6.2.2. Economic Benefits

(1) North Wahby and Com Osheem Areas

The project benefits are generated from the production of crops and livestock breeding. The growing of benefits is scheduled in consideration of three factors. That is, implementation schedule, land classification, and stage development of cropping pattern. According to the results of soil survey, the difference of drainability is not remarkable by the land class. Then benefits growing by the land class is considered as homogeneous. After the initial leaching in the first stage, soil salinity will be reduced by 6.0 from 8.0 mmhos per centimeters, and the cropping pattern in this stage is planned for one year only. In the second stage, soil salinity will be reduced by 4.0 from 6.0 mmhos per centimeter. The cropping pattern in this stage is also planned to last in one year. In the third or full stage, soil salinity will be reduced by less than 4.0 mmhos per centimeter, and the cropping pattern of three-year rotation is applied.

The construction of on-farm facilities is scheduled during 1990 to 1992. Hence the project benefits would be estimated for each of the three blocks. Since it takes three to six years for the proposed crops to achieve their target yields, the growing of benefits by each block should be studied for a ten-year period to reach the full development stage. Table J4-1 in Appendix J-4 shows the growing schedule of benefits mentioned here.

1) Cropping Area with Project

The acreage to be planned to the proposed crops is totalized as shown follow. Cropping intensity is planned at 183 percent in 2001. Intercrops of berseem and watermelon shall remain by 1997. (refer to Table J4-2 in Appendix J-4)

Acreage of Crops

(Unit : feddan)

	1991	1992	1993	1997	2001
North Wahby	1,890	4,354	7,140	8,221	7,652
Com Osheem	1,600	3,750	5,366	5,707	5,502
Total	3,490	8,104	12,506	13,928	13,154

2) Production of Crops with Project

The production of crops is estimated by using crop yields by years. Fodder crops such as berseem and sorghum will reach their target yield stage in five years. Wheat, tomato, groundnuts and watermelon will require a three-year period before arriving at their target yield stage. Olive, orange, mango, and guava need five years, six years, and four years, respectively to reach the target yield stage. The 60 percent of tomato production is estimated at to be exported. The production of crops will reach the full development stage by 2001, eleven years after 1991 as shown below.
(refer to Table J4-3 in Appendix J-4)

Production of Crops

(Unit : 1,000 tons)

	8yrs (1991)	9yrs (1992)	10yrs (1993)	12yrs (1995)	17yrs (2000)	18yrs (2001)
Berseem	9.1	21.3	31.2	51.9	58.8	58.8
Sorghum	7.9	27.7	45.0	43.5	45.9	45.9
Tomato	-	-	2.3	9.5	11.6	11.6
Wheat	-	0.7	1.4	1.3	1.3	1.3
Groundnuts	-	-	0.1	0.9	1.2	1.2
Watermelon	-	-	4.1	18.5	15.3	15.3
Fruits	-	-	0.26	2.2	10.6	11.1

3) Number of Livestock and Produce

The animal husbandry would bring considerable benefits. The number of baladi cow, buffalo and friesian in the full development stage are projected as shown below.
(refer to Table J4-4 in Appendix J-4)

Number of Livestock

(Unit: head)

		Total Breeding	Beneficial For Fattening	Beneficial For Milking
North Wahby	Baladi cow	3,410	640	1,385
	Buffalo	860	160	351
	Sub-total	4,270	800	1,736
Com Osheem Settlers	Baladi cow	1,700	320	689
	Buffalo	430	80	176
Cattle Breeding Center	Friesian	4,500	900	2,430
	Baladi cow	1,500	300	585
	Sub-total	8,130	1,680	3,880
Total		12,400	2,400	5,616

4) Production Cost

The production cost by crops is estimated based on cost items of seeds, fertilizers, agricultural chemicals, rental of machines, labor and so forth. The cost items for breeding friesian, baladi cow, buffalo, and sheep consists of fodder, labor medicine, and others. The production cost for berseem and sorghum are counted as a cost for livestock breeding. The present costs are based on results of the farm economic survey and data collected from the Department of Extension, Fayoum, the Ministry of Agriculture.

5) Crop Budget

The net production value by crops and livestock would be estimated as shown at Tables J4-5 to J4-17 in Appendix J-4.

6) Net Production Value Without Project

All the existing fields are excluded from the Project Area. Hence, the net production value without Project is estimated at zero.

7) Net Production Value with Project

The net production value (NPV) with Project is the net production value of crops plus that of livestock and after 2000, the annual benefit obtained from casuarina trees is added as LE 0.355 million.

The annual benefit in the key years is projected as follows;

Net Production Value with Project

(Unit : 1,000 LE)

	8yrs (1991)	9yrs (1992)	10yrs (1993)	12yrs (1995)	14yrs (1997)	18yrs (2001)
Crop Husbandry						
Gross Income	-	290	1,667	5,756	7,700	9,278
Production Cost	99	304	743	1,592	2,058	2,422
NPV	(-)99	(-)14	924	4,164	5,642	6,856
Animal Husbandry						
Gross Income	1,375	4,980	8,508	9,281	9,649	9,646
Production Cost	1,089	2,795	4,371	4,422	4,449	4,310
NPV	286	2,185	4,137	4,859	5,200	5,336
Total NPV	187	2,171	5,061	9,023	10,842	12,192

(2) Wahby Downstream Area

1) Estimation of Benefit Area

The gross acreage of Wahby Downstream Area is measured at 17,200 feddan on topographic maps. There are five villages, that is, El Mazatly, Fanous, Tamiah, Rashuwan and Menshat in the area. The ratio of arable land in the total land is different by each village. The statistic data obtained from the Ministry of Agriculture do not indicate the accurate ratio of arable land. In this study, 85 percent is used in consideration of the other data. Hence, the benefit area at present and without Project would be estimated at 17,200 x 0.85 = 14,620 feddan. As right of way for the Project is estimated at 50 feddan, the benefit area with Project would be estimated at 14,570 feddan.

2) Benefit Formation

According to the implementation schedule, rehabilitation of facilities and construction of laterals and canal structure are projected to be completed at 50 percent to 70 percent by the year 1990 and 90 percent by the year 1991. Hence, a part of the Project Area shall be benefited from the works completed by 1991. The 30 percent of total area is assumed to benefit in 1991, the 70 percent in 1992. The Project Area shall be supplied with an enough irrigation water after the completion of the Project including the re-use water pump project. Annual benefit shall be gained through an expansion of cropping intensity and increase in crop yield.

3) Cropping Area

The cropping intensity without Project is estimated at 130 percent, of which winter and summer season are 75 and 55 percent, respectively. The cropping intensity with Project is projected at 90 percent in winter season and 80 percent in summer season, that is at 170 percent per annum.

An incremental benefit is expected to start from the winter season in 1990. After the completion of construction of the Project facilities, the cropping intensity would be projected to reach a high level in Aslan village to which sufficient water is supplied because of its topographic advantage located in the upstream reaches.
(for further details, refer to Tables J4-21)

Cropping Area

(Unit : feddan)

	Without Project	With Project			
		1991	1992	1993	1994
Winter Crop	10,965	10,965	11,271	12,602	13,113
Summer Crop	8,041	8,041	8,686	10,634	11,656
Total	19,006	19,006	19,957	23,236	24,769

4) Production of Crops

Products concerned to the Project consist of cash crop and by-products used as fodder. Incremental benefits are gained from both husbandry of cash crop and animal. Cash crops are wheat, barley, beans, tomato, onions, cotton, maize (grain), millet (grain), sesame and sunflower. By-products are each straw of wheat, maize and millet. Berseem is estimated as discussed in animal husbandry.
(refer to Tables J4-21 and J4-22 in Appendix J-4)

5) Number of Livestock

Number of livestock is estimated based on the nutritious foods supplied from berseem in winter season and straws in summer season produced in the Project Area. Number of livestock is limited by forage production in summer season. Hence a part of berseem volume is not feed but sold because of unbalance of supply and demand of animal foods by season. The following figures show number of livestock and berseem to be sold. (refer to Table J4-23 in Appendix J-4)

Number of Livestock

		Unit	Without Project	With Project
Fodder	Berseem	tons	92,289	110,903
	Straw	"	28,152	42,910
Number of Livestock	Buffalo	head	2,240	3,360
	Baladi	"	8,920	13,480
Berseem to be sold		tons	46,700	19,500

6) Crop Budget

Net production value per feddan by crop is shown in Tables J4-24 to J4-28 in Appendix J-4.

7) Gross Income

Gross income consist of those in both husbandry of cash crop and animal. Gross income in crop husbandry without and with Project are shown as follows.
(refer to Tables J4-29 and J4-30 in Appendix J-4)

Gross Income in Crop Husbandry

(Unit : 1,000 LE)

	Without Project	With Project (1994)
Winter season		
Grain & Vegetable	1,944	2,867
Straw	196	233
Sub-total	2,140	3,100
Summer season		
Grain & Vegetable	1,963	4,235
Straw	7	10
Sub-total	1,970	4,245
Total Gross Income	4,110	7,345

8) Production Cost

Production cost of crop husbandry is estimated on cash crops while that of animal husbandry is calculated on berseem. As maize straw and millet straw are by-crops, production costs are estimated in crop husbandry. The following figures shown the production cost in both husbandries.
(refer to Tables J4-31 to J4-33 in Appendix J-4)

Production Cost

(Unit : 1,000 LE)

	Without Project	With Project (1994)
Crop Husbandry	2,754	4,294
Animal Husbandry	1,027	1,215

9) Incremental Net Production Value

Net production value on buffalo and baladi are estimated based on the net production value per head used in the economic evaluation on the North Wahby and Com Osheem areas.

As this value does not include fodder cost, berseem cost has to be deducted from net production value mentioned above. The incremental net production value is shown as follows.
(refer to Tables J4-34 and J4-35 in Appendix J-4)

Incremental Net Production Value

(Unit : 1,000LE)

Item	Without Project	With Project			
		1991	1992	1993	1994
A. Crop Husbandry	1,356	1,539	2,067	2,959	3,051
B. Animal Husbandry	4,289	4,351	4,837	5,572	6,036
C. Total NPV	5,645	5,890	6,904	8,531	9,087
D. Incremental NPV		245	1,259	2,886	3,442

(3) South Area of Lake Qarun

1) Estimation of Benefit Area

The study area is defined at 6,770 feddan of gross land extending below EL (-)38 meters. The land of 480 feddan below an elevation (EL) of (-)43 meters is submerged at present. This area is divided into three blocks; 330 feddan in Abu Harawa sub-area, 100 feddan in Bats Said sub-area, and 50 feddan in Abu Tarfaya and Khore el-Hifon sub-area. Of the land of 4,320 feddan located between EL (-)43 and EL (-)40 meters, about 85 percent of 3,670 feddan is used as arable land. It is considered that the crop production in this arable land has directly suffered from damages caused by high groundwater table in connection with the water level of Lake Qarun. The land situated between EL (-)40 and EL (-)38 meters amounts to 1,970 feddan of which arable land is 1,675 feddan. This arable land is assumed to be affected indirectly.

The submerged area of 480 feddan, about 65 percent or 310 feddan would be improved as agricultural land after the completion of the Project works including the arable land of 265 feddan. Tables J4-36 and J4-37 in Appendix J-4 show the arable land with and without Project.

2) Cropped Area

According to the implementation schedule, construction of the three sub-areas will start year by year such as Bats Said sub-area in 1991, Abu Tarfaya and Khor el Hiton sub-areas in 1992 and Abu Harawa sub-area in 1993. Cropping intensity without Project in the Abu Harawa sub-areas is 2,058 feddan or 100 percent. After completion of the works, cropping intensity with Project is projected as follows.
(refer to Tables J4-38 to J4-41 in Appendix J-4)

Cropped Area and Cropping Intensity

Sub-area	Unit	Without Project	With Project				
			1991	1992	1993	1994	1995
Bats Said	%	138	146	153	160	160	160
	feddan	3,271	3,445	3,617	3,794	3,794	3,794
Abu Tarfaya	%	142	142	146	151	153	153
	feddan	2,058	2,058	2,124	2,191	2,225	2,225
Abu Harawa	%	100	100	100	133	157	179
	feddan	1,520	1,520	1,520	2,022	2,386	2,720

3) Production

Crop production without and with Project are estimated by sub-area as shown in Table J4-42 in Appendix J-4. Total quantities would be projected as follows.

Crop Production

(Unit: ton)

Sub-area	Without Project	With Project				
		1991	1992	1993	1994	1995
Bats Said	21,287	22,720	23,615	23,770	23,770	23,770
Abu Tarfaya Khor el-Hitan	9,321	9,321	10,328	11,409	12,239	12,239
Abu Harawa	5,100	5,100	5,100	7,263	10,596	13,665

4) Number of Livestock

Number of livestock is estimated based on the nutritious foods supplied from berseem and straws of wheat, maize and millet produced in the Project Area. The following figures show number of livestock of three sub-areas.
(refer to Table J4-43 in Appendix J-4)

Number of Livestock

			Without Project	With Project (1995)
Fodder	Berseem	ton	26,477	39,520
	straw	"	7,599	13,133
No. of Livestock	Buffalo	head	590	1,020
	Baladi	"	2,400	4,130

5) Crop Budget

Production costs are estimated by crops on three kinds of new and old land in the direct effected area and old land in the indirect effected area. Tables J4-44 and J4-45 in Appendix J-4 show the production cost per feddan by year.

6) Incremental Net Production Value

The incremental net production value is estimated as follows. (refer to Tables J4-46 to J4-48 in Appendix J-4)

Incremental Net Production Value

(Unit : 1,000 LE)

Description	Without Project	With Project				
		1991	1992	1993	1994	1995
A. Crop Husbandry	590	712	765	884	968	1,004
B. Animal Husbandry	999	1,205	1,399	1,565	1,682	1,734
C. Total NPV	1,589	1,917	2,164	2,449	2,650	2,738
D. Incremental NPV		328	575	860	1,061	1,149

6.2.3. Evaluation of Project Cost

(1) North Wahby and Com Osheem Areas

The direct costs employed for estimating the economic internal rate of return consist those of engineering design, property and construction of the Project, but exclude the interest to be incurred during the construction period.

Both interest and tax are considered as transfer payments, and therefore, are not included in the economic costs. The Project cost includes a depreciation cost of the construction equipment instead of the procurement cost of the construction equipment.

The local currency costs are converted into the border prices by using the standard conversion factor.

The financial Project cost using for economic evaluation does not include the escalation factor. The costs on the re-use water pump project and the Model Farm are added.

The economic project cost is estimated as follows.
(refer to Table J5-1 to J5-5 in Appendix J-5)

Capital Cost

(Unit: 1,000 LE)

	Financial	Economic
1. North Wahby and Com Osheem areas	29,730	27,215
2. Model Farm	2,764	2,550
3. Re-Use Water Pump Project	9,469	7,732
Total	41,963	37,497

Note: Financial costs are estimated the depreciation cost basis. Price escalation is not included in both costs.

The operation and maintenance cost of facilities consists of electric charge for pumping stations, repair cost, salary and wage and the operation and maintenance cost of irrigation facilities.

The annual electric charge for pump station occupies about 70 percent of the total operation and maintenance cost. As the conversion factor of electricity is 3.321, the economic operation and maintenance cost shows an important influence in the estimation of economic internal rate of return.
(refer to Tables J5-6 to J5-9 in Appendix J-5)

Operation and Maintenance Cost

(Unit : 1,000 LE)

	Financial	Economic
1. North Wahby and Com Osheem areas	774	1,808
2. Model Farm	55	108
3. Re-Use Water Pump Project	330	889
Total	1,159	2,805

The replacement costs are estimated on pumps and terminal irrigation facilities such as drip and sprinkler as shown in the following table. (refer to Tables J5-10 to J5-12 in Appendix J-5)

Replacement Cost for 50 Years

(Unit: 1,000 LE)

	Financial	Economic
1. North Wahby and Com Osheem Areas	35,105	35,105
2. Model Farm	1,104	1,104
3. Re-use Water Pump Project	817	817
Total	37,026	37,026

The improvement costs on the existing drainage canals are counted in the tenth years after completion of the Project works. (refer to Table J5-13 in Appendix J-5).

(2) Wahby Downstream Area

The economic project costs to be used for estimation of economic internal rate of return are as follows.
(refer to Tables J5-14 to J5-15 in Appendix J-5)

Capital Cost

(Unit : 1,000 LE)

	Financial	Economic
1. Wahby Downstream Area	5,488	4,736
2. Re-Use Water Pump Project	8,198	6,694
Total	13,646	11,430

Note: Financial costs are estimated by the depreciation cost basis. Price escalation is not included in both costs.

The O & M costs estimated as follows are mainly those of the re-use water pump project.
(refer to Tables J5-16 and J5-17 in Appendix J-5)

Operation and Maintenance Cost

(Unit: 1,000 LE)

	Financial	Economic
1. Wahby Downstream Area	10	8
2. Re-Use Water Pump Project	274	720
Total	284	728

The replacement costs are estimated on the re-use water pump project. The financial and economic replacement costs for 50 years are estimated the same at both LE 708 thousand.
(refer to Table J5-18 in Appendix J-5)

(3) South Area of Lake Qarun

The financial project cost excluding the price escalation cost is estimated at LE 6,490 thousand. The economic cost used for evaluating the internal rate of return is estimated at LE 5,699 thousand. The financial and economic operation and maintenance costs are estimated at LE 41 thousand and LE 39 thousand, respectively. The replacement cost of pumps is estimated at LE 173 thousand for 50 years.
(refer to Table J5-19 to J5-21 in Appendix J-5)

6.2.4. Internal Rate of Return

The economic internal rate of return is computed by using the linear interpolation method. The incremental benefit is estimated by subtracting the Project cost from the benefits for each project year. The Project cost consists of initial capital, operation and maintenance cost and replacement cost. The project economic life is adopted at 50 years.

