respectively. The required experts will be a team leader and supervisors.

The proposed schedule of the consulting services is shown in Table V.4.1. "Manning Schedule of Consulting Services".

The cost of the consulting engineering services are summarized as follows:

I. Final Design

Foreign Currency	US$1,500,000
Foreign Experts 62 Man-months	
Local Experts 180 Man-months	
Local Currency	US$ 300,000
Per diem allowance & others	
Total	US$1,800,000

II. Pilot Project

Foreign Currency	US$ 770,000
Foreign Experts 46 Man-months	
Local Experts 52 Man-months	
Local Currency	US$ 180,000
Per diem allowance & others	
Total	US$ 950,000

III. Stage-I Implementation

Foreign Currency	US$1,900,000
Foreign Experts 93 Man-months	
Local Experts 174 Man-months	
Local Currency	US$ 380,000
Per diem allowance & others	
Total	US$2,280,000

IV. Stage-II Implementation

Foreign Currency	US$1,800,000
Foreign Experts 84 Man-months	
Local Experts 174 Man-months	
Local Currency	US$ 370,000
Per diem allowance & others	
Total	US$2,170,000
Grand Total	US$7,200,000
Foreign Currency	US$5,970,000
Local Currency	US$1,230,000

FIG. V.4-1 MANNING SCHEDULE OF CONSULTING SERVICES

EXPERT	NO. OF EXPERT	MAN-MONTH	YEAR 1983 1 2 3 4	1984 1 2 3 4	1985 1 2 3 4	1986 1 2 3 4	1987 1 2 3 4	1988 1 2 3 4	1989 1 2 3 4	1990 1 2 3 4	1991 1 2 3 4
I. FINAL DESIGN											
1. TEAM LEADER	1	12									
2. HYDROLOGIST	1	6									
3. DESIGN ENGR.	1	12									
4. DESIGN ENGR.(L)	3	36									
5. ASST.DESIGN ENGR.(L)	3	36									
6. CONST.PLAN & COST ENGR.	1	7									
7. CONST.PLAN & COST (L)	4	26									
8. DRAFTMAN (L)	3	36									
9. SURVEYOR (L)	3	27									
10. AGRONOMIST	1	6									
11. AGRONOMIST (L)	1	6									
12. SOIL SCIENTIST	1	9									
13. SOIL SCIENTIST (L)	1	9									
14. PROJECT ECONOMIST	1	4									
15. PROJECT ECONOMIST (L)	1	4									
16. ENGINEER (TENDERING)	1	6									
II. PILOT PROJECT											
1. TEAM LEADER	1	20									
2. DESIGN ENGR.	2	6									
3. DESIGN ENGR.(L)	2	12									
4. ENGINEERS	4	20									
5. ENGINEERS (L)	4	40									
III. STAGE - I IMPLE'T											
1. TEAM LEADER	1	33									
2. SUPERVISORS	2	60									
3. SUPERVISORS (L)	6	174									
IV. STAGE - II IMPLE'T											
1. TEAM LEADER	1	24									
2. SUPERVISORS	2	60									
3. SUPERVISORS (L)	6	174									

CHAPTER VI. PROJECT JUSTIFICATION

CHAPTER VI. PROJECT JUSTIFICATION

VI.1. General

The Project aims, among others, to improve the farm economy in the Project Area so as to contribute to Pakistan's national economy as a whole. At the farm economic level, the improvement of the farm economy could be attained through the stabilization and increase in farm production supported by more expanded farm lands and intensive farming than those at present. It involves also an increase in cash income for the upgrading of farmers' living standard. At the national level, it should comply with the requirements in the national policies such as the stable supply of agricultural products, saving and increase in foreign exchange earnings by self-sufficiency and export of agricultural products, creation of employment opportunities and correcting the existing income disparity among industries as well as regions.

The Project benefits are to be generated through an increased crop production in the cultivable area of 612,000 acres. The internal economic rate of return (IERR) and the farm budget analysis have been applied to the evaluation of the Project from the standpoints of the national economy and farm economy.

VI.2. Economic Evaluation

VI.2.1. Method of Economic Evaluation

In the economic evaluation, an incremental crop production was calculated as the direct benefits of the Project. On the other hand, the construction cost of the Project was estimated as the cost including the cost of on-farm development that will be made by the farmers themselves.

In this analysis, all prices are expressed in 1982 constant value at this Project site. The Project site prices of internationally-traded commodities can be derived from their world market prices.

Prices of non-traded goods excluding crops are converted into the border price equivalents by making use of the conversion factors that were estimated in this study. The conversion factors were estimated at 0.86 of Standard Conversion Factor (SCF) and 0.9 of Conversion Factor of Consumption (CFC). The conversion rate of foreign exchange used is eleven Rupees to one US Dollar.

VI.2.2. Price Evaluation of Farm Inputs and Outputs

1) Farm Inputs

a) Fertilizers

As for fertilizers of nitrogen, phosphorus and potassium, Pakistan has imported them increasingly foreign countries in recent years, and this tendency will remain unchanged for some time to come. All fertilizers essential to an increase in the crop production of crops are treated as tradable goods, accordingly.

b) Farm Labor Wage Rate

Since farm labor can be defined as unskilled labor, the economic price of which was herein evaluated as an opportunity cost. The average wages paid in the farming season are Rs 35 per day.

c) Other Inputs

As for the other inputs (agricultural chemicals, animals and machinery), the conversion factor was applied to their economic prices.

2) Farm Outputs

All farm outputs were evaluated by the normal current farm-gate prices. In this case these prices of the Pakistan's internationally-traded commodities were derived based on the world market price level.

a) Wheat

Pakistan imports wheat every year, but the amount of import has been decreasing recently. And wheat is a staple food in Pakistan. For this reason, the world market rate was applied to the wheat price.

b) Rice

Pakistan has been the fifth largest rice-exporting country in the world for the last five years, and the export has been steadily increasing in its amount. Moreover, the rice export occupies on an average, approximately twenty per cent of the total export, and ranks second among the exported commodities, next to cotton. Therefore, the world market price was used for the study of rice.

c) Other Crops

Other crops (i.e. sorghum, sesamum, sunflower, rape and mustard, soybean, gram, sugarcane and berseem) were regarded as Pakistan's non-traded commodities in this study because mainly consumed in domestic market.

The result of the price evaluation is summarized in Table VI.2-1.

Table VI.2-1. List of Farm-gate Prices of Inputs and Outputs

(Unit: Rs.)

Commodities	Unit	Financial Prices	Economic Prices
1) Fertilizers (Nutrient-basis prices)			
a) Nitrogen	kg	4.54	7.01
b) Phosphorus	"	2.85	5.54
c) Potassium	"	1.53	2.96
2) Animal and Machinery			
a) Pair of Bullock	day	12	13
b) Tractor for Plowing	"	535	452
c) Tractor for Harrowing	"	329	285
d) Power Thresher	"	120	102
e) Power Sprayer	"	98	82
3) Farm Products			
a) Sorghum	ton	1,869	1,869
b) Paddy	"	1,244	1,926
c) Sesamum	"	3,950	3,950
d) Sunflower	"	3,370	3,370
e) Soybean	"	3,000	3,000
f) Sugarcane	"	200	200
g) Wheat	"	1,370	2,497
h) Rape & Mustard	"	2,140	2,140
i) Gram	"	3,960	3,960
j) Berseem	"	83	83

VI.2.3. Evaluation of Benefits

1) Beneficial Area

The construction works of the Project have been scheduled to take ten years, commencing in 1983. The benefits will be created after the completion of the on-farm works which will be implemented by the farmers. The beneficial area of the Project will be developed by 1992 in parallel with the progress of on-farm works to be implemented following the completion of the major civil works for canals.

Table VI.2-2. Beneficial Cultivable Area with Project

(Unit: acres)

Year	Pilot Project Area	Stage 1 Area	Stage 2 Area	Total
1983	-	-	-	-
1984	3,000	-	-	3,000
1985	3,000	-	-	3,000
1986	3,000	-	-	3,000
1987	3,000	16,000	-	19,000
1988	3,000	33,000	-	36,000
1989	3,000	50,000	135,000	188,000
1990	3,000	67,000	270,000	340,000
1991	3,000	67,000	406,000	476,000
1992	3,000	67,000	542,000	612,000

The crop-wise beneficial areas are shown in Appendix VI.

2) Incremental Production Value

It will take ten years after the completion of the Project to attain the target yield and totally 19 years will be required for achieving the target yields in the entire Project Area from the start of the construction works in 1983. Therefore, the target year of production will be 2002 and a net incremental crop production in the target year was estimated as follows;

Table VI.2-3. Net Incremental Crop Production in Target Year 2002

(Unit: Million Rupees)

Alternative Plan	Gross Production	Production of Crops	Net Production	Net Incremental Production (Benefit)
Case - 1	2,275.61	1,691.06	584.55	518.50
Case - 2	1,907.09	1,417.70	489.30	423.34
Case - 3	1,753.61	1,255.59	498.02	413.97
Case - 4	1,611.30	1,199.79	411.51	345.46

VI.2.4. Evaluation Project Cost

The Project costs employed in the cost analysis include those costs for the pre-engineering works and civil works for the main canal, distributaries, on-farm facilities and roads and those for agricultural development, project facilities, consulting services and operation and maintenance, but exclude the costs for land acquisition and interests during the construction period. In the project justification, the cost of on-farm works that will be executed by the farmers was included in the Project cost. This differs from the Project cost given in Chapter IV.6.

The Project cost employed in this cost analysis includes the pre-engineering cost, construction costs of the main canal, distributaries and roads, agricultural development costs, the Project facilities costs, O & M costs and consultants'cost, but excludes the land acquisition costs and interests during the construction period.

In the Project justification, the cost of on-farm facilities to be constructed by the beneficial farmers themselves was excluded. This differs from the Project cost given in Chapter IV.6.

In converting the Project cost in terms of financial value into the economic value, taxies on the construction machines directly purchased from foreign countries and these on cement, steel bars and fuel indirectly purchased therefrom were deducted from the Project cost. The costs of construction equipment and materials purchased in Pakistan and labour secured domestically were converted into the economic values by applying the conversion factors. By allocating the construction cost of the main canal to Phase-I and Phase-II, the cost allocated to Phase-II was deducted from the total construction cost in order to obtain the cost for Phase-I. The conversion factors were also applied to compute the economic values of the cost for operation and maintenance of the main canal, distributaries and irrigation facilities.

The Project cost includes the additional O & M cost as a difference between the present O & M cost and the O & M cost with Project. The economic value of the present O & M cost for irrigation facilities and for agricultural extension services was computed at 2.25 million Rupees and 0.54 million Rupees, respectively, while that of the future O & M cost for them at 3.34 million Rupees and 2.83 million Rupees, respectively.

Table IV.2-4. Economic Value of Construction Cost

(Unit: Million Rs.)

Year	Economic Cost	
	Case 1 and 3	Case 2 and 4
1983	41.86	43.54
1984	63.33	62.47
1985	303.90	209.67
1986	143.07	117.68
1987	195.01	181.20
1988	269.63	250.76
1989	254.27	243.60
1990	147.44	142.80
1991	62.85	62.86
1992	30.54	33.51
Total	1,511.90	1,348.09

VI.2.5. Internal Economic Rate of Return (IERR)

The economic feasibility of the Project has been examined by employing the IERR method in discounting two series of benefits and costs. The IERR is a rate at which the difference between the economic value of the benefits and costs is zero. As mentioned above, the Project benefit is the incremental production value from agricultural production, i.e. the value added with Project minus the value added without Project. The Project costs include the construction and O & M costs of public works and the construction cost of on-farm facilities to be borne by the farmers.

As a result, IERR in Case 3 and Case 4 were computed at 16.0 per cent and 14.6 per cent, respectively. With this IERR, Case 3 development plans are judged to be economically feasible since the opportunity cost of capital in Pakistan ranges from 11 to 15 per cent.

Although the implementation of Case 1 and Case 2 development plans will be physically difficult due to the probable shortage in irrigation water, IERRs for these plans were computed at 18.0 per cent in Case 1 and at 17.1 per cent in Case 2.

VI.2.6. Sensitivity Analysis

In general, the sensitivity analysis is made to examine the effects on the Project caused by various changes in the Project plan. The internal economic rate of return (IERR) of the Project is computed assuming various changes of the Project plan that are considered to take place in future. Results of the sensitivity analysis are effective to supplement the information and data on the justification of the Project from the view point of the national economy.

Taking into consideration the different construction volumes, construction periods, target years, cropping areas in winter, etc., the sensitivity analysis was conducted for Case-3, which will show same tendency for Case-4.

Results of the analysis are tabulated below. In all cases, the IERR is higher than the pessimistic value of opportunity cost, 10 per cent. From this fact, the Project can be judged to be feasible.

Table VI.2-5. Sensitivity Analysis for Case-3

Case		IERR (%)
1.	Project cost runover by 20%	14.2
2.	Extension of the construction period by one year	13.5
3.	Decrease in the target unit yield by 10%	10.9
4.	Delay in reaching the target year by 10 years	14.5
5.	Decrease in cropping intensity of winter crops from 60% to 40%	14.9

VI.3. Financial Analysis

VI.3.1. Farm Budget Analysis

A financial analysis was conducted to compare the farm budgets of the following owner farmers and tenant farmers in the two cases of "with Project" and "without Project" (Appendix III.3-2, Table III.3-8).

Owner farmers having a cultivated area of 18 acres (7.3 ha) ..... (A)

Owner farmers having a cultivated area of 10 acres (4.0 ha) ..... (B)

Tenant farmers having a cultivation area of 10 acres (4.0 ha) ..... (C)

At present the farmer (A) earns a net annual income of 3,210 Rupees, the farmer (B) of 1,770 Rupees and the farmer (C) of 385 Rupees. These annual incomes are all insufficient to cover the annual living cost of 4,560 Rupees for seven family members on an average. It is considered that the shortage in living cost is covered by saving or by non-agricultural income.

After the completion of the Project, all the farmers in the Project Area could have sufficient farm income to meet the annual living cost due to an increase in cropping area and unit yields of crops. The computations for the farm budget analysis were made assuming the following matters.

° The costs to be borne by the Government are the costs for pre-engineering, construction costs of main canal, distributaries and roads, the cost for agricultural development, the costs for the Project facilities, the cost for consulting services and O & M cost of the facilities during the construction period.

° The cost for on-farm development and facilities amounting to 512 Rupees per acre is fully borne by the beneficial farmers by 100 per cent of the construction cost, after one and a half years of grace period, with interest at 11 per cent.

° The O & M cost of facilities after the completion of the construction works that amounts to 5.6 Rupees per acre per crop is fully borne by the beneficial farmers.

IV.4. Socio-economic Impact

Besides the aforesiad direct benefit of the crop production benefits, the Project will create other direct or indirect benefits and influences to various aspect of the society. From the viewpoint of socio-economy, the following impacts are expected.

Impacts to rural socio-economy

i) The Project will improve the farmers' living standard, and increase the farm income. The increase in the farm income from agricultural would lead to an increase in consumption and saving, and improve the farm families' living standard in both quantity and quality.

ii) For making good use of water, the Project will strengthen or establish agricultural cooperatives and water users' associations involving all beneficial farmers. These organizations will enable the farmers to keep close communication with each other as well, resulting in technical upleveling of farmers for crop cultivation and farm management in or around the Project Area.

iii) The operation and maintenance roads to be constructed under the Project would speed up transporting inputs and outputs of farming.

iv) Great improvements will be made in the latent unemployment of farm dependents with increasing of the farm labor requirements.

Impacts for national and provincial socio-economy

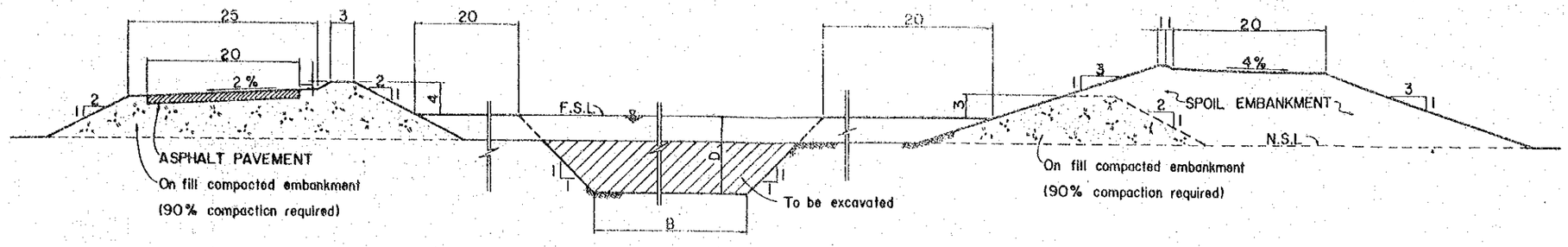
v) The Project will increase the agricultural production to a considerable extent, and a portion of these incremental products has been sent to other areas of the country or overseas. Therefore, the Project will lead the nation to stabilization in food supply.

vi) The economic feasibility of the Project can be confirmed by the other indexes as well. These indexes are such a great net incremental value as Rupees 431.97 millions and such a large number of beneficiary farm households as totalling to about 38,000. These indexes are quite significant for the development of the country on the socio-economic base, and the increase in farm inputs and outputs resulting from the Project execution will magnify the agri-business directly or indirectly through distribution of these products.

