

ANNEX - K
PUBLIC CONSULTATION

ANNEX K
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ANNEX K

PUBLIC CONSULTATION

The Kzyl-Orda Irrigation/Drainage and Water Management Project involves farm members, managers of production cooperatives, specialists of production cooperatives, and government officials participation throughout the study process. On July 29, 1997 this process was formalized in two public consultations with project beneficiaries in the Shagan and Ilyasov Areas. The purposes of public consultations were to explain the necessity, outline and benefit of the Project to farm members and to promote project beneficiaries' understanding of payment of water charge and the organization of water user's association.

Based on the explanation note attached as Attachment K.1, these consultations detailed the proposed engineering, economic, and social aspects of the Project with presentations from government officials, managers of production cooperatives, JICA Study Team experts, and JICA Study Team counterparts as shown in attached minutes as Attachments K.2 and K.3.

The consultations were attended by 82 persons in Ilyasov Area and 49 persons in Shagan Area as shown in attached participation list as Attachments K.4 and K.5. An open question and discussion period ensued with full participation of farm members and others. At the conclusion of the discussion, a call for votes by farmers in favor or opposition to the Project was made and in both public consultations, participants voted unanimously in favor of the Project.

Attachments

Explanation Notes for Public Consultation

1. Background of the Project

In order to attain the sustainable agriculture under the severe climatic conditions prevailing over Kazakstan, particularly of minimal precipitation (250 mm per annum), the Government of Kazakstan has been promoting an irrigation development program mainly in the southern part of the country, where water resources of the Syr Darya river are available. Under this program the Kzyl-Orda Irrigation/Drainage Project was taken up in 1940's primarily for paddy cultivation and completed in 1960's. The water source for this project, the Syr Darya river, is also an important water source together with the Amu Darya river for Aral Sea. After completion of this project, about 87,000 hectares of paddy field have been opened up and become the rice granary of the country producing 70% of total production of the country. Recently, however, the rice production is decreasing because of shortage of irrigation water caused by deterioration of irrigation facilities, salinization and inundation problems caused by mal-function of drainage facilities, unfavorable water management, worn-out agricultural machinery, limited use of agricultural chemicals and fertilizers due to deficit of budget, and inadequate institutional supports.

In addition to the above-mentioned agricultural difficulties, the Syr Darya river basin is bearing to the environmental problems in and around Aral Sea. This environmental problem has been caused by a large-scaled irrigation development along the Syr Darya river, which needs a large amount of water intake from the Syr Darya river, resulting in decrease of inflow to Aral Sea, and as a result causes the destruction of ecosystem in and around the sea.

The Government of Kazakstan (GOK), taking the above situation seriously, in November 1994 requested the Government of Japan (GOJ) for technical assistance to conduct the study on the Kzyl-Orda Irrigation/Drainage and Water Management Project. In response to this request, GOJ sent a Preparatory Study Team to Kazakstan and concluded the Scope of Work (S/W) for the Study between Japan International Cooperation Agency (JICA) and the Ministry of Agriculture (MOA) of GOK on March 12, 1996.

Based on the above-mentioned S/W, the present JICA Study Team was dispatched to Kazakstan two times, August to November 1996 and May to September 1997, to conduct the field survey.

2. Objectives and Scope of Project

The main objectives of the Project are: (i) enhancement of irrigation efficiency through rehabilitation and improvement of irrigation system; (ii) assurances of operation and maintenance (O&M) of project facilities by farmers' organizations and beneficiaries themselves in process of privatization of agricultural production system; (iii) prevention of salinization through proper management of irrigation and drainage and proper landuse and cropping system; (iv) mitigation of environmental negative impact caused by the agricultural development; and (v)

enhancement of farmers' incentive towards agriculture through improvement of agricultural production environment.

In order to realize the above-mentioned objectives of the Project, the following scope of the Project is envisaged:

- (i) Rehabilitation and improvement of the intake structure of the Kzyl-Orda Headworks, Left Main Canal, inter-farm canals and on-farm canals to distribute irrigation water from the intake structure to the irrigation area in an efficient manner.
- (ii) Rehabilitation and improvement of the North and South Collectors, inter-farm collectors and on-farm collectors to lead excess water in farm lands to the Kuvan Darya river.
- (iii) Rehabilitation and improvement of on-farm facilities including field canals, field ditches, field collectors and field drains to enable farmers to maintain the proper water control in farm plots.
- (iv) Introduction of improved farming practices, including the selection of profitable crops and diversified cropping system, proper and timely application of fertilizers and chemicals, and improvement of post-harvesting and marketing system.
- (v) Establishment of an effective water management and O&M system.
- (vi) Improvement of agricultural support services such as agricultural research and agricultural credit, and establishment of agricultural extension system.
- (vii) Establishment of agricultural cooperatives which will have functions of marketing of agricultural products, procurement of farm inputs, rental of agricultural machinery to farmers and water management.

3. Farm Economy

The benefits of the project will be attributed to (i) restoration of abandoned land and (ii) increase of yields. Under the present conditions of year 1996, 4,290 ha or 34% of the agricultural land was abandoned due to the shortage of irrigation water, poor drainage condition, salinity problem, and shortage of farm machinery and farm inputs. This agricultural land will be restored to cultivated one under the "with project" conditions.

The yield of the major crop (paddy) is projected to increase from 3.7 tons/ha under the present conditions to 6.0 tons/ha with the project. The estimated yields of the two other major crops; lucerne and wheat, are expected to be 86% and 113% higher under the "with project" condition compared to present condition.

Taking the above benefit, the farm economy is expected to be changed as follows:

Item	Unit	Present Condition			Future With Project Condition		
		Ilyasov	Shagan	Total	Ilyasov	Shagan	Total
Population	person	2,324	4,010	6,334	2,324	4,010	6,334
Household	nos.	454	695	1,149	454	695	1,149
Agricultural Land		6,480	7,210	13,690	6,480	7,210	13,690
Crop Area	ha	3,530	4,960	8,490	6,480	7,210	13,690
Abandoned Area	ha	2,950	2,250	5,200	0	0	0
Net Return per ha	Tenge	3,710	2,162	2,805,654	35,472	35,564	35,520,234
Net Farm Income							
Per Farm	Tenge	13,098,000	10,722,000	23,820,000	229,859,000	256,413,000	486,272,000
Per Household	Tenge	28,850	15,427	20,731	506,297	368,940	423,213
Net Reserve (With Project Condition - Present Condition)							
Per Farm	Tenge				216,761,000	245,691,000	462,452,000
Per Household	Tenge				477,447	353,512	402,482

In the Ilyasov Area including Berlek peasant farm, the net income will increase from present 13,098 thousand Tenge to 229,859 thousand Tenge under the future "with project" condition. In the Shagan Area including peasant farms, the net income will increase from present 10,722 thousand Tenge to 256,413 thousand Tenge under the future "with project" condition.

In addition to the above mentioned improvement of farm economy, the living condition will be improved through the following works after the Project:

- Improvement of domestic water supply system, and
- Improvement of road networks in farms.

Farmers will be the beneficiaries and therefore will pay a part of the costs associated with the Project through a loan from the donor country at a rate of 2-3%, payable over a period of 20-30 years. The Project, if approved by the Government of Kazakhstan and the donor country, will proceed in stages. The first stage would involve the Priority Project Area which include the Production Cooperative Farm "Ilyasov", Production Cooperative Farm "Shagan" Peasant Farm "Berlek" and five family farms in the area. Member of these farms would jointly share in the responsibility for the Project and be involved in its planning and implementation.

4. Water User Association

This project involves farmer beneficiaries in all key decisions. In our meeting today, we are describing the physical and economic aspects of this project and its potential benefits. Today's discussion also serves as an introduction to the concept of the Water User's Association and how it is integral to this project.

Leaders at the national, regional, and local levels have agreed that the transition from collective to market agriculture must be accompanied by increased self-governance and independence for all farmers, whether they are members of Joint Stock Companies, Production Cooperatives, or are independent family farmers. With the freedom to organize agriculture privately comes the responsibility to manage agricultural resources (such as water) independently of direct government intervention. A key element of self-governing, independent agriculture is the management of irrigation water by the farmers themselves.

The farmer management of irrigation water in the market economy is undertaken at the local level by the Water User's Association. A Water User's Association is an independent and voluntary organization of farmer members within a distinct irrigation area. It includes all water users within the area who wish to participate in irrigation regardless of whether they are members of a cooperative or are independent family farmers. Its purposes are to:

- Assure that each member of the association receives adequate water in a timely and equitable manner,
- Maintain the irrigation system, including canals, gates, drains, and other structures,
- Assure the collection of water payments in proportion to its use,
- Prevent water theft, taking water out of turn, the destruction of infrastructure, and other violations of good irrigation practice
- Carry out an operations plan, including water scheduling and distribution.

