Rice stem borers are the most harmful insect to paddy plants, and plant hoppers and rice green worms follow.

There were some farmers who complained about damages by rice grass hoppers, mole crickets, and army worms.

Diazinon, DDT, and Linden are used as main insecticides.

(5) Final Drainage Period (ref. to Table C.5.14)

Almost of all the farmers practise final drainage (ponding water release) 10 to 20 days before harvesting. In the high and middle lands, some farmers drain their fields only five to seven days before harvesting, while in the low land, some farmers do about 30 days before; however, although these farmers are considered as exception.

The final drainage on or around 10 days before harvesting is deemed most suitable for successful ripening of paddy, although depending upon moisture conditions of respective paddy fields.

(6) Some Improvements on Paddy Fields Management

a) The utmost effort available at present should be made for the water management as reasonable as possible. A particular attention should be paid to irrigation water control to properly meet the requirement of paddy plants in their growing period and to the relationship between spraying of agri-chemicals including herbicides and water conditions over the fields.

b) Further study should be made on top-dressing to obtain appropriate time and amount to be dosed as well as the proper kinds of fertilizers.

c) A great care should be given to adverse effects of agri-chemicals and herbicides on human and living environment, when using these chemicals. For example, both DDT and Linden containing the organic chlorides give serious and adverse effect on human being.

C.5.7. Harvesting

Excepting for some farmers in the high land who have recently come to employ large-size combines, almost farmers in the Project Area harvest their crops by manual reaping. Paddy plants are reaped on the stalks at 20 cm to 30 cm high and laid on the stubbles for sun-dry for one or two days. The reaped paddy, after bound, is hauled out of the fields, and threshed. Threshing is made with power threshers with tillers as mover. Paddy threshed is bagged for storage. The aforesaid works show a flow of a general harvesting works. And there are some farmers in the high land who employ large-size combines for reaping and threshing.

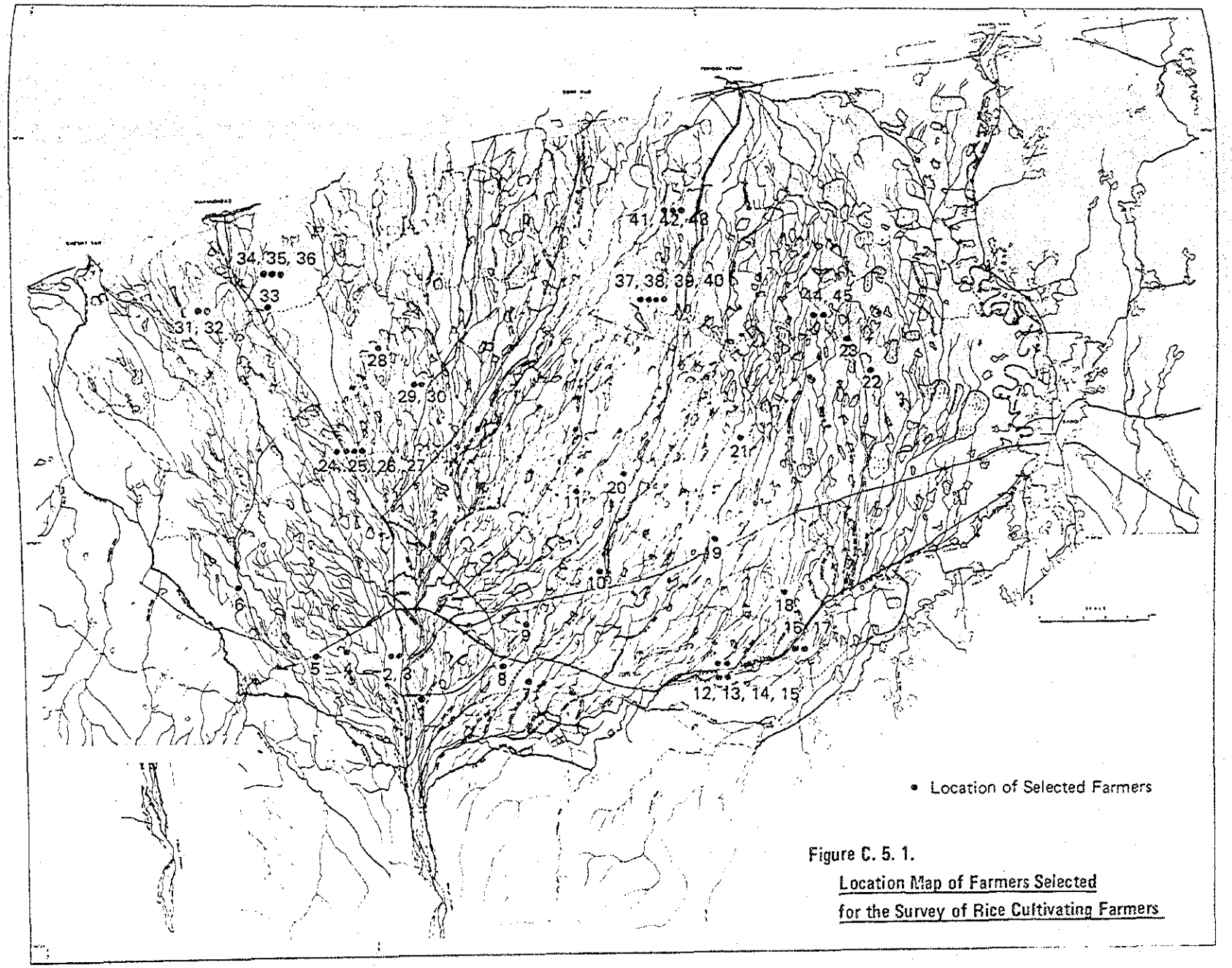


Figure C. 5. 1.
Location Map of Farmers Selected
for the Survey of Rice Cultivating Farmers

Table C.5.1. Villages and Farmers selected in the Survey of Rice Cultivating Farmers

Sub Area	Villages	Farmers	No. in the Map
High Land	Rudbar Dasht	Ahmad Jafari	1
	Divroz	Smaill Hghadghany	5
	Chreh	Astandiyar Alizadeh	10
	Keti Posht Doab	Shaban Ali Akbari	8
	Firuz Kola Sofla	Ramazan Firozi	7
	Buran	Gholam Hosen Yurefzadeh	9
	Darazan	Asghar Jafari	2
	Darazan	Malak Jafari	3
	Meikheran	Vali Allahra Mazani	4
	Varisdeh	Kazemi Rumezanzape	6
	Sorkh Kola	Seed Hassan-Maamod-Por	12
	Sorkh Kola	Ghasem Hosennejat	13
	Sorkh Kola	Mohamad Ali Rezazadeh	14
	Sorkh KOla	Meerbajher Jhasempor	15
	Darzi Kola	Mohamada Ali Hosainzadeh	11
Middle Land	Musa Mahaleh	Mikaeel Ahei	19
	Davud Kola	Mehran Talebi	20
	Bala Ghad Kola	Mostala Hassan Por	22
	Urtehdsht	Smaeel Khosravi	29
	Urtehdsht	Ramezan Khosravi	30
	Bayudeh Sofla	Parviz Smaeel Zadeh	28
	Shng Keti	Reza Mohmmarz	24
	Shng Keti	Smail Faramarz	25
	Shng Keti	Ramezan Asta	26
	Shng Keti	Hasan Mohmmadi	27
	Bala Ahmad Chalehpei	Ahmad Hasanzadeh	16
	Bala Ahmad Chalehpei	Peza Allibrary	17
	Reisa Bad	Rahmat Fallan	21
	Audi Kola	Soleiman Ahei	18
	Archi	Ehrahim Rahmm-Por	23
Low Land	Sharmeh Kola	Allibrar Bezadeh	44
	Sharmeh Kola	Chasem Agho-Babaie	45
	Tarsiab	Ghorban Jafari	34
	Tarsiab	Jan Baba Babai	35
	Tarsiab	Smaill Shokry	36
	Saiar Kola	Gan Bar Ahmadi	33
	Azadmud	Namat Nasoti	31
	Azadmud	Rza Nosoti	32
	Kachap Olia	Meerna Jhyrezaey	37
	Kachap Olia	Tajhy Ashjhy	38
	Kachap Olia	Jafat Malany	39
	Kachap Olia	Sadoch Ebrahemy	40
	Ezbaran	Rezahdary	41
	Ezbaran	Asmaeel Homayanng	42
	Ezbaran	Sayd Yahya Jaghavy	43

Table C.5.2. Items of the Survey of Rice Cultivating Farmers

(June to July, 1986)

(1) Family composition and exclusive farm workers

(2) Cultivated area and land ownership

(4) Conditions of paddy field

1) number and size of plots
2) condition of irrigation water
3) method of irrigation to each plots of paddy field
4) farm road to each plots of paddy field
5) paddy suffering from leakage through levee

(4) Irrigation water source (canal, abbandan, return flow, spring, river pump and others)

(5) Preparation of paddy for rice cultivation

1) plowing (times, periods, depth, implement and others)
2) fertilizer application (basal application)

(6) Rice variety

1) varieties and cultivated area in 1986
2) characteristics of variety expected by farmers

(7) Nursery and seeding

1) area and type of nursery
2) fertilizer application
3) seeding date and its rate
4) seed selection and pre-treatment for seeding
5) disinfection of seed

(8) Transplanting

1) method and date of transplanting
2) workers for transplanting
3) transplant rate and seedlings per hill
4) efficiency of worker for transplanting

(9) Management of paddy field

1) water control
2) fertilizer application (top dressing)
3) weeding
4) disease and insect control

(10) Harvesting in last year

1) method and date of cutting
2) drying, bundling and carrying
3) efficiency of workers for harvesting

(11) Yield of each variety in last year

Table C.5.3. Present Size of Paddy Fields Surveyed

Items		High land (ha)	Middle land (ha)	Low land (ha)
Cropping area per farmer	Mean	3.25	2.46	2.46
	Max.	5.4	8.0	8.0
	Min.	0.6	1.2	1.1
Number of paddy plots per farmer	Mean	21.8	15.8	14.8
	Max.	70	40	70
	Min.	4	5	3
	Plots/ha	6.5	8.5	6.1
Area per plot	Mean	0.15	0.16	0.17
	Max.	1.5	0.8	3.5
	Min.	0.003	0.005	0.003

Table C.5.4. Accessibility to Paddy Fields Surveyed

Items	High land (%)	Middle land (%)	Low land (%)
Plots accessible directly from road	28.8	56.7	28.6
Plots not accessible directly from road, but through farmers' own field	56.7	24.9	23.4
Plots not accessible directly from road, but through other farmers' fields	14.5	18.1	48.0

Table C.5.5. Irrigation Water Source of Paddy Fields Surveyed

Items		High land (%)	Middle land (%)	Low land (%)
Irrigated directly from canal	% of area	33.3	48.3	37.4
	% of plots	24.9	32.6	12.3
Irrigated by plot to plot	% of area	54.4	50.5	48.1
	% of plots	60.6	67.0	76.6
Irrigated by spring or shallow well	% of area	12.3	1.2	14.5
	% of plots	14.5	0.4	11.1

Table C.5.6. Present Conditions of Irrigation and Drainage of Paddy Fields Surveyed

Items	High land (%)	Middle land (%)	Low land (%)
Paddy under well irrigation and drainage	91.5	95.9	80.6
Paddy under ill irrigation and drainage	0	0	3.1
Paddy under well irrigation but ill drainage	8.5	4.1	15.1
Paddy under well drainage but ill irrigation	0	0	1.2

Note: Table C.5.4 is based on the answer of farmers.

Table C.5.7. Acreage of Nursery per ha of Paddy and Seeding Ratio

Items		High land	Middle land	Low land
Acreage of nursery per ha of paddy	Mean	217.9 m^2	183.1 m^2	306.1 m^2
	Max.	337.0	400.0	500.0
	Min.	100.0	83.0	100.0
Seeding ratio	Mean	0.252 kg/m^2	0.332 kg/m^2	0.176 kg/m^2
	Max.	0.500	0.600	0.348
	Min.	0.100	0.150	0.100
Seeding to paddy		54.9 kg/m^2	60.8 kg/m^2	53.9 kg/m^2

Table C.5.8. Transplanting Ratio and Seedlings per Hill

Items		High land	Middle land	Low land
Transplanting ratio	Mean	14.9 hills/m^2	14.0 hills/m^2	14.4 hills/m^2
	Max.	20	25	16
	Min.	12	10	11
Seedlings per hill	Mean	4.5 seedlings	4.8 seedlings	4.9 seedlings
	Max.	8	9	10
	Min.	3	3	3

Table C.5.9. Fertilizer Application as Basal Dressing for Rice Cropping

(Unit: kg/ha)

	Urea			D.A.P.			Major elements contained in mean quantity of fertilizer		
	Mean	Max.	Min.	Mean	Max.	Min.	N	P_2O_5	K_2O
High Land	329.1	550	166	275.8	550	150	201.0	126.9	0
Middle Land	212.2	400	145	149.0	285	80	124.4	68.5	0
Low Land	142.6	220	75	140.0	280	50	90.8	64.4	0

Note: 1) D.A.P. = Diammonium phosphate ($(NH_4)_2HPO_4$)

2) Major elements contained in fertilizer

Urea N 46%

D.A.P. N 18%, P_2O_5 46%

Table C.5.10. Percentage of Farmers applying Top Dressing

Fatilizer	High land (%)	Middle land (%)	Low land (%)
Urea	100	92.9	82.4
D.A.P.	28.6	28.6	29.4

Table C.5.11. Percentage of Farmers divided by the Frequency of Top Dressing Application

Frequency	High land (%)	Middle land (%)	Low land (%)
1	64.2	76.9	78.6
2	28.6	23.1	21.4
3	7.2	0	0

Table C.5.12. Time of Top Dressing Application

Application after Transplanting	High land (%)	Middle land (%)	Low land (%)
Within 10 days	10.0	12.5	35.3
11 - 20 days	50.0	50.0	41.2
21 - 30 days	20.0	6.2	5.9
31 - 40 days	10.0	12.5	11.7
41 - 45 days	10.0	18.8	5.9

Table C.5.13. Fertilizer Application as Top Dressing for Rice Cultivation

(Unit: kg/ha)

	Urea			D.A.P.			Major elements contained within mean quantity of fertilizer		
	Mean	Max.	Min.	Mean	Max.	Min.	N	P 0	K 0
High Land	185.9	500.0	40.0	172.0	300.0	188.0	116.0	79.1	0
Middle Land	150.1	300.0	40.0	72.5	150.0	50.0	82.1	33.4	0
Low Land	148.3	300.0	50.0	115.2	200.0	50.0	88.9	53.0	0

Table C.5.14. Time of Ponding Water Release for Harvesting

Item		High land (days)	Middle land (days)	Low land (days)
Days before harvesting	Mean	14.6	15.5	21.3
	earliest	25	25	30
	Latest	7	5	10

Table C.5.15. Rice Varieties and Their Cultivation Status in the Project Area

Variety		High land		Middle land		Low land	
		A (%)	B (%)	A (%)	B (%)	A (%)	B (%)
AMOL-3	(I.V)	100	66.0	64.3	46.7	23.5	19.4
TAROM	(L.V)	50.0	15.1	64.3	25.4	70.6	56.7
HARAZ	(I.V)	50.0	7.2	42.9	9.2	5.9	1.4
AMOL-2	(I.V)	7.1	0.7	-	-	5.9	1.4
BEANAM	(L.V)	14.3	1.3	-	-	11.8	2.4
172-KHORSAND	(L.V)	14.3	4.7	-	-	-	-
SHASTAKE-MALAKI	(L.V)	21.4	3.7	14.3	1.2	-	-
SHASTRAS	(L.V)	7.1	1.3	-	-	5.9	0.4
ABKENARY	(L.V)	-	-	14.3	1.2	5.9	0.5
KHAZAR	(L.V)	-	-	14.3	9.8	-	-
RASHTY	(L.V)	-	-	21.4	6.5	-	-
GERDEH	(L.V)	-	-	-	-	5.9	0.35

Note: A ... Ratio of Farmers cultivating the concerned variety to the farmers surveyed.

B ... Ratio of acreage cultivated with the concerned variety to the whole paddy field surveyed.

I.V.: Improved Variety, L.V: Local Variety

Table C.5.16. Common Weeds in Paddy in the Project Area

Weeds (species)	Remark
Panicum crus-galli L. (=Echinochola crus-galli)	Com.=Barn yard grass, Jap.=Inubie, Gramineae family, Annual grass.
Monochoria vaginalis	Com.=Monochoria, Jap.=Konagi, dicotyledonous, Annual grass.
Cyperus difformis L.	Com.=Small-flowered umbrella plant, Jap.=Tama-kayatsuri, Annual sedges.
Paspalum distichum	Com.=Knot grass, Jap.=Karimata-Suzumenohie, perennial grass.
Scirpus juncoides	Com.=Bulrush, Jap.=Hotaru-i, Cyperaceae family, Annual grass.
Segittaria trifolia	Com.=Arrow Head, Jap.=Hana-guwai, Alismataceae family, perennial grass.
Alisma plantago-aquatica	Com.=Arrow Head, Jap.=Saji-omodaka, Alismataceae family, perennial grass.
Dopatrium junceum	Com.=Dopatrium, Jap.=Abuno-me, Scrophulariaceae family, Annual grass.

Note: Com. = Common name, Jap. = Japanese name

Table C.5.17. Yield by Varieties (1985)

	High Land				Middle Land				Low Land			
	P.F. (%)	Mean (kg/ha)	Max. (kg/ha)	Min. (kg/ha)	P.F. (%)	Mean (kg/ha)	Max. (kg/ha)	Min. (kg/ha)	P.F. (%)	Mean (kg/ha)	Max. (kg/ha)	Min. (kg/ha)
Amol-3	100	7,619	10,500	6,000	86	7,089	9,000	5,250	24	7,500	12,000	6,000
Tarom	53	3,871	5,120	2,850	64	3,708	3,280	4,500	88	4,089	5,500	2,250
Haraz	20	7,007	7,500	6,750	21	7,633	9,500	6,500	-	-	-	-
Behnum	13	6,350	6,700	6,000	-	-	-	-	-	-	-	-
Shastras	13	4,050	4,500	3,600	-	-	-	-	-	-	-	-
Mesba	7	5,000	-	-	-	-	-	-	6	5,000	5,000	-
Fuji minori	7	8,320	-	-	-	-	-	-	-	-	-	-
Amol-2	7	7,200	-	-	-	-	-	-	6	6,000	6,000	-
172-Khorsand	13	6,500	7,000	6,000	-	-	-	-	-	-	-	-
Shastake-Malaki	-	-	-	-	-	-	-	-	6	4,000	-	-
Rashty	-	-	-	-	21	3,708	4,125	3,000	41	3,997	4,500	3,200
Abkenary	-	-	-	-	14	4,875	6,000	3,750	-	-	-	-
Gerdeh	-	-	-	-	7	6,000	-	-	6	4,200	-	-

Note: P.F. = Percentage of farmers cultivating the concerned variety.

Table C.5.18. Percentage of Farmers divided by the Date of Transplanting

Date of Transplanting	High Land (%)	Middle Land (%)	Low Land (%)
Apr. 1 to Apr.30	0	1.0	35.8
May 1 to May 10	12.0	30.0	30.0
May 11 to May 20	31.3	40.9	22.5
May 21 to May 31	44.7	24.5	11.4
June 1 to June 10	6.0	3.6	0
June 11 to June 20	6.0	0	0

Table C.5.19. Percentage of Farmers divided by the Growing Duration of Seedlings

Growing Duration of Seedlings	High Land (%)	Middle Land (%)	Low Land (%)
25 to 30 days	12.0	0	20.4
31 to 40 days	41.0	41.0	55.3
41 to 50 days	35.0	51.0	16.5
51 to 60 days	9.6	8.0	7.8
61 to 65 days	2.4	0	2.4

APPENDIX D

SOCIO-ECONOMY

APPENDIX D. 1.

ADMINISTRATIVE ORGANIZATIONS

LIST OF TABLES

LIST OF FIGURES

LIST OF EXHIBIT

Table D.1.1 Administrative Structures in Mazandaran Province

CENTRAL GOVERNMENT	PROVINCIAL UNITS	SHAHRESTAN UNITS
Ministry of Interior	Provincial Governor	Farmandar Bakhshdar Shahrdar (Mayor)
Ministry of Justice	Provincial Court	Branch
Ministry of Information	General Department	
Ministry of Islamic Guid.	General Department	
Ministry of Education	General Department	Shahrestan Office
Ministry of Health	Regional Organization	Shahrestan Offices (3)
Ministry of Labour & S.A.	General Department	Shahrestan Office
Ministry of Commerce	General Department	Shahrestan Office
Ministry of Economy/Finance	General Department	Shahrestan Office
Ministry of Plan/Budget	General Department	-
Ministry of Oil	Central Distributory (1)	Distributors
Ministry of Industries	General Department	-
Ministry of Agriculture	General Department	Shahrestan Office/ARTSC (4)
	Central Forestry Office	Forestry Office
Ministry of Energy	Regional Water Board	Irrigation Office
	Electric Company-Branch	Shahrestan Branch
Ministry of Roads/Trans.	General Department	Shahrestan Office
Ministry of Post & T.T.	General Department-Post Telephone Company-Branch (2)	Post Office Telephone Office
Ministry of Housing & U.D.	General Department	-
Ministry of Construction J.	Provincial Committee	Shahrestan Committee

Notes (1) Located in Ghaemshahr

(2) Located in Babol

(3) Shahrestan Office is divided in 3 branches of; Social Health, Environmental Sanitary and Anti-Malaria

(4) Agriculture, Rural and Tribal Service Center

Table D.1.2 Outline of Rural Service Centers in Babol

	Establish	No. of Villages		Population	Total Area	Land Use		
		Initial	1962			Paddy	Upland	Other
					ha			
Bagher Tangeh	1359-E	11	31	20,000	8,100	2,900	4,500	700
Jalalazrak Shomali	1361-E		13	8,000	3,129	2,800	179	150
Jalalazrak Junubi	1361-E		29	16,000	5,037	5,000	-	37
Bisheh Shomali	1361-E		27	19,500	7,960	5,100	2,270	590
Bisheh Junubi	1361-E		27	20,000	6,100	4,550	931	619
Shahid Ashrafi Estahani	1361-E		33	27,000	7,500	4,200	2,600	700
Lalehabad	1361-E		46	38,000	7,552	6,700	352	500
Ganji Afruz	1361-E		42	43,000	9,800	6,700	900	2,200
Poin Ahmad Chalehpei	1361-E		43	50,000	8,500	7,950	120	430
Bandpei Sharghi	1361-E		47	36,000	9,400	4,400	1,580	3,420
Bandpei Gharbi	1361-E		54	36,000	8,995	5,740	600	2,655
Babolkanar	1361-E		46	45,000	8,700	4,500	900	3,300

Note: -E means Esfand (12th Month of Iranian Calendar)

Main Activities of RSC

1. Agricultural Infrastructures:

(1) Digging of Deep Well
(2) Repair of Farm Pond
(3) Construction of Irrigation Canal
(4) Repair of Irrigation Canal
(5) Construction of Intake Facility
(6) Construction of Flood Protection Dike
(7) Land Levelling
(8) Repair of Farm Road
(9) Drainage Works

2. Livestock Farming:

(1) Distrubution of Forage
(2) Pest Protection
(3) Castration
(4) Construction of Model Shed

3. Crop and Agri-Machinery:

(1) Soil Survey
(2) Cropping Plan
(3) Extension of Berseem
(4) Distribution of Agri-chemical
(5) Distribution of Fertilizer
(6) Distribution of Seed Paddy
(7) Distribution of Vegetable Seed
(8) Distribution of Sprayer
(9) Distribution of Spare part of Agri-machinery
(10) Distribution of Fuel for Agri-machinery
(11) Disinfection of Storage

Table D.1.3 Personnel Allocation of Rural Service Center in Babol Shahrestan

Name of Service Center	Bagher Tangeh	Lalehabad	Poin Ahmad Chalehpei	Jalalazrak Shomali	Jalalazrak Junubi	Shahid Ashraf Esfahani	Ganji Afruz	Babol Kenar	Bandpei Sharghi	Bandpei Gharbi	Bisheh Shomali	Bisheh Junubi
Head of Service Center	1	1	1	1	1	1	1	1	1	1	1	1
Expert - Agronomy	1	1	-	2			1	-				
- Water & Soil	-	-	-					1		1	1	
Technician - Agronomy	3	-	1	2		3	1	1	1		1	2
- Veterinary	1	1	2	1	1	1	2	2	1	1	1	1
- Plant Protection	-	1	-		1			-	1	2		
- Water & Soil	-	1	-					-	1			
- Livestock Farming	-	-	-					-	1	1		
Incharge of Administration	2	1	-					1		1		
Accountant	2	1	-	1	1	1	1	1		1	1	2
Mechanic	1	-	-					-				
Assist. Mechanic	-	-	-					-		1		
Driver	1	2	2	2	1	3	2	2		2	2	2
Store Keeper	1	1	1	1	1		1	-	1	1		1
Art. Insemi. Worker	1	-	-					-				
Guardman	2	1	1	1		1	1	1	1	1		1
Servant	1	-	-					-			1	

Figure D.1.1 Organizational Chart of Government in Islamic Republic of Iran

President Office

Prime Minister's Office

Ministry of Interior
" Justice
" Foreign Affairs
" Information
" Islamic Guidance

Ministry of Defense
" Islamic Revolutional Guards Corps

Ministry of Education
" Culture and Higher Education

Ministry of Health
" Labour and Social Affairs

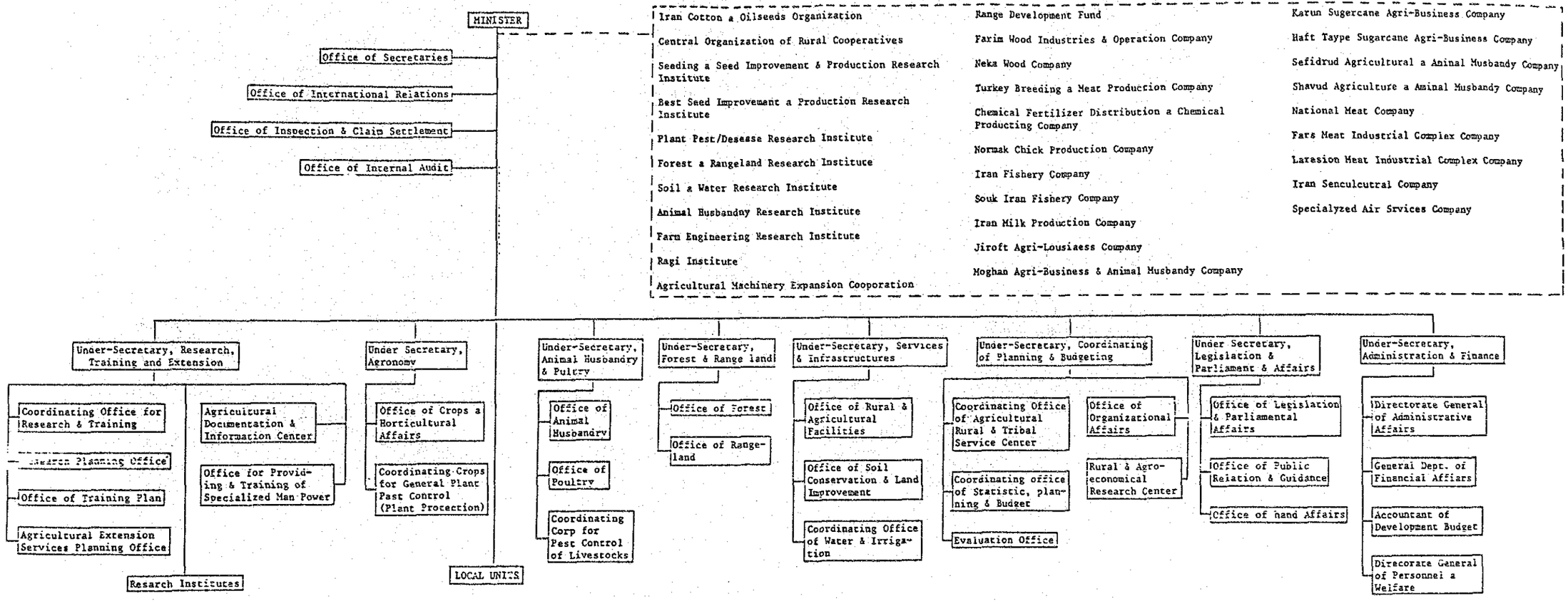
Ministry of Commerce

Ministry of Economy and Finance
" Plan and Budget —— (Development Budget)

Ministry of Oil
" Mines and Metals
" Industries
" Heavy Industries

Ministry of Agriculture
" Energy
" Roads and Transportation
" Post, Telegraph and Telephone
" Housing and Urban Development
" Construction Jihad

Figure D.1.2 Organization Chart of Ministry of Agriculture



Note: This chart was planned chart in 1984, and the reformation of MOA in 1986 was taken place with some revision.

