

**STUDY REPORT**  
**ON**  
**THE PROJECT FOR RIVER TRAINING**  
**IN**  
**THE KINGDOM OF NEPAL**

**FEBRUARY 1999**

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**Ministry of Water Resources  
Ministry of Works and Transport  
The Kingdom of Nepal**

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ON  
THE PROJECT FOR RIVER TRAINING  
IN  
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1149968 [8]

## PREFACE

In response to a request from the Government of the Kingdom of Nepal, the Government of Japan decided to conduct a study on the Project for River Training and entrusted the Japan International Cooperation Agency ( JICA ) to conduct the study with the assistance of the Japan International Cooperation System ( JICS ).

JICA sent to Nepal a study team from November 15 to December 5, 1998.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Kingdom of Nepal for their close cooperation extended to the team.

February 1999



Kimio Fujita

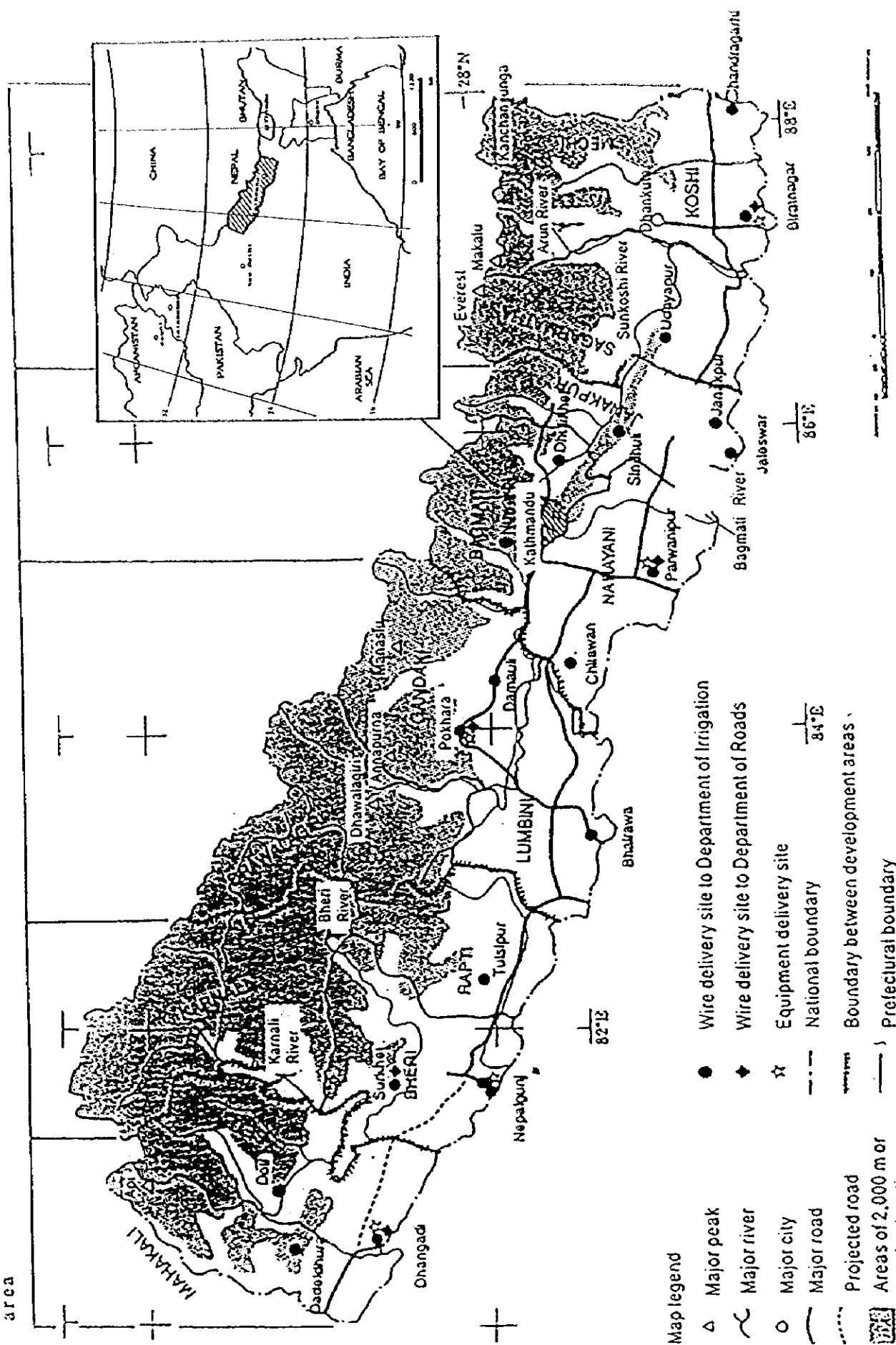
President

Japan International Cooperation Agency





Far Western development area      Mid Western development area      Western development Area      Central development area      Eastern development Area



- Map legend**
- △ Major peak
  - Major river
  - Major city
  - Major road
  - ⋯ Projected road
  - ▭ Areas of 2,000 m or over in elevation
  - Wire delivery site to Department of Irrigation
  - ◆ Wire delivery site to Department of Roads
  - ☆ Equipment delivery site
  - National boundary
  - Boundary between development areas
  - Prefectural boundary

Kingdom of Nepal: Project Site Map



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## Chapter 1. Background of the Project

The Kingdom of Nepal (hereinafter called Nepal) is a mountainous country, with its 80% being mountainous areas and there develop more than 6,000 small and large rivers. The country is renowned not only for being most abundant with topographical rise and fall in the world but also for the development of a great many faults due to the contact of the India Plate with the Eurasia Plate. The topography and the geology of Nepal are thus possessed of factors susceptible to disasters. Besides this, 80% of precipitation in a year concentrates in June to September. Such being the case, the natural environments surrounding Nepal are apt to trigger off natural disasters such as landslide, collapse and flood, etc.

In order to cope with the above-mentioned disasters, the Government of Nepal has been using gabions made of G.I.Wire which was procured in the past under grant aid of Japan. The gabions have been installed across the country, centering on rivers and roads. Judging from the conditions of facilities in which gabions were installed, the gabion installation has proved itself to be very effective in Nepal as countermeasures for collapse and flood and that to be appropriate as a technology.

