Further, the probable effective rainfall was estimated on the basis of 80% recurrence.

H.1.4 Other Criteria

To estimate net water requirement for paddy field, percolation and puddling water are to be determined. Further, the irrigation efficiency is defined to estimate the diversion requirement for irrigation. The criteria applied in this updating study are explained hereunder.

a) Percolation:

Vertical percolation is estimated only for paddy field. In accordance with the permeability coefficient of subsurface soils estimated by permeability test at 10^{-4} cm/s to 10^{-5} cm/s, the percolation in the paddy field is assumed at 3 mm/day throughout the year.

b) Puddling Water:

Puddling water is required for preparing paddy field to receive nursing plant. In the light of soil porosity and thickness of soil layer, the puddling water requirement is estimated at 200 mm.

c) Irrigation Efficiency:

Irrigation efficiency is estimated on the basis of application efficiency (Ea), distribution efficiency (Ed) and conveyance efficiency (Ec). The application efficiency is estimated at around 65%, in the light of favorable soil texture and topographical conditions in the project area. The distribution efficiency from branch canals to the field inlets is estimated at 85% for the unlined and earth-lined canals. On the other hand, the conveyance efficiency of the concrete-lined headreach and main canals is estimated at 95%. Consequently, the irrigation efficiency is calculated at 52.5% (= Ea x Ed x Ec = 65% x 85% x 95%).

H.1.5 Design Irrigation Water Requirement

The net irrigation water requirement by crop was estimated on a monthly basis for each area of the project (Western plain, Eastern plain, Middle Reach valley and San Juan de Flores area), as shown on Tables H-15 to H-19.

Further, on the basis of proposed cropping pattern discussed in Annex F, the net irrigation water requirement by type of cropping patterns and the design irrigation water requirement for each area of the project were calculated.

	(Reference)
Western plain	Table H-20 and H-21
Eastern plain - A	Table H-22 and H-23
Eastern plain - B	Table H-24 and H-25
Middle Reach valley	Table H-26
San Juan de Flores area	Table H-27
Western plain - rainy season	Table H-28 and H-29

For irrigation in the Western plain area (16,000 ha), the annual design diversion water requirement was estimated at around 287.3 MCM, and the monthly maximum requirement at 20.5 m^3/s in April. The water requirement for diversion at the existing irrigation area in the Middle Reach valley Orocuina - Choluteca (680 ha) and San Juan de Flores valley (2,680 ha) was estimated at around 22.4 MCM (1.6 m^3/s at monthly maximum) and 28.5 MCM (2.0 m^3/s at maximum) respectively. Likewise, diversion water requirement was estimated at 87.4 MCM a year (8.1 m^3/s at monthly maximum) for the Eastern plain - A and at 97.4 MCM a year (7.0 m^3/s at monthly maximum) for the Eastern plain - B. (Refer to Table H-30)

H.2 IRRIGATION PRACTICES

H.2.1 Soil-Water Characteristics

Growth and yield of crops are affected by water holding capacities and intake rates of soils. In the feasibility study made in 1977-78, effective root zone and moisture extraction pattern of each crop were studied, and basic intake rate and field capacity were tested in the field. The results of tests were found still useful, and they were referred to in this updating study.

The effective root zone of crops proposed for cultivation in the Choluteca plain was determined by the result of survey in 1977-78 and data provided by G. Hargreaves, as summarized on Table H-31. The moisture extraction pattern of each crop was determined by referring to the AMES Irrigation Handbook. The basic intake rate was assessed to be around 2.5 - 7.6 mm/hr for fine textured sandy clay, silty clay and clay, 6.4 - 19.1 mm/hr for medium textured sandy loam and silty loam, and 12.7 - 38.1 mm/hr for moderately coarse textured sandy loam and fine sandy loam Available moisture per soil depth of 10 cm was estimated on the basis of field capacity of soil tested in the field and water content of soil at the permanent wilting points. The available moisture was calculated to range from 14 mm/10 cm to 26 mm/10 cm, and it was defined to each type of soils as shown on Table H-32. The total readily available moisture was calculated on the basis of moisture extraction at an important soil layer for growth of crops, as summarized on Table H-33.

Irrigation intervals of each crop were estimated on the basis of total readily available moisture and maximum consumptive use of crop, as follows:

$$\text{Min. Irrigation Interval} = \frac{\text{Total Readily Available Moisture (mm)}}{\text{Max. Consumptive Use (mm/day)}}$$

The minimum irrigation intervals were estimated as summarized on Table H-34.

The furrow length was determined by referring to the USDA SCS standard, as well as the existing irrigation systems in the project area. In view of the maximum furrow length estimated for each soil type as shown on Table H-32, furrow length of 200 m was adopted for the design of irrigation systems on the Choluteca plain.

H.2.2 Irrigation Method

Various alternative irrigation methods were compared, including surface irrigation methods (furrow, border strip and flooding), spray irrigation method (sprinkler), subirrigation method and trickle irrigation method. The subirrigation method and trickle irrigation method are applicable to medium to very light textured top soil and stable subsoil of moderately rapid permeability in the semi-arid and arid zone where slope of field surface is very flat. However, these two methods require higher installation cost and they are economically unrecommendable.

In view of the soil-water characteristics in the irrigable area in the Choluteca plain, the furrow irrigation method, border irrigation method and sprinkler irrigation method were comparatively evaluated from the economic point of view. As a result, the furrow irrigation method was assessed to be most economical for upland crop cultivation. Considering its economical advantage, as well as simplicity in operation and maintenance, the furrow irrigation method is recommended for cultivation of sugar cane and other upland crops. For cultivation of paddy, the flooding irrigation method would only be applicable, technically and economically.

H.3 CRITERIA FOR PRELIMINARY DESIGN

H.3.1 Irrigation Canal

For the preliminary design of irrigation canal cross sections, the criteria were determined as explained hereunder.

a) Flow Formula:

Manning's formula was adopted for design of the irrigation canals as follows:

$$V = \frac{1}{n} \cdot R^{2/3} I^{1/2}$$

$$Q = V \cdot A$$

where,

V: Mean velocity (m/sec)
n: Coefficient of roughness
R: Hydraulic radius, A/P (m)
P: Wetted perimeter (m)
I: Hydraulic gradient
Q: Discharge (m^3/sec)
A: Flow area (m^2)

b) Coefficient of Roughness:

Coefficient of roughness, n, was applied as follows:

	n
Concrete lined canal	0.017
Earth canal	0.035

c) Allowable Velocity:

Allowable velocity of canal flow was set within the following ranges:

	Min. (m/sec)	Max. (m/sec)
Concrete lined canal	0.5	1.5
Earth canal	0.2	0.6

d) Canal Bottom Width (B)/Water Depth (h) Ratio:

B/h ratio was determined in accordance with the empirical data mentioned in "Canal and Related Structures" published by USBR. The B/h ratio applied in the design of canals is as follows:

(1) Concrete Lined Canal

Discharge (m^3/sec)	Range of B/h	Representative B/h
$Q > 36$	1.0 - 1.5	1.5
$36 \geqq Q > 10$	1.0 - 1.2	1.2
$10 \geqq Q >$	1.1 - 1.5	1.5

(2) Earth Canal

Discharge (m^3/sec)	Range of B/h	Representative B/h
$Q > 25$	2.5 - 5.0	4
$25 \geqq Q > 10$	2.0 - 4.5	3
$10 \geqq Q > 5$	2.0 - 3.0	2.5
$5 \geqq Q > 2$	2.0 - 2.5	2
$2 \geqq Q$	1.0 - 2.0	1.5

e) Side Slope:

Side slope of each type of canal was adopted as follows:

Concrete lined canal 1 : 1.5

Earth canal

$B \leqq 0.7$ m 1 : 1

$B > 0.7$ m 1 : 1.5

f) Free Board:

Free board was determined in accordance with canal water depth, fluctuation of roughness coefficient and wave actions. However, as for the free board of headreach, main canals, branch canals and secondary

canals, the peak design discharge was designed to flow within one-third of the free board in the ordinary design. Therefore, the free board on each canal was determined as noted hereunder.

Water depth (m)	Free board (Fb) (m)	Extraembankment (m)
Less than 0.75	0.20	0.35
0.75 - 1.00	0.25	0.40
1.00 - 1.50	0.30	0.45
1.50 - 1.75	0.35	0.50
1.75 - 2.00	0.40	0.55
More than 2.0	0.45	0.60

Free board for tertiary and distribution canals was designed to be 0.15 m.

g) Canal Lining:

Rocks, gravels and coarse sand would be underlain, and canal lining would be required to control seepage losses. Therefore, canal lining was designed as follows:

Type	Thickness	Remarks
Concrete lining	10 cm	For headreach, main canal and branch canal

H.3.2 Drainage Facilities

Design surface drainage requirement was estimated on the basis of design rainfall, runoff and drainage period. The design daily rainfall was determined to be about 130 mm, which was 80% probably maximum daily rainfall at Choluteca. (Refer to Annex C.2.2, Table C-18) Further, 70% of design rainfall was assumed to be runoff, and the excess water would be designed to be drained within 2 days. Consequently, the drainage requirement in the Choluteca plain was estimated to be about 5.3 lit/s/ha in the drainage area.

Criteria for preliminary design of drainage canal were determined as follows:

a) Flow Formula:

Manning's formula was adopted, as in the case of irrigation canal. Coefficient of roughness is 0.035.

b) Allowable Velocity:

Allowable maximum velocity of drainage flow was determined at 0.9 m/s.

c) Other Criteria:

Canal bottom width (B)/water depth (h) ratio, side slope and free board were determined in accordance with the same criteria as proposed for the irrigation canals.

H.3.3 Related Structures

The structures related to irrigation and drainage canals, such as turnouts, cross regulators, drops, culverts, spillways and water measuring devices would be designed in accordance the criteria as explained hereunder. Design of these structures would also be prepared by applying the Manning's formula and the coefficient of roughness set at n= 0.017 for concrete structures and n= 0.016 for precast concrete pipes.

a) Turnouts:

Turnout is a structure to distribute water from a canal to a lower grade canal. In designing, turnouts are classified into the following 3 types:

Type	Barrel	Discharge	Remarks
A-I	Box	$Q > 0.7$ m^3/sec	For main, branch and secondary canal
A-II	Precast Con. Pipe	$Q \leq 0.7$ m^3/sec	
B	"	$Q < 0.7$ m^3/sec	For tertiary canal

b) Cross Regulators:

In order to maintain a certain water level at the points of diversion or off-taking irrespective of the discharge, cross regulators are to be provided where a number of turnouts would be densely provided or where a fairly large discharge would be diverted. Eight types of cross regulators were designed, in accordance with the design discharge of structures and types of canals, as follows:

Type	Canal	Discharge (m^3/sec)	Remarks
A-I	Concrete lined	$Q \geq 19$	With double box barrels
A-II	"	$Q \geq 19$	Flume type
A-III	"	$19 > Q \geq 15$	With single box barrels
B-I	Earth canal	$10 > Q \geq 0.7$	With single box barrel
B-II	"	$0.7 > Q \geq 0.55$	With precast con. pipe
B-III	"	$0.7 > Q \geq 0.55$	Flume type
C-I	"	$Q < 0.5$	With precast con. pipe
C-II	"	$Q < 0.5$	Flume type

c) Drop:

Drops are required where the topography along the canal has a steeper slope than that of proposed hydraulic gradient in the canal. Wooden stoplogs are provided on the structure to keep the flow velocity low and the upstream water surface high enough to permit the distribution through the upstream turnout. Two types of drops were designed in accordance with the design discharge, as follows:

Type	Design Discharge
Inclined drop	$Q > 2\ m^3/sec$
Vertical drop	$Q \leq 2\ m^3/sec$

d) Culverts:

Culverts are required where canals cross a farm road or a linked road. A size of culvert was determined to pass the design discharge as a free-flow with an ample clearance. The flow velocity in the barrel was designed to be 1.3 times the velocity in the adjacent canal to avoid silting. Culverts were classified into the following two types:

Type	Design Discharge
Precast concrete pipe type	$Q \leq 0.7\ m^3/sec$
Concrete box barrel type	$Q > 0.7\ m^3/sec$

e) Spillway:

Two types of spillways are adopted in the canal system. One is a spillway with slide gate. This type of spillway is required at the end of main canals, branch canals, and secondary canals to empty the canal in case of emergency or cleaning and repairing the canal. The other is an overflow type spillway. This type of spillway would be to spill out excess water which would otherwise cause unfavorable high water surface in the canal. The discharge spilled out would be released to a stream or drainage canal.

f) Water Measuring Device:

The day-to-day measurement of water is required to know a daily water use and to compare it with inflow, reserves and demands. Accurate and reliable measurement is essential for the efficient use of water and to establish the charges to water users. Two types of the measuring structures were proposed to be provided at the head of every canal, as follows:

Type	Measuring Device	Flow Condition in Barrel	Remarks
A	Parshall flume	Open flow	For turnouts related to main, branch, secondary canals
B	Constant head orifice gate	Pressure flow	For turnouts related to tertiary canal

H.3.4 Road and Related Structures

For the preliminary design of link road and farm road (main, secondary and tertiary farm road), the criteria would be applied as explained hereunder:

a) Link Road and Farm Road:

Truck loads were applied to be 30 tons for link road and main farm road, 20 tons for secondary road and 14 tons for tertiary farm road. The horizontal and vertical alignment would be designed in accordance with the following criteria:

Class	Slope	Max. Slope	Max. Length of Slope	Min. Radius
Linked road and main farm road:	4%	3%	300 m	15 m
Secondary farm road:	4%	7%	140 m	10 m
Tertiary farm road	4%	7%	140 m	10 m

b) Bridges:

Bridges are constructed at location where road crosses canal of more than 10 m in width. The bridge width is 6 m for main farm roads and 3 m for secondary roads. The minimum clearance between the water surface and the girder bottom would be 1.0 m.

c) Other Structures:

Culverts, cross drains and other structures related to the road would be designed under the same design criteria as proposed for the irrigation and drainage facilities.

H.4 IRRIGATION AND DRAINAGE SYSTEMS IN WESTERN PLAIN

H.4.1 General

The irrigation and drainage systems in the Western plain would be planned for implementation at the first stage. The systems would cover a net irrigation area of 16,000 ha, including the estate farm of two sugar factories. The irrigation area would extend mainly on the right bank of the Choluteca river, and partly on alluvial plain (3,600 ha) on the left bank of the river.

Water for irrigation in the Western plain would be taken by constructing an intake weir near El Papalon. Although an alternative weir site is conceivable at a place about 2 km downstream from El Papalon, the preliminary design was prepared for El Papalon intake weir for the moment, because the construction cost of the alternative weir would not presumably be different. The Western plain irrigation systems would provide water to the estates of sugar factories (4,030 ha in total) and it was envisaged to utilize the existing irrigation and drainage canal systems in the estates. Major irrigation and drainage facilities to be constructed under the project were proposed as described hereunder, on the basis of available topographic map on the scale of 1/5,000. A general layout of the Western plain irrigation and drainage systems is illustrated on DWG-H-01.

H.4.2 Intake Weir

Intake weir would be located near El Papalon, some 9 km downstream from Choluteca city. The catchment area at El Papalon is 7,115 km^2. The annual inflow was estimated at around 1,480 MCM, as noted in Annex C.3.1, and the probable flood discharge was estimated at 2,600 m^3/s for the return period of 100 years. A storage curve at El Papalon is illustrated on Figure H-02. The river channel is approximately 100 m in width and 5 - 7 m in depth, with its bottom at EL. 20.5 m. The left bank is an extensive alluvial plain with elevation at EL. 28 m. The right bank flat of 150 m in width composed of volcanic breccia is

connected with the hills of tertiary tuff and rhyolite. As noted in Annex D.2.2, the river deposit is underlain by weathered andesite at 9.4 m in depth and solid andesite at 13.1 m in depth. The site would be favorable for construction of a concrete weir of floating foundation to avoid deep excavation.

The intake weir was designed to be an ogee crest concrete type. The weir is 140 m in crest length, 4.8 m in height and 15,000 m^3 in volume, as shown on DWG-H-02. The ogee crest would be 125 m in length at EL. 23.8 m. Two lines of steel sheet pile cutoff walls would be provided between the weir bottom and bed rock. A concrete apron blanket with dental sills and cutoff would be provided in the downstream side of the weir. The upstream concrete blanket would be 10 m in width. A scouring sluice with 3 sluice gates of 3.5 m x 3.0 m would be provided. A scouring trough of 12.0 m in width and 45.0 m in length with concrete bottom and concrete side walls upstream of the sluice would maintain a low water channel at the right side of the pondage. The pondage water surface would be at EL. 28.4 m for the design flood discharge. The pondage would be normally confined within the existing river channel, but construction of levees with a height of 1.5 m would be required on both banks of the river upstream of the weir.

The intake structure would be located on the right bank upstream of the scouring sluice section of the weir. The inlet bay would be a rectangular concrete open channel with its bottom at EL. 22.3 m, and it is 29 m to 12 m in width. Two sets of trash rack would be installed at the inlet. Three sets of roller gates (2.0 m x 3.0 m) would be installed for closure at the end of the inlet bay. A desilting basin of 90 m in length and 20 m in width would be constructed next to the inlet. The desilting basin would be equipped with a sand flush cannel having two sets of sluice gates. Two sets of stoplogs would be installed at the end of the desilting basin, where the main canal would start.

H.4.3 Irrigation Canal System

A layout of the irrigation canal systems was prepared for a net irrigable area of 11,970 ha, excluding the area of existing irrigation systems (4,030 ha) which are owned by the sugar factories and able to function if an outlet for irrigation water is provided by the project.

The main canal systems would consist of the upper main canal, left main canal and right main canal. The upper main canal would start at the intake and stretch for about 11.6 km on the right bank of the Choluteca river. From the upper main canal, three secondary canals would branch to distribute water to the Ola district. In the previous study in 1977-78, a booster pumping station was planned to be installed for one of the secondary canals, but it was found unnecessary for conveyance of irrigation water.

The left main canal would run for about 8.6 km from the bifurcation structure. It would be aligned along the Choluteca river, so as to function at the same time as flood protection dikes. At the end of the left main canal, the left branch canal would be connected to irrigate the left bank of the Choluteca river. It would cross the river by an inverted siphon and extend for about 5.2 km along the left bank up to near El Parengue. The left main canal and left branch canal would have three secondary canals, with a total length of about 12.6 km.

The right main canal would be aligned to run for about 3.4 km from the bifurcation structure, on the western side of the old river course. Four branch canals were designed to cover the irrigation area on the right bank of the Choluteca river, with a total length of about 40 km. Outlets for irrigation water are provided for the existing irrigation areas to be commanded by the right branch canals.

The branch canals, as well as the secondary canals, would run in parallel with the existing distributaries and depressions which are proposed to be improved and function as drainage canals. The tertiary canals would be aligned to run at the intervals of about 1 km to

distribute water to the field canals. The total length of the canal systems in the Western plain is shown on Table H-35 and summarized as follows: (Refer to Irrigation Diagram in Figure H-03)

	Length (km)
Main canals	23.6
Branch canals	45.2
Secondary canals	33.6

The main canals were designed to be trapezoidal open channels with side slopes of 1 : 1.5. They would be lined with concrete of 10 cm in thickness. The design flow velocity would range from 0.5 m/s to 1.5 m/s at maximum. The branch canals were designed to be 10 cm thick concrete lined trapezoidal open channels with the side slopes of 1 : 1.5. The design flow velocity would also range from 0.5 m/s to 1.5 m/s. Typical cross sections of the main and branch canals, as well as secondary and tertiary canals, are illustrated on DWG-H-03. A canal profile is shown on DWG-H-04 and DWG-H-05.

A bifurcation structure would be located at the end of the upper main canal to distribute water to the left and right main canal as shown on DWG-H-06. The upstream portion would be an enlarged rectangular concrete open channel where the flow velocity would be substantially reduced. A check gate would be installed in the middle of the bifurcation structure with 4 sets of roller gates (2.5 m x 2.5 m), each two of them controlling the discharge either in the left or right main channel. A rectangular concrete open channel downstream from the check gate would constitute a stilling pool, and it would be followed by a parshall flume where the flow would be divided and measured.

An invested siphon would be constructed to cross the Choluteca river for irrigation in the lower left bank area (3,600 ha). It would be composed of concrete box barrels (2 m x 2 m) with a trash rack installed at the inlet. Flow in the barrels would be a pressure flow, and the flow velocity was designed to be 1.5 times the velocity in the upstream canal to avoid silting. The barrels would be embedded below the ground for a length of 85 m. (Refer to DWG-H-07)

Other structures related to the irrigation systems, such as turnouts, cross regulators, drops, culverts, spillways, and measuring devices were designed in accordance with the criteria as proposed in Chapter H.3. The number of structures required for the Western plain irrigation systems is summarized on Table H-36.

H.4.4 Drainage Canal System

River gradient is gentle and conveyance capacity is rather limited in the lower reaches of the Choluteca river. Inundation occurs sometimes in the lowland, and intensive rainfall causes rather extensive depressions. Construction of drainage canal systems is therefore important in the Choluteca plain to avoid excessive moisture in soils by flooding.

A surface drainage system is proposed in the Western plain. The main drainage canals would be aligned along the existing distributaries and the old river course of the Choluteca river. The old river course and distributaries would be deepened or enlarged to have enough capacity for drainage discharge. As noted in Chapter H.3.2, the design of drainage canals was prepared in accordance with the drainage requirement estimated at 5.3 lit/s/ha in the Choluteca plain.

The proposed alignment of the main drainage canals is illustrated on DWG-H-01. The right main drain No. 1 (RMD-1) and No. 3 (RMD-3) would run along the existing depression, and the right main drain No. 2 (RMD-2) along the old river course of the Choluteca river. Other main drains would also be designed to facilitate drainage by utilizing the depression as existing distributaries. Collector drain canals would be the tributaries of main drainage canals. They may be natural tributary channels to be partially improved or trapezoidal earth canals to be newly excavated. The drainage canal systems and the length of each canal are summarized on Table H-37. The total length of drainage canals is as follows:

Main drainage canal:	90.5 km
Secondary drain:	27.0 km

In addition, numerous field drains are to be provided to convey water from the farm to the secondary drains.

