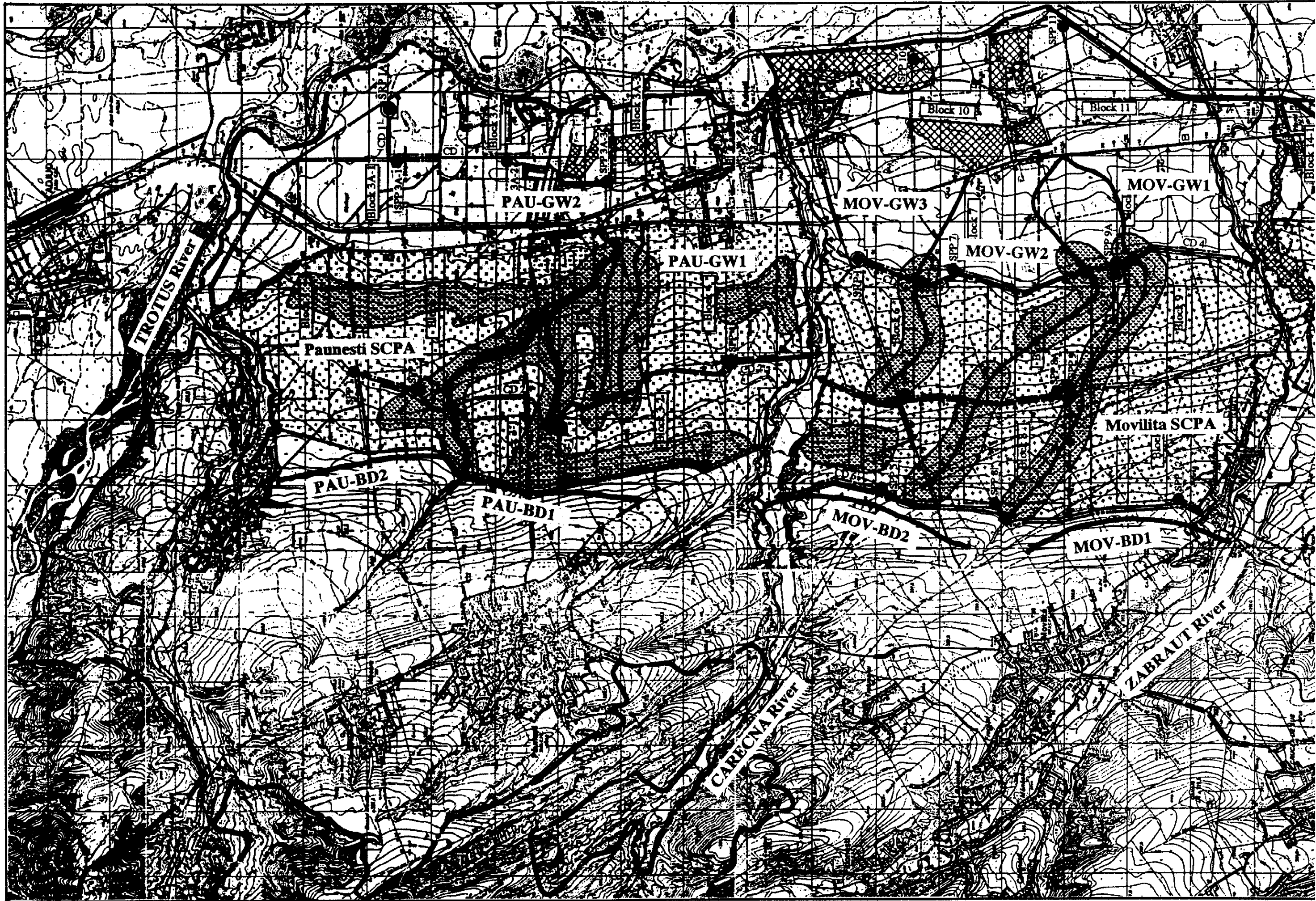
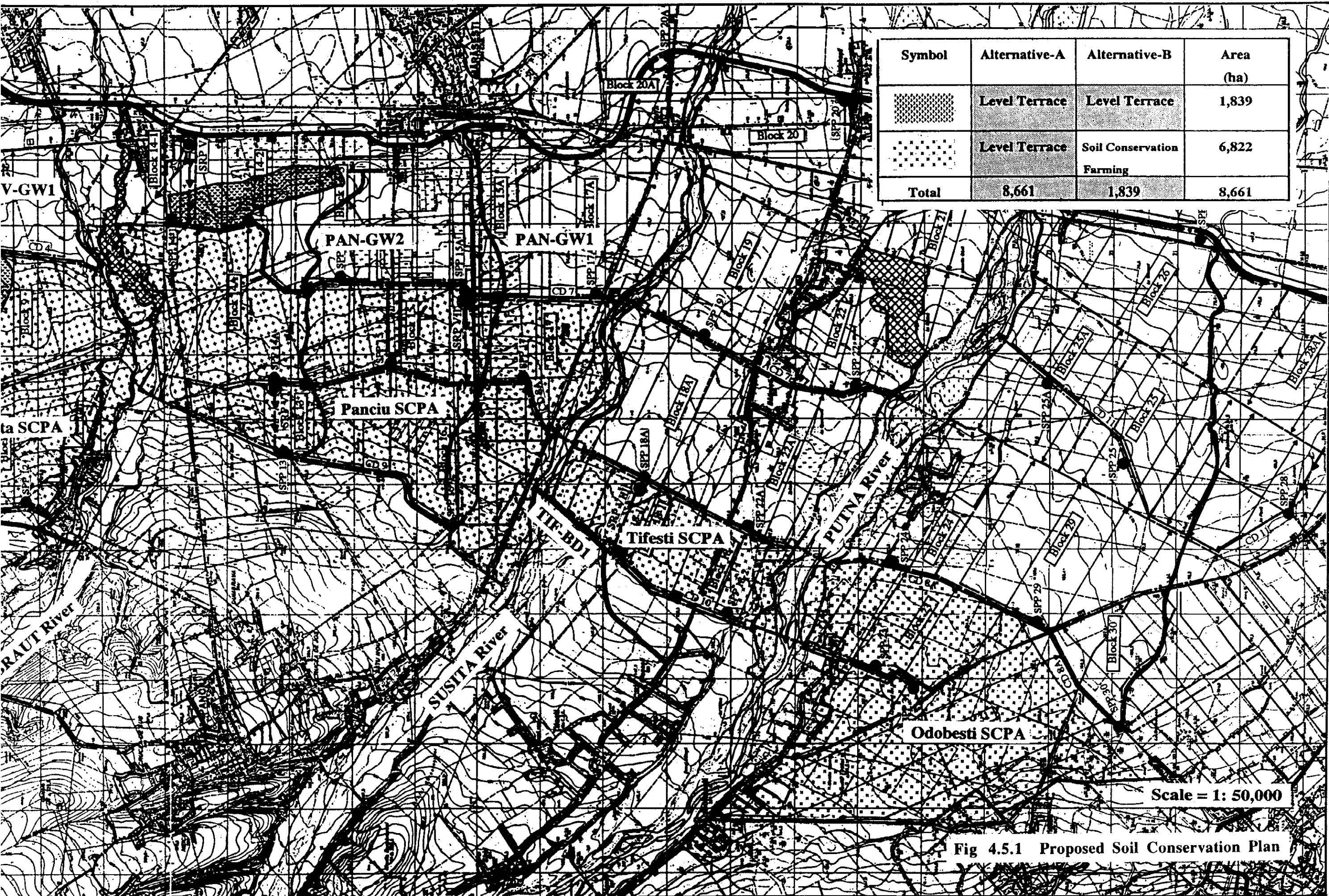


Fig 4.4.3 Layout of Drainage Facilities







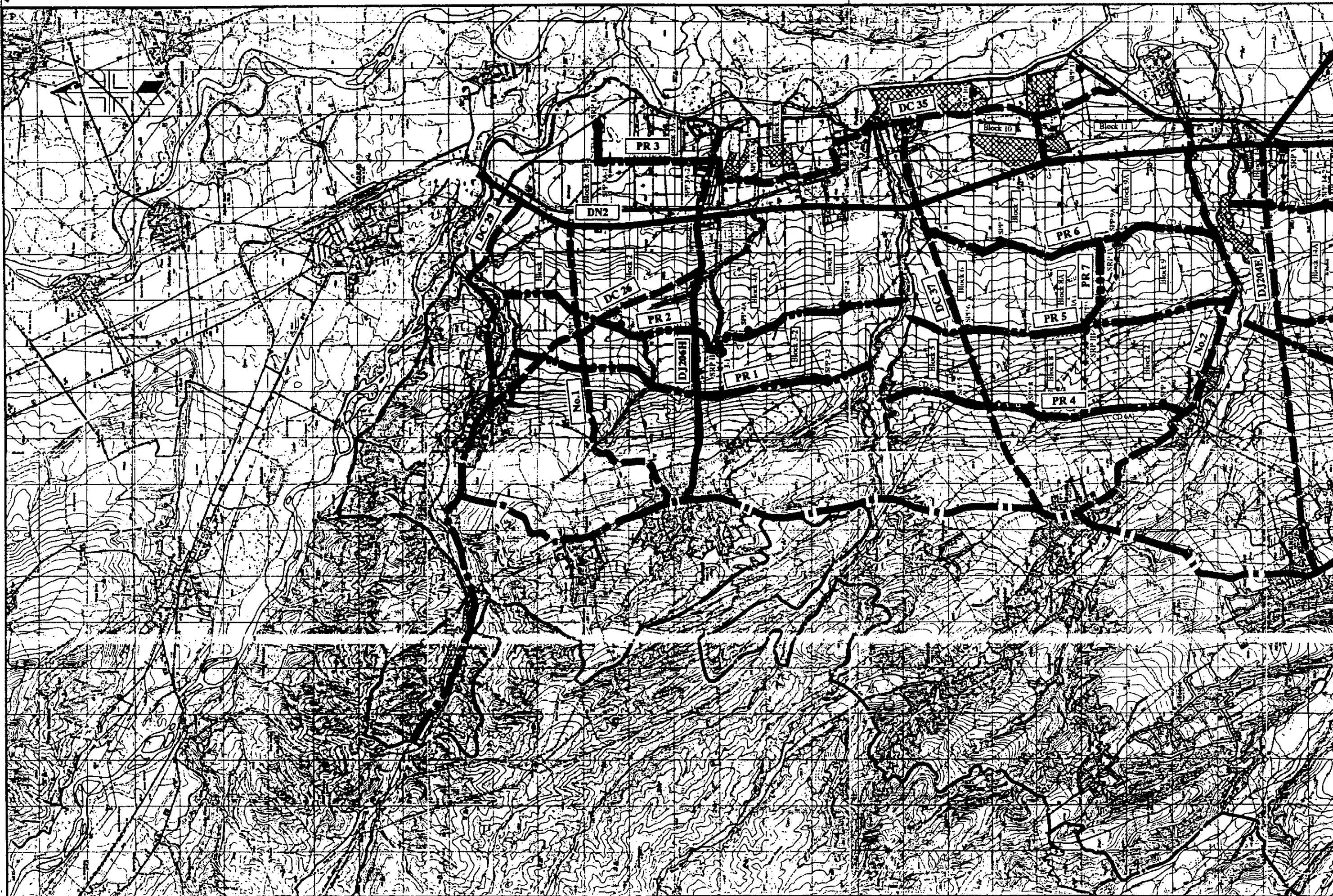
Symbol	Alternative-A	Alternative-B	Area (ha)
	Level Terrace	Level Terrace	1,839
	Level Terrace	Soil Conservation Farming	6,822
<b>Total</b>	<b>8,661</b>	<b>1,839</b>	<b>8,661</b>

