MALAYSIA

FEASIBILITY STUDY
FOR
BELURU/LONG LAMA/LIMBANG
TRUNK ROAD CONSTRUCTION PROJECT

INCEPTION REPORT

JULY 1978

JAPAN INTERNATIONAL COOPERATION AGENCY

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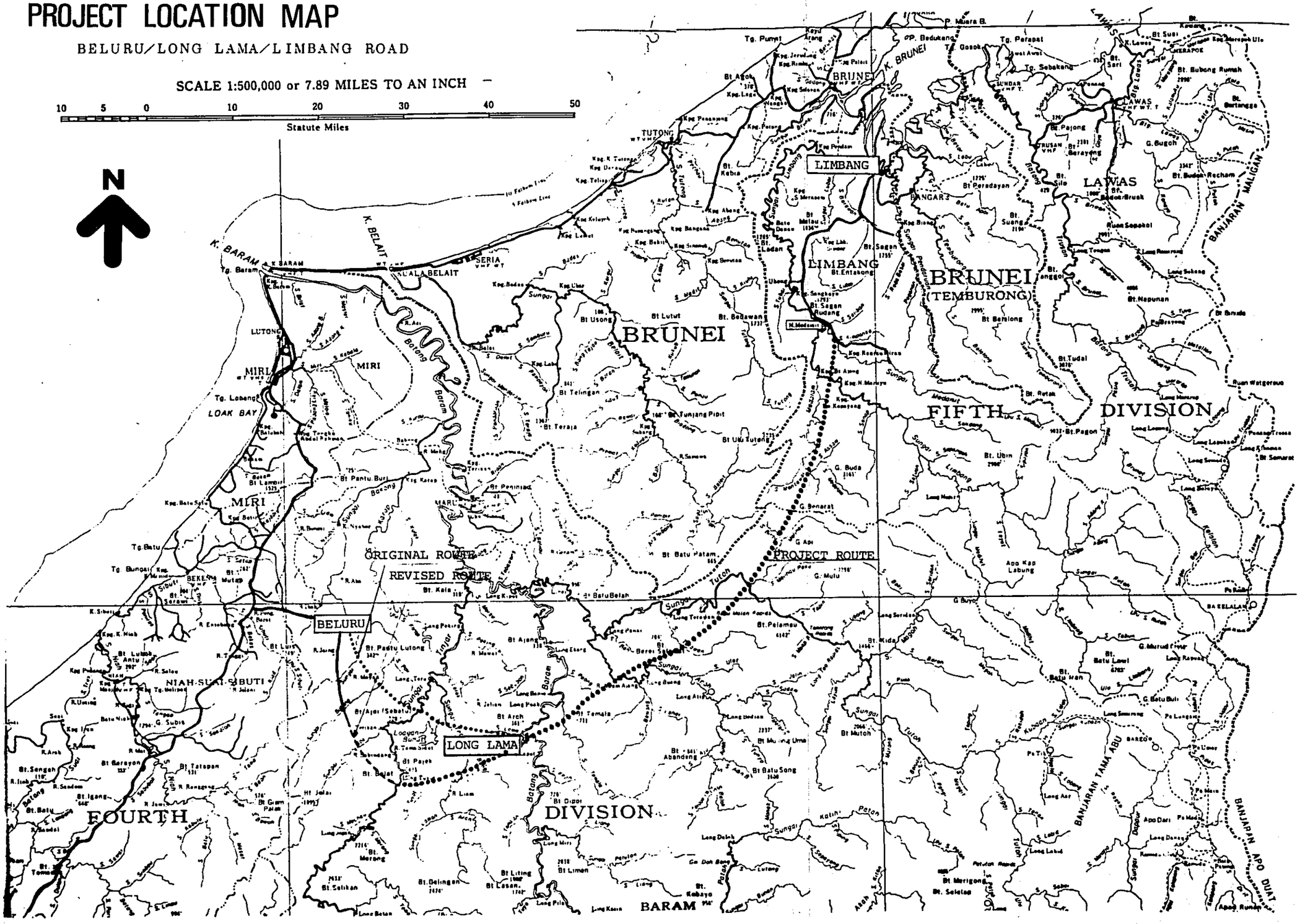
PROJECT LOCATION MAP

BELURU/LONG LAMA/LIMBANG ROAD

SCALE 1:500,000 or 7.89 MILES TO AN INCH

10 5 0 10 20 30 40 50

Statute Miles



CHAPTER 1 BACKGROUND AND OBJECTIVES OF THE STUDY

1. Introduction

The concept of development of the Second Trunk Road System in the State of Sarawak was put forward in the Second Malaysia Plan (1971 - 1975) prepared by the Governmetn of Malaysia. In response to this concept the SEATEC (Southeast Asian Agency for Regional Transport and Communications Development) has carried out a prefeasibility study for the purpose of promoting the development of a trunk road system in the State of Sarawak. In the prefeasibility study report, it was recommended that further detailed studies have to be made on the development (improvement or new construction) of this project which is a road to connect Miri region (4th Division) with Limbang region (5th Division).

This study is a part of the Japanese Government technical cooperation program, in response to the request of the Government of Malaysia, for the purpose of carrying out a feasibility study of the said road and the executing agency for the project is the Japan International Cooperation Agnecy.

2. Project Background

The project area is composed mainly of tropical jungle area with a rolling terrain traversed by many rivers, and except for the towns of Beluru, Long Lama, N. Medamit and Limbang, in generally very low in population density, with only small villages scattered in the jungle. Road provision is lacking and rivers forms the major means of transport for a large portion of the area.

The project road serves to connect the Miri-Bintulu region, which, with various development projects underway, it is recent years growing into a new regional centre, with the Limbang region of 4th Division where until now connection is only possible by air or water transport. The road has the characteristics of a trunk road and will form a part of the overall transport system for the State of Sarawak, as well as part of an interstate trunk road linking the States of Sabah and Sarawak, making up a section in the Asian Highway.

Past studies have verified that a good road system should be developed for the region, the project area has great potential in agricultural, forestry, mineral as well as tourism development. Such provision of better access to the inland region of Sarawak will also enable development of the inland area and modernization of the social services to the inhabitants of the region, in line with the basic policy of the Government of Malaysia.

Although the development of a road in such a area will involve many technical and economic problems, it will have very great social impact to the regional community, so that if effective investment is implemented, new industries may be induced and it is anticipated that the region can be rapidly developed.

3. Objectives of the Study

Based on the above background, the object of this study is to make economic, social, technical and financial analyses of the expected problems accompanying the development (improvement or new construction) of the trunk road of 230 km in length connecting Beluru, Long Lama of the 4th Division with N. Medamit, Limbang of the 5th Division in Sarawak and to identify the viability of the implementation of the

project. The extent of development of the major sections of the project road are as follows:

(1) Improvement of Beluru - Long Lama section (about 80 km)

(2) New construction of Long Lama - N. Medamit section (about 118 km)

(3) Improvement of N. Medamit - Limbang section (about 32 km)

(4) Provision of bridges or ferries where necessary for all the above sections.

CHPATER 2 WORK ITEM OF THE STUDY

1. Basic Policy

In consideration of the characteristics and the basic role of the project road and with an aim to fulfilling the objectives of the study without dealy, the following basic policy of study will be adopted.

[1] Since the accessibility to the study area is poor, the study will be carried out in two phases. In the field investigation in Phase I, emphasis will be put on the understanding of the overall regional characteristics and the comprehension of the basic plan and design conditions of the route. After the completion of the route selection on Phase II, a further field investigation will be carried out for the purpose of a more detailed study of the route.

[2] Since the availability of reliable topographic maps to an uniform rate of accuracy in the study area will greatly affect the performance of the study, the necessity of producing of detailed topographic maps will be determined during the Phase I field investigation.

[3] From the present economic situation of the study area, it is anticipated that even on completion of the project road, the benefit to normal traffic and diverted traffic volume on the road will be very limited on most of the road sections. The

qualification of potential regional development and the computation of their economic and social effects will therfore be made fully in detail.

