CHAPTER V. PROJECT IMPLEMENTATION AND OPERATION & MAINTENANCE

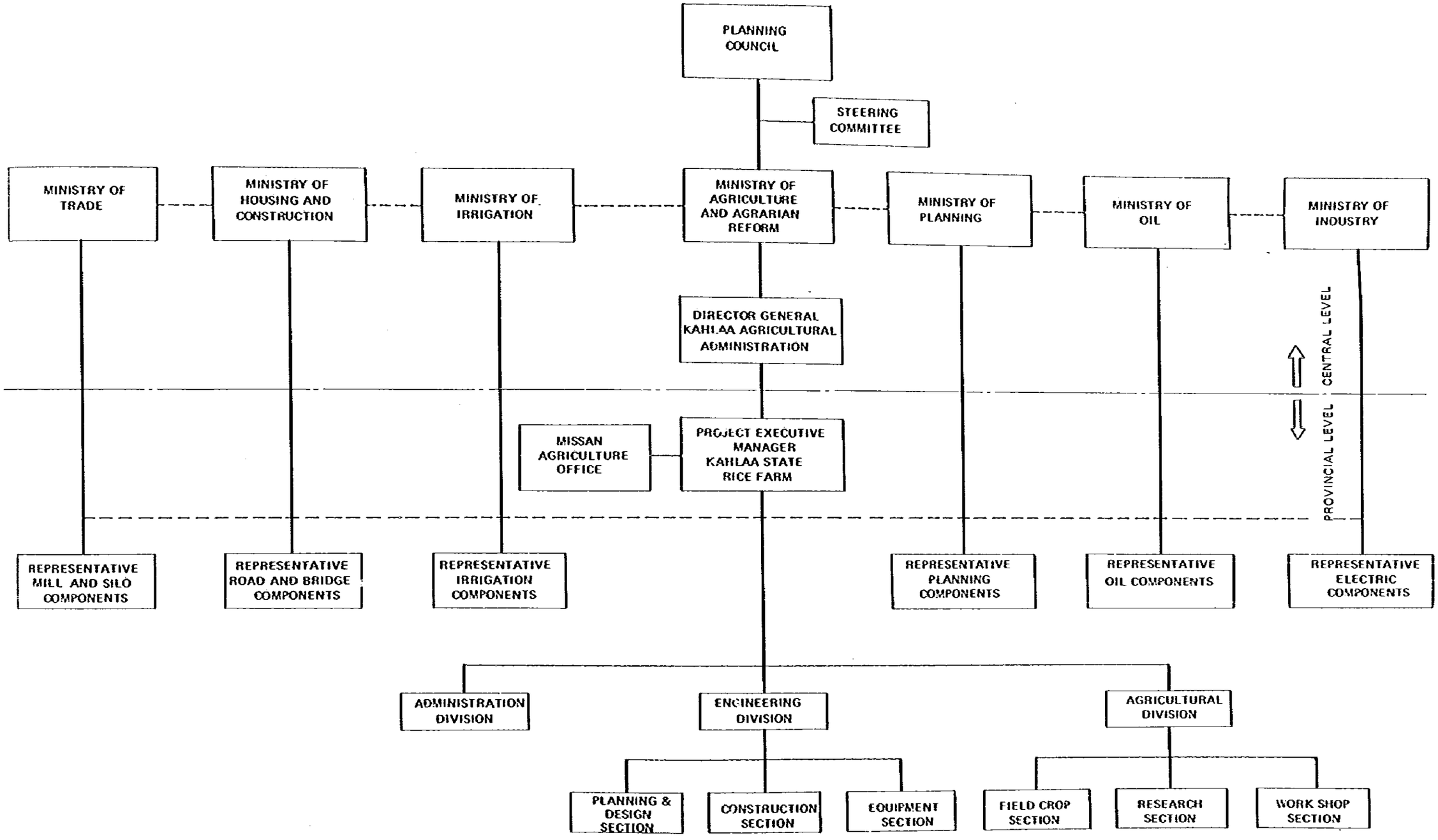
A. Executing Agency and Coordination

Since this Project is an integrated agricultural development project having various project components such as mechanized agriculture, irrigation and drainage, roads, housing, etc., the Planning Council should coordinate the Project, and the Ministry of Agriculture and Agrarian Reform should function as the executing body of the Project. In order to assist the Planning Council, the Project Steering Committee shall be organized for smooth project implementation through good coordination among the related Governmental organizations and authorities concerned such as the Ministries of Irrigation, Planning, Housing and Construction, Trade, Industry and Oil for obtaining their assistance and cooperation directly or indirectly to the Kahlaa Agriculture Administration Office (KAAO), which shall be newly organized under the Ministry of Agriculture and Agrarian Reform. And the Committee shall give advices and assistance to the KAAO in administration related to the Project.

With these coordinations, the KAAO headed by specifically nominated Director General will be the direct executing body. The Director General is fully responsible in executing the Project works, to coordinate the related Governmental organizations and to direct the Project Manager to be assigned to carry out, with full responsibility, the works in the job site.

Under the control of the Project Manager, departments of general affairs, management facilities, machinery, cultivation, experimentation will be organized (see Figure 5-1).

FIGURE 5-1 PROPOSED ORGANIZATION CHART FOR PROJECT IMPLEMENTATION



B. Construction

1. Construction Method

There are two ways in executing the Project construction, that is, the force account and contract bases. The contract basis will be adopted in the Project in consideration of a big scale of the construction works. Consequently, contractors will execute the construction works, and to such contractors the equipment and materials to be imported or purchased by the Government will be supplied.

2. Construction Schedule

The Project Area having the total acreage of 8,160 ha will be divided into four blocks based on the proposed irrigation and drainage systems. The earth works will occupy the major part of the Project construction. The construction period of seven years has been scheduled including the final design in the fiscal year 1981, and the construction of facilities will be started in the fiscal year 1982, and completed in the fiscal year 1987.

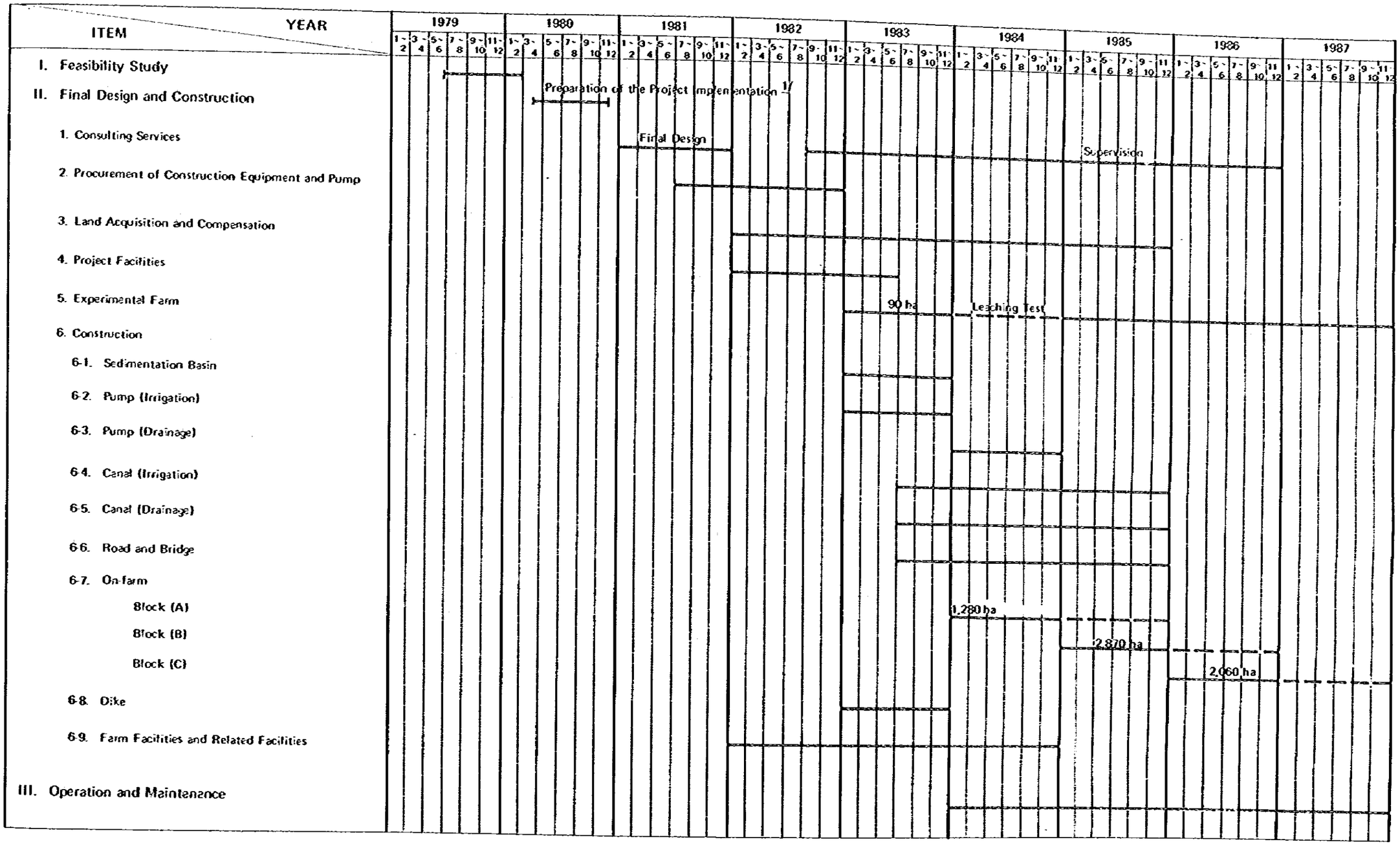
In construction scheduling, the following considerations were made:

- The major facilities such as pump stations, main and secondary canals, desilting reservoir and dike should be constructed prior to on-farm development; and,
- The land reclamation for on-farm development shall be completed during the fiscal years, 1984 to 1986.

The reclamation area will be, therefore, 2,780 ha in the fiscal year 1984, 2,060 ha in the fiscal year 1985 and 1,370 in the fiscal year 1986, respectively. After the completion of land reclamation, each construction block will be equipped with on-farm facilities. Leaching will be conducted for one year.

The construction schedule of major civil works is shown in Figure 5-2. Immediately after the commencement of the civil works for main facilities, the construction of experimental farm shall be started to attain the quick yield of agricultural products as well as to conduct experimentations and trainings required in the Project.

FIGURE 5-2 CONSTRUCTION SCHEDULE OF THE PROJECT



1/ : include the negotiation for external financial arrangement of the Project, establishment of project organization and recruitment of consulting firm.

C. Operation and Maintenance

The proper operation and maintenance of farm machines, equipment and buildings will be one of the most important works in farm management specially for this large-scaled rice farm.

1) To execute appropriate operation and maintenance of farm machines, equipment and facilities including their timely renovation;

2) To operate carefully machines and facilities for saving repair costs;

3) To allot the operation and maintenance cost of machines and facilities to the field crops departments in order to make clear their responsibility in bearing such expenses;

4) To keep clear record on the annual expenditures for operation and maintenance; and,

5) To conduct the training of operation and maintenance staff for upgrading their techniques.

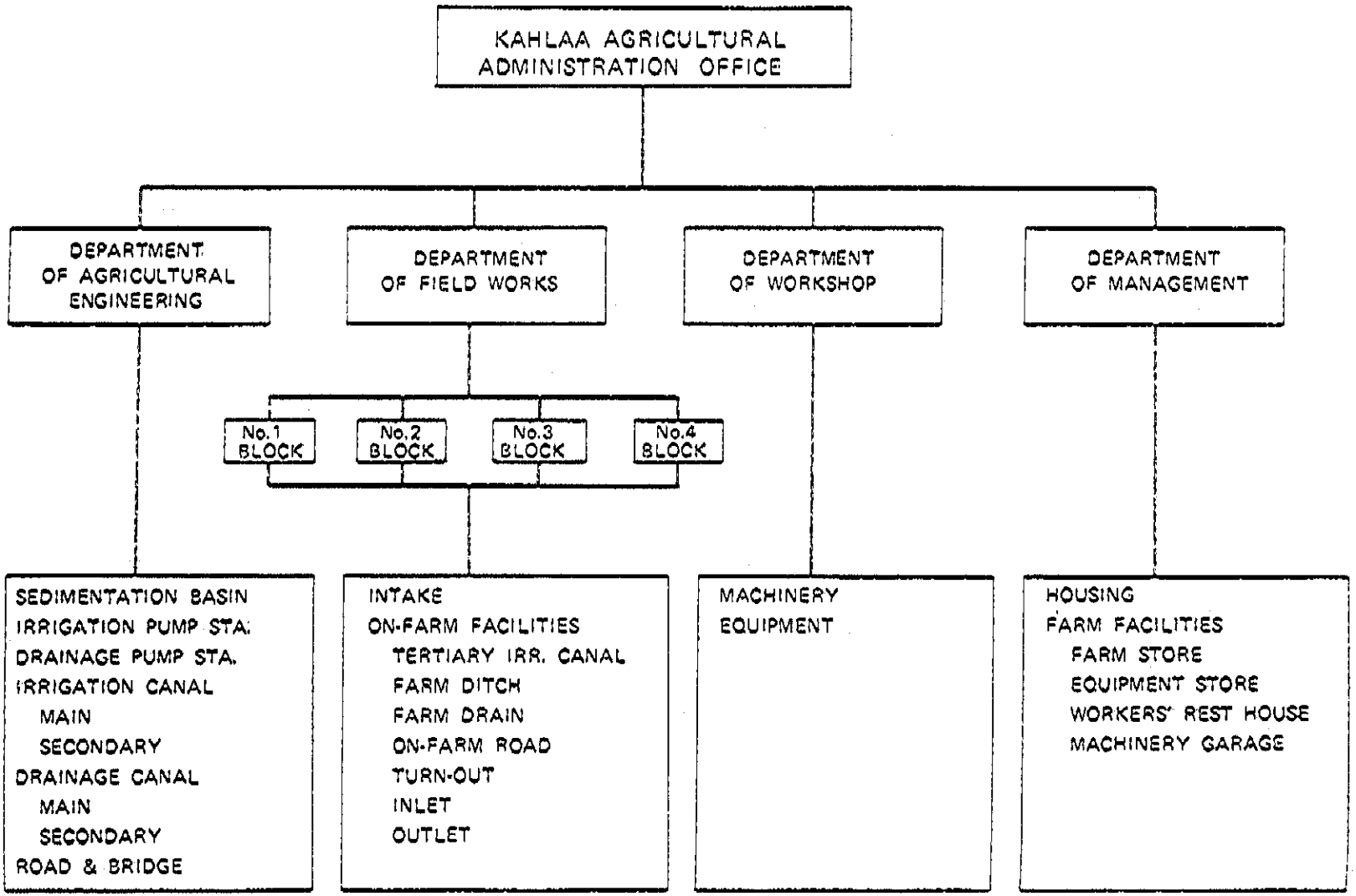
The operation and maintenance cost, after the completion of construction, would be estimated as follows:

Operation and Maintenance Cost Per Year

(Unit: '000 I.D.)

1) Salary and wage	
Farm management and administrative staff	107
Skilled laborers	21
Sub-total	128
2) Machinery and equipment for operation and maintenance (depreciation cost)	
For office	11
For experimental farm	1
For pumping stations	6
Sub-total	18
3) Fuel	72

FIGURE 5-3 PROPOSED ORGANIZATION FOR OPERATION AND MAINTENANCE



4) Materials

For canals	55	
" roads	7	
" buildings	14	
" aircraft runway	1	
Sub-total	77	
TOTAL	295	(47.5 I.D/ha = US$160)

D. Consulting Services

The Consultant's services include the implementation of final design and supervision of the Project.

The Consultant's services are divided into the following three phases:

1) The final detailed design of the Project as well as the preparation of tender documents. It will cover 12 months' period starting from January 1981. Highly qualified experts will be engaged including irrigation engineer, engineering geologist, design engineer, equipment engineer and economist.

2) Construction supervision and training of counterpart personnel in all phases of the Project activities. The service period would extend over 52 months from September 1982 to December 1986. The required experts would be two project engineers and an equipment engineer.

3) Establishment of farm management systems covering all the aspects of rice farm and training programs for the smooth management of the rice farm. It would cover 36 months starting from September 1984. Highly qualified experts will also be engaged, inclusive of agronomist, mechanical farm expert and farm management expert.

The Terms of Reference for the Consultant's Services and the required costs are given in Appendix 5D-1.

CHAPTER VI. PROJECT ECONOMIC EVALUATION

A. General

This Project has been taken up to fill the national economic need to establish a large-scaled state rice farm, to extend a large-scaled rice cultivation techniques and to increase the paddy rice production, a staple food in Iraq.

In general, project should be planned to obtain the maximum benefit with the minimum investment, or with an economical project cost. The Project should be evaluated based on its contribution extent to the national economy.

B. Method of Economic Evaluation

The measurable economic benefits and costs are expressed in monetary terms, and both streams of benefit and cost, in annual form, over an evaluation period are converted to the present values, respectively. Under the prevailing evaluation standards, a fifty-year limit of evaluation period might be well justifiable. The internal rate of return (IRR) is used as the main indicator in economic evaluation of projects. The project evaluation deals with incremental benefits and costs to clarify a difference between the "with the project" case and the "without the project" case.

C. Economic Evaluation

1. Economic Evaluation of Commodities and Labor Prices

In general, the traded goods are valued not in their domestic prices but in the international prices. Paddy and wheat are regarded as the traded goods at present and in future. These two commodities are valued in Tables 6-2 and 6-3.

Table 6-1 Demand and Supply Balance of Rice

Year	Supply of Rice: Cropped Area (1000ha)	Paddy Yield (ton/ha)	Paddy Volume (1000ton)	Rice Volume (1000ton)	Estimated Demand: Population (1000person)	Per Capita Rice Consumption 25kg (1000 ton)	20kg (1000 ton)	15kg (1000 ton)	Balance: Per Capita Rice Consumption 25kg (1000 ton)	20kg (1000 ton)	15kg (1000 ton)	Imported Rice (Statistics) (1000 ton)
1971	109.1	2.817	307	169	9,750	244	195	146	- 75	- 26	23	97
1972	94.1	2.848	268	147	10,070	252	201	151	-105	- 54	4	33
1973	64.0	2.448	157	86	10,410	260	208	156	-174	-122	- 70	16
1974	31.4	2.204	69	38	10,760	269	215	161	-231	-177	-123	138
1975	30.0	2.024	61	34	11,120	278	222	167	-244	-188	-133	120
1976	52.4	3.110	163	90	11,430	286	229	171	-196	-139	- 81	na
1977	63.5	3.156	199	109	11,750	294	235	176	-185	-126	- 67	na

Table 6-2 Paddy Rice Price Structure, 1979 and 1985

(Unit: I.D./ton)

Description	1979	1985
1) Export price of Thai 25 to 35% broken rice, f.o.b., Bangkok	95 (280US$)	100 (331US$)
2) Import price of rice, Basra	115	130
3) Milled rice price, the Project Area	110	125
4) Unhulled rice equivalent to the above-mentioned milled rice	60	75
5) Farm gate price of paddy	60	75
Financial farm gate price (Amber varieties second class rice)	(85)	(70)

The foreign exchange rate of one Iraqi Dinar is equal to 3.37778 US$1. The shaow exchange rate is equivalent to the reciprocal of standard conversion factor. The standard conversion factor has been estimated at 0.9 though basic information for this estimation is not sufficient.

