

HIS MAJESTY'S GOVERNMENT OF NEPAL
MINISTRY OF WORKS AND TRANSPORT
DEPARTMENT OF ROADS

**THE STUDY
ON
KATHMANDU VALLEY
URBAN ROAD DEVELOPMENT**

**FINAL REPORT
PART B : FEASIBILITY STUDY**

MAIN TEXT

MARCH 1993

JAPAN INTERNATIONAL COOPERATION AGENCY

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URBAN ROAD DEVELOPMENT
KATHMANDU VALLEY
FINAL REPORT
PART B: FEASIBILITY STUDY

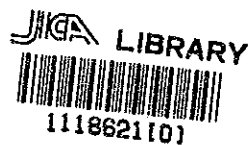
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PREFACE

In response to a request from His Majesty's Government of Nepal, the Government of Japan decided to conduct the study on Kathmandu Valley Urban Road Development and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Nepal a study team headed by Mr. H. Shinkai, Nippon Koei Co., Ltd., 5 times between October 1991 and March 1993.

The team held discussions with the officials concerned of His Majesty's Government of Nepal, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

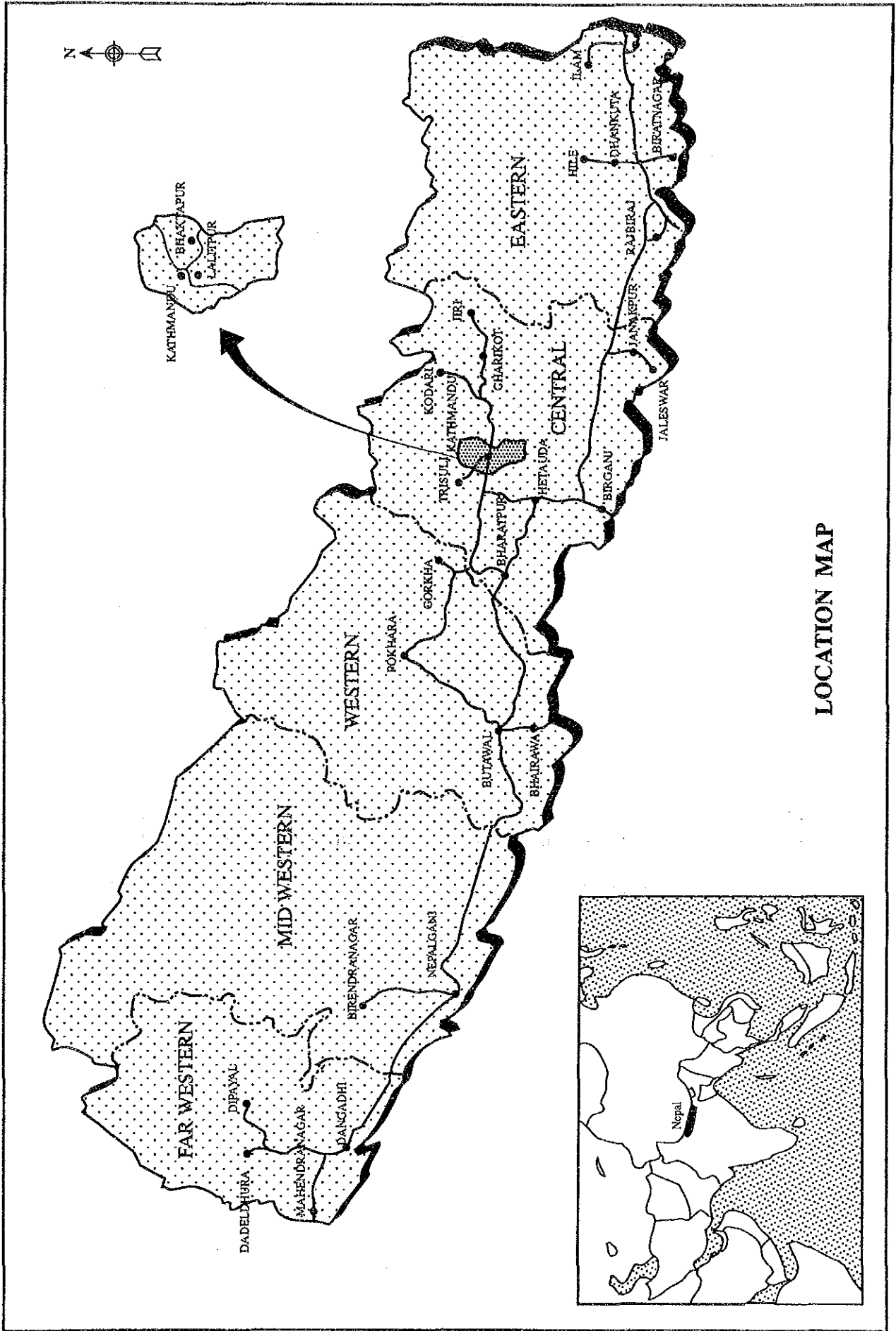
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

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

March 1993



Kensuke Yanagiya
President
Japan International Cooperation Agency



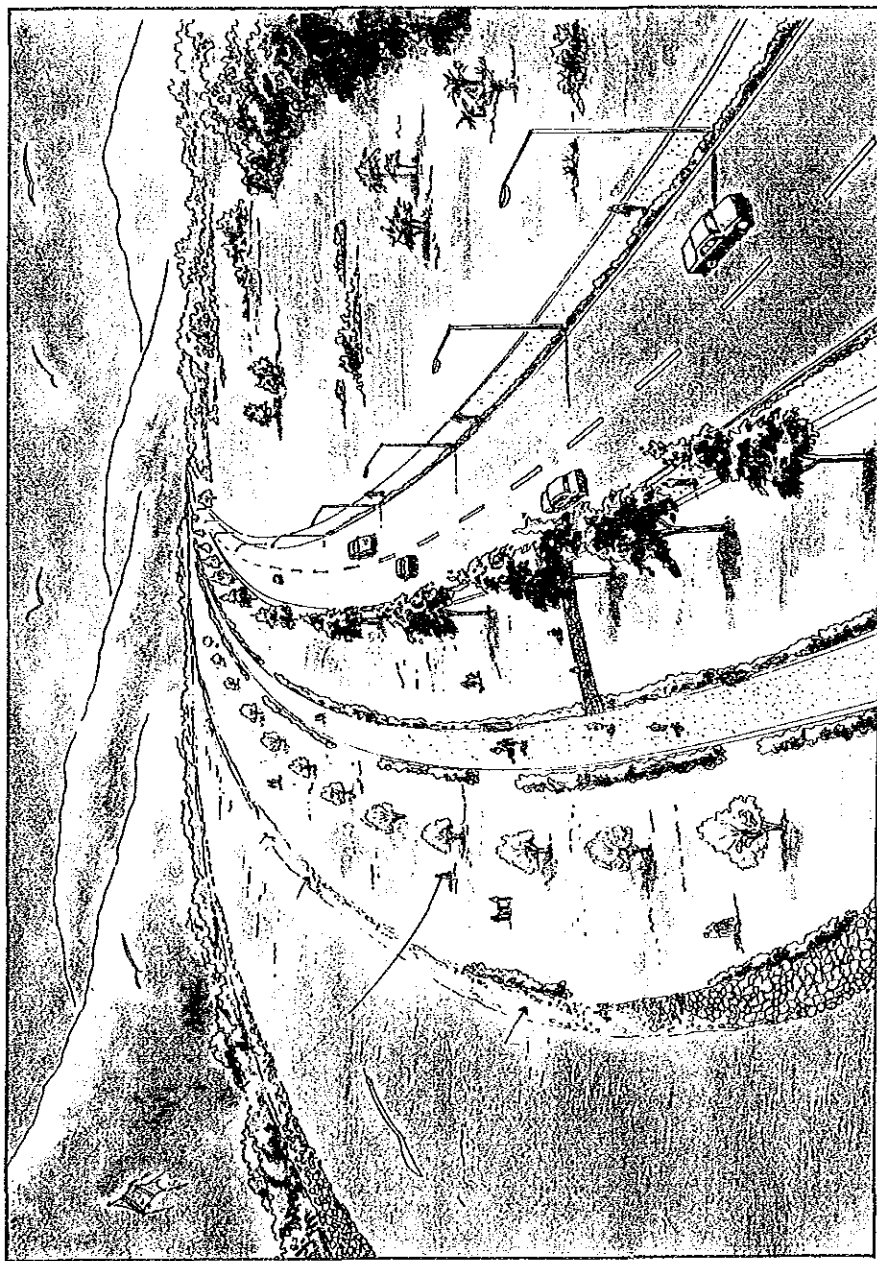
LOCATION MAP

Currency Equivalent

US\$1.00 = Yen 123.8 = NRs.46.568 (Average Rate from June to December, 1992)

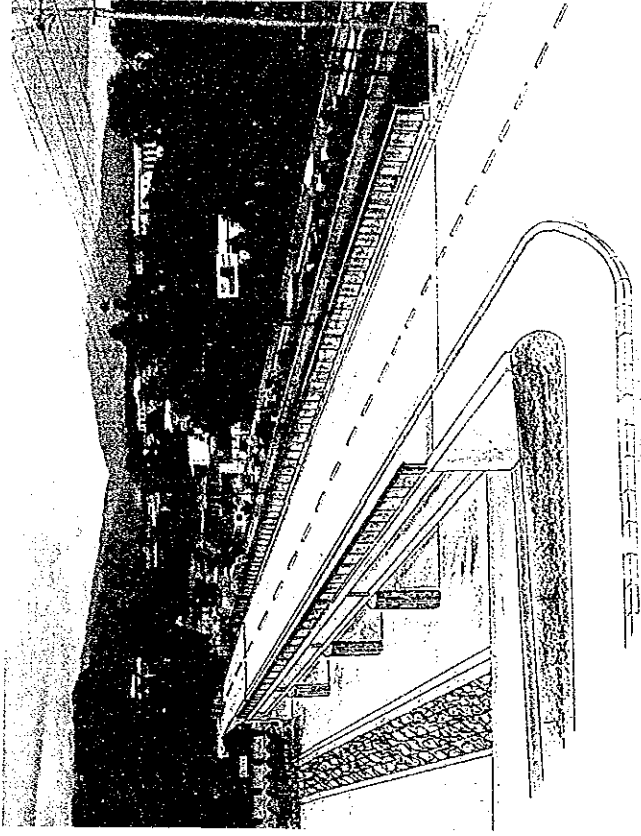
(or NRs. 1.00 = Yen 2.6585)

← Tentative Bird's-Eyes View of South Link
of Inner Ring Road along Bagmati River

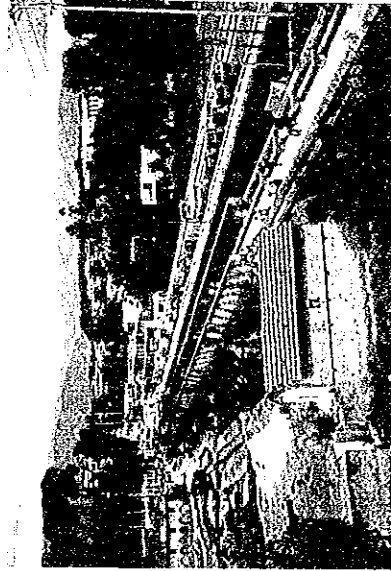


Photograph of Bagmati River and Vicinity
taken from Teku Bridge (Proposed Road will
Pass along the Right side of Tree Line)





Tentative Bird's-Eyes view of New Bagmati Bridge at Thapathali



Existing Bagmati Bridge at Thapathali

SOUTH LINK OF INNER RING ROAD(1)

①

The starting point of South Link of Inner Ring Road will be at the intersection of Kalimati Road in Kuleswor.