[4] The selection of the alternative routes will be made with due consideration of the regional development of the sutdy area, and on the fact that the route will in future also play the role of part of the national trunk road system providing service to inter-regional traffic. For the engineering study, hydrological problems, detours of swamp areas, selection of the locations for river crossings, will be given careful study.

[5] Necessary feeder roads to the project road will be duly considered in order to promote regional economic development and to provide improved accessibility to the main centres of population.

[6] Since the future development of the sutdy area will not be at a uniform pace, the various types of traffic demand may be anticipated at different times. A stage construction porgram fully meeting the demand at each stage will be studied for the purpose of maximizing the investment effects.

[7] The reduction of construction cost will be the basic policy of the sutdy, and in this regard, besides studies on the stage construction program, considerations will be given to the optional design criteria, the location of bridges, the viability of introducing ferries at river crossings and on the constructoin method.

[8] At all stages of the survey efforts will be made towards the transfer of technical knowledge to our counterparts in the Government of Malaysia.

2. Outline of the Phase I Study

The Phase I Study, aiming at selecting the best alternative route and developing a basic policy for the construction of the proposed road sections, covers extensive field surveys and analysis of socio-economic, traffic and engineering characteristics in the areas.

The Phase I Study of which an outline framework is shown in flow chart, Fig. A can be broken down and explained as follows:

[1] Preparatory Work

[1]-1 Preparatory Work

Prior to field surveys the following work has already been carried out and accomplished in Japan.

* Review of available data
* Preparation of necessary questionnaires and survey sheets
* Preparation of an Inception Report

[1]-2 Discussion of Inception Report

[2] Field Survey

[2]-1 Determination of Survey Policy

Soon after the arrival at the site a general survey policy will be determined by:

* confirming the availability of necessary data and information
* interviewing relevant governmental agencies
* conducting general observation trip by chartered aircraft/car

[2]-2 Socio-economic Survey

1) Data Collection

The following data will be collected for analytical purposes.

* National and regional income
* Population: distribution, urban/rural, employment, etc.
* Imports and exports: major items, amount, etc.
* Industries: agriculture, fishery, mining, forestry, processing industries, tourism, etc.
* Development plans in public and private sectors

2) Agricultural/forestry survey

As it is anticipated that agricultural and forestry development in particular will be stimulated by the completion of the proposed road, the following items will be surveyed.

(a) Present status of agricultural/forestry activities

* Production of major crops/products
* Marketing and commodity flow of major crops/products
* Price structure of major crops/products
* Characteristics of families engaged in agriculture
* Agricultural based processing industries

(b) Appraisal of existing development plans

Where existing plans, long or short term, are available, the practicality will be assessed and an implementation program drawn up on the basis of discussion with relevant officials/agencies and the following information.

* Location and size of the related projects
* Type of products and production amount
* Implementation schedule and organization
* Marketing and production cost

(c) Assessment of the agricultural development potential areas along the proposed road sections.

(d) Government policy and strategy of agricultural/forestry development

3) Community Survey

Present conditions of socio-economic activities in major communities in the area will be surveyed both quantitatively and qualitatively in order to study the socio-economic impacts due to the completion of the proposed road. Particularly plans and strategies of developing Long Lama as a sub-regional centre will be fully clarified.

[2]-3 Traffic Surveys

Traffic surveys covering the modes of road and river transport will be performed in depth while those of coastal shipping and air transport to a lesser degree. These will be carried out as follows:

1) Collection of Transport Data

* Overall transport network in the area
* Number of vehicles
* Transport business and operation
* Results of available traffic census/survey
* Transport cost data

2) Traffic Survey (road and river transport)

(a) Survey Method

* Traffic count survey
* OD survey

(b) Survey Station

* Road: two stations on Limbang/N. Medamit road
  one station on Beluru road
* River: Long Lama and other places when and where necessary.

(c) Survey Period

* Traffic counts: from three days to one week
* OD survey: from two to three days

(d) Survey Items

* Survey time
* Type of vehicle/vessels
* Origin and destination
* Trip purpose
* Number of passengers
* Travel time
* Loading capacity
* Tonnage of commodity loaded

3) Coastal Shipping and Air Transport Survey

Present condition of coastal shipping and air transport in the area will be surveyed by interviewing operators/ companies and by analyzing the data and statistics in their possession.

* Operating conditions and operational problems
* Amount of passengers and commodities handled
* Origin and destination of major commodities
* Fare/freight and transport time

4) Transportation Cost Survey

The necessary data and information will be collected to estimate transportation cost for each one of the representative types of vehicles/vessels including ferry boats.

5) Survey on transport conditions of timber and major agricultural products

As traffic of timber/agricultural products is expected to generate considerably, characteristics of trnasporting those commodities will be surveyed.

[2]-4 Engineering Survey

The purpose of engineering survey in Phase I is to survey extensively various conditions arising as technical problems in the project area through data collection, discussion with the persons concerned, field reconnaissance and survey.

1) Inventory Survey of project road

The followng items of existing road consisting of the alternative routes are surveyed.

* Design criteria
* Width composition
* Road surface condition
* Longitudinal grade and its length
* Roadside condition
* Horizontal curve radii
* Structures
* Others

2) Design Criteria

a) Confirmation of design criteria of the Government and Sarawak State

b) Hearing of the details and basic concept of design criteria, and opinions to the project road

3) Meteorology/Hydrology

a) Collection of meteorological data

b) Collection of water level and discharge data of major rivers to cross the project road

4) Soil/Geology/Aggregate

a) Collection of existing data

b) Discovery of swamp area

c) Carrying out physical, compaction and CBR test of the soil samples taken from the spot of every 15 - 20 km along the project road construction

d) Observation of soil layer variation at excavated holes

e) Survey of present situation of existing gravel pit, quarry site and proposed gravel pit

f) Study of possibility of new gravel pit and quarry site for the project road construction

5) Structures

a) Present situations of existing structure within the project road

b) Present situations of bridges, drainage facilities, ferry facilities and other structures in Sarawak State

6) Construction materials & equipments/construction works

a) Land acquisition and compensation cost

b) Supply of construction materials, equipments and labor

c) Unit cost of construction items and construction conditions of the objective road

d) Present situation of maintenance and repair

7) Preparation of Topographical Map

a) Justification of the possibility of mapping of the air photo with a scale of 1 : 25,000

b) Data collection of survey stations and the survey of restriction and facilities of local survey offices

[2]-5 Preliminary Selection of Alternative Alignment

On the basis of the actual findings and preliminary results of the field survey, alternative alignments will be selected for each of which characteristics of economic as well as engineering aspects will be outlined. In selecting alternative alignments the following factors are particularly taken into account.

* Accessibility to the areas of development projects and communities along the proposed road
* Topographic and soil conditions
* Prevention of areas prone to flood and swamps
* Crossing points at major rivers

[2]-6 Preparation of Progress Report

All work performed during the period of the field survey will be summarized in the Progress Report.

[2]-7 Discussion of Progress Report

The progress report will be submitted for disucssion to the Government of Malaysia before departure of the JICA Study Team. Major items to be presented and discussed are as follows:

* Outline of performed field surveys
* Major findings and results of the field surveys
* Selection of alternative alignments
* General policy on developing alternative road plans
* Basic policy for further study

3. Detailed Analysis

[3]-1 Economic/Traffic Analysis

The followings will be analyzed in detail on the basis of data and information obtained in the field survey.

1) Determination of Project Influence Area

2) Analysis of Present Social and Economic Activities in the Project Influence Area

3) Analysis of Future Prospects of Social and Economic Activities in the Project Influence Area

   * Population: growth, distribution changes and population movement
   * Industries: possibility of promoting new industries
   * Forecast of major economic indicators

4) Assessment of Development Potentials of Agriculture and Forestry

   Development potentials of agriculture and forestry will

be assessed in detail and the followings clarified for the case with and without Implementation of the proposed road.