The shadow exchange rate of one Iraqi Dinar is computed at 3.04 US$, accordingly.

Judging from the recent balance of demand and supply of rice, Iraq would be an importer of rice in future, too. (see Tables 6-1/2)

On the assumption that the annual growth rate of population and annual consumption per capita are 2.8% and 25 kg, the rice demand as of 1985 is computed about 366,000 tons. This rice is converted to unhulled paddy rice of 610,000 tons. Assuming, again, that the yield per hectare of paddy ranges from 3.5 tons to 4.0 tons, the cropping area necessary to produce such quantity of paddy is 179,000 ha to 152,000 ha. If the cropping area or yield per hectare is smaller than the above-mentioned figures, teh import of rice will be still necessary.

The farm gate price of paddy could be evaluated at the export price of Thai 25 to 35% broken rice, f.o.b., Bangkok, forecasted by the World Bank, that is, 280 US$ per ton as of 1979 and 331 US$ per ton as of 1985. As indicated in the following table, the financial farm gate price of paddy (domestic price) is higher than the economic gate price (shadow price).

Iraq imported wheat of 672,000 tons in 1974 and 512,000 tons in 1975. These tonnages are equivalent to 60% to 50% of the gross wheat production in Iraq, respectively. Wheat production in Iraq has not yet stabilized and its yield per unit area has still remained low due to saline soils and shortage of irrigation water.

On the assumption that wheat yield per hectare increases from 0.8 tons at present to 1.5 tons in 1985, Iraq will be no more wheat importer even if the present wheat cropping area is not expanded. However, a sharp increase of yield might be difficult.

Taking into account the above-mentioned balance, wheat has been regarded as a trade commodity in the economic study. The economic farm gate price of wheat has been computed as follows in the same manner applied in computation of the economic farm gate price of rice.

Table 6-3. Price Structure of Wheat, 1979 and 1985

(Unit: I.D/ton)

		1979	1985
1)	Canadian wheat (Western Red Spring), export price at Thunder Bay warehouse	60 (170 US$)	70 (204 US$)
2)	Export price at Basra port	75	85
3)	Economic farm gate price of wheat	70	80
4)	Financial farm gate price		
	(Sabar Bar)	(51)	(70)
	(Mexi Bag)	(47)	

Reportedly, one-third of fertilizers produced in Iraq has been domestically consumed, and the rest of two-third has been exported to the other Arabic countries. The domestic demand for fertilizers will increase to a degree, but it is said that Iraq has a sufficient fertilizer producing capacity to meet such demand. Fertilizers in Iraq are subsidized. Therefore, their economic prices have been computed in the way to add the subsidized amounts.

To compute the economic prices of agricultural input and output excluding rice, wheat and labor, their domestic market prices have been converted to the border prices by multiplying them by the standard conversion rate.

Application of pylazorate type herbicide with low toxicity has been proposed in the farm operation plan. Pylazorate type herbicide is more expensive than satan type ones since its development is on the way. In this economic evaluation, the price of the latter has been applied. The former is dealt with in the sensitivity analysis hereinafter.

Farm labor is interpreted as unskilled labor. The shadow wage rate of unskilled labor is considered the total value of the following amounts: i) an opportunity cost of labor employed in a new project, that is, a value of marginal products to be decreased in a former productive section, ii) an investment value to be decreased due to an additional consumption of labor employed in the new project, and iii) an incremental of consumption.

The determination of the national parameters is prerequisite for this computation. However, such parameters are not available in Iraq.

Taking into consideration the present favorable financing conditions in Iraq, the shadow wage rate is presumed to be close to the value of marginal products.

Farmers in and around the Project Area will be employed as laborers in this rice farm. The opportunity cost in this employment might be considered the present agricutural income. The farm household economy survey made in the feasibility study revealed that the agricultural income per capita is 0.8 I.D. per day. The agricultural labor wage of 1.0 I.D. at present is decided by the government. It can not be stated positively that this rate is the actual market price of labor, though, in a socialist country the demand and supply

of labor are controlled by the government. But the rate will be interpreted to be the market price of labor. Under the situations, the shadow labor wage rate could be assumed at 0.8 I.D.

2. Evaluation of Benefit

The incremental benefit should be estimated in the economic evaluation. Cropping areas in the summer of 1977 and in the winter of 1977/78 are shown in Tables 3-1 and 3-2.

In this study, the cropping areas and yield shown in the above-mentioned tables have been assumed to continue in future, too, for convenience, if the Project is not implemented.

The actual benefited area in each year should be decided based on the proposed construction schedule. According to the schedule, on-farm development of 6,210 ha will be completed in three-year period in the whole area. The full benefit will be attained in the 13th year, 1991, from 1979 when the feasibility study was conducted, if the construction starts in 1981 as scheduled.

Table 6-4 indicates the cropping area by crops after implementation of the Project.

Table 6-4. Cropping Area in case of "With the Project"

(Unit: ha)

Crop	1986	1987	1988	1989	1990	1991
Paddy	2,780	4,840	6,210	6,210	6,210	6,210
(Summer, total)	2,780	4,840	6,210	6,210	6,210	6,210
Wheat	460	780	1,000	1,000	1,000	1,000
Barley	460	780	1,000	1,000	1,000	1,000
(Winter, total)	920	1,560	2,000	2,000	2,000	2,000
Total Area	3,700	6,400	8,210	8,210	8,210	8,210
Gross production (ton)	8,822	18,432	26,653	30,735	32,560	33,245

The production cost of crops has been estimated based on input material price such as seeds, fertilizers and chemicals, etc. The operation cost of machinery consists of fuel, repair, depreciation costs and drivers' wage. The machinery cost is counted, in general, in the benefit flow, and the purchasing cost of farm machinery is not counted in the cost flow. In this study, the depreciation cost is, however, not included in the production cost. Therefore, the purchasing cost of farm machinery and replacement cost is accounted in the cost flow.

The unskilled labor cost has been counted in the production cost by applying the shadow price. The salaries of administrative officers and skilled laborers have been counted in the cost flow. The following table shows the annual incremental net production values.

Table 6-5 Incremental Net Production Value
(Paddy Target Yield 4.5 ton)

(Unit: '000 I.D.)

Item	1986*/	1987	1988	1989	1990	1991
With Project						
Gross Production Value	642	1,337	1,936	2,239	2,374	2,426
Production Cost	125	235	319	346	354	358
Net Production Value	517	1,102	1,617	1,893	2,020	2,068
Without the Project						
Gross Production Value	153	155	157	159	161	163
Production Cost	46	47	47	48	48	49
Net Production Cost	107	108	110	111	113	114
Incremental Net Production Value	410	994	1,507	1,782	1,907	1,954
Unskilled Labor Cost	24	42	53	53	53	53
Incremental Net Production Value	386	952	1,454	1,729	1,854	1,901

Note: */: The first cultivation year

3. Evaluation of the Project Cost

The cost flows are categorized into the Project cost, operation and maintenance cost and replacement cost. The project cost consists of the cost items of civil works, facilities, machinery and equipment, project administration and consulting services. The civil works include all work items required for civil works. The construction cost does not include the interest during the construction period. The land acquisition cost is not considered because this Project aims to develop a state rice farm.

The international inflation index of the World Bank has been applied to the price escalation in the foreign currency portion whereas the price escalation in the local currency portion has been estimated based on recent price indices of construction materials and labor, etc. For convenience sake, the price escalation rate in the Project has been determined at nine percent in this study weighing by the percentages of foreign and domestic currency amounts.

The depreciation cost of construction machines was computed based on their operation hours and included in the construction cost. Therefore, it was re-estimated to compute a yearly fixed depreciation cost. The unskilled labor cost has been re-evaluated by applying the shadow wage rate.

The operation cost has been estimated based on official salaries, skilled labor wages, depreciation costs of office, equipment and instruments for operation and maintenance and pump station, fuel cost, operation costs for canals, roads and buildings and material costs.

Some officers and skilled laborers will be mobilized to this rice farm from existing organizations, etc. Salaries and wages of such persons are not regarded as an incremental cost from the viewpoint of national economy.

The replacement cost has been estimated for farm machine, irrigation and drainage pump. The following table shows the cost flows:

Table 6-6. Project Economic Cost

(Unit: '000 I.D.)

Project Cost	1981 (1st)	1982 (2nd)	1983 (3rd)	1984 (4th)	1985 (5th)	1986 (6th)	1987 (7th)	Total
Financial Cost	270	2,062	5,352	3,189	4,940	4,102	356	20,271
Economic Cost	267	631	4,113	3,189	5,030	4,272	644	18,206

D. Economic Internal Rate of Return

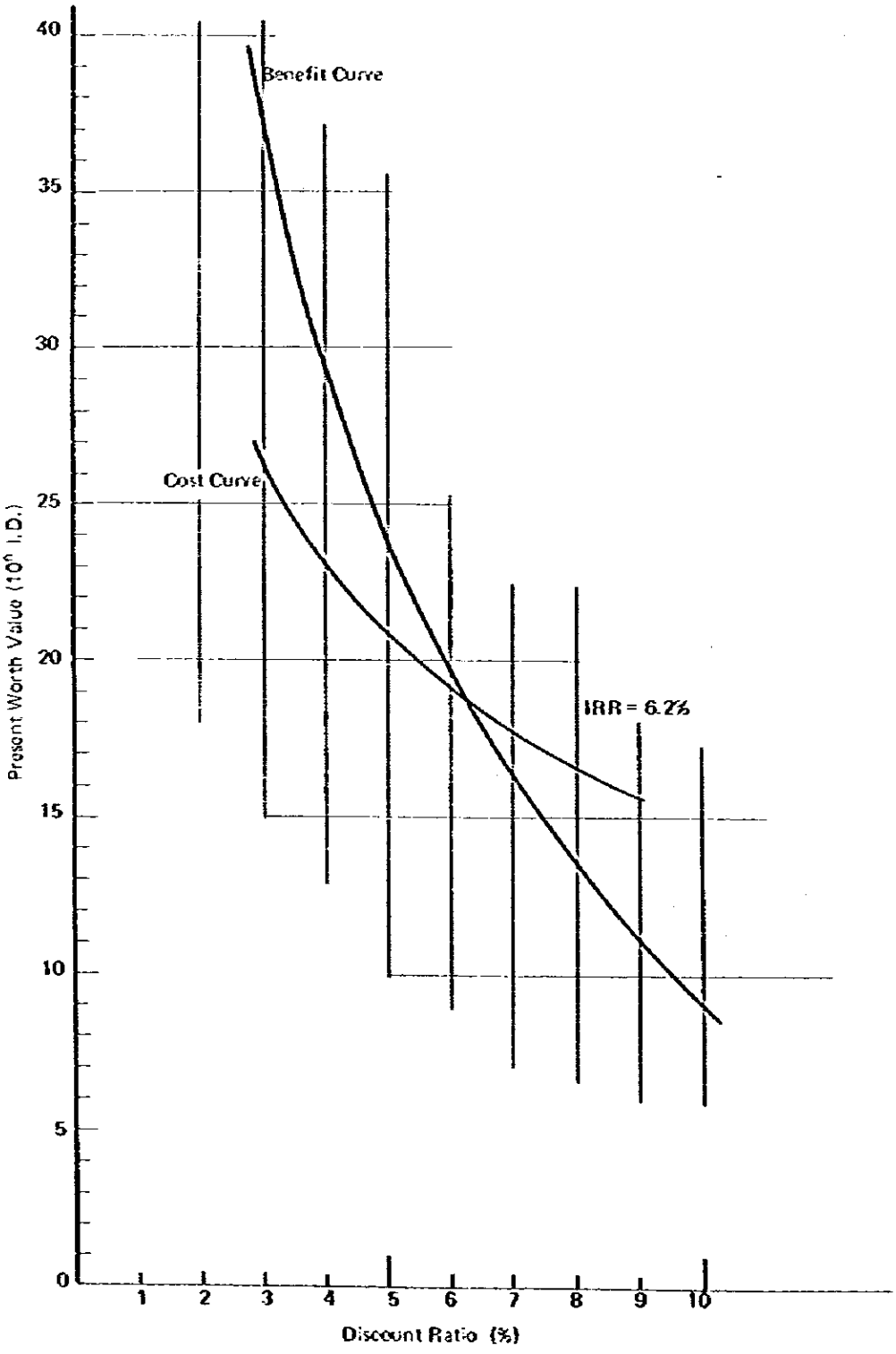
The present worth values of the economic costs and benefits have been estimated with the discount rate of 3%, 5%, and 8%. The following table indicates the present values thus estimated and the economic internal rate of return of 6.2%.

Table 6-7. Economic Internal Rate of Return

Discount Rate	3%	5%	8%
Benefit I.D. x 10^6	36.86	23.54	13.25
Cost I.D. x 10^6	26.49	21.14	16.39
B/C	1.39	1.11	0.81
Economic Internal Rate of Return			6.2%

When international financing agencies such as the World Bank and Asian Development Bank loan to a project in the Southeast Asian developing countries, they apply the appraisal standard of the economic internal rate of return ranging from 12% to 14% or more with the cost-benefit ratio of 1.0 or more. It means that, if the cost-benefit ratio of that project is less than 1.0, the loan with an interest rate of 12 to 14% is already risky for such financing agencies. From this point of view, the economic internal rate of return of this Project is

FIGURE 6-1 ECONOMIC INTERNAL RATE OF RETURN



too low to obtain a loan from the above-mentioned financing agencies.

However, Iraq has rich oil dollar, and does not need loans to the Project from outside. Under the situations, it is not rational, from the economic point of view, to apply the international rate of return of such a high percent as mentioned above to this Project.

The appraisal standard of the Ministry of Irrigation in investment is the cost-benefit ratio method with the interest ratio of 5%. Therefore, this Project is feasible, under the prevailing domestic appraisal standard premising that the rice farm can produce paddy of 4.5 ton per hectare as the following figure (Fig. 6-1) indicates.

The rice processing and storage facilities are not taken into consideration in computation of the Project cost but the economic evaluation was conducted in the sensitivity analysis.

E. Sensitivity Analysis

The sensitivity analysis has been conducted on the following items.

The Internal Rate of Return in Sensitivity Analysis

	Item	Internal Rate of Return
1)	10% increase of the paddy target yield (4.5 ton/ha)	7.2%
2)	10% decrease of the paddy target yield	4.8%
3)	Use of pylazorate type herbicide	5.6%
4)	10% decrease of the construction cost	7.1%
5)	20% decrease of the construction cost	8.0%
6)	When the purchasing cost of construction machines is included.	5.4%
7)	When the cost of rice processing and storage facilities is included.	4.4%

F. Financial Analysis

This rice farm requires in its establishment the capital investment of 20,271 thousand of Iraq Dinar (excluding price escalation). The rice farm economy in the full benefit stage will be as follows:

Table 6-8. State Farm Economy in Full Benefit Stage

(Unit: '000 I.D.)

Item	Value
Gross farm income per annum	2,265
Production cost per annum	
Input materials	309
Operation cost of farm machines (inclusive of depreciation cost)	208
Salary and wage	193
Operation and maintenance cost	167
Interest	25
Sub-total	902
Net farm income	1,363

The annual net farm income of 1,363 thousand Iraqi Dinars corresponds to the return of 6.7% to the capital investment. It is expected that this rice farm will be operated as a commercial enterprise with the self-financing account investment. The profit accured from the Project should cover the following requirements:

i) Re-investment for development of further profitability and improvement of farm operation efficiency;
ii) Replacement of farm machinery and equipment;
iii) Repayment to the national treasury a part of the capital cost to be recovered;
iv) Payment of some charges like cooperation tax, etc.; and,
v) Payment of bonus or high wages to the rice farm staff and laborers to stimulate their willingness for production.

The analysis of annual net cash balance is shown in Table 6-10. The negative balance will continue until the seventh year, and from the seventh year, the balance will convert to be positive with the estimated annual net income of 1,453 thousand I.D. However, the accumulated negative balance will continue until the 20th year even if the interest is not taken into account. In the 21th year, the accumulated balance will convert from the negative to the positive.

The figures in Table 6-10 have been estimated on the assumption that the civil works expenditure of 10,836 thousand Iraqi Dinars for the rice farm construction exclusive of the contingency will be recovered by this rice farm itself.

The financial internal rate of return is evaluated as follows:

Table 6-9. Financial Internal Rate of Return

Discount Rate		5%	8%	10%
° In case that all the capital cost is recovered by the rice farm				
Inflow	I.D. x 10^6	29.1	11.6	12.1
Outflow	I.D. x 10^6	26.8	20.5	17.9
B/C		1.08	0.81	0.68

Financial internal rate of return 6.0%

Table 6-10 Financial Forecast for the State Rice Farm (Standard Price Rate as of 1979)

(Unit: '000 I.D.)

Year	1981 1	1982 2	1983 3	1984 4	1985 5	1986 6	1987 7	1988 8	1989 9	1990 10	1991 11	1992 12	1993 13	1994 14
Cost Flow														
(1) Capital Investment														
Civil Works	7	-	2,949	2,045	3,238	2,597	-	-	-	-	-	-	-	-
Construction/O.M Equipment	-	1,296	1,296	199	-	-	-	-	-	-	-	-	-	-
Building & Facilities	-	344	345	-	-	-	-	-	-	-	-	-	-	-
Farm Machinery	-	-	25	361	809	583	-	-	-	-	-	-	-	-
Office Management	2	50	104	98	190	173	29	-	-	-	-	-	-	-
Consulting Services	225	13	40	126	113	146	-	-	-	-	-	-	-	-
Contingency	24	188	486	290	450	373	32	-	-	-	-	-	-	-
Sub-total (A)	258	1,891	5,245	3,119	4,800	3,872	61	-	-	-	-	-	-	-
(2) O/M Cost														
Salaries & Wages	12	15	16	36	70	102	117	128	128	128	128	128	128	128
Machinery & Equipment	-	-	-	1	20	60	90	90	90	90	90	90	90	90
Materials	-	-	17	33	50	68	77	77	77	77	77	77	77	77
Sub-total (B)	12	15	33	70	140	230	284	295	295	295	295	295	295	295
(3) Production Cost (C)	-	-	-	-	-	197	359	478	505	513	517	517	517	517
(4) Total Cost (D) (D = A + B + C)	270	1,906	5,278	3,189	4,940	4,299	704	773	800	808	812	812	812	812
Benefit Flow														
(5) Total Income accrued from Agri. Products (E)	-	-	-	-	-	599	1,249	1,808	2,090	2,217	2,265	2,265	2,265	2,265
(6) Net Cash Balance														
(E - D)	(270)	(1,906)	(5,278)	(3,189)	(4,940)	(3,700)	545	1,035	1,290	1,409	1,453	1,453	1,453	1,453
Accumulated Amount	(270)	(2,176)	(7,454)	(10,643)	(15,583)	(19,283)	(18,733)	(17,703)	(16,413)	(15,004)	(13,551)	(12,098)	(10,645)	(9,192)

Note: 1/ The production cost includes the depreciation cost of farm machinery.

