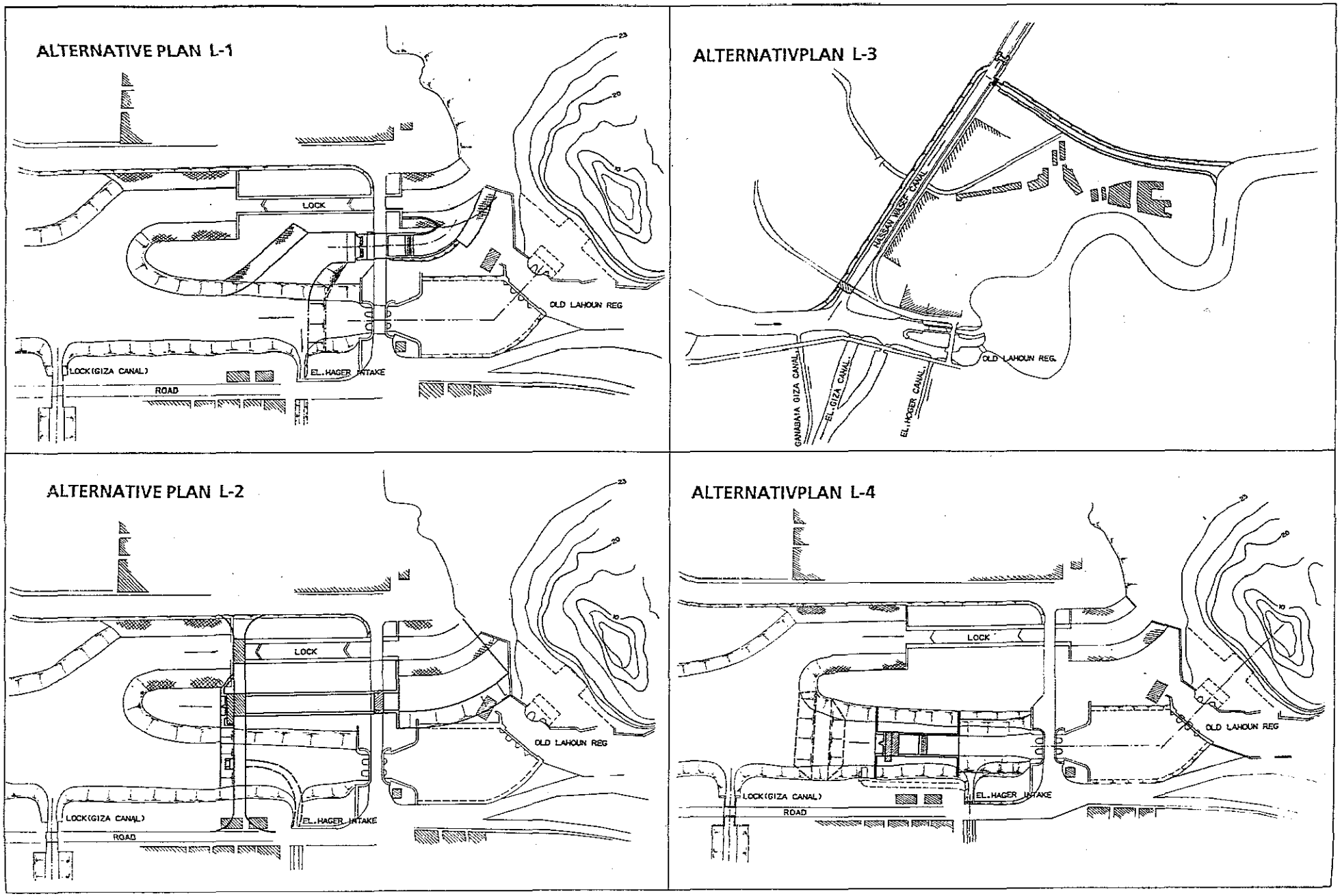


Figure F-2-13 Water Level in Original Condition of Harika Branch Canal

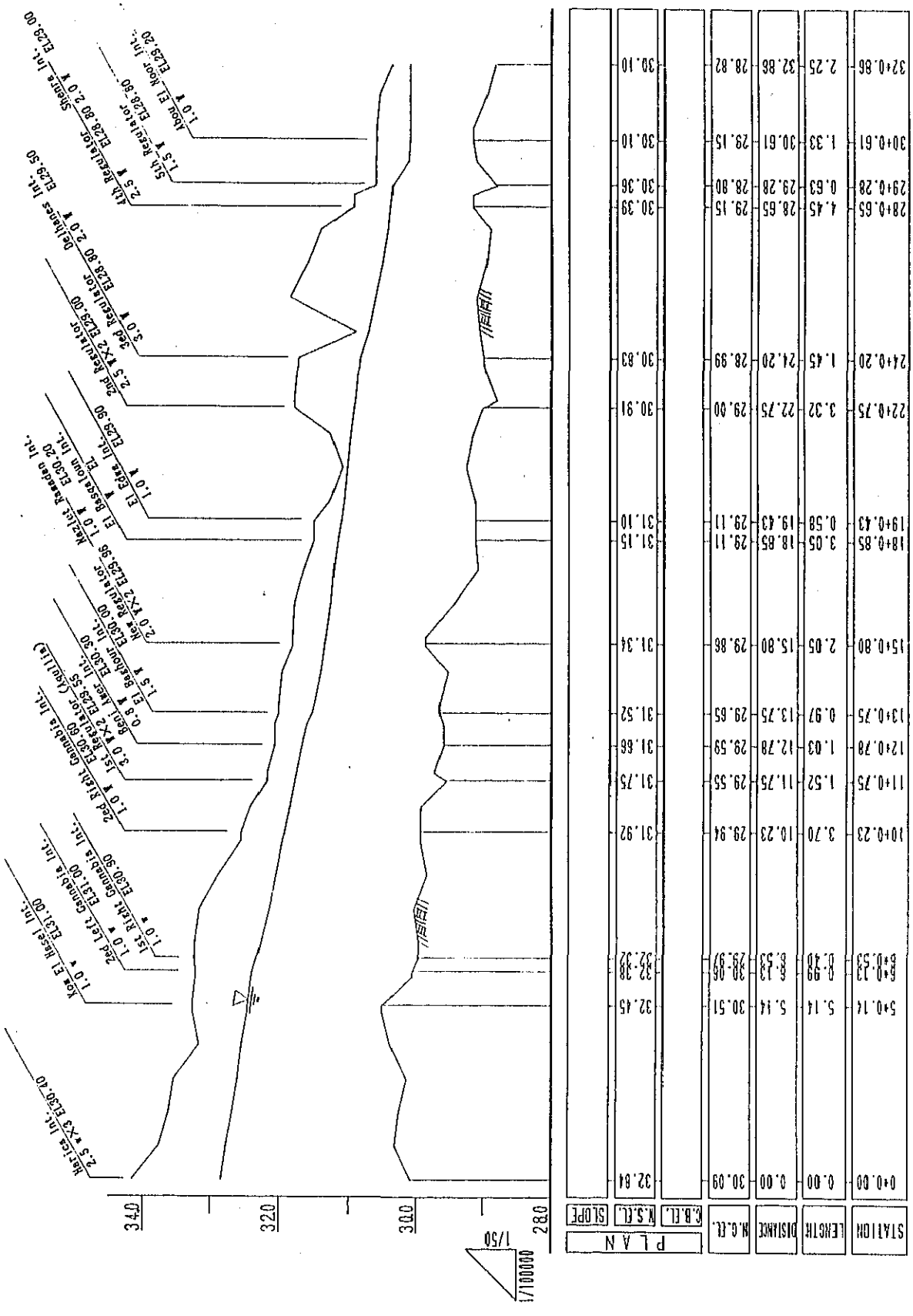


Figure F-2-14 Water Level in Case 1 of Harika Branch Canal

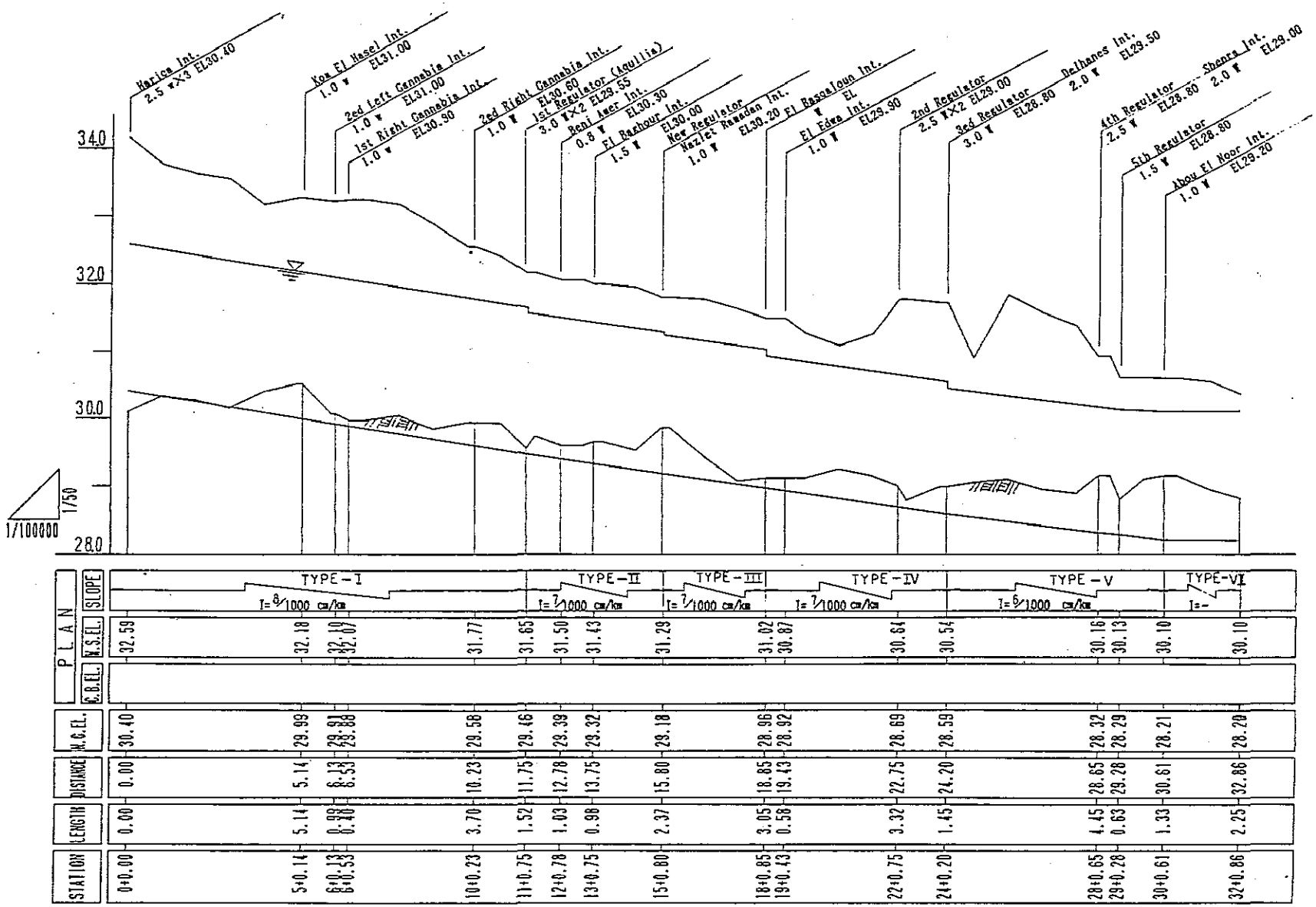


Figure F-2-15 Water Level in Case 2 of Harika Branch Canal

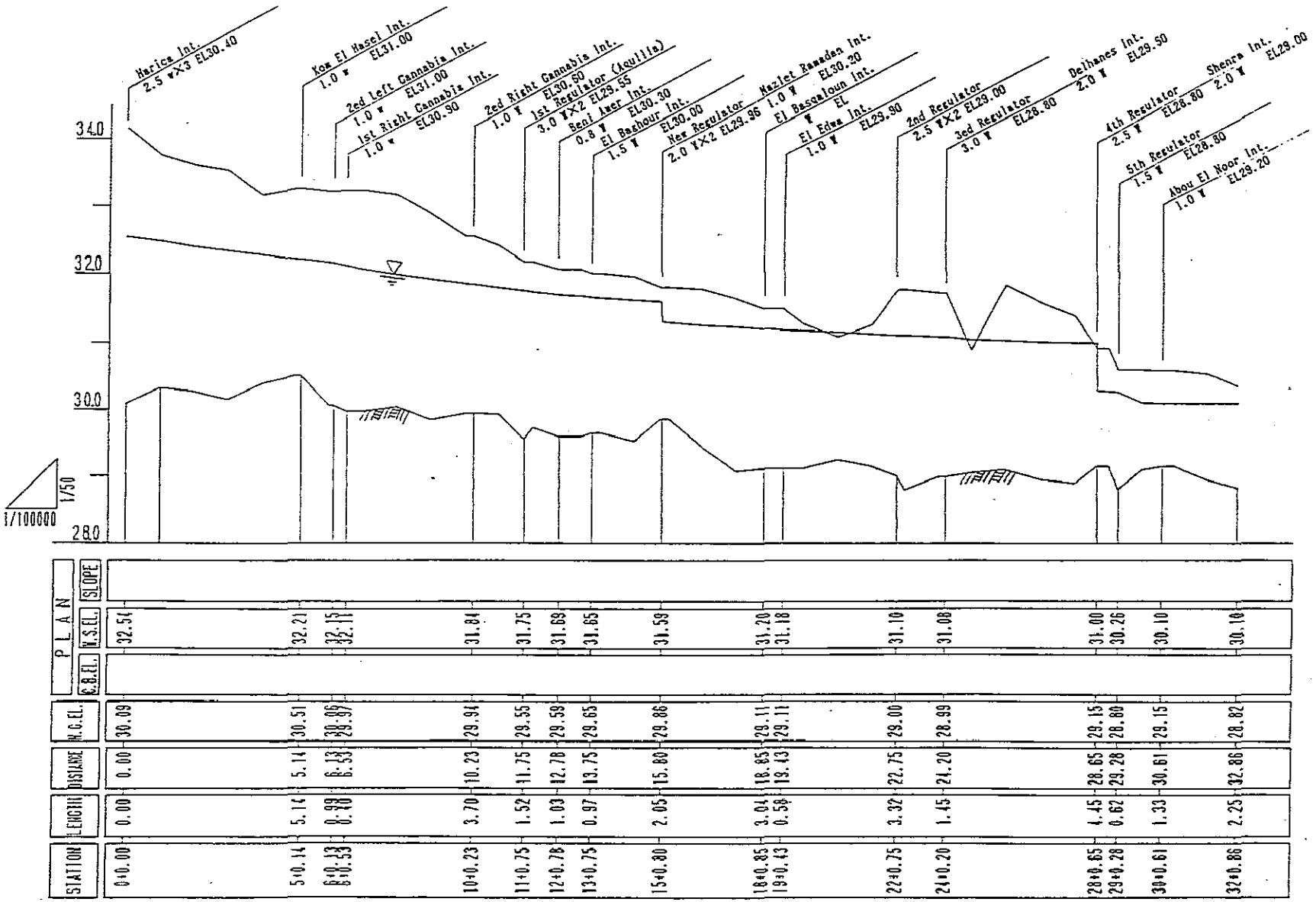
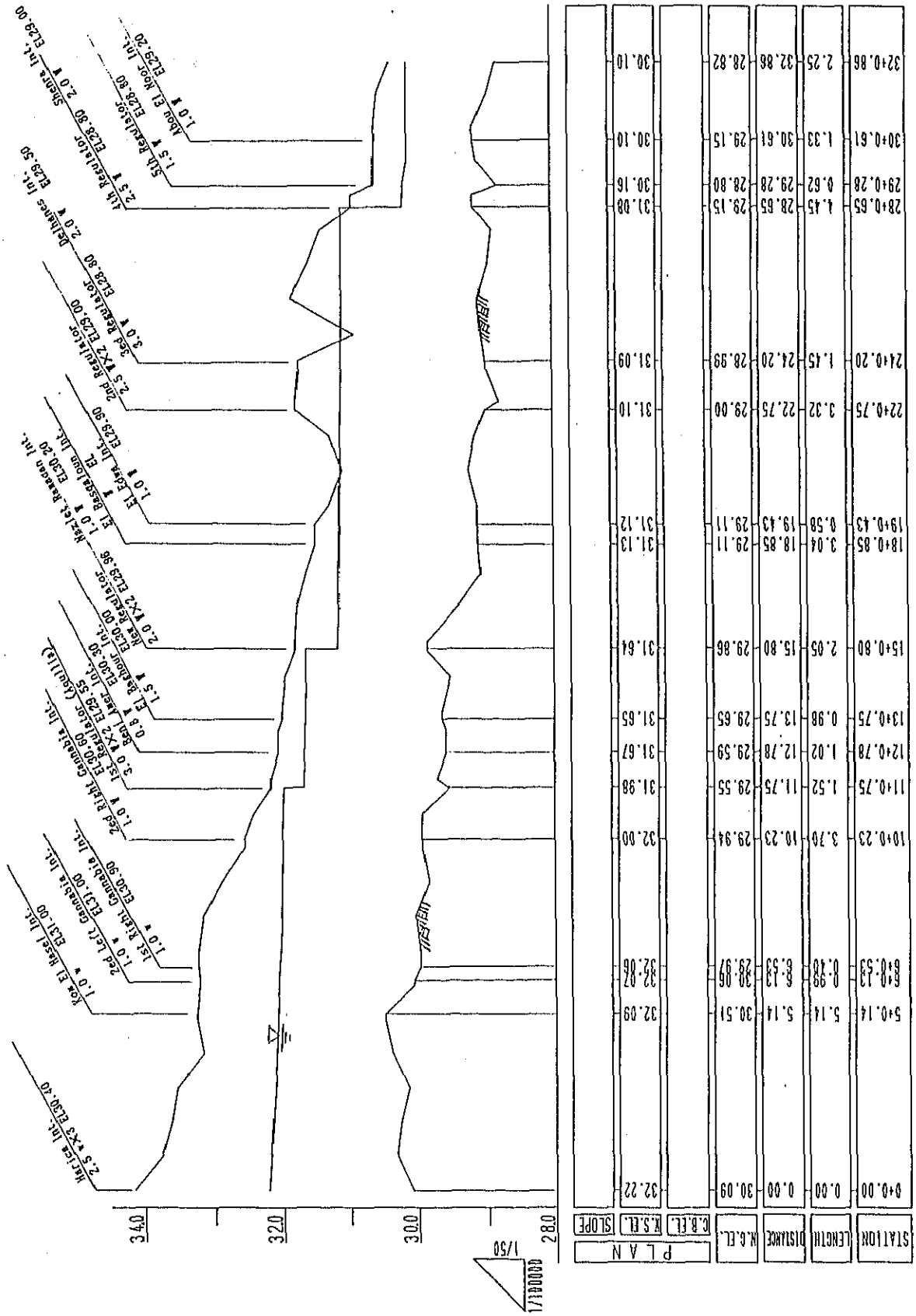


Figure F-2-16 Water Level in Case 3 of Harika Branch Canal



STATION	LENGTH	DISTANCE	N.G.EL.	C.B.EL.	F.S.EL.	SLOPE
0+0.00	0.00	0.00	30.09		32.22	
5+0.14	5.14	5.14	30.51		32.09	
8+0.33	0.19	5.33	29.97		32.06	
8+0.43	0.98	6.31	30.05		32.82	
10+0.23	3.70	10.23	29.94		32.00	
11+0.75	1.52	11.75	29.55		31.98	
12+0.78	1.02	12.78	29.59		31.67	
13+0.75	0.98	13.75	29.65		31.65	
15+0.80	2.05	15.80	29.86		31.64	
18+0.85	3.04	18.85	29.11		31.13	
19+0.43	0.58	19.43	29.11		31.12	
22+0.75	3.32	22.75	29.00		31.10	
24+0.20	1.45	24.20	28.98		31.09	
28+0.65	4.45	28.65	29.15		31.08	
29+0.28	0.62	29.28	28.80		30.16	
30+0.61	1.33	30.61	29.15		30.10	
32+0.86	2.25	32.86	28.82		30.10	

Figure F-2-17 Water Level in Case 4 of Harika Branch Canal

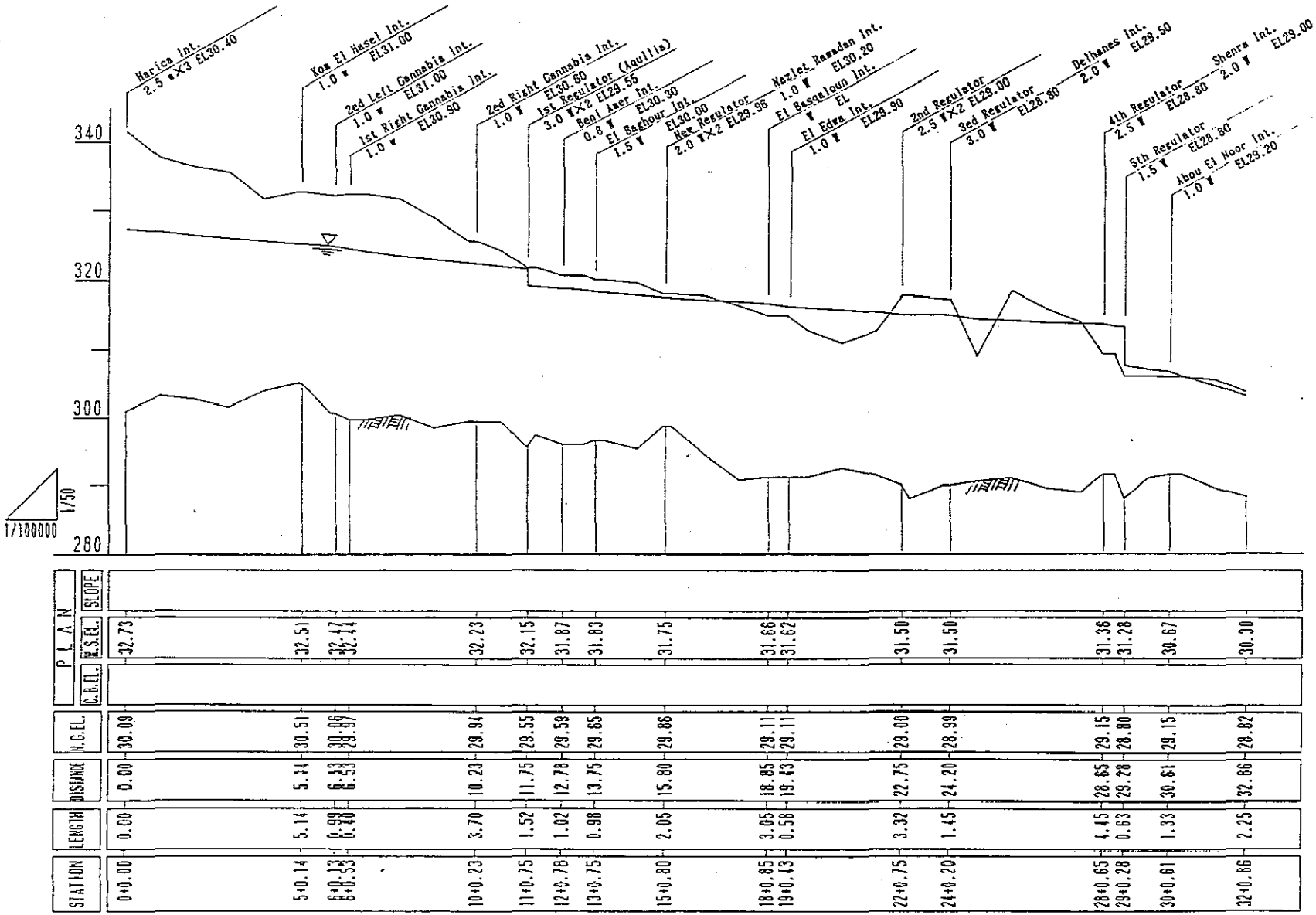
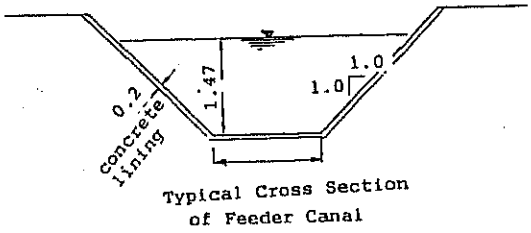


Figure F-2-18 Location of Proposed Beni Khalid Pump Station & Proposed Feeder Canal