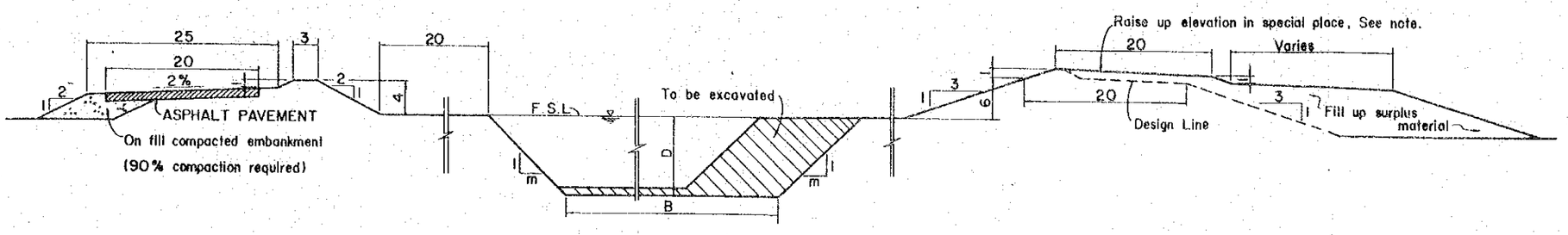
DRAWINGS

LIST OF DRAWINGS

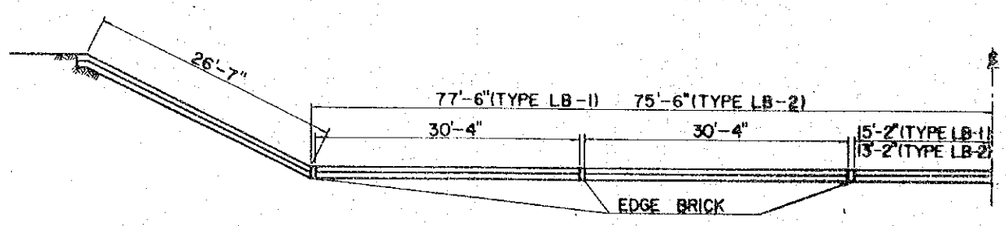
DWG.NO.	TITLE
001	TYPICAL CROSS SECTION OF MAIN CANAL
002	TYPICAL CROSS SECTION OF DISTRIBUTARY
003	CROSS REQULATOR OF PAT FEEDER
004	GROUP REQULATOR OF PAT FEEDER AT RD 558
005	GROUP REQULATOR OF PAT FEEDER AT RD 624
006	ROAD BRIDGE OF PAT FEEDER (RD 42, 76 & 92)
007	ROAD BRIDGE OF PAT FEEDER (RD 489.8)
008	VILLAGE ROAD BRIDGE OF PAT FEEDER
009	CROSS DRAINAGE OF PAT FEEDER
010	GROUP REQULATOR OF KHALLAN & LOWER UCH DISTRIBUTARIES
011	PLAIN FALL (CONSTRUCTION)
012	PLAIN FALL (IMPROVEMENT)
013	OFF-TAKE
014	VILLAGE ROAD BRIDGE OF DISTRIBUTARIES (CONSTRUCTION)
015	MINOR CANAL
016	TYPICAL LAYOUT OF ON-FARM FACILITIES
017	TYPICAL STRUCTURE OF ON-FARM FACILITIES
018	LAYOUT OF SAMPLE AREA
019	GENERAL LAYOUT OF PILOT PROJECT
020	DEMONSTRATION OF IRRIGATION FACILITIES (1) OF PILOT PROJECT
021	DEMONSTRATION OF IRRIGATION FACILITIES (2) OF PILOT PROJECT
022	CHECK STRUCTURE OF PILOT PROJECT
023	LAYOUT OF ENGINEERS QUARTERS OF PILOT PROJECT
024	WATER PURIFICATION FACILITIES OF PILOT PROJECT
025	CONSTRUCTION PLANNING



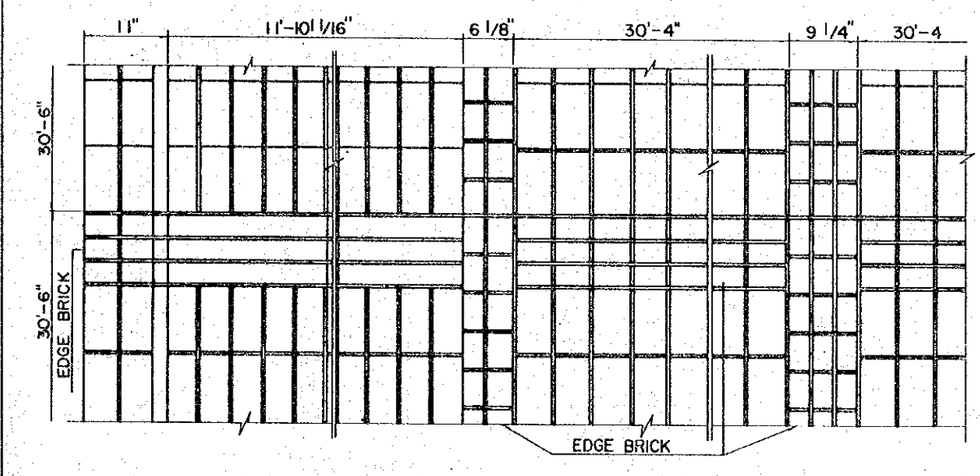
TYPICAL SECTION OF NEW CANAL

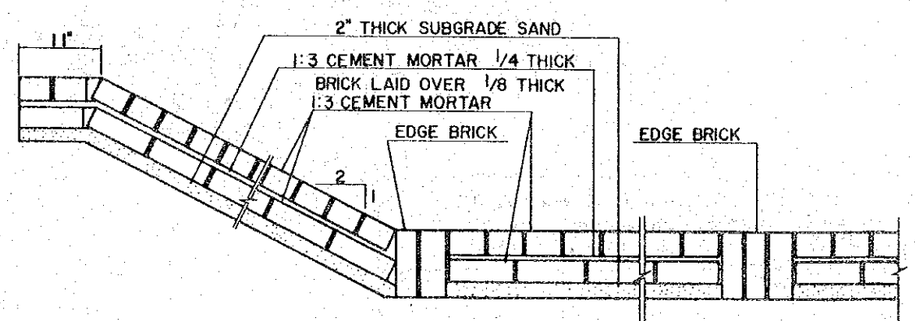


TYPICAL SECTION OF WIDENING CANAL



CROSS SECTION OF LINING





DETAILS OF BRICK LINING

TYPE OF CANAL	DISCHARGE Q (cusecs)	GRADIENT S	WATRE DEPTH D(feet)	BED WIDTH B(feet)	VELOCI -TY V (fps)
CASE 1 (8,200 cusecs)					
MA – 1	17,500	1/15,000	15.5	285.0	3.77
2	11,000	1/14,000	13.0	235.0	3.41
3	5,823	1/12,400	10.5	170.0	3.07
4	3,405	1/10,500	9.0	120.0	2.93
5	1,960	1/8,800	8.0	85.0	2.87
MB – 1	8,200	1/13,700	12.0	193.0	3.16
2	8,006	〃	〃	188.0	3.15
3	7,312	1/13,200	11.5	182.0	3.12
LB – 1	8,200	1/15,000	12.0	155.0	3.83
2	8,006	〃	〃	151.0	3.82
CASE 2 (6,700 cusecs)					
MA – 1	16,000	1/15,000	15.5	260.0	3.74
2	9,500	1/14,200	13.0	205.0	3.36
3	4,758	1/12,600	10.5	140.0	3.00
4	2,786	1/10,500	9.0	100.0	2.88
5	1,602	1/8,800	8.0	65.0	2.79
MB – 1	6,700	1/14,000	12.0	158.0	3.07
2	6,542	〃	〃	154.0	3.07
3	5,945	1/13,000	11.5	145.0	3.08
LB – 1	6,700	1/15,000	12.	127.0	3.70
2	6,542	〃	〃	124.0	3.69

NOTE :

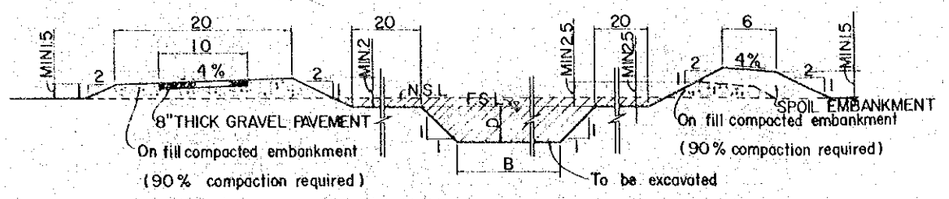
1. All dimensions are in feet unless otherwise specified
2. Inside slope of TYPE LA is m= 1:1
3. Inside slope of TYPE LB is m=2:1
4. Raise up elevation of right bank
   RD 201 to RD 246 : EL. 248.9
   RD 368 to RD 372 : EL. 235.1
5. Abbreviation
   N.S.L Natural surface level
   F.S.L Full supply level

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

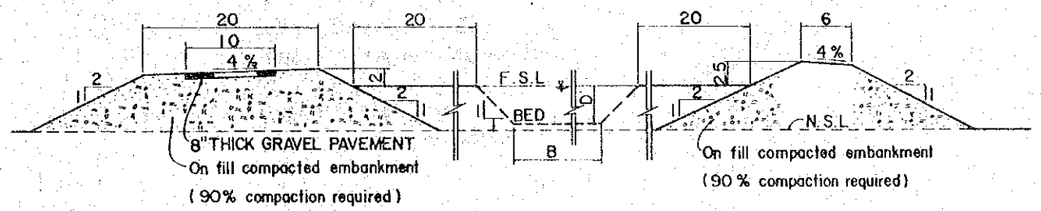
TYPICAL CROSS SECTION OF MAIN CANAL

DWG. NO. 001

JAPAN INTERNATIONAL COOPERATION AGENCY

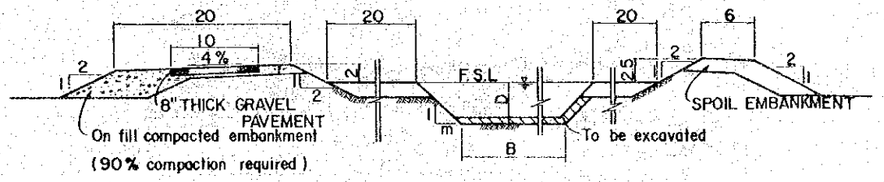


1. NATURAL SURFACE LEVEL ABOVE FULL SUPLLY LEVEL



2. NATURAL SURFACE LEVEL BELOW BED LEVEL

TYPICAL SECTION OF NEW CANAL



TYPICAL SECTION OF WIDENG CANAL

TYPE OF CANAL	DISCHARGE Q(cusecs)	GRADIENT S	WATER DEPTH D(feet)	BED WIDTH B(feet)	VELOCI -TY V(fps)
A - 1	5 ~ 16	1/4,500	2.0	5.0	1.16
2	~ 25	〃	〃	8.0	1.25
3	~ 52	〃	〃	17.0	1.39
4	~ 80	1/5,000	2.4	20.0	1.50
5	~ 105	〃	〃	26.0	1.54
6	~ 130	1/5,500	2.8	26.0	1.63
7	~ 152	〃	〃	30.0	1.66
8	~ 180	1/6,000	3.2	29.0	1.72
9	~ 200	〃	〃	33.0	1.74
10	~ 232	1/6,300	3.4	35.0	1.78
11	~ 260	〃	〃	39.0	1.80
12	~ 272	1/6,600	3.6	38.0	1.82
13	~ 310	〃	〃	43.0	1.84
14	~ 336	1/7,000	4.0	40.0	1.91
15	~ 353	〃	〃	42.0	1.92
16	~ 375	1/7,300	4.2	42.0	1.93
17	~ 402	〃	〃	45.0	1.95
18	~ 423	〃	4.5	42.0	2.02
19	~ 454	〃	〃	45.0	2.04
20	~ 480	1/7,500	4.7	45.0	2.06
21	~ 502	〃	〃	47.0	2.07
22	~ 540	〃	5.3	41.0	2.20
23	~ 565	〃	〃	43.0	2.21
24	~ 605	〃	5.5	43.0	2.27
25	~ 632	〃	〃	45.0	2.28
26	~ 653	〃	5.6	45.0	2.30
27	~ 710	〃	〃	49.0	2.32
28	~ 755	〃	〃	52.0	2.34
29	~ 824	〃	5.7	55.0	2.38
30	~ 835	1/7,900	5.8	55.0	2.37
31	~ 900	〃	〃	60.0	
32	~ 940	1/8,000	〃	62.0	
33	~ 963	〃	〃	64.0	2.38
34	~ 1.085	〃	〃	72.0	2.47

TYPE OF CANAL	DISCHARGE Q(cusecs)	GRADIENT S	WATER DEPTH D(feet)	BED WIDTH B(feet)	VELOCI -TY V(fps)
B - 1	5 ~ 20	1/4,500	2.0	5.0	1.14
2	~ 34	〃	〃	10.0	1.26
3	~ 50	〃	〃	15.0	1.33
4	~ 62	1/5,000	2.4	15.0	1.38
5	~ 81	〃	〃	18.0	1.48
6	~ 101	〃	2.6	20.0	1.54
7	~ 123	1/5,500	〃	26.0	1.52
8	~ 151	〃	2.8	28.0	1.61
9	~ 165	〃	〃	31.0	1.62
10	450 ~ 482	1/7,500	4.7	43.0	1.99
11	500 ~ 560	〃	5.3	40.0	2.12
11	~ 590	〃	〃	42.0	2.13

NOTES ;

1. All dimensions are footage
2. Inside slope of TYPE A is m = 1 : 1
3. Inside slope of TYPE B is m = 2 : 1
4. Abbreviation

   N.S.L Natural surface level

   F.S.L Full supply level

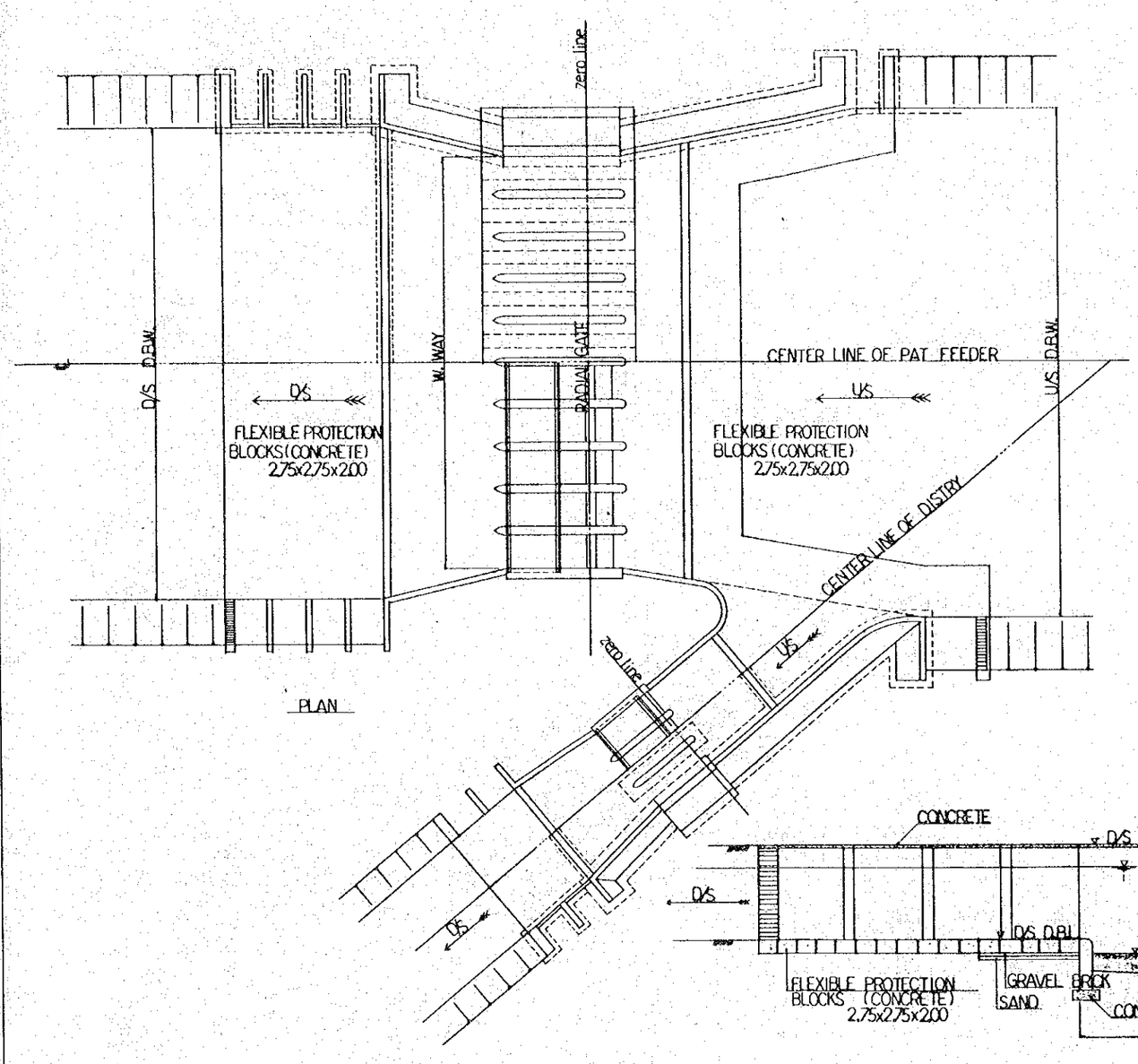
THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

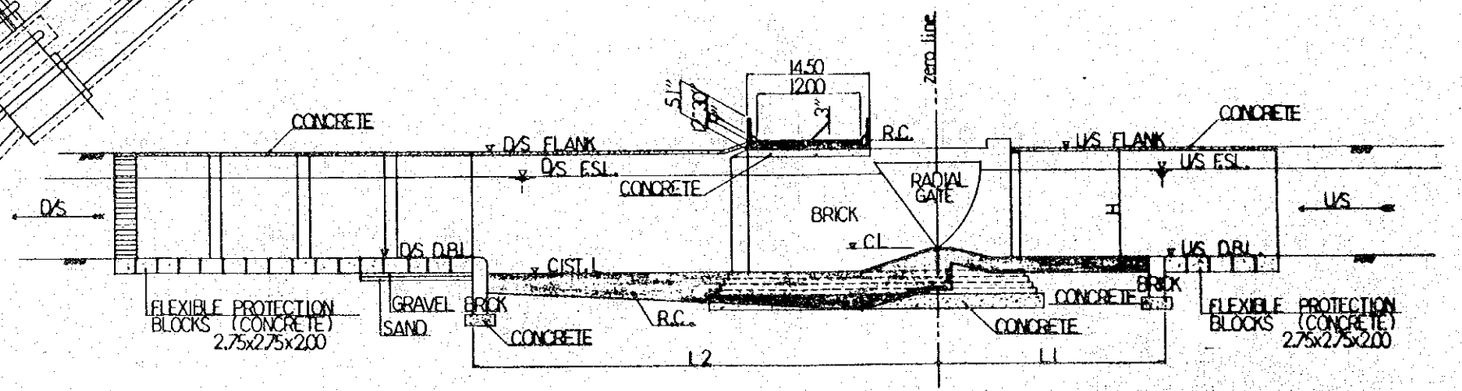
TYPICAL CROSS SECTION OF DISTRIBUTARY

DWG. NO. 002

JAPAN INTERNATIONAL COOPERATION AGENCY

	D.B.L. U/S	D.B.L. D/S	C.L.	CIST.L	L1	L2	H	EXISTING U/S DBW	EXISTING D/S DBW	EXISTING W. WAY	CASE 1 8200 cusecs U/S DBW	CASE 1 8200 cusecs D/S DBW	CASE 1 8200 cusecs W.WAY	CASE 2 6700 cusecs U/S DBW	CASE 2 6700 cusecs D/S DBW	CASE 2 6700 cusecs W.WAY
RD 0	23668	23865	239.50	233.80	108.00	105.00	18.80		165.00	100.0 x11	285.00	235.00	10.0 x15	260.00	205.00	10.0 x11
109	23089	23159	231.95	229.45	44.50	65.50	14.20	165.00	154.00	10.0 x11	235.00	193.00	10.0 x6	205.00	158.00	10.0 x12
238	22020	22193	222.45	220.45	25.75	62.25	14.70	154.00	150.00	10.0 x11	193.00	188.00	10.0 x16	158.00	154.00	10.0 x13
342	21446	21456	216.00	213.00	30.00	62.00	14.30	150.00	140.00	10.0 x10	188.00	182.00	10.0 x5	154.00	145.00	10.0 x12
418	20881	20936	209.23	207.23	38.50	59.50	14.00	140.00	121.00	10.0 x9	182.00	170.00	10.0 x3	145.00	140.00	10.0 x10
505	20226	20346	205.13	202.13	21.00	51.00	13.00	121.00	83.00	10.0 x 6	170.00	120.00	10.0 x9	140.00	100.00	10.0 x 8
558	19842	19912	201.00	197.50	13.50	49.50	10.80	83.00	60.00	10.0 x 4	120.00	85.00	10.0 x7	100.00	65.00	10.0 x 6