* Production of major crops/products
* Production cost
* Preconditions of development with necessary related investment

5) Analysis of Present Traffic Conditions

* Level and characteristics of traffic on principal transport network
* Traffic flow of goods and passengers
* Modal-split
* Transport time between major points
* Activities of transport business
* Transport characteristics of major commodities
* Utilization of transport facilities by the people living in isolated inland areas

6) Forecast of Future Traffic

Future traffic volume will be forecasted by major road section for the following types of traffic.

* Normal traffic
* Diverted traffic
* Development traffic
* Induced traffic

[3]-2 Engineering Analysis

The following items are analysed based on the findings of field survey.

1) Design Criteria

   (a) Preparation of design criteria plan to be adopted

2) Meteorology/Hydrology

   (a) Data arrangement of fine weather days, rainfall, temperature, wind direction, wind velocity and humidity

   (b) Rough estimation of discharge at the point of proposed bridge sites along the alternative routes

   (c) Rough determination of probable rainfall

3) Soil/Geology/Aggregate

   (a) Zoning of swamp and landslide area

   (b) Determination of grubbing thickness of surface soil

   (c) Zoning of design CBR of subgrade soil

   (d) Rough determination of gravel pits and quarry sites

4) Structures

   (a) Arrangement of the findings of field survey

5) Construction materials and equipments/Construction Works

   (a) Classifying construction materials and equipments into imported or local products

   (b) Rough determination of maintenance and repair method

   (c) Arrangement of other findings of field survey

6) Preparation of Topographical map

(a) Arrangement of the findings of field survey

7) Preliminary Engineering Study

Preliminary Engineering Studies are carried out establishing plural alternative routes depended on the engineering analysis in the topographical map with a scale of 1 : 50,000.

The itmes to be defined are as follows:

* Design criteria
* Route location
* Typical cross section
* Outline of pavement structure
* Structure plan
* Earthwork plan

[3]-3 Preliminary Cost Estimate

Construction sections are established dividing alternative routes into existing and new road. Preliminary project cost is estimated by construction cost, maintenance and repair costs per Km. Taking into account of the regional characteristics for economic analysis are estimated from the former data of similar projects in Sarawak.

[3]-4 Preliminary Estimate of Benefit

Benefit, deriving from the implementation of the project, will be preliminarily estimated in order to get the level and composition of benefit. Benefit will be estimated in detail in the Phase II Study.

[3]-5 Preliminary Economic Evaluation

Economic evaluation in the Phase I Study aims at determining generally the economic viability of the project and the ranking of the alternatives according to economic priority.

As it deems that the completion of this project will not necessarily show up sufficient tangible benefits throughout the whole section, an economic analysis will also be made by section as well. The results will be based on establishing basic policy for setting up detailed alternative road development plans to be worked out in the Phase II Study.

[3]-6 Selection of the Best Alternative Alignment

A comprehensive appraisal will be made of the alternative alignment in order to select the best one.

[3]-7 Preparation of Interim Report

All works performed in the Phase I Study will be summarized in the Interim Report.

[3]-8 Discussion of Interim Report

The Interim Report will be submitted to the Government of Malyasia for comments and discussion.

3. Outline of the Phase II Study

This Phase will follow the review of the Government of Malaysia and the approval of the JICA Survey Team's recommendation in the Interim Report. Detailed engineering and supplemental field survey will be carried out for the selected best alternative alignment followed by a further analysis, final eocnomic evaluation and a comprehensive appraisal of the project in order to recommend the most adequate road development plan. The framework of the Phase II Study is shown in Fig. B.

[4] Field Reconnaissance and Survey

[4]-1 Engineering Survey

The detailed field work for the best alternative alignment will cover the following items:

1) River and hydrological investigation

   a) The flood conditions of major rivers at the crossing point
   b) The features of flood and rainfall
   c) The flood discharge, the high water level and the velocity of major rivers

2) Soils and materials investigation

   a) Machine borings at the site of the proposed major bridges
   b) Soil samplings along the route and physical tests
   c) Quantities of materials and its transport method from the possible material sites

3) Construction materials, equipments and construction works

a) Collection of unit price data of materials, labor and equipment

b) Collection of construction and maintenance data of similar projects in Sarawak

4) Structures

a) Collection of engineering design data

b) Reconnaissance at the site of proposed main structures

5) Road

a) Reconnaissance along the best alternative alignment

b) Discussion on the best alternative alignment with the Government of Malaysia

c) Establishment of design criteria

[4]-2 Economic/Traffic Survey

The following work will be supplementarily carried out.

1) Conducting an additional traffic sruvey, if necessary, to find out the seasonal variation of traffic and to refine the traffic forecast.

2) Collection of additional data necessary for refining the estimate of benefit.

3) Development plan of feeder roads

[4]-3 Preparation of Progress Report

All work performed in the Phase II field survey will be summarized in the Progress Report.

[4]-4 Discussion of Progress Report

The Progress Report will be submitted to the Government of Malaysia for disucssion.

[5] Preliminary Engineering Design/Economic Analysis

[5]-1 Alternative Studies

In order to recommend the best alternative alignment, the alternative studies for alignment, pavement, bridge structure, ferry facility, stage construction and plan of feeder road will be conducted.

[5]-2 Preliminary Engineering Design

Based on the engineering analysis, the preliminary engineering design will cover the following items:

1) Route alignment design
2) Pavement design
3) Design of major structures
4) Design of ferry facility
5) Feeder road plan

[5]-3 Construction Cost Estimate

The cost estimates will cover the following items:

1) Land acquisition and compensation cost
2) Construction cost
3) Maintenance cost
4) Foreign currency portion and local currency portion
5) Economic cost and financial cost

[5]-4 Construction Schedule

1) Implementation Plan

Implementation plan will cover the following items:

a) Stage construction

b) Construction section

c) Execution method

d) Implementation plan and schedule

2) Maintenance Plan

Maintenance work and managing system of the project road will be made clear and the maintenance plan will be proposed.

[5]-5 Refinement of Traffic Forecast

Based on the analysis of additional data and information obtained in the field survey, the results of the traffic forecast will be refined.

[5]-6 Calculation of Benefit

The following types of benefits will be calculated in detail by traffic type and by major road section.

* Benefit due to the reduction of transportation cost
* Benefit due to the reduction of travel time
* Net value added
* Benefit due to the reduction of maintenance and repair cost
* Other intangible benefit

[5]-7 Economic Evaluation

1) Method

The economic viability of the project will be determined by comparing the costs with the benefit expressed in economic price over the project life according to the following methods.

* Internal Rate of Return
* Cost-Benefit Ratio

2) Alternatives for Economic Evaluation

Alternatives for economic evaluation which will be identified finally, based on the results of road development plans, cover basically the followings.

* Alignment (when necessary)
* Stage construction
* Section
* Ferry/Bridge
* Investment timing

3) Determination of Conditions for Economic Evaluation

The various conditions including the residual value of the project, discount rate, application of shadow rate etc. which are necessary for economic evaluation will be determined based on the results of field surveys.

4) Sensitivity Analysis

In order to check the economic viability of the project, sensitivity analysis will be made by applying the varied figures as to the following input within their probable range of accuracy.

* Dicsount rate
* Increase/decrease of construction cost
* Timing of investment
* Others

[5]-8 Comprehensive Appraisal of the Project

Finally the project will be appraized comprehensively from engineering, socio-economic and financial aspects and the followings will be recommended.

* The most adequate road plan
* Implementation schedule
* Construction/maintenance method
* Necessary improvement of institution and organization
* Scope of work for detailed engineering

[5]-9 Preparation of Draft Final Report

All work performed both in the Phase I and Phase II Study will be summarized in the Draft Final Report.

[5]-10 Discussion of Draft Final Report

The Draft Final Report will be submitted to the Government of Malaysia for discussion and comments.