Typical Cross Section of Feeder Canal

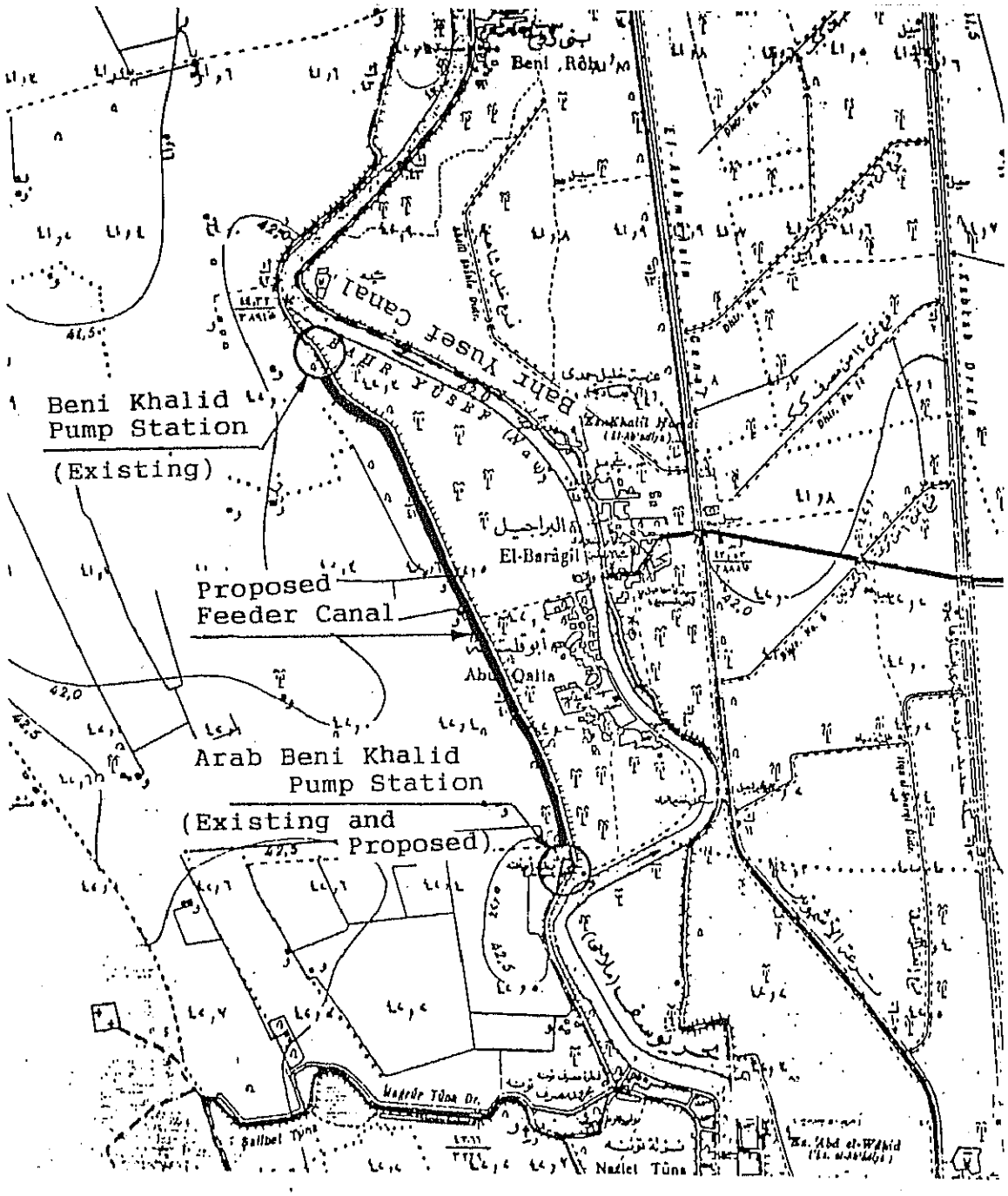
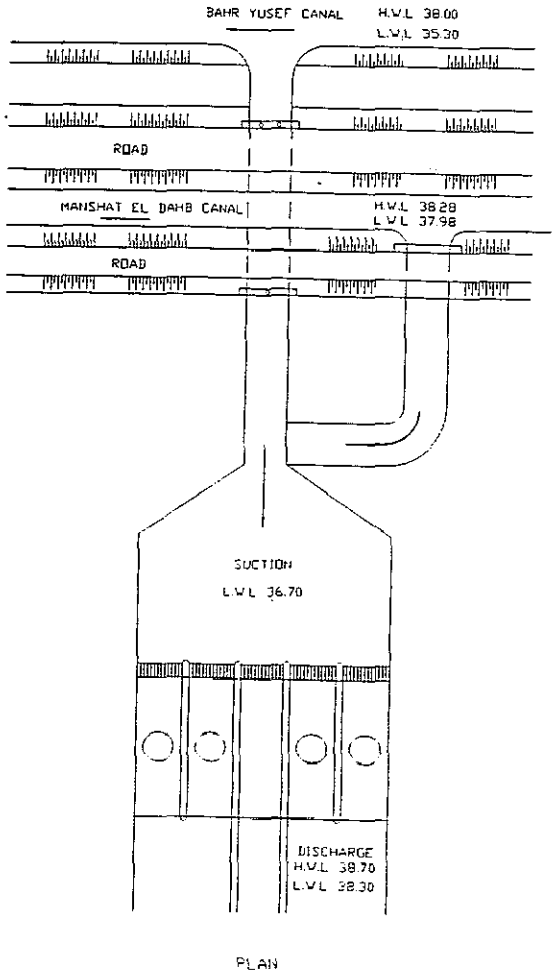
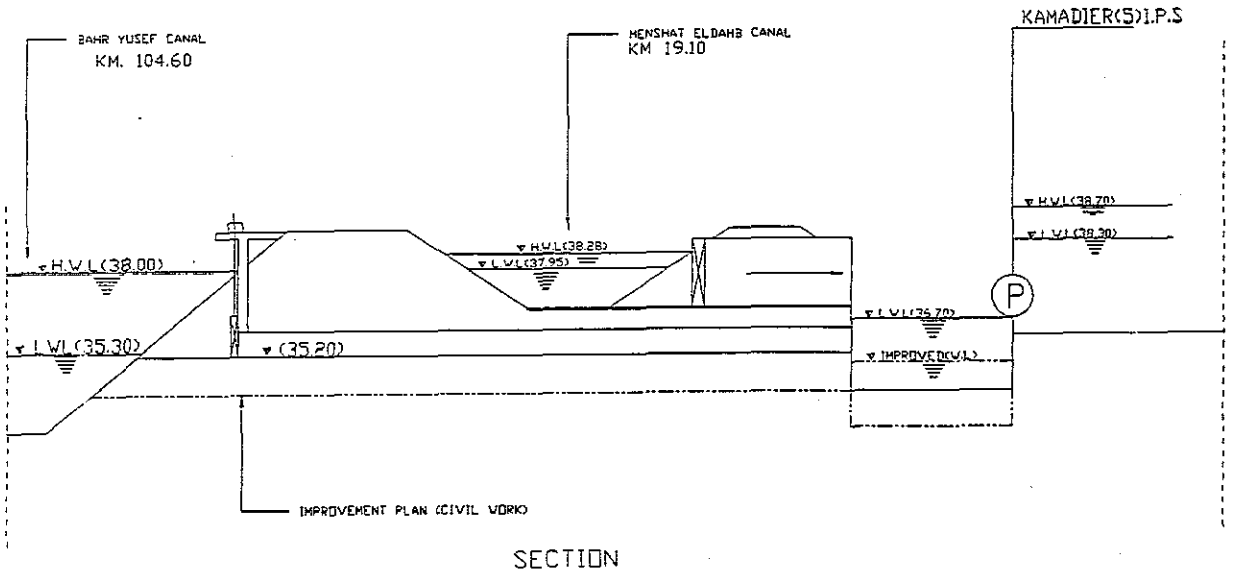


Figure F-2-19 Intake Profile of Kamadir No.5 Drainage Pump Station





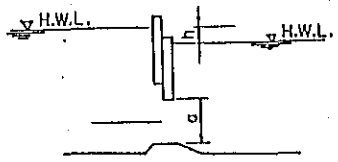
F-3 Proposed Plan of Facilities

Table F-3-1 Design of Proposed Vent Width

Barrage Names	Q (m^3/s)	B (m)	q (m^3/sec)	h (m)	a (m)	Span Length (m) ×No. of Gate
Dairout	226.50	28	8.09	0.60	3.15	7 × 4
Manshat El Dahab	210.15	35	6.06	0.81	2.00	7 × 5
Sakoula	193.64	32	6.05	0.83	2.00	8 × 4
Mazoura	187.79	32	5.87	0.39	2.84	8 × 4
Lahoun	80.06	11	7.28	1.00	2.19	5.5 × 2

The following equation is applied to hydraulic calculation.

$$Q = CA\sqrt{2gh}$$



Where

Q : Designed discharge at the barrage site

B: Effective width in section of barrage

q : Designed discharge for the unit width at the barrage

h: Water level difference between up- and downstream at the barrage in design discharge

a: Gate opening difference

A: Area of cross section at barrage A = B· a

C: Discharge coefficient

The above value is obtained by 0.75 from the observation data in the similar conditions that all the gates would be opened to the same degrees

Table F-3-2 Design of Proposed Apron and Riprap

Barrage Names	q (m^3/s/m)	H (m)	ℓ_B (m)	ℓ_a (m)	ℓ (m)	Remarks
Dairout	8.09	4.63	111	35	76	Movable Weir
Manshat El Dahab	6.06	4.67	96	35	61	〃
Sakoula	6.05	3.92	87	32	55	〃
Mazoura	5.07	3.21	78	29	49	〃
Lahoun	7.28	1.50	60	20	40	〃
Lahoun	7.28	3.00	56	19	37	Fixed Wire

Calculation is made by Bligh's empirical equation.

$$\ell = \ell_B - \ell_a$$

$$\ell_B = 0.67 \cdot C \sqrt{H \cdot q} \cdot f$$

$$\ell_a = 0.6 \cdot C \sqrt{H} \cdot f$$

ℓ : Length of bed protection works

ℓ_B : Length of protection works including apron length (ℓ_a) and bed protection (ℓ)

H : Height from the lowest water level at downstream up to the gate crest (Weir height for the fixed weirs)

q : Designed discharge for the unit width at the barrage

f : Safety ratio (1.5 for movable weirs and 1.0 for fixed weirs)

C : Bligh's coefficient for foundation (18 for very fine sand materials)

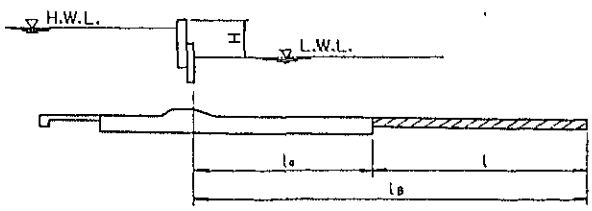


Table F-3-3 Design of Cut-off Length

Barrage Names	h'	C· h'	Total Apron Length	Creep Length to be Added	Volume, Water Retention Wall
	(m)	(m)	(m)	(m)	(m)
Dairout	4.13	74	13.2	-	-
Manshat El Dahab	4.17	75	48	27	13.5
Sakoula	3.42	62	45	17	8.5
Mazoura	2.71	49	42	7	3.5
Lahoun	3.60	65	65	-	-

Calculation is made by Bligh's method.

$L \geqq C \cdot h'$

L : Length of seepage line measured along the foundation of barrages

h' : Maximum water level differencebetween up - and downstream

C : Bligh'scoefficient for foundation by kinds of materials : 18 for very fine sand materials

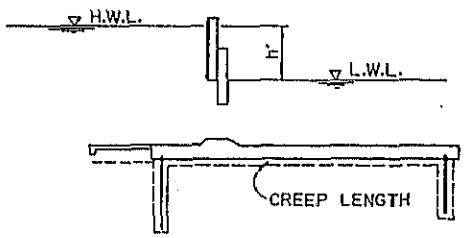
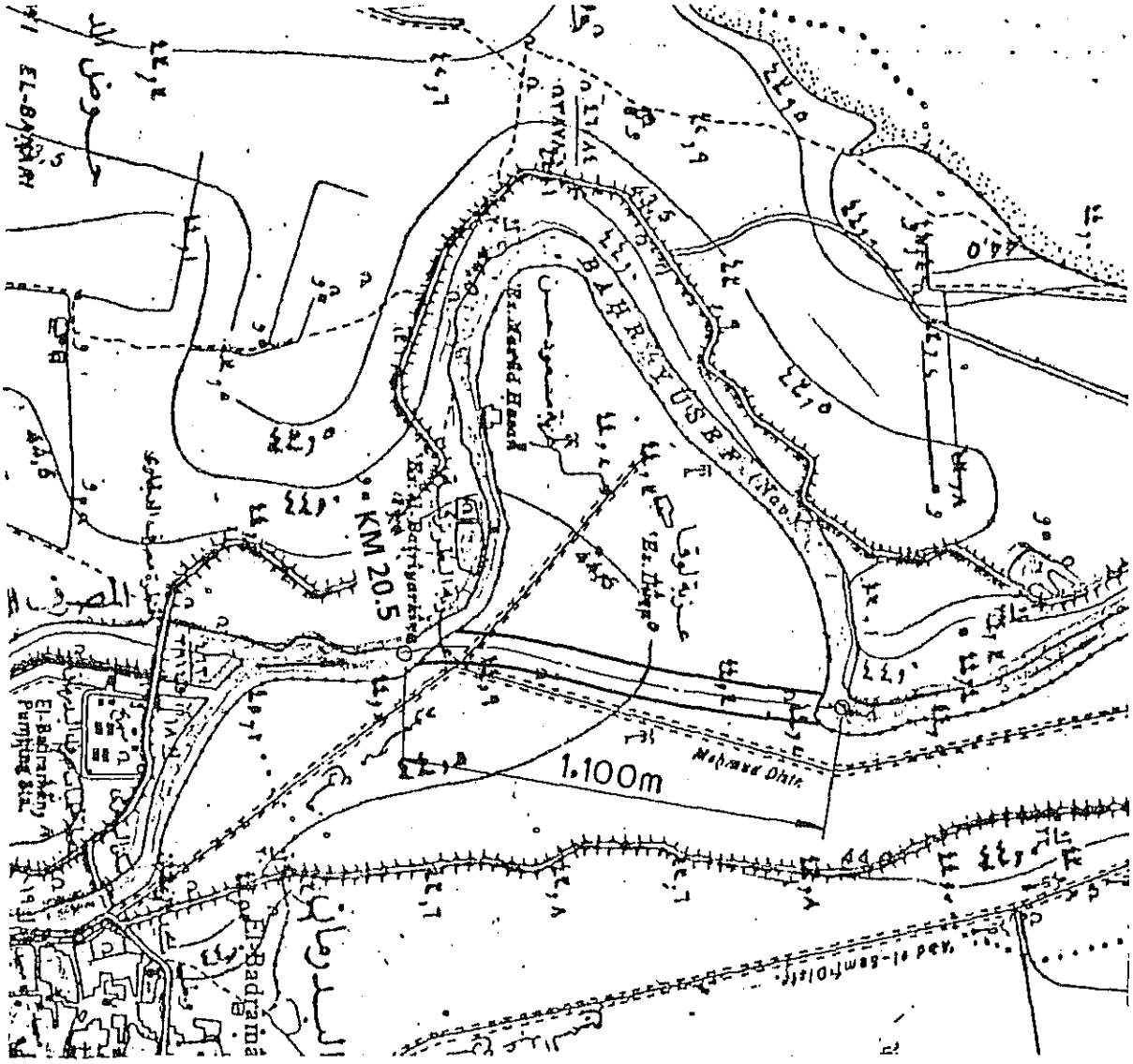
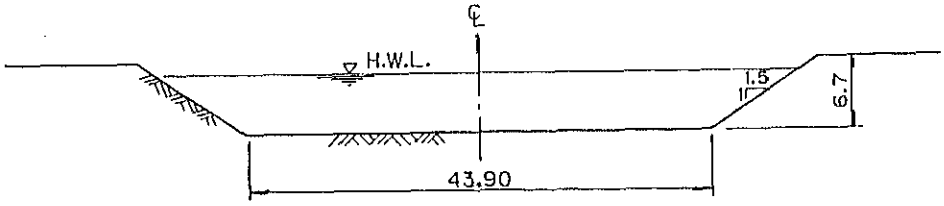


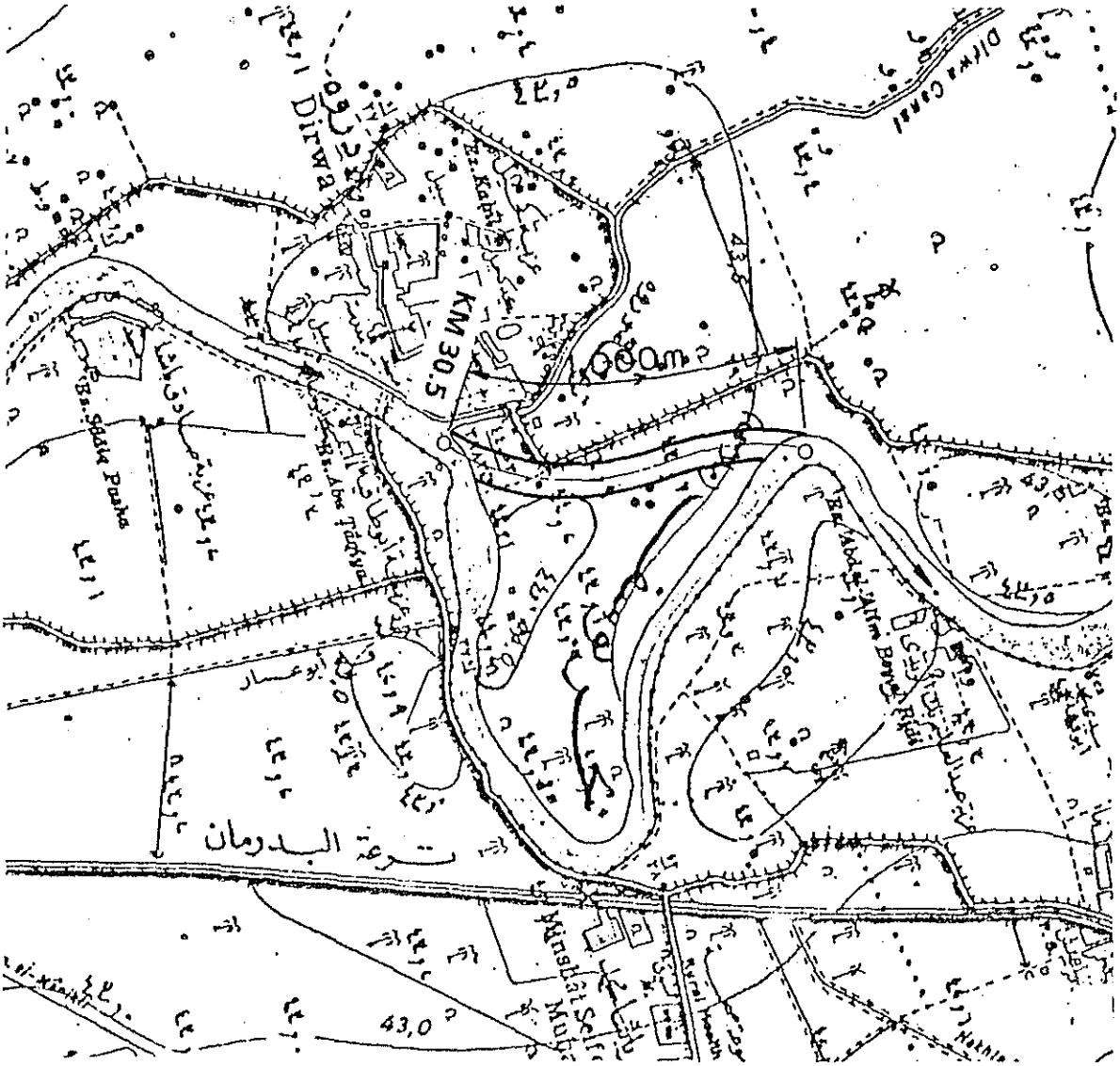
Figure F-3-1 Proposed Shortcut Plan at KM20.5

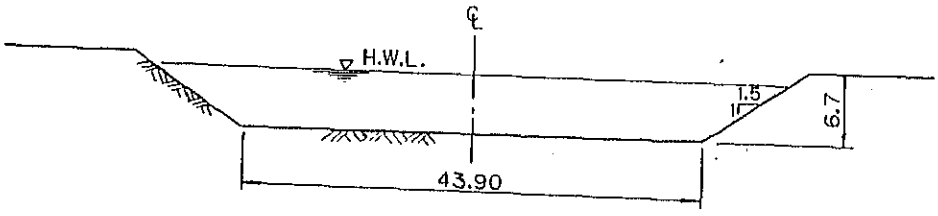




TYPICAL SECTION

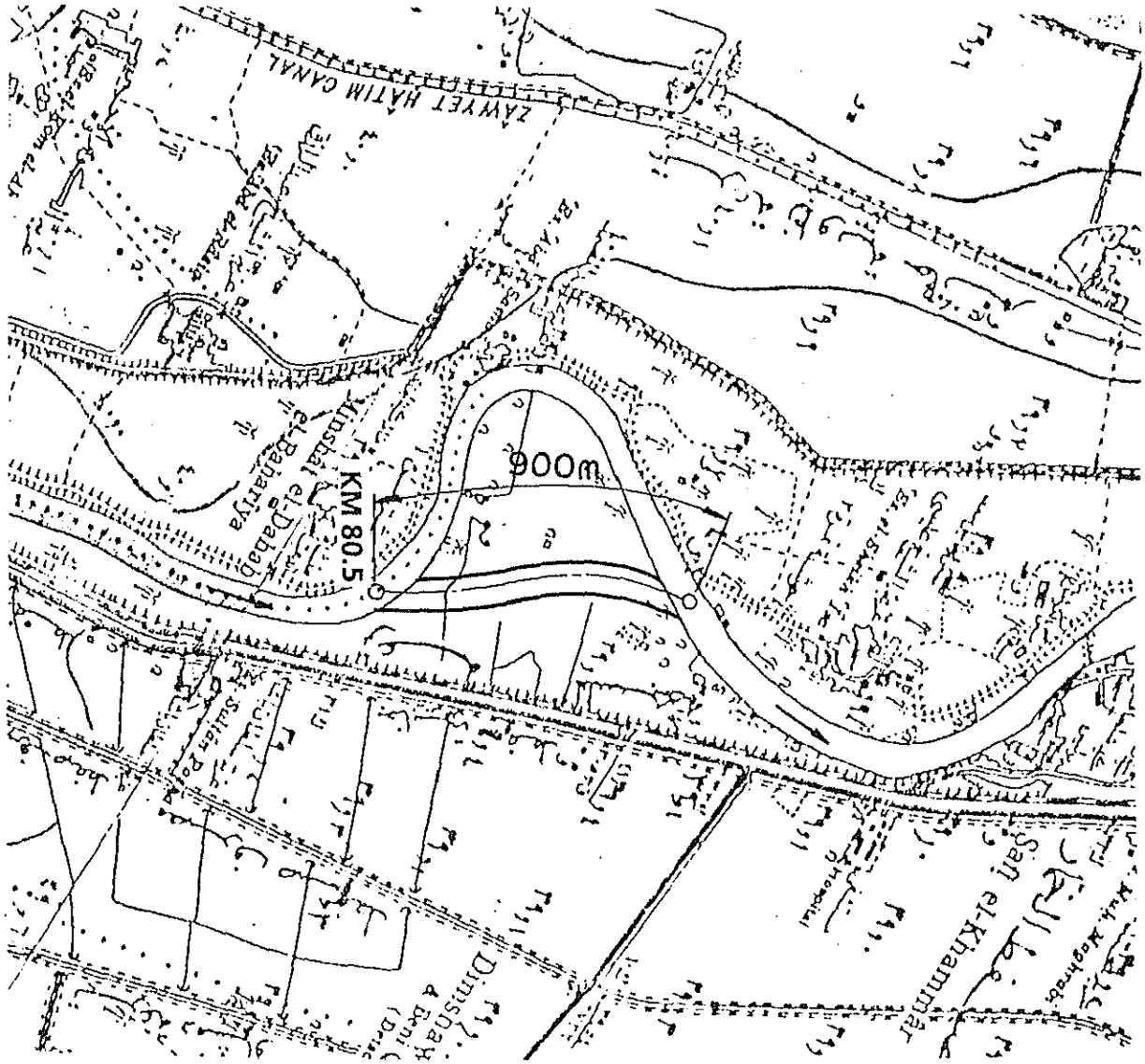
Figure F-3-2 Proposed Shortcut Plan at KM30.5

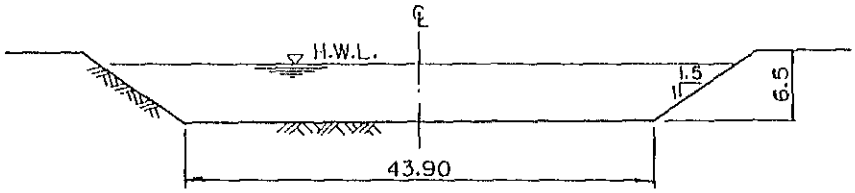




TYPICAL SECTION

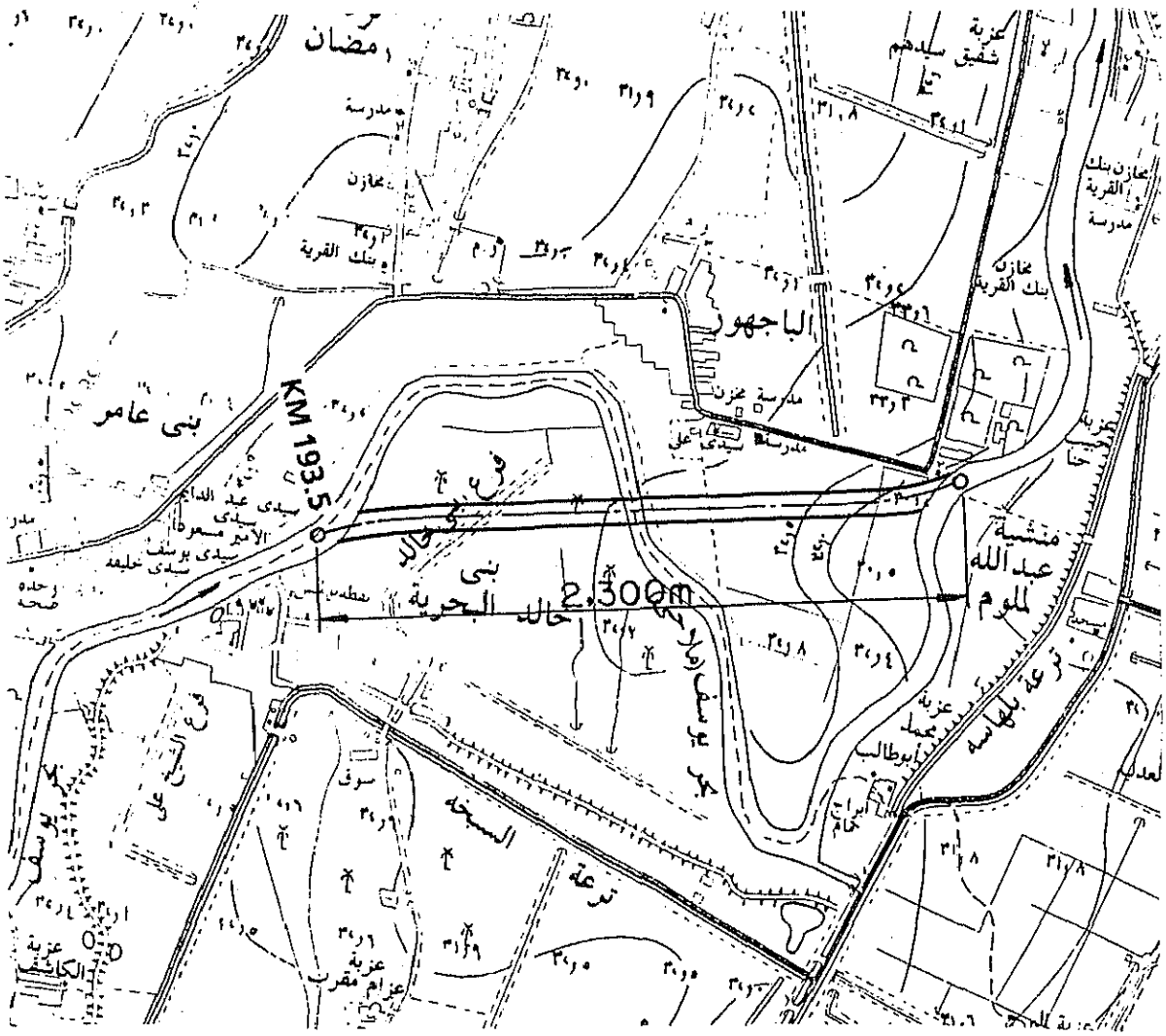
Figure F-3-3 Proposed Shortcut Plan at KM80.5





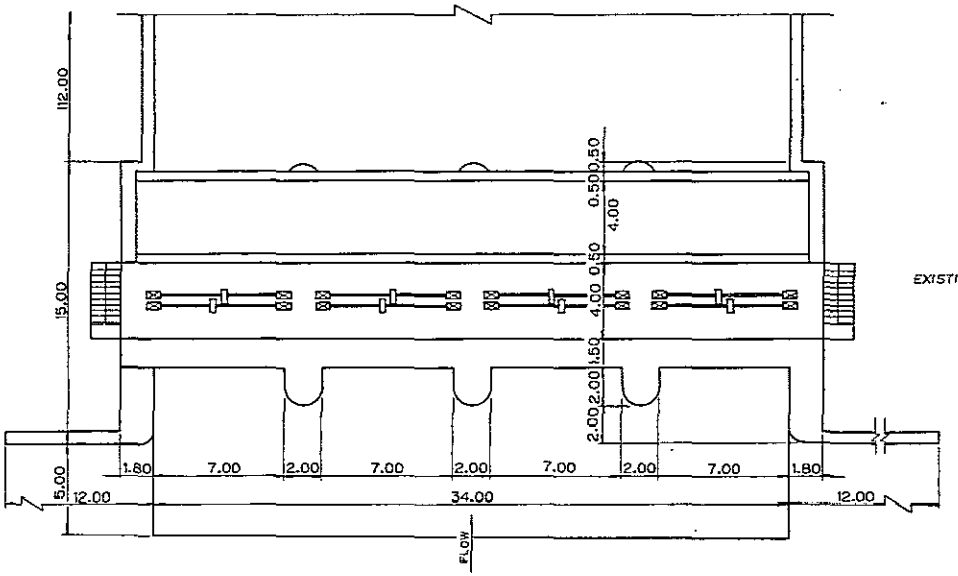
TYPICAL SECTION

Figure F-3-4 Proposed Shortcut Plan at KM193.5

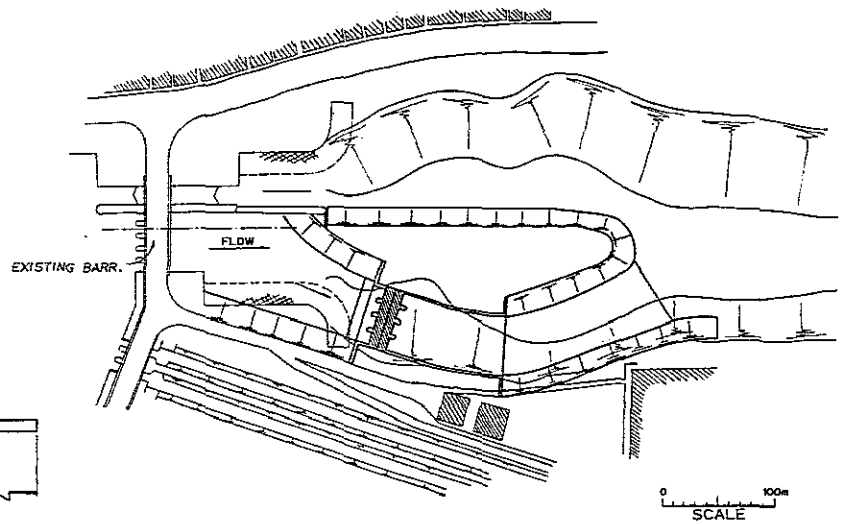


TYPICAL SECTION

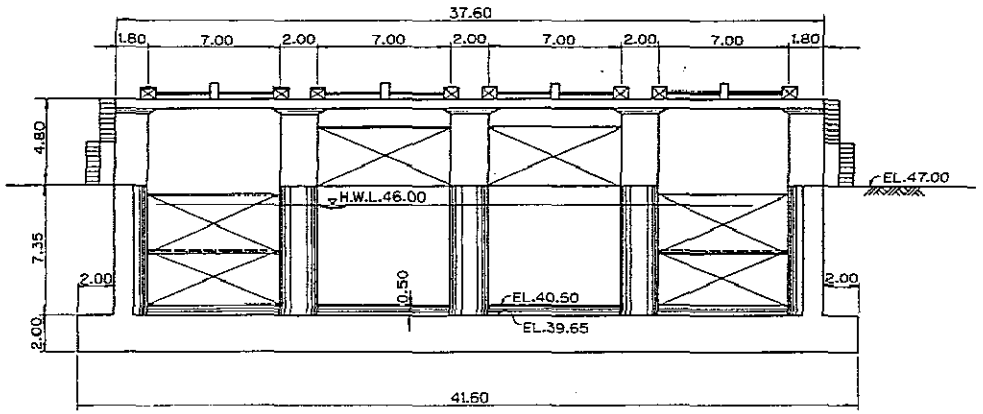
Figure F-3-5 Proposed Plan of Dairout Barrage