TYPICAL L-SECTION

LEGEND

U/S : UP STREAM
D/S : DOWN STREAM
D.B.L. : DESIGN BED LEVEL
D.B.W. : DESIGN BED WIDTH
C.L. : CREST LEVEL
CIST.L : CISTERN LEVEL
W.WAY: WATER WAY WIDTH

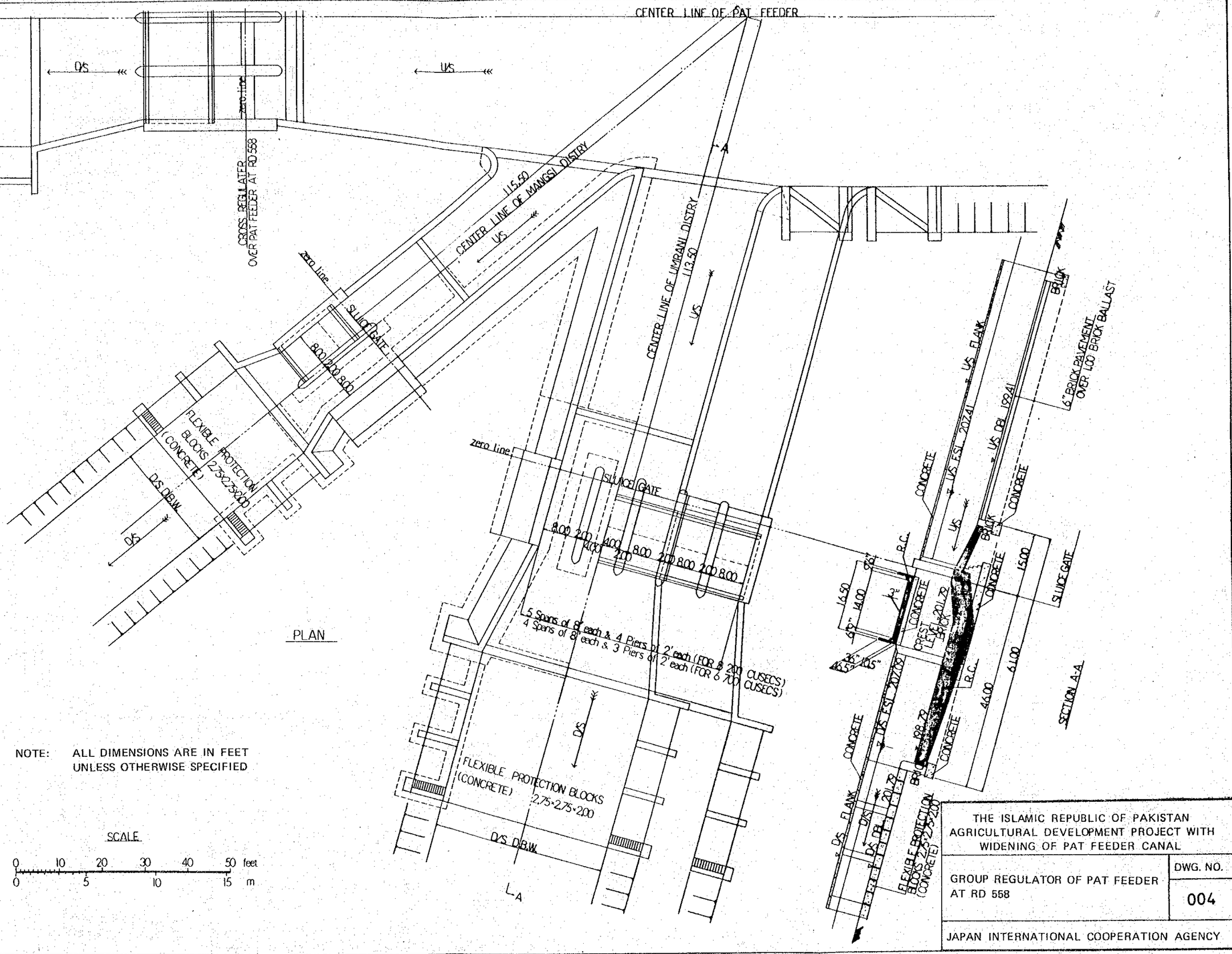
NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

CROSS REGULATOR OF PAT FEEDER

DWG. NO. 003

JAPAN INTERNATIONAL COOPERATION AGENCY



NOTE: ALL DIMENSIONS ARE IN FEET
UNLESS OTHERWISE SPECIFIED

SCALE

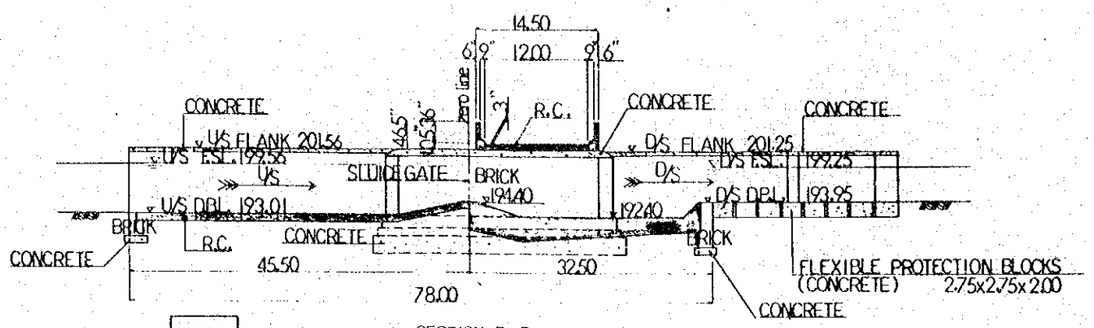
0 10 20 30 40 50 feet
0 5 10 15 m

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

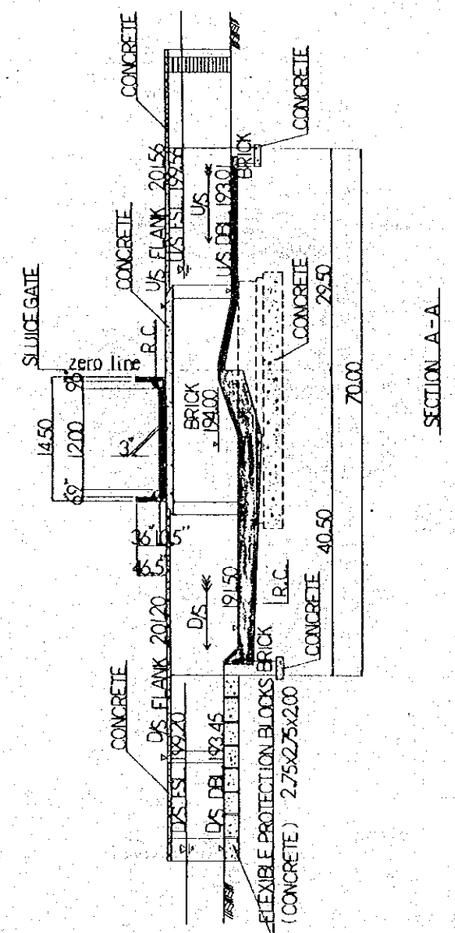
GROUP REGULATOR OF PAT FEEDER AT RD 558

DWG. NO.
004

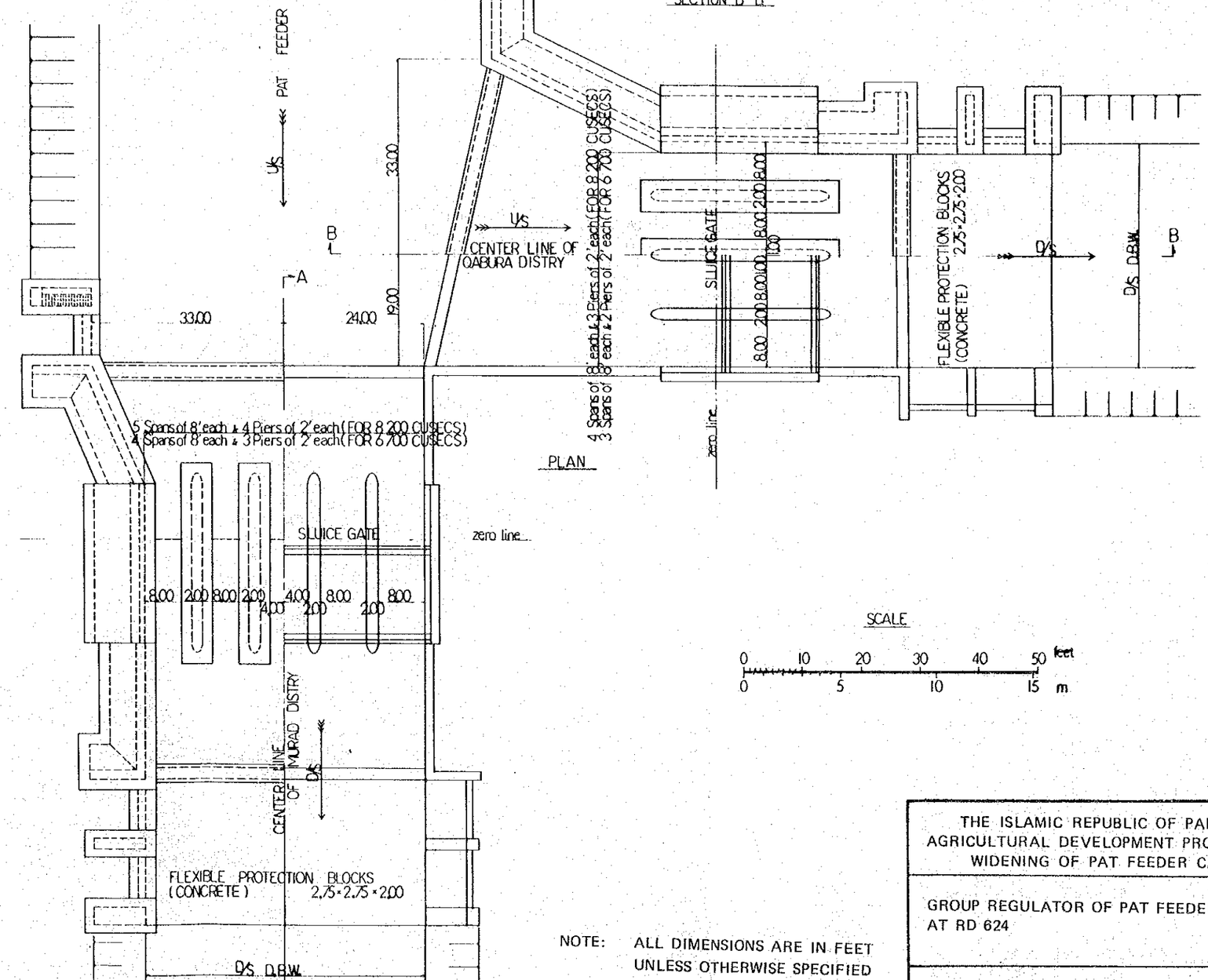
JAPAN INTERNATIONAL COOPERATION AGENCY



SECTION B-B



SECTION A-A



PLAN

SCALE

0 10 20 30 40 50 feet
0 5 10 15 m

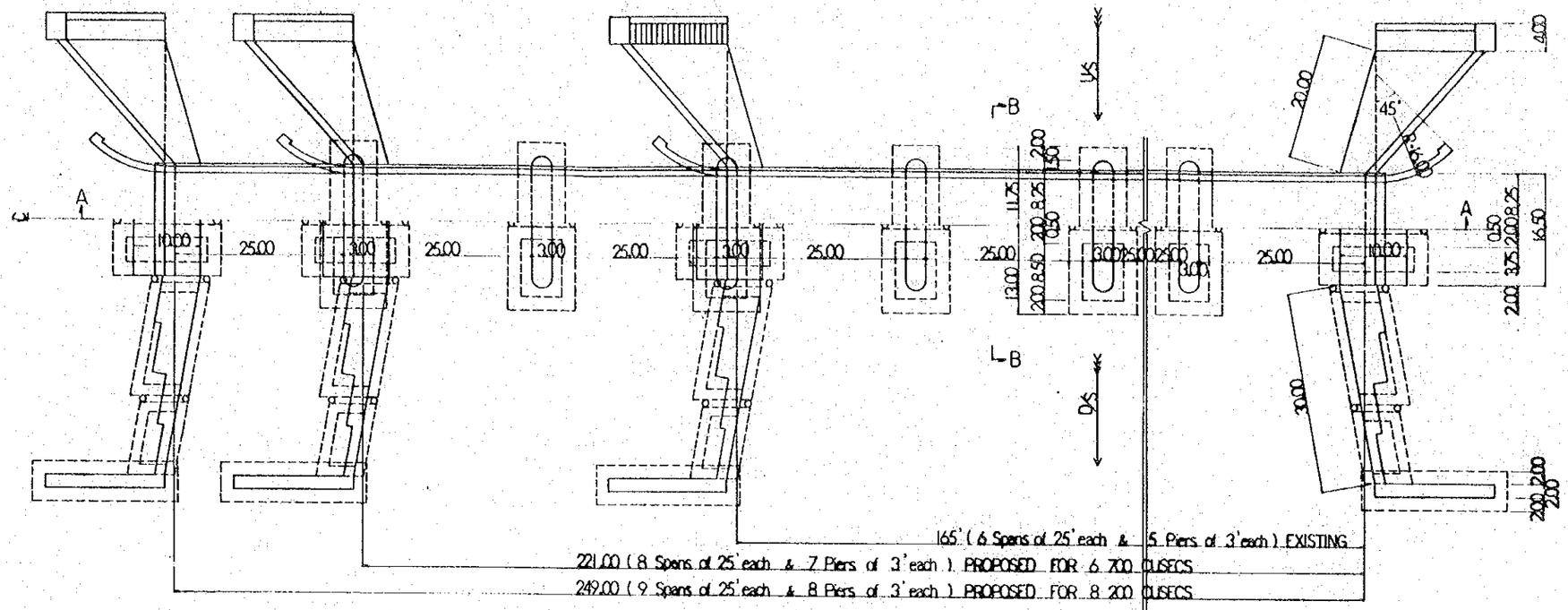
NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

GROUP REGULATOR OF PAT FEEDER AT RD 624

DWG. NO. 005

JAPAN INTERNATIONAL COOPERATION AGENCY



SECTION A-A

NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

SCALE

0 10 20 30 40 50 feet

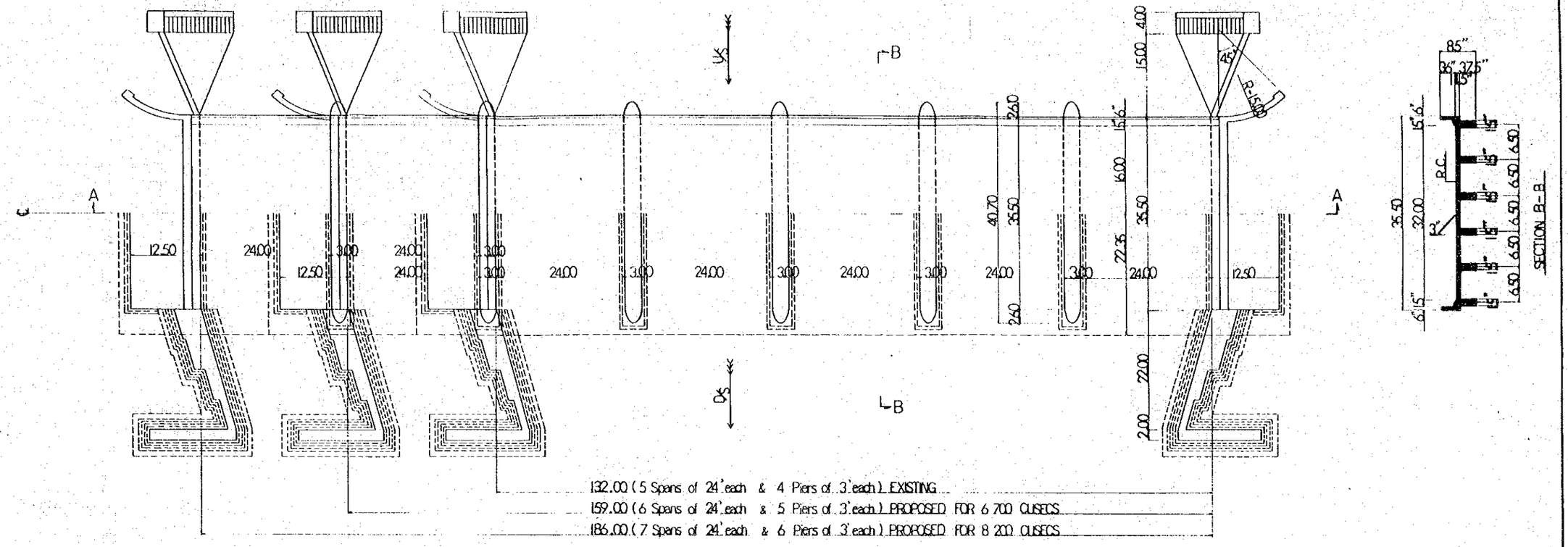
0 5 10 15 m

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

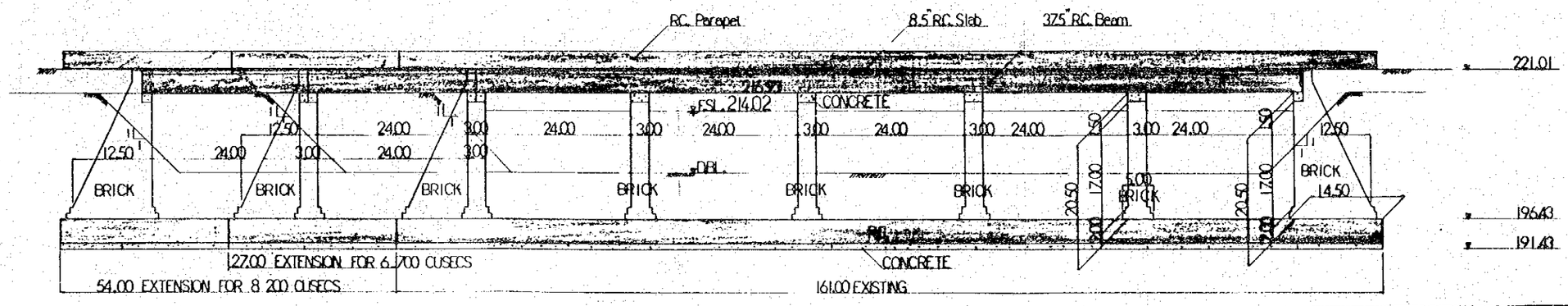
ROAD BRIDGE OF PAT FEEDER
(RD 42, 76 & 92)

DWG. NO.
006

JAPAN INTERNATIONAL COOPERATION AGENCY



PLAN



SECTION A-A

NOTE: ALL DIMENSIONS ARE IN FEET
UNLESS OTHERWISE SPECIFIED.