Figure D.1.3 Organization Chart of Provincial Agricultural General Department (Planned)

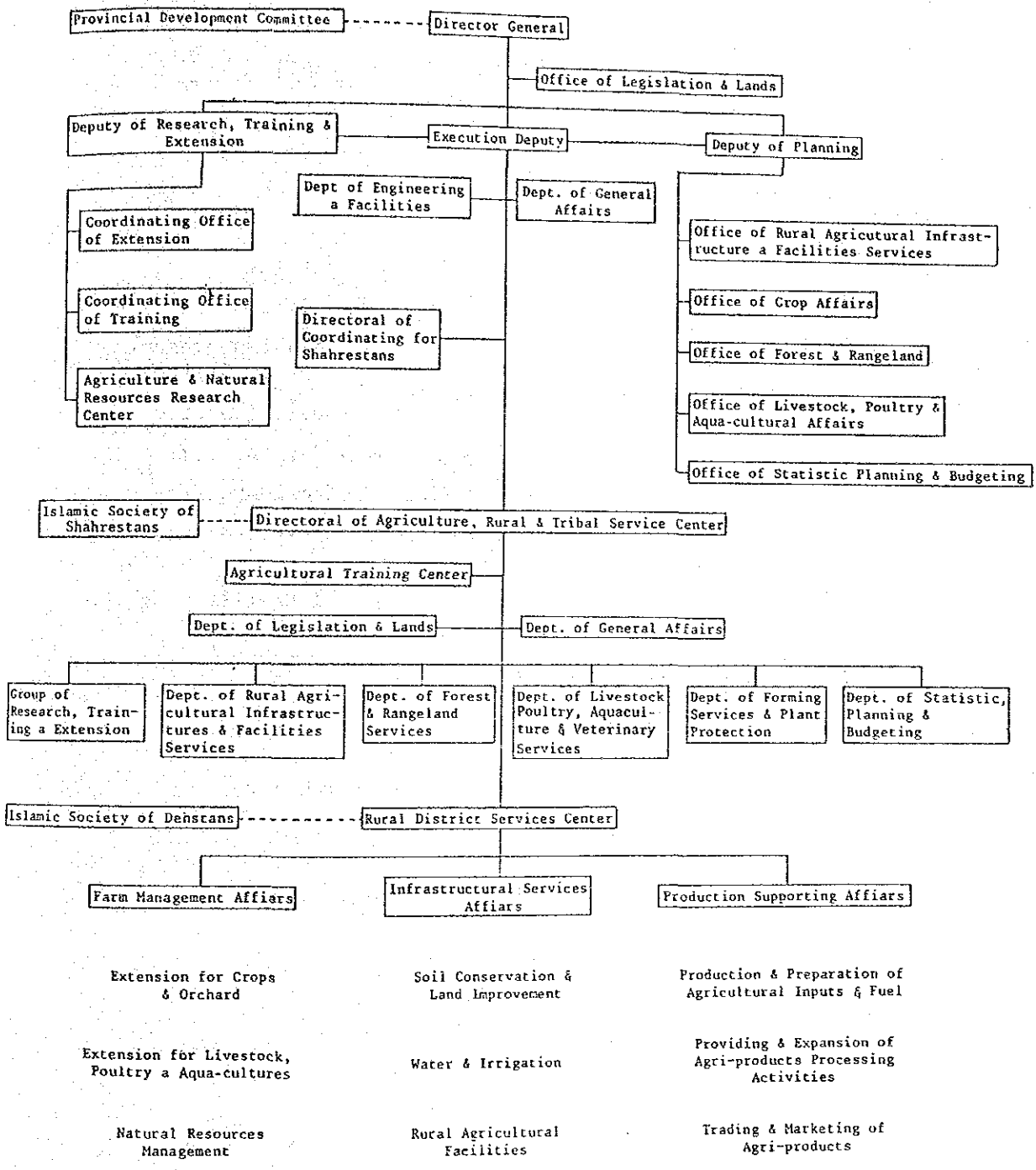


Figure D.1.4 Organization Chart of Provincial Agricultural General Department (Present)

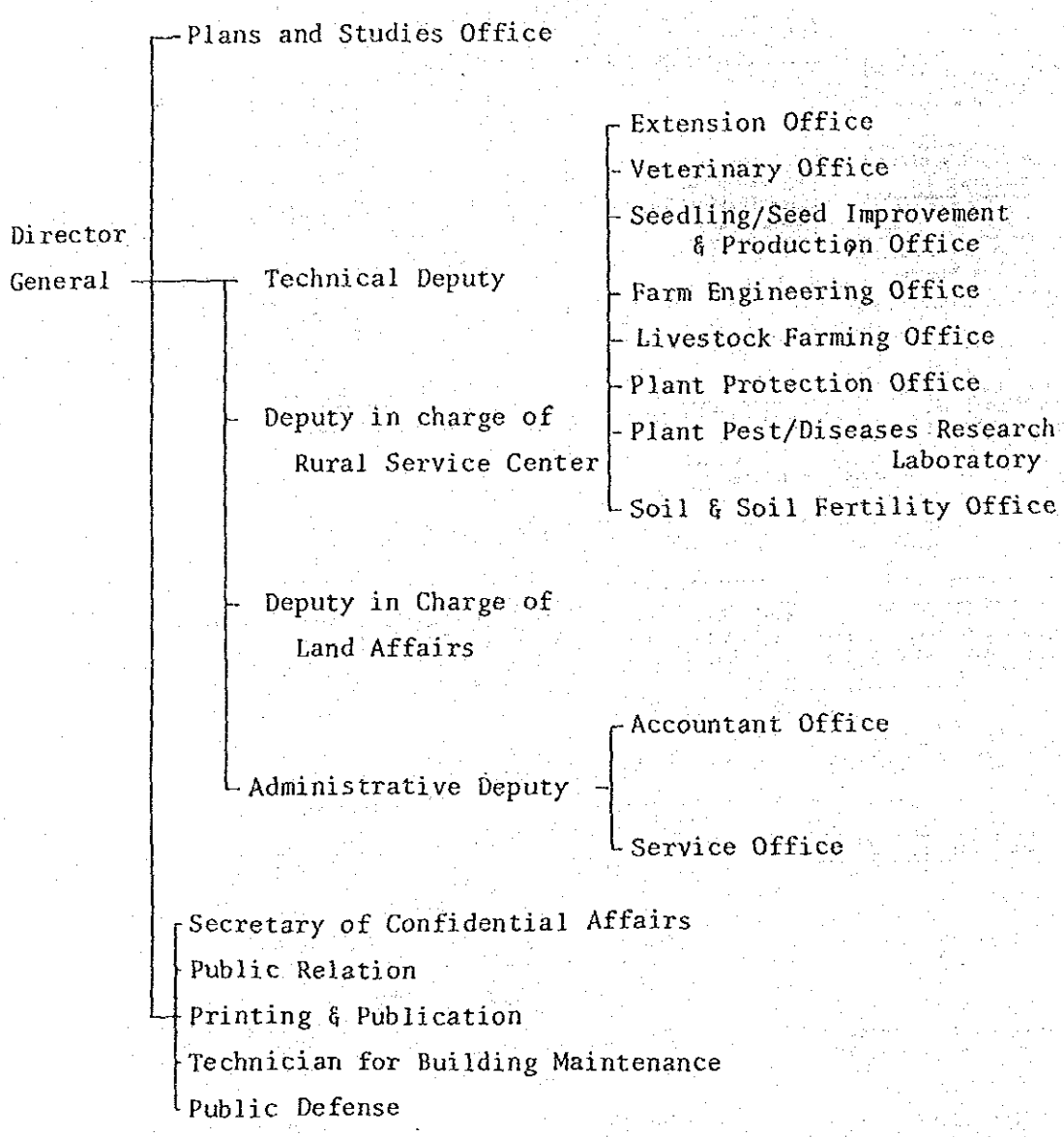


Figure D.1.5 Organization Chart of Amol Shahrestan Agricultural Office

Head of Office

Sections	Personnel		
	Expert	Technician	Others
Extension	5	1 + 6(1)	3
Plant Protection	2	3	3
Livestock Farming	1	2	
Veterinary	4	12	4
General Affairs	4(2)		9(3)
Cooperative/Rural Affairs(4)	2	6 + 2(2)	4

Notes: (1) Extension Service Crew

(2) Office Clerk

(3) Including 5 gardener and 2 guardmen

(4) Previously, the office was belonging to Ministry of Cooperatives and Rural Affairs and Consolidated in 1980, but this section has separated office in Amol.

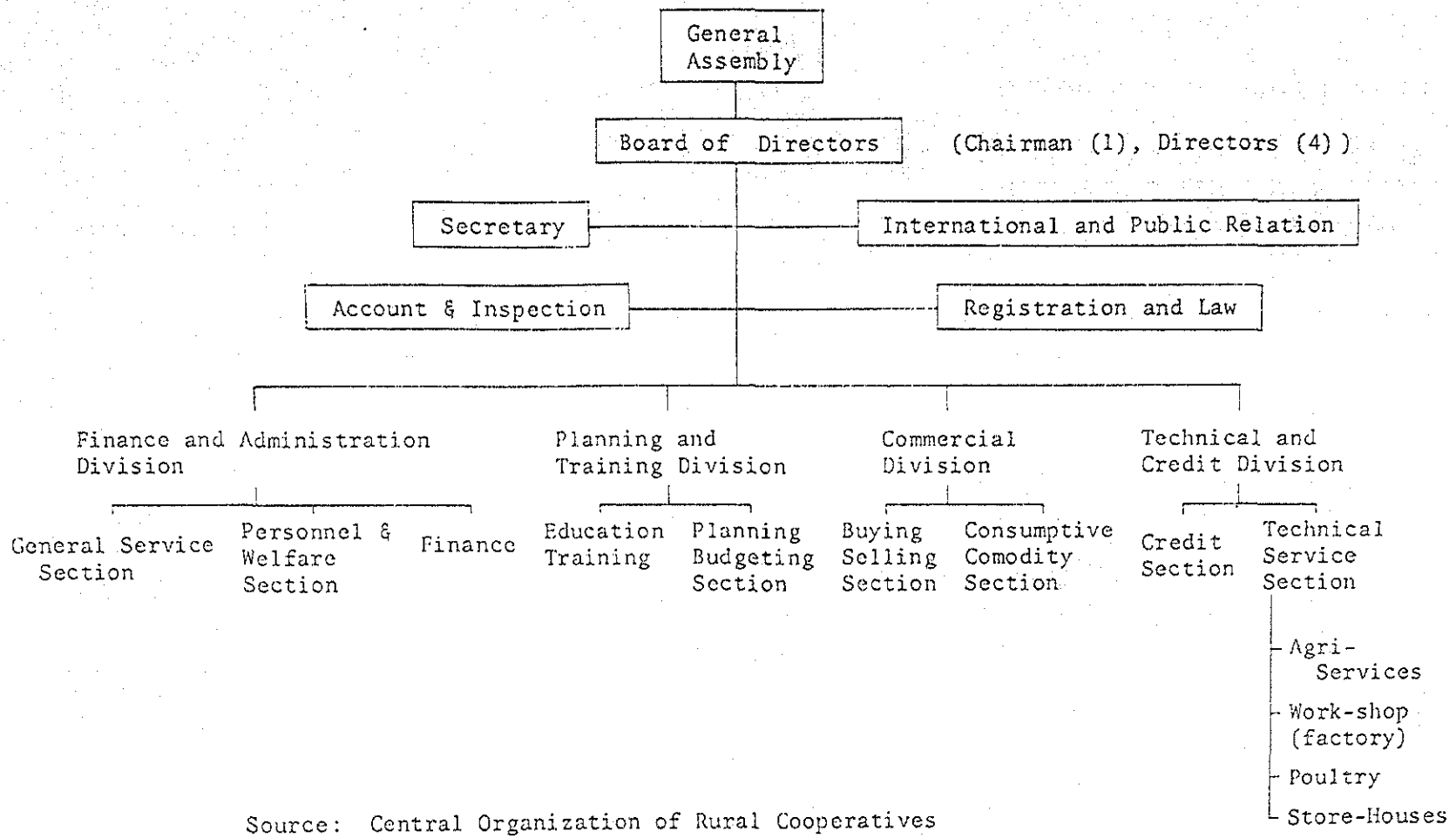
Figure D.1.6 Organization Chart of Babol ARTSC

Services	Expert	Technican	Others
Extension	4	-	-
Plant Protection	2	-	-
Livestock Farming	1	1	-
Veterinary & Slaughter House	4	2 + 7 (2)	-
Land Reform (Ex-MOCRA (1))	2	1	1
Agricultural Infrastructure (Farm Engineering)	2	1 (3)	-
Heavy Machinery	-	-	13 (4)
Soil	-	2	-
Plan & Survey	2	1	-
General Affairs			21 (5)
Finance — Accountant			3
Finance — Audit			1

Representative of Center

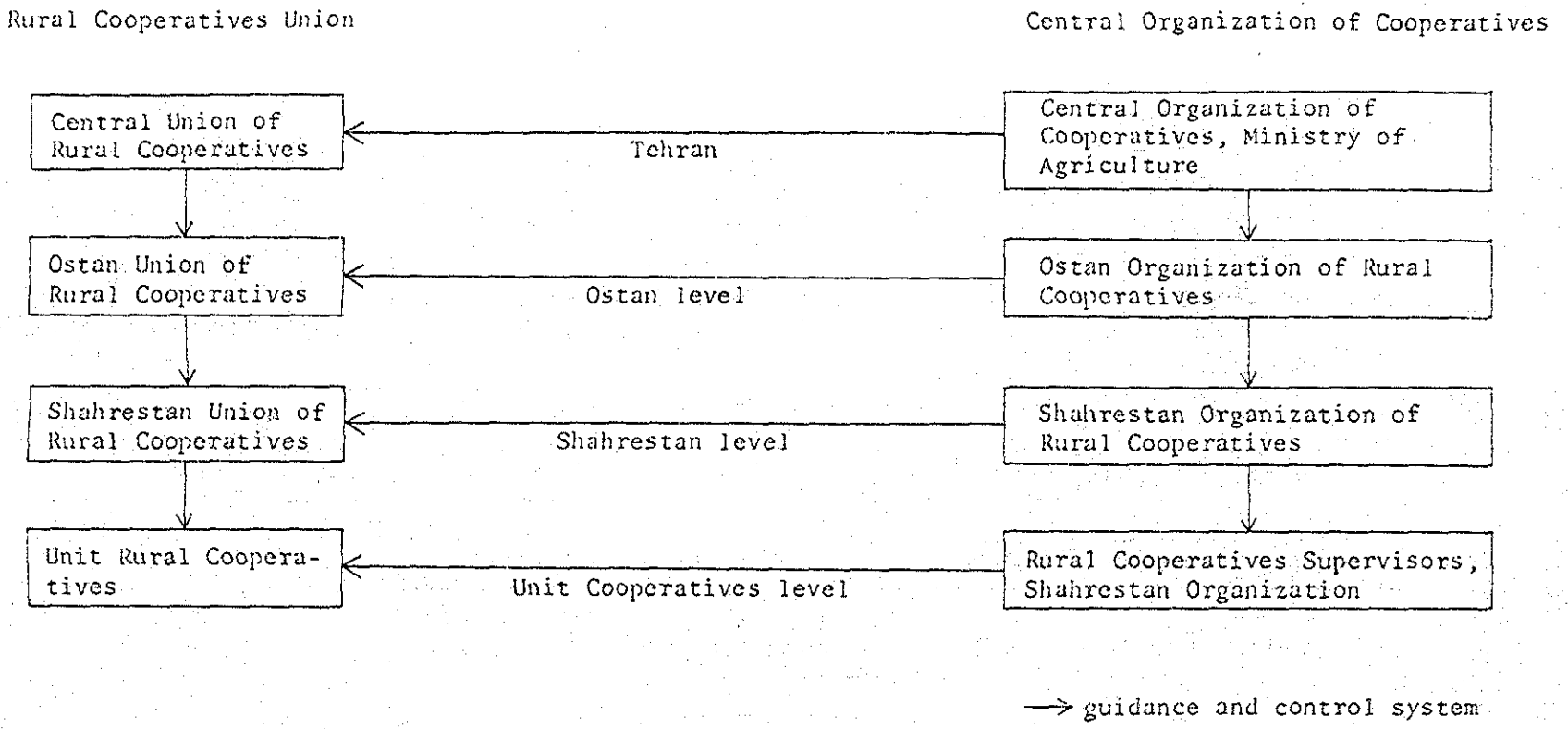
Notes: (1) Ministry of Cooperatives and Rural Affairs
(2) Inspector at Slaughter House
(3) Topo-Surveyor
(4) Operators
(5)
- Responsible person 1
- Archive 1
- Typist 3
- Store Keeper 3
- Driver 8
- Others 5

Figure D.1.7 Organization Chart of Central Organization of Rural Cooperatives



Source: Central Organization of Rural Cooperatives

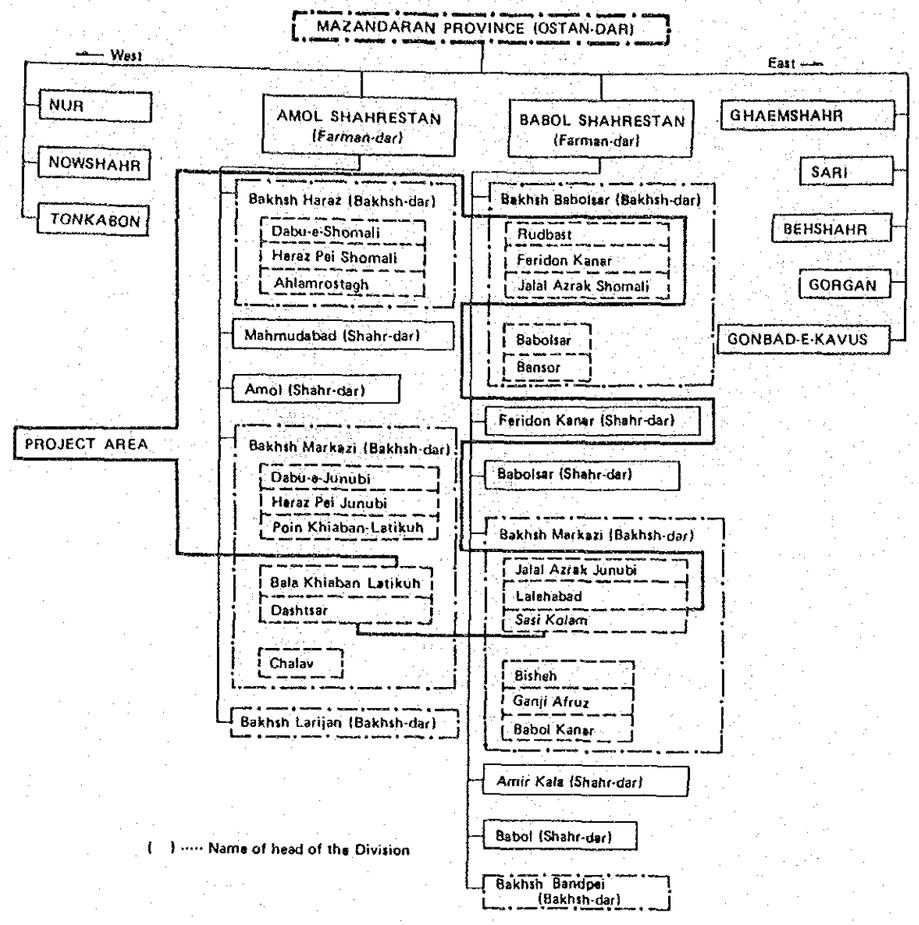
Figure D.1.8 Relation of Unit Cooperatives and C.O.R.C.

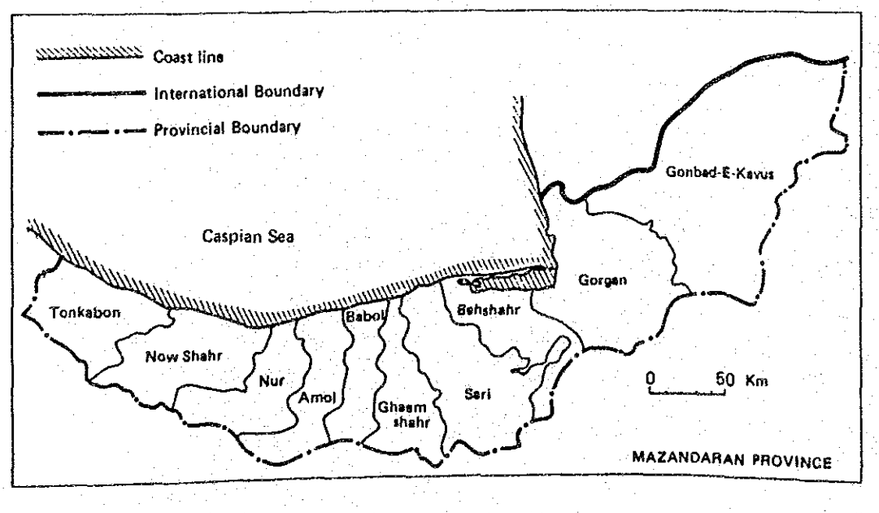


Source: Central Organization of Rural Cooperatives

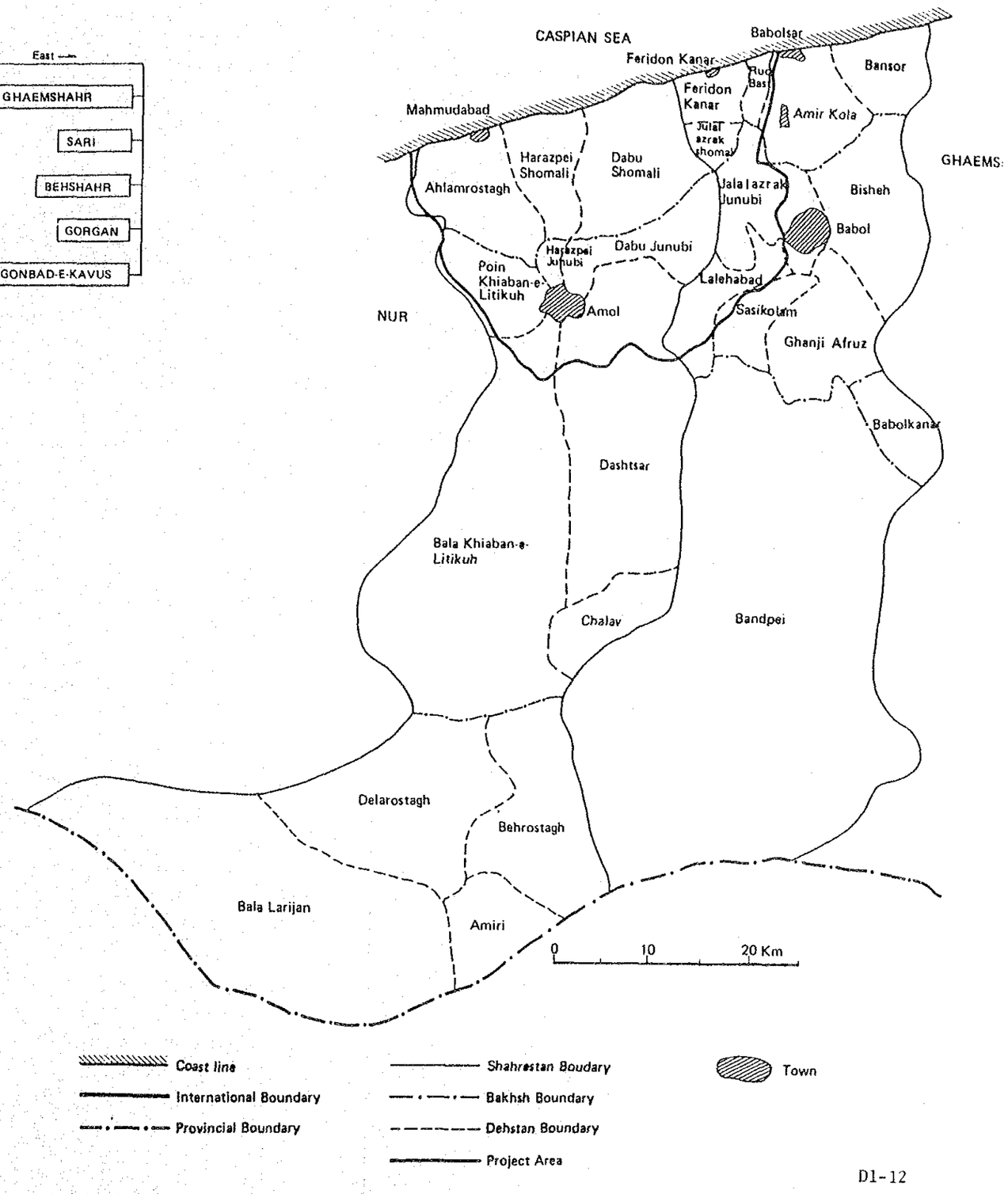
EXHIBIT D.1.1. ADMINISTRATIVE BOUNDARY OF PROJECT AREA

ADMINISTRATIVE DIVISIONS





AMOL & BABOL SHAH RESTANS



APPENDIX D. 2.

DEMOGRAPHY

LIST OF TABLES

Table D.2.1 Demographic Summary of Project Area

Descriptions	AMOL SHAHRESTAN	BABOL SHAHRESTAN	PROJECT AREA
POPULATION in 1956 CENSUS	(123,000)*	188,190	-
POPULATION in 1966 CENSUS	171,520	267,710	-
POPULATION in 1976 CENSUS	232,470	348,620	-
PROJECT AREA POPULATION-1976	213,985	90,725	304,710
RATIO per TOTAL POPULATION	92.0 %	20 %	
INCREASE RATE in 1956-66	3.38 %/	3.59 %/	-
INCREASE RATE in 1966-76	3.08 %/	2.67 %/	(2.96 %/)
RATIO of URBAN POPUL.-1956	14.6 %	28.9 %	-
RATIO of URBAN POPUL.-1966	23.4 %	30.2 %	-
RATIO of URBAN POPUL.-1976	32.7 %	32.6 %	29.5 %
HOUSEHOLD No. in 1966	29,892	49,105	-
HOUSEHOLD No. in 1976	40,180	64,429	51,989
FAMILY SIZE in 1966	5.74	5.45	-
FAMILY SIZE in 1976	5.79	5.41	5.86
RURAL FAMILY SIZE in 1966	5.82	5.57	-
RURAL FAMILY SIZE in 1976	6.07	5.76	6.14
NATIVE BORN POPULATION in 1966	162,300	254,360	-
NATIVE BORN POPULATION in 1976	215,010	330,730	-
RATIO of NATIVE BORN in 1966	94.6 %	95.0	-
RATIO of NATIVE BORN in 1976	92.5 %	94.9	-
POPULATION INFLOW in 1966	9,220	13,350	-
POPULATION OUTFLOW in 1966	10,500	23,080	-
NET POPULATION OUTFLOW in 1966	0.7 %	3.7 %	-
RATIO of UNDER 15 YEARS POPUL.-1976	47.5 %	46.4 %	-
RATIO of 15-55 YEARS POPUL.-1976	38.8 %	38.5 %	-
RATIO of OVER 55 YEARS POPUL.-1976	13.7 %	15.1 %	-

Note: At the CENSUS of 1956, AMOL SHAHRESTAN was including NUR DISTRICT (Presently NUR SHAHRESTAN) and the total population was reported as 152,211. About 123,000 of which are considered as resident of present AMOL SHAHRESTAN.

