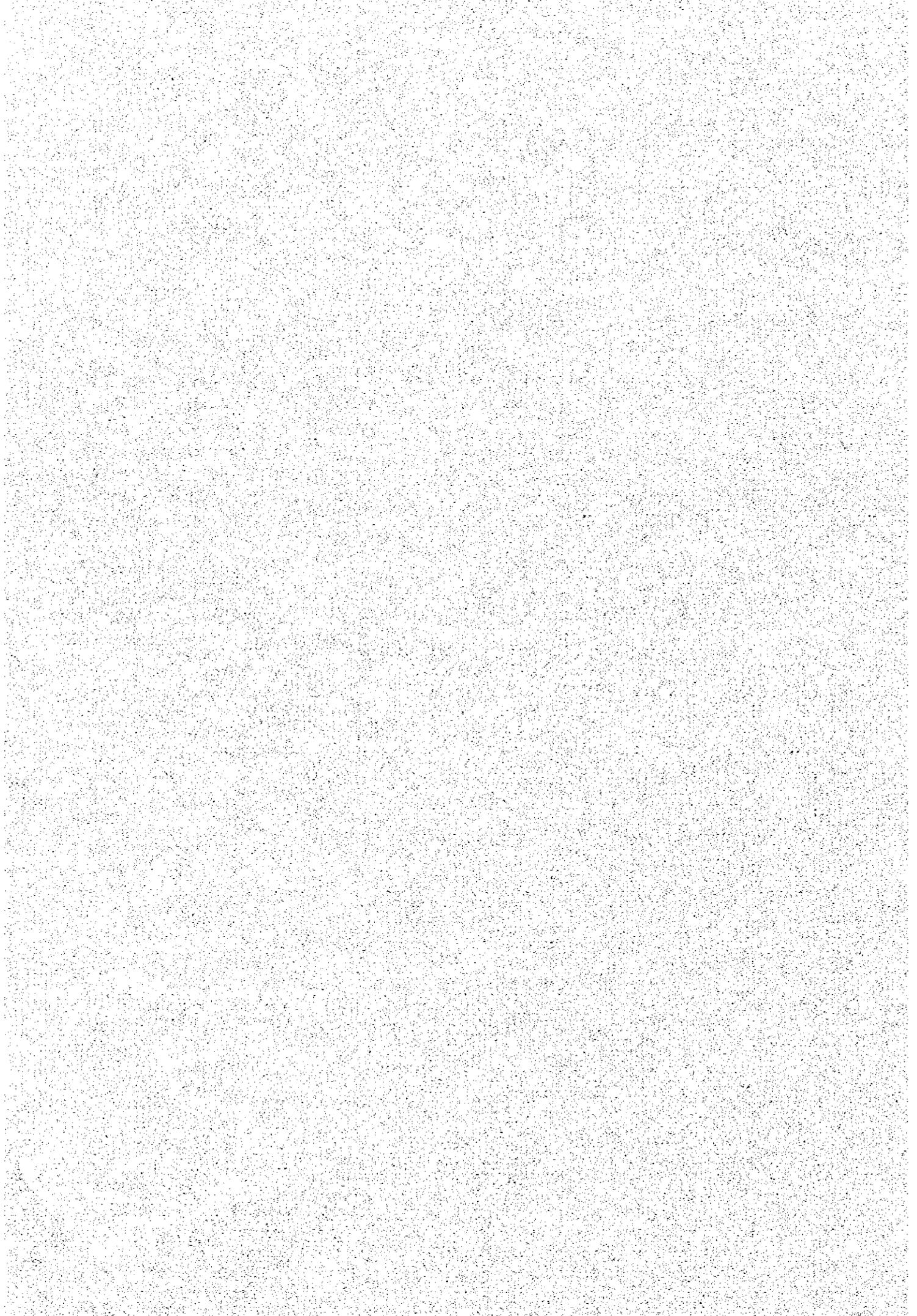


## 付 属 資 料

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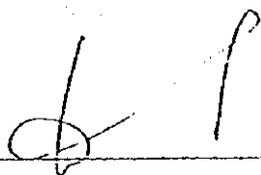


1 . Scope of Work (S/W)

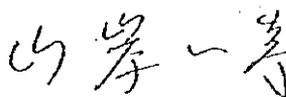


SCOPE OF WORK  
FOR  
THE FEASIBILITY STUDY  
ON  
THE RECONSTRUCTION OF MANGOCHI ROAD BRIDGE  
IN  
THE REPUBLIC OF MALAWI  
AGREED UPON BETWEEN  
MINISTRY OF WORKS AND SUPPLIES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

Lilongwe, Dated the 7th of November 1997



Mr. M. A. Kammalere  
Principal Secretary  
Ministry of Works and Supplies



Mr. Kazuhiko YAMAGISHI  
Team Leader  
Preparatory Study Team  
Japan International Cooperation Agency



Mr. J. C. T. Nthani  
Deputy Secretary (Bilateral)  
Ministry of Finance

## A . INTRODUCTION

In response to the request of the Government of the Republic of Malawi (hereinafter referred to as "the Government of Malawi"), the Government of Japan decided to implement the Feasibility Study on the Reconstruction of Mangochi Road Bridge in the Republic of Malawi (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study, in close cooperation with the authorities concerned of the Government of Malawi. Ministry of Works and Supplies (hereinafter referred to as "MOWS") shall act as the counterpart agency to the Japanese Study Team (hereinafter referred as "the Team") and also act as the coordinating body with other relevant organizations for the smooth implementation of the Study on behalf of the Government of Malawi.

This document sets forth the Scope of Work with regard to the Study.

## B. OBJECTIVES OF THE STUDY

The objective of the Study is to conduct feasibility study for the reconstruction project of Mangochi Road Bridge including its approaches for the period up to the year of 2005.

## C. SCOPE OF THE STUDY

To achieve the objectives mentioned above, the Study shall cover the following items;

### 1. Preliminary Economic Feasibility

#### 1.1. Socio-economic assessment

- (1) Collection of socio-economic data (population, private and public investment plans, employment, land use plan and so on by national and regional level)
- (2) Collection of traffic and transport data including transport system, costs, price subsidies etc.
- (3) Collection of national and regional development plans
- (4) Assessment of existing social-economic conditions and impacts which a new bridge construction will influence
- (5) Forecast of future socio-economic framework

#### 1.2. Traffic Analysis

- (1) Traffic survey (O-D survey, axle load survey)
- (2) Forecast of future traffic demand

#### 1.3. Economic Analysis

- (1) Examination of available information on vehicle operating costs, maintenance costs
- (2) Preliminary estimation of economic benefits and costs derived from new bridge alternatives

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- (3) Cost estimate of the bridge construction and maintenance
- (4) Estimation of the benefits derived from the bridge

#### 1.4. Economic evaluation

- (1) Calculation of economic internal rate of return, net present values and costs-benefits analysis
- (2) Sensitivity analysis

### 2. Assessment of institutional capability of MOWS on road and bridge construction and maintenance

### 3. Preliminary Engineering

#### 3.1. Data collection and analysis

- (1) Soil and geological data
- (2) Climatic and seismic data
- (3) Hydrological data
- (4) Topographic data

#### 3.2. Site Survey

- (1) Topographic survey
- (2) Soil and geological survey
- (3) Hydrological survey
- (4) Land use survey
- (5) Survey on materials mines for construction of road and bridge

#### 3.3. Examination of design criteria

#### 3.4. Comparative study of alternatives

- (1) Study on the construction of new bridge and approaches (routes, location, bridge type and others)
- (2) Evaluation of alternatives

#### 3.5. Preliminary design and quantity estimate of the optimum alternative

- (1) Bridge design
- (2) Approach roads
- (3) Quantity estimate

### 4. Environmental Impact

#### 4.1. Initial environmental evaluation

#### 4.2. Environmental impact assessment

- (1) Social impacts assessment

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(2) Natural environment

5. Implementation Program

5.1. Construction program

5.2. Maintenance program

6. Conclusions and Recommendations

D. STUDY SCHEDULE

The Study shall be conducted in accordance with the attached tentative schedule.