H.4.5 On-Farm Facilities

Topographic conditions on the Western plain are characterized, in general, by gentle undulation with a slope of less than 2%. As discharged in Chapter H.2.2.2, furrow irrigation method would be applied for cultivation of upland crops, with an average furrow length of 200 m. In view of the topographic condition and efficiency in machinery operation, the average length of field canals was set at 1,000 m, which is equal to the intervals of tertiary canals. The farm block of 200 m x 1,000 m may be divided into 4 farm lots of 5 ha each.

A typical layout of on-farm facilities was proposed on DWG-H-08. Water would be diverted from the tertiary canal to the field canals, and further distributed to farm ditches. The drained water in the farm would be conveyed to the farm drains and then to the collector drains which will be generally aligned in parallel with the tertiary canals. The total length of tertiary canals, collector drains, field canals, farm drains and other facilities in the Western plain is summarized as follows:

On-farm Facilities	Length/Number
Tertiary canals	152 km
Farm canals	760 km
Collector drains	152 km
Farm drains	760 km
Tertiary roads	152 km
Turnouts	770 nos.
Division boxes	3,080 nos.

The capacity and size of these facilities would vary in accordance with the irrigation intervals and kinds of crops. However, the bottom width of the farm ditches would not be less than 0.3 m.

Land clearance would be made through bush clearing, tree felling, stumping and removal, grass clearing and removal of gravel and land grading. Clearance would be mechanized, except for removal of small stones to be executed by manpower. Minor levelling would be required for upland crop field. More precise levelling would be required for paddy field. At the final stage of land preparation, the field would be plowed up to the depth of about 0.5 m as an initial plowing.

H.5 IRRIGATION AND DRAINAGE SYSTEMS IN EASTERN PLAIN - A

H.5.1 General

Through the reservoir operation as described in Annex G.5, water for irrigation in the Eastern plain - A would be made available by constructing the San Fernando reservoir with an effective storage capacity of 380 MCM. The Eastern plain - A is located on a relatively flat terrace developed on the left bank of the Choluteca river. It borders to the east on the Sampile river. The net irrigable land in the Eastern plain - A is 4,600 ha.

For irrigation in the Eastern plain - A, two alternative weir sites were conceived. One would be located at Las Bases, about 5 km upstream of Choluteca, and the other at about 2 km downstream from Choluteca. The downstream alternative weir site would be preferable in case that the irrigation would be limited to the Eastern plain - A, while the alternative site at Las Bases would be considered if the Eastern plain - B would be contemplated for irrigation by water to be stored additionally at a site other than San Fernando.

On the Eastern plain - A, there exist two irrigation areas with a total acreage of 805 ha. About 700 ha are used for paddy cultivation. The existing facilities in these systems would be utilized, but water would be supplied by the project at the inlet of the existing systems. As proposed in Annex F.1.4, a rotation of paddy with maize or beans, as well as cotton with maize or beans, would be contemplated.

H.5.2 Canal Layout

Water diverted at the downstream weir site would be led to the main canal aligned to the south of Choluteca city. In case that the weir would be alternatively located at Las Bases, a headreach canal of 7.7 km in length would be required. The main canal EM-1 would run for 3.8 km on the right bank of the Sampile river, and bifurcated into the branch canal EB-1 (9.3 km) to be aligned along the Sampile river and

the branch canal EB-2 (8.9 km) to be aligned in the southwestern direction. The branch canal EB-3 (12.1 km) would extend to the west of EB-2. The drainage canal ED-1 would be aligned in parallel with the irrigation branch canal EB-2, and drainage canal ED-2 along the irrigation canal EB-3. The drainage canal ED-3 would form border with the Eastern plain - B. The total length of major canals in the Eastern plain - A is given on Table H-38 and summarized as follows (Refer to DWG-H-09 and Figure H-04):

Headreach canal	3.5 km (or 7.7 km from Las Bases)
Main canals	3.5 km (or 6.5 km from Las Bases)
Branch canals	30.3 km
Tertiary canals	50.9 km
Main drainage canals	22.5 km
Collector drain	50.9 km

The design of irrigation and drainage canals was prepared in accordance with the same design criteria as proposed for the Western plain systems (Chapter H.4.3 and H.4.4). The number of structures related to the irrigation canals and drainage canals in the Eastern plain - A is summarized on Table H-39.

A layout of typical on-farm development was the prepared as proposed for the Western plain system. A farm block of 200 m x 1,000 m would be contemplated, and the tertiary canals and roads would be aligned at intervals of 1.0 km. The capacity and size of on-farm facilities would be decided in accordance with the irrigation intervals and kinds of crops. Land levelling would be executed in accordance with the contour lines.

H.6 IRRIGATION IN OTHER AREAS

H.6.1 Future Irrigation in Eastern Plain - B

The Eastern plain - B will cover the area of 5,200 ha, if and when additional water is made available by constructing another storage dam in the middle reach in future. Since a canal layout was studied in relation to the irrigation systems on the Eastern plain - A, it is briefly described for reference purpose hereunder.

For the implementation of the Eastern plain - B, it is desirable that water will be taken at Las Bases weir site. Being conducted through a headreach canal, water would be led to the Eastern main canal (EM-2) of 3.2 km. This would branch into EUB-1 branch canal of 10.8 km that would extend to the south and EUB-2 branch canal of 7.7 km that would be aligned along the existing road to Marcovia. Secondary canals of 9.4 km in total would also be provided. (Refer to DWG-H-10)

H.6.2 Irrigation Expansion in San Juan de Flores Area

In addition to the rehabilitation of the existing irrigation systems in the San Juan de Flores area, it would be required to expand the irrigation system by pumping up water from the Choluteca river. For pumping irrigation in the San Juan de Flores area, as well as in the middle reach valleys for rehabilitation of the existing irrigation systems, the number and capacity of pumps should be determined on the basis of comparison between applicability of pumps and construction cost of pumping stations.

The applicability and suitable efficiency of pumps, as well as the capacity of motor were worked out in accordance with the following formula:

1) Applicability and Suitable Efficiency of Pumps:

$$Ai = Vi/Vpi \leqq 1.0$$

$$A = \Sigma D \cdot Vi \cdot Ai/\Sigma D \cdot Vi$$

where, Ai: Applicability and efficiency of pumps suitable to monthly design discharge

Vi: Monthly design discharge

Vpi: Max. capacity of operating pumps

A: Applicability and efficiency of pumping station during the whole year

D: Number of days in a month

2) Capacity of Motor:

$$P = \frac{K \cdot r \cdot Q \cdot H}{p} \times (1 + R)$$

where, P: Capacity of motor in kW

K: Coefficient 0.163

r: Specific gravity of water

Q: Discharge of pump in m^3/min

H: Total head of pump in m

p: Efficiency of pump

R: Efficiency of motor

Preliminary study was made on some pumping irrigation areas in the San Juan de Flores valley. For irrigation of sub-area A in the San Juan de Flores (230 ha), the design discharge would be 19.9 m^3/min and 4 units of pumps of a capacity of 6.4 m^3/min each would be installed. On the other hand, the sub-area B (110 ha) would be irrigated by 2 sets of pumps, each having a capacity of 9.4 m^3/min. Capacity of motor would be 75 kW. (Refer to Table H-40)

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TABLES

Table H-01 POTENTIAL EVAPOTRANSPIRATION AT CHOLUTECA*

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	268.2	273.1	289.0	352.5	203.6	131.2	231.8	216.9	89.7	169.4	248.9	259.8	2,734.1
1975	277.1	238.1	248.7	271.6	161.1	163.5	159.2	136.4	69.1	97.4	138.4	224.9	2,185.5
1976	247.9	253.9	274.8	198.2	162.5	101.8	247.4	226.1	184.2	138.2	203.3	247.2	2,485.4
1977	284,5	288.3	342.6	273.6	179.4	161.9	256.6	195.4	140.6	149.2	193.4	216.8	2,682.3
1978	273.2	250.3	273.5	238.0	191.5	159.1	172.5	195.5	113.0	127.1	203.9	252.7	2,450.3
1979	258.1	258.0	284.9	259.3	180.5	165.4	171.2	168.5	97.2	126.0	179.8	241.9	2,390.8
1980	261.0	232.2	275.1	249.0	142.0	140.8	179.5	117.4	73.3	83.5	112.9	292.4	2,179.1
1981	212.7	175.4	218.7	250.3	136.5	89.7	144.3	131.3	111.1	108.4	182.4	212.2	1,973.0
1982	251.4	254.7	281.9	230.6	119.5	120.2	247.5	249.8	129.8	176.8	242.1	269.2	2,573.5
1983	282.4	220.3	237.1	206.1	277.2	156.3	208.8	198.1	120.6	149.5	149.5	196.7	2,402.6
Mean	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4	2,405.7

Note: Calculated by Christiansen-Hargreaves method on the basis of meteorological data at Choluteca meteorological station.

Table H-02 MONTHLY PRECIPITATION AT CHOLUTECA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	211.4	369.9	29.3	167.7	519.8	117.1	43.7	1.3	1,460.2
1975	1.2	0.0	4.2	0.0	311.0	139.8	212.9	184.2	529.4	402.6	201.3	0.0	1,986.6
1976	0.0	0.0	0.0	172.3	133.6	336.9	31.8	76.3	134.9	338.5	41.4	0.0	1,265.7
1977	0.0	0.0	0.0	10.4	265.4	296.0	5.7	252.2	126.6	142.6	95.8	1.5	1,196.2
1978	2.5	8.4	5.0	18.0	397.6	171.3	231.5	78.3	434.4	178.4	73.4	19.6	1,618.4
1979	0.0	3.2	0.0	80.3	260.0	297.0	257.4	389.0	379.1	306.8	79.5	0.0	2,052.3
1980	3.8	0.0	1.3	8.9	390.7	201.1	170.9	150.4	548.6	361.3	113.6	0.4	1,951.0
1981	0.0	0.0	89.1	40.6	192.7	644.9	214.4	358.9	208.5	468.4	2.2	23.1	2,242.8
1982	30.8	22.9	4.6	117.0	892.8	204.0	23.0	0.2	322.5	164.4	30.7	6.1	1,819.0
1983	0.0	43.4	1.1	19.6	89.5	345.4	120.3	229.5	344.9	220.6	110.2	2.7	1,527.2
Mean	3.8	7.8	10.5	46.8	314.5	300.6	129.7	188.7	354.9	270.1	79.2	5.5	1,711.9

Table H-03 MONTHLY PRECIPITATION AT ACENSA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1978	0.0	0.0	0.0	25.0	225.5	263.8	349.0	90.0	358.5	277.8	25.0	0.0	1,614.6
1979	0.0	0.0	0.0	214.0	391.0	823.0	321.6	372.5	419.5	147.0	48.0	0.0	2,736.6
1980	0.0	0.0	0.0	0.0	128.1	270.2	63.7	163.5	438.1	311.8	82.3	0.0	1,457.7
1981	0.0	0.0	0.0	60.8	187.1	426.2	213.5	384.6	251.8	385.5	1.5	28.5	1,939.5
1982	5.8	17.3	63.6	21.5	646.4	316.1	121.3	65.3	462.4	207.9	35.3	53.0	2,015.9
1983	0.0	0.0	8.8	19.7	73.3	255.7	68.4	239.2	349.5	296.5	107.1	0.0	1,418.2
Mean	1.0	2.9	12.1	56.8	275.2	392.5	189.6	219.2	380.0	271.1	49.9	13.6	1,863.8

Table H-04 MONTHLY PRECIPITATION AT LOS ENCUENTROS

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	385.8	189.8	11.6	111.5	443.3	16.7	0.0	0.0	1,158.7
1975	0.0	0.0	19.2	4.7	261.9	58.1	79.2	102.8	344.9	173.2	164.0	0.0	1,208.0
1976	0.0	0.0	0.0	11.0	129.3	337.1	42.5	29.9	133.9	297.0	20.1	0.0	1,000.8
1977	0.0	0.0	0.0	5.1	300.0	168.3	4.6	67.7	199.4	59.4	18.3	0.0	822.8
1978	1.8	0.0	6.4	10.9	317.8	106.9	77.2	52.6	235.1	98.0	0.2	2.4	909.3
1979	0.0	4.7	0.9	173.2	78.4	257.5	111.1	246.4	374.2	259.6	9.8	0.0	1,515.8
1980	5.6	0.0	0.0	84.8	204.4	163.4	49.0	91.0	285.5	305.3	22.8	0.0	1,211.8
1981	0.0	0.0	15.0	21.9	228.8	243.0	86.5	282.9	105.8	189.7	10.7	4.2	1,188.5
1982	2.1	7.7	1.9	93.8	546.9	163.7	18.1	0.7	219.3	117.3	29.2	0.0	1,200.7
1983	0.0	0.5	5.4	35.3	84.4	270.9	51.1	75.0	155.8	138.9	76.3	2.6	896.2
Mean	0.1	1.3	4.9	44.1	253.8	195.9	53.1	106.1	249.7	165.5	35.1	0.9	1,111.3

Table H-05 AVERAGE AND PROBABLE PRECIPITATION FOR UPLAND CROPS AT CHOLUTECA AND ACENSA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	211.4	369.9	29.3	167.7	519.8	117.1	43.7	1.3	1,460.2
1975	1.2	0.0	4.2	0.0	311.0	139.8	212.9	184.2	529.4	402.6	201.3	0.0	1,986.6
1976	0.0	0.0	0.0	172.3	133.6	336.9	31.8	76.3	134.9	338.5	41.4	0.0	1,265.7
1977	0.0	0.0	0.0	10.4	265.4	296.0	5.7	252.2	126.6	142.6	95.8	1.5	1,196.2
1978	1.3	4.2	0.3	21.5	311.6	217.6	290.3	84.2	396.5	228.1	49.2	9.8	1,614.6
1979	0.0	1.6	0.0	147.2	325.5	560.0	289.5	380.8	399.3	226.9	63.8	0.0	2,394.6
1980	1.9	0.0	0.7	4.5	259.4	235.7	117.3	157.0	493.4	336.6	98.0	0.2	1,704.7
1981	0.0	0.0	44.6	50.7	189.9	535.6	214.0	371.8	230.2	427.0	1.9	25.8	2,091.5
1982	18.3	20.1	34.1	69.3	769.6	260.1	72.2	32.8	392.5	186.2	33.0	29.6	1,917.8
1983	0.0	21.7	5.0	19.7	81.4	300.6	94.4	234.4	347.2	258.6	108.7	1.4	1,473.1
Mean	2.3	4.8	8.9	49.6	285.9	325.2	135.7	194.1	357.0	266.4	73.7	7.0	1,710.5
80% Probable Rainfall	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7	1,404.4

Table H-06 AVERAGE AND PROBABLE PRECIPITATION FOR UPLAND CROPS AT CHOLUTECA AND LOS ENCUENTROS

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	298.6	279.9	20.5	139.6	481.6	66.9	21.9	0.7	1,309.7
1975	0.6	0.0	11.7	2.4	114.6	99.0	146.1	143.5	437.2	287.9	116.4	0.0	1,359.4
1976	0.0	0.0	0.0	91.7	131.5	337.0	37.2	53.1	134.4	317.8	30.8	0.0	1,133.5
1977	0.0	0.0	0.0	7.8	282.7	232.2	5.2	160.0	163.0	101.0	57.1	0.8	1,009.8
1978	2.2	4.2	5.7	14.5	357.7	139.1	154.4	65.5	334.8	138.2	36.8	11.0	1,264.1
1979	0.0	4.0	0.5	126.8	169.2	277.3	184.3	317.7	376.7	283.2	44.7	0.0	1,784.4
1980	4.7	0.0	0.7	46.9	297.6	182.3	110.0	120.7	417.1	333.3	68.2	0.2	1,581.7
1981	0.0	0.0	52.1	31.3	210.8	444.0	150.5	320.9	157.2	329.1	6.5	13.7	1,716.1
1982	16.5	15.3	3.3	105.4	719.9	183.9	20.6	0.5	270.9	140.9	30.0	3.1	1,510.3
1983	0.0	22.0	3.3	27.5	87.0	308.2	85.7	152.3	250.4	179.8	93.3	2.7	1,212.2
Mean	2.4	4.6	7.7	45.4	267.0	248.3	91.5	147.4	302.3	217.8	50.6	3.2	1,388.1
80% Probable Rainfall	2.0	3.9	6.6	38.8	228.0	212.0	78.1	125.9	258.2	186.0	43.2	2.7	1,185.7

Table H-07 PROBABLE PRECIPITATION FOR UPLAND CROPS AT EL PORVENIR

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1979	2.2	31.1	4.9	161.1	41.6	170.4	58.0	93.8	178.9	225.2	112.2	35.3	1,114.7
1980	6.4	0.6	0.0	55.4	229.5	203.5	139.6	163.7	172.1	172.5	24.0	19.7	1,187.0
1981	7.1	33.2	9.3	22.7	161.5	172.4	82.2	160.3	132.3	87.3	32.9	33.4	934.6
1982	3.1	5.8	5.8	12.0	153.1	188.8	114.2	53.4	131.6	53.4	22.9	2.8	746.9
1983	8.4	18.3	1.0	58.4	39.0	154.3	140.0	114.2	177.6	137.3	48.0	22.9	919.4
Mean	5.4	17.8	4.2	61.9	124.9	177.9	106.8	117.1	158.5	135.1	48.0	22.8	980.5
80% Probable Rainfall	4.7	15.4	3.6	53.6	108.2	154.1	92.5	101.4	137.3	117.0	41.6	19.7	849.5

Table H-08 AVERAGE MONTHLY EFFECTIVE RAINFALL AS RELATED TO MEAN MONTHLY 80% PROBABLE RAINFALL AND MEAN MONTHLY CONSUMPTIVE USE (USDA, SCS)

Mean monthly 80% probable rainfall (mm)	Mean monthly consumptive use (mm)													
	25	50	75	100	125	150	175	200	225	250	275	300	325	350
	Mean monthly effective rainfall (mm)													
12.5	7.5	8.0	8.7	9.0	9.2	10.0	10.5	11.2	11.7	12.5	12.5	12.5	12.5	12.5
25.0	15.0	16.2	17.5	18.0	18.5	19.7	20.5	22.0	24.5	25.0	25.0	25.0	25.0	25.0
37.5	22.5	24.0	26.2	27.5	28.2	29.2	30.5	33.0	36.2	37.5	37.5	37.5	37.5	37.5
50.0	25	32.2	34.5	35.7	36.7	39.0	40.5	43.7	47.0	50.0	50.0	50.0	50.0	50.0
62.5	at 41.7	39.7	42.5	44.5	46.0	48.5	50.0	53.7	57.5	62.5	62.5	62.5	62.5	62.5
75.0		46.2	49.7	52.7	55.0	57.5	60.2	63.7	67.5	73.7	75.0	75.0	75.0	75.0
87.5		50.0	56.7	60.2	63.7	66.0	69.7	73.7	77.7	84.5	87.5	87.5	87.5	87.5
100.0		at 80.7	63.7	67.7	72.0	74.2	78.7	83.0	87.7	95.0	100	100	100	100
112.5			70.5	75.0	80.2	82.5	87.2	92.7	98.0	105	111	112	112	112
125.0			75.0	81.5	87.7	90.5	95.7	102	108	115	121	125	125	125
137.5		at 122		88.7	95.2	98.7	104	111	118	126	132	137	137	137
150.0				95.2	102	106	112	120	127	136	143	150	150	150
162.5				100	109	113	120	128	135	145	153	160	162	162
175.0			at 160		115	120	127	135	143	154	164	170	175	175
187.5					121	126	134	142	151	161	170	179	185	187
200.0					125	133	140	148	158	168	178	188	196	200
225					at 197	144	151	160	171	182				
250						150	161	170	183	194				
275						at 240	171	181	194	205				
300							175	190	203	215				
325							at 287	198	213	224				
350								200	220	232				
375								at 331	225	240				
400									at 372	247				
425										250				
										at 412				
450	25	50	75	100	125	150	175	200	225	250				

Table H-09(1) MULTIPLICATION FACTORS TO RELATE MONTHLY EFFECTIVE RAINFALL VALUE TO NET DEPTH OF IRRIGATION APPLICATION

d /* mm	Factor	d mm	Factor	d mm	Factor
10.00	0.620	31.25	0.818	70.00	0.990
12.50	0.650	32.50	0.826	75.00	1.000
15.00	0.676	35.00	0.842	80.00	1.004
17.50	0.703	37.50	0.860	85.00	1.008
18.75	0.720	40.00	0.876	90.00	1.012
20.00	0.728	45.00	0.905	95.00	1.016
22.50	0.749	50.00	0.930	100.00	1.020
25.00	0.770	55.00	0.947	125.00	1.040
27.50	0.790	60.00	0.963	150.00	1.060
30.00	0.808	65.00	0.977	175.00	1.070

Note: d = net depth of irrigation application.