The great disaster in July 1993, however, did a serious damage to major roads and bridges in Nepal. To overcome the situation, works were implemented. But, it was de facto that the disaster prevention works would be behind the schedule because a plan drawn by the Nepal side to request Japan to procure G.I.Wire has remained intact for three years. The Government of Nepal, for this reason, again requested Japan for the procurement of G.I.Wire.

### (1) River Erosion Control

The DOI (hereinafter called DOI), one of the implementing agencies of the Nepal side, is currently implementing river disaster protection works of rivers across the country. The major objective of these various kinds of works is to construct embankments, and the gabions are used for revetment of the embankments. As the embankment construction by the DOI is directed to rivers, the section to be covered by a work is long, many gabions will be used and the construction can only be proved effective after a continuous work for many years. Though the embankment construction is implemented at a site distant from a major road and thus it is not simple to confirm the condition of the site, the DOI has been firmly carrying out the protection works. In fact, the DOI has distributed G.I.Wire to the 23 District Irrigation Offices to use the gabions for river disaster protection works across the country.

The DOI, as mentioned above, is in much need for river disaster protection works with gabions in order to cover the whole country.

## (2) Road-Related Works

The Department of Roads (hereinafter called DOR) is currently implementing under Cooperation of India a work between the Karnari River and Dhangadhi, a section left unpaved on the East-West Highway. In this work, foundation works for 22 bridges are in progress. When this section is open, the East-West Highway will be an entirely paved road, being expected to largely contribute to distribution in Nepal and to the correction of regional differences. As access roads have to be secured for these works, the DOR makes use of gabions as course ways before completing bridges or as reinforcement for bankings and bridge piers.

On the other hand, the existing roads suffer large and small collapse of slopes and erosion by rivers every year. Gabions are effectively utilized for protection and reinforcement of the roads. They are extensively used particularly in Dharan-Dhankutta road, a road constructed under assistance of United Kingdom. In this road, sweeping personnel are positioned every three kilometers, thus the road maintenance and management being well implemented. Now, vegetation has revived on the slopes of the gabions installed, turning the once artificial slopes into semi-natural road slopes.

At present, roads for exclusive use by vehicles have not yet constructed in 25 districts although most of the domestic transportation in Nepal relays on road. In addition, the collapse of slopes will occur at various places across the country during the monsoon season every year. In view of these conditions, the DOR makes use of gabions for repair of the roads across the country.

Table 1 G.I.Wire Procurement Plan of Nepal

Department	Size (mm)						(Ton)
		1995	1996	1997	1998	1999	Total
DOI	3.2	3,150	3,150	3,150	3,150	3,150	15,750
	4.0	350	350	350	350	350	1,750
	Total	3,500	3,500	3,500	3,500	3,500	17,500
DOR	3.2	3,163	3,521	3,041	2,794	2,320	14,839
	4.0	314	350	303	278	230	1,475
	2.64	126	139	121	111	92	589
	Total	3,603	4,010	3,465	3,183	2,642	16,903
Grand total		7,103	7,510	6,965	6,683	6,142	34,403

## Chapter 2 Contents of the Project

### 2-1 Objective of the Project

The purpose of this project aims at procurement of G. I. Wire to make gabions required for protection of roads and structures such as bridges and banks from natural disasters like floods and landslides which annually occur nationwide Nepal.

In view of the fact that G. I. Wire procured so far was completely used by DOI and DOR contributing to countermeasures against natural disasters Nepal, the propriety of this project is quite high as a Japanese Grant Aid Cooperation project.

### 2-2 Basic Concept of the Project

In conferences with the DOI and the DOR which are the operating bodies, the final requirement of Nepal side was concluded as procurement of 3,800 tons G. I. Wire only.

At the beginning of the conferences, they requested provision of trucks for transportation of gabions and construction equipment, but finally deleted them from the current request because a site survey revealed a fact that existing trucks and equipment owned by DOI are not effectively utilized.

In the meantime, after the site survey, G. I. Wire to be procured this time is limited to two kinds, i.e. Japanese products having service life of 20 years in the river, and conventional Nepal products. Japanese products are to be used mostly by DOI for river disaster protection for which a specially high strength material is required. DOR insists they can well deal with Nepal products, which are strength-wise equivalent to conventional Japanese products as their G. I. Wire is made of wire imported from Japan these days.

The allocations of the material for the DOI and the DOR are agreed as 7 to 3 as used to be, and Nepal side strongly wishes the procurement is made in 1999 before the rainy season starts.

## 2-3 Basic Design

### 2-3-1 Design Concept

Equipment names, specifications and quantities, as finally agreed between Nepal side and the Study Team after the site survey, are given hereunder in Table 2.

The Government of Nepal has carried out bank protection works for river and road maintenance works under administration of DOI for over twenty years through utilization of gabions. As to bank protection works for river, DOI maps out a plan based on a petition of the residents, on which plan the work is carried out. bank protection works for river is a nationwide necessity. In the meantime nationwide river improvement is actually impossible from financial standpoint of view, and accordingly easily executable, durable and relatively inexpensive gabions are extremely needed. Gabions used by DOI are mass-produced generally by using netting machines, and are utilized in projects for river disaster protection. Therefore, G. I. Wire procured so far by Japan is totally out of stock, and is made good use of. Furthermore, DOI is carrying out various projects for sand guards of rivers all over Nepal, and the total amount of G. I. Wire required for these works is calculated as 4,000 tons a year. Considering additional 1,000 tons for DOR, 3,800 tons, as requested this time, do not necessarily meet the actual situation of Nepal. However, Nepal side is satisfied with additional 300 tons to the initial plan, although the plan of Japan has been shelved for three years.

Gabions are produced with cooperation of the local residents using locally available pebbles. Eighty-five percent of the budget was applied to the material cost and the labor cost for manual works at the time of gabion production so far in Nepal. For reduction of the costs and expedition of bank protection works for river, the Government of Nepal requests the Government of Japan for projects of river disaster protection, and was provided with about 22,000 tons of G. I. Wire for production of gabions equivalent to 254 km long bank protection for river, five units of netting machine, trucks for transportation, and construction equipment in seven years from the fiscal year 1987 through the fiscal year 1994.