Scale = 1: 50,000

Fig 4.5.1 Proposed Soil Conservation Plan

27° 15'

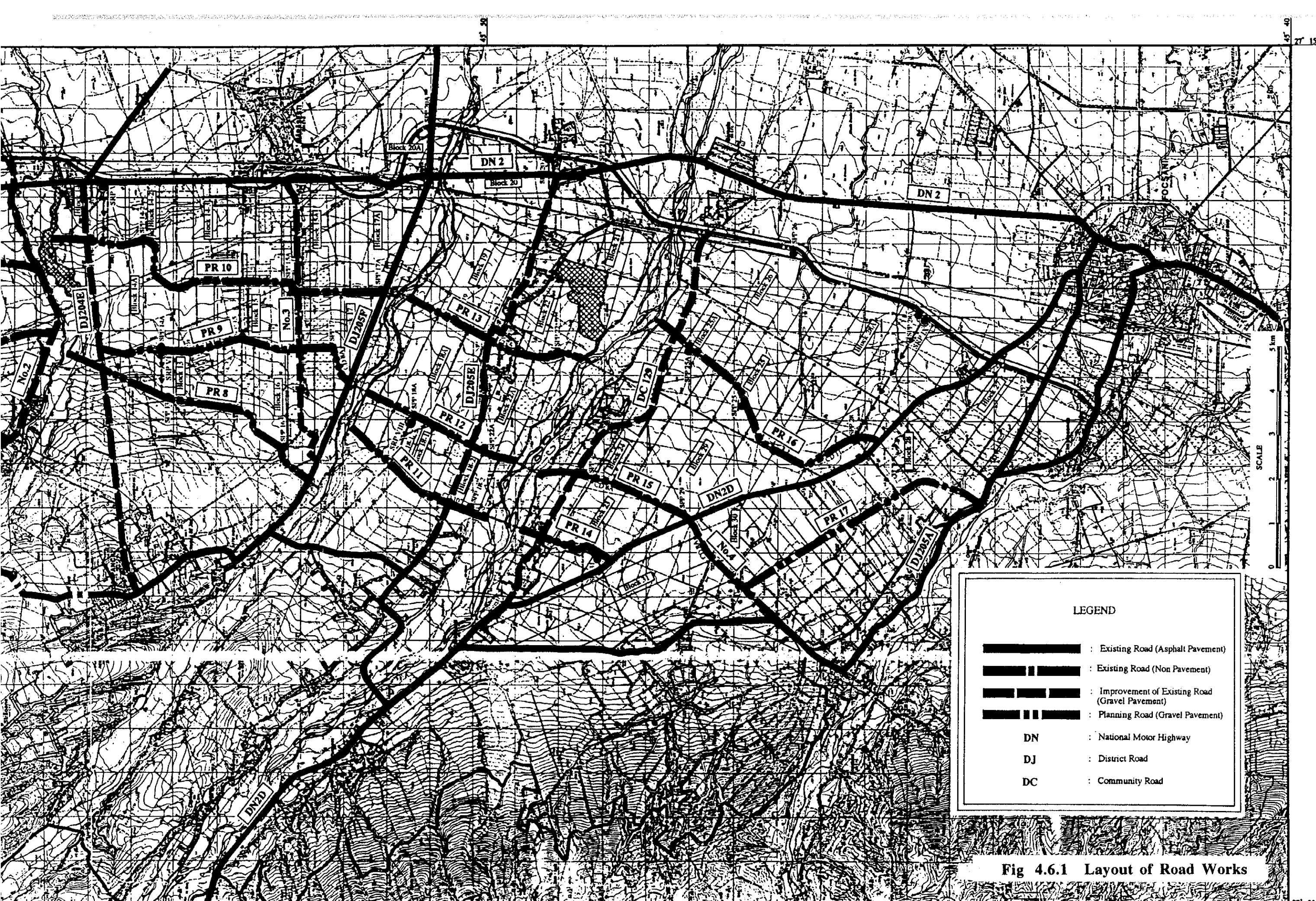
46° 00'







27° 00'

46° 00'

