

禁止出持

社会開発協力部

AFRICAN DEVELOPMENT BANK  
THE GOVERNMENT OF MAURITIUS

# INCEPTION REPORT

on  
Feasibility Study of the Beau Bassin - Port Louis  
Link Road Project  
in Mauritius

JICA LIBRARY



1079225(7)

November 1977

JICA

410

61.4

SDF

LIBRARY

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団

20495

## C O N T E N T S

	<u>page</u>
I. INTRODUCTION .....	1
II. PURPOSE OF STUDY AND THE SECTION TO BE STUDIED	2
II-1 Purpose of Study .....	2
II-2 Outline of the Project Area and the Section to be Studied .....	2
III. SCOPE OF WORK .....	5
III-1 Framework of the Study .....	5
III-2 Matters of Note in Execution of the Study .....	9
III-3 General Description of Study Contents	10
III-3-1 Preparatory Works .....	10
III-3-2 Selection of Alternatives and Determination of Study Policy .....	11
III-3-3 Zoning and Determination of Project Influence Area .....	11
III-3-4 Survey of Present Road Condition ...	12
III-3-5 Traffic Survey .....	12
III-3-6 Economic Study .....	13
III-3-7 Engineering Study .....	14
III-3-8 Preliminary Design and Estimation of Construction Cost	16
III-3-9 Forecast of Traffic .....	17
III-3-10 Evaluation .....	18
III-3-11 Conclusion and Recommendation .....	20
IV. ORGANIZATION AND WORK PLAN .....	21
IV-1 Organization Chart .....	21
IV-2 Work Schedule .....	24

## I. INTRODUCTION

In response to the request of the Government of Mauritius and the African Development Bank (ADB), the Government of Japan decided to lend technical cooperation in the feasibility study of a new link road to be constructed under the plans of the Government to connect Beau Bassin and Port Louis. The Feasibility Study is to be accomplished by Japan International Cooperation Agency (JICA).

JICA sent a preliminary survey team to Mauritius and ADB/ADF in August 1977 for the discussion of Terms of Reference and draft Scope of Work. This document, prepared by consultants appointed by JICA, establishes the particulars, methodology, and time table for the accomplishment of the feasibility study in accordance with the established Terms of Reference and Scope of Work.

## II. PURPOSE OF STUDY AND THE SECTION TO BE STUDIED

### II-1 Purpose of Study

The purpose of this Feasibility Study is to recommend the most suitable route and investment plan for the development of an inter-urban trunk highway (Link Road) to connect the most and next most densely populated areas in Mauritius--the country's capital city of Port Louis and Beau Bassin/Rose Hill area--for the objectives of:

1. Mitigating traffic congestions in the two areas, and
2. Accommodating traffic generating from the implementation of various development projects in the Project Area.

### II-2 Outline of the Project Area and the Section to be Studied

The Project area subject to Feasibility Study encompasses Port Louis, Beau Bassin, Rose Hill and the extent of heaviest urbanization toward south. Implementation of industrial and other development projects are in plan in this area.