Table H-09(2) NET DEPTH OF IRRIGATION APPLICATION

Soil Type	Land Capacity	Spot Number	Crops							
			Pasture	Sugarcane	Beans	Maize	Sesame	Cotton	Water Melon Melon	Sorghum
Mollisol	1st class	No. 1	72	119	79	113	113	124	81	85
"	"	No. 3	-	113	74	107	107	125	-	80
		Range	72	113-119	74-79	107-113	107-113	124-125	81	80-85
Mollisol	2nd class	No. 4	71	113	75	107	107	117	76	80
"	"	No. 5	74	114	76	109	109	126	77	81
		Range	71-74	113-114	75-76	107-109	107-109	117-126	76-77	80-81
Entisol	2nd class	No. 2	72	114	76	108	108	123	77	81
Entisol	3rd class	No. 6	64	102	68	97	97	104	69	73

Table H-10 EFFECTIVE PRECIPITATION FOR PADDY AT CHOLUTECA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	127.2	211.3	19.2	117.6	202.5	70.7	25.8	0.0	774.3
1975	0.0	0.0	0.0	0.0	248.0	101.6	80.9	134.4	401.5	302.4	153.6	0.0	1,422.4
1976	0.0	0.0	0.0	131.2	101.9	256.2	21.3	56.7	92.0	259.1	30.9	0.0	949.4
1977	0.0	0.0	0.0	5.0	201.5	224.2	4.2	189.2	94.6	97.0	73.3	0.0	889.0
1978	0.0	6.7	0.0	12.1	248.2	129.4	242.4	119.6	376.2	125.4	58.7	15.4	1,334.0
1979	0.0	0.0	0.0	56.2	198.7	224.9	204.6	393.9	283.1	229.8	57.3	0.0	1,648.6
1980	0.0	0.0	0.0	0.0	273.3	149.1	129.4	117.1	350.4	284.7	83.4	0.0	1,387.5
1981	0.0	0.0	0.0	20.2	137.3	507.3	168.5	278.6	152.5	368.8	0.0	16.4	1,649.4
1982	24.4	18.1	0.0	92.6	602.8	151.9	4.3	0.0	243.9	124.4	24.2	0.0	1,286.6
1983	0.0	34.6	0.0	5.1	65.4	275.8	90.9	180.6	259.8	171.6	80.1	0.0	1,163.8
Mean	2.4	5.9	0.0	32.2	220.4	223.2	96.6	158.8	245.7	203.4	58.7	3.2	1,250.5
80% Probable Rainfall	1.9	4.8	0.0	26.0	177.7	179.9	77.9	128.0	198.1	164.0	47.3	2.6	1,008.1

Table H-11 EFFECTIVE PRECIPITATION FOR PADDY AT ACENSA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1978	0.0	0.0	0.0	20.0	179.6	201.8	276.0	68.0	274.8	215.0	20.0	0.0	1,255.2
1979	0.0	0.0	0.0	171.2	308.0	554.0	257.3	287.2	311.2	101.6	38.4	0.0	2,028.9
1980	0.0	0.0	0.0	0.0	100.8	210.0	41.3	112.0	337.6	224.8	63.9	0.0	1,090.4
1981	0.0	0.0	0.0	48.6	133.4	336.2	156.0	296.5	190.7	297.1	0.0	20.3	1,478.8
1982	4.6	13.8	49.8	17.2	398.7	238.3	89.9	50.0	350.7	149.4	28.2	42.4	1,433.0
1983	0.0	0.0	7.0	12.6	56.0	199.6	47.4	186.5	261.6	226.7	83.3	0.0	1,080.7
Mean	0.8	2.3	9.5	44.9	196.1	290.0	144.7	166.7	287.8	202.4	39.0	10.5	1,394.5
80% Probable Rainfall	0.6	1.9	7.7	36.2	158.1	233.7	116.6	134.4	232.0	163.1	31.4	8.5	1,123.7

Table H-12 EFFECTIVE PRECIPITATION FOR PADDY AT LOS ENCUENTROS

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	302.8	134.3	7.8	87.5	285.0	10.9	0.0	0.0	828.3
1975	0.0	0.0	15.4	194.3	202.3	42.0	61.4	76.1	257.2	135.0	126.5	0.0	1,110.1
1976	0.0	0.0	0.0	8.8	93.1	261.3	30.4	13.7	134.8	228.7	9.5	0.0	780.3
1977	0.0	0.0	0.0	4.1	207.5	126.2	0.0	46.5	147.6	39.8	5.4	0.0	577.0
1978	0.0	0.0	5.1	4.5	260.6	76.7	61.0	41.5	169.9	75.5	0.0	0.0	694.9
1979	0.0	0.0	0.0	135.3	53.0	191.0	76.9	208.4	291.8	197.2	0.0	0.0	1,153.5
1980	4.5	0.0	0.0	64.0	159.4	115.4	26.1	58.2	187.1	241.5	18.0	0.0	874.2
1981	0.0	0.0	10.3	11.8	143.0	174.5	54.8	213.8	58.3	137.5	8.6	0.0	812.6
1982	0.0	5.0	0.0	75.0	371.4	123.3	4.9	0.0	172.1	93.5	23.1	0.0	868.3
1983	0.0	0.0	0.0	28.2	67.5	207.6	33.2	51.2	109.7	101.8	58.4	0.0	657.7
Mean	0.5	0.5	3.1	52.6	186.1	145.2	35.6	79.7	181.3	126.1	24.9	0.0	835.7
80% Probable Rainfall	0.4	0.4	2.6	43.4	153.5	119.8	29.4	65.8	149.6	104.0	20.5	0.0	689.7

Table H-13 AVERAGE EFFECTIVE PRECIPITATION FOR PADDY AT CHOLUTECA AND ACENSA

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	127.2	211.3	19.2	117.6	202.5	70.7	25.8	0.0	774.3
1975	0.0	0.0	0.0	0.0	248.0	101.6	80.9	134.4	401.5	302.4	153.6	0.0	1,422.4
1976	0.0	0.0	0.0	131.2	101.9	256.2	21.3	56.7	92.0	259.1	30.9	0.0	949.4
1977	0.0	0.0	0.0	5.0	201.5	224.2	4.2	189.2	94.6	97.0	73.3	0.0	889.0
1978	0.0	3.4	0.0	16.1	213.9	165.6	259.2	93.8	325.5	170.2	39.4	7.7	1,294.8
1979	0.0	0.0	0.0	113.7	253.4	389.5	231.0	340.6	297.2	165.7	47.9	0.0	1,239.2
1980	0.0	0.0	0.0	0.0	187.1	179.6	85.4	114.6	344.0	254.8	73.7	0.0	1,839.0
1981	0.0	0.0	0.0	34.4	135.4	421.8	162.3	287.6	171.6	333.0	0.0	18.4	1,564.5
1982	14.5	16.0	24.9	54.9	500.8	195.1	47.1	25.0	297.3	136.9	26.2	21.2	1,359.9
1983	0.0	17.3	3.5	8.9	60.7	237.7	69.2	183.6	260.7	199.2	81.7	0.0	1,122.5
Mean	1.5	3.7	2.8	36.4	203.0	238.3	98.0	154.3	248.7	198.9	55.3	4.7	1,245.5
80% Probable Rainfall	1.2	2.9	2.2	28.8	160.7	188.6	77.6	122.1	196.8	157.4	43.8	3.7	985.7

Table H-14 AVERAGE EFFECTIVE PRECIPITATION FOR PADDY AT CHOLUTECA AND LOS ENCUENTROS

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	0.0	0.0	0.0	0.0	215.0	172.8	13.5	102.6	243.8	40.8	12.9	0.0	801.4
1975	0.0	0.0	7.7	97.2	225.2	71.8	71.2	105.3	329.4	218.7	140.1	0.0	1,266.6
1976	0.0	0.0	0.0	70.0	97.5	258.8	25.8	35.2	113.4	258.9	20.2	0.0	879.8
1977	0.0	0.0	0.0	4.5	204.5	175.2	2.1	117.8	121.1	68.4	39.3	0.0	733.0
1978	0.0	3.4	2.6	8.3	254.4	103.0	151.7	80.6	273.0	100.4	29.4	7.7	1,014.4
1979	0.0	0.0	0.0	95.7	125.9	207.9	140.8	301.2	287.4	213.5	28.6	0.0	1,401.0
1980	2.2	0.0	0.0	32.0	216.3	132.3	77.8	87.7	268.8	263.1	50.7	0.0	1,130.9
1981	0.0	0.0	5.2	16.0	140.1	340.9	111.6	246.2	105.4	253.2	4.3	0.0	1,222.8
1982	12.2	9.0	0.0	83.8	487.1	137.6	4.6	0.0	208.0	109.0	23.6	0.0	1,075.0
1983	0.0	17.3	0.0	16.7	66.5	241.7	62.0	115.9	184.7	136.7	69.2	0.0	910.7
Mean	1.4	3.0	1.6	42.4	203.3	184.2	66.1	119.3	213.5	166.3	41.8	0.8	1,043.6
80% Probable Rainfall	1.2	2.5	1.3	35.4	169.8	153.8	55.2	99.6	178.3	138.9	34.9	0.7	871.4

Table H-15 NET IRRIGATION WATER REQUIREMENT BY CROP (WESTERN PLAIN)

Western Plain (1)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Seed Cane												
KC		0.01	0.09	0.20	0.32	0.46	0.62	0.78	0.85	0.88	0.86	0.73
PET		244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU		2.4	24.7	50.6	56.1	63.9	125.2	143.1	96.0	116.7	159.5	176.2
P		3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER		0.0	7.7	16.2	57.8	65.8	82.6	115.3	98.9	120.2	50.5	0.0
NIWR		2.4	17.0	34.4	0.0	0.0	42.6	27.8	0.0	0.0	109.0	176.2
KC	0.57	0.41	0.25	0.12	0.02							
PET	261.7	244.4	274.6	252.9	175.4							
CU	149.2	100.2	68.7	30.3	3.5							
P	1.9	3.9	7.3	40.7	234.7							
ER	0.0	0.0	8.8	23.5	0.0							
NIWR	149.2	100.2	59.9	6.8	3.5							
Plant Cane												
KC											0.01	0.09
PET											185.5	241.4
CU											1.9	21.7
P											60.5	5.7
ER											0.0	0.0
NIWR											1.9	21.7

Note: KC: Seasonal Variation of KC
PET: Potential Evapotranspiration in mm. (Ref.: Table H-01)
CU: Consumptive Use in mm. (KC x PET)
P: Precipitation in mm. (Ref.: Table H-05)
ER: Effective Rainfall in mm.
NIWR: Net Irrigation Water Requirement in mm.
*: Refer to Table H-13

Western Plain (2)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Plant Cane (cont'd)												
KC	0.19	0.29	0.41	0.54	0.67	0.75	0.82	0.88	0.92	0.94	0.94	0.89
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	49.7	70.9	112.6	136.6	117.5	104.3	165.6	161.5	103.9	124.6	174.4	214.8
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	9.4	29.7	121.0	107.4	88.0	119.7	107.0	128.3	51.5	0.0
NIWR	49.7	70.9	103.2	106.9	0.0	0.0	77.6	41.8	0.0	0.0	122.9	214.8
KC	0.75	0.58	0.42	0.27	0.13	0.02						
PET	261.7	244.4	274.6	252.9	175.4	139.0						
CU	196.3	141.8	115.3	68.3	22.8	2.8						
P	1.9	3.9	7.3	40.7	234.7	267.0						
ER	0.0	0.0	9.4	24.9	22.6	0.0						
NIWR	196.3	141.8	105.9	43.4	0.2	2.8						
Ratoon Cane												
KC											0.01	0.10
PET											185.5	241.4
CU											1.9	24.1
P											60.5	5.7
ER											0.0	0.0
NIWR											1.9	24.1
KC	0.19	0.30	0.42	0.56	0.71	0.79	0.86	0.91	0.93	0.90	0.76	0.60
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	49.7	73.2	115.3	141.6	124.5	109.8	173.6	167.0	105.0	119.3	141.0	144.8
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	9.4	29.7	128.2	113.1	89.5	121.3	108.2	122.9	49.0	0.0
NIWR	49.7	73.3	105.9	111.9	0.0	0.0	84.1	45.7	0.0	0.0	92.0	144.8

Western Plain (3)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Ratoon Cane (cont'd)												
KC	0.43	0.28	0.13	0.02								
PET	261.7	244.4	274.6	252.9								
CU	112.5	68.4	35.7	5.1								
P	1.9	3.9	7.3	40.7								
ER	0.0	0.0	7.9	0.0								
NIWR	112.5	68.4	27.8	5.1								
Paddy												
KC		0.06	0.43	0.87	1.04	0.84	0.29					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		14.7	118.1	220.0	182.4	116.8	58.6					
Percor.		84.0	93.0	90.0	93.0	90.0	93.0					
Puddling		13.0	100.0	87.0	0.0	0.0	0.0					
ER*		2.9	2.2	28.8	160.7	188.6	77.6					
NIWR		108.8	308.9	368.2	114.7	18.2	74.0					
Cotton												
KC							0.04	0.20	0.45	0.71	0.86	0.79
PET							201.9	183.5	112.9	132.6	185.5	241.4
CU							8.1	36.7	50.8	94.1	159.5	190.7
P							111.4	159.4	293.1	218.7	60.5	5.7
ER							0.0	38.2	52.8	97.9	49.1	0.0
NIWR							8.1	0.0	0.0	0.0	110.4	190.7
KC	0.39	0.05										
PET	261.7	244.4										
CU	102.1	12.2										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	102.1	12.2										

Western Plain (4)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Melon												
KC									0.05	0.20	0.459	0.386
PET									112.9	132.6	185.5	241.4
CU									5.6	26.5	85.1	93.2
P									293.1	218.7	60.5	5.7
ER									0.0	26.5	43.3	0.0
NIWR									5.6	0.0	41.8	93.2
KC	0.115											
PET	261.7											
CU	30.1											
P	1.9											
ER	0.0											
NIWR	30.1											
Maize												
KC		0.02	0.22	0.58	0.75	0.41	0.05					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		4.9	60.4	146.7	131.6	57.0	10.1					
P		3.9	7.3	40.7	234.7	267.0	111.4					
ER		0.0	8.5	29.1	133.9	58.7	0.0					
NIWR		4.9	51.9	117.6	0.0	0.0	10.1					
Vegetable (Case-1)												
KC										0.111	0.334	0.445
PET										132.6	185.5	241.4
CU										14.7	62.0	107.4
P										218.7	60.5	5.7
ER										10.6	41.0	0.0
NIWR										4.1	21.0	107.4

Western Plain (5)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Vegetable (Case-1) (cont'd)												
KC	0.334	0.111										
PET	261.7	244.4										
CU	87.4	27.1										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	87.4	27.1										
Vegetable (Case-2)												
KC			0.111	0.334	0.445	0.334	0.111					
KET			274.6	252.9	175.4	139.0	201.9					
CU			30.5	84.5	78.1	46.4	22.4					
P			7.3	40.7	234.7	267.0	111.4					
ER			7.6	26.7	78.1	46.4	21.4					
NIWR			22.9	57.8	0.0	0.0	1.0					
Beans (Case-1)												
KC		0.02	0.20	0.57	0.66	0.37	0.04					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		4.9	54.9	144.2	115.8	51.4	8.1					
P		3.9	7.3	40.7	234.3	267.0	111.4					
ER		0.0	8.1	29.0	115.8	51.4	0.0					
NIWR		4.9	46.8	103.5	0.0	0.0	8.1					

Western Plain (6)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Beans (Case-2)												
KC										0.079	0.377	0.66
PET										132.6	185.5	241.4
CU										10.5	69.9	159.3
P										218.7	60.5	5.7
ER										0.0	40.9	0.0
NIWR										10.5	29.0	159.3
KC	0.56	0.167										
PET	261.7	244.4										
CU	146.6	40.8										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	146.6	40.8										
Sesame												
KC										0.08	0.36	0.69
PET										132.6	185.5	241.4
CU										10.6	66.8	166.6
P										218.7	60.5	5.7
ER										0.0	42.8	0.0
NIWR										10.6	24.0	166.6
KC	0.77	0.40	0.05									
PET	261.7	244.4	274.6									
CU	201.5	97.8	13.7									
P	1.9	3.9	7.3									
ER	0.0	0.0	7.7									
NIWR	201.5	97.8	6.0									

Western Plain (7)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Water Melon												
KC			0.05	0.238	0.459	0.386	0.115					
PET			274.6	252.9	175.4	139.0	201.9					
CU			13.7	60.2	80.5	53.7	23.2					
P			7.3	40.7	234.7	267.0	111.4					
ER			7.5	24.9	80.5	53.7	22.5					
NIWR			6.2	35.3	0.0	0.0	0.7					
Pasture												
KC	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	214.6	200.4	225.2	207.4	143.8	114.0	165.6	150.5	92.6	108.7	152.1	197.9
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	11.7	33.9	139.3	114.0	85.4	113.1	92.6	108.7	48.6	0.0
NIWR	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9

Table H-16 NET IRRIGATION WATER REQUIREMENT BY CROP (EASTERN PLAIN)

Eastern Plain (1)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Paddy												
KC		0.06	0.43	0.87	1.04	0.84	0.29					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		14.7	118.1	220.0	182.4	116.8	58.6					
Percor.		84.0	93.0	90.0	93.0	90.0	93.0					
Puddling		13.0	100.0	87.0	0.0	0.0	0.0					
ER*		2.9	2.2	28.8	160.7	188.6	77.6					
NIWR		108.8	308.9	368.2	114.7	18.2	74.0					
Cotton												
KC							0.04	0.20	0.45	0.71	0.86	0.79
PET							201.9	183.5	112.9	132.6	185.5	241.4
CU							8.1	36.7	50.8	94.1	159.5	190.7
P							111.4	159.4	293.1	218.7	60.5	5.7
ER							0.0	38.2	52.8	97.9	49.1	0.0
NIWR							8.1	0.0	0.0	0.0	110.4	190.7
KC	0.39	0.05										
PET	261.7	244.4										
CU	102.1	12.2										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	102.1	12.2										

Note: KC: Seasonal Variation of KC
PET: Potential Evapotranspiration in mm. (Ref.: Table H-01)
CU: Consumptive Use in mm. (KC x PET)
P: Precipitation in mm. (Ref.: Table H-05)
ER: Effective Rainfall in mm.
NIWR: Net Irrigation Water Requirement in mm.
*: Refer to Table H-13.

Eastern Plain (2)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Maize (Case-1)												
KC		0.02	0.22	0.58	0.75	0.41	0.05					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		4.9	60.4	146.7	831.6	57.0	10.9					
P		3.9	7.3	40.7	234.7	267.0	111.4					
ER		0.0	8.5	29.1	133.9	58.7	0.0					
NIWR		4.9	51.9	117.6	0.0	0.0	10.1					
Maize (Case-2)												
KC										0.086	0.389	0.720
PET										132.6	185.5	241.4
CU										11.4	72.2	173.8
P										218.7	60.5	5.7
ER										0.0	43.5	0.0
NIWR										11.4	28.7	173.8
KC	0.612	0.195										
PET	261.7	244.4										
CU	160.2	47.7										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	160.2	47.7										
Beans (Case-1)												
KC										0.079	0.377	0.660
PET										132.6	185.5	241.4
CU										10.5	69.9	159.3
P										218.7	60.5	5.7
ER										0.0	41.9	0.0
NIWR										10.5	28.0	159.3

Eastern Plain (3)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Beans (Case-1) (cont'd)												
KC	0.560	0.167										
PET	261.7	244.4										
CU	146.6	40.8										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	146.6	40.8										
Beans (Case-2)												
KC		0.02	0.20	0.57	0.66	0.37	0.04					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		4.9	54.9	144.2	115.8	51.4	8.1					
P		3.9	7.3	40.7	234.7	267.0	111.4					
ER		0.0	8.1	29.0	115.8	51.4	0.0					
NIWR		4.9	46.8	103.5	0.0	0.0	8.1					
Pasture												
KC	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	214.6	200.4	225.2	207.4	143.8	114.0	165.6	150.5	92.6	108.7	152.1	197.9
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	11.7	33.9	139.3	114.0	85.4	113.1	92.6	108.7	48.6	0.0
NIWR	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
KC												
PET												
CU												
P												
ER												
NIWR												

Table H-17 NET IRRIGATION WATER REQUIREMENT BY CROP (MIDDLE REACH)

Middle Reach (1)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Paddy (1)												
KC		0.21	0.67	0.98	1.02	0.57	0.08					
PET		244.4	274.6	252.9	175.4	139.0	201.9					
CU		51.3	184.0	247.8	178.9	79.2	16.2					
Percor.		84.0	93.0	90.0	93.0	90.0	93.0					
Puddling		50.0	100.0	0.0	0.0	0.0	0.0					
ER*		2.5	1.3	35.4	169.8	153.8	55.2					
NIWR		182.8	375.7	302.4	102.1	15.4	54.0					
Paddy (2)												
KC									0.21	0.67	0.98	1.02
PET									112.9	132.6	185.5	241.4
CU									23.7	88.8	181.8	246.2
Percor.									90.0	93.0	90.0	93.0
Puddling									50.0	150.0	0.0	0.0
ER*									178.3	138.9	34.9	0.7
NIWR									0.0	192.9	236.9	338.5

Note: KC: Seasonal Variation of KC
PET: Potential Evapotranspiration in mm. (Ref.: Table H-01)
CU: Consumptive Use in mm. (KC x PET)
P: Precipitation in mm. (Ref.: Table H-06)
ER: Effective Rainfall in mm.
NIWR: Net Irrigation Water Requirement in mm.
*: Refer to Table H-14.

Middle Reach (2)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Paddy (2) (cont'd)												
KC	0.57	0.08										
PET	261.7	244.4										
CU	149.2	19.6										
Percor.	93.0	84.0										
Puddling	0.0	0.0										
ER*	1.2	2.5										
NIWR	241.0	101.1										
Maize												
KC						0.02	0.22	0.59	0.75	0.41	0.05	
PET						139.0	201.9	183.5	112.9	132.6	185.5	
CU						2.8	44.4	108.3	84.7	54.4	9.3	
P						212.0	78.1	125.9	258.2	186.0	43.2	
ER						0.0	42.7	86.1	87.2	56.0	0.0	
NIWR						2.8	1.7	22.2	0.0	0.0	9.3	
Beans												
KC	0.086	0.389	0.720	0.612	0.195							
PET	261.7	244.4	274.6	252.9	175.4							
CU	22.5	95.1	197.7	154.8	34.2							
P	2.0	3.9	6.6	38.8	228.0							
ER	0.0	0.0	11.1	29.4	34.2							
NIWR	22.5	95.1	186.6	125.4	0.0							

Middle Reach (3)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Vegetable												
KC	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445	0.445
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	116.5	108.8	122.2	112.5	78.1	61.9	89.8	81.7	50.2	59.0	82.5	107.4
P	2.0	3.9	6.6	38.8	228.0	212.0	78.1	125.9	258.2	186.0	43.2	2.7
ER	0.0	0.0	9.2	27.9	78.1	61.9	51.5	76.7	50.2	59.0	26.6	0.0
NIWR	116.5	108.8	113.0	84.6	0.0	0.0	38.3	5.0	0.0	0.0	55.9	107.4
KC												
PET												
CU												
P												
ER												
NIWR												

Table H-18 NET IRRIGATION WATER REQUIREMENT BY CROP (S.J. FLORES)

S.J. Flores (1).