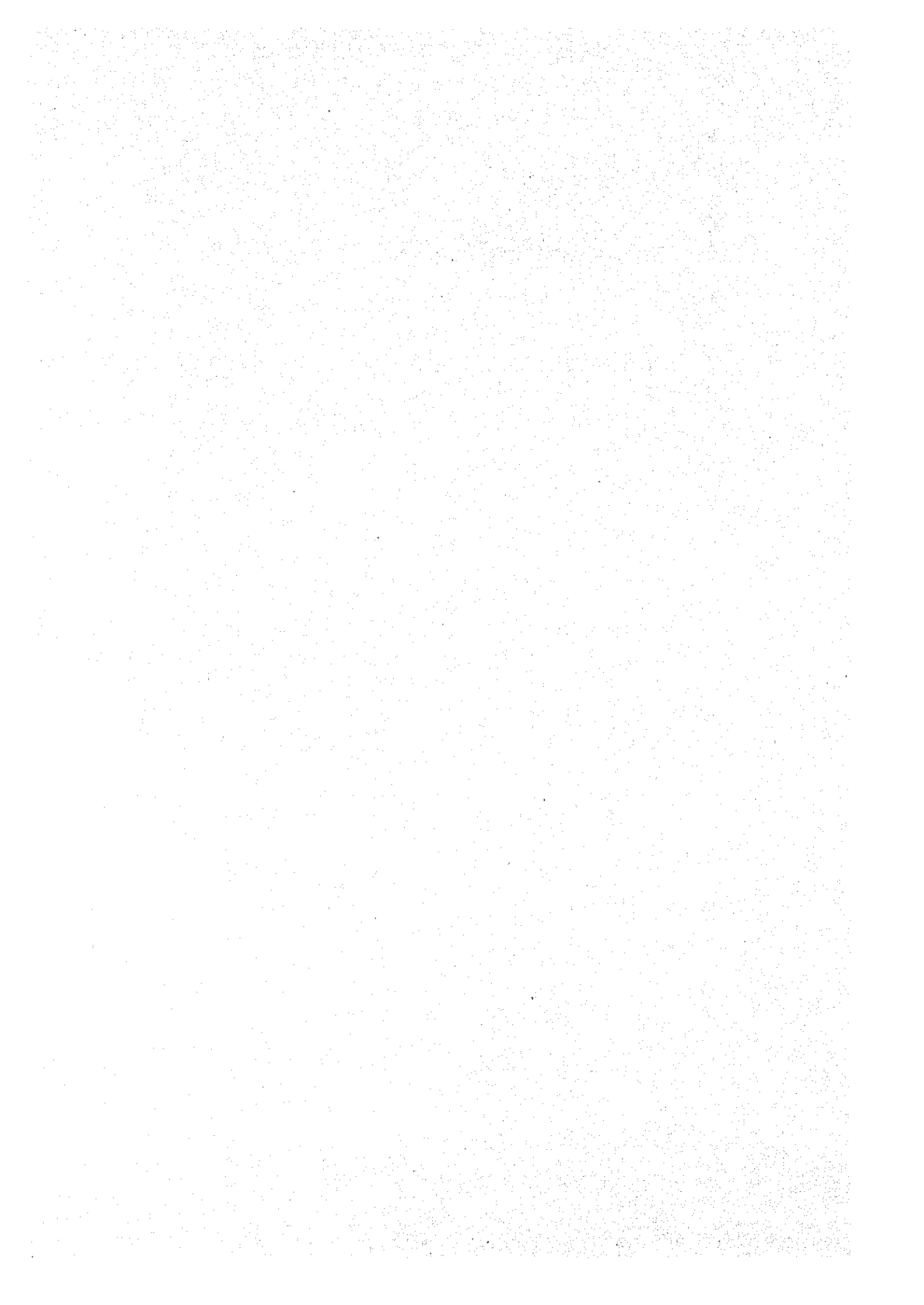




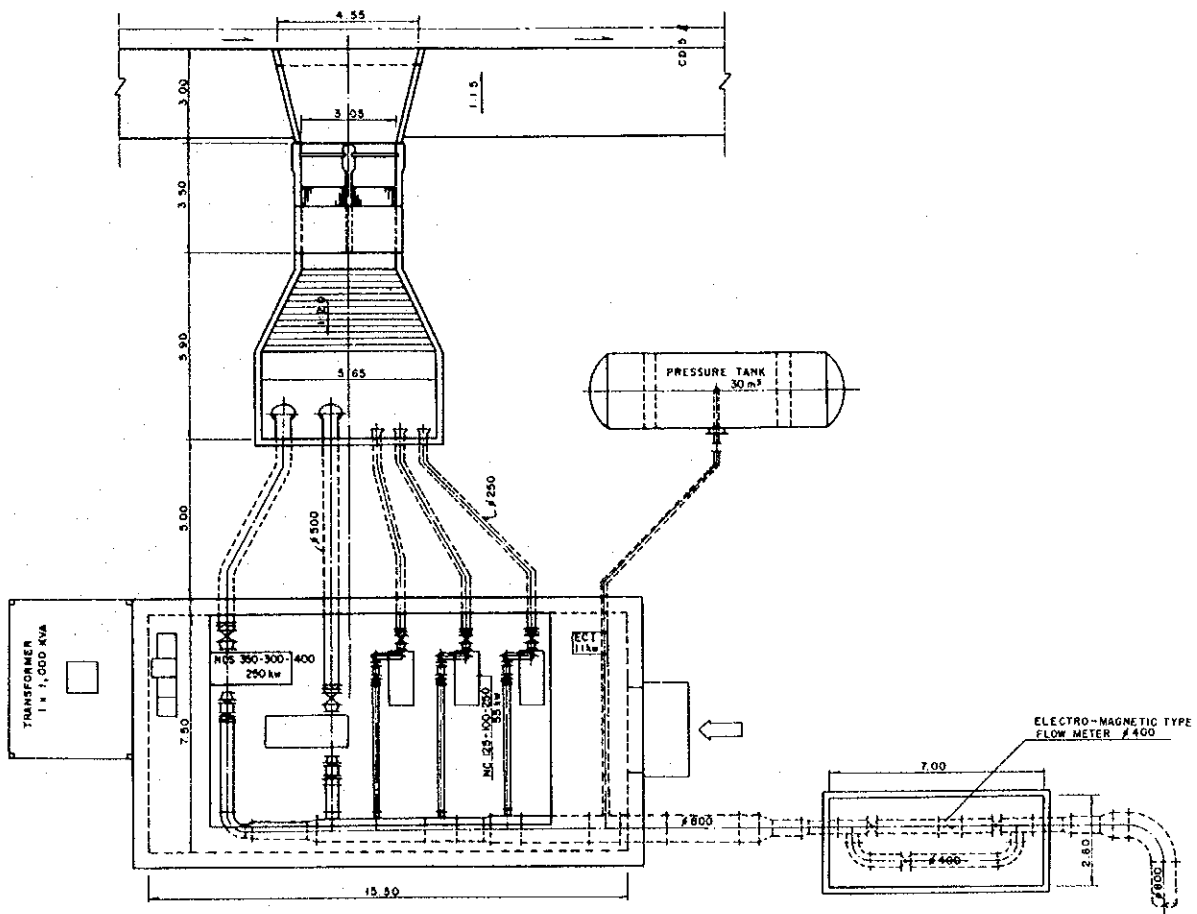
**LEGEND**

	: Existing Road (Asphalt Pavement)
	: Existing Road (Non Pavement)
	: Improvement of Existing Road (Gravel Pavement)
	: Planning Road (Gravel Pavement)
<b>DN</b>	: National Motor Highway
<b>DJ</b>	: District Road
<b>DC</b>	: Community Road

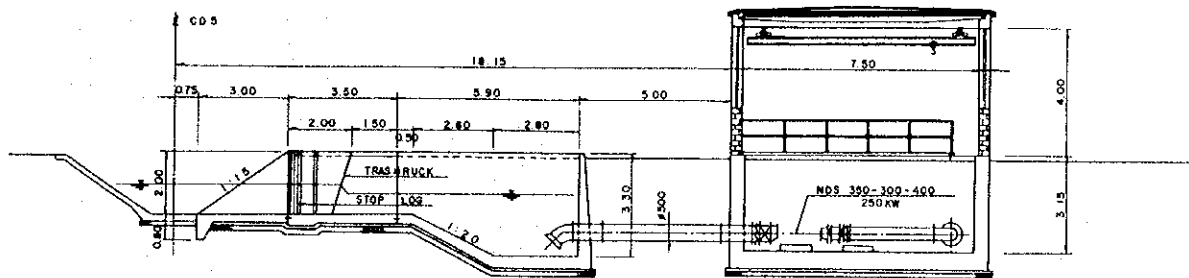
**Fig 4.6.1 Layout of Road Works**





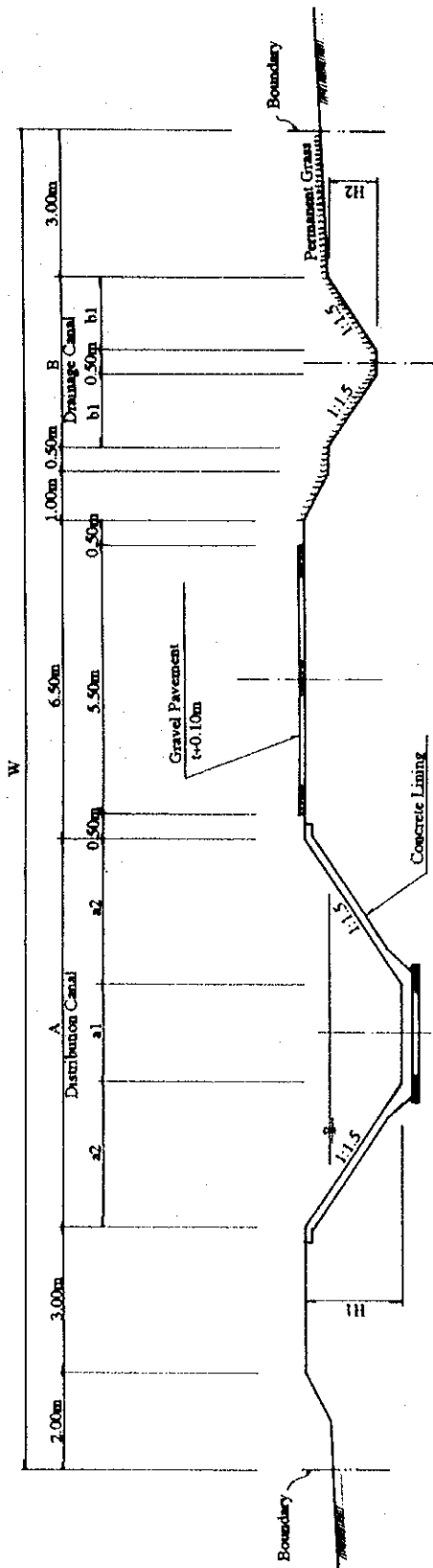


**Profile**



**Cross Section**

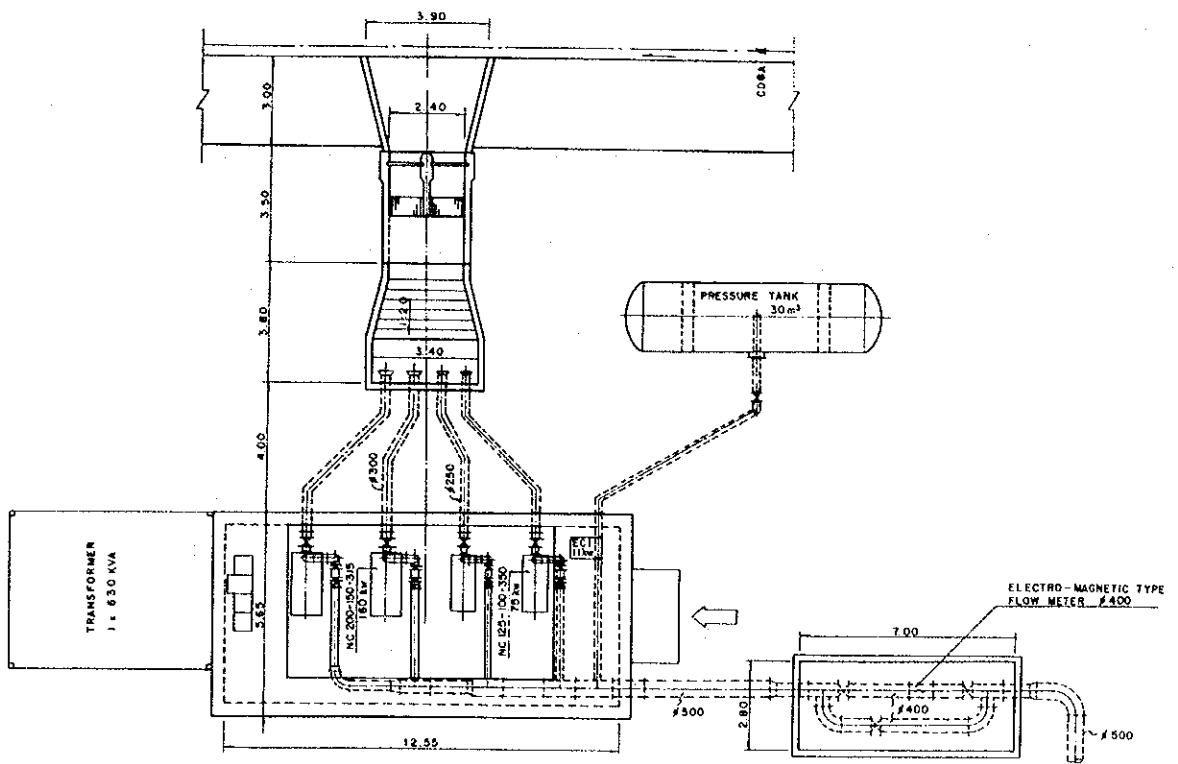
**Fig 4.7.1 Typical Drawing of SRP**



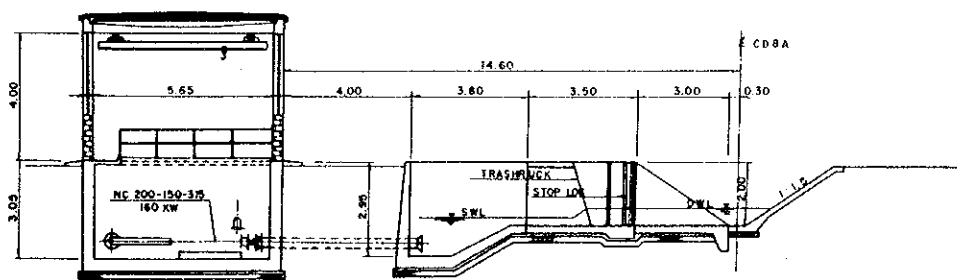
Dimension of Distribution Canal

Name of Canal Canal No.	Race No.	Canal Length			Bottom Slope (%)	Canal Dimension			Name of Canal Canal No.	Race No.	Canal Length			Bottom Slope (%)	Canal Dimension			
		Race (m)	Total (m)			Hm (m)	A (m)	a1 (m)			a2 (m)	Race (m)	Total (m)			Hm (m)	A (m)	a1 (m)
CD 1	I	1,150	5,100		0.020	1,685	6,055	1,000	2,528	CD 7	I	5,745	12,645	0.012	2,675	10,025	2,000	4,013
	II	1,655			0.020	1,620	5,860	1,000	2,430		II	3,000		0.020	2,330	7,990	1,000	3,495
	III	2,295			0.020	1,330	4,990	1,000	1,995		III	705		0.020	2,305	7,915	1,000	3,458
CD 2	I	3,300			0.015	1,730	6,690	1,500	2,595	CD 8	I	3,195		0.050	1,620	5,860	1,000	2,430
	II	2,500	7,105		0.015	1,720	6,660	1,500	2,580		II	3,010	3,010	0.015	2,295	8,385	1,500	3,443
	III	1,305			0.010	1,910	6,730	1,000	2,865		III	3,900		0.020	2,295	8,385	1,500	3,443
CD 3	I	2,260	2,260		0.020	1,430	5,290	1,000	2,145	CD 8A	I	4,650	12,550	0.020	2,580	9,240	1,500	3,870
	II	2,465			0.010	2,290	8,370	1,500	3,435		II	1,500		0.020	1,550	6,150	1,500	2,325
	III	4,785	7,950		0.012	2,300	8,400	1,500	3,450		III	2,500		0.020	1,850	7,050	1,500	2,775
CD 4	I	700			0.015	1,860	6,580	1,000	2,790	CD 9	I	3,450	3,450	0.020	2,090	7,270	1,000	3,135
	II	1,500	4,070		0.015	1,905	7,215	1,500	2,858		II	2,285		0.012	2,160	7,480	1,000	3,240
	III	2,570			0.015	1,645	5,935	1,000	2,468		III	2,510	5,595	0.012	1,485	5,455	1,000	2,228
CD 5	I	1,060	4,535		0.020	1,975	7,425	1,500	2,963	CD 10	I	800		0.012	1,880	6,640	1,000	2,820
	II	3,475			0.015	2,150	7,450	1,000	3,225		II	2,500		0.015	1,635	5,905	1,000	2,453
CD 6A	I	1,920	1,920		0.020	1,690	6,070	1,000	2,535	CD 11	I	1,500	6,180	0.015	1,935	6,805	1,000	2,903
	II	2,180			0.015	1,655	5,965	1,000	2,483		II	2,180		0.015	1,655	5,965	1,000	2,483