[6] Preparation and Submission of Final Report

After receipt of comments on the Draft Final Report from the Government of Malaysia necessary revisions will be made to finalize the Report. The Final Report will be submitted within three month period after the receipt of the comments.

CHAPTER 3 WORK EXECUTION

1. Organization for Survey Implementation

This survey will be carried out by Japan International Cooperation Agency (JICA) and Supervisory Committee and Working Team which have been organized by JICA.

The Supervisory Committee comprizes five members as follows:

Members of Supervisory Committee

Chairman:	Mr. Akira Kaneko Head, Municipal Road Section, Local Road Division, Road Bureau, Min. of Construction
Committee Member: (Road Planning)	Mr. Shigeki Yamamoto Vice Director, Road Division, Tohoku Regional Construction Bureau, Min. of Construction
Committee Member: (Bridge/Structure)	Mr. Atsuyoshi Matsumoto Overseas Cooperation Officer, International Affairs Division, Planning Bureau, Min. of Construction
Committee Member: (Hydrology)	Mr. Eiichi Sazawa Instructor, Construction Department, Construction College, Min. of Construction
Committee Member: (Economic Evaluation)	Mr. Yukio Yasuda Senior Staff, Economic Research Office, Japan Highway Public Corporation

The Working Team is composed of the following nine consultants.

Members of Working Team

Team Leader:	Mr. Giichi Kataoka	(PCI)
Team Member: (Road design structures)	Mr. Hiroyuki Endo	(PCI)
Team Member: (Regional Planning/ Transport Economy)	Mr. Shizuo Iwata	(PCI)
Team Member: (Engineering Analysis/Soil)	Mr. Takashi Tomiyasu	(MCC)
Team Member: (Traffic Analysis)	Mr. Osamu Ohtsu	(PCI)
Team Member: (Agriculture/Forestry)	Mr. Yoshifumi Takeda	(MCC)
Team Member: (Hydrology)	Mr. Tomeo Ohta	(MCC)
Team Member: (Construction Method/Materials)	Mr. Mineo Endo	(MCC)
Team Member: (Survey)	Mr. Toshitaka Hibii	(PCI)

PCI: Pacific Consultants International

MCC: Mitsui Consultants Co., Ltd.

Organization for implementating the study is shown in the following organization chart, Fig. C.

2. Work Shcedule

Work Schedule of this study is shown in the flow charts of Fig. A and Fig. B and the staffing schedule of each consultant is shown in Fig. D.

3. Reports and Drawings

Reports and drawings to be submitted to the Government of Malaysia are as follows:

[3]-1 Reports

1)	Inception Report	:	50 copies
2)	Phase I Progress Report	:	50 copies
3)	Interim Report	:	50 copies
4)	Phase II Progress Report	:	50 copies
5)	Draft Final Report	:	50 copies
6)	Final Report	:	150 copies

[3]-2 Drawings

1)	When Interim Report is submitted	:	30 copies
2)	When Draft Final Report is submitted	:	30 copies
3)	When Final Report is submitted	:	50 copies

CHAPTER 4 UNDERTAKINGS BY THE GOVERNMENT OF MALAYSIA

Undertakings by the Government of Malaysia, being explained in the Scope of Work agreed between the both Governments are further broken down as follows:

1. Provision of Office Space and Equipment

   1) Office space is required both in Miri and Kuching
   2) Space: Approximately 50 sq.m. in Miri and approximately 30 sq.m. in Kuching, air-conditioned
   3) Equipment: Desks and chairs for five consultants & conference table and chairs

2. Provision of Counterparts

   1) At least one counterpart for economic/traffic team and engineering team respectively.
   2) Cooperation of a vegetation specialist
   3) Typist for preparing the reports

3. Cooperation in Recruiting Local Man Power

   1) Surveyors for traffic surveys
   2) Labourers for engineering surveys

4. Provision of Transport Vehicles

   1) At least two 4-wheel drive vehicles such as Jeep, Land Rover etc. are needed particularly during the period of field reconnaissance and engineering work at sites together with drivers.
   2) Cooperation in hiring necessary number of Cars