2/ The parenthesized figures of the net cash balance are in red.

(continued)

(Unit: '000 I.D.)

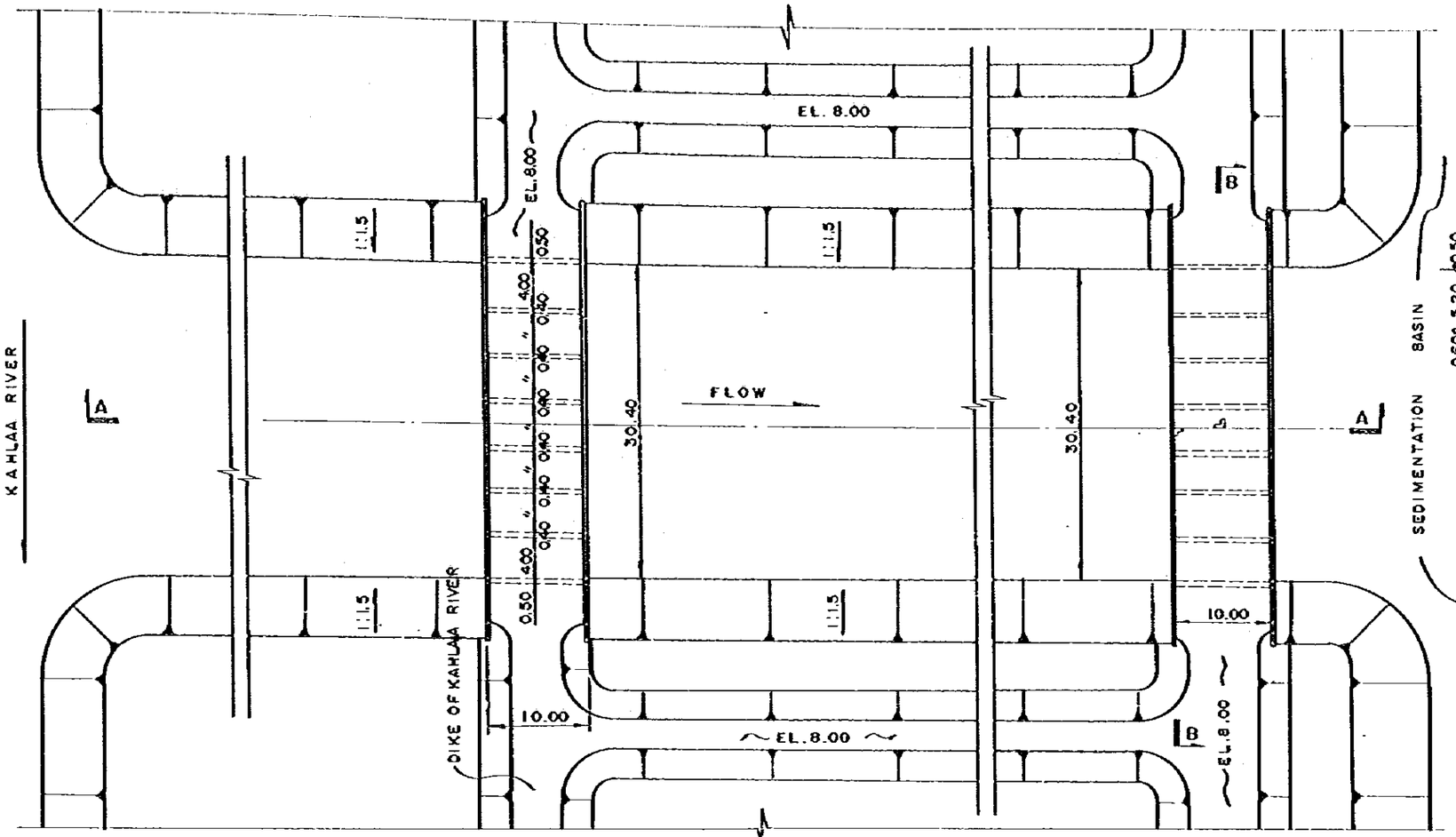
Year	1995 15	1996 16	1997 17	1998 18	1989 19	20	21
Cost Flow							
(1) Capital Investment							
Civil Works	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Building & Facilities	-	-	-	-	-	-	-
Farm Machinery	-	-	-	-	-	-	-
Office Management	-	-	-	-	-	-	-
Consulting Services	-	-	-	-	-	-	-
Contingency	-	-	-	-	-	-	-
Sub-total (A)	-	-	-	-	-	-	-
(2) O/M Cost							
Salaries & Wages	128	128	128	128	128	128	128
Machinery & Equipment	90	90	90	90	90	90	90
Materials	77	77	77	77	77	77	77
Sub-total (B)	295	295	295	295	295	295	295
(3) Production Cost (C)	517	517	517	517	517	517	517
(4) Total Cost (D) (D = A + B + C)	812	812	812	812	812	812	812
Benefit Flow							
(5) Total Income Accrued from Agri. Products (E)	2,265	2,265	2,265	2,265	2,265	2,265	2,265
(6) Net Cash Balance							
(E - D)	1,453	1,453	1,453	1,453	1,453	1,453	1,453
Accumulated Amount	(7,739)	(6,286)	(4,833)	(3,380)	(1,927)	(474)	979

G. Indirect Benefits of the Project

Indirect benefits should be taken into account in the economic evaluation of the Project. The following impacts might be pointed out in the national and provincial economic aspects;

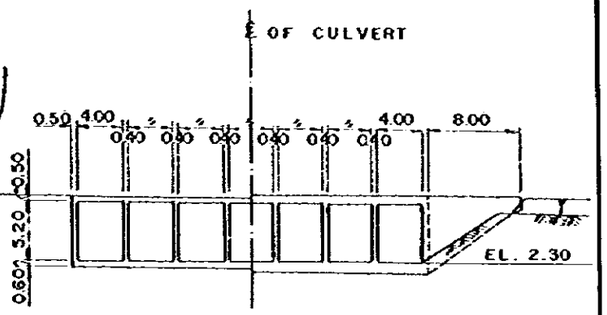
1) Successful implementation of the Project and operation and management of this rice farm would be a model for future agricultural development in the socialistic sector in Iraq. It will be proved that a higher productivity of labor in paddy production through a big investment to land for leaching and farm machinery can be realized in the Governmental projects.
2) Missan province will occupy a bigger share in rice production in Iraq with the increased rice production accrued from the Project, and much contribute to the national food policy.
3) Farmers now living in the Project Area will be employed by the state rice farm as laborers. If a part of the profits made in the Project is paid to such laborers for a higher wage rate, the farmers will have much stabilized life than present.
4) Heavy farm machinery and fertilizers to be used in the Project will contribute to the development in the related secondary industries in Iraq.
4) The import of rice and wheat will be decreased to an extent.

LIST OF DRAWINGS



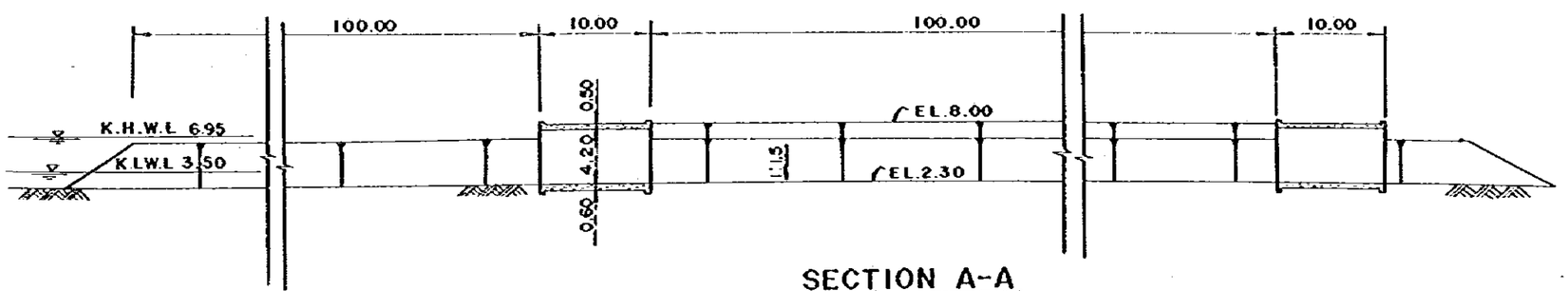
PLAN

S = 1 : 500



SECTION B-B

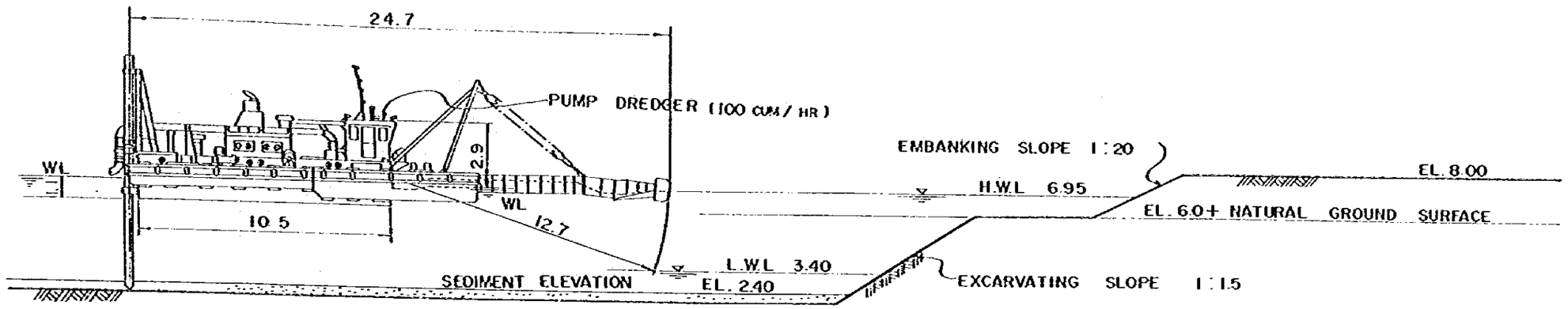
S = 1 : 500



SECTION A-A

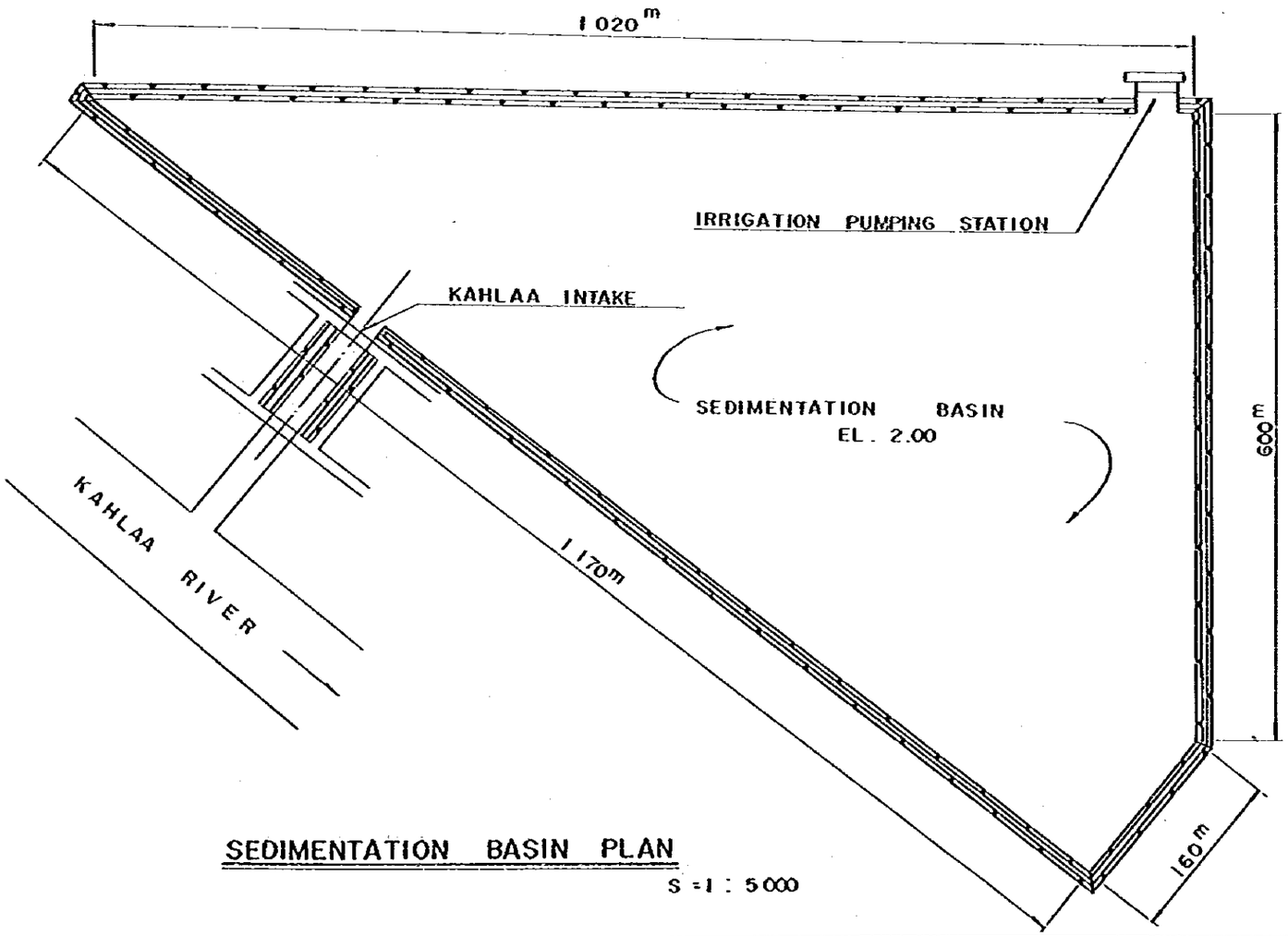
S = 1 : 500

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
DESIGN OF KAHLAA INTAKE	
DRAWING NO.	1
JAPAN INTERNATIONAL COOPERATION AGENCY	



SEDIMENTATION BASIN DESIGN

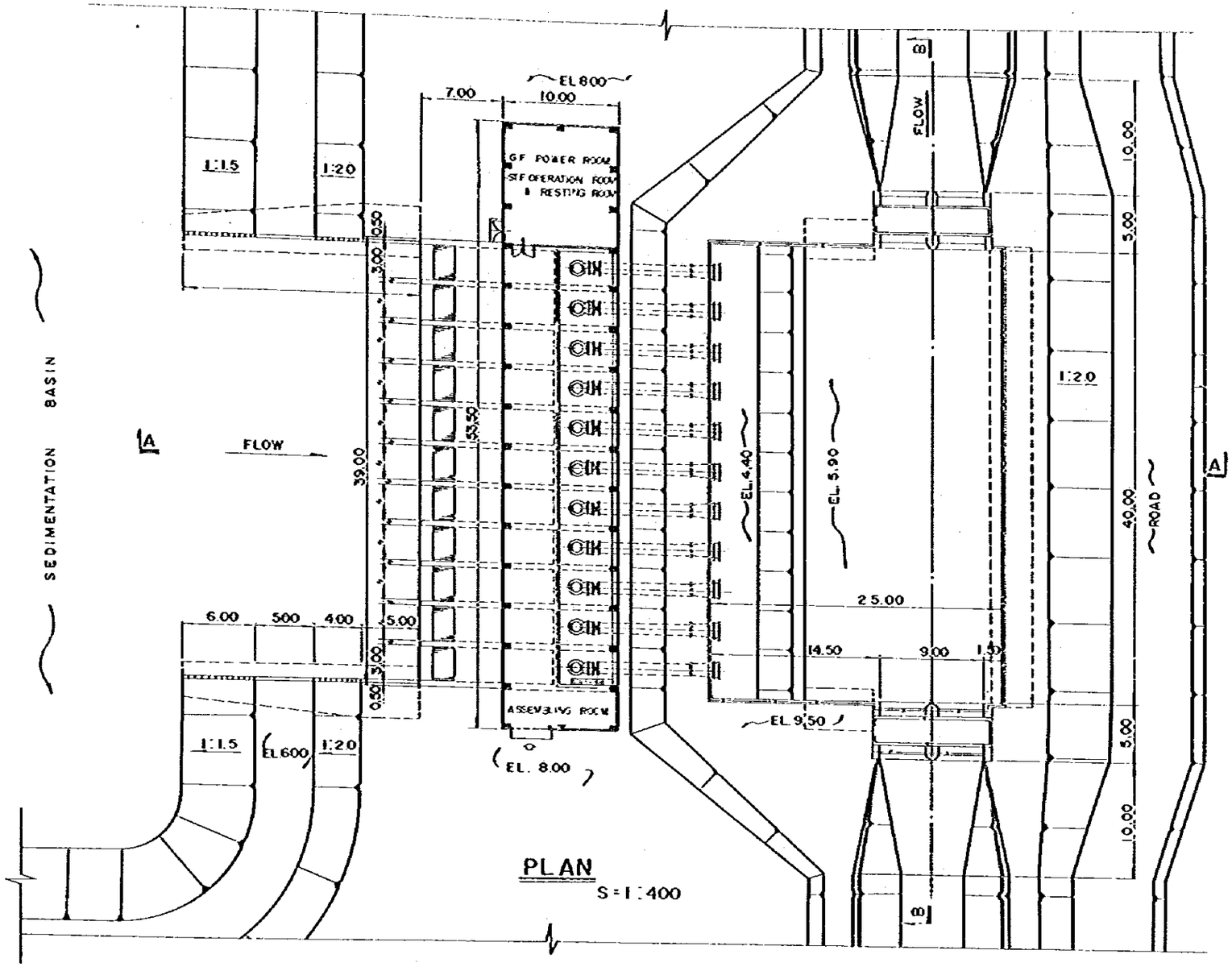
S = 1 : 200



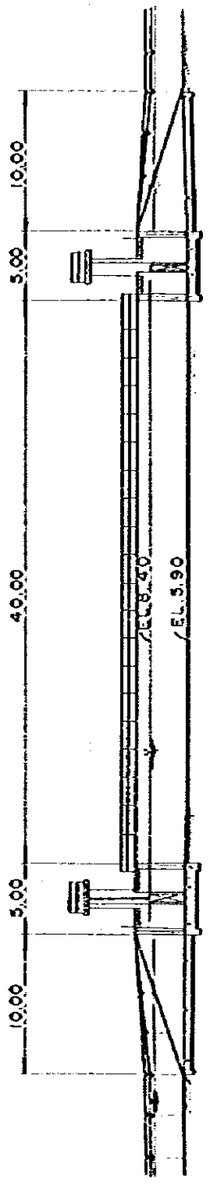
SEDIMENTATION BASIN PLAN

S = 1 : 5000

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
LAYOUT OF SEDIMENTATION BASIN	
DRAWING NO.	2
JAPAN INTERNATIONAL COOPERATION AGENCY	