Fig 4.7.2 Standard Cross Section of Distribution Canal

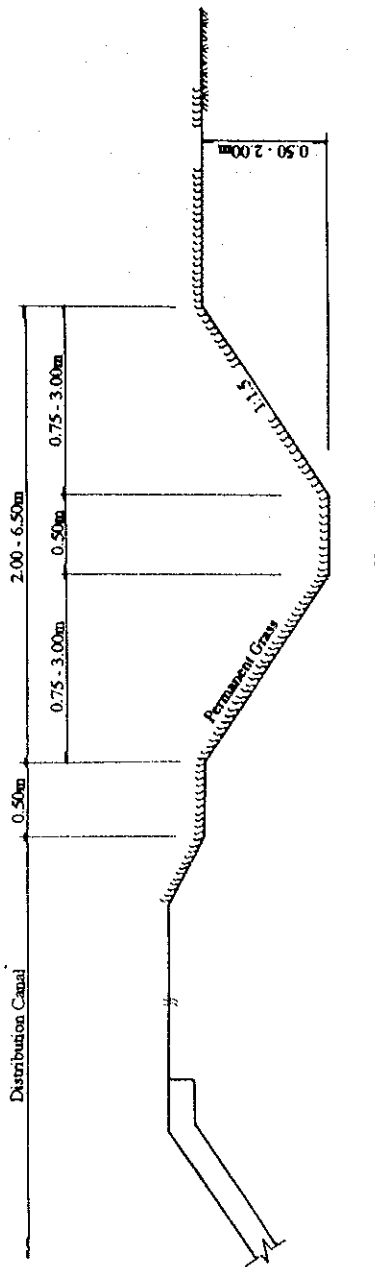


**Profile**

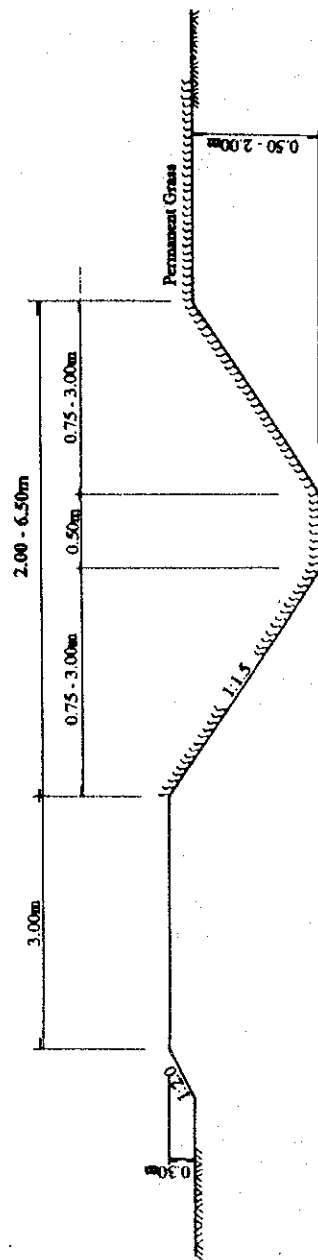


**Cross Section**

**Fig 4.7.3 Typical Drawing of SPP**



Type-I



Type-II

Table of Flow Capacity

Bottom Slope  $I=1/1,000$

H (m)	Q (m <sup>3</sup> /s)	V (m/s)	A (m <sup>2</sup> )
0.50	0.24	0.38	0.63
0.75	0.58	0.47	1.22
1.00	1.12	0.56	2.00
1.25	1.89	0.64	2.97
1.50	2.93	0.71	4.13
1.75	4.27	0.78	5.47
2.00	5.93	0.85	7.00

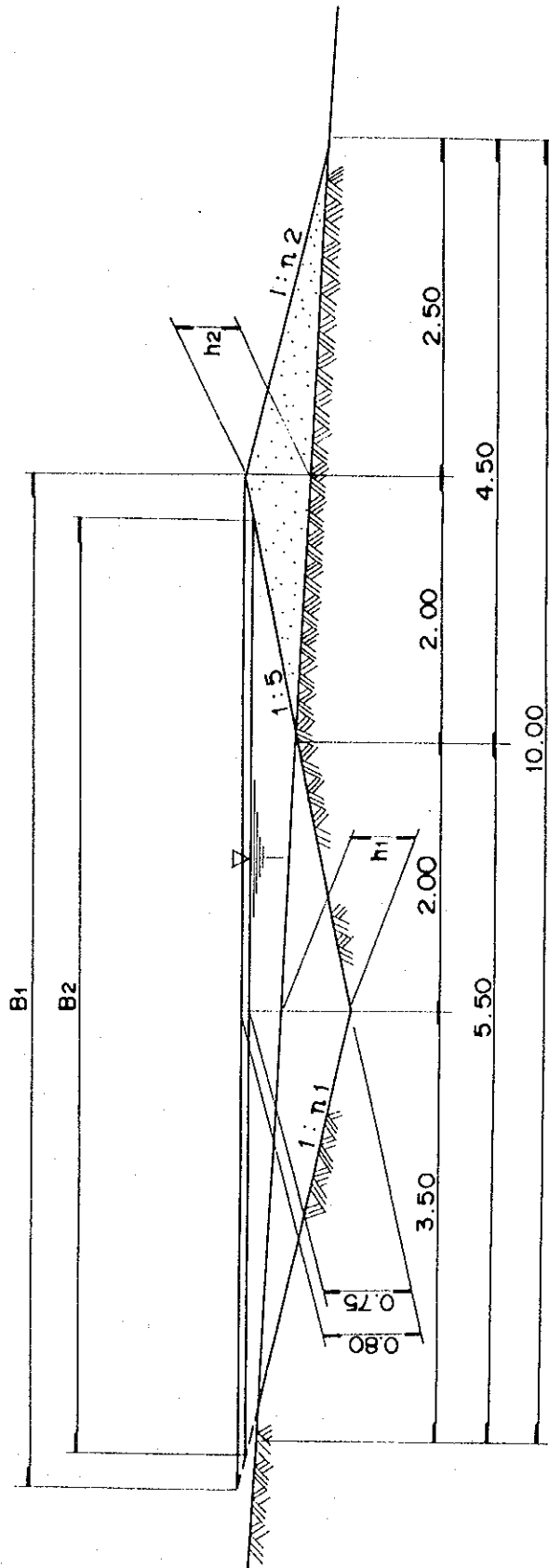
Bottom Slope  $I=1/1,500$

H (m)	Q (m <sup>3</sup> /s)	V (m/s)	A (m <sup>2</sup> )
0.50	0.19	0.31	0.63
0.75	0.47	0.39	1.22
1.00	0.91	0.46	2.00
1.25	1.55	0.52	2.97
1.50	2.39	0.58	4.13
1.75	3.49	0.64	5.47
2.00	4.84	0.69	7.00

Bottom Slope  $I=1/2,000$

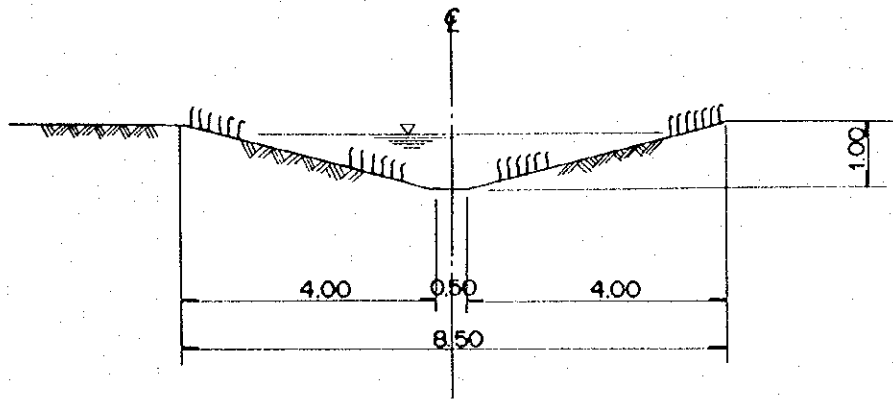
H (m)	Q (m <sup>3</sup> /s)	V (m/s)	A (m <sup>2</sup> )
0.50	0.17	0.27	0.63
0.75	0.41	0.34	1.22
1.00	0.79	0.40	2.00
1.25	1.34	0.45	2.97
1.50	2.07	0.50	4.13
1.75	3.02	0.55	5.47
2.00	4.19	0.60	7.00