SCALE

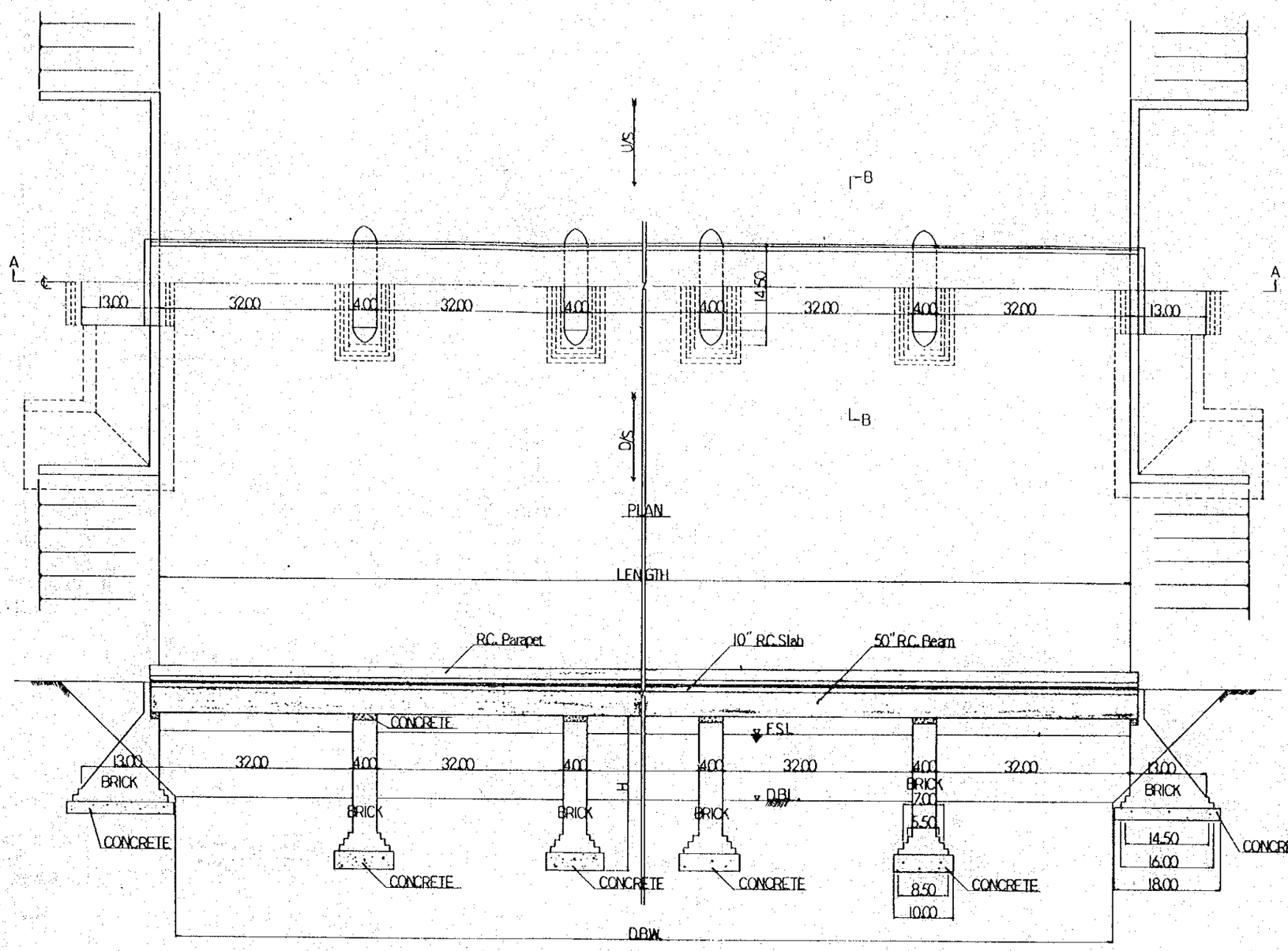
0 10 20 30 40 50 feet
0 5 10 15 m

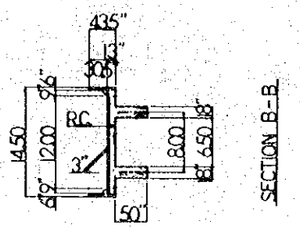
THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH
WIDENING OF PAT FEEDER CANAL

ROAD BRIDGE OF PAT FEEDER
(RD 489.8)

DWG. NO.
007

JAPAN INTERNATIONAL COOPERATION AGENCY





NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

SCALE

0 10 20 30 40 50 feet

0 5 10 15 m

LEGEND

D.B.W.	: DESIGN BED WIDTH
D.B.L.	: DESIGN BED LEVEL
W DEPTH	: WATER DEPTH
F.S.L.	: FULL SUPPLY LEVEL
H	: HEIGHT OF PIERS
CASE 1	: PROPOSED FOR 8200 CUSECS
CASE 2	: PROPOSED FOR 6700 CUSECS

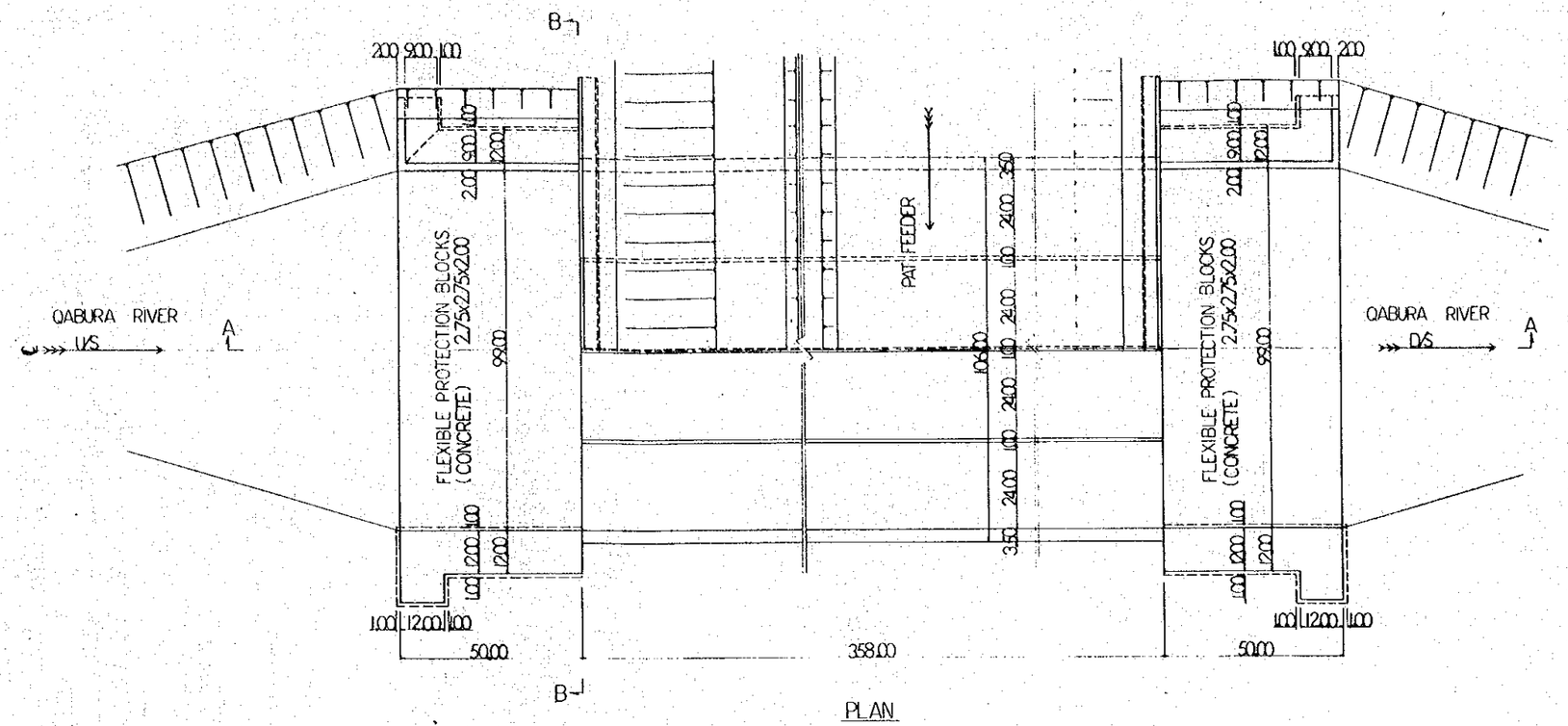
	D.B.W.		D.B.L.		F.S.L.		W DEPTH		H		LENGTH					
											CASE 1			CASE 2		
	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	SPAN	PIER	TOTAL	SPAN	PIER	TOTAL
RD 171	193.00	158.00	227.08	226.95	239.08	238.95	12.00	12.00	27.00	27.00	32.00x7+4.00x6 = 248.00			32.00x6+4.00x5 = 212.00		
205	193.00	158.00	224.59	224.51	236.59	236.51	12.00	12.00	27.00	27.00	32.00x7+4.00x6 = 248.00			32.00x6+4.00x5 = 212.00		
280	188.00	154.00	218.88	218.80	230.88	230.80	12.00	12.00	27.00	27.00	32.00x7+4.00x6 = 248.00			32.00x6+4.00x5 = 212.00		
318	188.00	154.00	216.21	216.22	228.21	228.22	12.00	12.00	19.00	19.00	32.00x6+4.00x5 = 212.00			32.00x5+4.00x4 = 176.00		
369	182.00	145.00	212.83	212.85	224.33	224.35	11.50	11.50	26.50	26.50	32.00x6+4.00x5 = 212.00			32.00x5+4.00x4 = 176.00		
441	170.00	140.00	207.52	207.51	218.02	218.01	10.50	10.50	25.50	25.50	32.00x5+4.00x4 = 176.00			32.00x4+4.00x3 = 140.00		
530	120.00	100.00	201.09	201.13	210.09	210.13	9.00	9.00	24.00	24.00	32.00x4+4.00x3 = 140.00			32.00x3+4.00x2 = 104.00		
585	85.00	65.00	196.06	195.99	204.06	203.99	8.00	8.00	23.00	23.00	32.00x3+4.00x2 = 104.00			32.00x2+4.00x1 = 68.00		

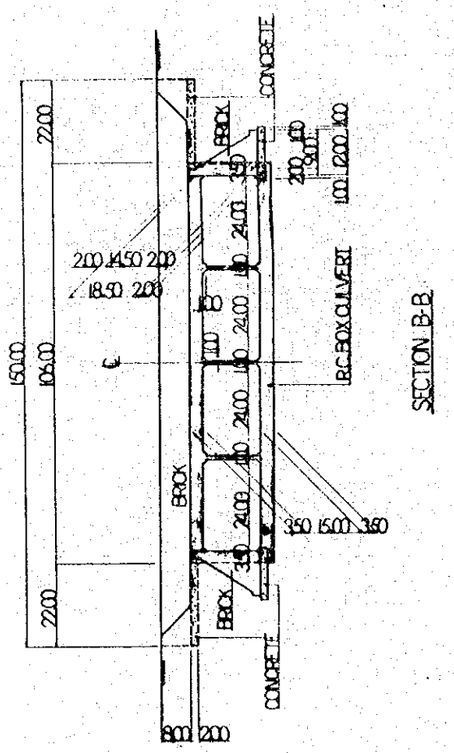
THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

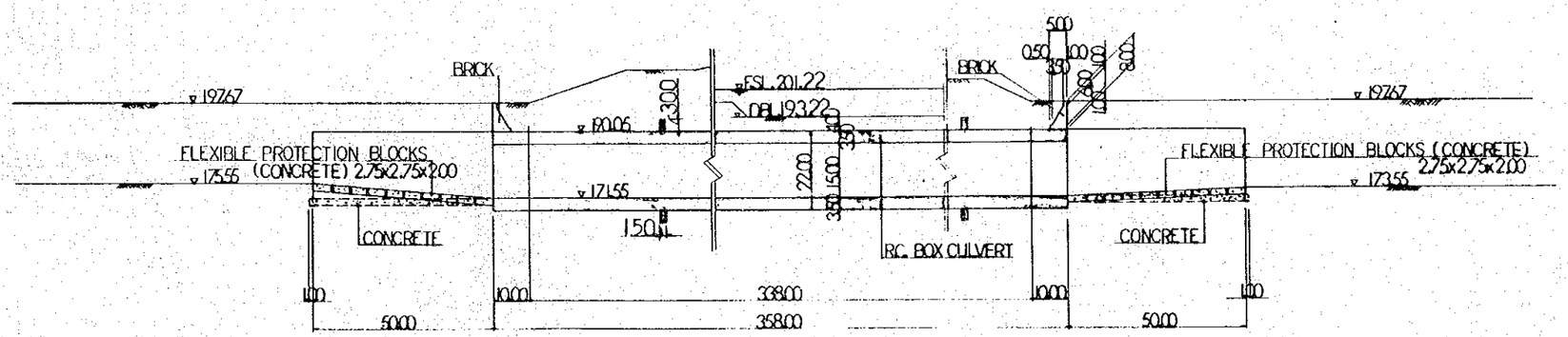
VILLAGE ROAD BRIDGE OF PAT FEEDER

DWG. NO. 008

JAPAN INTERNATIONAL COOPERATION AGENCY







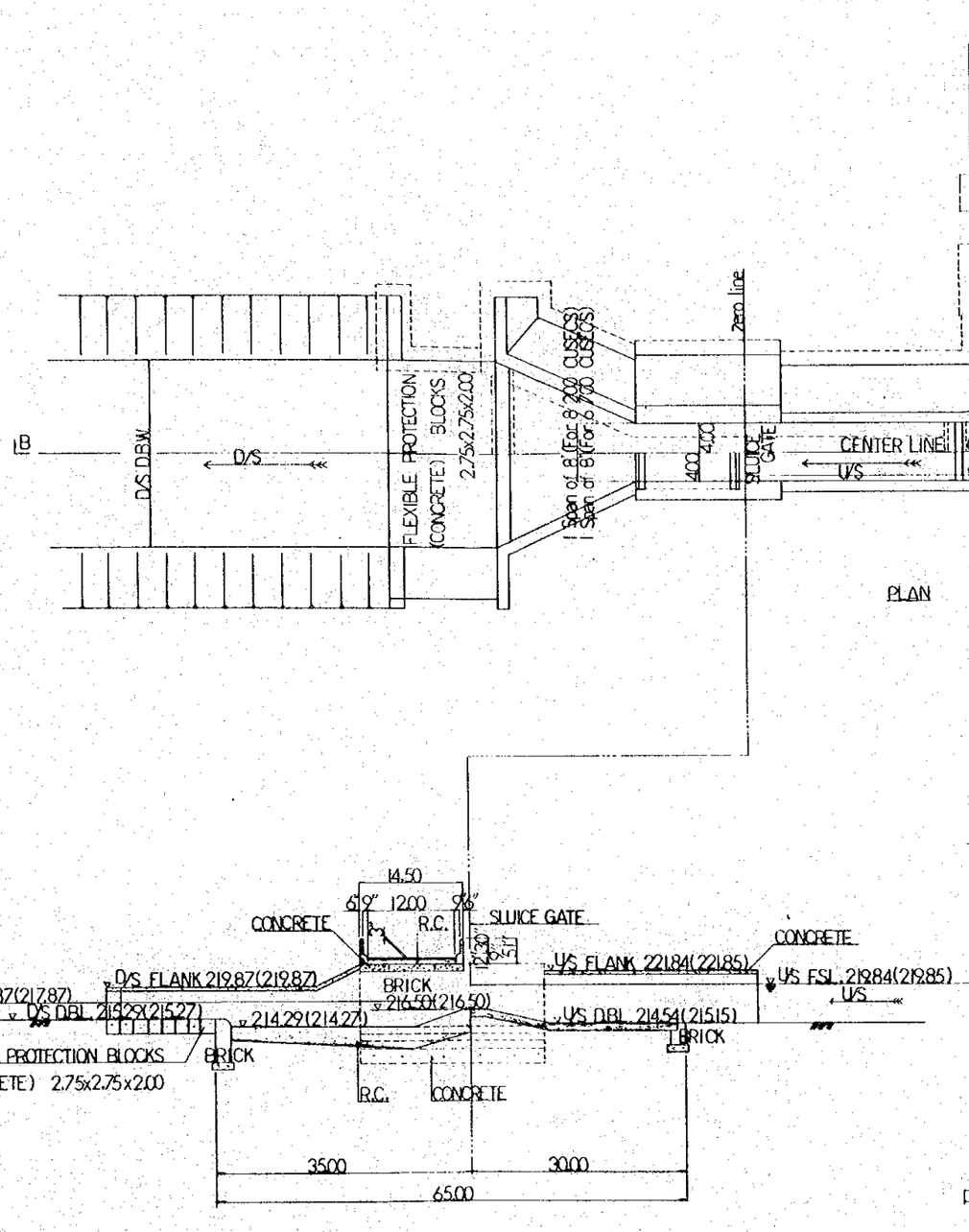
NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

SCALE

0 10 20 30 40 50 60 70 80 90 100 feet

0 10 20 30 m

THE ISLAMIC REPUBLIC OF PAKISTAN AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL	
CROSS DRAINAGE OF PAT FEEDER	DWG. NO. 009
JAPAN INTERNATIONAL COOPERATION AGENCY	



SCALE

0 10 20 30 40 50 feet

0 5 10 15 m

NOTES

(1) ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

(2) ALL VALUES ARE FOR THE CASES 1 & 3 WHILE VALUES IN PARENTHESES ARE FOR CASES 2 & 4.