E. REPORTS

JICA shall prepare the following reports in English and submit them to the Government of Malawi;

1. Inception Report

Twelve (12) copies

At the commencement of the Study;

2. Interim Report

Twelve (12) copies

Within two and half (2.5) months after the commencement of the Study;

3. Draft Final Report

Twelve (12) copies

Within four (4) months after the commencement of the Study;

The written comments on the Draft Final Report from the Government of Malawi shall be delivered to JICA within one (1) month after submission of the draft final reports.

4. Final Report

Seventeen (17) copies

Within one (1) month after the receipt of the written comments on the Draft Final Report from the Government of Malawi.

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## F. UNDERTAKINGS OF THE GOVERNMENT OF MALAWI

1. To facilitate the smooth conduct of the Study, the Government of Malawi shall take necessary measures;

(1) to secure the safety of the Japanese Study Team

(2) to permit the members of the Team to enter, leave and sojourn in Malawi for the duration of their assignments therein, and exempt them from foreign registration requirements and consular fees

(3) to exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into Malawi for the conduct of the Study

(4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study

(5) to provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into Malawi from Japan in connection with the implementation of the Study

(6) to secure permission for the Team for entry into private properties or special areas for the conduct of the Study

(7) to secure permission for the Team to take all data and documents (including maps and photographs) related to the Study out of Malawi ; and

(8) to provide medical services as needed, while its expenses will be chargeable on members of the Team

2. The Government of Malawi shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. The counterpart agency shall, at its own expenses, provide the Team with the following in cooperation with relevant organizations;

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- (1) data and information related to the Study available in MOWS, including maps and photographs
- (2) counterpart personnel
- (3) to provide office with appropriate area and necessary equipment for the Study Team
- (4) credentials or identification cards

#### G. UNDERTAKINGS OF JICA

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

1. to dispatch the Team to Malawi at its own expense; and
2. to pursue technology transfer to the Malawian counterpart personnel in the course of the Study.

#### H. OTHERS

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

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### TENTATIVE STUDY SCHEDULE

Month	1	2	3	4	5	6
Work in Malawi	[Bar spanning months 1, 2, 3]				[Bar in month 5]	
Work in Japan	[Bar in month 1]		[Bar spanning months 3, 4]			[Bar in month 6]
Report Presentation	△ IC/R		△ IT/R	△ DF/R		△ F/R

- IC/R: Inception Report
- IT/R: Interim Report
- DF/R: Draft Final Report
- F/R: Final Report

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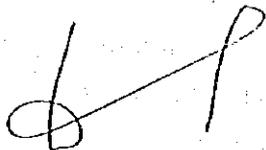


2. Minutes of Meeting (M/M)

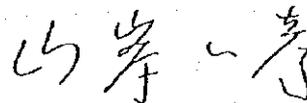


MINUTES OF MEETING  
ON  
THE SCOPE OF WORK  
FOR  
THE FEASIBILITY STUDY  
ON  
THE RECONSTRUCTION OF MANGOCHI ROAD BRIDGE  
IN  
THE REPUBLIC OF MALAWI  
AGREED UPON BETWEEN  
MINISTRY OF WORKS AND SUPPLIES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

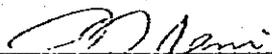
Lilongwe, Dated the 7th of November 1997



Mr. M. A. Kammalere  
Principal Secretary  
Ministry of Works and Supplies



Mr. Kazuhiko YAMAGISHI  
Team Leader  
Preparatory Study Team  
Japan International Cooperation Agency



Mr. J. C. T. Nthani  
Deputy Secretary (Bilateral)  
Ministry of Finance

The preparatory study team for the Feasibility Study on the Reconstruction of Mangochi Road Bridge in the Republic of Malawi (hereinafter referred to as "the Study") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") headed by Mr. Kazuhiko YAMAGISHI visited the Republic of Malawi from 1st November to 8th November, 1997, and had a series of discussions with the government of Malawi, represented by Ministry of Works and Supplies (hereinafter referred to as "MOWS"). List of participants is shown in Attachment I.

As a result of the said discussions, both sides reviewed and came to an agreement on the Scope of Work (hereinafter referred to as "S/W") of the Study, and signed it on 7th November, 1997.

This document summarizes major items discussed between both sides and is meant to supplement the S/W for the smooth conduct of the Study.

#### 1. Reconfirmation of the project justification

MOWS reaffirmed the study team that this project is still high on Government's priority. MOWS informed the study team that the design of the road from Mangochi through Chiponde, Ntaja, Naminga to Liwonde has been completed and the tendering process started in October, 1997 with a prequalification exercise. Completed Tender Documents and a Feasibility Study Report were submitted to the study team for inspection. As a result of the upgrading of this road, the only bottleneck will be the Mangochi Bridge.

MOWS informed the team that plans are underway for the European Union (EU) to fund the rehabilitation of the M10 road from Mua to Monkey Bay to a Class 1 bitumen road.

MOWS also informed the team that the Development Bank of Southern Africa (DBSA) have expressed interest to fund the improvement of the Mangochi to Makanjila road along the eastern shore of Lake Malawi. Completion of the construction of this road will attract tourism and agricultural development.

#### 2. Title of the Study

Both sides agreed to use "The Feasibility Study on the Reconstruction of Mangochi Road Bridge in the Republic of Malawi" as the title of the Study.

#### 3. Study Area

Both sides agreed that the Study should cover the existing Mangochi Road Bridge, approaches, and environs.

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4. Target year

Both sides agreed that the target year of the Study shall be 2005.

Desirable schedule of this project may be as follows;

Phase I	Feasibility Study	1998. 2. - 1998. 8.
II	Detailed Design	1999 - 2000
III	Construction	2000 - 2002

5. Economic evaluation

MOWS requested that the full scale study team should use the FDM-III for economic analysis and evaluation. The Japanese side agreed.

6. Environmental survey

Both sides agreed that the full scale study team and MOWS would cooperate to carry out environmental survey.

7. Steering Committee

Both sides agreed that the Government of Malawi would establish a Steering Committee consisting of Sections of MOWS (Planning, Bridges, Highways, Construction, Planning & Evaluation), Ministry of National Heritage, Ministry of Forestry, Fisheries and Environmental Affairs, Ministry of Finance, National Economic Council co-opted as required.

8. Undertaking of the Government of Malawi

(1) The Japanese side requested MOWS to provide the office space for the full-scale study team. MOWS agreed.

(2) The Government of Malawi shall provide the full-scale study team with copies of all available data, reports and any information considered relevant for the execution of the Study.

