Figures

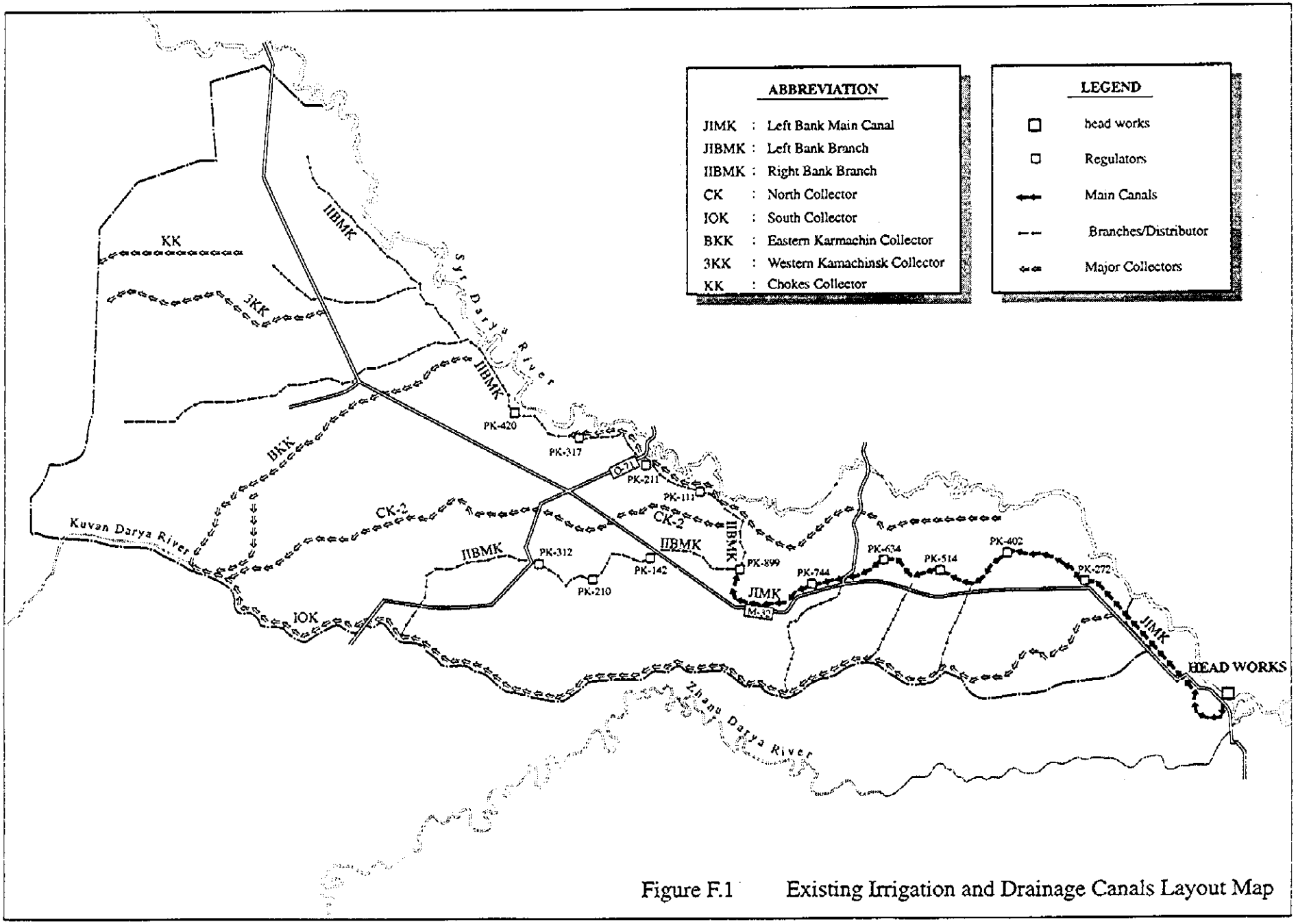


Figure F.1 Existing Irrigation and Drainage Canals Layout Map

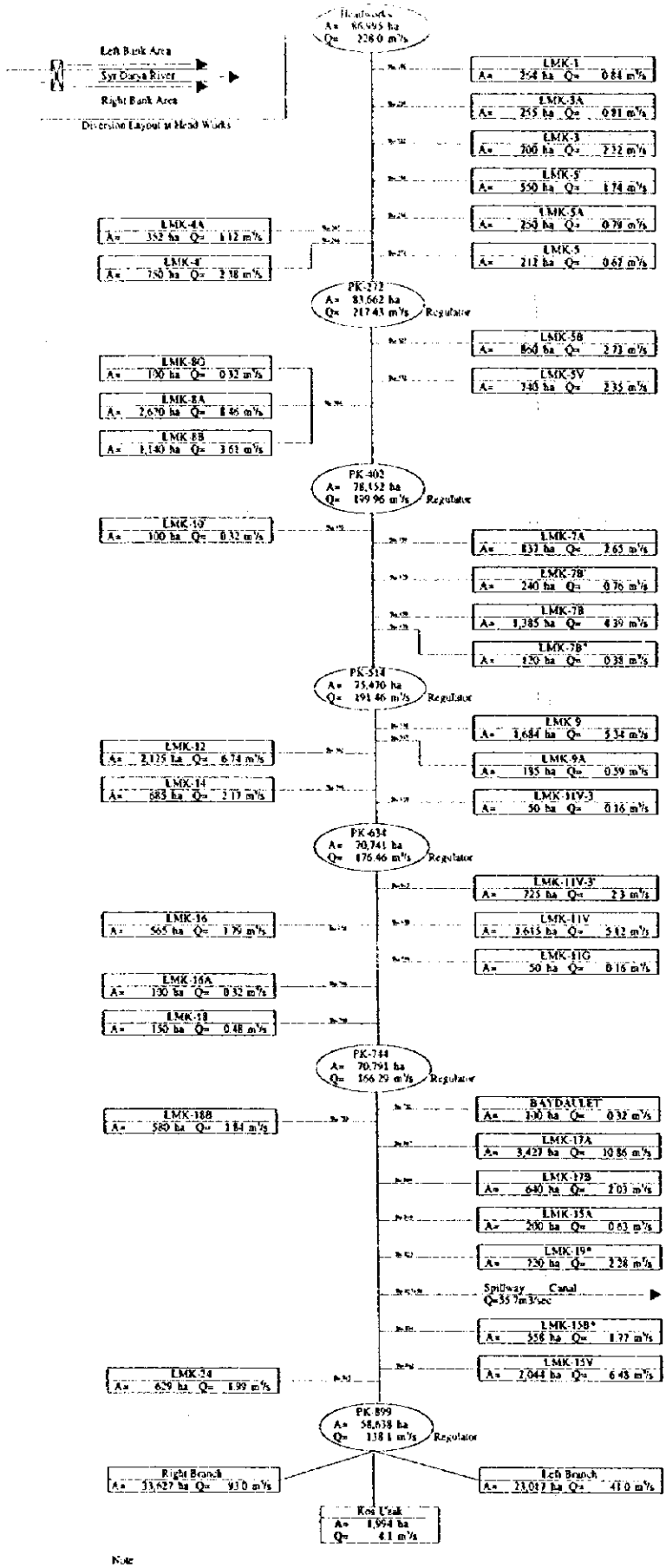


Figure F.2 Schematic Diagram of Existing Left Main Canal System

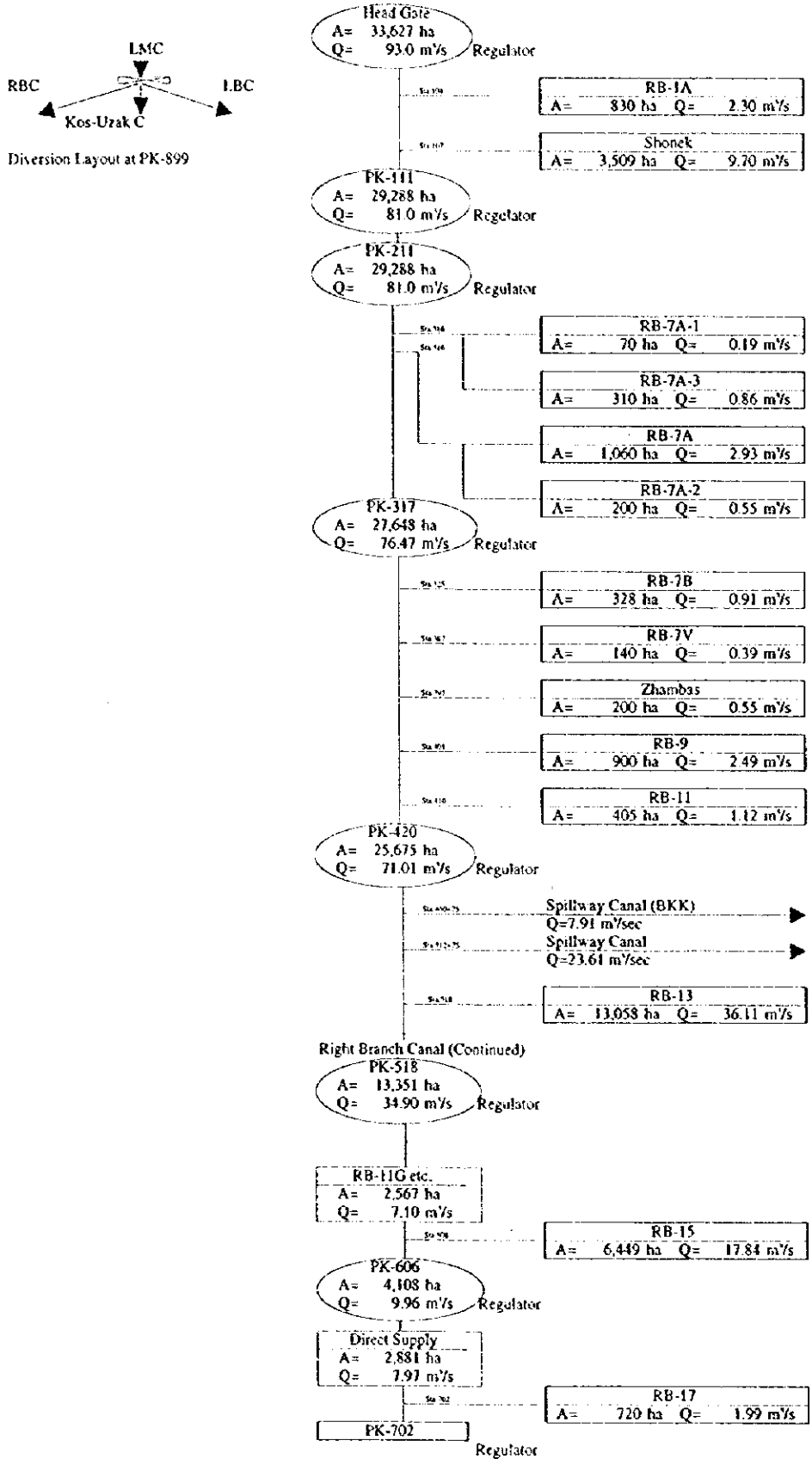


Figure F.3 Schematic Diagram of Existing Right Branch Canal System

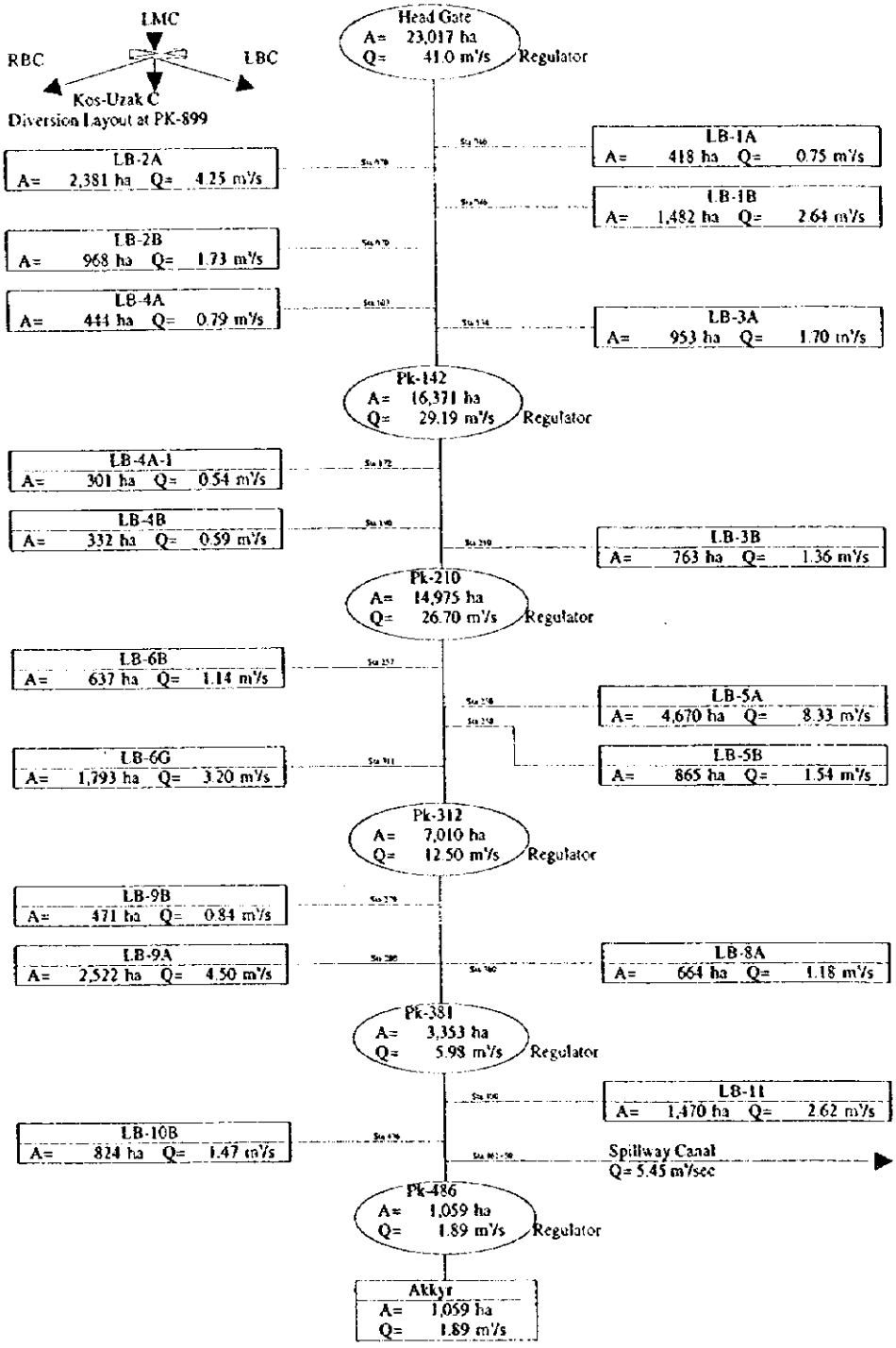


Figure F.4 Schematic Diagram of Existing Left Branch Canal System

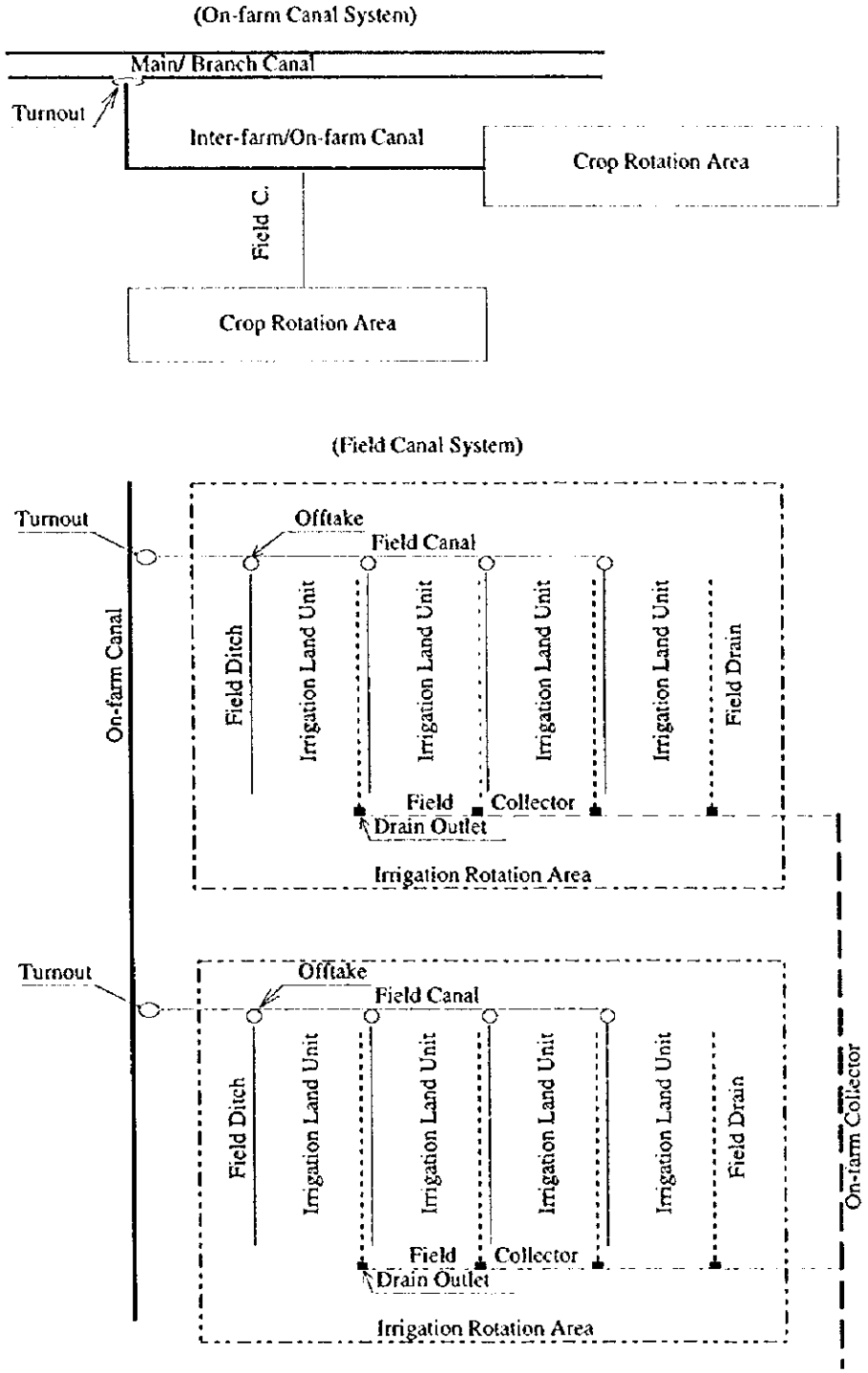


Figure F.5 Typical Layout of Irrigation Canal System

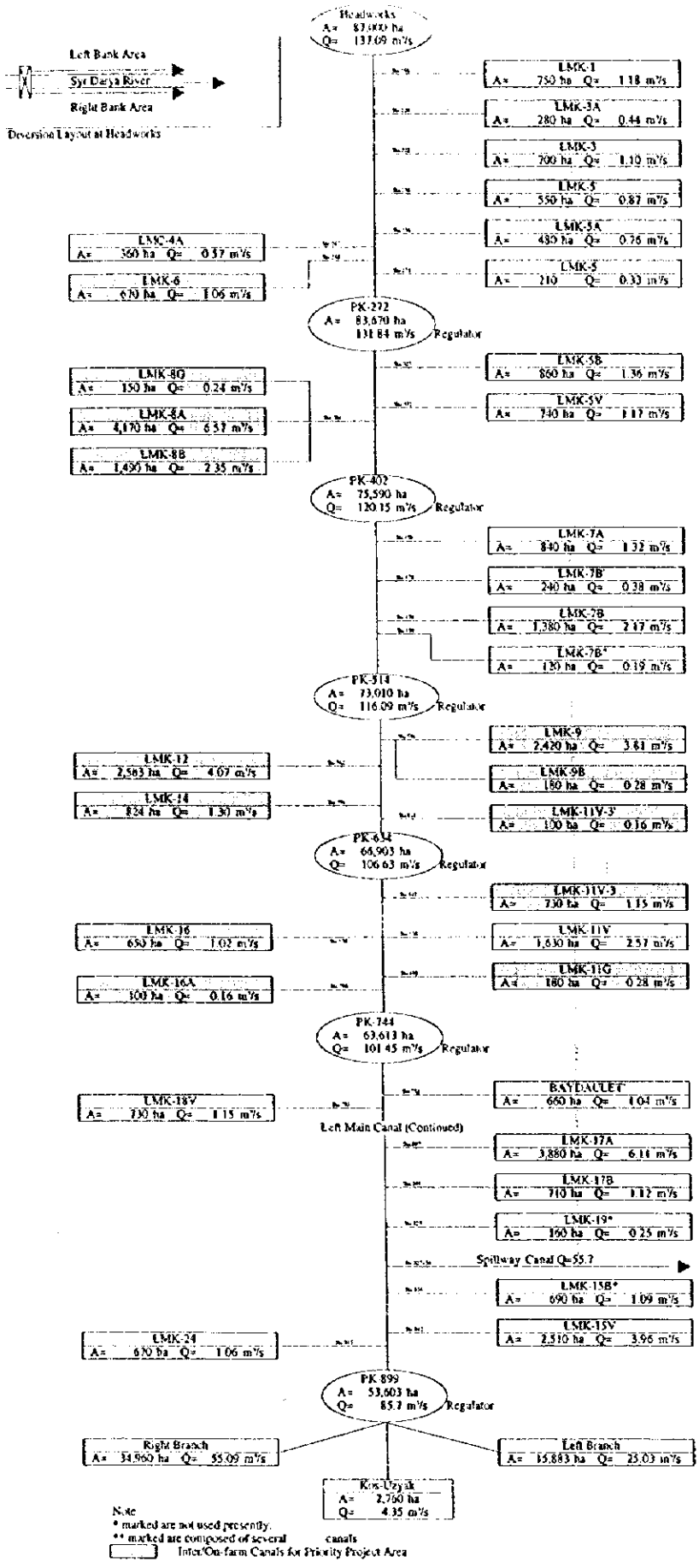


Figure F. 6 Schematic Diagram of Left Main Canal System under the Master Plan

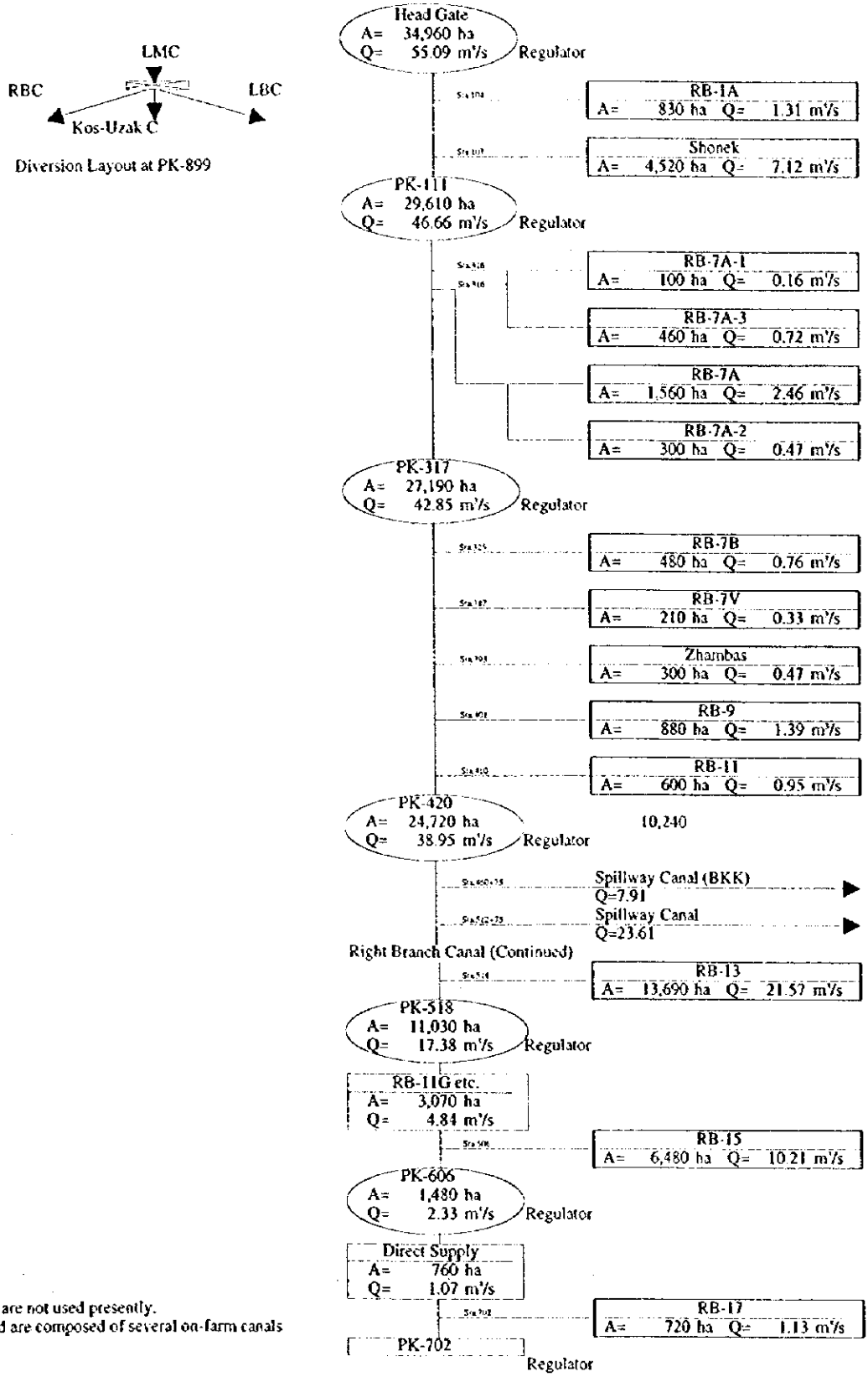


Figure F.7 Schematic Diagram of Right Branch Canal System under the Master Plan

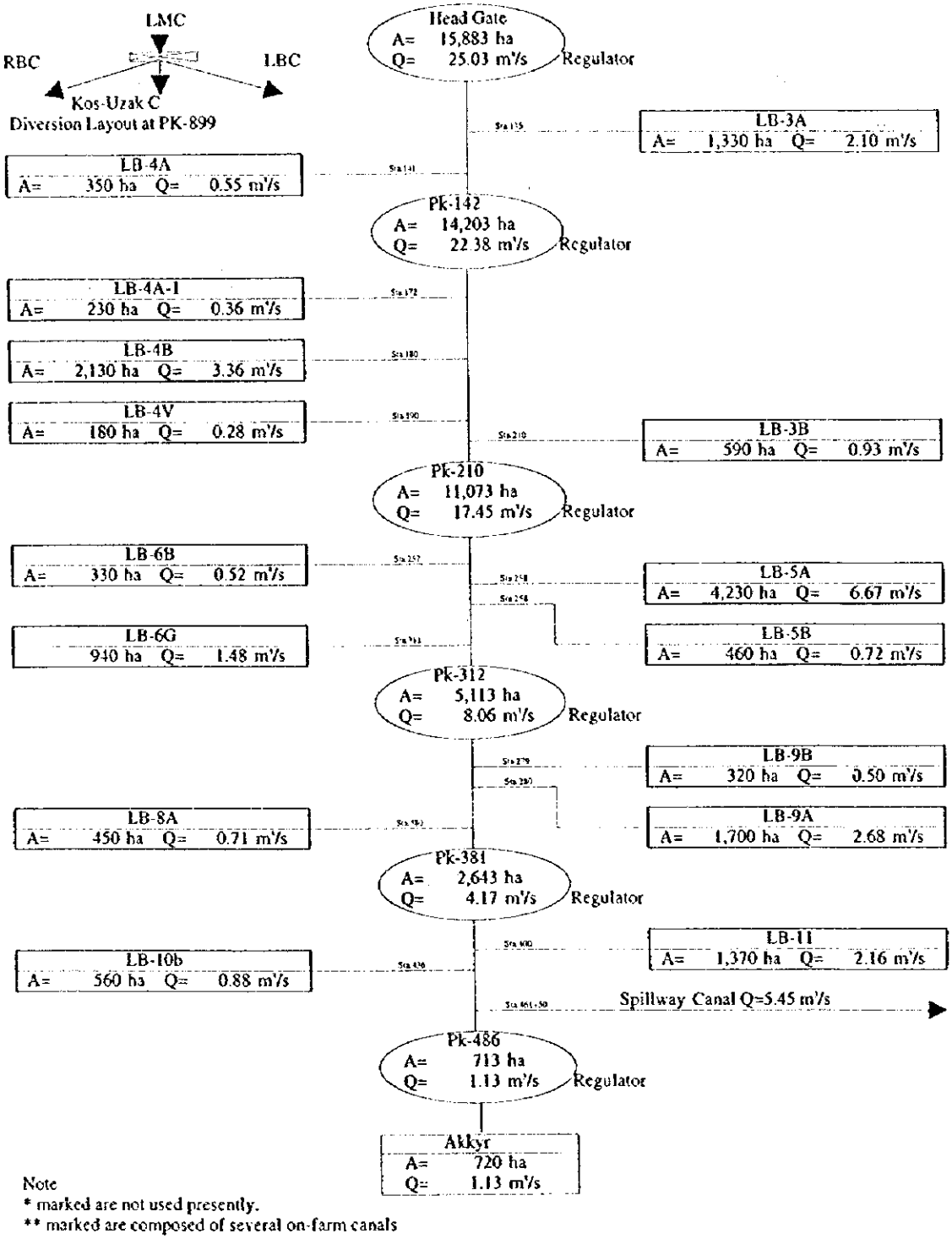


Figure F.8 Schematic Diagram of Left Branch Canal System under the Master Plan

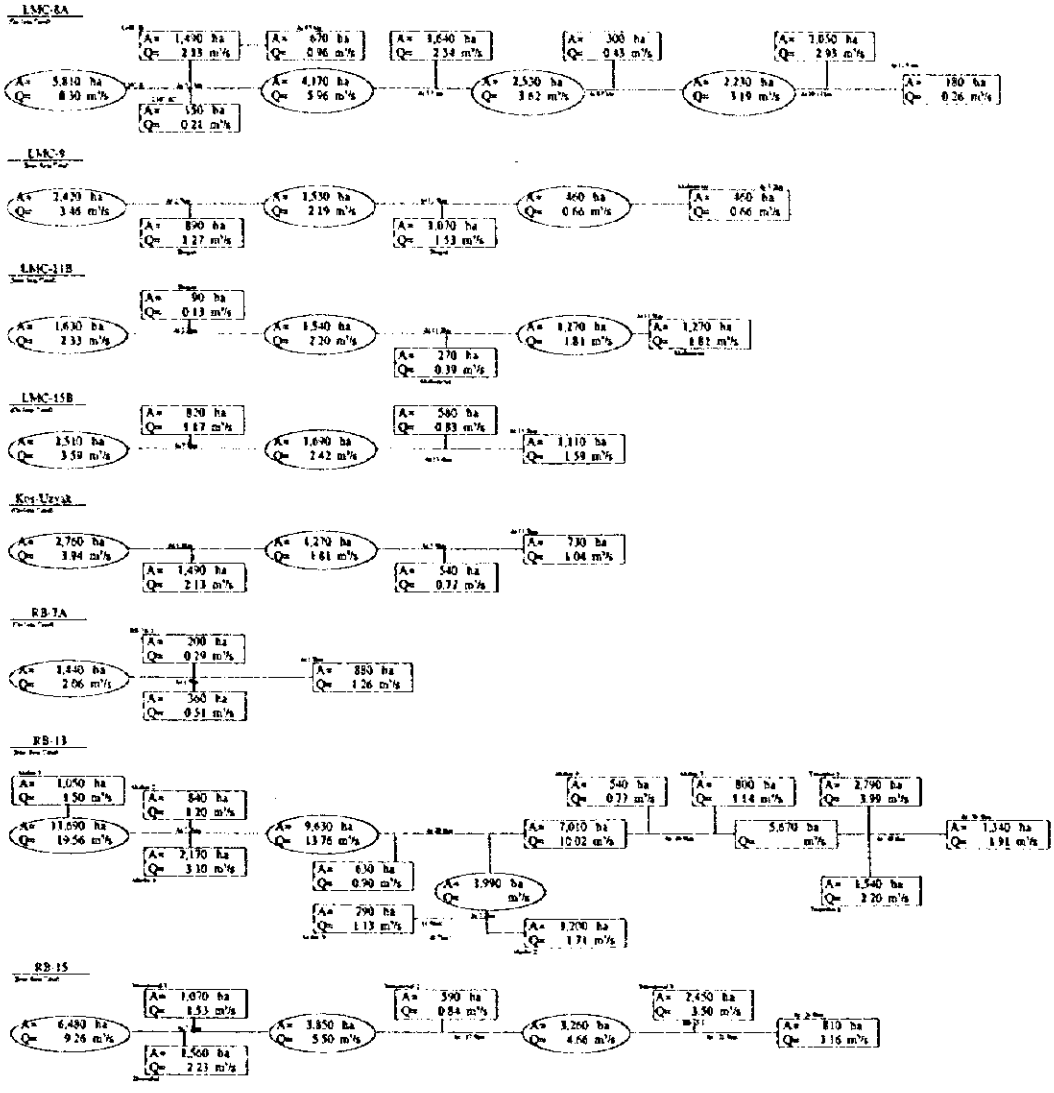


Figure F.9 Schematic Diagram of Major Inter-farm/On-farm Canal Systems under the Master Plan