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Seed Cane												
KC												0.01
PET												98.3
CU												1.0
P												19.7
ER												0.0
NIWR												1.0
KC	0.09	0.20	0.32	0.46	0.62	0.73	0.85	0.88	0.86	0.73	0.57	0.41
PET	121.6	157.1	206.9	195.5	173.7	119.7	131.8	131.2	124.0	109.2	103.7	98.3
CU	10.9	31.4	66.2	89.9	107.7	93.4	112.0	115.5	106.6	79.7	59.1	40.3
P	4.7	15.4	3.6	53.6	108.2	154.1	92.5	101.4	137.3	117.0	41.6	19.7
ER	0.0	7.9	0.0	36.0	78.9	92.6	63.7	72.5	93.1	73.5	25.5	16.2
NIWR	10.9	23.5	66.2	53.6	28.8	0.8	48.3	43.0	13.5	6.2	33.6	24.1
KC	0.25	0.12	0.02									
PET	121.6	157.1	206.9									
CU	30.4	18.9	4.1									
P	4.7	15.4	3.6									
ER	0.0	7.5	0.0									
NIWR	30.4	11.4	4.1									

Note: KC: Seasonal Variation of KC
PET: Potential Evapotranspiration in mm. (Ref.: Table C-15)
CU: Consumptive Use in mm. (KC x PET)
P: Precipitation in mm. (Ref.: Table H-07)
ER: Effective Rainfall in mm.
NIWR: Net Irrigation Water Requirement in mm.

S.J. Flores (2)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Plant Cane												
KC									0.01	0.09	0.19	0.29
PET									124.0	109.2	103.7	98.3
CU									1.2	9.8	19.7	28.5
P									137.3	117.0	41.6	19.7
ER									0.0	0.0	16.6	15.6
NIWR									1.2	9.8	3.1	12.9
KC	0.41	0.54	0.67	0.75	0.82	0.88	0.92	0.94	0.94	0.89	0.75	0.58
PET	121.6	157.1	206.9	195.5	173.7	119.7	131.8	131.2	124.0	109.2	103.7	98.3
CU	49.9	84.8	138.6	146.6	142.4	105.3	121.3	123.3	116.6	97.2	77.8	57.0
P	4.7	15.4	3.6	53.6	108.2	154.1	92.5	101.4	137.3	117.0	41.6	19.7
ER	0.0	9.1	0.0	39.8	84.3	99.5	65.1	73.9	95.8	76.7	27.1	17.1
NIWR	49.9	75.7	138.6	106.8	58.1	5.8	56.2	49.4	20.8	20.5	50.7	39.9
KC	0.42	0.27	0.13	0.02								
PET	121.6	157.1	206.9	195.5								
CU	51.1	42.4	26.9	3.9								
P	4.7	15.4	3.6	53.6								
ER	0.0	8.1	0.0	0.0								
NIWR	51.1	34.3	26.9	3.9								
Ratoon Cane												
KC											0.01	0.10
PET											130.7	98.3
CU											1.0	9.8
P											41.6	19.7
ER											0.0	0.0
NIWR											1.0	9.8

S.J. Flores (3)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Ratoon Cane (cont'd)												
KC	0.19	0.30	0.42	0.56	0.71	0.79	0.86	0.91	0.93	0.90	0.76	0.60
PET	121.6	157.1	206.9	195.5	173.7	119.7	131.8	131.2	124.0	109.2	103.7	98.3
CU	23.1	47.1	86.9	109.5	123.3	94.6	113.3	119.4	115.3	98.3	78.8	59.0
P	4.7	15.4	3.6	53.6	108.2	154.1	92.5	101.4	137.3	117.0	41.6	19.7
ER	0.0	8.2	0.0	37.2	82.2	93.6	63.9	73.2	95.5	76.9	27.2	17.2
NIWR	23.1	38.9	86.9	72.3	41.1	1.0	49.4	46.2	19.8	21.4	51.6	41.8
KC	0.43	0.28	0.13	0.02								
PET	121.6	157.1	206.9	195.5								
CU	52.3	44.0	26.9	3.9								
P	4.7	15.4	3.6	53.6								
ER	0.0	8.1	0.0	0.0								
NIWR	52.3	35.9	26.9	3.9								
KC												
PET												
CU												
P												
ER												
NIWR												

Table H-19 NET IRRIGATION WATER REQUIREMENT BY CROP (RAINY SEASON)

Western Plain - Rainy Season (1)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Seed Cane												
KC	0.043	0.130	0.253	0.386	0.536	0.700	0.818	0.866	0.877	0.799	0.648	0.485
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	11.3	34.0	69.5	97.6	94.0	97.3	165.2	158.9	99.0	105.9	120.2	117.1
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	8.8	28.2	96.8	100.2	87.9	119.0	102.0	109.1	47.1	0.0
NIWR	11.3	34.0	60.7	69.4	0.0	0.0	77.3	39.9	0.0	0.0	73.1	117.1
KC	0.324	0.179	0.054									
PET	261.7	244.4	274.6									
CU	84.8	43.7	14.8									
P	1.9	3.9	7.3									
ER	0.0	0.0	11.0									
NIWR	84.8	43.7	3.8									
Plant Cane												
KC									0.01	0.09	0.19	0.29
PET									112.0	132.6	185.5	241.4
CU									1.1	11.9	38.2	70.0
P									293.1	218.7	60.5	5.7
ER									0.0	0.0	31.9	0.0
NIWR									1.1	11.9	3.3	70.0

Note: KC: Seasonal Variation of KC
PET: Potential Evapotranspiration in mm. (Ref.: Table H-01)
CU: Consumptive Use in mm. (KC x PET)
P: Precipitation in mm. (Ref.: Table H-05)
ER: Effective Rainfall in mm.
NIWR: Net Irrigation Water Requirement in mm.

Western Plain - Rainy Season (2)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Plant Cane (cont'd)												
KC	0.41	0.54	0.67	0.75	0.82	0.88	0.92	0.94	0.94	0.89	0.75	0.58
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	107.3	132.0	184.0	189.7	143.8	122.3	185.7	172.5	106.1	118.0	159.1	140.0
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	11.1	32.9	143.5	126.0	92.2	122.9	109.3	121.5	48.8	0.0
NIWR	107.3	132.0	172.9	156.8	0.3	0.0	93.5	49.6	0.0	0.0	90.3	140.0
KC	0.42	0.27	0.13	0.02								
PET	261.7	244.4	274.6	252.9								
CU	109.9	66.0	35.7	5.1								
P	1.9	3.9	7.3	40.7								
ER	0.0	0.0	7.9	0.0								
NIWR	109.9	66.0	27.8	5.1								
Ratoon Cane												
KC											0.01	0.10
PET											185.5	241.4
CU											1.9	24.1
P											60.5	5.7
ER											0.0	0.0
NIWR											1.9	24.1
KC	0.19	0.30	0.42	0.56	0.71	0.79	0.36	0.91	0.93	0.90	0.76	0.60
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	49.7	73.3	115.3	141.6	124.5	109.8	173.6	167.0	105.0	119.5	141.0	144.8
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	9.4	29.7	128.2	113.1	89.5	121.3	108.2	122.9	49.0	0.0
MIWR	49.7	73.3	105.9	111.9	0.0	0.0	84.1	45.7	0.0	0.0	92.0	144.8

Western Plain - Rainy Season (3)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Ratoon Cane (cont'd)												
KC	0.43	0.28	0.13	0.02								
PET	261.7	244.4	274.6	252.9								
CU	112.5	68.4	35.7	5.1								
P	1.9	3.9	7.3	40.7								
ER	0.0	0.0	7.9	0.0								
NIWR	112.5	68.4	27.8	5.1								
Paddy												
KC					0.210	0.666	0.978	1.015	0.565			
PET					175.4	139.0	201.9	183.5	112.9			
CU					36.8	92.6	197.5	186.3	63.8			
Percor.					93.0	90.0	93.0	93.0	90.0			
Puddling					50.0	150.0	0.0	0.0	0.0			
ER*					160.7	188.6	77.6	122.1	196.8			
NIWR					19.1	144.0	212.9	157.2	0.0			
Cotton												
KC							0.04	0.20	0.45	0.71	0.86	0.79
PET							201.9	183.5	112.9	132.6	185.5	241.4
CU							8.1	36.7	50.8	94.1	159.5	190.7
P							111.4	159.4	293.1	218.7	60.5	5.7
ER							0.0	38.2	52.8	97.9	49.1	0.0
NIWR							8.1	0.0	0.0	0.0	110.4	190.7

Western Plain - Rainy Season (4)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Cotton (cont'd)												
KC	0.39	0.05										
PET	261.7	244.4										
CU	102.1	12.2										
P	1.9	3.9										
ER	0.0	0.0										
NIWR	102.1	12.2										
Melon												
KC									0.05	0.238	0.459	0.386
PET									112.9	132.6	185.5	241.4
CU									5.6	31.6	85.1	93.2
P									293.1	218.7	60.5	5.7
ER									0.0	31.6	43.3	0.0
NIWR									5.6	0.0	41.8	93.2
KC	0.115											
PET	261.7											
CU	30.1											
P	1.9											
ER	0.0											
NIWR	30.1											

Western Plain - Rainy Season (5)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Maize												
KC									0.086	0.389	0.720	0.612
PET									112.9	132.6	185.5	241.4
CU									9.7	51.6	133.6	147.7
P									293.1	218.7	60.5	5.7
ER									0.0	53.1	48.3	0.0
NIWR									9.7	0.0	85.3	147.7
KC	0.195											
PET	261.7											
CU	51.0											
P	1.9											
ER	0.0											
NIWR	51.0											
Vegetable												
KC					0.334	0.445	0.445	0.111				
PET					175.4	139.0	201.9	183.5				
CU					58.6	61.9	89.8	20.4				
P					234.7	267.0	111.4	159.4				
ER					58.6	61.9	73.2	18.6				
NIWR					0.0	0.0	16.6	1.8				

Western Plain - Rainy Season (6)

Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Pasture												
KC	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
PET	261.7	244.4	274.6	252.9	175.4	139.0	201.9	183.5	112.9	132.6	185.5	241.4
CU	214.6	200.4	225.2	207.4	143.8	114.0	165.6	150.5	92.6	108.7	152.1	197.9
P	1.9	3.9	7.3	40.7	234.7	267.0	111.4	159.4	293.1	218.7	60.5	5.7
ER	0.0	0.0	11.7	33.9	139.3	114.0	85.4	113.1	92.6	108.7	48.6	0.0
NIWR	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
KC												
PET												
CU												
P												
ER												
NIWR												

Table H-20 IRRIGATION WATER REQUIREMENT FOR WESTERN PLAIN

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	6,980		178.4	154.8	147.4	122.2	0.1	0.5	82.0	44.0	0.0	0.0	100.2	182.3
		(6980/16000)	77.8	67.5	64.3	53.3	0.0	0.2	35.8	19.5	0.0	0.0	43.7	79.5
2	2,000		30.1	108.8	308.9	368.2	114.7	18.2	74.0	0.0	5.6	0.0	41.8	93.2
		(2000/16000)	3.8	13.6	38.6	46.0	14.0	2.3	9.3	0.0	0.7	0.0	5.2	11.7
3	800		87.4	135.9	308.9	368.2	114.7	18.2	74.0	0.0	0.0	4.1	21.0	107.4
		(800/16000)	4.4	6.8	15.4	18.4	5.7	0.9	3.7	0.0	0.0	0.2	1.1	5.4
4	1,000		146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	29.0	159.3
		(1000/16000)	9.2	9.4	19.3	23.0	7.2	1.1	4.6	0.0	0.0	0.7	1.8	10.0
5	250		201.5	206.6	314.9	368.2	114.7	18.2	74.0	0.0	0.0	10.6	24.0	166.6
		(250/16000)	3.1	3.2	4.9	5.8	1.8	0.2	1.2	0.0	0.0	0.2	0.4	2.6
6	2,000		102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
		(2000/16000)	12.8	2.1	6.5	14.7	0.0	0.0	2.3	0.0	0.0	0.0	13.8	23.8
7	1,830		102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7
		(1830/16000)	11.7	2.0	5.4	11.8	0.0	0.0	1.9	0.0	0.0	0.0	12.6	21.8
8	800		102.1	12.2	22.9	57.8	0.0	0.0	9.1	0.0	0.0	0.0	110.4	190.7
		(800/16000)	5.1	0.6	1.1	2.9	0.0	0.0	0.5	0.0	0.0	0.0	5.5	9.5
9	200		102.1	12.2	6.2	35.3	0.0	0.0	8.8	0.0	0.0	0.0	110.4	190.7
		(200/16000)	1.3	0.2	0.1	0.4	0.2	0.0	0.1	0.0	0.0	0.0	1.4	2.4
10	140		214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
		(140/16000)	1.9	1.8	1.7	1.5	0.0	0.0	0.7	0.3	0.0	0.0	0.9	1.7
Total	16,000	(16000/16000)	131.1	107.2	157.3	177.8	29.0	4.8	60.1	19.8	0.7	1.1	86.4	168.4
Diversion Req.		(/0.525)	249.7	202.2	299.6	338.7	55.2	9.1	114.5	37.7	1.3	2.1	164.6	320.8

Note: Refer to Table H-21 for water requirement by type.

Table H-21 NET IRRIGATION WATER REQUIREMENT BY TYPE

Western Plain (1)

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	Seed cane	130		2.4	17.0	34.4	0.0	0.0	42.6	27.8	0.0	0.0	109.0	176.2
			149.2	100.2	59.9	6.8	3.5							
			(149.2)	(102.6)	(76.9)	(41.2)	(3.5)	(0.0)	(42.6)	(27.8)	(0.0)	(0.0)	(109.0)	(176.2)
		(130/6900)	2.8	1.9	1.4	0.8	0.1	0.0	0.8	0.5	0.0	0.0	2.0	3.3
	Plant cane	1,370											1.9	21.7
			49.7	70.9	103.2	106.9	0.0	0.0	77.6	41.8	0.0	0.0	122.9	214.8
			196.3	141.8	105.9	43.4	0.2	2.8						
			(246.0)	(212.7)	(209.1)	(150.3)	(0.2)	(2.8)	(77.6)	(41.8)	(0.0)	(0.0)	(124.8)	(236.5)
		(1370/6980)	48.3	41.7	41.0	29.5	0.0	0.5	15.2	8.2	0.0	0.0	24.5	46.4
	Ratoon cane	5,480											1.9	24.1
			49.7	73.3	105.9	111.9	0.0	0.0	84.1	45.7	0.0	0.0	92.0	144.8
			112.5	68.4	27.8	5.1								
			(162.2)	(141.7)	(133.7)	(117.0)	(0.0)	(0.0)	(84.1)	(45.7)	(0.0)	(0.0)	(93.9)	(168.9)
		(5480/6980)	127.3	111.2	105.0	91.9	0.0	0.0	66.0	35.9	0.0	0.0	73.7	132.6
	Total NIWE	6,980	178.4	154.8	147.4	122.2	0.1	0.5	82.0	44.6	0.0	0.0	100.2	182.3
2	Paddy	2,000		108.8	308.9	368.2	114.7	18.2	74.0					
	Melon	2,000	30.1								5.6	0.0	41.8	93.2
	Total	2,000	30.1	108.8	308.9	368.2	114.7	18.2	74.0	0.0	5.6	0.0	41.8	93.2
3	Paddy	800		108.8	308.9	368.2	114.7	18.2	74.0					
	Vegetable	800	87.4	27.1								4.1	21.0	107.4
	Total	800	87.4	135.9	308.9	368.2	114.7	18.2	74.0	0.0	0.0	4.1	21.0	107.4

Note: Refer to Table H-15 for water requirement by crops.

Western Plain (2)

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
4	Paddy	1,000		108.8	308.9	368.2	114.7	18.2	74.0					
	Beans	1,000	146.6	40.8								10.5	29.0	159.3
	Total	1,000	146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	29.0	159.3
5	Paddy	250		108.8	308.9	368.2	114.7	18.2	74.0					
	Sesame	250	201.5	97.8	6.0							10.6	24.0	166.6
	Total	250	201.5	206.6	314.9	368.2	114.7	18.2	74.0	0.0	0.0	10.6	24.0	166.6
6	Maize	2,000		4.9	51.9	117.6	0.0	0.0	10.1					
	Cotton	2,000	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Total	2,000	102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
7	Beans	1,830		4.9	46.8	103.5	0.0	0.0	8.1					
	Cotton	1,830	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Total	1,830	102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7
8	Vegetable	800			22.9	57.8	0.0	0.0	1.0					
	Cotton	800	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Total	800	102.1	12.2	22.9	57.8	0.0	0.0	9.1	0.0	0.0	0.0	110.4	190.7
9	Cotton	200	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Water melon	200			6.2	35.3	0.0	0.0	0.7					
	Total	200	102.1	12.2	6.2	35.3	0.0	0.0	8.8	0.0	0.0	0.0	110.4	190.7
10	Pasture	140	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
	Total	140	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9

Table H-22 IRRIGATION WATER REQUIREMENT FOR EASTERN PLAIN (A)

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	1,150		160.2	156.5	308.9	368.2	114.7	18.2	74.0	0.0	0.0	11.4	28.7	173.8
		(1150/4600)	40.1	39.1	77.2	92.1	28.7	4.6	18.5	0.0	0.0	2.9	7.2	43.5
2	1,150		146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	28.0	159.3
		(1150/4600)	36.7	37.4	77.2	92.1	28.7	4.6	18.5	0.0	0.0	2.6	7.0	39.8
3	1,150		102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
		(1150/4600)	25.5	4.3	13.0	29.4	0.0	0.0	4.6	0.0	0.0	0.0	27.6	47.7
4	1,150		102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7
		(1150/4600)	25.5	4.3	11.7	25.9	0.0	0.0	4.1	0.0	0.0	0.0	27.6	47.7
Total	4,600	(4600/4600)	127.8	85.1	179.1	239.5	57.4	9.2	45.7	0.0	0.0	5.5	69.4	178.7
Diversion Req.		(/0.525)	243.4	162.1	341.1	456.2	109.3	17.5	87.0	0.0	0.0	10.5	132.2	340.4

Note: Refer to Table H-23 for water requirement by type.

Table H-23 NET IRRIGATION WATER REQUIREMENT BY TYPE

Eastern Plain - A

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	Paddy	1,150		108.8	308.9	368.2	114.7	18.2	74.0					
	Maize	1,150	160.2	47.4								11.4	28.7	173.8
	Total	1,150	160.2	156.5	308.9	368.2	114.7	18.2	74.0	0.0	0.0	11.4	28.7	173.8
2	Paddy	1,150		108.8	308.9	368.2	114.7	18.2	74.0					
	Beans	1,150	146.6	40.8								10.5	28.0	159.3
	Total	1,150	146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	28.0	159.3
3	Cotton	1,150	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Maize	1,150		4.9	51.9	117.6	0.0	0.0	10.1					
	Total	1,150	102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
4	Cotton	1,150	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Beans	1,150		4.9	46.8	103.5	0.0	0.0	8.1					
	Total	1,150	102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7

Note: Refer to Table H-16 for water requirement by crops.

Table H-24 NET IRRIGATION WATER REQUIREMENT BY TYPE

Eastern Plain - B

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	Cotton	1,100	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Maize	1,100		4.9	51.9	117.6	0.0	0.0	10.1					
	Total	1,100	102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
2	Cotton	1,100	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Beans	1,100		4.9	46.8	103.5	0.0	0.0	8.1					
	Total	1,100	102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7
3	Paddy	500		108.8	308.9	368.2	114.7	18.2	74.0					
	Maize	500	160.2	47.7								11.4	28.7	173.8
	Total	500	160.2	156.5	308.9	368.2	114.7	18.2	74.0	0.0	0.0	11.4	28.7	173.8
4	Paddy	500		108.8	308.9	368.2	114.7	18.2	74.0					
	Beans	500	146.6	40.8								10.5	28.0	159.3
	Total	500	146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	28.0	159.3
5	Pasture	2,000	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
	Total	2,000	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9

Note: Refer to Table H-25 for water requirement by type.

Table H-25 IRRIGATION WATER REQUIREMENT FOR EASTERN PLAIN (B)

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	1,100		102.1	17.1	51.9	117.6	0.0	0.0	18.2	0.0	0.0	0.0	110.4	190.7
		(1100/5200)	21.6	3.6	11.0	24.9	0.0	0.0	3.8	0.0	0.0	0.0	23.4	40.3
2	1,100		102.1	17.1	46.8	103.5	0.0	0.0	16.2	0.0	0.0	0.0	110.4	190.7
		(1100/5200)	21.6	3.6	9.9	21.9	0.0	0.0	3.4	0.0	0.0	0.0	23.4	40.3
3	500		160.2	156.5	308.9	368.2	114.7	18.2	74.0	0.0	0.0	11.4	28.7	173.8
		(500/5200)	15.4	15.0	29.7	35.4	11.0	1.7	7.1	0.0	0.0	1.1	2.8	16.7
4	500		146.6	149.6	308.9	368.2	114.7	18.2	74.0	0.0	0.0	10.5	28.0	159.3
		(500/5200)	14.1	14.4	29.7	35.4	11.0	1.7	7.1	0.0	0.0	1.0	2.7	15.3
5	2,000		214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
		(2000/5200)	82.5	77.1	73.6	66.7	1.7	0.0	30.8	14.4	0.0	0.0	39.8	76.1
Total	5,200	(5200/5200)	155.2	113.7	153.9	184.3	23.7	3.4	52.2	14.4	0.0	2.1	92.1	188.7
Diversion Req.		(/0.525)	295.6	216.6	293.1	351.0	45.1	6.5	99.4	27.4	0.0	4.0	175.4	359.4

Note: Refer to Table H-16 for water requirement by crops.

Table H-26 IRRIGATION WATER REQUIREMENT FOR MIDDLE REACH

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Paddy-1	510		241.0	101.1							0.0	192.9	236.9	338.5
Paddy-2	510			182.8	375.7	302.4	102.1	15.4	54.0					
Total	510		241.0	283.9	375.7	302.4	102.1	15.4	54.0	0.0	0.0	192.9	236.9	338.5
		(510/680)	180.8	212.9	281.8	226.8	76.6	11.6	40.5	0.0	0.0	144.7	177.7	253.9
Beans	150		22.5	95.1	186.6	125.4	0.0							
Maize	150							2.8	1.7	22.2	0.0	0.0	9.3	
Total	150		22.5	95.1	186.6	125.4	0.0	2.8	1.7	22.2	0.0	0.0	9.3	0.0
		(150/680)	5.0	21.0	41.2	27.7	0.0	0.6	0.4	4.9	0.0	0.0	2.1	0.0
Vegetable	20		116.5	108.8	113.0	84.6	0.0	0.0	38.3	5.0	0.0	0.0	55.9	107.4
		(20/680)	3.4	3.2	3.3	2.5	0.0	0.0	1.1	0.1	0.0	0.0	1.6	3.2
Total	680	(680/680)	189.2	237.1	326.3	257.0	76.6	12.2	42.0	5.0	0.0	144.7	181.4	257.1
Diversion Req.		(/0.525)	360.4	451.6	621.5	489.5	145.9	23.2	80.0	9.5	0.0	275.6	345.5	489.7

Note: Refer to Table H-17 for water requirement by crops.