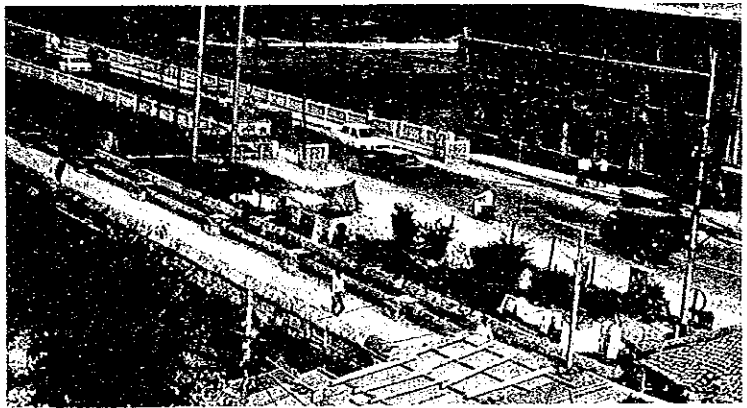


②

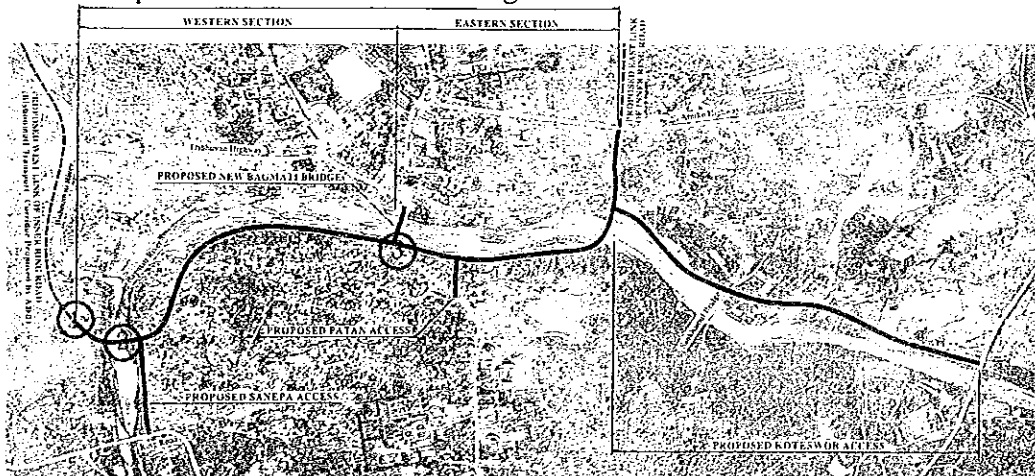
Proposed site for Bagmati Bridge No.1 connecting western Patan with Kuleswor on Kalimati Road. The route is located nearby Bagmati river in order to avoid acquiring land and houses as much as possible.

③

Proposed site for new intersection at Kupandol. The South Link will be connected with New Bagmati Bridge here.



Proposed South Link Of Inner Ring Road



SOUTH LINK OF INNER RING ROAD(2)

④

Eastern section of South Link is passing on the right bank of Bagmati river, where the area is mostly government lands.



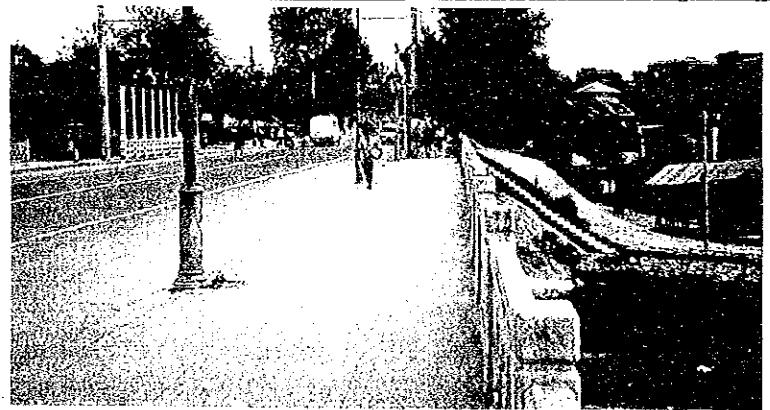
⑤

Proposed crossing point of Bagmati Bridge No.3.
The route crosses the Bagmati river about 1.0km down stream from the Shankhamol temple.

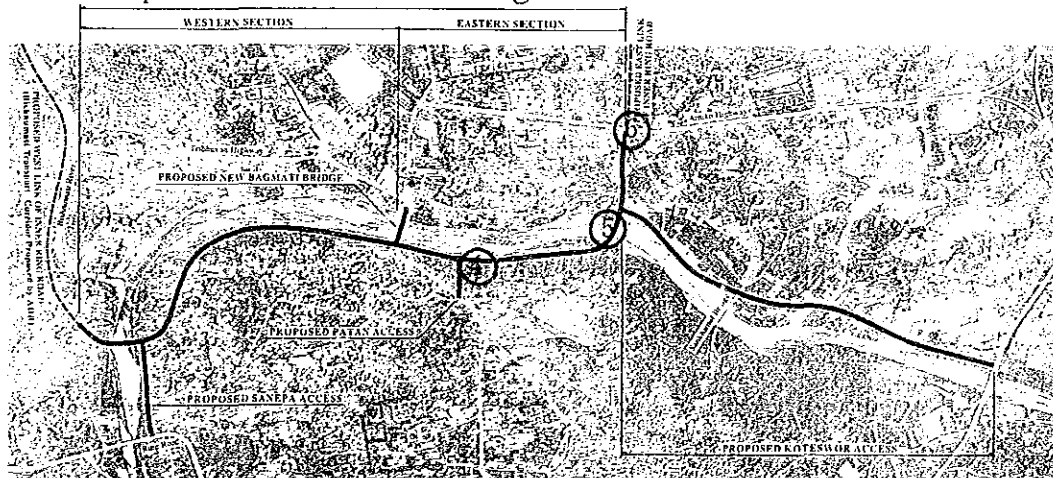


⑥

Proposed South Link is connected with Arniko Highway at east of Dhobi Khola Bridge.



Proposed South Link Of Inner Ring Road



OTHER SECTIONS OF BAGMATI TRANSPORT CORRIDOR

Sanepa Access

The proposed route runs along the right bank of Bagmati river.

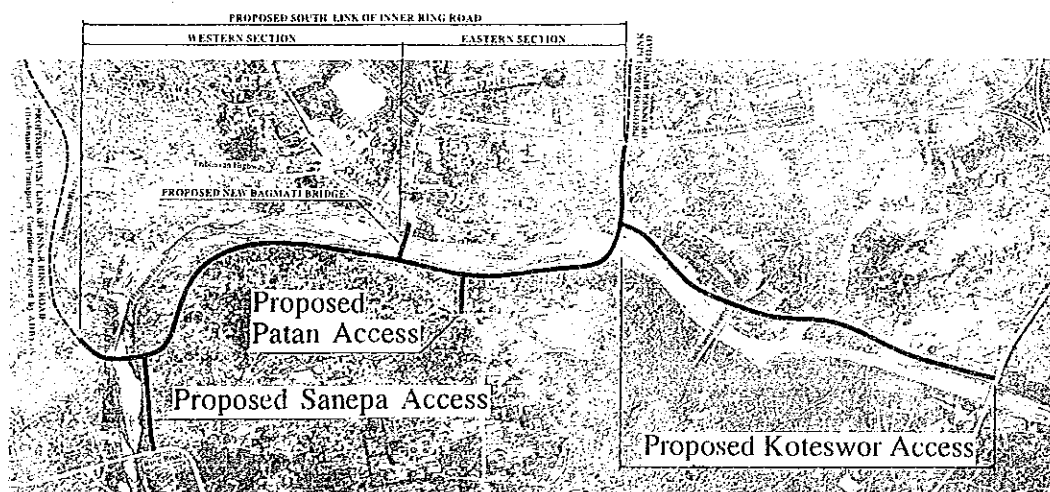


Koteswor Access

The route runs on agricultural land along the left bank of Bagmati river and Manohara river.

Patan Access

The proposed access shall apply reduced carriageway width to minimize the buildings acquisition.



CENTRAL BUS TERMINAL ACCESS

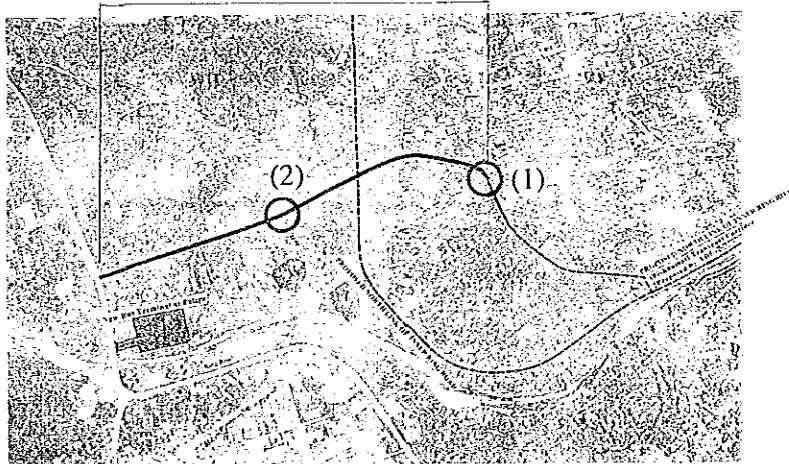


(1)
The beginning point of Central Bus Terminal Access will be at the intersection in Nayabazar. This point should be connected with Bishnumati Link Road proposed in ADB.

(2)
The route in Samakhusi area should be run to minimize the building compensation cost.