(1) North Wahby and Com Osheem Areas

Economic Internal Rate of Return of the land reclamation project is estimated at 12.1 percent. According to the suggestion of the Economist, GARPAD, the marginal capital interest is ten to 12 percent. The marginal productivity of capital at border prices is ten percent based on the accounting ratios evaluated in the World Bank Staff Working Paper No.521. This project, therefore, is economically justifiable. (refer to Table J6-1 in Appendix J-6)

(2) Wahby Downstream Area

Economic Internal Rate of Return is estimated at about 12.8 percent. This project is economically justifiable.
(refer to Table J6-2 in Appendix J-6)

(3) South Area of Lake Qarun

Economic Internal Rate of Return is estimated at 15.3 percent. This project is economically justifiable.
(refer to Table J6-3 in Appendix J-6)

6.2.5. Sensitivity Analysis

A sensitivity analysis is an effective measure of testing the risk of a project. The analysis for the Project are made for the following cases.

(1) North Wahby and Com Osheem Areas

Item	EIRR
1. Original	12.1%
2. 10% decline in prices of products	9.7
3. 10% decline in target yield of products	9.7
4. 10% increase in production cost	11.0
5. 10% increase in North Wahby and Com Osheem project cost	11.4
6. 20% increase in North Wahby and Com Osheem project cost	11.0
7. One year delay in start of North Wahby and Com Osheem	11.0
8. Two year delay in start of North Wahby and Com Osheem	10.7

(2) Wahby Downstream Area

Item	EIRR
1. Original	12.8%
2. 10% decline in prices of products	10.5
3. 10% decline in target yield of products	10.5
4. 10% increase in production cost	11.8
5. 10% increase in project cost in Wahby Downstream area	12.6
6. 20% increase in project cost in Wahby Downstream area	12.3
7. One year delay in start	12.0
8. Two year delay in start	11.1

(3) South Area of Lake Qarun Area

Item	EIRR
1. Original	15.3%
2. 10% decline in prices of products	13.0
3. 10% decline in target yield of products	13.0
4. 10% increase in production cost	14.4
5. 10% increase in project cost	14.1
6. 20% increase in project cost	13.1

6.3. Economic Justification of Agro-Industry

6.3.1. Slaughterhouse

The existing twelve slaughterhouses in the Fayoum Governorate are not equipped with the hygienic and modernized facilities. There is no slaughterhouse in Wahby Downstream area and South Area of Lake Qarun. To improve the present circumstances, an establishment of one modernized slaughterhouse would be planned in North Wahby area. This slaughterhouse is designed to slaughter and dress 7,430 head of cattle and sheep annually. Implementation is scheduled in 1990 to 1992.

The financial and economic cost are estimated at LE 1,495 thousand and LE 1,435 thousand, excluding escalation cost respectively.

The annual gross income and operating costs in the full development stage (1995) are estimated as follows.

Benefits in 1995

(Unit: 1,000 LE)

	Financial	Economic
Gross Income	4,937	5,686
Operating Cost	2,653	4,224
Benefits	1,284	1,462

Financial and economic internal rates of return are calculated at 28.3 and 39.3 percent, respectively by using the project life of 25 years. (refer to Table J6-4 in Appendix J-6)

6.3.2. Milk Processing Factory

In order to develop the role of Fayoum as a supplier of agricultural products for Cairo, an establishment of milk processing factory would be planned in North Wahby area. This factory would be constructed in 1991 and 1992.

The financial project cost includes costs for processing facilities, buildings, transportation vehicles and refrigerator but excludes price escalation amounting to LE 4.98 million. The economic project cost is estimated at LE 4.83 million.

The gross production income in the fifth year (1995) after the onset of operation of factory would be projected as follows.

Gross Production Value (1995)

Products	Quantity (tons)	Financial G.P.V. (1,000 LE)	Economic G.P.V. (1,000 LE)
UHT Milk	12,220	4,888	4,732
Yoghurt	4,888	2,933	2,839
White Cheese	3,055	4,582	4,435
Total		12,403	12,006

The conversion factor of milk products is 0.968 of tradable urban consumer goods. Production costs are variable cost of raw milk, packing and chemical and fixed cost of salary & wages and repayment cost.

The production cost in 1997 is estimated as follows.

Production Cost
(1995)

(Unit: 1,000 LE)

Items	Financial	Economic
Raw Milk Cost 0.25 LE/kg	7,638	7,638
Operation Cost	1,610	1,613
Total	9,248	9,251

Financial and economic internal rates of return are calculated by using the project life of 25 years.
(refer to Table J6-5 in Appendix J-6)

(Unit: %)

	FIRR	EIRR
Raw Milk Cost 0.25 LE/kg	22.0	24.9

6.4. Economic Justification of Housing and Infrastructure

The components of rural development project are houses, road, water supply, sewage, electricity, communication and village facilities. The financial basic cost of these components accounts for 54, 11, 5, 6, 18 and 4 percent of total basic cost, respectively. An economic justification of these investments is difficult to make in monetary terms. However, the social and economic justification of investment in village water supply and rural electrification projects are attempted by the way introduced in the World Bank Paper (Refer to Village Water Supply, Mar. 1976 and Rural Electrification, Oct. 1975).

6.4.1. Water Supply Project

In the Project Area, if the investment in village water supply is not made, the settlers have to look for alternative supply system, that is, to use irrigation water or to purchase drinking water from outside town. The salt content of irrigation water will be 800 parts per million in maximum. Hence the irrigation water to be used in the Project Area is unsuitable for drinking purpose in case of no treatment. Another alternative is to purchase drinking water of 950 cubic meters per day.

If revenues from water charges in urban systems are sufficient to meet all costs and provide a reasonable rate of return, these revenues can be used as a minimum approximation of economic benefits.

Cairo water supply council approved the raising of water charge from LE 0.012 to LE 0.02 per cubic meter in July, 1983. It is reported that the desirable water charge is LE 0.10 per cubic meter consisting of LE 0.055 of a water production cost and LE 0.045 of a repayment cost of facilities.

Annual benefit is expected at LE 0.03 million by using LE 0.1 per cubic meter in order to derive the moderate benefit.

6.4.2. Electric Facilities

There is normally a substitute for publicly supplied electricity in the form of diesel engines. The net advantage of electricity over the substitutes is counted as benefits.

Total electric power requirement amounts to about 18.8 million kilowatts hour.

The electric charge is lower than the fuel cost of operating diesel engines. The difference is assumed as annual benefit. The conversion factor of electricity is 3.321 based on the World Bank Papers No.521. In order to estimate a moderate benefit, the conversion factor of fuel is 1.01 of crude oil. Annual economic benefit is estimated at LE 1.23 million.

6.5. Economic Justification of Entire Project in North Wahby and Com Osheem Areas

The entire project comprising of agricultural land reclamation, houses and social infrastructure and agricultural processing is economically justified as follows.

a. Agricultural land reclamation project only 12.1%

b. Project comprising of agricultural land reclamation, houses and social infrastructure

- Case with benefit of water supply and electricity 13.2%
- Case without benefit of water supply and electricity 11.8%

c. Project comprising of agricultural and reclamation, house & social infrastructure and agricultural processing 10.4%

(refer to Tables J6-6 to J6-8 in Appendix J6)

6.6. Financial Analysis

6.6.1. North Wahby and Com Osheem Areas

A farm budget study was carried out for three types of farmers; i.e., five , 15 and 20 feddan holders. Each budgetary item was calculated under the hypothesis that output and input excluding labor cost are valued in proportion to farm sizes. The labor balance is different between small and large holders.

The annual amortization of the initial capital was estimated for reclamation lands, settlers houses, terminal irrigation facilities and animal husbandry. The irrigation water charge is estimated by using the annual operation and maintenance cost. The forecast living cost of farmhousehold in the full development stage in year 2000 is assumed from the annual GDP growth rate of 5.7 percent based on the Five Year Plan for Economic and Social Development. It is estimated that five feddan farmers will balance about LE 2,160 of net farm income at the full development stage, while 15 and 20 feddan farmers will balance enough profit for re-investment or saving, i.e., LE 6,530 and LE 9,250, respectively. (refer to Tables J7-1 to J7-2 in Appendix J-7)

The living costs of three cases are estimated by using the coefficient of Engle, 50, 60 and 70 percent, respectively. Farm income is computed by deducting the production cost from gross income. Farm income of two cases at the full development stage in 2000 are studied by using prices of average and low bases. Farm income of five feddan farmer is ranged from LE 6,454 to LE 4,421. Disposal income is gained in range from LE 5,164 to LE 3,131 by deducting annual amortization and irrigation charge from farm income. The living cost should be paid by disposal income. The balance is estimated from LE 1,464 to LE 2,524 by using the average price and LE (-)569 to LE 491 by using low price, respectively.

6.6.2. Wahby Downstream Area

An average farm size in Fayoum Governorate is estimated at 2.8 feddan. A farm budget analysis is carried out by using this size. Farm economy at present is estimated based on the results of the farm management survey conducted by the study team and the data collected from MOA, Fayoum.

Average farmer will gain about LE 1,670 of farm income at the full development stage. Incremental farm income will be expected at about LE 1,020. (refer to Tables J7-5 and J7-6 in Appendix J-7)

6.6.3. South Area of Lake Qarun

Farm budget is estimated on the average farm size of 2.8 feddan. The project area of South Area of Lake Qarun consists of three sub-projects. Farm budget is studied on two representative farmers in Bats Said & Abu Tarfaya sub-areas and Abu Harawa sub-area. The average size farmer in Bats Said and Abu Tarfaya sub-areas will gain about LE 1,110 of farm income at the full development stage. Incremental farm income will be expected at about LE 240. And average size farmer in Abu Harawa sub-area will gain about LE 1,140 of farm income at the full development stage. Incremental farm income will be expected at about LE 490. (refer to Table J7-7 in Appendix J-7)

6.7. Social and Economic Impact

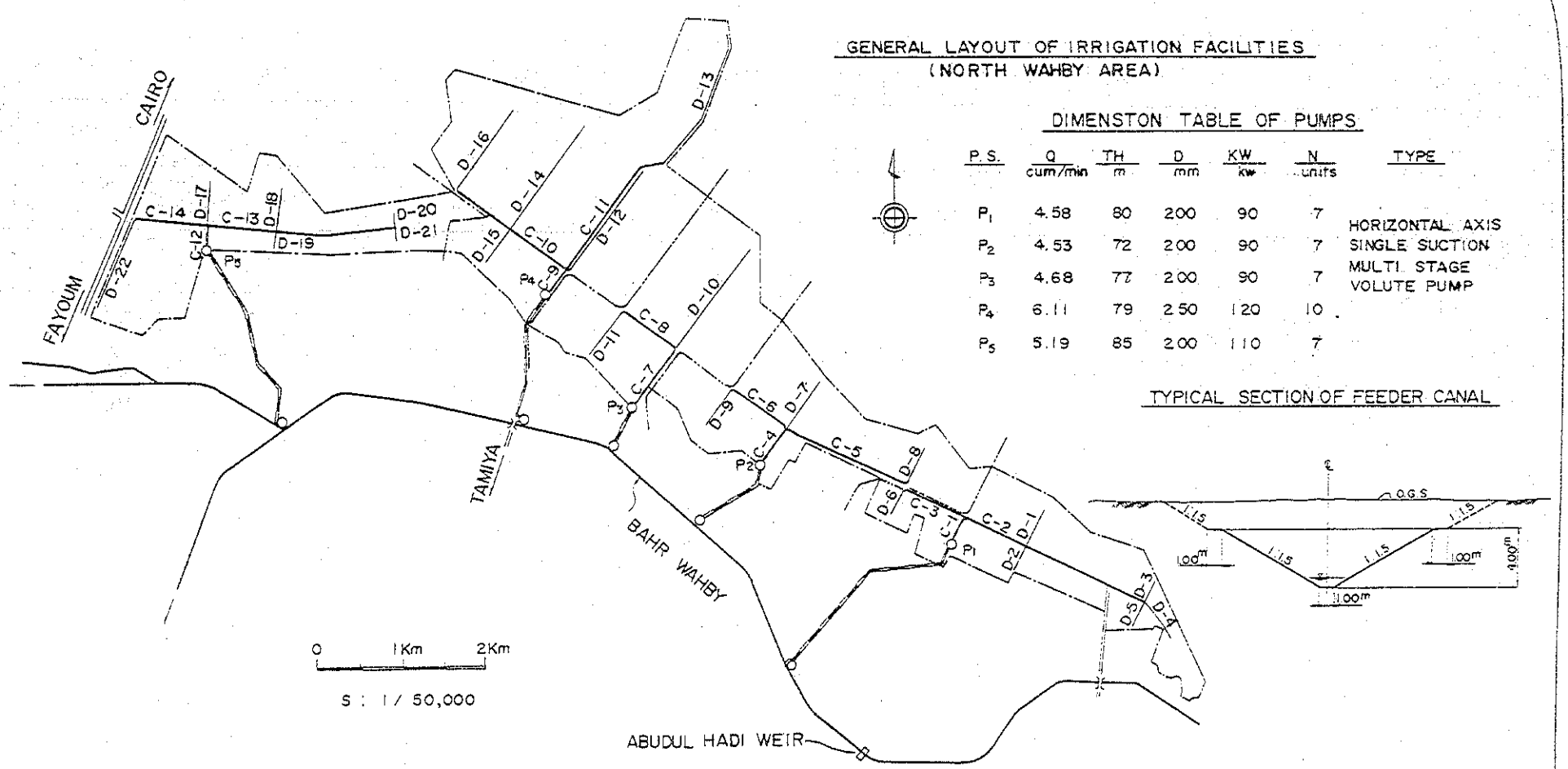
The project economy should be also evaluated in terms of the indirect benefits. Besides the direct benefits mentioned before, the Project will create indirect benefits and socio-economic impact on the regional and national economy.

a. Employment opportunities will be created.
b. The new settlers can earn a high farm income. The tax revenue of Fayoum Governorate will be invested in the social infrastructure, resulting in the increased regional welfare, accordingly.
c. The consumptive goods market in the vicinity of the Project Area shall be expanded through an increase in population of about 5,000.
d. Income of the local people will increase during the construction period.
e. Production of crops and animal products as substitute of imports will save foreign currency.
f. The Project will serve as a model for the water resource development strategy in the Five Year Plan for Economic.

DRAWINGS

LIST OF DRAWINGS

GENERAL LAYOUT OF IRRIGATION FACILITIES
(NORTH WAHBY AREA)

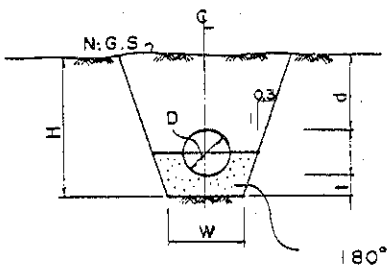


DIMENSTON TABLE OF PUMPS

P.S.	Q cum/min	TH m	D mm	KW kw	N units	TYPE
P_1	4.58	80	200	90	7	HORIZONTAL AXIS SINGLE SUCTION MULTI STAGE VOLUTE PUMP
P_2	4.53	72	200	90	7	
P_3	4.68	77	200	90	7	
P_4	6.11	79	250	120	10	
P_5	5.19	85	200	110	7	

TYPICAL SECTION OF FEEDER CANAL

TYPICAL SECTION OF PIPE LAYING



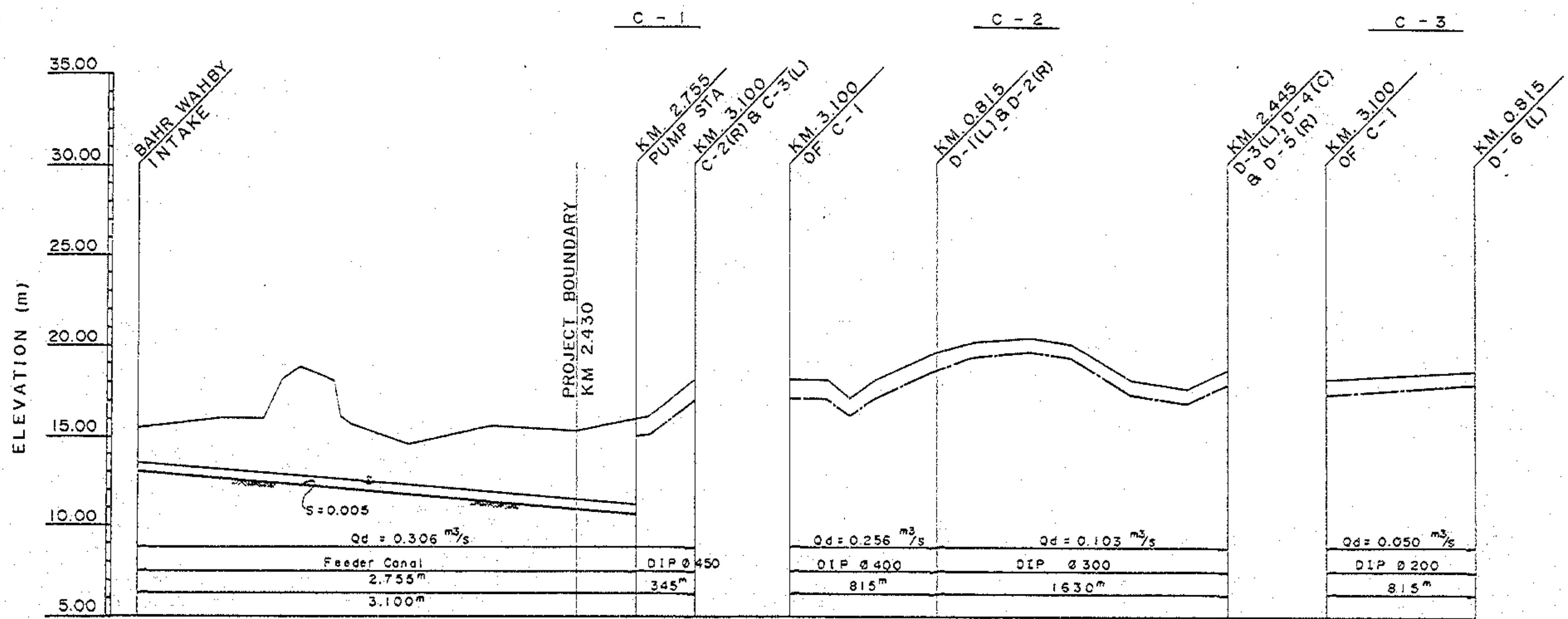
D mm	W m	d m	t m	H m
700	1.00	0.80	0.20	1.70
600	0.90	0.80	0.20	1.60
500	0.80	0.80	0.20	1.50
450	0.80	0.80	0.15	1.40
400	0.70	0.80	0.15	1.40
350	0.70	0.60	0.15	1.10
300	0.60	0.60	0.15	1.10
250	0.60	0.60	0.15	1.00
200	0.60	0.60	0.10	0.95