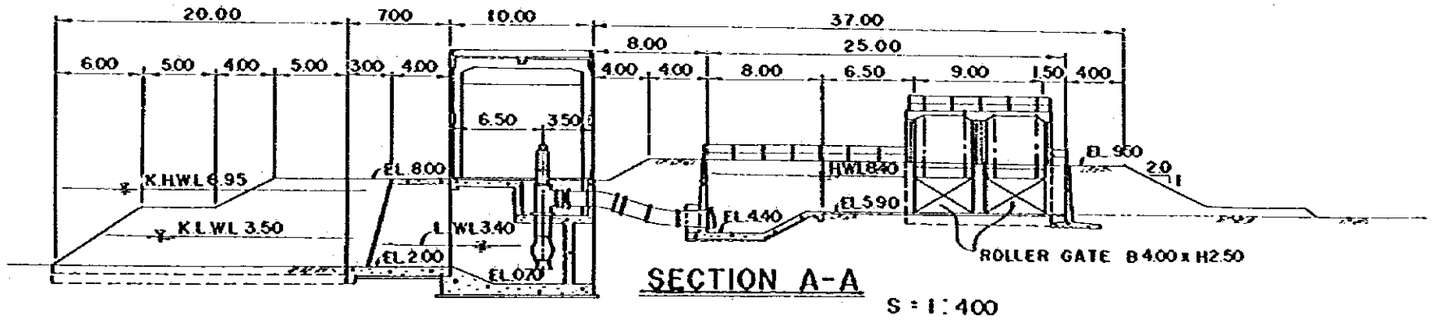


PLAN
S = 1 : 400



SECTION B-B
S = 1 : 400

ITEM		DIMENSION
PUMP TYPE		VERTICAL MIXED FLOW TYPE
NUMBER OF PUMPS	NO.	11
PUMP BORE	mm	ϕ 1000
PUMP CAPACITY	$0.3m^3/s$	2.43
TOTAL HEAD	m	5.60
PRIME MOVER		MOTER
MOTOR OUTPUT	KW	200



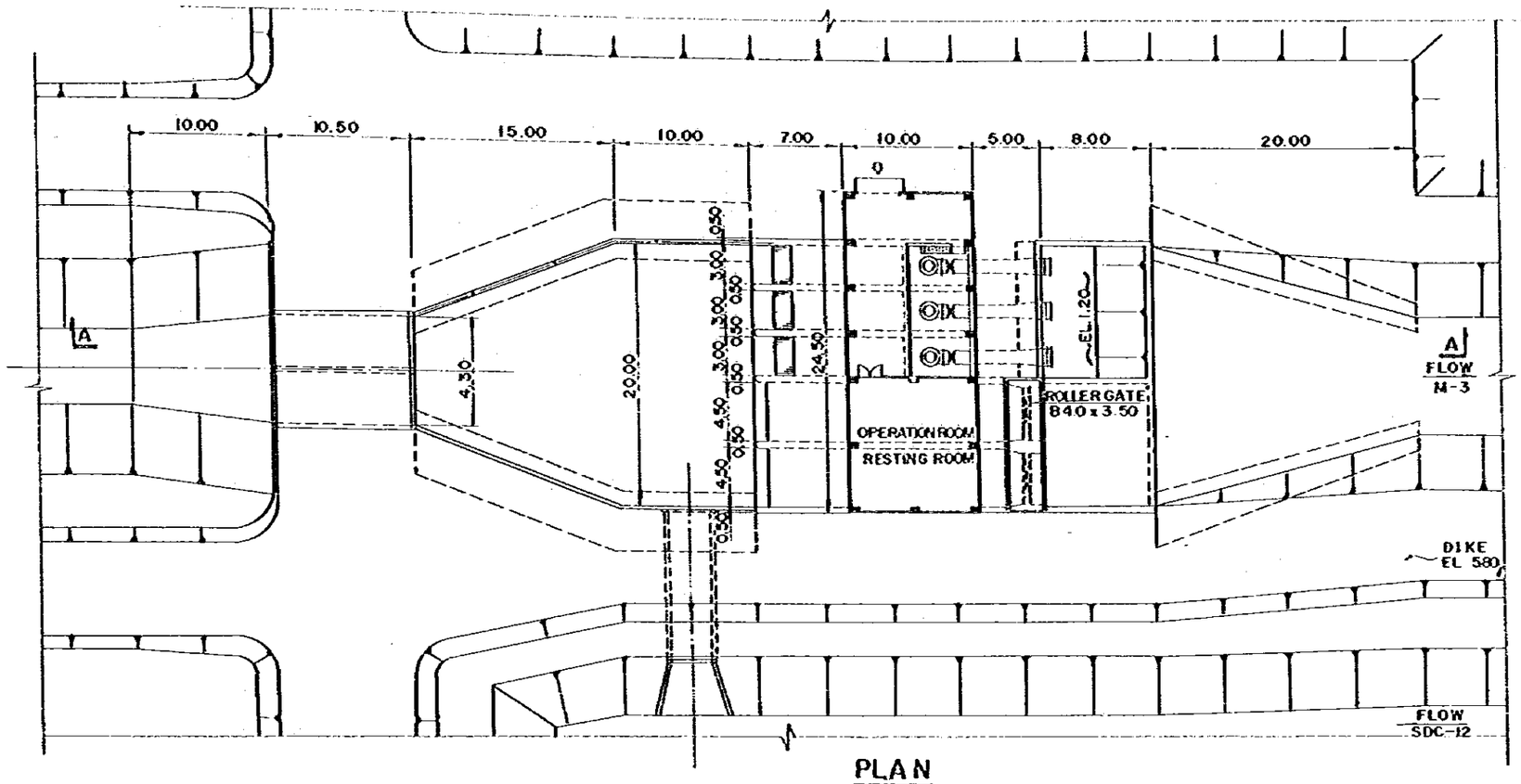
SECTION A-A
S = 1 : 400

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

LAYOUT OF IRRIGATION PUMPING STATION

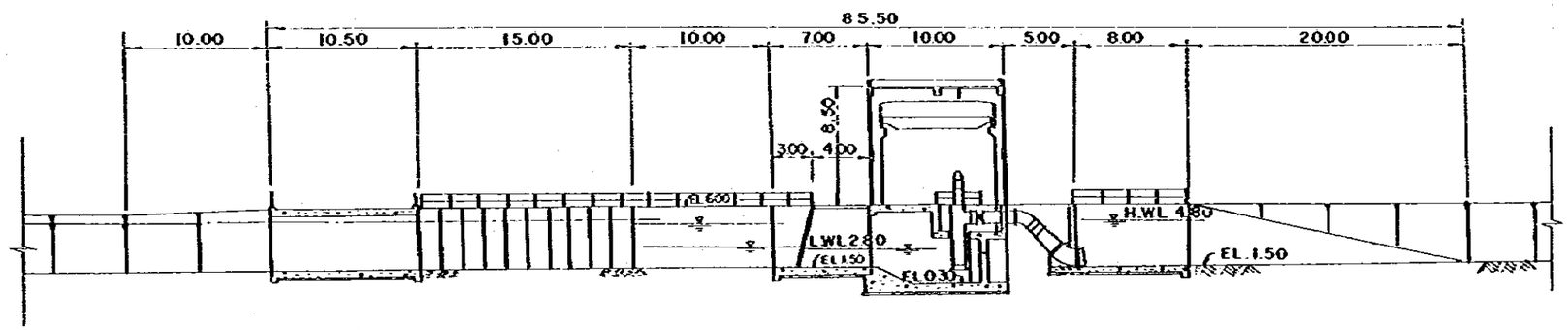
DRAWING NO. 3

JAPAN INTERNATIONAL COOPERATION AGENCY



PLAN

S = 1 : 400



SECTION A-A

S = 1 : 400

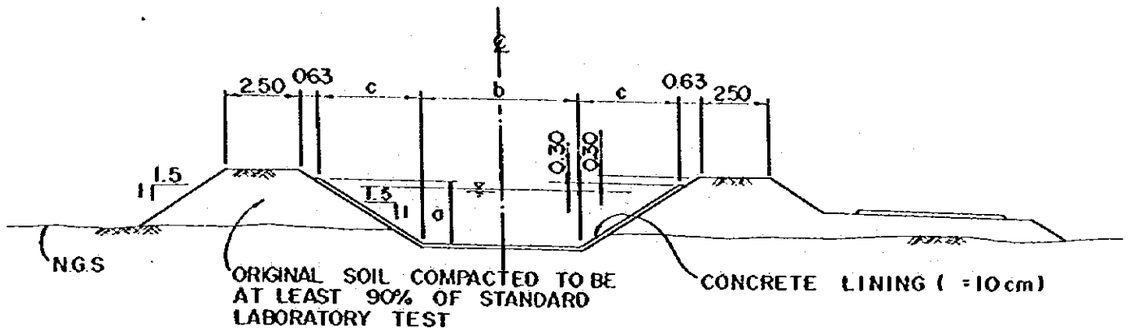
ITEM		DIMENSION
PUMP TYPE		VERTICAL AXIAL FLOW TYPE
NUMBER OF PUMPS	NO.	3
PUMP BORE	mm	ϕ 900
PUMP CAPACITY	$0.m^3/s$	1.79
TOTAL HEAD	m	2.20
RRIME MOVER		MOTER
MOTOR OUTPUT	KW	60

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

LAYOUT OF DRAINAGE PUMPING STATION

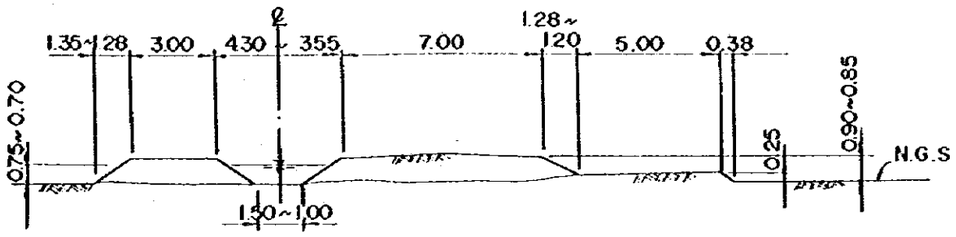
DRAWING NO. 4

JAPAN INTERNATIONAL COOPERATION AGENCY



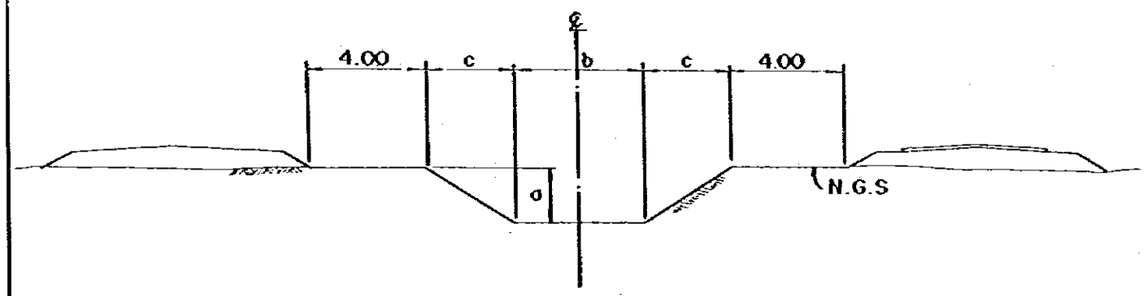
MAIN AND SECONDARY IRRIGATION CANEL

S = 1 : 200



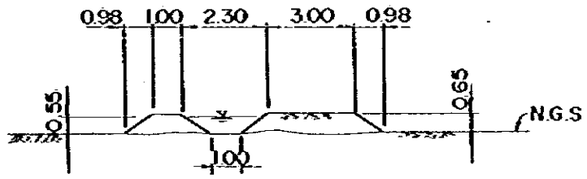
TERTIARY IRRIGATION CANAL

S = 1 : 200



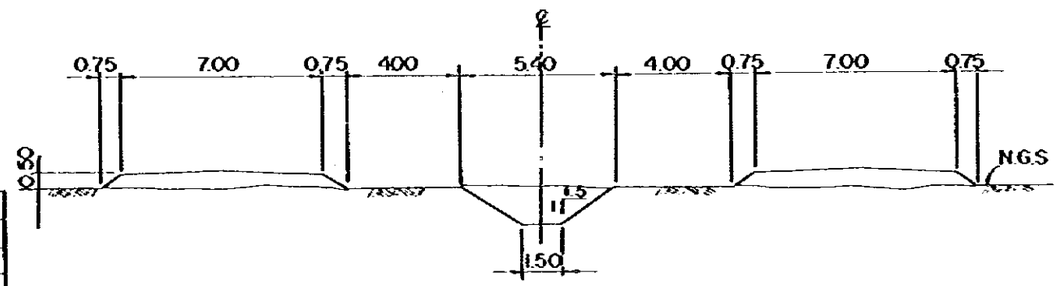
MAIN AND SECONDARY DRAINAGE CANAL

S = 1 : 200



FARM DITCH

S = 1 : 200



FARM DRAIN

S = 1 : 200

IRRIGATION CANAL					DRAINAGE CANAL									
NAME	a	b	c	LENGTH	NAME	a	b	c	LENGTH	NAME	a	b	c	LENGTH
MIC-1-1	2.00	6.40	3.00	2.7	MDC-1	3.00	4.00	4.50	7.0	SDC-10	1.60	1.50	2.40	1.4
MIC-1-2	1.50	4.10	2.25	2.8	MDC-2	3.00	5.50	4.50	6.6	SDC-11	1.60	1.50	2.40	0.7
MIC-2-1	2.00	5.50	3.00	3.7	MDC-3	1.70	9.00	2.55	2.1	SDC-12	1.60	1.50	2.40	1.5
MIC-2-2	1.60	4.50	2.40	4.4	SDC-1	1.65	1.50	2.78	3.1	SDC-13	1.85	3.00	2.78	7.0
SIC-1-1	1.60	4.50	2.40	6.2	SDC-2	1.90	4.00	2.85	4.1	SDC-14	1.85	2.00	2.78	2.1
SIC-1-2	1.20	2.00	1.80	8.0	SDC-3	2.30	4.50	3.45	5.4					
SIC-1-3	1.50	2.50	2.25	2.6	SDC-4	1.90	4.00	2.85	6.7					
SIC-1-4	1.20	2.10	1.80	1.7	SDC-5	2.10	4.50	3.15	5.0					
SIC-2-1	1.50	3.50	2.25	5.0	SDC-6	1.85	2.00	2.78	5.0					
SIC-2-2	1.20	2.60	1.80	1.8	SDC-7	1.85	3.00	2.78	2.3					
SIC-2-3	1.50	2.50	2.25	2.3	SDC-8	1.60	1.50	2.40	0.3					
SIC-2-4	1.20	2.60	1.80	3.4	SDC-9	1.60	1.50	2.40	1.4					

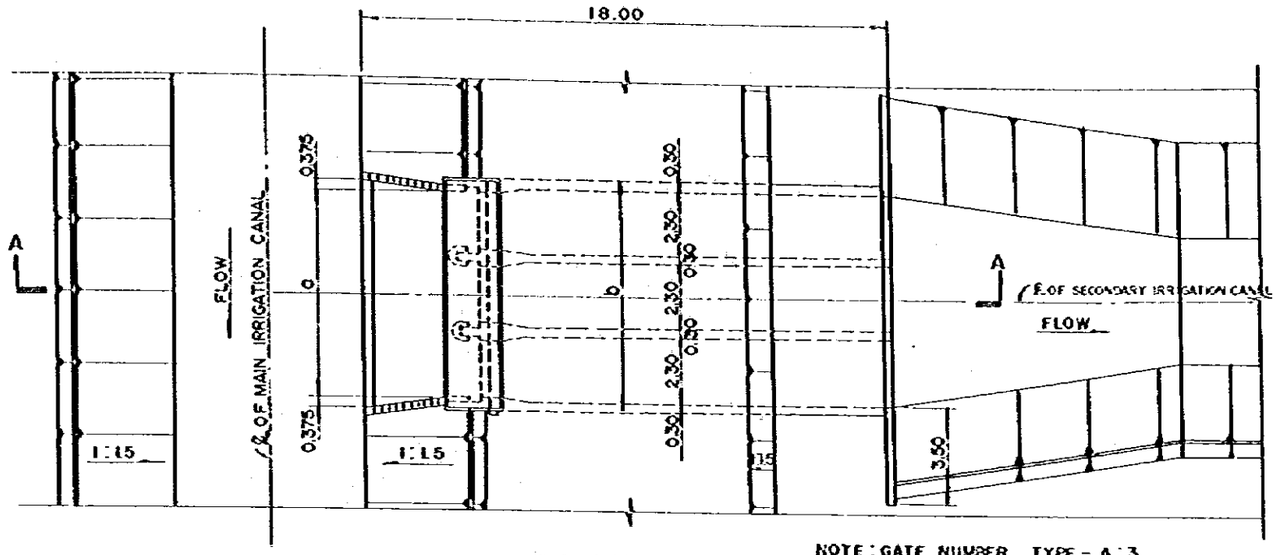
UNIT a, b, c ; m
LENGTH ; Km

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

TYPICAL SECTION OF IRRIGATION AND DRAINAGE CANAL

DRAWING NO. 5

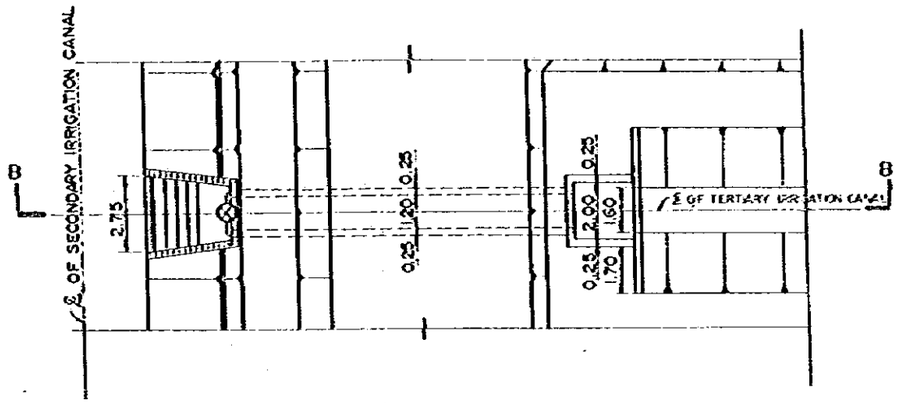
JAPAN INTERNATIONAL COOPERATION AGENCY



PLAN

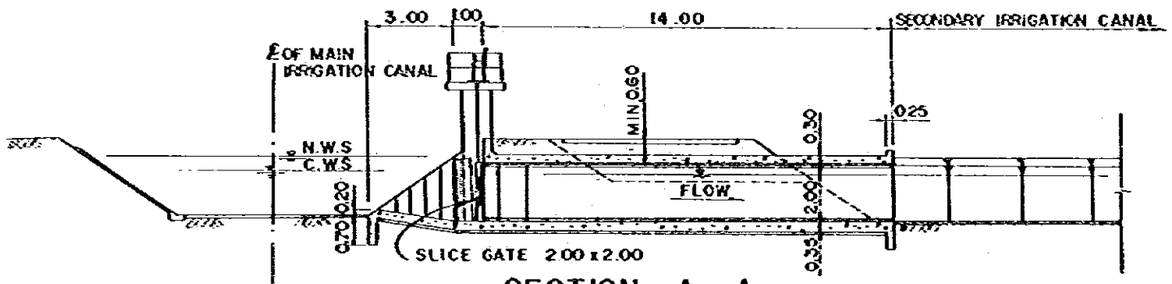
S = 1 : 200

NOTE : GATE NUMBER TYPE - A : 3
TYPE - B : 2



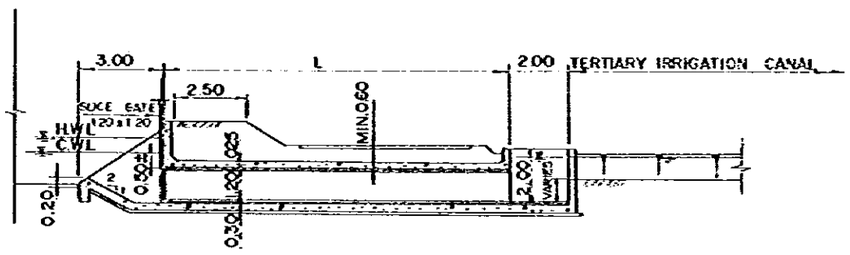
PLAN

S = 1 : 200



SECTION A - A

S = 1 : 200



SECTION B - B

S = 1 : 200

(UNIT ; m)