3) Cooperation in hiring aircraft/helicopter

4) Cooperation in hiring speedboats

Fig. A FRAMEWORK OF PHASE I STUDY

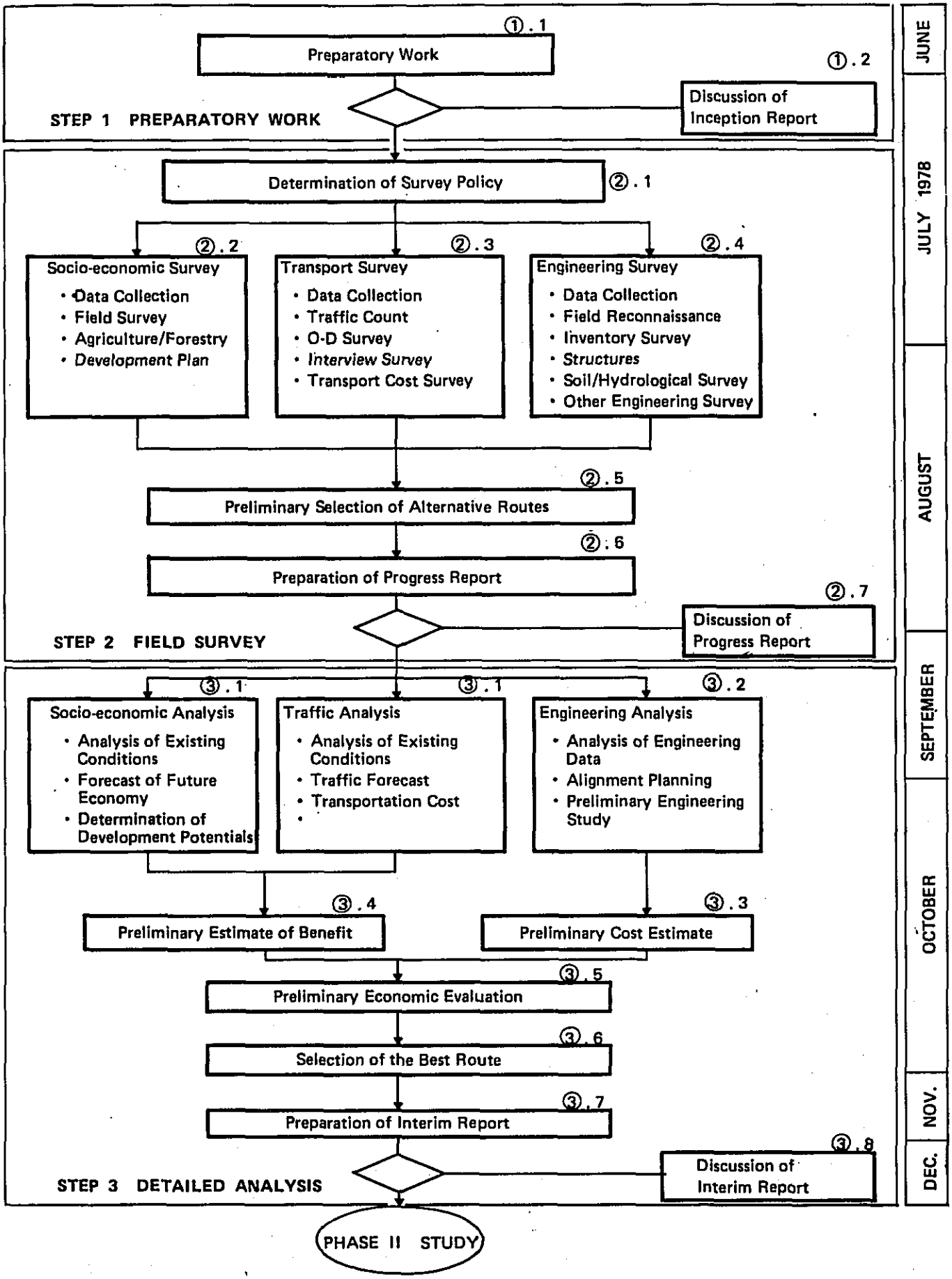


Fig. B FRAMEWORK OF PHASE II STUDY

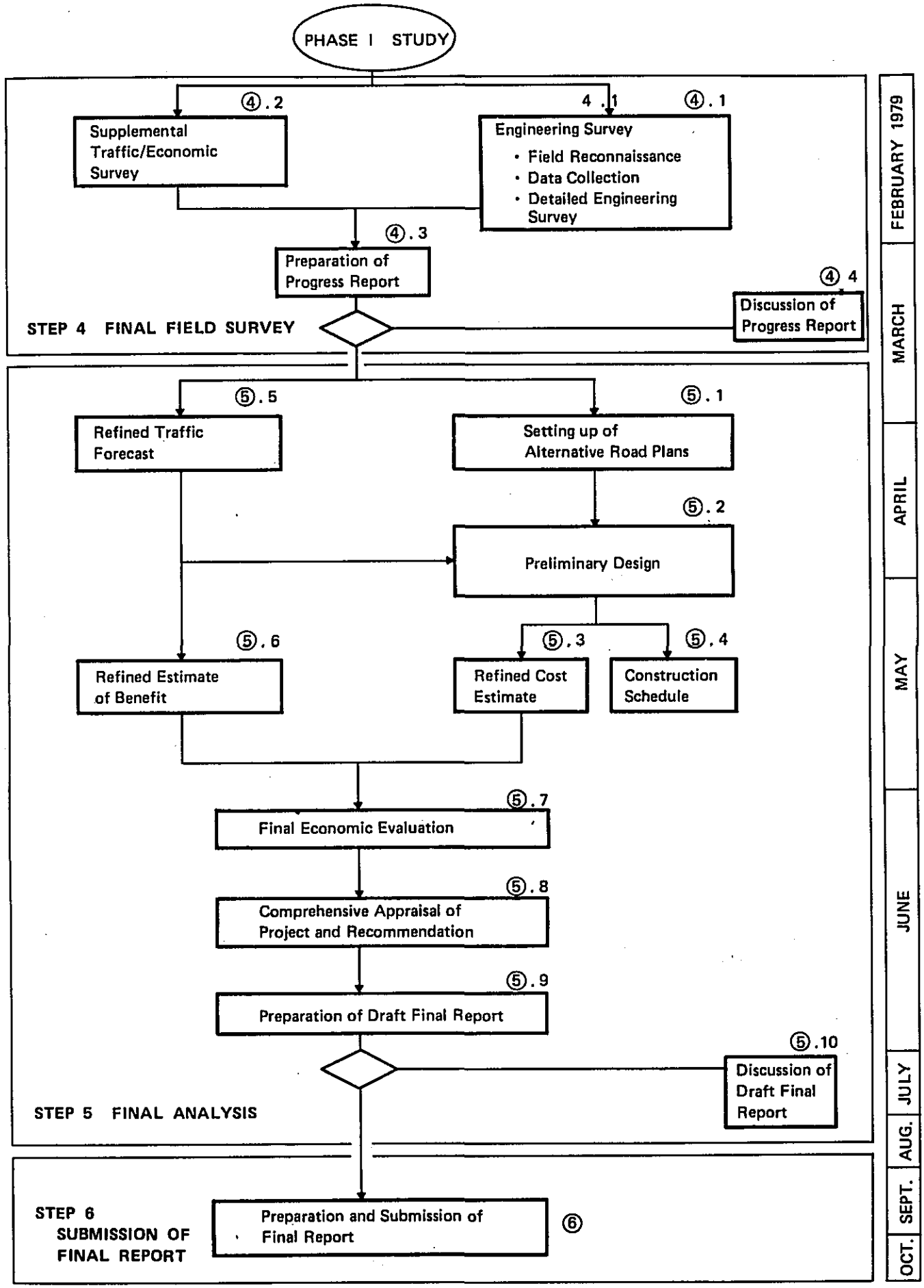


Fig. C ORGANIZATION CHART

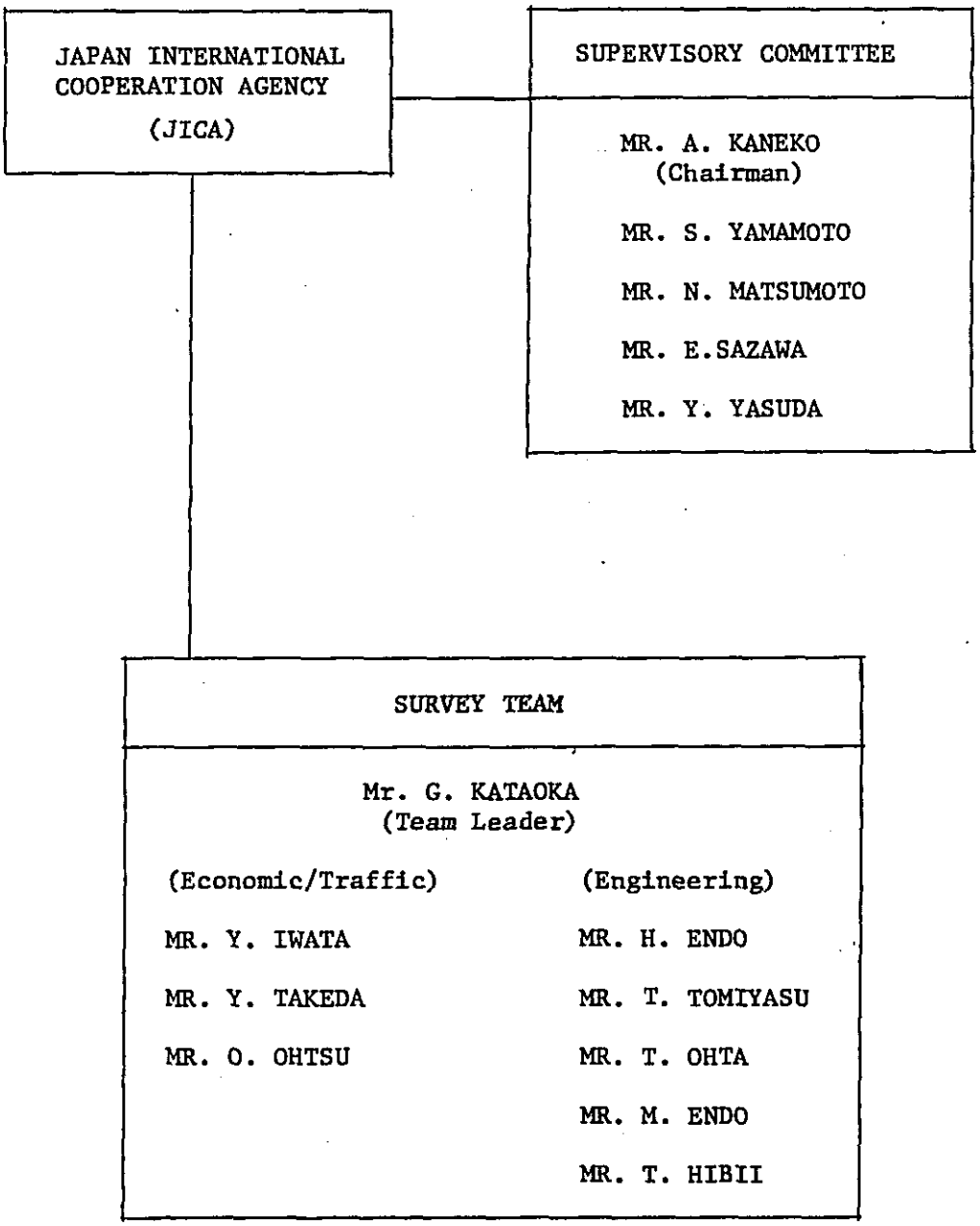
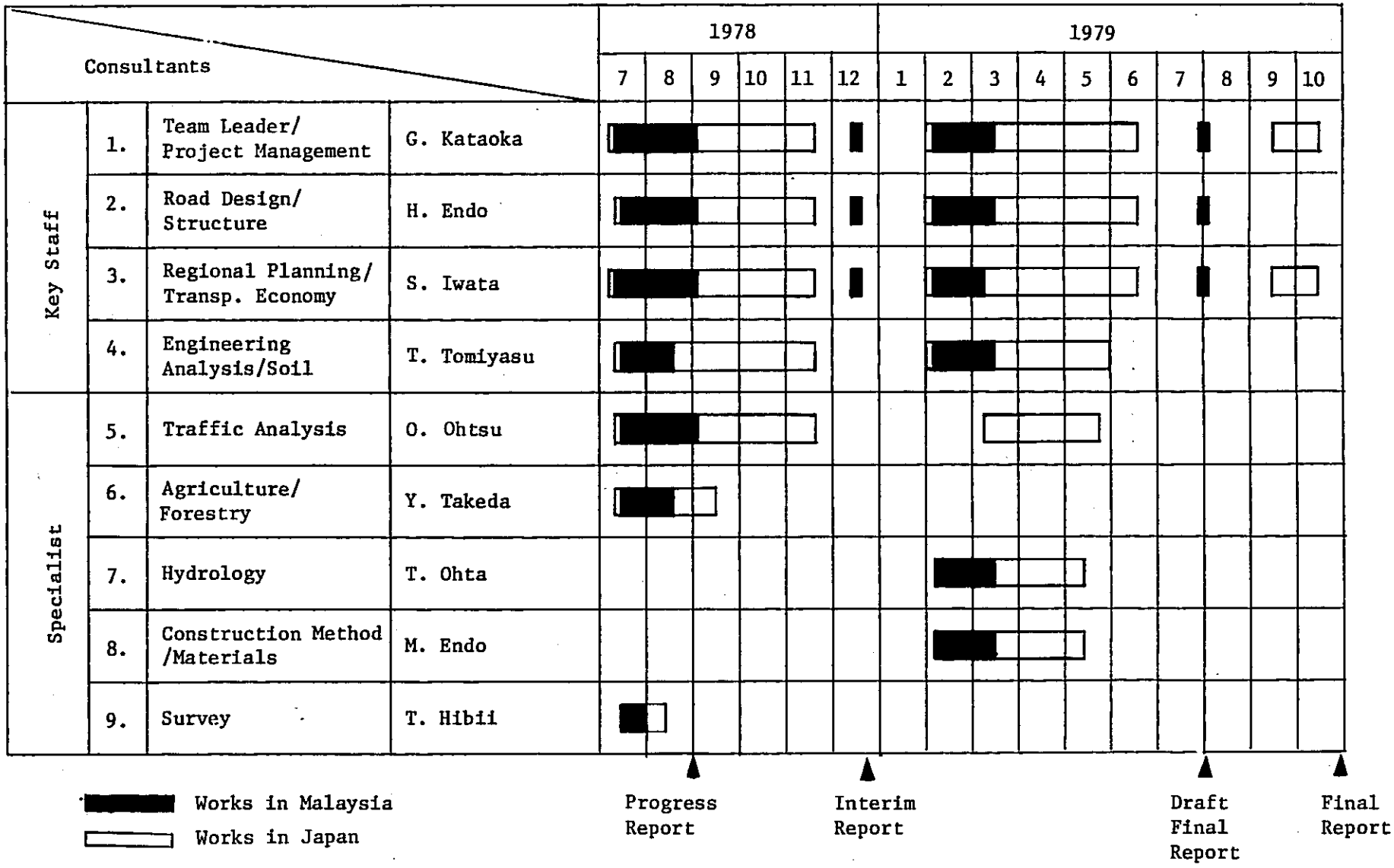