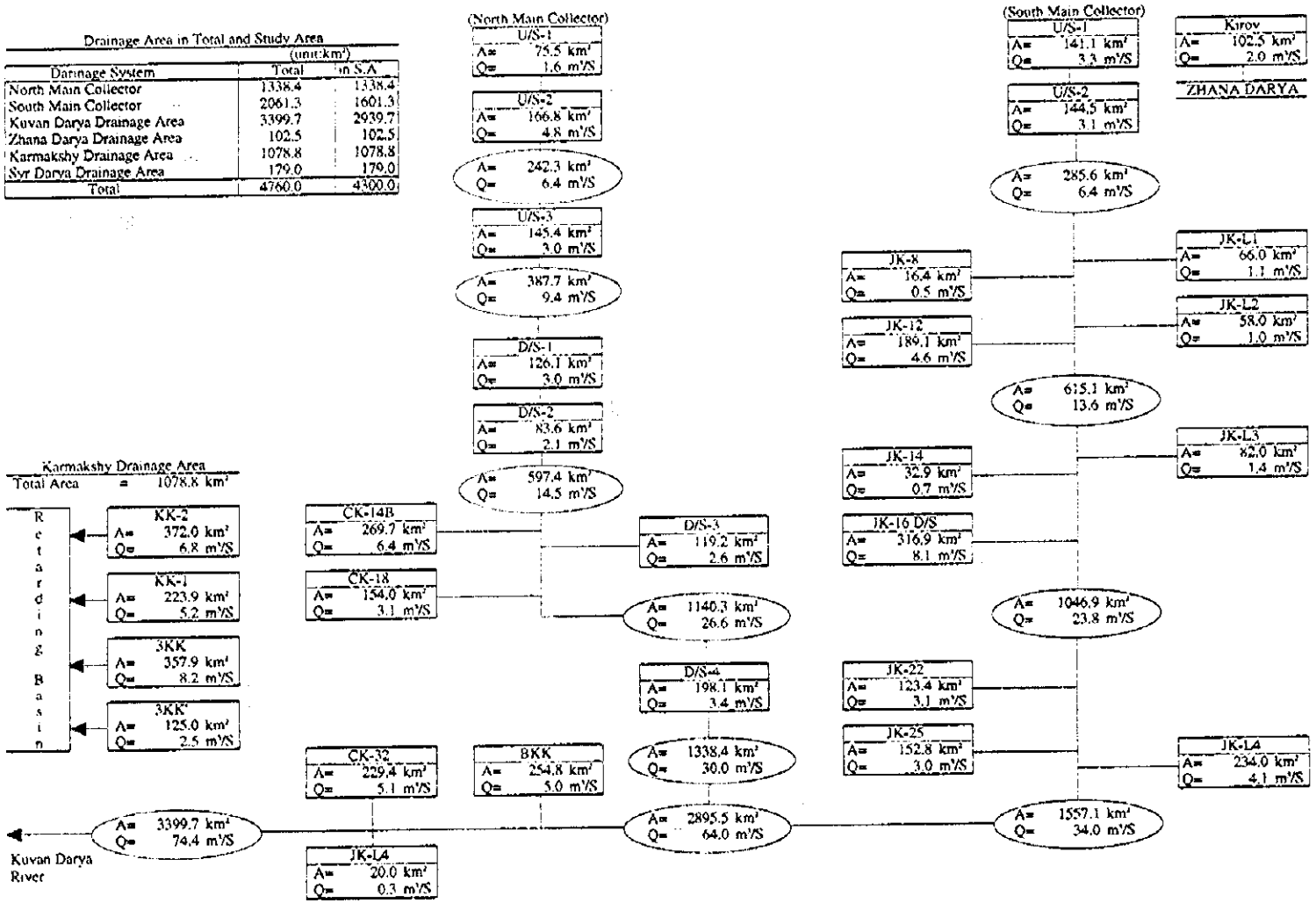


Figure F.10 Schematic Diagram of Drainage Systems under the Master Plan

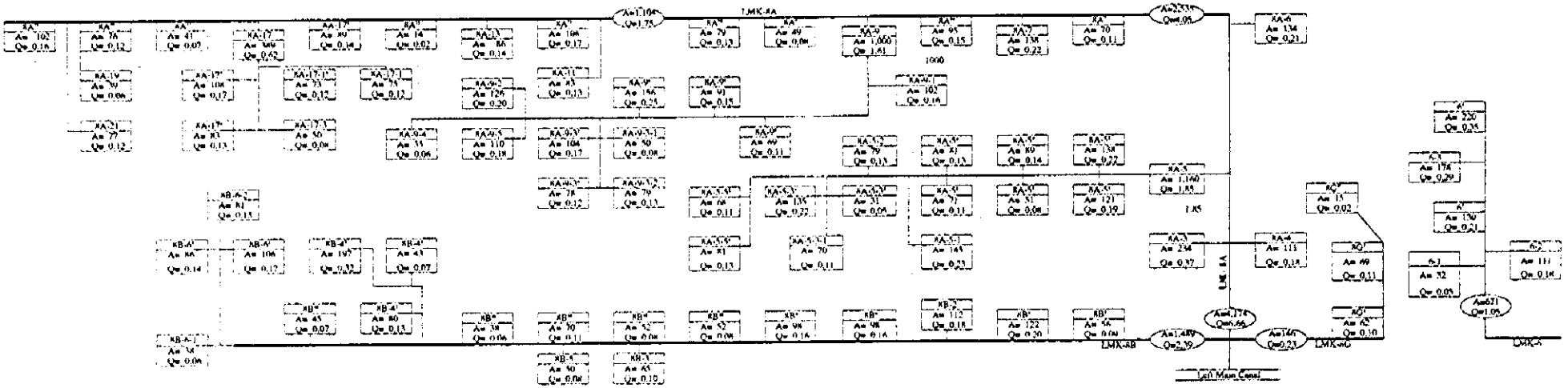


Figure F.11 Schematic Diagram of Existing Irrigation System in the Ilyasov Area

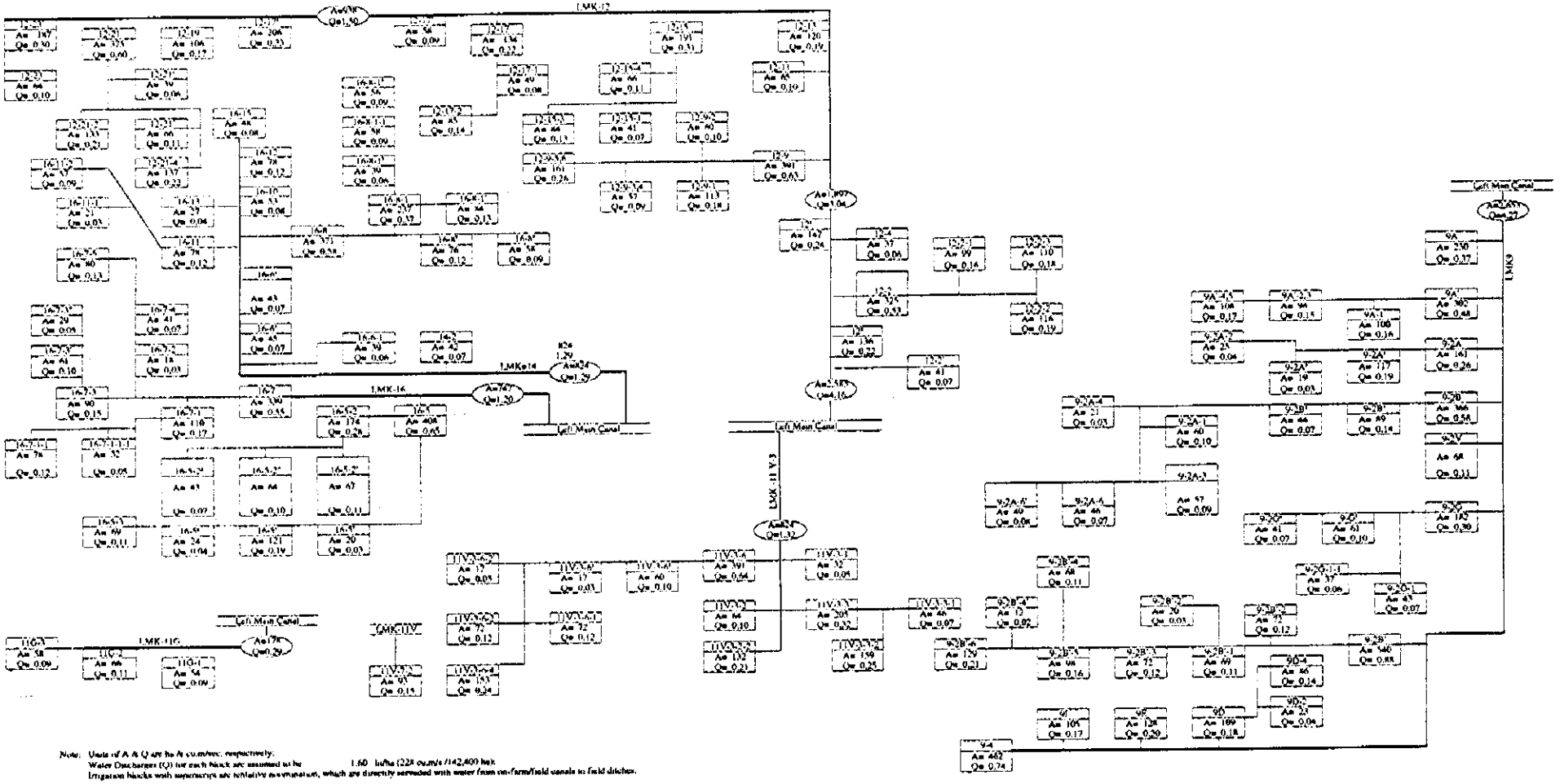
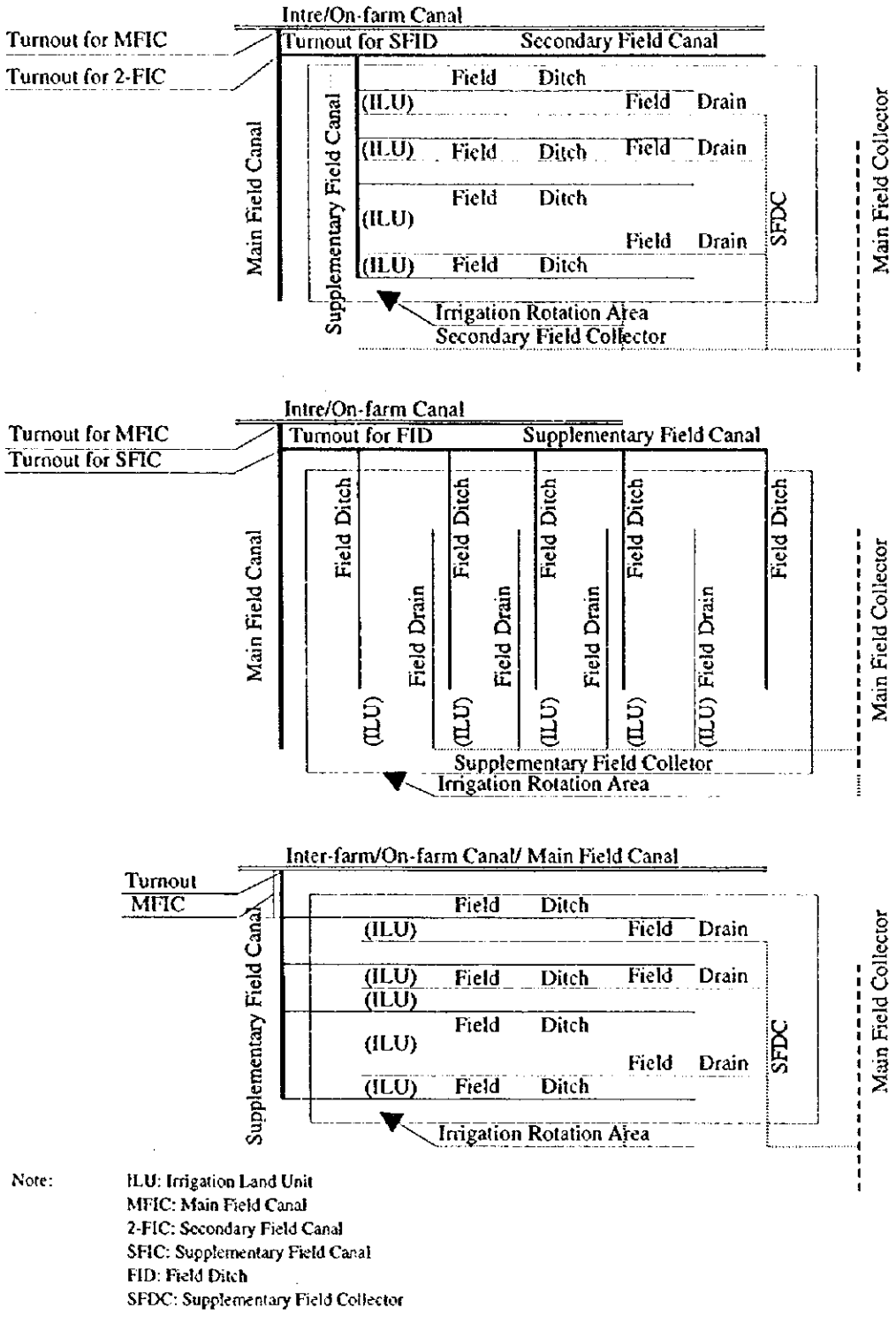
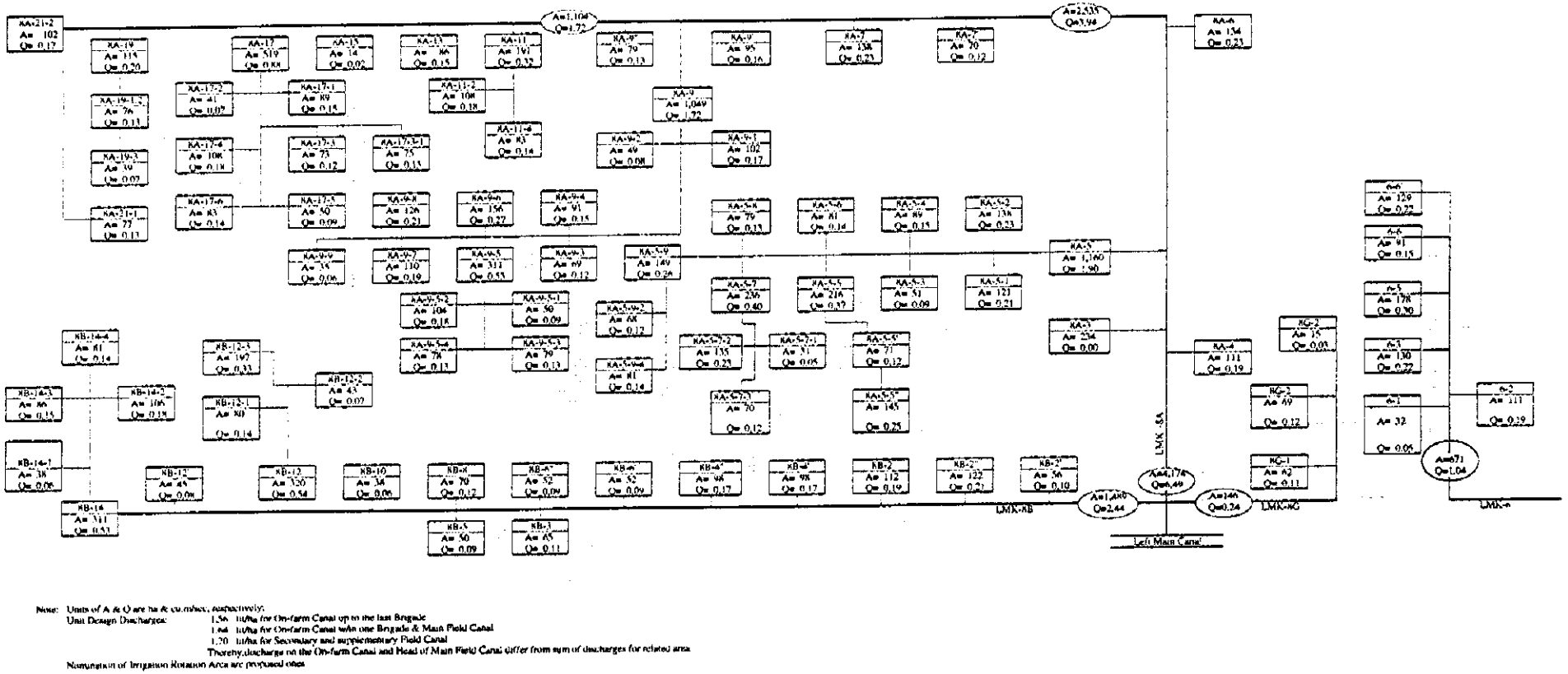


Figure F.12 Schematic Diagram of Existing Irrigation System in the Shagan Area



Note: ILU: Irrigation Land Unit
MFIC: Main Field Canal
2-FIC: Secondary Field Canal
SFIC: Supplementary Field Canal
FID: Field Ditch
SFDC: Supplementary Field Collector

Figure F.13 Typical Layout of Field and On-farm Canal Systems



Note: Units of A & Q are ha & cu.m/sec, respectively.
Unit Design Discharges: 1.56 lit/ha for On-farm Canal up to the last Brigade
1.44 lit/ha for On-farm Canal wiht one Brigade & Main Field Canal
1.20 lit/ha for Secondary and supplementary Field Canal
Thereby,discharge on the On-farm Canal and Head of Main Field Canal differ from sum of discharges for related area
Numeration of Irrigation Rotation Area are proposed ones

Figure F.14 Schematic Diagram of Proposed Irrigation System in the Ilyasov Area

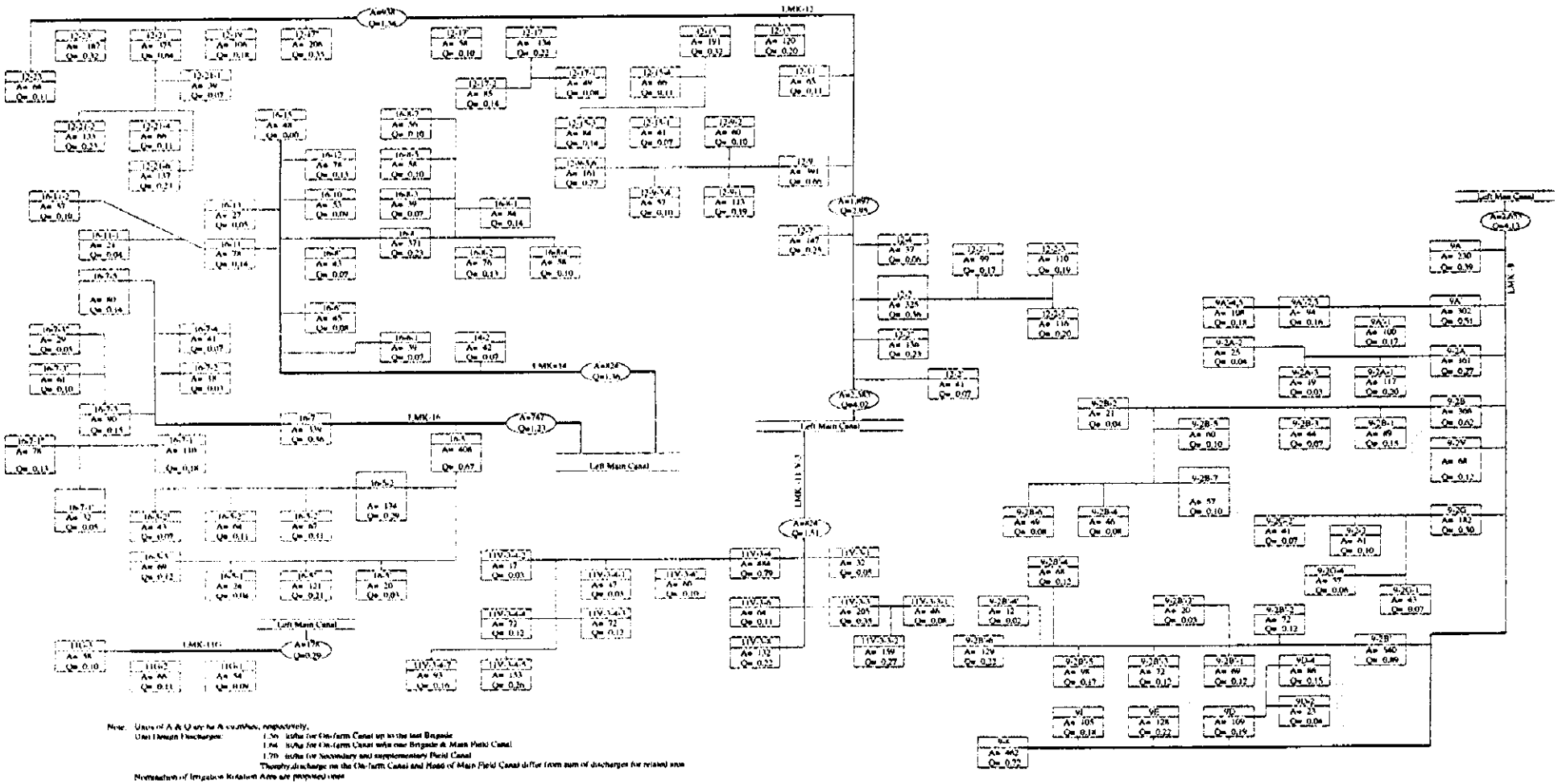


Figure F.15 Schematic Diagram of Proposed Irrigation System in the Shagan Area

ANNEX - G

WATER MANAGEMENT AND O&M OF PROJECT FACILITIES

ANNEX-G

WATER MANAGEMENT AND O&M OF PROJECT FACILITIES

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ANNEX - G

WATER MANAGEMENT AND O&M OF PROJECT FACILITIES

1. Introduction

This ANNEX together with its Appendices is prepared to support the Study Report of the Kzyl-Orda Irrigation/Drainage and Water Management Project in Republic of Kazakstan by providing rationales and data sources relevant to the Water Management and O&M of Project Facilities. The water management issues discussed hereafter are described in line with the following three headlines; namely objectives, methodology and findings.

2. Objectives

2.1 Schema of Water Management

The objective of the water management in a broad sense is to control the natural state water for human use. It means that every human concernment with water connotes water management. The methodology to achieve the objective of the water management can be conveniently divided into institution management, facilities management and information management. The information management stands for an interfacial position connecting the facilities system and the institution system.

The facilities system is considered as transformed nature that consists of the fixed structures and the movable structures. The maintenance of the facilities system refers to both structures, while the operation of the facilities can be materialized through operating the movable structures such as regulator, sluice gate, valve, notch and the like. When the facilities management is stressed, it is often called operation and maintenance (O&M) system (Figure G-1).

The water management in the Study refers to the irrigation water management in the Kyle-Orda Project unless otherwise specified and its objective is to supply necessary irrigation water for crop cultivation. Above mentioned objective can be realized in conformity with the water management practices described below (Figure G-2).

2.2 Water Management Practices

(1) Estimation of Available Water Amount

The Committee on Water Resources (CWR) under the Ministry of Agriculture is the responsible body to determine the interstate water sector agreements which are significant to sustain the state economy since the interstate inflow into the territory reaches as high as 50% in Kazakstan (Appendix C). While, a report on the flow regime from the River Basin Organization (or Union) (BVO), is also meaningful in estimating the amount of available water. This estimation is based on snow depth in the upper basin and reservoir storage, and should be completed before irrigation period starts.

(2) Water Supplier and Water User

There are two lines of institutions in the project water management as illustrated in Figure G-10. The Committee on Water Resources represents the "Water Supplier" side, while the Production Cooperative (former Farm was renamed but Farm is still used in this Annex as the case may be) represents the "Water User" side. Both parties are independent self-financing bodies confronting each other at the water delivery point (customarily called Hydro-Post) regarding water quantity and water price.

(3) Annual Cropping Plan and Request of Demand Amount

The Production Cooperatives draw out the annual cropping plan to estimate the seasonal water requirement by end of March and request the water allocation to the Raion Management of Watereconomy System. This request provides a basis to water delivery plan and collection of water charge.

(4) Negotiation for Water Allocation and Water Pricing

The negotiation for water allocation and water pricing between both parties starts early April and concludes by the end of April. Coordination of the Raion Akim (District Chief) or Oblast Akim (Governor of Province) may be requested from the both parties as the case may be, because the subject matters are substantially hard task to come to full agreement between both parties.

(5) Water Delivery and Monitoring

The water delivery operation commences around mid-April to irrigate spring wheat and ends during late August along with the agreed water delivery schedules. The delivered water is monitored at each Hydro-Post for the water charge collection with 10-day interval by the staff of the Raion Management of Watereconomy Systems together with staff of the Hydro Stations. Telecommunication system between the Hydro Station and the Raion Management of Watereconomy System or Hydro Department is the major measures for water operation as depicted in Figure G-4.

(6) Monitored Data and Data Management

The water delivery schedule and the actual discharge amount are constantly monitored at each Hydro-Post to report to the Oblast Committee on Water Resources for feedback adjustment (Figure G-2). It is duly important to build up a proper hydraulic model together with corresponding database to conduct the water delivery operation effectively.

(7) Collection of Water Charge

The collection of water charge is the final step to conclude the annual water management practices. The delivered water amount and water charge collected are as indicated in Table G-1 and Table G-2. Site survey revealed that the water charge equivalent to 5.63 tiyn/cum is fixed since 1995 and an estimated O&M cost comes up to US$17/ha.

3. Methodology

3.1 Institution Management

(1) General Description

Figure G-2 indicates that the institution system forms hierarchy structure being interlinked with the information system. The centralized water management system is currently common practices over the world including Kazakstan. However, the decentralization under the concept of local participation or Water Users Association (WUA) is a general tendency in recent years associating with the advancement of computer technology and communication infrastructures.

(2) Committee on Water Resources

Water together with land are the most fundamental resources for agricultural production, but both are not products of human labor. They are substantially different from the ordinary marketable commodities. This fact calls for the state intervention to water as well as land sectors in most countries.

The Committee on Water Resources (CWR) under the Ministry of Agriculture is responsible for organizing the overall water administration in Kazakstan. Major activities of CWR with channel to the project water management are illustrated in Figure G-6.

(3) River Basin Organization

There are two types of rivers in Kazakstan namely interstate rivers and domestic rivers. In case of the interstate rivers, the state level water management is required to fulfill the interstate agreements in terms of river constraints. In case of domestic rivers, the state level water management has exclusive power to control the river water.

The original river flow depends fully on natural conditions, therefore, monitoring of hydrological information is substantially important for the river water management. There are eight River Basin Organizations (BVOs) under CWR covering the entire territory of the Republic (Map 1). The Kzyl-Orda Irrigation/Drainage Project area is under jurisdiction of the Syr Darya River Basin Organization in Chimkent.

(4) Oblast Committee on Water Resources

Under CWR there are nineteen Oblast Committees on Water Resources (OCWR) in each of the Oblasts (Map 2). The Kzyl-Orda OCWR is the responsible body for the Project. The Project level water management refers to the operation and maintenance (O&M) of the facilities under the Kzyl-Orda Irrigation/Drainage Project as described in Table G-7 and Table G-8.

CWR and OCWR receive their funds from the central government but all of the raion level operations are now self-supporting in financial arrangement that seriously suppresses the O&M activities of the Project.

(5) Raion Management of Watereconomy System

Under the Kzyle-Orda OCWR the Raion Management of Water Economy System (sometimes called Raion Water Management Office) together with the Hydro-Stations holds pivotal role in the practical project level water management. The four Raion Management of Water Economy Systems correspond with administrative jurisdiction such as Syrdariya, Terenozek, Zhalagash and Karmakshi Raions in the Kzyl-Orda Oblast, as shown in Map 3 and Figure G-7.

(6) Production Cooperative

The Production Cooperatives (former Farm) represents "Water User" side forming an independent "Enterprise" style without any financial support from the Government. The Farm level water management refers to O&M of on-farm canal down to the terminal farm plot. The objectives of the Farm level water management are:

- To maintain the function of the on-farm facilities up to the original level as possible,
- To operate the facilities so as to ensure the planned discharge at each inlet, and
- To maintain the soil moisture conditions so as to apt to crop requirement.

The on-farm O&M operations are currently undertaken by the Hydro-Engineer/Technician under the instruction of the Chief Agronomist (Figure G-9 and Figure G-10).

3.2 Facilities Management

The facilities management is identical to the operation and maintenance (O&M) of project facilities. The maintenance refers to the activities to keep the facilities as original state as possible. While the operation means the activities to take out the originally intended function of facilities.

Major items of facility inventory by management body are presented in Table G-4 and Table G-5. The Kzyl-Orda Head Works and the Left Main Canal down to PK 420 are directly managed by the Hydro-Department for Kzyl-Orda Headworks due to its structural importance and technical requirement. Two alignments of drainage canals are also managed by the Department of Zhanadaria Canal Management under the Kzyl-Orda Oblast Committee on Water Resources.

Meantime, the Hydro-Posts at the heads of the Inter/on-farm canals are managed by the Telenozek Raion Management of Watereconomy System. While, the Inter/on-farm canals themselves are managed by the Production Cooperatives. The present Farm management in terms of the water management and O&M of Project facilities is proposed to be reorganized into the Water Users Association. under the Project.

3.3 Information Management

(1) General Description

The information management occupies a pivotal role in the water management and consists of the following systems:

(a) Monitoring System,

(b) Communication System, and

(c) Data Management System.

The overall water management scheme is illustrated in Figure G-2 and Figure G-3 which represent not only the scope of the information management but also the relation with the institutions involved and the facilities to be managed.

(2) Monitoring System

The Project facilities are currently managed through the line of Hydro StationÅ\Raion Management of Watereconomy System (Raion Water Management Office)Å\Hydro DepartmentÅ\Kzyl-Orda Oblast Committee on Water Resources as illustrated in Figure G-2 and Figure G-3. While, the on-farm canals are managed by the Farm management, as shown in Figure G-9.

The most important water management activities in the above line would be the water level and discharge measurements by providing the source of data for the water management. The water level measurement is carried out every ten days at each Hydro-Post by the Hydro Station staff. While, the discharge measurement is undertaken twice a year to establish H-Q relationship at the same Hydro-Post sites.

(3) Communication System

The monitored hydraulic data at the regulator sites along the Left Main Canal are directly sent via PK899 local station or Terenozek Raion Management of Watereconomy System to the Hydro-Department for Kzyl-Orda Head Works through the Angara radio communication system with range around 200 km (Figure G-4).

Meantime, the monitored hydraulic data at the heads of the inter/on-farm canals are transmitted to the Terenozek Raion Management of Watereconomy System through the Len radio communication system with range around 50 km (Figure G-4). Both informations are integrated at the Oblast Committee on Water Resources for cross reference purpose in context of the water delivery schedule and the actually released water amount.

Current local communication measures between the Hydro-Posts and the Len stations are motor cycles, tractors and horses as the case may be. Wagon type patrol cars and motor cycles are proposed for the local communication after the Project. The communication instruments are proposed to be modernized in response to the implementation of the civil works.

(4) Data Management System

The data management system refers to the computer system comprising

hardware, software and humanware. The software consists of database and model. The database is suggested to be built upon the CALS (Continuous Aquisition and Life-cycle Support) concept, because it enables to provide a consistent project management system throughout the planning stage to management stage in autonomous way. The dissemination to similar projects would also be facilitated by applying the above concept.