Fig 4.7.4 Standard Cross Section of Drainage Canal

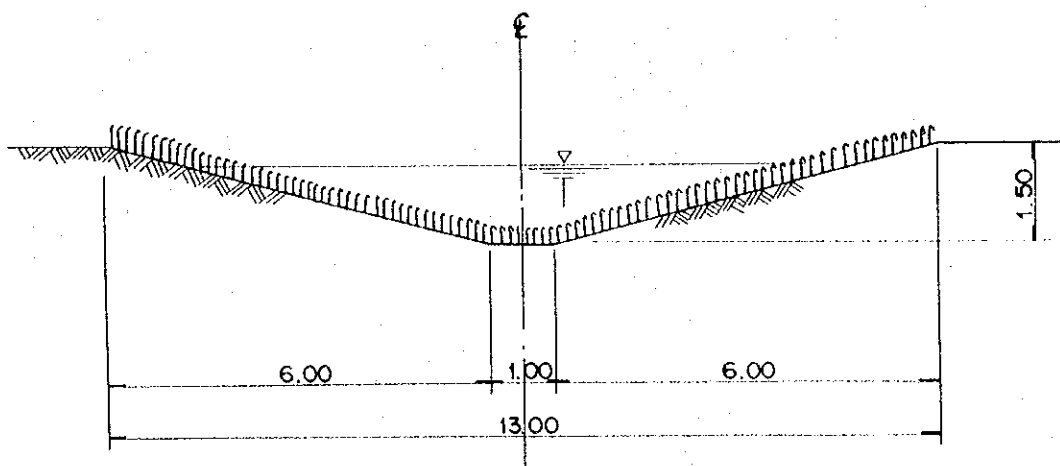


Slope declination	h1 (m)	h2 (m)	d (m)	B1 (m)	B2 (m)	n1	n2	Cut volume (m <sup>3</sup> /m)	Fill volume (m <sup>3</sup> /m)	Terrace storage (m <sup>3</sup> /m)
2%	0.440	0.440	0.750	8.800	8.250	6.000	5.102	1.100	0.990	3.094
3%	0.460	0.460	0.750	8.364	7.841	5.455	4.673	1.150	1.035	2.940
5%	0.500	0.500	0.750	7.692	7.211	4.615	4.000	1.250	1.125	2.704

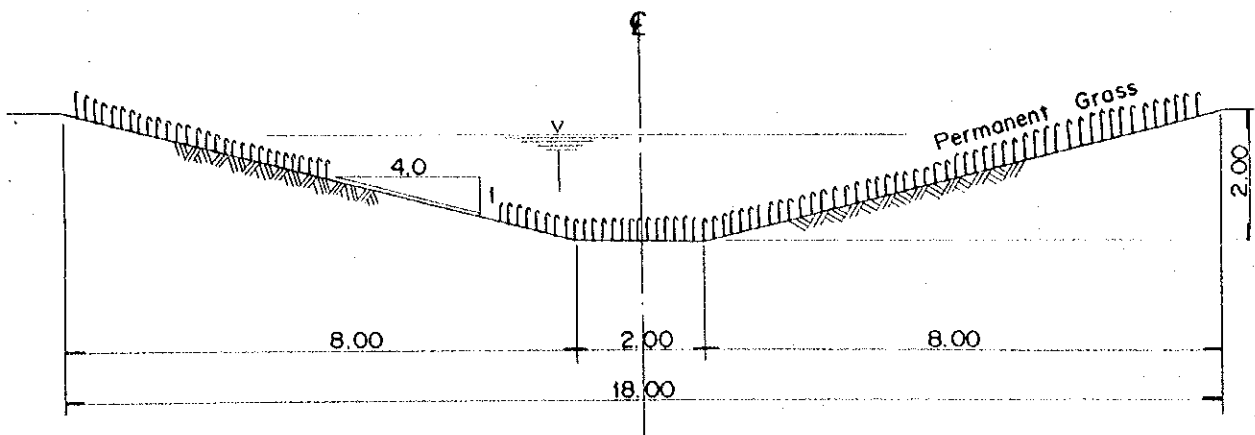
Fig 4.7.5 Typical Cross Section of Level Terrace



Type C

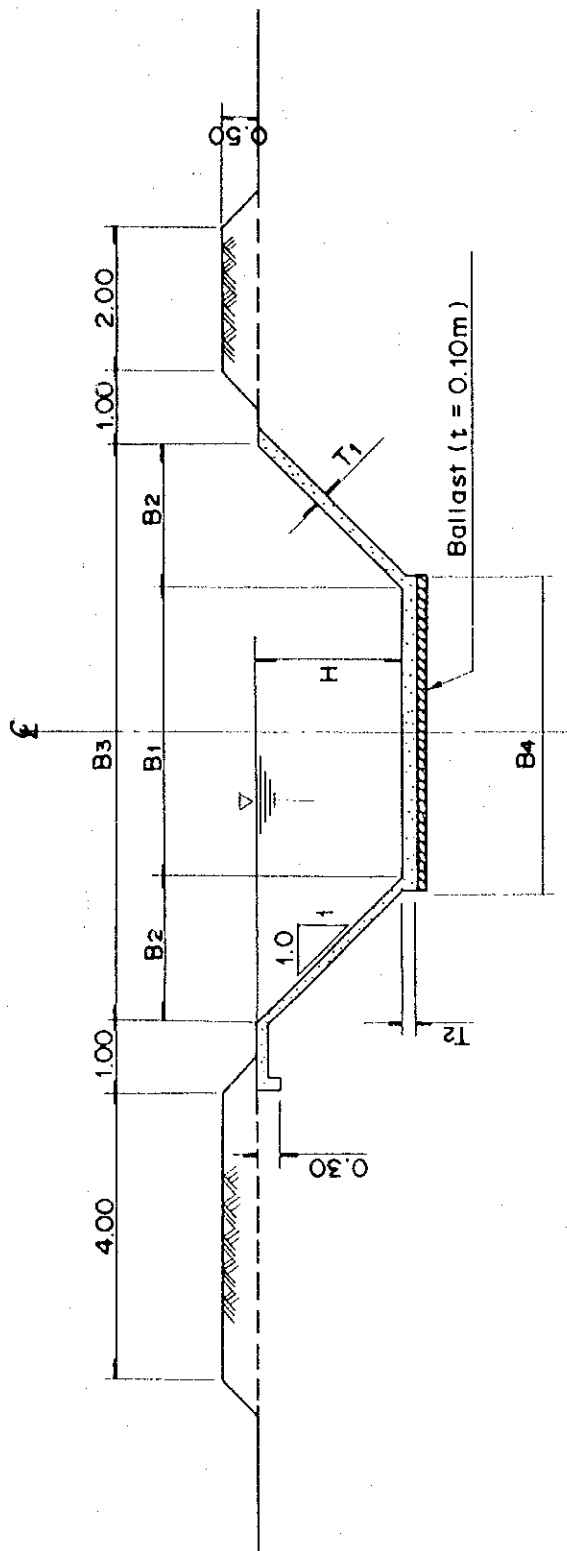


Type B



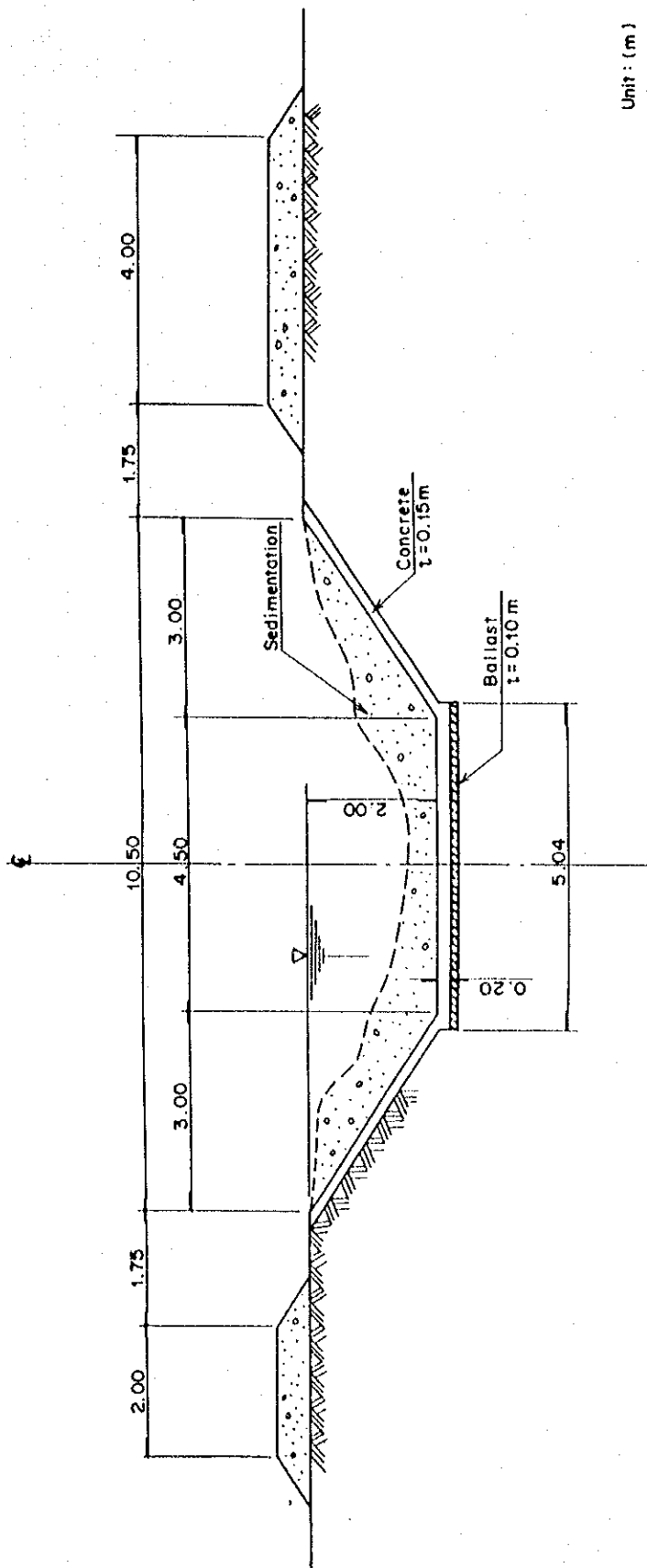
Type A

**Fig 4.7.6 Typical Cross Section of Grassed Waterway**



Canal Type	Channel Slope	Capacity (m <sup>3</sup> /s)	B1 (m)	B2 (m)	B3 (m)	B4 (m)	H (m)	T1 (m)	T2 (m)
A	1/100	1.11	0.50	0.50	1.50	0.78	0.50	0.10	0.10
B	1/200	6.12	1.00	1.00	3.00	1.42	1.00	0.15	0.20
C	1/200	7.79	1.50	1.00	3.50	1.92	1.00	0.15	0.20
D	1/200	8.45	1.70	1.00	3.70	2.12	1.00	0.15	0.20
E	1/200	9.40	2.00	1.00	4.00	2.42	1.00	0.15	0.20
F	1/200	9.98	2.20	1.00	4.20	2.62	1.00	0.15	0.20
G	1/200	13.94	2.20	1.20	4.60	2.62	1.20	0.15	0.20
H	1/200	16.38	2.50	1.25	5.00	2.92	1.25	0.15	0.20