Fig. D STAFFING SCHEUDLE



GIICHI KATAOKA

Date of Birth: October 2, 1926

Final Education: Sapporo Technical High School in Civil Engineering, 1944

Professional Registration: Registered Surveyor No. 39552

Languages: Japanese, English

Professional Experience:

1974 - Present	Director, Pacific Consultants International
1971 - 1974	Pacific consultnats International
1956 - 1971	Pacific Consultants, K.K.

Major Works Performed in Recent Years:

Year	Country	Description of Work
1977 - Present	Saudi Arabia	Project Manager for Supervision, 700 Km long highway project between Najran and Sulayyil in Southern Region
1976	Philippines	Technical Advisor for feasibility study of Commuter Service of Philippines National Railway
1975	Peru	Route location and preliminary design of highway bridge, as highway engineer
1973 - 1975	Saudi Arabia	Project Manager for the preliminary engineering including roconnaissance survey, economic feasibility study, determination of the location, estimate of the construction costs and design and specifications including soil investigations, geotechnical investigation, meterological & hydrological investigation, estimate of the construction cost, preparation of tender documents and training of local engineers for the construction of highway network in the regions of Najran, Abha and Bisha
1972 - 1973	Indonesia	Construction of supervision of Balikpapan-Samarinda Highway, East Kalimantan in length 116 Km
1969 - 1970	Philippines	Senior Alignment Engineer for field survey and route selection of Cagayan Valley Railroad Extension Project, between San Jose - Tuguegarao 300 Km long, Luzon

Year	Country	Description of Work
1968	Philippines	Senior Civil Engineer for field survey and site selection of San Juanico Strait Bridge between Leyte and Samar Islands
~~1~~967	Afganistan	Project Manager for field investigation of Asian Highway Route No. 2 between Kabul and Herat
1966	Japan	Project Manager for route locationing and design of Shiga - Kusatsu plateau road; and tunneling project Gunma Pref.
1965 - 1966	Japan	Deputy Project Manager for route survey of Akashi-Himeji Section of New Sanyo Line
1964	Bolivia	Senior Alignment Engineer for field investigation system (including tunnel) of Matilde Mine Overall Development Project
1963	Lebanon	Senior Alignment Engineer for field investigation and preliminary design of Dhar El Baidar Tunnel on Beirut-Damascas Road
1962	Japan	Civil Engineer for plan survey for Ueno and other four Tokyo Subway Stations
1959 - 1961	Japan	Alignment Engineer for route survey and design of Fuji, Sekigahara and Ohmihachiman Section of New Tokaido Line; and design investigation for tunneling
1960	Indonesia	Civil Engineer for site investigation and design of pipe line and loading for Tamiyang Oil Development Project, North Sumatra

HIROYUKI ENDO

Date of Birth:	December 19, 1939
Final Education:	Waseda University, B.S. in Civil Engineering, 1963
	M.S. in Civil Engineering, 1968
Professional Registration:	1st Class Civil Work Supervisory Engineer, No. 403290 Consulting Engineer - Construction Dept.
Membership:	Japan Sociaty of Civil Engineers
Language Proficiency:	Japanese, English, Indonesian

Professional Experience:

1971 - Present	Pacific Consultants International
1968 - 1971	Nippon Metal Fabrication Co., Ltd.
1966 - 1968	Research in the design of concrete structures at Waseda University
1963 - 1966	Nippon Metal Fabrication Co., Ltd.