Table D.2.2 Population Increase Rate by Dehstan

Dehstan	TOTAL PROJECT AREA in 1976		SAMPLE VILLAGE NO.	COMPARISON				POPULATION INCREASE RATE (%)
				1976		1985		
	POPULATION	HOUSE HOLD		POPULATION	HOUSE HOLD	POPULATION	HOUSE HOLD	
AHLAMROSTAGH	18,359	2,926	32	14,682	2,315	21,355	3,118	4.5
HARAZPEI SHOMALI	11,745	1,892	26	11,712	1,950	16,446	2,588	4.1
DABU-E-SHOMALI	34,100	5,471	48	32,373	5,213	44,281	7,778	3.7
HARAZPEI JUNUBI	2,682	418	8	2,523	392	3,615	640	4.2
DABU-E-JUNUBI	22,687	3,655	76	19,851	3,359	25,249	4,322	2.9
POIN KHIABAN-LITIKUH	11,018	1,760	36	10,311	1,655	13,366	2,182	3.1
BALA KHIABAN-LITIKUH	10,546	1,851	17	7,792	1,350	10,486	1,978	3.5
DASHT SAR	26,787	4,401	48	23,988	3,932	32,802	5,398	3.7
Sub-total in AMOL SHAHRESTAN	137,924	22,374	291	123,232	20,166	167,600	28,004	3.7
RUD BAST	7,093	1,248	7	6,337	1,123	8,926	1,604	4.1
JALAL AZRAK SHOMALI	5,223	825	8	5,223	825	7,603	1,163	4.5
JALAL AZRAK JUNUBI	28,106	4,570	50	25,772	4,168	34,310	6,183	3.4
LALEH ABAD	23,693	3,816	36	18,245	2,926	24,117	3,989	3.3
SASI KOLAM	12,637	2,142	12	9,754	1,645	13,457	2,373	3.8
Sub-total in BABOL SHAHRESTAN	76,752	12,601	113	65,331	10,687	88,413	15,312	3.6
Total in PROJECT AREA	214,676	34,975	404	188,563	30,853	256,013	43,316	3.7

D.2.3 Country Wide Demographic Back Data

	Year	Whole Country Total	Whole Country Male	Whole Country Female	Mazandaran Total	Mazandaran Male	Mazandaran Female	Amol Total	Amol Male	Amol Female	Babol Total	Babol Male	Babol Female	Project Area Total
Total Population	1345	25,078,923	12,981,665	12,097,258	1,841,657	940,333	901,304	171,524	86,771	84,753	267,759	134,551	133,208	-
	1355	33,708,744	17,356,347	16,352,397	2,387,171	1,197,591	1,189,580	232,475	117,852	114,643	348,618	173,641	174,977	304,710
Male/Female Ratio	1345	100.0	51.8	48.2	100.0	51.1	48.9	100.0	50.6	49.4	100.0	50.3	49.7	-
	1355	100.0	51.5	48.5	100.0	50.2	49.8	100.0	50.7	49.3	100.0	49.8	50.2	-
Rural Population	1345	15,284,677	7,885,011	7,399,666	1,400,640	710,992	689,648	131,448	66,273	65,175	186,908	93,390	93,518	-
	1355	17,854,064	9,064,896	8,789,168	1,610,352	796,634	813,718	156,414	78,469	77,945	235,026	114,722	120,304	214,705
Urban Population	1345	9,794,246	5,096,654	4,697,592	440,997	229,341	211,656	40,076	20,498	19,578	80,851	41,161	39,690	-
	1355	15,854,680	8,291,451	7,563,229	776,819	400,957	375,862	76,061	39,363	36,698	113,592	58,919	54,673	90,005
Rural/Urban Ratio	1345	60.9:39.1	60.7:39.3	61.2:38.8	76.1:23.9	75.6:24.4	76.5:23.5	76.6:23.4	76.4:23.4	76.9:23.1	69.8:30.2	69.4:30.6	70.2:29.8	-
	1355	53.0:47.0	52.2:47.8	53.7:46.3	67.5:32.5	66.5:33.5	68.4:31.6	67.3:32.7	66.6:33.4	68.0:32.0	67.4:32.6	66.1:33.9	68.8:31.2	70.5:29.5
Population Increase	1335/45	2.84%	-	-	-	-	-	-	-	-	-	-	-	-
(%/annum)	1345/55	3.00%	-	-	2.35%	-	-	3.09%	-	-	2.67%	-	-	2.98%
Population Rural Area	1345/55	1.57%	-	-	1.41%	-	-	1.75%	-	-	2.32%	-	-	-
Population Urban Area	1345/55	4.93%	-	-	5.83%	-	-	6.62%	-	-	3.46%	-	-	-
Native-born Population	1345	21,797,608	11,181,974	10,615,634	1,538,321	775,762	762,559	162,229	81,721	80,578	254,360	127,274	127,086	-
	1355	25,892,843	13,152,431	12,740,412	2,058,122	1,024,000	1,034,122	215,010	107,525	107,485	330,735	163,302	167,433	-
N-b P at Rural Area	1345	14,588,788	7,503,534	7,085,254	1,209,832	609,418	600,414	124,938	62.673	62.265	180.809	90,352	90.457	-
	1355	16,872,196	8,526,065	8,346,131	1,452,002	714,263	737,739	148,752	73,480	75,272	229,721	111,978	117,743	-
N-b P at Urban Area	1345	7,208,820	3,678,440	3,530,380	328,489	166,344	162,145	37,361	19,048	18,313	73,551	36,922	56,629	-
	1355	9,020,647	4,626,366	4,394,281	606,120	309,737	296,383	66,258	34,045	32,213	101,014	51,324	49,690	-
N-b P Ratio	1345	86.9	86.1	87.8	83.5	82.5	84.6	94.6	94.2	95.1	95.0	94.6	95.4	-
	1355	76.8	75.8	77.9	86.2	85.5	86.9	92.5	91.3	93.8	94.9	94.0	95.7	-
N-b P Ratio at Rural	1345	95.4	95.2	95.8	86.4	85.7	87.1	95.0	94.6	95.5	96.7	96.7	96.7	-
	1355	94.5	94.1	95.0	90.2	89.7	90.7	95.1	93.6	96.6	97.7	97.6	97.9	-
N-b P Ratio at Urban	1345	73.6	72.2	75.2	74.5	72.5	76.6	93.2	92.9	93.5	91.0	89.7	92.3	-
	1355	56.9	55.8	58.1	78.0	77.2	78.9	87.1	86.5	87.8	88.9	87.1	90.9	-
Age Group of less than 15	1345	11,560,329	6,029,262	5,531,067	880,827	450,192	430,635	84,816	43,160	41,656	128,933	65,237	63,696	-
	1355	15,009,363	7,818,568	7,190,795	1,110,869	568,449	542,420	110,393	56,865	53,528	161,703	82,567	79,136	-
Age Group of 15 - 55	1345	11,452,651	5,869,478	5,583,173	828,247	424,774	403,473	74,348	37,860	36,588	118,763	59,858	58,905	-
	1355	13,506,366	6,732,586	6,873,880	1,113,105	545,456	567,649	107,138	53,584	53,554	160,966	78,200	82,766	-
Age Group of more than 55	1345	2,015,943	1,082,925	983,018	132,563	65,367	67,196	12,360	5,751	6,609	20,063	9,456	10,607	-
	1355	5,193,015	2,805,193	2,387,822	163,197	83,686	79,511	14,944	7,383	7,561	25,949	12,874	13,075	-

	Year	Whole Country Total	Whole Country Rural	Whole Country Urban	Mazandaran Total	Mazandaran Rural	Mazandaran Urban	Amol Total	Amol Rural	Amol Urban	Babol Total	Babol Rural	Babol Urban	Project Area Total	Project Area Rural	Project Area Urban
Total No. of Household	1345	5,030,935	3,068,912	1,962,023	345,497	261,294	84,203	29,892	22,572	7,320	49,105	33,036	16,069	-	-	-
	1355	6,711,628	3,446,104	3,265,524	443,350	288,756	154,594	40,165	25,773	14,392	64,411	40,798	23,613	51,989	34,983	17,006
Size of Household	1345	4.98	4.98	4.99	5.33	5.36	5.23	5.74	5.82	5.47	5.45	5.66	5.03	-	-	-
	1355	5.02	5.18	4.86	5.38	5.58	5.02	5.79	6.07	5.28	5.41	5.76	4.81	5.86	6.14	5.29

APPENDIX D. 3.

MAN-POWER AND EMPLOYMENT

LIST OF TABLES

Table D.3.1 Summary of Employment by Age Group in 1976

Description		AMOL SHAHRESTAN Population	Ratio	BABOL SHAHRESTAN Population	Ratio
Total Population in 1976		232,475	100.0%	348,618	100.0%
Total of 10 year over Population		154,702	66.5	236,119	67.7
Total of 15-55 year population		107,138	46.1	160,965	46.2
Economically Active Popul.	10 year over	54,641	23.5	105,133	30.0
	15-55 year	47,390	20.4	88,610	25.4
ditto -Rural Area-	10 year over	36,631	-	76,431	-
	15-55 year	31,426	-	63,337	-
Employed Population	10 year over	34,299	14.8	38,648	11.1
	15-55 year	30,439	13.1	33,896	9.7
ditto -Rural Area-	10 year over	17,410	-	13,558	-
	15-55 year	15,404	-	11,517	-
Public Servant	10 year over	5,898	2.5	9,484	2.7
	15-55 year	5,756	2.5	9,133	2.6
ditto -Rural Area-	10 year over	2,363	-	1,734	-
	15-55 year	2,320	-	1,694	-
Farmer	10 year over	8,186	3.5	5,217	1.5
	15-55 year	6,743	2.9	4,077	1.2
ditto -Rural Area-	10 year over	7,198	-	3,763	-
	15-55 year	5,930	-	2,889	-

Table D.3.2 Summary of Employment by Sector in 1976

	AMOL SHAHRESTAN						BABOL SHAHRESTAN					
	Total		Rural Area		Urban Area		Total		Rural Area		Urban Area	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Technical/Scientific Specialist	2,602	7.6	630	3.6	1,972	11.7	4,489	11.6	745	5.5	3,744	14.9
Manager & High Grade Employee	102	0.3	34	0.2	68	0.4	179	0.5	69	0.5	110	0.4
Clerk & Similar	1,795	5.2	330	1.9	1,465	8.7	2,806	7.3	413	3.0	2,393	9.6
Trader & Marchant	4,234	12.3	1,048	6.0	3,186	18.9	4,630	12.0	1,175	8.7	3,455	13.8
Service	2,434	7.1	938	5.4	1,496	8.9	3,219	8.3	840	6.2	2,379	9.5
Agriculture, Fishery, etc.	8,186	23.9	7,198	41.3	988	5.8	5,217	13.5	3,763	27.8	1,454	5.8
Production & Transportation	13,478	39.3	5,918	34.0	7,560	44.8	16,149	41.8	5,928	43.7	10,221	40.7
Others	1,468	4.3	1,314	7.6	154	0.9	1,959	5.0	625	4.6	1,334	5.3
Total	34,299	100.0	17,410	100.0	16,889	100.0	38,648	100.0	13,558	100.0	25,090	100.0

Table D.3.3 Job Distribution by Head of Family

		Amol Area		Bobol Area		Whole project Area	
		House hold	%	House hold	%	House hold	%
Agriculture	Land Owner Farmer	24,443	64.0	7,456	52.1	31,899	60.7
	(Non-Resident Land Owner)	(1,829)		(35)		(1,864)	
	Land Lent Farmer	1,370	3.6	0		1,370	2.6
	(Land Own-Lent Farmer)	(3,733)		(7,587)		(11,320)	
	Agricultural Worker (Landless)	5,070	13.3	3,382	23.6	1,452	16.1
	Sub-total	30,883	80.9	10,838	75.7	41,721	79.4
	Retail Saler	1,271	3.3	687	4.8	1,958	3.7
	Teacher	432	1.1	300	2.1	732	1.4
	Government Employee	640	1.7	446	3.1	1,086	2.1
	Driver	1,384	3.6	718	5.0	103	4.0
	Construction Worker	1,135	3.0	932	6.5	266	3.9
	Mechanic/Electrician	30	0.1	153	1.1	183	0.3
	Factory Worker	205	0.5	23	0.2	228	0.4
	Other Worker	1,505	3.9	193	1.3	1,698	3.2
	Revolutional Organization	252	0.7	13	0.1	265	0.5
	Other (including jobless)	470	1.2	7	*	477	0.9
	Sub-total	7,324	19.1	3,472	24.3	10,796	20.6
	Total	38,207	100.0	14,310	100.0	52,517	100.0

Table D.3.4. Employment Status of Population in 1345/1355 (1)

1. Whole Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 10 years over	1345	7,584,085	6,584,257	999,828	578,353	478,653	99,700	45,511	43,179	2,332	80,007	67,419	12,588
	1355	9,796,056	8,347,050	1,449,006	701,314	537,930	163,384	54,641	52,289	2,352	105,133	75,724	29,409
Employed	1345	6,858,396	5,948,413	909,983	502,865	410,291	92,574	33,500	31,248	2,252	60,463	48,396	12,067
	1355	8,799,420	7,587,400	1,212,020	532,479	416,368	116,111	34,299	32,364	1,935	38,648	34,093	4,555
Un-employed	1345	725,689	635,844	89,845	75,488	68,362	7,126	12,011	11,931	80	19,544	19,023	521
	1355	996,636	759,650	236,986	168,835	121,562	47,273	20,342	19,925	417	66,485	41,631	24,854
Economically In-active													
Total - 10 years over	1345	8,951,759	1,961,981	6,989,778	603,326	125,090	478,236	61,961	10,832	51,129	90,487	17,925	72,562
	1355	13,206,443	3,449,364	9,757,079	901,795	257,981	643,814	100,061	25,412	74,649	130,986	40,540	90,446
Home Maker	1345	5,843,516	-	5,843,516	406,403	-	406,403	45,169	-	45,169	60,932	-	60,932
	1355	7,706,902	-	7,706,902	490,588	-	490,588	59,988	-	59,988	66,811	-	66,811
Student	1345	1,932,123	1,332,510	609,613	120,887	87,865	33,022	10,586	7,608	2,978	17,395	11,921	5,474
	1355	4,442,503	2,778,007	1,664,496	345,538	218,384	127,154	33,642	21,424	12,218	54,561	35,441	19,120
Un-able to Work	1345	911,207	428,513	482,694	60,243	24,454	35,789	4,842	2,203	2,639	9,639	3,877	5,762
	1355	667,185	427,391	239,794	36,916	22,485	14,431	2,543	1,775	768	5,859	3,149	2,710
Others	1345	264,913	210,958	53,755	15,793	12,771	3,022	1,264	1,021	243	2,521	2,127	394
	1355	389,853	243,966	145,887	28,753	17,112	11,641	3,888	2,213	1,675	3,755	1,950	1,805
Economically Active													
Total- 10 ∿ 14 years	1345	773,331	571,390	201,941	60,513	41,218	19,295	4,357	3,839	518	8,394	6,195	2,199
	1355	635,492	415,779	219,713	44,653	21,944	22,709	2,135	1,918	217	6,048	2,701	3,347
Employed	1345	642,657	464,051	178,606	50,182	32,884	17,298	2,989	2,490	499	6,082	4,035	2,047
	1355	511,554	318,860	192,694	34,191	16,285	17,906	1,142	961	181	1,634	988	646
Un-employed	1345	130,674	107,339	23,335	10,331	8,334	1,997	1,368	1,349	19	2,312	2,160	152
	1355	123,938	96,919	27,019	10,462	5,659	4,803	993	957	36	4,414	1,713	2,701
Economically In-active													
Total - 10 ∿ 14 years	1345	2,243,919	1,022,445	1,221,474	160,356	72,384	87,972	16,407	6,561	9,846	23,274	9,835	13,439
	1355	3,667,626	1,842,856	1,824,770	282,154	144,825	137,329	30,485	14,816	15,669	43,157	22,489	20,668
Home maker	1345	740,846	-	740,846	60,026	-	60,026	7,212	-	7,212	9,178	-	9,178
	1355	687,342	-	687,342	36,405	-	36,405	6,426	-	6,426	7,271	-	7,271
Student	1345	1,398,649	940,296	458,353	92,681	66,240	26,441	8,593	6,118	2,475	12,624	8,569	4,055
	1355	2,899,404	1,794,007	1,105,397	230,470	141,463	89,007	23,559	14,457	9,102	35,201	22,123	13,078
Un-able to Work	1345	7,489	5,148	2,341	672	484	188	55	41	14	118	79	39
	1355	17,156	10,598	6,558	630	357	273	74	50	24	92	60	32
Others	1345	96,935	77,001	19,934	6,977	5,660	1,317	546	402	144	1,354	1,187	167
	1355	63,724	38,251	25,473	4,649	3,005	1,644	426	309	117	593	306	287

Table D.3.4. Employment Status of Population in 1345/1355 (2)

1. Whole Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 15 ∿ 54 years	1345	6,058,253	5,323,579	734,674	469,099	393,150	75,949	37,244	35,618	1,626	64,811	55,109	9,702
	1355	8,165,236	7,004,757	1,160,479	590,091	455,630	134,461	47,390	45,396	1,994	88,610	63,448	25,162
Employed	1345	5,528,821	4,856,599	672,222	410,864	339,835	71,029	27,626	26,057	1,569	49,316	39,956	9,360
	1355	7,398,000	6,434,143	963,857	452,275	358,531	93,744	30,439	28,810	1,629	33,896	30,191	3,705
Un-employed	1345	529,432	466,980	62,452	58,235	53,315	4,920	9,618	9,561	57	15,495	15,153	342
	1355	757,236	570,614	196,622	137,816	97,099	40,717	16,951	16,586	365	54,714	33,257	21,457
Economically In-active													
Total - 15 ∿ 54 years	1345	5,394,398	545,899	4,848,499	359,148	31,624	327,524	37,204	2,342	34,862	53,952	47,149	49,203
	1355	8,059,644	1,210,528	6,849,116	523,014	89,826	433,188	59,748	8,188	51,560	72,355	14,752	57,603
Home Maker	1345	4,612,907	-	4,612,907	315,221	-	315,221	34,007	-	34,007	46,945	-	46,945
	1355	6,166,291	-	6,166,291	398,259	-	398,259	47,871	-	47,871	50,651	-	50,651
Student	1345	533,474	382,214	151,260	28,206	21,625	6,581	1,993	1,490	503	4,771	3,352	1,419
	1355	1,543,099	984,000	559,099	115,068	76,921	38,147	10,083	6,967	3,116	19,360	13,318	6,042
Un-able to Work	1345	124,428	62,235	62,193	9,091	4,319	4,772	668	417	251	1,385	658	727
	1355	176,737	107,185	69,562	8,948	5,262	3,686	638	417	221	1,099	540	559
Others	1345	123,589	101,450	22,139	6,630	5,680	950	437	435	2	851	739	112
	1355	173,507	119,343	54,164	10,739	7,643	3,096	1,156	804	352	1,245	894	351
Economically Active													
Total- 55 years	1345	752,501	689,288	63,213	48,741	44,285	4,456	4,010	3,822	188	6,802	6,115	687
	1355	995,328	926,514	68,814	66,570	60,356	6,214	5,116	4,975	141	10,475	9,575	900
Employed	1345	686,918	627,763	59,155	41,819	37,572	4,247	2,885	2,701	184	5,065	4,405	660
	1355	889,866	834,397	55,469	46,013	41,552	4,461	2,718	2,593	125	3,118	2,914	204
Un-employed	1345	65,583	61,525	4,058	6,922	6,713	209	1,025	1,021	4	1,737	1,710	27
	1355	105,462	92,117	13,345	20,557	18.804	1,753	2,398	2,382	16	7,357	6,661	696
Economically In-active													
Total -	1345	1,313,442	393,637	919,805	83,822	21,082	62,740	8,350	1,929	6,421	13,261	3,341	9,920
	1355	1,479,173	395,980	1,083,193	96,627	23,330	73,297	9,828	2,408	7,420	15,474	3,299	12,175
Home maker	1345	489,763	-	489,763	31,156	-	31,156	3,950	-	3,950	4,809	-	4,809
	1355	853,269	-	853,269	55,924	-	55,924	5,691	-	5,691	8,889	-	8,889
Student	1345	-	-	-	-	-	-	-	-	-	-	-	-
	1355	-	-	-	-	-	-	-	-	-	-	-	-
Un-able to Work	1345	779,290	361,130	418,160	50,480	19,651	30,829	4,119	1,745	2,374	8,136	3,140	4,996
	1355	473,282	309,608	163,674	27,338	16,866	10,472	1,831	1,308	523	4,668	2,549	2,119
Others	1345	44,389	32,507	11,882	2,186	1,431	755	281	184	97	316	201	115
	1355	152,622	86,372	66,250	13,365	6,464	6,901	2,306	1,100	1,206	1,917	750	1,167

Table D.3.4. Employment Status of Population in 1345/1355 (3)

2. Rural Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 10 years over	1345	4,815,724	4,134,959	680,765	453,158	367,639	85,519	34,893	33,542	1,351	58,011	47,672	10,339
	1355	5,460,492	4,500,784	959,708	507,927	369,637	138,290	36,631	35,915	716	76,431	50,366	26,065
Employed	1345	4,248,102	3,645,501	602,601	385,095	306,212	78,883	23,491	22,189	1,302	40,968	30,975	9,993
	1355	4,686,784	3,934,771	752,013	354,242	261,048	93,194	17,410	17,027	383	13,558	11,918	1,640
Un-employed	1345	567,622	489,458	78,164	68,063	61,427	6,636	11,402	11,353	49	17,043	16,697	346
	1355	773,708	566,013	207,695	153,685	108,589	45,096	19,221	18,888	333	62,873	38,448	24,425
Economically In-active													
Total - 10 years over	1345	4,973,681	874,022	4,099,659	427,741	77,629	350,112	45,666	6,747	38,819	56,197	8,763	47,434
	1355	6,114,030	1,277,836	4,836,194	541,845	138,887	402,958	64,152	13,760	50,392	75,215	21,600	53,615
Home Maker	1345	3,658,254	-	3,658,254	308,317	-	308,317	35,470	-	35,470	42,098	-	42,098
	1355	4,234,010	-	4,234,010	328,412	-	328,412	43,125	-	43,125	42,657	-	42,657
Student	1345	568,188	484,858	83,330	60,305	50,026	10,279	5,286	4,366	920	5,382	4,650	732
	1355	1,374,821	995,421	379,400	172,018	116,122	55,896	16,777	11,480	5,297	26,565	18,910	7,655
Un-able to Work	1345	596,793	267,555	329,238	47,674	18,566	29,108	3,892	1,666	2,226	7,030	2,661	4,369
	1355	306,412	168,914	137,498	22,888	12,876	10,012	1,620	1,009	611	3,785	1,757	2,028
Others	1345	150,446	121,609	28,837	11,445	9,037	2,408	1,018	715	303	1,687	1,452	235
	1355	198,787	113,501	85,286	18,526	9,889	8,637	2,630	1,271	1,359	2,208	933	1,275
Economically Active													
Total - 10 ∿ 14 years	1345	604,795	456,713	148,082	52,833	36,089	16,744	3,514	3,238	276	6,940	5,095	1,845
	1355	517,113	335,736	181,377	39,436	18,957	20,479	1,613	1,539	74	5,369	2,209	3,160
Employed	1345	494,886	367,465	127,421	43,488	28,661	14,827	2,224	1,967	257	4,937	3,218	1,719
	1355	413,389	256,522	156,867	29,781	13,950	15,831	678	637	41	1,041	573	468
Un-employed	1345	109,909	89,248	20,661	9,345	7,428	1,917	1,290	1,271	19	2,003	1,877	126
	1355	103,724	79,214	24,510	9,655	5,017	4,638	935	902	33	4,328	1,636	2,692
Economically In-active													
Total -	1345	1,143,136	471,715	671,421	109,175	47,039	62,136	11,599	4,238	7,361	13,500	5,101	8,399
	1355	1,715,466	824,829	890,637	177,035	89,716	87,319	19,826	9,324	10,502	28,110	14,893	13,217
Home maker	1345	580,609	-	580,609	51,319	-	51,319	6,330	-	6,330	7,573	-	7,573
	1355	550,841	-	550,841	39,919	-	39,919	5,695	-	5,695	6,279	-	6,279
Student	1345	482,720	407,482	76,238	51,243	41,777	9,466	4,749	3,871	878	4,734	4,052	682
	1355	1,103,440	788,393	315,047	133,025	87,208	45,817	13,760	9,060	4,700	21,281	14,629	6,652
Un-able to Work	1345	4,972	3,416	1,556	547	381	166	43	30	13	93	60	33
	1355	13,743	8,417	5,326	515	298	220	54	39	15	73	43	30
Others	1345	73,835	60,817	13,018	6,066	4,881	1,185	477	337	140	1,100	989	111
	1355	47,442	28,019	19,423	3,576	2,213	1,363	317	225	92	377	221	256

Table D.3.4. Employment Status of Population in 1345/1355 (4)

2. Rural Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 15 ∿ 54 years	1345	3,726,914	3,229,541	497,373	361,847	296,608	65,239	28,339	27,358	981	46,367	38,383	7,984
	1355	4,325,812	3,591,445	734,367	418,609	305,998	112,611	31,426	30,842	584	63,337	41,167	22,170
Employed	1345	3,321,957	2,878,311	443,646	309,462	248,741	60,721	19,308	18,353	955	32,777	24,992	7,785
	1355	3,745,987	3,182,471	563,516	293,511	219,664	73,847	15,404	15,104	300	11,517	10,403	1,114
Un-employed	1345	404,957	351,230	53,727	52,385	47,867	4,518	9,031	9,005	26	13,590	13,391	199
	1355	579,825	408,974	170,851	125,098	86,324	38,774	16,022	15,738	284	51,820	30,764	21,056
Economically In-active													
Total -	1345	3,014,708	161,800	2,852,908	253,984	14,794	239,190	27,563	1,072	26,491	33,668	1,441	32,227
	1355	3,666,444	285,614	3,380,820	300,553	34,938	265,615	37,705	2,979	34,726	37,174	4,833	32,341
Home Maker	1345	2,793,106	-	2,793,106	233,811	-	233,811	26,142	-	26,142	31,537	-	31,537
	1355	3,256,008	-	3,256,008	251,280	-	251,280	33,698	-	33,698	30,746	-	30,746
Student	1345	84,468	77,376	7,092	9,062	8,249	813	537	495	42	648	598	50
	1355	271,381	207,028	64,353	38,993	28,914	10,079	3,017	2,420	597	5,284	4,281	1,003
Un-able to Work	1345	77,408	34,856	42,552	7,148	3,214	3,934	540	318	222	1,021	451	570
	1355	71,341	36,506	34,835	4,792	2,575	2,217	356	185	171	595	228	367
Others	1345	59,837	49,668	10,169	4,083	3,331	752	344	259	85	462	392	70
	1355	67,714	52,091	15,623	5,487	3,449	2,038	634	374	260	549	324	225
Economically Active													
Total - 55 year over	1345	484,015	448,705	35,310	38,478	34,942	3,536	3,040	2,946	94	4,704	4,194	510
	1355	617,567	573,603	43,964	49,882	44,682	5,200	3,592	3,534	58	7,725	6,990	735
Employed	1345	431,259	399,725	31,534	32,145	28,810	3,335	1,959	1,869	90	3,254	2,765	489
	1355	527,408	495,778	31,630	30,950	27,434	3,516	1,328	1,286	42	1,000	942	58
Un-employed	1345	52,756	48,980	3,776	6,333	6,132	201	1,081	1,077	4	1,450	1,429	21
	1355	90,159	77,825	12,334	18,932	17,248	1,684	2,264	2,248	16	6,725	6,048	677
Economically In-active													
Total -	1345	815,837	240,507	575,330	64,582	15,796	48,786	6,504	1,437	5,067	9,029	2,221	6,808
	1355	732,120	167,383	564,737	64,257	14,233	50,024	6,621	1,457	5,164	9,931	1,874	8,057
Home maker	1345	284,539	-	284,539	23,187	-	23,187	2,998	-	2,998	2,988	-	2,988
	1355	427,161	-	427,161	37,213	-	37,213	3,732	-	3,732	5,632	-	5,632
Student	1345	-	-	-	-	-	-	-	-	-	-	-	-
	1355	-	-	-	-	-	-	-	-	-	-	-	-
Un-able to Work	1345	514,413	229,283	285,130	39,979	14,971	25,008	3,309	1,318	1,991	5,916	2,150	3,766
	1355	221,328	123,991	97,337	17,581	10,006	7,575	1,210	785	425	3,117	1,486	1,631
Others	1345	16,774	11,124	5,650	1,296	825	471	197	119	78	125	71	54
	1355	83,631	33,391	50,240	9,463	4,227	5,236	1,679	672	1,007	1,182	388	794

Table D.3.4. Employment Status of Population in 1345/1355 (5)

3. Urban Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 10 years over	1345	2,768,361	2,449,298	319,063	125,195	111,014	14,181	10,618	9,637	981	21,996	19,747	2,249
	1355	4,335,564	3,846,266	489,298	193,387	168,293	25,094	18,010	16,374	1,636	28,702	25,358	3,344
Employed	1345	2,610,294	2,302,912	307,382	117,770	104,079	13,691	10,009	9,059	950	19,495	17,421	2,074
	1355	4,112,636	3,652,629	460,007	178,237	155,320	22,917	16,889	15,337	1,552	25,090	22,175	2,915
Un-employed	1345	158,067	146,386	11,681	7,425	6,935	490	609	578	31	2,501	2,326	175
	1355	222,928	193,637	29,291	15,150	12,973	2,177	1,121	1,037	84	3,612	3,183	429
Economically In-active													
Total - 10 years over	1345	3,978,078	1,087,959	2,890,119	175,585	47,461	128,124	16,295	4,085	12,210	34,290	9,162	25,128
	1355	7,092,413	2,171,528	4,920,885	359,950	119,094	240,856	35,909	11,652	24,257	55,771	18,940	36,831
Home Maker	1345	2,185,262	-	2,185,262	98,086	-	98,086	9,699	-	9,699	18,834	-	18,834
	1355	3,472,892	-	3,472,892	162,175	-	162,175	16,863	-	16,863	24,154	-	24,154
Student	1345	1,363,935	837,652	526,283	60,582	37,839	22,743	5,300	3,242	2,058	12,013	7,271	4,742
	1355	3,067,682	1,782,586	1,285,096	173,520	102,262	71,258	16,865	7,944	6,921	27,996	16,531	11,465
Un-able to Work	1345	314,414	160,958	153,456	12,569	5,888	6,681	950	537	413	2,609	1,216	1,393
	1355	360,773	258,477	102,296	14,028	9,609	4,419	923	766	157	2,074	1,392	682
Others	1345	114,467	89,349	25,118	4,348	3,734	614	346	306	40	834	675	159
	1355	191,066	130,465	60,601	10,227	7,223	3,004	1,258	942	316	1,547	1,017	530
Economically Active													
Total - 10 ∿ 14 years	1345	168,536	114,677	53,859	7,670	5,119	2,551	843	601	242	1,454	1,100	354
	1355	118,379	80,043	38,336	5,217	2,977	2,240	522	379	143	679	492	187
Employed	1345	147,771	96,586	51,185	6,694	4,223	2,471	765	523	242	1,145	817	328
	1355	98,165	62,338	35,827	4,410	2,335	2,075	464	324	140	593	415	178
Un-employed	1345	20,765	18,091	2,674	976	896	80	78	78	-	309	283	26
	1355	20,214	17,705	2,509	807	642	165	58	55	3	86	77	9
Economically In-active													
Total - 10 ∿ 14 years	1345	1,100,783	550,730	550,053	51,181	25,345	25,836	4,808	2,323	2,485	9,774	4,734	5,040
	1355	1,952,160	1,018,027	934,133	105,119	55,109	50,010	10,659	5,492	5,167	15,047	7,596	7,451
Home maker	1345	160,237	-	160,237	8,707	-	8,707	883	-	883	1,605	-	1,605
	1355	136,501	-	136,501	6,486	-	6,486	731	-	731	992	-	992
Student	1345	914,929	532,814	382,115	41,438	24,463	16,975	3,844	2,247	1,597	7,890	4,517	3,373
	1355	1,795,964	1,005,614	790,350	97,445	54,255	43,190	9,799	5,397	4,402	13,920	7,494	6,426
Un-able to Work	1345	2,517	1,732	785	125	103	22	12	11	1	25	19	6
	1355	3,413	2,181	1,232	115	52	53	20	11	9	19	17	2
Others	1345	23,100	16,184	6,916	911	779	132	69	65	4	254	198	56
	1355	16,282	10,232	6,050	1,073	792	281	109	84	25	116	85	31