There is a considerable room for the improvement of the current data management system relevant to the water management, because they are now manually operated. Therefore, it is proposed to introduce a set of data processing unit with graphic panel at the Hydro-Department for Kzyl-Orda Headworks. The integrated operation with the communication system will enhance the overall performance in the data management system. The importance of training program for the system engineers/operators should be stressed for the successful operations of the new data management system.

4. Findings and Conclusions

4.1 General Description

(1) Institutional Issues

The Committee on Water Resources has been reorganized several times in the course of the transitional economy after dissolution of the former Soviet Union in 1991. The Committee on Water Resources was recently incorporated with the Ministry of Agriculture. However, its actual operations have been performed in the same manners without any serious institutional problem.

Meanwhile, the restructuring processes in Farm management are currently underway to cope with the huge tide of privatization under the transitional economy. The diversified requirements in Farm management call for the setting up of the Water Users Association, because they materialize the local participation in terms of the bottom-up decision making process among water users.

(2) Physical Constraints

The physical constraints for the proper water management refer to the deteriorated irrigation/drainage facilities and the worn-out telecommunication and data management systems. These physical constraints cause currently serious drawbacks to the desirable water management, but are expected to be resolved through the implementation of the civil engineering works under the Project.

(3) Management Technology

The site survey and interviews with O&M staff of the relevant organizations clarified that as far as the O&M management technology is concerned, no serious drawback was identified despite the facts that current O&M situations are seriously suffering from shortage of staff, scarcity in supply of spare parts, rusted metal works, silting of canal section and so on. It means that current O&M situations are originated from the financial deficit but not from technical expertise.

4.2 Institutional Proposal

(1) Oblast Committee on Water Resources

The Terenozek Raion Management of Watereconomy System is involved in the Project which proposes to rehabilitate ten Hydro-posts and corresponding number of Inter/on-farm canals. Sufficient number of personnel are assigned to the water management activities, but actual engagement is far below of the assigned number. Therefore, it is recommended to improve this situation along with the manners described in the following paragraphs.

(2) Organization during Project Implementation

A Project office is contemplated to set up during the project implementation period. The existing organizations relevant to the water management and Project O&M is planned to incorporate with the project office according to the progress of works.

Thus, well qualified O&M staff will be ensured to conduct O&M activities during and after Project. The vocational training of the O&M staff is prerequisite for the recruitment to the Project office due to an introduction of new O&M technology entailed by the project implementation.

(3) Formation of Water Users Association

The on-farm level water management has been practiced within the framework of the Farm management under the initiative of the Agronomist basing upon the top-down decision making system as presented in Figures G-9 and Figure G-10. There is no serious technical problem in this system but there exists a considerable room to be improved from financial or social standpoints originated from the transitional economy and subsequent water pricing mechanism.

Under the circumstances, the Water Users Association has been advocated as a counter morphology to the current farm-based water management. Taking into account the above-mentioned situations in the Project Area, the following step-by-step approach for the formation of the Water Users Associations is proposed from the infrastructual viewpoints.

It is proposed to reorganize the farm water management groups into four hierarchies. The first step starts from the resolution of the current farm water management system into on-farm canal level Water Users Associations corresponding ten Inter/on-farm canals as illustrated in Figure G-5. The second step proceeds to the Brigade level and finally reaches the individual farmer level. This step-by-step approach basically conforms with the proposed irrigation canal system and enables to foster necessary specialists under the on-the-job training style.

(4) Water Pricing Mechanism

The Hydro-Posts are placed at each head gate of the inter/on-farm canals and stand for the delivery point of irrigation water to the Farms. The measured flow discharges are converted into volumetric unit for the water charge collection from the

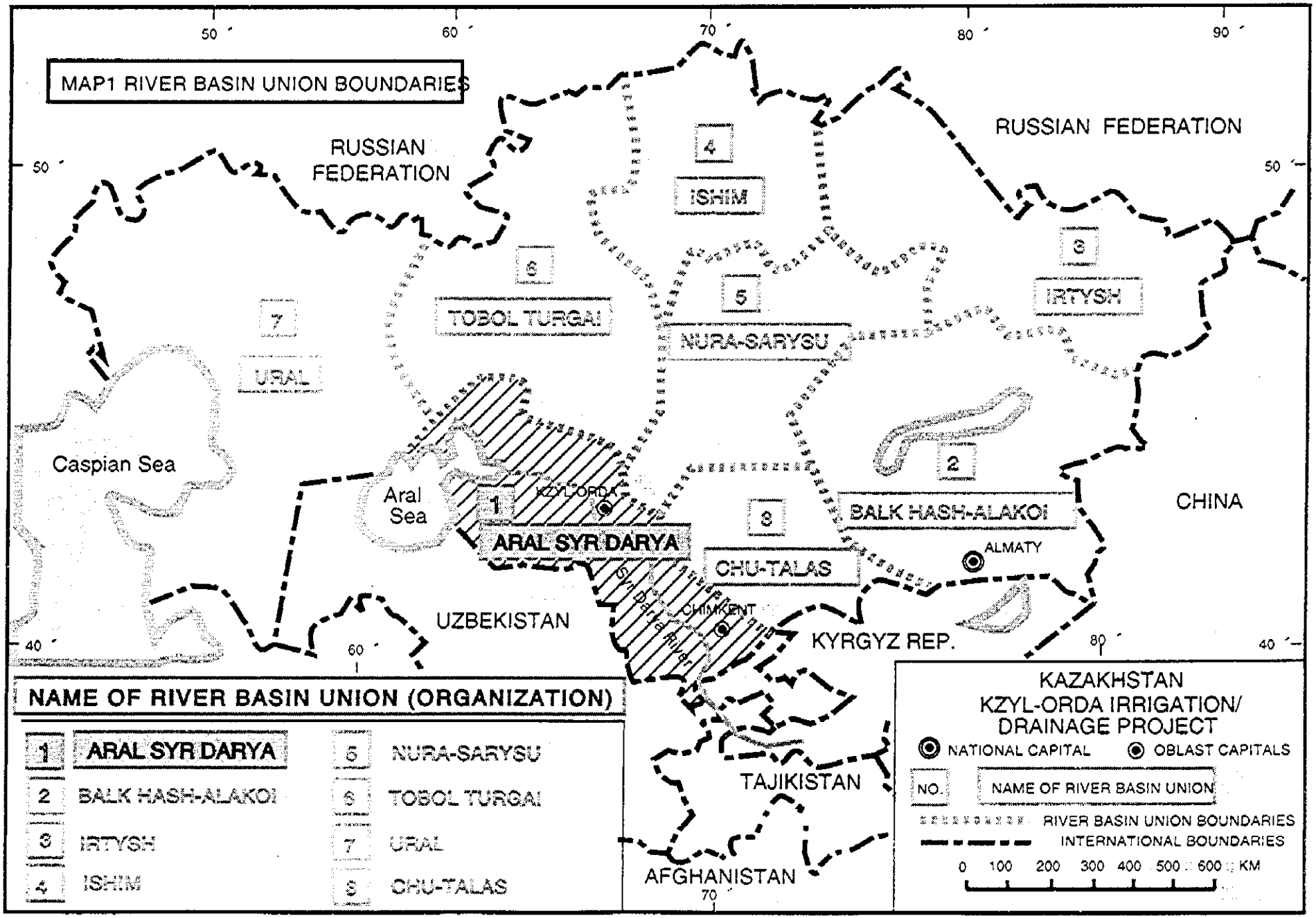
Farms, since the water charge is an indispensable income source to the Raion Management of Watereconomy System under the self-financing system.

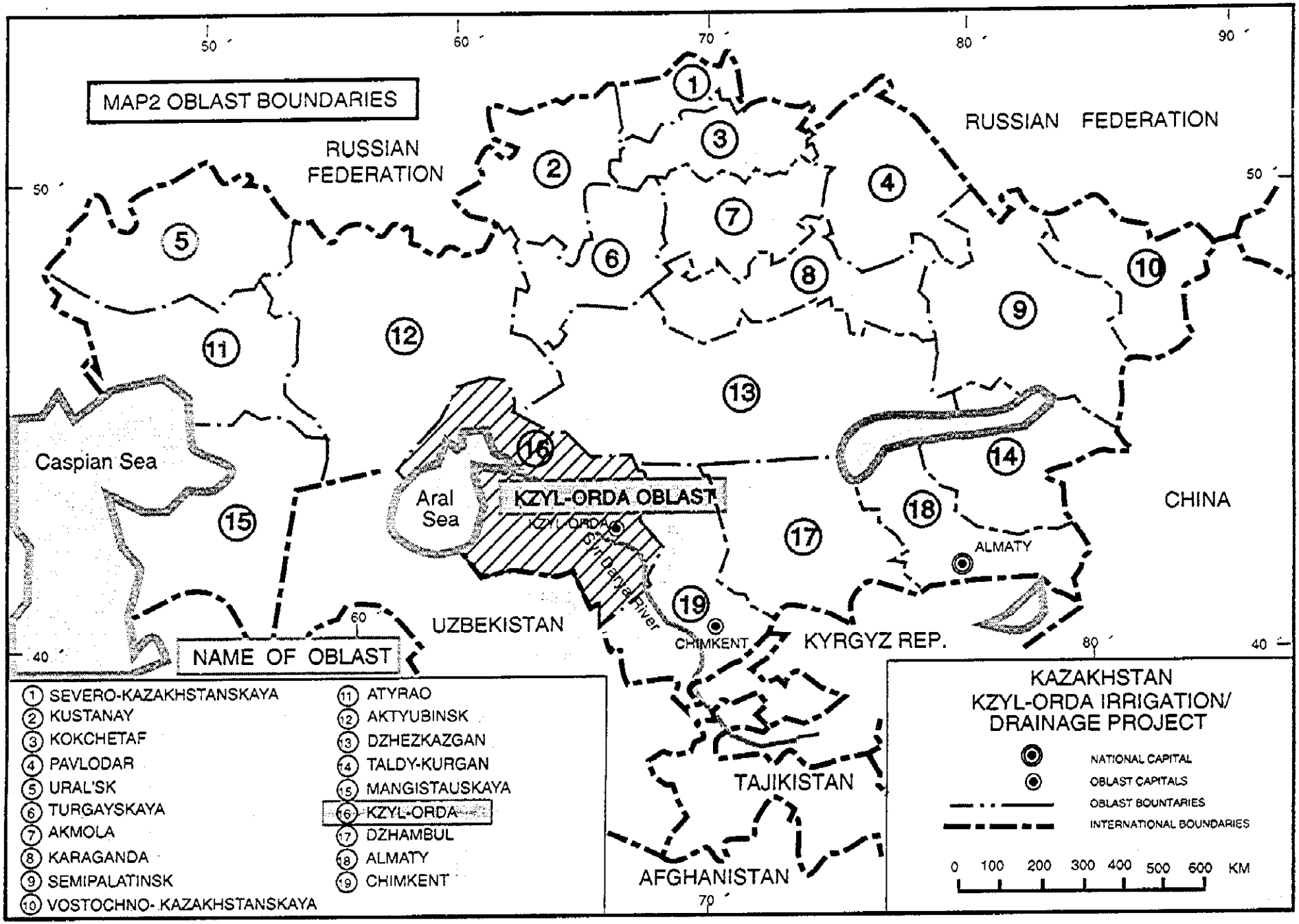
The original water cost is estimated by the Committee on Water Resources on the basis of the Water Cost Estimate Criteria stipulated in the Cabinet Decree (See Appendix C). It comes up to 12 tiyns/cum since 1995 fiscal year. However, the farm side can hardly accept the estimated water cost which suppresses the farm finance. The water charge issues are controversial and usually settled by the Governor's arbitration.

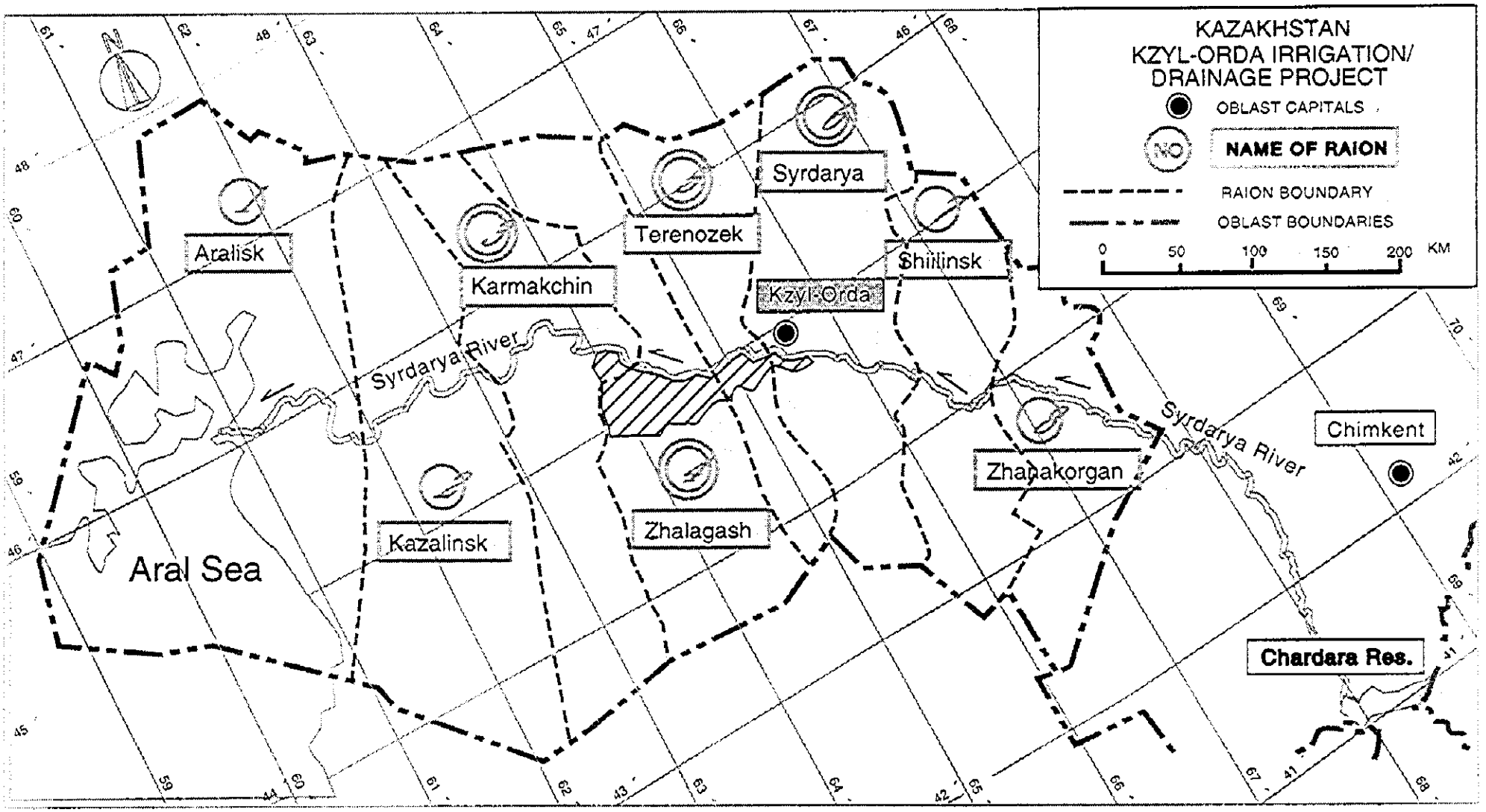
In the context of the above situations, it is recommended to initiate an institutional comparative study among the neighboring riparian countries to seek after solutions of the subject (Appendix A-C are attached for reference sake).

Meanwhile, the Harvard Institute for International Development (HIID) is now providing technical assistance to the Committee on Water Resources to develop water pricing methodology under the legislative and institutional framework of water policy reform in Kazakstan. Coordination with HIID may be required to forward the subject matter.

Maps


MAP1 RIVER BASIN UNION BOUNDARIES
RUSSIAN FEDERATION
RUSSIAN FEDERATION
4
ISHIM
3
IRTYSH
6
TOBOL TURGAI
5
NURA-SARYSU
7
URAL
Caspian Sea
Aral Sea
1
KZYL-ORDA
ARAL SYR DARYA
2
BALK HASH-ALAKOI
8
CHU-TALAS
ALMATY
CHINA
UZBEKISTAN
CHIMKENT
Syr Darya River
KYRGYZ REP.
TAJIKISTAN
AFGHANISTAN
50
60
70
80
90
40
NAME OF RIVER BASIN UNION (ORGANIZATION)
1 ARAL SYR DARYA
2 BALK HASH-ALAKOI
3 IRTYSH
4 ISHIM
5 NURA-SARYSU
6 TOBOL TURGAI
7 URAL
8 CHU-TALAS
KAZAKHSTAN
KZYL-ORDA IRRIGATION/
DRAINAGE PROJECT
NATIONAL CAPITAL
OBLAST CAPITALS
NO.
NAME OF RIVER BASIN UNION
RIVER BASIN UNION BOUNDARIES
INTERNATIONAL BOUNDARIES
0 100 200 300 400 500 600 KM


MAP2 OBLAST BOUNDARIES
RUSSIAN FEDERATION
RUSSIAN FEDERATION
CHINA
Caspian Sea
Aral Sea
KZYL-ORDA OBLAST
KZYL-ORDA
Syr Darya River
ALMATY
CHIMKENT
UZBEKISTAN
KYRGYZ REP.
TAJIKISTAN
AFGHANISTAN
NAME OF OBLAST
50
60
70
80
90
40
1 SEVERO-KAZAKHSTANSKAYA
2 KUSTANAY
3 KOKCHETAF
4 PAVLODAR
5 URAL'SK
6 TURGAYSKAYA
7 AKMOLA
8 KARAGANDA
9 SEMIPALATINSK
10 VOSTOCHNO- KAZAKHSTANSKAYA
11 ATYRAO
12 AKTYUBINSK
13 DZHEZKAZGAN
14 TALDY-KURGAN
15 MANGISTAUSKAYA
16 KZYL-ORDA
17 DZHAMBUL
18 ALMATY
19 CHIMKENT
KAZAKHSTAN
KZYL-ORDA IRRIGATION/
DRAINAGE PROJECT
NATIONAL CAPITAL
OBLAST CAPITALS
OBLAST BOUNTARIES
INTERNATIONAL BOUNDARIES
0 100 200 300 400 500 600 KM



MAP3 RAION BOUNDARIES

Tables

Table G.1 Selective Statistics on Water Charge Collection

Intake Amount from Syrdarya Diversion Barrage

(MCM)

Description	1994	1995	1996
Intake Amount Plan	665.57	770.39	558.00
Actual	646.84	538.99	553.68
Supply Amount Plan	577.48	494.47	339.30
Actual	605.42	433.54	339.22

Collection of Irrigation Fee (Telnozek in 1996)

District	Irrigated Area (ha)	Sown Area (ha)	Unit Rate (Tenge/m³)	Intake Amount (m³)	Water Cost (1000Tenge)	Collected Cost (1000Tenge)
1.Alzharma	5769	3724	5.63	116.09	5972.9	5747.7
2.Shirkuil	4506	3197	5.63	75.92	4268.7	3493.9
3.Shagan	7209	4695	5.63	120.86	6804.4	5050.0
4.Jeliasov	6478	3215	5.63	100.83	5676.7	4663.0
Total	35663	21454	5.63	403.6	22722.7	18954.7

Use of Irrigation Water in Dhalagash in 1996

No.	Designation of Farm	Irrigation Area (ha)	Water Amount (1000 m³)	Total Cost (Tenge)	Unit Cost (Tiyns)
1	Akaryk	3298	58474	3292086	5.63
3	Akkum	3692	65949	3712929	5.63
7	Zhanatalap	985	21321	1200372	5.63
8	Buharbai	5085	91206	5134898	5.63
10	Enbek	3039	53607	3018074	5.63
11	Madeniet	2785	50192	2825810	5.63
12	Tan	3090	57233	3222218	5.63
14	Myrzabai	1989	38057	2142609	5.63
15	Zhurgenov	2811	58111	3271649	5.63

Table G.2 Water Charge Estimation in 1997

(1) Syr Darya Raion Management of Watereconomy System

Farm Name	Area (ha) A	Water Amount (MCM) V	Water Charge (Tenge/1000ÜG) R	Total Charge 1000Tenge C=RxV	Unit Volume (ÜG/ha) D=V/A	Commencement Date of Irrigation
Kogalykol						
1. Sulukol	420	8.81	56.3	496	20,976	7, May
2. Dostik	50	1.51	56.3	85	30,200	10, May
3. Maiarik	579	9.54	56.3	537	16,477	10, May
KZ.Mis						
1. Umit	260	6.01	56.3	338	23,115	5, May
2 Daulet	300	5.67	56.3	319	18,900	5, May
Total	1,609	32	56	1,775	19,602	

(2) Terenozek Raion Management of Watereconomy System

Farm Name	Area (ha) A	Water Amount (MCM) V	Water Charge (Tenge/1000ÜG) R	Total Charge 1000Tenge C=RxV	Unit Volume (ÜG/ha) D=V/A	Commencement Date of Irrigation
Production Cooperative						
1. Shirkeli	3,700	72.38	56.3	4,075	19,562	1, May
2. Ilyasov	3,510	79.49	56.3	4,475	22,647	2, May
3. Shagan	4,769	121.87	56.3	6,861	25,555	1, May
4. Akzharma	3,809	92.77	56.3	5,223	24,355	1, May
5. Inkardarya	407	3.74	56.3	211	9,189	2, May
Peasant Farm						
1. Birlik	362	8.5	56.3	479	23,481	2, May
Total	16,557	378.75	56.3	21,324	22,876	