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

GROUP REGULATOR OF KHALLAN & LOWER UCH DISTRIBUTARIES	DWG. NO. 010

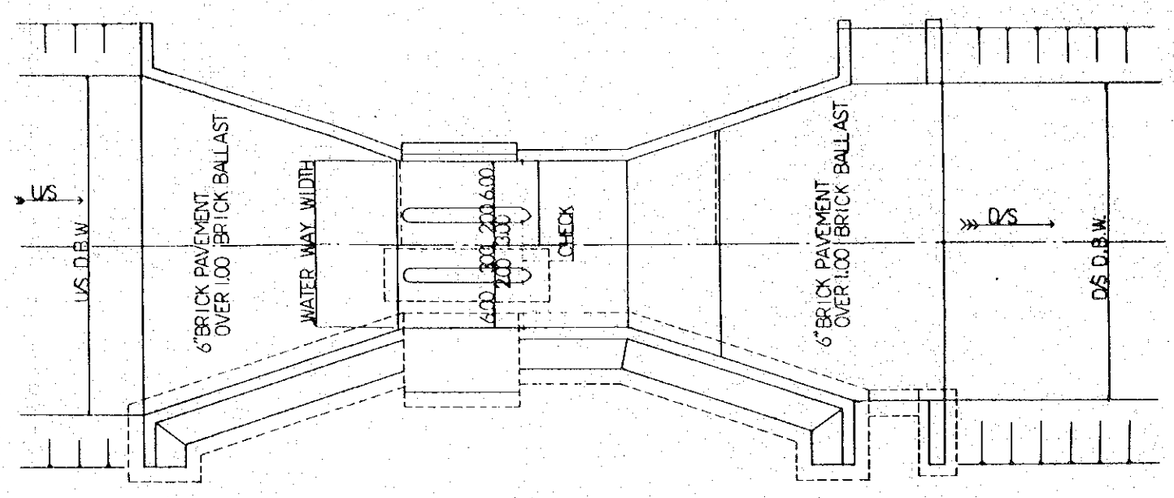
JAPAN INTERNATIONAL COOPERATION AGENCY

CASE 1 & CASE 3 (8 200 CUSECS)

	D.B.L U/S	D.B.L D/S	FALL	C.L	H.1	H.2	LENGTH L.1	LENGTH L.2	WATER WAY WIDTH	REMARKS
BITTI										
46.72	222.48	219.88	3.00	223.07	1.40	4.40	19.00	18.00	6.00	
50.50	219.05	215.05	4.00	219.25	1.60	4.00	19.00	20.00	6.00	
53.50	214.39	211.39	3.00	214.79	1.30	4.00	19.00	18.00	6.00	
KHALLAN										
40.02	212.86	208.86	4.00	213.06	1.60	4.40	19.00	20.00	6.00	
JHUDHER										
29.37	208.94	206.15	3.00	210.44	1.90	6.70	19.00	24.00	6.00x4=24.00	
JHATPAT										
51.84	188.80	187.30	1.50	189.70	1.20	5.60	19.00	16.00	6.00x3=18.00	
BALLAN										
80.02	175.00	174.01	1.00	175.20	0.80	4.40	19.00	10.00	6.00	
UMRANI										
31.47	194.06	193.36	1.00	195.06	1.10	6.50	19.00	14.00	6.00x3=18.00	
QABULA										
19.02	191.13	189.33	2.00	193.53	1.70	7.50	19.00	20.00	6.00x5=30.00	
28.02	188.14	186.75	2.00	190.14	1.70	7.30	19.00	20.00	6.00x4=24.00	
38.02	185.43	183.64	2.00	187.13	1.70	6.70	19.00	20.00	6.00x4=24.00	
49.02	182.44	179.64	3.00	183.44	1.90	6.20	19.00	24.00	6.00x3=18.00	
59.02	178.63	175.33	3.50	179.73	1.80	5.60	19.00	22.00	6.00x3=18.00	
71.02	173.52	170.63	3.50	174.52	1.80	5.40	19.00	22.00	6.00x2=12.00	
86.02	167.91	166.72	2.00	169.01	1.30	4.80	19.00	16.00	6.00	
MURAD										
20.02	190.81	188.81	2.00	192.81	1.80	7.80	19.00	22.00	6.00x6=36.00	
40.02	186.28	183.38	3.00	188.58	2.10	7.80	19.00	24.00	6.00x6=36.00	
60.02	180.84	178.84	2.00	182.94	1.80	7.60	19.00	22.00	6.00x5=30.00	
80.02	176.29	173.99	2.50	178.39	1.50	7.50	19.00	24.00	6.00x4=24.00	
100.02	172.13	169.93	2.50	173.23	1.70	6.50	19.00	20.00	6.00x3=18.00	
115.02	168.40	165.90	2.50	169.30	1.60	5.60	19.00	16.00	6.00x3=18.00	
127.52	164.31	163.12	2.00	165.71	1.30	5.20	19.00	16.00	6.00x2=12.00	

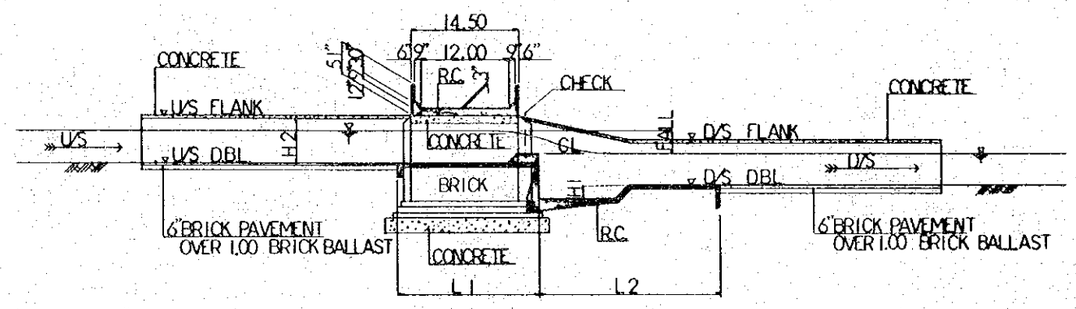
CASE 2 & CASE 4 (6 700 CUSECS)

	D.B.L U/S	D.B.L D/S	FALL	C.L	H.1	H.2	LENGTH L.1	LENGTH L.2	WATER WAY WIDTH	REMARKS
BITTI										
46.72	222.47	219.47	3.00	222.87	1.30	4.00	19.00	18.00	6.00	
50.50	218.64	215.14	3.50	219.04	1.40	4.00	19.00	18.00	6.00	
53.50	214.48	211.49	3.00	215.08	1.30	4.00	19.00	18.00	6.00	
KHALLAN										
40.02	212.84	209.24	4.00	213.34	1.60	4.40	19.00	20.00	6.00	
JHUDHER										
29.37	209.54	206.54	3.00	210.34	1.80	6.20	19.00	22.00	6.00x3=18.00	
JHATPAT										
51.84	188.97	187.47	1.50	189.97	1.20	5.40	19.00	14.00	6.00x3=18.00	
BALLAN										
80.02	175.14	174.55	1.00	175.64	0.80	4.40	19.00	12.00	6.00	
UMRANI										
31.47	194.37	193.37	1.00	195.34	1.00	6.00	19.00	12.00	6.00x3=18.00	
QABULA										
19.02	191.93	190.04	2.00	193.43	1.60	6.70	19.00	20.00	6.00x4=24.00	
28.02	188.73	187.24	2.00	190.53	1.60	6.70	19.00	20.00	6.00x4=24.00	
38.02	185.88	184.09	2.00	186.78	1.60	6.20	19.00	20.00	6.00x3=18.00	
49.02	182.89	179.89	3.00	183.69	1.70	5.60	19.00	20.00	6.00x3=18.00	
59.02	178.56	175.76	3.00	179.76	1.70	5.40	19.00	20.00	6.00x3=18.00	
71.02	173.77	170.68	3.50	174.87	1.80	5.20	19.00	22.00	6.00x2=12.00	
86.02	168.23	166.64	2.00	169.13	1.20	4.40	19.00	14.00	6.00	
MURAD										
20.02	190.74	188.84	2.00	192.74	1.70	7.70	19.00	22.00	6.00x5=30.00	
40.02	186.19	183.70	2.50	188.29	1.90	7.60	19.00	24.00	6.00x5=30.00	
60.02	181.14	179.34	2.00	183.04	1.70	7.50	19.00	22.00	6.00x4=24.00	
80.02	177.30	175.01	2.50	179.00	1.90	6.70	19.00	24.00	6.00x4=24.00	
100.02	172.75	170.66	2.50	173.85	1.60	6.00	19.00	20.00	6.00x3=18.00	
115.02	168.56	166.06	2.50	169.66	1.60	5.40	19.00	20.00	6.00x3=18.00	
127.52	164.56	162.97	2.00	165.86	1.20	4.80	19.00	14.00	6.00x2=12.00	



PLAN

NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.



TYPICAL L-SECTION

SCALE

0 10 20 30 40 50 feet

0 5 10 15 m

LEGEND

D.B.W.: DESIGN BED WIDTH
D.B.L.: DESIGN BED LEVEL
U/S : UP STREAM
D/S : DOWN STREAM
C.L. : CLEST LEVEL

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

PLAIN FALL (CONSTRUCTION)

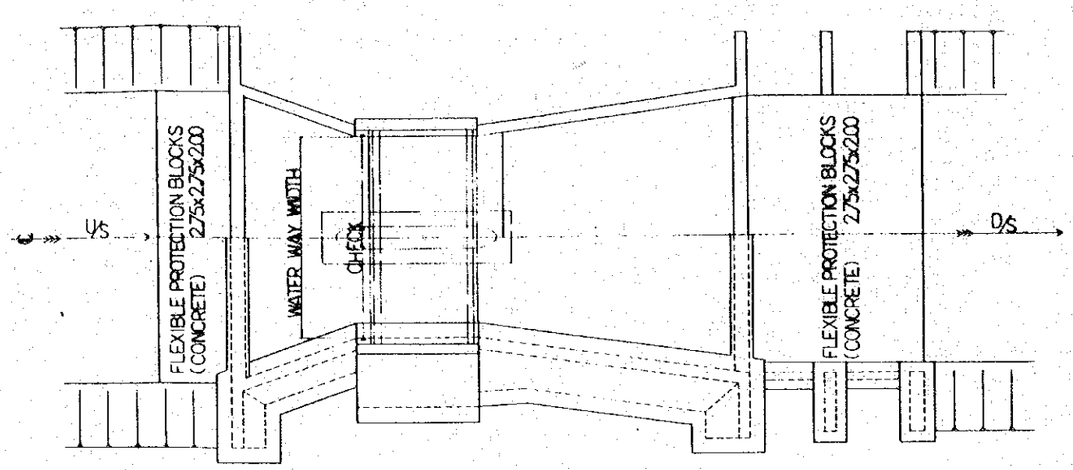
DWG. NO. 011

JAPAN INTERNATIONAL COOPERATION AGENCY

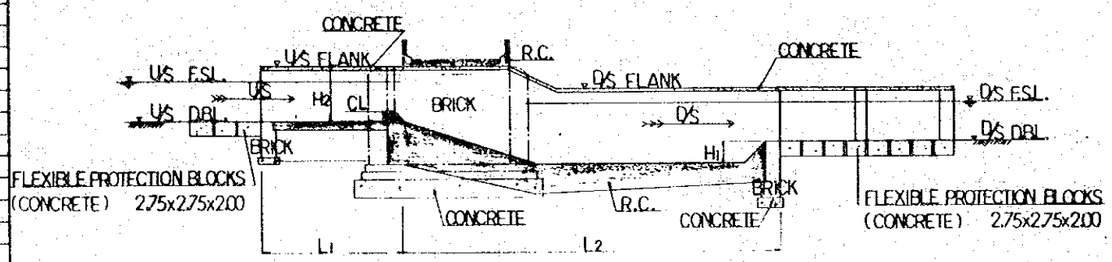
	D.BL U/S	D.BL D/S	FALL CASE 1	FALL CASE 2	H1	H2	LENGTH L1	LENGTH L2	WATER WAY WIDTH	C.L. CASE 1	C.L. CASE 2	REMOULD TYPE	REMARKS
LOWER UCH													
RD 2.00	210.36	203.36	7.00	7.00	5.00	6.50	15.00	40.00	8.00 x 3 = 24.00	211.66	211.45	B	NOT AVAILABLE
4.00	203.09	196.09	7.00	7.00	5.00	6.50	15.00	40.00	8.00 x 3 = 24.00	204.39	204.17	B	〃
8.00	195.55	188.55	7.00	7.00	5.00	6.50	15.00	40.00	8.00 x 3 = 24.00	196.85	196.61	A	〃
NASIRABAD													
RD 7.60	212.15	208.65	3.50	3.50	2.50	5.60	9.00	47.00	10.00 x 2 = 20.00	213.05	213.39	B	
10.90	208.23	203.83	4.50	4.50	3.00	5.40	8.50	49.50	6.00 x 3 = 18.00	209.06	209.38	B	
16.01	203.02	200.12	3.00	3.60	2.50	5.40	13.50	33.50	8.00 x 2 = 16.00	203.97	204.18	A	
22.00	199.30	194.80	4.00	3.60	3.00	5.40	13.50	33.50	14.00	200.13	200.39	A	NOT AVAILABLE
30.40	193.35	190.80	3.00	3.00	2.50	4.60	6.50	32.50	10.00	195.01	195.43	A	
JHUCHER													
RD 34.40	205.35	202.35	3.00	3.00	3.00	6.40	14.00	48.00	12.00 x 2 = 24.00	206.97	207.06	C	
52.93	199.00	196.00	3.00	3.00	4.00	7.13	13.00	43.00	10.00 x 2 = 20.00	201.62	201.93	B	
60.91	195.00	193.00	2.00	2.00	5.00	6.77	11.00	40.00	10.00 x 2 = 20.00	197.83	197.98	B	
66.93	192.00	188.00	4.00	3.60	4.00	6.40	9.00	41.00	8.00 x 2 = 16.00	194.41	194.39	A	
78.76	187.00	183.00	4.00	4.00	4.00	5.98	10.00	36.00	16.00	189.36	189.42	C	
89.66	181.00	178.00	3.00	3.00	3.00	6.16	9.50	41.50	14.00	183.78	184.03	C	
TEMPLE													
RD 33.52	206.00	203.00	3.00	2.50	3.00	7.16	10.50	39.50	10.00 x 2 = 20.00	208.94	208.83	B	
45.50	202.00	198.00	4.00	4.00	4.00	6.25	11.00	39.00	8.00 x 2 = 16.00	204.36	204.61	A	
67.74	195.00	191.00	4.50	4.10	4.00	5.30	8.00	33.00	10.00	196.97	196.36	C	
75.17	189.00	187.00	2.00	2.00	3.00	5.35	7.00	30.00	8.00	191.10	191.30	B	
JHATPAT													
RD 9.90	201.00	200.00	2.50	2.50	3.00	10.55	19.00	52.75	20.00 x 2 = 40.00	205.99	206.39	C	
27.10	194.00	193.00	3.00	2.70	3.00	9.31	16.00	52.00	12.00 x 2 = 24.00	198.17	198.43	A	
40.00	191.00	189.00	2.50	2.50	3.00	7.53	11.50	38.50	28.00	194.12	194.50	D	
61.50	187.00	183.00	2.00	2.00	2.00	5.89	10.00	43.00	8.00 x 2 = 16.00	188.81	187.01	A	
69.90	180.00	178.00	3.50	3.50	2.00	8.07	9.00	36.00	15.00	184.26	184.36	C	
MOHABATPUR													
RD 39.0	194.00	193.00	2.00	2.00	3.00	8.51	12.50	40.50	28.00	198.01	198.27	D	
193.0	189.00	188.00	3.00	2.50	3.00	9.37	10.50	40.50	12.00 x 2 = 24.00	193.82	193.95	D	
309.0	185.00	184.50	2.00	2.00	3.00	8.91	12.50	38.50	22.00	189.28	189.82	C	
436.0	183.00	180.50	2.00	2.00	3.00	6.51	11.00	39.00	8.00 x 2 = 16.00	185.34	185.81	A	
545.0	177.00	177.00	2.00	2.00	3.00	8.24	8.00	31.00	14.00	182.25	182.33	C	
670.0	174.00	174.00	2.00	2.00	2.00	7.22	5.00	42.00	10.00	178.27	178.35	A	
BARI													
RD 40.00	197.00	193.50	2.50	2.50	2.50	6.83	12.00	50.00	28.00	199.78	200.12	D	
59.00	191.00	188.00	3.00	3.00	4.00	6.46	14.00	43.00	22.00	194.62	194.86	C	
70.00	186.50	184.00	4.00	3.50	3.00	6.62	14.00	40.50	6.00 x 3 = 18.00	190.00	190.12	A	
80.00	183.00	180.50	3.00	3.00	2.50	6.12	12.00	38.00	18.00	185.11	185.25	C	
90.00	179.00	176.00	2.00	2.00	2.50	6.02	10.00	34.00	18.00	180.83	181.19	C	
105.00	174.00	171.00	3.00	3.00	2.50	5.32	8.50	36.00	14.00	176.75	177.01	C	
BALLAN													
RD 1.00	200.00	197.00	2.00	2.00	2.00	7.44	14.00	40.00	28.00	202.39	202.77	D	
24.00	195.50	192.00	3.50	3.50	2.00	7.12	17.50	41.50	10.00 x 2 = 20.00	198.34	198.70	A	
37.00	190.50	187.00	3.00	3.00	3.00	6.73	14.00	42.00	22.00	193.47	193.75	C	
49.00	185.00	182.00	4.00	4.00	3.00	6.93	11.00	44.00	6.00 x 3 = 18.00	188.92	188.92	A	
57.00	181.47	178.57	3.50	3.00	4.00	5.60	11.00	45.00	18.00	184.06	184.06	C	
66.50	176.00	175.80	1.50	1.50	3.00	6.36	12.00	33.00	12.00	179.39	179.39	C	
UMRANI													
RD 9.68	199.30	197.60	3.40	3.40	3.00	7.32	11.00	35.00	8.00 x 4 = 32.00	201.50	201.92	A	
45.17	191.34	187.94	2.00	2.00	3.00	6.00	17.00	32.00	8.00 x 2 = 16.00	192.20	192.37	A	
57.00	185.00	182.00	5.00	4.50	3.00	6.00	13.50	33.50	6.00 x 2 = 12.00	188.61	188.49	A	
69.24	180.00	178.00	5.00	5.00	2.50	5.20	13.50	29.50	8.00	182.11	182.32	A	
79.34	175.50	172.00	5.00	5.00	2.00	4.09	10.00	26.00	5.00	176.29	176.33	B	
RUPA													
RD 9.60	192.36	189.16	3.00	3.00	3.00	5.90	10.00	34.00	10.00 x 2 = 20.00	193.51	193.86	A	
17.30	188.00	185.30	4.00	4.00	3.00	5.59	11.00	34.00	8.00 x 2 = 16.00	189.27	189.59	A	
27.00	183.50	179.80	4.00	4.00	3.00	5.30	18.00	35.00	6.00 x 2 = 12.00	183.58	183.86	A	
41.80	174.77	173.80	2.00	1.80	2.00	7.00	20.00	27.00	6.00 x 2 = 12.00	178.21	178.34	B	
MANGSI													
RD 40.00	195.20	194.40	2.00	1.70	3.00	5.50	16.50	30.50	6.00 x 2 = 12.00	198.03	198.05	A	
50.00	192.40	192.10	3.00	3.00	2.00	4.78	15.00	23.00	5.00 x 2 = 10.00	195.12	195.26	A	