Fig 4.7.7 Typical Cross Section of BDC



Unit : ( m )

Fig 4.7.8 Typical Cross Section of Soimubui Canal



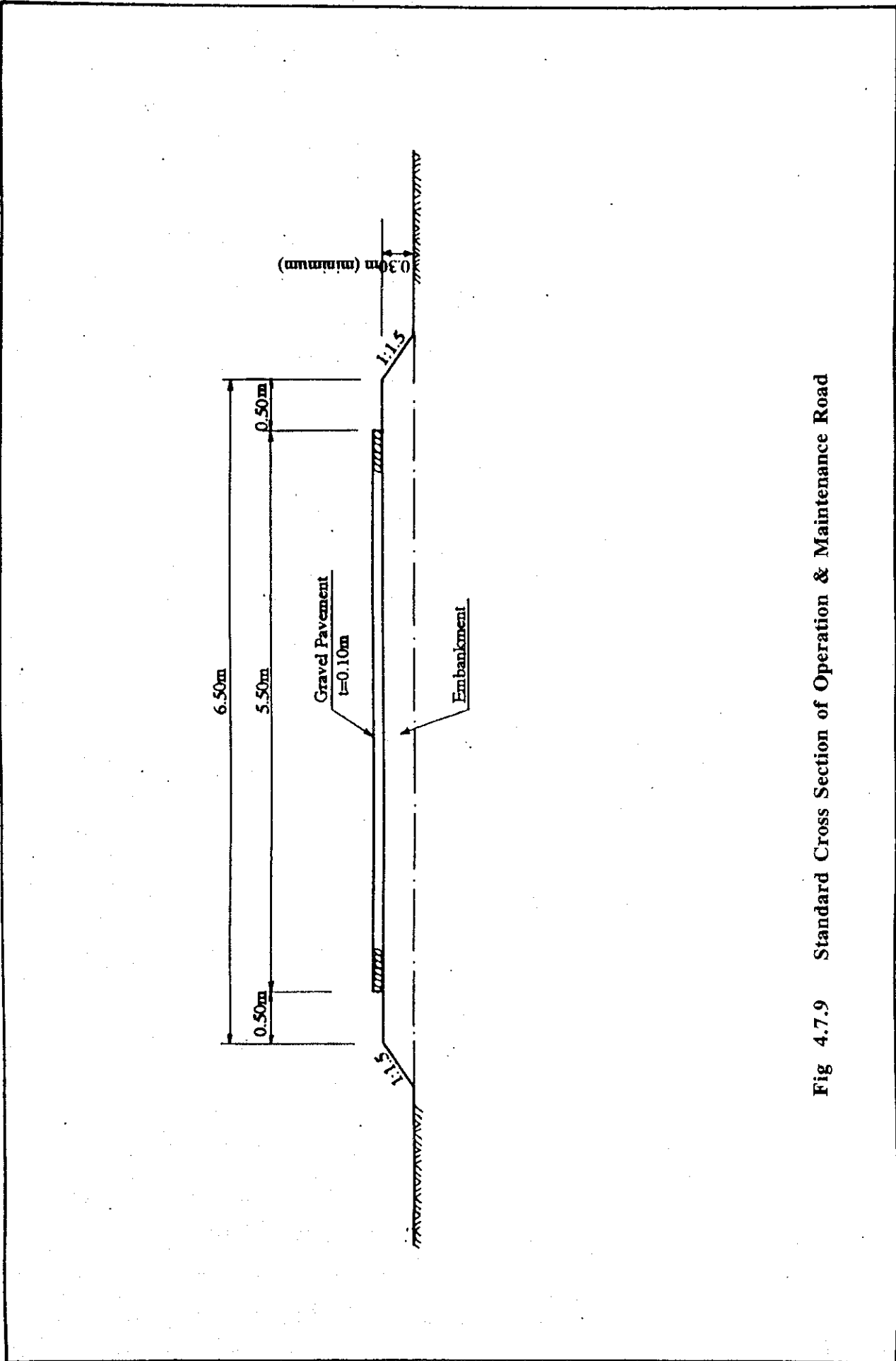


Fig 4.7.9 Standard Cross Section of Operation & Maintenance Road

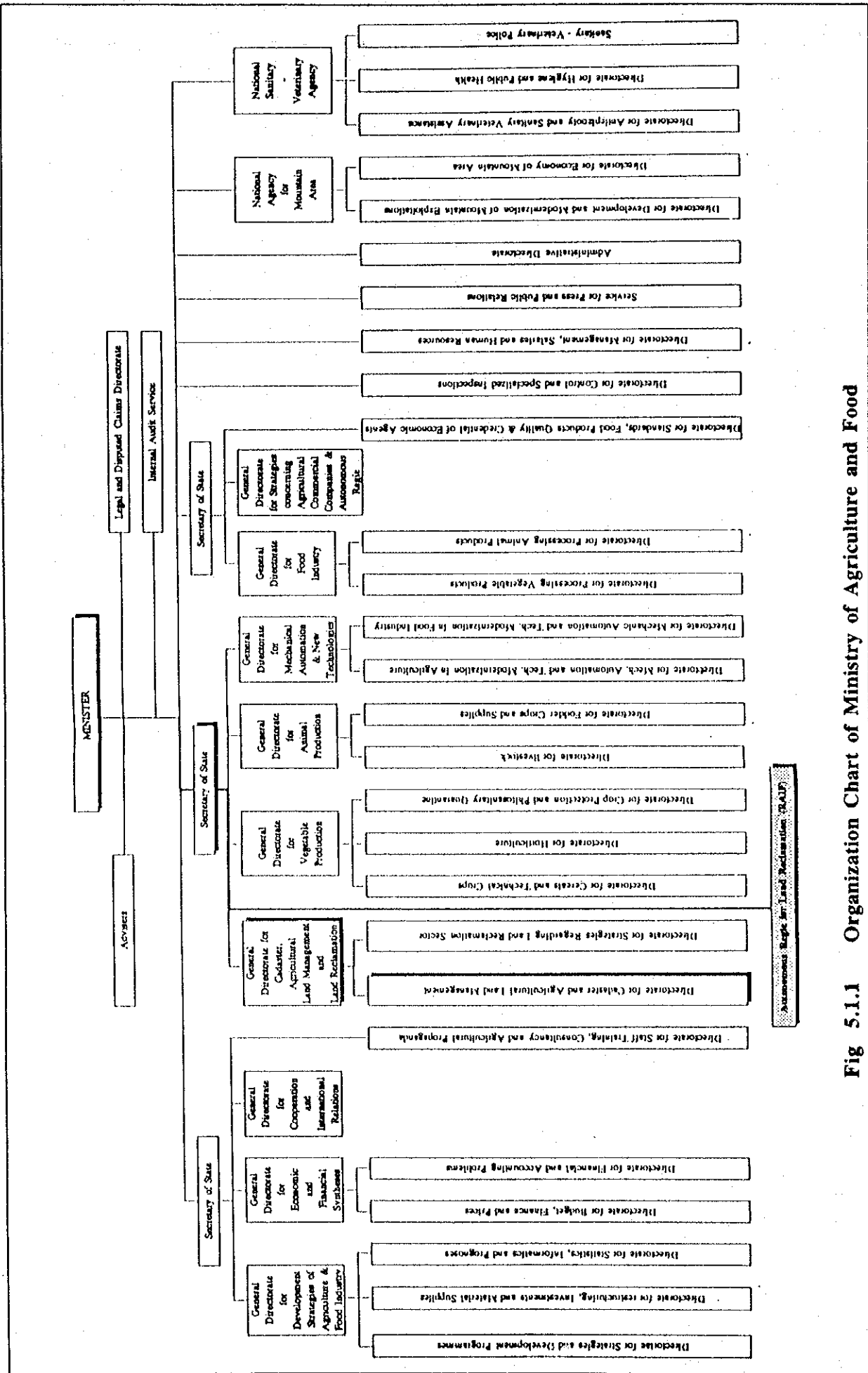


Fig 5.1.1 Organization Chart of Ministry of Agriculture and Food

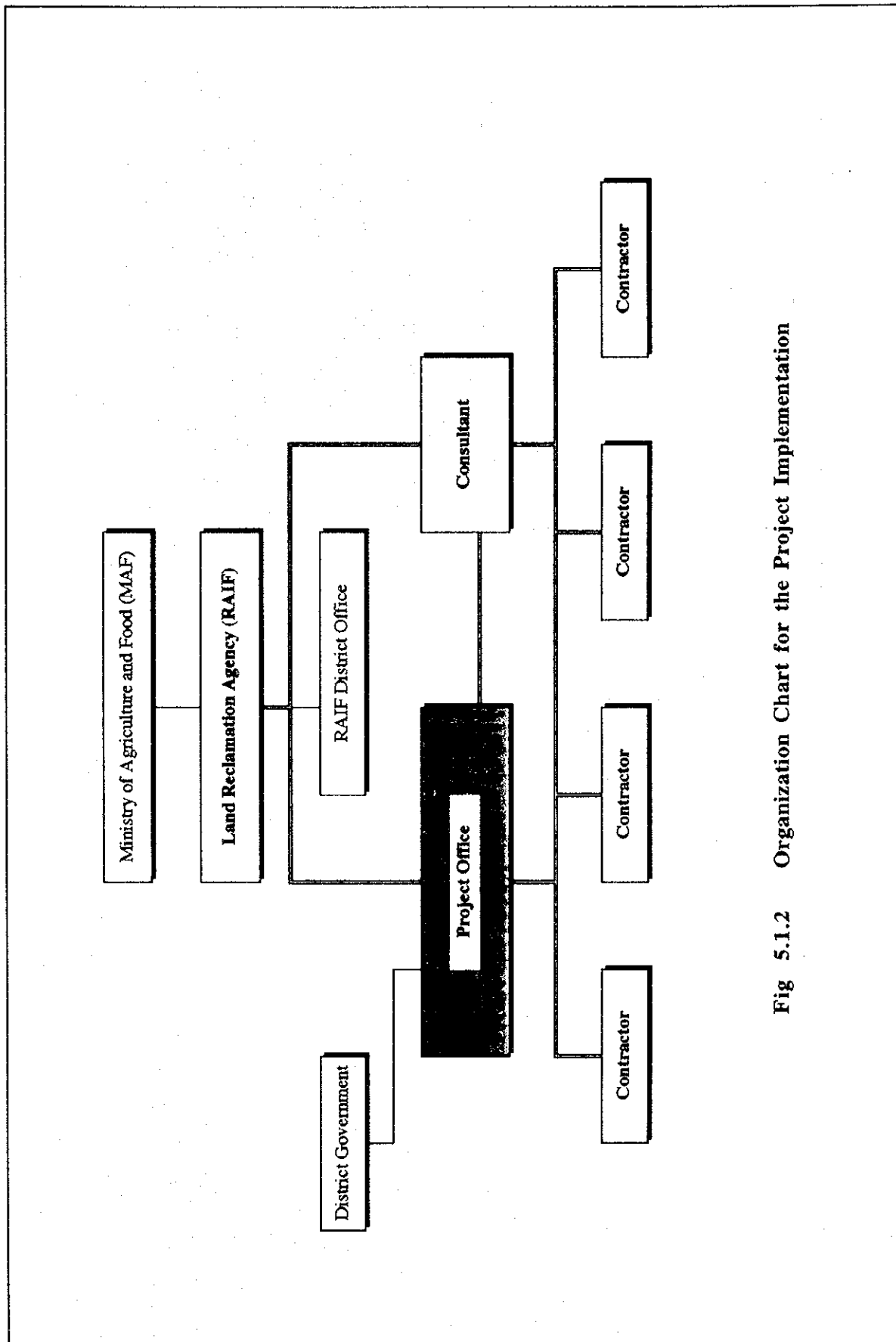
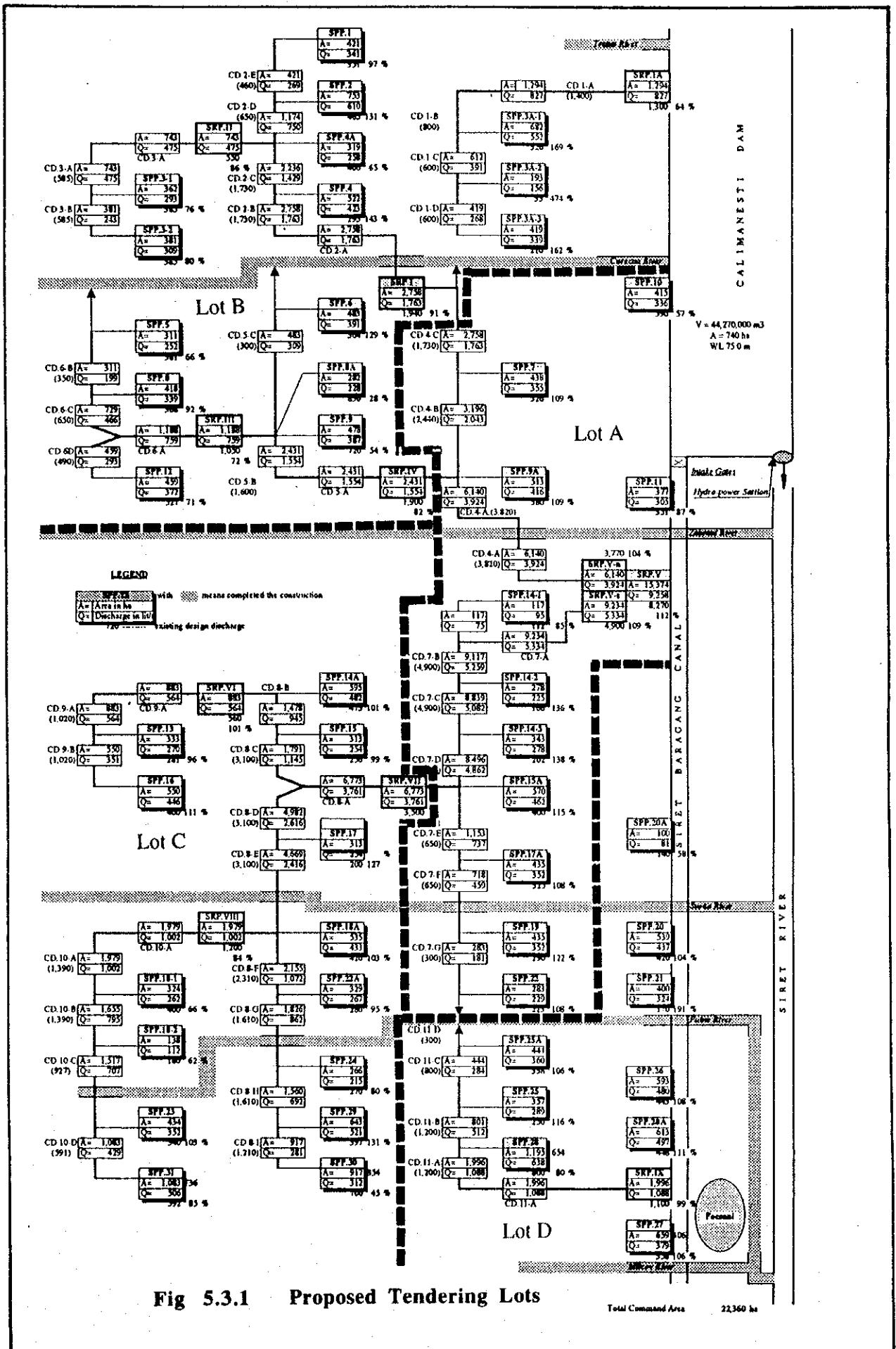


Fig 5.1.2 Organization Chart for the Project Implementation

Work Item	1st year				2nd Year				3rd Year				4th Year				5th Year				6th Year				Remarks				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4					
<b>Loan Arrangement</b>																													
Application of Loan																													
Exchange of Notes between Governments																													
Appraisal Mission																													
Loan Agreement																													
<b>Detailed Design Phase</b>																													
Formalities in Romanian Government																													
Procurement of Consultants																													
Detailed Design																													
<b>Construction Phase</b>																													
Tendering for Construction																													
Construction Phase I																													
Land Acquisition																													
SRP-V, CD-4 & CD-7 System (5,543 ha)																													
SRP-IA, SPP-10 & SPP-11 (2,087 ha) includes Project Office																													
SRP-II & SRP-IV Systems (1,814 ha)																													