Table D.3.4. Employment Status of Population in 1345/1355 (6)

3. Urban Area

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically Active													
Total - 15 ∿ 54 years	1345	2,331,339	2,094,038	237,301	107,262	96,552	10,710	8,805	8,160	645	18,444	16,726	1,718
	1355	3,839,425	3,413,312	426,113	171,482	149,642	21,840	15,964	14,554	1,410	25,273	22,281	2,992
Employed	1345	2,206,864	1,978,288	228,576	101,402	91,094	10,308	8,318	7,704	614	16,539	14,964	1,575
	1355	3,652,013	3,251,672	400,341	158,764	138,867	19,897	15,035	13,706	1,329	22,379	19,788	2,591
Un-employed	1345	124,475	115,750	8,725	5,860	5,458	402	487	456	31	1,905	1,762	143
	1355	187,411	161,640	25,771	12,718	10,775	1,943	929	848	81	2,894	2,493	401
Economically In-active													
Total -	1345	2,379,690	384,099	1,995,591	105,164	16,830	88,334	9,641	1,270	8,371	21,284	4,308	16,976
	1355	4,393,200	924,904	3,468,296	222,461	54,888	167,573	22,043	5,209	16,834	35,181	9,919	25,262
Home Maker	1345	1,819,801	-	1,819,801	81,410	-	81,410	7,864	-	7,864	15,408	-	15,408
	1355	2,910,283	-	2,910,283	136,978	-	136,978	14,173	-	14,173	19,905	-	19,905
Student	1345	449,006	304,838	144,168	19,144	13,376	5,768	1,456	995	461	4,123	2,754	1,369
	1355	1,271,718	776,972	494,746	76,075	48,007	28,068	7,066	4,547	2,519	14,076	9,037	5,039
Un-able to Work	1345	47,131	27,479	19,652	1,963	1,105	858	128	99	29	364	207	157
	1355	105,406	70,679	34,727	4,156	2,687	1,469	282	232	50	504	312	192
Others	1345	63,752	51,782	11,970	2,647	2,349	298	193	176	17	389	347	42
	1355	105,793	77,253	28,540	5,252	4,194	1,058	522	430	92	696	570	126
Economically Active													
Total - 55 years over	1345	268,486	240,583	27,903	10,263	9,343	920	970	876	94	2,098	1,921	177
	1355	377,760	352,911	24,849	16,688	15,674	1,014	1,524	1,441	83	2,750	2,585	165
Employed	1345	255,659	228,038	27,621	9,674	8,762	912	926	832	94	1,811	1,640	171
	1355	362,458	338,619	23,839	15,063	14,118	945	1,390	1,307	83	2,118	1,972	146
Un-employed	1345	12,827	12,545	282	589	581	8	44	44	-	287	281	6
	1355	15,303	14,292	1,011	1,625	1,556	69	134	134	-	632	613	19
Economically In-active													
Total - 55 years over	1345	497,605	153,130	344,475	19,240	5,286	13,954	1,846	492	1,354	3,232	120	3,112
	1355	747,053	228,597	518,456	32,370	9,097	23,273	3,207	951	2,256	5,543	1,425	4,118
Home maker	1345	205,224	-	205,224	7,969	-	7,969	952	-	952	1,821	-	1,821
	1355	426,108	-	426,108	18,711	-	18,711	1,959	-	1,959	3,257	-	3,257
Student	1345	-	-	-	-	-	-	-	-	-	-	-	-
	1355	-	-	-	-	-	-	-	-	-	-	-	-
Un-able to Work	1345	264,766	131,747	133,019	10,481	4,680	5,801	810	427	383	2,220	990	1,230
	1355	251,954	185,617	66,337	9,757	6,860	2,897	621	523	98	1,551	1,063	488
Others	1345	27,615	21,383	6,232	790	606	184	84	65	19	191	130	61
	1355	68,991	42,980	26,011	3,902	2,237	1,665	627	428	199	735	362	373

Table D.3.5. Employed Population by Categories of Job in 1345/1355 (1)

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1. Whole Area													
Employer	1345	152,623	146,891	5,732	10,986	10,434	552	1,099	1,080	19	1,431	1,378	53
	1355	182,229	176,871	5,358	14,626	14,370	256	1,751	1,741	10	1,247	1,223	24
Own Account Worker	1345	2,658,851	2,461,139	197,712	208,393	183,449	24,944	13,261	13,026	235	24,988	22,117	2,871
	1355	2,810,311	3,679,518	130,693	141,151	133,398	7,753	9,629	9,425	204	11,346	10,780	566
Government Employee	1345	662,666	605,833	56,833	38,294	35,644	2,650	1,872	1,687	185	3,593	3,191	402
	1355	1,673,092	1,428,174	245,918	82,129	69,167	12,962	5,898	4,873	1,025	9,484	7,492	1,992
Private Wage Earner	1345	2,635,607	2,205,979	129,628	169,812	136,434	33,379	10,654	9,768	886	18,526	15,326	3,200
	1355	3,071,927	2,749,781	322,146	211,397	166,403	44,994	15,357	14,670	587	15,032	13,582	1,450
Unpaid Family Worker	1345	677,071	479,145	197,926	71,512	41,528	29,984	6,264	5,399	865	11,133	5,848	5,285
	1355	1,021,312	525,589	495,723	81,660	32,287	49,373	1,620	1,555	65	1,491	988	503
Not Classified	1345	71,580	49,426	22,154	3,868	2,802	1,066	350	288	62	792	536	256
	1355	40,649	28,467	12,182	1,516	743	773	144	100	44	48	28	20
Total Employed	1345	6,858,396	5,948,413	909,983	502,865	410,291	92,574	33,500	31,248	2,252	60,463	48,396	12,067
	1355	8,799,420	7,587,400	1,212,020	532,479	416,368	116,111	34,299	32,364	1,935	38,648	34,093	4,555
2. Rural Area													
Employer	1345	55,077	52,446	2,631	5,802	5,532	270	347	333	14	584	559	25
	1355	40,016	37,366	2,650	6,184	6,046	138	695	692	3	174	168	6
Own Account Worker	1345	2,035,166	1,876,733	158,433	176,844	154,489	22,355	10,182	10,064	118	19,690	17,145	2,545
	1355	1,894,928	1,804,177	90,751	99,183	93,340	5,843	5,204	5,112	92	4,286	4,083	203
Government Employee	1345	89,151	86,207	2,844	10,496	10,202	294	615	601	14	392	304	18
	1355	268,133	245,730	22,403	26,520	24,905	1,615	2,363	2,282	81	1,734	1,579	155
Private Wage Earner	1345	1,399,949	1,153,219	246,720	121,979	95,384	26,595	6,290	5,968	322	9,139	7,011	2,128
	1355	1,526,845	1,341,605	185,240	144,219	106,200	38,019	7,688	7,555	133	6,121	5,268	853
Unpaid Family Worker	1345	628,295	447,700	180,595	67,599	38,850	28,749	5,879	5,076	803	10,697	5,555	5,142
	1355	935,731	490,661	445,070	77,051	30,031	47,020	1,354	1,305	49	1,229	812	417
Not Classified	1345	40,466	29,096	11,370	2,375	1,755	520	178	147	31	466	331	135
	1355	21,131	15,232	5,899	1,085	526	559	106	81	25	14	8	6
Total Employed	1345	4,248,102	3,645,501	602,601	385,095	306,212	78,883	23,491	22,189	1,302	40,968	30,975	9,993
	1355	4,686,784	3,934,771	752,013	354,242	261,048	93,194	17,410	17,027	383	13,558	11,918	1,640

Table D.3.5. Employed Population by Categories of Job in 1345/1355 (2)

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
3. Urban Area													
Employer	1345	95,546	94,445	3,101	5,184	4,902	282	752	747	5	847	819	28
	1355	142,213	129,505	2,708	8,442	8,324	118	1,056	1,049	7	1,073	1,055	18
Own Account Worker	1345	623,685	584,406	39,279	31,549	28,960	2,589	3,079	2,962	117	5,298	4,972	326
	1355	915,283	875,341	29,942	41,968	40,058	1,910	4,425	4,313	112	7,060	6,697	363
Government Employee	1345	573,515	519,526	53,989	27,798	25,442	2,256	1,257	1,086	171	3,201	2,817	384
	1355	1,404,959	1,181,444	223,515	55,609	44,262	11,347	3,535	2,591	944	7,750	5,913	1,837
Private Wage Earner	1345	1,235,658	1,052,760	182,898	47,833	41,050	6,783	4,364	3,800	564	9,387	8,315	1,072
	1355	1,545,082	1,408,176	136,906	67,178	60,203	6,975	7,369	7,115	454	8,911	8,314	597
Unpaid Family Worker	1345	48,776	31,445	17,331	3,913	2,678	1,235	385	323	62	436	293	143
	1355	85,581	34,928	50,653	4,609	2,256	2,353	266	250	16	262	176	86
Not Classified	1345	31,114	20,330	10,784	1,493	1,047	446	172	141	31	326	205	121
	1355	19,518	13,235	6,283	431	217	214	38	19	19	34	20	14
Total Employed	1345	2,610,294	2,302,912	307,382	117,770	104,079	13,691	10,009	9,059	950	19,495	17,421	2,074
	1355	4,112,036	3,652,629	460,007	178,237	155,320	22,917	16,889	15,337	1,552	25,090	22,175	2,915

Table D.3.6. Employed Population by Sectors of Industries in 1345/1355 (1)

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1. Whole Area													
Agri., Forest, Fish.	1345	3,168,515	2,965,287	202,228	323,715	258,924	64,791						
	1355	2,991,869	2,763,934	227,935	274,562	196,802	77,760	8,546	8,465	81	5,346	4,941	405
Mining	1345	26,312	25,911	401	1,247	1,243	4						
	1355	89,888	86,604	3,284	4,475	4,393	82	406	405	1	42	42	-
Manufacturing	1345	1,267,600	758,799	508,801	49,888	34,086	15,802						
	1355	1,672,059	1,032,960	639,099	60,442	40,681	19,761	3,895	3,675	220	6,160	4,784	1,376
Construction	1345	509,778	507,703	2,075	21,330	21,244	86						
	1355	1,188,720	1,180,913	7,807	48,511	48,290	221	6,678	6,659	19	5,811	5,797	14
Electric, Gas, Water & Sanitary Service	1345	52,858	52,165	693	2,520	2,497	23						
	1355	61,623	59,716	1,917	2,199	2,137	62	109	106	3	205	200	5
Commerce	1345	552,023	543,096	8,927	31,111	30,570	541						
	1355	668,494	656,177	12,317	35,995	35,127	868	4,632	4,581	51	5,286	5,175	111
Transport, Storage & Communication	1345	224,086	221,531	2,555	13,630	13,356	274						
	1355	431,471	422,647	8,824	24,684	24,448	236	3,164	3,154	10	3,632	3,573	59
Services	1345	929,685	759,718	169,967	52,651	42,254	10,297						
	1355	1,620,597	1,324,586	296,011	79,475	63,176	16,299	7,684	6,181	1,503	12,083	9,516	2,567
Other	1345	127,539	114,203	13,336	6,773	6,017	756						
	1355	74,689	59,863	14,826	2,136	1,314	822	185	138	47	83	65	18
Total Engaged	1345	6,858,396	5,948,413	909,983	502,865	410,291	92,574						
	1355	8,799,420	7,587,400	1,212,020	532,479	416,368	116,111	34,299	32,364	1,935	38,648	34,093	4,555

Table D.3.6. Employed Population by Sectors of Industries in 1345/1355 (2)

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
2. Rural Area													
Agri., Forest, Fish.	1345	2,970,780	2,777,090	193,690	305,530	243,314	62,216						
	1355	2,761,280	2,544,000	217,280	250,846	176,980	73,866	7,466	7,399	67	3,799	3,434	365
Mining	1345	17,907	17,689	218	1,170	1,167	3						
	1355	35,630	35,247	383	3,540	3,476	64	342	342	-	26	26	-
Manufacturing	1345	544,700	176,233	368,467	26,157	14,444	11,713						
	1355	783,966	287,583	495,383	32,459	16,705	15,754	1,393	1,282	111	2,598	1,625	973
Construction	1345	242,763	241,758	1,005	9,982	9,927	55						
	1355	621,412	618,424	2,988	23,867	23,775	121	3,478	3,467	11	2,409	2,405	4
Electric, Gas, Water & Sanitory Service	1345	5,419	5,400	19	504	503	1						
	1355	9,459	9,396	63	472	468	4	19	19	-	29	29	-
Commerce	1345	131,817	130,168	1,649	11,523	11,293	230						
	1355	128,205	125,955	2,250	10,683	10,231	452	1,166	1,149	17	1,324	1,289	35
Transport, Storage & Communication	1345	55,087	54,715	372	5,630	5,444	186						
	1355	100,937	100,575	362	8,937	8,898	39	716	713	3	835	834	1
Services	1345	215,018	185,210	29,808	20,152	16,232	3,920						
	1355	220,521	192,977	27,544	22,014	19,708	2,206	2,711	2,560	151	2,511	2,254	257
Other	1345	64,611	57,238	7,373	4,447	3,888	559						
	1355	26,374	20,614	5,760	1,415	827	588	119	96	23	27	22	5
Total Engaged	1345	4,248,102	3,645,501	602,601	385,095	306,212	78,883						
	1355	4,686,784	3,934,771	752,013	354,242	261,048	93,194	17,410	17,027	383	13,558	11,918	1,640

Table D.3.6. Employed Population by Sectors of Industries in 1345/1355 (3)

		Whole Country			Mazandaran			Amol			Babol		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
3. Urban Area													
Agri., Forest, Fish.	1345	197,735	188,197	9,538	18,185	15,610	2,575						
	1355	230,589	219,934	10,655	23,716	19,822	3,894	1,080	1,066	14	1,547	1,507	40
Mining	1345	8,405	8,222	183	77	76	1						
	1355	54,258	51,357	2,901	935	917	18	64	63	1	16	16	-
Manufacturing	1345	722,900	582,566	140,334	23,731	19,642	4,089						
	1355	889,093	745,377	143,716	27,983	23,976	4,007	2,502	2,393	109	3,562	3,159	403
Construction	1345	267,015	265,945	1,070	11,348	11,317	31						
	1355	567,308	562,489	4,819	24,635	24,535	100	3,200	3,192	8	3,402	3,392	10
Electric, Gas, Water & Sanitary Service	1345	47,429	46,765	674	2,016	1,994	22						
	1355	52,174	50,320	1,854	1,727	1,669	58	90	87	3	176	171	5
Commerce	1345	420,206	412,928	7,278	19,588	19,277	311						
	1355	540,289	530,222	10,067	25,312	24,896	416	3,466	3,432	34	3,962	3,886	76
Transport, Storage & Communication	1345	168,999	166,816	2,183	8,000	7,912	88						
	1355	330,534	322,072	8,462	15,747	15,550	197	2,448	2,441	7	2,797	2,739	58
Services	1345	714,667	571,508	140,159	32,499	26,122	6,377						
	1355	1,400,076	1,131,609	268,467	57,461	43,468	13,993	4,973	3,621	1,352	9,572	7,262	2,310
Other	1345	62,928	56,965	5,963	2,326	2,129	197						
	1355	48,315	39,249	9,066	721	487	234	66	42	24	56	43	13
Total Engaged	1345	2,610,294	2,302,912	307,382	117,770	104,079	13,691						
	1355	4,112,636	3,652,629	460,007	178,237	155,320	22,917	16,889	15,337	1,552	25,090	22,175	2,915

APPENDIX D. 4.

NATIONAL ECONOMY

LIST OF TABLES

Table D.4.1 Summary of National Production by Sectors

(Market price: Billion rials)

	1356		1357		1358		1359		1360		1361	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Agriculture	474.5	7.8	561.7	9.9	702.4	10.7	1083.3	15.4	1525.6	18.1	1912.1	17.7
Petrolium	1740.8	28.7	1185.5	20.8	1660.2	25.2	980.4	13.9	930.8	11.0	1769.5	16.3
Non-petro. Mines	77.5	1.3	73.7	1.3	67.7	1.0	99.7	1.4	143.8	1.7	158.3	1.5
Industries	469.4	7.7	416.7	7.3	488.7	7.4	602.2	8.5	731.6	8.7	894.4	8.3
Energy	58.8	1.0	54.0	0.9	62.6	1.0	61.3	0.9	77.8	0.9	98.6	0.9
Construction	476.8	7.9	501.4	8.8	441.5	6.7	529.8	7.5	546.5	6.5	685.6	6.3
Transport & Communication	326.0	5.4	361.6	6.4	452.4	6.9	553.8	7.9	620.7	7.3	709.8	6.5
Commerce hotel etc.	676.6	11.2	652.9	11.5	640.4	9.7	753.5	10.7	1295.0	15.3	1702.8	15.7
Public service	501.5	8.3	624.0	11.0	910.4	13.8	751.2	10.6	833.9	9.9	1040.5	9.6
Other service	1251.0	20.7	1257.3	22.1	1158.8	17.6	1637.5	23.2	1741.6	20.6	1860.8	17.2
Total	6052.9	100.0	5688.8	100.0	6585.1	100.0	7052.7	100.0	8447.3	100.0	10832.4	100.0

Table D.4.2 National Income

(Unit: Billion rials - market price basis)

	1356	1357	1358	1359	1360	1361
AGRICULTURE	474.5	561.7	702.4	1083.3	1525.6	1912.1
PETROLIUM	1740.8	1185.5	1660.2	980.4	930.8	1769.5
INDUSTRIES AND MINES	1082.5	1045.8	1060.5	1293.0	1499.7	1836.9
Mines	(77.5)	(73.7)	(67.7)	(99.7)	(143.8)	(158.3)
Industries	(469.4)	(416.7)	(488.7)	(602.2)	(731.6)	(894.4)
Electricity, Gas & Water	(58.8)	(54.0)	(62.6)	(61.3)	(77.8)	(98.6)
Construction	(476.8)	(501.4)	(441.5)	(529.8)	(546.5)	(685.6)
SERVICES	2755.1	2895.8	3162.0	3696.0	4491.2	5313.9
Commerce, Restaurant & Hotel	(676.6)	(652.9)	(640.4)	(753.5)	(1295.0)	(1702.8)
Transport, Storage & Communication	(326.0)	(361.6)	(452.4)	(553.8)	(620.7)	(709.8)
Financial & Monetary Services	(375.5)	(336.1)	(280.4)	(402.9)	(304.2)	(305.0)
Professional and Specialized Services	(583.0)	(610.4)	(538.0)	(680.5)	(795.6)	(948.0)
Public Services	(501.5)	(624.0)	(910.4)	(751.2)	(833.9)	(1040.5)
Social, Personal & House Services	(292.5)	(310.8)	(340.4)	(554.1)	(641.8)	(607.8)
LESS:						
Social Remuneration	290.5	334.4	247.3	293.8	228.8	210.9
GROSS INTERNAL PRODUCTION	5762.4	5354.4	6337.8	6758.9	8218.5	10621.5
(GROSS INTERNAL PRODUCTION WITHOUT PETROLIUM)	4021.6	4168.9	4677.6	5778.5	7387.7	8852.0
NET INCOME from OVERSEAS PRODUCTION	-98.0	-185.8	55.5	6.4	32.9	-0.2
NET INCOME of INDIRECT TAX	185.1	175.2	2.5	167.1	104.4	134.8
GROSS NATIONAL PRODUCTION	5849.5	5342.8	6390.8	6932.4	8355.8	10756.1
LESS:						
CAPITAL AMORTIZATION	283.1	333.9	374.9	462.2	583.4	708.1
NET INCOME of INDIRECT TAX	185.1	175.2	-2.5	167.1	104.4	134.8
NATIONAL INCOME	5381.3	4834.7	6018.9	6303.1	7668.0	9913.2

Table D.4.3. National Income

(Unit: Billion rials - Constant price basis in 1353)

	1356	1357	1358	1359	1360	1361
Agriculture	340.9	352.6	356.3	362.9	404.0	436.0
Petrolium	1,363.4	929.8	767.6	330.5	273.6	526.8
Industries and Mines	645.6	553.9	511.9	520.2	534.5	590.7
Mines	(35.5)	(33.2)	(25.3)	(26.4)	(25.5)	(27.5)
Industries	(378.2)	(317.1)	(318.8)	(324.8)	(346.4)	(387.8)
Electricity, Gas & Water	(52.9)	(47.9)	(55.0)	(48.3)	(56.6)	(64.7)
Construction	(179.0)	(155.7)	(112.8)	(120.7)	(106.0)	(110.7)
Services	1,753.8	1,620.4	1,560.7	1,475.6	1,504.1	1,546.2
Commerce, Restaurant & Hotel	(486.3)	(420.1)	(345.0)	(310.5)	(436.5)	(487.3)
Transport, Storage & Communication	(180.6)	(169.9)	(196.9)	(174.3)	(158.3)	(168.1)
Financial & Monetary Services	(234.4)	(190.8)	(142.8)	(166.1)	(102.1)	(85.9)
Professional and Specialized Services	(350.9)	(308.4)	(241.8)	(287.5)	(310.0)	(335.0)
Public Services	(313.0)	(354.1)	(463.8)	(309.8)	(279.9)	(292.9)
Social, Personal & House Services	(188.6)	(177.1)	(170.4)	(227.4)	(217.3)	(177.0)
Less:						
Social Remuneration	181.4	189.8	126.0	121.2	76.8	59.4
Gross Internal Production	3,922.3	3,266.9	3,070.5	2,568.0	2,639.4	3,040.3
(Gross Internal Production Without Petrolium)	2,558.9	2,337.1	2,302.9	2,237.5	2,365.8	2,513.5
Net Income from Overseas Production	-37.7	-71.9	58.6	32.7	51.6	28.4
Net Income of Indirect Tax	121.0	92.8	-1.3	68.9	37.3	43.8
Gross National Production	4,005.6	3,287.7	3,127.8	2,669.6	2,728.3	3,112.5
Balance of International Trade	107.7	-0.7	255.1	256.7	276.6	264.1
Gross National Income	4,113.3	3,287.1	3,382.9	2,926.3	3,004.9	3,376.6
Less:						
Capital Amortization	171.8	182.8	181.0	183.9	208.4	232.1
Net Income of Indirect Tax	121.0	92.8	-1.3	68.9	37.3	43.8
National Income	3,820.5	3,011.5	3,203.2	2,673.5	2,759.2	3,100.7

Table D.4.4. National Expenditure

(Unit: Billion rials - Market price basis)

	1356	1357	1358	1359	1360	1361
Consumptive Expenditure - Private Sector	2,696.5	2,902.4	2,963.7	3,505.6	4,735.4	5,713.0
Consumptive Expenditure - Public Sector	1,133.7	1,255.0	1,223.0	1,377.1	1,676.6	1,844.2
Gross Capital Investment	1,790.4	1,696.0	1,190.8	1,392.4	1,575.3	1,887.0
Machinery	516.1	430.9	280.8	258.3	428.4	530.8
- Private Sector	(227.3)	(96.0)	(69.9)	(66.8)	(172.3)	(130.6)
- Public Sector	(288.8)	(334.9)	(210.9)	(191.5)	(256.1)	(400.2)
Building	1,274.3	1,265.1	910.0	1,134.0	1,146.9	1,356.2
- Private Sector	(469.0)	(448.5)	(509.9)	(647.3)	(597.5)	(671.5)
- Public Sector	(805.3)	(816.6)	(400.1)	(486.8)	(549.4)	(684.7)
Change in Stock	-168.8	-479.1	99.4	743.1	1,378.0	1,208.5
Net Export of Commodity and Services	259.4	85.8	839.7	-208.8	-503.9	172.5
Error in Statistics	236.3	69.5	18.7	116.6	-538.5	-68.9
Gross Internal Expenditure	5,947.5	5,529.6	6,335.3	6,926.0	8,322.9	10,756.3
Net Income from Overseas Investment	-98.0	-185.8	55.5	6.4	32.9	1.8
Gross National Expenditure	5,849.5	5,343.8	6,390.8	6,932.4	8,355.8	10,758.1
= Gross National Income						

Table D.4.5. National Expenditure

(Unit: Billion rials - Constant price basis in 1353)

	1356	1357	1358	1359	1360	1361
Consumptive Expenditure - Private Sector	1,839.1	1,745.0	1,525.9	1,459.7	1,548.3	1,642.9
Consumptive Expenditure - Public Sector	799.2	797.3	636.7	580.4	606.9	583.6
Gross Capital Investment	1,074.7	928.3	575.8	553.8	562.8	618.5
Machinery	367.1	281.1	165.3	128.0	194.4	215.7
- Private Sector	(161.7)	(62.7)	(41.2)	(33.0)	(78.2)	(53.1)
- Public Sector	(205.4)	(218.5)	(124.1)	(95.0)	(116.2)	(162.6)
Building	707.6	647.2	410.5	425.8	368.4	402.8
- Private Sector	(250.5)	(218.0)	(217.0)	(230.6)	(175.1)	(186.7)
- Public Sector	(457.1)	(429.2)	(193.5)	(195.2)	(193.3)	(216.1)
Change in Stock	-122.0	-308.7	53.6	306.6	464.9	346.4
Net Export of Commodity and Services	94.7	67.0	182.6	-342.9	-488.6	-203.1
Error in Statistics	357.6	130.8	94.6	79.3	-17.6	95.8
Gross Internal Expenditure	4,043.3	3,359.7	3,069.2	2,636.9	2,676.7	3,084.1
Net Income from Overseas Investment	-37.7	-71.9	58.6	32.7	51.6	28.4
Gross National Expenditure	4,005.6	3,287.8	3,127.8	2,669.6	2,728.3	3,112.5
Balance of International Trade	107.7	-0.7	255.1	256.7	276.6	264.1
Gross National Income	4,113.3	3,287.1	3,382.9	2,926.3	3,004.9	3,376.6

Table D.4.6. Whole Sale Price Index in 1352 - 61

(1353 = 100)

	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361
Total Index	79.6	100.0	105.3	119.5	136.9	149.9	179.6	234.3	279.7	318.1
Wheat	62.2	100.0	87.9	89.8	100.1	114.2	160.9	204.7	260.3	284.5
Rice	61.1	100.0	93.3	117.4	131.8	148.5	186.5	286.4	324.8	391.2
Barley	64.7	100.0	98.4	100.9	105.3	119.7	178.9	282.7	349.1	436.4
Maize	-	100.0	97.5	106.1	107.8	109.7	163.5	186.3	190.0	267.8
Red Meat	82.1	100.0	109.8	126.1	152.2	159.2	204.8	328.0	427.5	510.6
Poultry Meat	85.2	100.0	103.9	112.7	115.7	124.1	190.1	256.2	264.9	266.8
Vegetable Edible Oil	92.8	100.0	100.0	100.1	100.2	100.2	100.2	106.6	154.9	171.0
Sugar and Relative Products	96.3	100.0	104.8	105.9	109.1	112.8	118.7	144.6	181.2	252.9
Cotton - before Ginning	94.4	100.0	79.1	118.5	118.1	126.9	148.3	249.0	307.6	339.6

Table D.4.7. Retail Sale Price Index in 1352 - 61

(1353 = 100)

	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361
Total Index	86.6	100.0	109.9	128.1	160.2	174.8	196.3	242.5	297.9	355.2
Various Bread	90.8	100.0	107.9	124.0	153.6	178.6	205.0	231.0	254.8	271.1
Various Rice	66.0	100.0	96.9	112.7	139.3	154.1	195.2	295.7	371.8	431.3
Red Meat	78.2	100.0	106.8	122.1	150.9	164.5	208.3	312.9	422.9	509.0
Poultry Meat	86.5	100.0	101.4	110.6	122.9	140.1	185.5	220.4	232.1	229.0
Edible Oil and Fat	88.9	100.0	101.5	106.1	114.7	119.4	136.7	169.9	204.5	232.7
Sugar and Relative Products	96.4	100.0	98.0	98.1	101.9	107.0	111.1	117.2	118.2	126.4

Table D.4.8 Summary of Budget in 1356 - 1361

(Unit: Billion Rials)

		1356		1357		1358		1359		1360		1361	
	Items	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Income	Petrolium/Gas	1497.8	73.6	1013.2	63.4	1219.7	71.8	888.8	67.0	1056.4	59.7	1689.5	67.5
	Taxes	443.6	21.8	465.9	29.1	368.4	21.7	340.4	25.7	554.1	31.3	613.9	24.5
	Others	92.8	4.6	119.8	7.5	111.5	6.5	96.7	7.3	159.6	9.0	198.5	8.0
	Total	2034.2	100.0	1598.9	100.0	1699.6	100.0	1325.9	100.0	1770.1	100.0	2501.9	100.0
Expenditure	Ordinary Expenses	1248.1	50.1	1387.1	62.8	1552.0	69.7	1727.8	75.2	2032.4	75.1	2293.9	70.1
	Wartime Expenses	---	---	---	---	---	---	---	---	(381.0)	---	(487.4)	---
	Capital Invertment	926.8	37.2	657.1	29.8	635.1	28.4	568.1	24.7	674.7	24.9	943.5	28.8
	Others	317.3	12.7	163.6	7.4	42.8	1.9	2.5	0.1	---	---	36.5	11.1
	Total	2492.2	100.0	2207.8	100.0	2227.9	100.0	2298.4	100.0	2707.1	100.0	3273.9	100.0
	Balance	-458.0		-608.9		-528.3		-972.5		-937.0		-772.0	

D.4.9 Details of Budget in 1352 - 61

(Unit: Billion rials)

	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361
Incomes	464.8	1,394.4	1,582.1	1,836.4	2,034.2	1,598.9	1,699.6	1,325.9	2,770.1	2,501.9
Petrolium and Gas	311.3	1,205.2	1,246.8	1,421.5	1,497.8	1,013.2	1,219.7	888.8	1,056.4[1/]	1,689.5[1/]
Taxes	131.2	157.8	270.8	342.9	443.6	465.9	368.3	340.4	554.1	613.9
Other Incomes	22.3	31.4	64.5	72.0	92.8	119.8	111.6	96.7	159.6	198.5
Monopoly and Gvt. Prop.	(11.1)	(13.6)	(30.8)	(23.3)	(34.9)	(52.0)	(35.8)	(0.1)	(56.2)	(61.2)
Sale of Commodity/Services	(6.6)	(8.9)	(12.3)	(17.4)	(20.0)	(15.5)	(21.9)	(29.2)	(37.0)	(72.0)
Interest/profit from overseas investment	(-)	(2.6)	(11.0)	(18.2)	(20.4)	(21.2)	(25.6)	(25.5)	(11.6)	(9.0)
Miscellaneous Incomes	(4.6)	(6.3)	(10.4)	(13.1)	(17.5)	(31.1)	(28.3)	(41.9)	(54.8)	(56.3)
Payments	532.2	1,511.3	1,775.9	2,006.2	2,492.2	2,207.8	2,227.9	2,298.4	2,707.1	3,273.9
Ordinary Payments	370.2	825.8	969.4	1,083.8	1,248.1	1,387.1	1,552.0	1,727.8	2,032.4	2,293.9
Wartime Expenses	-	-	-	-	-	-	-	-	(381.0)	(417.3)
Capital Investment	161.2	348.7	526.8	591.6	926.8	657.1	633.1	568.1	674.7	943.5
Agriculture	(12.8)	(30.9)	(36.1)	(34.3)	(42.1)	(53.6)	(55.9)	(26.7)	(24.5)	(44.6)
Water Resources[2/]	(10.5)	(17.5)	(22.0)	(27.1)	(38.2)	(25.2)	(18.3)	(19.5)	(21.4)	(18.7)
Others	(137.9)	(300.3)	(468.7)	(530.2)	(846.5)	(578.3)	(558.9)	(521.9)	(628.8)	(880.2)
Rehabilitation of war damaged regions	-	-	-	-	-	-	-	-	-	(70.1)
Loan/Investment at Overseas	0.8	159.4	165.6	95.7	74.3	38.0	6.0	2.4	-	1.1
Unrefundable Aid	-	1.8	2.0	3.3	3.2	1.1	1.0	0.1	-	-
Advance Payment/Special Fund	-	175.6	112.1	231.8	239.8	124.5	35.8	-	-	35.4
Balance	-67.4	-116.9	-193.8	-169.8	-458.0	-608.9	-528.3	-972.5	-937.0	-772.0
Source to fill deficit/Payment of surplus	67.4	116.9	193.8	169.8	458.0	608.9	528.3	972.5	937.0	772.0
Internal Loan	94.3	30.0	10.0	-	350.0	250.0	350.0	688.6	779.1	567.2
Loan from Abroad	15.7	9.5	6.1	25.4	29.4	0.8	2.4	-	-	-
Refundment, Advance, etc.	-	77.4	177.7	144.4	126.6	257.7	31.2	263.2	169.8	195.1
Refundment from Abroad	-	-	-	-	-	100.4	92.2	22.8	51.3	15.8
Transfer to next year	-42.6	-	-	-	-48.0	-	52.5	-2.1	-63.2	-6.1

Notes: 1/ ..... Including the Deposit of 118.5 billion in 1360 and 126 billion rials in 1361.
2/ ..... Excluding Domestic Water Supply, Hydro-power and Sewage.