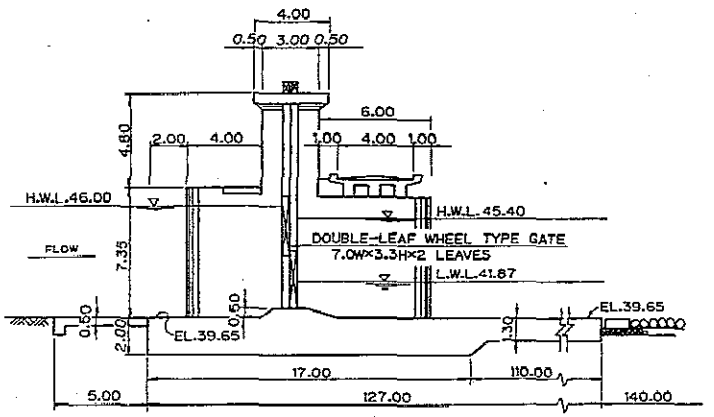
PLAN



GENERAL PLAN

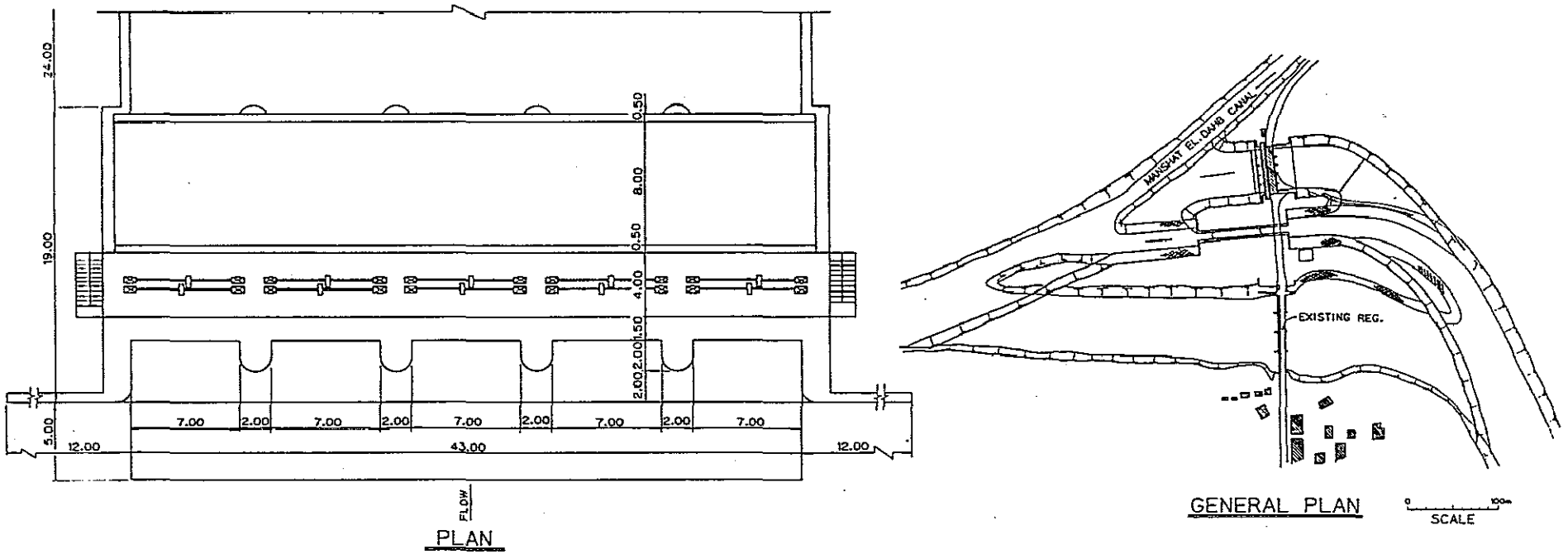


ELEVATION



TYPICAL SECTION

Figure F-3-6 Proposed Plan of Manshat El Dahab Regulator



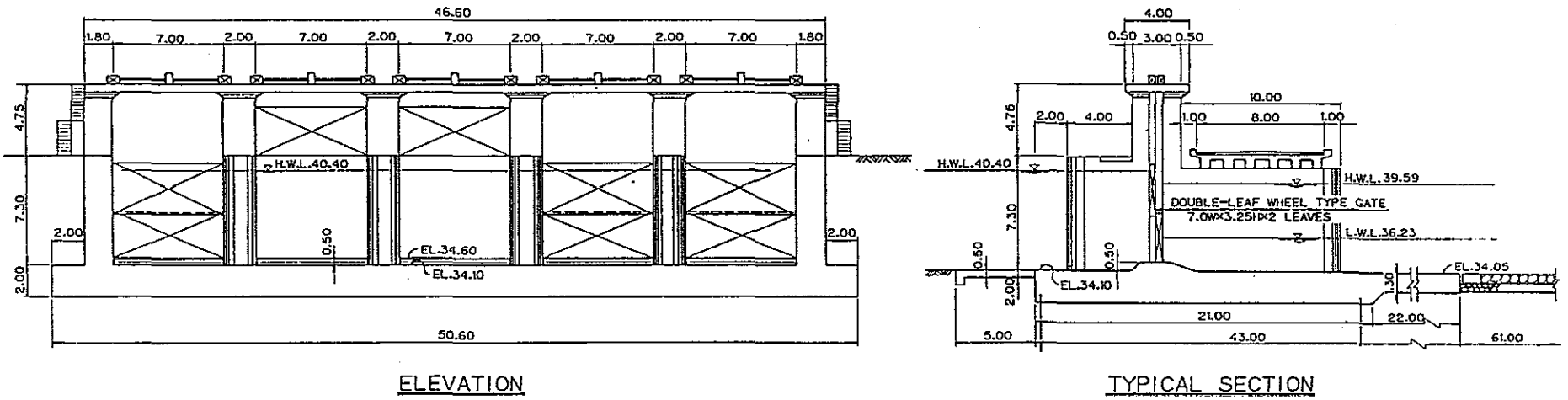
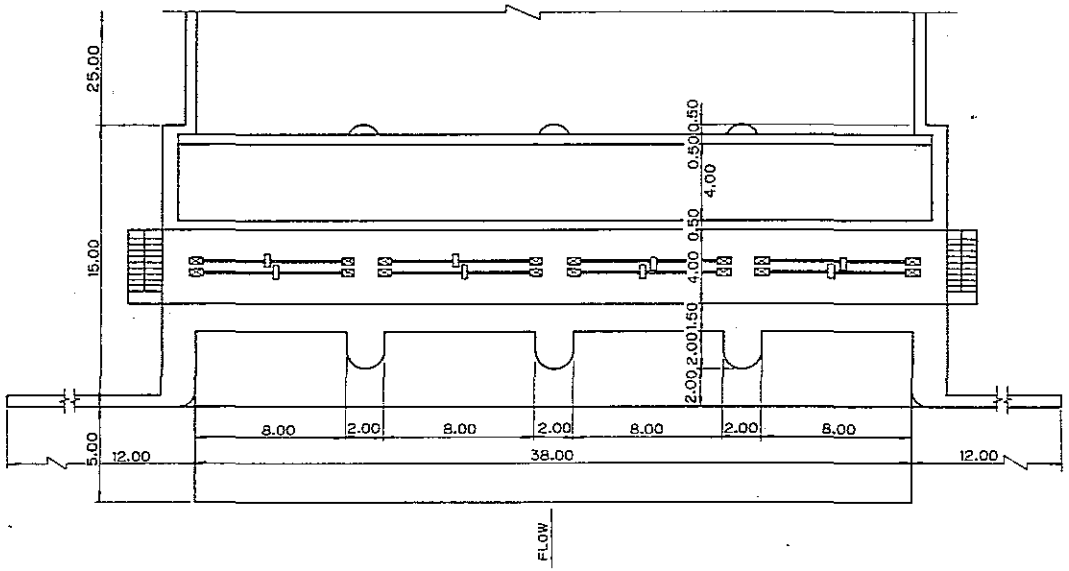
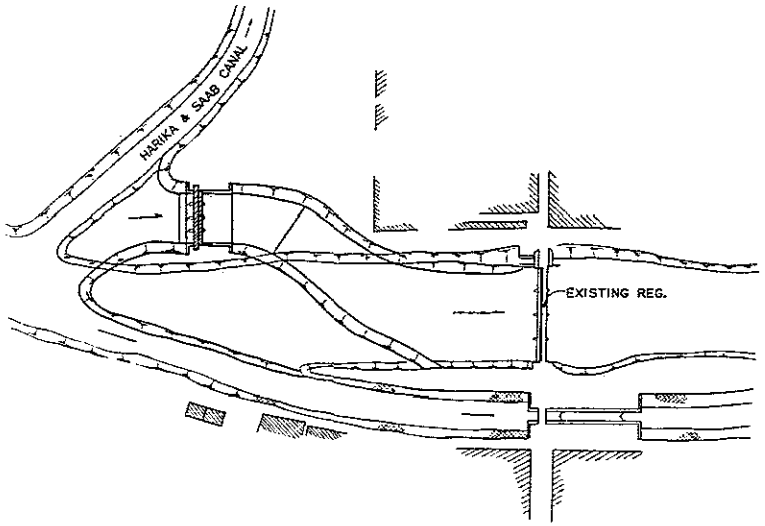


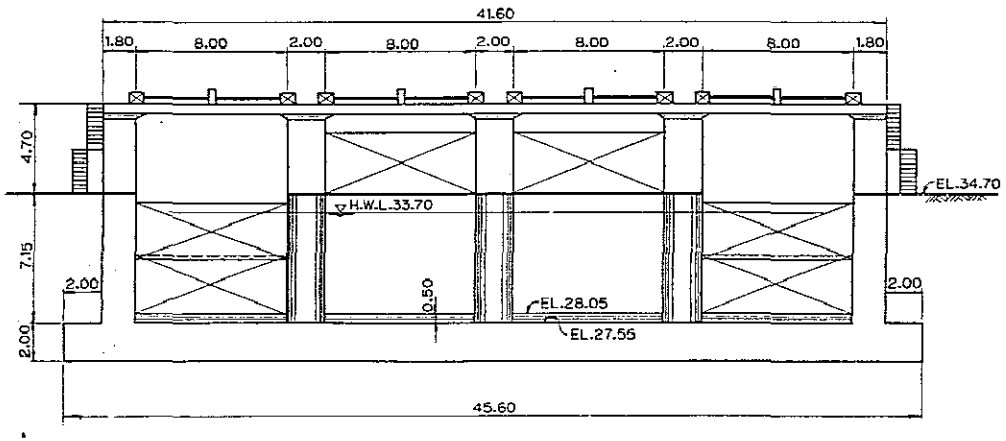
Figure F-3-7 Proposed Plan of Sakoula Regulator



PLAN



GENERAL PLAN



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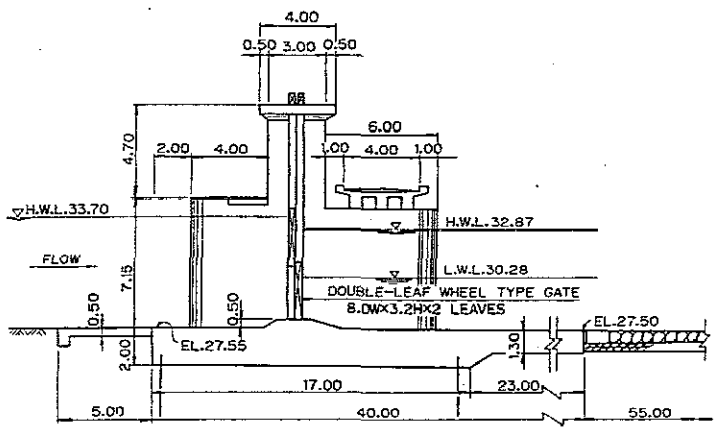
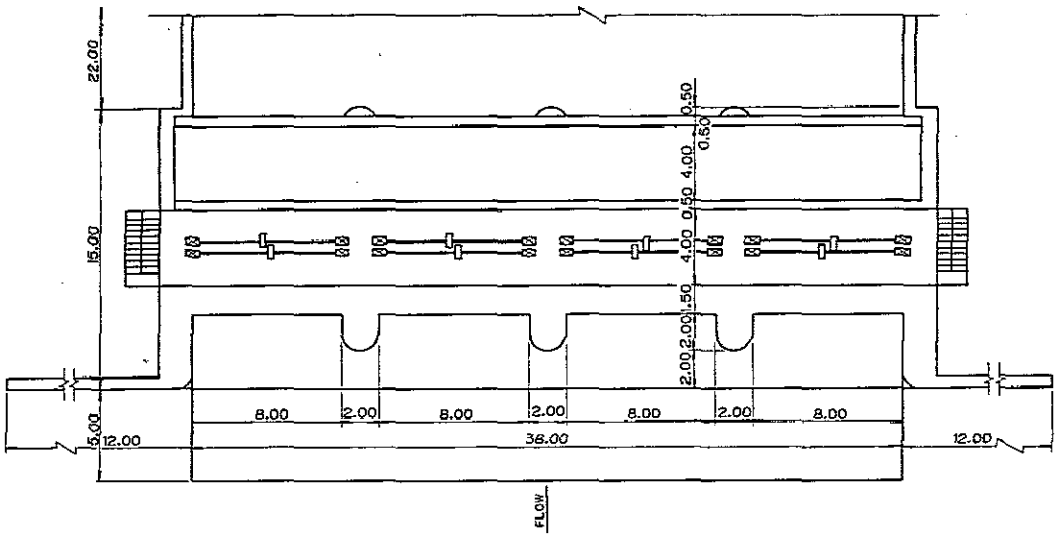
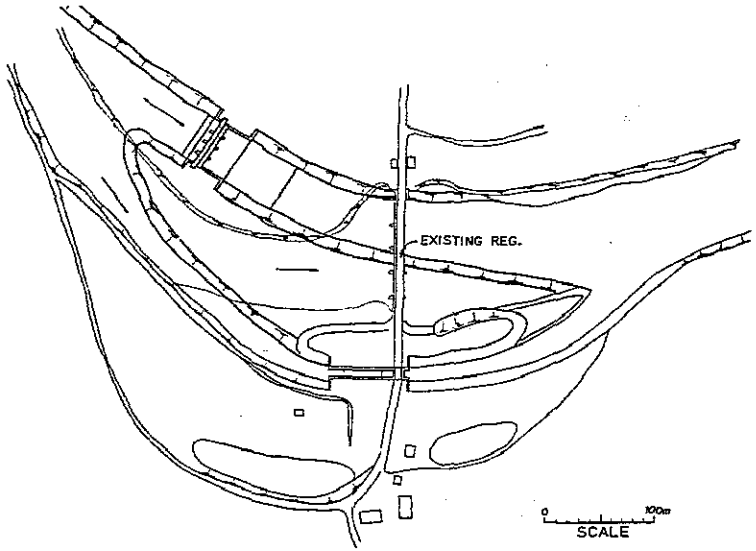


TYPICAL SECTION

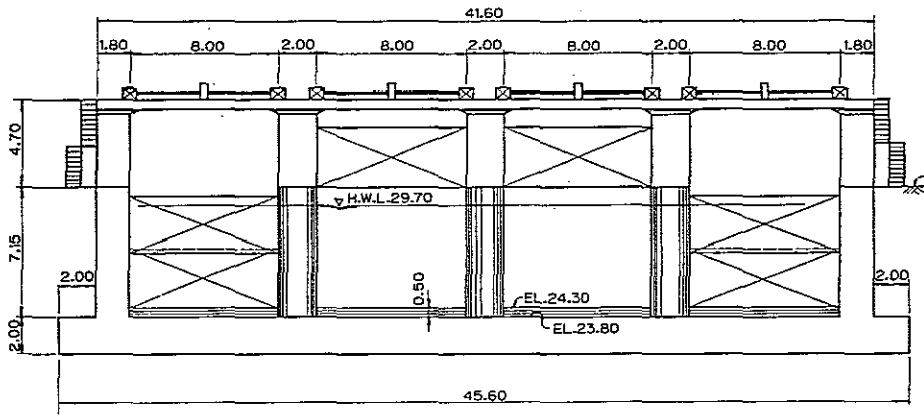
Figure F-3-8 Proposed Plan of Mazoura Regulator



PLAN



GENERAL PLAN



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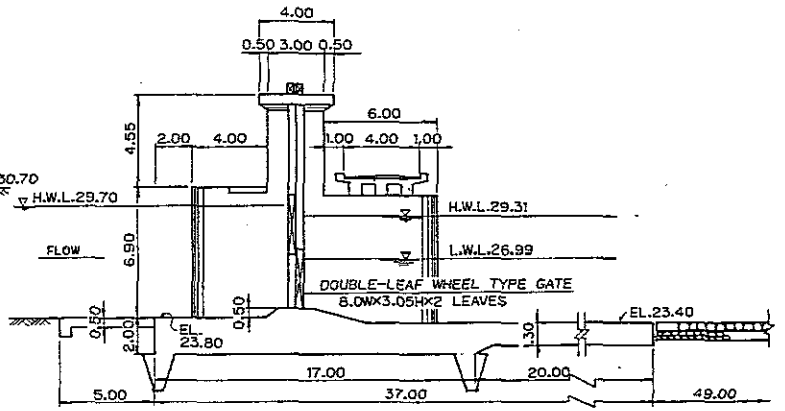


TYPICAL SECTION

Figure F-3-9 Proposed Plan of Lahoun Regulator

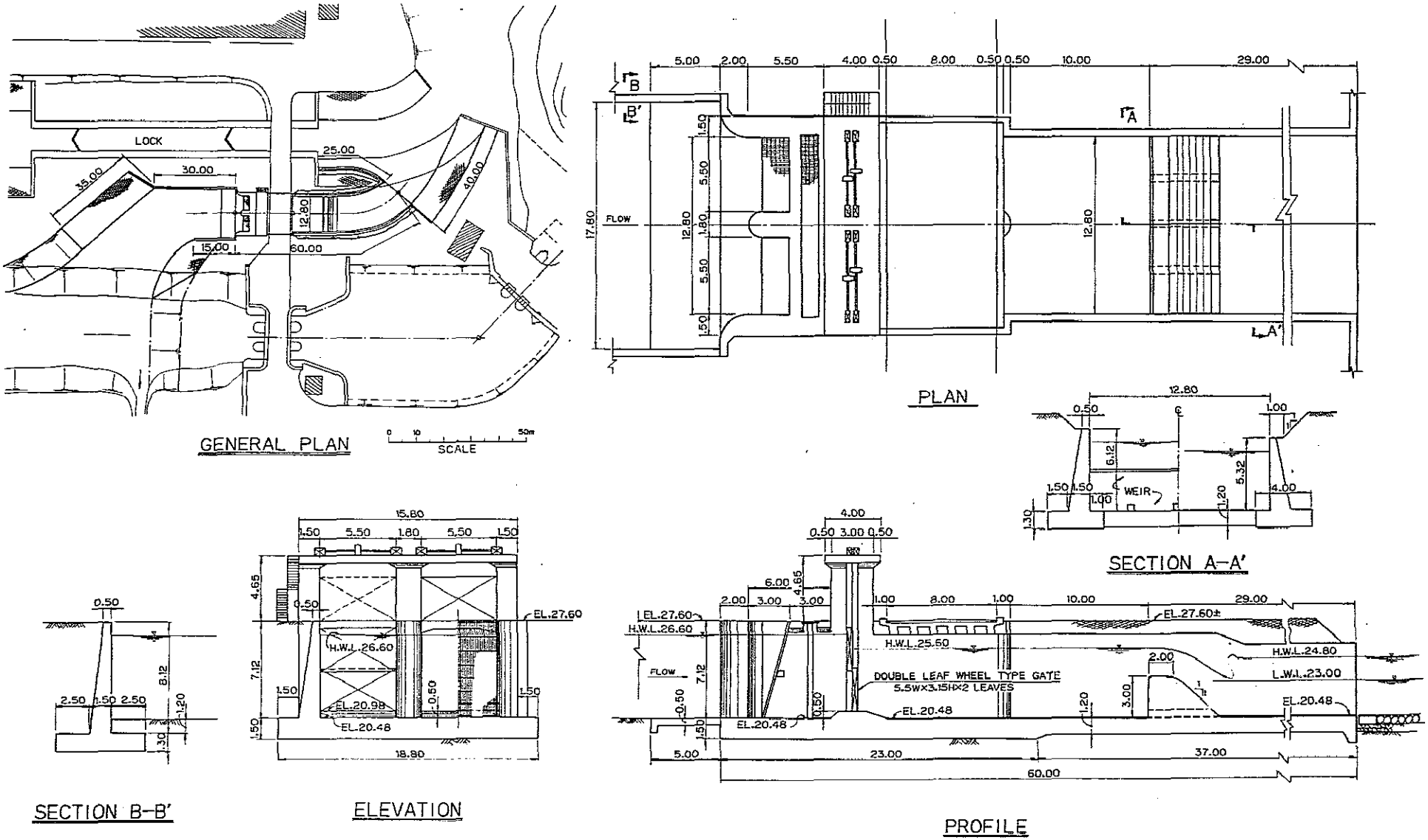


Figure F-3-10 Proposed Plan of Medium Scale Intake Structure

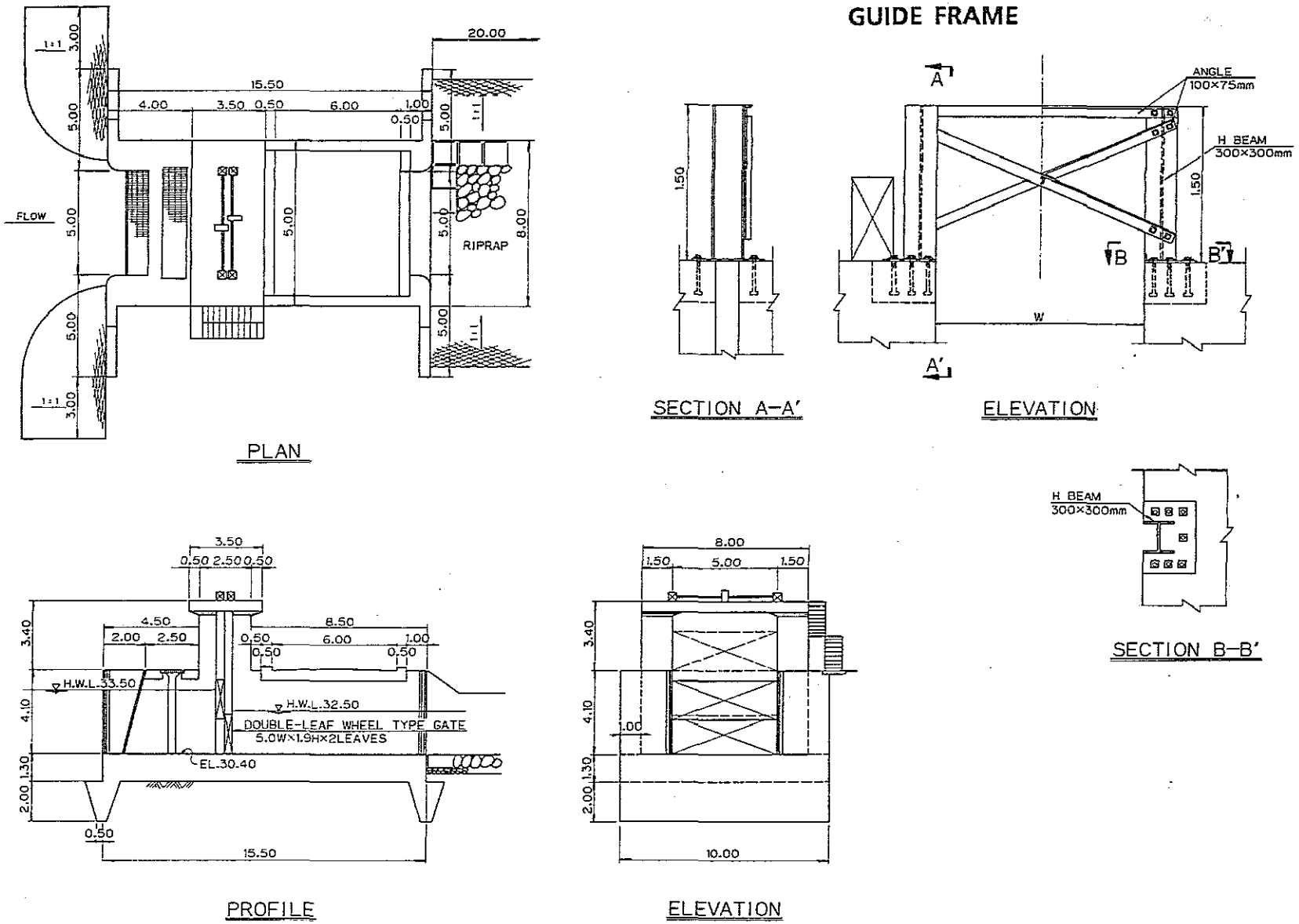
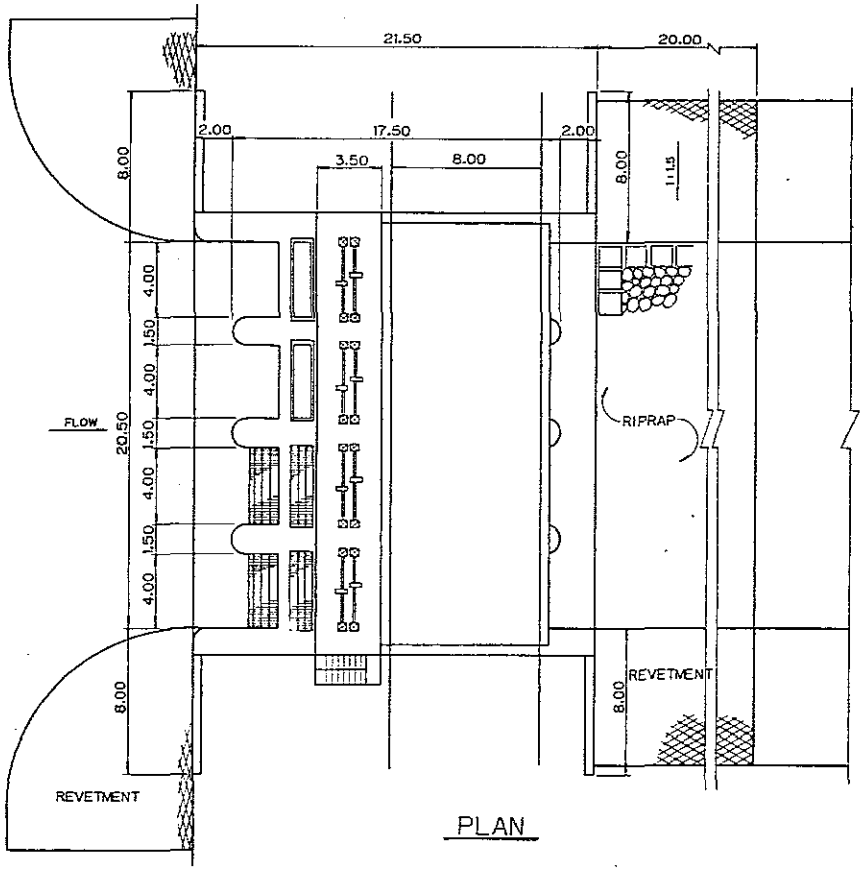
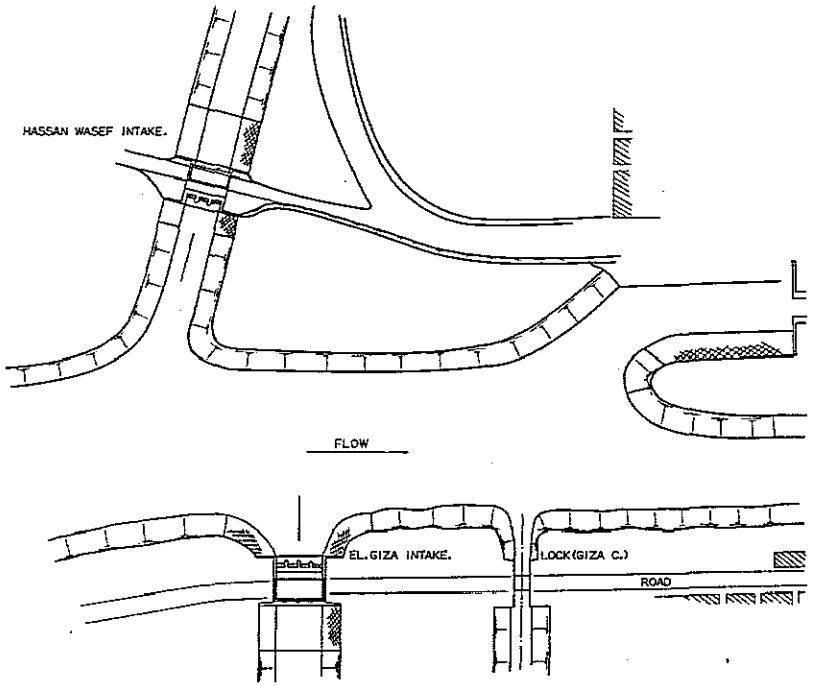