The Water User Association is governed by a charter which is adopted by the membership. Members elect a Board of Directors and a Manager and appointed hydro-technicians carry out the work of the association. Farmers themselves are involved in all key decisions through the general assembly process. Farmers are expected to participate in the operation and maintenance of the irrigation system.

Water User's Associations improve productivity by involving the farmers in all aspects of water management, thereby reducing conflict, improving maintenance, reducing over-irrigation by powerful users, eliminating under-irrigation by smaller users, and reducing the power of distant government bureaucrats.

This project requires that the beneficiaries of the project manage irrigation water through the water user's association. Technical assistance will be provided to new organizations, including training, draft Water User's Association Charters and by-laws, and on-going consultation. Members of the Water User's Association will be consulted at each stage of the project, including feasibility, final design, construction, testing, and acceptance.

Minutes of Public Consultation

Place : Meeting Room in Ilyasov Production Cooperative

Date and Time : 10:00-12:00, July 29, 1997

Attendance :	Local Government:	Adviser of the Oblast Akimate, and Terenozek Raion Akim
	Line Agency	Chief of Oblast Committee on Water Resources, President of JSC Arna Morozov, and Chief of Land Committee
	Farm Member	Manager of Ilyasov Production Cooperative, and 82 members of the Ilyasov Production Cooperative and Berlek Peasant Farm
	Local Expert	Agronomist and civil engineer
	JICA Study Team	Agronomist, sociologist, design engineer, environmentalist, translators and recorders

Summary of Meeting

1. JICA Study Team explained the purpose, brief content of the meeting and the participatory process to farmers . JICA Study Team distributed project summaries as shown in Attachment M.1.
2. Advisor of the Oblast Akimate explained the work done by the JICA Study Team during two years.
3. Terenozek Akim expressed gratitude to the JICA Team for the study and her pleasure that the Terenozek Raion was selected for field survey. She noted that paddy yield was declining and that according to estimates, yield will rise to 6.0 tons/ha with project, if irrigation and drainage are improved as planned. She also noted problems of drinking water and road conditions and requested farm members to appeal to local newspapers with any problems.
4. Local expert explained the present conditions with respect to clogged canals, saline soils, and water logging. He described planned works with a map, noting headworks, inter-farm canals and collectors.
5. Local expert summarized the field survey and its findings from the view points of agriculture, agro-economy and organization. Based on the writing materials, she explained the present condition of farm economy and direct benefit under "with project"

condition. In addition, she explained the necessity of water user's association under "with project" condition.

6. The farm member asked the improvement of depreciation in the paddy field during the construction period. JICA Study Team answered that the elaborate land preparation should be made by farmers themselves by using machinery in order to solve this problem.
7. The economist of Ilyasov Production Cooperative noted the problems of bartering and absence of cash flow and commented in favor of project. JICA Study Team explained that the new credit and marketing information system will be proposed in the study on the basis of the result of analysis of the present condition.
8. Manager of Ilyasov Production Cooperative noted the shortage and inferior working condition of machinery and asked the necessity of crop rotation. JICA Study Team explained that the farm machinery will be replaced by using loan system financed in the Project. JICA Study Team also explained that the rice based crop rotation should be applied in the Project due to the desalinization of agricultural land.
9. Final comments were made by the Advisor of the Oblast Akimate and thanks to JICA on behalf of local inhabitants.
10. JICA Study Team requested farmers vote either for or against the project. Affirmative vote was 100%.

Minutes of Public Consultation

Place : Meeting Room in Shagan Production Cooperative

Date and Time : 14:00-16:00, July 29, 1997

Attendance :

Local Government:	Adviser of the Oblast Akimate, and Terenozek Raion Akim
Line Agency	Chief of Oblast Committee on Water Resources, President of JSC Arma Morozov, and Chief of Land Committee.
Farm Member	Manager of Shagan Production Cooperative and 49 members of the Shagan Production Cooperative and local peasant farms
Local Expert	Agronomist and civil engineer
JICA Study Team	Agronomist, sociologist, design engineer, environmentalist, translators and recorders

Summary of Meeting

1. JICA Study Team explained the purpose, brief content of the meeting and the participatory process to farmers . JICA Study Team distributed project summaries as shown in Attachment M.1.
2. Advisor of the Oblast Akimate explained the work done by the JICA Study Team during two years.
3. Terenozek Akim expressed gratitude to the JICA Team for the study and her pleasure that the Terenozek Raion was selected for field survey. She noted that paddy yield was declining and that according to estimates, yield will rise to 6.0 tons/ha with project, if irrigation and drainage are improved as planned. She also noted problems of drinking water and road conditions and requested farm members to appeal to local newspapers with any problems.
4. Local expert explained the present conditions with respect to clogged canals, saline soils, and water logging. He described planned works with a map, noting headworks, inter-farm canals and collectors.
5. Local expert summarized the field survey and its findings from the view points of agriculture, agro-economy and organization. Based on the writing materials, she explained the present condition of farm economy and direct benefit under "with project"

condition. In addition, she explained the necessity of water user's association under "with project" condition.

6. Chief of Water Resources Committee noted the economic and water management system problems in and around the Project Area.
7. The farm member asked the loan repayment of the project cost. JICA Study Team answered that the beneficiaries should pay a part of project costs and the allocation of loan repayment between beneficiaries and government will be studied by the team. In addition, payment capacity of beneficiaries will also be studied taking into account net income of beneficiaries under future "with project" condition.
8. Manager of Shagan Production Cooperative noted the present problem of irrigation/drainage condition and requested to realize the Project in order to solve this problem. The Advisor of the Oblast Akimate answered to push the central government to promote the Project.
9. Final comments were made by the Advisor of the Oblast Akimate and thanks to JICA on behalf of local inhabitants.
10. JICA Study Team requested farmers vote either for or against the project. Affirmative vote was 100%.

Жиналыска катысушылар тізімі

Attachment K.4

Күн: Шілденің 29, 1997 ж.

№	Аты жөні	Шаруашылық/Бірлестік	Қолы
1	Хаймурдиев Назарбек		
2	Омаров Сейітбек		
3	Достанов Курманбек		
4	Есеналиев Халим		
5	Дубсанов Шүкрат		
6	Хаймурдиев Мурат		
7	Ахметов Курманбек		
8	Тәжібаев Аманжол		
9	Аманжолбаева Рахымжан		
10	Аманжолбаева Рахымжан		
11	Халимжанов Аман		
12	Халимжанов Аман		
13	Аманжолбаева Рахымжан		
14	Муратов Аманжол		
15	Муратов Аманжол		
16	Сыздықова Гүлнар		
17	Досалықов Тұрған		
18	Командарова Шүкрат		
19	Ермағұлов Аманжол		
20	Мамытжанов Рахымжан		
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Жиналыска катысушылар тізімі

Күні: Шілденін 29, 1997 ж.

№	Аты жөні	Шаруашылық/Бірлестік	Қолы
1	Құрабаев Әмірбек	Альмас	
2	Ахметжанов Ахмед		
3	Баширов Сәдуақас		
4	Арыстанов Аман		
5	Қамбаев Қурман		
6	Аманбаев Аманжол		
7	Құрабаев Аманжол		
8	Қасымжанов Әділ		
9	Қасымжанов Әділ		
10	Молжанов Аманжол		
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Жиналыска катысушылар тізімі

Күні: Шілденін 29, 1997 ж.

№	Аты жөні	Шаруашылық/Бірлестік	Қолы
1	Сарықарев Бағдат	Шығар	Сарықарев
2	Сарғандықов Серікбай		Сарғандықов
3	Алиханов Мемлекет		Алиханов
4	Сығарев Кудайбергали		Сығарев
5	Алиевдаев Шеркеш		Алиевдаев
6	Қабдышев Ермек		Қабдышев
7	Жұрмағалиев Ержан		Жұрмағалиев
8	Богарисов Марат		Богарисов
9	Бирманов Мамыр		Бирманов
10	Жармаев Ержан		Жармаев
11	Ахмедов Барсегали		Ахмедов
12	Қабдышев Қурман		Қабдышев
13	Доманов Мамыр		Доманов
14	Қабдышев Әзімжан		Қабдышев
15	Қоңғаров Қурман		Қоңғаров
16	Қоңғаров Қашағали		Қоңғаров
17	Алиев Садыр		Алиев
18	Алиев Марат		Алиев
19	Ермек Дархан		Ермек
20	Темірбеков Ресулжан		Темірбеков
21	Қоңғаров Қашағали		Қоңғаров
22	Алиев Шамшурман		Алиев
23	Қоңғаров Садыр		Қоңғаров
24	Темірбеков Ресул		Темірбеков
25	Ермек Бақай		Ермек
26	Шоңғаров Ресул		Шоңғаров
27	Қоңғаров Қашағали		Қоңғаров
28	Қоңғаров Әли		Қоңғаров
29	Шоңғаров Шағалы		Шоңғаров
30	Қоңғаров Ресул		Қоңғаров

Жиналыска катысушылар тізімі

Күні: Шілденін 29, 1997 ж.