D.4.10 Governmental Subsidy to Agriculture and Food

Organization	Commodity	1357	1358	1359	1360	1361
Meat Organization	Red Meat	10,100	17,500	-	-	-
Iran Milk Company	Milk	2,654	3,915	3,250	3,416	3,600
Sugar Organization	Sugar	4,400	23,313	12,000	18,700	6,000
Grain Organization	Wheat, etc.	5,521	15,185	3,732	24,000	37,000
Governmental Trade	Edible Oil Poultry/Egg Cement	14,826	11,770	3,780	8,561	10,372
Central Organization of Rural Cooperative	Transport of Onion, Potato & Dates	119	-	-	-	660
Provincial Trade	Poultry/Egg	-	-	-	-	6,574
Tea Organization		-	-	-	-	500
Rangeland Develop. Fund		2,500	-	-	7,000	-
Total		40,120	71,683	22,762	60,677	64,706

Table D.4.11 Summary of International Trade Balance in 1356 - 60

(Unit: Billion Rials)

Commodity		1356		1357		1358		1359		1360	
		Amount	Ratio	Amount	Ratio	Amount	Ratio	Amount	Ratio	Amount	Ratio
Food & Grain	Import	106.9	89.8	72.8	89.7	107.1	90.8	108.1	94.4	168.7	96.3
	Export	12.2	10.2	8.4	10.3	10.8	9.2	6.4	5.6	6.5	3.7
Beverage/Tabacco	Import	9.3		8.3		3.7		3.3		7.0	
	Export										
Non-food Material except Fuel	Import	31.7	65.4	22.4	62.7	23.2	64.1	47.3	85.7	53.5	87.4
	Export	16.8	34.6	13.3	37.3	13.0	35.9	7.9	14.3	7.7	12.6
Fuel/Mineral	Import	3.0		1.8		1.3		6.3		17.2	
	Export	629.2		191.3		36.5		48.7		----	
Animal/Vegetable Oil & Fat	Import	13.1	99.9	10.8	99.9	18.9	99.9	8.1	99.9	23.5	99.9
	Export		0.1		0		0		0		0
Chemical Materials	Import	73.2		60.4		81.6		112.8		176.8	
	Export	2.4		5.8		0.6		0.1			
Products Classified by Material	Import	296.6		203.9		200.6		235.4		320.8	
	Export	7.9		7.5		30.0		30.8		12.3	
Machinery/Transport Equipment	Import	451.5		320.4		210.9		218.5		282.6	
	Export	2.9		2.2		1.5		0.2			
Others	Import	48.8		31.6		37.1		36.9		31.8	
	Export	1.9		0.9		1.1		0.5		0.4	
Total	Import	1034.2	60.6	732.4	88.0	684.5	88.0	776.8	94.6	1082.0	
	Export	673.2	39.4	229.5	12.0	93.6	12.0	94.7	5.4	----	

D.4.12 Self Sufficient Supply Rate of Main Foodstuff in 1977 - 84

(Unit: 1,000[t])

		1977	1978	1979	1980	1981	1982	1983	1984	Average of 8 yrs.
Wheat										
Production		5,517	5,700	5,500	5,700	6,518	6,600	5,956	5,500	
Import		1,238	1,210	1,200	1,341	1,620	1,770	2,688	3,489	
Total		6,755	6,910	6,700	7,041	8,138	8,370	8,644	8,989	
Supply/Caput	(kg)	205.4	192.8	181.2	184.7	206.9	206.4	203.4	205.2	
Consumption/Caput	(kg)	190.4	193.1	195.8	198.5	201.1	203.8	206.5	209.2	
Total Consumption		6,262	6,919	7,239	7,568	7,908	8,264	8,777	9,163	
Self Supply Rate	(%)	88	82	76	75	82	80	68	60	76
Rice										
Production		1,400	1,280	1,400	1,212	1,500	1,605	1,216	1,230	
Import		600	367	440	402	587	432	622	710	
Total		2,000	1,647	1,840	1,614	2,087	2,037	1,838	1,940	
Supply/Caput	(kg)	60.8	46.0	49.8	42.3	53.1	50.2	43.2	44.3	
Consumption/Caput	(kg)	45.0	46.0	47.1	48.1	49.2	50.2	51.3	52.3	
Total Consumption		1,480	1,648	1,741	1,834	1,935	2,036	2,180	2,291	
Self Supply Rate	(%)	95	78	80	66	78	79	56	54	73
Pulse										
Production		119	84	128	164	96	194	160	157	
Import		10	15	13	3	18	15	33	28	
Total		129	99	142	167	114	209	193	185	
Supply/Caput	(kg)	3.9	2.8	3.8	4.4	2.9	5.2	4.5	4.2	
Consumption/Caput	(kg)	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	
Total Consumption		115	133	144	156	169	182	200	215	
Self Supply Rate	(%)	103	63	89	105	57	107	80	73	85
Beef										
Production		160	160	162	171	181	170	165	165	
Import		30	28	21	60	46	53	119	125	
Total		190	188	183	231	227	223	284	290	
Supply/Caput	(kg)	5.8	5.2	4.9	6.1	5.8	5.5	6.7	6.6	
Consumption/Caput	(kg)	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	
Total Consumption		171	193	207	221	236	251	272	289	
Self Supply Rate	(%)	94	83	78	77	77	68	61	57	74
Mutton										
Production		220	277	274	277	270	270	275	275	
Import		80	50	55	110	125	162	114	130	
Total		300	327	329	387	395	432	389	405	
Supply/Caput	(kg)	9.1	9.1	8.9	10.2	10.0	10.7	9.2	9.2	
Consumption/Caput	(kg)	9.3	9.4	9.5	9.7	9.8	9.9	10.0	10.2	
Total Consumption		306	337	351	370	385	401	425	447	
Self Supply Rate	(%)	72	82	78	75	70	67	65	62	71
Poultry Meat										
Production		189	208	211	211	213	215	230	235	
Import		25	15	5	6	66	39	43	42	
Total		214	223	216	217	279	254	273	277	
Supply/Caput	(kg)	6.5	6.2	5.8	5.7	7.1	6.3	6.4	6.3	
Consumption/Caput	(kg)	6.2	6.2	6.3	6.3	6.4	6.4	6.5	6.5	
Total Consumption		204	222	233	240	252	260	276	285	
Self Supply Rate	(%)	93	94	91	88	85	83	83	82	87
Butter										
Production		58	66	66	67	69	68	70	70	
Import		26	26	49	38	66	43	67	59	
Total		84	92	115	105	135	111	137	129	
Supply/Caput	(kg)	2.6	2.6	3.1	2.8	3.4	2.7	3.2	2.9	
Consumption/Caput	(kg)	2.8	2.8	2.9	2.9	3.0	3.0	3.1	3.1	
Total Consumption		92	100	107	111	118	122	132	136	
Self Supply Rate	(%)	63	66	62	60	58	56	53	51	59
Cheese										
Production		89	98	98	99	102	102	104	104	
Import		34	40	46	62	78	68	92	120	
Total		123	138	144	161	180	170	196	224	
Supply/Caput	(kg)	3.7	3.9	3.9	4.2	4.6	4.2	4.6	5.1	
Consumption/Caput	(kg)	3.7	3.9	3.9	4.2	4.2	4.5	4.5	4.8	
Total Consumption		122	140	144	160	165	182	191	210	
Self Supply Rate	(%)	73	70	68	62	62	56	54	50	62
Population (1,000)		32,891	35,831	36,971	38,126	39,326	40,549	42,503	43,799	

Notes: (1) Production and Population are quoted from FAO Production yearbook.
(2) Import is quoted from FAO Trade yearbook. No export is recorded in the period of 1977 - 84.
(3) Consumption/Caput is mainly computed as trend of consumption.

APPENDIX D. 5.

RURAL ECONOMY

LIST OF TABLES

Table D.5.1 Rural/Urban Home Budget Comparison

(Unit: Rials/annum)

Region	Year	1356		1358		1362	
		Rural	Urban	Rural	Urban	Rural	Urban
Country Average	Income	166,208	448,729	213,285	514,446	471,927	918,386
	Expense	207,196	438,209	288,437	532,024	611,681	1113,116
Mazandaran	Income	219,978	378,413	270,208	478,142	582,359	814,144
	Expense	206,193	434,671	308,486	557,180	721,993	951,399
Gilan	Income	181,294	399,895	246,189	440,252	578,503	863,182
	Expense	264,583	463,841	410,127	482,164	741,168	997,873
East Azarbaijan	Income	198,221	377,681	251,771	440,747	520,383	795,086
	Expense	267,034	386,875	466,031	471,577	700,445	946,063
Khozestan	Income	191,265	441,771	273,549	666,726	577,468	937,582
	Expense	210,409	484,554	280,100	585,014	735,100	1238,426
Fars	Income	145,143	358,825	192,375	468,747	490,115	876,185
	Expense	181,226	398,979	227,758	462,603	547,485	805,790
Esfahan	Income	185,789	349,533	275,999	424,539	490,481	842,938
	Expense	195,550	357,711	312,452	413,025	608,206	1019,797
Khorassan	Income	107,011	304,074	144,974	388,325	358,714	741,401
	Expense	139,822	279,911	212,994	416,509	490,724	888,785

D.5.2 Record of Rural Cooperatives and Unions

		1352	1353	1354	1355	1356	1357	1358	1359	1360	1361
No. of Rural Cooperatives		2,717	2,847	2,858	2,886	2,925	2,942	2,964	2,989	3,032	3,058
No. of Member	(1,000 person)	2,263	2,488	2,685	2,868	2,984	3,022	3,135	3,275	3,405	3,616
Capital	(million rials)	3,857	4,678	5,690	6,962	8,385	9,353	9,941	10,344	13,102	17,351
Paid Loan	(million rials)	12,372	19,744	24,723	28,326	30,100	30,216	37,595	44,791	51,820	55,965
Average Member/Cooperative		833	874	939	994	1,020	1,027	1,058	1,096	1,123	1,182
Average Capital/Cooperative[1/]		1,420	1,643	1,991	2,412	2,867	3,179	3,354	3,461	4,321	5,674
Average Loan/Cooperative[1/]		4,554	6,935	8,650	9,815	10,291	10,271	12,684	14,985	17,091	18,301
No. of Union		131	139	144	150	153	153	155	158	160	163
No. of Member Cooperatives		2,704	2,790	2,840	2,870	2,907	2,922	2,947	2,944	2,989	3,039
Capital	(million rials)	2,031	2,416	2,883	3,220	3,665	4,010	4,107	4,406	4,368	5,278
Product Procured by Union[2/]		-	1,686	2,891	7,563	12,201	10,675	17,259	9,054	60,048	43,475
Provided Fertilizer	(1,000 ton)	530	169	173	171	213	177	269	386	653	1,169
Provided Chemicals	(ton)	3,039	70	582	1,137	1,811	810	847	1,846	5,432	8,449
Improved seeds	(1,000 ton)	111	50	16	21	32	22	11	13	10	9
No. of storage built by Coop.		-	99	22	5	14	22	11	12	37	17
Capacity of storage	(ton)	-	-	1,000	2,000	9,000	40,000	20,000	35,000	19,000	21,000
No. of storage built by Union		-	45	12	17	24	20	24	43	8	12
Capacity of Storage	(ton)	-	-	14,000	39,000	49,000	10,000	19,000	37,000	5,000	19,000
Provided Agri-machinery		5,301	742	1,334	2,720	1,587	170	346	-	-	-
Activity in Crop Increase Plan											
No. of Participant Coop.		-	-	-	1,145	1,400	1,161	563	365	424	224
No. of Member	(1,000 person)	-	-	-	186	225	195	153	85	74	37
Cultivated Area	(1,000 ha)	-	-	-	516	719	671	381	241	217	166
Seeds distributed	(1,000 ton)	-	-	-	20	29	20	12	11	12	10
Fertilizer distrib.	(1,000 ton)	-	-	-	115	152	122	69	51	47	41

Notes: 1/ ..... 1,000 rials

2/ ..... million rials

D.5.3 Distribution of Agri-machinery and Inputs through Cooperatives

	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361
Tractor	4,781	7,564	9,038	7,458	11,636	7,654	12,434	13,994	14,727	28,940
Disc Harrow	3,499	5,837	7,057	5,831	9,750	6,455	6,121	5,256	13,369	15,145
Sprayer	154	257	1,401	108	186	184	656	475	702	65
Trailer	820	321		1,677	2,947	2,210	2,876	2,381	399	2
Tiller	719	3,525	4,296	2,180	3,944	1,164	217	-	2,000	5,000
Disc	1,258	1,829	1,603	1,088	1,699	1,232	2,390	3,522	3,944	791
Combine	-	-	-	15	30	19	30	142	320	15
Total Distribution	11,231	19,333	25,396	18,357	30,192	18,918	24,724	25,770	35,461	49,958
Distributed by Cooperatives	5,301	742	1,334	2,720	1,587	170	346	-	-	-
Share of Cooperative (%)	47.2	3.8	5.3	14.8	5.3	0.9	1.4	-	-	-
Chemical Fertilizer (1,000 ton)										
Imported	87	180	333	71	339	197	540	875	1,246	1,592
Internal production	408	414	424	406	419	259	318	234	65	60
Distributed	494	615	596	630	774	581	900	1,096	1,280	1,641
Distributed by Cooperatives	530	169	173	171	213	177	269	386	653	1,169
Share of Cooperative (%)	107.2	27.5	29.0	27.1	27.5	30.5	29.9	35.2	51.0	71.2

D.5.4 Loan Supply by Agriculture Bank

(Unit: Million rials)

	1358	1359		1360		1361	
	Amount	No.	Amount	No.	Amount	No.	Amount
Allocation of Payment							
Rural Tribal Cooperative		3,655	49,155	2,706	54,230	2,852	59,004
Consumer's Cooperative		1	5	-	-	-	-
Agriculture Loan		561,821	64,426	609,289	85,844	624,207	120,043
Administrated Account		7,377	2,600	22,115	6,052	113	201
Credit at Ordinary Account		121	197	140	2,250	76	4,673
Others (1)		-	4,959	-	1,262	1,075	933
Total		573,075	121,342	634,250	149,638	628,323	184,854
Use of Paid Loan							
Agricultural purpose	44,014		61,272		73,954		88,053
Irrigation	5,809		10,715		14,321		13,586
Orchard/Nursery	5,617		7,211		8,423		10,563
Livestock Farming	13,442		21,974		30,021		41,696
Building/Rural Facilities	2,335		3,033		4,346		11,660
Agri-machinery Procurement	5,503		5,577		5,870		10,467
Carpet Weaving/Rural Industries	2,008		1,898		3,358		5,677
Other purpose	3,009		4,702		8,085		2,153
Ex-Agri. Develop. Bank Payment	14,742		7,147		1,262		479
Total	96,479		123,529		149,640		184,334

Note: (1) Payment as ex-Agricultural Development Banks Credit.

Table D.5.5 Loan Supply by Agricultures Bank in Project Area by Rural Cooperatives (1)

(Unit : Million rials)

Name of Cooperative	1356	1357	1358	1359	1360	1361	1362	1363	1364
Vahadat	12.0	12.5	15.0	47.0	75.0	17.8	100.0	50.0	47.0
Payam	18.0	19.0	10.0	50.0	44.0	17.8	85.0	42.0	40.0
Taliksar	27.0	35.0	61.0	95.0	50.0	26.7	80.0	40.0	40.0
Hendu Kola	10.0	11.0	23.6	40.0	60.0	80.0	80.0	40.0	40.0
Aghuzbon	14.0	15.0	2.7	30.0	53.0	80.0	80.0	37.0	41.0
Pishru	28.0	30.0	11.0	90.0	135.0	-	120.0	60.0	60.0
Omid	14.0	16.0	6.0	41.0	68.0	72.3	-	57.0	-
Mehr	11.0	12.0	3.5	26.0	8.0	-	60.0	30.0	30.0
Golestan	11.0	12.0	7.1	34.0	45.0	11.8	65.0	33.0	31.0
Taher	14.0	15.0	18.0	40.0	75.0	17.8	60.0	24.0	20.0
Resalat	25.0	24.5	11.5	40.0	52.5	23.7	117.0	50.0	50.0
Bahman	10.0	13.5	5.2	37.0	55.0	13.3	48.0	25.0	25.0
Nimae Amol	14.344	16.5	4.0	-	77.0	19.0	120.0	60.0	55.0
Aresh	17.0	11.0	23.0	68.2	97.0	23.7	100.0	50.0	50.0
Valiasr	19.0	20.0	-	67.5	85.0	19.3	80.0	25.0	21.0
Esfand Amol	14.0	15.0	11.0	40.0	64.0	14.8	55.0	20.0	23.0
Tohid	-	27.0	11.2	71.0	81.5	20.7	80.0	50.0	50.0
Ettehad	18.0	20.956	17.5	81.0	110.0	32.6	128.0	65.0	60.0
Haghighat	15.0	17.0	8.5	50.0	85.0	19.3	61.0	30.5	33.0
Azadi	26.0	26.0	5.0	52.0	-	16.3	66.0	23.5	30.0
Momtaz	10.0	13.0	8.0	35.0	52.0	12.0	43.6	22.0	22.0
Dabu	28.0	29.0	15.0	90.0	130.0	32.6	130.0	-	-
Etemad	20.0	21.0	28.0	53.0	100.0	23.7	106.0	-	40.0
Dehferi	23.0	24.0	11.0	69.0	95.0	-	90.0	-	30.0
Molla Kola	23.4	27.0	10.0	-	80.0	32.6	120.0	-	43.0
Total of Amol Area	421.744	482.956	326.8	1,246.7	1,777.0	627.8	2,074.6	834.0	881.0

Table D.5.5 Loan Supply by Agriculture Bank in Rural Cooperatives(2)

(Unit : Million rials)

Name of Cooperative	1356	1357	1358	1359	1360	1361	1362	1363	1364
Pol Ansari	-	-	-	120.0	150.0	98.0	107.0	-	87.0
Andeesheh	20.0	-	86.0	65.914	17.0	58.0	67.0	55.0	-
Amir Kola	24.0	-	132.0	-	138.0	80.0	95.0	-	75.0
Azadi	30.0	-	45.0	93.0	120.0	102.8	166.5	-	-
Pishrou	28.5	12.0	139.0	96.0	40.0	122.89	140.0	-	-
Hadaf	22.0	-	110.0	120.0	90.0	77.0	-	75.0	-
Hafez	-	18.0	-	-	-	59.9	-	49.0	-
Rud Posht	18.0	-	18.0	122.5	100.0	94.1	105.0	92.0	-
Khazar	8.0	-	10.0	28.5	100.0	66.8	-	52.0	-
Total of Babol Area	150.5	30.0	510.0	645.914	755.0	759.49	680.5	323.0	162.0

Table D.5.6 Record of Ghaemshahr Cooperative Rice Mill

Year	Variety	(1) Paddy (kg)	Price Rls/kg	(2) Whitened Rice (kg)	(3) Broken Rice (kg)	(4) Bran (kg)	(5) (2) + (3)	5/1 ratio	2/1 ratio	3/1 ratio	4/1 ratio	3/5
1355	Tarom	711,617	30.11	377,990	59,877	98,629	437,867	61.5%	53.1%	8.4%	13.9%	13.7
	Mesbah	293,696	28	172,496	30,000	60,500	202,496	68.9	58.7	10.2	22.6	14.8
1356	Amol-1	97,199	24.90	51,353	11,163	11,193	62,516	64.3	52.8	11.5	11.5	17.9
1357	Tarom	35,258	44	21,131	4,863	4,223	25,994	73.7	59.9	13.8	12.0	18.7
1358	Tarom	749,225	52	489,000	77,581	86,103	566,581	75.6	65.3	10.4	11.5	13.7
1359	Tarom	34,736	102.5	20,989	2,613	3,654	23,602	67.9	60.4	7.5	10.5	11.1
1360	Tarom	5,540,263	97	3,407,395	357,461	698,362	3,764,856	68.0	61.5	6.5	12.6	9.5
	Mesbah	87,872	83	52,723	4,398	9,664	57,121	65.0	60.0	5.0	11.0	7.7
	Shastres	69,685	64	42,506	5,638	8,712	46,144	66.2	61.0	5.2	12.5	7.9
	Gerdi	2,623	54	1,704	257	615	1,961	74.8	65.0	9.8	23.4	13.1
1361	Amol-2, 3	27,044	78	15,150	2,690	3,620	17,840	66.0	56.0	9.9	13.4	15.1
	Gerdi	5,204	57	3,815	60	400	3,875	74.5	73.3	1.2	7.7	1.5
1362	Tarom	1,645,366	129	823,500	374,190	238,595	1,197,690	72.8	50.0	22.7	14.5	31.2
	Amol-3	7,724,221	100.85	3,133,663.5	1,665,584	1,120,081	4,799,247.5	62.1	40.6	21.6	14.5	21.6
1363	Amol-3	1,467,645	97.889	715,115	261,430	203,080	976,545	66.5	48.7	17.8	13.8	26.8
	Tarom	8,716,465		5,140,005	876,585	1,129,564	6,016,590	69.0	59.0	10.1	13.0	14.6
	Mesbah	381,568		225,219	34,398	76,164	259,617	68.0	59.0	9.0	20.0	13.2
	Gerdi	7,827		5,519	517	1,015	5,856	74.5	70.5	4.1	13.0	5.4
	Amol-2, 3	9,218,910		3,863,928.5	1,929,704	1,326,781	5,793,632.5	62.8	41.9	20.9	14.4	33.3
	Amol - 1	97,199		51,353	11,163	11,193	62,516	64.3	52.8	11.5	11.5	17.9
	Shastres	69,685		42,506	5,638	8,712	46,144	66.2	61.0	5.2	12.5	7.9
		18,491,652		9,528,530.5	2,855,805	2,553,429	12,184,335.5	65.9	50.4	15.4	13.8	23.4

Table D.5.7 Record of Issuance of Permit for Rice Mill in Amol and Babol Shahrestan in 1355-64

		1355	1356	1357	1358	1359	1360	1361	1362	1363	1364
Amol	Basic Approval	-	-	-	-	1	1	2	8	1	18
	Establishing Permit	3	2	3	14	6	4	1	2	5	4
	Operation Permit	-	1	-	-	-	2	5	5	39	5
	Total	3	3	3	14	7	7	8	15	45	27
Babol	Basic Approval	-	-	-	-	-	4	2	7	4	9
	Establishing Permit	8	15	12	14	19	16	1	4	7	-
	Operation Permit	-	1	3	-	1	3	13	16	44	6
	Total	8	16	15	14	20	23	16	27	55	15

Note: In same period, following permit have been issued for other industrial activities ;

	Amol	Babol
Iron Works	105	186
Non-iron Metal Work	56	125
Wearing	21	17
Chemical	14	30
Fiber	102	146
Total	298	504

Table D.5.8 Record of Issuance of Permit for Establishing Factories in Mazandaran in 1363

Foodstaff Industries	Basically Accepted				Permit for Establishment					Permit for Operation				
	No. of Licence	Employable Worker	Investable Capital Fixed	Movable	No. of Licen.	Worker	Capital Fixed	Movable	Land changed for industries	No. of licen.	Worker	Capital Fixed	Movable	Land changed for industries
AMOL	4	165	364.2 10^6	179.8 10^6	3	11	19.9 10^6	44	284,350 m^2	12	169	292.8 10^5	112.9 10^5	49,312 m^2
BABOL	10	105	368.4	588.4	5	73	76	347	18,800	10	112	103.1	41.9	54,091
BANDAR TORKMAN	2	9	21.7	0.7	3	26	72.6	45.4	-	3	35	42.1	111.5	10,890
BEHSHAHR	4	53	78.2	8.7	6	58	92.3	12.9	17,150	5	83	161	50.3	39,683
TONEKABON	5	80	50.6	48.9	3	285	112.7	39	35,700	2	48	13	11.8	30.666
RAMSAR	-	-	-	-	-	-	-	-	-	2	56	21.5	5	670
SARI	5	46	134.3	50.8	5	678	403.5	217.9	18,557	10	274	432.5	149.5	67,396
SAVADKUHI	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ALIABAD	1	8	5.3	1.5	1	13	15	6	8,000	2	15	18.4	9.1	5,820
GHAEM SHAHR	4	37	70.2	26.1	3	26	90.2	7.8	16,700	10	71	136.1	77.1	25,857
KORDKUHI	-	-	-	-	5	139	209.1	186.6	45,500	1	5	12.8	5	2,740
GORGAN	5	69	470	6.9	9	166	87	64.7	40,752	10	403	671.3	718.4	89,083
GONBAD	4	103	202	122.3	7	32	54.8	20.3	6,390	8	170	287.3	203	48,341
NUR	3	19	46.2	5.4	1	15	4.8	8.3	1,000	2	2	4.1	3.3	500
NOSHAHR	6	86	627.9	57.8	5	34	75.1	41	21,280	2	56	66.5	79.7	10,700
Rice Milling														
AMOL	8	27	57.8	6.2	17	52	60.4 10^5	14.2	3,350 m^2	53	149	546.3 10^5	38.2 10^6	75,657
BABOL	8	21	62.7	5.1	78	177	309.9	43.6	23,005	97	203	544.2	48.9	106,104
BANDAR TORKMAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BEHSHAHR	4	10	24.2	1.6	4	6	10.7	1	1,600	12	20	32	2.9	5,550
TONEKABON	5	9	22.4	1.6	19	34	57.4	8.6	2,607	22	43	72.9	11.2	13,614
RAMSAR	-	-	-	-	-	-	-	-	-	1	2	2.6	0.5	100
SARI	10	24	43.6	5.5	31	57	71.2	7	4,083	53	73	156.4	18.6	33,670
SAVADKUHI	1	2	5.3	0.5	-	-	-	-	-	5	6	8.5	1.3	1,820
ALIABAD	1	3	6.5	0.5	3	6	5.1	1.2	1,650	5	9	8.8	1.4	5,360
GHAEM SHAHR	6	15	37	3.2	14	47	44.2	8.5	750	22	36	72.4	9.9	14,375
KORD KUHI	2	5	12.5	1	4	16	21.2	5.1	-	6	11	24.1	5.3	6,900
GORGAN	2	6	11.9	0.9	2	4	5.8	0.4	1,000	6	10	10	0.4	11,960
GONBAD	3	7	14.5	0.7	13	19	29.7	5.5	2,868	5	8	9	1.5	3,680
NUR	3	10	22.2	1	9	26	44.5	6.5	4,950	9	15	45.1	4.7	7,600
NOSHAHR	5	9	39.5	6.5	10	27	30.9	7.7	-	19	34	89.8	8.1	12,010

D.5.9 Summary of Agri-Business in Project Area

Name of Company	Place	Area-ha	Agreeed Credit	Paid Amount	Purpose of Establish
Ujak	Amol	360	55,495	31,600	Rice production
Takhat Shirin	Amol	50	8,040	5,170	- ditto -
Mazandaran Milk & Meat	Amol	1,800	598,388	146,000	Cow/Fodder Crop
Namdar Kola Asbshurpei(1)	Babol	7	1,000	950	Rice production
Atayar (1)	Amol	54	7,627	6,827	Rice and Soya Bean
(Surrounding Area)					
Aghuz	Babol		23,185	14,260	Cow Breeding
Ashkar Bisheh	Babol		22,015	12,965	- ditto -
Azda	Babol		5,665	2,017	Rice production
Soya	Nur		103,365	21,100	Cow Breeding
Kharman (1)	Nur		8,288	6,300	Rice and Soya Bean

Notes: (1) Loan supplied by Khazar Development Bank. Others were supplied by Agricultural Development Bank.