9. Undertaking of JICA

(1) The Malawian side requested that the Malawian counterpart personnel take advantage of training in Japan related to the Study to promote effective technology transfer. The Japanese side promised to convey this request to the JICA Headquarters in Tokyo.

(2) The Japanese side agreed that JICA would bear the costs to collect new data and information if required in the course of the Study.

(3) The Malawian side requested that JICA will bear the following costs:

(a) fee of necessary equipment (electricity, telephone, fax machine, furniture)

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(b) appropriate numbers of vehicles to be used while the full scale study team is in Malawi

The Japanese side promised to convey these requests to JICA headquarters.

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Attachment 1  
PARTICIPANTS LIST

THE MALAWIAN SIDE

1. Mr. M. A. Kamalere Secretary, Ministry of Works and Supplies (MOWS)
2. Mr. J. A. Makunje Acting Director of Roads, MOWS
3. Mr. E. L. K. Mwakhwawa Deputy Director of Roads, MOWS
4. Mr. B. Kapoteza Chief Civil Engineer, MOWS
5. Mr. B. Nayeja Civil Engineer, MOWS
6. Mr. L.S. Siwande Chief Planning & Evaluation Officer, MOWS

THE JAPANESE SIDE

1. Mr. Kazuhiko YAMAGISHI Team Leader, Preparatory Study Team
2. Mr. Koichi KITO Study Planning, Preparatory Study Team
3. Mr. Masahiro ISHIDA Bridge Maintenance Planning, Preparatory Study Team
4. Mr. Keiichi SAKAEBARA Natural Conditions/Environment, Preparatory Study Team
  
5. Mr. Tetsuo SEKI Assistant Resident Representative, JICA Malawi Office

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### 3. Terms of Reference (TOR)





SECRETARY TO THE TREASURY  
P.O. BOX 30049  
LILONGWE 3  
MALAWI

Ref. No. 31/3/1

19th March, 1997

His Excellency the Ambassador,  
Embassy of Japan,  
P.O. Box 34190,  
Lusaka,  
ZAMBIA.

(Attn: Mr M. Yuuki)

Your Excellency,

REQUEST FOR CONSULTANCY SERVICES : MANGOCHI  
BRIDGE OVER THE SHIRE RIVER

We have the honour to forward herewith the terms of reference for a feasibility study on the Construction of the Mangochi Bridge over the Shire river.

The main objective of the proposed study is to determine the economic and technical feasibility of replacing the current bridge with a permanent structure in order to provide a more durable and stable crossing over the Shire river in Mangochi district.

The purpose of this letter is to officially request the Government of Japan to consider financing the proposed feasibility study.

We should be most grateful for Your Excellency's kind consideration of our request.

Please accept, Your Excellency, the assurances of my highest consideration.

I am, Your Excellency,

John M. Mhango  
SECRETARY TO THE TREASURY

for :

TERMS OF REFERENCE FOR CONSULTANCY SERVICES FOR AN  
ECONOMIC FEASIBILITY STUDY  
OF THE MANGOCHI BRIDGE OVER THE SHIRE RIVER

1. TITLE OF THE PROJECT: FEASIBILITY STUDY FOR THE MANGOCHI BRIDGE OVER THE SHIRE RIVER
2. LOCATION OF THE PROJECT: The project is located in Mangochi district in the Southern part on the shores of Lake Malawi.
3. BACKGROUND TO THE PROJECT

i) Current Situation of the Sector:

The total road network for Malawi is about 14,594 Kilometers of which about 18 per cent is paved. The primary network consists of main and secondary roads. Of this primary network, the major part has been bituminised providing a high quality all weather surface. For example all major road links with neighbouring countries are all of bitumen surface; the road linking Blantyre to Mwanza en-route to Zimbabwe through Mozambique was completed and opened to traffic by 1987. The road linking Lilongwe through Mchinji to Lusaka, Zambia was completed in late 1978.

The latest road link to be completed is the Karonga-Songwe which forms part of the Northern Transport Corridor, a multi-modal transport system designed to provide access for Malawi's international trade to the port of Dar-es-Salaam, in Tanzania. Under this project the Malawi government has carried out port improvements on ports along lake Malawi, rehabilitation of some roads has also been carried out, while in Tanzania Malawi cargo centres have been established. The cargo centres consists of dry goods and fuel transshipment facilities for Malawi's international trade.

ii) Problems to be solved in the sector:

- a) To continue improving the road network in order to facilitate the opening up of domestic and international trade routes;
- b) To improve the utilization of the existing road infrastructure;
- c) To help the people in the project areas gain access to income generating activities i.e. agriculture; fishing; and also to social services such as hospitals and schools.

ToRKB 1

#### 4. SCOPE OF THE STUDY

##### 4.1 The objectives

The objective of the study is to determine the economic and technical feasibility of replacing the current bridge with a permanent structure in order to provide a more durable and stable crossing over the Shire river in Mangochi district.

##### 4.2 Description

The study consists of:-

- i) Review of the existing data on the project;
- ii) Collection of economic, operating and physical data that may be necessary to support the technical and economic feasibility study of the bridge;
- iii) Comparative economic studies for a different location and design options;
- iv) Preliminary engineering survey and design for the preferred location and design options including, preliminary cost estimates and implementation schedule.

#### 5. DETAILED TERMS OF REFERENCE OF THE STUDY

##### 5.1 General

The consultant shall co-operate fully with Government Ministries and Departments responsible for transport issues. He shall liaise closely with the Ministry of Works and Supplies throughout the period of the services, keeping them fully informed at all times.

The consultant shall familiarize himself and comply with all laws, customs and practices in Malawi in relation to the works.

All available data will be supplied by the Government, but the consultant will be solely responsible for the interpretation

TORKB 2

and analysis thereof.

All activities of the consultant shall be carried out in strict accordance with the general regulations for works, supply and service contracts financed by the Japanese Government and the general conditions for service contracts financed by the donor. He shall be responsible for providing all resources necessary to complete the services in accordance with these regulations and conditions.

## 5.2 ECONOMIC FEASIBILITY

5.2.1 In order to justify the investment, the consultant will carry out a thorough economic evaluation of the project. In addition, he should comment on the role of the project in relation to both the national and regional development plans.

5.2.2 With regard to transport links between Malawi and Mozambique, the consultant shall describe the existing transport system ( road, rail, lake, ports and shipping, aviation, pipeline etc) and assess possible constraints and bottlenecks.

5.2.3 The consultant shall examine the transport supply and its efficiency such as:

- i) The capacity of the different modes of transport and their utilisation;
- ii) Public and private transport enterprises;
- iii) Competition in the supply ( price subsidies, transport charges, government intervention in transport pricing);
- iv) Constraints on the transport supply ( such as availability of fuel, spare parts, transport costs, and transport prices);
- v) The impact of this project on the transportation of agricultural goods in the project catchment area.

5.2.4 The consultant shall analyse the economic potential as

TORKS 3

well as the potential for inter-regional and ocean going trade in the project area focusing on:

- i) Population, ( past, present, and future growth), employment by sector, unemployment rate, migration, socio-cultural aspects;
- ii) Economic resources in agriculture, mining, energy, manufacturing and tourism;
- iii) Exploitation of the economic potential, ( past 5 - 10 years and the future development;
- iv) Constraints on the exploitation of the economic potential, ( pricing, transport, institutional, building, marketing, role of skilled labour, financing etc.);
- v) Private and public investments both realised and projected, nature of investments, amount, location, results achieved or expected;
- vi) Exchange of goods, (nature, origin and destination) in the project area between neighboring countries;
- vii) Government plans and targets, prospects and constraints.