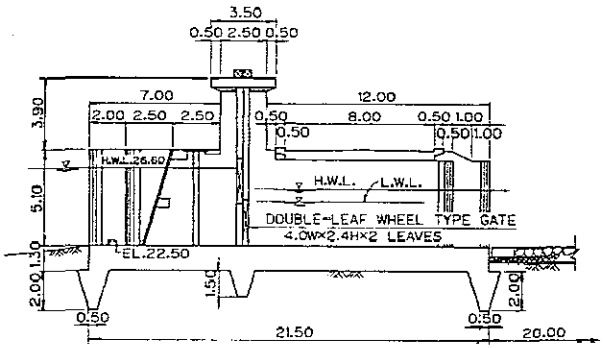
Figure F-3-11 Proposed Plan of Large Scale Intake (El Giza Intake)



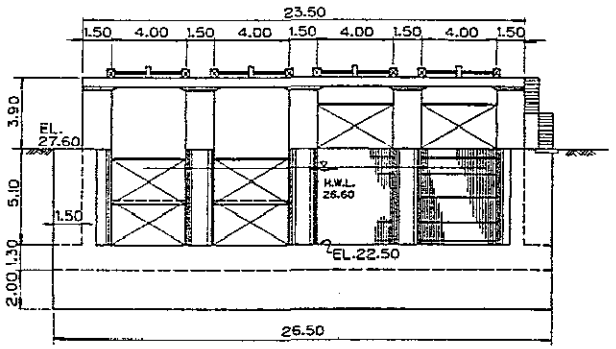
PLAN



GENERAL PLAN

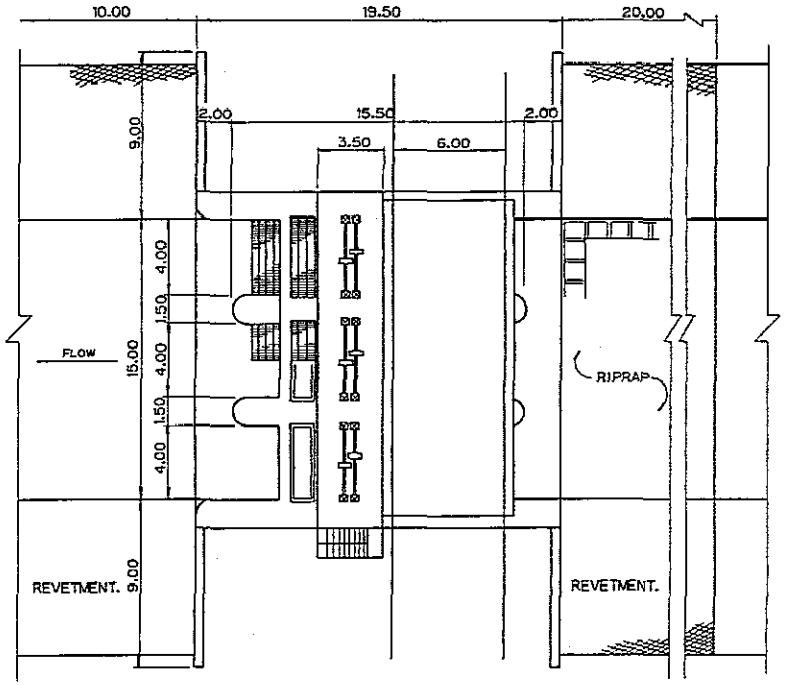


TYPICAL SECTION

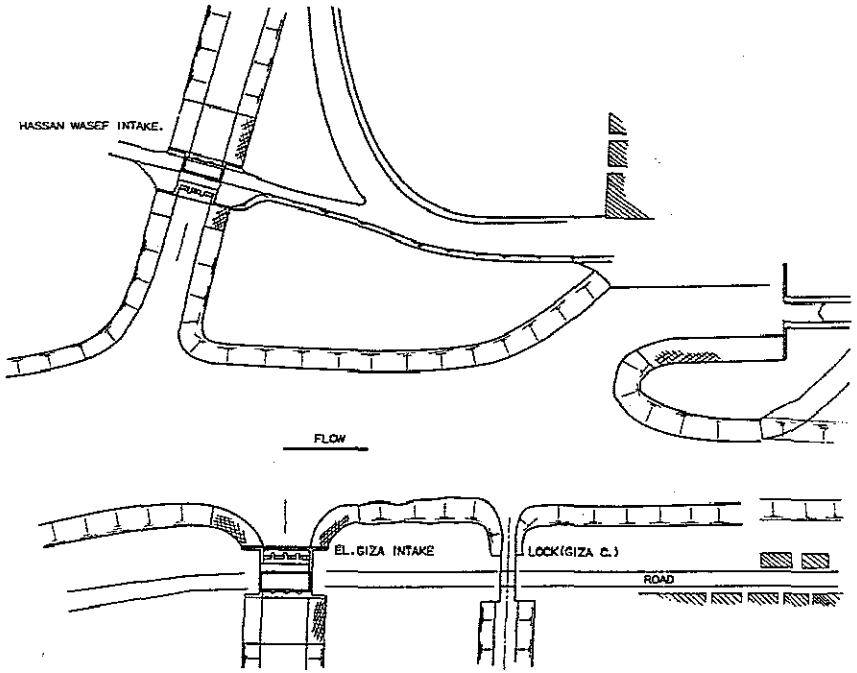


ELEVATION

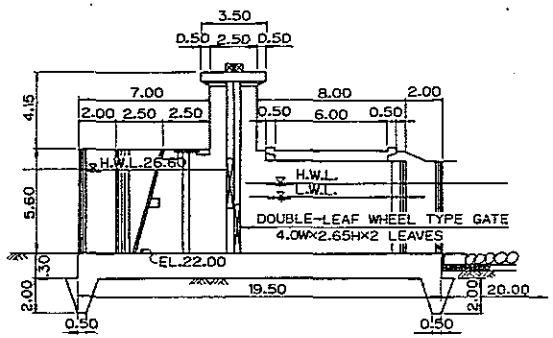
Figure F-3-12 Proposed Plan of Large Scale Intake (Hassan Wasef Intake)



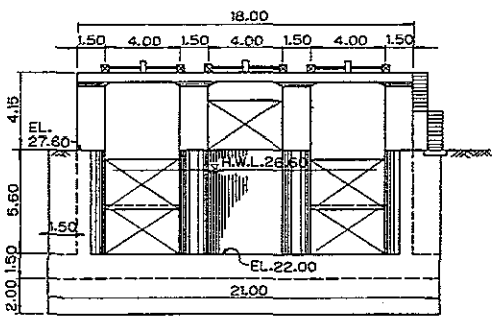
PLAN



GENERAL PLAN



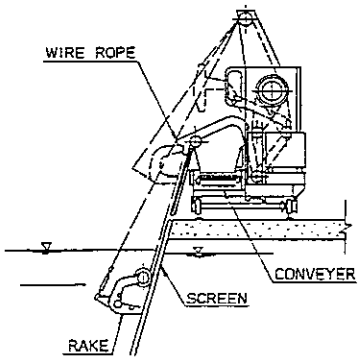
TYPICAL SECTION



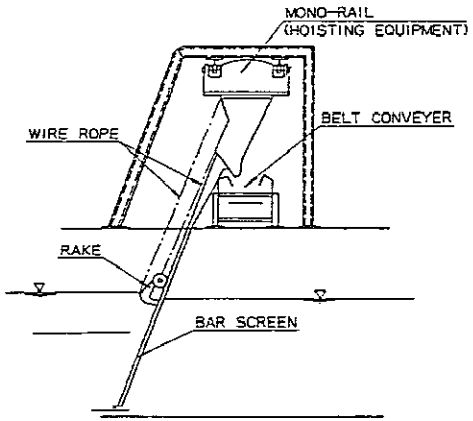
ELEVATION

Figure F-3-13 Proposed Plan of Appurtenant Structures for Pump Station

TRASH RAKING SYSTEM

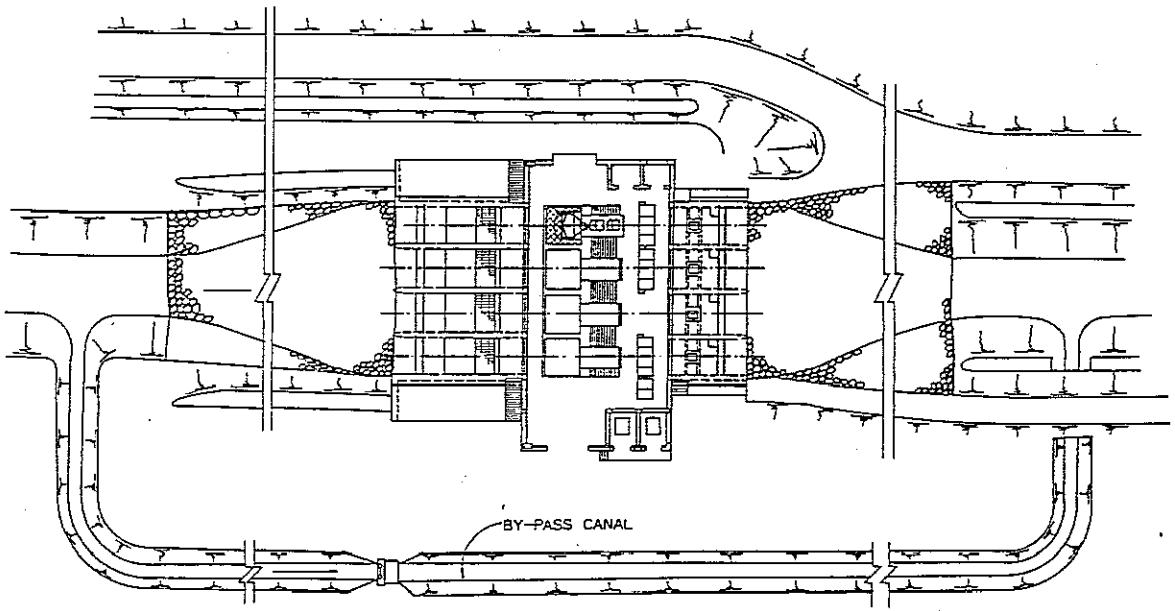


TRASH CAR

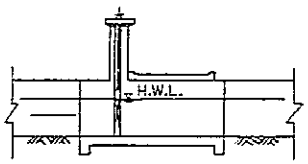


TRASH RAKE

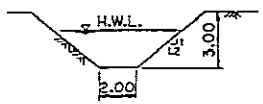
BY-PASS CANAL



PLAN



CHECK GATE



TYPICAL SECTION

Figure F-3-14 Proposed Plan of El Badraman Drainage Pump Station

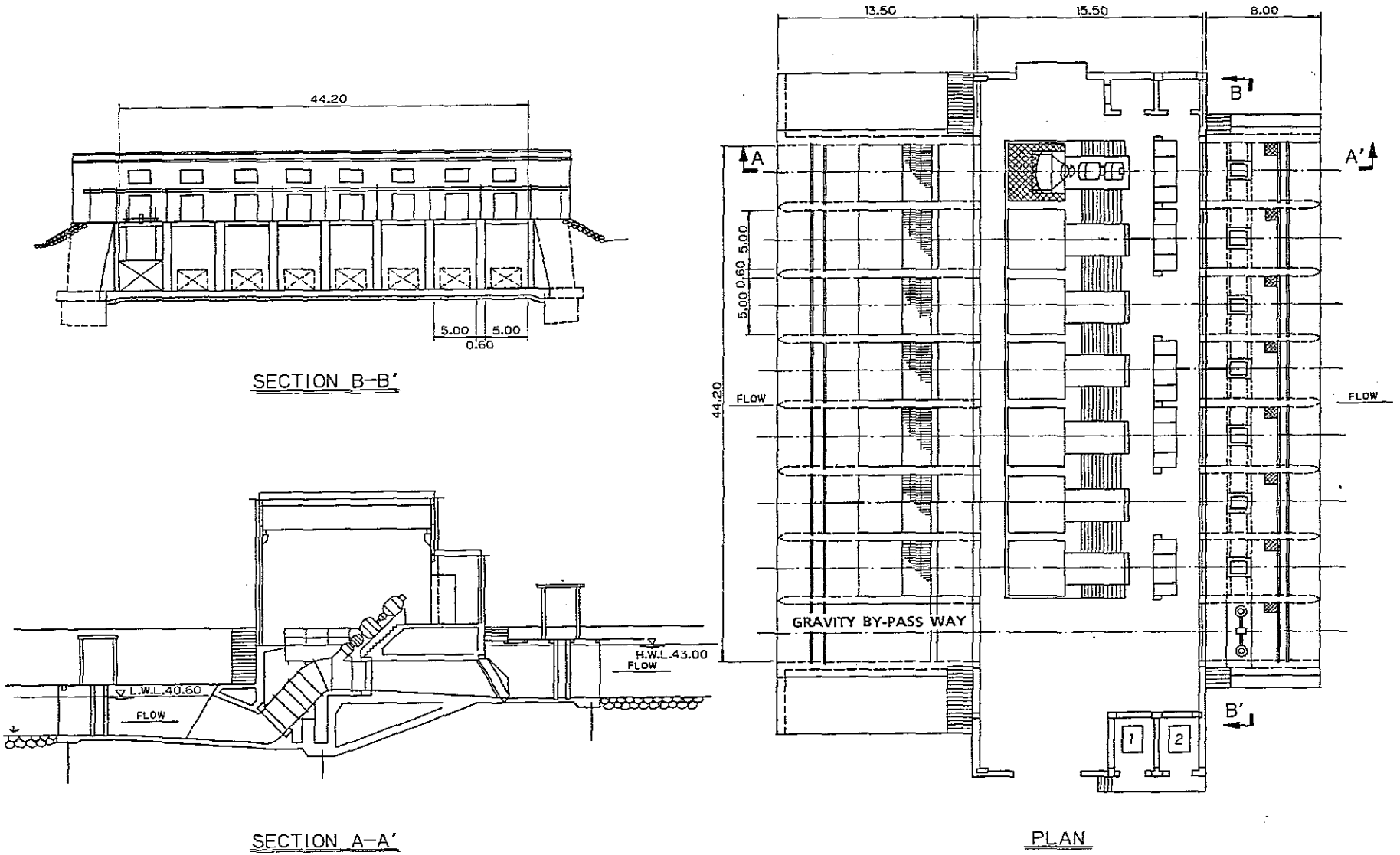
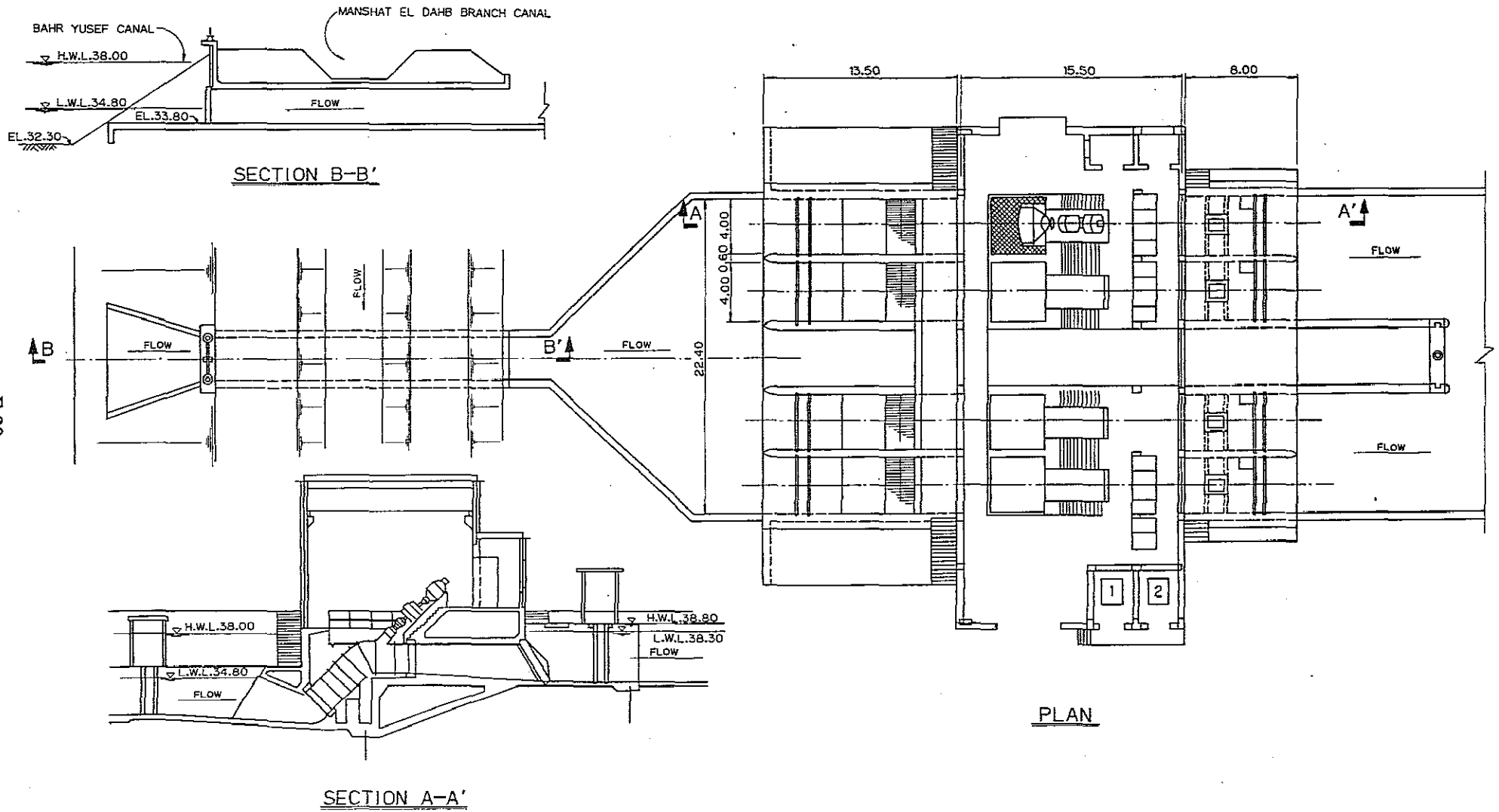