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1	Мусинденов Хасан	Шығар	[Signature]
2	Серікшев Марат		[Signature]
3	Ботанинбаев Аманжол		[Signature]
4	Сәдуақасұлы Сүлеймен		[Signature]
5	Қудайбергалиев Марат		[Signature]
6	Бексесеев Аманжол		[Signature]
7	Мұрашев Аманжол		[Signature]
8	Жеңісбаев Сәлімжан		[Signature]
9	Миско Николай		[Signature]
10	Қаракандыев Сәдімжан		[Signature]
11	Жадырқалиев Аманжол		[Signature]
12	Молжанов Бағдат		[Signature]
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Жиналыска катысушылар тізімі

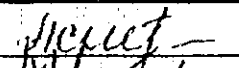
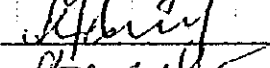
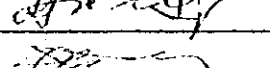
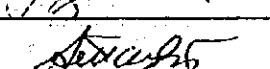
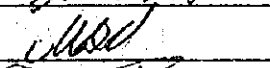
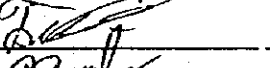
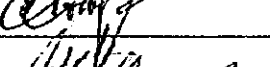
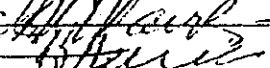
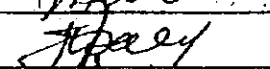


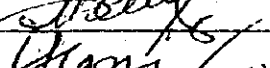
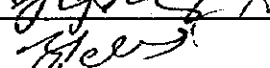
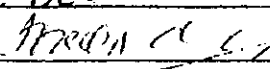
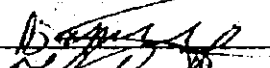
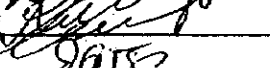

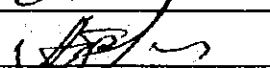
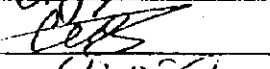
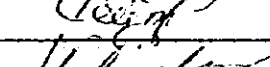
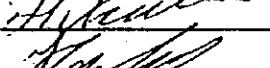
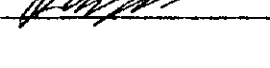


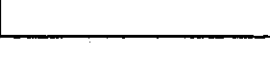

Attachment K.5

Күні: Шілденін 29, 1997 ж.

№	Аты жөні	Шаруашылық/Бірлестік	Қолы
1	Оспанов Сабір	ПК, Чалма	
2	Айтқасанов Әбдіга		
3	Қарибайев Төрехан		
4	Аидерев Шығу		
5	Сарсенбаев Ұрпақ		
6	Шеңізаров Қурман		
7	Жариев Бақыт		
8	Серікбаев Абдіқасым		
9	Жамабергалиев Бақыт		
10	Рамазан Ахмедов		
11	Тәужиев Қалмабек		
12	Сәдуақасов Абдіразақ		
13	Баданов Қурман		
14	Ермаханов Болат		
15	Сәтмисов Қурман		
16	Аманжол Тілек		
17	Әмірбаев Науман		
18	Момынов Азамат		
19	Бектуров Абдыразақ		
20	Жемісов Әсетқали		
21	Сәтбаев Қобайым		
22	Сәлмұрзаев Болат		
23	Сәрсүрәев Селімбек		
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30			

Жиналыска катысушылар тізімі

Күні: Шілденін 29, 1997 ж.

№	Аты жөні	Шаруашылық/Бірлестік	Қолы
1	Аманжол Нұрлан	ПК "Шығанақ"	
2	Турганбаев Баймағам		
3	Аманжол Аманжол		
4	Аманжол Турганбаев		
5	Турганбаев Аманжол		
6	Аманжол Аманжол		
7	Аманжол Ержан		
8	Аманжол Аманжол		
9	Аманжол Тоған		
10	Аманжол Аманжол		
11	Аманжол Аманжол		
12	Аманжол Аманжол		
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27			
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ANNEX - L

TOPOGRAPHIC MAPPING

ANNEX I
TOPOGRAPHIC MAPPING

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ANNEX I

TOPOGRAPHIC MAPPING

1. General

The topographic mapping work was carried out in two phases: Phase-I from September 6, 1996 to February 10, 1997 and Phase-II from May 28, 1997 to July 31, 1997. The scope of work for the Phase-I consists of aerial photography on a scale of 1 : 12,000 for the Kzyl-Orda Left Bank Area of 4,300 km² and preparation of compilation manuscripts of topographic maps with a scale of 1 : 5,000 for the Priority Development Area of 300 km², while that for the Phase-II is to prepare topographic maps with a scale of 1 : 5,000 for the Priority Development Area of 300 km².

All the above-mentioned works were successfully carried out by three contractors under the sub-let contracts with JICA Study Team; aerial photography by the Main Administration of Geodesy and Cartography (Kazgeodesy, MAGC)/Burundayavia, preparation of compilation manuscripts by Zhambyl Geodesy and topographic maps by Enterprise Cartography (Almaty).

2. Aerial Photography

2.1 Objectives

The objectives of aerial photography are to obtain the present status of land use, topography and infrastructure in the Kzyl-Orda Left Bank Area and to facilitate the preparation of topographic maps on a scale of 1 : 5,000 for the Priority Development Area.

2.2 Area for Photography

The area photographed under the contract covers 4,300 km² of the Kzyl-Orda Left Bank Area extending over Syrdarya, Terenozek, Zhalagash and Karmakshy Raions.

The topography of this area is generally flat, and its lowest elevation is about 100 m above mean sea level in the north-west end of the area and the highest is 139 m in the eastern part of the area. The area is largely covered by paddy fields surrounded by irrigation canals and drains, though some of them are kept fallow. The remaining area is covered by prickly shrubbery, suffrutex and semi-desert, thicket of reed, inhabited villages, etc.

Most of artificial features are of straight shape. Some crescent-shaped ponds are found in this area. Most of major roads, farm roads and canal service roads are built of embankment and those levels are higher than the surrounding.

2.3 Achievement of Aerial Photography

The photographic scale was decided to be 1 : 12,000 so as to attain the accuracy requirement for the photographic mapping of 1 : 5,000 scale. Flight lines were planned on the topographic maps with a scale of 1 : 100,000 in east-west direction; parallel to the latitude with a space of 48.6 second in latitude to ensure the side-lap of 30%.

Aerial photographic work was conducted by MAGC/Burundayavia flying from the Kzyl-Orda Airport in the period from September 6 through 9, 1996. All rolls of exposed negative film were transported from the site to Almaty. They were processed at the photolaboratory in Burunday Airport in Almaty and inspected picture by picture and on the contact print mosaics for their overlaps, side-laps, picture qualities, cloud and halation, etc. The summary of the work is as shown below:

Aerial photographic coverage	:	approximately 4,300 km ²
Scale of photographs	:	1 : 12,000
Total number of flight lines	:	56 lines
Total number of accepted photographs	:	3,844 photos

2.4 Employed Equipment and Instruments

The equipment and instrument employed for the aerial photography and photo-processing are as follows:

Airplane	:	Antonov AN-30 Surveycraft Registration No. 30038
Aerial Camera	:	TAFSA-10 No. 305912120, 18x18 format with gyro-stabilized mount GUT-3 Lens "Ortagon - 5a" No.200 Focal Length; 99.3685 mm
Aerial Film	:	Type 42, B/W, Isopan - chrom (Kazan, Russia)
Navigation System	:	Auto - pilot GPS navigation system (Trimble/PRIN) Differential aneroid altimeter DAPS Radio altimeter RB - 18zh

2.5 Products of Aerial Photography

The products of the aerial photography are as shown below:

(i) Contact prints	:	2 sets (3,844 photos/set)
(ii) Flight line index sheet with a scale of 1 : 200,000	:	1 sheet

3. Photogrammetric Mapping

3.1 Objective

Objective of the photogrammetric mapping is to prepare the topographic maps on a scale of 1 : 5,000 for the Priority Development Area of approximately 30,000 hectares for the use of Feasibility Study in the Phase-II Study.

3.2 Works Done for Photogrammetric Mapping

(1) Preparatory Work

Before start of the photogrammetric mapping work, the following materials were prepared for the use of mapping:

(i) Dia-positives (1 : 12,000)	:	454 pcs.
(ii) 2-time enlarged photos (1 : 6,000)	:	454 pcs.
(iii) Contact prints (1 : 12,000)	:	454 pcs.
(iv) Photo index map (1 : 48,000)	:	2 sets

The following instruments were employed for the preparation of above materials:

- (i) Photo processor : APP - 85 (USSR)
- (ii) Contact printer : KR - 8 (USSR)
- (iii) Photo enlarger : FTB (USSR)

(2) Field Reconnaissance

Field reconnaissance was conducted for the area of about 300 km² to check available control points and terrain conditions for the use of the photogrammetric survey planning. As a result, it was clarified that the existing triangulation stations and national bench marks were available at the following densities:

- (i) Triangulation station : 20 ~ 25 km²/station
- (ii) National bench mark : 15 ~ 16 km²/bench mark

(3) Geodetic Control Point Survey

The geodetic control point survey consisting of geodetic control survey and levelling was carried out for the area of about 300 km². The pricking of the above-mentioned control points was also conducted on the 2-time enlarged photographs. The geodetic control survey and levelling were conducted in the following manner:

(a) Geodetic control survey

In order to establish the photo control points of stereo models, the control point survey was carried out by employing the traversing method. In the survey, all the existing triangulation points were connected each other for checking their accuracy.