LEGEND

- ——— : PROJECT BOUNDARY
- ——— : IRRIGATION DEVISION BOUNDARY
- ═══ : ROAD
- ——— : CONVEYANCE PIPE LINE
- ——— : DISTRIBUTION PIPE LINE
- ○ P_4 : PUMPING STATION
- ⌅ : BRIDGE (EXISTING)
- ○ : INTAKE
- ——— : FEEDER CANAL

DWG NO. 1

LONGITUDINAL PROFILE OF CONVEYANCE PIPE. (PI SYSTEM)

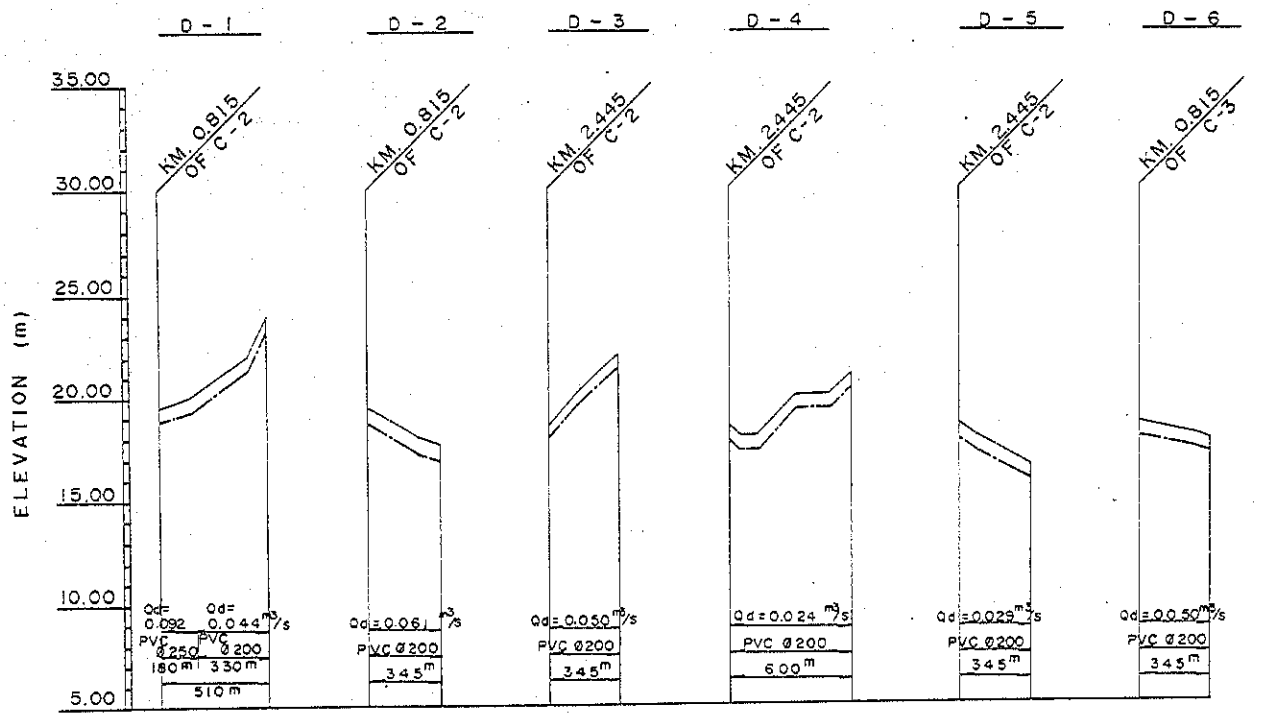


STATION No.	0	0.450	0.700	0.790	0.900	1.100	1.130	1.180	1.500	1.950	2.430	2.775	2.850	3.100
DISTANCE (km)	0	0.450	0.700	0.790	0.900	1.100	1.130	1.180	1.500	1.950	2.430	2.776	2.850	3.100
ELEVATION (m) GROUND	15.40	16.00	16.00	18.00	18.80	18.00	16.00	15.60	14.50	15.50	15.20	15.90	16.00	18.00
ELEVATION (m) CANAL BED OR PIPE ℄	12.90 (12.10)											11.52	14.97	16.97
WATER LEVEL OR HYDRAULIC GRAD	13.40 (13.75)											12.02 (11.95)	91.95	89.45

STATION No.	0	0.200	0.340	0.480	0.815	1.000	1.325	1.550	1.900	2.210	2.445	0	0.815
DISTANCE (km)	0	0.200	0.340	0.480	0.815	1.000	1.325	1.550	1.900	2.210	2.445	0	0.815
ELEVATION (m) GROUND	18.00	18.00	17.00	18.00	19.50	20.00	20.30	20.00	18.00	17.50	18.50	18.00	18.50
ELEVATION (m) CANAL BED OR PIPE ℄	16.97	16.99	15.99	16.99	18.49	19.24	19.54	19.24	17.24	16.74	17.74	16.97	17.79
WATER LEVEL OR HYDRAULIC GRAD	89.45				81.95						70.65	89.45	78.85

DWG NO.2

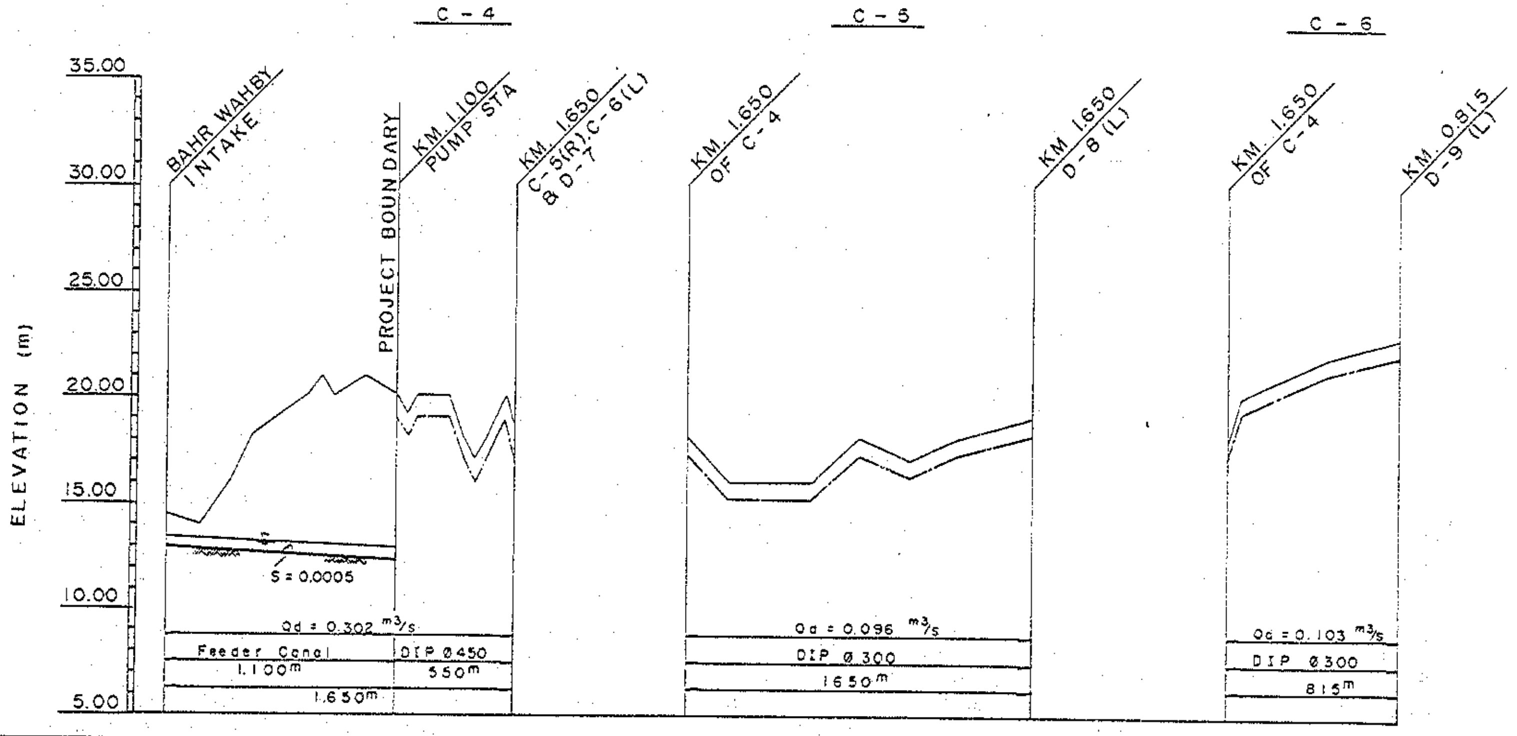
LONGITUDINAL PROFILE OF DISTRIBUTION PIPE. (PI SYSTEM)



WATER LEVEL OR HIYDRAULIC GRAD		81.95			76.05		81.95			75.45		70.65			66.15	70.65			68.55	70.65		68.95		78.85		74.35
ELEVATION (m) CANAL BED OR PIPE ℄		18.49	19.27		21.27	23.27	18.49		17.79	16.89		17.74	19.29		21.29	17.74	17.03	17.02	19.29	19.30	20.29	17.74	17.03	15.79	17.79	17.29	16.99
ELEVATION (m) GROUND		19.50	20.00		22.00	24.00	19.50		18.00	17.60		18.50	20.00		22.00	18.50	18.00	18.00	20.00	20.00	21.00	18.50	18.00	16.50	18.50	18.00	17.70
DISTANCE (km)		0	0.150		0.425	0.510	0		0.240	0.345		0	0.130		0.345	0	0.050	0.140	0.320	0.500	0.600	0	0.070	0.345	0	0.280	0.345
STATION No.	km	0	0.150		0.425	0.510	0		0.240	0.345		0	0.130		0.345	0	0.050	0.140	0.320	0.500	0.600	0	0.070	0.345	0	0.280	0.345

DWG NO. 3

LONGITUDINAL PROFILE OF CONVEYANCE PIPE.(P2 SYSTEM)



C - 4

WATER LEVEL OR HYDRAULIC GRAD	(13.70) 13.35								12.80 (12.75)	84.75							80.85
ELEVATION (m) CANAL BED OR PIPE ℄	(12.05) 12.85								12.30	17.97	18.97	18.96	16.97	15.97	16.97	18.97	16.97
ELEVATION (m) GROUND	14.40	14.00	16.00	18.00	20.00	21.00	20.00	21.00	20.00	19.00	20.00	20.00	18.00	17.00	18.00	20.00	18.00
DISTANCE (km)	0	0.150	0.300	0.400	0.680	0.740	0.800	0.950	1.100	1.150	1.200	1.350	1.410	1.460	1.510	1.600	1.650
STATION No.	Km 0	0.150	0.300	0.400	0.680	0.740	0.800	0.950	1.100	1.150	1.200	1.350	1.410	1.460	1.510	1.600	1.650

C - 5

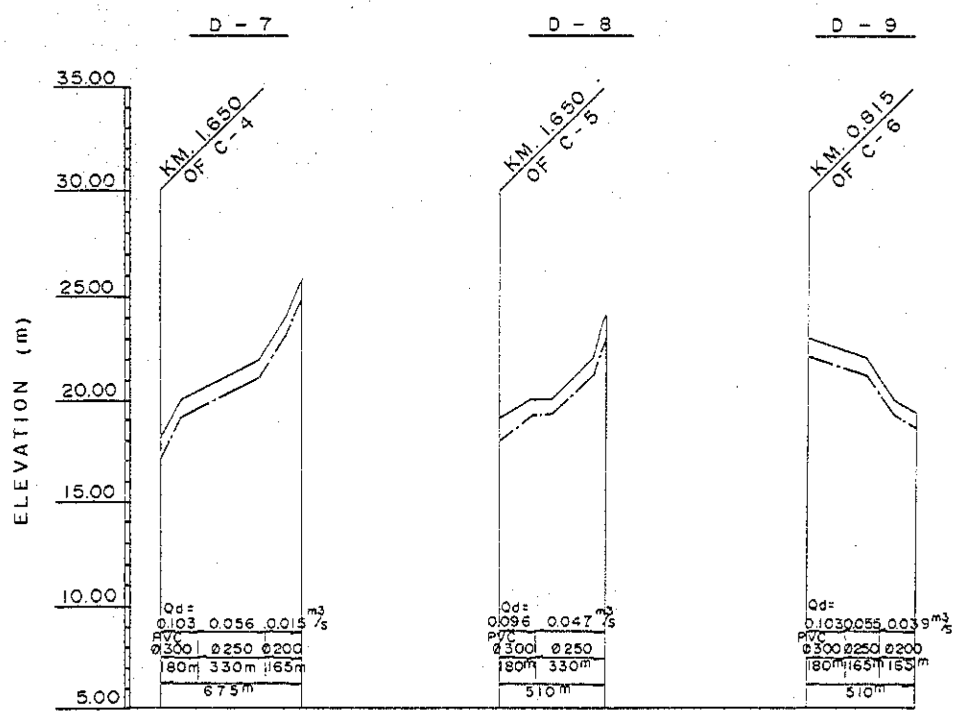
WATER LEVEL OR HYDRAULIC GRAD	80.85						70.95
ELEVATION (m) CANAL BED OR PIPE ℄	16.97	15.24	15.25	17.24	16.24	17.24	18.24
ELEVATION (m) GROUND	18.00	16.00	16.00	18.00	17.00	18.00	19.00
DISTANCE (km)	0	0.200	0.600	0.815	1.060	1.300	1.650
STATION No.	0	0.200	0.600	0.815	1.060	1.300	1.650

C - 6

WATER LEVEL OR HYDRAULIC GRAD	80.85			75.15
ELEVATION (m) CANAL BED OR PIPE ℄	16.97	19.24	21.24	22.24
ELEVATION (m) GROUND	18.00	20.00	22.00	23.00
DISTANCE (km)	0	0.050	0.480	0.815
STATION No.	0	0.050	0.480	0.815

DWG NO. 4

LONGITUDINAL PROFILE OF DISTRIBUTION PIPE. (P2 SYSTEM)