Figure F-3-15 Proposed Plan of Kamadir No.5 Irrigation Pump Station



APPENDIX G WATER MANAGEMENT

G - 1 Present Condition

G - 2 Water Management Plan

Figure G-1-1 Location Map of Pilot Areas

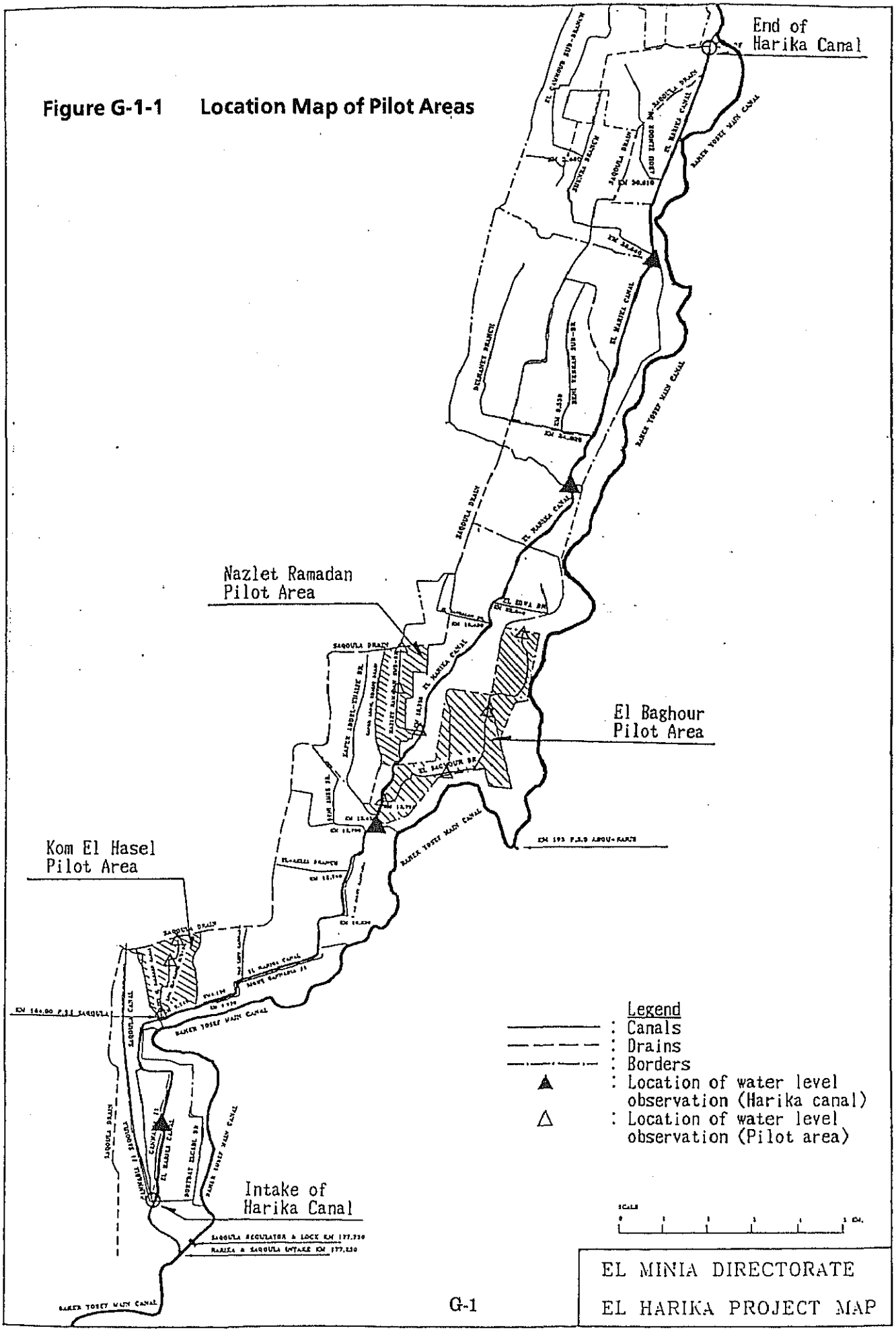


Figure G-1-2 Location Map of Kom El Hasel Pilot Area

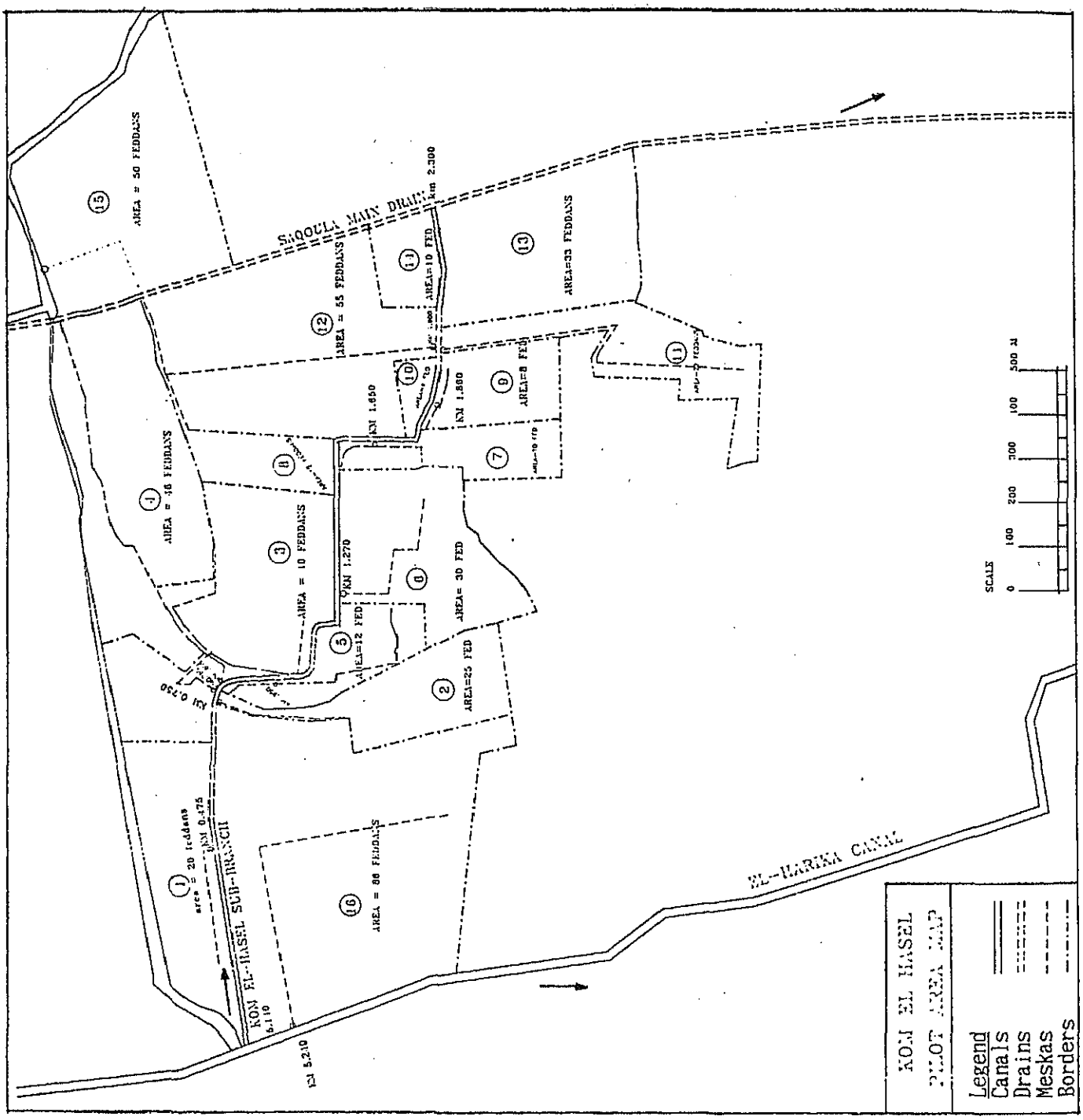


Figure G-1-3 Location Map of Nazlet Ramadan Pilot Area

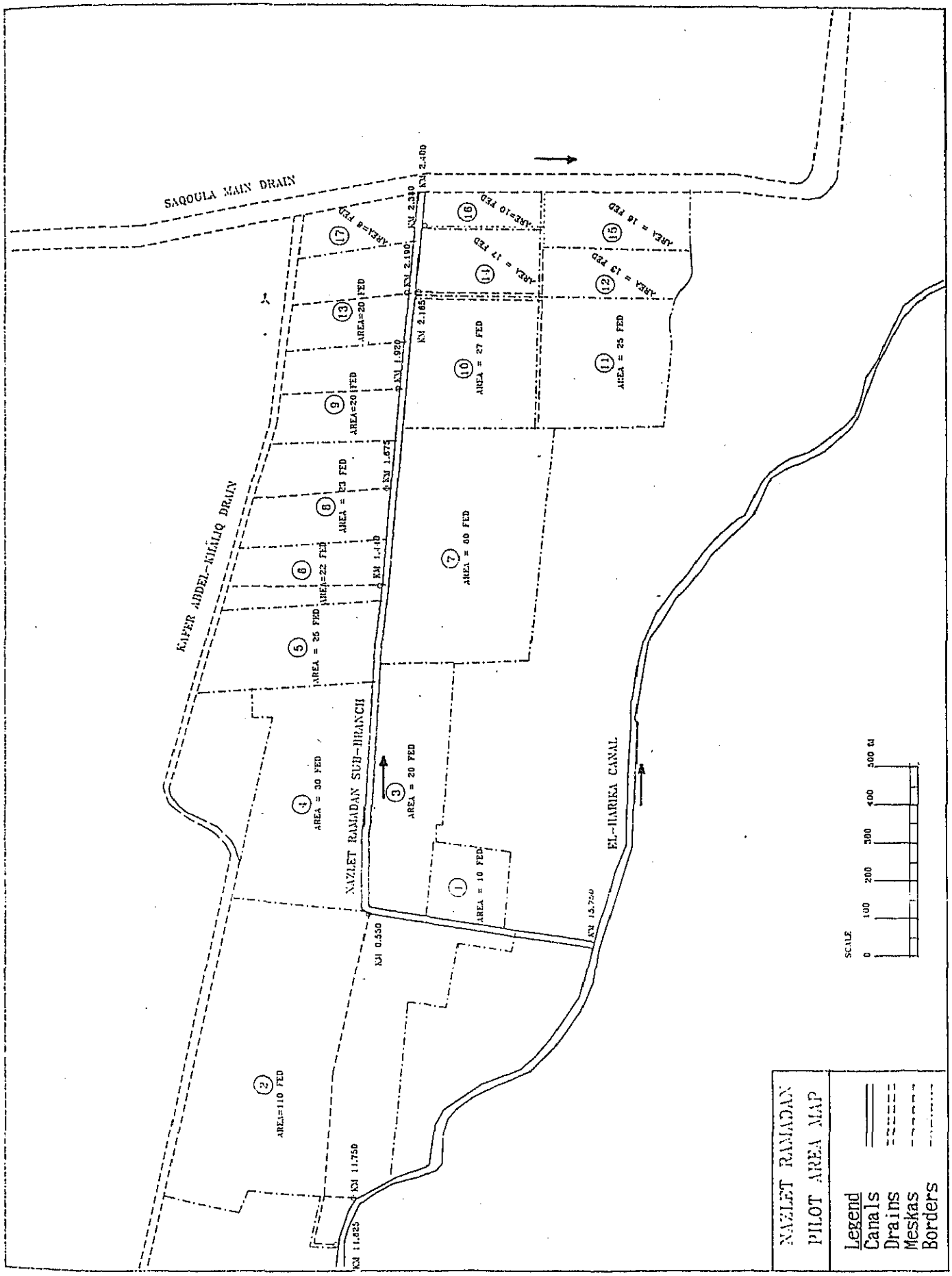


Figure G-1-4 Present Irrigation Network of Kom El Hasel Sub-branch Canal

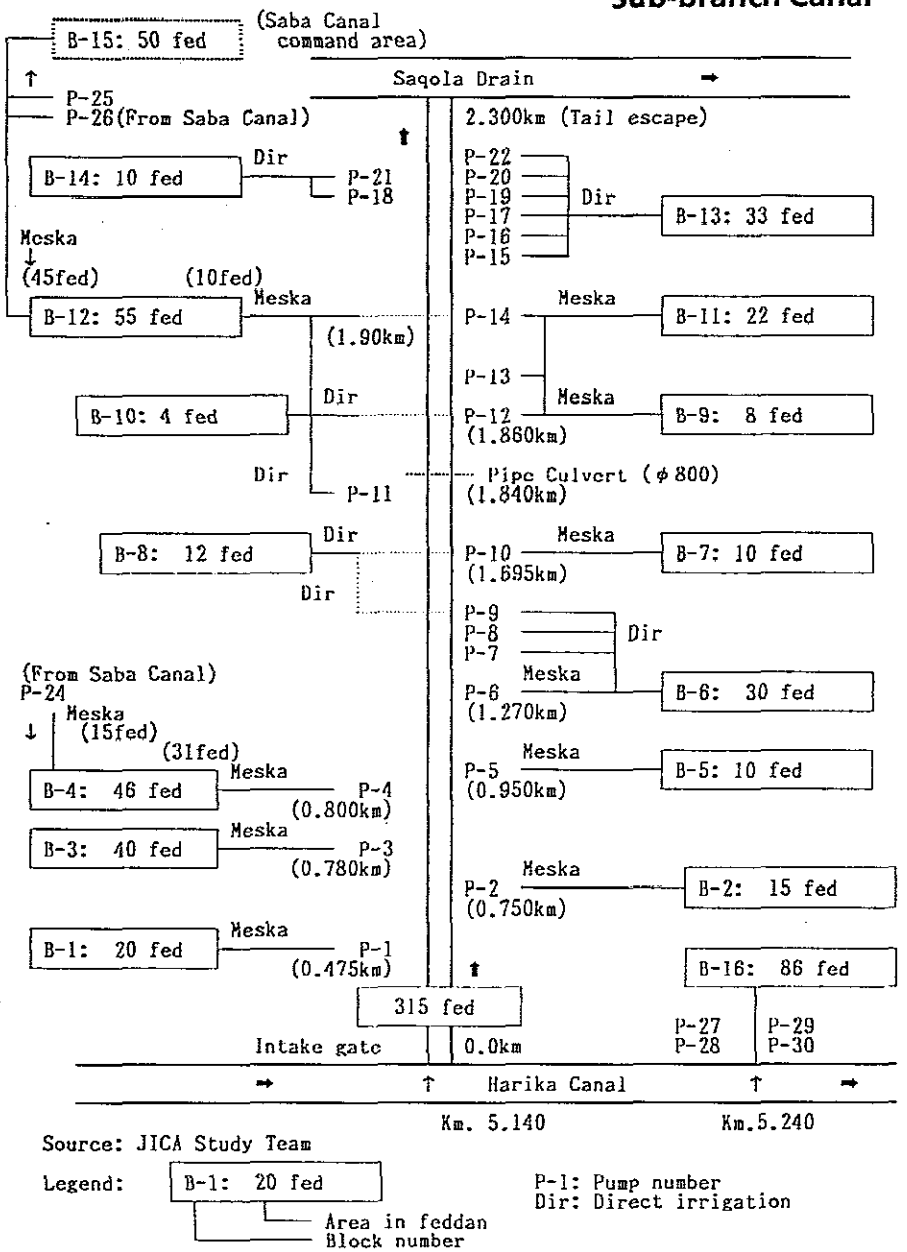


Figure G-1-5 Present Irrigation Network of Nazlet Ramadan Sub-branch Canal

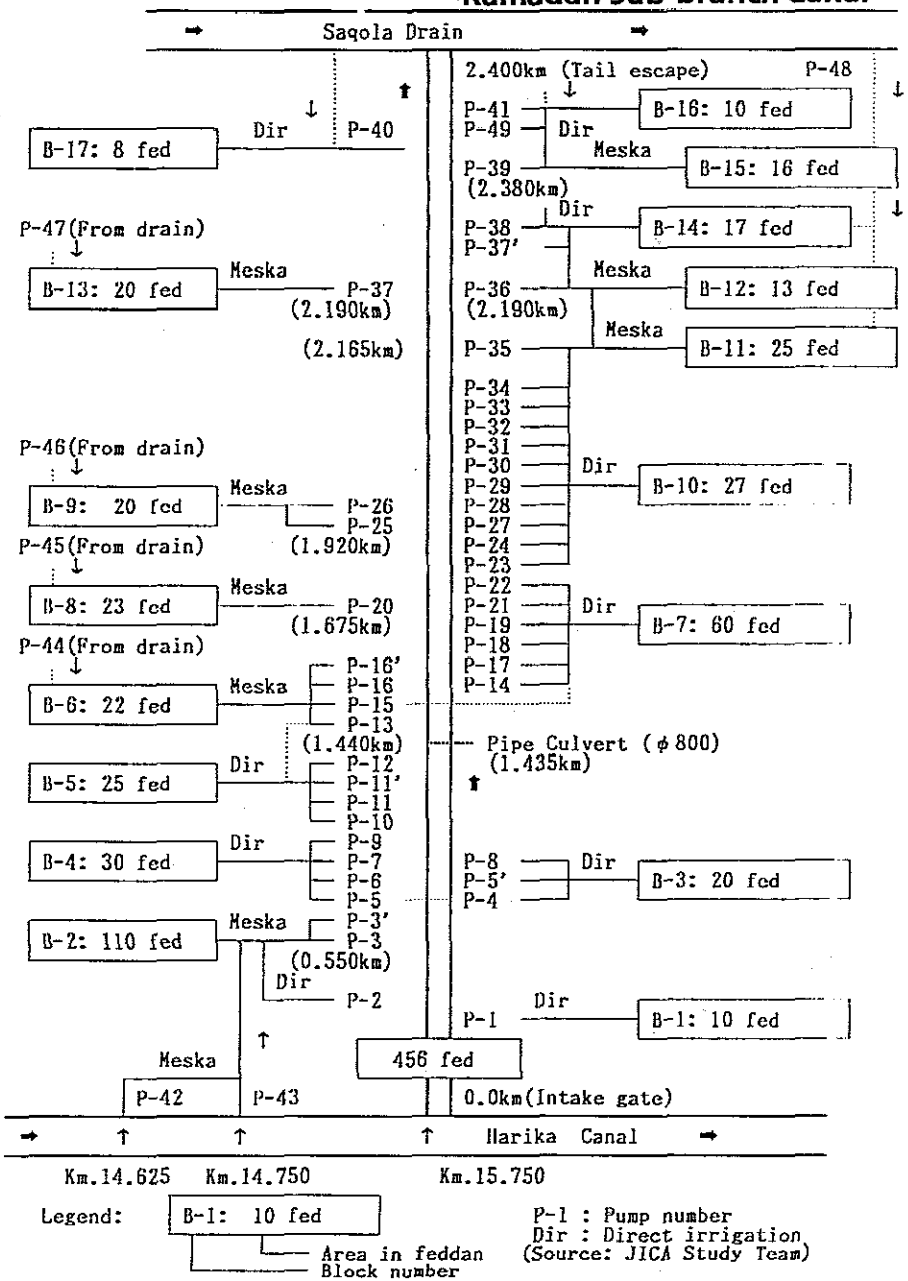


Figure G-1-6 Present Irrigation Network of Baghour Sub-branch Canal

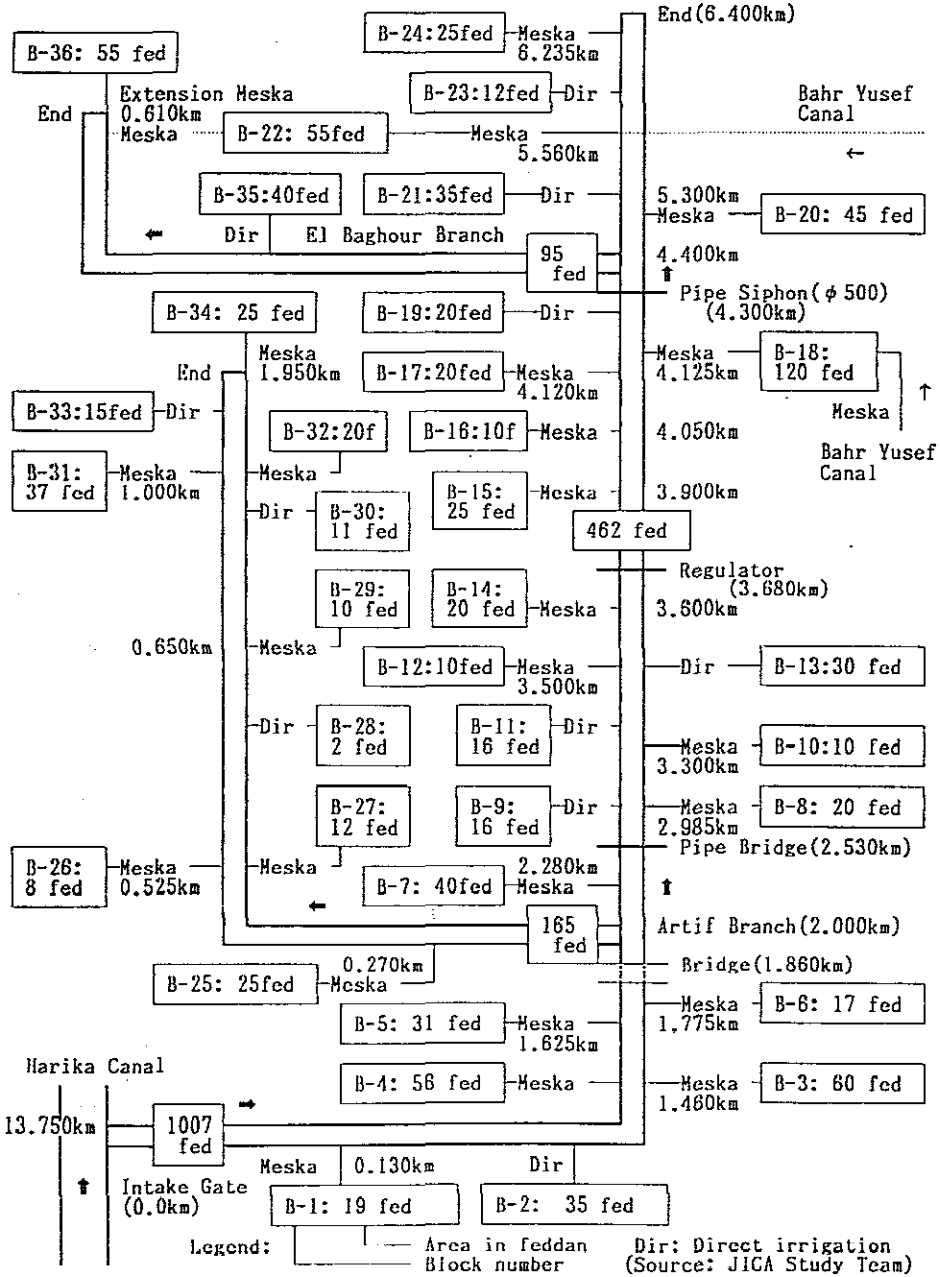


Table G-1-1 Existing Irrigation Facilities in Pilot Area

Description		Kom El Hasel	Nazlet Ramadan	El Baghour	Total
Command area	(fed)	550	780	1,800	3,130
Net irrigated area	(fed)	421	645	1,388	2,454
1) From sub-branch canal	(fed)	315	456	1,007	1,778
- By Meska	(fed)	(256)	(249)	(775)	(1,280)
- By direct	(fed)	(59)	(207)	(232)	(498)
2) From Harika direct	(fed)	106	189	381	676
Field elevation	(El.m)	32.8-33.7	31.0-32.1	31.1-32.5	
Canal bed elevation	(El.m)	30.9-31.4	29.9-30.6	29.7-30.9	
Canal length	(m)	2,300	2,400	6,400	11,100
Branch length	(m)	-	-	2,560	2,560
No. of Meskas	(No)	10	8	25	43
Meska length	(m)	4,980	3,700	12,950	21,630
No. of intake pumps	(No)	27	54	84	165
- For Meska	(No)	(14)	(20)	(25)	(59)
- For Marwa	(No)	(13)	(34)	(59)	(106)
No. of regulators	(No)	-	-	1	1
No. of tail escapes	(No*mm)	1*φ 500	1*φ 500	-	2
No. of RC pipe culvert	(No*mm)	1*φ1000	1*φ1000	2*φ1000	9
		1*φ 800	1*φ 800	1*φ 800	
				1*φ 500	
				1*φ 450	
No. of aqueduct	(No*mm)	-	-	1*φ 500	1

Source: JICA Study Team, Minya Directorate of Irrigation Department

Table G-1-2 Sub-Branch Canals in Harika Command Area

Name of Sub-branch Canal	Location KM	Command Area	Canal Length	Branch Length	No. of Pumps
		(fed)	(Km)	(Km)	(No)
* 1. Kom El Hasel branch	5.14 L	550	2.30	--	27
2. 1st Right Gannabia	6.53 R	450	2.97	--	1
3. 2nd Left Gannabia	6.13 L	1,100	2.54	--	25
4. 2nd Right Gannabia	10.23 R	800	2.80	--	8
5. El Aqllia branch	11.74 L	600	1.58	--	22
6. Beni Amer branch	12.78 L	400	1.59	--	32
7. Kaffer Abd El Khaliq	13.43 L	1,000	4.10	--	91
* 8. El Baghour branch	13.75 R	1,800	6.40	2.56	84
* 9. Nazlet Ramadan branch	15.75 L	780	2.40	--	54
10. El Basqaloun branch	18.85 L	1,000	2.26	--	29
11. El Edwa branch	19.43 R	700	1.95	--	64
12. Delhanes branch	24.02 L	2,400	6.85	4.30	78
13. Shenra branch	28.64 L	1,800	4.53	5.25	116
14. Abou El Noor branch	30.61 L	800	2.97	--	34
15. Others (Direct irri.)	--	4,620	--	--	--
Total		18,800	45.24	12.11	665

Source: JICA Study Team, Minya Directorate of Irrigation Department
Note : *: Pilot area

Table G-1-3 Inventory of Meskas in Pilot Area

Meska No.	Location (km)	R/L Bank	Area Served (fed)	Meska Length (m)	Remark
1. Kom El Hasel Sub-Branch Canal					
1	0.475	L	20	300	
2	0.750	R	15	300	
3	0.780	L	40	750	
4	0.800	L	46	850	
5	0.950	R	10	540	
6	1.270	R	30	400	
7	1.695	R	10	340	
8	1.860	R	8	150	
9	1.900	R	22	500	
10	1.900	L	55	850	
(Total)			256	4,980	(315 fed)
2. Nazlet Ramadan Sub-Branch Canal					
1	0.550	L	110	900	
2	1.440	L	22	350	
3	1.675	L	23	350	
4	1.920	L	20	300	
5	2.165	R	25	650	
6	2.190	R	13	450	
7	2.190	L	20	300	
8	2.380	R	16	400	
(Total)			249	3,700	(456 fed)
3. El Baghour Sub-Branch Canal					
1	0.130	R	19	400	
2	1.460	R	60	730	
3	1.460	L	56	900	
4	1.625	L	31	400	
5	1.775	R	17	100	
6	2.280	L	40	150	
7	2.985	R	20	475	
8	3.300	R	10	500	
9	3.500	L	10	350	
10	3.600	L	20	700	
11	3.900	L	25	550	
12	4.050	L	10	400	
13	4.120	L	20	450	
14	4.125	R	120	1,650	
15	5.300	R	45	560	
16	5.560	L	55	925	
17	6.235	L	25	400	
18	* 0.270	L	25	250	Artif Branch
19	* 0.525	L	8	200	-do-
20	* 0.525	R	12	400	-do-
21	* 0.650	R	10	400	-do-
22	* 1.000	L	37	500	-do-
23	* 1.000	R	20	250	-do-
24	* 1.950	R	25	200	-do-
25	* 0.610	L	55	1,050	El Baghour B.
(Total)			775	12,950	(1,007 fed)

Source: JICA Study Team

Table G-1-4 Inventory of Pumps in Pilot Area

(1/2)

Pump No.	Location	R/L Bank	Diameter	Diesel Engine	Year Used	Ownership	Remark
	(Km)		(Inch)	(HP)	(Year)	(No. of farmers)	
(Kom El Hasel Sub-Branch Canal)							
P- 1	0.475	L	6/5	5.5	7	1	Meska
P- 2	0.750	R	6/6	11.0	8	2	Meska
P- 3	0.780	L	6/6	11.0	10	3	Meska
P- 4	0.800	L	6/6	11.0	15	3	Meska
P- 5	0.950	R	6/5	6.5	15	2	Meska
P- 6	1.270	R	5/5	5.5	15	2	Meska
P- 7	1.320	R	4/4	4.5	10	1	
P- 8	1.360	R	6/5	5.5	8	2	
P- 9	1.440	R	6/5	5.5	8	2	
P-10	1.695	R	5/5	5.5	12	3	Meska
P-11	1.720	L	5/5	5.5	10	2	
P-12	1.860	R	6/5	5.0	6	2	Meska
P-13	1.890	R	5/5	5.0	15	1	
P-14	1.900	R	6/6	11.0	15	2	Meska
P-15	1.955	R	5/5	5.0	4	1	
P-16	1.960	R	5/5	5.0	4	1	
P-17	2.010	R	5/5	5.0	10	1	
P-18	2.040	L	5/5	5.0	1	3	
P-19	2.120	R	5/5	6.5	1	1	
P-20	2.140	R	5/5	6.5	1	1	
P-21	2.160	L	5/5	6.5	4	1	
P-22	2.220	R	5/5	5.5	4	2	
P-23	-----	L	6/5	5.0	7	2	At Meska end in R-2
P-24	Saba canal	-	6/6	11.0	7	1	Meska
P-25	-do-	-	8/8	16.0	30	1	Meska
P-26	-do-	-	8/8	16.0	30	1	Meska
P-27	Narika	L	6/6	11.0	7	4	At 5.240km,Meska
P-28	Narika	L	5/5	5.5	8	2	At 5.240km,Meska
P-29	Narika	L	6/5	6.5	10	3	At 5.240km,Meska
P-30	Narika	L	6/5	6.5	5	4	At 5.240km,Meska
(Nazlet Ramadan Sub-Branch Canal)							
P- 1	0.250	R	6/6	6.5	31	2	
P- 2	0.260	L	5/5	5.5	1	1	
P- 3	0.550	L	6/5	7.5	3	2	Meska
P- 3'	0.550	L	5/5	5.5	3	1	Meska
P- 4	0.690	R	6/5	6.5	2	2	
P- 5	0.750	L	6/6	11.0	2	1	
P- 5'	0.810	R	6/5	6.5	2	1	
P- 6	0.840	L	5/5	6.0	1	1	
P- 7	0.900	L	5/5	5.5	1	1	
P- 8	0.980	R	6/6	7.5	1.5	3	
P- 9	1.050	L	6/5	5.5	1	1	
P-10	1.070	L	5/5	5.5	2	1	

Table G-1-4 (cont'd)

(2/2)

Pump No.	Location	R/L Bank	Diameter	Diesel Engine	Year Used	Ownership	Remark
	(Km)		(inch)	(HP)	(Year)	(No. of farmers)	
P-11	1.230	L	5/5	5.5	2	1	
P-11'	1.250	L	4/4	4.0	5	1	
P-12	1.330	L	6/5	5.5	1	1	
P-13	1.360	L	6/5	5.5	3.5	1	Meska
P-14	1.400	R	6/5	5.5	3	1	
P-15	1.425	L	6/5	5.5	4	1	Meska
P-16	1.440	L	6/5	5.5	5	1	Meska
P-16'	1.440	L	6/5	5.5	4	1	Meska
P-17	1.540	R	6/5	7.5	5	1	
P-18	1.590	R	6/6	7.5	6	1	
P-19	1.635	R	6/5	7.5	4	1	
P-20	1.675	L	6/5	7.5	6	1	Meska
P-21	1.730	R	6/5	5.5	5	1	
P-22	1.780	R	6/5	5.5	4	1	
P-23	1.870	R	5/5	5.5	3	1	
P-24	1.890	R	6/5	5.5	3	1	
P-25	1.920	L	6/5	5.5	4	1	Meska
P-26	1.920	L	6/5	5.5	5	1	Meska
P-27	1.930	R	6/5	5.5	7	1	
P-28	1.960	R	5/5	5.5	1	1	
P-29	1.980	R	5/5	5.5	5	1	
P-30	2.020	R	6/5	7.5	5	1	
P-31	2.050	R	5/5	5.5	1	1	
P-32	2.060	R	6/5	7.5	1	1	
P-33	2.110	R	6/5	5.5	7	1	
P-34	2.140	R	4/4	5.0	5	1	
P-35	2.165	R	6/5	11.0	4	1	Meska
P-36	2.190	R	6/5	7.5	1	1	Meska
P-37	2.190	L	6/6	7.5	3	1	Meska
P-37'	2.260	R	5/5	5.5	3	1	
P-38	2.290	R	5/5	5.0	3	1	
P-39	2.380	R	5/5	5.5	4	1	Meska
P-40	2.400	L	5/5	7.5	6	1	
P-41	2.400	R	6/5	7.5	7	1	
P-42	Narika	L	8/8	16.0	20	1	At 14.625km,Meska
P-43	Narika	L	8/8	16.0	6	1	At 14.750km,Meska
P-44	Drain	-	5/5	6.5	7	1	Meska
P-45	Drain	-	6/5	5.5	5	1	Meska
P-46	Drain	-	6/5	6.5	6	1	Meska
P-47	Drain	-	6/5	6.5	5	1	Meska
P-48	Drain	-	6/5	7.5	3	1	Meska
P-49	2.390	R	5/5	5.5	3	1	

Source: JICA Study Team
Note : Pump diameter shows suction/discharge in inches.