SRP-VII System (6,722 ha)																													
Construction Phase II																													
Land Acquisition																													
SRP-IX, SPP-20A and Others (4,951 ha)																													
Construction Supervision																													
<b>Operation and Maintenance</b>																													
Construction Siret - Baragan Canal (5.5 km - 32 km)																													
								</																					



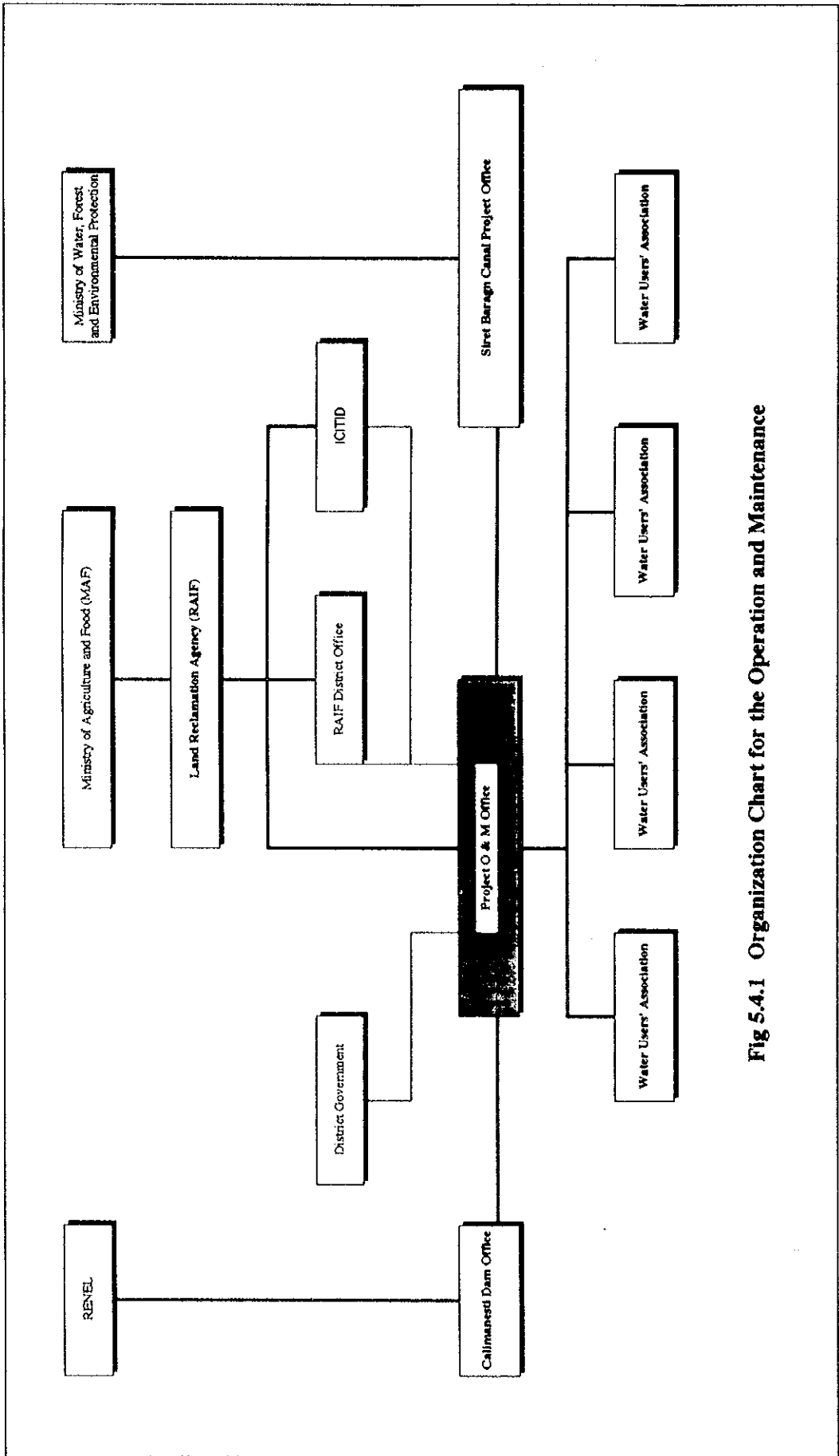


Fig 5.4.1 Organization Chart for the Operation and Maintenance

*APPENDIX - 1*

**SCOPE OF WORK  
FOR  
THE STUDY**

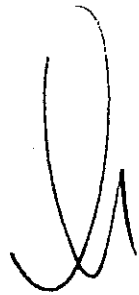




SCOPE OF WORK  
FOR  
THE FEASIBILITY STUDY  
ON  
THE IRRIGATION PROJECT  
IN  
RUGINESTI-PUFESTI-PANCIU DISTRICT VRANCEA

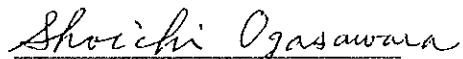
AGREED UPON BETWEEN  
MINISTRY OF AGRICULTURE AND FOOD OF ROMANIA  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

Bucuresti, 15, December, 1993



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MR. VASILE BERBECI  
SECRETARY OF STATE  
MINISTRY OF AGRICULTURE  
AND FOOD  
DEPT. OF LAND RECLAMATION



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MR. SHOICHI OGASAWARA  
LEADER  
PREPARATORY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY

## I. Introduction

In response to the request of the Government of Romania, the Government of Japan has decided to conduct the Feasibility Study on The Irrigation Project in Ruginesti-Pufesti-Panciu District Vrancea (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Romania.