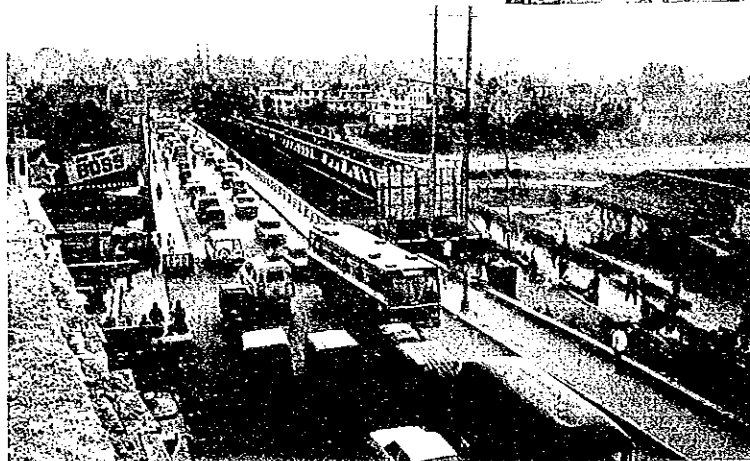
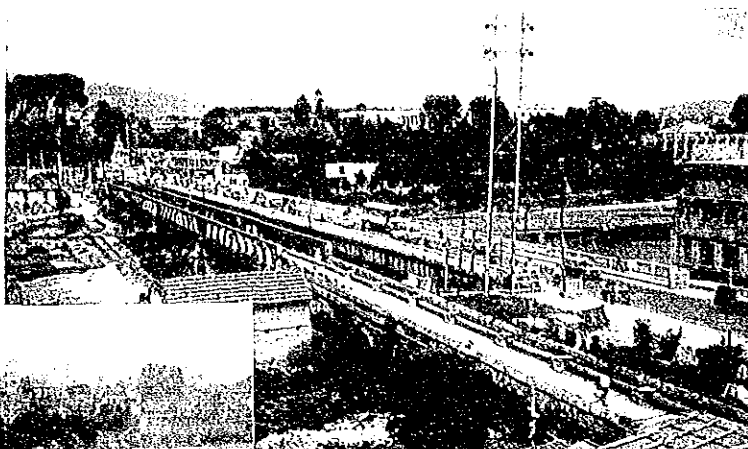


Proposed Central Bus Terminal Access

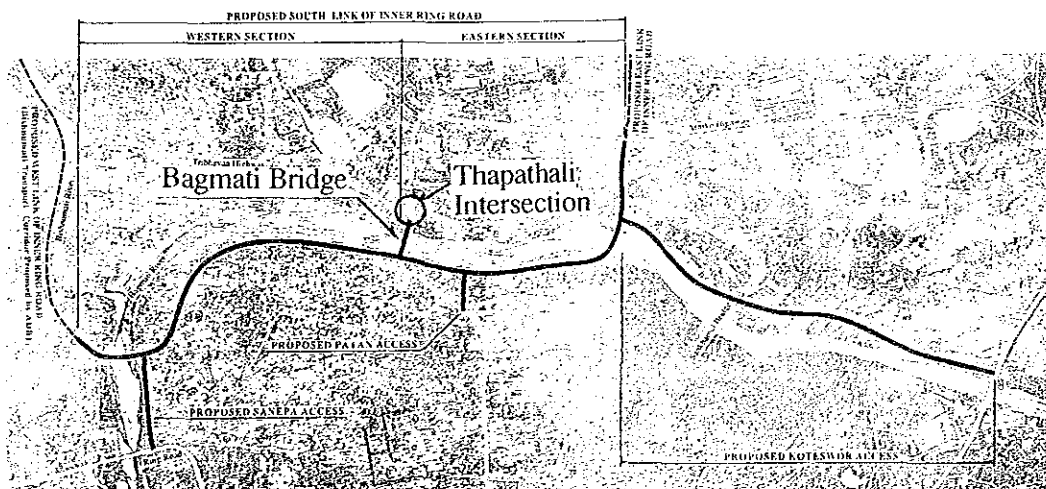


BAGMATI BRIDGE(1)

Heavy traffic congestion on the existing **Bagmati Bridge** at Thapathali. The traffic capacity across the Bagmati river is extremely insufficient.

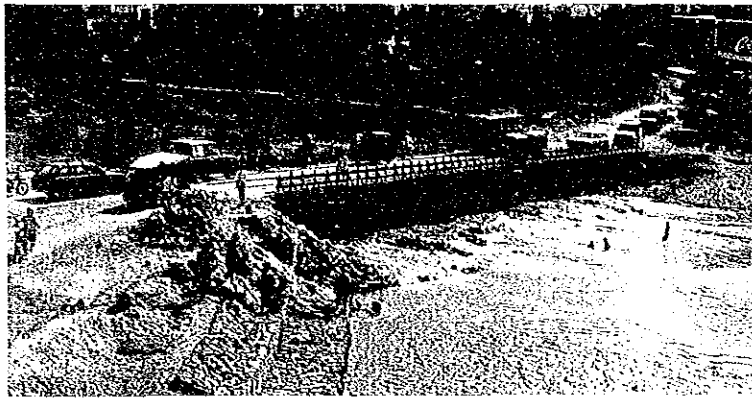
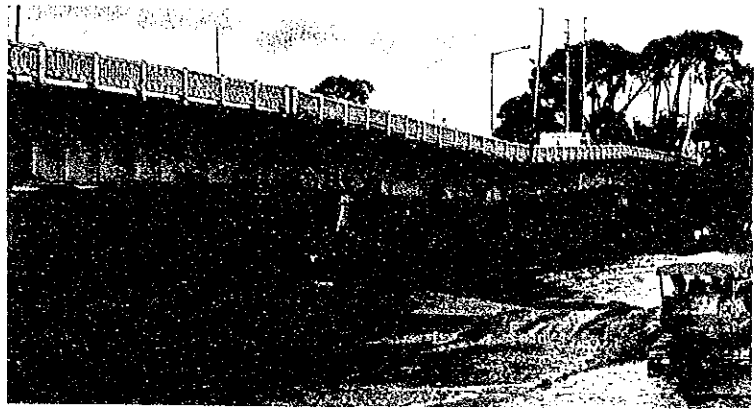


Present condition of **Thapathali intersection** near Bagmati Bridge. The intersection should be upgraded to have a sufficient traffic capacity. New signal control system and pedestrian over-bridge might be necessary so as to operate traffic flow smoothly and large numbers of pedestrian.



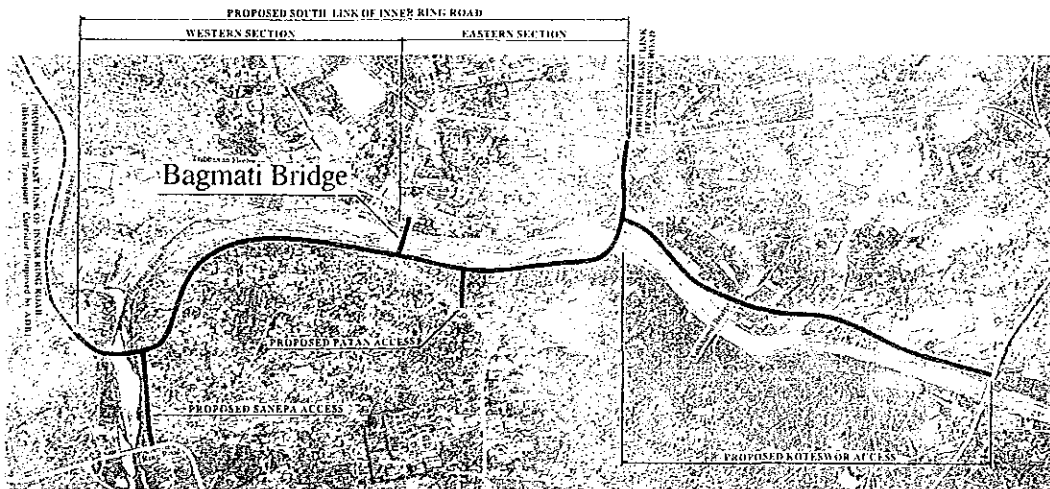
BAGMATI BRIDGE(2)

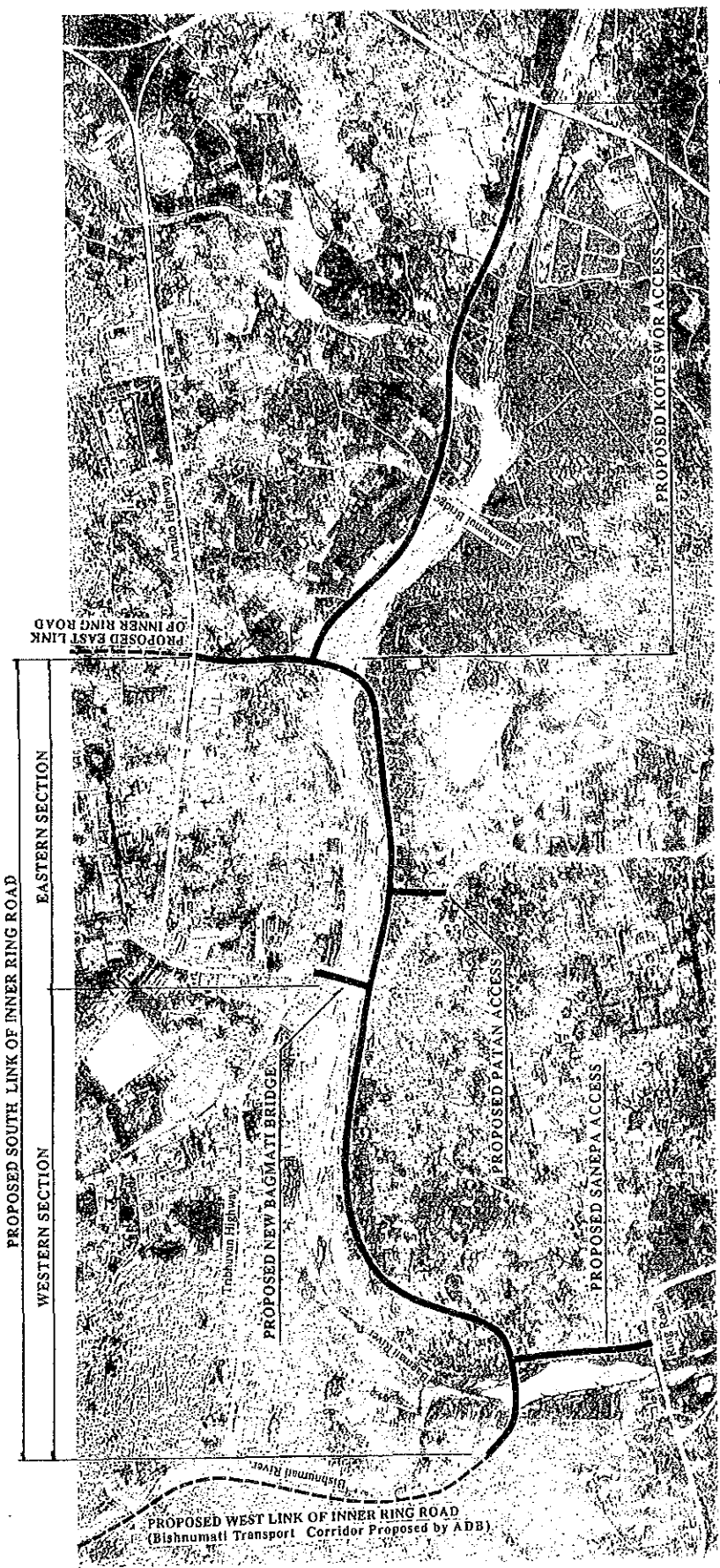
Bagmati Bridge collapsed in August 1991 due to settlement of one of its pier caused by scouring of bridge foundation.



Temporary bridge built a little further upstream the existing bridge.

Temporary check-dam constructed by the government to prevent scouring of bridge foundation from further lowering of river bed. This countermeasure however is not sustainable against flood in next season.