(3) Zhalagash Raion Management of Watereconomy System

Farm Name	Area (ha) A	Water Amount (MCM) V	Water Charge (Tenge/1000ÜG) R	Total Charge 1000Tenge C=RxV	Unit Volume (ÜG/ha) D=V/A	Commencement Date of Irrigation
Production Cooperative						
1. Ak-arik	3,005	59.52	56.3	3,351	19,807	11, April
2. Akkum	2,118	43.41	56.3	2,444	20,496	11, April
3. Enbek	2,067	45.92	56.3	2,585	22,216	11, April
4. Bubarbai-batir	4,281	67.13	56.3	3,779	15,681	11, April
5. Madenilt	1,881	40.42	56.3	2,276	21,489	11, April
6. Zhanatalap	740	15.24	56.3	858	20,595	11, April
7. Mizzabai	879	22.44	56.3	1,263	25,529	12, April
8. Zhurgenov	843	17.69	56.3	996	20,985	16, April
9. Tan	1,544	38.99	56.3	2,195	25,253	11, April
Peasant Farm						
15Farms	2,804	73.85	56.3	4,158	26,337	13-16, April
Total	20,162	424.61	56.3	23,905	21,060	

(4) Karmakshy Raion Management of Watereconomy System

Farm Name	Area (ha) A	Water Amount (MCM) V	Water Charge (Tenge/1000ÜG) R	Total Charge 1000Tenge C=RxV	Unit Volume (ÜG/ha) D=V/A	Commencement Date of Irrigation
Production Cooperative						
1. Zhanazhol	3,091	55.34	56.3	3,116	17,904	21, April
2. IE International	4,680	79.74	56.3	4,489	17,038	21, April
3. Aktobe	2,555	57.93	56.3	3,261	22,673	21, April
4. Akzharskii	2,874	76.47	56.3	4,305	26,608	21, April
5. Maibozek	520	15.22	56.3	857	29,269	21, April
6. Oktobyabr	311	14.21	56.3	800	45,691	21, April
7. Turnaubet	2,171	50.75	56.3	2,857	23,376	21, April
Company *	759	12.87	56.3	725	16,957	21, April
Total	16,961	362.53	56.3	20,410	21,374	

*Company with limited responsibility zhetiagar

(5) Summary Table

Raion Name	Area (ha) A	Water Amount (MCM) V	Water Charge (Tenge/1000ÜG) R	Total Charge 1000Tenge C=RxV	Unit Volume (ÜG/ha) D=V/A	Commencement Date of Irrigation
1. Syr Darya	1,609	31.54	56.3	1,775	19,602	5-10, May
2. Terenozek	16,557	378.75	56.3	21,324	22,876	1-2, May
3. Zharagash	20,162	424.61	56.3	23,905	21,060	11-16, May
4. Karmakshy	16,961	362.53	56.3	20,410	21,374	21, April
Total	55,289	1197.43	56.3	67,414	21,658	21, April-16, May

Table G.3 Institution / Facilities Relationship

Institutional Body	Management Criteria	Facilities for Management Object
A. Oblast Committee on Water Resources (1)	1. Hydro-Department 2. Inter-Raion Main Canal	1. Kzgl-Orda Head Works 2. Left Bank Main Canal : Section between Head Works and PK420 Regulator
B. Raion Water Management Office (4)	1. On-Raion Main Canal	1. Syrdarya W.M.O. - none - 2. Terenozek W.M.O. - none - 3. Zhalagash W.M.O. : Left Branch Canal Section PK 899 - PK 486 Regulators 4. Karmakshy W.M.O. : Right Branch Canal Section PK 420 - PK 702 Regulators
	2. Inter-Farm Distributor (Inter-Farm Canal)	1. 8 alignments with 85.3 km long
C. Farm (23)	1. On-Farm Distributor (On-Farm Canal)	1. 76 alignments with 364.3 km long

Table G.4 Major Project Facilities under Master Plan

(a) Kzyl-Orda Head Works

Description	Capacity	Gate
(1) Intake for Left Bank Main Canal	Q=228.0 m^3/sec	Slide Gate 5.0 mÅ~6 nos.
(2) Intake for Right Bank Main Canal	Q= 30.0 m^3/sec	Slide Gate 5.0 mÅ~2 nos.
(3) Scoring Sluice		Radial Gate 17.0 mÅ~5 nos.

(b) Irrigation Canal

Description	Length (km)	Regulator (No.)	Distributor (line)
(1) Left Bank Main Canal	75	6	39
(2) Right Branch Canal	70	6	30
(3) Left Branch Canal	50	5	15
Total	195	17	84

(c) Distributor Canal

Raion	Farm (No.)	(No.)	(km)	(No.)	(km)
(1) Syrdarya	3	-	-	8	51.6
(2) Telenozek	4	2	23.7	29	86.2
(3) Zhalagash	9	3	23.6	32	181.3
(4) Karmakshy	7	3	38.0	7	45.2
Total	23	8	85.3	76	364.3

(d) Drainage Canal

Description	Capacity (m^3/sec)	Length (km)
(1) South Collector	55.0	148.8
(2) North Collector	92.4	69.6
(3) Koksu Collector	6.0	18.8
(4) Eastern-Karmachinshy	3.5	42.1
Total		279.3

Table G.5 Major Project Facilities under Feasibility Study

Major Facilities -[Management body]