(b) Levelling

Direct levelling was carried out to connect the elevations of respective stereo models to the existing bench marks for vertical control perpendicular to the flight lines. In the survey, all the existing bench marks were connected each other for checking their accuracy based on the levelling datum of M.S.L. of Baltic Sea 1977.

For the above surveys, the following instruments were used:

- Theodolite : TEODOLIT Y-2 (USSR)
CARL ZEISS YENA 2-T-2 (East Germany)
- Electric distance meter : BLESK CT (USSR)
- Level : NV-1 (USSR)
NI-O25 (USSR)
N-3 (USSR)

The following coordinate system and projection system were employed for the geodetic control point survey:

- (i) 1942 Coordinates System (Ellipsoid of Kazakstan "KRASSOVSKY 1940")
- (ii) Gauss Conformal Projection System

(4) Field Identification and Data Collection

Field identification and data collection for administrative names and boundaries and geographical names were conducted for the Priority Development Area of 300 km² using the 2-time enlarged photographs.

(5) Photogrammetric Work

(a) Stereo plotting

Stereo plotting was carried out on 435 stereo-models to produce the map with a scale of 1 : 5,000.

The following instruments were employed for the above work:

Stereo Projector	:	Romanov SPR (USSR)
	:	Drobyshev SD (USSR)

(b) Compilation and Editing

Compilation and editing work was carried out to develop 106 reproducible compilation manuscripts.

(6) Topographic Mapping (Scribing)

Topographic maps on a scale of 1 : 5,000 covering the area of approximately 300 km² of the Priority Development Area were prepared by Enterprise Cartography (Almaty) from May 29 to July 31, 1997, by using the compilation manuscripts of topographic maps with a scale of 1 : 5,000 prepared by Zhambyl Geodesy under the sub-let contract with JICA Study Team. In the preparation of these maps, the scribing method was employed, of which details are as mentioned below:

(a) Image printing on scribing base

Scribe plates were produced by photo-processing the scribing base coated with diazo-solution, on which the reversed compilation manuscripts were printed.

(b) Production of scribed sheet

Based on the above-prepared scribe plates, negative plates showing map information such as roads, canals, rivers, houses and other features were prepared. The other map information such as symbols for irvegetations, geographical names, annotations were expressed on masking plates.

(c) Production of original manuscripts

The composed positives as original manuscripts were produced using polyester-base (clear base) sheets.

(d) Production of reproducible manuscripts

The reproducible manuscripts of 1 : 5,000 topographic maps were produced using the same material as that employed for the original manuscripts.

(e) Instrument employed for the work

For the scribing work, the following instrument was employed:

Vacuum Printer	:	KLIMSCH KOMMODORE (A0 size) (East Germany)
----------------	---	---

3.3 Products of Photogrammetric Mapping Work

The final products of the photogrammetric mapping work are as mentioned below:

- | | | |
|---|---|------------|
| (i) Original manuscripts (positive)
of 1 : 5,000 topographic map
(approximately 300 km ²) | : | 106 sheets |
| (ii) Reproducible manuscripts (positive)
of 1 : 5,000 topographic maps
(approximately 300 km ²) | : | 106 sheets |
| (iii) Photo copies of 1 : 5,000 topo maps
(5 copies for each sheet) | : | 530 copies |

Attachments

SCOPE OF WORK AND REQUIREMENTS
FOR THE AERIAL PHOTOGRAPHY OF THE STUDY OF KZYL-ORDA
IRRIGATION/DRAINAGE AND WATER MANAGEMENT PROJECT IN THE
REPUBLIC OF KAZAKSTAN

1. SCOPE OF WORK:

Aerial photography shall be carried out by the SECOND PARTY as one of the phases for the engineering services for the STUDY OF KZYL-ORDA IRRIGATION/DRAINAGE AND WATER MANAGEMENT PROJECT IN THE REPUBLIC OF KAZAKSTAN, sponsored by Japan International Co-operation Agency (JICA).

2. AREA:

The area to be photographed is outlined on attached Flight Map marked as Encl. 1, covering approx. 4,300 km² and total flight distance of 3,367 kms.

3. COMMENCEMENT OF THE WORK:

All arrangement for personnel of high-skill, materials, facilities and/or equipment necessary for this work shall be prepared quickly by the SECOND PARTY so that the flying can be commenced from BAZIROVANIA (Kzyl-Orda) Airport, within five (5) days or as soon as possible after receipt of the notice of commencement from the FIRST PARTY.

FIRST PARTY will make every effort to give the SECOND PARTY preliminary notice of commencement as soon as possible. The SECOND PARTY should afterwards execute the work diligently and as soon as practicable.

FIRST PARTY may stop the operation after a certain time of stand-by when the SECOND PARTY cannot complete the aerial photo flights due to continuing bad weather. In this case, the SECOND PARTY may demobilise but the SECOND PARTY shall come back to complete the work later within a certain time to be agreed upon. The whole work shall be completed within forty (40) days after mobilisation of aircraft and personnel at site.

4. REPRESENTATIVE OF JICA STUDY TEAM ON SITE:

FIRST PARTY will dispatch its personnel to Kazakstan as its representative in order to supervise and check the photo flight of the SECOND PARTY. Detail indication and minor modification of the specification as set forth below, within the extent of not affecting agreement amount as mutually agreed by both parties will be ordered on site by the FIRST PARTY representative.

5. EQUIPMENT TO BE UTILISED:

5.1 Aircraft

The survey aircraft to be used in the performance of the agreement work shall have an Air Transportation airworthiness certificate by authority. It shall be equipped with all the essential navigational and photographic instruments. It must have the requisite photographic cruising speed and operating range, a high rate of climb, good stability while in flight, good field of view for visual navigation and a service ceiling at full load equal to or higher than the highest altitude required for the project. The design of the aircraft shall be such that there shall be an unobstructed field of view for the total image of the camera, shielded from exhaust gases, oil and turbulence of airflow caused by propellers.

5.2 Aerial Camera

Aerial camera to be used for the photography shall be a precision aerial photographic survey camera such as AFA-TAFA-10, etc., with a precision wide angle lens (100 mm focal length), which has a valid calibration report.

The calibration report should include:

- a) The Maker's serial number of the camera and the serial number of the lens;
- b) The coordinates of the principal point with reference to fiducial marks;
- c) The radial distortions of the image, with reference the principal point as origin;
- d) The calibrated focal length at which these distortions apply;
- e) The certificate as by whom and when the camera was calibrated.

5.3 Laboratory

The SECOND PARTY's laboratory shall be spacious enough to meet the expected operational requirements and shall be adequately equipped and staffed with sufficient qualified personnel to facilitate high quality production in such a volume as the agreement may require.

6. PERSONNEL TO BE EMPLOYED:

SECOND PARTY should employ or hire skilled and well trained personnel for this kind of work, and submit to FIRST PARTY their experience previously for the acceptance of FIRST PARTY. FIRST PARTY shall have the right to reject and direct the replacement of SECOND PARTY's personnel who is judged "unqualified" by FIRST PARTY for the execution of the work.

7. SPECIFICATION:

7.1 Flight Plan

The flight plan is attached as Encl. 1 and was prepared on a topographical map of the area at scale 1:400,000. The flight plan shows the lines to be flown and the required coverage. The directions of the flight lines are shown as such on the flight plan.

7.2 Photo Scale and Altitude

The aerial photography shall be taken at average scale of 1/12,000. Flying altitudes for each line are shown on the list of flight lines marked as Encl. 2.

7.3 Aerial films

- a) The aerial films to be used shall be with a fine grain freshly coated emulsion and the base shall have minimum dimensional distortion.
- b) Negatives shall be clear and sharp in details and of uniform density. They shall be free from clouds, smoke, haze, light streaks, shadows, tears, scratches and other blemishes.
- c) To ensure dimensional stability, the film shall not be stretched or otherwise deformed in any way. Special care shall be exercised to ensure proper

development and thorough fixing and washing of all films; and to avoid rolling of film tightly on drums during processing and drying. About one meter at each end of a roll shall remain unexposed.