PROPOSED ROUTE MAP OF SOUTH LINK OF INNER RING ROAD, KOTESWOR ACCESS, SANEPA ACCESS AND PATAN ACCESS

PART B: FEASIBILITY STUDY

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ABBREVIATION

ADB	:	Asian Development Bank
ADT	:	Average Daily Traffic
AC	:	Asphalt Concrete
BM	:	Bhaktapur Municipality
CBD	:	Central Business District
CBR	:	California Bearing Ratio
CBS	:	Central Bureau of Statistics
CTP	:	Central Traffic Police
DBST	:	Double Bituminous Surface Treatment
DOHM	:	Department of Hydrology and Meteorology
DOR	:	Department of Roads
DOTM	:	Department of Transport Management
ESA	:	Equivalent Standard Axles
GDP	:	Gross Domestic Product
GLD	:	Guided Land Development
HMGN	:	His Majesty's Government of Nepal
IDA	:	International Development Association
IRR	:	Internal Rate of Return
JICA	:	Japan International Cooperation Agency
KM	:	Kathmandu Municipality
KVUDPP	:	Kathmandu Valley Urban Development Plans and Programs
LM	:	Lalitpur Municipality
MHPP	:	Ministry of Housing and Physical Planning
MOF	:	Ministry of Finance
MOWT	:	Ministry of Works and Transport
NPC	:	National Planning Commission
OD	:	Origin and Destination
P.C.U.	:	Passenger Car Unit
ppha	:	person per hectare
TDC	:	Town Development Committee
USAID	:	United States Agency for International Development
VCC	:	Village Development Committee
vpd	:	vehicle per day
WECS	:	Water and Energy Commission Secretariat

CHAPTER 1
INTRODUCTION



CHAPTER 1 INTRODUCTION

1.1 Background of the Study

Kathmandu Valley comprises of the city of Kathmandu, the capital of Nepal, the city of Lalitpur (Patan), third largest city in Nepal, and the city of Bhaktapur. The population in the Valley in 1991 is estimated at about 1 million. The population in this area is on the increase due to immigration of people from the other parts of Nepal and India. This fact along with inadequate provision of urban infrastructure, has given rise to a variety of urban problems including slumming inside the city, sprawling of urban area, traffic congestion on roads and poor facilities of public transport. To cope with the above issues, His Majesty's Government of Nepal has come up with some comprehensive development plans of the area including "Physical Development Plan for the Kathmandu Valley in 1969" and "Kathmandu Valley Physical Development Concept in 1984". However, in spite of these plans, condition of urban area of the Valley has worsened day by day. This fact seems to come from, among other things, following reasons:

- Inability to implement the plan due to administrative, financial and legislative difficulties,
- Fragmental implementation of improvement works mainly done with foreign aids for the solution of impending issues on the spot,
- and lack of data base for scientific planning.

In these circumstances, His Majesty's Government of Nepal, under the financial assistance from the Asian Development Bank, has conducted a study named "Kathmandu Valley Urban Development Plans & Programmes" with the aim of formulating of more concrete and implementation plans and programmes for the realization of the concepts proposed in the 1984 plan.

The issues of the transportation in the Valley are getting worse day by day as seen below:

- Traffic congestion on certain sections of roads in the central area,
- Mixing of traffic on major roads and resultant decrease in efficiency of road usage and increase in traffic accidents,
- and poor condition of public transport and creation of the transportation-poor who are unable to use any mean of transport.

It is high time now to formulate more comprehensive and implementable urban transportation development strategies for the Valley in conjunction with other ongoing development plans for urban infrastructure such as "Kathmandu Valley Urban Development Plans & Programmes" and so on.

1.2 Objectives of the Study

The major objectives of the Study are:

- (1) To formulate master plan for Kathmandu Valley Urban Road Development for the period up to the year as shown below:
 - Long-term plan; Target year of 2015
 - Short-term plan; Target year of 1997
- (2) To conduct feasibility study on the high priority projects proposed in the short-term master plan (- 1997).

1.3 Study Area

The Study area covers the area of Kathmandu Valley including Kathmandu District, a Part of Lalitpur District and Bhaktapur District as shown in Fig. 1.1.

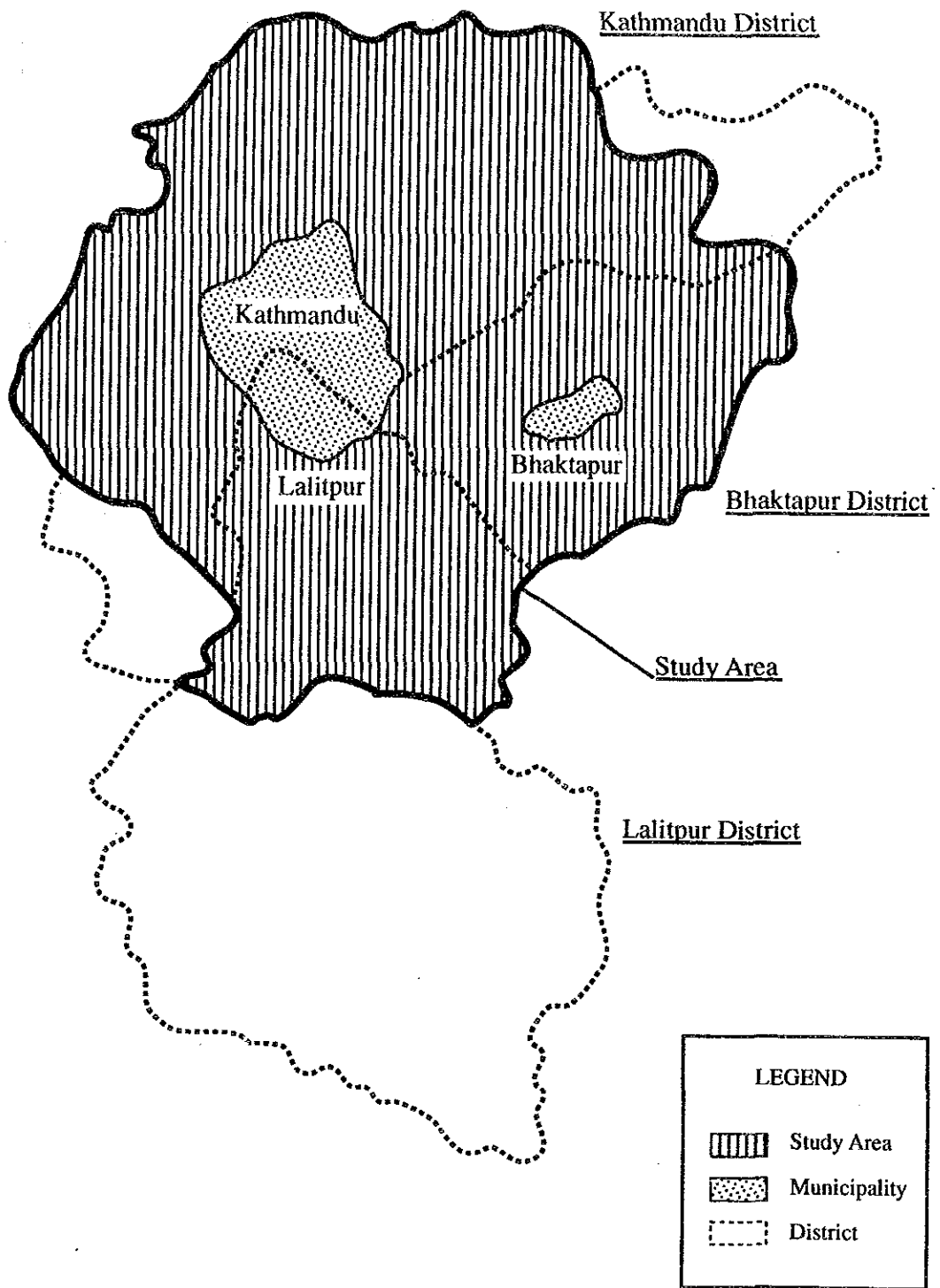


FIG. 1.1 STUDY AREA

1.4 Work Schedule of the Study

The Study has started from the middle of November 1991 and will continue till the end of March 1993. An overall work flow illustrating the inter-relationship of each activities in the Study is presented in Fig. 1.2.

1.5 Organization and Assignment of the Study Team

The Study has been carried out by the Study Team under the guidance of the Advisory Committee, which is organized by JICA.

Department of Roads (hereinafter referred to as DOR), Ministry of Works and Transport, His Majesty's Government of Nepal, is the counterpart agency to the Study Team.

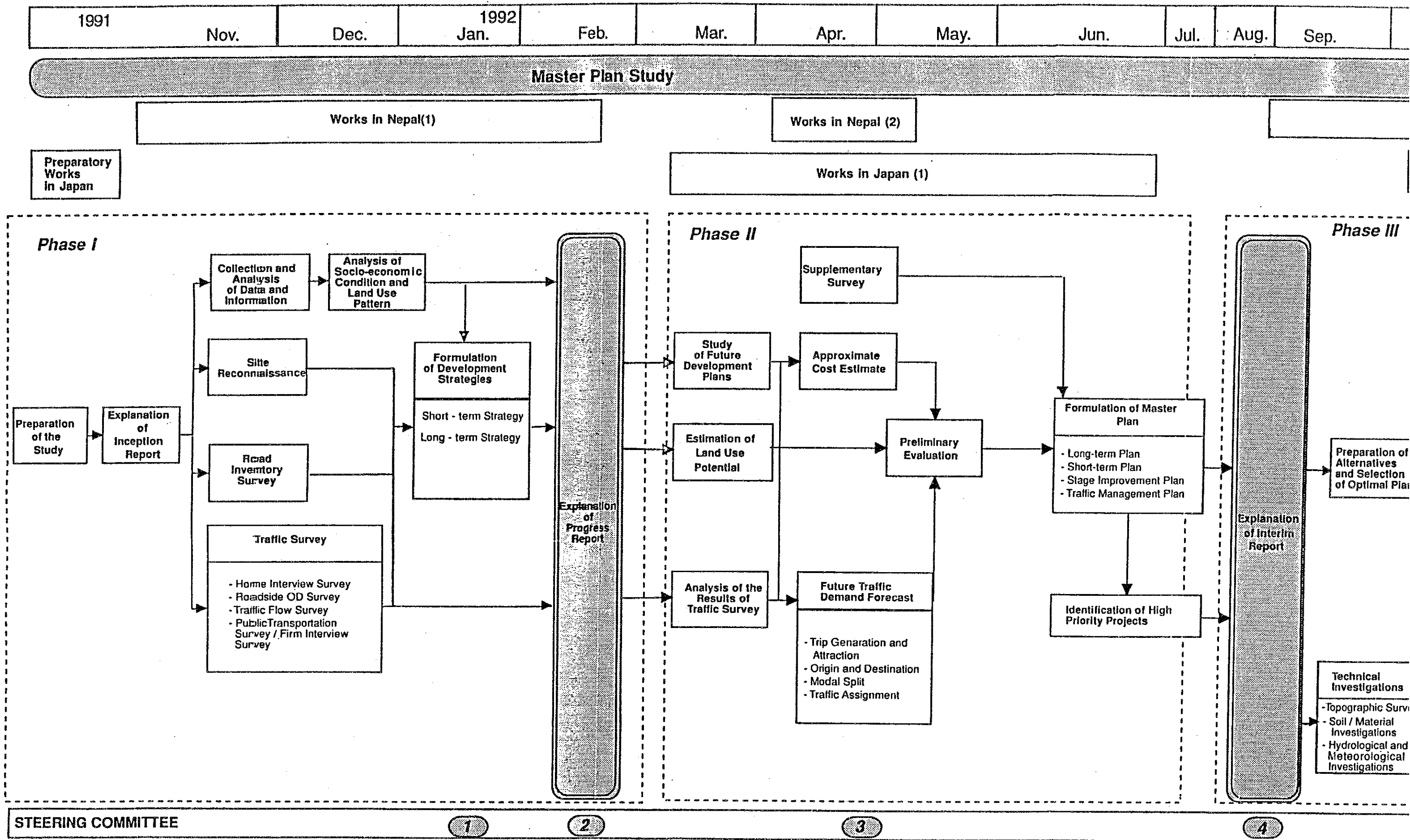
The His Majesty's Government of Nepal has established a Steering Committee consisting of the following organizations under the chairmanship of the Director General of DOR for the smooth implementation of the Study.