LEGEND

REMOULD TYPE A : CHECK
B : CHECK & SLAB TYPE BRIDGE
C : CHECK & BEAM TYPE BRIDGE (SPAN ≤ 24.00)
D : CHECK & BEAM TYPE BRIDGE (SPAN > 24.00)

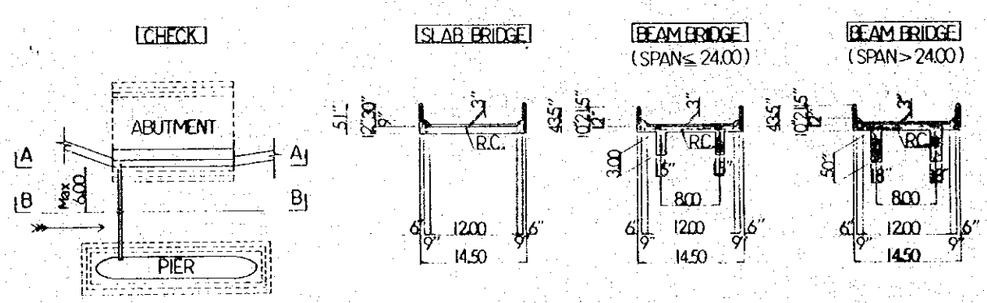


PLAN

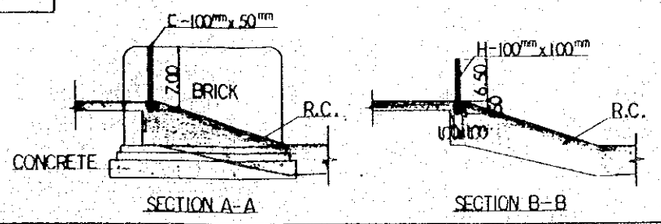


TYPICAL L-SECTION

NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.



PLAN



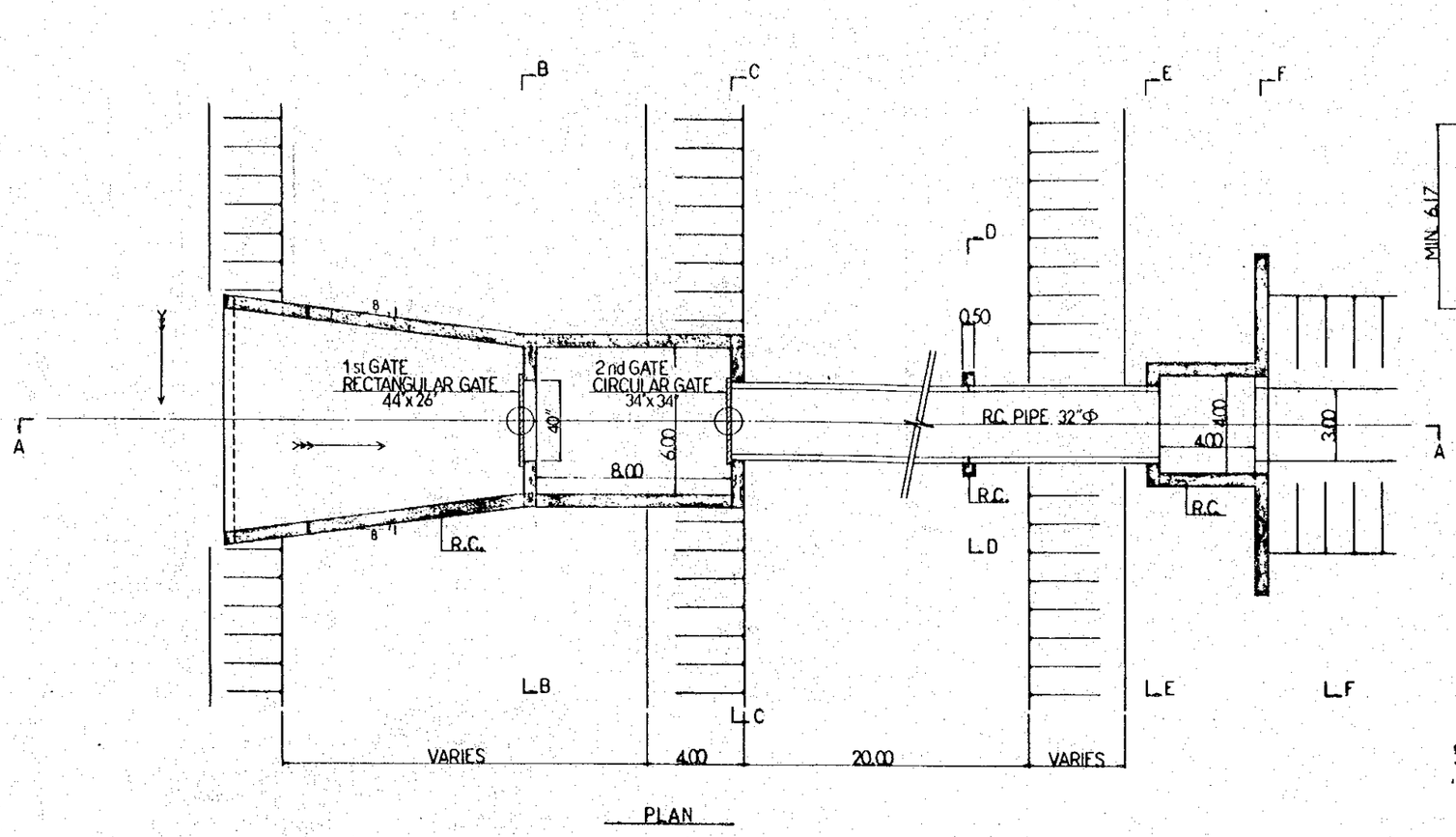
SECTION A-A SECTION B-B

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

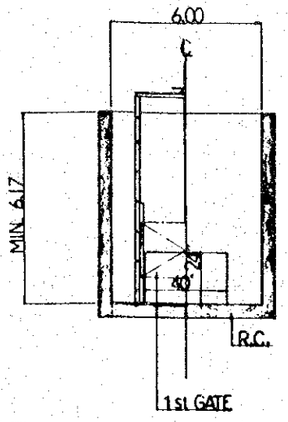
PLAIN FALL (IMPROVEMENT)

DWG. NO. 012

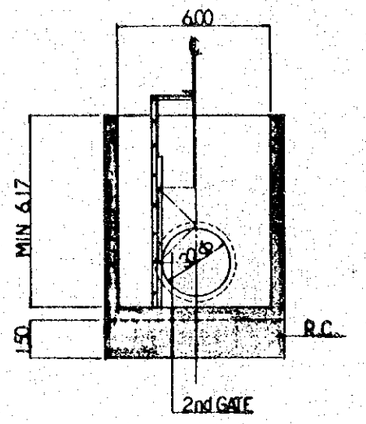
JAPAN INTERNATIONAL COOPERATION AGENCY



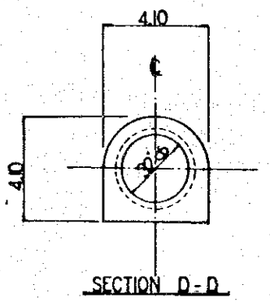
PLAN



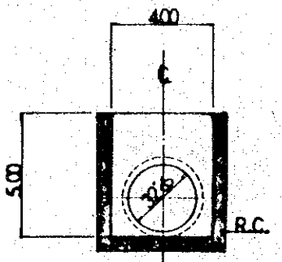
SECTION B-B



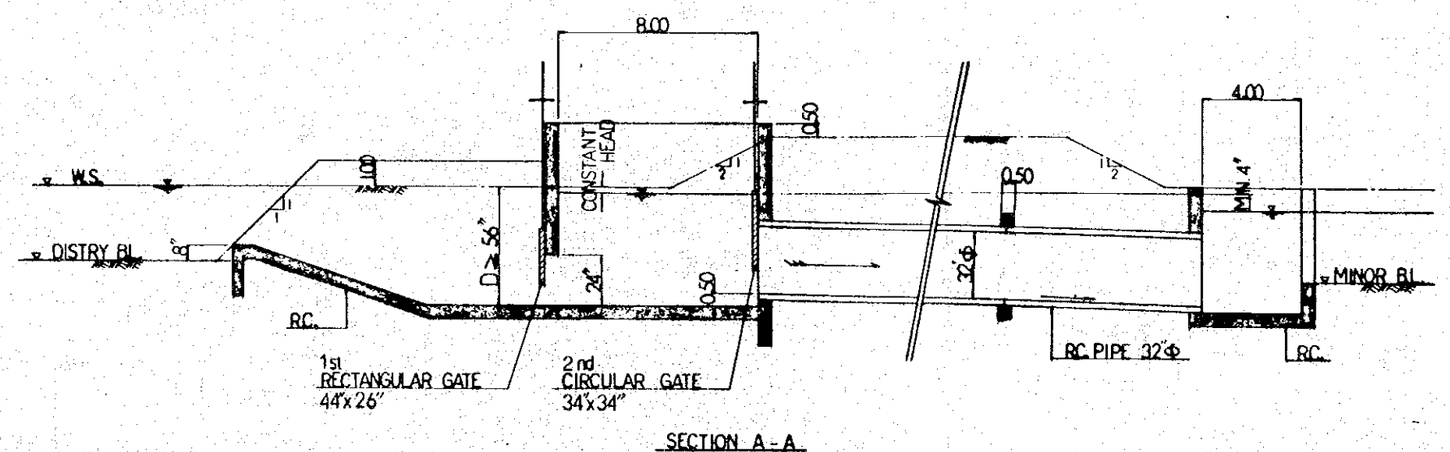
SECTION C-C



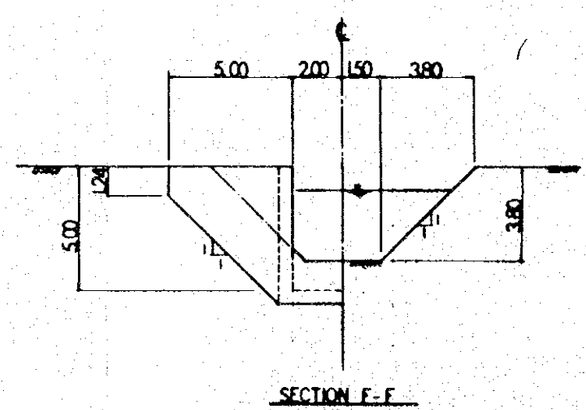
SECTION D-D



SECTION E-E



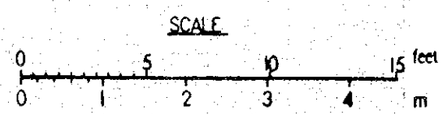
SECTION A-A



SECTION F-F

NOTE: ALL DIMENSIONS ARE IN FEET
UNLESS OTHERWISE SPECIFIED.

SCALE



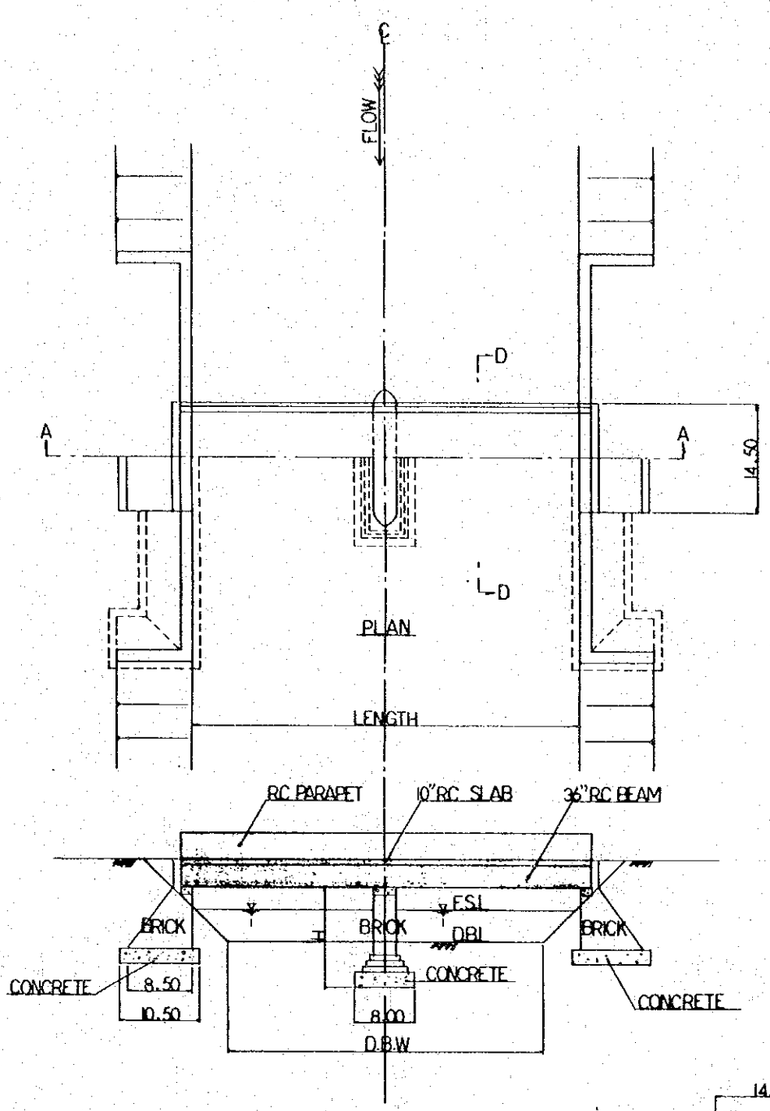
THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH
WIDENING OF PAT FEEDER CANAL

OFF - TAKE

DWG. NO.