Table 2 Final Request Amount

Item	Size(mm)	DOI	DOR	Total (M/T)	Japan	Nepal	Total (M/T)
G. I. Wire	3.2	2,520	900	3,420	1,150	2,270	3,420
	4.0	280	100	380	100	280	380
Total (M/T)		2,800	1,000	3,800	1,250	2,550	3,800



## **2-3-2 Basic Design**

### **(1) General Plan**

The plan aims at procurement of G. I. Wire required for river disaster protection and road maintenance. Projects related with river disaster protection carried out by DOI are implemented all over Nepal, and 2,800 tons, i.e. 74 % of G. I. Wire procured in this plan, are to be used in these projects related with river disaster protection. DOI has already made an allocation plan of G. I. Wire among 23 prefectures over the country, to which Gabions manufactured by netting machines are to be allocated.

On the other hand, DOR is to be provided with 1,000 tons of G. I. Wire. As DOR implements road maintenance work all over Nepal, the DOR positively wishes Nepali made wires to be procured before the rainy season starts.

### **(2) Construction Circumstances & Local Contractors**

There exist two options for manufacturing process of gabions : one is mechanical manufacturing using gabion netting machines, and the other is manual manufacturing by craftsmen using G. I. Wire carried into fields. Netting machines, being utilized as a rule for river disaster protection where many gabions are required, are located at five Regional Irrigation Directorates.

The DOR where gabions are manually made assigns a few craftsmen specialized in gabion weaving to respective job site, each of whom manufactures five to six gabions per day. The per diem of a workman is as low as 50 to 100 NRs, and construction works are carried out using only dump trucks or truck mixers.

### **(3) Maintenance Capability**

As to maintenance capability at Nepal side, there is no problem anticipated, as this project is of G. I. Wire procurement which requires no maintenance.

### **(4) Scope and Grade of Equipment**

There are two types of G. I. Wire to be procured in this project, i.e. 4.0 and 3.2 mm dia., where the amount of 4.0 mm wire is 380 tons which is equivalent to 10 % of total procured amount of 3,800 tons. In machine weaving, 3.2 mm wire is used in a large quantity mainly for mesh wire (network portion) of gabions, while 4.0 mm wire is used mainly as line wire (edge portion) of gabions.

In another execution procedure, 4.0 mm wire is used for foot protector, and 3.2 mm wire for slope pavement. The zinc galvanized wire is ordinary iron wire or annealed iron wire

uniformly galvanized with zinc. Zinc galvanized wire, as stipulated in Japan Industrial Standard (JIS G 3532), is classified into four classes (SWM-G1 through SWM-G4) according to the amount of deposited zinc. Class 1 and 3 are in average use with deposited zinc amount stipulated respectively as 30 g/m<sup>2</sup> and 135 g/m<sup>2</sup>. Although this stipulation does not apply to the zinc galvanized wire used in Nepal where purchased annealed wire is locally galvanized with zinc, it is assumed to be close to Class 1. In the meanwhile, Japan Industrial Standard on gabions made of zinc galvanized wire (JIS A 5513) stipulates the material for gabions to meet Class 3 (SWM-G3) under JIS G 3532. In Japan, gabions are frequently used in disaster relief works and temporary works. In Nepal, however, the uses are more for semi-permanent bank protection works for river, and therefore sufficiently durable wire is recommended to be used. High durability materials are to be used for the gabions in this project, because they are expected to be used under severe conditions of erosion by gravels.

Table 3 G. I. Wire Allocation Plan of the DOI

Region	Delivery		Nepal Made			Japan Made (*)		
	Site	Office	3.2mm	4.0mm	Total	3.2mm	4.0mm	Total
Eastern	Jhapa	DIO, Jhapa	66	7	73			
	Udayapur	DIO, Udayapur	43	4	47			
	Biratnagar	ERID, Biratnagar	267	35	302	350	30	380
Sub Total			376	46	422	350	30	380
Central	Dhulikhel	DIO, Kavrepalanchok	53	7	60			
	Kathmandu	DIO, Kathmandu	84	11	95	250	20	270
	Bhaktapur	DIO, Bhaktapur	6	1	7			
	Lalitpur	DIO, Lalitpur	9	1	10			
	Nuwakot	DIO, Nuwakot	33	4	37			
	Chitwan	DIO, Chitwan	49	6	55			
	Parwanipur	DIO, Bara	164	25	189	350	30	380
	Janakpur	DIO, Dhanusba	24	3	27			
	Jaleswar	DIO, Mahottari	24	3	27			
	Malangawa	DIO, Sarlahi	37	5	42			
Sindhuli	DIO, Sindhuli	31	4	35				
Sub Total			514	70	584	600	50	650
Western	Damauli	DIO, Tanahu	23	3	26			
	Pokhara	WRID, Pokhara	114	18	132			
	Bhairabawa	DIO, Rupandehi	106	14	120			
Sub Total			243	35	278			
Mid-Western	Nepalgunj	DIO, Banke	92	13	105	100	10	110
	Surkhet	MWRID, Surkhet	14	1	15			
	Tulsipur	DIO, Dang	24	2	26			
Sub Total			130	16	146	100	10	110
Far-Western	Doti	DIO, Doti	14	2	16			
	Dadeldhura	DIO, Dadeldhura	24	2	26			
	Dhangadhi	FWRID, Dhangadhi	69	9	78	100	10	110
Sub Total			107	13	120	100	10	110
Grand Total			1,370	180	1,550	1,150	100	1,250