Table G-1-5 Result of Infiltration Measurement

Block No.	Accumulated Intake (D)	Intake Rate (I)	Basic Intake Rate (Ib)	Remark
	(mm)	(mm/hr)	(mm/hr)	
1. Kom El Hasel Pilot Area				
B-13	$D=13.819 \times T^{0.148}$	$I=122.7 \times T^{-0.852}$	0.60	
B-14	$D=4.678 \times T^{0.244}$	$I=68.4 \times T^{-0.756}$	0.67	
B-16	$D=17.625 \times T^{0.158}$	$I=167.1 \times T^{-0.842}$	0.88	
2. Nazlet Ramadan Pilot Area				
B-3	$D=9.169 \times T^{0.185}$	$I=101.5 \times T^{-0.815}$	0.65	
B-3	$D=17.710 \times T^{0.135}$	$I=143.5 \times T^{-0.865}$	0.64	
B-16	$D=8.286 \times T^{0.253}$	$I=125.6 \times T^{-0.747}$	1.31	
B-17	$D=6.953 \times T^{0.195}$	$I=81.2 \times T^{-0.805}$	0.56	

Source: JICA Study Team

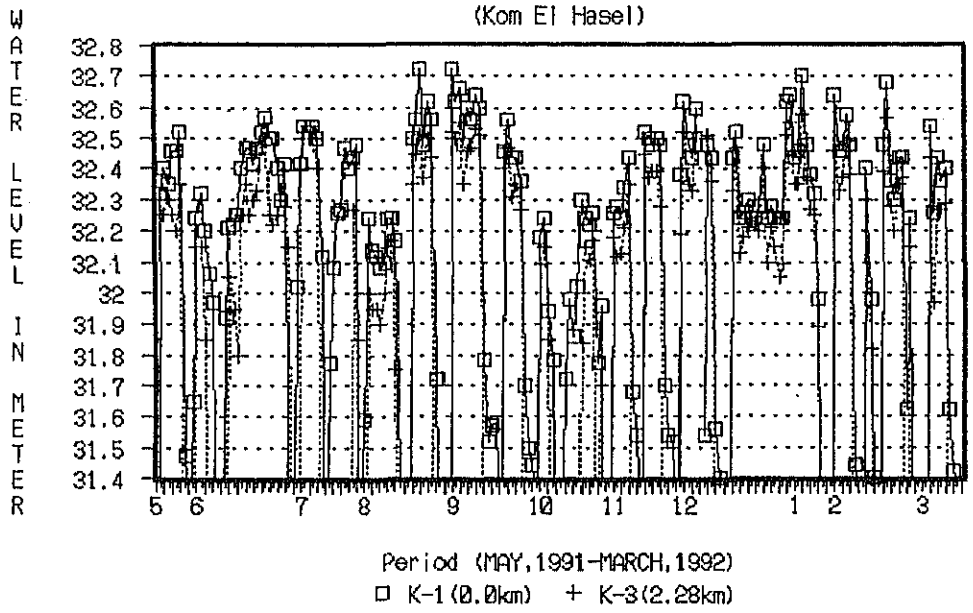
Table G-1-6 Drain Water Reuse in Nazlet Ramadan Pilot Area (from August 3 to August 17, 1991)

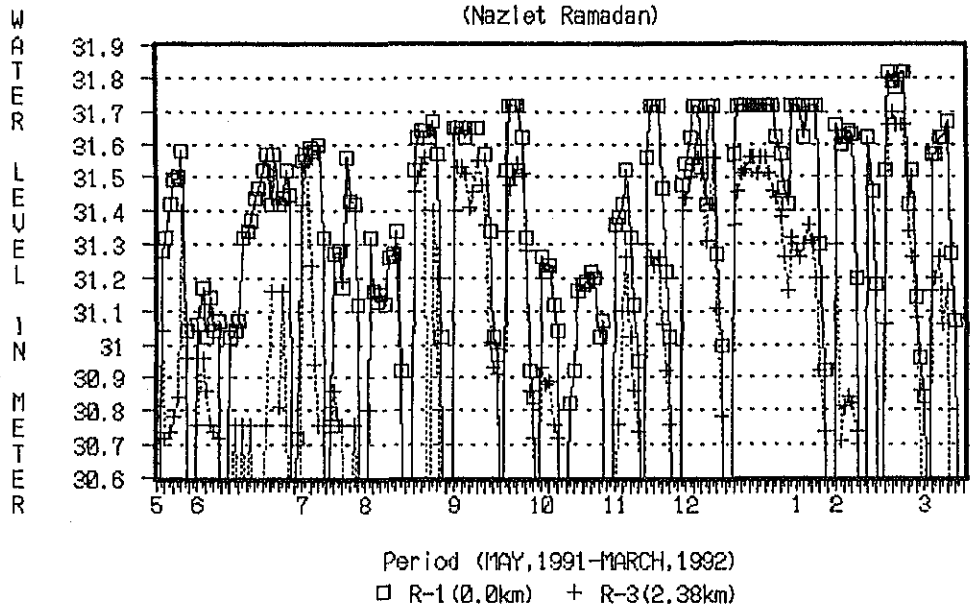
Block No	Area	Estimated Ea	Amount of Water by Source: Drain	Canal	Total	Remark
	(fed)	(%)	(m3)	(m3)	(m3)	
B-5/6/7	107	56.3	5,242	39,175	44,417	P-44
B-9	20	60.6	5,386	2,570	7,956	P-46
B-11/12/14/15/16	81	68.1	2,815	26,280	29,095	P-48
Total	208		13,443 (16.5%)	68,025 (83.5%)	81,468 (100%)	

Irrigation area where possibly intake water from drains ..... 259 fed (57%)
Irrigation area where only intake water from canals ..... 197 fed (43%)
Total area ..... 456 fed (100%)
Therefore,
drain water ratio at total irrigated area would be;
16.5% x 57.0% = 9.4%

Source: JICA Study Team
Note : "Amount of Water by Source" is taken from the pump operation hour observation.

Figure G-1-7 Water Level Fluctuation at Sub-branch Canal





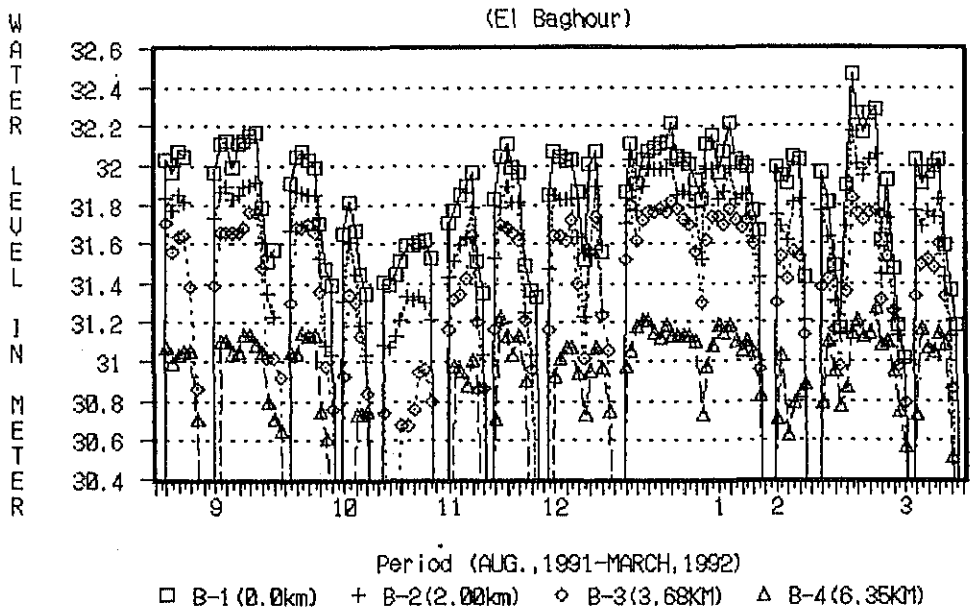
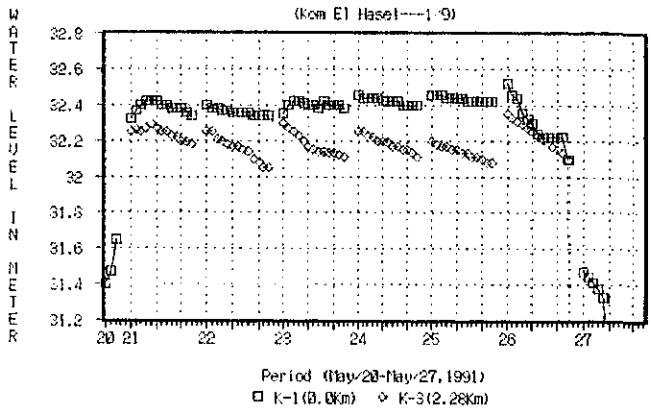
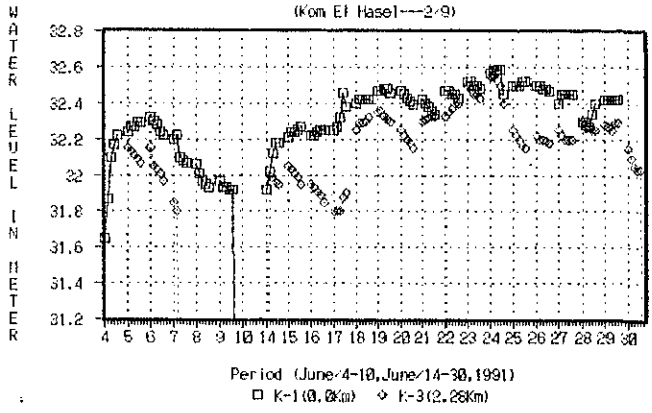
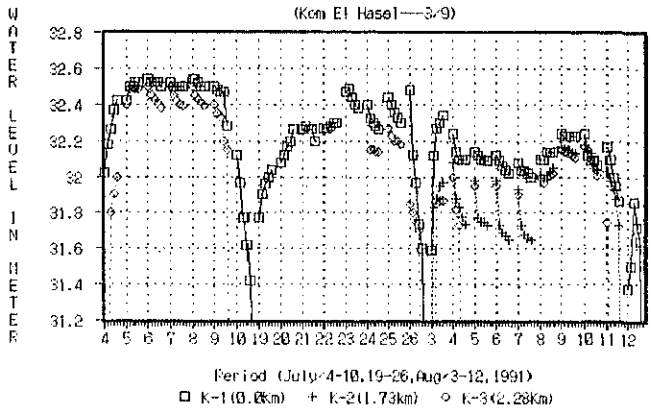


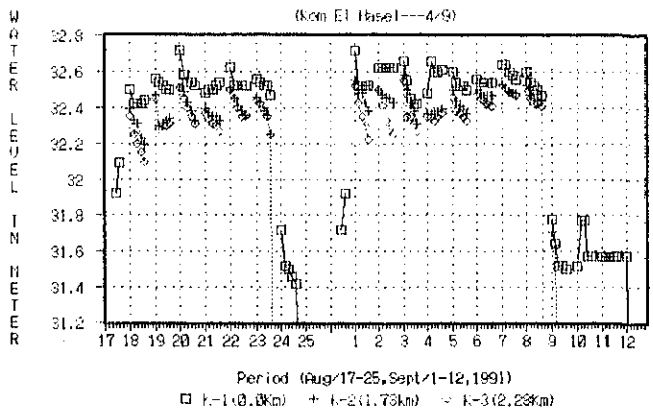
Figure G-1-8 Water Level by Rotation Period at Sub-branch Canal

(1/6)









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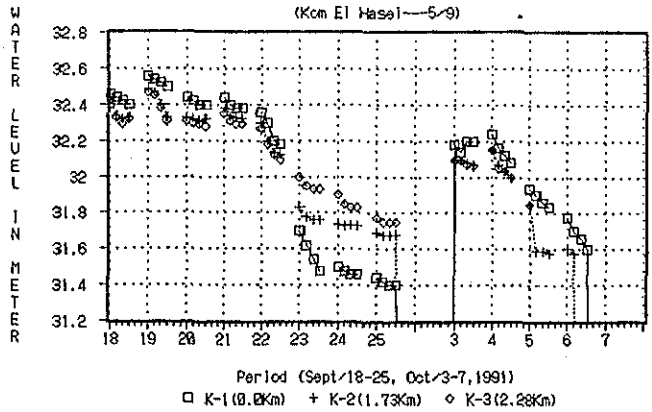

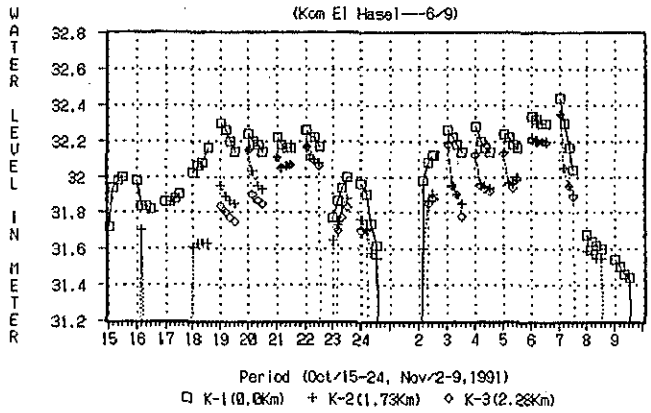

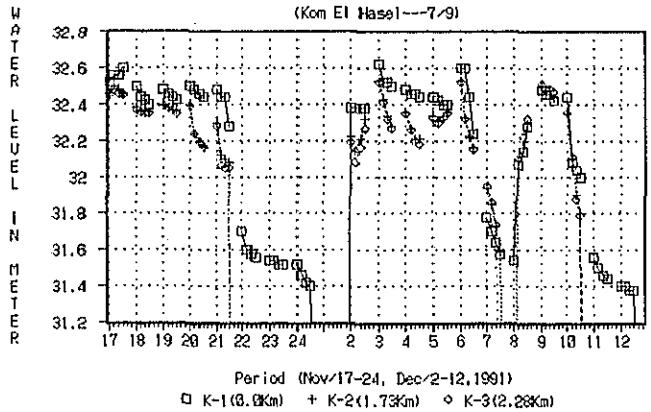

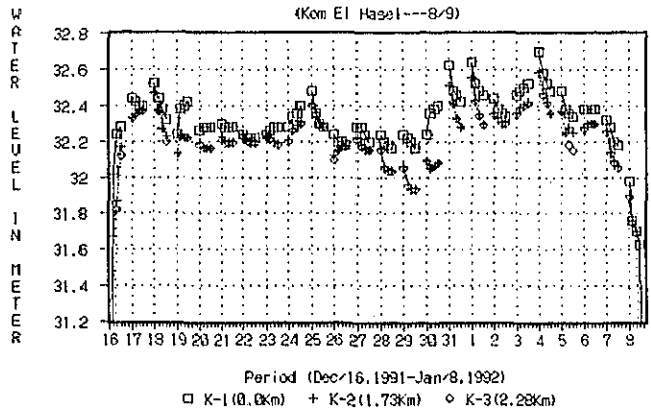

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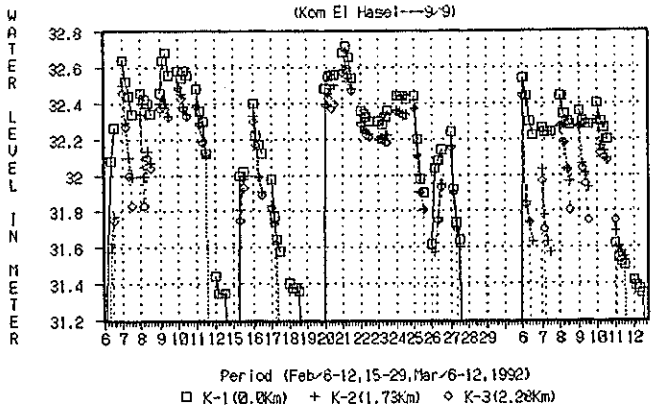

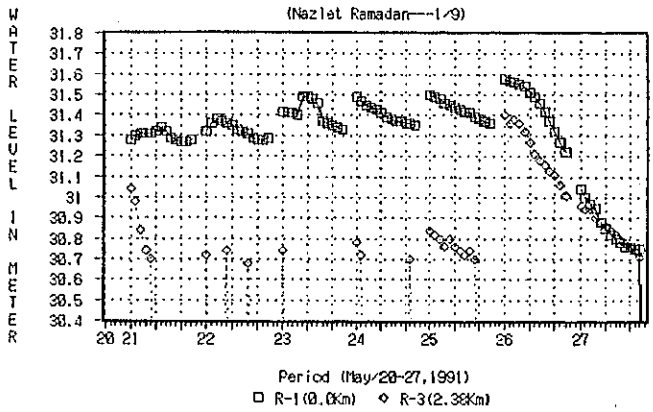

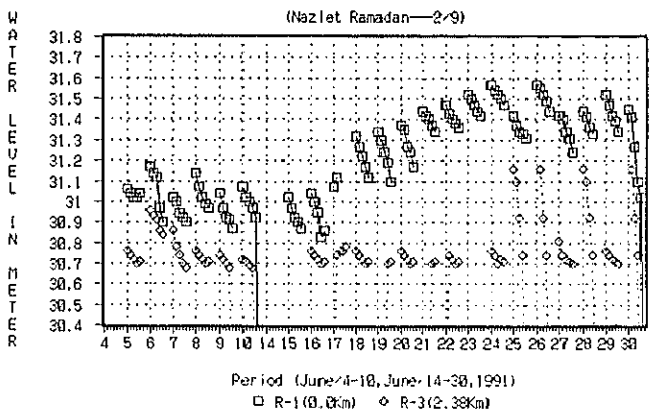

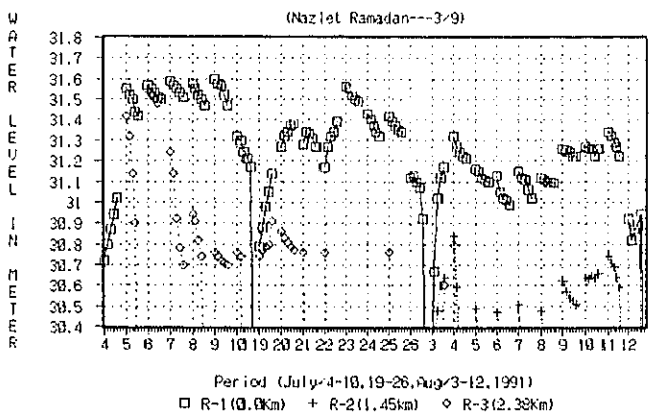

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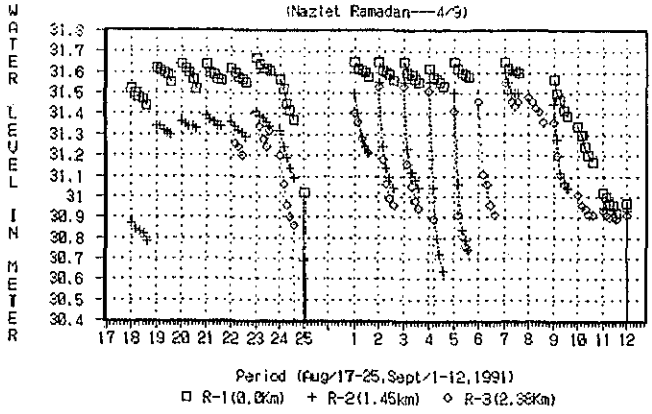

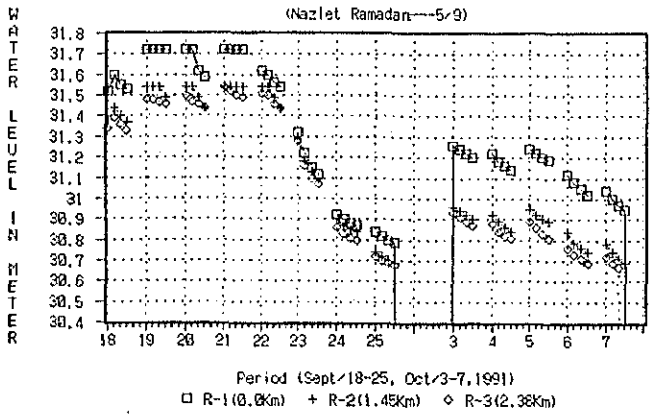

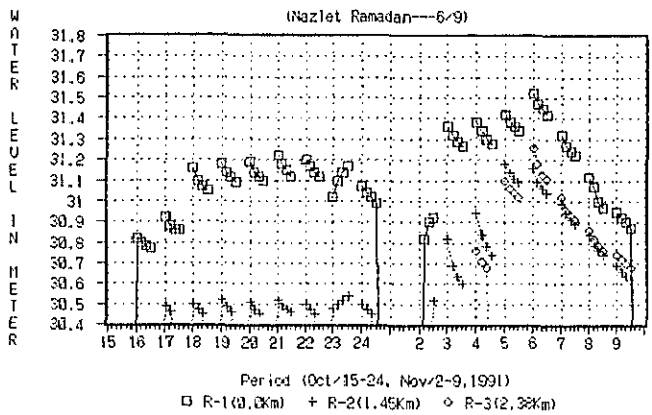

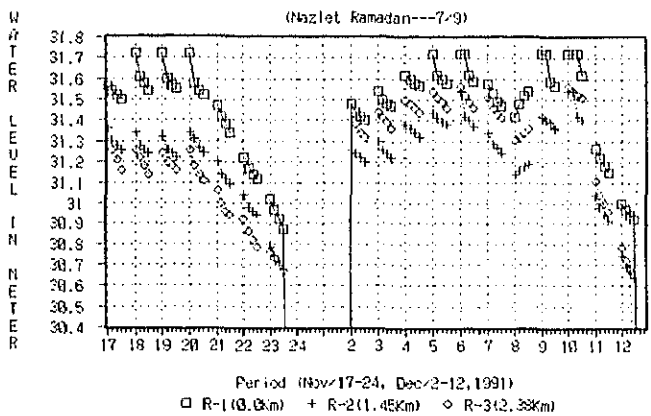

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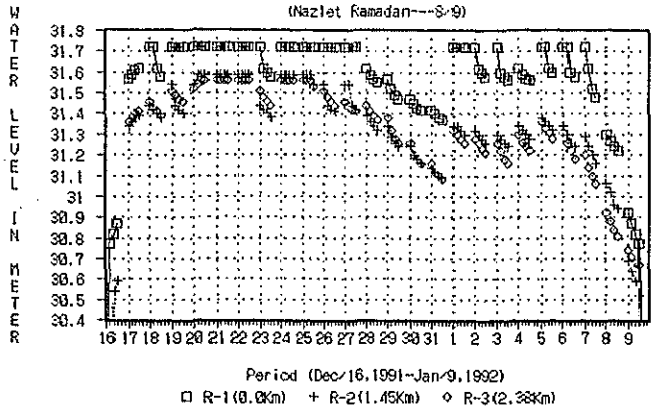

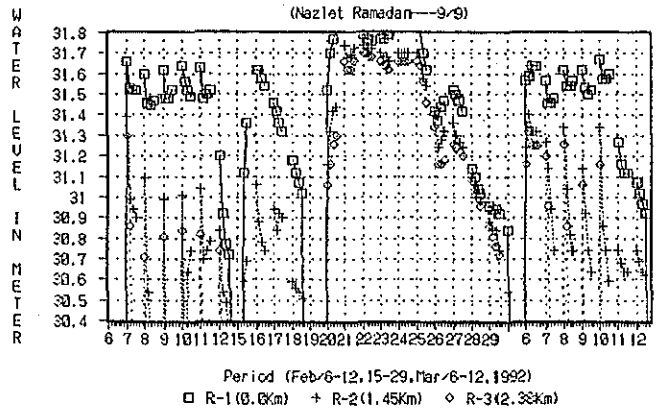

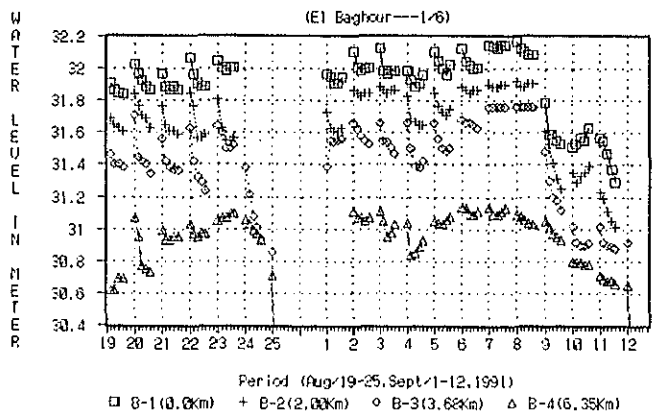

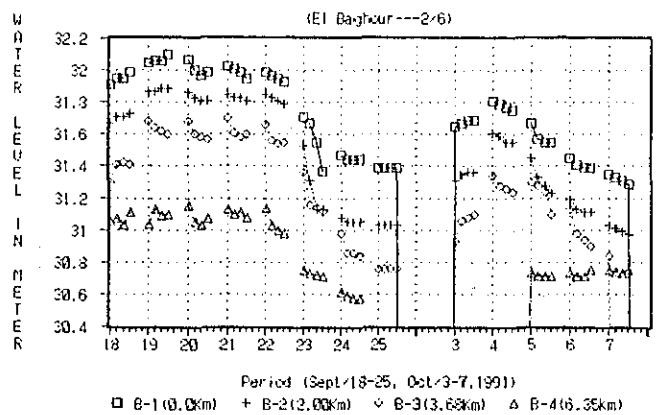

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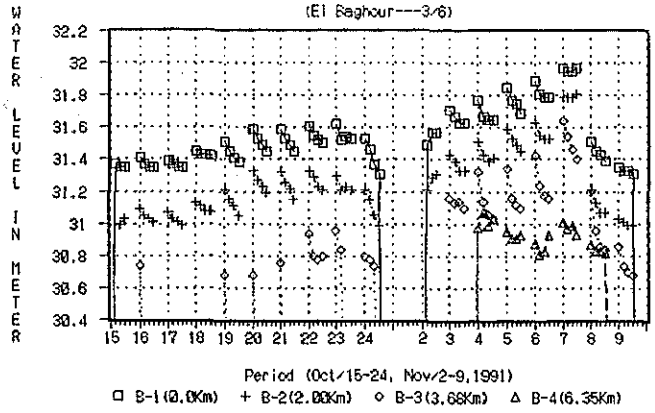
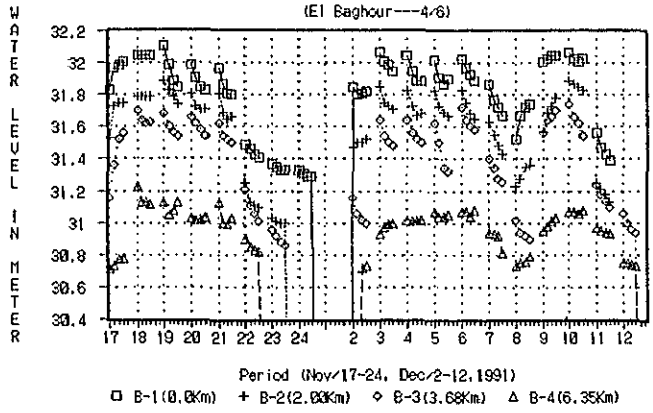
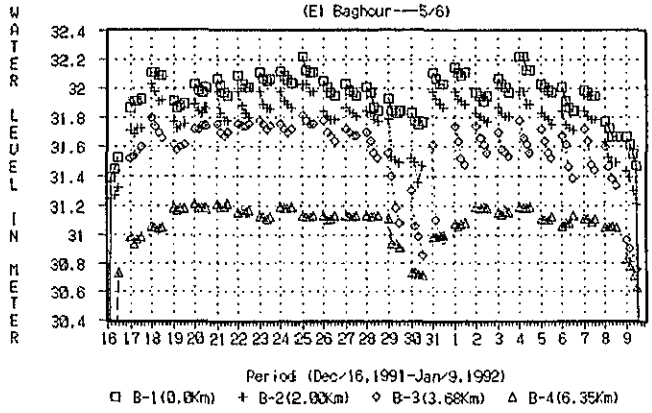