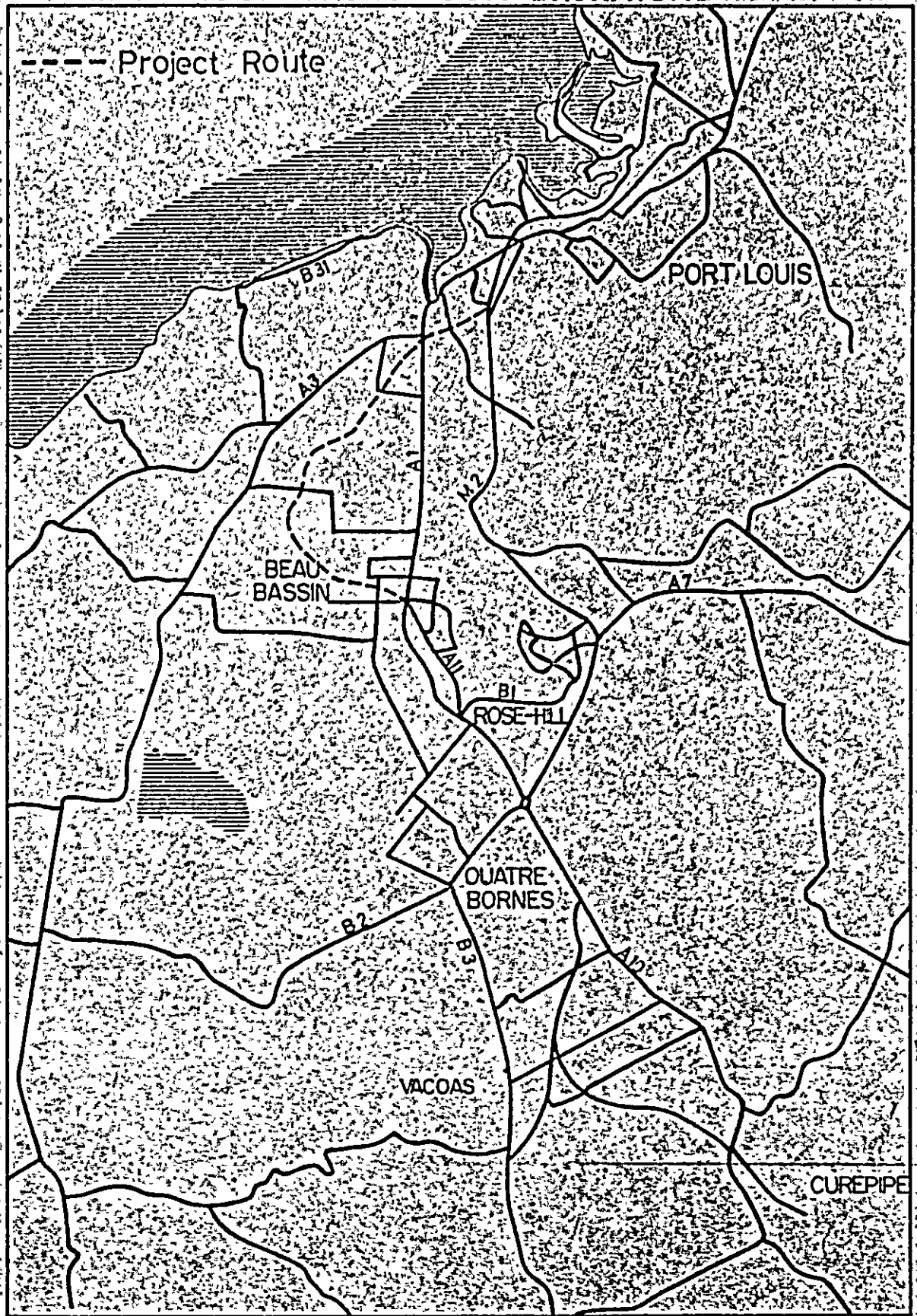
Motorways M1 and M2, on the other side of Grand River NW, function as A1 Highway's by-pass road. But traffic generating from Beau Bassin or Rose Hill and running toward Port Louis will be serviced only inadequately by the

Motorways because their approach to A1 Highway is in Saint Jean.

A1 Highway and its extension, A10 Highway, are among the most important routes of Mauritian road network. They service Port Louis, Beau Bassin, Rose Hill, Quatre Bornes, Phoenix, and Curepipe, which represent the most of urbanized areas of the country, and provide an access to the international airport in Plaisance.

Section subject to Study begins at the Cassis Fly-Over Bridge in Port Louis and ends in Beau Bassin for a total extension of eight kilometers (see attached Map).

LOCATION MAP  
OF BEAU-BASSIN-PORT LOUIS LINK ROAD



### III. SCOPE OF WORK

#### III-1 Framework of the Study

The framework of Feasibility Study consists of the five steps as illustrated in the flow-chart, Figure III-1.