After: plies to questionnaire

## Notes

\* : Japanese products on procurement of long life G. I. Wire

DOI : DOI

DIO : District Irrigation Office

ERID : Eastern Regional Irrigation Directorate

CRID : Central Regional Irrigation Directorate

WRID : Western Regional Irrigation Directorate

MWRID : Mid-Western Regional Irrigation Directorate

FWRID : Far-Western Regional Irrigation Directorate

Table 4 Type and Specification of Wires for Gabions

Type		Zinc Galvanized Wire, Class 3							Melt Zinc - Aluminum Alloy Galvanized Wire (Sun AZ Wire AZA-30 10% Al min. 300g/m <sup>2</sup> )						
Code		JIS G 3547 SWMGS-3							JIS G 3547 SWMGS-3						
		Dia. (mm)	Allowance (mm)	Tensile Strength (N/mm <sup>2</sup> )	Elongation (%)	Torsion (turn)	Deposit Amount (g/m <sup>2</sup> )	Wind (dx6)	Dia. (mm)	Allowance (mm)	Tensile Strength (N/mm <sup>2</sup> )	Elongation (%)	Torsion (turn)	Deposit Amount (g/m <sup>2</sup> )	Wind (dx6)
Corrosion Protection		3.2	±0.07	290 to 540	min. 10	min. 30	min. 135	1	3.2	±0.09	min. 290	min. 10	min. 26	min. 300	1.5
		4.0	±0.08	290 to 540	min. 10	min. 24	min. 155	1	4.0	±0.10	min. 290	min. 10	min. 21	min. 300	1.5
		Zinc, by gradually melting out of galvanization layer, protect base wire to the deposit amount of zinc, i.e. Zinc Galvanized Wire, Class 7 (min. 400 g/m <sup>2</sup> deposit) has a life of 3 x Zinc Galvanized Wire, Class 3 (min. 155 g/m <sup>2</sup> deposit at Dia. of 4.0 mm). Cut sections or handling damages are also protected due to sacrificial corrosion protection effect if zinc exists nearby. Stable workability is available. Color turns to grey due to aging.													
Manufacturing Method		Mild steel wire (JIS C 3505, SWRH6K), after extension and heat treatment, is galvanized with zinc. (Class 3)													
Environment		Annual Corrosion Amount of Galvanization							Annual Corrosion Amount of Galvanization						
Corrosion Resistance of Galvanization	Heavy Industry	40 g/m <sup>2</sup> · year							40 g/m <sup>2</sup> · year						
	Sea Coast	11 g/m <sup>2</sup> · year							6 g/m <sup>2</sup> · year						
	Country Side	7 g/m <sup>2</sup> · year							4 g/m <sup>2</sup> · year						
	Urban Area	18 g/m <sup>2</sup> · year							9 g/m <sup>2</sup> · year						
	Clay	11 g/m <sup>2</sup> · year							6 g/m <sup>2</sup> · year						
	Soil	10 g/m <sup>2</sup> · year							5 g/m <sup>2</sup> · year						
in Still River Water		25 g/m <sup>2</sup> · year							13 g/m <sup>2</sup> · year						
in Water/Sea Water		40 g/m <sup>2</sup> · year							20 g/m <sup>2</sup> · year						
Wire Corrosion Amount		about 0.07 mm/year							about 0.07 mm/year						
Remarks		conventionally used in projects of sand guards of rivers long life wire in examination on special request of Nepal side													

## Chapter 3 Implementation Plan

### 3-1 Implementation Plan

#### 3-1-1 Implementation Schedule

The implementation schedule of Project is as described in Table 5.

Table 5 Implementation Schedule

		Month	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Overall Period	Signing Exchange of Notes		▼											
	Detail Design (about 3 1/2 months)													
	- Final approval of Plan			■										
	- Preparation of Tender Documents			□										
	- Approval of Tender Document				■									
	- On-Site explanation & Document delivery					□								
	- Tendering & Evaluation						■							
	- Contract with suppliers							▼						
	Implementation Management													
	- Approval of specification								□					
- Manufacturing equipment & materials								■						
- Inspection before shipping												□		
- Transportation of equipment & material								Local	■			Japan	■	
- Delivery / Commissioning													■	

■ : work in Nepal

□ : work in Japan

### 3-1-2 Obligations of Recipient Country

The necessary undertakings to be taken by Nepal side for implementing the project with grant aid of Japan are as described hereunder.

- (1) to bear the expenses of inland transportation to each construction site
- (2) to bear the expenses to be incurred for banking procedures based on the banking agreements
- (3) to exempt taxes to be imposed on the imported equipment for the project, and to take necessary measures for the relevant custom clearance
- (4) to admit entries into and stay in Nepal of Japanese nationals for the implementation of the project
- (5) to organize responsible agencies and to assign staffs in charge for the implementation of the project and after completion of the project
- (6) to secure budget for the responsible agencies for the implementation of the project and after completion of the project
- (7) to bear all the expenses except for those for construction of the facilities and procurement, transportation and installation of the equipment provided with grant aid cooperation of Japan

### 3-2 Project Cost Estimation

The total project cost on the grant aid cooperation of Japan is 537 million Japanese Yen. The cost breakdown on the allocation to Japan and Nepal is as described below.

#### (1) Cost Charged to Japan

The costs born by Japan is as described in Table 6.

Table 6 Costs Charged to Japan

Break Down	Amount (million Japanese Yen)
Equipment, Materials & Transportation	521.3
- Equipment & Materials	439.1
- Transportation/Packing	82.2
Engineering & Construction Management	16.1
- Engineering	11.0
- Construction management	5.1
Total	537.4

Foreign currency rate : ¥130.0/1 US\$

(July through  
December 1998)

## **(2) Cost Charged to Nepal**

Nepal bears the cost for transportation from each District Irrigation Office to each construction site, which is equivalent to about 7,600,000 Japanese Yen

## **(3) Condition of Estimation**

- ① time of estimation : December of 1998
- ② foreign currency exchange rate : ¥130.0/US\$
- ③ period of time : procurement of equipment and materials as per implementation Schedule in Table 5.
- ④ others : The project is implemented in accordance with the grant aid cooperation of Japan

### **3-3 Operation and Maintenance Cost**

G. I. Wire, even if left in the atmosphere, without any care changes little : its annual corrosion amount is only 10 to 15 g/m<sup>2</sup>. This is why it has been stored indoors or outdoors in Nepal.

As G. I. Wire to be procured this time also does not require such maintenance control as is needed for trucks and construction equipment, Nepal side does not have any special maintenance control plan in implementing the project.

## Chapter 4 Project Evaluation and Recommendation

### 4-1 Project Effect

#### (1) Propriety Verification

Floods, landslides and mud flows break up every year in Nepal because of reduced water-holding capacity of the upstream ground due to recent deforestation in addition to its special condition of nature. In view of the above and also to rectify regional disparities, the government is positively improving its highway system.

In Nepal under such a situation as described in above, a big problem is how to minimize natural disasters, and the government has steadily carried out countermeasures against natural disasters by receiving assistance of developed countries including Japan.

However, sufficient effects are not necessarily available through countermeasure works with a limited amount of budget, equipment and materials. This is the background of the request of the Government of Nepal to Japan for G. I. Wire for the first time in last three years.

Gabions made of G. I. Wire are widely utilized for river disaster protection and road maintenance, and G. I. Wire procured by Japan so far is fully used up. As G. I. Wire does not require such maintenance control as trucks and construction equipment do, it would be adequate to be used in such a developing country as Nepal. Furthermore, gabions have a merit not only that they are manufactured in Nepal, but that pebbles are locally procurable and countermeasure works are executable at low costs.