Table H-27 IRRIGATION WATER REQUIREMENT FOR S.J. FLORES

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Seed cane	40													1.0
			10.9	23.5	66.2	53.6	28.8	0.8	48.3	43.0	13.5	6.2	33.6	24.1
			30.4	11.4	4.1									
			(41.3)	(34.9)	(70.3)	(53.6)	(28.8)	(0.8)	(48.3)	(43.0)	(13.5)	(6.2)	(33.6)	(25.1)
		(40/2680)	0.6	0.5	1.0	0.8	0.4	0.0	0.7	0.6	0.2	0.1	0.5	0.4
(fallow)	405	(405/2680)	-	-	-	-	-	-	-	-	-	-	-	-
Plant cane	447										1.2	9.8	3.1	12.9
			49.9	75.7	138.6	106.8	58.1	5.8	56.2	49.4	20.8	20.5	50.7	39.9
			51.1	34.3	26.9	3.9								
			(101.0)	(110.0)	(165.5)	(110.7)	(58.1)	(5.8)	(56.2)	(49.4)	(22.0)	(30.3)	(53.8)	(52.8)
		(447/2680)	16.8	18.3	27.6	18.5	9.7	1.0	9.4	8.2	3.7	5.1	9.0	8.8
Ratoon	1,788												1.0	9.8
			23.1	38.9	86.9	72.3	41.1	1.0	49.4	46.2	19.8	21.4	51.6	41.8
			52.3	35.9	26.9	3.9								
			(75.4)	(74.8)	(113.8)	(76.2)	(41.1)	(1.0)	(49.4)	(46.2)	(19.8)	(21.4)	(52.6)	(51.6)
		(1788/2680)	50.3	49.9	75.9	50.8	27.4	0.7	33.0	30.8	13.2	14.3	35.1	34.4
Total	2,680	(2680/2680)	67.7	68.7	104.5	70.1	37.5	1.7	43.1	39.6	17.1	19.5	44.6	43.6
Diversion Req.		(/0.525)	129.0	130.9	199.0	133.5	71.4	3.2	82.1	75.4	32.6	37.1	85.0	83.0

Note: Refer to Table H-18 for water requirement by crops.

Table H-28 IRRIGATION WATER REQUIREMENT FOR WESTERN PLAIN (RAINY SEASON)

(Unit: mm)

Type	Area	Average	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	9,510		145.9	128.8	123.6	106.2	0.0	0.0	73.0	39.5	0.2	2.0	79.4	149.6
		(9510/16000)	86.7	76.6	73.5	63.1	0.0	0.0	43.4	23.5	0.1	1.2	47.2	88.9
2	2,000		30.1	0.0	0.0	0.0	19.1	144.0	212.9	157.2	5.6	0.0	41.8	93.2
		(2000/16000)	3.8	0.0	0.0	0.0	2.4	18.0	26.6	19.7	0.7	0.0	5.2	11.7
3	1,000		51.0	0.0	0.0	0.0	19.1	144.0	212.9	157.2	9.7	0.0	85.3	147.7
		(1000/16000)	3.2	0.0	0.0	0.0	1.2	9.0	13.3	9.8	0.6	0.0	5.3	9.2
4	3,350		102.1	12.2	0.0	0.0	0.0	0.0	13.6	0.6	0.0	0.0	110.4	190.7
		(3350/16000)	21.4	2.6	0.0	0.0	0.0	0.0	2.8	0.1	0.0	0.0	23.1	39.9
5	140		214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
		(140/16000)	1.9	1.8	1.7	1.5	0.0	0.0	0.7	0.3	0.0	0.0	0.9	1.7
Total	16,000	(16000/16000)	117.0	81.0	75.2	64.6	3.6	27.0	86.8	53.4	1.4	1.2	81.7	151.4
Diversion Req.		(/0.525)	222.9	154.3	143.2	123.0	6.9	51.4	165.3	101.7	2.7	2.3	155.6	288.4

Note: * Refer to Table H-29 for ideal water requirement by type.
** Refer to Table C-22 for available mean discharge at El Papalon.

Table H-29 NET IRRIGATION WATER REQUIREMENT BY TYPE

Western Plain - Rainy Season (1)

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	Seed cane	160	11.3	34.0	60.7	69.4	0.0	0.0	77.3	39.9	0.0	0.0	73.1	117.1
			84.8	43.7	3.8									
			(96.1)	(77.7)	(64.5)	(69.4)	(0.0)	(0.0)	(77.3)	(39.9)	(0.0)	(0.0)	(73.1)	(117.1)
		160/9510	1.6	1.3	1.1	1.2	0.0	0.0	1.3	0.7	0.0	0.0	1.2	2.0
	Plant cane	1,585									1.1	11.9	3.3	70.0
			107.3	132.0	172.9	156.8	0.3	0.0	93.5	49.6	0.0	0.0	90.3	140.0
			109.9	66.0	27.8	5.1								
			(217.2)	(198.0)	(200.7)	(161.9)	(0.3)	(0.0)	(93.5)	(49.6)	(1.1)	(11.9)	(93.6)	(210.0)
		1585/9510	36.2	33.0	33.4	27.0	0.0	0.0	15.6	8.3	0.2	2.0	15.6	35.0
	Ratoon cane	6,340											1.9	24.1
			49.7	73.3	105.9	111.9	0.0	0.0	84.1	45.7	0.0	0.0	92.0	144.8
			112.5	68.4	27.8	5.1								
			(162.2)	(141.7)	(133.7)	(117.0)	(0.0)	(0.0)	(84.1)	(45.7)	(0.0)	(0.0)	(93.9)	(168.9)
		6340/9510	108.1	94.5	89.1	78.0	0.0	0.0	56.1	30.5	0.0	0.0	62.6	112.6
	Total	9,510	145.9	128.8	123.6	106.2	0.0	0.0	73.0	39.5	0.2	2.0	79.4	149.6
2	Paddy	2,000					19.1	144.0	212.9	157.2	0.0			
	Melon	2,000	30.1								5.6	0.0	41.8	93.2
	Total	2,000	30.1	0.0	0.0	0.0	19.1	114.0	212.9	157.2	5.6	0.0	41.8	93.2

Note: Refer to Table H-19 for water requirement by crops.

Western Plain - Rainy Season (2)

(Unit: mm)

Type	Crop	Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
3	Paddy	1,000					19.1	144.0	212.9	157.2	0.0			
	Maize	1,000	51.0								9.7	0.0	85.3	147.7
	Total	1,000	51.0	0.0	0.0	0.0	19.1	144.0	212.9	157.2	9.7	0.0	85.3	147.7
4	Cotton	3,350	102.1	12.2					8.1	0.0	0.0	0.0	110.4	190.7
	Vegetable	3,350					0.0	0.0	5.5	0.6				
	Total	3,350	102.1	12.2	0.0	0.0	0.0	0.0	13.6	0.6	0.0	0.0	110.4	190.7
5	Pasture	140	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9
	Total	140	214.6	200.4	191.3	173.5	4.5	0.0	80.2	37.4	0.0	0.0	103.5	197.9

Table H-30 DIVERSION WATER REQUIREMENT

(Unit: 10^3m^3)

Area	(Ha)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1) Western Plain	(16,000)	39,952	32,352	47,936	54,192	8,832	1,456	18,320	6,032	208	336	26,336	51,328	287,280
2) Middle Reach	(680)	2,450	3,071	4,226	3,329	992	158	544	65	0	1,874	2,349	3,330	22,388
3) S.J. Flores	(2,680)	3,457	3,508	5,333	3,578	1,914	86	2,200	2,021	874	994	2,278	2,224	28,467
Total (1 - 3)	(19,360)	45,859	38,931	57,495	61,099	11,738	1,700	21,064	8,118	1,082	3,204	30,963	56,882	338,135
4) Eastern Plain - A	(4,600)	11,196	7,457	15,691	20,985	5,028	805	4,002	0	0	483	6,081	15,658	87,386
Total (1 - 4)	(23,960)	57,055	46,388	73,186	82,084	16,766	2,505	25,066	8,118	1,082	3,687	37,044	72,540	425,521
5) Eastern Plain - B	(5,200)	15,371	11,263	15,241	18,252	2,345	338	5,169	1,425	0	208	9,121	18,689	97,422
Total (1 - 5)	(29,160)	72,426	57,651	88,427	100,336	19,111	2,843	30,235	9,543	1,082	3,895	46,165	91,229	522,943

Table II-31 EFFECTIVE ROOT ZONE OF CROPS

Crop	Effective Root Zone (m)	Representative Effective Root Zone (m)
Sugar cane	0.6 - 0.9	0.9
Cotton	0.9 - 1.2	1.2
Maize	0.6 - 0.9	0.9
Beans	0.6	0.6
Sorghum	0.6	0.6
Sesame	0.6 - 0.9	0.9
Melon	0.6 - 0.75	0.75
Water melon	0.6 - 0.75	0.75
Pasture	0.45 - 0.75	0.75

Table H-32 SOIL-WATER CHARACTERISTICS

	Moderately Coarse Textured Sandy Loam & Fine Sandy Loam	Medium Textured Fine Sandy Loam & Silty Loam	Fine Textured Sandy Clay, Silty Clay & Clay
Available Moisture (mm/10 cm)	12.5 - 19.2	14.6 - 20.9	13.4 - 20.9
Basic Intake Rate (mm/hr) (slope 0 - 2%)	12.7 - 38.1	6.4 - 19.1	2.5 - 7.6
Maximum Length of Runs (mm)			
0.25 (1/400) slope	456 - 319	395 - 289	350 - 250
0.50 (1/200) "	304 - 220	273 - 198	236 - 167
0.75 (1/130) "	243 - 175	213 - 152	190 - 129

Table H-33 TOTAL READILY AVAILABLE MOISTURE

Soil Type (Land Capability)	Mollisols (Class I)	Mollisols (Class II)	Entisols (Class II)	Entisols (Class III)
Sugar Cane	113 - 119	113 - 114	114	102
Cotton	124 - 125	117 - 126	123	104
Maize	107 - 113	107 - 109	108	97
Beans	74 - 79	75 - 76	76	68
Sorghum	80 - 85	80 - 81	81	73
Sesame	107 - 113	107 - 109	108	97
Melon	81	76 - 77	77	69
Water Melon	81	76 - 77	77	69
Pasture	72	71 - 74	72	64

Table H-34 MINIMUM IRRIGATION INTERVAL

	Max. Consumptive Use (mm/day)	Mollisols		Entisols	
		(Class I)*	(Class II)*	(Class II)*	(Class III)*
Sugar cane	7.1	113 - 119 / 15 - 16	113 - 114 / 15 - 16	114 / 16	102 / 14
Cotton	6.8	124 - 125 / 18	117 - 126 / 17 - 18	123 / 18	104 / 15
Maize	5.5	107 - 113 / 19 - 20	107 - 109 / 19	108 / 19	97 / 17
Beans	5.4	74 - 79 / 13 - 14	75 - 76 / 13 - 14	76 / 14	68 / 12
Sorghum	5.5	80 - 85 / 14 - 15	80 - 81 / 14	81 / 14	73 / 13
Sesame	5.5	107 - 113 / 19 - 20	107 - 109 / 19	108 / 19	97 / 17
Melon	3.0	81 / 27	76 - 77 / 25	77 / 25	69 / 23
Water melon	3.0	81 / 27	76 - 77 / 25	77 / 25	69 / 23
Pasture	7.7	72 / 9	71 - 74 / 9	72 / 9	64 / 8

Note: * $\frac{\text{Total Readily Available Moisture (mm)}}{\text{Minimum Irrigation Interval (days)}}$

Table H-35 LENGTH OF MAIN, BRANCH AND SECONDARY CANALS IN WESTERN PLAIN AREA

(Unit: km)

		Main	Branch	Secondary
Upper Main Canal		11.6	-	-
Secondary canal	R-1	-	-	5.1
Secondary canal	R-2	-	-	7.3
Secondary canal	R-3	-	-	8.6
Left Main Canal	L.M.C.-1	8.6	-	-
Left Branch Canal	LB-1	-	5.2	-
Secondary canal	L-1	-	-	2.4
Secondary canal	L-2	-	-	6.1
Secondary canal	L-3	-	-	4.1
Right Main Canal	R.M.C.-1	3.4	-	-
Right Branch Canal	RB-1	-	10.0	-
Right Branch Canal	RB-2	-	14.0	-
Right Branch Canal	RB-3	-	9.9	-
Right Branch Canal	RB-4	-	6.1	-
Total		23.6	45.2	33.6

Table H-36 RELATED STRUCTURES IN WESTERN PLAIN AREA

(Unit: Nos.)

		Irrigation Systems	Drainage Systems	On-Farm Facilities
1.	Turnout	89	-	770
2.	Cross Regulator	65	-	-
3.	Drop	40	9	-
4.	Culvert	54	-	-
5.	Spillway	15	-	-
6.	Drainage Culvert	-	15	-
7.	Bridge	8	10	-
8.	Causeway	-	1	-
9.	Division Box	-	-	3,080
10.	Measuring Device	5	-	-
	Total	280	33	3,850

Table H-37 LENGTH OF MAIN AND SECONDARY DRAIN IN WESTERN PLAIN

(Unit: km)

		Main Drain	Secondary Drain
Right Main Drain	RD-1	5.5	-
Right Main Drain	RD-2	9.5	-
Right Main Drain	RD-3	12.0	-
Right Main Drain	RD-4	10.5	-
Right Main Drain	RD-5	21.5	-
Right Main Drain	RD-6	15.0	-
Secondary Drain	RD-6-1	-	10.0
Secondary Drain	RD-6-2	-	4.5
Left Main Drain	RD-9	9.0	-
Secondary Drain	RD-9-1	-	4.0
Left Main Drain	RD-8	7.5	-
Secondary Drain	RD-8-1	-	4.5
Secondary Drain	RD-7	-	4.0
Total		90.5	27.0

Table H-38 LENGTH OF MAIN AND BRANCH CANALS IN EASTERN PLAIN - A

(Unit: km)

		Main	Branch	Secondary
Headreach Canal		(7.7)	-	-
Eastern Main Canal	EM-1	3.8	-	-
Eastern Main Canal	EM-2	2.7	-	-
Eastern Branch Canal	EB-1	-	9.3	-
Eastern Branch Canal	EB-2	-	8.9	-
Eastern Branch Canal	EB-3	-	12.1	-
Total		14.2	30.3	-

Table H-39 NUMBER OF RELATED STRUCTURES IN EASTERN PLAIN - A

(Unit: Nos.)

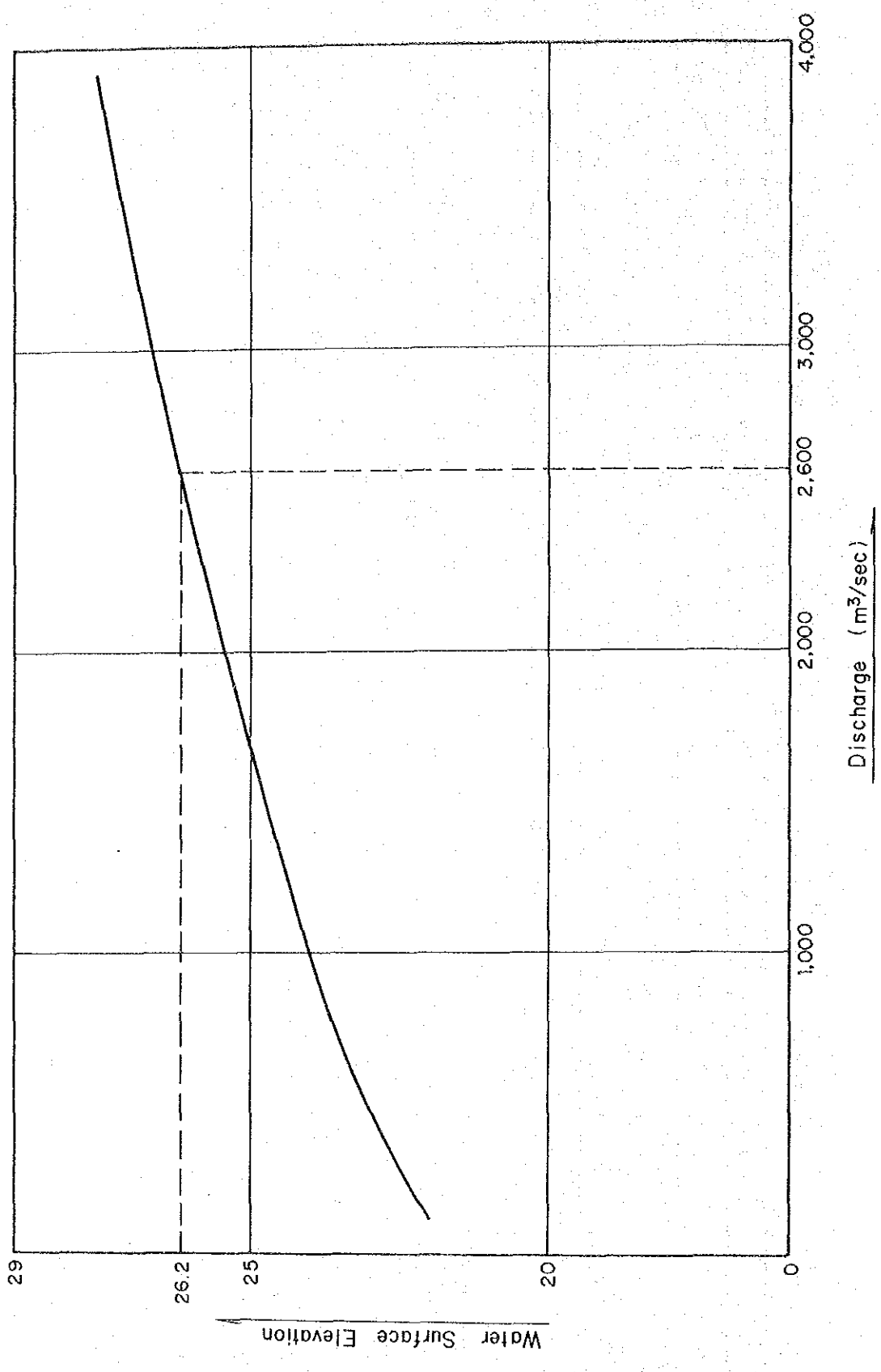
	Irrigation Systems	Drainage Systems	On-Farm Facilities
1. Turnout	30	-	255
2. Cross Regulator	26	-	-
3. Drop	13	5	-
4. Culvert	19	-	-
5. Spillway	6	-	-
6. Drainage Culvert	-	6	-
7. Bridge	11	5	-
8. Division Box	-	-	1,020
9. Measuring Devise	3	-	-
Total	111	16	1,275

Table H-40 PUMPING IRRIGATION IN SAN JUAN DE FLORES

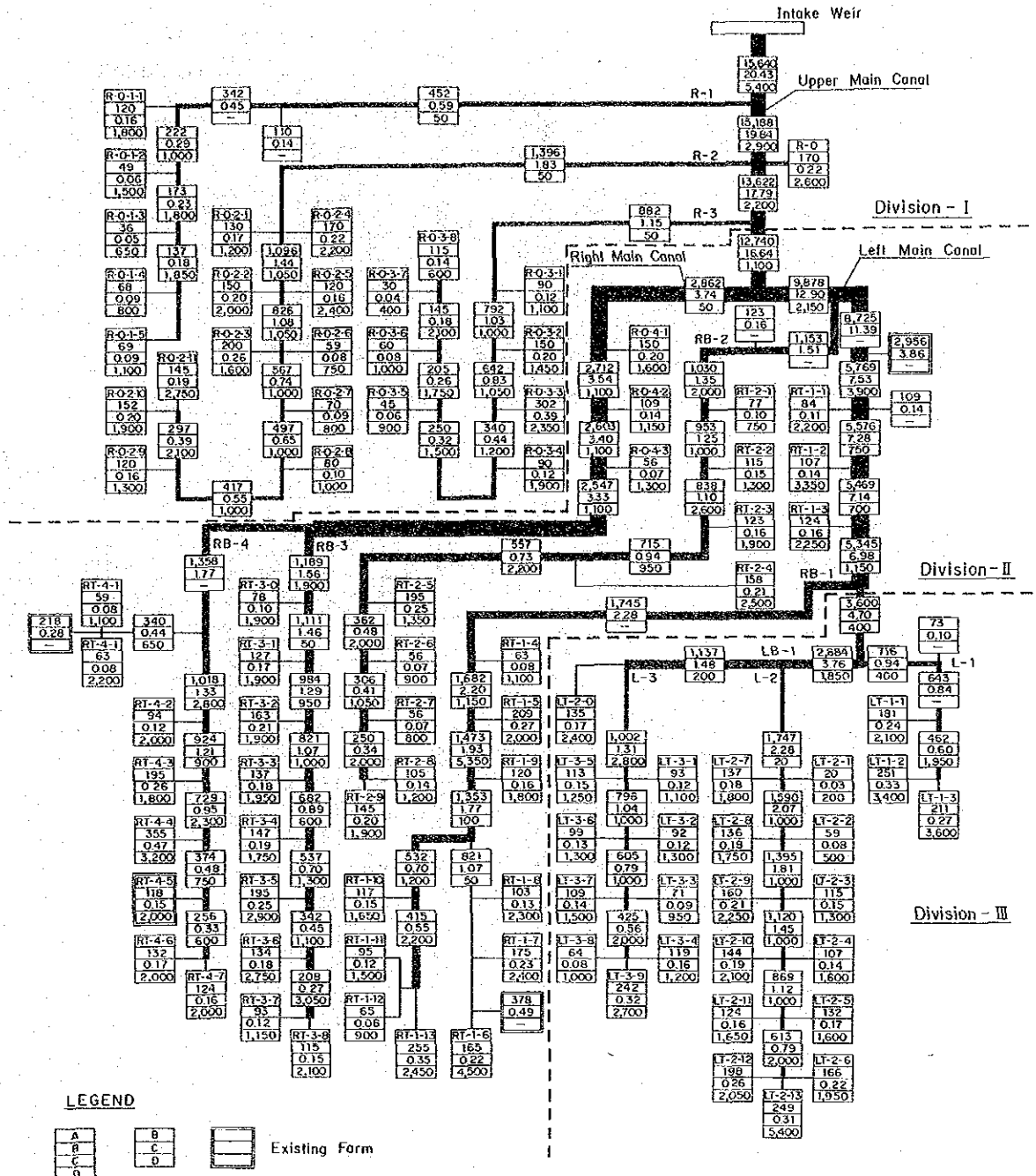
		Sub-Area (A)	Sub-Area (B)
Irrigation area	(ha)	230	110
Design discharge	(m^3/min)	19.9	9.4
Total head	(m)	40	31
Pump capacity	(m^3/min)	6.4	9.4
Number of pumps	(nos.)	4	2
Type of pumps		Centrifugal	Centrifugal
Diameter of pipes	(mm)	600	450
Length of pipes	(m)	100	150
Capacity of motor	(kW)	75	75