The five steps are:

##### Step I

1. Preparation of an inception report
2. Review of the report and attached data prepared by the preliminary survey team
3. Preparation of necessary equipment and materials for field survey

##### Step II

1. Collection of data and their arrangement
2. Field reconnaissance
3. Interview with parties concerned
4. Discussion with Government officials
5. Selection of alternatives
6. Determination of Study policy
7. Discussion with and consent of the Government officials

##### Step III

1. Determination of Zoning and influence area
2. Study of existing traffic condition
3. Review of urban plans, urban facilities, and roadside environment conditions



4. Present and future prospect of the regional economy
5. Topographic survey, geological and soil survey, study of civil engineering structures, and hydrological survey
6. Study of construction equipment, materials, and labor
7. Study of construction and maintenance methods
8. Preliminary evaluation and determination of alternatives
9. Discussion with and consent of the Government officials
10. Preparation and submission of a progress report

Step IV

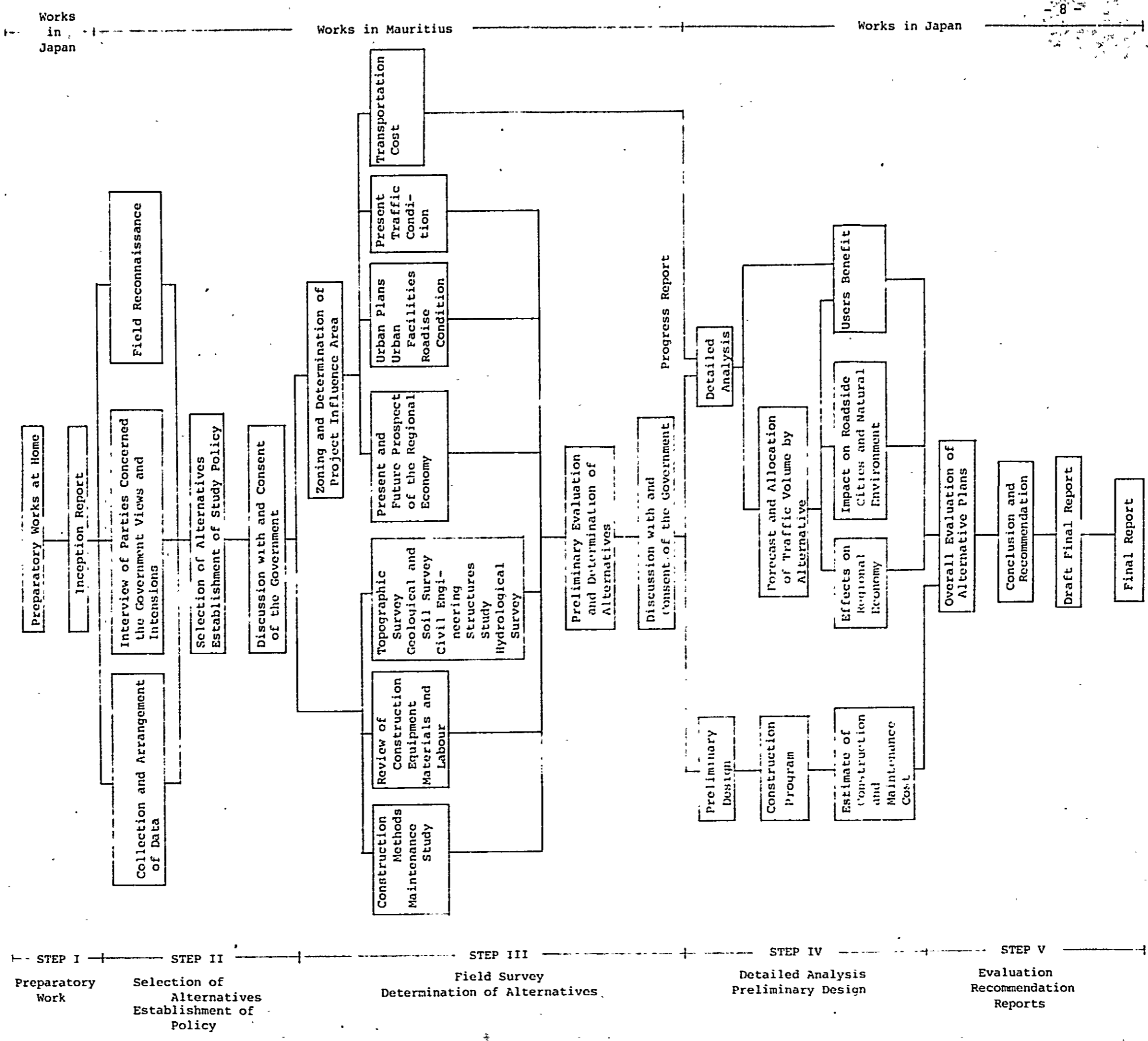
1. Forecast of traffic volume
2. Estimation of user benefits
3. Evaluation of impact on roadside social and natural environment
4. Preliminary engineering study
5. Programming of construction schedule
6. Estimation of construction and maintenance cost