Although the amount of G. I. Wire to be procured for the project is only 3,800 tons ; less than the amount for river disaster protection for river planned by the DOI and for road maintenance works in nationwide Nepal planned by DOR, i.e. 5,000 tons, Nepal side is satisfied with the amount because the G. I. Wire is of long durability type which has not been imported so far.

In such a developing country as Nepal, the biggest problem is maintenance control of procured equipment and facilities. Procurement of maintenance-free material like G. I. Wire would be an exactly appropriate project, and the propriety of the project is also very high when considering those numbers of sites in Nepal calling for gabions.

#### (2) Project Effect

Positive effects expected through implementing the project are as described below.

- ① Among the budget of the DOI for bank protection for river, the allocation for materials is lightened by G. I. Wire procurement, and as a result projects of bank protection works for river using gabions make progresses.



- ② By installing gabions in mountainous area, landslides or slope failures are prevented, mud flows occur less frequently, and accordingly the safety from floods improves in areas near rivers.
- ③ In low lands by installing gabions at medium to small rivers, farm land and villages are protected from floods, and as a result conservation of farm land and agricultural production are expected to improve.
- ④ Roads all over the country are protected from damage by avalanches of sand gravel, slope failures, etc. by installation of gabions, and therefore interruption of economic activity takes place less frequently.
- ⑤ Installed gabions give favorable views due to use of natural pebbles, and restoration of vegetation takes place at an early time when compared with use of concrete blocks, etc., and accordingly afforestation of bare land is promoted.
- ⑥ Through DPTC model project, technology transfer to Nepal engineer is carried out.

## 4-2 Recommendation

### (1) Timing of Procurement

Nepal side requests to get G. I. Wire procured before the rainy season of 1999 at the latest. In order to meet the request, a consultant contract must be signed up at an earliest opportunity. This scheme is an item for fiscal year 1998. Although the work is being proceeded aiming at the Cabinet Conference in February, if Exchange of Note is agreed at the end of March, the consultant contract will be signed in the middle of April, and accordingly tendering will be most probably at the beginning of June. Assuming a real rainy season in Nepal at the beginning of July, as procurement of Japanese products takes time, a problem is how early Nepal products starts to be manufactured. Considering the fact all purchase orders start by approving contracts with suppliers after tendering, the situation is tight to meet the request of Nepal side. Therefore, a study is required if the consultant contract is available before Exchange of Note.

### (2) Follow-up of Netting machines

The estimated cost of repair of netting machines is 4.1 million Japanese Yen according to a maker's estimation. As to repair of netting machines, a separate follow-up from this scheme is recommended, and procurement of spare parts and repair by the maker's technical experts together with a guidance of maintenance control are indispensable.

### **(3) Japanese Made G. I. Wire**

G. I. Wire is supposed to be procured from both Japan and Nepal. For Japanese products, aluminum-zinc mixed galvanization is assumed for which no reference of procurement exists. In terms of introduction of the products, Nepal side and DPTC agree that the products are to be utilized for the projects of the river disaster protection of DOI for which particularly high strength material is required.

However, a follow-up study is necessary to investigate how far the natural disasters in Nepal can be coped with by Japanese products which the service life is calculated as thirty years ; three times longer than ten years for conventional type. For this purpose, a study on site of the usage and on the procedure would be necessary for identification of Japanese products from Nepali ones.

### **(4) Netting machines**

As to the situations about netting machines, although evaluation largely depends on District Irrigation Offices, at least the most reason of machine troubles exists obviously in absence of full-time operators. The survey team comments in the minutes of meeting that the basic condition for the project is securing personnel skilled in operating the machine particularly for Pokhara and Parawanipur where the machine situation is poor, and careful attention is required to watch how Nepal side deal with this problem. In the meanwhile, a fact is that automatic operation of netting machines does not meet the technical level of Nepali, and a guidance is necessary in the follow-up to switch to manual operation from troublesome automatic operation. On the other hand, Nepal side requests to increase the mesh sizes of gabions, which method, even if contributing to reduced consumption of G. I. Wire, cause an enormous cost : the cost for design change would be equivalent to purchasing new netting machines. Considering that their netting machines were procured in 1988, and ten years have already passed, what is desirable is that the existing netting machines are used as much as possible, and are consumed finally by Nepal side through depreciation, i.e. completion of the life cycle and fulfillment of the target.

### **(5) Trucks and Construction Equipment**

Although transportation of gabions and pebbles by trucks is necessary, judging from the status of the existing trucks of DOI, the request for procurement of trucks and equipment should be declined under the current situation : if new ones are procured while the existing ones are still usable, the latter would be left unused at all.

The demand on gabions is large in Nepal, and in reality private trucks and tractors are used to transport gabions and pebbles. Gabions do not go wrong even if left without any

care. In the meantime, under circumstances where people are less maintenance-minded and do not take good care of them, trucks would most probably be left abandoned without proper repair of slight troubles even, and would become useless sooner or later. Under such a situation procurement of trucks and construction equipment would have to be avoided. Even if Japan is to procure those trucks and equipment, the issue should be separately discussed in order to give right evaluation of the project for river disaster protection itself. According to the investigation of this time, except for netting machines and trucks, "G. I. Wire for effective utilization in Nepal" is positively rated "A".