1. Kzyl-Orda Head Works-[Hydro-Department for Kzyl-Orda Head Works]

(1) Intake for Left Main Canal

Q=228.0 ÜG/s, Roller Gate 5.0 mÅ~6 nos, Under Scoring Sluice Gate 5.0 mÅ~1.5 m

(2) Intake for Right Main Canal

Q=30.0 ÜG/s, Roller Gate 5.0 mÅ~2 nos

(3) Flood Sluice

Radial Gate 17.0 mÅ~5 nos

2. Left Main Canal-[Hydro-Department for Kzyl-Orda Head Works]

(1) Left Main Canal

L=79.4 km, Regulator 6nos, Head Gate 10 places, Inter/On-Farm Canal 8 lines

3. Distributor Canal - [Raion Water M.Office/ProductionCooperative]

(1) Iyasof Production Cooperative

LMK-6 (On-farm Canal) L=13.0 km, A=671 ha, Q=1.04 ÜG/s

LMK-8G (On-farm Canal) L=0.2 km, A=146 ha, Q=0.24 ÜG/s

LMK-8A (On-farm Canal) L=19.1 km, A=4,174 ha, Q=6.49 ÜG/s

LMK-8B (On-farm Canal) L=11.7 km, A=1,489 ha, Q=2.12 ÜG/s

Total 4 lines L=44.0 km A=6,480 ha Q=9.89 ÜG/s

(2) Shagan Production Cooperative

LMK-12 (On-farm Canal) L=27.6 km, A=2,583 ha, Q=4.02 ÜG/s

LMK-14 (On-farm Canal) L=10.8 km, A=824 ha, Q=1.35 ÜG/s

LMK-16 (On-farm Canal) L=6.9 km, A=747 ha, Q=1.23 ÜG/s

LMK-9 (Inter-farm Canal) L=11.9 km, A=1,961 ha, Q=3.05 ÜG/s

LMK-11V-3 (On-farm Canal) L=5.4 km, A=917 ha, Q=1.51 ÜG/s