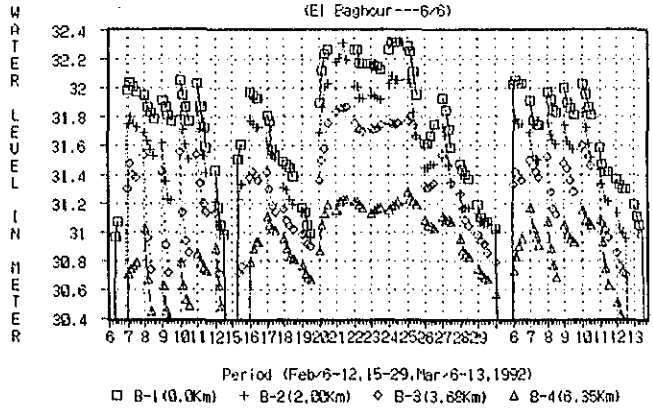
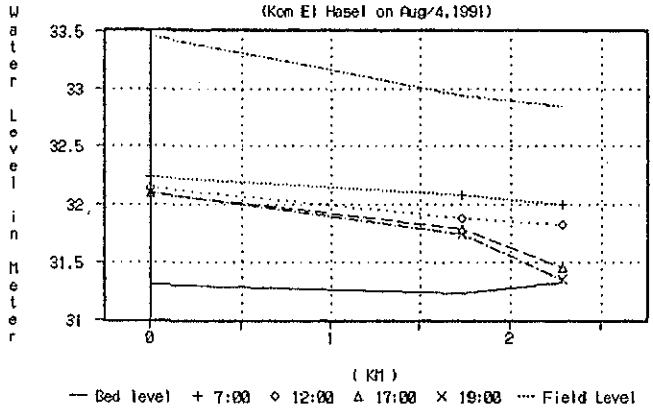
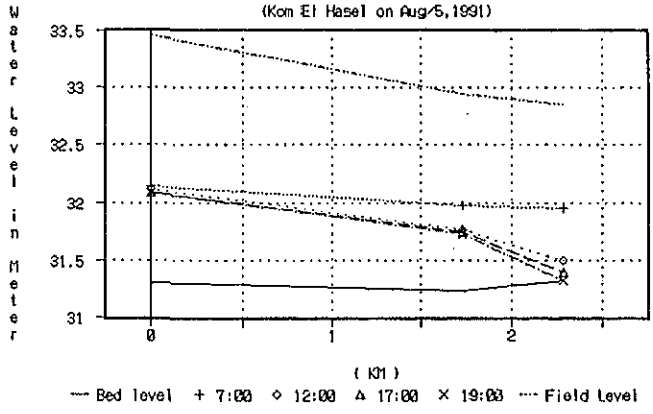
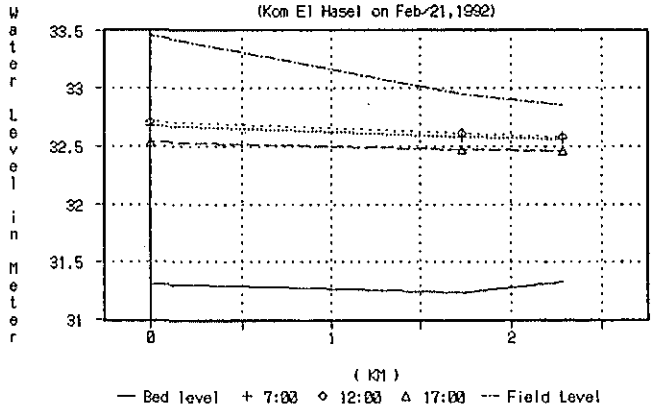


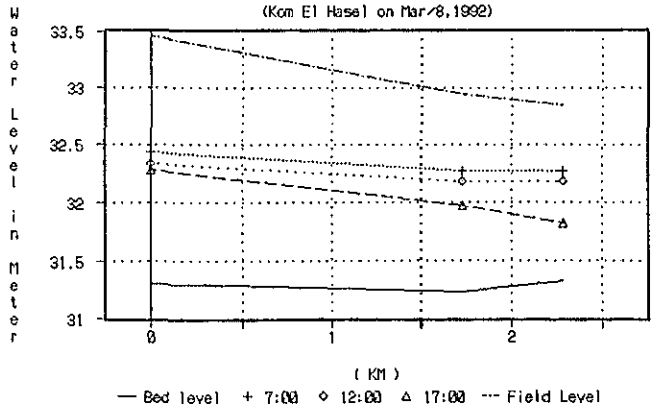
Figure G-1-9 Daily Water Level Trend at Sub-branch Canals

(1/3)









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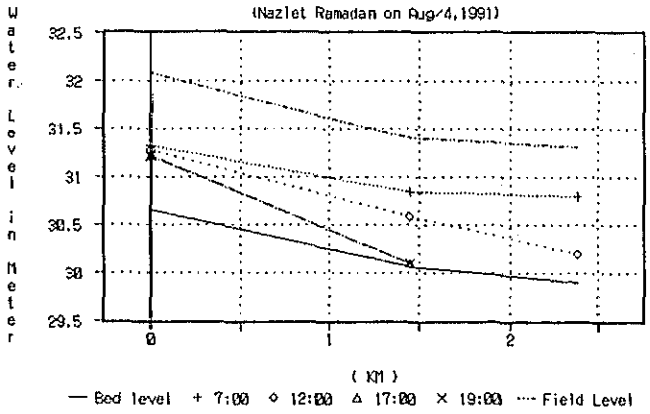
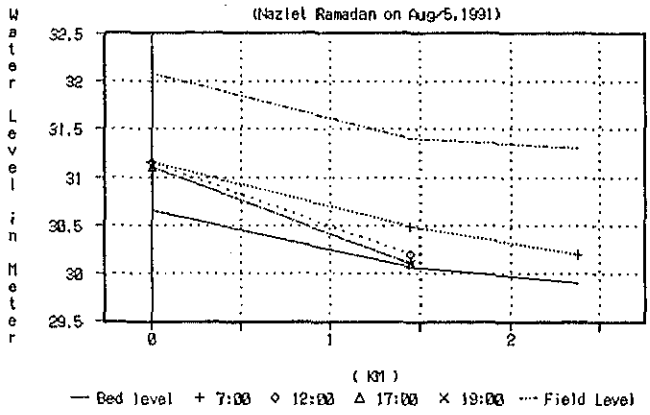
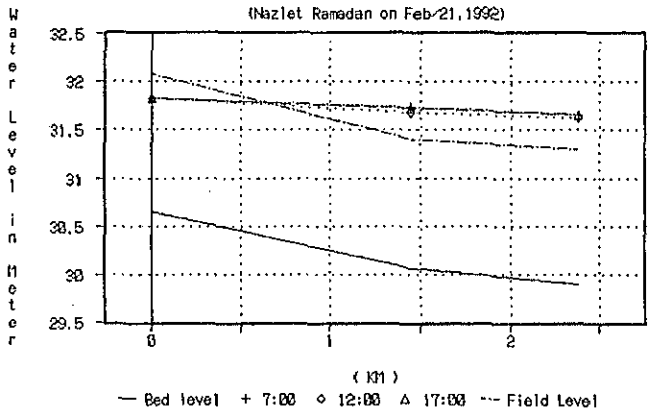






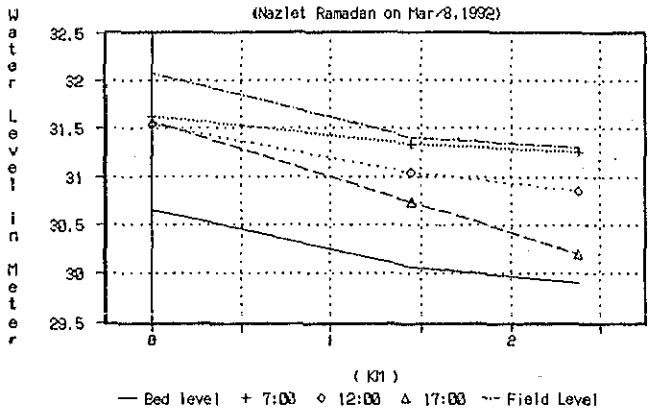
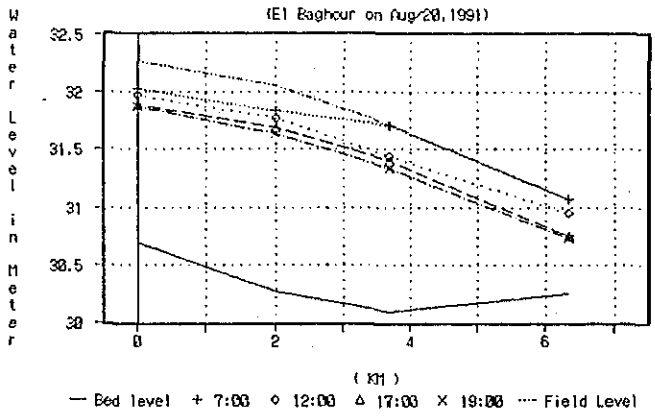
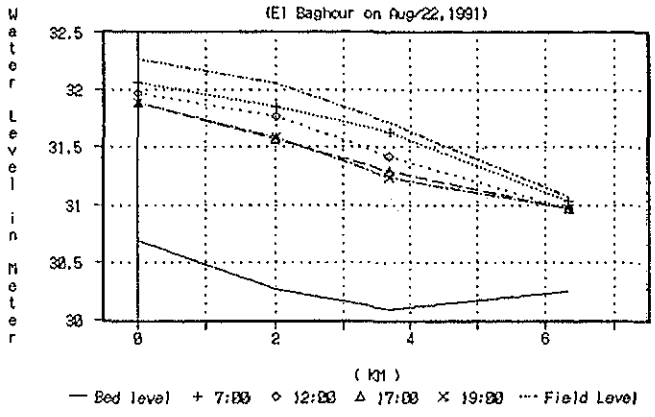
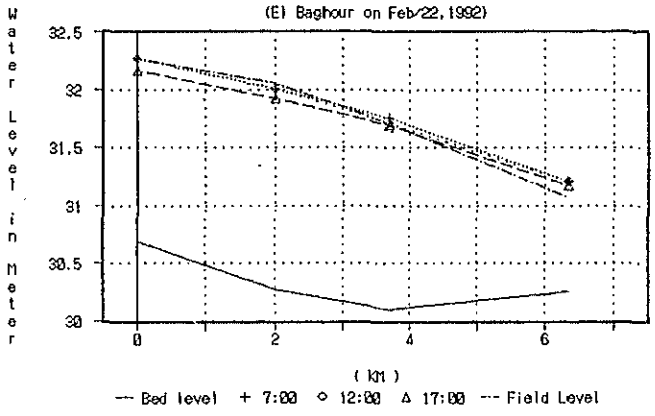


Figure G-1-9 (cont'd)







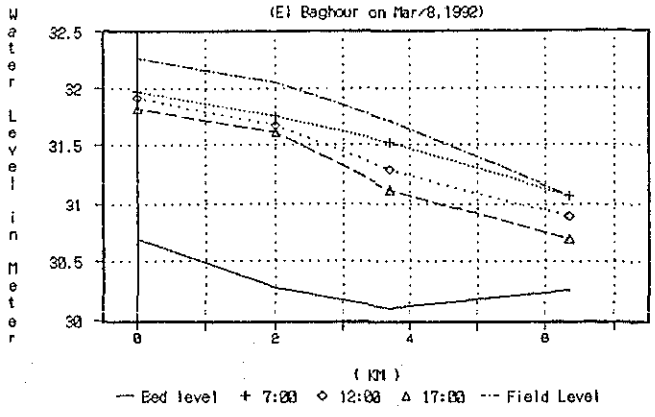


Table G-1-7 Result of Pump Test

Diameter	Pump No.	Diesel Engine	Year Used	Discharge		Remark
(Inch)		(HP)	(Year)	(lps)	(Cu.m/min)	
5/5	K, P-22	5.5	4	28.8	1.728	
5/5	K, P-28	5.5	8	22.9	1.374	
5/5	K, P-19	6.5	1	21.5	1.290	
5/5	K, P-20	6.5	1	25.4	1.524	
5/5	R, P-39	5.5	4	27.7	1.662	
5/5	R, P-40	7.5	6	29.8	1.788	
			(Average)	(26.0)	(1.561)	V=2.119m/s
6/5	R, P-38	5.0	3	31.3	1.878	
6/5	R, P-41	7.5	7	35.1	2.106	
6/5	R, P-26	5.5	5	35.9	2.154	
6/6	R, P-37	7.5	3	34.3	2.058	
			(Average)	(34.2)	(2.049)	V=1.935m/s
6/6	K, P- 4	11.0	15	45.9	2.754	V=2.597m/s

Source: JICA Study Team
Note : -Discharge volume was obtained from field pumping tests using triangular or rectangular measuring weirs.
-Pump diameter shows suction/discharge in inches.

Table G-1-8 Soil Moisture at Pilot Area

Area and Block No.	Present Crop	Soil Moisture		Time of last Irrigation	Date of Sampling	Remark
		(V.%)	(W.%)			
N.R. B-11	Maize	30.83	17.25	13-15 days ago	Sep/3,1991	Ave
		33.72	16.92	-do-	-do-	=32.3%
K.H. B- 1	Cotton	45.83	27.12	1 day ago	Sep/5,1991	
		45.48	27.21	-do-	-do-	
N.R. B-17	Cotton	46.97	27.30	1 day ago	Sep/5,1991	Ave.
		47.04	27.78	-do-	-do-	=46.3%
K.H. B-13	Berseem	45.37	24.80	35 days ago	Feb/9,1992	Ave.
		44.19	24.41	-do-	-do-	=44.8%
K.H. B- 1	Berseem	53.18	30.82	2 days ago	Feb/8,1992	Ave.
		50.73	28.36	-do-	-do-	=52.0%

Source: JICA Study Team
Note : K.H.: Kom El Hasel Pilot Area. N.R.: Nazlet Ramadan Pilot Area.
Soil samples were taken from the depth of 30-35 cm.

Table G-1-9 Soil Particle Size Distribution

Area and Block No.		Sand (2-0.02mm)	Silt (0.02-0.002mm)	Clay (0.002mm >)	Texture grade
		(%)	(%)	(%)	
Kom El Hasel, B-1	1)	10.0	45.2	44.8	Silty clay
	2)	11.2	44.9	43.9	Silty clay
	3)	10.7	45.1	44.2	Silty clay
	4)	14.8	44.5	40.7	Silty clay
	5)	11.2	47.0	41.8	Silty clay
	6)	15.6	44.2	40.2	Silty clay
Kom El Hasel, B-13	1)	13.4	47.7	38.9	Silty clay loam
	2)	10.9	50.4	38.7	Silty clay loam
	3)	14.7	43.9	41.2	Silty clay
	4)	13.8	43.9	42.3	Silty clay
	5)	14.6	45.1	40.3	Silty clay
	6)	16.3	42.5	41.2	Silty clay

Source: JICA Study Team

Table G-1-10 Result of Permeability Test

Area and Block No.		Permiability (m/day)
Kom El Hasel,	Block 1	0.20
-do-	Block 13	0.36
Nazlet Ramadan,	Block 10	0.14
-do-	Block 17	0.16

Source: JICA Study Team
Note : Permiability test was conducted by auger-hole method.

Figure G-1-10 Present Water Application Efficiency in Pilot Area

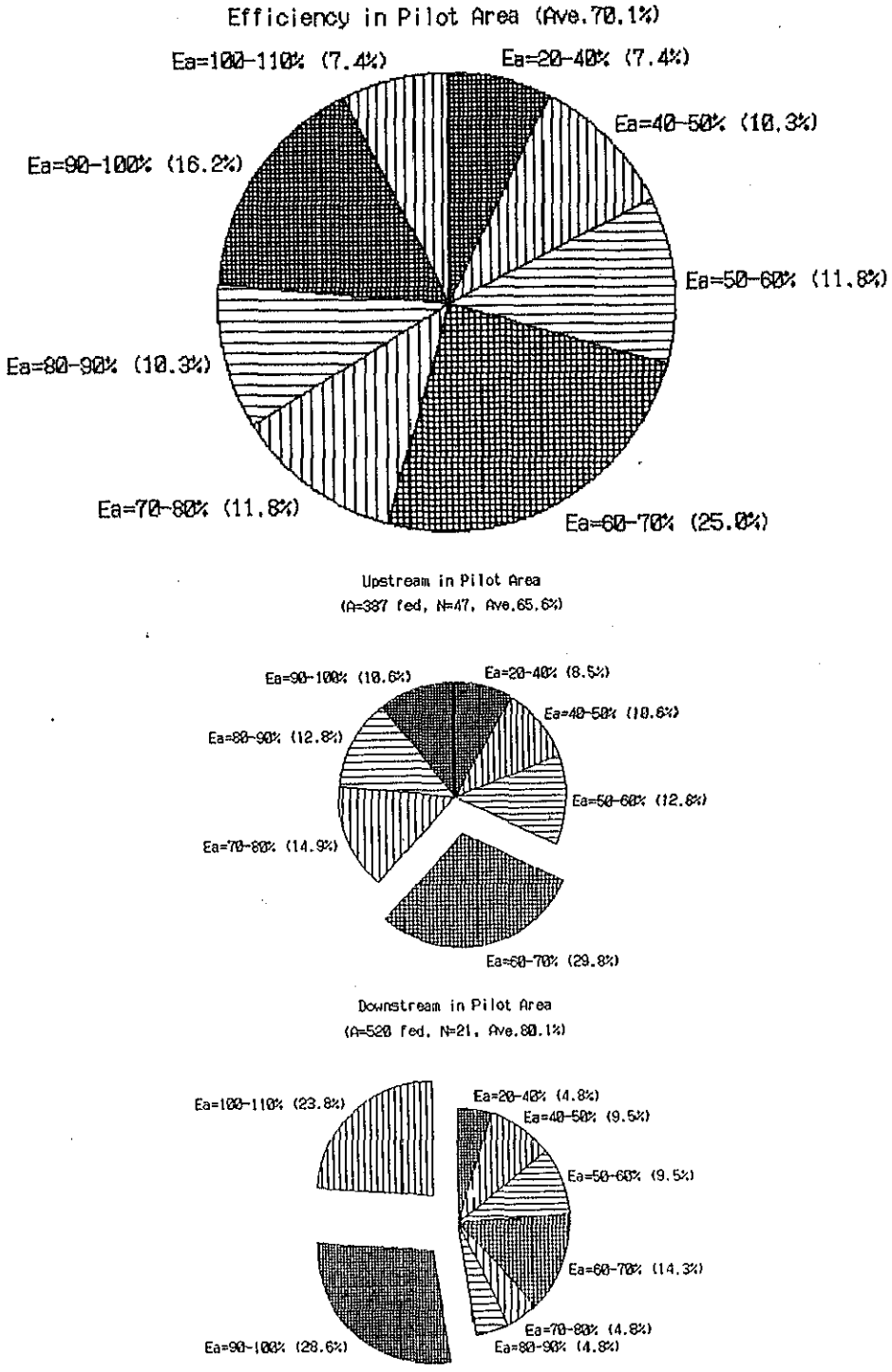


Table G-1-10 (cont'd)

** Irrigation intervals are calculated by following formula based on soil moisture which was measured at pilot areas (see Table G-1-8).

TRAM = (Fc-Ml)*D*1/Cp = (46.3-32.3)*375*1/40 = 131mm

Where: TRAM: total readily available moisture (mm)
(net irrigation water in one application)
Fc : fied capacity (ave. Fc=46.3% in summer)
Ml : depletion of moisture content for optimum growth
(ave. Ml=32.3%)
D : depth of critical soil layer (assume effective soil layer is 1.5m for summer crops, D=1.5/4=0.375m)
Cp : SMEP of critical soil layer (in general Cp=40%)

Therefore,
Ii = TRAM/ETc = 131/8.3 = 15days

Where: Ii : irrigation intervals (day)
ETc: evapotranspiration by crop (ETc=8.3mm for maize in July)

** Meska conveyance losses (seepage plus evaporation) by measurement were calcuated below. Measurement was conducted using V-notch at the Meska for block No.15 at Nazlet Ramadan pilot area.

-- water flow quantity at the beginning point, Q1=28.4 l/sec
-- water flow quantity at the end point, Q2=26.1~26.7 l/sec
-- Meska length, L=430m

Therefore,
Conveyance losses = 1-Q2/Q1 = 1-(26.1~26.7)/28.4 = 6.0~8.1 %

** Meska seepage by calcuration using measured K value (see Table G-1-10). Following formula taken from Drainage Manual, U.S. Department of The Interior, Bureau of Reclamation, is adapted. Sample channel is the same Meska for conveyance losses measurement.

q = K*(B+2d)/3.5 = 0.25*(1.2+2*0.3)/3.5 = 0.13 m3/l.m/day

Where: q : seepage when water table is below channel bottom
(free drainage condition) (m3/l.m/day)
K : hydraulic conductivity (ave. K=0.25m/day)
B : width of water in channel (B=1.2m)
d : depth of water in channel (d=0.3m)
3.5: factor used to adjust hydraulic conductivity test values to seepage losses from ponding tests

Then,
Q = 28.4 l/sec *24*60*60 = 2454 m3/day

Where: Q : channel water flow quantity in one day(24 hrs)
Therefore,
Seepage loss rate = 0.13*430/2454 *100 = 2.3%

Table G-1-11 Summary of Water Application Efficiency in Pilot Area

Block No.	Area	Period						Remarks
		June/4 -July/3 (30 days)	July/4 -Aug./2 (30 days)	Aug./3 -Aug./17 (15 days)	Aug./18 -Sept./1 (15 days)	Sept./2 -Sept./16 (15 days)	Feb./5 -Mar./5 (30 days)	
	(fed)	(%)	(%)	(%)	(%)	(%)	(%)	
(1) Kom El Hasel Pilot Area								
B-1	20	61.6	**	62.1	74.6	87.4	68.9	U.S.
B-2	15	33.7	85.1	69.4	67.9	75.0	46.1	U.S.
B-3	40	84.0	**	66.6	**	78.2	**	U.S.
B-4	46	47.3	**	57.8	60.8	95.4	49.4	U.S.
B-5	10	26.3	80.3	**	96.1	60.8	29.2	U.S.
B-6/7/8	52	56.9	106.6	**	**	**	61.2	D.S.
B-9/10 11/12/15	139	61.4	95.9	97.0	**	**	89.1	D.S.
B-13	33	40.4	63.6	91.5	**	49.3	52.2	D.S.
B-14	10	26.5	48.9	81.4	**	50.1	74.2	D.S.
B-16	86	--	--	--	65.5	**	63.2	U.S.
	451							
(2) Nazlet Ramadan Pilot Area								
B-1	10	96.4	**	**	37.6	**	**	U.S.
B-2	110	**	**	78.5	93.5	69.7	**	U.S.
B-3/4	50	53.0	86.1	75.4	**	41.5	68.6	U.S.
B-5/6/7	107	76.2	96.3	**	**	57.5	**	D.S.
B-8	23	**	**	103.1	--	**	**	D.S.
B-9	20	104.5	**	97.6	--	64.3	**	D.S.
B-10/11/12 14/15/16	108	59.7	107.4	106.3	**	50.5	**	D.S.
B-13	20	96.5	**	**	**	76.6	**	D.S.
B-17	8	64.2	**	**	**	66.8	**	D.S.
	456							(N=68) Ave.=70.1%

Source: JICA Study Team

Note : 1) ** : To be neglected due to observation error and/or obvious lacking another water sources such as drains or gravity irrigation.
2) -- : No record of pump operation was conducted.
3) U.S.: Upstream, D.S.: Downstream.
4) Water application efficiency includes Meska and Marwa losses.
5) Efficiencies in the period 9/2-16 and 2/5-3/5 are classified to upstream area for analysis because water shortage was not found during said period.

Table G-1-12 On-farm Water Balance Analysis in Pilot Area

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(1) June/4-July/3,1991(30 days)															
(1-1) Kom El Hasel Pilot Area (6/4-7/3)															
B-1	17	P-1	34.0	185	22,644	15	28.31	12,740	2	20.28	1,217	13,956	8,688	61.6	
B-2	15	P-2	46.0	207	34,279	10	-do-	8,493	5	-do-	3,042	11,535	22,744	33.7	
B-3	40	P-3	46.0	213	35,273	22	-do-	18,685	18	-do-	10,951	29,636	5,637	84.0	
B-4	28	P-4	46.0	273	45,209	18	-do-	15,287	10	-do-	6,084	21,371	23,837	47.3	
B-5	10	P-5	34.0	226	27,662	5	-do-	4,247	5	-do-	3,042	7,289	20,374	26.3	
B-6	30	P-6	26.0	179	16,754	25	-do-	21,233	5	-do-	3,042	24,275			
B-7	10	P-7	16.0	144	8,294	3	-do-	2,548	7	-do-	4,259	6,807			
B-8	12	P-8	34.0	126	15,422	6	-do-	5,096	6	-do-	3,650	8,746			
		P-9	34.0	151	18,482										
		P-10	26.0	118	11,045										
	52			718	69,998	34		28,876	18		10,951	39,827	30,171	56.9	
B-9	8	P-11	26.0	107	10,015	0		0	8	-do-	4,867	4,867			
B-10	4	P-12	34.0	106	12,974	0		0	4	-do-	2,434	2,434			
		P-13	26.0	127	11,887										
B-11	22	P-14	46.0	74	12,254	4	-do-	3,397	18	-do-	10,951	14,348			
B-12	10					5	-do-	4,247	5	-do-	3,042	7,289			
	44			414	47,131	9		7,644	35		21,294	28,938	18,194	61.4	
B-13	33	P-15	26.0	73	6,833	18	-do-	15,287	15	-do-	9,126	24,413			
		P-16	26.0	97	9,079										
		P-17	26.0	102	9,547										
		P-19	26.0	139	13,010										
		P-20	26.0	126	11,794										
		P-22	26.0	108	10,109										
	33			645	60,372	18		15,287	15		9,126	24,413	35,959	40.4	
B-14	10	P-18/21	26.0	245	22,932	0		0	10	-do-	6,084	6,084	16,848	26.5	
Total	249														

Source: JICA Study Team

Note : 1) **: To be neglected due to observation error or lacking another water sources such as drains or gravity intake.
2) Unit water requirement (UWR) is obtained from ID presently applied.