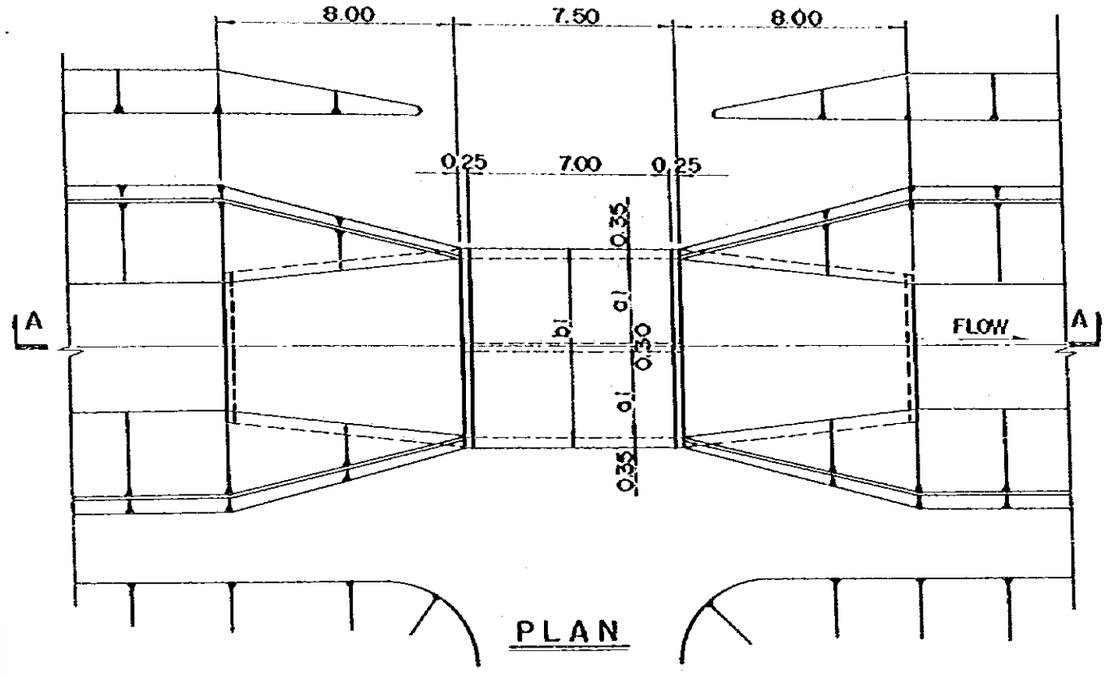
TYPE	a	b	L	GATE NUMBERS	NUMBERS
A	7.20	8.10	—	3	2
B	4.60	5.50	—	2	6
C	—	—	12.0	1	18
D	—	—	5.0	1	17

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

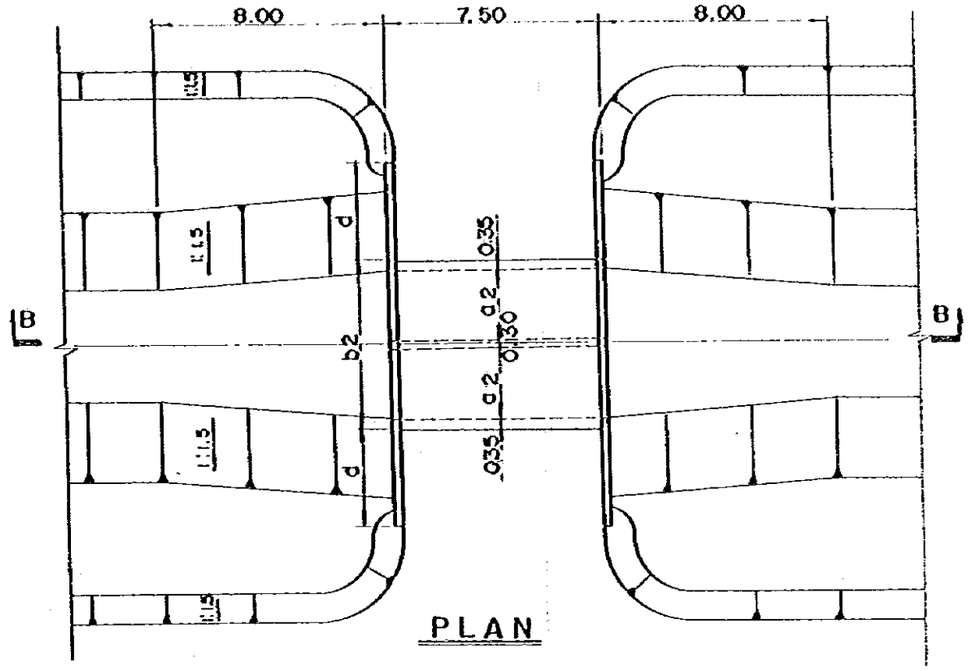
TYPICAL DESIGN OF DIVERSION BOX IN MAIN AND SECONDARY IRRIGATION CANAL

DRAWING NO. 6

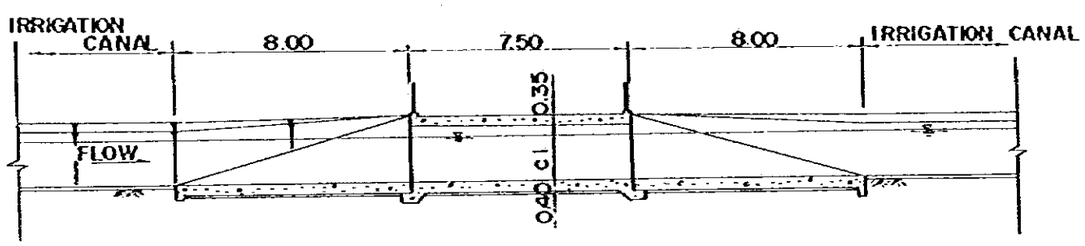
JAPAN INTERNATIONAL COOPERATION AGENCY.



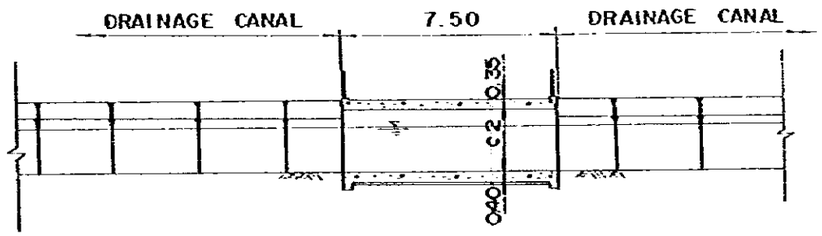
PLAN



PLAN



SECTION A-A



SECTION B-B

ROAD CROSSING FOR IRRIGATION CANAL

S = 1:200

ROAD CROSSING FOR DRAINAGE CANAL

S = 1:200

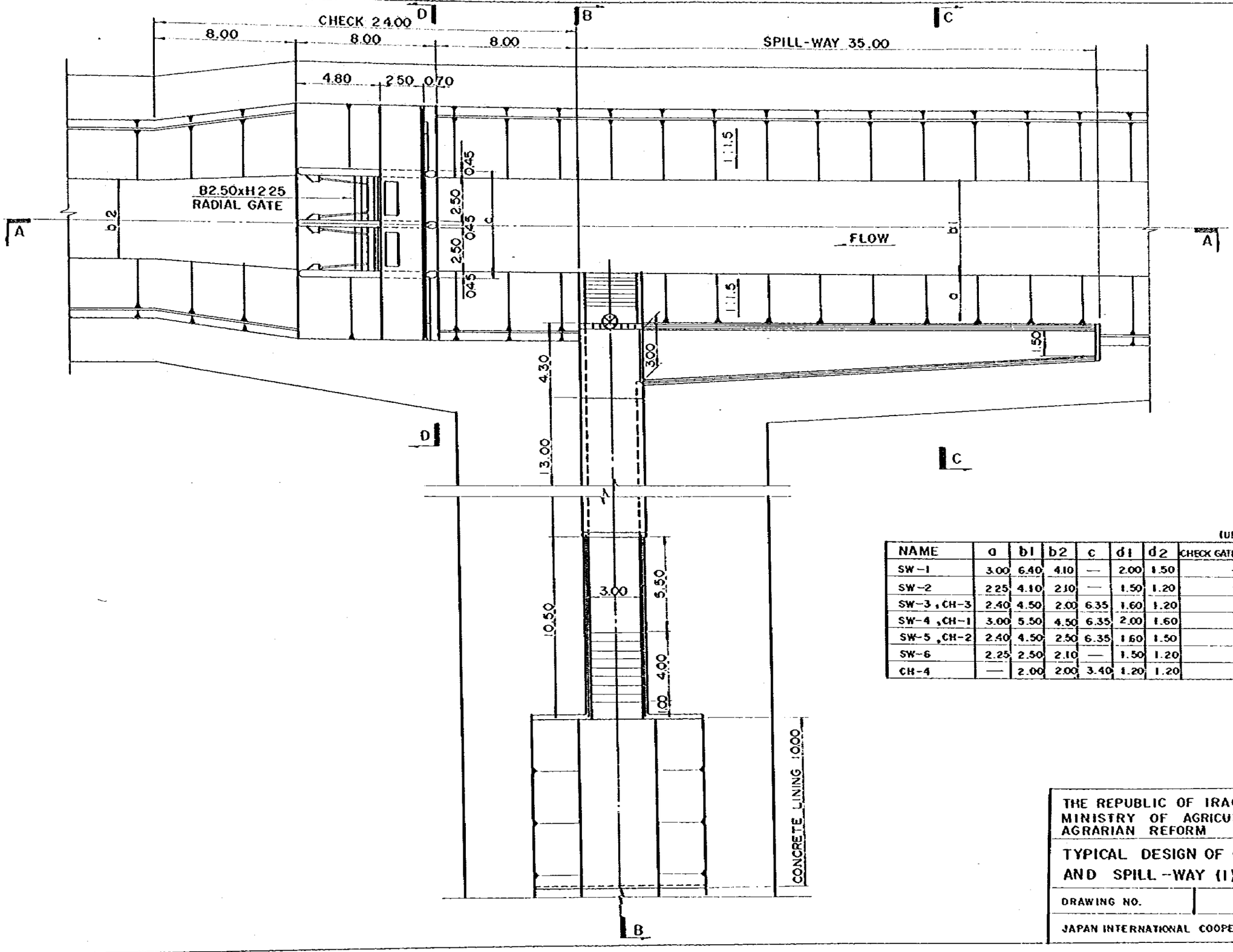
TYPE	a1	b1	c1	a2	b2	c2	d	CULVERT NUMBERS	NUMBERS	NOTE
TYPE – A	4.0	9.0	2.3	—	—	—	—	2	1	FOR IRRIGATION CANAL
TYPE – B	3.0	7.0	1.9	—	—	—	—	2	7	
TYPE – C	2.5	6.0	1.8	—	—	—	—	2	3	
TYPE – D	—	—	—	3.0	7.0	3.3	5.0	2	2	FOR DRAINAGE CANAL
TYPE – E	—	—	—	3.0	9.0	2.6	4.0	2	4	
TYPE – F	—	—	—	2.5	6.0	2.4	3.5	2	14	
TYPE – G	—	—	—	2.0	2.7	1.9	3.0	1	9	

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

TYPICAL DESIGN OF ROAD CROSSING (1) IN MAIN & SECONDARY IRRIGATION AND DRAINAGE CANAL

DRAWING NO. 7

JAPAN INTERNATIONAL COOPERATION AGENCY



(UNIT : m)

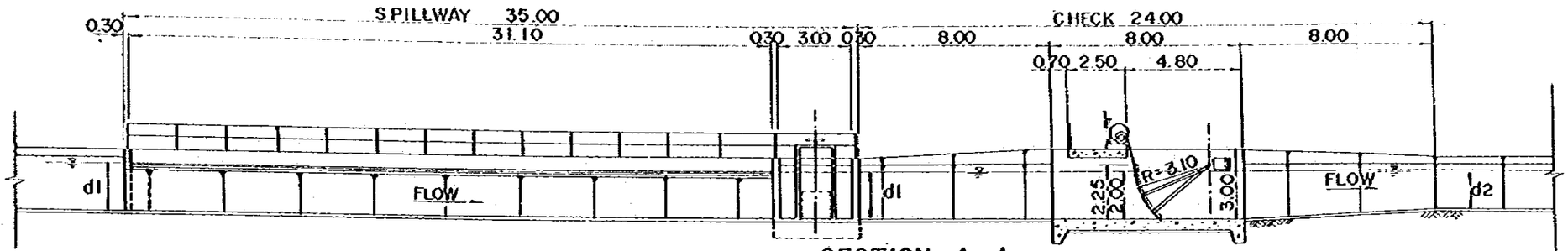
NAME	a	b1	b2	c	d1	d2	CHECK GATE NUMBERS
SW-1	3.00	6.40	4.10	—	2.00	1.50	—
SW-2	2.25	4.10	2.10	—	1.50	1.20	—
SW-3 , CH-3	2.40	4.50	2.00	6.35	1.60	1.20	2
SW-4 , CH-1	3.00	5.50	4.50	6.35	2.00	1.60	2
SW-5 , CH-2	2.40	4.50	2.50	6.35	1.60	1.50	2
SW-6	2.25	2.50	2.10	—	1.50	1.20	—
CH-4	—	2.00	2.00	3.40	1.20	1.20	1

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

TYPICAL DESIGN OF CHECK AND SPILL-WAY (1)

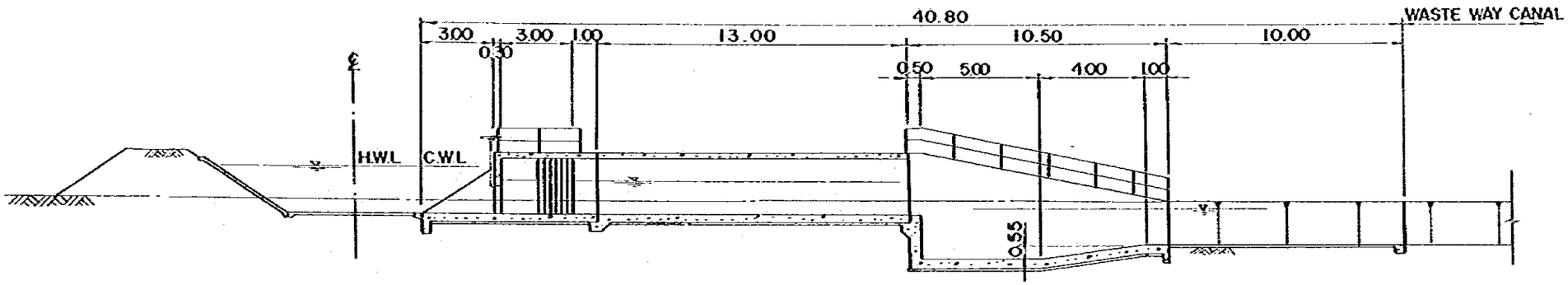
DRAWING NO. 8

JAPAN INTERNATIONAL COOPERATION AGENCY



SECTION A-A

S = 1 : 200



SECTION B-B

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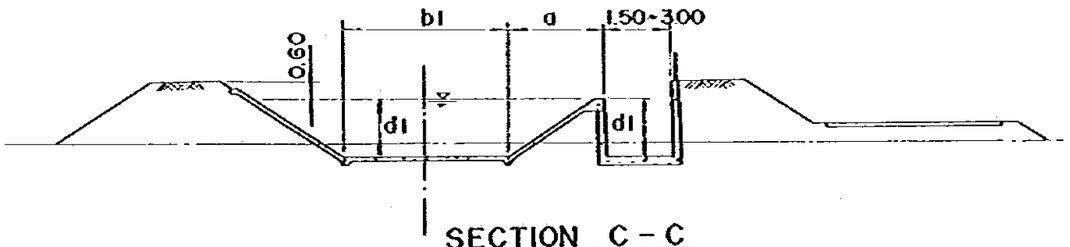

SECTION C - C

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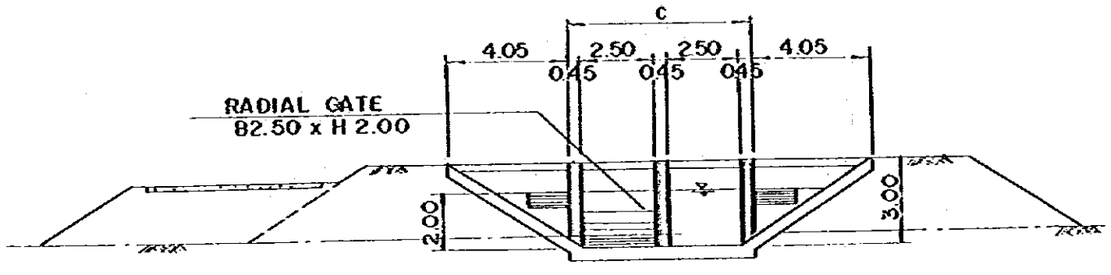