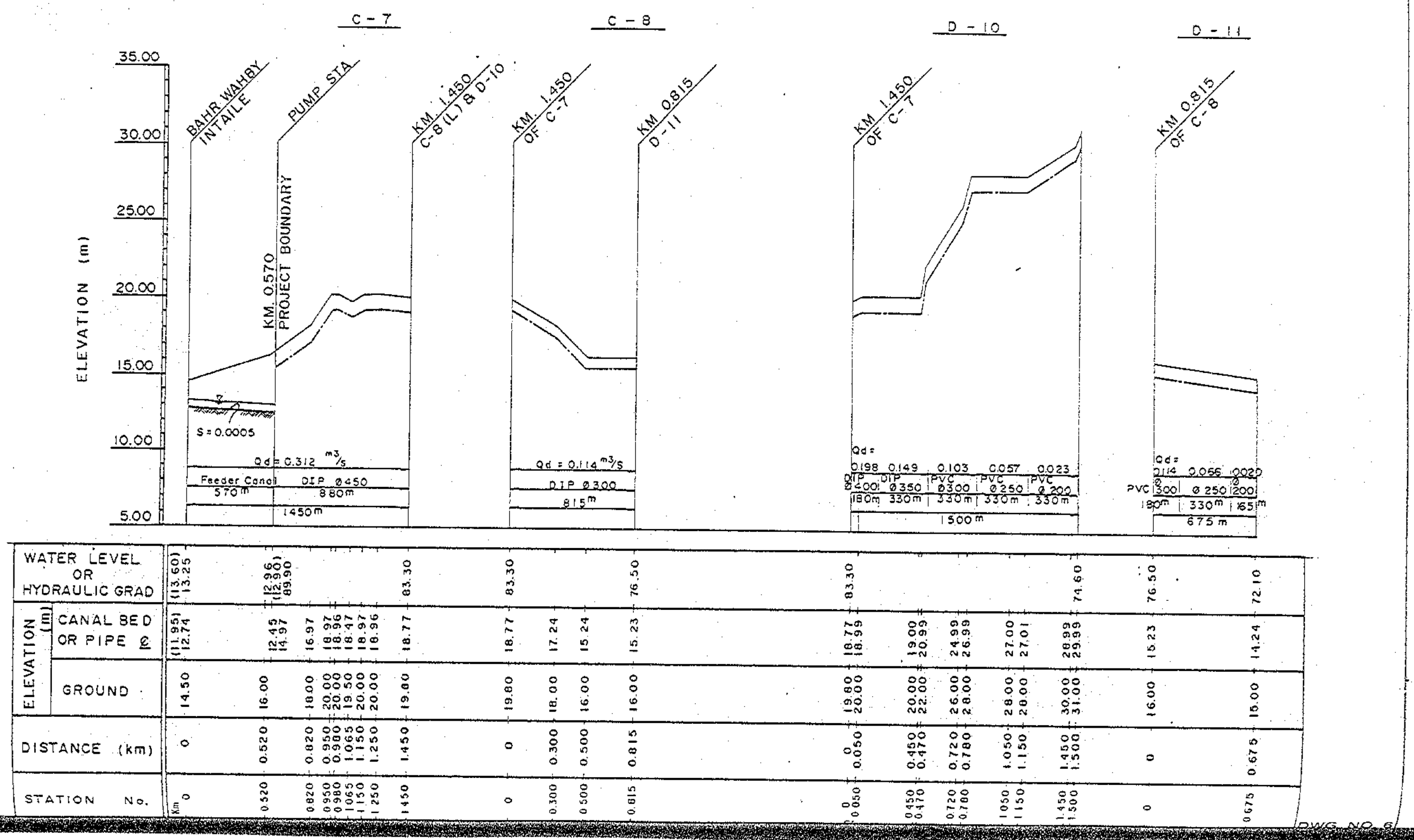
D - 7					
WATER LEVEL OR HYDRAULIC GRAD	70.85				66.45
ELEVATION (m) CANAL BED OR PIPE ℄	16.97	19.24	21.24	23.24	25.24
ELEVATION (m) GROUND	18.00	20.00	22.00	24.00	26.00
DISTANCE (km)	0	0.100	0.470	0.600	0.675
STATION No. (Km)	0	0.100	0.470	0.600	0.675

D - 8					
WATER LEVEL OR HYDRAULIC GRAD	70.85				68.45
ELEVATION (m) CANAL BED OR PIPE ℄	16.97	19.24	19.25	21.24	23.24
ELEVATION (m) GROUND	19.00	20.00	20.00	22.00	24.00
DISTANCE (km)	0	0.150	0.250	0.440	0.510
STATION No.	0	0.150	0.250	0.440	0.510

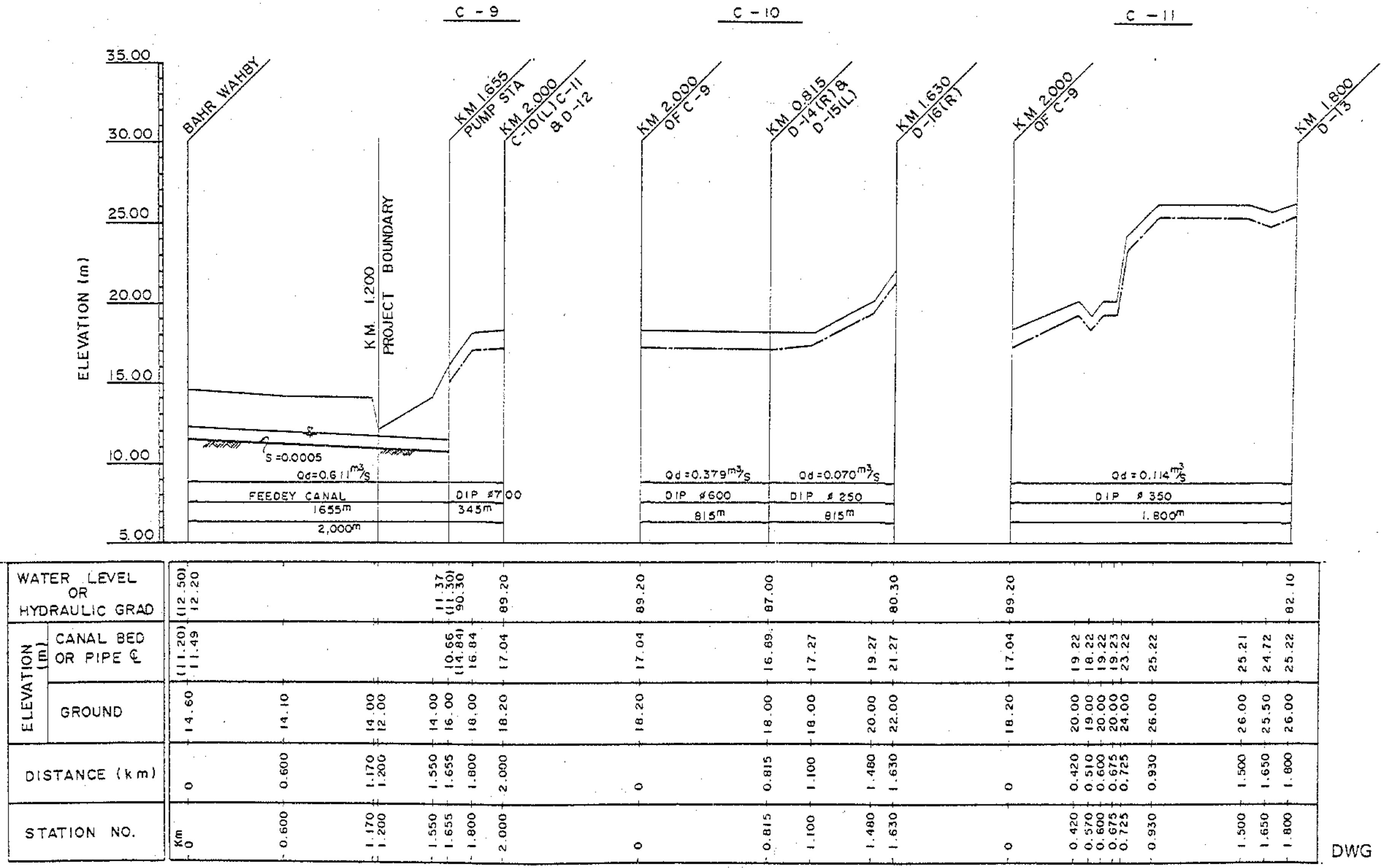
D - 9				
WATER LEVEL OR HYDRAULIC GRAD	75.15			71.55
ELEVATION (m) CANAL BED OR PIPE ℄	22.24	21.24	19.24	18.54
ELEVATION (m) GROUND	23.00	22.00	20.00	19.30
DISTANCE (km)	0	0.280	0.420	0.510
STATION No.	0	0.280	0.420	0.510

DWG NO. 5

LONGITUDINAL PROFILE OF CONVEYANCE AND DISTRIBUTION PIPES. (P3 SYSTEM)

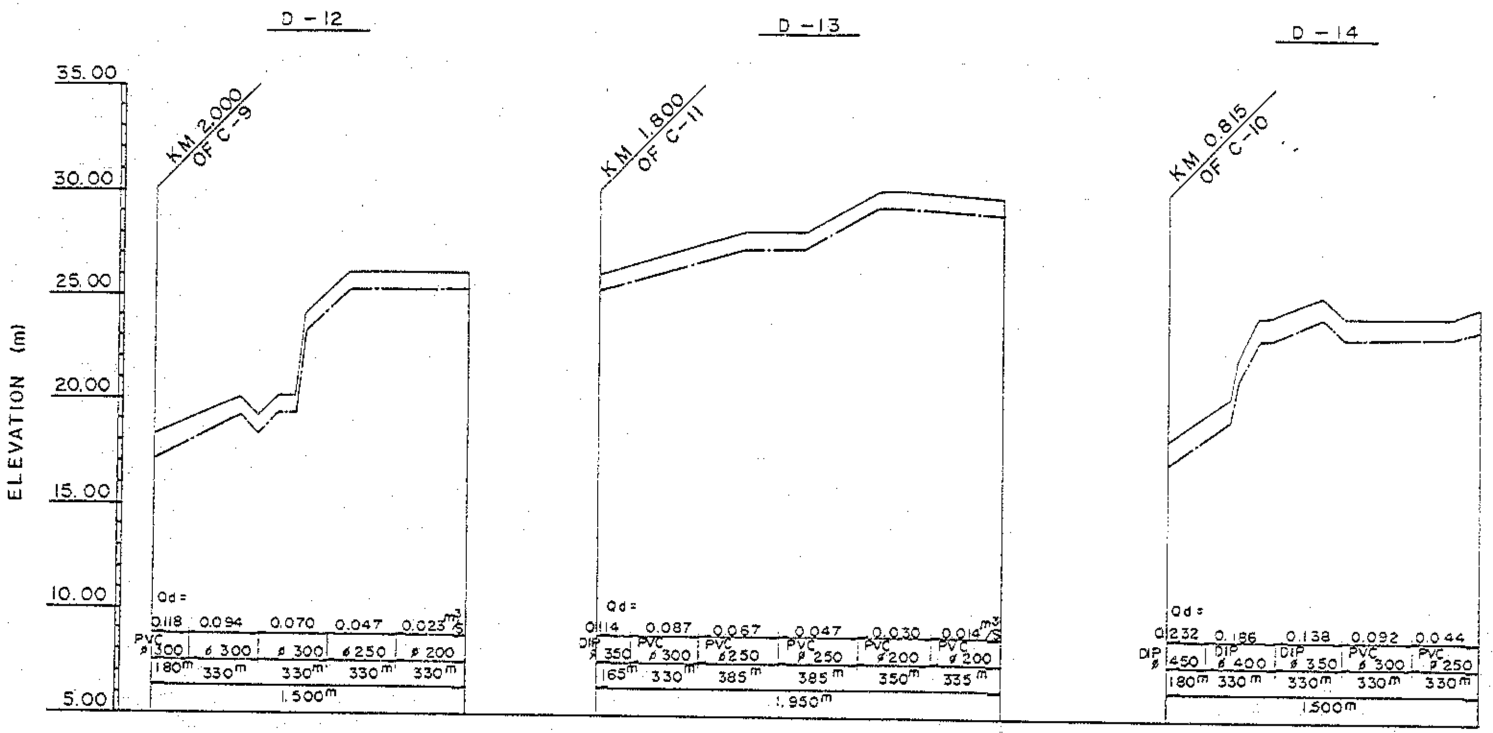


LONGITUDINAL PROFILE OF CONVEYANCE PIPE (P4 SYSTEM)



DWG NO. 7

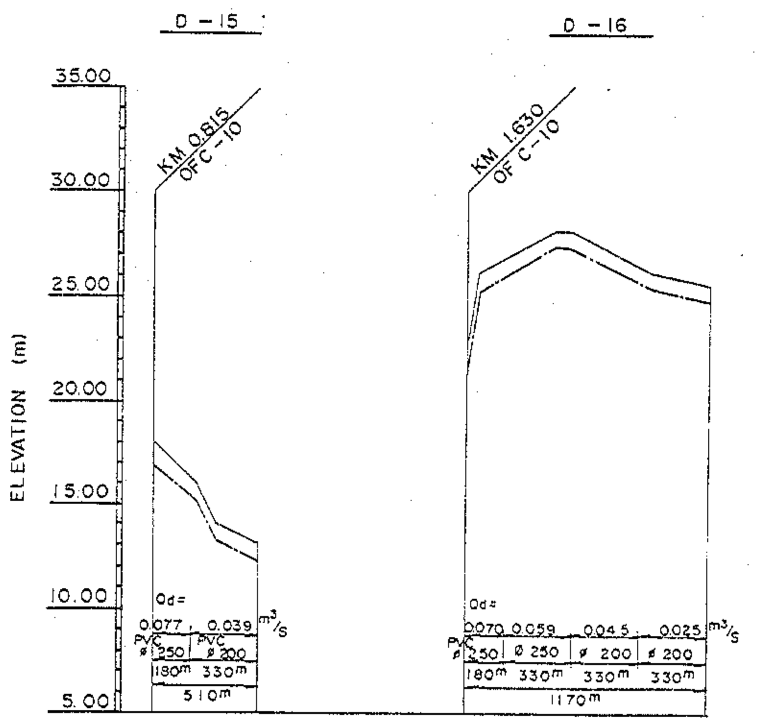
LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P4 SYSTEM) 1/2



Line	STATION NO.	DISTANCE (km)	WATER LEVEL OR HYDRAULIC GRAD	ELEVATION (m) CANAL BED OR PIPE ℄	ELEVATION (m) GROUND
D-12	Km 0	0	89.20	17.04	18.20
D-12	0.420	0.420		19.24	20.00
D-12	0.510	0.510		18.24	19.00
D-12	0.600	0.600		19.24	20.00
D-12	0.675	0.675		19.25	20.00
D-12	0.725	0.725		23.24	24.00
D-12	0.930	0.930		25.24	26.00
D-12	1.500	1.500	80.30	25.25	26.00
D-13	0	0	82.10	25.22	26.00
D-13	0.700	0.700		27.22	28.00
D-13	1.000	1.000		27.23	28.00
D-13	1.350	1.350		29.22	30.00
D-13	1.450	1.450		29.21	30.00
D-13	1.950	1.950	73.00	28.82	29.60
D-14	0	0	87.00	16.89	18.00
D-14	0.300	0.300		18.97	20.00
D-14	0.350	0.350		20.97	22.00
D-14	0.430	0.430		22.97	24.00
D-14	0.500	0.500		22.98	24.00
D-14	0.750	0.750		23.97	25.00
D-14	0.850	0.850		22.97	24.00
D-14	1.350	1.350		22.96	24.00
D-14	1.500	1.500	79.50	23.47	24.50

DWG NO.8

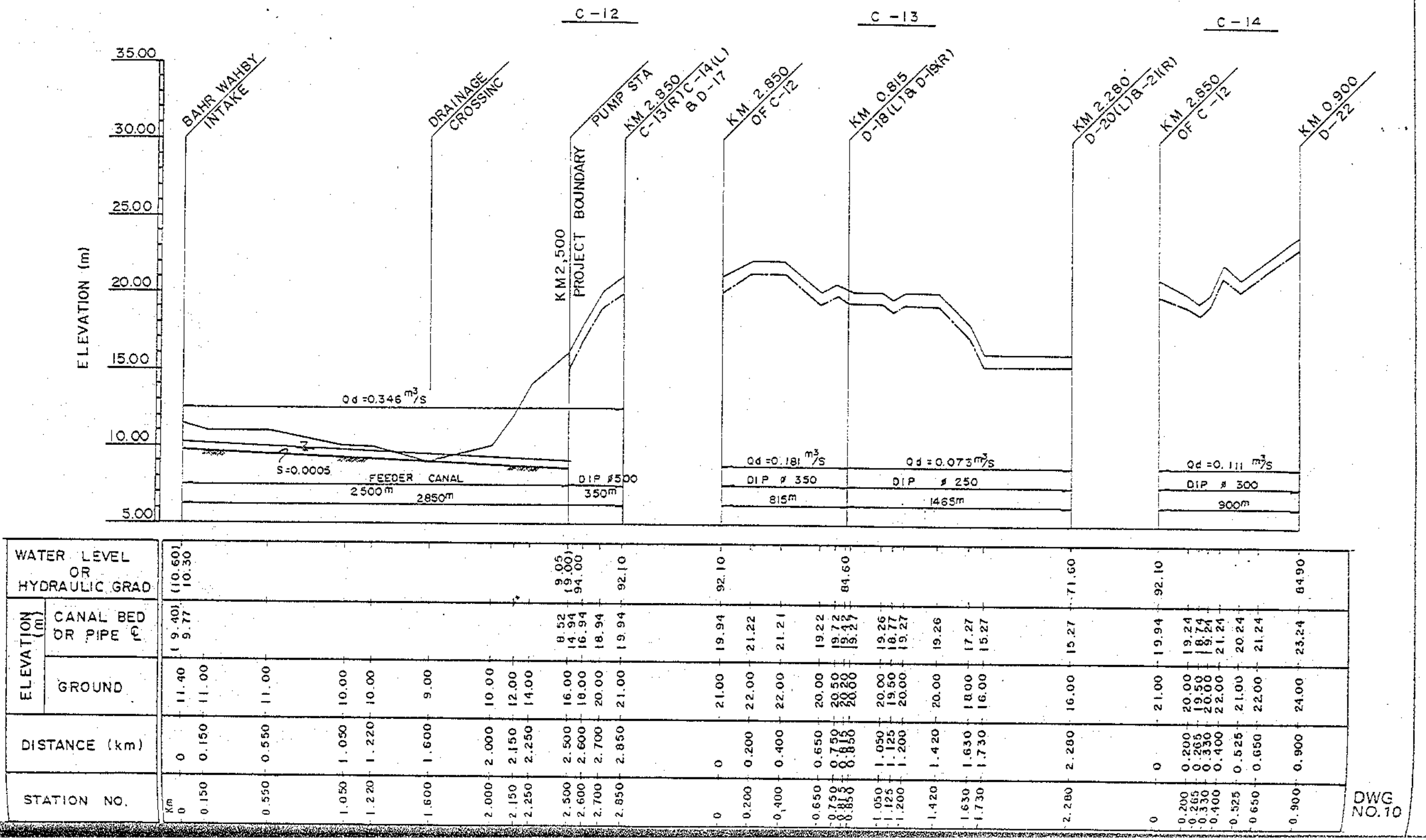
LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P4 SYSTEM) 2/2