## 1.Member of the Team

1.Mr.Mitsuro UEMURA : JICS(Equipment Planner)

2.Mr.Eiichi HASEGAWA : JICS(Sabo Planner)

## 2.Schedule of Mission

1	15	Nov.	Sun	Tokyo(11:00)	→Bangkok(15:30)	TG 641	Bangkok
2	16	Nov.	Mon	Bangkok(10:30)	→Kathmandu(12:35)	TG 319	
				15:00 Courtesty call on Japanese Embassy and JICA Office			Kathmandu
3	17	Nov.	Tue	9:00 Courtesty call on DOI and DOR			Kathmandu
4	18	Nov.	Wed	Discussion with DOI and DOR			Kathmandu
5	19	Nov.	Thu	Site Survey			Pokara
6	20	Nov.	Fri	Site Survey			Bhairawa
7	21	Nov.	Sat	Site Survey			Nepalgunj
8	22	Nov.	Sun	Site Survey			Dhangadhi
9	23	Nov.	Mon	Site Survey			Bhairawa
10	24	Nov.	Tue	Site Survey			Hetauda
11	25	Nov.	Wed	Site Survey			Biratnagar
12	26	Nov.	Thr	Site Survey			Hetauda
13	27	Nov.	Fri	Site Survey			Kathmandu
14	28	Nov.	Sat	Report making			Kathmandu
15	29	Nov.	Sun	Report making			Kathmandu
16	30	Nov.	Mon	Discussion with DOI and DOR			Kathmandu
17	1	Dec.	Tue	Discussion with DOI and DOR			Kathmandu
18	2	Dec.	Wed	Signature of Minites			Kathmandu
19	3	Dec.	Thu	Report to EOJ and JICA			Kathmandu
20	4	Dec.	Fri		→Bangkok (18:10)	TG 320	Bangkok
21	5	Dec.	Sat	Kathmandu(13:50)	→Tokyo (19:00)	TG 640	

### 3.List of Party Concerned in the Recipient Country

#### 3-1.Department of Irrigation

- 1.Mahendra Nath Aral : Director General
- 2.Amoda Nand Mishra : Deputy Director General
- 3.Kedal Prakash Rizal : Project Director

#### 3-2.Department of Road

- 1.Niranjan Prasad Chalise : Director General
- 2.Jamuna Bahadur Shrestha :Senior Division Engineer
- 3.Madan Gopal Maleku :Deputy Director General
- 4.Hari Lal Rajbahak :Deputy Director General
- 5.Lava Prasad Wagley : Senior Director General

4. Minutes of Discussion

MINUTES OF DISCUSSIONS  
ON THE STUDY  
ON THE PROJECT  
FOR G.I.WIRE & EQUIPMENT SUPPLY FOR RIVER TRAINING  
IN THE KINGDOM OF NEPAL

In response to the request from the Government of the Kingdom of Nepal (hereinafter refer to as "Nepal"), the Government of Japan decided to conduct a Study on the Project for G.I.Wire & Equipment Supply for River Training in the Kingdom of Nepal (hereinafter refer to as "the Project") and entrusted the study to Japan International Cooperation Agency (JICA).

JICA has send to Nepal the Study Team (hereinafter refer to as "the Team") and is scheduled to stay in the country from November 16 to December 4, 1998.

The Team held a series of discussions with the officials concerned of the Government of Nepal and conducted a field survey at the study area.

As a result of discussions between both sides and the field survey, the Team has confirmed that it will convey the requested main items as attached for consideration by the Government of Japan.

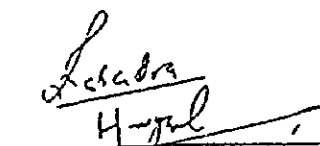
Kathmandu, December 2, 1998

  
Mr. Ken HASEGAWA

Leader

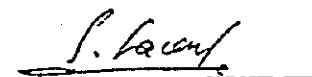
Study Team

Japan International Cooperation Agency (JICA)

  
Mr. M.N. ARYAL  
Director General

Department of Irrigation

Ministry of Water Resources

  
Mr. S.K. LACOUL

Acting Director General

Department of Roads

Ministry of Works and Transport

## ATTACHEMENT

### 1. Objective of the Project

The objective of the Project is to solve the emergency flood, roads protection and river bank erosion problems by the constructing river control structures.

### 2. Project Sites

The Project sites are shown in ANNEX-1.

### 3. Responsible and Executing Agency

Department of Irrigation, Ministry of Water Resources and Department of Roads, Ministry of Works and Transport are responsible for the administration and execution of the Project. The organization chart of above-mentioned agency is shown in ANNEX-2.

### 4. Items requested by the Government of Nepal

After discussions with the team, the total 3,800 M/T of G.I. Wire was finally requested by the Nepalese side. And the details of G.I. Wire is summarized as follows;

Size(mm)	DOI	DOR	Total (M/T)	Japan	Nepal	Total (M/T)
3.2	2,520	900	3,420	1,150	2,270	3,420
4.0	280	100	380	100	280	380
Total (M/T)	2,800	1,000	3,800	1,250	2,550	3,800

However, the final components of the Grant Aid will be decided after further studies in Japan.

### 5. Japan's Grant Aid System

- (1) The Nepalese side has understood the Japan's Grant Aid Scheme explained by the team, as described in ANNEX-3.
- (2) The Nepalese side will take the necessary measures, as described in ANNEX-4 for smooth implementation of the Project, on condition that Grant Aid by the Government of Japan is expected to the Project.

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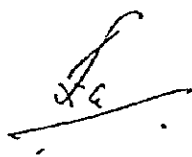
## 6. Schedule of the Study