LMK-11G (On-farm Canal) L=1.4 km, A=178 ha, Q=0.29 ÜG/s

Total 6 lines L=64.0 km A=7,210 ha Q=11.45ÜG/s

4. Drainage Canal - [Department of Zhanadaria Canal Management]

(1) South Collector

Capacity 74.3 ÜG/s, L=149.6 km

(2) North Collector

Capacity 29.8 ÜG/s, L=119.7 km

Figures

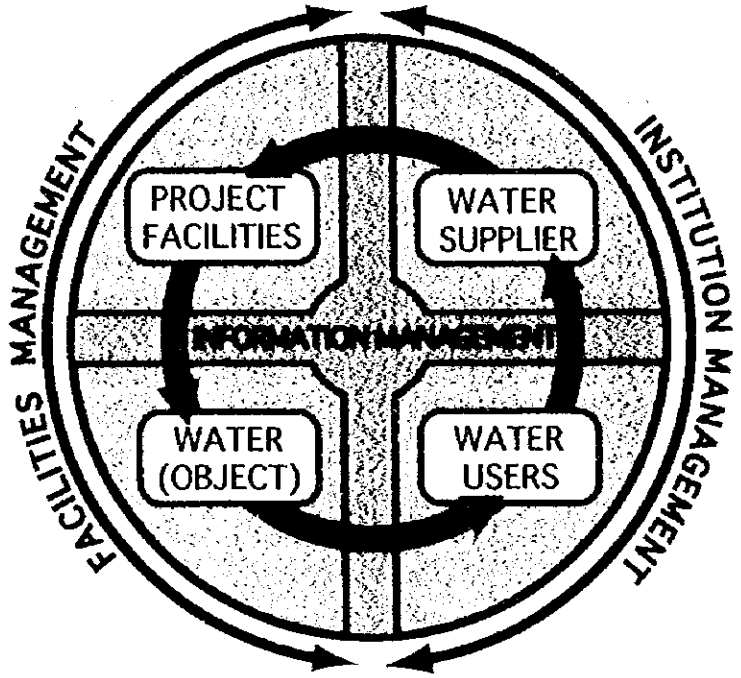


Figure G-1 Frameworkof Water Management

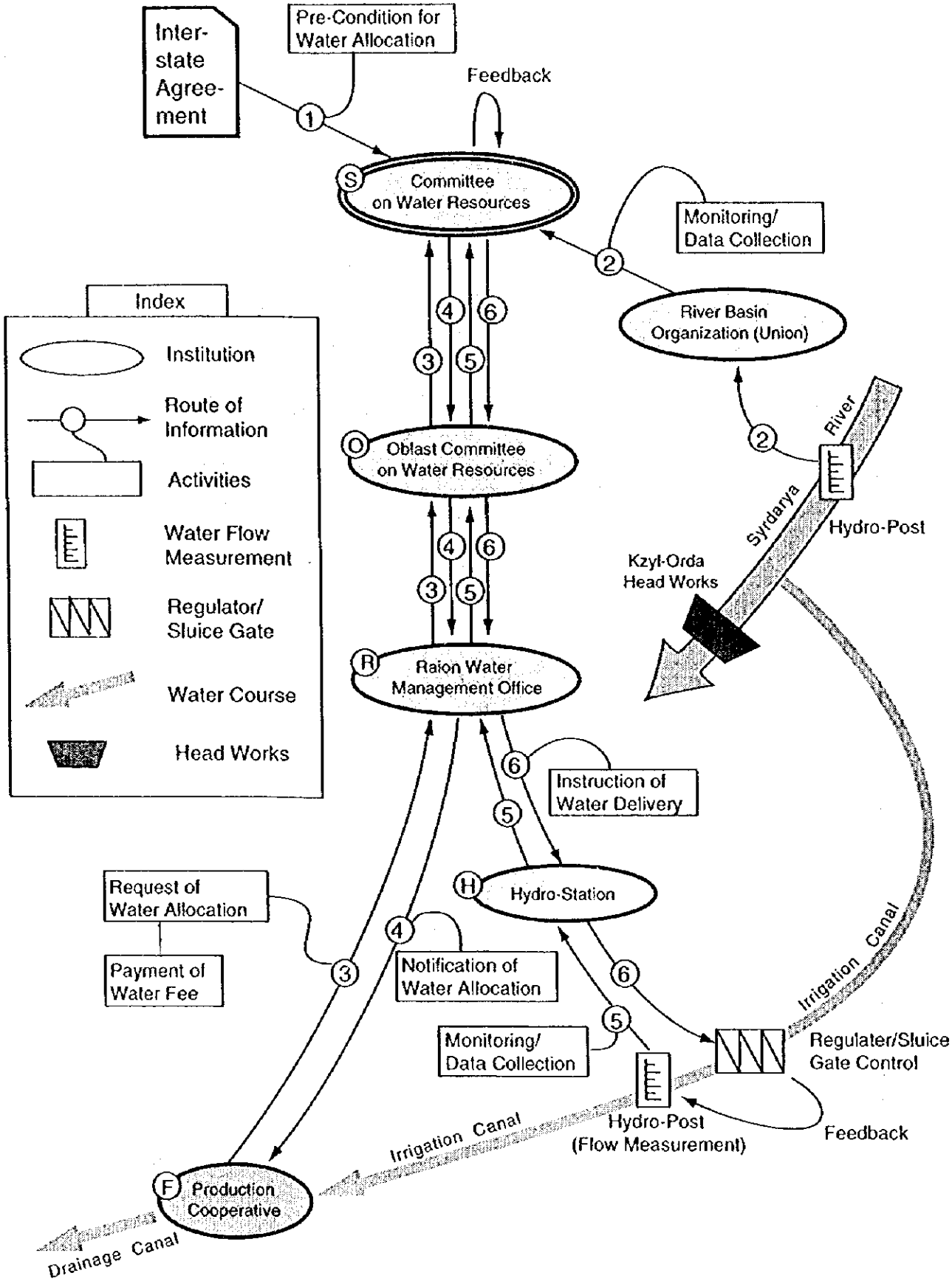


Figure G-2 Schema of Water Management

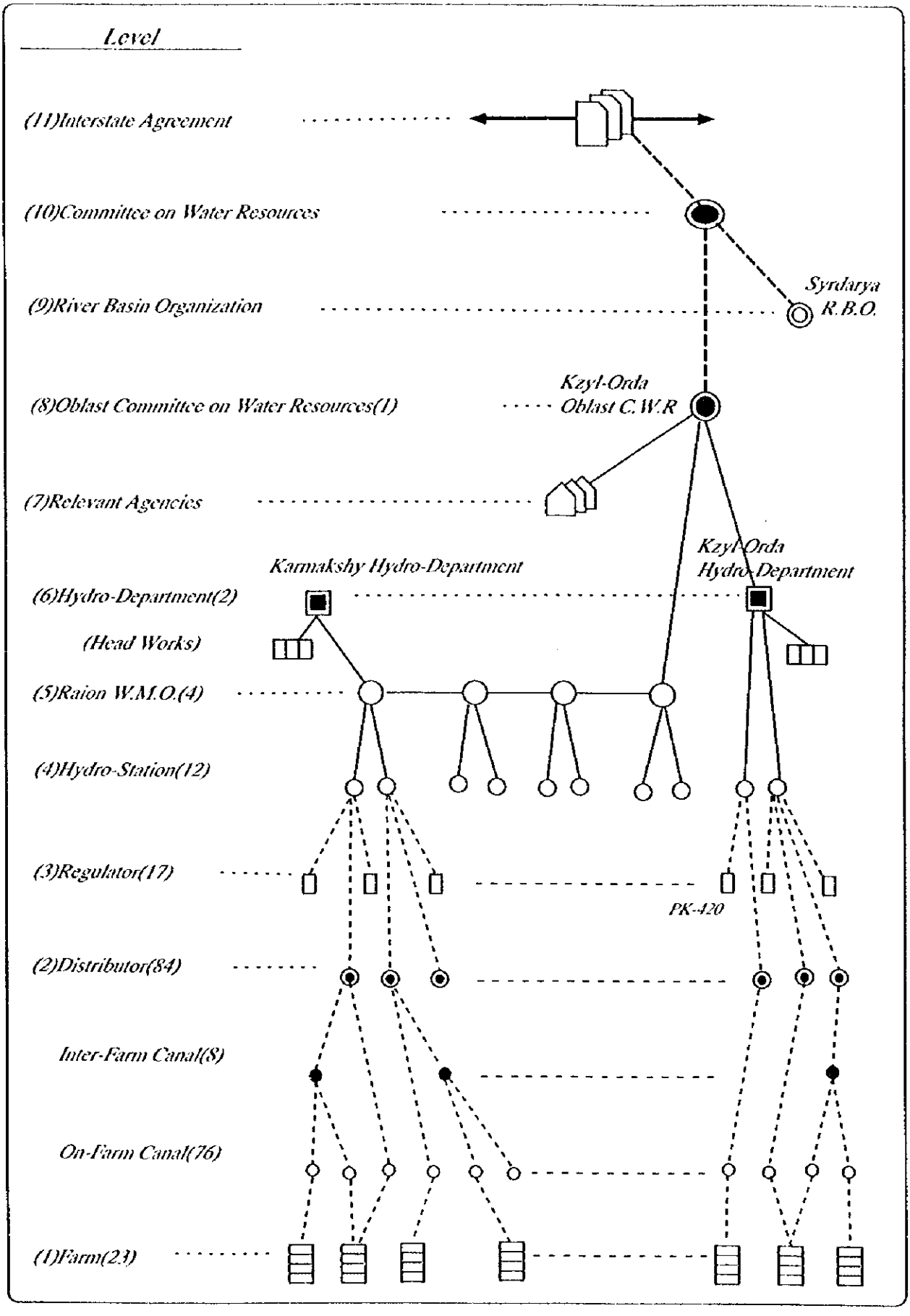


Figure G-3 Communication Diagram by Level

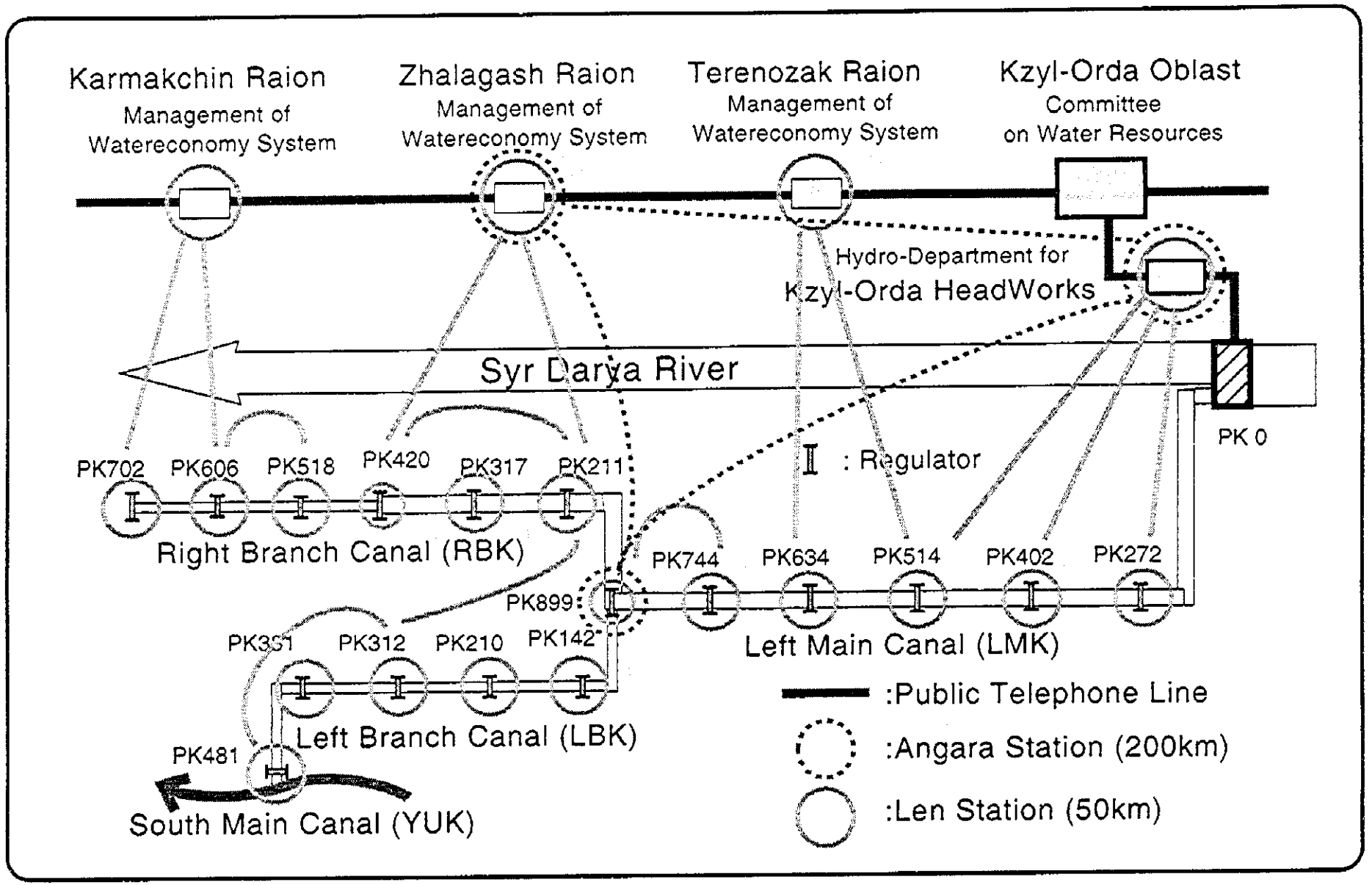


Figure G-4 Telecommunication System for Water Management

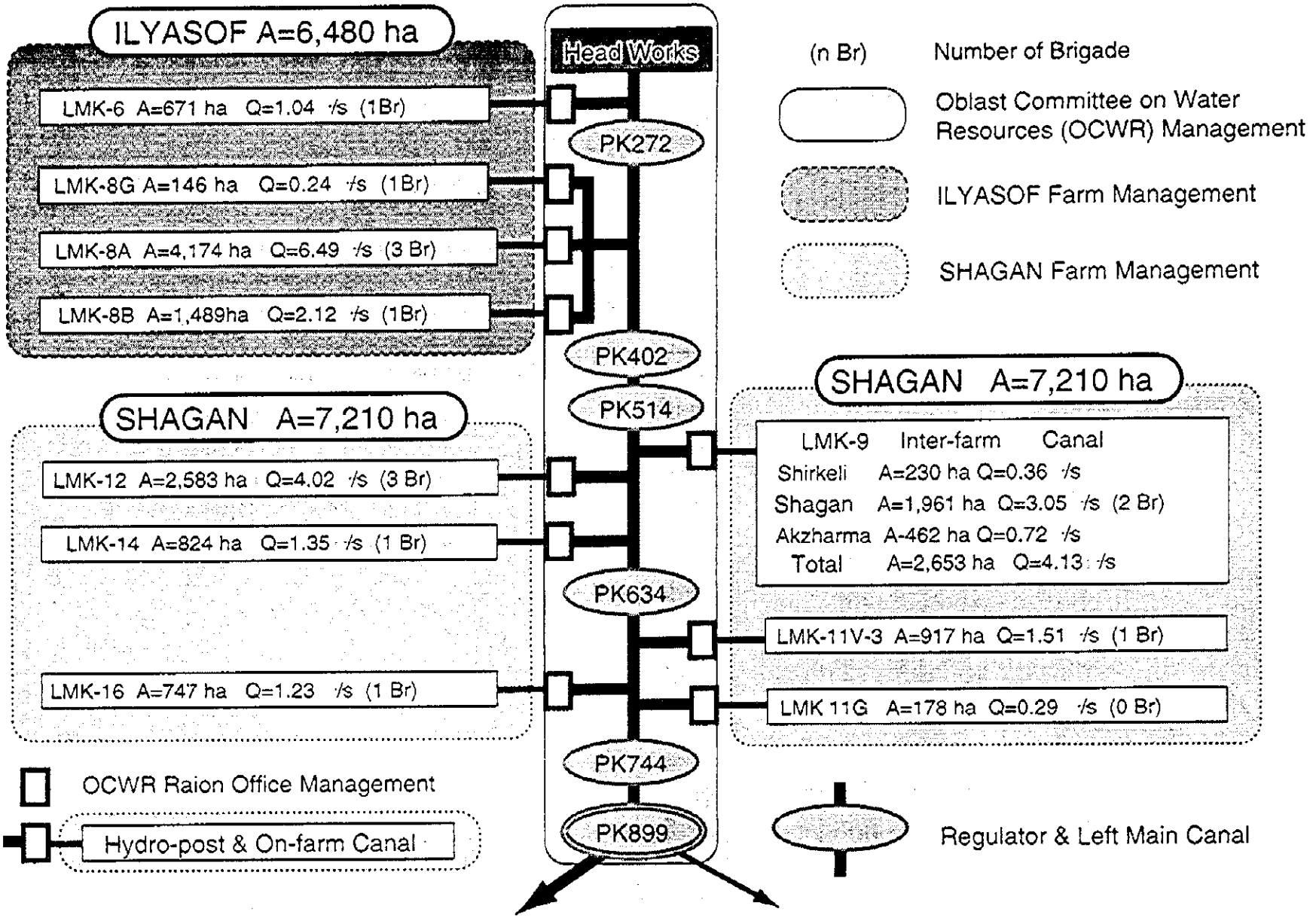


Figure G-5 Left Main Canal Irrigation System

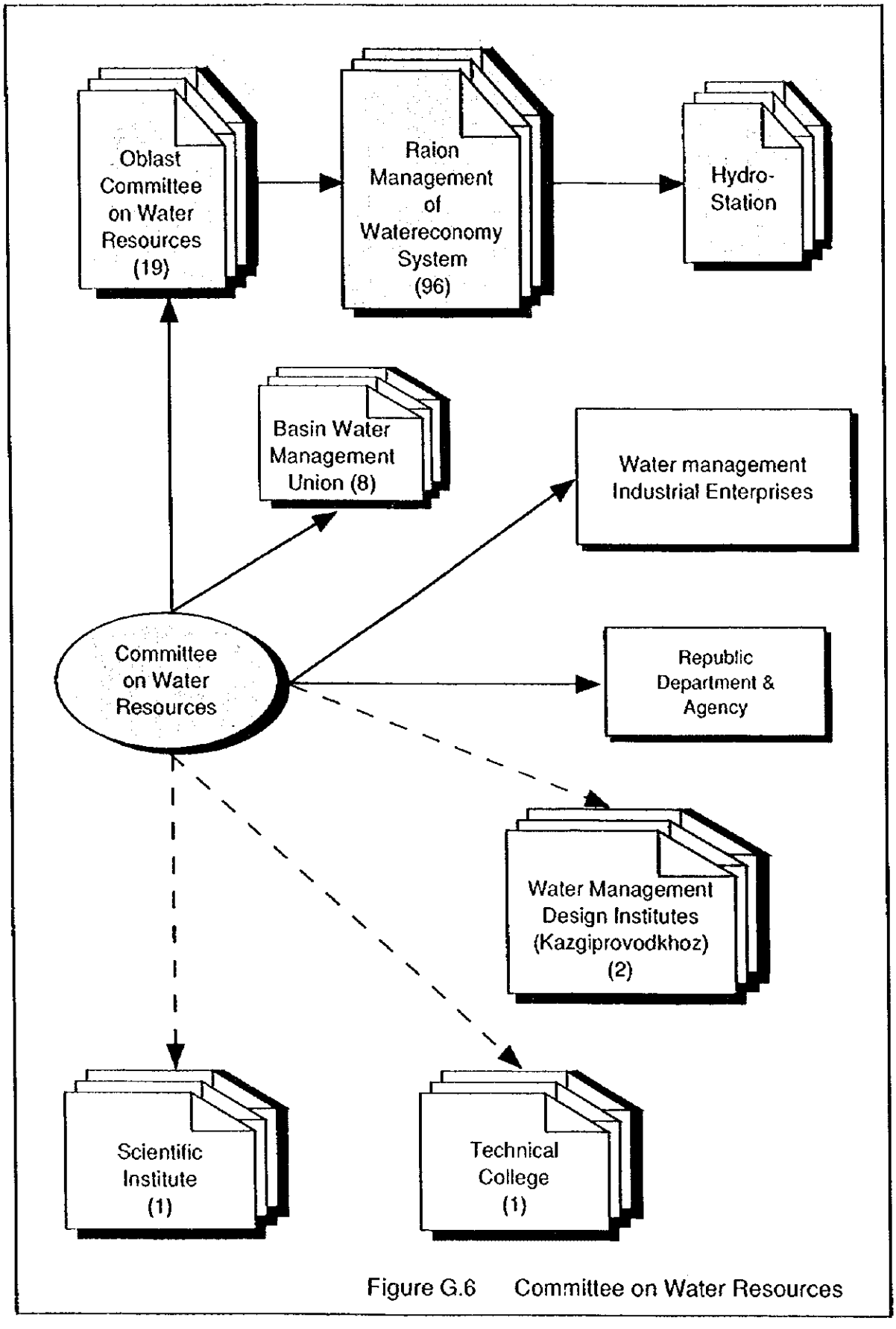


Figure G.6 Committee on Water Resources

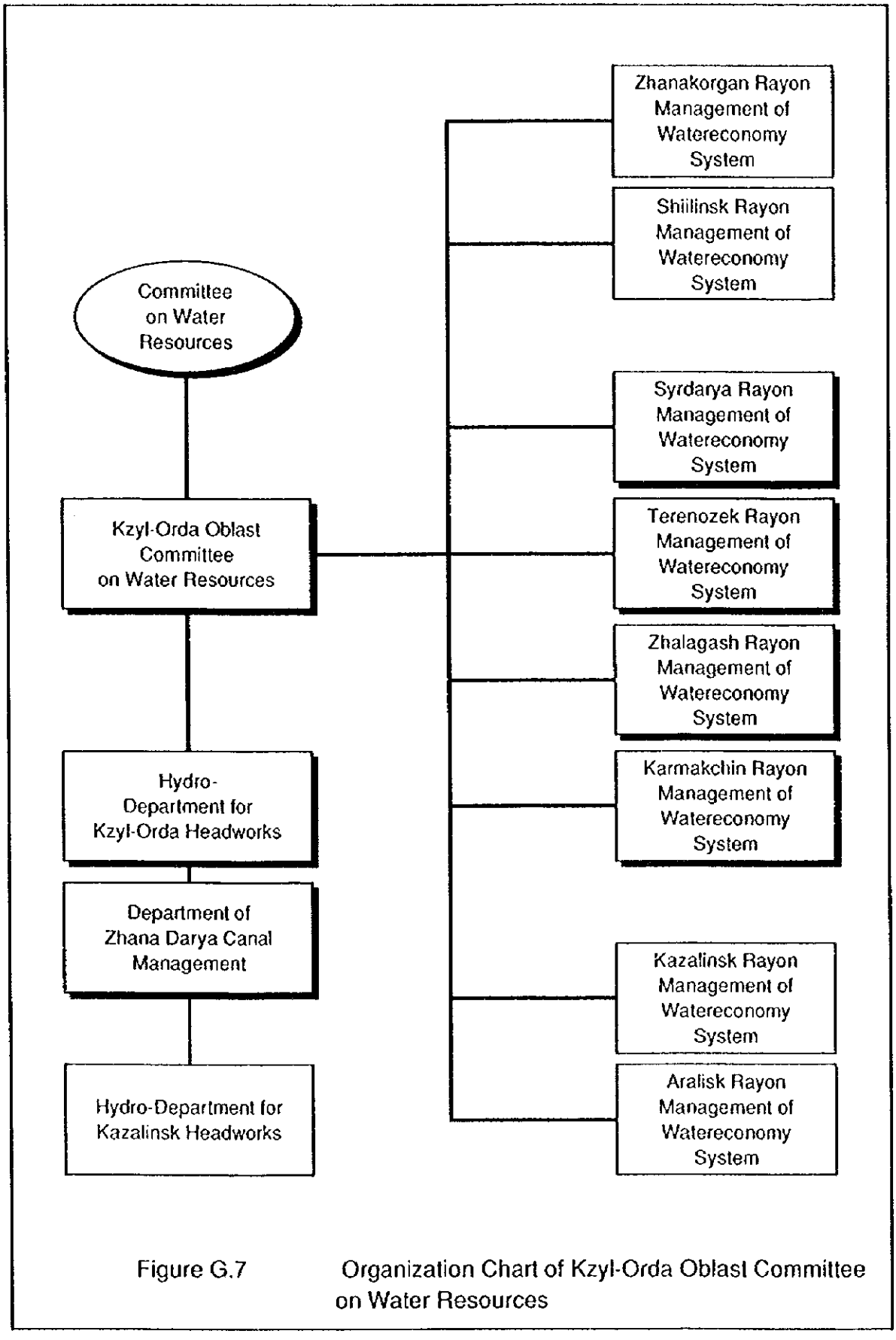


Figure G.7 Organization Chart of Kzyl-Orda Oblast Committee on Water Resources

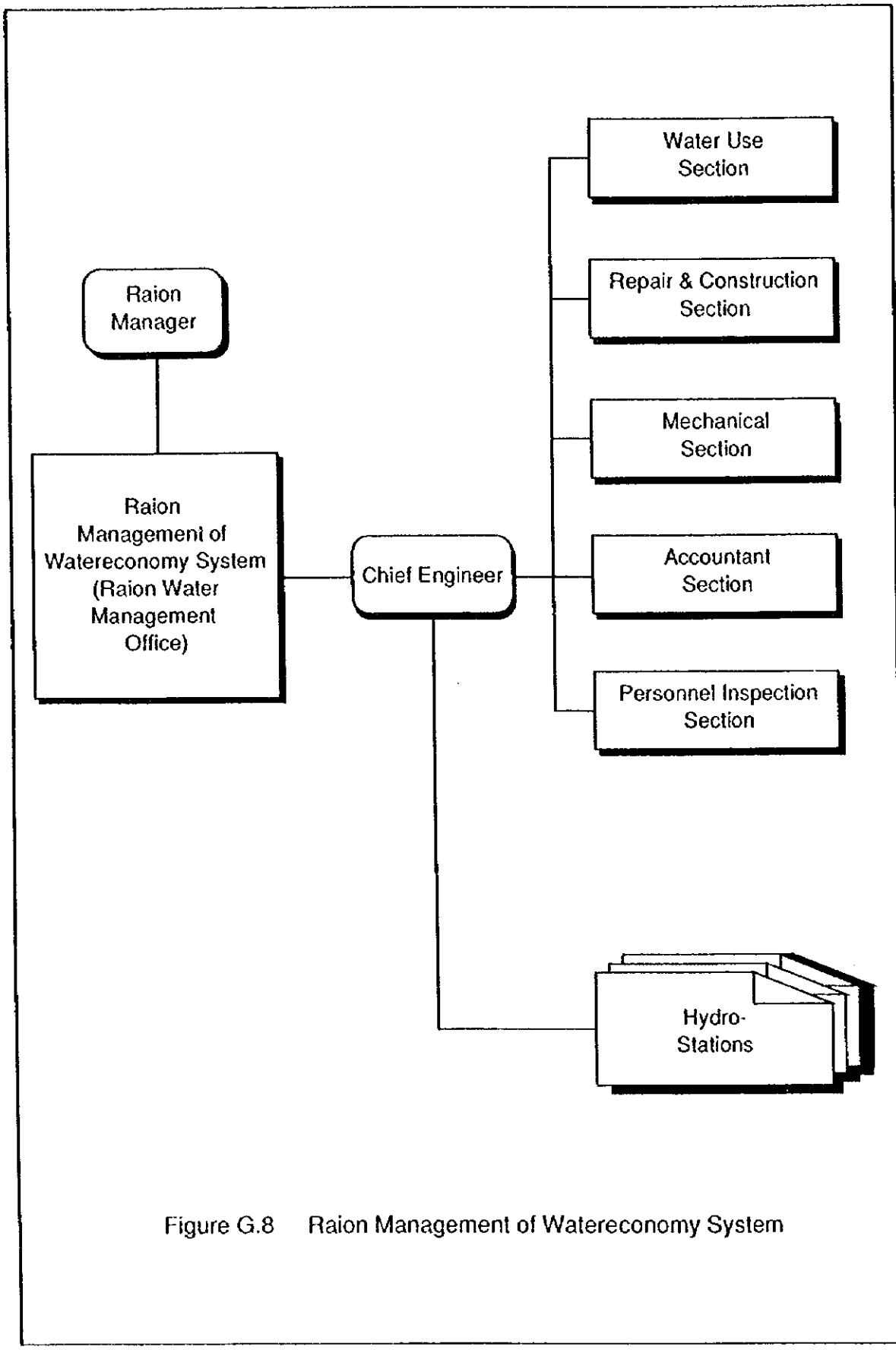


Figure G.8 Raion Management of Watereconomy System

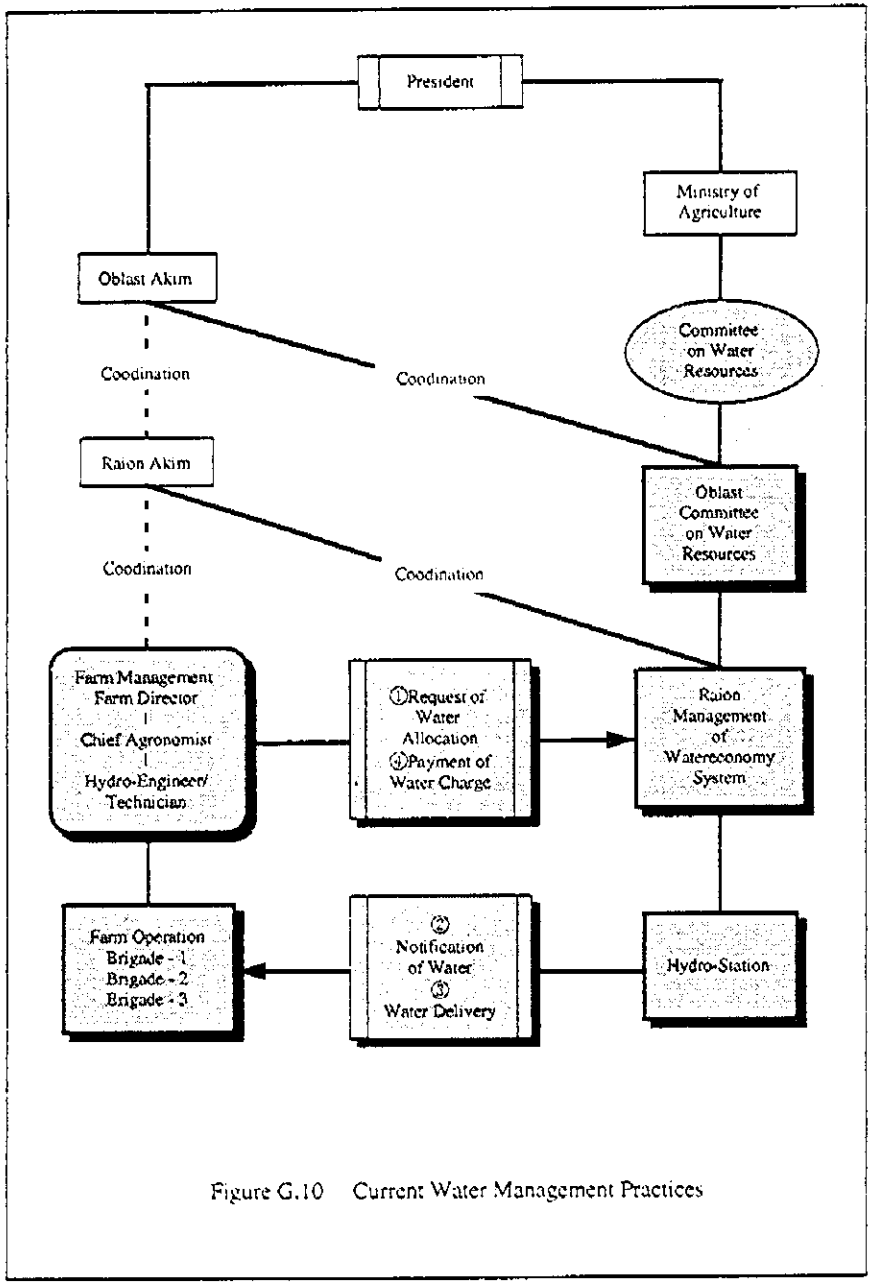


Figure G.10 Current Water Management Practices

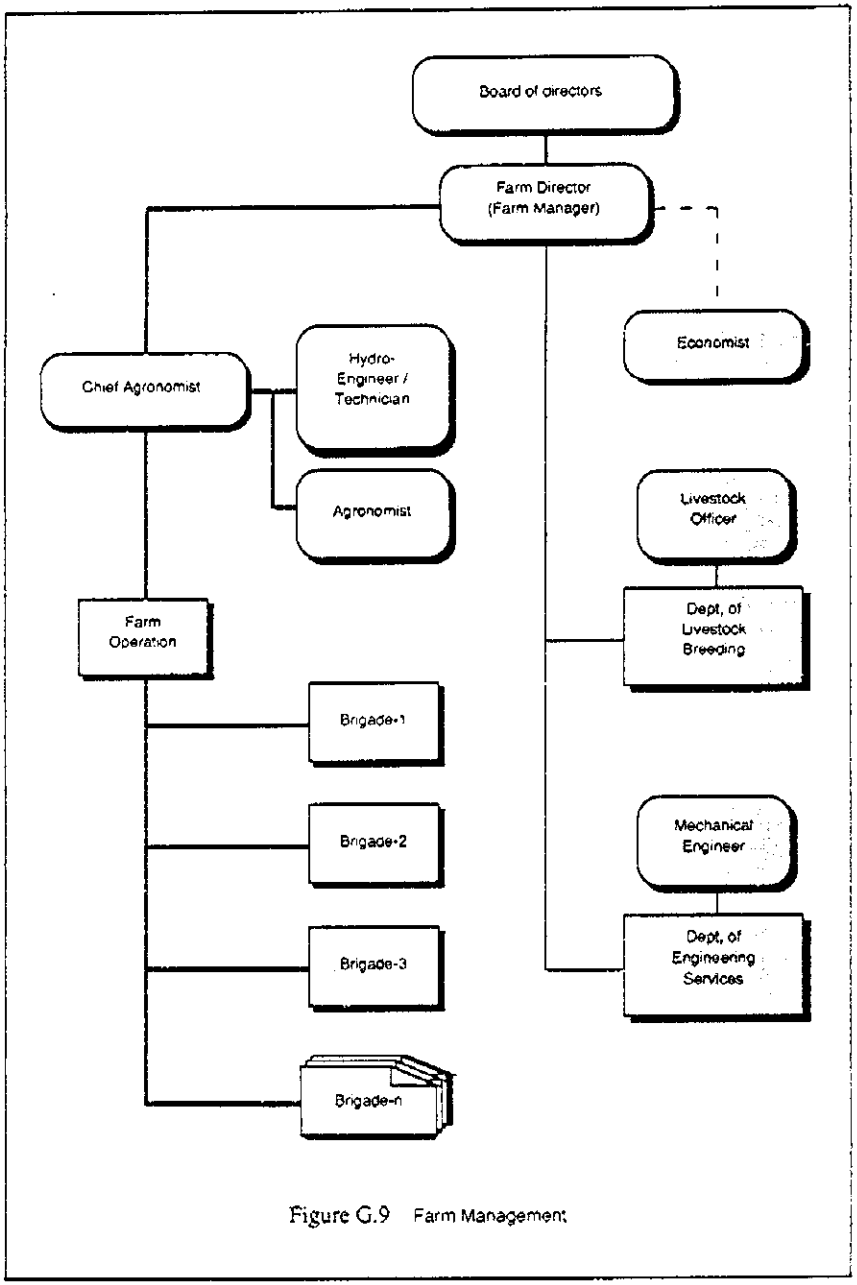
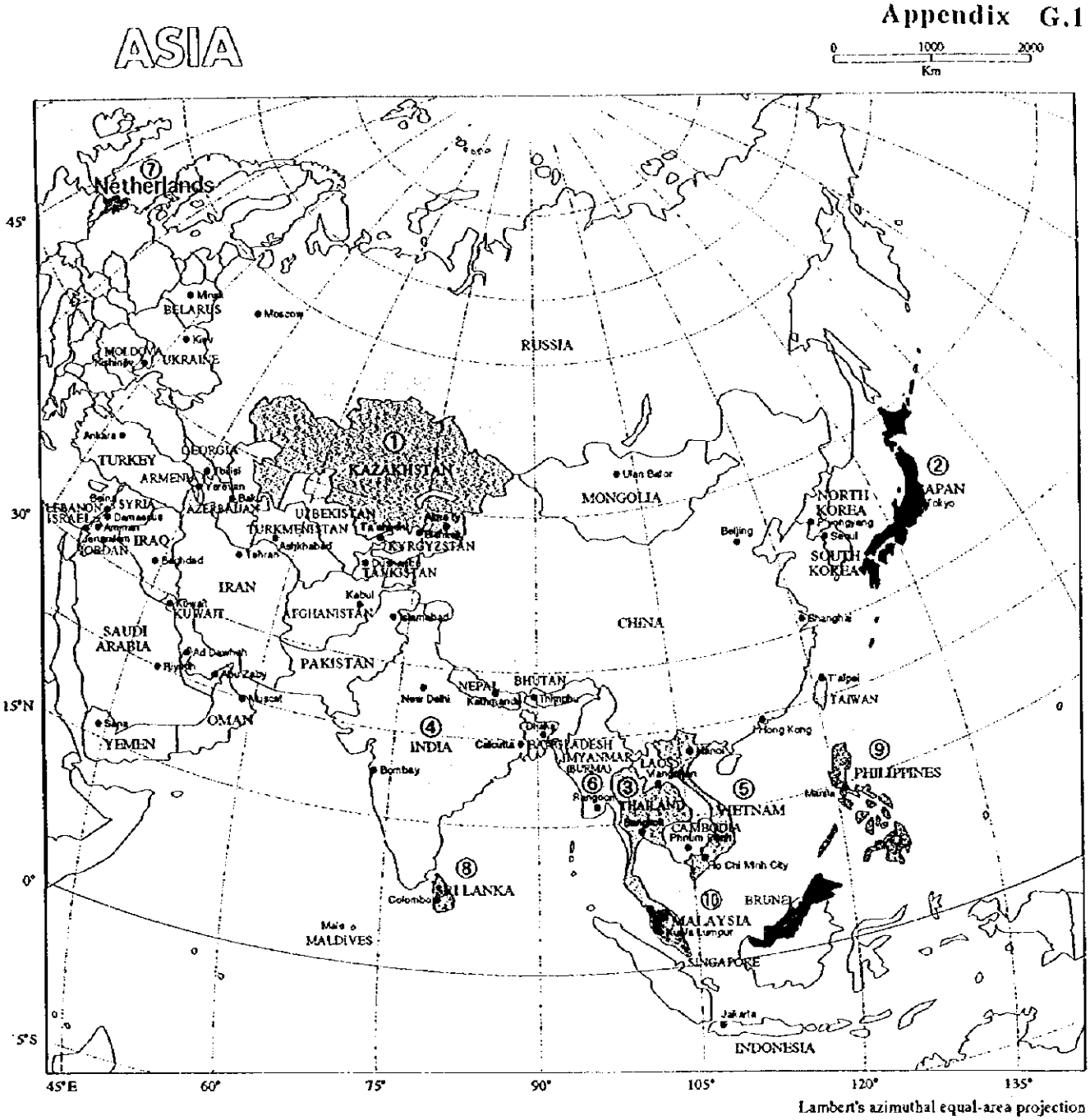