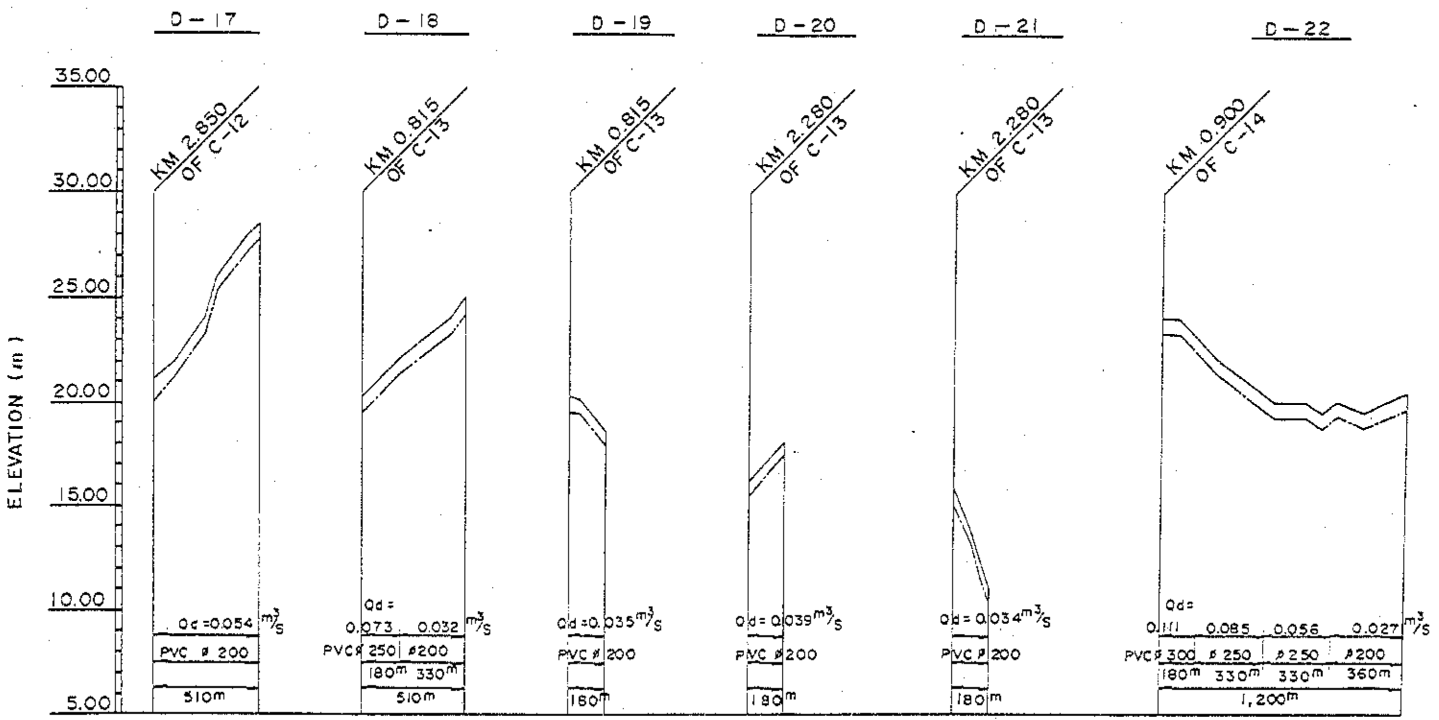
	D-15				D-16						
WATER LEVEL OR HYDRAULIC GRAD.	87.00			82.50	80.30					72.00
ELEVATION (m) CANAL BED OR PIPE ℄	16.89	15.27	13.27	12.27	21.27	25.27	27.27	27.26	25.27	24.77
ELEVATION (m) GROUND	18.00	16.00	14.00	13.00	22.00	26.00	28.00	28.00	26.00	25.50
DISTANCE (km)	0	0.200	0.300	0.510	0	0.050	0.430	0.500	0.900	1.170
STATION NO.	km 0	0.200	0.300	0.510	0	0.050	0.430	0.508	0.900	1.170

DWG NO. 9

LONGITUDINAL PROFILE OF CONVEYANCE PIPE (P5 SYSTEM)



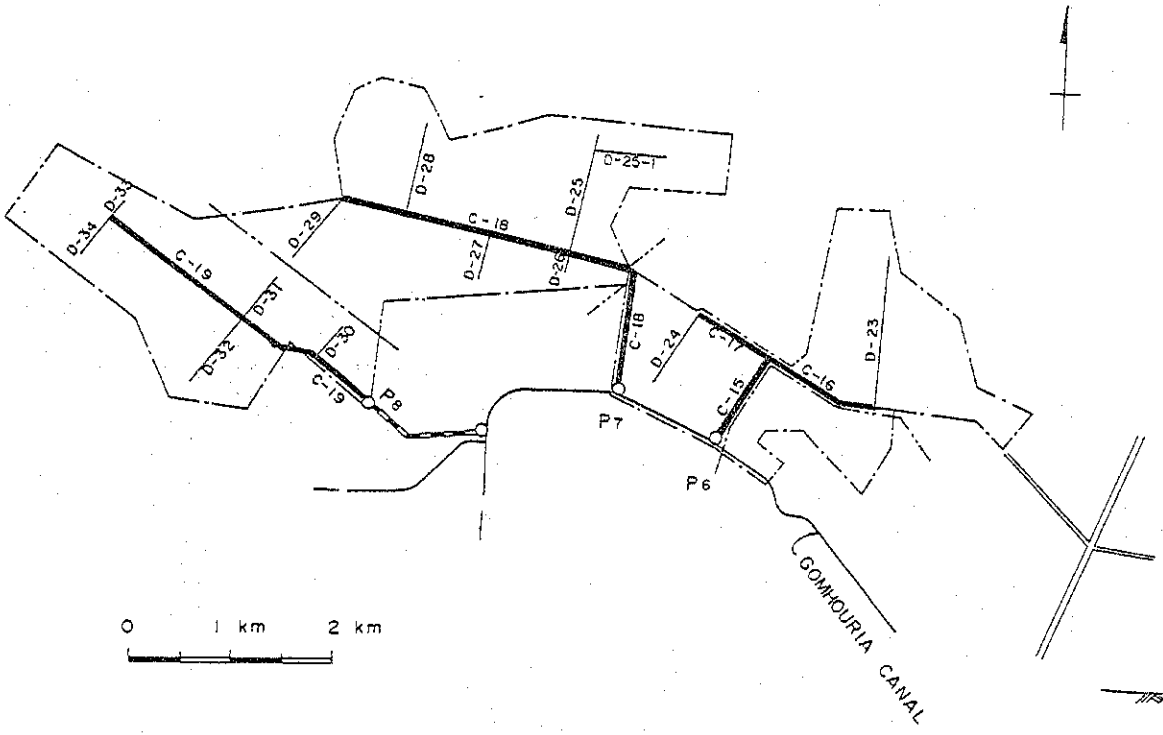
LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P5 SYSTEM)



Line	STATION NO. (km)	DISTANCE (km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
D-17	0	0	21.00	19.94	92.10
	0.100	0.100	22.00		
	0.250	0.250	24.00		
	0.300	0.300	26.00		
	0.450	0.450	28.00		
	0.510	0.510	28.50	27.79	84.40
D-18	0	0	20.20	19.42	84.60
	0.180	0.180	22.00		
	0.430	0.430	24.00		
	0.510	0.510	25.00	24.27	81.10
D-19	0	0	20.20	19.42	84.60
	0.050	0.050	20.00		
	0.180	0.180	18.50	17.79	83.40
D-20	0	0	16.00	15.27	71.60
	0.180	0.180	18.00	17.29	70.10
D-21	0	0	16.00	15.27	71.60
	0.090	0.090	14.00		
	0.150	0.150	12.00		
	0.180	0.180	11.00	10.29	70.40
D-22	0	0	24.00	23.24	84.90
	0.080	0.080	24.00		
	0.280	0.280	22.00		
	0.550	0.550	20.00		
	0.700	0.700	20.00		
	0.775	0.775	19.50		
	0.850	0.850	20.00		
	1.000	1.000	19.50		
	1.100	1.100	20.00		
	1.200	1.200	20.50	19.74	76.20

DWG NO. 11

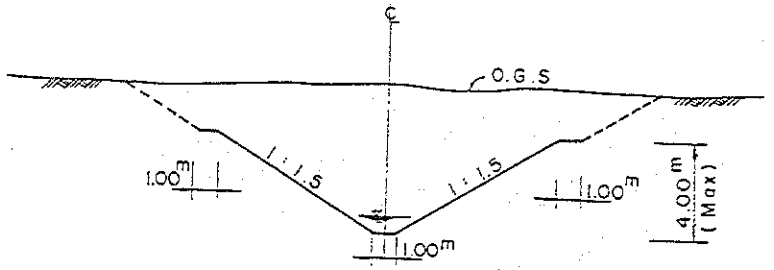
General Layout of Irrigation Facilities
(Com Osheem Area)



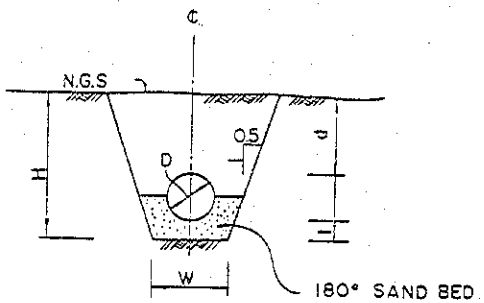
DIMENSION TABLE OF PUMPS

P.S	Q cum/min	TH m	D mm	KW km	N units	TYPE
P6	6.60	78	250	130	7	HORIZONTAL AXIS SINGLE SUCTION
P7	8.04	83	250	160	7	MULTI STAGE VOLUTE PUMP
P8	5.36	82	200	110	7	

TYPICAL SECTION OF FEEDER CANAL



TYPICAL SECTION OF PIPE LAYING



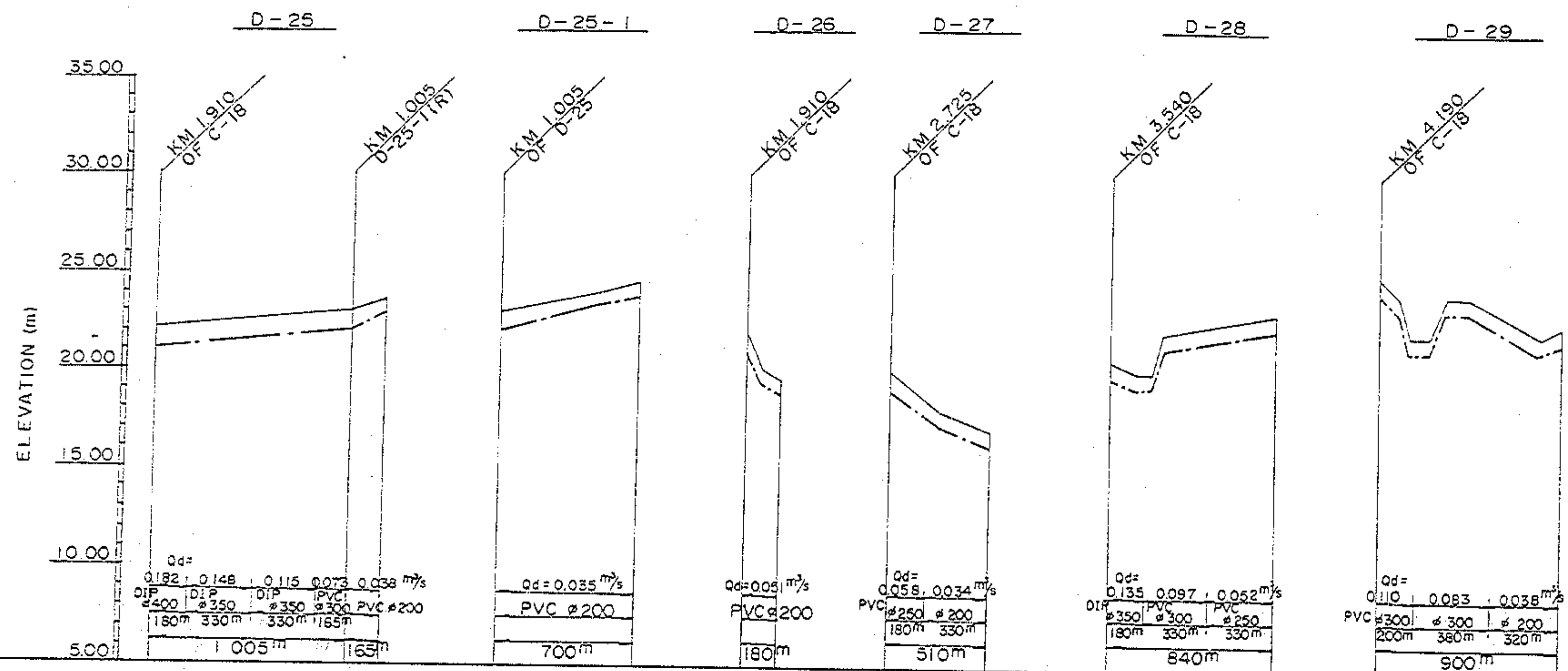
D mm	W m	d m	t m	H m
700	1.00	0.80	0.20	1.70
500	0.90	0.80	0.20	1.60
500	0.80	0.80	0.20	1.50
450	0.80	0.80	0.15	1.40
400	0.70	0.80	0.15	1.40
350	0.70	0.60	0.15	1.10
300	0.60	0.60	0.15	1.10
250	0.60	0.60	0.15	1.00
200	0.60	0.60	0.10	0.95

LEGEND

- : Project Boundary
- : Irrigation Division Boundary
- : Road
- : Conveyance Pipe Line
- : Distribution Pipe Line
- P4 : Pumping Station
- : Intake
- : Feeder Canal

DWG NO. 12

LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P7 SYSTEM)

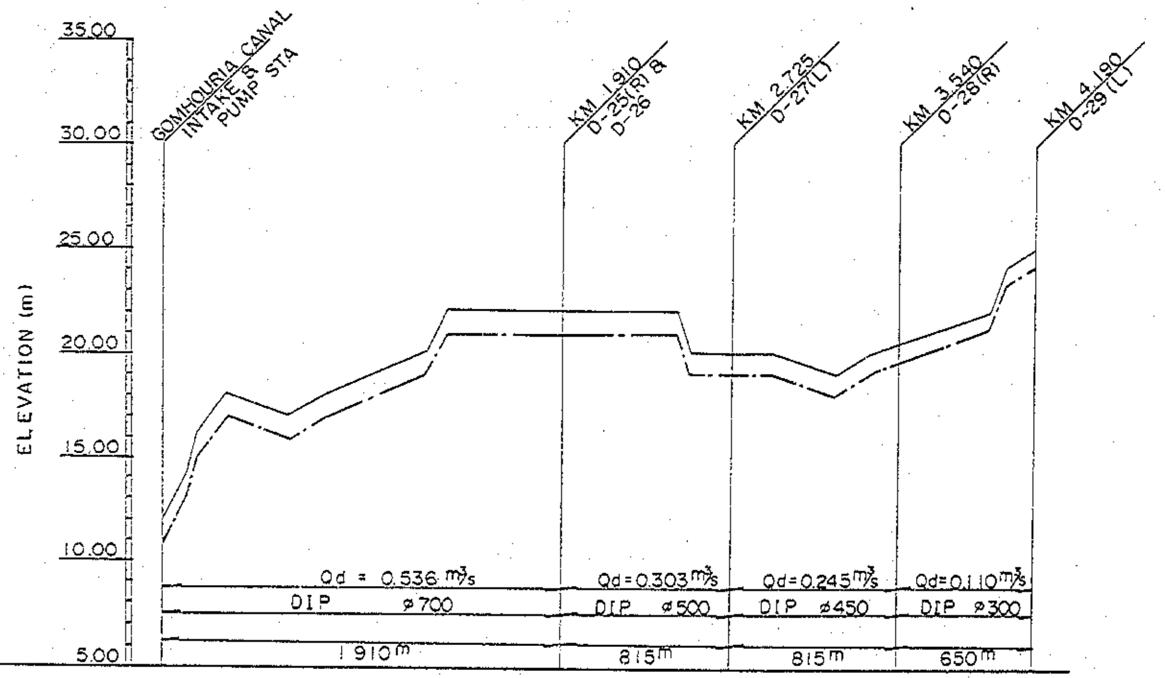


Line	STATION NO.	DISTANCE (Km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
D-25	0	0	22.00	20.85	87.20
	1.005	1.005	23.00	21.99	82.20
	1.170	1.165	23.50	22.79	80.90
D-25-1	0	0	23.00	21.99	82.20
	0.450	0.450	24.00	23.29	
	0.700	0.700	24.50	23.79	77.40
D-26	0	0	22.00	20.85	87.20
	0.070	0.070	20.00	19.29	
	0.180	0.180	19.50	18.79	84.70
D-27	0	0	20.00	18.94	83.70
	0.250	0.250	18.00	17.27	
	0.510	0.510	17.00	16.27	80.60
D-28	0	0	20.50	19.47	79.80
	0.130	0.130	20.00	19.22	
	0.200	0.200	20.00	19.23	
	0.250	0.250	22.00	21.22	
	0.840	0.840	23.00	22.22	75.20
D-29	0	0	25.00	24.24	74.70
	0.100	0.100	24.00	23.24	
	0.150	0.150	22.00	21.24	
	0.250	0.250	22.00	21.25	
	0.330	0.330	24.00	23.24	
	0.450	0.450	24.00	23.23	
	0.800	0.800	22.00	21.24	
	0.900	0.900	22.50	21.74	68.80