5.2.5 The consultant shall indicate measures appropriate for the improvement of the economic and social situation of the population in the project area, which do not require major funds and which can be realised relatively quickly, and which would be assisted or made possible by the proposed improvements in the construction of the bridge. He shall estimate the costs involved and assess the benefits to the population resulting from the project.

5.2.6 On the basis of the economic potential in the project area, the consultant shall indicate possible future investment projects appropriate for increasing the income and employment of the population in the sectors of agriculture, mining, manufacturing, energy, and tourism.

5.2.7 The consultant shall identify existing institutional constraints and indicate which policy measures appear necessary to ensure the economic and financial viability

ToRKB 4

of the proposed project.

5.2.8 Traffic Analysis

The consultant shall determine the type and volume of existing traffic using the bridge by analysing all existing statistical data, and by conducting and analysing such traffic counts and origin and destination studies as are required to determine the nature of the traffic and the present volume of freight and passenger movements.

5.2.9 Traffic studies will include:

- i) Existing traffic composition, occupancy, and volume counts taking account of seasonal variations;
- ii) Origin and destination studies; and
- iii) Forecasts of annual average daily traffic composed of normal, generated, and diverted traffic, by appropriate vehicle type.

Traffic surveys shall include counts on a 24 hour basis in order to record long distance and cross-border traffic moving at night.

5.2.10 The consultant shall identify, describe, and quantify existing and potential traffic generating factors in the immediate areas served by the bridge, or in areas likely to be influenced by its future improvements, based on the economic development of the region and the future needs for road transport. Such needs will result, inter alia from:

- i) population growth and changes in the rural and urban population distribution;
- ii) national and regional economic growth;
- iii) development of agriculture, industry, commerce, and tourism within the project area;
- iii) development of social services, medical facilities and schools;

TORKB 5

iv) other factors identified by the consultant.

5.2.11 Based on the above analyses, the consultant shall make:

i) detailed annual traffic forecasts for a period of 10 years with present and future inter-regional trade after the completion of the project;

ii) more general projections of future traffic by class of vehicle for the following 10 years.

5.2.12 Although greater emphasis is given to accurate forecasting in the earlier part of the project's life, all traffic forecasts shall be given at three growth rates, namely, low, medium, and high. The consultant shall use the medium level of forecasts for use in the final evaluation of the project, but shall use the other two in the sensitivity analysis.

5.2.13 In developing the final traffic forecasts, the consultant shall give particular attention to the future mix of vehicles in the traffic population. Due attention shall be given to changes in vehicle sizes and types that will arise when improvements are made in the condition of the bridge.

5.2.14 Economic costs

The consultant shall examine all available information on vehicle operating costs and road maintenance costs, and shall produce valid current estimates of such costs for the present structure and the proposed new structure.

5.2.15 Since the greatest element of measurable and quantifiable user benefits to be derived from the improvement of roads and bridges are, in practice, derived from savings in vehicle operating costs, the consultant shall give particular attention to the development of valid current estimates of such costs. In particular, and where a computer based highway investment model has been used, or based on a programme developed by an international agency or research organization, the consultant shall ensure that all individual factors units costs (such as tyres, fuel, crew wages, insurance) which are inputs into the model are derived from direct investigations of local sources of supply.

TORKB 6

- 5.2.16 The consultant shall carefully detail in the report all the data, assumptions, and parameters which have been used in developing estimates for the current vehicle operating costs.
- 5.2.17 For construction costs, the consultant shall give estimates broken down into foreign and local currency components according to the details given for construction costs in paragraph 5.3.17.
- 5.2.18 For maintenance costs the consultant shall ensure that such costs are strictly related to current and forecast traffic volumes, and shall detail in the reports all the data assumptions and parameters which have been used to develop estimates of current and future maintenance costs, which shall be split into foreign and local costs given in paragraph 5.3.17.
- 5.2.19 In determining the economic costs for all factors in the project, the consultant shall ensure that all costs are net of all taxes and duties, or any other transfer payments to government. Shadow prices which reflect the true scarcity of the value of resources shall be used in all calculations.

5.2.20 Economic analysis

The consultant shall undertake evaluations of the economic viability of the project for the twenty years following the completion of the construction of the bridge. For this, the economic costs of the construction of the design standard being evaluated shall be compared with the relevant level of economic user benefits derived from implementing the project at a different design level. The design which results in the greatest user benefits in relation to costs shall be determined as the optimum design and shall be selected for implementation.

- 5.2.21 User benefits shall be expressed primarily in terms of:
- i) savings in vehicle operating costs;
  - ii) savings in maintenance expenditure;
  - iii) residual value of the bridge structure at the end of the evaluation period;
  - iv) any other factor that the consultant may

ToRKB 7

consider relevant for the analyses.

5.2.22. In view of the fact that many indirect economic and social benefits arising from the improvements in road and bridge conditions are "intangible" or are difficult to quantify accurately, the consultant shall undertake detailed qualitative analyses of these benefits. Only when such benefits can be firmly demonstrated in quantitative terms shall they be included in the economic analysis. In all other cases these benefits will not be included in the economic evaluation of the project, but may be used as secondary justification for the implementation where appropriate.

5.2.23 The evaluation shall be expressed in terms of:

- i) the economic internal rate of return (EIRR);
- ii) first year rate of return to indicate the optimum year of construction and opening of the bridge;
- iii) the net present value (NPV) in relation to the government's current opportunity cost of capital;
- iv) the benefit cost ratio for:
  - a) each country (Malawi and Mozambique);
  - b) the bridge project;
  - c) regional aspects.

5.2.24 The consultant shall also undertake sensitivity analyses on the results of the finally selected design standard. In these, apart from the levels of traffic forecasts previously discussed in paragraph 5.2.11, all costs and benefits shall be varied by up to plus or minus 20 per cent, or at another level deemed appropriate for the analyses and agreed with the government.

5.2.25 Impact on Women in Development

The consultant shall indicate the impact that the project may have on the position of women in development in the

proposed project area. These indications shall cover such areas as:

- i) changes in job opportunities particularly relevant to women;
- ii) the improvement in social services particularly appropriate for women and children, such as health, medical services, and education;
- iii) changes in work patterns such as water carrying and wood gathering and any other factors considered appropriate by the consultant.

### 5.3 PRELIMINARY ENGINEERING

#### 5.3.1 General

Within the scope of the feasibility study, the consultant shall conduct all topographic surveys, aerial surveys or satellite imagery ( if required), hydrological studies, sub-surface explorations, materials survey, and other field and laboratory examinations of optional sites, location of suitable construction materials, and water, and the preliminary engineering. This shall comprise inter alia:

- i) topographic surveys, plans and profiles of proposed sites;
- ii) materials testing, soils investigation and pavement evaluation to identify and test appropriate materials for the construction and maintenance of the bridge;
- iii) hydrological and hydraulic studies.

#### 5.3.2 Design standards

The geometric and loading standards to be used will be as agreed in writing with the Government of Malawi. The consultant shall be responsible for the design details

ToRKB 9

within this framework. The methodologies employed for the design of the pavement, earthworks, drainage and structures shall conform with the latest techniques while ensuring use of available materials. At all times, a balance must be made between capital and maintenance costs.