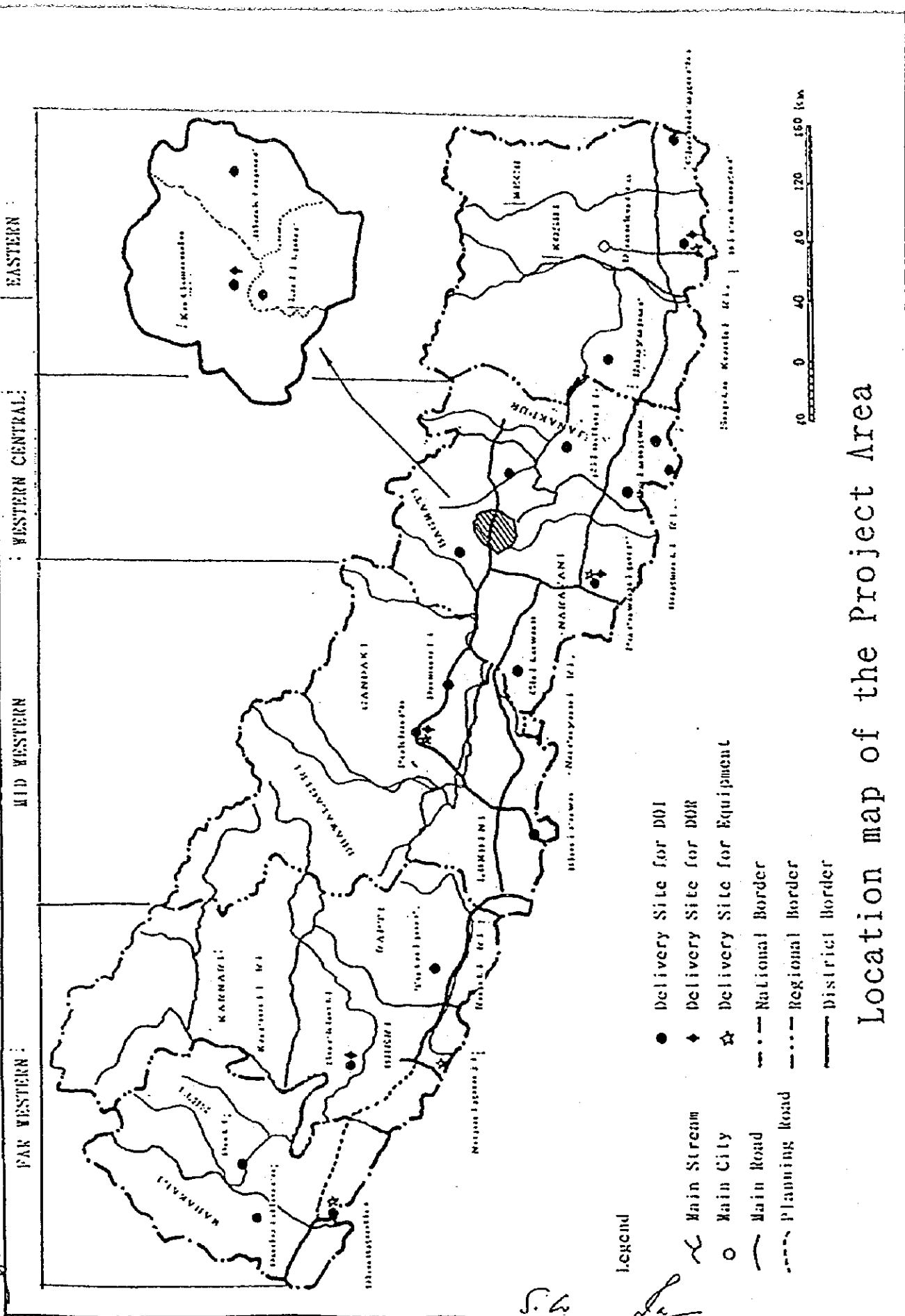
JICA will prepare a report on the Project and send it to the Government of Nepal by the beginning of February, 1999.

## 7. Other relevant issues

- (1) The Government of Nepal requested the Study Team to supply G.I. Wire before coming monsoon, 1999.
- (2) Nepalese side requested the follow-up cooperation to procure some spare parts for netting machines.
- (3) The Government of Nepal will allocate the necessary skilled and fixed operator at Pokhara and Parwanipur before coming monsoon to utilize of netting machines for smooth implementation of the Project. In case of personnel changes, Nepalese side will take necessary countermeasures to avoid misoperation of netting machine and decreasing of gabion production.

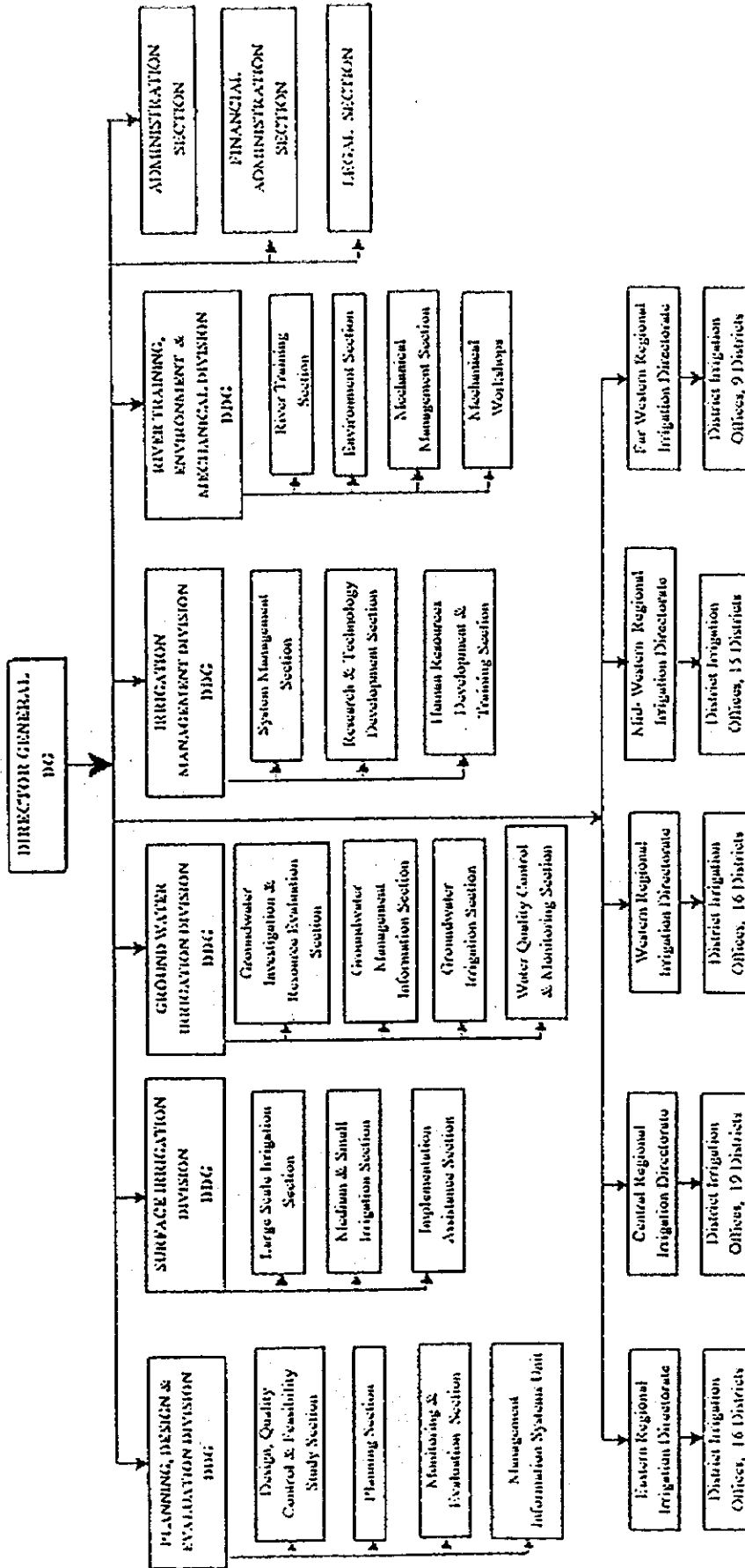
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Location map of the Project Area