7.4 Flying Requirements

- a) The topography will be undertaken so as to provide complete stereoscopic coverage over the specified area.
- b) The area will be covered with straight strips of photographs having overlap of about 60 ± 5 percent. The sidelap (overlap of parallel strips of photography) should average 30 percent. In the event of considerable variations in ground level, a reasonable increase in the specified overlaps will be accepted.
- c) Crab shall not exceed 10 degrees or be such that stereoscopic gaps in the photography result from it.
- d) Tip and tilt should not exceed 5 degrees.
- e) The centres of the first and the last photograph shall fall outside the required area boundary.
- f) Exposure of photography should be so that even in the shadows caused by topographic relief, satisfactory identification of details is possible.
- g) Where breaks in a flight strip are necessary the minimum overlap between segments of the strip shall be at least three (3) exposures. Any segment of a flight strip resulting from necessary breaks shall consist of no fewer than eight (8) exposures.
- h) Reasonable effort will be made to obtain cloud free photographs and five percent of clouds appearing in each photograph may be considered as tolerable. In no case, however, shall clouds fall on a principal point or its conjugate.
- i) All flight strips shall be centred as closely as possible over flight lines plotted. No flight strip or segment of a flight strip shall deviate from its plotted position on the flight map such that the resulting sidelap with any adjacent strip shall be less than 10%. Failure of any flight strip or section thereof to meet these requirements may be a cause for rejection.

- j) Attention of the SECOND PARTY is directed to all existing regulations concerning restrictions and procedures on photography of classified installations and/or reproducing, publishing or selling photographs of such installations. The SECOND PARTY shall meet all the concerning national security requirements before taking photographs of classified areas or installations.
- k) A flight report has to be delivered for each film containing the following information (see Encl. 3)
 - 1) The name of the agreement
 - 2) The name of the Second Party
 - 3) The number of the film
 - 4) The time of the first and last exposure of each run
 - 5) The date exposed
 - 6) The serial number of the camera, magazine and lens
 - 7) The calibrated focal length given in the calibration report
 - 8) Lens aperture, filter, shutter speed
 - 9) Type of film
 - 10) Aircraft number
 - 11) Height above sea level
 - 12) Weather conditions, etc.

7.5 Each film and each aerial negative shall be marked clearly of the block type lettering.

a) Film markings - Each negative roll shall be numbered consecutively starting with No. 001 or proper numbers. Each end of each roll shall be clearly marked with:

- 1. Agreement Number or Project Designation:
- 2. Roll number, flight line number and photograph number.
- 3. Dates on which exposed, together with relevant negative numbers.
- 4. Serial number of camera optical unit and the principal distance as shown in the calibration certificate.

5. Corrected height (not indicated height) above mean sea level at which exposed, together with relevant negative numbers.

b) Negative Numbering

Negative numbering will be instructed later.

7.6 Contact Prints

a) Contact prints from the negatives of the aerial photography shall be made on double weight semimatte standard commercial grade photographic paper and shall be trimmed with an appropriate margin outside of the photographic image including the space necessary to show the registering instrument clearly.

b) Special care shall be exercised to ensure the proper development and the thoroughly fixing of contact prints. All prints shall be cleaned and free from stains, blemishes, uneven spots, light fog, and finger marks, and shall be thoroughly washed to completely eliminate the hypo or any other chemicals which would impair their permanency.

7.7 Photo index

A photo coverage index of the project shall be prepared to check for overlaps and placement of flight strips against the approved flight plan. The coverage index shall be a lone index which is to be prepared on the master reproducible 1:200,000 flight plan sheet.

8. PROCESSING AND INSPECTION:

8.1 The SECOND PARTY shall process aerial films and make single weight contact prints immediately after the every photographic flight is completed in order to make preliminary inspection of the result and instruct re-flight if it is needed.

8.2 Quality Control Sheet to be used for record of the result (see Encl. 4) shall be inspected by the representative of the FIRST PARTY.

8.3 The SECOND PARTY shall follow any reasonable instructions or technical advice given by the representative of the FIRST PARTY.

9. FINAL MATERIALS TO BE DELIVERED:

9.1 Negatives, Prints and Reports

The following photographic materials and reports shall be delivered or supplied by the SECOND PARTY:

a) All original aerial negatives exposed during the aerial photography under this Agreement. The films are to be on metal spools in metal or plastic containers properly labelled. The labels shall be durable materials and contain the following information:

Project Designation

Name of the Second Party

Date Exposed

Roll Number

Numbers of the First and Last Negatives

b) Two contact prints from every negative of all accepted photography.

c) One set of line index in reproducible materials.

d) All reports required by the specifications.

9.2 Shipment of Photographic Material

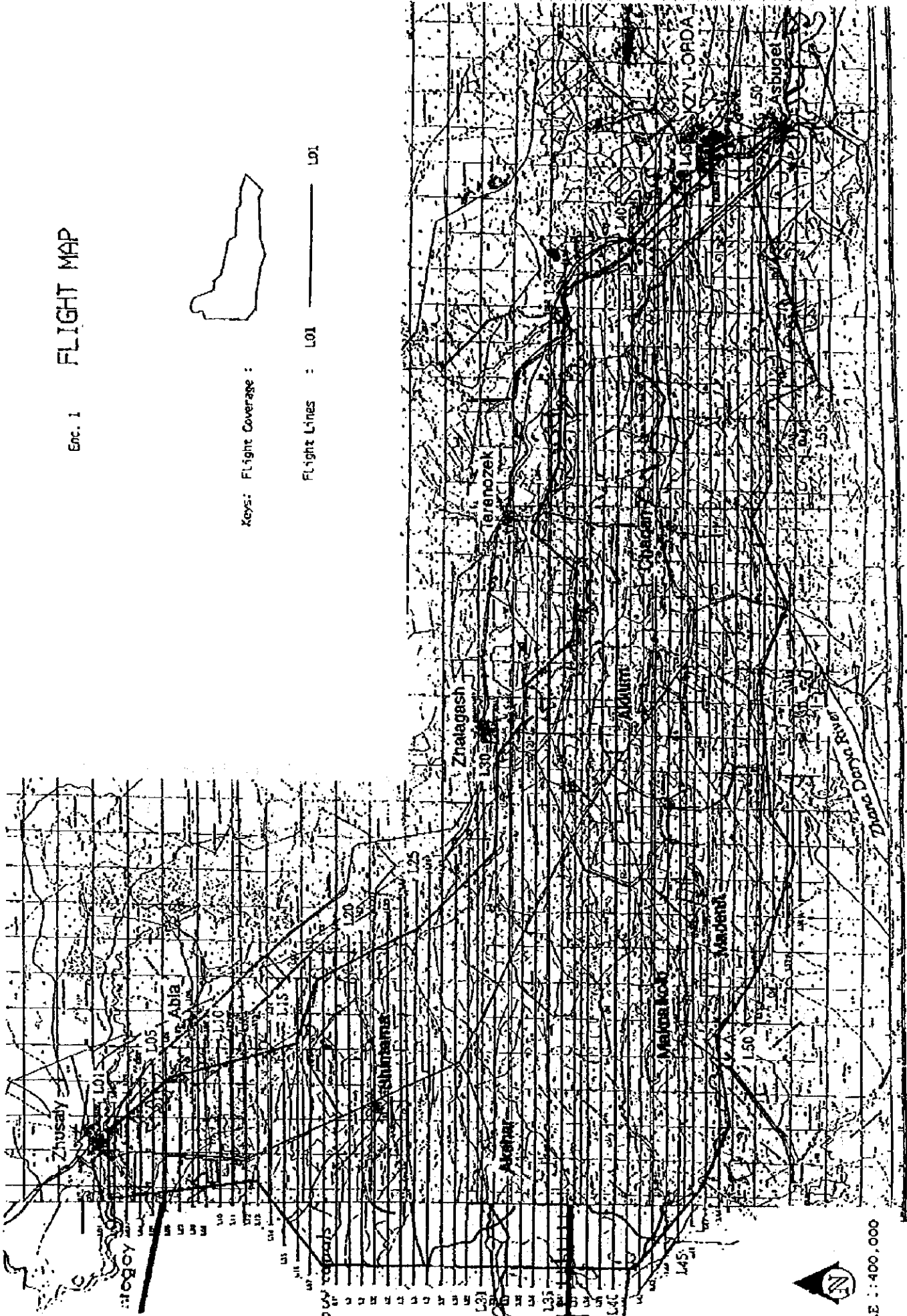
All films shall be thoroughly cleaned, placed on spools and original metal or plastic containers, and sealed with emulsion facing the core of the roll and the outside edge secured to prevent unrolling contact prints shall be arranged and bound by flight strip number, and relevant roll and negative numbers.

10. DELIVERY POINT:

All finished products and materials to be completed by the SECOND PARTY and required under this agreement, and all records, drawings and other technical data used by the SECOND PARTY shall be delivered at the SECOND PARTY's expense to the FIRST PARTY's authorised representative in Almaty.