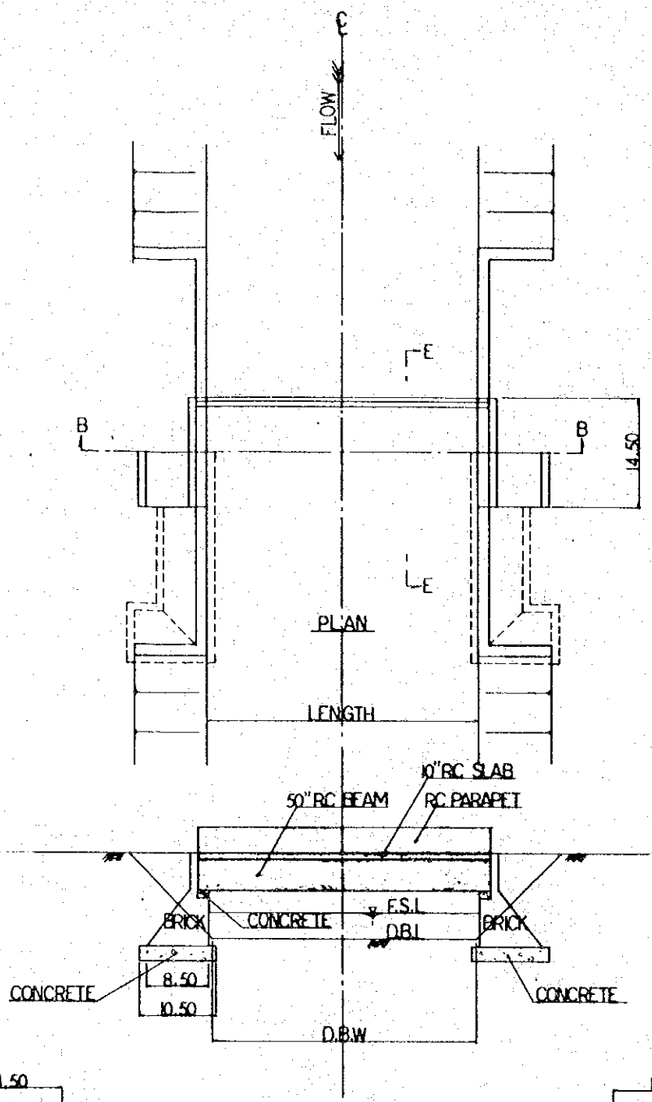
013

JAPAN INTERNATIONAL COOPERATION AGENCY



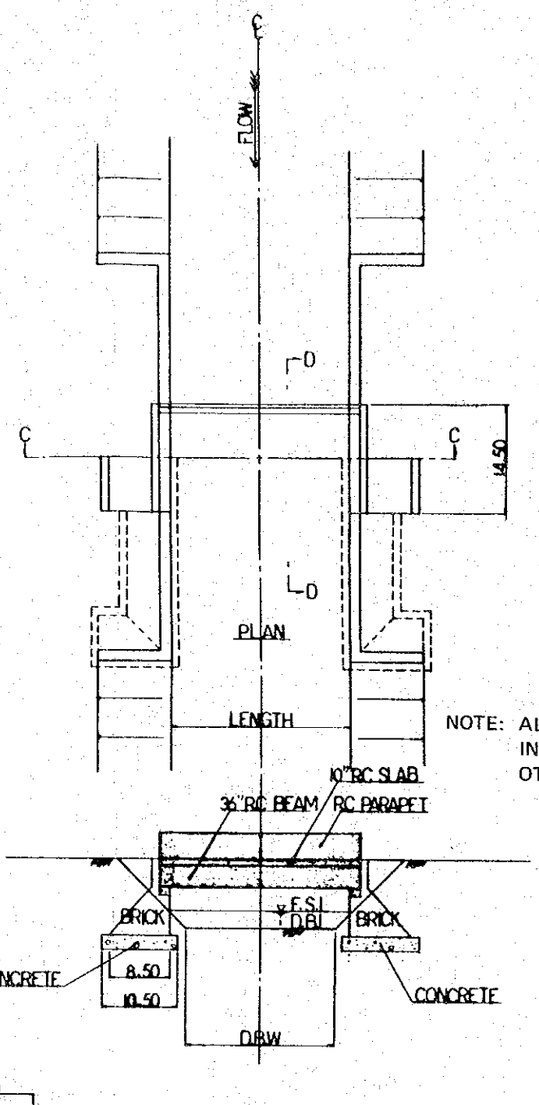
SECTION A-A

TYPE-1



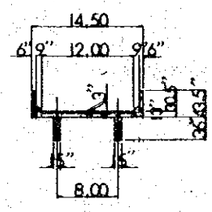
SECTION B-B

TYPE-2

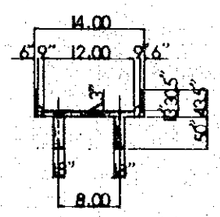


SECTION C-C

TYPE-3



SECTION D-D



SECTION E-E

SCALE

0 10 20 30 40 50 feet

0 5 10 15 m

NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

LEGEND

DBW : DESIGN BED WIDTH
DBL : DESIGN BED LEVEL
FSL : FULL SUPPLY LEVEL
WDEPTH : WATER DEPTH
H : HEIGHT OF PIERS

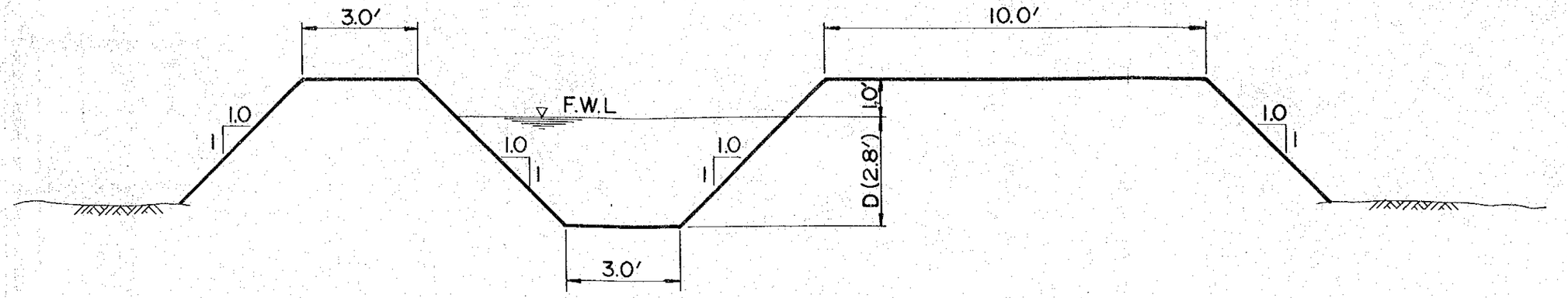
		D.B.W		DBL		F S L		W-DEPTH		H		LENGTH					REMARKS
		CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1			CASE 2		
		U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	U/S / D/S	SPAN	PIER	TOTAL	SPAN	PIER	TOTAL	
LOWER UCH	RD 15.28	42.00 / 43.00	43.00 / 39.00	187.86 / 188.37	188.49 / 188.59	192.06 / 191.97	192.09 / 191.99	4.20 / 3.60	3.60 / 3.40	13.20 / 12.60	12.60 / 12.40	2400×2+300×1=		51.00	2400×2+300×1=		51.00	TYPE - 1
NASIRABAD	36.40	35.00 / 29.00	29.00 / 26.00	186.11 / 186.21	186.23 / 186.54	189.51 / 189.41	189.43 / 189.34	3.40 / 3.20	3.20 / 2.80	—	—	3600×1		=3600	3000×1		=3000	TYPE - 2
	37.00	20.00 / 20.00	20.00 / 20.00	190.51 / 190.41	190.63 / 190.53	192.91 / 192.81	193.03 / 192.93	2.40 / 2.40	2.40 / 2.40	—	—	2000×1		=2000	2000×1		=2000	TYPE - 3
	50.00	17.00 / 17.00	12.00 / 12.00	189.21 / 188.11	188.17 / 188.07	190.21 / 190.11	190.17 / 190.07	2.00 / 2.00	2.00 / 2.00	11.00 / 11.00	11.00 / 11.00	1800×1		=1800	NO NEED TO REMOULD			TYPE - 3
TEMPLE	23.99	42.00 / 42.00	43.00 / 43.00	208.70 / 208.80	208.97 / 208.87	212.90 / 212.80	212.57 / 212.47	4.20 / 4.00	3.60 / 3.60	—	—	2400×2+300×1=		51.00	2400×1+300×1=		51.00	TYPE - 1
BALLAN	87.00	20.00 / 17.00	17.00 / 12.00	172.66 / 172.86	173.05 / 172.85	176.41 / 175.06	175.05 / 174.85	2.40 / 2.40	2.00 / 2.00	—	—	1800×1		=1800	NO NEED TO REMOULD			TYPE - 3

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

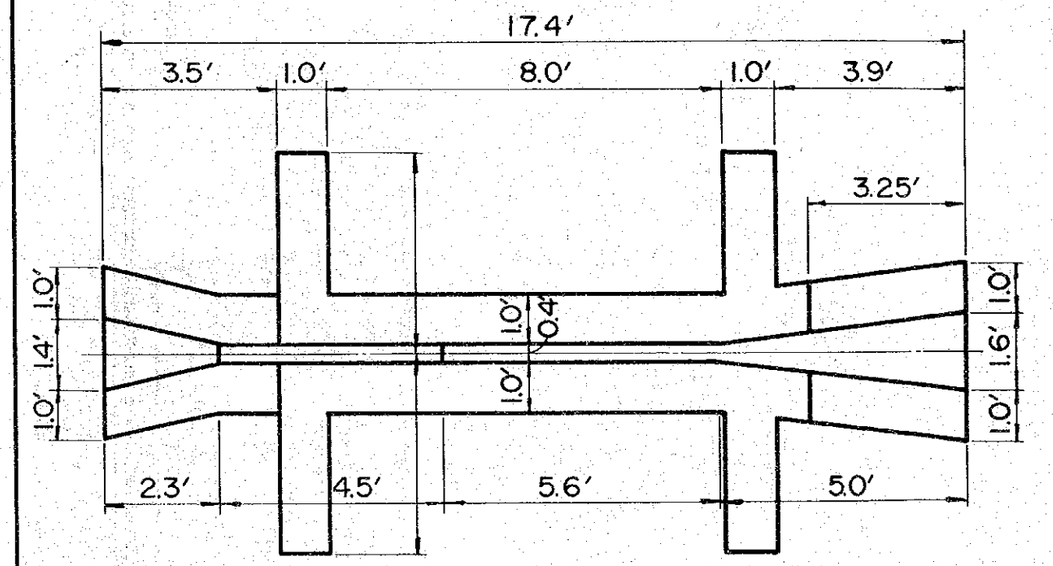
VILLAGE ROAD BRIDGE OF DISTRIBUTARIES (CONSTRUCTION)

DWG. NO. 014

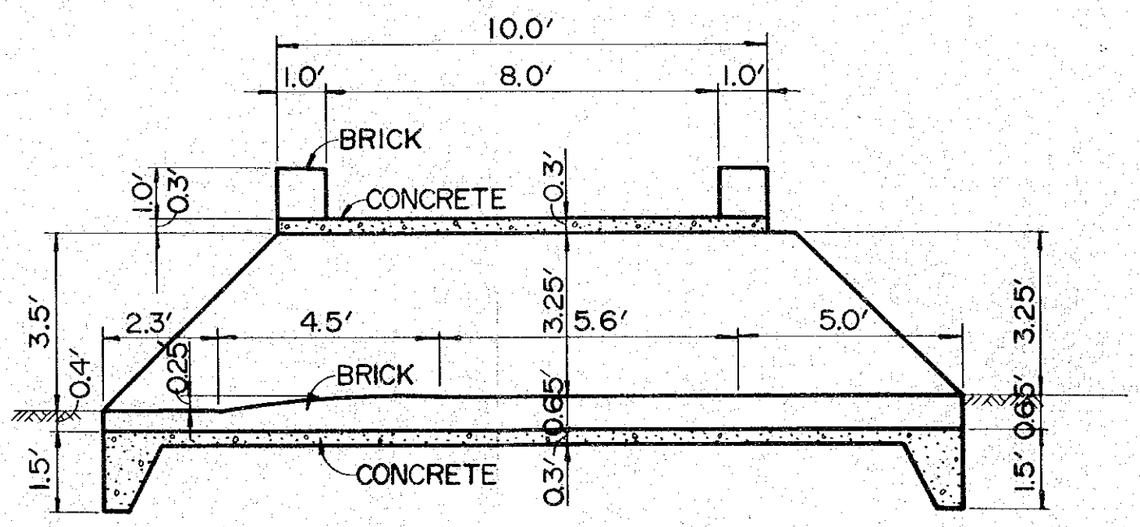
JAPAN INTERNATIONAL COOPERATION AGENCY



TYPICAL CROSS SECTION MINOR CANAL



PLAN OF OUTLET (MODULE)



L-SECTION OF OUTLET

NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

MINOR CANAL

DWG. NO. 015

JAPAN INTERNATIONAL COOPERATION AGENCY

OFF TAKE

MINOR CANAC

OUTLET NAKKA

M.W.C

80 ac

80 ac

80 ac

80 ac

80 ac

16 ac

1.0 ac

DISTRIBUTARY

ONE CHAK

M.W.C

NAKKA I.W.C

DIVERSION BOX

FARM DRAIN

BRANCH DRAIN

I.W.C

L.W.C

M.W.C

BRANCH DRAIN

SUB-MAIN DRAINE

FARM DRAIN

BRANCH DRAIN

CHAK BOUNDARY

MINOR CANAL
MAIN WATER COURSE
INTERNAL WATER COURSE

MAIN DRAIN
BRANCH DRAIN
FARM DRAIN
CHAK BOUNDARY

OUTLET

NAKKA

DIVERSION BOX

0 1,000' 2,000' 3,000' 4,000' 5,000'

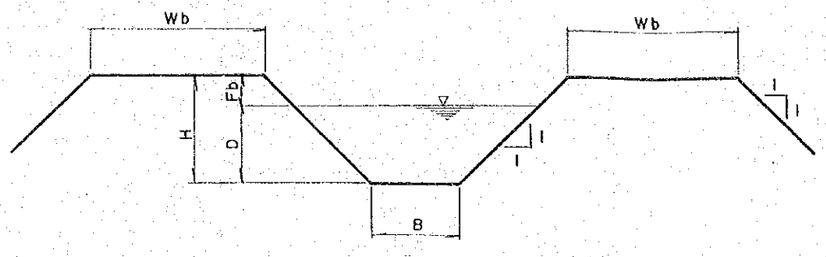
0 500m 1,000m 1,500m

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

TYPICAL LAYOUT OF ON-FARM FACILITIES

DWG. NO. 016

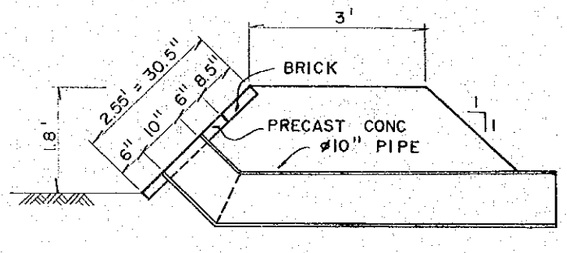
JAPAN INTERNATIONAL COOPERATION AGENCY



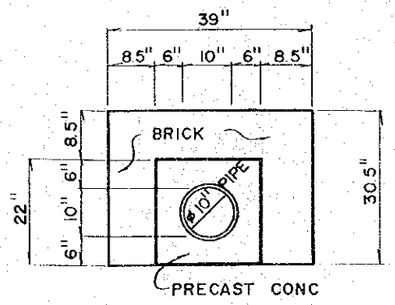
TYPICAL CROSS SECTION OF WATER COURSES

DIMENSIONS OF WATER COURSES (unit = feet)

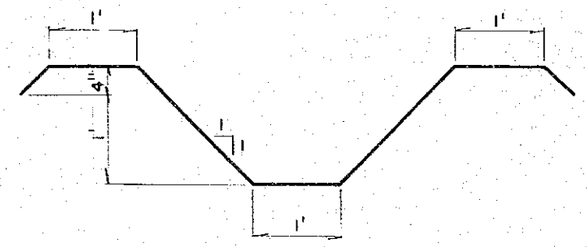
WATER COURSES	B	D	Fb	H	Wb
MAIN WATER COURSE	1.5	1.3	0.5	1.8	3.0
INTERNAL WATER COURSE	1.0	1.8	0.2	1.0	2.0
LINK WATER COURSE	1.0	0.5	0.2	0.7	2.0