5.3.3 The metric system shall be used throughout. The standards for the design of bridges as adopted by the Government of Malawi shall be adhered to at all times, where this is not possible, adequate explanation shall be given where different standards are recommended and subsequently adopted.

#### 5.3.4 Climate, Topography, Geology and Vegetation

The consultant shall describe the climate conditions of the study area, providing details of:

- i) rainfall (monthly distribution and intensity, including rain days per month);
- ii) temperature ( minimum, medium, maximum, and monthly ranges throughout the year);
- iii) other climatic features of importance (e.g. wind, erosion, effects of extreme temperatures on the alternative wearing course designs).

5.3.5 The consultant shall provide a topographical description of the project area ( bridge site) and the effects of relief on the vertical alignment.

5.3.6 A catalogue of the relevant geological features of the study area including a description of the soils and rocks encountered on the proposed sites, and their effect and influence on such factors bridge location and design shall be compiled by the consultant. The influence of geology and availability of construction materials and water are to be regarded as of great importance by the consultant. The consultant shall provide, as far as possible, information on the quantities, quality, and potential sources of water required for construction purposes.

5.3.7 A description of the type and density of the vegetation as well as existing and potential agricultural land use

within the study area, shall be provided by the consultant.

5.3.8 Mapping, and Aerial Photography

No relevant aerial photographs exists. The consultant shall assess the need for, and include in his proposal the cost of, any mapping, aerial photography, or satellite imagery considered necessary for the study.

5.3.9 Hydrology and Drainage Investigations

The consultant shall provide a complete description of the hydrological features of the area, including:

- i) information about soils drainage at the proposed site, such as sub-soil drainability drainage impedance, flooding etc.;
- ii) characteristics of required water crossings.

5.3.10 Sufficient information shall be obtained by the consultant based upon the guide lines provided by the Government of Malawi and supplemented by other relevant sources of information, to justify, and provide the basis for the preliminary engineering design of all systems and structures, and for feasibility costing purposes. The consultant shall be fully responsible for obtaining all the data and information necessary for him to carry out hydrological and drainage investigations and designs.

5.3.11 Investigation of optional sites

The consultant shall investigate all possible sites for the construction of the proposed bridge. Evaluation of all feasible sites shall be carried out taking into account the following among other factors:

- i) existing road links, and their residual value, if any;
- ii) landuse including existing settlements;
- iii) locations of sources of suitable materials;

- iv) hydrological and drainage characteristics;
- v) environmental effects.

5.3.12 Account shall be taken of any previous studies of the project, but results of these shall not be considered to be binding in any way. The consultant shall comment on the implications, merits and problems associated with each alternative site, and provide reasons for the selection and recommendation of one particular site.

5.3.13 Preliminary Soil Investigations

The consultant shall undertake all preliminary soil investigations and tests, and identify type and sources of construction materials necessary for the economic feasibility, final design and construction of the bridge and associated infrastructure. These should be taken into account when selecting the final bridge site.

5.3.14 Preliminary Design

Based on traffic studies, economic analysis and the geotechnical tests, the consultant shall, develop at least two, and not more than three preliminary designs for the bridge project, and shall ascertain the merits and demerits of each to determine the final design to be adopted for the bridge, whose design life should be taken as 20 years. It will be necessary for the consultant to provide the comparative data for the construction and maintenance costs for the different designs considered, in order to support the final design adopted for the bridge project.

5.3.15 The consultant shall prepare preliminary design drawings, using the format and title sheets as required by the Government, as follows:

- i) Location plans, scale 1:50,000;
- ii) Bridge plans, scale 1:5,000 showing the center line, with chainages of cross-sections, horizontal curves, location, description and references to all drainage and road works; right of way demarcation indicating land utilization; and other relevant natural and cadastral information;

- iii) Typical cross-sections of the proposed design shall be prepared at scales acceptable to the government.

#### 5.3.16 Environmental Impact

The consultant shall conduct analyses which shall detail the positive and negative effects of the development of the project on the environment, and shall recommend appropriate solutions to minimise and undesirable effects resulting from improvements to the bridge. The analysis shall include, but not limited to the following factors:

- i) the role of the project in the development plans at the national and regional levels;
- ii) preservation of the areas and landuse of the particular value including agricultural land, natural conservation areas, cultural and historic sites, forests, and other important natural resources, etc;
- iii) assessment of the direct impact on agriculture and demography, particularly the utilisation of fuelwood and water resources;
- iv) disturbance of vegetation, and plans for the re-vegetation;
- v) the prevention of soil erosion and sedimentation;
- vi) the prevention of health hazards arising from ponding water and pollution of water courses and / or sources;
- vii) measures for the rehabilitation of construction materials borrow pits and quarries;
- viii) health and sanitation for the construction labour units;
- ix) the avoidance or reduction of visual intrusion, and;
- x) the prevention of undesirable roadside or

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bridge side developments and risks, and regulations and measures to limit negative impact on adjacent communities and areas.

5.3.17 Cost Estimates

Based on the study analyses and findings the consultant shall furnish:

- i) a preliminary quantities estimate with an accuracy of plus or minus 20 per cent for the proposed construction. The principal quantities shall include common excavation, rock excavation, determination of the spans and types of foundations; and
- ii) preliminary cost estimates with an accuracy of plus or minus 20 per cent for the construction of the bridge and associated road works. This estimate shall be based on locally derived unit prices appropriate for the estimated quantities in 5.3.17 (i) above. The estimate shall give details of foreign and local costs by main work items, as well as taxes and duties to be paid.

5.3.18 The cost estimates shall include the following components:

- i) Foreign currency:
  - a) imported equipment, materials and supplies;
  - b) identifiable foreign components of domestic manufactured equipment, materials and supplies;
  - c) salaries of expatriate personnel;
  - d) profit and overheads of foreign firms where appropriate.
- ii) Local currency:
  - a) right-of-way acquisition ( which will not

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be included in the economic evaluation of the project);

- b) local materials, supplies, and services;
- c) salaries and wages of local employees.

In addition, the consultant shall present separately a detailed analysis of the taxes and duties elements of the cost estimates.

## 6 REPORTS AND TIME SCHEDULE

### 6.1 Reports

6.1.1 The consultant shall prepare and submit the following reports. All reports shall be in the English language and prepared on metric size paper:

- i) Inception Report: Summarizing initial findings, and giving proposals for the conduct of the services in ten (10) copies to the Government of Malawi, and two (2) copies to the donor directly.
- ii) Progress Reports: The consultant shall produce progress reports at two (2) months intervals showing the programme, progress, difficulties, staff employed and other salient points including photographs, in ten (10) copies to GoM and two (2) copies to the donor.
- iii) Draft Final Report: Giving findings, analyses and recommendations in ten (10) copies to the Government of Malawi, and two (2) copies to the donor directly.
- iv) Final Report: Incorporating all modifications based on the comments by the GoM and the donor in fifteen

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(15) copies to GoM and two (2) to the donor directly.