The present document sets forth the scope of work with regard to the Study.

## II. Objectives of the Study

The objectives of the Study are:

1. to conduct a Feasibility Study on the Irrigation Project in Ruginesti-Pufesti-Panciu District Vrancea.
2. to carry out technology transfer to the counterpart personnel of the Government of Romania in the course of the Study.

## III. Study Area

The total study area covers about 47,000 ha (agricultural area about 38,000 ha) located in the boundary of Ruginesti-Pufesti-Panciu project in the District Vrancea.

## IV. Scope of the Study

In order to achieve the above objectives, the Study will consist of two (2) phases and the following items.

### 1. Phase I

1.1. Collection and review of existing data and information and field survey on the following items:

- (1) natural condition (topography, meteorology, hydrology, soil, water quality, water resources, etc);
- (2) social condition (population, regional socio-economy, social infrastructure, regional development plan etc);

- (3) agriculture (land use, land tenure, land conservation, cultivation technique, cropping pattern, production, agricultural machinery, etc);
  - (4) agro economy (farmers economy, agricultural credit, processing, marketing system, etc);
  - (5) agricultural infrastructures (irrigation and drainage system, farm road and rural water supply, etc);
  - (6) agricultural supporting system (farmers' organizations, supporting organizations, extension service organizations, etc); and
  - (7) environmental condition (natural condition, social condition, etc).
- 1.2. Review of the existing development plans and projects in the Study Area.
  - 1.3. Identification and evaluation of the development potentials of irrigation and land conservation and constraints based on the results of the above survey.

## 2. Phase II

- 2.1. Field survey for collection of supplementary data and information of the Study areas.
- 2.2. Formulation of the Irrigation and agricultural development plan of the Study areas by considering the following components:
  - (1) Irrigation and Drainage;
  - (2) Land conservation;
  - (3) Cropping pattern;
  - (4) Land use;
  - (5) Rural infrastructure;
  - (6) Marketing system; and
  - (7) Farmers' organization and supporting service.
- 2.3. Preparation of environmental conservation plan.
- 2.4. Preparation of a preliminary design of the main facilities.
- 2.5. Preparation of an operation and maintenance plan of the facilities.

- 2.6. Preparation of the project implementation plan.
- 2.7. Estimation of the project costs and benefits.
- 2.8. Evaluation of the project.
- 2.9. Recommendation.

#### V. Study Schedule

The Study will be carried out in accordance with the tentative schedule attached in Annex.

#### VI. Report

JICA shall prepare and submit the following reports in English to Romania.

1. Inception Report  
Ten (10) copies at the commencement of the Phase I field work.
2. Progress Report (1)  
Ten (10) copies at the end of the Phase I field work.
3. Interim Report  
Ten (10) copies at the commencement of the Phase II field work.
4. Progress Report (2)  
Ten (10) copies at the end of the Phase II field work.
5. Draft Final Report  
Ten (10) copies at the end of the Phase II home office work. The Romania side will provide its comments on the Draft Final Report to JICA within one (1) month after receiving the Draft Final Report.
6. Final Report  
Thirty (30) copies within two (2) months after the receipt of comments on the Draft Final Report.

VII. Undertakings of the Government of Romania.

1. To facilitate the smooth conduct of the Study, the Government of Romania shall take necessary measures:
  - (1) to secure the safety of the Japanese study team;
  - (2) to permit the members of the Japanese study team to enter, leave and sojourn in Romania for the duration of their assignment therein, and exempt them from visa fees;
  - (3) to exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and other materials to be brought into and out of Romania for the conduct of the Study;
  - (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study, if necessary;
  - (5) to provide necessary facilities to the Japanese study team for the remittance as well as the utilization of the funds introduced into Romania from Japan in connection with the implementation of the Study, if necessary;
  - (6) to secure permission for entry into private properties or restricted areas for the implementation of the Study;
  - (7) to secure permission for the Japanese study team to take all data and documents (including photographs and maps) related to the Study out of Romania to Japan by the Japanese study team; and
  - (8) to provide medical services as needed. Its expenses will be chargeable on the members of the Japanese study team.
2. The Government of Romania shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

3. Ministry of Agriculture and Food shall act as a counterpart agency to the Japanese study team and also as coordinating body in relation with other Romanian organizations concerned for the smooth implementation of the Study.
4. Ministry of Agriculture and Food shall act as the implementing agency. It shall undertake, at its own expense, to provide the Japanese study team with the following, in cooperation with other organizations concerned:
  - (1) available data and information related to the Study;
  - (2) additional survey related to the study, if necessary;
  - (3) counterpart personnel;
  - (4) suitable office space with necessary equipment and furniture;
  - (5) credentials or identification cards.

#### VIII. Undertakings of JICA

For the implementation of the Study, JICA shall take the following measures:

- (1) to dispatch, at its own expense, the study team to the Romania,
- (2) to pursue technology transfer to the counterpart personnel of the Government of Romania in the course of the Study.

#### IX. Consultation

JICA and the Government of Romania shall consult with each other in respect of any matter that may arise from or in connection with the Study.

TENTATIVE SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Item																		
WORK IN ROMANIA		▬▬▬				▬▬▬						▬	○					
WORK IN JAPAN	□			▬▬▬					▬▬▬					▬▬▬				
REPORTS		△		△		△		△			△					△		
		IC/R		PR(I)		IT/R		PR(II)			DF/R					F/R		

Remarks IC/R : Inception Report PR(II) : Progress Report II  
 PR(I) : Progress Report I DF/R : Draft Final Report  
 IT/R : Interim Report F/R : Final Report  
 ○ : Comments on DF/R by Romania side


▬▬▬ : Field Work

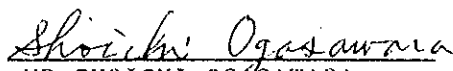
□ : Home Office Work

MINUTES OF MEETING  
FOR  
SCOPE OF WORK  
FOR  
THE FEASIBILITY STUDY  
ON  
THE IRRIGATION PROJECT  
IN  
RUGINESTI-PUFESTI-PANCIU DISTRICT VRANCEA

AGREED UPON BETWEEN  
MINISTRY OF AGRICULTURE AND FOOD OF ROMANIA  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

Bucuresti, 15, December, 1993

  
\_\_\_\_\_  
MR. VASILE BERBECI  
SECRETARY OF STATE  
MINISTRY OF AGRICULTURE  
AND FOOD  
DEPT. OF LAND RECLAMATION

  
\_\_\_\_\_  
MR. SHOICHI OGASAWARA  
LEADER  
PREPARATORY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY



In response to the request of the Government of the Romania, the Government of Japan decided to dispatch through Japan International Cooperation Agency (hereinafter referred to as "JICA"), which is responsible for the implementation of technical cooperation programmes of the Government of Japan, the preparatory study team (hereinafter referred to as "the Team"), headed by Mr. Shoichi OGASAWARA to the Romania from December 8th to 16th, 1993 so as to discuss and exchange views on the study with Ministry of Agriculture and Food and officials concerned of the Government of Romania for the implementation of the study.

Ministry of Agriculture and Food and the Team mutually agreed to the Scope of Work on the Feasibility Study on the Irrigation Project of Ruginesti-Pufesti-Panciu District Vrancea (hereinafter referred to as "the Study"). The list of participants of the meeting is attached in ANNEX.

The following minutes were prepared to confirm the main issues discussed and matters agreed upon by both sides in connection.

1. The Team requested the Romanian side to assign the qualified and necessary number of counterpart experts for the study at its own expences and the Romanian side accepted its request.
2. The Team suggested that the Steering Committee for the Project should be organized by the concerned Ministries and Agencies. The Romanian side agreed to the idea and promised to organize the Committee.
3. The Romanian side and the Team confirmed that topographic map at the scale of 1/5,000 for the study should be prepared before commencement of the study by the Romanian side.
4. The Romanian side shall provide the Japanese study team with suitable office space with necessary equipment and furniture in Bucuresti and the study site.
5. The Romanian side shall carry out the Environmental Impact Assessment according to the Romanian laws and regulations. The Japanese study team shall provide Romanian side with basic data and information on environmental issues in the course of the study.
6. The Romanian side requested that the Romanian counterpart personnel take advantage of training in Japan related to the Study to promote an effective technology transfer. The Team promised to convey this request to the Government of Japan.

7. The Romanian side requested that the appropriate number of vehicles for the study should be arranged by JICA. The Team promised to convey the request to the Government of Japan.
8. The Romanian side requested that the equipment and machinery which would be used for smooth implementation of the Study to be transferred to the Romanian side at the end of the study. The Team promised to convey the request to the Government of Japan.
9. The Romanian side requested that the automatic control system of pumping station should be taken into consideration particularly in the course of the study. The Team promised to convey the request to the Government of Japan.
10. The Romanian side requested that reduction of the Tentative Schedule should be taken into consideration by the Japanese side. The Team promised to convey the request to the Government of Japan.

List of Participants of the Meeting

\* Romanian side

Ministry of Agriculture and Food  
Dept. of Land Reclamation

Mr. VASILE BERBECI	Secretary of State
Dr. LIVIU BUHOCIU	Counselor of Minister
Mr. PETRE MOROIANU	Senior Adviser
Mr. LIVIU CREANGA	Senior Adviser

ISPIF<sub>SA</sub>

Mr. VIRGIL NEACSU	General Director
Mr. MIHAI GROSU	Deputy Director
Dr. NICOLAE C POPESCU	Chief of Dept. of Soil Erosion
Mr. COMAN CORNELIU	Counselor
Mr. SIMIONESCU IANCU	Project Manager

\* Japanese side

Preparatory Study Team

Mr. SHOICHI OGASAWARA	Leader
Mr. AKIHIKO KUBOTA	Member
Mr. KAZUHIKO NIKI	Member
Mr. TOSHIRO YAMASHITA	Member
Mr. EIJI TAKEMORI	Member