FIGURES

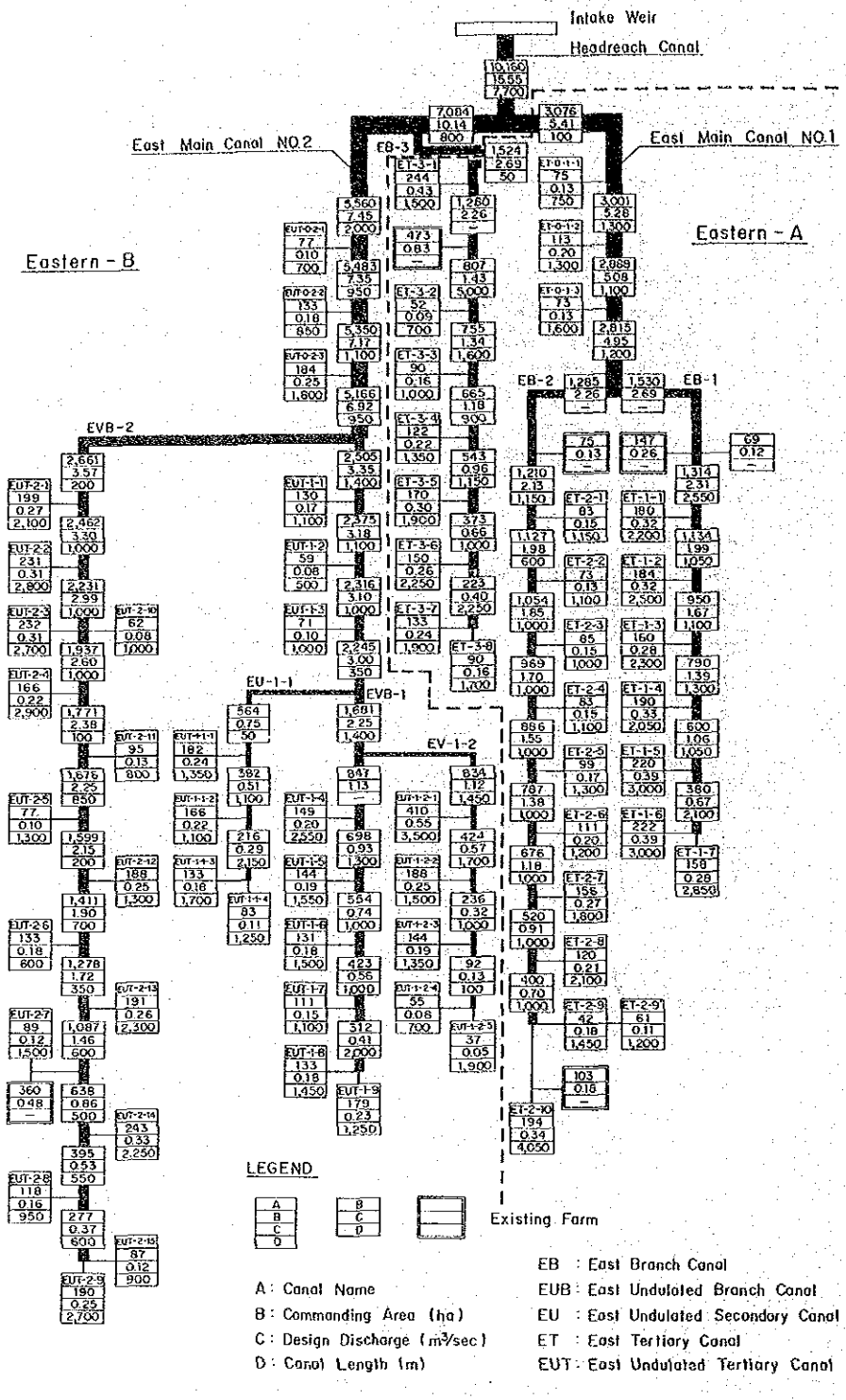
GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. H-01	PROPOSED CROPPING PATTERN FOR CHOLUTECA PLAIN



GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. H-02	H-Q CURVE AT EL PAPALON

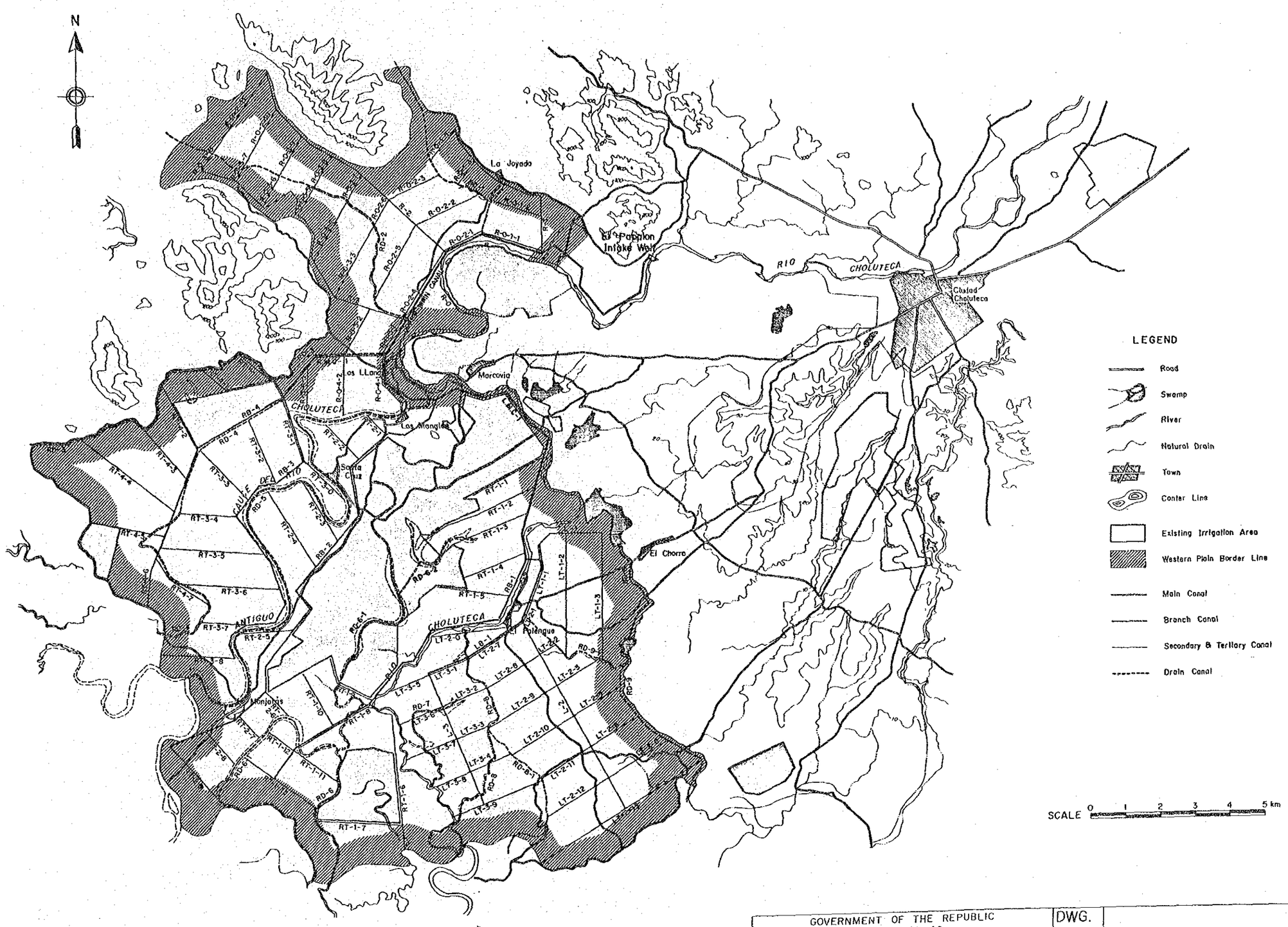


GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. H-03	IRRIGATION DIAGRAM FOR WESTERN PLAIN AREA

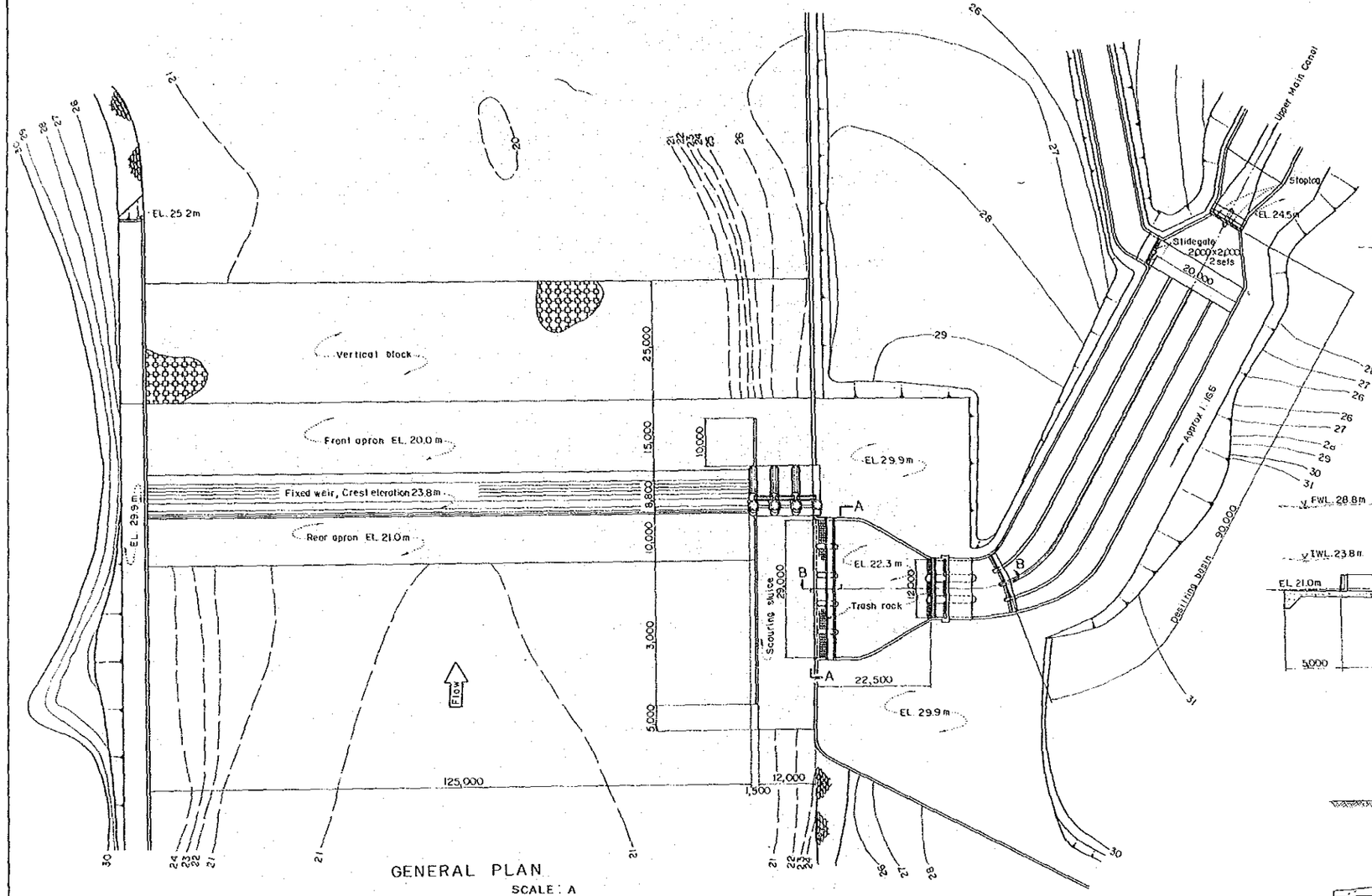


GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. H-04	IRRIGATION DIAGRAM FOR EASTERN PLAIN AREA

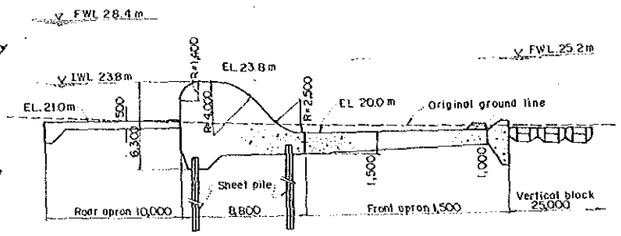
DRAWINGS



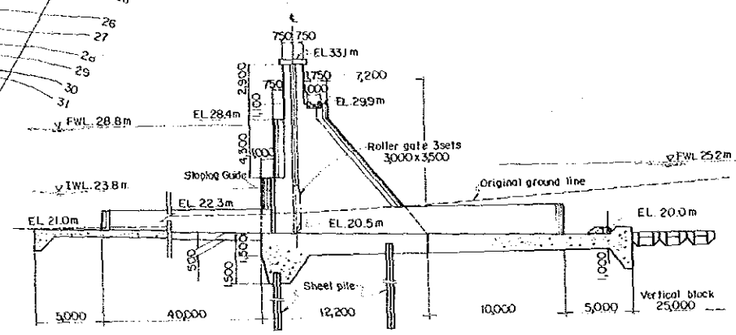
GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-01	LAYOUT IN WESTERN PLAIN AREA



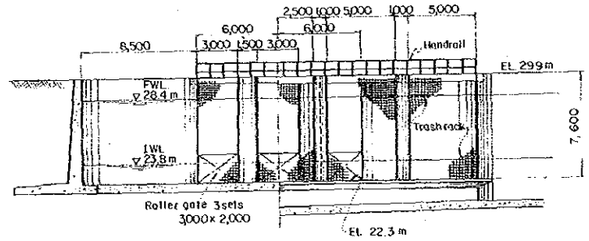
GENERAL PLAN
SCALE : A



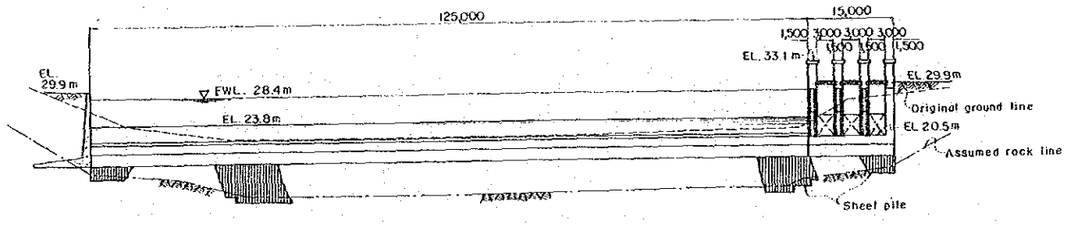
PROFILE (FIXED WEIR)
SCALE : B



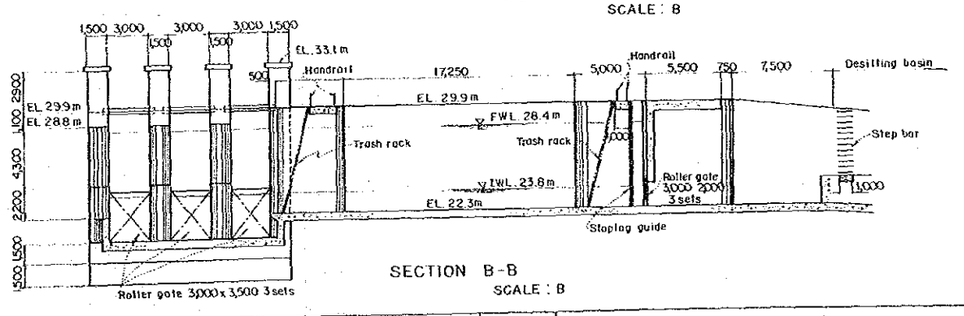
PROFILE (SCOURING SLUICE)
SCALE : B



SECTION A-A
SCALE : B



FRONT VIEW
SCALE : A



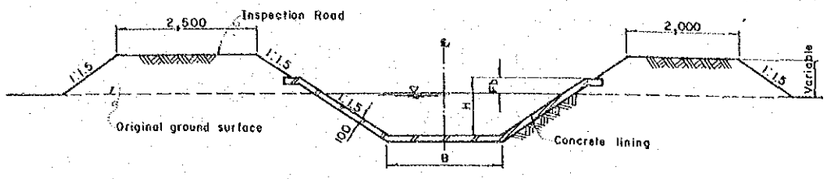
SECTION B-B
SCALE : B

SCALE : A
0 10 20 30 40 50 m

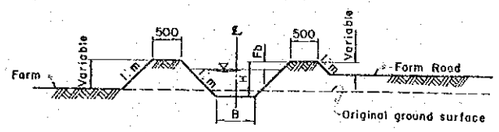
SCALE . B
0 10 20 30 40 m

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-02	EL PAPALON INTAKE WEIR

TYPICAL SECTION OF IRRIGATION CANAL

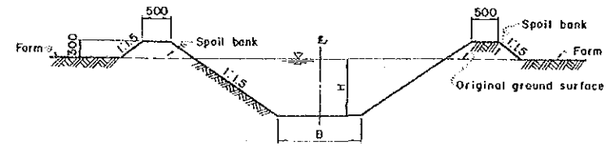


MAIN CANAL & BRANCH CANAL

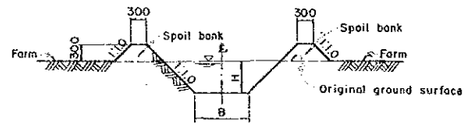


SECONDARY & TERTIARY CANAL

TYPICAL SECTION OF DRAINAGE CANAL

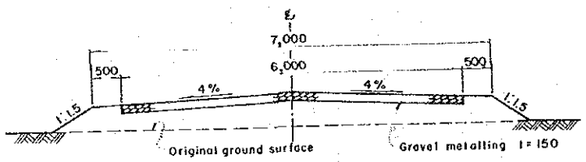


MAIN DRAIN & SECONDARY DRAIN

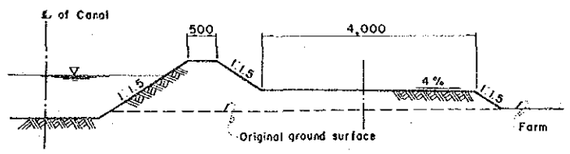


COLECTOR & FIELD DRAIN

FARM ROAD



MAIN FARM ROAD & LINKED ROAD



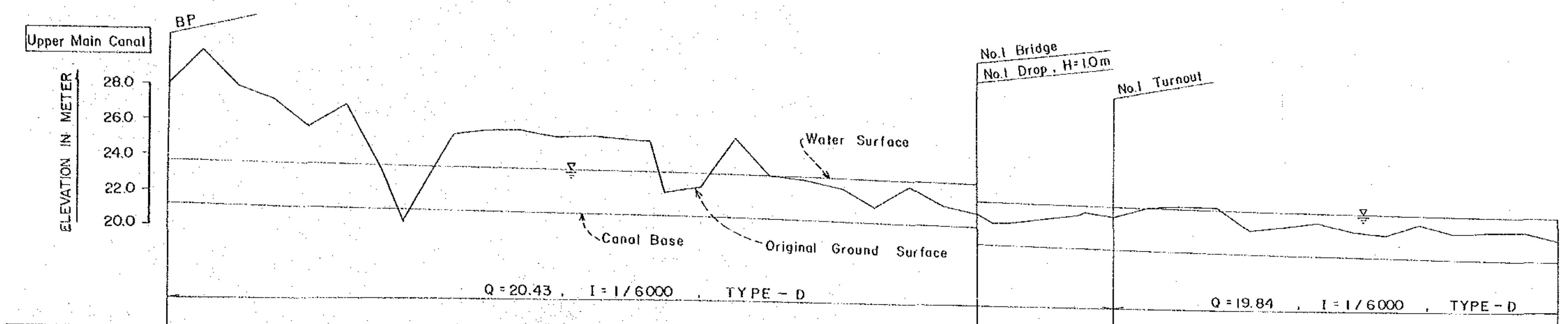
SECONDARY FARM ROAD

SCALE

SCALE

SCALE

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-03	TYPICAL SECTION OF IRRIGATION DRAINAGE CANAL & FARM ROAD

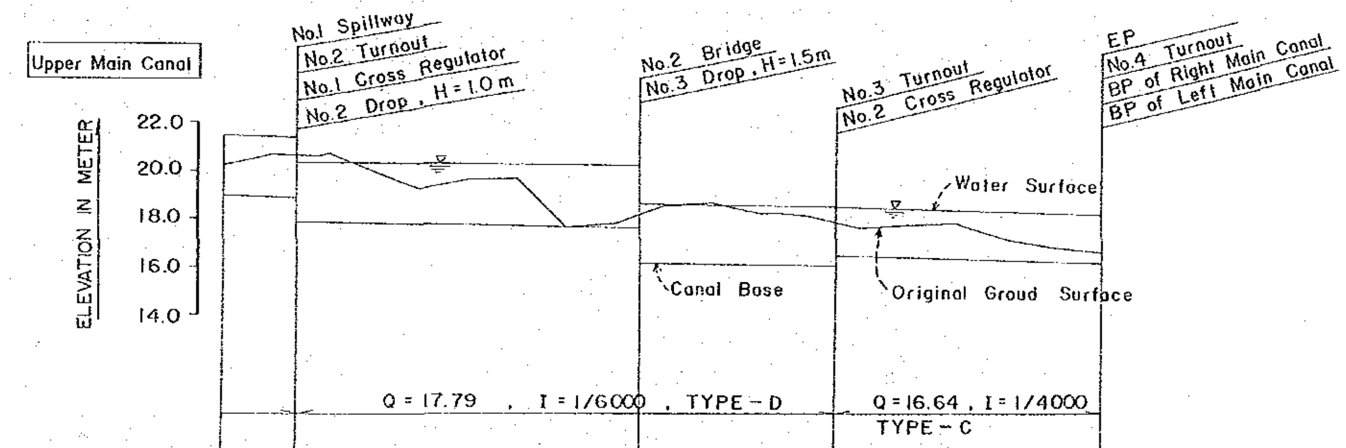


STATION	NO.0	NO.1	NO.2	NO.3	NO.4	NO.5	NO.6	NO.6 +120.0	NO.7	NO.8	NO.9	NO.10
CANAL BASE ELEVATION	21.3	21.3	21.2	21.2	21.2	21.1	21.1	21.1	21.1	21.0	21.0	21.0
WATER SURFACE ELEVATION	23.8	23.8	23.7	23.7	23.7	23.6	23.6	23.6	23.6	23.5	23.5	23.5
GROUND SURFACE ELEVATION	28.0	30.0	28.0	27.3	25.7	27.0	23.3	20.4	21.8	25.4	25.6	25.5
REDUCED DISTANCE	0.0	200.0	400.0	600.0	800.0	1000.0	1200.0	1320.0	1400.0	1600.0	1800.0	2000.0
DISTANCE	0.0	200.0	200.0	200.0	200.0	200.0	200.0	120.0	80.0	200.0	200.0	200.0