FLIGHT MAP

Enc. 1



Keys: Flight Coverage :



Flight Lines : L01 ——— L01

LIST OF FLIGHT LINE

No 1

Line No.	Mean Ground Level	Flight Height (N. S. L)	Line Distance	Number Exposure (Approx.)	Remarks
	(m)	(m)	(km)	(Pcs)	
L 01	140	1,340	13.0	16	
L 02	do	do	14.0	17	
L 03	do	do	15.0	19	
L 04	do	do	16.0	20	
L 05	do	do	17.0	21	
L 06	do	do	18.0	22	
L 07	do	do	18.0	22	
L 08	do	do	19.0	23	
L 09	do	do	19.0	23	
L 10	do	do	19.0	23	
L 11	do	do	20.0	24	
L 12	do	do	20.0	24	
L 13	do	do	20.0	24	
L 14	do	do	22.6	27	
L 15	do	do	25.0	30	
L 16	do	do	32.0	38	
L 17	do	do	36.0	43	
L 18	do	do	38.5	46	
L 19	do	do	38.7	46	
L 20	do	do	39.5	47	
L 21	do	do	40.0	48	
L 22	do	do	41.2	49	
L 23	do	do	42.2	50	
L 24	do	do	44.3	53	
L 25	do	do	45.7	54	
Total					

LIST OF FLIGHT LINE

No 2

Line No.	Mean Ground Level	Flight Height (M. S. L.)	Line Distance	Number Exposure (Approx.)	Remarks
	(m)	(m)	(km)	(Pcs)	
L 26	140	1,340	46.7	55	
L 27	do	do	46.7	55	
L 28	do	do	48.8	58	
L 29	do	do	49.5	59	
L 30	do	do	56.0	66	
L 31	do	do	64.0	75	
L 32	do	do	65.0	77	
L 33	do	do	70.0	82	
L 34	do	do	91.0	107	
L 35	do	do	110.0	129	
L 36	do	do	116.0	135	
L 37	do	do	117.0	137	
L 38	do	do	118.0	138	
L 39	do	do	118.6	139	
L 40	do	do	119.0	139	
L 41	do	do	120.0	140	
L 42	do	do	121.0	141	
L 43	do	do	121.0	141	
L 44	do	do	121.0	141	
L 45	do	do	121.0	141	
L 46	do	do	121.0	141	
L 47	do	do	120.0	140	
L 48	do	do	118.0	138	
L 49	do	do	116.0	135	
L 50	do	do	101.0	118	
Total					

**THE SPECIFICATION OF 1:5000 TOPOGRAPHIC MAPPING FOR THE STUDY OF
KZYL-ORDA IRRIGATION/DRAINAGE AND WATER MANAGEMENT PROJECT IN
THE REPUBLIC OF KAZAKSTAN**

1 GENERAL

- (1) The Photogrammetric Mapping shall be conducted in accordance with this specifications.**
- (2) The site to be surveyed is located on the Southern (Left) Bank of Syrdarya River as shown on the attached map.**
- (3) The work shall comprise the following:
a) Field reconnaissance
b) Reproduction of aerial photographs
c) Ground control surveying for photogrammetric mapping
d) Photogrammetric mapping (up to compilation manuscripts)**
- (4) The plan and schedule of surveying works shall be submitted to the FIRST PARTY for approval before commencing work.**
- (5) The SECOND PARTY shall take into account all possible effects on the progress of work, such as any delay resulting from compliance with police and other government regulations and requirements, including traffic conditions.**
- (6) The SECOND PARTY shall take into account all possible weather conditions before it will sign the Agreement and shall not be entitled to extra payment by reason of the occurrence or effect of excessive rainfall, storm or any other meteorological phenomena.**
- (7) The SECOND PARTY shall submit for approval the name and biodata of his representative who shall receive and carry out the instructions of the FIRST PARTY.**
- (8) Any change in the Services shall be done by written consent made by the FIRST PARTY.**
- (9) All surveying results shall be checked by SECOND PARTY's engineers before submitting to the FIRST PARTY.**
- (10) The FIRST PARTY shall have the right to let the SECOND PARTY re-survey for correction of the surveying results which do not meet the accuracy and any requirement specified hereinafter.**

2 PROGRAMME

The field and office work shall be programmed to be finished within One Hundred Five (105) calendar days from the date of signing the Agreement.

3 PHOTOGRAMMETRIC MAPPING

(1) Work Volume

Topographic maps in the scale of 1:5,000, covering the area of approx. 300 km² of Southern (Left) Bank of Syrdarya River between Kzyl-Orda City and Zhusalı City, shall be prepared by means of photographic method by employing 1:12,000 B/W aerial photographs. In the course of photogrammetric mapping, the following works shall be carried out:

	Work Items	Unit	Quantity	Remarks
I	Dia-positives 1:12,000 2-time Enlargements 1:6,000 Contact print 1:12,000 Photo-index 1:48,000	km ² km ² km ² km ²	approx. 300 approx. 300 approx. 300 approx. 300	1 set for stereo plotting 1 set for field work 1 set 2 sets
II	Field Reconnaissance	L.S.	1	Checking available control points, terrain conditions for preparation of photogrammetric surveying plan
III	3-1 Geodetic Control Point Survey	km ²	approx. 300	To establish photo control points of stereo models. Pricking of all photo-control points. Direct levelling to connect the elevations of respective stereo-models.
	3-2 Field Completion	km ²	approx. 300	Field identification and data collection with aerial photos.

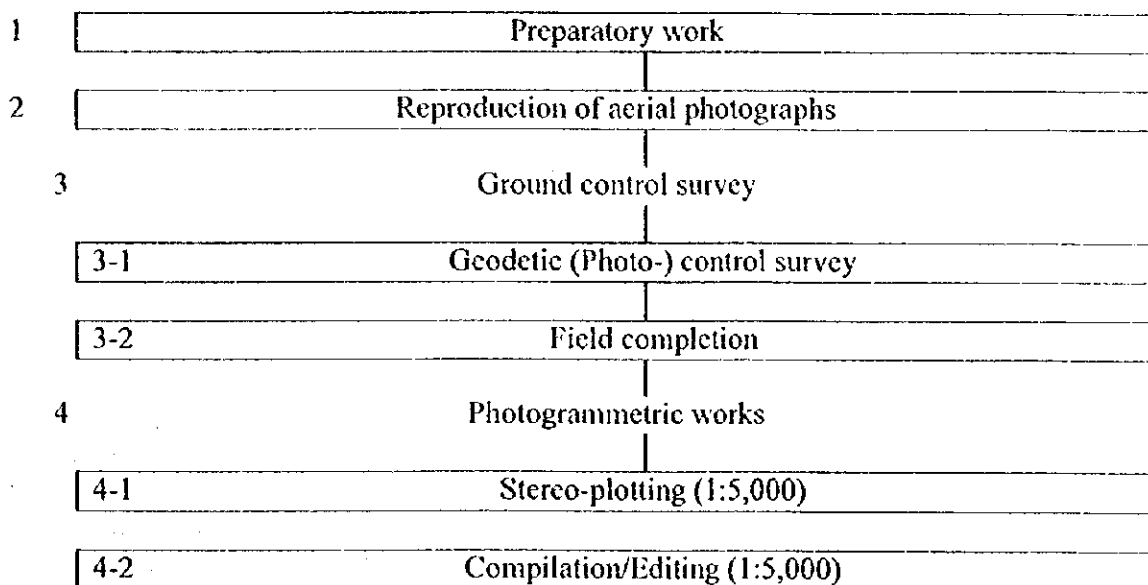
	Work Items	Unit	Quantity	Remarks
IV	Stereo Plotting	km ²	approx. 300	Scale: 1/5000 Contour-line interval: 1.0 m: intermediate 0.5 m: supplementary
	Compilation/Editing	km ²	approx. 300	-do- Development of reproducible compilation manuscripts

- Note: I Preparatory works
 II Reproduction of Aerial Photographs
 III Field Reconnaissance
 IV Ground Control Survey
 V Photogrammetric Work

(2) Site

The site is shown in Appendix, which covers approx. 300 km² including Shagan and Ilyasov farm.

(3) Technological Scheme for 1:5,000 scale mapping.



(4) Methodology

The work shall be conducted in accordance with the following order:

(4)-1 Reproduction of aerial photographs

- a) Diapositives and 2-time enlargements covering the area where the photogrammetric works for development of 1:5,000 topographic Maps shall be produced from the original 1:12,000 aerial negatives.

(4)-2 Field reconnaissance

- a) The available control points and state of the site to be covered with topographic mapping shall be observed and confirmed.
- b) In accordance with the result of field observation, five (5) geodetic (photo-) control points, which may be composed of either new or existing stations, in two (2) consecutive stereo models shall be selected on the reproduced 2-time enlargements.

(4)-3 Ground control survey

(4)-3-1 Geodetic control point survey

- a) In accordance with the results of the field reconnaissance, the horizontal and vertical positions of all selected photo-control points shall be measured and determined by traversing and/or tachometric method employing theodolite, electric distance meters and/or total stations.
- b) The observations for determining new photo-control points shall be started from and to existing national triangulation stations furnished by MAGC.