Step V

1. Overall evaluation of alternatives and determination of the most recommendable alternative
2. Conclusion and recommendation
3. Preparation and submission of draft final report
4. Exposition of draft final report and discussion with the Government officials

5. Preparation of written reply to comments by the Government.
6. Preparation and submission of final report

Figure III-1-1 Study Framework



### III-2 Matters of Note in Execution of the Study

Following matters will be noted and taken into consideration in the execution of the Study:

1. In selection of alternative routes, prime emphasis will be placed on the utilization of disused railroad track while making sure that Link Road, when constructed, will offer the most suitable link within the road network of the region.
2. Possibilities will be considered of developing Link Road in phased steps in order to best meet types of traffic demands arising at different times from development in parts of the Project Area in diverse patterns.
3. Full attention will be paid to the preservation of roadside environment in view of considerable volume of through traffic expected on Link Road.
4. Access roads to related development projects will be considered as necessary in a manner facilitating the effective functioning of Link Road.
5. To insure the effective functioning of Link Road, the pace of urbanization and the direction of development in the Project Area, relevant Government measures and the characteristics of the traffic will be surveyed and studied.
6. Particular care will be taken in technical studies of the feasibility of using existing bridges and the

comparison of major structures such as interchanges and over-pass bridges in urban areas.

7. In evaluating the project not only the direct benefits of the project but also Link Road's impacts on regional development and natural environment within the Project Area will be considered.
8. Central verge to accommodate a monorail will be considered for the alternatives other than that of widening the existing road.
9. The sectioning, lane width and pavement structure of Link Road, and bridges should be studied in relation to staged construction.

### III-3 General Description of Study Contents

The substance and methodology of Study are in summary as follows.

#### III-3-1 Preparatory Works

1. Review of pre-feasibility study report
2. Preparation of an inception report
3. Procurement of equipment for surveying traffic volume and preparation of survey forms and study manual
4. Arrangement of basic data
5. Preparation of maps for field survey
6. Various questionnaire forms

7. Preparation of preliminary zoning plan and zoning maps
8. Procurement of on-site investigation equipments

### III-3-2 Selection of Alternatives and Determination of Study Policy

Upon arrival in Mauritius, Project Area and the road section will be explored immediately, relevant matters will be discussed with the Government officials, other parties concerned will be interviewed, and relevant data will be gathered, thereby selecting alternatives and determining a Study policy. In doing so, the following items will be considered:

1. Degree of use of disused railroad tracks
2. Possibility of use of disused railroad bridge
3. Regional development plans for Pointe aux Sables, Coromandel, Quatre Bornes, etc.
4. Connection to Port Louis Ring Road
5. Junction with existing road, A1
6. Possibility of widening existing road, A1

### III-3-3 Zoning and Determination of Project Influence Area

Areas subject to strong impact of the project is to be conceived of as "Direct Influence Area" and subjected to detailed zoning, and other areas as "Indirect Influence Area" subject to rough zoning.

#### III-3-4 Survey of Present Road Condition

The entire Project Influence Area will be explored for the rough understanding of economic and technical aspects such as the geometry and alignment of road, drainage facility, and traffic control. After selecting alternatives an inventory will be taken immediately of the present situations of roads.

#### III-3-5 Traffic Survey

A detailed traffic volume survey will be conducted for the purpose of understanding the present condition and characteristics of traffic on existing roads in the Project Area.

1. Traffic Volume Survey (counting of traffic volume, OD study, interview survey other than OD)
2. Traffic Analysis (preparation of OD tables, ADT estimation, traffic characteristics)
3. Goods Distribution Survey (distribution functions, distribution channels, seasonal changes, transportation "morphology," production scale and generated traffic volume)
4. Traffic Dynamics (number of motor vehicles owned, motor vehicle importation policy, business of bus and truck transportation)

### III-3-6 Economic Study

In order to define the movement and characteristics of the traffic in the socio-economic activities of the Project Area and Mauritius as a whole, the following will be reviewed and studied.