His Majesty's Government  
 MINISTRY OF WATER RESOURCES  
**DEPARTMENT OF IRRIGATION**  
**ORGANISATION CHART**

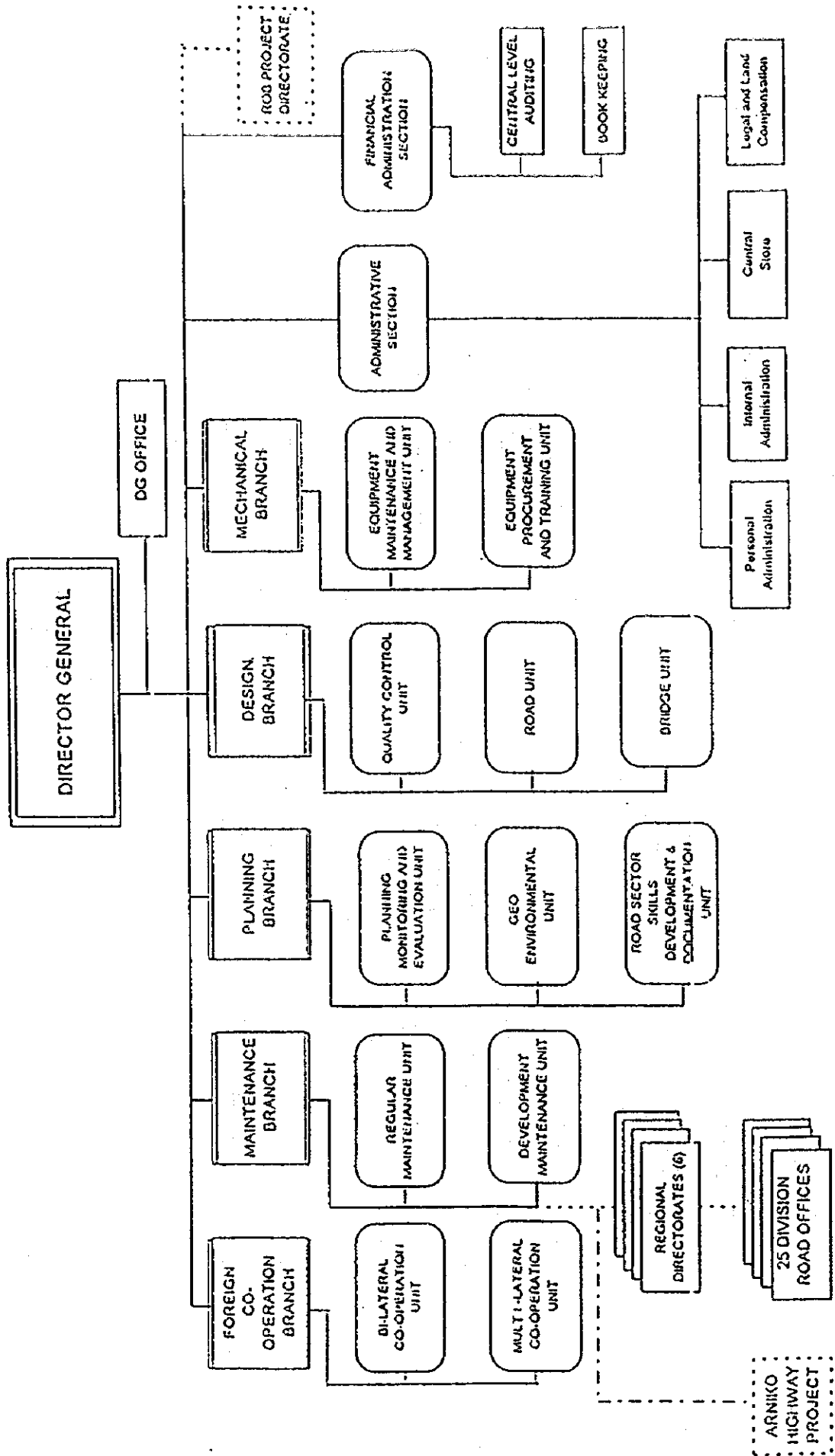


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# DEPARTMENT OF ROADS ORGANISATION



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JAPAN'S GRANT AID PROGRAMME1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures:

Application (request made by a recipient country)  
 Study (Preliminary Study and Basic Design Study conducted by JICA)  
 Appraisal & Approval  
 (Appraisal by the Government of Japan and Approval by the Cabinet of Japanese Government)  
 Determination of (Exchange of Notes between the both Governments)  
 Implementation (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grant Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency)

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested Project are not clear, a Preliminary Study is conducted prior to Basic Design Study.

Thirdly, the Government of Japan appraises the Project to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted to the Cabinet for approval.

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.


2. Contents of the Study

(1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- ① to confirm background, objectives, benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation.
- ② to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
- ③ to confirm items agreed on by both parties concerning a basic concept of the project.
- ④ to prepare a basic design of the Project.

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(5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to the Japanese tax payers.

(6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

- ① to secure land necessary for the sites of the Project and to clear and level the land prior to commencement of the construction work,
- ② to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- ③ to secure buildings prior to the installation work in case the Project is providing equipment,
- ④ to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and inland transportation of the products purchase under the Grant Aid,
- ⑤ to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the goods and services under the Verified Contracts,
- ⑥ to accord Japanese nationals whose services may be required in connection with the supply of the goods and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchase under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

(8) Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

(9) Banking Arrangement (B/A)

The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.

The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

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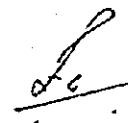
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## Necessary Measures to be taken by the Nepalese side

Following necessary measures should be taken by Nepalese side on condition that the Grant Aid by the Government of Japan is extend to the Project :

1. To secure the sites for installation of gabion making machine and storage of G.I. wire.
2. To summon the participation of local people in installation boulders in gabion.
3. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
4. To exempt taxes and to take necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkation.
5. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into Nepal and stay therein for the performance of their work.
6. To maintain and use properly and effectively the machinery and materials provided under the Grant.
7. To bear all the expenses other than those to be borne by the Grant, necessary for implementation of the Project.



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