Major Works Performed in Recent Years:

Year	Country	Descripiton of Work
1978	Indonesia	Deputy Project Manager for the feasibility study of Jakarta Intra-Urban tollway system 32 km in length; engaged in preparing preliminary design of alignment, viaduct interchange cost estimates and all technical documentations
1977	Indonesia	Senior Structural Engineer for feasibility study of Jakarta Outer Ring Road 48,2 km in length; engaged in outline design, construction cost estimates and tollway study
1977	Paraquay	Senior Engineer for investigation for Villaricca-Caazapa highway project 60 km in length
1974 - 1975	Indonesia	Chief Engineer for engineering services for the Cilamaya - Cilegon Gas Pipeline Project; engaged in preparation of date and construction documents and technical advice for construction

Year	Country	Descripiton of Work
1974 - 1975	Indonesia	Senior Structural Engineer for detailed engineering services for Telukbetung - Bakauhuni Highway and Panjang - Sribhawono Highway (F-16 and FTA-11); engaged in route survey, hydrological study, and all reporting works
1973 - 1974	Japan	Senior Structural Engineer for preliminary design of composite girders and detailed design of reinforced concrete piers for Tokyo Metropolitan Expressway
1973	Japan	Senior Structural Engineer for detailed design of metal slab bridge of 205 m length (Nakabori Bridge) of National Highway Route No. 19
1973	Japan	Detailed design of three overbridges of Shin-Yokohama-Motoishikawa Highway, Yokohama
1971 - 1972	Indonesia	Structural Engineer engaged in supervisory services for Graving Dock of Surabaja
1968 - 1971	Japan	Detailed design of pipe arch center and stress calculation for tunnel driving of Shisui Tunnel, Chiba Prefecture
1968 - 1969	Japan	Detailed design of concrete forms and measuring of temperature in the mass concrete for Iwamori Dam, Hokkaido
1968	Japan	Planning and detailed design of preparatory works of Kashima Line, Ibaragi Prefecture Study and development of helical corrugated pipe for drainage
1968	Japan	Planning and detailed design of preparatory works of Azumi Dam, Nagano Prefecture
1968	Japan	Planning and design of preparatory works of Nyuyama Tunnel, Nagano Prefecture

SHIZUO IWATA

Date of Birth:	September 1, 1942
Final Education:	Waseda University, B.S. in Civil Engineering, 1966
Membership:	City Planning Agency of Japan
Language:	Japanese, English and German

Professional Experience:

1972 - Present	Affiliate Staff of Pacific Consultants International
1966 - 1972	Pacific Consultants K.K.

Major Works Performed in Recent Years:

Year	Country	Description of Work
1977 - 1978	Mauritius	Engaged in full-scale feasibility study on the construction of some 10 kilometer long urban road link in Mauritius as Deputy Leader to cover economic analysis, traffic forecast and project evaluation
1977 - 1978	Nigeria, Cameroun	Engaged in research on the infrastructural development in Nigeria and Cameroun as Senior Regional Planner
1977	Sudan	Engaged in full-scale feasibility study on the construction of some 140 kilometer long section of road located in the desert area of the central Sudan as transport Economist
1977	Nigeria	Pre-feasibility study on the development of new ocean port in Lagos
1976	Nigeria	Engaged in feasibility study and master planning of the development of industrial estates for the Rivers State Government of Nigeria as Chief Planner
1976	Nigeria	Research of investment environment and construction business opportunities in Nigeria
1975 - 1976	Malaysia	Pre-feasibility study and related economic development studies for the State of Sarawak, Malaysia

Year	Country	Description of Work
1975 - 1976	Japan	Project Leader for the research and analysis of the impacts due to the series of industrial estates development on the functions and facilities of the Utsunomiya urban areas
1975	Nigeria	Engaged in research and planning on comprehensive regional development project for the Rivers State Government as Transport Planner
1974 - 1975	Zaire	Engaged in full-scale feasibility study on the construction of 720 kilometer long section in Zaire of the Trans-African Highway proposed by ECA/UN
1974	Regional	Research on the tourism development in the Isalnds of South Pacific Ocean covering Tahiti, Samoa, Tonga, Fiji, Solomon, New Hebrides, Nauru, Ponape, Majuro, Guam and the Philippines
1974	U.S.A.	Research on the investment environment in the West coast areas of the U.S.A.
1973 - 1974	Brazil	Preliminary planning on the development of the Garuja Island
1973	Japan	Feasibility study on the development of large-scale recreational area in Kujukuri as an international resort area
1972 - 1974	Bangladesh	Engaged in full-scale feasibility study on the construction of the crossings over the River Jamuna to analyze and forecast regional economy and traffic as Transport Economist
1972	Japan	Planning on a new town development fot the area of 1,000 ha accommodating 50 to 100 thousand inhabitants
1971 - 1972	Japan	Planning of transport network and urban facilities for the greater urban areas of Hikone and Nagahama
1971 - 1972	Japan	Working member of the committee on the introduction of new transport system
1970 - 1971	Regional	Engaged in highway transportation study as a part of Regional Transport Survey under auspices of Asian Development Bank covering Indonesia, Malaysia, Singapore, Thailand, Vietnam, Laos and the Philippines

Year	Country	Description of Work
1970	Japan	Planning and preliminary design of the industrial estate with an area of 400 ha.
1968 - 1969	Japan	Planning and preliminary design on the series of development of resort areas in Karuizawa, Izu, Nasu and Mt. Fuji's outskirts
1967 - 1968	Japan	Land use planning for the vicinity areas of the New Tokyo International Airport
1966 - 1967	Japan	Transport planning of curb side of the New Tokyo International Airport in Narita
1964 - 1965	West Germany	Technical training in the city planning division of Duisburg city as an exchange student.

TAKESHI TOMIYASU

Date of Birth:	August 13, 1940
Final Education:	Graduated from Kumamoto Univeristy, Civil Engineering Dept., 1965
Professional Registration:	Registered First Class Surveyor
Membership:	Japan Society of Civil Engineers
Language:	Japanese, English, Malay and Indonesian
Professional Experience:	Engineer of Mitsui Consultants Co., Ltd.
1977 Sudan	Feasibility and Preliminary Engineering Study of Road Project (El Obeid to Um Ruaba)
1976 Indonesia	Feasibility Study for Central and East Java Road Betterment Project
1975 Indonesia	Technical Support Services for Highway Rehabilitation in North Sumatra and Central Java
1974	Comparative Design for Misato Interchange, Saitama Prefectrue
1973 - 1972	Design for National Road Ohmiya Line in Shobuharaichi, Saitama Prefecture
1972 - 1971	Design Works for No. 16 National Road Bypass, Tokyo
	Survey and Design Works for Sano Bypass, Tochigi Prefecture
1970	Design Works for No. 20 National Road Hino - Ohtsuki Section, Tokyo
	Design Works for Hokurikudo Expressway Niigata - Nagaoka Section, Niigata Prefecture
	Detailed Design Works for Higashi - Ohmiya Bypass, Saitama Prefecture
	Planning Works for the Highway along Taichun Port, Taiwan
1968 - 1969	Detailed Design Works for National Road Kobe - Akashi Section, Hyogo Prefecture
	Planning and Design Works of No. 16 National Road, Sagamihara Section, Kanagawa Prefecture

1966 - 1968	Survey and Design Works for the Circumference Roads of Osaka Airport, Osaka
	Paper Route Location Planning Works for Tohokudo Expressway.

OSAMU OHTSU

Date of Birth: January 15, 1945

Final Education: Tokyo University, B.S. in Urban Engineering, 1969

Membership: City Planning Agency of Japan

Language: Japanese and English

Professional Experience:

1971 - Present	Affiliate staff of Pacific Consultants International
1969 - 1971	Pacific Consultants, K.K.