- (1) Ministry of Works and Transport
- (2) Ministry of Finance
- (3) Ministry of Housing and Physical Planning
- (4) National Planning Commission
- (5) Department of Roads
- (6) Department of Transport Management
- (7) Traffic Police
- (8) Municipalities of Kathmandu, Lalitpur and Bhaktapur

In carrying out the Study, the Study Team has worked with the counterpart personnel assigned by the counterpart agency.

The organization chart of the Study Team is presented in Fig. 1.3.

FIG. 1.2 WORK FLOW DIAGRAM



2 WORK FLOW DIAGRAM

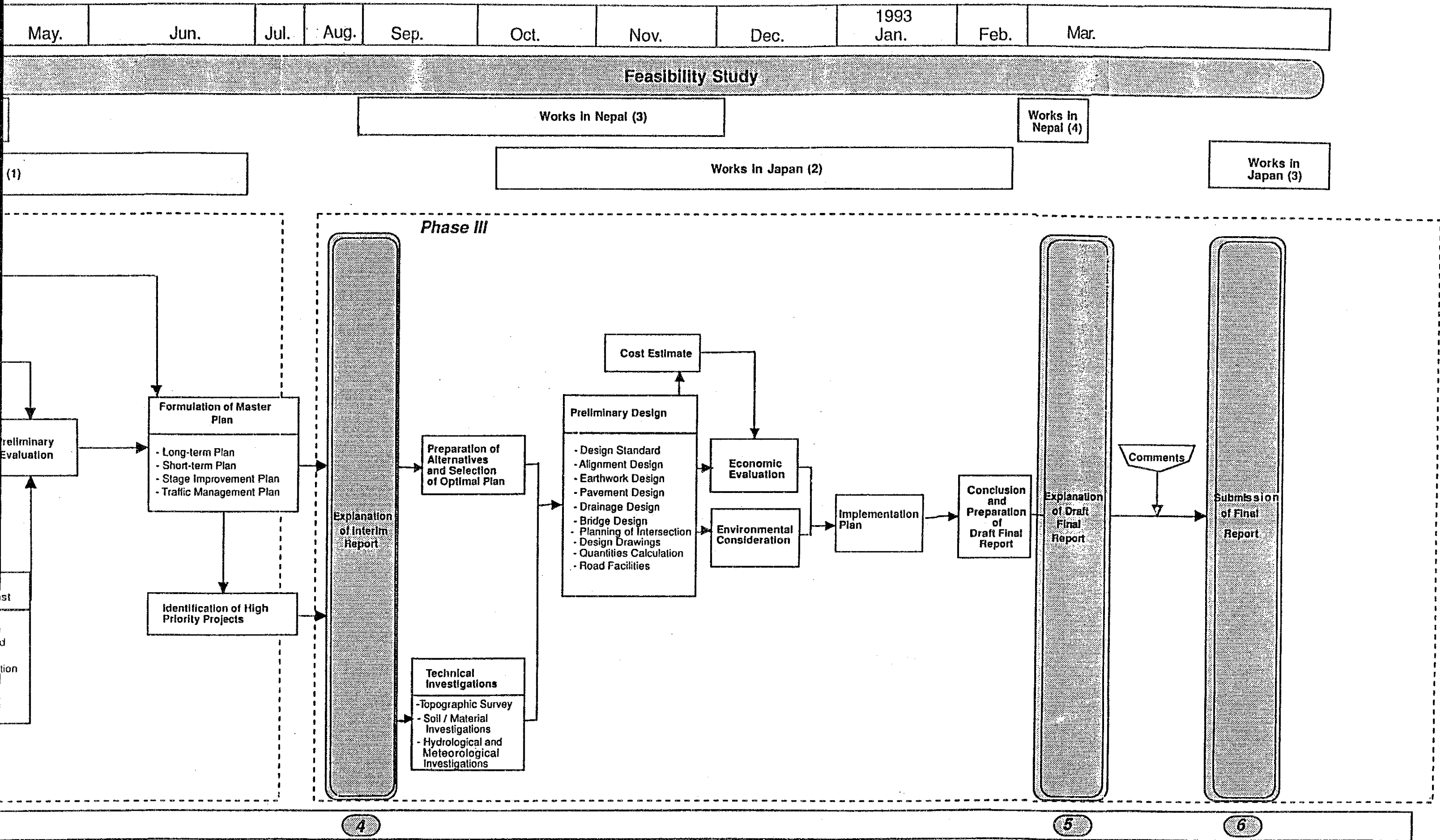
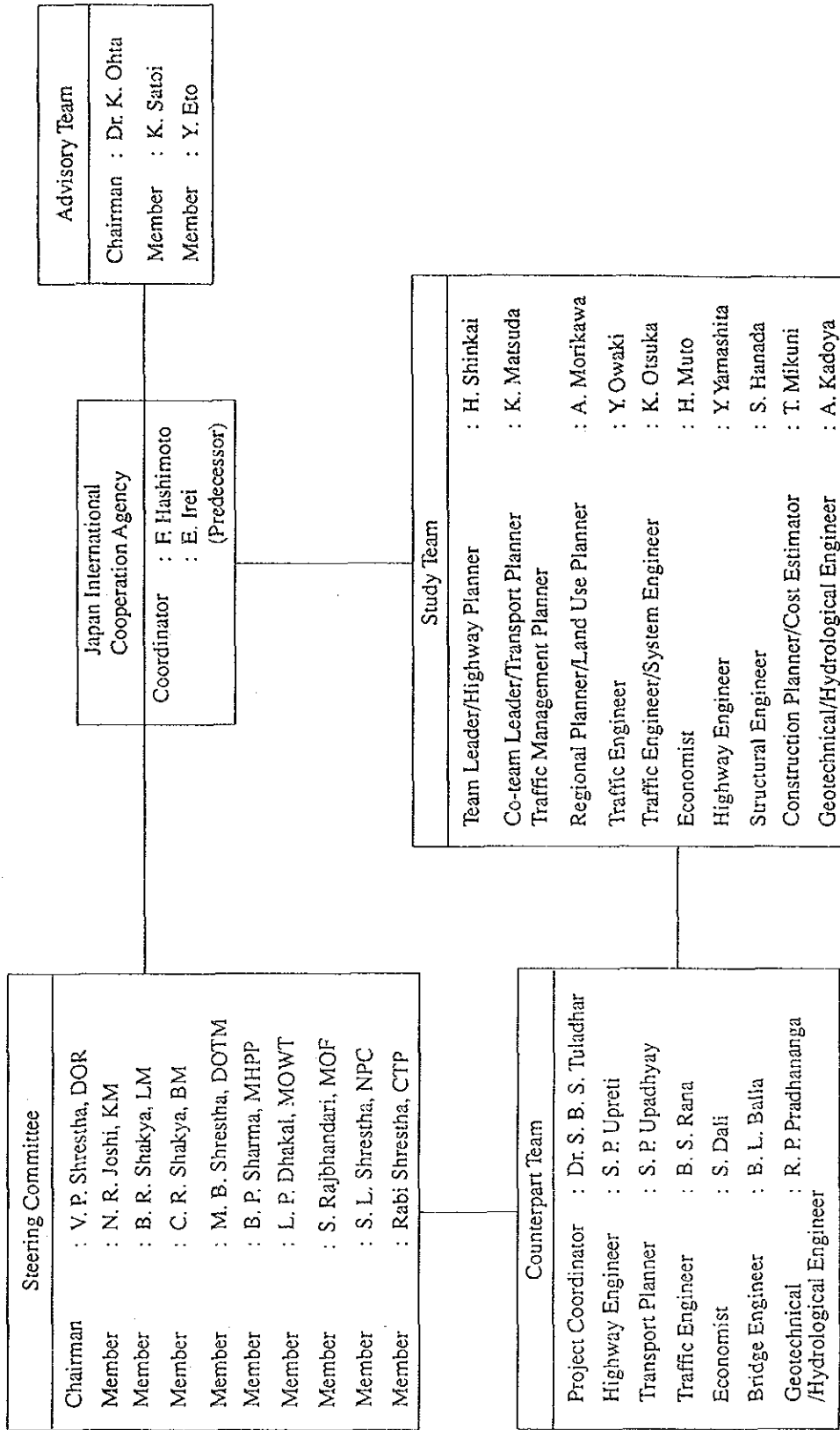


FIG. 1.3 ORGANIZATION CHART



CHAPTER 2

MASTER PLAN AND

HIGH PRIORITY PROJECTS



CHAPTER 2 MASTER PLAN AND HIGH PRIORITY PROJECTS

2.1 General

Master plan study, Part A of this Study, consisted of the following three categories of the development plan in the short-term (target year 1997) as well as the long-term plan (target year 2015) :

- (1) Urban road development plan
- (2) Public transport development plan
- (3) Traffic management plan

These development plans were formulated in the short-term and long-term to achieve the following targets:

Short-term Development (for the year 1997)

- Improvement of bottlenecks in urban roads
- Relief of transportation-poor areas

Long-term Development (for the year 2015)

- Establishment of well-balanced road transportation system as a capital of nation
- Homogeneous development of the Valley

High priority projects were selected out of the urban road development plans in the short-term taking into consideration the required funds of projects, ease of land and house acquisition, urgency of the project, improvement of local traffic movement, improvement of transportation access, etc.