Figure G.9 Farm Management

Appendixes



Lambert's azimuthal equal-area projection
Arranged from MAPIO WORLD WB17MBN MillerE

World Map to Appendix · Selected Countries in O&M Review

① Kazakhstan
② Japan
③ Thailand
④ India
⑤ Vietnam
⑥ Myanmar
⑦ Netherlands
⑧ Sri Lanka
⑨ Philippines
⑩ Malaysia

Table A Comparison Table for Countries in O&M Review (1/6)

(As of 1994)

Heading of Information	Kazakhstan
1. Country description: - natural conditions - socio-economic conditions - development policy - agricultural pattern	 - continent - developing - environment - upland crops
2. Major economic index - Land Area (1,000km^2) - population (million) - GNP (million US$) - GNP/capita (US$)	 2,717 17.03 18,896 1,110
3. Institutional arrangement for management of water related project:	- State Committee for Water Resources (SCWR)
4. Organizational setup; - relevant agencies - water users/management associations - farmers group	 - Oblast Committee for Water Resources under SCWR - farm - underway
5. O&M cost implications: - government subsidy system - project cost amortization - water levies, O&M cost level - cost recovery in general	 - self-supporting system except the Committee - W.L. is crucial - C.R. is crital
6. Public/beneficiary participation: - mechanisms, - success, - problems, - prospect	 - privatized - but not individualized - worn out infrastructure - organizer needed
7. The extent of representation and accountability in the water management and O&M system: - general background	- institutional restructuring processes are rapidly going on in all relevant sectors - depends on success of water economy
8. Attachment	
9. Prepared by	- Mitsunobu, K.

Table A Comparison Table for Countries in O&M Review (2/6)

(As of 1994)

Heading of Information	(1) Kazakhstan	(2) Japan	(3) Thailand
1. Country description:			
- natural conditions	- continent	- islands	- peninsula with delta
- socio-economic conditions	- transitional	- advanced	- middle
- development policy	- environment	- environment	- diversify crops
- agricultural pattern	- upland crops	- paddy	- paddy
2. Major Economic Index			
- Land Area (1,000km^2)	2,717	378	513
- population (million)	17.03	124.96	59.40
- GNP (million US$)	18,896	4,321,136	129,864
- GNP/capita (US$)	1,110	34,630	2,210
3. Institutional arrangement for management of water related project:	- State Committee for Water Resources (SCWR)	- MOC's initiatives (project) - farmers' initiatives (I/D Project)	- RID under MOAC - request of influential persons
4. Organizational setup; - relevant agencies - water users/management associations - farmers group	- Oblate Committee for Water Resources under SCWR - farm - underway	- MOC/MAFF - regional/local bodies - LIA	- RID deputy DG - O&M P.M. - WUG/PIS
5. O&M cost implications: - government subsidy system - project cost amortization - water levies, O&M cost level - cost recovery in general	- self-supporting system except the Committee - W.L. is crucial - C.R. is crital	- despite 80% subsidy for large scale project C.R. is critical	- fully borne by government - but tends to collect water levies
6. Public/beneficiary participation: - mechanisms, - success, - problems, - prospect	- privatized - but not individualized - worn out infrastructure - organizer needed	- historically established - but negative aspects emerged	- success in PIS - but some problem in WUG
7. The extent of representation and accountability in the water management and O&M system: - general background	- institutional restructuring processes are rapidly going on in all relevant sectors - depends on success of water economy	- LIA managed - but shifting to basin wise public management	- RID's initiative
8. Attachment		O&M System in Japan	
9. Prepared by	Mitsunobu, K.	Mitsunobu, K.	Mitsunobu, K.

Table A Comparison Table for Countries in O&M Review (3/6)

Heading of Information	(4) India	(5) Vietnam	(6) Myanmar
1. Country description:			
- natural conditions	- semi continent	- delta	- peninsula with delta
- socio-economic conditions	- developing	- developing	- developing
- development policy	- production	- production increase	- production increase
- agricultural pattern	- upland crops	- paddy	- paddy
2. Major Economic Index			
- Land Area (1,000km^2)	3,288	332	677
- population (million)	918.57	72.51	45.56
- GNP (million US$)	278,739	13,775	-
- GNP/capita (US$)	310	190	-
3. Institutional arrangement for management of water related project:	- ID - farmers/local initiative (tanks)	- government - cooperatives	- large scale: I/D project - small scale: farmers project
4. Organizational setup; - relevant agencies - water users/management associations - farmers group	- state ID	- local/regional administration - cooperatives	- ID under MOA
5. O&M cost implications: - government subsidy system - project cost amortization - water levies, O&M cost level - cost recovery in general	- government subsidy - very poor cost recovery	- government subsidy - labor and food contributions	- ID's initiatives
6. Public/beneficiary participation: - mechanisms, - success, - problems, - prospect	- authoritarian in past - lack of local management	- CIT's initiatives	- farmers group apply rural project
7. The extent of representation and accountability in the water management and O&M system: - general background	- answerable to state government	- cooperative	- ID's initiative
8. Attachment			
9. Prepared by	Thompson, P.M.	Thompson, P.M.	Mitsunobu, K.

Table A Comparison Table for Countries in O&M Review (4/6)

Heading of Information	(7) Netherlands	(8) Sri Lanka	(9) Philippines
1. Country description:			
- natural conditions	- delta	- islands	- island
- socio-economic conditions	- advanced	- developing	- developing
- development policy	- environment	- cash crop	- production increase
- agricultural pattern	- diversified	- paddy/coconut	- paddy
2. Major Economic Index			
- Land Area (1,000km^2)	41	66	300
- population (million)	15.38	17.87	67.04
- GNP (million US$)	338,144	11,634	63,311
- GNP/capita (US$)	21,970	640	960
3. Institutional arrangement for management of water related project:	- farmers - many water authorities	- ID	- farmers (irrigation system)
4. Organizational setup;			
- relevant agencies	- water authorities	- Mahaberi Authority	- NIA
- water users/management associations		- ID	- IA
- farmers group		- LDB	
5. O&M cost implications:			
- government subsidy system	- local and central taxes	- directly managed by ID	- sustainable O&M directly from farmers
- project cost amortization			
- water levies, O&M cost level			
- cost recovery in general			
6. Public/beneficiary participation:			
- mechanisms,	- public representation	- ID's initiatives	- IA's formed with beneficiaries
- success,	- consultation		- organizers needed to form groups
- problems,	- strong farmers lobby		
- prospect			
7. The extent of representation and accountability in the water management and O&M system:	- elected members of WA board	- ID's initiatives	- IA elected boards
- general background			
8. Attachment			
9. Prepared by	Thompson, P.M.	Khan, Belal.	Thompson, P.M.

Table A Comparison Table for Countries in O&M Review (5/6)

Heading of Information	(10) Malaysia		
1. Country description: - natural conditions - socio-economic conditions - development policy - agricultural pattern	 - peninsula - middle - flexible cropping - tree crops		
2. Major Economic Index - Land Area (1,000km^2) - population (million) - GNP (million US$) - GNP/capita (US$)	 330 19.49 68,674 3,520		
3. Institutional arrangement for management of water related project:	- DID's initiatives		
4. Organizational setup; - relevant agencies - water users/management associations - farmers group	 - DID in MOA - Regional Agricultural Development Authorities		
5. O&M cost implications: - government subsidy system - project cost amortization - water levies, O&M cost level - cost recovery in general	 - government subsidy		
6. Public/beneficiary participation: - mechanisms, - success, - problems, - prospect	- mostly DID's initiatives		
7. The extent of representation and accountability in the water management and O&M system: - general background	- DID's initiatives - advanced		
8. Attachment			
9. Prepared by	Mitsunobu, K.		

Table A Comparison Table for Countries in O&M Review (6/6)

ABBREVIATIONS:

MOC - Ministry of Construction
FC - Flood Control
I/D - Irrigation and/or Drainage
MAFF - Ministry of Agriculture, Forestry and Fisheries
LIA - Land Improvement Association
C.R. - Cost Recovery
RID - Royal Irrigation Department
MOAC - Ministry of Agriculture and Cooperatives
DG - Director General
P.M. - Project Manager
WUG - Water Users Group
PIS - Peoples' Irrigation System
ID - Irrigation Department
CIT - Cooperative Irrigator Teams
FC - Flood Control
WA - Water Authority
MOA - Ministry of Agriculture
LDB - Land Development Bureau
NIA - National Irrigation Administration
IA - Irrigators Association
DID - The Department of Irrigation and Drainage

Appendix G.3

O&M SYSTEM IN JAPAN

1 COUNTRY DESCRIPTION

1.1 Scale of River Basins

Japan consists of a series of four major islands with an area of 378,000 km^2 and population of 123 millions.

Forested mountain ranges with an altitude of 2000~3000 m run through the central lines of the islands of Japan. A number of river basins, different in size and shape, extend from the mountain ranges toward surrounding seas. This contrasts strongly with the geography of Kazakhstan which is characterized by the continental steps.

Alluvial plains developed along the coastlines and are the major sites for farming and manufacturing industries.

1.2 Type of Flood Problem

Amounts of rainfall differ considerably from place to place. The average annual rainfall is 1600 mm. The rainfall is concentrated during the pre-summer rainy season (July), the typhoon season (September) and the snow melt season (March).

There is a wide range of variation in river discharge due to short river courses and steep river slopes. These characteristics in topography and meteorology constrain water use conditions, also causing recurrent floods and droughts in the basins.

A typical flood in Japan follows the following process. Unforeseeable heavy local rainfall hits a river basin with steep topography, a sudden rise of river stage overtops the crest of the river embankment causing a breach and finally floods wash away fields and houses in densely populated urban area. Therefore, flood damage is intense and confined within a certain area, and not extensive and widespread as seen in the continental delta.

Japan is known as a country with natural disasters. In addition to floods, tidal waves caused by earthquakes and high tides due to low pressure frequently threaten the coastal zones. A combined occurrence of river floods and the extraordinary rise in sea level can bring about catastrophic calamity to the low lying areas located in river mouths.

1.3 Type of Project Considered

FC (flood control) and DI (drainage and irrigation) are distinguished in Japan. The Ministry of Construction (MOC) and Ministry of Agriculture, Forestry and Fisheries (MAFF) are the responsible authorities respectively.

Major civil engineering structures relevant to FC are dams, retarding basins and river embankments. Flood forecasting systems have also been introduced for improvement of operational procedures of the above structures. Associations for flood fighting activities have been organized by local people living in the flood prone areas for a long time.

Meanwhile, major engineering structures pertinent to DI are dams, diversion weirs, irrigation canals, land consolidation and drainage canals. Pumping plants and regulators (sluice gates) are also sometimes incorporated in the irrigation/drainage systems where necessary.

Coastal embankment projects have been implemented to protect the country from calamity brought about by sea flooding in certain sections of the coastline. The Ministry of Transport (MOT) participates in these project, in addition to the above two Ministries because

MOT is responsible for sea navigation and port facilities.

1.4 Complexity of Systems

Development projects in Japan corresponding to FCDI tend to be large in scale, complex in system, and advanced in level. This comes from social requirements in terms of an effective use of water resources and safety measures. A deployment of maintenance specialists to each key structure is a compulsory requirement under relevant regulations.

Improved criteria for safety measures have been enforced according to the accumulated social capital in the basins.

In brief, current water sector issues in Japan involve establishment of an overall management system covering safety, resources and environment under an integrated engineering and institutional arrangement. It is noteworthy that these aims are identical to O&M implications in Kazakhstan currently being discussed.

1.5 Agriculture

Land use in Japan is summarized in Table B1.

Table 1: Land Use in Japan

Land Type	million ha	Per cent
Total National Land	37.0	100 %
farm land	6.1	16 %
(paddy field	2.9	8 %)
pasture land	0.9	3 %
forest land	25.4	69 %
residential land etc.	4.6	12 %

Japanese agriculture in the context of land use can be featured as follows:

- Most of the national land consists of forest land accounting for 69 %;
- Half the farm land is used as paddy fields with irrigation/drainage systems;
- Paddy cultivation is the most certain and advantageous choice for farmers all over the country under the current agricultural policy of the Government ; and
- The former cropping pattern was paddy-wheat/barley but now paddy-fallow is commonly practiced.

Japanese agriculture could be characterized as being excessively dependent on paddy cultivation and the associated rice price support policy. It is currently facing difficulties in this connection and because of the high rate of economic growth in Japan.

Economic development has resulted in increasing wages and escalation of farm land prices, while consumption of agricultural products and their market prices are stagnating. In addition to such declining profitability found in the farm economy, there are increasing overseas demands to further open the domestic market in agricultural products.

Agricultural support has been justified on non-economic grounds to maintain national food security, to maintain the rural community and to maintain traditional landscapes and environment.

2. ADMINISTRATION/INSTITUTIONS

2.1 Government.

The framework of the state regime in Japan is given as follows:

- Constitutional monarchy under symbolic Emperor system;
- Respective independence of the three powers (administration, legislation and judiciary);
- Parliamentary democracy under universal suffrage;
- Nomination of the prime minister (cabinet premiership) by the legislature; and
- Presidency of the prime minister over the administration.

There are three hierarchies in Japanese administration. These are a central government, 47 local governments named prefectures, and local autonomous bodies.

The prefecture governor is elected and local autonomy has been propagated for a long time. However, most decision powers as concentrated in each ministry in the central government. In this sense Japan is a centralized country.

2.2 Development Policy

The Agency of Economic Planning is the responsible authority for formulating Economic Plans in Japan. Ten Economic Plans have been established since the war. Government's roles are defined in the Plans as follows:

- Clearly indicate perspectives on desirable and possible status of economic society;
- Set up basic direction on economic operation for medium and short terms by clarifying policies to be addressed; and
- Indicate guidelines for economic activities of households and enterprises.

The new Economic Five Year Plan staring from 1992 is now under contemplation by the Government. The parts of the plan relevant to FCDI O&M system can be summarized as follows:

- To work out the desirable status for maintenance of overall social infrastructures by sector;
- To establish the renewal or improvement plan for realization of the above; and
- To estimate investment costs with alternatives to achieve the above goals.

2.3 Responsibility for Water Management

The Ministry of Construction (MOC) and the Ministry of Agriculture, Forestry and Fisheries (MAFF) are the authorities responsible for the overall water sector and for water management in Japan.

MOC was set up by branching out from the Ministry of the Interior after the war. MOC is accountable for maintaining social order and public welfare by protecting human life and property from natural calamities. FC projects in Japan have been exclusively controlled under MOC's initiative.

The River Bureau under MOC is the agency responsible for river management. The Bureau undertakes its duty at its own cost under the legal basis of the "River Law" (enacted in 1964).

MAFF is the authority answerable for stable supply of foodstuffs to the people and for improvement of farmers' livelihood through materialization of agricultural policies. In this

context, DI projects in Japan have been managed under MAFF's instruction and supervision.

The Agricultural Structure improvement Bureau (ASIB) under MAFF is the agency responsible for DI projects (called land improvement projects) in Japan.

The land improvement projects comprise:

- Irrigation and Drainage Projects,
- Farmland Consolidation Projects,
- Farmland Development Projects,
- Integrated Rural Development Projects,
- Farm Road Improvement Projects, and
- O&M of Irrigation and Drainage Facilities Projects.

The "Land Improvement Law" (enacted in 1952) provides a legislative basis for the land improvement projects and its major characteristics can be summarized as follows:

- projects shall be arranged for farmers who are actually cultivating and not for absentee land owners;
- projects shall be initiated upon the request of beneficiary farmers themselves;
- project costs shall be primarily borne by the beneficiary farmers. The Government can subsidize a part of project costs when it is deemed to accord with public benefit;
- "Land Improvement Association" (sometimes called District) shall be organized by application of more than 15 beneficiaries and shall be accountable for overall project implementation, including collection of project dues;
- projects shall be implemented with the consensus of two thirds of the beneficiaries in the Association; and
- projects shall be profitable enough for beneficiaries to pay the project dues and shall be proved to conform with Governments' agricultural policy and guidelines.

2.4 Role of Central/Local Government

There are three types of project operating body in the land improvement projects in Japan. These are state-operated, prefecture-operated and group-operated projects, relevant to different sizes and social implications of the projects.

The Water Resources Corporation can implement particular large scale projects entrusted to it by the Ministries. This is due to a separation of powers as the Government concentrates on the water policy formation and leaves implementation to the corporation. The Corporation is similar in many ways to the Committee for Water Resources in Kazakhstan.

The responsibilities for water management in Japan are outlined in Table B2.

Table 2: Establishment of Water Management in Japan

Project Scale	Planning	Construction	O&M
Very large	Group/State	Corporation	Corporation
Large	Group/State	State	Group
Medium	Group/Pref.	Prefecture	Group
Small	Group	Group	Group

The above project stratification is based on project size which implies the larger the size, the more public; and the smaller in size, the more private responsibility.

A salient feature found in the establishment of water management in Japan rests on the

participation of the local body or group during the stages of planning and O&M. It is natural that the group nevertheless entrusts construction to the operating body.

Hence the main water management issues in Japan are as follows:

- The operating bodies differ by locations from upstream to downstream (in case of irrigation projects);
- The responsible bodies also differ by timing from planning stage to O&M stage;
- Consistent water management is a hard task under such recurrent takeover procedures;
- Negative aspects of local participation have emerged in respect to water resources management and environmental conservation; and
- A system (both engineering and institutional) which enables integrated basin water management is expected to be formulated.

2.5 Liaison With Other Agencies

Horizontal liaison between governmental agencies is difficult because the administrative channels in Japan are in most cases divided in vertical directions only. Shortcomings of this lack of interagency coordination are that sometimes agencies delay decisions or duplicate services.

However, on the other hand, several ways exist to coordinate government operations such as cost allocation procedures in multi-purpose projects. The Agency of Economic Planning is responsible for coordinating inter-ministry negotiations for smooth implementation of multi-purpose projects.

3. O&M

3.1 Organization of Water Sector for O&M

As previously stated, the Land Improvement Association (LIA) is the accountable body for O&M in Japan under instruction and supervision of MAFF.

An LIA can be set up with the consensus of more than 15 eligible members. The members of LIA are under and obligation to pay membership dues, while they can share in various privileges.

LIA revenue depends on the members dues, and expenditure can be classified into project dues, O&M costs and overhead costs of the LIA. However, it is difficult for LIA's to realize their cost burden out of general public or social activities, particularly in the case of drainage projects. The fact that LIA projects are accompanied by external benefits, or internal disbenefits results in controversy and conflict, and calls for overall review of the current institutional system.