(2) Loan consists of Long Term (8 - 10 years), Short Team (less than 3 years), and subsidy (partly or whole). Subsidy was given to land consolidation and infrastructural facilities. In case of Livestock Farming, the cost of seed OX was also subject to loan supply.

(3) In case of Agri-business in Caspian Sea Coastal Area, cultivation of poplar was obliged as material of paper mill.

(4) Above projects had been implemented in 1975 - 78.

APPENDIX D. 6.

RURAL INFRASTRUCTURES

LIST OF EXHIBIT

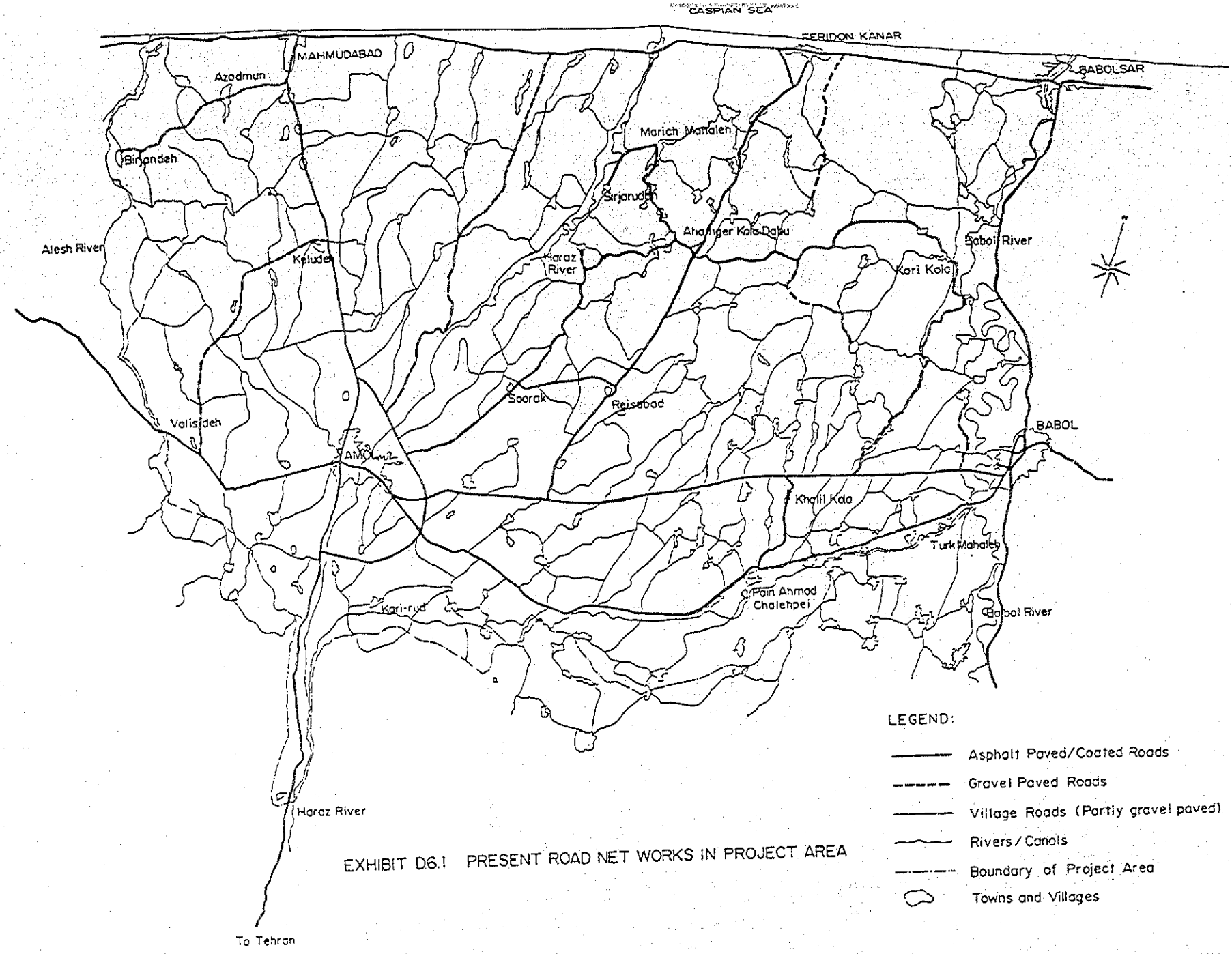


EXHIBIT D6.1 PRESENT ROAD NET WORKS IN PROJECT AREA

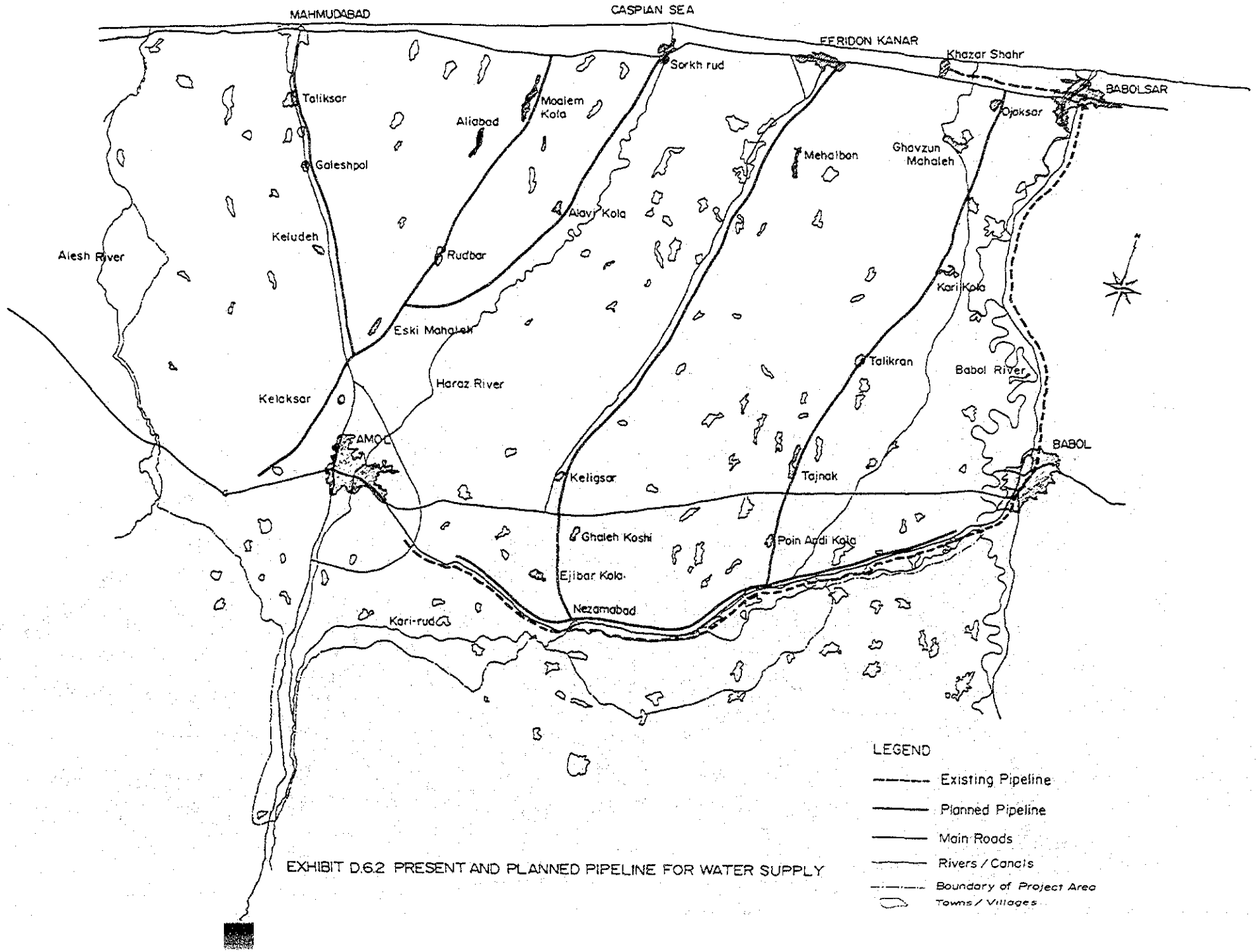


EXHIBIT D.6.2 PRESENT AND PLANNED PIPELINE FOR WATER SUPPLY

APPENDIX E

PROJECT PLANNING

APPENDIX E. 1.

DESIGN

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E.1.1. Irrigation

E.1.1.1 Irrigation Canal Capacity

Irrigation canal capacity is to be capable to convey peak water duty during irrigation period. Though maximum monthly water demand of 215 MCM appears in June as shown in Table B.1.7 Appendix B.1, peak water duty, however, comes at the end of paddling work in late May. Peak water duty varies by the time to complete paddling work. Paddling work is shorter at the terminal level and one month in the whole project area.

(1) Canal Capacity at the Terminal Canal Level

At the terminal level, paddling is expected to be completed for 3 days in a field lot and 10 days in a farm block respectively. Therefore, irrigation duty is estimated at 2.9 ℓ/sec/ha for the terminal canals.

$$Itm = 10 \times (\frac{1}{10} \cdot LP + \frac{9}{10} \cdot In) / (86400 \text{ sec/day} \times Ea)$$

$$= 10 \times (\frac{1}{10} \times 150 \text{mm/day} + \frac{9}{10} \times 6.84 \text{mm/day}) / (86400 \times 0.85)$$

$$= 0.0029 \text{ m}^3/\text{sec/ha} = 2.9 \text{ ℓ/sec/ha}$$

where,

Itm : irrigation duty at the terminal canal level (ℓ/sec/ha)

Lp : paddling water (mm/day)

In : crop water requirement (mm/day)

In = ETo x Kc + P = 4.4 mm/day x 1.1 + 2.0 mm/day
= 6.84 mm/day

Ea : field application efficiency (0.85 to be applied)

(2) Canal Capacity at the Tertiary Canal Level

At the tertiary canal level, paddling is expected to be completed for 15 days. Irrigation duty is at 2.5 ℓ/sec/ha.

$$Itc = 10 \times \left(\frac{1}{15} \cdot Lp + \frac{14}{15} \cdot In\right) / (86400 \text{ sec/day} \times Ea \times Ec2)$$

$$= 10 \times \left(\frac{1}{15} \times 150\text{mm/day} + \frac{14}{15} \times 6.84\text{mm/day}\right) / (86400 \times 0.85 \times 0.90)$$

$$= 0.0025 \text{ m}^3\text{/sec/ha} = 2.5 \text{ ℓ/sec/ha}$$

where,

Itc : irrigation duty at the tertiary canal level

Ec_2 : conveyance efficiency for the tertiary canals

(3) Canal Capacity at the Secondary Canal Level

At the secondary canal level, paddling is expected to be completed for 30 days in the whole project area. In this case, field application efficiency (Ea) is estimated at 0.90 by the effect of return flow as mentioned in B.1.2. vii), Appendix B.1. Therefore, irrigation duty is at 2.0 ℓ/sec/ha.

$$Isc = 10 \times \left(\frac{1}{30} \cdot Lc + \frac{29}{30} \cdot In\right) / (86400 \text{ sec/day} \times Ea \times Ec2 \times Ec1)$$

$$= 10 \times \left(\frac{1}{30} \times 150\text{mm/day} + \frac{29}{30} \times 6.84\text{mm/day}\right) / (86400 \times 0.90 \times 0.90 \times 0.85)$$

$$= 0.0020 \text{ m}^3\text{/sec/ha} = 2.0 \text{ ℓ/sec/ha}$$

where,

Isc : irrigation duty at the secondary canal level

Ec_1 : conveyance efficiency for the secondary canals

E.1.1.2 Improvement of Irrigation Facilities

As mentioned in Section 5.2.3 of the main report, following facilities have to be improved or newly installed;

(1) Settling basins

Settling basins will be newly installed for mitigating sedimentations in the canal at the heads of the Kari Rud, the Zan-e-Mard and the Sag Rud. Other canals have not suitable sites for installing the settling basins.

Above three settling basins will be constructed at the right bank of the Haraz river and sedimentations will be flushed away by gravity from the settling basins to the Haraz river.

Table E.1.1 Proposed Settling Basins

Proposed Canal	Assumed Canal Capacity cms	Size of Basin	Drawings
Kari Rud	40	$131.6^{m} \times 126^{m} = 16,600^{m2}$	Exhibit B.1.1
Zan-e-Mard	3.5	34 x 71 = 2,400	Exhibit B.1.2
Sag Rud	1.5		-

(2) Intakes

All intakes to the secondary irrigation canals will be improved and replaced by the gate-controlled intakes with measuring devices for accurate and proper water distribution.

Parshall flume is the most practical and suitable device for measuring the flow, and the mirab can adjust the flow to necessary amount by controlling the intake gate in accordance with the flow measured by the parshall flume which will be installed at just downstream from each intake.

Table E.1.2 Proposed Intakes

Command Area	Proposed Number of Intakes	Assumed Typical Capacity cms	Drawings
Haraz Left Bank	11 intakes	4.0	-
Haraz Right Bank	11 intakes	2.0	Exhibit E.1.3
Kari Rud	40 intakes	2.0 (10 intakes)	Exhibit E.1.3
		1.0 (30 intakes)	Exhibit E.1.4

In the Kari Rud command area, smaller secondary irrigation canals will be unified, and present 72 intakes will be unified into 40 intakes.

(3) Division Works

All division works in the irrigation system will be improved and replaced by the permanent ones with measuring devices for accurate and proper water distribution. Division works are classified into three categories by their locations, namely division works from the secondary canal to the tertiary canal, from the tertiary canal to the smaller tertiary canal and from the tertiary canal to the terminal block. In this study, these are named the secondary division works, the tertiary division works and the terminal division works respectively.

Gate-controlled division works will be installed for secondary division works in the low land, the tertiary division works and the terminal division works. The gate-controlled division works needs a parshall flume as a measuring device.

Jet flow division works will be installed for secondary division works in the high and middle lands, since canal gradient is sufficiently steep to install the jet flow division works in these lands. Since the jet flow division works functions as a measuring device itself, it needs no parshall flume.

Proposed division works are summarized as shown in the table below;

Table E.1.3 Proposed Division Works

Division Works	Type	Proposed Number of Division Works: Haraz Left	Haraz Right	Kari Rud	Total	Drawings
Secondary Division Works						
High Land	Jet Flow	25	15	40	80	Exhibit E.1.5
Middle Land	"	30	15	50	95	Exhibit E.1.5
Low Land	Gate-controlled	25	15	25	65	Exhibit E.1.6 Exhibit E.1.7
Total		80	45	115	240	
Tertiary Division Works						
High Land	Gate-controlled	100	45	120	265	Exhibit E.1.6 Exhibit E.1.7
Middle Land	"	90	45	100	235	"
Low Land	"	75	45	100	220	"
Total		265	135	320	720	
Terminal Division Works						
High Land	Gate-controlled	140	100	165	405	Exhibit E.1.6 Exhibit E.1.7
Middle Land	"	130	70	180	380	"
Low Land	"	85	40	75	200	"
Total		355	210	420	985	

(4) Rehabilitation of Canals

Though the irrigation canals are annually maintained removing sedimentations and grasses by farmers, some of canals have problems on canal capacity particularly in the middle land and in a part of the low land. Rehabilitation will be necessary to the canals of 134 km equivalent to 10% of canals in the said lands.

Table E.1.4 Proposed Canal Rehabilitation

(Unit: km)

Sub-area	Haraz Left	Haraz Right	Kari Rud	Total
High Land	-	-	-	-
Middle Land	26	19	56	101
Low Land	33	-	-	33
Total	59	19	56	134

(5) Rehabilitation of Abbandans

Most of abbandans are not operated effectively as farm pond at present. Many of them can supply irrigation water to less area than their reservoir area because of shallow water depth and low water level comparing with their service area. The shallow water depth is due to insufficient maintenance against sedimentations and vegetations, but the low water level is because of lack of engineering consideration.

For effective use of the existing abbandans, the rehabilitation plan shall be studied from the following 3 points of view;

1) Function of regulation of irrigation water, especially to the peak demand at puddling works and late period of irrigation,

2) Function of regulation of drainage water as retarding basin in rainy season of autumn - winter, and

3) Environment conservation and/or use of abbandans as fishery pond.

Although some of abbandans have been deepened mechanically by the authorities concerned, there are not sufficient engineering considerations to the function of abbandans. Therefore, a comprehensive study for rehabilitation and effective use of the existing abbandans shall be carried out taking above 3 functions into account.

Exhibit E.1.11 shows a preliminary idea for rehabilitation of existing abbandans.

E.1.1.3 Effects by Irrigation Improvement

Irrigation improvement achieves following effects such as to dissolve water shortage, to prevent sedimentation in the canal in the Kari rud, the Zan-e-Mard and the Sag Rud and to increase canal capacity to proper level partly.

As studied in Section B.1.3 of Appendix B.1, water shortage occurs presently almost every year in the area especially in the middle and low lands. Though water shortage will be dissolved quantitatively by the Lar dam, proper water distribution has also an important role in dissolution of water shortage. The following table shows area where water shortage will be dissolved.

Table E.1.5 Dissolution of Water Shortage

(Unit: ha)

Sub-area	Frequency of Water Shortage: Every year	1/2 years	1/3 years	1/4-5 years	1/6 yrs or more	Total	Annual Area
Haraz Left Bank							
High Land	1,350	130	400	200	0	2,080	1,590
Middle land	3,210	1,070	600	220	0	5,100	3,990
Low Land	3,750	1,350	210	990	0	6,300	4,710
Total	8,310	2,550	1,210	1,410	0	13,480	10,290
Haraz Right Bank							
High Land	710	0	0	0	0	710	710
Middle Land	1,870	30	0	80	0	1,980	1,900
Low Land	3,480	750	0	0	0	4,230	3,860
Total	6,060	780	0	80	0	6,920	6,470
Kari Rud							
High Land	1,690	0	320	1,100	0	3,110	2,040
Middle Land	3,370	940	2,230	2,140	470	9,150	5,140
Low Land	2,360	1,050	390	930	0	4,730	3,220
Total	7,420	1,990	2,940	4,170	470	16,990	10,400
Total							
High Land	3,750	130	720	1,300	0	5,900	4,340
Middle Land	8,450	2,040	2,830	2,440	470	16,230	11,030
Low Land	9,590	3,150	600	1,920	0	15,260	11,790
Total	21,790	5,320	4,150	5,660	470	37,390	27,160

Note: 1) estimated from the Village Survey - 1985

2) Annual area = $\Sigma \left(\frac{1}{T} \times A_T \right)$

where; $\frac{1}{T}$: frequency

A_T : Area where water shortage occurs once in T years (ha)

E.1.2. Drainage

E.1.2.1. Surface Drainage

Surface drainage rate has been set to drain 1/10 year one day rainfall within one day. To reduce surface drainage rate, some retarding basins are proposed in the middle and low lands in this study. Abbandans and some other depressed paddy lands are to be utilized as such retarding basins. When retarding basins are proposed in drainage system, it is necessary to examine how retarding basins extend by consecutive rainfalls. From the rainfall records in the project area, rainfall lasts generally for three to five days when rainfall is heavy. In this study, consecutive five day rainfall has been considered. (Details are in A.1.3. in Appendix A.1)

Furthermore, areal reduction has been also considered in rainfall intensity when drainage area exceeds 100 sq.km. (Details are in Figure A.1.3. in Appendix A.1)

(2) Criteria in Surface Drainage Analysis

For analyzing surface drainage, following criteria have been set in this study;

- Rainfall

1/10 year rainfall

	1st day	2nd day	3rd day	4th day	5th day
Daily Rainfall (mm)	36	130	13	16	9
Accumulation (mm)	36	166	179	195	204

- Areal Reduction of Rainfall
  When drainage area exceeds 100 sq.km, rainfall is reduced by area in accordance with Figure A.1.3.

- Runoff Coefficient (f)

Runoff coefficient (f) has been estimated at 0.75 considering land use (generally paddy field) and topography.

- Storage Volume of Retarding Basins

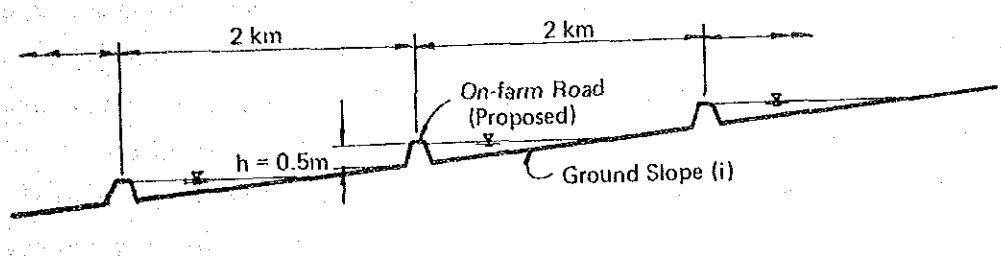
1) Abbandans

90 percent of abbandans are assumed to be utilized as retarding basins.

Storage volume = Surface area x 1.5 m depth

2) Depressed Paddy Field

Depressed paddy field will be enclosed by on-farm roads which are proposed in land consolidation. Such enclosure is assumed at 2 km interval as below;



LONGITUDINAL PROFILE OF THE RETARDING BASINS USING DEPRESSED PADDY FIELD

Surface area and storage volume are estimated by following equations;

$$A = \frac{h}{i} \times L \times n \qquad (m^2)$$

$$V = \frac{h^2}{2i} \times L \times n \qquad (m^3)$$

where;

A: Surface area of retarding basins in the depressed paddy field.

V: Storage volume of retarding basins in the depressed paddy field.

i: Ground slope

h: depth of retarding basins (m)
Retarding basins become maximum, when h reaches to 0.5 m. Overflow occurs when h exceeds 0.5 m.

L: Length of on-farm road (m)

n: number of on-farm roads

(2) Drainage Network

As see in Figure E.1.1., drainage network is devided basically into two drainage areas, namely the Haraz Left Bank and the Haraz Right Bank drainage areas. Each drainage area is further devided into smaller sub-drainage areas by drainage system.

The Haraz Left Bank drainage area is devided into three sub-drainage areas, namely L1, L2 and L3 sub-drainage areas from west to east. Drainage network is not clear in the land (La sub-drainage area in Figure E.1.1.) where is bounded by the project boundary and the Alesh Rud, because this land is occupied extensively by the forestry. In this study, this land is excluded from the drainage area and is considered to be drained into the Alesh Rud. Though all sub-drainage areas drains directly into the Caspian Sea, L1 and L2 sub-drainage areas drain only at Khesht Sar and Mahmud Abad respectively, and L3 sub-drainage is, however, drained separately through five smaller drainage channels crossing sand dune.

The Haraz Right Bank drainage area is devided into five sub-drainage areas, namely R1, R2 and R3 sub-drainage areas on the right bank of the Kari Rud, and R4 and R5 sub-drainage areas. Though two sub-drainage areas of R4 and R5 drain directly into the

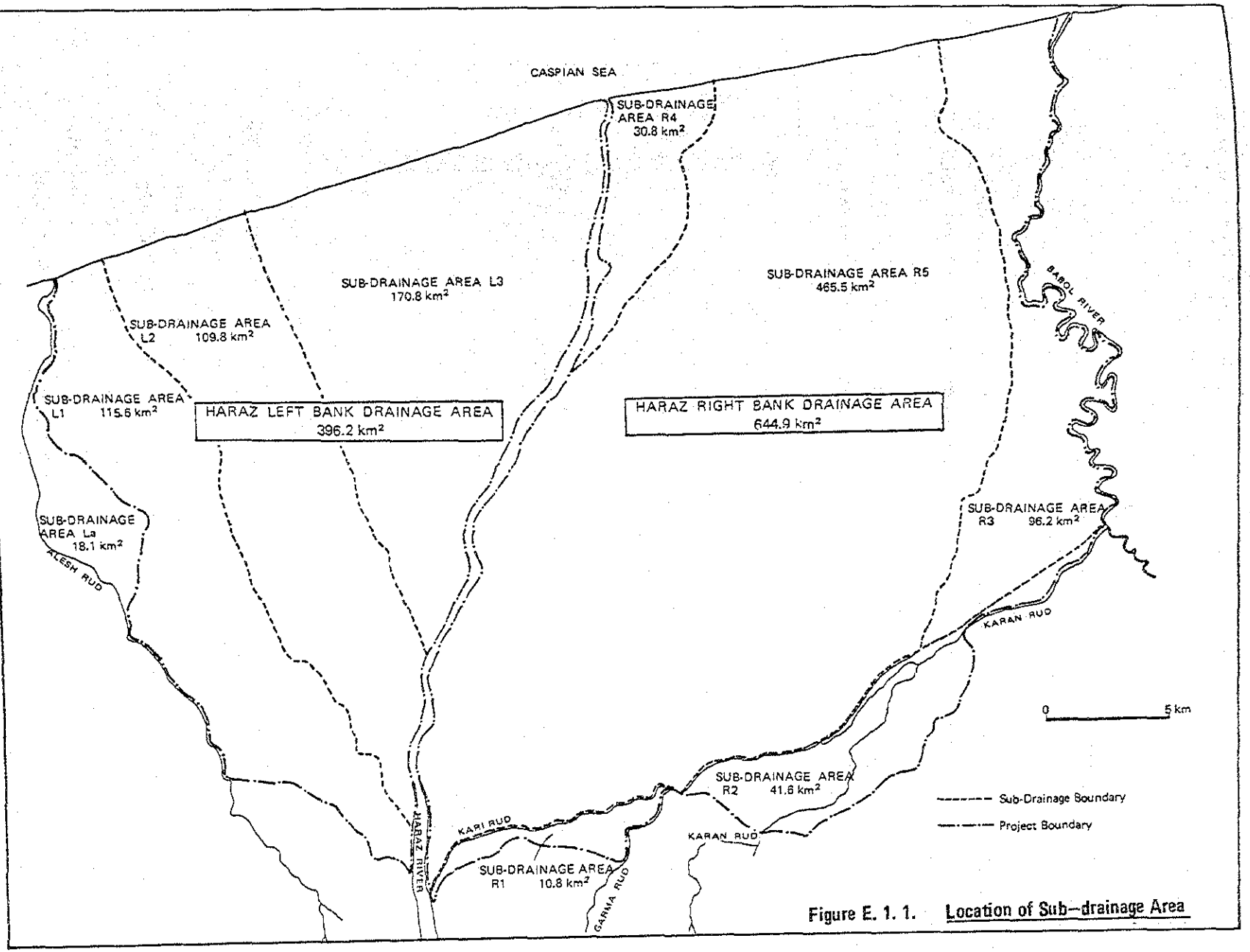


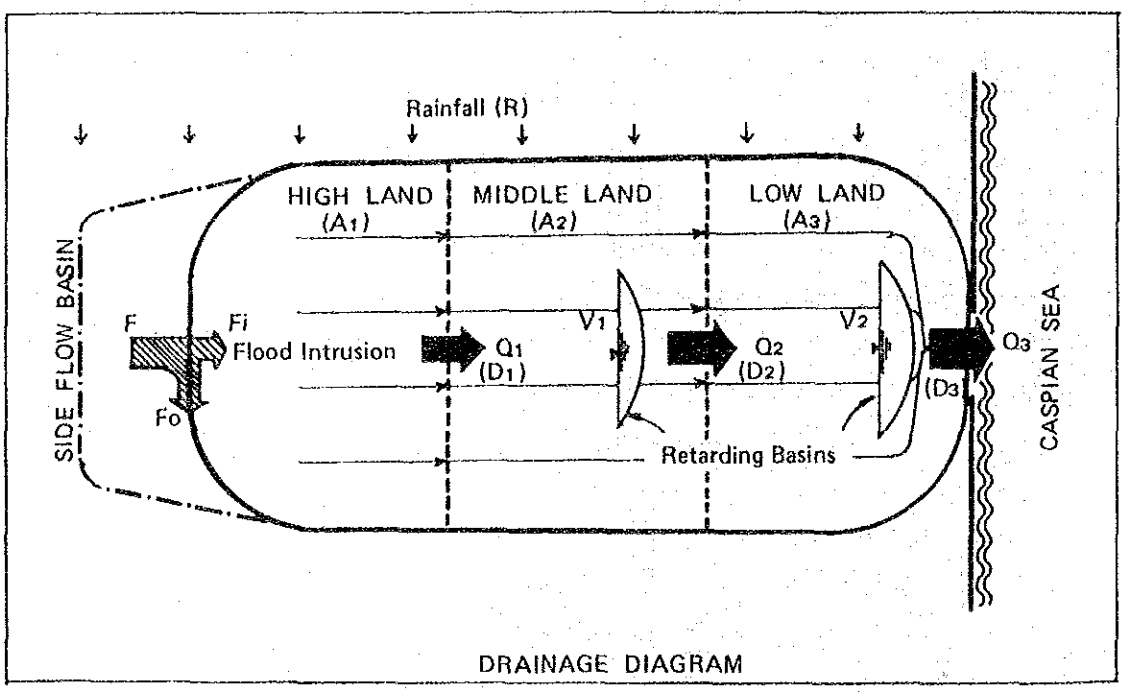
Figure E. 1. 1. Location of Sub-drainage Area

Caspian Sea, other three sub-drainage areas on the right bank of the Kari Rud are not drained directly, R1, R2 and R3 sub-drainage areas are drained into the Kari Rud, the Karan Rud and the Babol river respectively.