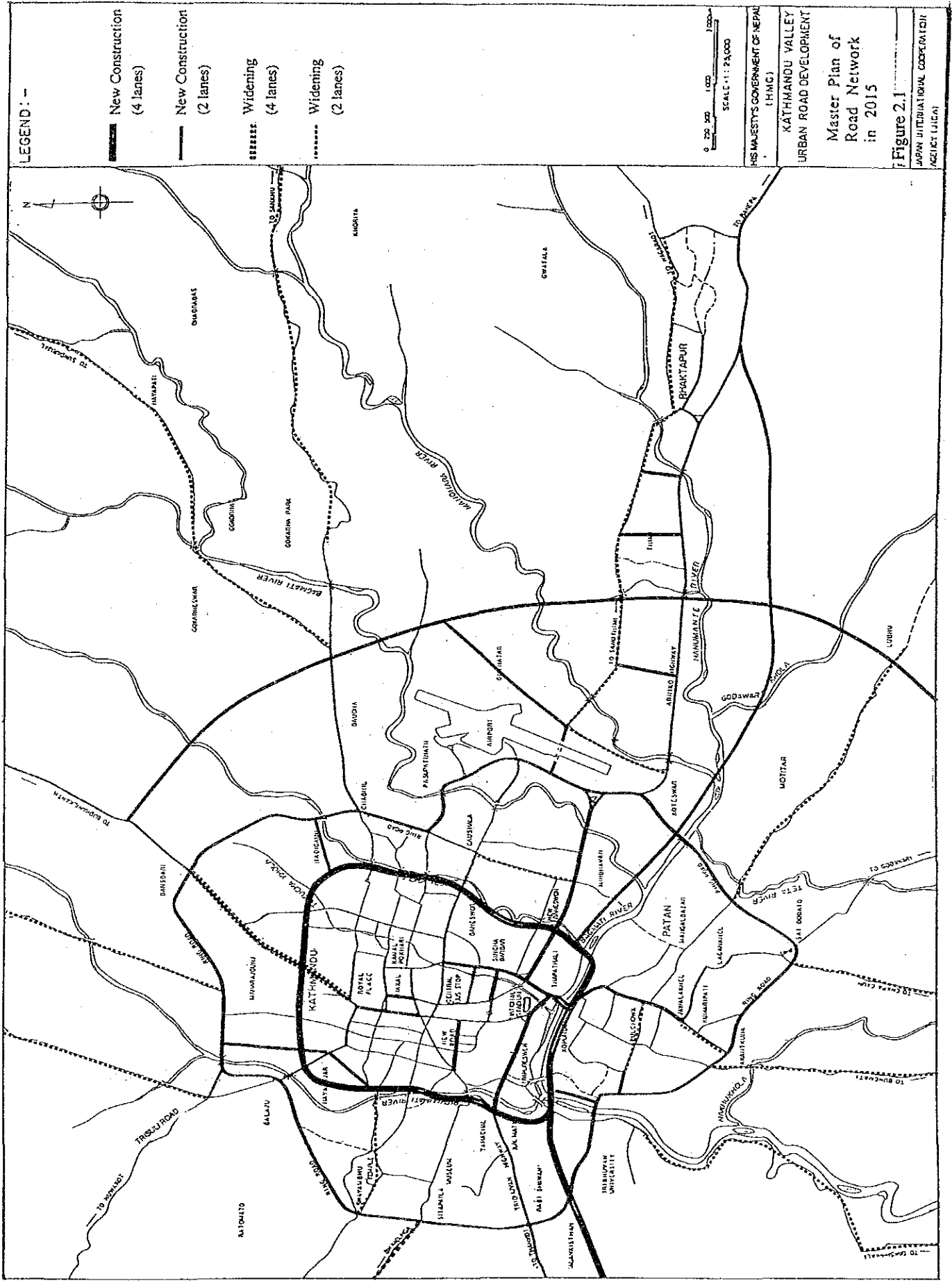
The feasibility study has been conducted on the high priority projects recommended in the above short-term plan. All findings and issues obtained through the feasibility study has been compiled in Chapter 3 through Chapter 10 in this text and presented as a "Part B; Feasibility Study on High Priority Projects".

2.2 Urban Road Development Plan

2.2.1 Road Development Plan in Master Plan

Road development plan for the year of 2015 was proposed by the Study Team in line with the five (5) development policy as shown below. (See Fig. 2.1)

- (1) Road development as a capital of nation
 - 1) Construction of Arniko Bypass
 - 2) Construction of 2nd Tribhuvan Highway
- (2) Road development in the wave of outward shift of urban area
 - 1) Widening of radiating roads
 - Sundarijal Road
 - Sankhu Road
 - Lubhu Road
 - Chapagaun Road
 - Bungmati Road
 - Bhimdhunga Road
 - Tokha Road
 - Phutung Road
 - 2) Construction of ring roads
 - The Outer Ring Road
(Budhanilkantha - Thimi - Lubhu - Bungmati)
 - Thimi North-South Ladder Step Roads
 - Gothatar Service Road (East of Airport)
- (3) Road development for the integration of three (3) existing city centers
 - 1) Widening of Koteswor - Thimi - Bhaktapur Feeder Road
 - 2) Construction of Baneswor - Thimi Shortcut by provision of tunnel under Tribhuvan Airport



- (4) Road development to streamline the traffic flow inside the Ring Road
 - 1) Construction of the Inner Ring Road
 - North Kathmandu link section (North Link)
 - Bishnumati link section (West Link)
 - Bagmati link section (South Link)
 - Dhobi Khola link section (East Link)
 - 2) Linkage of the Inner Ring Road with the Ring Road
 - Bijeswari - Swayambhunath Stupa - Ring Road West (Widening)
 - Sanepa Access from Teku bridge- Ring Road West (Construction)
 - Koteswor Access from Dhobi Khola at Thapathali - Ring Road East South (Construction)
 - Hadigaun - Ring Road East North (Construction)
 - 3) Widening of Kantipath
 - 4) Widening of Bhaktapur Ring Road
- (5) Road development with imminent necessity to erase existing bottleneck and alleviation of transportation-poor
 - 1) Construction of New Bagmati Bridge
 - 2) Construction of Access to the New Bus Terminal at Balaju
 - 3) Widening of New Baneswor - Old Baneswor
 - 4) Improvement of Lalitpur Access
 - Jhamsikhel - Ring Road (Extension and Widening)
 - Jawalakhel - Ring Road (Widening)
 - Sat Dobato - Ring Road (Widening)

2.2.2 Short-term Urban Road Development Plan

Short-term development plan was established employing the following two major targets:

- Improvement of bottlenecks in urban roads
- Relief of the transportation-poor areas

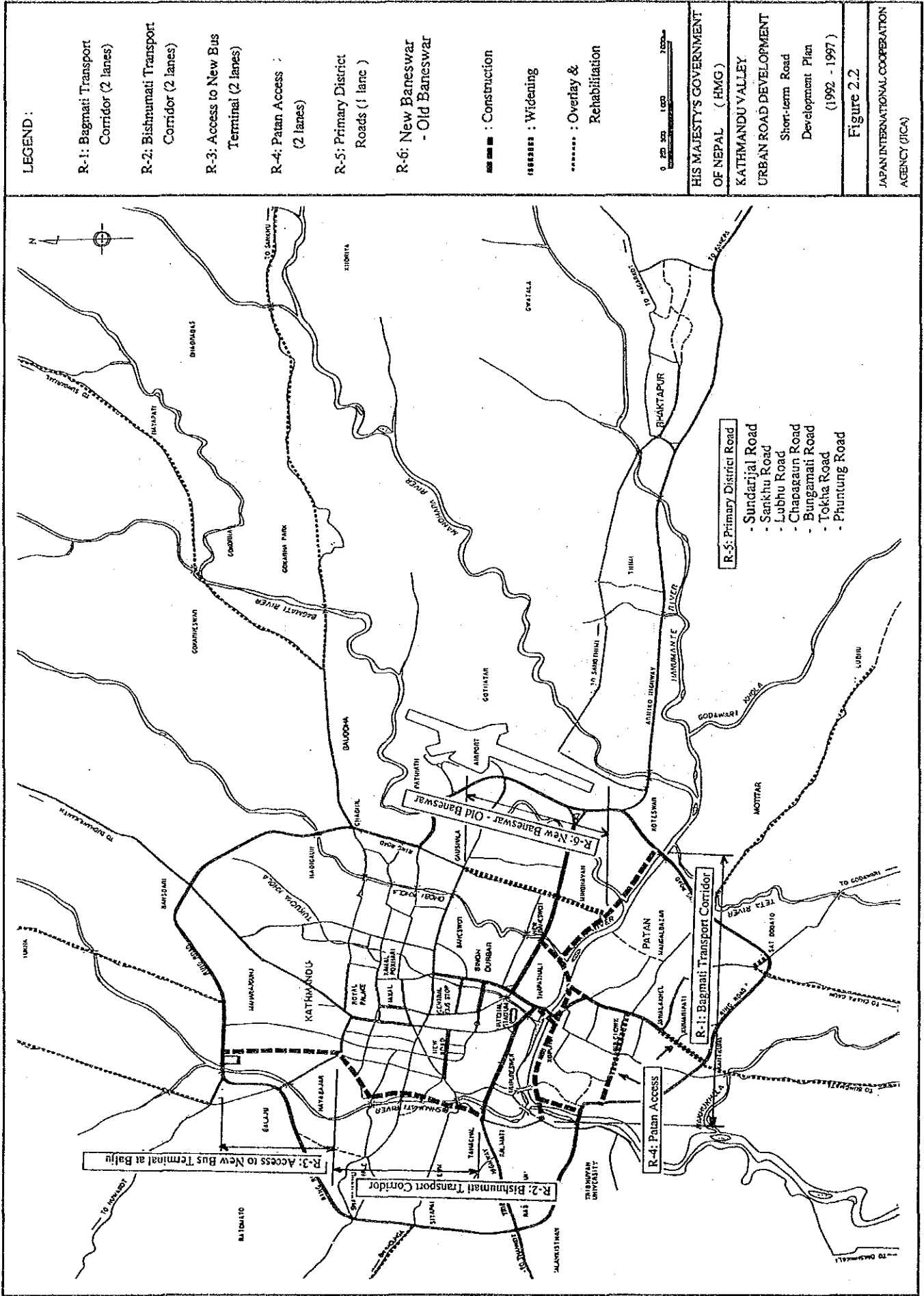
The recommended road network to be implemented in the short-term was presented in Fig. 2.2 and the concept of road development in the short-term plan is outlined as shown below:

- Improvement of Bagmati Transport Corridor
- Improvement of Bishnumati Transport Corridor
- Access to the New Bus Terminal at Balaju
- Improvement of Lalitpur Access
- Improvement of radial roads connecting with the central area

2.3 High Priority Projects to be conducted for Feasibility Study

High priority projects were selected among the projects proposed in the short-term road development plan. Selection of the high priority project was made taking into consideration the following factors:

- Required amount of the construction fund
- Required amount for land/house acquisition and compensation
- Ease of construction from the view point of acquiring land
- Urgency of the project
- Improvement of local traffic movement
- Decrease of the traffic accidents
- Construction technology
- Improvement of access to the public transport services



LEGEND :

R-1: Bagnmati Transport Corridor (2 lanes)

R-2: Bishnumati Transport Corridor (2 lanes)

R-3: Access to New Bus Terminal (2 lanes)

R-4: Patan Access (2 lanes)

R-5: Primary District Roads (1 lane)

R-6: New Baneswar - Old Baneswar

▬ : Construction

▬ : Widening

▬ : Overlay & Rehabilitation

0 250 500 1000 2000

HIS MAJESTY'S GOVERNMENT OF NEPAL (HMG)

KATHMANDU VALLEY

URBAN ROAD DEVELOPMENT

Short-term Road

Development Plan

(1992 - 1997)

Figure 2.2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

- R-5: Primary District Road**
- Sundarjal Road
 - Sankhu Road
 - Lubhu Road
 - Chapagaun Road
 - Bungamati Road
 - Tokha Road
 - Phuntung Road

After conducting careful evaluation, the Study team selected the following projects as high priority project of which location is shown in Fig. 2.3.

(1) Improvement of Bagmati Transport Corridor, which consists of:

1) Construction of South Link of Inner Ring Road

The project will be a part of proposed Inner Ring Road. The proposed road, starting from Kuleswor at intersection of Kalimati - Teku Road, runs along the south bank of Bagmati River and connects the Arniko Highway at east of the Dhobi Khola Bridge.

2) New Bagmati Bridge (hereafter called New Bagmati Bridge)

3) Koteswor Access along north bank of Bagmati River up to the Ring Road (hereafter called Koteswor Access)

4) Sanepa Access from proposed new Teku bridge to the Ring Road (hereafter called Sanepa Access)

5) Patan Access from the proposed south link of Inner Ring Road to Patan city core area. (hereafter called Patan Access)

(2) Construction of Access to the New Central Bus Terminal at Balaju (hereafter called New Bus Terminal Access)

The feasibility study has been conducted on the high priority projects selected above.