## 6.2 Time Schedule

- 6.2.1 The consultant shall commence the study within thirty (30) calendar days of the effective date of the contract. The effective date shall be the date on which the consultant is awarded the contract.
- 6.2.2 The following shall be observed in carrying out the duties:

### Schedule of Execution

- |  |         |
|--|---------|
| i) Effective date of the contract  | : M     |
| ii) Commencement of service ( within 30 days after effective date of contract) | : M + 1 |
| iii) Inception report  | : M + 2 |
| iv) Draft final report   | : M + 4 |
| v) Comments and approval by donor and GoM on the Draft Final Report            | : M + 5 |
| vi) Final Report   | : M + 6 |

## 7. TERMS OF PAYMENT OF FEES

### 7.1 Description

- 7.1.1 Terms of payment of fees shall be detailed in the proposed contract format to the letter of invitation for submission of proposals.

## 8.0 RESPONSIBILITIES OF THE GOVERNMENT OF MALAWI

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## 8.1 Documents

- 8.1.1 The GoM shall provide the consultant with copies of all data, existing photographs, reports and any information considered relevant for the execution of the consultant's work.
- 8.1.2 If required and capacities available the services of the Materials Laboratory and Survey departments will be made available to the consultant on such terms and conditions to be agreed upon by the consultant and the GoM.

## 8.2 Liaison

- 8.2.1 The consultant shall submit his detailed work programme to GoM for review and approval prior to commencement of services not later than thirty (30) calendar days after the signature date of the contract.
- 8.2.1 In connection with the work of the consultant that requires the cooperation of government and other public agencies, the government will provide liaison and is to ensure that the consultant has access to all information required for the completion of the design.
- 8.2.3 As the design progresses, the consultant's project manager shall maintain close liaison with GoM and shall submit regularly, according to the work programme, draft design proposals for earthworks, pavement, alignment bridge structure and other technical aspects of the design for approval.

## 8.3 Training of Counterpart Staff

- 8.3.1 The consultant shall provide a training plan for counterpart staff, and on its approval by the GoM, it shall be implemented accordingly.
- 8.3.2 GoM will assign qualified counterpart staff to work with the key personnel of the consultants in so far as the exigencies of the services allow.

## 8.4 Privileges and Immunities

- 8.4.1 The consultant shall pay all Malawi Customs Duties except

on all equipment, spares, materials or other things required and certified by the GoM as being necessary for the purposes of carrying out the work covered by this agreement and imported into Malawi by the consultant or obtained from the bonded warehouse, shall be free from any duty imposed by any written law relating to Customs and Excises; provided that such duty shall become payable, unless such items not expended are either re-exported from Malawi not more than three months after the completion or are used by the consultant on other projects on behalf of the GoM, or become the property of the GoM.

- 8.4.2 The consultant shall comply with Labour and Immigration Regulations. However, in the event of any problems arising therefrom, the Ministry of Works shall offer assistance in obtaining the necessary permits.

## 9.0 RESPONSIBILITIES OF THE CONSULTANT

### 9.1 responsibilities of the consultant

- 9.1.1 All data, reports, information obtained from the GoM in the execution of the services of the consultant shall be properly analysed and reviewed by the consultant. The responsibility of the correctness of using such data shall rest with the consultant. All such information, data, reports, etc, shall be treated as confidential.
- 9.1.2 The consultant shall make his own arrangements for all necessary office and living accommodations, transportation, supplies, surveys, investigations, testing, secretarial services, etc, in connection with this work.
- 9.1.3 The consultant may carry out laboratory and other tests in the government's laboratory in Lilongwe on such terms and conditions as may be agreed with the GoM. In such cases, the consultant shall be responsible for defining and supervising the tests.

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#### 4 . Questionnaire



SUBMITTED 6/11/97  
97.10.14  
S/S  
S/S  
S/S (P/D)

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QUESTIONNAIRE

JAPANESE PREPARATORY STUDY TEAM

FOR

THE FEASIBILITY STUDY

ON

THE RECONSTRUCTION OF MANGOCHI ROAD BRIDGE

IN

THE REPUBLIC OF MALAWI

OCTOBER, 1997

JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)

Note:

- Please mark  for the Data/Item in the "Availability" which is available
- Please mark  for the Data/Item in the "Availability" which is not available
- List of required data/reports are as per attached
- Please answer YES or NO by marking  in the "VI. ROAD AND BRIDGE MAINTENANCE QUESTIONNAIRE"

1. ORGANIZATIONS CONCERNING THE IMPLEMENTATION OF THE STUDY

ITEM	DESCRIPTION	AVAILABILITY		NAME OF MATERIALS
		AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Agencies which are responsible for the following: (A) Road development planning (B) Road construction (C) Road improvement/maintenance (1) Road maintenance management	(1) For the National roads	○	MOWS	SYSTEM ROAD PLAN
	(2) For the Provincial roads	○	"	PROGRESS REPORTS
	(3) For the Toll roads	○	"	PROGRESS REPORTS
		○	"	MAINTENANCE MANAGEMENT SYSTEM
2. Agencies in charge of work concerned with the following: (A) Permission of aerial photo taking (B) Custody of topographic maps and aerial photos (C) Area conservation (D) Geological data/information	(1) Name of Agencies and Departments	○	SURVEYS DEPT.	MAPS
	(2) Name and position of the responsible persons in charge for the Japanese Study Team to contact	○	"	MAPS
		○	MOREA	MAPS
		○	GEOLOGICAL SURVEY DEPT.	MAPS
3. Organization to supervise and steer the management of the Study	(1) Necessity of the Steering Committee and proposed member institutions	○	MOWS MOT MLG NEC MOF	Highway Authority POLICY DOCUMENTS

MOWS = MINISTRY OF WORKS AND SUPPLIES  
 MOREA = MINISTRY OF RESEARCH AND ENVIRONMENTAL AFFAIRS  
 MOT = MINISTRY OF TRANSPORT  
 NEC = NATIONAL ECONOMIC COUNCIL  
 MOF = MINISTRY OF FINANCE  
 MLG = MINISTRY OF LOCAL GOVERNMENT

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II. TECHNICAL DATA / INFORMATION

ITEM	DESCRIPTION	AVAILABILITY		NAME OF MATERIALS
		AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Maps to be used for field investigation	(1) Topographic maps covering the Study area (of smaller scale)	0	SURVEYS DEPARTMENT	MAPS
2. Availability of aerial photos and topographic maps	(1) Aerial photos (1/5,000) (2) Topographic maps (1:2,000), etc 1/2,500	0	SURVEYS DEPARTMENT	MAPS
		0	"	"
3. Geological data	(1) Geological maps covering the Study area (2) Existing report about data/information such as : - Location of soft ground - Results of geological/soil investigation	0	GEOLOGICAL SURVEYS	MAPS
		-		
4. Geodetic data	(1) Triangulation point network (2) Bench-mark network (3) Points description (Control points, Bench-mark) (4) Triangulation point data lists	0	MOLDS SURVEYS DEPT.	COORDINATES & BENCH MARKS
		0	"	"
		0	"	"
		0	"	"
5. Meteorological data	(1) Monthly rainfall data (daily rainfall data, if possible) (2) Temperature (3) Others	0	METEOROLOGICAL DEPT.	MONTHLY REPORTS
		0	"	"

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<p>13 Reports/Information of the road development projects closely related to the Study</p>	<p>(1) Intersection improvement plan                  (2) Widening plan for major road                  (3) Bridge plan                  -New construction                  -Reconstruction</p>	<p>0 0 0 0 0</p>	<p>MOWS " " " "</p>	<p>REPORTS " " " "</p>
<p>14. Road related budget</p>	<p>(1) Road construction budget                  (2) Road maintenance budget</p>	<p>0 0</p>	<p>MOWS "</p>	<p>ANNUAL BUDGET "</p>
<p>15. Road related costs</p>	<p>(1) Construction cost by type of road and location                  (2) Maintenance cost by type of road and location</p>	<p>0 0</p>	<p>MOWS "</p>	<p>PROGRESS REPORTS AND BUDGETS</p>