(4)-3-2 Pricking

- a) Locations of the all photo-control points shall be pricked on the 2-time enlargement precisely as well as clearly.
- b) In case the location of the photo-control point is not identified obviously on the photograph, pricking shall be done after eccentricity of the photo-control point is made. The place where the location of the photo-control point is transferred eccentrically shall be fully photo-identifiable.

(4)-3-3 Levelling

- a) Direct levelling, transversing perpendicularly to flight lines shall be carried out to tie the elevations of photo-control points between each pair of consecutively combined stereo models by employing levelling instruments.

(4)-3-4 Field completion

- a) The area partly or locally not photo-identifiable due to shade caused by building, trees, etc. and the information necessary for the annotations in the topographic maps such as administrative boundaries, geographical names, etc. shall be surveyed in the field.
- b) The result of the field survey shall be recorded on the 2-time enlargements.
- c) The tying with adjacent aerial photographs shall be checked on each aerial photograph.

(4)-4 Stereo compilation

(4)-4-1 Stereo plotting

- a) On the basis of the result of the ground control survey, features to be expressed in the topographic map shall be plotted by employing precise stereo plotters.
- b) Plotting scale shall be 1:5,000. The aerial photographs in the scale of 1:12,000, which are to be reproduced from the aerial negatives furnished by the FIRST PARTY, shall be employed.
- c) The materials to be used for plotting shall be polyester-base whose elasticity is within 0.05% and thickness is more than 0.12 mm, which is to be provided by the FIRST PARTY.
- d) The horizontal control points, gridlines, etc. shall be plotted by using plotting device. Maximum plotted error shall be within 0.2 mm on the plotted polyester-base.
- e) The contour interval shall in principle be 1 mm.
- f) All plotted sheets (plotted manuscripts) shall be tied smoothly to adjacent sheets.

(4)-4-2 Compilation

- a) Based upon the plotting manuscripts, the result of the field completion and other collected data, the compilation shall be carried out to develop the original manuscripts for drafting.
- b) The compilation shall be subject to the available Kazakstani Standard of Map Symbols and Specifications in principle.
- c) The materials to be used for the compilation shall be the polyester-base to be provided by the FIRST PARTY whose elasticity is the same as stereo plotting's.

4 INSTRUMENT TO BE USED

(1) The following instruments shall be required for this survey.

a) Photogrammetric mapping:

Theodolite and Electronic Distance Meter (EDM) for geodetic Control Point Survey, Level and Staff for Levelling, Precise stereo plotter (Ctse-1 or equivalent) for stereo plotting.

(2) The instrument shall be checked and adjusted properly by MAGC before commencing work.

5 SPECIFICATIONS OF SURVEYING

(1) Geodetic control point survey

a) Set numbers and allowable discrepancy:

Items	Description	Set Numbers/ Allowable Discrepancy
Horizontal angle	Number of sets	2 set
	Difference of observation	20"
	Double angle difference	30"
	Position	0°, 90°
Vertical angle	Number of set	1 set
	Constant of elevation	30"
Distance	Number of measurements	2 times (1 set)
	Discrepancy	4 cm

b) Closure error

c)

Items	Allowable Discrepancy
Direction angle	$20'' \sqrt{n}$
Coordinate	1:4,000
Relative height	$12 \text{ cm } \sum S / \sqrt{l}$

Note: n - number of observed angles
 l - number of observed sides
 S - distance of side (km)

(2) Levelling

a) The allowable discrepancy of direct levelling shall be within $\pm 6 \text{ cm } \sqrt{S}$ (S - distance of observation)

(3) Stereo plotting

a) Plotting of horizontal control points and gridlines.
 Maximum error: less than 0.2 mm on the plotting sheet.

b) The discrepancy between the location of the plotted point on the plotting sheet and the location of the same point on the dia-positive after absolute orientation.
Maximum error: less than 0.5 mm on the plotting sheet.

c) Accuracy of height

Maximum error: within 1/3 of contour line interval.

(4) Compilation

a) The discrepancy of gridlines and a pair of diagonal-line of the original manuscripts.

Gridline: less than 0.3 mm

Diagonal-line: less than 0.4 mm

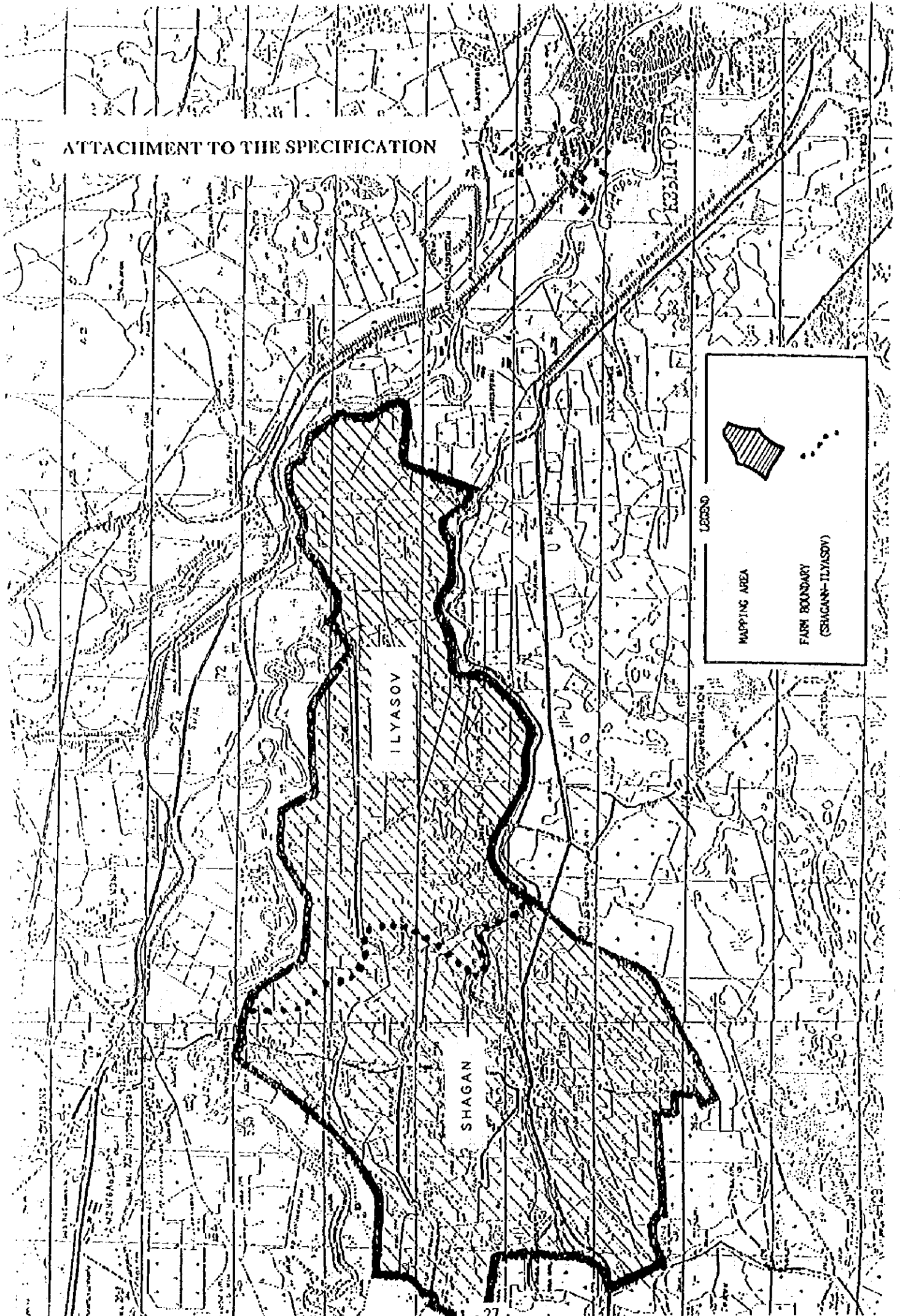
6 FINAL RESULTS

(1) Photogrammetric mapping

a) Compilation manuscripts of
1:5,000 topographic maps

approx. 300 km²

ATTACHMENT TO THE SPECIFICATION



**THE SPECIFICATION OF 1:5000 TOPOGRAPHIC MAPPING
(CARTOGRAPHIC WORK) FOR THE STUDY OF KZYL-ORDA
IRRIGATION/DRAINAGE AND WATER MANAGEMENT PROJECT IN
THE REPUBLIC OF KAZAKSTAN**

1. GENERAL

- (1) The Topographic Mapping shall be conducted in accordance with this specifications.
- (2) The site to be mapped is located on the Southern (Left) Bank of Syrdarya River as shown on the attached location map.
- (3) The work shall comprise the following:
 - a) Cartographic Work of the Original Map-Plates by scribing method
 - b) Development of Original Manuscripts
 - c) Development of Reproducible Manuscripts
- (4) The plan and schedule of cartographic work shall be submitted to FIRST PARTY for approval before commencing work.
- (5) SECOND PARTY shall take into account all possible effects on the progress of work, such as any delay resulting from compliance with the police and other government regulations and requirements, including traffic conditions.
- (6) SECOND PARTY submit for approval the name and biodata of his representative who shall receive and carry out the instructions of the FIRST PARTY for approval.
- (7) Any change in the Services shall be done by written consent made by the FIRST PARTY.
- (8) All cartographic work results shall be checked by SECOND PARTY's engineers before submitting to the FIRST PARTY.
- (9) FIRST PARTY shall have the right to let the SECOND PARTY make corrections of the cartographic results which do not meet the accuracy and any requirement specified hereinafter.