1. GNP/GDP Level
2. Industrial Activities (agriculture, manufacturing, tourism, trade, fishery, and other industries)
3. Population Distribution (overall and by district/sub-district)
4. Present Status of Relevant Regional Development Plans
  - a. Industrial development plan, industrial estate plan
  - b. Tourism development plan
  - c. Agricultural development plan
  - d. Housing estate development plan
5. Urban Plans and Urban Facilities Study
  - a. Future plans for the development of traffic system in the Influence Area
  - b. Progress of urbanization in the Influence Area
  - c. Condition of roadside facilities
  - d. Land utilization plan, urban plans
6. Transportation Cost Study

This is important to the quantitative estimation of user benefits. Following study and analysis will be done:



- a. Determination of representative vehicles
- b. Distinction between economic cost and financial cost
- c. Affect of changes in road and travel conditions on transportation cost
- d. Estimation of time value

III-3-7 Engineering Study.

1. Topographic Maps

Necessary topographic maps will be made from maps available from the Government in scales of 1:100,000, 1:25,000 and 1:2,500 after supplementary survey.

2. Geological/Soil Study

Subgrade soil along the route will be tested at the Government's Laboratory.

- a. Surface observation of the road and the surrounding terrain
- b. Examination by boring of the foundation of the disused bridge
- c. Drawing of soil maps, soil samplings by using auger boring for laboratory tests, and surveying of under-ground water level
- d. Laboratory C.B.R. Test
- e. Survey on an existing quarry and gravel borrow pits

3. Construction Materials

Study of imported steel, cement and asphalt will be fully conducted.

4. Structures

Study of disused railway bridge over Grand River NW and other structures will be conducted separately. In the absence of drawings of the bridge, the sub-structures will be studied with regard to the distribution of reinforcement steel bars by physiological tests and chemical analysis of test pieces obtained from parts free of stress.

5. Hydrological Survey

Hydrological survey will be conducted of the following items in order to determine bridge clearance, cross-section (geometry) of structures crossing a road, and proposed height of road.

- a. Water levels, discharge measurement
- b. Present condition of river water, topographical survey of river bed and embankment, protective wall condition, coefficient of roughness, slope of river bed
- c. Flood traces survey
- d. River improvement plans

6. Construction Equipment, Materials, and Labor Study

The quantity and quality of construction machines, materials, and labor bear heavily upon the method and cost of construction work and should be studied carefully.

- a. Capability of Contractor (by interview of contractors and inspection of their works)--

- b. Review and analysis of construction materials and labor costs (review of existing data, cost analysis of materials and labor, cost estimation, distinction by local currency and foreign exchange)

7. Construction Method, Maintenance, and Administration Study

Construction methods which have been actually used in Mauritius will be studied to offer reference information for the Link Road Project.

III-3-8 Preliminary Design and Estimation of Construction Cost

Alignment plan will be prepared for the selected alternatives based on the 1:2,500 map.

1. Design Standard

- a. Review of AASHO, B.S., and standards used in the past
- b. Determination of suitable design standard

2. Route Planning

- a. Review of road development plans of Mauritius
- b. Study of control points
- c. Road characteristics
- d. Alignment plan

3. Basic Structures Plan

- a. Types, size and span design of bridges and structures
- b. Basic structures plan

4. Preliminary Design of Road
  - a. Plan
  - b. Profile
  - c. Cross Section
5. Preliminary Design of Structures
  - a. Superstructures
  - b. Substructures
6. Formulation of Staged Construction Plan
  - a. Construction work plan
  - b. Staged construction plan
7. Estimation of Quantities
8. Estimation of Project Cost
  - a. Construction cost by type of work and section  
(local currency, foreign exchange, and tax)
  - b. Maintenance cost
  - c. Construction/Maintenance cost by year

### III-3-9 Forecast of Traffic

The volume of traffic will be forecasted based on the analysis of the present road traffic survey and by establishing forecast methodology. Following items will be studied.

1. Determination of Forecast Methodology
2. Determination of Target Year for the Forecasting
3. Estimation of Future Distribution of Traffic  
Volume by Type of Traffic

4. Assignment of Traffic Volume to Alternative Road Networks (seasonal changes, day-of-the-week changes, hourly changes)

III-3-10 Evaluation

1. Economic Evaluation

Major benefits to result directly from the implementation of Link Road Project will be the reduction of vehicle running cost and saving of vehicle travel time. The amounts of travel time and running cost to be saved by the construction of each alternative Link Road will be estimated with regard to various types of traffic and by year.