III. SOCIO-ECONOMIC DATA/INFORMATION

ITEM	DESCRIPTION	AVAILABILITY		NAME OF MATERIALS
		AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Latest socio-economic indices	(1) GNP and GDP (2) Population (3) Past and future population growth rate (4) Industrial, agricultural and mining products (by main sort) (5) Foreign trade (quantity and value) (6) Tourism development plans (7) Others	0 0 0 0 0 0 0	NEC " " MOEM MOTD NEC MOTM	Reports " " " " " "
2. Existing development plans and reports	(1) Economic development plans (2) Transportation development plans (3) Industrial development plans (4) Mining and agricultural development plans (5) Forecast of socio-economic indicators	0 0 0 0 0	NEC MOT MOEM MOEM NEC	Reports " " " "
3. Existing and on-going road development plans and road development projects	(1) Design, implementation schedule and current project status	0	MOTWS	Progress Reports

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MOTM = MINISTRY OF TOURISM  
MOTD = MINISTRY OF TRADE  
MOEM = MINISTRY OF ENERGY AND MINING

IV. ENVIRONMENTAL ISSUES

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ITEM	DESCRIPTION	AVAILABILITY		NAME OF MATERIALS
		AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Legislation	(1) Law/guidelines on environmental impact assessment	0	MOEA	REPORTS
	(2) Quality standards	0	MBS	COPIES OF STANDARDS
2. International conventions on environmental conservation	(1) Bilateral convention	0	MOEA	REPORTS
	(2) Multilateral convention	0	"	"
3. Present situation of the project area	(1) Socio-economic environment	0	MOVS	ECONOMIC FEASIBILITY REPORTS ON SIMILAR PROJECTS IN THE AREA
	Number of people to be resettled and plans of resettlement or compensation	0	MANUSCRIPT DISTRICT COMMISSIONER	
	Main industry or source of income of the residents	0	MOEC	REPORTS
	Number and distribution of schools, hospitals, religious facilities	0	MANUSCRIPT DISTRICT COMMISSIONER	"
	Location of the community which might be split by the project	0	MOHA	"
	Cultural property or archaeological site	0	MOAIG	"
	Use of river/lake water i.e. domestic, industrial and agricultural	0	DISTRICT COMMISSIONER	REPORTS
	Existence of common land	0	METEOROLOGICAL DEPARTMENT	REPORTS
	(2) Natural environment	0		"
	Availability of meteorological data			
Availability of land use and vegetation map				

MOAIG = MINISTRY OF AGRICULTURE AND IRRIGATION  
 MOEA = MINISTRY OF RESEARCH AND ENVIRONMENTAL AFFAIRS  
 MBS = MACAU BUREAU OF STANDARDS  
 MOEC = MINISTRY OF EDUCATION AND CULTURE  
 MOHA = MINISTRY OF HERITAGE  
 OPC = OFFICE OF THE PRESIDENT AND CABINET

<ul style="list-style-type: none"> <li>• History of natural disaster, landside earthquake and flood</li> <li>• Areas affected by soil erosion</li> <li>• Change of water level of rivers and lakes in recent years</li> <li>• Location of environmentally vulnerable areas such as wetland</li> <li>• Species of valuable animals and plants living in the project area</li> <li>• Location of particular areas officially protected such as national parks</li> <li>• Distribution of important landscape or scenery for tourism</li> </ul>	<p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p>	<p>MORR</p> <p>MORA</p> <p>WATER RESOURCES</p> <p>MORR</p> <p>0</p> <p>MORR</p> <p>MOTM</p>	<p>RESPONS</p> <p>"</p> <p>RESPONS</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p>
<p>(3) Quality of life</p> <ul style="list-style-type: none"> <li>• Present air quality</li> <li>• Regulation on emission gas</li> <li>• Present water quality</li> <li>• Regulation on effluents</li> <li>• Present condition of soil contamination</li> <li>• Regulation for prevention of soil contamination</li> <li>• Present condition of noise and vibration</li> <li>• Regulation for prevention of noise and vibration</li> </ul>	<p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p> <p>0</p>	<p>MORR</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p>	<p>RESPONS</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p> <p>"</p>

MORR = Ministry of Department of RELIEF AND REHABILITATION

V. OTHER INFORMATION

ITEM	DESCRIPTION	AVAILABILITY		NAME OF MATERIALS
		AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Future budgetary plan for the implementation of the Project		0	MOWS	BUDGET REPORTS
2. Any specific restrictions related to the Study		X	—	—
3. Availability of the Government's equipment/instruments/apparatus for the Study	<p>(1) List up equipment/instruments/apparatus which are available for the Study by the following category with the following information:</p> <p>a) Category</p> <ul style="list-style-type: none"> <li>- Instruments for geologic survey</li> <li>- Apparatus for geological/soil investigation</li> <li>- Apparatus for traffic survey</li> <li>- Computer</li> <li>- Services vehicle</li> <li>- Others</li> </ul> <p>b) Information</p> <ul style="list-style-type: none"> <li>- Name</li> <li>- Type (or model/maker)</li> <li>- Characteristics (or capacity)</li> <li>- Number of units</li> <li>- Condition</li> </ul>	<ul style="list-style-type: none"> <li>0 — MOWS</li> <li>0 — " " " "</li> <li>0 — MOWS</li> <li>0 — " " " "</li> </ul>	<p>TOTAL STATIONS THERMISTATE, DUMP LEVELS BILLING, RIGS TDL, COUNTERS AST LOANER, PICKUPS PICKUPS, LOANERS, ITOMENS TOYOTA, NISSAN 3, 2, 2 POOR</p>	

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VI. ROAD AND BRIDGE MAINTENANCE QUESTIONNAIRE

I. INSTITUTIONAL CAPABILITY

1.1 Legal powers

- 1.1.1. Is the responsibility for road and bridge maintenance legally defined?
- 1.1.2. Are all roads the responsibility of the maintenance department?
- 1.1.3. Are the legal powers understood?
- 1.1.4. Are the powers adequate?

..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO

1.2 Administration

- 1.2.1. Is there an administrative structure capable of maintaining roads?
- 1.2.2. Is there an unambiguous chain of command?
- 1.2.3. Are responsibilities defined?
- 1.2.4. Are staff aware of their responsibilities?
- 1.2.5. Are decisions independent of the influence of nepotism, favoritism, graft or corruption?

..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO

1.3. Human Resources

- 1.3.1. Are there sufficient personnel available?
- 1.3.2. Are they adequately trained?
- 1.3.3. Are they adequately motivated?
- 1.3.4. Is there an internal training scheme?
- 1.3.5. Are there operations manuals?

..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO

1.4 Budget

- 1.4.1. Is a budget awarded?
- 1.4.2. Is it adequate?
- 1.4.3. Can it be relied upon?
- 1.4.4. Are operations independent of foreign exchange constraints?

..... YES NO  
 ..... YES NO  
 ..... YES NO  
 ..... YES NO

1.5. Financial Control

- 1.5.1. Does full financial control reside within the maintenance authority?
- 1.5.2. Are accounts independently audited?