SECTION B-B

S = 1 : 200

(UNIT : m)

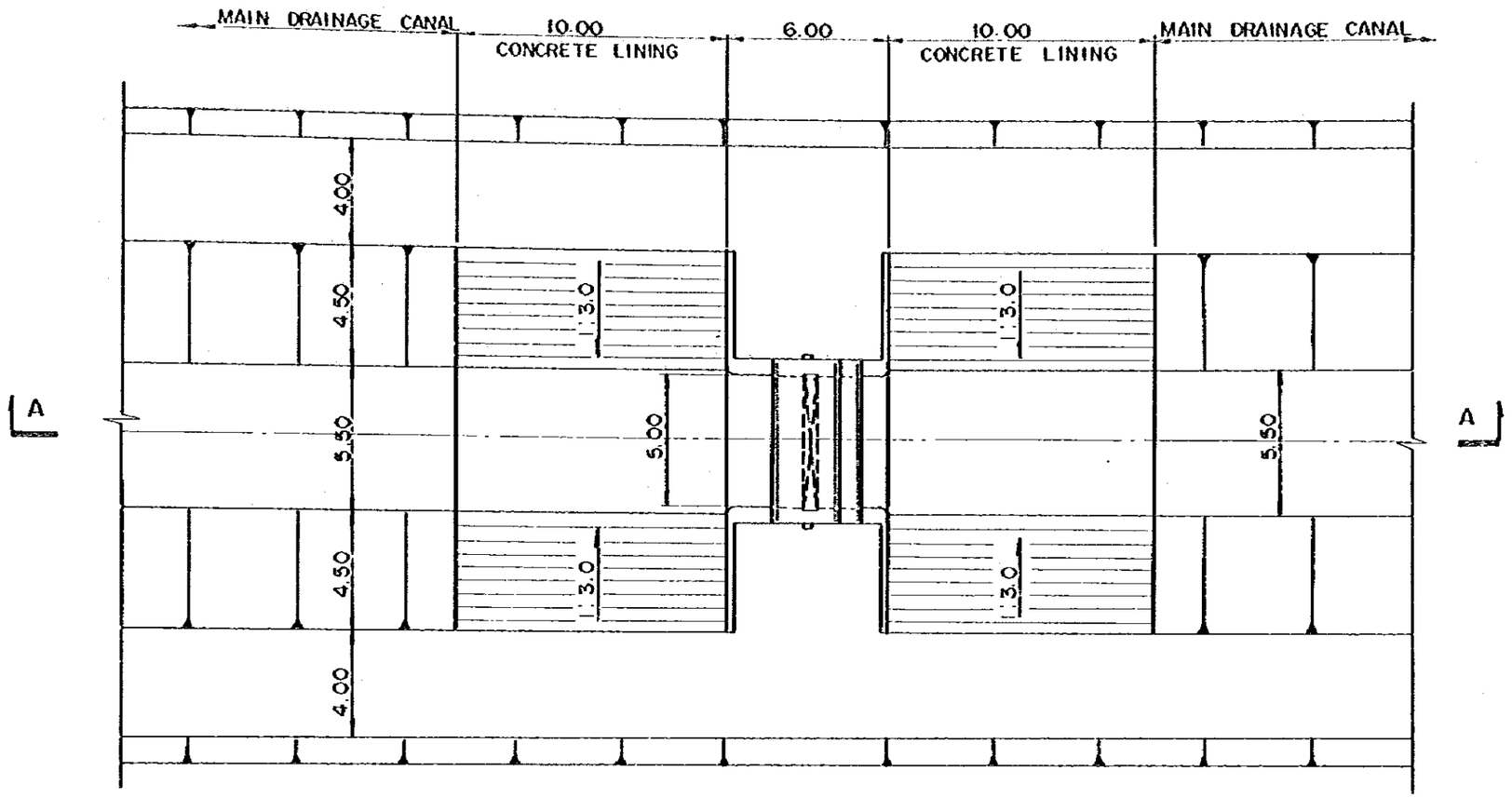
NAME	a	b1	b2	c	d1	d2	CHECK GATE NUMBERS
SW-1	3.00	6.40	4.10	—	2.00	1.50	—
SW-2	2.25	4.10	2.10	—	1.50	1.20	—
SW-3 CH-3	2.40	4.50	2.00	6.35	1.60	1.20	2
SW-4 CH-1	3.00	5.50	4.50	6.35	2.00	1.60	2
SW-5 CH-2	2.40	4.50	2.50	6.35	1.60	1.50	2
SW-6	2.25	2.50	2.10	—	1.50	1.20	—
CH-4	—	2.00	2.00	3.40	1.20	1.20	1

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

TYPICAL DESIGN OF CHECK AND SPILLWAY (2)

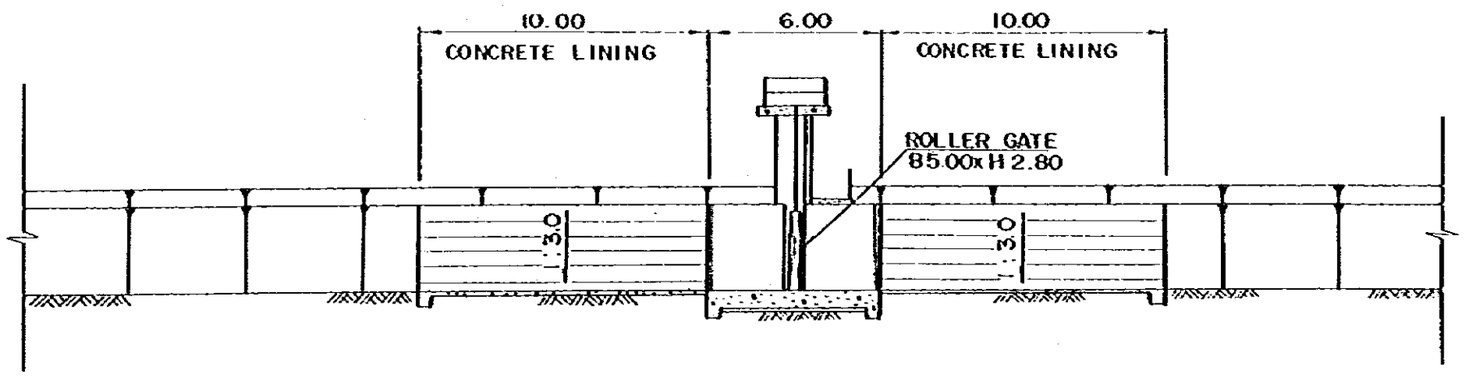
DRAWING NO. 9

JAPAN INTERNATIONAL COOPERATION AGENCY



PLAN

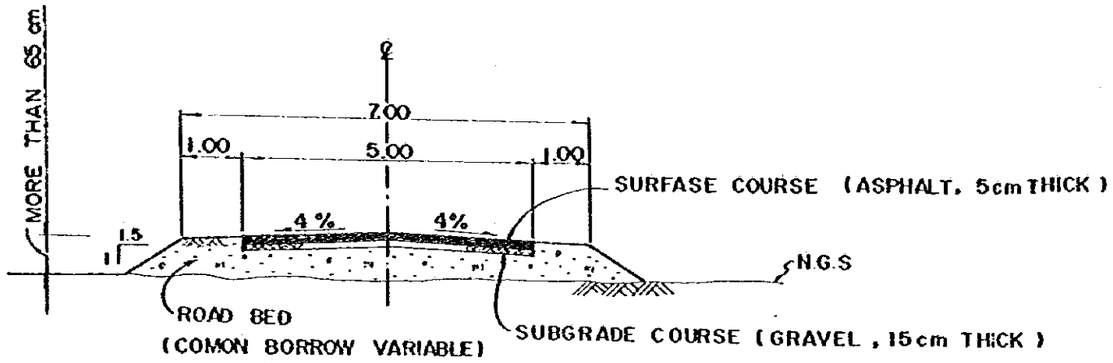
S=1:200



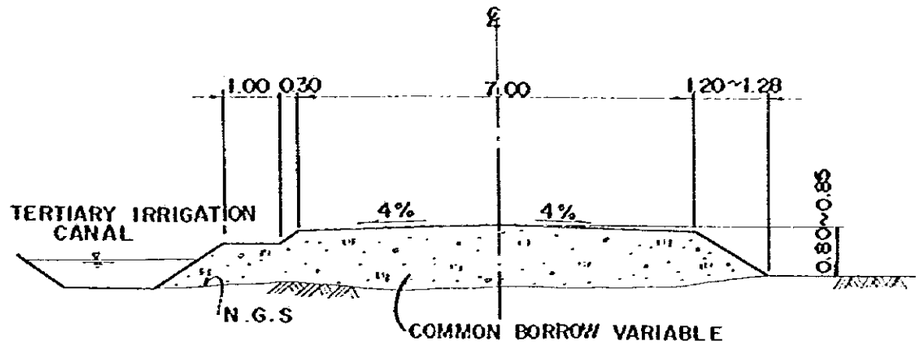
SECTION A-A

S=1:200

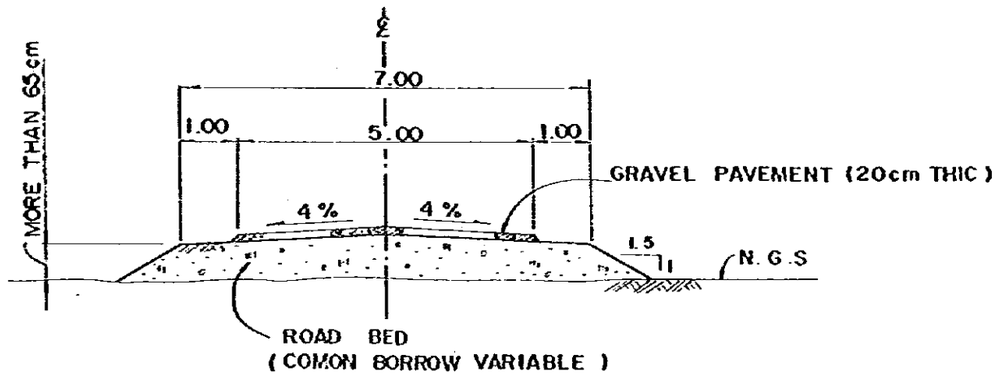
THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
DESIGN OF CHECK STRUCTURE IN DRAINAG CANAL	
DRAWING NO.	10
JAPAN INTERNATIONAL COOPERATION AGENCY	



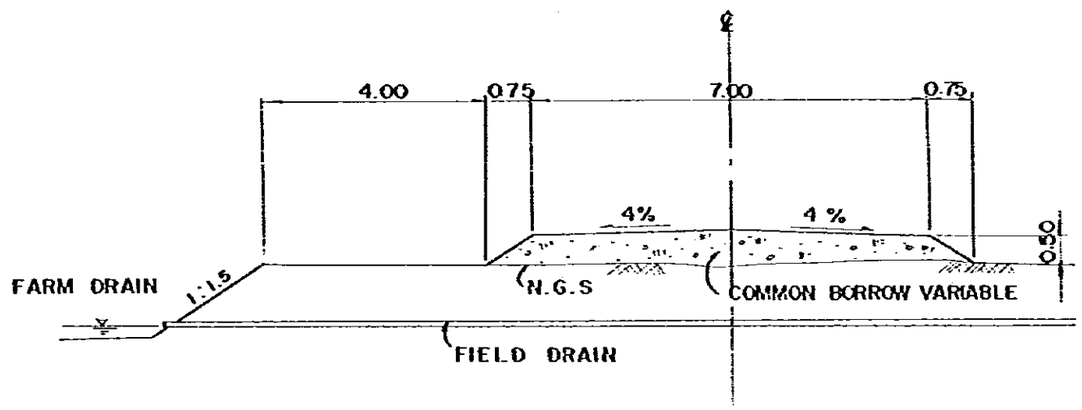
MAIN ROAD
S = 1 : 100



SERVICE ROAD ALONG TERTIARY IRRIGATION CANALS
S = 1 : 100

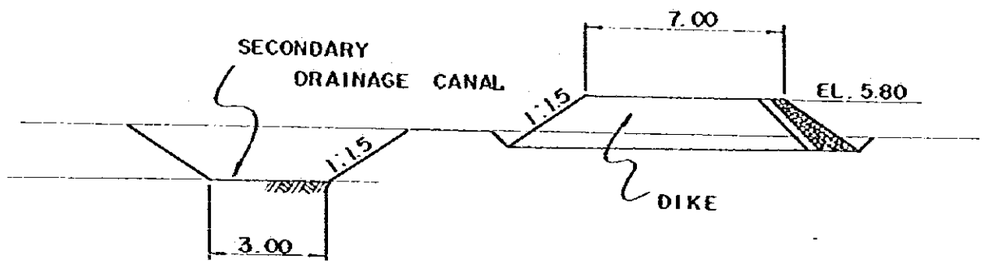


SERVICE ROAD ALONG MAIN AND SECONDARY CANALS
S = 1:100



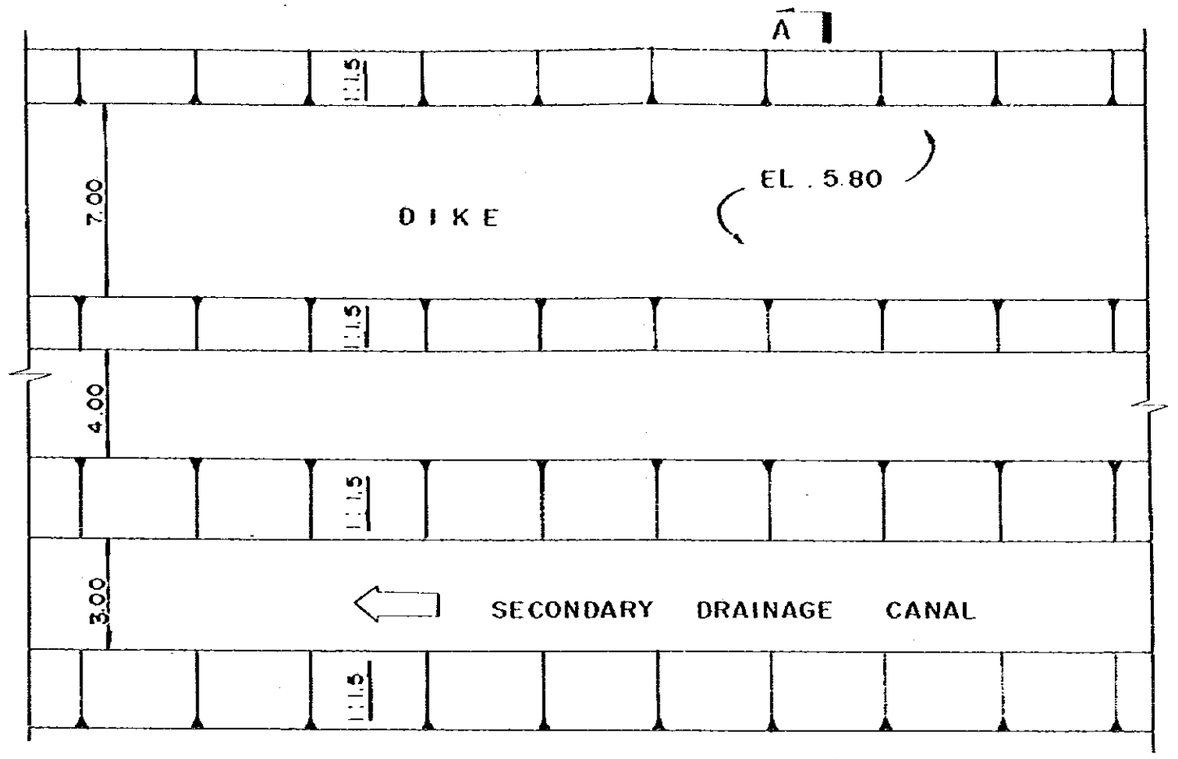
ON-FARM ROAD ALONG FARM DRAINS
S = 1 : 100

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL SECTION OF ROAD	
DRAWING NO.	11
JAPAN INTERNATIONAL COOPERATION AGENCY	



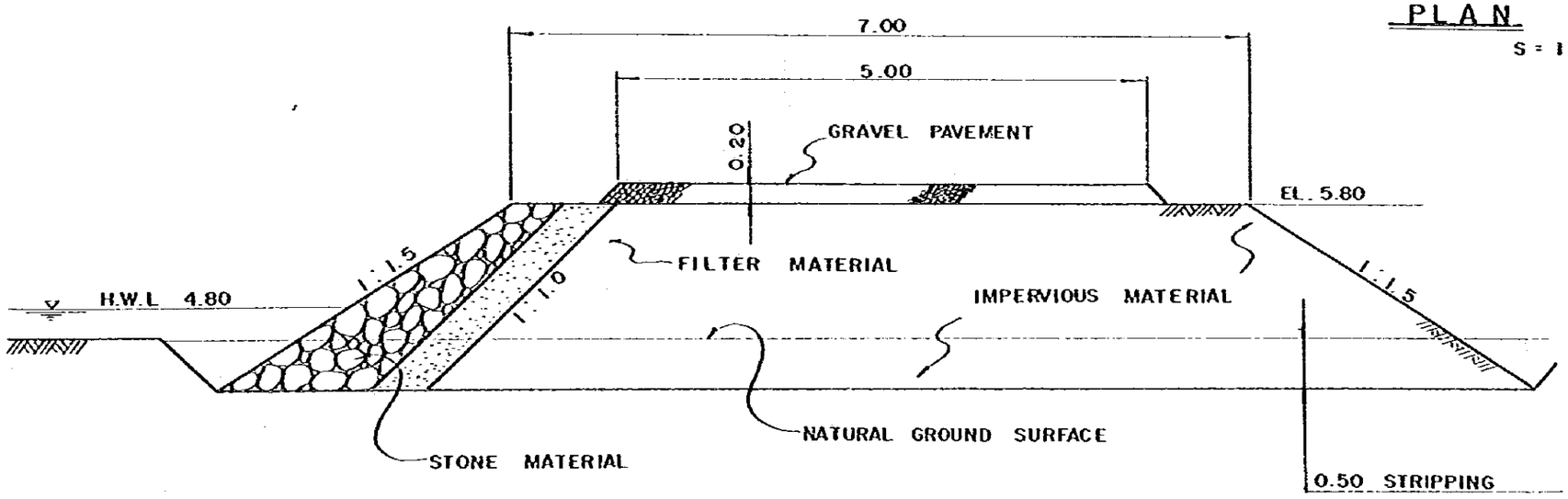
SECTION A-A

S = 1 : 200



PLAN

S = 1 : 200



TYPICAL SECTION OF DIKE

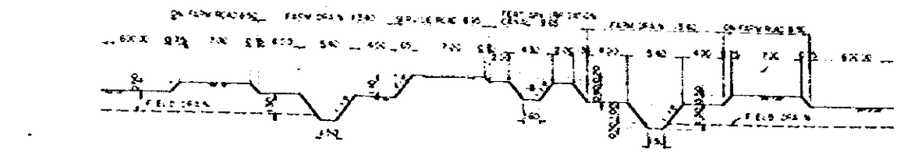
S = 1 : 50

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

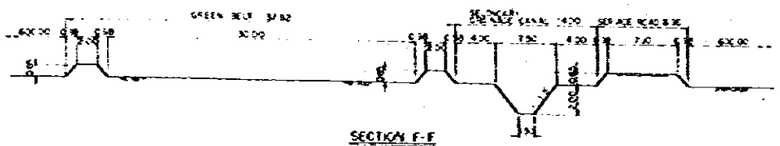
TYPICAL DESING OF DIKE

DRAWING NO. 12

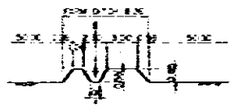
JAPAN INTERNATIONAL COOPERATION AGENCY



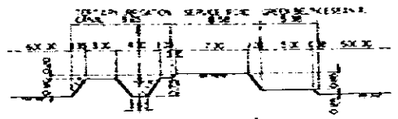
SECTION E-E



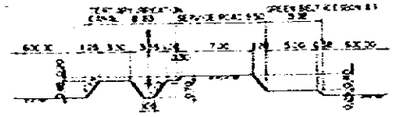
SECTION F-F



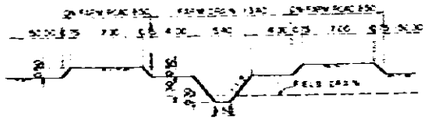
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