(3) Methodology of Drainage Analysis

Drainage analysis has been conducted on three sub-drainage areas combinedly in the Haraz Left Bank drainage area and on R5 sub-drainage area as representative area in the Haraz Right Bank drainage area.

Drainage system is explained as shown in the diagram below;



DRAINAGE DIAGRAM

When heavy rainfall occurs in the area, some of flood from the side flow basin intrudes into the high land and excess water is drained into the middle and the low lands and finally into the Caspian Sea. Since there exist no retarding basins in the high land, all excess water drains directly into the middle land. In the middle and the low lands, some of excess water is stored transiently in the retarding basins such as the abbandans and the depressed paddy fields.

Following equations give water balance of drainage in the area;

$$Fi + f \cdot R \cdot A_1 \times 10^3 = Q_1 \quad \ldots\ldots 1)$$
$$Q_1 + f \cdot R \cdot A_2 \times 10^3 - V_1 = Q_2 \quad \ldots\ldots 2)$$
$$Q_2 + f \cdot R \cdot A_3 \times 10^3 - V_2 = Q_3 \quad \ldots\ldots 3)$$

where;

Fi	:	Flood intrusion	(m^3/day)
f	:	Runoff coefficient	
R	:	Daily rainfall	(mm/day)
A_1, A_2, A_3	:	Drainage areas	(km^2)
Q_1, Q_2, Q_3	:	Excess drain	(m^3/day)
V_1, V_2	:	Stored volume in the retarding basins	(m^3/day)

(4) Drainage Calculation of the Haraz Left Bank Drainage Area

In this drainage area, drainage areas and maximum storage volume of retarding basins are as follows;

	High Land	Middle Land	Low Land	Total
Drainage Area (km^2)	116.8	133.4	146.0	396.2
Storage Volume (MCM)	0	4.87	7.91	12.78
Abbandans	(0)	(1.86)	(5.78)	(7.64)
Depressed Paddy Field	(0)	(3.01)	(2.13)	(5.14)

In this drainage area, since the acreage of sub-drainage areas is nearly 100 sq.km, no areal reduction has been given to the rainfall. The results of drainage analysis are shown in Figure E.1.2. As seeing in the figure, drainage rate is proposed at 3.6 mm/hr. When this drainage rate is given to the drainage system, 12.7 percent of paddy field will be used as retarding basins in the middle and the low lands, and no overfloodings occur on the proposed on-farm road.

(5) Drainage Calculation of the Haraz Right Bank Drainage Area

In this drainage area, the sub-drainage area R5 has been selected as representative area. Since this sub-drainage area is 465.5 sq.km and exceeds 100 sq.km, areal rainfall is estimated at 88 mm/day. Therefore, two different rainfalls are considered in this drainage area.

Design Rainfall

Rainfall	1st day	2nd day	3rd day	4th day	5th day
1/10 Year Rainfall	36	130	13	16	9
Areal Rainfall	24	88	9	11	6

1/10 year rainfall is used to decide drainage rate for the drainage canals and areal rainfall is used to check flooding conditions in the area when flood intrusion occurs from the Garma Rud.

Drainage areas and maximum storage volume of retarding basins are as follows in the sub-drainage area R5;

	High Land	Middle Land	Low Land	Total
Drainage Area (km^2)	134.1	195.6	135.8	465.5
Storage Volume (MCM)	0	15.5	21.8	37.3
Abbandans	(0)	(11.1)	(13.9)	(25.0)
Depressed Paddy Field	(0)	(4.4)	(7.9)	(12.3)

Under above conditions, the results of drainage analysis for 1/10 year rainfall are shown in Figure E.1.3. As seeing in the figure, drainage rates are proposed at 3.5 mm/hr in the middle land and 2.3 mm/hr in the low land respectively. When these drainage

Figure E. 1. 2. Drainage Results in the Haraz Left Bank

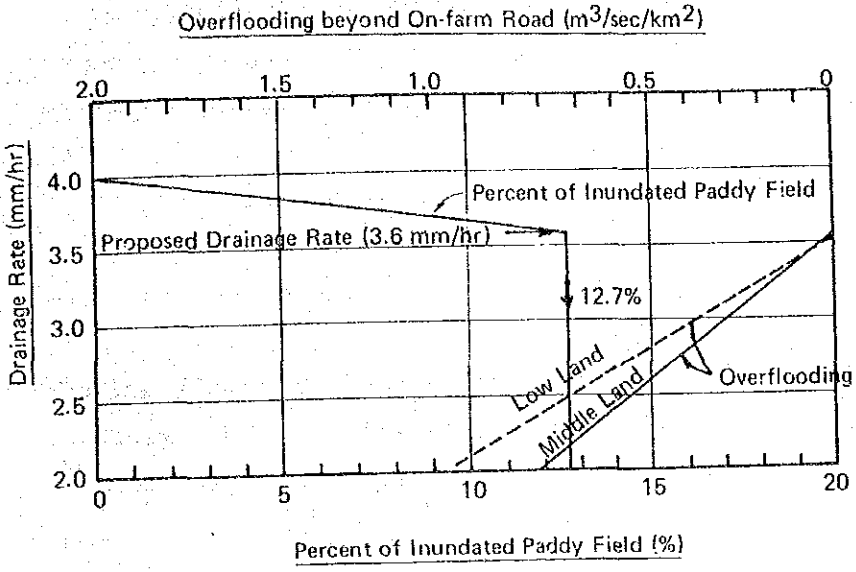
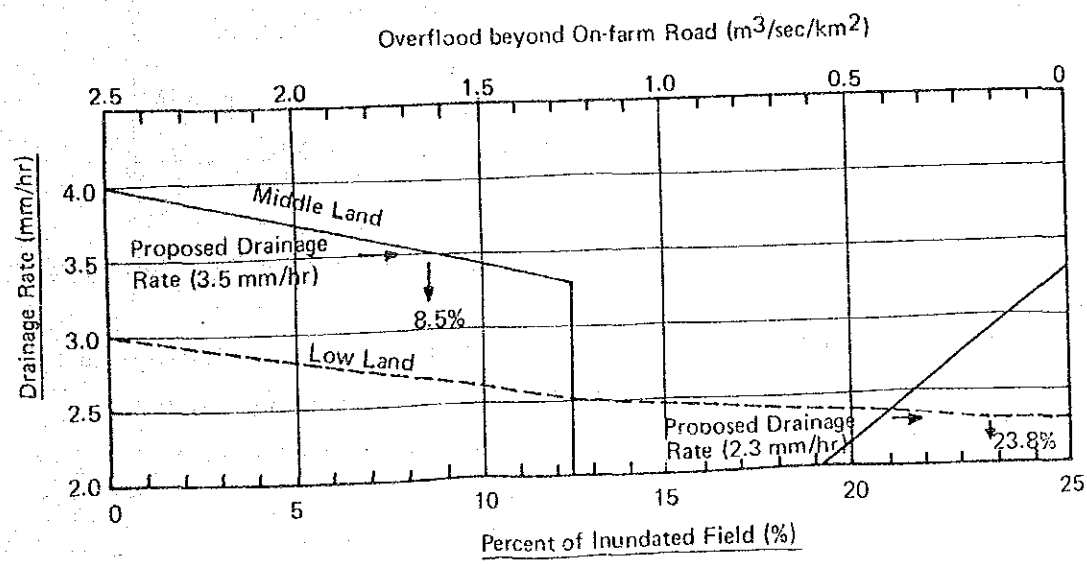


Figure E. 1. 3. Drainage Results in the Haraz Right Bank

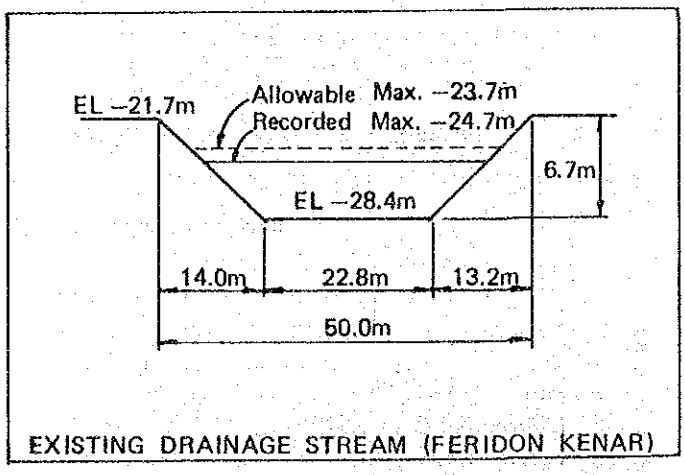


rates are given, 8.5 percent and 23.8 percent of paddy field will be used as retarding basins without overfloodings on the proposed on-farm roads in the middle and the low lands respectively.

In case of areal rainfall, flood intrusion is estimated at 800,000 m^3 from the Kari Rud as mentioned in the Section A.2.4, (2), iii) of Appendix A.2. Considering above flood intrusion, drainage analysis has been conducted. However, no inundation will occur when above drainage rates are given to the drainage system.

(6) Check of the Existing Drainage Stream Capacity

It is necessary to check the drainage capacity of the existing drainage streams such as at Khesht Sar, Mahmud Abad and Feridon Kenar. Among three, the most critical condition is expected at Feridon Kenar because of large drainage area and low elevation. The figure shows the cross-section of the drainage stream at Feridon Kenar. At this point, drainage amount is assumed at 297 cms (465.5 km^2 x 2.3 mm/hr x 10^3/3600 sec.)



EXISTING DRAINAGE STREAM (FERIDON KENAR)

Drainage capacity is estimated as shown in the following table. As seeing in the table, the existing stream can convey above drainage amount, even if the Caspian Sea rises to EL-25.3 m.

Drainage Capacity at Feridon Kenar

Water Level of The Caspian Sea	Inland Water Level: Recorded Max. -24.7 m	Inland Water Level: Allowable Max. -23.7 m
Present Level -27.6m	298 cms	540 cms
Expected Max. Level -25.3m	142 cms	397 cms

Note: 1) Calculated by Manning Formula (n = 0.035)
2) Stream length is 1,250 m to the Caspian Sea.

(7) Required Drainage Facilities

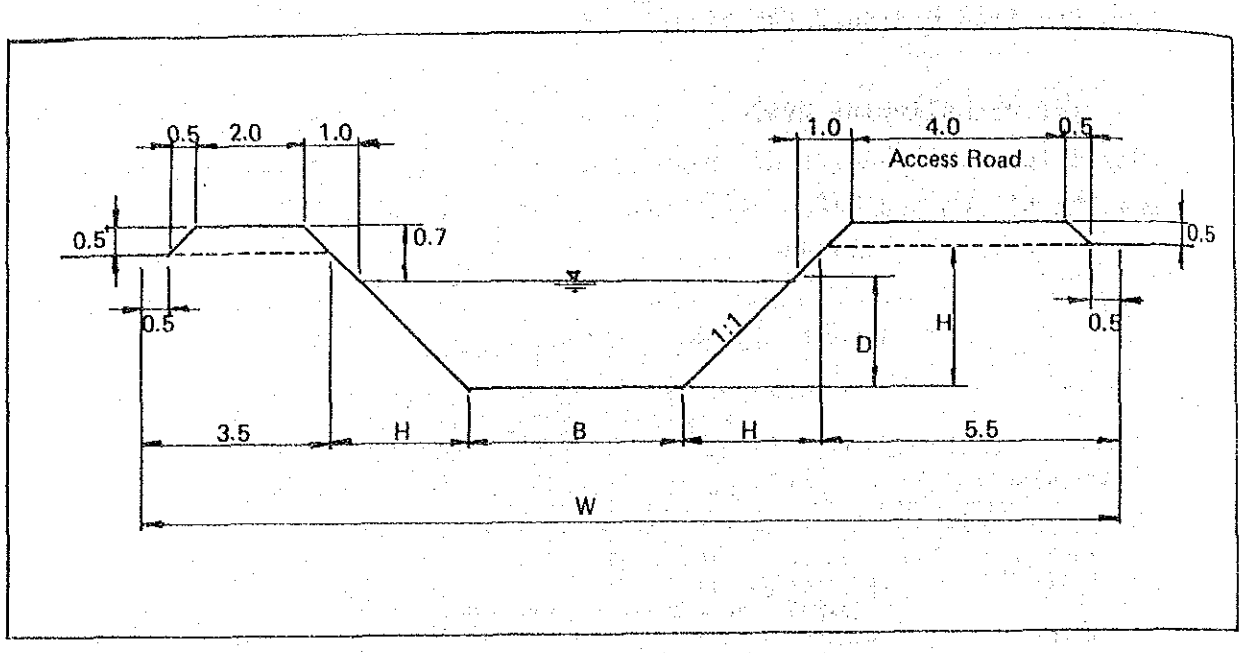
For establishing drainage system in the project area, following facilities are required as shown in Table E.1.6. Drainage canals will be 511 km and occupy the land of 845 ha totally.

Table E.1.6. Required Drainage Facilities

Drainage Facilities		Haraz Left		Haraz Right		Total	Drawings
		Middle	Low	Middle	Low		
Drainage Canal	(km)	80	111	159	160	510	Figure E.1.4
New Construction		(35.0)	(34.0)	(69.2)	(49.0)	(187)	
Improvement		(45.4)	(77.0)	(89.9)	(111.1)	(323)	
Drops H = 1.00m	(places)	51	68	121	0	240	Exhibit E.1.10
Bridges	(places)	138	96	84	66	384	Exhibit E.1.8 &
	(size)	8mx1	5.5mx2	10mx1	8mx2		E.1.9
Checks	(places)	5	17	8	25	55	Exhibit E.1.10
Spillway of Abbandans	(places)	19	33	41	45	138	
Land Occupation	(ha)	255	245	135	210	845	
	(%)	1.8	2.9	1.4	2.2	2.0	

Note: 1) Checks will be provided in the irrigation-cum-drainage canals to keep water level at necessary level during irrigation period.
2) Percentage of land occupation is the ratio to cultivated lands.

Figure E.1.4. Typical Section of Drainage Canal



Note: 1) Dimensions are given in Table E.1.7.
2) Canals are designed under following criteria;
n = 0.035, 0.7 m/sec $\leq$ V $\leq$ 1.35 m/sec

Table E.1.7. Dimensions of Drainage Canal

Descriptions	Haraz Left		Haraz Right*	
	Middle	Low	Middle	Low
Drainage Area (km^2)	250.2	396.2	329.7	465.5
Drainage Rate (mm/hr)	3.6	3.6	3.5	2.3
Drainage Discharge(cms)	250	396	320	297
Number of Canals	21	20	21	11
Discharge/Canal (cms)	12	20	15	27
Canal Dimension				
D (m)	2.0	2.0	2.0	2.0
H (m)	2.7	2.7	2.7	3.0
B (m)	2.5	5.0	4.0	9.5
W (m)	16.5	19	18	23.5
Slope				
Ground	4/1,000	3/1,000	1/300	1/1,000
Canal	1/500	1/600	1/600	1/1,000
Necessity of Drops	required	required	required	not required

Note: * Sub-drainage Area R5.

E.1.2.2. Tile Drainage

(1) Drainage Spacing

Spacing of the drainage canals and the tile drainages are to be decided taking the soil permeability and the future land use into consideration. When the impermeable layer exists close to the ground surface, it is necessary to decide whether restricting the land use or providing the subsoil improvement positively. From a view point of introducing the second crops, the paddy fields can be classified as follows;

- Paddy fields without drainage problems

  These fields locate in the high land. In the high land, there is no drainage problem due to steep ground slope of about 1 percent and low subsurface groundwater table. However, permeability is generally low in the high land as shown in Table A.4.8.

- Paddy fields with drainage problems

  These fields locate extensively in the middle and the low lands. In the middle and the low lands, it is necessary to consider not only the surface drainage but also the subsurface drainage due to higher subsurface groundwater table. As shown in Figure E.1.5, hydraulic conductivity ranges from 1×10^{-3} cm/sec to 2×10^{-2} cm/sec in these lands, and is assumed at about 5×10^{-3} cm/sec in average. Impermeable layer exists generally deeper than 3 m from ground surface, and exceptionally at shallower depth according to Table A.4.7.

When the impermeable layer locates close to the ground surface within 50 cm, it will take cost to provide the subsoil improvement for introducing the second crops. Such soil has been found only at three sites at Hole No.4, 20 and 23.

Other than above three sites, drainage improvement will take less cost because the impermeable layer exists at 1.0 m or deeper. Where the hydraulic conductivity is about 1×10^{-2} cm/sec, drainage can be achieved only by the open drainage system with 200 m interval and 1.2 m depth. In case of the hydraulic conductivity of 5 x 10 cm/sec or lower, the tile drainage will be necessary. The tile drainage needs spacing of 60 m, depth of 60 cm or deeper and lateral pipes of 70 mm diameter.

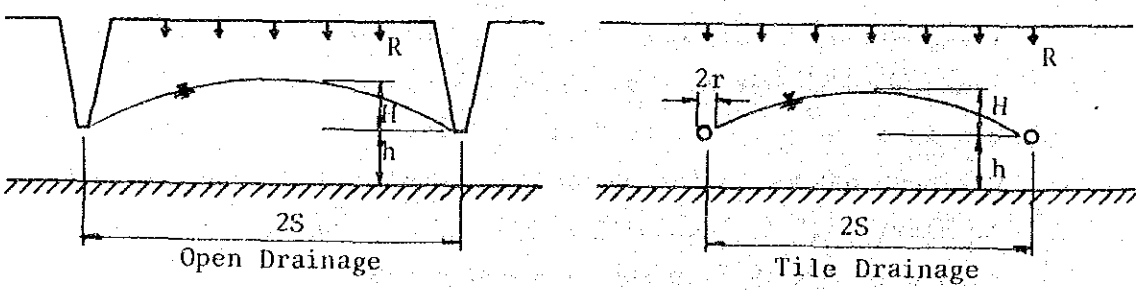
(2) Formulas for Drainage Spacing Computation

Drainage spacing has been computed for open drainage and tile drainage at testing sites and at assumed typical site. Computation is using following two formulas;

$$(2S)^2 = \frac{8K}{R} Hh + \frac{4K}{R} H^2 \quad \text{(Hooghoudt)} \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad 1)$$

$$H = \frac{2SR}{\pi K} \left[\ell n \frac{2S}{\pi r} + \sum_{m=1}^{\infty} \frac{1}{m} \left(\cos \frac{m\pi r}{S} - \cos m\pi \right) \left(\coth \frac{m\pi h}{S} - 1 \right) \right.$$

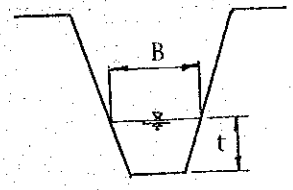
$$\text{(Don Kirkham)} \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad 2)$$



where;

2S:	space of drainage	(m)
H :	height of groundwater	(m)
h :	depth to impermeable layer	(m)
r :	radius of laterel drain	(m)
K :	hydraulic conductivity	(m/day)
R :	infiltration	(m/day)

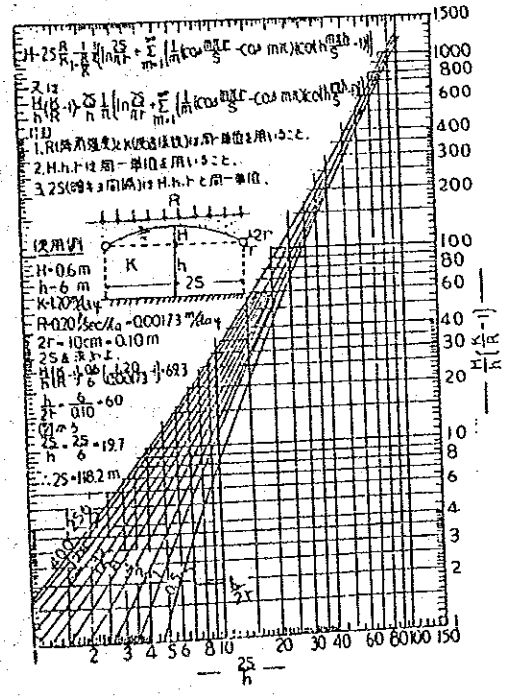
When Don Kirkham formula is applied to the open drainage, radius (r) is to be radius of a circle having same area to flow area in drainage canal. In this case, r is estimated by following equation. Applicable r is to be 0.13 m, when t = 0.10 m and B = 0.50 m,



$$Bt = \pi r^2$$

$$r = \left(\frac{Bt}{\pi}\right)^{0.5} \quad \cdots\cdots\cdots\cdots\cdots\cdots 3)$$

For computing the drainage space by Don Kirkham, nomograph is prepared as shown in the figure below.



Nomograph for Drainage Spacing Determination when impermeable layer existing (Don Kirkham's Paper)

(3) Computation of Drainage Spacing

Assuming the impermeable layer at 1.5 m depth safely, sub-surface drainage in analized as followings;

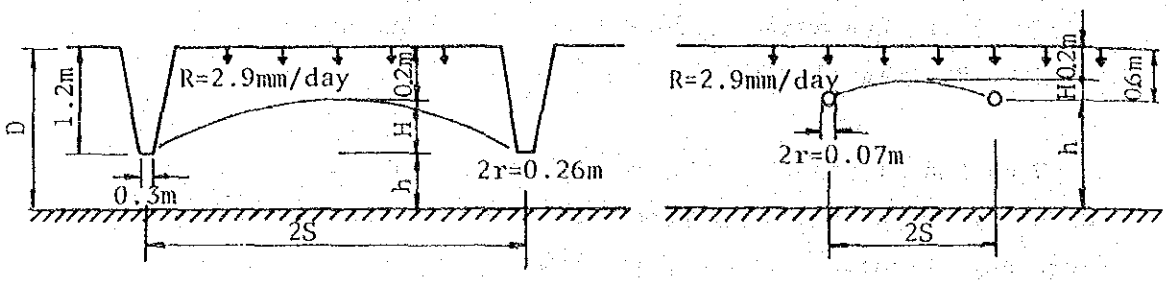


Table E.1.8. Computation of Drainage Spacing

		Drainage Spacing by Hydraulic Conductivity				
k	(cm/sec)	$1x10^{-4}$	$1x10^{-3}$	$5x10^{-3}$	$1x10^{-2}$	$5x10^{-2}$
D	(m)	1.5	1.5	1.5	1.5	1.5
K	(m/day)	0.0864	0.864	4.32	8.64	43.2
Open Drainage						
H	(m)	1.0	1.0	1.0	1.0	1.0
h	(m)	0.3	0.3	0.3	0.3	0.3
Hooghoudt						
2S	(m)	13.8	43.7	98	138	309
Don Kirkham						
$\frac{H}{h}\left[\frac{K}{R}-1\right]$		96	990	4,962	9,928	49,652
$\frac{h}{2r}$		1.15	1.15	1.15	1.15	1.15
$\frac{2S}{h}$		28	95	190	-	-
2S	(m)	8.4	28.5	57	-	-
Tile Drainage						
H	(m)	0.4	0.4	0.4	0.4	0.4
h	(m)	0.9	0.9	0.9	0.9	0.9
Hooghoudt						
2S	(m)	10	32	72	102	229
Don Kirham						
$\frac{H}{h}\left[\frac{K}{R}-1\right]$		12.8	132	662	1,324	6,620
$\frac{h}{2r}$		12.9	12.9	12.9	12.9	12.9
$\frac{2S}{h}$		8.0	30	75	105	-
2S	(m)	7.2	27	68	95	-

(4) Infiltration

Groundwater table is raised by infiltration to the soil. When the second crops are introduced, critical period may be in December due to heavy rainfall and low evapotranspiration. Infiltration is assumed to be 2.9 mm/day in this period.

Infiltration = Rainfall-Evapotranspiration
= 117 mm/month - 28 mm/month
= 88 mm/month = 2.9 mm/day

where;

Rainfall : Average monthly rainfall at Babolsar in December.

Evapotranspiration: Monthly evapotranspiration in December.

E.1.2.3. Effects by Drainage Works

Table E.1.9. is showing the effects expected by the drainage works in the project area. Drainage works consists of the area drainage project and the terminal drainage project as explained in the Main Report, Section 5.2.2.(3).