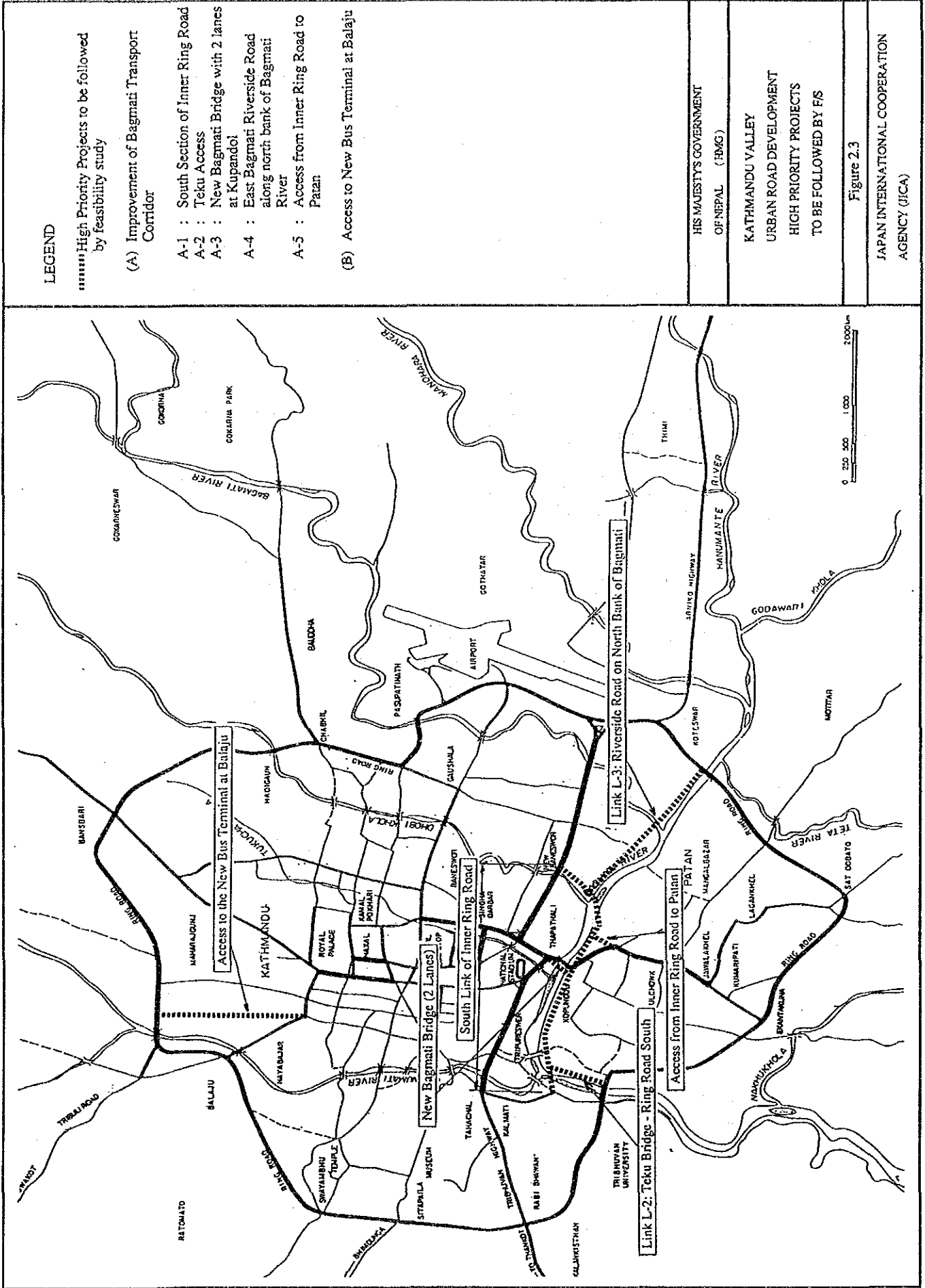
In addition to the above, the improvement of traffic management at the following intersections are also included as high priority projects so as to decrease the traffic accidents and secure a smooth traffic flow on the major city road:

1) Maitighar Intersection

2) Tripureswar Intersection

3) Koteswor Intersection

There are many intersections to be improved other than the above, however, the improvement measures required for these intersections are either smaller scale than that of the above three or inefficient unless the fundamental improvement is made together with the related roads. Therefore, only three intersections mentioned above are selected for the implementation under this project as a model case.



LEGEND

High Priority Projects to be followed by feasibility study

(A) Improvement of Bagmati Transport Corridor

A-1 : South Section of Inner Ring Road

A-2 : Teku Access

A-3 : New Bagmati Bridge with 2 lanes at Kupandol

A-4 : East Bagmati Riverside Road along north bank of Bagmati River

A-5 : Access from Inner Ring Road to Patan

(B) Access to New Bus Terminal at Balaju

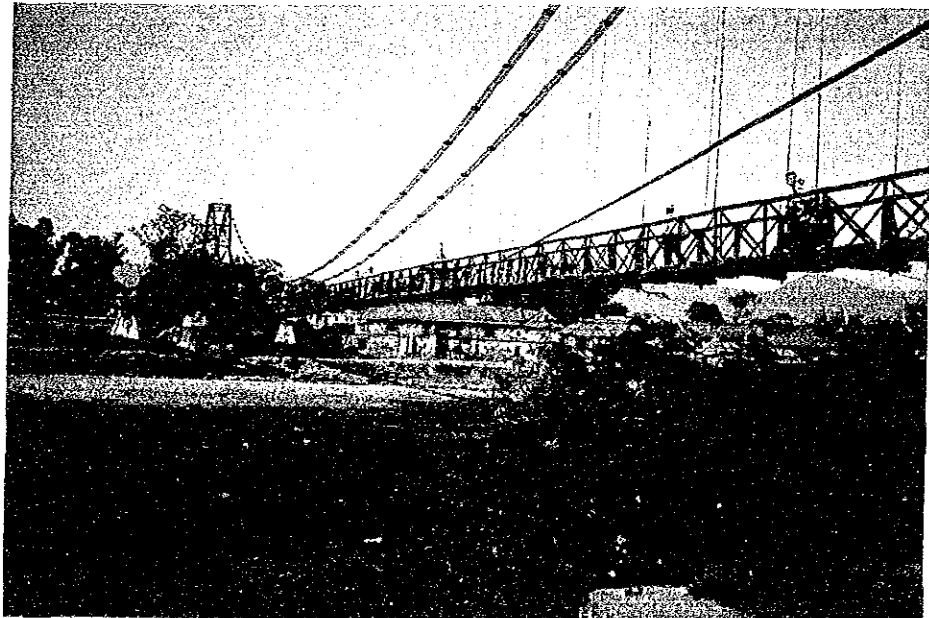
HIS MAJESTY'S GOVERNMENT OF NEPAL (HMG)

KATHMANDU VALLEY URBAN ROAD DEVELOPMENT HIGH PRIORITY PROJECTS TO BE FOLLOWED BY FIS

Figure 2.3

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

CHAPTER 3
DESIGN STANDARD AND
ALTERNATIVES



CHAPTER 3 DESIGN STANDARDS AND ALTERNATIVES

3.1 General

In this chapter, the basic engineering aspects to be applied for the proposed roads, including selection of optimum route, design standards, geometric standards, typical cross sections, right-of-way width, design criteria, etc. has been studied.

Alternative route study was conducted to determine the optimum route using the existing aerial photo. mosaic and the topo. map in a scale 1/10000 and 1/2000 respectively. Existing topographic map with a scale 1/2000 was updated by the local survey team appointed by the Study Team for subsequent preliminary design. Alternative bridge study was also carried out using the topo. map with a scale of 1/500 prepared by the Study Team.

3.2 Design Standards and Typical Cross Sections

3.2.1 Functional Classification of the Proposed Roads

The functional classification for each proposed road has been determined in accordance with NEPAL ROAD STANDARDS (2027) prepared by Department of Roads , the Ministry of works and Transport as well as DESIGN MANUAL FOR URBAN ROADS prepared by Department of Housing and Urban Development, the Ministry of Housing and Physical Planning.

Since the proposed roads are located inside the Ring Road where it could be identified as an urban area, the proposed road are classified into the following:

South Section of the Inner Ring Road	;	Arterial road
New Bagmati Bridge	;	Arterial road
Koteswor Access	;	Collector road
Sanepa Access	;	Collector road
Patan Core Access	;	Collector road
New Bus Terminal Access	;	Collector road

3.2.2 Design Standards

(1) Design Speed to be Applied

Design speed is directly related to the element of geometric elements on horizontal and vertical alignments. The topography in proposed road is assumed to be level terrain.

The value of design speed are obtained in accordance with the Nepal Road Standards taking into consideration the expected function, anticipated traffic volume and terrain and surrounding condition along the proposed road.

The design speed to be applied for each road is given in Table 3.1.

Table 3.1 Design Speed to be adopted

Proposed Roads	Expected Road Function	Surrounding Condition	Traffic Volume in 1997(ADT)	Design Speed (km/hr)
South Link of Inner Ring Road	Arterial Road	B and C	10,000	60
New Bagmati Bridge	Arterial Road	A	30,000	60
Sanepa Access	Collector Road	B and C	2,000	40
Koteswor Access	Collector Road	B and C	3,000	40
Patan Access	Collector Road	B	5,000	40
Access to New Bus Terminal	Collector Road	A and B	5,000	40

A; Commercial area
B; Residential area
C; Agricultural area

(2) Pavement Design

Asphalt pavement will be adopted to the project roads basically.

Standard developed by Japan Road Association (JRA) will be used for design of pavement.

(3) Bridge Design

(i) Bridge Width

- a) Nepal Road Standards (2027), HMG, MOWT, DOR, 2045 (NRS)
- b) Road Structure Ordinance, Japan Road Association, 1983

(ii) Design Live Load

- a) Specifications for Highway Bridges, Japan Road Association, 1990
- b) The American Association of State Highways and Transportation Officials (AASHTO)

(iii) Seismic Load

- a) Indian Standard, Criteria for Earthquake Resistant Design of Structure, Third Revision, 1980.
- b) Specification for Highway Bridges, Japan Road Association, 1990

(iv) Others

Where no applicable standard exists in respect of bridge structures and other related design, the relevant Japanese Standards will be used. Pedestrian bridge will be designed applying the standard of Japan Road Association.

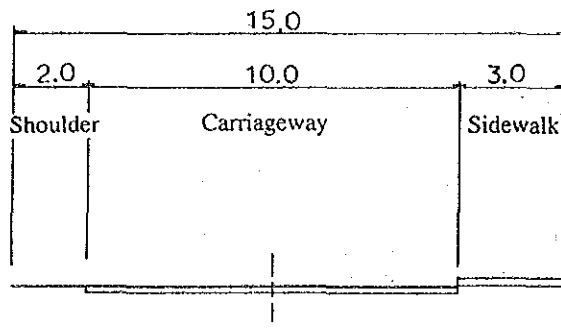
3.2.3 Standard Cross Sections and Right-of-way

(1) Standard Cross Sections

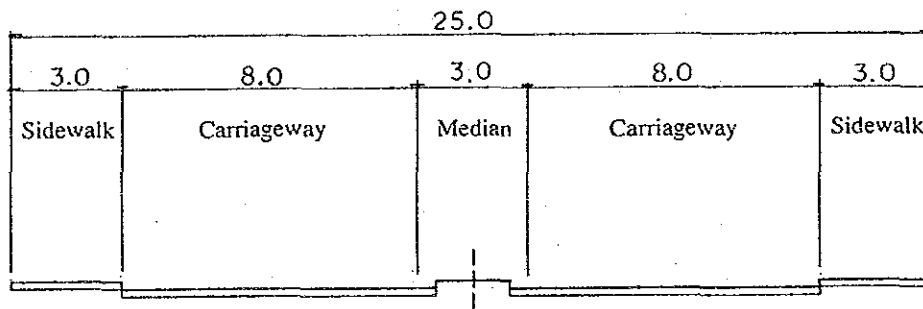
The standard roadway cross-section given in Nepal Road Standards shall apply a rural road in principle and therefore demand very wide right of way. So alternative option are worked out for urban roads depending upon the availability of right of way for different roads and are shown in Figure 3.1 and 3.2. Though carriageway width and sidewalk width are as per Nepal Road Standards Carriageway, side greenbelt is deleted from standard cross section but will be developed in riverside depending upon availability of land. Utilities will be buried and set up within sidewalk width.