DWG NO.16

LONGITUDINAL PROFILE OF CONVEYANCE PIPE (P7 SYSTEM)

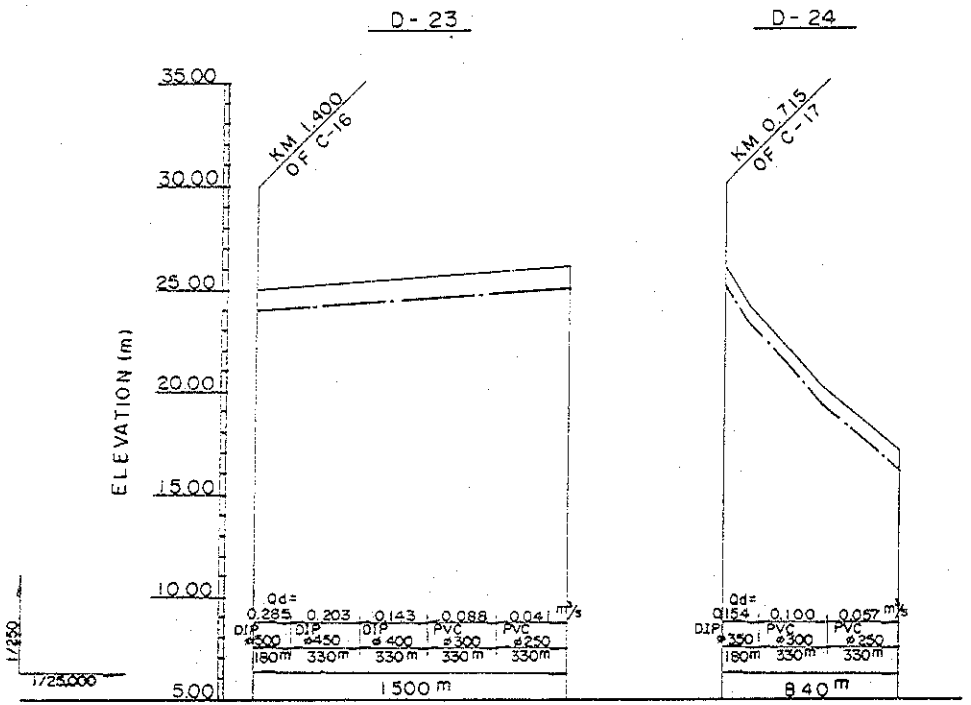
C – 18



STATION NO.	DISTANCE (Km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
0	0	12.00	(8.00) 10.84	(9.00) 8.70
0.100	0.100	14.00	12.84	91.70
0.160	0.160	16.00	14.84	
0.300	0.300	18.00	16.84	
0.600	0.600	17.00	15.84	
0.770	0.770	18.00	16.84	
1.250	1.250	20.00	18.84	
1.350	1.350	22.00	20.84	
1.910	1.910	22.00	20.85	87.20
2.460	2.460	22.00	20.94	
2.510	2.510	20.00	18.95	
2.725	2.725	20.00	18.94	83.70
2.925	2.925	20.00	18.93	
3.225	3.225	19.00	17.97	
3.405	3.405	20.00	18.97	
3.540	3.540	20.50	19.47	79.80
3.970	3.970	22.00	21.24	
4.040	4.040	24.00	23.24	
4.190	4.190	25.00	24.24	74.70

DWG NO. 15

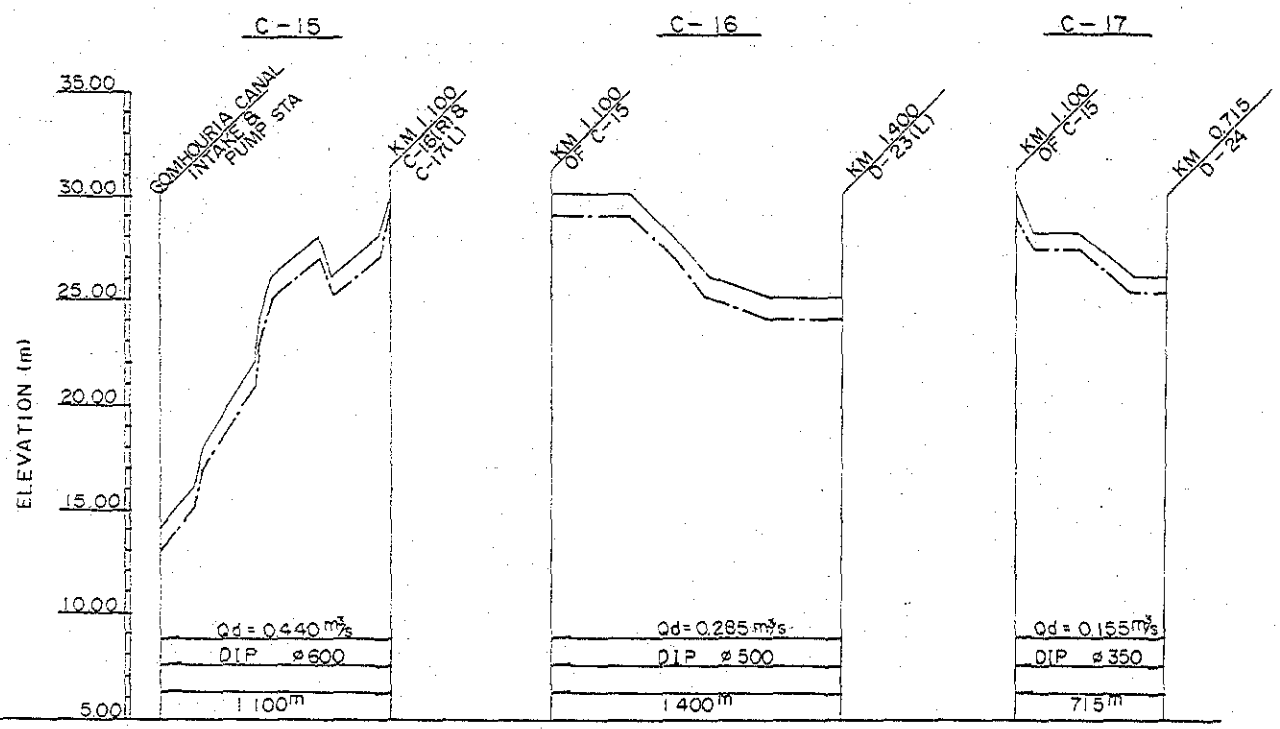
LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P6 SYSTEM)



WATER LEVEL OR HYDRAULIC GRAD		77.60			71.90	77.90			72.50	
ELEVATION (m)	CANAL BED OR PIPE ℄	23.97			24.97	25.24	23.24	21.24	19.24	17.24	16.24
	GROUND	25.00			26.00	26.00	24.00	22.00	20.00	18.00	17.00
DISTANCE (Km)		0			1.500	0	0.110	0.310	0.470	0.730	0.840
STATION NO.		0			1.500	0	0.110	0.310	0.470	0.730	0.840

DWG NO. 14

LONGITUDINAL PROFILE OF CONVEYANCE PIPE (P6 SYSTEM)

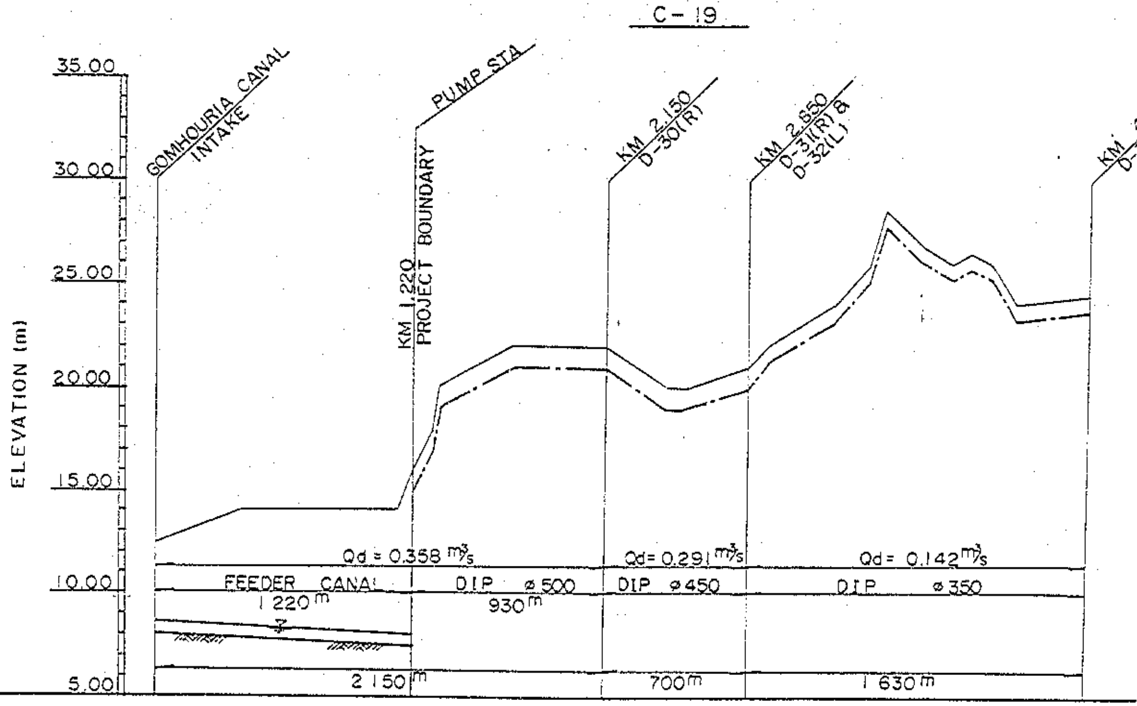


STATION NO.	DISTANCE (Km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
0	0	14.00	(8.05) 12.94	(9.05) 8.70 86.70
0.150	0.150	16.00	14.94	
0.200	0.200	18.00	16.94	
0.330	0.330	20.00	18.94	
0.450	0.450	22.00	20.94	
0.470	0.470	24.00	22.94	
0.520	0.520	26.00	24.94	
0.750	0.750	28.00	26.94	
0.830	0.830	26.00	24.94	
1.050	1.050	28.00	26.94	
1.100	1.100	30.00	28.94	82.90
0	0	30.00	28.94	82.90
0.350	0.350	30.00	28.97	
0.580	0.580	28.00	26.97	
0.750	0.750	26.00	24.97	
1.050	1.050	25.00	23.97	
1.400	1.400	25.00	23.96	77.60
0	0	30.00	28.94	82.90
0.100	0.100	28.00	27.24	
0.200	0.200	28.00	27.23	
0.300	0.300	28.00	27.22	
0.540	0.540	26.00	25.24	
0.715	0.715	26.00	25.23	77.90

DWG NO. 13

LONGITUDINAL PROFILE OF CONVEYANCE PIPE (P8 SYSTEM)

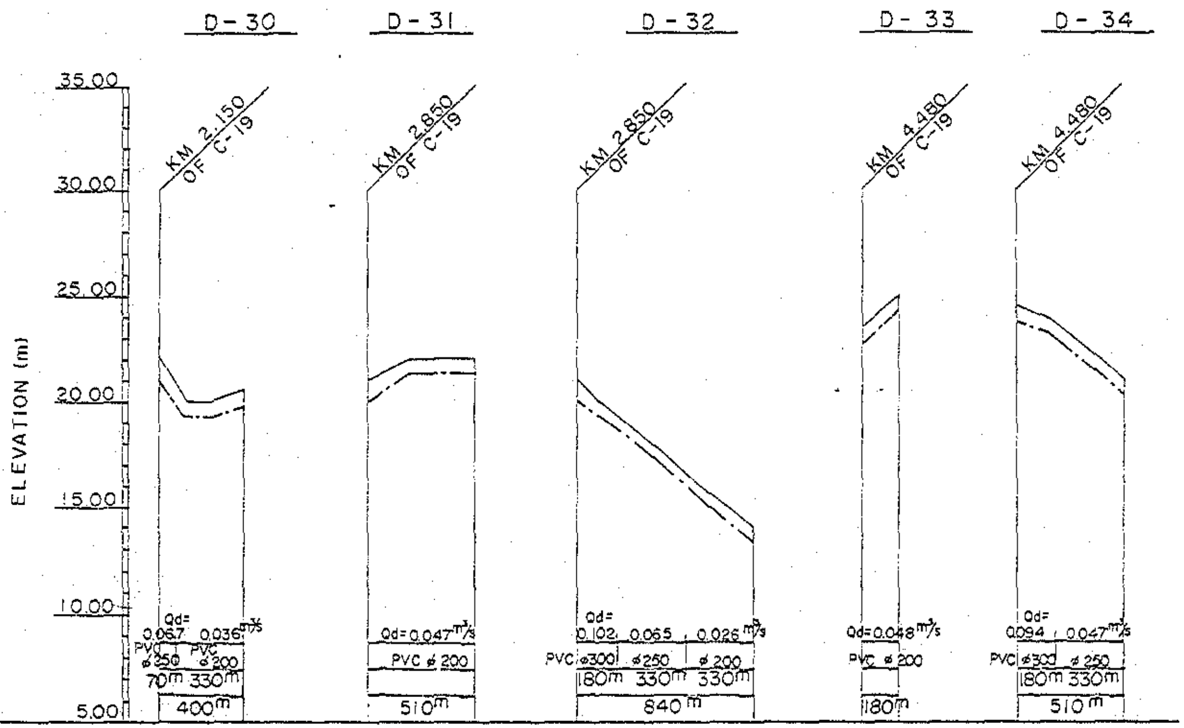
C-19



STATION NO.	DISTANCE (Km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
0	0	12.40	(7.85) 8.06	(8.85) 8.60
0.400	0.400	14.00		
0.600	0.600	14.00		
1.050	1.050	14.00		
1.150	1.150	14.00		
1.220	1.220	16.00	7.45 (14.94)	7.99 (7.90) 89.90
1.320	1.320	18.00	16.94	
1.350	1.350	20.00	18.94	
1.700	1.700	22.00	20.93	
2.150	2.150	22.00	20.94	84.50
2.450	2.450	20.00	18.97	
2.530	2.530	20.00	18.98	
2.850	2.850	21.00	19.97	79.90
2.930	2.930	22.00	21.22	
3.270	3.270	24.00	23.22	
3.430	3.430	26.00	25.22	
3.500	3.500	28.70	27.92	
3.665	3.665	27.00	26.22	
3.815	3.815	26.00	25.22	
3.910	3.910	26.50	25.72	
4.005	4.005	26.00	25.22	
4.135	4.135	24.00	23.22	
4.480	4.480	24.50	23.72	70.30

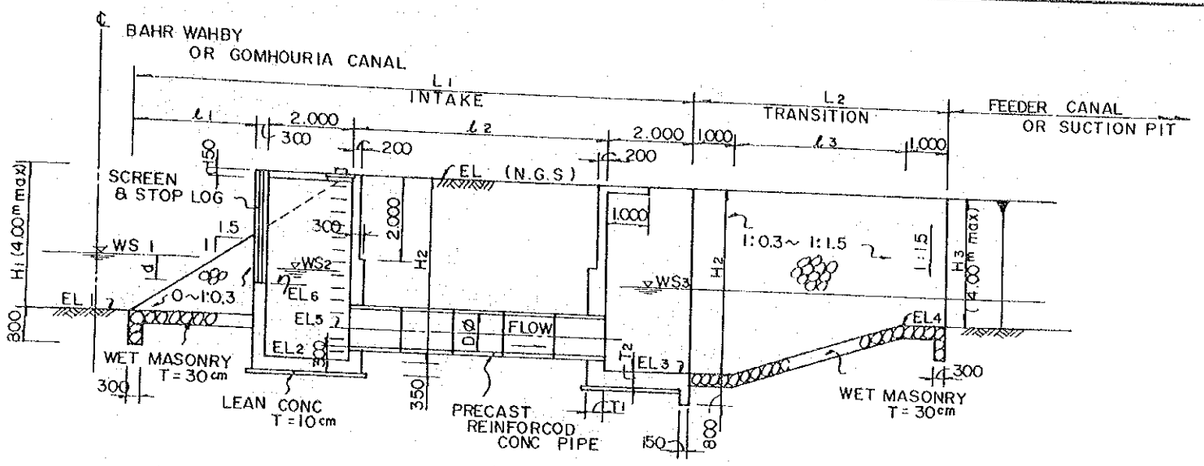
DWG NO. 17

LONGITUDINAL PROFILE OF DISTRIBUTION PIPE (P8 SYSTEM)