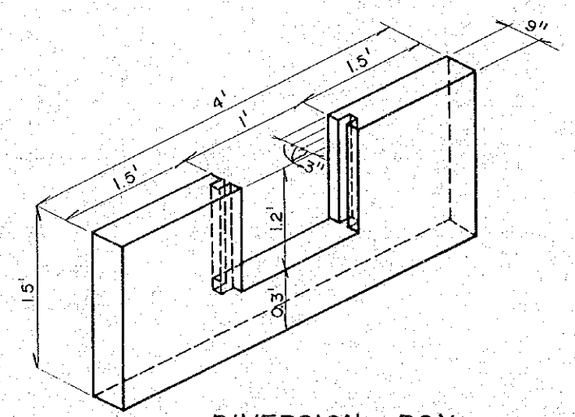
NAKKA



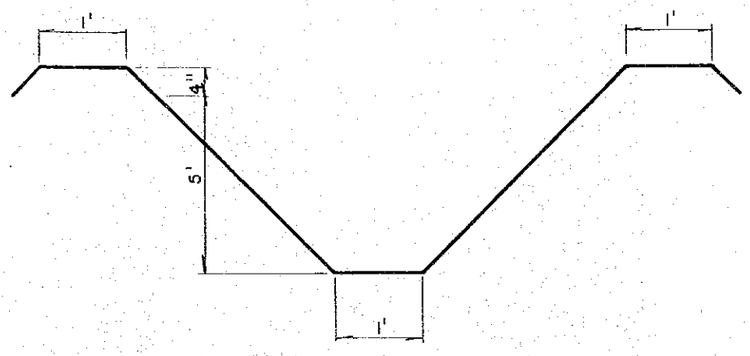
ELEVATION OF NAKKA



TYPICAL CROSS SECTION OF FARM DRAIN



DIVERSION BOX



TYPICAL CROSS SECTION OF BRANCH DRAIN

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

TYPICAL STRUCTURE OF ON-FARM FACILITIES

DWG. NO. 017

JAPAN INTERNATIONAL COOPERATION AGENCY

PAT FEEDER CANAL

JHATPAT DISTRY

OFFTAKE OF MINOR C

MOHBAD PUR DISTRY

MINOR CANAL

MINOR CANAL B

OFFTAKE OF MINOR A

OFFTAKE OF MINOR B

HEAD REGURATOR FOR JHATPAT

HEAD REGURATOR FOR BARI

CROSS REGURATOR

OUTLET FOR B-1

BRANCH DRAIN

MAIN WATER COURSE

INTERNAL WATER COURSE

SUB-MAIN DRAIN

SUB-MAIN DRAIN

OUTLET FOR A-1 CHAK

OUTLET FOR A-2 CHAK

OUTLET FOR A-3 CHAK

OUTLET FOR A-4 CHAK

OUTLET FOR A-5 CHAK & A-6 CHAK

SARI DISTRY

M.W.C

I.W.C

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8

C-1 C-2 C-3 C-4 C-5 C-6

A-1 A-2 A-3 A-4 A-5 A-6

D-1 D-2 D-3 D-4 D-5 D-6 D-7

E-1 E-2 E-3 E-4 E-5

F-1 F-2 F-3 F-4 F-5 F-6

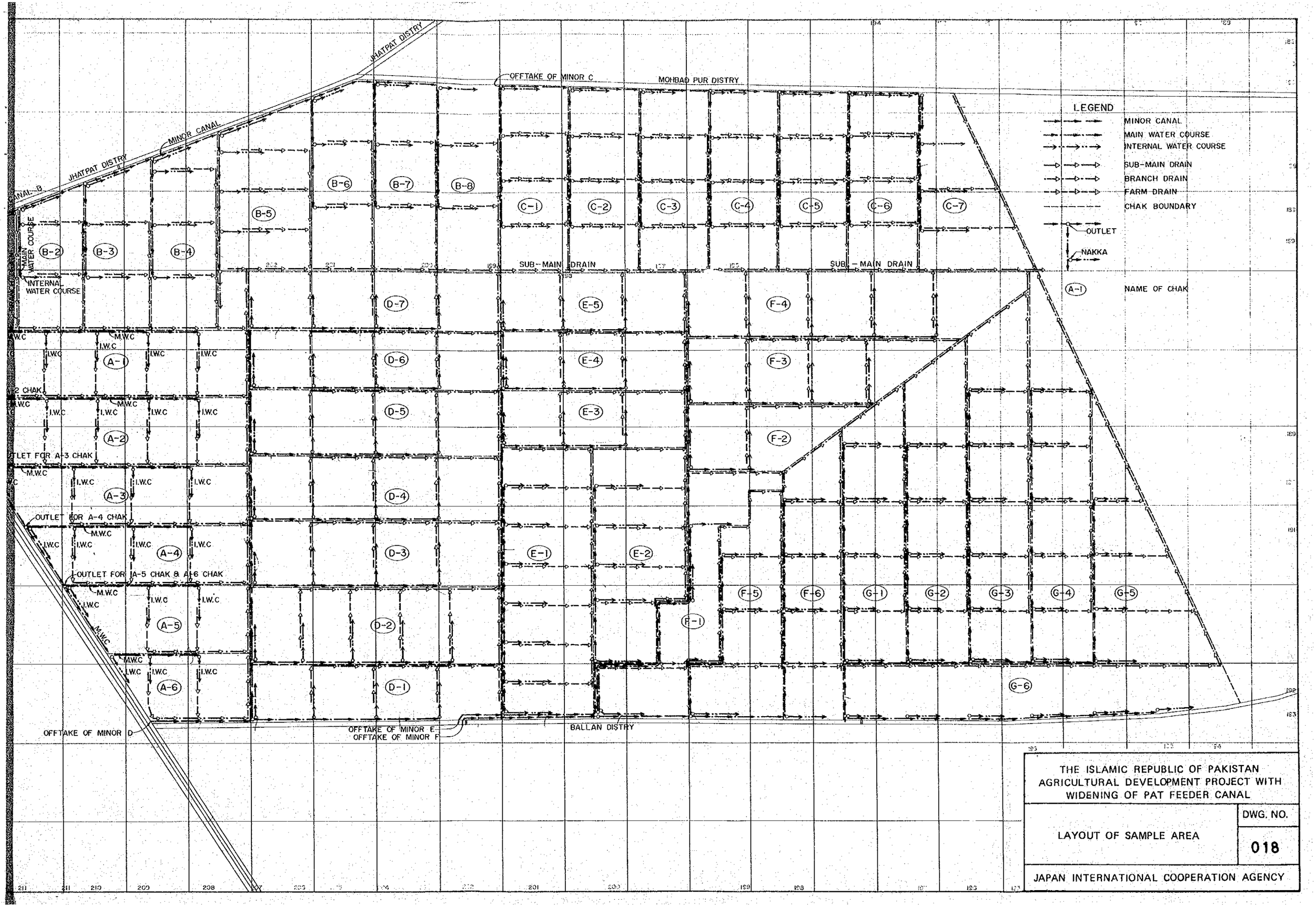
G-1

OFFTAKE OF MINOR D

OFFTAKE OF MINOR E

OFFTAKE OF MINOR F

BALLAN DISTRY



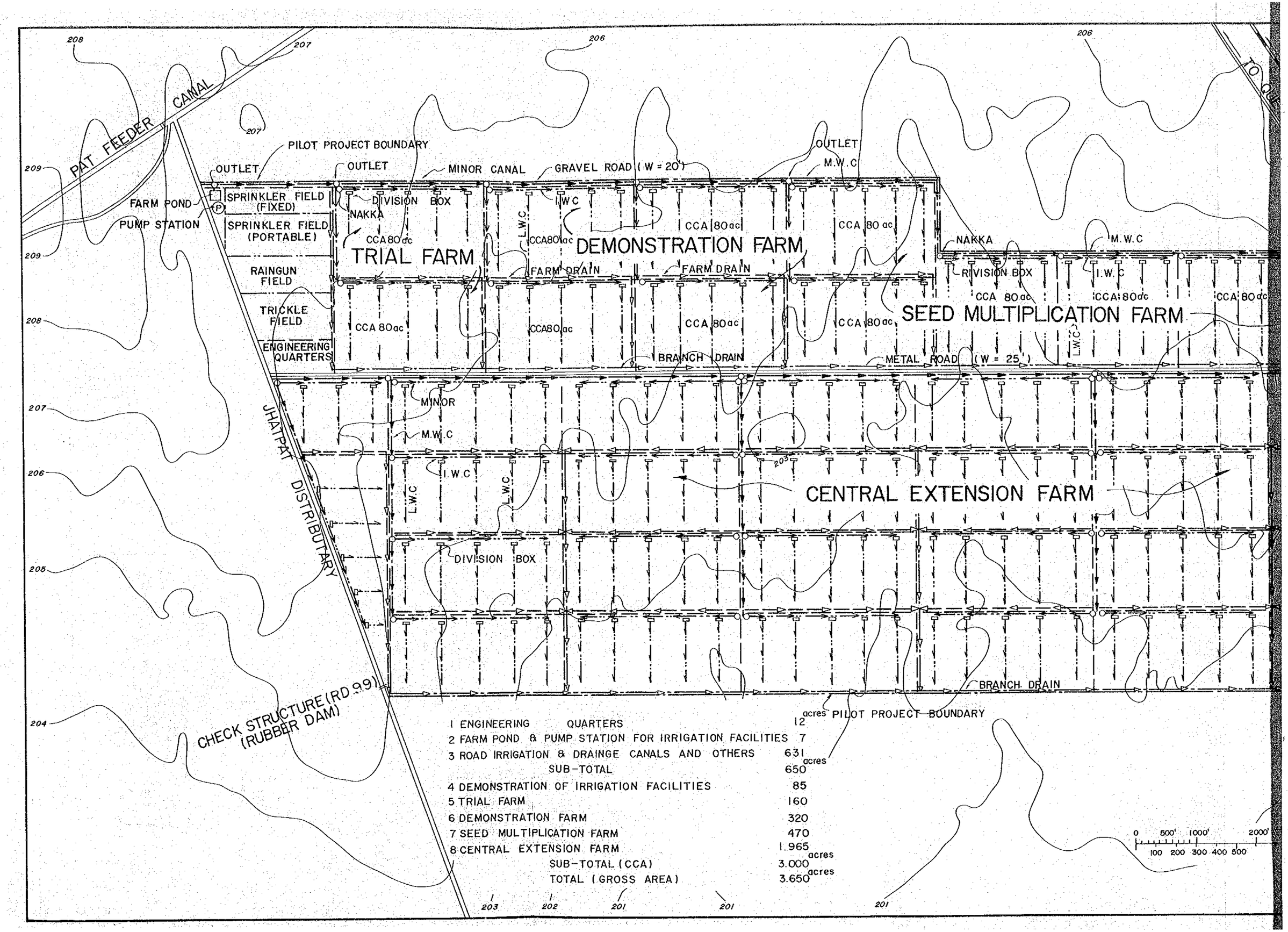
THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

LAYOUT OF SAMPLE AREA

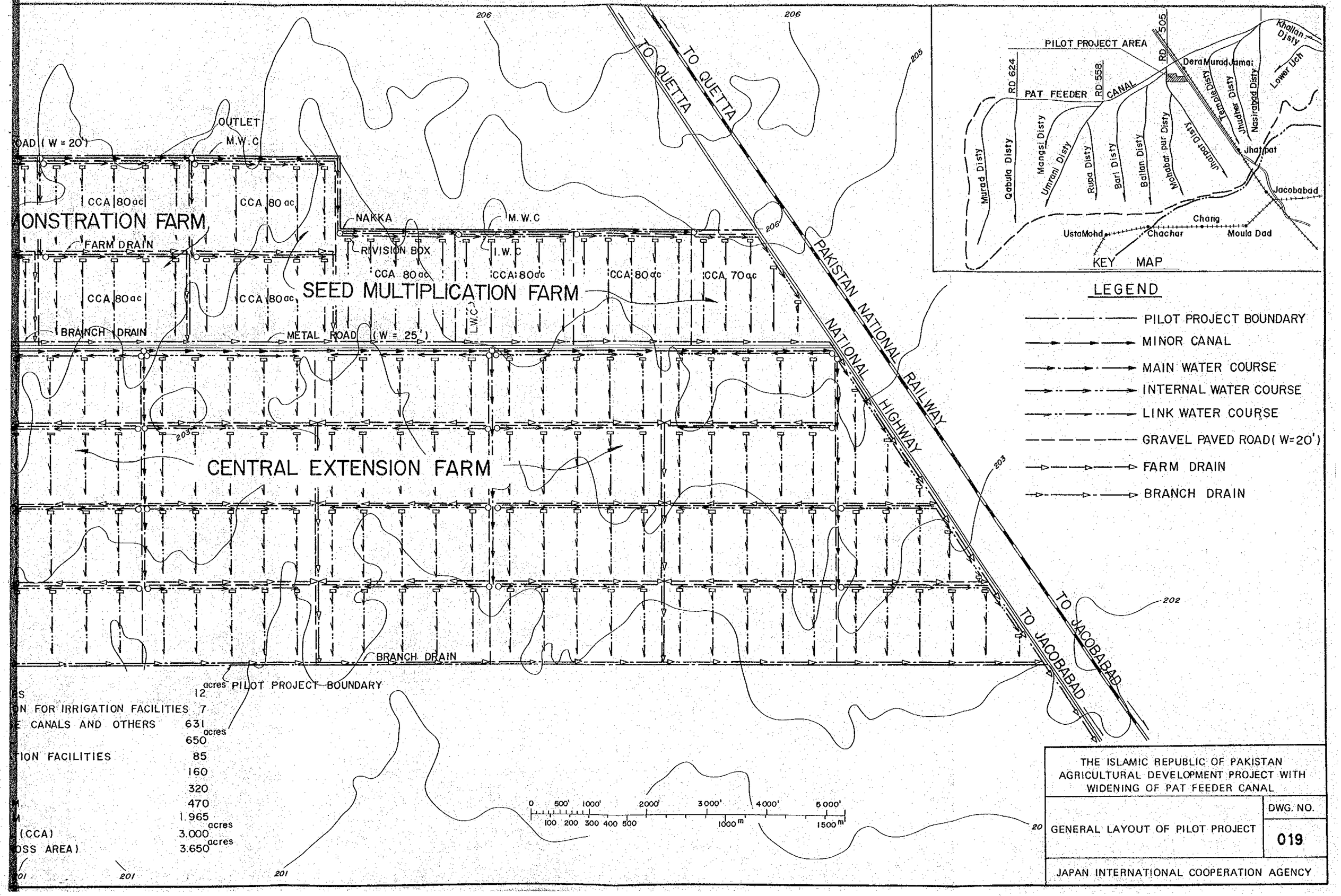
DWG. NO.

018

JAPAN INTERNATIONAL COOPERATION AGENCY



1	ENGINEERING QUARTERS	12 acres
2	FARM POND & PUMP STATION FOR IRRIGATION FACILITIES	7
3	ROAD IRRIGATION & DRAINGE CANALS AND OTHERS	631
	SUB-TOTAL	650 acres
4	DEMONSTRATION OF IRRIGATION FACILITIES	85
5	TRIAL FARM	160
6	DEMONSTRATION FARM	320
7	SEED MULTIPLICATION FARM	470
8	CENTRAL EXTENSION FARM	1.965
	SUB-TOTAL (CCA)	3.000 acres
	TOTAL (GROSS AREA)	3.650 acres



LEGEND

- PILOT PROJECT BOUNDARY
- MINOR CANAL
- MAIN WATER COURSE
- INTERNAL WATER COURSE
- LINK WATER COURSE
- GRAVEL PAVED ROAD(W=20')
- FARM DRAIN
- BRANCH DRAIN

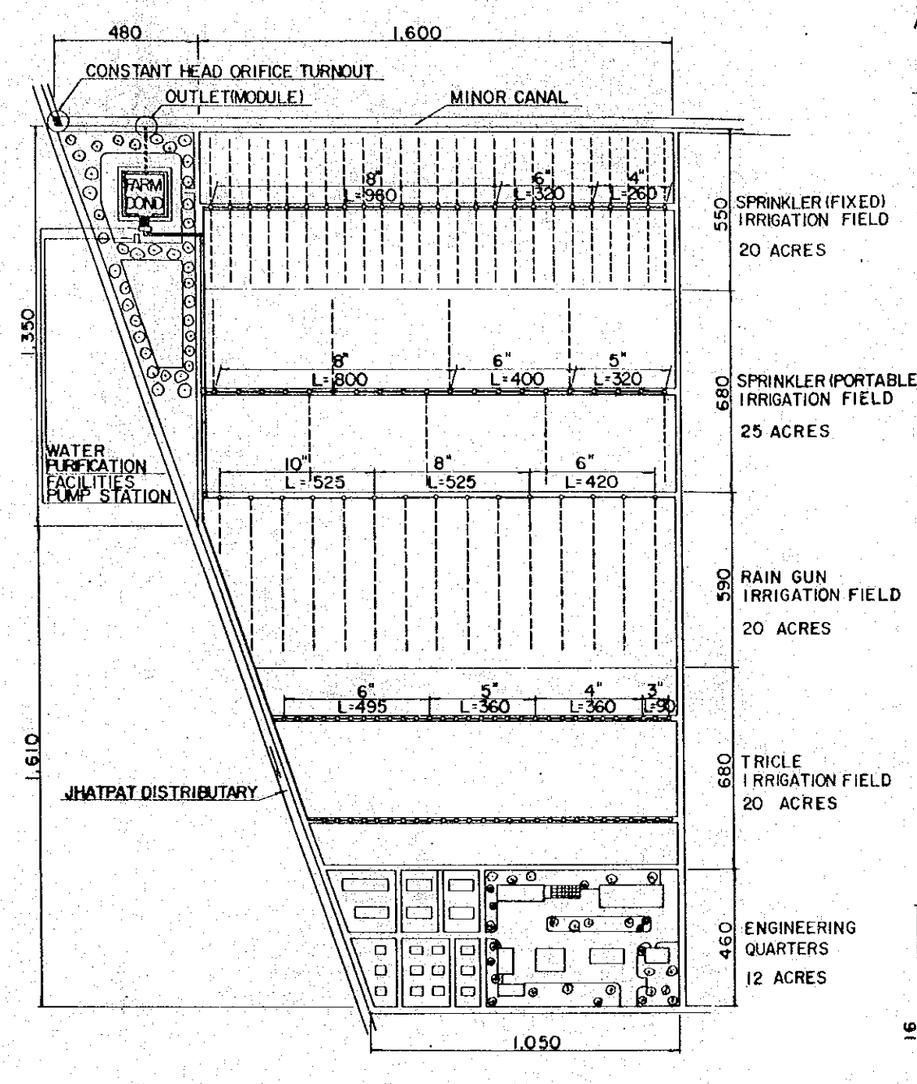
S	12 acres
ON FOR IRRIGATION FACILITIES	7
E CANALS AND OTHERS	631 acres
	650
TION FACILITIES	85
	160
	320
	470
M	1.965
M	3.000 acres
(CCA)	3.650 acres
OSS AREA)	

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

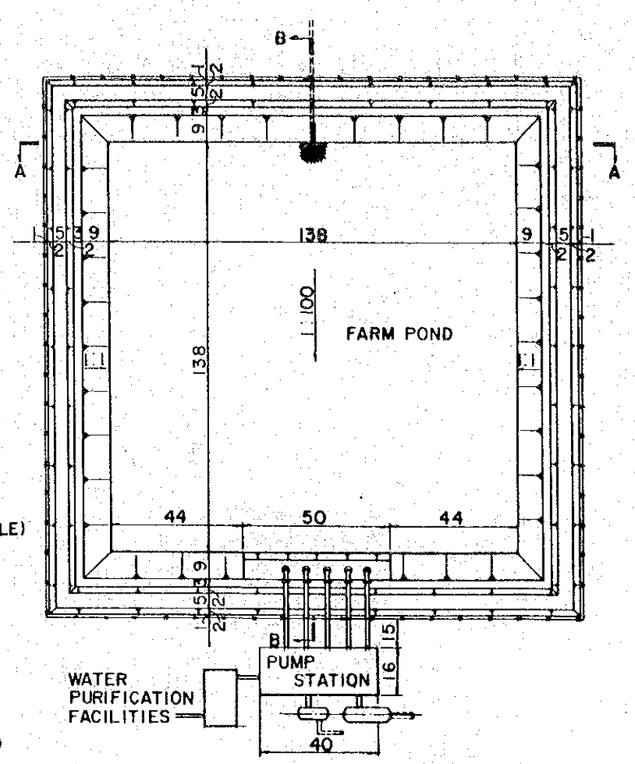
GENERAL LAYOUT OF PILOT PROJECT

DWG. NO. 019

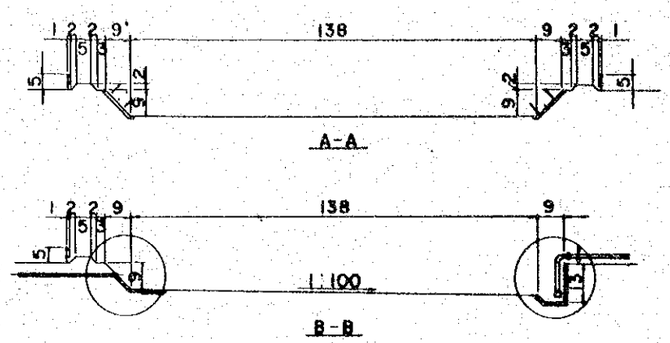
JAPAN INTERNATIONAL COOPERATION AGENCY



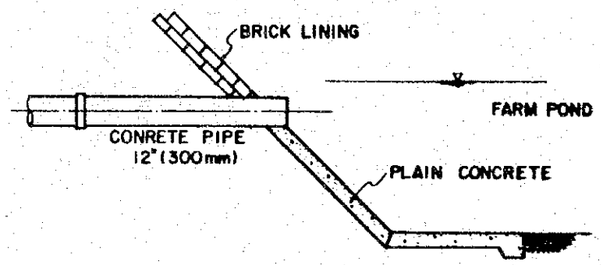
GENERAL PLAN OF DEMONSTRATION OF IRRIGATION FACILITIES



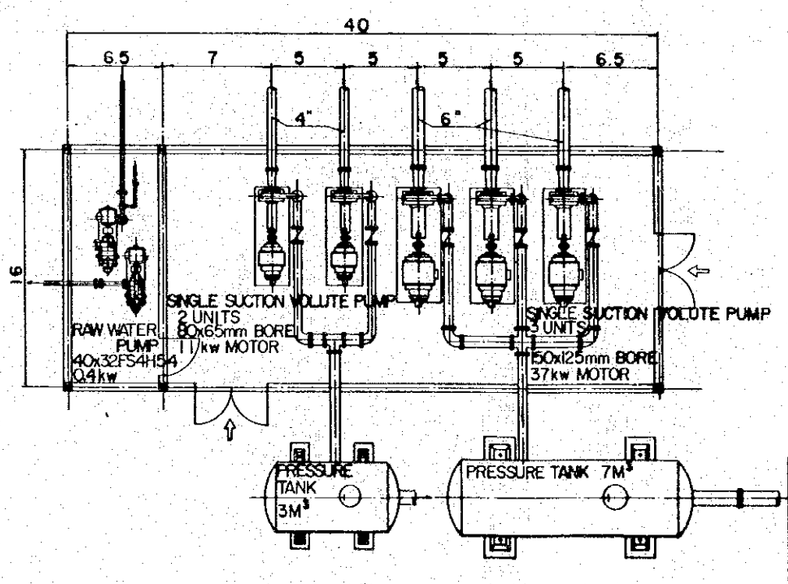
PLAN OF FARM POND



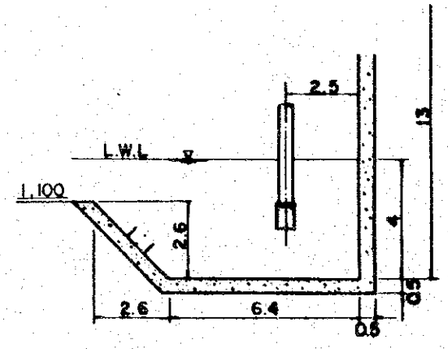
SECTION OF FARM POND



SECTION OF PIPE INLET



PLAN OF PUMP STATION



SUCTION TANK

NOTE ; ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED

THE ISLAMIC REPUBLIC OF PAKISTAN
AGRICULTURAL DEVELOPMENT PROJECT WITH WIDENING OF PAT FEEDER CANAL

DEMONSTRATION OF IRRIGATION FACILITIES (1) OF PILOT PROJECT

DWG. NO. 020

JAPAN INTERNATIONAL COOPERATION AGENCY