(2) Right-of-Way

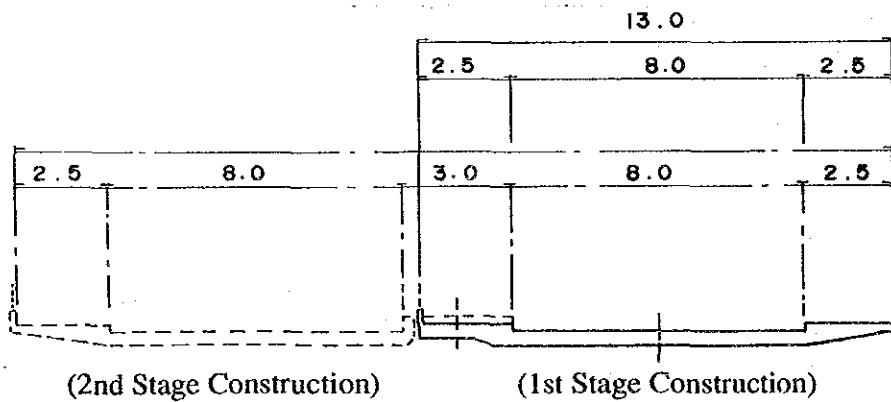
The right of way as per Nepal Road Standards is quite enough for proposed roads, but this has been not in existence except in Ring Road and Arniko Highway. By reviewing the right-of-way of existing major city roads and high land acquisition/building compensation cost, it is recommended to adopt the following right-of-way width for the proposed road. The minimum right-of-way shall also apply for critical section of roads as shown in Table 3.2.



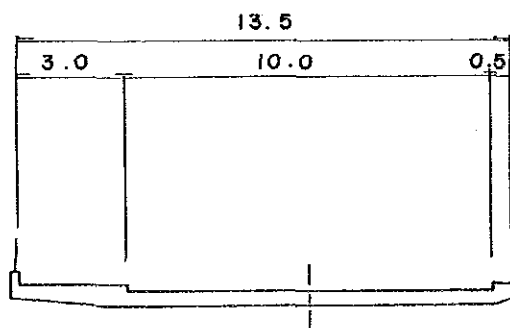
2 Lane Road (1st Stage Construction)



4 Lane Road (2nd Stage Construction)

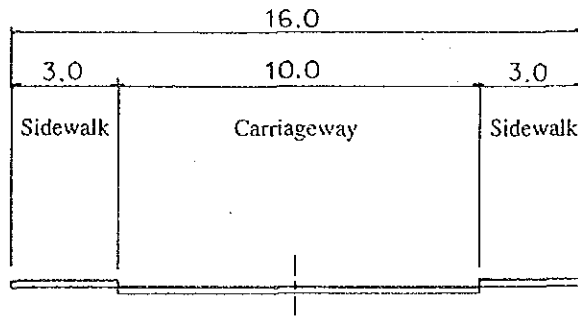


Bridge

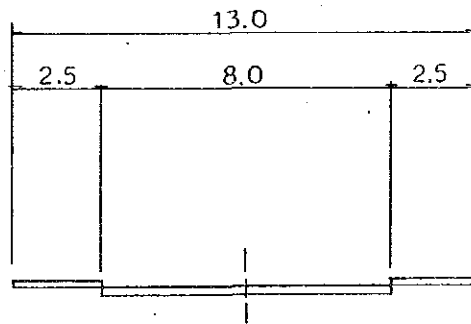


Bridge at Thapathli

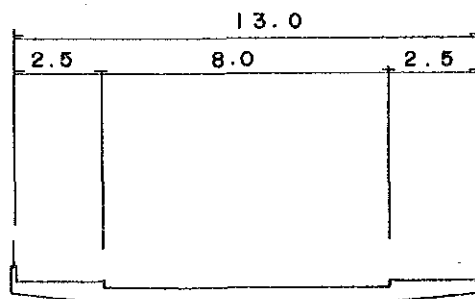
Figure 3.1 Standard Cross-Section of South Link of Inner Ring Road and Bridge



**Sanepa Access, Koteswor Access
and Central Bus Terminal Access**



Patan Access



Bridge (Koteswor Access)

Figure 3.2 Standard Cross-Section of Other Access Roads and Bridge

Table 3.2 Proposed Right-of-way Width to be Adopted

Road type	Proposed Right-of-way
Four Lane Arterial Roads	50 m
Two Lane Arterial Roads and Collector Road	30 m

3.3 Alternative Route Study on High Priority Roads

3.3.1 Outline of Selected Prospective Routes

Master Final Plan Study (Part A) has recommended the following high priority projects:

(A) Improvement of Bagmati Transport Corridor

(A-1) South Link of Inner Ring Road

(A-2) New Bagmati Bridge

(A-3) Koteswor Access

(A-4) Sanepa Access

(A-5) Patan Access

(B) New Bus Terminal Access at Balaju

The Study team member inspected the alignment and some control points taking the following factors into account: appropriate site for bridge location, possible high floods, monument of historical importance/religious sentiments, ease of land acquisition and low building compensation cost. Attention was also paid on intersection facility with existing major road to avoid congestion in intersection.

3.3.2 Improvement of Bagmati Transport Corridor

(1) South Link of Inner Ring Road

(i) Alternative Route Study

Horizontal alignment at west and middle section of South Link of Inner Ring Road is fixed by control points. At east section, two alternative routes were proposed as shown in Fig. 3.3 through the consideration of river conditions.

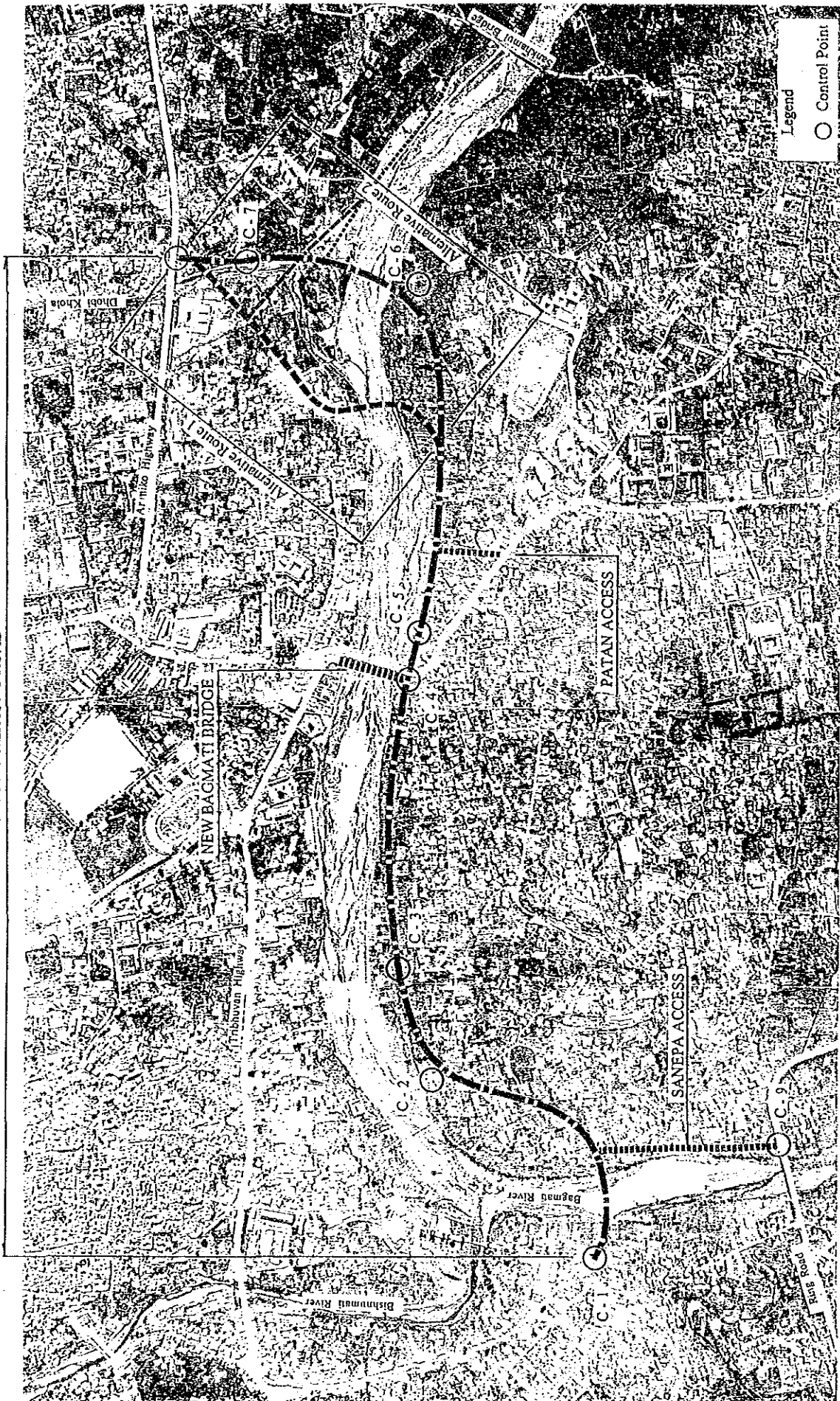
Alternative route 1 passes right side of Dhobi Khola and crosses the river at about 100 m down stream of the existing Dhobi Khola bridge on Arniko Highway and meets with Arniko Highway at about 50 m east of the existing bridge. The aim of Alternative route 1 is to make the road free from scouring by Dhobi Khola at flood time and to improve accessibility to major road in Thapathali Area.

Alternative route 2 passes left bank of Dhobi Khola and meets with Arniko Highway at same position as Alternative route 1. This alternative aims at minimization of land acquisition and building compensation costs, and to be planned so as to protect bank erosion and river bed degradation.

	Alternative 1	Alternative 2
- Length of the Road	3,700 m	3,750 m
- Construction cost	NRs. 460 M	NRs. 410 M
- Land/building acquisition cost	NRs. 120 M	NRs. 100 M

After hydrological site investigation and comparing each alternative route, Alternative route 2 was selected taking into account of the construction cost, land acquisition cost, building compensation cost and river conditions.

SOUTH LINK OF INNER RING ROAD



Scale 1:10,000 (Approximately)

Figure 3.3 PROPOSED ROUTE OF SOUTH LINK OF INNER RING ROAD, SANEPA ACCESS AND PATAN ACCESS
(Showing alternative route and control point)