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(1-2) Nazlet Ramadan Pilot Area (6/4-7/3)															
B-1	10	P-1	34.0	72	8,813	10	28.31	8,493	0		0	8,493	320	96.4	
B-2	110	P-2	26.0	81	7,582	50	-do-	42,465	60	20.28	36,504	78,969			
		P-3	34.0	231	28,274										
	110			312	35,856	50		42,465	60		36,504	78,969	-43,113	**	P-42/43
B-3	20	P-4/8	34.0	187	22,889	10	-do-	8,493	10	-do-	6,084	14,577			
B-4	30	P-5	46.0	62	10,267	10	-do-	8,493	20	-do-	12,168	20,661			
		P-6/7	26.0	131	12,262										
		P-9	34.0	172	21,053										
	50			552	66,470	20		16,986	30		18,252	35,238	31,232	53.0	
B-5	25	P-10/11	26.0	92	8,611	0		0	25	-do-	15,210	15,210			
B-6	20	P-12/13/15	34.0	207	25,337	20	-do-	16,986	0		0	16,986			
B-7	60	P-16	34.0	44	5,386	0		0	60	-do-	36,504	36,504			
		P-14/17/18	34.0	214	26,194										
		P-19/21/22	34.0	201	24,602										
	105			758	90,130	20		16,986	85		51,714	68,700	21,430	76.2	P-44
B-8	23	P-20	34.0	31	3,794	23	-do-	19,534	0		0	19,534	-15,740	**	P-45
B-9	20	P-25/26	34.0	114	13,954	10	-do-	8,493	10	-do-	6,084	14,577	-623	104.5	P-46
B-10	27	P-23/31	26.0	113	10,577	0		0	27	-do-	16,427	16,427			
		P-24/27	34.0	152	18,605										
		P-28/29	26.0	80	7,488										
		P-30/32/33	34.0	182	22,277										
		P-34	16.0	67	3,859										
B-11	20	P-35	46.0	46	7,618	20	-do-	16,986	0		0	16,986			
B-12	6	P-36/38	34.0	154	18,850	6	-do-	5,096	0		0	5,096			
B-14	17	P-39	26.0	54	5,054	0		0	17	-do-	10,343	10,343			
B-15	9	P-41	34.0	86	10,526	9	-do-	7,644	0		0	7,644			
B-16	10					0		0	10	-do-	6,084	6,084			
	89			934	104,854	35		29,726	54		32,854	62,579	42,275	59.7	P-48
B-13	20	P-37	34.0	103	12,607	0		0	20	-do-	12,168	12,168	439	96.5	P-47
B-17	8	P-40	26.0	81	7,582	0		0	8	-do-	4,867	4,867	2,714	64.2	
Total	435														

Table G-1-12 (cont'd)

(3/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(2) July/4-Aug./2,1991(30 days)															
(2-1) Kom El Hasel Pilot Area (7/4-8/2)															
B-1	20	P-1	34.0	133	16,279	15	34.80	15,660	2	30.03	1,802	17,462			
								(Nile maize)	3	24.30	2,187	2,187			
	20			133	16,279	15		15,660	5		3,989	19,649	-3,370	**	
B-2	15	P-2	46.0	106	17,554	10	-do-	10,440	5	30.03	4,505	14,945	2,609	85.1	
B-3	40	P-3	46.0	146	24,178	22	-do-	22,968	18	-do-	16,216	39,184	-15,007	**	
B-4	31	P-4	46.0	141	23,350	18	-do-	18,792	10	-do-	9,009	27,801			
								(Other crop)	3	40.97	3,687	3,687			
	31			141	23,350	18		18,792	13		12,696	31,488	-8,139	**	
B-5	10	P-5	34.0	99	12,118	5	-do-	5,220	5	30.03	4,505	9,725	2,393	80.3	
B-6	30	P-6	26.0	112	10,483	25	-do-	26,100	5	-do-	4,505	30,605			
B-7	10	P-7	16.0	74	4,262	3	-do-	3,132	7	-do-	6,306	9,438			
B-8	12	P-8	34.0	95	11,628	6	-do-	6,264	6	-do-	5,405	11,669			
		P-9	34.0	103	12,607										
		P-10	26.0	102	9,547										
	52			486	48,528	34		35,496	18		16,216	51,712	-3,184	106.6	
B-9	8	P-11	26.0	85	7,956	0		0	8	-do-	7,207	7,207			
B-10	4	P-12	34.0	81	9,914	0		0	4	-do-	3,604	3,604			
		P-13	26.0	81	7,582										
B-11	22	P-14	46.0	104	17,222	4	-do-	4,176	18	-do-	16,216	20,392			
B-12	10					5	-do-	5,220	5	-do-	4,505	9,725			
	44			351	42,674	9		9,396	35		31,532	40,928	1,747	95.9	
B-13	33	P-15	26.0	81	7,582	18	-do-	18,792	15	-do-	13,514	32,306			
		P-16	26.0	92	8,611										
		P-17	26.0	100	9,360										
		P-19	26.0	92	8,611										
		P-20	26.0	98	9,173										
		P-22	26.0	80	7,488										
	33			543	50,825	18		18,792	15		13,514	32,306	18,519	63.6	
B-14	10	P-18/21	26.0	197	18,439	0		0	10	-do-	9,009	9,009	9,430	48.9	
Total	255														

(4/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(2-2) Nazlet Ramadan Pilot Area (7/4-8/2)															
B-1	10	P-1	34.0	52	6,365	10	34.80	10,440	0		0	10,440	-4,075	**	
B-2	110	P-2	26.0	68	6,365	50	-do-	52,200	60	30.03	54,054	106,254			
		P-3	34.0	141	17,258										
	110			209	23,623	50		52,200	60		54,054	106,254	-82,631	**	P-42/43
B-3	20	P-4/8	34.0	136	16,646	10	-do-	10,440	10	-do-	9,009	19,449			
B-4	30	P-5	46.0	78	12,917	10	-do-	10,440	20	-do-	18,018	28,458			
		P-6/7	26.0	148	13,853										
		P-9	34.0	100	12,240										
	50			462	55,656	20		20,880	30		27,027	47,907	7,749	86.1	
B-5	25	P-10/11	26.0	140	13,104	0		0	25	-do-	22,523	22,523			
B-6	22	P-12/13/15	34.0	198	24,235	20	-do-	20,880	0		0	20,880			
		P-16	34.0	51	6,242			(Other crop)	2	40.97	2,458	2,458			
B-7	60	P-14/17/18	34.0	252	30,845	0		0	60	30.03	54,054	54,054			
		P-19/21/22	34.0	240	29,376										
	107			881	103,802	20		20,880	87		79,035	99,915	3,888	96.3	P-44
B-8	23	P-20	34.0	30	3,672	23	-do-	24,012	0		0	24,012	-20,340	**	P-45
B-9	20	P-25/26	34.0	126	15,422	10	-do-	10,440	10	-do-	9,009	19,449	-4,027	**	P-46
B-10	27	P-23/31	26.0	131	12,262	0		0	27	-do-	24,324	24,324			
		P-24/27	34.0	129	15,790										
		P-28/29	26.0	124	11,606										
		P-30/32/33	34.0	191	23,378										
		P-34	16.0	72	4,147										
B-11	25	P-35	46.0	19	3,146	20	-do-	20,880	0		0	20,880			
		P-36/38	34.0	145	17,748			(Other crop)	5	40.97	6,146	6,146			
B-12	13	P-39	26.0	51	4,774	6	-do-	6,264	0		0	6,264			
		P-41	34.0	67	8,201			(Other crop)	7	40.97	8,604	8,604			
B-14	17					0		0	17	30.03	15,315	15,315			
B-15	16					9	-do-	9,396	0		0	9,396			
								(Other crop)	7	40.93	8,595	8,595			
B-16	10					0		0	10	30.03	9,009	9,009			
	108			929	101,052	35		36,540	73		71,993	108,533	-7,481	107.4	P-48
B-13	20	P-37	34.0	71	8,690	0		0	20	-do-	18,018	18,018	-9,328	**	P-47
B-17	8	P-40	26.0	46	4,306	0		0	8	-do-	7,207	7,207	-2,902	**	
Total	456														

Table G-1-12 (cont'd)

(5/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(3) Aug./3--Aug./17,1991(15 days)															
(3-1) Kom El Hasel Pilot Area (8/3-8/17)															
B-1	20	P-1	34.0	78	9,547	15	17.20	3,870	2	34.56	1,037	4,907			
								(Nile maize)	3	22.80	1,026	1,026			
	20			78	9,547	15		3,870	5		2,063	5,933	3,614	62.1	
B-2	15	P-2	46.0	45	7,452	10	-do-	2,580	5	34.56	2,592	5,172	2,280	69.4	
B-3	40	P-3	46.0	136	22,522	22	-do-	5,676	18	-do-	9,331	15,007	7,514	66.6	
B-4	46	P-4/24	46.0	162	26,827	25	-do-	6,450	10	-do-	5,184	11,634			
								(Other crop)	11	23.48	3,874	3,874			
	46			162	26,827	25		6,450	21		9,058	15,508	11,319	57.8	
B-5	10	P-5	34.0	23	2,815	5	-do-	1,290	5	34.56	2,592	3,882	-1,067	**	
B-6	30	P-6	26.0	17	1,591	25	-do-	6,450	5	-do-	2,592	9,042			
B-7	10	P-7	16.0	9	518	3	-do-	774	7	-do-	3,629	4,403			
B-8	12	P-8	34.0	22	2,693	6	-do-	1,548	6	-do-	3,110	4,658			
		P-9	34.0	35	4,284										
		P-10	26.0	48	4,493										
	52			131	13,579	34		8,772	18		9,331	18,103	-4,524	**	
B-9	8	P-11	26.0	16	1,498	0		0	8	-do-	4,147	4,147			
B-10	4	P-12	34.0	10	1,224	0		0	4	-do-	2,074	2,074			
		P-13	26.0	32	2,995										
B-11	22	P-14	46.0	42	6,955	4	-do-	1,032	18	-do-	9,331	10,363			
B-12	55	P-25	63.0	107	24,268	33	-do-	8,514	20	-do-	10,368	18,882			
B-15	50	P-26	63.0	80	18,144	30	-do-	7,740	15	-do-	7,776	15,516			
								(Other crop)	7	23.48	2,465	2,465			
	139			287	55,084	67		17,286	72		36,161	53,447	1,636	97.0	
B-13	33	P-15	26.0	12	1,123	18	-do-	4,644	15	34.56	7,776	12,420			
		P-16	26.0	14	1,310										
		P-17	26.0	28	2,621										
		P-19	26.0	20	1,872										
		P-20	26.0	23	2,153										
		P-22	26.0	48	4,493										
	33			145	13,572	18		4,644	15		7,776	12,420	1,152	91.5	
B-14	10	P-18/21	26.0	68	6,365	0		0	10	-do-	5,184	5,184	1,181	81.4	
Total	365														

(6/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(3-2) Nazlet Ramadan Pilot Area (8/3-8/17)															
B-1	10	P-1	34.0	14	1,714	10	17.20	2,580	0		0	2,580	-866	**	
B-2	110	P-2/3'	26.0	85	7,956	50	-do-	12,900	60	34.56	31,104	44,004			
		P-3	34.0	74	9,058										
		P-42/43	63.0	172	39,010										
	110			331	56,023	50		12,900	60		31,104	44,004	12,019	78.5	
B-3	20	P-4/8/5'	34.0	93	11,383	10	-do-	2,580	10	-do-	5,184	7,764			
B-4	30	P-5	46.0	47	7,783	10	-do-	2,580	20	-do-	10,368	12,948			
		P-6/7	26.0	52	4,867										
		P-9	34.0	28	3,427										
	50			220	27,461	20		5,160	30		15,552	20,712	6,749	75.4	
B-5	25	P-10/11/44	26.0	90	8,424	0		0	25	-do-	12,960	12,960			
B-6	22	P-11'	16.0	15	864	20	-do-	5,160	0		0	5,160			
		P-12/13/15	34.0	46	5,630			(Other crop)	2	23.48	704	704			
B-7	60	P-16/16'	34.0	62	7,589	0		0	60	34.56	31,104	31,104			
		P-14/17/18	34.0	129	15,790										
		P-19/21/22	34.0	50	6,120										
	107			392	44,417	20		5,160	87		44,768	49,928	-5,512	**	
B-8	23	P-20/45	34.0	47	5,753	23	-do-	5,934	0		0	5,934	-181	103.1	
B-9	20	P-25/26/46	34.0	65	7,956	10	-do-	2,580	10	-do-	5,184	7,764	192	97.6	
B-10	27	P-23/31	26.0	29	2,714	0		0	27	-do-	13,997	13,997			
		P-24/27	34.0	24	2,938										
		P-28/29	26.0	22	2,059										
		P-30/32/33	34.0	23	2,815										
		P-34	16.0	26	1,498										
B-11	25	P-35	46.0	0	0	20	-do-	5,160	0		0	5,160			
		P-36/38	34.0	95	11,628			(Other crop)	5	23.48	1,761	1,761			
B-12	13	P-37'/39	26.0	31	2,902	6	-do-	1,548	0		0	1,548			
		P-41/48	34.0	119	14,566			(Other crop)	7	23.48	2,465	2,465			
B-14	17					0		0	17	34.56	8,813	8,813			
B-15	16					9	-do-	2,322	0		0	2,322			
								(Other crop)	7	23.48	2,465	2,465			
B-16	10					0		0	10	34.56	5,184	5,184			
	108			369	41,119	35		9,030	73		34,685	43,715	-2,596	106.3	
B-13	20	P-37/47	34.0	31	3,794	0		0	20	-do-	10,368	10,368	-6,574	**	
B-17	8	P-40	26.0	30	2,808	0		0	8	-do-	4,147	4,147	-1,339	**	
Total	456														

Table G-1-12 (cont'd)

(7/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capa-city	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(4) Aug./18--Sept./1,1991(15 days)															
(4-1) Kom El Hasel Pilot Area (8/18-9/1)															
B-1	20	P-1	34.0	65	7,956	15	17.20	3,870	2	34.56	1,037	4,907			
								(Nile maize)	3	22.80	1,026	1,026			
	20			65	7,956	15		3,870	5		2,063	5,933	2,023	74.6	
B-2	15	P-2	46.0	46	7,618	10	-do-	2,580	5	34.56	2,592	5,172	2,446	67.9	
B-3	40	P-3	46.0	78	12,917	22	-do-	5,676	18	-do-	9,331	15,007	-2,090	**	
B-4	46	P-4/24	46.0	154	25,502	25	-do-	6,450	10	-do-	5,184	11,634			
								(Other crop)	11	23.48	3,874	3,874			
	46			154	25,502	25		6,450	21		9,058	15,508	9,994	60.8	
B-5	10	P-5	34.0	33	4,039	5	-do-	1,290	5	34.56	2,592	3,882	157	96.1	
B-6	30	P-6	26.0	27	2,527	25	-do-	6,450	5	-do-	2,592	9,042			
B-7	10	P-7	16.0	4	230	3	-do-	774	7	-do-	3,629	4,403			
B-8	12	P-8	34.0	4	490	6	-do-	1,548	6	-do-	3,110	4,658			
		P-9	34.0	60	7,344										
		P-10	26.0	41	3,838										
	52			136	14,429	34		8,772	18		9,331	18,103	-3,674	**	
B-9	8	P-11	26.0	19	1,778	0		0	8	-do-	4,147	4,147			
B-10	4	P-12	34.0	14	1,714	0		0	4	-do-	2,074	2,074			
		P-13	26.0	0	0										
B-11	22	P-14	46.0	27	4,471	4	-do-	1,032	18	-do-	9,331	10,363			
B-12	55	P-25	63.0	93	21,092	33	-do-	8,514	20	-do-	10,368	18,882			
B-15	50	P-26	63.0	69	15,649	30	-do-	7,740	15	-do-	7,776	15,516			
								(Other crop)	7	23.48	2,465	2,465			
	139			222	44,705	67		17,286	72		36,161	53,447	-8,743	**	
B-13	33	P-15/16	26.0	25	2,340	18	-do-	4,644	15	34.56	7,776	12,420			
		P-17	26.0	15	1,404										
		P-19	26.0	14	1,310										
		P-20	26.0	0	0										
		P-22	26.0	23	2,153										
	33			77	7,207	18		4,644	15		7,776	12,420	-5,213	**	
B-14	10	P-18/21	26.0	26	2,434	0		0	10	-do-	5,184	5,184	-2,750	**	
B-16	86	P-27	46.0	160	26,496	43	-do-	11,094	43	-do-	22,291	33,385			
		P-28	26.0	84	7,862										
		P-29/30	34.0	136	16,646										
	86			380	51,005			11,094			22,291	33,385	17,620	65.5	
Total	451														

(8/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capa-city	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(4-2) Nazlet Ramadan Pilot Area (8/18-9/1)															
B-1	10	P-1	34.0	56	6,854	10	17.20	2,580	0		0	2,580	4,274	37.6	
B-2	110	P-2/3'	26.0	52	4,867	50	-do-	12,900	60	34.56	31,104	44,004			
		P-3	34.0	67	8,201										
		P-42/43	63.0	150	34,020										
	110			269	47,088	50		12,900	60		31,104	44,004	3,084	93.5	
B-3	20	P-4/8/5'	34.0	56	6,854	10	-do-	2,580	10	-do-	5,184	7,764			
B-4	30	P-5	46.0	48	7,949	10	-do-	2,580	20	-do-	10,368	12,948			
		P-6/7	26.0	12	1,123										
		P-9	34.0	15	1,836										
	50			131	17,762	20		5,160	30		15,552	20,712	-2,950	**	
B-5	25	P-10/11/44	26.0	15	1,404	0		0	25	-do-	12,960	12,960			
B-6	22	P-11'	16.0	10	576	20	-do-	5,160	0		0	5,160			
		P-12/13/15	34.0	13	1,591				(Other crop)	2	23.48	704	704		
B-7	60	P-16/16'	34.0	58	7,099	0		0	60	34.56	31,104	31,104			
		P-14/17/18	34.0	26	3,182										
		P-19/21/22	34.0	26	3,182										
	107			148	17,035	20		5,160	87		44,768	49,928	-32,893	**	
B-8	23	P-20/45	34.0	0	0	23	-do-	5,934	0		0	5,934	(Gravity supply)		
B-9	20	P-25/26/46	34.0	0	0	10	-do-	2,580	10	-do-	5,184	7,764	(Gravity supply)		
B-10	27	P-23/31	26.0	15	1,404	0		0	27	-do-	13,997	13,997			
		P-24/27	34.0	13	1,591										
		P-28/29	26.0	37	3,463										
		P-30/32/33	34.0	3	367										
		P-34	16.0	18	1,037										
B-11	25	P-35	46.0	12	1,987	20	-do-	5,160	0		0	5,160			
		P-36/38	34.0	77	9,425				(Other crop)	5	23.48	1,761	1,761		
B-12	13	P-37'/39	26.0	16	1,498	6	-do-	1,548	0		0	1,548			
		P-41/48	34.0	0	0				(Other crop)	7	23.48	2,465	2,465		
B-14	17	P-49	26.0	35	3,276	0		0	17	34.56	8,813	8,813			
B-15	16					9	-do-	2,322	0		0	2,322			
								(Other crop)	7	23.48	2,465	2,465			
B-16	10					0		0	10	34.56	5,184	5,184			
	108			226	24,048	35		9,030	73		34,685	43,715	-19,667	**	
B-13	20	P-37/47	34.0	16	1,958	0		0	20	-do-	10,368	10,368	-8,410	**	
B-17	8	P-40	26.0	21	1,966	0		0	8	-do-	4,147	4,147	-2,182	**	
Total	456														

Table G-1-12 (cont'd)

(9/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(5) Sept./2--Sept./16,1991(15 days)															
(5-1) Kom El Hasel Pilot Area (9/2-9/16)															
B-1	20	P-1	34.0	47	5,753	15	32.76	3,440	2	26.79	375	3,815			
								(Nile maize)	3	26.97	1,214	1,214			
	20			47	5,753	15		3,440	5		1,589	5,029	724	87.4	
B-2	15	P-2	46.0	26	4,306	10	-do-	2,293	5	26.79	938	3,231	1,075	75.0	
B-3	40	P-3	46.0	65	10,764	22	-do-	5,045	18	-do-	3,376	8,421	2,343	78.2	
B-4	31	P-4/24	46.0	38	6,293	18	-do-	4,128	10	-do-	1,875	6,003			
								(Other crop)	3	0.00	0	0			
	31			38	6,293	18		4,128	13		1,875	6,003	290	95.4	
B-5	10	P-5	34.0	28	3,427	5	-do-	1,147	5	26.79	938	2,084	1,343	60.8	
B-6	30	P-6	26.0	17	1,591	25	-do-	5,733	5	-do-	938	6,671			
B-7	10	P-7	16.0	23	1,325	3	-do-	688	7	-do-	1,313	2,001			
B-8	12	P-8	34.0	21	2,570	6	-do-	1,376	6	-do-	1,125	2,501			
		P-9	34.0	24	2,938										
		P-10	26.0	10	936										
	52			95	9,360	34		7,797	18		3,376	11,172	-1,812	**	
B-9	8	P-11	26.0	11	1,030	0		0	8	-do-	1,500	1,500			
B-10	4	P-12	34.0	0	0	0		0	4	-do-	750	750			
		P-13	26.0	7	655										
B-11	22	P-14	46.0	27	4,471	4	-do-	917	18	-do-	3,376	4,293			
B-12	10	P-25	63.0	0	0	5	-do-	1,147	5	-do-	938	2,084			
B-15	--	P-26	63.0	0	0	0	-do-	0	0	-do-	0	0			
								(Other crop)	0	0.00	0	0			
	44			45	6,156	9		2,064	35		6,564	8,627	-2,471	**	
B-13	33	P-15/16	26.0	23	2,153	18	0.00	0	15	26.79	2,813	2,813			Harvest of maize from Sept./3
		P-17	26.0	8	749										
		P-19	26.0	5	468										
		P-20	26.0	11	1,030										
		P-22	26.0	14	1,310										
	33			61	5,710	18		0	15		2,813	2,813	2,897	49.3	
B-14	10	P-18/21	26.0	40	3,744	0		0	10	-do-	1,875	1,875	1,869	50.1	
B-16	86	P-27	46.0	6	994	43	0.00	0	43	-do-	8,064	8,064			Harvest of maize from Sept./3
		P-28	26.0	0	0										
		P-29/30	34.0	0	0										
	86			6	994			0			8,064	8,064	-7,070	**	
Total	341														

(10/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Maize Area	Maize UWR	Maize Amount	Cotton Area	Cotton UWR	Cotton Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3/f/d)	(m3)	(fed)	(m3/f/d)	(m3)	(m3)	(m3)	(%)	
(5-2) Nazlet Ramadan Pilot Area (9/2-9/16)															
B-1	10	P-1	34.0	12	1,469	10	32.76	2,293	0		0	2,293	-824	**	
B-2	110	P-2/3'	26.0	21	1,966	50	-do-	11,466	60	26.79	11,252	22,718			
		P-3	34.0	39	4,774										
		P-42/43	63.0	114	25,855										
	110			174	32,594	50		11,466	60		11,252	22,718	9,877	69.7	
B-3	20	P-4/8/5'	34.0	72	8,813	10	-do-	2,293	10	-do-	1,875	4,169			
B-4	30	P-5	46.0	66	10,930	10	-do-	2,293	20	-do-	3,751	6,044			
		P-6/7	26.0	13	1,217										
		P-9	34.0	30	3,672										
	50			181	24,631	20		4,586	30		5,626	10,212	14,419	41.5	
B-5	25	P-10/11/44	26.0	103	9,641	0		0	25	-do-	4,688	4,688			
B-6	22	P-11'	16.0	21	1,210	20	-do-	4,586	0		0	4,586			
		P-12/13/15	34.0	46	5,630			(Other crop)	2	0.00	0	0			
B-7	60	P-16/16'	34.0	25	3,060	0		0	60	26.79	11,252	11,252			
		P-14/17/18	34.0	81	9,914										
		P-19/21/22	34.0	51	6,242										
	107			327	35,698	20		4,586	87		15,940	20,526	15,171	57.5	
B-8	23	P-20/45	34.0	26	3,182	23	-do-	5,274	0		0	5,274	-2,092	**	
B-9	20	P-25/26/46	34.0	53	6,487	10	-do-	2,293	10	-do-	1,875	4,169	2,319	64.3	
B-10	27	P-23/31	26.0	32	2,995	0		0	27	-do-	5,063	5,063			
		P-24/27	34.0	36	4,406										
		P-28/29	26.0	26	2,434										
		P-30/32/33	34.0	31	3,794										
		P-34	16.0	15	864										
B-11	25	P-35	46.0	36	5,962	20	-do-	4,586	0		0	4,586			
		P-36/38	34.0	54	6,610			(Other crop)	5	0.00	0	0			
B-12	13	P-37'/39	26.0	6	562	6	-do-	1,376	0		0	1,376			
		P-41/48	34.0	68	8,323			(Other crop)	7	0.00	0	0			
B-14	17	P-49	26.0	0	0	0		0	17	26.79	3,188	3,188			
B-15	16					9	-do-	2,064	0		0	2,064			
								(Other crop)	7	0.00	0	0			
B-16	10					0		0	10	26.79	1,875	1,875			
	108			304	35,950	35		8,026	73		10,127	18,153	17,797	50.5	
B-13	20	P-37/47	34.0	40	4,896	0		0	20	-do-	3,751	3,751	1,145	76.6	
B-17	8	P-40	26.0	24	2,246	0		0	8	-do-	1,500	1,500	746	66.8	
Total	456														

Table G-1-12 (cont'd)

(11/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Berseem Area	Berseem Amount	Beans Area	Beans Amount	Wheat Area	Wheat Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3)	(fed)	(m3)	(fed)	(m3)	(m3)	(m3)	(%)	
(6) Feb./5--Mar./5,1992(30 days)															
(6-1) Kom El Hasel Pilot Area (2/5-3/5)						27.57 m3/f/d		11.18 m3/f/d		13.65 m3/f/d					
B-1	20	P-1	34.0	118	14,443	6	4963	10	3354	4	1638	9,955	4,489	68.9	
B-2	15	P-2	46.0	101	16,726	5	4136	7	2348	3	1229	7,712	9,014	46.1	
B-3	40	P-3	46.0	132	21,859	21	17369	6	2012	13	5324	24,705	-2,846	**	
B-4	46	P-4/24	46.0	250	41,400	9	7444	29	9727	8	3276	20,447	20,954	49.4	
B-5	10	P-5	34.0	114	13,954	1	827	6	2012	3	1229	4,068	9,886	29.2	
[B-6	30	P-6	26.0	114	10,670	2	1654	28	9391	0	0	11,045			
[B-7	10	P-7	16.0	20	1,152	8	6617	0	0	2	819	7,436			
[B-8	12	P-8	34.0	30	3,672	0	0	6	2012	6	2457	4,469			
		P-9	34.0	114	13,954										
		P-10	26.0	86	8,050										
	52			364	37,498	10	8271	34	11404	8	3276	22,951	14,547	61.2	
[B-9	8	P-11	26.0	59	5,522	6	4963	0	0	2	819	5,782			
[B-10	4	P-12	34.0	55	6,732	3	2481	0	0	1	410	2,891			
		P-13	26.0	19	1,778										
[B-11	22	P-14	46.0	135	22,356	10	8271	7	2348	5	2048	12,666			
[B-12	55	P-25	63.0	111	25,175	10	8271	25	8385	20	8190	24,846			
[B-15	50	P-26	63.0	68	15,422	10	8271	30	10062	10	4095	22,428			
	139			447	76,986	39	32257	62	20795	38	15561	68,613	8,373	89.1	
B-13	33	P-15/16	26.0	71	6,646	3	2481	20	6708	10	4095	13,284			
		P-17	26.0	57	5,335										
		P-18	26.0	45	4,212										
		P-20	26.0	21	1,966										
		P-22	26.0	78	7,301										
	33			272	25,459	3	2481	20	6708	10	4095	13,284	12,175	52.2	
B-14	10	P-18/21	26.0	89	8,330	5	4136	0	0	5	2048	6,183	2,147	74.2	
B-16	86	P-27	46.0	225	37,260	20	16542	30	10062	36	14742	41,346			
		P-28	26.0	115	10,764										
		P-29/30	34.0	142	17,381										
	86			482	65,405	20	16542	30	10062	36	14742	41,346	24,059	63.2	
Total	451														

(12/12)

Block No.	Area	Supply of Irrigation Water: Pump No.	Capacity	Opera Time	Water Amount	Crop Water Consumption: Berseem Area	Berseem Amount	Beans Area	Beans Amount	Weat Area	Weat Amount	Total	On-farm Water Balance	Water Application Efficiency	Remarks
	(fed)		(lps)	(hrs)	(m3)	(fed)	(m3)	(fed)	(m3)	(fed)	(m3)	(m3)	(m3)	(%)	
(6-2) Nazlet Ramadan Pilot Area (2/5-3/5)						27.57 m3/f/d		11.18 m3/f/d		13.65 m3/f/d					
B-1	10	P-1	34.0	12	1,469	3	2481	5	1677	2	819	4,977	-3,509	**	
B-2	110	P-2	26.0	3	281	45	37220	40	13416	25	10238	60,873			
		P-3	34.0	83	10,159										
		P-42/43	63.0	186	42,185										
	110			272	52,625	45	37220	40	13416	25	10238	60,873	-8,248	**	
[B-3	20	P-4/8/5'	34.0	149	18,238	9	7444	7	2348	4	1638	11,430			
[B-4	30	P-5	46.0	96	15,898	15	12407	5	1677	10	4095	18,179			
		P-6/7/3'	26.0	81	7,582										
		P-9	34.0	12	1,469										
	50			338	43,186	24	19850	12	4025	14	5733	29,608	13,577	68.6	
[B-5	25	P-10/11	26.0	62	5,803	5	4136	3	1006	17	6962	12,103			
[B-6	22	P-11'	16.0	32	1,843	0	0	22	7379	0	0	7,379			
		P-12/13/15	34.0	104	12,730										
[B-7	60	P-16/16'	34.0	52	6,365	20	16542	0	0	40	16380	32,922			
		P-14/17/18	34.0	125	15,300										Partly
		P-19/21/22	34.0	81	9,914										irrigated
	107			456	51,955	25	20678	25	8385	57	23342	52,404	-449	**	by gravit
B-8	23	P-20	34.0	40	4,898	1	827	22	7379	0	0	8,206	-3,310	**	-do-
B-9	20	P-25/26	34.0	82	10,037	5	4136	10	3354	5	2048	9,537	500	**	-do-
B-10	27	P-23/31	26.0	14	1,310	7	5790	0	0	20	8190	13,980			
		P-24/27	34.0	38	4,651										
		P-28/29	26.0	53	4,961										
		P-30/32/33	34.0	36	4,406										
		P-34	16.0	10	576										
[B-11	25	P-35	46.0	5	828	2	1654	23	7714	0	0	9,368			
		P-36/38	34.0	37	4,529										
[B-12	13	P-37'/39	26.0	5	468	1	827	12	4025	0	0	4,852			
		P-41	34.0	10	1,224										
[B-14	17	P-49	26.0	21	1,966	10	8271	2	671	5	2048	10,989			
[B-15	16					4	3308	2	671	10	4095	8,074			
[B-16	10					4	3308	0	0	6	2457	5,765			
	108			229	24,919	28	23159	39	13081	41	16790	53,029	-28,110	**	-do-
B-13	20	P-37	34.0	16	1,958	8	6617	0	0	12	4914	11,531	-9,572	**	-do-
B-17	8	P-40	26.0	41	3,838	7	5790	0	0	1	410	6,199	-2,362	**	-do-
Total	456														