LEGEND

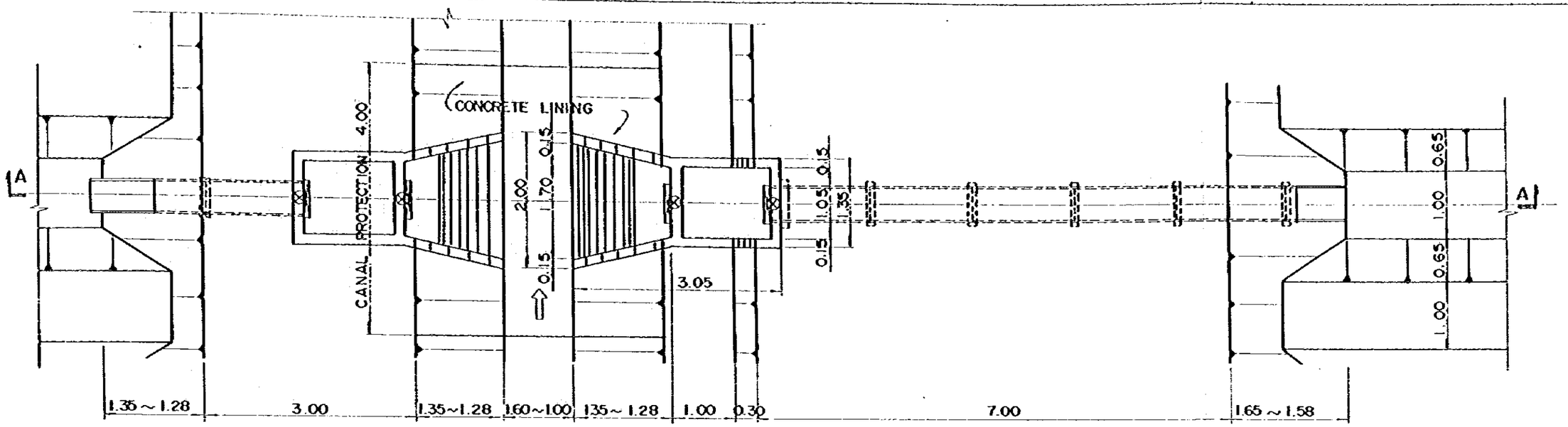
- EXISTING CANALS
- BOUNDARY OF EXISTING LAND CATEGORY
- SPOT ELEVATION IN METER
- CONTOUR LINE
- BOUNDARY OF SAMPLE AREA
- TERTIARY IRRIGATION CANAL
- FARM DITCH
- SECONDARY DRAINAGE CANAL
- FARM DRAIN
- SERVICE ROAD
- ON-FARM ROAD
- GREEN BELT
- ROAD CROSSING AND ITS TYPE
- TURN-OUT
- INLET
- CHECK STRUCTURE
- OUTLET
- PLOT NUMBER
- PROPOSED PLOT ELEVATION

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

LAYOUT OF FARM FACILITIES (SAMPLE AREA)

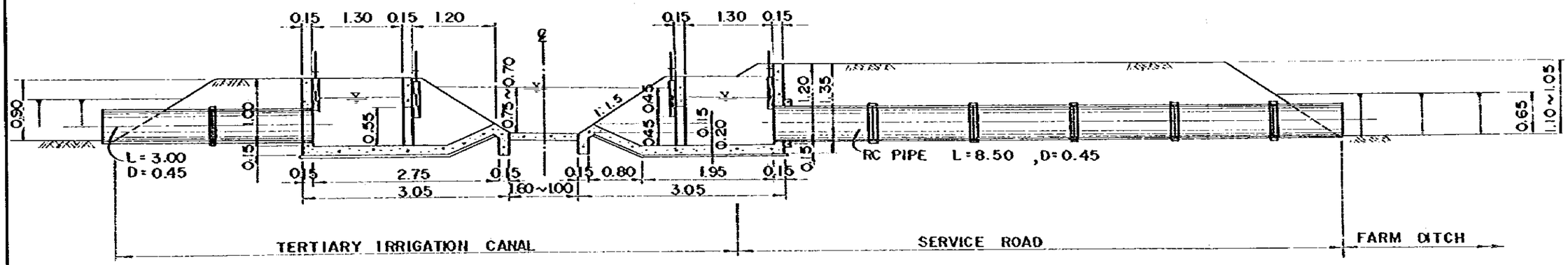
DRAWING NO. 13

JAPAN INTERNATIONAL COOPERATION AGENCY



PLAN

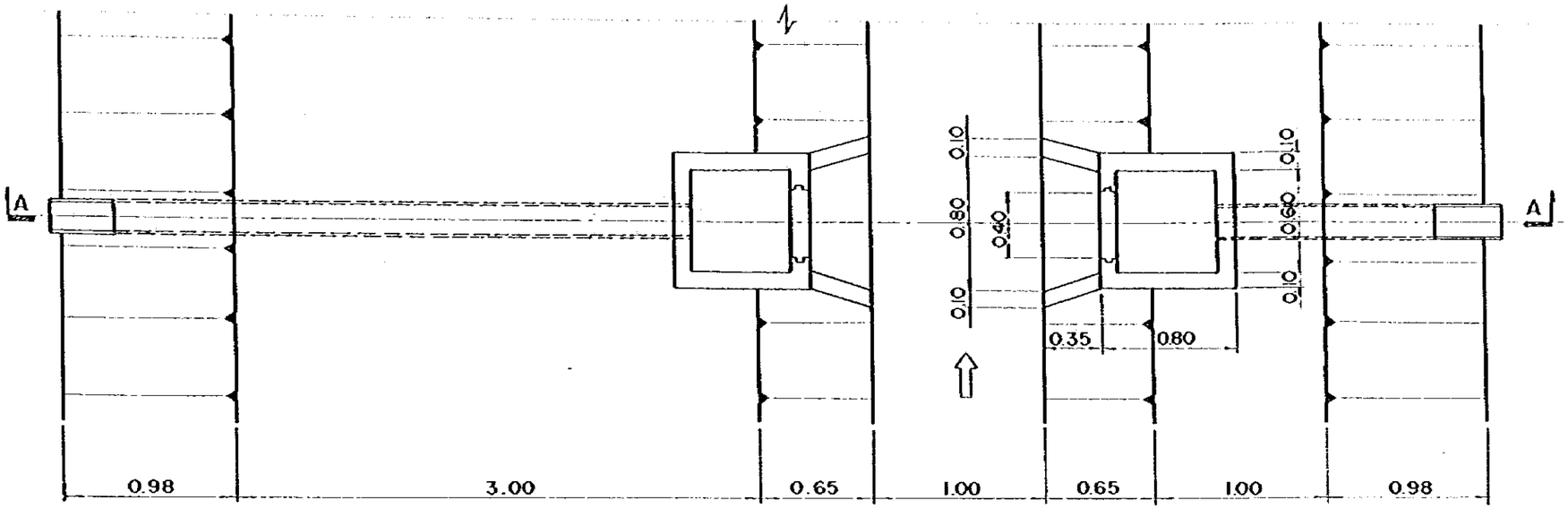
S = 1 : 60



SECTION A-A

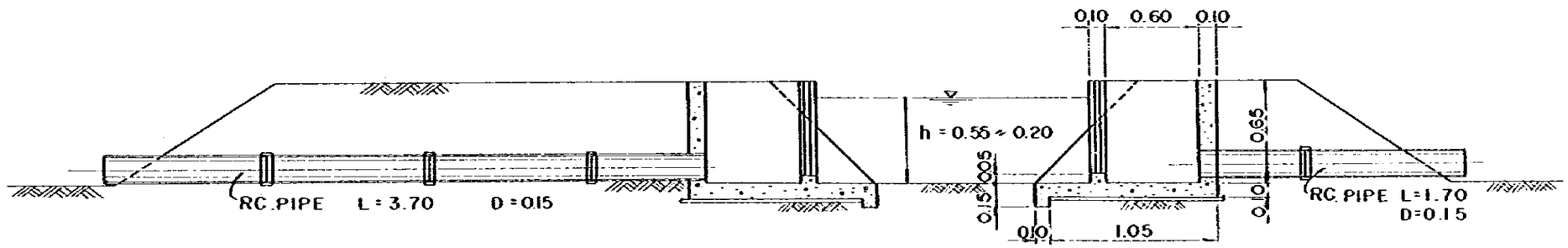
S = 1:60

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL DESIGN OF TURNOUT	
DRAWING NO.	14
JAPAN INTERNATIONAL COOPERATION AGENCY	



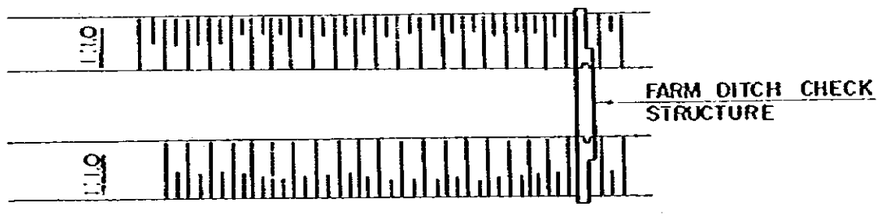
PLAN

S = 1 : 30



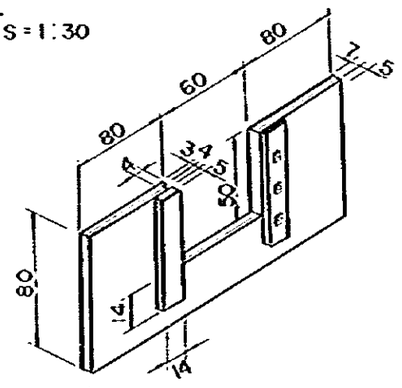
SECTION A-A

S = 1 : 30



PLAN OF CHECK STRUCTURE

NO SCALE



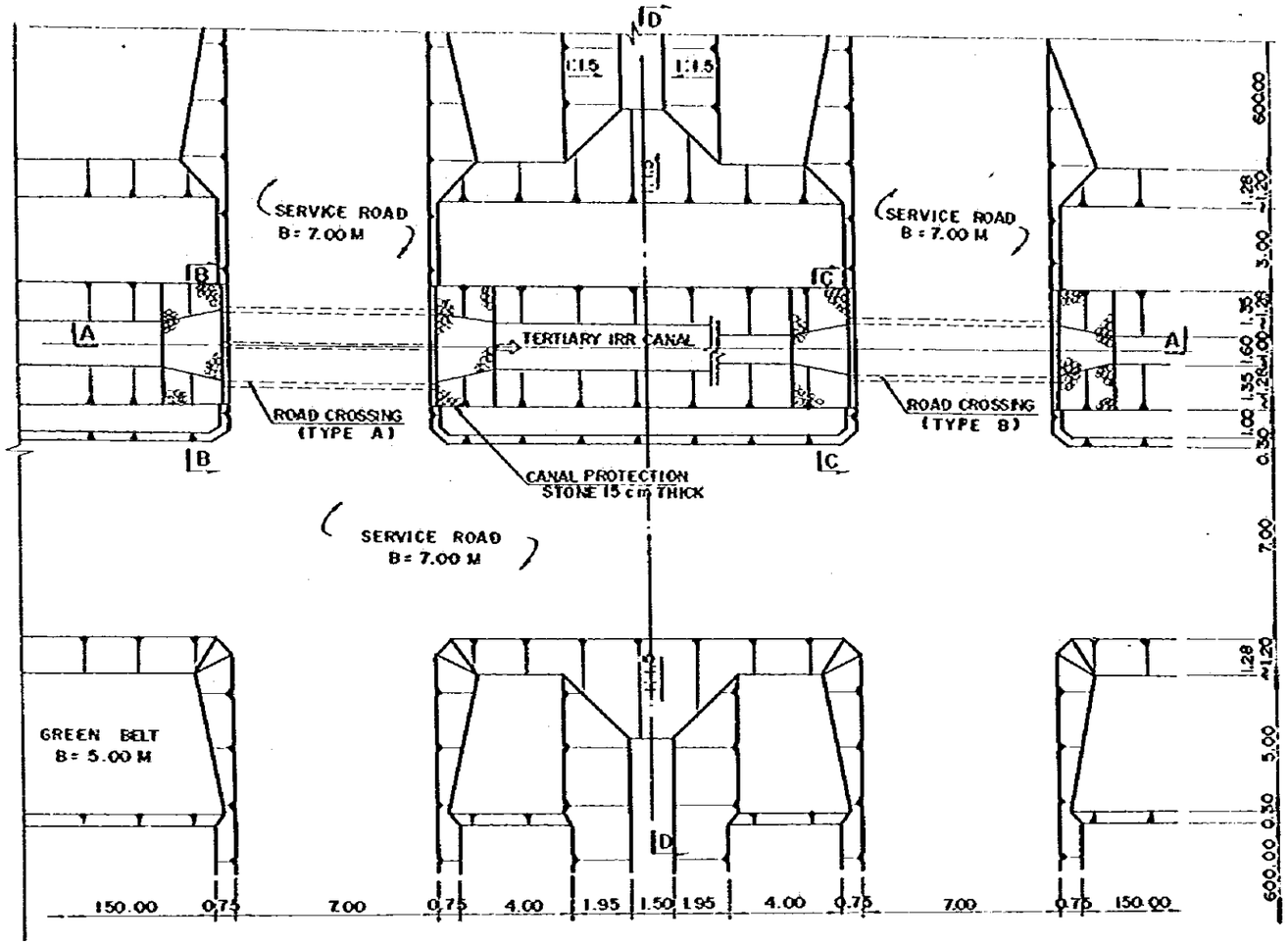
ISOMETRIC VIEW
FARM DITCH CHECK STRUCTURE

THE REPUBLIC OF IRAQ
MINISTRY OF AGRICULTURE AND AGRARIAN REFORM

TYPICAL INLET AND CHECK STRUCTURE

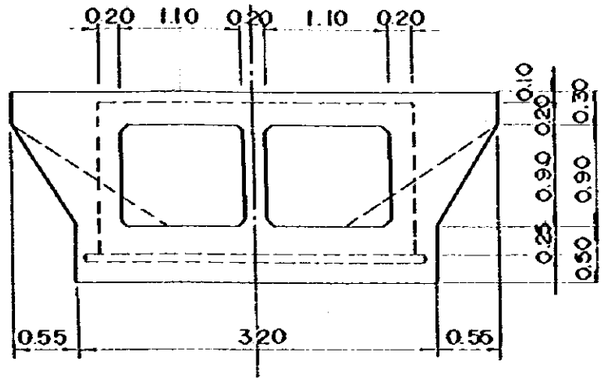
DRAWING NO. 15

JAPAN INTERNATIONAL COOPERATION AGENCY



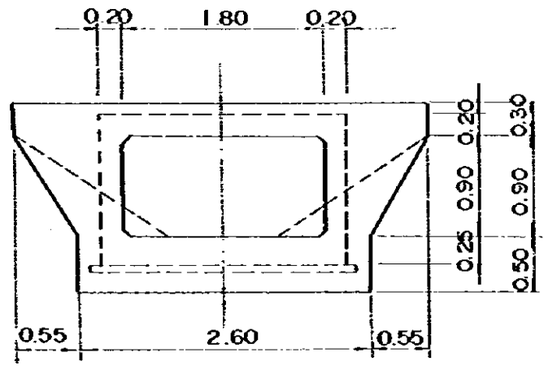
ROAD CROSSING FOR TERTIARY IRRIGATION CANAL

S = 1 : 200



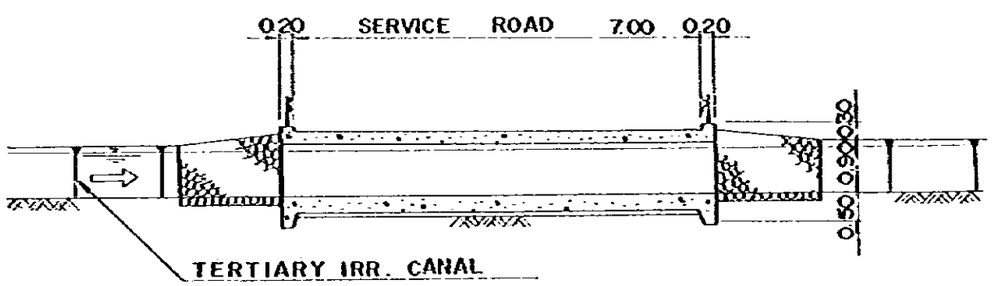
SECTION B-B (TYPE A)

S = 1 : 50



SECTION C-C (TYE B)