Table E.1.9. Effects by Drainage Works

(Unit: ha)

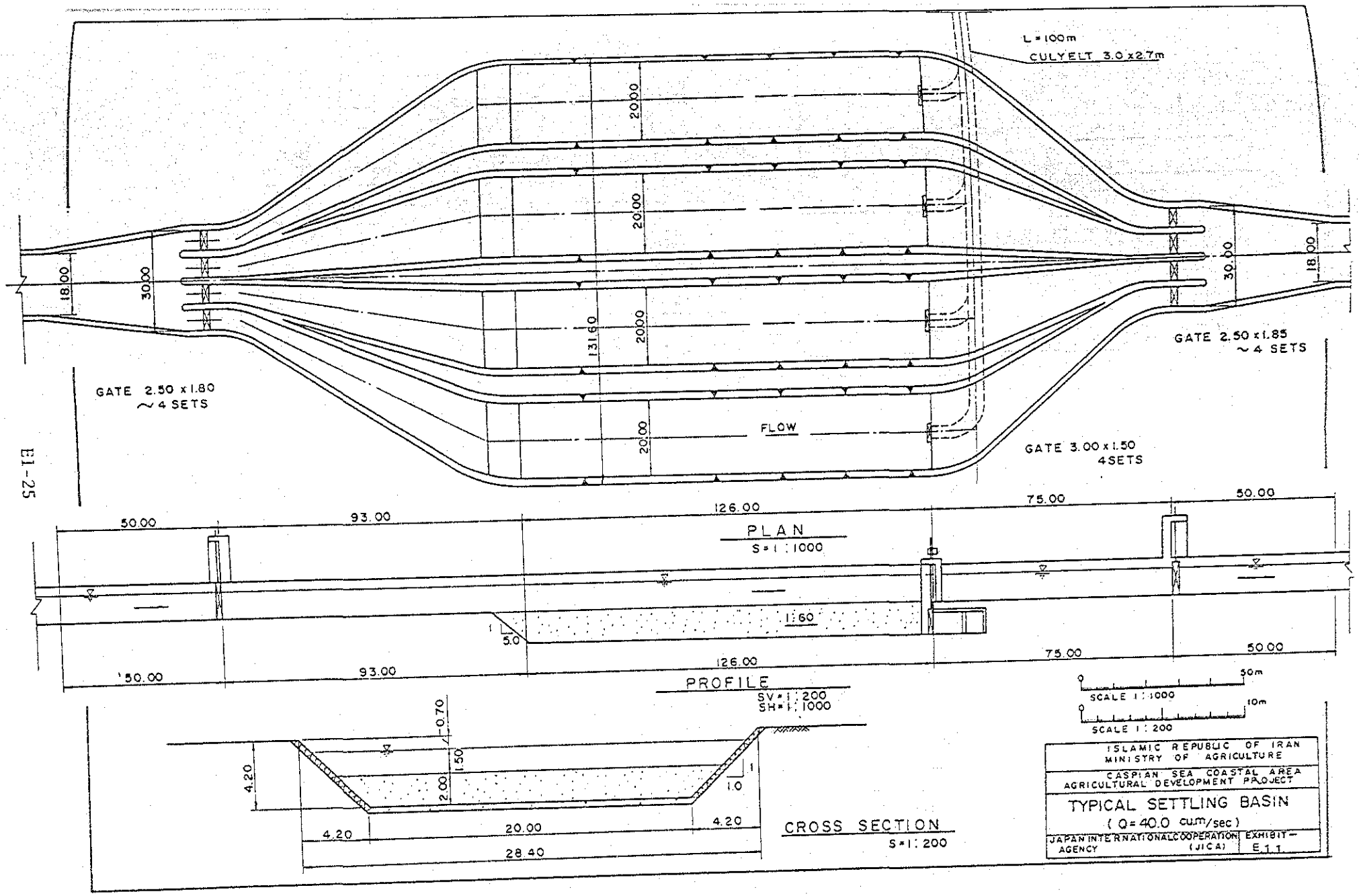
Drainage Areas	Paddy Field	Area under Drainage Problems			Retarding Basins (%)	Effects by Area Drainage		Effects by Terminal Drainage		
		1R/2Ud	2Rd/3Ud	3Rd/3Ud		Dissolution of Inundation to Paddy	Second Crop Introduction	Dissolution of Inundation to Paddy	Mechanization	Second Crop Introduction
Haraz Left Bank Drainage Area	25,670	15,390	6,030	0		3,015	5,420	3,015	17,960	12,660
High Land	7,720	3,470	0	0	-	0	1,010[1/]	0	0	2,350[1/]
Middle Land	8,930	8,130	800	0	12.7	400	2,260[1/]	400	8,930	5,280[1/]
Low Land	9,020	3,790	5,250	0	12.7	2,615	2,150[1/]	2,615	9,020	5,030[1/]
Haraz Right Bank Drainage Area	42,790	12,720	16,670	3,450		10,060	8,520	10,060	30,240	19,890
High Land	12,550	2,600	0	0	-	0	780	0	0	1,820
Middle Land	18,160	9,260	5,780	3,120	8.5	4,450	4,980	4,450	18,160	11,630
Low Land	12,080	860	10,890	330	23.8	5,610	2,760	5,610	12,080	6,440
Haraz Right Bank Command	13,370	6,560	3,690	0		1,845	2,670	1,845	8,850	6,250
High Land	4,520	1,400	0	0	-	0	420	0	0	980
Middle Land	5,120	4,300	820	0	8.5	410	1,400	410	5,120	3,280
Low Land	3,730	860	2,870	0	23.8	1,435	850	1,435	3,730	1,990
Kari Rud Command	29,420	6,160	12,980	3,450		8,215	5,850	8,215	21,390	13,640
High Land	8,030	1,200	0	0	-	0	360	0	0	840
Middle Land	13,040	4,960	4,960	3,120	8.5	4,040	3,580	4,040	13,040	8,350
Low Land	8,350	0	8,020	330	23.8	4,175	1,910	4,175	8,350	4,450
Total	68,460	28,110	22,700	3,450		13,075	13,940	13,075	48,190	32,550
High Land	20,270	6,070	0	0		0	1,790	0	0	4,170
Middle Land	27,090	17,390	6,580	3,120		4,850	7,240	4,850	27,090	16,910
Low Land	21,100	4,650	16,120	330		8,225	4,910	8,225	21,100	11,470

Note: 1) Dissolution of Inundation to paddy: Area Drainage ; 50% of (2Rd/3Ud + 3Rd/3Ud)
Terminal Drainage; 50% of (2Rd/3Ud + 3Rd/3Ud)

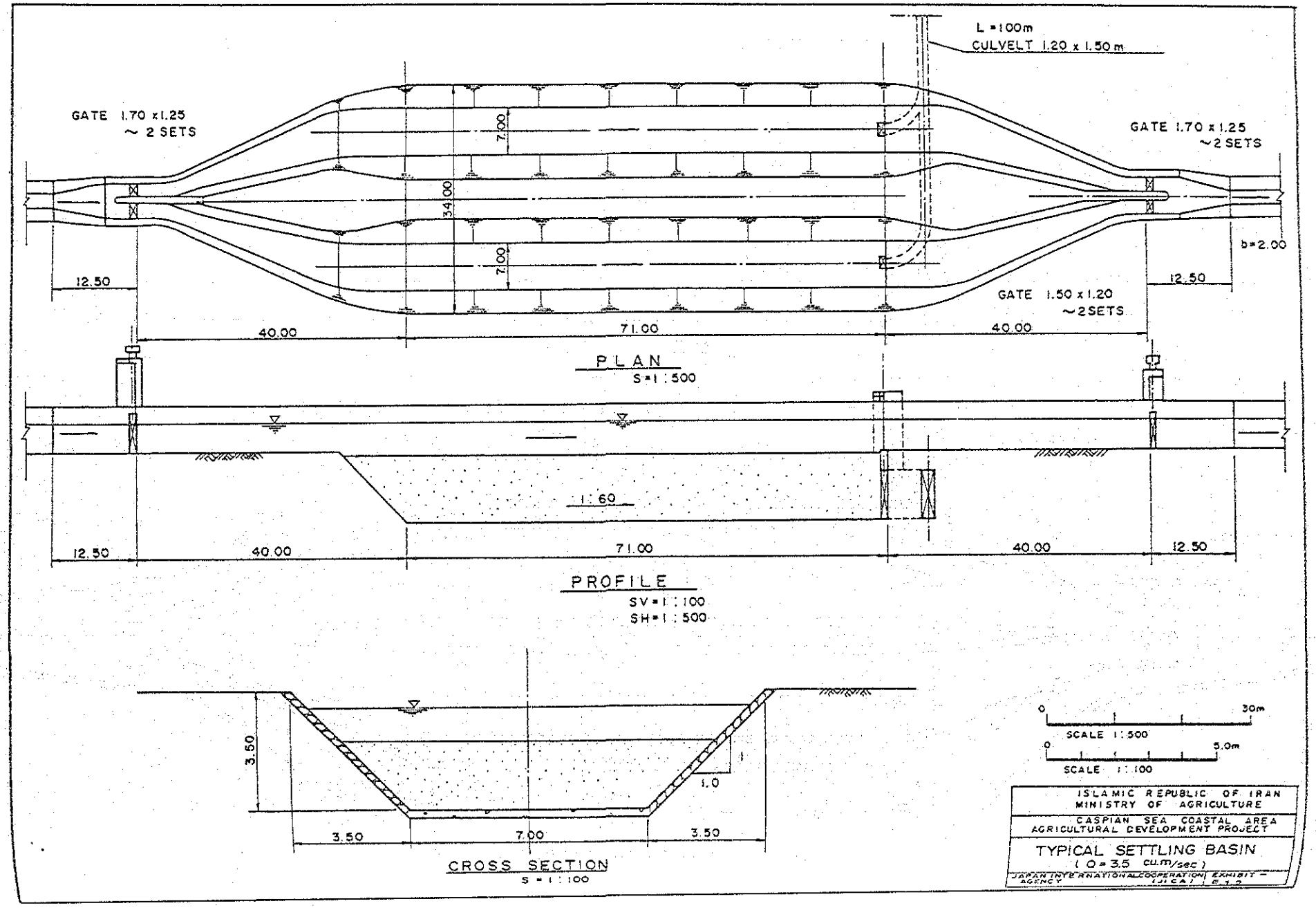
2) Second Crop Introduction : Area Drainage ; 30% of (1R/2Ud + 2Rd/3Ud + 3Rd/3Ud) x [100-Retarding Basin(%)]/100
Terminal Drainage; 70% of (1R/2Ud + 2Rd/3Ud + 3Rd/2Ud) x [100-Retarding Basin(%)]/100

3) Mechanization : Terminal Drainage; 100% of the Middle and the Low Lands

4) 1/ ..... Area reduced due to flood from the Alesh Rud.


L = 100m
CULVELT 3.0 x 2.7m
20.00
20.00
131.60
20.00
20.00
18.00
30.00
30.00
18.00
GATE 2.50 x 1.80
~ 4 SETS
FLOW
GATE 2.50 x 1.85
~ 4 SETS
GATE 3.00 x 1.50
4 SETS
50.00
93.00
126.00
75.00
50.00
PLAN
S = 1 : 1000
1:60
1
5.0
50.00
93.00
126.00
75.00
50.00
PROFILE
SV = 1 : 200
SH = 1 : 1000
0.70
1.50
2.00
4.20
1
1.0
4.20
20.00
4.20
28.40
CROSS SECTION
S = 1 : 200
50m
SCALE 1 : 1000
10m
SCALE 1 : 200
ISLAMIC REPUBLIC OF IRAN
MINISTRY OF AGRICULTURE
CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT
TYPICAL SETTLING BASIN
(Q = 40.0 cu.m/sec)
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
EXHIBIT — E.1.1

E1-25


L =100m
CULVELT 1.20 x 1.50 m
GATE 1.70 x1.25
~ 2 SETS
GATE 1.70 x1.25
~2 SETS
7.00
34.00
7.00
b=2.00
12.50
12.50
GATE 1.50 x 1.20
~2SETS
40.00
71.00
40.00
PLAN
S=1 : 500
1 : 60
12.50
40.00
71.00
40.00
12.50
PROFILE
SV=1 : 100
SH=1 : 500
3.50
1
1.0
3.50
7.00
3.50
CROSS SECTION
S = 1 : 100
0
30m
SCALE 1 : 500
0
5.0m
SCALE 1 : 100
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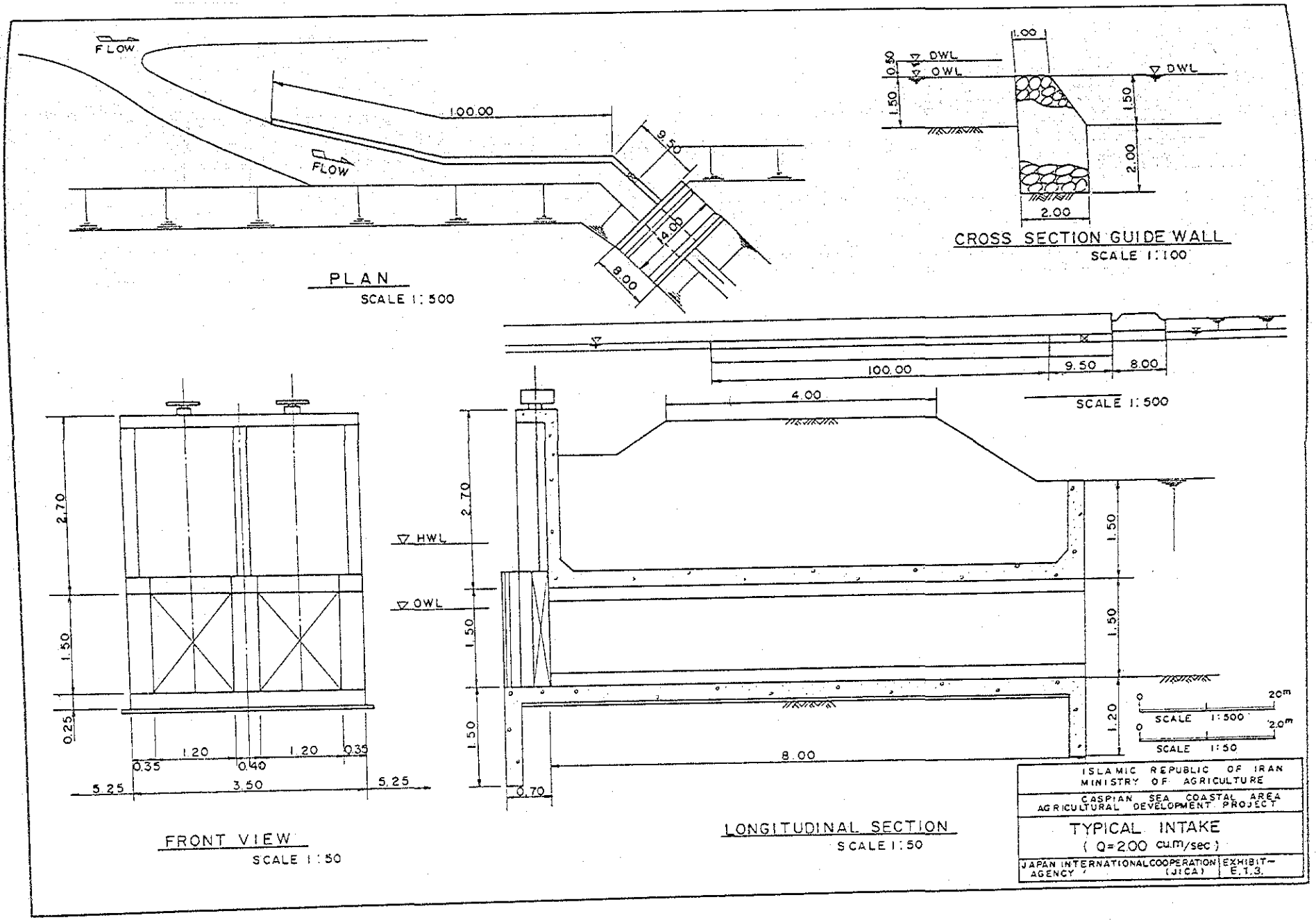
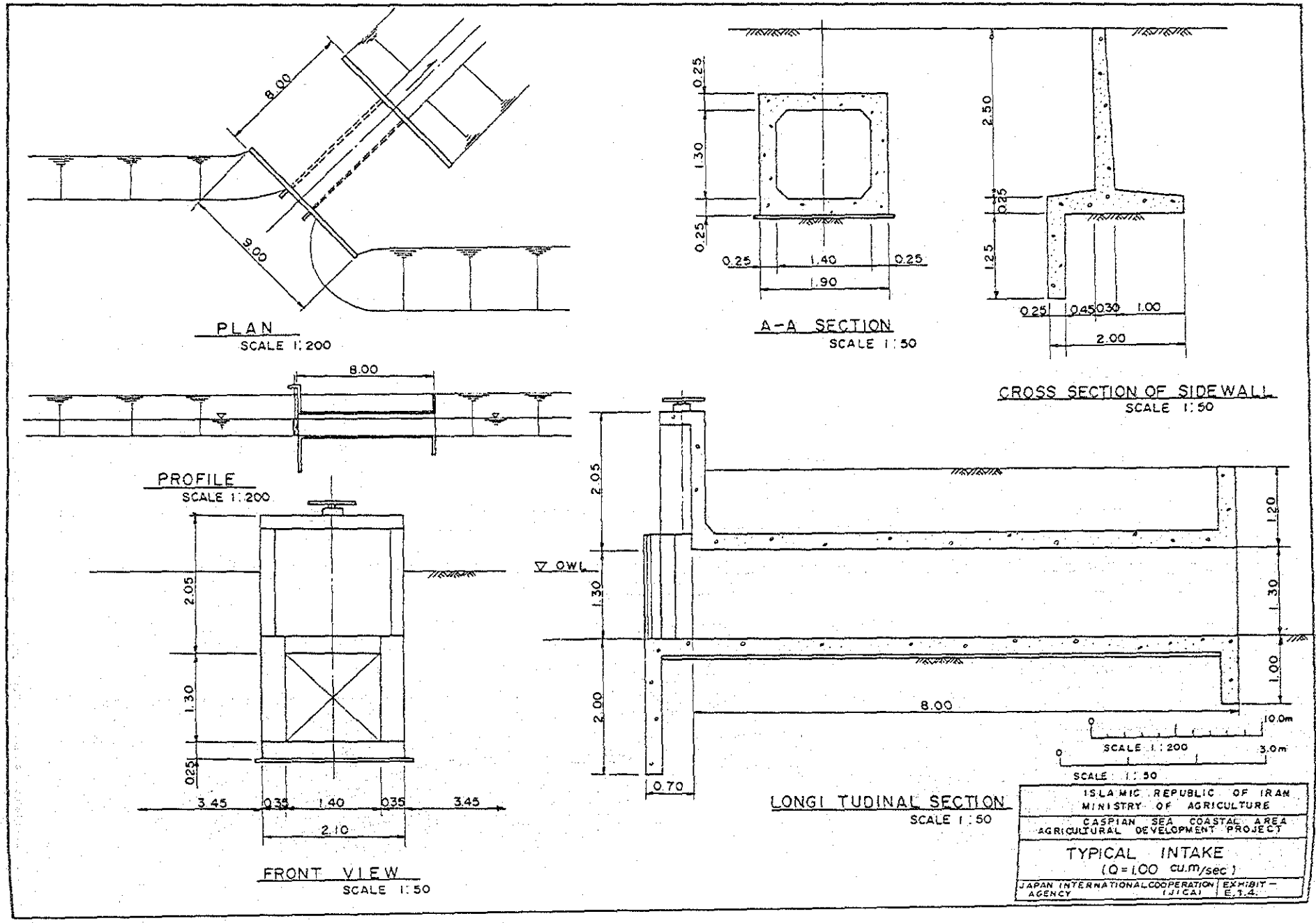
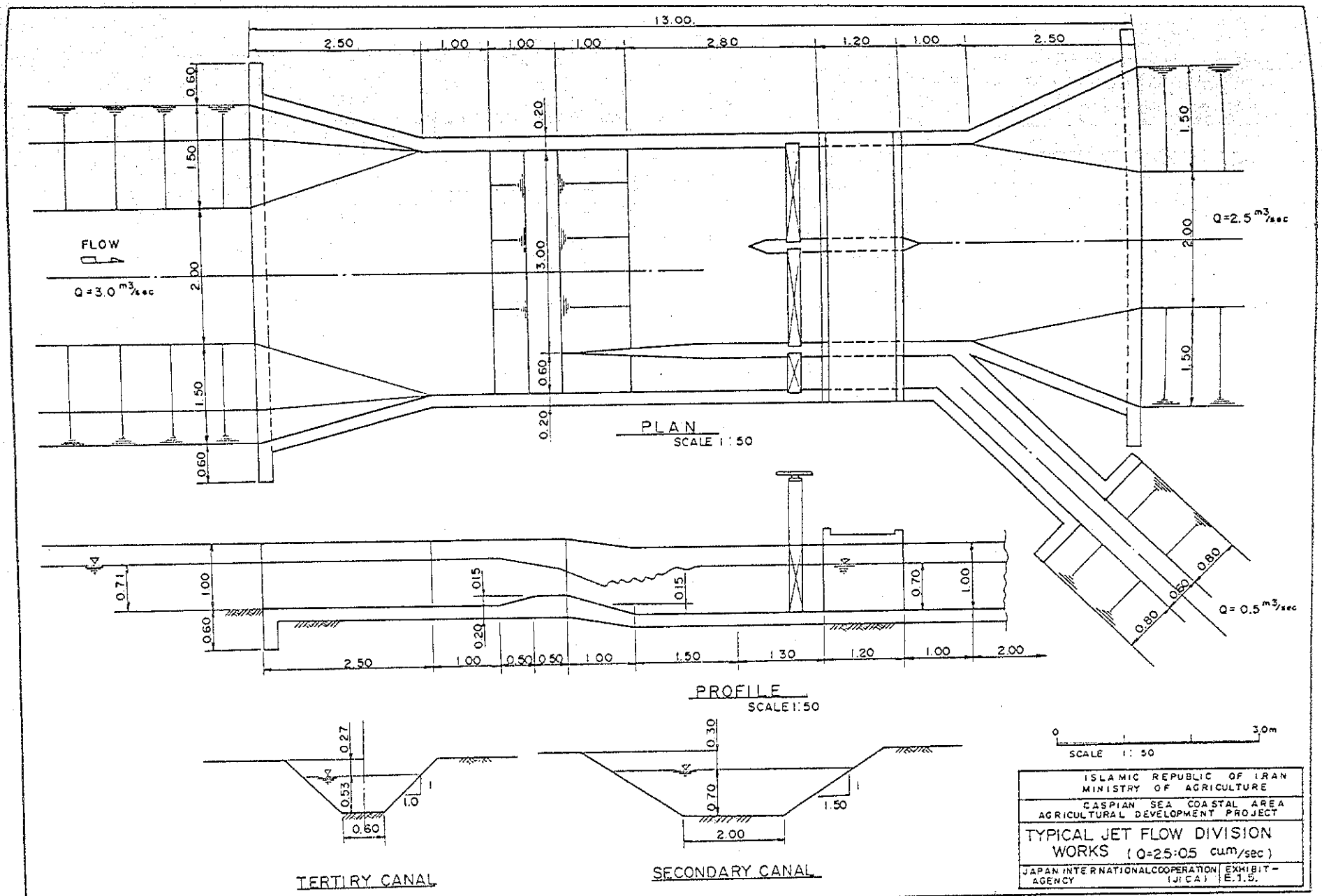
AGRICULTURAL DEVELOPMENT PROJECT
TYPICAL SETTLING BASIN
(Q = 3.5 cu.m/sec)
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) EXHIBIT E-1-2


FLOW
FLOW
100.00
9.50
4.00
8.00
PLAN
SCALE 1:500
1.00
0.50
DWL
OWL
DWL
1.50
1.50
2.00
2.00
CROSS SECTION GUIDE WALL
SCALE 1:100
100.00
9.50
8.00
SCALE 1:500
4.00
2.70
HWL
OWL
1.50
1.50
1.50
1.50
1.50
1.20
0.25
0.35
1.20
0.40
1.20
0.35
5.25
3.50
5.25
0.70
8.00
FRONT VIEW
SCALE 1:50
LONGITUDINAL SECTION
SCALE 1:50
0
20m
SCALE 1:500
0
20m
SCALE 1:50
ISLAMIC REPUBLIC OF IRAN
MINISTRY OF AGRICULTURE
CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT
TYPICAL INTAKE
(Q=2.00 cu.m/sec)
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
EXHIBIT-E.1.3.


8.00
3.00
PLAN
SCALE 1:200
0.25
1.30
0.25
0.25
1.40
0.25
1.90
A-A SECTION
SCALE 1:50
2.50
0.25
1.25
0.25
0.45
0.30
1.00
2.00
CROSS SECTION OF SIDEWALL
SCALE 1:50
8.00
PROFILE
SCALE 1:200
2.05
1.30
0.25
3.45
0.35
1.40
0.35
3.45
2.10
FRONT VIEW
SCALE 1:50
2.05
1.30
2.00
0.70
O.W.L.
1.20
1.30
1.00
8.00
0
10.0m
SCALE 1:200
0
3.0m
SCALE 1:50
LONGI TUDINAL SECTION
SCALE 1:50
ISLAMIC REPUBLIC OF IRAN
MINISTRY OF AGRICULTURE
CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT
TYPICAL INTAKE
(Q=1.00 cu.m/sec)
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
EXHIBIT-E.1.4.



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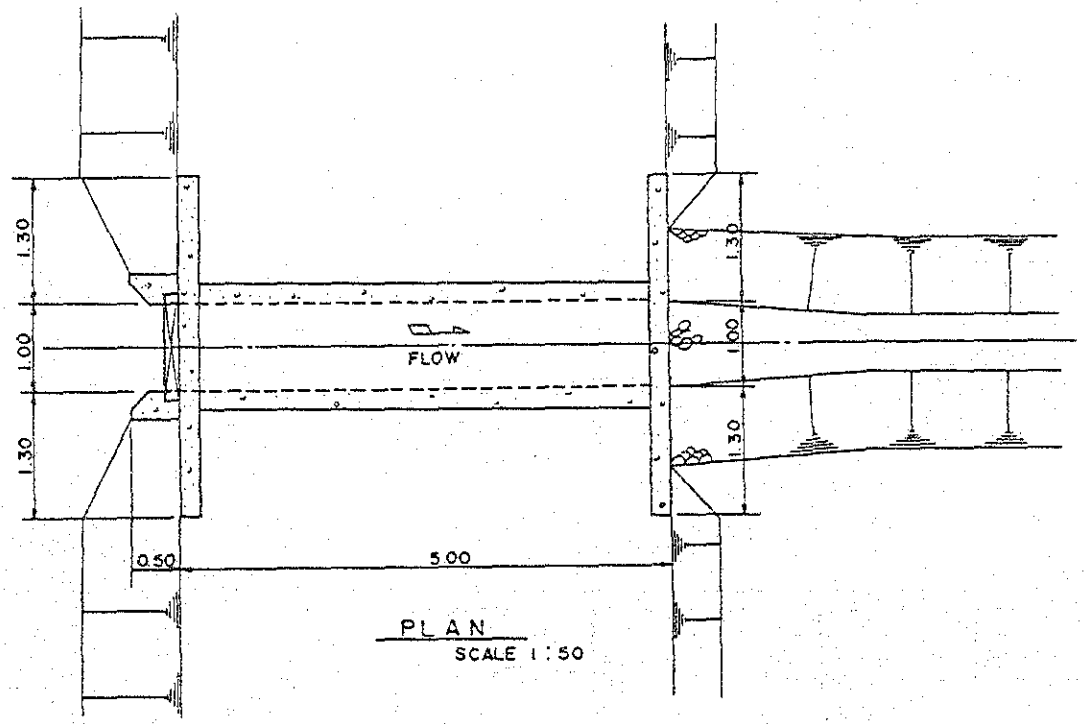
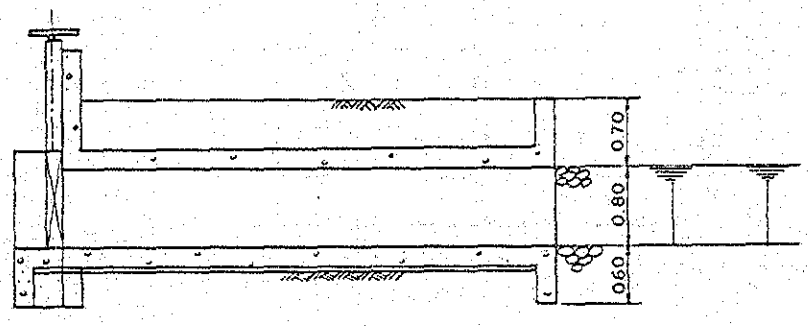
CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT

TYPICAL JET FLOW DIVISION WORKS (Q=2.5:0.5 cum/sec)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) | EXHIBIT-E.1.5.



PLAN
SCALE 1 : 50



PROFILE
SCALE 1 : 50

0 3.0m
SCALE 1 : 50

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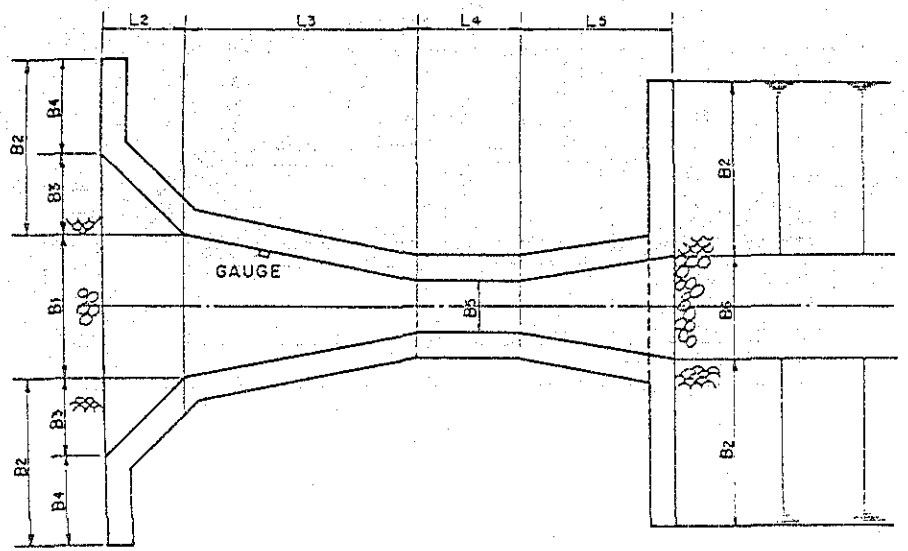
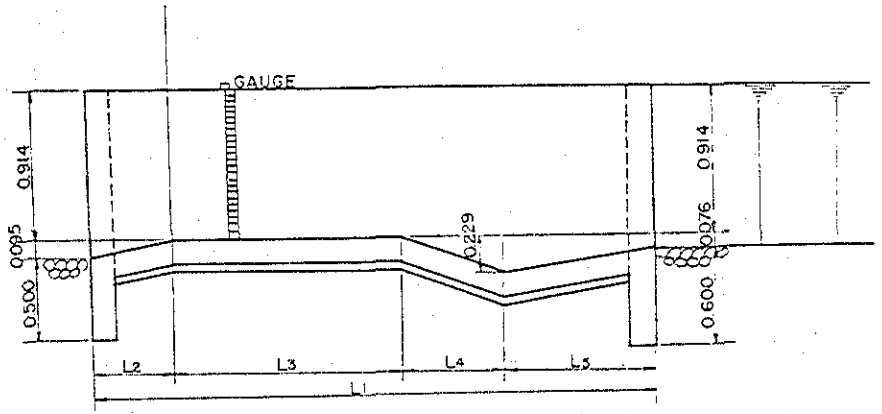
CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT

TYPICAL GATE CONTROLLED DIVISION WORKS (Q=0.20 cu.m/sec)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) | EXHIBIT-E.1.6.



PLAN



PROFILE

TYPE	DISCHARGE cum/sec	B_1	B_2	B_3	B_4	B_5	B_6
1 FOOT	Q=0.00311 ~ 0.697	0.845	1.00	0.381	0.619	0.3048	0.61
2 FEET	Q=0.0119 ~ 0.937	1.207	1.00	0.381	0.619	0.610	0.914
TYPE	DISCHARGE	L_1	L_2	L_3	L_4	L_5	—
1 FOOT	Q=0.00311 ~ 0.697	3.248	0.381	1.343	0.610	0.914	
2 FEET	Q=0.0119 ~ 0.937	3.400	0.381	1.495	0.610	0.914	

TABLE OF DIMENSIONS

ALL DIMENSIONS ARE GIVEN IN METERS.

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CASPIAN SEA COASTAL AREA
AGRICULTURAL DEVELOPMENT PROJECT

PARSHALL FLUME

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) | EXHIBIT-E.1.7