Major Works Performed in Recent Years:

Year	Country	Description of Work
1978	Japan	Study on the improvement of urban road network for Juki City covering traffic forecast and network planning
1978	(Thailand)	Traffic forecast, a part of comprehensive tourism development survey for Pataya (home work only)
1977 - 1978	Japan	Engaged in the impact study on the road side environment of Takamatsu Higashi by-pass
1977	Philippines	Engaged in survey and preliminary planning with particular reference to the development of road transport system and bus terminals for the area of Cebu as Transport Planner
1977	Japan	Transport planning with particular reference to traffic analysis and forecast for the Shibata section of National Highway No. 7
1977	Japan	Transport planning with particular reference to traffic analysis and forecast for Yuzawa by-pass
1976	Nigeria	Engaged in feasibility study and master planning of the development of industrial estates for the Rivers State Government of Nigeria as Traffic Engineer
1976	Japan	Traffic analysis and forecast for Miharu by-pass of National Highway No. 286

Year	Country	Description of Work
1976	Japan	Comprehensive road transport survey for the greater urban areas of Aizu, Fukushima Prefecture
1975	Japan	Study on the introduction of new transport system (P.R.T.) into the housing areas
1975	Japan	Research and planning of by-pass of National Highway No. 6 for Hamadori area of Fukushima
1974	Japan	Study on the methodology of road traffic control
1973	Japan	Transport planning for intermediate size cities
1972	Japan	City planning with particular reference to the urban renewal of the Inage Station and its vicinity areas

YOSHIFUMI TAKEDA

Date of Birth:	April 26, 1923
Final Education:	Graduated from California University, 1957 (Graduated from Kyoto Univeristy, Engineering Dept., 1945)
Professional Registration:	Specialist for Food and Agriculture Organization of the United Nations, 1971
	Individual Consultant for Asian Development Bank, Agricultural Section, 1972
	Individual Consultant for the World Bank, Agricultural Section, 1977
Qualification:	Doctor of Agricultural Science
Language:	Japanese, English and Spanish
Professional Experience:	
1978	Special Adviser of Mitsui Consultants Co., Ltd.
Laos	Adviser of Agricultural Development Plan
1974 - 1978	Nomura Trading Co., Ltd. General Manager of Agricultural Development Dept.
Philippines	Adviser of Phosphoric Acid Fertilizer Plant Construction Planning Works, 1975
Brunei	Adviser of Agricultural Development Plan, 1974 - 1978
1947 - 1974	Toyo Soda Manufacturing Co., Ltd. Manager of Fertilizer Section, 1963 Team Leader of Development Dept., 1972-1974
Saudi Arabia	Study of Desert Afforestation Plan, 1972
United Arab Emirates	Study of Desert Afforestation Plan, 1972
Iran, Iraq, Afganistan	Study of Fertilizer Distribution System, 1973
Malaysia	Adviser of Rubber and Palm Planting Plan, 1969 - 1970
Vietnam	Technical Adviser of Agro-Industrial Development Plan, 1969 - 1973
Cambodia	Technical Adviser of Agro-Industrial Development Plan, 1969 - 1970

Thailand	Adviser of Fertilizer Distribution Plan 1969 - 1970
Indonesia	Supervisor of Bimas Plan, 1969 - 1970
Burma	Technical Adviser of Agricultural Development Plan, 1968 - 1969
Nepal	Technical Adviser of Agriculturel Development Plan, 1968 - 1969
India	Technical Adviser of Agricultural Development Plan, 1966 - 1969
Korea	Technical Adviser of Fertilization concerning Paddy and Technical Extension of Fertilization, 1961 - 1965
Brazil	Technical Adviser of Fertilization concerning Sugar Cane, 1958
Paraguay	Technical Adviser of Fertilization concerning Paddy, 1958

TOMEO OHTA

Date of Birth:		May 19, 1948
Final Education:		Graduated from Kumamoto Technical High School, Civil Engineering Course, 1967
		Graduated from Special Engineering College of Kogakuin University, Civil Engineering Dept., 1972
Language:		Japanese, English and Malay
Professional Experience:		Engineer of Mitsui Consultants Co., Ltd.
1977		Basic planning of Retarding Basin of Sunaoshi River, Miyagi Prefecture
		Basic Planning of On-site Detention in Matsudo City, Chiba Prefecture
1976		Basic Planning for Drainage of the Sendai Northern Kernel New City, Miyagi Pref.
		Hydrological Study of Sakura River, Ibaragi Prefecture
1975	Indonesia	Hydrological Analysis for Central and East Java Road Betterment Project
		Basic Planning for Execution of Betterment of the Arakawa River, Tochigi Prefecture
		Planning works of Controling Pond to Prevent Damages by Natural Disasters for Mitsui Moriya and Okuyama Area, Ibaragi Prefecture
1972	Malaysia (1972 - 1974)	Engineering Volunteer of Japan International Cooperation Agency to the Sabah State
1974		Hydrological Study and Estimation of Designed Storm
1967 - 1972		Betterment Planning of the Mitsuya River, Osaka
		Drainage Planning in Chiba New Town, Chiba Prefecture
		Betterment Planning of the Nishiyoke River Osaka
		Analysis of Precipitation at the Ina River, Osaka
		Study for Betterment of the Yamato River, Osaka

Betterment Planning of Junction of the Higashiyoke River, Osaka

Hydraulic Analysis of Academic New Town Construction Plan, Ibaraki Prefecture

Survey of Mutsu Bay and Lake Ogawara in connection with the Comprehensive Regional Development Planning, Aomori Prefecture

Survey for Betterment Standard of the Northern Area of Hokuriku Expressway, Niigata Prefecture

Hydraulic Analysis of Controling Pond to Prevent Damages by Natural Disasters, Mie Prefecture

Hydraulic Analysis of Controling Pond at the Sayamadai Area, Saitama Prefecture

MINEO ENDO

Date of Birth:		January 14, 1944
Final Education:		Graduated from Ritsumeikan University, Civil Engineering Dept. 1967
Professional Registration:		Registered First Class Construction Supervisor
Language:		Japanese, English and Laos
Professional Experience:		Mitsui Consultants Co., Ltd.
1978		Design Works for Tokyo Bay Link Road
1977	Sudan	Feasibility and preliminary Engineering Study of Road Project (EL Obeid to Um Ruaba)
		Detailed Design Works of No. 18 National Road, Nagano Prefecture
1974 - 1976		Supervision Works of Hokuriku Expressway Construction Works, Nagano Prefecture
1971 - 1973	Laos	Study and Design Works of Road Construction Plan for Ministry of Public Works of Laos Government as Engineering Volunteer of Japan International Cooperation Agency.
1970 - 1971		Wakachiku Kensetsu Co., Ltd. Civil Engineer
		Supervision Works of Tokyo Bay Reclamation Works
		Supervision Works of Sakata Bay Reclamation Works, Yamagata Prefecture
1967 - 1969		Kokan Kiso Kogyo Co., Ltd. Civil Engineer
		Supervision Works of Iwaki River Bridge Construction Works, Aomori Prefecture
		Supervision Works of Masubayashi Bridge Construction Works, Saitama Prefecture
		Supervision Works of Keiyo Highway Construction, Chiba Prefecture

TOSHITAKA HIBII

Date of Birth: May 27, 1940

Final Education: Ritsumeikan University, B.S. in Civil Engineering, 1963

Professional Registration: Surveyor authorized by Ministry of Construction, Japan No. 44409

Membership: Japan Society of Photogrammetry

Language: Japanese and English

Professional Experience:

1969 - Present	Pacific Aero Survey Co., Ltd.
1963 - 1968	Nitto Kookuu Co., Ltd.

Major Works Performed in Recent Years:

Year	Country	Description of Work
1978	Libya	1/50,000 & 1/1,000 Mapping for Regional Planning of Bengazi Area as Assistant Project Manager
1977	Thailand	Technical Adviser for Mapping Projects of Ministry of Agriculture, Thailand
1976	Saudi Arabia	Field Identification for 1/50,000 Asir Mapping Project as Project Manager
1975	Saudi Arabia	Technical Adviser for Mapping Project of MAPS
1974	Saudi Arabia	Technical Adviser for Aerial Triangulation of A.S.D., Ministry of Petroleum and Mineral Resources
1973	Peru	1/50,000 Topographic Mapping for Oil Field Development Project
1972	Brazil	1/20,000 Topographic Mapping for Metallic Exploration
1971	Indonesia	1/10,000 Topographic Mapping for Forest Planning
1970	Ecuador	1/10,000 Topographic Mapping for Mine Development
1969	Saudi Arabia Kuwait	1/100,000 Mapping for Dividing Line of Neutral Zone
1963 - 1968	Japan	Many kind of Topo Mapping for Public Utilities