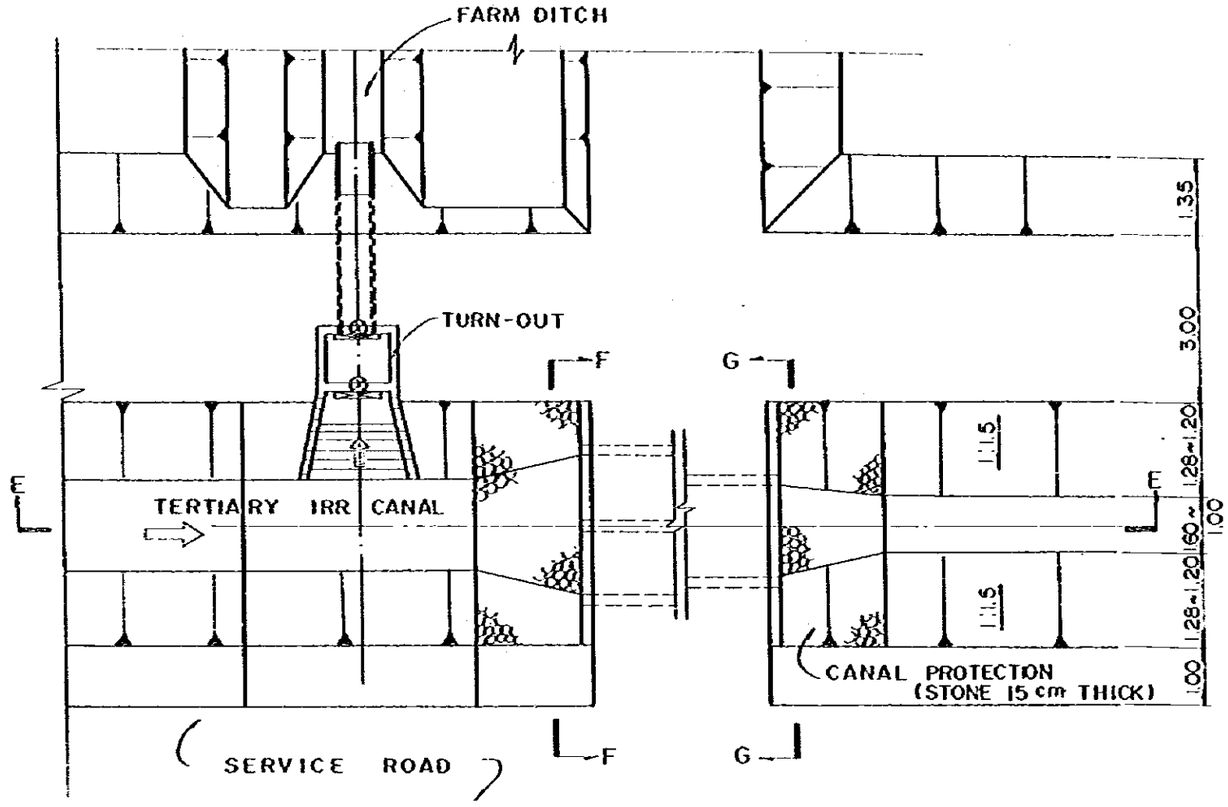
S = 1 : 50



SECTION A-A

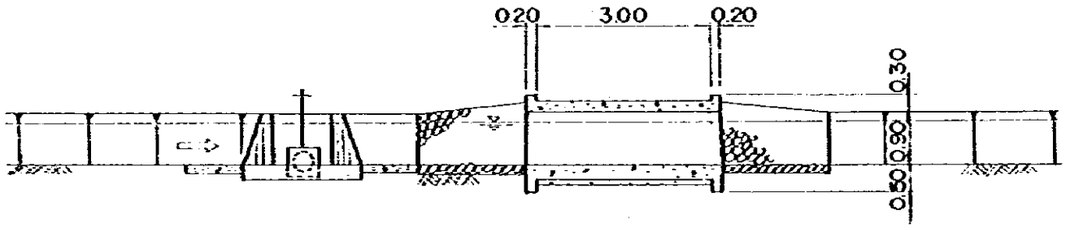
S = 1 : 100

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL DESIGN OF ROAD CROSSING(2) IN TERTIARY IRRIGATION CANAL	
DRAWING NO.	16
JAPAN INTERNATIONAL COOPERATION AGENCY	

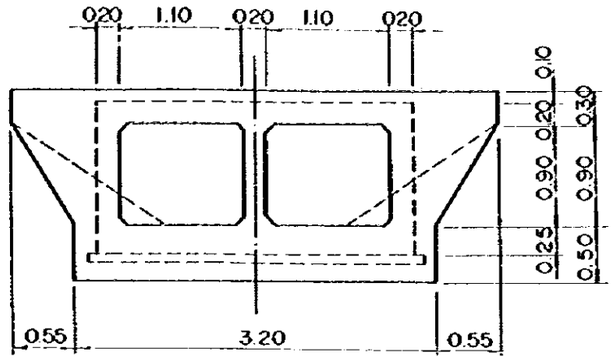


ROAD CROSSING FOR TERTIARY IRRIGATION CANAL

S = 1 : 100

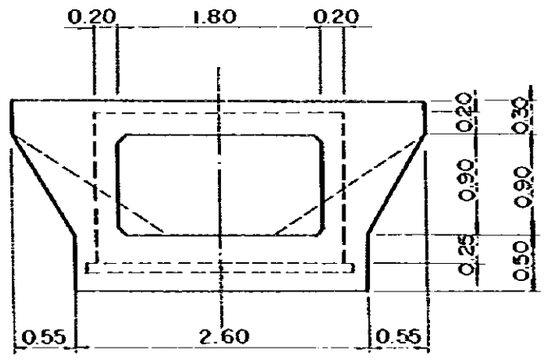


SECTION E-E



SECTION F-F (TYPE C)

S = 1 : 50

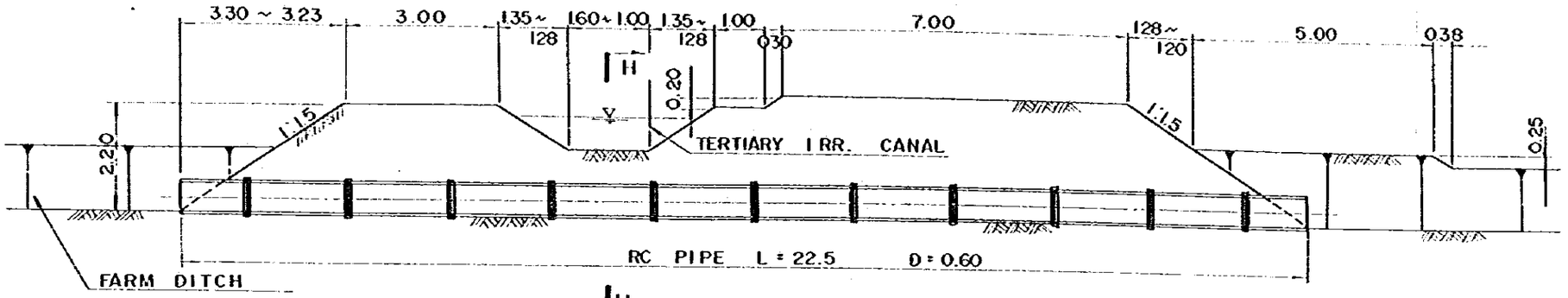


SECTION G-G (TYPE D)

S = 1 : 50

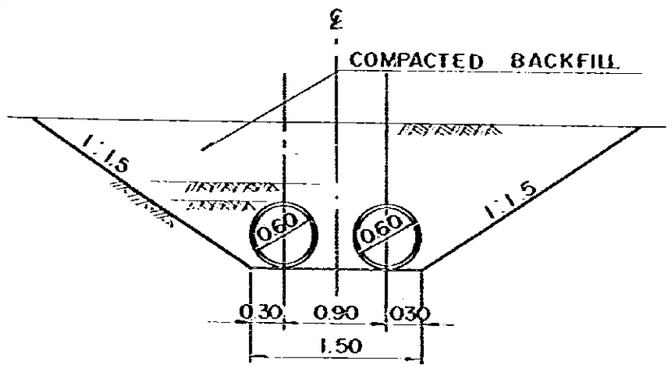
NOTE: DETAIL LAYOUT OF TURN-OUT IS GIVEN IN DRAWING NO : 14

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL DESIGN OF ROAD CROSSING(3) IN TERTIARY IRRIGATION CANAL	
DRAWING NO.	17
JAPAN INTERNATIONAL COOPERATION AGENCY	



SECTION D-D (TYPE E)

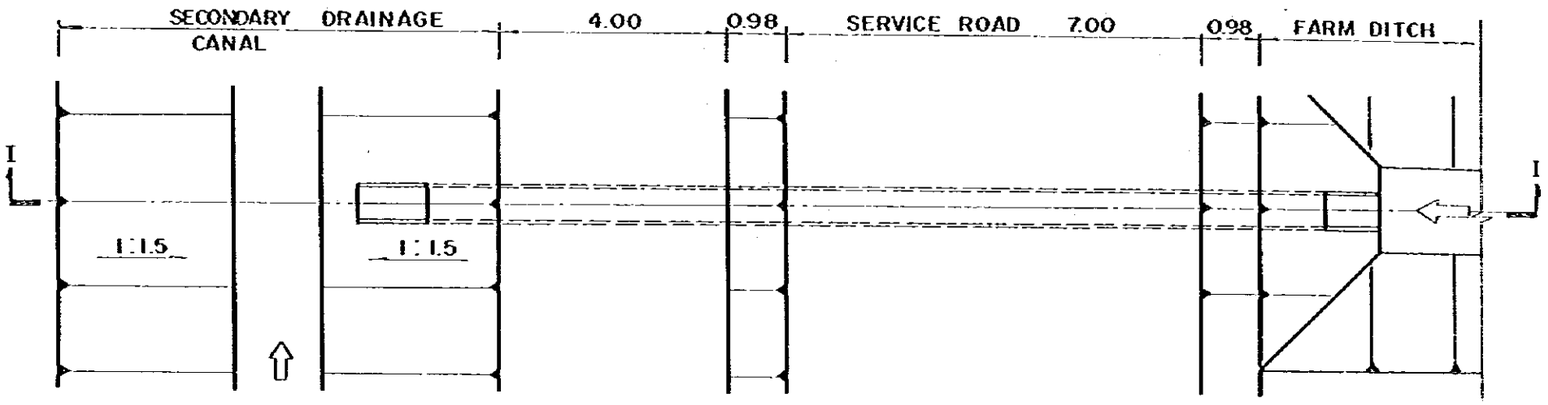
S = 1 : 100



SECTION H-H

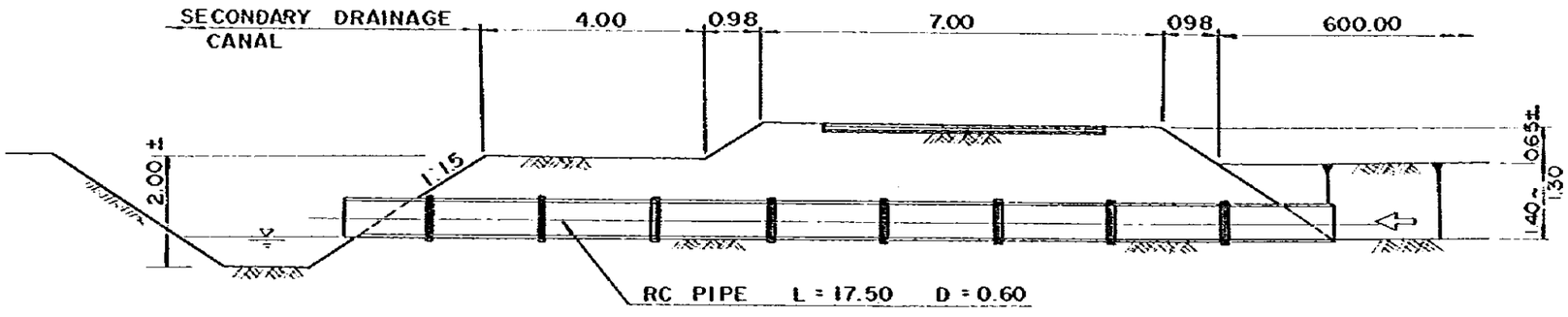
S = 1 : 50

NOTE : SECTION D-D IS SHOWN IN DRAWING 16



ROAD CROSSING FOR FARM DRAIN

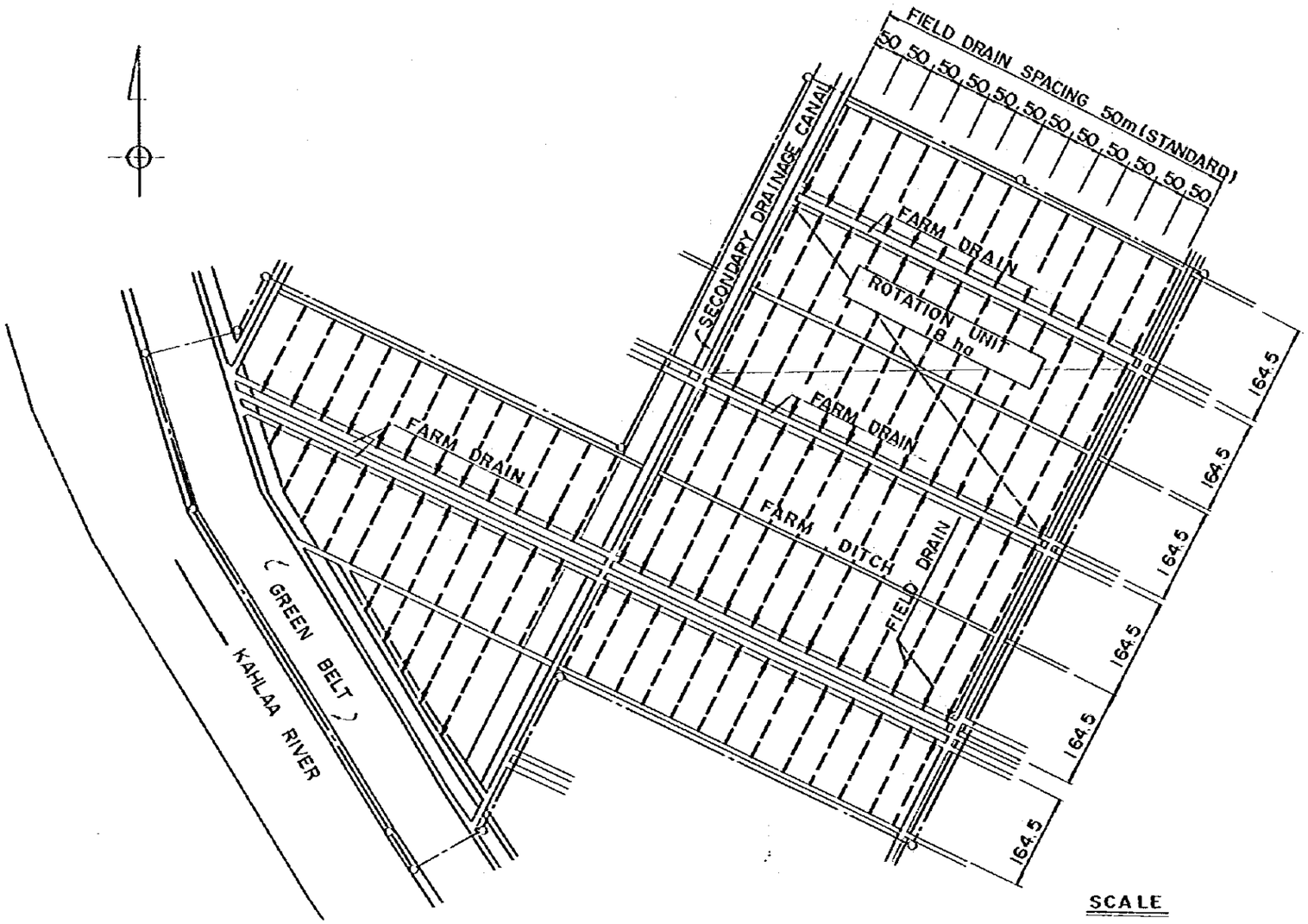
S = 1 : 100

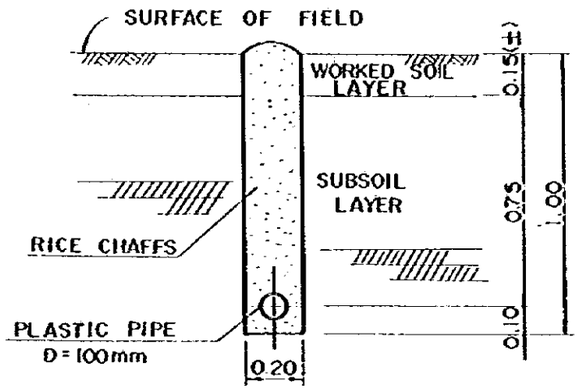


SECTION I-I (TYPE F)

S = 1 : 100

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL DESIGN OF ROAD CROSSING (4) IN FARM DRAIN	
DRAWING NO.	18
JAPAN INTERNATIONAL COOPERATION AGENCY	





FIELD DRAIN WITH RICE CHAFFS

S = 1 : 20

(IMMEDIATELY AFTER COMPLETION)

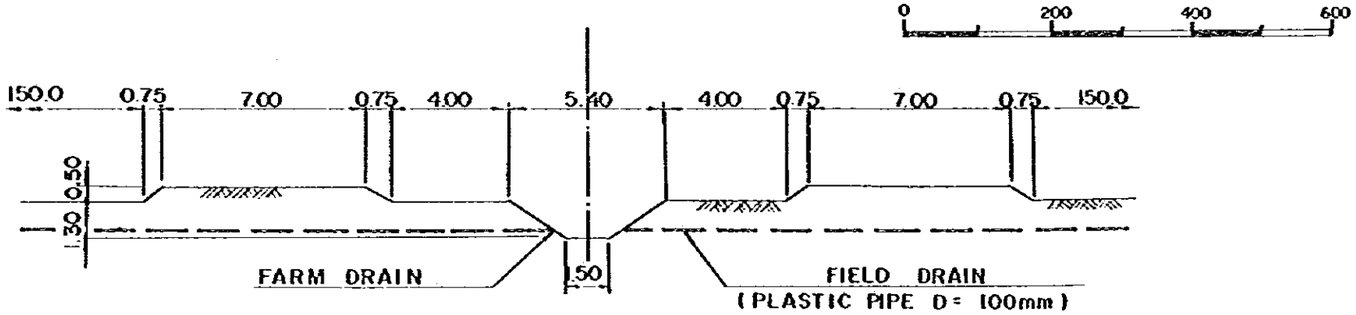
FIELD DRAIN WITH RICE CHAFFS

S = 1 : 20

(ONE YEAR AFTER COMPLETION)

SCALE

0 200 400 600



PROFILE OF FIELD DRAN

S = 1 : 20

THE REPUBLIC OF IRAQ MINISTRY OF AGRICULTURE AND AGRARIAN REFORM	
TYPICAL LAYOUT OF FIELD DRAIN IN SAMPLE AREA	
DRAWING NO.	19
JAPAN INTERNATIONAL COOPERATION AGENCY	

JICA