The cost and benefit will be compared of each alternative by "with and without basis" through the calculation of B/C ratio, IRR and NPW, thereby evaluating the economic viability of alternatives. Particular attention will be directed to the influence of staged construction plan on the assessed economic viability in order that the most suitable investment plan will be developed.

2. Sensitivity Analysis

The stability of cost-benefit analysis findings will be checked and error in cost-benefit estimation will be eliminated by sensitivity analysis. Items to be subjected to this analysis will be determined based on the results of the studies (but possibly including time benefit,

construction cost, volume and time of appearance of development traffic, and construction time schedule).

### 3. Unquantifiable Social/Economic Effects

The economic consequences of Link Road Project may not be accurately assessed based only on the above economic evaluation. Therefore, the roles which the alternative roads will perform in the adequate formulation of regional community needs to be fully studied even qualitatively. Alternative plans will be evaluated from the viewpoint of composing a desirable link in the (present and future) transportation network of entire city (or district) and, at the same time, drawing out maximum development potentials from the project area over and beyond the currently contemplated future development of urban areas.

Roadside living environment is affected by the improvement of existing of the construction of new roads, by the appearance of new traffic, or increase/decrease in the volume of traffic.

- a. Impact of vehicle exhaust gas on the environment  
of human living
- b. Impact on natural environment
- c. Social aspect of influence from the alterations  
or abolitions of houses or agricultural land

### III-3-11 Conclusion and Recommendation

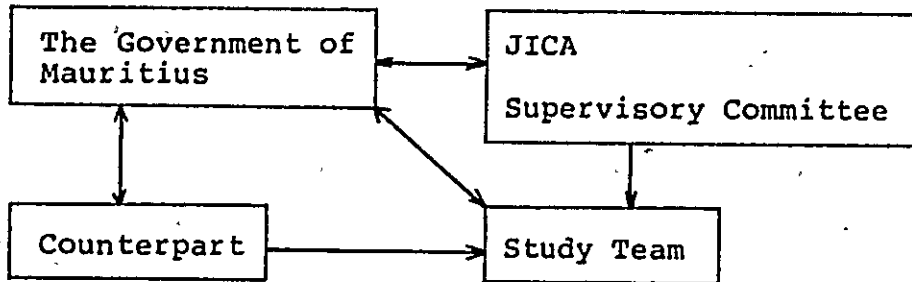
Based on the above analyses, the overall value of each of the alternative plans will be evaluated and the best plan will be recommended in view of the position of Link Road Project in the development plan of Mauritius.

#### IV. ORGANIZATION AND WORK PLAN

##### IV-1 Organization Chart

Organization chart for the accomplishment of Feasibility Study will be as shown in Figure IV-1.

Figure IV-1 Organization Chart



Supervisory Committee members will be those listed on Table IV-1, on-site investigation will be carried out by persons listed on Table IV-2, and Organization of Study Team members will be as shown in Figure IV-2.



Table IV-1 Supervisory Committee Members

Chairman:	Mr. Kimio Chiba Preliminary Survey Team Leader
Committee Member:	Mr. Koichi Shimizu
Committee Member:	Mr. Mizuo Kishita Preliminary Survey Team Member
Committee Member:	Mr. Koichi Tsuchiya Preliminary Survey Team Member

Table IV-2 Investigation Field Study Team Members

Leader:	Shunji Minami	General
Sub-Leader:	Ko Kuwata	Road Planning
Sub-Leader:	Shizuo Iwata	Regional Economy
Member:	Takashi Shoyama	Transportation Economy
Member:	Hisashi Muto	Traffic Analysis
Member:	Mitsuo Takamatsu	Survey Road Design
Member:	Kinzo Narita	Geology and Soil
Member:	Itsuki Onishi	Structures, Bridges
Member:	Mitsuo Hatakeyama	Structures, Hydrology
Member:	Hideyuki Wakatabi	Work Plan Quantity Survey

Special Members of Staff:

	Tetsuo Kunihiro
	Yukitake Shioi
	Atsushi Hikawa
	Koichi Tsuchiya
	Seiichi Kanai

Figure IV-2 Organization of Study Team