STATION	NO.10 +80.0	NO.11	NO.12	NO.13	NO.13 +110.0	NO.14	NO.15	NO.16	NO.17	NO.18	NO.19	NO.19 +30.0
CANAL BASE ELEVATION	21.0	20.9	20.9	20.9	20.8	20.8	20.8	20.8	20.7	20.7	20.7	20.7
WATER SURFACE ELEVATION	23.5	23.4	23.4	23.4	23.3	23.3	23.3	23.3	23.2	23.2	23.2	23.2
GROUND SURFACE ELEVATION	25.4	25.2	25.3	25.1	25.0	22.1	22.5	25.3	23.2	23.0	22.6	22.5
REDUCED DISTANCE	2080.0	2200.0	2400.0	2600.0	2710.0	2800.0	3000.0	3200.0	3400.0	3600.0	3800.0	3830.0
DISTANCE	80.0	120.0	200.0	200.0	110.0	90.0	200.0	200.0	200.0	200.0	200.0	30.0

STATION	NO.20	NO.21	NO.22	NO.23	NO.23 +90.0	NO.24	NO.25	NO.26	NO.26 +25.0	NO.27	NO.28	NO.29
CANAL BASE ELEVATION	20.6	20.6	20.6	20.5 / 19.5	19.5	19.5	19.5	19.4	19.4	19.4	19.4	19.3
WATER SURFACE ELEVATION	23.1	23.1	23.1	23.0 / 22.0	22.0	22.0	22.0	21.9	21.9	21.9	21.9	21.8
GROUND SURFACE ELEVATION	21.5	22.7	21.7	21.3	20.8	20.8	21.1	21.4	21.5	21.3	21.9	22.0
REDUCED DISTANCE	4000.0	4200.0	4400.0	4600.0	4690.0	4800.0	5000.0	5200.0	5225.0	5400.0	5600.0	5800.0
DISTANCE	170.0	200.0	200.0	200.0	90.0	110.0	200.0	200.0	25.0	175.0	200.0	200.0

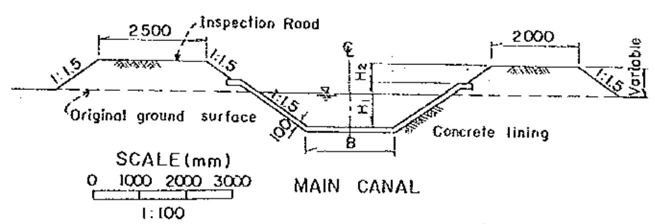
STATION	NO.30	NO.31	NO.32	NO.33	NO.34	NO.35	NO.36	NO.37	NO.38	NO.39	NO.40
CANAL BASE ELEVATION	19.3	19.3	19.2	19.2	19.2	19.1	19.1	19.1	19.0	19.0	19.0
WATER SURFACE ELEVATION	21.8	21.8	21.7	21.7	21.7	21.6	21.6	21.6	21.5	21.5	21.5
GROUND SURFACE ELEVATION	22.0	20.7	20.9	21.2	20.7	20.5	21.1	20.6	20.7	20.7	20.2
REDUCED DISTANCE	6000.0	6200.0	6400.0	6600.0	6800.0	7000.0	7200.0	7400.0	7600.0	7800.0	8000.0
DISTANCE	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0



STATON	NO.40	NO.41	NO.41 +100.0	NO.42	NO.42 +25.0	NO.43	NO.44	NO.45	NO.46	NO.47
CANAL BASE ELEVATION	19.0	18.9	18.9 / 17.9	17.9	17.9	17.9	17.8	17.8	17.8	17.7
WATER SURFACE ELEVATION	21.5	21.4	21.4 / 20.4	20.4	20.4	20.4	20.3	20.3	20.3	20.2
GROUND SURFACE ELEVATION	20.2	20.7	20.7	20.6	20.7	20.1	19.3	19.7	19.7	17.7
REDUCED DISTANCE	8000.0	8200.0	8300.0	8400.0	8425.0	8600.0	8800.0	9000.0	9200.0	9400.0
DISTANCE	200.0	200.0	100.0	100.0	25.0	175.0	200.0	200.0	200.0	200.0

STATON	NO.48	NO.48 +100.0	NO.49	NO.50	NO.51	NO.52	NO.52 +100.0	NO.53	NO.54	NO.55	NO.56	NO.57	NO.58
CANAL BASE ELEVATION	17.7	17.7 / 16.2	16.2	16.1	16.1	16.1	16.1 / 16.5	16.4	16.4	16.3	16.3	16.2	16.2
WATER SURFACE ELEVATION	20.2	20.2 / 18.7	18.7	18.6	18.6	18.6	18.6	18.5	18.5	18.4	18.4	18.3	15.3
GROUND SURFACE ELEVATION	17.9	18.2	18.6	18.7	18.3	18.2	18.0	17.0	17.8	17.9	17.2	16.9	16.7
REDUCED DISTANCE	9600.0	9700.0	9800.0	10000.0	10200.0	10400.0	10500.0	10600.0	10800.0	11000.0	11200.0	11400.0	11600.0
DISTANCE	200.0	100.0	100.0	200.0	200.0	200.0	100.0	100.0	200.0	200.0	200.0	200.0	200.0

TYPICAL SECTION OF IRRIGATION CANAL



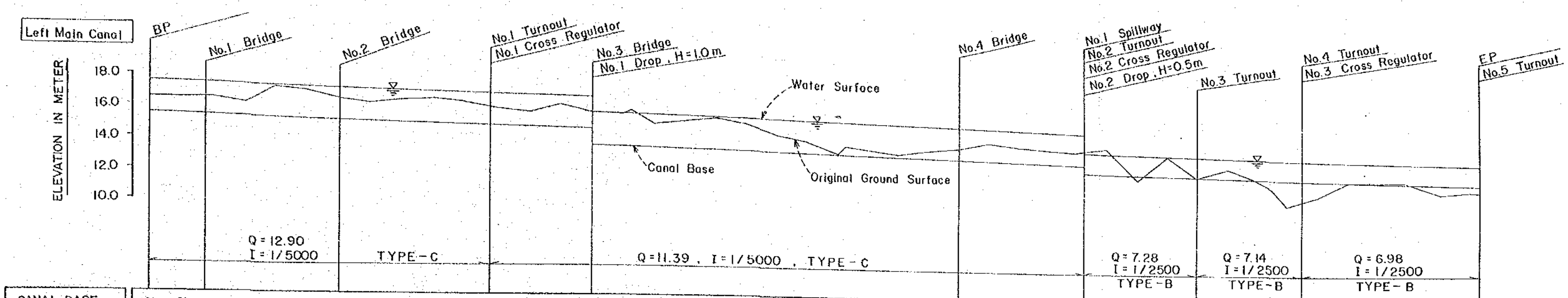
MAIN CANAL

DIMMENSION TABLE(mm)

CANAL TYPE	B	H_1	H_2
C	2500	2530	600
D	3000	2950	600

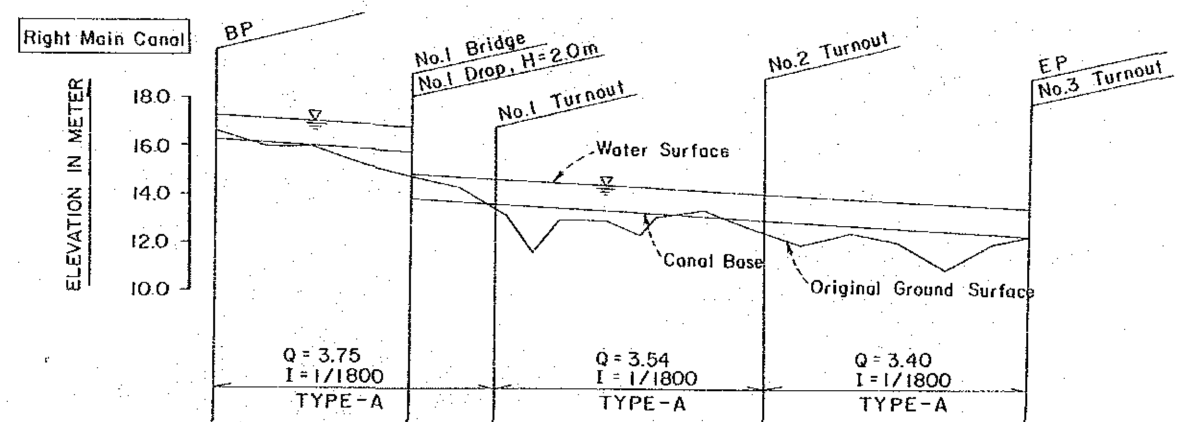
GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-04	PROFILE OF UPPER MAIN CANAL

Left Main Canal



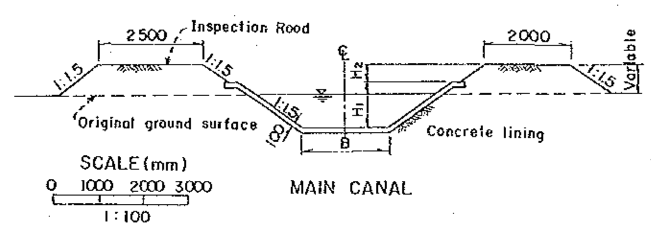
STATION	CANAL BASE ELEVATION	WATER SURFACE ELEVATION	GROUND SURFACE ELEVATION	REDUCED DISTANCE	DISTANCE
NO.0	15.2	17.3	16.7	0.0	0.0
NO.1	15.2	17.2	16.7	200.0	200.0
NO.1 +150.0	15.1	17.2	16.7	350.0	150.0
NO.2	15.1	17.2	16.7	400.0	50.0
NO.3	15.1	17.2	16.3	600.0	200.0
NO.4	15.0	17.1	17.3	800.0	200.0
NO.5	15.0	17.1	17.1	1000.0	200.0
NO.6	15.0	17.0	16.5	1200.0	200.0
NO.7	14.9	17.0	16.3	1400.0	200.0
NO.8	14.9	17.0	16.5	1600.0	200.0
NO.9	14.8	16.9	16.5	1800.0	200.0
NO.10	14.8	16.9	15.3	2000.0	200.0
NO.10 +150.0	14.8	16.9	15.8	2150.0	150.0
NO.11	14.8	16.8	16.0	2200.0	50.0
NO.12	14.7	16.8	15.9	2400.0	200.0
NO.13	14.7	16.8	16.3	2600.0	200.0
NO.14	14.6 / 13.6	16.7 / 15.7	15.8	2800.0	200.0
NO.15	13.6	15.7	15.8	3000.0	200.0
NO.15 +65.0	13.6	15.7	16.0	3065.0	65.0
NO.16	13.6	15.6	15.2	3200.0	135.0
NO.17	13.5	15.6	15.5	3400.0	200.0
NO.18	13.5	15.6	15.7	3600.0	200.0
NO.19	13.4	15.5	15.3	3800.0	200.0
NO.20	13.4	15.5	14.6	4000.0	200.0
NO.21	13.4	15.4	14.2	4200.0	200.0
NO.22	13.3	15.4	13.7	4400.0	200.0
NO.22 +85.0	13.3	15.4	14.0	4485.0	85.0
NO.23	13.3	15.4	13.8	4600.0	115.0
NO.24	13.2	15.3	13.6	4800.0	200.0
NO.25	13.2	15.3	13.9	5000.0	200.0
NO.26	13.2	15.2	14.0	5200.0	200.0
NO.27	13.1	15.2	14.4	5400.0	200.0
NO.27 +30.0	13.1	15.2	14.4	5430.0	30.0
NO.28	13.1	15.2	14.2	5600.0	170.0
NO.29	13.0	15.1	14.0	5800.0	200.0
NO.30	13.0	15.1	14.0	6000.0	200.0
NO.30 +50.0	13.0 / 12.5	15.1 / 13.8	14.1	6050.0	50.0
NO.31	12.4	13.8	14.2	6200.0	150.0
NO.32	12.4	13.7	12.3	6400.0	200.0
NO.33	12.3	13.6	13.9	6600.0	200.0
NO.34	12.2	13.5	12.5	6800.0	200.0
NO.35	12.1	13.4	13.0	7000.0	200.0
NO.36	12.0	13.4	12.3	7200.0	200.0
NO.36 +135.0	12.0	13.3	11.8	7335.0	135.0
NO.37	12.0	13.3	10.8	7400.0	65.0
NO.37 +100.0	11.9	13.2	11.1	7500.0	100.0
NO.38	11.9	13.2	11.3	7600.0	100.0
NO.39	11.8	13.1	12.3	7800.0	200.0
NO.40	11.7	13.0	12.2	8000.0	200.0
NO.41	11.6	13.0	12.2	8200.0	200.0
NO.42	11.6	12.9	11.5	8400.0	200.0
NO.43	11.5	12.8	11.7	8600.0	200.0
NO.43 +50.0	11.5	12.8	11.7	8650.0	50.0

Right Main Canal



STATION	CANAL BASE ELEVATION	WATER SURFACE ELEVATION	GROUND SURFACE ELEVATION	REDUCED DISTANCE	DISTANCE
NO.0	16.3	17.3	16.7	0.0	0.0
NO.1	16.2	17.2	16.0	200.0	200.0
NO.2	16.1	17.1	16.0	400.0	200.0
NO.3	15.9	16.9	15.3	600.0	200.0
NO.4	15.8 / 13.8	16.8 / 14.8	14.8	800.0	200.0
NO.5	13.7	14.7	14.3	1000.0	200.0
NO.5 +150.0	13.6	14.6	13.5	1150.0	150.0
NO.6	13.6	14.6	13.2	1200.0	50.0
NO.6 +100.0	13.6	14.6	11.7	1300.0	100.0
NO.7	13.5	14.5	13.0	1400.0	100.0
NO.8	13.4	14.4	13.0	1600.0	200.0
NO.8 +140.0	13.3	14.3	12.4	1740.0	140.0
NO.9	13.3	14.3	13.1	1800.0	60.0
NO.10	13.2	14.2	13.4	2000.0	200.0
NO.11	13.1	14.1	12.7	2200.0	200.0
NO.11 +50.0	13.0	14.0	12.5	2250.0	50.0
NO.12	12.9	13.9	12.0	2400.0	150.0
NO.13	12.8	13.8	12.5	2600.0	200.0
NO.14	12.7	13.7	12.2	2800.0	200.0
NO.15	12.6	13.6	11.0	3000.0	200.0
NO.16	12.5	13.5	12.1	3200.0	200.0
NO.16 +150.0	12.4	13.4	12.5	3350.0	150.0

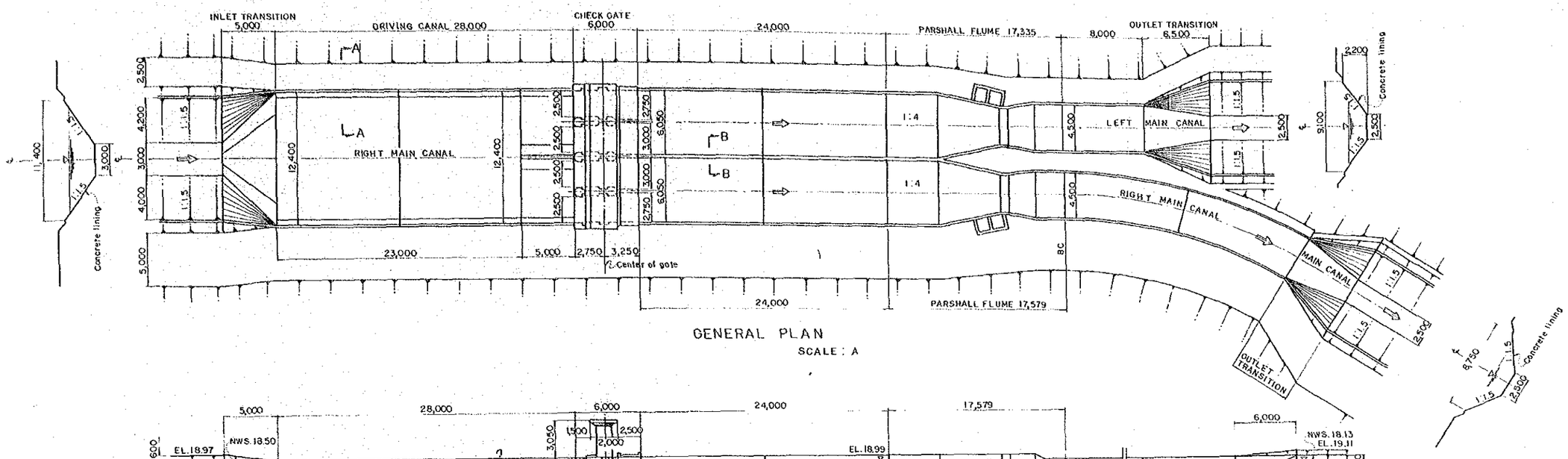
TYPICAL SECTION OF IRRIGATION CANAL



DIMMENSION TABLE (mm)

CANAL TYPE	B	H_1	H_2
A	1500	1250	400
B	2000	1630	450
C	2500	2530	600

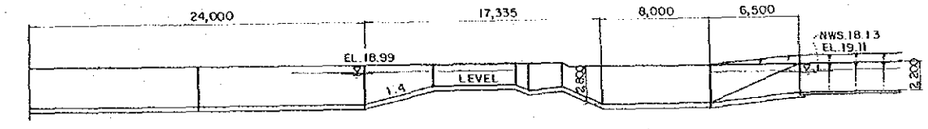
GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-05	PROFILE OF LEFT MAIN CANAL & RIGHT MAIN CANAL