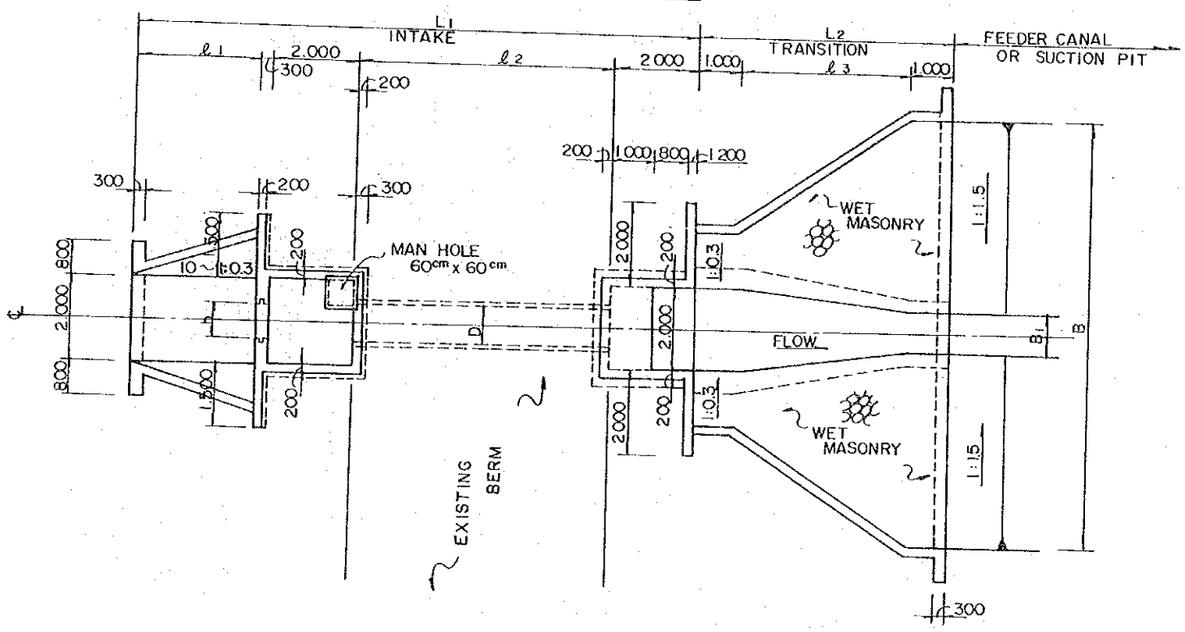


Pipe	STATION NO.	DISTANCE (Km)	ELEVATION (m) GROUND	ELEVATION (m) CANAL BED OR PIPE ℄	WATER LEVEL OR HYDRAULIC GRAD
D-30	0	0	22.00	20.94	84.50
D-30	0.120	0.120	20.00	19.26	
D-30	0.250	0.250	20.00	19.27	
D-30	0.400	0.400	20.50	19.77	81.50
D-31	0	0	21.00	19.97	79.90
D-31	0.200	0.200	22.00	21.27	
D-31	0.300	0.300	22.00	21.28	
D-31	0.510	0.510	22.00	21.29	73.90
D-32	0	0	21.00	19.97	79.90
D-32	0.110	0.110	20.00	19.24	
D-32	0.350	0.350	18.00	17.24	
D-32	0.580	0.580	16.00	15.24	
D-32	0.840	0.840	14.00	13.24	74.90
D-33	0	0	24.50	23.72	70.30
D-33	0.180	0.180	25.00	24.29	68.10
D-34	0	0	24.50	23.72	70.30
D-34	0.150	0.150	24.00	23.24	
D-34	0.400	0.400	22.00	21.24	
D-34	0.510	0.510	21.00	20.24	67.90

DWG. NO. 18



PROFILE



PLAN

DIMENSION OF INTAKES

PS	A feddan	b mm	d mm	WS1 m	WS2 m	WS3 m	EL1 m	EL2 m	EL3 m	EL4 m
P1	830	450	54	13.75	13.55	13.40	12.10	12.05	12.05	12.90
P2	820	450	54	13.70	13.50	13.35	12.05	12.00	12.00	12.85
P3	850	450	54	13.60	13.40	13.25	11.95	11.90	11.90	12.74
P4	1660	850	54	12.50	12.30	12.20	11.20	10.20	10.20	11.49
P5	940	500	54	10.60	10.40	10.30	9.40	8.70	8.70	9.77
P6	925	1300	36	9.05	8.90	8.75	8.05	7.20	7.20	7.36
P7	1480	1500	36	9.00	8.85	8.75	8.00	6.95	6.95	7.36
P8	985	1000	36	8.85	8.70	8.60	7.85	7.00	7.00	8.06

PS	EL5 m	EL6 m	EL7 m	B mm	D mm	ℓ1 mm	ℓ2 mm	ℓ3 mm	L1 mm	L2 mm
P1	12.65	13.21	15.40	8.500	600	2.650	6.000	2.750	10.950	4.750
P2	12.60	13.16	14.40	5.650	600	1.225	6.000	1.350	9.525	3.350
P3	12.50	13.06	14.50	6.280	600	1.525	6.000	1.650	9.825	3.650
P4	10.95	11.96	14.60	10.330	900	2.800	6.000	3.650	11.100	5.650
P5	9.35	10.06	11.40	5.890	700	700	6.000	1.450	9.000	3.450
P6	7.85	8.69	12.05	8.250	700	3 700	6.000	3.150	12.000	5.150
P7	7.65	8.64	12.00	8.250	800	3 700	6.000	3.150	12.000	5.150
P8	7.65	8.49	11.85	12.370	700	3 700	6.000	4.700	12.000	6.700

PS	H1 mm	H2 mm	H3 mm	B1 mm	T1 mm	T2 mm	N.G.S
P1	3.300	3.350	2.500	1.000	350	400	15.40
P2	2.350	2.400	1.550	1.000	250	300	14.40
P3	2.550	2.600	1.760	1.000	300	350	14.50
P4	3.400	4.400	3.110	1.000	450	500	14.60
P5	2.000	2.700	1.630	1.000	300	350	11.40
P6	4.000	4.850	4.690	7.050	500	550	14.00
P7	4.000	5.050	4.640	7.050	500	550	12.00
P8	4.000	4.850	3.790	1.000	500	550	12.40

NOTE

1. A SHOWS GROSS IRRIGATION AREA
2. b AND d SHOWS THE WIDTH AND OVERFLOW DEPTH OF VENTS RESPECTIVELY
3. WATR SURFACE WITHOUT CONSIDERING THE RE-USE WATER FROM BATHE DRAIN
4. 1.00m OF CUT OFF SHALL BE PROVIDED AT THE TOE OF RIVER-SIDE WALL
5. P_6 AND P_7 HAVE NO FEEDER CANALS

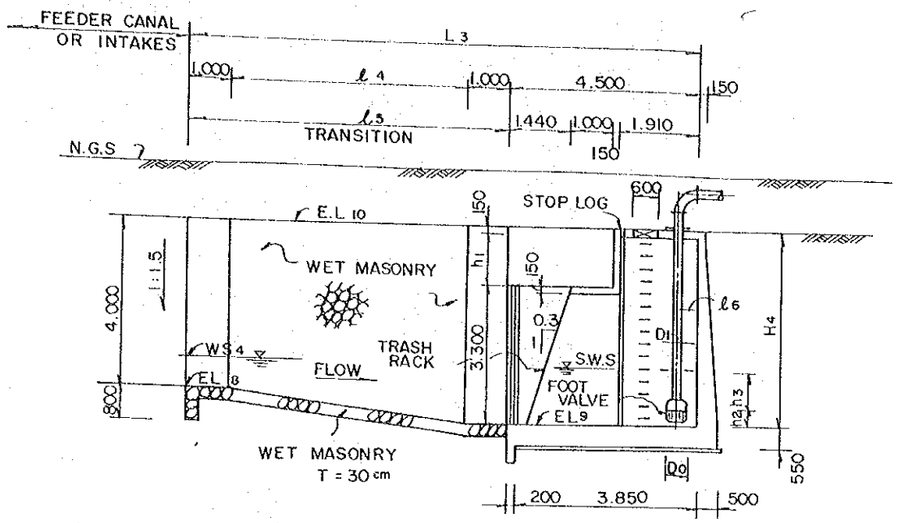
ARAB REPUBLIC OF EGYPT
FAYOUM GOVERNORATE

FAYOUM AGRICULTURAL
DEVELOPMENT PROJECT

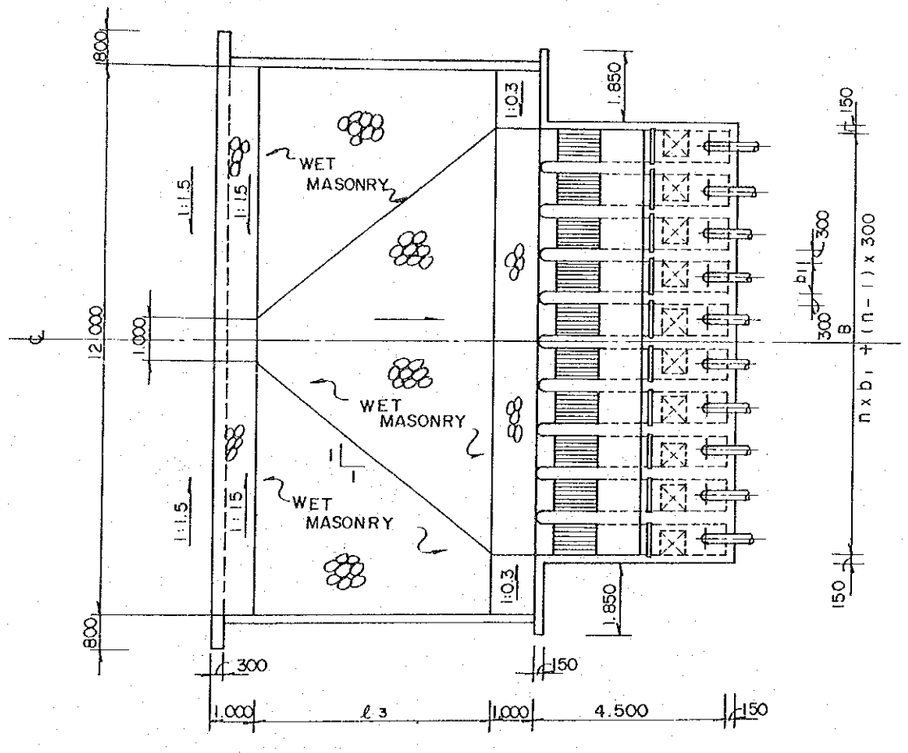
IRRIGATION FACILITIES OF RECLAMATION AREA
INTAKE

DATE		DWG NO.	19

JAPAN INTERNATIONAL COOPERATION AGENCY



PROFILE



PLAN

DIMENSION TABLE OF SUCTION PIT

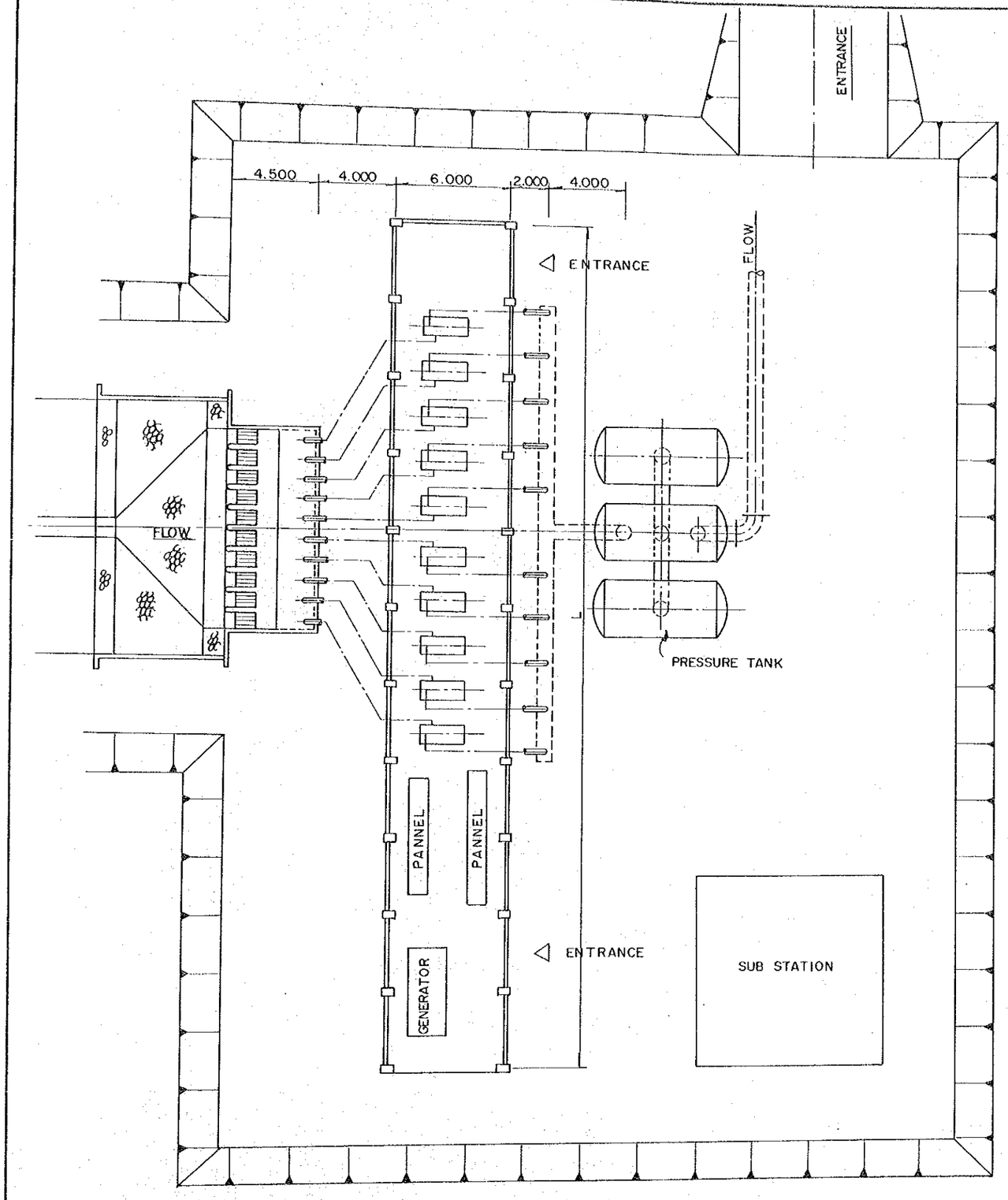
P.S	Q m/s	WS4 m	S.W.S m	EL8 m	EL 9 m	EL 10 m	N.G.S m	b1 mm	B2 mm	D0 mm
P1	0.301	12.02	11.95	11.52	10.85	15.52	15.90	600	6.000	410
P2	0.297	12.80	12.75	12.30	11.65	16.30	20.00	600	6.000	410
P3	0.307	12.96	12.90	12.45	11.80	16.40	16.40	600	6.000	410
P4	0.601	11.37	11.30	10.66	9.96	14.66	16.00	750	10.200	520
P5	0.340	9.05	9.00	8.52	7.90	12.52	16.00	600	6.000	410
P6	0.435	8.75	8.70	7.36	7.36	12.05	14.00	750	7.050	520
P7	0.528	8.75	8.70	7.36	7.36	12.00	12.00	750	7.050	520
P8	0.352	7.99	7.90	7.45	6.80	11.45	16.00	600	6.000	410

P.S	D1 mm	ℓ4 mm	ℓ5 mm	ℓ6 mm	L3 mm	h1 mm	h2 mm	h3 mm	H4 mm	n
P1	200	2.500	4.500	400	9.000	1.400	500	600	4.700	7
P2	200	2.500	4.500	400	9.000	1.350	500	600	4.650	7
P3	200	2.500	4.500	400	9.000	1.300	500	600	4.600	7
P4	250	4.600	6.600	400	11.100	1.400	620	720	4.700	10
P5	200	2.500	4.500	400	9.000	1.350	500	600	4.650	7
P6	250	3.025	5.025	400	9.525	1.400	620	720	4.700	7
P7	250	3.025	5.025	400	9.525	1.350	620	720	4.650	7
P8	200	2.500	4.500	400	9.000	1.350	500	600	4.650	7

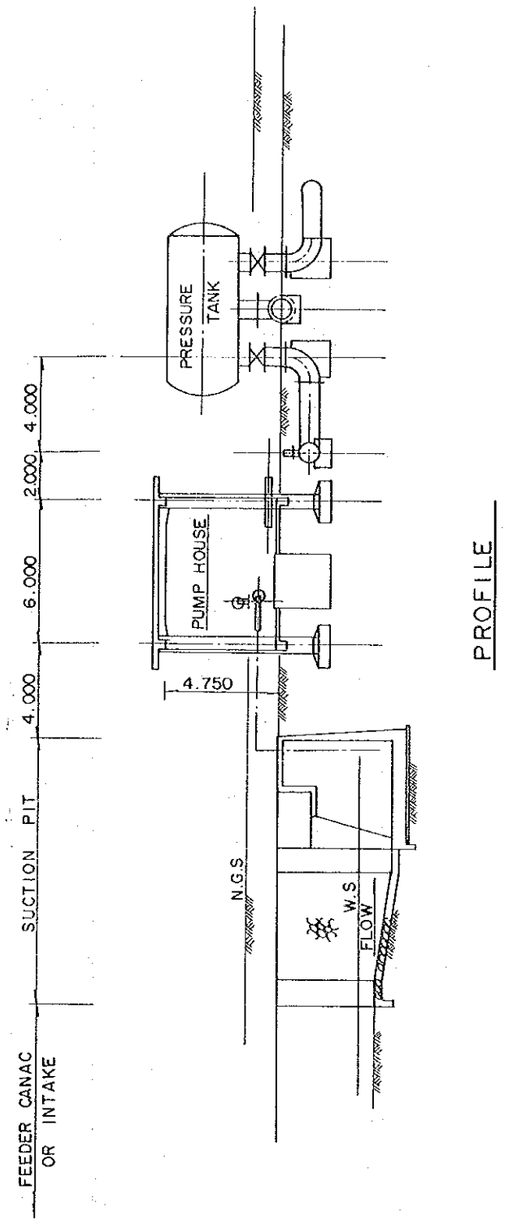
NOTE

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETER OTHERWISE SPECIFIED
2. DIMENSION OF TRANSITION FOR P6 AND P7 ARE REFERRED IN DWG