2. PROGRAMME

The entire work shall be programmed to be finished within Sixty Five (65) calendar days from the date of signing the Agreement.

3. TOPOGRAPHIC MAPPING

(1) Work volume

Topographic maps in the scale of 1:5,000, covering the area of approx. 300 km² of Southern (Left) Bank of Syrdarya River between Kzyl-Orda City and Zhusaly City, shall be prepared by means of scribing method by employing 1:5,000 compilation manuscripts prepared by Zhambyl Geodesy under the agreement with JICA Study Team by February 1997. In the course of topographic mapping, the following work shall be carried out:

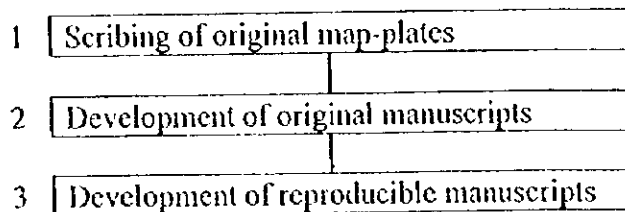
	Work Items	Unit	Quantity	Remarks
1	Cartographic Work (Scribing)	km ²	approx. 300	Scale: 1/5,000 Separation plates (Topographic maps)
		(sheets)	(106)	
	Original Manuscripts	sheets	106	1:5,000 Topographic maps (Positives)
	Reproducible Manuscripts	sheets	106	-do- (Positives for reproduction)

(2) Site

The site is shown in the attached location map, which covers approx. 300 km² including Shagan and Ilyasov farm. The Sheet Index of 1:5,000 Topographic Map shall be shown in the attached sheet index map.

(3) Work flow

The topographic mapping shall be carried in accordance with following work flow.



(4) Methodology

The work shall be conducted in accordance with the following order:

(4)-1 Scribing of Original Map-Plates

(4)-1-1 Image Printing on Scribing Base

Scribe plates shall be prepared by photo-processing of scribing base coated with diazo-solution, on which the reversed image of the compilation manuscripts are printed. The error of the length of each four (4) side printed on the scribing base shall be less than 0.1 mm.

(4)-1-2 Development of Scribed Sheet

Based upon the scribe plates, Separation Plates (Negatives) showing respective map-informations, e.g., planimetry, contour, geographical names, etc., shall be developed by means of scribing method. If necessary, Plates for symbols will be prepared by masking method.

(4)-2 Development of Original Manuscripts

The composed positives as original manuscripts shall be generated by such a way that the respective scribed map-informations are printed, plate by plate, on a same sheet of polyester-base (clear base) which will be supplied by JICA Study Team.

(4)-3 Development of Reproducible Manuscripts

The reproducible manuscripts of 1:5,000 Topographic Maps shall be developed from the original manuscripts on the polyester-base as same material as employed for the original manuscripts.

4. INSTRUMENTS TO BE USED

(1) The following instruments shall be required for this work.

- | | | | |
|-----------------------------|---|---|------|
| a) Scribing | : | Large-size (AO) vacuum printer and/or equivalents | |
| b) Original manuscripts | : | | -do- |
| c) Reproducible manuscripts | : | | -do- |

(2) The instruments shall be checked and adjusted properly by SECOND PARTY before commencing the work

5. SPECIFICATION OF SURVEYING DISCREPANCY

The tolerable discrepancy of the scribing work shall be as follows:

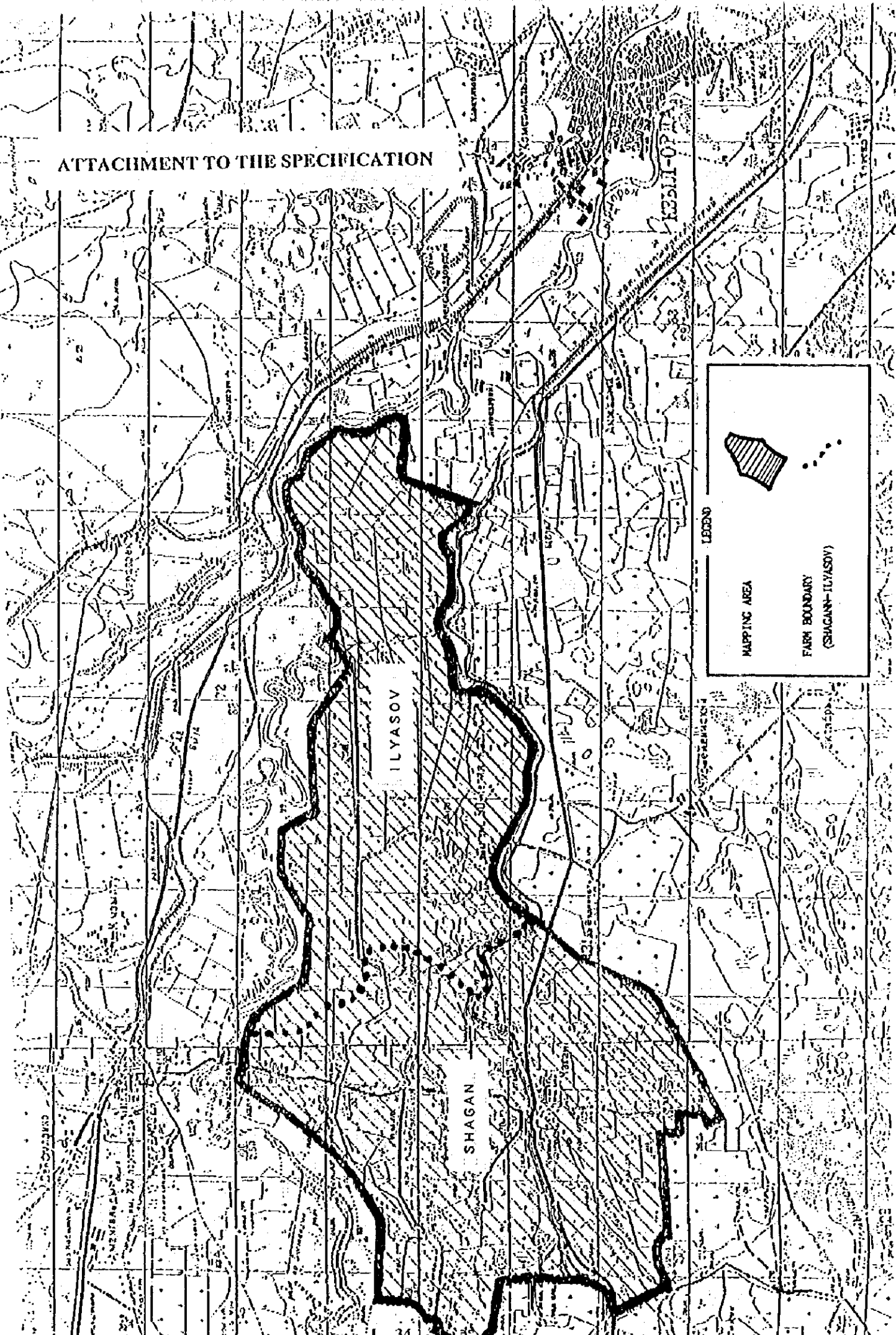
- a) The discrepancy of neat-lines, grid-lines and pair of diagonal-line of the original manuscripts.
 - Neat/Grid-line : less than 0.2 mm
 - Diagonal-line : less than 0.3 mm
- b) The discrepancy of scribed-lines of the original manuscripts.
 - Scribed-line : less than 0.2 mm as compared with the compilation manuscripts

FINAL RESULTS

The final delivery of the Topographic mapping shall be as follows:

- a) Original manuscripts of 1:5,000 topographic maps : approx. 300 km² (Positives) (106 sheets)
- b) Reproducible manuscripts of 1:5,000 topographic maps : approx. 300 km² (Positives) (106 sheets)
- c) Photo-copies of 1:5,000 topographic maps : 530 copies (5 copies/sheet)

ATTACHMENT TO THE SPECIFICATION



LEGEND

MAPPING AREA

FARM BOUNDARY
(SHAGAN-ILYASOV)

JICA