..... YES NO  
 ..... YES NO

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3.5. Field Monitoring

3.5.1. Is there any systematic monitoring of:

3.5.1.1. quality of work?

3.5.1.2. material quantities used?

3.5.1.3. man-hours spent on job?

3.5.2. Do the results of any monitoring feedback into the future planning process?

3.6. Research and Information

3.6.1. Is there adequate access to current work on road maintenance from other maintenance organizations or international research centers?

3.6.2. Is research on road maintenance currently carried out within the organization?

3.6.3. Are new techniques and practices introduced as a result of research results?

LACK OF SUFFICIENT  
STAFF FOR  
MONITORING

..... YES  NO

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## 5. 収集資料リスト



収集資料リスト

番号	資料の名称	形態(図書・ビデオ・地図・写真等)	発行機関
1	Economic Feasibility Study, Detailed Design & Preparation of Tender Documents of Selected Rural Roads Development project Economic Feasibility Study, Final Report, March 1997	部分コピー	公共事業省道路局
2	Reconstruction of the Liwonde - Namanga - Nsanama - Nselema - Chiponde - Mangochi Road Project Tender Documents, Division 1-6, July 1997	図面部分コピー	同上
3	Economic Feasibility Study, Detailed Design & Preparation of Tender Documents of Selected Rural Roads Development project Environmental Assessment, December 1996	コピー	同上
4	ローカル・コンサルタント一覧表	同上	同上
5	ローカル・コントラクター一覧表(土木分野)	同上	同上
6	ローカル・コントラクター一覧表(建築分野)	同上	同上
7	環境管理法( Environment Management Acts)	同上	林業・水産・環境省環境局
8	環境影響評価ガイドライン (Environment Impact Assessment Guidelines)	コピー	林業・水産・環境省環境局
9	シレ川マゴチ測水所における年間最高・最低水位及び流量	コピー	水開発省水資源局
10	マラウイ湖における月別平均水位一覧表 (Dec. '15 - Nov. '95)	同上	運輸省気象局南部地域支局(Blanityre)
11	マンゴチ測水所における日平均水位(1985~1986)、平均月別水位、平均年水位、ピーク水位と発生日及び最低水位と発生日	同上	同上
12	南部地域各気象観測所における日降雨量、降雨日数 (1997年2月分)	同上	同上
13	図表	同上	同上
14	Financial Cooperation with Malawi Secondary Centres Development Programme Follow-up Mission, May 1996	同上	自治・スポーツ省技術局

15	Consulting Services for the SECONDARY CENTRES DEVELOPMENT PROGRAMME Republic of Malawi URBAN PLANNING / PRELIMINARY DESIGN REPORT VOLUME I - REPORT MANGOCHI, March 1993	コピー	同上
16	The Geology of the Mangochi - Makanjila Area, 1976	図書	エネルギー・鉱業省地質調査局
17	The Geology of the Cape Maclear Peninsula and Lower Bwanje valley, 1968 Economic Report 1997	同上	同上
18		同上	国家経済企画庁 (NEC)
19	The Public Sector Investment Programme (PSIP) 1996/197 Financial Year	同上	同上
20	Malawi Economic Prospects and Country Programming Paper 1993 - 1995	同上	アフリカ開発銀行 (African Development Bank)、 アフリカ開発基金 (African Development Fund)
21	マラウイ国地質図	地図	地質局

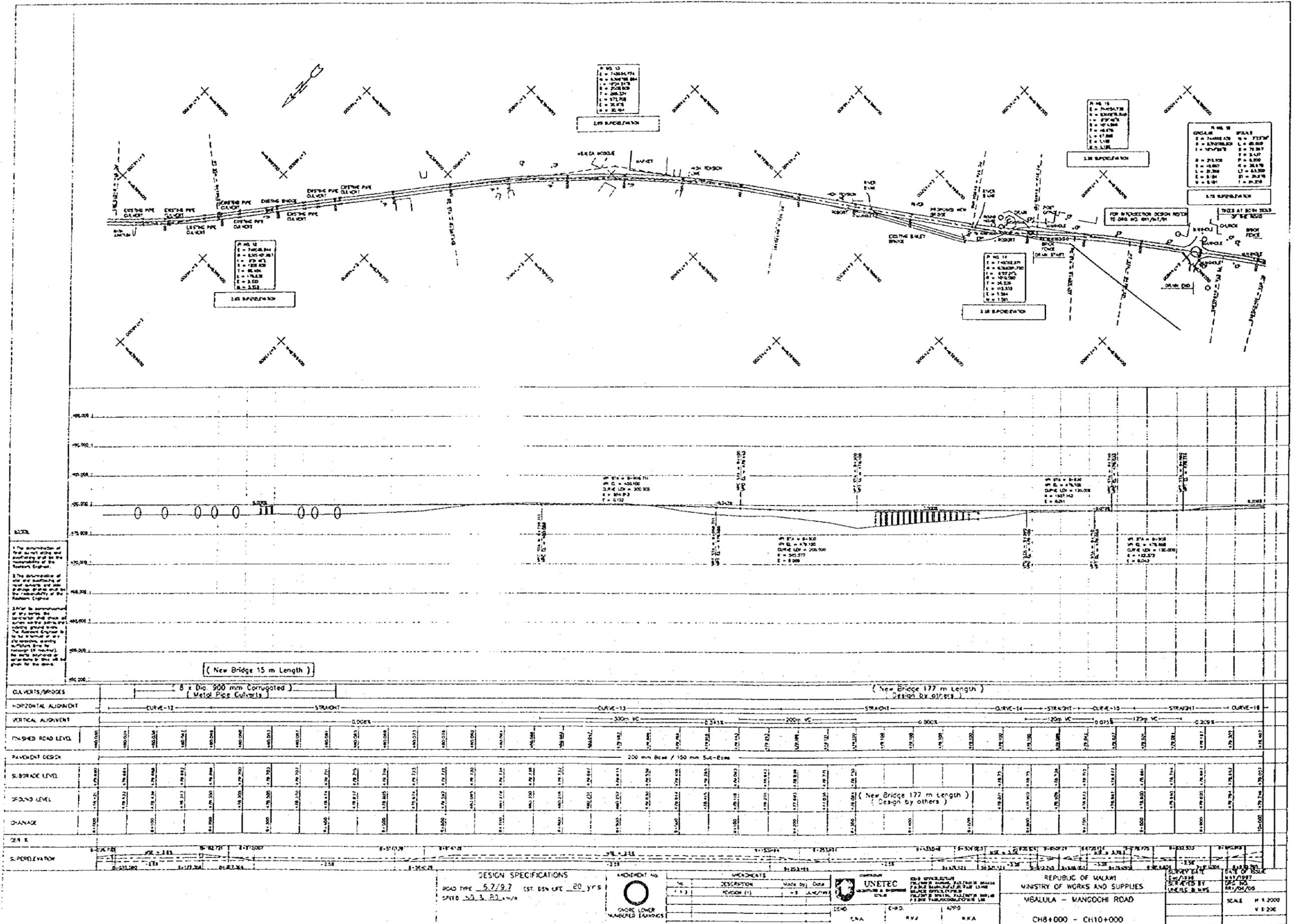
## 6. 国家行政組織図







## 7. クウェートファンドによるF/S (マンゴチ橋前後区間)











JICA