ARAB REPUBLIC OF EGYPT FAYOUM GOVERNORATE			
FAYOUM AGRICULTURAL DEVELOPMENT PROJECT			
IRRIGATION FACILITIES OF RECLAMATION AREA SUCTION PIT			
DATE		DWG NO.	20
JAPAN INTERNATIONAL COOPERATION AGENCY			



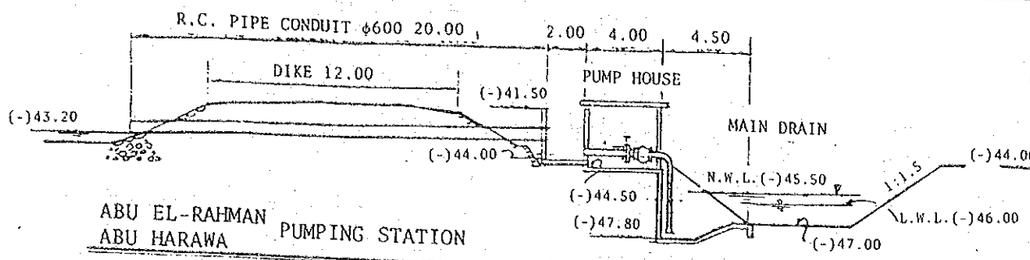
PLAN



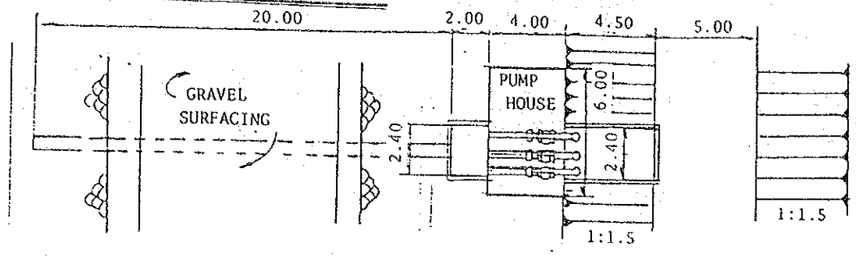
PROFILE

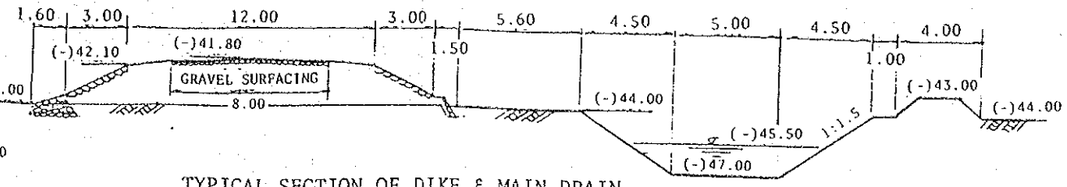
NOTE DIMESIONS OF L ARE :
44.0m FOR P4
36.0m FOR OTHER PUMP STATION

ARAB REPUBLIC OF EGYPT FAYOUM GOVERNORATE			
FAYOUM AGRICULTURAL DEVELOPMENT PROJECT			
IRRIGATION FACILITIES OF RECLAMATION AREA PUMP STATION			
DATE		DWG NO.	21
JAPAN INTERNATIONAL COOPERATION AGENCY			

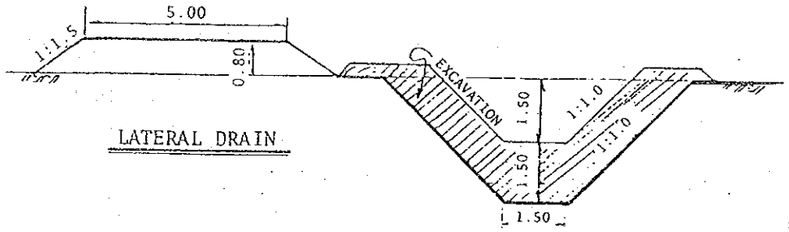


ABU EL-RAHMAN
ABU HARAWA PUMPING STATION

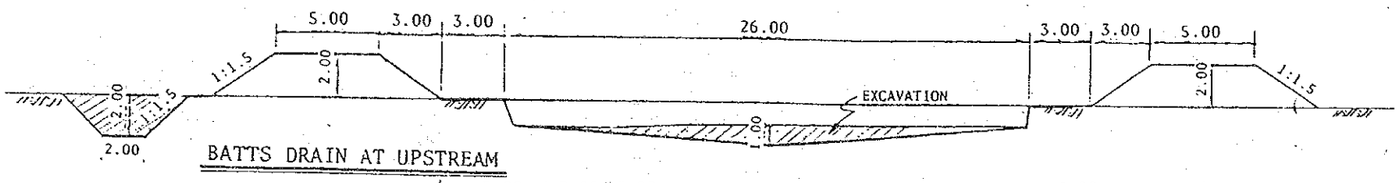




TYPICAL SECTION OF DIKE & MAIN DRAIN

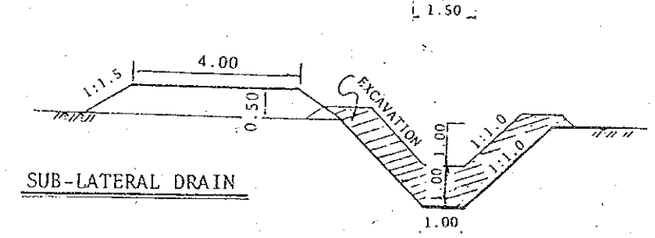


LATERAL DRAIN

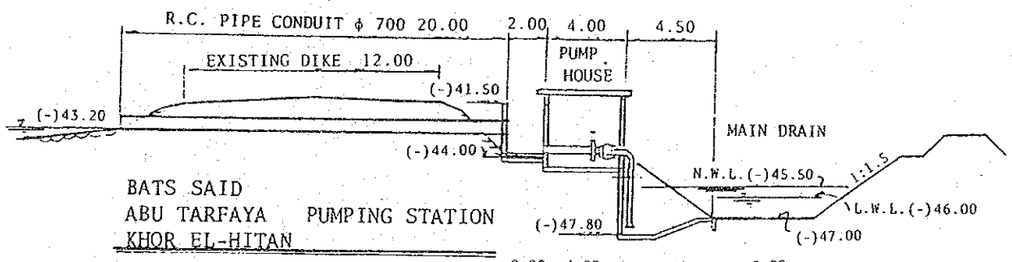


BATTS DRAIN AT UPSTREAM

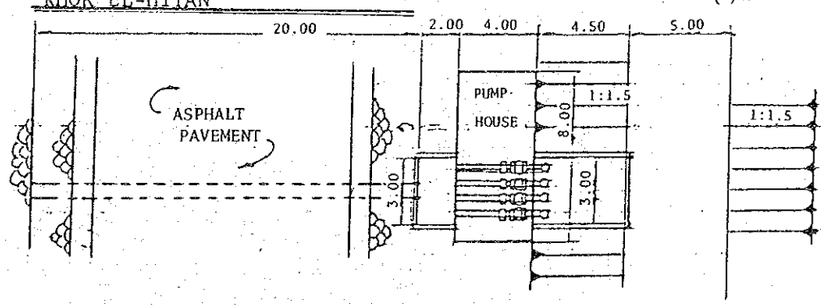
BATS DRAIN A. DOWNSTREAM

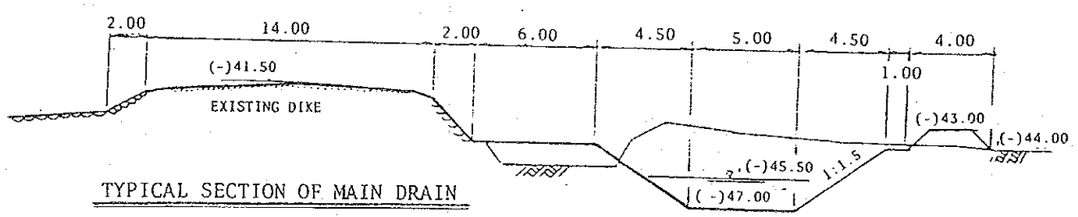


SUB-LATERAL DRAIN



BATS SAID
ABU TARFAYA PUMPING STATION
KHOR EL-HITAN



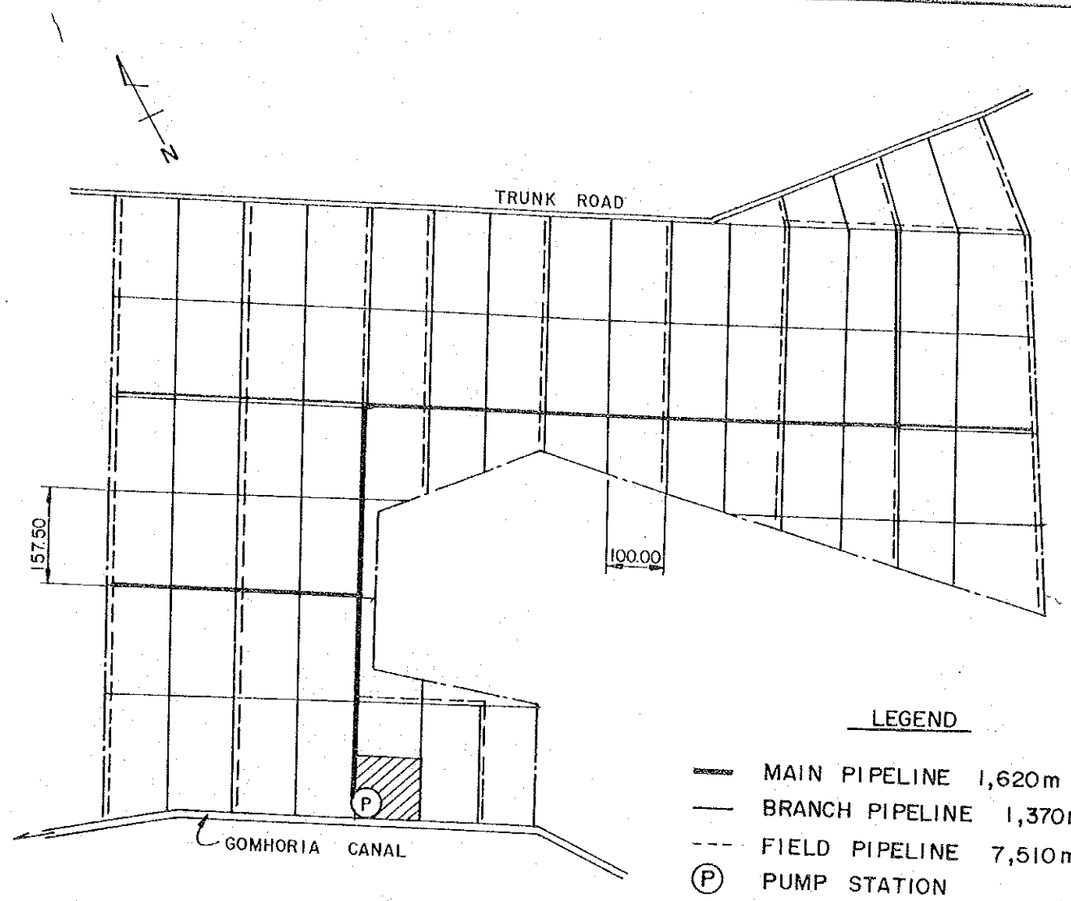


TYPICAL SECTION OF MAIN DRAIN

GENERAL NOTES

1. All dimensions are in meters unless otherwise specified.
2. All elevations are in meters below mean level.

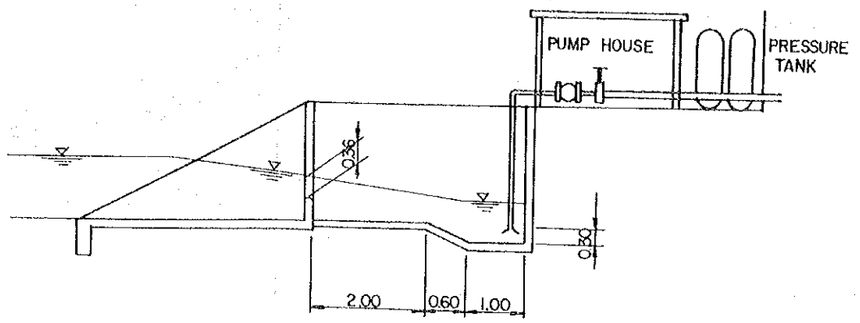
ARAB REPUBLIC OF EGYPT FAYOUM GOVERNORATE			
FAYOUM AGRICULTURAL DEVELOPMENT PROJECT			
IMPROVEMENT OF DRAINAGE FACILITIES IN SOUTH AREA OF LAKE QARUN			
DATE	.	DWG NO.	22
JAPAN INTERNATIONAL COOPERATION AGENCY			



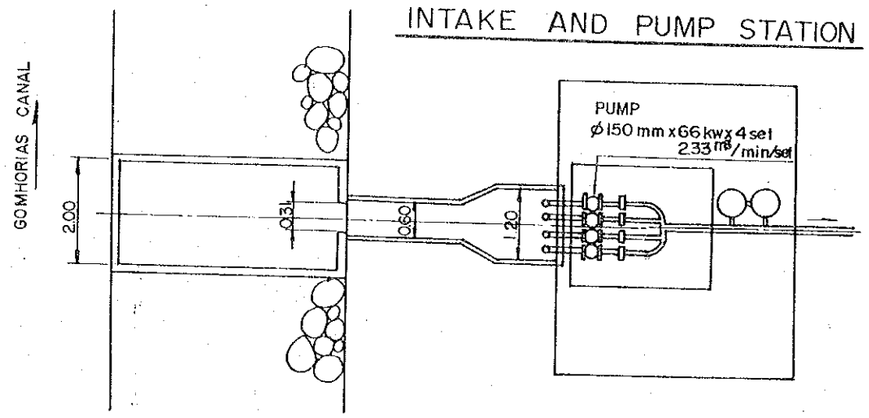
LEGEND

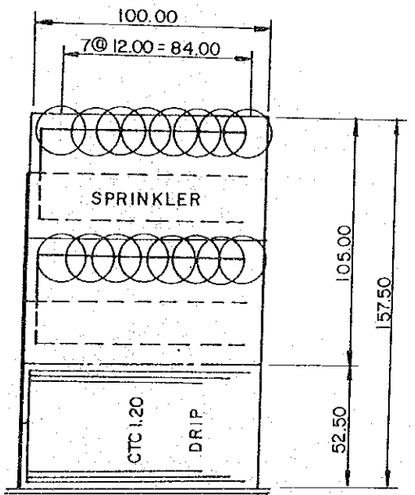
- MAIN PIPELINE 1,620m
- BRANCH PIPELINE 1,370m
- FIELD PIPELINE 7,510m
- (P) PUMP STATION
- OFFICE

GENERAL PLAN

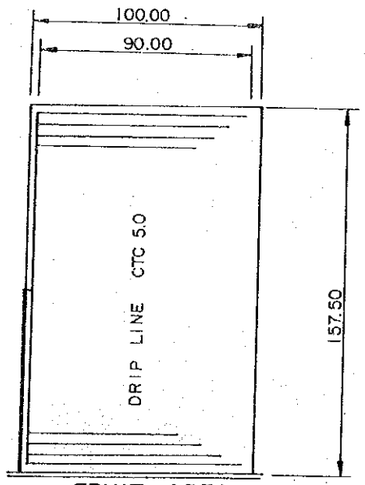


INTAKE AND PUMP STATION



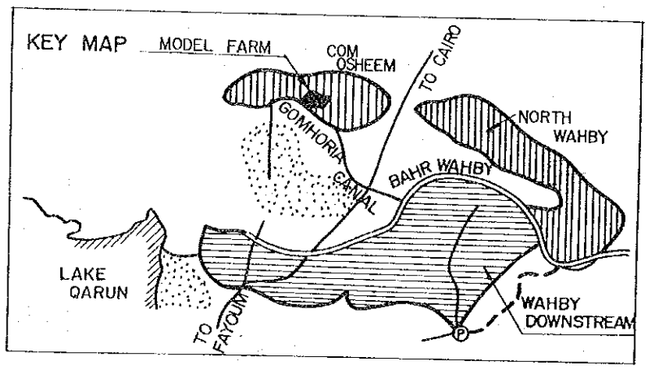


THREE YEAR ROTATION AREA



FRUIT AREA

ON-FARM FACILITIES



NOTE: ALL DIMENISIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED

ARAB REPUBLIC OF EGYPT			
FAYOUM GOVERNORATE			
FAYOUM AGRICULTURAL DEVELOPMENT PROJECT			
GENERAL LAYOUT OF MODEL FARM			
DATE		DWG NO.	23
JAPAN INTERNATIONAL COOPERATION AGENCY