3.2 Resource Sources

Subsidy systems are commonly used to support the projects. Subsidy rates differ from project to project in response to location, size, nature of works, public involvement and social implications. Table B3 indicates the shares of project cost by project type and operating body.

Despite this subsidy system, the project cost share borne by the beneficiaries is too heavy for most of the farmers. Some privileges are given to the farmers to alleviate their burden.

Table 3: Share of Project Cost between Government and Beneficiaries

Project Type	Operating Body	Areal Criteria for Approval	State	Pref.	Beneficiary
Irrigation and Drainage	State	B.A.>3000 ha	60	20	20
	Prefecture	B.A.> 500 ha	50	25	25
	Group	B.A.> 20 ha	45	-	55
Farmland Development	State	D.A.> 400 ha	75	12.5	12.5
	Prefecture	D.A.> 40 ha	65	17.5	17.5
	Group	D.A.> 10 ha	55	-	45.0

Notes: BA Beneficial Area, D.A. Development Area
Source: "Land Improvement Projects in Japan". The Japanese Institute of Irrigation and Drainage

3.3 Beneficiary participation in Operation

Beneficiary participation in operation in Japan has been realized through LIA. Decisions for operation are made at LIA board meetings. The actual works are done based on the Operation Manual by the LIA staff or on a contract basis.

3.4 Beneficiary Participation in Maintenance

Beneficiary participation in maintenance follows the same procedures as in operation. Since O&M activities are undertaken within the framework of LIA management, it is required to keep accounting books in conformity with forms and terms specified by the supervisory authorities.

3.5 Monitoring

Periodic monitoring of project facilities and hydro-meterological data is a prerequisite for proper O&M. Detailed monitoring procedures are specified in O&M manuals according to the significance of the structures and sites.

Collection of monitoring data is necessary not only for O&M purposes but also for renewal of structures or future rehabilitation projects.

Facilities inventory and O&M manuals form fundamentals for O&M activities. However, maintenance of the facilities inventory is not satisfactory, resulting in bottlenecks for proper O&M in Japan as in most countries.

3.6 Training

Training of relevant staff in O&M has been periodically programmed. Exchanges of views and experiences are an important part of training. Innovatory comments for O&M can be proposed to relevant authorities through training and feedback mechanisms.

4. LESSONS

a) Projects are initiated at the request of local people. Inevitably there is therefore a local interest in seeing that they work once implemented.
b) Construction is subsidized but farmers contribute. Cost realization is a problem.
c) Management of smaller projects is by beneficiaries, under a prescribed system.
d) Beneficiary management of complex systems is difficult and requires technical assistance.
e) The above points refer to irrigation and agricultural development. Flood control mainly concerns urban areas and is publicly funded.
f) Projects are handed over between different bodies which results in differences in water management.
g) Local control can be to the detrimental of other wider objectives (environmental and basin-wide integrate management).

Appendix G.4

About Water Resources Committee of the Republic Kazakstan

Kazakstan is disposed by limited water resources. In average water year it is estimated equal to 101,000 MCM, out of which 56,000 MCM is formed at the territory of Kazakhstan and 45,000 MCM are coming from contiguous territories (People's Republic of China, Kyrgys Republic, Republic of Uzbekistan and Russian Federation). The significant part comes on transboarder drainage which amounts 55,000 MCM from this common capacity 80 possible to using water resources don't increase 46,000 MCM and with account of underground water-53-54 milliards m. In all river basins, besides irtishskii, water resources are involved to economic using and drained. Shortage of water resources limit effective decision of social-economic tasks, normalization of ecologic condition, it leads to disbalance between necessities in water and its presence, complication of relations with states, having common river basins.

In this conditions the main task of Committee of water resources are realizing of purposeful water-economic politics, directing on rational management and regulation ofusing of water in economy, preventing its soiling and exhaustion, perfection of interstate water relations.

It is functioned 8 basins water-economic unions, 19 regional committees of water resources also organizations of interregional and inter republican meaning at the Committee, management by exploitation Shardarynski and Tasotkelski water reservoirs, organization by exploitation irtysh-Karaganda channel, 3 main managements by exploitation group water-pipe. There are 462 water reservoirs on its balance, from it 106 main 16,000 km main water transporting channels, corresponding repairing - industrial base.

There are 54 group water-pipes in 15 regions, length - 13,538.4 km and separating units - 959 km.

1,175,000 men in 1068 inhabitant points use drinking water. Water is given also to Omskaya, Tumenskaya and Kurganskaya regions of Russian Federation.

Acting system of water economy is considered on stabel financing from state budget. The part of objects: water-resourvoirs, regulating hydrotechnic structures are not connected with sevices by supply of water. Annually on supporting its stability it's necessary no less 1.0-1.2 mlrd Tenge. For the last years is envisaged by budget no more 240 mln Tenge, actually it is financed only half from this sum. All main water-reservoirs, hydropoints, which are input to the expoitation 30-40 years ago, are in unsatisfied technical condition and represent objects increased dangerous. They need in urgent conducting repairing - reducing works. Because of absence sufficient means, it is not lead, properly work of basin water-economical unites, which realizes important state functions by regulating using water resources, interstate, territorial and branch distributors, protection of water from soiling and exhaustion. These organizations haven't possibilities to contain ingenier - technic personnel now, autotransport, to realize tasks in full volume, envisaged by water legislation.

Input of payment for services by water - supply (from 1992) had its positive results in conditions of solvency of water - users. It is fall loading on budget, it is founded economic mechanisum of rational using of water resources. Also economic - water - users by objective economical reasons have high debts to water - economic organizations. In 1995 it was paid only 15 % of services by water - supply. Consequences of it are negative reflect for all branch: expoitation personnel don't get salary for months, it is not lead repairing works in full volume on objects of water economy, increase danger of water emergency situations. The difficult situation formed on group water- pipes. Because of non-payments of water-users its work is supported with large effort. Envisaged budget means on reconstruction are given non full volume.

At the result of structual reforms, freezing of water-economical and meliorative building the unit of projected institutes stopped its activity. It is the large loss for republic. Here, it was prepared high-qualificated ingeniers-designers, it is accumulated large fund of projected - investigation materials.

Questions of development of water economy of water - reservoirs channels hydro-

electric station water-supply, especially central Kazakstan, regulating of water relations, problems of Aral and Kaspii request constant work in cut of concreate water - economic districts.

With Ministries of Water economy of Uzbekistan; Kirgyzstan, Tadzhikistan, Turkmenistan, Russian Federation are realized cooperation by trans-border rivers of coordinating Water-economy Commission of States of Central Asia, Kazakstan-Russian water commission, inter-state Council by problems of basin of Aral Sea.

According to interstate Agreements of republic must bring its part to these states by support and repairing on water-economy objects, is situating on transborder water-flow, as Syr-Darya, Shu, Talas, Large and Small Uzeni and others.

Questions of effective using of irrigation lands request more attention. Founding on area 2,3 mln. ha significant meliorative potential must bring more high output. At the same time with attracting foreign investments should economically profitable to make conditions for extension meliorative works, reorganazation and reconstruction of intereconomic irrigating unit by itself.

In order to decide of all these questions Committee of water resources works, take all measures in order bring out branch from crisis condition and provide its stable functioning in programme of acting Parliament by extending reforms on 1996-1998.

It is worked out plan of actions by Committee for realization programme of Parliament, where are envisaged some measures, including, beginning with 1997 input of payment for water (water resources) and using by irrigative systems. It was conducted 2 seminars by questions of organization O&M, one of it of practical character with departure to shuiski district of Zhambyl region. It was worked out concreate recommendations on O&M on these seminars, by foundation normative - law base and other offers. From September, 20, the specialist of water resources of Asia Bank of Development Mr. Adrian Hatchine joined to this work. Hydropoints, head water-intake structures, intereconomic main channels are stayed on state expoitative balance of organization and irrigative units of local means (intraeconomic irrigating unit) transfer to the management of water-users. So, it made the base for phased decision of questions, connecting with transfering of separate water-economic systems on unstate forms of economy.

It is necessary up 1996 to revise former order of organization providing by water of irrigating lands, to work out the mechanism of levy payment for water resources, using by irrgative systems and interaction between water-users and managements of water-economic system.

The process of privatization, state agriculture organisations and separation of collectve farms and state farms on farming, peasant economics and other economic subjects with private form of property requests of new forms of organizations maintenance of irrigating unit, regulating of activity of state managements water-economic systems.

It is necessary to provide coordination between new water-users, account of capacity of channels, agreement of structure of agriculture, plan of water-using, fulfilment of repairing works.

This year, it was concluded agreements by sum 2,29 mlrd.tenge by regional subdivisions in order to supply water in volume 12,4 mlrd.m3. For 8 months of this year, actually it is given water in volume 8,8 mlrd.m3 water to water-users, on sum 1,71 mlrd. tenge. However, on accounts of water-economic organisations, it was received in all 730,000,000 tenge (it's 40% from volume actually giving services). Debtor debts with account of last years is 2,46mlrd. tenge.

On state on 01.09.96 it was given 30,4 mln. m3 drinking water to users from group water-pipe on sum 840,4 mln. tenge, from it was paid in all 283,3 mln. tenge.

Attachment: Structure of expenses for service by water-supply to water-users.

Comparison of Expenses for Service of Supplying Water to Water Consumeres

From the 1st of Februaruy of 1992 year in accordance with resolution of Ministry Cabinet of Republic Kazakstan from the 4.03. 1992 N182 "About payment for servicefor supplying water in irrigated agriculture" all water consumers transferred forchargeable water using.

Services for supplying water to water economical organizations, farms - water consumers are paid with calculation of tax for additional cost by tariffs, established by the Head of district administration in accordance with resolution Ministry Cabinet of Republic Kazakstan from 3.01. 1992 NS "About Measures for liberalisation prices" and also with account of index in dependence of changing outside economical conditions (point 4.3) in accordance with the decision of the Head of Oblast administration "About the realisatin of the resolution of Ministry Cabinet of Republic Kazakstan N 182 from 4.03.92" About payment for service by supplying water in irrigated agriculture".

Volume of given water is determined by attested commercial hydro posts with possibility established by equipments of water calculation for account means of water consumers, but on pumping stations and wells, except by expended energy.

Calculation cost of water supply in account of expenses explotation and water economical organisations is fulfilled by one-rated tariff, in accordance with methodical instructions "Full economical estimate in water economical organisations"1991.

Tariffs for services are calculated in account with expences and profit ability of water economic organisations and includes expences for developing of production in calculation of collection from allwater consumers10% means of established tariff for cubic meter of used water.

Expences of water-economic organisations include discharges for support of explotation staff of management, plots, current and capital repair of main funds of explotation organisations, acquiring means of communication, telemech anics, wateraccounting instruments for changing of useless mechanisms, equipment, transport stock, for measures for protection of environment, elaboration and introduction of science elaborations, connected with water economical activity. Main expences are defined in accordance of resolution of college. State economical committee RK from 30.07.1992 N7 "About position and structure of expences by productivity, realisation of production (works, services) including in cost price of production (works, services) and about order of forming financial reults, taken into account while tax assessment of profit" elaborated in together with Ministry of Finance and State Committee of Statistics of Public.

In value of services includes expences for civil defence, labor protection, by estimates in dependence of members of workers of water econmic systems, by constructed yearly measures included in in collective agreement, in accordance with "Application about financing mobilization preparation of natural economy and measures of civil defence RR" established by the resolution of MR RK from 20.07.1992 year N611-21 and Law of RR "About labor protection" from 22.01.1993.

Tariff of assignment on state social insurance is in size 38%, medical - 1%, fund of payment of labor, fund of reform of economy - 5% out of rendered service, in accordance with resokution of President RK "About republic budget for 1994 year" from 27.01.1994 and value added tax 20%.

Expence (input) item by economic estimate fulfilled confromably to from N2 in "Fulfilment estimate expences by state budget expotation water economical systems and structures, established by Ministry of finanace USSR N41-59 from 15.01.1971 and includes following divisions and measures.

Supporting of exploitation staff of management and plots. Expoitation staff of self-financing expoitation water economic organisation (ingenier technical employers, line and repairing - expoitation personnel) in dependence of irrigated area, average annual number of empolyers, volume of movement material -wares values, total main discharge of canal, length of intereconomic and main canals, number of hydro posts, pumping stations, determined in accordance with order N 166 from 18.04.1977 Ministry of Melioration and Water economy USSR. Temporary standard staff norms leading ingenier-technical employers and office workers of water economic expoitation organisation and Water economy of USSR" - 1977, but number of time-workers by norms, established by Ministry of Melioration and Water economy of Kazakh Republic from 14.06.88. Temporary standard staff norms of number of time-workers expoitation organisations. Alma-Ata 1988, and also order N 8-'18/608' from2.09.92 Regional Committee of water resources about number of workers of apparatus Water Management System, depending on the water volume to water users.

Maximum rate of means, paid from fund of consumption for first heads is determined from seize of minimum salary, in accordance with resolution Ministry Cabinet RK from 20..11.1992 N 868 "About new terms of payment for labor on the Basis (base) united tariff net for all categories employers of public economy, order N8-17/42 from 29.01.93. Regional Committee of Water resources and resolution of Ministry Cabinet RK from 8.04. 1994 N148. "About state regulation of means directed on consumption, besides that norms of means directed on consumption from profit, left at the disposal of entrerprice. Expences for sendings, on business tripsare determined in accordance with resolution of Ministry Cabinet RK from 23.11.93 N1175 "About norms of discharge for business trips", but typographic, post-telegraph, telephone and other administrative- economic dischargs, in accordance with existing' positions.

Exploitation discharges and current repairings. Repair of hydro structures, dams, canals, fencing dams, pumping station, wells, fish protecting equipments means of account water, must determined mainly by norms of rates on current repairing of main funds in percents from initial or reducing balance cost by table N 56, but norms of amothzation assignments by main funds in percents with balance cost by table 141. "Reference book of specialist in melioration".

However with going over to market laws in economics, inflation processes, earlier worked system of determination of expences for repairing in percents from balance cost of objects, by constantly changing its size in accordance with inflation turned out in now days unacceptable.

That's why, expences for current and capital repair objects determined in each concrete case commission on the base of formed defective acts and estimates for achievement after repairing working, technical and aesthetic suitable for expoitation of objection.

In accordance with Law of RK "About unity of measurement onirrigated system, yearly are liablle to attestation and reattestation of hydrometric posts, check, graduation and attestation hydrometric instruments 80% from common number of time next attesstation after 2 years, but with delay period 100%. Expences are paid for territorial organ of Kazakstan main standard or Alma-Ata department "Water automotization Metrology" by given accounts, but in estimates are filled up with position-finding costs.

Whole form of calculation tariffs for service by supplying water by water economy organizations is following.

Summary estimate of expences
management of water economy systems

1. Sallary of administrative government personnel.
2. Sallary of line personnel

   - regulators of structures

- supervisors of structures, canals

- inspector of hydrotechnical posts and wells

- employers of radio-telephone acommuncation

- employers of machine and economical yard, repairing exploitation staff of pumping stations, group water pipes, wells

3. Additional sum for social insurance -38% from fund of Labor protection

4. Fund of engaging of population -2% from FPL (fund of protecting labor)

5. Medical insurance - 1% from FPL

6. Travelling expences

7. Stationery, telegraphic post - telegraphic and telephne expences

8. Current repairof main structures, pumping statins, group water pipes, wells.

9. Current repair of hydroposts, instruments of water account and other means of measuring

10. Current repair of dams, canals, collective drainage net, expoitation roads, pipe line, closing armature

11. Current repair of civil and production buildings

12. Current repair of fish fenced constructions

13. Unflooding and unmounting torrent works

14. Repairing-regulative woks

15. Levelling of dams, canals, ranges of hydropost and construction of benchmarks.

16. Mechanical clearing of water economic irrigated net and pumps

17. Current repair of auto-transport, mechanisms.

18. Capital repair of state telephone stations (observing stations, wells).

19. Capital repairing of hydroposts.

20. Capital repair of civil and productive buildings.

21. Capital repair of dams, expoitation roads, canals, collective drainage net, pipe . lines, closing armature.

22. Maintenance plantations, forest plantations.

23. Expences for civil defence.

24. Expences for labor protection.

25. Expences for heating.

26. Cost of electrical energy.

27. Aquirements of sport inventory and special clothes.

28. Expences for attestation and reattestation of hydro posts, instruments of water account and other means of measurement. Acquiring of instruments of water account.

29. Expences for science.

30. Maintenance of autotransport, land digging and building technics.

31. Collection for developing public transport 10-20% from FPL.

32. Chemical cultivation of productive buildings (pumping stations), reservoirs from insects, rodents.

33. Amortization assignments.

34. Maintenance of cartage transport.

35. Percent(%) of profitable enterprices.

Total:

36. Fund of transforings economy-5%.

37. Road fund -1% from the volume opf done works.

38. Value added tax.

Total:

PREPARED BY:

WORLD BANK IRRIGATION AND DRAINAGE
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THE MINISTRY OF AGRICULTURE
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ANNEX - H

COST ESTIMATE

ANNEX H
COST ESTIMATE

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ANNEX-H COST ESTIMATE

1. Basic Consideration and Assumptions for Cost Estimate

The costs for the project works and their relevant works and services are estimated based on the following conditions and assumptions:

(a) Conversion rate among Kazakstan Tenge (T.), US dollar (US $) and Japanese Yen (JPY) is assumed to be US$ 1.0 = T. 75.0 = JPY 115.0, referring to the current exchange rate as of August 1997.

(b) All the costs are estimated based on the unit prices in July 1997. The unit prices comprise the foreign currency and local currency portions. The ratios of local currency and foreign currency portions of the construction materials used in the unit price are determined through market survey in Kazakstan and shown below.

Items	Local C. (%)	Foreign C. (%)
Cement	20%	80%
Aggregate	90%	10%
Reinforcement Bar	20%	80%
Structural Steel	20%	80%
Precast Concrete Block	90%	10%
Timber	95%	5%
Concrete Pipe	90%	10%
Fuel	90%	10%

(c) All the construction works for the irrigation and drainage canal systems as well as procurement of rice mill, farm machinery, O&M equipment and water management equipment will be carried out by the contractors selected through the international competitive bidding (ICB).

(d) Machinery and equipment required for construction work will be provided by the contractors themselves. The depreciation costs of machinery and equipment are therefore counted in the unit prices of the construction works instead of the procurement cost.

(e) The project administration cost required during the construction period is estimated at 5 % of the direct construction cost.

(f) The cost for fishery compensation is included in the cost for the phase-II Work based on the Ordinance on "Protection of Fish Resources and Management of Inland Fishery" .

(g) A physical contingency of 10 % of the direct construction cost is included in the project cost.

(h) The price contingencies are estimated on the basis of 3.0% per annum for the local currency portion after conversion to the US$ and 2.0% per annum for the foreign currency portion..

2 Project Cost

2.1 General

The project cost comprises: (i) direct construction cost; (ii) cost for procurement of rice mill, farm machinery, office equipment, O&M equipment and water management equipment; (iii) project administration cost; (iv) cost for technical support; (v) land acquisition cost;

(vi) cost for fishery compensation; (vii) physical contingency and (viii) price contingency. The direct construction cost for the irrigation and drainage systems including on-farm system and rural infrastructure are estimated based on the estimated work quantities and unit prices consisting foreign and local portions. The unit prices are calculated referring to the current labor costs and material cost as of July 1997 as shown in Tables H.1 and H.2.

The costs for the other items such as procurement of O&M equipment, water management equipment and office equipment, land acquisition, fishery compensation, project administration, and technical supports are made after estimating their actual requirements. The total project cost thus estimated is divided into two portions; Phase-I and Phase-II portions, following the recommendation made in the project implementation schedule as shown in Figure H.1.

2.2 Direct Construction Cost

(1) Irrigation and Drainage Systems

The irrigation facilities will comprise: (i) rehabilitation of the Kzyl-Orda Headworks, (ii) rehabilitation and improvement of the Left Main Canal, (iii) rehabilitation and improvement of 10 inter/on-farm canals and main and secondary field canals in the Ilyasov and Shagan Areas. As for drainage system, rehabilitation and improvement of existing collectors will be made for (i) North Main Collector, (ii) South Main Collector, and (iii) 17 inter-farm/on-farm collectors and (iv) main and secondary field collectors in the Ilyasov and Shagan Areas. As for the on-farm development, rehabilitation and improvement of field canals, field collectors, field ditches, and field drains, and construction of additional field drains will be carried out. O&M roads parallel to the irrigation canals and collectors will be rehabilitated and/or improved under the Project. Based on the work quantities, these construction costs are estimated as shown in Tables H.3 to H.5.

(2) Rural Infrastructure

The rural infrastructure will consist of (i) rehabilitation and improvement of 63.5 km of farm roads, and (ii) rehabilitation and improvement of village water supply systems with 16.2 km of supply pipes in total in the Ilyasov and the Shagan Areas. The cost estimate is made based on the work quantities for the respective farms and shown in Table H.6.

(3) Buildings

There are 22 buildings with a total floor area of 19,100 m^2, all of which will be constructed or rehabilitated under the Project. The costs of these buildings are also made based on the work quantities and shown in Table H.7.

2.3 Procurement of O&M and Office Equipment

In order to carry out proper and efficient O&M and water management, it is proposed to procure the O&M equipment including water management equipment, heavy equipment and vehicles, communication system, meteo-hydrological observation equipment, survey instrument and some office equipment. The required cost for these procurement is estimated at US$ 2,022,100 for the Phase-I implementation and US$ 2,218,800 for the Phase-II implementation. The details of these cost are shown in Tables H.8 and H.9.

2.4 Land Acquisition

The land acquisition is required only for the construction of new canal route of the Left Main Canal, which is estimated at 6.5 ha. Referring to the land prices announced by the Land Use Committee on March 8, 1996, the land acquisition cost is estimated at US$ 8,700.