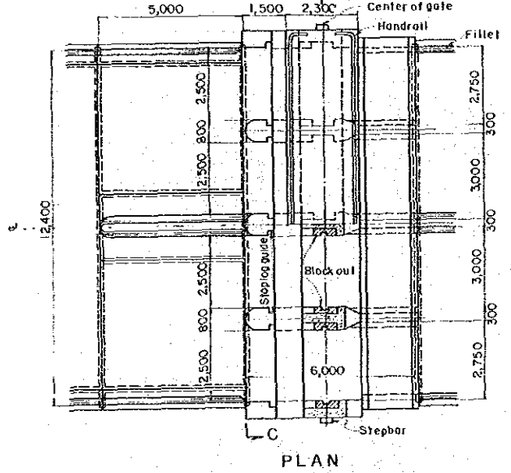
GENERAL PLAN
SCALE : A

CHECK GATE
SCALE : B

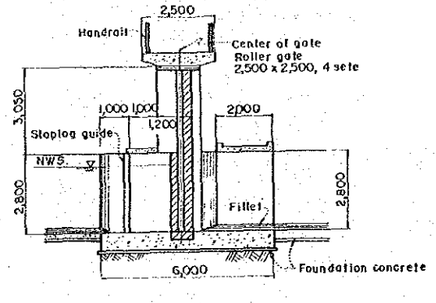
PROFILE (RIGHT MAIN CANAL)
SCALE : A



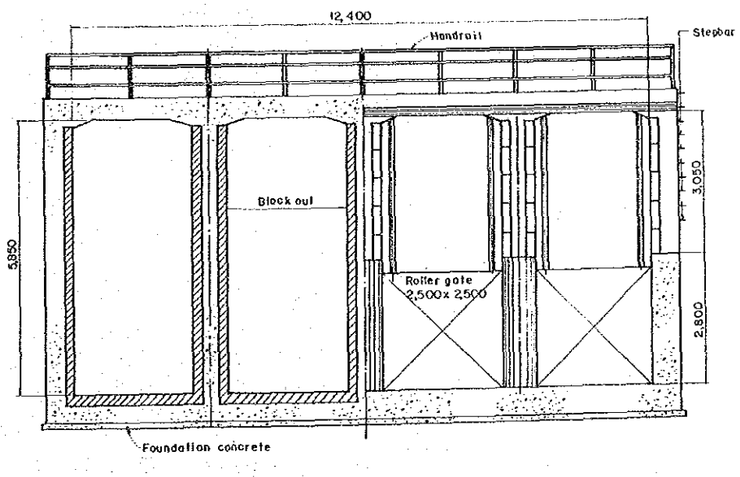
PROFILE (LEFT MAIN CANAL)
SCALE : A



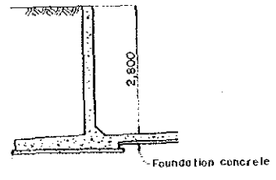
PLAN



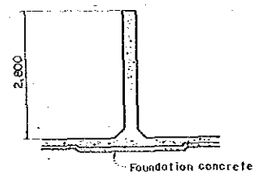
PROFILE



SECTION C-C SCALE : C



SECTION A-A
SCALE C



SECTION B-B
SCALE C

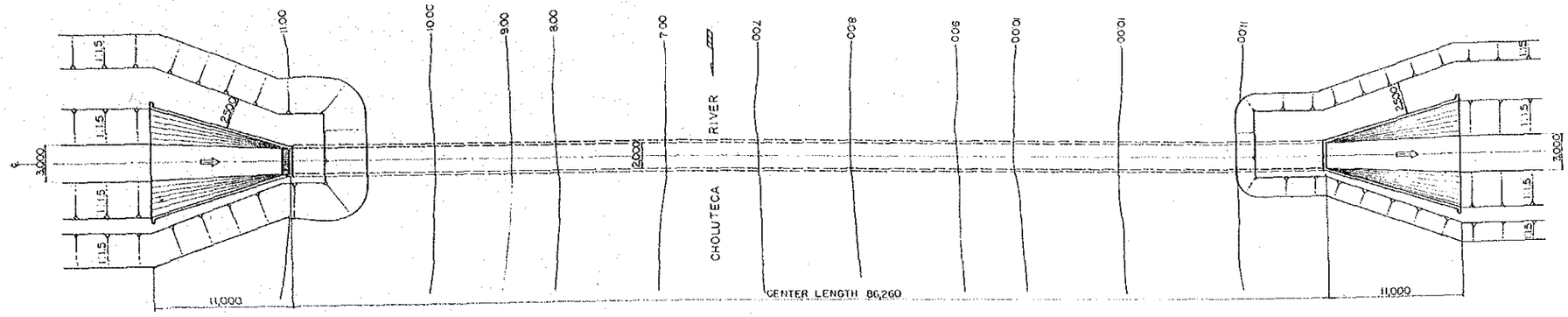
SCALE : C

SCALE A 0 20 40 60 80 100 m

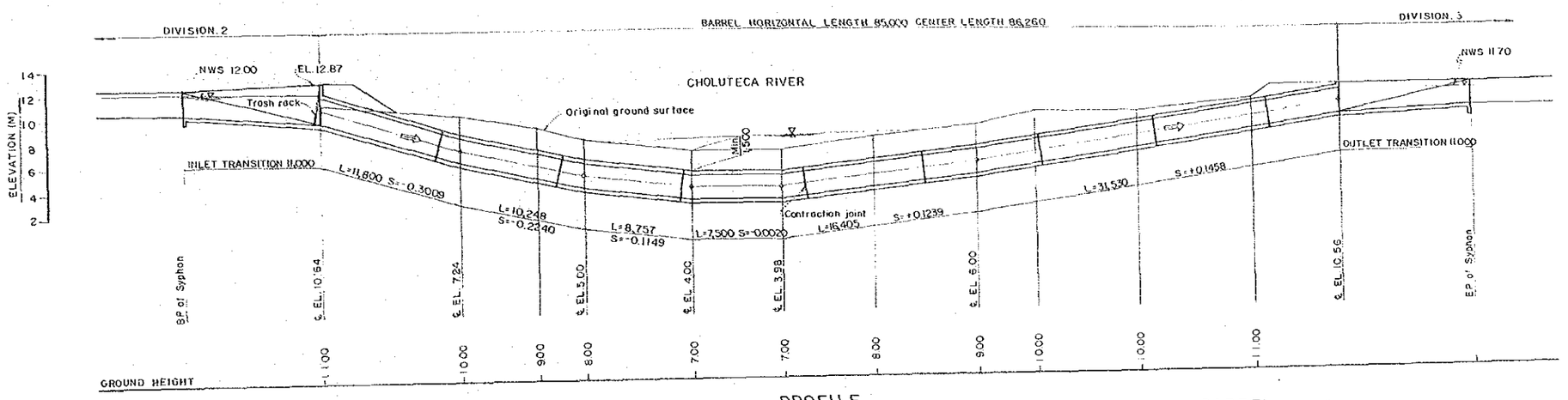
SCALE B 0 5 10 m

SCALE C 0 1 2 3 4 5 m

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-06	BIFURCATION STRUCTURE

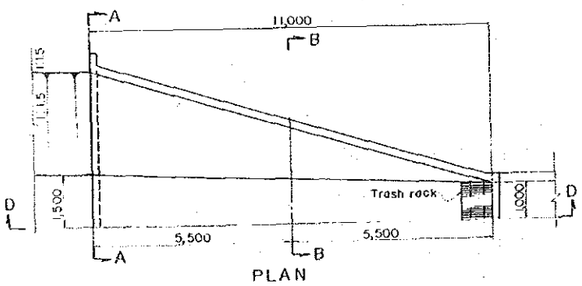


PLAN
SCALE : A

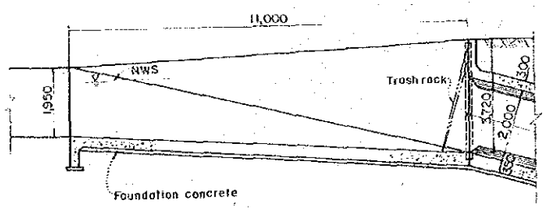


PROFILE
SCALE : A

INLET TRANSITION
SCALE : B

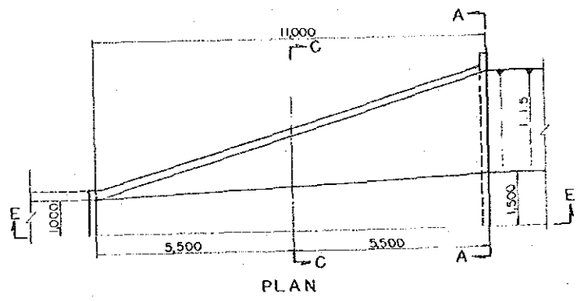


PLAN

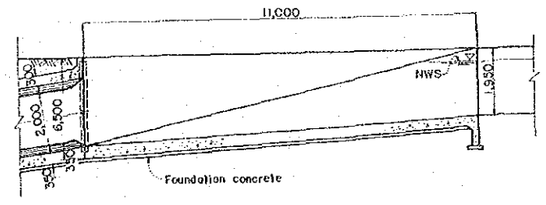


SECTION D-D

OUTLET TRANSITION SCALE : B

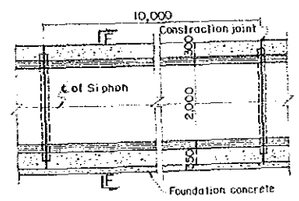


PLAN

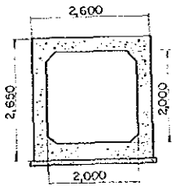


SECTION E-E

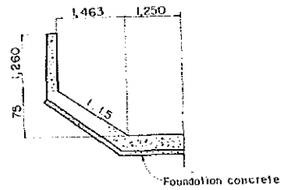
BARREL SCALE : B



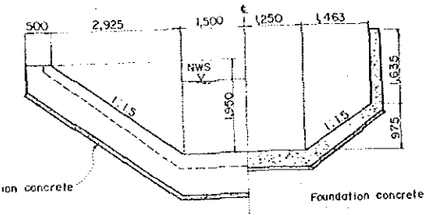
LONGITUDINAL SECTION



SECTION F-F



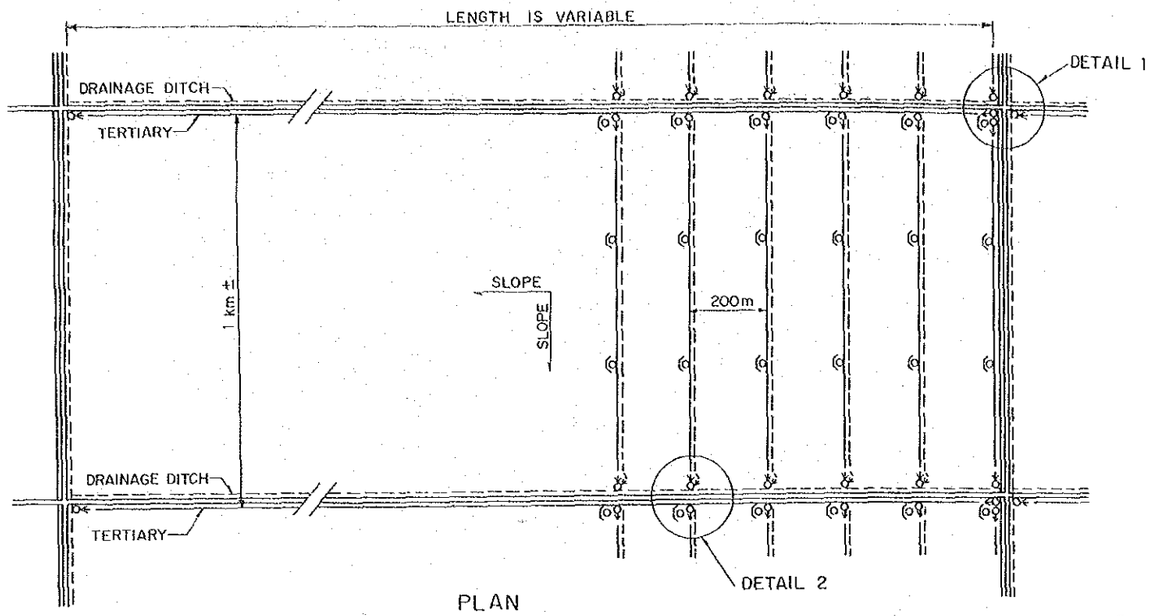
SECTION C-C
SCALE : B



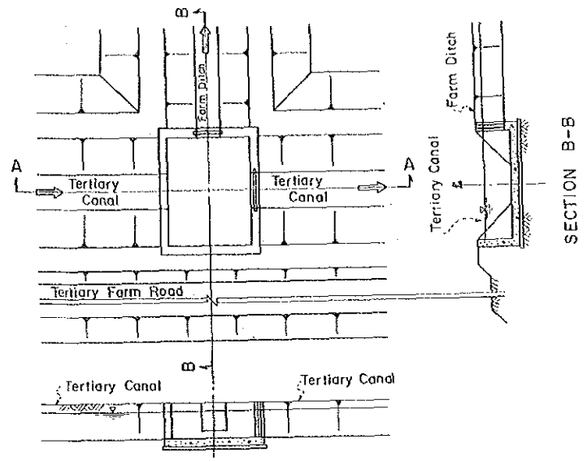
SECTION A-A SECTION B-B
SCALE : B

SCALE A 0 5 10 m
SCALE B 0 1 2 3 4 5 m

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-07	INVERTED SIPHON



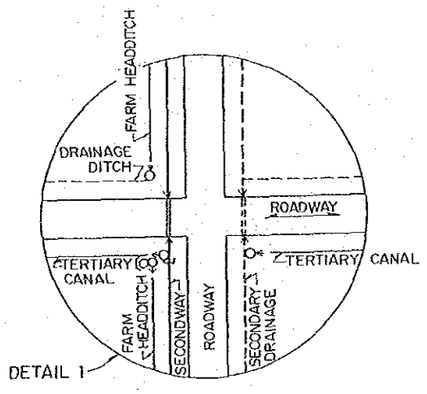
PLAN

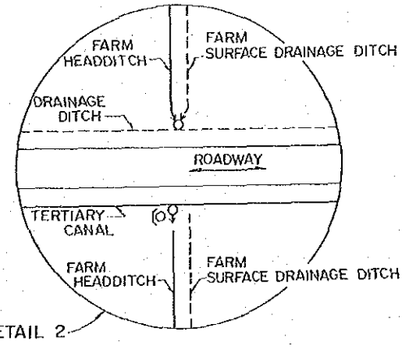


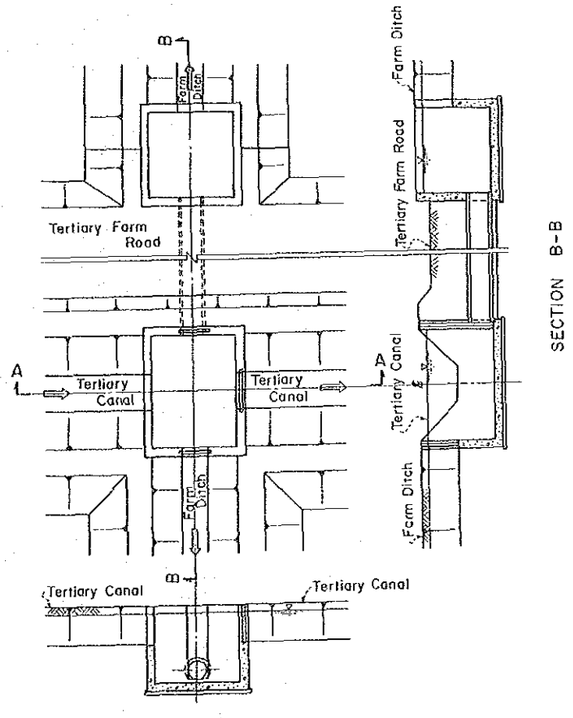
SECTION B-B

SECTION A-A

TYPE A



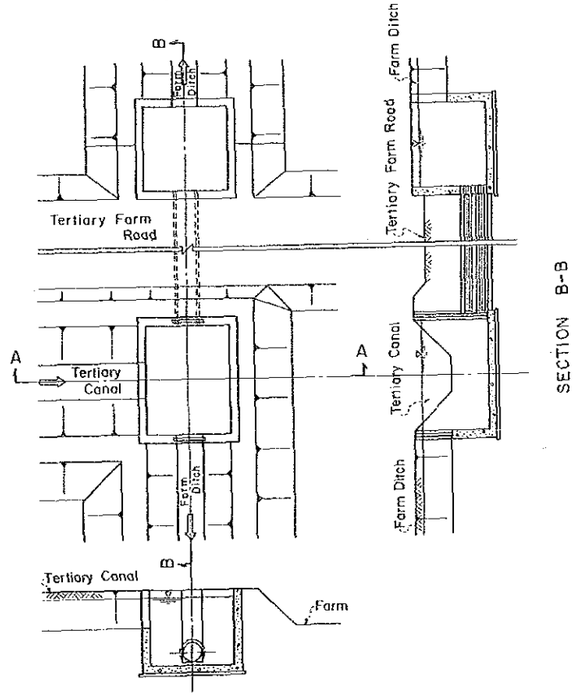




SECTION B-B

SECTION A-A

TYPE B

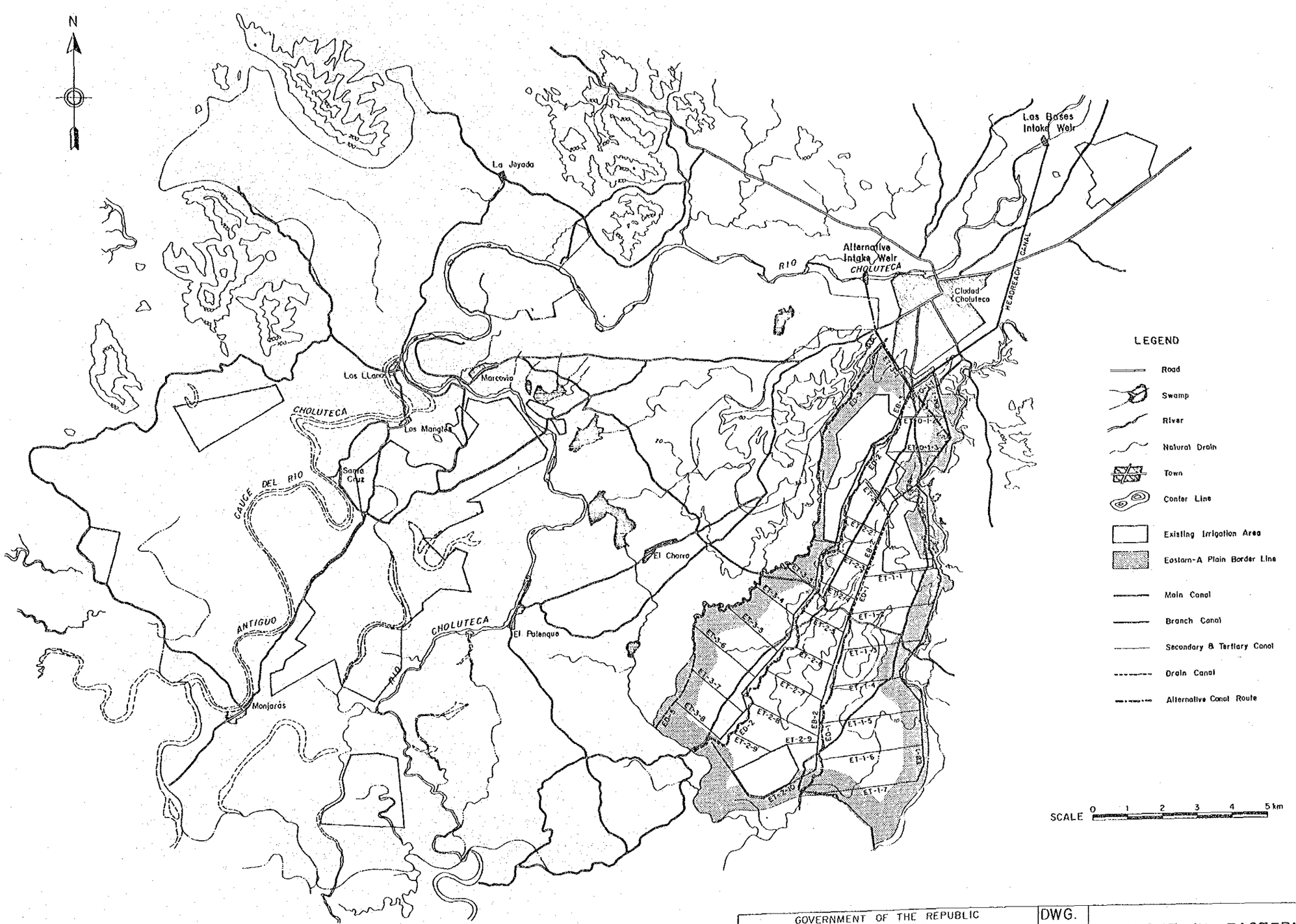


SECTION B-B

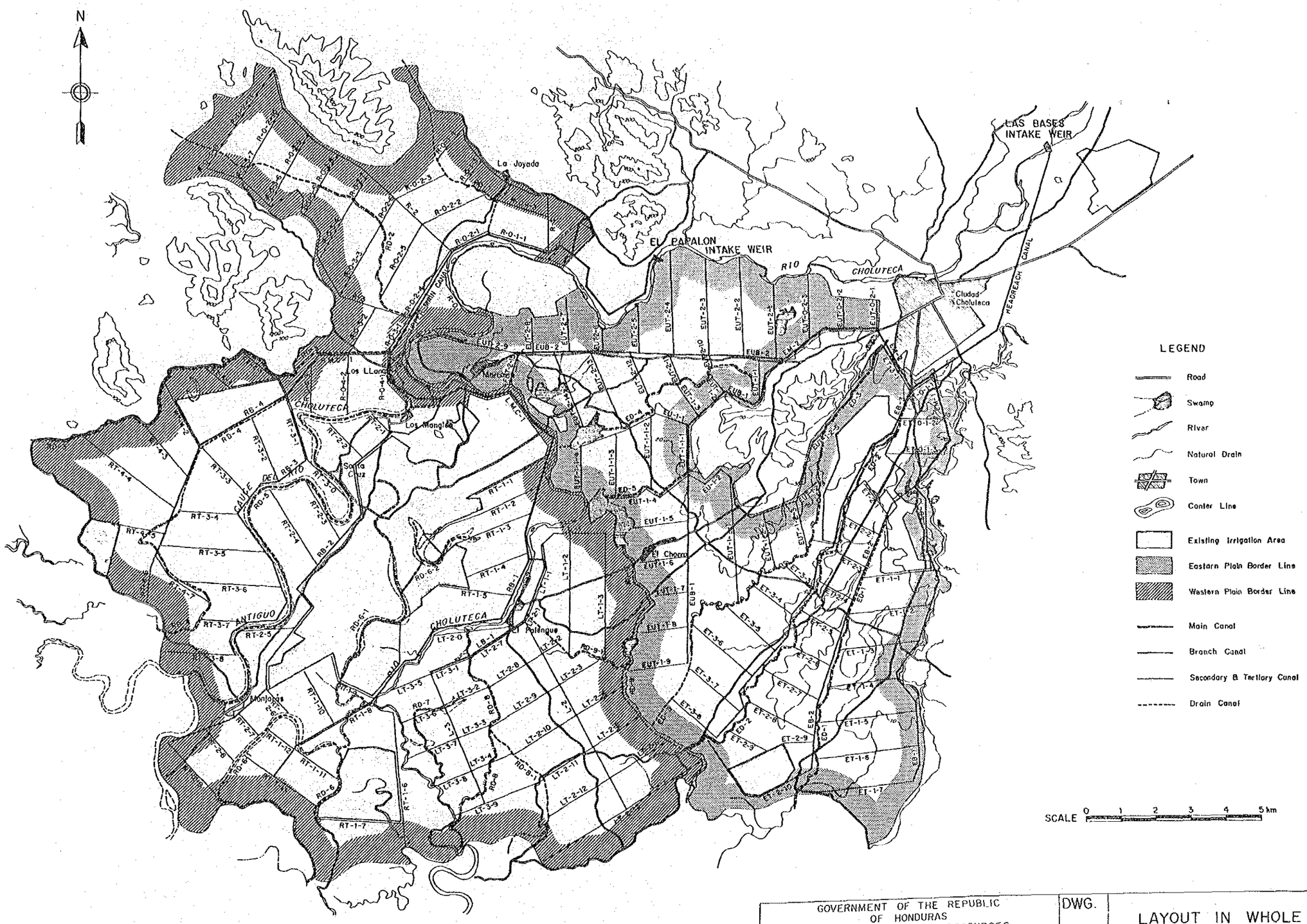
SECTION A-A

TYPE C

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-08	TYPICAL FARM LAYOUT AND DIVISION BOX



GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-09	LAYOUT IN EASTERN PLAIN-A AREA



GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. H-10	LAYOUT IN WHOLE CHOLUTECA PLAIN